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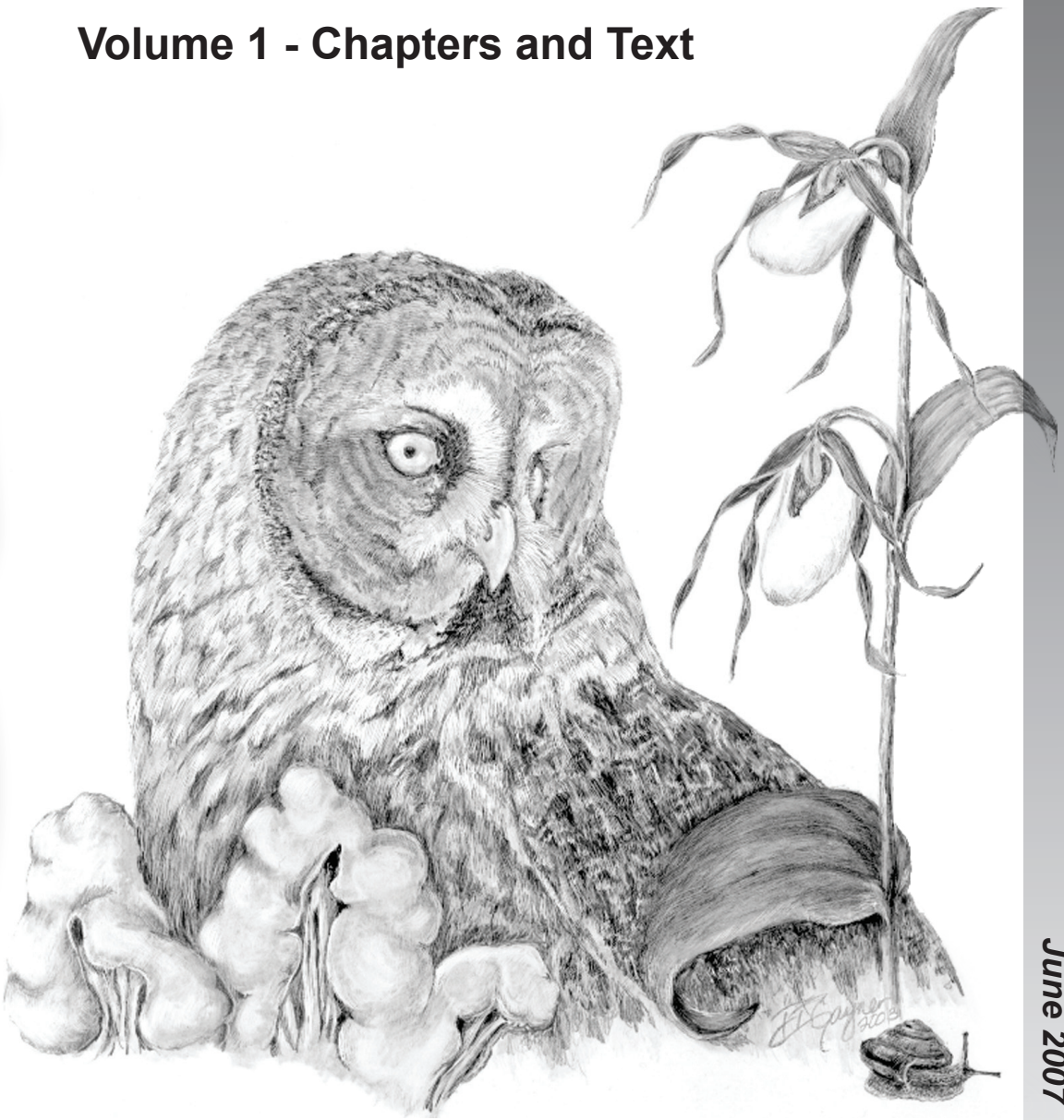
Final Supplement to the 2004 Supplemental Environmental Impact Statement

To Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines

Volume 1 - Chapters and Text



June 2007

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

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Cover artwork compliments of Elizabeth I. Gayner. Drawing includes the Greray grey owl *(Strix nebulosa),* an orchid *(Cypripedium montanum)*, a mushroom *(Gyromitra calfornica),* and a snail *(Monadenia fidelis)*.

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and Bureau of Land Management Districts
in Washington, Oregon, and California
Within the Range of the Northern Spotted Owl

June 2007

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“With regard to plants and animals. . . , we are better for coming to a knowledge of them, for we are inhabitants of the same earth. They have a nearness and kinship to us. . . .In every natural object there is something to excite our imagination.”

Aristotle
4th Century BC

Notice

Readers should note that the Secretary of Agriculture and the Secretary of the 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 (ROD) under 36 CFR 217. Also no administrative review ("protest") through the Bureau of Land Management will be available on the Final Supplement under 43 CFR 1610.5-2. Because there is no administrative review of the proposed plan or decision, the ROD(s) will not be signed until at least 30 days after the EPA Notice of Availability for the Final Supplement appears in the *Federal Register* (see 40 CFR 1506.10(b)).

Abstract

This Supplemental Environmental Impact Statement examines the environmental effects of a proposal by the Forest Service and BLM to remove or modify the Survey and Manage Standards and Guidelines of the Northwest Forest Plan. Alternatives considered in detail are: (1) Alternative 1, No-Action as the Agencies have been most recently conducting the program; (2) Alternative 2, an alternative that would amend 28 land and resource management plans by removing the Survey and Manage Standards and Guidelines; (3) Alternative 3, an alternative that would amend 28 land and resource management plans by modifying the Survey and Manage Standards and Guidelines; and (4) Alternative 4, No-Action to reflect the potential implications of a recent court decision relative to Alternative 1. The need for the proposal was generated by concerns that the Survey and Manage Standards and Guidelines are frustrating Forest Service and BLM efforts to accomplish resource management objectives of the Northwest Forest Plan. The 337 Survey and Manage species (on the most inclusive alternative) affected by this proposal were analyzed to determine the environmental consequences under the four alternatives. Analyses show that the Survey and Manage Standards and Guidelines and the Special Status Species Programs add protection and reduce risk to species. Recognizing there is much that remains unknown about many of the species, for 133 species there would be insufficient habitat (including known sites) to support stable populations in all or part of the Northwest Forest Plan area under all alternatives due to factors beyond the control of the Forest Service and BLM. When compared to Alternative 4, there are 2, 53, and 11 species that would have insufficient habitat (including known sites) to support stable populations in all or part of the Northwest Forest Plan area under Alternatives 1, 2 and 3, respectively. These species would have sufficient habitat under Alternative 4. Potential mitigation is identified to reduce the adverse effects to these species. The analysis also showed annual timber harvest would be 70 MMBF higher under Alternative 2 and 60 MMBF higher under Alternative 3 compared to Alternatives 1 and 4, No-Action. Cost of both of the No-Action Alternative is projected to be $21.0 million annually for the next 5 years, dropping to $14.4 million annually, thereafter. Short-term annual costs of Alternatives 2 and 3 are $7.9 million and $10.7 million, respectively. After 5 years, those annual costs fall to $7.4 million and $9 million, respectively. Alternatives 2 and 3 showed increases in annual employment and annual hazardous fuel treatment acreage relative to Alternatives 1 and 4. The preferred alternative is Alternative 2 because it best meets the purpose and need. Specifically, Alternative 2 conserves rare and little known species, reduces cost and effort, and allows for achievement of healthy forests and timber outputs.

Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
ACS	Aquatic Conservation Strategy
AMA	Adaptive Management Area
As	Bureau Assessment
ASR	Annual Species Review
BBN	Bayesian belief network
BE	Biological Evaluation
BLM	Bureau of Land Management
BO	Biological Opinion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CI	Confidence Interval
CVS	Continuous Vegetation Survey
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEMAT	Forest Ecosystem Management Assessment Team
FIA	Forest Inventory and Analysis
FLPMA	Federal Land Policy and Management Act
FR	Federal Register
FRCC	Fire Regime Condition Class
FS	Forest Service
FSEIS	Final Supplemental Environmental Impact Statement
FSM	Forest Service Manual
FWS	U.S. Fish and Wildlife Service
GeoBOB	Geographic Biotic Observations database
GIS	Geographic Information System
ha	hectare
HRV	historic rate of variability
IMG	Intermediate Management Group
ISMS	Interagency Species Management System database
LRMP	Land and Resource Management Plans
LSOG	Late-Successional and Old-Growth forest
LSR	Late Successional Reserve
MMBF	million board feet
MR	Management Recommendations
MUSY	Multiple Use Sustained Yield Act
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFP	Northwest Forest Plan (Appendix 9)
NFPORS	National Fire Plan Operations & Reporting System
NOAA Fisheries	National Marine Fisheries Service
NWFP	Northwest Forest Plan

O&C Act	Oregon and California and Coos Bay Wagon Road Grant Lands Act
O&C lands	lands that are the subject to the O&C Act
ONHP	Oregon Natural Heritage Program
ORNHIC	Oregon Natural Heritage Information Center
PCFFA	Pacific Coast Federation of Fishermen's Association
PM	particulate matter
PNW	Pacific Northwest Research Station
PSQ	Probable Sale Quantity
R-5	Forest Service Region 5 (California)
R-6	Forest Service Region 6 (Oregon and Washington)
RA	Rapid Assessment
RDS	Random Double Sample
REO	Regional Ecosystem Office
RIEC	Regional Interagency Executive Committee
RMS	Random Multi-Species
ROD	Record of Decision
S&Gs	Standards and Guidelines
SE	Standard Error
SEIS	Supplemental Environmental Impact Statement
SS	Forest Service or BLM Sensitive Species
SSSP	Special Status Species Program(s)
U.S.C.	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of Interior
WFU	Wildland Fire Use
WUI	Wildland Urban Interface

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Summary

Changes since the 2004 FSEIS:

Changes displayed in the July 2006 Draft Supplement or made in response to public comments received about that document:

- A brief description of court-identified deficiencies to which this Supplement responds has been added to the Introduction.
- Species effects summaries have been updated to reflect analysis changes based on new information.
- Effects for species "off" of Survey and Manage are also displayed as if they are not added to, or are removed from, Agencies' Special Status Species Programs.
- The *Wildland and Prescribed Fire* effects have been changed to reflect the rewritten section in *Chapter 3&4*. In addition, effects to the program are displayed against an 80,000 acre per year current program level.
- Costs are updated for inflation and to reflect the new analysis in the *Wildland and Prescribed Fire* section

Changes displayed in the January 2007 *Supplement* to the July 2006 Draft Supplement or made in response to comments received about that document:

- A brief description of the court issue leading to the inclusion of No-Action Alternative 4, a second no-action alternative, is included in the Introduction.
- Species and other resource effects are displayed for another no-action alternative, Alternative 4, added to display the potential implications of a November 2006 court decision.
- Effects for 42 species in all of their range and an additional 16 in part of their range have been added to address the species added by the new No-Action Alternative, Alternative 4.

NOTE: In the January 2007 Supplement, Alternative 3 had been reconfigured based on the species and categories of Alternative 4. In this FSEIS, Alternative 3 is returned to the 2004 and July 2006 configuration based on Alternative 1. (See introduction to Alternative 3 in Chapter 2 for details.)

Minor corrections, explanations, and edits are not included in this list.

Summary

Introduction

This Supplemental Environmental Impact Statement (SEIS) presents the environmental consequences of undertaking different management strategies for rare and little known species that are associated with late-successional and old-growth forests within the range of the northern spotted owl. The proposed action is to remove the Survey and Manage Standard and Guidelines from the Northwest Forest Plan.

The Survey and Manage Standards and Guidelines were originally added to agency land and resource management plans as part of the 1994 *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). The Northwest Forest Plan primarily takes a landscape approach to providing habitat for late-successional and old-growth forest related species on Forest Service and Bureau of Land Management (BLM) (hereafter referred to as the Agencies) administrative units in western Washington and Oregon, and northwestern California. The Survey and Manage mitigation measure was added to the basic elements of the Northwest Forest Plan to provide benefits for rare and little known species. In January 2001, the Agencies modified the Survey and Manage Standards and Guidelines by identifying needed management, clarifying language, eliminating inconsistent and redundant practices, and establishing an annual species review process. Those modifications were embodied in the January 2001 *Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines.*

Following a species review process described in the 2001 Standards and Guidelines, the Agencies removed 58 species from Survey and Manage in all or part of their range between 2001 and 2003, so that by early 2004, 295[1] species and 4 arthropod functional groups were being managed under the Survey and Manage Standards and Guidelines.

A "proposed action" to remove the Survey and Manage Standards and Guidelines was made public on October 21, 2002, through a Notice of Intent published in the Federal Register (67 FR 64601). This Notice of Intent provided preliminary information about the proposed action and resulted in over 650 public comments. A Draft SEIS was released in May 2003 and the public was again invited to comment. The 90-day public comment period resulted in the Agencies receiving more than 5,100 letters, postcards, and e-mails. In January 2004, the Agencies issued a Final SEIS, and in March 2004 issued a Record of Decision selecting the proposed action.

A lawsuit by the Northwest Ecosystem Alliance and others resulted in an August, 2005 decision by the District Court of the Western District of Washington identifying three deficiencies in the 2004 analysis. The court found the Agencies had:

1. *"…failed to analyze potential impacts to Survey and Manage species if they are not added to or are removed from the Forest Service's and BLM's respective programs for special status species";*

2. *"…failed to disclose and analyze flaws in their methodology for calculating the acreage in need of hazardous fuel treatments. Part of the cost analysis was similarly flawed because it relied on the acreage in need of hazardous fuel treatments in calculating the cost of the Survey and Manage standard."* (Northwest Ecosystem Alliance v. Rey, 380 F. Supp. 2d 1175 (W.D.Wash. 2005) at 1197-98)

[1]The 2004 FSEIS addressed "296" species but that number included a species since determined to be a synonym for another included species and was thus combined.

3. *"…failed to provide a thorough analysis of their assumption that the late-successional reserves would adequately protect species that the Survey and Manage standard was introduced to protect, particularly in light of their previous positions in earlier environmental impact statements"*; and,

The 2004 Record of Decision was set aside and the Agencies were required to return to implementation of the Standards and Guidelines including any amendments or modifications to the 2001 Record of Decision that were in effect as of March 21, 2004.

A Notice of Intent to prepare a Supplement to the 2004 FSEIS to address these three deficiencies was published in the *Federal Register* December 12, 2005. A Draft Supplement supplying the missing information, as well as new information about species that had become available since the 2004 analysis, was issued in July 2006 and the public was again invited to comment. The 90-day public comment period resulted in the Agencies receiving 55 letters and e-mails.

On November 6, 2006, in a different court case, the United States Court of Appeals for the Ninth Circuit ruled the BLM violated the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA) when it authorized two timber sales that did not protect a species removed from Survey and Manage by the 2001-2003 species review process. The court found the category change and subsequent removal of the red tree vole from the Mesic Biological Zone constituted a Resource Management Plan amendment, which should have had accompanying NEPA analysis. Although the court's decision was specific to the red tree vole, the Agencies decided to consider the potential implications of that decision on other species affected by the 2001-2003 species review process.

On January 5, 2007, the Agencies issued a *Supplement* to the July 2006 Draft Supplement, which added another no-action alternative (Alternative 4), that included the 337[2] species included in Survey and Manage in 2001. The *Supplement* displayed effects of the proposed action and other alternatives on all 337 species, and addressed the effects of the new alternative on other resource management activities including timber harvest and fuels management. The 90-day public comment period ending April 5, 2007 resulted in the Agencies receiving 45 letters and e-mails.

This (2007) *Final Supplement to the 2004 FSEIS to Remove of Modify the Survey and Manage Mitigation Measure Standards and Guidelines* updates the 2004 analysis to respond to both court decisions by adding the information in the above two drafts, improved in response to the public comments received during both 90-day public comment periods.

Why is the Action Being Proposed?

Agency managers and the public have raised concerns that the Survey and Manage Standards and Guidelines are frustrating the Agencies' ability to meet the resource management goals and objectives as set forth in the Northwest Forest Plan. They assert that the costs of the Survey and Manage mitigation measure, both in dollars and in time, are excessive. They also suggest that because 80 percent of federally managed lands within the Northwest Forest Plan area are allocated to reserves, it is not necessary to manage substantially more land for late-successional and old-growth forest related species. The Survey and Manage Standards and Guidelines require management of known species sites within areas allocated to multiple use such as timber harvest or watershed restoration. Such management can prevent timber sales and other activities such as habitat conservation and restoration from going forward.

[2] The 2001 Decision addressed "346" species, but that number included 4 arthropod groups, 3 species that were counted twice because they were in more than one category and two species since determined to be synonyms for other included species and were thus combined.

The underlying needs to which the Agencies are responding are healthy forest ecosystems and a sustainable supply of timber and other forest products, to the extent these are frustrated by the Survey and Manage Standards and Guidelines.

What Would It Mean Not to Meet the Need?

To answer this question, two No-Action Alternatives (Alternatives 1 and 4) were analyzed. Alternative 1 continues implementation of all current elements of the Northwest Forest Plan including the Survey and Manage mitigation measure as applied to the 295 species remaining after the 2001, 2002, and 2003 Annual Species Reviews, the underlying land and resource management plans, and relevant agency programs and policies. Alternative 4 is the same as Alternative 1 but includes analysis of effects for an additional 58 species, and 32 others in different categories than in Alternative 1, those affected by the Annual Species Reviews. Not meeting the need continues a 13 percent fall-down in Northwest Forest Plan timber sale accomplishments attributable to Survey and Manage (105 MMBF reduction in the 805 MMBF goal), lowers the accomplishment and effectiveness of fuels treatments designed to protect communities and restore ecosystems, and continues annual costs of $13.1 million when compared with the proposed action, funds that could be assigned to other programs including higher priority ecosystem management such as invasive species control or eastside (dry forest) ecosystem improvements.

What Action is Proposed?

The Agencies propose to remove the Survey and Manage Standards and Guidelines by amending the 28 land and resource management plans for the National Forests and BLM Districts within the range of the northern spotted owl. This proposal is referred to as the "proposed action" or Alternative 2. Under Alternative 2, the Agencies would rely on their existing Special Status Species Programs to help conserve rare species. Alternative 2 is described in detail in *Chapter 2*.

Would Other Alternatives Meet the Need?

During the scoping and public review phases for this project, many comments were received both internally and externally. Commenters suggested various ideas for meeting the need, and many of these are addressed in *Chapter 2* under *Alternatives Considered but Eliminated from Detailed Study*. Several of these ideas were also incorporated into another alternative, Alternative 3. Alternative 3 would remove the uncommon species from the Survey and Manage mitigation measure while retaining rare species. Alternative 3 would also remove the requirement to conduct pre-disturbance surveys in forest stands that have not developed late-successional and old-growth characteristics. Alternative 3 would meet much of the need by reducing the fall-down in Northwest Forest Plan annual timber accomplishments to 10 MMBF when compared with the proposed action, significantly improving fuels treatment amounts and effectiveness when compared with the No-Action Alternatives, and reducing program implementation costs to $10.3 million annually compared with no-action.

What are the Effects of the Alternatives?

This section summarizes the environmental consequences of the four alternatives discussed in detail in *Chapter 3&4*.

Survey and Manage Species

The environmental consequences analysis in this SEIS supplements the previous analyses in the 1994 Northwest Forest Plan Final SEIS and 2000 Survey and Manage Final SEIS. Those analyses concluded the Survey and Manage Standards and Guidelines generally provide benefits to species and provide consistent processes for obtaining information about numbers, populations, and distribution.

The analysis in this SEIS determines one of the following outcomes for each of the 337 species:

1. Habitat (including known sites) is sufficient to support stable populations in the Northwest Forest Plan area.
2. Habitat (including known sites) is sufficient to support stable populations range-wide in the Northwest Forest Plan area, although there is insufficient habitat to support stable populations in a portion of the Northwest Forest Plan area.
3. Habitat (including known sites) is insufficient to support stable populations in the Northwest Forest Plan area.
4. There is insufficient information to determine an outcome.

Recognizing there is much that remains unknown about many of the species, the analysis in this SEIS concludes that some species would have insufficient habitat (including known sites) to provide for stable populations in the Northwest Forest Plan area or in portions of the species range due to the proposed action. In addition, the analysis shows that some species have insufficient habitat or there is insufficient information to determine an outcome under any alternative. Table S-2 summarizes the number of species by outcome under each of the four alternatives.

The analysis determined Alternative 2, the proposed action, would not provide sufficient habitat to support stable populations for 38 of the 337 species analyzed, due to differences between No-Action Alternative 4 and the Proposed Action (Alternative 2). This includes 2 lichens, 10 mollusks, 1 bryophyte, and 25 fungi. For these species, there is sufficient habitat (including known sites) to support stable populations under Alternative 4, while there is insufficient habitat to support stable populations under Alternative 2. The difference in outcome for almost all of these species was caused by a species not qualifying for one or more of the Agencies' Special Status Species Programs in all or important parts of their range under Alternative 2, generally either because they are considered more secure in other parts of their range outside of the Northwest Forest Plan area or because too little is known about them to effectively manage them under these programs.

For the 337 species included in this analysis, Alternatives 1, 2, 3, and 4 provide stable habitat range wide or in all but a portion of their range for 185, 147, 181, and 185 species respectively (Table S-2).

The analysis determined Alternative 3 would not provide sufficient habitat to support stable populations for four species in the Northwest Forest Plan (NWFP) area due to differences between Alternatives 1 and 3. This includes two fungi and two lichens. For these species, there is sufficient habitat (including known sites) to support stable populations under Alternative 4 while there is insufficient habitat (including known sites) to support stable populations under Alternative 3. Under Alternative 3, the difference in outcome for almost all of these species was caused by a species not qualifying for one or more of the Agencies' Special Status Species Programs in all or important parts of their range for the reasons described under alternative 2 above.

For some of the species, even though they would have sufficient habitat (including known sites) to support stable populations range-wide in the Northwest Forest Plan area, they would have insufficient habitat (including known sites) to support stable populations in a portion of their range under Alternatives 1, 2, and 3. For Alternative 1, this includes one lichen and one vascular plant. For Alternative 2, this includes three fungi, three lichens, two mollusks, one vascular plant, and six vertebrates. For Alternative 3, this includes one lichen, one vascular plant, and five vertebrates.

However, the analysis shows that the Survey and Manage "sufficient habitat" outcome definition, and its application in this analysis, exceeds legal requirements. One species effects specialist (amphibians), for example, specifically notes management precluding listing under the Endangered Species Act and meeting the Forest Service viability and diversity provisions would not necessarily meet the definition for Outcome 1 in this FSEIS. The above species effects are for the Northwest Forest Plan area only, and many are for a portion of the Plan area only, and all are tied to a "persistence objective" that the 1994 Record of Decision notes exceeds legal requirements.

Additionally, habitat continues to improve. The analysis shows a 19 to 26 percent increase in late-successional forests in reserves since the Forest Ecosystem Management Assessment Team (FEMAT) did its original species ratings. Analysis also shows that older forest abundance, diversity, and connectivity are within the natural range of variability except perhaps for two provinces in the eastern Cascades (Moeur et al. 2005), a condition the FEMAT estimated had a 63 to 77 percent chance of occurring within 100 years (USDA et al. 1993: IV-70). Ten-year monitoring results appear to show that certain of the Northwest Forest Plan's assumptions about late-successional forest abundance and function were too conservative (Moeur et al. 2005).

Species Effects if Special Status Species Program Assignments Are Not Made

The species effects for Alternatives 1, 2, and 3 in this FSEIS assume that the Agencies will assign qualifying species to one or more of their Special Status Species Programs[3], and in fact, all of the assignments shown in this analysis as "assumed" have been made. While use of these programs is Agencies' policy and can be assumed, Decision-makers have latitude regarding whether to assign specific species to these programs. Therefore, the effects for species "off" of Survey and Manage under each alternative are also described as if species are not assigned, or are removed from, these programs. Of the 58 species "off" Survey and Manage in all or part of their range under Alternative 1, 15 are assumed assigned to one or more Special Status Species Programs affecting at least part of that range. Of these 15, one has insufficient habitat in part of its range even with the Special Status Species Program assignments, while two (one additional) have insufficient habitat in part of their range if those assignment are removed (Table S-1).

Of the 337 species "off" Survey and Manage under Alternative 2, 157 are assumed assigned to one or more Special Status Species Programs. Of these 157, 27 in all of their range and 15 in part of their range have insufficient habitat with the Special Status Species Program assignments, while 64 in all of their range and 18 in part of their range have insufficient habitat if those assignments are removed (Table S-1).

Of the 61 species "off" Survey and Manage in all or part of their range under Alternative 3, 28 species are assumed assigned to one or more Special Status Species Programs affecting at least part of that range. Of these 28, three in all of their range and four in

[3]There are two Forest Service Regions and two BLM State offices involved, and each has its own Special Status Species Program and respective species assignments, based on National Policies applied to specific local situations (see *Appendix 2*). Table 2-13 at the end of Chapter 2 shows which species are assumed to be assigned to which of the four programs.

Table S-1. Summary of Environmental Consequences for Species Assumed to be Managed Primarily by Special Status Species Programs under Each Alternative[3]

		Alternative 1		Alternative 2		Alternative 3	
		With SSSP	Without SSSP	With SSSP	Without SSSP	With SSSP	Without SSSP
Species and Groups	Insufficient habitat not due to federal actions [1]	2	2	38(1[2])	38(1[2])	2	2
	Insufficient habitat due to actions under the alternative	0(1[2])	0(2[2])	27(15[2])	64(18[2])	3(4[2])	5(3[2])
	Sufficient Habitat	12	12	81	44	21	19
	Insufficient Information to Determine Outcome	1	1	11	11	2	2
Number of Species Managed Primarily by Special Status Species Programs in Each Alt.		15 (12 in all and 3 in part of their range)		157		28 (23 in all and 5 in part of their range)	

[1] Factors resulting in insufficient habitat are things such as limited potential habitat and few populations on federal lands, potential for stochastic events, low number of individuals, limited distribution, or narrow ecological amplitude.
[2] Species with sufficient habitat range-wide, but with insufficient habitat in a portion of the range. These are included in the "sufficient habitat" count.
[3] Does not include 1 species in Alternative 4 with insufficient habitat in a portion of its range without SSSP.

Table includes only species assumed assigned to Special Status Species Programs (SSSP) in one or more alternative, and the effects with and without SSSP. See Table 2-11 for *total* species effects with and without SSSP.

part of their range have insufficient habitat with the Special Status Species Program assignments, while five in all of their range and three in part of their range have insufficient habitat if those assignments are removed (Table S-1).

Under Alternative 4, one Category F species' "sufficient habitat" outcome is based, in part, on known sites being managed under one of the Special Status Species Programs in a portion of its range. When the Special Status Species Program assumption is removed, this species has insufficient habitat in a portion of its range in this alternative.

Potential Species Mitigation

Measures could be used to mitigate the adverse environmental effects for 2, 53, and 11 species that would have insufficient habitat (including known sites) to support stable populations in all or a portion of the Northwest Forest Plan area under Alternatives 1, 2 and 3 (respectively), but not under Alternative 4. Mitigation could include management of known sites where species are not included in the Agencies' Special Status Species Programs. In addition, mitigation for some of these species could include pre-project clearances.

There are also 132 species (and one in part of its range) with insufficient habitat (including known sites) to support stable populations in the Northwest Forest Plan area under all alternatives. This predicted outcome is due to factors such as limited potential habitat, few known populations on federally managed lands, potential for stochastic events, low number of individuals, limited distribution, and narrow ecological amplitude. Since the insufficient habitat is not a result of federal actions, no alternative could be proposed that would change this outcome (USDA, USDI 1994a; USDA, USDI 2000a). There are also 20 species and 4 arthropod groups for which there is insufficient information to determine an outcome under all alternatives.

Under Alternative 1 and 4, when the analyses shows that there is "insufficient information to determine an outcome" or "there is insufficient habitat (including known sites) to support stable populations" for a species, this outcome is the same for Alternatives 2 and 3 as well. Although the Survey and Manage Standards and Guidelines under Alternative 1 and 4 generally provide benefits to species, they do not substantively change the outcome or have as yet not resolved the insufficient information. However, many of these are species with few known sites or populations. For species with insufficient habitat under all alternatives that receive management under Alternative 1 and 4, but are not included in the Agencies' Special Status Species Programs under Alternatives 2 and 3, the differences in species management could somewhat increase the risk to these species. For species where there is "insufficient information to determine an outcome" that receive management under Alternatives 1 and 4, but are not included in the Agencies' Special Status Species Programs under Alternatives 2 and 3, it is unknown if the lack of species management will increase the risk to these species. Mitigation that would eliminate the difference between the alternatives is possible. Mitigation would consist of conducting pre-project clearances and/or managing known sites. It is unknown to what degree mitigation lessens the risk for these species; however, it will not change the outcome or resolve the insufficient information needed to determine the outcome for a species.

Timber Harvest

The amount of late-successional forest projected for management of known sites reduces the acres of late-successional forest in the Matrix and Adaptive Management Areas available for harvest. The projected Probable Sale Quantity (PSQ) reductions shown below are reductions from the current 805 million board foot (MMBF) baseline.

Under Alternatives 1 and 4, there would be a 105 MMBF reduction in PSQ due to management of known sites. Under Alternative 4, there would also be an additional 80 to 100 MMBF reduction in timber sales for the first two years if Annual Species Review changes resulted in a plan amendment requiring additional NEPA analysis.

Under Alternative 2, there would be a 35 MMBF reduction in PSQ due to management of known sites. Mitigation measures for 53 species, including management of additional known sites, would reduce PSQ an additional 2 MMBF. Under Alternative 2 with mitigation, there would be a 35 MMBF (rounded to the nearest 5 MMBF) reduction in PSQ.

Under Alternative 3, there would be a 45 MMBF reduction in PSQ due to management of known sites. Mitigation measures for 11 species, including management of additional known sites, would reduce PSQ an additional 5 MMBF. Under Alternative 3 with mitigation, the reduction in PSQ would be 50 MMBF.

Wildland and Prescribed Fire

Under Alternatives 1 and 4, the annual acres available for hazardous fuel treatments would be 73,040. The cost per acre to manage for species would be $98.95. Under Alternative 4 there would be about a 10 percent reduction in these levels for the first two years if a species review process requires additional NEPA documentation.

Under Alternative 2, the annual acres available for fuel treatments would be 78,400, an increase of 5,360 acres compared to Alternatives 1 and 4. Fuel treatment costs to manage for species would be $39.30 per acre, a decrease of $60 compared with Alternatives 1 and 4. If this savings could be directly applied to additional fuels treatment, an additional 7,900 acres could be treated. Mitigation measures for 53 species under Alternative 2 would result in 100 fewer acres available for annual fuel treatments and an increase

of approximately $3 per acre to protect species compared to Alternative 2 without mitigation.

Under Alternative 3, the annual acres available for fuel treatments would be 77,440, an increase of 4,400 acres compared to Alternatives 1 and 4. Fuel treatment costs to manage for species would be $29.95 per acre, a decrease of $69 compared with Alternatives 1 and 4. If this savings could be directly applied to additional fuels treatment, an additional 9,350 acres could be treated. Mitigation measures for 11 species under Alternative 3 would result in 140 fewer acres available for annual fuel treatments and an increase of less than $1 per acre to protect species compared to Alternative 3 without mitigation (See Table S-2).

Costs of Management

Under Alternatives 1 and 4, the Agencies' short-term annual costs[4] would be $21.0 million. Long-term annual costs (5 to 10 years) would decrease to $14.4 million. Under Alternative 4 there would also be an additional $0.5 million cost in the first two years to conduct, if needed, an additional Annual Species Review with additional NEPA analysis.

Under Alternative 2, the Agencies' short-term annual costs4 would be $7.9 million. This would result in a short-term cost savings of $13.1 million per year compared to Alternatives 1 and 4. The Agencies' long-term annual costs would be $7.4 million. This would result in a long-term cost savings of $7.0 million per year compared to Alternatives 1 and 4. The cost of mitigation under Alternative 2 would be $0.4 million (short-term) annually, mostly due to the need for additional clearance surveys.

Under Alternative 3, the Agencies' short-term annual costs4 would be $10.7 million. This would result in a short-term cost savings of $10.3 million per year compared to Alternatives 1 and 4. The Agencies' long-term annual costs would be $9.0 million. This would result in a long-term cost savings of $5.4 million per year compared to Alternatives 1 and 4. The cost of mitigation under Alternative 3 would be negligible (See Table S-2).

Socioeconomic Effects

All alternatives have an adverse effect on Probable Sale Quantity (PSQ) that was not anticipated in the Northwest Forest Plan Final SEIS (see 2000 Survey and Manage Final SEIS, p. 429). The full PSQ level under the Northwest Forest Plan is currently 805 MMBF which would support 7,309 timber-related jobs.

Under Alternatives 1 and 4, the timber-related employment decrease from the Northwest Forest Plan harvest level would be 953. Survey-related employment would provide an additional 360 jobs. This would result in a net decrease of 593 jobs and a net loss in annual personal earnings of $23.8 million compared to projected employment under the Northwest Forest Plan.

Under Alternative 2, the timber-related employment decrease from the Northwest Forest Plan harvest level would be 318 jobs. Survey-related employment would provide an additional 142 jobs. This would result in a net decrease of 176 jobs and a net loss in annual personal earnings of $7.4 million compared to projected employment under the Northwest Forest Plan. Mitigation under this alternative would result in an additional decrease of 11 jobs and an additional loss in annual personal earnings of $0.5 million when considering both timber and survey-related jobs.

Under Alternative 3, the timber-related employment decrease from the Northwest Forest Plan harvest level would be 409 jobs. Survey-related employment would provide an

[4]Costs include direct program management costs including surveys, and additional fuels treatment costs for protecting known sites.

additional 172 jobs. This would result in a net decrease of 237 jobs and a net loss in annual personal earnings of $9.8 million compared to projected employment under the Northwest Forest Plan. Mitigation under this alternative would result in an additional decrease of 35 jobs and an additional loss in annual personal earnings of $1.2 million when considering both timber and survey-related jobs (See Table S-2).

Other Resources

For the other resources, including the aquatic ecosystem, late-successional forest ecosystem, air quality, water quality, soil productivity, late-successional mammals (excluding red tree vole), late-successional birds (excluding great gray owl), threatened and endangered species, and species associated with early-successional forest, the alternatives would either have relatively minor effects or would not change the analysis or outcomes developed in the Northwest Forest Plan Final SEIS and implemented through its Record of Decision (USDA, USDI 1994b).

Table S-2 displays a brief summary of the environmental consequences of the alternatives.

Table S-2. Summary of Environmental Consequences

		Alternative 1	Alternative 2	Alternative 2 with Mitigation	Alternative 3	Alternative 3 with Mitigation	Alternative 4
Species and Groups	Insufficient habitat not due to federal actions [1]	132(1[2])	132(1[2])	132(1[2])	132(1[2])	132(1[2])	132(1[2])
	Insufficient habitat due to actions under the alternative	0(2[2])[3]	38(15[2])	0	4(7[2])	0	0
	Sufficient Habitat	185	147	185	181	185	185
	Insufficient Information to Determine Outcome	24	24	24	24	24	24
Effect on Annual Timber Harvest (MMBF)		-105	-35	-35	-45	-50	-105[4]
Short-term Annual Cost (millions)		$21.0	$7.9	$8.3	$10.7	$10.8	$21.0[5]
Long-term (5-10 years) Annual Cost (millions)		$14.4	$7.4	$7.8	$9.0	$9.1	$14.4
Employment Decrease From Full Harvest Level (per Northwest Forest Plan)		-953	-318	-336	-409	-445	-953
Survey Related Employment		+360	+142	+149	+172	+173	+360
Net Loss in Annual Personal Earnings (millions)		-$23.8	-$7.4	-$7.9	-$9.8	-$11.0	-$23.8
Hazardous Fuel Treatment (Annual Acres)		73,040	78,400	78,300	77,440	77,300	73,040[4]
Hazardous Fuel Treatment (Cost to Protect Species/Acre)		$98.95	$39.30	$42.50	$29.95	$30.18	$98.95

[1] Factors resulting in insufficient habitat are things such as limited potential habitat and few populations on federal lands, potential for stochastic events, low number of individuals, limited distribution, or narrow ecological amplitude.
[2] Species with sufficient habitat range-wide, but with insufficient habitat in a portion of the range. These are included in the "sufficient habitat" count.
[3] No "Alternative 1 with Mitigation" column because mitigation effects are negligible.
[4] Additional 80 to 100 MMBF/year harvest reduction and 8 to 15 percent fuels treatment reduction for first two years for Alternative 4.
[5] Plus 0.5 $million for ASR NEPA.

There are no significant differences in environmental consequences between alternatives for any of the following environmental components: Aquatic Ecosystems, Late-Successional Forest Ecosystems, Air Quality, Water Quality, Soil Productivity, Threatened and Endangered Species, and Species Associated with Early-Successional Forest.

What Factors Will be Used in Making the Decision?

The Secretary of Agriculture and the Secretary of the Interior will each decide which alternative best meets the underlying need for this proposal. In making the decision, they will also weigh how well each of the alternatives meets the following purposes:

1. Provide for diversity of plant and animal communities in accordance with the National Forest Management Act and conserve rare and little known species that may be at risk of becoming listed under the Endangered Species Act.

It has been longstanding policy in both the Forest Service and BLM to avoid taking actions that would lead to the listing of species under the Endangered Species Act. In addition, the Forest Service has regulations that require it "to provide for diversity of plant and animal communities based on the suitability and capability of the specific land area" (16 USC 1604(g)(3)(B)).

2. Reduce the Agencies' cost, time, and effort associated with rare and little known species conservation.

Pre-disturbance surveys, strategic surveys, and other elements of the Survey and Manage Standards and Guidelines are expensive and use a disproportionate share of available agency funding. Required pre-disturbance surveys can delay projects for 2 years and draw valuable personnel and resources away from other conservation efforts.

3. Restore the Agencies' ability to achieve resource management objectives that were established under the Northwest Forest Plan.

Some uncommon Survey and Manage species are so numerous that the acreage required to be managed far exceeds that projected in previous analyses. As a result, some project areas become dotted with dozens of known sites, severely reducing project size or making the entire project infeasible. This problem has limited the Agencies' ability to restore forest health including fuel treatments to reduce the threat of catastrophic wildfire to watersheds and communities at risk. This problem has also contributed to the Agencies' inability to achieve predictable and sustainable levels of timber outputs as anticipated in the Northwest Forest Plan.

What Monitoring is Necessary that is Not Included in the Proposed Action or Alternatives?

Monitoring will continue in accordance with existing monitoring requirements for the Northwest Forest Plan and for the land and resource management plans for each of the Forest Service and BLM administrative units within the Northwest Forest Plan area. No new monitoring requirements are proposed under any of the alternatives.

Which Alternative is Preferred?

Based on consideration of the environmental consequences, Alternative 2 was found to best meet the purpose and need, and is the preferred alternative. Specifically, Alternative 2 conserves rare and little known species, reduces cost and effort, and allows for achievement of healthy forests and timber outputs.

Introduction

Changes since the 2004 FSEIS:

- This is a new section.
- This section contains information about the objectives of this Final Supplement and the court cases that led to it.

Introduction

Objectives of this FSEIS

Background

This background discussion is brief, intended only to set the stage for presenting the two court decisions below. A more detailed background discussion for Survey and Manage can be found in Chapter 2.

In a January 2001 Record of Decision, the Forest Service and BLM modified the Northwest Forest Plan standards and guidelines for Survey and Manage, reducing the number of species included to 337[1] and providing a detailed Annual Species Review (ASR) process for adding or removing species, or for changing species between categories. The Agencies conducted the ASRs in 2001, 2002, and 2003 without additional NEPA analysis, ultimately changing the category assignments for 32 species and reducing the number of species on Survey and Manage to 295[2]. These 295 species and the categories to which they were then assigned subsequently made up the No-Action Alternative in a January 2004 FSEIS analyzing a proposal to remove or modify the Survey and Manage Standards and Guidelines.

In a March 2004 Record of Decision, the Agencies removed the Survey and Manage Standards and Guidelines entirely, relying on other elements of the Northwest Forest Plan and assumed Agency Special Status Species Programs assignments to achieve the goals and the Northwest Forest Plan through a more streamlined process.

District Court Decision on the 2004 FSEIS

In October, 2004, the Northwest Ecosystem Alliance and others brought suit against the Agencies under the Administrative Procedure Act, alleging the 2004 FSEIS and Record of Decision violated the National Environmental Policy Act (NEPA), National Forest Management Act (NFMA), Federal Land Policy and Management Act (FLPMA) and the Endangered Species Act (ESA) and several other relevant land and species management statutes (Northwest Ecosystem Alliance, et al. *v.* Rey). On August 1, 2005, the United States District Court, Western District of Washington found the 2004 FSEIS deficient under the NEPA in three specific areas. This Supplement addresses those findings as follows:

1. *"...Agencies' analysis of the environmental impacts of eliminating the standard is premised on an assumption that is inconsistent with their own prior analysis and therefore appears to lack support.....The Agencies have an obligation under NEPA to disclose and explain on what basis they deemed the standard necessary before but assume it is not now"* (Northwest Ecosystem Alliance v. Rey, 380 F. Supp. 2d 1175 (W.D.Wash. 2005) at 1192-1193) and the Agencies *"failed to provide a thorough analysis of their assumption that the late-successional reserves would adequately protect species that the Survey and Manage standard was introduced to protect, particularly in light of their previous positions in earlier environmental impact statements."* (Northwest Ecosystem Alliance v. Rey, 380 F. Supp. 2d 1175 (W.D.Wash. 2005) at 1198).

The *Late-Successional Forest Ecosystems* section in Chapter 3&4 has been supplemented. In addition, a new section called *Survey and Manage Species* has been added to discuss new

[1]The 2001 Decision addressed "346" species, but that number included 4 arthropod groups, 3 species that were counted twice because they were in more than one category and two species since determined to be synonyms for other included species and were thus combined.
[2]The 2004 FSEIS addressed "296" species but that number included a species since determined to be a synonym for another included species and was thus combined.

information, rarity, and risk for Survey and Manage species. Additional information about the 2000 Final SEIS and the Northwest Forest Plan's objectives has been added to the section, *Relationship of this SEIS to the Northwest Forest Plan Final SEIS and the 2000 Survey and Manage Final SEIS*.

2. The Agencies failed to...*"analyze potential impacts to Survey and Manage species if they are not added to or are removed from the Forest Service's and BLM's respective programs for special status species" (*Northwest Ecosystem Alliance v. Rey, 380 F. Supp. 2d 1175 (W.D.Wash. 2005) at 1197).

The circumstance of the Agencies not assigning species to Agencies' Special Status Species Programs is addressed in this Supplement as "scenarios" under Alternatives 1, 2 and 3, and not as new alternatives. Species effects under these scenarios are described in the text for each of the 157 species assumed to be assigned to one or more of these programs as shown on Table 2-13 in Chapter 2. Resultant outcomes, by species, are also displayed on Table 2-13, and summarized on Tables S-1 and 2-10. These effects are displayed so decision-makers can understand the implications of exercising their discretion to not follow through on one or more of the FSEIS species assignments assumed in the FSEIS.

3. The Agencies *"failed to disclose and analyze flaws in their methodology for calculating the acreage in need of hazardous fuel treatments. Part of the cost analysis was similarly flawed because it relied on the acreage in need of hazardous fuel treatments in calculating the cost of the Survey and Manage standard"* (Northwest Ecosystem Alliance v. Rey, 380 F. Supp. 2d 1175 (W.D.Wash. 2005) at 1198).

A new *Wildland and Prescribed Fire* section is included in this FSEIS. The section addresses new approaches to hazardous fuel reduction to reflect recent identification and national mapping of Fire Regime Condition Classes and the emphases of the National Fire Plan. Resultant changes in cost have been incorporated into the analyses in the *Costs of Management* and *Socioeconomic Effects* sections.

The above new information was presented in a Draft Supplement circulated for 90-day public review beginning July 7, 2006.

The Ninth Circuit Court Decision on the Annual Species Reviews

On November 6, 2006, the United States Court of Appeals for the Ninth Circuit ruled the BLM violated the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA) when it authorized the Cow Catcher and Cottonsnake timber sales, located in Oregon. The court found the 2001 and 2003 Survey and Manage Annual Species Review (ASR) category change and subsequent removal of the red tree vole from Survey and Manage requirements in the Mesic Biological Zone constituted a Resource Management Plan amendment, which should have had accompanying NEPA analysis. Although the court's decision was specific to the red tree vole, it is prudent and reasonable for the Agencies to consider the implications of that decision on other species affected by the ASR process.

This FSEIS, therefore, presents another no-action alternative (Alternative 4), which includes all 337 species included in Survey and Manage, and their category assignments, prior to completion of the three ASRs. Because no legal decision has been rendered about other ASR decisions, or even about the red tree vole on National Forests, the No-Action Alternative 1 from the 2004 FSEIS and July 2006 Draft Supplement is also retained. The difference in effects between Alternatives 1 and 4 disclose the effects of species removals and changes in management categories from the 2001, 2002, and 2003 ASRs.

Compared to No-Action Alternative 1, Alternative 4 adds 42 species in all of their range, adds 16 species in part of their range, and changes the categories for 32 species in all or part of their range. Five of the species with changed categories in part of their range were removed in the other part of their range and are therefore included in the 16 above, so the total number of species different between Alternatives 1 and 4 is 85. This FSEIS provides effects analysis for these 85 species (and all others on Survey and Manage) under all four of the alternatives. For Alternative 4, the FSEIS also describes effects on fuel treatments, costs of management, timber harvest, and other non-Survey and Manage species-specific resources.

The above new information was presented in a *Supplement* to the July 2006 Draft Supplement and circulated for 90-day public review beginning January 5, 2007.

2007 Final Supplement

The above changes have been made within the 2004 FSEIS and the entire document is republished here. Although new information has been incorporated, costs have been updated, and language has been made internally consistent in an attempt to provide a current, seamless analysis, much of the 2004 FSEIS remains unchanged. Since Survey and Manage was dropped by the Agencies in March 2004, there is little additional experience upon which to base additional analysis for, for example, fuels treatments or timber harvest effects. The number of known sites for species, on the other hand, has doubled since the 2004 analysis and random multi-species survey results are available as well. Therefore, the species outcomes have been reconsidered and updated. There is a "Changes since the 2004 FSEIS" list at the start of each chapter. This Final Supplement is itself a Supplemental Environmental Impact Statement, and references to "this FSEIS" and "this Final Supplement" both refer to this document.

Subsequent Documents

The next documents to be prepared will be Records of Decision for each Agency. The Secretary of Agriculture and the Secretary of the 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 (ROD) under 36 CFR 217. Also no administrative review ("protest") through the Bureau of Land Management will be available on the Final Supplement under 43 CFR 1610.5-2. Because there is no administrative review of the proposed plan or decision, the Records of Decision will not be signed until at least 30 days after the EPA Notice of Availability for this Final Supplement appears in the *Federal Register* (see 40 CFR 1506.10(b)).

Chapter 1

Changes since the 2004 FSEIS:

Changes displayed in the July 2006 Draft Supplement or made in response to public comments received about that document:

- A description of the December 2005-January 2006 Scoping period for the 2006 Draft Supplement has been added at the end of the chapter.
- The text has been edited to show that assumed Special Status Species Program species assignments have now been made.

Changes displayed in the January 2007 *Supplement* to the July 2006 Draft Supplement or made in response to comments received about that document:

- None.

Minor corrections, explanations, and edits are not included in this list.

Chapter 1 – Purpose and Need

Introduction

This chapter specifies the purpose and need to which the Forest Service and Bureau of Land Management (BLM) (the Agencies) are responding in developing the proposed action and alternatives assessed in this Final Supplemental Environmental Impact Statement (FSEIS). The Agencies propose to amend 28 land and resource management plans within the range of the northern spotted owl to remove the Survey and Manage Standards and Guidelines. This includes land and resource management plans of the Forest Service and resource management plans of the BLM (collectively referred to as land and resource management plans) in the Pacific Northwest and northern California (Figure 1-1). The existing Survey and Manage Standards and Guidelines were added to land and resource management plans as part of the 1994 *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (aka the Northwest Forest Plan), and then amended by the January 2001 *Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*. Although the 1994 and 2001 Records of Decision actually amended the land and resource management plans for the 28 National Forests and BLM Districts within the Northwest Forest Plan area, the overall resource management strategy was, and continues to be, called the Northwest Forest Plan.

The Survey and Manage Standards and Guidelines currently provide procedures and requirements for the management of around 300[1] rare and/or little-known species and 4 arthropod functional groups within the Northwest Forest Plan area. Species include fungi, lichens, vascular plants, mollusks, bryophytes, and vertebrates. The Survey and Manage Standards and Guidelines include species that are associated with late-successional or old-growth forests and for which other elements of the Northwest Forest Plan (such as reserves or other standards and guidelines) may not provide a reasonable assurance of persistence. Background information about the Survey and Manage Standards and Guidelines can be found in Chapter 2.

The Need

Impacts of the Survey and Manage Standards and Guidelines have been much greater than the impacts anticipated when the mitigation measure was added to the SEIS for the Northwest Forest Plan in 1994 (see *Reasons for the Purpose and Need* section later in this chapter). As a result, they are one of the factors frustrating the achievement of the stated needs of the Northwest Forest Plan "… protect the long-term health of our forests, our wildlife and our waterways …," "[w]here sound management policies can preserve the health of forest land, [timber] sales should go forward," and "… produce a predictable and sustainable level of timber sales and non-timber resources that will not degrade or destroy the environment" (USDA, USDI 1994a:1-4; USDA, USDI 1994b:3).

In 2003, Jack Ward Thomas, team leader for the Forest Ecosystem Management Assessment Team, was asked to evaluate the application of the Northwest Forest Plan in National Forests in northern California. In his report, he stated his opinion "The NWFP made two promises – enhanced environmental protection and a sustained (though much reduced) flow of goods and services. The first promise has been kept ... Performance on the second promise has lagged in a number of aspects and has the potential of producing longer-term negative consequences to the environment" (Thomas 2003:8). The Survey

[1]For reasons explained in the Introduction and Chapter 2, there are two No-Action Alternatives. No-Action Alternative 1 has 295 species and 4 arthropod groups; No-Action Alternative 4 has 337 species and 4 arthropod groups.

Figure 1-1. Range of the Northern Spotted Owl.

and Manage Standards and Guidelines are one of several reasons for the Agencies not meeting a predictable and sustainable flow of good and services. The Survey and Manage Standards and Guidelines are frustrating the Agencies' ability to protect the long-term health of forests, wildlife, and waterways because they restrict forest health treatments. They are also preventing timber sales that were predicted under the Northwest Forest Plan from being implemented.

The underlying needs to which the Agencies are responding are healthy forest ecosystems and a sustainable supply of timber and other forest products, to the extent these are frustrated by the Survey and Manage Standards and Guidelines.

The Purposes

Meet Terms of the Settlement Agreement

In response to a lawsuit against the Secretaries of Agriculture and the Interior concerning the 2001 Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, the Secretaries, on September 30, 2002, entered into a settlement agreement with the plaintiffs, Douglas Timber Operators and American Forest Resource Council (Douglas Timber Operators, et al. v. Secretary of Agriculture, et al. Civil No. 01-6378-AA (D. Oregon, filing December 24, 2001)). The lawsuit being settled alleges that the Survey and Manage amendments transferred more than 81,000 acres of timber-producing forest land into permanent reserves, resulting in a 7 percent reduction of the regional timber volume permitted under the Northwest Forest Plan. The lawsuit alleges that this equates to a loss of 51 million board feet (MMBF) of timber sales per year in perpetuity. Thus, the lawsuit alleges the Survey and Manage amendments are in violation of the substantive and procedural requirements of the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act), 43 U.S.C. §1181a; the National Forest Management Act (NFMA), 16 U.S.C. §1600, et seq.; the Multiple-Use Sustained-Yield (MUSY) Act of 1960, 16 U.S.C. §528-531; and the Federal Land Policy and Management Act (FLPMA), 43 U.S.C. §1701, et seq. The settlement agreement requires the Agencies to examine, in an SEIS, an alternative "that replaces the Survey and Manage mitigation requirements with existing Forest Service and BLM special status species programs to achieve the goals of the Northwest Forest Plan through a more streamlined process."

A purpose is to comply with the terms of the Settlement Agreement by considering, in detail, an alternative that removes the Survey and Manage Standards and Guidelines. Other elements of the Northwest Forest Plan and the Agencies' existing Special Status Species Programs would be relied on to provide for species viability and diversity while achieving other objectives of the Northwest Forest Plan.

Conserve Rare and Little Known Species

It has been longstanding policy in both the Forest Service and BLM to avoid taking actions that would lead to the listing of species under the Endangered Species Act. Policies to this effect are found in U.S. Department of Agriculture Regulation 9500-4, Forest Service Manual 2670.32, and BLM Manual 6840.22. These policies share two principles: assist in the recovery of threatened and endangered species and implement management practices to ensure that species do not become threatened or endangered because of federal actions. In addition, the Forest Service has regulations that require it "to provide for diversity of plant and animal communities based on the suitability and capability of the specific land area" (16 U.S.C. 1604(g)(3)(B)). The National Forest Management Act (NFMA) implementing regulations for the Forest Service at 36 CFR

219.19 (1982) require 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."

A purpose is to continue to provide for diversity of plant and animal communities in accordance with the National Forest Management Act and conserve rare and little known species that may be at risk of becoming listed under the Endangered Species Act.

Reduce Cost and Effort

Agency funding is important to accomplishing overall management objectives. A review of the Northwest Forest Plan in northern California found "Implementation of pre-disturbance surveys and management recommendations are expensive, time consuming ..." (USDA 2003a:4). The annual cost of the Survey and Manage Program is projected to be more than $21 million. While progress at streamlining processes has been made, some Survey and Manage processes are still complex and time consuming, leading to delays and stalled projects. These problems limit the Agencies' ability to meet policy objectives and divert money from other work including watershed restoration projects, fuel reduction projects, timber management projects, and projects designed to improve habitat for threatened, endangered, and other species.

A purpose is to reduce the Agencies' cost, time, and effort associated with rare and little known species conservation.

Healthy Forests and Timber Outputs

Some species in the "uncommon" category of Survey and Manage are so numerous or widespread that the acreage being set aside to protect them far exceeds that projected in previous analyses. A recent review of the Northwest Forest Plan in northern California found "Survey and Manage protection buffers have affected approximately 30% of the project areas proposed. The majority of fuels treatments and timber management activities are excluded within protection buffers" (USDA 2003a:3). As a result, some project areas become dotted with dozens of known sites, severely reducing project size or making the entire project infeasible. This problem has limited the Agencies' ability to restore forest health including fuel treatments to reduce the threat of catastrophic wildfire to watersheds and communities at risk. This problem has also contributed to the Agencies' inability to achieve predictable and sustainable levels of timber outputs as predicted in the Northwest Forest Plan.

A purpose is to restore the Agencies' ability to achieve resource management goals and timber outputs that were established under the Northwest Forest Plan.

Reasons for the Purpose and Need

1. Effects of Survey and Manage were underestimated. The Survey and Manage Final SEIS in 2000 stated:

"A 6 MMBF reduction in PSQ [probable sale quantity] was made for 1993 known sites, but the possibility of future sites was 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, page 3&4-267). The Northwest Forest Plan SEIS made no PSQ adjustment for Survey and Manage sites that would be identified in the future.

It was assumed that occurrences of these species would be rare and effects on lands available for harvest would be minimal" (USDA, USDI 2000a).

The Survey and Manage Final SEIS 2000 estimated that Probable Sale Quantity (PSQ) would be reduced by 51 MMBF per year due to implementation of the Survey and Manage Standards and Guidelines, and notes proportionate limitations on habitat restoration, prescribed fire, and other forest management activities. With further implementation experience and new information gained primarily over the following 3 years, effects of the Survey and Manage mitigation measure are estimated to be more than twice that projected in the 2000 Final SEIS (Chapter 3&4, *Timber Harvest* section).

Jack Ward Thomas, in a 2003 evaluation of the Northwest Forest Plan in the National Forests in northern California, said "There is no record of which I am aware that indicates that efforts were made to 'cost out' the changes and additions to Option 9, such as survey and manage" (Thomas 2003:2). He also said "Responses (the addition of 'bells and whistles') that emerged in the NWFP to perceived problems with the adequacy of FEMAT Option 9 to stand up to judicial review do not seem to have been subjected to any economic assessment of costs and benefits, with survey and manage being the prime example. I find it hard to imagine that any Administration would have signed off on a NWFP that required $33,000,000 per year for S&M. If that figure were known, it would have been clear that most, likely all, land management activities would be destined to be carried out 'below costs.' Or, for projects not related to production of goods, at several times the actual cost of doing the project" (Thomas 2003:3-4).

The Survey and Manage Standards and Guidelines have clearly not had the relatively minor effects originally predicted. Some species in the "uncommon" category of Survey and Manage species are so numerous that the required avoidance substantially constrains other forest management activities including fuel reduction treatments, watershed and late-successional forest restoration, and timber harvests. There are a total of 72 Survey and Manage species that require pre-disturbance (clearance) surveys under No-Action Alternative 1 (63 requiring "practical" surveys because they are assigned to Survey and Manage Categories A or C, and 9 requiring equivalent-effort surveys as a mitigation measure or because Strategic Surveys are not complete). (Ninety-five species require pre-disturbance surveys under No-Action Alternative 4.) Field units, on average, must look for 20 of the 72 species prior to undertaking habitat-disturbing activities. When a species is located during surveys, a "known site" is established and managed. Management usually includes a buffer ranging from 1/4 to 10 acres in size. For one fungus species, *Bridgeoporus nobilissimus*, 600 acres are managed for each site found until a management plan is written. For some species, so many sites are found that whole projects are cancelled. This has reduced silvicultural treatments designed to enhance old-growth development in Late-Successional Reserves and prevented the implementation of some fuel treatments in areas in National Forests in northern California at high risk of catastrophic wildfire. The Agencies currently manage more than 33,000 acres of known sites under No-Action Alternative 1, typically to the exclusion of other forest management activities, regardless of the number of known sites nearby. (No-Action Alternative 4 currently has over 80,000 acres of known sites.)

2. <u>Survey and Manage is costly and time consuming</u>. The Survey and Manage Standards and Guidelines drain agency resources and impact project implementation. The annual cost for the Survey and Manage Program, assuming full implementation of the Northwest Forest Plan, is projected to be more than $21 million. "While ... [this] is a small amount of money relative to the value of the land and resources in question, it is a significant amount in terms of the limited amount of money in the budget of a land management agency" (Thomas 2003:4). Requirements for pre-disturbance surveys can extend project planning 1 to 2 additional years because "Survey protocols are time consuming to implement and survey windows are often less than several weeks in length due to inclement weather conditions. Project delays are often due to survey

windows being too short" (USDA 2003a:4). Delays to complete pre-disturbance surveys delay other needed work. Seventy-two (72) Survey and Manage species require pre-disturbance surveys under No-Action Alternative 1 (95 under No-Action Alternative 4), and few habitat-disturbing activities are exempt. These factors reduce the Agencies' ability to complete work such as develop or expand recreation sites, prepare timber sales, or otherwise respond to management needs.

The various Survey and Manage administrative processes and procedures, originally intended to provide consistency of implementation, have turned out to be costly and time consuming. Survey and Manage Standards and Guidelines for species in the "rare" category generally require retention of all known sites regardless of local situations or resource objectives. For example, fuel reduction projects reintroducing fire at the landscape scale have become difficult in some field units in northern California because of the requirement to protect sites even when the species occupying the site naturally occurs in fire-adapted ecosystems. The 2001 Record of Decision only requires management of high-priority sites for the "uncommon" category because of the large number of known sites for these species. Until Management Recommendations are revised to address high-priority sites, all sites are assumed high priority or field units must use the process described in the standards and guidelines to determine non-high priority sites on a case-by-case basis. To date, no Management Recommendations have been written that identify high-priority sites. Hence, all known sites must be managed even though not all sites are needed for a reasonable assurance of persistence for the species.

In some ways, protection measures for Survey and Manage species are more restrictive than those for federally listed threatened or endangered species. Jack Ward Thomas recently said that Survey and Manage "essentially treats all species ... identified as being 'at risk' to deserve protection until proven otherwise. This turns the concept of the Endangered Species Act (ESA) wherein species are declared as 'threatened' or 'endangered' upon the evaluation of evidence that a species in question qualifies for that distinction 'inside out'" (Thomas 2003:3). While the Endangered Species Act requires listing agencies to act on available information within a relatively short period of time following the application for permit or request for an opinion, the Survey and Manage Standards and Guidelines have required time-consuming surveys to demonstrate that such species are not present in the project area.

The amendments in the 2001 Record of Decision significantly reduced costs and conflicts when compared with what the Agencies would have experienced under the original 1994 Northwest Forest Plan Survey and Manage Standards and Guidelines. However, even as amended, the complexity and cost of the Survey and Manage mitigation measure is reducing agency resources that would otherwise be available for implementation of other elements of the Northwest Forest Plan.

3. <u>The Survey and Manage Standards and Guidelines under the Northwest Forest Plan and the Agencies' Legal Requirements</u>. The Forest Service's NFMA implementing regulation at 36 CFR 219.19 (1982) requires 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." The FEMAT, in crafting the ten alternatives considered in the 1994 SEIS, was instructed to "include alternatives that range from a medium to a very high probability of ensuring the viability of species" (USDA et al. 1993:II-5). The Survey and Manage mitigation measure was added well after the ten alternatives were developed and analyzed by the FEMAT. The FEMAT did not include the Survey and Manage mitigation measure as a necessary component to achieving its task of identifying alternatives that would provide assurance of viability in the medium to high range of probability. The criteria used for identifying species to be included in the Survey and Manage mitigation measure did "not represent a judgment about what is required by the National Forest Management Act or the Endangered Species Act"

(USDA, USDI 1994a:J2-2); therefore, inclusion in Survey and Manage does not necessarily mean species viability is dependent upon this mitigation measure. In fact, other adopted mitigation measures, such as the expansion of the riparian reserves and standards for course woody debris and snags in the Matrix were identified as benefiting these species (USDA, USDI 1994a:J2-56 through 79). To a large extent, the species included in the Survey and Manage mitigation measure were species which had not been studied and little was known about them.

The BLM regulations, issued under the Federal Land Policy and Management Act (FLPMA) (43 U.S.C. 1701), have no diversity or viability requirements. The Ninth Circuit Court ruled in Headwaters vs. BLM (914 F.2d 1174 (9th Cr. 1990)) that the BLM has no authority under the O&C Act (43U.S.C. 1181a) to set aside timberlands for wildlife purposes. Yet, under Option 9, BLM administered lands were given the same species viability protections as National Forest System lands (USDA et al. 1993:II-5). Extending the viability requirements to BLM lands was not required by any law.

The Northwest Forest Plan Record of Decision states, "By its own terms, the [Forest Service viability provision] regulation applies only to vertebrate species. Nonetheless, consistent with the statutory goals of providing for diversity of plant and animal communities and the long-term health of federal forests, as well as the agencies' conservation policies, our decision satisfies a similar standard with respect to non-vertebrate species to the extent practicable" (USDA, USDI 1994b:44). Extending protection to non-vertebrate species on National Forests was a matter of policy discretion and not required by any law.

The Forest Service NFMA implementing regulations at 36 CFR 219.27 (g) require management prescriptions to *"….. preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species, so that it is at least as great as that which would be expected in a natural forest……"* However, this is only required *"where appropriate and to the extent practical"* In 1994, when the Northwest Forest Plan ROD was signed, the Agencies believed that applying Survey and Manage requirements were 'practical'. By 1998, the Agencies had sufficient experience implementing the Survey and Manage Standards and Guidelines to conclude the requirements were not clear, efficient, or practical. The January 2001 record of decision was a first attempt at modifying the requirements to make them practical. However, by 2002 it became apparent that the effects on programs and the costs associated with Survey and Manage continued to make this program impractical. That realization is what triggered the need for the current FSEIS.

While the Agencies may not be prohibited from implementing greater protections for these species, there is no law or regulation requiring such protections. By doing so, species protection measures included in the Survey and Manage mitigation measure have constrained other programs and activities to an extent not anticipated in the Northwest Forest Plan.

4. <u>Special Status Species Programs provide for species management</u>. Rare and uncommon species in all other parts of the nation rely on the Agencies' Special Status Species Programs to meet legal and policy requirements for such species.

Proposed Action

The Proposal

The Agencies propose to amend 28 land and resource management plans within the range of the northern spotted owl to remove the Survey and Manage Standards and

Guidelines, and rely on the Agencies' Special Status Species Programs to provide any species-specific protections needed above those provided by other elements of the Northwest Forest Plan and the underlying land and resource management plans.

The Agencies have already assigned nearly half of the Survey and Manage species to one or more of their Special Status Species Programs. Following the Annual Species Reviews in 2001, 2002, and 2003, many of the species removed from Survey and Manage were reviewed for, and some were added to, the Agencies' Special Status Species Programs. Then, separate from the 2004 FSEIS, the Agencies reviewed the remaining 295 Survey and Manage species to determine their eligibility for inclusion in the Agencies' existing Special Status Species Programs. Following the March 2004 decision to remove Survey and Manage, 145 of those species were added to one or more of the Agencies' Special Status Species Programs (counting ones already included at the time). The Agencies' Special Status Species Programs seek to further the objectives of the Endangered Species Act by preventing future listings of species as threatened or endangered. Both Agencies' programs require coordination with state agencies to achieve conservation goals of species identified by state governments (see Chapter 2 and Appendix 2 for description of Special Status Species Programs). The objectives of the Forest Service's program also include compliance with NFMA regulations requiring diversity of plant and animal communities.

In making the determination of which of the Survey and Manage species to add to their respective Special Status Species Programs, the Agencies used global and state biodiversity database rankings from the Oregon Natural Heritage Information Center (ORNHIC) along with existing agency policy. ORNHIC rankings and criteria for inclusion in the Agencies' Special Status Species Programs are not based solely on local abundance; they also consider habitat distribution, threats, global population levels, and other factors. None of the species affected by this proposal are currently listed as threatened or endangered or proposed for listing under the Endangered Species Act. The proposed action does not include any other changes to the Northwest Forest Plan. The proposed action is described in detail in Chapter 2.

Decisions to be Made

The decisions to be made by the Secretaries of Agriculture and the Interior are whether to select the proposed action or another alternative, and if any mitigation is to be applied. The decisions will be based on the degree to which the proposed action and alternatives meet the purpose and need. Specifically, alternatives will be evaluated on how well they achieve the resource management objectives of the Northwest Forest Plan including healthy forests and timber outputs, conserving rare or little known species, and reducing costs. While the settlement agreement provides an impetus to prepare this SEIS, it does not require the selection of any particular alternative.

This Supplemental FSEIS is itself a supplement to the 2000 Survey and Manage Final SEIS, which was a supplement to the Northwest Forest Plan Final SEIS. The Agencies have chosen to focus this proposal on the Survey and Manage Standards and Guidelines.

Scoping

2004 SEIS

A Notice of Intent to prepare the 2004 SEIS was published in the Federal Register on October 21, 2002 (67 FR 64601). The Notice of Intent provided preliminary information about the proposed action and invited public comment. Concurrently, a scoping letter

was mailed to more than 3,300 individuals and groups identified as potentially interested in the proposed action and analysis. The Agencies received more than 650 letters in response to the Notice of Intent and the scoping letter. Public comments contained a wide variety of suggestions for issues and alternatives. Alternative 3 was developed in response to scoping comments suggesting ways to cut costs and achieve resource objectives by making changes to the Survey and Manage Standards and Guidelines. Chapter 2 of this SEIS includes a discussion of other alternatives that were considered but eliminated from detailed study, and explains why they were eliminated. Many issues raised during scoping are relevant to this analysis and are addressed in Chapter 3&4. Other issues were raised that are not pertinent to this analysis. For example, some comments suggested ending all commercial logging everywhere in the Northwest while another was concerned about the inadequacies of city planning rules intended to protect the environment. These issues have not been considered further.

Some comments suggested that all old-growth forests need to be protected and placed off-limits to logging. They suggested that protecting all remaining late-successional and old-growth forests on federally managed lands would meet the purpose and need. Protecting additional old-growth forests outside the Late-Successional and Riparian Reserves would be akin to changing land allocations by creating additional Late-Successional Reserves. Various levels of reserves, including one which protected all remaining old-growth stands, were a key element in designing the ten alternatives originally considered for the Northwest Forest Plan in the 1994 SEIS which this SEIS supplements.

Some comments suggested that eliminating the Survey and Manage mitigation measure would lead to Survey and Manage species being listed as threatened or endangered. Others were concerned that eliminating the Survey and Manage mitigation measure could lead to loss of old-growth forests, unraveling of ecological systems, and loss of social values. Other commenters provided different viewpoints and suggested elimination of the Survey and Manage mitigation measure was needed so that fuel reduction, thinning, and other restoration treatments could proceed without further delays.

2007 Supplement

According to Council on Environmental Quality (CEQ) regulations, 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 publish a Notice of Intent to prepare a Supplement to the 2004 Final SEIS in the *Federal Register* (70 FR 73483) on December 12, 2005. The Notice of Intent provided preliminary information about objectives of the Supplement and invited public comment. Two letters were received, one from the U.S. Environmental Protection Agency and one from the Oregon Natural Resources Council et al. Suggestions from both of these letters were incorporated into this Supplement.

Preferred Alternative

The Agencies have identified Alternative 2 as the preferred alternative because it best meets the purpose and need. Alternative 2 relies on the Agencies' Special Status Species Programs and the other elements of the Northwest Forest Plan to conserve rare and little known species. Alternative 2 is the least costly and requires the least effort to implement. Management of species under Alternative 2 reduces conflicts with other programs to the lowest levels, resulting in higher timber outputs and more acres available for hazardous fuels treatment. Species protection under Alternative 2 appears adequate and consistent with applicable laws and regulations.

Chapter 2

Changes since the 2004 FSEIS:

Changes displayed in the July 2006 Draft Supplement or made in response to public comments received about that document:

- Additional alternatives have been added to the *Alternatives Considered but Eliminated from Detailed Study* section.
- Tables showing "assumed" Special Status Species Program assignments now show only the assignments that have actually been made.
- The mitigation section(s) have been moved to the end of the chapter to follow the *Summary and Comparison of Effects* discussion; species-specific mitigation tables have been removed in favor of a detailed description of what the mitigation is.
- The *Summary* and *Comparison of Effects* section now includes species outcomes for species if they are not added to, or are removed from, the Agencies' Special Status Species Programs for alternatives where they are "off" Survey and Manage.

Changes displayed in the January 2007 *Supplement* to the July 2006 Draft Supplement or made in response to comments received about that document:

- The description of the 2001, 2002, and 2003 Annual Species Reviews has been moved from Background to Alternative 1, since it is now assumed not to apply to Alternative 4.
- Another No-Action Alternative (Alternative 4) has been added to reflect the potential implications of a November 2006 Ninth Circuit Court decision. This alternative includes all 337 species on Survey and Manage following the 2001 Record of Decision. The original No-Action Alternative (Alternative 1) with 295 species is also displayed and analyzed.
- A section comparing the effects between Alternatives 1 and 4 has been added to show the implications of the changes made by the 2001, 2002, and 2003 Annual Species Reviews.
- Species outcomes (effects) are now included for all 337 species for all four alternatives.

NOTE: In the January 2007 Supplement, Alternative 3 had been reconfigured based on the species and categories of Alternative 4. In this FSEIS, it is returned to the 2004 and July 2006 configuration based on Alternative 1. (See Introduction to Alternative 3 in Chapter 2 for details.)

Also:

- Various tables have been reformatted or combined, but the same information is displayed.

Minor corrections, explanations, and edits are not included in this list.

Chapter 2 – The Alternatives

Introduction

This chapter presents four alternatives including the Proposed Action. Alternative 1 is the No-Action Alternative described in the 2004 FSEIS, and includes the 295[1] species remaining on Survey and Manage after conduct of the 2001, 2002, and 2003 Annual Species Reviews. It would retain the Survey and Manage Standards and Guidelines adopted by the Agencies in 2001. Under Alternative 2, the Proposed Action, the Agencies propose to amend 28 land and resource management plans within the range of the northern spotted owl by removing the Survey and Manage Standards and Guidelines. Alternative 3 was developed in response to comments received during scoping suggesting that the purpose and need would be better met by alternatives other than the proposed action. Alternative 3 is similar to the proposed action except the Agencies would amend 28 land and resource management plans by modifying the Survey and Manage Standards and Guidelines. These modifications include: (1) removing provisions for uncommon species; (2) eliminating the requirement to conduct pre-disturbance surveys in non-late-successional and non-old-growth forest stands; and (3) changing the review process for excepting known sites from management. Alternative 4 is a No-Action Alternative added by this Supplement that would retain the Survey and Manage Standards and Guidelines and, to respond to the potential implications of a November 6, 2006 Ninth Circuit Court decision regarding the Annual Species Review removal of the red tree vole from Survey and Manage, retains all 337 species and categories described in the 2001 Survey and Manage Record of Decision. All alternatives apply to lands administered by the Forest Service, BLM, and Coquille Tribe (approximately 5,400 acres of forest lands known as the Coquille Forest) within the Northwest Forest Plan area. Alternatives 2 and 3 are referred to collectively as the action alternatives.

The Northwest Forest Plan, adopted in 1994 and amended in 2001 (Survey and Manage), amended land and resource management plans on all 28 administrative units of the Forest Service and BLM in western Washington, western Oregon, and northwestern California (see Figure 1-1). The Northwest Forest Plan provides 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 Standards and Guidelines proposed for removal in the Proposed Action were added to the Northwest Forest Plan as a mitigation measure for species that were rare or about which little was known. References to the Northwest Forest Plan in this SEIS are intended as references to those portions of individual land and resource management plans that were amended by the 1994 and 2001 Records of Decision.

Background for Survey and Manage Standards and Guidelines

The Northwest Forest Plan

In the late 1980's and early 1990's, conflicts between protecting late-successional and old-growth forest related species habitats and providing a predictable and sustainable level of timber harvest and other forest management activities brought many Forest Service and BLM forest management activities to an impasse. At a forest conference on April 2,

[1]The 2004 FSEIS addressed "296" species, but that number included a species that has since been determined to be a synonym for another included species and thus has been combined.

1993, then 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 economic dimensions dependent on timber sales. Specifically, the President 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 non-timber resources ..." within the range of the northern spotted owl (USDA, USDI 1994a:1-4). To meet this charge, the FEMAT was asked to develop *"alternatives that range from a medium to very high probability of ensuring the viability of species"* (USDA et al. 1993:iv). In addition to a no-action (no-change) option, the FEMAT developed nine options for meeting this charge. The nine options served as the basis for the alternatives presented in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a).

The Northwest Forest Plan resulting from this charge was adopted in April 1994, and amended or was included in Land Resource Management Plans for BLM and Forest Service lands within the range of the northern spotted owl in western Washington, western Oregon, and northwestern California. The Northwest Forest Plan has the dual purpose of providing for management of habitat for northern spotted owl and other late-successional and old-growth forest related species while providing for a predictable and sustainable level of timber harvest.

The scientists who developed the proposal for the Northwest Forest Plan recommended a landscape approach to managing species associated with late-successional and old-growth forests. Of the 24.5 million federally-managed acres within the Northwest Forest Plan area, almost 20 million acres either provide for old-growth and late-successional forest conditions under designation of Congressionally Reserved Areas, or they are managed for such conditions in Late-Successional Reserves, Managed Late-Successional Areas, Administratively Withdrawn Areas, or Riparian Reserves. The remaining 4.5 million acres are allocated to Matrix or Adaptive Management Areas where the bulk of timber outputs are produced.

The Survey and Manage Standards and Guidelines

The FEMAT assembled panels of experts to assess the likelihood of meeting various population stability and distribution outcomes for 1,120 species for 7 of their 10 options, including Option 9, the basis for the Northwest Forest Plan (USDA et al. 1993: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 stabilized, well-distributed populations for 100 years across federally managed lands for some of the lichens, bryophytes, fungi, arthropods, mollusks, and other species. FEMAT (USDA et al. 1993: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 1993. In this option, approximately 78 percent of the federally managed lands in the Northwest Forest Plan area were allocated to reserves. Late in the analysis process, in response to concerns about the above species, the SEIS team formed a scientist-staffed "Additional Species Analysis Team" to

reconsider these species and suggest mitigation measures (USDA, USDI 1994a:J2). This team selected species for additional analysis based on: (1) species ratings in the FEMAT report; (2) expected changes in Alternative 9 after the Northwest Forest Plan Draft SEIS; (3) cumulative effects on species; and, (4) additional species-specific criteria (USDA, USDI 1994a:J2-2 through J2-3). Through this screening process, the team identified 486 species and 4 arthropod functional groups for additional analysis.

Following their analysis, the team described 23 possible mitigation measures to improve conditions for these species. Eight mitigation measures were eventually adopted but overall species ratings were not recalculated. Although these mitigation measures reduced the likelihood species would be disturbed by management activities, they are only a part of the overall strategy of the Northwest Forest Plan to meet species management objectives. The Northwest Forest Plan network of reserves and other designated areas, along with many other standards and guidelines, work together to provide habitat and protect species. The Survey and Manage mitigation measure was among the eight mitigation measures adopted, from the additional species analysis, in the final version of the Northwest Forest Plan (USDA, USDI 1994b:C-4 through C-6 and Table C-3). Species were assigned to the Survey and Manage mitigation measure to increase the likelihood of a stable, well-distributed population of the species across federally managed lands or to decrease the likelihood of their extirpation on federally managed lands in the Northwest Forest Plan area. The other seven mitigation measures also variously add protections for most of these same species. The increase in Riparian Reserve width as a result of the Additional Species Analysis, for example, benefits "…mollusks, amphibians, lichens, fungi, bryophytes, vascular plants, …red tree voles.." (USDA, USDI 1994b:B-13).

The late addition of the Survey and Manage mitigation measure to the Northwest Forest Plan SEIS precluded a detailed effects analysis. For example, the Survey and Manage mitigation measure was predicted to have a "relatively minor" effect on maintaining a functional and interconnected late-successional forest ecosystem. Other effects were "likely to improve at least slightly" when compared to effects without the eight mitigation measures (USDA, USDI 1994a:3&4-39). Similarly, except for a 6 million board foot (MMBF) reduction in Probable Sale Quantity (PSQ) to reflect management of Survey and Manage sites known at that time, the Northwest Forest Plan Final SEIS did not quantify socioeconomic effects of these mitigation measures, noting only that these measures "... add to the uncertainty of PSQ calculations" (USDA, USDI 1994a:3&4-267). The Final SEIS provided only a rough estimate for some species, and no estimate at all for others, of the overall acreage involved in managing known sites for Survey and Manage species (USDA, USDI 1994a:J2-40 and others).

The original Survey and Manage and related Standards and Guidelines were developed for 23 bryophytes (mosses and liverworts), 234 fungi, 81 lichens, 58 mollusks (snails and slugs), 5 amphibians (salamanders), 17 vascular plants (plants with stems), 1 mammal (red tree vole), the great gray owl, and 4 arthropod functional groups (insects and related species). Species were assigned to one or more of the following four categories: (1) manage known sites where species are located; (2) survey prior to potential habitat-disturbing activities; (3) conduct extensive surveys to find high-priority sites for management; and, (4) conduct general regional surveys to acquire additional information and to determine necessary levels of protection.

The Agencies have made changes to the Survey and Manage mitigation measure since it was first adopted in 1994. Changes were made in species assignments in 1995 and 1996, primarily to correct errors in the original category assignments. The Agencies also changed the implementation date for pre-disturbance surveys for 32 species in February 1999, and again for 7 of these same species in February 2000.

The 2000 Survey and Manage SEIS

By 1998, the Agencies had sufficient experience implementing the Survey and Manage Standards and Guidelines to conclude the requirements were not clear, efficient, or practicable. A SEIS to assess alternative ways to correct these problems was begun in November 1998. The SEIS considered alternatives with an objective of continuing to provide the same level of protection intended by the 1994 Record of Decision.

In January 2001, the Agencies issued a Record of Decision, based on the Survey and Manage Final SEIS 2000, which amended the Survey and Manage Standards and Guidelines to: (1) clarify required management in part by placing species in new categories based on species characteristics of relative rarity and whether they can be reasonably located and identified during site-specific field surveys; (2) remove unnecessary and duplicative or conflicting requirements; (3) add a process for changing species between categories, and for adding or removing species from Survey and Manage, based on new information (the Annual Species Review Process). Species would be removed when they fail to meet the three basic criteria for Survey and Manage: (1) does the species have suitable habitat in the Northwest Forest Plan area? (2) is the species associated with late-successional or old-growth forest? and, (3) does the reserve system and other standards and guidelines (other than Survey and Manage) provide for a reasonable assurance of species persistence? The January 2001 Record of Decision also removed 72 (of more than 400) species from Survey and Manage and related mitigation measures in all or part of their range, following the same process described therein for subsequent annual species reviews. The 2000 Survey and Manage Final SEIS, 2001 Record of Decision, and Standards and Guidelines are available on the internet at http://www.reo.gov/s-m2006. The current Survey and Manage Standards and Guidelines Sections I through VIII and XII are included in Appendix 1 (No-Action), and summarized under Alternative 1 later in this chapter.

Changes since the 2000 Final SEIS

Delegation of Authority for Survey and Manage Related Reviews

On May 16, 2003, the Regional Interagency Executive Committee (RIEC) delegated certain reviews to the Survey and Manage Intermediate Managers Group (Survey and Manage IMG) (USDA, USDI 2003d). These delegated reviews include:

1. New or revised Management Recommendations.
2. New or revised Survey Protocols.
3. Management exceptions for high-priority sites.
4. Pre-disturbance survey exceptions:
   a. where the time required to complete the surveys greatly increases and creates an unacceptable environmental risk.
   b. proposed to minimize wildland fire hazards or maximize resource benefits in backcountry areas.
   c. proposed for Late-Successional Reserves (LSR), where the "LSR Assessment addresses the potential presence and likely effect on S&M species, and REO review of that aspect of the Assessment concludes such fire(s) will not prevent achievement of the persistence objectives of these S&G's."

The RIEC also delegated the Annual Species Review and Strategic Survey Implementation Guide to the RIEC Survey and Manage Subcommittee.

Exemption to Survey and Manage Pre-disturbance Survey Requirements for Wildland Fire for Resource Benefits

On July 31, 2003, the RIEC exempted wildland fires for resource benefits from pre-disturbance surveys, regardless of land allocation (USDA, USDI 2003e). Exemptions are allowed if the following conditions are met.

1. The fire is consistent with the Land and Resource Management Plan (Forest or District Plan).
2. A fire management plan has been developed that addresses wildland fire starts and appropriate prescriptions for the area.
3. The fire is burning within prescription, and the prescription is designed for resource benefits. (Note: A prescription designed for resource benefits provides for an adequate level of structural components such as snags, coarse woody debris, litter/duff, and mid and overstory canopy. Typically, the fire has a low to moderate rate of spread and flame lengths less than 4-6 feet.)
4. In Late-Successional Reserves (LSRs) only:
   a. The LSR Assessment, supplement to the LSR Assessment, or other large-scale analysis addresses the potential presence and likely effect on Survey and Manage species.
   b. The Forest Supervisor or District Manager review of the LSR Assessment (and/or other documentation noted in 4.a., above) concludes that such fires will not prevent achievement of the persistence objectives of the Standards and Guidelines.

No further REO or IMG review is required prior to implementation.

Copies of both of the above memorandums are available on the internet at http://www.blm.gov/or/plans/surveyandmanage/.

The Lawsuit and Settlement Agreement

On December 26, 2001, the Douglas Timber Operators, Inc., and American Forest Resource Council filed a complaint against the Secretary of Agriculture and the Secretary of the Interior in the United States District Court for the District of Oregon (Douglas Timber Operators, et al. v. Secretary of Agriculture, et al., Civil No. 01-6378-AA (D. Oregon)). The complaint alleged that the January 2001 amendment to the Survey and Manage Standards and Guidelines "… transferred more than 81,000 acres of timber-producing NWFP forest land into permanent reserves, resulting in a 7% reduction on the regional timber volume permitted under the NWFP - a loss of 51 million board feet (MMBF) of timber sales per year in perpetuity" and "added uncertainty." The complaint also alleged that the 2001 Survey and Manage amendment is "… in violation of substantive and procedural requirements of the Oregon and California and Coos Bay Wagon Road Grant Lands Act (O&C Act), 43 U.S.C. § 1181a, the National Forest Management Act (NFMA), 16 U.S.C. §§ 1600, et seq., the Multiple-Use Sustained-Yield (MUSY) Act of 1960, 16 U.S.C § 528-531, and the Federal Land Policy and Management Act (FLPMA), 43 U.S.C. §§ 1701, et seq." The Association of O&C Counties intervened on behalf of plaintiffs and filed an Intervener's Complaint substantially similar to the Douglas Timber Operators, et al., amended complaint. The Secretaries filed an answer denying all allegations.

On September 30, 2002, "to avoid further costly litigation, and without admission of any liability or wrongdoing by either party" the parties signed a Settlement Agreement. They agreed:

"1. The BLM and Forest Service will supplement the 2000 FSEIS by considering an alternative that replaces the Survey and Manage mitigation requirements with existing Forest Service and BLM special status species programs to achieve the goals of the Northwest Forest Plan through a more streamlined process.
"2. The BLM and Forest Service will prepare a Biological Assessment to determine the effects of this alternative on species listed under the ESA, and will conduct consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to the extent required by the ESA.
"3. Within 30 days after publication of the Final Supplemental EIS the Secretaries will issue a Record of Decision (2003 ROD) determining whether to adopt the new alternative presented in the Final Supplemental EIS, and the 2003 ROD shall become effective 30 days after the date of issuance by the Secretaries."

Unless the parties agree on an amendment to change the dates, Douglas Timber Operators, Inc., and American Forest Resource Council agreed to stay their complaint until February 20, 2004, or the issuance of the Record of Decision, whichever comes first, and agreed to dismiss their previous complaint and seek no reimbursement for related legal fees when the Record of Decision is issued.

The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) directs agencies to 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 Settlement Agreement directs the Agencies to consider "… an alternative that replaces the Survey and Manage mitigation measure with existing Forest Service and BLM special status species programs." This constitutes a significant new circumstance. Preparing this SEIS and the associated Record of Decision will fully meet the Secretaries' commitment under the Settlement Agreement, and comply with the CEQ requirements for a supplemental environmental impact statement.

To respond to the terms of the Settlement Agreement, the Agencies issued a Final Supplemental Environmental Impact Statement in January 2004 (USDA, USDI 2004a), and a Record of Decision removing Survey and Manage in March 2004. By July 2004, the Agencies had assigned qualifying species to their respective Special Status Species Programs.

This Supplemental Environmental Impact Statement

On August 1, 2005, the United States District Court, Western District of Washington, found the 2004 FSEIS deficient under NEPA in three areas (see *Introduction* or *Summary* sections), and subsequently set aside the 2004 Record of Decision, directing the Agencies to apply the Survey and Manage Standards and Guidelines as they stood in 2004 before the decision was made. In December 2005, the Agencies filed a Notice of Intent to prepare a Supplemental EIS to correct these deficiencies. A Draft Supplement was issued for 90-day public review in July 2006.

On November 6, 2006, in a separate case, the United States Court of Appeals for the Ninth Circuit ruled the BLM violated the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA) when it authorized the Cow Catcher and Cottonsnake timber sales, located in Oregon. The court found the 2001 Annual Species Review (ASR) category change and 2003 ASR removal of the red tree vole from Survey and Manage in the Mesic Biological Zone constituted a Resource Management

Plan amendment, which should have had accompanying NEPA analysis. Although the court's decision was specific to the red tree vole, it is prudent and reasonable for the Agencies to consider the potential implications of that decision on other species affected by the ASR process by presenting an alternative based on Survey and Manage in 2001, before the ASRs were conducted.

The Agencies decided, therefore, to issue a January 2007 *Supplement* to the July 2006 Draft Supplement, to present the analysis of effects for an additional no-action alternative (Alternative 4) which included all 337[2] species included in Survey and Manage, and their category assignments, prior to completion of the three ASRs. The additional 58 species included in this alternative that were new to the 2004/2006 analysis, in all or part of their range, were also considered in the context of the other action alternatives. The effects of Alternative 4 on other forest management activities were also addressed in the *Supplement*.

The analyses presented in both the July 2006 Draft Supplement and the January 2007 *Supplement* to it, with corrections and additions made as a result of new information and both 90-day public comment periods, are incorporated into the updated 2004 FSEIS and issued here as the (2007) Final Supplement to the 2004 FSEIS.

Because the proposal is not an action separate and distinct from the Northwest Forest Plan and the land and resource management plans of the Agencies, a new EIS is not warranted. Therefore, it is appropriate to analyze the effects of this proposal in a Supplement to the *Final SEIS for Amendment to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*; the Northwest Forest Plan Final SEIS; and the Final EISs 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 1994 Northwest Forest Plan Final SEIS and the *2000 Final SEIS for Amendment to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, and, to a lesser extent, on the EISs prepared for the land and resource management plans of the Agencies. Such data and analyses are incorporated in this SEIS by reference (per 40 CFR 1502.21) to the extent they continue to be relevant to, and are not superseded by, the contents of this SEIS. As described above and in more detail later in this chapter, 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 1994 and 2001 Records of Decision.

Changing Standards and Guidelines

The Northwest Forest Plan Standards and Guidelines specify that "decisions to change ... [these] standards and guidelines will be made only through the adoption, revision, or amendment of these documents following appropriate public participation, NEPA 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:E-18). The alternative proposed for selection in this SEIS will be submitted to the RIEC for review prior to finalizing the Record of Decision.

[2]The 2000 FSEIS addressed "346" species, but that number included 4 arthropod groups, 3 species that were counted twice because they were in more than one category and two species that have since been determined to be synonyms for other included species and thus has been combined.

The Planning Area

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

Although all federally managed lands within the Northwest Forest Plan area are included in the analysis and are considered to contribute habitat for late-successional and old-growth forest related species, including species affected by Survey and Manage, the management direction addressed in this SEIS applies only to those lands managed by the Forest Service, BLM, and 5,400 acres managed by the Coquille Tribe. No management direction is included here for other federally managed lands, other Native American trust lands, or state and private lands. However, cumulative impacts from expected management activities on these other lands, as appropriate, were considered as part of the effects analysis in this SEIS.

Relationship of Alternatives to Existing Management Plans

If one of the action alternatives is selected, the direction established by the Record of Decision for this SEIS will remove or modify the Survey and Manage Standards and Guidelines in all 28 land and resource management plans for Forest Service and BLM administrative units within the Northwest Forest Plan area.

The Coquille Indian Tribe currently manages approximately 5,400 acres of forest lands (Coquille Forest) under the same standards and guidelines as the adjacent federal land management agency (BLM Coos Bay District). By amending the land and resource management plans for the BLM Coos Bay District, the action alternatives would, in effect, also remove or modify the Survey and Manage Standards and Guidelines from 5,400 acres of tribal trust lands owned by the Coquille Indian Tribe.

Bureau of Land Management

Adoption of one of the action alternatives would be consistent with 43 CFR 1610.5-5 and would amend the resource management plans for the Coos Bay, Eugene, Medford, Roseburg, and Salem 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 Resource Management Plan in the Arcata 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); 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 SEIS 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 the National Forest land and resource management plans for the Gifford Pinchot, Mt. Baker-Snoqualmie, Okanogan, Olympic, and Wenatchee National Forests in Washington and the Deschutes, Mt. Hood, Rogue River, Siskiyou, Siuslaw, Umpqua, Willamette, and Winema National Forests in Oregon, in Region 6; and the Klamath, Lassen, Mendocino, Modoc, Shasta-Trinity, and Six Rivers National Forests in California in Region 5.

If an amendment to a Forest Plan results in "a significant change in the plan," the NFMA and its 1982 implementing regulations under which this SEIS is prepared, 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)). Determining whether a plan amendment is a significant change uses different criteria than those used in evaluating significance in the NEPA process. For the NFMA requirement, the Forest Service Manual (FSM 1922.51 and .52) provides specific direction.

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 land and resource management plans as amended by the Northwest Forest Plan. The purpose of the action alternatives is to facilitate achieving those goals and objectives. The action alternatives will continue to provide species protection in compliance with all applicable laws and regulations, while making more Agency resources available for other forest management priorities and simplifying processes so needed management actions can move forward more expeditiously. The underlying need to which the action alternatives are responding is the need to achieve the objectives originally established for the Northwest Forest Plan, to the extent these objectives are frustrated by the Survey and Manage Standards and Guidelines.

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 action alternatives would change management on a portion of known sites occupied by rare and uncommon species. The action alternatives would not reduce species protection below legally required levels or increase timber harvest beyond levels identified in the Northwest Forest Plan Final SEIS. The action alternatives would reduce costs and improve the Forest Service' ability to conduct forest management activities at a level described in the land and resource management plans. Selection of one of the action alternatives would enable the Forest Service to better meet the long-term goals and objectives currently identified in land and resource management plans.

3. Minor changes in standards and guidelines.

The action alternatives would remove or modify a mitigation measure added during preparation of the Northwest Forest Plan Final SEIS. The action alternatives would not significantly change any key elements of the underlying strategy or standards and guidelines. Removing or modifying the Survey and Manage Standards and Guidelines would be a relatively minor change because: (1) the Northwest Forest Plan is an ecosystem-based approach that relies primarily on a system of reserves and standards

and guidelines to accomplish its primary objectives; (2) the underlying land and resource management plans also provide habitat for the affected species; and, (3) Survey and Manage species that qualify are assumed to be given Sensitive Species status when the Regional Foresters update their Sensitive Species lists. The effects discussion in *Chapter 3&4* helps quantify the change within the context of the Northwest Forest Plan.

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

The action alternatives are specifically designed to better and more efficiently meet the underlying needs identified in the Northwest Forest Plan Final SEIS.

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 by the action alternatives would help achieve, not alter, the relationship between the levels of multiple-use goods and services originally projected. Species currently included in the Survey and Manage mitigation measure will continue to receive protection as required to meet all applicable laws and regulations.

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.

The changes proposed would remove or modify a mitigation measure added late in the preparation of the Northwest Forest Plan. The action alternatives do not change land allocations or other elements of the Northwest Forest Plan. There will be a reduction in the area managed as known species sites; however, no other Northwest Forest Plan resource objective is dependent upon those sites. There is predicted to be an increase in timber harvest from current levels; the current levels are well below the predictions displayed in the Northwest Forest Plan Final SEIS. The purpose of the proposal is to achieve levels of timber harvest that were expected when the Northwest Forest Plan was established in 1994. Thus, the action alternatives will help achieve (and not change) the multiple-use goals and objectives set forth in the Northwest Forest Plan Record of Decision.

The Alternatives

Overview

- Alternative 1, No-Action with ASRs, includes the 295[3] species remaining after the Agencies' 2001-2003 Annual Species Review (ASR) decisions. It would continue implementing all current elements of the Northwest Forest Plan including the Survey and Manage mitigation measure, the underlying land and resource management plans, and relevant agency programs and policies.
- Alternative 2, the Proposed Action, would amend the 28 land and resource management plans within the range of the northern spotted by removing the Survey and Manage Standards and Guidelines. Conservation of rare and little known species would rely on the Agencies' Special Status Species Programs and other elements of the Northwest Forest Plan, the underlying land and resource management plans, and relevant agency programs and policies.

[3]The 2004 FSEIS addressed "296" species, but that number included a species that has since been determined to be a synonym for another included species and thus has been combined.

- Alternative 3 would amend 28 land and resource management plans by modifying the Survey and Manage Standards and Guidelines (as reflected in Alternative 1[4]) by: (1) removing the Survey and Manage provisions for the three "uncommon" species categories; (2) eliminating the requirement to conduct pre-disturbance surveys in non-late-successional and non-old-growth forest stands; and (3) changing the review process for excepting known sites from management. Conservation of uncommon species would rely on the Agencies' Special Status Species Programs and other elements of the Northwest Forest Plan, the underlying land and resource management plans, and relevant agency programs and policies.
- Alternative 4, No-Action without ASRs, includes all 337[5] species and category assignments made by the 2001 Survey and Manage Record of Decision. It would continue implementing all current elements of the Northwest Forest Plan including the Survey and Manage mitigation measure (modified slightly to assume future ASRs will require additional NEPA analysis if they result in a plan amendment), the underlying land and resource management plans, and relevant agency programs and policies.

The BLM's Special Status Species policies and the Forest Service' Sensitive Species policies apply to Agencies' lands nation-wide, including within the Northwest Forest Plan area. In this SEIS, these policies are referred to collectively as the Agencies' Special Status Species Programs, or SSSPs. The objectives of the policies and, thus, the programs are for the Agencies to avoid actions that may contribute to the need to list a Special Status Species under the Endangered Species Act, and to help maintain the diversity and viability of species on Forest Service managed lands. Species are included in these programs by the Regional Foresters and State Directors using national and regional policies. The action alternatives in this SEIS propose to remove or modify the Survey and Manage Standards and Guidelines. Existing Special Status Species Program species assignments including many made in 2004 when the Agencies thought they had removed Survey and Manage are included as an analysis assumption for species "off" Survey and Manage under Alternatives 1, 2 and 3. The Agencies' Decision-makers, however, have latitude regarding the assignment of individual species to, or removal from, their Special Status Species Programs. For this reason, effects to species under Alternatives 1, 2, and 3 as if they are not added, or are removed from, Agencies' Special Status Species Programs at this time, are described in *Chapter 3&4*, displayed on Table 2-13, and summarized on Tables 2-10, 2-11, and S-1. Special Status Species Program assignments are shown on Table 2-13.

Elements Common to All Alternatives

Special Status Species Programs

All alternatives include utilizing the Agencies' Special Status Species Programs. There are also several assumptions regarding these programs that are shared by all alternatives.

1. Any Survey and Manage species the Agencies have determined eligible for their Special Status Species Programs may be added to those programs at the discretion of the Agency. The Special Status Species Programs cover all lands managed by an agency in a region or state, while Survey and Manage is confined to the Northwest Forest Plan area. Adding Survey and Manage species to the Special Status Species Programs can result in species being included outside of the Northwest Forest Plan area.

[4]In the January 2007 Supplement, Alternative 3 had been reconfigured based on the species and categories of Alternative 4. In this FSEIS, it is returned to the 2004 and July 2006 configuration based on Alternative 1. (See introduction to Alternative 3 later in this chapter for details.)
[5]The 2000 FSEIS addressed "346" species, but that number included 4 arthropod groups, 3 species that were counted twice because they were in more than one category and two species that have since been determined to be synonyms for other included species and thus has been combined.

2. The SSSP assignments shown on Table 2-13 are assumptions that apply to all alternatives where the species is "off" of Survey and Manage. The assignments shown have already been made. However, because managers have the discretion to add or remove species outside of the SEIS process, the assignments are described as assumptions, and the effects to species if they are removed from Agencies' Special Status Species Programs at this time are also displayed.

3. Within the Northwest Forest Plan area, where species have been included in both Survey and Manage and a Special Status Species Program, the species have been managed primarily under the Survey and Manage Standards and Guidelines. This is because (with the exception of Survey and Manage Category F), the Survey and Manage Standards and Guidelines generally meet or exceed the requirements of the Special Status Species Programs. This policy is expected to continue for species that become listed in both programs under any alternative selected.

4. Species removed from Survey and Manage because they are determined not to be closely associated with late-successional or old-growth forests continue to have their known sites managed until the Agencies determine whether to add them to their Special Status Species Programs.

Legal Requirements

There are many laws that affect the Agencies management of lands and resources. In order to better understand the alternatives and their objectives, it is important to understand the key laws governing the Agencies' responsibilities. The key laws described below affect how the Agencies approach and manage various resources.

Endangered Species Act (16 U.S.C. 1531 et seq.)

A principle law affecting species management for both Agencies is the Endangered Species Act (ESA). Section 7(a)(2) of the ESA requires that Federal agencies consult with the U. S. Fish and Wildlife Service and National Marine Fisheries Service (NOAA Fisheries), as appropriate, to ensure that their actions do not jeopardize the continued existence of species listed as threatened or endangered under the ESA, or destroy or adversely modify their critical habitat. The Agencies prepare a biological assessment and consult with U. S. Fish and Wildlife Service or NOAA Fisheries for any management activities that are likely to affect listed species.

Conservation plans are developed by the U. S. Fish and Wildlife Service or NOAA Fisheries with the goal of recovering listed species and eventually de-listing them. The Agencies must abide by these recovery plans and are actively engaged with the U. S. Fish and Wildlife Service and NOAA Fisheries in carrying them out.

Federal Land Policy and Management Act (43 U.S.C. 1701 et seq.)

The Federal Land Policy and Management Act (FLPMA) requires the BLM to operate under a land use planning process that is based on multiple-use and sustained-yield principles. The law includes guidelines to be followed in the development and revision of resource management plans, including coordination with other federal agencies. The FLPMA requires that:

"*goals and objectives be established by law as guidelines for public land use planning, and that management be on the basis of multiple use and sustained yield unless otherwise specified by law;*" (43 U.S.C. Section 1701(a)(7))

"*the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use;*" (43 U.S.C. Section 1701(a)(8))

"*the public lands be managed in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands …*" (43 U.S.C. Section 1701(a)(12)).

BLM planning regulations (43 CFR 1600) provide guidance in how to apply the FLPMA to BLM resource management.

"*Multiple use means the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the lands for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some lands for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the lands and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output*"(43 CFR1601.0-5).

Section 701 of FLPMA states that not withstanding any provision of FLPMA, in the event of conflict or inconsistency between FLPMA and the O&C Act, insofar as they relate to management of timber resource and disposition of revenues from lands and resources, the O&C Act shall prevail (43 U.S.C 1701 note 701(b)).

Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (43 U.S.C. §§1181a-1181j)

The Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act) requires the Secretary of the Interior to manage O&C lands for permanent forest production; and such management must also be in accord with sustained-yield principles. Further, the O&C Act has required that management of O&C lands protect watersheds, regulate steam flow, provide for recreational facilities, and contribute to the economic stability of local communities and industries (43 U.S.C. 1181a). In Headwaters, Inc. vs. Bureau of Land Management (1990, CA9 Or) 914 F.2d 1174, the Ninth Circuit Court of Appeals held that Congress clearly intended that these lands be used primarily for sustained yield timber production, and not multiple use, including wildlife conservation. A U.S. District Court ruled that the Secretary of the Interior was within the authority of this mandate to designate the reserves in the Northwest Forest Plan for the purposes of fulfilling the conservation duties of the Endangered Species Act. This issue was not raised on the appeal of that decision. Seattle Audubon Society vs. Lyons, 871 F.Supp. 1291 (W.D. Wash. 1994), aff'd. 80 F.3d 1401 (9th Cir. 1996).

National Forest Management Act (16 U.S.C. §§ 1600-1614)

The National Forest Management Act (NFMA) requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a land and resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of National Forests.

The NFMA directs the Forest Service to provide for diversity of plant and animal communities based on the suitability and capability of the specific land area, in order to meet overall multiple-use objectives. Forest Service planning regulations (36 CFR 219, September 30, 1982) provide guidance in how to apply the diversity requirement in NFMA to National Forest management.

"36 CFR 219.26 Diversity. Forest planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process. Inventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition. For each planning alternative, the interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices. (Refer to Sec. 219.27(g).)

"36 CFR 219.27(g) Diversity. Management prescriptions, where appropriate and to the extent practicable, shall preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species, so that it is at least as great as that which would be expected in a natural forest and the diversity of tree species similar to that existing in the planning area. Reductions in diversity of plant and animal communities and tree species from that which would be expected in a natural forest, or from that similar to the existing diversity in the planning area, may be prescribed only where needed to meet overall multiple-use objectives. Planned type conversion shall be justified by an analysis showing biological, economic, social, and environmental design consequences, and the relation of such conversions to the process of natural change."

The 1982 rule also introduced the management requirement to provide for the viability of vertebrate species

"219.19 Fish and wildlife resource. Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area."

The 2004 FSEIS applied the amendment process set out in the Forest Service NFMA planning rule issued in 1982, and thus this supplement continues to do likewise. The 1982 planning regulations may be viewed in their entirety at: http://www.fs.fed.us/emc/nfma/includes/nfmareg.html.

Multiple-Use Sustained-Yield Act (16 U.S.C. 528 et seq.)

This Act declares that the purposes of the National Forests include outdoor recreation, range, timber, watershed, and fish and wildlife (16 U.S.C. 528). The Act directs that the Secretary of Agriculture must develop and administer the renewable surface resources of the National Forests for multiple-use and sustained-yield of the various products and services obtained from these areas. The Secretary must give appropriate consideration to the relative values of the resources of particular areas (16 U.S.C. 529). Multiple use means: The management of all the various renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the

various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output. Sustained yield of the several products and services means the achievement and maintenance, in perpetuity, of a high-level annual or regular periodic output of the various renewable resources of the National Forests without impairment of the productivity of the land (16 U.S.C. 531).

All alternatives meet the legal and regulatory requirements of the ESA, FLPMA, O&C Act, NFMA, and Multiple-Use Sustained-Yield Act. Aside from the Survey and Manage mitigation measure, all alternatives retain all other elements of the Northwest Forest Plan. The alternatives include the standards and guidelines of the underlying land and resource management plans for the individual BLM and Forest Service administrative units.

Endangered Species Act Consultation

To conform to the terms of the Settlement Agreement, the BLM and Forest Service prepared a Biological Assessment for the Final SEIS (see *Appendix 5*), and consulted with the U.S. Fish and Wildlife Service to comply with the Endangered Species Act.

Northwest Forest Plan Standards and Guidelines

The Northwest Forest Plan Standards and Guidelines were adopted in April 1994 as amendments to existing land and resource management plans, or were subsequently adopted into land and resource management plans completed since that date. The complete Northwest Forest Plan SEIS, appendices, Record of Decision, and Standards and Guidelines are available on the internet at http://www.reo.gov/s-m2006. The Northwest Forest Plan Standards and Guidelines were amended in January 2001. The 2001 amendment, which primarily affected the Survey and Manage Standards and Guidelines, is also available on the internet at http://www.reo.gov/s-m2006 and is summarized under Alternative 1 below. The 2001 Standards and Guidelines proposed for removal also appear in their entirety in Appendix 1.

The Northwest Forest Plan divides all BLM and Forest Service managed lands within the range of the northern spotted owl into specific land allocations. Each allocation comes with its own set of standards and guidelines to ensure management activities will meet plan objectives on those lands. About 80 percent of the area is designated as reserves or withdrawn areas. Table 2-1 displays how the 24.5 million acres of federally managed lands were allocated in the original Northwest Forest Plan. Additional information about Northwest Forest Plan land allocations is in the *Assumptions and Information Common to All Alternatives* section early in *Chapter 3&4*.

Table 2-1. Northwest Forest Plan Land Allocations

Allocation	Acres[1] (millions)
Congressionally Reserved Areas	7.3
Late-Successional Reserves and Managed Late-Successional Areas	7.4
Adaptive Management Areas	1.5
Administratively Withdrawn Areas	1.5
Riparian Reserves (within Matrix[2])	2.6
Matrix	4.0

[1] Acres do not total 24.5 million because of rounding.
[2] Forty percent of the other land allocations are Riparian Reserve as well, but it is not shown to avoid double counting.

Alternative 1, No-Action with ASRs (Northwest Forest Plan Including Survey and Manage for 295[6] Species)

Alternative 1, the 2004 FSEIS No-Action Alternative, continues implementation of all current elements of the Northwest Forest Plan including the Survey and Manage mitigation measure for the 295 species remaining after the Agencies' 2001, 2002, and 2003 Annual Species Reviews (described below), the underlying land and resource management plans for the individual administrative units, and relevant agency programs and policies. Key features of the Survey and Manage Standards and Guidelines are summarized below. The current Survey and Manage Standards and Guidelines, Sections I through VIII and XII are included in Appendix 1. The January 2001 Record of Decision and the complete Survey and Manage Standards and Guidelines are available on the internet at http://www.reo.gov/s-m2006.

Program Objectives - Survey and Manage

In general, the Survey and Manage Standards and Guidelines are designed to help the Northwest Forest Plan provide for a reasonable assurance of persistence of late-successional and old-growth forest associated species. The objective is to provide roughly the same likelihood of persistence as that provided by the Northwest Forest Plan as originally adopted in the 1994 Record of Decision (USDA, USDI 2001a:Standards and Guidelines - 3). In particular, the Northwest Forest Plan specified use of the Forest Service viability provision in the National Forest System Land and Resource Management Planning Regulation for the National Forest Management Act of 1976 (36 CFR 219.19). This viability provision requires that fish and wildlife habitat be managed to maintain viable populations of existing native and desired non-native vertebrate species. The Northwest Forest Plan Record of Decision (p. 44) identified compliance with this Forest Service regulation as a goal across both Forest Service and BLM administered lands as a means of serving the important policy goal of protecting the long-term health and sustainability of all federal forests within the range of the northern spotted owl and the species that inhabit them. For non-vertebrate species, the Northwest Forest Plan Record of Decision extended "a similar standard (to the one reflected in the NFMA viability provision for vertebrate species) … to the extent practicable" (p. 44).

Background - Changes since the 2000 Final SEIS

Following the Annual Species Review process described in the January, 2001 Survey and Manage Standards and Guidelines, the Agencies removed 37 species from Survey and Manage in all or part of their range in June 2002. (Since most of the analysis occurred in 2001, this is referred to herein as the 2001 Annual Species Review.) The 2002 Annual Species Review resulted in removing 13 species (March 2003) and the 2003 Annual Species Review resulted in removing 9 more species, including red tree vole in a portion of its range (December 2003). For those species removed because they were not associated with late-successional or old-growth forests (15), their known sites continued to be managed until the Agencies decided whether to add them to the Special Status Species Programs. More specifically, the Annual Species Reviews changed species as follows[7]:

[6]The 2004 FSEIS addressed "296" species, but that number included a species that has since been determined to be a synonym for another included species and thus has been combined.
[7]Annual Species Reviews also clarified ranges for over 50 species. Since the standards and guidelines only require pre-disturbance surveys within the species range, such changes and do not affect actual species protection levels and thus are not summarized here.

Annual Species Review 2001

All 337 Survey and Manage species were evaluated during the 2001 Annual Species Review.

- Number of species that changed category: 42.
- Number of species removed in all of their range: 26.
- Number of species removed in part of their range: 11.
- Number of species that were removed and needed to be reviewed for Sensitive status: 9.
- Number of species moved into a category with a pre-disturbance survey requirement: 4.
- Estimate of known sites released for other resource considerations: 6,900.

Annual Species Review 2002

A total of 313 species were reviewed during the 2002 Annual Species Review. The four arthropod functional groups were not reviewed.

- Number of species that changed category: 8.
- Number of species removed in all of their range: 8.
- Number of species removed in part of their range: 5.
- Number of species that were removed and needed to be reviewed for Sensitive status: 4.
- Number of species moved into a category with a pre-disturbance survey requirement: 1.
- Estimate of known sites released for other resource considerations: 1,895.

Annual Species Review 2003

A total of 304 species were reviewed during the 2003 Annual Species Review. The four arthropod functional groups were not reviewed.

- Number of species that changed category: 4.
- Number of species removed in all of their range: 8.
- Number of species removed in part of their range: 1.
- Number of species that were removed and needed to be reviewed for Sensitive status: 0.
- Number of species moved into a category with a pre-disturbance survey requirement: 1.
- Estimate of known sites released for other resource considerations: 2,140.

The above numbers do not add up to the sum of the changes because some of the species that were recorded as being removed or changed categories in part of their range in one year, were removed or changed categories in the remaining part of their range in subsequent years. For example, because a portion of the range for one species was removed from Survey and Manage in 2001 and the other portion was removed in 2003, the total number of species removed by the three ASRs in all or part of their range is 58.

As a result of the above changes, there are currently 295 species and 4 arthropod functional groups included in the Survey and Manage mitigation measure under Alternative 1, with management requirements for each species based on characteristics of relative rarity, whether they can be reasonably located and identified during site-specific field surveys, and whether there is sufficient information to determine conformance to the basic criteria.

For 72 species, Alternative 1 currently requires site-specific "pre-disturbance" surveys prior to most management activities. In addition, "strategic" surveys are required for

all Survey and Manage species to learn more about the species and its habitat. Strategic surveys are the primary source of information on species for which pre-disturbance surveys are not practical. Information gathered through strategic surveys helps provide the basis for making species management decisions.

When surveys locate a species, a "known site" is established and is managed. These sites normally range from 1/4 to 10 acres in size. For about half of the species, each has been found on fewer than 19 sites. Only 10 of the species in Alternative 1 have been found on more than 200 sites.

Number of Species and Taxa

Because 42 species were removed from Survey and Manage in all their range (and 16 in part of their range) during the 2001, 2002, and 2003 Annual Species Review processes defined in the Survey and Manage Standards and Guidelines, this no-action alternative applies to 295 species and 4 arthropod functional groups in all or part of their range. Taxa include: vertebrates, bryophytes, mollusks, vascular plants, fungi, and lichens, in addition to the 4 arthropod functional groups. Each species is assigned to one of six management categories as shown on Table 2-13.

Effects discussions in *Chapter 3&4* include effects for the 58 species "off" Survey and Manage in all or part of their range under this alternative. Of these, 15 have been assigned to one of more of the Agencies' Special Status Species Programs (Table 2-2). Management of these species would be as described under Alternative 2. Since assignment to those programs is partly discretionary on the part of local agency heads and done outside the EIS process, effects for these 15 are described both as if they were included, and not included, in those programs (See Tables 2-10, 2-11, 2-13, and individual species effects sections in *Chapter 3&4*).

Standards for Inclusion

The Survey and Manage Standards and Guidelines have three basic criteria (see box) that must be met for a species to be included. Species no longer meeting these criteria will be removed; species meeting the criteria can be added.

Concern for persistence is one of the basic criteria for applying the Survey and Manage mitigation measure to a species. A concern for persistence exists when the reserve system and other standards and guidelines of the Northwest Forest Plan do not appear to provide a reasonable assurance of species persistence. Little or no concern for

Table 2-2. Summary of Assumed Special Status Species Program Assignments for Species "Off" Survey and Manage in Alternative 1 (Specific species assignments are show on Table 2-13)

Taxon*	BLM OR/WA[1]	BLM CA	FS R-6 WA	FS R-6 OR	FS R-5	ANY[2]
Fungi (27)	0	0	2	2	0	**2**
Lichens (13)	0	2	3	2	0	**5**
Bryophytes (4)	0	0	0	1	0	**1**
Vertebrates (2)	0	0	1	1	0	**1**
Mollusks (10)	2	1	1	4	0	**5**
Vascular Plants (2)	1	0	1	1	0	**1**
Totals	**3**	**3**	**8**	**11**	**0**	**15**

* The total number of species "off" of Survey and Manage in all or part of their range under Alternative 1 is included in parens next to the taxon.
[1] Includes Bureau Sensitive and Bureau Assessment species. Bureau Tracking species are not included.
[2] The ANY column is the total number of species in one or more SSSP. This is not the total of the five columns.

persistence exists when the reserve system and other standards and guidelines of the Northwest Forest Plan (other than Survey and Manage) provide a reasonable assurance of persistence. When this assurance of species persistence exists, the species may be removed from the Survey and Manage mitigation measure.

Criteria Indicating a **Concern for Persistence**. One or more of the following factors may indicate that persistence is a concern:

- 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.

Criteria Indicating **No Concern for Persistence**. Usually, most of the following criteria need to be met to indicate that a concern for persistence does not exist:

- Moderate-to-high number of likely extant sites/records.
- High proportion of sites and habitat in reserve land allocations, or 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.
- Sites are relatively well distributed within the species range.
- Matrix Standards and Guidelines or other elements of the Northwest Forest Plan provide a reasonable assurance of species persistence.

Concern for persistence is based on existing knowledge and may change over time.

Species Categories

Three Basic Criteria for Survey and Manage

1. The species must occur within the Northwest Forest Plan area, or occur close to the Northwest Forest Plan area and have potentially suitable habitat within the Northwest Forest Plan area.
2. The species must be closely associated with late-successional or old-growth forest.
3. 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.

Once species are included in Survey and Manage, they are assigned to one of six management categories (A-F) as shown in Table 2-3. Categories are based on: (1) relative rarity; (2) ability to reasonably and consistently locate occupied sites during surveys prior to habitat-disturbing activities; and, (3) the level of information known about the species or group of species. The species included in Survey and Manage, and the category to which each species, or portion of the range of each species, is assigned, are shown on Table 2-13 at the end of this chapter.

Relative Rarity

Species that are "rare" have a higher concern for persistence than species that are "uncommon." Management direction for rare and uncommon species is different because relative rarity changes the level of concern and, subsequently, the management needed to provide for a reasonable assurance of persistence.

A determination that a species is "rare" is based on a combination of information, as described in the criteria for

Table 2-3. Survey and Manage Categories and Management Requirements, Alternative 1

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	Category A – 56 species • Manage All Known Sites • Pre-Disturbance Surveys • Strategic Surveys	Category B – 183 species • Manage All Known Sites • N/A[1, 2] • Strategic Surveys	Category E – 33 species • Manage All Known Sites • N/A[2] • Strategic Surveys
Uncommon	Category C – 7 species • Manage High-Priority Sites • Pre-Disturbance Surveys • Strategic Surveys	Category D – 15 species[3] • Manage High-Priority Sites • N/A • Strategic Surveys	Category F – 10 species • N/A • N/A • Strategic Surveys

Species do not total 295 because the 4 arthropod functional groups are included in Category F, and for 5 species, different areas of their geographic ranges are assigned to different categories.
[1] Equivalent-effort surveys are required for 2006 and beyond (2011 for fungi) unless strategic surveys are completed.
[2] Three mollusks require equivalent-effort surveys as a mitigation measure.
[3] Includes three species with pre-disturbance surveys practical but not necessary.

each category. A species may be rare if it has: (1) limited distribution; (2) a low number of sites or individuals per site; (3) highly specialized habitat requirements; (4) declining habitat or population trends; (5) reproductive characteristics that limit population growth rates; (6) restricted distribution pattern relative to range or potential habitat; and/or, (7) narrow ecological amplitude.

A determination that a species is "uncommon" is based on information that indicates a species may have: (1) more widespread distribution; (2) higher numbers of sites; (3) low-to-high number of individuals per site; (4) more stable populations or habitats; (5) less restricted distribution pattern relative to range or potential habitat; and/or, (6) moderate-to-broad ecological amplitude.

Ability to Reasonably and Consistently Conduct Pre-Disturbance Surveys

Pre-disturbance surveys are "clearance" surveys that are completed when projects may disturb species habitats. They are conducted prior to signing NEPA documents with the goal of reducing the potential inadvertent loss of sites by searching specified habitats before habitat-disturbing activities occur.

Pre-disturbance surveys are defined as "practical" if a reasonable effort is likely to determine the presence of a species on a specific area. Put another way, practicality of surveys generally relates to the ability to confidently answer questions about species presence through surveys, while avoiding unreasonable costs or spending unreasonable amounts of time. Surveys before habitat disturbance are considered practical if all of the following criteria apply:

- The species appears annually or predictably, producing identifying structures that are visible for a predictable and reasonably long time.
- The species is not so minuscule or cryptic as to be barely visible.
- The species 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 species can be readily distinguished in the field and needs no more than simple laboratory or office examination to confirm its identification.

- Surveys do not require unacceptable safety or species risks.
- Surveys can be completed in two field seasons (approximately 7-18 months).
- Credible survey methods for the species are known or can be developed within a reasonable time period (approximately 1 year).

Level of Knowledge About a Species

Species are assigned to Categories E and F if there is insufficient knowledge to determine whether they meet the three basic criteria for inclusion in the Survey and Manage mitigation measure.

Project Analysis

Surveys prior to habitat-disturbing activities are required for some Survey and Manage species. Such surveys help gather relevant information during the NEPA process so that it is available to the Decision-maker(s) before actions are taken. Ideally, this information would be available to Interdisciplinary Teams during preparation of an EA or Draft EIS so it could be used in project analysis, formulation of alternatives, and evaluation of effects. Required surveys should be completed and their results included in an EA or Draft EIS whenever practicable. This would have the added advantage that results would be available during the public review and comment process.

Categories A and C (63 species) require that site-specific surveys be conducted prior to signing NEPA decisions or decision documents for habitat-disturbing activities. In Survey and Manage, these are called pre-disturbance surveys and they focus on the project unit with the objective of reducing the inadvertent loss of undiscovered sites by searching specified potential habitats prior to making decisions about habitat-disturbing activities. They are done according to the Survey Protocol for each species and can use methods such as transects or plots that focus on priority habitats, habitat features, or involve the entire project area. Generally, pre-disturbance surveys are only prescribed for species for which they are practical. "Equivalent-effort" surveys may be prescribed for other species whose characteristics, such as small size and identifying characteristics, prevent them from being consistently located during site-specific surveys. Under Alternative 1, equivalent-effort surveys are prescribed as a mitigation measure for three mollusk species, and for projects in old-growth for four Category B bryophytes and two Category B lichens because strategic surveys have not been completed for them.

Habitat-Disturbing Activities are disturbances likely to have a significant negative impact on the species' habitat, its life cycle, microclimate, or life support requirements.

Survey Protocols provide guidelines for pre-disturbance surveys. These are interagency documents 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.

Line officers should seek specialists' recommendations to help determine the need for a survey based on site-specific information.

The policy governing pre-disturbance surveys for wildland fires for resource benefits was updated on July 31, 2003 (USDA, USDI 2003e). A wildland fire for resource benefit is a fire that results from natural ignition (i.e. lightning strike) and is (1) permitted to burn because it is resulting in resource benefits; (2) consistent with the land and resource management plan; (3) consistent with the fire management plan; and, (4) burning within prescription. No pre-disturbance surveys are required for wildland fires for resource benefits, regardless of land allocation, if certain conditions are met. See *Exemption to*

Survey and Manage Pre-disturbance Survey Requirements for Wildland Fire for Resource Benefits section earlier in this chapter.

Pre-disturbance surveys are not required in the unusual circumstance that a delay in implementation of the activity (to permit pre-disturbance surveys) would result in greatly increased and unacceptable environmental risk. Such circumstances are subject to review by the Survey and Manage IMG (USDA, USDI 2003d) to ensure the urgency of the activity justifies the risk to species.

Site Management

Known sites are historic and current locations of a species reported by a credible source, available to field offices, and that do not require additional species verification or survey by the Agency to locate the species. Known sites include those sites known prior to the signing of the Northwest Forest Plan Record of Decision (USDA, USDI 1994b), as well as sites located since then. Known sites are typically found during pre-disturbance or strategic surveys. Known sites are documented and recorded in Agency databases.

Manage All Known Sites applies to rare species and means all current and future known sites will be managed according to the Management Recommendation for the species. Professional judgment, 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 Survey and Manage IMG (USDA, USDI 2003d).

Manage High-Priority Sites applies to uncommon species and means only high-priority sites need to be managed according to the Management Recommendation for the species. However, until a Management Recommendation is written addressing high-priority sites for the species, either assume all sites are high priority or, with guidance from the Interagency Survey and Manage Program Manager, determine locally that the known site is not high priority. Professional judgment, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional high-priority sites not needed for persistence. These exceptions will be reviewed by the Survey and Manage IMG (USDA, USDI 2003d).

Management Recommendations are interagency documents that address how to manage known sites and provide guidance for conserving Survey and Manage species. They describe the habitat parameters that will provide for maintaining the species at the site. They are the responsibility of management working closely with taxa experts and are developed by taxa experts and land managers (at any administrative level) for use at field offices. They are subject to review by the Survey and Manage IMG (USDA, USDI 2003d).

Management Recommendations may also provide information on natural history, current species status, species distribution, management goals, and objectives. They can also include specific management actions or recommendations, monitoring needs, and needs for information and research to the extent such information supports management of known sites, identification of high-priority sites, and identification of survey priorities.

They also provide guidance for site-specific decisions about what management activities are appropriate within the site. 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.

For uncommon species, Management Recommendations identify high-priority sites that must be managed, as well as sites that no longer need to be managed.

Inventories

Inventory is conducted through "strategic surveys." Strategic surveys are landscape-scale surveys designed to collect information about a species, including its presence and habitat. They are required for all Survey and Manage species. Information provided by strategic surveys (as well as research and other information-gathering efforts) helps address fundamental questions about Survey and Manage species, including: (1) is there a concern for persistence? (2) is the species rare or uncommon? (3) is the species closely associated with late-successional forests? (4) what is the appropriate management for the species? and, (5) do the reserve land allocations and other standards and guidelines of the Northwest Forest Plan provide a reasonable assurance of species persistence? Information from strategic surveys is used in the annual species review process and is incorporated into Management Recommendations and Survey Protocols. Strategic surveys are prescribed for all categories. Once strategic surveys have helped answer these questions, or further surveys are not expected to contribute significant additional information, strategic surveys may be complete even if few or no additional sites are found.

Strategic surveys are different from pre-disturbance surveys because they are focused on gathering information about the species and its habitat needs range-wide, and are not focused on determining presence or absence in specific areas prior to habitat-disturbing activities.

Because Category B species are rare and do not have pre-disturbance surveys, completing strategic surveys is a high priority. For this category, the Standards and Guidelines require "To reduce the inadvertent loss of undiscovered sites, the Agencies will not sign NEPA decisions or decision documents for habitat-disturbing activities in old-growth forest (a sub-set of late-successional forest - see *Glossary*) in fiscal year 2006 (fiscal year 2011 for fungi) and beyond, unless either:

- "strategic surveys have been completed [as defined in the standards and guidelines] for the province that encompasses the project area, or
- "surveys equivalent to pre-disturbance surveys have been conducted in the old-growth habitat to be disturbed."

Adding/Removing Species

The Annual Species Review is a detailed process for annually analyzing new information about species and moving them to new categories, removing them from, or adding them to Survey and Manage. This process is based on new information about the species regarding numbers, distribution, and other factors indicating risk to persistence. New information about species is also used to develop or revise Management Recommendations, Survey Protocols, and the Strategic Survey Implementation Guide.

The adaptive management process includes the following steps.

1. Acquiring new information relative to Survey and Manage species. New information about species status or needs is generated through strategic surveys, pre-disturbance surveys, and other sources. This information is maintained primarily in the GeoBOB/ISMS database.

2. Evaluating new information. A regional-level, interagency group including taxa experts, meeting at least annually, weighs new information against the persistence and category criteria to determine if additions or deletions of species from Survey and Manage or changes of species among categories are warranted. Similarly, when new information indicates that a species no longer meets the Survey and Manage basic criteria, the species will be removed. Removed species can be considered for inclusion in the Agencies' Special Status Species Programs. In particular, for species that are removed from Survey and Manage because they are found not to be associated with late-successional or old-growth forests, their known sites will continue to be managed until it is determined whether they are eligible for the Agencies' Special Status Species Programs.

3. Implementing changes or refinements to Survey and Manage. Changes include adding and removing species, and changing species between categories, as well as changes to Management Recommendations, Survey Protocols, and the Strategic Survey Implementation Guide. Changes are the responsibility of management working closely with taxa experts and may be made without further NEPA documentation. Changes are reflected in subsequent project planning documents.

The results are reviewed by the RIEC Survey and Manage Subcommittee (USDA, USDI 2003d) to ensure that current information about the species has been appropriately considered and weighed against the stated criteria, and that proposed reassignments continue to provide at least the level of protection intended by the Standards and Guidelines.

Reports, Monitoring, and Review

Annual Status Reports are required and will, at minimum, include: (1) the results of adaptive management changes; (2) status of Management Recommendations and Survey Protocols; (3) a summary of the Strategic Survey Implementation Guide (including the status of strategic surveys); (4) status and results of ongoing monitoring; and, (5) important new management direction. This report is the primary tool for the public to learn about annual changes to species assignments and resultant application of surveys to activities. The Agencies maintain a mailing list for all persons wishing to receive all or part of this report.

Monitoring will continue in accordance with existing monitoring requirements for the Northwest Forest Plan and for the land and resource management plans for each of the Forest Service and BLM administrative units within the Northwest Forest Plan area.

Review by the Survey and Manage IMG or the RIEC Survey and Manage Subcommittee (USDA, USDI 2003d) is required for eight different documents or processes included in the Survey and Manage Standards and Guidelines. Three documents are referenced in these Standards and Guidelines: Management Recommendations, Survey Protocols, and Strategic Survey Implementation Guide. Each document plays an important role in accomplishing Survey and Manage objectives. The documents are typically written for a species range. 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. New or revised versions of Management Recommendations and Survey Protocols are subject to review by the Survey and Manage IMG (USDA, USDI 2003d) 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. New or revised versions of the Strategic Survey Implementation Guide are subject to review by the RIEC Survey and Manage Subcommittee (USDA, USDI 2003d). Other processes (e.g., exceptions to

management of known sites, changes in categories resulting from the annual species review) are also subject to Survey and Manage IMG (or RIEC Survey and Manage Subcommittee) (USDA, USDI 2003d) review as described in these Standards and Guidelines. The Survey and Manage IMG or RIEC Survey and Manage Subcommittee (USDA, USDI 2003d) may develop criteria to exempt certain documents or processes from review.

Alternative 2, Proposed Action (Northwest Forest Plan without Survey and Manage)

The Agencies propose to remove the Survey and Manage Standards and Guidelines by amending 28 land and resource management plans within the range of the northern spotted owl to remove the Survey and Manage Standards and Guidelines. The Survey and Manage Standards and Guidelines Sections I-VIII and XII (USDA, USDI 2001a, Attachment 1) would be removed in their entirety except for that portion of Section I removing the 1994 Standards and Guidelines. The description of Management Recommendations and the explanation of how they are revised would continue to apply to certain cavity nesting birds and some bat roosts as referenced in Sections IX and XI, respectively. The Canada lynx Standard and Guideline, Section X, would also continue to apply.

This alternative assumes the BLM's Special Status Species policies and the Forest Service' Sensitive Species policies would continue to apply in the Northwest Forest Plan area. In this SEIS, these policies are referred to collectively as the Agencies' Special Status Species Programs, or SSSPs. The guidance for these programs is found in the following national and regional/state policies (see *Appendix 2* for excerpts):

<u>BLM</u>

1. National Policy - BLM Manual 6840 (Release 6-121 11/09/01).
2. OR/WA - OR/WA Instruction Memorandum OR-91-57 dated November 5, 1990, and OR/WA Instruction Memorandum 2003-054 dated March 24, 2003.
3. CA - BLM Manual Supplement 6840 (Release No. 6-24, dated March 25, 1996) and 6840 Handbook Special Status Plant Management (Release 6-25 4/15/96).

<u>Forest Service</u>

1. National Policy - Forest Service Manual - Chapter 2670 Threatened, Endangered, and Sensitive Plants and Animals (effective June, 23, 1995) and Forest Service Manual Chapter 2620 - Habitat Planning and Evaluations (effective July 19, 1991).
2. Region 6 - 2670 letter to Forest Supervisors updating the Regional Forester's Sensitive Animal List dated November 28, 2000, and 2670 letter to Forest Supervisors updating the Regional Forester's Sensitive Plant List dated May 13, 1999.
3. Region 5 - Regional Forester's 2670 letter dated June 10, 1998.

Standards for Inclusion

This SEIS does not propose to establish, update, amend, modify, or change existing policies for the Agencies' Special Status Species Programs; it merely analyzes the effects of implementing the existing programs on the Survey and Manage species that were eligible for inclusion in one or more of the Agencies' Special Status Species Programs. This SEIS assumes for the analysis of effects that once species are included in the Agencies' Special Status Species Programs they will be managed according to

the direction for those programs. The Agencies' have the authority to update, amend, modify, change, or eliminate their policy. Species are included or removed from the Special Status Species Programs based on new information and the application of the Agencies' policies in effect at that time. Existing policies that guide the activities and actions required for the Special Status Species Programs are described below.

The Agencies update their Special Status Species lists on a regular schedule, when state heritage programs publish new rankings, or when other information indicates a need. After 1994, both Forest Service regions delayed or deferred inclusion of additional species in their Sensitive Species programs because the species were already included in the Survey and Manage mitigation measure. With the proposed removal of the Survey and Manage Standards and Guidelines, and with new information about Survey and Manage species as a result of recent pre-disturbance and strategic surveys, the Agencies requested updated rankings from state natural heritage programs in 2003.

The Agencies' program managers used the updated rankings and other species information to review the 295 (Alternative 1) Survey and Manage species to determine their eligibility for inclusion in the Agencies' existing Special Status Species Programs. Based on that review, the Agencies' Special Status Species Program Managers provided the list of eligible species to be analyzed in this SEIS. For analysis purposes, it was assumed that the Survey and Manage species that were eligible for the Agencies' Special Status Species Programs would be added to those programs if the Survey and Manage Standards and Guidelines were removed. Under Alternative 2, 152 of the 295 Survey and Manage species were identified as eligible for inclusion in one or more of the Agencies' existing Special Status Species Programs (240 separate program assignments). The 2004 FSEIS included an analysis assumption that if Alternative 2 was selected, the Regional Foresters and State Directors would exercise their authority to add species to the Special Status Species Programs.

The Agencies subsequently added 145 of these 295 Alternative 1 species to one or more of their respective Special Status Species Programs (Table 2-13)(counting those already included at that time), and the effects to species described in *Chapter 3&4* of this Supplement reflect these actual assignments. (Since such assignments are actually outside the purview of this SEIS, effects to these species are also described for a scenario of Alternative 2 without Special Status Species Programs assignments.)

For 15 (of the 240) Special Status Species Programs assignments assumed in the 2004 FSEIS but not subsequently made, 13 species turned out not to occur or be suspected on relevant agency lands, the ORNHIC ranking changed for one, and one was deemed more secure than originally believed, in part because it is more common outside the Northwest Forest Plan area and is a synonym for another Survey and Manage fungus that is more common. The above numbers do not include the 42 species added to this analysis by Alternative 4. Twelve of those are also currently assigned to one or more of the Agencies' Special Status Species Programs. Table 2-13 in this Supplement includes only those assignments actually made.

Alternative 2 continues implementation of all other elements of the Northwest Forest Plan, continues the underlying land and resource management plans for the individual administrative units, and continues relevant agency programs and policies. None of the species affected by this proposal are currently listed as threatened, endangered, or proposed for listing under the Endangered Species Act.

Policy Objectives - Special Status Species

The Forest Service' Sensitive Species Policies and the BLM's Special Status Species Policies, and thus the Special Status Species Programs, have similar objectives (a

comparison table for both programs, and Survey and Manage, and excerpts from the Agencies' policies are found in Appendix 2). The objectives of the policies, and thus the programs, are for the Agencies to avoid actions that may contribute to the need to list a Special Status Species under the Endangered Species Act. Both programs require coordination with state and other federal agencies to achieve conservation goals of species identified by state governments. The objectives of the Forest Service' Sensitive Species Policy also include compliance with NFMA regulations requiring diversity of plant and animal communities, and requiring habitat to be managed to maintain viable populations of existing native and desired non-native vertebrate species.

BLM: To ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list any special status species, either under provisions of the Endangered Species Act or other provisions of this policy (BLM Manual 6840.02 B).

Forest Service:

1. Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
2. Maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.
3. Develop and implement management objectives for populations and/or habitat of Sensitive species (Forest Service Manual 2670.22).

The following describes, for analysis purposes, how Survey and Manage species that have been included in one or more of the Agencies' Special Status Species Programs would be managed under those programs. Policies and descriptions of the programs may have been summarized, condensed, or paraphrased. If there is a discrepancy between the language in the description of Alternative 2 and Agency policy, the policy prevails. Each Agency will follow their own policy for the species added to their programs. This SEIS does not propose to establish or change existing policies; it merely analyzes their implementation. Selected excerpts specific to the Special Status Species Programs can be found in Appendix 2 and on the internet by starting at http://www.fs.fed.us/r6/sfpnw/issssp/.

Number of Species and Taxa

Not all of the Survey and Manage species qualify for the Agencies' Special Status Species Programs. Agency personnel, using the existing criteria specific to their agency and region, identified which Survey and Manage species are eligible for inclusion in one or more of the Agencies' Special Status Species Programs.

As described earlier in this chapter, the number of species "currently" on Survey and Manage depends upon which no-action alternative is being considered. The analysis for Alternative 2 discussed in *Chapter 3&4* and summarized later in this chapter, however, describes the effects of not being on Survey and Manage for all 337 species included in this analysis. Out of these 337 species, 157 species are eligible for one or more of the Agencies' "Sensitive" (or "Assessment," Oregon /Washington BLM only) categories and have been so assigned. Sensitive and Assessment categories are described below. The numbers of species by taxa that are assumed to be included in these programs under Alternative 2 are shown in Table 2-4. Forest Service Regional Foresters and BLM State Directors are responsible for designating or removing species from their programs. It is assumed that qualifying species shown in Table 2-13 will be, or have been, added to the Agencies' Special Status Species Programs as a reasonably foreseeable result of selecting

Alternative 2. For analysis purposes, this assumption is considered in the environmental consequences discussions in *Chapter 3&4*. However, the effects to species if they are not added to, or are removed from, Agencies' Special Status Species Programs at this time are also displayed.

Of the 157 species eligible for inclusion in the Agencies' Special Status Species Programs, only 2 species are included in all four programs (and several others are included throughout their range). However, many species are eligible for inclusion in more than one program. When a species is included in more than one program, each agency will manage the species in accordance with their own policy.

Project Analysis

BLM: The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Land use plans shall be sufficiently detailed to identify and resolve significant land use conflicts with special status species without deferring conflict resolution to implementation-level planning. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the Endangered Species Act are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary (BLM manual 6840.22 A).

Bureau Sensitive. Analyze effects of the proposed action on potentially affected species. Request technical assistance, if appropriate, from U.S. Fish and Wildlife Service, NOAA Fisheries, or other qualified sources. Avoid taking actions that would contribute to the need to list the species under the Endangered Species Act (BLM 6840).

Bureau Assessment (OR/WA only). Analyze effects of the proposed action on potentially affected species. Avoid taking actions that would contribute to the need to list the species under the Endangered Species Act. Impacts by BLM actions to the population and to the species as a whole will be determined in the NEPA process (BLM Instruction Memorandum Nos. OR 91-57 and OR 2003-054).

Bureau Tracking (OR/WA only). To enable the state natural heritage program to determine appropriate state rankings, collection of occurrence data is encouraged and

Table 2-4. Summary of Assumed Special Status Species Program Assignments for Species "Off" Survey and Manage in Alternative 2 (Specific species assignments are show on Table 2-13)

Taxon*	BLM OR/WA[1]	BLM CA	FS R-6 WA	FS R-6 OR	FS R-5	ANY[2]
Fungi (208)	20	31	32	26	8	**67**
Lichens (49)	13	12	20	19	2	**31**
Bryophytes (17)	8	4	3	5	2	**12**
Vertebrates (7)	3	1	4	4	3	**7**
Mollusks (44)	8	5	13	14	8	**30**
Vascular Plants (12)	6	2	4	8	5	**10**
Totals	**58**	**55**	**76**	**76**	**28**	**157**

* The total number of species "off" of Survey and Manage under Alternative 2 is included in parens next to the taxon.
[1] Includes Bureau Sensitive and Bureau Assessment species. Bureau Tracking species are not included.
[2] The ANY column is the total number of species in one or more SSSP. This is not the total of the five columns.

reported if observed. Bureau Tracking is not considered a special status species for management purposes (BLM Instruction Memorandum No. OR 91-57).

Forest Service: The Forest Service' 2670 Manual (June 23, 1995) requires:

As part of the NEPA process, review programs and activities through a biological evaluation, to determine their potential effect on Sensitive species. The biological evaluation analyzes the proposed action and the significance of potential adverse effects on the population or its habitat within the area and on the species as a whole, and makes recommendations for removing, avoiding, or compensating for any adverse effect. It must be prepared by a journey-level biologist or botanist and include: (1) Sensitive species that may be present; (2) identification of occupied and unoccupied habitat; (3) an analysis of the effects of the proposed action on the species or their occupied habitat; (4) a discussion of cumulative effects; (5) a determination of no effect, beneficial effect, or may affect; and, (6) recommendations for avoiding or mitigating any adverse effects.

Region 5 Watch List: These species make an important contribution to forest biodiversity and should be maintained under the provisions of NFMA, and addressed as appropriate through the NEPA process (Region 5 Regional Forester letter). These are not considered special status species for the purpose of this analysis.

Pre-project clearances are activities conducted to learn whether a species is present or potentially present in a geographic area. Pre-project clearances may include, but are not limited to,

- clearance surveys;
- field clearances;
- field reconnaissance;
- inventories;
- habitat examinations;
- habitat evaluation;
- evaluation of species-habitat associations and presence of suitable or potential habitat;
- review of existing survey records, inventories, and spatial data;
- utilization of professional research, literature, and other technology transfer sources; or
- use of expertise, both internal and external, that is based on documented, substantiated professional rationale.

Pre-project clearances are completed prior to habitat-disturbing activities to determine the presence of a species or its habitat and the effect of management actions on the species.

BLM: In general, BLM only conducts pre-project clearances for those Sensitive species where BLM administered lands or actions have a significant effect on their status.

Bureau Sensitive: To ensure that actions authorized, funded, or carried out by the BLM do not contribute to the need to list any Sensitive species as threatened or endangered, conduct inventories (i.e., pre-project clearances) to determine the impacts of such actions on any Sensitive species that might be within the area of a proposed project. Inventories (i.e., pre-project clearances) are to be conducted at the time of year when species can be found (BLM Instruction Memorandum No. OR 91-57 and CA Supplement 6840).

The manual for BLM California goes on to present a decision key for determining the minimum level of inventory, at least for Sensitive plants, based on the probability

of occurrence of the species and the level of habitat disturbance associated with the proposed activity. Survey exceptions require approval by the State Director. Potential effects to Sensitive species and their habitats are discussed in the environmental assessment for the proposed activity (BLM CA 6840 Handbook III).

Bureau Assessment (OR/WA only): Pre-project clearances are required contingent upon available funding and personnel. When funding and personnel are not available, a review of likely habitats on maps and aerial photos, and available data from other federal and state agencies and State Heritage Programs, will be the minimum acceptable level for clearances (BLM Instruction Memorandum No. OR 91-57).

Bureau Tracking (OR/WA only): Pre-project clearances are not required (BLM Instruction Memorandum No. OR 91-57).

Forest Service: Forest Service policy is to complete a Biological Evaluation to review potential impacts of proposed actions on Sensitive species, as described in the *Project Analysis* discussion above. The biological evaluation identifies all occupied and unoccupied habitat for Sensitive species that may occur in the project area. Surveys may be conducted in suitable habitat to determine if a species is present, but are not required. If suitable habitat is identified, the assumption may be made that it is occupied and measures are recommended to avoid impacts (Forest Service Manual 2670).

Region 5 Watch List: To analyze potential impacts to these species, consider the context, intensity, and duration of likely effects. Appropriate analysis may range from formal surveys to simple documentation of a lack of potential habitat. Do not incorporate analysis for the Watch List species into the biological evaluation, which is reserved for Sensitive Species. Regardless of inclusion on any list, concerns related to NFMA diversity and viability requirements for any species or its habitat can be raised as a NEPA issue, and should be tracked through the planning process (Region 5 Regional Forester letter).

Site Management

Manual direction concerning species site management is slightly different between the Agencies. It is the policy of both Agencies to avoid actions that would contribute to a need to list a Special Status species as threatened or endangered under the Endangered Species Act. Authority to disturb known Sensitive species sites lies with the agency official who is responsible for authorizing the proposed habitat-disturbing activity.

BLM: The protection provided by the policy for candidate species shall be used as the minimum level of protection for BLM Sensitive species (BLM Manual 6840.06 E). Consistent with existing laws, the BLM shall conserve Sensitive species and their habitats and shall ensure that actions authorized, funded, or carried out by the BLM do not contribute to the need for the species to become listed.

Specifically, BLM shall:

1. Determine, to the extent practicable, the distribution, population dynamics, current threats, abundance, and habitat needs for Sensitive species occurring on lands administered by the BLM; evaluate the significance of lands administered by the BLM or actions undertaken by the BLM in maintaining and restoring those species.

2. For Sensitive species where lands administered by the BLM or BLM authorized actions have a significant effect on their status, manage the habitat to conserve the species by:
   a. Ensuring candidate species are appropriately considered in land use plans.

b. Developing, cooperating with, and implementing range-wide or site-specific management plans, conservation strategies, and assessments for Sensitive species that include specific habitat and population management objectives designed for conservation, as well as management strategies necessary to meet those objectives.
c. Ensuring that BLM activities affecting the habitat of Sensitive species are carried out in a manner that is consistent with the objectives for managing those species.
d. Monitoring populations and habitats of candidate species to determine whether management objectives are being met (BLM Manual 6840.06 C).

Forest Service: Avoid or minimize impacts to species whose viability has been identified as a concern. If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. The line officer with project approval authority makes the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward federal listing (Forest Service Manual 2670.32).

Conservation Strategies

BLM: The protection provided by the policy for "candidate" species (taxa for which the U.S. Fish and Wildlife Service has sufficient information on their status and threats to support proposing the species for listing as endangered or threatened under the Endangered Species Act, but for which issuance of a proposed rule is currently precluded by higher priority listing actions) is used as the minimum level of protection for BLM Sensitive species (BLM Manual 6840.06 E). Policy regarding conservation strategies for BLM Sensitive species is:

1. In coordination with U.S. Fish and Wildlife Service and/or NOAA Fisheries determine, to the extent practicable, the distribution, population dynamics, current threats, abundance, and habitat needs for candidate species occurring on lands administered by the BLM. Evaluate the significance of lands administered by the BLM or actions undertaken by the BLM in maintaining and restoring those species.

2. For Sensitive species where lands administered by the BLM or BLM authorized actions have a significant effect on their status, manage the habitat to conserve the species by:
   a. Ensuring Sensitive species are appropriately considered in land use plans.
   b. Developing, cooperating with, and implementing range-wide or site-specific management plans, conservation strategies, and assessments for candidate species that include specific habitat and population management objectives designed for conservation, as well as management strategies necessary to meet those objectives.
   c. Ensuring that BLM activities affecting the habitat of Sensitive species are carried out in a manner that is consistent with the objectives for managing those species.
   d. Monitoring populations and habitat of Sensitive species to determine whether management objectives are being met.

In an effort to eliminate the need for listings under the Endangered Species Act, the BLM shall participate in developing habitat conservation assessments leading to conservation agreements for proposed, candidate, and Sensitive species, groups of species, or specific ecosystems. A conservation assessment is a technical document that describes the current state of the knowledge for the life history, habitat requirements, and management considerations for a species or group of species throughout its occupied range on the

lands managed by the cooperating agencies. Habitat conservation assessments are often done as a forerunner to preparation of a conservation agreement (BLM Manual 6840.22. C.2).

State Directors and line managers should identify opportunities for habitat conservation assessments or, if none exists, initiate the development of these assessments and conservation agreements for the purpose of furthering the conservation of the subject species on BLM administered and other lands (BLM 6840.22 C.2.b).

The BLM should use habitat conservation assessments to develop conservation agreements that outline the procedural assurance necessary to: (1) reduce, eliminate, or mitigate specific threats to proposed, candidate, or Sensitive species; (2) develop an ecosystem management approach to conservation on federal lands; and, (3) facilitate coordination and cooperation with others, such as States and private entities, to achieve species and habitat conservation through an ecosystem management approach that extends beyond federally managed lands (BLM 6840.22 C.2.c).

Regional manual supplements for Oregon/Washington and California summarize this policy, stating that for Sensitive species where lands administered by the BLM, or BLM actions, have a significant effect on their status: (1) manage the habitat to conserve the species; (2) prepare management plans when necessary; and, (3) implement active management where needed to prevent listing or to conserve the species. Progress toward meeting species management objectives will be monitored periodically (BLM Instruction Memorandum No. OR 91-57).

Forest Service: To preclude trends toward endangerment that would result in the need for federal listing, units must develop conservation strategies for those Sensitive species whose continued existence may be negatively affected by the forest plan or a proposed project. To devise conservation strategies, first conduct biological assessments of identified Sensitive species. In each assessment, meet these requirements:

1. Base the assessment on the current geographic range of the species and the area affected by the plan or project. If the entire range of the species is contained within the plan or project area, limit the area of analysis to the immediate plan or project area. If the geographic range of the species is beyond the plan or project area, expand the area of analysis accordingly.

2. Identify and consider, as appropriate for the species and area, factors that may affect the continued downward trend of the population, including such factors as: distribution of habitats, genetics, demographics, habitat fragmentation, and risk associated with catastrophic events.

3. Display findings under the various management alternatives considered in the plan or project (including the no action alternative) (FSM 2621.2).

For Sensitive plants in Region 5, the interim Threatened, Endangered, and Sensitive Plant Handbook (Region 5 Forest Service Handbook 2609.25) requires that, when information on a Sensitive species is needed, a professional botanist directs the botanical investigation of species in order to determine the status of the species. The botanical investigation is an in-depth investigation conducted to gather information on distribution, abundance, trends, ecological requirements, and management needs. Based on the botanical investigation, a Species Management Guide is produced. A Species Management Guide is a biological and administrative action document that contains the information and guidance necessary for successful management of a species through time. A guide specifies monitoring and periodic review to ensure that it is working to benefit the species. As new data becomes available, it is incorporated into species management

guides. Effective implementation of these guides should ensure the long-term viability of Sensitive species, thereby, preventing the need to list the species under the Endangered Species Act.

In Region 6, conservation strategies are developed for candidate and Sensitive species. The strategy is based on the best scientific information available for the species and usually includes an outline of the biological limiting factors, recommended conservation measures to manage or protect the species, and a monitoring plan (Region 6 Regional Forester letter dated August 17, 1995).

Inventories

General inventories are similar to Strategic Surveys. They are conducted to learn more about a species distribution and status. These surveys can be conducted to help develop conservation strategies.

BLM: State Directors are responsible for establishing programs to determine which special status species occur on public land, and the condition of the populations and their habitats (BLM Manual 6840.04 E.3). Field managers are responsible for conducting and maintaining current inventories for special status species on public lands (BLM Manual 6840.04 F.1).

BLM OR/WA: For Sensitive species, general inventories are required where needed to determine species distribution and status, and monitoring to determine the species' requirements and trends (BLM Instruction Memorandum No. OR 91-57).

BLM CA: It is policy to conduct inventories to determine the occurrence and status of all special status plant species on lands managed by BLM or affected by BLM actions. This includes pro-active inventories directed toward development of plans or determining the status of plant species. Such inventories are to be conducted at the time of year when such plant species can be found and positively identified (BLM CA 6840 Handbook III).

Forest Service: Inventories are encouraged where needed to support biological evaluations and establish management objectives for conservation of Sensitive species. Inventories are not required.

Adding/Removing Species

The heritage program rankings are updated on a regular cycle of 2-3 years, depending on the state. These rankings are then published or posted on their websites. The BLM Sensitive species list in Oregon is considered to include all ORNHIC List 1 species, with few exceptions, when new rankings are published. The State Director is able to accept, add, or remove ranked species as information warrants. In addition, BLM District managers can nominate species for addition or deletion.

Forest Service Sensitive species lists are updated at the discretion of the Regional Forester. These lists are updated as demand warrants.

Reports, Monitoring, and Review

Monitoring will continue in accordance with existing monitoring requirements for the Northwest Forest Plan and for the land and resource management plans for each of the Forest Service and BLM administrative units within the Northwest Forest Plan area. No new monitoring requirements are proposed.

Formal reviews or reports regarding special status species are not required.

BLM: The Special Status Species Program Manager is responsible for monitoring implementation of the special status species program and recommending changes to ensure compliance with law, regulation, and policy and to maintain effectiveness of the program (BLM Manual 6840.04 E.8). BLM policy is to monitor populations and habitats of Sensitive species to determine whether management objectives are being met (BLM Manual 6840.06 C.2.d). Field Managers are responsible for ensuring actions are evaluated to determine if special status species objectives are being met (BLM Manual 6840.04 F.5).

BLM OR/WA: Monitoring is required for Bureau Sensitive species where lands administered by the BLM or BLM actions have a significant effect on their status. Monitoring should be designed on a case-by-case basis at the intensity appropriate for the monitoring objective (related to an EA, to species trend, or species/habitat management). Monitoring may include any of the following: (1) Compliance monitoring to determine if protection and mitigation measures included in project EAs were implemented in the field; (2) Impact analysis monitoring to determine if protection and mitigation implemented in the field achieved management objectives; or (3) Research and studies to determine biological status, taxonomic status, threats, trend, etc., by qualitative and quantitative data collection. Monitoring is optional for Bureau Assessment and Bureau Tracking species (BLM Instruction Memorandum No. OR 91-57).

BLM CA: For Sensitive plants, BLM California prioritizes Sensitive species for monitoring based upon degree of rarity, existing threats, and potential conflicts. Plant species with the highest rating are monitored annually while others are monitored every 3-5 years. A study plan is developed and peer reviewed for each species being monitored (BLM CA 6840 Handbook IV).

Forest Service: Monitoring should be proposed as necessary to determine if wildlife, fish, and other resource objectives are being met. Develop and implement management strategies (objectives, management prescriptions, and monitoring) to meet riparian habitat goals for dependent fish and wildlife species.

Regional Foresters are responsible for ensuring Region-wide consistency in standards, technologies, and methods used in habitat planning and evaluation and monitoring of wildlife and fish resources (Forest Service manual 2620.43).

Region 6: Include a monitoring plan in conservation strategies for candidate and Sensitive species.

Region 5: For Sensitive plants, monitor key populations and specify monitoring and periodic review in species management guides to ensure that the guide is working to benefit the species.

Alternative 3 (Northwest Forest Plan with Modified Survey and Manage)

Under Alternative 3, the Agencies would amend 28 land and resource management plans within the range of the northern spotted owl by modifying the Survey and Manage Standards and Guidelines. Modifications include: (1) removing the uncommon species categories and all Survey and Manage requirements pertaining to them; (2) eliminating the requirement to conduct pre-disturbance surveys in non-late-successional and non-old-growth forest stands; and, (3) changing the review requirements for excepting known sites from management.

This alternative retains Survey and Manage for the 271 species in the "rare" categories (Categories A, B, and E) in Alternative 1. The Survey and Manage Standards and Guidelines, as modified by Alternative 3, are included in Appendix 4. Key features of Alternative 3 are summarized below. If there is a conflict between the Standards and Guidelines found in Appendix 4 and the text in this document, the Standards and Guidelines in Appendix 4 prevail.

Twenty-eight Survey and Manage species plus 4 arthropod functional groups in the "uncommon" categories in No-Action Alternative 1, as well as the 58 species previously removed by one of the Annual Species Reviews in all or part of their range and not included in Alternative 1, are not included in Survey and Manage under this alternative. For these species, the Agencies have reviewed their eligibility and assigned qualifying species to one or more of their Special Status Species Programs. (Details about the Agencies' Special Status Species Programs are summarized under Alternative 2.) If Alternative 3 is selected, the analysis in this SEIS assumes qualifying species will be managed under those programs. However, the effects of not adding species to these programs, or of removing them, are also discussed in the *Environmental Consequences* section for each species in *Chapter 3&4*, displayed on Table 2-13 at the end of this chapter, and summarized on Tables 2-10, 2-11, and S-1.

NOTE: Species placements in this alternative are based on Alternative 1, as described in the 2004 FSEIS and July 2006 Draft Supplement. The January 2007 *Supplement* showed this alternative reconfigured based on the species and category assignments of Alternative 4 so that more species would be included in the analysis. That configuration also shared an effects analysis assumption with Alternative 4 that were it to be selected, a species review process would begin immediately and the changes made in the 2001, 2002, and 2003 Annual Species Reviews would be expected to be reinstated. After publication of the January 2007 *Supplement*, is was realized it was not appropriate for an Action Alternative to carry an analysis assumption that it would be immediately changed, and in this case, changed in predictable ways based on information already available to the Agencies and even displayed in Appendix 9. Alternative 3 now simply adopts (and thus analyzes) the assumed changes, those made by the previous Annual Species Reviews, by being based on the species and category assignments of Alternative 1. The appropriateness of these changes is not based on the information in Appendix 9 alone; the species effects analyses in *Chapter 3&4* and summarized later in this chapter describe the effects of the individual species assignments, thus providing the evidence as to whether those assignments are appropriate.

The description of this alternative is returned to that displayed in the 2004 FSEIS and July 2006 Draft Supplement previously made available for public review and comment.

Program/Policy Objectives

Program objectives for the Survey and Manage mitigation measure are the same as those described under Alternative 1. Policy objectives for the Agencies' Special Status Species Programs are the same as those described under Alternative 2.

Number of Species and Taxa

The number of "rare" species and the categories to which they are assigned are the same as No-Action Alternative 1. Alternative 3 removes Standards and Guidelines for the "uncommon" categories in Survey and Manage. The 271 species assigned to "rare" Categories A, B, or E in Alternative 1 as shown on Table 2-13 would continue to be included in the Survey and Manage mitigation measure. Taxa would include: vertebrates, bryophytes, mollusks, vascular plants, fungi, and lichens. For four species

that are included in both the "rare" and "uncommon" categories, the species would be removed from Survey and Manage in the "uncommon" portion of the species' range, and would be retained in Survey and Manage in the "rare" portion of the range.

The twenty-eight Survey and Manage species plus 4 arthropod functional groups in the "uncommon" categories in No-Action Alternative 1, and the 58 species previously removed by one of the Annual Species Reviews in all or part of their range and not included in Alternative 1, are not included in Survey and Manage under this alternative. Because, for five species, "part of their range" was removed by an Annual Species Review and another part of their range is removed as an uncommon species, the total number of species not on Survey and Manage in this alternative is 81, for all or part of their range. Of these 81, 66 are not included in Survey and Manage for their entire NWFP area range, and 15 are not on Survey and Manage for part of their range. These species are shown as "off" under this alternative on Table 2-13.

For these species, the Agencies reviewed their eligibility and assigned 28 to one or more of their Special Status Species Programs (summarized on Table 2-5; individual assignments shown on Table 2-13). Effects for these species under the Special Status Species Programs are described in *Chapter 3&4* and included on Table 2-13. Because Agency managers have latitude regarding assignments to the these Programs, the effects of not adding species to these programs, or of removing them, are also discussed in the *Environmental Consequences* section for each species in *Chapter 3&4*, displayed on Table 2-13 near the end of this chapter, and summarized on Tables 2-10, 2-11 and S-1.

Details about qualifications for, and management under, the Agencies' Special Status Species Programs are summarized under Alternative 2.

Standards for Inclusion

Survey and Manage has three basic criteria (see box included with Alternative 1 description) that must be met for a species to be included in the Survey and Manage Standards and Guidelines. Species no longer meeting these criteria will be removed; species meeting the criteria can be added. (Note: Since uncommon species are not included in Survey and Manage under Alternative 3, the criteria addressing concern for persistence reflects a higher threshold of concern than under Alternative 1.)

Table 2-5. Summary of Assumed Special Status Species Program Assignments for Species "Off" Survey and Manage in Alternative 3 (Specific species assignments are show on Table 2-13)

Taxon*	BLM OR/WA[1]	BLM CA	FS R-6 WA	FS R-6 OR	FS R-5	ANY[2]
Fungi (42)	1	1	4	4	0	6
Lichens (17)	1	5	6	5	1	9
Bryophytes (4)	0	0	0	1	0	1
Vertebrates (3)	2	0	1	3	0	3
Mollusks (11)	2	2	2	4	0	7
Vascular Plants (4)	1	2	1	1	2	2
Totals	7	10	14	18	3	28

* The total number of species "off" of Survey and Manage in all or part of their range under Alternative 3 is included in parens next to the taxon.
[1] Includes Bureau Sensitive and Bureau Assessment species. Bureau Tracking species are not included.
[2] The ANY column is the total number of species in one or more SSSP. This is not the total of the five columns.

Concern for persistence is one of the basic criteria for applying the Survey and Manage mitigation measure to a species. A concern for persistence exists when the reserve system and other standards and guidelines of the Northwest Forest Plan do not appear to provide a reasonable assurance of species persistence. Little or no concern for persistence exists when the reserve system and other standards and guidelines of the Northwest Forest Plan (other than Survey and Manage) provide a reasonable assurance of persistence. When this assurance of species persistence exists, the species may be removed from the Survey and Manage mitigation measure.

Criteria Indicating a **Concern for Persistence**. A combination of one or more of criteria 1 through 9 and criteria 10 or 11, considered in the context of the reserve system and other standards and guidelines of the Northwest Forest Plan, may indicate a concern for species persistence. These criteria must be considered separate from the Survey and Manage mitigation measure and must apply within the Northwest Forest Plan area.

1. Low number of likely extant known sites/records or low number of estimated sites predicted from statistical analysis of random-grid surveys or comparable statistical surveys.
2. Low numbers of individuals throughout the species range.
3. Low number of individuals at most sites or in most populations.
4. Reproductive characteristics that limit population growth rates.
5. Found or suspected in only one physiographic province or a similar small area.
6. Limited habitat or narrow ecological amplitude within known or suspected range.
7. Not well distributed within range or habitat or distribution is unpredictable in a significant part of its range.
8. Declining habitat or populations in a significant part of its range.
9. Habitat fragmentation significant enough to cause genetic isolation.
10. Low proportion of sites and habitat in reserve land allocations or limited number of sites within reserves, but the proportion or amount of potential habitat within reserves is high and there is a low probability that the habitat is occupied.
11. Matrix Standards and Guidelines or other elements of the Northwest Forest Plan do not provide for a reasonable assurance of species persistence.

Criteria Indicating Little or **No Concern for Persistence**. Any one of criteria 1 through 9 or either 10 or 11 indicates that a concern for persistence may not exist. These criteria must apply within the Northwest Forest Plan area.

1. Moderate-to-high number of likely extant sites/records or moderate-to-high number of estimated sites predicted from statistical analysis of random-grid surveys or comparable statistical surveys.
2. Moderate-to-high numbers of individuals throughout the species range.
3. Moderate-to-high number of individuals at most sites or in most populations.
4. Population growth rates are not limited by reproductive characteristics.
5. Found or suspected in more than one physiographic province or similar small area.
6. Habitat is not limited or moderate-to-broad ecological amplitude within known or suspected range.
7. Well distributed in a significant part of its range.
8. Stable or increasing habitat or populations in a significant part of its range.
9. Habitat continuity allows reasonable flow of genetic material.

10. Moderate-to-high proportion of sites and habitat in reserve land allocations, or limited number of sites within reserves, but the proportion or amount of potential habitat within reserves is high and there is a moderate-to-high probability that the habitat is occupied.
11. Matrix Standards and Guidelines or other elements of the Northwest Forest Plan provide a reasonable assurance of species persistence.

Concern for persistence is based on existing knowledge and may change over time. While concern will remain for some species that are truly rare, the concern for many species will be alleviated as more information is accumulated through pre-disturbance and strategic surveys, and considered with the criteria indicated above. A species for which there is no longer a concern for persistence will be removed from the Survey and Manage mitigation measure as described in the *Adaptive Management* section.

The criteria for adding species to the Special Status Species Programs are described under Alternative 2.

Species Categories

Species included in Survey and Manage would be assigned to one of three management categories (A, B, or E) as shown on Table 2-6. Categories are based on: (1) ability to reasonably and consistently locate occupied sites during surveys prior to habitat-disturbing activities, and (2) the level of information known about the species or group of species. The species included in Survey and Manage, and the category to which each species, or portion of the range of each species, is assigned, are shown on Table 2-13.

Ability to Reasonably and Consistently Conduct Pre-Disturbance Surveys

Pre-disturbance surveys are completed for projects that may disturb species habitats. They are conducted prior to signing NEPA documents with the goal of reducing the inadvertent loss of sites by searching specified habitats.

Pre-disturbance surveys are defined as practical, if a reasonable effort is likely to determine the presence of a species on a specific area. Put another way, practicality of surveys generally relates to the ability to confidently answer questions about species presence through surveys, while avoiding unreasonable costs or spending unreasonable amounts of time.

Table 2-6. Survey and Manage Categories and Management Requirements, Alternative 3

Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Category A – 56 species • Manage All Known Sites • Pre-Disturbance Surveys in LSOG • Strategic Surveys	Category B – 183 species • Manage All Known Sites • N/A[1, 2] • Strategic Surveys	Category E – 33 species • Manage All Known Sites • N/A[2] • Strategic Surveys

Species do not total 271 because for 1 species, different areas of their geographic ranges are assigned to different categories.
LSOG = Late Successional and/or old-growth forest stands
[1] Equivalent-effort surveys are required for FY 2006 and beyond (2011 for fungi) unless strategic surveys are completed.
[2] Three mollusks require equivalent-effort surveys as a mitigation measure.

Surveys prior to habitat disturbance are considered practical if all of the following criteria apply:

- The species appears annually or predictably, producing identifying structures that are visible for a predictable and reasonably long time.
- The species is not so minuscule or cryptic as to be barely visible.
- The species 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 species can be readily distinguished in the field and needs no more than simple laboratory or office examination to confirm its identification.
- Surveys do not require unacceptable safety or species risks.
- Surveys can be completed in two field seasons (approximately 7-18 months).
- Credible survey methods for the species are known or can be developed within a reasonable time period (approximately 1 year).

Level of Knowledge About a Species

Species are assigned to Category E if there is insufficient knowledge to determine whether they meet the three basic criteria for inclusion in the Survey and Manage mitigation measure.

Species categories for Special Status Species are described under Alternative 2.

Project Analysis

Project analysis requirements for Survey and Manage species would be the same as described for Alternative 1 except that the requirement to conduct pre-disturbance surveys is limited to habitat in late-successional or old-growth forests (see below). Project analysis requirements for Special Status Species would be the same as described for Alternative 2.

Category A requires that pre-disturbance surveys be conducted prior to signing NEPA decisions or decision documents for habitat-disturbing activities in late-successional and/or old-growth forests. They focus on the project unit with the objective of reducing the inadvertent loss of undiscovered sites by searching specified potential habitats prior to making decisions about habitat-disturbing activities. They are done according to the Survey Protocol for each species and can use methods such as transects or plots that focus on priority habitats, habitat features, or involve the entire project area. Generally, pre-disturbance surveys are only prescribed for species for which they are practical. "Equivalent-effort" surveys are prescribed as a mitigation measure for three Category B mollusk species whose characteristics, such as small size and identifying characteristics, prevent them from being consistently located during site-specific surveys.

Habitat-Disturbing Activities are disturbances likely to have a substantial negative impact on the species' habitat, its life cycle, microclimate, or life support requirements.

Survey Protocols provide guidelines for pre-disturbance surveys. These are interagency documents 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.

Line officers should seek specialists' recommendations to help determine the need for a survey based on site-specific information.

Pre-disturbance and equivalent-effort surveys are not required in stands that have not yet become late-successional and/or old-growth forest. The unit proposing the project will be responsible for applying the following definition in making the determination whether a forest stand is late-successional.

> **Late-successional forests** - Forest stands consisting of trees, structural attributes, supporting biological communities, and processes associated with old-growth and/or mature forests (USDA, USDI 1994a). Forest seral stages that include mature and old-growth age classes (USDA, USDI 1994a). These stands exhibit increasing stand diversity, patchy multi-layered canopy, trees of several age classes, larger standing dead trees (snags), large woody debris and species that represent the potential natural community (USDA et al. 1993). Age is not a defining characteristic but has been used as a proxy or indicator in the past. Minimum ages vary depending on the site quality, species, rate of stand development, and other factors.

The policy governing pre-disturbance surveys for wildland fires for resource benefits was updated on July 31, 2003 (USDA, USDI 2003e). A wildland fire for resource benefit is a fire that results from natural ignition (i.e. lightning strike) and is (1) permitted to burn because it is resulting in resource benefits; (2) consistent with the land and resource management plan; (3) consistent with the fire management plan; and, (4) burning within prescription. No pre-disturbance surveys are required for wildland fires for resource benefits, regardless of land allocation, if certain conditions are met. See *Exemption to Survey and Manage Pre-disturbance Survey Requirements for Wildland Fire for Resource Benefits* section earlier in this chapter.

Pre-disturbance surveys are not required in the unusual circumstance such that a delay in implementation of the activity (to permit pre-disturbance surveys) would result in greatly increased and unacceptable environmental risk. Such circumstances are subject to review by the line officer at the next level above the official responsible for the proposal to ensure the urgency of the activity justifies the risk to species.

Pre-project clearances for Special Status Species would be the same as described under Alternative 2.

Site Management

Known sites are historic and current locations of a species reported by a credible source, available to field offices, and that do not require additional species verification or survey by the Agency to locate the species. Known sites include those sites known prior to the signing of the Northwest Forest Plan Record of Decision (USDA, USDI 1994b), as well as sites found since then. Known sites are typically found during pre-disturbance or strategic surveys.

Known site management for Survey and Manage species would be the same as Alternative 1, except: it would only apply to Categories A, B, and E; and, exceptions to known site management would be approved by the line officer at the next level above the official responsible for the proposal.

For the 66 species not included in Survey and Manage in all of their range, and 15 not included in part of their range, known sites of species not assigned to Agency Special Status Species Programs would no longer be managed and would be made available for multiple use. For the 28 species that qualify for the Agencies' Special Status Species Programs, site management would be the same as described under Alternative 2.

Conservation Strategies

Conservation strategies for Special Status Species would be the same as described under Alternative 2.

Inventories

For species remaining in Survey and Manage, inventory will continue through strategic surveys. Strategic surveys are landscape-scale surveys designed to collect information about a species, including its presence and habitat. Information provided by strategic surveys (as well as research and other information-gathering efforts) helps address fundamental questions about Survey and Manage species, including: (1) is there a concern for persistence? (2) is the species closely associated with late-successional forests? (3) what is the appropriate management for the species? and, (4) do the reserve land allocations and other standards and guidelines of the Northwest Forest Plan provide a reasonable assurance of species persistence? Information from strategic surveys is used in the annual species review process and is incorporated into Management Recommendations and Survey Protocols. Strategic surveys are prescribed for all categories. Once strategic surveys have helped answer these questions, or further surveys are not expected to contribute significant additional information, strategic surveys may be complete even if few or no additional sites are found.

Strategic surveys are different from pre-disturbance surveys because they are focused on gathering information about the species and its habitat needs range-wide, and are not focused on determining presence or absence in specific areas prior to habitat-disturbing activities.

Because Category B species are rare and do not have pre-disturbance surveys, completing strategic surveys is a high priority. For this category, the Standards and Guidelines require "To reduce the inadvertent loss of undiscovered sites, the Agencies will not sign NEPA decisions or decision documents for habitat-disturbing activities in old-growth forest (a sub-set of late-successional forest - see *Glossary*) in fiscal year 2006 (fiscal year 2011 for fungi) and beyond, unless either:

- "strategic surveys have been completed [as defined in the standards and guidelines] for the province that encompasses the project area, or
- "surveys equivalent to pre-disturbance surveys have been conducted in the old-growth habitat to be disturbed."

Currently, equivalent-effort surveys would be required for four bryophytes and two lichens species under this requirement.

Inventories for Special Status Species would be the same as described under Alternative 2.

Adding/Removing Species

For Survey and Manage species, the process for adding or removing species would be the same as described under Alternative 1, except that additional NEPA analysis is assumed required if the proposed changes are determined to be a plan amendment. For Special Status Species, the process for adding or removing species would be the same as described under Alternative 2.

Reports, Monitoring, and Review

Requirements for reports, monitoring, and review for Survey and Manage species would be the same as described under Alternative 1. Reports, monitoring, and review for Special Status Species would be the same as described for Alternative 2.

Alternative 4, No-Action without ASRs (Northwest Forest Plan Including Survey and Manage for 337 Species)

Alternative 4, No-Action, would continue implementing all current elements of the Northwest Forest Plan including the Survey and Manage mitigation measure (modified slightly to assume future ASRs will require additional NEPA analysis if they result in a plan amendment), the underlying land and resource management plans, and relevant agency programs and policies. It responds to the November 6, 2006 Ninth Circuit Court decision on two BLM timber sales by including those species previously thought removed by Annual Species Reviews. It therefore includes all 337 species and categories (plus 4 arthropod functional groups) listed in the 2001 Survey and Manage Record of Decision (USDA, USDI 2001a:41-51).

Background

In 2001, there were 337[8] species and 4 arthropod groups included in the Survey and Manage mitigation measure. The 2001 Survey and Manage Standards and Guidelines include an Annual Species Review (ASR) process for adding, removing, or changing a species from one category to another, based on new information relative to the Survey and Manage three basic criteria. The ASR process is a rigorous, science-based, comparison of available species information with criteria specified in the Survey and Manage Standards and Guidelines and used to place the species in 2001 (USDA, USDI 2001a:Standards and Guidelines-68). The process was completed in 2001, 2002, and 2003 according to the prescribed process and criteria (see *Appendix 9*). The three ASRs removed 42 species in all of their range and 16 species in part of their range because they did not meet one or more of the three basic criteria for inclusion in Survey and Manage, and changed the categories of another 32 in all or part of their range, including 5 in part of their range that are also counted in the 16 above. Thus, for the 2004 Final Supplemental Environmental Impact Statement (FSEIS) and Record of Decision, there were 295[9] species and 4 arthropod functional groups remaining on Survey and Manage. Those species and the categories to which they were assigned were described in the 2004 FSEIS, the July 2006 Draft Supplement, and this Final Supplement as Alternative 1, No-Action with ASRs.

On November 6, 2006, the United States Court of Appeals for the Ninth Circuit found the 2001 and 2003 Survey and Manage ASR category change and subsequent removal of the red tree vole from the Mesic Biological Zone constituted a Resource Management Plan amendment which should have had accompanying National Environmental Policy Act (NEPA) analysis. Although the court's decision was specific to the red tree vole, it is prudent and reasonable for the Agencies to consider the potential implications of that decision on other species affected by the ASR process. This Supplement, therefore, presents analysis of another no-action alternative (Alternative 4), which includes all 337

[8]The 2000 FSEIS addressed "346" species, but that number included 4 arthropod groups, 3 species that were counted twice because they were in more than one category, and two species that have since been determined to be synonyms for other included species and thus has been combined.
[9]The 2004 FSEIS addressed "296" species, but that number included a species that has since been determined to be a synonym for another included species and thus has been combined.

species included in Survey and Manage, and their category assignments as they appeared in the 2001 Record of Decision prior to completion of the three ASRs.

This alternative does not reflect the Agencies' position on any further legal proceedings related to the Ninth Circuit Court ruling on the Cow Catcher and Cottonsnake Timber Sales or the Annual Species Review process. Because no legal decision has been rendered about other ASR decisions, or even about the red tree vole on National Forests, No-Action Alternative 1 from the 2004 FSEIS and July 2006 Draft Supplement is also retained.

This alternative is the same as Alternative 1 except as follows:

Number of Species and Taxa

The Annual Species Review changes of 2001, 2002, and 2003 are assumed not to have occurred. Thus, 42 species previously removed in all of their range and 26 species previously removed in part of their range are included in Survey and Manage in this alternative. It also includes 32 species with changed categories in all or part of their range (5 or which are ones previously removed in the other part of their range), variously increasing or decreasing protection levels when compared to Alternative 1. Table 2-7 shows the number of species by category. Table 2-13 shows the categories to which each species is assigned.

Project Analysis

"Equivalent-effort" surveys were prescribed in the 2001 Record of Decision as a mitigation measure for certain mollusk species "for as long as they remain in Category B or E." Thus, this mitigation measure applies to an additional four mollusks (These are in addition to the three already identified under Alternative 1). The affected mollusks are *Ancotrema voyanum, Helminthoglypta hertleini, Monadenia infumata ochromphalus*, and *Pristoloma arcticum crateris*.

Table 2-7. Survey and Manage Categories and Management Requirements, Alternative 4

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	Category A – 57 species • Manage All Known Sites • Pre-Disturbance Surveys • Strategic Surveys	Category B – 220 species • Manage All Known Sites • N/A[1, 2] • Strategic Surveys	Category E – 22 species • Manage All Known Sites • N/A[2] • Strategic Surveys
Uncommon	Category C – 10 species • Manage High-Priority Sites • Pre-Disturbance Surveys • Strategic Surveys	Category D – 14 species[3] • Manage High-Priority Sites • N/A • Strategic Surveys	Category F – 21 species • N/A[4] • N/A • Strategic Surveys

Species do not total 337 because the 4 arthropod functional groups are included in Category F, and for 3 species, different areas of their geographic ranges are assigned to different categories.
[1] Equivalent-effort surveys are required for FY 2006 and beyond (2011 for fungi) unless strategic surveys are completed.
[2] Seven mollusks require equivalent-effort surveys as a mitigation measure.
[3] Includes three species with pre-disturbance surveys practical but not necessary.
[4] Two mollusks require management of sites known as of 9/30/99, as a mitigation measure.

Site Management

Manage sites known as of September 30, 1999 was prescribed in the 2001 Record of Decision as a mitigation measure for two mollusk species, *Megomphix hemphilli* in California and south of Lincoln, Benton, and Linn Counties in Oregon, and *Monadenia churchi*, "for as long as these species remain in Category F." Thus, this mitigation measure applies to these two mollusks under Alternative 4.

Adding, Removing, and Changing Species Between Categories

The reference in the Survey and Manage Standards and Guidelines to adding species or removing species, from Survey and Manage and making changes to species categories "without further NEPA documentation" now assumes such changes will be accompanied by appropriate NEPA analysis when such changes would result in a plan amendment.

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 action.

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. The Purpose and Need, as described in *Chapter 1*, is the need for "… *healthy forest ecosystems and a sustainable supply of timber and other forest products, to the extent these are frustrated by the Survey and Manage Standards and Guidelines*." This includes purposes to conserve rare and little known species, reduce costs, and improve the Agencies' ability to provide healthy forests and timber outputs. 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 or intent of this SEIS 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 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 the Agencies' ability to meet the underlying needs of the Northwest Forest Plan by addressing the problems associated with the Survey and Manage Standards and Guidelines. 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 described below.

No Late-Successional and Old-Growth Harvest

This alternative addresses concerns that the proposed action would result in the loss of some late-successional and old-growth forests that are not already protected by the Late-Successional and Riparian Reserves in the Northwest Forest Plan. By prohibiting

harvest of these forests, proponents hope to avoid negative impacts to ecological systems and social values like spiritual renewal, scenic beauty, and recreation. This alternative would extend prohibitions on harvest of late-successional and old-growth forests to the remaining 20 percent of federally managed lands not already included in the reserve system in the Northwest Forest Plan. During the scoping process, several variations of this theme were proposed including no old-growth harvest both with and without the Survey and Manage Standards and Guidelines. Many scoping respondents cited an alternative proposed by the Oregon Natural Resources Council (now Oregon Wild). This variation prohibits late-successional and old-growth harvest, retains the Survey and Manage Standards and Guidelines, and eliminates pre-disturbance survey requirements for some projects.

In 1994, the Northwest Forest Plan Record of Decision (USDA, USDI 1994b) resolved the issue of late-successional and old-growth forest protection through selection of Alternative 9. Alternative 9 allocated about 80 percent of federally managed lands to reserves, leaving about 20 percent for sustainable timber production. In making that decision, the Secretaries of Agriculture and the Interior considered nine other alternatives that included varying levels of late-successional and old-growth forest preservation. In particular, Alternative 1 retained essentially all remaining old-growth and reduced lands available for sustainable timber production to 11 percent (USDA, USDI 1994a:2-41). Alternative 1 was rejected in the 1994 Record of Decision.

Protecting additional late-successional and old-growth forests outside reserves would be similar to Alternative 1 in the 1994 Final SEIS, and would be akin to expanding the reserve land allocation decision in the 1994 Record of Decision. As previously stated, the Agencies have not identified a need to make changes to the Northwest Forest Plan land allocations. Therefore, any alternative that includes no harvest of late-successional and old-growth forests is considered outside the scope of this proposal.

Keep Survey and Manage for Vertebrate Species Only

The intent of this alternative is to reduce costs by removing all species from the Survey and Manage mitigation measure except for vertebrate species. Some have suggested that only vertebrate species warrant protection because the viability provision in the National Forest Management Act planning regulations at 36 CFR 219.19 refers only to "existing native and desired non-native vertebrate species." This alternative reduces the list of Survey and Manage species from 337 to 7.

This alternative is similar to the proposed action and does not merit further consideration because it would be redundant to the proposed action in terms of environmental consequences. Effects would only differ from the proposed action for the six of the seven species that would be retained in Survey and Manage under this alternative. However, under Survey and Manage, these six all require pre-disturbance surveys in all or part of their range and all are on one or more of the Agencies' Special Status Species Programs (four previous to the proposed action, and two added in 2004), although the red tree vole and great gray owl are included in the Special Status Species Programs in only a portion of their range. Under those programs, pre-project clearances will also be used where needed or required to meet SSSP goals. Thus, the only substantial difference between this alternative and the proposed action is in treatment of the red tree vole and great gray owl. Effects of including the red tree vole and great gray owl in Survey and Manage, or not, are already discussed in *Chapter 3&4*, and potential mitigation is described where adverse effects are identified. Repeating that analysis for this alternative would be redundant.

Keep Survey and Manage, Use the Natural Heritage Program Process to Determine which Species to Include

This alternative would use the natural heritage program species ranking process as the basis for determining which species would be subject to the Survey and Manage Standards and Guidelines. Proponents have suggested that this process would remove potential agency bias and result in a more credible Survey and Manage species list. Other elements of the Survey and Manage Standards and Guidelines would remain. Criteria would need to be developed for determining which species to include in Survey and Manage. Without such criteria, it is impossible to predict exactly which species would be included in Survey and Manage under this alternative.

Survey and Manage focuses on providing for rare species persistence at the Northwest Forest Plan scale. The Natural Heritage Programs do not assess species threats and rarity at this scale. Instead, these programs look at State and Global scales as a means to determine species ranks. These differences in scales make use of the Natural Heritage Programs ranking system impossible to use for determining species concerns at the Northwest Forest Plan scale. Inflexible management and survey requirements would continue frustrating accomplishments of multiple-use and NWFP goals and continue high costs.

Eliminate Survey and Manage, Coordinate Agency Policies Regarding Special Status Species Management

This alternative responds to concerns that there are differences in the Agencies' Special Status Species Programs, between the Agencies, between BLM state offices, and between Forest Service regions. Differences in programs can lead to inconsistencies in Special Status Species listings between and within agencies. This alternative is the same as the Proposed Action except it goes further by requiring the Agencies to coordinate their Special Status Species Programs so they are consistent throughout the Northwest Forest Plan area.

Coordinating Special Status Species Programs between agencies already occurs as appropriate. Existing agency policies include guidance aimed at coordinating their respective programs with States and other federal agencies:

- Regional Foresters are responsible for coordinating Regional programs with States, other federal agencies, groups, and individuals concerned with the management of threatened, endangered, and Sensitive species (Forest Service Manual 2670.44).
- BLM State directors are responsible for coordinating the special status species program with adjoining BLM State Offices, State, and other federal agencies, various private organizations, and BLM constituents (BLM Manual 6840.04 E.2).

The different laws governing the two agencies and the different habitat capabilities associated with agency lands explain most of the inconsistencies. While there may be some benefits from additional coordination of Special Status Species Programs between and within agencies, this alternative is outside the scope of this proposal since it involves policies and processes independent of the Northwest Forest Plan. The purpose and need for this proposal is focused on reducing costs and management limitations associated with the Survey and Manage Standards and Guidelines. Suggesting changes in how the Agencies manage and coordinate their Special Status Species Programs does not address the purpose and need for this proposal. These programs are national in scope and their management and coordination go well beyond the Northwest Forest Plan area. The Proposed Action removes the Survey and Manage Standards and Guidelines and identifies species that are likely to gain, or have gained, Special Species status after

they are removed from Survey and Manage. The Agencies have the discretion to add or remove species from their Special Status Species Programs as appropriate. Coordinating such programs is an administrative function; nothing in this proposal prevents the Agencies from coordinating their Special Status Species Programs at any time.

Keep Survey and Manage, Eliminate the Pre-Disturbance Survey Requirement

This alternative seeks to reduce costs by eliminating the requirement for pre-disturbance surveys. All other elements of the Survey and Manage mitigation measure would continue. Of the 295 Survey and Manage species in Alternative 1, pre-disturbance surveys apply to 72 species (including 9 receiving equivalent-effort surveys). Yet, pre-disturbance surveys are the most expensive mitigation measure in the Survey and Manage Standards and Guidelines and account for about half the cost of the program.

This alternative shares some similarities with Alternative 3, which eliminates pre-disturbance surveys for the uncommon species (Category C) and eliminates the pre-disturbance survey requirement for projects in non-late-successional and non-old-growth forest stands. However, it differs in the requirement to survey for the 56 rare species in late-successional and old-growth forest stands. Without this requirement, many species would have insufficient habitat to support stable populations. Therefore, eliminating the pre-disturbance requirement in its entirety (meaning they would also not be added to Agency Special Status Species Programs) would not meet the purpose to conserve rare and little known species and is eliminated from further study.

Keep Survey and Manage, Cut Costs by Exempting Certain Projects

This alternative seeks to reduce Survey and Manage costs by exempting certain projects from requirements for pre-disturbance surveys. All other elements of the Survey and Manage Standards and Guidelines would remain. Examples include no pre-disturbance surveys for precommercial thinning, prescribed fire, or fire salvage projects; low intensity surveys in Matrix and in plantations in Late-Successional Reserves; and no surveys required for stands below specified age limits (e.g. less than 80 years old). This alternative was considered, but eliminated from further consideration because it is similar to Alternative 3. Alternative 3 eliminates requirements for pre-disturbance surveys for projects in non-late-successional and non-old-growth forest stands. All other elements of Survey and Manage would be retained except for the uncommon species and some requirements for REO review. As such, this alternative was considered, but eliminated from detailed study because it would be redundant to the alternatives already considered in detail.

Eliminate Survey and Manage, Keep Strategic Surveys

This alternative would be similar to the Proposed Action except that Strategic Surveys would continue until they were completed. It continues information-gathering through strategic surveys, but eliminates all other elements of Survey and Manage including pre-disturbance surveys and management of known sites. As with the Proposed Action, qualifying Survey and Manage species would probably be added to the Agencies' Special Status Species Programs. The Agencies did in fact continue with many aspects of strategic surveys after March 2004 when they thought they had removed Survey and Manage, because of initial investments and the applicability of results to the management of Special Status Species. Statistical analysis of results from the Random Multi-Species Surveys, for example, was completed late in 2006 (see *Chapter 3&4*). In addition, the

Agencies' Special Status Species Programs have provisions for general inventories, which are similar to strategic surveys. This alternative was considered, but eliminated from further consideration because it is basically the same as Alternative 2.

Stop All Timber Harvest

This alternative prohibits all timber harvest and recommends only custodial management of federal forests in the Northwest Forest Plan area. Prohibiting timber harvest would not fulfill the underlying need because the need for timber outputs would not be met. In addition, fuel treatment projects that include commercial timber harvest would not be undertaken. This would leave many forests at risk of catastrophic wildfire and compromise forest health. This alternative would also violate the O&C Act, which mandates that lands managed under the Act be managed for the sustained-yield of timber. This alternative was eliminated because it does not meet the underlying need for the proposal and violates federal law.

Strengthen the Survey and Manage Standards and Guidelines

This alternative would expand the current Survey and Manage Standards and Guidelines by retaining more species in the program, increasing the frequency and intensity of strategic and pre-disturbance surveys, and managing more known sites. This alternative addresses two concerns. First, some commenters feel the current Survey and Manage Standards and Guidelines are a good model for species management and should be expanded to other species. Second, other commenters believe the current Survey and Manage Standards and Guidelines were weakened by the 2001 Record of Decision and need to be restored to the requirements in the 1994 Record of Decision.

Alternative 3 in the Survey and Manage Final SEIS 2000 had objectives similar to this alternative including pre-disturbance surveys for 322 species, and known site management for 337 species. Alternative 3 in the Survey and Manage Final SEIS 2000 would have reduced the PSQ to 455 MMBF per year with a cost of $60 million per year (USDA, USDI 2000a:417 and 434). The No-Action Alternative in the Survey and Manage Final SEIS 2000 would have maintained a program similar to that in the 1994 Record of Decision, and would also be representative of this alternative. It included pre-disturbance surveys for 87 species and management of known sites for 272 species. That alternative would have reduced the PSQ to 510 MMBF with a cost of $117 million per year (USDA, USDI 2000a:417 and 434). Analysis for Timber Harvest in this SEIS (*Chapter 3&4*) indicates that the PSQ under Alternative 1 and 4 (No-Action) would be 700 MMBF per year. Since both Survey and Manage Final SEIS 2000 alternatives would reduce the PSQ well below the 700 MMBF PSQ predicted under Alternative 1, and the ability to do fuels treatments and other potentially habitat-disturbing management activities would be proportionately reduced, strengthening the Survey and Manage Standards and Guidelines as suggested would fail to meet the underlying need of the proposal to achieve the objectives of the Northwest Forest Plan. In addition, this alternative would fail to reduce costs below that of the No-Action Alternatives ($21 million) and thus fails to meet the purpose to reduce costs. Because it fails to meet the purpose and need of this proposal, this alternative was eliminated from detailed study.

List Survey and Manage Species under the Endangered Species Act

This alternative moves all Survey and Manage species into threatened or endangered species status under the Endangered Species Act. This alternative addresses concerns

that the Survey and Manage program is flawed and that species would be better conserved through the Endangered Species Act.

The Department of the Interior, acting through the U.S. Fish and Wildlife Service, is responsible for protecting most threatened and endangered species. The Department of Commerce, through NOAA Fisheries, is responsible for marine species, including marine mammals and anadromous fish such as salmon. The process for listing involves a rigorous consideration of rarity, threat, and other factors. There is no evidence suggesting that all Survey and Manage species are at sufficient risk to warrant listing under the Endangered Species Act. Currently, none of the Survey and Manage species are listed as threatened or endangered.

Listing species under the Endangered Species Act is outside the authority of the Agencies. Threatened and endangered species listing would need to be carried out by the regulatory agencies separate from this SEIS.

Although this alternative eliminates the Survey and Manage Standards and Guidelines, there is no evidence that it would address the purposes of providing protection for rare and little known species while reducing costs and improving the Agencies' ability to accomplish forest health projects. In fact, it is likely that managing 295 or 337 species under terms of the Endangered Species Act would be more costly and time consuming than either the Proposed Action or No-Action Alternatives. Both Survey and Manage and the Special Status Species Programs would, operating as designed, prevent species from becoming imperiled to the degree they warrant listing under the Endangered Species Act. There is no evidence to suggest that these programs are not working as intended. For these reasons, this alternative was eliminated from detailed study.

Eliminate Survey and Manage, Do Not Add Species to Agency Special Status Species Programs

This alternative is similar to Alternative 2, the Proposed Action, except the Agencies would not add Survey and Manage species to their Special Status Species Programs. This alternative would assure the maximum achievement of Northwest Forest Plan resource objectives with little or no cost for species conservation other than for species listed under the Endangered Species Act. This alternative was not considered in detail because 1) the decision of whether or not to add species to the Agencies' Special Status Species Programs is outside the scope of the SEIS, and 2) the effects of such an alternative are fully discernable from the analysis, as described below.

Although not an "alternative", since the addition of species to Special Status Species Programs is up to local Agency heads and thus may not happen (or current assignments may be removed), the effects of such a "de facto" alternative are displayed in this analysis. Individual species sections include outcomes without SSSP assignment. These outcomes are included as additional columns on Table 2-13, and summarized for all species on Tables S-1, 2-10, and 2-11. The effects of a wholesale removal of species from SSSP on Timber Harvest, Fuels Treatments, Costs and so forth are discernable in those sections as the effects of Alternative 2. For example, the PSQ effect of assigning species to the SSSPs is displayed as 35MMBF, and so forth.

Keep Survey and Manage in the Oregon Coast Range, SW Oregon, NW California, and Oregon BLM Lands

This alternative was suggested during the 2006 public comment period for the July 2006 Draft Supplement. This alternative would retain Survey and Manage where past harvest has reduced mature and old-growth stands to low levels, and where future harvest

appeared to commenter to be focused. Such an alternative would help protect Survey and Manage species where habitat is most limited or at most risk.

In provinces where mature stands are at comparatively low levels, such as the Oregon Coast Range, most older stands are already in reserves so the risk to late-successional forest habitat related species is low. Otherwise, the alternative is similar to Alternative 1. Survey and Manage surveys and known site management is already focused where harvest, fuel treatments, and other activities are focused. Known sites managed outside of areas where activities are proposed are not the ones frustrating accomplishment of other Northwest Forest Plan goals. Thus the effects of such an alternative, both in terms of species protection and program effects to other management activities, would be similar to those described for Alternative 1.

Keep Survey and Manage for Species About Which Little is Known, Put Insufficient Habitat Species on Agency Special Status Species Programs, and More Aggressively Remove Those with Sufficient Habitat

This alternative seeks to better align species needs with existing programs, while making the entire species protection program more efficient. Species with "sufficient habitat" would be removed altogether, reducing costs. Species needing protection and about which enough is known to manage them under one or more of the Agencies' Special Status Species Programs would be so assigned, and Survey and Manage would be retained for species about which little is known.

This proposal has similarities to what would happen under the proposed action. In Alternative 2, virtually no Category F species and few D species make it to an Agency Special Status Species Program because they are too common. Virtually every Category A species (Rare, Pre-Disturbance Surveys practical) is assigned to one or more of the Agencies' Special Status Species Programs because they are both rare and they can be consistently located with reasonable effort. Category C is split, some following Category A because of remaining apparent rarity or special interest, and some following Category F because of apparently high numbers. Category E, status uncertain, splits as might be expected. Some in this category are there not because of high numbers but because their reliance on late-successional habitats is in question. That would not stop them from being assigned to a Special Status Species Program, because such programs are not limited to late-successional forest associated species.

Only Category B is widely split. Most lichens and bryophytes in this category have been assigned to Agency Special Status Species Programs, because although they are hard to identify based on field or simple laboratory examination, their habitats are often unique and identifiable. Not enough is known about many Category B fungi, on the other hand, for them to qualify for Special Status Species Programs. Thus, it is predominantly these that would benefit from the suggested alternative.

For species about which little is known and not assigned to the Agencies' Special Status Species Programs, predominantly the Category B fungi, the land management Agencies are neither mandated nor funded to do basic research on populations and habitat identification. These are roles better left to research, academia, and other specialists. Retaining only this aspect of Survey and Manage would substantially reduce impacts to timber sales, fuel treatments, and other management activities because the number of species sites would be so low. However, Agency administrative costs would continue because of the need to maintain specialists, databases, and processes. Also, the Agencies expect the populations of many of these species are likely much higher than currently known because fungi do not regularly fruit or otherwise predictably show themselves

for population sampling. Results of the Random Multi-Species Surveys for fungi illustrate this point; about a third of the fungi were detected even though the numbers of previously known sites were very low. For species actually determined to need additional protection, the Agencies' Special Status Species Programs would then be applicable.

Comparison of Alternatives

Features of the Alternatives

Tables 2-8 summarizes the key features for all four alternatives in a comparative format. Alternatives differ primarily in the number of species that would be managed under the Survey and Manage Standards and Guidelines versus the Agencies' Special Status Species Programs. The key differences between the current Survey and Manage Standards and Guidelines and the Special Status Species Programs relevant to this analysis are briefly described below:

1. Species are included in the Survey and Manage mitigation measure if the three basic criteria are met:
   a. The species must occur within the Northwest Forest Plan area, or occur close to the Northwest Forest Plan area and have potentially suitable habitat within the Northwest Forest Plan area.
   b. The species must be closely associated with late-successional or old-growth forest.
   c. 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. For the Agencies' Special Status Species Programs, species are generally included only if they are rare, there is enough known about the species and its habitat to affect management, and agency actions could possibly move the species toward listing under the Endangered Species Act.

2. For species in Survey and Manage categories A, B and E, the Standards and Guidelines require management of all known sites. Exceptions are permitted following review by another office. For Special Status Species, final decisions about the management of occupied sites are up to local line officers following analysis documented in a biological evaluation or NEPA document. That analysis can weigh a variety of factors including the condition of the species and habitat locally, the potential short and long-term benefits, and other effects of the proposed management activity.

3. Survey and Manage only considers concerns for persistence in the Northwest Forest Plan area, and the Standards and Guidelines only apply to that area. The Agencies' Special Status Species Programs consider the conservation status of the species state-wide and globally, and inclusion of species in one of those programs includes it for the entire state or region, not just the Northwest Forest Plan area. Survey and Manage species with few sites known within the Northwest Forest Plan area but with extensive sites outside the area may be considered secure and not be included in the Special Status Species Programs.

4. The Survey and Manage mitigation measure only focuses on species closely associated with late-successional or old-growth forests because that habitat was decreasing up until the early 1990's when work on the Northwest Forest Plan was begun (such habitat has subsequently increased, see *Assumptions and Information*

Table 2-8. Summary of the Key Features of the Alternatives

Feature	Alternatives 1 & 4		Alternative 2				Alternative 3
Program	Survey and Manage		BLM Special Status Species		FS Sensitive Species		Survey and Manage and Special Status Species
	Alt. 1	Alt. 4	OR/WA	CA	R-6	R-5	
Program Objectives	Continued persistence of old-growth and late-successional species in the Northwest Forest Plan area.		Prevent listing under ESA.		Prevent listing under ESA and maintain viable populations of fish, plants, and wildlife.		For Survey and Manage species, objectives are the same as Alternative 1. For special status species, objectives are the same as Alternative 2
Standards for Inclusion	Northwest Forest Plan area inhabitant, late-successional and old-growth related, and a concern for persistence.		Concern for listing and knowledge of decline and threat from state natural heritage programs. Capability to significantly affect the conservation status of the species.		Concern for viability or listing based on current or predicted downward trends in population or habitat capability.		For Survey and Manage species, must be Northwest Forest Plan area inhabitant, late-successional and old-growth related, and a concern for persistence. For special status species, same as Alternative 2.
Species Categories	6 (A-F) based on rarity, uncertainty, and survey practicality.		3 - Sensitive, Assessment, Tracking	1- Sensitive	1 - Sensitive	2 - Sensitive and Watch	For Survey and Manage species: 3 (A, B, E) based on uncertainty and survey practicality. For special status species, same as Alternative 2.
# Species included (primary management)	S&M: 295 SSSP: 15	S&M: 337 SSSP: 0	S&M: 0 SSSP: 58	S&M: 0 SSSP: 55	S&M: 0 SSSP: 102	S&M: 0 SSSP: 28	S&M: 271 SSSP: 28
Project Analysis Requirements	Follow Survey Protocols, Management Recommendations and include in NEPA documents.		Impacts and mitigation considered in NEPA documents.		Analyze effects through BE and recommend mitigation in NEPA documents.		For Survey and Manage species, same as Alternative 1. For special status species, same as Alternative 2.
Pre-Project Surveys	Pre-disturbance surveys required for 72 or 95 species (includes 9 or 28 equivalent -effort surveys) for alts 1 & 4 respectively. Exceptions are limited and require IMG review.		Multiple sources of survey data are utilized as needed to determine potential impacts. Required for sensitive species in OR/WA BLM. Exceptions require State Director approval.		As needed to conduct BE effects analysis. Usually needed, unless habitat assumed occupied or prior surveys are adequate.		For Survey and Manage species, pre-disturbance surveys required for 65 species in late-successional/old-growth forest stands (includes 9 equivalent-effort surveys). Exceptions are limited and require approval by the line officer at next level above the official responsible for the proposal. For special status species, same as Alternative 2.
Site Management	Manage all Category A, B, and E sites and all high-priority C and D sites, exceptions reviewed by IMG.		Manage site if loss would contribute to need to list.		Manage site if loss would create significant trend toward listing or loss of species viability.		For Survey and Manage species, manage all known sites. Exceptions approved by the line officer at next level above the official responsible for the proposal. For special status species, same as Alternative 2.

Table 2-8. Summary of the Key Features of the Alternatives

Feature	Alternatives 1 & 4		Alternative 2				Alternative 3
Program	Survey and Manage		BLM Special Status Species		FS Sensitive Species		Survey and Manage and Special Status Species
	Alt. 1	Alt. 4	OR/WA	CA	R-6	R-5	
Conservation Strategies	Management Recommendations describe managing known sites and guidance for conserving species, including high-priority sites for 22 or 24 Category C and D species (alts. 1 and 4 respectively).		To eliminate the need for listings under the ESA, the BLM shall participate in developing habitat conservation assessments leading to conservation agreements for some species.		Include objectives in LRMPs to ensure viable populations throughout geographic ranges. Develop conservation strategies for sensitive species where continued existence can be negatively affected by the LRMP or a planned project.		For Survey and Manage species, Management Recommendations describe how to manage known sites and provide guidance for conserving species. For special status species, same as Alternative 2.
Inventory	Strategic surveys required for all species.		Recommended where needed to determine species status on BLM lands. Not required.		Encouraged as needed to support BEs. Not required.		Strategic surveys required for all Survey and Manage species. For special status species, same as Alternative 2.
Adding/ Removing Species	Annual Species Review includes new information and recommendations for category changes/ additions/deletions. RIEC review required.		Generally bi-annual, when heritage rankings or state lists are updated. State Director authorizes changes/additions/ deletions.		As needed. Regional Forester authorizes changes/ additions/deletions.		For Survey and Manage species, Annual Species Review includes new information and recommendations for category changes/additions/deletions. RIEC review required. For special status species, same as Alternative 2.
Reports, Monitoring, Review	Annual Status Reports required. IMG review required for most information products. Monitoring in accordance with LRMPs.		Formal reviews/reports not required. Monitor populations and habitats to determine if management objectives are being met. Monitoring in accordance with LRMPs.		Formal reviews/reports not required. Monitoring recommended depending on level of concern. Monitoring in accordance with LRMPs.		For Survey and Manage species, Annual Status Reports required. IMG review required for most information products. Monitoring in accordance with LRMPs. For special status, species same as Alternative 2.
Potential Mitigation	None for Alt. 4; Continued site management and surveys for 2 species in Alt. 1		Continued site management and/or pre-project clearances for 53 species with insufficient habitat due to Alternative 2.				Continued site management and/or pre-project clearances for 11 species with insufficient habitat due to Alternative 3.

BE = Biological Evaluation
ESA = Endangered Species Act
LRMP = Land and Resource Management Plan
NEPA = National Environmental Policy Act
RIEC = Regional Interagency Executive Committee

Common to All Alternatives section in *Chapter 3&4*). Species not closely associated with late-successional or old-growth forests are removed from Survey and Manage and, where they qualify, would be added to the Agencies' Special Status Species Programs. The Special Status Species Programs include species associated with a variety of terrestrial and aquatic habitat types and seral stages.

Finally, there is a difference between the Agencies' Special Status Species Programs and Survey and Manage regarding the taxa potentially included. Before the additional evaluation done for this SEIS, certain taxa groups had not been included in the Agencies' Special Status Species Programs either because of: (1) an absence of perceived threats; (2) the rules embedded in agency regulations and policies pertaining to inclusion of Special Status Species; (3) a lack of sufficient information to evaluate potential management effects; (4) a lack of available agency expertise; (5) absence of heritage rankings; (6) a lack of suitable habitat on agency lands; or, (7) other reasons. For example, the Forest Service in California excludes species about which so little is known that effective surveys and management strategies cannot be designed. BLM Oregon/Washington maintains a broad list at the state level that can be modified at the District level to exclude species that do not inhabit federally managed lands in the vicinity of the local administrative unit.

Effects of the Alternatives

Table 2-9 summarizes the key environmental consequences for all four alternatives in a comparative format.

Species Effects

Species effects are summarized on Table 2-9. (Table 2-13 display species outcomes for each alternative for all 337 species included in this analysis. Table 2-13 also shows Survey and Manage category assignments (or "off") applicable to each alternative, and the Special Status Species Program assignments applicable to species/alternatives where species are "off" Survey and Manage. In these cases, outcomes for species "without" assignment to any of the Agencies' Special Status Species Programs are also displayed.)

Under Alternative 1, two species previously removed from Survey and Manage by the 2001, 2002, or 2003 Annual Species Reviews received outcomes of sufficient habitat range wide, but insufficient habitat in a portion of their range due to actions under the alternative. Both were removed because they were determined not to be closely associated with late-successional forest, and because they were deemed secure when their entire range was considered.

Under Alternative 2, 53 species received outcomes of insufficient habitat to support stable populations in all or a portion of their range due to actions under the alternative. This includes 6 vertebrates in a portion of their range: the great gray owl, the red tree vole, and four salamanders (see Table 2-13). Mitigation (described later in this chapter) of manage known sites and/or pre-project surveys could remove the adverse effects for these 53 species. The cost and program effects for such mitigation are displayed on Table 2-9.

Under Alternative 3, 11 species receive outcomes of insufficient habitat to support stable populations in all or a portion of their range due to actions under the alternative. This includes the red tree vole and four salamanders in a portion of their range. As in Alternative 2, the costs and program effects of mitigation to remove these adverse effects are displayed on Table 2-9.

Under Alternative 4, all 337 species are assigned to Survey and Manage and none have insufficient habitat to support stable populations due to actions under the alternative.

Table 2-9. Summary of Environmental Consequences

		Alternative 1	Alternative 2	Alternative 2 with Mitigation	Alternative 3	Alternative 3 with Mitigation	Alternative 4
Species and Groups	Insufficient habitat not due to federal actions [1]	132(1[2])	132(1[2])	132(1[2])	132(1[2])	132(1[2])	132(1[2])
	Insufficient habitat due to actions under the alternative	0(2[2])[3]	38(15[2])	0	4(7[2])	0	0
	Sufficient Habitat	185	147	185	181	185	185
	Insufficient Information to Determine Outcome	24	24	24	24	24	24
Effect on Annual Timber Harvest (MMBF)		-105	-35	-35	-45	-50	-105[4]
Short-term Annual Cost (millions)		$21.0	$7.9	$8.3	$10.7	$10.8	$21.0[5]
Long-term (5-10 years) Annual Cost (millions)		$14.4	$7.4	$7.8	$9.0	$9.1	$14.4
Employment Decrease From Full Harvest Level (per Northwest Forest Plan)		-953	-318	-336	-409	-445	-953
Survey Related Employment		+360	+142	+149	+172	+173	+360
Net Loss in Annual Personal Earnings (millions)		-$23.8	-$7.4	-$7.9	-$9.8	-$11.0	-$23.8
Hazardous Fuel Treatment (Annual Acres)		73,040	78,400	78,300	77,440	77,300	73,040[4]
Hazardous Fuel Treatment (Cost to Protect Species/ Acre)		$98.95	$39.30	$42.50	$29.95	$30.18	$98.95

[1] Factors resulting in insufficient habitat are things such as limited potential habitat and few populations on federal lands, potential for stochastic events, low number of individuals, limited distribution, or narrow ecological amplitude.
[2] Species with sufficient habitat range-wide, but with insufficient habitat in a portion of the range. These are included in the "sufficient habitat" count.
[3] No "Alternative 1 with Mitigation" column because mitigation effects are negligible.
[4] Additional 80 to 100 MMBF/year harvest reduction and 8 to 15 percent fuels treatment reduction for first two years for Alternative 4.
[5] Plus 0.5 $million for ASR NEPA.

There are no meaningful differences in environmental consequences between alternatives for any of the following environmental components: Aquatic Ecosystems, Late-Successional Forest Ecosystems, Air Quality, Water Quality, Soil Productivity, Threatened and Endangered Species, and Species Associated with Early-Successional Forest.

For one of these species in Category F, however, the sufficient habitat outcome is based in part on known site management added by its also being included in one or more of the Agencies' Special Status Species Programs.

Species outcomes are shown on Table 2-13 for each species range subdivision made in Survey and Manage. That is, if a species is in two categories (or "off") in different parts of its range, outcomes are included for both areas. In these cases, the outcomes are combined (averaged) for the entire species' range (shaded blocks) before being summarized onto Table 2-9.

Program Effects

The effects to Timber Harvest, Costs, Employment, and the Fuels Treatment Program are summarized on Table 2-9. The effects of mitigation are also summarized[10]. Effects for Alternative 1 and 4 are the same because of the analysis assumption (see *Chapter 3&4*) that if Alternative 4 is selected, the Agencies would immediately begin a species review, supported by appropriate NEPA, with the results expected to look very much like Alternative 1. This assumption is consistent with limiting of species site projections in other alternatives. If this assumption were not made, the constraining effects of Alternative 4 would be nearly three times those of Alternative 1. There are approximately 15,500 known sites for species included in Survey and Manage under Alternative 1. The are an additional 26,000 known sites just for the 58 species previously removed during the 2001, 2002, and 2003 Annual Species Reviews and assumed added back to Survey and Manage under Alternative 4.

Species Effects without Special Status Species Programs

To comply with the order of the District Court (see *Introduction*) and because managers have latitude about specific assignments to the Agencies' Special Status Species Programs, effects to species as if the assumed Special Status Species Program assignments are not made, or are removed at this time, are also displayed on Table 2-13 and summarized on Tables S-1, 2-10 and 2-11. Under Alternative 2 without Special Status Species Programs, the number of species with insufficient habitat to support stable populations in all or part of their range would increase from 53 to 94 (Table 2-11). One-hundred-nine of the 337 species included in this analysis would have stable populations throughout the Northwest Forest Plan area even without the Agencies' Special Status Species Programs. This number increases to 147 when the Special Status Species Program assignments are assumed.

Comparison of the Species Effects Between Alternatives 1 and 4

Alternative 4 is an additional No-Action Alternative with 337 species on Survey and Manage, each in the category to which it was assigned in the 2001 Survey and Manage Record of Decision. Compared with No-Action Alternative 1, it includes 42 more species in all of their range, and another 16 in part of their range. It also includes 32 species with changed categories in all or part of their range, 5 of which are ones previously removed in (the other) part of their range.

As noted earlier in this chapter, No-Action Alternative 4 was added to this analysis because a November 6, 2006 decision by the Ninth Circuit Court found the 2001 and 2003 ASR decisions for red tree vole constituted a BLM Plan Amendment and should have

[10]The effects of mitigation were not recalculated from the 2004 analysis even though the number of species with adverse outcomes (and therefore needing mitigation) has declined. Because the effects of mitigation were small, and the decline in the number of species with adverse outcomes is small, the change in timber, fuels management, and cost effects for mitigation from the 2004 analysis would be on the order of ten percent.

Table 2-10. Summary of Environmental Consequences for Species Assumed to be Managed Primarily by Special Status Species Programs under Each Alternative[3]

		Alternative 1		Alternative 2		Alternative 3	
		With SSSP	Without SSSP	With SSSP	Without SSSP	With SSSP	Without SSSP
Species and Groups	Insufficient habitat not due to federal actions [1]	2	2	38(1[2])	38(1[2])	2	2
	Insufficient habitat due to actions under the alternative	0(1[2])	0(2[2])	27(15[2])	64(18[2])	3(4[2])	5(3[2])
	Sufficient Habitat	12	12	81	44	21	19
	Insufficient Information to Determine Outcome	1	1	11	11	2	2
Number of Species Managed Primarily by Special Status Species Programs in Each Alt.		15 (12 in all and 3 in part of their range)		157		28 (23 in all and 5 in part of their range)	

[1] Factors resulting in insufficient habitat are things such as limited potential habitat and few populations on federal lands, potential for stochastic events, low number of individuals, limited distribution, or narrow ecological amplitude.
[2] Species with sufficient habitat range-wide, but with insufficient habitat in a portion of the range. These are included in the "sufficient habitat" count.
[3] Does not include 1 species in Alternative 4 with insufficient habitat in a portion of the range without SSSP.

Table 2-11. Summary of Environmental Consequences for all Species[3]

		Alternative 1		Alternative 2		Alternative 3	
		With SSSP	Without SSSP	With SSSP	Without SSSP	With SSSP	Without SSSP
Species and Groups	Insufficient habitat not due to federal actions [1]	132 (1[2])	132 (1[2])	132 (1[2])	132 (1[2])	132 (1[2])	132 (1[2])
	Insufficient habitat due to actions under the alternative	0(2[2])	0(3[2])	38(15[2])	76(18[2])	4(7[2])	7(6[2])
	Sufficient Habitat	185	185	147	109	181	178
	Insufficient Information to Determine Outcome	24	24	24	24	24	24
Number of Species Managed Primarily by Special Status Species Programs in Each Alt.		15 (12 in all and 3 in part of their range)		157		28 (23 in all and 5 in part of their range)	

[1] Factors resulting in insufficient habitat are things such as limited potential habitat and few populations on federal lands, potential for stochastic events, low number of individuals, limited distribution, or narrow ecological amplitude.
[2] Species with sufficient habitat range-wide, but with insufficient habitat in a portion of the range. These are included in the "sufficient habitat" count.
[3] Does not include 1 species in Alternative 4 with insufficient habitat in a portion of the range without SSSP.

been subject to additional NEPA analysis. The inclusion of Alternative 4 in this FSEIS allows an analysis of the effects to species of all 85 species affected by the 2001, 2002, and 2003 ASR process. The pre-ASR (2001) category assignments are retained in Alternative 4 (Table 2-12), while the 58 species removals (in all or part of their range) and 32 species with category changes (in all or part of their range, with 5 of the "part of" ranges being species also included in the 58 removals for the other "part of" their range) made by the ASRs are reflected in Alternative 1. A comparison of the species outcomes under each of these two alternatives provides an understanding of the effects of the changes made by the three ASRs (Table 2-12). Since many of the ASR species removals and category changes applied only to part of a species range, Outcomes shown on Table 2-12 apply only to the part of the range affected by the ASR.

For the 58 species returned to Survey and Manage in Alternative 4 in all or part of their range:

- 1 species has insufficient information to determine an outcome under both alternatives,
- 2 species have insufficient habitat to support stable populations under both alternatives, and
- 2 species in part of their range have sufficient habitat under Alternative 4 but insufficient habitat under Alternative 1.

The Agencies had previously removed these 5 species from Survey and Manage because they are not closely associated with late-successional forests. Mitigation in the form of pre-disturbance survey and manage known sites could be applied. The remaining 53 species have sufficient habitat to maintain stable populations across the Northwest Forest Plan area under all alternatives.

For the 32 species (including 5 of the 58 "part of their range" species above) that are in different categories in all or part of their range under No-Action Alternative 1 than under No-Action Alternative 4:

- 2 species have insufficient information to determine an outcome under both alternatives.
- 5 species have insufficient habitat to support stable populations under both alternatives; and
- 25 species have sufficient habitat to support stable populations under both alternatives.

When examining the species outcomes under each of these two alternative, its important understand 15 of the 58 species removed from Survey and Manage in all or part of their range were removed only because they were determined not to be closely associated with late-successional forests. This criteria is part of the Survey and Manage Standards and Guidelines because they, like the rest of the Northwest Forest Plan, were written specifically to protect late-successional and old-growth forest related species (and watersheds). Habitat for early seral forest species was not an issue because timber harvest combined with natural disturbances had raised the acreage in early seral forests above natural levels.

Known sites for species removed because they are not closely associated with late-successional forests continued to be managed until each agency made a decision about whether or not to include it in their respective Special Status Species Programs. Twelve of the 58 species removed by the ASRs have been subsequently added to one or more Special Status Species Program, and most of these additions were for the 15 species removed because they are not closely associated with late-successional forests.

As noted above, 2 species in part of their range have sufficient habitat under Alternative 4 but insufficient habitat under Alternative 1. The vascular plant *Cypripedium montanum* in the Washington Eastern Cascades Physiographic Province portions of its range has an Outcome 3 (insufficient habitat to support stable populations) when removed from Survey and Manage under Alternative 1. It was removed by the ASR process because it was not associated with late-successional forests in this eastside province. It has not been assigned to a Special Status Species Program because it has nearly 300 known sites in the WA Eastern Cascades Province, because it ranges in the Pacific Northwest from northern California to Wyoming, and in British Columbia and Alberta in Canada, and because the Washington Natural Heritage Program does not list the species on their Rare Plant List.

The lichen *Bryoria tortuosa* in the portion of its range in the Washington Olympic Peninsula, Washington Western lowlands, Washington Western Cascades, Oregon Western Cascades, Oregon Coast Range, Oregon Willamette Valley, and California Coast

Range Provinces has an Outcome 3 (insufficient habitat to support stable populations) when removed from Survey and Manage under Alternative 1. It was removed by the ASR process because it was not associated with late-successional forests and determined to be secure range-wide. It has not been added to Special Status Species Programs in most of this area because it is believed to be secure range-wide with "many occurrences documented in southern Oregon. This species is also found in British Columbia, California, Idaho, eastern Washington, Norway, and the Carpathian Mountains in Europe" (ORNHIC ranking factors).

Alternative 1 and 4 Effects Without Special Status Species Program Assignments

The Agencies' Special Status Species Program assignments are shown on Table 2-12. Assignments made but not applicable to the area or to these two alternatives are shown as NA. (SSSP assignments, and outcomes without SSSP, only apply to alternatives and areas where species are "off" SSSP.) If the Agencies' Special Status Species Program assignments had not occurred or were removed, only two of the Outcome 1 (sufficient habitat) ratings are affected, one each for Alternative 1 and 4. Under Alternative 1, the 2002 ASR removal of *Cypripedium fasciculatum* in the Washington Eastern Cascades was based on the species not being closely associated with late-successional forests. Its outcome rating under Alternative 1 is based on its assignment to the Forest Service's Special Status Species Program in Region 6 (Washington and Oregon). If that assignment is removed, it falls to Outcome 3, habitat insufficient to support stable populations. It is known from over 1,000 sites within the Northwest Forest Plan area, and 180 sites within this portion of its range.

Under Alternative 4, the lichen *Nephroma bellum* in the Oregon Klamath, Willamette Valley, and Eastern Cascades; Washington Western Cascades (outside the Gifford Pinchot National Forest), Eastern Cascades, and Olympic Peninsula Physiographic Provinces is in Category F and receives only strategic surveys. The Outcome 1 under Alternative 4 is dependent, in the Washington portion of the range, on the management of known sites under the Forest Service's Special Status Species Program. Removal of this species from that program would result in an outcome of insufficient habitat in the Washington portion of its range. The 2001 ASR moved it to the more restrictive Category E, where under Alternative 1 it has an Outcome 1 (sufficient habitat), even without the Special Status Species Program assignment.

Potential Mitigation

Mitigation measures avoid, minimize, rectify, reduce, or compensate for adverse environmental impacts of management actions (40 CFR 1508.20). NEPA implementing regulations require agency's to "Include appropriate mitigation measures not already included in the proposed action or alternatives" and include a discussion of "Means to mitigate adverse environmental impacts." The regulations also require that in the Record of Decision the Responsible Officials "State whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not." Consistent with those requirements, mitigation measures are identified and described here for all adverse effects identified for the proposed action. However, it is important to remember the Survey and Manage provisions are themselves a mitigation measure applied to the Northwest Forest Plan, and its removal simply restores the potential for adverse effects resulting from management under other aspects of that plan (as identified in this analysis).

The following mitigation was not included as part of the alternatives themselves, as mitigation often is, because it would in large part have duplicated the provision proposed for removal, negating the positive effects of the proposal along with the negative.

Table 2-12. Comparison of Outcomes for the 85 Species that Have Different Category Assignments Between Alternatives 1 and 4

TAXA GROUP *Species*[1]	Category Assignment		Outcomes[2]		Special Status Species Programs (SSSP)[3, 4]				Outcome for Alt. 1 without SSSP[6]	*ASR Year*
	Alt. 1	Alt. 4	Alt. 1	Alt. 4	BLM OR/WA	BLM CA	FS R-6[5]	FS R-5[5]		
FUNGI										
Albatrellus flettii, Oregon	off	B	1	1	-	NA	-	-	NA	*2001*
Bondarzewia mesenterica, Oregon	off	B	1	1	-	-	-	-	-	*2001*
Cantharellus subalbidus, Oregon	off	D	1	1	-	-	-	-	-	*2001*
Chromosera cyanophylla	off	B	1	1	-	-	-	-	-	*2001*
Clavariadelphus truncatus	D	B	1	1	-	-	-	-	-	*2001*
Collybia bakerensis	F	B	1	1	-	-	-	-	-	*2001*
Cordyceps capitata	off	B	1	1	-	-	ss	-	1	2001
Craterellus tubaeformis, Oregon	off	D	1	1	-	-	-	-	-	*2001*
Craterellus tubaeformis, Washington and California	off	D	1	1	-	-	-	-	-	*2003*
Galerina atkinsoniana	off	B	1	1	-	-	-	-	-	*2003*
Galerina vittaeformis	off	B	1	1	-	-	-	-	-	*2001*
Gomphus clavatus	F	B	1	1	-	-	-	-	-	*2002*
Gomphus kauffmanii	E	B	1	1	-	-	NA	-	NA	*2001*
Gymnopilus punctifolius, Oregon and Washington	off	B	1	1	-	NA	-	-	NA	*2001*
Gyromitra esculenta	off	F	1	1	-	-	-	-	-	*2001*
Gyromitra infula	off	B	1	1	-	-	-	-	-	*2001*
Gyromitra melaleucoides	off	B	1	1	-	-	-	-	-	*2001*
Gyromitra montana	off	F	1	1	-	-	-	-	-	*2001*
Helvella maculata	off	B	1	1	-	-	-	-	-	*2001*
Hydnum umbilicatum	off	B	1	1	-	-	-	-	-	*2001*
Mycena monticola	off	B	1	1	-	-	ss	-	1	*2001*
Mycena overholtsii	D	B	1	1	-	-	-	-	-	*2001*
Neournula pouchetii	off	B	1	1	-	-	-	-	-	*2001*
Nivatogastrium nubigenum, OR Eastern Cascades and CA Cascades Physiographic provinces	off	B	1	1	-	-	-	-	-	*2001*
Otidea leporina	D	B	1	1	-	-	-	-	-	*2001*
Otidea onotica	off	F	1	1	-	-	-	-	-	*2001*
Phaeocollybia olivacea, Washington and California	E	B	1	1	NA	NA	NA	NA	NA	2001
Phaeocollybia olivacea, Oregon	F	B	1	1	NA	NA	NA	NA	NA	*2001*
Pithya vulgaris	off	D	1	1	-	-	-	-	-	*2001*
Plectania melastoma	off	F	1	1	-	-	-	-	-	*2001*
Plectania milleri	off	B	1	1	-	-	-	-	-	*2001*
Ramaria rubripermanens, Oregon	D	B	1	1	-	-	NA	-	NA	*2001*
Sarcodon imbricatus	off	B	1	1	-	-	-	-	-	*2001*
Sarcosoma latahense	off	B	1	1	-	-	-	-	-	*2001*
Sarcosoma mexicana	off	F	1	1	-	-	-	-	-	*2001*
Sarcosphaera eximia	off	B	1	1	-	-	-	-	-	*2001*

Table 2-12. Comparison of Outcomes for the 85 Species that Have Different Category Assignments Between Alternatives 1 and 4

TAXA GROUP *Species*[1]	Category Assignment		Outcomes[2]		Special Status Species Programs (SSSP)[3, 4]				Outcome for Alt. 1 without SSSP[6]	*ASR Year*
	Alt. 1	Alt. 4	Alt. 1	Alt. 4	BLM OR/WA	BLM CA	FS R-6[5]	FS R-5[5]		
Tremiscus helvelloides	D	B	1	1	-	-	-	-	-	*2001*
Turbinellus floccosus, California	off	F	1	1	-	-	-	-	-	*2001*
LICHENS										
Bryoria pseudocapillaris	A	B	3	3	NA	NA	NA	-	NA	*2001*
Bryoria spiralifera	A	B	3	3	NA	NA	NA	-	NA	*2001*
Bryoria tortuosa, WA Eastern Cascades, OR Eastern Cascades, OR Klamath, CA Klamath, and CA Cascades Physiographic Provinces	off	D	1	1	-	ss	-	-	1	*2002*
Bryoria tortuosa, WA Olympic Peninsula, WA Western Lowlands, WA Western Cascades, OR Western Cascades, OR Coast Range, OR Willamette Valley and CA Coast Range Physiographic Provinces	off	A	3	1	-	ss	-	-	3	*2002*
Calicium glaucellum	off	F	1	1	-	-	-	-	-	*2002*
Calicium viride	off	F	1	1	-	ss	-	-	1	*2002*
Chaenotheca furfuracea	off	F	1	1	-	-	-	-	-	2003
Cladonia norvegica	off	B	1	1	-	-	-	-	-	*2003*
Dendriscocaulon intricatulum, Oregon in Coos, Douglas, Curry, Josephine, and Jackson Counties	off	B	1	1	-	NA	NA	-	NA	*2002*
Dendriscocaulon intricatulum, all of Washington and Oregon except Coos, Douglas, Curry, Josephine, and Jackson Counties	A	B	1	1	-	NA	NA	-	NA	*2001*
Dendriscocaulon intricatulum, California	E	B	1	1	-	NA	NA	-	NA	*2001*
Dermatocarpon meiophyllizum	E	B	1	1	-	-	NA	-	NA	*2001*
Fuscopannaria saubinetii	E	F	3	3	-	-	-	-	-	*2003*
Hypogymnia duplicata	C	A	1	1	-	-	NA	-	NA	*2002*
Hypogymnia oceanica	off	F	1	1	-	-	-	-	-	*2001*
Leptogium burnetiae var. *hirsutum*	E	A	4	4	-	-	NA	-	NA	*2001*
Leptogium rivale	E	B	1	1	-	-	-	-	-	*2001*
Lobaria linita, WA Western Cascades physiographic province north of Snoqualmie Pass and the Olympic Peninsula	off	A	1	1	as	-	ss-o	-	1	*2002*

Table 2-12. Comparison of Outcomes for the 85 Species that Have Different Category Assignments Between Alternatives 1 and 4

TAXA GROUP *Species*[1]	Category Assignment		Outcomes[2]		Special Status Species Programs (SSSP)[3, 4]				Outcome for Alt. 1 without SSSP[6]	*ASR Year*
	Alt. 1	Alt. 4	Alt. 1	Alt. 4	BLM OR/WA	BLM CA	FS R-6[5]	FS R-5[5]		
Nephroma bellum, In OR: Western Cascades and Coast Range. In WA: Western Cascades in the Gifford Pinchot National Forest	off	F	1	1	-	-	ss-w	-	1	*2001*
Nephroma bellum, In OR; Klamath, Willamette Valley, Eastern Cascades; WA; Western Cascades (outside the Gifford Pinchot National Forest), Eastern Cascades, Olympic Peninsula physiographic provinces	E	F	1	1	-	ss	ss-w	-	Outcome 2 in Alt. 4[7]	*2001*
Nephroma occultum	C	B	1	1	-	-	NA	-	NA	*2001*
Platismatia lacunosa, Oregon Coast Range physiographic province	off	C	1	1	-	-	NA	-	NA	*2002*
Platismatia lacunosa, Except in Oregon Coast Range physiographic province	E	C	1	1	-	-	NA	-	NA	*2002*
Pseudocyphellaria perpetua	A	B	3	3	-	-	-	-	-	*2003*
Pyrrhospora quernea	off	E	3	3	-	-	ss	-	3	*2002*
Ramalina pollinaria	off	E	3	3	as	ss	ss	-	3	*2002*
Ramalina thrausta	off	A	1	1	-	-	-	-	-	2003
Usnea hesperina	E	B	3	3	-	-	-	-	-	*2001*
BRYOPHYTES										
Buxbaumia viridis, Oregon and Washington	off	D	1	1	-	-	-	-	-	*2001*
Buxbaumia viridis, California	E	D	1	1	-	NA	-	NA	NA	*2001*
Diplophyllum albicans	off	D	1	1	-	-	-	-	-	*2002*
Encalypta brevicolla var. *crumiana*	off	B	4	4	-	-	ss-o	-	4	*2002*
Herbertus aduncus	E	B	4	4	NA	-	-	-	NA	*2001*
Racomitrium aquaticum	E	B	1	1	-	-	-	-	-	*2001*
Rhizomnium nudum, Washington	off	B	1	1	as	-	ss-o	-	1	*2002*
VERTEBRATES										
Great Gray Owl *Strix nebulosa*	A	C	1	1	-	-	NA	NA	NA	*2002*
Oregon Red Tree Vole Arborimus longicaudus, Mesic	off	C	1	1	-	-	-	-	-	*2003*
Del Norte salamander Plethodon elongates	off	D	1	1	-	-	ss	-	1	*2001*
Siskiyou Mountains salamander *Plethodon stormi*, South Range	A	C	1	1	NA	-	NA	NA	NA	*2002*
Siskiyou Mountains salamander *Plethodon stormi*, North Range	D	C	1	1	NA	-	NA	NA	NA	*2001*

Table 2-12. Comparison of Outcomes for the 85 Species that Have Different Category Assignments Between Alternatives 1 and 4

TAXA GROUP *Species*[1]	Category Assignment		Outcomes[2]		Special Status Species Programs (SSSP)[3, 4]				Outcome for Alt. 1 without SSSP[6]	*ASR Year*
	Alt. 1	Alt. 4	Alt. 1	Alt. 4	BLM OR/WA	BLM CA	FS R-6[5]	FS R-5[5]		
MOLLUSKS										
Ancotrema voyanum	off	E	1	1	-	-	-	-	-	2003
Fluminicola n. sp. 1	off	A	1	1	ss	-	ss-o	-	1	*2001*
Fluminicola n. sp. 2	off	A	1	1	-	-	ss-o	-	1	*2001*
Helminthoglypta hertleini	off	B	1	1	ss	ss	ss-o	-	1	*2002*
Helminthoglypta talmadgei	D	A	1	1	-	NA	-	-	NA	*2001*
Hemphillia burringtoni	E	A	1	1	-	-	NA	-	NA	*2001*
Hemphillia glandulosa, In WA: Olympic Peninsula and OR: Coast Range	off	C	1	1	-	-	ss-w	-	1	*2001*
Hemphillia glandulosa, In WA Western Cascades Physiographic Province	E	C	1	1	-	-	NA	-	NA	*2001*
Hemphillia malonei, Oregon	off	C	1	1	-	-	ss-w	-	1	*2001*
Megomphix hemphilli, North of south boundary of Lincoln, Benton, and Linn Counties, Oregon	off	A	1	1	-	-	-	-	-	*2003*
Megomphix hemphilli, South of south boundary of Lincoln, Benton, and Linn Counties, Oregon	off	F	1	1	-	-	-	-	-	*2003*
Monadenia churchi	off	F	1	1	-	-	-	-	-	*2001*
Monadenia infumata ochromphalus	off	B	1	1	-	-	-	-	-	*2003*
Pristiloma arcticum crateris	A	B	1	1	NA	-	NA	-	NA	*2002*
Vorticifex klamathensis sinitsini	off	B	1	1	-	-	ss-o	-	1	*2001*
VASCULAR PLANTS										
Corydalis aquae-gelidae	A	C	1	1	NA	-	NA	-	NA	*2002*
Cypripedium fasciculatum , WA Eastern Cascades physiographic province	off	C	1	1	ss	ss	ss	ss	3	*2002*
Cypripedium montanum, WA Eastern Cascades physiographic province	off	C	3	1	-	NA	-	NA	NA	*2001*

[1] Current taxonomic name. Any differences between these and previous NWFP documents are displayed in Table 3&4-18.
[2] Outcomes:
1 - Sufficient Habitat
2 - Sufficient Habitat but Insufficient Habitat in a Portion of their Range
3 - Insufficient Habitat
4 - Insufficient Information to Determine and Outcome

[3] SSSP Codes:

ss	Bureau Sensitive or Forest Service Sensitive
as	Bureau Assessment
ss-o	Sensitive in Oregon
ss-w	Sensitive in Washington
NA	Species is on SSSP in this region or state, but is not applicable because the species is not "off" Survey and Manage in this area under these two alternatives.

[4] Actual SSSP assignments. Supplement text uses "assumed" assignments because managers have the discretion to add or remove species outside of the SEIS process.
[5] FS R-5: Forest Service, Region 5 (California); FS R-6: Forest Service, Region 6 (Oregon and Washington)
[6] Applies only to species assumed to be on one or more SSSP, and only to alternatives where species is "off" Survey and Manage.
[7] For the *Nephroma bellum* in this portion of its range, under the scenario of Alternative 4 without SSSP, the outcome is 2 (Sufficient Habitat but Insufficient Habitat in a Portion of its Range).

The 2004 FSEIS included tables specifically identifying the species, Agency/region, and management activity (manage known sites/pre-disturbance surveys) that would reduce each adverse species outcome (Outcomes 3 and 4). These tables have been removed in favor of descriptions of the mitigations available and how they could be applied. When these descriptions are coupled with the outcomes, the Special Status Species Programs or Survey and Manage assignments, and the discussion of the species status and outcomes in *Chapter 3&4*, the specific mitigations available become self-evident. The tables in the 2004 FSEIS could not display all of such considerations and thus were unnecessarily and misleadingly prescriptive.

Decision-makers may decline to select identified mitigation measures for many reasons, including the fact that species effects described in this analysis are limited to the Northwest Forest Plan area, or in many cases to a portion of the Northwest Forest Plan area. Many of these species are secure in other areas both in and outside of the Northwest Forest Plan area. See the *Survey and Manage Species* section in *Chapter 3&4* for a more detailed discussion of species with adverse outcomes, and their implications.

There are two different groups of species' outcomes discussed in this section. The first is species with insufficient habitat caused by management actions under Alternatives 1, 2 or 3. The second group is species with insufficient habitat under all alternatives or species where there is insufficient information to determine an outcome.

Species with Insufficient Habitat Caused by Management under Alternatives 1, 2, or 3

The analysis of environmental consequences for Alternatives 1, 2 and 3 indicates that removing the Survey and Manage requirements for known site management and/or pre-disturbance surveys results in some species having insufficient habitat (including known sites) to support stable populations in all or part of their range (Table 2-13). In these cases, mitigation to eliminate this adverse environmental effect can be identified. Mitigation is identified by comparing the management actions in Alternative 4 to those in Alternative(s) with the adverse outcome, assisted by the specific outcome discussion in *Chapter 3&4*, to isolate what caused the difference in species outcomes. Mitigation usually consists of applying management of known sites and, for Category A and C species, pre-project clearances, in the species range within the Agency and region/state the Special Status Species Program assignment is not made or is removed.

Pre-project clearances are completed prior to habitat-disturbing activities to determine the presence of a species or its habitat and the effect of management actions on the species. Pre-project clearances may include, but are not limited to,

- clearance surveys;
- field clearances;
- field reconnaissance;
- inventories;
- habitat examinations;
- habitat evaluation;
- evaluation of species-habitat associations and presence of suitable or potential habitat;
- review of existing survey records, inventories, and spatial data;
- utilization of professional research, literature, and other technology transfer sources; or
- use of expertise, both internal and external, that is based on documented, substantiated professional rationale.

Managing a known site is designed to maintain the habitat elements needed to provide for persistence of the species at the site. Management 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. Authority to disturb known sites lies with the agency official who is responsible for authorizing the proposed habitat-disturbing activity.

If the Responsible Officials adopt mitigation in the Record of Decision for the SEIS, the analysis indicates that site management and/or pre-project clearances would effectively eliminate the adverse effects caused by management actions (refer to *Chapter 3&4*). If adopted, the ROD will identify how long the mitigation will remain in effect - typically until the species is added to the Agencies' Special Status Species Programs or a conservation agreement or a conservation strategy has been approved for the species. A conservation strategy is a technical document based on the available scientific information for a species or group of species that discuss the biological and ecological factors of the species and determines if management actions are necessary for a species or group of species to persist over time. If actions are necessary, the strategy describes the actions land management agencies must take to maintain a species or group of species and usually includes a monitoring plan. Conservation strategies can also be known as management strategies.

For the scenario of Alternatives 1, 2 or 3 without assumed assignments to Agencies' Special Status Species Programs, species outcomes are displayed on Table 2-13. Under this scenario, there are additional species with insufficient habitat (including known sites) to support stable populations in all or part of their range. These adverse effects could be similarly mitigated by the application of manage known sites and pre-project clearances within the Agency and region/state where the Special Status Species Program assignment is not made, or where such assignment are subsequently removed.

Species with Insufficient Habitat Under all Alternatives or with Insufficient Information to Determine an Outcome.

When the analyses shows that there is "insufficient information to determine an outcome" or "there is insufficient habitat (including known sites) to support stable populations not caused by federal action" for a species, this outcome is the same for all alternatives (Table 2-13). Although the Survey and Manage Standards and Guidelines generally add protection and reduce risks to species by completing pre-disturbance surveys and managing known sites, it does not change the outcome of insufficient habitat or resolve the inadequate information needed to determine the outcome for a species. Many of these are species with few known sites or populations. Some of these species did not meet the criteria for inclusion in one or more of the Agencies' Special Status Species Programs and the lack of managing known sites or completing pre-disturbance surveys would increase the risk to these species. In these cases, mitigation to eliminate the difference between the alternatives can be identified. Mitigation consists of conducting pre-project clearances and/or managing known sites for species that currently have these requirements under the Survey and Manage Standards and Guidelines. The requirements for conducting pre-project clearances and managing known sites are the same as those described in the previous mitigation. It is unknown to what degree mitigation lessens the risk to the species; however, it will not change the outcome of insufficient information or resolve the inadequate information needed to determine the outcome for a species.

There is insufficient information to determine an outcome for the four arthropod functional groups. Since pre-disturbance surveys and known site management are not required under Alternative 1, pre-project clearances and known site management are not offered as mitigation under Alternative 2 or 3. No mitigation was identified for the four

arthropod functional groups because the effects of Alternatives 2 and 3 are similar to the effects of Alternatives 1 and 4.

If the Responsible Officials adopt mitigation in one or both Records of Decision for this SEIS, the analysis indicates that site management and/or pre-project clearances could effectively reduce the risk to the same level for all alternatives (refer to *Chapter 3&4*). If adopted, the Record of Decision will indicate the duration of mitigation or the circumstances under which it could be terminated – typically it would remain in effect until the species is added to the Agencies' Special Status Species Programs, where appropriate, or a conservation agreement or conservation strategy has been approved for the species.

If species are not assigned to or are removed from the Agencies' Special Status Species Programs as assumed (see Table 2-13), outcomes would not change but additional risk might be incurred. Mitigation for that additional risk is the same as that described above. That is, apply manage known sites and, for Survey and Manage Categories A and C species, pre-project clearances, in the species range within the Agency and region/state where the Special Status Species Program assignment is not made or where such assignments are subsequently removed.

Other available mitigation for adverse species effects identified under Alternatives 1, 2 or 3 would require changes in management in larger, or specific, blocks of known or suspected habitat. Such changes would effectively result in changed land allocations, departing from the Northwest Forest Plan allocations for which Survey and Manage is a mitigation measure. Different land allocations were considered in the 1994 FSEIS for the Northwest Forest Plan; such changes are outside the scope of this analysis.

Table 2-13 displays category assignment, outcomes with and without Special Status Species Programs, Special Status Species Program assignment, and numbers of known sites and RMS detections, for each of the species discussed in this supplement under each alternative.

The outcomes used in Table 2-13 are as follows:
1: Sufficient Habitat
2: Sufficient Habitat but Insufficient Habitat in a Portion of their Range
3: Insufficient Habitat
4: Insufficient Information to Determine and Outcome

Table 2-13. Summary of Environmental Consequences, Survey and Manage Category Assignments, Special Status Species Program Assignments, and Known Site Numbers for All 337 Species and All 4 Alternatives

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
FUNGI																					
Acanthophysium farlowii	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	2		0	0	0
Albatrellus avellaneus	B	off	B		3	3	3	3	SS	-	SS	-	-	3	-	1	3		4	4	0
Albatrellus caeruleoporus	B	off	B		3	3	3	3	-	SS	-	-	-	3	-	4	9		0	0	1
Albatrellus ellisii	B	off	B		1	3[15]	1	1	-	SS	SS-W	-	-	3	-	39	41		7	7	0
Albatrellus flettii					1	2[15]	1	1			-	-	-	2	-						
Washington and California	B	off	B		1	3[15]	1	1	-	SS	-	-	-	3	-	39	43		0	0	1
Oregon		off		B	1	1	1	1			-	-	-	1	-	57	67	2001	16	16	1
Alpova alexsmithii	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	6	6		0	0	0
Alpova olivaceotinctus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	1	1
Arcangeliella camphorata	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	8	11		0	0	2
Arcangeliella crassa	B	off	B		3	3	3	3	-	-	-	-	-	-	-	2	2		0	0	1
Arcangeliella lactarioides	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		0	0	1
Asterophora lycoperdoides	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	5		2	2	1
Asterophora parasitica	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	5		0	0	0
Baeospora myriadophylla	B	off	B		3	3	3	3	-	-	-	-	-	-	-	9	17		1	1	0
Balsamia nigrens	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	4		1	1	0
Boletus haematinus	B	off	B		3	3	3	3	-	SS	-	-	-	3	-	1	1		6	6	0
Boletus pulcherrimus	B	off	B		1	1	1	1	SS	-	SS	SS	-	3	-	6	12		14	14	0
Bondarzewia mesenterica					1	1	1	1					-	-	-						
Washington and California	B	off	B		1	1	1	1	-	-	-	-	-	-	-	22	23		4	4	0
Oregon		off		B	1	1	1	1					-	-	-	102	122	2001	44	46	0
Bridgeoporus nobilissimus	A	off	A		3	3	3	3	SS	-	SS	SS	-	3	-	48	60		29	38	0
Cantharellus subalbidus					1	1	1	1					-	-	-						
Washington and California	D	off		D	1	1	1	1	-	-	-	-	-	-	-	53	68		7	7	9
Oregon		off		D	1	1	1	1					-	-	-	164	199	2001	50	51	22
Catathelasma ventricosa	B	off	B		3	3	3	3	-	-	-	-	-	-	-	6	15		1	1	0
Chalciporus piperatus	D	off		D	1	1	1	1	-	-	-	-	-	-	-	43	76		6	6	0
Chamonixia caespitosa	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	5		1	1	3
Choiromyces alveolatus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	7	8		0	0	1
Choiromyces venosus	B	off	B		3	3	3	3	-	SS	-	-	-	3	-	2	2		1	1	0
Chromosera cyanophylla		off		B	1	1	1	1	-	-	-	-	-	-	-	189	222	2001	41	41	7

Table 2-13. Summary of Environmental Consequences, Survey and Manage Category Assignments, Special Status Species Program Assignments, and Known Site Numbers for All 337 Species and All 4 Alternatives

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Chroogomphus loculatus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	4	4		0	0	0
Chrysomphalina grossula	B	off	B		3	3	3	3	-	-	-	-	-	-	-	9	14		1	1	2
Clavariadelphus ligula	B	off	B		1	3[15]	1	1	-	SS	-	-	-	3	-	41	47		4	4	4
Clavariadelphus occidentalis	B	off	B		1	1	1	1	-	-	SS-W	-	-	1	-	57	70		9	10	9
Clavariadelphus sachalinensis	B	off	B		1	3[15]	1	1	-	-	SS-W	-	-	3	-	29	34		1	1	0
Clavariadelphus subfastigiatus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	5	5		3	3	0
Clavariadelphus truncatus	D	off		B	1	1	1	1	-	-	-	-	-	-	-	106	118		12	12	2
Clavulina castanopes v. *lignicola*	B	off	B		1	1	1	1	-	SS	-	-	-	1	-	4	11		4	4	13
Clitocybe senilis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	5	5		1	1	3
Clitocybe subditopoda	B	off	B		3	3	3	3	-	SS	-	-	-	3	-	2	4		0	0	3
Collybia bakerensis	F	off		B	1	1	1	1	-	-	-	-	-	-	-	124	129		0	0	2
Collybia racemosa	B	off	B		1	1	1	1	-	SS	-	SS	-	3	-	17	34		2	2	4
Cordyceps capitata		off		B	1	1	1	1	-	-	SS	-	1	1	1	26	40	2001	5	5	3
Cordyceps ophioglossoides	B	off	B		3	3	3	3	-	SS	-	-	-	3	-	9	12		0	0	1
Cortinarius barlowensis	B	off	B		1	1	1	1	-	-	SS-O	-	-	3	-	0	0		9	9	17
Cortinarius boulderensis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	8	9		0	0	7
Cortinarius cyanites	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		5	5	2
Cortinarius depauperatus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	0
Cortinarius magnivelatus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	8	8		2	2	0
Cortinarius olympianus	B	off	B		1	1	1	1	-	-	-	-	-	-	-	41	42		3	3	5
Cortinarius speciosissimus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	5	5		0	0	0
Cortinarius tabularis	B	off	B		4	4	4	4	-	-	-	-	-	-	-	0	0		0	0	0
Cortinarius umidicola	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	0
Cortinarius valgus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	0		1	1	0
Cortinarius variipes	B	off	B		3	3	3	3	-	-	-	-	-	-	-	4	5		0	0	1
Cortinarius verrucisporus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	7	8		1	1	0
Cortinarius wiebeae	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	1
Craterellus tubaeformis					1	1	1	1					-	-	-						
Oregon		off		D	1	1	1	1	-	-	-	-	-	-	-	156	156	2001	61	61	36
Washington and California		off		D	1	1	1	1					-	-	-	103	103	2003	5	5	42
Cudonia monticola	B	off	B		1	3[15]	1	1	-	-	SS	SS	-	3	-	12	12		11	14	6
Cyphellostereum laeve	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		1	1	2

Table 2-13. Summary of Environmental Consequences, Survey and Manage Category Assignments, Special Status Species Program Assignments, and Known Site Numbers for All 337 Species and All 4 Alternatives

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Cystangium idahoensis	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	2	2		0	0	0
Cystangium lymanensis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	0		0	0	0
Dermocybe humboldtensis	B	off	B		3	3	3	3	SS	SS	-	-	-	3	-	1	3		1	1	0
Destuntzia fusca	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	3		0	0	0
Destuntzia rubra	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	0	4		0	0	0
Dichostereum boreale	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	0
Elaphomyces anthracinus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	0
Elaphomyces subviscidus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	1
Endogone acrogena	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		0	0	0
Endogone oregonensis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	7		0	0	0
Entoloma nitidum	B	off	B		3	3	3	3	-	SS	-	-	-	3	-	6	7		0	0	2
Fayodia bisphaerigera	B	off	B		3	3	3	3	-	-	-	-	-	-	-	10	14		0	0	0
Fevansia aurantiaca	B	off	B		3	3	3	3	-	-	-	-	-	-	-	2	2		0	0	0
Galerina atkinsoniana		off		B	1	1	1	1	-	-	-	-	-	-	-	83	83	2003	0	0	57
Galerina cerina	B	off	B		1	1	1	1	-	-	-	-	-	-	-	3	3		0	0	24
Galerina heterocystis	E	off	E		1	1	1	1	-	-	-	-	-	-	-	3	7		2	3	18
Galerina sphagnicola	E	off	E		3	3	3	3	-	-	-	-	-	-	-	0	0		0	0	1
Galerina vittaeformis		off		B	1	1	1	1	-	-	-	-	-	-	-	37	44	2001	24	24	99
Gastroboletus imbellus	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	1	1		0	0	0
Gastroboletus ruber	B	off	B		1	1	1	1	-	-	-	-	-	-	-	25	25		1	1	1
Gastroboletus subalpinus	B	off	B		1	1	1	1	-	-	-	-	-	-	-	29	30		9	9	0
Gastroboletus turbinatus	B	off	B		1	1	1	1	-	-	-	-	-	-	-	3	4		25	25	0
Gastroboletus vividus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		2	2	0
Gastrosuillus amaranthii	E	off	E		4	4	4	4	-	-	-	-	-	-	-	0	0		0	0	0
Gastrosuillus umbrinus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	0
Gautieria magnicellaris	B	off	B		3	3	3	3	-	-	-	-	-	-	-	2	2		0	0	0
Gautieria otthii	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	2		0	0	0
Gelatinodiscus flavidus	B	off	B		1	1	1	1	-	-	-	-	-	-	-	19	19		35	35	0
Glomus radiatum	B	off	B		3	3	3	3	-	-	-	-	-	-	-	2	3		0	0	0
Gomphus clavatus	F	off		B	1	1	1	1	-	-	-	-	-	-	-	71	96		14	14	11
Gomphus kauffmanii	E	off	E	B	1	3[15]	1	1	-	-	SS	-	-	3	-	43	54		16	16	2
Gymnomyces abietis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	21	21		2	2	0

Table 2-13. Summary of Environmental Consequences, Survey and Manage Category Assignments, Special Status Species Program Assignments, and Known Site Numbers for All 337 Species and All 4 Alternatives

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Gymnomyces fragrans	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		0	0	0
Gymnomyces nondistincta	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	1	1		1	1	0
Gymnopilus punctifolius					1	2[15]	1	1					-	2	-						
California	B	off	B		1	3[15]	1	1	-	SS	-	-	-	3	-	0	5		1	1	0
Oregon and Washington		off		B	1	1	1	1					-	1	-	63	63	2001	18	18	4
Gyromitra californica	B	off	B		1	3[15]	1	1	-	-	SS	-	-	3	-	22	22		16	16	4
Gyromitra esculenta		off		F	1	1	1	1	-	-	-	-	-	-	-	225	323	2002	56	57	21
Gyromitra infula		off		B	1	1	1	1	-	-	-	-	-	-	-	71	82	2001	52	53	8
Gyromitra melaleucoides		off		B	1	1	1	1	-	-	-	-	-	-	-	68	85	2001	40	41	7
Gyromitra montana		off		F	1	1	1	1	-	-	-	-	-	-	-	1108	1311	2001	23	23	1
Hebeloma olympianum	B	off	B		3	3	3	3	-	-	-	-	-	-	-	6	6		0	0	0
Helvella crassitunicata	B	off	B		3	3	3	3	-	-	-	-	-	-	-	25	25		0	0	0
Helvella elastica	B	off	B		1	1	1	1	-	-	-	-	-	-	-	33	36		4	4	5
Helvella maculata		off		B	1	1	1	1	-	-	-	-	-	-	-	64	91	2001	24	24	1
Hydnotrya inordinata	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		2	2	0
Hydnotrya subnix	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	0
Hydnum umbilicatum		off		B	1	1	1	1	-	-	-	-	-	-	-	103	137	2001	50	50	32
Hydropus marginellus	B	off	B		3	3	3	3	-	SS	-	-	-	3	-	9	14		3	3	1
Hygrophorus caeruleus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	4	5		2	2	0
Hygrophorus saxatilis	B	off	B		1	1	1	1	-	-	-	-	-	-	-	0	0		18	19	1
Hygrophorus vernalis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	0
Hypomyces luteovirens	B	off	B		3	3	3	3	-	-	-	-	-	-	-	7	11		1	1	1
Leucogaster citrinus	B	off	B		1	1	1	1	-	SS	SS	-	-	1	-	8	21		2	3	33
Leucogaster microsporus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	7	7		2	2	5
Macowanites chlorinosmus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	2	11		2	2	0
Macowanites mollis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		0	0	1
Marasmius applanatipes	B	off	B		3	3	3	3	-	-	-	-	-	-	-	2	2		1	1	3
Mycena hudsoniana	B	off	B		3	3	3	3	-	-	-	-	-	-	-	6	7		0	0	3
Mycena monticola		off		B	1	1	1	1	-	-	SS	-	1	1	1	102	134	2001	53	53	11
Mycena overholtsii	D	off		B	1	1	1	1	-	-	-	-	-	-	-	130	136		6	6	2
Mycena quinaultensis	B	off	B		3	3	3	3	-	SS	-	-	-	3	-	3	9		0	0	0
Mycena tenax	B	off	B		1	1	1	1	-	-	-	-	-	-	-	12	29		0	0	11

Table 2-13. Summary of Environmental Consequences, Survey and Manage Category Assignments, Special Status Species Program Assignments, and Known Site Numbers for All 337 Species and All 4 Alternatives

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Mythicomyces corneipes	B	off	B		3	3	3	3	-	-	-	-	-	-	-	8	9		0	0	0
Neolentinus adhaerens	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	4		0	0	1
Neolentinus kauffmanii	B	off	B		1	1	1	1	-	-	-	-	-	-	-	20	34		1	1	1
Neournula pouchetii	off			B	1	1	1	1	-	-	-	-	-	-	-	48	67	2001	8	8	16
Nivatogastrium nubigenum					1	1	1	1					-	-	-						
Entire range except OR Eastern Cascades and CA Cascades Physiographic provinces	B	off	B		1	1	1	1	-	-	-	-	-	-	-	8	8		2	2	1
OR Eastern Cascades and CA Cascades Physiographic provinces	off			B	1	1	1	1					-	-	-	171	193	2001	19	20	1
Octavianina cyanescens	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	1
Octavianina macrospora	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	0	0		0	0	0
Otidea leporina	D	off		B	1	1	1	1	-	-	-	-	-	-	-	101	110		21	22	0
Otidea onotica	off			F	1	1	1	1	-	-	-	-	-	-	-	643	749	2001	480	480	9
Otidea smithii	B	off	B		3	3	3	3	-	-	SS	SS	-	3	-	11	12		1	1	0
Phaeocollybia attenuata	D	off		D	1	1	1	1	-	-	SS	-	-	1	1	78	106		39	40	6
Phaeocollybia californica	B	off	B		1	3[15]	1	1	SS	SS	SS-O	-	-	3	-	39	44		9	9	0
Phaeocollybia dissiliens	B	off	B		1	3[15]	1	1	-	-	SS-O	-	-	3	-	16	18		4	4	0
Phaeocollybia fallax	D	off		D	1	3[15]	3	1	-	-	SS-W	-	-	3	3	61	88		25	27	2
Phaeocollybia gregaria	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	4	4		0	0	0
Phaeocollybia kauffmanii	D	off		D	1	1	1	1	-	-	-	-	-	-	-	78	97		13	13	5
Phaeocollybia olivacea					1	1	1	1					-	2	1						
Washington and California	E	off	E	B	1	1	1	1	SS	SS	SS-O	SS	-	3	-	6	18		6	6	0
Oregon	F	off		B	1	1	1	1					-	1	1	0	0		22	23	0
Phaeocollybia oregonensis	B	off	B		1	1	1	1	SS	-	SS	-	-	3	-	31	36		6	6	0
Phaeocollybia piceae	B	off	B		1	3[15]	1	1	-	SS	SS	-	-	3	-	41	46		11	11	0
Phaeocollybia pseudofestiva	B	off	B		1	3[15]	1	1	-	SS	SS	-	-	3	-	21	31		14	14	0
Phaeocollybia scatesiae	B	off	B		1	3[15]	1	1	-	SS	SS	-	-	3	-	13	13		6	6	0
Phaeocollybia sipei	B	off	B		1	3[15]	1	1	-	-	SS-O	-	-	3	-	38	42		11	11	1
Phaeocollybia spadicea	B	off	B		1	3[15]	1	1	-	SS	SS	-	-	3	-	41	56		24	24	3
Phellodon atratus	B	off	B		1	1	1	1	-	-	-	-	-	-	-	8	29		1	1	0
Pholiota albivelata	B	off	B		3	3	3	3	-	-	-	-	-	-	-	7	14		0	0	0

Table 2-13. Summary of Environmental Consequences, Survey and Manage Category Assignments, Special Status Species Program Assignments, and Known Site Numbers for All 337 Species and All 4 Alternatives

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Pithya vulgaris	off			D	1	1	1	1	-	-	-	-	-	-	-	193	220	2001	20	20	5
Plectania melastoma	off			F	1	1	1	1	-	-	-	-	-	-	-	90	129	2001	39	39	60
Plectania milleri	off			B	1	1	1	1	-	-	-	-	-	-	-	228	260	2001	80	80	1
Podostroma alutaceum	B	off	B		3	3	3	3	-	-	-	-	-	-	-	4	9		1	1	1
Polyozellus multiplex	B	off	B		1	3[15]	1	1	-	SS	-	-	-	3	-	53	55		10	10	0
Pseudaleuria quinaultiana	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		1	1	0
Ramaria abietina	B	off	B		1	1	1	1	-	-	-	-	-	-	-	4	9		2	2	0
Ramaria amyloidea	B	off	B		1	3[15]	1	1	-	SS	SS	-	-	3	-	14	15		4	4	1
Ramaria araiospora	B	off	B		1	3[15]	1	1	-	-	SS-W	-	-	3	-	80	89		29	33	11
Ramaria aurantiisiccescens	B	off	B		1	3[15]	1	1	-	SS	SS	-	-	3	-	22	25		4	4	0
Ramaria botryis var. *aurantiiramosa*	B	off	B		3	3	3	3	-	-	-	-	-	-	-	8	10		2	2	0
Ramaria celerivirescens	B	off	B		1	1	1	1	-	-	-	-	-	-	-	62	65		28	29	14
Ramaria claviramulata	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	0
Ramaria concolor f. marrii	B	off	B		4	4	4	4	-	-	-	-	-	-	-	0	0		0	0	0
Ramaria concolor f. tsugina	B	off	B		3	3	3	3	-	-	-	-	-	-	-	4	5		0	0	0
Ramaria conjunctipes var. *sparsiramosa*	B	off	B		1	1	1	1	-	-	-	-	-	-	-	4	4		5	8	7
Ramaria coulterae	B	off	B		3	3	3	3	-	-	-	-	-	-	-	8	8		6	8	1
Ramaria cyaneigranosa	B	off	B		1	3[15]	1	1	-	SS	SS-W	-	-	3	-	21	27		9	10	0
Ramaria gelatiniaurantia	B	off	B		1	1	1	1	-	-	SS	-	-	3	-	13	22		4	6	0
Ramaria gracilis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	2		1	1	0
Ramaria hilaris var. *olympiana*	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	0		1	1	0
Ramaria largentii	B	off	B		1	3[15]	1	1	-	SS	SS	-	-	3	-	8	10		7	7	0
Ramaria lorithamnus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	0		1	1	0
Ramaria maculatipes	B	off	B		3	3	3	3	-	-	-	-	-	-	-	8	8		2	2	0
Ramaria rainierensis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	2	3		0	0	0
Ramaria rubella var. *blanda*	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	0		3	3	0
Ramaria rubribrunnescens	B	off	B		3	3	3	3	-	-	-	-	-	-	-	9	9		2	2	0
Ramaria rubrievanescens	B	off	B		1	3[15]	1	1	-	-	SS-W	-	-	3	-	42	46		9	13	3
Ramaria rubripermanens					1	2[15]	1	1					-	2	-						
Washington and California	B	off	B		1	3[15]	1	1	-	-	SS-W	-	-	3	-	10	11		3	5	1
Oregon	D	off		B	1	1	1	1					-	1	-	113	124		20	20	9
Ramaria spinulosa var. *diminutiva*	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	1	1		0	0	0

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TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Ramaria stuntzii	B	off	B		1	3[15]	1	1	-	-	SS-W	-	-	3	-	73	76		23	24	1
Ramaria suecica	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		0	0	1
Ramaria thiersii	B	off	B		3	3	3	3	-	-	-	-	-	-	-	4	4		5	5	1
Ramaria verlotensis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	3		0	0	0
Rhizopogon abietis	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	0		1	2	0
Rhizopogon atroviolaceus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	1	1		10	10	2
Rhizopogon brunneiniger	B	off	B		3	3	3	3	-	-	-	-	-	-	-	6	7		2	2	0
Rhizopogon chamaleontinus	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	1	1		0	0	0
Rhizopogon ellipsosporus	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	1	1		1	3	1
Rhizopogon evadens var. *subalpinus*	B	off	B		3	3	3	3	-	-	-	-	-	-	-	18	19		4	4	0
Rhizopogon exiguus	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	2	3		0	0	0
Rhizopogon flavofibrillosus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	8	8		0	0	1
Rhizopogon inquinatus	B	off	B		3	3	3	3	-	-	-	-	-	-	-	2	2		0	0	0
Rhizopogon truncatus	D	off		D	1	1	1	1	-	-	-	-	-	-	-	31	55		29	32	15
Rhodocybe speciosa	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		0	0	2
Rickenella swartzii	B	off	B		1	1	1	1	-	-	-	-	-	-	-	3	8		12	14	0
Russula mustelina	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	0		1	1	0
Sarcodon fuscoindicus	B	off	B		1	3[15]	1	1	-	SS	SS-W	-	-	3	-	27	40		2	2	6
Sarcodon imbricatus		off		B	1	1	1	1	-	-	-	-	-	-	-	100	127	2001	27	27	1
Sarcosoma latahense		off		B	1	1	1	1	-	-	-	-	-	-	-	49	57	2001	11	11	1
Sarcosoma mexicana		off		F	1	1	1	1	-	-	-	-	-	-	-	676	817	2001	15	15	8
Sarcosphaera eximia		off		B	1	1	1	1	-	-	-	-	-	-	-	533	674	2001	73	74	0
Sedecula pulvinata	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	0		0	0	0
Sowerbyella rhenana	B	off	B		1	3[15]	1	1	-	SS	SS	SS	-	3	-	58	68		5	5	0
Sparassis crispa	D	off		D	1	3[15]	3	1	-	SS	-	-	-	3	3	59	60		18	19	1
Spathularia flavida	B	off	B		1	1	1	1	-	SS	SS-W	-	-	1	-	24	38		5	5	9
Stagnicola perplexa	B	off	B		3	3	3	3	-	-	-	-	-	-	-	7	7		0	0	0
Thaxterogaster pavelekii	B	off	B		3	3	3	3	SS	-	-	-	-	3	-	3	7		0	0	0
Tremiscus helvelloides	D	off		B	1	1	1	1	-	-	-	-	-	-	-	81	107		5	5	3
Tricholoma venenatum	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	0		0	0	1
Tricholomopsis fulvescens	B	off	B		3	3	3	3	-	-	-	SS	-	3	-	2	2		2	2	0
Tuber asa	B	off	B		3	3	3	3	-	-	-	-	-	-	-	3	3		0	0	0
Tuber pacificum	B	off	B		3	3	3	3	-	-	-	-	-	-	-	2	3		0	0	0

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TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Turbinellus floccosus (California)	off			F	1	1	1	1	-	-	-	-	-	-	-	286	327	2001	12	12	3
Tylopilus porphyrosporus	D	off		D	1	1	1	1	-	-	-	-	-	-	-	21	34		2	3	0
Zelleromyces papyracea	B	off	B		3	3	3	3	-	-	-	-	-	-	-	0	1		0	0	0
LICHENS																					
Bryoria pseudocapillaris	A	off	A	B	3	3	3	3	SS	SS	SS		-	3	-	13	24		32	52	0
Bryoria spiralifera	A	off	A	B	3	3	3	3	SS	SS	SS-O	-	-	3	-	20	49		16	25	2
Bryoria subcana	B	off	B		3	3	3	3	As	-	-	-	-	3	-	18	18		4	5	0
Bryoria tortuosa					2	2	2	1					2	2	2						
WA Olympic Peninsula, WA Western Lowlands, WA Western Cascades, OR Western Cascades, OR Coast Range, OR Willamette Valley and CA Coast Range Physiographic Provinces	off			A	3	3	3	1	-	SS	-	-	3	3	3	3	18	2002	113	114	2
WA Eastern Cascades, OR Eastern Cascades, OR Klamath, CA Klamath, and CA Cascades Physiographic Provinces	off			D	1	1	1	1					1	1	1	650	650	2002			
Buellia oidalea	E	off	E		3	3	3	3	-	-	-	-	-	-	-	5	18		1	1	0
Calicium abietinum	B	off	B		4	4	4	4	-	-	-	-	-	-	-	9	10		1	1	1
Calicium adspersum	E	off	E		4	4	4	4	As	-	-	SS	-	4	-	0	0		0	0	0
Calicium glaucellum	off			F	1	1	1	1	-	-	-	-	-	-	-	64	64	2002	29	29	71
Calicium viride	off			F	1	1	1	1	-	SS	-	-	1	1	1	119	119	2002	57	57	45
Cetrelia cetrarioides	E	off	E		1	1	1	1	-	-	SS-W	-	-	2	-	29	60		29	36	2
Chaenotheca chrysocephala	B	off	B		1	1	1	1	-	-	-	-	-	-	-	21	21		4	5	15
Chaenotheca ferruginea	B	off	B		1	1	1	1	-	-	-	-	-	-	-	12	12		93	94	3
Chaenotheca furfuracea	off			F	1	1	1	1	-	-	-	-	-	-	-	153	153	2003	181	181	28
Chaenotheca subroscida	E	off	E		3	3	3	3	-	-	SS	-	-	3	-	5	5		14	14	4
Chaenothecopsis pusilla	E	off	E		1	1	1	1	-	-	-	-	-	-	-	4	4		5	5	0
Cladonia norvegica	off			B	1	1	1	1	-	-	-	-	-	-	-	70	70	2003	0	0	28
Collema nigrescens (WA and OR, except in OR Klamath Physiographic province)	F	off		F	4	4	4	4	-	-	SS-W	-	-	4	4	18	28		7	7	5

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	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Dendriscocaulon intricatulum					1	2	1	1	-	SS	SS-W	-	-	2	-						
In all of Washington and Oregon except Coos, Douglas, Curry, Josephine, and Jackson Counties	A	off	A	B	1	2	1	1					-	3	-		23		6	6	1
California	E	off	E	B	1	1	1	1					-	1	-				101	105	2
Oregon in Coos, Douglas, Curry, Josephine, and Jackson Counties	off			B	1	1	1	1					-	1	-	526	526	2002	117	117	0
Dermatocarpon meiophyllizum	E	off	E	B	1	1	1	1	-	-	SS	-	-	3	-	12	16		35	35	0
Fuscopannaria saubinetii	E	off	E	F	3	3	3	3	-	-	-	-	-	-	-	180	190		4	4	0
Heterodermia sitchensis	E	off	E		4	4	4	4	As	-	-	-	-	4	-	0	0		1	1	0
Hypogymnia duplicata	C	off		A	1	1	1	1	-	-	SS-O	-	-	1	1	200	211		31	42	8
Hypogymnia oceanica	off			F	1	1	1	1	-	-	-	-	-	-	-	441	456	2001	7	7	17
Hypogymnia vittata	E	off	E		4	4	4	4	-	-	-	-	-	-	-	0	0		0	0	0
Hypotrachyna revoluta	E	off	E		3	3	3	3	As	-	SS	-	-	3	-	10	10		2	11	0
Leptogium burnetiae var. *hirsutum*	E	off	E	A	4	4	4	4	-	-	SS	-	-	4	-	1	4		0	0	0
Leptogium cyanescens	A	off	A		3	3	3	3	-	-	SS	-	-	3	-	8	10		0	0	0
Leptogium rivale	E	off	E	B	1	1	1	1	-	-	-	-	-	-	-	67	71		87	87	0
Leptogium teretiusculum	E	off	E		3	3	3	3	-	-	-	-	-	-	-	7	8		22	22	3
Lobaria linita					1	1	1	1	As	-	SS-O	-	-	2	-						
Oregon and Washington except WA Western Cascades physiographic province north of Snoqualmie Pass and Olympic Peninsula physiographic province	A	off	A		1	1	1	1					-	3	-		29		5	5	2
WA Western Cascades physiographic province north of Snoqualmie Pass and Olympic Peninsula physiographic province	off			A	1	1	1	1					-	1	-	119	119	2002	28	28	10
Lobaria oregano (California)	A	off	A		3	3	3	3	-	SS	-	-	-	3	-	11	11		19	19	2
Microcalicium arenarium	B	off	B		4	4	4	4	As	-	-	-	-	4	-	0	0		2	2	0

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	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Nephroma bellum					1	1	1	1					1	2	1						
In OR; Klamath, Willamette Valley, Eastern Cascades; WA; Western Cascades (outside the Gifford Pinchot National Forest), Eastern Cascades, and Olympic Peninsula physiographic provinces	E	off	E	F	1	1	1	1	-	SS	SS-W	-	1	2[12]	1	20	20		13	13	6
In OR: Western Cascades and Coast Range. In WA: Western Cascades in the Gifford Pinchot National Forest		off		F	1	1	1	1					1	1	1	151	173	2001	7	11	23
Nephroma isidiosum	E	off	E		4	4	4	4	-	-	-	-	-	-	-	0	0		0	0	0
Nephroma occultum	C	off		B	1	3	3	1	-	-	SS	-	-	3	3	168	168		48	49	4
Niebla cephalota	A	off	A		3	3	3	3	As	SS	SS	-	-	3	-	4	15		3	29	0
Pannaria rubiginosa	E	off	E		3	3	3	3	As	SS	SS	-	-	3	-	10	13		2	7	0
Peltigera pacifica	E	off	E		1	1	1	1	-	-	SS	-	-	1	-	72	80		84	85	12
Platismatia lacunosa					1	2	1	1					-	2	-						
Except in Oregon Coast Range physiographic province	E	off	E	C	1	2	1	1	-	-	SS-W	-	-	3	-		37		21	22	3
Oregon Coast Range physiographic province		off		C	1	1	1	1					-	1	-	14	59	2002	39	41	18
Pseudocyphellaria perpetua	A	off	A	B	3	3	3	3	-	-	-	-	-	-	-	5	5		43	49	0
Pseudocyphellaria rainierensis	A	off	A		1	3	3	1	-	-	SS	-	-	3	-	167	167		101	101	6
Pyrrhospora quernea		off		E	3	3	3	3	-	-	SS	-	3	3	3	≤60	≤60	2002	2	2	0
Ramalina pollinaria		off		E	3	3	3	3	AS	SS	SS	-	3	3	3	<25	<25	2002	8	33	1
Ramalina thrausta		off		A	1	1	1	1	-	-	-	-	-	-	-	327	327	2003	391	395	15
Stenocybe clavata	E	off	E		4	4	4	4	-	-	-	-	-	-	-	7	7		0	0	4
Teloschistes flavicans	A	off	A		3	3	3	3	As	SS	SS-O	-	-	3	-	3	9		2	4	0
Tholurna dissimilis (south of Columbia River)	B	off	B		4	4	4	4	As	-	SS	-	-	4	-	3	5		0	0	0
Usnea hesperina	E	off	E	B	3	3	3	3	-	-	-	-	-	-	-	14	17		14	31	0

Table 2-13. Summary of Environmental Consequences, Survey and Manage Category Assignments, Special Status Species Program Assignments, and Known Site Numbers for All 337 Species and All 4 Alternatives

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Usnea longissima					1	1	1	1	-	SS	SS	SS	-	2	1						
California and in Curry, Josephine, and Jackson Counties, Oregon	A	off	A		1	1	1	1					-	3	1	19	26		24	27	0
Oregon, except in Curry, Josephine, and Jackson Counties and in Washington	F	off		F	1	1	1	1					-	1	1	115	207		103	104	13
BRYOPHYTES																					
Brotherella roellii	E	off	E		4	4	4	4	-	-	-	-	-	-	-	5	5		0	0	0
Buxbaumia viridis					1	1	1	1	-	SS	-	SS	-	2	-						
California	E	off	E	D	1	1	1	1					-	3	-	4	5		1	1	0
Oregon and Washington		off		D	1	1	1	1					-	1	-	536	637	2001	202	202	19
Diplophyllum albicans		off		D	1	1	1	1	-	-	-	-	-	-	-	117	117	2002	18	19	25
Diplophyllum plicatum	B	off	B		1	1	1	1	As	-	-	-	-	3	-	78	80		21	21	1
Encalypta brevicolla var. crumiana		off		B	4	4	4	4	-	-	SS-O	-	4	4	4	2	2	2002	3	3	0
Herbertus aduncus	E	off	E	B	4	4	4	4	As	-	-	-	-	4	-	8	9		1	1	0
Iwatsukiella leucotricha	B	off	B		1	1	1	1	As	-	SS	-	-	3	-	2	2		15	18	0
Kurzia makinoana	B	off	B		4	4	4	4	As	-	-	-	-	4	-	3	4		1	1	0
Marsupella emarginata var. *aquatica*	B	off	B		1	3	1	1	-	-	-	-	-	-	-	1	1		1	1	0
Orthodontium gracile	B	off	B		1	1	1	1	-	SS	-	-	-	1	-	2	29		0	0	0
Ptilidium californicum (California)	A	off	A		1	1	1	1	-	SS	-	SS	-	1	-	228	228		50	50	4
Racomitrium aquaticum	E	off	E	B	1	1	1	1	-	-	-	-	-	-	-	24	28		8	8	6
Rhizomnium nudum					1	1	1	1	As	-	SS-O	-	-	1	-						
Oregon and California	B	off	B		1	1	1	1					-	1	-		26		22	22	3
Washington		off		B	1	1	1	1					-	1	-	160	166	2002	67	67	21
Schistostega pennata	A	off	A		1	1	1	1	As	-	SS	-	-	3	-	59	59		22	22	0
Tetraphis geniculata	A	off	A		1	1	1	1	As	SS	SS	-	-	3	-	57	57		26	26	1
Tritomaria exsectiformis	B	off	B		4	4	4	4	As	-	-	-	-	4	-	15	15		6	6	0
Tritomaria quinquedentata	B	off	B		4	4	4	4	-	-	-	-	-	-	-	11	12		4	4	0
VERTEBRATES																					
Del Norte salamander *Plethodon elongatus*		off		D	1	1	1	1	-	-	SS	-	1	1	1	1838	1838	2001	329	344	-
Larch Mountain salamander *Plethodon larselli*	A	off	A		1	2	2	1	As	-	SS	-	-	2	-	88	88		15	16	-

Table 2-13. Summary of Environmental Consequences, Survey and Manage Category Assignments, Special Status Species Program Assignments, and Known Site Numbers for All 337 Species and All 4 Alternatives

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Shasta salamander *Hydromantes shastae*	A	off	A		1	2	2	1	-	SS	-	SS	-	2	-	56	56		22	22	-
Siskiyou Mountains salamander *Plethodon stormi*					1	2	2	1					-	2	2						
South Range	A	off	A	C	1	2	2	1	SS	-	SS-O	SS	-	2	2	30	30		19	20	-
North Range	D	off		C	1	2	2	1					-	2	2	143	143		182	185	-
Van Dyke's salamander *Plethodon vandykei*	A	off	A		1	2	2	1	-	-	SS	-	-	2	-	23	29		17	21	-
Great Gray Owl *Strix nebulosa*	A	off	A	C	1	2	1	1	-	-	SS-W	SS	-	2	-	103	114		15	17	-
Oregon Red Tree Vole *Arborimus longicaudus*					2	2	2	2					-	2	2						
Xeric and Northern Mesic	C	off		C	2	2	2	2	SS[13]	-	SS[13]	-	-	2	2	346	346		201	204	18[14]
Mesic		off		C	1	1	1	1					-	1	1	404	405	2003	81	84	62[14]
MOLLUSKS																					
Ancotrema voyanum		off		E	1	1	1	1	-	-	-	-	-	-	-	225	285	2003	41	41	24[11]
Cryptomastix devia	A	off	A		1	1	1	1	SS	-	SS	-	-	3	-	121	148		27	29	0
Cryptomastix hendersoni	A	off	A		1	1	1	1	-	-	SS	-	-	3	-	18	22		0	0	0
Deroceras hesperium	B	off	B		1	1	1	1	SS	-	SS	-	-	3	-	2	4		12	16	0
Fluminicola n. sp. 1		off		A	1	1	1	1	SS	-	SS-O	-	1	1	1	3	27	2001	2	5	0
Fluminicola n. sp. 2		off		A	1	1	1	1	-	-	SS-O	-	1	1	1	0	1	2001	0	0	0
Fluminicola n. sp. 3	A	off	A		1	1	1	1	SS	-	SS-O	-	-	3	-	3	5		0	1	0
Fluminicola n. sp. 11	A	off	A		1	1	1	1	SS	-	-	-	-	3	-	2	2		13	17	0
Fluminicola n. sp. 15	A	off	A		1	3	1	1	-	-	-	-	-	-	-	0	4		0	0	0
Fluminicola n. sp. 16	A	off	A		1	3	1	1	-	-	-	-	-	-	-	0	17		0	0	0
Fluminicola n. sp. 17	A	off	A		1	3	1	1	-	-	-	-	-	-	-	0	2		0	0	0
Fluminicola n. sp. 18	A	off	A		1	3	1	1	-	-	-	-	-	-	-	1	3		0	0	0
Fluminicola n. sp. 19	A	off	A		1	3	1	1	-	-	-	-	-	-	-	0	1		0	0	0
Fluminicola n. sp. 20	A	off	A		1	3	1	1	-	-	-	-	-	-	-	0	2		0	0	0
Fluminicola potemicus	A	off	A		1	3	1	1	-	-	-	-	-	-	-	3	12		0	0	0
Fluminicola seminalis	A	off	A		1	2	1	1	-	-	-	SS	-	3	-	5	15		0	0	0
Helminthoglypta hertleini		off		B	1	1	1	1	SS	SS	SS-O	-	1	1	1	97	97	2002	103	110	3[11]
Helminthoglypta talmadgei	D	off		A	1	1	1	1	-	SS	-	-	-	1	1	761	761		370	370	0[11]
Hemphillia burringtoni	E	off	E	A	1	1	1	1	-	-	SS-W	-	-	1	-	17	55		7	7	1

Table 2-13. Summary of Environmental Consequences, Survey and Manage Category Assignments, Special Status Species Program Assignments, and Known Site Numbers for All 337 Species and All 4 Alternatives

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Hemphillia glandulosa					1	1	1	1					1	1	1						
In WA Western Cascades Physiographic Province	E	off	E	C	1	1	1	1	-	-	SS-W	-	1	1	1	139	140		13	13	0
In WA: Olympic Peninsula and OR: Coast Range	off			C	1	1	1	1					1	1	1	1084	1132	2001	412	412	8
Hemphillia malonei					1	1	1	1					-	1	1						
Washington	C	off		C	1	1	1	1	-	-	SS-W	-	-	1	1	341	352		275	275	1
Oregon	off			C	1	1	1	1					-	1	1	585	619	2001	350	350	8
Hemphillia pantherina	B	off	B		4	4	4	4	-	-	SS-W	-	-	4	-	0	0		0	0	0
Juga (O) n. sp. 2	A	off	A		1	1	1	1	-	-	SS-O	-	-	3	-	3	7		1	3	0
Juga (O) n. sp. 3	A	off	A		1	3	1	1	-	-	-	-	-	-	-	0	4		0	0	0
Lyogyrus n. sp. 1	A	off	A		1	1	1	1	-	-	SS	-	-	3	-	49	61		3	3	0
Lyogyrus n. sp. 2	A	off	A		1	1	1	1	-	-	SS	-	-	3	-	3	3		0	0	0
Lyogyrus n. sp. 3	A	off	A		1	3	1	1	-	-	-	-	-	-	-	0	1		0	0	0
Megomphix hemphilli					1	1	1	1					-	-	-						
North of south boundary of Lincoln, Benton, and Linn Counties, Oregon	off			A	1	1	1	1	-	-	-	-	-	-	-	813	825	2003	138	139	3
South of south boundary of Lincoln, Benton, and Linn Counties, Oregon	off			F	1	1	1	1					-	-	-	1119	1119	2003	21	23	1
Monadenia chaceana	B	off	B		1	2	1	1	SS	SS	SS-O	-	-	3	-	110	125		96	98	2[11]
Monadenia churchi	off			F	1	1	1	1	-	-	-	-	-	-	-	2213	2372	2001	652	652	56[11]
Monadenia fidelis minor	A	off	A		1	1	1	1	-	-	SS	-	-	3	-	60	61		37	37	0
Monadenia infumata ochromphalus	off			B	1	1	1	1	-	-	-	-	-	-	-	223	223	2003	0	0	16[11]
Monadenia troglodytes troglodytes	A	off	A		1	1	1	1	-	-	-	SS	-	3	-	8	9		0	0	0[11]
Monadenia troglodytes wintu	A	off	A		1	1	1	1	-	-	-	SS	-	3	-	7	8		0	0	0[11]
Oreohelix n. sp.	A	off	A		1	1	1	1	-	-	SS-W	-	-	3	-	43	54		43	50	0
Pristiloma arcticum crateris	A	off	A	B	1	1	1	1	SS	-	SS-O	-	-	1	-	90	90		119	119	0
Prophysaon coeruleum (Washington and California)	A	off	A		1	1	1	1	-	-	SS-W	SS	-	3	-	112	112		18	18	0[11]
Trilobopsis roperi	A	off	A		1	1	1	1	-	-	-	SS	-	3	-	140	146		0	0	0[11]
Trilobopsis tehamana	A	off	A		1	1	1	1	-	SS	-	SS	-	3	-	4	7		5	5	0[11]
Vertigo n. sp.	A	off	A		1	1	1	1	-	-	SS-W	-	-	3	-	1	1		0	0	0
Vespericola pressleyi	A	off	A		1	1	1	1	-	SS	-	SS	-	3	-	21	21		6	6	0[11]

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TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Vespericola shasta	A	off	A		1	1	1	1	-	-	-	SS	-	3	-	72	78		0	0	0
Vorticifex klamathensis sinitsini		off		E	1	1	1	1	-	-	SS-O	-	1	1	1	0	7	2001	0	0	0
Vorticifex n. sp. 1	E	off	E		1	3	1	1	-	-	-	-	-	-	-	0	2		0	0	0
VASCULAR PLANTS																					
Arceuthobium tsugense mertensianae (Washington)	F	off		F	1	1	1	1	-	-	-	-	-	-	-	2	2		0	0	-
Bensoniella oregana (California)	A	off	A		1	1	1	1	SS	-	SS-O	SS	-	3	-	3	25		0	0	-
Botrychium minganense (Oregon and California)	A	off	A		1	1	1	1	-	-	SS-O	SS	-	3	-	13	16		2	2	-
Botrychium montanum	A	off	A		1	1	1	1	As	-	SS-O	SS	-	1	-	68	68		29	29	-
Coptis asplenifolia	A	off	A		1	1	1	1	-	-	SS-W	-	-	1	-	21	21		5	5	-
Coptis trifolia	A	off	A		1	1	1	1	As	-	SS-O	-	-	3	-	2	3		1	1	-
Corydalis aquae-gelidae	A	off	A	C	1	1	1	1	SS	-	SS	-	-	3	-	102	110		26	26	-
Cypripedium fasciculatum					1	1	1	1					2	3	3						
Entire Range except WA Eastern Cascades physiographic province	C	off		C	1	1	1	1	As	SS	SS	SS	1	3	3		818		282	285	-
WA Eastern Cascades physiographic province		off		C	1	1	1	1					3	3	3	147	147	2002	33	33	-
Cypripedium montanum					2	2	2	1					-	3	3						
Entire range except WA Eastern Cascades physiographic province	C	off		C	1	2	2	1	-	SS	-	SS	-	3	3	393	424		180	184	-
WA Eastern Cascades physiographic province		off		C	3	3	3	1					-	3	3	274	247	2001	21	21	-
Eucephalus vialis	A	off	A		1	1	1	1	SS	-	SS-O	-	-	3	-	65	89		75	85	-
Galium kamtschaticum (Olympic Peninsula, WA Eastern Cascades, OR & WA Western Cascades physiographic provinces, south of Snoqualmie Pass)	A	off	A		1	1	1	1	-	-	SS	-	-	1	-	11-14	11-14		2	2	-
Platanthera orbiculata var. *orbiculata*	C	off		C	1	1	1	1	-	-	-	-	-	-	-	146	146		53	54	-
ARTHROPODS																					
Canopy herbivores (south range)	F	off		F	4	4	4	4	-	-	-	-	-	-	-	-	-		-	-	-
Coarse wood chewers (south range)	F	off		F	4	4	4	4	-	-	-	-	-	-	-	-	-		-	-	-
Litter and soil dwelling species (south range)	F	off		F	4	4	4	4	-	-	-	-	-	-	-	-	-		-	-	-

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TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcomes[3, 9]				Special Status Species Programs[4]				Outcomes[3] without SSSP[5, 9]			Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[10]		RMS Sites[6,7]
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	BLM CA	FS R6[8]	FS R5[8]	Alt 1	Alt 2	Alt 3	Federal Land Only	Total	ASR Year	Federal Land Only	Total	
Understory and forest gap herbivores (south range)	F	off		F	4	4	4	4	-	-	-	-	-	-	-	-	-		-	-	-

[1] Current taxonomic name. Any differences between these and previous NWFP documents are displayed in Table 3&4-18.
[2] See Table 2-3 (Alt. 1), Table 2-6 (Alt. 3), or Table 2-7 (Alt. 4) for information about Management Requirements for Category Assignments
[3] Outcomes:
1 - Sufficient Habitat
2 - Sufficient Habitat but Insufficient Habitat in a Portion of their Range
3 - Insufficient Habitat
4 - Insufficient Information to Determine and Outcome
[4] Actual SSSP assignments. Supplement text uses "assumed" assignments because managers have the discretion to add or remove species outside of the SEIS process. SSSP placement applies to entire states (except in the case of the red tree vole), not just the NWFP area.
SSSP Codes:
ss Bureau Sensitive or Forest Service Sensitive
as Bureau Assessment
ss-o Sensitive in Oregon
ss-w Sensitive in Washington
[5] Applies only to species assumed to be on one or more SSSP, and only to alternatives where species is "off" Survey and Manage.
[6] RMS sites: Please see Table 3&4-16 for more information about the Random Multi-Species Surveys.
[7] Species removed from Survey and Manage during the process of the 2001 Annual Species Review may not be accurately represented in the RMS Surveys, as surveys may not have been completed.
[8] FS R-5: Forest Service, Region 5 (California); FS R-6: Forest Service, Region 6 (Oregon and Washington).
[9] Species outcomes are shown for each species range subdivision made in Survey and Manage. If a species is in two categories (or "off") in different parts of its range, outcomes are included for both areas. In these cases, outcomes are combined (averaged) for the entire species range (shown as shaded blocks) for use in various summary tables (e.g. 2-9). (Assumed ratings for averaging purposes are also shaded.)
[10] Additional sites since the last ASR or the 2004 FSEIS. For species with new sites since their last ASR (as indicated by the year in the ASR year column) the known site numbers are the result of a data call with a cutoff date of 11/22/06. For all other species, the data entry deadline was 09/29/06.
[11] Surveyed as part of the GOBIG2K Survey. See Table 3&4-16 for more information.
[12] For the *Nephroma bellum* in this portion of its range, under the scenario of Alternative 4 without SSSP, the outcome is also 2 (sufficient habitat but insufficient habitat in a portion of its range).
[13] The Red Tree Vole is included in SSSP in the northwestern Oregon Coast area only (North of Highway 20, west of the Willamette Valley).
[14] Surveyed as part of the Random Double Sample Survey. See Table 3&4-11 for more information.
[15] Insufficient habitat range-wide, but sufficient habitat in the portion of the range where the species in on one or more SSSP.

Note: Site numbers and outcomes are for the NWFP area unless a smaller area is specified with the species name.

Chapter 3 & 4

Changes since the 2004 FSEIS:

Changes displayed in the July 2006 Draft Supplement or made in response to public comments received about that document:

- Species effects discussions have been updated for new information.
- Species effects are provided for species as if they are not added to, or are removed from, Agencies' Special Status Species Programs.
- The *Late-Successional Forest Ecosystems* section has been expanded to address 10-year Northwest Forest Plan monitoring results.
- A new *Survey and Manage Species* section has been added to discuss the implications of species outcomes and the level of risk potentially created by the Agencies' management activities.
- The *Wildland and Prescribed Fire* section has been totally rewritten. The anticipated fuels treatment program is more accurately described as coming from fuel hazard inventories rather than from an assumption of duplicating historic wildfire levels. Further, effects to the program are displayed against an 80,000 acre per year current program level.

Changes displayed in the January 2007 *Supplement* to the July 2006 Draft Supplement or made in response to comments received about that document:

- The statistical analysis of the Random Multi-Species Surveys is complete, displayed on Table 3&4-16 near the end of the chapter, and referenced in various species effects discussions. Random plot detections are displayed on the known sites table (Table 2-13).
- Species effects discussions have been updated for new information, and updated to address the new no-action alternative.
- Effects for 42 species in all of their range and an additional 16 in part of their range have been added to address the species added by the new No-Action Alternative, Alternative 4.
- The effects of the new no-action alternative on Wildland Fire, Timber Harvest, Cost, and other non-species specific sections are discussed as, after two years, equivalent to the effects for No-Action Alternative 1.

Also:

- Implications of the BLM Western Oregon Plan Revision and other management actions have been updated in the *Cumulative Impacts* section.
- Species known site numbers have been updated for new information and continued data checking and analysis.
- Costs have been updated for inflation.
- Species outcomes have changed based on new information.
- The *Global Climate* section has been expanded in response to public comments.

Minor corrections, explanations, and edits are not included in this list.

Chapter 3 & 4 – Affected Environment and Environmental Consequences

Introduction

Chapter 3 (Affected Environment) and Chapter 4 (Environmental Consequences) are combined in this document, as was done in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a), to more clearly present information to the readers. The text is ordered by first describing a resource or environmental component, and 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. This chapter also describes the effects (direct, indirect, and cumulative) of management under the alternatives. Together, these descriptions form the scientific and analytic basis for the *Comparison of Effects of the Alternatives* section in *Chapter 2*. Additional information regarding the existing environment may be found in the 2000 Survey and Manage Final SEIS.

Relationship of this SEIS to the Northwest Forest Plan Final SEIS and the 2000 Survey and Manage Final SEIS

The Final SEIS (1994) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (the Northwest Forest Plan) is referred to as the 1994 Final SEIS or the 1994 Northwest Forest Plan Final SEIS. The Final SEIS (2000) for Amendment to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines is referred to as the 2000 Final SEIS or the 2000 Survey and Manage Final SEIS.

This SEIS supplements the analysis contained in the 2000 Survey and Manage Final SEIS, and the 1994 Northwest Forest Plan Final SEIS. Whenever a broad environmental impact statement has been prepared and a subsequent environmental impact statement is then prepared on an action within the entire program, 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). Appendix 8 contains a summary of the species analyses from the previous two Final SEISs.

Additional information is incorporated, where appropriate, from the Forest Ecosystem Management: An Ecological, Economic, and Social Assessment: Report of the Forest Ecosystem Management Assessment Team (FEMAT) 1993, as well as from the 2001, 2002, and 2003 Annual Species Reviews of Survey and Manage species.

The analysis of environmental consequences of Alternative 1 in the 2000 Survey and Manage Final SEIS is the analytical equivalent of Alternative 1 (one of the no-action alternatives) in this SEIS. A feature of this alternative is that 58 species have been removed from Survey and Manage in all or part of their Northwest Forest Plan (NWFP) area range, and another 32 are in different categories in all or part of their NWFP area range, as a result of the 2001, 2002, and 2003 Annual Species Reviews conducted according to the Standards and Guidelines of this alternative. For the sake of brevity, the effects analysis for Alternative 1 in this SEIS only includes the outcomes from the 2000 Final SEIS. The complete analysis from the 2000 Final SEIS is incorporated by reference. Outcomes for the 58 species previously removed by the 2001-2003 ASRs from Survey and Manage are also included.

The analysis of environmental consequences for Alternative 2 includes consideration of the analysis from the 2000 Final SEIS, the 1994 Final SEIS, and FEMAT, as well as information from the 2001, 2002, and 2003 Annual Species Reviews of Survey and Manage species.

Alternative 3 combines elements of Alternative 1 with elements of Alternative 2. As a result, much of the analysis of Alternative 3 can be interpolated from the analysis of Alternatives 1 and 2.

Alternative 4, the other no-action alternative, is essentially the same as Alternative 1 except this alternative retains (on Survey and Manage) all 337 species and categories in effect prior to the conduct of the 2001, 2002, and 2003 Annual Species Reviews. For other, non-species-specific resource effects, an analysis assumption for Alternative 4 is that if it is selected, an Annual Species Review supported by appropriate NEPA would be completed within one to two years, and the species remaining on Survey and Manage would most likely be the same as those included in Alternative 1 today. Therefore, in the longer term, effects to timber harvest, fuels treatments, and other non-species-specific resources would be same as those described for Alternative 1. Only in the short term then, would these alternate versions of no-action be expected to differ.

The analysis of environmental consequences in this SEIS is limited to those consequences that would result from the actions described in the alternatives. Many aspects of the alternatives in this SEIS have already been thoroughly analyzed in FEMAT, the 1994 Final SEIS, and the 2000 Final SEIS. During the Annual Species Review process, new information was considered where available and changes to the Survey and Manage Program were made as appropriate (Alternative 1). A summary of that information is presented in Appendix 9. For all species in this analysis, new information that would substantially change the conclusions provided in these earlier documents is presented and applied where applicable.

Environmental consequences described in the 1994 Final SEIS relating to other aspects and elements of the Northwest Forest Plan, which are unchanged by the alternatives in this SEIS or time, are assumed to remain valid. Ten-year Northwest Forest Plan monitoring has routinely confirmed the accuracy of those consequences, or determined that the 1994 projections were more pessimistic than evidence now shows.

The 2000 Final SEIS did not propose a major change in Survey and Manage. The proposed action in 2000 was limited to correcting Survey and Manage implementation difficulties. The resultant decision clarified required management, removed unnecessary and duplicative or conflicting requirements, removed species found to be much more common than anticipated, added a process for changing species between categories, and added a process for adding or removing species from Survey and Manage based on new information. The 2000 Final SEIS did not re-examine whether Survey and Manage was needed to meet the requirements of the 1982 NFMA, FLPMA, or the O&C Act, and let stand the 1994 statement in Appendix J2 that the analysis screens leading to the adoption of Survey and Manage and seven other mitigation measures did "not represent a judgment about what is required by either the National Forest Management Act (NFMA) or the Endangered Species Act (ESA)." The 2000 Final SEIS simply indicated there was not enough experience with the Survey and Manage provision itself to justify an alternative specifying its removal at that time.

To provide sideboards for the alternatives, the 2000 Final SEIS introduced the term "persistence objective" as *"providing for roughly the same likelihood of persistence as that which was provided by the Northwest Forest Plan as originally adopted in the 1994 ROD"* (USDA, USDI 2000a:42). The 2000 Final SEIS did not establish, define, or assume a legal requirement with respect to persistence. It simply referenced the level of protection provided by the Plan.

Similarly, the 2000 Final SEIS did not define or attempt to rebalance the objectives of the Plan. Those objectives remain as President Clinton established them: "The need to protect long term health of our forests, our wildlife and our waterways…" and … "produce a predictable and sustainable level of timber sales and non timber resources that will not degrade or destroy the environment" (USDA, USDI 1994a:1-4; USDA, USDI 1994b:3). Survey and Manage was not a foundational objective of the Plan. Rather, Survey and Manage was a mitigation measure adopted to help "avoid, rectify, reduce, or eliminate potentially adverse environmental impacts of forest management activities" expected under the basic elements of the Northwest Forest Plan (USDA, USDI 1994b:29). As noted on page 10 of the 2000 Final SEIS, the evidence and experience in 2000 did not suggest a need for fundamental restructuring of Survey and Manage Standards and Guidelines at that time, nor did it suggest alternatives to satisfy the Plan's foundational objectives. The purposes of the 2000 Final SEIS, and the resulting decisions were narrowly focused, and were therefore quite different from those of this SEIS.

In discussing the origin of the Survey and Manage Standards and Guidelines, the 2000 Final SEIS noted that "Survey and Manage and other mitigation measures were designed to provide additional benefits to species while maintaining the balance between late-successional and old-growth forest habitat and forest products" (USDA, USDI 2000a:8). Of the alternatives examined in 1994, the selected alternative "was deemed to provide the most appropriate level of management 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 effects of the alternatives" (USDA, USDI 1994a:3&4-39; USDA, USDI 2000a:8). *Chapter 1* (*Purpose and Need*) notes that in 1994, Survey and Manage was predicted to decrease Probable Sale Quantity (PSQ) by 6 million board feet annually (MMBF) and "add to the uncertainty of the PSQ calculations"; in the 2000 Final SEIS the PSQ decrease was estimated at 51 MMBF, and is now estimated at 105 MMBF (see *Timber Harvest* later in this chapter). That this effect no longer maintains the balance, and no longer results in relatively minor changes on expected effects, are presented as part of the frustration of the "Need" for healthy forest ecosystems and a sustainable supply of timber and other forest products (*Chapter 1*).

The system of Late-Successional and other reserves provide the Plan's primary management for late-successional and old-growth forest associated species including those on Survey and Manage (USDA, USDI 2000a:26). The mitigation of Survey and Manage was established for species whose persistence was uncertain to be provided by the reserves and other elements of the Northwest Forest Plan. The FEMAT had originally expressed concern about these species because "it is widely accepted that the vascular plants, fungi, and lichens, along with the invertebrates, are critically important for the maintenance of ecosystem function and productivity" (USDA et al. 1993:II-34). However, in comparing alternatives, the FEMAT found both numbers of species as well as individuals within a species responded favorably to increased protection of late-successional forest (USDA et al. 1993:II-29). The Agencies' Northwest Forest Plan monitoring report *Status and Trend of Late-Successional and Old-Growth Forest* similarly noted a link between the likelihood of maintaining the viability of species and the likelihood of maintaining a functional, interacting older forest ecosystem on federal lands. The monitoring report went on to report older forest abundance, diversity, and connectivity to be within the range of natural variability, except perhaps, for the provinces of the eastern Cascades, a condition the FEMAT predicted as 63 percent likely on the eastside, and 77 percent likely on the westside, in 100 years (Moeur et al. 2005). These findings are significant to Survey and Manage species, and are discussed in more detail in the *Late-Successional Forest Ecosystems* section later in this Final Supplement.

The FEMAT did not add Survey and Manage. The senior FEMAT scientists took the view that there was sufficient late-successional and old-growth forest in reserves to protect

these species, and that further protections should await evidence of risk (Thomas et al. 2006). These scientists recommend that management:

> *"Focus species-specific protection on endangered, threatened, and at-risk species. Management plans can cope with only a limited number of individual species if they are to be effective. Franklin (1993), for example, argues that "larger-scale approaches – at the level of ecosystems and landscapes – are the only way to conserve the overwhelming mass – the millions of species- of existing biodiversity." Thus, we generally advocate a coarse-filter approach in which we rely on ecosystem diversity to provide for maintenance of species diversity. We recognize, however, that additional species-level criteria will often be needed. Clearly a fine-filter approach is required for federally threatened and endangered species. It is also prudent to recognize species whose habitat, without special consideration, might deteriorate sufficiently so as to require listing under our Endangered Species Act. The new USFS planning rules and directives provide an example of this approach … They call for forest plans to provide for appropriate ecological conditions for threatened and endangered species and species of concern, with "species of concern" being those species that might require listing as threatened without special action. Furthermore the directives suggest use of lists from credible independent sources ("NatureServe") in making that determination"* (Thomas et al. 2006).

This is precisely what the proposed action suggests.

Survey and Manage was adopted to address concerns related to uncertainty, endemism, small populations sizes, association with scarce habitats, and impacts from previous management (USDA, USDI 2000a:26). When the 2000 Final SEIS was written, the Agencies did not have enough species information, habitat information, or experience implementing the standard to adequately address alternatives to it. Since then, the Agencies have more than twice the years of experience implementing the Survey and Manage standard. Survey Protocol and Management Recommendation documents are in use for most species, tens of thousands of sites have been discovered, and the field work for over 700 Random Multi-Species (RMS) Survey sites and other Strategic Surveys are completed and statistically analyzed. This last item provides much of the information sought by the original Survey and Manage Categories 3 (extensive surveys) and 4 (general regional surveys). This and other information about Survey and Manage species is discussed in the *Survey and Manage Species* section later in this Final Supplement.

Incomplete or Unavailable Information

The management of natural resources and the analysis in the Northwest Forest Plan Final SEIS has been surrounded by public and scientific controversy. The Northwest Forest Plan Final SEIS acknowledged this controversy. The public and scientific controversy concerning natural resource management in the Pacific Northwest has continued to the present time. Additionally, the amount of information available for description and analysis varies greatly by species and taxa managed under the Survey and Manage Standards and Guidelines.

One step in preparing an environmental impact statement is to evaluate whether information about effects of a proposed action is incomplete or unavailable and, if so, to disclose that fact and make certain findings about the relevance, importance, and/or costs of acquiring data that could help fill any such gaps. Much of the discussion concerning these issues in the Northwest Forest Plan Final SEIS (pp. 3&4-3 and 3&4-4) and the 2000 Final SEIS (pp. 180-182) remains relevant for purposes of the analysis in this SEIS and is specifically tiered to and incorporated by reference.

When encountering a gap in information, the question implicit in the Council on Environmental Quality (CEQ) regulations (40 CFR 1502.22(a)) on incomplete or

unavailable information was posed: Is this information "essential to a reasoned choice among alternatives?" While additional information would often add precision to estimates, the basic data and central relationships are sufficiently well established that any new information would not likely reverse or nullify relationships. Though new information would be welcome, no missing information is essential to a reasoned choice among the alternatives.

As noted throughout the species analyses in this SEIS, there is much that remains unknown about many of the species subject to analysis. Despite more than 5 years and tens of millions of dollars spent on surveys, it is unknown how many sites are located in reserves because they have not been surveyed to the same degree as Matrix and Adaptive Management Area lands. In fact, for dozens of species, no new sites have been found anywhere since the FEMAT analysis, and ten have no known sites within the NWFP area at all. Although some species are thought to be closely associated with late-successional and old-growth (LSOG) forests, for some species, the strength of this association is not well known. Connectivity and habitat needs, range, and other specific information for many species are unknown or uncertain. For many species, it is still unknown if the reserve system and other standards and guidelines provide for a reasonable assurance of persistence or if they are associated with LSOG forests. Any discussion of risk based on rarity and likelihood of disturbance must recognize that, for most species, only a small percentage of potential habitat has been surveyed. In situations where limited species-specific information is available, more reliance, by necessity, must be placed on information regarding the condition and management of the overall landscape in formulating conclusions regarding environmental consequences. The best available information was used to evaluate the alternatives.

Of the 337 species analyzed here, the analysis indicates there are 20 species (and 4 arthropod groups) with insufficient information to determine an outcome, and 132 species (and one in part of its range) with insufficient habitat to support stable populations under all alternatives. The risk that one or more of these species could be extirpated from the NWFP area, and the change in that risk between alternatives, is unknown. Over 700 random survey plots, as well as other surveys, have been done; the cost of obtaining additional information about these species is prohibitive; they have been included in the Survey and Manage Program for over 10 years in large part because little is known about them. The effect of such a loss to ecosystem function is also unknown. These risks and implications are discussed in the *Survey and Manage Species* and *Late-Successional Forest Ecosystem* sections in this chapter. For an additional 53 species, effects writers have assigned an outcome of insufficient habitat to support stable populations in all or part of their NWFP area range under Alternative 2, 11 species receive this outcome prediction under Alternative 3, and 2 receive this outcome for part of their range under Alternative 1. As discussed in the *Survey and Manage Species* section, outcomes are based on the species' reference distribution and may not necessarily be a good predictor of extirpation from the NWFP area. These species, and the implications of risk, are also discussed in the new *Survey and Manage Species* and *Late-Successional Forest Ecosystem* sections in this chapter.

As described in the *Timber Harvest* and *Wildland and Prescribed Fire* sections, the area expected to be managed as known species sites is projected from pre-disturbance survey detection rates, and then the more common species projections are capped to simulate their removal from Survey and Manage during the Annual Species Review process. A public comment between the Draft and Final Supplements suggested that with the completion of the Random Multi-Species (RMS) Survey, additional species would be removed (by the Annual Species Review process) from Survey and Manage. If these were not accounted for, the impacts to timber sales and fuel treatments would be overestimated (see public comment and response in the *Timber Harvest* section of Appendix 11). Since the RMS Survey was completed after the 2004 removal of Survey and Manage, it is true the Agencies have little experience upon which to predict these

additional species removals and therefore adverse effects to timber harvest and fuels treatments may be slightly overestimated for Alternatives 1 and 4 and to a smaller degree, Alternative 3. However, species removal rates were reconsidered between the 2003 Draft and the 2004 FSEIS because of the 2001 and 2002 Species Reviews. Also, as part of the PSQ analysis, species 1997-2001 site detection rates were doubled for all Category B species for seven years, to reflect sites expected to be found with the RMS and other Strategic Surveys. While designed primarily to accommodate the actual site impacts, this doubling probably goes a long way in accommodating Strategic Survey result extrapolations as well, since such surveys are the most likely source of information that will result in removal of Category B species, those for which pre-disturbance surveys are not practical and therefore will not be located in other ways. Any additional unmeasured effects to timber harvest and fuels treatment must be very small. Most effects to fuels treatment, timber harvest, and so forth come from managing sites of the more common species, and these are already predicted to be removed from Survey and Manage as known site levels increase. An increase in species removals based even in part on results of the RMS Survey would be ones with fewer known sites, which are therefore a relatively small portion of the timber and fuels effects calculations – no more than 5 to 10 percent. If the conservative interpretations of the RMS Survey used by taxa specialists as described in the individual species discussions later in this chapter are an indication of how the RMS Survey would be used during the Annual Species Reviews, species removals based on the RMS Survey would likely change the timber and fuels effects less than five percent from those described later in this chapter.

Assumptions and Information Common to All Alternatives

The land allocations and Northwest Forest Plan Standards and Guidelines provide direction for retention, protection, and development of late-successional forest.

- Reserves - Congressionally Reserved, Late-Successional Reserves, Administratively Withdrawn Areas, and Riparian Reserves encompass about 81 percent of the NWFP area and 87 percent of the existing late-successional forest. In-growth since the Plan was adopted has increased this total to approximately 8.1 million acres. The objectives of these reserves are to provide for protection and development of late-successional forest. These reserves were originally about 34 percent late-successional forest. Ten-year monitoring indicates in-growth has increased this amount, on average, to over 40 percent.

  - Late-Successional Reserves and Congressionally Reserved - Late-Successional Reserves were designed around the most ecologically significant existing late-successional forest. Late-Successional Reserves and Congressionally Reserved Areas designate 60 percent of federally managed lands in large block reserves. Forested portions of these reserves are being managed for the creation of large blocks of late-successional forest habitat. Smaller Late-Successional Reserves were also designated around known spotted owl activity centers and occupied marbled murrelet sites. These Late-Successional Reserves provide additional protection of the late-successional forest associated with these sites.
  - Administratively Withdrawn Areas - The current land and resource management plans have administratively withdrawn an additional six percent of federally managed lands, which protect and preserve existing resource values. While the objectives of some of these areas (such as recreation facilities) are not to provide for protection and development of late-successional forest, most of these areas contain late-successional forest and incidentally protect them. Examples of administratively withdrawn areas include Research Natural Areas, Areas of Critical Environmental Concern, Scenic Areas, fragile sites not suitable for long-term timber production,

unique habitat areas (caves, meadows, wetlands, etc.), recreation areas, and wildlife management areas (eagles, peregrine falcon, etc.).

- Riparian Reserves - The Riparian Reserve network adopted under the Northwest Forest Plan was the most extensive among the alternatives considered. In 1994, the Riparian Reserves were estimated to encompass 40 percent of federally managed lands. Since 1994, revised estimates have indicated as much as an additional 10 percent of federally managed lands are in Riparian Reserves. This reserve component spans the full range of forest conditions including late-successional forest and provides a network of reserve lands intermingled throughout Matrix lands. Riparian Reserves are managed to protect water courses, and that management includes developing and protecting late-successional forest in riparian areas. The 1994 Record of Decision specifically doubled the width of the narrowest category of Riparian Reserves (from the widths recommended by the FEMAT) as a mitigation measure to benefit most of the same species included on Survey and Manage.

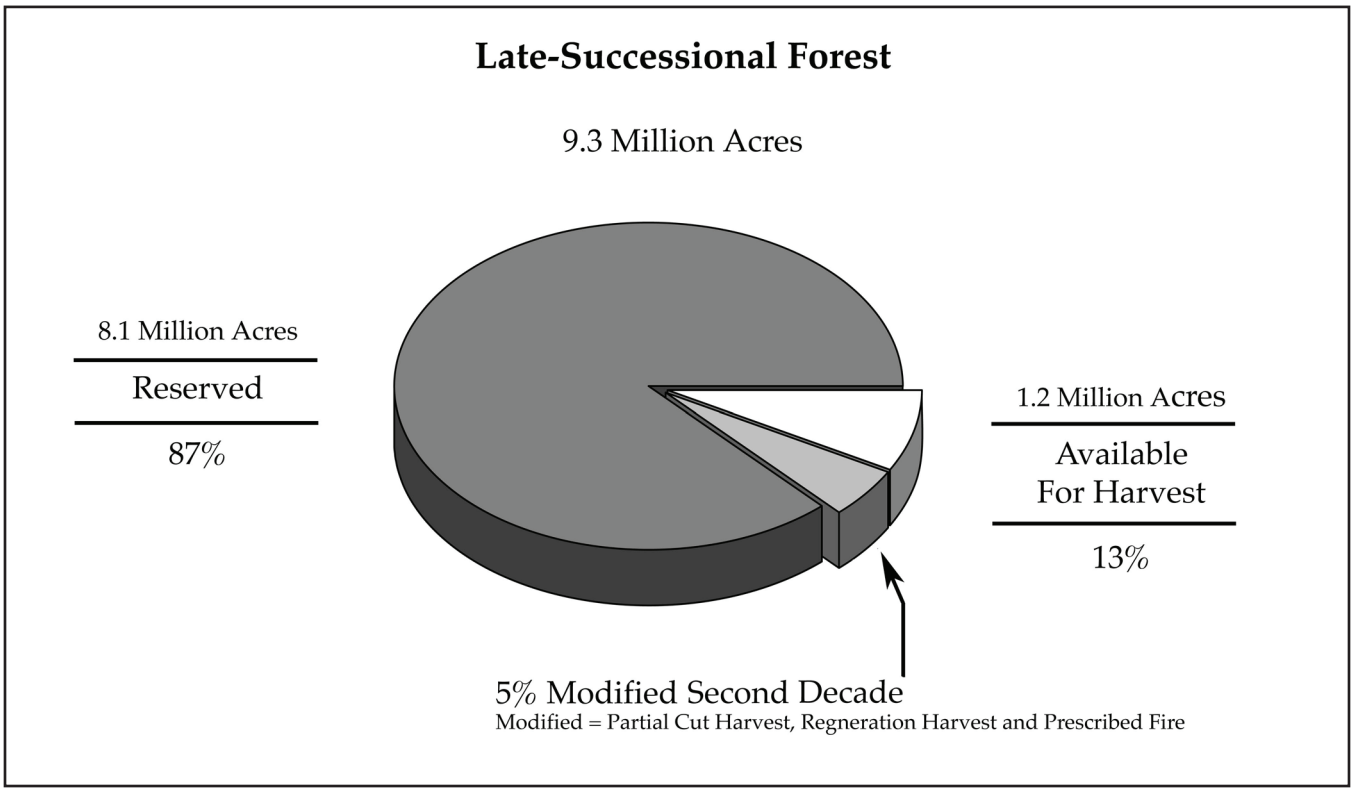
- Matrix and Adaptive Management Areas – Thirteen percent of the existing late-successional forest (originally 1.1 million acres but currently more than 1.2 million acres because of in-growth and lower-than-expected harvest rates) is assumed to be available for harvest within the Matrix and Adaptive Management Areas in support of the Probable Sale Quantity (PSQ) objectives of the Northwest Forest Plan.
  - Matrix management activities, including regeneration harvest, partial cut harvest, and prescribed fire, are expected to modify about 5 percent of the existing late-successional forest in the Matrix/AMAs over the next decade (see Figure 3&4-1).[1],[2]
  - Matrix Standards and Guidelines provide for retention of legacy elements of late-successional forest after harvest such as snags, large green trees, and down logs. There are also provisions for retaining old-growth fragments in watersheds where little remains.
  - The lands available for harvest in the Matrix contain all seral stages. The management of some of these lands, particularly in the southern half of the Northwest Forest Plan, is under longer rotations and partial cut regimes that will maintain some forest in older stages of stand development at all times.

Of the 24.5 million acres under the Northwest Forest Plan, over 9.3 million acres are now late-successional forest (Figure 3&4-1). The existing distribution and spatial patterns of this late-successional forest are the result of past land management activities, natural disturbances, the land allocations designated prior to the Northwest Forest Plan, and in-growth.

Under the assumptions of the Northwest Forest Plan, much of the original 1.1 million acres of late-successional forest in the Matrix and Adaptive Management Areas would be harvested over the next 40 to 50 years. During this same timeframe, with the Northwest Forest Plan assumptions for harvest and stand replacement fire, it is estimated the overall amount of late-successional forest will increase by 2.7 million acres due to the development of late-successional forest in reserves (see Figure 3&4-2). Although the Biscuit Fire was large, with approximately 204,000 acres containing stands with high fire mortality (USDA 2003b), the Northwest Forest Plan SEIS (p. 3&4-84) acknowledged the potential for this type of disturbance. It said, "The risk of large-scale wildfire in Northern Spotted Owl habitat is greatest within the dry provinces." Acknowledging the variability of fire events that analysis assumed that 12.5 percent of the reserves would

[1]The Northwest Forest Plan Biological Opinion assumed that 2.5 percent of existing owl habitat will be removed as suitable habitat through timber harvest. Figure 3&4-1 differs from the Biological Opinion assumption in that it displays all late-successional forest not just owl habitat. Further, the 2.5- 4 percent is "modified" not "removed" by activities such as prescribed fire, partial cuts, and forest health treatments as well as regeneration harvest.
[2]An additional 2 percent in reserves would be subject to modification by fuel treatments at full implementation levels, but such treatments usually retain (albeit usually reduced at least in the short term) late-successional forest characteristics.

Figure 3&4-1. Late-Succesional Forest in the Northwest Forest Plan Area – Second Decade



be subject to severe disturbance over 50 years (USDA, USDI 1994a:3&4-42). Ten-year monitoring results indicate late-successional forest within the Oregon Klamath Province, the province most affected by the Biscuit Fire, is 34 percent; the same as in 1994 when the Northwest Forest Plan was adopted.

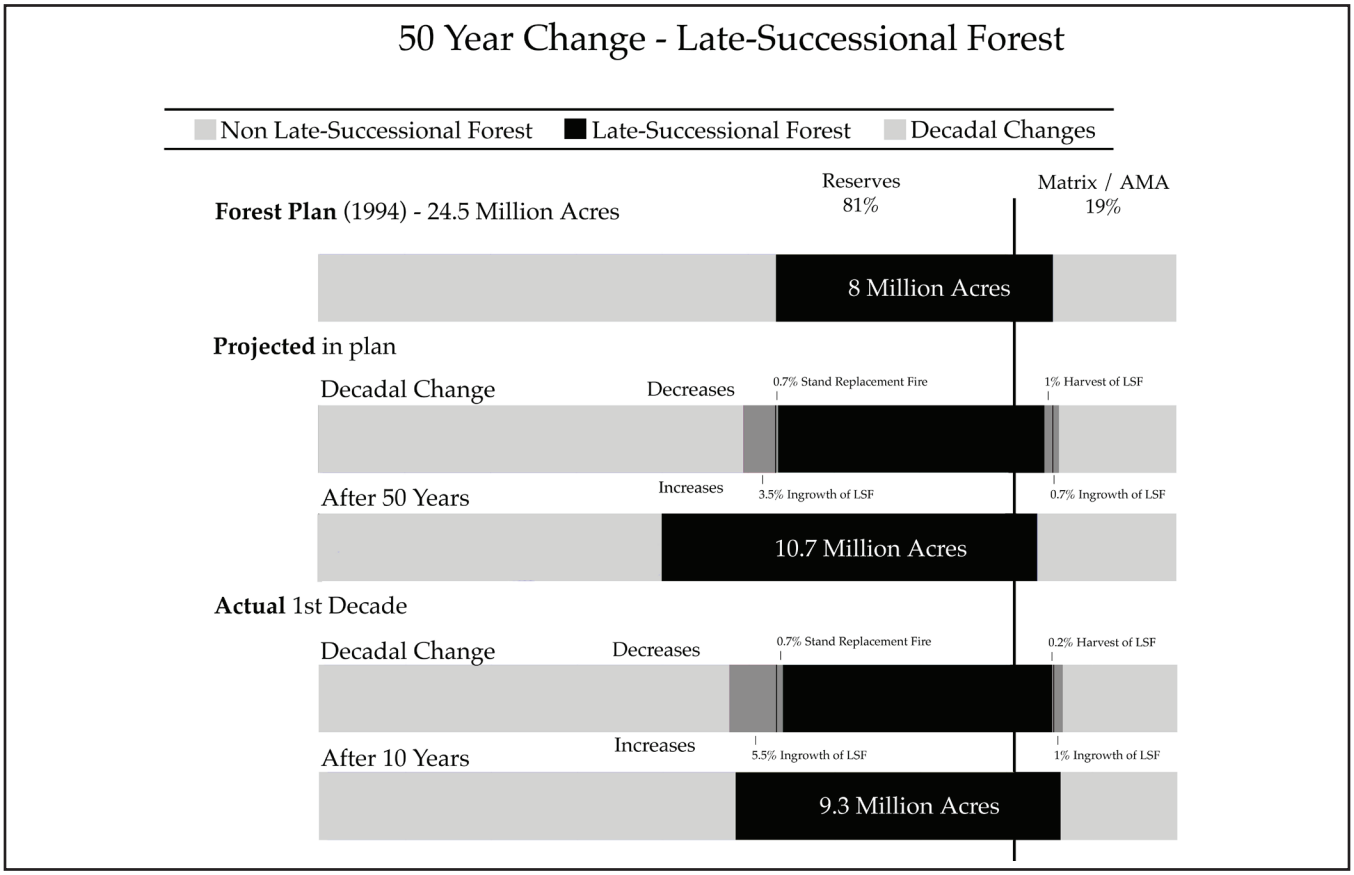
Ten-year Northwest Forest Plan monitoring found first decade in-growth has been about twice the predicted rate (Moeur et al. 2005); see further discussion in the *Late-Successional Forest Ecosystem* section later in this chapter.

The development of forest over time occurs across the full spectrum of late-successional forests, including old-growth, so acreage increases due to in-growth do not necessarily mean the age-class distribution is more heavily weighted toward younger forests. Late-successional forest is increasing at 2.5 times the rate of loss that occurs through stand replacement fire and harvest. The relative amounts in reserves and Matrix (as shown in Figure 3&4-2) have been adjusted to account for the assumed increase in reserves as a result of the 15 percent reduction in PSQ which has occurred since the beginning of the Northwest Forest Plan (see *Timber Harvest* Section).

Conclusions regarding the environmental consequences of the alternatives are based on specific species information, information about the landscape, and assumptions regarding management actions. Information and assumptions regarding federally managed lands that are common to all alternatives include:

- The Northwest Forest Plan incorporates conservation principles of maintaining: (1) connectivity across the landscape; (2) landscape heterogeneity; (3) structural complexity; and, (4) the integrity of aquatic systems;
- 81 percent of the NWFP area is reserved (see Figures 3&4-2 and 3&4-3);

Figure 3&4-2. Development of Late-Successional Forest Over Time

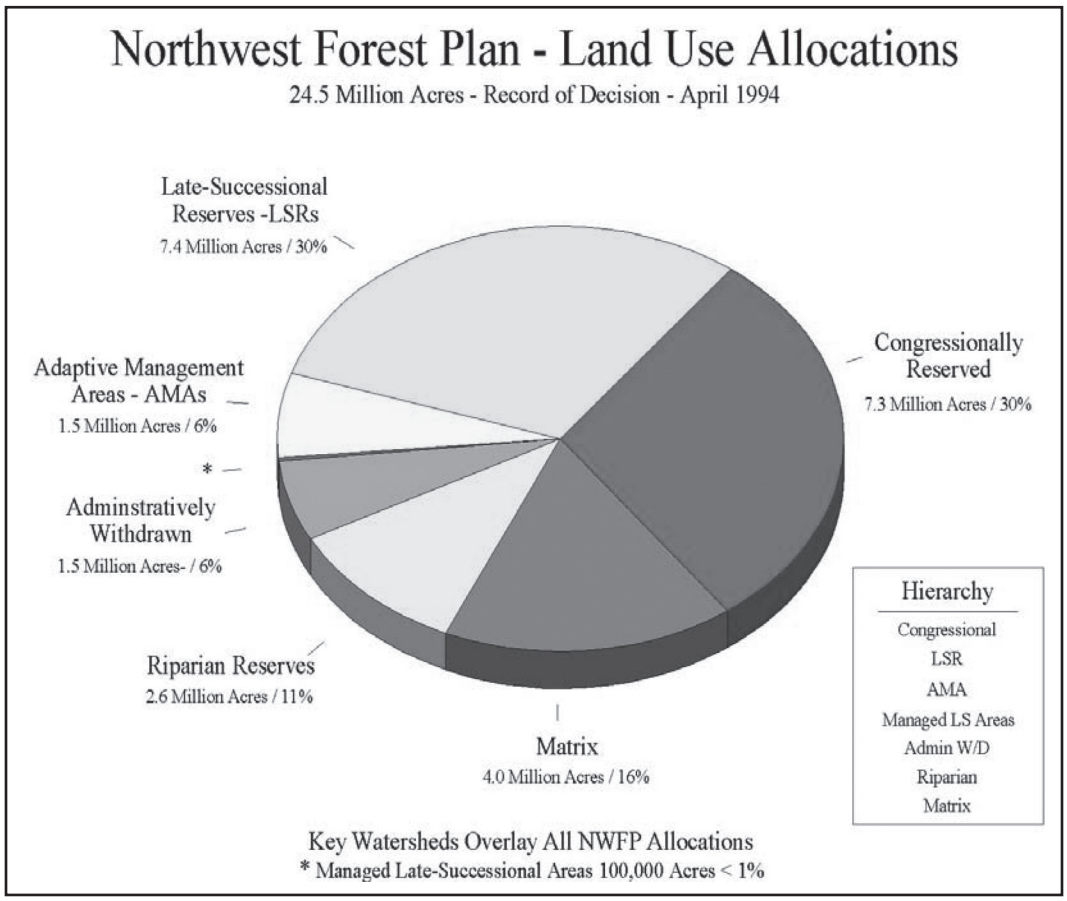


- 86 percent of current late-successional forest is reserved (see Figure 3&4-1);
- Less than 5 percent of late-successional forest will be disturbed by management per decade, and less than 14 percent in the first 50 years;
- Development of late-successional forest is 2.5 times the rate of loss through stand replacement fire and harvest (see Figure 3&4-2);
- Under the Northwest Forest Plan, there is a 600,000-acre net increase in late-successional forest predicted per decade (although monitoring indicates the actual increase in the first decade has been twice that), and a 2.7 million-acre net increase in late-successional forest over 5 decades;
- On average, 40 to 50 percent of any watershed is reserved by the application of Riparian Reserves; and
- The 1994 Final SEIS and FEMAT concluded the Northwest Forest Plan would provide for maintenance and restoration of a functional and interconnected late-successional forest ecosystem, and ten-year monitoring indicates those parameters are now essentially within the lower end of their historic range.

New Information

This subject was addressed in the 2000 Survey and Manage Final SEIS (pp. 183-187) which this SEIS supplements. This SEIS only addresses new information since the 2000 Final SEIS was prepared.

Figure 3&4-3. Original Northwest Forest Plan Land Allocations and Late-Successional Forest.



One of the primary events that has taken place since the 2000 Survey and Manage Final SEIS is the occurrence of wildfire. In the summer of 2002, wildfires burned many acres of federally managed lands within the NWFP area. Fires burned with varying degrees of intensity. Low-intensity ground fires consumed light fuels while leaving much of the forest structure intact. Other forested areas were completely consumed in high-intensity, stand-replacing fires. Effects to Survey and Manage species probably varied with the intensity of the fires. Some species that depend on fire probably benefited while others that do not tolerate fire may have been killed or displaced. However, it is important to recognize that late-successional forests in the planning area are dynamic and have historically experienced varying levels of disturbance from fire, windstorms, insects, and disease. Survey and Manage species have evolved within this ecosystem.

A Final Environmental Impact Statement (EIS) on the Biscuit Fire Recovery Project was completed in June 2004. The fire burned in a mosaic pattern; approximately 20 percent of the area burned lightly, with less than 25 percent of the vegetation killed. Approximately 50 percent of the area burned very hot, with more than 75 percent of the vegetation killed. The analysis in the Biscuit Fire EIS refers to a fire history analysis of the Klamath-Siskiyou Region of northwest California and southwest Oregon (Frost and Sweeney 2000) which stated "… initial analysis of 20th Century fire history suggests that forests of the Klamath-Siskiyou Region have experienced a reduction in both the total amount of area burned and the average fire size since the middle of the 1900's ..." It continued with the hypothesis that "… fire suppression has been somewhat effective at reducing area burned at low and moderate intensities - when fire sizes are likely to be small - but not at high intensities when extreme conditions typically exist and allow fires to grow to large

size." And, "while high intensity fires may now comprise a larger proportion of total area burned than before 1950, this does not necessarily imply that the size or frequency of large fire events is outside the historic range" (USDA, USDI 2004b:III-28). Moeur et al. 2005 reported 10-year Northwest Forest Plan-wide late-successional forest losses to fire of 1.3 percent (102,500 acres), of which 78,700 acres were lost in the 2002 Biscuit fire, affecting 21 percent of the late-successional forests in Congressionally Reserved and Administratively Withdrawn land allocations in the Oregon Klamath Province, and 7 percent of the Late-Successional Reserves. These are acres of stand-replacement intensity fire; other acres were affected to a lesser degree. The overall late-successional forest percentage in the Oregon Klamath Province is 34 percent, or within the range of expectation. There is currently no information that indicates that the fires of 2002 are inconsistent with assumptions made in the Northwest Forest Plan Final SEIS regarding the importance of hazardous fuels reduction or the predicted amount of disturbance due to fires.

A data call for new species site information for the 295 species in the 2004 FSEIS was sent to Agencies' administrative units on March 8, 2006, and resultant new data was used to update Agencies' databases, which in turn were used to compile data for this analysis. When the Agencies decided to add Alternative 4 in November 2006, an additional data call was initiated for information about the 42 species new to that alternative. The numbers of sites known for each species, as well as new sites reported since the data cutoff date for the 2004 FSEIS (or, for the 42 new species, since the Annual Species Review), are shown in Table 2-13 at the end of *Chapter 2*. New site data, new research, and other publications, as well as new information about threats and other activities, have been considered and used to help determine the effects of the different alternatives to each individual species discussed later in this chapter. More than 25 species outcomes have changed since the 2004 FSEIS, and 58 new species are analyzed in all or part of their NWFP area range.

Monitoring of the Northwest Forest Plan has indicated the Agencies have a high degree of fidelity in implementing the Standards and Guidelines as written. The 2005 field season marked the tenth consecutive year of the Northwest Forest Plan implementation monitoring program. This program is designed to determine whether the Record of Decision and its corresponding Standards and Guidelines are consistently followed across the NWFP area. Overall, compliance in meeting the Northwest Forest Plan Standards and Guidelines was 97 percent for the 24 projects and watersheds monitored in 2005. The assumed level of timber sales under the Northwest Forest Plan has not been achieved for a variety of reasons including greater than anticipated effects from the Survey and Manage Standards and Guidelines and lawsuits.

It is important to understand the relationship of monitoring and information to mitigation. New information is always welcome and often facilitates decision-making and adaptive management. Additional information may allow a more accurate management of risk. Monitoring is often an important source of new information. Although monitoring and gaining new or additional information are important, they are not mitigation measures that reduce the environmental consequences of management actions. For instance, monitoring or completing research on water temperature would not mitigate a management action that removed shade from streams. Gaining new information can aid the adaptive management process, but it does not predetermine what specific management decisions will be taken in response to that information. New information does not have a direct mitigating effect on the environmental consequences of management actions.

Both the Survey and Manage Standards and Guidelines and the Special Status Species Programs (SSSPs) have mechanisms to obtain new information. The Survey and Manage Standards and Guidelines arguably have the more intensive and uniform strategy to accomplish information gathering. In general, new information facilitates

decision-making and adaptive management. It is not possible to attribute a reduction of specific environmental consequences from information gathering and the facilitation of adaptive management. Even though a direct link to environmental consequences is not attributable to information gathering and monitoring, these are the basis of adaptive management and informed decision-making.

Adaptive Management

The Northwest Forest Plan requires adaptive management. Adaptive management is 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. Under the concept of adaptive management, new information will be evaluated and a decision will be made whether to make adjustments. Each alternative provides for acquiring and utilizing additional information to improve management direction for species. Alternatives 1, 3, and 4 prescribe Strategic Surveys to obtain new information and the Annual Species Review process to evaluate new information relating to species currently included in the Survey and Manage Standards and Guidelines. One type of Strategic Survey is a random-grid survey (see *Species Site Information Sources* in the *Background for Effects Analysis* section later in this chapter). Region-wide, random-grid surveys (the Random Multi-Species (RMS) Surveys for most Survey and Manage fungi, lichens, bryophytes, and mollusks, and the Random Double-Sample (RDS) Survey for red tree vole) were completed and analyzed in 2006. These surveys were conducted on existing, randomly selected Current Vegetation Survey (CVS)/Forest Inventory and Analysis (FIA) plots. The objectives of the surveys were to estimate species' abundances throughout the NWFP area and to determine if species are associated with late-successional/old-growth habitats and reserve land allocations. For all alternatives, the Agencies' Species Status Species Programs also provide for evaluation of new information regarding species. If the Survey and Manage Standards and Guidelines were eliminated as described under Alternative 2, it is expected that the results of the above surveys would be used in guiding species management under the Agencies' Special Status Species Programs.

Cumulative Impacts

Cumulative impacts to the environment are defined in the CEQ regulations as those that result from the incremental effects of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes them (40 CFR 1508.7). Given the programmatic nature and scale of this SEIS, the environmental consequences represent a general projection of the accumulated effects of management actions that are reasonably assumed to occur given the current status of federally managed lands and the full compliance of the Northwest Forest Plan Standards and Guidelines.

The cumulative effects analysis in Chapter 3&4 of the Northwest Forest Plan Final SEIS, including Appendix J2, and in the 2000 Survey and Manage Final SEIS, addressed in detail the cumulative effects relating to species that are the subject of the analysis in this SEIS. The extensive cumulative effects analysis in these documents, as well as that contained in FEMAT, is incorporated by reference in this SEIS. The analysis and conclusions contained in the environmental consequences sections of this SEIS have considered new information as well as information contained in FEMAT and other Final SEISs. As in the previous efforts, the primary focus of the analysis in this SEIS is on federally managed lands, "The intent was and continues to be to make explicit the 'benefit expected to accrue to … species … from habitat provided on federally managed lands under each of the alternatives'" (USDA, USDI 1994a, Appendix J3).

New actions taking place at a scale that could affect many species, or affect the programmatic nature of the alternatives included in this analysis, are described below. Land management actions at the site-specific scale, such as the likely disturbance of a specific species site, the operation and use of a reservoir upstream from an aquatic species site, or a proposal to dam and flood most of the known habitat for a specific species, are considered and displayed in the discussions for the affected species later in this chapter.

The Agencies proposed to amend the Northwest Forest Plan to clarify the proper spatial and temporal scale for evaluating progress toward attainment of Aquatic Conservation Strategy (ACS) objectives and clarify that no project-level finding of consistency with the ACS objectives was required. An October 2003 FSEIS explained the proposal was consistent with the original intent of the report prepared by the Forest Ecosystem Management Assessment Team. A decision selecting the proposed action was issued in March 2004. That decision was set aside on March 30, 2007 by the U.S. District Court of the Western District of Washington. The analysis in this Final Supplement assumes implementation of the Aquatic Conservation Strategy with the 2004 amendment. A change in assuming implementation of the Aquatic Conservation Strategy without the 2004 amendment does not alter the expected effects of the Survey and Manage proposal because the process in which consistency with ACS objectives is being evaluated has no bearing on the determination of effects under the four alternatives.

Changes have been made to the Forest Service appeal rule (36 CFR 215), and changes have been made for categorical exclusions for both Agencies. Neither of these changes affects the design of projects that comply with Northwest Forest Plan Standards and Guidelines and land allocations. These rule changes did not increase PSQ, but they are likely to contribute to agency success in meeting the PSQ. Changes were made to the Forest Service planning rule in 2005 (36 CFR 219), but implementation of those changes was recently enjoined by the U.S. District Court of the Northern District of California. As explained in *Chapter 2*, this supplement continues to use the Forest Service 1982 planning rule.

The Forest Service amended land and resource management plans for all Forests in Oregon and Washington (in and out of the NWFP area) on November 9, 2005, with an Invasive Plant treatment strategy. The April 2005 analysis indicates herbicide harm to amphibians was one of the identified issues, but that the risk under the selected alternative was low (similar to the risk for fish), and noted the Agency's Special Status Species Program direction would be followed for all projects (all Survey and Manage amphibians are included in the Region 6 (Oregon and Washington Forest Service) Special Status Species Program). The analysis noted, "Any short-term adverse effects would be largely offset by the long-term benefits to these species from protecting their habitat from loss due to invasive plants" (USDA 2005b:4-55). The adopted strategy is similarly sensitive to vascular plants, again noting they are sensitive to invasive plants and carefully designed control strategies would be beneficial. A similar BLM western U.S. strategy is in preparation and is intended (among other things) to address problems identified in court injunctions from the 1980's that continue to restrict BLM herbicide use.

A BLM and Forest Service Port-Orford-cedar SEIS resulted in amending three BLM District and one National Forest land and resource management plans in 2004, improving existing controls for the control of Port-Orford-cedar root disease. No part of the adopted strategy is anticipated to have negative effects for Survey and Manage species. The SEIS resulted from a need to address cumulative effects as directed by the Kern v. BLM decision of the Ninth Circuit Court of Appeals.

The Forest Service is beginning land and resource management plan revisions, with the Wenatchee/Okanogan/Colville plan being the only NWFP area Forest to be far enough along in the process to foresee potential effects. A draft plan is expected to be

issued for 90-day public review in the fall of 2007. The proposed action is expected to retain extensive areas of late-successional forest, and continue the current emphasis on maintaining and restoring aquatic habitat.

None of these efforts have changed the Northwest Forest Plan goals and objectives, land allocations, or Standards and Guidelines that are the basis for the effects analysis in this SEIS. None of these analyses, regulatory proposals, or settlement agreements currently alters the effects of the Northwest Forest Plan as analyzed in the 1994 Final SEIS.

The BLM has begun the process of revising its current Resource Management Plans within the NWFP area. Although a settlement agreement in American Forest Resources Council v. Clarke, Civ. No. 94-1031TPJ (D.D.C.) served as an impetus for the revision process, under the BLM's normal planning cycles and the analysis of the management situation a revision was expected to be prepared even without the agreement. A draft Environmental Impact Statement is expected to be issued in 2007, with a Record of Decision expected in 2008. The range of action alternatives being considered would revise the land allocations and Standards and Guidelines of the Northwest Forest Plan. These alternatives have been designed to consider new approaches to achieve the intent of the O&C Act while still complying with the Endangered Species Act and other applicable laws. For example, alternatives will range from designating late-successional management areas essentially as large as the current Late-Successional Reserves, to designating reserves matching expected changes in designated Northern Spotted Owl and Marbled Murrelet Critical Habitat, to managing the entire landscape using a long rotation to provide for timber production and habitat for a variety of species.

The BLM planning effort is expected to revise the direction in the Northwest Forest Plan for BLM-administered lands. However, until a revised plan is adopted, the BLM will continue to manage lands under its administration in accordance with existing resource management plans. The selection of one of the alternatives from this Survey and Manage FSEIS would apply until a revised BLM plan is adopted. The Survey and Manage provision was a mitigation measure adopted to reduce the effects of the selected alternative of the Northwest Forest Plan, and is not an independent action that can be considered apart from the plans themselves. Thus, if the plans themselves are revised, mitigation measures will be considered anew for reducing adverse effects of the new plans.

The current plans being amended by this Supplemental EIS will serve as the "no action" alternative for the BLM plan revisions. Effects to species, resulting from changes to the plans under the management alternatives in the BLM plan revisions, will be analyzed and displayed in the BLM's environmental documentation for those proposed changes. If one has to consider possible future changes to a plan while analyzing the proposed plan itself, the analysis could never be completed because such an analysis would be circular.

Although the analysis for the BLM plan revisions might borrow information about species from this analysis, that analysis could not tier to, or otherwise expect to borrow, effects described herein without thoroughly explaining why they might still apply. The BLM plan revision EIS will itself consider the effects of each its alternatives on habitats and the species associated with those habitats.

While there is a potential for the BLM plan revision to affect individuals of species that spend part of their lives on National Forest System lands, the potential for such negative effects is limited. For non-mobile species (the majority of Survey and Manage species), if they are truly at any significant risk, are assumed to have relatively restricted mobility and dispersal capabilities. Given this, even a significant change in the management of BLM lands is not likely to substantially affect species on adjacent National Forests, because these species are affected most likely by site-specific management, rather than

management of broad landscapes that is the focus of plan level decisions. For mobile species that could easily migrate, negative effects are also limited. This is due to the fact that the BLM alternatives will be designed to meet the requirements of the Endangered Species Act. Thus, BLM's revised land use plans will continue to provide sufficient older forests and other habitats to avoid jeopardy and contribute to recovery of listed species, and incidentally provide habitat for other species dependent on late-successional habitat.

Given this very limited potential for negative effects from the management of BLM lands to species on National Forest System lands, no significant cumulative effects to Survey and Manage species are expected from the proposed BLM plan revision. In any case, the appropriate context for analyzing whether the BLM Plan revision alternatives would have an effect on management objectives of the Forest Service is that planning process, not this one that is only considering whether to continue a mitigation measure under the existing plans.

Background for Effects Analysis

The information used to describe the affected environment and environmental consequences in this chapter in this SEIS was, with consideration of new information, compiled or derived from FEMAT; the Northwest Forest Plan Final SEIS, including Chapter 3&4 and Appendix J2; the 2000 Survey and Manage Final SEIS; and the 2001, 2002, and 2003 Annual Species Reviews.

The analysis of environmental consequences in this SEIS must be understood in the context of the overall Northwest Forest Plan. The Northwest Forest Plan is an ecosystem approach to land management that focuses on habitat for late-successional and old-growth forest related species. Overall, environmental consequences cannot be attributed to a single set of standards and guidelines, such as Survey and Manage. The overall strategy in the Northwest Forest Plan is comprised of a combination of seven different land allocations and many different standards and guidelines.

The Survey and Manage Standards and Guidelines were a mitigation measure added to Alternative 9 in the Northwest Forest Plan Final SEIS and adopted in its Record of Decision. This mitigation measure was included to decrease the likelihood of extirpation of little known species that were thought to be rare.

A brief summary of the analyses provided in FEMAT, the Northwest Forest Plan Final SEIS (including Appendix J2), and the 2000 Survey and Manage Final SEIS is included here to help the reader understand the effects analysis in this SEIS.

FEMAT

The Forest Ecosystem Management Assessment Team (FEMAT) was commissioned in 1993 to formulate and assess options for managing Forest Service and BLM administered lands within the range of the Northern Spotted Owl. Of 64 options considered by FEMAT, 10 options encompassing various mixes of Late-Successional Reserves, Riparian Reserves, and prescriptions for management of forests both inside and outside of these reserves were selected for detailed consideration and analysis. In Late-Successional and Riparian Reserves, standards and guidelines were designed to restore and maintain late-successional forests and to maintain natural ecosystem processes. In the Matrix (areas outside of reserves), standards and guidelines were designed to provide connectivity between reserves and provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees.

The Matrix and portions of many of the Adaptive Management Areas was also expected to provide for ecologically diverse early-successional conditions and planned timber harvest.

For each of the 10 options, the team evaluated the likelihood of maintaining well-distributed habitat conditions on federally managed lands for threatened Marbled Murrelets and Northern Spotted Owls. In addition, for seven of the options, similar assessments were done for more than 1,000 plant and animal species thought to be closely associated with late-successional forests. In keeping with agency policies to prevent species from being listed under the Endangered Species Act (ESA) and with the regulations issued pursuant to the National Forest Management Act (NFMA), the team assessed the "likelihood of maintaining species viability, defined as the continued persistence of the species population, well distributed throughout its historical range on federal lands within the range of the Northern Spotted Owl over the next 100 years" (USDA et al. 1993:IV-40).

Panels of experts were convened to make a determination of the likelihood of achieving four possible outcomes relating to habitat conditions on federally managed lands for each species. Panelists were asked to assign 100 "likelihood votes" (or points) across four outcomes. A panelist could express complete certainty in a single outcome for a species/option combination by allocating 100 points to a single outcome. The panelist could express uncertainty by spreading votes across the outcomes. Following are the four outcomes:

<u>Outcome A</u>: Habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands (Note that the concept of well distributed must be based on knowledge of the species distribution, range, and life history).

<u>Outcome B</u>: Habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize, but with significant gaps in the historic species distribution on federal land. These gaps cause some limitation in interactions among local populations (Note that the significance of the gaps must be judged relative to the species distribution, range, and life history, and the concept of metapopulations).

<u>Outcome C</u>: Habitat only allows continued species existence in refugia, with strong limitations on interactions among local populations.

<u>Outcome D</u>: Habitat conditions result in species extirpation from federal land [within the range of the Northern Spotted Owl] (USDA et al. 1993:IV-43).

While the use of a "point" system implies a certain precision, the ratings were compilations of subjective ratings by numerous scientists (USDA et al. 1993:II-29). Although the overall evaluation may have been reasonable, the ratings are not precise and the ratings are conservative for many rare species. The following areas, which are relevant to the assessment of rare species, were subject to different interpretations by different panels.

1. Treatment for rare and locally endemic species. Many of these species had small and restricted ranges or existed in refugia even before habitat alteration by harvesting and other activities. Some panelists tended to rate these species in Outcome B or C under even the most protective options (USDA, USDI 1994a:3&4-122).
2. Habitat versus population outcomes. Outcomes were defined in terms of habitat "quality, distribution, and abundance." Some panelists found it difficult to separate the habitat and population elements (USDA, USDI 1994a:3&4-122).
3. Definition of "well distributed." Panelists were not uniformly clear about what "well

distributed" meant for each taxon. This issue was particularly confusing between Outcome A and B (USDA, USDI 1994a:3&4-123).

4. Historic versus current species distribution. Reference in the scale to "historic species distribution" in Outcome A was difficult for species groups for which information is limited to the current distribution. Taken literally, the reference to historic distribution held the ratings to a high standard of requiring habitat reestablishment throughout the historic range (USDA, USDI 1994a:3&4-123).
5. It was difficult for panelists to project changes in biophysical conditions over the 100-year timeframe specified (USDA et al. 1993:IV-42 through IV-43; USDA, USDI 1994a:3&4-123).

FEMAT compared outcomes of the options on by assessing whether the scientists believed that under the alternative being evaluated, species had an 80 percent or greater likelihood of achieving Outcome A. In focusing on the 80 percent likelihood of achieving Outcome A, FEMAT did not suggest that only options attaining that likelihood satisfied the viability provision. FEMAT specifically noted that no single such level represents a viable population for all species and circumstances. The 80 percent level was chosen only as a point of comparison (USDA et al. 1993:IV-49).

The analysis by FEMAT was limited to assessing the sufficiency of habitat. It did not assess population viability per se. The team did note, for some species, continued persistence was in question regardless of federal land management. A system of Late-Successional Reserves was the central feature of all the options considered. The extent of the reserve system (i.e. total acreage) was the single most distinguishing feature across the array of options.

Late in the Northwest Forest Plan Final SEIS process, eight mitigation measures were added to Alternative 9. The panels and assessments were not repeated to determine if the additional protections would have caused a different outcome.

Northwest Forest Plan Final SEIS including Appendix J2 (Results of Additional Species Analysis)

Using the FEMAT report, the Northwest Forest Plan interdisciplinary team prepared a Supplemental EIS, basing the alternatives on FEMAT's 10 options. The 1994 Record of Decision selected Alternative 9 as the alternative that best met the dual needs: the need for forest habitat and the need for forest products.

Additional species analysis was completed between the Northwest Forest Plan Draft and Final SEIS. Species were screened for the necessity of further analysis if, for vertebrates, there was a likelihood of Outcome A of less than 80 percent or any percent likelihood of Outcome D. For all other taxa, the screen was a combined likelihood of Outcome C and D of 20 percent or more, or any percent likelihood of Outcome D. The screening levels were not intended to represent a judgment of what is required by either the NFMA or the ESA (USDA, USDI 1994a:J2-2). The additional species analysis is described in detail in Appendix J2 of the Northwest Forest Plan Final SEIS.

The additional species analysis process described in Appendix J2 of the Northwest Forest Plan Final SEIS considered 23 additional mitigation measures, including Survey and Manage, which might improve the ratings for the species that did not pass the screen. Eight of the 23 mitigation measures, including Survey and Manage, were incorporated into Alternative 9 and were adopted in the Northwest Forest Plan Record of Decision. Other mitigation measures adopted at this time included Riparian Reserve Scenario 1 (doubling the width of Riparian Reserves on either side of intermittent streams outside of Key Watersheds), and creating 100 acre Late-Successional Reserves around all known

spotted owl activity centers in the Matrix and Adaptive Management Areas. These greatly increased the amount of forest protected in reserves. Since these mitigation measures were added late in the process, the ratings for species were never changed to reflect the added mitigation. Chapter 3&4 of the 1994 Final SEIS contained only general statements that the additional standards and guidelines resulting from the added mitigation provided increased habitat protection for some species. The overall assessment of maintenance of a functional and interconnected late-successional forest ecosystem in the Final SEIS was not revised to reflect the additional mitigations because the Agencies anticipated that the changes to the outcomes would be relatively minor.

After a species was screened for additional analysis in the Northwest Forest Plan Final SEIS, the thresholds by which it was screened for additional analysis (see explanation above) were used in evaluating the benefits of proposed mitigation (USDA, USDI 1994a: J2-57). Although the screening levels did not represent a judgment as to what is required by either the NFMA or the ESA (USDA, USDI 1994a:J2-2), it is easy to confuse the screen thresholds with targets that must be met. The 1994 Final SEIS did not adopt any specific level of likelihood of Outcomes A, B, C, or D from the additional species analysis as representing a threshold of reasonable certainty to support a conclusion regarding environmental consequences.

2000 Survey and Manage Final SEIS

In 1998, the Secretaries of Agriculture and the Interior determined the Survey and Manage mitigation measures added to Alternative 9 as a result of the additional species review needed to be revised. The revision was intended to: (1) better identify the management needed; (2) clarify language; (3) eliminate inconsistent and redundant direction; and, (4) establish a process that better responded to new information.

To accomplish this revision, three action alternatives were considered in a Supplemental EIS. The conclusions in the 2000 Survey and Manage Final SEIS were complex. For any given species, the process in that SEIS allowed for: 30 different descriptions of range and distribution, 5 different descriptions of populations, 24 different descriptions of habitat associations, 9 different descriptions of known sites, and 10 different standard conclusions for the outcome (USDA, USDI 2000a, Appendix J:345).

Potential outcomes based on population stability and distribution patterns were:

Outcome 1: Habitat (including known sites) is of sufficient quality, abundance, and distribution to allow species to stabilize in a pattern similar to reference distribution.

Outcome 2: Habitat (including known sites) is of sufficient quality, abundance, and distribution to allow species to stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions.

Outcome 3: Habitat (including known sites) is insufficient to support stable populations of the species.

Outcome 4: Information is insufficient to determine an outcome.

The results of the analysis were stated with varying degrees of uncertainty: low, moderate, or high.

Alternative 1 from the 2000 Final SEIS was adopted in the subsequent Record of Decision. Alternative 1 in the 2000 Final SEIS is the approximate analytical equivalent to Alternative 1, one of the no-action alternatives in this SEIS.

Comparison of Alternatives for this SEIS

The Agencies' Special Status Species Programs are described in *Chapter 2* and Appendix 2 of this SEIS. An analytical assumption of the environmental consequences is that species "off" of Survey and Manage in Alternatives 1, 2, or 3 will be assigned to any or all of the Agencies' Special Status Species Programs to which they qualify, as shown in Table 2-13. One hundred fifty-seven of the 337 species included in this analysis are currently assigned to one or more of these programs. However, because the addition of specific species to these programs is discretionary on the part of Forest Service Regional Foresters and BLM State Directors, the effects of not adding species to these programs, or of removing them at this time, are also described.

The environmental consequences analysis of Alternative 1 considers the 58 species removed from Survey and Manage in all or part of their NWWFP area range by the 2001-2003 ASR process to be "off" Survey and Manage. The environmental consequences analysis of Alternative 2 considers all 337 species and 4 arthropod functional groups that are included in this analysis as "off" Survey and Manage.

The environmental consequences analysis of Alternative 3 considers the 58 removed by the 2001-2003 ASRs in all or part of their NWFP area range as "off" Survey and Manage, as well as the 28 species and 4 arthropod functional groups in all or part of their NWFP area range that are included in the Survey and Manage "uncommon" categories (Categories C, D, and F) in Alternative 1. Alternative 3 also eliminates pre-disturbance surveys in stands that have not developed late-successional or old-growth characteristics.

The Survey and Manage Standards and Guidelines and the Agencies' Special Status Species Programs have similar objectives; they both provide species-specific management for species of concern. They both contain strategies that provide for site management and determining if a project would affect a species. While little management discretion exists under the Survey and Manage Standards and Guidelines, on-the-ground management discretion exists for the Special Status Species Programs. Line officers have discretion in survey methodology and in implementing protection measures in site-specific situations. This discretion in the Special Status Species Programs is constrained by policy objectives that include not contributing to the need to list species under the Endangered Species Act and, for the Forest Service, maintaining viable populations in habitats distributed throughout the species range. The BLM uses environmental analysis (in the form of an EA or EIS) and the Forest Service requires a biological evaluation to identify whether effects on populations, habitat, and viability as a whole would occur. Coordination with other concerned units and agencies may be necessary to gather information about the species. If adverse effects are expected to individuals of the species, the analysis also determines whether it would result in a trend toward federal listing. In addition, the Forest Service biological evaluation identifies whether the project is part of a trend towards loss of viability. A broad assumption of this SEIS is that the expected future conservation status of species included under the Agencies' Special Status Species Programs is basically similar to the expected conservation status for species included under the Survey and Manage mitigation measure. Timeframes for projections of outcomes are the same as described in the Northwest Forest Plan, "Our approach involves complex projections regarding the likely fate of species over the next 50 to 100 years, or more" (USDA, USDI 1994b:44).

As noted throughout the effects analyses in this SEIS, there is much that remains unknown about many of the species subject to analysis. Despite more than 5 years and tens of millions of dollars spent on surveys, it is unknown how many sites are located in reserves because they have not been surveyed to the same degree as the Matrix and Adaptive Management Area lands. In fact, for dozens of species no new sites have been found anywhere since the adoption of the Northwest Forest Plan. Although some

species are thought to be closely associated with late-successional and old-growth forests, for some species, the strength of this association is not well known. Connectivity and habitat needs, range, and other specific information for many species are unknown or uncertain. For many species, it is still unknown if the reserve system and other standards and guidelines provide for a reasonable assurance of persistence. Any discussion of risk based on rarity and likelihood of disturbance must recognize that, for most species, only a small percentage of potential habitat has been surveyed. In situations where limited species-specific information is available, more reliance, by necessity, must be placed on information regarding the condition and management of the overall landscape in formulating conclusions regarding environmental consequences.

The environmental consequences analysis in this SEIS supplements the previous analyses in the Northwest Forest Plan Final SEIS and 2000 Final SEIS. The analysis in this SEIS determines one of the following outcomes for each species:

Outcome 1: Habitat (including known sites) is sufficient to support stable populations in the NWFP area

Outcome 2: Habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area, although there is insufficient habitat to support stable populations in a portion of the Northwest Forest Plan area.

Outcome 3: Habitat (including known sites) is insufficient to support stable populations in the NWFP area (either caused by the differences between the alternatives or for reason beyond the control of the Agencies).

Outcome 4: There is insufficient information to determine an outcome.

These outcomes correlate to those found in the 2000 Survey and Manage Final SEIS with the following exceptions:

> Outcome 1 in this Final SEIS is a combination of Outcomes 1 and 2 from the 2000 Survey and Manage Final SEIS. In the 2000 Final SEIS, Outcome 1 described species as stabilizing "in a pattern <u>similar</u> to reference distribution" while Outcome 2 described species as stabilizing "in a pattern <u>altered</u> from reference distribution, with some limitations on biological functions and species interactions" (emphasis added).
>
> Outcome 2 is new. It allows for an outcome of habitat that supports stable populations in most of the planning area while acknowledging that there are certain portions of the species range where habitat does not provide for stable populations. Populations may or may not be described by distinct population segments or evolutionarily significant units. The viability provision and the Survey and Manage persistence objectives define a viable population as "continued existence is well distributed in the planning area" (36 CFR 219.19). The 2000 Survey and Manage Final SEIS described well-distributed as "distributed sufficiently to permit normal biological function and species interactions ..." (USDA, USDI 2000a:189). Insufficient habitat to support stable populations in a portion of a species range could result in some restriction on normal biological function and species interactions. This would imply that the species is no longer well distributed in at least a part of the planning area, which could result in a downward trend in distribution. So, while a species may be well distributed and have stable populations in most of the NWFP area, it is important to describe and disclose in the analysis of environmental consequences that a species may not have stable populations in a portion of its range.

The determination of an outcome is based on numerous factors including (1) the extent of the reserve system; (2) Matrix and Adaptive Management Area Standards and Guidelines; (3) provisions for species management under the Survey and Manage

or Special Status Species Programs; (4) species range, distribution, and populations; (5) species life history and habitat needs; and, (6) the number and location of known sites. Information from FEMAT; the Northwest Forest Plan Final SEIS; the 2000 Survey and Manage Final SEIS; the Annual Species Reviews; and the Agencies' known site database, along with recent publications and the professional knowledge of biologists and botanists was used to make the determination. Since each species has different life histories, ranges, distributions, and habitat needs, it is nearly impossible to devise precise thresholds for determining outcomes. Determinations are based on the evaluation of experts and tend to be more qualitative than quantitative in nature. This is consistent with the approach used throughout the Northwest Forest Plan. Even FEMAT, with its 100-point rating system, described their evaluations as "qualitative expert opinion assessments" (USDA et al. 1993:II-101).

When analyzing species, particularly rare species, it is nearly impossible to have complete information. When a species has very low known population numbers despite intensive survey efforts, a narrow range, poor distribution, and the proposed action is likely to eliminate the few remaining populations, the determination that habitat is insufficient to provide for stable populations is highly certain. When a species has very high numbers, a large range, good distributions, and the proposed action is not likely to eliminate a significant number of populations, the determination that the proposed action would result in habitat sufficient to support stable populations is highly certain. Between these two situations are a range of conditions and outcomes that are not as certain. The effects writers were asked to evaluate known information and determine an outcome that was reasonably certain based on their professional interpretation and evaluation. The determinations are based on information sufficient to support predictions of reasonably foreseeable outcomes in order to provide the Responsible Officials with an indication of the risk to species across the alternatives.

Relationship of Outcome Determinations to ASR Species Removal Criteria and Legal Requirements

The Annual Species Review process, the "outcome" definitions used in this Supplement, and the finding of legal sufficiency that will be used in the Record of Decision, are each based on standards or criteria that are different. A brief discussion of those differences is offered here.

The ***Annual Species Review*** (ASR) process considers species removals or additions to Survey and Manage based on their meeting the Three Basic Criteria for Survey and Manage (see the description of Alternative 1 in *Chapter 2*). The first two of those criteria are fairly straight forward, but the third (the one relevant to this discussion) requires a determination 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." This determination is based on criteria in the Standards and Guidelines indicating "a concern for persistence" (see *Appendix 1, Adaptive Management Process*, and *Appendix 9, The Review Process*). These criteria were developed for the 2000 FSEIS to identify species that could be removed from Survey and Manage while "providing for roughly the same likelihood of persistence as that which was provided by the Northwest Forest Plan as originally adopted in the 1994 ROD" (USDA USDI 2000a:42). Since the selected Northwest Forest Plan alternative was the second-most protective of the nine action alternatives considered, and the Record of Decision found that alternative "satisfies a similar standard [to the NFMA vertebrate viability standard[3]] with respect to non-vertebrate species to the extent practicable," the Northwest Forest Plan by its own terms exceeded legal requirements. No lower standard was considered in the 2000 FSEIS, because in 2000 the Agencies only sought to correct implementation difficulties

[3]The National Forest Manage Act (NFMA) viability standard applies only to native and desired non-native vertebrate species (see Legal Requirements in *Chapter 2*).

by clarifying wording, removing common species, and providing a clear ASR process. The ASR criteria developed for the 2000 FSEIS are thus more restrictive than legal requirements. The ASR process also does not consider existing Special Status Species Program placements or populations outside of the NWFP area. Further, the process does not lead to species removals unless the available information is convincing that one or more of the Survey and Manage Three Basic Criteria are not met. Thus, while about 130 species were removed from Survey and Manage in all or part of their NWFP area range between 1999 and 2003 using the ASR criteria, 295 species remained on Survey and Manage following the Annual Species Reviews.

The ***Outcome Definitions*** used to determine species outcomes in this Final Supplement are essentially the same as those used in the 2000 FSEIS which this SEIS supplements. Those outcomes had their origins primarily from those used by the 1993 FEMAT species review panels, and thus the criteria to apply when determining species outcomes were developed somewhat differently than the ASR criteria. The outcomes criteria consider the known distribution and population, minus expected losses from habitat disturbing activities and other factors, and then weigh that against an assumed historic distribution and the species' anticipated ability to interact and thus maintain stable, healthy populations. Species with naturally disjunct populations are often rated down even if that isolation dates from the most recent ice age or other prehistoric event. Application of the outcomes requires expert judgments about dispersal mechanisms and habitat needs often based on limited knowledge or using inferred relationships from the same genera or family. The decisions are strictly biological, and at least one effects writer assigned Outcome 2 to a species even assuming the existing Special Status Species Programs assignment would meet the NFMA viability standards and prevent a trend toward ESA listing (see Shasta salamander discussion in this chapter). Without Survey and Manage, 185 species are judged to have "insufficient habitat" using these outcome definitions, and another 20 have insufficient information to determine an outcome (These numbers include 132 with "insufficient habitat" under all alternatives). Since the ASR criteria have retained 295 species on Survey and Manage, but the outcomes criteria find only 205 species have insufficient habitat or insufficient information, the outcome definitions and their application are somewhat less restrictive than the criteria for the Annual Species Reviews[4]. For a variety of reasons discussed in the *Survey and Manage Species* section later in this chapter, both the outcome definitions themselves, and their application by the effects writers, tend to be restrictive. In particular, favorable outcomes are limited by a lack of information, with apparently rare species having unfavorable outcomes even though survey efforts may have been very limited. Nine species with insufficient habitat under all alternatives in the 2000 FSEIS are now considered to have sufficient habitat under all alternatives because of new sites discovered since 2000. Outcomes have tended toward worst case and thus were far more pessimistic than turned out to be the case when more information was obtained.

The ***Legal Sufficiency*** standard that will be applied in the Record of Decision will be based on the applicable laws described in the *Legal Requirements* section in *Chapter 2*, most notably avoiding listing under ESA[5] and, on the National Forests, meeting the applicable viability (for vertebrates) and diversity standards. Decisions may consider factors beyond those considered in the ASRs and outcome determinations, such as populations in other parts of the species range (including those outside of the NWFP area), risk, conflicts with other multiple-use mandates, consistency with other laws such as the O&C Act, and whether there are laws requiring the Agency to protect a species or class of species beyond Endangered Species Act requirements. This is a lower standard than used in the ASRs or outcome determinations, and involves consideration of elements that could not have been written into the "biological" outcome definitions used by the effects authors. Meeting this standard is the objective of the Agencies' Special Status

[4]Part of the (90 species) difference between the two standards is related to time; the ASR process has not been conducted sine 2003. If the ASR process were conducted today, a portion of those 90 species would be expected to be removed.
[5]ESA listing is based on criteria in the Endangered Species Act – see Appendix 3, last page.

Species Program placements, which helps explain why a species with Outcome 3 may not necessarily be assigned to one of those programs. For species where legal requirements may be similar to the species outcome definitions (for example, those for vertebrates on the National Forests), the Decision-maker(s) may be able to use the outcome statements as fairly reasonable indicators of legal sufficiency. Where the outcome definitions appear to exceed legal requirements, (for example, for bryophytes on O&C lands), the outcomes will serve more as risk indicators to be weighed with other factors in determining how to best meet the purpose and need. This is particularly true for species on Survey and Manage primarily because little is known about them.

Thus, the above standards and criteria should not be considered equivalents. An outcome 3, for example, does not by itself indicate a failure to meet legal sufficiency, nor is it necessarily an indicator of impending ESA listing. That a species is still on Survey and Manage is not itself an indicator that removing it would not be legally sufficient. There are species on Survey and Manage that, because of populations outside of the NWFP area, are raked as globally common by Heritage programs. The Decision-maker(s) will use the species outcomes and other factors in the analysis in their appropriate context and purpose, to select an alternative and make findings of compliance with applicable laws.

Key Assumptions for Pre-Project Surveys/Clearances and Known Site Management

Alternatives 1 and 4

Implement current Survey and Manage Standards and Guidelines for pre-disturbance surveys and managing known sites.

Alternative 2

Special Status Species policies have an objective that the effects of a proposed project (management activity) do not result in a trend toward the listing of a Special Status Species under the Endangered Species Act. For the Forest Service, policy also requires that the effects of a proposed project would not result in a trend towards loss of viability for Sensitive Species. The analysis of the effects of the project on Special Status Species is in the NEPA documentation for the project for the BLM, and the Biological Evaluation for the Forest Service.

Pre-project clearances are activities conducted to learn whether a species is present or potentially present in a project area. Pre-project clearances may include, but are not limited to,

- clearance surveys;
- field clearances;
- field reconnaissance;
- inventories;
- habitat examinations;
- habitat evaluation;
- evaluation of species-habitat associations and presence of suitable or potential habitat;
- review of existing survey records, inventories, and spatial data;
- utilization of professional research, literature, and other technology transfer sources; or
- use of expertise, both internal and external, that is based on documented, substantiated professional rationale.

Pre-project clearances are completed prior to habitat-disturbing activities to determine the presence of a species or its habitat and the effect of management actions on the species. The following assumptions are made regarding the most likely methods for completing pre-project clearances under the Special Status Species Programs.

If pre-disturbance surveys are practical under the Survey and Manage Standards and Guidelines, then clearance surveys, field clearances, field reconnaissance, inventories, and/or habitat examinations are most likely to be used under the Special Status Species Programs.

If pre-disturbance surveys are not practical under the Survey and Manage Standards and Guidelines (most Category B and D species) or a species status is undetermined (Categories E and F species), then field surveys are not likely to occur under the Species Status Species Programs either. Instead, the other components of pre-project clearances such as habitat examinations; habitat evaluation; evaluation of species-habitat associations and presence of suitable or potential habitat; review of existing survey records, inventories, and spatial data; or utilization of professional research, literature, and other technology transfer sources are most likely to be used.

The assumption for managing known sites under the Special Status Species Programs is that those sites needed to prevent a listing under Endangered Species Act, would be managed. For the Forest Service, this also includes managing as needed to maintain viability. For species currently included in Survey and Manage Categories A, B, and E (which require management of all known sites), it is anticipated that only in rare cases would a site not be needed to prevent a listing. For species currently included in Survey and Manage Categories C and D (which require management of only high-priority sites), it is anticipated that loss of some sites would not contribute to a need to list.

For the Bureau Assessment category, the Agencies assumed in this SEIS that those sites needed to avoid a trend toward federal listing for species would be managed. BLM policy states that pre-project clearances are completed subject to limitations in funding or positions. Funding for pre-project clearances comes out of field-level project dollars. Given the realities of limited funding and heavy staff workloads at the field level, costly field surveys are unlikely to occur. For species in the Bureau Assessment category, it is assumed that methods other than field surveys would be used for these clearances. The agency must still determine the effect of a planned management action on a species and provide appropriate management.

Species in the BLM OR/WA Tracking category are not considered a special status species for management purposes. The assumption for this SEIS is that pre-project clearances would not be completed and known sites would not be managed. This category is not included on Table 2-13, and is generally not considered in effects determinations later in this chapter.

Alternative 3

Exceptions for known site management and pre-disturbance surveys in emergency situations would be made by the line officer above the official responsible for the proposal instead of the Survey and Manage Intermediate Managers Group. The same criteria used under Alternative 1 (Survey and Manage Standards and Guidelines) would be used under Alternative 3 to make these determinations.

Pre-disturbance surveys would not be completed in stands that have not become late-successional and/or old-growth forest. Since it is a requirement that species included in Survey and Manage have a close association with late-successional or old-growth forest, the Agencies assumed that such species would not likely be present in non-late-successional and non-old-growth stands. Existing Northwest Forest Plan Standards and

Guidelines provide for retention of late-successional or old-growth legacy components in Matrix. Therefore, even if they were present, the components of the stands, which support their use, would likely be retained anyway.

All other Survey and Manage Standards and Guidelines remain the same. Uncommon species that are assumed to be included in the Special Status Species Programs would follow the assumptions listed under Alternative 2. For uncommon species removed from the Survey and Manage mitigation measure, known sites would be released from management constraints unless the species were included in the Agencies' Special Status Species Programs.

Key Assumptions for Riparian Reserves and Late-Successional Reserves

Riparian Reserves

Management of Riparian Reserves will be as written in the 1994 Record of Decision and Northwest Forest Plan Standards and Guidelines. This is the same assumption used in the 2000 Survey and Manage Final SEIS. Riparian Reserves are one of the components of the Aquatic Conservation Strategy along with Key Watersheds, Watershed Analysis, and Watershed Restoration. These components are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. There are nine objectives included in the Aquatic Conservation Strategy, which are intended to benefit aquatic and riparian-dependent species. The Aquatic Conservation Strategy provides for a high degree of protection for aquatic and riparian associated species that may be locally rare, but have a wide distribution. Species that occur only in a few locales would be at a slightly increased risk compared to widely distributed aquatic or riparian species from habitat-disturbing activities under the Aquatic Conservation Strategy. However, the Aquatic Conservation Strategy provides substantial protective measures to reduce the risk to aquatic-dependent flora and fauna, such as riparian buffers and associated standards and guidelines.

Late-Successional Reserves

Management of the Late-Successional Reserves will be as written in the 1994 Record of Decision and Northwest Forest Plan Standards and Guidelines. This is the same assumption used in the 2000 Survey and Manage Final SEIS. Activities are allowed in Late-Successional Reserves but only within the context of Late-Successional Reserve objectives. The objectives are described on Page C-11 of the 1994 Standards and Guidelines:

> *Late-Successional Reserves are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the Northern Spotted Owl. These reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem.*

Approximately 30 percent of all federally managed lands in the NWFP area are contained in Late-Successional Reserves. Approximately 87 percent (over 8 million acres) of late-successional forest on federally managed lands in the NWFP area is in late-successional and other reserves. Based on Late-Successional Reserve objectives and the large amount of late-successional forest in reserves, it is assumed that all alternatives include the same protective measures to reduce the risk to late-successional or old-growth forest associated species.

Species Site Information Sources

The species site numbers displayed on Table 2-13 serve as one of the key sources of information upon which species outcomes, and other analysis within this Supplement, are based. Known species sites are recorded in the Agencies' databases when there is credible information as to species and specific location. This information can come from a variety of sources including private and public herbaria and other collections, publications, agency and other surveys conducted for purposes other than Survey and Manage (e.g. lichen air quality survey), and other sources. As noted in the *Survey and Manage Species* section in this Supplement, compilation of data from these sources served as the beginning of the Survey and Manage database. Site data also comes from the Agencies' own surveys conducted under Survey and Manage. For example, 79 percent of the Agencies' 68,000 site records of current and former Survey and Manage species have come from pre-disturbance Survey and Manage surveys.

Sites are removed from the database or otherwise downgraded if confirmation visits fail to relocate them, if they do not have location information specific enough to find them on the ground, if further examination of samples indicates they are a different species, and so forth. Agencies' specialists, including those contributing to the analysis in this Supplement, are familiar with the data. They regularly examine and challenge suspect or older data, particularly during the Annual Species Review process. Also, see "Known Sites" in the *Glossary*.

Species sites within the GeoBOB and ISMS databases have sufficient geospatial information that comparisons with Northwest Forest Plan land allocation maps is possible, and thus many of the species sections later in this chapter note what percentage of known sites are in reserves versus Matrix and Adaptive Management Areas (AMAs). In these breakdowns, it is important to note that there is no map layer for Riparian Reserves, so "Matrix/AMA" almost always also includes Riparian Reserves. If the species is aquatic or riparian dependant, virtually 100 percent of its sites are "in reserves," and the stated percentages refer only to the surrounding landscape away from the reserve. Sometimes the phrase "large reserves" is used to remind the reader where Riparian Reserves are not included.

Types of Survey and Manage Surveys

There are two main categories of surveys conducted for Survey and Manage species, *pre-disturbance surveys* and *Strategic Surveys.* Pre-disturbance and many types of Strategic Surveys are non-random, so the ability to make inferences about occupancy in similar habitat away from the survey area can be limited. Random Strategic Surveys can be used to make statistically-based inferences about sample populations and habitat, but data from such surveys have only recently become available (see Table 3&4-16 near the end of this chapter).

Since individual species discussions later in this chapter reference, and necessarily rely on, site numbers obtained from all of these sources, it is important to understand the nature and objective of each of the types of surveys used.

Pre-Disturbance Surveys

Pre-disturbance surveys are clearance surveys that focus on a project unit with the objective of reducing the inadvertent loss of undiscovered sites by searching specified potential habitats prior to making decisions about habitat-disturbing activities. They are done according to a written survey protocol for each species and can use methods such as transects or plots that focus on priority habitats, habitat features, or involve the entire

project area (USDA, USDI 2001a:Attachment 1-21). Practical pre-disturbance surveys are required for most Survey and Manage species if such surveys are "practical." Pre-disturbance surveys are deemed practical for species whose physiological characteristics make them likely to be located with reasonable effort. (Some species are too small to be detected, do not show themselves regularly and predictably, or cannot be separated from other species outside of a lab.) Surveys for some species must be conducted during a relatively narrow timing window when they are in bloom or otherwise annually (or no less than semi-annually) showing definitive characteristics. Equivalent-effort pre-disturbance surveys are required for some species whose characteristics preclude "practical" surveys. Pre-disturbance surveys prior to habitat-disturbing activities have been required at least since 2001 for 66 species on Survey and Manage under Alternative 1. Since the majority of management activities take place in the Matrix land allocation, most pre-disturbance surveys have been conducted there. Pre-disturbance surveys have covered approximately 16 percent of the Matrix, but probably less than 1 percent of other land allocations (Reserves, etc.). The majority of the existing Survey and Manage species known sites have been located with these surveys. However, because these surveys focus only on lands proposed for management (usually in Matrix), the ability to extrapolate resultant site information to other areas and land allocations is limited.

Strategic Surveys

Strategic Surveys gather information at different scales about the species' range, distribution, and habitat requirements. Strategic survey efforts have varied from broad-scale, multiple-species surveys to more small-scale surveys depending on the information needs. These surveys and methods include probability-sampling approaches; proposive surveys in likely habitat (if known); known site surveys to collect habitat information; modeling of potential habitat; and for some species, specific surveys and other information-gathering techniques used to answer specific information needs. Existing pre-disturbance survey experience is used to help design Strategic Surveys, in part because pre-disturbance surveys were conducted before Strategic Surveys. Both positive and negative detection information helps indicate the most appropriate Strategic Survey approach.

Probability-Sampling Approaches:

Probability-based approaches allow for inference to the broader sampled landscape (Molina et al. 2003). The random selection of sample plots reduces bias and includes measures of uncertainty, including standard errors and confidence intervals. It is also a method of formally testing statistical hypotheses. Probabilistic sampling has been conducted at different spatial scales for various Survey and Manage species groups and individual species including amphibians, red tree vole, mollusks, lichens, bryophytes, and fungi.

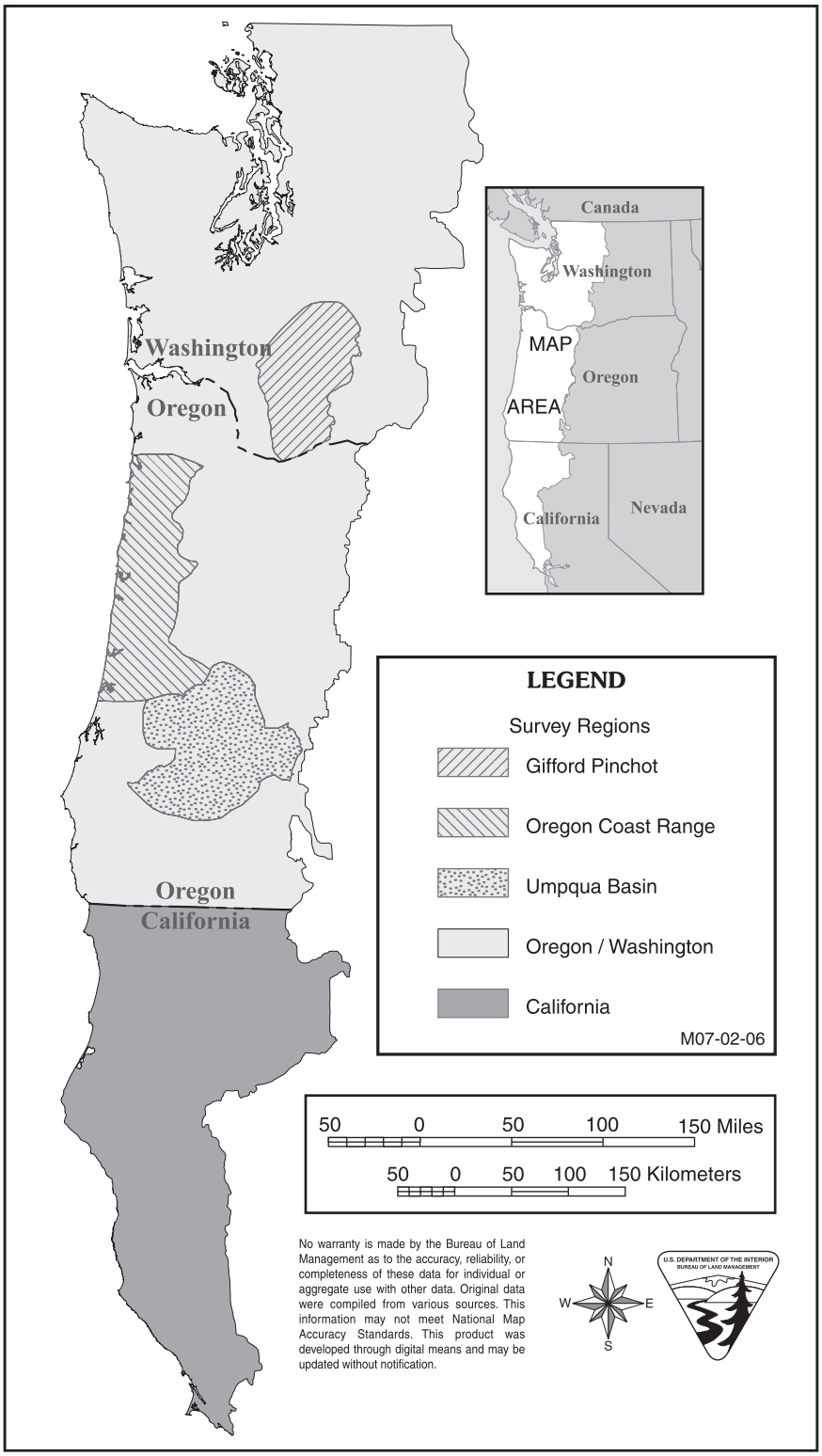
The Random Multi-Species (RMS) Survey is an example of a statistically-based probability-sampling survey. It used a double sample design of random and systematic sampling that allows unbiased detection estimates and estimates of species associations with reserve land allocations and late-successional forest. The Agencies completed the field survey portion of the RMS Survey in autumn 2004, using a stratified sample from existing Continuous Vegetation Surveys (CVS) and Forest Inventory and Analysis (FIA) plots. The percentages of plots by strata were as follows:

60%	Reserve and late-successional/old-growth
20%	Reserve and non-late-successional/old-growth
10%	Matrix and late-successional/old-growth
10%	Matrix and non-late-successional/old-growth

The survey sampled 750 botany plots, 658 fungi plots, and 509 mollusk plots. (The RMS Survey sampled mollusks only in Oregon and Washington, although the similar

GOBIG2K random survey sampled mollusks in California - see Table 3&4-16.) Analysis of the results is complex and necessarily species and taxa-specific. Although detailed species-specific biological interpretations of the results are lacking, numerical expansion (statistical inference) of the plot results has been completed and is displayed on Tables 3&4-16 at the end of this chapter and 3&4-11 in the *Red Tree Vole* section. Except as otherwise footnoted, the displayed data expansion covers the entire NWFP area, including areas where a species may have been removed from Survey and Manage in the 2001 Survey and Manage Record of Decision because it was determined to no longer meet the Survey and Manage Basic Criterion. (Raw RMS detections shown on Table 2-13 are only for the area where species are included in Survey and Manage.)

Figure 3&4-4. RMS Survey Regions.



Detections in the statistical sample are used to estimate detections across the sample area. For the RMS Survey, the population was stratified (see Figure 3&4-4) so that detection in one stratum does not necessarily represent the same area as detection in another stratum. For example, each sample plot represents anywhere from 7,000 to over 200,000 similar areas (i.e., plots of the same size), depending upon the species and strata. Since there is uncertainty (standard error) associated with sampling, a 95% confidence bound was calculated to give a range of plausible values of the true, unknown number. Thus, depending upon the stratification of the plots, the 95% confidence bound for one to four detections generally includes zero.

Table 3&4-16 presents RMS detection levels and the percent of the Northwest Forest Plan landscape estimated as occupied, along with the standard error. Additional columns display resultant projections of number of occupied sites across the NWFP area (assuming sites the same size as the sample plots), and lower and upper limits on such site numbers assuming a 95% confidence bound. Table 3&4-16 presents only the detections and statistical analysis; consideration of what those numbers represent in terms of species aggregation, locations, or relative rarity have been made by the species effects writers.

Proposive Surveys:

The proposive survey is a knowledge-based approach that relies on the ability of experts to recognize and concentrate survey effort in potentially occupied or suitable habitats. The objective of these surveys was to locate additional sites in high-likely habitats or attempt to relocate known sites of species that have not been observed for several years. They are used primarily for species known from none or few sites to help confirm presence.

Known Site Surveys:

Known site surveys (surveying known locations of Survey and Manage species to relocate the site and collect habitat information) have been conducted for selected species at hundreds of known sites. The data collected from these surveys provides information about habitat, provides specific location data, and can be used to develop potential habitat maps for species modeling. In association with these surveys, habitat modeling using potential natural vegetation is ongoing for selected Survey and Manage species.

Habitat Modeling:

Modeling of Survey and Manage species habitat has occurred at various scales. Large-scale habitat modeling using Potential Natural Vegetation and Plant Associations has been done for several species in all taxonomic groups. These models use data collected from known site surveys to develop maps showing high-, moderate, and low- likely habitats and can be used to identify areas where proposive surveys can be conducted. These maps are then calibrated and validated through ground-truthing surveys. Once these models are validated, they can estimate the amount of potential habitat there is for that species. Micro-site habitat modeling using the Bayesian Belief Model identifies the likelihood a species is present at a specific location. A similar modeling effort has been conducted for red tree vole habitat. These site-specific models potentially can be used to determine if pre-disturbance surveys are necessary. Additional habitat modeling has been conducted for three salamander species.

Species-Specific Surveys and Other Information-Gathering Techniques:

Other Strategic Surveys have been conducted that focused on answering specific information needs. These varied efforts included species-specific surveys, research designed to address specific questions such as habitat associations, genetic and taxonomic analyses, and historic data compilation. Examples include arthropod literature synthesis, radio telemetry work on red tree vole to answer connectivity concerns and seasonal movement questions, determination of mollusk clades, and determining habitat associations at multiple scales for an amphibian species.

Key Assumption for Environmental Consequences for Species on Survey and Manage and Agencies' Special Status Species Programs Simultaneously

One hundred fifty-seven of the species discussed in this Supplement are on one or more of the Agencies' Special Status Species Programs at this time. With the reinstatement of the Survey and Manage Standards and Guidelines in January 2006 by the District Court, these species are now covered by both programs. Because the Survey and Manage provisions generally provide protections that are similar to or exceed those provided by the Special Status Species Programs, species effects discussions for Alternative 1 and 4 (and Alternative 3 for Category A, B, and E species) in this Supplement generally do not mention, or attribute benefits to, inclusion in the Special Status Species Programs. Such attribution would be unnecessarily duplicative.

Key Assumption for Past Management

The effects analysis in the Final Supplement assumes all previous project or management activity decisions will be executed as described in their respective NEPA decisions or decision documents.

Key Assumption for Non-Species-Specific Effects Analyses for Alternative 4

Effects to 337 individual species are displayed in this chapter for each of the four alternatives considered in detail, according to the category to which they are assigned in each of those alternatives. No-Action Alternative 4, for example, has 58 more species (in all or part of their NWFP area range) included in Survey and Manage than No-Action Alternative 1. Outcomes for those species on Survey and Manage are described for Alternative 4, and for those species "off" Survey and Manage under Alternatives 1, 2, and 3.

Effects for non-species-specific resources such as Costs, Timber Harvest, and Wildland and Prescribed Fire are handled somewhat differently. Previous analyses of these resources (2000 Final SEIS, 2004 FSEIS) assumed more common species would be removed from Survey and Manage following the adaptive management provisions of the Standards and Guidelines, as new information indicated the species was more secure. Site acreage projection caps were applied for all species with over 100 acres in known sites in 2000, as described in the *Timber Harvest* section in this chapter. Such an assumption is consistent with the 1994 Standards and Guidelines as well, which included: "As experience is acquired with these requirements, agencies may propose changes … These changes could include… dropping this mitigation requirement for any species whose status is determined to be more secure than originally projected" (USDA, USDI 1994b: C-6). Those capped species site acreage projections from the *Timber Harvest* section were applied to the *Wildland and Prescribed Fire* section as well, and in turn were reflected in the *Costs of Management* section of this analysis.

Modeling caps were neither arbitrary nor uniform; species experts helped predict when each species might be removed from Survey and Manage if the individual species' detection rates continued as in the past. To not have applied such caps would have been to ignore a key element of the Standards and Guidelines, and would have provided the Survey and Manage alternatives with unrealistically high effects on these non-species-specific resources. Consistent with that previous modeling, effects for the newly added Alternative 4 are displayed in this chapter as if the adaptive management process would be applied as described in the Standards and Guidelines. In the case of Alternative 4, however, there is considerable evidence regarding what adaptive management (Annual Species Review) changes would be made. That evidence, displayed in Appendix 9, is the record of changes actually made by the Agencies following the prescribed process. The version of Survey and Manage resulting from those changes is Alternative 1.

Therefore, an analysis assumption for the species new to No-Action Alternative 4 in all or part of their NWFP area range (when compared to No-Action Alternative 1), as well as for category differences between this and Alternatives 1, is that if Alternative 4 is adopted, a revised species review process would begin, and changes previously adopted during the 2001, 2002, and 2003 Annual Species Reviews would most likely be reinstituted. This is a reasonable assumption. The Ninth Circuit did not address whether species were sufficiently protected or if the species removal criteria were flawed, only that the planning and NEPA processes required for plan amendments were not followed with respect to one such species, the red tree vole in its Mesic Biological Zone.

The Annual Species Review process considered copious amounts of information (summarized in Appendix 9), rigorously judged against specific criteria spelled out in the 2001 Record of Decision. The Agencies made changes only where new information indicated the species' status had changed relative to the Three Basic Criteria for Survey and Manage. Because this copious information has already been carefully considered by the Agencies, and the specified criteria are those already published and used to categorize and remove species from Survey and Manage in the 2000 Final SEIS, it would be reasonable to expect those ASR decisions to represent the preferred alternative in any subsequent proposal, including proposals which are determined to require plan amendment and associated NEPA analysis. The Agencies would of course rigorously comply with their responsibilities to consider any new information revealed during the analysis or resulting from public comments, and could arrive at a different decision after that consideration. Nevertheless, hypothetically, but in the interest of providing the public with a fair comparison of alternatives in this analysis, the Agencies believe that it is reasonable to assume that if the processes required by the Ninth Circuit for the Mesic Biological Zone red tree vole were used for other species also previously addressed in the 2001-2003 ASRs, the Agencies are more likely than not to select the preferred alternative, and that on average and on the whole, the previous species category changes or species removals would be reaffirmed or reoccur. The result of this assumption is that effects to timber harvest, costs of management, wildland and prescribed fire, and other potentially habitat-disturbing management activities under Alternative 4 are expected, at least after the first one to two years, to be the same as those described for Alternative 1.

Even if the previous ASR decisions were not assumed as likely to be reaffirmed or reoccur, the previously used analysis capping of projected site numbers to simulate the adaptive management process would simulate removal of many of these same species, particularly those common enough to have a significant effect on fuel treatments, costs of management, timber harvest, and other non-Survey and Manage species-specific resources. Failure to simulate a removal process during effects modeling would, as noted above, cast Alternative 4 in an unrealistically negative light with respect to adverse effects on other Northwest Forest Plan goals. No such prohibition should be assumed or inferred from the Ninth Circuit Court decision. The Ninth Circuit did not find that making such changes would be illegal, but just that additional procedures would be required before they could be made.

In the short term, for the one to two years potentially required to conduct any planning steps that may be identified by the above-referenced reconsideration, Alternative 4 would have additional adverse effects on timber harvest and other potentially habitat-disturbing management activities including fuels management when compared to Alternative 1. Achievement of fiscal year 2007 and 2008 timber sale targets would be reduced 80 to 100 million board feet per year (about 16 percent of the 530-600 million board feet target) under Alternative 4 when compared to the effects under Alternative 1. Short term effects to fuels treatment and other management activities are less than 16 percent of those programs because of shorter planning lead-time requirements and the greater availability of substitute treatment methods and locations. Short term costs to conduct the planning and NEPA analysis associated with the above assumption would include $0.5 million spread over two years. If the analysis assumption described above proves to be incorrect, effects to timber harvest, fuels treatments, and other management activities could occur for a longer period of time.

Summary of Environmental Consequences for Species

Habitat (including known sites) is insufficient to support stable populations in the Northwest Forest Plan area under all alternatives

There are 132 species (115 fungi and 17 lichens) with an outcome of habitat (including known sites) is insufficient to support stable populations range-wide in the NWFP area under all alternatives (see Tables 2-11 and 2-13), and 1 species (red tree vole) with this outcome for part of its range. This outcome is not due to federal actions, but other factors such as: (1) limited potential habitat and few populations on federally managed lands; (2) potential for stochastic events; (3) low number of individuals; (4) limited distribution; and, (5) narrow ecological amplitude (USDA, USDI 1994a; USDA, USDI 2000a).

Insufficient information to determine an outcome under all alternatives

There are 20 species (6 bryophytes, 3 fungi, 1 mollusk, and 10 lichens) and 4 arthropod functional groups for which there is insufficient information to determine an outcome under all alternatives (see Tables 2-11 and 2-13). This is due to limited information about abundance, distribution, and ecology of these species. In addition, for some of these species, there is uncertainty regarding effects of management practices and environmental conditions including global climate change.

Under Alternative 4, when the analyses show that there is "insufficient information to determine an outcome" or "insufficient habitat (including known sites) to support stable populations" for a species, this outcome is the same for Alternatives 1, 2, and 3 as well. Although presumably the Survey and Manage Standards and Guidelines generally provide benefits to species, they do not substantively change the outcomes or resolve the lack of sufficient information. However, many of these are species with few known sites or populations. For species with insufficient habitat under all alternatives that are not included in the Agencies' Special Status Species Programs under Alternatives 1, 2 or 3, the lack of species management may increase the risk to these species. For species where there is "insufficient information to determine an outcome" and they are not included in the Agencies' Special Status Species Programs under Alternatives 1, 2 or 3, it is unknown if the lack of species management would increase the risk to these species.

Habitat (including known sites) is sufficient to support stable populations in the Northwest Forest Plan area under all alternatives

There are 147 species with an outcome of habitat (including known sites) is sufficient to support stable populations in the NWFP area under all alternatives (see Tables 2-11 and 2-13).

Habitat (including known sites) is insufficient to support stable populations in the Northwest Forest Plan area because of actions under Alternatives 2 and/or 3

There are 38 (Alternative 2) and 4 (Alternative 3) species for which an outcome of habitat (including known sites) is sufficient to support stable populations in the NWFP area under Alternative 1 and 4, but habitat (including known sites) is insufficient to support stable populations in the NWFP area under Alternatives 2 and 3, respectively (see Tables 2-11 and 2-13).

Habitat is insufficient to support stable populations in a portion of the Northwest Forest Plan area because of actions under Alternatives 1, 2, and/or 3

There are 2 (Alternative 1), 15 (Alternative 2), and 7 (Alternative 3) species for which an outcome of habitat (including known sites) is sufficient to support stable populations

in the NWFP area under Alternative 4, but habitat is insufficient to support stable populations in a portion of the NWFP area under Alternatives 1, 2 and 3, respectively (see Tables 2-11 and 2-13).

Environmental Consequences Without Special Status Species Programs

The August 1, 2005 District Court decision that lead, in part, to the creation of this Supplement requires the Agencies to "analyze potential impacts to Survey and Manage species if they are not added to or are removed from the Forest Service's and BLM's respective programs for special status species" (Northwest Ecosystem Alliance v. Rey, 380 F. Supp. 2d 1175 (W.D.Wash. 2005) at 1197). Therefore, effects discussions for species included in this Supplement provide, for every species assumed to be assigned to one or more of the Agencies' Special Status Species Programs, outcome statements for Alternatives 1, 2 and 3 without the assumption of Special Status Species Programs assignment. The outcomes are provided to display for the public, the Decision-makers (Secretaries of Agriculture and the Interior), and the Special Status Species Programs' administrators (BLM State Directors in California and Oregon, and Forest Service Regional Foresters in Regions 5 and 6) the consequences of not adding individual species to the respective Special Status Species Programs as shown on Table 2-13 and otherwise assumed in the effects analysis. Display of such effects is required under NEPA, the Court explained, because even though the Agencies have subsequently added the species to their Special Status Species Programs, the 2004 FSEIS analysis relied on "an assumption based on uncertain future events that there is no guarantee will occur" (Northwest Ecosystem Alliance v. Rey, 380 F. Supp. 2d 1175 (W.D.Wash. 2005) at 1190).

Removal of the Special Status Species Programs (SSSP) assignments are displayed as "scenarios" in the species effects discussions in this Supplement, and may be abbreviated "Alternative 2 without SSSP", "Alternative 2 without assignment to the Region 5 (California Forest Service) Sensitive Species Program," and so forth. The reference means the outcome (effect) is for Alternative 2 as if none of the assumed Special Status Species Program assignments were to occur, or were undone at this time for those species where such assignment has already occurred. Species outcomes under these scenarios are displayed on Table 2-13, and summarized on Tables 2-10 and 2-11.

Aquatic Ecosystem

Affected Environment

The Northwest Forest Plan provides for a high level of protection for all streams, lakes, and wetlands on Forest Service and BLM managed lands within the NWFP area. The Aquatic Conservation Strategy is a habitat-based approach for restoring and maintaining ecological health of watersheds and the aquatic ecosystems contained within them on these federally managed lands (USDA, USDI 1994a; USDA, USDI 1994b). The key assumption of the Aquatic Conservation Strategy in 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: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- and part-time riparian-dependent flora and fauna. Some of these species are currently included under the Survey and Manage Standards and Guidelines. Species that spend their entire life histories in water receive the highest degree of protection on federally managed lands, because 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 NWFP area. Riparian Reserves also benefit species that spend considerable portions of their life histories within the water or within riparian areas.

Alternative 9 in the Northwest Forest Plan Final SEIS incorporated Riparian Reserve Scenario 1, which increased the width recommended by the FEMAT 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 outside of Key Watersheds (those within Key Watersheds already had been proposed for this protection in FEMAT). This change was a result of the additional species analysis and response to public and internal comments in the Northwest Forest Plan Final SEIS. The analysis in the Northwest Forest Plan Final SEIS underestimated the potential landscape level of protection provided by the Aquatic Conservation Strategy. The quantity of Riparian Reserve acres is higher than originally analyzed, and the amount of land within all reserves has increased from a 6:1 ratio of reserve to non-reserve lands in the Northwest Forest Plan Final SEIS to a 7:1 ratio. This higher acreage has resulted in a 15 percent decrease in PSQ when compared to that anticipated in the Northwest Forest Plan Final SEIS. The absolute increase in reserves is in addition to the increase in prescribed Riparian Reserve widths identified in the Northwest Forest Plan Record of Decision. The Agencies assume that the conclusions regarding the level of protection provided by the Aquatic Conservation Strategy contained in the Northwest Forest Plan Final SEIS remain valid or are exceeded.

Several species of fish occurring in the NWFP area have been listed under the Endangered Species Act since the Northwest Forest Plan Record of Decision was signed (see Appendix 5, Table 5-2 for the complete list of threatened and endangered fish). These listings do not reflect the integrity of the Aquatic Conservation Strategy. The Northwest Forest Plan anticipated the potential of these listings and adopted a strategy to assist in the long-term recovery of these species. Factors other than habitat and land uses contributed to the need to list these species. Anadromous fish spend the majority of their life histories in areas outside of the federally managed lands covered by the Northwest Forest Plan. Other mortality factors (commercial and recreational fish harvest, ocean conditions, etc.) contributed to the listing of these fish. The relative contribution of each mortality factor was not identified in the listing announcements. The Northwest Forest Plan Final SEIS states:

> "*…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:3&4-202).

The Aquatic Conservation Strategy has been in place for approximately 14 years, a time period too short to demonstrate a measurable improvement in habitat conditions for fish populations to respond to the improved conditions. This, too, is consistent with the analysis contained in the Northwest Forest Plan Final SEIS and FEMAT Report. The authors of the Aquatic Conservation Strategy (USDA et al. 1993) stated:

> *"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 over the last 14 years has not affected the listings of water quality-impaired stream segments under section 303(d) of the Clean Water Act. Although the number of stream miles added to the 303(d) list in Oregon increased from approximately 12,000 miles during 1994-1996, to approximately 13,700 miles in 1998 (Oregon Department of Environmental Quality 1999), not all of these streams occur within the NWFP area. The increase in stream miles is due primarily to more information being available and a greater emphasis on water quality in recent years. For example, the State of Oregon initiated a statewide effort aimed at recovering declining fish stocks. The State's effort involved identifying water quality-impaired water bodies and developing Water Quality Recovery Plans to address factors that contribute to the listing of the water body under section 303(d). The Northwest Forest Plan recognized these water quality concerns prior to their listing under 303(d). These listings are not new information for the Northwest Forest Plan.

Environmental Consequences

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. The Riparian Reserve network 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. Watershed analyses address the factors that affect the protection and restoration of the habitat type affected (such as a lake or wetland). They also recommend Riparian Reserve management designed to protect and restore the functions and processes necessary to support the habitat type. The Riparian Reserve widths applied through project-level NEPA decision documents are based on these watershed analyses.

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. Species that have very limited distribution throughout their known range and/or occur in rare or isolated habitats (wetlands, lakes, geothermal springs, isolated seeps, etc.) are generally at higher risk than more widely distributed species and/or species that utilize a broader range of habitat conditions.

The degree of dependence on water is also a risk factor. Species that spend their entire lives within water generally have a lower risk of long-term negative effects due to habitat-disturbing activities. Species that spend greater proportions of their life histories out of water and within Riparian Reserves have a somewhat higher risk to their persistence than purely aquatic species, but they have a relatively 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 and Administratively Withdrawn Areas, provide other levels of protection for those species that spend more time outside Riparian Reserves.

All alternatives in this SEIS include the same protective measures to reduce the risk to aquatic-dependent flora and fauna such as riparian buffers and associated standards and guidelines. Aquatic-dependent flora and fauna will benefit from the restoration of aquatic ecosystem functions and processes, which is required to meet the Aquatic

Conservation Strategy objectives. Application of the Aquatic Conservation Strategy is expected to yield functioning riparian and aquatic ecosystems in the long term.

The effects of the alternatives to aquatic species do not change the outcomes described in the Northwest Forest Plan Final SEIS. This is due to the fact the Aquatic Conservation Strategy provides a high level of protection to aquatic habitats and associated species regardless of the presence of known sites for Survey and Manage or Special Status species. The managed area for Survey and Manage or Special Status species that contributes to additional protection for wetlands less than 1-acre, for example, would provide additional protection to other species that inhabit the affected wetland. These protections would accrue primarily at the site scale versus the scale of the Northwest Forest Plan and would not alter the conclusions reached in the Northwest Forest Plan Final SEIS.

None of the alternatives in this SEIS change the assessment of achieving the Aquatic Conservation Strategy goals described in the Northwest Forest Plan Final SEIS. The effectiveness of the Aquatic Conservation Strategy in achieving its goals is independent of whether managed sites are added in the future or currently managed sites are removed from the Survey and Manage category. The goal of the Aquatic Conservation Strategy is to restore the functions and processes to maintain the ecological health of watersheds and aquatic ecosystems. The four components (Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration) were determined to effectively achieve the overall goal independent of the Survey and Manage mitigation measure. The Aquatic Conservation Strategy applied through the Northwest Forest Plan Record of Decision resulted in an 80 percent or higher likelihood of providing sufficient aquatic habitat to support stable, well-distributed populations of the seven races/species and groups of salmonids. Similarly, the Aquatic Conservation Strategy provides a high probability for aquatic species persistence.

Late-Successional Forest Ecosystem

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 within the range of the Northern Spotted Owl. The Northwest Forest Plan features a functional, interconnected, late-successional forest ecosystem that is extensive and well distributed and provides for dispersal and movement between populations of species. The Northwest Forest Plan comprises a network of reserves, which protect large blocks of late-successional forest and aquatic resources, and Matrix where most timber harvest occurs. In general, the reserve system is designed to be comprehensive, adequate, representative, and replicated. The proportion of the landscape in reserves varies among physiographic provinces; the reserves always predominate, ranging from 59 percent to 99 percent at the province level (USDA et al. 1993:IV-64 and IV-65; USDA, USDI 1994a, Appendix G:G-35).

The Northwest Forest Plan anticipated and planned for increases in late-successional acres in the long term, as well as short-term harvest of late-successional stands in Matrix and Adaptive Management Areas. Standards and guidelines for Late-Successional Reserves are designed to maintain late-successional forest ecosystems and reduce their loss from large-scale fire, insect and disease epidemics, and major human impacts. Nevertheless, the Northwest Forest Plan acknowledged the role of natural disturbance in the development of late-successional forests and anticipated continued disturbances, even large-scale fire, in the reserves (USDA, USDI 1994a:3&4-46 through 49 and 3&4-89 through 91; USDA, USDI 1994b:B-3 through B-4). The reserves are designed to maintain frequent, low-intensity natural ecosystem processes such as gap dynamics, natural

regeneration, pathogenic fungal activity, insect herbivore, and low-intensity fire (USDA, USDI 1994b:B-8 through B-9 and C-13 through C-14).

The Matrix is an integral part of the conservation strategy. Land allocations and standards and guidelines within the Matrix important to maintaining ecological processes include: (1) Riparian Reserves; (2) 100-acre owl activity centers; (3) Connectivity Diversity Blocks (BLM managed lands north of Grants Pass); (4) green tree and snag retention within cutting units; (5) provisions for downed woody debris; and, (6) protection of all remaining late-successional stands within fifth-field watersheds currently comprised of 15 percent or less late-successional forests on federally managed lands. Estimates from FEMAT on the percent of the land base within Riparian Reserves averaged 40 percent (USDA, USDI 1994b:B-12). Estimation done on individual administrative units has found that these initial estimates were conservative and, in most cases, Riparian Reserves are more extensive than originally estimated. In the 2000 Survey and Manage FSEIS, approximately 81,000 acres or 1 percent of the late-successional forest were projected to be managed for the protection of Survey and Manage species (USDA, USDI 2000a:436).

The Northwest Forest Plan and this SEIS assume a continuation of succession and disturbance processes that interrupt succession. Assumptions used in this SEIS also include the natural variability in successional process rates and directions. The late-successional forest ecosystems in the NWFP area are dynamic and have historically experienced varying levels of disturbance, generally from frequent, low-intensity fires in the dry, southern provinces to infrequent, severe fires in the northern provinces (USDA, USDI 1994a:3&4-17 through 24, 3&4-88 through 91, and B-44 through 46; USDA, USDI 2000a:208). Although disturbance regimes (high rates of change) are often described precisely in terms of frequency, intensity, duration, and extent, such regimes are also highly variable. For example, the average fire return interval in the temperate forests of Oregon vary from less than 10 years between fires at low elevation, drier habitats to more than 100 years between fires in the high elevation, moister habitats. Variability throughout the overall region is greater yet. These frequencies seem precise, but the 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 approximated. Because natural variability is wide, chaotic, and takes at least several decades to establish patterns and trends, it is premature to effectively evaluate human-caused effects and trends since the establishment of the Northwest Forest Plan 13 years ago.

However, there have been changes to the reserves that are pertinent to this analysis. The reserves are larger and contain far more late-successional forest than assumed by the FEMAT viability rating panels, because of the subsequent addition to Riparian and Late-Successional Reserves, under-estimates of Riparian Reserve acreage, and increases in the acreage of late-successional forest over the last 10 years due to higher than expected rates of in-growth. The latter has come from growth into the lower end of the age class (80-90 years) used to define older forest. While these areas may not be the same quality as forests with larger trees and more structural diversity, all existing late-successional forest areas are growing older at the same time, so it is appropriate to attribute at least a portion of this in-growth as additional acres in all age classes. Even without such an assumption, the 80 to 90 year old stands themselves contribute habitat for many late-successional forest related species.

In addition to these late-successional forest increases in the reserves, late-successional forest in the Matrix has been increasing as well, in part because harvest rates of late-successional forests in the Matrix have been a fraction of the rate projected in the Plan. Supporting details are as follows.

Mitigations adopted as a result of the Additional Species Analysis (see *Background for Survey and Manage Standards and Guidelines* in *Chapter 2*) resulted in the addition of 775,000 acres to the Riparian and Late-Successional Reserves between the 1993 FEMAT report and the 1994 Northwest Forest Plan Record of Decision (USDA, USDI 1994b:29). Approximately 35 percent of this (USDA, USDI 1994a:3&4-41), or 270,000 acres, was late-successional forest.

Additionally, the FEMAT (and 1994 Northwest Forest Plan Record of Decision) estimated Riparian Reserves to encompass, on average, 40 percent of all NWFP areas (USDA, USDI 1994b:B-12). The FEMAT estimate was based on analysis of sample stream systems appearing on broad scale topographic maps (Johnson et al. 1993). Subsequent Watershed Analyses and project planning experience by the Agencies' administrative units has shown that estimate to be 20 to 30 percent too low west of the Cascade crest where dense vegetation apparently kept photo-interpreters from seeing and mapping all intermittent streams, wet areas, and unstable soils. Northwest Forest Plan practitioners generally use at least 50 percent as a more accurate reflection of average area in Riparian Reserves, or an increase of approximately 675,000 acres from within Matrix, and approximately 100,000 acres from within Adaptive Management Areas (AMA). Approximately 29 percent of these acres (USDA, USDI 1994a:3&4-41), or 225,000 acres, is late-successional forest in reserves.

Much of this 225,000 acres Riparian Reserve increase is reflected in the decrease in PSQ from the original 958 to the present 805 million board feet (MMBF). Six Oregon BLM and four Region 5 (California) Forest Service land and resource management plans were in draft when the Northwest Forest Plan was finalized in 1994. Completion of those plans in 1995, and subsequent review of six Region 6 (Oregon and Washington) Forest Service land management plan PSQs resulted in a 15 percent decrease in PSQ "based primarily on increases…in Riparian Reserves", including an increase of late-successional forests in reserves from 6.7 to 6.9 million acres (USDA, USDI 2000a:429-430). Other west-side units also report actual Riparian Reserve acres to be considerably higher than estimated in the documentation of the FEMAT sampling (Johnson et al. 2003).

Additionally, the net ten-year increase in late-successional forest within reserves was projected to be about 2.8 percent of the NWFP area (3.5 percent in-growth less 0.7 percent loss to fire)(Figure 3&4-2), or 685,000 acres. Actual in-growth was nearly double this rate because of a particularly large cohort of approximately 100 year old stands originating from large fires at the turn of the last century but not quite old enough to be counted as late-successional by the FEMAT (Moeur et al. 2005). These are ten-year gains; it has been 14 years since the FEMAT panel rated species, so the in-growth gains could be 40 percent higher or an additional two to three hundred thousand acres[6]. It is important to note that the effect of in-growth is not just more acres in the youngest age class; all existing late-successional forest has aged ten years as well, resulting in a corresponding increase in all late-successional forest age classes. While the continued development of late-successional characteristics in these older stands is dependent upon processes and events as well as age, a general assumption that these acres become richer in late-successional forest characteristics as they get older, is reasonable.

Taken together, these factors indicate an increase in late-successional forest in reserves of at least 1.3 million acres from the reserves considered by the FEMAT viability panels, and perhaps as much as 1.7 million. This is a 19 to 26 percent increase over the 6,623,200 acres of late-successional forests in reserves displayed in the FEMAT report (USDA et al. 1993: IV-54).

[6]This is not to suggest that this faster rate of in-growth will continue. While there is a large cohort of stands around 180 years of age that are becoming late-successional now, there is a nearly empty age class at 60 to 80 years, so in-growth will slow in decades 4 and 5, and the total late-successional forest after 50 years may be 10.7 million acres as predicted in the NWFP (see Figure 3&4-2).

Substantial increases in late-successional forest in the Matrix and AMAs are in addition to the above gains. Actual harvest during the first ten years of the Northwest Forest Plan (contributing to PSQ, including regeneration harvesting in the Matrix) has been about 56 percent of PSQ (*Timber Harvest* section; Baker et al. 2005). Reasons for this have included: more Survey and Manage site protection occurred than was expected; for some species, Endangered Species Act compliance has resulted in more habitat acres retained in the Matrix; AMA Plan(s) have called for deferral of harvests from the first decade; project and program lawsuits have reduced sale offerings (including the Pacific Coast Federation of Fishermen's Association v. National Marine Fisheries Service, 71 F. Supp.2d 1063, 1069 (W.D. Wash. 1999)); some areas are not economical to harvest, often in part because adjacent areas are excluded from harvest by the other factors listed here; and, funding and personnel issues have slowed some offerings. Further, the above factors have prevented harvests within late-successional forests disproportionate with the volume reduction. Thus, although the Agencies expected to harvest (remove) approximately 247,000 acres of late-successional forest in the first decade (see *Assumptions and Information Common to All Alternatives* earlier in this chapter), less than 50,000 acres have been harvested, so there are approximately 200,000 acres more late-successional forest in the Matrix/AMAs at the end of the first decade than had been projected in 1994. While these stands may eventually be harvested, their retention through the first decade can be assumed to have helped maintain species to a greater degree than had been expected in the analysis of effect for the 1994 Northwest Forest Plan.

A ten-year Northwest Forest Plan Monitoring Report, *Status and Trend of Late-Successional and Old-Growth Forest*, was published in 2005. The late-successional forest increases shown in the ten-year report parallel and confirm the acreage increases described above. That is,

> *"The environmental impact statement (USDA, USDI 1994a, USDA, USDI 2000) assumed that 0.7 percent of the Plan area would be lost to stand-replacing wildfire per decade, and that 1 percent of the Plan area (or 3 percent of the total late-successional forest) would be harvested per decade. It further assumed that ingrowth from younger classes into older forest classes would occur at a rate of 3.5 percent per decade on reserve lands, and 0.7 percent per decade on matrix lands. On balance, older forest was expected to increase by 600,000 acres in the first decade, and by 2.7 million acres after 50 years.*
>
> *"Our monitoring results, albeit based on short-term observed trend, appear to show that certain of the Plan's assumptions were too conservative. Our data show that during the first 10 years of the Plan, projected gains far outpaced losses of older forest, resulting in a net projected increase of between 1.25 and 1.5 million acres of older forest on federally managed land… The observed rate of gain was about twice the first decadal gain expected under the Plan"* (Moeur et al. 2005:106).

The report goes on to note there was more than expected in-growth likely because large fires in the late 1800s and early 1900s poised many acres on the brink of late-successional size. In addition, actual stand-replacing harvest of late-successional forest in the ten years following adoption of the Plan was 16,900 acres[7] rather than the 230,000 projected to have been harvested at the three percent rate. Fire losses over the same period had a larger than expected effect on some provinces, but the overall rate was within Northwest Forest Plan expectations.

Some of the above-described acreage increase is due to the addition of wider Riparian Reserves and 100 acre patches of late-successional forest scattered across the Matrix (from the Option 9 analyzed by the FEMAT panels), creating a better web or network of

[7]These are the acres visible on the monitoring team's inventory photos, typically 5 acre and larger regeneration harvests. The US Fish and Wildlife Service 2004 report of 156,000 acres of owl habitat harvested during the same period is considered grossly overstated because it includes consultations for harvests that did not take place, and thinning or other stand tending that did not remove the stands (Haynes et al. 2006:90). See Appendix 11, Comment and Response #51, for additional discussion.

late-successional forest connecting larger reserves. The improved connectivity and 19 to 26 percent increase in reserved late-successional forest acreage are significant, and as a result, late-successional forest related species would be expected to be more secure than estimated in 1994.

The ten-year monitoring report addressed this increased connectivity and overall late-successional forest ecosystem health as well. Given the improvements between the FEMAT report and the final version of the Northwest Forest Plan, along with more detailed inventory information and more time for analysis (the FEMAT developed their entire report in 90 days), the ten-year monitoring report states:

> *"…we perceive the condition of older forest abundance, diversity, and connectivity at the start of the Plan to have been generally consistent with Outcome 2, except perhaps for the provinces of the eastern Cascades. The interpretation for this outcome is that the older forest baseline was within the typical range of conditions that occurred during previous centuries, but less than the long-term presettlement average of 65 percent of the landscape* [Outcome 1] *(USDA, USDI 1994a). Connectivity was strong, characterized by short distances between large older forest patches. The condition of older forest in the eastern Cascades provinces was more typical of Outcome 3, interpreted as below long-term averages, with relative scarcity in some areas or occurring as scattered remnant patches"* (Moeur et al. 2005:106).

While the report did not address fine-scale functionality features such as the number of snags and logs, the reported increases in acreage, diversity, and connectivity are significant indicators of improvement in the functionality of the late-successional forests. The FEMAT estimated Option 9 had a 77 percent likelihood of achieving Outcome 2 or better in the moist provinces *in 100 years,* and a 63 percent chance in the dry provinces (USDA et al. 1993:VI-70). However, Outcome 2 was essentially achieved by the reserve additions made in the final Plan. The late-successional forest in-growth in the past 14 years is in addition to, and helps strengthen, these findings. This does not suggest that the existing mix of age classes in Late-Successional Reserves is not still a concern, that fragmentation or connectivity are restored to target levels, that restoration is complete, or that any other concerns noted in the 1994 Northwest Forest Plan analysis should not continue to guide the Agencies' restoration goals. The findings do, however, indicate significant gains have been made toward meeting those goals, and thus these findings have significant implications for late-successional forest related species including those included in the Survey and Manage Program.

Finally, the more than 200,000 acre reduction in first decade harvest (from FEMAT projections) (Moeur et al. 2005:106) coupled with silvicultural techniques of green-tree retention, snag and coarse wood retention, smaller unit size, and yarding techniques to minimize disturbance, simply helps to facilitate the transition from 1993 conditions to a fully functional network of reserves.

Recent trends in global climate have raised questions from the public about impacts to forest vegetation. There is a generally accepted principle that temperature rises will have a corresponding effect on the lower elevation boundary of various forest types, although the magnitude and timing for such change is also affected by other factors such as disturbance events. The literature concerning plant establishment and growth has long documented that environmental conditions needed for establishment of new perennial plants are narrower than the environmental conditions needed for persistence of established perennial plants. However, whether older forests are uniquely suited to "resist" climate change and younger trees are uniquely vulnerable to climate change are unexplored questions. Recent experiences with different types of disturbances suggest that older trees can be more vulnerable than younger trees due to differences in rooting depth, affecting access to soil water needed for several plant processes. All plant species have ecological limits. As environmental stressors increase, the likelihood that

an individual plant will succumb to any particular stressor increases, regardless of age. For example, the recent increase in bark beetle-related mortality in nearly all coniferous forest types is believed to be due to a combination of past management practices, current climate, and, in higher elevation forests, natural timeframes for susceptibility (Fettig et al. 2007, WFLC 2007). Many of the large fires in Oregon and Washington during 2006 were associated with insect outbreaks and mortality, both from bark beetles and defoliators, which have been on-going for several years. Merely retaining older forest is no guarantee that such forests will continue to persist under a changing climate, providing the benefits claimed. Whether younger trees are more susceptible depends on how well matched the species planted is to the changing site conditions.

It would be inappropriate, however, to view "old-growth" as a monolith forest type. The structure and species composition of old forest varies considerably with biophysical setting. There is no evidence that climate change means the absolute end of old forests. It does mean that the structures and compositions of old forests will change and are less likely to resemble the structures and compositions of today's old forests regardless of what management strategies and activities the Agencies undertake. As noted later in this section, pollen deposition studies in the Pacific Northwest dating back 10,000 years indicate significant changes in major forest species dominance every 2 to 3 thousand years.

Environmental Consequences

In assessing the environmental consequences of the alternatives to the 337 Survey and Manage species and four arthropod functional groups included in this analysis, specific information about the species is used whenever available. 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:3&4-122). When specific species information is insufficient to base a conclusion of reasonable certainty regarding the security of habitat, reliance must be made on information regarding the overall design and effectiveness of the Northwest Forest Plan (land allocations, standards and guidelines, and other assumptions) and the understanding of the overall ecology of the late-successional forest ecosystem within the NWFP area.

PSQ has been adjusted downward by approximately 15 percent primarily to more accurately reflect the extent of Riparian Reserves. This has resulted in a corresponding increase in protection of late-successional forest. Under any of the Alternatives, approximately 5 percent of existing late-successional forest on federally managed lands would be modified per decade by management actions such as partial cut harvests, regeneration harvests, and fuels treatments. In relation to long-term and regional ecological objectives, the environmental consequences associated with the rates of management disturbance per decade are small in comparison to the large extent of reserves and the large range of natural variability. Because the rate of disturbance through management activities is so small, there would be no meaningful difference in environmental consequences to the late-successional forest ecosystem, as a whole, between the alternatives, and certainly no departure from the consequences described in the 1994 FSEIS.

Under all alternatives, late-successional and old-growth forest is anticipated to be replaced due to aging of existing stands across the NWFP area in the long term at a rate 2.5 times greater than the rate of current anticipated harvest. In the long term, large blocks of late-successional and old-growth forest would be limited to the reserves and administratively withdrawn land allocations (USDA, USDI 1994a:3&4-42 through 46). The Matrix would include smaller patches of late-successional forest (such as within

connectivity/diversity blocks) and late-successional structural elements within younger or multi-aged stands (such as older trees, snags, and coarse woody debris) (USDA, USDI 1994b:C-40 through C-43).

FEMAT and the Northwest Forest Plan assessed the likelihood of maintaining a functional and interconnected, late-successional forest ecosystem. The ecosystem assessments were based upon diversity, function, dynamics, and spatial patterns of the late-successional forest ecosystem. Three attributes were assessed: abundance and ecological diversity, processes and function, and connectivity. Because the amount of forest habitat that is managed for known sites under the Survey and Manage Standards and Guidelines is small when compared to the 20 million acres of reserves, the rating of the likelihood of maintaining a functional and interconnected, late-successional forest ecosystem would not substantively vary among the four alternatives. Moreover, variation associated with implementation of the alternatives is likely to be insignificant when compared to the effects of successional disturbance processes and because of the high natural variability of the forest ecosystems.

The most substantial effect of Alternatives 1, 3 and 4 would be when the species-specific direction of the Survey and Manage Standards and Guidelines conflict with the Northwest Forest Plan strategy of maintaining functioning, late-successional forest ecosystems. An example of this conflict is the use of prescribed fire to restore ecological functions to fire-associated forests in southern or eastside provinces when the known site of a Survey and Manage species consists of habitat resulting from the exclusion of fire from the ecosystem. Management aimed at dampening extreme ecological variations caused by fire tends to lead to extreme magnification of the effects associated with disturbance (USDA et al. 1993:IV-35 through IV-36 and IV-71 through IV-76; USDA, USDI 1994b:B-4; USDA, USDI 2000a:205).

Given that approximately 80 percent of the NWFP area (and 87 percent of currently existing late-successional forests) is reserved, most late-successional and old-growth forest related species are likely to be adequately protected by the reserve system. There may be greater uncertainty about some late-successional and old-growth forest related species, such as those that have limited distribution and that are highly intolerant of disturbance. However, the design of the reserve system, which generally provides the most reserves in those physiographic provinces that had the most late-successional forest historically and the least natural disturbance, provides some additional assurance that late-successional and old-growth forest related species adapted to more static systems are adequately protected by the reserve system.

Within the late-successional forest ecosystems in the NWFP area, in order for species to persist, they would likely need some tolerance for disturbance at least at the population level. Tolerance for disturbance by species at the population level is needed because the forest ecosystems are dynamic and have historically experienced levels of disturbance as described above.

Physiographic provinces with the least reserves and most Matrix are the Willamette Valley, California Cascades, and the Oregon Klamath Provinces. In the Willamette Valley Province, 66 percent of all federally managed forest and 59 percent of late-successional forest is in Reserves. In the California Cascade Province, 57 percent of all federally managed forest and 68 percent of late-successional forest is in Reserves. In the Oregon Klamath Province, 68 percent of all federally managed forest and 74 percent of late-successional forest is in reserves. These provinces have had historically high fire frequencies, have had the least late-successional forests, and have had forests that were naturally highly fragmented (USDA, USDI 1994a:3&4-21 through 3&4-24, 3&4-37; USDA, USDI 2001b). Species that might be limited predominately to the Matrix in these areas would most likely have evolved in an ecosystem characterized by the least late-successional forest, the least connectivity of late-successional habitat, and the most

frequent disturbance. Therefore, in general and in the absence of specific information to the contrary, if there are late-successional and old-growth forest related species that are restricted to provinces that have disproportionately more Matrix, such as the Willamette Valley, California Cascades, and Oregon Klamath provinces, then they are more likely to be at less risk from limited or fragmented late-successional habitat, and are more likely to be relatively tolerant of disturbance.

Physiographic provinces with the most infrequent fire have the most reserves and least Matrix. The Olympic Peninsula and high elevations of Western Washington Cascades have "... the lowest fire frequencies of Pacific Northwest forest ecosystems" (USDA, USDI 1994a:3&4-17 through 18). In the Olympic Peninsula Province, 92 percent of all federally managed forest and 99 percent of late-successional forest is in reserves. In the Western Washington Cascade Province, 88 percent of all federally managed forest and 92 percent of late-successional forest is in reserves (USDA, USDI 1994a:2-39 and G-35). Therefore, if there are species that are restricted to these provinces, they may be highly intolerant of disturbance (in contrast to species that might be restricted to the drier provinces described above). However, if there are species restricted to these provinces that are highly intolerant of disturbance, they are likely to be adequately protected by the reserve system, because these provinces have disproportionately more reserves.

The coarse filter/fine filter approach to species management has become well established in the ecological literature (Noss 1987, Hunter 1991, Noss and Cooperider 1994, Groves 2003). Large reserved areas can be presumed to protect 85-90% of species, with fine filter methods providing for the rest (Iverson 2001). This was more or less the strategy used in the Northwest Plan, with Survey and Manage provisions for fine filter concerns. Coarse filter reserves efficiently conserve large numbers of species while allowing resource development in the non-reserved areas (the "Matrix" of the Northwest Plan). The post-FEMAT analysis resulted in several other fine-filter standards and guidelines as well. Since the Northwest Plan began implementation in 1994, monitoring and other information results suggest the Survey and Manage aspect of the fine filter approach may not be necessary. The Agencies present evidence for this as follows:

For the species eventually placed on Survey and Manage, the FEMAT reported their species evaluation panel's lower ratings as "troubling," and went on to suggest that investigations of these taxa receive priority attention

> *"because it is widely accepted that the vascular plants, fungi, and lichens, along with the invertebrates, are critically important for the maintenance of ecosystem function and productivity"* (USDA et al. 1993:II-34).

The purpose of the following discussion is to examine whether this concern would be exacerbated by the removal of the Survey and Manage mitigation measure.

Certainly, vascular plants, fungi, lichens, and so forth are important ecosystem components, but the role of actually rare individual species is not well understood (Lyons et al. 2005, Schwartz et al. 2000). The FEMAT scientists themselves chose not to add individual species protection to Option 9, taking the view that there was sufficient late-successional and old-growth forest in the Late-Successional and Riparian Reserves to protect these species, and further protections should await evidence of risk (Thomas et al. 2006).

About 25 percent of the original Survey and Manage species have been removed from the program with the 2001 Record of Decision and subsequent Annual Species Reviews (Alternative 1), primarily because they were found to be more common and/or more secure than originally thought. For this discussion, it is assumed some additional number of species would eventually be determined to be more common and/or more secure than currently thought. For example, the recently completed RMS Survey and

resultant statistical analysis indicates many species that were previously thought rare are likely more numerous and widespread than originally believed. Because reserves, including riparian reserves, cover so much of the landscape, it is reasonable to assume these reserves would protect the majority of these sites. (As noted above, the amount of late-successional forest in reserves has increased more than 19 percent, or more than a million acres, since the Plan was adopted. It is unknown what portion of the continuing increase in known sites is attributable to increases in habitat, and what portion is attributable to surveys simply finding previously occupied sites.)

More than one-third of the species currently on Survey and Manage had at least one RMS detection, and on average, such a detection suggests 7,000 to over 200,000 similarly occupied sites (although the 95% confidence bound includes zero for such a single detection) depending upon the sample stratification (see RMS Survey discussion in the *Background for Effects Analysis* section). From these existing detections, it is possible to mathematically project average species numbers and populations for those not detected (and indeed several models are available), but those projections cannot accurately predict extremely rare species (Schreuder et al. 2000). Such projections are used, for example, to predict how many unknown species of a taxa (e.g. insects) there are in the world. Projection techniques preclude the need to continue random sampling with lower and lower likelihoods of finding additional, proportionately rarer species. For example, if the 750 half-acre botany RMS Survey points were repeated 100 times, for example (75,000 plots), to where a detection represents (on average) about 650 occupied ½-acre sample sites, many more of the Survey and Manage species would be detected, and they would, on average, have populations covering hundreds of acres and more.

There are, however, some Survey and Manage species that still may not be detected at such intensity because they have smaller populations than hundreds of acres. In fact, such a situation is likely. There are mollusks, for example, associated with dry province springs, and lichens in hypermaritime sand dunes, that have fewer than 30 acres of known sites and their habitat is so specialized that it all may have been identified and examined, and all extant sites located. These species may have developed in these rare habitats, or they may have once been more widespread and have been relegated to their current locations by major events such as the advance or retreat of glacial ice. Species so rare are most likely to be, though not necessarily always, associated with specialized, limited habitat and not with late-successional forests.

A discussion of risk to species (from management or natural disturbance) and in the implications of that risk to Northwest Forest Plan late-successional forest ecosystems first requires a distinction between rare and "actually" rare. That is, if a species is considered rare simply because it is known only from a few sites, it is not necessarily "actually" rare. Many of the Category B fungi, for example, may be rare only because the difficulty in locating them has kept the number of known sites low. Thorough searches done for the RMS Survey increased the known sites for some Survey and Manage fungi species by several times, and subsequent statistical analysis indicates they are not actually rare at all. The only reason such species were included in Survey and Manage in the first place was lack of information, and given enough time and inventory funding, all species not "actually" rare would eventually be removed from Survey and Manage.

If a species is actually rare, there is some risk (though likely low) that management activities would have a significant negative impact on a species population or even extirpate it from the NWFP area ecosystem. The likelihood of direct impact is discussed in the *Survey and Manage Species* section later in this chapter. That analysis indicates if a species truly exists on only 1 or 2 sites, the likelihood of intersecting the entire population with timber management activities is about 3 percent or 1/10th of one percent per decade respectively (and even then, the possibility of that impact actually eliminating the sites depends on the nature of the habitat and the resilience of the species). If the species exists on 4 or 5 separate sites, the possibility of timber management activities impacting

all of them rapidly approaches zero. The analysis makes it quickly apparent that only species making up much less than 1 percent of the biomass of late-successional forest ecosystems are at any risk of direct impacts at all.

Setting aside the intrinsic importance of individual species for the *Survey and Manage Species* section later in this chapter, the question important to this section of the analysis is whether such species are important to the functionality of the ecosystems in which they live. Actually rare species (the ones clearly making up less than one percent of the biomass of their ecosystem) are by definition so uncommon as to not appear at all on most sites. While their site-specific ecosystem contribution or function is generally apparent, research has not suggested a unique functional role for species so rare. Lyons et al. (2005) and Schwartz et al. (2000) examined research efforts to link biodiversity and rare species to ecosystem function.

Lyons et al. (2005) noted few examples of even uncommon species (defined in Lyons et al. as approximately 1 to 5 percent of the biomass of the ecosystem studied) playing significant roles. Nevertheless, some cases did occur. For example, removal of mountain lions led to significantly increased deer numbers, resulting in a variety of vegetation and human interaction issues. A suite of Equisetum species in Alaskan shrub wetlands making up less than 5 percent of the above and below ground biomass made substantial contributions to phosphorus, potassium, and calcium in litter and soil nutrient pools.

Similarly, Lyons et al. identified instances where aggregations of uncommon species fill ecosystem roles. For example, early seral species may be poorly represented in late-successional forest ecosystems, but are important in pioneering disturbed sites after large fires or other disturbances, providing soil stability and sometimes providing significantly high levels of nitrogen and other nutrients. Less common species played important roles in nutrient cycling in an alpine meadow in part, because they were able to be active in slightly different times of the season than other species present on the site. Bees too, fall in this latter group; and less common species helped stabilize population variations. Indeed, the role of uncommon species in helping to buffer population variations is the only benefit of uncommon species Schwartz et al. (2000) confidently identified.

None of these studies uncovered a role for actually rare species, defined as species truly extant on only a few sites, and comprising less than 1 percent of the biomass in an ecosystem. In fact, the Schwartz et al. (2000) examination of 94 literature references found the majority of biodiversity-ecosystem function studies indicated that most ecosystem function is achieved with relatively few species, and that "evidence in support of a linear dependence of ecosystem function on diversity such that even the rare species contribute to function is practically non-existent" (Schwartz et al. 2000). Schwartz et al. (2000) found "little support for the hypothesis that there is a strong dependence of ecosystem function on the full compliment of diversity within sites."

Anecdotal observations support application of these findings in Northwest forest ecosystems. For example, lichens in the genus *Bryoria* make up nearly 100 percent of the winter food for the northern flying squirrel, a prey species for the Northern Spotted Owl and an important distributor of mycorrhizal fungi. However, other species in the *Bryoria* genus are common, and the biomass of the three Survey and Manage *Bryoria* species are an immeasurably tiny fraction of the genus. There are examples of single species upon which entire ecosystems rely (e.g., coral in atolls and krill in the North Sea). However, there do not appear to be similar examples for Pacific Northwest forests. Indeed, pollen deposition studies in the Pacific Northwest dating back 10,000 years indicate significant changes in major forest species dominance every 2 to 3 thousand years. The current suite of forest species did not evolve together, and there is no evidence they are irrevocably interrelated in function and thus potentially singularly dependent upon one another. Considerable functional similarity (redundancy) has evolved or migrated here. Researchers estimate, for example, there are approximately 2,000 species of mycorrhizal

fungi associated with Douglas-fir roots alone (Trudell et al. 2006). Although different ones perform different functions in space and time, there is no reasonable probability that the extirpation of some of these species would threaten the existence of the Douglas-fir forests. The role of such mycorrhizal fungi in facilitating water and nutrient uptake and other functions would continue to be played by the many such species still remaining.

No actually rare species has been identified as serving as a system catalyst, keystone, or gatekeeper. They are simply too rare to be critical to current ecosystem processes; no system could survive if it was dependent on an actually rare and vulnerable species. If such a role existed, fluctuating climate or fire would not only affect it, but would remove the whole ecosystem as well. Very rare species exist naturally, because of limited habitat or historic circumstances. The previously cited research does not support the notion that ecosystem function relies upon them.

Although the above line of reasoning and research indicates the Pacific Northwest forest ecosystem is not dependent upon actually rare species, it cannot be concluded that rare species have no role in ecosystem function. Much remains to be evaluated before any conclusions can be made. While rare species currently do not have *known* roles as system catalysts, keystones, or gatekeepers in Pacific Northwest ecosystems, they provide diversity that can potentially allow these ecosystems to adapt to climate and vegetation change, and indeed evolutionary processes, into the future. Because the species have no apparent critical role today does not mean they will not in the future. The point here is not to suggest Survey and Manage species do not matter, however, or that a real risk of extirpation should be ignored. The point is that the likelihood a species plays a significant or unique role in late-successional forest ecosystems increases with its abundance, but such an increase in abundance correspondingly reduces the risk the species might be extirpated by management activities in the NWFP area. Thus, there appears to be no measurable or significant risk to forest ecosystems brought about by the apparently small risk of extirpating a species under the proposed action when compared to the No-Action Alternative.

There are some unusual and limited ecosystems within the NWFP area, such as *Darlingtonia* bogs, where rare species might potentially serve a much larger ecosystem role in such geographically limited systems. No such role has been identified for Survey and Manage species. These systems are appropriately protected through Agencies' Special Status Species Programs or other policies other than Survey and Manage. Moreover, the Endangered Species Act recognizes the importance of, and need to protect, rare species.

The value of individual populations of species, as well as the species as a whole, is acknowledged (Luck et al. 2003), as well as the fact that species can appear redundant locally but have functions at different scales (Peterson et al. 1998). The lack of information on rare species is also acknowledged:

> *At this time, biotic and abiotic interactions of a majority of species on the planet are unknown or poorly understood. Our survey suggests this is doubly true for rare and less common species. In the short-term, widespread ignorance warrants a precautionary approach regarding taxa with putatively less ecosystem impact* (Lyon et al. 2005).

These aspects of biodiversity are not in conflict with the provisions of the Northwest Forest Plan, nor of this document. The Plan has strong provisions for the conservation of species at multiple scales, and there is little evidence that Survey and Manage species are at significantly greater risk by the removal of Survey and Manage provisions.

Individual species outcomes notwithstanding, an analysis of the odds of impacting species sites coupled with the above examination of the potential role of rare species in ecosystem function points to a general conclusion there is very little risk of species

extirpation unless species are actually rare or face a serious threat from disease or other forces (see *Survey and Manage Species* section later in this chapter). Further, and in spite of ecosystems being more complex than will likely ever be known or understood, it can be said with a reasonable level of confidence that if a species were so rare as to be at actual risk of extirpation, it would be too rare for its loss to have a detectable effect on the function of the late-successional forest ecosystem.

Global Climate

The conclusion of the Northwest Forest Plan Final SEIS was that management activities under the Northwest Forest Plan would cause a change in global atmospheric carbon dioxide of less than 0.01 percent of the total (USDA, USDI 1994a:3&4-46, and 3&4-50 through 51). The 2000 Survey and Manage Final SEIS concluded that this increase would be even less because of the lower harvest levels than originally anticipated (USDA, USDI 2000a:203). Although these changes are intended to represent contributions to the atmosphere from Northwest Forest Plan-level activities, opposite effects are as likely. Since the U.S. demand for wood products continues to increase, each decrease in harvest levels to accommodate other management objectives likely translates to a corresponding increase in harvesting elsewhere in the world, where environmental controls might not lead to efficient replacement, the type of forest harvested may be more efficient at slowing global change than Pacific Northwest temperate forests, and fossil fuels will be burned to deliver the product to U.S. markets.

As indicated in the most recent summary from the Intergovernmental Panel on Climate Change (IPCC) (2007), temperatures worldwide are expected to increase with the greatest change in the higher latitudes; precipitation regimes are also expected to change, with some areas becoming more arid and some becoming wetter. Weather is expected to become more variable with extreme events, such as heat waves and heavy precipitation, occurring more frequently (IPCC 2007). The most recently available projections for the northwestern United States are that winters will become warmer and wetter and summers will become warmer and drier, although these projections have a higher level of certainty east of the Cascade crest than west (Leung et al. 2004, Mote et al. 2005).

Projections for temperature have a much higher level of certainty than those for precipitation (IPCC 2007, Leung et al. 2004, Mote et al. 2005). Further, current climate projections remain very coarse, usually 10 km resolution or coarser. Several models that address known feedback links between vegetation and climate are under development, but these also remain relatively coarse, functioning at the level of general ecosystems, such as ponderosa pine forest, rather than specific sites. Climatologists are unable to project how climate might change in a local area, such as the individual ecological provinces within the NWFP area, much less at the scale of stands or microsites.

Several studies have documented shifts in the ranges of some species and in spring phenologies consistent with those expected under a warming climate (Parmesan and Yohe 2003, Root et al. 2003, Walther et al. 2002). However, species are what migrate, not communities, with range changes occurring at different rates. The differential changes mean that we can expect new plant and animal communities to develop, but we do not know what form those communities may take, at what rate the changes will occur, or when more-or-less stable communities will redevelop. We do not know at what rate current communities may 'destabilize' either. A recent report from the National Academy of Sciences (Williams et al. 2007) indicated that we can expect to lose communities that depend on cold climates at the upper elevations of many mountain ranges and at the high latitudes. The species covered by the Northwest Forest Plan are not cold climate obligates. This report also states that we can expect the development of new climates; however, as with new ecosystems, the current science is unable to predict what new climates will develop where and when.

Other factors that compound the uncertainties in estimating potential effects on individual species are interactions between increasing carbon dioxide levels and changing temperature and precipitation regimes as they affect plant species responses, and the recently identified impacts of Asian pollution on Pacific storm tracks (Zhang et al. 2007). All these uncertainties make it impossible to estimate the potential impacts of climate change on the persistence probabilities of any given taxa. They do increase the level of uncertainty concerning projected outcomes, but we cannot say how much that uncertainty increases or whether the increase is the same for all taxa. Where specific concerns are identified, they are noted in the individual species sections.

Locally, the best approach to increasing carbon sequestration in forests is to exclude fire and other disturbances (Tilman et al. 2000, Thornley and Cannell 2000, Houghton 2003). However, this approach has proven infeasible and unsustainable. Many other studies indicate the issue of carbon storage and sequestration is complex. Globally and within the conterminous United States, the expected net ecosystem productivity in temperate forests resulting from both carbon fertilization and various land use practices would sequester about 10 percent of anthropogenically (human caused) emitted carbon dioxide (Hamilton et al. 2000, Woodbury et al. 2007). Nearly half the carbon dioxide uptake is in short-lived tissues such as foliage, with little of that transferred to soil carbon stocks during the decay process (Schlesinger and Lichter 2001). While the trees of the Pacific Northwest account for a significant portion of the carbon stocks of the conterminous United States, a significant portion of those carbon stocks are also contained in wood products, including wood in landfills (Woodbury et al. 2007). The temperate forests of the North America and Europe are currently net carbon sinks, but this is largely due to the effects of fire exclusion (Houghton 2003). The maximum rate of carbon accumulation attributable to land use changes was reached around 1980 with less than half this uptake in forests (Houghton et al. 2000). Total ecosystem carbon storage and the fraction of carbon stored in above ground wood in dry forests increases rapidly for 150-200 years and then levels off (Law et al. 2003). Law et al. (2001, 2003) found that net ecosystem productivity, a measure of carbon uptake, in ponderosa pine forests was highest in mature forests (95-106) years old and next to lowest in old forests (190+ years old) and that young forests switch from being a net carbon source to a net carbon sink 10-20 years after a stand-replacing disturbance, either natural or anthropogenic. Most of the carbon emitted from very young forests appears to be the result of increased metabolic rates in soil organisms exposed to increased temperatures and moisture (Law et al. 2001). Thornley and Cannell (2000) found that undisturbed forests store more carbon overall but that management regimes that retain canopy cover and mimic regular natural disturbances are likely to achieve a reasonable amount of carbon storage and wood yield.

Hence, there are few if any negative effects to global climate expected by increases in timber harvest and other activities expected from the proposed action when compared to the No-Action Alternatives. The ability to better conduct fuels treatments under the proposed action would be expected to benefit global climate. All alternatives result in fewer acres harvested than were anticipated in the Northwest Forest Plan analysis however.

Air Quality

Affected Environment

The federal Clean Air Act, as amended in 1990, is designed to reduce air pollution, protect human health, and preserve the Nation's air resources. To protect air quality, the Clean Air Act requires federal agencies to comply with all federal, state, and local air pollution requirements (Section 118). The regulating of prescribed fire activity

is delegated to the states and county level air pollution control districts. Prescribed fire can be used as a tool for treating logging residue from regeneration harvest, for restoring ecosystem processes, and for hazardous fuel reduction. Wildland Fire Use is management of naturally ignited fire to meet resource objectives (see *Wildland and Prescribed Fire*), and protection of air quality is a primary concern when Wildland Fire Use is employed.

The Environmental Protection Agency (EPA) issued the Regional Haze Rule (EPA 1999), intended to protect visibility in Federal Mandatory Class I Wilderness areas[8], and the Particulate Mater standard (EPA 2006) for particles 2.5 microns (PM 2.5) or less in size. Prescribed fire, wildfire, and Wildland Fire Use all have a direct impact on visibility protection and human health. Over 70 percent of the smoke emission from all sources is PM 2.5.

The level of smoke emission varies based on the type of burning and the amount of available fuel. Wildfires produce the highest amount of emission because of their size and intensity during the summer months. Prescribed fire emission vary based on season of burn, the prescribed fire activity (i.e. underburn, broadcast burn, and pile burn), and the amount of available fuel.

Ecosystem restoration burning and some hazardous fuel burning (e.g. under-burning) are typically cooler or lower intensity and the majority of the emission remains on-site. Pile burning usually takes place in the fall and winter months after significant rainfall or snow. Burning piles is more efficient - thereby reducing total emission. Broadcast burns create the most emission and are controlled by dispersion and avoidance techniques.

The Northwest Forest Plan Final SEIS estimated PM10 levels under Alternative 9, aggregated across climatic groups (moist, dry, or intermediate), to be 35-40 percent of historic PM10 levels (1985-1992) (USDA, USDI 1994b:3&4-96).

EPA standards for PM10 changed in 1997, and a standard from PM2.5 was initiated. Trend monitoring by EPA shows PM standards are being met throughout the NWFP area based on prescribed fire activity type and the number of acres treated.

Environmental Consequences

The acres to be burned for prescribed fire, Wildland Fire Use for and wildfire for each alternative would be less than the 476,000 annual acres that were projected under Alternative 9 of the Northwest Forest Plan. None of the alternative would exceed the level of impacts analyzed in the Northwest Forest Plan. Under all alternatives, 80,000 annual acres of hazardous fuel treatment are projected, with 38 percent of that expected to be prescribed fire (for further discussion, see the *Wildland and Prescribed Fire* section later in this chapter) and 40-50 percent of the remainder is the more efficient pile burning. Strict adherence to the local smoke management plans is the best and most successful mitigation for reducing smoke emission impacts on local populations and maintaining visibility protection in Class I Wilderness Areas and National Parks.

As discussed in the *Wildland and Prescribed Fire* section later in this chapter, virtually no acres are planned for Wildland Fire Use in the foreseeable future. Wildfire within the NWFP area has averaged about 220,000 acres per year since 1994.

[8]Class I Area: as defined in the Clean Air Act, the following areas that were in existence as of August 7, 1977: national parks over 6,000 acres, national wilderness areas and national memorial parks over 5,000 acres, and international parks.

Water Quality

Affected Environment

Water flowing from forested areas administered by the Agencies has a number of beneficial uses. The Clean Water Act directs federal agencies to comply with state water quality requirements to restore and maintain water quality necessary to protect beneficial uses. The Agencies are the designated management agencies within the range of the Northern Spotted Owl, charged with implementing and enforcing natural resource management programs for the protection of water quality on lands they administer. The four major components of the Northwest Forest Plan's Aquatic Conservation Strategy are Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. These provide for maintaining and improving water quality.

Environmental Consequences

None of the alternatives change the provisions of the Northwest Forest Plan that provide for restoring and maintaining water quality on federally managed lands in the NWFP area. None of the alternatives change the analysis or outcomes for water quality described in the Northwest Forest Plan Final SEIS.

Soil Productivity

Affected Environment

The combined influences of time, parent material, climate, living organisms, and the topography of a site interact to form soils with unique sets of physical and chemical properties that determine the productivity of each soil type. Soil productivity is a soil's ability to produce vegetation. Long-term forest soil productivity is the capacity or suitability of a soil to establish and grow a plant species and community over time, primarily through nutrient availability and available soil moisture. Ecosystem structures and functions ultimately depend on productive soils.

Environmental Consequences

Forest management practices have the potential to reduce natural productivity if certain operating guidelines are not followed. Under all alternatives, implementation of soil management prescriptions and best management practices would prevent unacceptable degradation of the soil resource and related productivity (USDA, USDI 1994a:3&4-111). None of the alternatives change the provisions of the Northwest Forest Plan that provide for maintaining soil productivity. Some of the Survey and Manage fungi are agents of soil productivity, but soil fungi are generally not one raising persistence concerns and their functions are generally redundant. Therefore, none of the alternatives change the analysis or outcomes for soil productivity described in the Northwest Forest Plan Final SEIS.

Wildland and Prescribed Fire

Affected Environment

Wildfire and the Ecosystem

Late-successional forest ecosystems in the NWFP area are dynamic and have historically experienced varying levels of disturbance by fire (Agee 1990, 1993). Historical fire regimes have generally ranged from frequent, low-severity in the dry, southern and eastern provinces, to mixed-severity in the Klamath, Siskiyou and some Cascade regions (Atzet 1991, Frost and Sweeney 2000, Taylor and Skinner 2003, Odion et al. 2004), to less frequent high-severity fire regimes in the northern provinces (Hessburg et al.2005, Baker 2006, Brown et al. 2004, Noss et al. 2006). Because fuels were maintained at relatively low levels by fire, fire intensity and severity was typically lower in frequent fire regimes. Historically, these regimes were typical of eastern ponderosa pine and some southern and central mixed conifers forests. Areas of varied terrain and topography, along with diverse species composition and irregular levels of forest cover and density, generally resulted in a mixed-severity fire regime, typical of the southern, central and some eastern mixed conifer forests (Brown 1995, Beaty and Taylor 2001, Odion et al. 2004, Hessburg et al. 2005, Baker et al. 2006). In more moist forests, typical of most coastal and some western, and high elevation forests, fire was less frequent but typically burned at higher intensity resulting in a high severity fire regime (Agee 1990, 1993, Frost and Sweeney 2000, Beaty and Taylor 2001). These fire regimes have shaped Northwest Forest Plan landscapes and influenced the habitats and the species that live there (Spies and Franklin 1989, Agee 1990). In the low and mixed-severity fire regimes, fires reduced surface fuel and created a mosaic of vegetation patches of differing ages, species, and structural attributes. Fires in high severity fires regimes also resulted in patch diversity, but at a much larger scale. These natural forest patches contribute to the diversity of the broader landscape (Pickett and White 1985, Spies 1991a, b, Spies and Franklin 1991). In aggregate, patchiness is integral to landscape function, providing habitats for diverse populations of species. With the absence of fires that generate seral diversity, forest stands become more homogeneous in terms of stand structure, species, and habitat, resulting in reduced biological diversity within and throughout landscapes (Parson and DeBenedettii 1979, Peterson et al. 2005). In frequent and mixed severity fire regimes, fire exclusion has often interrupted the natural role of fire in reducing fuels, permitting vast areas to accumulate uncharacteristically higher levels of flammable debris and ladder fuels leading to an increased risk of high-severity, stand-replacing fire, damaging insects, and disease. Therefore, in these ecosystems, the alteration of natural fire regimes by fire exclusion affects species composition, diversity, structure, and sometimes species persistence (Petraitis et al.1989; Brown 1995; USDA, USDI 1994a:3&4-83).

Although the effects of climate change are uncertain, it may significantly increase fire severity, frequency, and extent (McKenzie et al. 2004, Turner and Roome 2004, Makundi 1997, Flannigan et al. 2000). Increased spring and summer temperatures and earlier spring snow melt, as a result of climate change, has been linked to an increase in Western U.S. wildfire activity (Westerling et al. 2006). McKenzie et al. (2004) concluded that the effects of climate change will partially depend on the extent to which resource management modifies vegetation structure and fuels, reinforcing the need for fuel reduction and restoration of fire adapted ecosystems.

Fuel Hazard Reduction for the Protection of Property, Structures, and Public Safety

In addition to the ecological necessity for treating excessive levels of fuel, there is an urgent and sizable need to reduce the vulnerability of homes, structures and ultimately the safety of those living in the wildland urban interface from uncontrollable wildfire.

The protection of life and property is a paramount goal of the National Fire Plan (NFP 2000) (see *National Fire Plan* section below).

Small communities and other developed private lands adjacent to federally managed lands can be directly affected by fuel conditions on those federal lands. Threats posed by fuel accumulations are realized almost annually when wildfires affect urban areas (e.g. wildfires in northern California 1999, throughout western states 2002, large wildfires in southern Oregon 2003, large wildfires in southern California 2003, 2005, 2006)

The wildland urban interface (WUI) is the area where houses meet or intermingle with undeveloped wildland vegetation. The WUI is thus a focal area for human/environment conflicts, such as the destruction of homes by wildfires, habitat fragmentation, introduction of exotic species, and biodiversity decline (Macdonald et al. 2006, Radeloff et al. 2005).

The analysis presented here uses the WUI definition developed by the SILVIS group at the University of Wisconsin. This is the only consistently mapped WUI available to cover the entire Northwest Plan area. WUI areas defined in Community Wildfire Protection Plans are expected to be used in actual project-level planning and implementation.

As defined by the SILVIS group, the WUI is comprised of both interface and intermix communities. In both interface and intermix communities, housing density exceeds one structure per 40 acres. Intermix communities are places where housing and vegetation intermingle, with vegetation being more than 50 percent and continuous. Interface communities are areas with housing in the vicinity of contiguous vegetation. Interface areas have more than 1 house per 40 acres, with less than 50 percent vegetation, and are within 1.5 mi of areas larger than 1,325 acres that are more than 75 percent vegetated. The minimum size limit ensures that areas surrounding small urban parks are not classified as interface WUI (SILVIS 2006). The adequate protection of communities at risk within the WUI requires a buffer or adjacent area where fuel is treated in order to reduce the risk of undesirable impacts from wildfire.

National Fire Plan

To address the issue of increased fire size and intensity throughout the west, as reflected in the more than 8 million acres burned nationally in 2000, Congress initiated a National Fire Plan (USDA, USDI 2000b). Activities such as firefighting, rehabilitation and restoration, hazardous fuels reduction, community assistance, and research are included in the plan. The National Fire Plan proposes aggressive hazardous fuels reduction activities to protect communities and at-risk landscapes. In the 2001 appropriations bill, Congress also directed completion of the Forest Service's Cohesive Strategy for Fuels Management and the 10-Year Comprehensive Strategy, which also included direction for implementation and accountability. The related Federal Cohesive Strategy for Fuels Management was released in February 2006.

The Evaluation of Fire Risk and Ecological Conditions

Because of the spatial and temporal variability of natural fire events, the influences of climatic fluctuations, and the uncertainties associated with the use of dendrochronological analysis for fire history dating, an accurate assessment of the amount of acres that historically burned annually is extremely difficult to derive (Veblen 2002:11-13). Fire history reconstructions are very rough estimates and the accuracy and precision of the estimates can only provide relative trends or fire regimes. Using an estimate of historic fire size and frequencies, the 2000 Survey and Manage Final SEIS (p. 210) approximated that, on average, 476,000 acres burned annually. This number was used as the basis for approximating the ecological goal for annual fuel treatment in the 2004 FSEIS (p. 136). Regularly updated and in the absence of other tools, this information

was valuable for inferring ecological needs. Recent severe fire years beg the question of applicability of previous trends. Because of this inherent uncertainty, this Final Supplement to the 2004 FSEIS uses a different approach, incorporating new technology previously unavailable.

Since 2000, over $12 billion has been allocated and expended on fire related planning, fire ecology research, and fuel reduction programs nationwide under the auspices of the National Fire Plan (http://www.fireplan.gov/resources/reference_library.html). Beginning before the National Fire Plan, the federal interagency Joint Fire Science research program has made major contributions to fire related research and technology (http://jfsp.nifc.gov/), including technology and tools to assess landscape scale vegetation structure, fuels, and fire regimes (LANDFIRE 2006, Hann et al. 2005). The purposes of these tools are to 1) Develop an interagency methodology for identifying, quantifying, and reporting ecological departure; 2) Develop capability for mapping the attributes needed for fire behavior modeling; and 3) Develop mapping using a consistent methodology to portray both the ecological departure and fire behavior variables. Ecological departure is portrayed with a landscape metric known as Fire Regime Condition Class (FRCC). FRCC essentially compares the similarity or lack of similarity of existing conditions of seral stages, fire frequency, and fire severity to modeled historic conditions of these variables. Mapping of FRCC is provided in both the LANDFIRE Rapid Assessment (RA) and in LANDFIRE National. For both products, workshops with local experts were held throughout the country to model the reference conditions needed; LANDFIRE National supplements this with ground data to build the vegetation layers used in the FRCC analyses.

Fire Regime Conditions Classes classify ecosystems into categories that reflect the degree to which a vegetative community is at risk of undesired effects from wildfire. FRCC is an interagency, standardized tool for determining the degree of departure from reference condition vegetation, fuels and disturbance regimes, and is specifically mentioned in the Healthy Forests Restoration Act to determine ecological departure for fuel treatment needs. Assessing FRCC can help in setting management objectives, identify needs, and assist in determining the location and priorities for fuel treatments (Hann and Strohm 2003). The Rapid Assessment layers include FRCC, a map of historic fire regimes, the current mix of seral stages, and a potential vegetation layer. The scientific basis for all processes, analyses, methods, and data have undergone peer review and are available at http://www.frcc.gov, http://www.landfire.gov/, and http://www.fireplan.gov/.

Fire Regimes and Departure from Reference Conditions (FRCC)

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention (Agee 1993). Burning by aboriginal peoples has been documented to have influenced Northwest landscapes for hundreds, perhaps thousands, of years and is considered an inseparable factor influencing fire ecology (LaLande 2003, Williams 2002). Coarse-scale definitions for natural (historical) fire regimes have been developed (Schmidt et al. 2002), and interpreted for fire and fuels management (Hann and Bunnell 2001). The five natural (historical) fire regimes are classified based on approximations of the average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. Fire regimes are approximations that reflect inherent variability in historic fire frequency, however they provide useful information for understanding and evaluating the extent that landscapes and ecosystems are related, adapted, and dependent on the frequency of fire. These five natural regimes are:

I 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75 percent of the dominant overstory vegetation replaced)

II 0-35 year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced)

III 35-100+ year frequency and mixed severity (less than 75 percent of the dominant overstory vegetation replaced)

IV 35-100+ year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced)

V 200+ year frequency and high severity (stand replacement)

Reference conditions are the range of seral stages, fire frequency, and fire severity characteristic of pre-settlement (for the Northwest, generally prior to 1850) landscapes, and relate directly to the natural fire regimes. Fire regime condition class (FRCC) is an estimate of the amount of departure from natural (typically historic) reference conditions (Hann and Bunnell 2001) (Table 3&4-1). This departure is evident as changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and disease mortality, grazing, and drought). For ease of communication, departure is aggregated into classes: Condition Class I (low) (0 to <33 percent departure); Condition Class II (moderate) (33 percent to <67 percent departure); and Condition Class III (high) (67 percent-100 percent departure) (Hardy et al. 2002, Schmidt et al. 2002, Hann et al. 2005). Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.

Fire Regime Condition Class (FRCC) is used as a measure of ecological resilience and sustainability. Ecosystems functioning within a natural range are less likely to experience uncharacteristically severe fires, for example. Note, however, that FRCC is an

Table 3&4-1. Fire Regime Condition Class Degree of Departure

Condition Classes	Description	Potential Risks
Condition Class I	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low.
Condition Class II	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate.
Condition Class III	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components is high.

ecological measure, *not a direct measure of fire risk*. Forests can have high fuel loads and be functioning within the historic range, particularly in longer interval regimes. Variables such as crown base height and crown bulk density are used to determine fire risk (Scott and Reinhardt 2001), not FRCC.

Social and economic considerations must also be made in forest planning. Further, there are cases where a departure might need to be maintained (e.g., an overabundance of late seral closed forest) for the benefit of endangered species. Reducing FRCC (moving towards the natural range of variation) is therefore not necessarily the same as the desired future condition. It is, however, an indicator of sustainability, particularly in the high fire frequency (short fire return interval) fire regimes.

The Fire Regime Condition Class analysis process was undertaken for the Northwest Forest Plan to evaluate the approximate extent of fuel reduction needs and priorities. Although there are about 6.5 million acres of FRCC III in the NWFP area indicating an immediate ecological risk, there are an additional 14 million acres is classified as FRCC II, indicating a growing future problem as these FRCC II areas further deteriorate to FRCC III (Table 3&4-2). In addition, about 2.5 million acres of the Wildland Urban Interface is classified as FRCC III posing the highest and most immediate risk to communities. Currently, it is estimated that there are approximately 4.7 million acres in FRCC II and 9.4 million acres in FRCC III accessible for treatment. Of these, over 8.2 million acres on federal land are within the WUI that may pose an immediate danger to nearby communities and property (Table 3&4-3). An additional 8 million acres in condition class III is on private, state, and county owned land within the WUI. Altogether, there are over 21 million acres of federal and private land in condition class II and III within the WUI within the NWFP area. These figures are indicative of the scale of the fire hazard throughout the West. This analysis underscores the importance, urgency, and enormity of the current fuel hazard reduction issue.

The ecological setting for the drier areas of the NWFP area (short fire return internal) and fire exclusion policies has resulted in a recognized departure from the historic range of conditions (see previous *The Evaluation of Fire Risk and Ecological Conditions* section). The implications of this departure include potential for loss of late-successional forest to severe wildfire (Moeur et al. 2005), with associated impacts on late-successional species, as well as potential adverse effects on communities and their municipal watersheds. Treatment of fuel accumulations through thinning, prescribed burning, and other

Table 3&4-2. Federal Acres of Fire Regime Condition Classes in Northwest Forest Plan

Land Use Allocation	Condition Class II	Condition Class III
Matrix and Adaptive Management Areas (AMA)	4,987,928	2,389,823
Late-Successional Reserves	4,460,361	2,279,756
Withdrawn (non-available) - Wilderness	4,609,743	1,831,299
Total	14,058,032	6,500,878

Table 3&4-3. Acres of Wildland Urban Interface (WUI) Fire Regime Condition Classes

Wildland Urban Interface	Condition Class II	Condition Class III
WUI communities at risk	99,934	78,778
WUI communities at risk buffer	5,561,626	2,444,721
Total	5,661,560	2,523,499

methods is necessary to alter wildfire behavior and severity to protect biodiversity and important habitat (Omi and Martinson 2002, Skinner et al. 2006, Graham et al. 2004, Agee and Skinner 2005, Ohlson et al. 2005, Raymond and Peterson 2005).

Hazardous Fuels Reduction Treatment Programs

The President's Healthy Forest Initiative and the Healthy Forest Restoration Act of December 3, 2003 established policy and funding for federal agencies to undertake fuel hazard reduction programs to better care for forests and rangelands, reduce the risk of catastrophic fire to communities, help save the lives of firefighters and citizens, and protect threatened and endangered species (http://www.healthyforests.gov/, http://www.whitehouse.gov/infocus/healthyforests/). As a result, both the Forest Service and the Bureau of Land Management have made hazardous fuel reduction a high priority, and have been expanding their programs to meet the growing problem that hazardous fuels present. The two Agencies are currently treating approximately 80,000 acres of hazardous fuels on federal land within the NWFP area annually (after adjustment for projects where more than one treatment per acre may have been necessary). In most places, fuel has accumulated beyond the point where prescribed burning can be used without first reducing the amount of existing hazardous fuel to a level at which fire behavior can be controlled and resource damage minimized. For example, hand-piling and burning of fuel concentrations is often performed prior to broadcast burning.

Because the need for fuel reduction is much greater than what is currently being treated, the Agencies could expand their hazardous fuels reduction programs by as much as 100 percent to achieve both ecosystem restoration objectives and community wildfire protection goals, particularly within the WUI, commensurate with increased funding and capability. However, the program capability is constrained by implementation logistics including, weather, permitted smoke emissions (air quality), operational windows, social, and other issues (Harbert, S. pers. comm., Fish, W. pers. comm.).

Environmental Consequences

Wildland Fire Use

Wildland Fire Use (WFU) is the management of naturally ignited fires to achieve resource benefits, such as ecological and fuel reduction objectives. WFU may include fires with minimal or delayed suppression actions, when and where the fire does not pose an unacceptable threat to resource values or have the potential to escape the identified WFU manageable area. Wildland fires can be used to mimic historic disturbance patterns, sizes, and intensities (Miller 2003; USDA, USDI 2003e). Where and when conditions permit, taking advantage of naturally ignited fires has great potential for achieving resource and ecological objectives at low cost. However, the use of WFU necessitates pre-ignition identification of specific areas in approved management plans. Because many factors are involved in the undertaking of successful WFU (weather, smoke considerations, adjacent private lands and homes, and available fire fighting resources) opportunities for WFU may be limited. Because BLM-administered lands are mostly dispersed among private property at lower elevations, WFU on BLM-administered land is not authorized at this time in the area addressed by this analysis. To date, few WFU plans have been implemented on National Forests in the NWFP area. Because few acres of WFU have occurred in the NWFP area in recent years, and because of the numerous constraints on its use, the number of acres predicted to be treated with this method in the foreseeable future is considered insignificant to this analysis.

Pre-disturbance surveys are not required for WFU in any land allocation (subject to conditions described in Appendix 1, Survey and Manage Standards and Guidelines).

Under all alternatives, WFU would remain unaffected. None of the alternatives change the acres available for WFU or affect annual costs.

Regeneration Harvesting and Hazardous Fuel Reduction Treatments

Regeneration harvests are generally conducted in mature forests likely having late-successional characteristics. Slash (harvest-generated fuels) treatments associated with commercial regeneration harvesting in late-successional forest stands are funded and administered through sale contract requirements. Such treatments are not considered part of the hazardous fuel reduction program for this analysis. Because pre-disturbance surveys are conducted prior to harvesting (and are thus evaluated in the *Timber Harvest* section), subsequent fuel treatments at the same location do not require additional surveys or incur additional costs. Because the hazardous fuels treatment need far exceeds program capability, and because not all acres of regeneration harvest are in need of a fuel reduction treatment, fuels treated as part of regeneration harvesting do not reduce the acres expected to be treated by the Agencies' hazardous fuels reduction program.

Hazardous Fuel Reduction Treatments

There is broad consensus that active management through thinning and fire is urgently needed in many forests of the western United States (Brown et al. 2004). Activity fuel treatments include silvicultural practices such as thinning, creating fuel breaks, controlling bark beetle infestations, and hazardous fuel treatments. Hazardous fuel treatments include the use of machines to mulch fuel (mechanical treatment), cutting, hand-piling, and then burning of fuel (manual treatment), and prescribed fire (human ignited and controlled underburning of forest stands to reduce fuel) (Kauffman 1990). In some cases, a mechanical or manual treatment is necessary prior to prescribed burning to reduce prescribed fire severity to a manageable and safe level (DellaSala et al. 2004).

Numerous studies have shown the benefits of fuel treatment (including thinning, reducing ladder fuel, and prescribed fire) to post-wildland fire tree survival in coniferous forests (Weatherspoon and Skinner 1995, Scott and Reinhardt 2001, Gorman 2003, Agee and Skinner 2005, Kaufmann et al. 2005, Ohlson et al. 2005, Stephens and Moghaddas 2005, Raymond and Peterson 2005). In the Lassen National Forest (Northern California), the 2002 Cone Fire demonstrated that thinned and prescribed-burned forests could survive an intense wildland fire, while adjacent untreated stands burned at high severity (Skinner et al. 2006). Pollet and Omi (2002) clearly demonstrated the benefits of fuel treatments to reduce crown fire in ponderosa pine ecosystems.

In response to the National Fire Plan, Survey and Manage species Management Recommendation amendments were developed with the intent of allowing greater fuel treatment flexibility around identified "communities at risk." The amendments were designed to allow for fuel reduction activities in known sites of those species occurring within shorter fire return interval areas. Some risk to individual site occupancy was considered acceptable, if this risk would not impair overall species management objectives. These Management Recommendation amendments became effective in 2003 (IM-OR-2003-062, IM-OR-20030-O45, http://www.blm.gov/or/plans/surveyandmanage), within a year of the Agencies removing the Survey and Manage Standards and Guidelines in March 2004. Thus, the full extent of their benefits or shortcomings is unknown. However, for some species, the amendments allow for prescribed fire and other hazardous fuels treatments to be used on and around some Survey and Manage species known sites. For other species, the Management Recommendations allow for very little risk to the site, and prohibit many fuel reduction activities within or near the site.

Evaluation of Alternatives

The evaluation of the environmental consequences considers how implementation of the alternatives may impede, or contribute to, the potential for achieving goals in the following areas (Noss et al. 2006):

1. Restoring landscapes to improve, restore, and maintain fire dependent landscapes, communities and habitat diversity, or treating fuels to reduce the probability of undesirable ecological effects from high-severity wildfire.

2. Providing for public safety and the protection of life and property within the wildland urban interface (Cohen 1991).

Because the number of acres in need of fuel treatment far exceed the hazardous fuel reduction treatment capacity of the Agencies, it is important to strategically locate treatments where they will be most effective. It has been demonstrated that the location and type of fuel treatment can substantially influence the rate of spread, intensity and the overall effects of a fire at the landscape scale (Graham and McGaffrey 2003). Carefully planned and strategically placed fuel treatment can moderate undesirable impacts even beyond the treatment area itself (Stratton 2004). Therefore, fuel treatment size, location, method, timing, and relative position on the landscape are important factors in planning and achieving fuel and fire management objectives (Finney 2005). The flexibility to do this varies by alternative. Because the effectiveness of fuel treatments is so dependent on these strategic considerations, especially relative to WUI treatments, the effects of the alternatives are described below as reductions to treatment acres and reduced treatment effectiveness (Cohen 1991, Stratton 2004). The difference in effects of the alternatives is largely focused on how they would constrain fuel treatments on late-successional forest acres considered for fuel reduction projects each year.

Comparison of Effects of Alternatives

As described in the *Key Assumption for Non-Species-Specific Effects Analyses for Alternative 4* section earlier in this chapter, an analysis assumption for Alternative 4 is that if this alternative is adopted, a revised species review process would begin, and changes previously adopted during the 2001, 2002, and 2003 Annual Species Reviews would most likely be reinstituted. As a result, Alternative 4 would end up looking very much like Alternative 1 within two years, and effects to fuels management for implementation of Alternative 4 are predicted to be the same as for Alternative 1. In the short term, while that analysis is being conducted (one to two years), the additional (and generally more common) species included in Alternative 4 would reduce fuels treatments by an additional 10 percent (approximately) of the levels described for Alternative 1.

Alternatives 1 and 4 continue Survey and Manage. Existing Survey and Manage requirements for species surveys and management of known sites would continue to apply to hazardous fuel treatments. The most effective fuel hazard reduction treatments require contiguous blocks of treated areas planned at the landscape scale. Interruptions in treated areas can create areas of vulnerability, reducing treatment efficacy and cost effectiveness. However, recent modeling and wildfire simulation (Treatment Optimization Model) suggests strategically placed treatments can improve effectiveness where continuity cannot be achieved (http://fire.org/, Finney 2005). Pre-disturbance surveys and the marking and buffering of known sites require time (one to two years) and funding. The narrow "window" for surveys is problematic because individual treatment units may span several survey windows because of changes in aspect or elevation, requiring two or more visits by the same surveyors in order to comply with survey protocols for all Survey and Manage species with potential habitat in the project area.

Since about one-third of the NWFP area is late-successional forest, approximately 26,400 of the 80,000 acres treated annually would be late-successional forest. As described in the *Timber Harvest* section, managed species sites are projected to occupy 15 percent or 3,960 acres of the late-successional portion of the acres proposed for treatment (although all actual sites and required surveys are not necessarily limited to such stands) (see *Projections of Acres of Managed Sites* in the *Timber Harvest* section later in this chapter). This estimate of species site acreage matches the rates found in actual projects. Annually, approximately 62 percent of fuel treatments use mechanical methods, thus would require approximately 2,460 acres to be managed as known Survey and Manage species sites. Prescribed fire constitutes 38 percent of fuels treatments, thus would require approximately 1,500 acres to be managed as known sites. However, burning conditions around some known sites would necessitate additional buffering. On average, this additional buffering would prohibit burning on three times more acres than would actually be contained in known sites. For hazardous fuel treatments using prescribed fire, it is estimated that 4,500 acres of the acres proposed for treatment annually would be left untreated to mitigate negative impacts to known sites. Thus under Alternatives 1 and 4, it is projected that approximately 6,960 total acres would be managed for known sites (Table 3&4-4). This level of known site management (8.7 percent of the average treatment area), especially in the WUI, would reduce efficiency and efficacy of hazardous fuel treatments by compromising the placement and methods available for treatment, although the likelihood of using mechanical treatments (with smaller site buffers) in WUI areas would decrease this slightly.

Under Alternative 2, the acres of fuel treatment would be reduced by the need to manage known sites for Special Status Species Program goals. However, fewer species are included in the Special Status Species Programs compared to Survey and Manage. In addition, local managers could identify some known sites as not needed to meet Special Status Species Program goals (with the latitude to focus on those most difficult to protect).

Since about one-third of the NWFP area is late-successional forest, approximately 26,400 of the 80,000 acres to be treated annually would be late-successional forest. As described in the *Timber Harvest* section, managed species sites are projected to occupy five percent or 1,330 acres of the late-successional portion of the acres proposed for treatment (although all actual sites and required surveys are not necessarily limited to such stands). Annually, approximately 820 acres within mechanical treatment areas and 510 acres within prescribed burning fuel treatment areas (62 and 38 percent respectively), prior to buffering, would be managed as known sites.

For hazardous fuel treatments that employ prescribed fire, burning conditions around some known sites would necessitate additional buffering to protect known sites. However, additional buffering would be less under Alternative 2 than under Alternatives 1 and 4 due to flexibility in local management decisions. On average, this additional buffering would prohibit burning on one and a half times more acres than would actually be contained in known sites, or 765 acres would be managed as known sites and additional buffering. Thus under Alternative 2, it is projected that approximately 1,600 total acres would be managed for known sites (Table 3&4-4). This level of known site management (2.0 percent of the average treatment area) is generally compatible with accomplishment of fuel treatment and protection objectives. The level substantially improves the potential efficiency and efficacy of hazardous fuel treatments when compared with Alternatives 1 and 4 (and to a lesser degree, Alternative 3), by providing more flexibility in treatment location method and timing. This is particularly important in the WUI where gaps in fuel treatments increased risk of fire spread to structures (Cohen 1991, Cohen and Wilson 1995).

Additionally, more flexible pre-project clearance protocols and site management options reduces both survey and planning lead time, reducing cost and logistical problems when compared to Alternative 1 and 4 and to a lesser degree, Alternative 3.

Under Alternative 3, the acres of fuel treatment would be reduced by the need to manage known sites for Category A, B, and E species and, with more flexibility for, 28 Special Status Species Program species (23 in all of their NWFP area range, and 5 in part). For the Special Status Species Program species, local managers could identify some known sites as not needed to meet Special Status Species Program goals (prevent listing under the Endangered Species Act and, for the Forest Service, meet the Forest Service viability and diversity requirements). Fifty-three species would not be included in Survey and Manage or Special Status Species Programs (43 species in all of their NWFP area range, and 10 in part), generally those with the most known sites, and 271 species (256 in all of their NWFP area range, and 15 in part) would remain on Survey and Manage.

Since about one-third of the NWFP area is late-successional forest, approximately 26,400 of the 80,000 acres to be treated annually would be late-successional forest. As described in the *Timber Harvest* section, managed species sites are projected to occupy seven percent, or 1,850 acres, of the late-successional acres proposed for treatment (although all actual sites are not necessarily limited to such stands). Annually, approximately 1,150 acres within mechanical treatment areas and 700 acres within prescribed burning fuel treatment areas (62 and 38 percent respectively), prior to buffering, would be managed as Survey and Manage known sites.

For hazardous fuel treatments that employ prescribed fire, burning conditions around some known sites would necessitate additional buffering to protect known sites. On average, this additional buffering would prohibit burning on two times more acres than would actually be contained in known sites, or 1,410 acres would be managed as known sites and additional buffering. Thus under Alternative 3, it is projected that approximately 2,560 total acres would be managed for known sites (Table 3&4-4). This level of site management (3.2 percent) is greater than in Alternative 2, but substantially less than Alternative 1. This level is generally compatible with fuel treatment and protection objectives, although site concentration areas are likely to create efficacy problem areas. Alternative 3 improves the potential efficiency and efficacy of hazardous fuel treatments when compared with Alternative 1 and 4.

Additionally, more flexible pre-project clearance protocols and site management options for the Special Status Species Program portion of the species, and the reduced number of Survey and Manage species, reduces both survey and planning lead time, reducing cost and logistical problems when compared to Alternative 1 and 4, but not as much as Alternative 2.

Survey Costs

The cost of surveys and fuels treatments was analyzed in 2003 for the 2004 FSEIS. Partly because the Agencies did not conduct Survey and Manage in most of 2004 and 2005, there is little additional experience with which to update these costs. The costs in this section,

Table 3&4-4. Acres of Hazardous Fuel Treatment

	Alternative 1 & 4	Alternative 2 (Un-Mitigated)	Alternative 3 (Un-Mitigated)
Proposed annual fuel treatment	80,000	80,000	80,000
Known site mitigation	-6,960	-1,600	-2,560
Actual fuel treatment	=73,040	=78,400	=77,440

like other costs in this SEIS, were converted to 2006 dollars using the gross domestic product (GDP) implicit price deflator. The overall increase in costs is about 4.68 percent.

Under Alternatives 1 and 4, pre-disturbance survey costs are estimated at $73.13 per acre (see *Cost of Management* section). Because portions of projects are abandoned or deferred during the planning process, the Agencies survey about 10 percent more acres than what is proposed for treatment. With annual surveys covering 88,000 acres (80,000 acres + 10 percent), total pre-disturbance survey costs for hazardous fuel treatments under Alternatives 1 and 4, would be $6.4 million annually. When the total survey cost is divided by the actual treatment acres, the cost is $88.11 per acre (see Table 3&4-5).

Under Alternative 2, pre-project clearance survey costs would be $31.81 per acre (see *Cost of Management* section). Because portions of projects are abandoned or deferred during the planning process, the Agencies survey about 10 percent more acres than what is proposed for treatment. With annual surveys covering 88,000 acres (80,000 acres + 10 percent), total pre-project clearance survey costs for hazardous fuel treatments under Alternative 2 would be approximately $2.8 million annually. When the total survey cost is divided by the actual treatment acres, the cost is $35.70 per acre (Table 3&4-5).

Under Alternative 3, pre-disturbance survey costs would be $66.40 per acre (see *Cost of Management* section). Management activities in non-late-successional stands would be exempt from survey and manage species pre-disturbance surveys, so 67 percent of the treatment area would not require surveys. Because portions of projects are abandoned or deferred during the planning process, the Agencies survey about 10 percent more acres than what is proposed for treatment. With annual surveys covering 29,040 acres (80,000 x .33 + 10 percent), total pre-disturbance survey costs for hazardous fuel treatments under Alternative 3 would be approximately $1.9 million annually. When the total survey cost is divided by the actual treatment acres, the cost is $24.90 per acre (Table 3&4-5).

Under all alternatives, treatment costs per acre vary from $50 to $160 for prescribed fire and from $420 to $630 for mechanical treatments. Treatment costs are generally higher around known Survey and Manage sites because treatment methods are limited, additional mitigation is often required, and treatments are more labor intensive, thus costs associated with implementation around known sites are higher even where prescribed fire is used. In addition, around known sites, treatments prior to underburning are usually required to prevent undesirable fire effects on habitat. For example, it is often necessary to hand pile and burn excess fuel around known sites prior to underburning. Treatment costs would increase $575.50 per acre for known sites where prescribed fire is used. Under Alternatives 1 and 4, based on the amount of late-successional forest and site detection rates described in the *Timber Harvest* section (in the acres actually treated annually with prescribed fire), each year an estimated 1,374 acres would have these increased costs. This would result in a total increased cost of approximately $0.8 million annually. Averaged across all the acres treated, this would result in an increased cost of $10.83 per acre ($790,737 divided by 73,040 acres).

Table 3&4-5. Costs of Hazardous Fuel Treatments – Surveys

	Alternative 1 & 4	Alternative 2 (Un-Mitigated)	Alternative 3 (Un-mitigated)
Survey cost per acre	$73.13	$31.81	$66.40
Total acres surveyed	x 88,000	x 88,000	x 29,040
Total cost	= $6,435,440	= $2,799,280	= $1,928,256
Acres of treatment	/ 73,040	/ 78,400	/ 77,440
Survey costs per treated acre	= $88.11	= $35.70	= $24.90

Under Alternative 2, based on the amount of late-successional forest and projected known sites (in the acres actually treated annually with prescribed fire), it is estimated that each year 492 acres would have these increased costs. This would result in a total increased cost of approximately $0.3 million annually. Averaged across all the acres treated, this would result in an increased cost of $3.61 per acre ($282,976 divided by 78,400 acres). As noted in the previous section, there would also be additional unquantified savings simply from shortening the required planning lead-time for the Special Status Species Program species.

Under Alternative 3, based on the amount of late-successional forest and projected known sites (in the acres actually treated annually with prescribed fire), it is estimated that each year 680 acres would have these increased costs. This would result in a total increased cost of approximately $0.4 million annually. Averaged across all the acres treated, this would result in an increased cost of $5.05 per acre ($391,503 divided by 77,440 acres). As noted in the previous section, there would be additional unquantified savings simply from shortening the required planning lead-time for the Special Status Species Program species.

These increased costs, added to survey costs and multiplied by total treatment acres, result in total costs to the fuels program to manage Survey and Manage or Special Status Species Program species (Table 3&4-6).

Wildland Urban Interface

In addition to the financial costs of species surveys and working around known sites, known site management can create logistical constraints on placement of treatments. Since current policy on these treatments emphasizes the importance of carefully placed landscape treatments (Finney 2005) to modify fire behavior, rather than random placement, effective treatments could be constrained by species site locations or delayed by species surveys, as discussed above. This concern is even more evident in the WUI where treatments (or lack of treatments) have implications for protecting communities.

There are approximately 4.7 million acres of FRCC II and III in the WUI available for fuel treatment (Table 3&4-7). Of these approximately 1,548,958 acres, or one-third, is late-successional, and 34 percent and 22 percent of the late-successional forest in WUI is in FRCC III and II respectively.

Based on calculations above, Alternatives 1 and 4 are projected to have approximately 8.7 percent of the WUI managed as known sites. Although exceptions and additional flexibility is provided by Management Recommendations in some situations for some species (http://www.blm.gov/or/plans/surveyandmanage/), and mechanical treatments can often be emphasized in these areas, reducing untreated areas, untreated sites can compromise fuel break continuity and place communities at greater risk and vulnerable

Table 3&4-6. Summary Comparison of Fuel Treatment Acres and Total Costs

	Alternative 1 & 4	Alternative 2	Alternative 3
Hazardous fuel treatment (annual acres)	73,040	78,400	77,440
Survey cost (per treated acre)	$88.11	$35.70	$24.90
Additional treatment costs to manage sites (average per treated acre)	$10.83	$3.61	$5.05
Total per acre survey and increase burning costs	$98.94	$39.31	$29.95
Total costs for Survey and Manage or Special Status species	$7,226,578	$3,081,904	$2,319,328

Table 3&4-7. Fire Regime Condition Class and Late-successional Forests Within the Wildland Urban Interface

	FRCC II	FRCC III
Matrix and Adaptive Management Areas	1,824,314	851,616
Late-Successional Reserves	1,309,712	708,170
Total available acres for hazardous fuel reduction	3,134,026	1,559,786
Unavailable or withdrawn	(1,939,695)	(963,712)
Percent of late-successional forest in each FRCC Class	23	34

to wildfire control and escape. Areas left untreated across the landscape can contribute to uncontrollable wildfire behavior and amplify the risk to communities as well as create an increase in suppression costs and a danger to fire fighters. The potential for spotting (the term used to describe embers spreading ahead of a fire when a fire burns intensely in untreated areas), is greatest under Alternatives 1 and 4. Such spotting is considered the primary ignition source for homes and other structures that catch on fire during a wildfire (Cohen 1991, Cohen and Wilson 1995, Cohen and Saveland 1997). Because known site management would be reduced under Alternatives 2 and 3 to 2 and 3.2 percent respectively, they provide greater flexibility for successful treatments in WUI.

Environmental Consequences Summary

Given that needed fuel treatments greatly exceed program capability, cost differences between alternatives can reasonably be converted to potential additional acres treated for comparison purposes. (Actual treatment levels may be constrained by other factors.) Projected treatment acres are 73,040, 78,400, and 77,440 for Alternatives 1 and 4, 2, and 3 respectively (Table 3&4-8). Survey and known site management costs by alternative, as well as the cost "savings" for Alternatives 2 and 3 when compared to Alternatives 1 and 4, are shown in Table 3&4-8. If this cost saving were available for hazardous fuels reduction, it could possibly fund upwards of 8,000 acres and 9,000 additional acres of treatment, respectively.

Given the disparity between treatment needs and capabilities, WUI and ecological goals will likely be achieved only at the local or watershed level for the foreseeable future regardless of the alternative selected. Nevertheless, these local achievements can be very worthwhile in protecting communities, maintaining habitats, and restoring fire regimes.

Table 3&4-8. Summary Comparison of Fuel Treatment Acres Potentially Forgone

	Alternative 1 & 4	Alternative 2	Alternative 3
Projected treatment acres (Table 3&4-4)	73,040	78,400	77,440
Total costs for Survey and Manage or Special Status species (from Table 3&4-6)	$7,226,578	$3,081,904	$2,319,328
Annual cost savings over Alternative 1		$4,144,674	$4,907,250
Potential acres treated with cost savings (at $525.00 per acre treatment cost)[1]		7,895	9,347
Relative difference between alternatives expressed as projected plus potential treatment acres	73,040	86,295	86,787

[1]$525.00 is the mid-point of mechanical hazardous fuel reduction cost range $400.00 to $ 650.00.

Survey and Manage Species

Affected Environment

New Information about Survey and Manage Species

Following adoption of the Survey and Manage Program, the Agencies' combined known location data from extensive searches in herbaria and museums with data from agency files, individuals, and publications to develop the first known site database for the Program. When assembled in 1998, the database had approximately 19,000 records; half were lichens from a Forest Service regional air-quality study. By January 2005, the Agencies had collected more high quality information on a wide variety of rare and uncommon species than had ever been attempted by the federal government. Species site data had increased to 68,000 records. Records for some taxa doubled, increased approximately fourfold for fungi, fivefold for bryophytes, and nearly fourfold for mollusks, constituting an unprecedented data set on these poorly known taxa. The Agencies now have a better understanding of the distributions, abundances, and habitat associations of species associated with mature and old-growth forests (Molina et al. 2006). Species site databases are accessible to over 250 users including specialists at each administrative unit.

Draft or Final Management Recommendation documents are available for over 300 species. Management Recommendations for each species provide detailed information on natural history (taxonomy, descriptions, biology, ecology, distribution, habitat, and abundance), current species status (threats, distribution relative to land allocations), and guidelines to maintain suitable habitat for species persistence at the site scale and suggested research and information needs to better understand species ecology and site management and monitoring needs to address status and trends (Molina et al. 2006). These documents are now available to assist management of these species, whether they are under the Survey and Manage Program or the Agencies' Special Status Species Programs (SSSPs) (http://www.blm.gov/or/plans/surveyandmanage/mr.htm). Some have already been revised as Special Status Species Program Conservation Assessments and are available at http://www.fs.fed.us/r6/sfpnw/issssp/planning-documents/assessments.shtml

From the beginning of the Survey and Manage Program, extensive and general regional surveys were required for 354 of the 404 species. These surveys were considered the key approach to gathering new information on the conservation needs and distribution of each species within the 24.4 million acre NWFP area. Following redesign of the Survey and Manage Standards and Guidelines in 2001, which lumped extensive and general regional surveys into "Strategic Surveys" and assigned the requirement to every species, Molina and others developed a Strategic Survey framework that described an iterative adaptive management process for acquiring data and managing species (Molina et al. 2003). The framework called for evaluating and prioritizing information needs on all species, designing and implementing Strategic Surveys, and analyzing surveys results relevant to species and habitat management. This approach addressed high-priority questions, especially distribution in reserves or association with late-successional forest habitat (Molina et al. 2006).

Strategic Surveys took several approaches depending upon the objective and the information needs of the species. Because the information from these surveys would assist future management of these species (including decisions about assignment to, and management under, the Agencies' SSSPs), RMS Survey and other Strategic Surveys were completed (at a cost of over $8 million) even though a decision had been made to eliminate the Survey and Manage Program. Analysis of collected data is nearly complete,

and results are now beginning to be published. The statistical analysis of the RMS Survey is included in Table 3&4-16 near the end of this chapter. This task helps address the FEMAT's only recommendation about these species, that "Investigation of these taxa should receive priority attention..." (USDA et al. 1993:II-34).

Four hundred eighty-two RMS detections were recorded for 111 of the 278 Alternative 1 species surveyed, and 1,435 detections were recorded for 145 of the 319 Alternative 4 species surveyed (even though surveys were reduced for species removed by the 2001 Annual Species Review). (Several species are on Survey and Manage in only a portion of the NWFP area, being deemed common or secure in other areas. The detections include only those in areas where the species is included in Survey and Manage.) Two-thirds of the detections were fungi, and one-fifth were lichens. Results showed, however, that three-quarters (of the species detected) occurred on 5 or fewer RMS plots, half occurred on only 1 or 2 plots, and half of the Alternative 1 Survey and Manage species were not detected on any plot (Table 2-13) (vascular plants and most vertebrates were excluded from this survey). The results confirmed expectations that this broad-scale type of RMS Survey was not likely to detect extremely infrequent species (Molina et al. 2006). The primary inference that can be drawn from the results relates to overall expected occurrences. A single detection estimates, on average, from 7,000 to over 200,000 occupied sites within the NWFP area (depending upon the stratification of the survey plots), although 95% confidence limits surrounding one to four detections usually includes zero (see RMS Survey discussion in the *Background for Effects Analysis* section). Species with RMS Survey detections are estimated to occur on hundreds of thousands of plots (depending upon plot or site size), and the 295 Alternative 1 species in total have at least several thousand times more estimated occurrences than currently known sites[9]. Species with fewer than 3,500 to 100,000 actual sites (depending on the stratum they occurred in) within the NWFP area; however, essentially had less than a 50 percent chance of being detected at all with this survey. Some of these estimated occurrences are likely underestimates of the true number of occurrences because in spite of thorough searches by specialists, sampling errors would have tended to be those of "omission", that is, failure to detect species even though actually present.

The RMS Survey has succeeded in shedding new light on Survey and Manage species. Until now, many observers assumed low known site numbers meant species are indeed rare, and low site numbers tended to equate to adverse outcomes regardless of the Survey and Manage category to which they are assigned. More than 50 percent of Survey and Manage species are known from fewer than 19 sites, 40 percent are known from 10 or fewer sites, and 30 percent known from 5 or fewer sites. As many predicted, however, the RMS Survey results imply many species to be more numerous than previously known. A single RMS detection implies, on average, thousands of occurrences (0 to over 200,000 at the 95% confidence interval), often for species previously known on none or few sites. For example, two species detected on the RMS Survey previously had no confirmed sites in the NWFP area. Another four species detected were previously known from only one site. Two other species detected were previously known from only two sites, and another five previously had only three known sites. One species previously known from only 3 sites had 14 RMS detections, implying hundreds of thousands of occurrences. Ones previously known from 9 and 10 sites each had 18 RMS detections[10], also implying hundreds of thousands of occurrences. Each of these examples are for Category B species, ones for which characteristics of the species makes them impractical to find during pre-disturbance surveys (e.g. they are too small to be detected, don't show themselves regularly and predictably, can't be separated from other species outside of a lab, etc.), so they are understandably rare in Agencies' databases.

[9]The reader is cautioned that the estimated occurrences displayed for each species in Table 3&4-16 are "plot-sized", thus representing .01 to 1 hectare areas for each occurrence, depending upon the taxon; existing known sites may be larger (or possibly smaller). Known sites were generally dropped from this analysis if they appeared in Agency databases within 100 meters of another site for the same species. Thus a single "known site" might be synonymous with several "estimated occurrences", and direct comparisons must be made with care.
[10]This is not to imply the total number of known sites is increased by 18. The sample could have overlapped with previously known sites.

Low known site numbers can be at least partially attributed to them not being looked for. This is evidenced by comparing site numbers for species which can be detected in practical pre-disturbance surveys, Survey and Manage Categories A and C, against those that cannot, Categories B, E, F, and most species in Category D. Categories A and C species average 115 known sites per species, while the non-survey categories average 30 (discounting former survey species now in Category D). Similarly, the rarest 1/3 of the Categories A and C species are known from 15 or fewer sites, while the rarest 1/3 of the non-survey categories are known from 5 or fewer sites. Thirty percent of non-survey species are known from 1 or fewer sites, compared to only 5 percent of Categories A and C species. It is clear that apparent rarity for some species is at least partly a function of the difficulty of detecting them during surveys.[11]

It is true, however, that RMS Survey detections were less common for species known only from five or fewer sites. While there are species with only 6, 7, and 8 known sites with 3 RMS Survey detections, the likelihood of one of the 97 species with 5 or less known sites being detected during an RMS Survey was only 19 percent (18 of 97). Conversely, the 97 most numerous species (those with 76 known sites or more) had a 72 percent likelihood of being detected by the RMS Survey (70 of 97). While the Agencies have learned that many Survey and Manage species are not actually rare, many others on Survey and Manage appear to at least be so rare as to have population sizes below the tens of thousands needed to expect a RMS Survey detection. A zero detection only tells us, at the 95% confidence level, species occurrence would not be expected to exceed 0.5 percent of the NWFP area or 122,000 acres. Although it is understood classic sampling designs are not efficient for rare species (Yoccoz et al. 2001), the samples allow us to draw some inferences about the "group" of Survey and Manage species assumed to be associated with terrestrial late-successional forest ecosystems (as opposed to those with specialized habitats and limited ranges).

Even with completed statistical analysis of the RMS Survey data (Table 3&4-16), species writers remained concerned about connectivity, distribution, whether the species are in the reserves, and other parameters needed to meet the Survey and Manage "sufficient habitat" as defined. Of the 53 species in this Supplement with insufficient habitat caused by Alternative 2 in all or part of their range within the Northwest Forest Plan, the lichen *Pseudocyphellaria rainierensis* has 298 known sites and 6 RMS Survey detections. The lichen *Nephroma occultum* has 217 known sites and 4 RMS Survey detections. The fungus *Ramaria rubripermanens* (in Oregon) has 160 and 10, and the fungus *Rameria araiospora* has 122 and 11. However, using outcome definitions provided earlier in this chapter (see *Background for Effects Analysis*), species effects writers have determined these species meet the definitions for "insufficient habitat to support stable populations" for at least a portion of their range.

Environmental Consequences

There are 337 Survey and Manage species considered in this Supplement. New information (including newly discovered sites) published or recorded since the 2004 FSEIS has been incorporated into the individual species analyses in the following sections. Where new information indicates a change in outcome from the 2004 analysis, those changes have been made and affected tables and conclusions have been revised and included in this Supplement.

Agency taxa specialists have determined species outcomes based on numerous factors including (1) the extent of the reserve system; (2) Matrix and Adaptive Management Area Standards and Guidelines; (3) provisions for species management under the Survey

[11]These differences are not a surprise to the Agencies. The 2000 SEIS considered an alternative requiring pre-disturbance surveys for all species but the $31 million per year cost for the additional surveys (USDA, USDI 2000a;417) was deemed too high for expected gain. However, even if surveys had been conducted for Category B species, detection rates would still be lower because the species are simply hard to find or identify.

and Manage or SSSPs; (4) species range, distribution, and populations; (5) species life history and habitat needs; and, (6) the number and location of known sites. Information from FEMAT; the Northwest Forest Plan Final SEIS; the 2000 Survey and Manage Final SEIS; the Annual Species Reviews; and the Agencies' species sites databases, along with the professional knowledge of biologists and botanists was used to make the determination. Since each species has different life histories, ranges, distributions, and habitat needs, it is nearly impossible to devise precise thresholds for determining outcomes. Determinations are based on the evaluation of experts and tend to be more qualitative than quantitative in nature (see *Comparison of Alternatives for the SEIS* earlier in this chapter).

The uncertainty surrounding Survey and Manage species and the emphasis that a strategy ensures protection of various resources has generally led to a high level of caution when the long-term effects of various management strategies (alternatives) are considered. The outcomes in this SEIS borrow from those used in the 2000 Survey and Manage FSEIS (USDA, USDI 2000a:189-193). Guidance for the determination of outcomes includes:

1. For species with relatively few, highly isolated sites or populations, with little to no potential for gene flow between them – may be known from a single site – loss of any sites might be considered a dire condition and the species assessed as becoming not well distributed.

2. For species distributed as groups or clusters of occurrences or subpopulations, with some potential for dispersal and/or gene flow within the groups but little potential for dispersal or gene flow between isolated clusters, loss of single sites, multiple sites, or clusters that serve a significant role for population persistence or in the species' biological diversity might result in a determination of not well distributed.

3. Species in groups or clusters of occurrences or subpopulations (some as strings of sites) with intra-cluster connectivity and some potential (based on species-specific spatial scale or configuration, over appropriate time periods) for connectivity among isolated sites or isolated site clusters, would be determined not well distributed if they lose sites or clusters that affect overall population persistence, such as source subpopulations, those within connectivity areas, or loss of genetic and biological diversity of the populations. Loss of a cluster for species with few clusters, relative to species range, distribution, and effective population size, could result in a species becoming not well distributed.

4. For species with multiple avenues of connectivity among sites and clusters, it might be possible for species to remain well distributed with numerous losses of non-significant sites and connections among sites and some gaps in distribution. However, fragmentation could be a serious risk to population stability and the projected distribution pattern need not completely change to the limited connectivity category for it to become not well distributed.

Species Outcomes

The analysis (as updated by this Supplement) now indicates that under all alternatives, 132 species are determined to have insufficient habitat to support stable populations in the NWFP area, 1 (red tree vole) has insufficient habitat in a portion of its range not due to federal actions, and 20 species and 4 arthropod functional groups have insufficient information to determine an outcome (Table 3&4-9).

ORNHIC Lists

summarized from Appendix 3

1 = taxa that are threatened with extinction or presumed to be extinct throughout their entire range.

2 = taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon. These are often peripheral or disjunct species, which are of concern when considering species diversity within Oregon's borders.

3 = species for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.

4 = taxa which are of conservation concern, but are not currently threatened or endangered. This includes taxa which are very rare, but are currently secure, as well as taxa which are declining in numbers or habitat but are still too common to be proposed as threatened or endangered.

Under Alternative 2, 147 species have sufficient habitat to support stable populations in the NWFP area in all or part of their NWFP area range. Under Alternative 2, 38 species are projected to have insufficient habitat to support stable populations in all of their range, and another 15 have sufficient habitat range-wide but insufficient habitat in a portion of their range due to actions under the alternatives (Table 3&4-9).

The analysis required effects writers to consider and assign outcomes only to the portion of the species range within the Northwest Forest Plan. For species endemic to the NWFP area, the stated outcome is applicable to the species' range. For species whose ranges include areas outside the Northwest Forest Plan, analysis of the portion of a species range within the Northwest Forest Plan may depict only a localized concern for persistence.

Because the legal questions relevant to this analysis are whether diversity and viability regulations are met (on the National Forests) and whether management actions are causing a trend toward listing (under ESA) (see *Relationship of Outcome Determinations to ASR Species Removal Criteria and Legal Requirements* earlier in this chapter), a further examination of management and the species statuses at different geographic scales for these 38 species with insufficient habitat in all of their range within the NWFP area and 15 species with insufficient habitat in part of their range is included here. Pertinent to this discussion are SSSP assignments. The requirements for inclusion in each of the Agencies' SSSPs are discussed in detail in Appendix 2 and in the description of Alternative 2. In general, SSSP inclusion

Table 3&4-9. Species Outcomes Summarized by Taxa

TAXA GROUP	Sufficient Habitat Under all Alternatives - Outcomes 1 and 2	Insufficient Information to Determine an Outcome - Outcome 4	Insufficient Habitat[1] - Outcome 3			
			Not caused by Federal Action	With the Removal of Survey and Manage under Alt. 1	With the Removal of Survey and Manage under Alt. 2	With the Removal of Survey and Manage under Alt. 3
Fungi	65	3	115	0	25 (3)[3]	2[3]
Lichens	20	10	17	0 (1[1])	2 (3)	2 (1)
Bryophytes	10	6	0	0	1	0
Vertebrates	7	0	0 (1)	0	0 (6)	0 (5)
Mollusks	33	1	0	0	10 (2)	0
Vascular Plants	12	0	0	0 (1)	0 (1)	0 (1)
Arthropods Groups	0	4	0	0	0	0
Total:	147[2]	24	132 (1)	0 (2)	38 (15)	4 (7)

[1] Parentheses show Species with sufficient habitat range wide in the NWFP area but with insufficient habitat in a portion of the range. These are included in the "sufficient habitat" count.

[2] Includes species with sufficient habitat range wide, but insufficient habitat in a portion of the range. These are also indicated in parens in the "Insufficient Habitat columns"

[3] While these fungi have insufficient habitat range-wide when removed from Survey and Manage, they have sufficient habitat in the portion of the range that is protected by SSSPs

Global (G) and State (S) Rank

summarized from Appendix 3

1 = Critically imperiled because of extreme rarity or because it is especially vulnerable to extinction or extirpation. Typically 5 or fewer occurrences.
2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation). Typically 6-20 occurrences.
3 = Rare, uncommon, or threatened. Not immediately imperiled. Typically 21-1,000 occurrences.
4 = Not rare and apparently secure with cause for long-term concern. Usually more than 100 occurrences.
5 = Demonstrably widespread, abundant, and secure.
? = Not yet ranked, or assigned rank is uncertain.

for BLM is most influenced by Oregon Natural Heritage Information Center (ORNHIC - see Appendix 3 for more information) listings, and inclusion for the Forest Service is most influenced by the state rankings (Table 3&4-10). Whether the Agency has habitat where management could be affected by inclusion is also considered.

Fungi

For the 28 fungi with insufficient habitat under Alternative 2 in all or a portion of their range, only 3 have fewer than 20 known sites (17, 19, and 19). Five of these fungi have at least 100 or more known sites within the NWFP area. These numbers are significant because they all are Category B or D species for which pre-disturbance surveys have not been conducted (Table 2-13), and most are underground and do not visibly fruit annually or predictably. Sixteen of the 28 species were detected on RMS Survey plots, with 9 of these having 3 detections or more and 2 having 10 detections or more (see Table 3&4-16 and the *Background for Effects Analysis* section earlier in this chapter for more information about the RMS Survey).

All 28 are on one or more of the Agencies' SSSPs, where they all have sufficient habitat in that portion of their range. Fungi have not generally been included in California and Washington Heritage rankings, so fungi are not normally included in SSSPs in those states. Of the 28, only *Phaeocollybia californica* is on ORNHIC List 1 (see text box for definitions), which means it is included in the Oregon BLM SSSP. It is S2? for Oregon, so it is included in SSSP in Forest Service Region 6 (Oregon and Washington). It is also included in SSSP for BLM in California. It has over 40 known federal sites and over 50 known total sites in the Agencies' databases, but previous taxonomic confusion has led ORNHIC to recently discount most of these sites. The range is now described as Jedediah Smith Redwoods State Park (just north of Crescent City) to McKinleyville, and east to Castle Crags State Park, all in California. The Global Rank is G2? and California State rank is S1?. As an ectomycorrhizal fungus (underground in association with tree roots) in 65 year old-plus stands, probably with oaks and tanoak, and with irregular fruiting, additional (unknown) sites are suspected (ORNHIC, California Status Factors). It receives Outcome 3 on Forest Service lands in California. There is abundant apparent habitat, and most of the few known sites are not on federal lands.

The only other G2 (G2G3?) fungus is *Phaeocollybia dissiliens*, which is ORNHIC List 3 and State ranked S2S3 in Oregon. Agency databases show 20 federal sites; Oregon State Ranking factors show "about 20" occurrences, all in Oregon. In addition, as an ectomycorrhizal fungus, it cannot be identified underground, visibly fruits only sporadically (not annually), and produces fairly scattered fruiting bodies. Habitat is moist, low-elevation late-successional conifer forests with soils saturated in the fall, either on flood plains, swampy areas, or up to 2,000 feet in the coast range. The Global Ranking is affected by at least half of known sites being in large reserves, where it would be expected to be protected from extirpation (ORNHIC, Oregon Status Factors).

Two of the 28 fungi are ORNHIC List 2: *Gyromitra californica* and *Ramaria amyloidea*. The *Gyromitra californica* has 38 known federal sites and 4 RMS detections in the NWFP area, and is a false morel known from the Pacific Northwest and the Rockies. It is sometimes commercially collected. It had a FEMAT rating of 70-30-0-0 (see *Background*

Table 3&4-10. Compilation of information about 53 species with insufficient habitat in all or part of their range caused by management under Alternative 2

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcome[3,8]		Special Status Species Programs[4]				Known Sites during the last ASR or 2004 FSEIS		Additional Known Sites since the last ASR or the 2004 FSEIS[9]		RMS Sites[5,6]	Global Rank	State Rank			ORNHIC List
	Alt 1	Alt 2	Alt 3	Alt 4	Off S&M	On S&M	BLM OR	BLM CA	FS R6[7]	FS R5[7]	Federal Land Only	Total	Federal Land Only	Total			WA	OR	CA	
Species with insufficient habitat within the NWFP area or sub-region of the NWFP area																				
FUNGI																				
Albatrellus ellisii	B	off	B		3[13]	1	-	SS	SS-W	-	39	41	7	7	0	G4	S2?	S2S3	S2	4
Clavariadelphus ligula	B	off	B		3[13]	1	-	SS	-	-	41	47	4	4	4	G5	S3	S4	S2	NL
Clavariadelphus sachalinensis	B	off	B		3[13]	1	-	-	SS-W	-	29	34	1	1	0	G5	S2?	S3	SU	3
Cudonia monticola	B	off	B		3[13]	1	-	-	SS	SS	12	12	11	14	6	G3	S2	S2S3	S1	3
Gomphus kauffmanii	E	off	E	B	3[13]	1	-	-	SS	-	43	54	16	16	2	G2G4	S3?	S3?	S3?	3
Gyromitra californica	B	off	B		3[13]	1	-	-	SS	-	22	22	16	16	4	G4	S3	S2	S2	2
Phaeocollybia californica	B	off	B		3[13]	1	SS	SS	SS-O	-	39	44	9	9	0	G2?	NONE	S2?	S1?	1
Phaeocollybia dissiliens	B	off	B		3[13]	1	-	-	SS-O	-	16	18	4	4	0	G2G3	NONE	S2S3	NONE	3
Phaeocollybia fallax	D	off		D	3[13]	1	-	-	SS-W	-	61	88	25	27	2	G4?	S4?	S4?	S3	NL
Phaeocollybia piceae	B	off	B		3[13]	1	-	SS	SS	-	41	46	11	11	0	G3?	S3?	S3?	S1S2	4
Phaeocollybia pseudofestiva	B	off	B		3[13]	1	-	SS	SS	-	21	31	14	14	0	G3	S2	S3?	S2S3	3
Phaeocollybia scatesiae	B	off	B		3[13]	1	-	SS	SS	-	13	13	6	6	0	G3?	S2?	S3?	S2?	3
Phaeocollybia sipei	B	off	B		3[13]	1	-	-	SS-O	-	38	42	11	11	1	G3?	SU	S3?	NONE	3
Phaeocollybia spadicea	B	off	B		3[13]	1	-	SS	SS	-	41	56	24	24	3	G3G4	S2	S3?	S2?	3
Polyozellus multiplex	B	off	B		3[13]	1	-	SS	-	-	53	55	10	10	0	G4	S3	S3	S1	4
Ramaria amyloidea	B	off	B		3[13]	1	-	SS	SS	-	14	15	4	4	1	G3	S2?	S2?	S2S3	2
Ramaria araiospora	B	off	B		3[13]	1	-	-	SS-W	-	80	89	29	33	11	G4	S2S3	S4	S2S3	NL
Ramaria aurantiisiccescens	B	off	B		3[13]	1	-	SS	SS	-	22	25	4	4	0	G3	S2	S3	S2	4
Ramaria cyaneigranosa	B	off	B		3[13]	1	-	SS	SS-W	-	21	27	9	10	0	G4	S3	S4	S2	NL
Ramaria largentii	B	off	B		3[13]	1	-	SS	SS	-	8	10	7	7	0	G3	S3	S2?	S3	3
Ramaria rubrievanescens	B	off	B		3[13]	1	-	-	SS-W	-	42	46	9	13	3	G4	S3	S4	S3	NL
Ramaria stuntzii	B	off	B		3[13]	1	-	-	SS-W	-	73	76	23	24	1	G4	S2S3	S4	S1S2	NL
Sarcodon fuscoindicus	B	off	B		3[13]	1	-	SS	SS-W	-	27	40	2	2	6	G3	S2	S2S3	S2	3
Sowerbyella rhenana	B	off	B		3[13]	1	-	SS	SS	SS	58	68	5	5	0	G3G4	S1	S3	S2	3
Sparassis crispa	D	off		D	3[13]	1	-	SS	-	-	59	60	18	19	1	G4	S4	S4	S2S4	NL
LICHENS																				
Nephroma occultum	C	off		B	3	1	-	-	SS	-	168	168	48	49	4	G4	S1	S3	NONE	4
Pseudocyphellaria rainierensis	A	off	A		3	1	-	-	SS	-	167	167	101	101	6	G3G4	S3	S3	NONE	4
BRYOPHYTES																				
Marsupella emarginata var. *aquatica*	B	off	B		3	1	-	-	-	-	1	1	1	1	0	G5T3	NONE	S1	NONE	2

Table 3&4-10. Compilation of information about 53 species with insufficient habitat in all or part of their range caused by management under Alternative 2

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcome[3,8]		Special Status Species Programs[4]				Known Sites during the last ASR or 2004 FSEIS		Additional Known Sites since the last ASR or the 2004 FSEIS[9]		RMS Sites[5,6]	Global Rank	State Rank			ORNHIC List
	Alt 1	Alt 2	Alt 3	Alt 4	Off S&M	On S&M	BLM OR	BLM CA	FS R6[7]	FS R5[7]	Federal Land Only	Total	Federal Land Only	Total			WA	OR	CA	
MOLLUSKS																				
Fluminicola n. sp. 15	A	off	A		3	1	-	-	-	-	0	4			0	G1	NONE	NONE	S1	ND
Fluminicola n. sp. 16	A	off	A		3	1	-	-	-	-	0	17			0	G1	NONE	NONE	S1	ND
Fluminicola n. sp. 17	A	off	A		3	1	-	-	-	-	0	2			0	G1	NONE	NONE	S1	ND
Fluminicola n. sp. 18	A	off	A		3	1	-	-	-	-	1	3			0	G1	NONE	NONE	S1	ND
Fluminicola n. sp. 19	A	off	A		3	1	-	-	-	-	0	1			0	G1	NONE	NONE	S1	ND
Fluminicola n. sp. 20	A	off	A		3	1	-	-	-	-	0	2			0	G1	NONE	NONE	S1	ND
Fluminicola potemicus	A	off	A		3	1	-	-	-	-	3	12			0	G1G2	NONE	NONE	S1S2	ND
Juga (O) n. sp. 3	A	off	A		3	1	-	-	-	-	0	4			0	G1G2	NONE	NONE	S1S2	ND
Lyogyrus n. sp. 3	A	off	A		3	1	-	-	-	-	0	1			0	G1	NONE	NONE	S1	ND
Vorticifex n. sp. 1	E	off	E		3	1	-	-	-	-	0	2			0	G1	NONE	NONE	S1	ND
Species with sufficient habitat range-wide, but with insufficient habitat in a portion of their range																				
FUNGI																				
Albatrellus flettii					2	1														
Washington and California	B	off	B		3[13]	1	-	SS	-	-	39	43	0	0	1	G4	S3	S4	S2	NL
Oregon		off		B	1	1					57	67	16	16	1					
Gymnopilus punctifolius					2	1														
California	B	off	B		3[13]	1	-	SS	-	-	0	5	1	1	0	G3G4	S3	S3	S2?	3
Oregon and Washington		off		B	1	1					63	63	18	18	4					
Ramaria rubripermanens					2	1														
Washington and California	B	off	B		3[13]	1	-	-	SS-W	-	10	11	3	5	1	G4	S1S3	S4	S2S3	NL
Oregon	D	off		B	1	1					113	124	20	20	9					
LICHENS																				
Bryoria tortuosa					2	1														
WA Olympic Peninsula, WA Western Lowlands, WA Western Cascades, OR Western Cascades, OR Coast Range, OR Willamette Valley and CA Coast Range Physiographic Provinces		off		A	3	1	-	SS	-	-	3	18	113	114	2	G5	S3	S5	S2	NL
WA Eastern Cascades, OR Eastern Cascades, OR Klamath, CA Klamath, and CA Cascades Physiographic Provinces		off		D	1	1					650	650								

Table 3&4-10. Compilation of information about 53 species with insufficient habitat in all or part of their range caused by management under Alternative 2

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcome[3,8]		Special Status Species Programs[4]				Known Sites during the last ASR or 2004 FSEIS		Additional Known Sites since the last ASR or the 2004 FSEIS[9]		RMS Sites[5,6]	Global Rank	State Rank			ORNHIC List
	Alt 1	Alt 2	Alt 3	Alt 4	Off S&M	On S&M	BLM OR	BLM CA	FS R6[7]	FS R5[7]	Federal Land Only	Total	Federal Land Only	Total			WA	OR	CA	
Dendriscocaulon intricatulum					2	1														
In all of Washington and Oregon except Coos, Douglas, Curry, Josephine, and Jackson Counties	A	off	A	B	2	1	-	SS	SS-W	-		23	6	6	1	G3G4Q	S2	S4	S1	NL
California	E	off	E	B	1	1							101	105	2					
Oregon in Coos, Douglas, Curry, Josephine, and Jackson Counties	off			B	1	1					526	526	117	117	0					
Platismatia lacunosa					2	1														
Except in Oregon Coast Range physiographic province	E	off	E	C	2	1	-	-	SS-W	-		37	21	22	3	G3G4	S2	S3	S1	4
Oregon Coast Range physiographic province	off			C	1	1					14	59	39	41	18					
VERTEBRATES																				
Larch Mountain salamander *Plethodon larselli*	A	off	A		2	1	As	-	SS	-	88	88	15	16	-	G3	S3	S2	NONE	2
Shasta salamander *Hydromantes shastae*	A	off	A		2	1	-	SS	-	SS	56	56	22	22	-	G1	NONE	NONE	S1	ND
Siskiyou Mountains salamander *Plethodon stormi*					2	1														
South Range	A	off	A	C	2	1	SS	-	SS-O	SS	30	30	19	20	-	G2G3	NONE	S2	S1S2	1
North Range	D	off		C	2	1					143	143	182	185	-					
Van Dyke's salamander *Plethodon vandykei*	A	off	A		2	1	-	-	SS	-	23	29	17	21	-	G3	S3	NONE	NONE	ND
Great Gray Owl *Strix nebulosa*	A	off	A	C	2	1	-	-	SS-W	SS	103	114	15	17	-	G5	S2B	S3	S1	4
Oregon Red Tree Vole *Arborimus longicaudus*					2	2														
Xeric and Northern Mesic	C	off		C	2	2	SS[11]	-	SS[11]	-	346	346	201	204	18[12]	G3G4	NONE	S3S4	S1	4
Mesic	off			C	1	1					404	405	81	84	62[12]					
MOLLUSKS																				
Fluminicola seminalis	A	off	A		2	1	-	-	-	SS	5	15			0	G2	NONE	SP	S1S2	ND
Monadenia chaceana	B	off	B		2	1	SS	SS	SS-O	-	110	125	96	98	2[10]	G2	NONE	S1S2	S2	1

Table 3&4-10. Compilation of information about 53 species with insufficient habitat in all or part of their range caused by management under Alternative 2

TAXA GROUP *Species*[1]	Category Assignment[2] for each Alternative				Outcome[3,8]		Special Status Species Programs[4]				Known Sites during the last ASR or 2004 FSEIS		Additional Known Sites since the last ASR or the 2004 FSEIS[9]		RMS Sites[5,6]	Global Rank	State Rank			ORNHIC List
	Alt 1	Alt 2	Alt 3	Alt 4	Off S&M	On S&M	BLM OR	BLM CA	FS R6[7]	FS R5[7]	Federal Land Only	Total	Federal Land Only	Total			WA	OR	CA	
VASCULAR PLANTS																				
Cypripedium montanum					2	1														
Entire range except WA Eastern Cascades physiographic province	C	off		C	2	1	-	SS	-	SS	393	424	180	184	-	G4	S4	S3S4	S4.2	4
WA Eastern Cascades physiographic province	off			C	3	1					274	247	21	21	-					

[1] Current taxonomic name. Any differences between these and previous NWFP documents are displayed in Table 3&4-18.
[2] See Table 2-3 (Alt. 1), Table 2-6 (Alt. 3), or Table 2-7 (Alt. 4) for information about Management Requirements for Category Assignments
[3] Outcomes: 1 - Sufficient Habitat 2 - Sufficient Habitat but Insufficient Habitat in a Portion of their Range 3 - Insufficient Habitat 4 - Insufficient Information to Determine and Outcome
[4] Actual SSSP assignments. Supplement text uses "assumed" assignments because managers have the discretion to add or remove species outside of the SEIS process. SSSP placement applies to entire states (except in the case of the red tree vole), not just the NWFP area.
SSSP Codes: ss Bureau Sensitive or Forest Service Sensitive as Bureau Assessment ss-o Sensitive in Oregon ss-w Sensitive in Washington
[5] RMS sites: Please see Table 3&4-16 for more information about the Random Multi-Species Surveys.
[6] Species removed from Survey and Manage during the process of the 2001 Annual Species Review may not be accurately represented in the RMS Surveys, as surveys may not have been completed.
[7] FS R-5: Forest Service, Region 5 (California); FS R-6: Forest Service, Region 6 (Oregon and Washington).
[8] Species outcomes are shown for each species range subdivision made in Survey and Manage. If a species is in two categories (or "off") in different parts of its range, outcomes are included for both areas. In these cases, outcomes are combined (averaged) for the entire species range (shown as shaded blocks) for use in various summary tables (e.g. 2-9). (Assumed ratings for averaging purposes are also shaded.)
[9] Additional sites since the last ASR or the 2004 FSEIS. For species with new sites since their last ASR , the known site numbers are the result of a data call with a cutoff date of 11/22/06. For all other species, the data entry deadline was 09/29/06.
[10] Surveyed as part of the GOBIG2K Survey. See Table 3&4-16 for more information.
[11] The Red Tree Vole is included in SSSP in the northwestern Oregon Coast area only (North of Highway 20, west of the Willamette Valley).
[12] Surveyed as part of the Random Double Sample Survey. See Table 3&4-11 for more information.
[13] Insufficient habitat range-wide, but sufficient habitat in the portion of the range where the species in on one or more SSSP.
[14] For more information on ORNHIC lists and Global and State Rank, see text boxes earlier in this chapter, or Appendix 3.

Note: Site numbers and outcomes are for the NWFP area unless a smaller area is specified with the species name.

for Effects Analysis for definitions); high for Survey and Manage, but there was concern for commercial overuse. It has a Global Rank of G4, but a State Rank of S2 in Oregon and California. Fruiting bodies are easy to spot however, so low reported numbers indicate that it is likely rarer than other fungi with similar known site numbers that are harder to find. The species depends on large quantities of coarse woody debris near seeps, trickles, or small streams, most or all of which should be protected in Riparian Reserves. *Ramaria amyloidea* has 19 sites in Agency databases and 1 RMS detection. It has a global rank of G3 and State Ranks of S2? in Oregon and Washington and S2S3 in California. It is a mycorrhizal late-successional forest associate with 50 percent of known sites in reserves. The species is endemic to the NWFP area, and found in all three states. The outcome is sufficient habitat on BLM California and Forest Service Region 6 (Oregon and Washington) where it is included in SSSP, and insufficient habitat elsewhere.

Three of the 28 fungi are Outcome 2, being secure in the Oregon portion of their range and wherever they are on SSSP in Washington or California, but have "insufficient habitat" in a portion of their range. These three species have 2, 4, and 10 RMS detections respectively. These are G3G4 or G4. Two are not on the ORNHIC List and one is included on ORNHIC List 3.

The remaining 21 fungi are all ORNHIC List 3 or better <u>and</u> Global Rank G3 or better, although some are S2 within individual states (Table 3&4-10). Three of these 21 are S1 within individual states: *Cudonia monticola* with 26 known sites and 6 RMS detections in the NWFP area is S1 in California where it is included in SSSP on Forest Service. Its habitat is spruce needle mats and coniferous debris at all elevations. *Polyozellus multiplex* with 56 known sites in the NWFP area is S1 in California where it is included in the BLM SSSP. It is a chanterelle known from California to southeast Alaska, and is sometimes commercially collected with other chanterelles. *Sowerbyella rhenana,* with 73 known sites in the NWFP area, is S1 in Washington where it is included in Forest Service SSSP.

<u>*Lichens*</u>

Under Alternative 2, two lichens are predicted to have insufficient habitat in all of the NWFP area (Outcome 3), and three others are predicted to have sufficient habitat range-wide in the NWFP area, but insufficient habitat in a portion of the NWFP area (Outcome 2). These five each have over 200 known sites, have 2 or more RMS Survey detections, and are on one or more of the Agencies' SSSPs under Alternative 2 (Table 3&4-10).

Nephroma occultum has over 200 known sites and 4 RMS detections in the NWFP area. It is ORNHIC List 4, and Global Rank G4. According to the British Columbia COSEWIC (Committee on the Status of Endangered Wildlife in Canada) rating, there appear to be several disjunct population areas ranging from Alaska to southern Oregon (where the preponderance of known sites are located). Major concerns for the species include that it is a poor competitor, it is dispersal limited because of large spores, and it needs low elevation moist late-successional forests to maintain a suitable microclimate. On this last point, Rosso et al. (2000) in southern Oregon found that attempting to protect this species with site buffers would not maintain sufficient microclimates and dispersal opportunities, and the species would be best managed in large reserves. It is S1 in Washington and S3 in Oregon, and included on SSSP for the Forest Service in Oregon and Washington.

Pseudocyphellaria rainierensis has over 250 known sites, and 6 RMS detections indicating over 200,000 sites (95% confidence bound 20,000 to 450,000 sites). The distribution, requirements, and concerns for this species are very similar to *Nephroma occultum* (above). It is usually found in stands more than 400 years old, and in those stands, understory trees are so critical to reproductive success that even the Survey and Manage requirements of Alternative 3 are considered inadequate to protect them. As with *N. occultum*, however, Rosso et al. found conditions at Survey and Manage-type protected

sites not conducive to long-term persistence or dispersal. This species is on ORNHIC List 4, Global Rank G3G4, and is State Ranked S3 in Oregon and Washington where it is SSSP on Forest Service lands.

Three lichens have Outcome 2, sufficient habitat throughout the NWFP area, but insufficient habitat in a portion of their NWFP area range. *Bryoria tortusa* has over 700 known sites spread from the Olympic Peninsula to the California Coast Range and 2 RMS detections, but is rare in the dryer portions of the NWFP area (from eastern Washington to the California Cascades) where it is not associated with late-successional forests and has an insufficient habitat outcome. It has a Global Rank G5, State Rank S3, S5, and S2 in Washington, Oregon, and California respectively, and is not ORNHIC listed. *Dendriscocaulon intricatulum* has Outcome 2 in Washington and Oregon outside of five southern Oregon counties, with 6 known sites and 1 RMS detection. It has sufficient habitat in Washington where it is included in SSSP, but does not have sufficient habitat in Oregon where it is not included on a SSSP. In the five southern Oregon counties and California, it has over 700 known sites and 2 RMS detections, and has Outcome 1. It has Global Rank G3G4Q, Oregon State Rank of S4, and is not ORNHIC Listed. It is S1 in California, but Agencies' databases show over 100 sites from there. *Platismatia lacunosa* has over 150 total known sites range-wide and 21 RMS detections (indicating 626,000 sites plus or minus 40,000 at the 95% confidence bounds). It is sometimes but not necessarily associated with riparian areas where it often grows on alders. However, with only 20 known sites in Oregon outside of the Oregon Coast Range province (but 3 RMS detections), and not included on SSSP in Oregon, it has insufficient habitat for this portion of its range. It has sufficient habitat in Washington and in the Oregon Coast Range. This species is Global Rank G3G4, ORNHIC List 4, and S2, S3, and S1 in Washington, Oregon, and California respectively.

Bryophytes

One bryophyte has Outcome 3 under Alternative 2. *Marsupella emarginata* var. *aquatica* is known from only two known sites, and although it is aquatic, the concern is that management within the Riparian Reserve and activities in Waldo Lake, a reservoir upstream from one of the known sites, might place it at risk. It is a Category B species, pre-disturbance surveys not practical. Its global distribution includes Europe, northeastern United States, and it has been reported from British Columbia and Alaska (USDA, USDI 1997). Its Global Rank is G5T3. It is ORNHIC List 2, and S1 for Oregon and unranked in Washington and California, being unknown there. Its Survey and Manage status under Alternative 1 is presumed to have the potential to protect this site/species from the multiple-use reservoir activities upstream.

Vertebrates

Under Alternative 2, six vertebrate species have Outcome 2, habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area, although there is insufficient habitat to support stable populations in a portion of the NWFP area.

The red tree vole, a Northwest Forest Plan endemic, has insufficient habitat in a portion of its range under all alternatives, and insufficient habitat in an even larger portion of its range under Alternative 2. It has over 1,000 known sites and 80 random double-sample (RDS) grid detections indicating 320,000 sites plus or minus about 30,000 at the 95% confidence bound. In the Xeric Biological Zone, one of the places determined to have insufficient habitat, RDS indicates 46,000 plus or minus 13,000 sites. The population thins farther in the larger Northern Mesic Biological Zone, with 36,000 sites indicated, plus or minus 9,000. The red tree vole is a poor disperser and particularly susceptible to predation. They do, however, nest in unthinned plantations over 30 to 40 years old, as well as in older stands, and roughly 80 percent of their range is in reserves. It is Global Rank G3G4, S3S4 in Oregon, S1 in California, and ORNHIC List 4; it is currently included

in the SSSPs for the Forest Service and BLM only in the North Coast range of the Northern Mesic Biological Zone, where there is little federal land but about 93 percent of that receives Late-Successional Reserve-type management. A September 2006 red tree vole status review by the Agencies confirms and adds details for the concerns described in the *Red Tree Vole* section (Mellen-McLean et al. 2006).

The great gray owl, with about 118 known nest sites in the NWFP area (all in Oregon) is protected as a raptor in all Forest Service and BLM land management plans for units on which it is known to occur, but receives Outcome 2 (sufficient habitat across its NWFP area range, but insufficient in a portion of its range) because plan direction "varies from very specific direction to general direction…" and is "dated, inconsistent, and do not provide any means of detecting sites where protections would be applied." However, much of the apparently suitable habitat in the Matrix/AMA portion of the NWFP area has been surveyed, and the owl is very detectable if present, so the issue creating the Outcome 2 is the potentially inadequate site management direction. It is Global Rank G5, ORNHIC List 4, and S2B, S3, and S1 for Washington, Oregon, and California respectively. It is included in the Forest Service SSSPs in Washington and California where it has been observed within the NWFP area, but is not known to nest there. The NWFP area is at the edge of its range; it is more common throughout eastern Washington, Oregon, and California, as well as Alaska, Canada, Europe, and Asia.

Four salamanders (Larch Mountain, Shasta, Siskiyou Mountains, and Van Dyke's) have Outcome 2 primarily because, under the Agencies' SSSPs (which essentially cover the entire range of each), "there is some uncertainty regarding inadvertent site losses or localized population losses created by discretionary procedures [under SSSP], and they would have habitat sufficient to provide stable populations in the NWFP area, with potential gaps." Individual species discussions indicate concerns for discrete genetic populations, but the analysis also recognizes management flexibility under SSSPs "is constrained by policy objectives that include maintaining viable populations in habitats throughout their geographic range on National Forest Systems lands and ensuring that actions do not contribute to the need to list under the Endangered Species Act." The Shasta salamander's range only includes California and the Global rank is G1 and State rank S1. The Siskiyou Mountains salamander only occurs in Oregon and California. Its Global rank is G2G3 and is on ORNHIC List 1, and is State rank S1S2 and S2 in California and Oregon, respectively. The Larch Mountain salamander occurs in Washington and Oregon and has a Global rank of G3, is on ORNHIC List 2, and is S2 in Oregon and S3 in Washington. The Van Dyke's salamander occurs only in Washington and is Global rank G3, State rank S3 and the Olympic Peninsula portion of its range is not included in Survey and Manage. For all but the Siskiyou Mountains salamander (and the Van Dyke's if all of the range is counted) known sites number about 100 or less.

<u>*Mollusks*</u>

Ten mollusks received Outcome 3, insufficient habitat across the NWFP area, under Alternative 2 (Table 3&4-10). Only two (current records) or three (FEMAT records) have known sites on federal lands in the NWFP area, either on the Shasta National Forest and/or Redding BLM Resource Area. All ten are rare aquatic snails associated with cold springs in the upper Sacramento and/or Pitt River drainages in north-central California, and are assumed to be provided significant protection by the Aquatic Conservation Strategy if they occur within the NWFP area. Only two have more than four known sites, and only one (*Fluminicola potemicus*) has new sites since 1994, in spite of all being Category A, pre-disturbance surveys required. Historical distribution is unknown. None are on SSSP, in part because Region 5 (California Forest Service) does not include unnamed species (*Fluminicola potemicus* was only recently published, having been *Fluminicola* n. sp. 14 in previous analyses), although all are Global Rank G1 or G1G2, and S1 or S1S2 for California. In the absence of new information, the outcomes generally date from the FEMAT, who acknowledged their apparent rarity but also qualified mollusks

ratings with "The mollusk experts acknowledged that past agency performance was a consideration in their judgments. While this is not an inappropriate consideration, it is inconsistent with the effort to compare management options" and "Those species currently confined to refugia because of habitat history and species life history were judged unlikely to expand their range and were rated accordingly. Therefore, in even the most favorable situations such species were judged unlikely to be well-distributed" (USDA et al. 1993:iv-135).

It is significant that the *Benefits of Mitigation* section for most of these species in Appendix J2 begins with "Proper implementation of [riparian] buffer strips will provide considerable protection for known and newly discovered sites and significantly improve the original ratings." That proper implementation has happened, as indicated by ten years of annual Northwest Forest Plan implementation monitoring, and these species can expect significant benefits from the Aquatic Conservation Strategy provisions if they occur on federal lands in the NWFP area.

Two mollusks, *Fluminicola seminalis* and *Monadenia chaceana*, have Outcome 2, sufficient habitat range-wide but insufficient habitat in a portion of the NWFP area. *Fluminicola seminalis* is an aquatic snail with five federal known sites, all on the Shasta National Forest in California where it is on SSSP, and another ten known sites on non-federal lands, all within the upper reaches of the Sacramento River. The non-federal range is believed to have been reduced 95% by recent human-caused and natural events[12]. It is Global Rank G2 and S1S2 for California. Although there is concern because of greatly reduced range, the Aquatic Conservation Strategy and SSSP management should provide good protection on the Shasta National Forest portion of its range.

Monadenia chaceana is a terrestrial snail widely scattered in shaded areas in the drier areas of southwestern Oregon and northwestern California, primarily Siskiyou County. It is dependent on coarse woody debris, and is sensitive to spring broadcast burning because it can be near the ground surface in the spring. It is Global Rank G2, ORNHIC List 1, and S1S2 and S2 for Oregon and California respectively. It is included in the SSSP for Forest Service and BLM in Oregon, and for the BLM in California. It receives an outcome of insufficient habitat for the portion of the range on National Forests in California, because most known sites are in California, and 88 percent of its known federal sites in California are on National Forest, where it is not assigned to SSSP. However, there are over 200 known sites in the Agencies' databases in spite of it being Category B, pre-disturbance surveys not practical; there were two RMS detections, and about 80 percent of the range is in reserves.

<u>*Vascular Plants*</u>

One vascular plant, *Cypripedium montanum*, has sufficient habitat range-wide, but insufficient habitat in a portion of its range because it has small, scattered populations that are declining. Its range is split; in the Washington Eastern Cascades province where it has nearly 300 known sites, this species was removed from Survey and Manage in the 2001 ASR because it was determined not to be closely associated with late-successional forest. Because canopy cover less than 60 percent is detrimental and 88 percent of known sites are in the Matrix, the outcome for this portion of the range is insufficient habitat. In the remainder of the range (extending into California), the outcome is sufficient habitat range-wide but insufficient in a portion of its range, primarily because of declining populations and 75 percent of known sites are in Oregon where it is not included in SSSP, and within Oregon 78 percent of known sites are in Matrix. It is on SSSP in California for BLM and Forest Service. However, this species has over 850 known sites in the NWFP area (the RMS Survey was not completed for vascular plants). As a Survey and Manage Category C species (uncommon, pre-disturbance surveys practical), it is not surprising

[12]Events like construction of dams, the spill of the herbicide metam sodium (Vapam) in the Cantara spill of 1991, and the Burney fire of 1992 and subsequent salvage logging have caused significant impacts to the population.

such a high percentage of known sites are in Matrix since that is where most pre-disturbance surveys have been conducted. It was not added to SSSP because it is Global Rank G4, ORNHIC List 4, and S4 and S3S4 in Washington and Oregon respectively. NatureServe describes it as "Occasional in western North America, with thousands of occurrences, but many of those with few plants. Occurs in a wide variety of habitats, from full sun on eastern mountain slopes to full shade in moist wooded valleys (Luer 1975). Threatened by habitat loss or alteration. The main concern for this species is that present-day botanists are observing and hearing anecdotal accounts of population loss. Although populations are known to be declining significantly, there are still abundant enough numbers of plants and populations." It occurs in western North America from Alaska to California and as far east as Wyoming, Montana, and Saskatchewan.

Summary

The "risk" to most if not all of these species appears limited to the potential to remove the species from some portion of its historic range, to remove individual populations, or to inhibit gene flow. With 87 percent of the late-successional forest and the entire aquatic habitat in reserves, and with the level of management activity predicted, there should be little risk of extirpating one of these species over much of its range, particularly considering that the entire range for many of these species goes well beyond the NWFP area boundary.

In addition to the 53 species discussed above, there are 20 species (6 bryophytes, 3 fungi, 1 mollusk, and 10 lichens) and 4 functional arthropod groups with insufficient information to determine an outcome, and 133 species (115 fungi, 17 lichens, and the red tree vole in part of its range) projected to have insufficient habitat under any alternative (Table 3&4-9). These species may, because of management or stochastic events, develop gaps or be extirpated in all or part of their range in the NWFP area. While the potential for such an event may increase with the removal of Survey and Manage, there is no way to predict that increase. Most of these species cannot be found with practical pre-disturbance surveys.

Assessing Ecological or Species Risk

As noted in the *Late-Successional Forest Ecosystem*s section of the 2000 Final SEIS, risk is a function of four essential elements: value, susceptibility, hazard, and exposure. The removal of any of these elements alters the risk landscape. Removing the Survey and Manage provisions does not automatically create risk. Removing pre-disturbance surveys (for Categories A and C species), and removing known site management, increases exposure to hazards (management activities). If species are resistant to that hazard (susceptibility), for example if the species lives in talus slopes or persists in down logs, they are less susceptible (USDA, USDI 2000a:204). Finally, the significance of risk is related to value. In the case of species, there are perhaps three identifiable values; the value society (as embodied in laws and regulations) puts on not losing any species; the value of species to the process and function of ecosystems in which they live; and, the potential value outlying species have in providing genetic diversity for future adaptation.

The background discussion for the species outcomes identifies each of the above points, and others, as sources of uncertainty in the expert assessments (outcomes). Uncertainty is identified to come from:

1. Limited knowledge of species life history including habitat relationships, reproductive characteristics, survival, and dispersal characteristics.
2. Limited knowledge of the historical status of species.
3. Limited knowledge of the current status or trend of species populations other than information on known sites.
4. Uncertainty concerning the effects of habitat-disturbing activities on species.

5. Uncertainty surrounding the exact type and location of activities that would be conducted on federally managed lands.
6. Uncertainty concerning activities on non-federal lands.
7. Uncertainty about the type, location, timing, and intensity of natural disturbances (USDA, USDI 2000a:192).

Specifically, species effects writers have generally assumed that unprotected known sites in Matrix would not remain occupied, however actual disturbance from timber sales or other management activities may be decades away or may not happen at all. West of the Cascades, Riparian Reserves making up over 50 percent of the landscape significantly reduce the likelihood that a species site of any size would be entirely affected by a management activity. Further, if disturbances do happen, they may not extirpate the species from the site. For example, many prescribed fire treatments occur in ecosystems where frequent fire is normal (albeit seasonally different), and all types of treatments are required by standards and guidelines to minimize soil disturbances. Such activities do not necessarily eliminate a species from the project area, even though, for analytical purposes, the species effects writers may have made the presumption that such species cannot tolerate such disturbances. Even regeneration harvest units are limited in size, are often adjacent to riparian or other reserves, and are required to retain certain levels of green trees, snags, and down logs, precisely for the purpose of retaining local populations of relatively non-mobile life forms. Thus, both exposure and hazard may be over-estimated.

Species effects writers have been hesitant to assume there are more actual sites than those currently documented. For most species, there are actually more species sites extant than can be discovered in strategic or pre-disturbance surveys, because many species are very small or show themselves (break the surface) only seasonally. Indeed only 63 of the 295 Alternative 1 Survey and Manage species can be detected by practical field surveys. Further, survey protocols generally call for sampling transects, not 100 percent coverage, in order to maintain practicality and because searches seek detectable populations, not necessarily individuals. The magnitude of this issue is demonstrated with the RMS Survey plots. At these plots, experts used rakes to thoroughly search for hypogeus fungi on 658 0.01 hectare plots. The results included 13 detections for a species previously known only from 7 other federal sites, and 3 detections for a species known only from 6 other total sites. These species have previously been assumed to be rare because so few sites were known.

Species effects writers have been hesitant to make population assumptions in reserve land allocations. Although pre-disturbance surveys within proposed harvest units to date have covered about 16 percent of the Matrix and have detected thousands of sites, most detections come from non-random sampling in Matrix. This information is limited in its usefulness, because no accurate populations can be estimated nor habitat associations determined from non-random sampling. Statisticians warn against using such data to make population inferences to nearby reserves – even where sites are known on either side of a reserved area. Because of this, and because most known sites are in Matrix where they are assumed to be at risk from management activities, experts often conclude species with dozens to hundreds of known sites are not adequately protected. Fifteen of the 53 species with insufficient habitat because of management under Alternative 2 are known from more than 100 sites, with four of these known from over 750 sites. The results of the RMS Survey have helped resolve this issue somewhat, by providing a basis for estimating population size. However, statistical analysis may not answer all of the connectivity questions, for example, raised by previous analyses.

Species effects writers have assumed many species are simply at greater danger from current conditions and stochastic events. Harvesting has made Pacific Northwest late-successional forests less inter-connected than during most prehistoric times, so

there are legitimate concerns about the long-term prospects for certain rare species. Human-caused pollution and the threat of unnaturally hot wildfires because of recent suppression of natural fire events may also be threats. However, fluctuations in climate over the last 10,000 years (see *Late-Successional Forest Ecosystems* section), related changes in forest structure, and severe fire years that affected hundreds of thousands of acres raises questions about threat predictions based on minor disturbances or temperature fluctuations.

Vertebrates and vascular plants aside, the possibility of a Survey and Manage species being extirpated from the NWFP area is a potential risk, and is a risk whether Survey and Manage is retained or not. There are, after all, 10 species on Survey and Manage with no known sites on federal lands within the area, and another 21 with only one known site. While the majority of these are probably represented outside the NWFP area as well, they may not all be. And while all may be actually extant on numerous but as yet undetected sites, it is probable one or more are actually very rare, or at least rare enough that additional habitat disturbance places them at some risk of extirpation. The magnitude of that risk, however, may not be quantifiable. The species most suspected of being truly limited to very few sites are generally aquatic.

As noted elsewhere in the analysis, factors affecting species outcomes are numerous and include the potential to lose connecting populations, habitat connectivity between reserves, the effect of activities on adjacent microclimates, and so forth. The possibility of direct impacts to individual sites is a primary element of species outcomes, and because that element may be quantifiable, the following discussion is relevant to an understanding of risk.

At full Northwest Forest Plan implementation, timber harvest is projected at 247,000 acres of late-successional forest, or about 3 percent of late-successional forest in the NWFP area, per decade (See *Assumptions and Information Common to All Alternatives* earlier in this chapter). If a species is so rare as to exist at only one forested location, and if the occupied area is smaller than the average timber sale unit size, the risk of the harvest directly intersecting its entire habitat is around 3 percent per decade. If it is limited to two such sites, that risk drops to less than 1/10th of 1 percent (.03 times .03, or 3 percent of 3 percent). Similarly, if there are two different such species extant on only one such site each, the likelihood of intersecting them both is less than 1/10th of 1 percent. These are worst-case scenarios. If the harvest unit only partially catches the occupied area, or if part of the occupied area falls within the required retention area for each harvest unit, the actual risk of intersecting the species is less. If there are three or more such sites, the risk is exponentially less. "Intersecting" is used here, because so far the discussion is only about exposure. Whether those intersections are significant even at the site scale depends upon susceptibility.

For negative impacts to occur, the species must also be susceptible. On most regeneration harvest timber sale units, for example, the harvest activity would leave a certain percentage of the largest oldest trees, down logs, and snags within the harvest unit. Timber sale contracts include requirements to minimize soil disturbance. These provisions are specifically designed to retain remnants of local non-mobile organisms such as fungi and invertebrates. The level of potential negative impact, or risk, is affected by the species sensitivity to the treatment; these retention elements would certainly conserve some Survey and Manage species but not others, as evidenced by the requirements to do pre-disturbance surveys for some species in young regenerated stands with relic large logs

Fuel treatments are expected to take place within 270,000 acres of late-successional forest per decade (since about one-third of the landscape is late-successional), mostly in the dry provinces. Much of this treatment would be prescribed fire, or mechanical treatments preparing for prescribed fire. Some Survey and Manage species are susceptible to these

treatments, although most species in these provinces should be adapted to some level of natural fire, albeit at different seasons[13]. At least one Survey and Manage mollusk species, *Helminthoglypta talmadgei*, appears to favor recently burned sites (Agee 2001). Natural fire return interval in these dry provinces is generally 0 to 35 years. The mechanical fuel treatments preparing for prescribed fires may pose a bigger hazard for most species in these provinces than the burning itself.

Most species, and arguably any species having a significant ecosystem role, would be present at more than one site. The odds that timber harvest activities over a decade (administrative units plans cover about 15 years) might noticeably affect any of the 53 species determined to be at risk under Alternative 2 was examined statistically and in detail. The examination ranged from considering a species so rare as to exist on only one site, and odds are calculated as above. Noting, however, that nearly half of these 53 species had at least one detection in the approximately 750 RMS Survey plots (actual number of plots varied by taxa), the risk to population sizes down to 1/100th of a detection on these same RMS Survey plots was examined (e.g. the assumption that 75,000 ½-acre RMS Survey plots would result in a single detection). The odds that a decade of Agencies' timber harvest would intersect at least 20 percent of such a population were determined. A single detection on 75,000 survey plots translates (on average) to approximately 375 occupied acres. If such a species was clustered into one area of late-successional forest in the Matrix, the odds were about 5 percent. If the species was spread into at least 5 separated clusters distributed across all land use allocations, the odds of intersecting 20 percent or more with harvest activities drops to 3 or 4 hundredths of a percent. Twenty percent was used in this analysis to represent a lower threshold for where negative impacts to very rare species might begin to cause gaps or otherwise affect population function. The likelihood of intersecting 80 or 90 percent of a species' sites is exponentially smaller (Alegria et al. 2006). Depending upon susceptibility and actual disturbance exposure, such intersection would not necessarily extirpate the species from the site.

The risk that any of the 53 species with insufficient habitat in all or a portion of their range under Alternative 2 would have 20 percent of its population intersected in a decade, using the detection estimates for those detected on the RMS Survey plots, and 1/100th of a detection for all others, was estimated. The odds are less than 5 percent that 20 percent of the population of any one of the 53 would be intersected by harvest activities if none of the sites received protection under any program. The odds of intersecting an entire population under the above scenario is several orders of magnitude lower (Alegria et al. 2006). And as above, whether intersection results in extirpation at a site is a function of susceptibility and exposure. The actual odds are substantially less because 42 of the 53 are on one or more of the Agencies' SSSPs (and 9 of the 11 that are not are un-named mollusks). Given that 31 of these species are in Survey and Manage categories not requiring pre-disturbance surveys and are therefore likely to go undetected at harvest and other management activity sites, these odds of avoiding such intersections under Alternative 1 may not be substantially better.

In the 1992 U.S. District Court decision that led in large part to FEMAT's thorough examination of all identifiable late-successional forest associated species, Judge William Dwyer rejected the Forest Service's adoption of the Interagency Scientific Committee's Northern Spotted Owl plan saying in part, the Forest Service cannot adopt a plan which they know or believe will probably cause the extirpation of other native vertebrate species in the planning area (Seattle Audubon Society, et al. v. Moseley et al., No. C92-479WC (SAS v. Moseley)). At issue were projections by some biologists that the adopted plan would have only a low to medium-low likelihood of providing for the viability of 32 vertebrate species specifically identified in the Forest Service's 1992 Environmental

[13]Adaptation to fire is helpful but does not always make a species immune to prescribed fire. Species life cycles often put them underground by the fall natural fire season, and spring burning for fuel-hazard reduction can catch them on the surface at a vulnerable time.

Impact Statement for Management of the Northern Spotted Owl (USDA 1993 unpub.; USDA, USDI 1994a:3&4-258).

The 1982 NFMA regulations at 36 CFR 219.19 require management of sufficient habitat to maintain viable populations of existing native and desired non-native vertebrate species in the planning area (see *Elements Common to All Alternatives, Chapter 2*). That is, well distributed habitat sufficient to support, at least, a minimum number of reproductive individuals and the habitat must be well distributed so those individuals can interact with each other. For the reasons discussed above and elsewhere in this analysis, all alternatives appear to meet this standard for the vertebrates in this analysis.

The 1982 regulation at 219.27(g) requires preservation and enhancement of plant and animal diversity so that it is at least as great as that which would be expected in a natural forest, where appropriate and to the extent practicable. Reductions may be prescribed only where needed to meet overall multiple-use objectives. For reasons discussed above, all alternatives appear to meet this standard. Many management activities reduce diversity temporarily and on a limited geographic scale; the regulation is clearly not intended to prohibit such perturbations. The risk to completely losing a species is very low, as described above. The risk of extirpating a species at all is only quantifiable for actually rare species, and that is low. That such a loss would be acceptable is not proposed here; if a species were to be actually extirpated it would be unknowingly extirpated. Nevertheless, extirpation of an actually rare species would not itself violate this provision. First, it is not reasonable to provide for multiple use and human activity while maintaining a risk-free environment. Second, to the degree an increase in risk is the result of a need to meet other multiple-use objectives (and that risk is recognized), the provision expressly permits it.

The NFMA regulations regarding viability and diversity do not apply to BLM lands.

Agencies' SSSPs and other policies require management of species to preclude listing under the Endangered Species Act. It can be assumed that additional SSSP assignments will be made if such a threat is indicated. "Insufficient habitat" outcomes, for the reasons discussed above, do not necessarily predict a trend toward listing.

At some evolutionary scale, excessive application of the precautionary principle is not practical. There are several hundred thousand microarthropods in a square meter of temperate forest floor (Madson 2003 citing Wallwork 1970, Norton 1990). Although some species of microarthropods are identified, they are generally considered as functional groups. As life forms become smaller, subterranean, or dispersal-limited, their numbers of apparent species within taxa rises dramatically. Researchers estimate there are 2,000 mycorrhizal fungi species associated with Douglas-fir roots alone (Trudell et al. 2006), and while groups of these are active at different points or during different seasons, no single species is identified as irreplaceable or uniquely critical to facilitating water and nutrient uptake and other functions. Tiny mollusk species such as some on Survey and Manage can be very localized because, in drier climates, they remain restricted to habitats close to their natal area (USDA et al. 1993). A stochastic event or a management activity could extirpate them from one or more of these sites.

Given that knowledge of actually rare species is limited, that management activities affect only a small percentage of the late-successional forest each decade, that species may not be extirpated from sites by management activities, that 87 percent of the late-successional forests are in reserves, and the other factors discussed above, the risk of extirpating a species appears low and may not vary significantly between alternatives.

Bryophytes

Affected Environment

Bryophytes are a distinct group of spore-bearing, nonvascular plants that include mosses, hornworts, and liverworts. They reproduce by producing spores, which are usually wind dispersed, or through specialized asexual structures. Although they are especially vulnerable to disturbance, they have managed to colonize a wide variety of habitats throughout the world.

Bryophytes are important components in the forest canopy and understory habitats of late-successional and old-growth forests. They contribute to the species diversity, primary productivity, and biomass of these stands. Old-growth forests may be essential to the continued existence of some bryophytes (USDA et al. 1993:IV-101).

Habitat components important to some 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 forested conditions. Snags, shaded rock outcrops, rotten logs, and stumps also provide suitable substrate for numerous bryophyte species.

Since 1994, new information has been acquired on the occurrence and distribution of bryophyte species from strategic and pre-disturbance surveys, herbaria, literature, field units, and taxonomic experts. This knowledge had been used during the Annual Species Review (ASR) process to move species between categories and to remove some species from the Survey and Manage mitigation measure for Alternative 1.

Environmental Consequences

Under Alternative 1, 15 of the 17 bryophyte species included in this analysis would be included in Survey and Manage; 13 in all of their NWFP area range, and two in part of their NWFP area range[14]. Alternative 1 includes management of all known sites and Strategic Surveys for all 15 of these species, and pre-disturbance surveys for the three species included in Category A. There is one species assumed to be included in one or more of the Agencies' Special Status Species Programs (SSSP)[15]. The remaining one species in all of its range and two species in part of their range would not be included in Survey and Manage or SSSP (see Table 2-13).

Under Alternative 2, twelve bryophyte species are assumed to be included in one or more of the Agencies' SSSPs in all or part or their range. The remaining five species would not be included in either the Survey and Manage Standards and Guidelines or SSSP (see Table 2-13).

Under Alternative 3, there would be 15 bryophyte species included in the Survey and Manage Standards and Guidelines (Categories A, B, and E), 13 in all of their NWFP area range, and two in part of their NWFP area range. Management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys for the three species included in Category A. The remaining one species in all of its range and two species in part of their range would not be included in Survey and Manage or SSSP (see Table 2-13).

Under Alternative 4, all of the 17 bryophyte species discussed would be included in the

[14]Summary only addresses species ranges included in this analysis. One species described as included in "all of its range" was removed from Survey and Manage in the Oregon and Washington portion of its range in 2001.
[15]Species also on Survey and Manage are not part of this total.

Survey and Manage Standards and Guidelines (Categories A, B, D, and E). Alternative 4 includes Strategic Surveys for all species, management of all known sites for the 15 species in Categories A, B, and E, management of high-priority sites for the 2 species in Category D and pre-disturbance surveys for the three species included in Category A (see Table 2-13).

Under all alternatives, bryophytes receive protection under the network of reserves. The Northwest Forest Plan Final SEIS concluded that several of the alternatives analyzed, including Alternative 9, were most favorable to bryophytes because they provide the set of allocations and management practices that best produces habitat components for bryophytes (USDA, USDI 1994a:3&4-133).

Brotherella roellii

This Pacific Northwest endemic species is known from the lower mainland area of British Columbia and five historical sites in Washington. It is currently unknown if *Brotherella roellii* is still extant at these five sites.

Under Alternatives 1, 3, and 4, this species would be included in Category E, which requires Strategic Surveys and management of all known sites. Given the uncertainty regarding the status of this species in the NWFP area, there is insufficient information to determine how these alternatives would affect distribution and stability of this species (USDA, USDI 2000a:223). There is insufficient information to determine an outcome under Alternatives 1, 3, and 4.

Under Alternative 2, this species is assumed not to be included in any of the Agencies' SSSPs. Known sites would no longer be managed and Strategic Surveys would not occur. Given the uncertainty regarding the status of this species in the NWFP area, there is insufficient information to determine how the alternative would affect distribution and stability of this species. There is insufficient information to determine an outcome under Alternative 2.

***Buxbaumia viridis* (Oregon and Washington only)**

The 2001 ASR determined *Buxbaumia viridis* to be secure in Oregon and Washington because it had a moderate to high number of known sites, a significant number of sites in reserves, a high likelihood of additional sites and suitable habitat reserves, and the known sites were well distributed within its range (USDA, USDI Species Review Panel 2001). The 2001 ASR documentation also notes that the species is found in young stands as well as in late-successional and old-growth stands. At that time, there were 637 known sites in Oregon and Washington, 536 of which were on federal land. Since that time, an additional 202 sites have been reported (GeoBOB/ISMS database). Nineteen additional detections were identified in the Oregon and Washington RMS Survey data. This data projects that there would be approximately 750,100 (SE = 204,500) expected 0.2 ha detections in Oregon and Washington (Table 3&4-16). This is probably a conservative estimate because data may not have been consistently collected for this species after the 2001 ASR removed it from Survey and Manage in Oregon and Washington. This new information collected since 2001 is consistent with the findings from the ASR.

Under Alternatives 1, 2, and 3, this species is removed from Survey and Manage and not assumed to be in the Agencies' SSSPs in Oregon or Washington. However, because it has a large number of known and projected sites, a significant number of known sites in reserves, a high likelihood of additional sites and suitable habitat reserves, well distributed sites within its range, and the suitable habitat is not entirely restricted to late-successional/old-growth stands, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternatives 1, 2, and 3 in Oregon and Washington.

Under Alternative 4, this species would be included in Category D, which includes management of high-priority sites and Strategic Surveys. For the reasons listed for Alternatives 1, 2, and 3, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternative 4 in Oregon and Washington.

***Buxbaumia viridis* (California only)**

The 2004 FSEIS showed *Buxbaumia viridis* known from four federal sites in northern California, three of which occur on National Forest System lands outside of reserves. Two new sites have been found in California since the 2004 FSEIS. Given the low number of known sites, loss of any site could affect populations to the point of leading to insufficient habitat in northern California. Although this species has a broad global distribution (USDA, USDI 2000a:235), it is widely scattered elsewhere and it is listed as vulnerable on the European Red List (Hallinback 1998).

Under Alternatives 1 and 3, this species would be included in Category E, which requires Strategic Surveys and management of all known sites. Under Alternative 4, this species would be included in Category D, which requires Strategic Surveys and management of high-priority sites, which all known federal sites in California are assumed to be. The 2000 FSEIS found, under Category D, *Buxbaumia viridis* would stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:237). Due to protection of known sites, habitat (including known sites) is sufficient to provide for stable populations under Alternatives 1, 3, and 4.

Under Alternative 2, this species is assumed to be included in the SSSPs for the Forest Service and BLM in California. Due to inclusion in the Agencies' SSSPs where known sites would be managed, habitat (including known sites) is sufficient to provide for stable populations under Alternative 2. Under Alternative 2 without SSSP, loss of habitat and sites would be expected to occur. Therefore, because of the low number of known sites, there is insufficient habitat (including known sites) to support stable populations in the California portion of the NWFP area under Alternatives 2 without SSSP.

Diplophyllum albicans

The 2002 ASR documentation (USDA, USDI Species Review Panel 2002) indicates that *Diplophyllum albicans* shows closer ties to moist, cool microsites than to late-successional forest. While the species is documented to occur in LSOG, it does not appear to require LSOG habitat components. While it is known to occur on organic substrates such as decaying logs and trunks of living trees, it also is found on north-facing talus slopes, crevices in rock outcrops, west-facing road cut-banks, trail soil banks, cliff faces and stream banks. It has also been found in a bog. There are numerous sites along the coast, where higher moisture is a shared condition, but location in late-successional stands is not. The Matrix downed log and green tree retention standards together contribute to the persistence of this species.

There are a relatively high number of known sites for this species, and the Annual Species Review record shows approximately 45 percent are in Late-Successional or Congressional Reserves. This species is widely distributed, and is found in five provinces within western Washington and western Oregon north of the Klamath Province. It appears to be well distributed throughout the Coast Range and along the western slope of the Cascades in Washington and Oregon. There are 25 detections from Random Multi-Species Surveys. Based on this number of detections, it is projected that there are at least 1,218,800 occurrences (standard error = 298,100) of this species within the NWFP area (Table 3&4-16). The species is likely under-represented in Agency databases because pre-disturbance surveys have not been required.

Under Alternatives 1, 2, and 3, this species is removed from Survey and Manage and not assumed to be in the Agencies' SSSPs. However, because of the high number of documented and projected sites, the number of known sites and potential habitat in reserves, and its wide ecological amplitude, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternatives 1, 2, and 3 across the NWFP area.

Under Alternative 4, this species would be included in Category D, which includes management of high-priority sites and Strategic Surveys. For the reasons listed for Alternatives 1, 2, and 3, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternative 4 across the NWFP area.

Diplophyllum plicatum

Between the 2000 Final SEIS and the 2004 FSEIS, information from pre-disturbance and proposive surveys had increased the known sites for this species to approximately 80. Little change has occurred in these site numbers since the 2004 FSEIS. These sites are primarily restricted to two cluster populations on Coos Bay BLM and the Olympic Peninsula. While most of the known sites on Coos Bay BLM are in reserve allocations, not all of the known sites on the Olympic Peninsula are in reserves. There are scattered occurrences in between these two clusters. The one RMS Survey detection provides little new information about rarity or land allocation. This species is not currently known from California.

Under Alternatives 1, 3, and 4, this species would be included in Category B, which requires management of all known sites and Strategic Surveys. With a high level of uncertainty due to low numbers and spotty distribution, *Diplophyllum plicatum* would stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:227). Due to management of known sites, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternatives 1, 3, and 4.

Under Alternative 2, *Diplophyllum plicatum* would have habitat (including known sites) sufficient to support stable populations. This is because this species is assumed to be included as Bureau Assessment on BLM managed lands in Oregon where known sites would be managed. This species is assumed not to be included as Forest Service Sensitive in Washington and Oregon. In locations where the species is not included under the SSSPs and is not protected by reserves, loss of habitat and populations would limit the gene flow and dispersal capability for this species especially between the two larger cluster populations. Because under Alternative 2, a prediction of habitat sufficient for stable populations was based on the combination of habitat and known sites in reserves and inclusion in the Oregon BLM SSSP, Alternative 2 without SSSP would likely lead to habitat (including known sites) that is insufficient to support stable populations in the NWFP area.

Encalypta brevicolla* var. *crumiana

The 2002 ASR determined that *Encalypta brevicolla* var. *crumiana* was not associated with late-successional and old-growth habitats (USDA, USDI Species Review Panel 2002). At that time, this species was known from only two locations in the world. There is an historic location in Mt Rainier National Park from 1937 and a site at Squirrel Peak on the Siskiyou National Forest that was relocated as part of a 2002 purposive survey. Three additional sites were subsequently discovered on the Siskiyou National Forest in 2005 on other open rock outcrops in Curry and Coos Counties.

Under Alternatives 1, 2, and 3, this species is assumed to be on the Forest Service Sensitive list in Oregon. Under Alternative 4, this species would be included in Category

B, which includes management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. The 2000 FSEIS found that because of low known site numbers, there was insufficient information to determine an outcome. That remains the case under all alternatives including Alternatives 1, 2, and 3 without SSSP.

Herbertus aduncus

This species extends from Alaska to Oregon where it reaches the southern edge of its range in western North America. Recent proposive surveys have located several additional populations in the Columbia Gorge and on the Mt. Baker-Snoqualmie National Forest. Current information indicates that this species is rare and limited in distribution (USDA, USDI 2000a:230).

Under Alternatives 1 and 3, this species would be included in Category E, which requires management of all known sites and Strategic Surveys. Under Alternative 4, this species would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are determined to be completed, and Strategic Surveys. The 2000 FSEIS found that because of low number of known sites, there was insufficient information to determine how any alternative would affect distribution and stability of this species (USDA, USDI 2000a:230). There is still insufficient information to determine an outcome under Alternatives 1, 3, and 4.

Under Alternative 2, this species is assumed to be Bureau Assessment on BLM managed lands in Oregon where known sites would be managed. It is assumed not to be included as Forest Service Sensitive. Known sites on Forest Service managed lands would no longer be managed and Strategic Surveys would not occur. Under Alternative 2 with or without SSSP, there is the potential for loss of some known sites (most of the known sites are in State or National Parks). However, there remains insufficient information to determine an outcome under Alternative 2 with or without SSSP.

Iwatsukiella leucotricha

Prior to 2002, there were only two known sites of this species in the continental U.S. Both sites were on non federal land in Oregon. There are at least 9 known sites of this species now documented on federal land as well as another 4 known sites occurring on state lands in Washington and Oregon. At least five of these new sites are located within Late-Successional Reserves. Current information continues to indicate that this species is rare and of limited distribution.

Under Alternatives 1, 3, and 4, this species would be included in Category B, which requires management of all known sites and Strategic Surveys. Due to protection of sites in reserves and management of known sites, habitat (including known sites) is sufficient to support stable populations in the NWFP area under Alternatives 1, 3, and 4.

Under Alternative 2, *Iwatsukiella leucotricha* would have habitat (including known sites) sufficient to support stable populations. This is because, this species is assumed to be included as Bureau Assessment on BLM managed lands in Oregon and as Sensitive on Forest Service managed lands in Washington and Oregon. This inclusion provides for management of all known sites on federal land and the anticipation that habitat and known sites would be sufficient for stable populations. Because under Alternative 2, a prediction of habitat sufficient for stable populations was based on the combination of habitat and known sites in reserves and inclusion in BLM and Forest Service SSSPs, Alternative 2 without SSSP would likely lead to habitat (including known sites) that is insufficient to support stable populations in the NWFP area.

Kurzia makinoana

This species has been reported from Washington, Oregon, and California. Currently there are four known sites. One new site has been found since the 2004 FSEIS, and there is no new information indicating that the species is other than rare and of limited distribution within the NWFP area. Nomenclature of this taxon is in question, so it is difficult to fully understand the range and distribution of this species within the NWFP area

Under Alternatives 1, 3, and 4, this species would be included in Category B, which requires management of all known sites and Strategic Surveys. There is insufficient information to determine how these alternatives would affect distribution and stability of this species. There is insufficient information to determine an outcome under Alternatives 1, 3, or 4.

Under Alternative 2, this species is assumed to be included as a Bureau Assessment species on Oregon BLM managed lands where known sites would be managed. It is assumed not to be included as Forest Service Sensitive in Washington, Oregon, or California, or in the BLM SSSP in California. With the exception of sites on BLM managed lands in Oregon, known sites would no longer be managed. Due to lack of information for this species, there is insufficient information to determine an outcome under Alternative 2, with or without inclusion in SSSPs.

Marsupella emarginata* var. *aquatica

This aquatic species grows attached to rocks in streams. Until recently, the only known site for this species was on the Willamette National Forest. Recent proposive surveys located one additional site on the Mt. Baker-Snoqualmie National Forest. There has been taxonomic confusion over the acceptance of this taxon as a valid variety (USDA, USDI 2000a:225).

Under Alternatives 1, 3, and 4, this species would be included in Category B, which requires management of all known sites and Strategic Surveys. Since this variety is restricted to aquatic habitats, Riparian Reserves may provide additional protection of habitat for this species. Habitat (including known sites) is sufficient to provide for stable populations for this species under Alternatives 1, 3, and 4.

Under Alternative 2, this species is assumed not to be included in the BLM SSSP in California or Oregon.

While all known sites of this species occur on lands managed by the Forest Service, it is assumed that this species would not be included in the Forest Service SSSP. The predicted outcome in the 2004 FSEIS under Alternative 2 was based on presumed protection of known sites due to their inclusion within Riparian Reserves. However, there are recent studies (Paavola et al. 2003, Muotka and Laasonen 2002) indicating that stream management directed toward habitat improvement for fish or aquatic macroinvertebrates may have negative effects on aquatic bryophytes and that key physical factors in the stream environment differ among aquatic bryophytes, fish, and aquatic macroinvertebrates. These studies suggest that management decisions affecting in-stream environments that do not include consideration of aquatic bryophytes may result in loss of aquatic bryophyte habitat and sites. This new information, coupled with knowledge that one of the two known sites of this species occur in the drainage from a lake that serves as a multiple-use recreational destination, suggests that Alternative 2 could result in habitat insufficient to support stable populations of this species in the NWFP area.

Orthodontium gracile

This species occurs in southern Oregon and northern California. Current information indicates this species occurs predominately in coastal redwood forests, most of which are located in reserves, state parks, or National Parks.

Under Alternatives 1, 3, and 4, this species would be included in Category B, which requires management of all known sites, equivalent-effort surveys until Strategic Surveys are determined to be complete. Due to current information that this species is limited to coastal redwood forests, most of which are protected, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternatives 1, 3, and 4.

Under Alternative 2, this species is assumed to be included as Sensitive on California BLM managed lands. The species is assumed to not be included as Forest Service Sensitive in California. Because the habitat is already largely protected, inclusion on the BLM SSSP in California is not considered to be critical to provide for stable populations. Therefore, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternative 2 with or without SSSP.

***Ptilidium californicum* (California only)**

This species has a North Pacific distribution (USDA, USDI 2000a:219). It reaches the southern extent of its range in northern California. Previously known only from the literature in California, there are now nearly 300 known sites. Abundance of *Ptilidium californicum* is low at most recorded sites, although local concentrations of known sites indicate that it may be thinly spread over large areas in appropriate habitat. This species was detected on three plots on California forests during the RMS Survey project. This results in an estimated 141,600 (Standard Error (SE) = 80,800) expected 0.2 ha detections in California. It was also located on a Rogue River National Forest plot in California from a separate, independent sample population. All four of the detections occurred in late-successional old-growth stands in reserved land allocations. The high SE with the estimate is too high to provide a satisfactorily accurate estimation of occurrence in California. However, the RMS Survey results, together with the steadily increasing numbers of known sites from other sources suggest that the species is not uncommon in old-growth forests in reserved land allocations. Roughly an equal percentage of the sites are in reserve and non-reserve allocations (GeoBOB/ISMS database).

Under Alternatives 1, 3, and 4, this species would be included in Category A in California, which requires pre-disturbance surveys, management of all known sites, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. Under Alternative 2, this species is assumed to be included as Sensitive for the California BLM and as Sensitive by the Forest Service in California.

Although there is potential for damage to individual known sites, even in reserves, particularly from fuels reduction projects, there are enough known sites distributed over a large enough area to provide a reasonable assurance of resiliency to the species in California within the present climatic regime. Habitat (including known sites) is sufficient to provide for stable populations under all alternatives with or without SSSP.

Racomitrium aquaticum

Most of the western North American material of this species has been proposed for a name change to *Racomitrium ryszardii*. It is a recent proposal that has not had time to be evaluated by the North American bryological community (USDA, USDI 2002b). This is a taxonomically difficult genus, and this species is often misidentified or overlooked when collections are made. Contrary to this species' name (*aquaticum*), it is not an aquatic

species (Harpel 2003 pers. comm.). It has been recently determined that California material previously identified as this species may be neither *R. aquaticum* nor *R. ryszardii* (Norris and Shevock 2004).

At least 31 known sites, including 6 RMS Survey detections, are now documented within the NWFP area. Based on the number of RMS Survey detections, it is projected that there are at least 287,200 occurrences (standard error = 120,500) of this species within the NWFP area. The apparent contradiction between the relatively small number of known sites and the large number of projected occurrences is likely, in part, due to under-collection associated with the great difficulty in recognizing this species in the field. With the assumption that Oregon and Washington material currently identified as *R. aquaticum* represents no more than a single taxonomic entity, there now appears to be sufficient information to determine outcome for this species.

Under Alternatives 1 and 3, this species would be included in Category E, which requires management of all known sites and Strategic Surveys. Under Alternative 2, this species is removed from Survey and Manage and not assumed to be in the Agencies' SSSPs within the NWFP area. Under Alternative 4, this species would be included in Category B, which requires management of all known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. While this species has only a moderate number of documented sites, the combination of difficult specimen identification and the very large number of projected occurrences indicates that, under all alternatives, *Racomitrium aquaticum* has habitat (including known sites) that is sufficient to support stable populations in the NWFP area.

***Rhizomnium nudum* (outside of Washington)**

Within the NWFP area, most documented sites of *Rhizomnium nudum* occur within Washington. A smaller number of sites occur in Oregon, and no sites are currently documented in California. At least 37 known sites, all on lands managed by the Forest Service, are now documented in Oregon. Seventeen of these sites occur in reserve allocations. There were three detections of this species during RMS Survey within Oregon. Statistically based population estimates based on RMS Survey detections have not been completed for the Oregon portion of the NWFP area. Hence, biological inferences using RMS Survey data cannot be made with confidence. The majority of known sites occur on Mt. Hood and Willamette National Forests, where they are rather evenly distributed among reserve and non-reserve allocations. Because this species typically occurs in higher and moister plant communities where management actions are generally low in frequency and intensity, the species is subject to relatively low risk due to forest management activities. In addition, the Oregon RMS Survey detections of this species, along with the generally low frequency of project-related bryophyte surveys within suitable habitat, suggest that the species is likely underreported within its Oregon range.

Under Alternatives 1, 3, and 4, this species would be included in Category B outside of Washington State. This requires management of all known sites and Strategic Surveys. Because known site management will contribute to providing for stable populations of this species, *Rhizomnium nudum* would stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:227). Habitat (including known sites) is sufficient to provide for stable populations for this species under Alternatives 1, 3, and 4.

Under Alternative 2, this species is removed from Survey and Manage but assumed to be included as Bureau Assessment for the BLM in Oregon and Forest Service Sensitive in Oregon. For reasons noted above, such as moderate number of known sites, moderate representation within reserves, relatively even distribution, habitats with relatively low risk of disturbance, and the likelihood of under-reporting, it is anticipated that with or

without inclusion in BLM or Forest Service SSSPs, habitat is sufficient to provide for stable populations of this species under Alternative 2.

***Rhizomnium nudum* (Washington only)**

The 2002 ASR reports that *Rhizomnium nudum* is well distributed within the eastern and western Cascades of Washington and on the Olympic Peninsula (USDA, USDI Species Review Panel 2002). Well over 200 sites are now documented within the state, with more than 50 percent of these included within reserve allocations or their equivalent. There are 21 RMS Survey detections for this species in Washington. Analysis including these detections plus another three in Oregon projects at least 1,372,000 occurrences (standard error = 333,000) of this species within the NWFP area (Table 3&4-16).

Under Alternatives 1, 2, and 3, this species is removed from Survey and Manage. Under Alternative 4, this species would be included in Category B, which requires protection of all known sites and Strategic Surveys (which have been completed). Given the documentation that, in Washington, this species is numerous, well-distributed, and well-represented in reserves, *Rhizomnium nudum* has habitat (including known sites) that is sufficient to support stable populations in Washington under all alternatives.

Schistostega pennata

This species occurs in Washington and Oregon with most of the known sites found on the Olympic Peninsula, and in the Gifford Pinchot, Mt. Baker-Snoqualmie, and Mt. Hood National Forests. It is known as far south as the Umpqua National Forest in Oregon. New information indicates this species is found in a variety of habitats and is not restricted to riparian areas (Harpel 2003 pers. comm.). Known occurrences are mostly small and are restricted to substrates that are temporary (i.e. the soil on the underside of upturned roots of fallen conifers). It is unknown what the population trend at these sites is or whether the sites are even still extant since this species occupies such a transitory substrate. The absence of detection of this species in the RMS Survey Analysis is consistent with a species that is rare on the landscape.

Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires pre-disturbance surveys, management of all known sites, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. Due to management of known sites, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternatives 1, 3, and 4.

Under Alternative 2, this species is assumed to be included as Forest Service Sensitive in Oregon and Washington. It is assumed to be Bureau Assessment on BLM managed lands in Oregon. Due to management of known sites, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternative 2. Alternative 2 without inclusion into SSSP would result in habitat (including known sites) insufficient to support stable populations in the NWFP area.

Tetraphis geniculata

This species occurs in Oregon and Washington and is suspected to occur in coastal California. Most of the known sites for this species occur in Washington on the Gifford Pinchot National Forest and the Olympic Peninsula. This species appears to be fairly well-distributed within the appropriate habitat on Gifford Pinchot National Forest but not elsewhere in the NWFP area. A substantial number of these sites occur outside of reserves. Only three locations are known to occur in Oregon. The one RMS Survey detection provides little new information about rarity or association with land allocation. Because this species in the Pacific Northwest is dependent on decaying coarse woody

debris, it is important to maintain these components within non-late-successional and non-old-growth forest stands.

Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires pre-disturbance surveys, management of all known sites, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. Due to management of known sites and surveys, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternatives 1, 3, and 4.

Under Alternative 2, this species is assumed to be included as Sensitive on BLM managed lands in California and as Bureau Assessment on BLM managed lands in Oregon. It is also assumed to be included as Forest Service Sensitive in Oregon and Washington. Due to inclusion in the Agencies' SSSPs where known sites would be managed and pre-project clearances would be completed, habitat (including known sites) is sufficient to provide for stable populations for this species under Alternative 2.

Because the known sites are concentrated within a relatively small portion of the NWFP area and there is limited protection from the reserve network, Alternative 2 without inclusion into SSSP would result in habitat (including known sites) insufficient to support stable populations in the NWFP area

Tritomaria exsectiformis

Previously this species was thought to occur only on the eastside of the Cascade Mountains. New information from proposive surveys expanded the known range of the species on the eastside and to the Olympic National Forest on the west side of the Cascades. Currently, all known sites occur on National Forest System lands.

Under Alternatives 1, 3, and 4, this species would be in Category B, which requires management of all known sites and Strategic Surveys. Due to few known sites and lack of information, there is insufficient information to determine how any alternative would affect the distribution and stability of *Tritomaria exsectiformis* (USDA, USDI 2000a:227). There is insufficient information to determine an outcome under Alternatives 1, 3, and 4.

Under Alternative 2, this species is assumed to be included as Bureau Assessment by the BLM in Oregon where known sites would be managed. It is assumed not to be included in the Forest Service Sensitive Species Programs or in the BLM SSSP in California. Known sites would no longer be managed on National Forest System lands or on BLM-managed lands in California. Strategic Surveys would not occur. Although loss of sites could occur where not included in the Agencies' SSSPs, there is insufficient information to determine how the alternative would affect distribution and stability of this species. There is insufficient information to determine an outcome under Alternative 2, including the scenario of Alternative 2 without SSSP.

Tritomaria quinquedentata

This species is known from few sites and current information indicates it is rare and limited in distribution (USDA, USDI 2000a:230). Most known sites for this species are in Washington; one is in Oregon. Nearly all occur on federally managed lands. Several recent collections on the eastside of the Cascade Mountains have expanded the range from the Mt. Baker-Snoqualmie National Forest to the Okanogan National Forest in Washington. The association of this species with late-successional or old-growth forests is uncertain (USDA, USDI Species Review Panel 1999).

Under Alternatives 1, 3, and 4, this species would be included in Category B, which requires management of all known sites and Strategic Surveys. Because there are so

few sites, there is insufficient information to determine how these alternatives would affect the distribution and stability of this species (USDA, USDI 2000a:230). There is insufficient information to determine an outcome under Alternatives 1, 3, and 4.

Under Alternative 2, this species is assumed not to be included in the Forest Service Sensitive Species Program or the BLM SSSP in California or Oregon. Known sites would no longer be managed on National Forest System lands or on BLM- managed lands. Strategic Surveys would not occur. Because it is unknown how well the current information reflects species' distribution and there are so few sites, there is insufficient information to determine an outcome under Alternative 2.

Summary

Under all alternatives, habitat (including known sites) is sufficient to provide for stable populations for ten species.

Under all alternatives, there is insufficient information to determine an outcome for six species.

The remaining one species would have habitat (including known sites) sufficient to provide for stable populations under Alternatives 1, 3, and 4, where the species is on Survey and Manage, but would have insufficient habitat under Alternative 2, where the species is off of Survey and Manage.

Under Alternative 2, 12 of these species would be on one or more SSSP. Under the scenario that they were removed from SSSP, there would be insufficient information to determine an outcome for 4 species, there would be sufficient habitat for 3 species, there would be sufficient habitat range-wide, but insufficient in a portion of its range for one species, and there would be insufficient habitat for 4 species.

Fungi

Affected Environment

Fungi are neither plants nor animals but are recognized as a separate kingdom of organisms, both in structure and function. 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 approximately 500 species of fungi that were evaluated as closely associated with late-successional and old-growth forests, approximately 100 are known to be endemic to the Pacific Northwest.

Most macrofungi (mushrooms, truffles, and allies) produce fruiting structures or sporocarps that are short-lived and ephemeral, seasonal in occurrence, and annually variable. Richardson (1970) estimated that sampling every 2 weeks would fail to detect about 50 percent of macrofungal species fruiting in a season. On the average, less than 10 percent of species were detected in each of 2 consecutive years at any one of eight sites (O'Dell et al. 1999). The reasons for 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. Dispersal, reproduction, and connectivity are not well understood for any of the fungi considered in this SEIS.

Current taxonomic names are used in this section. Any differences between these and names in previous Northwest Forest Plan documents are displayed in Table 3&4-18.

Environmental Consequences

Under Alternative 1, 186 of the 208 fungi species included in this analysis would be included in Survey and Manage; 181 in all of their NWFP area range, and five in part of their NWFP area range. There would be 2 species included in one or more of the Agencies' Special Status Species Programs (SSSP). The remaining 20 species in all of their range and five species in part of their range would not be included Survey and Manage or SSSP. Under Alternative 2, 67 fungi species would be included in one or more of the Agencies' SSSPs in all or part or their range. The remaining 141 species would not be included in either the Survey and Manage Standards and Guidelines or SSSP. Under Alternative 3, there would be 172 fungi species included in the Survey and Manage Standards and Guidelines (Categories A, B, and E); 166 in all of their range and 6 in part of their range. Six species would be included in one or more of the Agencies' SSSP, including in the part of its range not included in Survey and Manage. The remaining 31 species would not be included in the Survey and Manage Standards and Guidelines or SSSP. Under Alternative 4, all of the 208 fungi species discussed would be included in the Survey and Manage Standards and Guidelines (see Table 2-13).

Habitat components important to fungi include dead, down wood; standing dead trees; and live, old-growth trees; as well as a diversity of host species (including trees and underbrush) and microhabitats. Also important for fungi is a well-distributed network of late-successional forest. Small forest fragments can function as refugia where fungi may persist until suitable habitat conditions become available in adjacent stands. The analyses of environmental consequences of Option 9 in FEMAT and Alternative 9 in the Northwest Forest Plan Final SEIS concluded that alternatives, such as Alternative 9, which provide for more extensive and interconnected late-successional and old-growth forest conditions, would minimize the risks to these species (USDA, USDI 1994a:3&4-136).

For most fungi species there is scant information regarding geographic range, habitat, or habitat range. Few systematic surveys for fungi have been performed, even within the NWFP area. Lack of detection does not necessarily indicate lack of presence. Therefore, there is incomplete knowledge regarding the true geographic range of Survey and Manage fungi species. Many fungi species are widespread but locally rare (large geographic range, but small, isolated populations). This may be due to broad macrohabitat (forests), yet restricted and specialized microhabitat requirements (specific hosts, local conditions). There currently are no methods to predict where specialized habitat occurs for most Survey and Manage fungi. Existing habitat information is confined to generalities and hypothesis, based on species that are more common. This makes it difficult to evaluate habitat for Survey and Manage fungi species.

The 2000 Survey and Manage Final SEIS acknowledged this high degree of uncertainty regarding the biological distribution of fungi. This uncertainty has been reduced for some species because of a variety of efforts including Strategic Surveys implemented under the Survey and Manage Standards and Guidelines. Consequently, the environmental consequences analysis in this SEIS was able to reach conclusions for some species that previously lacked sufficient information to determine how any alternative would affect distribution and stability. For other species, conclusions were modified from the 2000 Final SEIS because of additional information. A primary source of information regarding the distribution and number of known sites used in the analysis of these species was the GeoBOB/ISMS database.

Species are grouped for the purpose of comparing environmental consequences. The groupings are not intended to imply that this certain aspect of the analysis is the only criteria by which the alternatives would be judged. Previous analyses, either incorporated by reference or supplemented by this SEIS, contain relevant information regarding the alternatives.

Group 1

Although historic locations delineate potential species ranges, the following 27 species have not been recorded since institution of the Survey and Manage fungi lab in 1996. Under all alternatives, for the following 27 species, habitat (including known sites) is insufficient to support stable populations in the NWFP area. The reasons for this outcome include the fact that many of these species have not been observed in the NWFP area in more than 30 years, many may already be extirpated from the NWFP area, and all alternatives would provide insufficient habitat to maintain these species (USDA, USDI 2000a). This outcome is not due to federal action.

Asterophora parasitica (B)
Cortinarius depauperatus (B)
Cortinarius speciosissimus (B)
Cortinarius umidicola (B)
Cystangium idahoensis (B)
Cystangium lymanensis (B)
Destuntzia fusca (B)
Destuntzia rubra (B)
Dichostereum boreale (B)
Endogone acrogena (B)
Endogone oregonensis (B)
Gastroboletus imbellus (B)
Gastrosuillus umbrinus (B)
Gautieria magnicellaris (B)
Gautieria otthii (B)
Glomus radiatum (B)
Gymnomyces fragrans (B)
Hebeloma olympianum (B)
Hydnotrya subnix (B)
Hygrophorus vernalis (B)
Mythicomyces corneipes (B)
Octavianina macrospora (B)
Pholiota albivelata (B)
Rhizopogon inquinatus (B)
Sedecula pulvinata (B)
Stagnicola perplexa (B)
Zelleromyces papyracea (B)

Macowanites lymanensis was transferred to the genus *Cystangium* as *Cystangium lymanensis* (Trappe et al. 2002). *Martellia fragrans* was transferred to the genus *Gymnomyces* as *Gymnomyces fragrans* (Trappe et al. 2002). *Martellia idahoensis* was transferred to the genus *Cystangium* as *Cystangium idahoensis* (Trappe et al. 2002). *Octavianina papyracea* was transferred to the genus *Zelleromyces* as *Zelleromyces papyracea* (Trappe et al. 2002).

Under Alternatives 1, 3 and 4, all 27 species would be included in Category B (as indicated by the B in parens following the species name) which requires management of known sites and Strategic Surveys.

Under Alternative 2, 23 of these 27 species are assumed not to be included in any of the Agencies' SSSPs. Sites would no longer be managed and Strategic Surveys would no longer be required. The remaining 4 species: *Destuntzia rubra*, *Gastroboletus imbellus*, *Gymnomyces fragrans*, and *Octavianina macrospora* are assumed to be included as Sensitive on BLM managed lands in Oregon. Pre-project clearances would be conducted and sites would be managed if site loss would contribute to the need to list. General inventories may be conducted. Under the scenario of Alternative 2 without SSSP, for these four species, the outcome is also habitat (including known sites) is insufficient to support stable populations across the NWFP area.

Group 2

Under all alternatives, the following 88 species would not maintain stable populations largely due to the very low number of occurrences (most have had only 1 to 10 sites discovered since 1996). For all alternatives, habitat (including known sites) is insufficient

to support stable populations in the NWFP area (USDA, USDI 2000a:244-245). This outcome is not due to federal action. For some species with a somewhat higher number of known sites, this outcome is also due to habitat requirements or life history. For example, *Bridgeoporus nobilissimus* has approximately 100 known sites and while pre-disturbance surveys are conducted and known sites are managed, there is still a high probability that populations will not remain stable. The only host for this species is true Fir (*Abies* spp., usually *Abies procera*). Known site survey data indicates that the majority of sites are located in second growth stands, with the most common substrate being *Abies* stumps or snags. In many of these stands, *Abies* is either not present, or negligibly present in the regeneration. Therefore, host populations may not be adequate to provide for continuity of *Bridgeoporus nobilissimus* over time, leading to unstable populations.

Acanthophysium farlowii (B)
Albatrellus avellaneus (B)
Albatrellus caeruleoporus (B)
Alpova alexsmithii (B)
Alpova olivaceotinctus (B)
Arcangeliella camphorata (B)
Arcangeliella crassa (B)
Arcangeliella lactarioides (B)
Asterophora lycoperdoides (B)
Baeospora myriadophylla (B)
Balsamia nigrens (B)
Boletus haematinus (B)
Bridgeoporus nobilissimus (A)
Catathelasma ventricosa (B)
Chamonixia caespitosa (B)
Choiromyces alveolatus (B)
Choiromyces venosus (B)
Chroogomphus loculatus (B)
Chrysomphalina grossula (B)
Clavariadelphus subfastigiatus (B)
Clitocybe senilis (B)
Clitocybe subditopoda (B)
Cordyceps ophioglossoides (B)
Cortinarius boulderensis (B)
Cortinarius cyanites (B)
Cortinarius magnivelatus (B)
Cortinarius valgus (B)
Cortinarius variipes (B)
Cortinarius verrucisporus (B)
Cortinarius wiebeae (B)
Cyphellostereum laeve (B)
Dermocybe humboldtensis (B)
Elaphomyces anthracinus (B)
Elaphomyces subviscidus (B)
Entoloma nitidum (B)
Fayodia bisphaerigera (B)
Fevansia aurantiaca (B)
Galerina sphagnicola (E)
Gastroboletus vividus (B)
Gymnomyces abietis (B)
Gymnomyces nondistincta (B)
Helvella crassitunicata (B)
Hydnotrya inordinata (B)
Hydropus marginellus (B)
Hygrophorus caeruleus (B)
Hypomyces luteovirens (B)
Leucogaster microsporus (B)
Macowanites chlorinosmus (B)
Macowanites mollis (B)
Marasmius applanatipes (B)
Mycena hudsoniana (B)
Mycena quinaultensis (B)
Neolentinus adhaerens (B)
Octavianina cyanescens (B)
Otidea smithii (B)
Phaeocollybia gregaria (B)
Podostroma alutaceum (B)
Pseudaleuria quinaultiana (B)
Ramaria botrytis var. *aurantiiramosa* (B)
Ramaria claviramulata (B)
Ramaria concolor f. tsugina (B)
Ramaria coulterae (B)
Ramaria gracilis (B)
Ramaria hilaris var. *olympiana* (B)
Ramaria lorithamnus (B)
Ramaria maculatipes (B)
Ramaria rainierensis (B)
Ramaria rubella var. *blanda* (B)
Ramaria rubribrunnescens (B)
Ramaria spinulosa var. *diminutiva* (B)
Ramaria suecica (B)
Ramaria thiersii (B)
Ramaria verlotensis (B)
Rhizopogon abietis (B)
Rhizopogon atroviolaceus (B)
Rhizopogon brunneiniger (B)
Rhizopogon chamaleontinus (B)
Rhizopogon ellipsosporus (B)
Rhizopogon evadens var. *subalpinus* (B)
Rhizopogon exiguus (B)
Rhizopogon flavofibrillosus (B)
Rhodocybe speciosa (B)
Russula mustelina (B)
Thaxterogaster pavelekii (B)
Tricholoma venenatum (B)
Tricholomopsis fulvescens (B)
Tuber asa (B)
Tuber pacificum (B)

Under Alternatives 1, 3, and 4, all but one of these species would be included in Category B or E (as indicated by the letter in parens) which requires management of known sites and Strategic Surveys. *Bridgeoporus nobilissimus* would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Management under Alternative 3 is similar to Alternatives 1 and 4, except pre-disturbance surveys would no longer be required for *Bridgeoporus nobilissimus* in non-late-successional and non-old-growth stands. Elimination of pre-disturbance surveys in non-late-successional and non-old-growth stands would further increase the habitat risk for *Bridgeoporus nobilissimus* by greatly reducing the probability of discovering and protecting new sites, since the majority of known sites are currently located in non-late-successional and non-old-growth stands (with large stumps and snags).

Under Alternative 2, 66 of these 88 species are assumed not to be included in any of the Agencies' SSSPs. Known sites would no longer be managed and Strategic Surveys would no longer be required. The remaining 22 species are assumed to be included in one or more of the Agencies' SSSPs. Pre-project clearances would be conducted and sites would be managed if site loss would contribute to need to list. General inventories may be conducted. *Albatrellus caeruleoporus*, *Boletus haematinus*, *Choiromyces venosus*, *Clitocybe subditopoda*, *Cordyceps ophioglossoides*, *Entoloma nitidum*, *Hydropus marginellus*, and *Mycena quinaultensis* are assumed to be included as Sensitive on California BLM managed lands. *Dermocybe humboldtensis* is assumed to be included as a Sensitive Species by BLM California and BLM Oregon. *Alpova alexsmithii*, *Arcangeliella camphorata*, *Gymnomyces nondistincta*, *Phaeocollybia gregaria*, *Ramaria spinulosa* var. *diminutiva*, *Rhizopogon chamaleontinus*, *Rhizopogon ellipsosporus*, *Rhizopogon exiguous*, and *Thaxterogaster pavelekii* are assumed to be included as Sensitive on BLM managed lands in Oregon. *Bridgeoporus nobilissimus* is assumed to be included as a Sensitive Species by the Forest Service in Regions 5 and 6 and BLM in Oregon. *Albatrellus avellaneus* is assumed to be included as a Sensitive Species by the Forest Service in Oregon and Washington and the BLM in Oregon. *Otidea smithii* is assumed to be included as a Sensitive Species by the Forest Service in Regions 5 and 6. *Tricholomopsis fulvescens* is assumed to be included as a Sensitive Species by the Forest Service in Region 5 (California). For the 22 species that are on SSSP, under the scenario of Alternative 2 without SSSP, the outcome would still be habitat (including known sites) insufficient to support stable populations in the NWFP area.

Cortinarius boulderensis had 7 RMS detections but few other known sites. The historic sites are predominately in the Olympic National Park and the Warm Springs Indian Reservation. The RMS detections were inside the known range and occurred exclusively along the Cascade Mountains at high elevation under *Tsuga* spp. (hemlock). These RMS detections confirm that this species is restricted to a narrow elevation range above 4000 ft.

Leucogaster microsporus had 5 RMS detections and few other known sites. This species is a sequestrate hypogeous fungus and belongs to a genus that has a demonstrated preference to fruit in the dry part of the season. Traditionally the collection of fungi occurs during the rainy wet season as fungi have relatively high demands for available water. Because it fruits beneath the soil surface it is not exposed to the drying winds or temperatures that limits fruiting of most other macrofungi . The cryptic nature of the fruiting body also makes it hard to detect when present on site. The high number of RMS detections may be an artifact of the collecting season that was conducive to fruiting and the timing of the RMS Survey. The range of expected detections at the 95% confidence interval includes a low estimated percent of Northwest Forest Plan occupied. The estimated number of .001 ha plots with detections is between 256,000 - 8,773,200.

The RMS Survey provides no new information on the rarity of *Marasmius applanatipes* (3 RMS detections) and *Mycena hudsoniana* (3 RMS detections) because the range of expected detections at the 95% confidence interval includes 0. Both species have few total known sites.

Group 3

For the following three species, there is insufficient information to determine how the alternatives would affect distribution and stability or to determine an outcome (USDA, USDI 2000a:247).

Cortinarius tabularis (B)
Gastrosuillus amaranthii (E)
Ramaria concolor f. marrii (B)

Under Alternatives 1, 3 and 4, all three of these species are included in Categories B or E, which both require management of known sites and Strategic Surveys. Category designations are indicated by the letter in parens. Under Alternative 2, none of these species are assumed to be included in the Agencies' SSSPs. Known sites would no longer be managed and Strategic Surveys would no longer be required.

Group 4

Under all alternatives, the following 63 species, (60 in all of their range and 3 in part of their range) would maintain stable populations largely due to the high number of occurrences, or because a substantial number of known sites are located in reserves. These species would stabilize in a pattern similar to or different from their reference distribution. For all alternatives, habitat (including known sites) is sufficient to support populations in the NWFP area (all species are off Survey and Manage in Alt. 2).

Albatrellus flettii in OR (Alts 1&3: off, Alt 4: B)
Boletus pulcherrimus (B)
Bondarzewia mesenterica in OR (Alts 1&3: off, Alt 4: B)
Bondarzewia mesenterica in WA and CA (B)
Cantharellus subalbidus in WA and CA (D),
Cantharellus subalbidus in OR (Alts 1&3: off, Alt 4: D)
Chalciporus piperatus (D)
Chromosera cyanophylla (Alts 1&3: off, Alt 4: B)
Clavariadelphus occidentalis (B)
Clavariadelphus truncatus (Alt 1: D, Alt 3: off, Alt 4: B)
Clavulina castanopes var. *lignicola* (B)
Collybia bakerensis (Alt 1: F, Alt 3: off, Alt 4: B)
Collybia racemosa (B)
Cordyceps capitata (Alts 1&3: off, Alt 4: B)
Craterellus tubaeformis (Alts 1&3: off, Alt 4: D)
Cortinarius olympianus (B)
Galerina cerina (B)
Galerina heterocystis (E)
Galerina atkinsoniana (Alts 1&3: off, Alt 4: B)
Galerina vittaeformis (Alts 1&3: off, Alt 4: B)
Gastroboletus ruber (B)
Gastroboletus subalpinus (B)
Gastroboletus turbinatus (B)
Gelatinodiscus flavidus (B)
Gomphus clavatus (Alt 1: F, Alt 3: off, Alt 4: B)
Gymnopilus punctifolius in OR and WA (Alts 1&3: off, Alt 4: B)
Gyromitra esculenta (Alts 1&3: off, Alt 4: F)
Gyromitra infula (Alts 1&3: off, Alt 4: B)
Gyromitra melaleucoides (Alts 1&3: off, Alt 4: B)
Gyromitra montana (Alts 1&3: off, Alt 4: F)
Helvella elastica (B)
Helvella maculata (Alts 1&3: off, Alt 4: B)
Hygrophorus saxatilis (B)
Hydnum umbilicatum (Alts 1&3: off, Alt 4: B)
Leucogaster citrinus (B)
Mycena monticola (Alts 1&3: off, Alt 4: B)
Mycena overholtsii (Alt1: D, Alt 3: off, Alt 4: B)
Mycena tenax (B)
Neolentinus kauffmanii (B)
Neournula pouchetii (Alts 1&3: off, Alt 4: B)
Nivatogastrium nubigenum in OR Eastern Cascades and CA Cascades Physiographic provinces (Alts 1&3: off, Alts 4: B)
Nivatogastrium nubigenum in the remainder of the range (B)
Otidea leporina (Alts 1: D, Alt 3: off, Alt 4: B)
Otidea onotica (Alts 1&3: off, Alt 4: F)
Phaeocollybia attenuata (D)
Phaeocollybia kauffmanii (D)
Phaeocollybia olivacea in WA and CA (Alts 1&3: E, Alt 4: B)
Phaeocollybia olivacea in OR (Alt 1: F, Alt 3: off, Alt 4: B)
Phaeocollybia oregonensis (B)
Phellodon atratus (B)
Pithya vulgaris (Alts 1&3: off, Alt 4: D)
Plectania melastoma (Alts 1&3: off, Alt 4: F)
Plectania milleri (Alts 1&3: off, Alt 4: B)
Ramaria abietina (B)
Ramaria celerivirescens (B)
Ramaria conjunctipes var. *sparsiramosa* (B)

Ramaria rubripermanens in OR
(Alt 1: D, Alt 3: off, Alt 4: B)
Rhizopogon truncatus (D)
Rickenella swartzii (B)
Sarcodon imbricatus (Alts 1&3: off, Alt 4: B)
Sarcosoma latahense (Alts 1&3: off, Alt 4: B)
Sarcosoma mexicana (Alts 1&3: off, Alt 4: F)
Sarcosphaera eximia (Alts 1&3: off, Alt 4: B)
Spathularia flavida (B)
Tremiscus helvelloides
(Alt 1: D, Alt 3: off, Alt 4: B)
Turbinellus floccosus (Alts 1&3: off, Alt 4: F)
Tylopilus porphyrosporus (D)

Hygrophorus karstenii is presently known as *Hygrophorus saxatilis* (Castellano et al. 2003). *Gomphus bonarii* is a synonym *of Turbinellus floccosus* (Schwein) Earle, which is the correct name for *Gomphus floccosus* (Giachini 2004).

Chomosera cyanophylla, Cordyceps capitata, Galerina vittaeformis, Gyromitra esculenta, Gyromitra influa, Gyromitra melaleucoides, Gyromitra montana, Helvella maculate, Hydnum umbilicatum, Mycena monticola, Neournula pouchettii, Otidea onotica, Pithya vulgaris, Plectania melastoma, Plectania milleri, Sarcosoma latahense, Sarcosoma mexicana, and *Sarcosphaera eximia* were removed from the Survey and Manage Standards and Guidelines during the 2001-2003 Annual Species Review process because they were found to be not associated with LSOG forest. They would have sufficient habitat to support stable populations without species-specific management.

Albatrellus flettii (in OR), *Bondarzewia mesenterica* (in OR), *Cantharellus subalbidus* (in OR), *Craterellus tubaeformis, Galerina atkinsoniana, Gymnopilus punctifolius* (in OR and WA), *Nivatogastrium nubigenum* (in OR Eastern Cascades and CA Cascades Physiographic provinces), and *Sarcodon imbricatus* were removed from the Survey and Manage Standards and Guidelines during the 2001-2003 Annual Species Review process because they were found to have sufficient habitat to support stable populations without species-specific management.

Clavariadelphus truncates, Collybia bakerensis, Gomphus clavatus, Mycena overholtsii, Otidea leporine, Phaeocollybia olivacea, Ramaria rubripermenans (in OR), and *Tremiscus helvelloides* moved from being managed under Category B (Alternative 4) into management under Categories D, E or F (Alternative 1) during the 2001-2003 Annual Species Review process. All four categories require Strategic Surveys. In addition, Categories B and E require managing all known sites, while Category D requires managing high-priority sites.

Under Alternative 1, 39 of these species, (35 in all of their range and 4 in part of their range) would be included in Categories B, D, E, or F as indicated by the letter in parens. All four categories require Strategic Surveys. In addition, Categories B and E require managing all known sites, while Category D requires managing high-priority sites. The remaining species (5 in part of their range and 22 in all of their range), would be off Survey and Manage. *Cordyceps capitata* and *Mycena monticola* are assumed to be included as a Sensitive Species by the Forest Service in Region 6 (Oregon and Washington). Pre-project clearances would be conducted and known sites would be managed if loss of the site would contribute to a trend toward listing. General inventories may be conducted.

Under the scenario of Alternative 1 without SSSP, the outcome for *Cordyceps capitata* and *Mycena monticola* is also habitat (including known sites) is sufficient to support stable populations across the NWFP area.

Under Alternative 2, 53 of these 63 species are assumed not to be included in any of the Agencies' SSSPs. Known sites would no longer be managed and Strategic Surveys would no longer be required. The remaining 10 species are assumed to be included in one or more of the Agencies' SSSPs. Pre-project clearances would be conducted and known sites would be managed if loss of the site would contribute to a trend toward listing. General inventories may be conducted. *Leucogaster citrinus* is assumed to be included as a Sensitive Species by the Forest Service in Region 6 (Oregon and Washington) and

the BLM in California. *Boletus pulcherrimus* is assumed to be included as a Sensitive Species by the Forest Service in Regions 5 and 6, and the BLM in Oregon. *Phaeocollybia oregonensis* is assumed to be included as a Sensitive Species by the Forest Service in Region 6 (Oregon and Washington) and the BLM in Oregon. *Cordyceps capitata*, *Mycena monticola,* and *Phaeocollybia attenuata* are assumed to be included as a Sensitive Species by the Forest Service in Region 6 (Oregon and Washington). *Phaeocollybia olivacea* is assumed to be included as a Sensitive Species by the Forest Service and BLM in California and Oregon. *Spathularia flavida* is assumed to be included as a Sensitive Species by the Forest Service in Washington and the BLM in California. *Clavariadelphus occidentalis* is assumed to be included as a Sensitive Species by the Forest Service in Washington. *Clavulina castanopes* v. *lignicola* is assumed to be included as a Sensitive Species by the BLM in California. *Collybia racemosa* is assumed to be included as a Sensitive Species by the BLM in California and the Forest Service in Region 5 (California).

Under the scenario of Alternative 2 without SSSP, the outcome for *Boletus pulcherrimus*, *Collybia racemosa*, *Phaeocollybia olivacea* (in OR) and *Ramaria rubripermanens* is habitat (including known sites) is insufficient to support stable populations across the NWFP area. *Clavariadelphus occidentalis*, *Clavulina castanopes* v. *lignicola, Cordyceps capitata, Leucogaster citrinus*, *Mycena monticola*, *Phaeocollybia olivacea* (in CA and WA), and *Spathularia flavida* would have an outcome of habitat (including known sites) is sufficient to support stable populations across the NWFP area.

Under Alternative 3, 22 species in all of their range and 8 species in part of their range would be included in Category B, and 1 species in part of its range would be in Category E, as indicated by the letter in parens. Three species and the "off" part of a fourth are assumed to be included in SSSPs. *Cordyceps capitata, Mycena monticola, and Phaeocollybia attenuata* are assumed to be included as a Sensitive Species by the Forest Service in Region 6 (Oregon and Washington). *Phaeocollybia olivacea* in Oregon is assumed to be included as a Sensitive Species by the Forest Service in Region 6 and the BLM in Oregon. Pre-project clearances would be conducted and known sites would be managed if loss of the site would contribute to a trend toward listing. General inventories may be conducted. Under the scenario of Alternative 3 without SSSP, the outcome for these species is also habitat (including known sites) is sufficient to support stable populations across the NWFP area. The remaining 13 species would not be included in Survey and Manage and are assumed not to be included in any of the Agencies' SSSPs

Under Alternative 4, all 63 species would be included in Categories B, D, E, or F as indicated by the letter in parens. All four categories require Strategic Surveys. In addition, Categories B and E require managing all known sites, while Category D requires managing high-priority sites.

Clavariadelphus occidentalis had 9 RMS detections. This species is widespread and well distributed in Oregon and California portions of the NWFP area; it is much less common in Washington. It is a saprobic species that decomposes humus material so the expectation is that is has broad habitat requirements. It fruits earlier in the wet season than other fungi, which means it has probably gone under-represented in the historic record. This new evaluation indicates the species is not as uncommon, and is better distributed than previously thought. Seven of the 9 RMS detections were on reserve lands. It was not particularly associated with LSOG (6 LSOG, 3 non-LSOG detections) further supporting its broad habitat requirements.

Galerina heterocystis had 18 RMS detections but had previously been known only from a few sites. This species is a relatively indistinct little fragile mushroom of low stature that is easily overlooked. It also belongs to a fungal genus that is problematic at best to identify to species. Most collectors of macrofungi overlook or disregard little brown mushrooms, as they are extremely numerous and a time-sink to identify correctly. This species is probably underrepresented in the historic record. It is a saprobic species that

decomposes humus material so the expectation is that is has broad habitat requirements. The small fragile saprobic mushrooms also fruit early in the wet season usually before the larger macrofungi. The RMS data reveal that this species is mostly associated with LSOG. This new understanding indicates the species is not as uncommon as, and is better distributed than, previously thought. Populations are mostly in reserve lands.

Leucogaster citrinus had an unusually high number of RMS detections (33) but is otherwise known only from a few sites. The RMS data reveal that this species is mostly associated with reserve LSOG lands. This species is a sequestrate hypogeous fungus that belongs to a genus that has a demonstrated preference to fruit in the dry part of the season. Traditionally the collection of fungi occurs during the rainy wet season as fungi have relatively high demands for available water. Because it fruits beneath the soil surface, it is not exposed to the drying winds or temperatures that limit most other macrofungi from fruiting. The cryptic nature of the fruiting body also makes it hard to detect when present on site. The high number of RMS detections may be an artifact of the collecting season that was conducive to fruiting and the timing of the RMS. These new findings indicate the species is not as uncommon as, and is better distributed than, previously thought. Populations are mostly in reserve lands.

Rhizopogon truncates had 15 RMS detections. This species is typically associated with *Pinus lambertiana* in western North America and is found predominately in southern Oregon and the extreme north portion of northern California. While it is also a sequestrate hypogeous species it forms an extensive, dense, bright yellow mycelial network in the soil that help locate potential colonies so it is one of the easier sequestrate species to determine if it is present on site. This new understanding indicates the species is not as uncommon as, and is better distributed than, previously thought. Known populations are mostly in reserve lands.

Spathularia flavida had 9 RMS detections, but few other known sites. This species is widespread and well-distributed across the NWFP area. It is a saprobic species that decomposes humus material so the expectation is that is has broad habitat requirements. This relatively small mushroom fruits earlier in the wet season than other fungi, which means it has probably gone under-represented in the historic record. This new evaluation indicates the species is not as uncommon, and is better distributed in Oregon than previously thought. Seven of the 9 RMS detections were on reserve lands. It was not particularly associated with LSOG (5 LSOG, 4 non-LSOG detections) further supporting its broad habitat requirements.

The RMS Survey has provided new information about other species, which indicate that the species are not as uncommon, and are better distributed than previously thought. *Phaeocollybia attenuata* had 6 RMS detections, and five of the six RMS detections were on reserve lands. *Ramaria celerivirescens* had 14 RMS detections. Most of the RMS detections were on reserve lands and all but one was associated with LSOG. *Ramaria rubripermanens*, in Oregon, had 9 RMS detections and eight of the nine RMS detections were on reserve lands.

Group 5

The following 9 species (8 in all of the NWFP area range, and one in part of its NWFP area range) are not endemic to the NWFP area. Under Alternatives 1 and 4, these 9 species would be included in Categories B or D. Both categories require Strategic Surveys. Category B requires management of known sites. Category D requires management of high-priority sites. For these species, management under the Survey and Manage Standards and Guidelines would allow these species to stabilize in a pattern similar to their reference distribution. Habitat (including known sites) is sufficient to support stable populations in the NWFP area. However, within the NWFP area, due to overall low numbers of known sites and low numbers of known sites located in reserves,

these species have limited potential for connectivity or gene flow between sites or clusters of sites.

Albatrellus ellisii (B)
Albatrellus flettii in CA & WA (B)
Clavariadelphus ligula (B)
Clavariadelphus sachalinensis (B)
Polyozellus multiplex (B)
Ramaria cyaneigranosa (B)
Ramaria rubrievanescens (B)
Sowerbyella rhenana (B)
Sparassis crispa (D)

Under Alternative 2, all of these species would receive management of known sites through the SSSPs. Pre-project clearances would be conducted and known sites would be managed if loss of the site would contribute to a trend toward listing. General inventories may be conducted. *Sowerbyella rhenana* is assumed to be included as a Sensitive Species by the Forest Service Washington, and the BLM in California. *Albatrellus ellisii* and *Ramaria cyaneigranosa* are assumed to be included as a Sensitive Species by the Forest Service in Regions 5 and 6, and the BLM in California. *Albatrellus flettii*, *Clavariadelphus ligula*, *Polyozellus multiplex*, and *Sparassis crispa* are assumed to be included as a Sensitive Species by the BLM in California. *Clavariadelphus sachalinensis* and *Ramaria rubrievanescens* are assumed to be included as a Sensitive Species by the Forest Service Washington. SSSPs provide similar protection for these species, and where the species is on a SSSP, habitat (including known sites) would be sufficient to support stable populations. However, in areas where the species is not on a SSSP, because the known sites of these species are not otherwise substantially protected by reserves, habitat (including known sites) would be insufficient to support stable populations in the NWFP area. This is due to soil disturbance and/or significant loss of host species (USDA, USDI 2000a:243; GeoBOB/ISMS database). Although Matrix Standards and Guidelines provide for minimizing soil and litter disturbance, there is a lack of knowledge about how much disturbance can be tolerated by these species. Loss of even a few known sites could adversely impact persistence within the NWFP area. Under the scenario of Alternative 2 without SSSP, habitat (including known sites) would also be insufficient to support stable populations in the NWFP area

Alternative 3 would require management of known sites for 8 of these 9 species. Under Alternative 3, these 8 species would stabilize in a pattern similar to their reference distribution. Habitat (including known sites) would be sufficient to support stable populations in the NWFP area. Under Alternative 3, *Sparassis crispa* would not be included in Survey and Manage. *Sparassis crispa* is assumed to be included as a Sensitive Species by the BLM in California, which would provide similar protection to Survey and Manage. Pre-project clearances would be conducted and known sites would be managed if loss of the site would contribute to a trend toward listing. General inventories may be conducted. Where *Sparassis crispa* is on a SSSP, habitat (including known sites) would be sufficient to support stable populations. However, in areas where the species is not on a SSSP, because the known sites of *Sparassis crispa* is not otherwise substantially protected by reserves, habitat (including known sites) would be insufficient to support stable populations in the NWFP area due to soil disturbance and/or significant loss of host species (USDA, USDI 2000a:243; GeoBOB/ISMS database). Although Matrix Standards and Guidelines provide for minimizing soil and litter disturbance, there is a lack of knowledge about how much disturbance can be tolerated by these species. Loss of even a few known sites could adversely impact persistence within the NWFP area. For *Sparassis crispa,* under the scenario of Alternative 3 without SSSP, habitat (including known sites) would be insufficient to support stable populations in the NWFP area

The RMS Survey provided some new information for *Clavariadelphus ligula* (4 RMS detections) and *Ramaria rubrievanescens* (3 RMS detections). The range of expected detections at the 95% confidence interval includes 0. All these species have relatively few total known sites.

Group 6

The following 21 species (19 in all of their range, and 2 in part of their range) are endemic to the NWFP area or the Pacific Northwest. Under Alternatives 1 and 4, these species would be included in Categories B, D, or E, as indicated by the letter in parens following the species name. Categories B and E require management of known sites and Strategic Surveys. Category D requires management of high-priority sites and Strategic Surveys. These species would stabilize in a pattern similar to their reference distribution. Habitat (including known sites) is sufficient to support stable populations in the NWFP area. However, due to overall low numbers of known sites and low numbers of sites located in reserves, these species have limited potential for connectivity or gene flow between sites or clusters of sites.

Cortinarius barlowensis (B)
Cudonia monticola (B)
Gomphus kauffmanii (Alts 1&3: E, Alt 4: B)
Gymnopilus punctifolius in CA (B)
Gyromitra californica (B)
Phaeocollybia californica (B)
Phaeocollybia dissiliens (B)
Phaeocollybia fallax (D)
Phaeocollybia piceae (B)
Phaeocollybia pseudofestiva (B)
Phaeocollybia scatesiae (B)
Phaeocollybia sipei (B)
Phaeocollybia spadicea (B)
Ramaria amyloidea (B)
Ramaria araiospora (B)
Ramaria aurantiisiccescens (B)
Ramaria gelatiniaurantia (B)
Ramaria largentii (B)
Ramaria rubripermanens in WA and CA (B)
Ramaria stuntzii (B)
Sarcodon fuscoindicus (B)

Under Alternative 2, all of these species would receive management of known sites through the SSSPs. Pre-project clearances would be conducted and known sites would be managed if loss of the site would contribute to a trend toward listing. General inventories may be conducted. *Phaeocollybia piceae*, *Phaeocollybia pseudofestiva*, *Phaeocollybia scatesiae*, *Phaeocollybia spadicea*, *Ramaria amyloidea*, *Ramaria aurantiisiccescens*, and *Ramaria largentii* are assumed to be included as a Sensitive Species by the Forest Service in Region 6 (Oregon and Washington) and the BLM in California. *Cudonia monticola* is assumed to be included as a Sensitive Species by the Forest Service in Regions 5 and 6. *Gomphus kauffmanii*, *Gyromitra californica*, and *Ramaria gelatiniaurantia* are assumed to be included as a Sensitive Species by the Forest Service in Region 6 (Oregon and Washington). *Phaeocollybia californica* is assumed to be included as a Sensitive Species by the Forest Service in Oregon and the BLM in California and Oregon. *Cortinarius barlowensis*, *Phaeocollybia dissiliens*, and *Phaeocollybia sipei* are assumed to be included as a Sensitive Species by the Forest Service in Oregon. *Sarcodon fuscoindicus* is assumed to be included as a Sensitive Species by the Forest Service in Washington and BLM in California. *Phaeocollybia fallax*, *Ramaria araiospora*, *Ramaria rubripermanens*, and *Ramaria stuntzii* are assumed to be included as a Sensitive Species by the Forest Service in Washington. *Gymnopilus punctifolius* is assumed to be included as a Sensitive Species by BLM in California. SSSPs provide similar protection for these species, and where the species is on a SSSP, habitat (including known sites) would be sufficient to support stable populations. However, in areas where the species is not on a SSSP, because the known sites of these species are not otherwise substantially protected by reserves, habitat (including known sites) would be insufficient to support stable populations in the NWFP area. This is due to soil disturbance and/or significant loss of host species (USDA, USDI 2000a:243; GeoBOB/ISMS database). Although Matrix Standards and Guidelines provide for minimizing soil and litter disturbance, there is a lack of knowledge about how much disturbance can be tolerated by these species. Loss of even a few known sites could adversely impact persistence within the NWFP area. *Cortinarius barlowensis* and *Ramaria gelatiniaurantia* would be protected range-wide by SSSPs, and would have habitat (including known sites) would be sufficient to support stable populations under all alternatives. Under the scenario of Alternative 2 without SSSP, habitat (including known sites) would be insufficient to support stable populations in the NWFP area

Under Alternative 3, 20 of these species would be included in Category B or E, as indicated by the letter in parens following the species name. Categories B and E require management of known sites and Strategic Surveys. These species would stabilize in a pattern similar to their reference distribution. Habitat (including known sites) would be sufficient to support stable populations in the NWFP area. Under Alternative 3, *Phaeocollybia fallax* would not be included on Survey and Manage. *Phaeocollybia fallax* is assumed to be included as a Sensitive Species by the Forest Service in Washington, which would provide similar protection to Survey and Manage. Pre-project clearances would be conducted and known sites would be managed if loss of the site would contribute to a trend toward listing. General inventories may be conducted. Where *Phaeocollybia fallax* is on a SSSP, habitat (including known sites) would be sufficient to support stable populations. However, in areas where the species is not on a SSSP, because known sites of *Phaeocollybia fallax* are not otherwise substantially protected by reserves, habitat (including known sites) would be insufficient to support stable populations in the NWFP area. This is due to soil disturbance and/or significant loss of host species (USDA, USDI 2000a:243; GeoBOB/ISMS database). Although Matrix Standards and Guidelines provide for minimizing soil and litter disturbance, there is a lack of knowledge about how much disturbance can be tolerated by these species. Loss of even a few known sites could adversely impact persistence within the NWFP area. For *Phaeocollybia fallax*, under the scenario of Alternative 3 without SSSP, habitat (including known sites) would be insufficient to support stable populations in the NWFP area.

Cortinarius barlowensis had 17 RMS detections and was previously known from few sites. This tripling of sites is inexplicable for the most part. This species is a fairly stout mushroom but could be easily confused with some other species in the genus *Cortinarius*. It seems to be restricted in distribution to true fir (*Abies* spp.) in the Mt. Hood area in Oregon and high elevation sites in the Olympic National Park and the Cascades Mountains of Washington. Numerous RMS detections were very close to previously known sites. Most RMS detections are on reserve lands or those with LSOG.

The RMS Survey provided some new information for *Phaeocollybia spadicea* (3 RMS detections) and *Ramaria araiospora* (11 RMS detections). The range of expected detections at the 95% confidence interval includes 0. Both species have relatively few total known sites.

Cudonia monticola had six RMS detections but the 95% confidence level for the estimated range of 0.1 ha detections is 66,300-2,147,500. *Gyromitra californica* had four RMS detections but the 95% confidence level for the estimated range of 0.1 ha detections is 3,800-879,000. *Sarcodon fuscoindicus* had six RMS detections but the 95% confidence level for the estimated range of 0.1 ha detections is 2,000-663,200. For these species, the low range of occupancy coupled with the low number of additional known sites indicates habitat insufficient to support stable populations when they are not protected by either Survey and Manage nor SSSPs.

Summary and Mitigation

Under all alternatives, there is insufficient information to determine an outcome for 3 of the 208 species.

Under all alternatives, for 115 of the 208 fungi species, habitat (including known sites) is insufficient to support stable populations in the NWFP area. This is due to factors other than federal action.

Under all alternatives, for 62 species in all of their range and 3 in a portion of their range, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

For those 62 species in all of their range, and 3 in a portion of their range, under the scenario of Alternative 2 without SSSP, 5 species in all of their range and 2 in a portion of their range would have habitat (including known sites) is insufficient to support stable populations in the NWFP area. The remaining 58 species in all of their range and 1 in a portion of its range would have habitat (including known sites) sufficient to support stable populations in the NWFP area.

Under Alternatives 1 and 4, the remaining 25 species in all of their range, and 3 species in a portion of their range (of the 208 fungi species) would stabilize in a pattern similar to their reference distribution. Habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, the remaining 25 species in all of their range, and 3 species in a portion of their range habitat (including known sites) would be insufficient to support stable populations in the NWFP area, except in areas where they would be protected by SSSPs. Those portions of the range would have habitat (including known sites) sufficient to support stable populations. Under the scenario of Alternative 2 without SSSP, the outcome would be habitat (including known sites) would be insufficient to support stable populations in the NWFP area.

Under Alternative 3, 23 of the remaining 25 species in all of their range, and 3 species in a portion of their range would stabilize in a pattern similar to their reference distribution. Habitat (including known sites) would be sufficient to support stable populations in the NWFP area. For the other two species, habitat (including known sites) would be insufficient to support stable populations in the NWFP area except in areas where they would be protected by SSSPs. Those portions of the range would have habitat (including known sites) sufficient to support stable populations. Under the scenario of Alternative 2 without SSSP, the outcome would be habitat (including known sites) would be insufficient to support stable populations in the NWFP area.

Lichens

Affected Environment

Lichens are symbiotic organisms made of members of at least two, and sometimes three, biological kingdoms. All lichens consist of a photosynthetic component (either a green algae or a cyanobacterium, and occasionally both) and a fungal component (usually an ascomycete).

The distribution of many lichens is dispersal limited (USDA et al. 1993). Overall, lichens disperse and grow more slowly than vascular plants. Many of the lichens in the Survey and Manage Standards and Guidelines have narrow ecological amplitude. Many of the forest species are epiphytic, growing directly on trees and shrubs, but some grow on downed wood or soil, or are aquatic and are partially submerged at least part of the year. Lichens often occupy late-successional and old-growth components that provide continuity in younger stands, such as legacy trees, wolf trees, well-developed hardwood gaps, and dynamic riparian areas with an old alder component. Some of the Northwest Forest Plan Standards and Guidelines, such as green tree retention and riparian buffers, can be effective for lichens, if clumps of colonized trees are retained to act as “seed” sources when habitat conditions become suitable again. FEMAT states that riparian buffers on all orders of streams are important for riparian and aquatic lichens (USDA et al. 1993:IV-97).

At the time of the Northwest Forest Plan Final SEIS (1994), there was little information about the distribution, number of sites, and habitat requirements for most of the lichens.

New information has contributed substantially to the understanding of many species' frequency and distribution throughout the NWFP area. Most of this information is a direct result of pre-disturbance and Strategic Surveys, statistical analyses of data from Oregon National Forests in the NWFP area and the Gifford Pinchot National Forest in Washington (Edwards et al. 2002), and the Coastal Lichen Study (Glavich et al. 2002). The historic distribution of these species is unknown and can only be inferred.

Additional information regarding the affected environment for lichens is found in the 2000 Final SEIS, the Northwest Forest Plan Final SEIS, and FEMAT.

Lichen Functional Groups

In the Option 9 and Alternative 9 analyses, lichens were grouped into 12 functional groups based on ecological relationships. Some of these groups were subdivided by their degree of rarity (USDA et al. 1993:IV-92). Additional information since these analyses has further refined membership within functional groups, and has also indicated that some functional affinities might not be as strong as once suspected. Although lichens are not analyzed by functional groups here, a brief description of the modified functional groups is presented below. This is not intended as a formal definition of functional groups, a task that is beyond the scope of this analysis. Each species is analyzed individually.

Forage Lichens

The forage lichens are a group of long, pendulous species that includes *Bryoria tortuosa.*

Coastal Lichens

The coastal lichen group includes *Bryoria pseudocapillaris, Bryoria subcana, Bryoria spiralifera, Buellia oidalea, Heterodermia sitchensis, Hypotrachyna revoluta, Niebla cephalota, Pannaria rubiginosa, Pyrrhospora quernea,Teloschistes flavicans,* and *Usnea hesperina*.

Information from the Coastal Lichen Study (Glavich et al. 2002) and the GeoBOB/ ISMS database confirm earlier information that all of the coastal lichens are rare and have narrow ecological amplitudes in limited habitat. None of these species are well represented in the reserves. Additional publications (Geiser et al. 2004, Geiser and Neitlich 2006, Glavich et al. 2005a, b, Lesher et al. 2003, Mote et al. 2003), and one report (Glavich et al. 2006), provide evidence corroborating previous concepts of these species and expand understanding of distribution, number of populations in reserves, habitat requirements, and potential vulnerability to climate change.

Riparian Lichens

The riparian lichen group includes *Cetrelia cetrarioides*, *Collema nigrescens, Ramalina pollinaria and Ramalina thrausta.*

Recent information indicates some riparian enhancement projects, especially hardwood removal to promote conifer development, may disturb habitat for riparian lichens (USDA, USDI 2003c). Riparian hardwoods can be an important substrate for these species.

Ambiguous Riparian Association Lichens

This group includes lichens whose riparian association is in question. The ambiguous riparian association lichens include *Leptogium cyanescens, Leptogium teretiusculum, Platismatia lacunosa,* and *Usnea longissima*.

Aquatic Lichens

The aquatic lichen group includes *Dermatocarpon meiophyllizum* and *Leptogium rivale*.

Aquatic lichens are truly aquatic and are submerged at least part of the year. The Aquatic Conservation Strategy was designed to address all elements of the aquatic and riparian ecosystem. FEMAT states that riparian buffers on all orders of streams are important for the riparian and aquatic lichens (USDA et al. 1993:IV-97). Riparian enhancement projects may disturb habitat for aquatic lichens (Derr 1998).

Rare and Uncommon Nitrogen-Fixing Lichens

This group includes *Dendriscocaulon intricatulum, Lobaria linita, Lobaria oregana, Nephroma bellum, Nephroma isidiosum, Nephroma occultum, Peltigera pacifica, Pseudocyphellaria perpetua,* and *Pseudocyphellaria rainierensis*.

These cyanolichens fix atmospheric nitrogen and make it usable to other components of the ecosystem.

Pin Lichens

The pin lichen group includes *Calicium abietinum, Calicium adspersum, Calicium glaucellum, Calicium viride, Chaenotheca chrysocephala, Chaenotheca ferruginea, Chaenotheca furfuracea, Chaenotheca subroscida, Chaenothecopsis pusilla, Microcalicium arenarium,* and *Stenocybe clavata*.

This is a group of small, easily overlooked species. Strategic Surveys have yielded new information on the rarity, distribution, and habitat association for many of these species.

Recent publications include (Rikkenen 2003) that expands the understanding of distribution and habitat requirements for the pin lichen group.

Decaying Wood Lichens

This group includes species that occur only on decaying wood, and includes *Cladonia norvegica*.

Other Lichens

Four species did not fit into any of the other groupings. They are *Hypogymnia duplicata, Hypogymnia oceanica, Hypogymnia vittata,* and *Tholurna dissimilis*.

Lichens of Taxonomic Concern

Two lichens, *Fuscopannaria* (*Pannaria*) *saubinetii* (a coastal lichen) and *Leptogium burnetiae* var. *hirsutum*, are lichens with taxonomic concerns.

Environmental Consequences

Under Alternative 1, there are 40 lichen species in the Survey and Manage Standards and Guidelines; 36 in all of their NWFP area range, and 4 in part of their NWFP area range. An additional five species are assumed to be included in one or more of the Agencies' Special Status Species Programs (SSSP) including one for part of its range where the other part of its range is on Survey and Manage. The remaining 5 species would not be included in Survey and Manage or SSSP.

Under Alternative 2, there are 31 lichen species assumed to be included in the Agencies' SSSPs (see Table 2-13).

Under Alternative 3, 37 lichen species would be included in the Survey and Manage Standards and Guidelines; 32 in all of their NWFP area range and 5 in part (Categories A, B, or E). An additional nine species are assumed to be included in the Agencies' SSSPs, including two for part of their range where the other part of their range is on Survey and Manage. Management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys for 11 species in Survey and Manage Category A. Late-successional and/or old-growth legacy components in these stands provide important refugia and propagule sources to re-colonize these stands. While surveys for these 11 species would not be completed in non-late-successional and non-old-growth stands, existing Northwest Forest Plan Standards and Guidelines for Matrix management (USDA, USDI 1994b:C-39 through C-48) provide for retention of these legacy components. The remaining five species would not be included in Survey and Manage or SSSP.

Under Alternative 4, 49 species would be included in the Survey and Manage Standards and Guidelines.

Under all alternatives, some of the lichen species would receive protection under the network of reserves provided by the Northwest Forest Plan. The level of protection varies by species, depending on how many sites and what proportions of the known sites are in reserves. Few statistical analyses have been done on the association between reserve allocations and lichens. Eight lichens (*Bryoria spiralifera*, *Buellia oidalea*, *Lobaria oregana*, *Nephroma isidiosum*, *Nephroma occultum*, *Peltigera pacifica*, *Pseudocyphellaria rainierensis*, and *Stenocybe clavata*) are Pacific Northwest endemics. FEMAT stated that "extirpation of these species in the region would equate to the extinction of the species" (USDA et al. 1993:IV-90). Two lichen species, *Hypogymnia vittata* and *Nephroma isidiosum*, are suspected but not documented in the NWFP area. The first record of *Heterodermia sitchensis* in the NWFP area was recently detected in coastal Oregon (McHenry and Tønsberg 2002).

The Northwest Forest Plan Final SEIS concluded that several alternatives including Alternative 9 were most favorable to lichens because they provided the set of allocations and management practices that best produce habitat components for lichens (USDA, USDI 1994a:3&4-145). In the Matrix, management that could provide suitable habitat for lichens includes clumping leave trees within managed stands and retaining old-growth fragments where little exists (USDA et al. 1993:IV-97). Colonized forest fragments act as refugia for lichens that become future propagule sources as suitable habitat conditions develop in the surrounding managed stand. Several of the late-successional and old-growth forest related lichens, including *Hypogymnia duplicata*, *Nephroma occultum*, and *Pseudocyphellaria rainierensis* are dispersal limited.

For some species, the following discussions group proximal or assemblages of known sites into fewer "populations" or "sites" than displayed on Table 2-13.

Bryoria pseudocapillaris

Recent information for *Bryoria pseudocapillaris* further clarifies its distribution and ecology. A recent study suggests that its world distribution is limited to within 16 km (10 miles) of the California, Oregon, and Washington coastlines (with just one, small population outside the NWFP area) (Glavich et al. 2005a). This study identified 14 populations on federal land, ten of which were new (Geiser et al. 2004). Of these 14 populations, only two are in reserves. The species was found to be statistically associated with non-reserve land allocations (Glavich et al. 2005a). The habitat for this species was recently defined by late-seral coastal forests in regions of moderate precipitation and winter temperatures

(Glavich et al. 2005b). Because temperature is an important factor in the habitat of *Bryoria pseudocapillaris*, this species is likely vulnerable to climate change.

Under Alternatives 1 and 3, *Bryoria pseudocapillaris* would be included in Category A, which requires pre-disturbance surveys, management of known sites, and Strategic Surveys. Under Alternative 3, pre-disturbance surveys are limited to late-successional and old-growth habitat. Under Alternative 4, this species would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. The 2000 FSEIS found this species would not maintain stable populations and/or distributions in Category B (USDA, USDI 2000a:293). Due to limited potential habitat, few populations on federally managed lands, and the potential for stochastic events, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Bryoria pseudocapillaris* is assumed to be included in the Agencies' SSSPs as Bureau Sensitive on BLM managed lands in Oregon and California and Sensitive on Forest Service managed lands in Oregon and Washington. Known sites would be managed and pre-project clearances would be conducted. General inventories may be conducted. The species is assumed not to be included as Sensitive for the Forest Service in California where there is suitable habitat at only one location. This species would not maintain stable populations and/or distributions under Alternative 2 due to limited potential habitat, few populations on federally managed lands, and the potential for stochastic events. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2, with or without SSSP. This outcome is not due to federal action.

Bryoria spiralifera

Recent information for *Bryoria spiralifera* further clarifies its distribution and ecology. A recent study suggests that its world distribution is limited to within 1.6 km (1 mile) of the California, Oregon, and Washington coastlines (with just one, small population outside the NWFP area) (Glavich et al. 2005a). This study identified 11 populations on federal land, five of which were new (Geiser et al. 2004). Although the detection sample was too small to test association, none of the 11 populations were in reserves (Glavich et al. 2005a). The habitat for this species was recently defined by late-seral coastal forests in regions of moderate precipitation and winter temperatures (Glavich et al. 2005b). Because temperature is an important factor in the habitat of *B. spiralifera*, this species is likely vulnerable to climate change. The two RMS detections do not demonstrate this species is secure.

Under Alternatives 1 and 3, *Bryoria spiralifera* would be included in Category A, which requires pre-disturbance surveys, management of known sites, and Strategic Surveys. Under Alternative 3, pre-disturbance surveys are limited to late-successional and old-growth habitat. Under Alternative 4, this species would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. The 2000 FSEIS found this species would not maintain stable populations and/or distributions in Category B (USDA, USDI 2000a:293). Due to limited potential habitat, few populations on federally managed lands, and the potential for stochastic events, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Bryoria* spiralifera is assumed to be included in the Agencies' SSSPs as Bureau Sensitive on BLM managed lands in Oregon and California and Sensitive on Forest Service managed lands in Oregon. Known sites would be managed and pre-project clearances would be conducted. General inventories may be conducted. This

species would not maintain stable populations and/or distributions under Alternative 2 due to limited potential habitat, few populations on federally managed lands, and the potential for stochastic events. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2 with or without SSSP. This outcome is not due to federal action.

Bryoria subcana

Bryoria subcana, which was previously thought to be strictly coastal (USDA, USDI 1994a), is now also known to occur in the Oregon Western Cascades (Glavich et al. 2002). This species is still considered to be rare with only one site in a reserve. New information for *Bryoria subcana* since the 2004 FSEIS has reduced the number of verified populations to four, all in the Oregon Coast Range and Oregon Western Cascades physiographic provinces. The lichen has not been found, so far, in Washington, and there have been no updates on the condition of historic sites just south of the NWFP area in San Mateo and Santa Clara Counties, CA since the 1970s. There are no other known sites in western North America. Because of the low number of known sites, there is still very little information about the habitat requirements of this lichen in the NWFP area.

Under Alternatives 1, 3, and 4, *Bryoria subcana* would be included in Category B, which requires management of known sites and Strategic Surveys. This species would not maintain stable populations and/or distributions (USDA, USDI 2000a:293). Due to limited potential habitat, few populations on federally managed lands, and the potential for stochastic events, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Bryoria subcana* would be removed from Survey and Manage. It is assumed to be included as a Bureau Assessment species on BLM managed lands in Oregon. Known sites would be managed and pre-project clearances would be conducted subject to limitations in funding or positions. Currently, only one of the four known sites occurs on BLM managed land. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2 for the same reason listed under Alternatives 1, 3, and 4. For Alternative 2 without SSSP on BLM managed lands, habitat remains insufficient to support stable populations. This outcome is not due to federal action.

***Bryoria tortuosa* (WA Olympic Peninsula, WA Western Lowlands, WA Western Cascades, OR Western Cascades, OR Coast Range, OR Willamette Valley, and CA Coast Range)**

Within this portion of the species' range, the 2002 Annual Species Review indicates there are a low number of known sites and that they are poorly distributed, and that the species is not associated with LSOG (USDA, USDI Species Review Panel 2002). At the time, a total of 18 sites were known. Since the 2002 ASR, one new site has been reported.

Under Alternatives 1, 2, and 3, *B. tortuosa* is removed from Survey and Manage. It is assumed to be included in the SSSP on BLM managed lands in California. Due to the low number of known sites and poor distribution, habitat (including known sites) is insufficient to provide for stable populations. Under Alternatives 1, 2, and 3 without SSSP on BLM managed lands in California, habitat is insufficient to provide for stable populations for the reasons listed.

Under Alternative 4, this species would be included in Category A, which requires management of all known sites and pre-disturbance surveys. Because known sites would be managed and pre-disturbance surveys conducted, there is sufficient habitat to provide for stable populations under Alternative 4.

***Bryoria tortuosa* (WA Eastern Cascades, OR Eastern Cascades, OR Klamath, CA Klamath, and CA Cascades Provinces)**

Information from the 2002 Annual Species Review indicates that within this portion of the species' range, *Bryoria tortuosa* has a moderate to high number of known sites, is well distributed, occurs in a wide range of habitat types, and is typically found in open, "well-lit" forest stands. A total of 650 sites were known at the time of the 2002 ASR (USDA, USDI Species Review Panel 2002). Since the 2002 ASR, 114 additional sites have been reported.

Under Alternatives 1, 2, and 3, *B. tortuosa* is removed from Survey and Manage within this portion of its range. It is assumed to be included in the SSSP on BLM-managed lands in California. Because the species is relatively common, has a wide range of habitats, and occurs in younger forest stands, habitat (including known sites) under Alternatives 1, 2, and 3 is sufficient to provide for stable populations with or without SSSP.

Under Alternative 4, *B. tortuosa* would be included in Category D, which requires management of high-priority sites and Strategic Surveys. For the reasons listed under Alternatives 1, 2, and 3, habitat is sufficient to provide for stable populations.

Buellia oidalea

Recent attempts to survey for *B. oidalea* support conclusions that this species is rare; it was not detected during the Coastal Lichen Study (Glavich et al. 2002). There is high concern for this species due to low numbers of known sites, low number of individuals, limited distribution, and narrow ecological amplitudes (USDA et al. 1993; USDA, USDI 1994a:J2; USDA, USDI 2000a; USDA, USDI Species Review Panel 1999).

Under Alternatives 1, 3, and 4 *Buellia oidalea* would be included in Category E, which requires management of known sites and Strategic Surveys. This species would not maintain stable populations and/or distributions (USDA, USDI 2000a:307). Due to low numbers of known sites, low number of individuals, limited distribution, and narrow ecological amplitude, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Buellia oidalea* is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories would not be required. This species would not maintain stable populations and/or distributions under Alternative 2 due to low numbers of known sites, low number of individuals, limited distribution, and narrow ecological amplitude. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. This outcome is not due to federal action.

Calicium abietinum

Calicium abietinum occurs in all three states. Information is still limited on the distribution, ecology, and abundance of this species in the NWFP area (USDA, USDI Species Review Panel 1999; 2000). New information since the 2004 FSEIS includes the report of one new site and information from proposive surveys.

Under Alternatives 1, 3, and 4, *C. abietinum* would be included in Category B, which requires management of known sites and Strategic Surveys. There is insufficient information to determine how distribution and stability of this species would be affected (USDA, USDI 2000a:290). Proposive surveys searching high probability habitat in western Oregon found this species to be infrequent (Rikkenen 2003). Due to limited information on the distribution, ecology, and abundance of this species in the NWFP area, there is insufficient information to determine an outcome under Alternatives 1, 3, and 4.

Under Alternative 2, *C. abietinum* is removed from Survey and Manage. It is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories would not be required. There is insufficient information to determine how the alternative would affect distribution and stability of this species due to limited information on its distribution, ecology, and abundance in the NWFP area. There is insufficient information to determine an outcome under Alternative 2.

Calicium adspersum

Calicium adspersum is still poorly known in the NWFP area (USDA, USDI 2000a:301). New information for this species since the 2004 FSEIS includes a report of the first site on federal land, located during proposive surveys (Rikkenen 2003) conducted in high probability habitat in western Oregon.

Under Alternatives 1, 3, and 4, *Calicium adspersum* would be included in Category E, which requires management of known sites and Strategic Surveys. Because only one site is known from federal lands in the NWFP area, there is insufficient information about this species to determine how distribution and stability would be affected (USDA, USDI 2000a:303). There is insufficient information to determine an outcome under Alternative 1, 3 or 4.

Under Alternative 2, *Calicium adspersum* is removed from Survey and Manage. It is assumed to be included in the Agencies' SSSPs as Bureau Assessment for the BLM in Oregon and as Sensitive for the Forest Service in California. Known sites would be managed on BLM managed lands in Oregon and Forest Service managed lands in California. Pre-project clearances would be conducted and general inventories may be completed on Forest Service managed lands in California. General inventories may be conducted. There is insufficient information about this species to determine how the alternative would affect distribution and stability. There is insufficient information to determine an outcome under Alternative 2. For Alternative 2 without SSSP on BLM managed lands in Oregon and Forest Service managed lands in California, there is insufficient information to determine an outcome for the reasons listed.

Calicium glaucellum

Information from the 2002 Annual Species Review indicates that this species is more common than previously known. It has a moderate to high number of known sites and a high proportion of those sites are likely to occur within reserves (USDA, USDI Species Review Panel 2002). The ASR records show 55 new known sites since the previous species review in 2000. In addition to the new sites, *C. glaucellum* had 35 RMS detections at that time. Since 2002, the total number of RMS detections has increased to 71, or 8 percent of the total number of plots in the study area. Since the 2002 ASR, proposive surveys conducted in high probability habitat in western Oregon found *C. glaucellum* to be frequent and broadly distributed in the OR Coast Range, OR Willamette Valley, and OR Western Cascade Range Provinces (Rikkenen 2003).

Under Alternatives 1, 2, and 3, *C. glaucellum* is removed from Survey and Manage and assumed not to be assigned to any Agency SSSP. Because current information indicates that this species is relatively common, widely distributed within the NWFP area, and that a large proportion of sites are expected to occur within reserves where it is afforded some protection, habitat (including known sites) is sufficient to provide for stable populations across the NWFP area.

Under Alternative 4, *C. glaucellum* would be included in Category F, which requires Strategic Surveys. Under this alternative, habitat is sufficient to provide for stable populations for the reasons listed under Alternatives 1, 2, and 3.

Calicium viride

Information from the 2002 Annual Species Review indicates that this species is more common than previously known (USDA, USDI Species Review Panel 2002). The ASR records show 119 known sites, 45 of which were new since the previous species review in 2000. It was also reported on 18 RMS plots at that time. Since the 2002 ASR, 57 new sites have been reported and the total number of RMS detections has increased to 45. Since the 2002 ASR, proposive surveys conducted in high probability habitat in western Oregon found *C. viride* to be frequent in the Willamette Valley and Cascade Range (Rikkenen 2003).

Under Alternatives 1, 2, and 3, *C. viride* is removed from Survey and Manage and assumed to be Bureau Sensitive on BLM managed lands in California where known sites would be managed. Because current information indicates that this species is relatively common and a large proportion of sites are expected to occur within reserves where they are afforded some protection, habitat is sufficient to provide for stable populations under Alternatives 1, 2, and 3 with or without SSSP.

Under Alternative 4, *C. viride* would be included in Category F, which requires Strategic Surveys. Under this alternative, habitat (including known sites) is sufficient to provide for stable populations across the NWFP area for the reasons listed under Alternatives 1, 2, and 3.

Cetrelia cetrarioides

Cetrelia cetrarioides is a riparian lichen that frequently occurs on large, old riparian hardwoods. It is considered rare and is found in Washington and Oregon. It is assumed to be protected by Riparian Reserves; however, riparian enhancement projects that remove large, old hardwoods may disturb habitat for this lichen. New information for *C. cetrarioides* since the 2004 FSEIS includes two detections from the RMS Survey. The range of expected detections at the 95% confidence interval (0 – 364,900) does not provide new information on the rarity of this species. A total of 24 new sites have been reported.

Under Alternatives 1, 3, and 4, *Cetrelia cetrarioides* would be included in Category E, which requires management of known sites and Strategic Surveys. This species would maintain stable populations and/or distributions (USDA, USDI 2000a:305). Due to management of known sites, and protection by reserves, habitat (including known sites) is sufficient to provide for stable populations under Alternatives 1, 3, and 4.

Under Alternative 2, *Cetrelia cetrarioides* is removed from Survey and Manage. It is assumed to be included in the SSSP for the Forest Service in Washington. This species would maintain stable populations and/or distributions under Alternative 2 due to management of known sites and pre-project clearances in the Washington portion of the range, and protection by reserves. Habitat (including known sites) is sufficient to provide for stable populations under Alternative 2. Under Alternative 2 without SSSP on Forest Service managed lands in Washington, habitat is sufficient to provide for stable populations within the NWFP area, however, because there are comparatively few known sites in Washington, removal of these from SSSP results in habitat insufficient to support stable populations within this portion of the NWFP area.

Chaenotheca chrysocephala

Chaenotheca chrysocephala was reported to be rare with only limited information on the distribution, ecology, and abundance of this species in the NWFP area (USDA, USDI Species Review Panel 1999; 2000). New information for C. *chrysocephala* since the 2004 FSEIS includes 14 detections from the RMS Survey, 18 new sites reported, and information from proposive surveys.

Under Alternatives 1, 3, and 4, *Chaenotheca chrysocephala* would be included in Category B, which requires management of known sites and Strategic Surveys. The RMS Survey data indicates a significant number of the sites would occur within reserve land allocations. Proposive surveys (Rikkenen 2003) conducted in high probability habitats in western Oregon found this species to be well distributed in both the Coast Range and Cascade Mountains. From this information it can be inferred that this species is relatively common, is well distributed within its range, and a moderate proportion of sites are likely to occur within reserve allocations where they are afforded some protection. Based on this information, habitat is sufficient to provide for stable populations under Alternatives 1, 3, and 4.

Under Alternative 2, *C. chrysocephala* is removed from Survey and Manage. It is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories would not be required. Because the species is likely to be relatively common, and a moderate proportion of known sites would occur within reserve land allocations, habitat is sufficient to provide for stable populations under Alternative 2.

Chaenotheca ferruginea

Chaenotheca ferruginea was considered to be rare with only limited information on the distribution, ecology, and abundance of this species in the NWFP area (USDA, USDI Species Review Panel 1999; 2000). New information for the species since the 2004 FSEIS includes three detections from the RMS Survey and the addition of 98 new sites. Most of the new sites are on lands managed by the BLM in southwest Oregon and the Forest Service in the Columbia River Gorge. Proposive surveys conducted in high probability habitats in western Oregon (Rikkenen 2003) found locations of *C. ferruginea* to be well distributed in montane conifer forests in the Coast Range and Cascade Mountains, as well as the foothills of the Willamette Valley

Under Alternatives 1, 3, and 4, *C. ferruginea* would be included in Category B, which requires management of known sites and Strategic Surveys. Because of the relatively large number of new sites and proposive surveys reporting the species to be well distributed in the Oregon Coast Range, Oregon Cascades and Willamette Valley foothills, it can be inferred that *C. ferruginea* is likely more common than previously known. For these reasons, Alternatives 1, 3, and 4, habitat is sufficient to provide for stable populations.

Under Alternative 2, *C. ferruginea* is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories would not be required. For the reasons stated for Alternatives 1, 3, and 4, habitat is sufficient to provide for stable populations under Alternative 2.

Chaenotheca furfuracea

Information from the 2003 Annual Species Review indicates that this species is more common than previously known (USDA, USDI Species Review Panel 2003). The ASR records show 153 known sites and 25 detections from the RMS Survey. Since the 2003 ASR, an additional 181 new sites have been reported and RMS detections have increased to 28, 82 percent of which are within reserves. Proposive surveys conducted in high probability habitat in western Oregon since the 2003 ASR found *C. furfuracea* to be frequent and broadly distributed in the OR Coast Range, OR Willamette Valley and OR Cascade Range Provinces (Rikkenen 2003).

Under Alternatives 1, 2, and 3, *C. furfuracea* is removed from Survey and Manage and not assumed to be assigned to any Agency SSSP. Because current information indicates that this species is relatively common, a large proportion of sites are expected to be

within reserves where it is afforded some protection, and it is widely distributed, habitat (including known sites) is sufficient to provide for stable populations across the NWFP area.

Under Alternative 4, *C. furfuracea* would be included in Category F, which requires Strategic Surveys. Under this alternative, habitat is sufficient to provide for stable populations for the reasons listed under Alternatives 1, 2, and 3.

Chaenotheca subroscida

Formerly, *Chaenotheca subroscida* was poorly known in the NWFP area and it was unknown if the species was even present (USDA, USDI 2000a:301). This species has now been confirmed in the NWFP area. New information for *C. subroscida* since the 2004 FSEIS includes four detections from the RMS Survey and eight new sites, for a total of 13 sites now known from the NWFP area.

Under Alternatives 1, 3, and 4, *C. subroscida* would be included in Category E, which requires management of known sites and Strategic Surveys. The range of expected detections from the RMS Survey at the 95% confidence interval (0 - 472,400 detections) does not provide additional information on the rarity of this species. This species would not maintain stable populations and/or distributions (USDA, USDI 2000a:303). Due to the low number of sites, limited distributions and populations, or limited suitable habitat on federally managed land, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *C. subroscida* is assumed to be included as Sensitive on Forest Service managed lands in Oregon and Washington. Known sites would be managed and pre-project clearances would be conducted. General inventories may be conducted. This species would not maintain stable populations and/or distributions under Alternative 2 due to the low number of sites, limited distributions and populations, or limited suitable habitat on federally managed lands. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. This outcome is not due to federal action. Alternative 2 without SSSP on Forest Service managed lands in Oregon and Washington would also have an outcome of insufficient habitat to support stable populations for the reasons listed under Alternative 2.

Chaenothecopsis pusilla

Formerly, *Chaenothecopsis pusilla* was poorly known in the NWFP area and it was unknown if these species were even present (USDA, USDI 2000a:301). This species has now been confirmed in the NWFP area. Information in 2004 indicated that this species has low site numbers, limited distributions and populations, few populations on federally managed lands, or limited suitable habitat on federally managed lands. However, proposive surveys conducted in high probability habitats in western Oregon (Rikkinen 2003) found *C. pusilla* to occur in a range of forest habitats and elevations within the Oregon Coast Range, Willamette Valley, Western Cascades, Eastern Cascades, and Klamath Physiographic Provinces. This new information indicates that the species is more common and widely distributed than was previously known.

Under Alternatives 1, 3, and 4, *C. pusilla* would be included in Category E, which requires management of known sites and Strategic Surveys. Because new information has determined that this species occurs more frequently, and in a wider range of habitats than was previously known, habitat is sufficient to provide for stable populations under Alternatives 1, 3 and 4.

Under Alternative 2, *C. pusilla* is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories are not required. Based on new information from proposive surveys that found the species to be widely distributed across western Oregon in habitats as diverse as low-elevation coastal forest, Willamette Valley foothill woodlands and sub-alpine forest on the Cascade Crest, it can be inferred that *C. pusilla* is likely more common than previously known. For these reasons, habitat is sufficient to provide for stable populations under Alternative 2.

Cladonia norvegica

Information from the 2003 Annual Species Review shows *C. norvegica* is well distributed in the NWFP area and known from 70 sites, of which 53 percent are in reserves. RMS detections were reported to be 37 (USDA, USDI Species Review Panel 2003). Since the 2003 ASR, the total number of RMS detections for the species has been reduced to 28.

Under Alternatives 1, 2, and 3, *C. norvegica* is removed from Survey and Manage and not assumed to be on any Agency SSSPs. Because current information indicates that this species is relatively common and a large proportion of sites are expected to be within reserves where it is afforded some protection, habitat (including known sites) is sufficient to provide for stable populations across the NWFP area.

Under Alternative 4, *C. norvegica* would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. Under this alternative habitat is sufficient to provide for stable populations for the reasons listed under Alternatives 1, 2, and 3.

Collema nigrescens

Collema nigrescens is a riparian lichen. It occurs primarily on deciduous trees and shrubs and occasionally mossy rock, mainly west of the Cascades (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999). It is included in the Survey and Manage Standards and Guidelines only for Washington and Oregon (except for the Oregon Klamath Physiographic Province) where there are relatively few documented sites (USDA, USDI 2000a:269). Elsewhere (Oregon and California Klamath Provinces and California Coast Range Province) the number of known sites increased from 2 to 474, with many sites in reserve allocations (USDA, USDI 2000a:269). In this part of its range where it is more common, there is a reasonable assurance of persistence as indicated by its widespread distribution, abundance, and by the number of known sites and availability of potential habitat in reserve land allocations (USDA, USDI Species Review Panel 1999). New information for *Collema nigrescens* since the 2004 FSEIS includes five detections from the RMS Survey and seven new sites reported. The total number of sites within the Survey and Manage portion of the range is 35.

Under Alternatives 1 and 4, *C. nigrescens* would be included in Category F which requires Strategic Surveys that could provide information to determine if the species is closely associated with late-successional or old-growth forest, whether reserve allocations provide for the species, and what is the appropriate management to provide for stable populations on federal lands (USDA, USDI 2000a:271). Until Strategic Surveys are completed, there is insufficient information to determine whether habitat (including known sites) is sufficient to support stable populations in the NWFP area under Alternatives 1 and 4.

Under Alternatives 2 and 3, *C. nigrescens* is removed from Survey and Manage. It is assumed to be Sensitive on Forest Service managed lands in Washington where sites will be managed and pre-project clearances completed. In Oregon, (except for the Oregon Klamath Province) sites will not be managed and pre-project clearances will not be conducted. Because Strategic Surveys have not been completed, there is insufficient

information to determine how these alternatives affect distribution and stability for the same reasons listed under Alternatives 1 and 4. Under Alternatives 2 and 3 without SSSP on Forest Service managed lands in Washington, sites will no longer be managed and pre-project clearances will not be conducted. The outcome for this scenario is insufficient information to determine how the alternatives affect distribution and stability for the same reasons listed under Alternatives 1 and 4.

***Dendriscocaulon intricatulum* (Washington, and Oregon except Coos, Douglas, Curry, Josephine, and Jackson Counties)**

Habitat preferences and the distribution of *Dendriscocaulon intricatulum* within this portion of its range differ from that in southwest Oregon and California. The 2002 Annual Species Review indicates that the species is rare (with 16 sites at that time), is poorly distributed, and the majority of sites occur in late-successional Douglas-fir and western hemlock communities. Most of the sites have a suppressed understory of silver fir under a canopy of late-successional and old-growth trees that provide moist, cool conditions (USDA, USDI Species Review Panel 2002). *D. intricatulum* most frequently occurs on the lower branches and dead twigs of suppressed, understory western hemlock and Pacific silver fir, which can be quite old. This is in contrast to the remainder of the range in southwest Oregon and California, where the majority of known sites occur in habitat less likely to include late-successional and old-growth components. New information since the ASR includes six new sites within this portion of the range.

Under Alternatives 1 and 3, *D. intricatulum* would be included in Category A, which requires management of known sites and pre-disturbance surveys. Under Alternative 3, pre-disturbance surveys are limited to late-successional and old-growth habitat. Because all known sites would receive protection, there is sufficient habitat (including known sites) to provide for stable populations under Alternatives 1 and 3.

Under Alternative 2, *D. intricatulum* would be removed from Survey and Manage. It is assumed to be a Forest Service Sensitive Species on Forest Service managed lands in Washington where known sites would be managed. Because this species is rare and poorly distributed within this portion of the range, the potential loss of the Oregon sites (which receive no protection) results in habitat insufficient to provide stable populations under Alternative 2 in Oregon. Habitat (including known sites) is sufficient to support stable populations, but is insufficient to support stable populations in a portion of the area. Under Alternative 2 without SSSP on Forest Service managed lands in Washington, habitat is insufficient to provide for stable populations for the reasons stated.

Under Alternative 4, *D. intricatulum* is included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. Because all known sites would receive protection, there is sufficient habitat (including known sites) to provide for stable populations under Alternative 4.

Dendriscocaulon intricatulum* (California*)

Recent information for *D. intricatulum* within the California portion of its range includes two detections from the RMS Survey and the report of 101 new sites on Forest Service managed lands in California. Under Alternatives 1 and 3, *Dendriscocaulon intricatulum* would be included in Category E, which requires management of known sites and Strategic Surveys. Because of the increase in the number of known sites in California, there is sufficient habitat to provide for stable populations under Alternatives 1 and 3.

Under Alternative 2, *D. intricatulum* is removed from Survey and Manage. The species is assumed to be included in the SSSP on BLM managed lands in California where sites would be managed. Because of the increase in the number of reported sites and because

the species appears to be more common than previously known within this portion of its range, under Alternative 2 with or without SSSP, habitat is sufficient to provide for stable populations.

Under Alternative 4, *D. intricatulum* would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. Under this alternative, habitat is sufficient to provide for stable populations for the reasons listed under Alternatives 1, 2, and 3.

***Dendriscocaulon intricatulum* (Oregon in Coos, Douglas, Curry, Josephine, and Jackson Counties)**

Information from the 2002 Annual Species Review indicates that this species is more common than previously known in southwest Oregon (USDA, USDI Species Review Panel 2002). A total of 489 new sites were reported since the previous species review in 2001, representing an 800 percent increase in known sites. Information also indicated that the species is well distributed across this portion of its range. Since the 2002 ASR, 117 additional sites have been reported.

Under Alternatives 1, 2, and 3, *D. intricatulum* is removed from Survey and Manage within this portion of the range and not assumed to be on SSSP in this area. Because current information indicates that this species is relatively common and well distributed, habitat (including known sites) is sufficient to provide for stable populations under Alternatives 1, 2, and 3.

Under Alternative 4, *D. intricatulum* would be included in Category B, which requires management of all sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. Under this alternative, habitat is sufficient to provide for stable populations for the reasons listed under Alternatives 1, 2, and 3.

***Dermatocarpon meiophyllizum* (*luridum*)**

New information for the aquatic lichen that had been known as *Dermatocarpon luridum* within the NWFP area shows that the species had been misidentified (Glavich and Geiser 2004). Of 12 historic *D. luridum* populations in the NWFP area that were relocated and re-identified, all proved to be *D. meiophyllizum*, not *D. luridum*. *Dermatocarpon luridum* does exist in the U.S., but has not yet been found in Oregon, Washington, or California (Glavich pers. observation). *Dermatocarpon meiophyllizum* is well known in Western Europe (Heiðmarsson 2001), but it was only recently discovered in North America (Glavich and Geiser 2004). Prior to a recent study of aquatic lichens in the NWFP area, *D. meiophyllizum* was known from only nine sites in North America. An additional 22 populations of *D. meiophyllizum* have been discovered on Forest Service and BLM lands in all three states of the Northwest Forest Plan (Glavich and Geiser 2004). Populations occurred in the Klamath, Siskiyou, Coast, and Cascade Mountain Ranges.

Because this lichen is aquatic, and although some enhancement projects within Riparian Reserves can disturb habitat for this species (culvert removal, in-stream structure placement), it is assumed that the Aquatic Conservation Strategy would lower the risk of loss of sites (USDA, USDI 2000a:297).

Under Alternatives 1 and 3, this lichen would be included in Category E, which requires management of known sites and Strategic Surveys. Under Alternative 4, this species would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. The 2000 FSEIS found this species would maintain stable populations and/or distributions in Category B (USDA, USDI 2000a:297). Due to management of known

sites, and protection by the Riparian Reserve network, habitat (including known sites) is sufficient to provide for stable populations under Alternative 1, 3, and 4.

Under Alternative 2, this species is assumed to be Sensitive on Forest Service managed lands in Oregon and Washington. This species would maintain stable populations and/or distributions under Alternative 2 due to management of known sites, pre-project clearances, and protection by the Riparian Reserve network. Habitat (including known sites) is sufficient to provide for stable populations under Alternative 2. Because pre-project clearances and management of known sites is critical to maintaining stable populations, the scenario of Alternative 2 without SSSP would lead to habitat insufficient to support stable populations in the NWFP area.

Fuscopannaria (Pannaria) saubinetii

Fuscopannaria (*Pannaria*) *saubinetii* was formerly thought to be a common, widespread species. The taxonomy of North American lichens in the family Pannariaceae has recently been revised, including lichens in the genus *Pannaria* (Jorgensen 2000). Some material formerly called *Pannaria saubinetii* has been moved to the genus *Fuscopannaria* (Jorgensen 2000). *Fuscopannaria saubinetii* is a rare species and only a few correctly identified specimens have been located to date (Jorgensen 2000). Although once believed to be a coastal species, examination of this material may prove otherwise. Until the taxonomic ambiguities can be resolved for *Fuscopannaria* (*Pannaria*) *saubinetii*, sites with voucher confirmation in progress continue to be managed as known sites.

Under Alternatives 1 and 3, this species would be included in Category E, which requires management of known sites and Strategic Surveys. Although the 2000 SEIS determined that this species would maintain stable populations and/or distributions due to species abundance (USDA, USDI 2000a:309), new information indicates this is a rare species. Due to low numbers, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1 and 3. This outcome is not due to federal action.

Under Alternative 2, this species is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed. This species would not maintain stable populations and/or distributions under Alternative 2 due to low numbers. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. This outcome is not due to federal action.

Under Alternative 4, *F. saubinettii* would be included in Category F, which requires Strategic Surveys. Habitat is insufficient to provide for stable populations for reasons listed under Alternatives 1, 2 and 3.

Heterodermia sitchensis

Heterodermia sitchensis has recently been detected at a single site in the NWFP area (McHenry and Tønsberg 2002). This species could occur at other sites along the immediate coast, but it was not detected on Coastal Lichen Study plots (Glavich et al. 2002). It is still uncertain whether this species is closely associated with late-successional or old-growth forests (USDA, USDI 2000a:299). However, the new site at Cape Lookout State Park is associated with old-growth Sitka spruce and western hemlock (McHenry and Tønsberg 2002).

Under Alternatives 1, 3, and 4, *Heterodermia sitchensis* would be included in Category E, which requires management of known sites and Strategic Surveys. There is insufficient information about this species to determine how distribution and stability would be affected by management activities (USDA, USDI 2000a:301). There is insufficient information to determine an outcome under Alternatives 1, 3 or 4.

Under Alternative 2, *Heterodermia sitchensis* is assumed to be included in the BLM SSSP as Bureau Assessment in Oregon. Known sites would be managed on BLM managed lands in Oregon. Pre-project clearances would be conducted subject to limitations in funding or positions. General inventories may be conducted. There is insufficient information about this species to determine how the alternative would affect distribution and stability. There is insufficient information to determine an outcome under Alternative 2.

Hypogymnia duplicata

Hypogymnia duplicata is endemic to the Pacific Northwest. It occurs from Alaska to northwestern Oregon. There are relatively high numbers of sites on the Mt. Baker-Snoqualmie National Forest. Concerns for this species have decreased in northern Washington because of the increase in number of known sites, although it is still restricted to specific habitat conditions and considered to be poorly distributed and rare (USDA, USDI 2000a). Most sites known in Washington are in reserves (GeoBOB/ISMS database). Populations known in 2002 were clustered and not well distributed across the landscape (Lesher 2002 pers. comm.), and it was rare in the rest of its range. Recent information includes 8 detections from the RMS Survey and 85 reported sites, most in Washington. Of the 8 RMS Survey detections, two were within the Oregon portion of its range, where the species is still considered rare. There are several known sites on BLM managed lands in Oregon. These sites fall within Areas of Critical Environmental Concern where management activity is limited.

Under Alternative 1, *Hypogymnia duplicata* would be included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. This species would maintain stable populations and/or distributions (USDA, USDI 2000a:282). Due to the high number of sites in reserves, habitat (including known sites) is sufficient to provide for stable populations under Alternative 1.

Under Alternatives 2 and 3, *Hypogymnia duplicata* is assumed to be Sensitive on Forest Service managed lands in Oregon. This species would maintain stable populations and/or distributions under Alternatives 2 and 3 due to protection by reserves and Areas of Critical Environmental Concern. Habitat (including known sites) is sufficient to provide for stable populations under Alternatives 2 and 3. Under Alternatives 2 and 3 without SSSP on Forest Service managed lands in Oregon, habitat is sufficient to provide for stable populations because it is expected that a large proportion of sites in Oregon as well as Washington will likely occur within reserves where they are afforded some protection.

Under Alternative 4, *H. duplicata* would be included in Category A, which requires management of all known sites and pre-disturbance surveys. Because of the high number of sites in reserves, habitat (including known sites) is sufficient to provide for stable populations under Alternative 4.

Hypogymnia oceanica

Information from the 2001 Annual Species Review indicates that this species is well distributed and more common than previously known (USDA, USDI Species Review Panel 2001). Of the 472 known sites at that time, 272 sites were newly reported since the 2000 species review. The species was also reported to have 17 detections from the RMS Survey. Since the 2001 ASR, seven additional sites have been reported.

Under Alternatives 1, 2, and 3 *H. oceanica* is removed from Survey and Manage and not assumed to be on SSSP. Because current information indicates that this species is relatively common and is well distributed, habitat is sufficient to provide for stable populations.

Under Alternative 4, *H. oceanica* would be included in Category F, which requires Strategic Surveys. Under this alternative, habitat is sufficient to provide for stable populations for reasons listed under Alternatives 1, 2, and 3.

Hypogymnia vittata

Hypogymnia vittata occurs in southern British Columbia and in forested habitat in southeast Alaska (Geiser et al. 1998) that is similar to habitat in the NWFP area. It is suspected to occur in the North Cascades, and could be present in other parts of the NWFP area. Because it is not yet known here, little is known of this species in the NWFP area and its status is undetermined. In addition, it is uncertain if this species is closely associated with late-successional or old-growth forests (USDA, USDI 2000a:299).

Under Alternatives 1, 3, and 4 *Hypogymnia vittata* would be included in Category E, which requires management of known sites and Strategic Surveys. There is insufficient information about this species to determine how distribution and stability would be affected (USDA, USDI 2000a:301). There is insufficient information to determine an outcome under Alternatives 1, 3, and 4.

Under Alternative 2, *Hypogymnia vittata* is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories are not required. There is insufficient information about this species to determine how the alternative would affect distribution and stability. There is insufficient information to determine an outcome under Alternative 2.

Hypotrachyna revoluta

Hypotrachyna revoluta was not rated by the FEMAT lichen panel because there was insufficient information at that time (USDA et al. 1993; USDA, USDI 2000a:299). This species was included in the Survey and Manage Standards and Guidelines because of persistence concerns since it was thought to be rare (USDA, USDI 1994a:J2). Since then, new information from a coastal lichen study found this species at only 2 percent of the 129 randomly selected sites (Glavich et al. 2005a). This study identified a total of seven sites on federal land, two of which were new (Geiser et al. 2004). Although the sample was too small to test association, only one of the seven sites was in reserves (Glavich et al. 2005a). This study also better documents its limited range, mostly occurring in northern coastal Oregon, which include four sites on Oregon State managed lands. This new information suggests that this species is rare across the NWFP area and has few populations and limited suitable habitat on federally managed lands.

Under Alternatives 1, 3, and 4, *Hypotrachyna revoluta* would be included in Category E, which requires management of known sites and Strategic Surveys. This species would not maintain stable populations and/or distributions (USDA, USDI 2000a:301). Due to extremely low numbers, limited distributions and populations, few populations on federally managed lands, or limited suitable habitat on federally managed lands, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Hypotrachyna revoluta* is assumed to be included as Sensitive for the Forest Service in Oregon and Washington and as Bureau Assessment by the BLM in Oregon. Known sites would be managed and pre-project clearances would be conducted. General inventories may be conducted. This species would not maintain stable populations and/or distributions under Alternative 2 due to extremely low numbers, limited distributions and populations, few populations on federally managed lands, or limited suitable habitat on federally managed lands. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. This outcome is not due to federal action.

Leptogium burnetiae* var. *hirsutum

For *Leptogium burnetiae* var. *hirsutum*, pre-disturbance surveys have yielded vouchers that are taxonomically indistinct, based on current keys and species descriptions. This species is known from few sites on federally managed land (USDA, USDI 2000a:283).

Under Alternatives 1 and 3, *Leptogium burnetiae* var. *hirsutum* would be included in Category E, which requires management of known sites and Strategic Surveys. There is insufficient information about this species to determine how distribution and stability would be affected (USDA, USDI 2000a:305). There is insufficient information to determine an outcome under Alternatives 1 and 3.

Under Alternative 2, *Leptogium burnetiae* var. *hirsutum* is assumed to be included as Sensitive for the Forest Service in Washington and Oregon. Known sites would be managed and pre-project clearances would be conducted. General inventories may be conducted. There is insufficient information about this species to determine how the alternative would affect distribution and stability. There is insufficient information to determine an outcome under Alternative 2. Under Alternative 2 without SSSP on Forest Service managed lands in Washington and Oregon, the outcome is also insufficient information to determine an outcome for the reasons already stated.

Under Alternative 4, *L. burnetiae* var. *hirsutum* would be included in Category A, which requires management of all known sites and pre-disturbance surveys. There is insufficient information to determine an outcome under Alternative 4 for the reasons listed under Alternative 1 and 3.

Leptogium cyanescens

Leptogium cyanescens is rare and occurs in all three states. Because it is known from few sites on federally managed land, there is a high concern for this species (USDA, USDI 2000a:283). In 2004, available information increased the number of known sites from one (USDA, USDI 1994a:J2-239) to 10 (GeoBOB/ISMS database). New information since the 2004 FSEIS includes a re-examination of voucher specimens from the NWFP area (Stone and Ruchty 2006). It now appears that this species is more limited than previously thought, with five confirmed sites in the NWFP area.

Under Alternatives 1, 3, and 4, *Leptogium cyanescen*s would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. This species would not maintain stable populations and/or distributions (USDA, USDI 2000a:284). Due to extremely low numbers, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Leptogium cyanescens* is removed from Survey and Manage. It is assumed to be included as Sensitive on Forest Service managed lands in Washington and Oregon. Known sites would be managed and pre-project clearances would be conducted. General inventories may be conducted. This species would not maintain stable populations and/or distributions under Alternative 2 due to low site numbers. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. This outcome is not due to federal action. Under Alternative 2 without SSSP on Forest Service managed lands in Washington and Oregon, the outcome is also insufficient habitat to determine an outcome for the reasons listed under Alternative 2.

Leptogium rivale

New populations of *Leptogium rivale* continue to be found on Forest Service and BLM lands, mostly in Oregon, but also in California and Washington from the Siskiyou, Coast, and Cascade Mountain Ranges.

Leptogium rivale occurs in all three states. It is an aquatic lichen that was thought to be endemic to North America until its recent discovery in Poland, the Czech Republic (Guttová 2000), and Portugal (van den Boom 2002). New research suggests this species is more common than once thought (with 26 percent frequency on aquatic lichen study plots across the NWFP area), occurring in many watersheds in several National Forests and BLM lands, and that it is more associated with LSOG forest stands (Glavich 2006, Glavich and Geiser 2007). Although Glavich (2006) found that *L. rivale* was neither more nor less likely to be associated with Congressional and Late-Successional Reserves, the aquatic habitat of this species would likely be protected in Riparian Reserves. Most known sites are on federally managed lands within Riparian Reserves (USDA, USDI 2000a:296). Although some enhancement projects within Riparian Reserves can disturb habitat for this species (culvert removal, in-stream structure placement), the Riparian Reserves and other elements of the Aquatic Conservation Strategy (USDA, USDI 1994b: B-9 through B-34) would lower the risk of loss of sites (USDA, USDI 2000a:297).

Under Alternatives 1 and 3, *Leptogium rivale* would be included in Category E, which requires management of known sites and Strategic Surveys. Under Alternative 4, this species would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. The 2000 FSEIS found this species would maintain stable populations and/or distributions under Survey and Manage (USDA, USDI 2000a:297). Due to increased numbers of sites and protection by Riparian Reserves, habitat (including known sites) is sufficient to provide for stable populations under Alternatives 1, 3, and 4.

Under Alternative 2, *Leptogium rivale* is assumed not to be included in the Agencies' SSSPs. This species would maintain stable populations and/or distributions under Alternative 2 due to protection by Riparian Reserves. Habitat (including known sites) is sufficient to provide for stable populations under Alternative 2.

Leptogium teretiusculum

Leptogium teretiusculum is rare and occurs in Oregon and California only. It is poorly known in the NWFP area (USDA, USDI 2000a:303). It is uncertain if it is closely associated with late-successional or old-growth forests (USDA, USDI 2000a:303). Information from 2004, based on broad regional surveys increased the number of known sites from one (USDA, USDI 1994a:J2-240) to eight (GeoBOB/ISMS database). New information for this species includes three detections from the RMS Survey and 25 new sites reported. This new information suggests that this species is rare with limited distribution and populations, few populations on federally managed lands, or limited suitable habitat on federally managed lands.

Under Alternatives 1, 3, and 4, *L. teretiusculum* would be included in Category E, which requires management of known sites and Strategic Surveys. The three detections from the RMS Survey, results in a range of expected detections at the 95% confidence interval (0 - 681,400) that is too large to provide any new information on the species' rarity. This species would not maintain stable populations and/or distribution (USDA, USDI 2000a:305). Due to rarity, limited distribution, and populations, few populations on federally managed lands, and limited suitable habitat on federally managed lands, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *L. teretiusculum* is removed from Survey and Manage. It is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories would not be required. This species would not maintain stable populations and/or distributions under Alternative 2 due to rarity, limited distribution and populations, few populations on federally managed lands, and limited suitable habitat on federally managed lands. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. This outcome is not due to federal action.

Lobaria linita* (Oregon and Washington except Washington Western Cascades North of Snoqualmie Pass and Washington Olympic Peninsula Province*)

Lobaria linita occurs sporadically in northern Europe and Asia, and is known to occur in North America from Alaska to Oregon (USDA, USDI 2000a:280). The majority of known sites in the NWFP area are in northwest Washington (USDA, USDI 2000a:280), most of which are on the Mt. Baker-Snoqualmie National Forest. These populations reflect the results of several years of field tests of a predictive model. Populations are clustered and not well distributed across the landscape. The numbers of individuals at most sites is low (Lesher 2002 pers. comm.). *Lobaria linita* is uncommon in Washington north of Snoqualmie Pass where most sites are in reserves on the Mt. Baker-Snoqualmie National Forest. It is rare south of the pass and its presence in reserve allocation in this part of its range is unknown. New information for *L. linita* since the 2004 FSEIS includes 2 detections from the RMS Survey within this portion of the range.

Under Alternatives 1, 3, and 4, *L. linita* is included in Category A within this portion of the range. It would receive management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. This species would maintain stable populations and/or distributions (USDA, USDI 2000a:282). Due to management of known sites, pre-disturbance surveys, Strategic Surveys, and protection by reserves, habitat (including known sites) is sufficient to provide for stable populations under Alternatives 1, 3, and 4.

Under Alternative 2, *L. linita* is removed from Survey and Manage. It is assumed to be included as Sensitive by the Forest Service in Oregon and as Bureau Assessment on BLM managed lands in Oregon and Washington. This species would maintain stable populations and/or distributions under Alternative 2 due to protection by reserves, management of known sites, and pre-project clearances. Habitat (including known sites) is sufficient to provide for stable populations under Alternative 2. Under Alternative 2 without SSSP on Forest Service and BLM managed lands, there is insufficient habitat to support stable populations because of its rarity in this portion of the range.

***Lobaria linita* (WA Western Cascades north of Snoqualmie Pass, and WA Olympic Peninsula Provinces)**

Information from the 2002 Annual Species Review indicates that this species is more common than previously known in this portion of the range, and that a high proportion of known sites are within reserves (USDA, USDI Species Review Panel 2002). Of the 119 known sites reported, 102 were within reserves. In addition, 10 of 12 RMS detections for the species occur within this portion of its range. Since the 2002 ASR, 28 additional sites have been reported.

Under Alternatives 1, 2, and 3, *Lobaria linita* is removed from Survey and Manage and not assumed to be included in SSSPs in Washington. Because the species is well distributed and a large proportion of known sites are within reserves where they are protected, habitat is sufficient to provide for stable populations.

Under Alternative 4, *L. linita* would be included in Category A, which requires management of all known sites and pre-disturbance surveys. Habitat is sufficient to provide for stable populations under Alternative 4 for the reasons listed under Alternatives 1, 2, and 3.

***Lobaria oregana* (California)**

Lobaria oregana is endemic to western North America (Goward et al. 1994, McCune and Geiser 1997). It is currently included in the Survey and Manage mitigation measure in California where it is rare and reaches the southern extent of its range. There is a high concern for this species in California because it is restricted in distribution and known from few sites (USDA, USDI 2000a:273). New information for *L. oregana* since the 2004 FSEIS includes two detections from the RMS Survey in California and a total of 19 new sites reported. The two detections from the RMS Survey, results in a range of expected detections at the 95% confidence interval (0 - 304,700) that is too large to provide any new information on the species' rarity.

Under Alternatives 1, 3, and 4, *L. oregana* would be included in Category A in California, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. This species would not maintain stable populations and/or distributions (USDA, USDI 2000a:274). Due to restricted distribution and low site numbers, habitat (including known sites) is insufficient to support stable populations in the NWFP area of northern California under Alternatives 1, 3 and 4. This outcome is not due to federal action.

Under Alternative 2, *L. oregana* is removed from Survey and Manage. It is assumed to be included in the BLM SSSP in California. Known sites would be managed and pre-project clearances would be conducted on BLM managed lands in California. This species is not included in the Forest Service Sensitive Species Program in California where it is rare and known sites occur on National Forest System lands. Known sites on Forest Service managed lands in California would not be managed and general inventories would not be required. This species would not maintain stable populations and/or distributions under Alternative 2 due to restricted distribution and extremely low numbers. Habitat (including known sites) is insufficient to support stable populations within this portion of the range under Alternative 2. This outcome is not due to federal action. Under Alternative 2 without SSSP on BLM managed lands, habitat is insufficient to support stable populations for the same reasons already listed.

Microcalicium arenarium

Prior to 2004, *Microcalicium arenarium* was known from one site in Washington not on federally managed lands. There is still limited information on the distribution, ecology, and abundance of most pin lichens in the NWFP area (USDA, USDI Species Review Panel 1999; 2000). New information since the 2004 FSEIS includes the location of the first two sites of this species on federal land and the results of proposive surveys conducted in high probability habitat in western Oregon (Rikkenen 2003). Known sites are shaded rock cliffs. There is uncertainty regarding its association with late-successional or old-growth forests.

Under Alternatives 1, 3, and 4, *M. arenarium* would be included in Category B, which requires management of known sites and Strategic Surveys. There is insufficient information about this species to determine how distribution and stability would be affected (USDA, USDI 2000a:290). There is insufficient information to determine an outcome under Alternatives 1, 3, and 4.

Under Alternative 2, *M. arenarium* is removed from Survey and Manage. It is assumed to be included as a Bureau Assessment species for the BLM in Oregon. Known sites would be managed. Pre-project clearances would be conducted subject to limitations in funding or positions. General inventories may be conducted. There is insufficient information about this species to determine how the alternative would affect distribution and stability. There is insufficient information to determine an outcome under Alternative 2. Under Alternative 2 without SSSP on BLM managed lands in Oregon, there is insufficient information to determine an outcome for the reasons already listed.

***Nephroma bellum* (OR Klamath, OR Willamette Valley, OR Eastern Cascades, WA Western Cascades (outside of Gifford Pinchot NF), WA Eastern Cascades, and WA Olympic Peninsula)**

Nephroma bellum has a broad, global distribution and is well distributed west of the Cascade crest (USDA, USDI Species Review Panel 1999). Current information indicates that it may be common in the NWFP area, although it is rare within this portion of its range. Recent information for *Nephroma bellum* includes six detections from the RMS Survey within this portion of its range and an increase in known sites for a total of 33 on federal lands. One site has been reported but has not been verified for California; this site does not occur on federally managed lands. The 2000 SEIS found this species would maintain stable populations and/or distributions range-wide managed under Survey and Manage Category F (USDA, USDI 2000a:309).

Under Alternatives 1 and 3, *Nephroma bellum* would be included in Category E, which requires management of known sites and Strategic Surveys. Due to management of known sites, protection by reserves, and species abundance in some NWFP areas, habitat (including known sites) is sufficient to provide for stable populations under Alternatives 1 and 3.

Under Alternative 2, *Nephroma bellum* is removed from Survey and Manage. It is assumed to be included in the Agencies' SSSP for the Forest Service in Washington. Habitat is sufficient to support stable populations under Alternative 2 because known sites on Forest Service managed lands in Washington would be protected and pre-project clearances will be conducted. In Oregon, where the species would not have SSSP status, a large proportion of sites are likely to occur within reserves where they are afforded some protection. Habitat (including known sites) is sufficient to provide for stable populations under Alternatives 2.

Alternatives 2 without SSSP on Forest Service managed lands in Washington will have sufficient habitat to provide for stable populations, however because this species is still considered to be rare in the Olympic Peninsula Province in Washington, Alternative 2 without SSSP would result in insufficient habitat to support stable populations in this portion of the range.

Under Alternative 4, *N. bellum* would be included in Category F, which requires Strategic Surveys. It is also assumed to be included in the Agencies' SSSP for the Forest Service in Washington where sites would be managed and pre-project clearances conducted. Habitat is sufficient to provide for stable populations. Under Alternative 4 without SSSP on Forest Service managed lands in Washington, known sites would not be managed and surveys would not be conducted. Habitat would be sufficient to provide for stable populations range-wide, but is insufficient to provide for stable populations in the Olympic Peninsula Province portion of the range for the reasons described under Alternative 2.

***Nephroma bellum* (OR Western Cascades, OR Coast Range, and WA Western Cascades in Gifford Pinchot NF)**

Information from the 2001 Annual Species Review indicates that this species was more common than previously known, with a total of 173 sites within this portion of the range, including 15 detections from the RMS Survey (USDA, USDI Species Review Panel 2001). Since the 2001 ASR, 11 additional sites have been reported and the total number of RMS detections has increased to 23.

Under Alternatives 1, 2, and 3, *N. bellum* is removed from Survey and Manage in this portion of its range. It is assumed to be included in the Agencies' SSSP for the Forest Service in Washington where known sites will be managed and pre-project clearances would be conducted. Because current information indicates that this species is relatively common, and a large proportion of sites are expected to occur within reserves, habitat is sufficient to provide for stable populations with or without SSSP.

Under Alternative 4, *N. bellum* is included in Category F, which requires Strategic Surveys. Under this alternative, habitat is sufficient to provide for stable populations because the species is relatively common and a large proportion of sites are expected to occur within reserves.

Nephroma isidiosum

Nephroma isidiosum occurs in southern British Columbia and in forested sites in Alaska, and is suspected to occur in the North Cascades. Strategic Survey results for *Nephroma isidiosum* since the 2004 FSEIS provide additional evidence that this lichen is suspected to occur in the NWFP area, but so far, it has not been located. Because it is not yet known from the NWFP area, nothing is known of this species here and its status is undetermined. In addition, it is uncertain if this species is closely associated with late-successional or old-growth forests (USDA, USDI 2000a:299).

Under Alternatives 1, 3, and 4, *N. isidiosum* would be included in Category E, which requires management of known sites and Strategic Surveys. There is insufficient information about this species to determine how distribution and stability would be affected (USDA, USDI 2000a:301). There is insufficient information to determine an outcome under Alternatives 1, 3, and 4.

Under Alternative 2, *N. isidiosum* is removed from Survey and Manage. It is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories are not required. There is insufficient information about this species to determine how the alternative would affect distribution and stability. There is insufficient information to determine an outcome under Alternative 2.

Nephroma occultum

Nephroma occultum is endemic to western North American, occurring from British Columbia to southern Oregon (USDA, USDI 2000a). Almost all known sites are on federally managed land and about 30 percent occur in reserves (USDA, USDI Species Review Panel 2000). It occurs on large, old lateral limbs of conifers (USDA, USDI 2000a:293). Although there are a moderate number of known sites, persistence concerns are based on the species' dispersal limitations, the low number of individuals at known sites, and the patchy distribution in the NWFP area. *Nephroma occultum* is known to be dispersal limited (Rosso et al. 2000, Sillett et al. 2000, Sillett and Goward 1998), is closely associated with very old old-growth habitat (Sillett and Goward 1998), and is not well distributed across the landscape (it occurs in isolated patches). The species has four detections from the RMS Survey. The range of expected detections at the 95% confidence interval (0 – 493,800 expected detections) does not provide new information on the rarity

of this species. Recent site detections have pushed the number of known federal sites over 200.

Under Alternative 1, *Nephroma occultum* would be included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. Because known sites would be managed and pre-disturbance surveys would be completed, habitat (including known sites) is sufficient to provide for stable populations under Alternative 1.

Under Alternatives 2 and 3, *Nephroma occultum* is assumed to be included as Sensitive for the Forest Service in Washington and Oregon. There is a high risk of loss of sites outside of reserves on BLM managed lands in Oregon. Although some legacy components are retained based on Matrix Standards and Guidelines, these Standards and Guidelines may not be sufficient because not all habitat components are included. For example, some suppressed understory conifers can be very old, and are known to be a source for propagules of *Nephroma occultum* and other old-growth lichens. In many cases, these suppressed understory trees are not protected because they do not appear to be old-growth components (USDA, USDI 2003c). The removal of these components greatly reduces the likelihood that refugial populations of *Nephroma occultum* will remain across the landscape. The single most important action promoting the accumulation of old-growth associated epiphytic lichens is the retention of propagule sources, and maintaining an adequate local source of propagules is critical to the resilience of dispersal limited species in a managed forested landscape (Sillett et al. 2000). Most of the known global sites occur in Oregon where the species reaches the southern extent of its range. A combination of factors, including the potential loss of inoculum sources in younger stands across its entire range in the NWFP area and the lack of protection of non-reserve sites on BLM managed lands in Oregon results in habitat (including known sites) insufficient to support stable populations in the NWFP area under Alternatives 2 and 3. Alternatives 2 and 3 without SSSP on Forest Service managed lands in Oregon and Washington could lead to the loss of some sites. This, in combination with the factors already stated, also results in an outcome of insufficient habitat to support stable populations.

Under Alternative 4 *N. occultum* would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. Under this alternative, habitat is sufficient to provide for stable populations for the reasons listed under Alternative 1.

Niebla cephalota

Niebla cephalota occurs from Baja California to Washington in coastal fog belt areas (McCune et al. 1997). New research provides a better understanding of its distribution and ecology in the NWFP area. In the NWFP area, its primary range is the California coastline; it occurs on the Oregon and Washington coastlines but is rare in these states (Glavich et al. 2005a). Most of the federal land populations were on non-reserve land use allocations, but most of the habitat exists in State Parks (Glavich et al. 2005a). Its habitat in the NWFP area was recently defined primarily by climate (relatively lower precipitation), proximity to the coastline, and Sitka spruce forest, and no late-seral association was found (Glavich et al. 2005a, b). This lichen is still considered to be rare in the NWFP area, and has a low number of known sites, low number of individuals at each site, limited distribution, and narrow ecological amplitude (USDA, USDI 2000a:285).

Under Alternatives 1, 3, and 4, *Niebla cephalota* would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. This species would not maintain stable populations and/or distributions (USDA, USDI 2000a:286). Due to

limited potential habitat, few populations on federally managed lands, and the potential for stochastic events, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Niebla cephalota* is assumed to be included in the Agencies' SSSPs as Bureau Assessment on BLM managed lands in Oregon, as Sensitive on BLM managed lands in California, and Sensitive on Forest Service managed lands in Oregon and Washington. Known sites would be managed and pre-project clearances would be conducted. General inventories may be conducted. This species would not maintain stable populations and/or distributions under Alternative 2 due to low number of known sites, low number of individuals at each site, limited distribution, and narrow ecological amplitude. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. This outcome is not due to federal action. Under the scenario of Alternative 2 without SSSP, the outcome is also insufficient habitat.

Pannaria rubiginosa

Pannaria rubiginosa, a coastal lichen, has a broad, global distribution, but is considered rare in the NWFP area. There is high concern for this species due to low numbers of known sites, low number of individuals, limited distribution, and narrow ecological amplitudes (USDA et al. 1993; USDA, USDI 1994a:J2; USDA, USDI 2000a; USDA, USDI Species Review Panel 1999). New research further supports the rarity of this species in the NWFP area. Surveys of randomly selected sites along the NWFP area coastline did not detect *P. rubiginosa* (Glavich et al. 2005a). One new site, for a total of four (none in California), was discovered in the NWFP area by selectively searching potential habitat (Glavich et al. 2005a).

Under Alternatives 1, 3, and 4, this species would be included in Category E, which requires management of known sites and Strategic Surveys. With a high degree of uncertainty due to low numbers of known sites, low number of individuals, limited distribution, and narrow ecological amplitudes, this species would not likely maintain stable populations and/or distributions (USDA, USDI 2000a:307). Due to limited potential habitat, few populations on federally managed lands, and the potential for stochastic events, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Pannaria rubiginosa* is assumed to be included in the SSSPs except for the Forest Service in California, where there is even less suitable habitat. Due to a low number of known sites, low number of individuals at most sites, limited distribution, and narrow ecological amplitude, there is insufficient habitat to maintain stable populations and/or distributions under Alternative 2, with or without SSSP.

Peltigera pacifica

Peltigera pacifica occurs in Washington and Oregon and is a Pacific Northwest endemic. It occurs 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 1999). This species is widespread in the NWFP area west of the Cascade crest (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999; 2000). A portion of its population may be provided for by the reserve land allocation, particularly the riparian buffers under the Aquatic Conservation Strategy. The contribution of the Riparian Reserves and other reserve allocations to provide for stable populations of this species is unknown (USDA, USDI 2000a:304). New information for *P. pacifica* since the 2004 FSEIS includes 12 detections from the RMS Survey and the addition of 91 new sites on federal lands within the NWFP area.

Under Alternatives 1, 3, and 4, *P. pacifica* would be included in Category E, which requires management of known sites and Strategic Surveys. This species would maintain stable populations and/or distributions (USDA, USDI 2000a:305). There is new information including 85 new sites and 12 RMS detections. This information indicates that a large number of occurrences are likely to occur within reserves, where they are afforded some protection. Habitat (including known sites) is sufficient to provide for stable populations under Alternatives 1, 3, and 4.

Under Alternative 2, *P. pacifica* is removed from Survey and Manage. It is assumed to be included as Sensitive by the Forest Service in Oregon and Washington where sites would be managed and pre-disturbance surveys conducted on Forest Service managed lands. However, due to sites and protection by reserves, this species would maintain overall stable populations and/or distributions under Alternative 2. Habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area. Under Alternative 2 without SSSP on Forest Service managed lands in Oregon and Washington, habitat is sufficient to provide for stable populations of *P. pacifica* for the same reasons.

***Platismatia lacunosa* (Except Oregon Coast Range)**

Platismatia lacunosa occurs in Washington and Oregon. It is common in the Oregon Coast Range and rare in the rest of its range. A high proportion of known sites, most of which are in the Oregon Coast Range, are protected by reserves (GeoBOB/ISMS database). It is sometimes, but not necessarily, associated with riparian areas where it often grows on alders. This species occurs primarily at lower elevations and it is unknown at this time how much potential habitat exists on federally managed lands (USDA, USDI 2000a:299). Although riparian enhancement projects that remove hardwoods within Riparian Reserves can disturb habitat for this species, the Riparian Reserve Standards and Guidelines and other elements of the Aquatic Conservation Strategy lower the risk of loss of sites. Late-Successional and other reserves may also provide some protection of known sites (USDA, USDI 2000a:299). The 2000 SEIS found this species would maintain stable populations and/or distributions range-wide in Survey and Manage Category C (USDA, USDI 2000a:299). Known site numbers have nearly doubled to over 50 in recent years. There are three detections from the RMS Survey.

Under Alternatives 1 and 3, *P. lacunosa* would be included in Category E, which requires management of known sites and Strategic Surveys. Due to management of known sites, habitat (including known sites) is sufficient to provide for stable populations under Alternative 1 and 3.

Under Alternative 2, *P. lacunosa* is removed from Survey and Manage. It is assumed to be included as Sensitive on Forest Service managed lands in Washington. Due to management of known sites and pre-project clearances under the Forest Service Sensitive Species Program in Washington, this species would maintain stable populations and/or distributions under Alternative 2 in Washington. There are fewer than 20 Oregon sites within this portion of the range, occurring in the Oregon Klamath, Western Oregon Cascades, and Willamette Valley Provinces. Because the species is rare and not well distributed within these physiographic provinces, habitat is insufficient to provide for stable populations under Alternative 2 for the Oregon portion of the range. Therefore habitat (including known sites) is sufficient to support stable populations, but insufficient to support stable populations in a portion of its range. Under Alternatives 2 without SSSP on Forest Service managed lands in Washington, habitat is also insufficient to provide for stable populations within this portion of the range for the reasons listed and because Washington sites would no longer receive management.

Under Alternative 4, *P. lacunosa* would be included in Category C, which includes management of high-priority sites and pre-disturbance surveys. Under this alternative,

habitat (including known sites) is sufficient to provide for stable populations because of known site management.

***Platismatia lacunosa* (Oregon Coast Range)**

Information from the 2002 Annual Species Review indicates that this species is more common within this portion of its range than previously known (USDA, USDI Species Review Panel 2002). It was reported that 19 of 21 RMS detections occurred within the Oregon Coast Range Province, inferring that the species was relatively common there. New information since the 2002 ASR includes 39 new federal sites reported and a correction to 18 RMS detections.

Under Alternatives 1, 2, and 3, *P. lacunosa* is removed from Survey and Manage within this portion of its range and is not included in SSSP in Oregon. Because current information indicates that this species is relatively common and is well distributed within the physiographic province, habitat is sufficient to provide for stable populations.

Under Alternative 4, *P. lacunosa* would be included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. Under this alternative, habitat (including known sites) is sufficient to provide for stable populations for reasons listed under Alternatives 1, 2, and 3.

Pseudocyphellaria perpetua

New research indicates that the Northwest Forest Plan population locus for *Pseudocyphellaria perpetua* is in the central Oregon Coast Range, and that it is rare elsewhere. It has also been found in the Olympics in Washington and the western foothills of the Oregon Cascades (Glavich et al. 2005a). The 49 new sites reported since the 2004 FSEIS that supports the current understanding of *P. perpetua*'s distribution were discovered by searching recently accessioned specimens from the herbaria of Oregon State University (OSC), University of Washington (WTU), Olympic National Park, and Bruce McCune, as part of the coastal lichen study (Geiser et al. 2004, Glavich et al. 2005a, GeoBob/ISMS database). Many of the recently accessioned specimens were new because questionable voucher specimens were re-evaluated and then correctly identified. There was, until recently, taxonomic uncertainty for this lichen. FEMAT (USDA et al. 1993) and the Northwest Forest Plan Final SEIS (USDA, USDI 1994a) erroneously applied the name *Pseudocyphellaria mougeotiana*. Because of the erroneous name, the Survey and Manage Final SEIS (USDA, USDI 2000a) and Lichen Management Recommendations (USDA, USDI 2000c) identified this entity as *Pseudocyphellaria* sp. 1 while acknowledging taxonomic work was underway. In the 2000 Survey and Manage Final SEIS (USDA, USDI 2000a:293) there was insufficient information about this taxonomic entity to determine effects. Since that time, sufficient new information clarified taxonomic uncertainty, habitat association, and rarity within the NWFP area. The taxonomic uncertainty was resolved when the new name, *Pseudocyphellaria perpetua*, was published by Miadlikowska et al. (2002). New research found low detection rates in the random sample that prevented statistical inference of old-growth and land use allocation association, but *P. perpetua* occurred in forest stands of 25 to 114 years-old with a median of 80 years, and 7 of 20 known populations on federal land are in reserves (Glavich et al. 2005a, b).

Under Alternatives 1and 3, *Pseudocyphellaria perpetua* would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, pre-disturbance surveys are limited to late-successional and old-growth habitat. Under Alternative 4, this species would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. Due to its rarity and narrow ecological amplitude, habitat (including known sites) is insufficient to support stable populations in the NWFP area under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Pseudocyphellaria perpetua* is assumed not to be included in the Agencies' SSSPs. Known populations on Forest Service and BLM managed lands in Oregon have increased from 7 to 20 (Glavich et al. 2005a). Although seven of the populations on federally managed lands are in reserves, their occurrence in stands under 80 years old would be at risk of being impacted by thinning. This and the remaining populations being in non-reserve land allocations, places populations at risk under Alternative 2 because known sites would no longer be managed. General inventories would not be required. Although there have been additional populations discovered recently, *P. perpetua* is still considered to be rare. Due to its rarity and narrow ecological amplitude, habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. This outcome is not a result of federal action.

Pseudocyphellaria rainierensis

Pseudocyphellaria rainierensis is a Pacific Northwest endemic. It is known to occur from southeastern Alaska to southern Oregon, west of the Cascade Crest (USDA, USDI Species Review Panel 2000). It is rare in Washington and throughout most of the rest of its range, although several large, scattered populations exist in large tracts of suitable habitat on the Willamette National Forest in Oregon. Although there are a moderate number of known sites, persistence concerns are based on the species' dispersal limitations, the low number of individuals at known sites, and the patchy distribution of this species in the NWFP area. This species occurs primarily in the oldest stands on the landscape and is rarely found in stands less than 400 years old (USDA, USDI 2000a; Mt. Baker-Snoqualmie NF Ecology Program data files). New information for *P. rainierensis* since the 2004 FSEIS includes six detections from the RMS Survey in the NWFP area. The number of expected detections at the 95% confidence interval is 19,900 – 451-500, supporting previous information that this species has a moderate number of sites.

Under Alternatives 1 and 4, *P. rainierensis* would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Habitat (including known sites) is sufficient to provide for stable populations under Alternative 1 since known sites would be protected and pre-disturbance surveys would be completed.

Under Alternative 3, *P. rainierensis* would be included in Category A, which requires management of known sites, pre-disturbance surveys in late-successional and old-growth habitat and Strategic Surveys. Management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. Late-successional, old-growth legacy components in younger stands provide important refugia and propagule sources to re-colonize younger stands. *Pseudocyphellaria rainierensis* is a dispersal limited species (Rosso et al. 2000, Sillett et al. 2000, Sillett and Goward 1998) and the loss of populations in legacy components surrounded by younger stands could further restrict the establishment, distribution, and persistence of this poorly distributed species. Although some legacy components are retained based on Matrix Standards and Guidelines, these Standards and Guidelines may not be sufficient for this species because not all legacy components are immediately apparent. For example, some suppressed understory conifers can be very old, and can provide propagules of *P. rainierensis* and other old-growth lichens. In many cases, these suppressed understory trees are not protected because they do not appear to be old-growth components (USDA, USDI 2003c). The removal of these components greatly reduces the likelihood that refugial populations of *P. rainierensis* will remain across the landscape. The single most important action promoting the accumulation of old-growth associated epiphytic lichens is the retention of propagule sources, and maintaining an adequate local source of propagules is critical to the resilience of dispersal limited species in a managed forested landscape (Sillett et al. 2000). The removal of refugial populations in isolated legacy components of younger stands would lead to habitat (including known sites) insufficient to support stable populations in the NWFP area under Alternative 3.

Under Alternative 2, *P. rainierensis* is removed from Survey and Manage. It is assumed to be included in the Forest Service Sensitive Species Program in Oregon and Washington. In areas of its range not included in the Agencies' SSSPs, there is a high risk of loss of sites where not protected by reserves. *Pseudocyphellaria rainierensis* is a dispersal limited species (Rosso et al. 2000, Sillett et al. 2000, Sillett and Goward 1998) and loss of these sites could affect stability and distribution of populations and result in insufficient habitat as described for alternative 3. A combination of factors, including the potential loss of innoculum sources in younger stands across its entire range in the NWFP area and the lack of protection of known sites outside of Forest Service managed lands in Oregon and Washington would lead to habitat (including known sites) insufficient to support stable populations in the NWFP area under Alternative 2. Under Alternative 2 without SSSP on Forest Service managed lands in Oregon and Washington, there is insufficient habitat to support populations for the reasons already listed under Alternative 2.

Pyrrhospora quernea

The 2000 FSEIS indicated that the coastal lichen *Pyrrhospora quernea* was known only from 11 sites in the NWFP area and that old-growth forest association was uncertain. A recent study has found this species at a frequency of 21 percent of the 129 randomly selected sites along the NWFP area coastline, with most sites occurring in Oregon. The Washington populations are mostly limited to state lands in the Puget Sound area (Glavich et al. 2005a). For the sites on federal land, this species was found significantly associated with reserve land allocations (Glavich et al. 2005a). This species was not found to be associated with stand age, and though it can occur in other coastal habitats, its primary habitat has been defined by Sitka spruce and shore pine-dominated coastal dune forests in a climate of moderate rainfall (100 to 150 days per year) (Glavich et al. 2005a, b).

Under Alternatives 1, 2, and 3, this species is removed from Survey and Manage and assumed to be in the Agencies' SSSPs for Forest Service in Oregon and Washington. The majority of its populations occur in the dune forest region of Siuslaw National Forest in Oregon; therefore, under Alternatives 1, 2, and 3 it is assumed that the Forest Service SSSP would manage these *P. quernea* populations. However, due to its narrow ecological amplitude, habitat (including known sites) is insufficient to support stable populations in the NWFP area under Alternatives 1, 2, and 3 with or without SSSP. This outcome is not due to federal action.

Under Alternative 4, this species would be included in Category E, which requires management of known sites and Strategic Surveys. For the reasons listed for Alternatives 1, 2, and 3, habitat (including known sites) is insufficient to provide for stable populations for this species under Alternative 4. This outcome is not due to federal action.

Ramalina pollinaria

The 2000 FSEIS indicated that the coastal lichen *Ramalina pollinaria* was known only from 9 sites in the NWFP area and that old-growth forest association was uncertain. The Coastal Lichen Study has found this species at a frequency of 9 percent of the 129 randomly selected sites along the NWFP area coastline, with most sites occurring in California (Glavich et al. 2005a). Most of these sites are in State Parks, and the five sites on federal land in the study occurred in non-reserve land allocations. This species was not found to be associated with stand age, and the habitat was primarily defined by low elevation (< 116 meters) coastal forests with moderate rainfall (100 to 150 days per year) (Glavich et al. 2005a, b).

Under Alternatives 1, 2, and 3, this species is removed from Survey and Manage and is assumed to be in the Agencies' SSSPs as Bureau Sensitive on BLM managed lands in Oregon and California, and Sensitive on Region 6 (Oregon and Washington) Forest

Service lands. Due to its narrow ecological amplitude, limited distribution, and few sites on federal land, habitat (including known sites) is insufficient to support stable populations in the NWFP area under Alternatives 1, 2, and 3, with or without SSSP. This outcome is not due to federal action.

Under Alternative 4, this species would be included in Category E, which requires management of known sites and Strategic Surveys. For the reasons listed for Alternatives 1, 2, and 3, habitat (including known sites) is insufficient to provide for stable populations for this species under Alternative 4. This outcome is not due to federal action.

Ramalina thrausta

Information from the 2003 Annual Species Review found that 295 new sites for *R. thrausta* had been reported since the previous ASR in 2002, including 15 detections from the RMS Survey, bringing the total number of sites known at that time to 327, one-third of which were in reserves (USDA, USDI Species Review Panel 2003). The indication was that this species is more common than previously known and is likely well represented within reserves. Since the 2003 ASR, 391 new federal sites have been reported.

Under Alternatives 1, 2, and 3, *R. thrausta* is removed from Survey and Manage and assumed not to be on the Agencies' SSSPs. Because current information indicates that this species is relatively common and some portion of sites are likely to be represented within reserves where they are afforded some protection, habitat (including known sites) is sufficient to provide for stable populations across the NWFP area.

Under Alternative 4, *R. thrausta* would be included in Category A, which requires management of all sites, pre-disturbance surveys, and Strategic Surveys. Under this alternative habitat is sufficient to provide for stable populations for the reasons listed under Alternatives 1, 2, and 3.

Stenocybe clavata

Stenocybe clavata is a Pacific Northwest endemic where its distribution is unknown. It is still poorly known in the NWFP area (USDA, USDI 2000a:301). Habitat data are limited and it is uncertain if it is closely associated with late-successional or old-growth forests (USDA, USDI 2000a:301). New information for *S. clavata* since the 2004 FSEIS includes four detections from the RMS Survey and a report of three new sites from proposive surveys conducted in high probability habitats in western Oregon (Rikkenen 2003). Because the range of expected detections from the RMS Survey at the 95% confidence interval is 0 – 280,300, an inference of the species' rarity cannot be made.

Under Alternatives 1, 3, and 4, *S. clavata* would be included in Category E, which requires management of known sites and Strategic Surveys. There is insufficient information about this species to determine how distribution and stability would be affected (USDA, USDI 2000a:303). There is insufficient information to determine an outcome under Alternatives 1, 3 or 4.

Under Alternative 2, *S. clavata* is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories would not be required. There is insufficient information about this species to determine how the alternative would affect distribution and stability. There is insufficient information to determine an outcome under Alternative 2.

Teloschistes flavicans

In the 2000 FSEIS, *Teloschistes flavicans* was considered rare in the NWFP area where there were a low number of known sites, and it was known for having a limited distribution and a narrow ecological amplitude (USDA, USDI 2000a:285). A recent study found that *T. flavicans* remains rare in the NWFP area, where this species was not detected in the random sample of the NWFP area coastline (Glavich et al. 2005a). Eleven sites were detected in this study by surveying known sites, potential habitat, and herbaria; five of these sites were in State Parks, including the only large Northwest Forest Plan population at Cape Lookout State Park, and five of the six sites on federal lands were in reserves.

Under Alternatives 1, 3, and 4, *Teloschistes flavicans* would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. This species would not maintain stable populations and/or distributions (USDA, USDI 2000a:286). Due to low number of known sites, low number of individuals, limited distribution, and narrow ecological amplitude, habitat (including known sites) is insufficient to provide for stable populations under Alternatives 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Teloschistes flavicans* is assumed to be included in the Agencies' SSSPs as Bureau Assessment on BLM managed lands in Oregon, as Sensitive on BLM managed lands in California, and as Sensitive on Forest Service managed lands in Oregon. Known sites would be managed and pre-project clearances would be conducted. General inventories may be conducted. This species would not maintain stable populations and/or distributions under Alternative 2 due to low number of known sites, low number of individuals, limited distribution, and narrow ecological amplitude. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. The outcome is the same without SSSP. This outcome is not due to federal action.

***Tholurna dissimilis* (South of the Columbia River)**

Tholurna dissimilis is rare in Oregon where there are few known sites. It occurs on sub-alpine and alpine conifers. Potential habitat is limited in extent in this part of its range (USDA, USDI 2000a:276). It was removed from Survey and Manage in Washington in 2001 because it is more common there, its tree line habitat is not very likely to be disturbed, and many sites are in Congressional Reserves, New information about *T. dissimilis* since the 2004 FSEIS includes the discovery of a site in the upper canopy of a Douglas-fir tree at relatively low elevation. Previous habitat information only included windswept trees at higher elevations. Because there are still only a few known sites within the Oregon portion of its range, the parameters of the species' habitat and distribution cannot yet be determined.

Under Alternatives 1, 3, and 4, *T. dissimilis* would be included in Category B in Oregon (it is unknown in California), which requires management of known sites and Strategic Surveys. There is insufficient information about this species to determine if distribution and stability would be affected (USDA, USDI 2000a:276). There is insufficient information to determine an outcome under Alternatives 1, 3, and 4.

Under Alternative 2, *T. dissimilis* is removed from Survey and Manage. It is assumed to be included as Bureau Assessment on BLM managed lands in Oregon and as Forest Service Sensitive in Washington and Oregon. Known sites would be managed and pre-project clearances would be conducted. Pre-project clearances on BLM managed lands are subject to limitations in funding and positions. General inventories may be conducted. There is insufficient information about this species to determine how the alternative would affect distribution and stability. There is insufficient information

to determine an outcome under Alternative 2. Under Alternative 2 without SSSP on BLM managed lands and Forest Service managed lands in Oregon, there is insufficient information to determine an outcome for the reasons listed.

Usnea hesperina

Usnea hesperina is rare in the NWFP area, with low number of known sites, low numbers of individuals, limited distribution, and narrow ecological amplitude. New research confirms *U. hesperina* to be rare (found at 5 percent of 129 randomly selected sites) across the coastline of the NWFP area; it was primarily found along the Oregon and Washington coastline, but was most common in Washington (Glavich et al. 2005a). The 31 new sites reported since the 2004 FSEIS came primarily from field surveys conducted for the coastal lichen study and the Region 6 (Oregon and Washington) air quality program, and some came from the Olympic National Park herbarium (Geiser et al. 2004, Glavich et al. 2005a, GeoBob/ ISMS database). Nearly all of these new sites are located within the previously known geographic range for *U. hesperina*. This species was not found to be more or less associated with Congressional and Late-Successional Reserves, but there was suggestive evidence that it is associated with late-seral forests. The habitat for *U. hesperina* has recently been defined by wet (> 150 days of rain) western hemlock forest in the coastal fog belt (Glavich et al. 2005b).

Under Alternatives 1 and 3, *Usnea hesperina* would be included in Category E, which requires management of known sites and Strategic Surveys. Under Alternative 4, this species would be included in Category B, which requires management of known sites, equivalent-effort surveys until Strategic Surveys are completed, and Strategic Surveys. This species would not maintain stable populations and/or distributions (USDA, USDI 2000a:293). Due to low number of individuals, limited distribution, and narrow ecological amplitude, habitat (including known sites) is insufficient to provide for stable populations under Alternative 1, 3, and 4. This outcome is not due to federal action.

Under Alternative 2, *Usnea hesperina* is assumed not to be included in the Agencies' SSSPs. Known sites would not be managed and general inventories are not required. This species would not maintain stable populations and/or distributions under Alternative 2 due to low number of individuals, limited distribution, and narrow ecological amplitudes. Habitat (including known sites) is insufficient to provide for stable populations under Alternative 2. This outcome is not due to federal action.

***Usnea longissima* (entire range)**

Usnea longissima in **Oregon (except in Curry, Josephine, and Jackson Counties and in Washington)** is uncommon. It can be locally abundant in all of its range. Although this species was once thought to be riparian, it is now known to occur on ridge tops (Keon and Muir 2002) and at other non-riparian sites. In **California and in Oregon's Curry, Josephine, and Jackson Counties**, this species is rare and is apparently associated with old-growth. New information for *Usnea longissima* since the 2004 FSEIS includes 11 detections from the RMS Survey within the Oregon Coast Range Province, and 2 detections from the Oregon Cascades. From this new information, it can be inferred that *U. longissima* is not rare in the Coast Range Province.

Under Alternative 1, 3, and 4, *U. longissima* would be included in Category A in California and in Oregon's Curry, Josephine, and Jackson Counties which requires pre-disturbance surveys, management of known sites, and Strategic Surveys. Under Alternative 3 in this portion of the range, pre-disturbance surveys are limited to late-successional and old-growth habitat. This species would be included in Category F in Oregon outside of Curry, Josephine, and Jackson Counties, which requires Strategic Surveys. This species would maintain stable populations and/or distributions under Alternative 1

(USDA, USDI 2000a:278). Due to pre-disturbance surveys and management of known sites in California and Oregon's Curry, Josephine, and Jackson Counties, and due to high site numbers in the rest of Oregon, and Washington, habitat (including known sites) is sufficient to provide for stable populations throughout the NWFP area under Alternatives 1, 3, and 4.

Under Alternative 2, *U. longissima* is removed from Survey and Manage. It is assumed to be included in the Agencies' SSSPs throughout its range except for the BLM in Oregon. Due to management of known sites and pre-project clearances, this species would maintain stable populations and/or distributions under Alternative 2. Habitat (including known sites) is sufficient to provide for stable populations under Alternative 2. Because there were no RMS Survey detections in the Category A portion of its range, where there are still a comparatively low number of known sites, an inference can be made that the species is rare there. Alternative 2 without SSSP for Forest Service managed lands in Curry, Josephine, and Jackson Counties, Oregon and BLM and Forest Service managed lands in California, could lead to a loss of sites and an outcome of insufficient habitat to support populations. Within the remainder of the species' range in Oregon and Washington there is sufficient habitat to support stable populations without SSSP on Forest Service managed lands. Overall, for the scenario of Alternative 2 without SSSP, habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area, although there is insufficient habitat to support stable populations in a portion of the NWFP area.

Summary and Mitigation

Under all alternatives, for 17 of 49 lichen species, habitat (including known sites) is insufficient to support stable populations in the NWFP area. This outcome is not a result of federal actions.

Under all alternatives, for 20 of 49 lichen species, habitat (including known sites) is sufficient to support stable populations in the NWFP area. However, for three of these 20 species (*Dendriscocaulon intricatulum, Bryoria tortuosa, and Platismatia lacunosa)* under alternatives where the species is removed from Survey and Manage, habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area, but is insufficient habitat to support stable populations in a portion of the NWFP area. Mitigation could include management of known sites not protected by reserves or the Agencies' SSSPs. In addition, for *Dendriscocaulon intricatulum* mitigation could also include pre-project clearances. These mitigations would eliminate the adverse effects of Alternative 2 for *Dendriscocaulon intricatulum and Platismatia lacunosa* in portions of its range, and the adverse effects of Alternatives 1, 2, and 3 for *Bryoria tortuosa* in portions of its range. See *Chapter 2* for a detailed description of mitigation.

Under all alternatives, 10 of 49 lichen species have insufficient information to determine an outcome.

Under Alternatives 1 and 4, two lichen species (*Nephroma occultum* and *Pseudocyphellaria rainierensis*) would have habitat (including known sites) sufficient to support stable populations, but under Alternatives 2 and 3, habitat (including known sites) is insufficient to support stable populations in the NWFP area. For *Nephroma occultum,* mitigation of these effects under Alternatives 2 and 3 could include management of known sites not protected by reserves or the Agencies' SSSPs, and pre-project clearances. For *Pseudocyphellaria rainierensis*, under Alternative 2, mitigation of these effects could include management of known sites and pre-project clearances where not protected by reserves or the Agencies' SSSPs. For *Pseudocyphellaria rainierensis* under Alternative 3, mitigation for this species could be to conduct pre-project clearances in all suitable

habitat, not just late-successional and old-growth stands. These mitigations would eliminate the adverse effects of Alternatives 2 and 3 for these two species. See *Chapter 2* for a detailed description of mitigation.

Vascular Plants

Affected Environment

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. They include seed-bearing plants (flowering plants and conifers) and spore-bearing forms such as ferns, horsetails, and club mosses. Ranging from dominant conifers to the delicate fern, vascular plants are defined as those that contain conducting or vascular tissue (USDA et al. 1993:IV-111).

In general, vascular plants provide substrate and habitat for other organisms, influence microclimate, and provide forage, hiding, and thermal cover for vertebrate and invertebrate species. They produce litter fall that contributes to organic matter and soil development (USDA et al. 1993:IV-111).

The habitat components important to vascular plants are those that generally increase amounts of late-successional, riparian, and old-growth habitat. The Northwest Forest Plan Final SEIS concluded that several alternatives, including Alternative 9, provided an intermediate level of the habitat conditions important to vascular plants (USDA, USDI 1994a:3&4-155).

Elements of the Northwest Forest Plan that are important to vascular plants include the system of reserves, introduction of prescribed fire, and retention of late-successional, old-growth, and riparian habitat components in the Matrix (retaining coarse woody debris, green trees, snags, and old-growth remnants where little remains) (USDA, USDI 1994a).

Field surveys, research, and monitoring have provided additional information on the abundance, distribution, and range for most of these species (USDA, USDI Species Review Panel 1999).

Current taxonomic names are used in this section. Any differences between these and names in previous Northwest Forest Plan documents are displayed in Table 3&4-18.

Environmental Consequences

Under Alternatives 1 and 4, there would be 12 species of vascular plants included under the Survey and Manage Standards and Guidelines. Alternative 1 would include six in all of their NWFP area range, and six in part of their NWFP area range. Alternative 4 would include eight in all of their NWFP area range and four in part of their NWFP area range.

Under Alternative 2, 10 species are assumed to be included in one or more of the Agencies' Special Status Species Programs (SSSPs).

Under Alternative 3, there would be eight species included under the Survey and Manage Standards and Guidelines, all in Category A. Management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys for these eight species. Late-successional and old-growth legacy components in younger stands provide important refugia and propagule sources to re-colonize younger stands. While surveys in these legacy components in younger stands would

not be completed for these eight species, existing Northwest Forest Plan Standards and Guidelines for Matrix (USDA, USDI 1994b:C-39 through C-48) provide for retention of legacy components. Under Alternative 3, two species would also be included in the Agencies' SSSPs.

Under all alternatives, vascular plants would receive protection under the network of reserves.

***Arceuthobium tsugense* ssp. *Mertensianae* (Washington)**

A majority of sites occur in reserve land allocations (USDA, USDI 2000a:318). Additionally, retention of old-growth fragments in the Matrix where little exists provides benefit to this species (USDA, USDI 1994a:3&4-156). The species is also present in Oregon and California in the NWFP area.

Under Alternatives 1 and 4, this species would be included in Category F in Washington, which requires Strategic Surveys. Since a majority of known sites would be protected under reserve land allocations, Alternatives 1 and 4 would provide sufficient habitat to allow the species to stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:318). Habitat (including known sites) is sufficient to provide for stable populations of this species under Alternatives 1 and 4.

Under Alternatives 2 and 3, *A. tsugense ssp. mertensianae* is removed from Survey and Manage. It is assumed not to be included in the Agencies' SSSPs. Since a majority of known sites would be protected under reserve land allocations, habitat (including known sites) is sufficient to provide for stable populations of this species under Alternatives 2 and 3.

***Bensoniella oregana* (California)**

This species has a restricted range and small populations in California. It is more common in Oregon. It does not occur in Washington. Cumulative effects of actions on nonfederal lands are impacting this species. Harvest, grazing, fire suppression, and road construction have impacted sites. This species has potential habitat in reserve land allocations (USDA, USDI 2000a:317).

Under Alternatives 1, 3 and 4, this species would be included in Category A in the California portion of its range. In this portion of its range, management of known sites, pre-disturbance surveys, and Strategic Surveys would be required. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. The management efforts identified for this species would provide sufficient habitat (including known sites) to allow it to stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:317). Due to management of known sites, pre-disturbance surveys, and potential habitat in reserve land allocations, habitat (including known sites) is sufficient to provide for stable populations of this species under Alternatives 1, 3 and 4.

Under Alternative 2, this species is assumed to be included in the SSSPs for the Forest Service in Oregon and California and for the BLM in Oregon. Since habitat is known to occur in reserve land allocations and this species is included in the Agencies' SSSPs where known sites are managed and pre-project clearances are completed, habitat (including known sites) is sufficient to provide for stable populations of this species under Alternative 2. Because the California portion of the species' range is represented by only two known sites that are separated by 110 miles from the more numerous Oregon populations, habitat would be insufficient to provide for stable populations under Alternative 2 without SSSP on BLM and Forest Service managed lands in California.

Botrychium minganense* (Oregon and California) and *Botrychium montanum

Botrychium minganense is one of the most widespread moonworts in North America. In the NWFP area, it is known from Washington, Oregon, and California. *Botrychium minganense* is less common in Oregon and California where it is known from less than 20 sites. *Botrychium minganense* no longer meets one of the The Basic Criteria for Survey and Manage in Washington because of the number of sites found in reserve land allocations (USDA, USDI 1998; USDA, USDI Species Review Panel 1999). *Botrychium montanum* is found in western North America. Most of the known occurrences have been reported from Oregon, Montana, and Washington. New information for these species includes the report of two new sites for *Botrychium minganense* and 39 new sites for *Botrychium montanum*.

Under Alternatives 1, 3 and 4, these species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys; however, potential habitat is known to occur in reserve land allocations that would not be typically subject to pre-disturbance surveys (USDA, USDI 2000a:317). Management efforts would provide sufficient habitat to allow these species to stabilize in a pattern similar to reference distribution (USDA, USDI 2000a:317). Habitat (including known sites) is sufficient to provide for stable populations of these species under Alternatives 1, 3 and 4.

Under Alternative 2, *Botrychium minganense* is removed from Survey and Manage and is assumed to be included in the Sensitive Species Program for the Forest Service in Oregon and California. *Botrychium montanum* is removed from Survey and Manage and is assumed to be included in the SSSPs for the Forest Service in Oregon and California and the BLM in Oregon. Since habitat is known to occur in reserve land allocations and these species are included in the Agencies' SSSPs where they receive management of known sites and pre-project clearances, habitat (including known sites) is sufficient to provide for stable populations of these species under Alternative 2. Because of the low number of known sites for *Botrychium minganens*, 60 percent of which are in the Matrix, there would be insufficient habitat to support stable populations under the scenario of Alternative 2 without SSSP on Forest Service managed lands in Oregon and California. Because 68 percent of *Botrychium montanum* known sites are within reserve allocations, there would be sufficient habitat to support stable populations under the scenario of Alternative 2 without SSSP on Forest Service managed lands in Oregon and California and BLM managed lands in Oregon.

Coptis asplenifolia* and *Coptis trifolia

Coptis asplenifolia reaches the southern extent of its range in northern Washington west of the Cascades. *Coptis trifolia* occurs from Greenland across North America to Alaska. It also occurs in northeast Asia to northern Japan. There are two disjunct populations in the western United States, in Washington and Oregon. New information for these species includes one new site reported for *Coptis trifolia* and five new sites for *Coptis asplenifolia*.

Under Alternatives 1, 3 and 4, these species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys; however, these species are known to have potential habitat in reserve land allocations that would not typically be subject to pre-disturbance surveys (USDA, USDI 1998; USDA, USDI Species Review Panel 1999). Management of known sites, pre-disturbance surveys, Strategic Surveys, and reserves would provide sufficient habitat to allow these species to stabilize in a pattern similar to reference distribution under Alternative 1 (USDA, USDI 2000a:317).

Habitat (including known sites) is sufficient to provide for stable populations of these species under Alternatives 1, 3 and 4.

Under Alternative 2, *C. asplenifolia* is removed from Survey and Manage. It is assumed to be included in the Sensitive Species Program for the Forest Service in Washington. *C. trifolia* is removed from Survey and Manage and is assumed to be included in the SSSPs for the Forest Service in Oregon and the BLM in Oregon. Since habitat is known to occur in reserve land allocations and these species are included in the Agencies' SSSPs where they receive management of known sites and pre-project clearances, habitat (including known sites) is sufficient to provide for stable populations of these species under Alternative 2. Known sites for *C. asplenifolia* all occur within reserve land use allocations, where they are afforded some protection. Under the scenario of Alternative 2 without SSSP on Forest Service managed lands in Washington, there would be sufficient habitat to provide for stable populations of *Coptis asplenifolia*.

Coptis trifolia is only known from three sites on federal land within the NWFP area. Without active management, there may be a loss of one or more sites. Under Alternative 2 without SSSP on Forest Service managed lands in Oregon and Washington and BLM managed lands in Oregon, there would be insufficient habitat to provide for stable populations.

Corydalis aquae-gelidae

This species is restricted to the western Cascades of Skamania and Clark Counties in Washington, and Clackamas, Lane, Linn, Marion, and Multnomah Counties in Oregon. Almost all known occurrences are on National Forest System lands and within Riparian Reserves. New information for *Corydalis aquae-gelidae* includes an updated Conservation Assessment (USDA, USDI 2005c), further characterization of habitat requirements for the species (McShane 2003), a monitoring plan for a hydroelectric project area (PGE 2006), and the location of 26 new sites. Because a high percentage of the newly reported sites occur within proximity to areas that were known to have *C. aquae-gelidae* populations (Scott 2006 pers. comm., Ruchty 2006 pers. comm.), the new sites are considered to be part of existing populations. An investigation to further define the habitat requirements of this species determined that *C. aquae-gelidae* in the Clackamas River drainage in Oregon occurs on stream reaches that have a mean gradient of 3-4 percent, and are downstream of structures or land features that either moderated flows or diverted flows away from plants (McShane 2003). Recognition of these narrow habitat requirements may help to explain why the species has a patchy distribution pattern.

Under Alternatives 1 and 3, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. The 2000 FSEIS found, for an equivalent alternative, management of known sites and pre-disturbance surveys would provide sufficient habitat to allow this species to stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:318). Habitat (including known sites) is sufficient to provide for stable populations of this species under Alternatives 1 and 3.

Under Alternatives 2, *C. aquae-gelidae* is removed from Survey and Manage. It is assumed to be included in the SSSPs for the Forest Service and BLM in Oregon and Washington. Known sites would be managed and pre-project clearances would be completed. Habitat (including known sites) is sufficient to provide for stable populations of this species under Alternative 2. Because the largest concentrations of *C. aquae-gelidae* in Oregon occur within river reaches used by two hydroelectric projects, they are potentially vulnerable to inundation and dewatering. Fish habitat improvement and thinning projects also have the potential to adversely impact sites throughout the species' range.

For these reasons, Alternative 2 without SSSP on BLM and Forest Service managed lands in Oregon and Washington would result in habitat insufficient to support stable populations.

Under Alternative 4, C. *aquae-gelidae* would be in Category C, which requires the management of high-priority sites and pre-disturbance surveys. Habitat is sufficient to support stable populations for the reasons listed under Alternative 1.

***Cypripedium fasciculatum* (Excluding the Washington Eastern Cascades)**

This species is known from Washington, Oregon, and California. This species has small and scattered populations that are declining. Effects of habitat fragmentation, trampling, collection for horticultural purposes, and lack of fire have reduced populations and habitat (USDA, USDI 1994a:J2-275). New information for *Cypripedium fasciculatum* since the 2004 FSEIS includes the addition of 374 sites on federal lands within the NWFP area.

Under Alternatives 1 and 4, this species would be included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. Since this species receives management of known sites and pre-disturbance surveys, habitat (including known sites) is sufficient to provide for stable populations of this species under Alternatives 1 and 4.

Under Alternatives 2 and 3, *C. fasciculatum* is removed from Survey and Manage. It is assumed to be included in the SSSPs for the BLM and Forest Service in Washington, Oregon, and California. Since this species is included in the Agencies' SSSPs where it receives management of known sites and pre-project clearances, habitat (including known sites) is sufficient to support stable populations in the NWFP area under Alternatives 2 and 3. Despite the large number of new sites reported, the total number of plant stems these sites represent is disproportionately low. Seventy-two percent of all known sites in the NWFP area have fewer than 10 stems per site and essentially all (96 percent) have fewer than 50 stems per site (USDA, USDI 2005a). In addition, 84 percent of known sites occur within the Matrix, where management activities that result in the reduction of canopy cover or disturb the soil and duff layer could result in the decline the site. Under Alternatives 2 and 3 without SSSP on BLM and Forest Service managed lands in California, Oregon, and Washington, there would be insufficient habitat to support stable populations throughout the NWFP area.

***Cypripedium fasciculatum* (Washington Eastern Cascades)**

Information from the 2002 Annual Species Review indicates that *C. fasciculatum* is not closely associated with late-successional and old-growth habitat within this portion of its range (USDA, USDI 2003a). It was also acknowledged that concerns for the species' persistence exist for the 147 then-known sites because of the low to moderate number of individuals at most sites, poor distribution, and a low number of sites within reserves (USDA, USDI Species Review Panel 2002). Since the 2002 ASR, new information includes 33 additional sites reported.

Under Alternatives 1, 2, and 3, *C, fasciculatum* is removed from Survey and Manage. It is assumed to be a Forest Service Sensitive Species on Forest Service managed lands. Known sites would be managed and pre-project clearances would be conducted. Because of site management and pre-project clearances, habitat is sufficient to provide for stable populations under Alternatives 1, 2, and 3. Under Alternatives 1, 2, and 3 without SSSP on Forest Service managed lands, habitat is insufficient to provide for stable populations because only 14 percent of sites are within reserves, sites are not well distributed, and there tends to be a low number of individuals per known site.

Under Alternative 4, *C. fasciculatum* would be included in Category C, which requires management of high-priority sites and pre-disturbance surveys. Under this alternative, habitat is sufficient to provide for stable populations because of known site management and pre-disturbance surveys.

***Cypripedium montanum* (Excluding the Washington Eastern Cascades Province)**

This species is known from Washington, Oregon, and California. It has small and scattered populations that are declining. Effects of logging, collection for horticultural use, loss of habitat on private land, and lack of fire have reduced populations and habitat (USDA, USDI 1994a:J2-281). New information for *Cypripedium montanum* since the 2004 FSEIS includes the addition of 255 known sites on federal lands within the NWFP area.

Under Alternative 1 and 4, this species would be included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys except in the Washington Eastern Cascades. Applying the Survey and Manage Standards and Guidelines to the entire range of *C. montanum* within the NWFP area would improve the chance for it to stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:319). Habitat (including known sites) is sufficient to provide for stable populations of this species under Alternative 1.

Under Alternatives 2 and 3, *C. montanum* is removed from Survey and Manage. It is assumed to be included in the SSSPs for the BLM and the Forest Service in California. It is assumed not to be included in the SSSPs for the BLM or Forest Service in Washington and Oregon where pre-disturbance inventory or site protection would not occur. Long-term monitoring of *C. montanum* in southwest Oregon looked at populations in clearcut, shelterwood and unmanaged forest sites comparing population trend, reproduction, dormancy and plant growth. *C. montanum* abundance, size and reproduction varied substantially from year to year but over the 15 year study, the clearcut site performed the worst, the shelterwood site the best, and sites in unmanaged forest intermediate in performance. The clearcut population lost over 85 percent of its stems between 1985 and 1998, had relatively short stems and few flowers after the first seven years of the study, and went from more than 60 percent of stems flowering in 1985, to less than 30 percent by 1998. This population also had dramatically lower overall fruit-set than the other populations, with 10 percent of the flowers forming fruits compared to 30-50 percent at the other sites. Incongruities between the clearcut population and the others could reflect differences in habitat not associated with timber harvest, or they could be explained by the competitive pressure exerted on *C. montanum* plants by re-colonizing trees and shrubs (Kaye 1999). The majority of occurrences (75 percent) for *C. montanum* are in Oregon and Washington where sites would not be SSSP and, therefore, not managed. Populations of *C. montanum* tend to be small and scattered, which makes them vulnerable to extirpation (USDA, USDI 1998). The loss of small, isolated populations due to activities such as timber harvest, road and trail construction, soil and litter disturbance, and a decrease of canopy closure to less than 60 percent have been identified as threats to this species (USDA, USDI 1994a; USDA, USDI 1998). The more fragmentation within the range of a species, the more likely it is to be adversely affected. Seventy-eight percent of *C. montanum* sites occur in Matrix (GeoBOB/ISMS database) within this portion of the range. Matrix Standards and Guidelines, such as 15 percent green tree retention, would not provide 60 percent or greater canopy cover in areas where habitat-disturbing activities occur. There could be negative impacts to these small populations from loss of canopy cover and changes in interior habitat conditions and microclimate (USDA, USDI 1998). Because of the potential loss of small sites due to management activities, and the small proportion of sites in reserves, habitat (including known sites) is insufficient to support stable populations for *C. montanum* on Forest Service and BLM managed lands in Oregon. Under Alternatives 2 and 3, since this species is included in the Agencies' SSSPs in California where it receives management of known sites and pre-project clearances, habitat (including known sites) is sufficient to support stable populations

range-wide in the NWFP area. Under Alternatives 2 and 3 without SSSP on BLM and Forest Service managed lands in California, there would be insufficient habitat to support stable populations throughout this portion of the species' range the reasons listed under Alternatives 2 and 3, and because long-term monitoring of sites in northern California has indicated declining population trends (USDA 2005a).

***Cypripedium montanum* (Washington Eastern Cascades)**

Information from the 2001 Annual Species Review indicates that *C. montanum* is not closely associated with late-successional and old-growth habitat within this portion of its range. At that time, the species was known from 274 sites (USDA, USDI Species Review Panel 2001). Since the 2001 ASR, 21 additional sites have been reported.

Under Alternatives 1, 2, and 3, *C. montanum* is removed from Survey and Manage. It is not assumed to be in a SSSP for the BLM or Forest Service and known sites would not be managed. Populations of *C. montanum* tend to be small and scattered, which makes them vulnerable to extirpation (USDA, USDI 1998). The loss of small, isolated populations due to activities such as timber harvest, road and trail construction, soil and litter disturbance, and a decrease of canopy closure to less than 60 percent have been identified as threats to the species (USDA, USDI 1994a; USDA, USDI 1998). Because 88 percent of known sites within this portion of the range occur within the Matrix (GeoBOB/ISMS database) where management activities may result in the loss of sites, habitat is insufficient to provide for stable populations under Alternatives 1, 2, and 3. Possible mitigation includes management of high-priority sites and pre-disturbance surveys in likely habitat.

Under Alternative 4, *C. montanum* would be included in Category C, which requires management of high-priority sites and pre-disturbance surveys. Under this alternative, habitat is sufficient to provide for stable populations because of known site management and pre-disturbance surveys.

Eucephalus vialis

This species is known from Oregon and California. There is currently a single known site in California which is protected on National Forest System lands. This species has potential habitat in reserve land allocations (USDA, USDI 2000a:317). New information since the 2004 FSEIS includes the report of 79 new known sites and the update of a Conservation Assessment (USDA, USDI 2005b).

Under Alternatives 1, 3 and 4, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. Management identified would allow *E. vialis* to stabilize. Due to management of known sites, pre-disturbance surveys, and potential habitat in reserve land allocations, habitat (including known sites) is sufficient to provide for stable populations of this species under Alternatives 1, 3 and 4.

Under Alternative 2, *E. vialis* is assumed to be included in the SSSPs for the BLM and the Forest Service in Oregon. Management efforts under Alternative 2 would allow *Eucephalus vialis* to stabilize in a pattern different from its reference distribution. Due to management of known sites, pre-project clearances, and potential habitat in reserve land allocations, habitat (including known sites) is sufficient to provide for stable populations of this species under Alternative 2. Potential threats for this species include habitat fragmentation and inbreeding depression, road construction and maintenance, off-highway vehicle use, plantation development where young stands approach 100 percent canopy closure, and fire suppression (USDA, USDI 2005b). Invasive plant competition is also seen as a threat to known sites (Sawtelle, N. pers. comm.). Preliminary genetics

work indicates that populations may be susceptible to the loss of genes, or random genetic drift, because of fragmented habitat and because the species is an obligate out-crosser. Subsequent generations of crossing among low numbers of related breeding individuals could result in breeding depression (USDA, USDI 2005b). Because of these concerns, and because only 3 percent of known sites are within reserve land allocations, there would be insufficient habitat to support stable populations under Alternative 2 without SSSP on BLM and Forest Service managed lands in Oregon.

***Galium kamtschaticum* (Olympic Peninsula, Washington Eastern Cascades, Oregon and Washington Western Cascades physiographic provinces, south of Snoqualmie Pass)**

The current known range of this species within the NWFP area is limited to the Olympic and Cascades Mountains north of Snoqualmie Pass in the State of Washington (USDA, USDI 2000a:317). It is not a concern in the WA Western Cascades Physiographic Province of the Mt. Baker-Snoqualmie National Forest because a high number of healthy populations occur in reserves spanning an array of geographic locations and habitats (USDA, USDI 1998; USDA, USDI Species Review Panel 1999), and it was removed from Survey and Manage in the Washington Western Cascades physiographic provinces, north of Snoqualmie Pass, in the 2001 Survey and Manage Record of Decision. New information for *Galium kamtschaticum* since the 2004 FSEIS includes the report of four new sites on federal land and the update of a Conservation Assessment (USDA, USDI 2004c).

Under Alternatives 1, 3 and 4, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys. Management efforts would provide sufficient habitat to allow this species to stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:317). Because virtually all known sites and much of the habitat in this area is in reserves, there would be habitat (including known sites) sufficient to provide for stable populations of this species under Alternatives 1, 3 and 4.

Under Alternative 2, *G. kamtschaticum* is removed from Survey and Manage. It is assumed to be included in the Sensitive Species Program for the Forest Service in Oregon and Washington. Due to management of known sites, pre-project clearances, and potential habitat in reserve land allocations, habitat (including known sites) is sufficient to provide for stable populations of this species under Alternative 2. The major threat identified for *G. kamtschaticum* is a change in hydrology caused by management activities. The majority of known sites are located within reserve allocations where they are afforded some protection from this threat. Within the Washington Western Cascades province (including the area off of Survey and Manage, north of Snoqualmie Pass), 91 percent of the 77 known sites from Mt Baker-Snoqualmie National Forest are within reserves. For the Olympic Peninsula province, where there is a greater concern for species persistence because of lower sites numbers, all 8 sites from the Olympic National Forest are located in reserves (USDA, USDI 2004c). Because a large proportion of known sites occur within reserves where they are likely protected from identified threats, habitat is sufficient to support stable populations under Alternative 2 without SSSP on Forest Service managed lands in Washington.

Platanthera orbiculata* var. *orbiculata

This species occurs throughout Canada, south to South Carolina and Tennessee in the east and Oregon to Wyoming in the west. There is a moderate to high likelihood of sites occurring in reserves (USDA, USDI 1998; USDA, USDI Species Review Panel 1999). Additionally, retention of old-growth fragments in the Matrix where little remains

provides benefit to this species (USDA, USDI 1994a:3&4-156). New information for *P. orbiculata* var. *orbiculata* since the 2004 FSEIS includes the report of 68 new sites on federal lands.

Under Alternatives 1 and 4, this species would be included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. Alternatives 1 and 4 would provide sufficient habitat to allow this species to stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:318). Since habitat is known to occur in reserve land allocations, habitat (including known sites) is sufficient to provide for stable populations of this species under Alternatives 1 and 4.

Under Alternatives 2 and 3, *P. orbiculata* var. *orbiculata* is removed from Survey and Manage. It would not be included in the Agencies' SSSPs. Habitat (including known sites) is sufficient to provide for stable populations of this species under Alternatives 2 and 3 for the reason stated for alternatives 1 and 4.

Summary and Mitigation

Under all alternatives, habitat (including known sites) is sufficient to provide for stable populations for 12 species. However, for one of these species (*Cypripedium montanum*), habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area, but there is insufficient habitat to support stable populations in a portion of the NWFP area under Alternatives 1, 2, and 3. Mitigation could include management of known sites not protected by reserves or the Agencies' SSSPs. In addition, mitigation could include pre-project clearances. These mitigations would eliminate the adverse effects of Alternatives 1, 2, and 3 for this species in a portion of its range. See *Chapter 2* for a detailed description of mitigation.

Arthropods

Affected Environment

Arthropods, invertebrates with jointed legs, a segmented body, and an exoskeleton, constitute more than 85 percent of the biodiversity in late-successional forests (Asquith et al. 1990) and play a vital role in ecosystem processes (Wilson 1987). They include insects, mites, crustaceans, spiders, and myriapods. Four functional groups of arthropods (out of 15 functional groups considered by FEMAT) were included in the Survey and Manage Standards and Guidelines because there was not sufficient information to determine necessary levels of protection for them. They are: (1) litter and soil dwellers; (2) coarse woody debris chewers; (3) understory and forest gap herbivores; and, (4) canopy herbivores, all south range. Some species of arthropods are included in the Agencies' Special Status Species Programs. For example, the Mardon Skipper Butterfly is listed as Sensitive by the Forest Service in Region 6 (Oregon and Washington).

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 is the site of some of the greatest biological diversity found anywhere (USDA et al. 1993:IV-137). The structure and function of temperate forest soils are largely determined by the feeding 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 (USDA et al. 1993:IV-137). It has been estimated that there are between 20,000 and 25,000 described species of arthropods within the NWFP area, and as many or more not yet described (USDA, USDI 2000a).

For the FEMAT analysis, arthropod species were aggregated into functional groups because it is not possible to monitor all arthropods as individual species. For Alternative 9 of the Northwest Forest Plan Final SEIS, ratings for the four arthropod functional groups showed an 80 percent or greater likelihood of achieving outcomes A and/or B: providing habitat of sufficient quality, distribution, and abundance to support stable populations either well distributed when measured against their historic range or distributed with gaps in their historic distribution on federally managed lands. Risk of extirpation varied between 2 and 6 percent for the four functional groups (USDA, USDI 1994a:3&4-161). The four groups were divided into northern and southern ranges. Only the southern portions of their ranges were subject to additional analysis for inclusion in Survey and Manage (USDA, USDI 1994a:3&4-160). While there is a low risk that an entire functional group, encompassing thousands of species, would face extirpation, individual species are at greater risk.

There is concern regarding the persistence of arthropods for several reasons. First, many of the species are flightless, so their dispersal capabilities are limited. Second, their flightless condition is believed to reflect habitat stability and permanence; therefore, they are Sensitive to habitat disturbance. Third, many of the old-growth forest associated species have disjunct distributions and are endemic to undisturbed conifer forests of the Pacific Northwest. Fourth, arthropods are key to ecosystem function and may serve as indicators of ecosystem health. Last, many of the species native to this region have not been described or named and the number of known species probably represents fewer than half the species estimated to exist (Lattin and Moldenke 1992). In a recent survey, 10 percent of the beetle species found were new to science (O'Keefe and Rappaport, unpublished).

New research has shown that fire can reduce soil arthropod biodiversity (particularly the forest floor arthropods: soil/litter dwellers) more than expected (Rappaport et al. in press and Camann et al. in press). In these two studies in the southern Cascade Range, soil arthropod species richness and diversity continued to decline for 2 years following fire, but late-successional stand characteristics mitigated the negative effects of fire. Even 2 years after the fire, there was no consistent sign of recovery of soil arthropods. This new information raises questions about the persistence of soil arthropods when subjected to fire, particularly high-intensity wildfire. Management that reduces fuel loads to minimize high-intensity wildfires will likely increase the probability of persistence of soil arthropods.

Environmental Consequences

Under Alternatives 1 and 4, the four arthropod functional groups would be included in the Survey and Manage Standards and Guidelines in Category F, which requires Strategic Surveys.

Under Alternatives 2 and 3, the four arthropod functional groups are assumed not to be included in the Agencies' Special Status Species Programs; however, individual arthropods, like species in any other taxonomic grouping, might qualify for the Special Status Species Programs. Under Alternatives 2 and 3, Strategic Surveys for arthropods would no longer be conducted.

New information gathered since 1994 does not substantially alter the basic assumptions or conclusions of the Northwest Forest Plan Final SEIS that expressed a concern that their ecological functions may not persist in the south range. However, there continues to be

insufficient information upon which to determine an outcome for these four functional groups (USDA, USDI 2000a:321).

In summary, new information gathered since 1994 increases concern about the effect of fire on two arthropod functional groups (soil/litter dwellers). However, there is insufficient information to determine an outcome in the NWFP area for the four arthropod functional groups under all alternatives.

The determination of whether habitat (including known sites) is sufficient to support stable populations which was made for other taxa in this analysis, is not applicable here because it is not practical to make those determinations for entire functional groups which consist of thousands of individual species.

Mollusks

Affected Environment

Mollusk species that inhabit Northwest forests include land snails, slugs, aquatic snails, and bivalves. Many mollusks have restricted geographic ranges and narrow ecological requirements. All 44 of the mollusk species below are either endemic to the NWFP area or have ranges that lie mostly within the NWFP area

Several different factors contribute to rarity and concerns for persistence in these animals. Some of the species are confined to very narrow ranges in which subpopulations appear relatively well-connected demographically and genetically. However, habitat sufficiency is a serious concern due to habitat alteration or catastrophic events. Other species are found widely scattered over a large range, so range-wide habitat concerns are low, but likelihood of loss of some populations, connectivity among populations, and normal biological function is high.

Several factors make prediction of occupation rates of suitable habitat difficult. While the understanding of suitable habitat has improved since 1994 (although some of these species have never been the subject of even basic studies), habitat definitions remain general. Habitat suitability for many species appears to depend on microsite conditions that are difficult or impossible to map. Because of the extremely limited dispersal ability of these animals and their sensitivity to environmental conditions like temperature and humidity, recolonization of unoccupied habitat is extremely slow, and historical factors leave their signature in current distributions. Suitable habitat may remain unoccupied for indefinite periods of time. As a result, the analysis of occupation of different land allocations, association with habitat types, and extent or pattern of distribution relies on data from known sites more than on predictive approaches

Current taxonomic names are used in this section. Any differences between these and names in previous Northwest Forest Plan documents are displayed in Table 3&4-18.

Additional information regarding the affected environment for mollusks is found in the 2000 Final SEIS, the Northwest Forest Plan Final SEIS, and the FEMAT Report.

Environmental Consequences

Under Alternative 1, 36 of the 44 mollusk species included in this analysis would be included in Survey and Manage; 34 in all of their NWFP area range, and two in part of their NWFP area range. Alternative 1 includes Strategic Surveys for all 36 species. Thirty-four species have management of all known sites and the remaining 2 would

have management of high-priority sites. Twenty-nine species (28 in category A, and one in category C) would receive pre-disturbance surveys. There would be five species included in one or more of the Agencies' Special Status Species Programs (SSSP) including one in the part of its range not included in Survey and Manage. The remaining four species would not be included Survey and Manage or SSSP (see Table 2-13).

Under Alternative 2, thirty mollusk species would be included in one or more of the Agencies' SSSPs in all or part or their range. The remaining 14 species would not be included in either the Survey and Manage Standards and Guidelines or SSSP (see Table 2-13).

Under Alternative 3, there would be 34 mollusk species included in the Survey and Manage Standards and Guidelines; 33 in all of their NWFP area range and 1 in part of its NWFP area range (Categories A, B, and E), and seven included in one or more of the Agencies' SSSP. Management activities in non-late-successional and non-old-growth forest stands would be exempt from pre-disturbance surveys for the three species included in Category A. The remaining species would not be protected by the Survey and Manage Standards and Guidelines or by SSSP (see Table 2-13).

Under Alternative 4, all of the 44 mollusk species discussed would be included in the Survey and Manage Standards and Guidelines (Categories A, B, C, E, and F). Alternative 4 includes Strategic Surveys for all species, management of all known sites for the 41 species in Categories A, B, and E, management of high-priority sites for the 2 species in Category C, and pre-disturbance surveys for the 32 species included in Category A (see Table 2-13).

Under Alternatives 1 and 4, the outcome for these 44 mollusk species would be habitat sufficient to allow the species to stabilize in a pattern either similar to reference distribution or altered from reference distribution with some limitations on biological function and species interactions (USDA, USDI 2000a:173 and 191; USDA, USDI 2001a:14). Table outcomes (in *Chapter 2*) display the category assignments for each of the 44 mollusk species analyzed here.

Analyses relevant to Alternative 2 include the FEMAT report, which judged Option 9, and the Northwest Forest Plan Final SEIS, which judged Alternative 9, among the alternatives that were generally the most favorable to mollusks (USDA, USDI 1994a:3&4-165). However, the options in FEMAT and alternatives in the Northwest Forest Plan Final SEIS were judged less effective in providing for mollusks than any of the other species groups (USDA et al. 1993:IV-132). Of 102 species assessed, 97 species were rated low enough that they failed to pass the screen in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a) and required additional analysis. All 44 species analyzed in this SEIS had combined likelihood scores in Outcomes C and D greater than 20 (see *Background for Effects Analysis, FEMAT*, earlier in this chapter). All but one species had at least some likelihood of Outcome D (USDA, USDI 1994a). Rarity, localized distribution, habitat specialization, and lack of information played an important role in the FEMAT rating for most of these species. Those species currently confined to refugia because of habitat history and species life history were judged unlikely to expand their range and were rated accordingly. "Therefore, in even the most favorable situations such species were judged unlikely to be well distributed" (USDA et al. 1993:IV-135).

In the Northwest Forest Plan Final SEIS, most of the mollusk species analyzed here were judged to be strongly or partly associated with riparian areas, or to have all or most sites in Late-Successional Reserves, Administratively Withdrawn Areas, or Congressionally Reserved Areas (USDA, USDI 1994a). Data collected since the Northwest Forest Plan Final SEIS provides substantial new information on the association of these species with riparian areas and other reserves. The 2004 FSEIS found that all but one species (*Fluminicola* n. sp. 11, known from two sites) currently have a majority of their known

sites outside of Late-Successional Reserves, Administratively Withdrawn Areas, or Congressionally Reserved Areas (GeoBOB/ISMS database). However, recent reports found, through Strategic Surveys, that terrestrial mollusks were found in Riparian Reserves more than expected (Dunk et al. 2002, 2004, 2006). The 2004 FSEIS indicated that of the 25 terrestrial species, only 8 (*Ancotrema voyanum*, *Cryptomastix hendersoni, Deroceras hesperium, Monadenia fidelis minor, Pristiloma arcticum crateris, Vertigo* n. sp. 1, *Vespericola pressleyi,* and *Vespericola shasta*) were believed to be associated with riparian areas in at least part of their range (USDA, USDI 2003b; USDA, USDI 2004a). However, Dunk et al. (2002) found that the NWFP area system of Riparian Reserves provided protection for terrestrial mollusks.

The remaining 19 species are aquatic snails. The analysis completed in 2000 and the 2001 Annual Species Review considered the protection provided to all of these species by the reserve network including Riparian Reserves. These reviews determined that for 34 species "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." However, Dunk et al. (2006) found that estimating persistence within these taxa is a difficult task, and that although species richness was not optimal, existing reserves provide conservation value for terrestrial mollusks. A study of 26 rare (less than 2 known sites) mollusks, 15 occurred exclusively in reserved lands, while only four occurred exclusively in unreserved lands (Dunk et al. 2006).

Under Alternative 3, pre-disturbance or equivalent-effort surveys for the 31 species requiring them would no longer be required in non-late-successional and non-old-growth forest stands. All 31 species are believed to be closely associated with late-successional and old-growth forest as defined in USDA, USDI (2001a:55-56). In many cases, these species appear more closely associated with old-growth forest components, such as down wood, than with forest stands of a particular age, although the forest stand may provide critical microhabitat conditions (USDA, USDI 2003b). Species may often be found in younger stands that contain some of these components, and sites in these areas may provide important connectivity corridors among populations in fragmented old-growth stands that were once part of more contiguous habitat in the species' reference distribution. Lack of surveys could result in inadvertent loss of undiscovered sites in these stands. The potential environmental consequences to these mollusk species are discussed in more detail below.

Ancotrema voyanum

Information from the 2003 Annual Species Review (ASR) indicates that the terrestrial snail *Ancotrema voyanum* is common. There are several hundred known sites and numerous detections from Strategic Surveys. The ASR also found that 62 percent of known sites and 48 percent of potential habitat is within reserves (USDA, USDI Species Review Panel 2003). Since the 2003 ASR, the number of known sites has continued to increase. The species was not included in all pre-disturbance surveys, so it is possible that the actual abundance has been underestimated. New information provides more clarity of this species habitat association, suggesting it is more frequently associated with late-successional forests and sites within close proximity to streams (Dunk et al. 2004).

Under Alternatives 1, 2, and 3, *Ancotrema voyanum* is removed from Survey and Manage and not assumed to be on SSSP. Under Alternative 4, this species would be included in Category E, which requires management of all known sites and Strategic Surveys. This species also requires equivalent-effort surveys as a mitigation measure "for as long as [it] remains in Categories B or E" (see *Chapter 2*). Because of the high number of known sites, and apparent habitat in reserves, association with Riparian Reserves, and its wide ecological amplitude, habitat (including known sites) is sufficient to provide for stable populations across the NWFP area under all alternatives.

Cryptomastix devia

Cryptomastix devia is known from a moderate numbers of known sites spread across a broad range. Under Alternatives 1, 3, and 4, it is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Cryptomastix devia* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included in both Agencies' SSSPs for all of its range. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Cryptomastix hendersoni

This snail has few known sites confined to a narrow range around the Columbia River. Under Alternatives 1, 3, and 4, it is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Cryptomastix hendersoni* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included in the Agencies' SSSPs as Sensitive on Forest Service managed lands in Oregon and Washington. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Deroceras hesperium

This slug is very rare, known from only a few sites scattered across a relatively broad range. Since 1994, the understanding of the range has changed; the species has been found in southern Oregon, although it was previously considered to occur only

in northwestern Oregon and western Washington (USDA, USDI 1994a:J2). Under Alternatives 1, 3 and 4, it is included in Category B, which requires management of known sites and Strategic Surveys. For this species, equivalent-effort surveys apply as a mitigation measure "for as long as it remains in Category E or B" – see *Chapter 2*. *Deroceras hesperium* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty, with the additional mitigation of equivalent-effort surveys (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included in the Agencies' SSSPs as Bureau Sensitive on BLM managed lands in Oregon and Sensitive on Forest Service managed lands in Oregon and Washington. Known sites and suitable habitat on federally managed lands occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Fluminicola* n. sp. 1**

Information from the 2001 ASR indicates that the aquatic snail *Fluminicola* n. sp. 1 is not closely associated with late-successional or old-growth forests, as the majority of known sites are not near forests. Of the 27 known sites, 25 are in or around Upper Klamath Lake; the remaining are within the California Cascades. All known sites occur on rocky bottoms of lakes and streams with some water flow as from spring influx (USDA, USDI Species Review Panel 2001). Since the 2001 ASR, detections include two sites outside of large reserves and three sites outside of Forest Service or BLM lands.

Under Alternatives 1, 2, and 3, *Fluminicola* n. sp. 1 is removed from Survey and Manage and assumed to be on SSSP for BLM in Oregon and Washington and the Forest Service in Oregon. Under Alternative 4, this species would be included in Category A, which requires management of all known sites, pre-disturbance surveys, and Strategic Surveys. Habitat for this species is not associated with forestlands, suggesting a very low risk of harm from timber harvest or other management activities. Because of site protection by Riparian Reserves and other elements of the Aquatic Conservation Strategy, habitat (including known sites) is sufficient to provide for stable populations for this species under all alternatives with or without SSSP.

***Fluminicola* n. sp. 2**

Information from the 2001 ASR indicates that the aquatic snail *Fluminicola* n. sp. 2 is not closely associated with late-successional or old-growth forest (USDA, USDI Species Review Panel 2001). It is known from only one aquatic site in Oregon (not on Forest Service or BLM lands). The 2000 Final SEIS outcome for Alternative 1 (Alternative 4 in this SEIS) was "sufficient habitat." Other suitable habitats within the vicinity have been thoroughly surveyed with no additional detections. Efforts were made to find additional sites and no new information has come about since 2000.

Under Alternatives 1, 2, and 3, *Fluminicola* n. sp. 2 is removed from Survey and Manage and assumed to be on SSSP for Forest Service in Oregon. Under Alternative 4, this species would be included in Category A, which requires management of all known sites, pre-disturbance surveys, and Strategic Surveys. If sites exist on Forest Service or BLM lands they would be offered protection by Riparian Reserves and other elements the Aquatic Conservation Strategy. Therefore, habitat (including known sites) is sufficient to provide for stable populations under all alternatives with or without SSSP.

***Fluminicola* n. sp. 3**

Fluminicola n. sp. 3 is an aquatic snail known from one cluster of sites in southern Oregon (USDA, USDI 1994a:J2). Although two sites have been recorded for this species in California, these records are most likely the result of confusion from inconsistent numbering schemes for undescribed species in this genus. Under Alternatives 1, 3 and 4, it is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Fluminicola* n. sp. 3 was predicted to have habitat sufficient to "stabilize in a pattern similar to reference distribution" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites and protection by Riparian Reserves, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included in the Agencies' SSSPs as Bureau Sensitive on BLM managed lands in Oregon and Sensitive on Forest Service managed lands in Oregon. Known sites and suitable habitat on federally managed lands occur almost exclusively on National Forest System lands (GeoBOB/ISMS database) and are protected by Riparian Reserves. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Rarity, limited distribution, and narrow range could mean that the loss of sites could result in habitat insufficient to support stable populations. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Fluminicola* n. sp. 11**

This aquatic snail is rare, known from only a few sites confined to a narrow range in the Klamath Basin. The known range has not changed substantially since 1994, despite pre-disturbance or equivalent-effort survey requirements (USDA, USDI 1994a: J2; GeoBOB/ISMS database). Under Alternatives 1, 3 and 4, it is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Fluminicola* n. sp. 11, was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites and protection by Riparian Reserves, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, *Fluminicola* n. sp. 11 would be listed as Bureau Sensitive in Oregon, covering most of the range for this species. The sites would be managed to avoid contributing to the need for listing under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Rarity, limited distribution, and narrow range could mean that the loss of sites

could result in habitat insufficient to support stable populations. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Fluminicola* n. spp. 15, 16, 17, 18, 19, and 20**

All six species in this group are aquatic snails known from a small number of sites in a narrow range. Number of known sites range from 1 (*Fluminicola* n. sp. 19) or 2 (*Fluminicola* n. spp. 17 and 20) to 17 (*Fluminicola* n. sp. 16). There is no new information since 1994 that would alter the evaluation in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a). All of these species have all of their known sites outside of Late-Successional Reserves, Administratively Withdrawn Areas, and Congressionally Reserved Areas. The known ranges of all of these species have not substantially changed since 1994, despite pre-disturbance and Strategic Survey requirements. The likelihood of significant undiscovered populations appears low (USDA, USDI 1994a: J2; GeoBOB/ISMS database). As aquatic snails, these species receive protection from the Aquatic Conservation Strategy (USDA, USDI 1994a). However, concerns for persistence remain (USDA, USDI 1994a:J2; USDA, USDI 2000a). These concerns include factors that could directly or indirectly affect local populations while still meeting overall Aquatic Conservation Strategy goals, such as livestock grazing or activities outside the riparian buffer zone, particularly around small wetlands or springs where the riparian buffer covers only the extent of riparian vegetation. Local extirpation and species extinction of ecologically similar species in this family (Hydrobiidae) have been documented because of water diversion, livestock grazing, and groundwater withdrawal outside the riparian zone (Hershler and Sada 1987, USDA et al. 1993, Hershler and Frest 1996).

Under Alternatives 1, 3 and 4, these species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. These species are expected to "stabilize in a pattern altered from reference distribution," all with moderate uncertainty (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, much of the habitat for these species may no longer require pre-disturbance surveys. The association of these species with late-successional and old-growth forest typically depends on stand conditions at a larger scale, which may not be considered in assessment of survey requirements. This may result in inadvertent loss of undiscovered sites or populations, although it is unlikely that significant undiscovered populations are extant. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, these six species would not be included in the Agencies' SSSPs. Known sites would not be managed and pre-disturbance and Strategic Surveys would not be completed. The loss of even a single site could result in habitat insufficient to support stable populations because of the rarity and narrow ranges of these species. Due to lack of management under Alternative 2, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Fluminicola potemicus

New information since the 2004 FSEIS includes the description of *Fluminicola* n. sp. 14 as *Fluminicola potemicus* (Hershler et al. in press).

This aquatic snail is known from a small number of sites in a narrow range. Only one of the 12 sites is in a Late-Successional Reserve. There is no new information since 1994 that would alter the evaluation in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a). The known range has not substantially changed since 1994, despite pre-disturbance and Strategic Survey requirements. The likelihood of significant undiscovered populations

appears low (USDA, USDI 1994a:J2; GeoBOB/ISMS database). As an aquatic snail, this species would receive protection from the Aquatic Conservation Strategy (USDA, USDI 1994a). However, concerns for persistence remain (USDA, USDI 1994a:J2; USDA, USDI 2000a). These concerns include factors that could directly or indirectly affect local populations while still meeting overall Aquatic Conservation Strategy goals, such as livestock grazing or activities outside the riparian buffer zone, particularly around small wetlands or springs where the riparian buffer covers only the extent of riparian vegetation. Local extirpation and species extinction of ecologically similar species in this family (Hydrobiidae) have been documented because of water diversion, livestock grazing, and groundwater withdrawal outside the riparian zone (Hershler and Sada 1987, USDA et al. 1993, Hershler and Frest 1996). It has been found on both BLM and Forest Service managed lands.

Under Alternatives 1, 3 and 4, it is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Fluminicola potemicus* was expected to have sufficient habitat to "stabilize in a pattern similar to reference distribution" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, much of the habitat for this species may no longer require pre-disturbance surveys. The association of this species with late-successional and old-growth forest typically depends on stand conditions at a larger scale, which may not be considered in assessment of survey requirements. This may result in inadvertent loss of undiscovered sites or populations, although it is unlikely that significant undiscovered populations are extant. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would not be included in the Agencies' SSSPs. Known sites would not be managed and pre-disturbance and Strategic Surveys would not be completed. The loss of even a single site could result in habitat insufficient to support stable populations because of the rarity and narrow range of this species. Due to lack of management under Alternative 2, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Fluminicola seminalis

This aquatic snail is characterized by a low number of known sites widely scattered over a somewhat limited range. Few sites have been discovered since 1994, despite pre-disturbance and Strategic Survey requirements (reports of new sites for *Fluminicola seminalis* discovered on National Forest System lands in southern Oregon were due to misidentification). The Northwest Forest Plan Final SEIS (USDA, USDI 1994a:J2) noted *Fluminicola seminalis* is "now about 95% extirpated from its former range in the Sacramento River." As an aquatic snail, this species receives protection from the Aquatic Conservation Strategy. However, concerns for persistence remain (USDA, USDI 1994a: J2; USDA, USDI 2000a). These concerns include factors that could directly or indirectly affect local populations while still meeting overall Aquatic Conservation Strategy goals, such as livestock grazing or activities outside the riparian buffer zone, particularly around small wetlands or springs where the riparian buffer covers only the extent of riparian vegetation. Local extirpation and species extinction of ecologically similar species in this family (Hydrobiidae) have been documented because of water diversion, livestock grazing, and groundwater withdrawal outside the riparian zone (Hershler and Sada 1987, USDA et al. 1993, Hershler and Frest 1996).

Under Alternatives 1, 3 and 4, it is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Fluminicola seminalis* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, much of the

habitat for this species may no longer require pre-disturbance surveys. The association of this species with late-successional and old-growth forest typically depends on stand conditions at a larger scale, which may not be considered in assessment of survey requirements. This may result in inadvertent loss of undiscovered sites or populations, although it is unlikely that significant undiscovered populations are extant. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, *Fluminicola seminalis* would be listed as Forest Service Sensitive in California. There are no known sites on BLM managed lands in California (previous reports of sites for *Fluminicola seminalis* discovered on BLM lands in northern California were due to misidentification). In the California portion of the range, listing as Sensitive by the Forest Service would provide protection for some of the species' populations. Because of the widely scattered distribution of this species, loss of any known sites would have a substantial effect on population interactions and the distribution of the species as a whole. This would lead to habitat insufficient to support stable populations from significant portions of the range in California (i.e. insufficient habitat in over 20 percent of the area of the species range, and/or loss of genetically or ecologically distinct populations) although habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Helminthoglypta hertleini

Information from the 2002 ASR indicates that the terrestrial snail *Helminthoglypta hertleini* is not closely associated with late-successional or old-growth forest. The majority of known sites are in non-reserve stands less than 80 years old. The most common habitat features reported are talus, rock, cobble, and rock outcrops, while only one site record lists habitat as down woody debris (USDA, USDI Species Review Panel 2002). Since the 2002 Annual Species Review, there are nearly 100 new Oregon sites, mostly on BLM lands outside of reserves. Revision and refinement of the taxonomy of the land snail clade Helminthoglypta Ancey, 1887, is ongoing (Roth and Tupen 2004). In California, identification of exterior features caused confusion and incorrect identification of this species with *Helminthoglypta cypreophila*. DNA sequencing has clarified this matter. However, known sites and the rate of detection may be an underestimate of abundance. Within California, corrected records for this species indicate it range includes four counties (Shasta, Tehama, Siskiyou, and Humboldt), which suggests that it is well distributed.

Under Alternatives 1, 2, and 3, *Helminthoglypta hertleini* would be removed from Survey and Manage and assumed to be on SSSP for BLM in California and Oregon, and Forest Service in Oregon. Under Alternative 4, this species would be included in Category B, which requires management of known sites, equivalent-effort surveys as a mitigation measure, and Strategic Surveys. For this species, equivalent-effort surveys apply "for as long as it remains in Category E or B" – see *Chapter 2*. Based on the high number of known sites and rate of detection, wide ecological amplitude, elements of habitat management by Matrix Standard and Guides, and possible association to fire prone environments, habitat (including known sites) is sufficient to provide for stable populations for this species under all alternatives with or without SSSP.

Helminthoglypta talmadgei

This terrestrial snail is known from over 1000 sites scattered widely across its California-limited range. There is evidence of genetically and ecologically distinct populations within this species (Roth 2002), each of which occupy relatively small ranges. Revision

and refinement of the taxonomy of the land snail clade Helminthoglypta Ancey, 1887, is ongoing (Roth and Tupen 2004). This species has been reported to depend to some extent on woody debris of various decay classes (USDA, USDI 2003b). In the drier regions of California and southern Oregon where this species is found, canopy and understory reduction may alter the necessary microclimate conditions that allow populations to persist (USDA, USDI 2000d). In addition, prescribed burning usually takes place in the spring or fall, when this species is more likely to be active on the surface, compared to late summer wildfires to which this species are adapted, when individuals are typically aestivating (similar to hibernating) (USDA, USDI 2003b). However, Agee (2001) evaluated the association of mollusk to evidence of fire and *Helminthoglypta talmadgei* was found more frequently on more recently burned plots. Dunk et al. (2004) found *Helminthoglypta talmadgei* detected in areas with less conifer canopy cover and basal area, more grass cover, younger trees, and on drier aspects than previously reported. There was also evidence that species habitat is not limited to late-successional forests, but is also closely associated with early seral forests (particularly Quercus hardwood forests).

Under Alternative 1, *Helminthoglypta talmadgei* is included in Category D, which requires management of high-priority sites and Strategic Surveys. Under Alternative 1, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternatives 2 and 3, *Helminthoglypta talmadgei* is removed from Survey and Manage and assumed to be on SSSP on BLM lands in California, although almost none of the known sites are on BLM lands. Because of increasing numbers of sites and recent evidence of wide ecological amplitude, habitat (including known sites) is sufficient to support stable populations in the NWFP area with or without SSSP.

Under Alternative 4, this species would be included in Category A, which requires management of all known sites, pre-disturbance surveys, and Strategic Surveys. In the 2000 FSEIS under this alternative, *Helminthoglypta talmadgei* was expected to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Because, of the high number of known sites, rate of detection and wide ecological amplitude, habitat (including known sites) is sufficient to support stable populations across the NWFP area.

Hemphillia burringtoni

This slug is known from a low to moderate numbers of sites spread across its Olympic Peninsula range. It is associated with woody debris and leaf litter. The majority of known sites are not on BLM or Forest Service land, and those sites that are occur exclusively within reserves.

Under Alternatives 1 and 3, *Hemphillia burringtoni* is included in Category E, which requires management of known sites and Strategic Surveys. Under Alternative 3, removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of reserves, habitat (including known sites) is sufficient to support stable populations in the NWFP area under Alternatives 1 and 3.

Under Alternative 2, *Hemphillia burringtoni* is assumed to be on SSSP on the Forest Service in Washington, which includes most or all of its range. However, because of the protection of reserves, habitat (including known sites) is sufficient to support stable populations in the NWFP area with or without SSSP.

Under Alternative 4, this species is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. In the 2000 FSEIS

under this alternative, *Hemphillia burringtoni* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Based on protection afforded by the reserve network, habitat (including known sites) is sufficient to support stable populations in the NWFP area under Alternative 4.

***Hemphillia glandulosa* (In WA Western Cascades Physiographic Province)**

This terrestrial slug is known from a moderate number of sites spread across a broad range. Known populations are adjacent to, and assumed to be in, reserve networks, which offer protection. It is associated with woody debris, moss, and leaf litter including that of alders. It is in Category E in Alternative 1 and 3 because of uncertainty about its LSOG association in this area.

Under Alternatives 1 and 3, *Hemphillia glandulosa* is included in Category E, which requires management of known sites and Strategic Surveys. Under Alternative 4, this species is included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. In Category C in the 2000 FSEIS, *Hemphillia glandulosa* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). For these alternatives, habitat (including known sites) is sufficient to support stable populations in the NWFP area

Under Alternatives 2, *Hemphillia glandulosa* in WA Western Cascades Province is assumed Sensitive for the Forest Service in Washington, which covers most or all of its range. However, based on the moderate rate of detection, the number of known sites, and protection within reserves, habitat (including known sites) is sufficient to support this species under all alternatives with or without SSSP.

***Hemphillia glandulosa* (In WA: Olympic Peninsula and OR: Coast Range)**

Information from the 2001 ASR indicates that the terrestrial slug, *Hemphillia glandulosa* is not closely associated with late-successional or old-growth forest and is more common than once thought (USDA, USDI Species Review Panel 2001). Since the 2001 Annual Species Review, its rate of detection has increased; resulting in over a thousand known sites distributed between both reserve and non-reserve lands. The rate of detection is high and is supported by eight RMS detections. Much of Olympic National Forest is Late-Successional Reserve or Riparian Reserve, and the federal lands in the Oregon Coast Range are heavily reserved as well.

Under Alternatives 1, 2, and 3 *Hemphillia glandulosa* would be removed from Survey and Manage in the WA Olympic Peninsula and OR Coast Range provinces and assumed to be on SSSP for Forest Service in Washington. Under Alternative 4, *Hemphillia glandulosa* would be included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. Based on a high number of known sites, high rate of detection, and protection in reserves, habitat (including known sites) is sufficient to support stable populations under all alternatives with or without SSSP.

***Hemphillia malonei* (Washington)**

This terrestrial slug is known from moderate numbers of known sites spread across a broad range. Under Alternatives 1 and 4, this species is included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. *Hemphillia malonei* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Under

Alternatives 1 and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternatives 2 and 3, this species would be included as Sensitive on Forest Service lands in Washington. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. However, known populations are adjacent to, and assumed to be in, reserves. Therefore, under Alternatives 2 and 3, habitat is sufficient to support stable populations with or without SSSP.

***Hemphillia malonei* (Oregon)**

Information from the 2001 ASR indicates that the terrestrial slug *Hemphillia malonei* in Oregon is common, with more than 600 known sites, and is well distributed across its range (USDA, USDI Species Review Panel 2001). Over 300 additional sites have been recorded since the 2001 Annual Species Review, providing a clearer understanding of its current range. Eight RMS detections are consistent with known site numbers nearing 1,000. A high proportion of known sites are within non-reserve land allocations.

Under Alternatives 1, 2, and 3 *Hemphillia malonei* in Oregon would be removed from Survey and Manage and is assumed to be on SSSP for the Forest Service in Washington. Under Alternative 4, the species would be included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. Because of a high number of known sites, a high rate of detection, and protection by reserves, habitat (including known sites) is sufficient to provide for stable populations under all alternatives with or without SSSP.

Hemphillia pantherina

Hemphillia pantherina was known from only one historic site in a riparian zone, although it is unknown if this population is still extant. The historic site and the species' presumed historic range lie entirely on National Forest System lands in the NWFP area in Washington. Surveys conducted at and in the vicinity of the single historic site have resulted in negative detections.

Under Alternatives 1, 3, and 4, the species would be included in Category E, which requires management of known sites, equivalent-effort surveys as a mitigation measure, and Strategic Surveys. Under Alternative 2, this species is assumed to be included as Sensitive on Forest Service lands in Washington. If extant, analysis of the one historic site in riparian habitat does not provide sufficient information to determine an outcome for any alternative including the scenario of Alternative 2 without SSSP.

***Juga* (O) n. sp. 2**

This aquatic snail is known from a few number of sites confined to a narrow range at low elevations near the Columbia River. The known range and number of sites have not changed substantially since 1994, despite pre-disturbance or equivalent-effort survey requirements, so the likelihood of significant undiscovered populations appears low (USDA, USDI 1994a:J2; GeoBOB/ISMS database).

Under Alternatives 1, 3, and 4, the species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Juga* (O) n. sp. 2, was predicted to have habitat sufficient to "stabilize in a pattern altered

from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species is assumed to be included as Sensitive on Forest Service lands in Oregon. Known sites and suitable habitat on federally managed lands occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Alternative 2 would provide sufficient habitat to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Juga* (O) n. sp. 3**

This aquatic snail is known from a small number of sites in a narrow range. None of the known sites are on federal land. There is no new information since 1994 that would alter the evaluation in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a). The known range of this species has not substantially changed since 1994, despite pre-disturbance and Strategic Survey requirements. The likelihood of significant undiscovered populations appears low (USDA, USDI 1994a:J2; GeoBOB/ISMS database). As an aquatic snail, this species receives protection from the Aquatic Conservation Strategy (USDA, USDI 1994a). However, concerns for persistence remained (USDA, USDI 1994a:J2; USDA, USDI 2000a). These concerns included factors that could directly or indirectly affect local populations while still meeting overall Aquatic Conservation Strategy goals, such as livestock grazing or activities outside the riparian buffer zone, particularly around small wetlands or springs where the riparian buffer covers only the extent of riparian vegetation. Local extirpation and species extinction of ecologically similar species in this family (Hydrobiidae) have been documented because of water diversion, livestock grazing, and groundwater withdrawal outside the riparian zone (Hershler and Sada 1987, USDA et al. 1993, Hershler and Frest 1996).

Under Alternatives 1, 3, and 4 this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. This species is expected to "stabilize in a pattern altered from reference distribution," all with moderate uncertainty (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, much of the habitat for this species may no longer require pre-disturbance surveys. The association of this species with late-successional and old-growth forest typically depends on stand conditions at a larger scale, which may not be considered in assessment of survey requirements. This may result in inadvertent loss of undiscovered sites or populations, although it is unlikely that significant undiscovered populations are extant. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would not be included in the Agencies' SSSPs. Known sites would not be managed and pre-disturbance and Strategic Surveys would not be completed. The loss of even a single site could result in habitat insufficient to support stable populations because of the rarity and narrow range of this species. Due to lack of management under Alternative 2, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Lyogyrus* n. sp. 1**

Lyogyrus n. sp. 1, an aquatic snail known north and south of the Columbia River in the Cascades, has moderate numbers of known sites confined to a narrow range. Under Alternatives 1, 3 and 4, this species is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Lyogyrus* n. sp. 1 was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included as Sensitive on Forest Service lands in Oregon and Washington. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Lyogyrus* n. sp. 2**

This aquatic snail is known from very few sites confined to a narrow range on and near the Wenatchee National Forest on Washington. The known range and number of sites have not changed substantially since 1994, despite pre-disturbance requirements, so the likelihood of significant undiscovered populations appears low (USDA, USDI 1994a:J2; GeoBOB/ISMS database).

Under Alternatives 1, 3 and 4, this species is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Lyogyrus* n. sp. 2, was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included as Sensitive on Forest Service lands in Oregon and Washington. Known sites and suitable habitat on federally managed lands occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Lyogyrus* n. sp. 3**

This aquatic snail is known from one site in Northern California, which is located outside of reserves. There is no new information since 1994 that would alter the evaluation in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a). The known range has not substantially changed since 1994, despite pre-disturbance and Strategic Survey requirements. The likelihood of significant undiscovered populations appears low (USDA, USDI 1994a:J2; GeoBOB/ISMS database). As an aquatic snail, this species receives protection from the Aquatic Conservation Strategy (USDA, USDI 1994a). However, concerns for persistence remain (USDA, USDI 1994a:J2; USDA, USDI 2000a). These concerns included factors that could directly or indirectly affect the site while still meeting overall Aquatic Conservation Strategy goals, such as livestock grazing or activities outside the riparian buffer zone, particularly around small wetlands or springs where the riparian buffer covers only the extent of riparian vegetation. Local extirpation and species extinction of ecologically similar species in this family (Hydrobiidae) have been documented because of water diversion, livestock grazing, and groundwater withdrawal outside the riparian zone (Hershler and Sada 1987, USDA et al. 1993, Hershler and Frest 1996).

Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. It is expected to "stabilize in a pattern altered from reference distribution," all with moderate uncertainty (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, much of the habitat for this species may no longer require pre-disturbance surveys. The association of this species with late-successional and old-growth forest typically depends on stand conditions at a larger scale, which may not be considered in assessment of survey requirements. This may result in inadvertent loss of undiscovered sites or populations, although it is unlikely that significant undiscovered populations are extant. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would not be included in the Agencies' SSSPs. Known sites would not be managed and pre-disturbance and Strategic Surveys would not be completed. The loss of the single site would result in habitat insufficient to support stable populations because of the rarity and narrow range of the species. Due to lack of management under Alternative 2, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Megomphix hemphilli* (entire range)**

Information from the 2003 ASR indicates that the terrestrial snail *Megomphix hemphilli* has a high number of likely extant sites. Over 1,900 known sites occur in the NWFP area, and four RMS Survey detections. Seven percent of all known sites (143 sites) occur in reserves (USDA, USDI Species Review Panel 2003). Since the 2003 Annual Species Review, the high rate of detection continues.

Under Alternatives 1, 2, and 3, *Megomphix hemphilli* would be removed from Survey and Manage and not assumed to be on SSSP. Under Alternative 4, *Megomphix hemphilli* (**North of south boundary of Lincoln, Benton, and Linn Counties, Oregon**) would be included in Category A, which requires management of all known sites, pre-disturbance surveys, and Strategic Surveys. *Megomphix hemphilli* (**South of south boundary of Lincoln, Benton, and Linn Counties, Oregon**) would be included in Category F, which requires Strategic Surveys. This species also requires, as a mitigation measure, management of sites known as of September 30, 1999 "for as long as [it] remains in Category F" – see *Chapter 2*. Because of a high number of known sites, high amount

of potential habitat and distribution across its range, habitat (including known sites) is sufficient to provide for stable populations for this species under all alternatives with or without SSSP.

Monadenia chaceana

This terrestrial snail is somewhat rare and is known from sites scattered widely across its Southwestern Oregon and northwestern California range. Revision and refinement of the taxonomy of the land snail clade Helminthoglypta Ancey, 1887, is ongoing (Roth and Tupen 2004). There is evidence of genetically and ecologically distinct populations within this species (Roth 2002), each of which occupy relatively small ranges. Several habitat components with which this species is associated may not be adequately provided by the Matrix Standards and Guidelines. This species depends, to some extent, on woody debris of various decay classes (USDA, USDI 2003b). Northwest Forest Plan Standards and Guidelines require retention of some level of woody debris. Carey et al. (1999) found that coarse woody debris amounts declined significantly as a result of variable density thinning, especially the higher decay classes, despite the intent of the treatment to leave all existing debris in place. While canopy shading may recover relatively quickly following harvest, large down wood takes much longer if sufficient levels were not maintained through disturbance (Harmon and Hua 1991). In the drier regions of California and southern Oregon where this species is found, canopy and understory reduction may alter the necessary microclimate conditions that allow populations to persist (USDA, USDI 2000d). Thinning and other management also shifts ground-level biomass from more shade-tolerant taxa, such as fungi or lichens, to primary producers like vascular plants (Carey 2000), altering the habitat and the food supply for this species. In addition, prescribed burning usually takes place in the spring or fall, when this species is more likely to be active on the surface, compared to late summer wildfires to which this species are adapted, when individuals are typically aestivating (similar to hibernating) (USDA, USDI 2003b). Since the 2004 FSEIS, there has been an increase in number of sites, nearly doubling those known in 2004, which expands the moderately large range, and increases the known site abundance within known populations. Negative detections from surveys, in and around the range, confirm the species is unpredictable in its distribution and there is insufficient information to define habitats critical to this species.

Under Alternatives 1, 3, and 4, *Monadenia chaceana* is included in Category B, which requires management of known sites and Strategic Surveys. For this species, equivalent-effort surveys apply "for as long as it remains in Category E or B" – see *Chapter 2*. *Monadenia chaceana*, with the additional mitigation of equivalent-effort surveys, is expected to have habitat sufficient to "stabilize in a pattern similar to reference distribution" with moderate uncertainty (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, *Monadenia chaceana* would be listed as Sensitive by the BLM throughout its range and by the Forest Service only in Oregon. In the California portion of the species' range (roughly one third of the total range), only 12 percent of the known sites are found on BLM managed land. Therefore, as described above, existing provisions of the Northwest Forest Plan and the addition of listing as Sensitive on BLM managed lands and on Forest Service–managed lands in Oregon, would not prevent or compensate for loss of known sites or population areas in the California Forest Service portion of its range. Because of the widely scattered pattern of populations for this species, loss of sites or population areas would reduce population interaction, connectivity, and normal biological function, and could result in habitat (including known sites) insufficient to

support stable populations in significant portions of the species' range in California although habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area under Alternative 2. Due to lack of species-specific management, under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Monadenia churchi

Information from the 2001 ASR indicates that the terrestrial snail *Monadenia churchi* is common, having extant known sites in excess of 2300, of which 2213 were on federal land. Detections within the Northwest Forest Plan appeared well distributed, with 49 percent of the known sites within reserves. Strategic survey results confirm this species is common, having the highest rate of RMS Survey detections of any mollusks at 55. Analysis suggests such high numbers indicates little-to-no concern for persistence (USDA, USDI Species Review Panel 2001). Since the 2001 Annual Species Review, new information provides more clarity of this species habitat association, suggesting that it is a habitat generalist (Dunk et al. 2004).

Under Alternatives 1, 2, and 3, *Monadenia churchi* would be removed from Survey and Manage and not assumed to be on SSSP. Under Alternative 4, *Monadenia churchi* would be included in Category F, which requires Strategic Surveys. This species also requires management of sites known as of September 30, 1999 "for as long as [it] remains in Category F" – see *Chapter 2*. Based on the high number of known sites, rate of detection, protection by reserves, and broad range distribution, habitat (including known sites) is sufficient to provide for stable populations in the NWFP area under all alternatives.

Monadenia fidelis minor

Monadenia fidelis minor is a terrestrial slug with a moderate numbers of known sites within the NWFP area. Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Monadenia fidelis minor* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included as Sensitive on Forest Service lands in Oregon and Washington. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

This species changed to Category E in the 2001 ASR, and back to Category A in the 2002 ASR. Although the net effect of these changes on this analysis is nil, the two ASR summaries have been included in Appendix 9 for the information that they provide.

Monadenia infumata ochromphalus

Information from the 2003 ASR indicates that the terrestrial snail, *Monadenia infumata ochromphalus* is more common than previously thought. Over 100 new sites and numerous detections during the RMS Survey suggest the species is common. Fifty-four percent of known sites occur in reserves and RMS Survey detections indicate additional occurrences in reserves. The rate of detection may be an underestimate of abundance because pre-disturbance surveys were not performed (USDA, USDI Species Review Panel 2003). Since the 2003 Annual Species Review, new information provides some clarity of this species' habitat association. It appears to be associated with many late-successional forest characteristics at the micro-scale and with plantations at the meso-scale (Dunk et al. 2004).

Under Alternatives 1, 2, and 3, *Monadenia infumata ochromphalus* would be removed from Survey and Manage and not assumed to be on SSSP. Under Alternative 4, this species would be included in Category B, which requires management of all known sites, equivalent-effort surveys, and Strategic Surveys. For this species, equivalent-effort surveys apply as a mitigation measure "for as long as it remains in Category E or B" – see *Chapter 2*. Based on a high number of known sites, rate of detection, amount of potential habitat, protection by reserves and good distribution across its range, habitat (including known sites) is sufficient to provide for stable populations in the NWFP area under all alternatives.

Monadenia troglodytes troglodytes* and *M. t. wintu

These terrestrial snails are very rare, known from few sites confined to a narrow range near Shasta Lake in northern California. The known range and number of sites have not changed substantially since 1994, despite pre-disturbance surveys (USDA, USDI 1994a:J2; GeoBOB/ISMS database).

Under Alternatives 1, 3, and 4, these species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Monadenia troglodytes troglodytes* and *M. t. wintu* were predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area for these two species.

Under Alternative 2, these species would be included as Sensitive on Forest Service lands in California. Known sites and suitable habitat on federally managed lands for this species occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Oreohelix* n. sp. 1**

Oreohelix n. sp. 1 is a terrestrial snail with a moderate numbers of known sites confined to a narrow range centered on the Wenatchee National Forest. Under Alternatives 1, 3, and

4, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Oreohelix* n. sp. 1 was predicted to have habitat sufficient to "stabilize in a pattern similar to reference distribution" with moderate uncertainty, respectively (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included as Sensitive on Forest Service lands in Washington. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Pristiloma arcticum crateris

This terrestrial snail is known from moderate numbers of sites spread across a broad range. *Pristiloma arcticum crateris* is believed to be associated with riparian areas in at least part of its range (USDA, USDI 2003b). Detections are within close proximity to wet areas, helping affirm its association to riparian areas. Recent (2006) 25 percent increases in known sites makes *Pristiloma arcticum crateris* more common and better distributed than previously thought. Recent new sites suggest the range to be straddling the Cascades and having good continuity.

Under Alternatives 1 and 3, *Pristiloma arcticum crateris* is included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 3, removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, because of recent increases in known site numbers and its association with riparian habitats, under Alternatives 1 and 3, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, *Pristiloma arcticum crateris* would be included in both BLM and Forest Service SSSP in Oregon in most or all of its range. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Because of recent increases in known site numbers and its association with riparian habitats, habitat (including known sites) is sufficient to support stable populations in the NWFP area with or without SSSP.

Under Alternative 4, this species is included in Category B, which requires management of known sites, equivalent-effort surveys, and Strategic Surveys. For this species, equivalent-effort surveys apply as a mitigation measure "for as long as it remains in Category E or B" – see *Chapter 2*. Habitat (including known sites) is sufficient to support stable populations in the NWFP area under Alternative 4 for the reasons noted for Alternatives 1, 2, and 3.

***Prophysaon coeruleum* (Washington and California)**

Although the California and Washington portions of the *Prophysaon coeruleum* range each represent less than 10 percent of the total range area, they may represent genetically or ecologically distinct populations or undescribed species (USDA, USDI 2000a). Under Alternatives 1, 3, and 4, this terrestrial snail would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Prophysaon coeruleum* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included as Sensitive on Forest Service lands in Washington and California. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Trilobopsis roperi

Trilobopsis roperi is a terrestrial snail with a moderate numbers of known sites in a recently expanding range mostly in California. Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Trilobopsis roperi,* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included as Sensitive on Forest Service lands in California. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Trilobopsis tehamana

This terrestrial snail is very rare, known from only a few sites scattered across a relatively broad range. The known range and number of sites have not changed substantially since 1994, despite pre-disturbance or equivalent-effort survey requirements, so the likelihood of significant undiscovered populations appears low (USDA, USDI 1994a:J2; GeoBOB/ISMS database).

Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Trilobopsis tehamana* was predicted to have habitat sufficient to "stabilize in a pattern similar to reference distribution" with moderate, high, and low uncertainty, respectively (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included in the Agencies' SSSPs in California as Sensitive on Forest Service and BLM lands. Known sites and suitable habitat on federally managed lands occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

***Vertigo* n. sp. 1**

The single known site for the terrestrial snail *Vertigo* n. sp. 1 lies on non-federal land adjacent to the Olympic National Forest, in an area subject to substantial timber harvest. Adjacent federally managed land is split between Late-Successional Reserve and Adaptive Management Area land allocations. The known range and number of sites have not changed since 1994, despite pre-disturbance or equivalent-effort survey requirements, so the likelihood of significant undiscovered populations appears low (USDA, USDI 1994a:J2; GeoBOB/ISMS database).

Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Vertigo* n. sp. 1 was predicted to have habitat sufficient to "stabilize in a pattern similar to reference distribution" with moderate, high, and low uncertainty, respectively (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included as Sensitive on Forest Service lands in Washington. Known sites and suitable habitat on federally managed lands occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained

by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Vespericola pressleyi

This terrestrial snail is known from a moderate number of sites confined to a narrow range in the Trinity National Forest area in Northern California. The known range and number of sites have not changed substantially since 1994, despite pre-disturbance or equivalent-effort survey requirements, so the likelihood of significant undiscovered populations appears low (USDA, USDI 1994a:J2; GeoBOB/ISMS database).

Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Vespericola pressleyi* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a; USDA, USDI 2001a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be included in the Agencies' SSSPs in California as Sensitive in Forest Service and BLM lands. Known sites and suitable habitat on federally managed lands occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Vespericola shasta

Vespericola shasta has a moderate numbers of known sites confined to a narrow range. Under Alternatives 1, 3, and 4, this terrestrial snail would be included in Category A, which requires management of known sites, pre-disturbance surveys, and Strategic Surveys. *Vespericola shasta* was predicted to have habitat sufficient to "stabilize in a pattern altered from reference distribution with some limitations on biological functions and species interactions" with moderate uncertainty (USDA, USDI 2000a). Under Alternative 3, the removal of the pre-disturbance survey requirement in non-late-successional and non-old-growth forest stands could result in loss of some sites. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would be listed as Sensitive by the Forest Service in California. Known sites and suitable habitat on federally managed lands (in the Survey and Manage portion of its range) occur almost exclusively on National Forest System lands (GeoBOB/ISMS database). Some known sites may be lost as site management requirements and management strategies are evaluated at a local scale. Site losses allowed under the SSSPs are constrained by policy objectives ensuring that actions do

not contribute to the need to list under the Endangered Species Act. Under Alternative 2, habitat (including known sites) is sufficient to support stable populations in the NWFP area. Due to lack of species-specific management under the scenario of Alternative 2 without SSSP, habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Vorticifex klamathensis sinitsini

Information from the 2001 ASR indicates that the aquatic snail *Vorticifex klamathensis sinitsini* is not closely associated with late-successional or old-growth forests. It is known from only seven aquatic sites in Oregon, not on Forest Service or BLM lands and not near late-successional forests. The 2000 FSEIS outcome for Category E was "sufficient habitat" (USDA, USDI 2000a). No new information or detections have been obtained since the 2001 Annual Species Review.

Under Alternatives 1, 2, and 3, *Vorticifex klamathensis sinitsini* is removed from Survey and Manage and assumed to be on SSSP for the Forest Service in Oregon. Under Alternative 4, this species would be included in Category E, which requires management of all known sites and Strategic Surveys. If sites where discovered on Forest Service or BLM lands, the species would be offered protection by Riparian Reserves and other elements of the Aquatic Conservation Strategy. Therefore, habitat (including known sites) is sufficient to provide for stable populations in the NWFP area under all alternatives with or without SSSP.

***Vorticifex* n. sp. 1**

This aquatic snail is known from two sites located outside of large reserves in Shasta County, northern California. There is no new information since 1994 that would alter the evaluation in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a). The known range has not substantially changed since 1994, despite pre-disturbance and Strategic Survey requirements. The likelihood of significant undiscovered populations appears low (USDA, USDI 1994a:J2; GeoBOB/ISMS database). As an aquatic snail, this species receives protection from the Aquatic Conservation Strategy (USDA, USDI 1994a). However, concerns for persistence remain (USDA, USDI 1994a:J2; USDA, USDI 2000a). These concerns include factors that could directly or indirectly affect the site while still meeting overall Aquatic Conservation Strategy goals, such as livestock grazing or activities outside the riparian buffer zone, particularly around small wetlands or springs where the riparian buffer covers only the extent of riparian vegetation. Local extirpation and species extinction of ecologically similar species in this family (Hydrobiidae) have been documented because of water diversion, livestock grazing, and groundwater withdrawal outside the riparian zone (Hershler and Sada 1987, USDA et al. 1993, Hershler and Frest 1996).

Under Alternative 1, 3, and 4, this species would be included in Category E, which requires management of all known sites and Strategic Surveys. This species also requires equivalent-effort surveys "for as long as [it] remains in Categories B or E" (see *Chapter 2*). *Vorticifex* n. sp. 1 is expected to have sufficient habitat to "stabilize in a pattern similar to reference distribution" with moderate uncertainty. Under Alternative 3, much of the habitat for this species may no longer require pre-disturbance surveys. The association of this species with late-successional and old-growth forest typically depends on stand conditions at a larger scale, which may not be considered in assessment of survey requirements. This may result in inadvertent loss of undiscovered sites or populations, although it is unlikely that significant undiscovered populations are extant. This could result in some minor loss of population connectivity and interaction. However, based on the protection of known sites, under Alternatives 1, 3, and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 2, this species would not be included in the Agencies' SSSPs. Known sites would not be managed and pre-disturbance and Strategic Surveys would not be completed. Habitat (including known sites) is insufficient to support stable populations in the NWFP area.

Summary and Mitigation

Thirty-one of the 44 species would have habitat (including known sites) sufficient to support stable populations in the NWFP area under all alternatives.

Two of the 44 species (*Fluminicola seminalis* and *Monadenia chaceana*) would have habitat (including known sites) sufficient to support stable populations range-wide in the NWFP area under all alternatives, although there is insufficient habitat to support stable populations in a portion of the NWFP area under Alternative 2. These species tend to have widely scattered known sites or populations and would not be included in the SSSPs throughout some of their range under Alternative 2. Loss of sites or population areas would reduce population interaction, connectivity, and normal biological function, and could result in habitat (including known sites) insufficient to support stable populations in the NWFP area from significant portions of the species range. Mitigation under Alternative 2 could include management of known sites not protected by reserves. Mitigation could also include pre-project clearances for *Fluminicola seminalis*. Mitigation would apply to National Forest System lands in California for the *Monadenia chaceana*, and to BLM managed lands in California for *Fluminicola seminalis*. Mitigation would eliminate the adverse effects of Alternatives 2. See *Chapter 2* for a detailed description of mitigation.

Ten of the 44 species would have habitat (including known sites) sufficient to support stable populations in the NWFP area under Alternatives 1, 3, and 4. Under Alternative 2, because of the rarity and narrow ranges of these species and lack of inclusion in the SSSPs, these species would have habitat (including known sites) insufficient to support stable populations in the NWFP area. Mitigation of these effects under Alternative 2 could include management of known sites not protected by reserves, and pre-project clearances. Mitigation would apply to National Forest System lands in California for all 10 of these species, and to BLM managed lands in California for 6 of these species (*Fluminicola* n. spp. 14, 18, 19, and 20; *Lyogyrus* n. sp. 3; and *Vorticifex* n. sp. 1). Mitigation would eliminate the adverse effects of Alternative 2. See *Chapter 2* for a detailed description of mitigation.

One species has insufficient information to determine an outcome for any alternative.

Amphibians

Affected Environment

Under Alternative 1, four salamanders are included in the Survey and Manage Standards and Guidelines: Larch Mountain, Shasta, Siskiyou Mountains, and Van Dyke's in the Cascade Range. Under Alternative 4, one additional species is included in Survey and Manage, the Del Norte salamander. Under Alternative 2, these five salamanders are included in the Agencies' Special Status Species Programs (see Table 2-13), and three of five species are included across their full range on federally managed lands. The Larch Mountain salamander is Bureau Assessment in the Oregon BLM and is Sensitive in Forest Service Region 6 (Oregon and Washington). The Shasta salamander is Bureau Sensitive in the California BLM and is included as Forest Service Sensitive in Region 5 (California). The Siskiyou Mountains salamander is Bureau Sensitive in BLM Oregon and Sensitive in

Oregon in Forest Service Region 6 and Sensitive in Forest Service Region 5 (California). The Van Dyke's salamander is Sensitive in Washington in Forest Service Region 6. The Del Norte salamander is Sensitive only in Oregon in Forest Service Region 6. Under Alternative 3, four salamanders would be retained under the Survey and Manage Standards and Guidelines similar to Alternative 1: Shasta salamander, Van Dyke's salamander, Larch Mountain salamander, and Siskiyou Mountains salamander South Range. Under Alternative 3, the Siskiyou Mountains salamander North Range and the Del Norte would be included in the Agencies' Special Status Species Programs (SSSPs) as in Alternative 2. The Survey and Manage Standards and Guidelines and the Agencies' SSSPs have similar strategies; they both provide for management of sites and surveys.

These five salamanders are found in terrestrial environments without an aquatic life history stage. Populations of interacting individuals may be comprised of numerous sites. Knowledge regarding the known sites and range of these species has increased since 1994. For example, during this time, the known range of these species has increased 51 percent for the Shasta salamander, 5 percent for the Van Dyke's salamander, 155 percent for the Larch Mountain salamander, and 91 percent for the Siskiyou Mountains salamander.

Although these five salamanders meet criteria for late-successional and old-growth forest associations, such association does not preclude their occurrence in younger stands. Terrestrial salamander habitat associations are often a mix of microhabitat to landscape-scale parameters, which may include an array of environmental variables in addition to late-successional and old-growth forests. They may have greater abundances in late-successional and old-growth forest and/or be associated with elements of late-successional and old-growth forest that may be retained in legacy conditions in younger stands. Furthermore, they may occur in non-late-successional and non-old-growth forest stands if other site conditions are lessening the deleterious effects of past disturbances (e.g., cooler surface microclimates of north facing slopes and deep rocky substrates, or wetter conditions of local surface hydrology).

The knowledge gained about the Shasta, Van Dyke's, Larch Mountain, Siskiyou Mountains, and Del Norte salamanders' biology, distributions, and habitats from pre-disturbance surveys, Strategic Surveys, and various research efforts has been used in adaptive management. This has resulted in improved survey protocols having a greater likelihood of detecting animals, reducing the inadvertent loss of sites. Improved knowledge of species' distributions and habitat associations has resulted in a perceived risk reduction for some salamanders.

These five salamander species' habitat associations with older forest stands or stand conditions suggest loss of these habitat conditions could adversely affect them (Blaustein et al. 1995). For example, disturbances such as regeneration timber harvest or stand replacement fires, which significantly remove canopy and/or disturb substrates, likely affect these salamanders. These vegetation or ground disturbances likely affect thermal and hydrological regimes and ground interstitial spaces, with concurrent effects on salamander summer/winter refugia, foraging, dispersal, and reproduction. Site occupancy or relative abundance could be affected. This conceptual model is an empirical information gap because there are no specific studies of these disturbance treatments on the salamanders considered here. However, some retrospective surveys and site monitoring supports these contentions. For example, Herrington and Larsen (1985) reported no Larch Mountain salamanders at a cut over site while they occurred at an adjacent intact area, and Clayton et al. (2005) reported loss of the Siskiyou Mountains salamander from a site for several years following clearcut harvest. Several studies on congeners demonstrate adverse effects of timber harvest activities (Clayton et al. 2005). In contrast, other reports document salamander occurrences in disturbed areas, hence, there is some uncertainty regarding these disturbance effects. There may be context-

dependent effects, for example with spatial habitat heterogeneity ameliorating effects in some areas (e.g., northerly aspects, deep talus slopes, high precipitation area) and magnifying effects elsewhere (south-facing slopes, compacted soils, rainshadow).

Shasta Salamander (*Hydromantes shastae*)

Shasta salamander, *Hydromantes shastae*, occurs only in California near Shasta Lake. The current range extends over 250,000 acres. There are 78 known sites of Shasta salamanders on federally managed lands. Sixty-eight percent of federal sites occur in reserved land allocations, and 32 percent of federal sites occur in Matrix. Of the 78 total federal sites, 22 have been found since 2004, 28 percent of the total known at this time. Federally managed lands are primarily National Forest System lands and comprise 68 percent of the range. Less than 1 percent of the range occurs on BLM managed lands. Habitat includes limestone outcrops, other rock sources, and non-rock habitats (USDA, USDI 2000d; Lewendal 1995; Lindstrand 2000; Nauman and Olson 2002; North State Resources, Inc. 2002). Potential habitat has not been well surveyed (USDA, USDI 2000e). Divergent genetic lineages have been detected in this species, with genetic levels of diversification analogous to those used to recognize other plethodontid salamander species (Bingham 2004, 2006). However, at this time the Shasta salamander is considered a species-complex with multiple discrete populations. Distribution of these discrete populations within federal land allocations is not available.

Van Dyke's Salamander (*Plethodon vandykei*)

The Van Dyke's salamander, *Plethodon vandykei*, occurs in Washington on the Olympic Peninsula, in southwestern Washington, and in the Cascade Range. Only the populations in the Cascade Range are included in the Survey and Manage Standards and Guidelines. There are 40 known sites of Van Dyke's salamanders on federally managed lands in the Cascades. About 65 percent of federal sites occur in reserves, and 35 percent of federal sites are in Matrix or Adaptive Management Areas. Of the 40 total federal sites, 17 new sites have been found since 2004, 42.5 percent of the current total. The distribution of the species is not well known. Although habitat is broad, including caves, talus, streams, and lakes, this species appears to have a strong association with riparian environments, occurring in association with streams and seeps, and including apparent affinities for high gradient and headwater areas. Sites are known up to an elevation of 5,200 feet.

Larch Mountain Salamander (*Plethodon larselli*)

Although originally thought to be restricted to the Columbia River Gorge, the range of the Larch Mountain salamander now extends 135 miles in length, north and south along the Cascade Range, and 40 miles wide, east to west. Since 1980, the total area encompassed by known sites has increased almost 10-fold (Nauman and Olson 1999). Of 103 sites of Larch Mountain salamanders known on federal lands, about 70 percent occur in reserves, with 30 of 103 (29 percent) in Matrix or Adaptive Management Areas. These 103 sites include 15 new federal sites that have been found since 2004. Known sites occur to an elevation of 4,200 feet (Krupka et al. 2006). The fact that relatively few sites have been identified since 1993 despite survey efforts (i.e., 461 negative surveys, GeoBOB/ISMS database) supports either the rarity of this animal (USDA, USDI Species Review Panel 2001) or inadequate knowledge of its specific habitat associations. This animal occurs in a variety of habitat types including talus and rocky slopes within a dense conifer overstory (Herrington and Larsen 1985). The majority of known sites for this species reflect narrow habitat and microclimate requirements. Known sites occur to an elevation of 4,100 feet. Divergent genetic lineages representing discrete populations have been identified within this species.

Del Norte Salamander (*Plethodon elongatus*)

The Del Norte salamander, *Plethodon elongatus*, occurs across 1.9 million hectares (ha), of which 1.3 million ha (70 percent) is on federal lands distributed entirely within the area of the Northwest Forest Plan (Clayton et al. 2005). The range includes or intersects part of 269 6th-field watersheds (= hydrologic unit code), of which almost half (127 of 269) were >90 percent federally managed (Nauman et al. unpub. 2002). By 6th field watershed, about one-third (77 of 269) of the watersheds had <10 percent large federal reserves by area, a quarter (62 of 269) had >90 percent federal reserves and the remainder were evenly distributed in the 8 intermediate classes by 10 percent increments (e.g., about 10-20 watersheds in each class: 11-20 percent reserves, 21-30 percent, etc.; Nauman et al. unpub. 2002). Within the species' range on federal lands, the large blocks of federal reserved lands occupy a distinct north-to-south core area of the range, with reduced large reserve coverage in portions of the federal range, specifically in the north and northeast portion of the range in Oregon and parts of the southernmost range in California. Not included in these large reserves are the Riparian Reserves and other smaller reserves such as the known spotted owl activity centers, within which these animals may occur if their habitat coincides with those areas.

Welsh et al. (2006) modeled *P. elongatus* habitat in California, comparing occurrences in reserved and non-reserved lands. They found that their best habitat model estimated occupancy rates to be greater for reserved lands, suggesting that reserved lands had higher habitat quality than non-reserved lands. Habitat in Oregon has not been assessed, however recent large-scale stand replacement fires may have altered some critical components of habitat in Oregon, including parts of the species' range in reserves (e.g., Biscuit fire).

Compilation of site data for this species has encountered quality control issues such as duplicate records, making the actual known site number difficult to assess. While about 1800 site records were compiled as of 2001, it was estimated that these likely represent between 700 and 1000 sites (USDA, USDI Species Review Panel 2001). An analysis that combined records within 100 meters of each other to eliminate duplicates resulted in 885 unique localities on federal and non-federal lands (Nauman et al. unpub. 2002). The 100-meter criterion was an estimate chosen due to limited salamander dispersal ability such that this distance may distinguish individuals or subpopulations. Over 350 records were not mappable due to locality imprecision. The 885 unique sites included 171 from museum records, 119 records from private land managers, and 595 records from federal researchers and land managers. Since the 2001 compilation of data for this species (USDA, USDI Species Review Panel 2001), 317 new site records have been reported, although a 100-meter proximity criterion has not been applied to these data and whether these overlap previous records is not known.

In a sampling effort at CVS/FIA plots in California allowing inference to the sampled population, the Del Norte salamander was detected at 35 of 307 plots (11.4 percent); preliminary results estimated this salamander to occur across a total of 230,000 (± 67,000) plots throughout the sampled range of the species in California (USDA, USDI Species Review Panel 2001). However, there were uncertainties expressed regarding this brief 2-page report because, for example, methods were not detailed.

Three discrete populations for *Plethodon elongatus* have been described using mitochondrial DNA techniques (Mahoney 2004). The largest of these populations (northern group) occurs in both Oregon and California, encompassing 206-214 6th-field watersheds and 1.3 million ha; half of these watersheds were >90 percent federally managed, with large reserved land allocations occurring in a north-south band down the center of this area (Nauman et al. unpub. 2002). The two southern genetic groups are more closely related (Mahoney 2004), and are poorly delineated geographically due to fewer samples, but together potentially occur across 68,000 to 548,000 ha and, depending

on how range decisions are made, intersecting 6 to 69 6th-field watersheds (Nauman et al. unpub. 2002). The proportion of these watersheds with >90 percent federal lands ranges from 28 percent to 42 percent for the different estimated areas. Large blocks of federal reserved lands occur in the northeastern portion of this estimated area (Nauman et al. unpub. 2002). The "Lonesome Ridge" population is defined by only 3 sites (Mahoney 2004, Nauman et al. unpub. 2002), but these appear to be in an area with large federal reserves (Nauman et al. unpub. 2002, comparison of Mahoney 2004 Figure 1 and Nauman et al. unpub. 2002 Figure 4). The southernmost group is described from about 10 sites and appears to occur on fewer large federal reserves.

A recent study (Karraker and Welsh 2006) in California found that combined numbers of both *Ensatina eschscholtzii* and *P. elongatus* were lower in clearcuts than in late-seral forests. Their data suggest that *P. elongatus* was more affected by clearcuts than *Ensatina. Ensatina* was four times more abundant than *P. elongatus* across all sites, but six times more abundant in clearcuts. In contrast, in a different study in Oregon, Biek et al. (2002) did not see an effect of clearcutting on *P. elongatus*, relative to intact stands, attributing their result to the down wood left at the site post-harvest. These recent studies add to the body of literature already existing for *P. elongatus,* which has documented old-growth forest associations (e.g. Welsh and Lind 1988, 1991, 1995, see review in Blaustein et al. 1995) and their occurrence in young managed stands along the Mesic coastal area (Diller and Wallace 1994). Caution should be used when applying results from each of these case study areas to the species range-wide; direct inference is not valid and it is not clear if detectability of animals may have affected results. Nevertheless, some data now accumulating for *P. elongatus* suggests that timber harvest may reduce abundances in some circumstances but not necessarily eliminate the species from sites, especially where they occur in a landscape mosaic of stand ages.

Karraker and Welsh (2006) also found 5 recaptured marked *P. elongatus* had moved, on average, 26.5 m (range 15 to 45 m), which has implications for potential response to timber harvest in non-reserved lands. If habitat were to become unsuitable, they may not be able to move to new areas due to their low mobility. However, with small home ranges, these animals may be able to persist in small protected areas such as riparian areas or owl cores; whether such areas can retain persistent populations is unknown.

Siskiyou Mountains Salamander (*Plethodon stormi*)

The known range of the Siskiyou Mountains salamander is limited to a small area near the Oregon-California border, and known sites have increased substantially from 1993. There are 374 total federal known sites of Siskiyou Mountains salamanders, including 201 (54 percent of total) new federal sites detected since 2004, many of which were detected during pre-disturbance surveys for mollusks, or Strategic Surveys for salamanders. The high number of recent sites may be explained by the use of different site definitions by different surveyors. Sites identified by mollusk surveys may indicate locations of individual salamanders (Reilly 2006 pers. comm.), whereas sites identified by amphibian surveys are based on the polygon of contiguous habitat within which an individual was found and may include more than one individual salamander's location (Clayton et al. 2005). Only 47 sites were known in 1993, just 13 percent of the current number. Habitat is forested, rocky substrates under a closed canopy that provides cool, moist microclimates (Ollivier et al. 2001). Additionally, certain tree species and lower elevations were associated with salamander occurrence in a recent landscape-scale habitat model for this species north of the Siskiyou crest (Suzuki et al. 2006). The species can occur in all seral stages but the majority of sites are in older forests (mature and old-growth) and abundances are higher in older forests (USDA, USDI Species Review Panel 2000; Nussbaum 1974).

Because ecology and biological diversity of this animal appears to differ north and south of the Siskiyou crest near the Oregon-California border, the range for this species

has been split for management considerations (USDA, USDI Species Review Panel 2001). On federal lands north of the crest, there are 325 known sites. South of the crest, there are 49 known sites on federal lands. In the north, only about 13 percent of known federal sites are in reserves, with 86 percent occurring in Adaptive Management Areas or Matrix. A landscape-level habitat model and habitat suitability map developed for the north group shows patchy occurrence of habitat for salamanders across the northern landscape, with clusters of sites in these modeled habitat patches (Suzuki et al. 2006). In the south, 21 of 49 (43 percent) known federal sites occur in Matrix, and 28 of 49 (57 percent) occur in federal reserves. A probability sampling effort conducted south of the Siskiyou crest addressed estimated occupancy at randomly selected grid cells (0.4 x 0.4 km) across federal reserves and non-reserves at lower elevations (Nauman and Olson 2006). There was an equitable estimated occupancy rate between the two land allocations (reserves: 409 (SE 153) occupied grid cells; non-reserves: 443 (SE 136) occupied grid cells). However, there were significantly fewer captures at grid cells in reserves than non-reserves, likely due to the distribution of non-reserves in the wetter portion (likely optimal habitat) of the landscape. Hence, this infers there is an estimated lower abundance (salamanders per area) across reserved federal lands.

Two genetically distinct lineages have been identified (Mahoney 2004, DeGross 2004, Mead et al. 2005). One occurs across the range of the north group and into part of the south group, along its central and eastern area south of the Siskiyou crest. The second lineage occurs only along the south and western portion of the south group (DeGross et al. 2006). Occurrences of these two populations in the south group appear to fall in both federal reserve and non-reserve land allocations, but estimates of number of sites or proportion of range per population occurring in each type of federal land allocation is not available at this time.

At the southernmost extent of the species range, genetic and morphological analyses have revealed another distinct population that is a completely separate lineage recently recognized as a new species (Scott Bar salamander, *Plethodon asupak*; Mead et al. 2005, Mead 2006). This population is considered together with the Siskiyou Mountains salamander. This species is not broken out for a separate and complete analysis of effects in this document because it is not a Survey and Manage species. To be added to the list of species managed as Survey and Manage requires an evaluation to determine whether it meets the requisite criteria; such evaluations are conducted during the Survey and Manage Program's Annual Species Review process. However, it continues to be managed by the local unit following the Siskiyou Mountains salamander direction. Seventeen locations are genetically confirmed as *Plethodon asupak* (Mead 2006). Of these 17 sites, 14 occur on federal lands, with 3 (21 percent of federal sites) occurring on reserve and 11 (79 percent) on non-reserve land allocations. This species has one of the smallest ranges for a plethodontid salamander in North America (Mead 2006), extending about 20 km (12 mile) along its north-south axis and about 17 km (10 mile), east-to-west. Additional *Plethodon* species sites are documented within the area of these 17 genetically confirmed locations and are assumed to be this species (Williams 2006 pers. comm., Woodridge 2006 pers. comm.).

Environmental Consequences

Shasta Salamander

The Shasta salamander was given a FEMAT rating of 0-40-40-20 (see *Background for Effects Analysis* section). The rating reflected an extremely localized distribution and risk of extirpation due to small population sizes (USDA, USDI 1994a:J2-426). The rating was not primarily a result of alternative design or federal management (USDA, USDI 1994a:3&4-175). No standards and guidelines could be devised that would fully eliminate the risks of extirpation from federally managed lands (USDA, USDI 1994a:3&4-176). The Shasta

salamander did not meet the Survey and Manage persistence criterion to maintain stable, well-distributed populations (USDA, USDI 2001a:Attachment 1-3) from implementation of other elements of the Northwest Forest Plan (e.g., land allocations, down wood). Most of the federal range of the Shasta salamander occurs on National Forest System lands (more than 99 percent) and about 66 percent occurs in Matrix with 33 percent occurring in Administratively Withdrawn Areas (Nauman and Olson 1999). These Administratively Withdrawn Areas are the Shasta Lake National Recreation Area, where vegetation-altering activities such as timber harvest do not generally occur, although fuels reduction activities such as prescribed burning for wildlife habitat do occur.

Since 1971, the State of California has listed this species as State Threatened, which offers additional oversight and protections for this salamander on federal, state, and private lands. A Memorandum of Understanding with the State of California is required for collecting this species, and incidental take permits are reviewed for projects within its range or priority habitat areas. In addition, a "Comprehensive Species Management Plan" is maintained by the Shasta-Trinity National Forest (Bogener and Brouha 1979). The Comprehensive Species Management Plan includes maintaining known sites and populations. Although the comprehensive plan includes an adaptive management provision, it does not include a specified process to fill information gaps (e.g., discrete population boundaries, species range, habitat associations), and it has not been periodically revised as originally envisioned. The outdated habitat definition and survey procedures included in the comprehensive plan create some uncertainty in predicting environmental consequences. The State Threatened status and National Forest Comprehensive Species Management Plan are independent of all alternatives and SSSP scenarios considered here.

Under Alternatives 1, 3, and 4, this species would be included in Survey and Manage Category A, which requires pre-disturbance surveys, Strategic Surveys, and management of all known sites. Alternatives 1 and 4 likely would provide sufficient habitat (including known sites) to allow the Shasta salamander to stabilize in a pattern similar to reference distribution on federally managed lands in the NWFP area (USDA, USDI 2000a:340-357). Under Alternatives 1 and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 3, pre-disturbance surveys would not be conducted in non-late-successional and non-old-growth forest. Lack of pre-disturbance surveys in non-late-successional and non-old-growth forest stands increases the risk of inadvertent loss of such sites. Losses of highly-localized populations or subpopulations are possible. There is uncertainty regarding the extent that this would affect stable, well-distributed populations. The spatial pattern of identified sites, and possibly populations, which is then managed, may be reduced under Alternative 3; some gaps in the species distribution may result. Under Alternative 3, habitat (including known sites) is sufficient to support stable populations in the NWFP area range-wide, although there is insufficient habitat to support stable populations in a portion of the NWFP area.

Under Alternative 2, the Shasta salamander is assumed to be included in the Agencies' SSSPs as Bureau Sensitive and Forest Service Sensitive in California (see Table 2-13). Discretion in survey methodology and in the management of known sites under the SSSPs results in uncertainty whether all sites would be detected and managed. This, in turn, creates some uncertainty in the analysis of environmental consequences because the inadvertent loss of undetected sites, and possibly localized populations, may reduce the overall spatial pattern of managed sites and populations and may affect the maintenance of stable, well-distributed populations. Some gaps in the species distribution may result. Such gaps could be greater than those developing under Alternative 3 due to the discretionary nature of surveys in all habitat types, not just lack of surveys in younger stands. The management discretion in the SSSPs is constrained by policy objectives that include maintaining viable populations in habitats throughout their geographic range

on National Forest System lands and ensuring that actions do not contribute to the need to list under the Endangered Species Act. Alternative 2 does not have a specified process (i.e. Strategic Surveys) to improve knowledge of the species that would facilitate adaptive management. Under Alternative 2, the Shasta salamander would have habitat (including known sites) sufficient to support stable populations range-wide in the NWFP area, although there is likely to be insufficient habitat to support stable populations in a portion of the NWFP area. In particular, there is potential loss of discrete genetic populations in the NWFP area under Alternative 2.

Under Alternative 2 without SSSP, the Shasta salamander would still be managed under the Shasta-Trinity National Forest "Comprehensive Species Management Plan." As described above, this Plan maintains known sites and populations, although there is some uncertainty in predicting environmental consequences due to its outdated habitat definition and survey procedures. In addition, this species' occurrence on federal reserved land allocations should be considered. At present, 19 of 63 (30 percent) federal known sites occur on non-reserved land and 44 of 63 (70 percent) federal sites occur in Administratively Withdrawn or Late-Successional Reserve allocations. This suggests most federal sites would not be at risk of disturbance or loss because of land management activities in non-reserves, which have priorities for other resource values such as wood production. However, it is unknown how discrete populations align with federal land allocations, and it is possible that clustered Matrix lands central to the species range (Nauman and Olson 1999) are coincident with one or more of these discrete lineages. In addition, the effects on these salamanders or their habitats of fire or fuels treatments to reduce fire risk are not known, and these treatments may occur in reserves. In particular, this species uses small pieces of down wood on the forest floor as cover (Olson and Lewendal 1999), and loss of these microhabitats is a concern, as is any loss of canopy closure, specifically in areas with little surface rock. Under Alternative 2 without SSSP, the Shasta salamander would have habitat (including known sites) sufficient to support most stable populations range-wide in the NWFP area, although there would be insufficient habitat to support stable populations in a portion of the NWFP area. Potential gaps in distribution could result in loss of discrete genetic populations in the NWFP area under this scenario.

Van Dyke's Salamander

The Van Dyke's salamander (Cascades populations, *Plethodon vandykei*) was given a FEMAT rating of 0-20-58-23 (see *Background for Effects Analysis* section). The rating reflected the species' naturally patchy distribution and it was thought that additional habitat protection would not increase its score (USDA, USDI 1994a:J2-420). The Van Dyke's salamander did not meet the persistence criterion to maintain stable, well-distributed populations (USDA, USDI 2001a:Attachment 1-3). Due to the few known sites of this animal, loss of sites may pose a risk to maintaining the species' reference distribution pattern, with potentially cascading effects on maintenance of stable, well-distributed populations throughout the species range. Current information suggests that Riparian Reserves under the Northwest Forest Plan provide mitigation for this species in areas where it occurs along stream banks.

Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires pre-disturbance surveys, Strategic Surveys, and management of all known sites. Alternatives 1 and 4 likely would provide sufficient habitat (including known sites) to allow the Van Dyke's salamander to stabilize in a pattern similar to reference distribution on federally managed lands in the NWFP area (USDA, USDI 2000a:340-357). Under Alternatives 1 and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 3, pre-disturbance surveys would not be conducted in non-late-successional and non-old-growth forest stands that may lead to inadvertent loss of some

sites. However, Riparian Reserves are likely to benefit animals at stream-associated sites. Losses of highly localized populations or subpopulations are possible at sites where Riparian Reserves or other habitat protection measures do not occur. There is uncertainty regarding the frequency of non-stream associated sites. This, in turn, creates some uncertainty in the analysis of environmental consequences because inadvertent loss of undetected sites or localized populations may affect stable, well-distributed populations, especially since this species has relatively few known sites on federal lands. Some gaps in the species distribution may result. Under Alternative 3, habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area, although there is likely insufficient habitat to support stable populations in a portion of the NWFP area.

Under Alternative 2, Van Dyke's salamander is assumed to be included in the SSSP as Forest Service Sensitive in Washington. Under Alternative 2, discretion in survey methodology and in the management of known sites under the SSSPs results in uncertainty whether all sites would be detected and managed. This, in turn, creates some uncertainty in the analysis of environmental consequences because the inadvertent loss of undetected sites may affect the maintenance of stable, well-distributed populations. Some gaps in the species distribution may result. Such gaps could be greater than those developing under Alternative 3 due to the discretionary nature of surveys in all habitat types, not just lack of surveys in younger stands. The management discretion in the SSSPs is constrained by policy objectives that include maintaining viable populations in habitats throughout their geographic range on National Forest System lands and ensuring that actions do not contribute to the need to list under the Endangered Species Act. Alternative 2 does not have a specified process to improve knowledge of the species that would facilitate adaptive management. Under Alternative 2, due to inclusion in the Sensitive Species Program and benefits provided by the Riparian Reserves, the Van Dyke's salamander would have habitat (including known sites) sufficient to support stable populations range-wide in the Cascade Range in the NWFP area, although there would be insufficient habitat to support stable populations in a portion of the NWFP area.

Under Alternative 2 without assignment as Forest Service Sensitive in Washington, the reserved land allocations of the Northwest Forest Plan would afford the Van Dyke's salamander some protection. At present, 20 of 31 (65 percent) federal known sites in the Cascade Range occur on reserved land allocations. This suggests over half of the known sites are likely at reduced risk from land management activities such as timber production. However, these salamanders may be vulnerable to site-specific losses from some management activities that occur on federal reserved lands. Of those sites on federal non-reserved lands (11 sites), it is currently unknown how many of them fall within Riparian Reserves or other locations likely to remain undisturbed. However, due to the primary habitats of this salamander to include seeps and streamside areas, many are likely to fall within Riparian Reserves. Hence, while there is some uncertainty regarding the maintenance of all of these sites, many could be protected from anthropogenic disturbance. However, with only 31 known sites on federal lands, this is one of the rarest vertebrates on federal lands in the region. Alternative 2 without SSSP has limited mechanisms to improve knowledge of this species' distribution, and few additional sites could be found unless independent studies were conducted. Risk to persistence could be reduced if additional sites were known and managed. Current sites are often small, isolated, fragmented habitat patches and may be subject to natural disturbances, effects of global climate change or stochastic processes affecting their persistence. Hence, additional site losses and hence gaps in the species' distribution are likely to accrue over time, although their extent is uncertain. Alternative 2 without SSSP likely would maintain some stable Van Dyke's salamander populations on federal lands, but with insufficient habitat to support stable populations in a portion of the NWFP area. Potential gaps in species distribution are likely to be coincident with both federal reserved and non-reserved land allocations.

Larch Mountain Salamander

The Larch Mountain salamander was given a FEMAT rating of 75-20-5-0 (see *Background for Effects Analysis* section). The rating was based on the fact that under Option 9 in FEMAT the species: (1) was provided protection buffers; (2) was rare and locally endemic; (3) might be a relict species susceptible to extirpation through catastrophic events; and, (4) distribution was very poorly known (USDA, USDI 1994a:J2-423). The Larch Mountain salamander did not meet the Survey and Manage persistence criterion to maintain stable, well-distributed populations from implementation of other elements of the Northwest Forest Plan (e.g., land allocations, down wood) (USDA, USDI 2001a: Attachment 1-3). Due to the few known sites of this animal, and their patchy distribution away from the Columbia River Gorge, loss of sites may pose a risk to maintaining the species' reference distribution, with potentially cascading effects on maintenance of stable, well-distributed populations throughout the species range.

Under Alternatives 1, 3, and 4, this species would be included in Category A, which requires pre-disturbance surveys, Strategic Surveys, and management of all known sites. Alternatives 1 and 4 likely would provide sufficient habitat (including known sites) to allow the Larch Mountain salamander to stabilize in a pattern similar to reference distribution on federally managed lands in the NWFP area (USDA, USDI 2000a:340-357). This result is analogous to Outcome A from FEMAT; thus, if a similar rating process were conducted now, this species would have a preponderance of points in Outcome A. Under Alternatives 1 and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area.

Under Alternative 3, pre-disturbance surveys would not be conducted in non-late-successional and non-old-growth forest stands, which may lead to inadvertent loss of some sites and populations. Losses of highly-localized populations or subpopulations are possible. There is uncertainty regarding the extent that this would affect persistence; there is a risk that this would affect the maintenance of stable, well-distributed populations in the patchy part of the species' range, north of the Columbia River Gorge. Some gaps in the species distribution may result. Under Alternative 3, habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area, but with insufficient habitat to support stable populations in a portion of the NWFP area.

Under Alternative 2, the Larch Mountain salamander is assumed to be included in the SSSPs as Forest Service Sensitive in Region 6 (Oregon and Washington) and Bureau Assessment in Oregon (there are no BLM Northwest Forest Plan lands in Washington) (see Table 2-13). Discretion in survey methodology and in the management of known sites under the SSSPs results in uncertainty whether all sites, and potentially localized populations, would be detected and managed. This, in turn, creates some uncertainty in the analysis of environmental consequences because the inadvertent loss of undetected sites may affect the maintenance of stable, well-distributed populations. Some gaps in the species distribution may result. Such gaps could be greater than those developing under Alternative 3 due to the discretionary nature of surveys in all habitat types, not just lack of surveys in younger stands. The management discretion in the SSSPs is constrained by policy objectives that include maintaining viable populations in habitats throughout their geographic range on National Forest System lands and ensuring that actions do not contribute to the need to list under the Endangered Species Act. Alternative 2 does not have a specified process to improve knowledge of the species that would facilitate adaptive management. Under Alternative 2, due to inclusion in the SSSPs and the extent of federally managed sites and potential range in reserve land allocations, the Larch Mountain salamander would have habitat (including known sites) sufficient to support range-wide stable populations in the NWFP area, but with insufficient habitat to support stable populations in a portion of the NWFP area.

Under Alternative 2 without SSSP, the federal reserved land allocations of the Northwest Forest Plan would afford the Larch Mountain salamander some protection. At present, 73 of 103 (71 percent) federal known sites occur on reserved land allocations. The spatial patterns of both sites and reserves across the species' range are patchy. Scattered sites are coincident with intermixed large blocks of federally reserved and non-reserved land. North of the Columbia River Gorge, past survey efforts have revealed that suitable habitat appears to be patchy in distribution and occupancy rates of apparently suitable habitat appears to be low. In addition, these salamanders may be vulnerable to site-specific losses from some management activities that occur on federal reserved lands. Of those sites on federal non-reserved lands (30 sites, 29 percent of total), management activities may compromise their persistence and it is unknown how many of these sites fall within locations likely to remain undisturbed. This is not a riparian-associated species; hence, Riparian Reserves would benefit them only if such areas transected their occupied upslope. In addition, some sites are small, isolated, fragmented habitat patches and may be subject to natural disturbances, effects of global climate change or stochastic processes affecting their persistence.

Alternative 2 without SSSP would maintain some stable Larch Mountain salamander populations on federal lands range-wide in the NWFP area, although there likely is insufficient habitat to support stable populations in a portion of the NWFP area. In particular, areas north of the Columbia River Gorge, which covers the largest extent of the species' range, may be vulnerable to losses.

Del Norte Salamander

The Del Norte salamander, *Plethodon elongatus*, was given a FEMAT rating of 90-10-0-0. These results appear to have assumed occupied sites would be protected with the protection buffer provisions that were part of the FEMAT's Option 9 before the rating panels were conducted. Although site numbers had not been compiled in 1993, a retrospective analysis by survey date suggests at least 481 had been detected at that time (Nauman and Olson 1999). In 1999, there were 882 sites known across 1.9 million ha (Nauman and Olson 1999) and the species was assigned to Category D in the 2001 Record of Decision (USDA, USDI 2001a). Later that year, the species was determined to be well-distributed across federal reserve allocations (USDA, USDI Species Review Panel 2001); a criterion for inclusion in Survey and Manage is that reserves and other elements of the Northwest Forest Plan do not provide for persistence.

Under Alternatives 1, 2, and 3, this species is removed from Survey and Manage, and is assumed to be in the SSSP for the Forest Service in Oregon. The high number of sites, occupancy in reserves across its range, and large extent of reserved lands in its range suggests the species would be retained in a central core area along its entire north-to-south extent. There is risk to persistence in portions of its range (e.g., 6th-field watersheds) with few large federal reserves, due to the apparent sensitivity of these animals to clearcut timber harvest and their low mobility, which likely affects their recolonization of disturbed areas. Riparian areas and other small areas of intact habitat likely contribute to local areas of persistence within federal Matrix and Adaptive Management Areas; however, it is uncertain to what degree such areas contribute to stable populations or offer population resiliency to disturbances. For its sister species, the Siskiyou Mountains salamander, the role of Riparian Reserves and other small habitat areas were evaluated in the draft conservation strategy (Olson et al. 2005); the outcome was a recommendation to identify additional high-priority sites to ensure well-distributed populations within and among 6th-field watersheds.

The distribution of genetically discrete populations also requires consideration. In California, where this species is not included within the Agencies' SSSP, the northern population is likely at reduced risk due to its larger spatial distribution and occurrence on large blocks of federal reserves. Uncertainty of effects is greater for the southern two

populations because their spatial distribution relative to land ownerships and allocations is unknown. However, their distributions appear considerably smaller than for the northern group and likely overlap large federal reserves. More information about the distribution of these two populations is needed to adequately assess them.

In Oregon, where this is a SSSP species and only one genetic population occurs, it is highly likely to persist on the extensive federal lands within its range. However, there are 6th-field watersheds along the margins of the species range where Del Norte salamanders appear at greater risk due to predominance of non-reserved lands, for example, along northern and the eastern extent. It is possible that some of these portions of the species range would be subject to losses in Oregon due to site-specific management discretion permitted by the SSSP direction. Similarly, in Oregon without SSSP under Alternative 2, there would likely be marginal portions of the species range subject to increased risk of losses.

However, under Alternatives 1, 2 and 3, and under Alternative 2 without SSSP, there is sufficient habitat to provide stable populations range-wide in the NWFP area, although there is uncertainty relative to the southernmost two genetic populations.

Under Alternative 4, this species would be included under Category D, which requires Strategic Surveys and management of high-priority sites. It is assumed that all sites would be managed until management recommendations were developed. It is likely that the distribution of habitat and all three discrete populations relative to federally reserved and non-reserved lands would be taken into consideration in this process. Therefore, under Alternative 4, there is sufficient habitat to provide stable populations range-wide in the NWFP area.

Siskiyou Mountains Salamander

The Siskiyou Mountains salamander, *Plethodon stormi*, was given a FEMAT rating of 50-30-15-5. The rating reflected its naturally patchy distribution and was not primarily a result of alternative design or federal management (USDA, USDI 1994a:J2-426). The species has an extremely small range. Because of its small population size, there was expected to be some risk of extirpation regardless of protective measures undertaken (USDA, USDI 1994a:3&4-177 and J2:427). The Siskiyou Mountains salamander did not meet the Survey and Manage persistence criterion to maintain stable, well-distributed populations from implementation of other elements of the Northwest Forest Plan without Survey and Manage (e.g., land allocations, down wood) (USDA, USDI 2001a: Attachment 1-3; USDA, USDI 2002a). In the north, most of the federal range occurs within an Adaptive Management Area, where programmed timber harvest activities can occur. Less than 10 percent of the high quality habitat is in reserves and much of this range is suitable habitat for the species (Clayton et al. 2005). In the south, the species is patchier in distribution, with fewer sites. In addition, a new genetic population has been identified (DeGross 2004), so maintenance of distinct populations is important.

Under Alternatives 1 and 3, this species would be included in Category A in the south range, which requires pre-disturbance surveys, Strategic Surveys, and management of all known sites. In Alternative 3 pre-disturbance surveys would be limited to late-successional and old-growth forests, which could lead to the loss of undiscovered sites. In Alternative 1 it would be included in Category D in the north range, which requires Strategic Surveys and management of high-priority sites. Under Alternative 4, this species would be included in Category C range-wide, which requires pre-disturbance surveys, Strategic Surveys, and management of all known sites. The 2000 FSEIS found that its Alternative 1 (Alternative 4 here) likely would provide sufficient habitat (including known sites) to allow the Siskiyou Mountains salamander to stabilize in a pattern similar to reference distribution on federally managed lands in the NWFP area (USDA, USDI 2000a:340-357). This result is analogous to Outcome A from FEMAT; thus,

if a similar rating process were conducted now, this species would have a preponderance of points in Outcome A. Under Alternatives 1 and 4, habitat (including known sites) is sufficient to support stable populations in the NWFP area, for both the northern and southern ranges. Under Alternative 3 for Siskiyou Mountains salamander in the south range, habitat (including known sites) is sufficient to support stable populations range-wide in the NWFP area, although there is insufficient habitat to support stable populations in a portion of the NWFP area. With two genetic subunits in the south group, in addition to the population now known as the Scott Bar salamander, there is a particular concern in the south for site-specific losses that may affect genetic population stability. While it has been estimated that there are about 800 occupied grid cells in the south, it is unknown how those are apportioned between the genetic populations. In addition to anthropogenic disturbances, natural disturbances, effects of global climate change or stochastic processes may affect their persistence.

Under Alternative 2 range-wide, and Alternative 3 in the north range, the Siskiyou Mountains salamander is assumed to be Forest Service Sensitive in Oregon and Region 5 (California), and Bureau Sensitive in Oregon. Discretion in survey methodology and in the management of known sites under the SSSPs results in uncertainty whether all sites would be detected and managed. Lack of detection and subsequent losses of highly localized populations or subpopulations are possible, especially in the southern portion of the species range where multiple genetic lineages have been detected. This, in turn, creates some uncertainty in the analysis of environmental consequences because the inadvertent loss of undetected sites may affect the maintenance of stable, well-distributed populations, particularly in the southern range. Some gaps in the species distribution may result. With two genetic subunits south of Siskiyou crest, in addition to the population now known as the Scott Bar salamander, there is a particular concern in the south for site-specific losses that may affect genetic population stability. While it has been estimated that there are about 800 occupied grid cells in the south, it is unknown how those are apportioned between the genetic populations. In addition to anthropogenic disturbances, natural disturbances, effects of global climate change or stochastic processes may affect their persistence. The management discretion in the SSSPs is constrained by policy objectives that include maintaining viable populations in habitats throughout their geographic range on National Forest System lands and ensuring that actions do not contribute to the need to list under the Endangered Species Act. The SSSPs do not have a specified process to improve knowledge of the species that would facilitate adaptive management.

Under Alternative 2, and Alternative 3 in the north range, the Siskiyou Mountains salamander would have habitat (including known sites) sufficient to support stable populations range-wide in the NWFP area, although there would be insufficient habitat to support stable populations in a portion of the NWFP area. In particular, the Scott Bar salamander population in the south may be particularly vulnerable to gaps within its tiny range. There are only 3 (21 percent) confirmed known sites occurring on federal reserved lands, and 11 sites on non-reserved federal lands, hence both management activities and natural disturbances are concerns for these few localities. The Agencies' SSSPs would help provide a reasonable assurance of maintaining stable, well-distributed populations if occupied sites were managed for site persistence, and in the south, surveys to detect occupied areas and delineation of genetic populations were conducted.

Under Alternative 2, and Alternative 3 in the north range, without SSSP, the Siskiyou Mountains salamander likely would benefit by reserved land allocations of the federal Northwest Forest Plan. However, for the northern range, 84 percent of known sites occur on federal non-reserved lands. Federal reserved lands are clustered towards the southern boundary of this north group at the Siskiyou crest. It is likely that higher elevation areas, coincident with these reserves, do not provide optimal habitat for this species (Suzuki et al. 2006). Additionally, this species may be vulnerable to some land management practices on federal reserved lands, and to natural disturbances on this landscape such

as fire, both of which may result in site-specific losses. In addition, global climate change and stochastic processes may affect this species on any land allocation. Of those sites on federal non-reserved lands, it is currently unknown as to how many of them fall within locations likely to remain undisturbed. Incidental benefits to this species would occur as owl, botanical, riparian, or retained habitat intersects salamander-occupied habitats. However, the extent of this overlap and whether such patches would protect salamander populations is uncertain. On non-reserved federal lands, while the negative effects on this species of land management activities is a particular concern, natural disturbances also may affect site-level species persistence. Hence, there is uncertainty regarding the maintenance of sites on non-reserved lands. For the southern range, federal reserved lands are in greater proportion and from random surveys, an estimated 400 occupied 0.4 x 0.4 km grid cells in reserves. However, abundance of salamanders in reserve grid cells is estimated to be lower than in non-reserves. In addition, it is unknown how reserves are apportioned between the two genetic populations of this species south of the Siskiyou crest. Hence, there is uncertainty regarding potential losses specific to these populations and the Scott Bar salamander.

Under Alternatives 2 (and 3 in the north range) without SSSP, the Siskiyou Mountains salamander would have habitat (including known sites) sufficient to support stable populations range-wide in the NWFP area, although there would be insufficient habitat to support stable populations in a portion of the NWFP area. Potential gaps on federal lands may be coincident with non-reserves or reserves due to anthropogenic and natural disturbances, effects of global climate change and stochastic processes. Due to its small range and few known sites on federal lands, the Scott Bar salamander is particularly vulnerable to losses.

Decision on Petition to List Siskiyou Mountains and Scott Bar Salamanders

On March 29, 2007, and upon reconsideration of an earlier (April 2006) finding vacated by the U.S. District Court of the Northern District of California, the U.S. Fish and Wildlife Service announced a 90-day finding on a petition to list the Siskiyou Mountains and Scott Bar salamanders as threatened or endangered under the Endangered Species Act. The Service found that the petition and additional information available indicated listing may be warranted, and initiated a 12-month review to determine if listing was needed.

The *Federal Register* notice of the decision (72 *Federal Register* 14750) discussed five listing factors, including the fact that both species were being managed under the current Survey and Manage Standards and Guidelines, and that the Siskiyou Mountains salamander was listed as a threatened species under the California Endangered Species Act and the Scott Bar salamander was being similarly managed. The finding noted the BLM and Forest Service were proposing to remove Survey and Manage protections and were expected to implement a decision in the fall of 2007. The finding also noted that the California Department of Fish and Game had submitted a petition to de-list, and a decision on that petition is expected from the California Fish and Game Commission in the fall of 2007. In regard to both of these actions, the finding states that if either action takes place, the adequacy of remaining protections should be evaluated at that time. There were other factors discussed in the finding, such as the mixed research findings regarding the persistence of the salamanders within harvested timber harvest units.

Because the finding includes additional discussion of available research, and has potential implications to the decision about Survey and Manage, the entire text of the March 29 Finding as it appeared in the Federal Register is included in Appendix 10.

Summary and Mitigation

For the Shasta, Van Dyke's, Larch Mountain, Del Norte and Siskiyou Mountains salamander, Alternatives 1, 3, and 4 would achieve stable, well-distributed populations, and would provide specified mechanisms to improve knowledge of the species that would facilitate adaptive management. Some site losses and possibly gaps in distributions of these species are expected under Alternative 3; however, the extent that this would affect stable, well-distributed populations is uncertain. Similarly, Alternative 2 for all five species would achieve stable, well-distributed populations; however, there is some uncertainty regarding inadvertent site losses or localized population losses created by discretionary procedures and lack of a specified mechanism to improve knowledge. Under Alternative 1 and 4, all of the five salamander species would have habitat (including known sites) sufficient to support stable populations in the NWFP area. Under Alternatives 2 and 3, four salamander species (all but the Del Norte salamander) would have habitat (including known sites) sufficient to support stable populations range-wide, with potential gaps, in the NWFP area. The Del Norte salamander would have habitat (including known sites) sufficient to support stable populations range-wide.

Improved knowledge of these populations (e.g., distribution, abundance, and habitat) through Strategic Surveys, under Alternatives 1, 3, and 4 may alter the current perception of its risk.

Late-Successional Birds

Affected Environment

The Northwest Forest Plan Final SEIS and its supporting documents addressed the habitat needs of 36 bird species that were identified as closely associated with late-successional and old-growth forests (USDA, USDI 1994a). Additional discussion of affected environment is contained in FEMAT and the 2000 Survey and Manage Final SEIS.

Environmental Consequences

Analyses and conclusions relevant to all alternatives in this SEIS include the Northwest Forest Plan Final SEIS finding that Alternative 9 adequately provides for the majority of these species (USDA, USDI 1994a:Table 3&4-29 and 3&4-179). These positive assessments for late-successional bird species were due to the provision of Congressionally Reserved Areas, Late-Successional Reserves, Riparian Reserves, watershed analysis, and the retention of green trees, snags, and coarse woody debris in areas of timber harvest in Matrix and Adaptive Management Area land allocations. None of these 36 bird species were originally included as Survey and Manage species. The conclusion of FEMAT regarding Option 9 and the Northwest Forest Plan Final SEIS regarding Alternative 9 was that these late-successional birds would be stable and well distributed on federally managed lands throughout the NWFP area.

The original analysis did not anticipate managed Survey and Manage species sites would be numerous enough to significantly contribute to the needs of late-successional birds, and thus release of a portion of those sites by one of the action alternatives does not alter that analysis.

Great Gray Owl

Affected Environment

Under Alternatives 1, 3 and 4, the great gray owl is included in the Survey and Manage Standards and Guidelines. Under Alternative 2, the great gray owl is assumed to be Forest Service Sensitive in Washington and California. The Survey and Manage Standards and Guidelines and the Agencies' SSSPs have similar strategies that include both pre-disturbance surveys or pre-project clearances and management of known sites. It is not included on Agencies' SSSPs in Oregon, where all the known nest sites within the Northwest Forest Plan are located.

There has been an increase in the known range of the great gray owl since the Northwest Forest Plan Final SEIS. At the time of the Northwest Forest Plan Final SEIS, 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 and Verner 1994) and the results of surveys indicate that the range is likely much greater. Great gray owls have been documented over much of the Cascade Range in Oregon and Washington, although nesting has not been confirmed in some of these new areas. In addition to increasing the geographic area of known and expected great gray owl nesting, recent information indicates that the great gray owl uses elevations below 3000 feet (Huff et al. 1996; USDA, USDI Species Review Panel 1999). Current Survey Protocols require surveys down to 500 feet.

Originally, great gray owl locations were classified as either an "Activity Center" or a "Nest Site." An activity center is the point that best describes the focal area of use by a territorial owl. It spans from active nest to diurnal location of a pair/single to nocturnal location of pair/single. A nest site is the known nest tree and the immediate area surrounding it.

The final survey protocol defines a great gray owl known site as:

1. A male and female are heard and/or observed in proximity (less than 0.1 mile apart) to each other on the same outing during the day.
2. A male takes prey to a female.
3. A female is seen on a nest.
4. Young are observed and can be determined as the correct species by the presence of an adult great gray owl or other means that is defensible (USDA, USDI 2004d).

According to this definition, there are currently 119 known great gray owl sites within the NWFP area (GeoBOB/ISMS database), mostly outside of large reserves. Although the great gray owl is found in eastern Washington, Oregon, and California, as well as Alaska, Canada, Europe and Asia, it has a spotty distribution throughout the NWFP area and the current population there is considered low. While there are sightings throughout the NWFP area dating back to 1967, incidental observations of great gray owls are not considered sites.

Recent information better clarifies the owl's habitat needs. The 2002 ASR Summary describes habitat as highly specialized, requiring juxtaposition of late-successional and early seral forest/meadows. This habitat is limited within the range of the species within the NWFP area. The ephemeral nature of early seral forests and the encroachment of brush and conifer into natural meadow habitats further limit the amount of available suitable habitat (USDA, USDI Species Review Panel 2002). Timber harvest activities are sometimes known to enhance nest sites by providing or maintaining the three required

stand conditions; protection of nest sites does not necessarily preclude moderate harvesting during the non-nesting season.

Environmental Consequences

Many raptors are protected under the Migratory Bird Treaty Act. Implementation of the Migratory Bird Treaty Act is handled differently by each agency. Generally, the Migratory Bird Treaty Act provides little additional protection for the great gray owl. Raptors, in general, are handled differently by each administrative unit's land and resource management plan. Protection measures vary from simple buffers of active nest sites to consideration as a Management Indicator Species, which requires some analysis of impacts and associated mitigation measures. These protection measures do not vary between the alternatives.

FEMAT rated the great gray owl as having an 83 percent likelihood of Outcome A (habitat sufficient to be stable, well distributed across federally managed lands), a 17 percent likelihood of habitat sufficient to be stable with significant gaps in its historic distribution on federally managed lands, and a 0 percent likelihood of continued existence only in refugia or extirpation from federally managed lands (USDA et al. 1993: IV-166), however these results appear to have assumed occupied sites would be protected with "protection buffer" provisions that were part of the FEMAT's Option 9 before the rating panels were conducted. One of the action alternatives (Alternative 8) considered in the Northwest Forest Plan Final SEIS did not include protection buffer provisions for the great gray owl, provided for less reserve, and generally provided less favorable habitat conditions (USDA, USDI 1994a:2-56 through 2-59 and 3&4-178). While this less protective alternative projected a 100 percent likelihood of providing habitat of sufficient quality, distribution, and abundance to allow the great gray owl populations to stabilize, it estimated a slightly higher likelihood of resulting in significant gaps in the historic distribution across federally managed lands (USDA, USDI 1994a:3&4-181).

The best available science continues to support the Northwest Forest Plan conclusion that the continued persistence of this species relies on the ability to find and protect available nest sites during management activities (Bull and Henjum 1990). Hayward and Verner (1994) stated that the loss of nesting habitat in central and eastern Oregon has been identified as the most immediate threat to great gray owl persistence in that region. Therefore, determined management of nesting habitat and the detection of great gray owls is needed to determine where to apply nest protections (Bull and Henjum 1990, Wahl 2006 pers. comm., Blow 2006 pers. comm.). Much of the apparently suitable habitat in the Matrix/AMA portion of the NWFP area has been surveyed, and the owl is very detectable if present.

Under Alternatives 1 and 3, this species would be included in Category A, which requires management of all known sites, pre-disturbance surveys, and Strategic Surveys. Under Alternative 4, this species would be included in Category C, which requires management of high-priority sites, pre-disturbance surveys, and Strategic Surveys. All known sites would be managed until high-priority management recommendations are developed. The 2000 FSEIS found that because of the protection of known sites, all alternatives provided sufficient habitat (including known sites) to allow the species to stabilize in a pattern similar to its reference distribution (USDA, USDI 2000a:367). Alternatives, 1, 3, and 4 would provide sufficient habitat to support stable populations in the NWFP area.

Under Alternative 2, this species is not included in either Agencies' Sensitive Species Program in Oregon where all the known sites are located. Forest Service Land and Resource Management Plans, and BLM District plans in Oregon within the range of the great gray owl provide for the protection of raptor nest sites, of which great gray owls are included. These protection measures vary from very specific direction (e.g. Deschutes

Land and Resource Management Plan[16]) to general direction (e.g. Medford District Resource Management Plan[17]). While these guidelines provide some protection, they are dated (1989 to 1995), inconsistent, and do not provide any means of detecting sites where protections would be applied. Thus, Alternative 2 would result in an outcome of habitat (including known sites) is likely sufficient to support stable populations range-wide in the NWFP area, although there is insufficient habitat to support stable populations in a portion of the NWFP area.

Late-Successional Mammals

Affected Environment

Additional discussion of affected environment is contained in FEMAT, the Northwest Forest Plan Final SEIS, and the 2000 Survey and Manage Final SEIS.

The Northwest Forest Plan Final SEIS listed 14 mammal species associated with late-successional forests. Important habitat components for these species were dead standing wood, dead down wood, live old-growth trees, and riparian zones (USDA, USDI 1994a:3&4-182 through 185).

Management of Riparian Reserves, Congressionally Reserved Areas, and Late-Successional Reserves has occurred as anticipated in the Northwest Forest Plan Final SEIS (USDA et al. 2002). The most common activities in Late-Successional Reserves are silvicultural thinning of young stands (not currently of appropriate age and structural characteristics to be classified as late-successional forest) to accelerate the development of late-successional forest structural and functional conditions, and fuels reduction through prescribed fire in drier forest types. Thinning similar to that in the Late-Successional Reserves has occurred in Riparian Reserves to further achievement of Aquatic Conservation Strategy objectives.

Although new information is constantly being gained and old information is being refined, there has been no new information or changed circumstances that would alter the basic scientific understanding of these species or that would alter, for these species, the conclusions of the Northwest Forest Plan Final SEIS.

Environmental Consequences

In addition to the Survey and Manage mitigation measure, the assessments of Option 9 in FEMAT and Alternative 9 in the Northwest Forest Plan Final SEIS did not include seven other mitigations that were added late in the Northwest Forest Plan Final SEIS process including an increase in Riparian Reserves. The increase in the size of Riparian Reserves has implications for improving connectivity for the red tree vole (USDA, USDI 1994a: J2-475).

A conclusion relevant to all alternatives is that Alternative 9 of the Northwest Forest Plan Final SEIS was judged to be among the alternatives most favorable to mammals because it provides the set of allocations and management practices that best produce habitat components for mammals (USDA, USDI 1994a:3&4-183).

[16]From the Deschutes Land and Resource Management Plan: "Habitat suitable for 8 great gray owl nesting pairs will be provided on the forest; nest sites protected by maintaining forested stand of at least 30 acres; maintain at least 300 feet of forest between the nest and opening."
[17]From the Medford District Resource Management Plan, specific to raptors: "Raptor nest site and habitat would be protected. Disturbance would be avoided during nesting season."

The acreage of protected known sites for Survey and Manage species under Alternatives 1, 3, and 4 occurs as scattered, small patches that provide little overall contribution to the maintenance of late-successional forest associated mammal species when compared to the contribution of Congressionally Reserved Areas, Late-Successional Reserves, and Riparian Reserves. If the protection of the known sites was permanent, they could play a role in providing refugia for certain species; however, the protection of these sites varies as new information refines management prescriptions for Survey and Manage species.

The conclusion of the Northwest Forest Plan Final SEIS was that 13 of the 14 species of mammals that were associated with late-successional forest would be stable, well-distributed on federally managed lands throughout the NWFP area without any anticipated contribution from the Survey and Manage Standards and Guidelines. The exception was the Oregon red tree vole. There is no new information or changed circumstances to alter these conclusions for any of the alternatives.

The relatively small difference in habitat acreage between the alternatives resulting from managed known sites is inconsequential to the maintenance of these species compared to the millions of acres of late-successional forest habitat contained in the reserves under all alternatives. Because the differences in habitat between the alternatives are inconsequential, they do not represent "gains" or "losses" of habitat essential to Northwest Forest Plan Final SEIS conclusions (USDA, USDI 2000a:371).

Oregon Red Tree Vole (*Arborimus longicaudus*)

Affected Environment

The red tree vole is the most arboreal mammal in the Pacific Northwest and is endemic to moist coniferous forests of western Oregon and extreme northwestern California (Hayes 1996). The geographic range of the red tree vole includes approximately 16.3 million acres across all land ownerships. More than 70 percent of known sites and 47 percent of the known and suspected range is on federally managed lands (USDA, USDI Species Review Panel 2000). Because of concerns that red tree voles were less common in some regions, management of the species was subdivided into biological zones in the 2000 and 2004 FSEISs. The Northern Mesic Biological Zone includes the North Coast and North Cascades ranges in Oregon, the Mesic Biological Zone includes the central Cascades and Coast Ranges in Oregon, and the Xeric Biological Zone includes the dry interior regions of southwest Oregon and northwest California.

The red tree vole (*Arborimus longicaudus*) is the only mammal included in the Survey and Manage Standards and Guidelines. Under Alternative 1, it is included in Category C in the Northern Mesic and Xeric portions of its range, and not included in Survey and Manage in the Mesic Biological Zone. Under Alternatives 2 and 3, it is included in the Forest Service and BLM Special Status Species Programs (SSSPs) in the North Coast range of Oregon north of Highway 20, but receives no other species-specific protection elsewhere. Under Alternative 4, it is in Category C in its entire range.

Recent new information about the tree vole includes the publication of a new paper on population structure (Miller et al. 2006), a thesis on home ranges, movements, and survival rates (Swingle 2005), and a draft report on habitat associations and probability of occurrence of tree voles in different forest types and land allocations (Dunk and Hawley 2007). Two papers cited as "in preparation" in the 2004 FSEIS have been fully analyzed and published, including a publication on the taxonomic relationships of tree voles and their relatives (Bellinger et al. 2005), and a publication on the range limits and relative abundance of the red tree vole in different regions (Forsman et al. 2004). There is also additional information on tree vole distribution and abundance from pre-disturbance

surveys, Random Double Sample (RDS) Surveys (Table 3&4-12), and retrospective surveys (GeoBOB/ISMS database, Forsman and Swingle unpub). Known sites (recently active tree vole nests) have been confirmed at 598 locations in the Northern Mesic and Xeric Biological Zones, including sites reported in the GeoBOB/ISMS database, and sites documented by Forsman and Swingle (unpub) during studies of tree vole ecology or distribution (Figures 3&4-5, 3&4-6, and 3&4-7). Recently active vole nests have been confirmed at 551 locations in the Mesic Biological Zone including 547 on federal lands and 4 on non-federal lands (Table 3&4-12).

Forsman et al. (2004) examined the proportion of tree voles in spotted owl pellets as one index of the distribution and relative abundance of tree voles in different parts of Oregon. They found that tree voles were most common in the diet in the central and southern Coastal regions of Oregon and were least common in the diet in the North Coast ranges, North Cascades, and the dry interior region of SW Oregon. Based on their analysis they concluded, "Although our data indicate that tree voles are widespread in Oregon, and fairly common in some regions, it is likely that tree vole populations have declined in areas where logging, fire, and human development have produced landscapes dominated by young forests." These authors also qualified their data, by pointing out that theirs was not a random sample, and that the areas in which their samples were collected were mostly in old forests. So they strongly emphasized that their data could not be used to infer the occurrence of tree voles in areas where the majority of old forests had been converted to young forests.

A recent study of radio-collared tree voles (Swingle 2005) confirmed previous speculation that tree voles have relatively small home ranges, are relatively weak dispersers, and use interconnected limbs to travel from tree-to-tree in the forest canopy (Hayes 1996, Carey 1996). There was no evidence that any of the radio-collared voles used terrestrial nests, although they did occasionally move between trees by traveling on the ground. Swingle (2005) suggested that thinning in young stands could remove the types of trees used by tree voles for nesting. He also suggested that some young forests may provide important habitat for tree voles, and should not necessarily be considered unsuitable habitat.

Swingle (2005) found that radio-collared juveniles typically dispersed less than 100 m before settling. This finding supports previous speculation that tree voles are relatively weak dispersers (USDA, USDI 2000a:377). However, this needs to be qualified with the statement that even species that typically disperse short distances can move considerable distances over multiple generations if suitable habitat is available. Currently available samples are too small to determine the influence of forest age on dispersal, although Swingle (2005) did observe dispersal in forests that were 35-60 years old. The role of young forests in the population dynamics of red tree voles is not well understood (USDA, USDI 2000a:378, Dunk and Hawley 2007).

Moeur et al. (2005) found that the amount of older forest on federal lands within the area of the Northwest Forest Plan increased by about 1.9 percent per year in the period 1994-2003. However, that change was mainly due to increases in the area of forest at the lower end of the diameter range used to define old forest (i.e., relatively young forests on old burned areas or harvest units). Whether this in-growth is the ecological equivalent of the very old forests that were cut or burned during the same time interval is unclear, at least in terms of the effects on tree voles. Moeur et al. (2005) also reported that connectivity between patches of old forest was "strong" on federal lands within the range of the tree vole. This is certainly encouraging from the standpoint of a weak disperser like the tree vole. However, it does not necessarily equate with a high probability of tree vole persistence on federal lands in the Xeric and Northern Mesic Biological Zones, especially in areas like the northern Oregon Coast Ranges and foothills of the Northern Oregon Cascades where federal lands are uncommon and often isolated in small patches.

Miller et al. (2006) examined population structure in the red tree vole and found a genetic discontinuity between tree voles in northern and southern Oregon, and a slightly weaker genetic discontinuity between tree voles on opposite sides of the Willamette Valley. These discontinuities reflect a non-random distribution of genetic haplotypes in the population. The line separating the north-south discontinuity occurs near the southern end of the Willamette Valley, and may represent a zone of secondary contact between populations that were isolated during the last ice age about 12,000 years ago. Further work is needed to determine if any of these discontinuities are sufficient to warrant sub-specific status. Bellinger et al. (2005) also cautioned that more work is needed to further evaluate subspecific and specific taxonomic relationships in the red tree vole.

A subspecies of the red tree vole (*Arborimus longicaudus silvicolus)* was believed to occur in the North Coast range of Oregon, primarily on nonfederal lands (USDA, USDI 1994a:3&4-185). A recent genetic study (Bellinger et al. 2005) found no clear difference between *Arborimus longicaudus silvicolus* and *Arborimus longicaudus longicaudus*. Previous Oregon Natural Heritage Information Center ranking of *Arborimus longicaudus silvicolus* as a subspecies has been dropped. The red tree vole is included in Agencies' Special Status Species Programs in the North Oregon Coast range portion of the red tree vole's range based in part on the previous Heritage rankings.

Recent pre-disturbance surveys, RDS surveys and retrospective surveys indicate that tree voles are uncommon or absent in much of the Northern Mesic Biological Zone (USDA, USDI 2000a; GeoBOB/ISMS database; Forsman et al. 2004; Forsman and Swingle unpub). For example, RDS Surveys conducted on the Salem District of the BLM and Mt. Hood National Forest revealed evidence of recently occupied tree vole nests at only 7 percent and 8 percent of the locations surveyed, respectively. In this region, there are only 170 sites with detections of recently occupied tree vole nests, most of which are concentrated in the western Cascades south of Salem (Figure 3&4-5). Data from owl pellets also suggest that tree voles are uncommon in the North Coast and North Cascades ranges (Forsman et al. 2004) but the sample from this study was based on known owl territories as opposed to a random sample, and included data collected over a 33 year time span (1970-2003). The known range of the tree vole has been better documented since 2004 based on recent surveys in the Columbia Gorge (Forsman and Swingle unpub) and an analysis of tree vole occurrence in diets of spotted owls (Forsman et al. 2004). The new surveys in the Columbia Gorge demonstrate that tree voles occur at least as far east in the gorge as Mitchell Point, about 2 miles west of Hood River. This represents an eastward extension of the known range of 10 miles from any previously known locations in the gorge.

Recent surveys indicate that, in Oregon, tree voles do not occur in part of the Xeric Biological Zone, and are unevenly distributed and relatively uncommon in the rest of the zone, where they occur only in Josephine County and in a narrow area along the western and northern edges of Jackson County (Figure 3&4-6). South of Grants Pass in Oregon, the eastern range limit is the Applegate River. North of Grants Pass the eastern range limit runs ENE on a line paralleling the Jackson County line to a few miles east of Prospect, and then NNE on a line paralleling Hwy 230, about 5 miles east of the highway (Figure 3&4-6). In California, Zentner (1977) located tree vole nests at three locations at the eastern edge of the Xeric Biological Zone, but all other surveys conducted to date have indicated that tree voles are either absent or extremely rare in much of this region (Figure 3&4-6). It is unclear if the locations reported by Zentner (1977) represent red tree voles or Sonoma tree voles (*Arborimus pomo*), as the range limits of the two species are still poorly documented in northern California (Bellinger et al. 2005). More surveys are needed along the eastern edge of the range limits in the Xeric Biological Zone in both Oregon and California to better elucidate the limits of the range.

The available data suggest that tree voles are patchily distributed on federal lands throughout most of the Mesic Biological Zone. They usually are found at elevations below about 3,600 feet, and are uncommon or rare at higher elevations in this zone. There are a moderate-to-high number of likely extant sites in the Mesic Biological Zone (USDA, USDI Species Review Panel 2003). The tree vole Taxa Team involved with the 2003 Annual Species Review estimated that the proportion of potential habitat in large reserves in the Mesic Biological Zone was 35 percent. Based on these results, they concluded that the proportion of sites and habitat in reserves was not high but that there was a high probability that potential habitat in reserves would be occupied. The Team also suggested that the longer rotation ages required in BLM Connectivity Blocks might allow for retention of tree voles within the connectivity blocks and re-colonization of habitat as the distribution of suitable habitat changes over time (USDA, USDI Species Review Panel 2003). Additionally, Riparian Reserves comprise 40 to 50 percent of the Mesic Biological Zone.

Analyses of the Random Double Sample (RDS) Survey data indicate that, on federal lands within the range of the red tree vole, tree voles are strongly associated with old forests (Dunk and Hawley 2007), and that there was evidence of occupancy by tree voles in 38 percent of the 2-ha plots surveyed. These results suggest that tree voles are still present in much of their historic range, but are patchily distributed in all parts of their range, particularly in the Northern Mesic and Xeric Biological Zones, where only 10-11 percent of the plots surveyed had evidence of recent occupancy by tree voles. Within the Mesic Biological Zone, there was evidence of recent occupancy in 30 percent of the 2-ha plots surveyed (Table 3&4-11). If anything, this probably underestimates the number of plots with vole nests (because some nests were probably not detected), but it is unclear if it underestimates the number of plots with recently occupied nests because of the criteria used to classify nests. Nests were classified as "recent" if they had green- or tan-colored Douglas-fir resin ducts or cuttings in nest structures (USDA, USDI 2000f; USDA, USDI 2002c), as opposed to counts of nests that were actually occupied by voles. While this protocol was the best available at the time it was done, subsequent experience at many sites indicates resin ducts stay green for months when they are stored inside the nest out of the sunlight, and they can be tannish or orangish for more than a year if they are inside the nest. Thus, it is possible that the number of recently occupied nests may have been biased high in the RDS surveys. In a more recent study (Swingle 2005) suggested that the only way to determine if nests are occupied is to physically probe each nest. Even this method does not always work because some voles vacate their nests before the climber reaches the nest, and others are difficult to chase from their nests. In addition, tree voles use multiple nests and many nests are not occupied at any given time (Swingle 2005), so estimates based on the number of recently used nests may overestimate the number of plots that are actually occupied by voles. It is also important to recognize that the estimates of the percent of the NWFP area occupied by tree voles in Table 3&4-11 are not comparable to estimates for the other species in Table 3&4-16. The estimates for the tree vole were based only on the area surveyed (lower elevations in western Oregon and NW California), whereas the estimates for all other species were based on the entire area of the Northwest Forest Plan.

Although the results of the RDS survey suggest that tree vole nests are more abundant in old forests than in young forests, Swingle (2005) and Dunk and Hawley (2007) cautioned against the blanket assumption that young forests are always unsuitable habitat for tree voles. A number of researchers have found relatively high densities of tree voles in some young forests (Clifton 1960, Maser 1966, Thompson and Diller 2002, Swingle 2005), and considerable numbers of tree vole nests were also found in some young forests during pre-disturbances surveys (GeoBOB/ISMS database). Thus, earlier unqualified statements that young forests are always unsuitable habitat for red tree voles (Aubry et al. 1991) are not consistently supported by the data.

Environmental Consequences

The FEMAT assessment panel gave the red tree vole a rating of 73-25-2-0 for Outcomes A, B, C, and D, respectively. Because of this rating, the red tree vole failed to pass the screen for additional species analysis in the Northwest Forest Plan Final SEIS (less than 80 percent Outcome A, the likelihood of stable, well distributed across federally managed lands). However, the panel judged that there was a 0 percent likelihood that this species would be extirpated from federally managed lands, a 2 percent likelihood that the habitat would only allow continued species existence in refugia, and a 73 percent likelihood that the population of this species would be stable, well distributed across federally managed lands in the NWFP area (USDA, USDI 1994a:J2).

The red tree vole failed to pass the screens because of its apparent association with old-growth forest, its limited dispersal capabilities, and concern about the extent to which information was lacking on the distribution, habitat requirements, and population status of the vole in 1994 when the evaluation was conducted. The species rating also reflected concerns that the provisions of Alternative 9 in the Northwest Forest Plan Draft SEIS might not adequately provide for connectivity among late-successional patches for dispersal and gene flow. Although the evidence from RDS surveys and from pitfall trapping indicates that red tree voles are most abundant in older forests or in forests with remnant old trees, there is still uncertainty about the role of young forests in the population ecology of red tree voles (USDA, USDI 2000a:378). Red tree voles begin to reinvade young stands when the trees become big enough to support arboreal nests; however, there is considerable uncertainty regarding the ability of tree voles to persist in landscapes dominated by young forests. Wildlife biologists have found many red tree voles and their nests in young stands, including many nests occupied by breeding females (Howell 1926, Clifton 1960, Maser 1966, Swingle 2005, GeoBOB/ISMS database). It is unclear whether red tree voles in these situations can persist over long periods or are ephemeral populations that contribute little to overall population persistence (USDA, USDI 2000a:378). Some (e.g. Aubry et al. 1991) have suggested that young forests do not provide suitable habitat for tree voles, and others have suggested that repeated clear-cutting or thinning at short intervals will isolate and eventually eliminate tree vole populations (Maser et al. 1981, Carey 1991).

Mitigation identified in the Northwest Forest Plan Final SEIS Appendix J2 and adopted in its Record of Decision was judged to raise the rating under Outcome A, stable, well-distributed across federally managed lands, above 80 percent (USDA, USDI 1994a: J2-55). This mitigation included the Survey and Manage Standards and Guidelines and the application of Riparian Reserve Scenario 1 (wider Riparian Reserves on intermittent streams outside of key watersheds). There would be a zero percent likelihood of extirpation from federally managed lands (USDA, USDI 1994a:3&4-183 and J2-473 through 475). The 2000 FSEIS found that red tree vole in Category C throughout its range (Alternative 4 in this SEIS) would allow the species to stabilize in a pattern similar to its reference distribution except in the North Coast range (USDA, USDI 2000a:390-391).

The cumulative effects assessment in the Northwest Forest Plan Final SEIS indicated that federally managed lands would likely provide for large, well-distributed populations of tree voles, except in the North Coast ranges of Oregon and the foothills of the Willamette Valley, where there is little federally managed land (USDA, USDI 1994a:J2-474). Recent surveys of vole nests and the presence of tree vole skulls in pellets of spotted owls indicate that tree voles are still present on some federally managed lands in the North Coast ranges, but the number of detections is small (Forsman et al. 2004, GeoBOB/ISMS database). Although 93 percent of federally managed lands in the North Coast range are in Late-Successional Reserves or Late-Successional Reserve-like in their management, land management practices on nonfederal lands reduce the potential connectivity between the blocks of federally managed lands (USDA, USDI 2000a:391). Riparian

Reserves and Matrix Standards and Guidelines provide additional levels of protection for red tree voles on federally managed lands, but do not eliminate the high risk that there is insufficient habitat in this particular area. Since there is so little federally managed land and so few animals here, every site is critical for persistence. In this portion of its range, under Alternative 1 and 4, the red tree vole would be included in Survey and Manage as Category C, which requires pre-disturbance surveys, management of high-priority sites and Strategic Surveys. In this portion of its range under Alternatives 2 and 3, it would be included in the Agencies' SSSPs.

There are few known sites, little federally managed land, and limited connectivity in this area. This would result in habitat (including known sites) insufficient to support stable populations in this portion of its range under all alternatives.

Summary

The information reviewed herein suggests that tree voles are uncommon and irregularly distributed on Federal lands in the North Coast and North Cascades ranges of Oregon and in the Xeric Biological Zone of southwest Oregon and northern California, and are most abundant in the Mesic Biological Zone. Under Alternatives 1 & 4, pre-disturbance surveys and management of known sites in the Northern Mesic and Xeric Biological Zones increase the odds that populations will stabilize in those regions. The main difference between Alternatives 1 & 4 relative to tree voles is that Alternative 1 removes the vole from Survey and Manage in the Mesic Biological Zone, whereas Alternative 4 does not. Thus, the odds that tree vole subpopulations will become genetically or demographically isolated in the Mesic Biological Zone are reduced with Alternative 4.

Under Alternatives 2 and 3, with the inclusion of Riparian Reserve Scenario 1, the rating for the red tree vole was improved by an undetermined amount above 73 percent likelihood of sufficient habitat to provide for stable, well-distributed populations across federally managed lands and 0 percent likelihood of extirpation in the NWFP area. In addition, the red tree vole is included in the Agencies' SSSPs in the North Coast range of Oregon under both alternatives. Habitat (including known sites) is thus sufficient to support stable populations range-wide (Mesic Biological Zone and in a portion of the Northern Mesic), but is insufficient to support stable populations in a portion of the range (the Xeric Biological Zone and the North Cascades and North Coast ranges of the Northern Mesic Biological Zone). Mitigation to stabilize red tree vole populations in the Xeric and Northern Mesic Biological Zones under Alternatives 2 and 3 would be to require pre-project clearances and management of known sites in the Xeric Biological Zone and in the Northern Mesic Biological Zone north of Highway 22 in the Cascades.

Under Alternatives 1, 2 and 3 in the Mesic Biological Zone, with its larger Riparian Reserves than those prescribed by FEMAT, the rating for the red tree vole was improved by an undetermined amount above 73 percent likelihood of sufficient habitat to provide for a stable, well-distributed population on federal lands and 0 percent likelihood of extirpation in the NWFP area. Under Alternatives 1, 2, and 3, there are no requirements to do pre-project clearances for tree voles in the Mesic Biological Zone. This results in some risk that subpopulations of tree voles in Late-Successional Reserves, Riparian Reserves, and late-successional patches in the Mesic Biological Zone may become genetically or demographically isolated under Alternatives 1, 2, and 3. Although Alternative 4 would reduce this risk because it requires pre-disturbance surveys and protection of known sites, it is not clear that the reduced risk of genetic or demographic isolation associated with Alternative 4 is needed to achieve stable populations in the Mesic Biological Zone. Because of the large size of Late-Successional Reserves and the connectivity provided by Riparian Reserves, all alternatives would have a high likelihood of providing sufficient habitat (including known sites) to provide for stable populations of tree voles on federal lands within the Mesic Biological Zone.

Table 3&4-11. Red Tree Vole RDS[3] Survey: Estimated Number of 2-ha Plots With Evidence of Recent Occupancy by Red Tree Voles in Different Biological Zones of Western Oregon

Sub-region[1]	Number of plots surveyed	Plots with Recent Occupancy	Percent of Survey Plots with evidence of recent RTV occupancy		Estimated Number of plot-sized areas with evidence of recent RTV occupancy[2]	
			Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
Range-wide	368	81	20.9	0.8	319,900	295,100 - 344,700
Xeric Zone	83	10	11.6	1.7	46,000	32,800 - 59,200
Mesic Zone	200	62	30.6	1	237,600	221,400 - 253,800
Northern Mesic Zone	85	9	10.1	1.2	36,400	27,600 - 45,200

[1] This survey was conducted solely within, or adjacent to, the known range of the red tree vole. The sampling area was restricted to 3,062,862 hectares (about 7.6 million acres) of lower elevation areas in western Oregon from the Columbia River south to around the Klamath River in northern California. The RTV probability sampling survey plots were 2-hectare polygons. Detection in these surveys indicated at least one recently-used red tree vole nest was detected on a plot (old nests may also have been detected but not displayed here).
[2] Estimates were derived by extrapolating from the sample plots to all potential plots in each region.
[3] Random Double Sample

Table 3&4-12. Red Tree Vole: Known Site Numbers and Summary of Outcomes and Program Assignments by Biological Zone and Sub-Zone Discussed in the Narrative

Oregon Red Tree Vole *Arborimus longicaudus*	Category Assignment for each Alternative				Outcomes[1, 3]				Special Status Species Programs[2,7]		Outcomes[1] without SSSP[4]		Known Sites during the last ASR or 2004 FSEIS			Additional Known Sites since the last ASR or the 2004 FSEIS[6]		
Biological zone/sub-zone	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	BLM OR	FS R6[8]	Alt 2	Alt 3	Fed. Land Only	Total	ASR Year	Fed. Land Only	Total	RDS Sites[5]
Range-wide					2	2	2	2	-	-	-	-						81
Xeric	C	off	C		1	3	3	1	-	-	-	-	346	346		201	204	10
Northern Mesic					2	2	2	2	-	-	-	-						9
North Coast					3	3	3	3	SS	SS	3	3						
North Cascades					1	3	3	1	-	-	-	-						
Remainder					1	1	1	1	-	-	-	-						
Mesic	off			C	1	1	1	1	-	-	-	-	404	405	2003	81	84	62

[1] Outcomes:
1 - Sufficient Habitat
2 - Sufficient Habitat but Insufficient Habitat in a Portion of the Range
3 - Insufficient Habitat
[2] SS = Bureau Sensitive or Forest Service Sensitive. The Red Tree Vole is included in SSSP in the northwestern Oregon Coast area only (North of Highway 20, west of the Willamette Valley).
[3] Outcomes are shown for each species range subdivision made in Survey and Manage. If a species is in two categories (or "off") in different parts of its range, outcomes are included for both areas. In these cases, outcomes are combined (averaged) for the entire species range (shown as shaded blocks).
[4] Applies only to area where species is assumed to be on one or more SSSP, and only to alternatives where species is "off" Survey and Manage.
[5] RDS sites: Please see Table 3&4-11 for more information about the Random Double Sample Survey Results.
[6] Additional sites since the last ASR or the 2004 FSEIS. For the area with new sites since the last ASR (as indicated by the year in the ASR year column), the known site numbers are the result of a data call with a cutoff date of 11/22/06. For the remaining area, the data entry deadline was 09/29/06.
[7] Actual SSSP assignments. Supplement text uses "assumed" assignment because managers have the discretion to add or remove species outside of the SEIS process.
[8] FS R-6: Forest Service, Region 6 (Oregon and Washington)

Figure 3&4-5. Red Tree Vole Surveys in the Northern Mesic Biological Zone.

Symbols indicate presence or absence of vole nests at locations surveyed during project clearance surveys (circles) and RDS Surveys (squares) in 1995-2006.

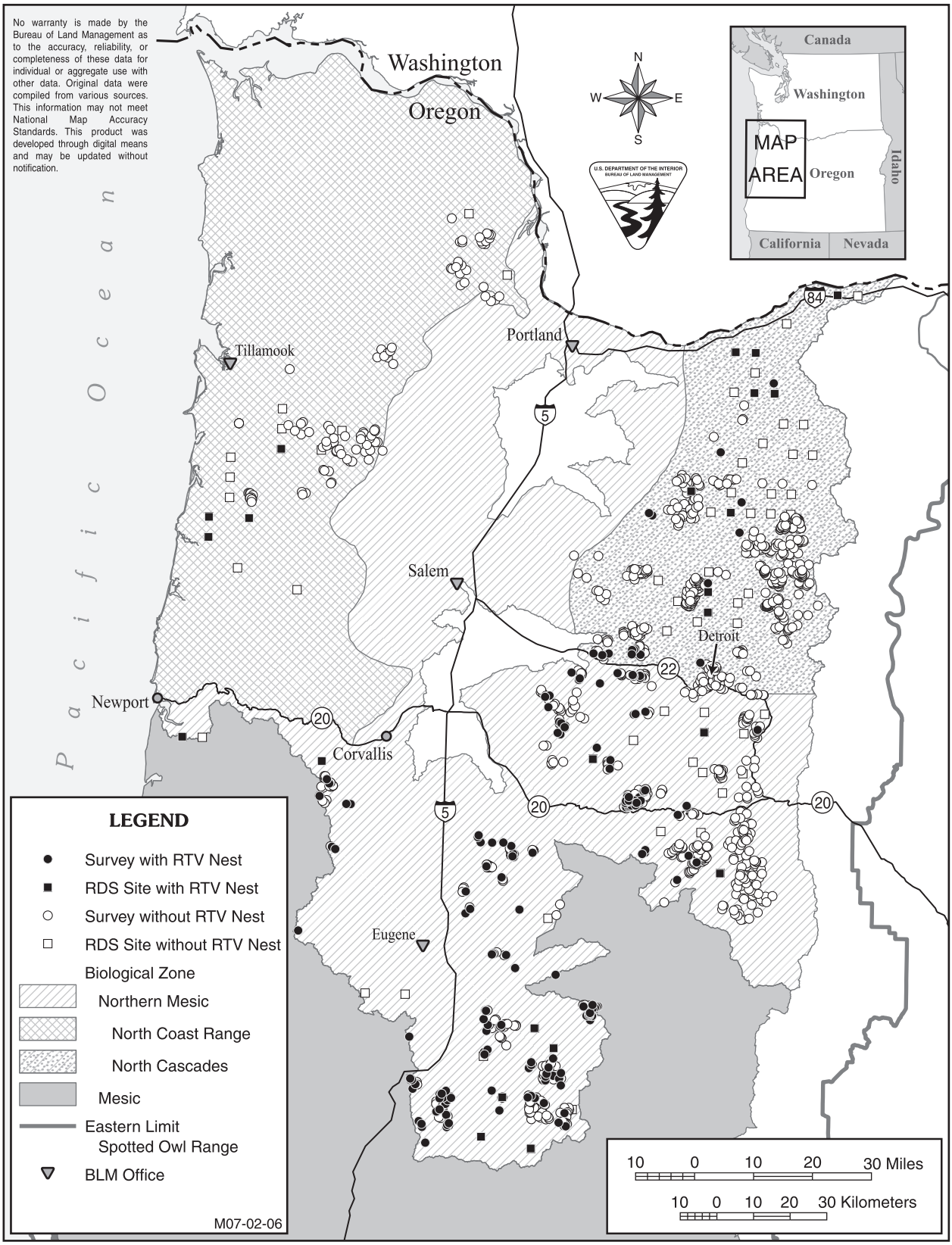


Figure 3&4-6. Red Tree Vole Surveys in the Xeric Biological Zone.

Symbols indicate presence or absence of vole nests at locations surveyed during project clearance surveys (circles) and RDS Surveys (squares), 1995-2006. Approximate range limits of the tree vole in the Xeric Biological Zone in California reflect uncertainty regarding persistence of voles at historic sites reported by Zentner (1977) (triangles) as well as uncertainty regarding species taxonomy in this region.

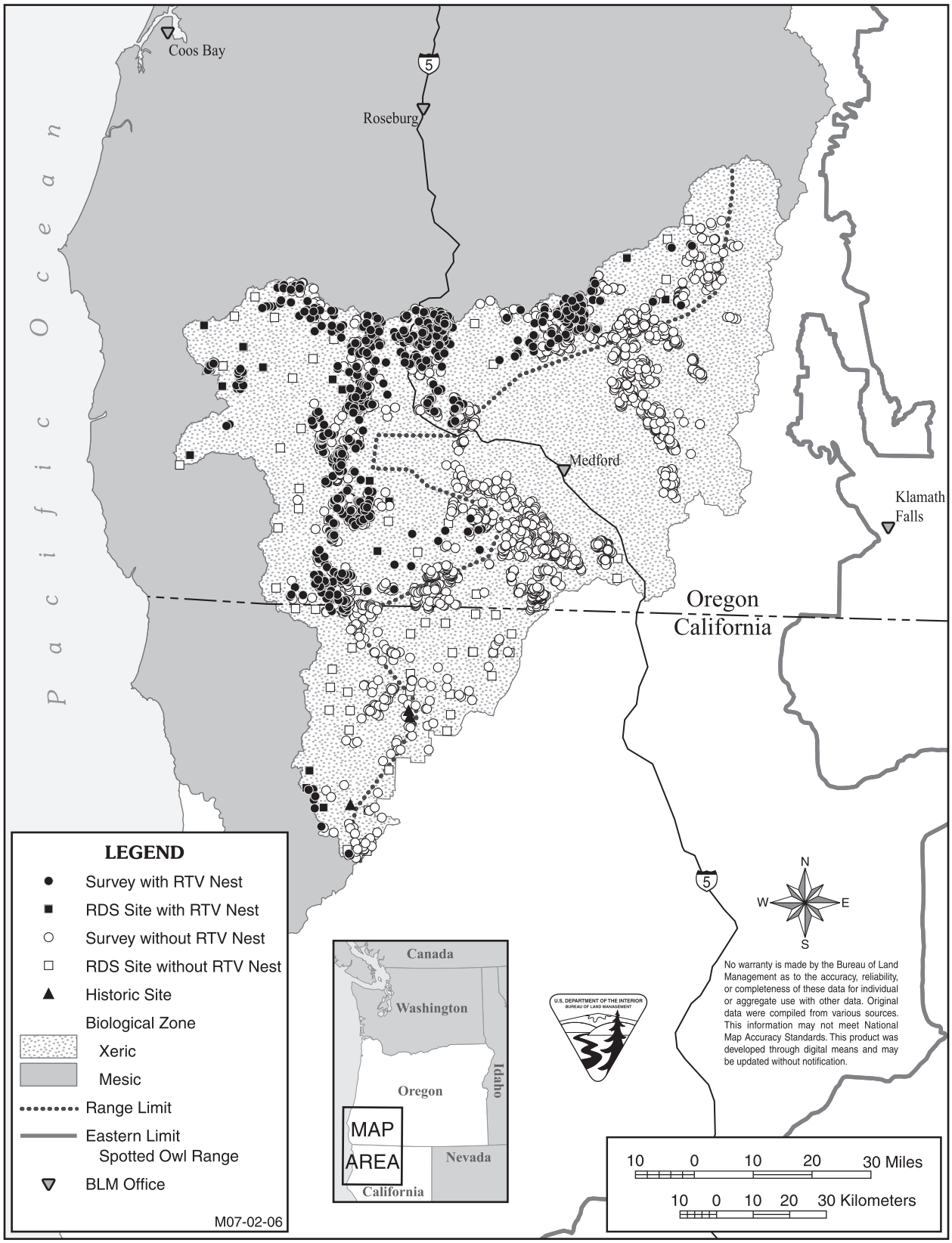
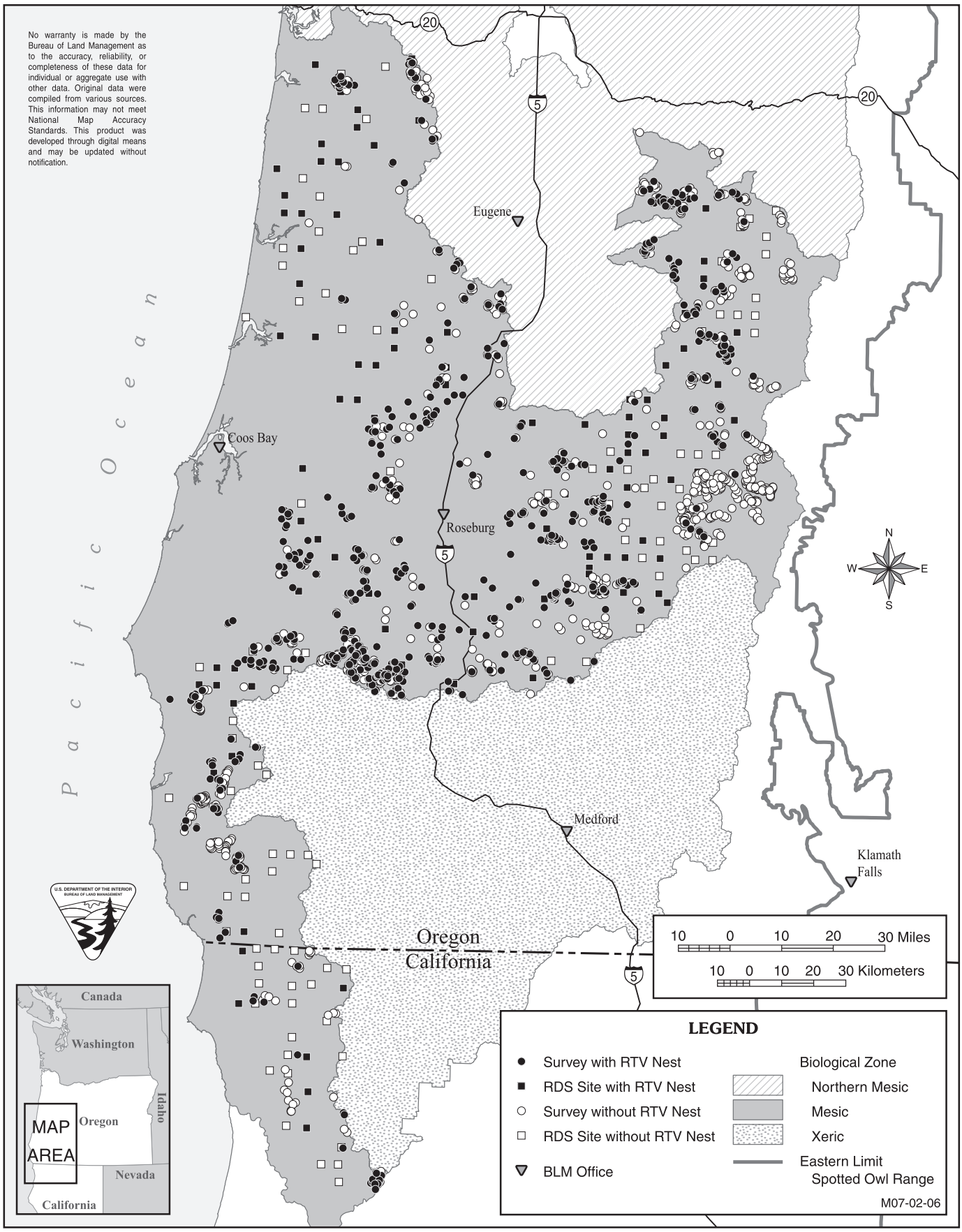


Figure 3&4-7. Red Tree Vole Surveys in the Mesic Biological Zone.

Symbols indicate presence or absence of vole nests at locations surveyed during project clearance surveys (circles) and RDS Surveys (squares) in 1995-2006.



The lack of clarity regarding both the distribution and taxonomy of the tree vole in the southern end of the Xeric Biological Zone in California is not likely to be resolved without a survey that systematically examines areas at the eastern edge of the range, including the areas where Zentner (1977) found evidence of tree voles. If these steps are taken, and no voles are found in the area east of the recent tree vole locations, then the range limits of the species in northern California could be reevaluated within just a few years.

Species Associated with Early-Successional Forest

Affected Environment

The Northwest Forest Plan was developed to address federal land management related to late-successional forest associated species. Despite this emphasis, the Northwest Forest Plan Final SEIS, the 2000 Survey and Manage Final SEIS, and this SEIS examined the expected effects of the alternatives on early-successional forest associated species. Early-successional forest associated species, as a group, are generally widespread, and occur throughout the NWFP area. Individual species may be distributed in a small geographic range, and occur in a more limited area within that general geographic range. These species are adapted to a variety of early-successional habitats (USDA, USDI 2000a:396).

The assumed availability on a landscape scale of early-successional habitat is unlikely to substantially differ from that occurring under historic natural disturbance processes. The Northwest Forest Plan was found acceptable for sustaining adequate populations of species dependent upon young-forest habitat (USDA, USDI 2000a:396).

Environmental Consequences

The primary sources of early-successional habitat are timber harvest and natural disturbance processes. The Northwest Forest Plan anticipated an annual harvest level of 958 million board feet (MMBF) of timber. Actual harvest levels have been less (see *Timber Harvest* section). Under Alternatives 1, 2 and 3, known sites for some Survey and Manage species would continue to be managed through the Special Status Species Programs.

Relevant to Alternatives 1, 3, and 4, the 2000 Final SEIS concluded that Survey and Manage Standards and Guidelines would not result in significant changes to the abundance and distribution of species associated with early-successional habitat that were anticipated in the Northwest Forest Plan SEIS. This is due to the large extent of early-successional habitat currently available, and the reasonable expectation that federally managed and nonfederal lands will continue to be harvested and natural disturbances will continue throughout the NWFP area (USDA, USDI 2000a:397). Because these assumptions apply to all alternatives, under all alternatives, early-successional species are expected to remain distributed in a pattern similar to their historic distribution within the NWFP area.

Threatened and Endangered Species

This section discusses the expected effects to terrestrial and inland aquatic species listed as threatened, endangered, or proposed for listing under the Endangered Species Act of 1973, as amended. See the *Aquatic Ecosystem* section for a discussion of fish species in the NWFP area listed as threatened or endangered. Refer to Appendix 5 for the Forest Service' Biological Evaluation which includes effects to species currently included in the

Sensitive Species Programs in Regions 5 (California) and 6 (Washington and Oregon), as well as a discussion of BLM Special Status Species. The Biological Evaluation also includes an in-depth analysis of effects to federally listed species.

Effects to listed species associated with late-successional and old-growth forests in the NWFP area (i.e. the action area) are discussed in detail.

Northern Spotted Owl (*Strix occidentalis caurina*)

Affected Environment

Management of the Northern Spotted Owl and its habitat on federally managed lands was an important consideration in the design of the Northwest Forest Plan. This species received extensive attention in the Northwest Forest Plan Final SEIS and its supporting documents. The Biological Opinion for the Draft of the Northwest Forest Plan concluded:

> "*…the adoption of Alternative 9, as modified, is not likely to jeopardize the continued existence of any listed species, or result in the destruction or adverse modification of any designated critical habitat for those species. The late-successional and riparian reserve features of Alternative 9 are particularly important contributions to the conservation of the spotted owl and marbled murrelet*" (USDA, USDI 1994a:Appendix G-3).

The Survey and Manage mitigation measure was not a component of the Northwest Forest Plan Draft SEIS. The addition of the Survey and Manage mitigation measure would have an insignificant effect on the maintenance of spotted owl populations (USDA, USDI 2000a:398). This was due to the small scale and isolated nature of the resultant late-successional and old-growth forest areas outside of reserves.

The Northwest Forest Plan concluded that the anticipated rate of timber harvest in Matrix and Adaptive Management Areas would occur in a manner that would allow the habitat to recover and spotted owl populations to stabilize in the Late-Successional Reserves and Congressionally Reserved Areas.

The 2000 Final SEIS concluded that neither the original basis for the assessment nor the conclusion of the effects to the Northern Spotted Owl as presented in the Northwest Forest Plan would be affected by the Survey and Manage Standards and Guidelines.

Environmental Consequences

Reserves protect about 80 percent of the federally managed lands within the NWFP area. Eighty-seven percent of the remaining late-successional and old-growth forests are in these reserves. The remaining 13 percent is available for regularly scheduled timber harvest. The Northwest Forest Plan projected that less than 2.5 percent of the late-successional forest would be harvested per decade. Actual harvest has been well below that rate. The reduced rate of harvest is due primarily to greater than expected Riparian Reserve coverage, the effects of the Survey and Manage mitigation measure, and legal challenges. Harvest of late-successional forest under any alternative would not exceed the rate anticipated in the Northwest Forest Plan Final SEIS.

Neither of the No-Action Alternatives nor either of the two action alternatives will affect the original basis for the assessment or the conclusions of the effects to spotted owls as presented in the Northwest Forest Plan Final SEIS. Congressionally Reserved Areas and Late-Successional Reserves will continue to be managed for late-successional habitat in the NWFP area and provide for spotted owl breeding clusters. Because Congressionally Reserved Areas, Late-Successional Reserves, and the Riparian Reserve

system are intertwined or in close proximity, adequate dispersal habitat for spotted owls will continue to be provided. The potential difference between alternatives has little effect on the spotted owl habitat management strategy because it results in only negligible and minor losses in the amount of habitat. The Northwest Forest Plan Final SEIS assumptions and conclusions relative to a spotted owl 4(d) rule and critical habitat remain valid as described above. Removal of the Survey and Manage Standards and Guidelines would result in the return of Survey and Manage known site management areas to the underlying management allocations. Most of the Survey and Manage species known sites consist of areas generally 1/2 to 2 acres in size. These size areas (given their scattered distribution across the NWFP area) do not generally provide significant benefit to spotted owls. However, one species, the red tree vole, requires site management of 10 acres or more. The return of red tree vole known sites to the underlying management allocations effects spotted owl, as the size of these areas may provide some beneficial effect to foraging owls, and provide for structural diversity during adjacent stand development.

The contribution of the red tree vole as prey varies in different portions of the range of the northern spotted owl, from a low of one percent (of total prey items) of the diet to a high of six percent (Biological Evaluation, Appendix 5),

At the project level there is a potential for adverse effects on individual owls due to removal of one or more acres of suitable habitat. Therefore, the determination for Alternatives 2 and 3 is *may affect, likely to adversely affect* the northern spotted owl and may affect, likely to adversely affect its critical habitat.

Marbled Murrelet (*Brachyramphus marmorata*)

Affected Environment

Management of the marbled murrelet and its habitat on federally managed lands was an important consideration in the design of the Northwest Forest Plan. This species received extensive attention in the Northwest Forest Plan Final SEIS and its supporting documents. The Biological Opinion for the Draft of the Northwest Forest Plan concluded:

> *"…the adoption of Alternative 9, as modified, is not likely to jeopardize the continued existence of any listed species, or result in the destruction or adverse modification of any designated critical habitat for those species. The late-successional and riparian reserve features of Alternative 9 are particularly important contributions to the conservation of the spotted owl and marbled murrelet"* (USDA, USDI 1994a:Appendix G-3).

The management strategy for Marbled Murrelets in the Northwest Forest Plan includes two primary components: (1) protection and development of marbled murrelet nesting habitat inside the large reserves near the coast, and (2) retention of all current and future known marbled murrelet nest sites in all land allocations.

Environmental Consequences

Under Alternatives 1 and 4, the level of protection for currently occupied marbled murrelet habitat would not be changed; all known and future nest sites would be protected.

The primary difference between the two action alternatives would be the number of species removed from the Survey and Manage Program and the subsequent acres removed from managed known site direction, much of which is outside the range of the marbled murrelet. In addition, much of the range of this species is protected by large

block Late-Successional Reserves. Despite eliminating protection for Survey and Manage sites in the future, the level of protection for habitat currently occupied by marbled murrelet would not be reduced, since marbled murrelet surveys and habitat protection measures would remain in place regardless of Survey and Manage species locations. All nest sites located would be protected under existing Northwest Forest Plan Standards and Guidelines for the murrelet. The determination for all alternatives is *no effect* for marbled murrelet and its critical habitat.

Bald Eagle (*Halieatus leucocephalus*)

Affected Environment

The Agencies survey extensively for bald eagles. Management of the bald eagle includes preparation of site-specific management plans and providing protection zones and management areas, as needed, to the species and its habitat.

Environmental Consequences

All alternatives in this SEIS would have similar effects on bald eagle habitat management. Removal of species from Survey and Manage will not change the environmental baseline for the bald eagle or result in changes to impacts to this species that were not anticipated in the original analysis of the Northwest Forest Plan and subsequent analyses. The current requirements to conduct specific surveys and develop site management plans for bald eagles greatly reduces any potential effect from changes in the 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 Final SEIS. Therefore, for the three alternatives, the determination is *no effect* for bald eagles. No critical habitat has been designated for bald eagles.

Canada Lynx (*Lynx canadensis*)

Affected Environment

The Canada lynx was listed by the U.S. Fish and Wildlife Service as a threatened species within the conterminous United States, effective April 24, 2000. Concurrent with the listing process, a national interagency Lynx Conservation Assessment and Strategy was developed to provide a consistent and effective approach to conservation of Canada lynx on federally managed land in the conterminous United States. This conservation agreement was entered into by the Forest Service, BLM, and the U.S. Fish and Wildlife Service. The Forest Service and BLM agreed to consider conservation measures in the Lynx Conservation Assessment and Strategy when designing and implementing activities that might affect lynx.

Environmental Consequences

Removal of species from Survey and Manage will not change the environmental baseline for the lynx or result in changes to impacts to this species that were not anticipated in the analysis of the Northwest Forest Plan and subsequent analyses. Future activities including, but not limited to, timber harvest, road construction, or application of prescribed fire, might be proposed on these “returned” sites, but would be evaluated for their direct and indirect effects to lynx under the auspices of the Endangered Species Act. All alternatives are expected to have *no effect* on the Canada lynx. No critical habitat has been designated for lynx.

Gray Wolf (*Canis lupus*)

Affected Environment

The range of the gray wolf includes portions of the NWFP 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, elk, and other species that are their primary prey, as well as areas supporting small mammal populations.

Environmental Consequences

All alternatives would have nearly identical effects on gray wolf habitat. Because gray wolves are not dependent on late-successional forest, loss of the small, isolated patches of late-successional forest that would be managed under the Survey and Manage Standards and Guidelines would have no effect on habitat for this species. None of the alternatives would affect the original basis for the assessment of the effects and conclusions in the Northwest Forest Plan Final SEIS. All alternatives are expected to have *no effect* on the gray wolf.

Grizzly Bear (*Ursus arctos*)

Affected Environment

The range of the threatened grizzly bear includes portions of the NWFP area, including the National Forests of the Cascade Range in Washington. While grizzly bears are not closely associated with late-successional forests, they use a variety of habitat, including forested areas for hiding and cover.

Environmental Consequences

All alternatives 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 managed under the Survey and Manage Standards and Guidelines would have no effect on habitat for this species. None of the alternatives would affect the original basis for the assessment of the effects and conclusions in the Northwest Forest Plan Final SEIS. All alternatives are expected to have *no effect* on the grizzly bear.

Listed or Proposed Plant Species Associated with Late-Successional Forests

Affected Environment

There are no species in the NWFP area that fit into this category.

Other Species

The following terrestrial or inland-aquatic listed species occur within the NWFP area, but are not associated with late-successional and old-growth forests. The Survey and Manage Standards and Guidelines were developed to address concerns for species associated with late-successional forest. Any habitat protected by the Survey and

Manage Standards and Guidelines is likely to be late-successional conifer forest. Therefore, any changes to the Survey and Manage Standards and Guidelines are not expected to affect these species or the conclusions of the Northwest Forest Plan Final SEIS.

Vascular Plants

Sonoma alopecurus	*Alopecurus aequalis* var. *sonomensis*
MacDonald's rockcress	*Arabis macdonaldiana*
Marsh sandwort	*Arenaria paludicola*
Applegate's milkvetch	*Astragalus applegatei*
Clara Hunt's milkvetch	*Astragalus clarianus*
Tiburon paintbrush	*Castilleja affinis* ssp. *neglecta*
Golden 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 fritillary	*Fritillaria gentneri*
Marin dwarf-flax	*Hesperolinon congestum*
Showy stickseed	*Hackelia venusta*
Water howellia	*Howellia aquatilis*
Beach layia	*Layia carnosa*
Burke's goldfields	*Lasthenia burkei*
Contra costa goldfields	*Lasthenia cojugens*
Western lily	*Lilium occidentale*
Large-flowered wooly meadowfoam	*Limnanthes floccosa* ssp. *grandiflora*
Bradshaw's desert-parsley	*Lomatium bradshawii*
Cook's lomatium	*Lomatium cookii*
Kincaid's lupine	*Lupinus sulphereus* ssp. *kincaidii*
Clover lupine	*Lupinus tidestromii*
Many-flowered navarretia	*Navarretia leucocephala* ssp. *plieantha*
Slender orcutt grass	*Orcuttia tenuis*
Yreka phlox	*Phlox hirsuta*
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 checkermallow	*Sidalcea oregana* ssp. *valida*
Ute ladies'-tresses	*Spiranthes diluvialus*
Kneeland Prairie penny-cress	*Thlaspi californicum* (*montanum* var. *californicum*)
Showy Indian clover	*Trifolium amoenum*

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*
Fender's blue butterfly	*Icaricia icarioides fenderi*
San Bruno elfin butterfly	*Incisalia mossii bayensis*
Vernal pool tadpole shrimp	*Lepidurus packardi*
Lotis blue butterfly	*Lycaeides argyrognomon lotis*
Shasta (placid) crayfish	*Pacifastacus fortis*
Callippe silverspot butterfly	*Speyeria callippe callippe*
Behren's silverspot butterfly	*Speyeria zerene behrensii*

Oregon silverspot butterfly	*Speyeria zerene hippolyta*
Myrtle's silverspot butterfly	*Speyeria zerene myrtleae*
California freshwater shrimp	*Syncaris pacifica*
<u>Fish</u>	
Tidewater goby	*Eucyclogobius newberryi*
Delta smelt	*Hypomesus transpacificus*
Oregon chub	*Oregonichthys* (*Hybopsis*) *crameri*
<u>Birds</u>	
Western snowy plover (coastal populations)	*Charadrius alexandrinus nivosus*
Brown pelican	*Pelcanus occidentalis*
California clapper rail	*Rallus longirostris obsoletus*
<u>Mammals</u>	
Point Arena mountain beaver	*Aplodontia rufa nigra*
Steller's (northern) sea lion	*Eumetopias jubatus*
Columbian white-tailed deer	*Odocoileus virginianus leucurus*
Salt marsh harvest mouse	*Reithrodontomys raviventris*

The Agencies survey for listed and proposed species in the vicinity of proposed projects. These surveys are designed to have a high likelihood of locating populations of such species irrespective of whether surveys are also done for Survey and Manage species. Since surveys for listed or proposed species will discover and subsequently protect these species with or without the Survey and Manage mitigation measure, there would be no difference between the alternatives.

All projects proposed on BLM or Forest Service administered lands must meet the Aquatic Conservation Strategy objectives of the Northwest Forest Plan. As proposed projects are designed and analyzed for effects to listed fish, needs of the fish species and habitat elements required to meet Aquatic Conservation Strategy objectives will be identified. Alternatives 2 and 3 would not alter this assessment process; therefore, there would be no change in effect as a result of the removal or modification of the Survey and Manage Standards and Guidelines when compared to Alternatives 1 and 4.

California red-legged frog (*Rana aurora draytonii*)

Affected Environment

The most important habitat for California red-legged frog is aquatic and riparian. This species is known to sometimes move through moist forest habitat during dispersal. Within the NWFP area, the listed range of the species may include some portions of the Mendocino and Shasta-Trinity National Forests and the BLM Redding Resource Area. This area has poor quality potential habitat (lack of narrow, incised channels and pools, dry chaparral/knobcone pine habitat, etc.). Few historical sightings for this species have been recorded in its limited potential range in the NWFP area. The Recovery Plan for the California red-legged frog was released on May 28, 2002. The Recovery Plan identified reasons for decline and threats to survival. It established Core Areas for recovery of the species, none of which are within the NWFP area.

Environmental Consequences

Under all alternatives, the Agencies would survey for listed species in the vicinity of proposed projects. These surveys are designed to have a high likelihood of locating populations of California red-legged frogs irrespective of whether surveys are also done

for Survey and Manage species. In addition, the species habitat will be provided a high level of protection through implementation of Aquatic Conservation Strategy objectives and the reserve land allocations. None of the areas identified for recovery of the species are within the NWFP area. Implementation of any alternative will have *no effect* on the California red-legged frog or its critical habitat.

Costs of Management

In the 2000 Survey and Manage Final SEIS (p. 417), the Agencies estimated that the Survey and Manage Program would cost approximately $28.6 million per year based on implementation of the Northwest Forest Plan. This total includes $9.8 million for Strategic Surveys and other regional-level tasks such as the maintenance of databases and the development of management recommendations. The total also includes $18.8 million for pre-disturbance surveys that would occur prior to activities such as timber sales ($8.2 million) and prescribed burning ($10.3 million). These estimates were based on predicted levels of timber sales, prescribed burning projects, and other habitat-disturbing activities.

Since 2000, the actual levels of habitat-disturbing activities have fallen short of that anticipated. As a result, the actual amount spent in Fiscal Year 2002 for the Survey and Manage Program was $16 million.

Comparison of Alternatives

These cost estimates used in the following discussion are for comparative purposes only. Actual implementation costs will vary. The costs are based on experience implementing the Northwest Forest Plan. The values in the following comparisons are stated in 2006 dollars. Previous cost estimates, primarily from 2003, are converted using the gross domestic product (GDP) implicit price deflator. The overall increase in costs is about five percent.

It is assumed for all alternatives that eligible species would be added to the Agencies' Special Status Species Programs. These programs cover entire states, so species would be added outside the NWFP area. The costs outside the NWFP area were not calculated; however, they would be the same under all alternatives.

As described in the *Key Assumption for Non-Species-Specific Effects Analyses for Alternative 4* section earlier in this chapter, an analysis assumption for Alternative 4 is that if this alternative is adopted, a revised species review process would begin, and changes previously adopted during the 2001, 2002, and 2003 Annual Species Reviews would most likely be reinstituted. As a result, Alternative 4 would end up looking very much like Alternative 1 within two years. Except for an estimated $0.5 million in the first two years to conduct the species review and related analysis and minor but inestimable one-to-two year implementation costs for the additional species (when compared with Alternative 1), costs for implementation of Alternative 4 are predicted to be the same as for Alternative 1.

Alternative 1 and 4

Alternative 1 and 4 would cost approximately $21.0 million per year to implement. This cost is less than predicted in 2000 because actual program management and Strategic Survey costs from Fiscal Year 2003 were used. These costs had a downward trend between 2001 and 2003. This estimated cost also reflects a savings accomplished by the removal of some species from Survey and Manage and elimination of requirements to conduct pre-disturbance surveys for some species through the Annual Species Reviews. The estimated cost is also lower because in spite of need, fuels treatment acres

are estimated to be lower, primarily because of other government funding priorities. There were increased costs in pre-disturbance surveys compared to the 2000 Survey and Manage Final SEIS because acres thinned through the timber program are no longer considered complete fuel reduction projects, which adds to the fuel treatment program. No estimate has been made for equivalent-effort surveys required if Strategic Surveys are not completed. If completing Strategic Surveys is delayed, costs could rise significantly, up to double the pre-disturbance survey costs. The total cost of Alternative 1 and 4 includes $6.1 million for pre-disturbance surveys for timber; $6.4 million for pre-disturbance surveys for fuel treatment; $0.3 million for pre-disturbance surveys for other activities; $0.8 million for additional fuel treatment cost; and $7.4 million for Strategic Surveys, program management, training, data management, and other costs. Totals are not exact due to rounding. Pre-disturbance surveys costs are estimated at $73.13 per acre, and total cost per fuels-treated acre is $98.94. Long-term (5-10 years) costs would decline by approximately 35 percent as Strategic Surveys are completed and recommendations are made for management of high-priority sites.

Alternative 2

Alternative 2 would cost approximately $7.9 million per year without mitigation and $8.3 per year with mitigation to implement. The total cost of Alternative 2 includes $2.7 million for pre-project surveys for timber; $2.8 million for pre-project surveys for fuel treatments; $0.1 million for pre-project surveys for other activities; $0.3 million for additional fuel treatment cost; and $2.0 million for general surveys, program management, conservation strategies, training, data management, and other costs. Pre-project surveys would cost approximately $31.81 per acre, and total cost per fuels-treated acre is $39.31. As with Alternatives 1 and 4, costs may decline over time as information is gained on the species in the Special Status Species Programs. It is estimated that 5 percent savings would accrue over time as knowledge is gained about species.

Alternative 2 differs from Alternative 1 in several key ways that affect cost.

- Reduced pre-project surveys
  - Twelve species that would have pre-disturbance surveys with Alternative 1 are assumed not to be included in the Agencies' Special Status Species Programs under Alternative 2. This includes one lichen, one bryophyte, one vascular plant, and nine mollusks. There would be little or no cost saving because these taxa groups would have other species included in the Agencies' Species Status Species Programs that would still receive surveys. The red tree vole is included in the Agencies' Special Status Species Programs under Alternative 2 in a small part of its range (the North Coast range of Oregon). Elsewhere, the red tree vole (and great gray owl in Oregon) would not be included in the Special Status Species Programs. This would result in cost savings since surveys would no longer be completed outside the area where it is included in the Special Status Species Programs. Unlike the other species noted above, the red tree vole and great gray owl receive their own surveys. Red tree vole surveys are particularly expensive if tree climbing is involved.
  - Many other species would only be surveyed in a portion of their range under Alternative 2. For example, a species may be added to the Special Status Species list for BLM managed lands in California, but not for nearby National Forest System lands.
  - For Sensitive Species that are currently in Survey and Manage Category A or C, pre-project clearances can include various tools besides surveys (see description of Alternative 2 in *Chapter 2*). Pre-project clearances will likely include surveys for non-fungal botanical species due to the lack of large-scale analysis tools for many of these species. In addition, many of the botanical taxa are relatively easy to survey for, so surveys are a useful and efficient tool for assessing potential project impacts. However, some of these species are more common, so there would likely be some

use of tools other than surveys for more common species. It is assumed surveys would be completed for non-fungal botanical species 85 percent of the time. Pre-project clearances for fungi would normally use other tools (than surveys) due to the infeasibility of surveys. Most of the fungi are unpredictable fruiters, and may not be discovered even after 5 years of survey effort. In addition, the time period in which surveys may be effective can be limited. Larger-scale analysis tools are a more efficient and effective means of assessing project impacts. It is assumed there would be no survey cost for fungi species, except for one fungus. This fungus can be identified during surveys and the cost of surveys for this species is included with other botanical surveys. For wildlife species, pre-project clearances will likely include tools other than surveys most of the time due to the complexity of survey methodology. Where the species has specific habitat parameters, habitat avoidance during project design is an effective way of eliminating survey need. Habitat avoidance will likely occur for many of the amphibians and some of the mollusks, where more refined definitions of habitat are known. Where a species has more general habitat characteristics, larger-scale tools, coupled with some surveys, may be used. In other cases, unsurveyed habitat may be assumed to be occupied by the species, and the impacts of the project upon that habitat assessed, by looking at overall impact to habitat. It is assumed surveys would be completed for wildlife species 25 percent of the time.

- For the Bureau Assessment category, pre-project clearances are completed subject to limitations in funding or positions. It is likely that methods other than field surveys would be used for these clearances due to funding and staffing limitations.

- Increased pre-project surveys
  - There are 87 species that would be added to the Special Status Species Programs under Alternative 2 that do not currently (Alternative 1) require pre-disturbance surveys (because they are in Categories B, D, E, or F). With Alternative 2, local land managers would decide what level of survey, if any, to apply to these species. It is assumed, for the purpose of cost analysis, that there would be little increase in pre-project surveys because methods other than direct surveys would usually be used to determine "clearance" (see *Key Assumptions for Pre-Project Surveys/Clearances and Known Site Management* earlier in this chapter).

- Reduced Strategic Surveys
  - With Alternative 2, there would be general surveys where needed to determine species distribution and to identify trends, but the cost of these general surveys would be far less than Strategic Surveys under Alternatives 1 and 4.
  - With Alternative 2, arthropod studies would be eliminated because these functional groups are not included in the Special Status Species Programs.

- Miscellaneous costs and overhead
  - It is assumed that other program management costs such as maintaining databases (similar to the GeoBOB and ISMS databases), updating survey protocols and field guides, developing conservation strategies, and overhead would occur with Alternative 2, but at a reduced level when compared to Alternatives 1 and 4. This reduction would be a result of elimination of the large overhead in place to administer the Survey and Manage Program, while existing overhead for the Special Status Species Programs would suffice with some additions to accommodate increased workload. Some costs might shift from regional to local levels. For example, at local units, environmental assessments and biological evaluations would require additional documentation to incorporate the species added to Special Status Species Programs.

Measures could be used to mitigate the adverse environmental impacts for species under Alternative 2. Mitigation of these effects under Alternative 2 could include management of known sites not protected by reserves or the Agencies' Special Status Species Programs. In addition, mitigation for some of these species could include pre-project clearances. The cost of possible mitigation under Alternative 2 for species would be $0.4 million.

Alternative 3

Alternative 3 would cost approximately $10.7 million per year without mitigation and $10.8 per year with mitigation to implement. The total cost of Alternative 3 includes $2.0 million for pre-disturbance surveys for timber; $1.9 million for pre-disturbance surveys for fuel treatments; $0.2 million for pre-disturbance surveys for other activities; $0.4 million for additional fuel treatment cost; $6.2 million for general surveys, program management, training, data management, and other costs. Pre-disturbance surveys would cost approximately $66.40 per acre, and total cost per treated acre is $29.95. Costs may decline over time as information is gained on the species in the Special Status Species Programs. It is estimated that 13 percent savings would accrue over time as knowledge is gained about species.

Alternative 3 differs from Alternative 1 in several key ways that affect cost.

- Reduced pre-disturbance surveys
  - Pre-disturbance surveys would not be conducted in non-late-successional and non-old-growth stands. For timber projects, this amounts to an estimated reduction of 50,000 acres of surveys per year (these are the acres involved in thinning projects). For fuel treatment projects, it is estimated that two-thirds of all projects would not need pre-disturbance surveys.
  - Seven Category C species would be eliminated from the Survey and Manage mitigation measure; six of these species would continue to receive some surveys under the Agencies' Special Status Species Programs. The primary cost savings would be from eliminating surveys for red tree voles except in the small portion of its range (North Coast range of Oregon) where it is included in the Agencies' Special Status Species Programs.

- Reduced Strategic Survey costs
  - The elimination of Categories C, D, and F species would result in a savings of $1.2 million per year compared to Alternative 1. Under Alternative 1, this amount would be spent on surveys and other studies to help define high-priority sites, rewrite Management Recommendations, and to answer questions about the species role in ecosystems.
  - As with Alternative 1, most Strategic Surveys would eventually be completed. In the long term, costs for Strategic Surveys under Alternative 3 would decline to approximately one-tenth the current level.

Measures could be used to mitigate the adverse environmental impacts for species under Alternative 3. Mitigation of these effects under Alternative 3 could include management of known sites not protected by reserves or the Agencies' Special Status Species Programs. In addition, mitigation for some of these species could include pre-project clearances.

The cost of possible mitigation under Alternative 3 is $0.1 million.

Table 3&4-13. Annual Cost (In millions of dollars[1])

Cost Element (includes overhead)	Alternatives 1 & 4[2]	Alternative 2	Alternative 3
Pre-disturbance surveys for Timber	6.1	2.7	2.0
Pre-disturbance surveys for Fuel Treatments	6.4	2.8	1.9
Pre-disturbance surveys for Other	0.3	0.1	0.2
Pre-disturbance surveys total	12.8	5.6	4.1
Additional Fuel Treatment Cost	0.8	0.3	0.4
Strategic Surveys/General Surveys/ Program Management/Training/ Data Management/Other Costs	7.4	2.0	6.2
Total Annual Cost (short term)	21.0	7.9	10.7
Total Annual Cost with Mitigation (short term)	-	8.3	10.8
Long-term Annual Cost (10 years)	18.4	7.4	9.0
Long-term Annual Cost with mitigation (10 years)	-	7.8	9.1

NOTE: Totals are not exact due to rounding.
[1]2003 Oregon Employment Department wage rates stated in 2006 dollars, an increase of 4.68 percent.
[2]Does not include first two-year cost of $0.5 million for Annual Species Review for Alternative 4.

Timber Harvest

Affected Environment

Each alternative would directly affect the level of timber available for harvest from lands administered by the Forest Service and BLM within the NWFP area. The purpose of this section is to display the effects of the alternatives on the Probable Sale Quantity (PSQ) at the Northwest Forest Plan scale (24.5 million acres) to provide a relative comparison between 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 National Forests and BLM Districts. Further, the alternatives in this SEIS do not authorize timber sales or other habitat-disturbing activities. The decision to harvest timber is made in site-specific, project-level decisions that implement land and resource management plans of administrative units.

Changes in PSQ from 1994 to Present

As noted in the 1994 Northwest Forest Plan Final SEIS, the PSQ is based only on those lands considered suitable for programmed, long-term, sustainable timber harvest. These lands are only in the Matrix and Adaptive Management Area land allocations. Riparian, Late-Successional, and other reserve allocations do not contribute to PSQ.

The Northwest Forest Plan Final SEIS estimated the PSQ at 958 million board feet (MMBF), plus an additional 10 percent volume estimated in “other wood” (cull, submerchantable, firewood, and other products) for a total of 1.1 billion board feet (USDA, USDI 1994a:3&4-266 and 268).

The 2000 Survey and Manage Final SEIS describes the changes in PSQ from 958 MMBF at the onset of the plan to the year 2000 level of 811 MMBF. In 2001, the Oregon Washington BLM State Director re-declared the Coos Bay and Eugene Districts PSQ (6 MMBF reduction) in response to the transfer of lands to the Coquille Tribe and additional protection for late-successional forest as required by the Northwest Forest Plan. The current combined PSQ for the BLM and Forest Service is 805 MMBF (current baseline

PSQ for the Northwest Forest Plan). Management of known sites for Survey and Manage species identified since the beginning of the Northwest Forest Plan has not been incorporated into the PSQ.

Relationship of PSQ and Late-Successional Forest

The PSQ for each administrative unit (National Forests and BLM Districts) is determined in their underlying Land and Resource Management Plans that were amended by, or adopted, the Northwest Forest Plan. The underlying plans identify "suitable" lands as lands upon which sustainable, regularly scheduled timber harvests can occur. There are nearly four million acres of suitable lands in the Matrix and Adaptive Management Areas. By policy, the PSQ level is currently no higher than the level that can be maintained in perpetuity.

Younger forest stands grow much faster than older stands, and the rotation age (the harvest age that maximizes average annual growth) in the Douglas-fir forest types is about 100 years for the average Northwest Forest Plan forest. If the suitable lands were occupied with a uniform distribution of age classes, all less than 100 years of age, a volume-driven harvest schedule would regenerate the 100-110 year age class each decade, while thinning some of the younger stands. The suitable lands are not, however, occupied by a uniform mix of age classes. While there are many stands on the suitable lands that are in the 60 to 100 year age class where regeneration harvesting would maximize volume production, most currently existing stands either are plantations created by regeneration harvesting that began 50-60 years ago and increased into the 1980s, or are remnant late-successional and old-growth stands. On most administrative units, the PSQ is heavily dependent on harvesting the late-successional forest for 3 to 5 decades until the younger stands begin to mature and become available for harvest. Because of this dependence, harvest schedules indicate about 90 percent (709 MMBF annually) of PSQ over the early decades of the Plan is dependent on harvest of late-successional forest. This is the difference between the Northwest Forest Plan-calculated PSQs for Alternative 1, which reserved all late-successional stands, and the selected Alternative 9, which left 1.1 million acres of late-successional forest in the non-reserved lands (Matrix and some of the AMAs) and thus available for harvest. The relationship between PSQ and late-successional forest was noted in the PSQ modeling 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 dependence on late-successional forest and old growth as the source of harvest volume ...*" (Johnson et al. 1993:22).

The percent of PSQ dependent upon late-successional forest decreases over succeeding decades, but this effect is negligible in the second (now current) decade because almost none of the existing plantations reached maturity in the first decade. There would be a slight increase in planned thinning for the second decade, but thinning generates less than ten to twenty percent of PSQ even in the later decades, and the effect would be much less for the existing, younger, plantations. Thus, the relationship between late-successional forest and PSQ has not significantly changed since 1994, and is still applicable to this analysis.

The harvest schedules used to calculate the PSQ on each administrative unit are based on stand inventories and growth models so that growth of existing and future stands is fully considered. At the start of the NWFP area, fourteen percent of the approximately 8 million acres of the then-existing late-successional forest, or 1.1 million acres, was within the Matrix and Adaptive Management Area land allocations. These 1.1 million acres of late-successional forest were the primary source for harvest in support of the PSQ. The

more than one-million acre increase in late-successional forest discussed in the *Late-Successional Forest Ecosystems* section does not affect the original PSQ calculations (except that harvests not made in the first decade are still available), because in-growth on non-reserved lands has been consistent with previous PSQ modeling predictions.

Since a majority of Survey and Manage species sites are assumed to be in late-successional forests, managing species sites within the Matrix and Adaptive Management Areas has the effect of reducing the amount of late-successional forest that is available for harvest. Because of the PSQ's reliance on older stands in the early decades of the Plan, this reduction in the amount of late-successional forest available for harvest has a direct and calculable effect on PSQ. Thus, reductions to the 1.1 million acres of late-successional forest available for harvest through management of known sites are assumed to have a direct, proportional effect to the 709 MMBF annual portion of the PSQ dependent on late-successional forests. For purposes of this analysis, the remaining 96 MMBF from early-successional forests is assumed to be unaffected by the management of known sites, and is held constant across all alternatives.

Although known sites affect harvest of early-successional forest for some species, the Agencies' known species site databases used for this analysis do not distinguish between early and late-successional forest at this time. Since Survey and Manage species are, by definition, closely associated with late-successional and old-growth forest, the calculated acreage effects are all assumed to occur on late-successional forest in this PSQ analysis.

The 2000 Final SEIS provided a detailed explanation on the shift in late-successional forest between the Reserves and Matrix/Adaptive Management Areas as a result of the reductions in the PSQ since the beginning of the Northwest Forest Plan. The assumptions for late-successional forest acreage available for harvest are the same as in the 2000 Final SEIS. The 6 MMBF reduction in PSQ since 2000 has not been incorporated into the assumptions for lands available for harvest because of the relatively minor nature of the change.

Differences in Data since the 2000 Final SEIS

For purposes of this analysis, the Agencies' species site data are assumed to reflect survey results up though calendar year 2001. Since the Agencies thought they had removed Survey and Manage early in 2004, sites identified since that time would not represent the trends expected under Survey and Manage.

In the 2000 Survey and Manage Final SEIS, Geographic Information System (GIS) data was not available for the red tree vole or great gray owl and estimations were made without GIS analysis. GIS data are now available for these two species and was used in this analysis.

Methodology Used in Analysis of PSQ

Estimating the effects to PSQ is dependent on determining the number of acres of late-successional forest that will ultimately be managed as known sites for Survey and Manage species. Projections are based on 4 years of experience conducting pre-disturbance surveys for most of the species requiring such surveys. Those 4 years of survey data, which has been entered into the Agencies' databases, is the basis for estimating the current acreage of known sites and species detection rates.

In the 2000 Final SEIS and this analysis, it is assumed that it will take 25 years to survey the original 1.1 million acres of late-successional forest in the Matrix and Adaptive Management Areas based on input from the field units. For most species, predicting the eventual number of sites that might affect PSQ involves projecting the current known sites detection rate ahead for 25 years. Since the alternatives provide for removing

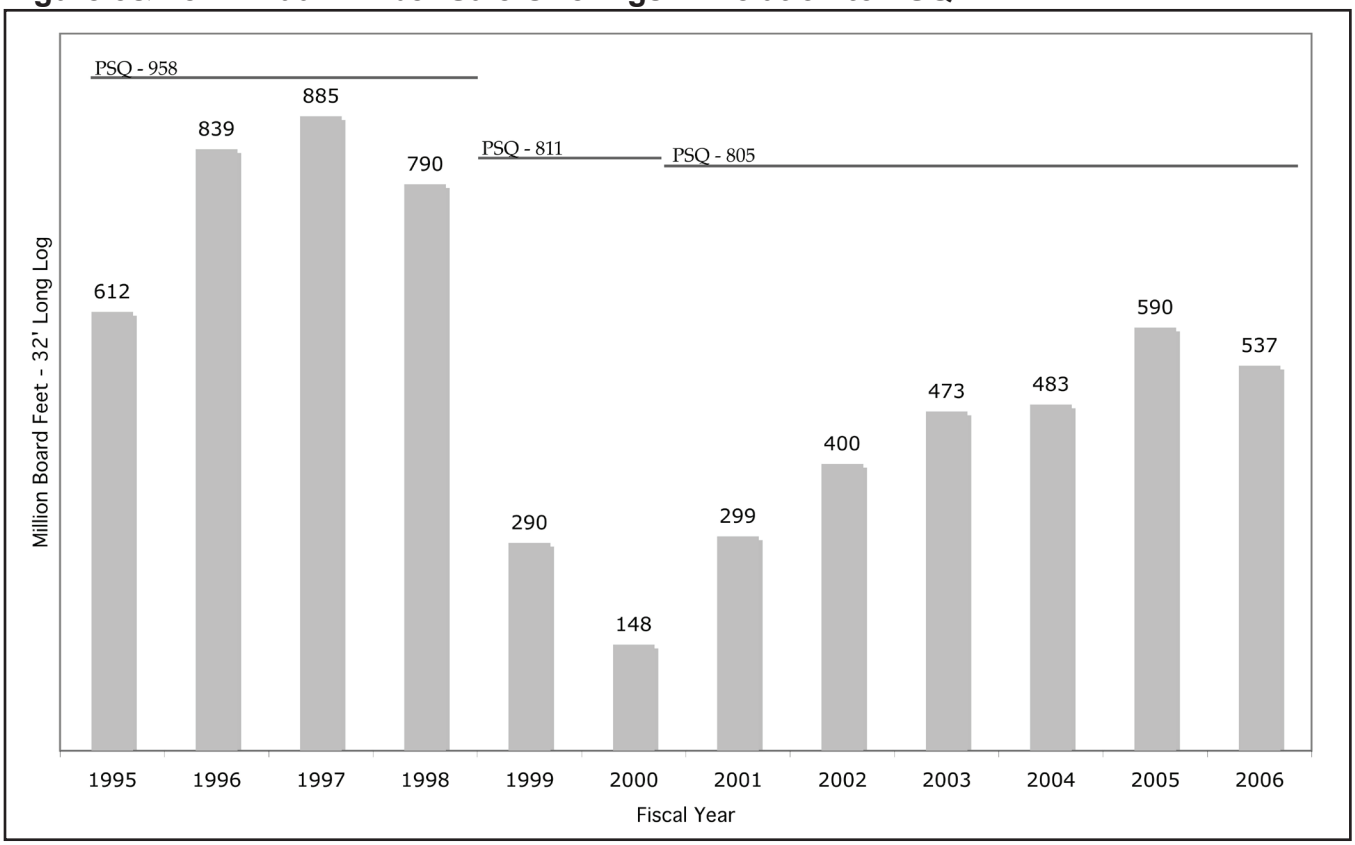
species from Survey and Manage and/or Special Status Species Programs, some of the more numerous species were projected for a shorter period of time. Although the alternatives provide for adding species to Survey and Manage and Special Status Species Programs no estimation of effects was attempted for adding new species. Potential increases in species sites because of increases in late-successional forest acres could increase the acreage of known sites beyond projections. However, for the more numerous species, this may simply mean they are removed from Survey and Manage sooner.

The average number of acres managed at each site varies by taxa group and by species within the taxa groups, according to habitat requirements described in Management Recommendations for each species or taxa group. The same average number of acres managed at each site, for particular species, was held as a constant for the alternatives. GIS was used to apply buffers to each of the species sites, which have been identified within the Matrix and Adaptive Management Areas, to calculate the total acreage of current known sites. Additional adjustments were made to account for acreage that would become inoperable for harvest, sites within Riparian Reserves, and additional sites expected to be found with Strategic Surveys (Alternatives 1, 3 and 4).

Timber Sale Offerings

The Agencies' annual timber sale offerings are shown in Figure 3&4-8. The Agencies' harvest targets were 60 and 80 percent of PSQ during the start-up years of 1995 and 1996, respectively. Shortfalls in sales offered since 1998 are related to the implementation of the Survey and Manage Standards and Guidelines and biological opinions related to certain harvests in watersheds with threatened or endangered anadromous fish (consultation issues associated with the Pacific Coast Federation of Fishermen's Associations et al. v. National Marine Fisheries Service lawsuits (commonly referred to as the PCFFA ruling)), protests/appeals on individual timber sales, and other factors. A portion of the increase after the Agencies thought they had removed Survey and Manage in 2004 can no doubt be attributed to that removal, but the proportion is unknown.

Figure 3&4-8. Annual Timber Sale Offerings in Relation to PSQ.



Since the beginning of the Northwest Forest Plan, the Agencies have offered timber sales at about 61 percent of the PSQ on average. Prior to the litigation on the Survey and Manage Standards and Guidelines and the PCFFA ruling (fiscal years 1995-1998), the Agencies had offered 82 percent of the PSQ. Considering the start-up period anticipated by the Northwest Forest Plan, the Agencies were close to meeting the timber sale objectives during that timeframe. Since 1999, the Agencies' offerings have been reduced to 50 percent of the PSQ.

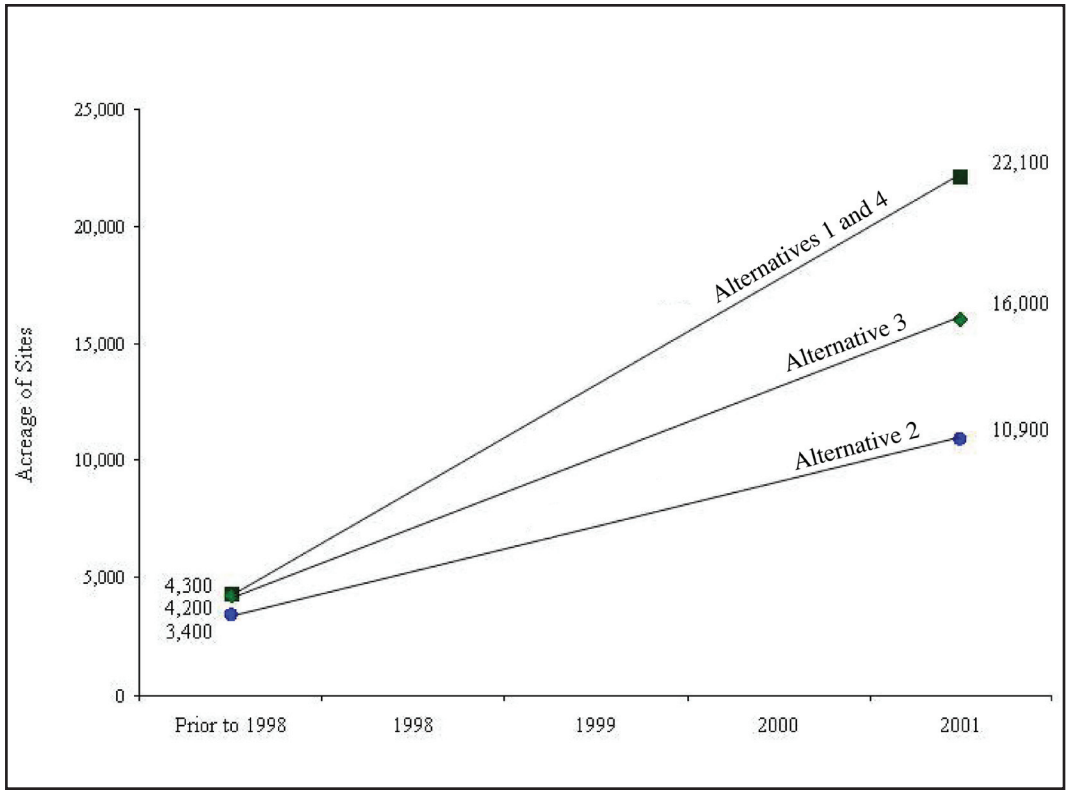
Environmental Consequences

The effect on PSQ is a direct result of the number of acres managed within the Matrix and Adaptive Management Areas for the species considered in the alternatives. These areas are not reserves; however, they are unavailable for harvest for several decades. Figure 3&4-9 reflects the estimated acreage associated with the species sites managed under each alternative, currently identified in the Agencies' databases as being within the Matrix and Adaptive Management Areas. The sites in databases prior to 1998 reflect the number of sites identified prior to the implementation of pre-disturbance surveys. The acreage of sites identified after 1998 reflect sites identified with pre-disturbance surveys being conducted. This illustrates the relative acreage of sites associated with the species under the alternatives, as well as the rates of detection used in the projections of effects.

Additional Constraints on Timber Sale Offerings and Estimating Effects on PSQ

The Agencies' databases and existing acreage of sites illustrated in Figure 3&4-9 do not convey the full constraints on the implementation of timber sales for the management of known sites within the Matrix and Adaptive Management Areas.

Figure 3&4-9. Acreage of Species Sites Identified Through 2001 Under The Alternatives.



Until 2004, the PCFFA ruling constrained timber sales in areas with Endangered Species Act-listed anadromous fish species to those that did not require formal consultation. As a result, there was additional emphasis on thinning of younger stands while some road construction, regeneration harvest, and density management silvicultural practices were deferred.

With the implementation of the Survey and Manage Standards and Guidelines, the PCFFA ruling, and protests and appeals, the Oregon BLM regeneration harvest timber sales sold during fiscal years 1999-2001 were reduced by 89 percent when compared to the fiscal year 1995-1998 timeframe. Regeneration harvest sales of stands 200 years and older was reduced by 88 percent during this timeframe. The 1995-1998 timber sales were 22 percent less than the harvest assumptions under the Northwest Forest Plan (BLM Annual Program Summaries).

The environmental consequences need to be based in the context of fully implementing the baseline PSQ (805 MMBF/year) identified in the Northwest Forest Plan. With the reduced levels of timber sale offerings (35 percent of PSQ during the four years preceding this analysis) and limits on regeneration harvest of older forest and more emphasis on thinning of younger forest, the Agencies' databases do not reflect the number of species/sites that would be identified under the full PSQ. Also, with more implementation experience since the 2000 Survey and Manage Final SEIS, two additional effects have been identified that are not reflected in the site data-based calculation of acres for existing sites or in the 2000 Survey and Manage Final SEIS timber harvest projections.

- Avoidance - When initial sale reconnaissance indicates the presence of numerous Survey and Manage species sites, sale areas are abandoned and no specific sites may be recorded. The Agencies have sought to offer timber sales (thinning, avoidance of older forest) where it is less likely Survey and Manage species will encumber the sale.

- Abandonment - Red tree vole surveys provide an example of the trade-offs managers face in use of staff time and dollars for preparing timber sales. Pre-disturbance surveys indicate nest structures within the sale area but only those nest structures associated with red tree vole activity require protection. Each site associated with activity commonly receives a 10-acre management area. When managers are faced with numerous nest structures in the sale area, they must weigh the additional staff work for reconfiguring the sale, and the cost of climbing the trees versus abandonment of the sale area. This situation extends beyond red tree vole when identified sites are so numerous that it results in an infeasible sale.

Sale areas that are avoided or abandoned are not fully reflected in Agencies' databases and the estimation of existing acreage of managed sites.

Projection of Acres of Managed Sites

The Agencies' databases were used to establish the number of acres associated with the management of Survey and Manage species within the Matrix and Adaptive Management Areas. The data for sites identified since 1998 is assumed to represent 4 years of surveys. It is assumed that it will take 25 years to survey the 1.1 million acres of late-successional forest within the Matrix and Adaptive Management Areas. Projecting sites into the future is based upon taking the existing sites, identified over 4 years, and expanding that to what would continue to be found over the next 21 years.

Additional factors were incorporated into the projection of effects to account for factors not reflected in the species site data:

- The four years of sale offerings preceding this analysis (35 percent of PSQ) do not reflect full implementation of PSQ.
- These sales placed an emphasis on thinning and partial cut harvest with less regeneration harvest.
- There was avoidance of harvest in older forest conditions.
- There was avoidance of areas where Survey and Manage species would likely encumber sales.
- The Survey and Manage mitigation measure resulted in abandonment of portions and/or entire sale areas.

The projected acreage was increased by 100 percent for Alternatives 1 and 4[18] to account for the factors listed above and to reflect the amount of sites what would be managed under full implementation of the PSQ under the Northwest Forest Plan. Given that there are fewer numbers of species under Alternatives 2 and 3, it is assumed that the degree of avoidance and abandonment would be less, so the projected acreage was increased by 50 percent for these alternatives.

Those species with more than 100 acres in known sites within the Matrix and Adaptive Management Areas had projection caps applied in the 2000 Final SEIS to simulate the adaptive management process. These same assumptions were applied to the projections for the alternatives in this SEIS.

The existing sites under Survey and Manage which are assumed to have been implemented with timber sales but under Alternatives 2 and 3 are now "released" continue to have an effect on the PSQ. Acreage of existing sites established in timber sales in which regenerations harvest has occurred are unavailable for harvest for several decades and has a long-term effect on PSQ. Those existing sites implemented in thinning or partial cut harvest are available for harvest with the next entry, which has less of a long-term effect. To account for this PSQ effect, 50 percent of acreage of the existing sites which are "released" from future site management under Alternatives 2 and 3 are assumed to reduce the 1.1 million acres of late-successional forest available for harvest.

A summary of 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 is shown on Figure 3&4-10.

As previously described, the percent of late-successional forest projected for management of known sites has a corresponding effect on the 1.1 million acres of late-successional forest in the Matrix and Adaptive Management Areas that supports the PSQ. For example, the projection of sites under Alternatives 1 and 4 identified 15 percent of the 1.1 million acres of existing late-successional forest would be managed for known sites. The 15 percent of the 709 MMBF of PSQ associated with late-successional forests equates to the projected PSQ reduction of 105 MMBF (rounded to nearest 5 MMBF). The projected PSQ reduction from the current 805 MMBF PSQ baseline for each alternative is shown in Figure 3&4-11. Note: these projections provide the relative magnitude effect on the PSQ for purposes of comparing alternatives. This analysis is not intended to have the precision necessary for re-declaring the PSQ for the National Forests and BLM Districts. The current 805 MMBF PSQ baseline does not include the added 10 percent volume for "other wood" that was used in the Northwest Forest Plan Final SEIS estimate of timber harvest.

[18]As described in the Key Assumption for Non-Species-Specific Effects Analyses for Alternative 4 section earlier in this chapter, an analysis assumption for Alternative 4 is that if this alternative is adopted, changes previously adopted by Annual Species Reviews would most likely be reinstituted within one to two years. As a result, Alternative 4 would end up looking very much like Alternative 1. PSQ effects (which are decadal) for Alternative 4 are predicted to be the same as for Alternative 1.

Comparison of Effects of the Alternatives

The primary factor affecting the PSQ between the alternatives is the number of species and resulting acreage of known sites affecting the 1.1 million acres of late-successional forest within the Matrix and Adaptive Management Areas.

The effect on PSQ of mitigating for adverse effects to species due to management under Alternatives 2 and 3 is included in Table 3&4-14 (mitigation for adverse effects for two species under Alternative 1 are negligible). For the 133 species that would have habitat (including known sites) insufficient to support stable populations in the NWFP area under all alternatives and the 20 species and 4 arthropod functional groups for which there is insufficient information to determine an outcome under all alternatives, there are less than 200 acres of known sites. The effect on PSQ is below the threshold of measuring any substantial effects; therefore, the effect is not shown in Table 3&4-14.

Alternatives 1 and 4

Under Alternatives 1 and 4, there would be a 105 MMBF reduction in PSQ due to management of known sites.

Of the species and arthropod functional groups included in the Survey and Manage mitigation measure, there are 14 species with projected acres of more than 1,000 each that account for approximately 41 percent of the projected acres and resulting effect on PSQ.

Figure 3&4-10. Projected Acres of Survey and Manage Sites Affecting PSQ. The projected acreage of known sites affecting the 1.1 million acres of late-successional forest within the Matrix and Adaptive Management Areas for each alternative

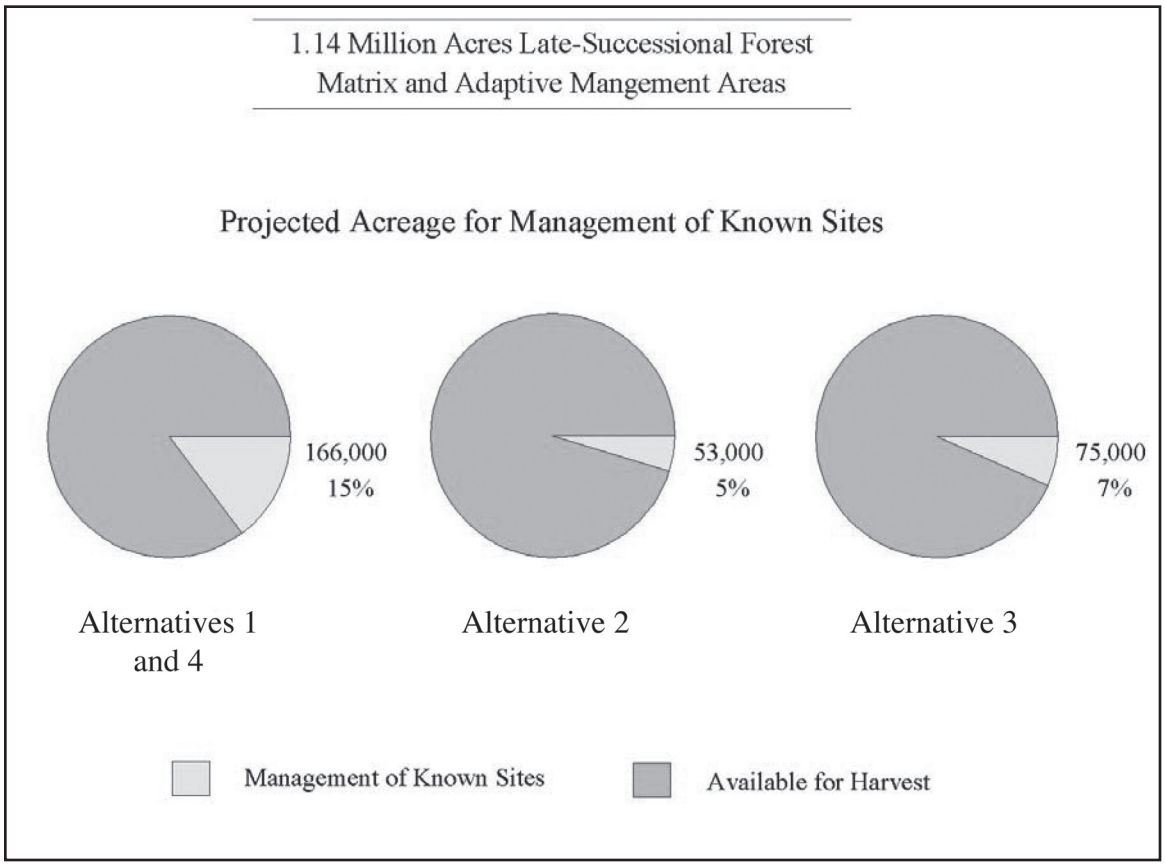
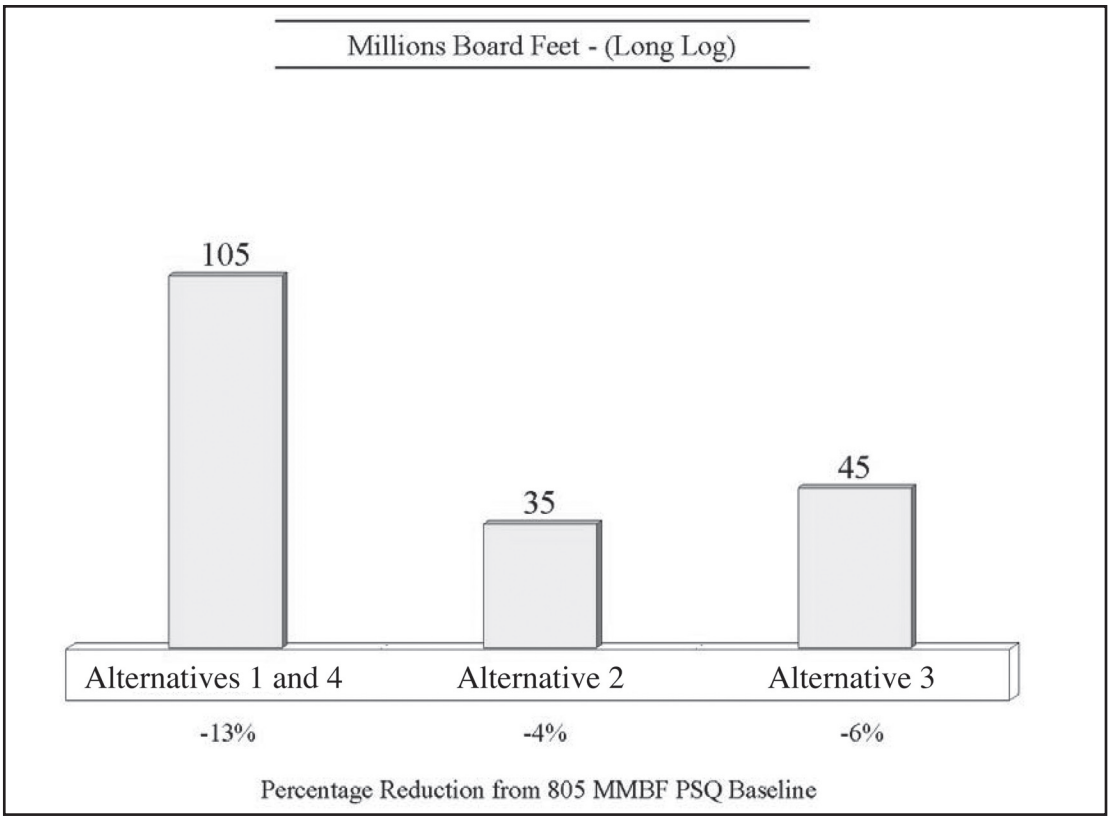


Table 3&4-14. Comparison of Timber Harvest Effects

	Alternatives 1&4[1]	Alternative 2	Alternative 3
Number of Species/Functional Groups Included[2]	299	145	285
Number of Species identified in Matrix/ Adaptive Management Areas through Pre-Disturbance Surveys Since 1998	138	68	125
Existing Acreage of Sites in the Matrix and Adaptive Management Areas[3]	22,100	10,900	16,000
Projected Acreage of Sites in the Matrix and Adaptive Management Areas + Existing	166,000	53,000	75,000
Projected Acreage of Sites as a percentage of the 1.1 million acres of late-successional forest in the Matrix and Adaptive Management Areas	15%	5%	7%
Projected PSQ Reduction in MMBF (rounded to nearest 5 MMBF)	105	35	45
Projected PSQ Percentage Reduction from 805 MMBF baseline (w/out mitigation)	13%	4%	6%
Reduction in MMBF for Mitigation	-	2	4
Projected PSQ Reduction with Mitigation in MMBF (rounded to nearest 5 MMBF)	-	35	50
Projected PSQ Percentage Reduction from 805 MMBF baseline (with mitigation)	13%	4%	6%

[1] Alternative 4 values are for after the Annual Species Review expected, for analysis purposes, to take place immediately if this alternative is adopted.
[2] Not counting 15 species in all alternatives removed from Survey and Manage by the 2001, 2002, and 2003 ASRs and assigned to SSSP before the 2004 timber harvest analysis.
[3] Existing at the time of the 2003 projection. Not updated because subsequent detection rate has been without Survey and Manage and thus does not apply.

Figure 3&4-11. Projected PSQ Reductions in Million Board Feet from the current 805 MMBF Baseline



Alternative 2

Under Alternative 2 without mitigation, there would be a 35 MMBF reduction in PSQ due to management of known sites. This is a 70 MMBF increase in PSQ compared to Alternatives 1 and 4.

Of the 145 species assumed to be included in the Special Status Species Programs (compared to Alternative 1), there are 8 species with projected acres of more than 1,000 each that account for approximately 30 percent of the total projected acres and resulting effect on PSQ[19].

Mitigation for the 53 species (see Table 2-13) that would have habitat insufficient to support stable populations in all or a portion of their range under Alternative 2, but would have habitat sufficient to support stable populations under Alternative 1, would require 2 MMBF for management of known sites.

Under Alternative 2 with mitigation, the total PSQ reduction is 35 MMBF (rounded to the nearest 5 MMBF). This is an increase of 70 MMBF compared to Alternative 1. Note: the addition of the mitigation fell within the rounding unit of 5 MMBF in which the PSQ effects are expressed.

Alternative 3

Under Alternative 3 without mitigation, there would be a 45 MMBF reduction in PSQ due to management of known sites. This would be a 60 MMBF increase in PSQ over Alternative 1.

Of the 287[19] species assumed to be included in Survey and Manage or the Agencies' Special Status Species Programs in this alternative, there are 8 species with more than 1,000 projected acres each that account for approximately 33 percent of the total projected acres and resulting effect on PSQ.

Mitigation for the 11 species that would have habitat insufficient to support stable populations in all or a portion of their range under Alternative 3, but would have habitat sufficient to support stable populations under Alternative 1, would require 4 MMBF for management of known sites.

Under Alternative 3 with mitigation, the total reduction in PSQ is 50 MMBF (rounded to the nearest 5 MMBF). This would be a 55 MMBF increase in PSQ over Alternative 1.

Northwest PSQ - Context and Cumulative Effects

The 1994 Northwest Forest Plan Final SEIS included a 6 MMBF reduction in the PSQ for the management of existing known sites under Survey and Manage. Since little was known about these species in 1994, the Agencies assumed that the effects on the PSQ would be minor since these species were thought to be relatively rare. Based on the analysis of effects in the 2000 Final SEIS and this SEIS, it has been demonstrated that the Survey and Manage mitigation measure within the Matrix and Adaptive Management Areas, under any of these alternatives, has affected PSQ to a greater extent than was anticipated in 1994.

The Northwest Forest Plan PSQ is the combined result of the harvest levels as stated in the individual National Forest and BLM District land and resource management plans. Harvest levels are established based on a set of forest management assumptions

[19]Twelve additional Alternative 4 species already on the Special Status Species Programs in Alternatives 1, 2 and 3 are not included in these calculations because effects are the same across all alternatives.

including the intensity of harvest, the acreage available for harvest, and the types of forest available. All of these harvest-level assumptions are based in the long-term context of decades of implementation and forest growth.

The projections of effects for alternatives to the current Survey and Manage Program can be quantified at the regional level to provide the relative effect on the PSQ in the long term. These effects are largely based on the reduction in land available for harvest as a result of managing species sites within Matrix and Adaptive Management Areas. The effects are based on full PSQ. If timber sale offerings are constrained by other factors, such as funding levels, the PSQ reductions described above would be proportionately reduced.

Scale and Precision

This analysis of PSQ 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 individual National Forests and BLM Districts 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 BLM Districts. Actual PSQ will be affected by the number of sites that are found and future adaptive management decisions. Modifications to National Forest and BLM District level PSQ need to be based on the accumulation of specific, unit-level effects during individual land and resource management plan amendments or revisions. At the NWFP area-wide scale, the PSQ effects calculated here are reasonable estimates of both the magnitude of effects and of the differences between the alternatives.

Additional information about methodology and assumptions in this analysis is included in the administrative record and is available upon request.

Short-Term Effects to the Timber Sale Program

As described above and earlier in this chapter, PSQ effects (which are decadal) for Alternative 4 are expected, after conduct of an Annual Species Review, to be approximately the same are for Alternative 1. In the short term, for the one to two years potentially required to conduct any planning steps that may be identified by the above-referenced reconsideration, Alternative 4 would have additional adverse effects on timber harvest and other potentially habitat-disturbing management activities including fuels management when compared to Alternative 1. Achievement of fiscal year 2007 and 2008 timber sale targets would be reduced 80 to 100 million board feet per year (about 16 percent of the 530-600 million board feet target) under Alternative 4 when compared to the effects under Alternative 1. If the analysis assumption described above proves to be incorrect, effects to timber harvest could occur for a longer period of time.

Socioeconomic Effects

Affected Environment

The Northwest Forest Plan Final SEIS addressed socioeconomic effects. The 2000 Survey and Manage Final SEIS examined alternative ways to change only one aspect, the Survey and Manage Standards and Guidelines of the Northwest Forest Plan. This SEIS also examines an alternative way to change only one aspect of the Northwest Forest Plan. Since it supplements the previous analyses, this SEIS does not repeat the analysis and conclusions in those documents that are unaffected by the proposals in this SEIS. The

following analysis presents effects that would be different than those identified in the 2000 Final SEIS. In many cases, effects are the same type previously identified, but vary in scope or extent as a result of alternatives analyzed in this SEIS. In these instances, the same assumptions used in the 2000 Final SEIS are used in this SEIS.

Environmental Consequences

As described in the *Key Assumption for Non-Species-Specific Effects Analyses for Alternative 4* section earlier in this chapter, an analysis assumption for Alternative 4 is that if this alternative is adopted, a revised species review process would begin, and changes previously adopted during the 2001, 2002, and 2003 Annual Species Reviews would most likely be reinstituted. As a result, Alternative 4 would end up looking very much like Alternative 1 within two years, and effects resulting from the implementation of Alternative 4 are predicted to be the same as for Alternative 1. Short term (one to two year) reductions of the timber sale program of about 16 percent, and lesser reductions in fuels treatments and other habitat-disturbing activities would create additional short-term socioeconomic effects when compared to Alternative 1.

Mineral Resources, Recreation Resources, and Special Forest Products

Impacts on these programs are correlated to the species requiring pre-disturbance surveys and projected known site management (USDA, USDI 2000a:420-422). The potential conflicts with these programs would be less under Alternative 2 compared to Alternatives 1, 3 and 4 because 157 species would be managed under the Special Status Species Programs under Alternative 2 compared to 299, 275 and 341 species/groups managed under Alternatives 1, 3 and 4, respectively. Pre-disturbance surveys would not be required for red tree voles under Alternatives 2 and 3 except in a small portion of its range. Under Alternative 1 and 4, the projected acreage of known sites is 166,000. Under Alternative 2, the projected acreage of known sites is 53,000. Under Alternative 3, the projected acreage of known sites is 75,000.

Range/Grazing Resources

As discussed in the 2000 Final SEIS (USDA, USDI 2000a:421), impacts to grazing are not discernibly different among the alternatives. Pre-disturbance surveys, management of known sites, and Strategic Surveys are not anticipated to change the conclusions of the Northwest Forest Plan Final SEIS regarding impacts to grazing. That document concluded, "... 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:3&4-276).

Commercial and Subsistence Fisheries Resources

None of the alternatives are anticipated to directly impact commercial or subsistence fisheries (USDA, USDI 2000a).

Lumber and Wood Products Employment

Actual timber harvest, a primary driver of economic, community, and social effects, has lagged behind levels projected in the Northwest Forest Plan Final SEIS for a variety of reasons as stated in the 2000 Final SEIS (USDA, USDI 2000a:422). The Northwest Forest Plan Final SEIS 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 NWFP area. An estimated 9.08 jobs are generated within the region per million board feet harvested and processed.

The current (2000 annual average) employment in the lumber and wood products industry is approximately 56,900 people in Oregon, 48,927 people in Washington, and 10,120 people in northern California counties. The employment figures for Oregon and Washington include the paper industry (Stevenson 2002, pers. comm.; State of California, Employment Development Department 2002; and Washington State Employment Security Department 2000).

Lumber and Wood Products employment changes have been close to the impacts projected in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a). Actual employment declines between 1990, the baseline used by the Northwest Forest Plan Final SEIS, and the 2000 Survey and Manage Final SEIS have been about 8,460 jobs in Washington, 16,300 jobs in Oregon, and 3,780 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.

All alternatives have an adverse effect on PSQ that was not anticipated in the Northwest Forest Plan Final SEIS (see Survey and Manage Final SEIS 2000:429). A comparison of annual employment and personal earnings associated with the alternatives is shown in Table 3&4-15. The full harvest level under the Northwest Forest Plan is currently 805 MMBF, which would support 7,309 jobs.

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) and overhead. Labor costs were assumed to represent 46.8 percent of total costs. This represents 60 percent costs after deduction of overhead. The potential mitigation of Alternative 3 would not materially add to the costs of that alternative.

The methodology and assumptions used in the Survey and Manage Final SEIS (USDA, USDI 2000a:424) are used for this analysis.

As in the 2000 Final SEIS the same three titles: (1) Biological, Agricultural, and Food Technicians; (2) Forest and Conservation Workers; and, (3) Surveying and Mapping Technicians are used. The weighted average median wage for these occupations was $11.42 per hour (Oregon Employment Department 2002 converted to 2006 dollars). For comparison, the weighted average median wage for the 22 major occupational titles in the Lumber and Wood Products industry was $16.34 per hour (Oregon Employment Department 2002 and Stevenson 2000, pers. comm., converted to 2006 dollars).

The Northwest Forest Plan Final SEIS did not specifically anticipate employment associated with species surveys. Table 3&4-15 displays estimated annual survey-related employment and personal earnings by alternative.

The effect of mitigating for adverse effects to species due to management actions under Alternatives 2 and 3 is based on the effect on PSQ from the *Timber Harvest* section and the increased costs shown in Table 3&4-13 from the *Cost of Management* section.

Table 3&4-15. Comparison of Annual Employment and Personal Earnings[3]

Alternatives 1 and 4:	
953 Lumber/Wood-related jobs lost @ $16.34/hr[2]	-$32.393.252
360 Survey-related jobs gained @ $11.42/hr	$8.554,272
Net loss in personal earnings	-$23,838,980
Alternative 2:	
318 Lumber/Wood-related jobs lost @ $16.34/hr[2]	-$10,809,081
142 Survey-related jobs gained @ $11.42/hr	$3,380,577
Net loss in personal earnings	-$7,428,504
Alternative 2 Mitigated:	
336 Lumber/Wood-related jobs lost @ $16.34/hr[2]	-$11,420,916
149 Survey-related jobs gained @ $11.42/hr	$3,537,085
Net loss in personal earnings	-$7,883,831
Alternative 3:	
409 Lumber/Wood-related jobs lost @ $16.34/hr[2]	-$13,902,245
172 Survey-related jobs gained @ $11.42/hr	$4,087,496
Net loss in personal earnings	-$9,814,749
Alternative 3 Mitigated:	
445 Lumber/Wood-related jobs lost @ $16.34/hr[2]	-$15,125,915
173 Survey-related jobs gained @ $11.42/hr	$4,119,430
Net loss in personal earnings	-$11,006,485

[1] Some jobs may be seasonal in nature, data has been annualized, and figures are based on a 2,080-hour work year.
[2] Loss in jobs and earnings are in comparison to full Northwest Forest Plan harvest level (805 MMBF).
[3] 2003 Oregon Employment Department wage rates stated in 2006 dollars, an increase of 4.68 percent.

Government Revenues

As stated in the 2000 Final SEIS, the analysis of impacts to government revenues in the Northwest Forest Plan Final SEIS did not include legislation that has provided a "special payment amount," also known as safety net payments. Legislation, passed October 30, 2000, provided for annual payments based on the average of the highest 3 years of payments between 1986 and 1999. It applied to the BLM "50-percent payments" and to the Forest Service "25-percent payments" through fiscal year 2006, and allowed for annual increases based on the Consumer Price Index.

To the extent that the alternatives reduce federal timber harvest below levels anticipated in the Northwest Forest Plan Final SEIS, federal revenue sharing would also be reduced beginning in 2006. Reductions would be greatest under Alternative 1 and 4, followed by Alternative 3 and Alternative 2 (see *Timber Harvest* section). Effects of reduced payments to the counties would be the same type as those identified in the Northwest Forest Plan Final SEIS, but to a greater extent (USDA, USDI 2000a:426).

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 Final SEIS (USDA, USDI 2000a:426).

People Coping with Change

Four factors of social and cultural disruption were noted in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a:3&4-307). Alternatives 1, 3, and 4 include the Survey and Manage mitigation measure and would influence the first three of the following four factors.

- 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,
- the perception that the federal government has reneged on its commitment to maintain non-declining, even flow of timber from federal forests,
- a social structure that is less likely to adapt to a permanent loss of employment, and
- the potential for conflict among different people in which the timber industry and workers, as well as other interested groups, are negatively stereotyped and stigmatized.

No change is anticipated in the level of controversy associated with public land management generally, and late-successional or old-growth forests specifically, because this SEIS also addresses only one of many issues associated with federal land management (USDA, USDI 2000a:426).

As stated in the Northwest Forest Plan Final SEIS "these factors can impose a significant emotional impact, and all can undermine individual and community efforts to successfully adapt to changes" (USDA, USDI 1994a:3&4-307).

Environmental Justice

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."

Thirty-three of the 51 counties covered by the Northwest Forest Plan have poverty rates above the rate for the state in which they are located. Nine 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. Nine of the 51 counties under the Northwest Forest Plan have Asian populations above the rate for the state in which they are located. Thirty-four of the 51 counties under the Northwest Forest Plan have Pacific Islander populations above the rate for the state in which they are located. Five 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. 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 (USDA Economic Research Institute 2002, Bureau of Census 2000). There are 25 federally recognized tribes in California and 36 in Oregon and Washington (USDA, USDI 1994a:3&4-314).

Under all alternatives, Native American subsistence uses (such as bark and root collecting) may be suspended or restricted until surveys can be completed for activities that are deemed habitat disturbing by the Agencies.

Suspending or restricting subsistence uses may affect treaty-reserved rights and the Agencies' ability to execute its trust responsibilities. The protection of tribal treaty rights and trust resources is addressed starting on page 54 of the Northwest Forest Plan ROD. Through the scoping and public involvement process on this SEIS there has been no specific identification of Survey and Manage species that are a particular concern of or used by Tribes.

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 habitat disturbing by the Agencies.

The potential impacts to environmental justice described above would be less under Alternative 2 because there would be 157 species requiring surveys and/or management of sites, compared to 341 species/groups under Alternative 4, 311 species/groups under Alternative 1, and 298 species under Alternative 3.

Species Values

As stated in the 2000 Final SEIS, the Survey and Manage species examined in this SEIS have no known consumptive use value to people. They are essentially not collected for food, shelter, or decoration. However, they have a variety of non-consumptive use values, which include ongoing and new scientific research, recreational observation, and photography (USDA, USDI 2000a:428).

Critical Elements of the Human Environment

Air Quality is addressed in the *Air Quality* section.

American Indian Religious Concerns: Projects that would occur as a result of this proposed action would receive site-specific analysis and clearances to ensure they would not restrict access to or ceremonial use of sacred sites by American Indian religious practitioners or adversely affect the physical integrity of such sacred sites per Executive Order 13007.

Areas of Critical Environmental Concern and Research Natural Areas: These areas are managed for the maintenance, protection, or restoration of important resource values or for the purpose of scientific study, research, and education. Projects that would occur as a result of this proposed action would receive site-specific analysis to ensure management activities were compatible with objectives for these areas as identified in land and resource management plans.

Cultural Resources: Projects that would occur as a result of this proposed action would receive site-specific analysis and clearances to ensure cultural resources were not adversely affected.

Energy: Executive Order 13212 requires an analysis of direct or indirect adverse affects on energy development, production, supply, and/or distribution. New energy development projects such as pipelines and power corridors that are proposed in the NWFP area could be directly affected by the proposed action. For some Survey and Manage or Special Status species, surveys would be needed and/or known sites would be managed. This could delay a project or cause rerouting. It is also possible, although unlikely, that a project could be abandoned. There are fewer species included in the Special Status Species Programs or Survey and Manage Program under Alternatives 2 and 3 when compared to Alternative 1 and 4. The adverse effects on energy development projects would be less under the action alternatives than under the no-action alternatives.

Environmental Justice is addressed in the Environmental Justice Section.

Prime Farmlands or Unique Land Characteristics: Prime farmlands and other unique federal land characteristics are required to be identified and restored as part of the Surface Mining and Reclamation Act of 1977. No federally managed land under the Northwest Forest Plan is currently designated as Prime Farmland. If any such lands were to be designated in the future, surface mining projects within the area of the Northwest Forest Plan would utilize the appropriate standards and guidelines from land and resource management plans to meet the requirements of this Act.

Floodplains: Executive Order 11988, as amended, requires agencies to determine if a proposed action will occur in a floodplain and if the action will significantly affect the quality of the human environment. The objective of the law is to avoid adverse impacts associated with occupancy and modification of floodplains and to avoid floodplain development.

Projects resulting from the proposed action could occur in floodplains. These projects are not expected to adversely affect the quality of the human environment since they must adhere to the Aquatic Conservation Strategy. Projects should generally improve floodplains since they are targeted to maintaining functioning riparian areas or restoring degraded riparian areas. A thorough discussion can be found in the *Aquatic Ecosystem* section.

Noxious Weeds and Invasive Nonnative Species: Projects would follow individual land and resource management plan provisions for preventing the introduction or spread of noxious and invasive nonnative species. It is possible that unintentional spread of noxious or invasive non-native species could occur with any project. The projected harvest of late-successional forest under Alternatives 1 and 4 would be 974,000 acres. The projected harvest of late-successional forest under Alternatives 2 and 3 would be 1,087,000 and 1,065,000 acres, respectively. Adverse impacts would be less under the No-Action Alternatives than either of the action alternatives. However, under all four alternatives, the total acreage harvested would still be less than that projected in the Northwest Forest Plan Final SEIS.

Threatened, Endangered, and Agency Sensitive Species are addressed in the Threatened and Endangered Species Section and in the Biological Evaluation (Appendix 5).

Solid or Hazardous Waste: The Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 are laws that regulate hazardous waste that endangers public health or the environment. No adverse affects relating to solid or hazardous waste are expected. Projects resulting from the proposed action will follow land and resource management plan provisions for identifying, investigating, or removing hazardous waste.

Water Quality (Ground and Surface): The *Water Quality* section addresses water quality and conformance with state water quality standards.

Wetlands and Riparian Zones: Executive Order 11990 requires federal agencies to avoid destruction or modifications of wetlands and to avoid undertaking or providing assistance for new construction located in wetlands. Projects resulting from the proposed action are not expected to destroy or modify wetlands or undertake/assist new construction located in wetlands. If projects near a wetland or in a riparian zone do occur, they would be completed in accordance with Aquatic Conservation Strategy objectives as well as follow individual land and resource management plan provisions for protecting wetlands and riparian zones. Projects should generally improve wetlands and riparian zones since they are targeted to maintaining functioning riparian areas or restoring degraded riparian areas. A thorough discussion can be found in the *Aquatic Ecosystem* section.

Wild and Scenic Rivers and Wilderness: Management of Wild and Scenic Rivers and Wilderness is guided by specific management plans or standards and guidelines. These are developed at the local level to maintain the wild character of these areas. The proposed action will not alter these specific plans or standards and guidelines. There are no expected adverse impacts to Wild and Scenic Rivers or Wilderness as a result of the proposed action.

Other Environmental Consequences

It is important to bear in mind the context of this SEIS when considering the overall environmental impacts of this proposal. This SEIS supplements previous impact statements, which includes 28 Final Environmental Impact Statements for Forest Service and BLM land and resource management plans. These plans were amended by the Northwest Forest Plan Final SEIS (USDA, USDI 1994a). The Northwest Forest Plan Final SEIS addressed issues and environmental impacts dealing with a wide range of multiple uses on federally managed lands and led to sweeping decisions regarding timber management and resource conservation. The 2000 Final SEIS was narrowly focused on issues concerning implementation of the Survey and Manage Standards and Guidelines. This SEIS is also narrowly focused on the Survey and Manage Standards and Guidelines. The 2000 Final SEIS and this SEIS only address changes to the Survey and Manage Standards and Guidelines and do not change the fundamental decisions or substantially change environmental impacts disclosed in the previous environmental impact statements.

The Council on Environmental Quality (CEQ) regulations require that the discussion of environmental consequences 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).

Adverse Environmental Effects Which Cannot Be Avoided

An agency does not have to avoid adverse effects, but must identify and disclose any adverse environmental, social, and economic effects in the impact statement. This SEIS incorporates by reference the Northwest Forest Plan SEIS and the 2000 Survey and Manage Final SEIS. Both of those Final SEISs included extensive discussions of effects, both beneficial and adverse. This SEIS supplements those Final SEISs and need not restate impacts disclosed in the previous impact statements. This SEIS addresses only those adverse effects caused by the alternatives herein. Adverse effects that cannot be avoided include habitat (including known sites) insufficient to support stable populations in the NWFP area for 133 species in all or part of their NWFP area range under all alternatives. These effects are not caused by the proposed action; no mitigation could be proposed that could change this outcome.

Relationship Between Short-term Uses of the Human Environment and Maintenance of Long-term Productivity

The Agencies' land and resource management plans, as amended by the Northwest Forest Plan, committed National Forest System and BLM administered lands to multiple use, including commercial timber commodity production. The environmental analyses supporting those plans determined that the loss in long-term productivity of forest soils and other components necessary for a healthy forest environment would be minimal. All alternatives explored in this SEIS are projected to impact fewer acres than analyzed for the land and resource management plans and, as such, will have less impact on productivity than previously disclosed.

Irreversible or Irretrievable Impacts

Irreversible refers to a loss of non-renewable resources, such as mineral extraction and heritage (cultural) resources, or to those factors, which are renewable over long time

spans such as soil productivity. Irretrievable commitment applies to losses that are temporary, such as loss of forage production in an area being used as a ski run or use of renewable natural resources.

Old-growth forests would be harvested in the Matrix and Adaptive Management Areas under all alternatives. The Northwest Forest Plan considered the loss of old-growth to be irretrievable (USDA, USDI 1994a:3&4-321). The projected harvest of late-successional forest under Alternatives 1 and 4 would be 974,000 acres. The projected harvest of late-successional forest under Alternatives 2 and 3 would be 1,087,000 and 1,065,000 acres, respectively. However, the total acreage harvested would still be less than that projected in the Northwest Forest Plan Final SEIS.

Elimination of habitat for species could be an irreversible or irretrievable impact depending on circumstances. In some cases, species may re-colonize an area following disturbance.

Conflicts with Other Plans

The CEQ regulations (40 CFR 1502.16) require 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 area concerned." This SEIS incorporates by reference the discussion in the Northwest Forest Plan Final SEIS concerning conflicts with other plans (USDA, USDI 1994a:3&4-319 and 320, and Appendix D). Removing the Survey and Manage Standards and Guidelines as proposed in Alternative 2 would not alter the conclusion of the Northwest Forest Plan Final SEIS regarding the possible conflicts with other plans. Modifying the Survey and Manage Standards and Guidelines as proposed in Alternative 3 also would not alter the conclusion of the Northwest Forest Plan Final SEIS regarding 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, none of the alternative in this SEIS apply to tribal and Indian-owned lands, with one exception. The Coquille Indian Tribe currently manages approximately 5,400 acres of forest lands (Coquille Forest) under the same standards and guidelines as the adjacent federal land management agency (Coos Bay District BLM). This places them in a unique position as the only tribe in the NWFP area that must comply with the Northwest Forest Plan Standards and Guidelines, including Survey and Manage.

In recent years, western states have raised concerns about the occurrence of catastrophic wildfires. This sentiment led to formation of the National Fire Plan, a national multi-agency policy designed to prevent catastrophic wildfires through broad-scale fuel treatment and improved suppression efforts. The National Fire Plan proposes aggressive hazardous fuel abatement activities around communities and at-risk landscapes. The 2002 fire season was particularly problematic for the NWFP area. Complex management recommendations in the Survey and Manage Standards and Guidelines have impeded the Agencies' ability to meet National Fire Plan objectives. Conflicts between these policies and the Survey and Manage Standards and Guidelines led, in part, to the proposed action.

Alternatives 2 and 3 result in more acres available for hazardous fuel treatments at a lower cost than under Alternatives 1 and 4. Under Alternative 1 and 4, fuel treatment is precluded by species protection on about 7,000 acres per year. Under Alternative 2, about 1,600 acres would be precluded from treatment. Under Alternative 3, about 2,500 acres would be precluded from treatment. Costs are similarly affected. Fuel treatment cost under Alternative 1 is approximately $99 per treated acre. Cost under Alternative 2 would be approximately $39 per treated acre. Cost under Alternative 3 would be approximately $30 per treated acre.

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Acanthophysium farlowii	0				
Albatrellus avellaneus	0				
Albatrellus caeruleoporus	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Albatrellus ellisii	0				
Albatrellus flettii	2	0.25	0.18	220,800	0 - 532,200
Oregon/Washington survey region	2	0.46	0.33	220,800	0 - 532,200
Alpova alexsmithii (Hypogeous)	0				
Alpova olivaceotinctus (Hypogeous)	1	0.11	0.11	965,900	0 - 2,897,700
California survey region	1	0.39	0.39	965,900	0 - 2,897,700
Arcangeliella camphorata (Hypogeous)	2	0.36	0.27	3,144,800	0 - 7,785,400
Oregon/Washington survey region	2	0.66	0.48	3,144,800	0 - 7,785,400
Arcangeliella crassa (Hypogeous)	1	0.13	0.13	1,103,900	0 - 3,311,700
Oregon/Washington survey region	1	0.23	0.23	1,103,900	0 - 3,311,700
Arcangeliella lactarioides (Hypogeous)	1	0.23	0.23	2,040,900	0 - 6,122,700
Oregon/Washington survey region	1	0.43	0.43	2,040,900	0 - 6,122,700
Asterophora lycoperdoides	1	0.37	0.37	319,500	0 - 958,500
Oregon/Washington survey region	1	0.67	0.67	319,500	0 - 958,500
Asterophora parasitica	0				
Baeospora myriadophylla	0				
Balsamia nigrens (Hypogeous)	0				
Boletus haematinus	0				
Boletus pulcherrimus	0				
Bondarzewia mesenterica	0				
Bridgeoporus nobilissimus	0				
Cantharellus subalbidus	33	3.01	0.57	2,627,700	1,636,100 - 3,619,300
California survey region	4	1.79	0.91	445,500	0 - 899,900
Gifford Pinchot survey region	6	6.29	3.08	319,000	6,400 - 631,600
Oregon Coast Range survey region	16	31.99	7.41	1,209,800	649,200 - 1,770,400
Oregon/Washington survey region	2	0.69	0.52	331,000	0 - 824,400
Umpqua Basin survey region	5	5.64	3.04	322,400	0 - 670,600
Catathelasma ventricosa	0				
Chalciporus piperatus	0				
Chamonixia caespitosa (Hypogeous)	3	0.38	0.22	3,311,700	0 - 7,114,100
Oregon/Washington survey region	3	0.69	0.40	3,311,700	0 - 7,114,100
Choiromyces alveolatus (Hypogeous)	1	0.25	0.25	2,206,500	0 - 6,619,500
Oregon/Washington survey region	1	0.46	0.46	2,206,500	0 - 6,619,500
Choiromyces venosus (Hypogeous)	0				
Chromosera cyanophylla	7	0.78	0.30	676,800	148,800 - 1,204,800
California survey region	1	0.39	0.39	96,600	0 - 289,800
Gifford Pinchot survey region	1	0.56	0.56	28,300	0 - 84,900
Oregon/Washington survey region	5	1.15	0.51	551,900	63,900 - 1,039,900
Chroogomphus loculatus (Hypogeous)	0				

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Chrysomphalina grossula	2	0.14	0.11	119,700	0 - 311,100
Gifford Pinchot survey region	2	2.36	1.89	119,700	0 - 311,100
Clavariadelphus ligula	4	0.72	0.42	631,700	0 - 1,365,700
Gifford Pinchot survey region	1	1.80	1.80	91,500	0 - 274,500
Oregon/Washington survey region	3	1.13	0.74	540,300	0 - 1,251,100
Clavariadelphus occidentalis	9	1.57	0.59	1,370,400	340,000 - 2,400,800
California survey region	1	0.63	0.63	155,800	0 - 467,400
Oregon/Washington survey region	7	2.48	1.02	1,185,800	205,400 - 2,166,200
Umpqua Basin survey region	1	0.50	0.50	28,800	0 - 86,400
Clavariadelphus sachalinensis	0				
Clavariadelphus subfastigiatus	0				
Clavariadelphus truncatus	2	0.07	0.05	57,700	0 - 138,100
Umpqua Basin survey region	2	1.01	0.70	57,700	0 - 138,100
Clavulina castanopes v. *lignicola*	13	1.01	0.36	879,600	258,200 - 1,501,000
Gifford Pinchot survey region	2	1.12	0.78	56,500	0 - 135,500
Oregon Coast Range survey region	6	4.69	1.95	177,400	30,200 - 324,600
Oregon/Washington survey region	5	1.35	0.63	645,600	47,000 - 1,244,200
Clitocybe senilis	3	0.69	0.46	606,500	0 - 1,404,100
California survey region	3	2.44	1.60	606,500	0 - 1,404,100
Clitocybe subditopoda	3	0.63	0.37	551,800	0 - 1,196,000
California survey region	1	0.63	0.63	155,800	0 - 467,400
Gifford Pinchot survey region	1	3.46	3.46	175,400	0 - 526,200
Oregon/Washington survey region	1	0.46	0.46	220,700	0 - 662,100
Collybia bakerensis	3	0.38	0.22	331,200	0 - 711,400
Oregon/Washington survey region	3	0.69	0.40	331,200	0 - 711,400
Collybia racemosa	4	0.54	0.32	469,800	0 - 1,028,800
California survey region	1	0.63	0.63	155,800	0 - 467,400
Oregon Coast Range survey region	2	2.47	1.90	93,400	0 - 237,200
Oregon/Washington survey region	1	0.46	0.46	220,700	0 - 662,100
Cordyceps capitata	3	0.34	0.22	292,600	0 - 678,000
California survey region	1	0.63	0.63	155,800	0 - 467,400
Oregon Coast Range survey region	1	0.70	0.70	26,500	0 - 79,500
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Cordyceps ophioglossoides	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Cortinarius barlowensis	17	2.77	0.75	2,423,100	1,122,300 - 3,723,900
Gifford Pinchot survey region	2	1.12	0.78	56,500	0 - 135,500
Oregon/Washington survey region	15	4.94	1.36	2,366,600	1,068,200 - 3,665,000
Cortinarius boulderensis	7	0.94	0.42	822,700	97,100 - 1,548,300
Gifford Pinchot survey region	2	2.82	2.33	142,700	0 - 378,500
Oregon/Washington survey region	3	0.92	0.56	441,400	0 - 981,400
Umpqua Basin survey region	2	4.17	3.70	238,500	0 - 661,700

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Cortinarius cyanites	2	0.40	0.37	347,800	0 - 989,200
Gifford Pinchot survey region	1	0.56	0.56	28,300	0 - 84,900
Oregon/Washington survey region	1	0.67	0.67	319,500	0 - 958,500
Cortinarius depauperatus	0				
Cortinarius magnivelatus (Hypogeous)	0				
Cortinarius olympianus	5	0.33	0.17	286,700	0 - 588,900
Gifford Pinchot survey region	4	3.48	2.04	176,300	0 - 382,500
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Cortinarius speciosissimus	0				
Cortinarius tabularis	0				
Cortinarius umidicola	0				
Cortinarius valgus	0				
Cortinarius variipes	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Cortinarius verrucisporus (Hypogeous)	0				
Cortinarius wiebeae (Hypogeous)	1	0.23	0.23	2,041,000	0 - 6,122,800
Oregon/Washington survey region	1	0.43	0.43	2,040,900	0 - 6,122,700
Craterellus tubaeformis	78	9.61	1.19	8,398,800	6,325,600 - 10,472,000
California survey region	6	3.04	1.24	757,000	140,200 - 1,373,800
Gifford Pinchot survey region	15	12.56	3.71	636,600	260,200 - 1,013,000
Oregon Coast Range survey region	5	13.83	1.34	522,800	421,400 - 624,200
Oregon/Washington survey region	41	12.68	2.01	6,074,200	4,153,800 - 7,994,600
Umpqua Basin survey region	11	7.13	2.44	408,100	128,700 - 687,500
Cudonia monticola	6	1.27	0.60	1,106,900	66,300 - 2,147,500
Oregon Coast Range survey region	1	0.70	0.70	26,500	0 - 79,500
Oregon/Washington survey region	5	2.26	1.09	1,080,400	41,000 - 2,119,800
Cyphellostereum laeve	2	0.36	0.27	314,500	0 - 778,500
Oregon/Washington survey region	2	0.66	0.48	314,500	0 - 778,500
Cystangium idahoensis (Hypogeous)	0				
Cystangium lymanensis (Hypogeous)	0				
Dermocybe humboldtensis	0				
Destuntzia fusca (Hypogeous)	0				
Destuntzia rubra (Hypogeous)	0				
Dichostereum boreale	0				
Elaphomyces anthracinus (Hypogeous)	0				
Elaphomyces subviscidus (Hypogeous)	1	0.03	0.03	288,300	0 - 864,900
Umpqua Basin survey region	1	0.50	0.50	288,300	0 - 864,900
Endogone acrogena (Hypogeous)	0				
Endogone oregonensis (Hypogeous)	0				
Entoloma nitidum	2	0.44	0.31	385,100	0 - 931,900
Gifford Pinchot survey region	2	7.60	5.39	385,100	0 - 931,900
Fayodia bisphaerigera	0				
Fevansia aurantiaca (Hypogeous)	0				

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Galerina atkinsoniana	57	6.27	0.96	5,475,400	3,791,800 - 7,159,000
Gifford Pinchot survey region	24	22.22	4.65	1,126,600	655,200 - 1,598,000
Oregon Coast Range survey region	7	16.29	2.31	616,200	441,400 - 791,000
Oregon/Washington survey region	23	7.61	1.67	3,646,200	2,042,400 - 5,250,000
Umpqua Basin survey region	3	1.51	0.85	86,500	0 - 183,700
Galerina cerina	24	3.15	0.81	2,747,900	1,339,300 - 4,156,500
Gifford Pinchot survey region	4	3.93	2.45	199,300	0 - 447,300
Oregon Coast Range survey region	7	10.08	6.16	381,100	0 - 846,700
Oregon/Washington survey region	13	4.53	1.36	2,167,500	861,500 - 3,473,500
Galerina heterocystis	18	2.90	0.63	2,536,600	1,443,800 - 3,629,400
California survey region	9	5.56	2.06	1,382,800	358,200 - 2,407,400
Gifford Pinchot survey region	5	5.69	3.62	288,500	0 - 655,900
Umpqua Basin survey region	4	15.12	0.85	865,300	768,100 - 962,500
Galerina sphagnicola	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Galerina vittaeformis	99	10.76	1.34	9,402,500	7,067,300 - 11,737,700
California survey region	10	6.34	2.10	1,578,500	533,100 - 2,623,900
Gifford Pinchot survey region	27	35.32	7.79	1,790,600	1,001,000 - 2,580,200
Oregon Coast Range survey region	35	53.92	9.74	2,038,800	1,302,400 - 2,775,200
Oregon/Washington survey region	17	6.75	1.72	3,231,200	1,585,000 - 4,877,400
Umpqua Basin survey region	10	13.34	6.08	763,400	67,800 - 1,459,000
Gastroboletus imbellus (Hypogeous)	0				
Gastroboletus ruber (Hypogeous)	1	0.13	0.13	1,103,900	0 - 3,311,700
Oregon/Washington survey region	1	0.23	0.23	1,103,900	0 - 3,311,700
Gastroboletus subalpinus (Hypogeous)	0				
Gastroboletus turbinatus (Hypogeous)	0				
Gastroboletus vividus (Hypogeous)	0				
Gastrosuillus amaranthii (Hypogeous)	0				
Gastrosuillus umbrinus (Hypogeous)	0				
Gautieria magnicellaris (Hypogeous)	0				
Gautieria otthii (Hypogeous)	0				
Gelatinodiscus flavidus	0				
Glomus radiatus (Hypogeous)	0				
Gomphus bonarii	0				
Gomphus clavatus	11	1.48	0.56	1,291,000	309,600 - 2,272,400
Gifford Pinchot survey region	3	2.92	1.97	148,000	0 - 347,200
Oregon/Washington survey region	6	2.25	1.00	1,075,400	119,200 - 2,031,600
Umpqua Basin survey region	2	1.18	0.85	67,600	0 - 164,200
Gomphus kauffmanii	2	0.55	0.45	483,800	0 - 1,262,600
California survey region	1	1.50	1.50	373,400	0 - 1,120,200
Orego /Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Gymnomyces abietis (Hypogeous)	0				
Gymnomyces fragrans (Hypogeous)	0				

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Gymnomyces nondistincta (Hypogeous)	0				
Gymnopilus punctifolius	4	0.51	0.25	441,600	3,800 - 879,400
Oregon/Washington survey region	4	0.92	0.46	441,600	3,800 - 879,400
Gyromitra californica	4	0.51	0.25	441,600	3,800 - 879,400
Oregon/Washington survey region	4	0.92	0.46	441,600	3,800 - 879,400
Gyromitra esculenta	21	2.43	0.68	2,126,000	941,400 - 3,310,600
Gifford Pinchot survey region	3	1.67	0.94	84,800	0 - 180,200
Oregon/Washington survey region	9	3.10	1.11	1,483,700	421,100 - 2,546,300
Umpqua Basin survey region	9	9.74	4.50	557,500	42,500 - 1,072,500
Gyromitra infula	8	0.76	0.34	666,600	73,400 - 1,259,800
Gifford Pinchot survey region	1	0.56	0.56	28,300	0 - 84,900
Oregon/Washington survey region	4	1.15	0.61	551,800	0 - 1,134,400
Umpqua Basin survey region	3	1.51	0.85	86,500	0 - 183,700
Gyromitra melaleucoides	7	1.49	0.62	1,301,200	217,200 - 2,385,200
Oregon/Washington survey region	7	2.72	1.13	1,301,200	217,200 - 2,385,200
Gyromitra montana	1	0.03	0.03	28,800	0 - 86,400
Umpqua Basin survey region	1	0.50	0.50	28,800	0 - 86,400
Hebeloma olympianum	0				
Helvella crassitunicata	0				
Helvella elastica	5	0.64	0.33	561,200	0 - 1,134,200
Gifford Pinchot survey region	2	2.36	1.89	119,700	0 - 311,100
Oregon/Washington survey region	3	0.92	0.56	441,400	0 - 981,400
Helvella maculata	1	0.37	0.37	319,500	0 - 958,500
Oregon/Washington survey region	1	0.67	0.67	319,500	0 - 958,500
Hydnotrya inordinata (Hypogeous)	0				
Hydnotrya subnix (Hypogeous)	0				
Hydnum umbilicatum	32	4.62	0.87	4,032,600	2,518,400 - 5,546,800
California survey region	5	2.65	1.18	660,400	73,200 - 1,247,600
Oregon Coast Range survey region	5	13.89	1.35	525,300	423,500 - 627,100
Oregon/Washington survey region	15	4.98	1.36	2,383,100	1,079,700 - 3,686,500
Umpqua Basin survey region	7	8.10	4.27	463,600	0 - 952,400
Hydropus marginellus	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Hygrophorus caeruleus	0				
Hygrophorus saxatilis	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Hygrophorus vernalis	0				
Hypomyces luteovirens	1	0.23	0.23	204,100	0 - 612,300
Oregon/Washington survey region	1	0.43	0.43	204,100	0 - 612,300
Leucogaster citrinus (Hypogeous)	33	4.23	0.92		20,973,500 - 52,943,500
California survey region	3	1.64	0.95	4,081,000	0 - 8,821,400
Gifford Pinchot survey region	6	3.35	1.28	1,696,100	403,100 - 2,989,100
Oregon Coast Range survey region	7	10.08	6.16	3,811,000	0 - 8,466,400

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Leucogaster citrinus (Hypogeous) (cont.)					
Oregon/Washington survey region	15	5.22	1.45		11,136,600 - 38,834,200
Umpqua Basin survey region	2	4.17	3.70	2,385,000	0 - 6,618,000
Leucogaster microsporus (Hypogeous)	5	0.52	0.24	4,514,600	256,000 - 8,773,200
Gifford Pinchot survey region	1	1.80	1.80	914,600	0 - 2,743,800
Oregon/Washington survey region	3	0.69	0.40	3,311,700	0 - 7,114,100
Umpqua Basin survey region	1	0.50	0.50	288,300	0 - 864,900
Macowanites chlorinosmus (Hypogeous)	0				
Macowanites mollis (Hypogeous)	1	0.23	0.23	2,040,900	0 - 6,122,700
Oregon/Washington survey region	1	0.43	0.43	2,040,900	0 - 6,122,700
Marasmius applanatipes	3	1.82	1.16	463,400	0 - 1,051,200
California survey region	2	1.81	1.48	450,700	0 - 1,184,900
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Mycena hudsoniana	3	0.19	0.13	166,900	0 - 401,300
Gifford Pinchot survey region	2	1.12	0.78	56,500	0 - 135,500
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Mycena monticola	11	2.59	0.86	2,259,900	752,900 - 3,766,900
California survey region	6	5.83	2.63	1,449,900	142,900 - 2,756,900
Gifford Pinchot survey region	1	3.46	3.46	175,400	0 - 526,200
Oregon/Washington survey region	3	0.89	0.54	424,900	0 - 938,300
Umpqua Basin survey region	1	3.67	3.67	209,700	0 - 629,100
Mycena overholtsii	3	0.38	0.22	331,200	0 - 711,400
Oregon/Washington survey region	3	0.69	0.40	331,200	0 - 711,400
Mycena quinaultensis	0				
Mycena tenax	11	0.61	0.35	337,500	0 - 724,100
California survey region	7	3.75	1.70	933,700	89,300 - 1,778,100
Gifford Pinchot survey region	4	3.48	2.04	176,300	0 - 382,500
Mythicomyces corneipes	0				
Neolentinus adhaerens	1	0.05	0.05	47,400	0 - 142,200
Oregon Coast Range survey region	1	1.25	1.25	47,400	0 - 142,200
Neolentinus kauffmanii	1	0.03	0.03	26,500	0 - 79,500
Oregon Coast Range survey region	1	0.70	0.70	26,500	0 - 79,500
Neournula pouchetii	16	2.73	0.81	2,381,800	962,800 - 3,800,800
California survey region	1	1.42	1.42	354,200	0 - 1,062,400
Gifford Pinchot survey region	3	1.67	0.94	84,800	0 - 180,200
Oregon/Washington survey region	10	3.56	1.20	1,704,400	553,800 - 2,855,000
Umpqua Basin survey region	2	4.17	3.70	238,500	0 - 661,700
Nivatogastrium nubigenum (Hypogeous)	1	0.25	0.25	2,206,500	0 - 6,619,500
Oregon/Washington survey region	1	0.46	0.46	2,206,500	0 - 6,619,500
Octavianina cyanescens (Hypogeous)	1	0.13	0.13	1,103,900	0 - 3,311,700
Oregon/Washington survey region	1	0.23	0.23	1,103,900	0 - 3,311,700
Octavianina macrospora (Hypogeous)	0				
Otidea leporina	0				

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Otidea onotica	9	1.46	0.57	1,278,600	287,000 - 2,270,200
Oregon Coast Range survey region	2	2.47	1.90	93,400	0 - 237,200
Oregon/Washington survey region	6	2.25	1.00	1,075,400	119,200 - 2,031,600
Umpqua Basin survey region	1	1.92	1.92	109,800	0 - 329,400
Otidea smithii	0				
Phaeocollybia attenuata	6	1.02	0.51	891,100	2,300 - 1,779,900
Oregon Coast Range survey region	2	1.40	0.98	53,000	0 - 127,000
Oregon/Washington survey region	4	1.75	0.93	838,100	0 - 1,723,900
Phaeocollybia californica	0				
Phaeocollybia dissiliens	0				
Phaeocollybia fallax	2	0.16	0.13	139,200	0 - 367,400
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Umpqua Basin survey region	1	0.50	0.50	28,800	0 - 86,400
Phaeocollybia gregaria	0				
Phaeocollybia kauffmanii	3	0.27	0.17	233,500	0 - 531,700
California survey region	1	0.39	0.39	96,600	0 - 289,800
Oregon Coast Range survey region	1	0.70	0.70	26,500	0 - 79,500
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Phaeocollybia olivacea	0				
Phaeocollybia oregonensis	0				
Phaeocollybia piceae	0				
Phaeocollybia pseudofestiva	0				
Phaeocollybia scatesiae	0				
Phaeocollybia sipei	1	0.03	0.03	26,500	0 - 79,500
Oregon Coast Range survey region	1	0.70	0.70	26,500	0 - 79,500
Phaeocollybia spadicea	3	0.09	0.05	79,500	0 - 168,900
Oregon Coast Range survey region	3	2.10	1.18	79,500	0 - 168,900
Phellodon atratus	0				
Pholiota albivelata	0				
Pithya vulgaris	5	0.41	0.21	360,100	1,300 - 718,900
California survey region	2	0.78	0.55	193,200	0 - 464,800
Gifford Pinchot survey region	2	1.12	0.78	56,500	0 - 135,500
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Plectania melastoma	0				
Plectania milleri	1	0.18	0.18	155,800	0 - 467,400
California survey region	1	0.63	0.63	155,800	0 - 467,400
Podostroma alutaceum	1	0.03	0.03	26,500	0 - 79,500
Oregon Coast Range survey region	1	0.70	0.70	26,500	0 - 79,500
Polyozellus multiplex	0				
Pseudaleuria quinaultiana	0				
Ramaria abietina	0				
Ramaria amyloidea	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Ramaria araiospora	11	0.67	0.38	584,300	0 - 1,241,700
Oregon Coast Range survey region	9	6.24	1.90	235,900	92,300 - 379,500
Oregon/Washington survey region	1	0.67	0.67	319,500	0 - 958,500
Umpqua Basin survey region	1	0.50	0.50	28,800	0 - 86,400
Ramaria aurantiisiccescens	0				
Ramaria botryis var. *aurantiiramosa*	0				
Ramaria celerivirescens	14	1.62	0.53	1,411,800	485,800 - 2,337,800
California survey region	1	0.63	0.63	155,800	0 - 467,400
Gifford Pinchot survey region	4	2.23	1.07	113,100	4,500 - 221,700
Oregon Coast Range survey region	2	1.33	0.95	50,500	0 - 121,900
Oregon/Washington survey region	6	1.84	0.79	882,900	129,500 - 1,636,300
Umpqua Basin survey region	1	3.67	3.67	209,700	0 - 629,100
Ramaria claviramulata	0				
Ramaria concolor f. *marrii*	0				
Ramaria concolor f. *tsugina*	0				
Ramaria conjunctipes var. *sparsiramosa*	7	1.12	0.45	979,500	201,700 - 1,757,300
California survey region	1	0.39	0.39	96,600	0 - 289,800
Oregon/Washington survey region	6	1.84	0.79	882,900	129,500 - 1,636,300
Ramaria coulterae	1	0.03	0.03	28,800	0 - 86,400
Umpqua Basin survey region	1	0.50	0.50	28,800	0 - 86,400
Ramaria cyaneigranosa	0				
Ramaria gelatiniaurantia	0				
Ramaria gracilis	0				
Ramaria hilaris var. *olympiana*	0				
Ramaria largentii	0				
Ramaria lorithamnus	0				
Ramaria maculatipes	0				
Ramaria rainierensis	0				
Ramaria rubella var. *blanda*	0				
Ramaria rubribrunnescens	0				
Ramaria rubrievanescens	3	0.38	0.22	331,200	0 - 711,400
Oregon/Washington survey region	3	0.69	0.40	331,200	0 - 711,400
Ramaria rubripermanens	10	1.53	0.52	1,336,600	425,400 - 2,247,800
Oregon/Washington survey region	9	2.73	0.95	1,307,700	398,300 - 2,217,100
Umpqua Basin survey region	1	0.50	0.50	28,800	0 - 86,400
Ramaria spinulosa var. *diminutiva*	0				
Ramaria stuntzii	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Ramaria suecica	1	0.37	0.37	319,500	0 - 958,500
Oregon/Washington survey region	1	0.67	0.67	319,500	0 - 958,500
Ramaria thiersii	1	0.37	0.37	319,500	0 - 958,500
Oregon/Washington survey region	1	0.67	0.67	319,500	0 - 958,500
Ramaria verlotensis	0				

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Rhizopogon abietis (Hypogeous)	0				
Rhizopogon atroviolaceus (Hypogeous)	2	0.16	0.13	1,392,200	0 - 3,674,000
Oregon/Washington survey region	1	0.23	0.23	1,103,900	0 - 3,311,700
Umpqua Basin survey region	1	0.50	0.50	288,300	0 - 864,900
Rhizopogon brunneiniger (Hypogeous)	0				
Rhizopogon chamaleontinus (Hypogeous)	0				
Rhizopogon ellipsosporus (Hypogeous)	1	0.13	0.13	1,103,900	0 - 3,311,700
Oregon/Washington survey region	1	0.23	0.23	1,103,900	0 - 3,311,700
Rhizopogon evadens var. *subalpinus* (Hypogeous)	0				
Rhizopogon exiguus (Hypogeous)	0				
Rhizopogon flavofibrillosus (Hypogeous)	1	0.24	0.24	2,096,700	0 - 6,290,100
Umpqua Basin survey region	1	3.67	3.67	2,096,700	0 - 6,290,100
Rhizopogon inquinatus (Hypogeous)	0				
Rhizopogon truncatus (Hypogeous)	15	2.09	0.64		6,981,500 - 29,469,900
California survey region	1	0.39	0.39	965,900	0 - 2,897,700
Oregon/Washington survey region	10	3.36	1.15		5,085,200 - 27,128,000
Umpqua Basin survey region	4	2.02	0.97	1,153,200	45,200 - 2,261,200
Rhodocybe speciosa	2	0.25	0.18	220,800	0 - 532,200
Oregon/Washington survey region	2	0.46	0.33	220,800	0 - 532,200
Rickenella swartzii	0				
Russula mustelina	0				
Sarcodon fuscoindicus	6	0.38	0.19	332,600	2,000 - 663,200
Gifford Pinchot survey region	2	1.12	0.78	56,500	0 - 135,500
Oregon Coast Range survey region	1	0.70	0.70	26,500	0 - 79,500
Oregon/Washington survey region	2	0.46	0.33	220,800	0 - 532,200
Umpqua Basin survey region	1	0.50	0.50	28,800	0 - 86,400
Sarcodon imbricatus	1	0.03	0.03	28,800	0 - 86,400
Umpqua Basin survey region	1	0.50	0.50	28,800	0 - 86,400
Sarcosoma latahense	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Sarcosoma mexicana	8	0.87	0.36	763,100	132,100 - 1,394,100
California survey region	1	0.63	0.63	155,800	0 - 467,400
Gifford Pinchot survey region	1	0.56	0.56	28,300	0 - 84,900
Oregon Coast Range survey region	4	6.56	3.08	248,000	14,800 - 481,200
Oregon/Washington survey region	2	0.69	0.52	331,000	0 - 824,400
Sarcosphaera coronaria	7	0.66	0.29	573,400	72,400 - 1,074,400
California survey region	1	0.63	0.63	155,800	0 - 467,400
Oregon/Washington survey region	3	0.69	0.40	331,200	0 - 711,400
Umpqua Basin survey region	3	1.51	0.85	86,500	0 - 183,700
Sarcosphaera eximia	0				
Sedecula pulvinata (Hypogeous)	0				
Sowerbyella rhenana	0				

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
FUNGI[6]					
Sparassis crispa	1	0.25	0.25	220,700	0 - 662,100
Oregon/Washington survey region	1	0.46	0.46	220,700	0 - 662,100
Spathularia flavida	9	1.52	0.64	1,324,200	214,800 - 2,433,600
California survey region	2	1.81	1.48	450,700	0 - 1,184,900
Gifford Pinchot survey region	4	4.72	2.57	239,500	0 - 500,300
Oregon/Washington survey region	3	1.32	0.82	634,000	0 - 1,423,800
Stagnicola perplexa	0				
Thaxterogaster pavelekii (Hypogeous)	0				
Tremiscus helvelloides	3	0.32	0.21	281,200	0 - 652,200
California survey region	2	1.01	0.74	252,300	0 - 618,900
Umpqua Basin survey region	1	0.50	0.50	28,800	0 - 86,400
Tricholoma venenatum	1	0.13	0.13	110,400	0 - 331,200
Oregon/Washington survey region	1	0.23	0.23	110,400	0 - 331,200
Tricholomopsis fulvescens	0				
Tuber asa (Hypogeous)	0				
Tuber pacificum (Hypogeous)	0				
Tylopilus porphyrosporus	0				
Turbinellus floccosus	25	3.27	0.84	2,855,600	1,383,800 - 4,327,400
California survey region	3	2.28	1.60	566,600	0 - 1,361,200
Gifford Pinchot survey region	11	13.91	5.48	704,900	149,100 - 1,260,700
Oregon Coast Range survey region	1	5.94	5.94	224,600	0 - 673,800
Oregon/Washington survey region	7	2.28	0.96	1,092,100	174,900 - 2,009,300
Umpqua Basin survey region	3	4.67	3.73	267,300	0 - 694,300
Zelleromyces papyracea (Hypogeous)	0				
LICHENS[6]					
Bryoria pseudocapillaris	0				
Bryoria spiralifera	0				
Bryoria subcana	0				
Bryoria tortuosa	2	0.38	0.28	162,900	0 - 406,100
Oregon/Washington survey region	2	0.69	0.51	162,900	0 - 406,100
Buellia oidalea	0				
Calicium abietinum	1	0.14	0.14	60,700	0 - 182,100
Gifford Pinchot survey region	1	2.42	2.42	60,700	0 - 182,100
Calicium adspersum	0				
Calicium glaucellum	70	8.47	1.19	3,653,600	2,623,200 - 4,684,000
California survey region	4	1.54	0.75	188,700	3,100 - 374,300
Gifford Pinchot survey region	9	10.02	3.73	250,900	64,300 - 437,500
Oregon Coast Range survey region	2	4.45	3.99	83,100	0 - 232,100
Oregon/Washington survey region	37	11.95	2.04	2,827,000	1,861,800 - 3,792,200
Umpqua Basin survey region	18	10.75	3.46	303,800	108,000 - 499,600
Calicium viride	45	5.04	0.92	2,175,500	1,380,100 - 2,970,900
California survey region	11	6.30	2.24	774,600	224,600 - 1,324,600
Oregon Coast Range survey region	6	6.40	4.10	119,600	0 - 272,600

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
LICHENS[6]					
Calicium viride (cont.)					
Oregon/Washington survey region	18	4.73	1.14	1,119,500	582,500 - 1,656,500
Umpqua Basin survey region	10	5.73	2.40	161,800	26,400 - 297,200
Cetrelia cetrarioides	2	0.30	0.28	127,500	0 - 364,900
Oregon Coast Range survey region	2	6.83	6.36	127,500	0 - 364,900
Chaenotheca chrysocephala	15	1.70	0.54	734,800	272,400 - 1,161,200
Oregon/Washington survey region	7	2.26	0.89	534,500	112,300 - 956,700
Umpqua Basin survey region	8	7.09	3.34	200,300	11,300 - 389,300
Chaenotheca ferruginea	3	0.17	0.13	74,600	0 - 186,200
Oregon/Washington survey region	1	0.23	0.23	53,900	0 - 161,700
Umpqua Basin survey region	2	0.73	0.51	20,700	0 - 49,700
Chaenotheca furfuracea	28	3.24	0.73	1,397,800	767,200 - 2,028,400
California survey region	5	1.92	0.84	235,900	29,700 - 442,100
Oregon Coast Range survey region	4	8.90	4.02	166,200	16,000 - 316,400
Oregon/Washington survey region	11	3.61	1.18	854,100	296,700 - 1,411,500
Umpqua Basin survey region	8	5.01	2.61	141,600	0 - 289,000
Chaenotheca subroscida	4	0.51	0.29	219,000	0 - 472,400
Oregon/Washington survey region	3	0.88	0.53	208,700	0 - 461,300
Umpqua Basin survey region	1	0.37	0.37	10,400	0 - 31,200
Chaenothecopsis pusilla	0				
Cladonia norvegica	28	4.33	0.97	1,867,400	1,031,200 - 2,703,600
Gifford Pinchot survey region	8	7.77	3.22	194,500	33,100 - 355,900
Oregon Coast Range survey region	2	4.36	3.98	81,400	0 - 230,200
Oregon / Washington survey region	16	6.62	1.70	1,566,000	759,800 - 2,372,200
Umpqua Basin survey region	2	0.90	0.65	25,400	0 - 62,000
Collema nigrescens	19	3.10	0.80	1,339,100	642,300 - 2,035,900
California survey region	12	6.37	2.05	783,300	279,100 - 1,287,500
Oregon/Washington survey region	4	1.82	0.95	429,800	0 - 880,400
Umpqua Basin survey region	3	4.46	2.97	126,100	0 - 294,100
Dendriscocaulon intricatulum	3	0.69	0.49	299,100	0 - 719,700
California survey region	2	1.99	1.65	244,800	0 - 651,200
Oregon / Washington survey region	1	0.23	0.23	53,900	0 - 161,700
Dermatocarpon meiophyllizum	0				
Fuscopannaria saubinetii	0				
Heterodermia sitchensis	0				
Hypogymnia duplicata	8	1.00	0.30	431,400	132,400 - 730,400
Oregon/Washington survey region	8	1.82	0.63	431,400	132,400 - 730,400
Hypogymnia oceanica	17	1.84	0.52	792,000	346,000 - 1,238,000
Gifford Pinchot survey region	1	0.40	0.40	10,000	0 - 30,000
Oregon Coast Range survey region	1	0.49	0.49	9,100	0 - 27,300
Oregon/Washington survey region	11	2.94	0.92	695,200	261,400 - 1,129,000
Umpqua Basin survey region	4	2.75	1.77	77,800	0 - 177,600
Hypogymnia vittata	0				

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
LICHENS[6]					
Hypotrachyna revoluta	0				
Leptogium burnetiae var. *hirsutum*	0				
Leptogium cyanescens	6	0.89	0.44	383,900	2,100 - 765,700
Oregon/Washington survey region	5	1.58	0.81	373,500	0 - 754,900
Umpqua Basin survey region	1	0.37	0.37	10,400	0 - 31,200
Leptogium rivale	0				
Leptogium teretiusculum	3	0.66	0.46	285,600	0 - 681,400
California survey region	2	1.99	1.65	244,800	0 - 651,200
Oregon/Washington survey region	1	0.23	0.23	53,900	0 - 161,700
Lobaria linita	12	1.40	0.40	603,200	255,000 - 951,400
Gifford Pinchot survey region	1	0.40	0.40	10,000	0 - 30,000
Oregon Coast Range survey region	0				
Oregon/Washington survey region	11	2.51	0.74	593,200	245,600 - 940,800
Lobaria oregana	119	10.00	1.22	4,315,400	3,264,200 - 5,366,600
California survey region	2	1.01	0.73	124,100	0 - 304,700
Gifford Pinchot survey region	23	15.28	3.91	382,600	186,600 - 578,600
Oregon Coast Range survey region	43	35.94	7.40	671,500	395,100 - 947,900
Oregon/Washington survey region	37	11.10	1.86	2,627,300	1,745,900 - 3,508,700
Umpqua Basin survey region	14	18.04	7.53	509,800	84,400 - 935,200
Microcalicium arenarium	0				
Nephroma bellum	29	2.45	0.64	1,055,800	501,600 - 1,610,000
Gifford Pinchot survey region	5	2.86	1.48	71,500	0 - 145,700
Oregon Coast Range survey region	5	2.44	1.05	45,600	6,400 - 84,800
Oregon/Washington survey region	9	2.92	1.07	691,200	185,600 - 1,196,800
Umpqua Basin survey region	10	8.76	3.73	247,400	36,600 - 458,200
Nephroma isidiosum	0				
Nephroma occultum	4	0.53	0.31	227,200	0 - 493,800
Oregon/Washington survey region	3	0.92	0.56	216,900	0 - 482,700
Umpqua Basin survey region	1	0.37	0.37	10,400	0 - 31,200
Niebla cephalota	0				
Pannaria rubiginosa	0				
Peltigera pacifica	12	1.49	0.52	642,900	198,300 - 1,087,500
Gifford Pinchot survey region	3	2.38	1.68	59,500	0 - 143,500
Oregon Coast Range survey region	1	6.34	6.34	118,400	0 - 355,200
Oregon/Washington survey region	4	1.31	0.68	309,500	0 - 630,500
Umpqua Basin survey region	4	5.62	3.27	158,800	0 - 343,800
Platismatia lacunosa	21	1.45	0.46	626,200	231,200 - 1,021,200
California survey region	1	0.63	0.63	76,900	0 - 230,700
Oregon Coast Range survey region	18	21.21	7.64	396,200	110,800 - 681,600
Oregon/Washington survey region	2	0.65	0.48	154,700	0 - 383,300
Pseudocyphellaria perpetua	1	0.02	0.02	7,400	0 - 22,200
Oregon Coast Range survey region	1	0.40	0.40	7,400	0 - 22,200

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
LICHENS[6]					
Pseudocyphellaria rainierensis	6	0.55	0.25	235,700	19,900 - 451,500
Gifford Pinchot survey region	2	0.80	0.56	19,900	0 - 47,900
Oregon/Washington survey region	4	0.91	0.45	215,700	1,900 - 429,500
Pyrrhospora quernea	0				
Ramalina pollinaria	1	0.37	0.37	157,800	0 - 473,400
Oregon/Washington survey region	1	0.67	0.67	157,800	0 - 473,400
Ramalina thrausta	15	2.23	0.78	960,100	283,100 - 1,637,100
Oregon Coast Range survey region	7	4.75	1.59	88,700	29,100 - 148,300
Oregon/Washington survey region	7	2.87	1.17	679,100	125,100 - 1,233,100
Umpqua Basin survey region	1	6.81	6.81	192,400	0 - 577,200
Stenocybe clavata	4	0.29	0.18	126,100	0 - 280,300
Oregon Coast Range survey region	2	0.98	0.68	18,200	0 - 43,800
Oregon/Washington survey region	2	0.46	0.32	107,900	0 - 259,900
Teloschistes flavicans	0				
Tholurna dissimilis	1	0.07	0.07	31,600	0 - 94,800
Gifford Pinchot survey region	1	1.26	1.26	31,600	0 - 94,800
Usnea hesperina	0				
Usnea longissima	13	0.60	0.27	257,300	23,700 - 490,900
Oregon Coast Range survey region	11	5.58	1.62	104,200	43,800 - 164,600
Oregon/Washington survey region	2	0.65	0.48	154,700	0 - 383,300
BRYOPHYTES[6]					
Brotherella roellii	0				
Buxbaumia viridis	19	1.74	0.47	750,100	341,100 - 1,159,100
California survey region	0				
Gifford Pinchot survey region	4	4.13	2.49	103,400	0 - 228,000
Oregon Coast Range survey region	2	2.24	1.61	41,900	0 - 101,900
Oregon/Washington survey region	6	1.60	0.68	378,600	55,600 - 701,600
Umpqua Basin survey region	7	8.01	3.70	226,200	17,200 - 435,200
Diplophyllum albicans	25	2.82	0.69	1,218,800	622,600 - 1,815,000
Oregon Coast Range survey region	10	8.59	2.70	160,500	59,700 - 261,300
Oregon/Washington survey region	15	4.49	1.25	1,061,700	471,900 - 1,651,500
Diplophyllum plicatum	1	0.13	0.13	53,900	0 - 161,700
Oregon/Washington survey region	1	0.23	0.23	53,900	0 - 161,700
Encalypta brevicolla var. *crumiana*	0				
Herbertus aduncus	0				
Iwatsukiella leucotricha	0				
Kurzia makinoana	0				
Marsupella emarginata var. *aquatica*	0				
Orthodontium gracile	0				
Ptilidium californicum	181	18.25	1.40	7,875,700	6,667,300 - 9,084,100
California survey region	3	1.15	0.66	141,600	0 - 303,200
Gifford Pinchot survey region	54	44.86	4.41	1,123,400	902,400 - 1,344,400
Oregon Coast Range survey region	5	7.95	5.69	148,500	0 - 360,900

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
BRYOPHYTES[6]					
Ptilidium californicum (cont.)					
Oregon/Washington survey region	86	23.89	2.38	5,653,000	4,527,600 - 6,778,400
Umpqua Basin survey region	33	28.64	4.79	809,300	538,500 - 1,080,100
Racomitrium aquaticum	6	0.67	0.28	287,200	46,200 - 528,200
Oregon Coast Range survey region	1	0.94	0.94	17,600	0 - 52,800
Oregon/Washington survey region	5	1.14	0.50	269,600	31,200 - 508,000
Rhizomnium nudum	24	3.18	0.77	1,372,000	706,000 - 2,038,000
Gifford Pinchot survey region	6	2.39	0.93	59,800	13,200 - 106,400
Oregon/Washington survey region	17	5.54	1.41	1,310,200	641,600 - 1,978,800
Umpqua Basin survey region	1	0.37	0.37	10,400	0 - 31,200
Schistostega pennata	0				
Tetraphis geniculata	1	0.07	0.07	31,600	0 - 94,800
Gifford Pinchot survey region	1	1.26	1.26	31,600	0 - 94,800
Tritomaria exsectiformis	0				
Tritomaria quinquedentata	0				
VERTEBRATES					
RMS surveys were not done for Vertebrates. A similar survey (The RDS Survey) was completed for the red tree vole, and results are shown in Table 3&4-11.					
MOLLUSKS[6]					
Ancotrema voyanum[7]	0				
Ancotrema voyanum (GOBIG2K - CA[5])	24	7.37	1.44	171,900	104,700 - 239,100
Cryptomastix devia[7]	0				
Cryptomastix hendersoni[7]	0				
Deroceras hesperium[7]	0				
Fluminicola n. sp. 1[7]	0				
Fluminicola n. sp. 2[7]	0				
Fluminicola n. sp. 3[7]	0				
Fluminicola n. sp. 11[7]	0				
Fluminicola n. sp. 15[7]	0				
Fluminicola n. sp. 16[7]	0				
Fluminicola n. sp. 17[7]	0				
Fluminicola n. sp. 18[7]	0				
Fluminicola n. sp. 19[7]	0				
Fluminicola n. sp. 20[7]	0				
Fluminicola potemicus[7]	0				
Fluminicola seminalis[7]	0				
Helminthoglypta hertleini[7]	1	0.51	0.51	31,900	0 - 95,700
Oregon/Washington survey region	1	0.67	0.67	31,900	0 - 95,700
Helminthoglypta hertleini (GOBIG2K - CA[5])	2	0.67	0.47	15,500	0 - 37,500
Helminthoglypta talmadgei[7]	0				
Helminthoglypta talmadgei (GOBIG2K - CA[5])	8	2.59	0.91	60,400	18,200 - 102,600

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
MOLLUSKS[6]					
Hemphillia burringtoni[7]	1	0.51	0.51	31,900	0 - 95,700
Oregon/Washington survey region	1	0.67	0.67	31,900	0 - 95,700
Hemphillia glandulosa[7]	11	2.05	0.71	128,200	40,000 - 216,400
Oregon Coast Range survey region	3	2.04	1.17	7,700	0 - 16,500
Oregon/Washington survey region	8	2.52	0.92	120,500	32,700 - 208,300
Hemphillia malonei[7]	9	2.31	0.84	144,500	39,500 - 249,500
Gifford Pinchot survey region	1	2.26	2.26	11,400	0 - 34,200
Oregon/Washington survey region	8	2.69	1.05	129,000	28,800 - 229,200
Hemphillia pantherina[7]	0				
Juga (O.) n. sp. 2[7]	0				
Juga (O.) n. sp. 3[7]	0				
Lyogyrus n. sp. 1[7]	0				
Lyogyrus n. sp. 2[7]	0				
Lyogyrus n. sp. 3[7]	0				
Megomphix hemphilli[7]	4	1.15	0.34	71,900	29,300 - 114,500
Oregon Coast Range survey region	2	12.67		47,900	47,900 - 47,900
Oregon/Washington survey region	1	0.44	0.44	21,100	0 - 63,300
Umpqua Basin survey region	1	0.50	0.50	2,900	0 - 8,700
Monadenia chaceana[7]	2	0.39	0.27	24,000	0 - 58,000
Oregon/Washington survey region	1	0.24	0.24	11,400	0 - 34,200
Umpqua Basin survey region	1	2.20	2.20	12,600	0 - 37,800
Monadenia chaceana (GOBIG2K - CA[5])	3	0.96	0.56	22,400	0 - 48,400
Monadenia churchi[7]	0				
Monadenia churchi (GOBIG2K - CA[5])	56	19.96	2.16	465,500	364,900 - 566,100
Monadenia fidelis minor[7]	0				
Monadenia infumata ochromphalus[7]	0				
Monadenia infumata ochromphalus (GOBIG2K - CA[5])	16	4.65	1.12	108,400	56,400 - 160,400
Monadenia troglodytes troglodytes[7]	0				
Monadenia troglodytes troglodytes (GOBIG2K - CA[5])	0				
Monadenia troglodytes wintu[7]	0				
Monadenia troglodytes wintu (GOBIG2K - CA[5])	0				
Oreohelix n. sp. 1[7]	0				
Pristiloma articum crateris[7]	0				
Prophysaon coeruleum[7]	27	4.21	1.12	263,000	122,600 - 403,400
Oregon Coast Range survey region	1	6.34	6.34	24,000	0 - 72,000
Oregon / Washington survey region	9	3.89	1.36	186,100	55,900 - 316,300
Umpqua Basin survey region	17	9.26	1.89	53,000	31,400 - 74,600
Prophysaon coeruleum (GOBIG2K - CA[5])	1	0.37	0.37	8,600	0 - 25,800
Trilobopsis roperi[7]	0				
Trilobopsis roperi (GOBIG2K - CA[5])	1	0.37	0.37	8,600	0 - 25,800

Table 3&4-16. Probability Sampling Survey Results (RMS and GOBIG2K[5])

TAXA GROUP Species[1] NOTE: Results apply to NWFP area unless a smaller Survey Region[2] is specified.	Plots[3] with Detection[8]	Percent of Survey Plots with detections within the survey area		Estimated[4] Number of plot-sized[3] areas with detections within the survey area	
		Mean	Standard Error (SE)	Mean	95% Confidence Interval (CI)
MOLLUSKS[6]					
Trilobopsis tehamana[7]	0				
Trilobopsis tehamana (GOBIG2K - CA[5])	2	0.59	0.42	13,800	0 - 33,200
Vertigo n. sp. [7]	0				
Vespericola pressleyi[7]	0				
Vespericola pressleyi (GOBIG2K – CA[5])	0				
Vespericola shasta[7]	0				
Vorticifex klamathensis sinitsini[7]	0				
Vorticifex n. sp. 1[7]	0				
VASCULAR PLANTS[6]					
RMS surveys not according to protocol (surveyed during non-flowering season), so no results for vascular plants					

[1] Current taxonomic name. Any differences between these and previous NWFP documents are displayed in Table 3&4-18.

[2] Survey Regions. Please see Figure 3&4-4 for more information

[3] RMS Plot Size:

	Hectares (ha)
Bryophytes	0.2
Fungi – Epigeous	0.1
Fungi – Hypogeous	0.01
Lichens	0.2
Vascular Plants	0.2
Mollusks (RMS)	1

[4] Estimates were derived by extrapolating from the sample plots to all potential plots in each region.

[5] Surveyed as part of the GOBIG2K surveys. The GOBIG2K survey studied 308 plots only in CA and used a modified project level mollusk survey protocol. Estimates are within 2,400,000 ha in California. GOBIG2K protocol is 20 minute search in highest quality area and 40 minute point searches at likely locations.

[6] Number of Plots Surveyed

Fungi	658 plots
Bryophytes, Lichens, and Vascular Plants	750 plots
Mollusks - RMS in OR and WA	509 plots
Mollusks - GOBIG2K in CA	308 plots

[7] Surveyed as part of a modified RMS Survey. The survey studied 509 plots in Oregon and Washington and it used a two visit (fall, spring) and two-stage mollusk survey protocol. Estimates are within 7,500,000 ha in Oregon and Washington. Stage 1 surveyed 18 microplots and stage 2 consisted of a minimum 2-hour intuitive search.

[8] Species removed from Survey and Manage during the process of the 2001 Annual Species Review may not be accurately represented in the RMS Surveys, as surveys may not have been completed.

Table 3&4-17. Species Outcomes

TAXA GROUP *Species*[1]	Sufficient Habitat Under all Alternatives - *Outcomes 1 and 2*	Insufficient Information to Determine an Outcome - *Outcome 4*	Insufficient Habitat - *Outcome 3*			
			Not caused by Federal Action	Caused by Management Under Alt. 1	Caused by Management Under Alt. 2	Caused by Management Under Alt. 3
FUNGI						
Acanthophysium farlowii			x			
Albatrellus avellaneus			x			
Albatrellus caeruleoporus			x			
Albatrellus ellisii					x[6]	
Albatrellus flettii	x[2]					
Alpova alexsmithii			x			
Alpova olivaceotinctus			x			
Arcangeliella camphorata			x			
Arcangeliella crassa			x			
Arcangeliella lactarioides			x			
Asterophora lycoperdoides			x			
Asterophora parasitica			x			
Baeospora myriadophylla			x			
Balsamia nigrens			x			
Boletus haematinus			x			
Boletus pulcherrimus	x					
Bondarzewia mesenterica	x					
Bridgeoporus nobilissimus			x			
Cantharellus subalbidus	x					
Catathelasma ventricosa			x			
Chalciporus piperatus	x					
Chamonixia caespitosa			x			
Choiromyces alveolatus			x			
Choiromyces venosus			x			
Chromosera cyanophylla	x					
Chroogomphus loculatus			x			
Chrysomphalina grossula			x			
Clavariadelphus ligula					x[6]	
Clavariadelphus occidentalis	x					
Clavariadelphus sachalinensis					x[6]	
Clavariadelphus subfastigiatus			x			
Clavariadelphus truncatus	x					
Clavulina castanopes v. *lignicola*	x					
Clitocybe senilis			x			
Clitocybe subditopoda			x			
Collybia bakerensis	x					
Collybia racemosa	x					
Cordyceps capitata	x					
Cordyceps ophioglossoides			x			
Cortinarius barlowensis	x					
Cortinarius boulderensis			x			
Cortinarius cyanites			x			
Cortinarius depauperatus			x			
Cortinarius magnivelatus			x			

Table 3&4-17. Species Outcomes

TAXA GROUP *Species*[1]	Sufficient Habitat Under all Alternatives - *Outcomes 1 and 2*	Insufficient Information to Determine an Outcome - *Outcome 4*	Insufficient Habitat - *Outcome 3*			
			Not caused by Federal Action	Caused by Management Under Alt. 1	Caused by Management Under Alt. 2	Caused by Management Under Alt. 3
Cortinarius olympianus	x					
Cortinarius speciosissimus			x			
Cortinarius tabularis		x				
Cortinarius umidicola			x			
Cortinarius valgus			x			
Cortinarius variipes			x			
Cortinarius verrucisporus			x			
Cortinarius wiebeae			x			
Craterellus tubaeformis	x					
Cudonia monticola					x[6]	
Cyphellostereum laeve			x			
Cystangium idahoensis			x			
Cystangium lymanensis			x			
Dermocybe humboldtensis			x			
Destuntzia fusca			x			
Destuntzia rubra			x			
Dichostereum boreale			x			
Elaphomyces anthracinus			x			
Elaphomyces subviscidus			x			
Endogone acrogena			x			
Endogone oregonensis			x			
Entoloma nitidum			x			
Fayodia bisphaerigera			x			
Fevansia aurantiaca			x			
Galerina atkinsoniana	x					
Galerina cerina	x					
Galerina heterocystis	x					
Galerina sphagnicola			x			
Galerina vittaeformis	x					
Gastroboletus imbellus			x			
Gastroboletus ruber	x					
Gastroboletus subalpinus	x					
Gastroboletus turbinatus	x					
Gastroboletus vividus			x			
Gastrosuillus amaranthii		x				
Gastrosuillus umbrinus			x			
Gautieria magnicellaris			x			
Gautieria otthii			x			
Gelatinodiscus flavidus	x					
Glomus radiatum			x			
Gomphus clavatus	x					
Gomphus kauffmanii					x[6]	
Gymnomyces abietis			x			
Gymnomyces fragrans			x			
Gymnomyces nondistincta			x			

Table 3&4-17. Species Outcomes

TAXA GROUP *Species*[1]	Sufficient Habitat Under all Alternatives - *Outcomes 1 and 2*	Insufficient Information to Determine an Outcome - *Outcome 4*	Insufficient Habitat - *Outcome 3*			
			Not caused by Federal Action	Caused by Management Under Alt. 1	Caused by Management Under Alt. 2	Caused by Management Under Alt. 3
Gymnopilus punctifolius	x[2]					
Gyromitra californica					x[6]	
Gyromitra esculenta	x					
Gyromitra infula	x					
Gyromitra melaleucoides	x					
Gyromitra montana	x					
Hebeloma olympianum			x			
Helvella crassitunicata			x			
Helvella elastica	x					
Helvella maculata	x					
Hydnotrya inordinata			x			
Hydnotrya subnix			x			
Hydnum umbilicatum	x					
Hydropus marginellus			x			
Hygrophorus caeruleus			x			
Hygrophorus saxatilis	x					
Hygrophorus vernalis			x			
Hypomyces luteovirens			x			
Leucogaster citrinus	x					
Leucogaster microsporus			x			
Macowanites chlorinosmus			x			
Macowanites mollis			x			
Marasmius applanatipes			x			
Mycena hudsoniana			x			
Mycena monticola	x					
Mycena overholtsii	x					
Mycena quinaultensis			x			
Mycena tenax	x					
Mythicomyces corneipes			x			
Neolentinus adhaerens			x			
Neolentinus kauffmanii	x					
Neournula pouchetii	x					
Nivatogastrium nubigenum	x					
Octavianina cyanescens			x			
Octavianina macrospora			x			
Otidea leporina	x					
Otidea onotica	x					
Otidea smithii			x			
Phaeocollybia attenuata	x					
Phaeocollybia californica					x[6]	
Phaeocollybia dissiliens					x[6]	
Phaeocollybia fallax					x[6]	x[6]
Phaeocollybia gregaria			x			
Phaeocollybia kauffmanii	x					
Phaeocollybia olivacea	x					

Table 3&4-17. Species Outcomes

TAXA GROUP *Species*[1]	Sufficient Habitat Under all Alternatives - *Outcomes 1 and 2*	Insufficient Information to Determine an Outcome - *Outcome 4*	Insufficient Habitat - *Outcome 3*			
			Not caused by Federal Action	Caused by Management Under Alt. 1	Caused by Management Under Alt. 2	Caused by Management Under Alt. 3
Phaeocollybia oregonensis	x					
Phaeocollybia piceae					x[6]	
Phaeocollybia pseudofestiva					x[6]	
Phaeocollybia scatesiae					x[6]	
Phaeocollybia sipei					x[6]	
Phaeocollybia spadicea					x[6]	
Phellodon atratus	x					
Pholiota albivelata			x			
Pithya vulgaris	x					
Plectania melastoma	x					
Plectania milleri	x					
Podostroma alutaceum			x			
Polyozellus multiplex					x[6]	
Pseudaleuria quinaultiana			x			
Ramaria abietina	x					
Ramaria amyloidea					x[6]	
Ramaria araiospora					x[6]	
Ramaria aurantiisiccescens					x[6]	
Ramaria botryis var. *aurantiiramosa*			x			
Ramaria celerivirescens	x					
Ramaria claviramulata			x			
Ramaria concolor f. marrii		x				
Ramaria concolor f. tsugina			x			
Ramaria conjunctipes var. *sparsiramosa*	x					
Ramaria coulterae			x			
Ramaria cyaneigranosa					x[6]	
Ramaria gelatiniaurantia	x					
Ramaria gracilis			x			
Ramaria hilaris var. *olympiana*			x			
Ramaria largentii					x[6]	
Ramaria lorithamnus			x			
Ramaria maculatipes			x			
Ramaria rainierensis			x			
Ramaria rubella var. *blanda*			x			
Ramaria rubribrunnescens			x			
Ramaria rubrievanescens					x[6]	
Ramaria rubripermanens	x[2]					
Ramaria spinulosa var. *diminutiva*			x			
Ramaria stuntzii					x[6]	
Ramaria suecica			x			
Ramaria thiersii			x			
Ramaria verlotensis			x			
Rhizopogon abietis			x			

Table 3&4-17. Species Outcomes

TAXA GROUP *Species*[1]	Sufficient Habitat Under all Alternatives - *Outcomes 1 and 2*	Insufficient Information to Determine an Outcome - *Outcome 4*	Insufficient Habitat - *Outcome 3*			
			Not caused by Federal Action	Caused by Management Under Alt. 1	Caused by Management Under Alt. 2	Caused by Management Under Alt. 3
Rhizopogon atroviolaceus			x			
Rhizopogon brunneiniger			x			
Rhizopogon chamaleontinus			x			
Rhizopogon ellipsosporus			x			
Rhizopogon evadens var. *subalpinus*			x			
Rhizopogon exiguus			x			
Rhizopogon flavofibrillosus			x			
Rhizopogon inquinatus			x			
Rhizopogon truncatus	x					
Rhodocybe speciosa			x			
Rickenella swartzii	x					
Russula mustelina			x			
Sarcodon fuscoindicus					x[6]	
Sarcodon imbricatus	x					
Sarcosoma latahense	x					
Sarcosoma mexicana	x					
Sarcosphaera eximia	x					
Sedecula pulvinata			x			
Sowerbyella rhenana					x[6]	
Sparassis crispa					x[6]	x[6]
Spathularia flavida	x					
Stagnicola perplexa			x			
Thaxterogaster pavelekii			x			
Tremiscus helvelloides	x					
Tricholoma venenatum			x			
Tricholomopsis fulvescens			x			
Tuber asa			x			
Tuber pacificum			x			
Turbinellus floccosus (California)	x					
Tylopilus porphyrosporus	x					
Zelleromyces papyracea			x			
LICHENS						
Bryoria pseudocapillaris			x			
Bryoria spiralifera			x			
Bryoria subcana			x			
Bryoria tortuosa	x[4]					
Buellia oidalea			x			
Calicium abietinum		x				
Calicium adspersum		x				
Calicium glaucellum	x					
Calicium viride	x					
Cetrelia cetrarioides	x					
Chaenotheca chrysocephala	x					
Chaenotheca ferruginea	x					
Chaenotheca furfuracea	x					

Table 3&4-17. Species Outcomes

TAXA GROUP *Species*[1]	Sufficient Habitat Under all Alternatives - *Outcomes 1 and 2*	Insufficient Information to Determine an Outcome - *Outcome 4*	Insufficient Habitat - *Outcome 3*			
			Not caused by Federal Action	Caused by Management Under Alt. 1	Caused by Management Under Alt. 2	Caused by Management Under Alt. 3
Chaenotheca subroscida			x			
Chaenothecopsis pusilla	x					
Cladonia norvegica	x					
Collema nigrescens (WA and OR, except in OR Klamath Physiographic province)		x				
Dendriscocaulon intricatulum	x[2]					
Dermatocarpon meiophyllizum	x					
Fuscopannaria saubinetii			x			
Heterodermia sitchensis		x				
Hypogymnia duplicata	x					
Hypogymnia oceanica	x					
Hypogymnia vittata		x				
Hypotrachyna revoluta			x			
Leptogium burnetiae var. *hirsutum*		x				
Leptogium cyanescens			x			
Leptogium rivale	x					
Leptogium teretiusculum			x			
Lobaria linita	x					
Lobaria oregana			x			
Microcalicium arenarium		x				
Nephroma bellum	x					
Nephroma isidiosum		x				
Nephroma occultum					x	x
Niebla cephalota			x			
Pannaria rubiginosa			x			
Peltigera pacifica	x					
Platismatia lacunosa	x[2]					
Pseudocyphellaria perpetua			x			
Pseudocyphellaria rainierensis					x	x
Pyrrhospora quernea			x			
Ramalina pollinaria			x			
Ramalina thrausta	x					
Stenocybe clavata		x				
Teloschistes flavicans			x			
Tholurna dissimilis (south of Columbia River)		x				
Usnea hesperina			x			
Usnea longissima	x					
BRYOPHYTES						
Brotherella roellii		x				
Buxbaumia viridis	x					
Diplophyllum albicans	x					
Diplophyllum plicatum	x					

Table 3&4-17. Species Outcomes

TAXA GROUP *Species*[1]	Sufficient Habitat Under all Alternatives - *Outcomes 1 and 2*	Insufficient Information to Determine an Outcome - *Outcome 4*	Insufficient Habitat - *Outcome 3*			
			Not caused by Federal Action	Caused by Management Under Alt. 1	Caused by Management Under Alt. 2	Caused by Management Under Alt. 3
Encalypta brevicolla var. crumiana		x				
Herbertus aduncus		x				
Iwatsukiella leucotricha	x					
Kurzia makinoana		x				
Marsupella emarginata var. *aquatica*					x	
Orthodontium gracile	x					
Ptilidium californicum (California)	x					
Racomitrium aquaticum	x					
Rhizomnium nudum	x					
Schistostega pennata	x					
Tetraphis geniculata	x					
Tritomaria exsectiformis		x				
Tritomaria quinquedentata		x				
VERTEBRATES						
Del Norte salamander *Plethodon elongatus*	x					
Larch Mountain salamander *Plethodon larselli*	x[3]					
Shasta salamander *Hydromantes shastae*	x[3]					
Siskiyou Mountains salamander *Plethodon stormi*	x[3]					
Van Dyke's salamander *Plethodon vandykei*	x[3]					
Great Gray Owl *Strix nebulosa*	x[2]					
Oregon Red Tree Vole *Arborimus longicaudus*	x[5]					
MOLLUSKS						
Ancotrema voyanum	x					
Cryptomastix devia	x					
Cryptomastix hendersoni	x					
Deroceras hesperium	x					
Fluminicola n. sp. 1	x					
Fluminicola n. sp. 2	x					
Fluminicola n. sp. 3	x					
Fluminicola n. sp. 11	x					
Fluminicola n. sp. 15					x	
Fluminicola n. sp. 16					x	
Fluminicola n. sp. 17					x	
Fluminicola n. sp. 18					x	
Fluminicola n. sp. 19					x	
Fluminicola n. sp. 20					x	
Fluminicola potemicus					x	
Fluminicola seminalis	x[2]					

Table 3&4-17. Species Outcomes

TAXA GROUP *Species*[1]	Sufficient Habitat Under all Alternatives - *Outcomes 1 and 2*	Insufficient Information to Determine an Outcome - *Outcome 4*	Insufficient Habitat - *Outcome 3*			
			Not caused by Federal Action	Caused by Management Under Alt. 1	Caused by Management Under Alt. 2	Caused by Management Under Alt. 3
Helminthoglypta hertleini	x					
Helminthoglypta talmadgei	x					
Hemphillia burringtoni	x					
Hemphillia glandulosa	x					
Hemphillia malonei	x					
Hemphillia pantherina		x				
Juga (O) n. sp. 2	x					
Juga (O) n. sp. 3					x	
Lyogyrus n. sp. 1	x					
Lyogyrus n. sp. 2	x					
Lyogyrus n. sp. 3					x	
Megomphix hemphilli	x					
Monadenia chaceana	x[2]					
Monadenia churchi	x					
Monadenia fidelis minor	x					
Monadenia infumata ochromphalus	x					
Monadenia troglodytes troglodytes	x					
Monadenia troglodytes wintu	x					
Oreohelix n. sp.	x					
Pristiloma arcticum crateris	x					
Prophysaon coeruleum (Washington and California)	x					
Trilobopsis roperi	x					
Trilobopsis tehamana	x					
Vertigo n. sp.	x					
Vespericola pressleyi	x					
Vespericola shasta	x					
Vorticifex klamathensis sinitsini	x					
Vorticifex n. sp. 1					x	
VASCULAR PLANTS						
Arceuthobium tsugense mertensianae (Washington)	x					
Bensoniella oregana (California)	x					
Botrychium minganense (Oregon and California)	x					
Botrychium montanum	x					
Coptis asplenifolia	x					
Coptis trifolia	x					
Corydalis aquae-gelidae	x					
Cypripedium fasciculatum	x					
Cypripedium montanum	x[4]					
Eucephalus vialis	x					

Table 3&4-17. Species Outcomes

TAXA GROUP *Species*[1]	Sufficient Habitat Under all Alternatives - *Outcomes 1 and 2*	Insufficient Information to Determine an Outcome - *Outcome 4*	Insufficient Habitat - *Outcome 3*			
			Not caused by Federal Action	Caused by Management Under Alt. 1	Caused by Management Under Alt. 2	Caused by Management Under Alt. 3
Galium kamtschaticum (Olympic Peninsula, WA Eastern Cascades, OR & WA Western Cascades physiographic provinces, south of Snoqualmie Pass)	x					
Platanthera orbiculata var. *orbiculata*	x					

[1] Current taxonomic name. Any differences between these and previous NWFP documents are displayed in Table 3&4-18.

[2] While this species has sufficient habitat range-wide in the NWFP area, the species has insufficient habitat in a portion of its range under Alternative 2.

[3] While this species has sufficient habitat range-wide in the NWFP area, the species has insufficient habitat in a portion of its range under Alternatives 2 and 3.

[4] While this species has sufficient habitat range-wide in the NWFP area, the species has insufficient habitat in a portion of its range under Alternatives 1, 2, and 3.

[5] While this species has sufficient habitat range-wide in the NWFP area, the species has insufficient habitat in a portion of its range under all alternatives. Under Alternatives 2 and 3, a larger portion of its range would have insufficient habitat, while still having sufficient habitat range-wide.

[6] While these fungi have insufficient habitat range-wide when removed from Survey and Manage, they have sufficient habitat in the portion of the range that is protected by SSSPs.

Table 3&4-18. Species with Multiples Names

TAXA GROUP *Species*	Where recent taxonomy work has changed a species' name, the first column is the current accepted name used in this document. The second column is the name(s) used in one or more previous NWFP documents.
FUNGI	
Acanthophysium farlowii	syn. *Aleurodiscus farlowii*
Albatrellus caeruleoporus	Misspelled as *Albatrellus caeruleporus* in ORNHIC documents
Arcangeliella camphorata	*Arcangeliella* sp. nov. #Trappe 12382; *Arcangeliella* sp. nov. #Trappe 12359
Balsamia nigrens	syn. *Balsamia nigra, Balsamia nigrescens*
Bondarzewia mesenterica	syn. *Bondarzewia Montana*
Bridgeoporus nobilissimus	syn. *Oxyporus nobilissimus*
Catathelasma ventricosa	*Catathelasma ventricosum*
Chalciporus piperatus	syn. *Boletus piperatus*
Chamonixia caespitosa	*Chamonixia pacifica* sp. nov. #Trappe #12768
Chromosera cyanophylla	syn. *Mycena lilacifolia*
Clavariadelphus occidentalis	syn. *Clavariadelphus pistillaris*
Clavariadelphus truncatus	syn. *Clavariadelphus borealis*
Clavulina castanopes v. *lignicola*	syn. *Clavulina ornatipes*
Cortinarius barlowensis	syn. *Cortinarius azureus*
Cortinarius depauperatus	syn. *Cortinarius spilomeus*
Cortinarius speciosissimus	syn. *Cortinarius rainierensis*
Cortinarius umidicola	syn. *Cortinarius canabarba*
Cystangium idahoensis	syn. *Martellia idahoensis*
Cystangium lymanensis	syn. *Macowanites lymanensis*
Dichostereum boreale	syn. *Dichostereum granulosum*
Entoloma nitidum	syn. *Rhodocybe nitida*
Fayodia bisphaerigera	syn. *Fayodia gracilipes*
Fevansia aurantiaca	*Alpova* sp. nov. # Trappe 1966
Gastroboletus vividus	*Gastroboletus* sp. nov. #Trappe 2897; *Gastroboletus* sp. nov. #Trappe 7515
Gastrosuillus amaranthii	*Gastrosuillus* sp. nov. #Trappe 9608
Gastrosuillus umbrinus	*Gastroboletus* sp. nov. #Trappe 7516
Gymnomyces abietis	*Gymnomyces* sp. nov. #Trappe 1690, 1706, 1710; *Gymnomyces* sp. nov. #Trappe 4703, 5576; *Gymnomyces* sp. nov. #Trappe 5052; *Gymnomyces* sp. nov. #Trappe 7545; *Martellia* sp. nov. #Trappe 1700; *Martellia* sp. nov. #Trappe 311; *Martellia* sp. nov. #Trappe 5903
Gymnomyces fragrans	syn. *Martellia fragrans*
Gymnomyces nondistincta	*Martellia* sp. nov. #Trappe 649
Gyromitra californica	*Pseudorhizina californica*
Hebeloma olympianum	syn. *Hebeloma olympiana*
Hydnotrya inordinata	*Hydnotrya* sp. nov. #Trappe 787, 792
Hydnotrya subnix	*Hydnotrya subnix* sp. nov. #Trappe 1861
Hydropus marginellus	syn. *Mycena marginella*
Hygrophorus saxatilis	syn. *Hygrophorus karstenii*
Mycena quinaultensis	*Mycena quiniaultensis*
Octavianina cyanescens	*Octavianina* sp. nov. #Trappe 7502, *Octaviania cyanescens*
Octavianina macrospora	*Octaviania macrospora*
Phaeocollybia oregonensis	syn. *Phaeocollybia carmanahensis*
Phellodon atratus	syn. *Phellodon atratum*
Pholiota albivelata	*Stropharia albovelata*
Ramaria conjunctipes var. *sparsiramosa*	syn. *Ramaria fasciculata* var. *sparsiramosa*
Ramaria spinulosa var. *diminutiva*	syn. *Ramaria spinulosa*

Table 3&4-18. Species with Multiples Names

TAXA GROUP *Species*	Where recent taxonomy work has changed a species' name, the first column is the current accepted name used in this document. The second column is the name(s) used in one or more previous NWFP documents.
Rhizopogon chamaleontinus	*Rhizopogon* sp. nov. #Trappe 9432
Rhizopogon ellipsosporus	*Alpova* sp. nov. # Trappe 9730
Rickenella swartzii	syn. *Rickenella setipes*
Sowerbyella rhenana	syn. *Aleuria rhenana*
Thaxterogaster pavelekii	*Thaxterogaster* sp. nov. #Trappe 4867, 6242, 7427, 7962, 8520
Tuber asa	*Tuber* sp. nov. #Trappe 2302
Tuber pacificum	*Tuber* sp. nov. #Trappe 12493
Turbinellus floccosus	syn. *Gomphus floccosus, G. bonarii*
Tylopilus porphyrosporus	syn. *Tylopilus pseudoscaber*
Zelleromyces papyracea	syn. *Octavianina papyracea*
LICHENS	
Dermatocarpon meiophyllizum	misidentified as *D. luridum* in NWFP 1994, 2000, and 2004 FSEIS.
Fuscopannaria saubinetii	taxanomic revision from *Pannaria saubinetii*
Hypogymnia duplicata	syn. *H. elongata*
Hypogymnia vittata	misspelled in FEMAT as *Hygomnia vittiata*
Leptogium burnetiae var. *hirsutum*	syn. *L. hirsutum*
Leptogium rivale	Misspelled as *Leptogium rivulare* in ORNHIC documents
Pseudocyphellaria perpetua	misapplied name *P. mougeotiana* in FEMAT, NWFP 1994, and 2000 FSEIS. Also called *Pseudocyphellaria* sp. 1 in Management Recommendations (Lesher et al. 2000)
Pyrrhospora quernea	syn. *Lecidea quernea, Problastenia quernea*
BRYOPHYTES	
Encalypta brevicolla var. *crumiana*	Also known as *E. brevicollis*
Racomitrium aquaticum	Now known as *Codriophorus ryszardii*
MOLLUSKS	
Fluminicola potemicus	*Fluminicola* n. sp. 14
Monadenia infumata ochromphalus	syn. *M. fidelis klamathica* and *M. f. ochromphalus*
VASCULAR PLANTS	
Eucephalus vialis	syn. *Aster vialis*
Platanthera orbiculata var. *orbiculata*	syn. *Habenaria orbiculata*

Glossary

Accessioned - Something that has been acquired or added; an acquisition.

Acre - A land area measurement based on horizontal plane; 43,560 square feet; 1/640th of a square mile; approximately 4/10ths of a hectare; if square, nearly 209 feet on a side.

Actually rare - Phrase used to denote species that truly only exist in a few sites, as opposed to species considered rare (for example, under the Survey and Manage criteria) simply because very few sites are currently known. Thus "actually rare" is a subset of species classified as "rare" under Survey and Manage.

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 Standards and Guidelines (USDA, USDI 1994a).

Adaptive Management Areas - Land allocation under the Northwest Forest Plan; areas designated for development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives.

Administratively Withdrawn Areas - Areas removed from the suitable timber base through agency direction and land and resource management plans.

Alternative - One of several policies, plans, or projects proposed for making decisions (USDA, USDI 1994a).

Amphibians - Cold-blooded vertebrates, including frogs, toads, salamanders, and newts, having four limbs and glandular skin, tied to moist or aquatic habitats for all or at least part of their life cycle.

Annual Species Review (ASR) - Process conducted by a regional-level interagency group including taxa experts meeting at least annually to weigh new information about species against the three basic criteria for inclusion/retention in Survey and Manage, and make decisions about additions and deletions of species or moving them between categories. The process and the criteria to which the group must adhere are described in the Survey and Manage Standards and Guidelines, Appendix 1, Section IV, Adaptive Management Process.

Anthropogenic - Involving the impact of humans on nature; effects or processes derived, induced or altered by the presence and activities of humans.

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).

Assessment species - A Special Status Species Category established by Oregon/Washington BLM. Assessment species include plant (vascular and non-vascular) and vertebrate species that are not presently eligible for official federal or state status but are of concern in Oregon or Washington and may, at a minimum, need protection or mitigation in BLM activities. These species will be considered as a level of special status species separate from Bureau Sensitive.

Biological Zone - Any area or zone designated for the purpose of describing biological processes. In this case, a subdivision of the red tree vole range delineated because of perceived differences in habitat conditions, species status, or health.

Bryophytes - Plants of the phylum *Bryophyta*, including mosses, liverworts, and hornworts; characterized by the lack of true roots, stems, and leaves (USDA, USDI 1994a).

Candidate Species - Those plant and animal species that, in the opinion of the U.S. Fish and Wildlife Service (FWS) or NOAA Fisheries, qualify for listing as endangered or threatened. Candidates are taxa for which the FWS has on file sufficient information to support proposals for listing.

Category - Survey and Manage 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.

Clade - A group of organisms, such as a species, whose members share homologous features derived from a common ancestor.

Clearance surveys - see Surveys Prior to Habitat-Disturbing Activities.

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).

Congener - A member of the same kind, class, or group; an organism belonging to the same taxonomic genus as another organism.

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). Includes similar areas established by Executive Order such as National Monuments.

Conservation Agreement - A formal written document agreed to by federal agencies, tribes, state agencies, local governments, and/or the private sector to achieve the conservation of species through voluntary cooperation. It documents the specific actions and responsibilities for which each party agrees to be accountable. The objective of a Conservation Agreement is to reduce threats to a species and/or its habitat. An effective Conservation Agreement may lower listing priority or eliminate the need to list a species.

Conservation Assessment - A technical document that describes the current state of knowledge for the life history, habitat requirements, and management considerations for a species or group of species throughout its occupied range on the lands managed by the cooperating agencies. Habitat conservation assessments are often done as a forerunner to preparation of a conservation agreement.

Conservation Strategy - an interagency technical document based on the available scientific information for a species or group of species that discuss the biological and ecological factors of the species and determines if management actions are necessary for a species or group of species to persist over time. If actions are necessary, the strategy describes the actions land management agencies must take to maintain a species or group of species and usually include a monitoring plan. Conservation Strategies can also be known as Management Strategies.

Decay Class - Decaying logs are classified into five separate classes depending on their state of decay. The five classes are:

Class 1: Intact, recently downed trees. Bark is intact and not loose. No invading roots are present. Log is structurally sound.

Class 2: There is some loose bark, but most bark is difficult to pull from log. No invading roots are present. Structurally, the sapwood is somewhat decayed while the heartwood is mostly sound.

Class 3: Bark is easily pulled from the log or is absent. The stem is partly rotted. There are invading roots present only in the sapwood. The sapwood is decayed, but the heartwood is still mostly sound.

Class 4: The log is deeply decomposed with invading roots throughout. Bark has fallen off or is absent. Heartwood is rotten and branch stubs are easily pulled out.

Class 5: Hummocks of wood chunks and organic material. Bark has fallen off or is absent. Invading roots are present throughout wood chunks. There is no structural integrity.

Dendrochronological - process of analyzing tree rings to determine dates and the chronological order of past events.

Ecological amplitude - The breadth of the biological and environmental requirements of a species such as temperature, moisture, soil types, hosts, and stand ages.

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.

Effects - Effects, impacts, and consequences 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 or endemism - Unique to a specific locality or the condition of being unique to a specific locality.

Endangered Species - A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register (USDA, USDI 1994a).

Endangered Species Act (ESA) - A law passed in 1973 to conserve species of wildlife and plants determined by the Director of the Fish and Wildlife Service or the NOAA Fisheries to be endangered or threatened with extinction in all or a significant portion of its range. Among other measures, ESA requires all federal agencies to conserve these species and consult with the Fish and Wildlife Service or NOAA Fisheries on federal actions that may affect these species or their designated critical habitat.

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 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 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 them from being consistently located during site-specific surveys.

Extant - Still present.

Extirpate - To destroy or eliminate completely. Extirpate is not necessarily synonymous with extinction, since the term may be applied to certain populations or areas within the range of a given species. The elimination of a species from a particular area (USDA, USDI 1994a).

Forest Ecosystem Management Assessment Team (FEMAT) - A 1993 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.

Fungi - Saprophytic and parasitic spore-producing organisms that lack chlorophyll and include molds, rusts, mildews, smuts, mushrooms, and yeasts.

GeoBOB (Geographic Biotic Observations) - A relational geodatabase used by the Oregon and Washington offices of the BLM, which stores spatial and attribute data on species of interest to the BLM and Region 6 of the Forest Service. This database currently holds legacy Survey and Manage species locations for both the BLM and the Forest Service. The data on Survey and Manage species on lands administered by the Forest Service are being moved to the Forest Service databases.

GOBIG2K - A random RMS-type survey for mollusks in California.

Habitat - Place or environment where a plant or animal naturally or normally lives and grows. For surveys: habitat specific to the species being surveyed, generally described in Survey Protocols or Management Recommendations.

Habitat Conservation Assessment - A comprehensive, state-of-knowledge technical document that describes life history, habitat requirements, and management considerations for a species or group of species throughout its/their occupied range on the lands managed by the cooperating agencies.

Habitat-disturbing activity - Activities with disturbances likely to have a substantial negative impact on the species habitat, its life cycle, microclimate, or life support requirements. See additional detail in the Standards and Guidelines, Appendix 1.

Haplotype - A set of closely linked genetic markers present on one chromosome that tend to be inherited together (not easily separable by recombination).

Hazardous fuel treatments - A management activity that is designed to reduce fuel levels and reduce burn intensity. Hazardous fuel treatments include, but are not limited to, thinning tree stands, creating fuel breaks, controlling bark beetle infestations, and prescribed fire.

Hectare (ha) - 10,000 meters^2 (about 2.5 acres)

High-priority sites - A site or group of sites deemed necessary for species persistence. 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. High-priority sites are those deemed necessary to ensure species persistence.

Hypermaritime - Very wet maritime, typically restricted to lower elevations very near the coast (fog belt).

In-growth - A growing inward (as to fill a void). Used herein, refers to acreage increases (as a result of aging or growth) of late-successional and old-growth forests within defined areas such as reserves.

Interagency Species Management System (ISMS) - An interagency database system that contains information about Survey and Manage species in the Northwest Forest Plan area, including known sites, species locations, and habitats.

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.

Issue - A point, matter, or question of public discussion or interest to be addressed or decided through the planning process.

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 include 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 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. Also see "site" for description of size or components.

Land management - The intentional process of planning, organizing, programming, coordinating, directing, and controlling land use actions.

Land allocation - Commitment of a given area of land or a resource to one or more specific uses (such as campgrounds or Wilderness). In the Northwest Forest Plan, one of the seven allocations of Congressionally Withdrawn Areas, Late-Successional Reserves, Adaptive Management Areas, Managed Late-Successional Areas, Administratively Withdrawn Areas, Riparian Reserves, or Matrix.

Landscape - A heterogeneous land area with interacting ecosystems repeated in similar form throughout (USDA, USDI 1994a).

Late-successional forests - Forest stands consisting of trees, structural attributes, supporting biological communities, and processes associated with old-growth and/or mature forests (USDA, USDI 1994a). Forest seral stages that include mature and old-growth age classes (USDA, USDI 1994a). These stands exhibit increasing stand diversity, patchy multi-layered canopy, trees of several age classes, larger standing dead trees (snags), large woody debris, and species that represent the potential natural community (FEMAT 1993). Age is not a defining characteristic but has been used as a proxy or indicator in the past. Minimum ages vary depending on the site quality, species, and rate of stand development.

Late-Successional Reserve - 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 - Organisms consisting of a fungus and a photosynthetic partner (green algae, cyanobacteria, or both) growing together in a mutually beneficial relationship. The composite form is strongly altered in appearance, physiology, reproduction, and chemistry, compared to free living fungi, algae, or bacteria.

Line officer - In the BLM and Forest Service, the individual managers in the direct chain of command.

Listed Species - A plant or animal identified and defined in accordance with the 1973 Endangered Species Act as threatened or endangered.

Listing - The designation of a species as threatened or endangered under the 1973 Endangered Species Act.

Macroinvertebrates - Any non-vertebrate organism that is large enough to been seen without the aid of a microscope.

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. 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 Recommendation - An interagency document that addresses how to manage known sites and that provides guidance to Agency efforts in conserving Survey and Manage species. They describe the habitat parameters that provide for maintaining the taxon at that site. They may also identify high-priority sites for uncommon species or provide other information to support management direction. See additional detail in the Standards and Guidelines, Appendix 1.

Management Strategy - see Conservation Strategy.

Matrix - Federal lands outside of reserves, withdrawn areas, Managed Late-Successional Areas, and Adaptive Management Areas (USDA, USDI 1994a).

Mature forest - A subset of late-successional forests. Mature forests are characterized by the onset of slowed height growth, crown expansion, heavier limbs, gaps, some mortality in larger trees, and appearance of more shade-tolerant species or additional crown layers (Adapted from USDA, USDI 1994b:B-2 and B-3).

Mesic - Of, characterized by, or adapted to a moderately moist habitat.

Microclimate - The suite of climatic conditions measured in localized areas near the earth's surface. Microclimate variables important to habitat may include temperature, light, wind speed, and moisture.

Mitigation - From NEPA implementing regulations: Avoiding, minimizing, rectifying, reducing, or compensating for adverse effects of a proposed action or alternatives.

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 slugs, snails, clams, or squids) that have a soft unsegmented body usually 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, stimulates the health and welfare of humanity, enriches the understanding of the ecological systems and natural resources important to the nation, and establishes 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.

Northwest Forest Plan - Coordinated ecosystem management direction incorporated into land and resource management plans for lands administered by the BLM and the Forest Service within the range of the northern spotted owl. In April 1993, then 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 the 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." The Northwest Forest Plan is not a "plan" in the agency planning regulations sense; the term instead refers collectively to the 1994 amendment to existing agency land and resource management plans or to the specific standards and guidelines for late-successional species incorporated into subsequent land and resource management plans.

Odds Ratio - A measure of effect size particularly important in Bayesian statistics and logistic regression. It is defined as the ratio of the odds of an event occurring in one group to the odds of it occurring in another group, or to a data-based estimate of that ratio. An odds ratio of 1 indicates that the condition or event under study is equally likely in both groups.

Old-growth forest - An ecosystem distinguished by old trees and related structural attributes. Old-growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species, composition, and ecosystem function. More specific parameters applicable to various species are available in the 1993 Interim Old-Growth Definitions (USDA Forest Service Region 6). The Northwest Forest Plan SEIS and FEMAT describe old-growth forest as 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).

Outcome - A reasoned determination of whether a particular species would be at high risk of extirpation. This determination was based on numerous factors including (1) the reserve system; (2) Matrix and Adaptive Management Area Standards and Guidelines; (3) provisions for species management under the Survey and Manage or Special Status Species Programs; (4) species range, distribution, and/or populations; (5) species life history and habitat needs; and, (6) number of known sites. Information from FEMAT; the Northwest Forest Plan Final SEIS; the 2000 Survey and Manage Final SEIS; the 2001, 2002, and 2003 Annual Species Review; and the GeoBOB/ISMS database, along with the professional knowledge of taxa experts was used to make the determination. Since each species has different life histories, ranges, distributions, and habitat needs, it is impossible to devise a single set of precise thresholds for determining what constitutes a high risk. Determinations are based on the professional evaluation of experts and tend to be qualitative. The four potential outcomes used to inform management decisions are:

1. Habitat (including known sites) is sufficient to support stable populations in the Northwest Forest Plan area
2. Habitat (including known sites) is sufficient to support stable populations range-wide in the Northwest Forest Plan area, although there is insufficient habitat to support stable populations in a portion of the Northwest Forest Plan area.
3. Habitat (including known sites) is insufficient to support stable populations in the Northwest Forest Plan area.
4. There is insufficient information to determine an outcome.

The Oregon Natural Heritage Information Center - ORNHIC is part of the Oregon State University Institute for Natural Resources in the Research Office. Their mission is to identify the plant, animal, and ecological community resources of Oregon. As part of the Natural Heritage Network and NatureServe, the Oregon Natural Heritage Information Center contributes to an understanding of global biodiversity and provides tools for managers and the public to better protect vanishing species and communities.

Oregon Natural Heritage Program - The Oregon Natural Heritage Program is a cooperative, interagency effort to identify the animal and plant community resources of Oregon. The program is managed by the Oregon Natural Heritage Information Center, part of the Oregon State University's Institute for Natural Resources, under a cooperative agreement with the Oregon Division of State Lands. The Natural Heritage Program was established by the Oregon Natural Heritage Act, and is overseen by the Natural Heritage Advisory Council, a board appointed by the Governor.

Persistence (as in persistence objective for a species) - An abbreviated expression of the species management objectives for the Survey and Manage Standards and Guidelines. Generally the persistence objective for vertebrates is based on the Forest Service viability provision in the regulations implementing NFMA. For non-vertebrates, it is a similar standard to the extent practicable. See "Species Persistence Objective" in the 2001 Survey and Manage Standards and Guidelines for more details. Use in the Standards and Guidelines such as "sites not needed for persistence" includes an understood "reasonable assurance of" or "to the extent practicable."

Persistence (as in persistence at a site) - Continued occupancy by a species at a known site.

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). See Figure 1 in Appendix 1.

Planning area - All of the lands within a federal agency's management boundary addressed in land management plans (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 features result in being able to reliably locate the species, if the species is present, within one or two field seasons and with a reasonable level of effort. Characteristics determining practicality 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 additional detail in the Standards and Guidelines, Appendix 1

Pre-disturbance surveys - see Surveys Prior to Habitat-Disturbing Activities.

Pre-project clearances - activities conducted to learn whether a species is present or potentially present in a geographic area. Pre-project clearances may include, but are not limited to,

- clearance surveys;
- field clearances;
- field reconnaissance;
- inventories;
- habitat examinations;
- habitat evaluation;
- evaluation of species-habitat associations and presence of suitable or potential habitat;
- review of existing survey records, inventories, and spatial data;
- utilization of professional research, literature, and other technology transfer sources; or
- use of expertise, both internal and external, that is based on documented, substantiated professional rationale.

Pre-project clearances are completed prior to habitat-disturbing activities to determine the presence of a species or its habitat and the effect of management actions on the species.

Prescribed fire - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Proposed species - Any plant or animal species that is proposed by the Fish and Wildlife Service or NOAA Fisheries in a Federal Register notice to be listed as threatened or endangered.

Proposive surveys - One type of landscape-scale or strategic survey, proposive surveys are focused searches conducted where taxa experts anticipate finding the target species. They are used to find sites of the rarest species, i.e. those that may not be picked up in random plots. Also referred to as purposive surveys.

Provinces - Areas of common biological and physical processes. Unless otherwise stated, assumes the 12 Physiographic Provinces shown in Figure 1, Appendix 1.

Public Domain - The remnant 264 million acres (nation-wide) of the original federal lands after sales, homesteading, grants, designation as National Parks and Forests, and so forth, currently administered by the BLM under the Federal Land Policy and Management Act (FLPMA), 1976. As opposed to O&C lands which were granted but re-vested by the O&C Act, which contains its own specific management requirements. FLPMA gives preference to the O&C Act in cases of conflicting direction.

Purposive surveys - see Proposive surveys.

Random Double Sample (RDS) - A two-phase random survey where a subset of the first-phase plots are randomly selected for more a detailed, or larger, examination. Used for red tree vole strategic surveys.

Random Multi Species (RMS) Survey - A two-phase systematic random plot survey, stratified by forest age and reserve/non-reserve land allocation, done for most Survey and Manage species to provide information on species occurrence, distribution, range, and habitat, and refine habitat characterization. See broad-scale Strategic Surveys, Survey and Manage Standards and Guidelines, Appendix 1.

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 Appendix 1.

Record (as applied in the GeoBOB/ISMS database) - 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: (1) states the management decision; (2) states the reason for that decision; (3) identifies all alternatives including the environmentally preferable and selected alternatives; and (4) states whether all practicable measures to avoid environmental harm from the selected alternative have been adopted, and if not, why not (USDA, USDI 1994a).

Reference distribution - Historic or inferred biological distribution pattern of a species (limited by historic potential) that serves as a baseline to compare current and future distribution. For purposes of this analysis, the reference distribution is considered to be "well distributed."

Regeneration Harvest - Harvest of all or nearly all trees in mature stands and establishing a new stand (or major age group) by natural or artificial planting or seeding. As opposed to thinning or salvage harvests.

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 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, BLM, U.S. Fish and Wildlife Service, NOAA Fisheries, 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.

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.

Responsible Official - The agency or department employee who has the delegated authority to make and implement a decision on a proposed action.

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 as dispersal habitat for certain terrestrial species (USDA, USDI 1994b).

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; (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).

Seral stages - The series of relatively transitory plant communities that develop during ecological succession from bare ground to the climax stage (USDA, USDI 1994a).

Site (as in occupied site) - The location where a specimen or population of the target species (taxonomic entity) was located, observed, or presumed to exist (occasionally used as a local option to pre-disturbance surveys for certain vertebrates) based on indicators described in the Survey Protocol or Management Recommendation. Also, the polygon described by connecting nearby or functionally contiguous detections at the same location.

Site (as used in manage known sites) - The occupied site plus any buffer needed to maintain the habitat parameters described in the Management Recommendation.

Site management - Managing an occupied site to maintain the habitat elements needed to provide for persistence of the species at the site. Management 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. Site management may allow loss of some individuals, areas, or elements not affecting continue site occupancy.

Skewness - Asymmetry in a frequency distribution.

South range (for arthropods) - The California Coast Range, the Oregon and California Klamath, and the California Cascades Physiographic Provinces (USDA, USDI 1994a:J-2 37).

Species - A class of individuals having some common characteristics or qualities. In these Standards and Guidelines, synonymous with taxon, which may include subspecies, groups, or guilds.

Special Status Species - As used in this SEIS, the term "Special Status Species" refers only to the following species categories that are included under agency species conservation policies:

Oregon/Washington BLM: Bureau Tracking, Bureau Assessment, and Bureau Sensitive (BLM Manual 6840; Instruction Memorandum No. OR-2003-054; and Instruction Memorandum No. OR-91-57).

California BLM: Bureau Sensitive (BLM Manual 6840 and Manual Supplement 6840.06, Plant Management).

Forest Service Region 5: Sensitive (Forest Service Manual 2670).

Forest Service Region 6: Sensitive (Forest Service Manual 2670).

Stable - A taxon that, over time, maintains population numbers, given inherent levels of population fluctuation and variability of habitats to which they are adapted. The species may become stable at a different population level than the current or (inferred) historical level.

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 - Survey and Manage surveys at the landscape, population, or site-specific scale to address questions that relate to identified objectives for each category. May range from random plot surveys with broad statistical inference, to habitat-focused proposive surveys designed to locate species sites and confirm suspected habitats (v. pre-disturbance or clearance surveys).

Stochastic Event - random event, such as fire, landslide, hurricane, etc.

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 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; (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.

Survey and Manage - Mitigation measure adopted as a set of standards and guidelines within the Northwest Forest Plan Record of Decision and replaced with standards and guidelines in 2001 (Record of Decision) 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. This mitigation measure applies to all land allocations and requires land managers to take certain actions relative to species of plants and animals, particularly some 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 habitat-disturbing activities; and, (3) conduct extensive and general regional (strategic) surveys.

Survey Protocol - Unless otherwise specified, Survey Protocols are for surveys prior to habitat-disturbing activities. These are interagency documents 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 Implementation Guide and may be referred to as strategic survey protocols.

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 additional detail in Appendix 1.

Taxa Expert - Taxa experts are scientists identified by interagency managers as the person responsible for taxonomic identification of specimens collected during field surveys, inventories, or incidental finds. The expert has advanced skills and/or education in the taxonomy, biology, ecology, and habitat needs as well as a strong knowledge and understanding of the research related to a species/taxa. Taxa experts provide scientific input in the preparation of management recommendations, surveys protocols, and during the annual species review.

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).

Tracking species - A special status species category established by Oregon/Washington BLM. The purpose of tracking species is to enable an early warning for species which may become threatened or endangered in the future. BLM Districts in Oregon and Washington are encouraged to collect occurrence data on species for which more information is needed to determine status within the state or which no longer need active

management. Until status of such species changes to federal or state listed, candidate or Assessment species, Tracking species will not be considered as special status species for management purposes.

Uncommon (species) - Species that do not meet the definition for rare, but where concerns for persistence remain. See criteria under "Relative Rarity" in Appendix 1.

Understory - The trees and other woody species growing under the canopies of larger adjacent trees and other woody growth (USDA, USDI 1994a).

Vascular plants - Plants that contain conducting or vascular tissue. They include seed-bearing plants (flowering plants and trees) and spore-bearing plants (ferns, horsetails, and clubmosses).

Vertebrate species - A species that has a backbone or spinal column (includes fish, amphibians, reptiles, birds, and mammals, all of which have a segmented bony or cartilaginous spinal column).

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).

Viability Provision - A provision contained in the National Forest System Land and Resource Management Planning Regulation of 1982, pursuant to the National Forest Management Act. This provision is found in 36 CFR 219.19 and reads as follows: "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area."

Viable population - A wildlife or plant population that contains an adequate number of reproductive individuals appropriately distributed in the planning area to ensure the long-term existence of the species (USDA, USDI 1994a).

Voucher - a specimen of a plant or animal that is preserved and archived for long-term storage along with specific habitat, location, and, at times, identification information.

Well distributed - Distribution sufficient to permit normal biological function and species interactions, considering life history characteristics of the species and the habitats for which it is specifically adapted.

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, educational, scenic, or historical value as well as ecological and geologic interest (USDA, USDI 1994a).

Wildland fire - Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildland fire for resource benefits - A fire that results from natural ignition (i.e. lightning strike) and is permitted to burn because it is resulting in resource benefits, is consistent with the land and resource management plan, is consistent with the fire management plan, and is burning within prescription.

Xeric - Of, characterized by, or adapted to an extremely dry habitat.

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Distribution List and Document Availability on the Internet

This Final Supplement to the 2004 Final Supplemental Environmental Impact Statement (SEIS) is being sent to the following individuals, groups, and organizations. The list includes elected officials; federal agencies; state, local, and county governments; American Indian Tribes and Nations; businesses; other organizations; libraries; and individuals.

The 2007 Final Supplement will also be available on the internet at: http://www.reo.gov/s-m2006.

Elected Officials

California
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John Woolley *County of Humboldt*

Federal Agencies

Advisory Council on Historic Preservation
Bonneville Power Administration
Environmental Protection Agency
- Operations Office

Federal Aviation Administration
- NW Mountain Region
- Western Pacific Region

Federal Energy Regulatory Commission
- Portland Office

Regional Ecosystem Office
U.S. Department of Agriculture
- Animal and Plant Health Inspection Service
- Forest Service
  - Pacific Northwest Regional Office
  - Pacific Southwest Regional Office
  - Pacific Northwest Research Station
  - Pacific Southwest Research Station
  - <u>*California*</u>
  - Klamath National Forest
  - Lassen National Forest
  - Mendocino National Forest
  - Modoc National Forest
  - Shasta-Trinity National Forest
  - Six Rivers National Forest
  - <u>*Oregon*</u>
  - Deschutes National Forest
  - Mt. Hood National Forest
  - Rogue River National Forest
  - Siskiyou National Forest
  - Siuslaw National Forest
  - Umpqua National Forest
  - Willamette National Forest
  - Winema National Forest
  - <u>*Washington*</u>
  - Gifford Pinchot National Forest
  - Mt. Baker-Snoqualmie National Forest
  - Okanogan National Forest
  - Olympic National Forest
  - Wenatchee National Forest
- Natural Resources Conservation Service

U.S. Department of Commerce
- NOAA Fisheries
- Northwest Regional Office
  - Southwest Regional Office
  - Washington State Habitat Office
  - Arcata Field Office
  - Roseburg Field Office

U.S. Department of Defense
- Air Force Deputy Asst. Secretary of Defense
- Army Corps of Engineers
  - Northwest Division
  - PE PF
  - Seattle District
  - South Pacific
  - Walla Walla District
- Naval Submarine Base Bangor

U.S. Department of Energy
U.S. Department of Housing and Urban Development
- Environmental Review Division
- Office of Community Planning & Development
- San Francisco Environmental Review Office

U.S. Department of Interior
- Bureau of Indian Affairs
  - Environmental Coordinator

Aberdeen, WA Office
Portland Area Office
Bureau of Land Management
California
Arcata Field Office
Redding Field Office
State Office
Ukiah Field Office
Oregon
Coos Bay District
Eugene District
Lakeview District
Medford District
Roseburg District
Salem District
Bureau of Reclamation - Pacific NW Region
Fish and Wildlife Service
Oregon Office
Bend Field Office
Tulelake National Wildlife Refuge
Geological Survey
Biological Resources Division
Pacific Northwest District
National Park Service
Fort Vancouver National Historic Site
Olympic National Park
Pacific Northwest Region
Redwood National Park
Office of Environmental Policy & Compliance
Office of the Regional Solicitor
Regional Environmental Office
U.S. Department of Justice
U.S. Department of Transportation
Federal Highway Administration
Oregon Division
Western Division
Western Federal Lands Highway Division
U.S. Ecosystem Restoration Office
U.S. Small Business Administration

State, County, and Local Governments

British Columbia
Ministry Of Water, Land & Air Protection

California
California Regional Water Quality
Caltrans
City of Yreka
Colusa County
Agricultural Department
County of Siskiyou
Del Norte County Board of Supervisors
Department of Fish and Game
Department of Forestry
Department of Forestry & Fire Protection
Department of Water Resources
EEL - Russian River Commission
Glenn County
Agricultural Department
Board of Directors
Board of Supervisors
U.C. Cooperative Extension
Humboldt County Board of Supervisors
Lake County Board of Supervisors
Mendocino County
Board of Supervisors
Planning Department
Water Agency
Board of Supervisors
U.C. Cooperative Extension
North California Water Association
Office of the Governor
Resources Agency
Shasta County Board of Supervisors
Siskiyou County
Administrators
Board of Supervisors
Sonoma County Conservation Action
State Clearinghouse
State Lands Commission
Tehama County
Board of Supervisors
Planning Department
Trinity County Board of County Supervisors

Colorado
San Miguel County

District of Columbia
Rural Utilities Service
Oregon
City of Cottage Grove
City of Klamath Falls
City of Detroit City Hall

Coos County Board of Commissioners
Curry County Board of Commissioners
Department of Agriculture
Department of Energy
Department of Fish & Wildlife
Department of Forestry
Department of Geology and Mineral Industries
Department of Human Resources
Department of Revenue
Department of Transportation
District 17 Watermaster
Douglas County
  Board of Commissioners
  Planning Department
Employment Department
Executive Department
Farm Bureau Federation
Hood River County
Jackson County Commissioners
Jefferson County Commissioners
Josephine County
  Courthouse
  Forestry Department
  Planning Department
Klamath Basin Water Resources Advisory Committee
Klamath County Commissioners
Klamath Irrigation District
Klamath Soil & Water Conservation
Lake County
Lane County Commissioner
Meadows Drainage District
Mohawk Watershed Planning Group
Northwest Power Planning Council
ODA - Noxious Weed Control Program
Office of the Governor
Oregon State Public Interest Research Group
Parks and Recreation
Portland Chamber of Commerce
Portland Water Bureau
Rogue Institute of Economy and Ecology
Rogue Valley Council of Governments
Roseburg DEQ Office
Small Business Administration
Southeastern Advisory Council
State Historic Preservation Office
State Marine Board
State Police
Tillamook County Commissioner

American Indian Tribes and Nations

Alturas Indian Rancheria
Bear River Band Rohnerville Rancheria
Big Lagoon Rancheria
Big Valley Band Pomo Indians Rancheria
Blue Lake Rancheria
Burns Paiute Tribe
Cahto Indian Tribe Laytonville Rancheria
Cher-Ae Heights Community Trinidad Rancheria
Cloverdale Rancheria of Pomo Indians
Colorado River Indian Tribes Reservation
Colville Business Council
Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of Siletz Indians of Oregon
Confederated Tribes of the Chehalis Reservation
Confederated Tribes of the Colville Reservation
Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians of Oregon
Confederated Tribes of the Grand Ronde Community of Oregon
Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes of the Warm Springs Reservation of Oregon
Coquille Indian Tribes
Cortina Indian Rancheria of Wintun Indians
Cow Creek Band of Umpqua Tribe of Indians
Cowlitz Indian Tribe
Coyote Valley Band of Pomo Indians
Dry Creek Rancheria of Pomo Indians
Elem Indian Colony Pomo Sulphur Bank Rancheria
Elk Valley Rancheria
Fort Bidwell Reservation
Grindstone Rancheria of Wintun-Wailaki Indians
Guidiville Band of Pomo Indians
Hoh Indian Tribe
Hoopa Valley Tribe
Hopland Band of Pomo Indians Rancheria
Jamestown S'Klallam Tribe of Indians
Kalispel Indian Community of the Kalispel Reservation
Karuk Tribe of California
Kashia Band Pomo Stewarts Point Rancheria
Klamath Indian Tribe of Oregon
Lower Elwha Tribal Community
Lummi Business Council
Lummi Tribe of the Lummi Reservation, Washington

Makah Indian Tribe of the Makah Indian Reservation
Manchester-Point Arena Band Pomo Indians Rancheria
Mechoopda Indian Tribe of Chico Rancheria
Middletown Rancheria Environmental Center
Middletown Rancheria of Pomo Indians
Mooretown Rancheria
Muckleshoot Indian Tribe
Nez Perce Tribe
Nisqually Indian Community
Nisqually Indian Community Council
Nooksack Indian Tribe
Paskenta Band of Nomlaki Indians
Pit River Tribe Environmental Office
Pit River Tribe of California
Point-No-Point Treaty Council
Port Gamble Band of S'Klallam Indians
Potter Valley Tribe
Puyallup Tribe of the Puyallup Reservation of the State of Washington
Quartz Vallen Indian Community Reservation
Quartz Valley Indian Community Reservation
Quileute Tribe of the Quileute Reservation
Quinault Indian Nation Business Committee
Redding Rancheria
Redwood Valley Rancheria of Pomo Indians
Resighini Rancheria (Coast Indian Community Yurok)
Round Valley Indian Reservation
Rumsey Indian Rancheria of Wintun Indians
Samish Indian Nation
Samish Tribal Council
Sauk-Suiattle Indian Tribe
Scotts Valley Band of Pomo Indians
Sherwood Valley Rancheria of Pomo Indians
Shoalwater Bay Indian Tribe of the Shoalwater Bay Indian Reservation
Skokomish Indian Tribe
Smith River Rancheria
Snoqualmie Tribal Organization
Squaxin Island Tribal Council
Squaxin Island Tribe
Stillaguamish Board of Directors
Suquamish Tribe of the Port Madison Reservation, Washington
Susanville Indian Rancheria
Swinomish Indian Tribal Community
Table Bluff Reservation-Wiyot Tribe
The Klamath Tribes
The Spokane Tribe
The Tulalip Tribes
Twin Rocks Inholders
Upper Lake Band of Pomo Indians Rancheria
Upper Skagit Tribal Council
Yurok Tribe

Businesses

American Forest Resource Council
Ameritite
Armco
Associated Oregon Loggers, Inc.
Boise Cascade Corporation
Brecher & Volker LLP
Buse Timber & Sales Inc.
C & D Lumber Co.
Columbia Helicopters Inc.
Crystal Mountain
David Evans and Associates Inc.
Deixis Consultant
Douglas Timber Operators
Drjohnson Lumber Co
Freres Lumber Co., Inc.
Gerald Jenson Consulting
Haglund, Kirtley, Kelley and Horngren
Huffman & Wright Timber Corp
Industrex Unlimited
Land & Water Consulting Inc.
Lone Rock Timber Co.
Mason, Bruce & Girard, Inc.
Mater Engineering Ltd
McFarland Cascade
Meridian Environmental
Mt Hood Meadows
Northwest Forest Resources
Pacific Analytics LLC
Pacific Northwest Ski Areas Association
Pacific Power and Light
PBS Environmental and Engineering
Roseburg Forest Products
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Simpson Door Co.
Siskiyou Coop Inc.
Starfire Lumber Co.
Swanson Group
T & E Inc.
The Nicholoff Company

The Phoenix Zoo
Thinking Inc.
Timber Products Company
Timberland Logging
US Timberlands Klamath Falls LLC
Washington Contract Loggers Association
Washington Forest Law Center
Woolley Enterprises Inc.
Zip-O-Log Mills

Other Organizations

Allegheny Defense Project
American Alpine Institute
American Lands Alliance
Arc-En-Ciel
BARK
Blue Mountains Biodiversity Project
Cascadia Wildlands Project
Center for Biological Diversity
Citizens Interested In Bull Run
Conservation Northwest
Epic - The Environmental Protection Information Center
Forest Service Employees for Environmental Ethics
Forest Unlimited
Friends of Hope Valley
Gifford Pinchot Task Force
Headwaters
Izaak Walton League of America
Kalmiopsis Audubon Society
Kitsap Audubon Society
Kittitas Audubon Society
Klamath Forest Alliance
Klamath Siskiyou Wildlands Center
Northern California Society of American Foresters
Native Plant Society of Oregon
North Coast Recreation Coalition
Northcoast Environmental Center
Northwest Ecosystem Alliance
Oregon Mycological Society
Oregon Wild
Oregon Wildlife Federation
Pacific Biodiversity Institute
Pacific Northwest 4 Wheel Drive
PEER
Provincial Interagency Executive Committees
- California Coast
- Deschutes
- Eastern Washington Cascades
- Klamath
- Olympic Peninsula
- Oregon Coast
- Sacramento
- Southwest Oregon
- Western Washington Cascades
- Willamette
- Yakima

Public Lands Foundation
Seattle Lichen Guild
Siskiyou Project
Society of American Foresters
The Wilderness Society
Trails Club of Oregon
Umpqua Watersheds
Washington State Hi-Lakers
Washington Trout
Wildwest Institute
Willits Environmental Center
World Wildlife Fund

Libraries, Schools, and Universities

Aberdeen Timberland Library
Albany City Library
Albina Library
Algona Pacific Library
Amanda Park Timberland Library
Applegate Branch Library
Arcata Branch Library
Ashland Public Library
Auburn Library
Bandon Public Library
Battleground Library
Bellevue Regional Library
Belmont Library
Bend Public Library
Black Diamond Library
Bleyhl Community Library
Blue Lake Branch Library
Bothell Regional Library
Boulevard Regional Library
Brownsville Public Library
Burien Library
Butte County Library
C Giles Hunt Memorial Library
California State University, Chico
Camas Public Library
Canyonville Branch Library
Capitol Hill Library
Carnation Library
Carpenter Memorial Library
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Cascade Locks Library
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Central Washington University
Chemult Branch Library
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City Of Springfield Library
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Dallas Library
Del Norte County Library
Des Moines Library
Douglas County Library System
Dufur Community Library
Dunsmuir Library
Duvall Library
Ellensburg Library
Entiat Public Library
Eugene Public Library
Everett Public Library
Evergreen State College
Fairview Columbia Library
Fairwood Library
Fall City Library
Fall River Library
Federal Way 320th Library
Federal Way Regional Library
Ferndale Branch Library
Flora M Laird Memorial Library
Forks Library
Fortuna Branch Library
Foster Library
Ft Bragg Library
Ft Jones Branch Library
Ft Vancouver Regional Library
Garberville Branch
Glendale Branch Library
Gold Beach Public Library
Goldendale Library
Granger Library
Grants Pass Library
Gregory Heights Library
Gresham Library
Happy Camp Library
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Hillsdale Library
Holgate Library
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Shasta College Library
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Simpson College
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Siuslaw Public Library Dist
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Southern Oregon University
Springfield Public Library
St Johns Library
State of Illinois University
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University Of California
University Of Oregon
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Washington Natural Heritage Program
Washougal Library
West Salem Library
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White Salmon Valley Library
White Swan Library
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Willow Creek Branch Library
Willows Public Library
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Woodinville Library
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Woodmont Library
Woodstock Library
Yakima Valley Regional Library
Yoncalla Branch Library
Yreka Library
Zillah Library

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Elmer Bauer
Eli Blavin
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Gail Boness
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BUREAU OF
LAND
MANAGEMENT

US Forest Service

BLM/OR/WA/PT-07/044-1792