Standards and Guidelines

for
Management of Habitat for Late-Successional
and Old-Growth Forest Related Species
Within the Range of the Northern Spotted Owl

Attachment A

to the Record of Decision for Amendments to Forest Service
and Bureau of Land Management Planning Documents
Within the Range of the Northern Spotted Owl

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Outline

All sections of this document, considered together, are the complete compilation of standards and guidelines. However, these standards and guidelines are broken down into the following sections for clarity and ease of reference.

A. Introduction - This section includes introduction, purpose, definition of the planning area, relationship to existing agency plans, introduction to the various land allocation categories used elsewhere in these standards and guidelines, identification of appurtenant maps, and transition standards and guidelines.

B. Basis for Standards and Guidelines - This section includes a background discussion of the objectives and considerations for managing for a network of terrestrial reserves. This section also contains the Aquatic Conservation Strategy, which includes discussions of the objectives and management emphases for Riparian Reserves, Key Watersheds, watershed analysis, and watershed restoration.

C. Standards and Guidelines - This section includes specific standards and guidelines applicable to all land allocation categories. It also contains descriptions of, and standards and guidelines applicable to, all designated areas, matrix, and Key Watersheds.

D. Adaptive Management Areas - This section contains a description of the Adaptive Management Area concept, overall objectives, and information for organizing to accomplish those objectives. A description of each Adaptive Management Area and its particular emphasis is included.

E. Implementation - This section includes the monitoring plan, a description of the adaptive management process, and a description of the interagency structure to ensure consistent and timely implementation of these standards and guidelines. The Regional Ecosystem Office and Regional Interagency Executive Committee, referenced elsewhere in these standards and guidelines, is described here.

F. Index - This section includes a word/topic index designed for readers who are interested in a particular activity.

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for

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Attachment A to the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl

A. Introduction

This document is attached to and a part of the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl*, 1994. It presents a combination of land allocations managed primarily to protect and enhance habitat for late-successional and old-growth forest related species, and standards and guidelines for the management of the land allocations. Except as identified elsewhere in the Record of Decision or otherwise changed since the Final SEIS was released, these standards and guidelines are intended to be consistent with those of Alternative 9 in the Final Supplemental Environmental Impact Statement (February 1994).

Purpose and Need for these Standards and Guidelines

The purpose, which includes President Clinton's mandate and principles as expressed at the April 2, 1993, Forest Conference, is to take an ecosystem management approach to forest management, with support from scientific evidence; meet the requirements of existing laws and regulations; maintain a healthy forest ecosystem with habitat that will support populations of native species (particularly those associated with late-successional and old-growth forests), including protection for riparian areas and waters; and maintain a sustainable supply of timber and other forest products that will help maintain the stability of local and regional economies on a predictable and long-term basis.

The Planning Area

These standards and guidelines apply to lands administered by the USDA Forest Service and the USDI Bureau of Land Management within the range of the northern spotted owl. These lands are located in Washington, Oregon, and northern California. While the influence of lands administered by the Fish and Wildlife Service, National Park Service, and Department of Defense, as well as private, state, and tribal lands, was considered in these standards and guidelines, no new management direction for them is presented here. These standards and guidelines assume these other federal lands will be managed according to existing management plans and applicable federal law.

Relationship to Existing Forest Service and BLM Plans

The direction established by these standards and guidelines (as an attachment to the Record of Decision) is added to the existing management direction for those administrative units without adopted Forest or District Plans, and will supersede management direction contained in existing plans where it differs for specific resources or areas, except as otherwise specifically provided. Standards and guidelines and land allocations in the existing plans not directly superseded will remain in effect. These standards and guidelines and land allocations will be incorporated into plans which are being developed. Resource management and the quantity of timber offered for sale will reflect the implications of these standards and guidelines and the land allocations. Additional agency details are provided below.

Forest Service

These standards and guidelines amend the Pacific Northwest and Pacific Southwest Regional Guides. They amend the standards and guidelines of approved National Forest Land and Resource Management Plans. For those National Forests without approved Forest Plans (Klamath, Shasta-Trinity, Six Rivers, and Mendocino), these standards and guidelines apply directly to management activities, and will be incorporated into Forest Plans as they are developed.

Bureau of Land Management

The existing plans for the Redding Resource Area, the Arcata Resource Area, and the King Range National Conservation Area of the Ukiah District, as well as the Management Framework Plans for western Oregon Districts, are amended by the direction established in these standards and guidelines. These standards and guidelines supplement the BLM Draft Resource Management Plans of August 1992 for the Salem, Eugene, Coos Bay, Roseburg, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District, and the seven alternatives considered in the Draft EISs appurtenant to those plans.

Current Plans and Draft Plan Preferred Alternatives

Although these standards and guidelines supplement existing plans, they also incorporate certain standards and guidelines from Draft National Forest Plans and the revised Draft BLM Resource Management Plans. When these standards and guidelines were prepared, beginning in April 1993, BLM Districts and National Forests either had completed (current) Forest and Resource Management Plans, or they were in the process of developing such plans. For those units that had not completed their plans, the then-current version, or draft, of the unit's preferred alternative was identified (see page C-2). These current plans and draft plan preferred alternatives were used as the base or starting point for these standards and guidelines. Therefore, except as specifically excepted (see page C-3), standards and guidelines from current plans and draft plan preferred alternatives apply where they are more restrictive or provide greater benefits to late-successional forest related species than the provisions of these standards and guidelines.

Consultation - Endangered Species Act

Management direction and land allocations of these standards and guidelines are intended to

constitute the Forest Service and BLM contribution to the recovery of the northern spotted owl. Actions proposed to implement these standards and guidelines will undergo consultation, either formal or informal, as appropriate. Consultation for the northern spotted owl is not required for activities consistent with these standards and guidelines if those activities will not result in incidental take. Consultation that may be required but that does not involve take is expected to be informal. Where incidental take would occur, incidental take statements will be provided through formal consultation.

Critical Habitat for Northern Spotted Owl

In January 1992, the Fish and Wildlife Service determined the lands that comprise critical habitat for the northern spotted owl. The Fish and Wildlife Service may review and revise its critical habitat designation for the northern spotted owl, based upon the provisions of these standards and guidelines. In the interim, the combination of, and standards and guidelines for, Late-Successional Reserves, Managed Late-Successional Areas, Riparian Reserves, and matrix, should allow critical habitat to perform the biological function for which it was designated. Any site-specific considerations of critical habitat in the matrix are considered minimal and will be evaluated through watershed analysis and addressed in area-specific plans, as appropriate.

Physiographic Provinces

Portions of these standards and guidelines, particularly those for silvicultural treatments, refer to one or more physiographic provinces. The use of provinces allows differentiation between areas of common biological and physical processes. The twelve physiographic provinces used in these standards and guidelines are shown in Figure A-1.

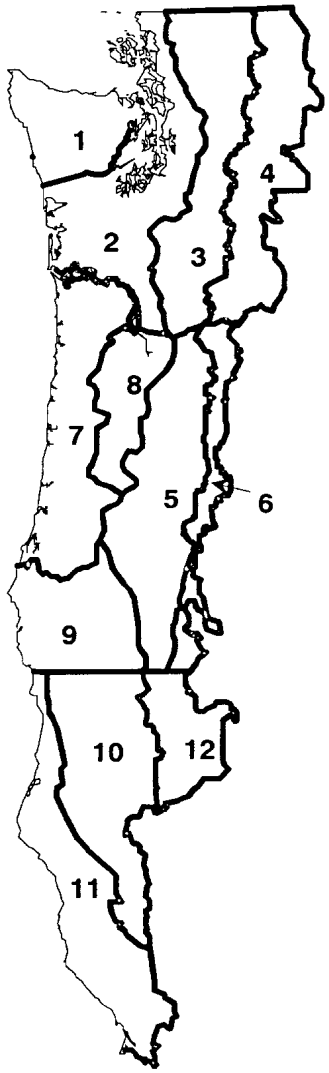


Figure A-1. Terrestrial ecosystems physiographic provinces

1. WA Olympic Peninsula
2. WA Western Lowlands
3. WA Western Cascades
4. WA Eastern Cascades
5. OR Western Cascades
6. OR Eastern Cascades
7. OR Coast Range
8. OR Willamette Valley
9. OR Klamath
10. CA Klamath
11. CA Coast Range
12. CA Cascades.

These provinces differ from the planning provinces which extend outside the range of the northern spotted owl, and are based more on major river basins (see Section E of these standards and guidelines).

Land Allocations

Designated Areas and Matrix

All 24.4 million acres of Forest Service, BLM, and other federally-administered lands within the range of the northern spotted owl are allocated to one of the following six designated areas or to matrix.

Congress. Res.	Million acres	7.321
Late-Successional Reserves	Million acres	7.431
	Timber harvest/salvage	West - Treatment of less than 80 years old. East - Manage to reduce risk of catastrophic loss.
	Protection for sites occupied by marbled murrelets outside reserves	Yes
	Protection of SAT species closely associated with old growth	Yes
Adaptive Management Areas	Million acres	1.522
	Timber harvest/salvage	Regulated harvest
Managed Late-Successional Areas	Million acres	0.102
	Timber harvest/salvage	Maintain owl habitat
Administratively Withdrawn Areas	Million acres	1.477
Riparian Reserves	Million acres	2.628
	Widths	2:1:1
Matrix	Million acres	3.975
	50-11-40	No
	Snags, logs, green trees per acre	Coastal areas WA/OR: 2,8-12,0 Other areas 2,8-12,15%
	Timber harvest/salvage	Regulated harvest

Congressionally Reserved Areas - This includes Wildernesses, Wild and Scenic Rivers, National Monuments, as well as other federal lands not administered by the Forest Service or BLM.

Late-Successional Reserves - Late-Successional Reserves are identified with an objective to protect and enhance conditions of late-successional and old-growth forest ecosystems, which 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.

Adaptive Management Areas - Ten Adaptive Management Areas are identified, each with an objective to develop and test new management approaches to integrate and achieve ecological and economic health, and other social objectives.

Managed Late-Successional Areas - Managed Late-Successional Areas are similar to Late-Successional Reserves but are identified for certain owl locations 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 complete stand destruction from large catastrophic events such as high intensity, high severity fires; or disease or insect epidemics.

Administratively Withdrawn Areas - Administratively Withdrawn Areas are identified in current Forest and District Plans or draft plan preferred alternatives and include recreation and visual areas, back country, and other areas where management emphasis precludes scheduled timber harvest.

Riparian Reserves - As a key element of the Aquatic Conservation Strategy (see Section B of these standards and guidelines), the Riparian Reserves provide an area along all streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. Riparian Reserves are important to the terrestrial ecosystem as well, serving, for example, as dispersal habitat for certain terrestrial species.

Matrix - The matrix consists of those federal lands outside the six categories of designated areas listed above.

Key and Non-Key Watersheds

All 24.455 million acres of Forest Service, BLM, and other federally-administered lands within the range of the northern spotted owl are also allocated to one of three watershed categories: Tier 1 Key Watersheds, Tier 2 Key Watersheds, or non-Key Watersheds (all others). Key Watersheds overlay portions of all six categories of designated areas and matrix, and place additional management requirements or emphasis on activities in those areas.

There are 8,119,400 acres of Tier 1 Key Watersheds, and 1,001,700 acres of Tier 2 Key Watersheds. Key Watersheds overlay the land allocations of designated areas and matrix as shown below.

Acres in each designated area and matrix, by Key and non-Key Watersheds.

	Tier 1	Tier 2	non-Key	Total
Designated Areas				
Congressionally Reserved Areas	2,728,000	311,200	4,281,400	7,320,600
Late-Successional Reserves	3,151,700	279,100	4,000,000	7,430,800
Adaptive Management Areas	228,100	60,600	1,233,100	1,521,800
Managed Late-Successional Areas	55,100	0	47,100	102,200
Administratively Withdrawn Areas	407,900	54,700	1,014,500	1,477,100
Riparian Reserves (based on samples)	631,000	113,700	1,882,800	2,627,500
Matrix				
Matrix	917,600	182,400	2,875,300	3,975,300
Total	8,119,400	1,001,700	15,334,200	24,455,300

Land Allocation Hierarchy

There is considerable overlap between some designated areas. For example, there are 4.1 million acres of Administratively Withdrawn Areas identified in current plans and draft plan preferred alternatives. A substantial portion of this, however, is included within Late-Successional Reserves. Similarly, Late-Successional Reserves contain streams, and thus Riparian Reserves. For consistency and acreage display purposes, such overlaps are displayed in only one category according to the following hierarchy.

> (1) Congressionally Reserved Areas, (2) Late-Successional Reserves, (3) Adaptive Management Areas, (4) Managed Late-Successional Areas, (5) Administratively Withdrawn Areas, (6) Riparian Reserves, and (7) Matrix.

Note as a result of this hierarchy, there are land allocation categories that are not completely represented by acreage figures listed in these standards and guidelines. For example, Administratively Withdrawn Areas within Late-Successional Reserves are shown only in the Late-Successional Reserve category. The calculation of Riparian Reserves is done after all other designated areas; therefore, acres shown for Riparian Reserves only reflect those Riparian Reserves that are interspersed throughout the matrix. In practice, where overlaps occur, the standards and guidelines of both allocations apply.

Note also that Key and non-Key Watersheds are not part of this hierarchy, because their designations overlap, and do not preclude, all of the above categories. Therefore, there are acres of all categories of designated areas and matrix both inside and outside Key Watersheds, as shown above.

Standards and Guidelines

Designated areas, matrix, and Key Watersheds all have specific management direction regarding how those lands are to be managed, including actions that are prohibited and descriptions of the conditions that should occur there. This management direction is known as "standards and guidelines"— the rules and limits governing actions, and the principles specifying the environmental conditions or levels to be achieved and maintained. Although the direction in all sections of this document constitutes standards and guidelines, standards and guidelines specific to particular land allocation categories, or relative to specific types of management activities, are included in Section C of these standards and guidelines.

Additional direction to management agencies includes, but is not limited to directives, policy, handbooks, manuals, as well as other plans, regulations, laws and treaties. The standards and guidelines presented here supersede other direction except treaties, laws, and regulations unless that direction is more restrictive or provides greater benefits to late-successional forest related species. These standards and guidelines do not apply where they would be contrary to existing law or regulation, or where they would require the agencies to take actions for which they do not have authority.

Maps

The essential features of these standards and guidelines are shown on maps as follows.

- Key Watersheds, Marbled Murrelet Zones 1 and 2, the five terrestrial designated areas, matrix, and samples of the Riparian Reserves, are shown on the 1:500,000 scale map included with the Final SEIS (1994).

- Maps at 1/2-inch to the mile scale showing all of the above elements are available for each Forest Service and BLM administrative unit at the individual unit offices.

- The official maps of the elements of these standards and guidelines are maintained as part of the administrative record and are also stored electronically in the Spatially Unified Database (SPUD) maintained by the Interagency Geographic Information System (GIS) staff in the Regional Ecosystem Office at 333 SW 1st St., Portland, OR 97204.

To more accurately define the zone in which marbled murrelet surveys are required, the marbled murrelet zone is being remapped in some areas to more closely parallel the

coastline, consistent with the narrative description of these zones on page C-10 of these standards and guidelines.

Transition Standards and Guidelines

As described in the Record of Decision, the following direction is adopted to provide for implementation of certain interim procedures in order to realize the goals and objectives of the management strategy while making project decisions with reasonable promptness that do not preclude long-term options or impair resources sought to be protected.

1. Watershed Analysis - In the initial years of implementation, the process for watershed analysis is expected to evolve to meet long-term goals described in these standards and guidelines. However, some projects proposed for the first few years of implementation are in areas that require watershed analysis prior to approval of the projects (i.e., Key Watersheds, Riparian Reserves, and inventoried roadless areas). In F.Y.s 1994-96, watershed analysis done for these projects may be less detailed than analyses that are completed in later years. Regardless, analysis done during the initial years (F.Y. 1994-96) will comply with the following guidance:

- The goal of the analysis is to determine whether the proposed actions are consistent with the objectives of the standards and guidelines.

- Existing information will be used to the greatest extent possible, with new information collected, to the maximum extent practicable, to fill crucial data gaps.

- Analysis will address the entire watershed, even though some areas may be analyzed at a lower level of precision, and the analysis of issues may be prioritized.

- Information from the analysis will flow into the NEPA documentation for specific projects, and will be used where practicable to facilitate Endangered Species Act and Clean Water Act compliance.

- Restoration opportunities will be identified.

As described elsewhere in these standards and guidelines, watershed analysis is an ongoing, iterative process. Watershed analyses will expand as appropriate to consider additional available information, changing conditions and potential effects associated with long-term management issues and needed actions.

2. Green Tree Retention Requirements - National forest timber sales already laid out at the time of the Record of Decision may use green tree retention requirements in the Draft SEIS if this eliminates the need to rework, redesign, or recruise a sale. All sales laid out after the date of the Record of Decision will comply with green tree retention requirements in these standards and guidelines.

3. Assessments for Late-Successional Reserves - Projects and activities within Late-Successional Reserves (including restoration, recreation, projects for public safety, thinning and salvage) may proceed in fiscal years 1994-96 using initial Late-Successional Reserve assessments done at a level of detail sufficient to assess whether the activities are consistent with the objectives of the Late-Successional Reserves.

B. Basis for Standards and Guidelines

Introduction

This section of the standards and guidelines is adapted from the FEMAT Report to provide additional information on the objectives and assumptions regarding management to protect and enhance habitat for late-successional and old-growth forest related species, and to protect and enhance riparian ecosystems. It clarifies the intent of the standards and guidelines in order to provide guidance for situations not specifically covered by the standards and guidelines. It has two primary parts: (1) Ecological Principles for Management of Late-Successional Forests (below), and (2) the Aquatic Conservation Strategy (beginning on page B-9).

Ecological Principles for Management of Late-Successional Forests

General Ecological Basis for Forest Management

Late-successional forests are those forest seral stages that include mature and old-growth age classes. One goal of these standards and guidelines is to maintain late-successional and old-growth species habitat and ecosystems on federal lands. Another goal of forest management on federal lands is to maintain biological diversity associated with native species and ecosystems in accordance with laws and regulations. Forest ecosystems are quite variable throughout the range of the northern spotted owl. Therefore, site-specific knowledge of ecosystems will be incorporated into watershed-level analysis and integrated into Forest and District plans and province-level planing.

In Late-Successional Reserves, standards and guidelines are designed to maintain late-successional forest ecosystems and protect them from loss due to large-scale fire, insect and disease epidemics, and major human impacts. The intent is to maintain natural ecosystem processes such as gap dynamics, natural regeneration, pathogenic fungal activity, insect herbivory, and low-intensity fire. These standards and guidelines encourage the use of silvicultural practices to accelerate the development of overstocked young plantations into stands with late-successional and old-growth forest characteristics, and to reduce the risk to Late-Successional Reserves from severe impacts resulting from large-scale disturbances and unacceptable loss of habitat.

The matrix is an integral part of the management direction included in these standards and guidelines. Production of timber and other commodities is an important objective for the matrix. However, forests in the matrix function as connectivity between Late-Successional Reserves and provide habitat for a variety of organisms associated with both late-

successional and younger forests. Standards and guidelines for the matrix are designed to 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 will also add ecological diversity by providing early-successional habitat.

Structure and Composition

The structure and composition of late-successional and old-growth forest ecosystems have been detailed in numerous publications. Four major structural attributes of old-growth Douglas-fir forests are: live old-growth trees, standing dead trees (snags), fallen trees or logs on the forest floor, and logs in streams. Additional important elements typically include multiple canopy layers, smaller understory trees, canopy gaps, and patchy understory. Structural characteristics of late-successional and old-growth forests vary with vegetation type, disturbance regime, and developmental stage. For example, in many Douglas-fir stands in western Oregon and Washington, the mature phase of stand development begins around 80 years and is characterized by relatively large live and dead trees, although multiple canopy layers may not yet be well developed. In some forest types subject to frequent, low-intensity fire, such as ponderosa pine, the late-successional and old-growth stages are typically characterized by relatively open understories and relatively few large fallen trees (in comparison to more moist Douglas-fir/western hemlock types). Standards and guidelines designed to promote the desired conditions vary among physiographic provinces because characteristics of the natural structure and composition of late-successional and old-growth forests also vary among the provinces.

Ecological Processes

Ecological processes include those natural changes that are essential for the development and maintenance of late-successional and old-growth forest ecosystems. Although the processes that created the current late-successional and old-growth ecosystems are not completely understood, they include: (1) tree growth and maturation, (2) death and decay of large trees, (3) low-to-moderate intensity disturbances (e.g., fire, wind, insects, and diseases) that create canopy openings or gaps in the various strata of vegetation, (4) establishment of trees beneath the maturing overstory trees either in gaps or under the canopy, and (5) closing of canopy gaps by lateral canopy growth or growth of understory trees. These processes result in forests moving through different stages of late-successional and old-growth conditions that may span 80 to 1,200 years for forests dominated by long-lived species.

Several authors have described these stages, and one has expanded these descriptions to include the protracted nature of stand development in forests dominated by long-lived trees such as Douglas-fir. Following stand-replacing disturbance, these stages can be described as: (1) establishment, (2) thinning, (3) maturation, (4) transition, and (5) shifting gap.

The maturation stage (3) is characterized by a slowed rate of height growth and crown expansion. Heavy limbs begin to form; gaps between crowns become larger and more stable, or expand as a result of insect and pathogen mortality. Large dead and fallen trees begin to

accumulate, and the understory may be characterized by seedlings and saplings of shade-tolerant tree species. In Douglas-fir stands west of the Cascade Range, this stage typically begins between 80 and 140 years, depending on site conditions and stand history.

During the transition stage (4), the original component of overstory trees approaches its maximum height and diameter, and growth is slow. Tree crowns become more open, irregular in shape and contain heavy limbs. Broken, dead, and decaying portions of tree crowns are common. Old trees become relatively resistant to low-to-moderate intensity fire and, depending on species, crown bases are high above the understory and bark is relatively thick. During this stage, understory trees form multiple canopy layers. Coarse woody debris accumulates to relatively high levels, and low-to-moderate intensity disturbances from insects, diseases, wind, and fire create patchy openings and accumulations of standing dead trees. These disturbances also frequently promote establishment or advancement of understory trees that eventually fill the holes in the canopy. In Douglas-fir stands west of the Cascade Range, this stage begins between 150 to 250 years, and may last for an additional 300 to 600 years depending on site conditions and species.

The shifting-gap stages begin when the last of the original component of overstory old-growth trees dies and all trees in the canopy have been established following various smaller gap-type disturbances. Forests in the last two stages of development (4 and 5) actually contain all of the stand developmental stages in a relatively fine-grained mosaic of smaller stands. The later three stages (3, 4, and 5) embody the late-successional and old-growth conditions that are the focus of these standards and guidelines.

Some of the stand development processes, such as tree growth and mortality, and understory establishment, can be accelerated through silvicultural manipulations in younger stands. Other processes such as tree crown maturation, bark thickening, and tree bole decay are not readily accelerated through silviculture. Because of limitations in knowledge of late-successional and old-growth forest processes and lack of silvicultural experience in old stands, it is not certain that old-growth ecosystems can be completely replicated.

Most of the current late-successional and old-growth stands developed from natural regeneration following wildfire events that occurred during the last 500 to 600 years. These fires covered large areas--frequently many thousands of acres. Although these fires were large, they burned in patches of variable intensity and severity, and left many areas of unburned or lightly burned forest. The natural regime of patchy fires that leave an abundance of large dead trees and lesser amounts of scattered live trees, as individuals and in patches, is the basis for silvicultural methods such as retention of green trees as individuals and in patches.

In some cases, however, natural reburns occurred, resulting in relatively little carryover of live trees as a legacy from the old-growth condition. Where considerable live and dead material was left following fires, young stands contained many old-growth structures and presumably old-growth associated organisms, including organisms associated with coarse woody debris on the forest floor.

Large fires and relatively long fire return intervals in the moist northern and western

physiographic provinces resulted in periods during which landscapes contained large areas of relatively unbroken forest cover. In the warmer, drier physiographic provinces (i.e., the Washington and Oregon Eastern Cascades, the California Cascades, and the Oregon and California Klamath Provinces), fire is more frequent, less intense, and is an integral part of the internal dynamics of a typical stand (tens to hundreds of acres). In the drier provinces, fire control and timber harvest have decreased the abundance of some types of old growth, such as ponderosa pine, that are dependent on frequent, low-intensity fires. Other types of late-successional forest that are less fire resistant or are less desirable for harvest have become more widely distributed. In these areas, the potential for stand-replacing wildfires has increased, resulting in a higher risk to the stability of current stands reserved for late-successional species.

At a landscape scale and spanning long periods of time, stand-replacing wildfires have an important role in resetting successional processes and developing new areas of late-successional forests to replace those lost through succession or disturbance. Silvicultural practices designed to imitate natural processes may be able to reset succession to achieve stand and landscape-level goals. This type of silviculture may meet a variety of ecosystem objectives. However, experience in applying silviculture for late-successional objectives is limited. Until more experience and knowledge about active management to produce late-successional ecosystems is gained, sustaining late-successional ecosystems in the landscape will be best accomplished through retention of existing areas of late-successional forest. Given the relatively low remaining proportion of late-successional ecosystems in the landscape at the present time, these older forests should be protected from fire and other stand-resetting disturbances.

Ecosystem Functions

Late-successional ecosystems perform several ecological functions that appear to be lacking, or less well developed, in younger natural forests and managed plantations. These functions include buffering microclimates during seasonal climatic extremes, producing food for those consumer organisms that occupy late-successional forests, storing carbon, providing nutrient and hydrological cycling, and providing sources of arthropod predators and organisms beneficial to other ecosystems or successional stages. Old-growth ecosystems appear to have high retention of nutrients and low soil erosion potential, although differences in these functions between stand developmental stages may not be large when canopy closure has occurred. Tall, deep canopies of late-successional forests can also intercept more moisture from clouds and fog than young plantations.

Late-Successional Reserves

These standards and guidelines include reserves designed to maintain and enhance late-successional forests as a network of existing old-growth forest ecosystems, although their size, distribution, and management varies. These reserves represent a network of existing old-growth forests that are retained in their natural condition with natural processes, such as fire, allowed to function to the extent possible. The reserves are designed to serve a number of purposes. First, they provide a distribution, quantity, and quality of old-growth forest

habitat sufficient to avoid foreclosure of future management options. Second, they provide habitat for populations of species that are associated with late-successional forests. Third, they will help ensure that late-successional species diversity will be conserved.

Late-successional forest communities are the result of a unique interaction of disturbance, regeneration, succession, and climate that can never be recreated in their entirety through management. The structure, species composition, and function of these forests are, in their entirety, not fully understood. However, silvicultural restoration in early-successional forests can accelerate the development of some of the structural and compositional features of late-successional forests. Because early-successional forests will regenerate by different processes during a different time period than existing late-successional forests, silviculturally created stands may look and function differently from current old-growth stands that developed over the last 1,000 years. Consequently, conservation of a network of natural old-growth stands maintains biodiversity into the future.

Desired late-successional and old-growth characteristics that will be created as younger stands change through successional development include: (1) multispecies and multilayered assemblages of trees, (2) moderate-to-high accumulations of large logs and snags, (3) moderate-to-high canopy closure, (4) moderate-to-high numbers of trees with physical imperfections such as cavities, broken tops, and large deformed limbs, and (5) moderate-to-high accumulations of fungi, lichens, and bryophytes. Although they may not be duplicates of existing old-growth forests, these stands could provide adequate habitat for many species in the long term.

The Role of Silviculture

Silviculture is the art and science of managing forest stands to provide or maintain structures, species composition, and growth rates that contribute to forest management goals. Silvicultural practices under these standards and guidelines will vary considerably because of the broad variety of forest species and ecosystems within the range of the northern spotted owl. The ecosystems range from coastal temperate rain forests where fire occurs infrequently, but where wind may have a major impact, to forests on dry interior sites where disturbance by wildfires and insects is common. Within specific locales, the silvicultural practices will be strongly influenced by such factors as nearby residential areas, local wildlife habitat requirements, and fire management constraints.

Silvicultural systems proposed for Late-Successional Reserves have two principal objectives: (1) development of old-growth forest characteristics including snags, logs on the forest floor, large trees, and canopy gaps that enable establishment of multiple tree layers and diverse species composition; and (2) prevention of large-scale disturbances by fire, wind, insects, and diseases that would destroy or limit the ability of the reserves to sustain viable forest species populations. Small-scale disturbances by these agents are natural processes, and will be allowed to continue.

Matrix objectives for silviculture should include: (1) production of commercial yields of wood, including those species such as Pacific yew and western red cedar that require

extended rotations, (2) retention of moderate levels of ecologically valuable old-growth components such as snags, logs, and relatively large green trees, and (3) increasing ecological diversity by providing early-successional habitat.

Stand Management

Forests within Late-Successional Reserves are composed of managed stands from 2 to more than 80 years old, as well as unmanaged, late-successional, and old-growth stands. The younger stands were usually established following fire or timber harvest. Some of these stands will develop old-growth characteristics without silvicultural intervention. However, current stocking and structure of some of these stands were established to produce high yields of timber, not to provide for old-growth-like forests. Consequently, silviculture can accelerate the development of young stands into multilayered stands with large trees and diverse plant species, and structures that may, in turn, maintain or enhance species diversity.

Stand management in Late-Successional Reserves should focus on stands that have been regenerated following timber harvest or stands that have been thinned. These include stands that will acquire late-successional characteristics more rapidly with treatment, or are prone to fire, insects, diseases, wind, or other disturbances that would jeopardize the reserve. Depending on stand conditions, treatments could include, but should not be limited to: (1) thinning or managing the overstory to produce large trees; release advanced regeneration of conifers, hardwoods, or other plants; or reduce risk from fire, insects, diseases, or other environmental variables; (2) underplanting and limiting understory vegetation control to begin development of multistory stands; (3) killing trees to make snags and coarse woody debris; (4) reforestation; and (5) use of prescribed fire. Thinning prescriptions should encourage development of diverse stands with large trees and a variety of species in the overstory and understory. Prescriptions should vary within and among stands.

Stands in the matrix can be managed for timber and other commodity production, and to perform an important role in maintaining biodiversity. Silvicultural treatments of forest stands in the matrix can provide for retention of old-growth ecosystem components such as large green trees, snags and down logs, and depending on site and forest type, can provide for a diversity of species. Retention of green trees following timber harvest in the matrix provides a legacy that bridges past and future forests. Retaining green trees serves several important functions including snag recruitment, promoting multistoried canopies, and providing shade and suitable habitat for many organisms in the matrix.

Retaining green trees of various sizes, ages, and species, in well-distributed patches as well as dispersed individuals, will promote species diversity. These trees may also act as refugia or centers of dispersal for many organisms including plants, fungi, lichens, small vertebrates, and arthropods. Patches of trees may provide protection for special microsites such as seeps, wetlands, or rocky outcrops. Trees retained within the Riparian Reserves can contribute to overall retention objectives, but will generally not be sufficiently dispersed across the landscape to fully satisfy these objectives. Diversity of tree structure should be considered when selecting trees for retention. Complex canopy structure and especially leaning boles are beneficial for some lichens. Trees that are asymmetrical provide a diversity of habitat

substrates, and often have more lichen and moss epiphytes on large lateral limbs than symmetrical trees. Location of green trees is also important (e.g., ridgelines are optimal locations for lichen dispersal).

Coarse woody debris is essential for many species of vascular plants, fungi, liverworts, mosses, lichens, arthropods, salamanders, reptiles and small mammals. Because of drier microclimates, logs in the matrix may be occupied by species different from those found on coarse woody debris in late-successional forests. However, these logs may provide transitional islands for the maintenance and eventual recovery of some late-successional organisms in the matrix.

Adequate numbers of large snags and green trees are especially critical for bats because these trees are used for maternity roosts, temporary night roosts, day roosts, and hibernacula. Large snags and green trees should be well distributed throughout the matrix because bats compete with primary excavators and other species that use cavities. Day and night roosts are often located at different sites, and migrating bats may roost under bark in small groups. Thermal stability within a roost site is important for bats, and large snags and green trees provide that stability. Individual bat colonies may use several roosts during a season as temperature and weather conditions change. Large, down logs with loose bark may also be used by some bats for roosting.

Management of Disturbance Risks

Natural disturbance is an important process within late-successional forest ecosystems, but humans have altered the disturbance regimes. Management may be required to reintroduce natural disturbance, such as fire, or to minimize socially unacceptable impacts. Fire suppression has resulted in significant increases in accumulated fuels within some forests, particularly in the Washington and Oregon Eastern Cascades Provinces, the California Cascades Province, and the Oregon and California Klamath Provinces. At the same time, these forests may have become much more vulnerable to insects and diseases.

In Late-Successional Reserves in the Washington Western Cascades and coastal areas of Oregon and Washington, manipulation of natural stands to reduce fire hazard is generally not necessary due to a lower occurrence of fire. However, fuel management may be desirable in plantations.

In Late-Successional Reserves in the Eastern Cascades or Klamath Provinces, silviculture aimed at reducing the risk of stand-replacing fires may be appropriate. Treatments may include thinning and underburning. Due to fire suppression, some forests have become quite dense and multistoried, primarily from the invasion of shade-tolerant species. Density reduction in mid-level canopy layers by thinning may reduce the probability of crown fires.

Underburning can be used to reduce fuel loading and vertical fuel continuity. Wildfires in stands that are managed using underburning are generally less severe, and fire suppression is aided. To increase effectiveness, underburning should be implemented over large areas. Such activities in older stands in westside provinces may be warranted when levels of fire

risk are high. Compartmentalized landscape units of reduced fuel allow safe access for fire suppression crews and provide strategic locations for efficient and effective fire suppression. Stands are manipulated to reduce continuity of canopies, boles are pruned on residual trees, and significant quantities of understory fuels are removed. Many of these treatments may reduce the quality of habitat for late-successional organisms. Thus, managers need to seek a balanced approach that reduces risk of fire while protecting large areas of fire-prone late-successional forest.

Silvicultural systems within the matrix contribute to management of the Late-Successional Reserves. Fire and fuels management in the matrix can reduce the risk of fire and other large-scale disturbances that would jeopardize the reserves. Harvesting trees immediately adjacent to Late-Successional Reserves may result in increased wind damage along boundaries. In such cases, "feathering" stands within harvest units may be appropriate to reduce this risk. Local expertise will be essential in designing meaningful strategies for wind protection.

Management After Natural Disturbance

Fire, wind, insects, and diseases have greatly influenced the development of Pacific Northwest forests. Fine-scale disturbances, generally by insects or diseases, cause deaths of single trees or small groups of trees which result in small patches of early-successional vegetation embedded in a larger portion of older forest. Coarse-scale disturbances, such as fire and wind, result in more extensive areas of early-successional vegetation. Many native forest organisms have adapted to these cycles and scales of disturbance and regrowth.

These standards and guidelines have provisions for management following natural disturbances in Late-Successional Reserves. Direct silvicultural management is appropriate following disturbances such as extensive, high-severity fires. Smaller scale disturbances, such as those caused by insects, diseases, and wind, create small gaps in the overstory that characterize the transition and shifting-gap stages of old-growth forest development.

Tree mortality is an important and natural process within a forest ecosystem. Diseased and damaged trees and logs are key structural components of late-successional and old-growth forests. Salvage of dead trees affects the development of future stands and habitat quality for a number of organisms. Snag removal may result in long-term influences on forest stands because large snags are not produced in natural stands until trees become large and begin to die from natural mortality. Snags are used extensively by cavity-nesting birds and mammals such as woodpeckers, nuthatches, chickadees, squirrels, red tree voles, and American marten. Removal of snags following disturbance can reduce the carrying capacity for these species for many years.

Coarse woody debris is a necessary component of forest ecosystems. This wood provides habitat for a broad array of vertebrates, invertebrates, fungi, mosses, vascular plants, and micro-organisms. Arthropods, salamanders, reptiles, and small mammals live in or under logs; woodpeckers forage on them; and vascular plants and fungi grow on rotting logs. Provision for retention of snags and logs normally should be made, at least until the new

stand begins to contribute coarse woody debris.

Many natural disturbances do not result in complete mortality of stands. For example, recent fires in the Oregon Western Cascades Province killed 25 to 50 percent of trees within the areas burned, leaving 50 to 75 percent of the stands intact. The surviving trees are important elements of the new stand. They provide structural diversity and provide a potential source of additional large snags during the development of new stands. Furthermore, trees injured by disturbance may develop cavities, deformed crowns, and limbs which are habitat components for a variety of wildlife species.

In the matrix, objectives for management after stand-replacing events will generally differ from those for Late-Successional Reserves. Economic benefits of timber production will receive greater consideration. For example, the commercial salvage of dead trees will be less constrained, and replanting disturbed areas will be a high priority.

Aquatic Conservation Strategy

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The strategy would protect salmon and steelhead habitat on federal lands managed by the Forest Service and Bureau of Land Management within the range of Pacific Ocean anadromy.

This conservation strategy employs several tactics to approach the goal of maintaining the “natural” disturbance regime. Land use activities need to be limited or excluded in those parts of the watershed prone to instability. The distribution of land use activities, such as timber harvest or roads, must minimize increases in peak streamflows. Headwater riparian areas need to be protected, so that when debris slides and flows occur they contain coarse woody debris and boulders necessary for creating habitat farther downstream. Riparian areas along larger channels need protection to limit bank erosion, ensure an adequate and continuous supply of coarse woody debris to channels, and provide shade and microclimate protection. Watersheds currently containing the best habitat or those with the greatest potential for recovery should receive increased protection and receive highest priority for restoration programs.

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. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. Because it is based on natural disturbance processes, it may take decades, possibly more than a century, to accomplish all of its objectives. Some improvements in aquatic ecosystems, however, can be expected in 10 to 20 years.

The important phrases in these standards and guidelines are "meet Aquatic Conservation

Strategy objectives," "does not retard or prevent attainment of Aquatic Conservation Strategy objectives," and "attain Aquatic Conservation Strategy objectives." These phrases, coupled with the phrase "maintain and restore" within each of the Aquatic Conservation Strategy objectives, define the context for agency review and implementation of management activities. Complying with the Aquatic Conservation Strategy objectives means that an agency must manage the riparian-dependent resources to maintain the existing condition or implement actions to restore conditions. The baseline from which to assess maintaining or restoring the condition is developed through a watershed analysis. Improvement relates to restoring biological and physical processes within their ranges of natural variability.

The standards and guidelines are designed to focus the review of proposed and certain existing projects to determine compatibility with the Aquatic Conservation Strategy objectives. The standards and guidelines focus on "meeting" and "not preventing attainment" of Aquatic Conservation Strategy objectives. The intent is to ensure that a decision maker must find that the proposed management activity is consistent with the Aquatic Conservation Strategy objectives. The decision maker will use the results of watershed analysis to support the finding. In order to make the finding that a project or management action "meets" or "does not prevent attainment" of the Aquatic Conservation Strategy objectives, the analysis must include a description of the existing condition, a description of the range of natural variability of the important physical and biological components of a given watershed, and how the proposed project or management action maintains the existing condition or moves it within the range of natural variability. Management actions that do not maintain the existing condition or lead to improved conditions in the long term would not "meet" the intent of the Aquatic Conservation Strategy and thus, should not be implemented.

Aquatic Conservation Strategy Objectives

Forest Service and BLM-administered lands within the range of the northern spotted owl will be managed to:

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

Components of the Aquatic Conservation Strategy

1. **Riparian Reserves:** Lands along streams and unstable and potentially unstable areas where special standards and guidelines direct land use.

2. **Key Watersheds:** A system of large refugia comprising watersheds that are crucial to at-risk fish species and stocks and provide high quality water.

3. **Watershed Analysis:** Procedures for conducting analysis that evaluates geomorphic and ecologic processes operating in specific watersheds. This analysis should enable watershed planning that achieves Aquatic Conservation Strategy objectives. Watershed Analysis provides the basis for monitoring and restoration programs and the foundation from which Riparian Reserves can be delineated.

4. **Watershed Restoration:** A comprehensive, long-term program of watershed restoration to restore watershed health and aquatic ecosystems, including the habitats supporting fish and other aquatic and riparian-dependent organisms.

These components are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. Late-Successional Reserves are also an important component of the Aquatic Conservation Strategy. The standards and guidelines under which Late-Successional Reserves are managed provide increased protection for all stream types. Because these reserves possess late-successional characteristics, they offer core areas of high quality stream habitat that will act as refugia and centers from which degraded areas can be recolonized as they recover. Streams in these reserves may be particularly important for endemic or locally distributed fish species and stocks.

1. Riparian Reserves

There are an estimated 2,627,500 acres of Riparian Reserves interspersed within the matrix. (Acres for matrix listed elsewhere in these standards and guidelines do not include Riparian Reserves.) Riparian Reserves and their appurtenant standards and guidelines also apply where these reserves overlap with any other land allocations. Acres of Riparian Reserves within other land allocations is not calculated, but is estimated to encompass 40 percent (based on a sample) of those allocations. The percent of area in Riparian Reserves varies markedly among administrative units, from a high of approximately 74 percent on the Siuslaw National Forest, to a low of approximately 4 percent on the Deschutes National Forest.

Riparian Reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. Standards and guidelines prohibit and regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives. Riparian Reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing waterbodies such as lakes and ponds, wetlands, streams,

stream processes, and fish habitats. Riparian Reserves include areas designated in current plans and draft plan preferred alternatives as riparian management areas or streamside management zones and primary source areas for wood and sediment such as unstable and potentially unstable areas in headwater areas and along streams. Riparian Reserves occur at the margins of standing and flowing water, intermittent stream channels and ephemeral ponds, and wetlands. Riparian Reserves generally parallel the stream network but also include other areas necessary for maintaining hydrologic, geomorphic, and ecologic processes.

Under the Aquatic Conservation Strategy, Riparian Reserves are used to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of the watershed. The Riparian Reserves will also serve as connectivity corridors among the Late-Successional Reserves.

Interim widths for Riparian Reserves necessary to meet Aquatic Conservation Strategy objectives for different waterbodies are established based on ecologic and geomorphic factors. These widths are designed to provide a high level of fish habitat and riparian protection until watershed and site analysis can be completed. Watershed analysis will identify critical hillslope, riparian, and channel processes that must be evaluated in order to delineate Riparian Reserves that assure protection of riparian and aquatic functions. Riparian Reserves are delineated during implementation of site-specific projects based on analysis of the critical hillslope, riparian, and channel processes and features. Although Riparian Reserve boundaries may be adjusted on permanently-flowing streams, the prescribed widths are considered to approximate those necessary for attaining Aquatic Conservation Strategy objectives. Post-watershed analysis Riparian Reserve boundaries for permanently-flowing streams should approximate the boundaries prescribed in these standards and guidelines. However, post-watershed analysis Riparian Reserve boundaries for intermittent streams may be different from the existing boundaries. The reason for the difference is the high variability of hydrologic, geomorphic and ecologic processes in a watershed affecting intermittent streams. At the same time, any analysis of Riparian Reserve widths must also consider the contribution of these reserves to other, including terrestrial, species. Watershed analysis should take into account all species that were intended to be benefited by the prescribed Riparian Reserve widths. Those species include fish, mollusks, amphibians, lichens, fungi, bryophytes, vascular plants, American marten, red tree voles, bats, marbled murrelets, and northern spotted owls. The specific issue for spotted owls is retention of adequate habitat conditions for dispersal.

The prescribed widths of Riparian Reserves apply to all watersheds until watershed analysis is completed, a site-specific analysis is conducted and described, and the rationale for final Riparian Reserve boundaries is presented through the appropriate NEPA decision-making process.

Riparian Reserve Widths

Riparian Reserves are specified on page C-30 of these standards and guidelines for the following five categories of streams or waterbodies:

- Fish-bearing streams
- Permanently flowing nonfish-bearing streams
- Constructed ponds and reservoirs, and wetlands greater than 1 acre
- Lakes and natural ponds
- Seasonally flowing or intermittent streams, wetlands less than 1 acre, and unstable and potentially unstable areas

Standards and guidelines specific to Riparian Reserves begin on page C-31.

Intermittent Streams

Intermittent streams are defined as any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria.

Including intermittent streams and wetlands within Riparian Reserves is important for successful implementation of the Aquatic Conservation Strategy. Accurate identification of these features is critical to the correct implementation of the strategy and protection of the intermittent stream and wetland functions and processes. Identification of these features is difficult at times due to the lack of surface water or wet soils during dry periods. The following discussion provides guidance on steps to identify these features for inclusion within Riparian Reserves.

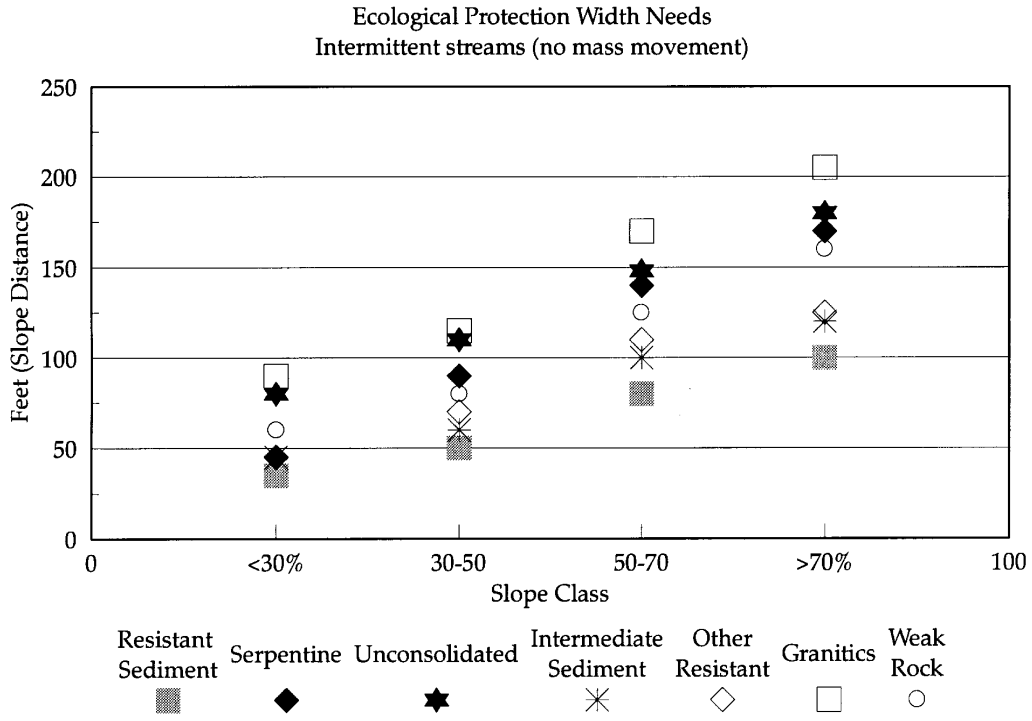
Fish-bearing streams are distinguished from intermittent streams by the presence of any species of fish for any duration. Many intermittent streams may be used as spawning and rearing streams, refuge areas during flood events in larger rivers and streams or travel routes for fish emigrating from lakes. In these instances, the standards and guidelines for fish-bearing streams would apply to those sections of the intermittent stream used by the fish.

The following discussion pertains to Riparian Reserve widths on intermittent streams and wetlands necessary to meet Aquatic Conservation Strategy objectives. Other Riparian Reserve objectives, such as providing wildlife dispersal corridors, could lead to Riparian Reserve widths different than those necessary to protect the ecological integrity of the intermittent stream or wetland. These other objectives could yield wider Riparian Reserves than those necessary to meet Aquatic Conservation Strategy objectives. There can never be instances where Riparian Reserves would be narrower than the widths necessary to meet Aquatic Conservation Strategy objectives.

The width of Riparian Reserves necessary to protect the ecological integrity of intermittent streams varies with slope and rock type. Figure B-1 shows the estimated size of Riparian Reserves necessary to protect the ecological values of intermittent streams with different slope and rock types. These estimates were made by geomorphologists, hydrologists, and fish biologists from the Bureau of Land Management, Forest Service, and the Environmental Protection Agency. These distances are consistent with the height of one site-potential tree used to define Riparian Reserve widths (see page C-30 of these standards and guidelines).

Watershed analysis provides the ecological and geomorphic basis for changing the size and location of Riparian Reserves.

Figure B-1. Ecological protection needs for intermittent streams, by slope class and rock type. Figure shows width, measured as slope distance, needed for streamside protection for reasons other than slope stability. These widths were estimated by an interagency team of scientists based on professional judgment and experience. Protection needs included surface erosion of streamside slopes, fluvial erosion of the stream channel, soil productivity, habitat for riparian-dependent species, the ability of streams to transmit damage downstream, and the role of streams in the distribution of large wood to downstream fish-bearing waters.



The prescribed widths for Riparian Reserves apply to all streams, lakes, ponds and wetlands on lands administered by the Forest Service and BLM within the range of the northern spotted owl until a watershed analysis is completed. Watershed analysis is expected to yield the contextual information needed to define ecologically and geomorphically appropriate Riparian Reserves. Analysis of site-specific characteristics may warrant Riparian Reserves that are narrower or wider than the prescribed widths. Thus, it is possible to meet the objectives of at least the Aquatic Conservation Strategy portion of these standards and guidelines with post-watershed analysis reserve boundaries for intermittent streams that are quite different from those conforming to the prescribed widths. Regardless of stream type, changes to Riparian Reserves must be based on scientifically sound reasoning, and be fully justified and documented.

Wetlands

The combinations of hydrology, soils, and vegetative characteristics are the primary factors influencing the development of wetland habitats. There must be the presence of surface water or saturated soils to significantly reduce the oxygen content in the soils to zero or near zero concentrations. These low or zero soil oxygen conditions must persist for sufficient duration to promote development of plant communities that have a dominance of species adapted to survive and grow under zero oxygen conditions. These wetland characteristics apply when defining wetlands for regulatory jurisdiction or for technical analysis when conducting inventories or functional assessments. Seeps and springs can be classified as streams if they have sufficient flow in a channel or as seasonal or perennial wetlands under the criteria defined in the 1987 Corps of Engineers Wetlands Manual. The standards and guidelines for wetlands, which are based on the hydrologic, physical and biologic characteristics described in the manual, apply to seeps and springs regardless of their size.

Formal definition for implementing section 404 of the Clean Water Act, adopted by the Environmental Protection Agency, is as follows:

> The term wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

Detailed technical methods have been developed to assist in identification of wetlands that meet the above definition. Currently, the field manual being used for implementing the Clean Water Act is the "1987 Corps Manual."

For purposes of conducting the National Wetland Inventory, the Fish and Wildlife Service has broadly defined both vegetated and nonvegetated wetlands as follows:

> Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three

attributes: (1) at least periodically, the land supports predominantly hydrophytes, (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Wetlands typically occur within and adjacent to riparian zones. It is frequently difficult to differentiate wetlands from riparian areas based on the definitions. Most typically, and particularly in forested landscapes, the riparian zone is defined by its spatial relation to adjacent streams or rivers. However, riparian zones are also commonly considered to be lands integrally related to other aquatic habitats such as lakes, reservoirs, intermittent streams, springs, seeps, and wetlands.

Because of such conceptual and definitional vagaries, there is spatial overlap between wetlands and riparian zones. This then results in only a portion of the riparian zone associated with rivers and streams being considered as wetlands. The extent of that portion will depend on the specifics of hydrologic, vegetation, and soil features. The functions of the wetland portion may also be distinct from the nonwetlands. For example, wetlands may provide habitat for specialized plant species or reproductive habitat for amphibians or other organisms that would not be provided by riparian areas.

Once the Riparian Reserve width is established, either based on existing widths or watershed analysis, then land management activities allowed in the Riparian Reserve will be directed by standards and guidelines for managing Riparian Reserves (see page C-31). The standards and guidelines for Riparian Reserves prohibit or regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives.

Summary of Aquatic Conservation Strategy for Riparian Reserves:

- Involves portions of the landscape where riparian-dependent and stream resources receive primary emphasis.
- Riparian Reserves are designated for all permanently-flowing streams, lakes, wetlands, and intermittent streams.
- Riparian Reserves include the body of water, inner gorges, all riparian vegetation, 100-year floodplain, landslides and landslide prone areas.
- Reserve widths are based on some multiple of a site-potential tree or a prescribed slope distance, whichever is greater. Reserve widths may be adjusted based on watershed analysis to meet Aquatic Conservation Strategy objectives.
- Standards and guidelines prohibit programmed timber harvest, and manage roads, grazing, mining and recreation to achieve objectives of the Aquatic Conservation Strategy (see page C-31).

2. Key Watersheds

There are 8,119,400 acres of Tier 1 Key Watersheds, and 1,001,700 acres of Tier 2 Key Watersheds within the range of the northern spotted owl. Key Watersheds overlay the land allocations of designated areas and matrix as follows:

Acres in each designated area and matrix, by Key and non-Key Watersheds.

	Tier 1	Tier 2	non-Key	Total
Designated Areas				
Congressionally Reserved Areas	2,728,000	311,200	4,281,400	7,320,600
Late-Successional Reserves	3,151,700	279,100	4,000,000	7,430,800
Adaptive Management Areas	228,100	60,600	1,233,100	1,521,800
Managed Late-Successional Areas	55,100	0	47,100	102,200
Administratively Withdrawn Areas	407,900	54,700	1,014,500	1,477,100
Riparian Reserves (based on sample)	631,000	113,700	1,882,800	2,627,500
Matrix				
Matrix	917,600	182,400	2,875,300	3,975,300
Total	8,119,400	1,001,700	15,334,200	24,455,300

Refugia are a cornerstone of most species conservation strategies. They are designated areas that either provide, or are expected to provide, high quality habitat. A system of Key Watersheds that serve as refugia is crucial for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species. These refugia include areas of high quality habitat as well as areas of degraded habitat. Key Watersheds with high quality conditions will serve as anchors for the potential recovery of depressed stocks. Those of lower quality habitat have a high potential for restoration and will become future sources of high quality habitat with the implementation of a comprehensive restoration program (see Watershed Restoration later in this section of these standards and guidelines).

The Aquatic Conservation Strategy includes two designations for Key Watersheds. Tier 1 (Aquatic Conservation Emphasis) Key Watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program. Tier 1 Key Watersheds consist primarily of watersheds identified previously by the Scientific Panel on Late-Successional Forest Ecosystems (1991), and in the Scientific Analysis Team Report (1993). The network of 143 Tier 1 Key Watersheds ensures that refugia are widely distributed across the landscape. While 21 Tier 2 (other) Key Watersheds may not contain at-risk fish stocks, they are important sources of high quality water.

Long-term management within Key Watersheds requires watershed analysis prior to further resource management activity. In the short term, until watershed analysis can be completed, minor activities such as those that would be Categorically Excluded under National Environmental Policy Act regulations (except timber harvest) may proceed if they are consistent with Aquatic Conservation Strategy objectives and apply Riparian Reserves and

standards and guidelines. Timber harvest, including salvage, can not occur in Key Watersheds without a watershed analysis. Key Watersheds that currently contain poor quality habitat are believed to have the best opportunity for successful restoration and will receive priority in any watershed restoration program.

Roadless Areas and Key Watersheds

Management activities in inventoried roadless areas with unstable land will increase the risk to aquatic and riparian habitat, impair the capacity of Key Watersheds to function as intended, and limit the potential to achieve Aquatic Conservation Strategy objectives. Standards and guidelines that refer to inventoried roadless areas (or simply "roadless areas") apply only to those portions of such areas that would still qualify as roadless under the guidelines used to originally designate the areas under the second Forest Service Roadless Area Review and Evaluation (RARE II).

To protect the remaining high quality habitats, no new roads will be constructed in inventoried roadless areas in Key Watersheds. Watershed analysis must be conducted in all non-Key Watersheds that contain roadless areas before any management activities can occur within those roadless areas.

The amount of existing system and nonsystem roads within Key Watersheds should be reduced through decommissioning of roads. Road closures with gates or barriers do not qualify as decommissioning or a reduction in road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds. That is, for each mile of new road constructed, at least one mile of road should be decommissioned, and priority given to roads that pose the greatest risks to riparian and aquatic ecosystems.

Summary of Aquatic Conservation Strategy for Key Watersheds:

- Tier 1 Key Watersheds were selected for directly contributing to anadromous salmonid and bull trout conservation.
- Tier 2 Key Watersheds were selected as sources of high quality water and may not contain at-risk fish stocks
- No new roads will be built in roadless areas in Key Watersheds.
- Reduce existing system and nonsystem road mileage outside roadless areas. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds.
- Key Watersheds are highest priority for watershed restoration.
- Watershed analysis is required prior to management activities, except minor activities such as those Categorically Excluded under NEPA (and not including timber harvest).

- Timber harvest cannot occur in Key Watersheds prior to completing a watershed analysis.

Standards and guidelines specific to Key Watersheds are summarized on page C-7 of these standards and guidelines.

3. Watershed Analysis

Watershed analysis, as described here, focuses on implementing the Aquatic Conservation Strategy. The broader role of watershed analysis in relation to implementing the ecosystem management objectives proposed by these standards and guidelines is described in Section E, Implementation. Watershed analysis is one of the principal analyses that will be used in making decisions on implementation of the Aquatic Conservation Strategy.

Watershed analysis is required in Key Watersheds, for roadless areas in non-Key Watersheds, and Riparian Reserves prior to determining how proposed land management activities meet Aquatic Conservation Strategy objectives. Watershed analyses must be completed before initiating actions within a Key Watershed, except that in the short term, until watershed analysis can be completed, minor activities such as those that would be categorically excluded under National Environmental Policy Act regulations (except timber harvest) may proceed if they are consistent with Aquatic Conservation Strategy objectives and Riparian Reserves and standards and guidelines are applied. Timber harvest, including salvage, cannot occur in Key Watersheds without a watershed analysis. Ultimately, watershed analyses should be conducted in all watersheds on federal lands as a basis for ecosystem planning and management.

Watershed analysis has a critical role in providing for aquatic and riparian habitat protection. In planning for ecosystem management and establishing Riparian Reserves to protect and restore riparian and aquatic habitat, the overall watershed condition and the array of processes operating there need to be considered. Watershed condition includes more than just the state of the channel and riparian area. It also includes the condition of the uplands, distribution and type of seral classes of vegetation, land use history, effects of previous natural and land-use related disturbances, and distribution and abundance of species and populations throughout the watershed. These factors strongly influence the structure and functioning of aquatic and riparian habitat. Effective protection strategies for riparian and aquatic habitat on federal lands must accommodate the wide variability in landscape conditions present across the Pacific Northwest. Watershed analysis plays a key role in the Aquatic Conservation Strategy, ensuring that aquatic system protection is fitted to specific landscapes.

Watershed analysis will focus on collecting and compiling information within the watershed that is essential for making sound management decisions. It will be an analytical process, not a decision-making process with a proposed action requiring NEPA documentation. It will

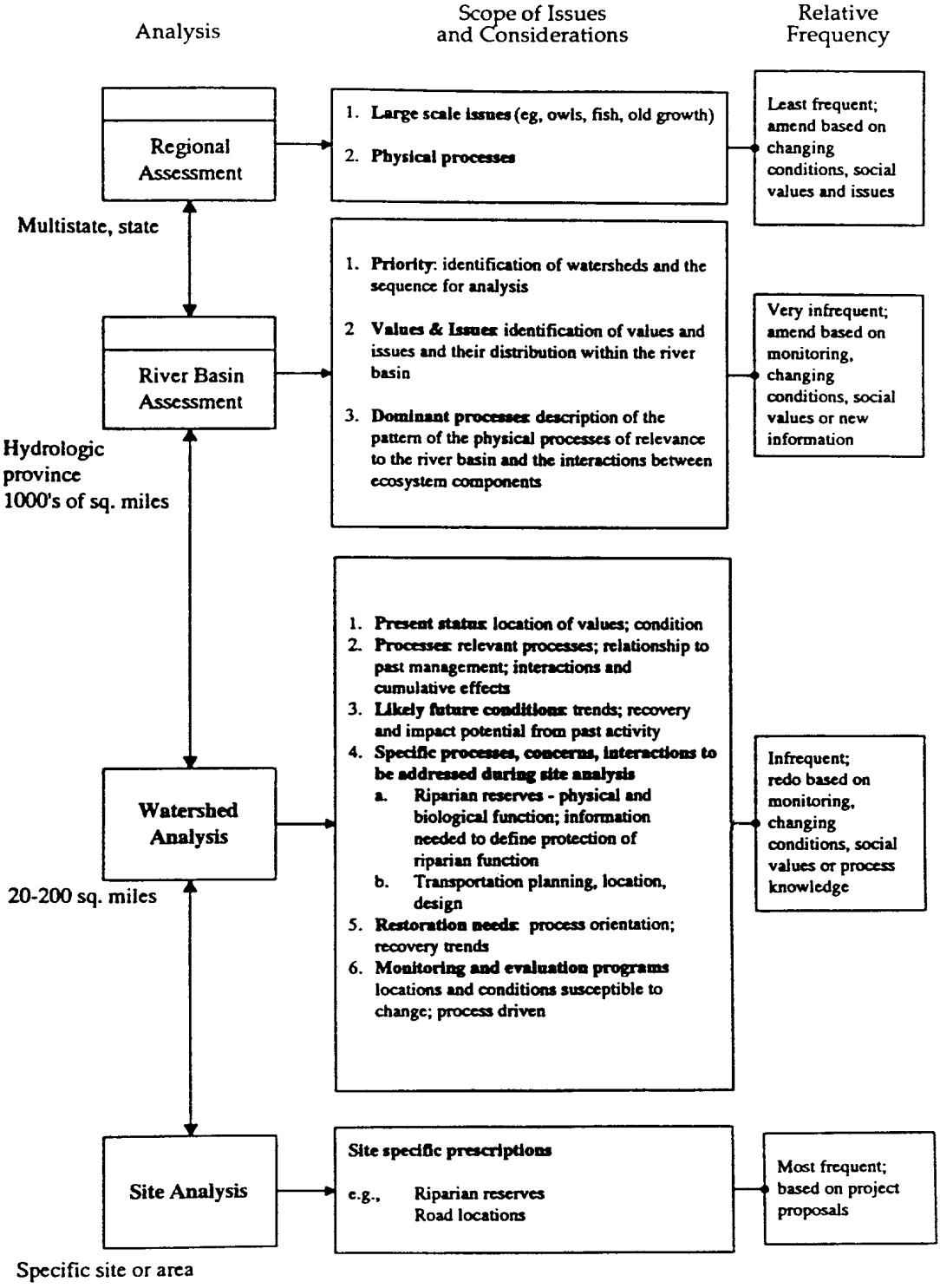
serve as the basis for developing project-specific proposals, and monitoring and restoration needs for a watershed. Some analysis of issues or resources may be included in broader scale analyses because of their scope. The information from the watershed analyses will contribute to decision making at all levels. Project-specific NEPA planning will use information developed from watershed analysis. For example, if watershed analysis shows that restoring certain resources within a watershed could contribute to achieving landscape or ecosystem management objectives, then subsequent decisions will need to address that information.

The results of watershed analyses may include a description of the resource needs, capabilities, opportunities, the range of natural variability, spatially explicit information that will facilitate environmental and cumulative effects analyses for NEPA, and the processes and functions operating within the watershed. Watershed analysis will identify potentially disjunct approaches and conflicting objectives within watersheds. The information from watershed analysis will be used to develop priorities for funding, and implementing actions and projects, and will be used in developing monitoring strategies and objectives. The participation of adjacent landowners, private citizens, interest groups, industry, various government agencies, and others in watershed analyses will be promoted.

Watershed analysis is a systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives. This information will support decisions for implementing management prescriptions, including setting and refining boundaries of Riparian Reserves and other reserves, developing restoration strategies and priorities, and revealing the most useful indicators for monitoring environmental changes. Watershed analysis is an important analytical step supporting ecosystem planning for watersheds of approximately 20 to 200 square miles (Figure B-2). It is a key component supporting watershed planning and analyzing the blending of social expectations with the biophysical capabilities of specific landscapes. Watershed analysis is the appropriate level for analyzing the effects of transportation systems on aquatic and riparian habitats within the target watershed. In contrast, issues pertaining to stocks at risk would generally be more applicable at the province or river basin analytical levels, as discussed in Section E of these standards and guidelines, rather than the 20 to 200 square mile watershed level.

Watershed analysis consists of technically rigorous and defensible procedures designed to identify processes that are active within a watershed, how those processes are distributed in time and space, the current upland and riparian conditions of the watershed, and how all of these factors influence riparian habitat and other beneficial uses. The analysis is conducted by an interdisciplinary team consisting of geomorphologists, hydrologists, soil scientists, biologists and other specialists as needed. Information used in this analysis includes: maps of topography, stream networks, soils, vegetation, and geology; sequential aerial photographs; field inventories and surveys including landslide, channel, aquatic habitat, and riparian condition inventories; census data on species presence and abundance; water quality data; disturbance and land use history; and other historical data (e.g., streamflow records, old channel surveys).

Figure B-2 Relationship between levels of analysis



Watershed analysis is organized as a set of modules that examine biotic and abiotic processes influencing aquatic habitat and species abundance (e.g., landslides, surface erosion, peak and low streamflows, stream temperatures, road network effects, coarse woody debris dynamics, channel processes, fire, limiting factor analysis for key species). Results from these modules are integrated into a description of current upland, riparian, and channel conditions; maps of location, frequency, and magnitude of key processes; and descriptions of location and abundance of key species.

Watershed analysis provides the contextual basis at the site level for decision makers to set appropriate boundaries of Riparian Reserves, plan land use activities compatible with disturbance patterns, design road transportation networks that pose minimal risk, identify what and where restoration activities will be most effective, and establish specific parameters and activities to be monitored. More detailed site-level analysis is conducted to provide the information and designs needed for specific projects (e.g., road siting or timber sale layout) so that riparian and aquatic habitats are protected.

Watershed analysis provides the ecologic and geomorphic basis for changing the size and location of Riparian Reserves necessary to meet Aquatic Conservation Strategy objectives. Ultimate design of Riparian Reserves is likely to be a hybrid of decisions based on consideration of sites of special ecological value, slope stability, wildlife dispersal corridors, endemic species considerations and natural disturbance processes.

Figure B-3 illustrates how slope stability and debris flow runout models may be used as part of watershed analysis for adjusting Riparian Reserves. The result is that the basin is stratified into areas that may require wider or narrower Riparian Reserves than those conforming to Riparian Reserve Scenario 1 for intermittent streams. For example, on intermittent streams in unstable areas with high potential to generate slides and debris flows, Riparian Reserves wider than those conforming to the definition may be necessary to ensure ecological integrity. Riparian Reserves in more stable areas may be less extensive, managed under upland standards and guidelines (e.g., levels of green-tree retention as either single trees or in patches of a specific size), or a combination of these.

Slope stability analysis for Augusta Creek is an example in which likely impact mechanisms are identified (Figure B-4). Distribution of areas subject to slope instability was interpreted from information contained within the Willamette National Forest Soil Resource Inventory. Slope data for each mapped unit was extracted from the Willamette National Forest Soil Resource Inventory based on whether hillslope gradients were less than 30 percent, between 30 and 60 percent, and greater than 60 percent. Geologic descriptions from the Willamette National Forest Soil Resource Inventory were used to determine whether underlying bedrock was hard, moderately hard, or soft. A hazard rating of low, moderate, or high slide potential was assigned to each mapped unit based on hillslope gradient and geologic description (Figure B-4). Predicted hazard ratings were tested and found to be in excellent agreement with the historical pattern of landslides observed on aerial photographs. This analytical step ensures that field and analysis time will be used efficiently to address the most important processes and issues in the watershed.

Using the results from the slope stability analysis, watersheds were stratified into subareas in

order to evaluate the watersheds as uniform response units for each of the processes or issues of concern. The process of determining debris flow susceptibility for Augusta Creek is an example of how a watershed might be stratified and how this stratification may be used as a basis for mapping Riparian Reserves (Figure B-3). To determine the susceptibility of different stream reaches to debris flows, a stream network map was overlaid on the slide potential map (Figure B-4). Areas with high slope instability were assumed to be most likely to generate debris flows. First-order channels (headward channels without tributaries) were assigned a debris flow hazard rating equal to the slide potential of the surrounding landscape (Figure B-4). Debris flow hazard to higher order channels downstream was assumed to be a function of two factors: channel gradient (Figure B-5) and tributary junction angle (Figure B-6). Debris flow hazard was reduced on the class where channel gradient was less than 3 degrees or tributary junction angle exceeded 70 degrees, to produce a map of debris flow potential (Figure B-7). The stratification will vary according to process or issue. Within a given physiographic province, similar geographic and topographic features control drainage network and hillslope stability patterns. These features may exert a strong influence on the design of Riparian Reserves. For example, in the highly dissected southern Oregon Coast Range, debris flows originating in channel heads are the primary mass movement process. Large, slow-moving earthflows are dominant in the western Oregon Cascades. Earthflows qualify as unstable and potentially unstable areas and would be analyzed for inclusion within Riparian Reserves for intermittent streams. To adequately protect the aquatic system from management induced landsliding, Riparian Reserve design may vary as a result of these differences. In the Coast Range, Riparian Reserves would tend to be in narrow bands associated with intermittent streams, relatively evenly distributed throughout the basin, while those in the Cascades may be locally extensive and centered around earthflows. Stable areas in other parts of the watershed may have reduced Riparian Reserves on intermittent streams.

Earthflows can cover extensive amounts of land within a watershed. As such, they largely influence the resulting landscape and directly affect aquatic and riparian habitat quality, structure and function. For example, streams flowing through active earthflows would tend to cut the toes of the inner gorges. Thus, the earthflow would serve as a chronic source of sediment to the channel. The effects of constructing roads or harvesting timber on the rate of sediment delivery to the channel on the earthflow would need to be considered during the design of the Riparian Reserve. Thus, the amount of a particular earthflow incorporated into a Riparian Reserve, as identified through watershed analysis, depends on the risk of management-induced disturbances and meeting Aquatic Conservation Strategy objectives. The risk will be determined based on an analysis of the projected instability of the earthflow relative to the recovery rate of aquatic and riparian ecosystems. There will be cases where entire earthflows will be incorporated into Riparian Reserves and cases where only those portions determined to directly affect the rate of achieving Aquatic Conservation Strategy objectives will be incorporated.

The efficacy of many previous analyses at the watershed level suffered from unclear logic used in weighting or combining individual elements, reliance on simple indices to explain complex phenomena, and assumptions of direct or linear relations between land use intensity and watershed response. These previous watershed analyses typically did not consider how key processes are distributed over watersheds within a given landscape and, in many cases, did not distinguish between physiographic provinces, which can vary widely in the importance of individual processes. Furthermore, most of the previous approaches lacked any method to validate their assumptions or results.

Figure B-3 Augusta Creek basin watershed with Riparian Reserve Scenario 1 modified by slope stability considerations

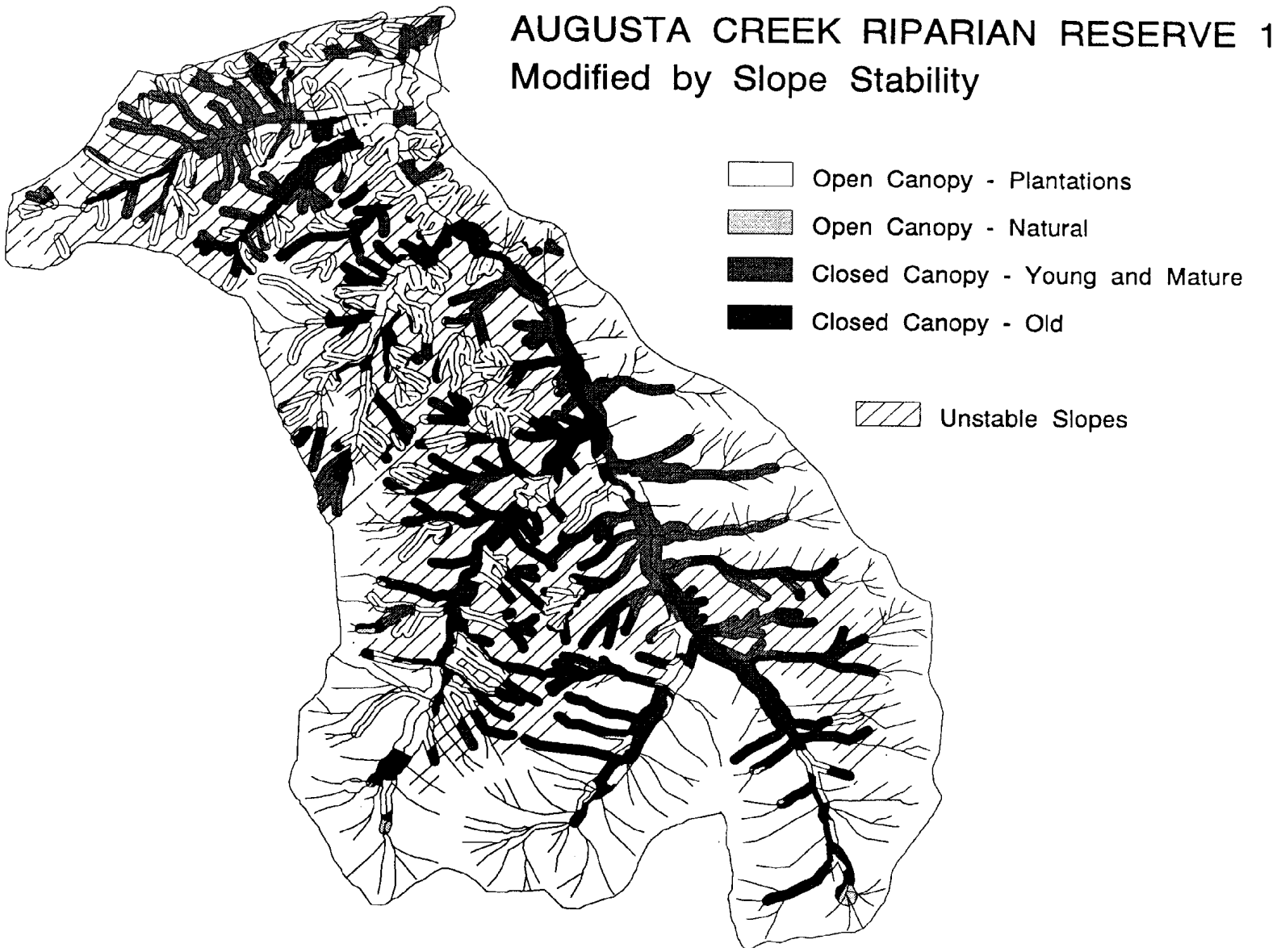


Figure B-4 Landslide potential with stream network, Augusta Creek basin, Willamette National Forest

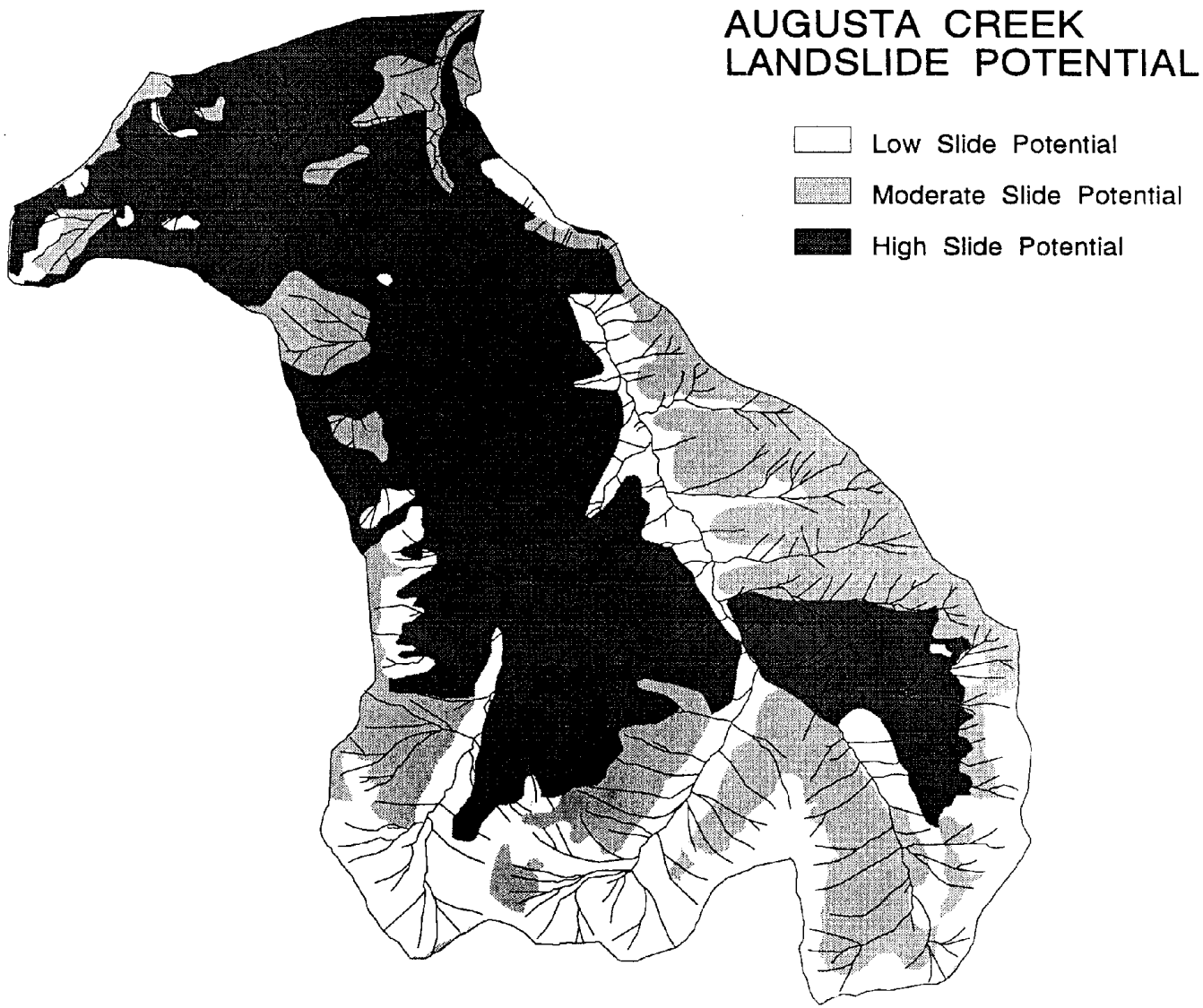


Figure B-5 Distribution of stream reaches with channel gradients greater than and less than 3 degrees, Augusta Creek basin, Willamette National Forest

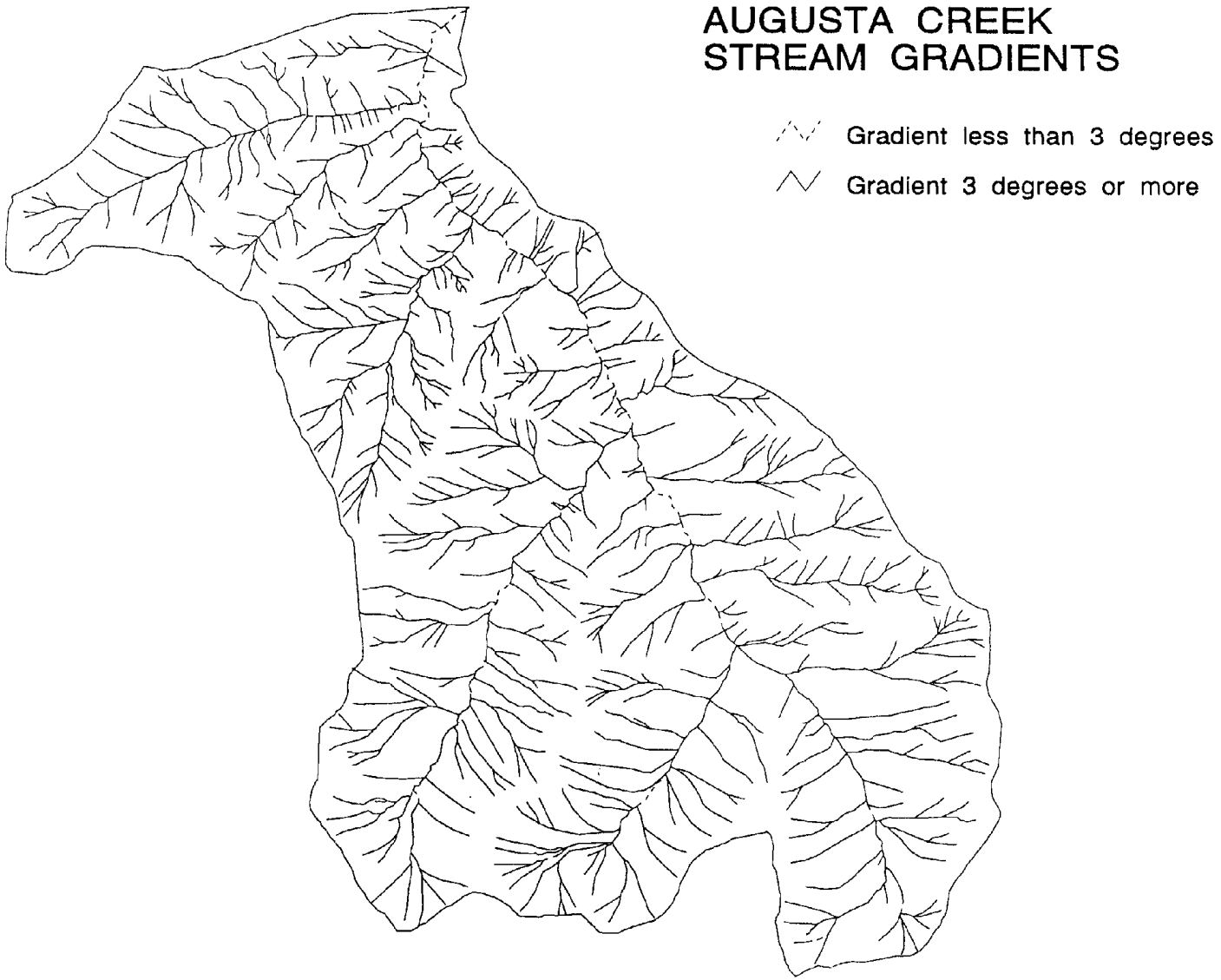


Figure B-6 Stream network for Augusta Creek watershed, Willamette National Forest, showing high-angle tributary junctions greater than 70 degrees

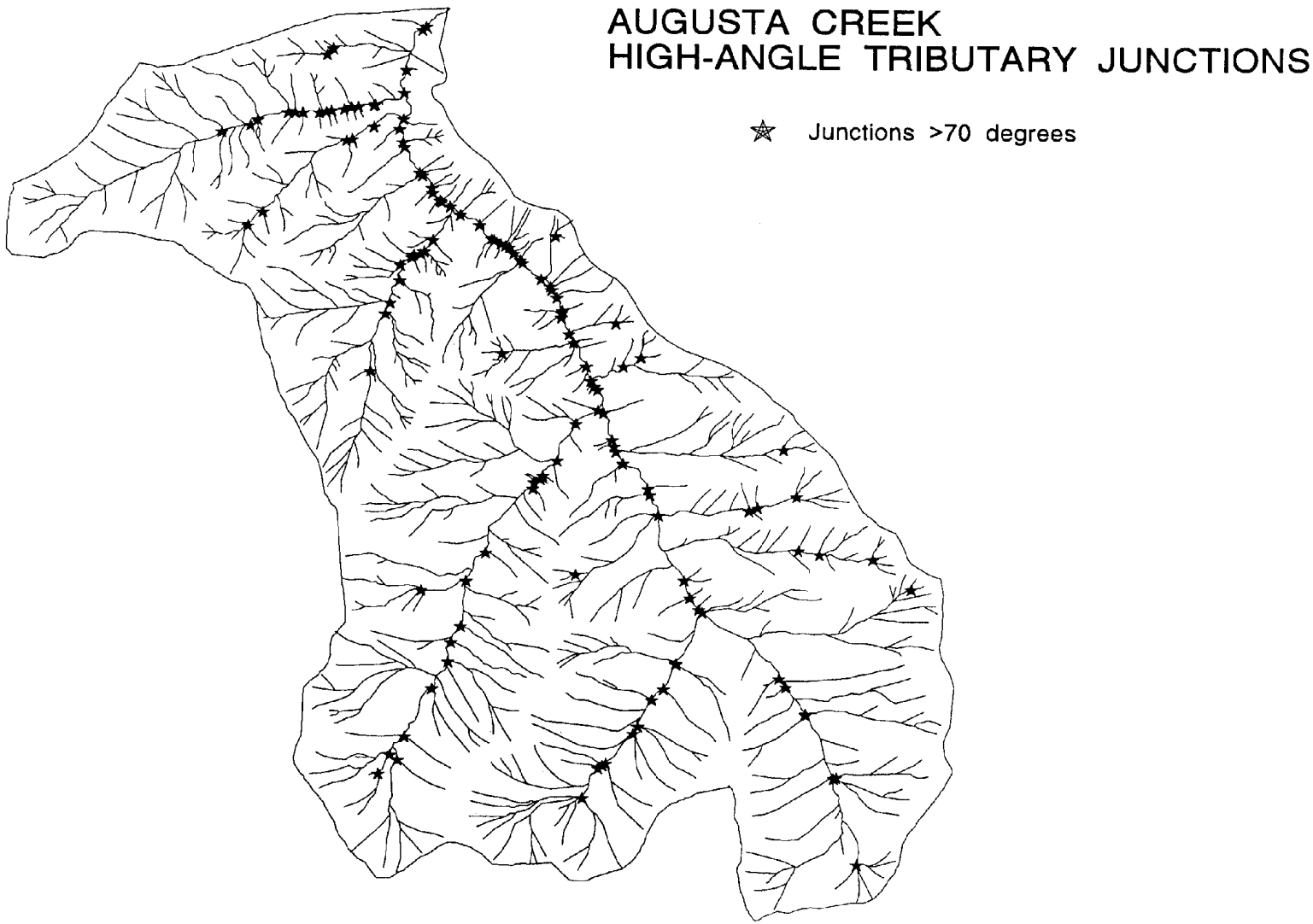
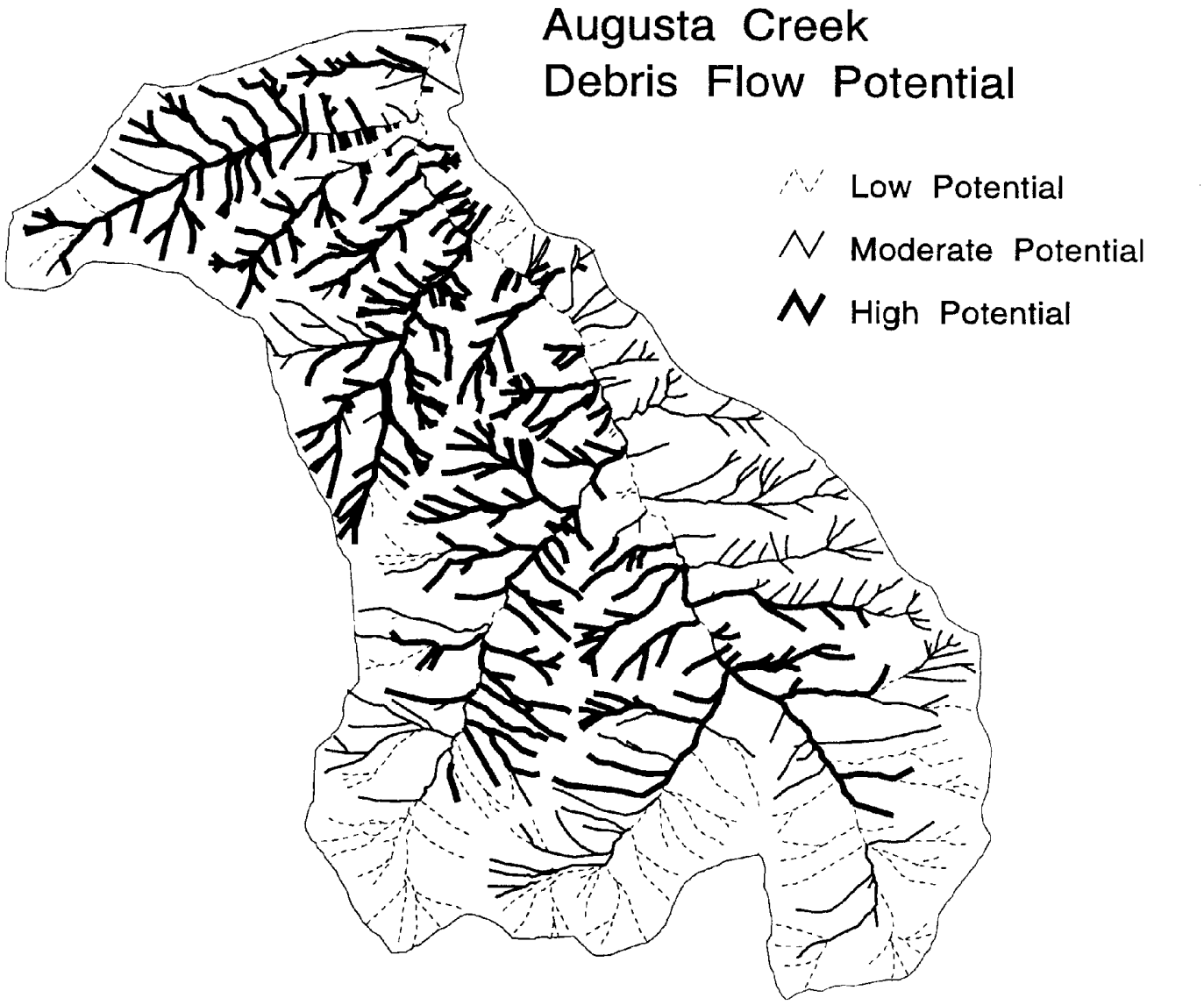


Figure B-7 Debris flow potential for Augusta Creek basin, Willamette National Forest, based on slope stability and potential for debris flow runout from stream gradient and tributary junction analysis



While watershed analysis can provide essential information for designing land use activities over the entire watershed, it can also highlight uncertainties in knowledge or understanding that need to be addressed. Watershed analysis is emerging as a new standard for assessing watershed condition and land use impacts. The process described in these standards and guidelines builds on more recent, comprehensive approaches, including the Water Resources Evaluation of Nonpoint Silvicultural Sources program; the watershed analysis procedure developed by the Washington State Timber, Fish and Wildlife program; and the cumulative effects methods being developed by the National Council on Air and Stream Improvement. Analysis modules in Watershed Analysis are patterned after the first two approaches because a modular approach allows flexibility in selecting methods appropriate to a particular watershed and facilitates modification of specific techniques as improved methods become available. Unique aspects of the watershed analysis procedure described in the FEMAT Report include explicit consideration of biological as well as physical processes, and the joint consideration of upland and riparian areas.

Watershed analysis is one of the important aspects of effectively implementing ecosystem planning and management on a watershed basis. Information gained through watershed analysis will be vital to adaptive management over broad physiographic provinces. When current plans and draft plan preferred alternatives are revised, information gathered through watershed analysis will, in part, be the basis of these revisions.

Summary of Aquatic Conservation Strategy for Watershed Analysis:

- Watershed analysis is a systematic procedure to characterize watersheds. The information is used to guide management prescription and monitoring programs, set and refine Riparian Reserve boundaries, and develop restoration.
- It is required in Key Watersheds prior to resource management.
- It is required in all roadless areas prior to resource management.
- It is recommended in all other watersheds.
- It is required to change Riparian Reserve widths in all watersheds.
- Earthflows qualify as unstable and potentially unstable areas and would be analyzed for inclusion within Riparian Reserves.
- Watershed analysis is important in developing monitoring strategies.

4. Watershed Restoration

Watershed restoration will be an integral part of a program to aid recovery of fish habitat, riparian habitat, and water quality. Restoration will be based on watershed analysis and planning. Watershed analysis is essential to identify areas of greatest benefit-to-cost relationships for restoration opportunities and greatest likelihood of success. Watershed analysis can also be used as a medium to develop cooperative projects involving various

landowners. In many watersheds the most critical restoration needs occur on private lands downstream from federally managed lands. Decisions to apply a given treatment depend on the value and sensitivity of downstream uses, transportation needs, social expectations, risk assessment of probable outcomes for success at correcting problems, costs, and other factors. Watershed analysis, including the use of sediment budgets, provides a framework for considering benefit-to-cost relations in a watershed context. Thus, the magnitude of restoration needs within the planning area will be based on watershed analysis.

The most important components of a watershed restoration program are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of in-stream habitat complexity. Other restoration opportunities exist, such as meadow and wetland restoration and mine reclamation, and these may be quite important in some areas. Regionally however, these opportunities are much less extensive than the three components listed above.

Roads

Road treatments range from full decommissioning (closing and stabilizing a road to eliminate potential for storm damage and the need for maintenance) to simple road upgrading, which leaves the road open. Upgrading can involve practices such as removing soil from locations where there is a high potential of triggering landslides, modifying road drainage systems to reduce the extent to which the road functions as an extension of the stream network, and reconstructing stream crossings to reduce the risk and consequences of road failure or washing out at the crossings.

The decision to apply a given treatment depends on the value and sensitivity of downstream uses, transportation needs, social expectations, assessment of probable outcomes for success at correcting problems, costs, and other factors. Watershed analysis, including the use of sediment budgets, provides a framework for considering benefit-to-cost relations in a watershed context. Thus, the magnitude of regional restoration needs will be based on watershed analysis.

Riparian Vegetation

Active silvicultural programs will be necessary to restore large conifers in Riparian Reserves. Appropriate practices may include planting unstable areas such as landslides along streams and flood terraces, thinning densely-stocked young stands to encourage development of large conifers, releasing young conifers from overtopping hardwoods, and reforesting shrub and hardwood-dominated stands with conifers. These practices can be implemented along with silvicultural treatments in uplands areas, although the practices will differ in objective and, consequently, design.

In-Stream Habitat Structures

In-stream restoration, based on the interpretation of physical and biological processes and deficiencies during watershed analysis, can be an important component of an overall program for restoring fish and riparian habitat. In-stream restoration measures are inherently short term and must be accompanied by riparian and upslope restoration to achieve

long-term watershed restoration. Maintaining desired levels of channel habitat complexity, for example, may best be achieved in the short term by introducing structures. However, a riparian area with the complete array of functions and processes should provide coarse woody debris to the channel in the long term.

In-stream restoration will be accompanied by riparian and upslope restoration if watershed restoration is to be successful. In-stream restoration, including in-channel structures, will not be used to mitigate for management actions that degrade existing habitat, as a substitute for habitat protection, or to justify risky land management activities and practices. Priority must be given to protecting existing high quality habitat.

Summary of Aquatic Conservation Strategy for Watershed Restoration:

- Watershed restoration restores watershed processes to recover degraded habitat.
- Watershed restoration should focus on removing and upgrading roads.
- Silvicultural treatments may be used to restore large conifers in Riparian Reserves.
- Watershed restoration should restore channel complexity. In-stream structures should only be used in the short term and not as a mitigation for poor land management practices.

Monitoring

The following monitoring section is specific to achieving the stated objectives of the Aquatic Conservation Strategy. Implementation, effectiveness, and validation monitoring need to be conducted consistent with the monitoring discussion in Section E of these standards and guidelines.

Watershed analysis will support decisions for a variety of planned ecosystem management actions within watersheds. Specific actions may include habitat restoration, sediment reduction programs, road removal and management, timber harvesting, development of a recreation facility, or any of a multitude of activities. Monitoring will be an essential component of these management actions and will be guided by the results of watershed analysis.

General objectives of monitoring will be to: (1) determine if Best Management Practices have been implemented, (2) determine the effectiveness of management practices at multiple scales, ranging from individual sites to watersheds, and (3) validate whether ecosystem functions and processes have been maintained as predicted. In addition, monitoring will provide feedback to fuel the adaptive management process.

Specific monitoring objectives will be derived from results of the watershed analysis and tailored to each watershed. Monitoring at the 20 to 200 square mile watershed level will link monitoring for ecosystem management objectives for multiple scales of province, river basin, smaller watershed and site-specific levels. Specific locations of unstable and potentially unstable areas, roads, and harvest activities will be identified. In addition, the spatial relationship of potentially unstable areas and management actions to sensitive habitats such

as wetlands will be determined. This information provides a basis for targeting watershed monitoring activities to assess outcomes associated with risks and uncertainties identified during watershed analyses.

Under natural conditions, river and stream habitats on federal forest lands exhibit an extremely wide diversity of conditions depending on past disturbances, topography, geomorphology, climate and other factors. Consequently, riparian area monitoring must be dispersed among the various landscapes rather than concentrated at a few sites and then extrapolated to the entire forest. Logistical and financial constraints require a stratified monitoring program that includes:

- Post-project site review
- Reference to subdrainages
- Basin monitoring
- A water quality network
- Landscape integration of monitoring data

A stratified monitoring program examines watersheds at several spatial and temporal scales. Information is provided on hillslope, floodplain, and channel functions, water quality, fish and wildlife habitat and populations, and vegetation diversity and dynamics.

Parameters selected for monitoring depend on the activities planned for a given watershed designed to specifically address forest practices and associated activities such as road construction and maintenance. Two of the more extensive activities related to water quality are timber harvest and road related operations. Other activities such as mining and in-stream channel alterations to improve habitat can affect water quality in localized areas. In addition to chemical and physical parameters, biological criteria may be appropriate to monitor using techniques such as Rapid Bioassessment Protocols for macroinvertebrates or the index of biotic integrity for fish diversity.

Long-term systematic monitoring in selected watersheds will be necessary to provide reference points for effectiveness and validation monitoring. These watersheds should represent a range of forest and stream conditions that have been exposed to natural and induced disturbance. Reference watersheds, subbasins, and individual sites will be selected as part of the overall adaptive management process described as part of these standards and guidelines.

Study plans will be cooperatively developed based on province, river basin, and/or watershed level analyses. Long-term data sets from reference watersheds will provide an essential basis for adaptive management and a gauge by which to assess trends in in-stream condition.

Monitoring plans must be tailored for each watershed. Significant differences in type and intensity of monitoring will occur based on watershed characteristics and management actions. For example, carefully targeted restoration activities may only require effectiveness monitoring of single activities, whereas watershed-scale restoration would be accompanied

by extensive riparian and in-stream monitoring. The specific design of monitoring programs can best be accomplished by the local interdisciplinary teams working in cooperation with state programs. Pooling the monitoring resources of federal and state agencies is a necessity to provide interagency consistency and to increase available resources.

Monitoring will be conducted and results will be documented, analyzed and reported by the agency or agencies responsible for land management in any particular watershed. Reports will be reviewed by local interdisciplinary teams. In addition, water resource regulatory agencies may review results to determine compliance with appropriate standards, and province and river basin-level strategies. A cross-section of team members that includes participants from states and regulatory agencies should assess monitoring results and recommend changes in Best Management Practices or the mechanisms for Best Management Practice implementation.

C. Standards and Guidelines

Although the direction in all sections of this document constitutes standards and guidelines, standards and guidelines specific to particular land allocation categories, or relative to specific types of management activities, are included (or referenced) in this section, Section C, of these standards and guidelines.

All land allocations have specific management direction regarding how those lands are to be managed, including actions that are prohibited and descriptions of the conditions that should occur there. This management direction for specific lands is known as "standards and guidelines"— the rules and limits governing actions, and the principles specifying the environmental conditions or levels to be achieved and maintained.

Existing Laws and Regulations

Additional direction to management agencies includes, but is not limited to directives, policy, handbooks, manuals, as well as other plans, regulations, laws and treaties. The standards and guidelines presented in this document supersede other direction except treaties, laws, and regulations unless that direction is more restrictive or provides greater benefits to late-successional forest related species. None of these standards and guidelines applies where they would be contrary to existing law or regulation, or where they would require the agencies to take actions for which they do not have authority.

Hierarchy of Standards and Guidelines

In some areas, land allocations overlap. Standards and guidelines for Congressionally Reserved Areas must be met first. Second, Riparian Reserve standards and guidelines apply and are added to the standards and guidelines of other designated areas. For example, where Riparian Reserves occur within Late-Successional Reserves, the standards and guidelines of both designations apply. Key Watershed designations may overlay any of the allocations (Congressionally Reserved Areas, Late-Successional Reserves, Managed Late-Successional Areas, Adaptive Management Areas, Administratively Withdrawn Areas, or the matrix). In this case, the standards and guidelines for the allocations apply, and the Key Watershed designation adds additional requirements. In all allocations, standards and guidelines in current plans and draft plan preferred alternatives apply where they are more restrictive or provide greater benefits to late-successional forest related species (see page C-3 for four specific exceptions). For example, thinning in a Late-Successional Reserve would be permitted only if it is consistent with the standards and guidelines in this document, and also is consistent with the standards and guidelines of the underlying current plan or draft plan preferred alternative.

Standards and Guidelines Common to all Land Allocations

Current Plans and Draft Plan Preferred Alternatives

Although these standards and guidelines supplement existing plans, these standards and guidelines also incorporate certain standards and guidelines from Draft National Forest Plans and Draft BLM Resource Management Plans. When these standards and guidelines were prepared, beginning in April 1993, BLM Districts and National Forests either had completed (current) Forest and Resource Management Plans, or they were in the process of developing such plans. For those units that had not completed their plans, the then-current version, or draft, of the unit's preferred alternative was identified. These current plans and draft plan preferred alternatives were used as the base or starting point for these standards and guidelines. Therefore, except as specifically excepted below (see page C-3), standards and guidelines (including Administratively Withdrawn Areas) from current plans and draft plan preferred alternatives apply where they are more restrictive or provide greater benefits to late-successional forest related species than other provisions of these standards and guidelines.

The standards and guidelines from the following current plans and draft plan preferred alternatives apply where they are more restrictive or provide greater benefits to late-successional forest related species than other provisions of these standards and guidelines:

Forest Service in Oregon and Washington - 1984 Regional Guide as amended in 1988. Existing Forest Plans for the Olympic, Mt. Baker-Snoqualmie, Gifford Pinchot, Okanogan, Wenatchee, Siuslaw, Mt. Hood, Willamette, Deschutes, Winema, Umpqua, Rogue River, and Siskiyou National Forests, approved 1988-1991.

Bureau of Land Management, Oregon - The April 1993 Revised Preferred Alternative to the Draft Resource Management Plans and EISs originally released August 1992 for the Salem, Eugene, Coos Bay, Roseburg, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District.

Forest Service, California - 1984 Regional Guide. Existing Forest Plans for the Lassen and Modoc National Forests. The Preferred Alternative as of May 1993 for Draft Forest Plans being developed for the Klamath, Shasta-Trinity, Mendocino, and Six Rivers National Forests.

Bureau of Land Management, California - Existing Resource Management Plans for the Arcata and Redding Resource Areas, approved 1992 and 1993, respectively. Existing Management Plan for the King Range National Conservation Area, approved 1974.

Related approved plans such as those for National Scenic Areas or Wild and Scenic Rivers are similarly assumed to apply where they are more restrictive or provide greater benefits for late-successional forest related species.

Exceptions

Exceptions to the above rule consists of those provisions of these standards and guidelines that are specifically designed to replace direction in current plans and draft plan preferred alternatives. These exceptions are:

1. Direction specific to management for the northern spotted owl and its habitat. Because of protection provided by these standards and guidelines, the BLM (Oregon) direction adapted from the *Recovery Plan for the Northern Spotted Owl-Draft* has been modified (see other provisions of these standards and guidelines), and the Forest Service direction adopting elements of *A Conservation Strategy for the Northern Spotted Owl* has been dropped.

2. Administratively Withdrawn Areas that are specified in current plans and draft plan preferred alternatives to benefit American martens, pileated woodpeckers, and other late-successional species are returned to the matrix unless local knowledge indicates that other allocations and these standards and guidelines will not meet management objectives for these species.

3. Green-tree retention standards for the matrix exceeding 15 percent in current plans and draft plan preferred alternatives for National Forests are superseded by the 15 percent retention direction in these standards and guidelines unless local knowledge indicates such direction must be retained to meet management objectives.

4. As described for Adaptive Management Areas elsewhere in these standards and guidelines, standards and guidelines within current plans and draft plan preferred alternatives need to be considered during planning and implementation of activities within Adaptive Management Areas, and they may be modified in Adaptive Management Area plans based on site-specific analysis. Coordination with the Regional Ecosystem Office is required.

Unmapped Late-Successional Reserves

Standards and guidelines for unmapped Late-Successional Reserves and Managed Late-Successional Areas prohibit or limit activities that otherwise appear to be within the matrix, Adaptive Management Area, or some other land allocation. Unmapped Late-Successional Reserves are identified for all LS/OG 1s and 2s within Marbled Murrelet Zone 1, around occupied marbled murrelet sites, and for 100 acres around known spotted owl activity centers. Unmapped Late-Successional Reserves and Managed Late-Successional Areas are identified for certain Protection Buffers. See the Late-Successional Reserve and Managed Late-Successional Area descriptions later in this section of these standards and guidelines for specific information.

Watershed Analysis

Watershed analysis is required in all Key Watersheds and all roadless areas prior to resource management. Watershed analysis is required to change Riparian Reserves widths in all watersheds. See the Aquatic Conservation Strategy starting on page B-9 of these standards and guidelines for additional information about watershed analysis.

Research

A variety of wildlife and other research activities may be ongoing and proposed in all land allocations. These activities must be assessed to determine if they are consistent with the objectives of these standards and guidelines. Some activities (including those within experimental forests) not otherwise consistent with the objectives may be appropriate, particularly if the activities will test critical assumptions of these standards and guidelines, will produce results important for habitat development, or if the activities represent continuation of long-term research. Every effort should be made to locate non-conforming activities in land allocations where they will have the least adverse effect upon the objectives of these standards and guidelines.

Current, funded, agency-approved research that meets the above criteria, is assumed to continue if analysis ensures that a significant risk to Aquatic Conservation Strategy objectives does not exist. Research Stations and other Forest Service and BLM units will, within 180 days of the signing of the Record of Decision, submit a brief project summary to the Regional Ecosystem Office of ongoing research projects that are potentially inconsistent with other standards and guidelines in this document but are expected to continue under the above research exception. The Regional Ecosystem Office may choose to more formally review specific projects, and may recommend to the Regional Interagency Executive Committee modification, up to and including cancellation, of those projects that have an unacceptable risk the objectives of these standards and guidelines.

Oregon-California Border

Where standards and guidelines vary between northern California and Oregon, management along administrative unit boundaries instead of the state line is acceptable as long as it is consistent, is stated as the intent of the unit, involves only a slight fraction of the unit, and does not violate a clear assumption of these standards and guidelines.

Survey and Manage

These measures may apply within any land allocations. However, the survey and manage provision for each species will be directed to the range of that species and the particular habitats that it is known to occupy. The "survey and manage" standard and guideline will provide benefits to amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropods. Table C-3 at the end of this section of these standards and guidelines shows what species are covered by the survey and manage provision, and which of the following four categories is to be applied to each. The standard and guideline contains four components, and priorities differ among them.

1. *Manage known sites*. Management of known species sites should receive the highest priority of these four categories. Efforts must be undertaken to acquire information on these known sites and to manage this information so that it is available to all project planners. An effective way to accomplish this is to compile the information in a GIS data base. Those efforts should be coordinated by the Regional Ecosystem Office, and should be completed expeditiously. As soon as the information becomes available, it should be used in the design or modification of activities. Activities that are implemented in 1994 should use this information to the greatest degree possible. Activities implemented in 1995 and later must include provisions for these known sites. In most cases, the

appropriate action will be protection of relatively small sites, on the order of tens of acres. For some species, including some vascular plants, the appropriate action will include the use of specific management treatments such as prescribed fire. For rare and endemic fungus species, areas of 160 acres should be temporarily withdrawn from ground-disturbing activities around known sites until those sites can be thoroughly surveyed and site-specific measures prescribed. For one fungus species, *Oxyporous nobilissimus*, there are only six known sites and two of these do not currently have a protected status. Management areas of all useable habitat up to 600 acres are to be established around these two sites for the protection of those populations until the sites can be thoroughly surveyed and site-specific measures prescribed. The actions to protect *Oxyporous* must be undertaken immediately.

2. *Survey prior to ground-disturbing activities*. Measures to survey for species and manage newly discovered sites are to be phased-in over a somewhat longer timeframe than the measures specified for currently known sites (see above). For some species, these efforts have been ongoing through rare and sensitive species programs. Where such efforts have been ongoing, they should continue. However, protocols have not been developed for surveys for all of these species, and the expertise needed to conduct them is not readily available in some cases. Efforts to design protocols and implement surveys should be started immediately. Where surveys are completed, the information gathered from them should be used to establish managed sites for species. Within the known or suspected ranges and within the habitat types or vegetation communities associated with the species, surveys for Del Norte, Larch Mountain, Shasta, Siskiyou Mountains, and Van Dyke's salamanders, and red tree voles (and lynx, see page C-47), must precede the design of all ground-disturbing activities that will be implemented in 1997 or later. Development of survey protocols for the other 71 species listed in Table C-3 must begin in 1994 and proceed as soon as possible. These surveys must be completed prior to ground disturbing activities that will be implemented in F.Y. 1999 or later. Work to establish habitat requirements and survey protocols may be prioritized relative to the estimated threats to the species as reflected in the SEIS. Management standards will be developed to manage habitat for the species on sites where they are located. These surveys may be conducted at a scale most appropriate to the species. For most species, this survey would start at the watershed analysis level with identification of likely species locations based on habitat. Those likely locations would then be thoroughly searched prior to implementation of activities. For other species, the identification of likely sites may be most appropriately done at the scale of individual projects. Surveys should be designed for maximum efficiency, focusing on the likely range and habitats of the target species. Multispecies surveys should be used wherever they would be most efficient. To the degree possible, surveys should be designed to minimize the number of site visits needed to acquire credible information. Survey protocols and proposed site management should be incorporated into interagency conservation strategies developed as part of ongoing planning efforts coordinated by the Regional Ecosystem Office.

3. *Extensive surveys*. Conduct extensive surveys for the species to find high-priority sites for species management. Specific surveys prior to ground-disturbing activities are not a requirement. Rather, the surveys will be done according to a schedule that is most efficient, and sites will be identified for protection at that time. This strategy entails some risk because some species sites may be disturbed prior to completion of surveys. It is recommended primarily for species whose characteristics make site and time-specific surveys difficult. For example, some fungi only produce fruiting bodies under specific

climatic conditions, so finding their location may take several to many years. It would be most efficient to do broad surveys for these species during times of appropriate conditions rather than attempting annual, site-specific surveys. Surveys under this strategy must be underway by 1996. As with surveys described in item 2 above, surveys should be designed for efficiency and standardized protocols should be developed.

4. *General regional surveys*. The objective is to survey for the species to acquire additional information and to determine necessary levels of protection. Species intended to benefit from this standard and guideline are the arthropods, the fungi species that were not classed as rare and endemic, bryophytes, and lichens. These groups of species are particularly poorly known. Many species have likely not yet been identified, and there is only general information available on the abundance and distribution of known species. The information gathered through these efforts may be useful in refining these standards and guidelines to better provide for these species as part of the adaptive management process. These surveys are expected to be both extensive and expensive, but the information from them is critical to successful implementation of ecosystem management. They will be initiated no later than F.Y. 1996 and are to be completed within ten years.

Annual status reports are to be submitted to the Regional Ecosystem Office for review beginning at the end of F.Y. 1995. As experience is acquired with these requirements, agencies may propose changes to the Regional Ecosystem Office for analysis. These changes could include changing the schedule, moving a species from one survey strategy to another, or dropping this mitigation requirement for any species whose status is determined to be more secure than originally projected. The Regional Ecosystem Office will forward such proposals, along with recommendations, to the Regional Interagency Executive Committee for action as appropriate.

Manage Recreation Areas to Minimize Disturbance to Species

This standard and guideline applies throughout all land allocations. This standard and guideline will benefit a number of fungi and lichen species whose known locations are predominantly within established recreation sites. This standard and guideline falls within the category of the survey and manage standard and guideline above, and species to be protected through this standard and guideline are among those shown in Table C-3 at the end of this section of these standards and guidelines. Additional information on the habitat requirements of these species are discussed in Appendix J of the Final SEIS.

Protect Sites From Grazing

This standard and guideline applies throughout all land allocations. This standard and guideline is designed to benefit mollusks and vascular plants. Known and newly discovered sites of these species will be protected from grazing by all practicable steps to ensure that the local populations of the species will not be impacted. Species to be protected through this standard and guideline are:

Mollusks: *Ancotrema voyanum, Monadenia fidelis klamathica, Monadenia fidelis ochromphalus, Pristiloma articum crateris, Fluminicola n. sp. 1, Fluminicola n. sp. 11, Fluminicola n. sp. 19, Fluminicola n. sp. 20, Fluminicola n. sp. 3, Fluminicola seminalis*

Vascular Plants: *Pedicularis howellii*

Standards and Guidelines for Key Watersheds

Description

Key Watersheds are not a designated area or matrix, but overlay all of these allocations (see also the Aquatic Conservation Strategy starting on page B-9 of these standards and guidelines). All 24.455 million acres of Forest Service, BLM, and other federally-administered lands within the range of the northern spotted owl are allocated to one of three watershed categories: Tier 1 Key Watersheds, Tier 2 Key Watersheds, or non-Key Watersheds (all others). Key Watersheds overlay portions of all six categories of designated areas and matrix as shown below, and place additional management requirements or emphasis on activities in those areas.

Acres in each designated area and matrix, by Key and non-Key Watersheds.

	Tier 1	Tier 2	non-Key	Total
Designated Areas				
Congressionally Reserved Areas	2,728,000	311,200	4,281,400	7,320,600
Late-Successional Reserves	3,151,700	279,100	4,000,000	7,430,800
Adaptive Management Areas	228,100	60,600	1,233,100	1,521,800
Managed Late-Successional Areas	55,100	0	47,100	102,200
Administratively Withdrawn Areas	407,900	54,700	1,014,500	1,477,100
Riparian Reserves (based on sample)	631,000	113,700	1,882,800	2,627,500
Matrix				
Matrix	917,600	182,400	2,875,300	3,975,300
Total	8,119,400	1,001,700	15,334,200	24,455,300

Standards and Guidelines

Inside Roadless Areas - No new roads will be built in remaining unroaded portions of inventoried (RARE II) roadless areas.

Outside Roadless Areas - Reduce existing system and nonsystem road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds.

Key Watersheds are highest priority for watershed restoration.

Watershed analysis is required prior to management activities, except minor activities such as those Categorically Excluded under NEPA (and not including timber harvest).

Watershed analysis is required prior to timber harvest.

Standards and Guidelines for Designated Areas and Matrix

In addition to the general standards and guidelines and management considerations described elsewhere in this document, the six categories of designated areas, and matrix, are described below, along with applicable standards and guidelines for each.

Congressionally Reserved Areas

Acres

Key and non-Key Watersheds are specified for all areas, and therefore overlay all other land allocations. Where Key Watersheds occur within Congressionally Reserved Areas, standards and guidelines for Key Watersheds (see Key Watersheds on page C-7, and the Aquatic Conservation Strategy starting on page B-9 of these standards and guidelines) apply to the extent they are consistent with the legislated direction for the Congressionally Reserved Area. See additional detail under Hierarchy of Standards and Guidelines on page C-1.

Congressionally Reserved within Tier 1 Key Watersheds	2,728,000
Congressionally Reserved within Tier 2 Key Watersheds	311,200
Congressionally Reserved within non-Key (other) Watersheds	4,281,400
Total Congressionally Reserved acres	7,320,600

Acreage of Riparian Reserves is not calculated within Congressionally Reserved Areas for these standards and guidelines. However, Riparian Reserves occur in approximately 40 percent of Congressionally Reserved Areas, and Riparian Reserve standards and guidelines apply to the extent they are consistent with the legislative direction for the Congressionally Reserved Area.

Description

These standards and guidelines retain existing land allocations for Congressionally Reserved Areas. These include lands with congressional designations that normally preclude timber harvest, as well as other federal lands not administered by the Forest Service or BLM, including National Parks and Monuments, Wildernesses, Wild and Scenic Rivers, National Wildlife Refuges, and military reservations.

Standards and Guidelines

Management of these lands follows direction written in the applicable legislation or plans. Direction from these standards and guidelines also applies where it is more restrictive or provides greater benefits to late-successional forest related species, unless the application of these standards and guidelines would be contrary to legislative or regulatory language or intent.

Late-Successional Reserves

Acres

Key and non-Key Watersheds are specified for all areas, and therefore overlay all other land allocations. For the portion of Late-Successional Reserves located within Key Watersheds, standards and guidelines for Key Watersheds (see Key Watersheds on page C-7, and the Aquatic Conservation Strategy starting on page B-9 of these standards and guidelines), as well as standards and guidelines for Late-Successional Reserves (listed below) apply. See additional detail under Hierarchy of Standards and Guidelines on page C-1.

Late-Successional Reserves within Tier 1 Key Watersheds	3,151,700
Late-Successional Reserves within Tier 2 Key Watersheds	279,100
Late-Successional Reserves within non-Key (other) Watersheds	4,000,000
Total Late-Successional Reserves	7,430,800

Acreage of Riparian Reserves is not calculated within Late-Successional Reserves for these standards and guidelines. However, Riparian Reserve standards and guidelines affect approximately 40 percent of Late-Successional Reserves.

Description

The objective of Late-Successional Reserves is 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.

Late-Successional Reserves have been designated based on five elements: (1) areas mapped as part of an interacting reserve system; (2) LS/OG 1 and 2 areas within Marbled Murrelet Zone 1, and certain owl additions, mapped by the Scientific Panel on Late-Successional Forest Ecosystems (1991); (3) sites occupied by marbled murrelets; (4) known owl activity centers; and (5) Protection Buffers for specific endemic species identified by the Scientific Analysis Team (SAT)(1993). Additional areas, such as 600 acres around known sites of fungus species *Oxyporous nobilissimus*, are protected under the survey and management standards and guidelines starting on page C-4 of these standards and guidelines. Details are as follows.

1. Mapped Late-Successional Reserves

Most Late-Successional Reserves are mapped areas, shown on the Alternative 9 map that was included with the Final SEIS and described on page A-6 of these standards and guidelines. They were designed to incorporate Key Watersheds to the extent possible, while remaining consistent with other objectives. They also incorporate some or parts of LS/OG1s and LS/OG2s (most ecologically significant, and ecologically significant late-successional and old-growth forests, respectively, from the Scientific Panel on Late-Successional Forest Ecosystems [1991] and some or parts of the Designated Conservation Areas (DCAs) from the Final Draft Spotted Owl Recovery Plan in the western portion of the range of the northern spotted owl.

2. LS/OG 1s and 2s

Also shown on the Alternative 9 map, all LS/OG1s and LS/OG2s within Marbled Murrelet Zone 1, except in the Quinault Special Management Area, are Late-Successional Reserve, as are owl additions mapped by the Scientific Panel on Late-Successional Forest Ecosystems (1991) within the Finney and Northern Coast Adaptive Management Areas. Where LS/OG status is used to define the boundaries of a Late-Successional Reserve, the boundaries are fixed regardless of the future condition of those (or other) stands.

3. Occupied Marbled Murrelet Sites

The area close to marine environments associated with most marbled murrelet activity is referred to as Marbled Murrelet Zone 1. Zone 1 extends approximately 40 miles inland in Washington, 35 miles inland in Oregon, 25 miles inland in California north of Fort Bragg, and 10 miles inland south of Fort Bragg. Zone 2 is defined for survey purposes and does not affect land allocations. Both Marbled Murrelet Zones 1 and 2 are shown on the Alternative 9 map that was included with the Final SEIS. However, for survey purposes only, some portions of these zones are being remapped to be consistent with the above description. (See also page A-6. This remapping does not LS/OGs reserved under #2 above.)

Preproject surveys of marbled murrelet habitat are required according to protocol currently used by the federal agencies. Current protocol requires 2 years of surveys to assure that no marbled murrelet nests exist in areas planned for timber harvest. If behavior indicating occupation is documented (described below), all contiguous existing and recruitment habitat for marbled murrelets (i.e., stands that are capable of becoming marbled murrelet habitat within 25 years) within a 0.5-mile radius will be protected. The 0.5-mile radius circle should be centered on either the behavior indicating occupation, or within 0.5 mile of the location of the behavior, whichever maximizes interior old-growth habitat. When occupied areas are close to each other, the 0.5-mile circles may overlap.

Behavior indicating marbled murrelet occupation includes at least one of the following: (1) discovery of an active nest or a recent nest site as evidenced by a fecal ring or eggshell fragments; (2) discovery of a chick or eggshell fragments on the forest floor; (3) birds flying below, through, into, or out of the forest canopy within or adjacent to a stand; (4) birds perching, landing, or attempting to land on branches; (5) birds calling from a stationary location within the stand; (6) birds flying in small or large radius circles above the canopy.

4. Known Spotted Owl Activity Centers

This standard and guideline applies to known spotted owl activity centers that are not protected by Congressionally Reserved Areas, Late-Successional Reserves, Riparian Reserves, Managed Late-Successional Areas, or Administratively Withdrawn Areas. One hundred acres of the best northern spotted owl habitat will be retained as close to the nest site or owl activity center as possible for all known (as of January 1, 1994) spotted owl activity centers located on federal lands in the matrix and Adaptive Management Areas. This is intended to preserve an intensively used portion of the breeding season home range. "Activity center" is defined as an area of concentrated activity of either a pair of spotted owls or a territorial single owl. Timber management activities within the 100-acre area should comply with management guidelines for Late-Successional Reserves. Management around this area will be

designed to reduce risks of natural disturbance. Because these areas are considered important to meeting objectives for species other than spotted owls, these areas are to be maintained even if they become no longer occupied by spotted owls.

5. Protection Buffers

Unmapped Late-Successional Reserves result from the application of Protection Buffers (see standards and guidelines below).

Standards and Guidelines

Also see Standards and Guidelines Common to all Land Allocations starting on page C-2 of these standards and guidelines.

Objectives - 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. See additional information in the Ecological Principles for Management of Late-Successional Forests discussion in Section B of these standards and guidelines.

Exceptions - Research Natural Areas and activities required by recovery plans for listed threatened and endangered species take precedence over Late-Successional Reserve standards and guidelines.

Management Assessment for Late-Successional Reserves - A management assessment should be prepared for each large Late-Successional Reserve (or group of smaller Late-Successional Reserves) before habitat manipulation activities are designed and implemented. Land management agencies may choose to develop these assessments as components of legally-mandated plans (e.g., Forest or District Plans), as part of province-level planning, or as stand-alone assessments. If developed to stand alone, the assessments should be closely coordinated with subsequent watershed analysis and province-level planning. Standards and guidelines should be refined at the province level, prior to development of Late-Successional Reserve assessments. Late-Successional Reserve assessments should generally include: (1) a history and inventory of overall vegetative conditions within the reserve, (2) a list of identified late-successional associated species known to exist within the Late-Successional Reserve and information on their locations, (3) a history and description of current land uses within the reserve, (4) a fire management plan, (5) criteria for developing appropriate treatments, (6) identification of specific areas that could be treated under those criteria, (7) a proposed implementation schedule tiered to higher order (i.e., larger scale) plans, and (8) proposed monitoring and evaluation components to help evaluate if future activities are carried out as intended and achieve desired results. Only in unusual circumstances would silvicultural treatments, including prescribed fire, precede preparation of this management assessment. Late-Successional Reserve assessments are subject to review by the Regional Ecosystem Office. Until Late-Successional Reserve assessments are completed, fire suppression activities should be guided by land allocation objectives in coordination with local resource management specialists.

Occupied Marbled Murrelet Sites - Timber harvest is prohibited within occupied marbled murrelet habitat at least until completion of the Marbled Murrelet Recovery Plan. Silvicultural treatments in non-habitat within the 0.5-mile circle must protect or enhance the suitable or replacement habitat. When objectives of the Marbled Murrelet Recovery Plan have been identified, management direction will be amended or revised as appropriate.

Silviculture

Thinning or other silvicultural treatments inside reserves are subject to review by the Regional Ecosystem Office to ensure that the treatments are beneficial to the creation of late-successional forest conditions. The Regional Ecosystem Office may develop criteria that would exempt some activities from review. Stand and vegetation management of any kind, including prescribed burning, is considered a silvicultural treatment. Excepted from review are reforestation activities legally required by, and planned as part of, existing sold timber sales, where the reforestation prescription has been modified as appropriate to meet the objectives of the Late-Successional Reserve.

Activities permitted in the western and eastern portions of the northern spotted owl's range are described separately below. Salvage of dead trees is described separately below, and is limited to stand-replacing disturbance events exceeding 10 acres.

West of the Cascades - There is no harvest allowed in stands over 80 years old (110 years in the Northern Coast Adaptive Management Area). Thinning (precommercial and commercial) may occur in stands up to 80 years old regardless of the origin of the stands (e.g., plantations planted after logging or stands naturally regenerated after fire or blowdown). The purpose of these silvicultural treatments is to benefit the creation and maintenance of late-successional forest conditions. Examples of silvicultural treatments that may be considered beneficial include thinnings in existing even-age stands and prescribed burning. For example, some areas within Late-Successional Reserves are actually young single-species stands. Thinning these stands can open up the canopy, thereby increasing diversity of plants and animals and hastening transition to a forest with mature characteristics.

East of the Cascades and in the Oregon and California Klamath Provinces - Given the increased risk of fire in these areas due to lower moisture conditions and the rapid accumulation of fuels in the aftermath of insect outbreaks and drought, additional management activities are allowed in Late-Successional Reserves. Guidelines to reduce risks of large-scale disturbance are as follows:

> Guidelines to Reduce Risks of Large-Scale Disturbance - Large-scale disturbances are natural events, such as fire, that can eliminate spotted owl habitat on hundreds or thousands of acres. Certain risk management activities, if properly planned and implemented, may reduce the probability of these major stand-replacing events. There is considerable risk of such events in Late-Successional Reserves in the Washington and Oregon Eastern Cascades, and California Cascades Provinces and a lesser risk in the Oregon and California Klamath Provinces. Elevated risk levels are attributed to changes in the characteristics and distribution of the mixed-conifer forests resulting from past fire

protection. These forests occur in drier environments, have had repeated insect infestations, and are susceptible to major fires. Risk reduction efforts are encouraged where they are consistent with the overall recommendations in these guidelines.

Silvicultural activities aimed at reducing risk shall focus on younger stands in Late-Successional Reserves. The objective will be to accelerate development of late-successional conditions while making the future stand less susceptible to natural disturbances. Salvage activities should focus on the reduction of catastrophic insect, disease, and fire threats. Treatments should be designed to provide effective fuel breaks wherever possible. However, the scale of salvage and other treatments should not generally result in degeneration of currently suitable owl habitat or other late-successional conditions.

In some Late-Successional Reserves in these provinces, management that goes beyond these guidelines may be considered. Levels of risk in those Late-Successional Reserves are particularly high and may require additional measures. Consequently, management activities designed to reduce risk levels are encouraged in those Late-Successional Reserves even if a portion of the activities must take place in currently late-successional habitat. While risk-reduction efforts should generally be focused on young stands, activities in older stands may be appropriate if: (1) the proposed management activities will clearly result in greater assurance of long-term maintenance of habitat, (2) the activities are clearly needed to reduce risks, and (3) the activities will not prevent the Late-Successional Reserves from playing an effective role in the objectives for which they were established.

Such activities in older stands may also be undertaken in Late-Successional Reserves in other provinces if levels of fire risk are particularly high.

Guidelines for Salvage

Salvage of dead trees is based on the following standards and guidelines, and is subject to review by the Regional Ecosystem Office. The Regional Ecosystem Office may develop criteria that would exempt some activities from review. Salvage of dead trees is not generally considered a silvicultural treatment within the context of these standards and guidelines.

Salvage is defined as the removal of trees from an area following a stand-replacing event such as those caused by wind, fires, insect infestations, volcanic eruptions, or diseases. Salvage guidelines are intended to prevent negative effects on late-successional habitat, while permitting some commercial wood volume removal. In some cases, salvage operations may actually facilitate habitat recovery. For example, excessive amounts of coarse woody debris may interfere with stand regeneration activities following some disturbances. In other cases, salvage may help reduce the risk of future stand-replacing disturbances. While priority should be given to salvage in areas where it will have a positive effect on late-successional forest habitat, salvage operations should not diminish habitat suitability now or in the future.

Tree mortality is a natural process in a forest ecosystem. Diseased and damaged trees are key structural components of late-successional forests. Accordingly, management planning for Late-Successional Reserves must acknowledge the considerable value of retaining dead and

dying trees in the forest as well as the benefits from salvage activities.

In all cases, planning for salvage should focus on long-range objectives, which are based on desired future condition of the forest. Because Late-Successional Reserves have been established to provide high quality habitat for species associated with late-successional forest conditions, management following a stand-replacing event should be designed to accelerate or not impede the development of those conditions. The rate of development of this habitat will vary among provinces and forest types and will be influenced by a complex interaction of stand-level factors that include site productivity, population dynamics of live trees and snags, and decay rates of coarse woody debris. Because there is much to learn about the development of species associated with these forests and their habitat, it seems prudent to only allow removal of conservative quantities of salvage material from Late-Successional Reserves and retain management opportunities until the process is better understood.

The following guidelines are general. Specific guidelines should be developed for each physiographic province, and possibly for different forest types within provinces.

1. The potential for benefit to species associated with late-successional forest conditions from salvage is greatest when stand-replacing events are involved. Salvage in disturbed sites of less than 10 acres is not appropriate because small forest openings are an important component of old-growth forests. In addition, salvage should occur only in stands where disturbance has reduced canopy closure to less than 40 percent, because stands with more closure are likely to provide some value for species associated with these forests.

2. Surviving trees will provide a significant residual of larger trees in the developing stand. In addition, defects caused by fire in residual trees may accelerate development of structural characteristics suitable for associated species. Also, those damaged trees that eventually die will provide additional snags. Consequently, all standing live trees should be retained, including those injured (e.g., scorched) but likely to survive. Inspection of the cambium layer can provide an indication of potential tree mortality.

3. Snags provide a variety of habitat benefits for a variety of wildlife species associated with late-successional forests. Accordingly, following stand-replacing disturbance, management should focus on retaining snags that are likely to persist until late-successional conditions have developed and the new stand is again producing large snags. Late-successional conditions are not associated with stands less than 80 years old.

4. Following a stand-replacing disturbance, management should retain adequate coarse woody debris quantities in the new stand so that in the future it will still contain amounts similar to naturally regenerated stands. The analysis that determines the amount of coarse woody debris to leave must account for the full period of time before the new stand begins to contribute coarse woody debris. As in the case of snags, province-level specifications must be provided for this guideline. Because coarse woody debris decay rates, forest dynamics, and site productivity undoubtedly will vary among provinces and forest types, the specifications also will vary.

   Province-level plans will establish appropriate levels of coarse woody debris and decay

rates to be used. Levels will be "typical" and will not require retention of all material where it is highly concentrated, or too small to contribute to coarse woody debris over the long timeframes discussed. This standard and guideline represents one item to be considered and may indeed result in no salvage following windthrow in low density stands. As for other management activities, it is expected that salvage standards and guidelines will be refined through the implementation and adaptive management processes.

5. Some salvage that does not meet the preceding guidelines will be allowed when salvage is essential to reduce the future risk of fire or insect damage to late-successional forest conditions. This circumstance is most likely to occur in the eastern Oregon Cascades, eastern Washington Cascades, and California Cascades Provinces, and somewhat less likely to occur in the Oregon Klamath and California Klamath Provinces. It is important to understand that some risk associated with fire and insects is acceptable because they are natural forces influencing late-successional forest development. Consequently, salvage to reduce such risks should focus only on those areas where there is high risk of large-scale disturbance.

6. Removal of snags and logs may be necessary to reduce hazards to humans along roads and trails, and in or adjacent to campgrounds. Where materials must be removed from the site, as in a campground or on a road, a salvage sale is appropriate. In other areas, such as along roads, leaving material on site should be considered. Also, material will be left where available coarse woody debris is inadequate.

7. Where green trees, snags, and logs are present following disturbance, the green-tree and snag guidelines will be applied first, and completely satisfied where possible. The biomass left in snags can be credited toward the amount of coarse woody debris biomass needed to achieve management objectives.

8. These basic guidelines may not be applicable after disturbances in younger stands because remnant coarse woody debris may be relatively small. In these cases, diameter and biomass retention guidelines should be developed consistent with the intention of achieving late-successional forest conditions.

9. Logs present on the forest floor before a disturbance event provide habitat benefits that are likely to continue. It seldom will be appropriate to remove them. Where these logs are in an advanced state of decay, they will not be credited toward objectives for coarse woody debris retention developed after a disturbance event. Advanced state of decay should be defined as logs not expected to persist to the time when the new stand begins producing coarse woody debris.

10. The coarse woody debris retained should approximate the species composition of the original stand to help replicate preexisting suitable habitat conditions.

11. Some deviation from these general guidelines may be allowed to provide reasonable access to salvage sites and feasible logging operations. Such deviation should occur on as small a portion of the area as possible, and should not result in violation of the basic

intent that late-successional forest habitat or the development of such habitat in the future should not be impaired throughout the area. While exceptions to the guidelines may be allowed to provide access and operability, some salvage opportunities will undoubtedly be foregone because of access, feasibility, and safety concerns.

Standards and Guidelines for Multiple-Use Activities Other Than Silviculture

The following standards and guidelines apply to Late-Successional Reserves and Managed Late-Successional Areas.

Introduction - As a general guideline, nonsilvicultural activities located inside Late-Successional Reserves that are neutral or beneficial to the creation and maintenance of late-successional habitat are allowed.

While most existing uses and development are envisioned to remain, it may be necessary to modify or eliminate some current activities in Late-Successional Reserves that pose adverse impacts. This may require the revision of management guidelines, procedures, or regulations governing these multiple-use activities. Adjustments in standards and guidelines must be reviewed by the Regional Ecosystem Office.

Road Construction and Maintenance - Road construction in Late-Successional Reserves for silvicultural, salvage, and other activities generally is not recommended unless potential benefits exceed the costs of habitat impairment. If new roads are necessary to implement a practice that is otherwise in accordance with these guidelines, they will be kept to a minimum, be routed through non-late-successional habitat where possible, and be designed to minimize adverse impacts. Alternative access methods, such as aerial logging, should be considered to provide access for activities in reserves.

Road maintenance may include felling hazard trees along rights-of-way. Leaving material on site should be considered if available coarse woody debris is inadequate. Topping trees should be considered as an alternative to felling.

Fuelwood Gathering - Fuelwood gathering will be permitted only in existing cull decks, where green trees are marked by silviculturists to thin (consistent with standards and guidelines), to remove blowdown blocking roads, and in recently harvested timber sale units where down material will impede scheduled post-sale activities or pose an unacceptable risk of future large-scale disturbances. In all cases these activities should comply with the standards and guidelines for salvage and silvicultural activities.

American Indian Uses - The exercise of tribal treaty rights will not be restricted by these standards and guidelines unless the Regional Interagency Executive Committee determines that the restriction is (1) reasonable and necessary for preservation of the species at issue, (2) the conservation purpose of the restriction cannot be achieved solely by regulation of non-Indian activities, (3) the restriction is the least restrictive available to achieve the required conservation purpose, (4) the restriction does not discriminate against Indian activities either as stated or as applied, and (5) voluntary tribal conservation measures are not adequate to achieve the necessary conservation purpose.

Mining - The impacts of ongoing and proposed mining actions will be assessed, and mineral activity permits will include appropriate stipulations (e.g., seasonal or other restrictions) related to all phases of mineral activity. The guiding principle will be to design mitigation measures that minimize detrimental effects to late-successional habitat.

Developments - Development of new facilities that may adversely affect Late-Successional Reserves should not be permitted. New development proposals that address public needs or provide significant public benefits, such as powerlines, pipelines, reservoirs, recreation sites, or other public works projects will be reviewed on a case-by-case basis and may be approved when adverse effects can be minimized and mitigated. These will be planned to have the least possible adverse impacts on Late-Successional Reserves. Developments will be located to avoid degradation of habitat and adverse effects on identified late-successional species. Existing developments in Late-Successional Reserves such as campgrounds, recreation residences, ski areas, utility corridors, and electronic sites are considered existing uses with respect to Late-Successional Reserve objectives, and may remain, consistent with other standards and guidelines. Routine maintenance of existing facilities is expected to have less effect on current old-growth conditions than development of new facilities. Maintenance activities may include felling hazard trees along utility rights-of-way, trails, and other developed areas.

Land Exchanges - Land exchanges involving Late-Successional Reserves will be considered if they provide benefits equal to or better than current conditions. Consider land exchanges especially to improve area, distribution, and quality (e.g., connectivity, shape, contribution to biodiversity) of Late-Successional Reserves, especially where public and private lands are intermingled (e.g., checkerboard ownership).

Habitat Improvement Projects - Projects designed to improve conditions for fish, wildlife, or watersheds should be considered if they provide late-successional habitat benefits or if their effect on late-successional associated species is negligible. Projects required for recovery of threatened or endangered species should be considered even if they result in some reduction of habitat quality for other late-successional species. For example, watershed rehabilitation projects, such as felling trees along streams, will be coordinated with a wildlife biologist and may include seasonal restrictions. Design and implement watershed restoration projects in a manner that is consistent with Late-Successional Reserve objectives.

Range Management - Range-related management that does not adversely affect late-successional habitat will be developed in coordination with wildlife and fisheries biologists. Adjust or eliminate grazing practices that retard or prevent attainment of reserve objectives. Evaluate effects of existing and proposed livestock management and handling facilities in reserves to determine if reserve objectives are met. Where objectives cannot be met, relocate livestock management and/or handling facilities.

Fire Suppression and Prevention - Each Late-Successional Reserve will be included in fire management planning as part of watershed analysis. Fuels management in Late-Successional Reserves will utilize minimum impact suppression methods in accordance with guidelines for reducing risks of large-scale disturbances. Plans for wildfire suppression will emphasize maintaining late-successional habitat. During actual fire suppression activities, fire managers

will consult with resource specialists (e.g., botanists, fisheries and wildlife biologists, hydrologists) familiar with the area, these standards and guidelines, and their objectives, to assure that habitat damage is minimized. Until a fire management plan is completed for Late-Successional Reserves, suppress wildfire to avoid loss of habitat in order to maintain future management options.

In Late-Successional Reserves, a specific fire management plan will be prepared prior to any habitat manipulation activities. This plan, prepared during watershed analysis or as an element of province-level planning or a Late-Successional Reserve assessment, should specify how hazard reduction and other prescribed fire applications will meet the objectives of the Late-Successional Reserve. Until the plan is approved, proposed activities will be subject to review by the Regional Ecosystem Office. The Regional Ecosystem Office may develop additional guidelines that would exempt some activities from review. In all Late-Successional Reserves, watershed analysis will provide information to determine the amount of coarse woody debris to be retained when applying prescribed fire.

In Riparian and Late-Successional Reserves, the goal of wildfire suppression is to limit the size of all fires. When watershed analysis, province-level planning, or a Late-Successional Reserve assessment are completed, some natural fires may be allowed to burn under prescribed conditions. Rapidly extinguishing smoldering coarse woody debris and duff should be considered to preserve these ecosystem elements.

Special Forest Products - Special forest products include but are not limited to posts, poles, rails, landscape transplants, yew bark, shakes, seed cones, Christmas trees, boughs, mushrooms, fruits, berries, hardwoods, forest greens (e.g., ferns, huckleberry, salal, beargrass, Oregon grape, and mosses), and medicinal forest products. In all cases, evaluate whether activities have adverse effects on Late-Successional Reserve objectives. Sales will ensure resource sustainability and protection of other resource values such as special status plant or animal species. Where these activities are extensive (e.g., collection of Pacific Yew bark or fungi), it will be appropriate to evaluate whether they have significant effects on late-successional habitat. Restrictions may be appropriate in some cases.

Recreational Uses - Dispersed recreational uses, including hunting and fishing, generally are consistent with the objectives of Late-Successional Reserves. Use adjustment measures such as education, use limitations, traffic control devices, or increased maintenance when dispersed and developed recreation practices retard or prevent attainment of Late-Successional Reserve objectives.

Research - A variety of wildlife and other research activities may be ongoing and proposed in late-successional habitat. These activities must be assessed to determine if they are consistent with Late-Successional Reserve objectives. Some activities (including those within experimental forests) not otherwise consistent with the objectives may be appropriate, particularly if the activities will test critical assumptions of these standards and guidelines, will produce results important for habitat development, or if the activities represent continuation of long-term research. These activities should only be considered if there are no equivalent opportunities outside Late-Successional Reserves.

Current, funded, agency-approved research that meets the above criteria is assumed to continue if analysis ensures that a significant risk to Aquatic Conservation Strategy objectives does not exist. Research Stations and other Forest Service and BLM units will, within 180 days of the signing of the Record of Decision for these standards and guidelines, submit a brief project summary to the Regional Ecosystem Office of ongoing research projects that are potentially inconsistent with other standards and guidelines of this document, but are expected to continue under the above research exception. The Regional Ecosystem Office may choose to more formally review specific projects, and may recommend to the Regional Interagency Executive Committee modification, up to and including cancellation, of those projects having an unacceptable risk to Late-Successional Reserve objectives.

Rights-of-Way, Contracted Rights, Easements, and Special Use Permits - Access to nonfederal lands through Late-Successional Reserves will be considered and existing right-of-way agreements, contracted rights, easements, and special use permits in Late-Successional Reserves will be recognized as valid uses. New access proposals may require mitigation measures to reduce adverse effects on Late-Successional Reserves. In these cases, alternate routes that avoid late-successional habitat should be considered. If roads must be routed through a reserve, they will be designed and located to have the least impact on late-successional habitat. Review all special use permits and when objectives of Late-Successional Reserves are not being met, reduce impacts through either modification of existing permits or education.

Nonnative Species - In general nonnative species (plant and animal) should not be introduced into Late-Successional Reserves. If an introduction of nonnative species is proposed, complete an assessment of impacts and avoid any introduction that would retard or prevent achievement of Late-Successional Reserve objectives. Evaluate impacts of nonnative species (plant and animal) currently existing within reserves, and develop plans and recommendations for eliminating or controlling nonnative species that are inconsistent with Late-Successional Reserve objectives. These will include an analysis of the effects of implementing such programs to other species or habitats within Late-Successional Reserves.

Other - Other activities should be evaluated by local interdisciplinary teams and appropriate guidelines should be written and documented. Activities deemed to have potentially adverse effects on Late-Successional Reserve objectives are subject to review of the Regional Ecosystem Office. The Regional Ecosystem Office may develop additional criteria for exempting some additional activities from review.

Protection Buffers

Protection Buffers are additional standards and guidelines from the Scientific Analysis Team Report for specific rare and locally endemic species, and other specific species in the upland forest matrix. The following rare and locally endemic species are likely to be assured viability if they occur within reserves. However, there might be occupied locations outside these areas that will be important to protect as well. Protocols for surveys will be developed that will ensure a high likelihood of locating these occupied sites, and such surveys will be conducted prior to ground-disturbing activities within the known or suspected ranges and within the habitat types or vegetation communities occupied by these species, according to the

implementation schedule for Survey and Manage components 1 and 2 on pages C-4 and C-5 of these standards and guidelines. When located, the occupied sites need to be protected as follows.

Nonvascular Plants:

Ptilidium californicum (Liverwort) - This species is rare and has a very limited distribution in old white fir forests with fallen trees. It occurs on trunks of trees at about 5000-feet elevation. Mitigation options include finding locations and maintaining stands of overmature white fir at about 5000-feet elevation for inoculum and dispersal along corridors; and studying specific distribution patterns. Protect known occupied locations if distribution patterns are disjunct and highly localized by deferring timber harvest and avoiding removal of fallen trees and logs.

Ulota meglospora (Moss) - This species occurs in northern California and southwest Oregon. It is best developed (locally abundant) in very old stands of tanoak, Douglas-fir, and other conifer species further north, but is generally scarce throughout its range. The species is poorly known ecologically. Mitigation activities include conducting basic ecological studies, and surveying for presence, particularly in Oregon. Protect known occupied sites if distribution patterns are disjunct and highly localized. Defer timber harvest or other activities which would not maintain desired habitat characteristics and population levels.

Aleuria rhenana (Fungus) - This mushroom is widely distributed but rare and little known throughout its range, known from one collection from Mt. Rainier National Park. It is a conifer litter decomposer. Mitigation activities include conducting ecological studies and surveys to determine localities. Protect known populations if surveys continue to indicate that the population is rare. Defer ground-disturbing activities.

Otidea leporina, *O. onotica*, and *O. smithii* (Fungi) - These mushrooms occur in conifer duff, and are widespread in distribution but uncommon. They are dependent on older-age forests. Specific mitigation options include protecting older forests from ground disturbance where the species are located.

For the plants listed above, it is recommended that Regional or state office-level ecologists or botanists should: (1) maintain a spatially explicit data base of all known sites in National Forests and BLM Districts, and (2) develop species or area management plans, to be implemented under the guidance of the regional botany programs.

Amphibians:

Shasta Salamander - This species is very narrowly distributed, occurring only in localized populations on the Shasta-Trinity National Forest. Only a small part of its range is included within Habitat Conservation Areas identified by the Interagency Scientific Committee (1990) (status within Late-Successional Reserves has not been determined). It occurs in association with limestone outcrops, protected by an overstory canopy. All known and future localities must be delineated and protected from timber harvest, mining, quarry activity, and road building within the delineated site, and a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, should surround the outcrop. Additional surveys conducted using a standardized protocol must be undertaken to identify

and delineate all occupied sites within the species' potential range.

Birds:

Great Gray Owl - Within the range of the northern spotted owl, the great gray owl is most common in lodgepole pine forests adjacent to meadows. However, it is also found in other coniferous forest types. In some locations, such as on the Willamette National Forest west of the crest of the Cascade Range, at least some shelterwood harvesting seems to be beneficial for the species by opening up otherwise closed canopy cover for foraging. In doing so, consequences to species such as northern goshawk and American marten must be evaluated. Specific mitigation measures for the great gray owl, within the range of the northern spotted owl, include the following: provide a no-harvest buffer of 300 feet around meadows and natural openings and establish 1/4-mile protection zones around known nest sites. Within one year of the signing of the Record of Decision for these standards and guidelines, develop and implement a standardized protocol for surveys; survey for nest locations using the protocol. Protect all future discovered nest sites as previously described.

Adaptive Management Areas

Acres

Key and non-Key Watersheds are specified for all areas, and therefore overlay all other land allocations. For the portion of Adaptive Management Areas located within Key Watersheds, standards and guidelines for Key Watersheds (see Key Watersheds on page C-7, and the Aquatic Conservation Strategy starting on page B-9 of these standards and guidelines), as well as standards and guidelines for Adaptive Management Areas (listed below) apply.

Adaptive Management Areas within Tier 1 Key Watersheds	228,100
Adaptive Management Areas within Tier 2 Key Watersheds	60,600
Adaptive Management Areas within non-Key (other) Watersheds	1,233,100
Total Adaptive Management Areas	1,521,800

Acreage of Riparian Reserves is not calculated within Adaptive Management Areas for these standards and guidelines. However, Riparian Reserve standards and guidelines affect approximately 40 percent of Adaptive Management Areas.

Introduction

Adaptive Management Areas are landscape units designated to encourage the development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives. Ten areas ranging from about 92,000 to nearly 500,000 acres of federal lands have been identified. The areas are well distributed in the physiographic provinces. Most are associated with subregions impacted socially and economically by reduced timber harvest from the federal lands. The areas provide a diversity of biological challenges, intermixed land ownerships, natural resource objectives, and social contexts.

Selection of the Adaptive Management Areas

Adaptive Management Areas were selected to provide opportunities for innovation, provide examples in major physiographic provinces, and provide a range of technical challenges, from an emphasis on restoration of late-successional forest conditions and riparian zones to integration of commercial timber harvest with ecological objectives.

Hierarchy of Standards and Guidelines Within Adaptive Management Areas

Standards and guidelines for Adaptive Management Areas are on pages D-9 through D-12 and elsewhere in Section D of these standards and guidelines. Also see Standards and Guidelines Common to all Land Allocations starting on page C-2 of these standards and guidelines.

Overall, management activities in all the Adaptive Management Areas will be conducted to achieve the objectives described in these standards and guidelines. Standards and guidelines for Congressionally Reserved Areas or Late-Successional Reserves must be followed when they occur within Adaptive Management Areas, except that the Adaptive Management Area plans for the Finney and Northern Coast Adaptive Management Areas may change the Late-Successional Reserves in those areas. Flexibility is provided to meet objectives for Riparian Reserves and Key Watersheds. Full watershed analysis will be conducted prior to new management activities in identified Key Watersheds within Adaptive Management Areas. Standards and guidelines of current plans and draft plan preferred alternatives (with exceptions noted on page C-3 of these standards and guidelines) need to be considered during planning and implementation of activities within Adaptive Management Areas, and they may be modified in Adaptive Management Area plans based on site-specific analysis. Otherwise, standards and guidelines are to be developed to meet the objectives of the Adaptive Management Area and the overall strategy. Coordination with the Regional Ecosystem Office is required.

More detailed information regarding Adaptive Management Areas, including complete standards and guidelines, and a description of each of the ten areas along with the particular management emphasis for each, is found in Section D of these standards and guidelines.

Managed Late-Successional Areas

Acres

Key and non-Key Watersheds are specified for all areas, and therefore overlay all other land allocations. For the portion of Managed Late-Successional Areas located within Key Watersheds, standards and guidelines for Key Watersheds (see Key Watersheds on page C-7, and the Aquatic Conservation Strategy starting on page B-9 of these standards and guidelines), as well as standards and guidelines for Managed Late-Successional Areas (listed below) apply. See additional detail under Hierarchy of Standards and Guidelines on page C-1 of these standards and guidelines.

Managed Late-Successional Areas within Tier 1 Key Watersheds	55,100
Managed Late-Successional Areas within Tier 2 Key Watersheds	0
Managed Late-Successional Areas within non-Key (other) Watersheds	47,100
Total Managed Late-Successional Area acres	102,200

Acreage of Riparian Reserves is not calculated within Managed Late-Successional Areas for these standards and guidelines. However, Riparian Reserve standards and guidelines affect approximately 40 percent of Managed Late-Successional Areas.

Because the data for the Modoc National Forest are not in the data base for these standards and guidelines, three Managed Late-Successional Areas on that forest are not included in the above acreage.

Description

Managed Late-Successional Areas are similar to Late-Successional Reserves but are identified for certain owl activity centers on the eastside where regular and frequent fire is a natural part of the ecosystem. Certain silvicultural treatments and fire hazard reduction treatments are permitted to help prevent complete stand destruction from large catastrophic events such as high intensity, high severity fires; or disease or insect epidemics.

Managed Late-Successional Areas have been designated for these standards and guidelines based on two elements: (1) Managed Pair Areas for known owl pairs and resident singles in the California Cascades and Washington Eastern Cascades Provinces, from the Final Draft Spotted Owl Recovery Plan; and (2) Protection Buffers for specific endemic species identified by the Scientific Analysis Team (1993). Details are as follows.

1. Managed Pair Areas

Managed Late-Successional Areas are specified as shown on the land allocation map (see page A-6) for known (as of January 1, 1994) northern spotted owl activity centers outside of other designated areas within the California Cascades and Washington Eastern Cascades Provinces to supplement the spotted owl reserve network. This includes about 9 known pairs in California, and 12 known pairs or resident singles in eastern Washington. Delineate an area surrounding the owl activity center with an acreage at least equal to the median home range size for pairs. The size of this area will be determined from median home range data for the province (Table C-1). Use data from the spotted owl study area that is most similar to the site being considered. The delineated area should be configured so that it contains an amount of suitable habitat that approximates at least the median amount observed in pair home ranges for the province (Table C-2).

2. Protection Buffers

Unmapped Managed Late-Successional Areas result from the application of Protection Buffers (see standards and guidelines below).

Table C-1. Annual home range areas (in acres) of northern spotted owl pairs in different states, physiographic provinces, and study areas[1]

State Physiographic Province Study Area	Number of Pairs	Forest Type [2]	Range Median	Min.	Max	Sources [3]
California						
Klamath Province						
Ukonom	9	MC	3,314	2,056	7,823	1
Mad River	12	MC	2,975	1,803	4,685	1
Willow Creek	2	MC	1,692	1,258	2,126	2
Oregon						
Klamath Province						
South Umpqua	3	MC	1,411	1,035	1,504	3
Cow Creek	6	MC	4,106	2,499	7,494	3
Chetco	4	ME	5,614	5,327	6,197	1
Coast Range Province						
Tyee	5	DF/HEM	3,387	1,880	8,272	3
Peterson	4	DF/HEM	6,318	3,483	10,189	3
Eugene BLM	4	DF/HEM	6,390	3,715	5,180	4
Other [4]	4	DF/HEM	4,183	2,849	9,748	5
Kellogg [5]	5	MC	4,072	1,618	6,281	3
Western Cascades Province	11	DF/HEM	2,955	1,443	9,758	6,7
Washington						
Western Cascades Province	11	DF/HEM	6,657	2,969	17,942	8,9,10
Olympic Peninsula Province	10	HEM/DF	14,271	4,497	27,309	9,11
Eastern Cascades Province	7	MC	7,124	3,694	15,587	11

Note: this table follows Thomas et al. (1990) with changes based on Forsman (pers. comm., as cited in USDI unpub.) and Hays (pers. comm., as cited in USDI unpub.).

[1]Pair home ranges were calculated by delineating 100 percent MCP (minimum convex polygons): total = exclusive area of male and exlusive area of female and the area of overlap shared by the two sexes.

[2] MC = mixed conifer, ME = mixed conifer/evergreen, DF/HEM = Douglas-fir, western hemlock, HEM/DF = mostly western hemlock with Douglas-fir intermixed.

[3]1= Paton et al. (1990), 2 = Solis (1983), 3 = Carey (pers. comm., as cited in USDI unpub.), 4 = Thrailkill (pers. comm., as cited in USDI unpub.) and Meslow (pers. comm., as cited in USDI unpub.), 5 = Carey et al. (1990), 6 = Forsman and Meslow (1985), 7 = Miller (pers. comm., as cited in USDI unpub.), 8 = Allen et al. (1989), 9 = Hays et al. (1989), 10 = Hamer (pers. comm., as cited in USDI unpub.), 11= Forsman (pers. comm., as cited in USDI unpub.).

[4] Includes four sites in the Oregon Coast Range Province near Roseburg.

[5]This is a relatively dry area bordering the Umpqua River valley, characterized by mixed-conifer forest more typical of the Oregon Klamath Province than the Oregon Coast Range Province.

Source: USDI unpub. p. 27.

Table C-2. Amounts of old-growth and mature forest (in acres) in annual pair home ranges of spotted owls, by state, physiographic province and study area

State Physiographic Province Study Area	Number of Pairs	Forest Type[1]	Range Median	Min.	Max	Sources[2]
California						
Klamath Province						
Ukonom	9	MC	2,484	1,030	5,654	1,2
Mad River	12	MC	1,365	835	1,953	1,2
Willow Creek	2	MC	800	367	1,233	3
Oregon						
Klamath Province						
South Umpqua	3	MC	615	563	768	4
Cow Creek	6	MC	1,549	1,450	1,983	4
Chetco[3]	4	ME	-	-	-	1
Coast Range Province						
Tyee	5	DF/HEM	2,031	1,645	3,984	4
Peterson	4	DF/HEM	2,609	1,284	3,196	4
Eugene BLM	4	DF/HEM	1,783	799	3,580	5
Other[4]	4	DF/HEM	2,375	1,795	2,625	6
Kellogg[5]	5	MC	1,018	697	1,983	4
Western Cascades Province	9	DF/HEM	1,796	1,050	3,786	7,8
Washington						
Western Cascades Province	11	DF/HEM	3,281	1,715	8,998	9,10,11
Olympic Peninsula Province	7	HEM/DF	4,579	2,787	8,448	12
Eastern Cascades Province	7	MC	-	-	-	12

Note: this table follows Thomas et al. (1990) with changes based on Forsman (pers. comm., as cited in USDI unpub.) and Hays (pers. comm., as cited in USDI unpub.).

[1] MC = mixed conifer, ME = mixed conifer/evergreen, DF/HEM = Douglas-fir, western hemlock, HEM/DF= mostly western hemlock with Douglas-fir intermixed

[2] 1 = Paton et al. (1990), 2 = Paton (pers. Comm., as cited in USDI unpub.), 3 = Solis, (1983), 4 = Carey (pers. comm., as cited in USDI unpub.), 5 = Thrailkill (pers. comm., as cited in USDI unpub.) and Meslow (pers. comm., as cited in USDI unpub.), 6 = Carey et al. (1990), 7 = Forsman and Meslow (1985), 8 = Miller (pers. comm., as cited in USDI unpub.), 9 = Allen et al. (1989), 10 = Hays et al. (1989), 11 = Hamer ((pers. comm., as cited in USDI unpub.), 12 = Forsman (pers. comm., as cited in USDI unpub.)

[3] Studies provided data for annual home range size; amounts of old-growth and mature forest not yet available

[4] Includes four sites in the Oregon Coast Range Province near Roseburg.

[5] This is a relatively dry area bordering the Umpqua River valley, characterized by mixed-conifer forest more typical of the Oregon Klamath Province than the Oregon Coast Range Province.

Source: USDI unpub. p. 28.

Standards and Guidelines

Also see Standards and Guidelines Common to all Land Allocations starting on page C-2 of these standards and guidelines.

Silviculture

Management activities proposed are subject to review by the Regional Ecosystem Office. The Regional Ecosystem Office may develop criteria that would exempt some activities from review. This review is especially important because innovative silvicultural techniques may be applied to manage suitable northern spotted owl habitat through time. These techniques may benefit from technical review by the Regional Ecosystem Office.

Managed Late-Successional Areas are identified in areas where regular and frequent fire is a natural part of the ecosystem. The objective for these areas is to produce and maintain an optimum level of late-successional and old-growth stands on a landscape scale. In these designated areas, certain silvicultural treatments and fire hazard reduction treatments would be allowed to help prevent complete stand destruction from large catastrophic events such as high intensity, high severity fires; or disease or insect epidemics.

Suitable northern spotted owl habitat should be maintained through time using various management techniques. The objective will be to always maintain an amount of suitable habitat equal to median amounts observed in pair home ranges in the province. The location of this acreage may change through time as management is rotated through the area. Some uncertainty will be accepted in management to provide habitat in these areas. The intent to accommodate some risk in the managed pair areas should be considered in any Section 7 consultations in these areas.

Silviculture, salvage, and other multiple-use activities for these areas always should be guided by the objective of maintaining adequate amounts of suitable habitat.

Management Assessment

Each Managed Late-Successional Area or group of smaller Managed Late-Successional Areas should have a management assessment, as described for Late-Successional Reserves.

Multiple-Use Activities Other Than Silviculture

Standards and guidelines for multiple-use activities other than silviculture, which are found in the standards and guidelines for Late-Successional Reserves, also apply to Managed Late-Successional Areas.

Protection Buffers

The following standards and guidelines incorporated from the Scientific Analysis Team Report will result in adding unmapped areas to Managed Late-Successional Areas that should be managed as indicated below. These standards and guidelines are to be applied wherever the species occurs outside of designated areas.

The following rare and locally endemic species are likely to be assured viability if they occur within designated areas. However, there might be occupied locations outside these areas that will be important to protect as well. Protocols for surveys will be developed that will ensure a high likelihood of locating these occupied sites, and such surveys will be conducted prior to ground-disturbing activities within the known or suspected ranges and within the habitat types or vegetation communities occupied by these species, according to the implementation schedule for Survey and Manage components 1, 2, 3, and/or 4 on pages C-4 through 6 of these standards and guidelines. When located, the occupied sites need to be protected as follows.

Nonvascular Plants:

Brotherella roellii (Moss) - This very rare species is endemic to the Washington Cascades north of Snoqualmie Pass. It occupies rotting logs in low-to-mid elevation old-growth stands having dense shade, closed canopies, and high humidity. Mitigation options include locating specific populations and protection of large decay class 3, 4, and 5 logs and canopy closure greater than 70 percent. Defer management activities that conflict with maintaining suitable habitat characteristics and known populations levels. The implementation schedule for this species is the same as for survey and manage components 1 and 3.

Buxbaumia piperi, B. viridis, Rhizomnium nudum, Schistostega pennata, and *Tetraphis geniculata* (Mosses) - Most of these species are fairly rare (the exception is *B. piperi*). They occur on rotten logs and some organic soil, and are shade dependent, occurring in old-growth forests. *S. pennata* occurs only in mature western red cedar forests in the Olympic National Forest and in the Washington Cascades. Mitigation activities include surveying to determine presence and distribution; and, where located, maintaining decay class 3, 4, and 5 logs and greater than 70 percent closed-canopy forest habitats for shade. Shelterwood and thinning prescriptions for timber harvest will cause their demise, as logs dry out. The implementation schedule for this species is the same as for survey and manage components 1 and 3.

Polyozellus multiplex (Fungus) - Ecologically, this mushroom was considered in the same species group as *Albatrellus caeryliopus* and others, listed earlier in the SAT Report under species aided by marbled murrelet mitigation measures. However, *P. multiplex* occurs in higher elevations of the Cascades in silver fir and mixed conifer (and is thus outside the range of marbled murrelet mitigations). It can be locally abundant and is a mycorrhizal species important to forest health. Like its group associates, it is a good indicator of old-growth forests. Mitigation activities for this species include conducting surveys to define its distribution, and studies to assess its habitat requirements. The implementation schedule for this species is the same as for survey and manage components 1 and 3.

Sarcosoma mexicana (Fungus) - This mushroom occurs in deep conifer litter layers in older forests. It is uncommon to rare and is found in the Oregon and Washington Coast Range into British Columbia. Mitigation activities include surveying for locations and protecting deep litter layers of older forests where found. Defer prescribed burning of understory or other activities which would not retain a deep litter layer. The implementation schedule for this species is the same as for survey and manage component 3.

For the plants listed above, it is recommended that regional and state ecologists or botanists should: (1) maintain a spatially explicit data base of all known sites in National Forests and BLM Districts, and (2) develop species or area management plans, to be implemented under

the guidance of the regional botany programs.

Amphibians:

Larch Mountain Salamander - Because of the narrow distribution of this species, mostly within the Columbia River Gorge, primary emphasis should be to survey and protect all known sites. Sites must be identified based on fall surveys conducted using a standardized protocol. Known sites are included within boundaries of conservation areas and under these guidelines, are not to be disturbed. Surveys are needed at additional sites in the forest matrix along the Columbia River Gorge. Key habitat is mossy talus protected by overstory canopy. Avoiding any ground-disturbing activity that would disrupt the talus layer where this species occurs is the primary means of protection. Once sites are identified, maintain 40 percent canopy closure of trees within the site and within a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, surrounding the site. Larger buffer widths are appropriate upslope from protected sites on steep slopes. Partial harvest may be possible if canopy closure can be retained; in such cases logging must be conducted using helicopters or high-lead cable systems to avoid disturbance of the talus layer. The implementation schedule for this species is the same as for survey and manage components 1 and 2.

Siskiyou Mountain Salamander - this species occurs within an extremely narrow range on the Rogue River, Siskiyou, and Klamath National Forests. Its range does not fall within any of the Habitat Conservation Areas identified by the Interagency Scientific Committee in Oregon. Additional surveys conducted using a standardized protocol must be undertaken to delineate range and identify subpopulations. All populations must be protected by delineating an occupied site and avoiding disturbance of talus throughout the site, especially on moist, north-facing slopes, particularly in Oregon where Habitat Conservation Areas do not incorporate species' range. Because this species seems to require cool, moist conditions, a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, surrounding the site, must be retained around the outer periphery of known sites. Overstory trees must not be removed within the boundary of this buffer. The implementation schedule for this species is the same as for survey and manage components 1 and 2.

Del Norte Salamander - This species occurs in talus slopes protected by overstory canopy that maintains cool, moist conditions on the ground. The species is a slope-valley inhabitant, and sometimes occurs in high numbers near riparian areas. Riparian Reserves, in combination with Late-Successional Reserves and other reserves, will offer some protection to the species but significant numbers also occur in upland areas. Additional mitigation options in this upland matrix include identifying locations (talus areas inhabited by the species) by using a standardized survey protocol, then protecting the location from ground-disturbing activities. Designate a buffer of at least the height of one site-potential tree or 100-feet horizontal distance, whichever is greater, surrounding the location. Within the site and its surrounding buffer, maintain 40 percent canopy closure and avoid any activities that would directly disrupt the surface talus layer. Partial harvest within the buffer may be possible if 40 percent canopy closure can be maintained; in such cases, tree harvest must be conducted using helicopters or high-lead cable systems to avoid compaction or other disturbance of talus. The implementation schedule for this species is the same as for survey and manage components 1 and 2.

Administratively Withdrawn Areas

Acres

Key and non-Key Watersheds are specified for all areas, and therefore overlay all other land allocations. For the portion of Administratively Withdrawn Areas located within Key Watersheds, standards and guidelines for Key Watersheds (see Key Watersheds on page C-7, and the Aquatic Conservation Strategy starting on page B-9 of these standards and guideline), as well as standards and guidelines for Administratively Withdrawn Areas (see below) apply. See additional detail under Hierarchy of Standards and Guidelines on page B-1 of these standards and guidelines.

Administratively Withdrawn Areas within Tier 1 Key Watersheds	407,900
Administratively Withdrawn Areas within Tier 2 Key Watersheds	54,700
Administratively Withdrawn Areas within non-Key (other) Watersheds . . .	1,014,500
Total Administratively Withdrawn Area acres	1,477,100

Acreage of Riparian Reserves is not calculated within Administratively Withdrawn Areas for these standards and guidelines. However, Riparian Reserve standards and guidelines affect approximately 40 percent of Administratively Withdrawn Areas.

Description

Administratively Withdrawn Areas are identified in current Forest and District Plans or draft plan preferred alternatives and include recreation and visual areas, back country, and other areas where management emphasis precludes scheduled timber harvest and which are not included in calculations of allowable sale quantity (ASQ).

Standards and Guidelines

Also see Standards and Guidelines Common to all Land Allocations starting on page C-2.

Except for the four specific exceptions listed on page C-3 of these standards and guidelines, Administratively Withdrawn Areas and all other standards and guidelines of the current plans and draft plan preferred alternatives apply where they are more restrictive or provide greater benefits to late-successional and old-growth forest related species than other provisions of these standards and guidelines. (Current plans and draft plan preferred alternatives include direction from unpublished drafts for some administrative units. See the Current Plans and Draft Plan Preferred Alternatives discussion on page C-2 of these standards and guidelines.)

While it is recognized that changes in administrative withdrawals may happen during future plan amendments, many assumptions within these standards and guidelines are based in part on existing administrative withdrawals. Plan amendments that propose to significantly reduce protection for late-successional or old-growth forest related species, or reduce protection for aquatic ecosystems, are subject to review by the Regional Ecosystem Office to determine if the objectives of these standards and guidelines would be significantly adversely affected.

Riparian Reserves

Acres

Key and non-Key Watersheds are specified for all areas, and therefore overlay all other land allocations. For the portion of Riparian Reserves located within Key Watersheds, standards and guidelines for Key Watersheds (see Key Watersheds on page C-7, and the Aquatic Conservation Strategy starting on page B-9 of these standards and guidelines), as well as standards and guidelines for Riparian Reserves (listed below) apply. See additional detail under Hierarchy of Standards and Guidelines on page C-1 of these standards and guidelines.

Riparian Reserves within Tier 1 Key Watersheds	631,000
Riparian Reserves within Tier 2 Key Watersheds	113,700
Riparian Reserves within non-Key (other) Watersheds	1,882,800
Total Riparian Reserve acres (based on samples)	2,627,500

Acreage of Riparian Reserves is calculated after all other designated areas have been calculated. Thus, the acres shown here are only those acres that are interspersed with matrix. However, Riparian Reserve standards and guidelines apply in the other designated area categories.

Description - Riparian Reserve Widths

Riparian Reserves, as described in detail in the Aquatic Conservation Strategy starting on page B-9 of these standards and guidelines, are specified for five categories of streams or waterbodies as follows:

- *Fish-bearing streams* - Riparian Reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.

- *Permanently flowing nonfish-bearing streams* - Riparian Reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest.

- *Constructed ponds and reservoirs, and wetlands greater than 1 acre* - Riparian Reserves consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the wetland greater than

1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest.

- *Lakes and natural ponds* - Riparian Reserves consist of the body of water and: the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance, whichever is greatest.

- *Seasonally flowing or intermittent streams, wetlands less than 1 acre, and unstable and potentially unstable areas* - This category applies to features with high variability in size and site-specific characteristics. At a minimum, the Riparian Reserves must include:

  The extent of unstable and potentially unstable areas (including earthflows),

  The stream channel and extend to the top of the inner gorge,

  The stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation, and

  Extension from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest.

A site-potential tree height is the average maximum height of the tallest dominant trees (200 years or older) for a given site class.

Intermittent streams are defined as any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria.

Standards and Guidelines

Also see Standards and Guidelines Common to all Land Allocations starting on page C-2 of these standards and guidelines.

As a general rule, standards and guidelines for Riparian Reserves prohibit or regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives. Watershed analysis and appropriate NEPA compliance is required to change Riparian Reserve boundaries in all watersheds.

Timber Management

TM-1. Prohibit timber harvest, including fuelwood cutting, in Riparian Reserves, except as described below. Riparian Reserve acres shall not be included in calculations of the timber base.

a. Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting if required to attain Aquatic Conservation Strategy objectives.

b. Salvage trees only when watershed analysis determines that present and future coarse woody debris needs are met and other Aquatic Conservation Strategy objectives are not adversely affected.

c. Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

Roads Management

RF-1. Federal, state, and county agencies should cooperate to achieve consistency in road design, operation, and maintenance necessary to attain Aquatic Conservation Strategy objectives.

RF-2. For each existing or planned road, meet Aquatic Conservation Strategy objectives by:

a. minimizing road and landing locations in Riparian Reserves.

b. completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landings in Riparian Reserves.

c. preparing road design criteria, elements, and standards that govern construction and reconstruction.

d. preparing operation and maintenance criteria that govern road operation, maintenance, and management.

e. minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.

f. restricting sidecasting as necessary to prevent the introduction of sediment to streams.

g. avoiding wetlands entirely when constructing new roads.

RF-3. Determine the influence of each road on the Aquatic Conservation Strategy objectives through watershed analysis. Meet Aquatic Conservation Strategy objectives by:

a. reconstructing roads and associated drainage features that pose a substantial risk.

b. prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected.

c. closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs.

RF-4. New culverts, bridges and other stream crossings shall be constructed, and existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

RF-5. Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.

RF-6. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

RF-7. Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy objectives. As a minimum, this plan shall include provisions for the following activities:

a. inspections and maintenance during storm events.

b. inspections and maintenance after storm events.

c. road operation and maintenance, giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources.

d. traffic regulation during wet periods to prevent damage to riparian resources.

e. establish the purpose of each road by developing the Road Management Objective.

Grazing Management

GM-1. Adjust grazing practices to eliminate impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives. If adjusting practices is not effective, eliminate grazing.

GM-2. Locate new livestock handling and/or management facilities outside Riparian Reserves. For existing livestock handling facilities inside the Riparian Reserve, ensure that Aquatic Conservation Strategy objectives are met. Where these objectives cannot be met, require relocation or removal of such facilities.

GM-3. Limit livestock trailing, bedding, watering, loading, and other handling efforts to those areas and times that will ensure Aquatic Conservation Strategy objectives are met.

Recreation Management

RM-1. New recreational facilities within Riparian Reserves, including trails and dispersed sites, should be designed to not prevent meeting Aquatic Conservation Strategy objectives. Construction of these facilities should not prevent future attainment of these objectives. For existing recreation facilities within Riparian Reserves, evaluate and mitigate impact to ensure that these do not prevent, and to the extent practicable contribute to, attainment of Aquatic Conservation Strategy objectives.

RM-2. Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective, eliminate the practice or occupancy.

RM-3. Wild and Scenic Rivers and Wilderness management plans will address attainment of Aquatic Conservation Strategy objectives.

Minerals Management

MM-1. Require a reclamation plan, approved Plan of Operations, and reclamation bond for all minerals operations that include Riparian Reserves. Such plans and bonds must address the costs of removing facilities, equipment, and materials; recontouring disturbed areas to near pre-mining topography; isolating and neutralizing or removing toxic or potentially toxic materials; salvage and replacement of topsoil; and seedbed preparation and revegetation to meet Aquatic Conservation Strategy objectives.

MM-2. Locate structures, support facilities, and roads outside Riparian Reserves. Where no alternative to siting facilities in Riparian Reserves exists, locate them in a way compatible with Aquatic Conservation Strategy objectives. Road construction will be kept to the minimum necessary for the approved mineral activity. Such roads will be constructed and maintained to meet roads management standards and to minimize damage to resources in the Riparian Reserve. When a road is no longer required for mineral or land management activities, it will be closed, obliterated, and stabilized.

MM-3. Prohibit solid and sanitary waste facilities in Riparian Reserves. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in Riparian Reserves exists, and releases can be prevented, and stability can be ensured, then:

a. analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics.

b. locate and design the waste facilities using best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such releases and ensure stability over the long term, prohibit such facilities in Riparian Reserves.

c. monitor waste and waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.

d. reclaim waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.

e. require reclamation bonds adequate to ensure long-term chemical and physical stability of mine waste facilities.

MM-4. For leasable minerals, prohibit surface occupancy within Riparian Reserves for oil, gas, and geothermal exploration and development activities where leases do not already exist. Where possible, adjust the operating plans of existing contracts to eliminate impacts that retard or prevent the attainment of Aquatic Conservation Strategy objectives.

MM-5. Salable mineral activities such as sand and gravel mining and extraction within Riparian Reserves will occur only if Aquatic Conservation Strategy objectives can be met.

MM-6. Include inspection and monitoring requirements in mineral plans, leases or permits. Evaluate the results of inspection and monitoring to effect the modification of mineral plans, leases and permits as needed to eliminate impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives.

Fire/Fuels Management

FM-1. Design fuel treatment and fire suppression strategies, practices, and activities to meet Aquatic Conservation Strategy objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuels management activities could be damaging to long-term ecosystem function.

FM-2. Locate incident bases, camps, helibases, staging areas, helispots and other centers for incident activities outside Riparian Reserves. If the only suitable location for such activities is within the Riparian Reserve, an exemption may be granted following review and recommendation by a resource advisor. The advisor will prescribe the location, use conditions, and rehabilitation requirements. Use an interdisciplinary team to predetermine suitable incident base and helibase locations.

FM-3. Minimize delivery of chemical retardant, foam, or additives to surface waters. An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following review and recommendation by a resource advisor, when an escape would cause more long-term damage.

FM-4. Design prescribed burn projects and prescriptions to contribute to attainment of Aquatic Conservation Strategy objectives.

FM-5. Immediately establish an emergency team to develop a rehabilitation treatment plan needed to attain Aquatic Conservation Strategy objectives whenever Riparian Reserves are significantly damaged by wildfire or a prescribed fire burning outside prescribed parameters.

Other - In Riparian Reserves, the goal of wildfire suppression is to limit the size of all fires. When watershed and/or landscape analysis, or province-level plans are completed and approved, some natural fires may be allowed to burn under prescribed conditions. Rapidly extinguishing smoldering coarse woody debris and duff should be considered to preserve these ecosystem elements. In Riparian Reserves, water drafting sites should be located and managed to minimize adverse effects on riparian habitat and water quality, as consistent with Aquatic Conservation Strategy objectives.

Lands

LH-1. Identify in-stream flows needed to maintain riparian resources, channel conditions, and fish passage.

LH-2. Tier 1 Key Watersheds: For hydroelectric and other surface water development proposals, require in-stream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies. During relicensing of hydroelectric projects, provide written and timely license conditions to the Federal Energy Regulatory Commission (FERC) that require flows and habitat conditions that maintain or restore riparian resources and channel integrity. Coordinate relicensing projects with the appropriate state agencies.

For all other watersheds: For hydroelectric and other surface water development proposals, give priority emphasis to in-stream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies. During relicensing of hydroelectric projects, provide written and timely license conditions to FERC that emphasize in-stream flows and habitat conditions that maintain or restore riparian resources and channel integrity. Coordinate relicensing projects with the appropriate state agencies.

LH-3. Locate new support facilities outside Riparian Reserves. For existing support facilities inside Riparian Reserves that are essential to proper management, provide recommendations to FERC that ensure Aquatic Conservation Strategy objectives are met. Where these objectives cannot be met, provide recommendations to FERC that such support facilities should be relocated. Existing support facilities that must be located in the Riparian Reserves will be located, operated, and maintained with an emphasis to eliminate adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives.

LH-4. For activities other than surface water developments, issue leases, permits, rights-of-way, and easements to avoid adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives. Adjust existing leases, permits, rights-of-way, and easements to eliminate adverse effects that retard or prevent the attainment of Aquatic Conservation Strategy objectives. If adjustments are not effective, eliminate the activity. Priority for modifying existing leases, permits, rights-of-way and easements will be based on the actual or potential impact and the ecological value of the riparian resources affected.

LH-5. Use land acquisition, exchange, and conservation easements to meet Aquatic Conservation Strategy objectives and facilitate restoration of fish stocks and other species at risk of extinction.

General Riparian Area Management

RA-1. Identify and attempt to secure in-stream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.

RA-2 Fell trees in Riparian Reserves when they pose a safety risk. Keep felled trees on-site when needed to meet coarse woody debris objectives.

RA-3. Herbicides, insecticides, and other toxicants, and other chemicals shall be applied only in a manner that avoids impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives.

RA-4. Locate water drafting sites to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat.

Watershed and Habitat Restoration

WR-1. Design and implement watershed restoration projects in a manner that promotes long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and attains Aquatic Conservation Strategy objectives.

WR-2. Cooperate with federal, state, local, and tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans or other cooperative agreements to meet Aquatic Conservation Strategy objectives.

WR-3. Do not use mitigation or planned restoration as a substitute for preventing habitat degradation.

Fish and Wildlife Management

FW-1. Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives.

FW-2. Design, construct and operate fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of Aquatic Conservation Strategy objectives. For existing fish and wildlife interpretative and other user-enhancement facilities inside Riparian Reserves, ensure that Aquatic Conservation Strategy objectives are met. Where Aquatic Conservation Strategy objectives cannot be met, relocate or close such facilities.

FW-3. Cooperate with federal, tribal, and state wildlife management agencies to identify and eliminate wild ungulate impacts that are inconsistent with attainment of Aquatic Conservation Strategy objectives.

FW-4. Cooperate with federal, tribal, and state fish management agencies to identify and eliminate impacts associated with habitat manipulation, fish stocking, harvest and poaching that threaten the continued existence and distribution of native fish stocks occurring on federal lands.

Research

RS-1. A variety of research activities may be ongoing and proposed in Key Watersheds and Riparian Reserves. These activities must be analyzed to ensure that significant risk to the watershed values does not exist. If significant risk is present and cannot be mitigated, study sites must be relocated. Some activities not otherwise consistent with the objectives may be appropriate, particularly if the activities will test critical assumptions of these standards and guidelines; will produce results important for establishing or accelerating vegetation and structural characteristics for maintaining or restoring aquatic and riparian ecosystems; or the activities represent continuation of long-term research. These activities should be considered only if there are no equivalent opportunities outside of Key Watersheds and Riparian Reserves.

RS-2. Current, funded, agency-approved research, which meets the above criteria, is assumed to continue if analysis ensures that a significant risk to Aquatic Conservation Strategy objectives does not exist. Research Stations and other Forest Service and BLM units will, within 180 days of the signing of the Record of Decision adopting these standards and guidelines, submit a brief project summary to the Regional Ecosystem Office of ongoing research projects that are potentially inconsistent with other standards and guidelines but are expected to continue under the above research exception. The Regional Ecosystem Office may choose to more formally review specific projects, and may recommend to the Regional Interagency Executive Committee modification, up to and including cancellation, of those projects having an unacceptable risk to Key Watersheds and Riparian Reserves. Risk will be considered within the context of the Aquatic Conservation Strategy objectives.

Matrix

Acres

Key and non-Key Watersheds are specified for all areas, and therefore overlay all other land allocations. For the portion of matrix located within Key Watersheds, standards and guidelines for Key Watersheds (see Key Watersheds on page C-7, and the Aquatic Conservation Strategy starting on page B-9 of these standards and guidelines), as well as standards and guidelines for matrix (listed below) apply. See additional detail under Hierarchy of Standards and Guidelines on page C-1 of these standards and guidelines.

Matrix within Tier 1 Key Watershed	917,600
Matrix within Tier 2 Key Watershed	182,400
Matrix within non-Key (other) Watershed	2,875,300
Total matrix acres	3,975,300

The above acreage is calculated after the Riparian Reserve acreage has been estimated and displayed elsewhere in these standards and guidelines, and thus does not include any Riparian Reserves.

Description

The matrix consists of those federal lands outside the six categories of designated areas (Congressionally Reserved Areas, Late-Successional Reserves, Adaptive Management Areas, Managed Late-Successional Areas, Administratively Withdrawn Areas, and Riparian Reserves). Most timber harvest and other silvicultural activities would be conducted in that portion of the matrix with suitable forest lands, according to standards and guidelines. Most scheduled timber harvest (that contributing to the probable sale quantity [PSQ] not taking place in Adaptive Management Areas) takes place in the matrix. The matrix includes nonforested areas, and forested areas that are technically unsuitable for timber production, and therefore do not contribute to PSQ.

Standards and guidelines for unmapped Late-Successional Reserves and Managed Late-Successional Areas prohibit or limit activities that otherwise appear to be within the matrix. Unmapped Late-Successional Reserves are identified for all LS/OG 1s and 2s within Marbled Murrelet Zone 1, around occupied marbled murrelet sites, and for 100 acres around known spotted owl activity centers. Unmapped Late-Successional Reserves and Managed Late-Successional Areas are identified for certain Protection Buffers. See the Late-Successional Reserve and Managed Late-Successional Area descriptions earlier in this section for specific information.

Standards and Guidelines

Also see Standards and Guidelines Common to all Land Allocations starting on page C-2 of these standards and guidelines.

Provide specified amounts of coarse woody debris in matrix management.

A renewable supply of large down logs is critical for maintaining populations of fungi, arthropods, bryophytes and various other organisms that use this habitat structure. Provision of coarse woody debris is also a key standard and guideline for American marten, fisher, two amphibians, and two species of vascular plants. The objective is to provide coarse woody debris well distributed across the landscape in a manner which meets the needs of species and provides for ecological functions. Standards and guidelines should provide for appropriate coarse woody debris quantity, quality (such as species, decay stage and size) and distribution. Models for computing expected numbers and sizes of logs should be developed for groups of plant associations and stand types which can be used as a baseline for managers to develop prescriptions for landscape management. An important factor is to provide the coarse woody debris within a forest patch so that the appropriate microclimate for various organisms that use this substrate is available. Coarse woody debris that is already on the ground needs to be retained and protected from disturbance to the greatest extent possible during logging and other land management activities that might destroy the integrity of the substrate. Scattered green trees will provide a future supply of down woody material as the stand regenerates and are important in providing for the distribution of this substrate throughout the managed landscape.

Specific measures for coarse woody debris follow. These measures are intended to be applied in matrix forests. The intent of the measures must also be met in Adaptive Management Areas, but specific standards and guidelines are not prescribed for those areas.

A. Manage to provide a renewable supply of large down logs well distributed across the matrix landscape in a manner that meets the needs of species and provides for ecological functions. Develop models for groups of plant associations and stand types that can be used as a baseline for developing prescriptions.

B. Until standards are developed as described above, the following guidelines apply in areas of regeneration harvests: for northern California National Forests, use the Draft Forest Plan standards and guidelines for down logs; for western Oregon and Washington north of and including the Willamette National Forest and the Eugene BLM District, leave 240 linear feet of logs per acre greater than or equal to 20 inches in diameter. Logs less than 20 feet in length cannot be credited toward this total. In eastern Oregon and Washington, and western Oregon south of the Willamette National Forest and the Eugene BLM District, a minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long should be retained. Decay class 1 and 2 logs can be counted towards these totals. Down logs should reflect the species mix of the original stand. In all cases, standards and guidelines from current plans and draft plan preferred alternatives apply if they provide greater amounts. In areas of partial harvest, the same basic guidelines should be applied, but they should be modified to reflect the timing of stand development cycles where partial harvesting is practiced.

C. Coarse woody debris already on the ground should be retained and protected to the greatest extent possible from disturbance during treatment (e.g., slash burning and yarding) which might otherwise destroy the integrity of the substrate.

D. Down logs should be left within forest patches that are retained under green-tree retention guidelines in order to provide the microclimate that is appropriate for various organisms that use this substrate.

E. As with all standards and guidelines, these guidelines are meant to provide initial guidance, but further refinement will be required for specific geographic areas. This can be accomplished through planning based on watershed analysis, and the adaptive management process.

Emphasize green-tree and snag retention in matrix management.

For many species, benefits will be greatest if trees are retained in patches rather than singly. Because very small patches do not provide suitable microclimates for many of these organisms, patches should generally be larger than 2.5 acres.

Although many species would benefit from retention of patches, others may be favored by retention of single trees. Within the minimum constraints described in item C below, the relative proportion of patches vs. single trees retained must reflect local knowledge of individual species needs.

Retained patches should be protected for multiple rotations to provide support for those organisms that require very old forests.

Specific measures for green tree and snag retention follow. These measures are intended to be applied throughout the matrix forests. Their intent should be met in Adaptive Management Areas, but standards and guidelines are not prescribed for those areas.

A. For lands administered by the BLM in Oregon, follow standards and guidelines described separately for those lands below. For lands administered by the BLM in California, manage according to existing District Plans, which emphasize retention of old growth.

B. For all other lands, retain at least 15 percent of the area associated with each cutting unit (stand) except within the Oregon Coast Range and Olympic Peninsula Provinces. On the Mt. Baker-Snoqualmie National Forest, this retention guideline does not apply, but site-specific prescriptions should be developed to maintain biological diversity and ecosystem function, including retention of green trees (singly and in patches), snags and down logs. Exceptions are made for the Oregon Coast Range and Olympic Peninsula Provinces because substantial retention is provided by marbled murrelet and riparian protection measures. If, as a result of watershed analysis or any future delisting of the murrelet, protection is reduced significantly, green-tree retention standards and guidelines may be required in these provinces. Only matrix lands count toward the 15 percent.

   This limitation does not apply to intermediate harvests (thinnings) in even-age young stands because leaving untreated portions of young stands would retard stand development and be detrimental to the objective of creating late-successional patches.

C. As a general guide, 70 percent of the total area to be retained should be aggregates of moderate to larger size (0.2 to 1 hectare or more) with the remainder as dispersed

structures (individual trees, and possible including smaller clumps less than 0.2 ha.) Larger aggregates may be particularly important where adjacent areas have little late-successional habitat. To the extent possible, patches and dispersed retention should include the largest, oldest live trees, decadent or leaning trees, and hard snags occurring in the unit. Patches should be retained indefinitely.

D. As a minimum, snags are to be retained within the harvest unit at levels sufficient to support species of cavity-nesting birds at 40 percent of potential population levels based on published guidelines and models. The objective is to meet the 40 percent minimum standard throughout the matrix, with per-acre requirements met on average areas no larger than 40 acres. To the extent possible, snag management within harvest units should occur within the areas of green-tree retention. The needs of bats should also be considered in these standards and guidelines as those needs become better known. Snag recruitment trees left to meet an identified, near-term (less than 3 decades) snag deficit do not count toward green-tree retention requirements.

Standards and Guidelines Specific to Northern Spotted Owl Habitat for Lands Administered by the Bureau of Land Management in Oregon - For lands administered by the BLM in Oregon north of Grants Pass (see General Forest Management Area boundary in the Medford District Draft Resource Management Plan), and including the entire Coos Bay District, provide 640-acre blocks (Connectivity/Diversity Blocks) as currently spaced, that are managed on 150-year rotation. When an area is cut, 12 to 18 green trees per acre will be retained. There must be 25 to 30 percent of each block in late-successional forest at any point in time. Late-successional stands within Riparian Reserves contribute toward this percentage. In the remainder of the matrix (General Forest Management Area), retain 6 to 8 green trees per acre in harvest units.

For lands administered by the BLM in Oregon south of Grants Pass, retain 16 to 25 large green trees per acre in harvest units.

Designated Conservation Areas, Reserved Pair Areas, and Residual Habitat Areas from the *Final Draft Recovery Plan for the Northern Spotted Owl* and other standards and guidelines of the BLM's Revised Preferred Alternative that are specific to northern spotted owls do not apply except as described below.

a. For lands administered by the BLM north of the Grants Pass line, and including all of the Coos Bay District, outside of the South Willamette-North Umpqua Area of Concern, implement the Connectivity/Diversity Block design from the Revised Preferred Alternative with District modifications that have been approved by the Scientific Advisory Group.

b. Apply additional matrix standards and guidelines to maintain the connectivity value of the I-5 Corridor (South Willamette/North Umpqua Area of Concern) in the Eugene District. Specifically, apply the Connectivity/Diversity Block standards and guidelines to all lands in the area designated as Deferred and Non-Deferred Old-Growth Emphasis Areas in the BLM's Revised Preferred Alternative.

   Connectivity/Diversity Block standards or guidelines call for 150-year area control rotations. Overall, 25 to 30 percent of each block will be maintained in late-successional

condition, and periodic timber sales will leave 12 to 18 green trees per acre. Riparian Reserves count toward the 25 to 30 percent if they are in late-successional condition. Riparian Reserves do not count toward the 150-year rotation of the area control.

c. Apply Connectivity/Diversity Block standards and guidelines to the entire area of seven Managed Pair Areas and two Reserved Pair Areas near the Medford/Roseburg District boundary and on a portion of the Coos Bay District surrounding Designated Conservation Area OD-33.

Provide additional protection for caves, mines, and abandoned wooden bridges and buildings that are used as roost sites for bats.

Most bat species occurring in the Pacific Northwest roost and hibernate in crevices in protected sites. Suitable roost sites and hibernacula, however, fall within a narrow range of temperature and moisture conditions. Sites commonly used by bats include caves, mines, snags and decadent trees, wooden bridges, and old buildings. Additional provisions for the retention of large snags and decadent trees are included in the standard and guideline for green tree patches in the matrix. Caves, mines, and abandoned wooden bridges and buildings, however, are extremely important roost and hibernation sites, and require additional protection to ensure that their value as habitat is maintained.

This provision is intended to apply in matrix forests and Adaptive Management Areas, and elements such as protection of known occupied caves should be considered for other land allocations. Conduct surveys of crevices in caves, mines, and abandoned wooden bridges and buildings for the presence of roosting bats, including fringed myotis, silver-haired bats, long-eared myotis, long-legged myotis, and pallid bats. For the purposes of this standard and guideline, caves are defined as in the Federal Cave Resources Protection Act of 1988 as "any naturally occurring void, cavity, recess, or system of interconnected passages which occur beneath the surface of the earth or within a cliff or ledge (. . . but not including any . . . man-made excavation) and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or man-made." Searches should be conducted during the day in the summer (to locate day roosts and maternity colonies), at night during the late summer and fall (to locate night roosts, which are important for reproduction), and during the day in the winter (to locate hibernacula). If bats are found, identify the species using the site and determine for what purpose it is being used by bats. As an interim measure, timber harvest is prohibited within 250 feet of sites containing bats. Management standards and guidelines that may be included as mitigation measures in project or activity plans will be developed for the site. These standards will be developed following an inventory and mapping of resources. The purpose of the standards and guidelines will be protection of the site from destruction, vandalism, disturbance from road construction or blasting, or any other activity that could change cave or mine temperatures or drainage patterns. The size of the buffer, and types of activities allowed within the buffer, may be modified through the standards developed for the specific site. Retention of abandoned bridges or buildings must be made contingent on safety concerns.

Townsend's big-eared bats are of concern to state wildlife agencies in both Washington and Oregon. These bats are strongly associated with caves, and are extremely sensitive to disturbance, especially from recreational cavers. When Townsend's big-eared bats are found occupying caves or mines on federal land, the appropriate agency should be notified, and management prescriptions for that site should include special consideration for potential impacts on this species.

Modify site treatment practices, particularly the use of fire and pesticides, and modify harvest methods to minimize soil and litter disturbance.

Many species of soil and litter-dwelling organisms, such as fungi and arthropods, are sensitive to soil and litter disturbance. Site treatments should be prescribed which will minimize intensive burning, unless appropriate for certain specific habitats, communities or stand conditions. Prescribed fires should be planned to minimize the consumption of litter and coarse woody debris. Other aspects to this standard and guideline include minimizing soil and litter disturbance that may occur as a result of yarding and operation of heavy equipment, and reducing the intensity and frequency of site treatments. Soil compaction, and removal or disturbance of humus layers and coarse woody debris, may impact populations of fungi and arthropods. These provisions are intended to apply throughout the matrix forests and within the Adaptive Management Areas.

Provide for retention of old-growth fragments in watersheds where little remains.

The distribution of old-growth stands throughout the landscape is an important component of ecosystem diversity, and plays a significant role in providing for biological and structural diversity across the landscape. Isolated remnant old-growth patches are ecologically significant in functioning as refugia for a host of old-growth associated species, particularly those with limited dispersal capabilities that are not able to migrate across large landscapes of younger stands. These include, but are not limited to, many species of fungi, lichens, bryophytes, arthropods, and vascular plants, and will likely include vertebrate species such as small mammals and amphibians, and various bird species. Isolated patches will function as refugia where old-growth associated species are able to persist until conditions become suitable for their dispersal into adjacent stands. Loss of these old-growth stands may result in local extirpation of an array of species. It is prudent to retain what little remains of this age class within landscape areas where it is currently very limited. This will ensure future options for management and enhancement of the diversity within adjacent developing stands

Landscape areas where little late-successional forest persists should be managed to retain late-successional patches. This standard and guideline will be applied in fifth field watersheds (20 to 200 square miles) in which federal forest lands are currently comprised of 15 percent or less late-successional forest. This assessment should include all allocations in the watershed. Within such an area, all remaining late-successional stands should be protected. Protection of these stands could be modified in the future, when other portions of the watershed have recovered to the point where they could replace the ecological roles of these stands.

In Adaptive Management Areas, less than 15 percent of federal forest land in fifth field watershed in late-successional forest should be considered as a threshold for analysis rather than a strict standard and guideline. A proposal to modify such stands should only be implemented following an analysis that considers the ecological function of the remaining late-successional forest and its location in the landscape.

Known Northern Spotted Owl Activity Centers

Standards and guidelines in the Late-Successional Reserve portion of these standards and guidelines specify the protection of 100-acres of owl habitat around all known owl activity centers. Management of stands in the matrix surrounding these areas will be designed to reduce risks of natural disturbance.

Current Plans and Draft Plan Preferred Alternatives

Except as specified in this paragraph or elsewhere in this section (and summarized under exceptions listed on page C-3), other allocations and standards and guidelines of current plans and draft plan preferred alternatives will be applied in the matrix where they provide greater benefits to late-successional forest related species than the provisions of these standards and guidelines. However, Administratively Withdrawn Areas that are specified in the current plans and draft plan preferred alternatives to benefit American martens, pileated woodpeckers, and other late-successional species are returned to the matrix unless local knowledge indicates that other allocations and these standards and guidelines will not meet management objectives for these species.

Protection Buffers

These standards and guidelines incorporated from the Scientific Analysis Team Report will result in protection for specific species. The following rare and locally endemic species are likely to be assured viability if they occur within designated areas. However, where these species occur in the matrix, the following standards and guidelines will be applied. For the birds listed below, activities that are implemented in 1994 should use this information to the greatest degree possible. Activities implemented in 1995 and later must include these provisions. For the Lynx, implementation should follow the schedule described for survey and manage component 2 on page C-5 or these standards and guidelines.

Birds:

White-headed Woodpecker, Black-backed Woodpecker, Pygmy Nuthatch, and Flammulated Owl - These species will not be sufficiently aided by application of mitigation measures for riparian habitat protection or for marbled murrelets alone. They all occur on the periphery of the range of the northern spotted owl on the east slope of the Cascade Range in Washington or Oregon. Additionally, the white-headed woodpecker and flammulated owl occur in the Klamath Province in northwestern California and southwestern Oregon. The viability of all

four species within the range of the northern spotted owl was rated as a medium risk on National Forests, although they each are much more widely distributed elsewhere.

Apply the following mitigation standards and guidelines to ensure that the distribution and numbers of all four species do not severely decline on National Forests and BLM Districts within the range of the northern spotted owl. These guidelines apply to the forest matrix outside designated habitat for the northern spotted owl and Riparian Reserves. Maintain adequate numbers of large snags and green-tree replacements for future snags within the four species' ranges in appropriate forest types. Where feasible, green-tree replacements for future snags can be left in groups to reduce blowdown. Specifically, the Scientific Analysis Team recommends that no snags over 20 inches dbh be marked for cutting. The Scientific Analysis Team recognizes, however, that safety considerations may prevent always retaining all snags. Use of standardized definitions of hazard trees is required. For the longer term, provide for sufficient numbers of green trees to provide for the full (100 percent) population potential of each species.

As depicted by Neitro in Management of Wildlife and Fish Habitats in Forest of Western Oregon and Washington (1985), the 100 percent population potential for white-headed woodpeckers is 0.60 conifer snags (ponderosa pine of Douglas-fir) per acre in forest habitats; these snags must be at least 15 inches dbh (or largest available if 15 inch dbh snags are not available) and in soft decay stages, and must be provided in stands of ponderosa pine and mixed pine/Douglas-fir. The 100 percent population potential for black-backed woodpeckers is 0.12 conifer snags per acre in forest habitats; these snags must be at least 17 inches dbh (or largest available if 17 inch dbh snags are not available) and in hard decay stages, and must be provided in stands of mixed conifer and lodgepole pine in higher elevations of the Cascade Range. Provision of snags for other cavity-nesting species, including primary cavity-nesters, must be added to the requirements for these two woodpecker species. Site-specific analysis, and application of a snag recruitment model (specifically, the Forest Service's Snag Recruitment Simulator) taking into account tree species, diameters, falling rates, and decay rates, will be required to determine appropriate tree and snag species mixes and densities. If snag requirements cannot be met, then harvest must not take place.

As identified by the expert panel, black-backed woodpeckers also require beetle infested trees for foraging; some such trees should be provided in appropriate habitat, and sanitation harvest of all such trees would be detrimental to the species. More information is needed on habitat use, seasonal occurrence, and use of forest age classes and burns, for the black-backed woodpecker.

Pygmy nuthatches use habitat very similar to those of white-headed woodpeckers. Pygmy nuthatches require large trees, typically ponderosa pine within the range of the northern spotted owl, for roosting. Provision of snags for white-headed woodpeckers is assumed to provide for the needs of pygmy nuthatch, as no species-specific guidelines for the species have been developed. Additional information on ecology of pygmy nuthatch within the range of the northern spotted owl is needed to develop more precise standards and guidelines.

Flammulated owls are secondary cavity-nesters and use cavities, in snags and live trees,

created by woodpeckers or, less often, that occur naturally. It is assumed that standards and guidelines for snags and green-tree replacements for woodpeckers and other primary cavity-nesting species, as provided by existing National Forest and BLM District Land and Resource Management Plans and for the woodpeckers in this species group, would provide for flammulated owls.

Note: The snag recommendations above are based on the model presented by Neitro and others (1985). In that model, snag requirements for individual species were treated as additive in developing snag requirements for the overall community of cavity excavators. As noted above, "provision of snags for other cavity-nesting species, including primary cavity nesters, must be added to the requirements for these two woodpecker species" (black-backed and white headed woodpeckers).

Snag requirements are developed by the National Forests and BLM Districts for specific forest cover types, and these may be further broken down by geographic location. The intent is to tailor the requirements to those species that are actually expected to occur in an area. To determine if the protection buffer requirements should be added to existing Forest or BLM District Plan requirements, the basis for those existing requirements should be analyzed to determine if they include the species identified by SAT at the specified level of percent population potential. If they do not, then the SAT requirements must be added to the existing Forest and BLM District Plan requirements.

Mammals:

Lynx - Lynx are rare within the range of the northern spotted owl, occurring primarily in the Okanogan area of Washington. The lynx is currently listed by the Fish and Wildlife Service as a Category 2 candidate (a species for which additional information is needed to propose listing as threatened or endangered). A petition was filed to list the lynx as endangered within the northern Cascades of Washington, based on small population size, population isolation, and lack of adequate prey base (snowshoe hare). However, the Fish and Wildlife Service ruled that available information does not warrant listing the lynx in Washington.

Three primary habitat components for lynx are (1) foraging habitat (15 to 35 year old lodgepole pine) to support snowshoe hare and provide hunting cover, (2) denning sites (patches of greater than 200-year old spruce and fir, generally less than 5 acres), and (3) dispersal/travel cover (variable in vegetation composition and structure). The major limiting factor is abundance of snowshoe hare, which in turn is limited by availability of winter habitat (primarily early-successional lodgepole pine with trees at least 6 feet tall). Past excessive trapping of lynx and incidental mortality of lynx from hunting of other species have depressed populations and may have been detrimental to local lynx populations in Washington. Roads provide access to hunters and trappers and thus road density may be related to lynx mortality.

The reserves and other designated areas in these standards and guidelines will provide denning habitat within protected forest stands in juxtaposition with early-successional vegetation in the forest matrix. Connectivity between many of the denning patches will be provided by the network of buffers along streams under the Riparian Reserves.

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

Fire and Fuels Management

For areas in the matrix that are located in the rural interface, fire management activities should be coordinated with local governments, agencies, and landowners during watershed analysis to identify additional factors which may affect hazard reduction goals. Hazard reduction may become more important in the rural interface and areas adjacent to structures, dwellings or other amenities. Fire suppression actions in the matrix will have no additional standards and guidelines.

Table C-3. Species to be protected through survey and management standards and guidelines. Each of the four survey strategies is described in the text.

Species	Survey Strategies 1	2	3	4
Fungi				
Mycorrhizal Fungi				
Boletes				
Gastroboletus subalpinus	x		x	
Gastroboletus turbinatus			x	
Boletes, low elevation				
Boletus piperatus			x	
Tylopilus pseudoscaber	x		x	
Rare Boletes				
Boletus haematinus	x		x	
Boletus pulcherrimus	x		x	
Gastroboletus imbellus	x		x	
Gastroboletus ruber	x		x	
False Truffles				
Nivatogastrium nubigenum	x		x	
Rhizopogon abietis			x	
Rhizopogon atroviolaceus			x	
Rhizopogon truncatus			x	
Thaxterogaster pingue			x	
Uncommon False Truffle				
Macowanites chlorinosmus	x		x	
Rare False Truffles				
Alpova alexsmithii	x		x	
Alpova olivaceotinctus	x		x	
Arcangeliella crassa	x		x	
Arcangeliella lactarioides	x		x	
Destuntzia fusca	x		x	
Destuntzia rubra	x		x	
Gautieria magnicellaris	x		x	
Gautieria otthii	x		x	
Leucogaster citrinus	x		x	
Leucogaster microsporus	x		x	
Macowanites lymanensis	x		x	
Macowanites mollis	x		x	
Martellia fragrans	x		x	
Martellia idahoensis	x		x	
Martellia monticola	x		x	

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage 3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Rare False Truffles (continued)				
Octavianina macrospora	x		x	
Octavianina papyracea	x		x	
Rhizopogon brunneiniger	x		x	
Rhizopogon evadens var. subalpinus	x		x	
Rhizopogon exiguus	x		x	
Rhizopogon flavofibrillosus	x		x	
Rhizopogon inquinatus	x		x	
Sedecula pulvinata	x		x	
Undescribed Taxa, Rare Truffles & False truffles				
Alpova sp. nov. #Trappe 9730	x		x	
Alpova sp. nov. #Trappe 1966	x		x	
Arcangeliella sp. nov. #Trappe 12382	x		x	
Arcangeliella sp. nov. #Trappe 12359	x		x	
Chamonixia pacifica sp. nov. #Trappe 12768	x		x	
Elasomyces sp. nov. #Trappe 1038	x		x	
Gastroboletus sp. nov. #Trappe 2897	x		x	
Gastroboletus sp. nov. #Trappe 7515	x		x	
Gastrosuillus sp. nov. #Trappe 7516	x		x	
Gastrosuillus sp. nov. #Trappe 9608	x		x	
Gymnomyces sp. nov. #Trappe 4703, 5576	x		x	
Gymnomyces sp. nov. #Trappe 5052	x		x	
Gymnomyces sp. nov. #Trappe 1690,1706,1710	x		x	
Gymnomyces sp. nov. #Trappe 7545	x		x	
Hydnotrya sp. nov. #Trappe 787, 792	x		x	
Hydnotrya subnix sp. nov. #Trappe 1861	x		x	
Martellia sp. nov. #Trappe 649	x		x	
Martellia sp. nov. #Trappe 1700	x		x	
Martellia sp. nov. #Trappe 311	x		x	
Martellia sp. nov. #Trappe 5903	x		x	
Octavianina sp. nov. #Trappe 7502	x		x	
Rhizopogon sp. nov. #Trappe 9432	x		x	
Rhizopogon sp. nov. #Trappe 1692	x		x	
Rhizopogon sp. nov. #Trappe 1698	x		x	
Thaxterogaster sp. nov. #Trappe	x		x	
Tuber sp. nov. #Trappe 2302	x		x	
Tuber sp. nov. #Trappe 12493	x		x	
Rare Truffles				
Balsamia nigra	x		x	
Choiromyces alveolatus	x		x	
Choiromyces venosus	x		x	

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage 3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Rare Truffles (continued)				
Elaphomyces anthracinus	x		x	
Elaphomyces subviscidus	x		x	
Chanterelles				
Cantharellus cibarius			x	x
Cantharellus subalbidus			x	x
Cantharellus tubaeformis			x	x
Chanterelles - Gomphus				
Gomphus bonarii			x	
Gomphus clavatus			x	
Gomphus floccosus			x	
Gomphus kauffmanii			x	
Rare Chanterelle				
Cantharellus formosus	x		x	
Polyozellus multiplex	x		x	
Uncommon Coral Fungi				
Ramaria abietina			x	
Ramaria araiospora	x		x	
Ramaria botryis var. aurantiiramosa	x		x	
Ramaria concolor f. tsugina			x	
Ramaria coulterae			x	
Ramaria fasciculata var. sparsiramosa	x		x	
Ramaria gelatiniaurantia	x		x	
Ramaria largentii	x		x	
Ramaria rubella var. blanda	x		x	
Ramaria rubrievanescens	x		x	
Ramaria rubripermanens	x		x	
Ramaria suecica			x	
Ramaria thiersii	x		x	
Rare Coral Fungi				
Ramaria amyloidea	x		x	
Ramaria aurantiisiccescens	x		x	
Ramaria celerivirescens	x		x	
Ramaria claviramulata	x		x	
Ramaria concolor f. marri	x		x	
Ramaria cyaneigranosa	x		x	
Ramaria hilaris var. olympiana	x		x	
Ramaria lorithamnus	x		x	

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage
3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Rare Coral Fungi (continued)				
Ramaria maculatipes	x		x	
Ramaria rainierensis	x		x	
Ramaria rubribrunnescens	x		x	
Ramaria stuntzii	x		x	
Ramaria verlotensis	x		x	
Ramaria gracilis	x		x	
Ramaria spinulosa	x		x	
Phaeocollybia				
Phaeocollybia attenuata			x	
Phaeocollybia californica	x		x	
Phaeocollybia carmanahensis	x		x	
Phaeocollybia dissiliens	x		x	
Phaeocollybia fallax			x	
Phaeocollybia gregaria	x		x	
Phaeocollybia kauffmanii	x		x	
Phaeocollybia olivacea			x	
Phaeocollybia oregonensis	x		x	
Phaeocollybia piceae	x		x	
Phaeocollybia pseudofestiva			x	
Phaeocollybia scatesiae	x		x	
Phaeocollybia sipei	x		x	
Phaeocollybia spadicea			x	
Uncommon Gilled Mushrooms				
Catathelasma ventricosa			x	
Cortinarius azureus			x	
Cortinarius boulderensis	x		x	
Cortinarius cyanites			x	
Cortinarius magnivelatus	x		x	
Cortinarius olympianus	x		x	
Cortinarius spilomius			x	
Cortinarius tabularis			x	
Cortinarius valgus			x	
Dermocybe humboldtensis	x		x	
Hebeloma olympiana	x		x	
Hygrophorus caeruleus	x		x	
Hygrophorus karstenii			x	
Hygrophorus vernalis	x		x	
Russula mustelina			x	

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage 3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Rare Gilled Mushrooms				
Chroogomphus loculatus	x		x	
Cortinarius canabarba	x		x	
Cortinarius rainierensis	x		x	
Cortinarius variipes	x		x	
Cortinarius verrucisporus	x		x	
Cortinarius wiebeae	x		x	
Tricholoma venenatum	x		x	
Uncommon Ecto-Polypores				
Albatrellus ellisii			x	
Albatrellus flettii			x	
Rare Ecto-Polypores				
Albatrellus avellaneus	x		x	
Albatrellus caeruleoporus	x		x	
Tooth Fungi				
Hydnum repandum			x	
Hydnum umbilicatum			x	
Phellodon atratum			x	
Sarcodon fuscoindicum			x	
Sarcodon imbricatus			x	
Rare Zygomycetes				
Endogone acrogena	x		x	
Endogone oregonensis	x		x	
Glomus radiatum	x		x	
Saprobes (Decomposers)				
Uncommon Gilled Mushrooms				
Baeospora myriadophylla			x	
Chrysomphalina grossula			x	
Collybia bakerensis	x		x	
Fayodia gracilipes (rainierensis)			x	
Gymnopilus puntifolius	x		x	
Marasmius applanatipes	x		x	
Mycena hudsoniana	x		x	
Mycena lilacifolia			x	
Mycena marginella			x	
Mycena monticola	x		x	
Mycena overholtsii	x		x	

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3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Uncommon Gilled Mushrooms (continued)				
Mycena quinaultensis	x		x	
Mycena tenax			x	
Mythicomyces corneipes			x	
Neolentinus kauffmanii	x		x	
Pholiota albivelata	x		x	
Stagnicola perplexa			x	
Rare Gilled Mushrooms				
Clitocybe subditopoda	x		x	
Clitocybe senilis	x		x	
Neolentinus adherens	x		x	
Rhodocybe nitida	x		x	
Rhodocybe speciosa	x		x	
Tricholomopsis fulvescens	x		x	
Noble Polypore (rare and endangered)				
Oxyporus nobilissimus	x	x	x	
Bondarzewia Polypore				
Bondarzewia montana	x	x	x	
Rare Resupinates and Polypores				
Aleurodiscus farlowii	x		x	
Dichostereum granulosum	x		x	
Cudonia monticola			x	
Gyromitra californica			x	x
Gyromitra esculenta			x	x
Gyromitra infula			x	x
Gyromitra melaleucoides			x	x
Gyromitra montana (syn. G. gigas)			x	x
Otidea leporina			x	
Otidea onotica			x	
Otidea smithii	x		x	
Plectania melastoma			x	
Podostroma alutaceum			x	
Sarcosoma mexicana			x	
Sarcosphaera eximia			x	
Spathularia flavida			x	
Rare Cup Fungi				
Aleuria rhenana				
Bryoglossum gracile				

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage 3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Rare Cup Fungi (continued)	x		x	
Gelatinodiscus flavidus				
Helvella compressa	x		x	
Helvella crassitunicata	x		x	
Helvella elastica	x		x	
Helvella maculata	x		x	
Neournula pouchetii	x		x	
Pithya vulgaris	x		x	
Plectania latahensis	x		x	
Plectania milleri	x		x	
Pseudaleuria quinaultiana	x		x	
Club Coral Fungi				
Clavariadelphus ligula			x	x
Clavariadelphus pistilaris			x	x
Clavariadelphus truncatus			x	x
Clavariadelphus borealis			x	x
Clavariadelphus lovejoyae			x	x
Clavariadelphus sachalinensis			x	x
Clavariadelphus subfastigiatus			x	x
Jelly Mushroom				
Phlogoitis helvelloides			x	x
Branched Coral Fungi				
Clavulina cinerea			x	x
Clavulina cristata			x	x
Clavulina ornatipes			x	x
Mushroom Lichen				
Phytoconis ericetorum			x	x
Parasitic Fungi				
Asterophora lycoperdoides			x	
Asterophora parasitica			x	
Collybia racemosa			x	
Cordyceps capitata			x	
Cordyceps ophioglossoides			x	
Hypomyces luteovirens			x	
Cauliflower Mushroom				
Sparassis crispa			x	

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage
3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Moss Dwelling Mushrooms				
Cyphellostereum laeve			x	
Galerina atkinsoniana			x	
Galerina cerina			x	
Galerina heterocystis			x	
Galerina sphagnicola			x	
Galerina vittaeformis			x	
Rickenella setipes			x	
Coral Fungi				
Clavicorona avellanea			x	
Lichens				
Rare Forage Lichen				
Bryoria tortuosa	x		x	
Rare Leafy (arboreal) Lichens				
Hypogymnia duplicata	x	x	x	
Tholurna dissimilis	x		x	
Rare Nitrogen-fixing Lichens				
Dendriscocaulon intricatulum	x		x	
Lobaria hallii	x		x	
Lobaria linita	x	x	x	
Nephroma occultum	x		x	
Pannaria rubiginosa	x		x	
Pseudocyphellaria rainierensis	x	x	x	
Nitrogen-fixing Lichens				
Lobaria oregana				x
Lobaria pulmonaria				x
Lobaria scrobiculata				x
Nephroma bellum				x
Nephroma helveticum				x
Nephroma laevigatum				x
Nephroma parile				x
Nephroma resupinatum				x
Pannaria leucostictoides				x
Pannaria mediterranea				x
Pannaria saubinetii				x

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage 3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Nitrogen-fixing Lichens (continued)				
Peltigera collina				x
Peltigera neckeri				x
Peltigera pacifica				x
Pseudocyphellaria anomala				x
Pseudocyphellaria anthraspis				x
Pseudocyphellaria crocata				x
Sticta beauvoisii				x
Sticta fuliginosa				x
Sticta limbata				x
Pin Lichens				
Calicium abietinum				x
Calicium adaequatum				x
Calicium adspersum				x
Calicium glaucellum				x
Calicium viride				x
Chaenotheca brunneola				x
Chaenotheca chrysocephala				x
Chaenotheca ferruginea				x
Chaenotheca furfuracea				x
Chaenotheca subroscida				x
Chaenothecopis pusilla				x
Cyphelium inquinans				x
Microcalicium arenarium				x
Mycocalicium subtile				x
Stenocybe clavata				x
Stenocybe major				x
Rare Rock Lichens				
Pilophorus nigricaulis	x		x	
Sticta arctica	x		x	
Riparian Lichens				
Cetrelia cetrarioides				x
Collema nigrescens				x
Leptogium burnetiae var. hirsutum				x
Leptogium cyanescens				x
Leptogium saturninum				x
Leptogium teretiusculum				x
Platismatia lacunosa				x
Ramalina thrausta				x
Usnea longissima				x

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage 3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Aquatic Lichens				
Dermatocarpon luridum	x		x	
Hydrothyria venosa	x		x	
Leptogium rivale	x		x	
Rare Oceanic Influenced Lichens				
Bryoria pseudocapillaris	x		x	
Bryoria spiralifera	x		x	
Bryoria subcana	x		x	
Buellia oidalea	x		x	
Erioderma sorediatum	x		x	
Hypogymnia oceanica	x		x	
Leioderma sorediatum	x		x	
Leptogium brebissonii	x		x	
Niebla cephalota	x		x	
Pseudocyphellaria mougeotiana	x		x	
Teloschistes flavicans	x		x	
Usnea hesperina	x		x	
Oceanic Influenced Lichens				
Cetraria californica	x		x	
Heterodermia leucomelos	x		x	
Loxospora sp. nov. "corallifera" (Brodo in edit)	x		x	
Pyrrhospora quernea	x		x	
Additional Lichen Species				
Cladonia norvegica			x	
Heterodermia sitchensis			x	
Hygomnia vittiata			x	
Hypotrachyna revoluta			x	
Ramalina pollinaria			x	
Nephroma isidiosum			x	
Bryophytes				
Antitrichia curtipendula				x
Bartramiopsis lescurii	x		x	
Brotherella roelli	x		x	
Diplophyllu albicans	x		x	
Diplophyllum plicatum	x	x		
Douinia ovata				x
Encalypta brevicolla var. crumiana	x		x	
Herbertus aduncus	x		x	
Herbertus sakurali	x		x	

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage
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Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Bryophytes (continued)				
Iwatsuklella leucotricha	x		x	
Kurzia makinoana	x	x		
Marsupella emarginata var. aquatica	x	x		
Orthodontlum gracile	x		x	
Plagiochila satol	x		x	
Plagiochila semidecurrens	x		x	
Pleuroziopsis ruthenica	x		x	
Ptilidium californicum	x	x		
Racomitrium aquaticum	x		x	
Radula brunnea	x		x	
Scouleria marginata				x
Tetraphis geniculata	x		x	
Tritomaria exsectiformis	x	x		
Tritomaria quinquedentata	x		x	
Amphibians				
Del Norte salamander		x		
Larch Mountain salamander		x		
Shasta salamander	x	x		
Siskiyou Mountains salamander	x	x		
Van Dyke's salamander (Cascades)		x		
Mammals				
Red tree vole (P. longicaudus)		x		
Mollusks				
Cryptomastix devia	x	x		
Cryptomastix hendersoni	x	x		
Helminthoglypta hertleini	x	x		
Helminthoglypta talmadgei	x	x		
Megomphix hemphilli	x	x		
Monadenia chaceana	x	x		
Monadenia churchi	x	x		
Monadenia fidelis minor	x	x		
Monadenia troglodytes troglodytes	x	x		
Monadenia troglodytes wintu	x	x		
Oreohelix n. sp.	x	x		
Pristiloma articum crateris	x	x		
Trilobopsis roperi	x	x		
Trilobopsis tehamana	x	x		
Vertigo n. sp.	x	x		

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage
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Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Mollusks (continued)				
Vespericola pressleyi	x	x		
Vespericola shasta	x	x		
Deroceras hesperium	x	x		
Hemphillia barringtoni	x	x		
Hemphillia glandulosa	x	x		
Hemphillia malonei	x	x		
Hemphillia pantherina	x	x		
Prophysaon coeruleum	x	x		
Prophysaon dubium	x	x		
Fluminicola n. sp. 1	x	x		
Fluminicola n. sp. 11	x	x		
Fluminicola n. sp. 14	x	x		
Fluminicola n. sp. 15	x	x		
Fluminicola n. sp. 16	x	x		
Fluminicola n. sp. 17	x	x		
Fluminicola n. sp. 18	x	x		
Fluminicola n. sp. 19	x	x		
Fluminicola n. sp. 2	x	x		
Fluminicola n. sp. 20	x	x		
Fluminicola n. sp. 3	x	x		
Fluminicola seminalis	x	x		
Juga (O.) n. sp. 2	x	x		
Juga (O.) n. sp. 3	x	x		
Lyogyrus n. sp. 1	x	x		
Lyogyrus n. sp. 2	x	x		
Lyogyrus n. sp. 3	x	x		
Vorticifex klamathensis sinitsini	x	x		
Vorticifex n. sp. 1	x	x		
Vascular Plants				
Allotropa virgata	x	x		
Arceuthobium tsugense	x	x		
Aster vialis	x	x		
Bensoniella oregana (California)	x	x		
Botrychium minganense	x	x		
Botrychium montanum	x	x		
Clintonia andrewsiana	x	x		
Coptis asplenifolia	x	x		

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage 3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

Table C-3. (continued)

Species	Survey Strategies 1	2	3	4
Vascular Plants (continued)				
Coptis trifolia	x	x		
Corydalis aquae-gelidae	x	x		
Cypripedium fasciculatum (Klamath)	x	x		
Cypripedium montanum (west Cascades)	x	x		
Galium kamtschaticum	x	x		
Habenaria orbiculata	x	x		
Pedicularis howellii	x	x		
Pedicularis howellii	x	x		
Scoliopus biglovei	x	x		
Arthropods				
Canopy herbivores (south range)				x
Coarse wood chewers (south range)				x
Litter and soil dwelling species (south range)				x
Understory and forest gap herbivores				x

Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage
3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys

D. Adaptive Management Areas

Acres

Key and non-Key Watersheds are specified for all areas, and therefore overlay all other land allocations. For the portion of Adaptive Management Areas located within Key Watersheds, standards and guidelines for Key Watersheds, as well as standards and guidelines for Adaptive Management Areas, apply, with some flexibility as described below (see additional detail under Hierarchy of Standards and Guidelines Within Adaptive Management Areas later in this section).

Adaptive Management Areas within Tier 1 Key Watersheds	228,100
Adaptive Management Areas within Tier 2 Key Watersheds	60,600
Adaptive Management Areas within non-Key (other) Watersheds	1,233,100
Total Adaptive Management Areas	1,521,800

Acreage of Riparian Reserves is not calculated within Adaptive Management Areas for these standards and guidelines. However, Riparian Reserve standards and guidelines affect approximately 40 percent of Adaptive Management Areas. The above acres are net federal, not including Congressionally Reserved Areas or Late-Successional Reserves. Acreage for each Adaptive Management Area listed later in this section includes all ownerships and all land allocations within the Adaptive Management Area boundary.

Introduction

Adaptive Management Areas are landscape units designated to encourage the development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives. Ten areas ranging from about 92,000 to nearly 500,000 acres of federal lands have been identified. The areas are well distributed in the physiographic provinces. Most are associated with subregions impacted socially and economically by reduced timber harvest from the federal lands. The areas provide a diversity of biological challenges, intermixed land ownerships, natural resource objectives, and social contexts. In the Applegate Adaptive Management Area in Oregon, grassroots community-based activities have already begun.

The overall objective for Adaptive Management Areas is to learn how to manage on an ecosystem basis in terms of both technical and social challenges, and in a manner consistent with applicable laws. It is hoped that localized, idiosyncratic approaches that may achieve the conservation objectives of these standards and guidelines can be pursued. These approaches rely on the experience and ingenuity of resource managers and communities rather than traditionally derived and tightly prescriptive approaches that are generally applied in management of forests.

The Adaptive Management Areas are intended to contribute substantially to the achievement of objectives for these standards and guidelines. This includes provision of well-distributed late-successional habitat outside of reserves, retention of key structural elements of late-successional forests on lands subjected to regeneration harvest, and restoration and protection of riparian zones as well as provision of a stable timber supply.

The Adaptive Management Area concept incorporates the three adaptive management models/objectives discussed in the FEMAT Report--technical, administrative, and cultural/social.

Key features of the Adaptive Management Areas:

- The areas are well-distributed geographically, represent a mix of technical and social challenges and are of sufficient size to provide for landscape-level management approaches.

- The areas provide for development and demonstration of monitoring protocols and new approaches to land management that integrate economic and ecological objectives based on credible development programs and watershed and landscape analysis.

- Opportunities exist for education, including technical training, to qualify local community residents for employment in monitoring and other management programs.

- Innovation in community involvement is encouraged, including approaches to implementation of initial management strategies and perhaps, over the longer term, development of new forest policies.

- Innovation is expected in developing adequate and stable funding sources for monitoring, research, retraining, restoration and other activities.

- Innovation in integration of multi-ownership watersheds is encouraged among federal agencies and is likewise encouraged among state and federal agencies, and private landowners.

- Innovation in agency organization and personnel policies might include individual certification requirements, and modification of recruitment and promotion procedures to encourage local longevity among the federal workforce.

Selection of the Adaptive Management Areas

Adaptive Management Areas were selected to provide opportunities for innovation, to provide examples in major physiographic provinces, and to provide a range of technical challenges, from an emphasis on restoration of late-successional forest conditions and riparian zones to integration of commercial timber harvest with ecological objectives.

The Adaptive Management Areas have been geographically located to minimize risk to

achieving the conservation objectives of these standards and guidelines. The designation of Adaptive Management Areas was intended to provide a mixture of public and private lands. In locating the Adaptive Management Areas, the proximity of communities that were subject to adverse economic impacts resulting from reduced federal timber harvest was considered. The social and economic analysis of the Forest Ecosystem Management Assessment Team was a major source of information that helped guide these decisions.

The Adaptive Management Areas incorporate a mix of ownerships and administrative responsibilities. Six areas include lands administered by the Forest Service and BLM. In two areas (Northern Coast Range and Olympic) there are significant opportunities for the states to participate in a major cooperative adaptive management effort. The majority of areas also have interspersed privately owned forest lands that could be incorporated into an overall plan if landowners so desired.

Establishment of the Adaptive Management Areas is not intended to discourage the development of innovative social and technical approaches to forest resource issues in other locales. They are intended to provide a geographic focus for innovation and experimentation with the intent that such experience will be widely shared. The array of areas provides a balance between having a system of areas that is: (1) so large and diffuse that it lacks focus and adequate resources; and has extensive management constraints because of its size and overall impact on regional conservation strategies; and (2) too small to allow for meaningful ecological and social experimentation.

Technical Objectives

The Adaptive Management Areas have scientific and technical innovation and experimentation as objectives. The guiding principle is to allow freedom in forest management approaches to encourage innovation in achieving the goals of these standards and guidelines. This challenge includes active involvement by the land management and regulatory agencies early in the planning process.

The primary technical objectives of the Adaptive Management Areas are development, demonstration, implementation, and evaluation of monitoring programs and innovative management practices that integrate ecological and economic values. Experiments, including some of large scale, are likely. Demonstrations and pilot projects alone, while perhaps significant, useful, and encouraged in some circumstances, may not be sufficient to achieve the objectives.

Monitoring is essential to the success of any plan and to an adaptive management program. Hence, development and demonstration of monitoring and training of the workforce are technical challenges and should be emphasized.

Technical topics requiring demonstration or investigation are a priority for Adaptive Management Areas and cover a wide spectrum, from the welfare of organisms to ecosystems to landscapes. Included are development, demonstration, and testing of techniques for:

- Creation and maintenance of a variety of forest structural conditions including late-successional forest conditions and desired riparian habitat conditions.

- Integration of timber production with maintenance or restoration of fisheries habitat and water quality.

- Restoration of structural complexity and biological diversity in forests and streams that have been degraded by past management activities and natural events.

- Integration of the habitat needs of wildlife (particularly of sensitive and threatened species) with timber management.

- Development of logging and transportation systems with low impact on soil stability and water quality.

- Design and testing of effects of forest management activities at the landscape level.

- Restoration and maintenance of forest health using controlled fire and silvicultural approaches.

Each Adaptive Management Area will have an interdisciplinary technical advisory panel, including specialists from outside government agencies, that will provide advice and support to managers and local communities involved with this effort.

Social Objectives

The primary social objective of Adaptive Management Areas is the provision of flexible experimentation with policies and management. These areas should provide opportunities for land managing and regulatory agencies, other government entities, nongovernmental organizations, local groups, landowners, communities, and citizens to work together to develop innovative management approaches. Broadly, Adaptive Management Areas are intended to be prototypes of how forest communities might be sustained.

Innovative approaches include social learning and adaptation, which depend upon local communities having sufficient political capacity, economic resources, and technical expertise to be full participants in ecosystem management. Similarly, management will need to be coordinated and characterized by collaboration across political jurisdictions and diverse ownerships. This will require mediating across interests and disciplines, strengthening local political capability, and enhancing access to technical expertise. Adaptive management is, by definition, information dependent. Setting objectives, developing management guidelines, educating and training a workforce, organizing interactive planning and management institutions, and monitoring accomplishments all require reliable, current inventories. New information technologies can be used to provide such information. Local people might be ideally suited to this task if appropriately trained.

Agency Approaches and Management Review

Federal agencies are expected to use Adaptive Management Areas to explore alternative ways of doing business internally, and with each other, other organizations, local and state government, and private landowners. In effect, the areas should be used to "learn to manage" as well as to "manage to learn."

Agencies are expected to develop plans (jointly, where multiple agencies are involved) for the Adaptive Management Areas. Development of a broad plan that identifies general objectives and roles, and provides flexibility should be the goal. Such a plan could be used in competing for financial resources, garnering political support, providing a shared vision, and identifying experiences to be tracked.

If the Adaptive Management Areas are to make timely contributions to the objectives of these standards and guidelines, and to the communities, it is absolutely critical that initiation of activities not be delayed by requirements for comprehensive plans or consensus documents beyond those required to meet existing legal requirements for activities. Development of such documents can proceed simultaneously with other activities; the only area in which detailed planning must precede most activities is the Snoqualmie Pass Adaptive Management Area. Current plans and draft plan preferred alternatives, as modified by the direction established in these standards and guidelines, can provide the starting point for activities. Initial involvement of user groups and communities would emphasize how the strategy and plans should be implemented. In the Snoqualmie Pass Adaptive Management Area, minor activities such as those Categorically Excluded under NEPA (except timber sales) and watershed restoration projects may precede detailed planning.

Initial direction and continuing review should be provided by the Regional Interagency Executive Committee. It is important that the interagency coordination involve both the regulatory and management agencies, and that the regulatory agencies participate in planning and regular review processes.

Adaptive Management Area Implementation Guidelines

Role of Agencies - The agencies will facilitate collaborative efforts, partnerships, mutual learning and innovation. They will provide staff work to the process of managing the Adaptive Management Areas. This could include providing meeting places, meeting facilitation, and expert analysis. Agency scientists are expected to provide scientific design of monitoring and experiments, though the decision is reserved for the federal land manager.

Although the agencies have a facilitation role, the land management agencies retain the authority and responsibility to make decisions and the regulatory agencies retain the authority and responsibility to regulate. Nothing in these guidelines is intended to change those authorities or responsibilities.

Local Communities - Specific community roles with public agencies and subject matter experts (such as the technical advisory panels) will include helping find innovative ways to set objectives, develop plans, implement projects, and monitor accomplishments. For example, Subtitle G of the 1990 Farm Bill gives criteria to identify "natural resource dependent communities" which may be used if appropriate when identifying local

communities.

Participation in Adaptive Management Areas - Although the emphasis is on the participation of people who are actively involved with that geographic location, nothing in these guidelines should be construed to suggest that the interests of people living outside "local communities" should not be considered in making agency decisions. Participation will be self identifying, to the extent possible. Experiments to address how this might happen are encouraged.

Project Development and Implementation - Specific project planning must:

* Involve the public early
* Coordinate with overall activities within the province
* Begin some projects as soon as practicable to respond to and facilitate public interest and involvement
* Begin some projects prior to completing an entire watershed analysis
* Begin watershed analysis as soon as possible
* Develop early plans and projects with the best available information
* Identify needs for improved inventory
* Proceed simultaneously with activities and Adaptive Management Area planning
* Assign priority status to watershed restoration projects that can be completed quickly
* Begin projects in nonsensitive sections of the Adaptive Management Area

Area Assessment - The Adaptive Management Area plans need to be based on information about historical, current and desired future conditions of the biophysical, social, and economic aspects of the area. The plans will rely largely on existing information. The area assessment will be a concise working document. The following is provided as a suggested framework:

Biophysical: Consider disturbance history, terrestrial and aquatic conditions, sensitive plant and animal species and/or habitat, capability of the system to produce a variety of forest products. A description of the desired future condition or a range of acceptable conditions for the biophysical system is needed. For example, what functions are important to maintain at the landscape level? What structure, species, age classes, and/or arrangement will maintain those functions? Consider both coarse and fine detail over time. What does the community want the Adaptive Management Area to be like in the future? What actions are needed to create that desired future condition?

Social: Consider historical and extant communities, their use patterns, uses of the land, issues, resources, and opportunities. In some areas, other demographic data will be helpful as well. What networks for communications are at work? How can the agencies better interact with these? What collaborative process will work best for the communities of interest to effectively participate in managing the Adaptive Management Area? What does the community want to look like in the future? Desired future social condition can be considered in terms of composition, structure, and/or functions over time.

Economic: A description of current economic conditions might include an inventory of

local employment, resource workers, skills, and access to technology. Desired future conditions could describe the future employment opportunities (e.g., what forest work will be needed in the future?) and skills needed to seize those opportunities. As the desired future condition of the ecosystem is better understood, the future forest work will also be more clear. Identification of needed knowledge, skills, abilities, and technology for the future may be useful in developing training programs as well as business or marketing assistance.

Plans - All Adaptive Management Areas will have a plan. An individual public, interagency approach to planning will be developed for each Adaptive Management Area. The plan should address or provide:

* A shared vision of the Adaptive Management Area, (e.g., the kind of knowledge the participants hope to gain). Identification of the desired future conditions may be developed in collaboration with communities, depending on the area.
* Learning that includes social and political knowledge, not just biological and physical information.
* A strategy to guide implementation, restoration, monitoring and experimental activities.
* A short-term (3 to 5 year) timber sale plan and long-term yield projections.
* Education of participants.
* A list of communities influenced by the Adaptive Management Area projects and outputs.
* An inventory of community strategies, and resources and partners being used.
* Coordination with overall activities within the province.
* A funding strategy.
* Integration of the community strategies and technical objectives.

Monitoring and Research - The Monitoring and Evaluation Plan (included in Section E of this plan) and watershed analysis present the framework and some required actions for each Adaptive Management Area. Additional efforts and specificity may be developed for each Adaptive Management Area.

The learning opportunity provided by Adaptive Management Areas will be enhanced if clear, measurable goals and objectives are set, monitored, and conveyed into the planning of projects or into the appropriate component of the Adaptive Management Area plan or Forest or District Plan. Shared synthesis of monitoring results will help provide a multiple-perspective assessment on whether social and ecosystem goals are being met, help identify problems to avoid in subsequent projects, and help gain consensus on what data gaps exist and what changes to the monitoring and research programs are needed.

Review - Monitoring and research, with careful experimental design, will be conducted in Adaptive Management Areas. Research in forest ecology and management as well as social, biological, and earth sciences may be conducted. Each Adaptive Management Area will have an interdisciplinary technical advisory panel that will provide advice to managers and the local communities involved with this effort. The technical advisory panels will provide advice and information on the appropriateness of the project.

Direction and review are provided by the Regional Interagency Executive Committee, through the Regional Ecosystem Office. This review will help assure that plans and projects developed for the various Adaptive Management Areas will be both scientifically and ecologically credible. It will assure that new, innovative approaches are used, that the laws and the goals of the plan are met, and that validation monitoring is incorporated.

The Regional Ecosystem Office will facilitate and coordinate the implementation of the Adaptive Management Area program. Federal agencies are expected to use the Adaptive Management Areas to explore new ways of working internally and externally.

Legal - All activities must comply with existing laws such as Endangered Species Act, National Environmental Policy Act, National Forest Management Act, Forest Land Policy and Management Act, Federal Advisory Committee Act, National Historic Preservation Act, Clean Water Act, Clean Air Act, and treaty rights. Management and regulatory agencies should work together to determine ways to expedite management while ensuring compliance, to improve cooperation through planning and on-the-ground consultation, and to avoid confrontation.

Other Issues - Some issues are beyond the authority of the agencies or the Regional Interagency Executive Committee. These include:

* Use of receipts from timber sales and other products derived from Adaptive Management Areas to develop programs and projects within the areas
* Employment targets for local people for special jobs like planning, training, and monitoring
* Special land management or stewardship contracts
* Restricted local use of wood and other products derived from Adaptive Management Areas.

Fire and Fuels Management

In Adaptive Management Areas, fire managers are encouraged to actively explore and support opportunities to research the role and effects of fire management on ecosystem functions. Cooperation across agency and ownership boundaries should be emphasized. The standards and guidelines in current plans and draft plan preferred alternatives for hazard reduction should be followed until approved Adaptive Management Area plans are established. Fire management experts will participate on the local Interdisciplinary Technical Advisory Panel on all Adaptive Management Areas. Management of Adaptive Management Areas is intended to be innovative and experimental. Wildfire suppression actions, however, should use accepted strategies and tactics, and conform with specific agency policy.

Timber Supply

One reason for locating Adaptive Management Areas adjacent to communities experiencing adverse economic impacts is to provide opportunity for social and economic benefits to these areas. Adaptive Management Areas are expected to produce timber as part of their program

of activities consistent with their specific direction under these standards and guidelines. The rates and methods of harvest will be determined on an area-by-area basis. Each area management team is expected to develop a strategy for ecosystem management as part of the Adaptive Management Area plan to guide implementation, restoration, monitoring, and experimental activities involving timber sales. The strategy should contain a short-term (3 to 5 year) timber sale component and an assessment of long-term outputs of timber.

Education

Each Adaptive Management Area was located adjacent to one or more communities with economies and culture long associated with utilization of forest resources. As a result, the people have a "sense of place" and desire for involvement. Many of these local workers already possess timber/forest-related skills and knowledge, as well as that sense of place, which in combination make them natural participants in ecosystem-based management and monitoring. Here adaptive management can bring indigenous knowledge together with formal studies, the local communities and the land management agencies in a mix that may provide creative common-sense approaches to complicated problems.

Technical and scientific training of a local workforce should be an educational priority of the Adaptive Management Area Program. Formal schooling and field apprenticeship might provide the workforce needed to help implement ecosystem management, particularly in the area of monitoring. This program might be based on collaborations among local community colleges, state universities, and the agencies.

Standards and Guidelines

Also see Standards and Guidelines Common to all Land Allocations starting on page C-2 of these standards and guidelines, and other standards and guidelines elsewhere in this section.

Late-Successional Reserves within Adaptive Management Areas will be managed according to the standards and guidelines for such reserves except as provided elsewhere in this section. Management of these areas will comply with the standards and guidelines for Late-Successional Reserves, and management around these areas will be designed to reduce risk of natural disturbances. Unmapped Late-Successional Reserves are specified for spotted owl activity centers, certain LS/OG 1s and 2s, occupied marbled murrelet sites, and for certain Protection Buffers (see Section C of these standards and guidelines).

Riparian protection in Adaptive Management Areas should be comparable to that prescribed for other federal land areas. For example, Key Watersheds with aquatic conservation emphasis within Adaptive Management Areas must have a full watershed analysis and initial Riparian Reserves comparable to those for Tier 1 Key Watersheds. Riparian objectives (in terms of ecological functions) in other portions of Adaptive Management Areas should have expectations comparable to Tier 2 Key Watersheds where applicable. However, flexibility is provided to achieve these conditions, if desired, in a manner different from that prescribed for other areas and to conduct bonafide research projects within riparian zones.

At the same time, any analysis of Riparian Reserve widths must also consider the contribution of these reserves to other, including terrestrial, species. Watershed analysis should take into account all species that were intended to be benefited by the prescribed Riparian Reserve widths. Those species include fish, mollusks, amphibians, lichens, fungi, bryophytes, vascular plants, American marten, red tree voles, bats, marbled murrelets, and northern spotted owls. The specific issue for spotted owls is retention of adequate habitat conditions for dispersal.

Standards and guidelines for matrix management in Section C of these standards and guidelines (there is no matrix in Adaptive Management Areas) provide specific measures for coarse woody debris, and for green tree and snag retention, for the matrix. The intent of the measures must also be met in Adaptive Management Areas, but specific standards and guidelines are not prescribed for these areas.

Provide additional protection for caves, mines, and abandoned wooden bridges and buildings that are used as roost sites for bats.

Most bat species occurring in the Pacific Northwest roost and hibernate in crevices in protected sites. Suitable roost sites and hibernacula, however, fall within a narrow range of temperature and moisture conditions. Sites commonly used by bats include caves, mines, snags and decadent trees, wooden bridges, and old buildings. Additional provisions for the retention of large snags and decadent trees are included in the standard and guideline for green tree patches in the matrix. Caves, mines, and abandoned wooden bridges and buildings, however, are extremely important roost and hibernation sites, and require additional protection to ensure that their value as habitat is maintained.

This provision is intended to apply in matrix forests and Adaptive Management Areas, and elements such as protection of known occupied caves should be considered for other land allocations. Conduct surveys of crevices in caves, mines, and abandoned wooden bridges and buildings for the presence of roosting bats, including fringed myotis, silver-haired bats, long-eared myotis, long-legged myotis, and pallid bats. For the purposes of this standard and guideline, caves are defined as in the Federal Cave Resources Protection Act of 1988 as "any naturally occurring void, cavity, recess, or system of interconnected passages which occur beneath the surface of the earth or within a cliff or ledge (. . . but not including any . . . man-made excavation) and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or man-made." Searches should be conducted during the day in the summer (to locate day roosts and maternity colonies), at night during the late summer and fall (to locate night roosts, which are important for reproduction), and during the day in the winter (to locate hibernacula). If bats are found, identify the species using the site and determine for what purpose it is being used by bats. As an interim measure, timber harvest is prohibited within 250 feet of sites containing bats. Management standards and guidelines that may be included as mitigation measures in project or activity plans will be developed for the site. These standards will be developed following an inventory and mapping of resources. The purpose of the standards and guidelines will be protection of the site from destruction, vandalism, disturbance from road construction or blasting, or any other activity that could change cave or mine temperatures or drainage patterns. The size of the

buffer, and types of activities allowed within the buffer, may be modified through the standards developed for the specific site. Retention of abandoned bridges or buildings must be made contingent on safety concerns.

Townsend's big-eared bats are of concern to state wildlife agencies in both Washington and Oregon. These bats are strongly associated with caves, and are extremely sensitive to disturbance, especially from recreational cavers. When Townsend's big-eared bats are found occupying caves or mines on federal land, the appropriate agency should be notified, and management prescriptions for that site should include special consideration for potential impacts on this species.

Modify site treatment practices, particularly the use of fire and pesticides, and modify harvest methods to minimize soil and litter disturbance.

Many species of soil and litter-dwelling organisms, such as fungi and arthropods, are sensitive to soil and litter disturbance. Site treatments should be prescribed which will minimize intensive burning, unless appropriate for certain specific habitats, communities or stand conditions. Prescribed fires should be planned to minimize the consumption of litter and coarse woody debris. Other aspects to this standard and guideline include minimizing soil and litter disturbance that may occur as a result of yarding and operation of heavy equipment, and reducing the intensity and frequency of site treatments. Soil compaction, and removal or disturbance of humus layers and coarse woody debris, may impact populations of fungi and arthropods. These provisions are intended to apply throughout the matrix forests and within the Adaptive Management Areas.

Provide for old-growth fragments in watersheds where little remains.

Matrix standards and guidelines on page C-44 of these standards and guidelines specify retention of old-growth fragments in fifth field watersheds containing less than 15 percent of such stands. In Adaptive Management Areas, less than 15 percent of fifth field watershed in late-successional forest should be considered as a threshold for analysis rather than a strict standard and guideline, and the role of remaining stands of late-successional forests must be fully considered in watershed analysis before they can be modified.

Hierarchy of Standards and Guidelines Within Adaptive Management Areas

In summary, management activities in all the Adaptive Management Areas will be conducted to achieve the objectives described in these standards and guidelines. Standards and guidelines for Congressionally Reserved Areas or Late-Successional Reserves must be followed when they occur within Adaptive Management Areas, except that the Adaptive Management Area plans for the Finney and Northern Coast Adaptive Management Areas may change the Late-Successional Reserve designations in those areas. Flexibility is provided to meet objectives for Riparian Reserves and Key Watersheds. Full watershed analysis will be conducted prior to new management activities in identified Key Watersheds within Adaptive Management Areas. Standards and guidelines of current plans and draft plan preferred alternatives (see exceptions on page C-3 of these standards and guidelines) need to be considered during planning and implementation of activities within Adaptive Management

Areas, and they may be modified in Adaptive Management Area plans based on site-specific analysis. Otherwise, standards and guidelines are to be developed to meet the objectives of the Adaptive Management Area and the overall strategy. Coordination with the Regional Ecosystem Office through the Regional Interagency Executive Committee is required.

Descriptions of the Adaptive Management Areas

Adaptive Management Areas are shown on the maps described on page A-6 of these standards and guidelines. Adaptive Management Areas would contribute to accomplishing the objectives of these standards and guidelines, such as protection or enhancement of riparian habitat and provision for well-distributed late-successional forest habitat. Detailed prescriptions for achieving such objectives are not provided, however, in order to permit managers to develop and test alternative approaches applicable to their areas and in a manner consistent with existing environmental and other laws.

Unlike tables elsewhere in these standards and guidelines that show only Federal Acres outside of Late-Successional Reserves and Congressional Reserves, the sizes listed below include all acres within the Adaptive Management Area boundaries, including all land allocations and ownerships.

Name:	**Applegate Adaptive Management Area, Oregon**
Size:	277,500 acres
Ownership:	Medford District Bureau of Land Management; Rogue River and Siskiyou National Forests; potentially state and private lands.
Associated Communities:	Grants Pass and Medford, Oregon; Jackson and Josephine Counties, Oregon; and Siskiyou County, California.
Emphasis:	Development and testing of forest management practices, including partial cutting, prescribed burning, and low impact approaches to forest harvest (e.g., aerial systems) that provide for a broad range of forest values, including late-successional forest and high quality riparian habitat. Late-Successional Reserves are included in the Adaptive Management Area boundaries.

Name:	**Central Cascades Adaptive Management Area, Oregon**
Size:	155,700 acres
Ownership:	Willamette National Forest; Eugene District Bureau of Land Management; potentially state and private lands.
Associated Communities:	Eugene, Springfield, and Sweet Home, Oregon.
Emphasis:	Intensive research on ecosystem and landscape processes and its application to forest management in experiments and demonstrations at the stand and watershed level; approaches for integrating forest and stream management objectives and on implications of natural disturbance regimes; and management of

	young and mature stands to accelerate development of late-successional conditions, a specific management objective for the forests within the Moose Lake block as well as in other portions of the Adaptive Management Area to be selected. Current status of the H.J. Andrews Experimental Forest as an Experimental Forest (i.e., maintenance of control areas and full flexibility to conduct experiments, is retained). One Late-Successional Reserve is included in the area.
Name:	**Cispus Adaptive Management Area, Washington**
Size:	143,900 acres
Ownership:	Gifford Pinchot National Forest; potentially state and private lands.
Associated Communities:	Randle, Morton, and Packwood, Washington; Lewis and Skamania Counties, Washington.
Emphasis:	Development and testing of innovative approaches at stand, landscape, and watershed level to integration of timber production with maintenance of late-successional forests, healthy riparian zones, and high quality recreational values.
Name:	**Finney Adaptive Management Area, Washington**
Size:	98,400 acres
Ownership:	Mt. Baker-Snoqualmie National Forest; potentially state and private lands.
Associated Communities:	Darrington, Washington; Skagit and Snohomish Counties, Washington.
Emphasis:	Restoration of late-successional and riparian habitat components. Because most late-successional forests have already been harvested, requirements for marbled murrelet include: (1) surveying for and protecting all occupied murrelet sites; (2) retaining LS/OG1s, LS/OG2s, and owl additions (from the Scientific Panel on Late-Successional Forest Ecosystems, 1991) as Late-Successional Reserves within the Adaptive Management Areas. These reserves should be managed as stipulated for such reserves under these standards and guidelines. However, because much of the Adaptive Management Area is Late-Successional Reserve, primarily designated for a single species about which information is still being developed, the designation and/or standards and guidelines for Late-Successional Reserves may be reconsidered in the Adaptive Management Area plan. Relaxation of the Late-Successional Reserve status is not necessarily assumed; proposals will require careful analysis to assure consistency with the Endangered Species Act and National Forest Management Act requirements,

	new marbled murrelet information, and overall objectives of these standards and guidelines. Sites occupied by spotted owls (pairs or territorial singles) will be protected by establishing Late-Successional Reserves using procedures to delineate Reserved Pair Areas described on page D-16 of these standards and guidelines.
Name:	**Goosenest Adaptive Management Area, California**
Size:	172,900 acres
Ownership:	Klamath National Forest; potentially private lands.
Associated Communities:	Yreka, Montague, Dorris, and Hornbrook California; Siskiyou County, California.
Emphasis:	Development of ecosystem management approaches, including use of prescribed burning and other silvicultural techniques, for management of pine forests, including objectives related to forest health, production and maintenance of late-successional forest and riparian habitat, and commercial timber production.
Name:	**Hayfork Adaptive Management Area, California**
Size:	488,500 acres
Ownership:	Shasta-Trinity and Six Rivers National Forests and Yreka District Bureau of Land Management; potentially private and state lands.
Associated Communities:	Hayfork, California; Trinity and Humboldt Counties, California.
Emphasis:	Development, testing, and application of forest management practices, including partial cutting, prescribed burning, and low-impact approaches to forest harvest, which provide for a broad range of forest values, including commercial timber production and provision of late-successional and high quality riparian habitat. Maintain identified Late-Successional Reserves; conduct full watershed analysis in critical watersheds.
Name:	**Little River Adaptive Management Area, Oregon**
Size:	91,800 acres
Ownership:	Umpqua National Forest and Roseburg District Bureau of Land Management; potentially private and state lands.
Associated Communities:	Roseburg and Myrtle Creek, Oregon; Douglas County, Oregon.
Emphasis:	Development and testing of approaches to integration of intensive timber production with restoration and maintenance of high quality riparian habitat.

Name:	**Northern Coast Range Adaptive Management Area, Oregon**
Size:	250,000 acres
Ownership:	Siuslaw National Forest and Salem District Bureau of Land Management; with potential participation by the Oregon Department of Forestry and private landowners.
Associated Communities:	Tillamook, Willamina, and Grand Ronde, Oregon; Polk, Yamhill, Tillamook, and Washington Counties, Oregon.
Emphasis:	Management for restoration and maintenance of late-successional forest habitat, consistent with marbled murrelet guidelines noted below. Conduct watershed analysis of the Nestucca River drainage. Subsequently, the Oregon Department of Forestry will be invited to collaborate in development of a comprehensive strategy for conservation of the fisheries and other elements of biological diversity in the northern Oregon Coast Ranges. Because most late-successional forests have already been harvested, requirements for marbled murrelet include: (1) surveying for and protecting all occupied murrelet sites; (2) retaining LS/OG1s, LS/OG2s, and owl additions (from the Scientific Panel on Late-Successional Forest Ecosystems, 1991) as Late-Successional Reserves within the Adaptive Management Areas. These reserves should be managed as stipulated for such reserves under these standards and guidelines. However, because much of the Adaptive Management Area is Late-Successional Reserve, primarily designated for a single species about which information is still being developed, the designation and/or standards and guidelines for Late-Successional Reserves may be reconsidered in the Adaptive Management Area plan. Relaxation of the Late-Successional Reserve status is not necessarily assumed; proposals will require careful analysis to assure consistency with the Endangered Species Act and National Forest Management Act requirements, new marbled murrelet information, and overall objectives of these standards and guidelines. In the interim, the maximum age for thinning within Late-Successional Reserves in this Adaptive Management Area is 110 years. Northern spotted owl sites will be protected by establishing Reserved Pair Areas described on page D-16 of these standards and guidelines.
Name:	**Olympic Adaptive Management Area, Washington**
Size:	150,400 acres
Ownership:	Olympic National Forest and potentially Washington Department of Natural Resources, Indian Reservations, and private lands.
Associated Communities:	Jefferson, Clallam, Grays Harbor, and Mason Counties,

	Washington.
Emphasis:	Create a partnership with the Olympic State Experimental Forest established by Washington Department of Natural Resources. Develop and test innovative approaches at the stand and landscape level for integration of ecological and economic objectives, including restoration of structural complexity to simplified forests and streams and development of more diverse managed forests through appropriate silvicultural approaches such as long rotations and partial retention. All occupied marbled murrelet sites will be surveyed for and protected. LS/OG 1 and LS/OG 2 are to be managed as Late-Successional Reserve except in the Quinault Special Management Area. The Quinault Special Management Area included within this Adaptive Management Area will continue to be managed in accordance with Public Law 100-638 which designated the area.

Name:	**Snoqualmie Pass Adaptive Management Area, Washington**
Size:	212,700 acres
Ownership:	Wenatchee and Mt. Baker-Snoqualmie National Forests; Plum Creek Timber Company and other private landowners; state.
Associated Communities:	Cle Elum and Roslyn, Washington; Kittitas and King Counties, Washington.
Emphasis:	Development and implementation, with the participation of the U.S. Fish and Wildlife Service, of a scientifically credible, comprehensive plan for providing late-successional forest on the "checkerboard" lands. This plan should recognize the area as a critical connective link in north-south movement of organisms in the Cascade Range.

Delineation and Management of Reserved Pair Areas

The following standards and guidelines apply to Reserved Pair Areas specified for the Finney and Northern Coast Range Adaptive Management Areas.

1. For each Reserved Pair Area, delineate an area surrounding the owl activity center with an acreage at least equal to the median home range size for pairs in that province. Use data from the spotted owl study area that is most similar to the site being considered (see Table C-1 on page C-24 of these standards and guidelines). This area will be delineated to encompass as much suitable northern spotted owl habitat as possible, and the habitat will be as close to the owl activity center as possible. Reserve all suitable habitat in that area from timber harvest. If the habitat acreage does not at least equal the median amount found for owl pairs in the province (see Table C-2 on page C-25 of these standards and guidelines), additional habitat must be provided from the next best habitat available in the home range area, or by expanding the area to incorporate additional suitable northern spotted owl habitat. Use logical physical boundaries to facilitate management of the area.

Late-Successional Reserve management standards and guidelines for salvage and other multiple-use activities would generally apply in the suitable habitat portion of the Reserved Pair Area.

2. In the Reserved Pair Areas, allow for management of currently unsuitable areas consistent with Late-Successional Reserve management standards and guidelines for silviculture and salvage. Management of other multiple-use activities in the unsuitable habitat should follow standards and guidelines from current plans and draft plan preferred alternatives (see Section C of these standards and guidelines), which may allow some activities that would not be consistent with Late-Successional Reserve management standards and guidelines.

E. Implementation

Introduction

These standards and guidelines will be implemented on lands administered by the Forest Service and BLM within the range of the northern spotted owl. Under these standards and guidelines, management activities will meet National Environmental Policy Act (NEPA) requirements. Resource management activities will be subject to site-specific environmental analysis and appropriate public participation before they are conducted. This will involve analysis of cumulative and other environmental effects.

These standards and guidelines provide a strategy for the entire range of the northern spotted owl that includes land allocations, and standards and guidelines that cross physiographic provinces, and Forest Service and BLM administrative boundaries. Management activities will be in accordance with the land allocations, and standards and guidelines prescribed in these standards and guidelines.

Monitoring

Monitoring is an essential component of natural resource management because it provides information on the relative success of management strategies. The implementation of these standards and guidelines will be monitored to ensure that management actions are meeting the objectives of the prescribed standards and guidelines, and that they comply with laws and management policy. Monitoring will provide information to determine if the standards and guidelines are being followed (implementation monitoring), verify if they are achieving the desired results (effectiveness monitoring), and determine if underlying assumptions are sound (validation monitoring). Some effectiveness and most validation monitoring will be accomplished by formal research.

Monitoring results will provide managers with the information to determine whether a goal has been met, and whether to continue or to modify the management direction. Findings obtained through monitoring, together with research and other new information, will provide a basis for adaptive management changes to the selected alternative. The processes of monitoring and adaptive management share the goal of improving effectiveness and permitting dynamic response to increased knowledge and a changing landscape. The monitoring program itself will also not remain static. The monitoring plan will be periodically evaluated to ascertain whether the monitoring questions and standards are still relevant, and will be adjusted as appropriate. Some monitoring items may be discontinued and others added as knowledge and issues change with implementation.

Monitoring will be conducted at multiple levels and scales. These may include site-specific projects; designated areas such as Late-Successional Reserves, Riparian Reserves and the matrix; watersheds; administrative units; physiographic provinces or river basins; states; and the planning area or region. At the project level, monitoring will examine how well specific

standards and guidelines have been applied on the ground and how effectively they produce expected results. Monitoring at broader levels will measure how successfully projects and other activities have achieved the objectives, goals, and/or desired future conditions of those management areas. Monitoring will be conducted in a manner to accommodate the multiple levels and scales so that localized information may be compiled and considered in a broader regional context, and thereby address both local and regional issues.

The monitoring process will collect information on a sample basis. Monitoring could be so costly as to be prohibitive if it is not carefully and reasonably designed. It will not be necessary or desirable to monitor each standard and guideline of every project. Unnecessary detail and unacceptable costs will be avoided by focusing on key monitoring questions and proper sampling methods. The level and intensity of monitoring will vary, depending on the sensitivity of the resource or area and the scope of the management activity.

Monitoring will be coordinated among appropriate agencies and organizations in order to enhance the efficiency and usefulness of the results across a variety of administrative units and provinces. The approach will build on past and present monitoring work. Current monitoring plans will continue to be used where appropriate. In addition, specific monitoring protocols, criteria, goals, and reporting formats will be developed for these standards and guidelines, subject to review and guidance of the Regional Ecosystem Office. This guidance will be used to revise current monitoring plans and facilitate the process of aggregating and analyzing information on province or regional levels. Each administrative unit will continue to be responsible for the collection, compilation, and analysis of much of the data gained through monitoring activities. Province teams and the Regional Ecosystem Office will compile and analyze information at larger scales.

The monitoring program will involve a long-term commitment to gathering and evaluating data on environmental conditions and management implementation. In the Forest Service Pacific Northwest Region's Forest Monitoring and Evaluation Guide (1993), the Regional Forester stated, "All programs and projects should contain appropriate levels of monitoring funds in their costs ---or they should not be undertaken." Similar commitments to monitoring were made in the BLM western Oregon Draft Resource Management Plans and Environmental Impact Statements. For example, the Roseburg District Draft RMP/EIS states, "Timber sale volumes and associated programs will be reduced if annual funding is not sufficient to support the relevant actions assumed in these standards and guidelines, including mitigation and monitoring. The extent of the reduction will be based on the principle of program balance as envisioned in the plan." The current monitoring plans and commitments will remain in effect, although they will be revised to reflect the direction in these standards and guidelines.

Current plans and draft plan preferred alternatives require monitoring of resources, activities, or effects, and will continue to do so under all alternatives. The monitoring items or elements of the current plans and draft plan preferred alternatives include soil, water, air, vegetation, Wild and Scenic Rivers, visual resources, cultural resources, lands, minerals, range, wildlife, fisheries, timber, and special areas (e.g., Areas of Critical Environmental Concern and Research Natural Areas). These broad categories include monitoring for species listed under the Endangered Species Act, and activities subject to the Clean Water Act, Clean Air Act and other laws, regulations and policies. Where relevant, these current monitoring plans include monitoring objectives or questions, sampling methods or techniques, criteria, standards,

frequency of monitoring, evaluation and reporting procedures, and associated costs for each item or element. The various aspects of these current plans and draft plan preferred alternatives will remain in effect, and may be revised as appropriate to reflect the direction in these standards and guidelines. The results of monitoring and associated evaluations will continue to be shared with the public.

Monitoring and Evaluation Plan

Monitoring is an important component in implementing the ecosystem management strategy prescribed in these standards and guidelines. Due to the broad scope of ecosystem management, the monitoring effort emphasizes coordination and cooperation between various federal, state, and local agencies; American Indian tribes; and other interests.

Conceptual Framework

Scope

One of the challenges in designing a monitoring network is accommodating a variety of geographic scales (e.g., region, province, watershed, and site) and land ownerships in a manner that allows localized information to be compiled and placed in a broader, regional context.

Monitoring at any scale should:

* Detect changes in ecological systems from both individual and cumulative management actions and natural events
* Provide a basis for natural resource policy decisions
* Provide standardized data
* Compile information systematically
* Link overall information management strategies for consistent implementation
* Ensure prompt analysis and application of data in the adaptive management process
* Distribute results in a timely manner

Relationship to Adaptive Management Process, Research, and Watershed Analysis

Adaptive Management

Adaptive management is based on monitoring that is sufficiently sensitive to detect relevant ecological changes. In addition, the success of adaptive management depends on the accuracy and credibility of information obtained through inventories and monitoring.

Research

Close coordination and interaction between monitoring and research also are essential for the adaptive management process to succeed. Data obtained through systematic and statistically

valid monitoring can be used by scientists to develop research hypotheses related to priority issues. Conversely, the results obtained through research can be used to further refine the protocols and strategies used to monitor and evaluate the effectiveness of these standards and guidelines.

Watershed Analysis

Watershed analysis is a technically rigorous procedure with the purpose of developing and documenting a scientifically-based understanding of the ecological structure, functions, processes, and interactions occurring within a watershed (see Section B of these standards and guidelines). Watershed analysis is one of the principal analyses that will be used to meet the ecosystem management objectives of these standards and guidelines. Information from watershed analysis will be used in developing monitoring strategies and objectives.

Specific to monitoring and evaluation, the results and findings from watershed analysis are used to reveal the most useful indicators for monitoring environmental change, detect magnitude and duration of changes in conditions, formulate and test hypotheses about the causes of the changes, understand these causes and predict impacts, and manage the ecosystem for desired outcomes. Watershed analysis may result in additional monitoring questions. Watershed analysis will provide information about patterns and processes within a watershed and provide information for monitoring at that scale.

Components of the Monitoring and Evaluation Plan

The following framework focuses on the purposes for monitoring and proposes units of measure for the monitoring process.

Types of Monitoring

Three basic types of monitoring (implementation, effectiveness, and validation) will be applied to meet the objectives of these standards and guidelines and evaluate the efficacy of management practices. These three types of monitoring encompass a spectrum of monitoring, although some agencies use different terminology (e.g., trend, program evaluation).

Evaluation Questions

Each basic monitoring question can be expressed in more definite terms that will lead to more specific and directed measurements, as explained in the following text.

1. Implementation Monitoring

Implementation monitoring determines if the standards and guidelines were followed.

Implementation monitoring asks: Does the project and/or activity follow the direction in its management plan? Generally, implementation monitoring answers this question by determining if the standards and guidelines were correctly applied and followed.

Implementation monitoring considers three strategies: aquatic, terrestrial, and social and

economic. The components of these strategies include:

* Land allocations with specific boundaries
* Standards and guidelines for managing the land allocations, including Key Watersheds
* Watershed analysis
* Social and economic effects
* An adaptive management process, or learning framework

EVALUATION QUESTION: Are the aquatic, terrestrial, and social and economic resources being managed according to the standards and guidelines? To address this question, implementation monitoring is organized around land allocations, including types of activities allowed and projected conditions within each allocation. For the most part, this approach focuses on areas broader than specific project sites and restricts evaluation questions to the fundamental elements and components of these standards and guidelines. This broader scope is consistent with the ecosystem approach.

Key items that require specific monitoring include standards and guidelines of:

* Late-Successional Reserves
* Riparian Reserves
* Matrix
* Adaptive Management Areas
* Key Watersheds
* Watershed analysis

Late-Successional Reserves - Key items to monitor include:

* Timber harvests consistent with standards and guidelines and with Regional Ecosystem Office review requirements.
* Other management activities in the Late-Successional Reserve consistent with the standards and guidelines (e.g., prescribed fire and resulting emissions)
* Late-Successional Reserve assessment completed
* Management activities consistent with the Late-Successional Reserve assessment?

Riparian Reserves - Key items to monitor include:

* Width and integrity of Riparian Reserves (i.e., did the conditions that existed before management activities were conducted, change in ways that are not in accordance with the standards and guidelines?)
* Completion of watershed analysis prior to management activities where required
* Management activities in Riparian Reserves consistent with standards and guidelines

Matrix - Key items to be monitored include:

* Number and distribution of green trees left in harvested areas
* Snags, coarse woody debris
* Completion of watershed analysis prior to harvesting late-successional stands in watersheds with less than 15 percent late-successional forest remaining

* Prescribed burning and resulting emissions

Adaptive Management Areas - In Adaptive Management Areas, implementation evaluations of the standards and guidelines are required, including the requirement that an Adaptive Management Area plan be developed that establishes future desired conditions.

Key items to monitor in Adaptive Management Areas include:

* Completion of an Adaptive Management Area plan
* Measurement of conditions that have been agreed to in the Adaptive Management Area plan

Key Watersheds - Key items to monitor include:

* Watershed analysis prior to management activities
* Presence and timing of activities, including restoration projects
* No new roads in roadless areas
* No net increase in roads

In evaluating these questions, it is necessary to consider the roles Key Watersheds play in the Aquatic Conservation Strategy: refugia for at-risk stocks of anadromous salmonids and resident fish species, and sources of high quality water.

Watershed Analysis - Key item to monitor:

* Presence and timing of watershed analysis

Participation - Key items to monitor include:

* Involvement of multiple agencies, the public, and others in planning, implementing, and monitoring watershed analysis
* Opportunities to share information (applicable to all parties such as agencies, publics, communities)
* Identification of clear expectations and responsibilities
* Active partnerships

2. Effectiveness Monitoring

Effectiveness monitoring takes a step further by evaluating if application of the management plan achieved the desired goals, and if the objectives of these standards and guidelines were met. Success may be measured against the standard of desired future condition (sometimes referred to as reference condition). For example: Does the management of this resource maintain or restore the habitat for late-successional associated species?

Effectiveness monitoring will be undertaken at a variety of reference sites in geographically and ecologically similar areas. These sites will be located on a number of different scales, and will require the assistance of research statisticians to design an appropriate sampling regime.

Aquatic Ecosystems - Evaluation Question: Is the ecological health of the aquatic ecosystems recovering or sufficiently maintained to support stable and well-distributed populations of fish species and stocks?

While many factors influence aquatic ecosystem integrity, the variables to be monitored will include important habitat requirements identified by research and watershed analysis, and represent a range of values indicative of a healthy system. Variables may be surrogates representing other physical, biological, and/or ecological processes. Variables must be quantifiable and measurable in a repeatable way. A range of values for the variables measured will often result from the spatial and temporal variability found in a particular geographic area. Variables must describe conditions for functional, healthy aquatic ecosystems.

A core set of inventory elements will be collected for streams. Core inventory elements are the minimum set of variables to be collected at all scales. In all cases, standardized measurement and reporting protocols will be determined and are essential for consistency.

The health of aquatic and riparian ecosystems is dependent on water quality. Effectiveness monitoring that assesses the physical, chemical, and biological integrity of aquatic ecosystems is necessary to ensure conditions that will maintain water quality and support aquatic organisms. The Clean Water Act directs that states adopt water quality standards and criteria as necessary to protect designated beneficial uses. The standards and criteria of the Clean Water Act, which apply to both federal and nonfederal lands, will be used in effectiveness monitoring to determine if water quality and the health of aquatic systems are being maintained.

An emphasis of the monitoring of aquatic ecosystems will be to determine if actions are meeting the Aquatic Conservation Strategy objectives. The Aquatic Conservation Strategy emphasizes watershed health and maintenance of the natural physical and biological integrity of aquatic and riparian habitats and watersheds. As such, monitoring will include aquatic, riparian, and watershed conditions and the processes in a watershed to determine if they achieve Aquatic Conservation Strategy objectives.

The wide range of natural variation and complex interaction of individual stream habitat components (e.g., numbers of pools, pieces of large wood, percent fine sediment, and water temperature) makes it difficult to establish relevant quantitative management directives for stream habitat components. Because of individual stream and watershed diversity and differences, it is also difficult to quantify direct linkages among processes and functions outside the stream channel to in-channel conditions and biological components. Watershed-specific objectives, based on watershed analysis, are necessary to accommodate the natural variation among individual streams and watersheds.

Key monitoring items include:

* Pool frequency and quality (width, depth, and cover)
* Percent fine sediment
* Coarse woody debris (size and quantity)
* Water temperature

* Width-to-depth ratio
* Bank stability and lower bank angle

Biological Diversity, Late-Successional and Old-Growth Forest Ecosystems - The purpose and need of these standards and guidelines includes, ". . . to take an ecosystem approach to forest management; maintain and restore biological diversity as it applies to late-successional and old-growth forest ecosystems." This purpose includes forest processes as well as forest species.

Evaluation questions:

* Is the forest ecosystem functioning as a productive and sustainable ecological unit?
* Is the use of prescribed fire or fire suppression maintaining the natural processes of the forest ecosystem?
* Are desired habitat conditions for the northern spotted owl and the marbled murrelet maintained where adequate, and restored where inadequate?
* Are habitat conditions for late-successional forest associated species maintained where adequate, and restored where inadequate?
* Are desired habitat conditions for at-risk fish stocks maintained where adequate, and restored where inadequate?
* Is a functional interacting, late-successional ecosystem maintained where adequate, and restored where inadequate?
* Did silvicultural treatments benefit the creation and maintenance of late-successional conditions?
* Will the overall conditions of the watersheds and provinces continue to be productive over the long term?

To address these questions, chemical, physical, and biological indicators may need to be evaluated. A variety of variables can be monitored within each of these categories, and those selected will address the objectives of specific monitoring plans. The Clean Air Act directs federal agencies to monitor air pollution emissions from prescribed burning on federal lands in order to manage prescribed fire operations, verify air quality models, and assess air quality impacts.

Indicators for assessing the condition and trends include:

* Land use data
* Seral development and shifts of forest plant communities
* Locations and concentrations of plant diseases and insect infestations
* Amount of fuels by category
* Air quality
* Riparian and stream habitat condition by stream class
* Water quality

Key monitoring items include:

* Size, location, spatial distribution, species composition, and development of late-successional and old-growth forests
* Retention of snags and coarse woody debris

* Abundance and diversity of species associated with late-successional forest communities
* Species presence (to calculate species richness i.e., numbers and diversity)
* Percent of land area effected by exotic species
* Structure and composition
* Ecological processes
* Ecosystem functions
* Air quality

Use Levels of Natural Resources - Evaluation Question: Are predictable levels of timber and nontimber resources available and being produced?

Key items to monitor include:

* Timber harvest levels
* Special forest products (e.g., mushrooms, boughs, and ferns)
* Livestock grazing
* Mineral extraction
* Recreation
* Scenic quality (including air quality)
* Commercial fishing

Rural Economies and Communities - Evaluation Question: Are local communities and economies experiencing positive or negative changes that may be associated with federal forest management?

Key items to monitor include:

* Demographics
* Employment (timber, recreation, forest products, fishing, mining, and grazing)
* Government revenues (Forest Service and BLM receipts)
* Facilities and infrastructure
* Social service burden (welfare, poverty, aid to dependent children, and food stamps)
* Federal assistance programs (loans and grants to state, counties, and communities)
* Business trends (cycles, interest rates, and business openings and closings)
* Taxes (property, sales, and business)

Information for these items are collected by local, county, state, and federal agencies. This information will be used through the adaptive management process in future planning efforts. Because of the complexity of the relationships and the number of factors involved in these items, it is not possible to set specific or definite thresholds or values that would cause a reevaluation of the goals and overall strategy of these standards and guidelines.

American Indians and Their Culture - Evaluation Questions:

* For those trust resources identified in treaties with American Indians, what are their conditions and trends?
* Are sites of religious and cultural heritage adequately protected?
* Do American Indians have access to and use of forest species, resources, and places

important for cultural, subsistence, or economic reasons, particularly those identified in treaties?

Key monitoring items include:

* Condition and trends of the American Indian trust resources
* Effectiveness of the coordination or liaison to assure protection of religious or cultural heritage sites
* Adequacy of access to resources and to the vicinity of religious or cultural sites

3. Validation Monitoring

Validation monitoring determines if a cause and effect relationship exists between management activities and the indicators or resource being managed. Validation monitoring asks: Are the underlying management assumptions correct? Do the maintained or restored habitat conditions support stable and well-distributed populations of late-successional associated species?

Among the key set of assumptions that need to be validated is the relationships between habitat and populations. This requires a strong mix of inventory, monitoring, and research. Where knowledge gaps exist, research and/or inventory may be needed. Hypotheses can be proposed and tested through a combination of research and monitoring.

There is one primary evaluation question with regard to the northern spotted owl, the marbled murrelet, and at-risk fish stocks: Is the population stable or increasing?

Key items to monitor include:

* Northern spotted owls by physiographic province
* Marbled murrelets within their known nesting range
* Populations of fish species and stocks that are listed under the Endangered Species Act or are considered sensitive or at risk by land management agencies
* Rare species
* The relationship between levels of management intervention and the health and maintenance of late-successional and old-growth ecosystems

Special Monitoring Issues and Situations

Natural and Induced Environmental Stressors- A preliminary step in designing any monitoring scheme is development of a premonitoring assessment or baseline data to define the natural and management-induced environmental stressors which could act as outside influences on the outcome of monitoring. Examples of natural stressors are large-scale disease cycles, climatic cycles, and hot, expansive fires.

Management-induced stressors include habitat simplification; reduced habitat connectivity; high fire frequency resulting from fire suppression activities; forest diseases resulting from increased abundance of susceptible host species, loss of natural controls, and introduced

pests; acid precipitation; introduced competitor species; and changes in predator-prey dynamics.

Rare and Declining Species - Monitoring will address rare and declining species - Rare species are plants or animals classified as:

* Federally threatened or endangered species
* Federally proposed threatened or endangered species
* Federal Candidate Species
* State listed species
* Forest Service sensitive species
* BLM special status species
* Other infrequently encountered species not considered by any agency or group as endangered or threatened and classified in the FEMAT Report as rare

Monitoring for the type, number, size, and condition of special habitats over time will provide a good indication of the potential health of special habitat-dependent species. Although all special habitat areas do not support rare species, there is overwhelming evidence that special habitat types are closely related to the continued existence of certain rare species.

Since many rare species are associated with riparian habitats, the Riparian Reserve system offers potential protection. However, some rare species often are closely associated with or restricted to specific habitats that are outside Riparian Reserves.

It is also important to recognize that many species' habitat requirements vary considerably with age or size of the individual, and with the season. In some cases, more than one special habitat must be available for the species to successfully complete its life cycle.

While a stable special habitat type through time is not proof that a special habitat-dependent species population is stable, a decrease in a special habitat type does indicate increased risk to that species population.

Widely-dispersed species not associated with special habitats usually are associated with as yet undefined habitats within the general upland environment. Species with this type of distribution are difficult to assess and monitor. Efforts will be made to identify key habitat components of existing species locations.

A monitoring program for rare and declining species will help to:

* Identify perceived present and future threats
* Increase future possibilities of discovering new locations
* Track their status and trends over time
* Ensure that, in times of limited agency resources, priority attention will be given to species most at risk

Inventoried locations and special habitats of rare species will be registered in the multiagency GIS data base. This information will be shared with the State Natural Heritage Programs.

Steps to Develop an Interagency Monitoring Network

An interagency monitoring network will be developed and implemented using a common design framework and common indicators (or environmental measurements). This effort will build on existing agency research and monitoring efforts, and will be accomplished through the Research and Monitoring Committee established by the Memorandum of Understanding for Forest Ecosystem Management (see page E-16).

Specific indicators will be identified within each monitoring component or activity, along with protocols and methodologies for their measurement and quality assurance. A required level of detectability, data quality objectives, and precision will be established.

Based on these details, a design framework will be established that permits resulting data to be integrated through statistical or modeling approaches to provide quantitative inputs to the adaptive management process. The design framework will accommodate multiple scales and provide a consistent process for establishing monitoring sites, frequency of sampling, scale of sampling, and specific techniques for analysis and reporting.

This approach will ensure that consistent collection, integration, and evaluation of data occur among projects, watersheds, provinces, agencies, and over long time periods.

The following four-step process will be used to establish such a monitoring network:

1. Identify information needs and develop them into quantitative monitoring objectives.
2. Survey and evaluate existing monitoring activities relevant to monitoring objectives, focusing on both the indicators and design components.
3. Develop a comprehensive monitoring strategy including statistical designs, indicators, quality assurance plan, and sampling protocols.
4. Establish linkages between and among agencies and groups.

Adaptive Management

Overview

Adaptive management is a continuing process of action-based planning, monitoring, researching, evaluating and adjusting with the objective of improving the implementation and achieving the goals of these standards and guidelines. These standards and guidelines are based on current scientific knowledge. To be successful, it must have the flexibility to adapt and respond to new information. Under the concept of adaptive management, new information will be evaluated and a decision will be made whether to make adjustments or changes. These standards and guidelines incorporate the concept of adaptive management. This approach will enable resource managers to determine how well management actions meet their objectives and what steps are needed to modify activities to increase success or improve results.

The adaptive management process will be implemented to maximize the benefits and

efficiency of these standards and guidelines. This may result in the refinement of standards and guidelines, land-use allocations, or amendments to Forest and District Plans. Adaptive management decisions may vary in scale from individual watersheds, specific forest types, physiographic provinces, or the entire planning area or region. Adaptive management modifications that require changes to Regional Guides, or Forest or District Plans will be adopted following applicable regulatory procedures. However, many adaptive management modifications may not require changes to Regional Guides, or Forest or District Plans.

The adaptive management concept applies to all lands administered by the Forest Service and BLM. The 10 Adaptive Management Areas described in Section D of these standards and guidelines, however, are specific areas dedicated primarily to the objective of development and testing of new approaches for integration and achievement of ecological and economic health, and other social objectives.

Adaptive Management Process

This discussion outlines the general concepts of the adaptive management process. An understanding of what adaptive management means, and does not mean, is important because the concept applies to all land allocations. The concept of adaptive management is straightforward and simple: new information is identified, evaluated, and a determination is made whether to adjust the strategy or goals. Adaptive management is a process of action-based planning, monitoring, researching, evaluating, and adjusting with the objective of improving the implementation and achieving the goals of these standards and guidelines.

While the concept of adaptive management is straightforward, applying it to complex management strategies requires a more in-depth explanation. What new information would compel an adjustment to the management strategy? Who decides when and how to make adjustments? What are the definitions and thresholds of acceptable results?

The concept of adaptive management acknowledges the need to manage resources under circumstances that contain varying degrees of uncertainty, and the need to adjust to new information. Different management strategies, resources, and geographic locations have degrees of confidence that vary from very high to very low. Although there are acknowledged gaps in information, there is enough reliable information, field experience, and research data to proceed with implementation of these standards and guidelines. Although formal experimentation and research is an important part of the adaptive management process, application of these standards and guidelines does not constitute widespread experiments on large areas of public lands and resources.

Adaptive management is a process that can be associated with any particular management strategy. The process can be applied successfully to management with differing or changing goals. Adaptive management is designed to improve implementation and increase the likelihood of achieving the goals and objectives of these standards and guidelines.

Essential requirements for adaptive management include:

* Clear goals
* Clear standards and guidelines

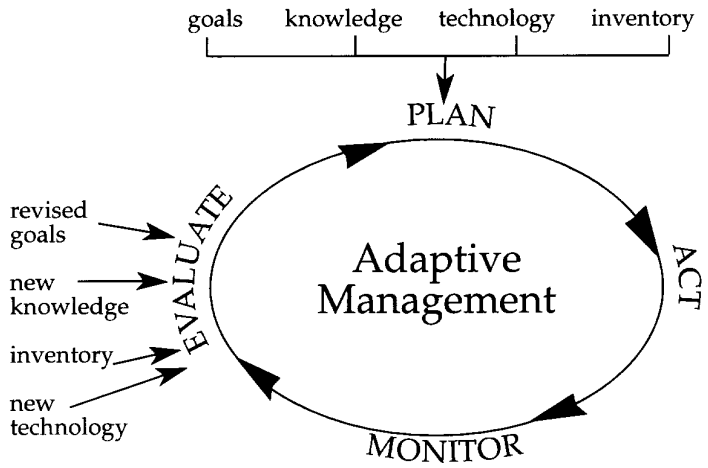
* A process for changing standards and guidelines or goals
* Monitoring and/or research aimed at adaptive management questions

The model displayed in Figure E-1 identifies the various steps, activities, and outline of a procedure for the adaptive management process. This diagram conveys the general concept, and is valuable as a starting point, for understanding adaptive management. A full and detailed explanation of the model, which is beyond the scope of this discussion, would require that each step be further broken down and defined.

The personnel, organizations, and members of the public who are involved at different steps of the adaptive management process will vary with the issue being considered. Issues may be very local; the organization and personnel involved may constitute a Ranger District or BLM Resource Area, or a work group within them. Issues may also have Forest or BLM District, province, or regional scope involving personnel and organizations from many levels, units, and/or agencies. Some issues, such as a technical engineering concern may involve very few professional disciplines, while others such as an ecosystem concern may involve a broad interdisciplinary approach. New information that could be the basis for changes through the adaptive management process may come from many different sources.

These concepts and model provide the means to answer questions about the what, who, and how of adaptive management.

Figure E-1. Basic adaptive management model



What new information would compel an adjustment of strategy? New information may come from monitoring, research, statutory or regulatory changes, organizational or process assessments, or any number of additional sources. During the evaluation process, personnel will analyze the information to determine the nature, scope, and importance of the new

information.

Who decides when to adjust the strategy or goals? The answer will depend on the character and scope of the issue. While public interest and participation will differ with the issue being considered, the authority to manage the public lands and resources remains by law with the land management agencies. On a local issue of limited scope, the decision maker may be the local manager. Broader issues and/or issues of regional scope may involve the Regional Forester, State Director, Regional Interagency Executive Committee, or Interagency Steering Committee.

How are adjustments made to strategies or goals? Any changes in federal land management decisions, whether arising from adaptive management or any other process, will be subject to existing regulatory and statutory requirements such as the National Environmental Policy Act (NEPA). Most adjustments will be within the realm of administrative change, while others may need to meet formal NEPA requirements. A few adjustments may be beyond the scope of agency authority and would require statutory changes.

The adaptive management process can be used for large-scale, highly-complex problems such as ecosystem management, localized technical problems, and organizational problems. Fundamentally, adaptive management is the application of the scientific principle of feedback and adjustment, of identifying and evaluating new information, and adjusting to improve implementation and to achieve the goals and the objectives of these standards and guidelines.

Interagency Coordination

These standards and guidelines call for a high level of coordination and cooperation among agencies during implementation. Issues will be discussed, objectives clarified, and problems solved in collaboration. The Memorandum of Understanding for Forest Ecosystem Management established a framework for coordinated implementation of these standards and guidelines. The parties to this memorandum of understanding are the Director of the White House Office on Environmental Policy, the Secretary of the Interior, the Secretary of Agriculture, the Administrator of the Environmental Protection Agency, and the Under Secretary of Commerce for Oceans and Atmosphere.

Interagency Groups

The following interagency groups have been established to develop, monitor, and oversee the implementation of these standards and guidelines. These interagency groups are identified in the Memorandum of Understanding for Forest Ecosystem Management. They do not substitute or alter the line of authority of individual agencies (see Figure E-2).

Interagency Steering Committee

The Interagency Steering Committee will establish overall policies governing the prompt, coordinated and effective implementation of this plan by all relevant federal agencies, and address and resolve issues referred to it by the Regional Interagency Executive Committee. The committee consists of representatives from the offices of the Secretary of the Interior, Secretary of Agriculture, Administrator of the Environmental Protection Agency, Under Secretary of Commerce for Oceans and Atmosphere, and is chaired by the Director of the

White House Office on Environmental Policy or the director's designee. A White House appointed representative of the Interagency Steering Committee serves as interagency coordinator to provide general oversight and guidance of regional activities.

Regional Interagency Executive Committee (RIEC)

This group consists of the Pacific Northwest federal agency heads of the Forest Service, Bureau of Land Management, Fish and Wildlife Service, National Marine Fisheries Service, Bureau of Indian Affairs, and Environmental Protection Agency. Other participants on this committee include: the National Park Service; Soil Conservation Service; the States of Washington, Oregon, and California; and three tribal organizations. The RIEC will serve as the senior regional entity to assure the prompt, coordinated, and successful implementation of these standards and guidelines. It serves as the principal conduit for communications between the Interagency Steering Committee and the agencies in the planning area. It will be responsible for implementing the directives of the Interagency Steering Committee, reporting regularly on implementation progress, and referring issues relating to the policies or procedures for implementing these standards and guidelines to the Interagency Steering Committee. The RIEC's policy and planning decisions and recommendations will be made collaboratively, and will be consistent with federal and state laws, federal trust responsibilities, and government-to-government relationships with American Indian tribes. The RIEC provides direction to the Regional Ecosystem Office, province teams, and the Research and Monitoring Committee (see below). The RIEC also works with the Regional Community Economic Revitalization Team (RCERT) to develop criteria and priorities for ecosystem investment opportunities.

Regional Ecosystem Office (REO)

This office provides staff work and support to facilitate RIEC decision making and prompt interagency issue resolution in support of implementation of these standards and guidelines. It will also be responsible for evaluation of major modifications arising from the adaptive management process and will coordinate the formulation and implementation of data standards. This office reports to the RIEC and will be responsible for developing, evaluating, and resolving consistency and implementation issues with respect to specific topics including, but not limited to, Geographic Information Systems (GIS), pilot watershed analyses, restoration guidelines, Endangered Species Act requirements, adaptive management guidelines, monitoring and research.

Although the standards and guidelines variously refer to the Regional Ecosystem Office for reviews and other actions, it is understood that the Regional Ecosystem Office recommends to the Regional Interagency Executive Committee who has responsibility for the decisions. The decision-making responsibility of the Regional Interagency Executive Committee described in these standards and guidelines is generally limited to interpretation of standards and guidelines. Individual land management and consultation agencies retain the decision-making authority that is vested in them by statute.

Research and Monitoring Committee

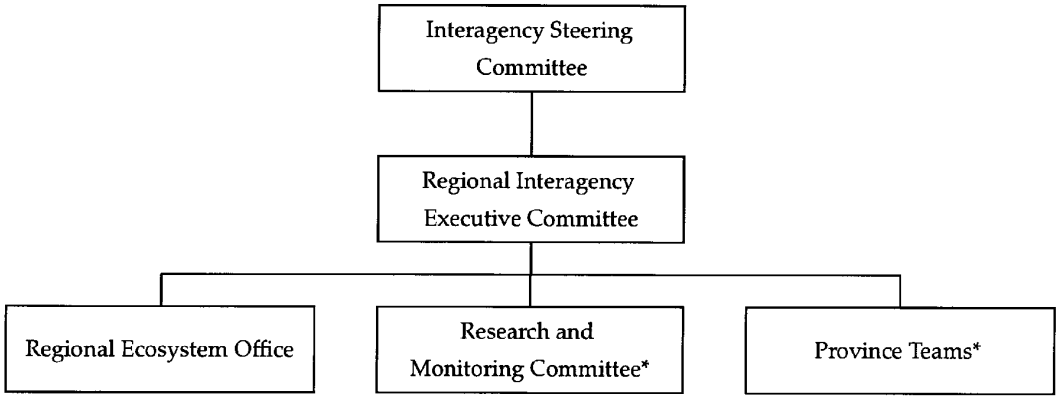
This committee, comprised of full time scientists in the Regional Ecosystem Office and a standing group of agency liasons provides recommendations to the RIEC on implementation of these standards and guidelines through monitoring and research plans. The Research and

Monitoring Committee will review and evaluate ongoing research; develop a research plan to address critical natural resource issues; address biological, social, economic, and adaptive management research topics; and develop and review scientifically credible, cost efficient monitoring plans; and facilitate scientific review of proposed changes to the standards and guidelines. The Research and Monitoring Committee is under the direction of, and is responsible to, the Regional Interagency Executive Committee, and reports to the RIEC through the Regional Ecosystem Office.

Province Teams

These teams consist of representatives of federal agencies, states, American Indian tribes, and others. These teams will provide or coordinate analyses at the province level that can provide the basis for amendments to Forest and District Plans and will provide monitoring reports for provinces. Province teams will also encourage and facilitate information exchange and complementary ecosystem management among federal and nonfederal land managers. The Interagency Steering Committee and the Regional Interagency Executive Committee will continue to develop and refine the appropriate role for these teams at the level of physiographic provinces, Adaptive Management Areas, or specific watersheds.

Figure E-2. Relationships of interagency groups



* Although they recieve direction from the Regional Interagency Executive Committee, the Research and Monitoring Committee and Province Teams will report to the Regional Interagency Executive Committee through the Regional Ecosystem Office.

Planning

Assessments of ecosystem issues may require analysis beyond existing political or administrative boundaries. At the same time, current statutes, regulations and administrative responsibilities governing federal land management agencies must recognize, and are based upon, political and administrative boundaries. A major challenge in ecosystem management is providing a planning regime in which these fundamentally different perspectives can be integrated, a task that is especially difficult in the current statutory and regulatory planning

structure.

As experience is gained in ecosystem management, statutes and regulations may be changed to provide for different decision points. Until statutes and regulations are changed, province-level "plans" or considerations will consist of analysis and coordination to help interpret or amend existing Forest Plans or District Resource Management Plans. The area delineation appropriate to this planning structure is shown in Figure E-3, Province planning and analysis areas.

The term "planning" is often used colloquially to include assessments, analysis, or other processes that are related to, but distinct from, the planning decision-making process defined by laws and regulations. Decisions on standards and guidelines and land allocations will be adopted using the planning structure of existing regulations, which provides for three levels of plans for the Forest Service (Regional Guides, Forest Plans and project plans) and two levels of plans for the BLM (District Plans and activity plans). Decisions to change land allocations, or 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.

The FEMAT Report and the SEIS for these standards and guidelines illustrate how different types of planning-related activities can be used to practice ecosystem management by assessing relevant issues from a variety of perspectives and facilitating a coordinated implementation of these standards and guidelines. Ecological "assessments" or "analyses" are aimed at viewing management issues from ecological perspectives, such as described in Ecological Principles for Management of Late-Successional Forests in Section B of these standards and guidelines. Assessments may include other perspectives relevant to land management decision making such as economic or social factors. These standards and guidelines also propose coordinating planning activities across administrative boundaries, such as province plans, Adaptive Management Area plans and Late-Successional Reserve assessments. Decisions will be made to adopt, revise or amend appropriate decision documents only when procedures for public participation and decision making have been followed.

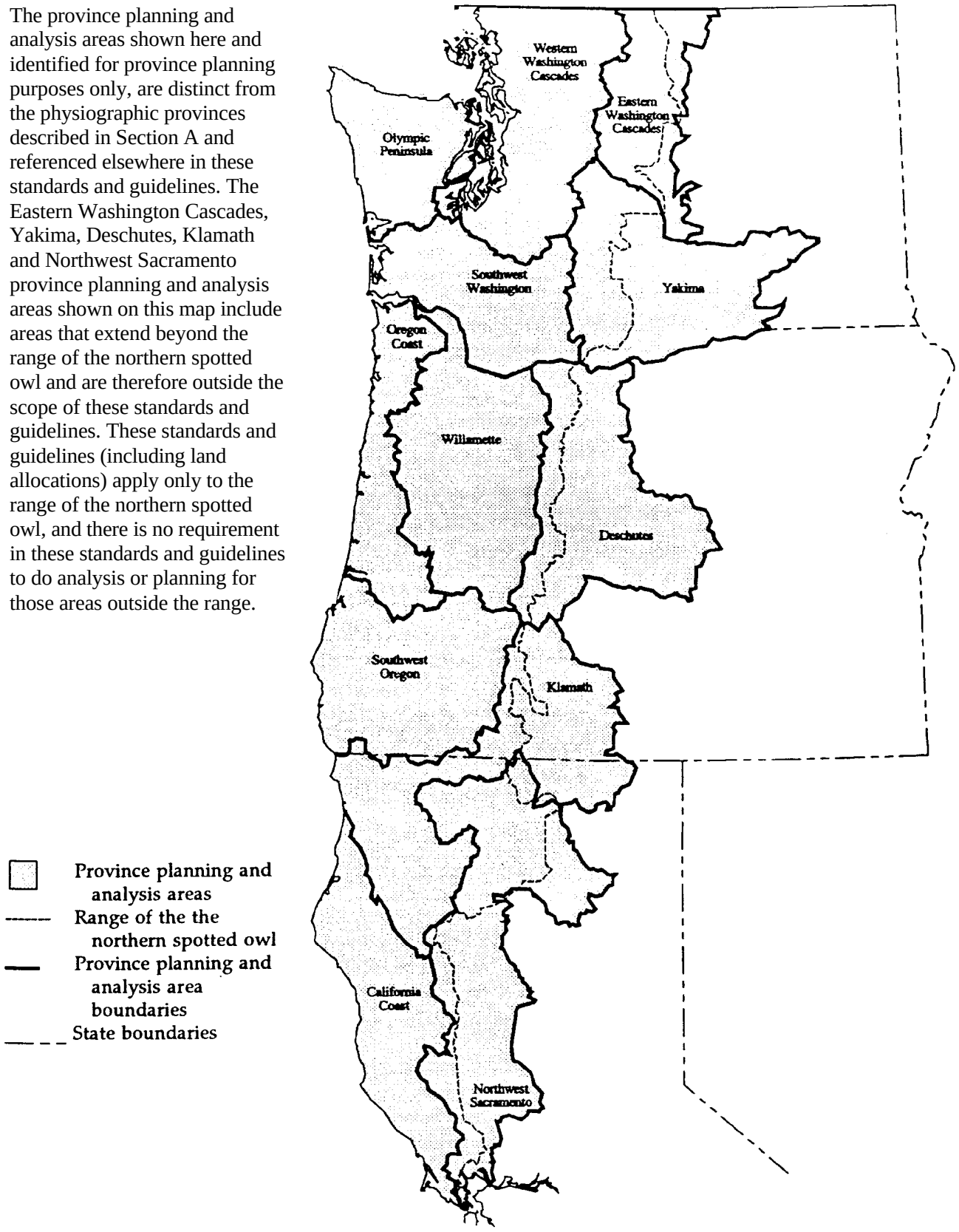
The Record of Decision (with these standards and guidelines) amends existing Forest Service and BLM management plans. The responsibility for implementing these standards and guidelines rests with the managers of the Forest Service and BLM units in the planning area. The interagency structure identified in the Memorandum of Understanding for Forest Ecosystem Management designates the Interagency Steering Committee and Regional Interagency Executive Committee to assure the coordinated and effective implementation of these standards and guidelines, and to support the development and implementation of future or revised Land and Resource Management Plans. Changes or adjustments to these standards and guidelines may be made through amendments to those plans required by regulations as described above. The authority to change or amend those plans remains as specified in the applicable regulations. The amendments will be reviewed by the Regional Interagency Executive Committee to assure consistency with the objectives of these standards and guidelines.

Key Watersheds as a Non-interchangeable Component of PSQ

As Forest and District Plans are completed or amended in the future to reflect the addition of

Figure E-3. Province planning and analysis areas.

The province planning and analysis areas shown here and identified for province planning purposes only, are distinct from the physiographic provinces described in Section A and referenced elsewhere in these standards and guidelines. The Eastern Washington Cascades, Yakima, Deschutes, Klamath and Northwest Sacramento province planning and analysis areas shown on this map include areas that extend beyond the range of the northern spotted owl and are therefore outside the scope of these standards and guidelines. These standards and guidelines (including land allocations) apply only to the range of the northern spotted owl, and there is no requirement in these standards and guidelines to do analysis or planning for those areas outside the range.



these standards and guidelines, units should disaggregate and display Probable Sale Quantity (PSQ) as a non-interchangeable component between Key and non-Key Watersheds.

Although no difference in PSQ between these two categories could be identified in the SEIS, it is recognized that the Aquatic Conservation Strategy objectives and the requirement to do watershed analysis before management activities can take place implies a higher level of uncertainty and a potential for future change with respect to future levels of sale offerings within key Watersheds. In this way, offerings affected by any changes or concerns in Key Watersheds, or dependent upon Key Watershed-related funding such as that needed for Watershed Analysis, can be identified and monitored.

Watershed Analysis

Watershed analysis is one of the principal analyses that will be used to meet the ecosystem management objectives of these standards and guidelines. Watershed analyses will be the mechanism to support ecosystem management described in these standards and guidelines at approximately the 20 to 200 square mile watershed level. Watershed analysis, as described here, focuses on its broad role in implementing the ecosystem management objectives prescribed by these standards and guidelines. The use of watershed analysis, as described in the Aquatic Conservation Strategy (starting on page B-9 of these standards and guidelines), is a more narrow focus and is just one aspect of its role.

Watershed analysis will focus on collecting and compiling information within the watershed that is essential for making sound management decisions. It will be an analytical process, not a decision-making process with a proposed action requiring NEPA documentation. It will serve as the basis for developing project-specific proposals, and determining monitoring and restoration needs for a watershed. Some analysis of issues or resources may be included in broader scale analyses because of their scope. The information from the watershed analyses will contribute to decision making at all levels. Project-specific NEPA planning will use information developed from watershed analysis. For example, if watershed analysis shows that restoring certain resources within a watershed could contribute to achieving landscape or ecosystem management objectives, then subsequent decisions will need to address that information.

The results of watershed analyses may include a description of the resource needs, issues, the range of natural variability, spatially explicit information that will facilitate environmental and cumulative effects analyses to comply with NEPA regulations, and the processes and functions operating within the watershed. Watershed analysis will identify potentially disjunct approaches and conflicting objectives within watersheds. The information from watershed analysis will be used to develop priorities for funding and implementing actions and projects, and will be used to develop monitoring strategies and objectives. The participation in watershed analysis of adjacent landowners, private citizens, interest groups, industry, government agencies, and others will be promoted.

Watershed analysis will be an ongoing, iterative process that will help define important resource and information needs. As watershed analysis is further developed and refined, it will describe the processes and interactions for all applicable resources. It will be an information-gathering and analysis process, but will not be a comprehensive inventory process. It will build on information collected from detailed, site-specific analyses. Information gathering and analysis will be related to management needs, and not be

performed for their own sake. While generally watershed analysis will organize, collate, and describe existing information, there may be critical information needs that must be met before completing the analysis. In those instances, the additional information will be collected before completing the watershed analysis. In other instances, information needs may be identified that are not required for completing the watershed analysis but should be met for subsequent analyses, planning, or decisions.

Watershed analysis is a technically rigorous procedure with the purpose of developing and documenting a scientifically-based understanding of the ecological structures, functions, processes and interactions occurring within a watershed (see the Aquatic Conservation Strategy in Section B of these standards and guidelines). The scope of the analysis for implementing the ecosystem management objectives of these standards and guidelines may include all aspects of the ecosystem. Some of these aspects include beneficial uses; vegetative patterns and distribution; flow phenomena such as vegetation corridors, streams, and riparian corridors; wind; fire (wild and prescribed fire, and fire suppression); wildlife migration routes; dispersal habitat; terrestrial vertebrate distribution; locally significant habitats; human use patterns throughout the ecosystem; cumulative effects; and hydrology. The number and detail of these aspects considered will depend on the issues pertaining to a given watershed.

Information Resource Management

An interagency Geographic Information System (GIS) data base will be developed to coordinate efforts in the collection of data and the development of information to support planning within watersheds, provinces, and the region.

Consultation and Coordination Process

Consultation under the Endangered Species Act will emphasize an integrated ecosystem approach. This will include involving the Fish and Wildlife Service and the National Marine Fisheries Service when the land management agencies begin to develop their plans for a particular area so their views can be made known. Concurrent coordination with the Environmental Protection Agency on water quality standards and beneficial use requirements of the Clean Water Act will minimize planning and project impacts.

The analysis and planning efforts used in implementing ecosystem management on lands administered by the BLM and Forest Service will comply with existing policies and laws relating to American Indian off-reservation trust resources. The analysis will identify Indian trust resources that would be effected, and identify potential conflicts between proposed federal actions and treaty rights or tribal plans and policies. Consultation on a government-to-government basis will be conducted early in the planning process with any effected tribes. Conflicts will be resolved consistent with the Federal Government's trust responsibilities.

F. References, Index, Glossary

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Index

Glossary

Selected terms important to the understanding of the standards and guidelines and not otherwise defined within these standards and guidelines. Additional glossary terms are included with the Final SEIS for these standards and guidelines.

Known Pairs or Resident Singles [owls] - Northern spotted owl activity centers identified as of January 1, 1994.

Local Knowledge - Refers to the planning unit level. Retaining administratively withdrawn areas based on "local knowledge" is a Forest Plan or District Resource Management Plan-level decision.

LS/OG 1s and 2s - Most significant old-growth, and significant old-growth, as mapped by the Scientific Panel on Late-Successional Forest Ecosystems, Johnson et. al. 1991, and maintained in the electronic data base for these standards and guidelines (see Section A). These are mapped units, and therefore do not change over time.

Coarse Woody Debris (CWD) - 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. FEMAT

Fish-Bearing Streams - Any stream containing any species of fish for any period of time.

Green Tree Retention - A stand management practice in which live trees as well as snags and large down wood are left as biological legacies within harvest units to provide habitat components over the next management cycle.

Old-Growth Forest - A forest stand usually at least 180-220 years old with moderate to high canopy closure; a multilayered, multispecies 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. FEMAT

Spotted Owl Additions - Areas mapped by the Scientific Panel on Late-Successional Forest Ecosystems that when added to LS/OG 1s, provided a level of protection for spotted owls comparable to that of the Interagency Scientific Committee's 1990 Conservation Strategy for the Northern Spotted Owl.

Standards and Guidelines - The rules and limits governing actions, and the principles specifying the environmental conditions or levels to be achieved and maintained.

Regional Ecosystem Office - Although the standards and guidelines refer to the Regional Ecosystem Office for reviews and other actions, it is understood that the Regional Ecosystem Office typically recommends to the Regional Interagency Executive Committee who has responsibility for the decisions. These groups and their responsibilities are described in Section E of these standards and guidelines and in the Memorandum of Understanding included in Appendix E of the Final SEIS.