

Chapter III

Option Development and Description

Table of Contents

[Back to Home Page](#)

[I. Development](#)

[A. Initial Rating of the Options](#)

[B. Other Options](#)

[C. Selection of the Options for Refined Assessment](#)

[II. Descriptions of the Options](#)

[A. Option 1](#)

[B. Option 2](#)

[C. Option 3](#)

[D. Option 4](#)

[E. Option 5](#)

F. Option 6

G. Option 7

H. Option 8

I. Option 9

J. Option 10

III. Adaptive Management Areas

A. Selection of the Adaptive Management Areas

B. Technical Objectives

C. Social Objectives

D. Agency Approaches and Management Oversight

E. Funding the Adaptive Management Area Program

F. Timber Supply

G. Education

H. Descriptions of the Adaptive Management Areas

IV. Guidelines for Silvicultural Activities and Salvage in Late-Successional Reserves

A. Guidelines for silviculture

B. Guidelines to reduce risks of large-scale disturbance

[C. Guidelines for salvage](#)

[V. References](#)

[Back to Home Page](#)

Development

Commencing with the first efforts in the 1970s, management plans for northern spotted owls and forest ecosystems have gone through a gradual evolution. Many of these plans were based on the hypothesis that providing sufficient habitat to ensure the continued existence of northern spotted owls would also provide for all other species associated with old-growth forests. However, the plans became increasingly complex as we gathered more information about both spotted owls and other species and about the entire late-successional forest ecosystem. In addition, instead of plans that would encompass the entire range of the northern spotted owl, some plans considered only specific areas such as the ecosystem plan for the Oregon Coast Range (Noss 1992) or the plan for the California subspecies of the spotted owl only in the Sierra Nevada Mountains (Verner et al. 1992).

In our current assignment, we considered all such plans--a total of 48--for application throughout the range of the northern spotted owl (table 3-1). Other proposed plans represent slight variations of these 48, but we believe the 48 plans represent a full range of options.

In our consideration of these plans we reviewed whether any risk assessments or viability assessments had been made for five criteria: (1) viability of northern spotted owls, (2) viability of marbled murrelets, (3) viability of at-risk fish species and stocks, (4) viability of other species associated with old-growth forests, and (5) maintaining an interacting late-successional/old-growth forest ecosystem. These criteria were based on the objectives expressed in the letter of instruction to the Forest Ecosystem Management Assessment Team from the White House (see Preface).

Table 3-1. Existing options considered with the Forest Ecosystem Management Assessment Team ratings for the five biological criteria.

Option or Plan	Rating for Spotted Owls	Rating for Marbled Murrels	Rating for At-Risk Fish Stocks	Rating for Other Species Closely Associated with Old-Growth Forests	Rating for Providing interacting Old-Growth Forest Ecosystem
1. Regional guide interim direction (USDA 1984)	Low	Low	Low	Low	Low
2. 1000 Acre spotted owl habitat area network (USDA 1988)	Low	Low	Low	Low	Low
3. Spotted owl habitat network of varying sized reserves 1000-3000 acres (USDA 1988)	Medium	Low	Low	Low	Low
4. Spotted owl habitat network of 2500-4500 acre reserves (USDA 1988)	Low-Medium Low	Low	Low	Low	Low
5. BLM management framework plans and ODF&W agreement areas (USDA 1988)	Low	Low	Low	Low	Low
6. Forest Plan	Low	Low	Low	Low	Low
7. Interagency Scientific Committee's conservation strategy (Thomas et al. 1990)	High	Medium-Low	Low	Medium-Low	Medium-Low
8. Jamison strategy (USDI 1990)	Medium	Low	Low	Low-Medium Low	Low-Medium Low

Option or Plan	Rating for Spotted Owls	Rating for Marbled Murrels	Rating for At-Risk Fish Stocks	Rating for Other Species Closely Associated with Old-Growth Forests	Rating for Providing interacting Old-Growth Forest Ecosystem
9. Johnson et al. (1991) Alt. 5A	Medium	Medium	Low	Medium	Medium
10. Johnson et al. (1991) Alt. 5B	Medium	Medium	Low	Medium	Medium
11. Johnson et al. (1991) Alt. 5C	Medium High	Medium High	Medium low	Medium High	Medium High
12. Johnson et al. (1991) Alt. 6A	High	Medium	Medium Low	Medium	Medium
13. Johnson et al. (1991) Alt. 6B	High	Medium	Medium Low	Medium	Medium
14. Johnson et al. (1991) Alt. 6C	High	Medium High	Medium Low	Medium	Medium High
15. Johnson et al. (1991) Alt. 7A	Medium	Medium	Medium	Medium	Medium
16. Johnson et al. (1991) Alt. 7B	Medium	Medium	Medium High	Medium High	Medium High
17. Johnson et al. (1991) Alt. 7C	Medium High	Medium High	High	Medium High	High
18. Johnson et al. (1991) Alt. 8A	High	Medium	Medium High	Medium High	Medium
19. Johnson et al. (1991) Alt. 8B	High	Medium	Medium High	Medium High	Medium High
20. Johnson et al. (1991) Alt. 8C	High	Medium High	High	High	High
21. Johnson et al. (1991) Alt. 9A	High	Medium	Medium Low	Medium	Medium
22. Johnson et al. (1991) Alt. 9B	High	Medium	Medium	Medium	Medium High
23. Johnson et al. (1991) Alt. 9C	High	Medium High	Medium	Medium High	High
24. Johnson et al. (1991) Alt. 10A	High	Medium	Medium High	Medium High	Medium High
25. Johnson et al. (1991) Alt. 10B	High	Medium	High	Medium High	High

Option or Plan	Rating for Spotted Owls	Rating for Marbled Murrels	Rating for At-Risk Fish Stocks	Rating for Other Species Closely Associated with Old-Growth Forests	Rating for Providing interacting Old-Growth Forest Ecosystem
26. Johnson et al. (1991) Alt. 10C	High	Medium High	High	High	High
27. Johnson et al. (1991) Alt. 11A	High	Medium High	Medium Low	High	Medium High
28. Johnson et al. (1991) Alt. 11B	High	Medium High	Medium	High	High
29. Johnson et al. (1991) Alt. 11C	High	High	Medium	High	High
30. Johnson et al. (1991) Alt. 12A	High	Medium High	Medium High	High	Medium High
31. Johnson et al. (1991) Alt. 12B	High	Medium High	High	High	High
32. Johnson et al. (1991) Alt. 12C	High	High	High	High	High
33. Johnson et al. (1991) Alt. 13A	High	High	Medium Low	High	Medium High
34. Johnson et al. (1991) Alt. 13B	High	High	Medium	High	High
35. Johnson et al. (1991) Alt. 13C	High	High	Medium	High	High
36. Johnson et al. (1991) Alt. 14A	High	High	High	High	High
37. Johnson et al. (1991) Alt. 14B	High	High	High	High	High
38. Johnson et al. (1991) Alt. 14C	High	High	High	High	High
39. The multi-resource strategy (National Forest Products Assn. 1991)	Low	Low	Low	Low	Low
40. ISC strategy plus critical habitat units (USDA 1992)	High	Medium	Low	Medium Low	Medium Low

Option or Plan	Rating for Spotted Owls	Rating for Marbled Murrels	Rating for At-Risk Fish Stocks	Rating for Other Species Closely Associated with Old-Growth Forests	Rating for Providing interacting Old-Growth Forest Ecosystem
41. Preservation plan for the northern spotted owl (Lujan et al. 1992)	Low	Low	Low	Low	Low
42. BLM preferred alternative DRMPs (USDI 1992a)	Medium	Medium Low	Medium Low	Medium	Medium
43. California spotted owl plan (Verner et al. 1992)	Low	Low	Low-Medium Low	Medium Low	Medium Low
44. Final Draft Recovery Plan Northern Spotted Owl (USDI 1992c)	High	Medium	Low-Medium	Medium Low	Medium Low
45. Scientific Analysis Team Plan (Thomas et al. 1993)	High	High	High	High	Medium High
46. New BLM preferred alternative (USDI 1993)	Medium High	Medium High	Medium High	Medium - Medium High	Medium
47. Reed Noss Plan (Noss 1992)	-- Not rated because believed to be similar to Alt. 14C in Johnson et al. (1991) --				
48. No cutting on federal lands	High	High	High	High	High

Initial Rating of the Options

Members of the Forest Ecosystem Management Assessment Team met on April 8, 1993, to review the existing assessments for the five major biological criteria for each option being considered, and either to validate existing ratings, update the rating, or provide a rating where no assessment had been done.

Team members present were given brief descriptions of the options being considered, the standards and guidelines of the options, a list of the five biological criteria and objectives, and a five-class rating scale with definitions of the ratings. The objective of the team effort was to rate the options at a coarse scale based on members' professional judgment of how well the options

met the five biological criteria. The coarse ratings of the Forest Ecosystem Management Assessment Team are displayed in table 3-1.

Other Options

From April 9 to April 16, the Forest Ecosystem Management Assessment Team met to develop other innovative options and select a set of options that would receive further, more refined, analysis. Six additional options were developed, including five hybrids containing mixtures of elements from assorted existing plans. Another option consisted of a long (300-350 year) timber harvest rotation with no Late-Successional Reserves. Each of these new options was rated using the same process described above.

Selection of the Options for Refined Assessment

The Team considered 29 of the existing options, the five hybrid options, and the new long-rotation option for selection for full analysis. The following criteria were used to make the selections. The Team's instructions (see Preface) are reflected in these criteria.

1. The option must be feasible to be analyzed within the time frame available to the team.
2. The majority of the options should have a relatively high probability of successfully meeting the objectives for each of the five biological criteria.
3. At least one of the options must have a medium probability rating.
4. At least one of the options must have a very high probability rating.
5. Options selected should include at least one developed from an approach focusing on species and at least one developed from an approach focusing on old-growth forest stands.
6. The economic and social implications of the options should be considered.

The process for the selection of options for further analysis was iterative. Eventually eight options were selected for full analysis. These eight appeared to pass a first screen for the five biological criteria and represented a range of probability ratings and social and economic values. Additional adjustments were made to some of the options during evaluation by the Team. Of the eight options initially selected for full analysis, one was dropped. Three other options were added resulting in a total of ten options. Tables 3-2, 3-3, and 3-4 provide summarized information on the options.

Descriptions of the Options

Each of the Options analyzed includes late successional forests found in National Parks, Wilderness Areas, Research Natural Areas, and other areas reserved by Congressional authority. Such designated areas are referred to in this report as "Congressionally Withdrawn Areas." Because they are constant in all the options, they are not displayed in the descriptions. Other areas have been withdrawn from timber harvest by the federal agencies. We call these Administratively Withdrawn Areas. Examples of such areas include roadless recreation areas, and lands that have unstable soils. While the extent of these areas vary by option (because the prescription for reserves supersede them) the Administratively Withdrawn Areas are not discussed option-by-option. This is because they are not specifically prescribed in the options, and these allocations could be changed by the agencies.

Fundamental to the options are late-successional forest areas where timber cutting will be restricted to some extent. These late-successional forest areas are categorized based on the levels of silvicultural treatment prescribed or allowed. Late-Successional Reserves are those areas where cutting of trees is generally limited to silvicultural treatment of young forests to attain or accelerate development of late-successional conditions. If young forest stands are moving toward such conditions, cutting is not appropriate. Managed Late-Successional Areas are where a wider application of silvicultural prescriptions may be employed to cut trees but where the primary objective remains the maintenance of late successional forests on a landscape scale. See General Ecological Basis for Forest Management for additional discussion of the areas.

Riparian buffers, delineated along perennial and intermittent streams and wetlands, also create reserves where silvicultural treatment is limited. These buffers are called Riparian Reserves. Cutting trees in the Riparian Reserves is generally precluded unless such cutting will meet riparian objectives. Even within Late-Successional Reserves or Managed Late-Successional Areas, the standards and guidelines for Riparian Reserves must be followed along perennial and intermittent streams when silvicultural treatments take place. The Aquatics Ecosystem section of this report provides details regarding the standards and guidelines and objectives for Riparian Reserves.

Under all options, except Options 7 and 8, no roads are to be constructed in roadless areas (as identified in federal agency forest management plans) inside Key Watersheds. Key Watersheds are areas designated for special protection of either water quality or aquatic species. In all other watersheds road construction in roadless areas will not occur until a watershed analysis is completed and such analysis indicates that construction is compatible with riparian and other ecological objectives.

Table 3-2. Summarized description of the options for forest ecosystem management. (See explanatory notes for origin of the Late-Successional Reserves, Managed Late-Successional Areas.)

Option Number	Late-Successional Reserves	Managed Late-Successional Areas	Riparian Reserve Strategy ^a	Matrix
Option 1	LS/OG1s; plus LS/OG2s; plus LS/OG3s; plus owl additions; plus occupied marbled murrelet sites; plus buffers for other species associated with old-growth forests. No timber harvest.	Buffers for other species associated with old-growth forest.	Riparian 1.	50-11-40 rule plus retention of six large green trees, two large logs, and two snags per acre. Timber harvest rotations of 180-years plus 10 percent of the matrix in stands over 180-years.
Option 2	LS/OG1s; plus LS/OG2s; plus owl additions; plus occupied marbled murrelet sites. Timber harvest only in younger forest stands and limited salvage.		Riparian 2.	50-11-40 rule plus retention of four large green trees, two large logs, and two snags per acre.
Option 3	LS/OG1s; plus LS/OG2s within marbled murrelet zone 1; plus owl additions in the western portion of the northern spotted owl range; plus buffers for other species associated with old-growth forests. Timber harvest only in	LS/OG2s outside marbled murrelet zone 1 plus owl additions - approximately 50% to be retained with other 50% to be managed on 250-350 year rotations or through uneven-age management in the eastern portion of the owl range.	Riparian 2.	50-11-40 rule plus retention of four large green trees, 2-12 logs per acre plus snag levels to support cavity excavators, plus protection of 10 percent of late-successional (or oldest available) forests.

Option Number	Late-Successional Reserves	Managed Late-Successional Areas	Riparian Reserve Strategy ^a	Matrix
Option 3 (Continued)	younger forest stands and limited salvage.	Six green trees retained in cutting units. Managed pair areas for the eastern portion of the northern spotted owl range. Number and management to be based on the provisions of the Final Draft Recovery Plan (USDI 1992c). Buffer for other species associated with old-growth forests.		
Option 4	LS/OG1s; plus LS/OG2s within marbled murrelet zone 1; plus designated conservation areas; plus reserved pair areas; plus residual habitat areas; plus occupied marbled murrelet sites; plus buffers for other	Managed pair areas - number and management based on the provisions of the Final Draft Recovery Plan (USDI 1992c); plus buffers for other species associated with old-growth forests.	Riparian 1.	50-11-40 rule plus retention of green trees, logs, and snags based on forest plan prescriptions.

Option Number	Late-Successional Reserves	Managed Late-Successional Areas	Riparian Reserve Strategy^a	Matrix
Option 4 (Continued)	species associated with old-growth forests. Management based on treatments of younger forest stands and limited salvage adapted from provisions of the Final Draft Recovery Plan (USDI 1992c).			
Option 5	LS/OG1s; plus LS/OG2s within marbled murrelet zone 1; plus designated conservation areas; plus reserved pair areas; plus residual habitat areas; plus occupied marbled murrelet sites; plus buffers for other species associated with old-growth forests. Management based on treatments of younger forest stands and limited salvage adapted from	Managed pair areas - number and management based on the provisions of the Final Draft Recovery Plan (USDI 1992c); plus buffers for other species associated with old-growth forests.	Riparian 2.	50-11-40 rule plus retention of green trees, logs, and snags based on forest plan prescriptions.

Option Number	Late-Successional Reserves	Managed Late-Successional Areas	Riparian Reserve Strategy^a	Matrix
Option 5 (Continued)	provisions of the Final Draft Recovery Plan (USDI 1992c).			
Option 6	LS/OG1s; plus owl additions; plus LS/OG2s within marbled murrelet zone 1; plus occupied marbled murrelet sites. Timber harvest limited to treatment of younger forest stands and limited salvage.		Riparian 2.	50-11-40 rule plus retention of six large green trees, two snags, and two logs per acre.
Option 7	Designated conservation areas; plus reserved pair areas; plus residual habitat areas. Management based on Federal agency interpretation of the provisions of the Final Draft Recovery Plan (USDI 1992c).	Managed pair areas - number and management based on the provisions of the Final Draft Recovery Plan (USDI 1992c).	Riparian buffers as prescribed in the forest Plans	50-11-40 rule (as interpreted by the agencies) plus retention of trees, logs, and snags based on forest plan provisions.
Option 8	LS/OG1s; plus owl additions; plus LS/OG2s within marbled murrelet		Riparian 3.	Retention of green trees, snags, and logs based on forest plan provisions.

Option Number	Late-Successional Reserves	Managed Late-Successional Areas	Riparian Reserve Strategy ^a	Matrix
Option 8 (Continued)	zone 1. Timber harvest only in younger stands and limited salvage within marbled murrelet zone 1. Outside marbled murrelet zone 1, timber harvest allowed in stands less than 180-years of age to produce or maintain spotted owl habitat, and salvage allowed that meets forest plan standards.			
Option 9	Portions of LS/OG1s, LS/OG2s, and designated conservation areas from Johnson et al. (1991) and USDI (1992c); plus all LS/OG1s and LS/OG2s in marbled murrelet zone 1; plus occupied marbled murrelet sites; plus buffers for other species associated with old-growth	Buffer for other species associated with old-growth forests.	Riparian 2.	Coastal OR and WA Forests - No retention of green trees. Other National Forests in OR and WA - retention of 15% of the volume of a cutting unit in individual green trees or aggregation of 1/2 to four acres. Federal Forests in CA -

Option Number	Late-Successional Reserves	Managed Late-Successional Areas	Riparian Reserve Strategy ^a	Matrix
Option 9 (Continued)	forests. Placement of Late-Successional Reserves in Key Watersheds emphasized. Management adapted from provisions of Final Draft Recovery Plan for Northern Spotted Owls (USDI 1992c).			180-year rotations in conifer forests, 100-year rotations in hardwood forests. BLM administered lands in OR - Provisions of the revised preferred alternatives of Draft Resource Management Plans.
Option 10	Same as Option 6	Same as Option 6	Same as Option 6	Retention of six large, green trees, two snags, and two logs per acre

a - Refer to Table "Minimum Widths of Riparian Reserves" for a description of the Riparian Reserve strategies.

Explanatory Notes:

LS/OG1, LS/OG2, LS/OG3, owl additions - Terms for late successional / old-growth reserve areas from the report of the Scientific Panel Late-Successional Forest Ecosystems (Johnson et al. 1991).

Designated conservation areas, reserved pair areas, residual habitat areas, and managed pair areas - Terms from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c).

Occupied marbled murrelet sites - Forest stands outside reserves found to be occupied by marbled murrelets.

Marbled murrelet zone 1 - Washington, coast-inland 40 miles; Oregon, coast-inland 35 miles; California, coast-inland 35 miles narrowing to 10 miles.

Buffers for other species associated with old-growth forests - Forest areas around sites occupied by species identified in the report of the Scientific Analysis Team (Thomas et al. 1993) that will be protected from cutting (Late-Successional Reserves) or managed under special guidelines (Managed Late-Successional Areas) to provide protection for the occupied sites.

Forest plan elements - Land allocations or standards and guidelines from National Forest or BLM District land and resource management plans that protect late-successional forests (Late-Successional Reserves) or provide for timber harvest consistent with definitions of Managed Late-Successional Areas.

50-11-40 rule - A prescription that calls for at least 50 percent of the forest stands on Federal lands to be at least 11 inches in diameter at breast height and for such stands to have canopy closure of at least 40 percent.

Explanatory notes-

LS/OG1, LS/OG2, LS/OG3, owl additions- Terms for late-successional/old-growth reserve areas from the report of the Scientific Panel Late-Successional Forest Ecosystems (Johnson et al. 1991).

Designated conservation areas, reserved pair areas, residual habitat areas; and managed pair areas - Terms from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c).

Occupied marbled murrelet sites - Forest stands outside reserves found to be occupied by marbled murrelets.

Marbled murrelet zone 1 - Washington, coast-inland 40 miles; Oregon, coast-inland 35 miles; California, coast-inland 35 miles narrowing to 10 miles.

Buffers for other species associated with old-growth forests - forest areas around sites occupied by species identified in the report of the Scientific Analysis Team (Thomas et al. 1993) that will be protected from cutting (Late-Successional Reserves) or managed under special guidelines (Managed Late-Successional Areas) to provide protection for the occupied sites.

Forest plan elements - Land allocations or standards and guidelines from National Forest on BLM District land and resource management plans that protect late-successional forests (Late-Successional Reserves) or provide for timber harvest consistent with definitions of Managed Late-Successional Areas.

50-11-40 rule - A prescription that calls for at least 50 percent of the forest stands on Federal lands to be at least 11 inches in diameter at breast height and for such stands to have a canopy closure of at least 40 percent.

Table 3-3. Summary of Aquatic Conservation Strategy.

Component	Role in Conservation Strategy
Riparian Reserves	<ul style="list-style-type: none"> • Portions of the landscape where riparian dependent and stream resources receive primary emphasis. • Designated for all permanently flowing streams, lakes, wetlands greater than one acre, and intermittent streams. • Includes the body of water, inner gorge, all riparian vegetation, 100-year floodplain, landslides and landslide prone areas • Interim widths will be at least some fraction of a site potential tree or a a prescribed slope distance (see Table "Minimum Widths of Riparian Reserves") • Standards and Guidelines prohibits programmed timber harvest, manages roads, grazing, mining, and recreation to achieve objectives of the Aquatic Conservation Strategy
Key Watersheds	<ul style="list-style-type: none"> • Tier 1 - Selected for directly contributing to anadromous salmonid and bull trout conservation • Tier 2 - May not contain at risks fish stocks but were selected as sources of high quality water • Inside roadless areas - at a minimum, there will be no net increase in roads in Key Watersheds • Receives highest priority in rectoration programs
Watershed Analysis	<ul style="list-style-type: none"> • A systematic procedure to characterize watersheds. The information guides management prescriptions, setting, and refining Riparian Reserve boundaries, development of restoration strategies and monitoring programs. • Required in Key Watersheds prior to resource management • Required in all roadless areas prior to resource management • Recommended in all other watersheds • Required to change Riparian reserve boundaries in all watersheds
Watershed Restoration	<ul style="list-style-type: none"> • Restore watershed processes to recover degraded habitat • Focus on road removal and upgrading • Silviculture treatments may be used to restore large conifers in Riparian Reserves • Restore channel complexity. In-stream structures should only be used in the short term and not as mitigation for poor land management practices

Table 3-4. Minimum widths of Riparian Reserves expressed as whichever slope distance is greatest. In addition, Riparian Reserves must include the 100-year floodplain, inner gorge, unstable and potentially unstable areas. See Chapter V for other criteria used to determine Riparian Reserve widths. Options to which Riparian Reserve scenario apply are also listed.

Riparian Reserve Scenario	Stream Class	Tier 1 Key Watershed	Tier 2 Key Watershed	All Other Watersheds
Riparian Reserve 1 Options 1,4	Fish Bearing Steams	Average Height of Two Site Potential Trees or 300 Feet	Average Height of Two Site Potential Trees or 300 Feet	Average Height of Two Site Potential Trees or 300 Feet
Riparian Reserve 1 Options 1,4	Permanently Flowing Non-Fish Bearing Streams	Average Height of One Site Potential Trees or 150 Feet	Average Height of One Site Potential Trees or 150 Feet	Average Height of One Site Potential Trees or 150 Feet
Riparian Reserve 1 Options 1,4	Intermittent Streams	Average Height of One Site Potential Trees or 100 Feet	Average Height of One Site Potential Trees or 100 Feet	Average Height of One Site Potential Trees or 100 Feet
Riparian Reserve 2 Options 2,3,5,6,9,10	Fish Bearing Steams	Average Height of Two Site Potential Trees or 300 Feet	Average Height of Two Site Potential Trees or 300 Feet	Average Height of Two Site Potential Trees or 300 Feet
Riparian Reserve 2 Options 2,3,5,6,9,10	Permanently Flowing Non-Fish Bearing Streams	Average Height of One Site Potential Trees or 150 Feet	Average Height of One Site Potential Trees or 150 Feet	Average Height of One Site Potential Trees or 150 Feet
Riparian Reserve 2 Options 2,3,5,6,9,10	Intermittent Streams	Average Height of One Site Potential Trees or 100 Feet	Average Height of One Site Potential Trees or 100 Feet	Average Height of One Site Potential Trees or 100 Feet

Riparian Reserve Scenario	Stream Class	Tier 1 Key Watershed	Tier 2 Key Watershed	All Other Watersheds
Riparian Reserve 3 Option 8	Fish Bearing Steams	Average Height of Two Site Potential Trees or 300 Feet	Average Height of Two Site Potential Trees or 300 Feet	Average Height of Two Site Potential Trees or 300 Feet
Riparian Reserve 3 Option 8	Permanently Flowing Non-Fish Bearing Streams	Average Height of 1/2 Site Potential Trees or 75 Feet	Average Height of 1/2 Site Potential Trees or 75 Feet	Average Height of 1/2 Site Potential Trees or 75 Feet
Riparian Reserve 3 Option 8	Intermittent Streams	Average Height of 1/6 Site Potential Trees or 25 Feet	Average Height of 1/6 Site Potential Trees or 25 Feet	Average Height of 1/6 Site Potential Trees or 25 Feet

In addition to withdrawn areas, reserves, and Managed Late-Successional Areas, the other major feature of the options is the set of management prescriptions for the intervening federal land referred to as the Matrix. The Matrix is the land base where a full range of silvicultural activities is allowed. In the descriptions of the options that follow, there are discussions of the Late-Successional Reserves, Managed Late-Successional Areas, Riparian Reserves, Matrix composition, and the "rules" by which management activities can be conducted in such areas. These "rules" are referred to as "standards and guidelines." Matrix acres include those outside other categories whether or not timber harvest can be regularly scheduled on them. The Matrix acres include nonforested acres and forested acres that are physically unsuitable for timber production due to their steep slopes, low site, and other characteristics. Thus, the acreage base for timber production (the acres used in calculation of probable sale quantities) is smaller than the acres shown as "Matrix acres". This Table 3-5 that follows the descriptions of the options provides estimated acres of federal land in each of the above categories by option. The estimates are further displayed by state and by physiographic province.

Option 1

Option 1 is a combination of option 14c from Johnson et al. (1991) and elements of the Scientific Analysis Team Report (Thomas et al. 1993). It was designed to have the highest probability of meeting the five biological criteria: (1) viability of northern spotted owls, (2) viability of marbled murrelets, (3) viability of fish species and stocks at risk, (4) viability of other species associated with old growth forests, and (5) maintenance of interacting late successional forests.

Late-Successional Reserves

Under Option 1, Late-Successional Reserves consist of the most **significant late successional forest areas (LS/OG1s)**, the **spotted owl additions**, and the **significant late-successional forest areas (LS/OG2s)**, and all other stands of late-successional forests (**LS/OG3s**) from Johnson et al. (1991). Under this option there would be no cutting of trees or salvage of dead trees in the Reserves.

Other Late-Successional Reserves Result From:

1. Protection of all forest sites **occupied by marbled murrelets** found outside the larger Reserves. This consists of conducting surveys to a U.S. Fish and Wildlife Service protocol and designating the contiguous marbled murrelet nesting and recruitment habitat (stands that are capable of becoming suitable within 25 years) within 0.5 miles of the area where murrelet activity is detected as a Late-Successional Reserve.
2. The application of some of the **protection buffers for other species** associated with old growth forests based on the provisions for such species. See Thomas et al. (1993) for details.

Managed Late-Successional Areas

Under Option 1, Managed Late-Successional Areas consist of:

1. The application of some of the **protection buffers for other species** associated with old growth forests based on the provisions for such species. See Thomas et al. (1993) for the description of the standards and guidelines for other species associated with old growth forests.

Riparian Reserves

Under Option 1, Riparian Reserve strategy 1 applies. Prescribed widths on both sides of streams for all watersheds are:

1. Fish-bearing streams - the combined average height of two site potential trees or 300 feet (whichever is greater).
2. Permanently flowing nonfish-bearing streams - the average height of one site-potential tree or 150 feet (whichever is greater).
3. Intermittent streams - the average height of one site-potential tree or 100 feet (whichever is greater).

The Matrix

Management of the Matrix under Option 1 is based on Matrix management option C in Johnson et al. (1991). This consists of the 50-11-40 rule plus the retention of at least six large, green trees per acre that exceed the average stand diameter, two large snags per acre, and two large logs per acre following logging. In addition to the above requirements, at least 10 percent of the Matrix should be over 180 years old at any one time. The remainder of the Matrix is to be managed using area control to achieve a rotation of 180 years. Matrix management will also be based on **allocations and standards and guidelines of the federal agency forest plans** where they are more restrictive than the provisions of this option. Forest plans are defined in all options as the existing land and resource management plans for the National Forests of the Pacific Northwest Region of the Forest

Service, the preferred alternatives of the draft land and resource management plans of the National Forests of the Pacific Southwest Region of the Forest Service, and the revised preferred alternative of the Bureau of Land Management resource management plans currently in preparation.

Option 2

Option 2 consists of a modified version of option 12a from Johnson et al. (1991).

Late-Successional Reserves

Under Option 2, these consist of the **most significant late successional forest areas (LS/OG1s)**, the **spotted owl additions**, and the **significant late successional forest areas (LS/OG2s)** from Johnson et al. (1991). Under this option cutting of trees in the Late-Successional Reserves is restricted to cutting that is designed to restore the integrity of the forest stands. This cutting would primarily be confined to precommercial and commercial thinning of forest stands less than 50 years old that have been established following logging. Cutting of forest stands in Late-Successional Reserves requires review by an oversight group established to ensure consistent application of the provisions of the option. Salvage of dead trees would be limited to areas of catastrophic loss exceeding 100 acres and would follow guidelines for salvage adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 70). Those guidelines are described at the end of this chapter.

Other Late-Successional Reserves Result From:

1. Protection of all forest **sites occupied by marbled murrelets** found outside the larger reserves. See Option 1 for details.

Managed Late-Successional Areas

Under Option 2, no Managed Late-Successional Areas are designated.

Riparian Reserves

Under Option 2, Riparian Reserve strategy 2 applies. Prescribed widths on both sides of streams are:

1. Fish-bearing streams in all watersheds - the combined average height of two site potential trees or 300 feet (whichever is greater).
2. Permanently flowing nonfish bearing streams in all watersheds - the average height of one site-potential tree or 150 feet (whichever is greater).
3. Intermittent streams in aquatic conservation emphasis Key Watersheds - the average height of one site-potential tree or 100 feet (whichever is greater).
4. For intermittent streams in all other watersheds - one-half the average height of a site-potential tree or 50 feet (whichever is greater).

The Matrix

Management of the Matrix under Option 2 is based on Matrix management option A in Johnson et al. (1991). This consists of the 50-11- 40 rule plus the retention of at least six large, green trees per

acre that exceed the average stand diameter, two large snags per acre, and two large logs per acre following logging. The **allocations and standards and guidelines of the federal agency forest plans** will also be applied in the Matrix where they are more restrictive than the provisions of this option.

Option 3

The basis for Option 3 is Johnson et al. (1991) with elements of the Scientific Analysis Team Report (Thomas et al. 1993) and the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c). Management prescriptions in Option 3 vary for the Eastern Cascades in Oregon and Washington and the California Cascades. Therefore, the Option will be described separately for two areas.

Description of Option 3 for all physiographic provinces except the Eastern Cascades of Oregon and Washington and the California Cascades:

Late-Successional Reserves

Under Option 3, Late-Successional Reserves consist of the **most significant late successional forest areas (LS/OG1s)** and the **spotted owl additions** and within the primary marbled murrelet zone, the **significant late successional forest areas (LS/OG2s)** from Johnson et al. (1991). Whereas owl additions are initially included in the Late-Successional Reserves, they may eventually be reclassified as Managed Late-Successional Areas if and when spotted owl population performance has been demonstrated and there is additional experience indicating that forest stands can be successfully managed to create late successional forests. Under this option, cutting of trees in the Late-Successional Reserves is restricted to restoring late-successional forest attributes, primarily through precommercial and commercial thinning of forest stands less than 50 years old that have been established following logging. Cutting in Late-successional Reserves requires review by an oversight group established to ensure consistent application of provisions of the option. Salvage of dead trees would be limited to areas of catastrophic loss exceeding 100 acres and would follow guidelines for salvage adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 70). Those guidelines are described at the end of this chapter.

Other Late-Successional Reserves Result From:

1. Protection of all forest **sites occupied by marbled murrelets** found outside the larger reserves. (See Option 1 for details.)
2. The application of some of the **protection buffers for other species** associated with old growth forests based on the provisions for such species. See Thomas et al. (1993) for the description of the standards and guidelines for other species associated with old growth forests.

Managed Late-Successional Areas

Except in the primary marbled murrelet zone, the **significant late successional forest areas (LS/OG2s)** identified by Johnson et al. (1991) are designated as Managed Late-Successional Areas under Option 3. Management prescribed for these areas includes the following:

1. Retention (no cutting) of 30 percent of each LS/OG2 area. Selection of the 30 percent of the forest stands to be retained would be based on occupancy by marbled murrelets or northern spotted owls, protection of fish-bearing streams within the area, sites occupied by other old growth forest species, and the best developed old growth forest stands.

2. Harvest rotations of 250 years for the remaining area within the LS/OG2s with area and inventory control. Cutting would proceed only if and when 40 percent of an entire LS/OG2 was in forest stands at least 100 years old.
3. Retention of 20 percent of the stands within each cutting unit. These retained areas are to consist of stands of late successional forests (or the oldest available) left in configurations that would provide buffering of intermittent streams.
4. Retention of six of the largest and oldest green trees per acre on the actual cutting unit. These do not count toward the 20 percent retention.

Other Managed Late-Successional Areas Result From:

1. The application of some protection buffers for other species associated with old growth forests based on the provisions for such species. See Thomas et al. (1993) for the description of the standards and guidelines for other species associated with old growth forests.

Riparian Reserves

Under Option 3, Riparian Reserve strategy 2 applies. Prescribed widths on both sides of streams are:

1. Fish-bearing streams in all watersheds - the combined average height of two site potential trees or 300 feet (whichever is greater).
2. Permanently flowing nonfish-bearing streams in all watersheds - the average height of one site-potential tree or 150 feet (whichever is greater).
3. Intermittent streams in aquatic conservation emphasis Key Watersheds - the average height of one site-potential tree or 100 feet (whichever is greater).
4. Intermittent streams in all other watersheds - one-half the average height of a site-potential tree or 50 feet (whichever is greater).

Description of Option 3 for the physiographic provinces of the Eastern Cascades in Oregon and Washington and the California Cascades:

Late-Successional Reserves

Under Option 3 in the eastern physiographic provinces, Late-Successional Reserves consist of the most significant late successional forest areas (LS/OG1s) from Johnson et al. (1991). Under this option vegetation management in the Late-Successional Reserves in the eastern physiographic provinces would be conducted under provisions adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 75). This allows treatment of forest stands to reduce risk of fire and insect infestations within an objective of providing late-successional forest conditions at landscape scales. Guidelines for salvage adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 70) are also to be followed. Guidelines are described at the end of this chapter.

Also included are other Late-Successional Reserves that result from protection of some other species associated with old-growth forests (Thomas et al. 1993).

Managed Late-Successional Areas

Significant late successional forest areas (LS/OG2s), owl additions identified by Johnson et al. (1991), and the **managed pair areas** based on the provisions of the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 86) are designated as Managed Late-Successional Areas under Option 3 for the Eastern Cascades and California Cascades provinces. Management of the managed pair areas is based on the provisions for such areas under the Final Draft Recovery Plan. Management for the LS/OG2s and owl additions has the objective of providing old-growth characteristics associated with both fire-dependent ponderosa pine sites and mixed conifer and sites with a long fire return interval. Management provisions for the LS/OG2s and owl additions include the following:

1. Retention (no cutting) of 30 percent of each LS/OG2 and owl addition area. Selection of the retained stands would be based on occupancy by marbled murrelets (east of the crest of the Cascades in Washington) or spotted owls, protection of fish-bearing streams within the area, sites occupied by other old growth forest species, and identification of the best developed old growth forest stands.
2. Management of the remaining forest stands in the LS/OG2s and owl additions through either uneven aged or even aged timber management or a combination of the two. Prior to any harvest, stands should be inventoried to determine stand conditions relative to spotted owls, other species associated with old growth forests, ecological functions, and susceptibility to insect infestations, disease, and catastrophic fire. Cutting would proceed only if and when at least 40 percent of an entire LS/OG2 or owl addition was in forest stands at least 80 years old.
3. Rotations of 250-350 years for the remaining area within an LS/OG2 or owl addition with area and inventory control, if even aged management is conducted. For mixed conifer areas a rotation of 250 years would be used. For ponderosa pine or Jeffery pine areas, rotation would be 350 years. For other mesic series, rotation would be 200 years. For lodgepole pine, rotation would be 100 years. The goal of uneven aged management would be to retain and grow large conifer trees.
4. Retention of 20 percent of the stands in each cutting unit. Retained areas are to consist of stands of late successional forests (or the oldest available) left in configurations that will provide buffering of intermittent streams.
5. Retention of six of the largest and oldest green trees per acre on the actual cutting unit. These do not count toward the 20 percent retention target.

Other Managed Late-Successional Areas Result From:

1. The application of some **protection buffers for other species** associated with old growth forests based on the provisions for such species. See Thomas et al. (1993) for the description of the standards and guidelines for other species associated with old growth forests.

Riparian Reserves

Under Option 3, Riparian Reserve strategy 2 applies. Prescribed widths on both sides of streams are:

1. Fish-bearing streams in all watersheds - the combined average height of two site potential trees

or 300 feet (whichever is greater).

2. Permanently flowing nonfish-bearing streams in all watersheds - the average height of one site-potential tree or 150 feet (whichever is greater).

3. Intermittent streams in aquatic conservation emphasis Key Watersheds - the average height of one site-potential tree or 100 feet (whichever is greater).

4. Intermittent streams in all other watersheds - one-half the average height of a site-potential tree or 50 feet (whichever is greater).

Matrix - All Physiographic Provinces

Management of the Matrix under Option 3 is based on some provisions developed specifically for this option. The provisions incorporate the 50-11-40 rule plus retention of 10 percent of the Matrix area in late successional forest stands (or the oldest available) to be left in small 5-10 acre well-dispersed islands. On the units to be cut, management will retain four large green trees per acre, 12 large logs (decay class 1 and 2) (2-10 logs in the eastern physiographic provinces), and enough snags to support populations of cavity nesters at 40 percent of potential population levels. In addition, all logs that are in decay classes 3, 4, and 5 will be retained. The allocations and standards and guidelines of the federal agency forest plans will also be applied in the Matrix where they are more restrictive than the provisions of the option.

Option 4

Option 4 is a combination of the strategies for management of late successional forests based on the Scientific Analysis Team Report (Thomas et al. 1993) and Johnson et al. (1991).

Late-Successional Reserves

Under Option 4, Late-Successional Reserves consist of the **most significant late successional forest areas (LS/OG1s) and within the primary marbled murrelet zone the significant late successional forest areas (LS/OG2s)** from Johnson et al. (1991). The areas established from the application of the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 63) are also Late-Successional Reserves. The areas resulting from the application of the Final Draft Recovery Plan include **designated conservation areas, reserved pair areas, and residual habitat areas**. Cutting of trees and salvage in Late-Successional Reserves would be guided by provisions adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 68). Those guidelines are described at the end of this chapter. Cutting of forest stands in Late-Successional Reserves requires review by an oversight group established to ensure consistent application of the provisions of the option.

Other Late-Successional Reserves Result From:

1. Protection of all forest **sites occupied by marbled murrelets** outside the larger reserves. (See Option 1 for details.)

2. The application of **protection buffers for other species** associated with old growth forests based on the provisions for such species. See Thomas et al. (1993) for the description of the standards and guidelines for other species associated with old growth forests.

Managed Late-Successional Areas

Under Option 4, the Managed Late-Successional Areas consist of **managed pair areas** as prescribed in the Final Draft Recovery Plan for the Northern Spotted Owls (USDI 1992c: 86).

Other Managed Late-Successional Areas Result From:

1. The application of some **protection buffers for other species** associated with old-growth forests based on the provisions for such species. See Thomas et al. (1993) for the description of the standards and guidelines for other species associated with old-growth forests.

Riparian Reserves

Under Option 4, Riparian Reserve strategy 1 applies. Prescribed widths on both sides of streams for all watersheds are:

1. Fish-bearing streams - the combined average height of two site potential trees or 300 feet (whichever is greater).
2. Permanently flowing nonfish-bearing streams - the average height of one site-potential tree or 150 feet (whichever is greater).
3. Intermittent streams - the average height of one site-potential tree or 100 feet (whichever is greater).

The Matrix

Management of the Matrix under Option 4 incorporates the 50-11-40 rule plus retention of green trees, snags, and coarse woody debris at levels specified in the forest plans. Retention of additional snags is required in the eastern Oregon and Washington Cascades and the Oregon and California Klamath as specified by Thomas et al. (1993). Additional **allocations and standards and guidelines of the federal agency forest plans** will also be applied in the Matrix where they are more restrictive than the provisions of this option.

Option 5

Option 5 is a strategy based on the Scientific Analysis Team Report (Thomas et al. 1993).

Late-Successional Reserves

Under Option 5, Late-Successional Reserves consist of areas established from the application of the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 63) that include **designated conservation areas and reserved pair areas, and residual habitat areas**. Within the primary marbled murrelet zone the **most significant late-successional forest areas (LS/OG1s)** and the **significant late-successional forest areas (LS/OG2s)** from Johnson et al. (1991) are also included as Late-Successional Reserves. Cutting of trees and salvage of dead trees in Late-Successional Reserves would be guided by provisions adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 68). The salvage guidelines are described at the end of this chapter. Cutting of stands in Late-Successional Reserves requires review by an oversight group established to ensure consistent application of the provisions of the option.

Other Late-Successional Reserves Result From:

1. Protection of all forest **sites occupied by marbled murrelets** found outside the larger reserves. (See Option 1 for details.)

2. The application of some **protection buffers for other species** associated with old-growth forests based on the provisions for such species. See Thomas et al. (1993) for the description of the standards and guidelines for other species associated with old-growth forests.

Managed Late-Successional Areas

Under Option 5, the Managed Late-Successional Areas consist of **managed pair areas** as prescribed in the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 86).

Other Managed Late-Successional Areas Result From:

1. The application of some **protection buffers for other species** associated with old growth forests based on the provisions for such species. See Thomas et al. (1993) for the description of the standards and guidelines for other species associated with old growth forests.

Riparian Reserves

Under Option 5, Riparian Reserve strategy 2 applies. Prescribed widths on both sides of streams are:

1. Fish-bearing streams in all watersheds - the combined average height of two site potential trees or 300 feet (whichever is greater).
2. Permanently flowing nonfish-bearing streams in all watersheds - the average height of one site-potential tree or 150 feet (whichever is greater).
3. Intermittent streams in aquatic conservation emphasis Key Watersheds - the average height of one site-potential tree or 100 feet (whichever is greater).
4. Intermittent streams in all other watersheds - one-half the average height of a site-potential tree of 50 feet (whichever is greater).

The Matrix

Management of the Matrix under Option 5 incorporates the 50-11-40 rule plus retention of green trees, snags, and coarse woody debris at levels specified in the forest plans. Retention of additional snags is required in the eastern Oregon and Washington Cascades and the Oregon and California Klamath as specified by Thomas et al. (1993). Additional allocations and standards and guidelines of the federal agency forest plans will be applied in the Matrix where they are more restrictive than the provisions in this option.

Option 6

Option 6 consists of a modified version of option 8a from Johnson et al. (1991).

Late-Successional Reserves

Under Option 6, Late-Successional Reserves consist of the **most significant late successional forest areas (LS/OG1s)** and the **spotted owl additions** from Johnson et al. (1991); and within the primary marbled murrelet zone, the **significant late-successional forest areas (LS/OG2s)**. Under

this option cutting of trees in the Late-Successional Reserves is restricted to precommercial and commercial thinning of forest stands less than 50 years old that have been established following logging. The objective is to accelerate development of late-successional conditions. Cutting in Late-Successional Reserves requires review by a group established to ensure consistent application. Salvage of dead trees would be based on application of the guidelines for salvage adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 70) and would be limited to areas where catastrophic loss exceeded 100 acres. The salvage guidelines are described at the end of this chapter.

Other Late-Successional Reserves Result From:

1. Protection of all forest **sites occupied by marbled murrelets** found outside the larger reserves. (See Option 1 for details).

Managed Late-Successional Areas

Under Option 6, no Managed Late-Successional Areas are designated.

Riparian Reserves

Under Option 6, Riparian Reserve strategy 2 applies. Prescribed widths on both sides of streams are:

1. Fish-bearing streams in all watersheds - the combined average height of two site potential trees or 300 feet (whichever is greater).
2. Permanently flowing nonfish-bearing streams in all watersheds - the average height of one site-potential tree or 150 feet (whichever is greater).
3. Prescribed widths for aquatic conservation emphasis Key Watersheds - the average height of one site-potential tree or 100 feet (whichever is greater).
4. Intermittent streams in all other watersheds - one-half the average height of a site-potential tree or 50 feet (whichever is greater).

The Matrix

Management of the Matrix under Option 6, is based on Matrix management option A in Johnson et al. (1991). This consists of the 50-11-40 rule plus the retention of at least six large, green trees per acre that exceed the average stand diameter, two large snags per acre, and two large logs per acre following logging. Some of the allocations and standards and guidelines of the federal agency forest plans are applied in the Matrix where they are more restrictive than the provisions of this option.

Option 7

Option 7 approximates current direction that might be implemented if the federal agencies continued present land and resource management planning processes and if they were to adopt the elements of the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c).

Late-Successional Reserves

Under Option 7, Late-Successional Reserves consist of the areas established from the application

of the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 63), specifically, **designated conservation areas and reserved pair areas and residual habitat areas**. Cutting of trees and salvage of dead trees in Late-Successional Reserves would be restricted to that provided by the Final Draft Recovery Plan (USDI 1992c: 68) as interpreted by the federal agencies. This could allow significant cutting in the future in Reserves on the Bureau of Land Management lands.

Managed Late-Successional Areas

Under Option 7, Managed Late-Successional Areas consist of **managed pair areas** as prescribed in the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 86).

Riparian Reserves

Under Option 7, these reserves include those that result from the **standards and guidelines of the federal agency forest plans** for riparian areas.

The Matrix

Management of the Matrix under Option 7 incorporates the 50-11-40 rule plus retention of green trees, snags, and coarse woody debris at levels specified in the forest plans. On lands administered by the Bureau of Land Management, the 50-11-40 rule is not applied. Other allocations and standards and guidelines of the federal agency forest plan would apply in the Matrix.

Option 8

Option 8 consists of a modified version of option 8a from Johnson et al. (1991).

Late-Successional Reserves

Under Option 8, Late-Successional Reserves consist of the **most significant late successional forest areas (LS/OG1s)**, the **spotted owl additions** from Johnson et al. (1991), and within the primary marbled murrelet zone the **significant late-successional forest areas (LS/OG2s)**. Under this option cutting of trees in the Late-Successional Reserves within the primary marbled murrelet zone, is restricted to precommercial and commercial thinning of forest stands less than 50 years old that have been established following logging. The objective is to accelerate development of late-successional conditions. Cutting in Late-Successional Reserves requires review by a group established to ensure consistent application. Salvage of dead trees would be based on application of the guidelines for salvage adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 70) and would be limited to areas where catastrophic loss exceeded 100 acres. The salvage guidelines are described at the end of this chapter.

Under this option cutting of trees in Late-Successional Reserves, outside of the primary marbled murrelet zone, is permitted in forest stands less than 180 years of age to produce or maintain northern spotted owl habitat. Salvage of dead trees would be permitted provided that forest plan standards for snags and logs were met after logging.

Managed Late-Successional Areas

Under Option 8, no Managed Late-Successional Areas are designated.

Riparian Reserves

Under Option 8, Riparian Reserve strategy 3 applies. Prescribed widths on both sides of streams for all watersheds are:

1. Fish-bearing streams - the combined average height of two site-potential trees or 300 feet (whichever is greater).
2. Permanently flowing nonfish-bearing streams - one-half the average height of a site-potential tree or 75 feet (whichever is greater)
3. Intermittent streams - one-sixth the average height of a site-potential tree or 25 feet (whichever is greater).

The Matrix

Management of the Matrix under Option 8 consists of retention of green trees, snags, and logs to be left following logging at levels provided by the forest plans. Other allocations and standards and guidelines of the federal agency forest plans will be applied where they are more restrictive than the provisions of this option.

Option 9

Option 9 consists of elements from the Scientific Panel on Late-Successional Forest Ecosystems (Johnson et al. 1991), the Scientific Analysis Team Report (Thomas et al. 1993), the Final Draft Recovery Plan for the Northern Spotted Owl (USDA 1992), and Key Watersheds as described in this study.

Late-Successional Reserves

Under Option 9, Late-Successional Reserves are based on boundaries that represent an integration of previous efforts (Johnson et al. 1991; USDI 1992c). They incorporate some portion of the reserves from each of those previous efforts, and include new areas designated to protect Key Watersheds. Thinning or silvicultural treatments inside Reserves require review by an interagency oversight team to ensure that they are beneficial to the creation of late-successional forest conditions. Activities that would be permitted in the western and eastern portions of the range are described separately below. Salvage of dead trees would be based on guidelines adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c) and would be limited to areas where catastrophic loss exceeded 10 acres.

West of the Cascades:

There is no entry allowed in stands older than 80 years of age. Thinnings (pre-commercial and commercial) may occur in stands up to 80 years of age regardless of the origin of the stands (plantations planted after logging or stands naturally regenerated after fire or blow down). The purpose of these silvicultural treatments is to be neutral or beneficial to the creation and maintenance of late-successional forest conditions.

East of the Cascades and the Eastern Portion of the Klamath Province:

Given the increased risk of fire in these areas due to more xeric conditions and the rapid accumulation of fuels as the aftermath of insect outbreaks and drought, there are additional management activities allowed in Late-Successional Reserves. Guidelines to reduce risks to large-scale disturbance are adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c). These guidelines can be found at the end of the chapter.

Other Late-Successional Reserves Result From:

1. Protection of all forest sites occupied by marbled murrelets found outside the larger reserves. (See Option 1 for details.)
2. The application of some of the protection buffers for other species associated with old growth forests based on the provisions for such species. See Thomas et al. (1993) for details.

Managed Late-Successional Areas

Under Option 9 these result from:

1. The application of some **protection buffers for other species** associated with old growth forests based on the provisions for such species. See Thomas et al. (1993) for the description of the standards and guidelines for other species associated with old growth forests.

Riparian Reserves

Under Option 9, Riparian Reserve strategy 2 applies. Prescribed widths on both sides of streams are:

1. Fish-bearing streams in all watersheds - the combined average height of two site potential trees or 300 feet (whichever is greater).
2. Permanently flowing nonfish-bearing streams in all watersheds - the average height of one site-potential tree or 150 feet (whichever is greater).
3. Intermittent streams in aquatic conservation emphasis Key Watersheds: - the average height of one site-potential tree or 100 feet (whichever is greater).
4. Intermittent streams in all other watersheds - one-half the average height of a site-potential tree or 50 feet (whichever is greater).

The Matrix

For the Oregon Coast Physiographic Province, the Olympic National Forest, and the Mount Baker-Snoqualmie National Forest (areas with high stream density):

Management of the Matrix is based on provisions of the forest plans for the retention of snags and logs in cutting units. No other retention provision is prescribed.

For other National Forests in Oregon and Washington within the range of the northern spotted owl:

Management of the Matrix under Option 9 consists of the retention of 15 percent of the volume of each cutting unit. This can be individual green trees, but one-half the amount must include some small (1/2 to 4 acre) late-successional stands that are intact. If late-successional stands are not available, the next oldest stands shall be retained.

For Bureau of Land Management administered lands in northern Oregon (north of Grant's

Pass):

Management is based on providing 640 acre blocks of land (spaced 3 to 5 miles apart) that are managed on 150-year timber harvest rotations. When an area is cut 12 - 18 green trees will be retained. Overall 25 to 30 percent of the block must be in late successional forest at any point of time.

For Bureau of Land Management administered lands in southern Oregon (south of Grant's Pass):

Management consists of selective harvest where 16 to 25 large green trees per acre are left.

For the federal forests in California within the range of the northern spotted owl:

Management of the Matrix provides for retention of 15 percent of the volume of each cutting unit, plus use of 180-year harvest rotations for conifer and mixed evergreen forests and 100 years for hardwood forests.

In all cases, other allocations and standards and guidelines of the federal agency forest plans will be applied in the Matrix where they are more restrictive than the provisions of this option. However, administrative withdrawals that were specified in the forest plans to benefit martens, pileated woodpeckers, and other late-successional species would be returned to the Matrix under this option.

Option 9 incorporates another feature called **Adaptive Management Areas** where broad guidelines are developed for each area to manage forests for a variety of values, including late-successional forests. These areas allow the application of innovative management techniques to integrate ecological, social, and economic objectives. A separate discussion of the Adaptive Management Areas follows the description of the Options.

Option 10

Option 10 consists of a modified version of option 8a from Johnson et al. (1991).

Late-Successional Reserves

Under Option 10, Late-Successional Reserves consist of the **most significant late successional forest areas (LS/OG1s)** and the **spotted owl additions** from Johnson et al. (1991); and within the primary marbled murrelet zone, the **significant late-successional forest areas (LS/OG2s)**. Under this option cutting of trees in the Late-Successional Reserves is restricted to precommercial and commercial thinning of forest stands less than 50 years old that have been established following logging. Cutting in Late-Successional Reserves requires review by a group established to ensure consistent application. Salvage of dead trees would be based on guidelines for salvage adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c: 70) and would be limited to areas where catastrophic loss exceeded 100 acres.

Other Late-Successional Reserves Result From:

1. Protection of all forest **sites occupied by marbled murrelets** found outside the larger reserves. (See Option 1 for details).

Managed Late-Successional Areas

Under Option 10, no Managed Late-Successional Areas are designated.

Riparian Reserves

Under Option 10, Riparian Reserve strategy 2 applies. Prescribed widths on both sides of streams are:

1. Fish-bearing streams in all watersheds - the combined average height of two site potential trees or 300 feet (whichever is greater).
2. Permanently flowing nonfish-bearing streams in all watersheds - the average height of one site-potential tree or 150 feet (whichever is greater).
3. Intermittent streams in aquatic conservation emphasis Key Watersheds - the average height of one site-potential tree or 100 feet (whichever is greater).
4. Intermittent streams in all other watersheds - one-half the average height of a site-potential tree or 50 feet (whichever is greater).

The Matrix

Management of the Matrix under Option 10 calls for the retention of at least six large, green trees per acre that exceed the average stand diameter, two large snags per acre, and two large logs per acre following logging. Other allocations and standards and guidelines of the federal agency forest plans will be applied in the Matrix where they are more restrictive than the provisions of this option.

Adaptive Management Areas

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 containing a range from about 84,000 to nearly 400,000 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, community-based activities have already begun from the grassroots.

The Adaptive Management Areas are specifically designated in Option 9, but the concept could be applied within any of the options. Specific boundaries of the areas would have to be modified consistent with particular options, and biological, economic, and social assessments would have to be revised to be consistent with those allocations.

The overarching objective for Adaptive Management Areas is to learn how to do ecosystem management 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 this plan 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 Option 9. 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 elsewhere in this report--technical, administrative, and cultural/social.

Key features of the Adaptive Management Areas:

- The areas are well-distributed geographically and 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 upon 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.
- Local processing (county level) of forest products harvested from the Adaptive Management Areas are encouraged.
- Innovation in integration of multi-ownership watersheds is to be encouraged between federal agencies and is likewise encouraged between state and federal agencies, and private landowners.
- Innovation in agency organization and personnel policies includes tests and modification in 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 the overall conservation strategy. The Adaptive Management Areas were intended to provide a mixture of public and private ownerships. In locating the Adaptive Management Areas, the proximity of communities that were subject to adverse economic impact resulting from reduced federal timber harvest was considered. The social and economic analysis of the Forest Ecosystem Management Assessment Team (reported elsewhere in this report) was a major source of information that helped guide these decisions.

The Adaptive Management Areas also provide a mixture of ownerships. Six areas include lands administered by the Forest Service and Bureau of Land Management. In two areas (Northern Oregon Coast Ranges and Olympic) there are significant opportunities for the states to participate in a major cooperative adaptive management effort with their forest lands. 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. These 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 provide 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. These are difficult to achieve under traditional agency management. The guiding principle is to allow freedom in forest management approaches to encourage innovation in achieving the goals of Option 9. 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 at quite large-scale, are likely. Demonstrations and pilot projects, while perhaps significant, useful, and encouraged in some circumstances, may not be sufficient to achieve the objectives in and of themselves.

Monitoring is essential to the success of any selected option and to an adaptive management program. Currently, adequate monitoring is essentially nonexistent throughout the federal resource management agencies despite being required by forest plans. Hence, development and demonstration of monitoring and training of the workforce are technical challenges and are suggested for emphasis.

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 wildlife welfare (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 should have an

interdisciplinary technical advisory panel, including specialists from outside government agencies, that would provide advice on research, development, and demonstration programs.

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, land owners, 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 with 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. But a well-trained

workforce to collect and assimilate required information is largely lacking. Local persons might be ideally suited to this task if appropriately trained.

Agency Approaches and Management Oversight

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

If the Adaptive Management Areas are to make timely contributions to the regional conservation strategy 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. Development of such documents can proceed simultaneously with other activities; the only area in which detailed planning must precede any activities is the Snoqualmie Pass Adaptive Management Area. Forest plans, as modified by the directions laid down in the selected conservation strategy, can provide the starting point for activities.

Initial involvement of user groups and communities would emphasize how the strategy and plans should be implemented.

Initial direction and continuing oversight should be provided by a regional interagency group, possibly working through the Provincial Interagency Team if this concept is adopted from the implementation plan. 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.

Funding the Adaptive Management Area Program

To achieve its multiple objectives the Adaptive Management Area program will require substantial and stable funding sources. Regular appropriations are one obvious source but are likely to be insufficient in amount and predictability to meet programmatic needs. Hence, developing innovative approaches to financing is an essential element of the Adaptive Management Area strategy.

Possible funding mechanisms for programs associated with Adaptive Management Areas include:

1. Using all or portions of the receipts from Adaptive Management Areas for accelerated monitoring, research, retraining, restoration and other innovative activities within these areas.
2. Authorizing agencies to assess user fees that could be retained for use within Adaptive Management Areas.

3. Using objective-based "end result" budgeting approaches with agency budgets.
4. Agency authorization for experimentation with nontraditional approaches to resource valuation, including market-based approaches to noncommodity resources, the purchasing, selling, and trading resources (e.g., private purchase of commercial timber for retention, rather than harvest).
5. Provision for other kinds of cooperative funding arrangements with other land owners, governmental bodies, organizations, and private individuals. In addition to funds needed for programs on the Adaptive Management Areas there may also be a need for risk capital for community-based efforts and pilot programs in incentive-based management agreements with private landowners.

If receipts are used as a source of funding for programs in Adaptive Management Areas several factors need to be considered. First, development of a common pool should be considered because all areas have the same basic needs -- such as in monitoring and retraining -- but differ greatly in their ability to generate revenues. Second, some portion of the funds should probably be reinvested on the same area, but care should be taken to avoid developing a negative feedback whereby resource exploitation is being stimulated by a desire for additional funds.

Development of additional innovative funding sources must not be viewed as a substitute for appropriate funds for management and research. Rapid implementation of programs within Adaptive Management Areas is essential to both their regional function and to the adjacent communities. In at least

the short term, this implementation will only be possible through the regular appropriation process. Indeed, the intensity of activity proposed on the Adaptive Management Areas calls for higher levels of appropriated funds in the short term rather than lower levels.

Timber Supply

One reason for locating Adaptive Management Areas adjacent to adversely economically impacted communities 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 Option 9. 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 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 a long-term projection of timber yield.

Local processing of wood products harvested from federal lands within Adaptive Management Areas may be critical to the economic welfare of the associated communities as well as essential to creation of adaptive management approaches. If local processing is not achieved, the potential economic benefits to the local communities may not be realized. Hence, agencies are encouraged to develop approaches which encourage or require processing of a portion of the harvest within the local area, defined here as the county or counties within which the Adaptive Management Area is located. Sufficient legal

authorities may already exist in laws such as the Cooperative Sustained Yield Act and the National Forest Dependent Rural Communities Economic Diversity Act (part of the 1990 Farm Bill).

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 the woods skills and knowledge and sense of place that 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. A program of 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.

Descriptions of the Adaptive Management Areas

Adaptive Management Areas are shown on the

appendix map for Option 9. Late-Successional Reserves provide for a major element of the Option 9 conservation strategy. Adaptive Management Areas would contribute to accomplishing the objectives of the option, such as protection or enhancement of riparian habitat and provision for distributed late-successional forest habitat. Detailed prescriptions for achieving such objectives are not provided, however, so that managers may develop and test alternative approaches, applicable to their areas and in a manner consistent with existing environmental and other laws.

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 buffers 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. 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.

Guidelines for sustaining marbled murrelet habitat necessitates management restrictions for Adaptive Management Areas within the primary murrelet zone if Option 9 is to rate at least an 80 percent likelihood of providing nesting habitat well-distributed in the planning area at 100 years (see Terrestrial Forest and Aquatic Ecosystem Assessment). In the two Adaptive Management Areas where most late-successional forests have already been harvested (Northern Oregon Coast Ranges and Finney), required mitigation is: (1) survey for and protection of all occupied murrelet sites

(see Option 1); (2) retention of LS/OG1s, LS/OG2s, and owl additions (from Johnson et al. 1991) as Late-Successional Reserves within the Adaptive Management Areas. These reserves should be managed as stipulated for such reserves under Option 9. On the Olympic Peninsula, where larger reserves of late-successional forests remain on federal lands, all sites occupied by marbled murrelets will be protected (see Option 1). In all the Adaptive Management Areas, management activities will be conducted to achieve the objectives described for Option 9. Full watershed assessments will be conducted prior to new management activities in identified Key Watersheds with Adaptive Management Areas.

**Name: Applegate Adaptive Management Area,
Oregon**

Size: 268,600 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: Blue River Adaptive Management Area,

Oregon

Size: 153,200 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-succession 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: 142,900 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: 101,100 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 and provision of stable timber supply.

Retention of habitat consistent with guidelines for marbled murrelet areas as noted at the beginning of this section. Sites occupied by spotted owls (pairs or territorial singles) will be protected by establishing Late-Successional Reserves using procedures to delineate Reserved Pair Areas under the Final Draft Recovery Plan for Northern Spotted Owls (USDI 1992c).

**Name: Goosenest Adaptive Management Area,
California**

Size: 169,600 acres.

Ownership: Klamath National Forest; potentially private lands.

Associated Communities: Yreka, Montague, Dorris, Hornibrook; 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: 399,500 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: 83,900 acres.

Ownership: Umpqua National Forest and Roseburg District Bureau of Land Management; potentially private and state lands.

Associated Communities: Roseburg, Myrtle Creek,

Oregon; Douglas County,
Oregon.

Emphasis: Development and testing 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: 247,000 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, Grand Ronde, Oregon; Polk, Yamhill, Tillamook, and Washington Counties, Oregon.

Concept: Management for restoration and maintenance of late-successional forest habitat, consistent with marbled murrelet guidelines noted at the beginning of this section. 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. All occupied marbled murrelet (see Option 1) and northern spotted owl sites will be protected by establishing Reserved Pair Areas under the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c).

**Name: Olympic Adaptive Management Area,
Washington**

Size: 145,000 acres.

Ownership: Olympic National Forest and potentially Washington

Department of Natural Resources, Indian Reservations, and private lands; 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 (see Option 1).

Name: Snoqualmie Pass Adaptive Management Area, Washington

Size: 261,300 acres

Ownership: Wenatchee and Mt. Baker-Snoqualmie National

Forests; Plum Creek Timber Company and other private land owners; 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.

<u>Previous</u>	<u>Back to Option</u>	<u>Next</u>
<u>Page</u>	<u>Development and</u>	<u>Page</u>
	<u>Description Table</u>	
	<u>of Contents</u>	

Guidelines for Silvicultural Activities and Salvage in Late-Successional Reserves

These guidelines are adapted from the Final Draft Recovery Plan for the Northern Spotted Owl (USDI 1992c). Some or all of these guidelines are applied in Options 2 through 10. See the individual option descriptions for specific application of the guidelines.

Guidelines for Silviculture

The primary objective of silvicultural activities in Late-Successional Reserves is to improve habitat in younger stands. Consequently, activities are encouraged if empirical information and modeling indicate that the development of late-successional habitat conditions will be accelerated. Interdisciplinary teams of wildlife biologists, silviculturists, and other specialists are encouraged to develop prescriptions that meet these criteria. General guidelines for silvicultural activities follow.

1. To safeguard the conservation benefits of Late-Successional Reserves, silvicultural activities should be directed at young stands where stocking, structure, or composition will prevent or significantly retard development of late-successional conditions. This will generally include stands that are composed of trees less than 10 to 12 inches dbh, show no significant

development of a multiple-canopy tree structure, and were regenerated following harvest activity. There will be exceptions to these guidelines, and judgments on stands to be managed will vary according to forest type and stand history. Activities in other types of stands that do not meet the general guidelines can be considered, particularly where those stands are heavily stocked and not being used by spotted owls or other late-successional associates. Examples may include stands that were planted following catastrophic fires or stands previously dominated by conifers that converted to hardwoods following harvest. Stands that have desired late-successional structure or that will soon develop it should not be treated unless such treatment is necessary to accomplish risk-reduction objectives (as described later).

2. Prescriptions to be used for each stand should be well thought out and documented. They will be designed to produce stand structure and components associated with late-successional conditions. These components include large trees, snags, logs, and dense, multi-storied canopies. Prescriptions should show the treatments to be applied and the anticipated effects on the stand over time. They should also include a discussion of the actions, coordination efforts, and oversight that will be necessary for successful implementation. This discussion should draw on previous efforts made to implement similar prescriptions. Finally, the prescriptions should identify key stand attributes or accomplishments that should be monitored. For example, if snags are to be created, or regeneration established, the accomplishment of these actions and their results should be monitored.

3. Silvicultural activities must maintain or reduce risk of large-scale natural disturbance. For example, activities should not be implemented if they

significantly increase the risk of windthrow in a stand.

4. To promote late-successional structure in stands to be thinned, prescriptions will provide for leaving some trees as snags and others as down wood. Those trees not needed for habitat development may be removed for commercial or fuel hazard reasons.

5. Key attributes of late-successional forests are their diversity and variability on individual sites and from site to site. To promote diversity and variability, a wide range of silvicultural practices should be applied, as opposed to reliance on a limited variety of techniques.

6. Activities that comply with these guidelines should provide positive conservation benefits. Actual implementation experience, however, is not extensive. A modest rate of implementation is prudent and will provide the opportunity to assess and refine activities. Acreage to be manipulated by silvicultural activities should generally be limited to 5 percent of the total area in any Late-Successional Reserve in the initial 5-year period of implementation, unless the need for larger-scale actions explicitly are justified.

7. Some habitat modification activities in Late-Successional Reserves will generate enough revenue to pay for themselves. Others will not and need to be supported by appropriated funds. It is not appropriate to conduct only those activities that generate a commercial return and ignore the needs of stands that cannot be treated commercially.

Guidelines to Reduce Risks of Large-Scale Disturbance

Large-scale disturbances are natural events, such as fire, that can eliminate 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 Forest Reserves in the eastern Oregon Cascades, eastern Washington Cascades, and California Cascades provinces and a lesser risk in the Oregon Klamath 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 this section.

Silvicultural activities aimed at reducing risk shall focus on younger stands in Late-Successional Forest 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 Forest Reserves in these provinces, management that goes beyond these guidelines may be considered. Levels of risk in those Late-Successional Forest Reserves are particularly high and may require additional measures.

Consequently, management activities designed to reduce risk levels are encouraged in those Late-Successional Forest 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 Forest Reserves from playing an effective role in the objectives for which it was established.

Guidelines for Salvage

Salvage is defined as the removal of trees from an area following a stand-replacing event 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. Priority should be given to salvage in areas where it will have a positive effect on late-successional forest habitat, but 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. Since 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 options until understanding of the process has improved.

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 small disturbed sites is not appropriate because small forest openings are an important component of old-growth forests. Depending on the option, salvage is not permitted in disturbed sites that

are either less than 10 acres or less than 100 acres. In addition, salvage should occur only in stands where disturbance has reduced canopy closure to less than 40 percent, as 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. Since coarse woody debris decay

rates, forest dynamics, and site productivity undoubtedly will vary among provinces and forest types, the specifications also will vary.

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, 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 since remnant coarse woody debris may be relatively small. In these cases,

diameter and biomass retention guidelines should be developed consistent with the intention of regenerating 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 future such habitat 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.

[Previous
Page](#)

[Back to Option
Development and
Description Table
of Contents](#)

[Next
Page](#)

References

- Johnson, K.N.; Franklin, J.F.; Thomas, J.W.; Gordon, J. 1991. Alternative for management of late-successional forests of the Pacific Northwest. Scientific Panel on Late-Successional Forest Ecosystems. A report to the Agriculture and Merchant and Marine Fisheries Committees of the U.S. House of Representatives. Washington, DC.
- Lujan, Manuel Jr.; Bruter, J.; Cassidy, E.; Hayden, J.M.; O'Neal, D.; Schrote, J.E. 1992. Preservation plan for the northern spotted owl - draft. 44 p.
- National Forest Products Association and American Council. 1991. A Multi-resource strategy for conservation of the northern spotted owl. Compiled by the Spotted Owl Subgroup of the Wildlife Committee. Unpublished Report.
- Nehlsen, W.; Williams, J.E.; Lichatowich, J.A. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. Fisheries. 16(2):4-21.
- Noss, Reid F. 1992. A preliminary biodiversity conservation plan for the Oregon Coast Range, a report to the Coast Range Association. Unpublished report. 65 p.
- Old Growth Definition Task Force. 1986. Interim definitions for old-growth Douglas-fir mixed conifer forests in the Pacific Northwest and California. USDA Forest Service Research Note PNW-447. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.
- Thomas, Jack Ward; Raphael, M.G.; Anthony R.G.; Forsman, E.D.; Gunderson A.G.; Holthausen, R.S.; Marcot, Bruce G.; Reeves, G.H.; Sedell, J.R.; Solis, D.M. 1993. Viability assessments and management consideration for species associated with late-successional and old-growth forests of the Pacific Northwest. Portland, OR: U.S. Department of Agriculture, Forest Service. 523 p.
- Thomas, J.W.; Forsman, E.D.; Lint, J.B.; Meslow, E.C.; Noon, B.R.; and Verner, J. 1990. A conservation strategy for the northern spotted owl: a report of the Interagency Scientific Committee to address the conservation of the northern spotted owl. Portland, OR: U.S. Department of Agricultural, Forest Service; U.S. Department of Interior, Bureau of Land Management, Fish and Wildlife Service, and National Park Service. 427 p.
- USDA Forest Service. 1984. Regional guide for the Pacific Northwest Region. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region.
- USDA Forest Service. 1988. Spotted owl guidelines in: final supplement to the environmental impact statement for an amendment to the Pacific Northwest Regional Guide. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. Vol. 1.
- USDA Forest Service. 1992. Final environmental impact statement on management for the northern spotted owl in the National Forests. Portland, OR: U.S. Department of Agriculture, Forest Service, National Forest System. 2 vol.
- USDI. 1992a. Draft Roseburg District resource management plan & EIS. Roseburg, OR: U.S. Department of the Interior, Bureau of Land Management. 2 vol.
- USDI. 1992b. Recovery plan for the northern spotted owl - draft. Portland, OR: U.S. Department of the Interior. 662 p.
- USDI. 1992c. Recovery plan for the northern spotted owl - final draft. Portland, Or: U.S. Department of the Interior. 2 vol.
- USDI Bureau of Land Management. 1988. Oregon Department of Fish and Wildlife agreement for spotted owl management. Portland, OR: U.S. Department of the Interior, Bureau of Land Management, Oregon State Office. 18 p.
- USDI Bureau of Land Management. 1990. BLM Facts. Contact Person: Joe Zilinear.
- USDI Bureau of Land Management. 1993. Revised preferred alternatives of the resource management plans. Unpublished documents.
- Verner, Jared; McKelvey, Kevin S.; Noon, Barry R.; Gutierrez, R.J.; Gould, Gordon I., Jr.; Beck, Thomas W., Tech. Coord. 1992. The California spotted owl: a technical assessment of its current status. Gen. Tech. Rep. PSW-GTR-133. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 285 p.

Table III-5. Estimated acres of federal land by allocation for each option by state and physiographic province.

State/ Physiographic province	Total acres federal land	OPTION 1 Acres of federal land by allocation					OPTION 2 Acres of federal land by allocation			
		Congressionally Withdrawn Areas	Late- Successional Reserves	Administrative Withdrawn Areas	Riparian Reserves	Matrix	Late- Successional Reserves	Administrative Withdrawn Areas	Riparian Reserves	Matrix
Washington										
Eastern Cascades	3,472,400	1,473,800	1,151,400	222,400	212,500	412,200	952,800	261,700	195,200	588,800
Western Cascades	3,721,700	1,749,400	1,405,100	191,600	151,100	224,600	1,216,900	265,100	150,600	339,700
Western Lowlands	126,300	1,700	90,600	0	0	34,100	0	0	0	124,700
Olympic Peninsula	1,518,800	977	413,300	1,900	63,500	63,400	402,000	2,200	56,600	81,300
Total:	8,839,200	4,201,600	3,060,400	415,900	427,100	734,300	2,571,700	529,000	402,400	1,134,500
Oregon										
Klamath	2,106,200	259,100	1,367,400	60,200	166	254,000	1,049,700	73,600	223,100	500,900
Eastern Cascades	1,557,400	425,200	642,000	109,200	102,900	278,100	562,800	130,100	82,400	356,900

Western Cascades	4,478,200	721,800	2,669,500	126,700	393,100	567,100	2,108,900	188,800	423 ~00	1,035
Coast Range	1,396,800	22,100	951,000	34,900	191,800	197,000	838,100	36,600	191,800	308,200
Willamette Valley	25,600	0	4,200	0	5,800	15,500	2,800	0	5,100	17,600
Total:	9,564,200	1,428,200	5,634,100	331,000	859,100	1,311,700	4,562,300	429,100	925,600	2,219,000
California										
Coast Range	388,200	94,700	129,900	31,700	40,500	91,400	118,200	33,900	29,300	112,100
Klamath	4,459,900	1,214,300	2,119,000	226,500	401,600	498,400	1,322,700	428,600	474,900	1,019,400
Cascades	1,009,200	44,300	552,100	76,100	141,900	194,800	342,500	96,000	160,500	365,900
Total:	5,857,300	1,353,300	2,801,000	334,300	584,000	784,600	1,783,400	558,500	664,700	1,497,400
Three-State Total:	24,260,700	6,983,100	11,495,500	1,081,200	1,870,200	2,830,600	8,917,400	1,516,600	1,992,700	4,850,900

OPTION 3
Acres of federal land by allocation

OPTION 4
Acres of federal land by allocation

State/ Physiographic province	Total acres federal land	Congressionally Withdrawn Areas	Late- Successional Reserves	Managed Late-Successional Areas	Administrative Withdrawn Areas	Riparian Reserves	Matrix	Late- Successional Reserves	Administrative Withdrawn Areas	Riparian Reserves	Matrix
Washington											
Eastern Cascades	3,472,400	1,473,800	1,035,600	0**	255,200	199,200	508,600	992,500	265,100	244,600	496,400
Western Cascades	3,721,700	1,749,400	1,105,700	79,500	301,900	167,800	317,400	1,220,900	252,900	211,900	286,500
Western Lowlands	126,300	1,700	0	0	0	0	124,700	90,600	0	0	34,100
Olympic Peninsula	1,518,800	976,700	404,600	0	2,200	59,100	76,100	418,400	1,700	61,000	61,000
Total:	8,839,200	4,201,600	2,545,900	79,500	559,300	426,100	1,026,800	2,722,400	519,700	517,500	878,000
Oregon											
Klamath	2,106,200	259,100	881,300	145,900	99,600	227,100	493,300	973,900	90,900	292,900	489,500
Eastern Cascades	1,557,400	425,200	575,600	0**	126,700	86,400	343,400	457,600	176,900	135,100	362,600
Western Cascades	4,478,200	721,800	1,528,300	516,900	252,600	467,900	990,800	1,706,400	229,400	734,600	1,086,000
Coast Range	1,396,800	22,100	870,100	2,600	36,900	183,400	281,700	919,300	36,400	205,800	213,200
Willamette Valley	25,600	0	2,500	300	0	5,100	17,500	3,200	0	6,300	16,000
Total:	9,564,200	1,428,200	3,857,800	665,700	515,800	969,900	2,126,700	4,060,400	533,600	1,374,700	2,167,300
California											
Coast Range	388,200	94,700	118,600	0	33,500	31,100	110,200	119,400	44,300	40,400	89,400
Klamath	4,459,900	1,214,300	1,170,300	101,100	480,000	534,100	960,100	1,262,200	43,290	693,500	856,900
Cascades	1,009,200	44,300	346,600	0* *	96,000	159,200	363,200	242,300	129,400	254,700	338,600
Total:	5,857,300	1,353,300	1,635,500	101,100	609,500	724,400	1,433,500	1,623,900	606,600	988,600	1,284,900
Three-State Total:	24,260,700	6,983,100	8,039,200	846,300	1,684,600	2,120,400	4,587,000	8,406,700	1,659,900	2,880,800	4,330,200

*Includes 147,000 acres of managed late-successional areas

**Managed Late Successional Areas have been included in Late-Successional Reserves. Approximate acreages follow:

Eastern Washington Cascades - 434,000 acres, Eastern Oregon Cascades - 190,000 acres, and California Cascades - 204,000 acres.

OPTION 5
Acres of federal land by allocation

OPTION 6
Acres of federal land by allocation

State/ Physiographic province	Total acres federal land	Congressionally Withdrawn Areas	Late- Successional Reserves	Administrative Withdrawn Areas	Riparian Reserves	Matrix	Late- Successional Reserves	Administrative Withdrawn Areas	Riparian Reserves	Matrix
Washington										
Eastern Cascades	3,472,400	1,473,800	730,700	409,800	235,600	622,400	809,500	300,400	219,700	668,900
Western Cascades	3,721,700	1,749,400	1,072,800	290,200	225,300	384,100	1,105,700	301,900	180,100	384,600
Western Lowlands	126,300	1,700	90,600	0	0	34,100	0	0	0	124,700
Olympic Peninsula	1,518,800	976,700	418,400	1,700	53,400	68,600	404,600	2,200	55,500	79,700
Total:	8,839,200	4,201,600	2,312,500	701,700	514,300	1,109,200	2,319,800	604,500	455,300	1,257,900
Oregon										
Klamath	2,106,200	259,100	877,100	108,800	272,000	589,300	881,300	99,600	260,900	605,400
Eastern Cascades	1,557,400	425,200	217,800	260,600	133,500	520,200	413,700	190,900	101,300	426,300
Western Cascades	4,478,200	721,800	1,123,600	317,900	741,800	1,573,200	1,528,300	252,600	566,500	1,409,000
Coast Range	1,396,800	22,100	916,200	36,400	166,300	255,800	870,100	36,900	177,200	290,500
Willamette Valley	25,600	0	2,200	200	5,400	17,800	2,500	0	5,200	17,800
Total:	9,564,200	1,428,200	3,136,900	723,900	1,319,000	2,956,300	3,695,900	580,000	1,111,100	2,749,000

California										
Coast Range	388,200	94,700	119,200	44,400	28,200	101,700	118,600	33,500	29,300	112,100
Klamath	4,459,900	1,214,300	1,070,800	476,400	604,700	1,093,700	1,170,300	480,000	505,600	1,089,710
Cascades	1,009,200	44,300	223,200	131,800	185,100	424,800	212,800	135,800	187,100	429,300
Total:	5,857,300	1,353,300	1,413,200	652,600	818,000	1,620,200	1,501,700	649,300	722,000	1,631,100
Three-State Total:	24,260,700	6,983,100	6,862,600	2,078,200	2,651,300	5,685,700	7,517,400	1,833,800	2,288,400	5,638,000

*Includes 147,000 acres of managed late-successional areas

State/ Physiographic province	Total acres federal land	Congressionally Withdrawn Areas	Late- Successional Reserves	OPTION 7 Acres of federal land by allocation			OPTION 8 Acres of federal land by allocation			
				Administrative Withdrawn Areas	Riparian Reserves	Matrix	Late- Successional Reserves	Administrative Withdrawn Areas	Riparian Reserves	Matrix
Washington										
Eastern Cascades	3,472,400	1,473,800	730,700	409,800	54,700	803,400	809,500	300,400	143,200	745,400
Western Cascades	3,721,700	1,749,400	982,200	330,800	52,500	606,800	1,105,700	301,900	124,500	440,300
Western Lowlands	126,300	1,700	90,600	0	0	34,100	0	0	0	124,700
Olympic Peninsula	1,518,800	976,700	353,000	5,700	15,300	168,100	404,600	2,200	44,200	91,100
Total:	8,839,200	4,201,600	2,156,500	746,300	122,500	1,612,400	2,319,800	604,500	311,900	1,401,500
Oregon										
Klamath	2,106,200	259,100	485,900	219,700	74,600	1,067,000	881,300	99,600	159,600	706,700
Eastern Cascades	1,557,400	425,200	216,500	260,600	29,200	626,000	413,700	190,900	61,500	466,100
Western Cascades	4,478,200	721,800	1,111,900	318,000	155,800	2,170,700	1,528,300	252,600	358,400	1,617,100
Coast Range	1,396,800	22,100	685,800	40,000	51,700	597,200	870,100	36,900	121,400	346,300
Willamette Valley	25,600	0	1,100	200	1,200	23,100	2,500	0	3,400	19,600
Total:	9,564,200	1,428,200	2,501,200	838,500	312,500	4,484,000	3,695,900	580,000	704,300	3,155,800
California										
Coast Range	388,200	94,700	118,200	45,000	6,600	123,600	118,600	33,500	19,300	122,000
Klamath	4,459,900	1,214,300	913,500	524,300	133,600	1,674,200	1,170,300	480,000	333,600	1,261,700
Cascades	1,009,200	44,300	223,200	131,800	44,200	565,600	212,800	135,800	126,200	490,100
Total:	5,857,300	1,353,300	1,254,900	701,100	184,400	2,363,400	1,501,700	649,300	479,100	1,873,800
Three-State Total:	24,260,700	6,983,100	5,912,600	2,285,900	619,400	8,459,800	7,517,400	1,833,800	1,495,300	6,431,100

*Includes 147,000 acres of managed late-successional areas

State/ Physiographic province	Total acres federal land	Congressionally Withdrawn Areas	Late- Successional Reserves	OPTION 9 Acres of federal land by allocation				OPTION 10 Acres of federal land by allocation			
				Adaptive Management Areas	Administrative Withdrawn Areas	Riparian Reserves	Matrix	Late- Successional Reserves	Administrative Withdrawn Areas	Riparian Reserves	Matrix
Washington											
Eastern Cascades	3,472,400	1,473,800	874,600	78,800	243,600	235,000	566,500	809,500	300,400	219,700	668,900
Western Cascades	3,721,700	1,749,400	973,900	247,800	215,400	190,800	344,500	1,105,700	301,900	180,100	384,600
Western Lowlands	126,300	1,700	90,600	0	0	0	34,100	0	0	0	124,700
Olympic Peninsula	1,518,800	976,700	398,400	141,800	0	200	1,700	404,600	2,200	55,500	79,700
Total:	8,839,200	4,201,600	2,337,500	468,400	459,000	426,000	946,800	2,319,800	604,500	455,300	1,257,900
Oregon											
Klamath	2,106,200	259,100	746,300	251,600	86,900	263,900	498,500	881,300	99,600	260,900	605,400
Eastern Cascades	1,557,400	425,200	374,000	0	196,600	117,700	443,900	413,700	190,900	101,300	426,300
Western Cascades	4,478,200	721,800	1,324,500	237,000	277,400	578,000	1,339,400	1,528,300	252,600	566,500	1,409,000
Coast Range	1,396,800	22,100	715,900	232,100	33,800	247,600	33,800	870,100	36,900	177,200	290,500
Willamette Valley	25,600	0	1,600	200	100	5,500	18,200	2,500	0	5,200	17,800
Total:	9,564,200	1,428,200	3,162,300	720,900	594,800	1,110,400	2,547,600	3,695,900	580,000	1,111,100	2,749,000
California											
Coast Range	388,200	94,700	119,500	0	43,800	28,300	101,900	118,600	33,500	29,300	112,100
Klamath	4,459,900	1,214,300	1,176,200	298,400	428,200	490,400	852,400	1,170,300	480,000	505,600	1,089,700
Cascades	1,009,200	44,300	257,100	0	127,100	176,200	404,600	212,800	135,800	187,100	429,300
Total:	5,857,300	1,353,300	1,552,800	298,400	599,100	694,900	1,358,900	1,501,700	649,300	722,000	1,631,100
Three-State Total:	24,260,700	6,983,100	7,052,600	1,487,700	1,652,900	2,231,300	4,853,300	7,517,400	1,833,800	2,288,400	5,638,000

[Previous Page](#)

[Back to Option Development and Description Table of Contents](#)