

## Chapter 3

### Effects of Bureau of Land Management Implementing Preferred Alternatives in Draft Resource Management Plans on the Viability Assessments in the Final Environmental Impact Statement

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## CHAPTER 3

### Effects of Bureau of Land Management Implementing Preferred Alternatives in Draft Resource Management Plans on the Viability Assessments in the Final Environmental Impact Statement

#### INTRODUCTION

In January 1992, the Forest Service issued a Final Environmental Impact Statement on Management for the Northern Spotted Owl in the National Forests (USDA 1992) (hereafter referred to as the Final Environmental Impact Statement). The Final Environmental Impact Statement analyzed five alternatives for management of spotted owl habitat. The Conservation Strategy put forward by the Interagency Scientific Committee (Thomas et al. 1990) was the selected alternative.

The Interagency Scientific Committee's Strategy applied to all Federal lands, including those under management by the USDI Bureau of Land Management in western Oregon and northern California. A major assumption made in the analysis of owl viability, under all five alternatives in the Final Environmental Impact Statement, was that Bureau of Land Management administered lands would be managed under a strategy equal or superior to the Interagency Scientific Committee's Strategy in providing for viability for the owl. It was also assumed in the Final Environmental Impact Statement that formal consultation between the Bureau of Land Management and Fish and Wildlife Service on any activity that might adversely affect spotted owls or their habitat would preclude implementation of Bureau of Land Management timber sales which were in conflict with the Interagency Scientific Committee's Strategy or an equivalent plan.

Subsequent to the preparation of the viability assessments that were included in the Final Environmental Impact Statement, the Bureau of Land Management applied to the Endangered Species Committee for an exemption from the requirements of Section 7 of the Endangered Species Act for 44 timber sales in western Oregon, judged by the Fish and Wildlife Service To cause jeopardy to the spotted owl. On May 15, 1992, the Endangered Species Committee exempted 13 of these timber sales. Additionally, the Endangered Species Committee required that if the Bureau of Land Management proceeded with the 13 exempted timber sales, the agency would, thereafter, adhere to mandates in the Draft Recovery Plan for the Northern spotted Owl (USDI 1992) (hereafter referred to as the Draft Recovery Plan).

Results of the Scientific Analysis Team analysis of the effects of the 13 exempted Bureau of Land Management timber sales on viability assessments reported in the Final Environmental Impact Statement are reported in Chapter 2. The Scientific Analysis Team concluded that the

exemption of these 13 timber sales, when viewed as a one-time action, would have negligible effects on the "high" viability rating of the Forest Service selected alternative, Alternative B (i.e., the Interagency Scientific Committee's Strategy). The Scientific Analysis Team however, believed that cutting these sales would locally compromise the conservation of dispersal habitat for the northern spotted owl (*Strix occidentalis caurina*) in a "critical link" area that was already below standards of the Interagency Scientific Committee's Strategy in terms of dispersal habitat.

We also concluded that exemption of the 13 Bureau of Land Management sales was only a part of a larger question regarding Bureau of Land Management's contributions to present and future spotted owl habitat. In Chapter 2, of this report, we analyzed the effects of the Bureau of Land Management following their current plans. However, based personal communication with the Bureau of Land Management Oregon State Director (D. Bibles Pers. comm.), we considered the Preferred Alternatives presented in Draft Resource Management Plans (USDI 1992a, USDI 1992b, USDI 1992c, USDI 1992d, USDI 1992e, USDI 1992f, USDI 1992g) for six western Oregon Bureau of Land Management Districts represent the closest approximations of how the Bureau of Land Management will provide habitat for northern spotted owls in the future. Thus, we used the Preferred Alternatives in the Bureau of Land Management Draft Resource Management Plans as the benchmark for our analysis.

## **PURPOSES OF THE ANALYSIS**

This analysis had two objectives. First, we evaluated the effects on northern spotted owl habitat from the exemption of the 13 timber sales and resulting from implementation of Preferred Alternatives in Draft Resource Management Plans on six western Oregon Bureau of Land Management Districts (Salem, Eugene, Roseburg, Coos Bay, Medford, and Klamath Districts). Second, we determined if the Bureau of Land Management Preferred Alternative would provide spotted owl habitat at levels equal or superior to the Interagency Scientific Committee Conservation Strategy. The assessment of viability in the Final Environmental Impact Statement was based on such an assumption.

## **DESCRIPTION OF THE ANALYSIS**

The Bureau of Land Management in Oregon is in the process of developing 10-year Resource Management Plans for each Bureau of Land Management District within the range of the northern spotted owl. These plans will establish direction for management of natural resources on Bureau of Land Management administered lands and will disclose consequences for the northern spotted owl and its habitat. Preferred Alternatives in the Draft Resource Management Plans have been identified and are hereafter referred to collectively as the "Bureau of Land Management Preferred Alternative". Each of the six Bureau of Land Management Draft Resource Management Plans also includes an Alternative D that represents the Interagency Scientific Committee's Strategy (hereafter referred to collectively as "Bureau of Land Management Alternative D").

Two basic premises that governed our analysis are described below. In the analysis documented in Chapter 2 of this report, we concluded that consultation under Section 7 of the Endangered Species Act has not and will not provide *de facto* management strategies that would ensure high probabilities of viability for northern spotted owls. Also, when implemented, agency management plans rather than Section 7 consultation procedures would ultimately produce the level of risks associated with the continued existence of viable populations.

Another basic premise undergirding this analysis is that implementation of Bureau of Land Management Alternative D along with implementation of the selected alternative of the Final Environmental Impact Statement (Interagency Scientific Committee's Strategy and hereafter referred to as Final Environmental Impact Statement Alternative B) on National Forests, results in a "high" viability rating for Final Environmental Impact Statement Alternative B. The high rating was deemed warranted due to full implementation of the Interagency Scientific Committee's Strategy on Federal lands throughout the range of the northern spotted owl as anticipated by the Interagency Scientific Committee.

The premise behind this high viability rating is consistent with assumptions used in making the viability assessments in the Final Environmental Impact Statement. Further, these assessments remain valid in the opinion of the Scientific Analysis Team. This assessment followed a review of new information regarding demographics of the spotted owl (Chapter 4) and the analysis of the effects of exemption by the Endangered Species Committee of 13 Bureau of Land Management timber sales considered as a one-time action (Chapter 2).

This analysis, then, focused on comparing Bureau of Land Management Alternative D (i.e., Interagency Scientific Committee's Strategy) to the Bureau of Land Management Preferred Alternative and assessing the significance of any differences. The Bureau of Land Management and Forest Service planning alternatives which address the Interagency Scientific Committee Conservation Strategy are compared as follows.

Bureau of Land Management Alternative D = Interagency Scientific Committee Conservation Strategy applied to Bureau of Land Management administered lands in Oregon within the range of the northern spotted owl.

Final Environmental Impact Statement Alternative B --- Interagency Scientific Committee Conservation Strategy applied to lands managed by the Forest Service within the range of the northern spotted owl.

### **Bureau of Land Management Alternative D - Interagency Scientific Committee's Strategy**

The Interagency Scientific Committee's Strategy as represented by Bureau of Land Management Alternative D and Final Environmental Impact Statement Alternative B was described in detail by Thomas et al. (1990). The strategy calls for establishment of large blocks of habitat spaced close enough (7-12 miles) to other large blocks of habitat to facilitate movement of spotted owls among such blocks. These blocks, known as Habitat Conservation Areas, have primary objectives of providing superior spotted owl habitat and supporting stable concentrations (multiple pairs) northern spotted owls now and in the future. The Interagency Scientific Committee's Strategy prohibits timber harvest within Habitat Conservation Areas except under special situations involving the loss of extensive areas of forest through catastrophic events. These standards were established to allow previously logged forests inside Habitat Conservation Areas to develop naturally into superior spotted owl habitat (Thomas et al. 1990:167). The Interagency Scientific Committee assumed that natural growth of young-age forests results in better habitat conditions, sooner, than if such young forests were to be silvicultural treated. This assumption was made because there were no data to demonstrate that silvicultural practices could improve upon natural succession. Silvicultural practices applied to forests outside Habitat Conservation Areas were to serve as a means to scientifically test whether, with proper prescriptions designed to

create or accelerate attainment of owl habitat, timber harvest might provide spotted owl habitat in the long-term future.

The Interagency Scientific Committee's Strategy also provided management prescriptions for Federal lands between Habitat Conservation Areas within the range of the northern spotted owl. These prescriptions direct the retention of forest stands around spotted owl nests (Category 4 Habitat Conservation Areas) and provide for well-distributed dispersal habitat for spotted owls based on the 50-11-40 rule. The 50-11-40 rule provided for at least 50 percent of a quarter-township having trees averaging at least 11 inches in diameter at breast height with a canopy closure of 40 percent or more.

### **Bureau of Land Management Preferred Alternative**

The Bureau of Land Management Preferred Alternative incorporates many aspects of the Interagency Scientific Committee's Strategy and the Draft Recovery Plan (USDI 1992h). Basic elements of the Bureau of Land Management Preferred Alternative pertaining to spotted owl habitat are described as follows.

Old-Growth Emphasis Areas are established and often overlap areas designated in the Interagency Scientific Committee's Strategy as Habitat Conservation Areas. Two types of Old-Growth Emphasis Areas are identified: (1) Deferred Old-Growth Emphasis Areas where regeneration logging in spotted owl habitat is deferred for 80 years; and (2) Non-deferred Old-Growth Emphasis Areas where limited regeneration cutting begins immediately following implementation, for purposes of testing the feasibility of a number of timber harvest techniques for maintenance of both old-growth conditions and sustained timber production (USDI 1992a:13). After 80 years, regeneration cutting in deferred Old-Growth Emphasis Areas will consist of small patch cuts (1 to 5 acres) with overall cutting cycles (i.e., rotations) of 300 years. One-fourth to one-third of 100- to 300-acre forest stands would receive regeneration harvest every 50-100 years. Overall, regeneration harvest would occur at a rate of about 3 percent of the total acreage of suitable habitat per decade. The Bureau of Land Management Preferred Alternative does not provide a stated objective for Old-Growth Emphasis Areas with respect to spotted owls.

Both types of Old-Growth Emphasis Areas would be silviculturally treated through density management to promote stand diversification and development of structural characteristics needed by species that prefer old-growth habitat (USDI 1992a:13). Density management consists of logging commercial trees in younger forest stands (not considered spotted owl habitat) control densities of trees (D. Dippon pers. comm.). Objectives of density management are accelerate creation of old-growth forest conditions and to produce timber (USDI 1992a:13). Based on discussions with Bureau of Land Management personnel (D. Dippon, pers. comm.), production of timber in Old-Growth Emphasis Areas is considered secondary to the primary objective of the development or maintenance of spotted owl habitat. Even though the Bureau of Land Management expects such treatments to hasten the development of suitable spotted owl habitat, analyses in Draft Resource Management Plans do not model the rate of habitat development at a rate faster than expected to occur naturally (D. Dippon pers. comm.).

Deferred Old-Growth Emphasis Areas are located in and include essentially the same geographic locations as proposed Designated Conservation Area~ in the Draft Recovery Plan (USDI 1992h). The locations also roughly correspond to Habitat Conservation Areas of the Interagency Scientific Committee Conservation Strategy. One non-deferred Old Growth Emphasis Area in the western portion of the Salem District corresponds in location to both a Habitat Conservation

Area and a Designated Conservation Area. The other non-deferred Old-Growth Emphasis Areas are located in areas outside the Habitat Conservation Areas or Designated Conservation Areas.

The Bureau of Land Management Preferred Alternative establishes two major prescriptions for forested lands administered by the Bureau of Land Management between Old-Growth Emphasis Areas (i.e., the matrix), One prescription is applied to "connectivity areas" which are linear tracts of Bureau of Land Management administered lands between and among Old-Growth Emphasis Areas. Here, the majority of the forest stands would be managed on harvest cycles of 120-200 years with 12-18 trees (size not specified) per acre remaining after logging. The other prescription is applied to forest stands called General Forest Management Areas. In southern Oregon, some of the General Forest Management Areas would be logged on 120 year rotations (USDI 1992a:13); 18-25 trees (size not specified) per acre would remain after logging (J. pets. comm.). The Bureau of Land Management expects a 40 percent canopy closure to remain when such numbers of trees are left (D. Dippon pers. comm.). In other areas, the General Forest Management Areas would be logged on 80-110 year rotations; 6-8 trees (size not specified) per acre would remain after logging (USDI 1992b:2-41). Canopy closure of 40 percent is not expected in these areas.

All currently known and newly found spotted owl pair sites in the forest matrix outside Old-Growth Emphasis Areas will be protected temporarily and to some degree. A total of 80-100 acres will be protected from logging at each location for at least 80 years in the two types of General Forest Management Areas and in connectivity areas (USDI 1992b:2-43.). These small reserves may correspond to Category 4 Habitat Conservation Areas of Bureau of Land Management Alternative D (interagency Scientific Committee's Strategy). However, the Bureau of Land Management Preferred Alternative does not specify that pair sites be comprised of suitable habitat, in contrast to the Interagency Scientific Committee's Strategy.

Prescriptions for snags and down logs are provided in the Bureau of Land Management Preferred Alternatives and generally call for leaving snags "where feasible" and four logs per acre 24 inches in diameter and 50 feet in length "where available", regardless of location relative to Old-Growth Emphasis Areas (USDI 1992b:2-41).

The key elements of Bureau of Land Management Alternative D and the Bureau of Land Management Preferred Alternative Listed above are summarized in Table 3-1.

Table 3-1 Summary of Key Elements of Bureau of Land Management Alternative D and the Bureau of Land Management Preferred Alternative.

BLM Alternative D	BLM Preferred Alternative
<p><u>Number of owl pairs in Multiple pair reserves:</u></p> <p>Establishes HCAs to support at least 20 pairs of spotted owls unless habitat or ownership prevented.</p>	<p>Not Stated.</p>
<p><u>Single pair reserves:</u></p> <p>Protects an area equal to a home range (Category 3 HCAs) for all known and future pairs of spotted owls in the Oregon Coast Range Area of Special Concern (Thomas et al. 1990)</p>	<p>Incorporates some of the spotted owl pairs that would be included in Category 3 HCAs into OGEAs. No provisions are made for protection of home range size areas of other known pairs.</p>
<p><u>Timber harvest in reserves:</u></p> <p>Prohibits harvest of any age-class Of forest within HCAs with few exceptions.</p>	<p>Timber harvest allowed in OGEAs to accelerated and develop old-growth characteristics and to provide timber.</p>
<p><u>Experimental forestry:</u></p> <p>Research outside the HCAs encouraged To validate hypotheses regarding silvicultural treatments.</p>	<p>Provides for treatments, most of which are largely experimental, to be conducted in OGEAs.</p>
<p><u>Protection of residual stands at pair sited:</u></p> <p>Establishes protection areas of up to 80 acres of suitable habitat around known spotted owl pair sites outside HCAs up to a maximum of seven per township.</p>	<p>Protection of 80-100 acres around all known and spotted owl pair sites found in the future outside OGEAs. Habitat quality is not specified</p>
<p><u>Dispersal habitat:</u></p> <p>Provisions for well distributed dispersal habitat per the 50-11-40 rule—to be attained as soon as possible.</p>	<p>Provisions that will likely meet 50-11-40 standard in parts of the range e.g., connectivity areas and General Forest Management Areas in portions of southern Oregon. Standards of 50-11-40 will be met in most other areas in 40-50 years.</p>

**Table 3-1 (continued)** Summary of Key Elements of Bureau of Land Management Alternative D and the Bureau of Land Management Preferred Alternative.

Dispersal standards apply to all areas within the range of the owl outside HCAs.	Dispersal standards apply to most areas within and surrounding OGEAs (UDDI 1992e:4-70)
<u>Spacing of reserve areas:</u>	
Spacing of 20+ pair areas to be no more than 12 miles apart, 2 to 19 pair areas no more than 7 miles apart.	Not stated.
<u>Distribution of reserve areas:</u>	
Distribution of HCAs to provide a hedge against catastrophic loss of habitat and represent varying elevations and vegetative communities within the range of the spotted owl.	Not stated.
<u>Slash disposal:</u>	
No provisions for disposal of logging slash in preparation for regeneration of forest stands since logging, for the most part, is prohibited in HCAs.	Prescribes fire as preferred method of slash disposal and method of preparing harvest units for planting in OGEAs.
<u>Habitat components:</u>	
No prescriptions for numbers of snags or down logs following logging since cutting is, for the most part, prohibited in HCAs.	Prescribes retention of snags “where feasible” and four logs, 20 inches in diameter and 50 feet long per acre “where feasible” following regenerations harvest in OGEAs.
<u>Oversight of implementation:</u>	
Calls for interagency oversight to ensure consistent interpretation and implementation if adopted as per ISC Strategy recommendations.	No provisions for interagency oversight.

## **METHODS**

The Bureau of Land Management's Draft Resource Management Plans provide information on seven alternatives for natural resource management on Bureau of Land Management administered lands. The plans present anticipated effects of each alternative on several attributes of spotted owl habitat. We used these attributes to make direct comparisons between alternatives. Some of these attributes correspond to criteria 1 through 7 used in the viability analysis in the Final Environmental Impact Statement. Where data were insufficient to assess alternatives relative to spotted owl viability, we contacted appropriate Bureau of Land Management staff to seek additional information. If data were not available, our viability assessments were made based on professional judgment of risk.

## **SCENARIOS ANALYZED**

### **Comparison of Bureau of Land Management Alternative D (Interagency Scientific Committee's Strategy) to Bureau of Land Management Preferred Alternative**

We assumed that Bureau of Land Management Alternative D of the Draft Resource Management Plans and Final Environmental Impact Statement Alternative B (USDA 1992:96) exactly meet provisions of the Interagency Scientific Committee Strategy. Therefore, the Bureau of Land Management Preferred Alternative was assessed to determine how it varied from Bureau of Land Management Alternative D relative to each criterion. Differences between Bureau of Land Management Alternative D and the Bureau of Land Management Preferred Alternative serve to demonstrate differences between the Interagency Scientific Committee's Strategy and the Bureau of Land Management's expected management strategy in providing for the viability of the spotted owl. Increased ability to meet each criterion and all criteria collectively would result in a higher viability rating. Conversely, a decreased ability to satisfy the criteria would reflect greater risk to viability.

## **VIABILITY EVALUATION CRITERIA**

Seven criteria were used to assess how well the five alternatives of the Final Environmental Impact Statement provided for viability of the northern spotted owl (USDA 1992). More detailed discussions of the criteria can be found in Chapter 2. The criteria are as follows:

1. Potential change in the amount and rate of change of spotted owl nesting, roosting, and foraging habitat.
2. Distribution of designated spotted owl nesting, roosting, and foraging habitat throughout the range of the northern spotted owl with emphasis on areas of concern.
3. Capability of the habitat to support pairs of spotted owls through time.
4. Provisions for dispersal habitat to facilitate successful dispersal of spotted owls between and among areas designated for spotted owl habitat.
5. Spacing between areas designated for spotted owl habitat.

6. Provisions for size of spotted owl nesting, roosting, and foraging habitat patches.
7. Provisions for designating multiple pairs of spotted owls thereby increasing probability that such areas will be occupied consistently through time (i.e., "clustering").

## **RESULTS**

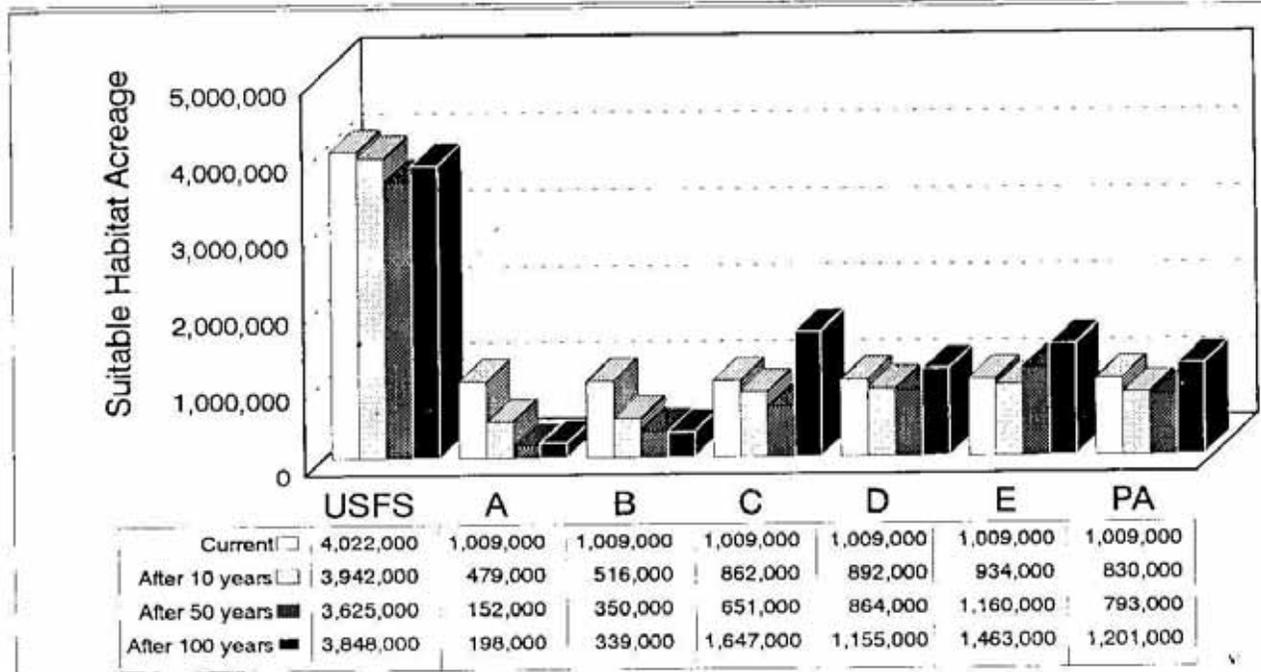
### **Comparison of Bureau of Land Management Alternative D (Interagency Scientific Committee's Strategy) to Bureau of Land Management Preferred Alternative**

#### **Criterion 1 - Potential Change in Habitat**

Factors contributing to quantity of spotted owl habitat include, but are not limited to, total acreage, age, juxtaposition, and size of habitat blocks across the landscape (Thomas et al.).

**Total Acreage of Habitat** - Figure 4-21 in the Roseburg District Draft Resource Management Plan, and included here as Figure 3-1, compares potential changes in spotted owl habitat on a Bureau of Land Management administered lands in western Oregon among alternatives analyzed in Draft Resource Management Plans. The total amount of suitable habitat decreases for above 50 years then increases thereafter in both Bureau of Land Management Alternative D and the Bureau of Land Management Preferred Alternative. Implementation of the Bureau of Land Management Preferred Alternative would result in less available suitable spotted owl habitat in both the first 10 years (62,000 fewer acres) and 50 years (71,000 fewer acres) compared to of Land Management Alternative D. In 100 years, the Bureau of Land Management Preferred Alternative would result in an increase of 46,000 acres of suitable spotted owl habitat, compared to Bureau of Land Management Alternative D. These projections are based on Bureau of Land Management assumptions that silvicultural practices proposed in the Old-Growth Emphasis Areas will succeed in providing spotted owl habitat.

Figure 3-1 Total Suitable Spotted Owl Habitat Western Oregon- Lands Administered by the Forest Service and BLM by Alternative



USFS 10-year data prorated between current and 50-year projection

This is a reproduction of Figure 4-21 from page 4-66 of the Draft Roseburg District Resource Management Plan and EIS (USDI 1992b).

USFS 10-year data prorated between current and 50-year projection

This is a reproduction of Figure 4-21 from page 4-66 of the Draft Roseburg District Resource Management Plan and EIS (USDI 1992b).

Each Draft Resource Management Plan provided estimates of expected amounts of suitable owl habitat at time periods of 10, 50 and 100 years after implementation. Differences in suitable spotted owl habitat between Bureau of Land Management Alternative D and the Bureau of Land Management Preferred Alternative are most pronounced at 50 years (Table 3-2).

**Table 3-2** Acres of Suitable Spotted Owl Habitat by Bureau of Land Management District After 10 Years/50 Years For Bureau of Land Management Alternative D and Bureau of Land Management Preferred Alternative.

Acres in Thousands		
<u>District BL</u>	<u>M Alternative D</u>	<u>BLM Preferred Alternative</u>
Salem	157/159	149/146
Eugene	107/114	102/116
Roseburg	190/156	174/144
Coos Bay	112/106	100/95
Medford	312/322	291/271
Klamath Falls	<u>14/8</u>	<u>14/21</u>
Totals	892/865	830/793

Draft Resource Management Plans indicate that the total amount of suitable spotted owl habitat decreases more in the short term (10-50 years) under the Bureau of Land Management Preferred Alternative than under Bureau of Land Management Alternative D. Overall, Bureau of Land Management Alternative D results in a decrease of 14 percent from the current amount (1,009,000 acres) of suitable spotted owl habitat on Bureau of Land Management administered lands in Oregon after 50 years. The Bureau of Land Management Preferred Alternative results in a decrease of 21 percent in that same time period. This decrease occurs in all but the Oregon Cascades East Physiographic Province and affects four of six districts (Table 3-3).

**Table 3-3** Acres of Suitable Spotted Owl Habitat on Bureau of Land Management Administered Lands by Physiographic Province After 10 Years/50 Years for Bureau Of Land Management Alternative D and Bureau of Land Management Preferred Alternative<sup>1</sup>.

Physiographic Province	Acres in Thousands	
	BLM Alternative D	BLM Preferred Alternative
Oregon Coast Range	290/304	270/288
Oregon Cascades West	260/236	242/213
Oregon Cascades East	14/9	14/22
Klamath Mountains	<u>328/315</u>	<u>304/270</u>
Totals	892/864	830/793

<sup>1</sup>Data are from Draft Resource Management Plans for each district.

Decreases in the amounts of suitable spotted owl habitat within both the Bureau of Land Management Preferred Alternative and Alternative D may be related to miles of roads constructed. The Executive Summary of the Bureau of Land Management’s Draft Resource Management Plans (USDI 1992a:10) indicates an annual road construction rate of 14 more miles per year under Bureau of Land Management Alternative D compared to the Bureau of Land Management Preferred Alternative for the first 10 years. This results in 140 more miles of roads per decade under Bureau of Land Management Alternative D than under the Bureau of Land Management Preferred Alternative. This seems inconsistent with projections for decreases in amounts of suitable habitat discussed above and expected timber sale volumes. The Executive Summary indicated that the Bureau of Land Management Preferred Alternative is expected to produce an additional 131 million board feet (MMBF) of timber per year compared to Bureau Land Management Alternative D. Data compiled from each Draft Resource Management Plan indicated that, for the first 10 years, 98 more miles of roads will be constructed in the Bureau of Land Management Preferred Alternative than in Bureau of Land Management Alternative D. Estimates of total annual timber production in the Draft Resource Management Plans for the Bureau of Land Management Preferred Alternative also indicate an expected increase of 131 MMBF compared to Bureau of Land Management Alternative D. This seems more consistent with other projections. For our analysis, we assumed each Draft Resource Management Plan was more accurate than the Executive Summary.

**Age of Habitat** - The amount of old-growth forest remaining across the landscape is another factor related to amounts of spotted owl habitat over time. Patches of old-growth forests are frequently the key to spotted owl occupancy of an area comprised of younger forests that are approaching maturity. Logging of isolated patches of old growth, even if relatively small (i.e., 10 - 20 acres) can reduce the probability of spotted owl use of the younger stands.

old growth is defined in the Bureau of Land Management planning documents (USDI 1992b:4-19) as either unmanaged stands older than 195 years, or managed stands which meet the definition in Forest Service Pacific Northwest Research Station Note PNW-447 (USDA 1986). While spotted owls do not typically use only old-growth forests, studies of habitat use by spotted owls have shown they strongly select older forest types. Use of habitat by owls, in general, is positively correlated with advanced stand development. Northern spotted owls use old, multilayered forests much more frequently than other structural and age classes (Thomas et al., 1990). This pattern shows that for most forest types in Oregon, Washington, and California, old forest [old-growth forest] is clearly preferred habitat (USDA 1991:2). The Interagency Scientific Committee (Thomas et al. 1990:144) adopted the following operational approach dealing with the, ecological dependency of spotted owls on preferred habitat:

"When patterns of a species' abundance and distribution show a consistent, close association with a particular type or types of habitat we assume that the habitat is essential for the species' persistence. We contend that habitat selection is a behavior that reflects the long-term needs of a given species, and that it has so evolved over thousands of years of varying environmental conditions as a result of natural selection. Consequently, preference for a given habitat or habitat attribute likely indicates a need."

Given this relationship between the needs of spotted owls and old-growth forests, it seems likely that decreases in the amounts of existing old-growth forests will have adverse effects on spotted owl pairs. Such effects could be disproportionately greater than the acreage lost. This is especially true where the amount of superior habitat is slightly less than spotted owls typically require, but where availability of additional marginal habitat may tip the balance in favor of successful occupancy or even occasional breeding (Thomas et al. 1990:143).

Implementation of the Bureau of Land Management Preferred Alternative reduces both average patch size and quantity of old-growth habitat, compared to the Bureau of Land Management Alternative D. With the exception of the Salem District, Draft Resource Management Plans indicate the Bureau of Land Management Preferred Alternatives would result in 274,600 acres of old growth which is in patches greater than 20 acres during the first decade, compared to 286,700 acres in such patch sizes for Bureau of Land Management Alternative D. This represents a 4 percent decline. The Executive Summary for the Draft Resource Management Plans (USDI 1992a:10) indicates that 475,000 acres of old growth would occur on Bureau of Land Management administered lands in 100 years under the Bureau of Land Management Preferred Alternative. This compares to 506,000 acres expected under Bureau of Land Management Alternative D. This is a 31,000 acre (6 percent) difference.

The distribution of old growth among various land allocations varies between Bureau of Land Management's Preferred Alternative and Alternative D. Less than 1 percent of the acres of old growth on the Roseburg District are expected to occur on lands available for timber production under Bureau of Land Management Alternative D while 65 percent of the old-growth acres are expected to occur on lands available for timber production under the Bureau of Land Management Preferred Alternative (Table 3-4). The implication is that Bureau of Land Management expects timber management to be compatible with maintaining or replacing old-growth forests.

**Juxtaposition and Size of Habitat Blocks** - Five Bureau of Land Management districts (all but Klamath Falls) provided comparisons of the numbers and sizes of blocks of old-growth forests by various block sizes expected over the next 10 years for each of the Draft Resource

Management Plans' alternatives. Implementation of the Bureau of Land Management Preferred Alternative results in reductions in the number of blocks of old growth in all size classes except for blocks greater than 600 acres. Numbers of large (300 to 599 acres) blocks of old growth decreased 14 percent under the Bureau of Land Management Preferred Alternative as compared to Bureau of Land Management Alternative D, within 10 years on the Eugene, Roseburg, and Medford Districts (Table 3-5). Reductions in total numbers of blocks and the overall reduction in acreage of old growth may be because the Bureau of Land Management Preferred Alternative does not provide reservation of habitat for all the single pair areas (Category 3 Habitat Conservation Areas) called for under Bureau of Land Management Alternative D (D. Dippon pers. comm.).

Another factor to consider relative to amounts of suitable spotted owl habitat is the arrangement of old-growth stands across the landscape. More contiguous stands of older forests are believed to provide better habitat conditions than an equal amount of habitat in loose aggregations of fragmented blocks (Thomas et al. 1990:285). Recent work by Meyer et al. (1992) indicates known owl sites selected at random contain more old growth, larger average size of old-growth patches, and larger maximum size of old-growth patches than occur in landscape locations selected at random (USDI 1992d:3-44). Lehmkuhl and Raphael (In press) report the same result for the Olympic Peninsula.

**Table 3-4 Acres of Stands in the Commercial Forest Landscape Expected to Attain Old-Growth Structural Characteristics within 100 Years\***

Acres of Stands Meeting Old-Growth Definitions			
Alternatives	Lands Available for Timber Production	Lands Not Available for Timber Production	Total
NA	0	39900	53300
A	0	22500	22500
B	200	45800	46000
C	74600	72400	147000
D	200	115800	116000
E	500	174900	175400
PA	64600	34900	99500

\*Old-Growth defined as either unmanaged stands older than 195 years, or managed stands which meet the definition in USFS PNW 447.

This is a reproduction of Table 4-7 from page 4-1 g of the Draft Roseburg District Resource Management Plan and EIS (USDI 1992b).

Alternatives from BLM Draft Resource Management Plan

PA= Preferred Alternative

**Table 3-5** Comparison of the Expected Number of Old-Growth Blocks in 10 Years by Size Category and District Between Bureau of Land Management Alternative D and the Bureau of Land Management Preferred Alternative (PA) of Bureau of Land Management’s Draft Resource Management Plans.

Block Size	BLM District	Numbers of Blocks		% Change
		BLM Alternative D	BLM PA	
20-79 acres	Salem	229	185	-19
	Eugene	280*	245*	-12
	Roseburg	543	516	-5
	Coos Bay	175	171	-2
	Medford	<u>492</u>	<u>7</u>	<u>-3</u>
Totals		1,719	1,593	-7
80-299 acres	Salem	73	67	-8
	Eugene	120"	120"	0
	Roseburg	219	219	0
	Coos Bay	79	78	-1
	Medford	<u>243</u>	<u>232</u>	<u>-5</u>
Totals		734	716	-2
300-599 acres	Salem	7	7	0
	Eugene	20*	18*	-10
	Roseburg	55	45	-18
	Coos Bay	17	17	0
	Medford	<u>47</u>	<u>38</u>	<u>-19</u>
Totals		146	125	-14
600+ Acres	Salem	2	3	+50
	Eugene	5*	5*	0
	Roseburg	19	18	-5
	Coos Bay	14	14	0
	Medford	<u>12</u>	<u>12</u>	<u>0</u>
Totals		52	52	0
Totals-all Blocks	Salem	311	262	-16
	Eugene	425	388	-9
	Roseburg	836	798	-5
	Coos Bay	285	280	-2
	Medford	<u>794</u>	<u>758</u>	<u>-5</u>
Totals		2,651	2,486	-6

\* = Values estimated from Bar Chart in Eugene Draft Resource Management Plan

In summary, implementation of the Bureau of Land Management Preferred Alternative, compared to Bureau of Land Management Alternative D, results in the following:

- 1) An additional 8 percent (71,000 acres) reduction in the amount of suitable spotted habitat in 50 years;
- 2) A 4 percent (46,000 acres) increase in the amount of suitable spotted owl habitat 100 years;
- 3) A 4 percent (12,100 acres) reduction in old growth over 10 years for five of six districts;
- 4) A 6 percent (31,000 acres) reduction of old growth after 100 years;
- 5) A 6 percent (165 blocks) reduction in total old-growth blocks (20 acres or larger) 10 years for five of six districts.

### **Criterion 2 - Distribution of Nesting, Roosting, and Foraging Habitat**

The distribution of spotted owl habitat in the Bureau of Land Management Preferred Alternative is similar to that of Bureau of Land Management Alternative D, with the following exceptions:

1. The Bureau of Land Management Preferred Alternative includes relatively minor inclusions and exclusions of acreages from 16 Habitat Conservation Areas (0-6, 0-7, 0-11, 0-12, 0-16, 0-17, 0-19, 0-21, 0-26, 0-27, 0-28, 0-31, 0-32, 0-33, 0-36, 0-38) identified in Bureau of Land Management Alternative D. The result of these changes is a net decrease of about 4,000 acres.
2. An additional 44,000 acres which can be considered a part of Habitat Conservation Area 0-30 is included in the Bureau of Land Management Preferred Alternative.
3. An additional 16,0400 acres within six new Old-Growth Emphasis Areas are included in the Bureau of Land Management Preferred Alternative.

These changes result in a total addition of approximately 56,000 acres of Bureau of Land Management administered lands being managed in Old-Growth Emphasis Areas under the Bureau of Land Management Preferred Alternative compared to Bureau of Land Management Alternative D. It should be remembered that the Bureau of Land Management Draft Resource Management Plans make no statement as purpose of the Old-Growth Emphasis Areas as they pertain to spotted owls. A majority (90 percent) of the added acres are within the Oregon Coast Range Province and within the portion of the province identified by the Interagency Scientific Committee as an area of special concern.

The overall distribution of spotted owl habitat in reserved areas is slightly better in the Bureau of Land Management Preferred Alternative because new areas were added between habitat blocks (Habitat Conservation Areas) identified under Alternative D. In addition, a new Old Growth Emphasis Area extends locations of habitat blocks on Federal lands 7 miles farther north from Habitat Conservation Area 0-36 in the Oregon Coast Range.

### **Criterion 3 - Capability of the Habitat to Support Pairs**

Bureau of Land Management evaluated alternatives in the Draft Resource Management Plans using a population model developed by the Pacific Southwest Forest and Range Experiment Station, Redwood Sciences Laboratory in Arcata, California (McKelvey in USDI 1992b). This model is commonly referred to as the McKelvey model. Although this is a different method than used by the Forest Service in the Final Environmental Impact Statement to estimate capability of habitat to support pairs of spotted owls, it provides a means to compare Bureau of Land Management Alternative D with the Bureau of Land Management Preferred Alternative.

The McKelvey model provides estimates of mean annual occupancy of a given habitat based on a number of factors including amounts and arrangements of habitat. Based on predicted habitat changes in the future, the model provides estimates of how likely it is that an area will be occupied by spotted owl pairs. These estimates are not actual projections of expected populations. The model is dependent on spatially explicit vegetative data to generate accurate estimates. The Bureau of Land Management has interpreted the mean annual occupancy estimates to be the spotted owl carrying capacity of the habitat at points in time. This represents an inappropriate use of the model. McKelvey (pers. comm.) indicated the only appropriate use of the model, as applied to the Bureau of Land Management's planning alternatives, was as a tool for the comparison of such alternatives.

Draft Resource Management Plans provided model-generated estimates of spotted owl carrying capacities at 10 and 100 year intervals following implementation of these plans. Two estimates were provided: one based on the premise that 60 percent of a 2,500 acre area had to be in suitable habitat for spotted owls to constantly occupy an area, the other based on 40 percent.

Table 3-6 summarizes Bureau of Land Management data taken from each of the Draft Resource Management Plans as corrected by the Bureau of Land Management (D. Dippon pers. comm.) since the plans were published. Bureau of Land Management data indicate that, for all assumptions and time periods given, carrying capacity of habitats for the spotted owl is greater under the Bureau of Land Management Preferred Alternative compared to Bureau of Land Management Alternative D, at both 10 and 100 years (Table 3-6).

We would expect a direct correlation of carrying capacity to expected amounts of suitable spotted owl habitat (see discussion for Criterion 1). Data presented in Draft Resource Management Plans, however, do not show this relationship. Estimated carrying capacity for all Bureau of Land Management Districts in western Oregon increases 1 percent and 4 percent for the 60 percent and 40 percent assumptions of habitat suitability, respectively, over 10 years. During the same 10 years, 62,000 fewer acres of suitable spotted owl habitat and 6 percent (n 165 blocks) fewer old-growth blocks are expected for the Bureau of Land Management Preferred Alternative than for Bureau of Land Management Alternative D. This absence of positive correlation between trends in habitat and expected carrying capacity of spotted owls was difficult for the Scientific Analysis Team to understand and warrants further examination.

The McKelvey model directly links habitat variation to demographic variation to assess effects of forest management on populations of the northern spotted owl (McKelvey 1992 in USDI 1992b:Appendix 4-107). Habitat projections developed by the Bureau of Land Management for the Bureau of Land Management Preferred Alternatives are based on assumptions discussed later in this Chapter (see Discussion Regarding Risk). Should these assumptions prove optimistic, it likely the estimated carrying capacities for spotted owls will likewise be optimistic.

No estimates of carrying capacities were presented in the Bureau of Land Management Draft Resource Management Plan for spotted owls at 50 years, the period of the greatest difference between amounts of suitable spotted owl habitat for the Bureau of Land Management Preferred Alternative and Alternative D of the Draft Resource Management Plans.

**Table 3-6** Estimated Carrying Capacity (Mean Annual Occupancy) of All Bureau of Land Management Administered Lands in Western Oregon by District at Years 10 and 100 for Bureau of Land Management Alternative D and Bureau of Land Management Preferred Alternative (PA). Based on Bureau of Land Management Analysis Data.

Assumption District	District	Carrying Capacity by BLM Alternative	
		D	PA
60% assumption at 10 years	Salem	16	17
	Eugene	7	8
	Roseburg	13	14
	Coos Bay	8	8
	Medford	39	38
	Klamath Falls	<u>1</u>	<u>0</u>
	Totals:	84	85
40% assumption at 10 years	Salem	53	50
	Eugene	28	29
	Roseburg	42	42
	Coos Bay	26	45
	Medford	88	84
	Klamath Falls	<u>5</u>	<u>22</u>
	Totals:	242	252
60% assumption at 100 years	Salem	48	48
	Eugene	21	32
	Roseburg	25	38
	Coos Bay	45	50
	Medford	105	134
	Klamath Falls	<u>3</u>	<u>1</u>
	Totals:	247	303
40% assumption at 100 years	Salem	80	80
	Eugene	56	87
	Roseburg	69	83
	Coos Bay	65	69
	Medford	183	254
	Klamath Falls	<u>7</u>	<u>6</u>
	Totals:	460	579

#### **Criterion 4 - Dispersal Habitat**

The Bureau of Land Management assessments of dispersal habitat in Draft Resource Management Plans were based on whether 1,389 quarter-townships individually meet 50-11-40 standards. This included approximately 103 quarter-townships located wholly within Old-Growth Emphasis Areas. To compare the Bureau of Land Management Preferred Alternative with the intent of the Interagency Scientific Committee's Strategy, the Scientific Analysis Team used quarter-townships or parts of quarter-townships outside of Old-Growth Emphasis Areas with the potential to meet 50-11-40 standards (n = 1,263). Bureau of Land Management quarter-townships within the Willamette Valley were analyzed as being either in the Oregon Coast Range Province or Western Oregon Cascades Province. Primary sources of information included a set of Bureau of Land Management maps (WODDB 50-11-40, July 31, 1992) showing the expected 50-11-40 status of quarter-townships at various time intervals (i.e., current, year 2030, and year 2040) for the Bureau of Land Management Preferred Alternative.

**Bureau of Land Management Alternative D-** Compliance with 50-11-40 standards in of Land Management Alternative D provides for dispersal habitat in accordance with expectations of the Interagency Scientific Committee's Strategy. The intent under Bureau of Land Management Alternative D is for all quarter-townships between Habitat Conservation Areas to reach 50-11-40 conditions as soon as possible, as described in detail in Thomas et al: (1990). Under this alternative, dispersal habitat improves steadily. The percentage quarter-townships with potential to meet 50-11-40 standards increases from 71 percent (n = 894 of 1,263) at present to 100 percent by year 2030 (Table 3-7; Figure 3-2). All quarter-townships, then, continue to meet 50-11-40 standards through year 2040.

Data were not available to ascertain trends of quarter-townships meeting 50-11-40 standards 50 years by physiographic province for Bureau of Land Management Alternative D. However, it seemed reasonable to assume that there will be a continual increase in the number of quarter-townships meeting 50-11-40 standards because assessments of all Bureau of Land Management administered lands in western Oregon indicate such a trend (J. Lint pets. comm.). The percentage of quarter-townships outside of Old-Growth Emphasis Areas with the capability to meet 50-11-40 standards is summarized by physiographic province (Figure 3:3). With the exception of the Oregon Cascades East Physiographic Province, the frequency distribution of quarter-townships capable of meeting 50-11-40 standards is similar between physiographic provinces.

Figure 3-2 Comparison of 50-11-40 Conditions on BLM Administered Lands Outside OGEAs Alternative D and Preferred Alternative - Western Washington

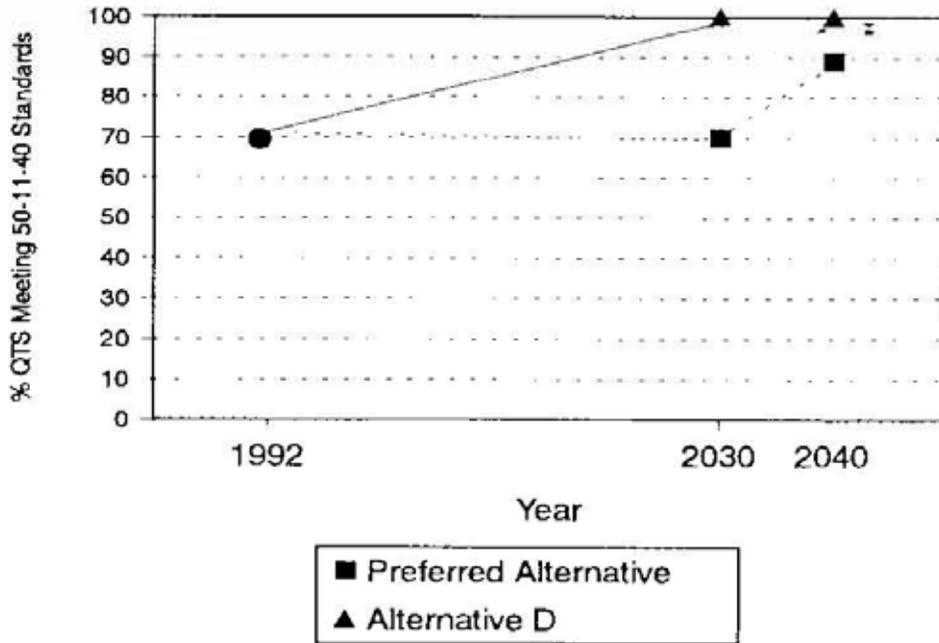
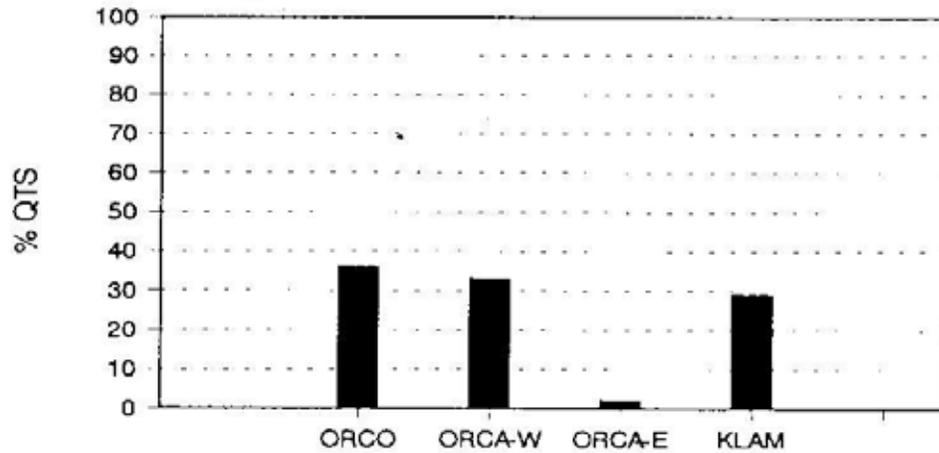


Figure 3-3 Percent of BLM Quarter-Townships by Physiographic Province



ORCO=Oregon Coast Range Province  
ORCA-W=Oregon Cascades West Province  
ORCA-E=Oregon Cascades East Province  
KLAM=Klamath Mountain Province

**Bureau of Land Management Preferred Alternative** - Under the Bureau of Land Management Preferred Alternative, quarter-townships are managed to improve overall from current conditions, with an emphasis on quickly meeting 50-11-40 standards in quarter-townships in linear bands between Old-Growth Emphasis Areas (designated as connectivity areas) and non=deferred Old-Growth Emphasis Areas (J. Lint pers. comm.).

Under the Bureau of Land Management Preferred Alternative, the percentage of quarter-townships meeting 50-11-40 standards initially declines slightly from 71 percent (n = 894) the present time to 70 percent (n = 878) by year 2030. A decline from 71 to 70 percent in the number of quarter-townships meeting 50-11-40 standards (dispersal habitat) is likely not significant reduction. What is significant is that it occurs during a period when owl populations, and amounts of nesting, roosting, and foraging habitat are declining. Further~ it occurs where conditions for dispersal are already most tenuous (i.e., the checkerboard ownership of Bureau of Land Management administered lands). The Bureau of Land Management Preferred Alternative will worsen conditions for spotted owls by slightly reducing current amounts of dispersal habitat and by delaying development of other stands which would meet 50-11-40 standards more quickly under Bureau of Land Management Alternative D. Between years 2030 and 2040, quarter-townships meeting 50-11-40 standards increase to 89 percent (n = 1,120) (Table 3-7, Figure 3-2). Beyond year 2040, the Bureau of Land Management Preferred Alternative is expected to nearly (90 percent or better) meet 50-11-40 standards in most areas (Bureau Land Management maps). This initial decline and following delay in meeting 50-11-40 standards represents a significant divergence from the intent of the Interagency Scientific Committee's Strategy.

**Table 3-7** Number of Quarter-Townships Meeting 50-11-40 Standards on Bureau of Land Management Administered Lands Within the Range of the Northern Spotted Owl under Bureau of Land Management’s Preferred Alternative.

Year	Physiographic province <sup>1</sup>	No. of quarter-townships
Current	All	894
	ORCO	307
	ORCA-W	287
	ORCA-E	17
	KLAM	283
2030	All	878
	ORCO	341
	ORCA-W	279
	ORCA-E	23
	KLAM	235
2040	All	1120
	ORCO	399
	ORCA-W	390
	ORCA-E	27
	KLAM	304

<sup>1</sup> Physiographic provinces: ORCO = Oregon Coast Range; ORCA-W = Oregon Cascades West; ORCA-E = Oregon Cascades East; KLAM = Klamath Mountains.

The following provides both a quantitative and qualitative description of the status of quarter-townships under the Bureau of Land Management Preferred Alternative.

a. Oregon Coast Range Province: Numbers of quarter-townships meeting 50-11-40 standards gradually increase (from 67 to 87 percent) over the next 50 years (Figure 3-4). Spatial distribution of quarter-townships meeting 50-11-40 generally improves as well. There is an increase in number of quarter-townships meeting 50-11-40 standards between Old-Growth Emphasis Areas overlapping with Habitat Conservation Areas O-28, O-29, O-30, O-31, O-32, O-33, O-35, O-36, O-37, and O-38 at years 2030 and 2040.

The number of quarter-townships meeting 50-11-40 standards in some areas near the outer boundaries of the Oregon Coast Range Province (e.g., the northeast corner of the province on the Bureau of Land Management Salem District and the southeast corner of the province on the Bureau of Land Management Coos Bay District) decreases or does not change. The overall effect at both years 2030 and 2040 represents an improvement in amount and distribution of quarter-townships meeting 50-11-40 standards but at a rate well below the numbers meeting such standards under Alternative D. This trend is significant because of the large (36 percent n = 460 of 1,263) (Figure 3-3) percentage Bureau of Land Management quarter-townships in the Oregon Coast Range Province and its identification as an area of special concern (Thomas et al. 1990).



Figure 3-4 Percent of 1263 BLM Quarter-Townships Meeting 50-11-40 Standards Under BLM's Preferred Alternative-Oregon Coast Range Physiographic Province

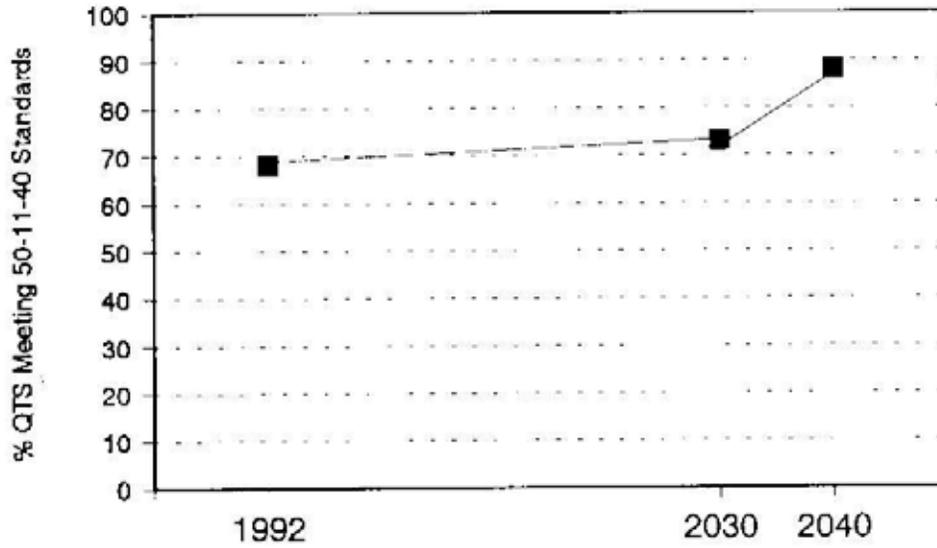
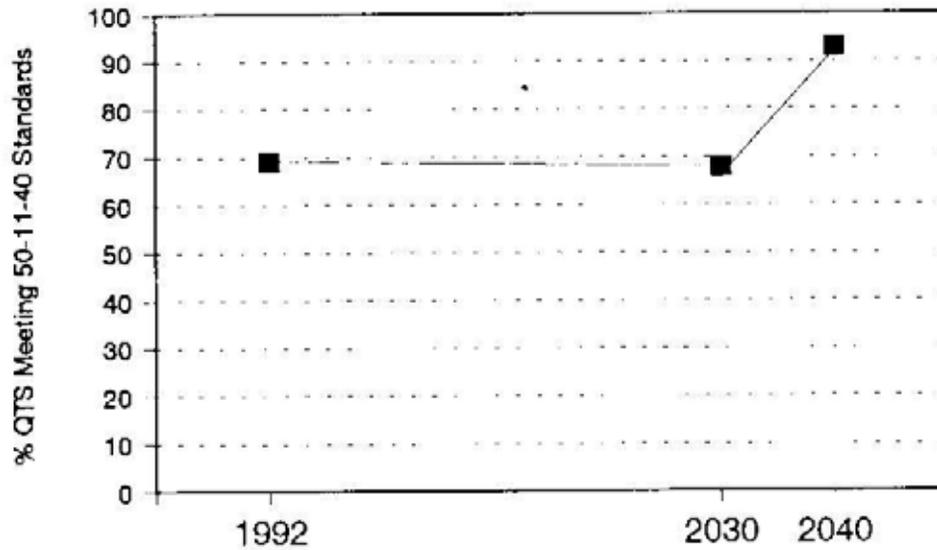


Figure 3-5 Percent of 1263 BLM Quarter-Townships Meeting 50-11-40 Standards Under BLM's Preferred Alternative - Oregon Cascade West Physiographic Province



b. Oregon Cascade West Province: Initially, the percentage of quarter-townships meeting 50-11-40 standards drops slightly from 69 percent to 67 percent at year 2030, then reaches 94 percent in year 2040 in the Bureau of Land Management Preferred Alternatives (Figure 3-5). Quarter-townships not meeting 50-11-40 standards at year 2030 are concentrated in two locations; one near Eugene, Oregon; the other, an area east of Roseburg, Oregon. While both areas improve by the year 2040, neither fully complies with 50-11-40 standards by year 2040.

The Fish and Wildlife Service identified the Southern Willamette/North Umpqua area between the Oregon Coast Range and Oregon Cascades West Physiographic Provinces as an area of concern (USDI, 1992h). Virtually all quarter-townships in this area of concern meet 50-11-40 standards by year 2030, a result similar to Bureau of Land Management Alternative D.

Quarter-townships anticipated to not meet 50-11-40 standards are highly concentrated in the southern portion of the province, an area east and north of Medford, Oregon. This condition remains virtually unchanged through year 2030. Between years 2030 and 2040, most of these quarter-townships are anticipated to meet 50-11-40 standards in this area.

The Oregon Cascades West Province contains approximately 33 percent (n = 414 of 1263) of all the Bureau of Land Management quarter-townships outside Old-Growth Emphasis Areas in Oregon within the range of the northern spotted owl (Figure 3-3). A decision to defer full compliance with 50-11-40 standards for 40 years after initiation of the plan in concentrated areas within this province represents a divergence from the results anticipated under the Interagency Scientific Committee's Strategy, and may pose localized dispersal obstacles to movement by spotted owls.

c. Oregon Cascades East Province: The Bureau of Land Management Preferred Alternative indicates a steady increase in quarter-townships meeting 50-11-40 standards from 63 to 100 percent over the next 50 years in this province (Figure 3-6). This is the only province in which the Bureau of Land Management expects to fully (100 percent, n = 27 quarter-townships) meet 50-11-40 standards (Table 3-7) in all quarter-townships in a 50-year time period. Approximately 2 percent (n = 27 of 1263) of Bureau of Land Management quarter-townships outside of Old-Growth Emphasis Areas in Oregon within the range of the northern spotted owl are located in this province. The 50-11-40 standards will be fully met under the Bureau of Land Management Preferred Alternative by year 2040. However, the province represents a relatively minor percentage of the landscape under consideration (Figure 3-3).

d. Klamath Mountains Province: The number of quarter-townships meeting 50-11-40 standards initially drops from 78 to 65 percent before increasing to 84 percent at year 2040 (Figure 3-7). The spatial distribution of quarter-townships not meeting 50-11-40 standards increases and is largely concentrated south of Roseburg, Oregon at year 2030. Conditions in this area improve by year 2040 but remain below current levels.

Figure 3-6 Percent of 1263 BLM Quarter-Townships Meeting 50-11-40 Standards Under BLM's Preferred Alternative - Oregon Cascade East Physiographic Province

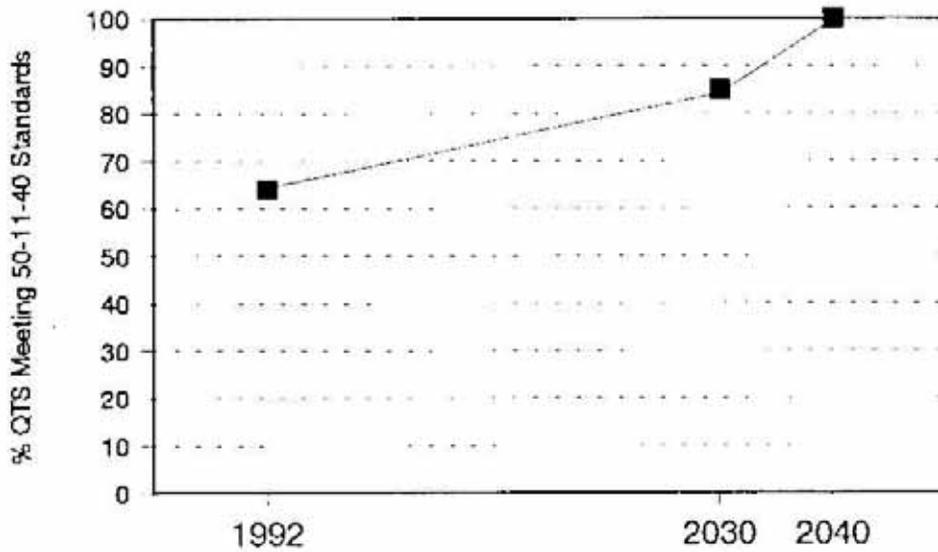
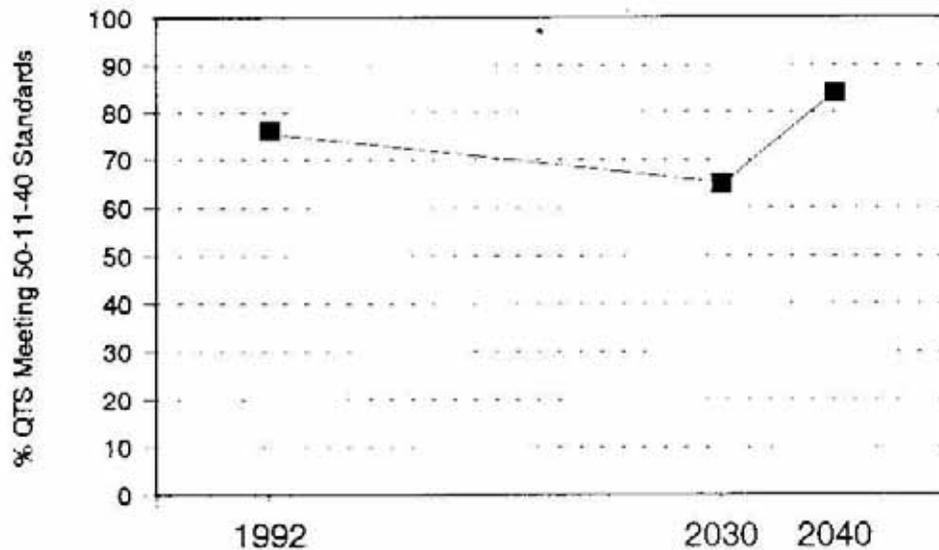


Figure 3-7 Percent of 1263 BLM Quarter-Townships Meeting 50-11-40 Standards Under BLM's Preferred Alternative - Klamath Mountain Physiographic Province (Oregon Portion)



In other portions of the Klamath Mountains Province, dispersal conditions, as reflected by analysis of quarter-townships, was anticipated to remain nearly constant until year 2030 when conditions improve in an area south and west of an Old-Growth Emphasis Area overlapping Habitat Conservation Area 0-16. At year 2040, conditions for dispersal improve in an area between Old-Growth Emphasis Areas overlapping Habitat Conservation Areas O-16, O-26, O-24, O-20, O-21, and O-17. A band of Federally managed quarter-townships meeting 50-11-40 standards results between these Old-Growth Emphasis Areas. Dispersal habitat is important in this area because in a large area around Grants Pass and Medford, Oregon, there are no Old-Growth Emphasis Areas designated. Dispersal habitat in this area is likely a key in facilitating movement by owls between the Klamath Mountains and Oregon Cascades West Physiographic Provinces.

Bureau of Land Management quarter-townships in the Klamath Physiographic Province with potential to meet 50-11-40 standards represent 29 percent (n = 362 of 1263) all quarter-townships on Bureau of Land Management administered lands in Oregon within the range of the northern spotted owl (Figure 343). A decision by the Bureau of Land Management to defer compliance with 50-11-40 standards for 40 years after implementation of the plan in concentrated areas within this province represents a significant divergence from the intent of the Interagency Scientific Committee's Strategy. These local areas may pose substantial dispersal obstacles to spotted owls (USDI 1992c).

Bureau of Land Management Alternative D incorporates the 50-11-40 rule across the landscape to respond to random dispersal of spotted owls as prescribed in the Interagency Scientific Committee's Strategy (Thomas et al. 1990). In contrast, in some areas, implementation of the Bureau of Land Management Preferred Alternative results in linear bands of quarter-townships meeting 50-11-40 standards.

Although some researchers support corridors of continuous suitable habitat (Thomas et al. 1990:303), Bureau of Land Management connectivity corridors occur in a fragmented ownership pattern, due to intermingling of other ownerships in a checkerboard pattern. This pattern will not likely result in the desired condition of bands of continuous suitable habitat. Even if the Bureau of Land Management meets 50-11-40 standards in all of its quarter-townships, the actual number of quarter-townships (all ownerships) meeting 50-11-40 standards across the landscape may range from less than 25 percent to 50 percent. Patches of habitat meeting 50-11-40 standards among Old-Growth Emphasis Areas may vary markedly in size and ability to provide connectivity. Ultimately, a reduction in quantity or quality of dispersal habitat for spotted owls may reduce probabilities of successful dispersal by owls. Reductions in successful dispersal by spotted owls are likely to result in higher death rates of dispersing owls and ultimately, reductions in population sizes, and an increasing inhibition to rescue effects (Thomas et al. 1990).

## **Criterion 5 - Spacing Between Areas Designated for Spotted Owl Management**

Minor changes in acreages of Old-Growth Emphasis Areas in the Bureau of Land Management Preferred Alternative reduce distances between some of these habitat blocks which are assumed by the Scientific Analysis Team to be somewhat analogous to Category 1 Habitat Conservation Areas (capable of supporting 20 or more pairs of owls) and Category 2 Habitat Conservation Areas (capable of supporting 2 to 19 pairs of owls) in the Interagency Scientific Committee's Strategy (see Criterion 2). A nearest-neighbor analysis of Old-Growth Emphasis Areas and Habitat Conservation Areas on Federal lands indicated that differences in spacing between all

Habitat Conservation Areas in the Interagency Scientific Committee's Strategy and the Habitat Conservation Area/Old Growth Emphasis Area network occur only within the Oregon Coast Range Province. Here the average first nearest-neighbor distance decreased from 5.1 to 4.0 miles and the average second-nearest neighbor distance decreased from 9.3 to 8.1 miles. The third nearest-neighbor distance decreased from 15.7 to 14.6 miles in the province.

Overall, 10 percent (n = 5 of 50) of Old-Growth Emphasis Areas equivalent in size to Category and 2 Habitat Conservation Areas in the State of Oregon would be closer together in the Bureau of Land Management Preferred Alternative than in Bureau of Land Management Alternative D. From this standpoint, the Bureau of Land Management Preferred Alternative is a slight improvement over Bureau of Land Management Alternative D so far as providing for successful dispersal of owls.

### **Criterion 6 - Patch Size of Habitat**

Areas of contiguous habitat probably support a larger number of northern spotted owls than an equal amount of habitat distributed as small patches (USDA 1988, Anderson et al. 1990). Fragmentation of habitat blocks increases the ratio of edge habitat to interior habitat resulting in a smaller amount of interior habitat overall (Thomas et al. 1990:293). A primary objective the design of Habitat Conservation Areas was to provide large blocks of nesting, roosting, and foraging habitat and offer areas which are expected to develop into superior owl habitat through time (Thomas et al. 1990:167). In this context, we equated patch size to Old Growth Emphasis Area size for a quantitative analysis.

The extent of density management of forest stands (i.e., selective cutting of trees) proposed the Bureau of Land Management Preferred Alternative within Old-Growth Emphasis Areas varies by Bureau of Land Management district and by decade (Table 3-8). On a district-wide basis, the Medford District would cut trees within 8 percent (n = 16,700 of 207,600 acres) of Old-Growth Emphasis Areas during the first decade. In contrast, a greater proportion (32 percent, n = 50,168 acres) of Old-Growth Emphasis Areas would be subject to density management on the Roseburg District by the fifth decade. Total area of Old-Growth Emphasis Areas subjected to density management increases from 3 percent (24,417 acres) in the first decade to 20 percent (143,344 acres) of 719,500 acres comprised by Old-Growth Emphasis Areas over the next 50 years. The low percentage of acres scheduled for density management in the first decade is attributed to the age class distribution (an abundance of early- and late-aged stands) in Old-Growth Emphasis Areas (D. Dippon pers. comm.), i.e., the trees are not large enough to be commercially valuable.

**Table 3-8** Acres of Density Control/Commercial Thinning in Old-Growth Emphasis Areas by Decade by District for Bureau of Land Management Preferred Alternative. (Numbers in Parentheses Represent Percentage of Total Area in Old-Growth Emphasis Areas by District.) Klamath Falls District has no Old-Growth Emphasis Areas.

District	10 Years	50 Years	Total area in OGEAs (At.)
Roseburg <sup>1</sup>	593 (<1%)	50,168 (32%)	155,200
Medford <sup>2</sup>	16,700 (8%)	33,400 (16%)	207,600
Eugene <sup>2</sup>	3,722 (3%)	28,832 (20%)	142,000
Salem <sup>2</sup>	2,799 (2%)	27,654 (21%)	134,200
Coos Bay <sup>2</sup>	603 (<1%)	3,290 (4%)	80,500
Total:	24,417 (3%)	143,344 (20%)	719,500

<sup>1</sup> J. Graham pers. comm.

<sup>2</sup> From Draft District Resource Management Plans.

Bureau of Land Management Draft Resource Management Plans assume stand management practices in Old-Growth Emphasis Areas will succeed in the development of characteristics of foraging habitat over the next 100 years. Consequently, patch size is expected to increase and fragmentation decrease over the long term. Draft Resource Management Plans do not discuss development of superior owl habitat as addressed by the Interagency Scientific Committee Conservation Strategy.

Available data on the extent of timber cutting (density management and regeneration cutting) within Old-Growth Emphasis Areas could not be directly translated into effects on Old-Growth Emphasis Area size. Optimistically, all proposed silvicultural treatments would produce desired results; all potential habitat would develop into suitable owl habitat, existing habitat would retain its suitability, and Old-Growth Emphasis Area size would not be adversely affected. Pessimistically, proposed silvicultural treatments would fail to produce desired results, potential habitat would not develop into suitable owl habitat, and existing habitat would lose its suitability, thus, reducing effective Old-Growth Emphasis Area size. The most likely event is that some proposed silvicultural treatments will succeed, others will fail. The likelihood of success or failure is unknown at this time, because the proposed silvicultural treatments have not been tested.

A comparison of overall patch size between Old-Growth Emphasis Areas and Habitat Conservation Areas (Table 3-9) indicates implementation of the Preferred Alternative Bureau Land Management Draft Resource Management Plans would affect the Oregon Coast Range, Oregon West Cascades, and Klamath Mountains Physiographic Provinces. Mean Habitat Conservation Area size increases (range = 36 to 4,678 acres, n = 2) in two physiographic provinces, and decreases in the Oregon Cascades West Province approximately 980 acres. In theory, smaller Habitat Conservation Areas would reduce the probability of reaching the desired cluster size within each Habitat Conservation Area, and hence, the population goal for spotted owls within each province. On a range-wide basis, average Habitat Conservation Area size increases from 45,212 to 45,453 acres (Table 3-9). These changes are so minor (-0.005 percent) that we consider the difference to be inconsequential.

Although the above discussion suggests an optimistic outlook, the Scientific Analysis Team considers it probable that all such expectations for the development of suitable habitat will not be met (see Discussion Regarding Risk). If these expectations are not met, the effective size Old-Growth Emphasis Areas will likely decrease over time.

**Table 3-9** Comparison of Size (Acres) of Habitat Conservation Areas in Bureau of Land Management Alternative D to Deferred Old-Growth Emphasis Areas in the Preferred Alternative of Bureau of Land Management’s Draft Resource Management Plans by Physiographic Province.

Province	<u>BLM Alternative D</u>		<u>BML Preferred Alternative</u>	
	No. of HCA	Mean HCA size (Ac.)	No. of OGEAs	Mean OGEA size (Ac.)
Oregon Coast Range	12	47,917	12	52,595
Oregon West Cascade	18	74,333	18	73,353
Oregon East Cascade	6	22,167	6	22,167
Klamath	43	44,279	43	44,315
CA Cascades/Modoc	12	21,283	12	21,283
No. CA Coast Range	31	7,435	31	7,435
WA Olympic Peninsula	1	676,000	1	676,000
WA West Cascade	22	67,727	22	67,727
WA East Cascade	13	39,000	13	39,000
Range-wide	158	7,143,462	158	7,181,498
Range-wide Mean HCA size:		45,212		45,453

The preceding analysis does not include six Old-Growth Emphasis Areas totaling 16,000 acres. These areas were excluded from our assessment because we assumed their size or configuration of habitat would preclude their functioning effectively as Category 1 or 2 Habitat Conservation Areas.

### **Criterion 7 - Clustering of Owl Pairs**

The number of owl pairs within Old-Growth Emphasis Areas expected in the future was not available from the Bureau of Land Management (D. Dippon pers. comm.). Consequently, were unable to complete an analysis of clusters of owl pairs. Based on the Bureau of Land Management’s timber harvest data and projections of vegetative response to timber cutting designed to develop characteristics of owl habitat, results from the McKelvey model predicted that the ability of the landscape to support owl pairs under the Bureau of Land Management Preferred Alternative will be very similar to that of the Interagency Scientific Committee’s Strategy (B. Noon pers. comm.). If the Bureau of Land Management’s assumption about rate habitat development in Old Growth Emphasis Areas is correct, there would be no appreciable differences between Bureau of Land Management Alternative D and the Bureau of Land Management Preferred Alternative.

Some of the above information suggests that the Bureau of Land Management has taken an optimistic outlook, however we do not believe that all untested hypotheses about the development of suitable habitat for spotted owls through silvicultural treatments will be met (see, Discussion Regarding Risk).

Table 3-10 summarizes short-term (10-50 years) and long-term (100 years) expectations spotted owl habitat and trends for the Bureau of Land Management Preferred Alternative as compared to Bureau of Land Management Alternative D.

**Table 3-10** Summary of Comparisons of Bureau of Land Management Preferred Alternative to Bureau of Land Management Alternative D of Bureau of Land Management’s Draft Resource Management Plans Over the Short and Long Term, Assuming Implementation of the Preferred Alternative.

<u>Short term</u>	<u>Long term</u>
8% (71,00 acres) reduction in suitable spotted owl habitat in 50 years.	4% (46,00 acres) increased in suitable spotted owl habitat.
4% (12,100 acres) reduction in old growth in 10 years	6% (31,000 acres) reduction in old growth.
A 1-6% <sup>1</sup> (1 to 10 pairs) increased capability of habitat to support pairs of spotted owls.	A 22-26% (56 to 119 pairs) increased capability of habitat to support pairs of spotted owls.
Approximately 385 fewer (30% of 1,263) quarter-townships meeting the 50-11-40 standards after 30-40 years.	Estimated to be nearly equal to BLM Alternative D (approximately 90% of 1263 quarter-townships) in meeting 50-11-40 standards.
No quantitative data were provided, but BLM expects patch size to increase in OGEAs at least equivalent to increases associated with BLM Alternative D.	Same as short term.
No comparative data for clusters of spotted owl pairs were provided but based on estimated capability to support pairs the SAT assumed that BLM expects clustering in OGEAs to be equal to or better than BLM Alternative D.	Same as short term.
Standards for distribution of habitat and spacing are nearly identical.	Same as short term.

<sup>1</sup>Range of values is based on differing modeling assumptions about the quantity of suitable habitat present within a 2,500 acre home range sized polygon in the McKelvey model. The minimum and maximum values are based on an assumption that 60 percent and 40 percent, respectively, of the home range-sized polygon consists of suitable spotted owl habitat.

## **DISCUSSION REGARDING RISK**

Assessment of Bureau of Land Management Alternative D and the Bureau of Land Management Preferred Alternative allowed quantitative comparisons where data existed. For many aspects of resource management planning, quantitative data were not generated or compiled, in such instances, assumptions regarding the expected consequences of particular actions or elements must be made to facilitate projection of the likelihood of success or failure of the plans.

Assumptions, however, introduce increased uncertainty into any assessment of a resource management strategy. The greater the number of assumptions made, the greater the uncertainty of attaining projected results. The Interagency Scientific Committee recognized that the plan that would entail the greatest probability of success, and hence embody the lowest degree of uncertainty, would be a strategy that protected all existing spotted owl habitat and made provisions to protect additional acres of young forest to develop into suitable habitat at the soonest possible time (Thomas et al. 1990:11, USDA 1991:9). Such an approach tends to minimize the role of assumptions regarding effects of additional human activities on suitable spotted owl habitat and expected reactions of owl populations. The Interagency Scientific Committee did not choose such an optimal approach. Instead, that group developed a strategy that increased risk to a level they considered acceptable. It must be noted that because of the associated risk and inherent assumptions and uncertainties, the Interagency Scientific Committee's Strategy was developed to be treated as a working hypothesis, to be validated and amended as indicated by research and monitoring and as experience accumulated.

### **Factors Associated With Increased Risk**

The Bureau of Land Management Preferred Alternative differs from the Bureau of Land Management Alternative D, and therefore the Interagency Scientific Committee's Strategy, in three major ways. First, the Bureau of Land Management Preferred Alternative prescribes timber management actions which delay, for 40-50 years, the development of forest stand conditions that meet the dispersal standards set forth in the Interagency Scientific Committee's Strategy. Second, the Bureau of Land Management Preferred Alternative allows logging in the Old-Growth Emphasis Areas, which are assumed to be somewhat analogous in function to the Habitat Conservation Areas in providing owl habitat. Third, these plans do not afford protection for home range size areas for all known or future pairs of owls in the Oregon Coast Range area of special concern identified by Thomas et al. (1990). In our opinion, these variations from the Interagency Scientific Committee's Strategy introduce considerable additional risk as to the viability of spotted owls on Bureau of Land Management administered lands in Oregon.

The Scientific Analysis Team believes the Bureau of Land Management Preferred Alternative, specifically with Bureau of Land Management's intentions to selectively cut forest stands to create conditions favorable for spotted owls, represents increased risks to the viability of the spotted owl. In addition, the Scientific Analysis Team recognizes at least five factors which have been identified and may introduce uncertainty into applied habitat management strategies. There are likely others. A discussion of each factor and the elements of the Bureau of Land Management Preferred Alternatives related to the factor follows:

## 1. Description of Desired Future Conditions.

The Bureau of Land Management Preferred Alternative identified in the Draft Resource Management Plans calls for selective cutting of trees as a means to accelerate the development of old-growth characteristics and, therefore, create future conditions suitable for spotted owls. Current working definitions of spotted owl habitat at the stand level are general in scope and vary considerably among physiographic provinces. Thomas et al. (1990:146) identified nine variations of general definitions of stand conditions relative to spotted owl studies. These variations reflect geographic differences in habitat and a general lack of specific owl use data correlated to quantitative descriptions of the habitat used. Terms used to describe quality of habitat are equally varied. Examples of such terms for spotted owl habitat include "suitable habitat;" "nesting, roosting, and foraging habitat;" "optimal habitat;" "superior habitat;" "dispersal habitat;" "roosting and foraging habitat;" "foraging habitat;" and "marginal habitat." These terms reflect a recognition on the part of biologists that spotted owl habitat exists within a continuum with respect to its ability to provide for all the life needs of the spotted owl. The variability and generality combined with the lack of consistency in application of the definitions serve to illustrate the uncertainties associated with describing desired future conditions of habitat.

Although the term "suitable spotted owl habitat" is frequently used in the Draft Resource Management Plans it is not defined there. Instead, some plans define "optimal" spotted owl habitat (USDI 1992b:3-46) or discuss "nesting, roosting, and foraging habitat" (USDI 1992e:3-67). Both a definition and the amount of suitable spotted owl habitat are basic data necessary for the development of projected mean annual occupancy estimates of the McKelvey model (USDI 1992b:Appendix 4-107) and provide a gauge for assessing how well the Bureau of Land Management Preferred Alternatives provide for spotted owls, especially in the future. McKelvey (1992 in USDI 1992b; Appendix 4-107) defines suitable habitat for an organism habitat in which the combination of birth and death rates allows for a stable or increasing population.

Whether site-specific variability of habitat required to meet McKelvey's definition were accounted for is unknown to the Scientific Analysis Team. To provide spatially explicit suitable spotted owl data required by the McKelvey model, Bureau of Land Management must have developed specific definitions. Otherwise the data used in the analysis must have been generic. The Draft Resource Management Plans do not, for the most part, acknowledge differences between the quality of habitat that might result from various silvicultural treatments or how the differences might affect assumptions about expected spotted owl population responses. Instead, it appears that Bureau of Land Management viewed all types of suitable spotted owl habitat equally in terms of their capability to provide for the balance between birth and death rates. Once forest stands were considered to have attained characteristics which would support spotted owls at any level they were apparently included in the category "suitable habitat" and used in the model. The model then viewed such stands as equivalent to older-aged stands. The model considers only the amounts and arrangement of habitat on the landscape and does not account for varying quality. The Scientific Analysis Team considers this approach particularly risky when assessing forest stands which develop in response to timber harvest. In the opinion of Scientific Analysis Team, assessments that do not account for the differential quality of habitats fail to fully assess the risks associated with habitat manipulation.

We conclude that, given current knowledge and without site-specific definitions of spotted owl habitat that account for variation (i.e., geographic, elevational, site productivity, climatic, vegetative community, and prey species), it is not likely that accurate descriptions of desired future conditions for suitable spotted owl habitat can be offered. Considerable additional research is likely required before this can be accomplished.

Although our assignment was to assess the implications of the Bureau of Land Management Preferred Alternative to the northern spotted owl only, we note here that the above discussions are even more applicable as they pertain to describing desired future conditions of habitat for the hundreds of other species associated with old growth. (See Chapter 5.)

## **2. Availability of Existing Mechanisms to Attain Desired Future Conditions.**

Manipulation of spotted owl habitat through logging involves use of silvicultural prescriptions. Silvicultural prescriptions are developed to attain desired future conditions in forest stands by establishing methods and standards for harvesting these stands. Most existing silvicultural techniques and prescriptions have been developed with an objective of maximizing growth of commercial tree species and, therefore, wood production. Lacking experience with selective cutting designed to create spotted owl habitat, such practices must be considered as untested hypotheses requiring testing to determine their likelihood of success. Without empirical data to demonstrate expected chances of success, assumptions of probabilities of success must be made to predict amounts, quality, and arrangements of spotted owl habitat.

It appears that Bureau of Land Management analysts made some assumptions as to the probability of success of silvicultural systems and stand treatments used in developing spotted owl habitat. The Draft Resource Management Plan for Roseburg District (USDI 1992b:2-41) describes some attributes of this uncertainty in a discussion of timber management proposed in the Bureau of Land Management Preferred Alternative as follows:

"Since this alternative includes some elements recognized to be substantially untested, modeling its sustainable timber yield is more difficult than with the alternatives that rely wholly on traditional forest management techniques. The level of confidence in the preceding numbers is therefore lower than the numbers for alternative A, B, D, and E".

The numbers referred to in the quote above were the numbers given for allowable sale quantity and expected acreages treated by various silvicultural techniques. Values for allowable sale quantity are closely associated with expected vegetative responses following forest management. Data used to derive expected timber yields are likely the same considered for projecting future habitat conditions for spotted owls.

Specific elements of the Bureau of Land Management Preferred Alternative in the Draft Resource Management Plans are associated with uncertainties regarding existing silvicultural systems and treatments expected to develop or maintain spotted owl habitat. Suitable spotted owl habitat, notwithstanding the lack of definition, is expected by Bureau of Land Management analysts to develop faster in some stands within Old-Growth Emphasis Areas scheduled for silvicultural treatment. Although the analysts did not factor such accelerated development into projected amounts of suitable habitat, it was offered as a reason for treating stands. In particular, density management is offered as a means of promoting stand diversification, developing old-growth like characteristics, and producing timber (USDI 1992b:2-41). Given the uncertainty of achieving such expectations, it is likely that some silvicultural treatments, which have been characterized

as largely experimental, may well have an opposite effect from that expected. Consequently, such treatments may hinder the development of suitable habitat or they may only partially succeed, resulting in development of marginal habitat that may not fully provide for the needs of spotted owls. Results which fall short of the expected conditions could occur because of delay or failure to regenerate stands that have been cut, increased levels of windthrow of remaining trees, mechanical damage during logging to trees remaining in the logging unit, the spread of root rot and other diseases. Increased risk of wildfires associated with logging operations that increase fuels and usually employ broadcast burning to reduce the fuels also increase the risk of not attaining expected results. Such events may spread to areas adjacent to stands that are logged, thereby affecting even more acreage than those acres directly treated.

The Bureau of Land Management Preferred Alternative calls for regeneration patch cutting in the non-deferred Old-Growth Emphasis Areas and, after 80 years, in deferred Old-Growth Emphasis Areas. In non-deferred Old-Growth Emphasis Areas, such patch cuts are expected to accelerate development of suitable habitat for spotted owls, whereas patch cuts in deferred Old-Growth Emphasis Areas are not expected to alter the habitat suitability of the stands for spotted owls. Likewise, regeneration patch cuts are not expected to change the character of old-growth stands. There is a decided lack of empirical data to demonstrate effects of these types of treatments. The discussions above for density management, are equally applicable here. It seems to the Scientific Analysis Team that the Bureau of Land Management did not fully evaluate the effects of such regeneration cuts on habitat and subsequent use by spotted owls. Data describing habitat components (e.g., numbers of snags and down logs-coarse woody debris) across a range of vegetative conditions are poorly developed or non-existent in the descriptions of the Bureau of Land Management Preferred Alternative. These components are believed to be required to provide structure for future spotted owl habitat in forest stands that develop following logging activities. The Bureau of Land Management Preferred Alternative calls for snags to be left "where feasible" and 4 logs, 20 inches in diameter and 50 feet long per acre, "where available". These standards are not site specific and are not rigorous enough to ascertain how often they will be met. In areas where it is not "feasible" to leave snags, or logs for retention are not "available", we expect that a greater amount of time would be required to return the forest stand to spotted owl habitat.

Uncertainties associated with the probabilities of successful manipulation of forest stands to maintain or create suitable spotted owl habitat combine to create additional risk. As a result, the amounts or quality of suitable habitat expected in the Bureau of Land Management Preferred Alternative are, in the opinion of the Scientific Analysis Team, not likely to be realized.

### **3. Implementation of Prescribed Activities.**

Whenever a natural resource management activity is proposed by a Federal land managing agency it is developed through a planning process. Planning produces a description of desired future conditions or objectives and methods to be followed to attain those conditions. Silviculturally treating forest stands to create or maintain spotted owl habitat entails describing habitat characteristics and identifying one or more combinations of silvicultural treatments designed to attain the desired future condition for habitat. The planning process culminates in a final plan for a project which, for timber sales, involves legal contracts obligating the purchaser and the seller to specific provisions. The project is then implemented according to the provisions of the plan as incorporated into a contract. Our experience is that commonly not all provisions of the plan are thoroughly incorporated into such contracts, nor are all contract provisions

thoroughly administered to ensure compliance. This situation further increases the probability that objectives for attaining desired future conditions for habitat will be met. The Bureau of Land Management Preferred Alternative does not describe whether such risk was considered in projections of suitable habitat.

#### **4. Ascertaining Success or Failure.**

Silvicultural treatments of forest stands designed to accelerate development of old-growth characteristics or to maintain suitable habitat for spotted owls will require aggressive monitoring to determine whether such treatments are successful. The Bureau of Land Management plans to monitor implementation of their Resource Management Plans (J. Lint pers. comm.). The monitoring plan is being developed and will be completed pending finalization of the Draft Resource Management Plans. No such plan has been completed to date. Therefore, the Scientific Analysis Team could not evaluate the likely effectiveness of such a monitoring plan. Such plans are integral parts of the ecosystem and adaptive management processes.

There are probabilities of success associated with any monitoring plan as to how well it will provide relevant and accurate data to demonstrate success or failure of a given plan. There are also probabilities associated with how well monitoring will identify "trigger points" that indicate a management plan may need modification. The more complex the plan (i.e., the more variables there are to monitor) the less likely the monitoring plan will successfully detect problems. Manipulation of forest stands to accelerate development of spotted owl habitat on a landscape scale, as prescribed in the Bureau of Land Management Preferred Alternative, is an extremely complex issue involving a myriad of variables over a very long timeframe. Development of a monitoring plan intensive enough to isolate the causes of observed variations for wide-scale implementation of the Bureau of Land Management Preferred Alternative seems unlikely to us.

The probability of carrying out a successful monitoring plan is totally affected by the availability of adequate and consistent funding. Our experience suggests that monitoring programs have been inadequate and will continue to be so until agencies fully evaluate the required effort and expense necessary to complete monitoring, and Congress provides a commitment through the budget process. If the status of monitoring does not improve dramatically over the current situation, it is misleading to minimize the risk of a course of action with promises of adequate monitoring to detect whether assumptions are indeed true. In other words, inadequate monitoring will increase, perhaps dramatically, the risk of failure of a plan that relies heavily on adaptive management.

#### **5. Adaptive Management.**

The term adaptive management has been used in the context of resource management to identify a strategy which essentially acknowledges the need to make decisions without perfect knowledge and provides a means to compensate for that lack of knowledge. Adaptive management entails monitoring the results of resource management and, where required (based on the monitoring feedback), modification of plans. Adaptive management is a means to reduce the risk of erroneous assumptions or decisions. A basic requirement for a viable adaptive management strategy is the existence of resources necessary to make the required adjustments. Adaptive management can only be expected to reduce risk if options to adjust management to fit new

circumstances are not eliminated. Adaptive management, therefore, can be considered a means to reduce risk associated with a Resource Management Plan commensurate with the options for adjustment which remain during the time the plan is in effect.

### **Revisiting the Interagency Scientific Committee's Strategy**

Consideration of the uncertainties and risk associated with the above discussed factors pertaining to the manipulation of spotted owl habitat, or younger stands expected to develop into spotted owl habitat, compelled the Interagency Scientific Committee to incorporate provisions into their strategy which did not allow timber harvest in Habitat Conservation Areas. Thomas et al. (1990:167) discuss the objectives for spotted owl habitat in Habitat Conservation Areas.

"Given the current distribution of old forests, we see no alternative in the short-term but to protect significant amounts of the remaining superior habitat for northern spotted owls through the creation of Habitat Conservation Areas. Under the conservation strategy proposed here, most logging activities within Habitat Conservation Areas would cease. The ultimate management goal within Habitat Conservation Areas, therefore, is to recreate a relatively unfragmented, natural landscape. This strategy will ultimately maximize the amount of superior habitat and minimize the amount of marginal and unsuitable habitat... Until we can demonstrate that silvicultural treatments can benefit spotted owls, natural succession will be the primary means to achieve an unfragmented landscape within Habitat Conservation Areas."

In answers to questions from the United States Senate Subcommittee on Energy and Natural Resources (USDA 1991:53) members of the Interagency Scientific Committee provided additional background regarding the intent for habitat in Habitat Conservation Areas.

"The intent of the Habitat Conservation Areas is to provide a network of large blocks of habitat for northern spotted owls until reasonable certainty exists (emphasis added) that forest practices are available for producing and maintaining equally good habitat. Such management can then be applied in Habitat Conservation Areas. Proven technology to achieve that end does not currently exist (emphasis added). Because extant populations will be greatly reduced (perhaps by 50 percent or more) by cutting, we believe that ensuring that the quality of the habitat retained within must be as high as possible., so the team recommended that existing old forests in Habitat Conservation Area should be left unmanaged, and that some previously harvested stands be allowed to develop in an unmanaged condition."

The Interagency Scientific Committee was primarily addressing logging and silvicultural practices (particularly the selective cutting of trees) when using the term "unmanaged." Prescribed fire was viewed by the Interagency Scientific Committee as a possible means to reduce wildfire frequency and magnitude. For that reason, the Interagency Scientific Committee called for the development of fire management plans for each Habitat Conservation Area.

The combined risks associated with treatment of spotted owl habitat or stands expected to develop into suitable habitat for spotted owls, as discussed above, will likely result in situations where either habitat development is inhibited or only marginal habitat for spotted owls is developed. The exact frequency of these partial successes or failures is unknown. Given the likely cumulative relationship among the risks for each factor, it appears to us that the overall risk of not meeting habitat objectives is high. (See Appendix 4-C for further discussion.)

In view of this anticipated high risk of Bureau of Land Management's proposed silvicultural treatment producing habitat conditions for spotted owls that are less than superior, an Interagency Scientific Committee response to a question from Congress about the desirability of low intensity management of habitat is especially pertinent. Members of the Interagency Scientific Committee indicated that, because a plan (the Interagency Scientific Committee's Strategy) was put forth which proposes to reduce the population of a threatened species by as much as 50 percent, providing the survivors with only marginal habitat would be extremely risky and certainly in their minds not "scientifically credible" (USDA 1991:45).

The Interagency Scientific Committee recognized the need for research designed to provide data regarding the applicability of silvicultural treatments for creating or maintaining superior spotted owl habitat. The Interagency Scientific Committee's Strategy called for this research to be conducted outside the Habitat Conservation Area. This approach allows for the questions to be addressed while risk in the keystone elements of the Interagency Scientific Committee's Strategy, the Habitat Conservation Areas, is reduced to acceptable levels.

## **SUMMARY AND CONCLUSIONS**

The transition period (1-50 years) between implementation of the Interagency Scientific Committee's Strategy and achievement of an equilibrium of habitat and spotted owls is a critical consideration. After examination of the data available in the draft resource management plans for comparing Bureau of Land Management's Alternative D and the Bureau of Land Management preferred alternative of the draft resource management plans and weighing the elements of risk discussed above, the Scientific Analysis Team concluded that the Bureau of Land Management preferred alternative introduces significant additional risk to the viability of spotted owls compared to Bureau of Land Management Alternative D (Interagency Scientific Committee's Strategy). Increased risk to viability can be attributed to three basic elements of the Bureau of Land Management Preferred Alternative: (1) provisions allowing a delay of 40-50 years before meeting the dispersal standards put forth in the Interagency Scientific Committee's Strategy (the 50-11-40 rule) which occurs in a sensitive area at a landscape level and because its checkerboard ownership; (2) plans to conduct density management (commercial thinning) in younger and still developing stands in Old-Growth Emphasis Areas and patch cuts in the non-deferred Old-Growth Emphasis Areas that overlap Habitat Conservation Areas; and (3) lack of provisions to protect home-range size areas for all Currently known and future pairs of spotted owls in the Oregon Coast Range area of special concern. Given the existing risks that face owl populations and the sensitivity of the transition period, the short-term effect of these actions on habitat loss may be much more significant than the long-term predicted habitat gains.

We further conclude that, although research and monitoring studies are presently being initiated, no significant new data exist which suggest that the degree of certainty that is expressed in the Bureau of Land Management Draft Resource Management Plans for developing owl habitat silvicultural treatments is justified. Therefore, it is our opinion that the course prescribed in the Interagency Scientific Committee's Strategy, pertaining to timber harvest in Habitat

Conservation Areas, remains the most likely course to result in superior habitat conditions within reserves (i.e., Old-Growth Emphasis Areas). The approach prescribed by the Interagency Scientific Committee's Strategy preserves options for adjustments in the course of management under a philosophy of adaptive management.

Our conclusions indicate that the viability ratings for spotted owls in the Final Environmental Impact Statement alternatives will be adversely affected if the Bureau of Land Management implements Preferred Alternatives of their Draft Resource Management Plans. Therefore, reassessments of the viability ratings were deemed warranted and such assessments are described below.

### **REASSESSMENT OF VIABILITY RATINGS FOR EACH OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT ALTERNATIVES**

Contributions from lands administered by the Bureau of Land Management to northern spotted owl habitat affect the chances of success of each of the five alternatives in the Final Environmental Impact Statement. Discussion of each alternative and how the viability assessments associated with each scenario are affected are described below. For this reassessment the Scientific Analysis Team used a five-scale rating system instead of the three used in the Final Environmental Impact Statement. See Chapter 2 for a discussion of the rating system.

Assessments of viability ratings are presented for each Final Environmental Impact Statement alternative rather than each evaluation criteria in a manner identical to analysis completed for the Final Environmental Impact Statement. Interrelationships among all criteria were considered collectively when addressing populations.

#### **Final Environmental Impact Statement Alternative A**

Final Environmental Impact Statement Alternative A provides spotted owl habitat by using a network of habitat areas where nesting, roosting, and foraging habitat capable of supporting single pairs of spotted owls would be protected from logging. No provisions are made for dispersal habitat. This strategy was evaluated by the Interagency Scientific Committee and described as having a high risk of spotted owls being extirpated from significant portions of their range. The viability assessment therefore rated Final Environmental Impact Statement Alternative A as having a "low" likelihood of population viability.

Implementation of the Bureau of Land Management Preferred Alternative, rather than an alternative that employs single pair habitat areas, would slightly improve conditions for spotted owls in a range-wide context but would have no effect upon the overall viability rating assigned in the Final Environmental Impact Statement. No change on the "low" rating for overall viability is indicated (Table 3-11).

## **Final Environmental Impact Statement Alternative B**

Final Environmental Impact Statement Alternative B is the Interagency Scientific Committee Conservation Strategy for application to National Forests within the range of the northern spotted owl. Since the Interagency Scientific Committee's Strategy was developed to include National Parks, National Forests, and Bureau of Land Management administered lands, deviations by any of those agencies from its standards and guidelines affect probabilities for a successful conservation strategy.

The Bureau of Land Management Preferred Alternative represents a considerable deviation from some of the criteria set forth in the Interagency Scientific Committee's Strategy (i.e., compliance with the 50-11-40 rule, exclusion of timber harvest within Habitat Conservation Areas, and protection of home range-size areas for all pairs in the Oregon Coast Range area of special concern). These deviations introduce additional risk beyond that inherent in the Interagency Scientific Committee's Strategy. In our opinion, the Bureau of Land Management's Draft Resource Management Plans do not adequately discuss or account for these increased uncertainties. Discussions in the sections of this report titled "Discussion Regarding Risk" and "Conclusions" are applicable here.

Cumulatively, the effects of implementing the Bureau of Land Management Preferred Alternative would lower the overall viability rating reported in the Final Environmental Impact Statement for Alternative B from "high" to "medium" (Table 3-11).

## **Final Environmental Impact Statement Alternative C**

Final Environmental Impact Statement Alternative C is comprised of the standards and guidelines of the Interagency Scientific Committee's Strategy plus Critical Habitat designated by the USDI Fish and Wildlife Service under provisions of the Endangered Species Act. Final Environmental Impact Statement Alternative C was rated as having a "high" likelihood of providing for viable populations in the original viability assessment reported in the Final Environmental Impact Statement.

Managing the additional large blocks of habitat in designated Critical Habitat Units under the same standards and guidelines as Habitat Conservation Areas has several beneficial effects that tend to alleviate the negative effects of the Bureau of Land Management Preferred Alternative in Draft Resource Management Plans. These beneficial effects include:

1. Reducing loss of habitat by protecting more area. Approximately 800,000 more acres will be protected on National Forests in the Oregon Coast Range, Oregon Cascades West and Oregon portion of the Klamath Mountains Physiographic Provinces under Final Environmental Impact Statement Alternative C than Final Environmental Impact Statement Alternative B.
2. Numbers of pairs expected in the future on National Forests are increased by 18 percent compared to Final Environmental impact Statement Alternative B.
3. increasing patch sizes designated for protection and, hence, the number of dusters of more than 20 owl pairs are increased from 34 such clusters in Final Environmental Impact Statement Alternative B to 40 such clusters in Final Environmental Impact

Statement Alternative C.

4. Reducing distances between Habitat Conservation Areas can be anticipated to facilitate movement of owls. This is particularly true in the Oregon Coast Range Province where first nearest neighbor distances decrease by 82 percent and second neighbor distances decrease by 65 percent. There are decreases in the Oregon Cascades West Province of 49 percent and 37 percent, respectively. Spacing in the Klamath Mountains province remains essentially unchanged, compared to Final Environmental Impact Statement Alternative B.

5. Increasing the distribution of spotted owl habitat to be protected in designated areas. The CHUs will create greater redundancy in the network, an important hedge against catastrophic loss of habitat which could cause loss of connectivity among components of the network.

Based on the above information, the Scientific Analysis Team believes the overall viability rating in the Final Environmental Impact Statement for Alternative C would remain "high" if the Bureau of Land Management implements their Preferred Alternative (Table 3-11). We however, continue to be concerned about the increased risk of isolation of the Oregon Coast Range Province population of spotted owls resulting from Bureau of Land Management Preferred Alternative.

### **Final Environmental Impact Statement Alternative D**

Final Environmental Impact Statement Alternative D entails applying the standards and guidelines of the Interagency Scientific Committee's Strategy plus to all remaining suitable habitat for northern spotted owls. This alternative provides some of the benefits ascribed to Alternative C above by adding significantly to the amount of spotted owl habitat protected. There are however, no provisions to allow young forests, outside Habitat Conservation Areas that are currently not suitable habitat, to develop into such habitat. It is probable that, because of the perpetuation of fragmentation in the added habitat, much will be degraded in the future. We therefore believe Alternative D has equivalent risk to viability compared to Alternative C. We determined that, if the Bureau of Land Management implements their preferred alternative, the rating would remain "high" for Final Environmental Impact Statement Alternative D (Table 3-11).

### **Final Environmental Impact Statement Alternative E**

Final Environmental Impact Statement Alternative E, titled the "Multi-resource Strategy", incorporates certain elements of the Interagency Scientific Committee's Strategy. However, it decreases the size and number of Habitat Conservation Areas, thereby increasing distances between them. It further reduces the land base subject to the 50-11-40 rule. This alternative was rated in the Final Environmental Impact Statement as having a "low" likelihood of providing for population viability. The likelihood of maintaining viability for spotted owls would be somewhat improved if the Bureau of Land Management implemented their preferred alternative, rather than a strategy comparable to Alternative E, but not enough to raise the rating from "low" for Final Environmental Impact Statement Alternative E (Table 3-11).

Table 3-11 Viability Ratings of the Final Environmental Impact Statement Alternatives Based on Assumptions of the Final Environmental Impact Statement Compared to Ratings if Bureau of Land Management Alternative D or Bureau of Land Management Preferred Alternative (PA) Bureau of Land Management's Draft Resource Management Plans are Implemented.

FEIS Alternative	FEIS Viability Rating	Revised Viability Rating If BLM Alternative D is Implemented	Revised Viability Rating if BLM PA is Implemented
A	LOW	LOW	LOW
B	HIGH	HIGH	MEDIUM
C	HIGH	HIGH	HIGH
D	HIGH	HIGH	HIGH
E	LOW	LOW	LOW

**RECOMMENDED MITIGATION OPTIONS**

Recommendations are offered as a means of offsetting the negative effects of the Bureau of Land Management implementing their Preferred Alternative of Draft Resource Management Plans on Final Environmental Impact Statement Alternative B. No recommendations for mitigation measures for Final Environmental Impact Statement Alternatives A or E are offered. Mitigation measures required to attain "high" viability ratings would cause these alternatives to lose their identities.

Table 3-12 lists brief summaries of the effects of the Bureau of Land Management Preferred Alternative and mitigation options. The options are discussed in greater detail following the table. Site-specific mitigation recommendations are delineated on the map in Appendix 3-A.

**Table 3-12** Effects of Implementing the Bureau of Land Management Preferred Alternative of Western Oregon Bureau of Land Management District Draft Resource Management Plans on Final Environmental Impact Statement Alternative B, the Selected Alternative of the Final Environmental Impact Statement and Recommended Mitigations.

Effects	Recommended Mitigation
Increased risk of reducing nesting, roosting, and foraging habitat in designated areas (i. e., HCAs/OGEAs).	Increased numbers and/or sizes of HCAs throughout National Forests in Oregon.
Increased risk of reducing distribution of nesting, roosting, and foraging habitat.	Mitigate by increasing numbers or sizes of HCAs National Forests in Oregon.
Increased risk of reducing the habitat capability to support pairs of spotted owls in the long term.	Increase numbers or sizes of HCAs on National Forests in Oregon.
Reductions in well-distributed dispersal habitat for 40-50 years.	Reduce distances between HCAs by increasing numbers or sizes of HCAs on National Forests in Oregon.
Higher risk of increasing distances between designated areas (i. e., HCAs/OGEAs).	Increase numbers or sizes of HCAs on National Forests in Oregon.
Increased risk of decreasing effective size of habitat patches protected in the long term.	Increase sizes of HCAs on National Forests in Oregon.
Increased risk of decreasing numbers and sizes of clusters of pairs of spotted owls (multiple pairs).	Increased numbers and sizes of HCAs on National Forests in Oregon.
Increased risk of isolation of the Oregon Coast Range Physiographic Province subpopulation of spotted owls.	Partially mitigated by increasing protection of habitat to allow for increased numbers of spotted owls in the future to reduce risks of local extinction.

Options for the Forest Service to mitigate the effects of the Bureau of Land Management implementing their Preferred Alternative of Draft Resource Management Plans are limited to increasing the intensity of spotted owl habitat management on National Forests. Increases in the number and size of Habitat Conservation Areas in National Forests would compensate to some degree for increased risk of losing habitat, and concomitant pairs of spotted owls, in Bureau of Land Management Old-Growth Emphasis Areas. Adjustments to numbers and sizes of Habitat Conservation Areas on National Forests alleviates additional risk of increased spacing between habitat reserves, loss of habitat, decrease in patch size, decreases in cluster size, and reduced future expected populations associated with the Bureau of Land Management Preferred Alternative as compared to Final Environmental Impact Statement Alternative B.

Decline in the quality and amount of well-distributed dispersal habitat on Bureau of Land Management administered lands between the Oregon Coast Range and the other physiographic provinces in Oregon can be only partially compensated for on National Forests. Increased number and size of Habitat Conservation Areas would improve probabilities of dispersal attempts, and perhaps success, between and among Habitat Conservation Areas. However, probabilities of successful movements of owls among and between the Oregon Coast Range, the Klamath Mountains, and Oregon Cascades West Physiographic Provinces will still be reduced by some significant but unquantifiable amount.

Bureau of Land Management administered lands, presently and potentially, provide integral links between the Klamath, Oregon Coast Range, and Oregon Cascades West Physiographic Provinces. Loss of attributes of the Interagency Scientific Committee's Strategy, specifically numbers and sizes of Habitat Conservation Areas and dispersal habitat on lands in Oregon administered by the Bureau of Land Management which bridged gaps between National Forests in the physiographic provinces of Oregon, was judged to increase the risk of isolating spotted owl populations in physiographic provinces. The Oregon Coast Range Physiographic Province is the most likely province population to be at risk of such isolation. Our recommended mitigation measures focus on increasing the size of Habitat Conservation Areas on the Siuslaw National Forest to increase the future population of spotted owls. We would expect a resulting increase in successful dispersal attempts of owls among physiographic provinces.

To further compensate for increased risks of isolation, and to hedge against risks of reductions in amount of habitat and numbers of pairs of spotted owls, we recommend the designation of additional Habitat Conservation Areas at locations near the critical links between physiographic provinces (Appendix 3-B). These critical links include the northern portion of Klamath Mountain Physiographic Province; the west and southwest portion of the Oregon Cascades West Physiographic Province and the Oregon Coast Range Physiographic Province.

Our recommended mitigation measures compensate for anticipated levels of risk associated with the Bureau of Land Management Preferred Alternative in Draft Resource Management Plans sufficiently to attain an overall viability rating of "high" for Final Environmental Impact Statement Alternative B. It is important to recognize that our proposed mitigation measures have not accounted for the Bureau of Land Management's proposed regeneration cutting within deferred Old-Growth Emphasis Areas. Although we are concerned about the possible effects on habitat and owls resulting from such regeneration cutting, our recommendations are based on the assumption that the Bureau of Land Management not implement regeneration harvesting within deferred Old-Growth Emphasis Areas for 80 years, or until reliable data are available to demonstrate such practices can maintain or develop conditions of habitat suitable for northern spotted owls. Therefore, we do not believe that mitigation measures for activities planned for (80

years or more) in the future and which are dependent on demonstration of success prior to actual implementation is germane at this point. Deviations from this assumption must be evaluated for possible changes to our recommendations.

Appendix 3-B contains site-by-site discussions and rationales for mitigation recommendations. Table 3-13 provides a summary of the viability ratings for the Final Environmental Impact

Statement alternatives based on the results of our analysis and the viability ratings if the mitigation measures recommendations discussed above and in Appendix 3-B are implemented. The map in Appendix 3-A provides locations of the mitigation recommendation.

Table 3-13 Viability Ratings of the Final Environmental Impact Statement Alternatives of this Analysis Based on Implementation of the Bureau of Land Management Preferred Alternative (PA) in the Draft Resource Management Plans Compared to Viability Ratings if Mitigation Recommendations are Implemented.

FEIS Alternative	Viability Rating-BLM Implementation of PA	Viability Rating-If Mitigation Implemented
A	LOW	No mitigation was offered as this alternative would not retain its identity if mitigated to attain a high rating.
B	MEDIUM	HIGH
C	HIGH	HIGH
D	HIGH	HIGH
E	LOW	No mitigation was offered as this alternative would not retain its identity if mitigated to attain a high rating.

## **SUMMARY AND CONCLUSIONS**

The viability ratings presented for the Final Environmental Impact Statement alternatives, with and without mitigation measures, are ratings for the northern spotted owl throughout its range. Although the overall viability ratings with mitigation measures are "high"~ it should be noted that ratings for individual physiographic provinces may vary. For example, the Oregon Coast Range Province alone would not attain a rating for "high". Increased reductions in probabilities of successful dispersal by spotted owls and the intermingled ownership patterns between Federally managed lands and private lands continue to result in conditions that increase risk to viability of northern spotted owls. These conditions persist regardless of the mitigation option presented or the alternative. There are simply no mitigation options that can fully compensate for habitat that may be lost on Bureau of Land Management administered lands. The recommended mitigations that we present are designed to compensate at a level necessary to attain a "high" viability rating - we believe they meet this objective but acknowledge these mitigation measures do not provide the security for spotted owls attainable if the Bureau of Land Management provided for spotted owl habitat at a level equal to or superior than, the Interagency Scientific Committee's Strategy.

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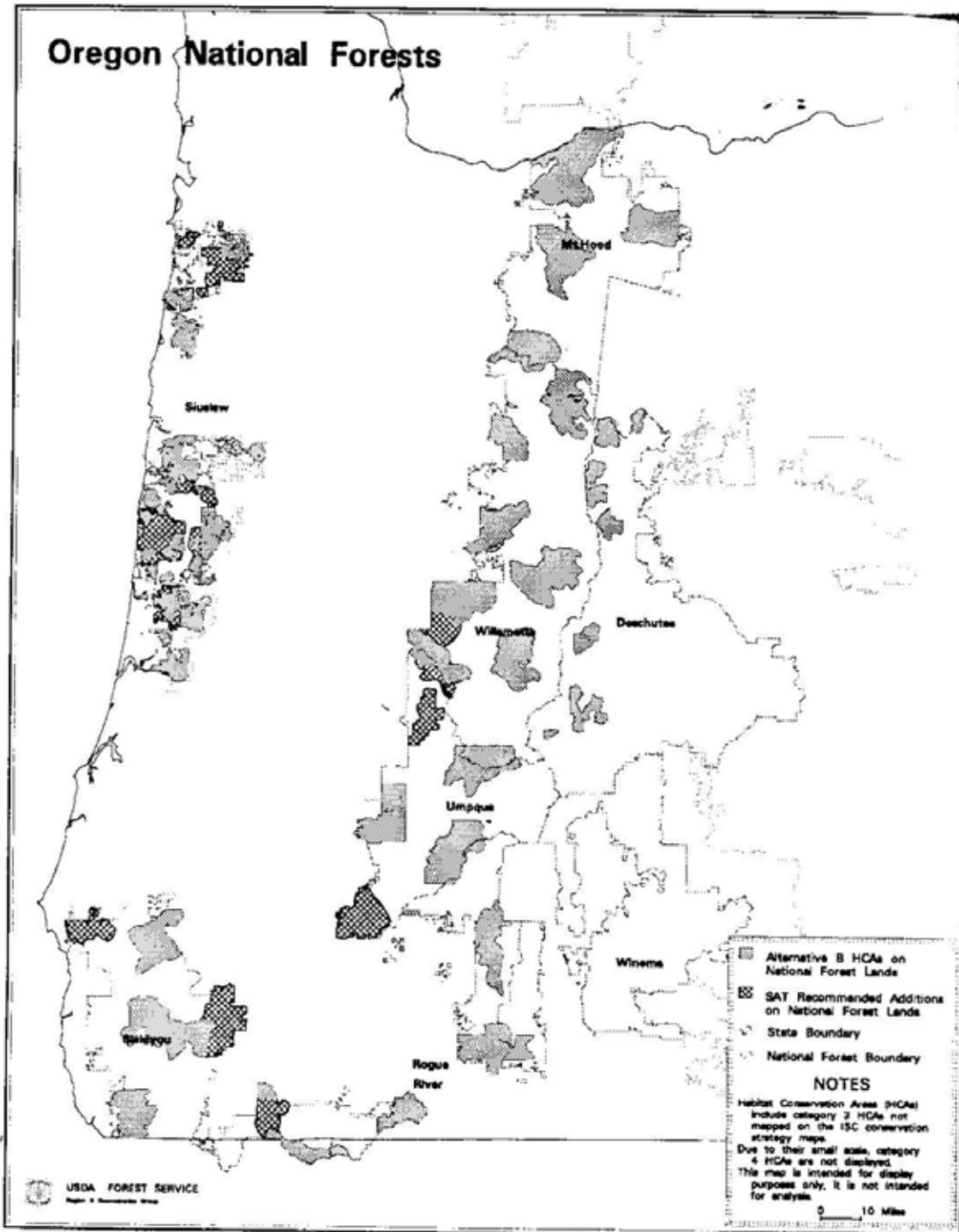
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## The Scientific Analysis Team Report

Map of Mitigation Recommendations

Appendix 3-A  
 Map of Mitigation Recommendations if BLM Implements Preferred Alternatives



Rationale for Recommended Mitigation Options

## **Appendix 3-B Rationale for Recommended Mitigation Options**

The following is a description of the mitigation measures recommended on National Forests to attain a "high" viability rating for Final Environmental Impact Statement Alternative B if the Bureau of Land Management implements the Preferred Alternative in their Draft Resource Management Plans. We expect these mitigation measures to remain in effect until such time the Bureau of Land Management either demonstrates their proposed habitat management results in (1) desired habitat structure and population goals at levels equal to or superior to the Interagency Scientific Committee's Strategy, or (2) the Bureau of Land Management adopts management strategy for spotted owls that has a "high" viability rating. Should the Bureau of Land Management incrementally adjust its habitat management strategy, we expect the Forest Service to similarly reconsider our proposed mitigation measures on an incremental basis. Recommended mitigation measures are designed to compensate for the increased risk of loss of habitat and decrease of patch size in Old-Growth Emphasis Areas, and ultimately increased risk of loss of owl pairs and pair dusters, by increasing the size and number of Habitat Conservation Areas on National Forests.

### **Methods**

Our rationale for mitigation through additions to the Habitat Conservation Area network is as follows: we identified a minimum of five critical areas of risk we assume are associated with managing spotted owl habitat through density control harvest. The five areas of risk are as follows:

1. Accurately describing the desired future condition of suitable spotted owl habitat.
2. Assuming the desired future condition can be adequately described, are mechanisms (e.g. silvicultural prescriptions) available to attain the desired future conditions?
3. Assuming proper silvicultural prescriptions are written, can prescriptions be successfully implemented?
4. Assuming prescription are successfully implemented, will monitoring be adequate to ascertain if prescriptions succeed or fail in achieving the desired future condition over time?
5. If monitoring shows that the desired future condition is not being met and adjustments are necessary, will options be foreclosed for an adaptive management strategy?

For each of these five areas of risk there is some unknown probability of success. Given the uncertainties, we are sure that the chances of success are less than 100 percent and likely considerably less for some of the areas of risk. Conversely, we are doubtful that the probability of failure is 100 percent. Complexity is added to the uncertainties associated with areas of risk, in that each area of risk is interactive with the others. We do not fully understand these relationships but believe they are likely cumulative. Failure to fully meet the objectives in some areas of risk has greater consequences than others and therefore indicates there probably should be some consideration given to weighting the areas of risk.

### **Appendix 3-B Rationale for Recommended Mitigation Options (Continued)**

Considering all of the above, it was not possible for us to develop a strict mathematical process for evaluating the risk associated with the Bureau of Land Management's plans to conduct silvicultural treatments inside Old-Growth Emphasis Areas. We do however believe that the overall risk of failure is high. To illustrate this, if we assume that the Bureau of Land Management will perhaps achieve a fairly high rate of success in each of the five risk areas - say 80 percent - and consider the rates of success to be cumulative with even weights, the overall rate of success is about 33 percent (.80 to the fifth power - .328). As discussed above, the actual rates of success for each risk area are unknown and probably vary widely depending on site-specific conditions. Additionally, we acknowledge that the rates of success may not be strictly cumulative. Based on professional judgment, we feel this assumed rate of success (33 percent) of attaining suitable spotted owl habitat is not unreasonable. The Bureau of Land Management plans to conduct density management on about 143,000 acres in the Old-Growth Emphasis Areas within the first 50 years. If we assume an average size of 40 acres for density management treatment units, there would be approximately 3,585 such units. If we assume an overall success rate of 33 percent, the objectives for spotted owl habitat would be met on 1,183 density management units. Objectives for spotted owl habitat would not be met on 2,402 such units. Forest stands adjacent to density management unit where the objectives for spotted owl habitat are not fully met will be adversely affected by conditions in the density management unit. We assumed a potential edge effect of 600 feet from the edge of each unit. Assuming density management units are shaped as squares, a total of 145 acres would be affected by each unit that failed to meet the objectives for spotted owl habitat. Multiplying the affected acreage by the 2,412 units totals approximately 348,300 acres likely to be adversely impacted by density management within the Old-Growth Emphasis Areas. In addition, there will be 62,000 acres less suitable spotted owl habitat under the Bureau of Land Management preferred alternative than under Bureau of Land Management Alternative D within the next 10 years. Rounded, this totals about 410,000 acres.

The 410,000 acre estimate represents a risk that we believe warrants mitigating actions on National Forests. We therefore used this acreage estimate as the basis for adding to the Habitat Conservation Area network on National Forests in Oregon. We used maps of habitat and owl pairs to select the recommended additions, focusing initially on the Oregon Coast Range. We then mapped additions in the Oregon Cascades West and Klamath Mountains Provinces until approximately 410,000 acres were added. The recommended additions to the Habitat Conservation Area network were placed to not only compensate for the acres at risk on Bureau of Land Management administered lands, but to also partially mitigate for delays in meeting 50-11-40 standards under the Bureau of Land Management Preferred Alternative. The recommended additions to the Habitat Conservation Area network on National Forests make Habitat Conservation Areas there closer together thereby increasing probabilities of successful dispersal among Habitat Conservation Areas on National Forests. While these additions increase the probability that Habitat Conservation Areas on National Forests will be occupied by spotted owls and that owls will interact, they only partially increase probabilities that owls will move among the three affected physiographic provinces.

## **Appendix 3-B**

### **Rationale for Recommended Mitigation Options (Continued)**

After we added the recommended additions, approximating 410,000 acres to maps, we reviewed the resulting "new" spotted owl Habitat Conservation Area network on National Forests. We assessed the "new" Habitat Conservation Area network to determine whether it, along with the Bureau of Land Management Preferred Alternative and the Interagency Scientific Committee's Strategy applied in Washington and northern California have a high viability rating. Based on our judgement, the resulting "new" network did meet that objective. The additions are designed to buffer against the risks associated with Bureau of Land Management's Preferred Alternative during the transition period, by preserving options on National Forests that may otherwise be lost.

### **Results**

We mapped additions to Habitat Conservation Areas as recommended mitigations within the three physiographic provinces, the Oregon Coast Range, Klamath, and Oregon Cascades West, most affected by the Bureau of Land Management preferred alternative. Acreages of mapped additions were tallied from the automated database and totaled approximately 418,000 acres. A summary of mitigation in each province follows.

The Oregon Coast Range Province was identified in the Interagency Scientific Committee's Strategy as an area of special concern. The density of spotted owls is one-eighth of that recorded in other coastal areas (Thomas et al. 1990:67). As stated previously, there is concern that management of dispersal habitat and Old-Growth Emphasis Areas under the Bureau of Land Management Preferred Alternative may not meet the needs of the spotted owl. The Oregon Coast Range may be subject to increased risk of demographic isolation by year 2030 due to higher numbers of deficit quarter-townships on lands administered by the Bureau of Land Management than under Bureau of Land Management Alternative D.

An additional estimated 128,000 acres are mapped and recommended for the Oregon Coast Range Province to increase sizes of existing Category 1 Habitat Conservation Areas (0-31, 0-32, 0-34, 0-35, and 0-36) and create a new Habitat Conservation Area to reduce the likelihood of catastrophic events removing large blocks of suitable habitat. A single catastrophic event has a greater chance of eliminating an entire small designated area than a large designated area (Thomas et al. 1990).

Within the Klamath Province, approximately 142,000 additional acres are mapped and recommended for inclusions in Habitat Conservation Areas. A new Habitat Conservation Area west of 0-25 would be created along with a Habitat Conservation Area combining 0-23 and 0-24, and 0-21 and C-5 along the common boundary between lands managed by both the Forest Service and the Bureau of Land Management. These areas were identified as critical links in the Interagency Scientific Committee's Strategy for owl dispersal across province boundaries. We consider these additions important for increasing the likelihood of providing habitat for owls dispersing to the Oregon Coast Range and Oregon Cascades West provinces.

**Appendix 3-B  
Rationale for Recommended Mitigation Options (Continued)**

Within the Oregon Cascades West Province 148,000 acres are mapped and recommended as mitigation. Inclusions are recommended for National Forests adjacent to Habitat Conservation Area 0-16. Under the Interagency Scientific Committee’s Strategy, Habitat Conservation Area 0-16 is located entirely on Bureau of Land Management administered lands. Other additions are included for Habitat Conservation Areas 0-12 and 0-11. These areas are considered critical links for dispersal of spotted owls across province boundaries. Previously discussed concerns of Bureau of Land Management management of Old-Growth Emphasis Areas and dispersal habitat makes these Habitat Conservation Area additions important for spacing needs of habitat blocks. These areas represent the best available habitat on National Forests within the critical link area that would contribute to the needs of the spotted owl.

Our proposed additions to these Habitat Conservation Areas provide additional protection for pairs of owls and reduced distances between Habitat Conservation Areas. An additional 87 known pairs of owls are protected within Habitat Conservation Areas. In addition, nearest neighbor distances between Habitat Conservation Areas are reduced within all affected provinces as indicated in Table 3-C-1.

**Table 3-C-1** National Forest Habitat Conservation Area Nearest Neighbor Analysis-Without Mitigation/With Mitigation by Physiographic Province (distance in miles).

Physiographic Province	1st Neighbor	Distance to: 2nd Neighbor	3rd Neighbor
Oregon Coast Range	8.2/2.8	19.6/7.3	25.4/18.1
Oregon Cascades	5.1/4.2	9.1/7.3	16.1/11.9
Klamath Mountains	4.2/4.0	7.8/6.8	12.8/12.3

## The Scientific Analysis Team Report