

# Chapter VI

## Economic Evaluation of Options

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# Introduction

The Forest Ecosystem Management Assessment Team was charged by the Administration through the Secretaries of Agriculture and Interior with developing options for managing the federal forests of the Pacific Northwest that are within the range of the northern spotted owl. This report summarizes the economic analysis of the proposals brought forth by the Team.

## Principal Economic Concerns

Several fundamental economic questions arise when discussing the management of the federal forests of the Pacific Northwest. Several of these were highlighted in the letter of charge to the Forest Ecosystem Management Assessment Team, which was instructed to:

...address a range of alternatives in a way that allows us to distinguish the different costs and benefits of various approaches (including marginal cost/benefit assessments), and in so doing at least the following should be considered:

- Timber sales, short and long term.
- Production of other commodities.
- Effects on public uses and values including scenic quality, recreation, subsistence, and tourism.
- Effects on environmental and ecological values, including air and water quality, including habitat conservation, sustainability, threatened and endangered species, biodiversity, and long-term productivity.
- Jobs attributable to timber harvesting and timber processing, and to the extent feasible, jobs attributable to other commodity production, fish habitat protection, and public uses of the forests, as well as jobs attributable to investment and restoration associated with each alternative.
- Economic and social effects on local communities, and effects on revenues to counties and the national treasury.
- Economic and social policies associated with the protection and use of forest resources that might aid in the transitions of the region's industries and communities.

- o Economic and social benefits from the ecological services you consider.
- o Regional, national, and international effects as they relate to timber supply, wood product prices, and other key economic and social variables.

This chapter summarizes the economic assessment of these considerations as they relate to the management of the federal forests in the range of the northern spotted owl. All of the cost and benefit issues listed in the charge were addressed by the economic assessment group. (The most extensive treatment of "environmental and ecological values" is within the biological assessments.) The economic assessment does not take the form of a traditional, benefit-cost analysis; instead, it is constructed to answer the primary policy questions posed to the Team.

## Scope

The assessment focused on federal forests in Oregon, Washington, and California that are within the current range of the northern spotted owl. The federal forests included in the analysis are listed in table 6-1. For regional economic assessments, the "impact region" is defined as the central and western Oregon and Washington counties and northern California counties that are directly impacted by the management of these forests (fig. 6-1).

In other parts of the report we will refer to the Pacific Northwest generally (but not always defined) as the states of Washington and Oregon. We will also refer to the Pacific Northwest-westside which is the western parts of the two states (sometimes called the Douglas-fir subregion) and the Pacific Northwest-eastside which is the eastern parts of the two states (sometimes called the Ponderosa Pine subregion). Finally, we will refer to California sometimes as the Pacific Southwest.

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**Table VI-1. Federal lands included in the analysis.**

Agency	Administrative unit
Forest Service - National Forest	<u>Region 6 (Washington)</u>  Gifford Pinchot Mt. Baker-Snoqualmie Okanogan (owl portion only) Olympic Wenatchee

National Forest

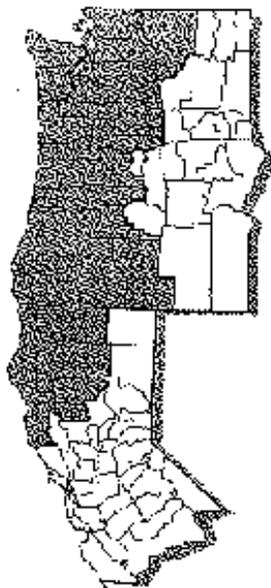
Gifford Pinchot  
Mt. Baker-Snoqualmie  
Okanogan (owl portion only)  
Olympic  
Wenatchee

Region 6 (Oregon)

Deschutes (owl portion only)  
Mt. Hood  
Rogue River  
Siskiyou  
Siuslaw  
Umpqua  
Willamette  
Winema (owl portion only)

Region 5 (California)

Klamath  
Mendocino  
Shasta-Trinity  
Six Rivers



Bureau of Land Management -  
Districts

Oregon

Coos Bay  
Eugene  
Lakeview  
Medford  
Roseburg  
Salem

California

Ukiah

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Figure 6-1. Geographic area encompassed in the impact region.

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## Review of Options

Ten different ecosystem management options were considered for partial or full analysis within the biological assessment and are discussed in detail in those chapters. The land allocation and land management implications of the ten options are discussed in the assessment of timber management (Johnson et al. 1993, a report prepared for the Team) The key characteristics of the ten options are displayed in table 3-2.

# Outlook for Federal Timber Harvests

## Sustainable Harvest Levels

In this analysis, we assumed that the federal forests in the owl region will be managed under a nondeclining yield mandate -- meaning that the planned harvest level in future decades cannot be less than the current decade's planned harvest level. The decadal harvest levels were estimated for each National Forest or Bureau of Land Management District using a variety of techniques including linear programming (FORPLAN), simulation (TRIM-plus), and data-base manipulation. These planning models estimate the acres treated and resource yields given land allocation patterns, management standards, and managerial constraints. Johnson, K.N., S. Crim, K. Barber, and M. Howell in an analysis written for this report, includes further details on the assumptions, techniques, and results.

The probable levels of federal timber sales for the owl region for the first decade under the rules for each option are summarized in table 6-2 and figure 6-2. In their analysis, Johnson et al. use the term "probable sales quantity" to describe these results rather than "allowable sale quantity" as they worked with agency personnel to estimate the likely sale level (probable sale level) under the rules for each option rather than the maximum sale level (allowable sale quantity) under the rules as has often been done in the past especially on the National Forests. Thus, they attempted to estimate sale levels likely to be achieved as opposed to estimating ceiling or upper limit estimates.

Some of the management rules and procedures for the different options make it difficult to fully determine the actual sale level that will result. As an example, many of the options call for further watershed assessment in certain Key Watersheds before timber harvest can occur there. Johnson et al. made estimates of likely timber sales that will result using a set of interim rules in those watersheds, but it is problematic as to what level of timber sales will be mandated after assessment. In addition, many options call for designation of "activity centers" for marbled murrelets and other species, as they are found, within which timber harvests will be prohibited or restricted. No allowance for these findings was made beyond sites that are already known. Finally, Option 9 includes the designation of Adaptive Management Areas across the owl region. In general, Johnson et al. assumed that such designation would not reduce the sales level that would otherwise occur under the option, but the actual level of sales that will occur in these areas remains somewhat uncertain.

Probable sale estimates do not include additional volume that might be obtained under some options from thinning, salvage and other treatments within reserves. An additional volume of up to 0-150 million board feet/year might be obtained from these activities depending on the option.

Figure 6-2 also summarizes "other wood," which includes cull volume and small salvage operations that are not counted in the normal allowable sales calculations. Historically, this has accounted for about 10 percent of the total harvest off of federal lands in the impact region. In the future, "other wood" is estimated at 10 percent of probable sales levels under each option. However, future removals of "other wood" are uncertain, due to changes in forest management practices, e.g., retention of snags and large woody debris.

**Table VI-2. Historic federal harvests and probable annual average timber sales in the first decade by option.<sup>a</sup>**

Administrative Unit	Average Harvest		Option <sup>c</sup>									
	1980-89	1990-92	1	2	3	4	5	6	7	8	9	10
National Forests- Owl Forests	million board feet, scribner											
Region 6 - Owl Forests												
Western Washington	824	404	22	69	75	67	119	87	186	133	131	94
Eastern Washington	195	124	11	31	33	30	26	37	47	65	47	52
Western Oregon	1902	897	68	207	239	284	392	300	716	473	429	357
Eastern Oregon	127	100	15	45	45	37	49	47	65	53	59	52
Total	3048	1525	116	352	391	418	585	471	1015	723	666	555

Region 6 - Owl Forests

Western Washington	824	404	22	69	75	67	119	87	186	133	131	94
Eastern Washington	195	124	11	31	33	30	26	37	47	65	47	52
Western Oregon	1902	897	68	207	239	284	392	300	716	473	429	357
Eastern Oregon	127	100	15	45	45	37	49	47	65	53	59	52
Total	3048	1525	116	352	391	418	585	471	1015	723	666	555

Region 5 - Owl Forests

Total	561	291	20	127	132	106	146	141	242	246	152	220
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Bureau of Land Management - Owl Forests

Western Oregon/Calif.	880	568	41	134	142	146	177	158	406	298	260	200
Eastern Oregon	35	5	0	3	3	3	6	4	7	6	6	4
Total	915	573	41	37	145	149	183	162	413	304	266	204

Total Owl Forests	4524	2389	177	616	668	673	915	774	1669	1274	1084	979
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National Forests- Non-Owl Forests<sup>b</sup>

Region 6 - Non-Owl Forests

Eastern Washington	134	138	102	102	102	102	102	102	102	102	102	102
Eastern Oregon	942	831	422	422	422	422	422	422	422	422	422	422
Total Non-Owl Forests	1076	969	524	524	524	524	524	524	524	524	524	524

<sup>a</sup> Probable sale levels should be within 10 percent of the final results and include no "other wood" estimates. Historic numbers are "gross" volumes and thus include historic levels of "other wood." Historic numbers for 1993-92 are estimates.

<sup>b</sup> Non-owl forests have not been subjected to rigorous analysis for the various alternatives and appear only for regional price projections. Fate of the outside forests is highly uncertain at the present time.

<sup>c</sup> Volumes for Options 1, 3, and 10 are approximated on the basis of analysis on the other seven options.

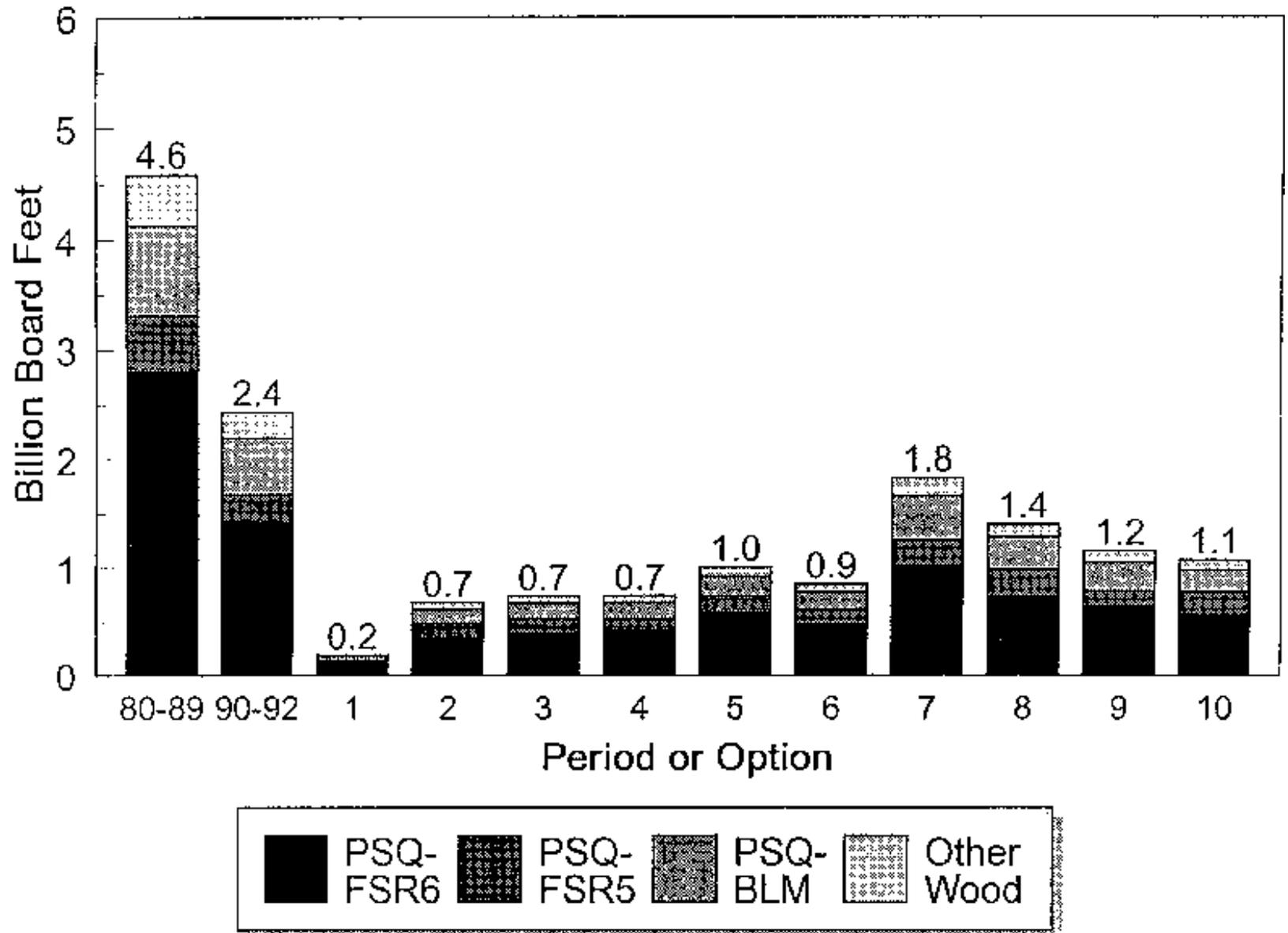


Figure VI-2. First decade probable timber sales levels (PST for options and historic harvest levels).

The average annual value of harvest in the region was over \$650 million per year in 1990-1992 (stumpage prices from Warren

1992). This represents the market value of the trees prior to harvesting. Log values to the mill in this period would be over \$1 billion per year - actual product values would be substantially higher (logging and transportation costs are assumed to be approximately \$140 per 1,000 board feet from Adams et al. [1988] updated to 1990-1992).

## Short-term Harvest Outlook

The short-term harvest is problematic and may differ from the calculated sustainable level due to required surveys, assessments and time required to distill proposals into new timber sales programs. The sales levels specified in the last section reflect the average annual sales levels that might be forthcoming on average in the decade ahead. Prior to being able to implement the active sales program it must be realized that:

- Coastal harvests will be restricted until the completion of marbled murrelet surveys (which may take 3 years or more to complete).
- Harvests in many watersheds will be restricted until comprehensive watershed analyses are conducted (these may take several years).
- The sales that have been laid out in the current sales program are often in areas that have been set aside in various options.

It takes many months or years to prepare timber sales. Sale planning and design by an interdisciplinary team, completion of protocols for the location of threatened and endangered species (such as the northern spotted owl and marbled murrelet), and National Environmental Protection Act compliance all take significant amounts of time. In addition, the added rules for management in many of the options of this report add to the complexity of sale design.

Given the time needed to prepare new sales, Johnson et al. (1993) concentrated their sale assessment on sales that were prepared in the last few years or are near completion in preparation. The results from their timber sale analysis for the portions of the National Forests of Regions 5 and 6 within the northern spotted owl region are summarized in table 6-3.

Four kinds of sales were considered:

1. Sales sold and awarded (category 1). By and large, these sales are available for harvest except in the near zone of the marbled murrelet where discussions with U.S. Fish and Wildlife Service continue. They make up most of the "volume under contract" in other displays in this report.
2. Sales prepared but not sold that have been enjoined by the decisions of judge Dwyer (category 2). By and large, these sales would have been the basis of the U.S. Forest Service fiscal year 1992 sale program if Judge Dwyer had lifted the injunction on sales in the habitat of the northern spotted owl.

3. Sales prepared but not yet sold that are not enjoined by the decisions of judge Dwyer (categories 3 and 4). By and large these sales occur in non-owl habitat or in owl habitat but are not degrading to it. Category 3 sales would be sold by September 30 and category 4 sales by December 31. We have lumped them together for this discussion.

4. Sales sold and not awarded (category 5). These sales have been bought by the purchaser but have not yet been formerly awarded to him. They make up the remainder of the volume reported as "under contract" in other displays in this report.

In table 6-3, each category of sales was classified according to three hierarchial criteria. First, the sales were classified as to whether or not they are within the near zone of the marbled murrelet. Given this determination, sales were further classified as to whether they were inside or outside the reserve system of the option (here option 9). Finally, the sales were further classified as to whether they were inside or outside tier 1 watersheds. As an example, 361.8 million board feet of enjoined sales (category 2) lie inside the near zone of the marbled murrelet. Of this volume, 198.8 million board feet lies in reserves of Option 9 and 163 million lies outside of these reserves. Of the volume in the reserves of Option 9 in the near zone of the marbled murrelet (198.8 million), 63.0 million lies inside tier 1 watersheds and 135.8 lies outside.

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Table VI-3. Sale estimates by sale category and Option 9 allocations for National Forests within the owl region.

Land Allocation Classes	Category 1 (Sold & Awarded)		Category 2 (Enjoined)		Category 3 & 4 <sup>c</sup> (Not Enjoined)		Category 5 (Sold & Not Awarded)	
	Total Vol	Net of RR <sup>a</sup>	Total Vol	Net of RR <sup>a</sup>	Total Vol	Net of RR <sup>a</sup>	Total Vol	Net of RR <sup>a</sup>
Millions of Board Feet								
Total Sales <sup>b</sup>	1808.1	1413.8	1199.2	874.7	475.7	414.2	85.1	58.9
I. Inside Murrelet Near Zone	411.6	244.2	361.8	205.3	63.3	49.3	13.8	4.8
A. Inside Reserves	209.4	109.3	198.8	102.4	13.8	9.8	13.8	4.8
1. Inside Tier 1 Watersheds	133.6	59.2	63.0	32.0	9.3	6.5	9.5	2.8
2. Outside Tier 1 Watersheds	75.8	50.1	135.8	70.4	4.5	3.3	4.3	2.0
B. Outside Reserves	202.2	134.9	163.0	102.9	49.5	39.5	0	0
1. Inside Tier 1 Watersheds	66.0	47.3	48.6	38.1	25.7	21.6	0	0
2. Outside Tier 1 Watersheds	136.2	87.6	114.4	64.8	23.8	17.9	0	0
II. Outside Murrelet Near Zone	1396.5	1169.6	837.4	669.4	412.4	364.9	71.3	54.1
A. Inside Reserves	453.5	372.3	214.5	161.9	77.7	65.0	42.3	30.8
1. Inside Tier 1 Watersheds	190.3	150.2	93.0	67.0	24.4	16.6	21.3	13.7
2. Outside Tier 1 Watersheds	263.2	222.1	121.5	94.9	53.3	48.4	21.0	17.1
B. Outside Reserves	943.0	797.3	622.9	507.5	334.7	299.9	29.0	23.3
1. Inside Tier 1 Watersheds	152.8	119.4	109.2	84.1	45.1	37.5	0	0
2. Outside Tier 1 Watersheds <sup>d</sup>	790.2	667.9	513.7	423.4	289.6	262.4	29.0	23.3

<sup>a</sup>Time needed to do sale redesign to exclude RR (Riparian Reserve) volume is not known at this time.

<sup>b</sup>This does not include three other possible encumbrances: Critical Habitat for the northwestern spotted owl, Roadless Area designations, and tier 2 watersheds.

<sup>c</sup>Category 4 sales are not wrapped. Assumed their total volume (55.3 million board feet) is available outside of all Option 9 allocations.

<sup>d</sup>Some sales will be split between categories. Sales volumes entirely outside the Reserves and Tier 1 Watersheds might be 10 percent less than these results.

<sup>2</sup>Time needed to do sale redesign to exclude RR (Riparian Reserve) volume is not known at this time.

<sup>3</sup>This does not include three other possible encumbrances: Critical Habitat for the northern spotted owl, Roadless Area designations, and tier 2 watersheds.

<sup>4</sup>Category 4 sales are not mapped. Assumed their total volume (55.3 million board feet) is available outside of all Option 9 allocations.

<sup>5</sup>Some sales will be split between categories. Sales volumes entirely outside the Reserves and Tier 1 Watersheds might be 10 percent less than these results.

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The volume in the intersection of each sale category and sale classification is further classified in terms of total volume and volume "net of Riparian Reserve" where Riparian Reserve represents the riparian buffers of Option 9. Thus, the total volume in category 1 sales within the near zone of the marbled murrelet equals 411.6 million board feet while the volume net of riparian habitat conservation areas equal 244.2 million.

A quick scan of these tables reveals that approximately 35 percent of category 1 (667.9/1808.2) and 2 (423.4/1199.2) sale volume lies in less controversial areas -- outside the near zone of the marbled murrelet, the reserve system, tier 1 watersheds, and the Riparian Reserve system. On the other hand, slightly more than half of category 3 and 4 sale volume (262.4/475.7) occurs in these less controversial areas.

In addition, sales were classified in the analysis as to whether they fell into U.S. Fish and Wildlife Service critical habitat for the northern spotted owl and whether they fell into roadless areas. As an example, over one-third of the sale volume of enjoined sales (category 2) in reserves is also in critical habitat and approximately 10 percent of the total enjoined sale volume falls into roadless areas. See Johnson, et al. for more details.

Finally, sales were classified by stand age. Over half of category 1 and 2 sales were from a stands over 200 years of age and over 90 percent from stands over 80 years of age. In contrast, category 3 and 4 sales had relatively little volume coming from stands over 200 years of age. See Johnson et al. for more details.

In summary, drawing on timber sales that have already been prepared to provide short term volume may prove difficult because of their location in the near zone of the marbled murrelet, reserves, tier 1 watersheds, Riparian Reserves, roadless areas, and U.S.

Fish and Wildlife Service critical habitat for the northern spotted owl. Of the 1.7 billion board feet in sales not yet sold that are at or near completion in sale preparation(categories 2, 3, and 4), approximately 0.6 billion (slightly more than one-third) lies outside potentially controversial areas in Option 9. And close to half of this 0.6 billion board feet would come from stands over 200 years of age. Even this 0.6 billion board feet may be delayed for some time while sales are redesigned to come into compliance

with the rules (especially the Riparian Reserve rules) for the option that is selected. Similar results can be expected in most other options.

An analysis of Bureau of Land Management timber sales produces similar results although less of its potential sale volume is over 200 years of age. On Bureau of Land Management land, preparation of close to 0.1 billion board feet in categories 2, 3,

and 4

outside of these potentially controversial areas is near completion.

The agencies may be able to prepare some additional sales in fiscal year 1994 beyond those listed here. Recent new sale preparation has focused on sales in non-owl habitat or sales in owl habitat that did not degrade it. More of these sales might be ready before the end of fiscal year 1994. It must be pointed out though, that the majority of the category 3 and 4 sales considered above will be sold before the end of this fiscal year. Thus, the new sales would replace, to some degree the depletion of these sales. Still some sale volume outside of potentially noncontroversial areas might be forthcoming in fiscal year 1994 to add to the 0.6 + 0.1 - 0.7 billion listed above. It would be surprising, though, if total new sales outside of potentially controversial areas rose much above 1 billion in fiscal year 1994.

Beyond fiscal year 1994, the picture brightens somewhat assuming the agency is given clear rules for project design and an efficient process for dealing with sales in owl habitat. Starting now with the fiscal year 1995 program would give enough lead time (almost 2 years) to prepare substantial amounts of new volume. One dark cloud on the horizon, however, is the continued reduction in force that is rapidly depleting the ranks of timber sale preparers. Unless this reduction is slowed and (in some cases) reversed, the manpower may not exist to prepare a future sales program of significant size.

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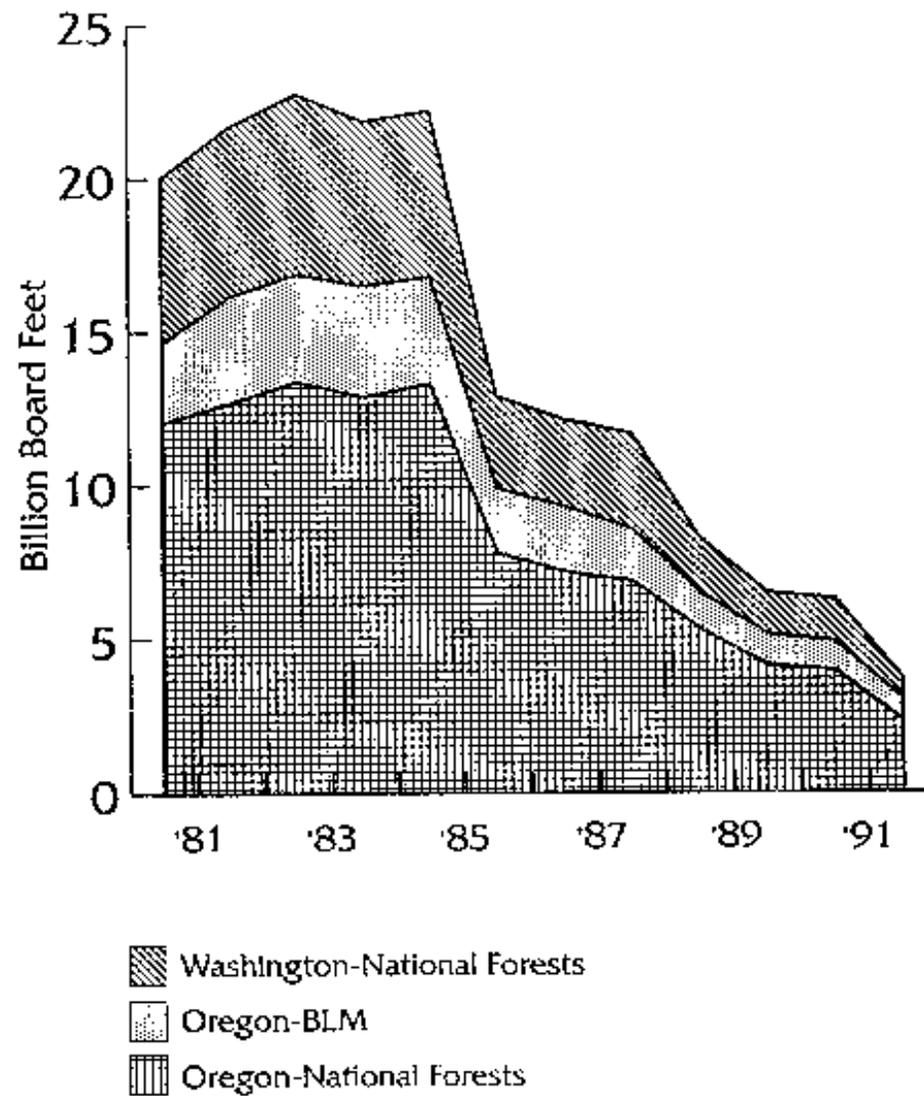


Figure VI-3. Historic federal timber sales volume under contract in Oregon and Washington.

**Figure VI-3. Historic federal timber sales volume under contract in Oregon and Washington.**

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## Summary

Estimated sales levels under all of the options are below program levels of the 1980's as well as below the harvest levels of 1990-1992, when most new federal sales were enjoined. In 1990-1992, harvests were being taken from sales under contract from the 1980's (fig. 7-3). The sales levels implied by the new options will not permit even that level of harvests to be realized in the future. In the next 1-3 years the outlook is for sales levels to be substantially less than the potential decadal average sales.

## Outlook for Other Commodity Production

A vast array of other resources are associated with the federal forest lands in the impact region. The work of the Forest Ecosystem Management Assessment Team did not deal explicitly with the management of the federal lands for commodities other than timber. In this section we briefly discuss these other commodities as they are important to local economics.

### Minerals

The federal lands in the region are known to include substantial mineral resources. The 1992 analysis of critical habitat designation for the northern spotted owl (Schamberger et al. 1992) provided preliminary assessments of the potential impacts of limiting mining activities within the lands designated as being critical habitat for the northern spotted owl.

Ten known mineral resource deposits were located within critical habitat (seven of these were in Jackson and Josephine Counties in Oregon). These minerals include lime, limestone, silicas, copper, zinc, gold, silver, and chrome. Of the ten known deposits, one is currently being mined, three others could be profitably mined at 1990 prices, and four more could be profitably mined given a doubling of mineral prices. The mineral resources from the currently profitable mines are estimated to have a value of \$344 million. This value includes the one active operation and the potential contributions from initiating the other operations, and it is uncertain as to the eventual restrictions that would be put upon these reserves. It is also uncertain at this time how additional land-use restrictions underlying the additional land allocations in the options specified by this working group. could further restrict mineral activities in the region.

In addition to known reserves with some currently ongoing activity and potential near-term activity, the U.S. Geological Survey identified three mineral terranes in southwestern Oregon and the "copper porphyry" terrane that corresponds roughly to the Cascade mountain range in Washington, Oregon, and northern California as being mineral terranes with substantial potential for yielding future discovery of deposits. The copper porphyry terrane, in particular, appears to hold great potential for revealing

future mineral deposits that might be within the bounds of important forest habitat. This terrane contains silver, gold, molybdenum, and copper and holds the potential for production of hundreds of millions of dollars worth of minerals.

In the longer term, it is likely that new mineral deposit discoveries will lead to further activities in mining and mineral processing in the region. The level of expansion in these industries may be limited to some degree by the proposals made by the Forest Ecosystem Management Assessment Team.

## Range

Federal lands of the West are often leased for grazing. This use of federal lands for grazing in Oregon, Washington, and northern California is far more typical east of the Cascades than in the range of the northern spotted owl. The Bureau of Land Management lands in the owl region have historically provided about 23,000 animal unit months while national forests in the owl region of Washington, Oregon, and California have provided about 213,000 animal unit months (information from the Bureau of Land Management State Director's Office and from the U.S. Forest Service Regions 5 and 6 offices). This contrasts to 510,000 animal unit months on the remainder of the National Forests in Region 6.

In light of the proposals made by the Forest Ecosystem Management Assessment Team, it is likely that modification of grazing practices would occur, particularly within the riparian protection areas. These modifications would likely have consequences for individuals, but the overall economic consequences of restrictions would likely be overwhelmed by other economic considerations in the region. In addition, the consequences to the industry would be minimized by the relatively minor share of range production represented on the federal lands within the impact region.

## Special Forest Products

A great deal of interest exists in the role that nontraditional or "special" forest products might play in the region. Currently, five major segments are in the industry: (1) floral greens, (2) Christmas ornamentals, (3) wild edible mushrooms, (4) other edibles and medicinals, and (5) Pacific yew. These products appear to have a significant amount of economic value. However, their eventual contribution is clouded by below-market pricing by public owners and a lack of recordkeeping.

In a report prepared for the Team, Schlosser and Blatner (1993) summarized many of the key aspects of the special forest products markets in the Pacific Northwest (Washington, Oregon, Idaho, and Montana). The major market segments are floral greens, Christmas ornamentals, and edible mushrooms; Pacific Yew appears to have less of a future in light of the development of synthetic taxol. In 1989 in western Oregon, Washington and southwestern British Columbia, approximately 27 million bunches of floral greens, 4,000 tons of moss, 15,000 thousand tons of Christmas bows, 1,000 tons of holly, and 7 million cones were harvested from the forests in the region with a value of over \$42 million (table 6-4). In 1992, preliminary estimates of

mushroom harvests totaled 1.1 million tons, with a value over \$11 million (table 6-5) paid to the harvesters. These are the values of the sales of these products, not the receipts to the government, as these products are rarely marketed by the federal government. Instead, permits are often issued for nominal fees.

The eastside of the Cascades is an important component of the total harvest and critical to the economic viability of the wild edible mushroom industry. The harvest begins in northern California and proceeds into eastern Washington and eastern Oregon and Idaho during the late spring and moves to the westside in the fall. Buyers located throughout the region often buy throughout this larger regional area. In this analysis we only estimated the westside component of the industry.

The western hemlock zone of the region appears to hold the greatest potential for supporting special forest products activity. Also, the mountain hemlock zone is productive for the high-valued beargrass. These forest types are well represented within the impact region.

Schlosser and Blatner (1993) highlight that silvicultural prescriptions can aid in enhancing the production of special forest products. Most of the floral greens prefer management regimes that maintain the forest in mid- to late-seral stages and maintain semiclosed canopies. Thus, the value of these products can be enhanced through maintenance of stands in this condition. Christmas ornamentals are less sensitive to stand structure, and information is not yet available on management associations of other special products.

## Commercial Fisheries

While commercial fisheries production is not a direct output of the forest, it is influenced by the quality of the stream habitat that lies within the forested areas.

**Table VI-4.** Harvest of floral greens and Christmas ornamentals in western Oregon, western Washington, and southwestern British Columbia in 1989.

Species	Volume	Value in 1989
		(thousand \$)
Floral Greens		
Evergreen Huckleberry	2,278,454 Bunches	\$1,481
Evergreen Huckleberry Tips	289,521 Bunches	107
Red Evergreen Huckleberry	173,692 Bunches	113
Salal	8,490,100 Bunches	7,641
Salal Tips	10,878,589 Bunches	5,439

				(thousand \$)
<b>Floral Greens</b>				
	Evergreen Huckleberry	2,278,454	Bunches	\$1,481
	Evergreen Huckleberry Tips	289,521	Bunches	107
	Red Evergreen Huckleberry	173,692	Bunches	113
	Salal	8,490,100	Bunches	7,641
	Salal Tips	10,878,589	Bunches	5,439
	Dwarf Oregon-grape	99,141	Bunches	59
	Beargrass	12,781,823	Bunches	11,504
	Sword Fern	2,463,092	Bunches	1,527
	Scotch-Broom	345,698	Bunches	138
	Moss	3,963	Tons	2,061
<b>Christmas Ornaments</b>				
	Noble Fir Boughs	9,310	Tons	6,703
	Douglas-fir Boughs	1,317	Tons	263
	Western Red Cedar Boughs	2,375	Tons	1,092
	Western White Pine Boughs	995	Tons	458
	Lodgepole Pine Boughs	272	Tons	99
	Subalpine Fir Boughs	900	Tons	576
	Western Juniper Boughs	283	Tons	142
	Incense Cedar Boughs	176	Tons	133
	Other Boughs		N/A	59
	Cones	7.2	Million	253
	Holly	954	Tons	2,672
<b>Total</b>				<b>42,520</b>

Source: Schlosser and Mazur (1993).

**Table VI-5.** Preliminary estimates of harvest of edible mushrooms in western Oregon and western Washington in 1992.

Species	Volume	Value in 1992
	(tons)	(thousand \$)
Chanterelles	637	4,019
Matsuke	396	6,261
Boletes	29	259
Spreading Hedgehog	20	144

Species	Volume (tons)	Value in 1992 (thousand \$)
Chanterelles	637	4,019
Matsuke	396	6,261
Boletes	29	259
Spreading Hedgehog	20	144
Morels	11	91
Cauliflower	3	23
Other	36	625
<b>Total</b>	<b>1,135</b>	<b>11,422</b>

Source: Based upon interpretations of preliminary data in Schlosser and Blarner (1993).

\*\*\*

Fisheries-related industries represent a significant proportion of the coastal economy of the Pacific Northwest. The principal commercial species categories in the region are salmon, tuna, groundfish, crab, shrimp, and others. In addition, clams and oyster values in Washington surpassed landed fish values in the state (oyster and clam values totaled \$60 million in 1989, \$54 million in 1990, and \$48 million in 1991) (Radtke and Davis 1993a, report prepared for the Team). While salmon represents the species most directly impacted by forestry activities, it is important to look at all of the species landed to see how the industry has adapted to changing conditions.

The volume and value of commercial seafood landed in Pacific Northwest ports fell substantially from 1989 to 1991 (table 6-6). The most significant decline was in salmon catch. A variety of factors contributed to this, including depressed fish prices, unfavorable ocean conditions, and increasing competition from other consumers of this resource. The decline in salmon catch continued into 1992 for Oregon and northern California. The catch of groundfish increased substantially in Oregon in 1992 and resulted in a substantial increase in the volume of catch (257 million pounds in 1992 as opposed to 150 million pounds in 1991), but the dollar value of the catch did not increase markedly (\$74 million in Oregon in 1992 as compared to \$62 million in Oregon in 1991). This is due to a changing mix in the catch and reductions in prices (Radtke and Davis 1993a).

These short-term changes cannot be necessarily be extrapolated to long-term projections. The seafood catch in the early 1980's, for example, declined greatly with bad economic conditions coupled with El Nino conditions. However, there is evidence of a longer term trend in the Pacific Northwest fishing industry - a trend that has seen a shift from salmon and tuna production toward groundfish and shrimp. This species substitution has allowed the industry to maintain its viability. Three factors, however, currently pose difficulties for the coastal fisheries: (1) the recession in world seafood prices, (2) continued reductions in salmon availability, and (3) the loss of a large share of the groundfish (particularly Pacific whiting) to offshore processors. The continuation of the loss of volume to offshore processors could result in large reductions in onshore groundfish processing in 1993

(Radtke and Davis 1993a).

The focus upon landings at ports in Washington, Oregon, and northern California may understate the importance of Pacific Northwest salmon stocks. Alaska and British Columbia operations dominate the salmon fisheries market and harvest more than 20 times the value of the salmon in the lower three states.

Options proposed by the Forest Ecosystem Management Assessment Team likely would not influence the immediate future of commercial fisheries operations. However, improved watershed and fisheries management policies may aid fish stocks in the longer term.

## Summary

The options proposed likely will provide some short-term benefits to the special forest products sector, due to maintenance of forest conditions conducive to the production of some of the special forest products. At the same time, some short-term costs in forage (and livestock) production may be incurred due to range restrictions. Potential restrictions on mineral extraction need further investigation to discern whether the current or future production operations may be limited. In the longer term, improved watershed protection may aid fish stacks if coupled with appropriate fisheries management.

**Table VI-6.** Estimated pounds and value of seafood landed at Washington, Oregon and California ports 1989-1992.

Year	Poundage				Value
	Washington	Oregon	Northern California	Total	
Species	thousand pounds				thousand \$
1989					
Salmon	8,112	11,724	1,878	21,714	25,812
Tuna, Albacore	405	1,080	202	1,687	1,309
Groundfish	22,096	82,510	52,228	156,834	46,375
Crab	17,667	11,676	4,728	34,071	37,822
Shrimp, Pink	15,895	49,129	13,323	78,347	28,611
Other	5,707	9,504	23,060	38,271	13,797

1989					
Salmon	8,112	11,724	1,878	21,714	25,812
Tuna, Albacore	405	1,080	202	1,687	1,309
Groundfish	22,096	82,510	52,228	156,834	46,375
Crab	17,667	11,676	4,728	34,071	37,822
Shrimp, Pink	15,895	49,129	13,323	78,347	28,611
Other	5,707	9,504	23,060	38,271	13,797
Total	69,882	165,623	95,419	330,924	153,726
1990					
Salmon	5,216	5,412	966	11,594	18,832
Tuna, Albacore	1,108	2,079	222	3,409	2,767
Groundfish	16,642	79,177	47,564	143,383	41,962
Crab	9,137	9,510	9,246	27,893	27,513
Shrimp, Pink	13,549	31,883	8,693	54,125	26,566
Other	4,890	11,011	14,113	30,014	13,920
Total	50,542	139,072	80,804	270,418	131,560
1991					
Salmon	6,715	5,344	624	12,683	13,006
Tuna, Albacore	606	1,259	105	1,970	1,536
Groundfish	16,740	110,817	44,092	171,649	48,075
Crab	4,337	4,924	3,199	12,460	19,051
Shrimp, Pink	9,944	21,711	10,363	42,018	23,398
Other	5,166	5,976	13,070	24,212	15,430
Total	43,567	150,031	71,453	264,992	120,496
1992					
Salmon	N/A	2,364	23	N/A	N/A
Tuna, Albacore	N/A	3,886	618	N/A	N/A
Groundfish	N/A	186,318	39,632	N/A	N/A
Crab	N/A	11,928	7,510	N/A	N/A
Shrimp, Pink	N/A	48,033	18,680	N/A	N/A
Other	N/A	4,454	10,769	N/A	N/A
Total	N/A	256,982	77,239	N/A	N/A

Groundfish	N/A	186,518	39,632	N/A	N/A
Crab	N/A	11,928	7,510	N/A	N/A
Shrimp, Pink	N/A	48,033	18,680	N/A	N/A
Other	N/A	4,454	10,769	N/A	N/A
<b>Total</b>	<b>N/A</b>	<b>256,982</b>	<b>77,239</b>	<b>N/A</b>	<b>N/A</b>

Source: Radtke and Davis (1993a).

## Outlook for Noncommodity Production

In addition to commodity products (i.e., those that are marketed) several noncommodity outputs are associated with forest management. While these outputs may not have direct economic value as expressed through market prices, they are valued by society and can lead to tangible economic returns through tourism and recreation expenditures and through increasing the attractiveness of the region to new firms.

### Recreation

Forest-based recreation in 1990 totaled 135 million visits in 1990 (table 6-7; Swanson and Loomis 1993, a report prepared for the Team). Estimates of willingness to pay suggest that forest visitors placed a value of over \$1.6 billion upon these visits (over and above their actual expenditures of \$2.8 billion). The recreation visits can also be portrayed as a function of land classifications used by the federal agencies - thus permitting the assessment of the acreage allocation within plans. This system is

known as the recreation opportunity spectrum and classifies the land base by broad categories of recreation potential, i.e., primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, and roaded modified rural. Currently, the use and total value levels are highest for the more developed, motorized forms of recreation (table 6-8). Use is a function of supply and demand considerations, and there is evidence that there is an excess supply of these more developed, motorized forms of recreation (table 6-9).

Table 6-9 contrasts the implicit recreation opportunity spectrum outcomes in the year 2000 given the two "extreme" options considered by the Forest Ecosystem Management Assessment Team, as well as the implications of retiring roads within the acres classed as semiprimitive motorized or roaded natural so that they may be moved to a nonroaded condition -- thus contributing toward this unmet demand. This latter category is denoted by "Option 1 with Recreation Emphasis." Forests of the region thus appear to be providing less of the primitive and semiprimitive nonmotorized opportunities than is desired by forest recreationists.

While land attributes can be useful for describing some aspects of recreation value, they are not sufficient for describing hunting and fishing opportunities and values. Table 6-7 indicates that Pacific Northwest fishing represents one of the highest valued recreation opportunities in the region. Sport fisheries activities are dominated by trout, salmon, and steelhead fishing and 77 percent of the fishing days were in pursuit of these species (Radtke and Davis (1993a). Forested watersheds can have marked impacts on the habitat for these fish species. Radtke and Davis (1993a) show that, while it is not attributable solely to forest conditions, Pacific Northwest salmon fishing catch rates and angler days have declined greatly from the late 1970's. The economic implications of these changes are addressed in later sections of this report.

**Table VI-7. Recreation visits and values in 1990 for Bureau of Land Management and National Forest lands in the range of the northern spotted owl by activity.**

Recreation activity	Visits thous.	Value/ visit ——— \$/visit ———	Expenditures/ visit ———	Annual value ———	Annual expenditures thousand \$'s ———
Off-road vehicle use	2,074	10.39	21.91	21,548	45,439
Motorized Sightseeing & exploring)	74,954	4.00	21.91	299,818	1,642,251
Hiking, biking, horsebacking, other nonmotorized visits	10,803	35.86	8.53	213,429	92,150
Camping	11,527	11.00	27.17	126,796	313,185
Hunting	2,604	39.08	20.69	101,757	53,873
Non-consumptive wildlife viewing	4,576	26.06	22.44	119,253	102,687
Picnicking, photography, nature study, interpretive visits, and other day-use	14,703	20.00	13.50	294,055	198,487
Fishing	5,842	42.92	30.65	291,646	179,066
Boating, canoeing, and rafting	1,922	6.00	22.73	11,534	43,696

viewing					
Picnicking, photography, nature study, interpretive visits, and other day-use	14,703	20.00	13.50	294,055	198,487
Fishing	5,842	42.92	30.65	291,646	179,066
Boating, canoeing, and rafting	1,922	6.00	22.73	11,534	43,696
Swimming, wading, and other water-based visits	2,172	3.00	4.56	6,515	9,903
Winter sports other than snowmobiling	2,224	33.69	22.41	74,922	49,837
Snowmobiling	1,203	33.69	22.41	40,539	26,966
Total	134,604			1,601,812	2,757,540

Source: Swanson and Loomis (1993).

**Table VI-8.** Recreation visits and values in 1990 for Bureau of Land Management and National Forest lands in the range of the northern spotted owl by Recreation Opportunity Spectrum setting category.

	Recreation Opportunity Spectrum setting category					Total
	Primitive	Semiprimitive nonmotorized	Semiprimitive motorized	Roaded natural	Roaded modified rural	
Acres (thousands)	3,856	1,608	1,578	8,686	7,615	23,342
Visits (thousands)	3,901	3,938	11,593	79,697	33,681	132,810
Annual Value (thous \$)	116,226	77,271	123,092	797,699	356,494	1,470,782
Value/Acre (\$/acre)	30.14	48.06	78.01	91.84	46.82	63.01
Visits per acre	1.01	2.45	7.35	9.18	4.42	5.69

Source: Swanson and Loomis (1993).

**Table VI-9.** Recreation acreage needs and values assessment in the year 2000 for Bureau of Land Management and National Forest lands in the range of the northern spotted owl by Recreation Opportunity

**Table VI-9.** Recreation acreage needs and values assessment in the year 2000 for Bureau of Land Management and National Forest lands in the range of the northern spotted owl by Recreation Opportunity Spectrum setting category under Options 1 and 7.

	Recreation Opportunity Spectrum setting category					Total
	Primitive	Semiprimitive Nonmotorized	Semiprimitive Motorized	Roaded Natural	Roaded Modified Rural	
<b>Projected Needs in the Year 2000</b>						
Acres (thousands)	5,859	7,610	1,821	3,315	4,748	23,342
Value/acre (\$)	30.14	48.06	78.01	91.84	46.82	N/A
<b>Option 7 Allocations in the Year 2000</b>						
Acres Allocated (thousands)	3,934	811	2,211	7,344	9,045	23,342
Acres Contributing to Needs (thousands)	3,934	811	1,821	3,315	4,738	
Deficit (Surplus) (thousand acres)	1,925	6,798	(394)	(4,029)	(4,307)	
Recreation Value (thousand \$'s)	118,568	38,988	142,027	304,409	221,842	825,834
<b>Option 1 Allocations in the Year 2000</b>						
Acres Allocated (thousands)	3,960	975	2,876	7,004	8,543	23,342
Acres Contributing to Needs (thousands)	3,960	975	1,821	3,315	4,748	
Surplus (Deficit) (thousand acres)	1,899	6,635	(1,055)	(3,689)	(3,795)	
Recreation Value (thousand \$'s)	119,357	46,836	142,027	304,409	221,842	834,470

(thousands)						
Acres Contributing to Needs (thousands)	3,960	975	1,821	3,315	4,748	
Surplus (Deficit) (thousand acres)	1,899	6,635	(1,055)	(3,689)	(3,795)	
Recreation Value (thousand \$'s)	119,357	46,836	142,027	304,409	221,842	834,470
Option 1 Allocations in the Year 2000 with Recreation Emphasis						
Allocation Acres						
Acres Allocated (thousands)	3,960	2,553	1,898	6,404	8,543	23,342
Acres Contributing to Needs (thousands)	3,960	2,553	1,821	3,315	4,748	
Surplus (Deficit) (thousand acres)	1,899	5,057	(77)	(3,089)	(3,795)	
Recreation Value (thousand \$'s)	119,357	122,669	142,027	304,409	221,842	910,304

Source: Swanson and Loontjens (1993) background report.

## Scenic Quality, Water Quality, Air Quality, and Other "Public Goods"

The aquatic assessment from the Forest Ecosystem Management Assessment Team addresses the relationship between the alternatives and water quality. Roadside and streamside visual considerations have been designed into forest plans in the region. The recreational assessment has highlighted how recreation values are influenced by landscape attributes, and one can infer some of the scenic values implicit in land management alternatives. The relationship between air quality and the alternatives is difficult to infer. More detailed air quality analysis should be undertaken in Forest, District, or Physiographic Province level planning.

Beyond these relationships lie two prevailing economic questions. First, how do these environmental qualities influence the quality of life within the Pacific Northwest and therefore its attractiveness for new businesses and residents? Second, how does

the public at large value the existence of a "quality environment"?

The Pacific Northwest has seen greater than the U.S. average employment growth since 1985 (Mitchell and Sommers 1993). Many contend that this economic growth has been fueled by the quality of life in the region, and that environmental quality is a component of this quality of life. Maintenance of a quality environment has become a critical component of the region's economic development. There is no way to judge, however, the relationship between the options specified and the future economic contributions of the forest from a quality of life standpoint.

Swanson and Loomis (1993) highlight that all Americans place a high value on maintenance of viable ecosystems, even when those systems are far removed from their homes. This implies that direct commodity production and forest use information does not fully account for how society values or assigns costs of particular management actions.

## Summary

Economic contributions from the forests of the region extend beyond the commodities yielded. The noncommodity outputs of the forest have true economic values and can provide a basis for economic development both through tourism-related activities and quality of life considerations. Assessment of recreation values, recreation needs, and land allocations suggest that land management strategies can be crafted that enhance the values provided by the forest. The range of options analyzed by this Team indicate little variation in recreation opportunity yields, but when coupled with activities such as watershed restoration, which call for elimination of roads in many watersheds, the options may lead to improved recreational opportunities.

## Outlook for Nonfederal Timber Harvests

The change in availability of federal timber will likely impact regional forest product prices and lead to changes in harvest activities from private and other public timber owners in the region. To assess the impacts of changes in federal harvests on regional timber prices and harvests from nonfederal sources, the timber market was simulated using the Timber Assessment Market Model (Adams and Haynes 1980). Simulations were done for harvest levels of 0.5, 1.0, 1.5, and 2.5 billion board feet from the federal forests in the analysis region. These levels spanned the range of harvests in the 10 options. Results are presented for entire half-states for Washington and Oregon, since this is the basis for analysis within the Timber Assessment Market Model. Later sections attempt to disaggregate these projections for implications for the owl region.

In the four simulations, no changes were assumed in the state forestry regulations of private timberlands. If the states enact extensive changes in forest practice act regulations, then these results may overstate the potential expense of private timberland owners. In addition, no changes in the rate and types of forest management were assumed.

# Timber Prices

Reductions of federal timber availability in the region do spur price increases for timber (table 6-10). All simulations show large price increases from the level prevailing in the regional market in 1990. These price signals serve to motivate other landowners to harvest timber in the near-term and invest in timber management in the longer term.

# Harvest Levels

The reductions in federal harvests tend to spur some supply responses on the part of private owners in the region (table 6-11). The level of the supply response is short lived and tempered by the age distribution of the timber on private lands (fig. 6-4; see also Greber et al. 1991 and Adams et al. 1992). The impact occurs in the early years of the simulations - by the year 2000 the harvests drop below the levels of the 1980's.

Table 6-12 puts together the public and private timber harvest outlook to show which regions are prone to be most impacted by changing harvest levels. The state of Washington demonstrates some resilience to the changes in federal harvests. Federal harvests represent a much smaller proportion of Washington's harvest than in the other states. The responses by the other landowners allow the state of Washington to maintain harvests at a level somewhat higher than the level of 1990-1992 - although some 11 to 12 percent less than the level of the 1980's. Most all of the aggregate harvest reduction in Washington is in the western region of the state.

Oregon harvests are apt to be declining given all options considered -- and these reductions will be substantial when compared to the 1980's. Options 1 through 6 and 8 through 10 (which all entailed harvests well under 1.5 billion board feet on the owl forests) all will yield decreases on the westside as well as the eastside. Eastern Oregon is confronted with substantial reductions on federal and nonfederal lands (see tables 6-2 and 6-12). California similarly sees substantial reductions under all options due to reductions on both federal and nonfederal lands (tables 6-2 and 6-12). These reductions in nonfederal harvests are consistent with findings in Haynes et al. (1993).

**Table VI-10. Historic and projected prices for timber by geographic region for simulations.**

Region/ Year	Harvest level from federal forests in the owl region			
	500	1000	1500	2500*
dollars per thousand board feet, scribner (1992 dollars)				

Pacific Northwest  
Westside

Region/ Year	Harvest level from federal forests in the owl region			
	500	1000	1500	2500*
	dollars per thousand board feet, scribner (1992 dollars)			
<b>Pacific Northwest</b>				
Westside				
1990	240	240	240	240
1995	347	333	319	281
2000	303	296	298	284
2010	379	363	341	319
2040	333	312	348	327
<b>Pacific Northwest</b>				
Eastside				
1990	124	124	124	124
1995	220	206	197	198
2000	260	244	244	221
2010	277	262	266	260
2040	288	270	276	262
<b>Pacific Southwest</b>				
1990	124	124	124	124
1995	227	223	219	212
2000	215	210	202	191
2010	224	221	223	216
2040	180	189	152	180

Source: Timber Assessment Market Model simulations.

\*Harvest levels in million board feet.

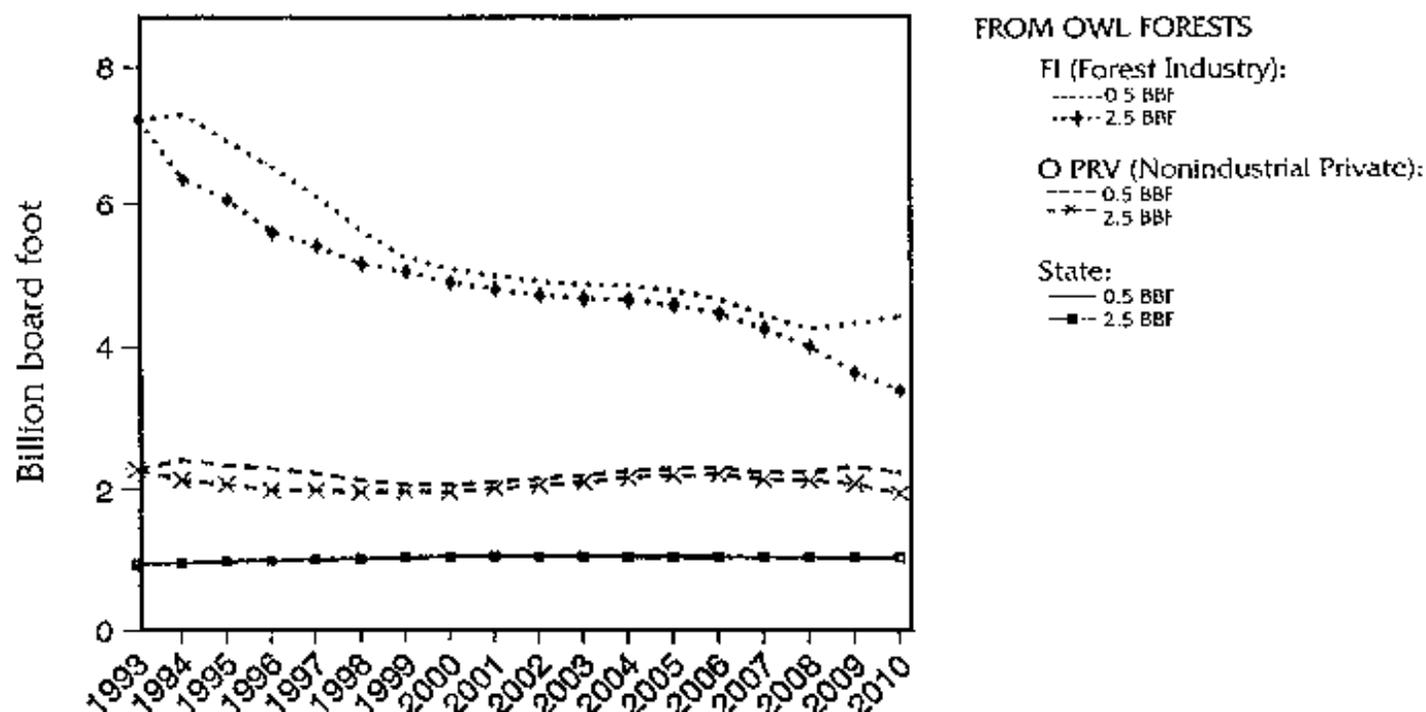
**Table VI-11.** Historic harvest levels and projects first decade average timber harvests on nonfederal lands by geographic region for options (whole state for Oregon and Washington).

Region	Average 1980-1989	Average <sup>a</sup> 1990-1992	Harvest level from federal forests in the owl region			
			500	1000	1500	2500
	million board feet, scribner					
Washington						
Western	4126	3775	4253	4193	4157	4008
Eastern	822	752	848	822	810	803
Total	4949	4528	5101	5015	4967	4811

	1992	1995	1998	2000	2005	2010
million board feet, scribner						
Washington						
Western	4126	3775	4253	4193	4157	4008
Eastern	822	752	848	822	810	803
Total	4949	4528	5101	5015	4967	4811
Oregon						
Western	3023	2855	3569	3519	3489	3364
Eastern	604	688	488	465	455	449
Total	3627	3543	4057	3984	3944	3813
California						
Owl Region	1640	1783	1361	1327	1287	1219

Source: Timber Assessment Market Model simulations.

\*California history actually 1992-2001. Oregon and Washington estimated for 1992.



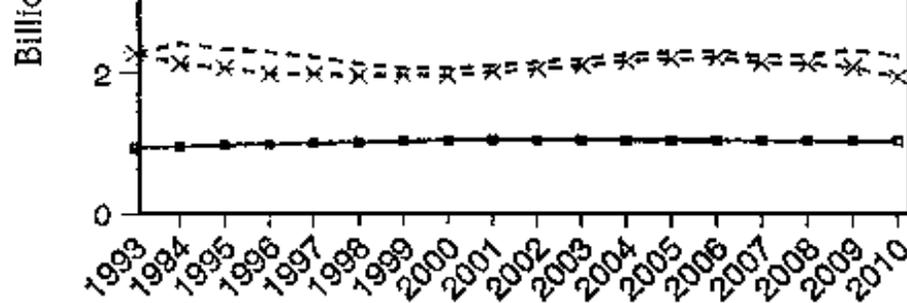


Figure VI-4. Projected harvest levels from nonfederal owners in the Pacific Northwest (FI = forest industry, O PRV = nonindustrial private), given 0.5 billion board feet of harvests from federal owl forests and 2.5 billion board feet of harvests from federal owl forests. Source: Timber Assessment Market Model simulations.

Table VI-12. First decade average timber harvests from all lands by geographic region for alternatives and historic harvest levels (whole state estimate for Washington and Oregon).

Region	Average 1980-1989	Average <sup>a</sup> 1990-1992	Harvest level from federal forests in the owl region			
			500	1000	1500	2500
			million board feet, scribner			
Washington						
Western	4950	4179	4299	4292	4315	4303
Eastern <sup>b</sup>	1151	1014	972	983	1002	1038
Total	6101	5193	5271	5275	5317	5341
Oregon						
Western <sup>a</sup>	5805	4320	3837	4062	4323	4821
Eastern <sup>b</sup>	1708	1624	880	917	951	992
Total	7513	5944	4717	4979	5274	5813
California						
Owl Region	2201	2074	1436	1477	1512	1594

<sup>a</sup>Western Oregon includes a small amount of northern California Bureau of Land Management harvest.

<sup>b</sup>Non-owl forests have not been subjected to rigorous analysis for the various alternatives and appear only for regional price projections. Fate of the outside forests is highly uncertain at the present time.

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<sup>a</sup>Western Oregon includes a small amount of northern California Bureau of Land Management harvest.

<sup>b</sup>Non-owl forests have not been subjected to rigorous analysis for the various alternatives and appear only for regional price projections. Fate of the outside forests is highly uncertain at the present time.

VI 11

## Export Levels

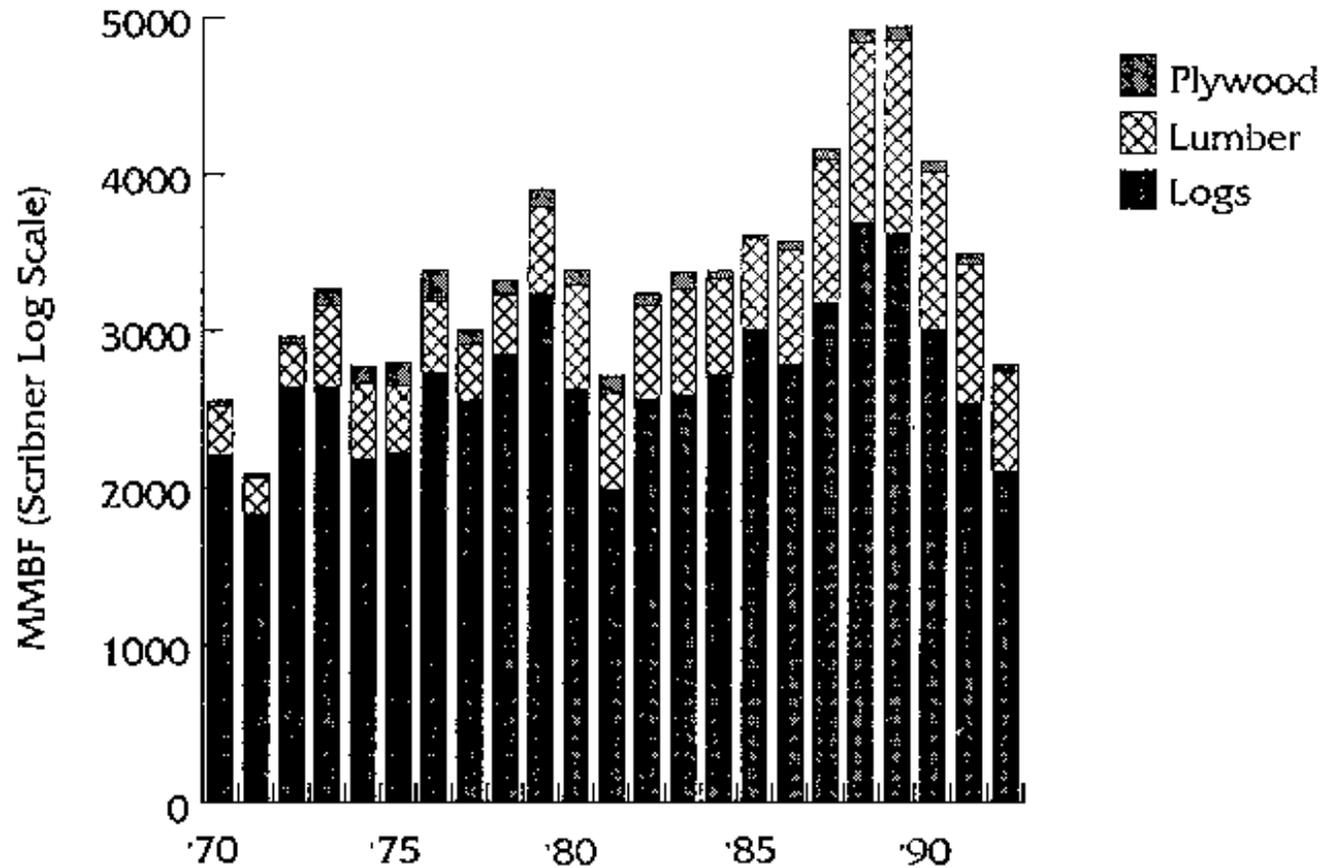
Historically, a significant portion of the nonfederal timber harvest was exported (fig. 6-5). Export logs are, in fact, the second most important forest product in the region in terms of volume and value. While some view these exports as a drain on the manufacturing industries, others view them as a vital part of the economy of the region.

In addition to federal timber sales reductions promoting changes in nonfederal harvest levels, these sales reductions may result in increased domestic competition for the export logs. The combined effects of higher domestic prices, changing wood quality, and increased exportation of milled products has led many to conclude that there will be significant reductions in log exports from the region. Relative to 1988, studies have shown that by the year 2000 the reduction in export levels could range from 30 to 57 percent when looking at some of the recent proposals for federal land management and conservation of the northern spotted owl (Adams and Haynes 1989; Cardellichio et al. 1989; Perez-Garcia 1991). In the short term (1 to 2 years) estimates are that these federal management changes would yield a 25 percent reduction in log exports. From 1988 to 1990-1992, log exports in the region did fall from 3.7 to 2.5 billion board feet (a 32 percent reduction). It would thus appear that this recent level of exports may be reasonable to assume for continuation into the decade ahead - barring any change in nonfederal log export policies.

## Summary

The state impacts from federal harvest reductions will vary. Federal harvests reductions will not be buffered to any great extent by increases in nonfederal harvest levels in Oregon and California but will be in Washington. Recent Washington harvests have been at levels that can be expected into the future, but under the scenarios considered, future reductions are evident in Oregon and California.

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**Figure VI-5.** Forest products exports from the impact region.

Logs could also be redirected from the log export market to the domestic markets. Market forces, however, have already caused a reduction in log exports to the level that appears to be reasonable to expect in the decade ahead.

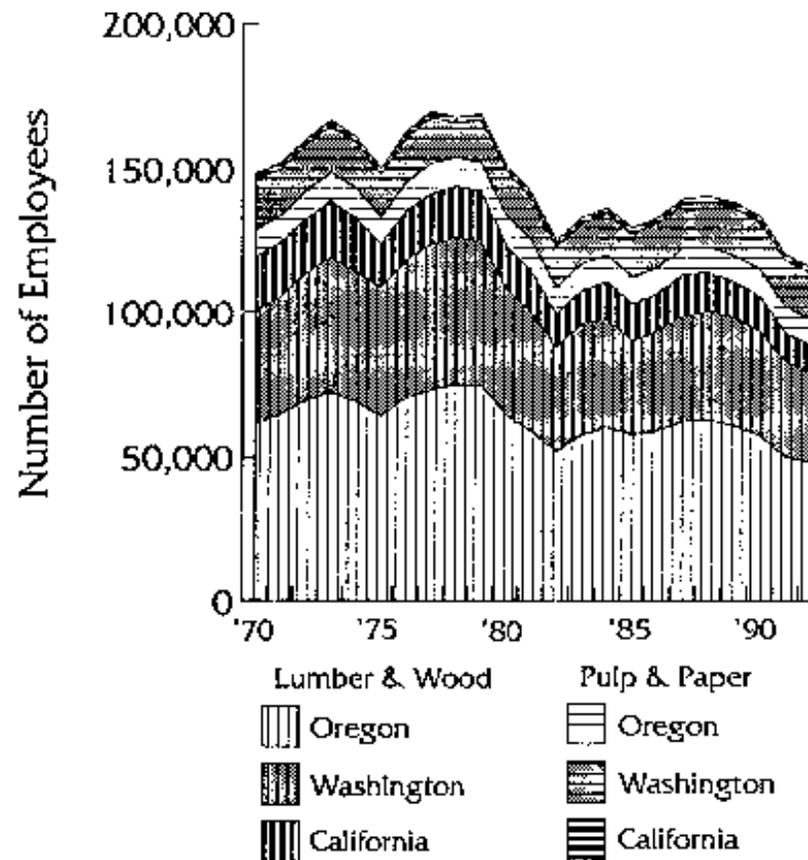
## Outlook For Regional Employment

Discussions of employment outlooks for each of the individual natural resource sectors focus upon employment directly within those sectors. We recognize that there are "indirect" and "induced" effects caused by changes in industrial purchases and household expenditures within a region. These other impacts will be reviewed within the section entitled "Overall Economic Outlook for the Region."

## Timber-Based Employment

Timber-based employment in 1991 stood at approximately 120,000 employees (fig. 6-6). This figure represents wage and salary employees (i.e., employees covered by unemployment insurance) and does not include self-employed personnel, who represent approximately 10 percent additional employment. The wage and salary employees are divided among sectors as follows: 17,000 in logging, 32,000 in sawmilling, 13,000 in veneer and plywood manufacturing, 25,000 in secondary wood products, 6,000 in miscellaneous solid wood products, and 27,000 in pulp and paper. This aggregate level of employment is down from the post 1980's recession high of 140,000 employees. It is estimated that 1992 employment had dropped to 116,000 employees.

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**Figure VI-6.** Wage and salary employment in the impact region by state and sector 1970-1992. Timber industries include solid wood products (SIC 24, inclusive of mobile home manufacturing) and pulp and paper processing (SIC 26, inclusive of paper converting).

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The role of timber in the regional economy has changed over the past 25 years. In 1985-1989, timber-based employment represented approximately 5.1 percent of regional employment (table 6-13). This percentage is down from 9.5 percent in the

early 1970's due largely to the diversification within the region's economy that was spurred by growth in the nonmanufacturing sectors. Subregional differences are, however, substantial. To discuss subregional differences, we have adopted the survey units used by the U.S. Forest Service for conducting periodic surveys of forest product industries (fig. 6-7). The Pacific Northwest is still fairly timber dependent outside the influences of the Portland and Seattle metropolitan areas. Table 6-13 shows that while the Puget sound area (containing Seattle) and the northwestern Oregon area (containing Portland) are not well characterized as timber dependent, the remainder of the owl impact region still depends, in a major way on timber -- although less so than 20 years ago.

Using U.S. Forest Service economic data bases and the agency's standard input-output model and methodology (commonly referred to as the IMPLAN model), we estimated that every million board feet change in timber harvests would impact approximately 7.79 solid wood products industry jobs (table 6-14). In addition, historic wood utilization indicated 1.29 pulp and paper industry jobs could be linked to each million board feet of timber harvested. These job estimates are based upon 1989-1990 average harvests and 1990 employment levels. The harvests are distributed by percentages according to 1988 mill survey statistics (Howard and Ward 1991a, 1991b; Larsen 1992).

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Table VI-13. Timber industries and total employment by sub-region<sup>a</sup>.

State/region	1970-1974 Average		1985-1989 Average			
	Employment		Timber as % of total	Employment		Timber as % of total
	Total timber			Total timber		
	-- thousands --		- percent-	-- thousands --	- percent-	
Washington - Owl Region						
Olympic Peninsula	83.7	16.6	19.84	127.9	13.2	10.32
Puget Sound	702.7	23.4	3.33	1205.3	21.6	1.79
Lower Columbia	65.0	16.0	24.58	101.0	13.0	12.88
Central	72.2	3.4	4.75	118.7	3.7	3.10
Total	923.6	59.4	6.43	1552.9	51.5	3.31
Oregon - Owl Region						
Northwest	411.8	16.9	4.12	690.9	19.9	2.88
West-Central	103.2	24.6	23.87	176.3	19.7	11.18
Southwest	76.8	23.7	30.83	121.9	21.3	13.31
Central	33.8	7.1	21.14	59.5	8.5	14.22
Total	625.6	72.4	11.57	1048.3	69.4	6.62
California - Owl Region						
Total	67.4	21.0	31.23	106.5	16.3	15.26
All States - Owl Region						
Total	1616.6	152.8	9.45	2707.7	137.2	5.07

Source: Greber (1992).

<sup>a</sup>Does not include self-employed individuals. Add approximately 10% to estimate total employment in timber industries. Timber industries include solid wood products (SIC 24, inclusive of mobile home manufacturing) and pulp and paper processing (SIC 26, inclusive of paper converting).

**Table VI-14.** Average timber industries employment impacted per million board feet of timber harvest processed by sub-region -- (inclusive of self-employed individuals).

State/Region	Solid wood products <sup>a</sup>	Pulp and paper <sup>b</sup>	Total
	————— jobs per million board feet, scribner —————		
Washington - Owl Region			
Olympic Peninsula	4.37	1.01	5.38
Puget Sound	9.67	1.74	11.41
Lower Columbia	5.94	5.58	11.52
Central	10.28	0.00	10.28
Oregon - Owl Region			
Northwest	9.16	2.19	11.35
West-Central	9.11	0.66	9.77
Southwest	9.07	0.37	9.44
Central	16.38	0.00	16.38
California - Owl Region			
Total	5.77	0.63	6.40
All States - Owl Region			
Total	7.79	1.29	9.08

Total	5.77	0.63	6.40
All States - Owl Region			
Total	7.79	1.29	9.08

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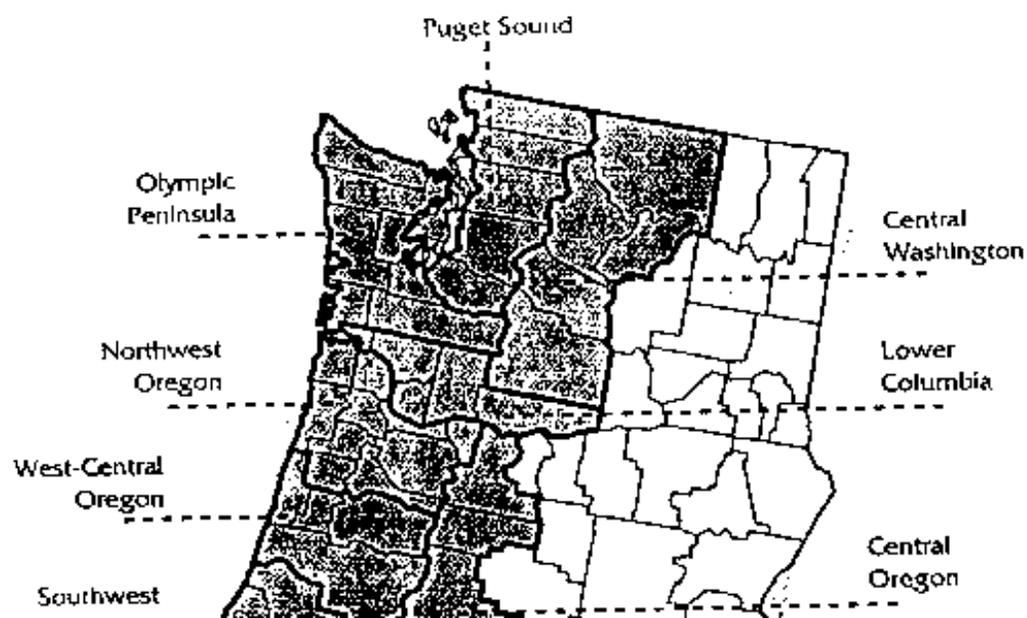
All States - Owl Region by Sector

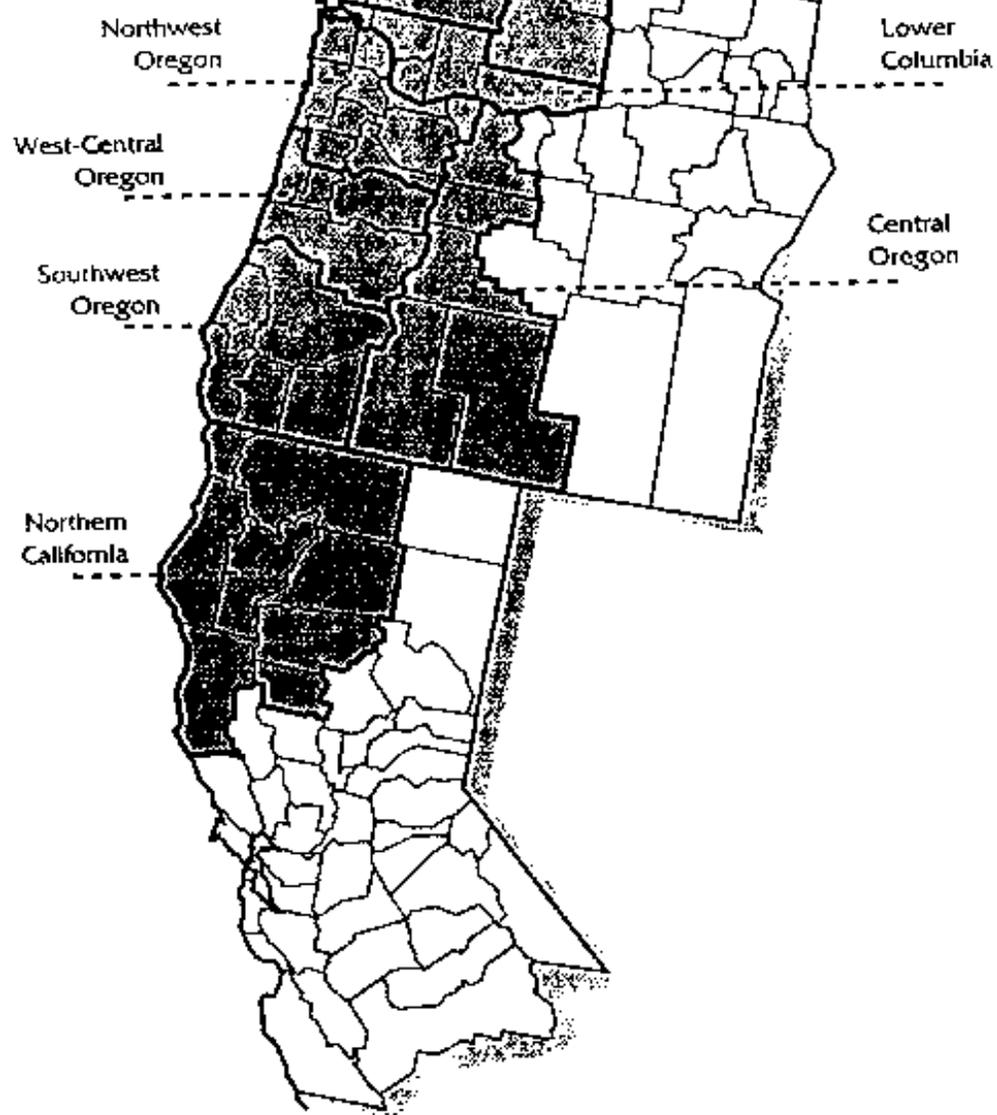
Logging	1.62	
Sawmilling	3.08	
Veneer & Plywood	1.33	
Millwork	0.82	
Other Wood Products	0.95	
Pulp		0.17
Paper Processing		1.11

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<sup>a</sup>Solid wood products is defined as SIC 24, except that mobile homes and prefabricated wood buildings are omitted from the statistics.

<sup>b</sup>Paper converting is not included in the statistics.





**Figure VI-7. Subregional areas for timber industry assessment.**

The timber volume processed by region and by option are displayed in table 6-15. These are based upon the harvest levels summarized in table 6-2 and interpolation of the data appearing in table 6-11. Within the half-state region, the harvests are distributed by percentages according to 1988 mill survey statistics (Howard and Ward 1991a, 1991b; Larsen 1992). The resulting projected employment in timber industries is portrayed in table 6-16 (employment is based upon harvests multiplied by IMPLAN based jobs/million board feet). Table 6-16 compares the projected employment levels to employment in 1990 and

estimated employment in 1992.

The projections assume no change in pulp and paper employment. This is not to suggest that there will not be impacts upon the pulp and paper sector, only to suggest that the industry will respond to supply-induced changes in ways different from the solid wood products sector. Of the 28,000 total employees in the pulp and paper sector, less than 3,000 are in the pulp sector, while 16,000 are in paper processing and 9,000 are in paper-convening (e.g., envelope and bag manufacturing). The paper-converting sector utilizes paper from the national and global market, and there is a weak direct relationship between forestry activities and this portion of the pulp and paper market. The paper market has already begun to respond to changing market conditions by installing increased paper recycling capacity that can buffer it from changes within the pulp processing sector. In addition, a vast supply of open-market pulp is available on the global market. The pulp sector is apt to be the most impacted of the pulp and paper sectors by the changes in forestry activity, but utilization of alternative species and improved pulp recovery processes can allow these industries to maintain installed capacities. However, capital investment is apt to be required, and the current market for pulp is plagued by weak prices (memo from S. Levan, U.S. Forest Service, Madison, Wisconsin, 1993, available from the Team). There is also a large quantity of chips exported from the region -- some of these will likely be re-directed to domestic pulp mills.

**Table VI-15. Historic and projected volume processed per year in next decade from all owners, by subregion and option – owl region only.**

State/Region	Average		Option									
	1980-89	1990-92	1	2	3	4	5	6	7	8	9	10
million board feet, scribner												
Washington - Owl Region												
Olympic Peninsula	1914		1970	1978	1977	1974	1980	1975	1967	1971	1977	1966
Puget Sound	1320		1415	1423	1423	1420	1418	1423	1416	1429	1419	1424
Lower Columbia	982		894	910	911	911	924	914	931	922	925	912
Central	353		313	333	335	332	336	337	345	358	335	348
Total	5661	4569	4592	4644	4646	4637	4658	4649	4659	4680	4656	4650
Oregon - Owl Region												
Northwest	1442		1401	1446	1452	1462	1492	1464	1602	1505	1493	1471
West-Central	1519		1184	1240	1253	1262	1311	1279	1419	1368	1353	1316
Southwest	1515		1110	1263	1278	1296	1351	1309	1635	1464	1432	1358
Central	875		459	489	489	486	492	489	511	490	506	487
Total	6972	5351	4154	4438	4472	4506	4646	4541	5167	4827	4784	4632
California - Owl Region												
Total	2216	2261	1379	1463	1464	1440	1462	1464	1486	1527	1447	1520

Oregon - Owl Region												
Northwest	1442	1401	1446	1452	1462	1492	1464	1602	1505	1493	1471	
West-Central	1519	1184	1240	1253	1262	1311	1279	1419	1368	1353	1316	
Southwest	1515	1110	1263	1278	1296	1351	1309	1635	1464	1432	1358	
Central	875	459	489	489	486	492	489	511	490	506	487	
Total	6972	5351	4154	4438	4472	4506	4646	4541	5167	4827	4784	4632
California - Owl Region												
Total	2216	2261	1379	1463	1464	1440	1462	1464	1486	1527	1447	1520
All States - Owl Region												
Total	14849	12181	10125	10545	10582	10583	10766	10654	11312	11034	10887	10802

**Table VI-16.** Historic and projected employment in timber industries in next decade, by subregion and option.

State/Region	Actual	Estimated	Option									
	1990	1992	1	2	3	4	5	6	7	8	9	10
thousand jobs												
Washington - Owl Region												
Olympic Peninsula	13.9		12.0	12.1	12.1	12.0	12.1	12.0	12.0	12.0	12.1	12.0
Puget Sound	25.7		20.9	21.0	21.0	21.0	20.9	21.0	20.9	21.1	21.0	21.0
Lower Columbia	14.1		12.7	12.8	12.8	12.8	12.9	12.8	12.9	12.9	12.9	12.8
Central	4.2		4.0	4.2	4.3	4.2	4.3	4.3	4.4	4.5	4.3	4.4
Total	57.9	51.3	49.7	50.1	50.1	50.0	50.2	50.1	50.3	50.5	50.2	50.2
Oregon - Owl Region												
Northwest	21.9		20.4	20.8	20.9	21.0	21.3	21.0	22.3	21.4	21.3	21.1
West-Central	20.9		14.3	14.8	14.9	15.0	15.4	15.1	16.4	16.0	15.9	15.5
Southwest	21.4		11.0	12.3	12.5	12.6	13.1	12.8	15.7	14.2	13.9	13.2
Central	8.9		7.5	8.0	8.0	7.9	8.1	8.0	8.4	8.0	8.2	8.0
Total	73.1	62.8	53.2	56.0	56.3	56.6	57.9	56.9	62.8	59.5	59.3	57.7
California - Owl Region												
Total	13.9	11.3	10.0	10.5	10.5	10.4	10.5	10.5	10.6	10.9	10.3	10.8
All States - Owl Region												
Total	144.9	125.4	112.9	116.6	116.9	117.0	118.6	117.5	123.7	120.9	119.8	118.7

\*Includes self employed in all solid wood products and pulp and paper sectors (SIC24 and SIC26).  
Wage and salary employment is approximately 75 percent less than total employment.

All States - Owl Region												
Total	144.9	125.4	112.9	116.6	116.9	117.0	118.6	117.5	123.7	120.9	119.8	118.7

<sup>4</sup>Includes self employed in all solid wood products and pulp and paper sectors (SIC24 and SIC26). Wage and salary employment is approximately 7.5 percent less than total employment.

Similarly, mobile home construction (which is typically included with the timber industry employment statistics) is assumed to maintain historic employment levels. Employment in this sector is included in the projections in table 6-16 at its 1990 level.

These job ratios have not been adjusted for future changes in technology. Greber (1993) notes that technology can increase jobs per unit of input when the focus is upon raw materials saving and product-improving technological change. Because raw material is apt to be viewed as the limiting resource, technology in the decade ahead will likely focus on raw materials savings as opposed to labor savings.

The job ratios in table 6-14 vary significantly by subregion. These vary on the basis of the types of species processed, the types of mills in the subregions, the amount of secondary manufacturing, and the level of exports from the region. For example, the jobs per million board feet are much higher than average in central Oregon, where there is a significant amount of secondary wood products manufacturing that is tied to the species processed in the subregion. The Olympic Peninsula, on the other hand, shows lower jobs per million board feet due to the amount of logs shipped into the region that are exported and the lack of secondary manufacturing activity.

Relative to 1992, these projections imply a range of job displacement ranging from 1,700 to 12,500 jobs. However, compared to 1990 employment levels, these projections imply a range of job displacement from 21,200 to 32,000 jobs. The majority of the job impacts are in Oregon and are concentrated in southwestern Oregon.

## Recreation/Tourism-Based Employment

In the 14 coastal counties in the region in 1990, tourism directly supported wages totaling an estimated \$348 million (Radtke and Davis 1993b, by a report prepared for the Team). Assuming an average annual wage of \$15,000 - \$20,000 per full-time equivalent worker, this would suggest that approximately 17,000 to 23,000 full-time equivalent workers were directly supported by the tourism industry in the coastal counties. Actual numbers employed in the industry are likely much higher, because the work tends to be seasonal and often part time. It is, nonetheless, a large and important part of the coastal economy. In the near term, the alternatives proposed will likely not radically change the nature of coastal tourism, but in future decades, restoration of salmon and trout runs could have marked impacts on coastal recreation activities.

Many thousands more are supported by the inland recreation industry as well. The Bureau of Land Management alone estimates that 900 recreation and tourism jobs were directly attributable to their proposed land management plans (see the Bureau of Land Management Resource Management Plans, 1992). Based upon expenditure data summarized in table 6-7 and a ratio of \$0.41 of recreation/tourism income for every dollar of recreation expenditures (from Radtke and Davis 1993), we estimate that a total of 50,000 to 80,000 full-time equivalent jobs may be directly attributable to forest-based recreation activities on Bureau of Land Management and National Forest lands combined. Of these jobs, it is estimated that 4,000 to 5,000 are related to jobs created by fishing opportunities. The land allocation patterns inherent in the plans do appear to provide more of the recreation opportunities that are currently supply limiting. Thus, there should be some gains to recreation and tourism in the inland communities. The extent of these gains, however, is currently uncertain.

## Commercial Fisheries Employment

Radtke and Jensen (1988) estimated that there were 177,000 full-time equivalent employees supported by the harvesting and processing of 4.8 billion pounds of fish in Washington, Oregon, California, and Alaska. This would imply 0.037 jobs per thousand pounds of fish landed. This figure includes direct, indirect, and induced effects. If we assume that approximately half of these jobs are directly involved in the harvesting and processing of fish, then in 1991 fish landed in Washington, Oregon, and northern California would have supported approximately 5,000 full-time equivalent workers in the fisheries industry.

Similarly, Radtke and Davis (1993) showed that in 1992, 15,108 economy-wide jobs in Oregon would have been supported by \$141,528,000 worth of fish landing. In addition, they show that fish harvesting and processing income represented 38 percent of the total income (direct, indirect, and induced) supported by this level of fish landing. If we assume that this means that 38 percent of the 15,108 jobs were directly involved in fish harvest and processing, then we have an estimate of 0.041 jobs per \$1,000 of fish landings. Using this with 1991 fish landings in Washington, Oregon, and northern California would suggest approximately 5,000 full-time equivalent workers in the fisheries industry.

Of these 5,000 jobs, less than 10 percent would appear to be directly related to the commercial salmon industry. This low percentage reflects a combination of growth in the importance of other species and the current low levels of salmon catch.

## Other Natural Resource Based Employment

State-wide in Washington. in the late 1980's, approximately 12,000 people were employed in mining and mineral processing. In Oregon, this number stood at 6,700 (note many of these jobs are in the eastern reaches of the state, outside the owl impact region, and some are on private lands). Northern California statistics are not available. Many of the minerals processed in the region came from federal lands.

The 1992 assessment of northern spotted owl critical habitat designation estimated that four of the 10 mineral deposits within

critical habitat could be profitably mined at prevailing mineral prices and that approximately 300 jobs would be associated with this mining and mineral processing activity (Schamberger et al. 1992). It should be noted that this employment level includes the one active operation and the potential contributions from initiating the other operations, and it is uncertain as to the eventual restrictions that would be put upon these reserves. It is also unknown whether other recommendations of this working group could have further implications on known mineral deposits in the region. The vast mineral terranes in the region also hold the potential for thousands of additional jobs in the region as new deposits are discovered; again, implications for future development are unknown at the current time.

In addition to known reserves with some currently ongoing activity and potential near-term activity, the U.S. Geological Survey identified three mineral terranes in southwestern Oregon and the "copper porphyry" terrain that corresponds roughly to the Cascade mountain range in Washington, Oregon, and northern California as being mineral terranes with substantial potential for yielding future discovery of deposits. The copper porphyry terrane, in particular, appears to hold great potential for revealing future mineral deposits that might be within the bounds of important forest habitat. This terrane contains silver, gold, molybdenum, and copper, and holds the potential for production of hundreds of millions of dollars worth of minerals and creation of several thousand mining and mineral processing jobs.

Jobs directly attributable to range activities are quite low. The Klamath Falls District of the Bureau of Land Management uses 1 job per 1,000 animal unit month's directly involved in cattle production activities (USDI Bureau of Land Management 1992) while the Umatilla National Forest uses 0.30 jobs per thousand animal unit months (Haynes et al. 1992). Extrapolating these to the owl region would imply that 69 to 236 livestock jobs would be attributable to range activities. The actual level of reductions in employment in the ranching sector that would be associated with any particular option is unknown at this time.

The floral greens, Christmas ornamentals, and mushroom segments of the special forest products markets produced over \$70 million in harvests in 1992 and provided some harvesting employment opportunities for an estimated 28,000 to 30,000 individuals in the region. As many as one-half of these individuals are involved with the harvesting or processing of two or more of the special products - a situation that is enhanced by the sequential nature of the seasons (i.e., Christmas ornamentals in late fall and early winter, edible mushrooms in spring, and floral greens in all but the spring seasons). Schlosser and Blatner (1993) note, however, that most harvesting and processing jobs are not full time and are seasonal, low paying, and without benefits. Thus, these numbers cannot be compared directly with other employment statistics in this report. There does, however, appear to be further economic potential in the development of industries involved with the processing and marketing of these special forest products. The possible extent of such developments is unknown.

## Service Employment in Forestry

Employment impacts discussed within the timber-based employment section of this report focused only on the logging and wood processing jobs in the region. An estimated 6,000 jobs are also involved with forestry services. These people have traditionally been involved with reforestation and timber stand improvement activities. Two factors will be at work influencing

the future employment in the forestry services sector: (1) many fewer acres will be harvested and thus the need for reforestation, fertilization, precommercial thinning, and other timber stand improvement work will greatly diminish the need for forestry services workers and (2) proposals from the Forest Ecosystem Management Assessment Team call for a number of assessments and recommend some forest restoration work. Included in the latter category are wildlife surveys for the marbled murrelet and the northern spotted owl, as well as watershed assessments throughout the region. These activities as well as some recommendations for watershed restoration and forest stand improvement will likely help offset some of the declines in the forestry services sector -- and potentially increase employment in the sector.

A review of the Bureau of Land Management draft Resource Management Plans (Greber et al. 1992) showed that the assumed impact on the forestry services sector ranged from approximately 0.3 to 0.6 jobs per million board feet change in timber harvest. Applying these job figures to a 2 billion board foot decline in timber harvests in the region would suggest the displacement of 600 to 1,200 forestry services workers.

Changes in management activities in the remaining timber base (e.g., application of pruning and other cultural practices) could help mitigate some of these job declines. Oliver (1993) estimates that an active pruning program in Washington's federal forests could add 43 jobs per year to the forestry services sector over the next decade. Assuming that approximately one fifth of the region's pruning activities lie in Washington, an active pruning program could add back 200 or more jobs per year over the next decade -- and promote the yield of higher quality, higher valued wood in future decades. Similarly, U.S. Forest Service estimates indicate that 600 jobs could be supported over the next 3 years from an aggressive pruning/timber stand improvement program in Washington and Oregon (memo from Lamar Beasley, U.S. Forest Service, Washington, D.C., 1993). These estimates, are thus consistent in magnitude and differ primarily in timing.

Aggressive reforestation activities similarly could support an additional 500 jobs on U.S. Forest Service lands over 3 years and an estimated 200 jobs in 1993 from Bureau of Land Management lands (Beasley memo, 1993; memo from Darwin Priebe, Bureau of Land Management State Office, Portland, 1993).

Northern spotted owl inventory and monitoring are estimated to cost \$6.1 million per year (Martin Raphael, U.S. Forest Service, personal communication, 1993). Most of this cost is labor related. Assuming a total cost (with overhead) of \$30,000 per job, this translates into 200 jobs per year. Murrelet surveys are estimated to require approximately 200 employees for 5 months per year for the next 2-3 years (weather depending) (Grant Gunderson, U.S. Forest Service, personal communication, 1993).

Watershed restoration activities are receiving increasing attention in the region. U.S. Forest Service estimates of stream and watershed restoration activities indicate the potential for 2,500 jobs in Oregon and Washington over the next 3 years. Additional jobs would likely be possible on Bureau of Land Management lands. Finally, the U.S. Forest Service identifies approximately 3,800 other jobs in Oregon and Washington that are related to other ecosystem restoration activities (Beasley memo, 1993).

The silvicultural activities, surveys, assessments, and restoration work could thus add up to more than 7,000 jobs per year over the next 3 years. The net result, when coupled with forestry services job losses, would be increases in forestry services jobs by approximately 6,000 jobs. Program costs, however, would be substantial, as the estimated budget requirements would be in

excess of \$250 million per year. These costs, however, should be viewed as a requisite component of forest health in the region and not as simply as source of jobs.

## Overall Economic Outlook for the Region

The options proposed by the Forest Ecosystem Management Assessment Team will have the most impact upon the timber industry sector. In addition to the workers displaced in this sector, there will be "indirect effects" caused from changing business expenditures in the region and "induced effects" caused by changing personal expenditures in the region. These ripple effects tend to increase the ramifications of job gains or losses in communities or regions. Table 6-17 summarizes the region-wide direct, indirect, and induced effects stemming from a 1 million board foot change in timber harvest as estimated using the U.S. Forest Service inputoutput model (IMPLAN). This table shows the impacts only for the solid wood products sector because this was the sector assumed to be impacted by the harvest changes. These numbers show that there is roughly one job impacted outside the timber industries for every job impacted within the timber industries.

While the IMPLAN coefficients are useful for showing a snapshot of the current makeup of an economy, they do not capture the dynamics in an economy and thus do not distinguish between actual job losses and lost opportunities in the economy, e.g., the industries affected by the indirect effects may reposition themselves to serve other markets and current workers may not be displaced, but future growth in the sector may be dampened.

To demonstrate the dynamics in the economy, the state economist in Oregon and the economic forecast council in Washington performed customized forecasts using their respective state economic and revenue forecasting models (Oregon Office of Economic Analysis 1993 and Economic and Revenue Forecast Council 1993). The results of these runs show that while differing harvest levels dampen expansion in the state-wide economies, there is still growth in the regional economies (table 6-18). These state-wide forecasts, however, mask the sub-regional differences where the rural communities are contracting while metropolitan areas are expanding. The new job holders in the region thus do not necessarily correspond to the job losers in the region.

## Summary

Timber-based employment is apt to be declining under all options considered. The sub-regions that are characterized as heavily timber dependent are apt to see the most severe impacts. Forestry services appear to also be faced with job declines, but these may be offset largely through monitoring, inventory, and restoration activities.

Some employment gains do appear possible in recreation, tourism, and special forest products. It may, however, be difficult to absorb displaced loggers and millworkers into these fields due both to skill considerations and geographic locations.

In the longer run, the options may provide some boost to commercial fisheries, but in light of the size of this industry and current issues regarding potential overcapacity (Radtke and Davis 1993) these gains may not be substantial. The longer term implications for mineral activities in the region need to be resolved. These activities may bear longer term costs or benefits of great significance to the region and to the nation.

While the net impact of the options is apt to be displacement of natural resource based jobs, the economy of the region as a whole appears to be poised for continued growth. The job loss issue thus becomes more of a distributional nature, with rural communities declining as more developed areas expand.

**Table VI-17. Direct, indirect, and induced effects per million board feet of timber harvest processed in the region.**

Impact	Solid wood products <sup>a</sup>					Total
	Logging	Sawmills	Veneer & plywood	Millwork	Other	
<b>Employment (jobs)</b>						
Direct Jobs	1.62	3.08	1.33	0.82	0.95	7.80
Indirect & Induced	1.65	3.74	1.64	0.76	0.96	8.75
<b>Total Jobs</b>	<b>3.27</b>	<b>6.82</b>	<b>2.97</b>	<b>1.58</b>	<b>1.91</b>	<b>16.55</b>
<b>Income (thousand \$'s)</b>						
Direct Income	81	107	44	25	37	294
Indirect & Induced Income	87	131	53	31	45	347
<b>Total Income</b>	<b>168</b>	<b>238</b>	<b>97</b>	<b>56</b>	<b>82</b>	<b>641</b>

Source: USDA Forest Service IMPLAN runs.

<sup>a</sup>Solid wood products is defined as SIC 24, except that mobile homes and prefabricated wood buildings are omitted from the statistics.

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<b>Total Income</b>	168	238	97	56	82	641
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Source: USDA Forest Service IMPLAN runs.

<sup>3</sup>Solid wood products is defined as SIC 24, except that mobile homes and prefabricated wood buildings are omitted from the statistics.

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1993	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
1994	58.0	58.2	58.2	58.2	58.3	58.2	58.6	56.1	56.1	56.1
1995	60.1	60.3	60.3	60.3	60.4	60.3	60.6	60.5	60.4	60.4
1996	63.1	63.3	63.3	63.3	63.4	63.4	63.7	63.5	63.5	63.4
1997	64.0	64.2	64.2	64.2	64.3	64.2	64.6	64.4	64.3	64.3

#### Washington & Oregon

1992	159.0	159.0	159.0	159.0	159.0	159.0	159.0	159.0	159.0	159.0
1993	163.3	163.3	163.3	163.3	163.3	163.3	163.3	163.3	163.3	163.3
1994	166.4	166.6	166.6	166.6	166.7	166.6	166.9	166.8	166.7	166.6
1995	171.1	171.4	171.4	171.4	171.5	171.4	171.7	171.6	171.5	171.4

Washington forecasts only available through 1995.

## Outlook for National Forest Products Markets

The changes in the management of the Pacific Northwest forests must be placed within the context of the national product markets for U.S. wood products. Many questions surround these changes. Included among these are: where will the future timber harvest come from, what will happen to import trade, and how much impact will there be on consumers? Prior to addressing these questions, some context must be provided for the national softwood markets.

In 1990, the total United States consumption of softwood timber products equaled 12.9 billion cubic feet of removals of roundwood from growing stock. This was 60 percent above the average consumption in the early 1950's, yet not as high as in the late 1980's. Softwood consumption is expected to increase to 14.3 billion cubic feet by the year 2040 with the largest increase in logs sawn for lumber (Haynes et al. 1993). United States softwood lumber consumption rises to 61.8 billion board feet by 2040 (the 1987 peak was 50.6 billion feet). Consumption increments come from increases in residential upkeep and alteration, nonresidential construction, and manufacturing. Plywood consumption falls slowly to 17.5 billion square feet by 2040 (the current level is 18.1 billion square feet) as a result of modest product substitution over the next 20 years.

Growth in the demand for solid wood products is expected to slow after the turn of the century as the population ages, growth in real gross national product slows, and new housing construction stabilizes/declines. Increases in recycling activities keeps wood used for pulp essentially constant, despite an expected 75 percent increase in paper and board consumption by 2040. In addition to slowing domestic demand and increased use of recycled fiber, increased use of hardwoods account for a slowing projected growth in demand for softwood timber.

The United States has been and is expected to continue to be a net importer of softwood forest products. The largest forest products trade flow for the United States is imports of softwood lumber -- over 95 percent of which comes from Canada.

**Table 6-19.** Historic average and projected annual federal timber receipts, by sub-region and option (by fiscal year).

Option											
	Average-----										
State/Region	1990-1992	1	2	3	4	5	6	7	8	9	10
Million dollars (1992)											
Washington - Owl Region											
Gross Receipts	N/A	14.2	42.4	45.4	41.7	57.9	51.5	85.9	77.3	62.9	60.1
Local Gov't Share	34.1	3.5	10.6	11.4	10.4	14.5	12.9	21.5	19.3	15.7	15.0
Federal Share	N/A	10.6	31.8	34.1	31.3	43.4	38.6	64.4	58.0	47.2	45.1
Oregon - Owl Region											
National Forests											
Gross Receipts	N/A	28.9	86.2	95.9	107.6	144.1	115.2	240.6	167.2	158.2	132.7
Local Gov't Share	107.7	7.2	21.6	24.0	26.9	36.0	28.8	60.1	41.8	39.5	33.2

Federal Share	N/A	21.7	64.7	71.9	80.7	108.0	86.4	180.4	125.4	118.7	99.5
Bureau of Land Management											
Gross Receipts	N/A	13.4	43.9	46.4	47.6	58.0	51.5	124.5	91.3	84.4	63.8
Local Gov't Share	131.1	6.7	21.9	23.1	23.7	28.9	25.7	62.0	45.5	42.0	31.8
Federal Share	N/A	6.7	22.0	23.3	23.9	29.1	25.8	62.5	45.8	42.4	32.0
California – Owl Region											
Gross Receipts	N/A	6.4	40.9	42.3	34.0	46.2	45.0	73.0	79.2	50.0	69.0
Local Gov't Share	21.4	1.6	10.2	10.6	8.5	11.6	11.2	18.2	19.8	12.5	17.3
Federal Share	N/A	4.8	30.7	31.7	25.5	34.7	33.7	54.7	59.4	37.5	51.8
All States - Owl Region											
Gross Receipts	N/A	62.9	213.4	230.0	230.9	306.2	263.2	524.0	415.0	355.5	325.6
Local Gov't Share	294.3	19.0	64.3	69.1	69.5	91.0	78.6	161.8	126.4	107.7	97.3
Federal Share	N/A	43.8	149.2	161.0	161.4	215.2	184.5	362.1	288.6	245.8	228.4

## Regional Harvest Levels

The Pacific Coast share of U.S. harvests peaked in the early 1960s at roughly 47 percent, the region's share is currently 38 percent. With changes in federal timber harvests, the share is expected to fall below 27 percent by the year 2000 (table 7-20). Harvest shifts from the Pacific Coast States to other United States regions, primarily the Southern United States. These shifts are the results of reductions in public harvest, which raise near-term projected stumpage prices. In the face of rising wood costs, the region's competitive position deteriorates, profits fall, and solid wood output and capacity drop. In addition, the Southern U.S. production shows the ability to continue to increase in the decades ahead (Haynes et al. 1993).

The range in the various harvest levels shown in table 6-20 demonstrate little variability in these regional harvest trends.

## International Trade

The United States is expected to remain a net importer of softwood products. It does not appear that the federal sales policies in the region will lead to large changes in wood products importation. Canada is the primary source of these products (Canadian lumber accounted for 30 percent of lumber consumed in the United States in 1992). Lumber imports from Canada show only modest changes in the decades ahead (table 6-21). Again the range of harvest levels considered demonstrates little variability in the import trends.

Much discussion recently has focused on the ability of Canadian producers to respond to higher prices in the United States markets (due to reductions in public timber harvests). Much of the discussion revolves around anecdotal evidence based on what is perceived to be happening in British Columbia. Current Canadian harvest is estimated to be 5.5 billion cubic feet. Recent Canadian Provincial allowable cut (i.e., the regulatory level of cut) estimates by Runyon (1991) show a Canadian harvest of 6.2 billion cubic feet. Except in British Columbia (where surveys have occurred since Runyon's work), Canadian producers seem able to sustain recent levels of production. Like the United States, Canada also faces a number of issues (owls, parks, native land claims, etc.) that could reduce harvests.

## Consumer Costs

The changing markets for wood products are apt to have some repercussions for final consumers. Softwood lumber prices do appear headed upward in the decades ahead, even with harvest levels much higher than the options considered by the Team (table 6-22). Softwood lumber prices show a marked increase from 1990 levels to 1995 levels, but much of the inherent increase in price stems from supply and demand considerations beyond the options considered by this Team. The 1992 softwood wholesale price index already stood at 120 in 1992, thus meeting the level expected by 1995. In 1993, the price index surpassed these levels (reaching 172.6 in April), but prices have started to settle back toward the levels shown in these forecasts.

To place these indexes in perspective, the average house in the United States in 1990 used \$5,500 worth of lumber and wood panel products (Elmore 1992), and by 1995 this will likely rise to \$6,700. The range of harvest levels implicit in the options considered by the Team varies this cost of lumber by less than 1 percent from the costs implicit with a two-fold increase in harvests. The range in the various harvest levels shown in table 6-20 demonstrate little variability in these regional harvest trends.

## Additional Policy Considerations

Changing federal timber management will reduce harvested wood quantity and quality in the region and place many pressures upon the timber industry and the communities of the region.

### Timber Industry Considerations

Forest products will continue to be a major economic factor in the region. The combined federal and nonfederal harvests will still support employment of over 110,000 individuals in the region. Many questions, however, arise as to how to strengthen the operating position of the remaining industry.

Log supplies to mills will continue to be a concern in the region. These supplies may be increased by (1) more aggressively pursuing fiber supplies on nonindustrial private lands, (2) redirecting currently exported logs, and (3) increasing the importation of wood products that are suitable for further manufacturing.

Market forces will promote much of the incentive for active management of nonindustrial private lands, but in addition some education and training is required, and many landowners will still be hesitant to make long-term investments in timber. Increased management of the nonindustrial private lands could thus be further promoted through more active public service forestry, encouragement of industrial/nonindustrial partnerships through cooperative forest management programs, and increased public assistance either through current cost-share programs or forest "trust" programs such as that being proposed in Oregon. Currently, the infrastructure is not in place in the region for mobilizing this valuable nonindustrial private resource. Hastening the establishment of this infrastructure should pay benefits to the region in terms of short-term and long-term timber supply and near term jobs. In the near term, more than 100 million board feet per year could be realized through rehabilitation of poorly stocked lands.

One potential supply response not fully captured in the analysis done for this chapter is the increased short-term conversion of poorly stocked and hardwood stands to softwood stands because of the sharp increases in stumpage prices. Since patterns have been observed by the Oregon Department of Forestry and are illustrated by lower harvest volumes per acre as timber supplies contract. These conversion opportunities could increase harvest in the region 1020 percent for several years in the early part of

this decade.

**Table 6-20.** Historic and projected proportions of U.S. harvests from Pacific Coast States.

Region/Year	Harvest level from federal forests in the owl region			
	500	1000	1500	2500*
	Percentage of national harvests			
1990	38	38	38	38
1995	29	29	29	29
2000	25	25	26	26
2010	23	23	23	24

**Table 6-21.** Historic and projected imports of Canadian lumber into the United States.

Region/Year	Harvest level from federal forests in the owl region			
	500	1000	1500	2500*
	Percentage of national harvests			
1990	12.2	12.2	12.2	12.2
1995	13.3	13.2	13.2	13.1
2000	13.9	13.8	13.6	13.4

2010	15.7	15.6	15.8	15.7
2040	12.5	12.2	12.2	11.9

**Table 6-22.** Historic and projected softwood wholesale price index (1990=100).

Region/Year	Harvest level from federal forests in the owl region			
	500	1000	1500	2500*
	Percentage of national harvests			
1990	100	100	100	100
1995	122	121	121	121
2000	125	124	122	121
2010	136	134	138	136
2040	130	129	129	129

Export restrictions would likely expand the volume of timber available for domestic processing, but such a ban may not have many of the effects sought. A ban on log exports would reduce stumpage prices in the log-exporting regions. Thus, a ban would adversely affect stumpage owners--public and private-- in the log exporting regions. This would result in less incentive to harvest. Thus, part of the volume of log exports would not be realized as volume flowing into domestic mills. Most discussions of the bans ignore quality and geographic differences between the log export and domestic log markets. Much of the log export activity originates in Washington, yet some of the more impacted regions are in southern Oregon and northern California. Finally, there is apt to be a substitution of mill jobs for longshore jobs (in an already troubled coastal economy), and the net effect upon jobs is uncertain.

Sliding-scale tariffs in Japan serve to provide strong effective rates of protection for Japanese-wood products manufacturers and provide additional impetus for exporting lessor-manufactured products. These tariffs inhibit the ability of U.S. wood products manufacturers (particularly high value-added manufacturers) to compete within the Japanese markets. A re-assessment of

barriers to trade in the Pacific Rim countries may aid in increasing the vitality of the region's producers and redirecting the flow of raw materials. Wood products imports are becoming increasingly important to wood products manufacturers in the region -- particularly secondary wood products manufacturers. Attempts should be made to investigate how the region's Pacific Rim location can be exploited on an import basis. Logs, lumber, and cutstock from New Zealand, Australia, Chile, and other Pacific Rim countries are valuable raw materials to the mills in the region. Policies that can channel more of these materials into this distressed region for further manufacturing will serve to buffer impacts from domestic harvest reductions.

Technology can also help to extend the utilization of raw material in the mills and create new forms of products that are less old-growth dependent. New generation composite wood products include a variety of structural and nonstructural wood products that can be made from smaller trees and combinations of lumber, veneer, particles, fibers, and plastics. The region has not moved aggressively into adoption of these composite technologies. Among the reasons are uncertainty over the timber supply outlook and substantial capital requirements. Overcoming the barriers to capital markets in this time of great uncertainty in the region is of great importance. Many of the composite products can serve as inputs to secondary wood products firms.

Currently, there is a large secondary wood products industry in the region (over 25,000 employees). Many people are looking to secondary manufacturing of wood products as a source of "mitigating" employment opportunities, yet many existing manufacturers are at risk. In addition to wood quantity changing, wood quality will as well. The secondary manufacturers of the region have focused upon the production of high quality molding and millwork for door and window components. The current secondary manufacturing industry will see a large change in the years ahead.

The industry will be seeing greater proportions of "construction grades" of lumber, and less of the type of lumber suitable for the current types of secondary manufacturing. A key to increasing the ability to use construction grades of wood products in remanufacturing is increasing the rate of adoption of manufactured housing and panelized housing. These technologies substitute factory labor for site-based construction labor. The technologies may result in lower wood use per house and may be more economical -- particularly as wood prices rise. The adoption of panelized housing and alternatives to conventional U.S. frame ("stick") housing is slowed by building codes, contractor knowledge, and tradition. Research and development in the area of alternative building technologies may pay long-term dividends to the region and the utilization of forest resources.

Basic technology and business knowledge needs improving, particularly for smaller manufacturers in the region. Industrial extension activities carried out by the region's universities and community colleges could augment technology transfer to these small manufacturers and provide some impetus for growth and diversification in the forest products sector. Manufacturing technology centers could speed the development and implementation of new technologies that could simultaneously increase raw material recovery and business success. Establishment and promotion of manufacturing and marketing networks can aid in providing synergism among the region's various forest products firms.

## Recreation and Tourism Considerations

Policies that aid in providing more of the recreation opportunities deemed in short-supply could bolster the region's tourism activities. This primarily means offering more opportunities for primitive and semiprimitive nonmotorized activities. Retirement of road systems within some Key Watersheds as part of watershed restoration activities could thus provide side benefits for recreation and tourism.

Currently, the failure to fully charge for recreational use of the forest leads one to understate the value of recreation outputs. Recreation fees, while contentious with much of the public, could provide a source of replacement revenues to the agencies and the local governments. Traditionally, much of the recreation improvement had been funded out of timber receipts; with declining receipts, recreational charges may be required to guarantee a continual offering of public recreation opportunities.

## Commercial Fisheries Considerations

A key concern in the commercial fishing industry is the failure to institute adequate limits on the off-shore catch and processing of Pacific whiting. The potential job losses to the coastal communities from this resource "drain" are apt to be substantial. While this is not a policy directly related to the management issues at hand, it is a confounding factor in the coastal communities that will be simultaneously impacted by the changes in federal forest management.

## Special Forest Products Considerations

This is a rapidly expanding industry in the region. To adequately capture the economic value of these products and guarantee that the inherent productivity of the resources are not adversely impacted by harvesting activities, the agencies need to take a more active role in managing the harvest of these products. Standards and guides for harvesting need to be established, and appropriate fee structures need to be assessed. Sustainable supplies need to be established, and then the appropriate role of these products in the region's economy can be fully considered.

Setting the appropriate permit fees is not a straightforward process. Harvest leases for floral greens and bough contracts could be sold on a competitive basis. However, even though cruising for boughs and floral greens is possible, it's unlikely to be cost effective. Setting harvest fees for mushrooms is far more problematic because the size of the crop varies by location and in volume annually. In addition, all special forest products sale prices are strongly influenced by product quality, which varies by product and the local area. Finally, extensive fee structures may not be justified as the dollar values are not large and the gains could easily be offset by the increased costs of sale administration.

## Summary and Conclusions

The economics of the alternatives can be viewed at three scales: national, regional, and local. From a national perspective the

assessment of the alternatives indicates that the financial costs are apt to be fairly negligible when one views the aggregate markets. There are gainers and losers among the region's forest products producers, and the consumer costs appear low. The national values placed upon the forests of the region also must be considered and can serve to offset the national costs incurred.

At the regional level, there is an economy that has been rapidly expanding for more than two decades and appears to be poised for continual growth. The changes in federal forest management appear to have modest impacts on this overall rate of growth in the regional economy. In the longer term, maintenance of a high quality environment may be a factor in allowing economic growth to continue.

Much of this regional economic growth is apt to be centered within the more metropolitan areas of the region, and hence these statistics mask much of the hardships that individuals and communities may be confronted with in the decade ahead. Many communities are already distressed, and additional job losses would be forthcoming. The changes in federal forest management will indeed represent severe impacts to many of the individuals, firms, and communities within the region. In addition to job losses, disruption in local government funding is inevitable without compensating legislation. These local economic costs are real and represent a major policy issue in the region -- an issue that cannot be ignored in light of national or broader -regional trends to the contrary.

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