

The Sky Did NOT Fall: The Pacific Northwest's Response to Logging Reductions

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Executive Summary

On May 29, 1991, Federal District Judge William Dwyer, ruling on a lawsuit filed by environmental groups seeking to prevent the extinction of the northern spotted owl, banned new timber sales on 24 million acres in 17 national forests in Oregon, Washington, and Northern California. Numerous earlier attempts to curtail logging had been dodged by the White House, Congress, and forest managers. This time, the decision could not be sidestepped.

The injunction and related events reduced timber harvests in Oregon and Washington (the Pacific Northwest, or PNW) from a peak level of 15.7 billion board feet (bbf) in 1988 to 8.3 bbf in 1996.

The reduction in logging triggered widespread fear of economic catastrophe. Some predicted as many as 150,000 workers would lose their timber-related jobs, hundreds of communities would become economic wastelands, and the region as a whole would fall into a depression that would take years, if not decades, to reverse.

These dire predictions, however, did not materialize. Instead of collapsing, the region's economy expanded. The PNW weathered virtually unscathed the national economic recession that occurred at about the same time as Judge Dwyer's ruling, and both Oregon and Washington have consistently outperformed the national economy throughout the 1990s. While timber harvests fell 86 percent on federal lands and 47 percent overall from their peak in 1988 to 1996, employment in the lumber-and-wood-products industry, which constitutes the bulk of the timber industry in the PNW, fell 22 percent. In contrast, total employment rose 27 percent.

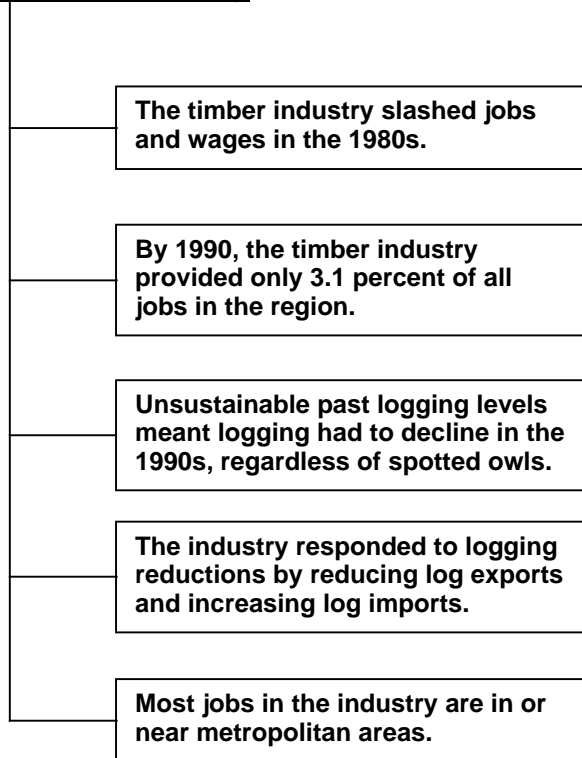
Why was the actual impact so much less than that predicted by so many? Figure E-1 summarizes the major reasons. They fall into two sets: logging's importance to the economy had diminished markedly and, conversely, unlogged forests had become much more important by the beginning of the 1990s.

Logging's Economic Importance Has Diminished Markedly

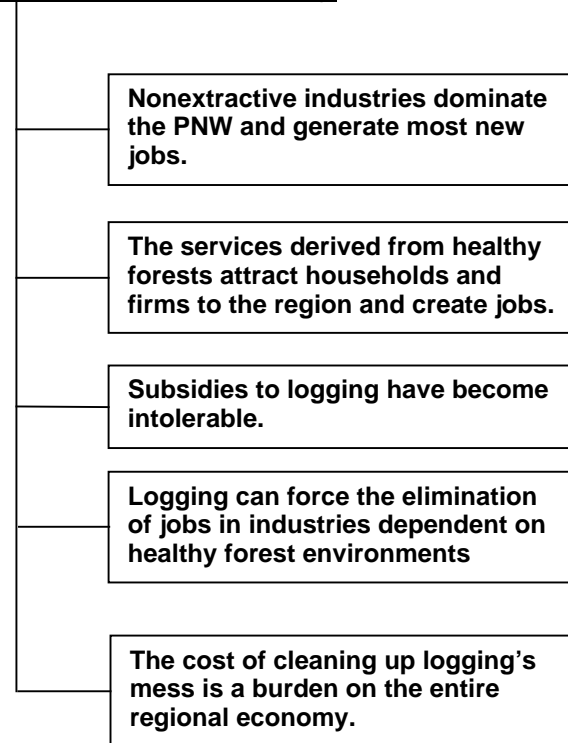
Once the king of industries in the Pacific Northwest, by 1991 the timber industry had lost its crown. As it responded to Judge Dwyer's logging ban, the PNW found that it did not have to log massive acreages to prosper. The industry, itself, had made logging less important. After slashing jobs and wages in the 1980s, the industry provided only a small percentage of the region's jobs. After logging at unsustainable rates for decades, it faced an inevitable drop in logging. After exporting millions of logs to Asia during

Figure E-1: Major Factors Why Logging Reductions to Protect the Environment Did Not Trigger Economic Calamity in the Pacific Northwest

Logging's Economic Importance Diminished Markedly



Unlogged Forests Became More Important to the Economy



Source: ECONorthwest.

the previous decade, the industry discovered that it could make money sending logs to domestic mills. After concentrating mills near metropolitan areas, the industry found it was just one among many industries in a modern economy.

Jobs and wages: Lumber-and-wood products employment had been steadily decreasing in the Pacific Northwest long before the listing of the spotted owl as a threatened species and Judge Dwyer's injunction. Timber employment declined by more than 27,000 in the Pacific Northwest between 1979 and 1989, the two peak years that bound the economic cycle of the 1980s, and by another 21,000 by 1996.¹ The wages paid to timber workers also decreased rapidly in the 1980s as payroll per employee fell 18.2 percent, from \$38,732 in 1979 to \$31,672 in 1989 (measured in 1997 dollars).

A small percentage of jobs: Although many believe that logging is a crucial aspect of the Pacific Northwest's economy, the lumber-and-wood products industry represented 1.9 percent of total employment in 1996. Since 1990, the percentage of lumber-and-wood products employees in Oregon has decreased from 4.3 percent to 3.0 percent. In Washington, it decreased from 1.6 percent to 1.3 percent.

Inevitable slump: Analysts have known for several decades that the timber industry has been liquidating the stock of timber at rates so high that, sooner or later, the logging levels would have to go down. In 1976 and again in 1989, researchers at Oregon State University examined the state's rate of harvest and concluded a substantial decline in logging was inevitable and would materialize probably in the 1990s.

Log exports and imports: Prior to Judge Dwyer's 1991 injunction, the timber industry exported more than 3 billion board feet (bbf) of logs annually, or about one-fourth of all logs cut in the region. By 1996, log exports had dropped by half, as the industry diverted logs to domestic mills. Some mills also imported logs from other states and countries. Consultants inside the industry reported that, during 1994 and 1995, mills in Oregon obtained logs from thirteen other states as well as from Chile, other countries in South America, Mexico, and New Zealand. (Ehinger and Associates 1995). Thus, the industry adjusted so that the logging reduction did not lead to a commensurate reduction in timber employment.

Metropolitan concentration: Although most trees grow in rural areas, the bulk of the lumber-and-wood-products industry is located in or near the metropolitan areas, where the timber industry plays a relatively small role, and where most dislocated workers readily could find other jobs. More than 80 percent of the jobs in Lane County's lumber-and-wood products mills, for example, lie in or adjacent to the county's urban core, Eugene-Springfield

¹ Throughout this report the timber industry refers to SIC 24, lumber-and-wood products. SIC 25, furniture and fixtures, and SIC 26, paper and allied products, are not included because raw material costs (the price of wood) are a very small percentage of total costs. The amount of timber harvested in the Pacific Northwest has little effect upon employment in either of these industries (Personal Communication with Richard Haynes, Program Manager for the U.S. Forest Service at the Pacific Northwest Research Station, October, 1998).

(Niemi and Whitelaw 1994). Almost half of Washington's timber jobs occur in the Puget Sound area (Conway et al. 1991), and many of the remaining lie within commuting distance of Olympia and Vancouver. The spotted-owl region, concentrated west of the Cascades, contains 38 counties and nine metropolitan areas. Several of these experienced year-to-year declines in employment since 1990, but only two counties, containing a tiny percentage of the region's overall employment, had fewer jobs in 1996 than in 1990, the year before Judge Dwyer's ruling. These two counties were adjacent to counties experiencing rapid job growth.

Unlogged Forests Have Become More Important to the Economy

While the timber industry's importance to the PNW economy shrank, the rest of the economy boomed. In effect, the vast majority of the economy decoupled itself from the timber industry. But the economy has not decoupled itself from the forest. Indeed, the vitality of the region's economy depends in no small part on the health and vitality of its forests. A standing forest often is now more valuable to the economy than a logged one.

Many firms locate in the PNW because it has a good workforce and many workers, in turn, are here because they cherish the quality of life. Healthy forests contribute far more to the quality of life than stumps do. In addition, residents of the region and the nation have learned more about the high costs they bear to support the timber industry, costs that include subsidies, the loss of jobs in other industries, and the costs of cleaning up the environmental mess that logging leaves behind.

Nonextractive industries dominate the PNW: Whereas in the distant past, regional economies grew largely by their ability to exploit their natural resources, in today's economy it is more important to have a skilled, productive workforce. Service industries now constitute the bulk of the economy and show the greatest ability to generate new jobs and higher incomes. Increasingly, the prosperity of the region and its communities depends on the ability to attract and retain skilled workers.

Forest-related services attract households and firms: Forests can boost the economy in two major ways: by providing commodities (logs) or services (recreational opportunities, clean water, etc.). As the timber industry shrinks and non-timber industries grow, the services become more important. Residents of the region derive numerous services from healthy forests. The services constitute, in effect, a **second paycheck** that complements the **first paycheck** they derive from their place of employment, pension program, and so forth.

Far more residents of the PNW receive a **second paycheck** than a **first paycheck** from the region's forests. A 1997 analysis of federal lands in the Columbia River Basin between the Cascades and Rockies, for example, found that the services associated with unroaded areas, camping spots, fishing holes, and so forth, accounted for 89 percent of the total value of all commodities and services derived from those lands in 1995. The value of timber was only 11 percent of the total (Haynes and Horne 1997). The

authors predicted that, by 2045, timber will have decreased to just 5 percent of the total.

Intolerable subsidies: At the end of the 1980s and into the 1990s critics of logging on federal lands began to document the full costs such logging imposed on taxpayers. They took these steps after finding that the agencies administering federal lands did not provide a full accounting of logging's costs. Direct subsidies occur when federal agencies sell timber for a price that is lower than the agencies' costs of making the sale. One analysis found that the national forests of Oregon and Washington lost nearly \$178 million in fiscal year 1995 (Wilderness Society 1997). Another subsidy materializes when firms in the timber industry fail to pay premiums covering the full costs of unemployment insurance, so that workers and business owners in other industries have to make up the difference. In Oregon alone, this subsidy amounted to \$192 million for the years 1980-90 (Niemi and Whitelaw 1995).

Cleaning up logging's mess: Another form of subsidy is the cost that society as a whole incurs to clean up the environmental and social mess that remain after forests are logged. These costs have become far more clear as the region has had to cope with the threat of extinctions for owls, salmon, marbled murrelets, bull trout, and other species. Logging is not the sole cause of these threats, but it surely is a major contributor. The full cost of cleaning up logging's mess is not known. But there is a growing recognition that the cost is large enough to warrant preservation of forests.

Logging can eliminate jobs: The subsidies to timber extract money from households and firms in other industries. In effect, they act like a punitive tax on non-timber economic activities, reducing the ability of firms in other sectors to grow and generate jobs. In addition, logging's negative impact on fish populations has, in turn, had a negative impact on jobs in the commercial and recreational fishing industries. An analysis early in the decade estimated that as many as 60,000 fishing-related jobs were at risk (Oregon Rivers Council 1991).

The public's recognition that logging can have a negative impact on jobs dramatically altered its response to logging reductions. Until then, Judge Dwyer's injunction and related actions were cast as jobs vs. owls, i.e., a contest between the economy and the environment. Afterward, however, the public generally realized that the issues were far more complex. To some extent, the region has prospered *despite* the logging reductions simply because the timber industry is such a small portion of the regional economy. More important, though, the mounting evidence indicates the region has prospered in part *because* of the logging reductions, insofar as they reduced the subsidies, cleaning-up costs, and job losses that accompany logging.

Reflections

Residents of the Pacific Northwest have learned a lot about themselves and their economy since Judge Dwyer shut down the timber-sale program on national forests with spotted-owl habitat. Contrary to expectations, quantifiable job losses following Judge Dwyer's ban on new timber sales occurred in only a few places and, with the exception of an even smaller number of places, for only a short time. As a result, residents of the Pacific

Northwest have learned not to fear logging reductions, and they've learned this lesson so profoundly that it is difficult to remember how pervasive and intense was the fear back in May, 1991.

By losing their fear, Oregonians and Washingtonians have realized that the timber industry no longer drives the regional economy.

Residents of the Pacific Northwest also have come to appreciate the *economic* importance of healthy, standing forests that provide clean water, a diverse mix of species, recreational opportunities, and countless other services. The availability of these services contributes mightily to the quality of life enjoyed by residents of the region and thereby increasing their overall standard of living. The high quality of life attracts skilled workers to the region, reinforcing its competitive edge relative to the rest of the nation and other countries, in an era of growing global competition.

The debate over how much forest to log, and how to log it, is not over. As growth in consumers' demand for services from the region's forests continues to outstrip growth in their demand for timber, they will exert ever more pressure to reduce logging further. Some landowners, workers, communities, and political leaders who have invested heavily in timber will resist these economic pressures. If the past serves as a guide to the future, those who resist may themselves benefit in the short run but only as they impede the long-run expansion of the region's overall economic prosperity.

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Chapter 1: Reader's Guide to This Report

"The sky is falling down."

—Chicken Little

What Is This Report?

In this report we describe the economy's response to dramatic reductions in logging that occurred in the Pacific Northwest during the 1980s and 1990s. We describe the intense fears that accompanied the onset of the reductions, and explain why these fears did not materialize. In the process, we describe how the timber industry, itself, made logging less important to the economy, and explain the logical errors of the economic-base models that supporters of logging use to exaggerate the timber industry's importance. We then discuss the competing demands for forest resources in today's modern economy and show how the demands for services—such as clean water, a wide diversity of species, and recreational opportunities—is outstripping the demands for logs.

Throughout the report, we highlight and discuss lessons from this experience that might be applicable outside the Pacific Northwest. Logging reductions were inevitable. The inevitability arose from two sources. First, past policies and economic conditions provided strong incentives to log old-growth forests faster than the land could replace them, so that, ultimately, the logging boom had to bust. Second, the shift in consumers' preferences strongly favored recreational and other forest services from healthy, standing forests over timber from logged forests. Workers, investors, communities, and regions that take advantage of these factors could experience logging reductions and prosper. Those who fought against them ultimately will still experienced logging reductions, but at a potentially great cost.

Who Prepared This Report?

This report was prepared by Ernie Niemi, Ed Whitelaw, and Andrew Johnston, of ECONorthwest, with support from the W. Alton Jones Foundation. We gratefully acknowledge the comments of Eban Goodstein, Lisa Matthaus, Richard Haynes, Tom Green, and Todd True, as well as the assistance of the many individuals who provided us with information and insight. We, alone, however, are responsible for the report's contents.

We have prepared this report based on our general knowledge of the timber industry and the economy of the Pacific Northwest, and with information derived from government agencies, private statistical services, the reports of others, interviews of individuals, or other sources believed to be reliable. ECONorthwest has not verified the accuracy of such information, however, and makes no representation regarding its accuracy or

completeness. Any statements nonfactual in nature constitute the authors' current opinions, which may change as more information becomes available.

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Chapter 2: Timber and the Economy of the Pacific Northwest: A Brief History

For many observers, May 29, 1991, marks a turning point in the timber industry and its economic role in the Pacific Northwest (PNW). On that date in Seattle, Federal District Judge William Dwyer shut down virtually the entire timber-sale program on nine national forests in Washington and Oregon¹ until the U.S. Forest Service (USFS) and other federal resource-management agencies could demonstrate that they had reversed “a remarkable series of violations of the environmental laws” (Dwyer 1991). In particular, Judge Dwyer issued an injunction forbidding the Forest Service from selling more timber in suitable spotted owl habitat until it could provide assurance that it could sell timber without significantly undercutting the continued survival of the northern spotted owl, a species threatened with extinction. Other injunctions extended the spotted-owl curtailment of timber harvests to cover other federal lands and other protected species.

The injunctions sparked widespread economic fear, fanned by numerous formal and informal predictions that they would cause economic collapse. In this chapter we describe the chain of events that reduced timber harvests in the region, the actual changes in timber harvests that have accompanied Judge Dwyer’s injunction and related decisions, and the range of economic predictions that swept through the region over the past decade. The chapter has five sections:

The injunctions’ impacts on timber harvest.

Events leading to the injunctions.

The Northwest Forest Plan and other events that followed the injunctions.

Predictions of economic catastrophe that did not materialize.

Reflections on the economic significance of the region’s response to the injunctions.

¹ The injunction applied to 17 national forests in Oregon, Washington, and Northern California, but primarily to national forests in western Oregon and Washington. We generally exclude Northern California from our discussion in this report because of the difficulty in assembling relevant data that are comparable to data for western Washington and Oregon. Elsewhere (ECONorthwest 1996) we have examined the economy-forest relationship in Northern California and reached conclusions similar to those we describe here.

The Injunctions' Impacts on Timber Harvest

Judge Dwyer's ruling and the others that followed dominated news headlines for months. Most reporters and editors focused on what they understood would be the dramatic impact the injunctions would have on the timber harvests from federal lands.

Judge Dwyer's injunction immediately stopped the scheduled sale of about 1.5 billion board feet (bbf)² per year.³ Other injunctions and administrative actions preceding and following Judge Dwyer's decision reduced federal timber harvests in western Oregon and Washington from a 1983-87 average of 3.8 bbf to less than 0.5 bbf in 1996 (see Table 2.1). Total federal harvests in the two states fell from 5.6 bbf to 0.9 bbf, and total harvest from all lands dropped from 14.3 bbf to 8.3 bbf. During the period, westside federal harvests, total statewide federal harvests, and total statewide harvests fell 87, 84, and 42 percent.

Table 2.1: Change in Federal and Total Harvests from the Mid 1980s to 1996

Area	1983-1987 average			1996		
	Federal Harvest ^{a,b}	Total Harvest ^b	Federal as a % of Total	Federal Harvest ^{a,b}	Total Harvest ^b	Federal as a % of Total
Western OR & WA	3,787	11,212	33.8%	478	6,379	7.5%
Pacific Northwest ^c	5,558	14,304	38.9%	871	8,289	10.5%
Oregon	4,316	8,015	53.8%	690	3,922	17.6%
Westside OR	2,927	6,091	48.1%	444	3,091	14.3%
Eastside OR	1,389	1,924	72.2%	246	831	29.6%
Washington	1,242	6,289	19.8%	181	4,366	4.2%
Westside WA	860	5,121	16.8%	34	3,288	1.0%
Eastside WA	382	1,168	32.7%	147	1,078	13.7%

^a Federal harvests include only harvests from lands managed by the Forest Service and the Bureau of Land Management.

^b Million board feet.

^c The Pacific Northwest includes state totals of Oregon and Washington.

Source: ECONorthwest with data from the Oregon Department of Forestry and the Washington Department of Natural Resources.

² A board foot is an amount of wood fiber equivalent to a one-inch-thick board one foot long and one foot wide. It takes about 7.5 thousand board feet to build an average home in America and a billion board feet of lumber is enough to support the construction of about 133,000 new homes. Old-growth, Douglas fir stands with spotted-owl habitat contain about 60,000-100,000 board feet per acre.

³The judicial ruling affected these national forests:

Washington Westside: Gifford Pinchot, Mt. Baker-Snoqualmie, and Olympic National Forests

Washington Eastside: Okanogan and Wenatchee National Forests

Oregon Westside: Mt. Hood, Rogue River, Siskiyou, Suislaw, Umpqua, and Willamette National Forests

Oregon Eastside: Deschutes and Winema National Forests

California: Klamath, Mendocino, Shasta-Trinity, and Six Rivers National Forests

Table 2.2: Federal Harvest As A Percent of Total Harvest, By County, 1989

County	Federal Harvest ^a (million board feet)	Total Harvest (million board feet)	Federal Harvest as a Percent of Total
Benton	48	170	27.9%
Clackamas	144	257	56.1%
Clatsop	0	234	0.0%
Columbia	1	265	0.5%
Coos	144	486	29.6%
Curry	126	167	75.3%
Douglas	790	1,237	63.9%
Hood River	36	65	55.0%
Jackson	237	419	56.5%
Josephine	148	172	85.8%
Lane	712	1,275	55.8%
Lincoln	116	333	35.0%
Linn	211	464	45.6%
Marion	67	116	58.1%
Multnomah	14	27	50.8%
Polk	12	145	8.5%
Tillamook	86	170	50.6%
Washington	3	85	3.2%
Yamhill	31	146	21.3%
Clallam	41	410	10.0%
Clark	0	119	0.0%
Cowlitz	9	527	1.8%
Grays Harbor	46	751	6.1%
Island	0	18	0.0%
Jefferson	41	284	14.5%
King	52	334	15.7%
Kitsap	0	48	0.0%
Lewis	188	749	25.1%
Mason	26	387	6.8%
Pacific	0	372	0.0%
Pierce	28	229	12.2%
San Juan	0	4	0.0%
Skagit	18	271	6.8%
Skamania	193	270	71.8%
Snohomish	46	270	17.2%
Thurston	0	195	0.0%
Wahkiakum	0	108	0.0%
Whatcom	18	144	12.4%
Western Washington	708	5,492	12.9%
Western Oregon	2,926	6,232	47.0%
Western OR & WA	3,635	11,724	31.0%

^a Federal harvests include only harvests from the land managed by the Forest Service and the Bureau of Land Management .

Source: ECONorthwest with data from the Oregon Department of Forestry and the Washington Department of Natural Resources.

The potential impact was even more severe in some counties. Table 2.2 shows the importance of federal harvests, relative to total harvest, for each Westside county in Oregon and Washington. The spotted-owl injunctions of federal timber sales threatened to eliminate 31 percent of the total Westside harvest in the two states—13 percent in western Washington and 47 percent in western Oregon. Josephine County in southern Oregon had the highest

concentration of federal harvests and the injunctions affected 85.8 percent of the total harvest.

Table 2.3: Acreage in the Range of the Northern Spotted Owl

	Federal	Nonfederal
Washington	8,839,100	12,494,400
Westside	5,366,900	10,284,400
Eastside	3,472,200	2,210,000
Oregon	9,564,100	11,830,400
Westside	8,006,600	11,062,900
Eastside	1,557,500	767,500
California	5,856,800	8,416,700
Three-State Total	24,260,000	32,741,500

Source: ECONorthwest with data from FEMAT, Table II-1.

The northern spotted owl's range encompasses about 57 million acres of forested and nonforested lands in Washington, Oregon, and California (see Table 2.3). Of this total, about 24 million acres of the spotted owl range is located on federally owned lands.

Events Leading to the Injunctions⁴

The injunctions against timber sales on federal lands were not entirely unanticipated. Controversy over logging's impact on the northern spotted owl and other species⁵ dependent on old-growth forests west of the Cascades (Westside) had been growing for more than 25 years and had erupted into a full-blown battle during the latter half of the 1980s. In 1972, researchers documented that northern spotted owls in Oregon seemed to locate primarily in the Westside old-growth forests that are dominated by large Douglas fir trees. By 1978, the research clearly indicated that either continued logging of old-growth would jeopardize spotted-owl habitat and, hence, the viability of the existing population, or measures to accomplish effective conservation of the owl would significantly reduce old-growth timber harvests. By this time, most of the old-growth on private lands had been logged, and it was apparent that most of the burden of owl conservation would fall on federal timberlands.

In 1981 the U.S. Fish and Wildlife Service concluded that the northern spotted owl did not warrant special protections associated with the Endangered Species Act, but observed that "the owls' dependence on large

⁴ Most of the discussion in this section is from Thomas, et al. (1993), which describes how spotted-owl issues evolved and impinged on forest-management policy until 1993. Another useful history is Durbin (1996).

⁵ There are 1,116 terrestrial species closely associated with the late-successional and old-growth forests of the spotted-owl region (U.S. Department of Agriculture and U.S. Department of the Interior 1994, S-16).

areas of old-growth coniferous forest make them extremely vulnerable. If current trends in old-growth timber harvest continue, the Northern Spotted Owl could become endangered in a relatively short time” (Thomas, et al. 1993). Despite this warning and those of numerous studies, strategies, and plans, Congress and federal land administrators did not develop and implement an effective conservation strategy. Instead, they stalled, unable or unwilling to accept the inevitable: that spotted-owl conservation would require marked reductions in timber harvests. They hoped that the problem would go away or that they could push the problem onto future Congresses, future administrators, and future generations. Indeed, rather than heed the 1981 warning from the Fish and Wildlife Service, the White House, congressional leaders and forest managers more-than-doubled federal timber harvests by the middle 1980s. Figure 2.1 shows the increase during 1982-88.

It is tempting, at first blush, to assign responsibility for the inaction solely to the administrators of the Forest Service and BLM. Certainly, in their zeal to maintain harvest levels and convert the federal old-growth forests to farms of smaller, younger trees, they bear much of the blame (Yaffe 1994). They were not alone, however. Urged by lobbyists and major contributors from the timber industry, leading senators and representatives from Oregon and Washington annually maneuvered Congress into setting high logging quotas and insisted that the agencies meet them.⁶

Faced with continued inaction by Congress and forest administrators, in 1987 an environmental group petitioned the U.S. Fish and Wildlife Service to list the owl as an endangered subspecies under the Endangered Species Act. The agency denied the petition, saying that the owl population was sufficiently robust that the protections afforded by listing were not warranted. Environmental groups quickly appealed, saying the agency’s action was motivated by political, not biological, considerations. A federal judge agreed and ordered the Fish and Wildlife Service to reconsider. The agency subsequently determined that the biological data did, indeed, support listing the owl as a species threatened with extinction.⁷ Members of Congress, at the urging especially of Senators Hatfield of Oregon and Adams of Washington, attached Section 318, a rider, to an appropriations bill to protect the timber industry.⁸ Setting aside the provisions of the Endangered Species Act, Section 318 declared that current land-management plans and guidelines of the Forest Service and BLM were sufficient to allow timber sales through September, 1990.

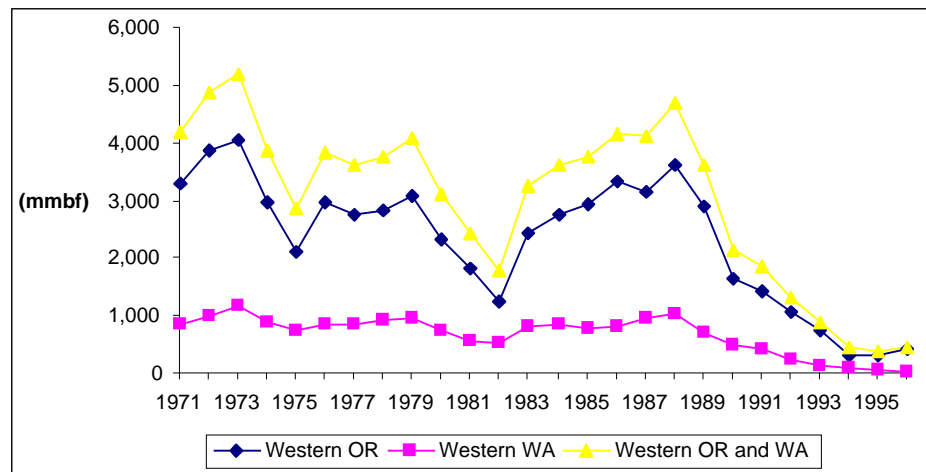
In 1981 the U.S. Fish and Wildlife Service concluded, “If current trends in old-growth timber harvest continue, the Northern Spotted Owl could become endangered in a relatively short time.” Rather than heed this warning, the White House, congressional leaders, and forest managers more-than-doubled federal timber harvests by the middle 1980s

⁶ For a larger discussion of the interconnection among the timber industry, Congress, and administrators, see O’Toole (1988) and Wondolleck (1988).

⁷ The Endangered Species Act allows for a species to be listed as “endangered” if it is in danger of extinction throughout all or a significant portion of its range. A species is listed as “threatened” if it is likely to become endangered in the foreseeable future throughout all or a significant portion of its range.

⁸ A rider is an amendment to a bill that has little, if any, bearing on the bill’s main substance. The amendment often is not subject to hearings and other public review and sponsors of riders hope that the momentum of the central bill will carry the rider into law. Members of Congress have often used this technique to avoid public scrutiny of attempts to short-circuit environmental legislation.

Figure 2.1: PNW Timber Harvests on Federal^a Lands, 1971-1996



^a Federal harvests include only harvests from the federal agencies affected by the northern spotted owl rulings, namely, the U.S. Forest Service, and the Bureau of Land Management.

Source: ECONorthwest with data from the Oregon Department of Forestry and the Washington Department of Natural Resources.

Section 318 also required the formation of an Interagency Scientific Committee (ISC), whose charge was to assess the status of the northern spotted owl and “to develop a scientifically credible conservation strategy for the northern spotted owl.” The Committee’s report (Thomas et al. 1990) called for complex conservation prescriptions on federal lands—including the reservation of 5.8 million acres of federal land not previously set aside—that would have the effect of reducing federal timber harvest by about half. The ISC’s report received high acclaim from the scientific community. The political mainstream, however, received the ISC report with wide-eyed incredulity. Even as they began to accept the reality of the scientific findings, many, if not most, political leaders in the region concluded that harvest reductions of this magnitude simply were unacceptable.

In 1990, the Fish and Wildlife Service finally listed the owl as a threatened species. The agency did not, however, comply with the Endangered Species Act’s requirement that it identify the critical habitat necessary to arrest the reductions in owl populations and support population increases. Activities that might degrade designated critical habitat could not be conducted with federal funds, the direct participation of a federal agency, or a federal permit. Environmental groups filed suit to compel the Fish and Wildlife Service to designate critical habitat. After a federal judge agreed with plaintiffs, the agency initially proposed designating 11.6 million acres of critical habitat, which it later reduced to 6.9 million acres to minimize the inclusion of private lands.

In October, 1990, Section 318 expired, clearing the way for the lawsuit that led to Judge Dwyer’s May, 1991, ruling. This suit focused not on the Endangered Species Act but on the Forest Service’s failure to comply with the National Forest Management Act (NFMA). Regulations developed under NFMA require that the Forest Service shall act so that “[f]ish and wildlife shall be managed to maintain viable populations of existing native and desired non-

native vertebrate species in the planning area [of a national forest]" (36 C.F.R. § 219.19). To insure viability, the Forest Service must provide sufficient habitat to support a minimum population of each species. Because it is infeasible to monitor every species, the regulations require the agency to monitor "indicator species," one of which is the northern spotted owl. Plaintiffs in the lawsuit contended that logging and development had reduced habitat for the owl to the point that continued logging would unreasonably jeopardize its viability.

After the Injunctions: The Northwest Forest Plan and Beyond

Judge Dwyer's injunction might have induced Congress to change the laws to allow logging, as it had done two years earlier with the Section 318 rider. But several things were different in 1991. One was that Judge Dwyer, in his ruling, documented prolonged, systematic violations of the law. Part of the ruling states:

"More is involved here than a simple failure by an agency to comply with its governing statute. The most recent violation of [the National Forest Management Act] exemplifies a deliberate and systematic refusal by the Forest Service and the [Fish and Wildlife Service] to comply with the laws protecting wildlife. This is not the doing of scientists, foresters, rangers, and others at the working levels of these agencies. It reflects decisions made by higher authorities in the executive branch of government" (Dwyer 1991).

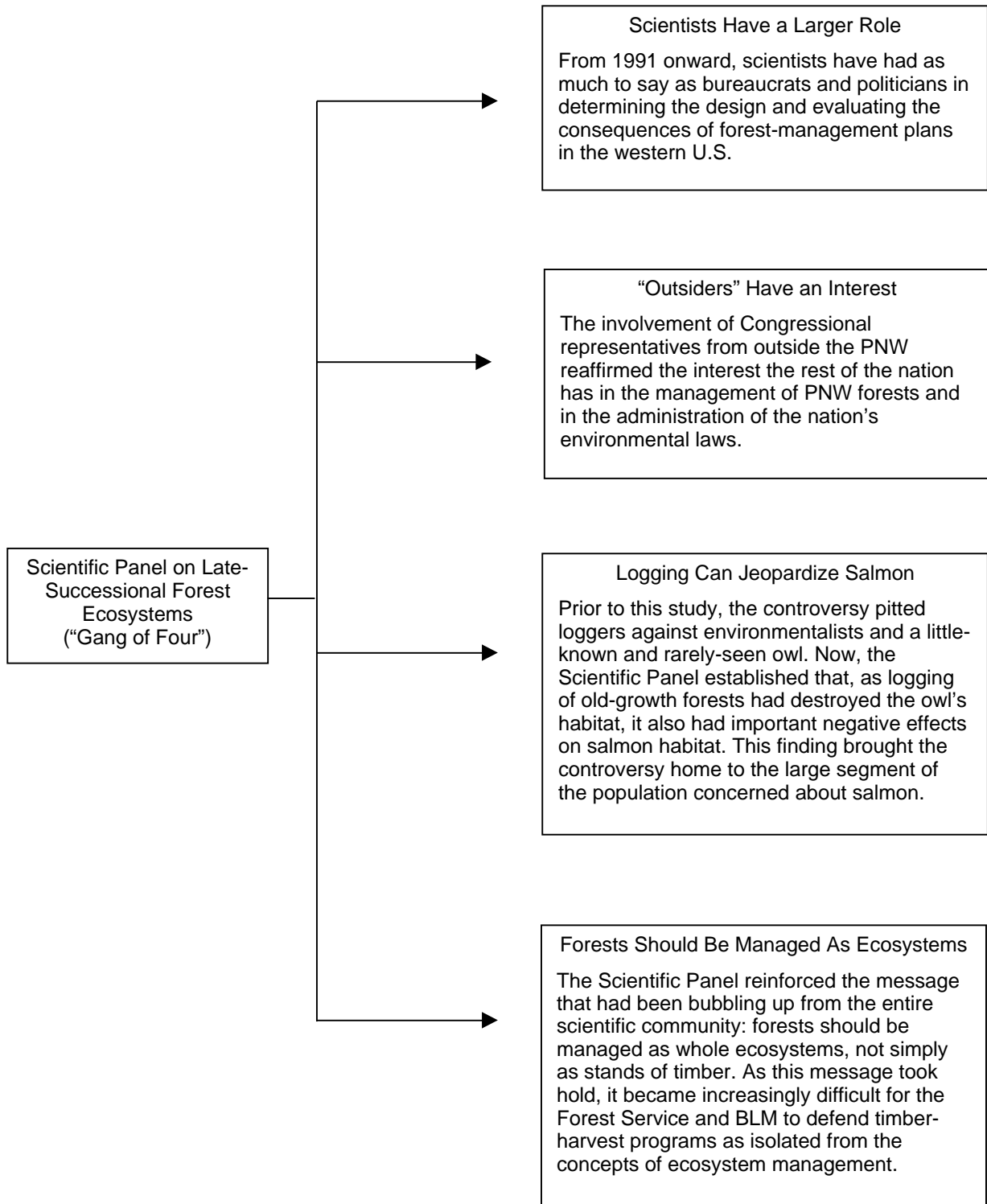
Another difference came through a broadening of the public's perception of the problem. Judge Dwyer's ruling allowed environmental groups to argue successfully that the problem was not the owl, but illegal, rogue elements within the agencies managing federal lands. In addition, new research supported the view that the dispute was over much more than just owls vs. logging.

In May, 1991, Congress commissioned four highly esteemed scientists as the Scientific Panel on Late-Successional Forest Ecosystems. Known as the Gang of Four, their charge was to define and evaluate alternatives for managing the spotted owl habitat on federal forests. Five months later, they presented their findings. They concluded that continued logging of old-growth forests in the PNW threatened not just the spotted owl but other vertebrates, salmon, and the overall integrity of old-growth ecosystems (Johnson et al. 1991). Their findings significantly changed the political environment surrounding forest-management issues, as shown in Figure 2.2.

Each of the milestones shown in Figure 2.2 was important. The enlarged roles of scientists and members of Congress from outside the region eroded the control that the region's pro-timber interests had over federal forest-management policies. The Gang of Four showed extensive overlap between owl habitat and salmon habitat. This gave a large interest group—salmon supporters—reason to become involved in the controversy and support owls.

Judge Dwyer, in his ruling, documented prolonged, systematic violations of the law... [His] ruling allowed environmental groups to argue successfully that the problem was not the owl, but illegal, rogue elements within the agencies managing federal lands.

Figure 2.2: Milestones Associated with the Scientific Panel, 1991



Source: ECONorthwest

Furthermore, the Gang of Four solidified the message that there is a high-ground from which forest managers, politicians, and the public as a whole should view forest management. Called *ecosystem management*, this new approach involved “a strategy or plan to manage ecosystems to provide for all associated organisms, as opposed to a strategy or plan for managing individual species” (Johnson et al. 1991). The idea had both scientific support and intuitive appeal. It seriously undermined those who argued that the controversy, narrowly defined as a choice between owls and jobs, would disappear if only Congress would set aside environmental protections for the owls. Clearly, far more was at stake.

The Gang of Four’s themes have continued to resonate. Early in his new presidency, Bill Clinton convened a Northwest Forest Summit in Portland and listened to speakers representing nearly every side of the forest-management controversy express their views. The President then set in motion a process that assembled natural and social scientists, managers, and others into a Forest Ecosystem Management Assessment Team (FEMAT) charged with developing an integrated assessment of the ecological, economic, and social issues. FEMAT delivered its report in July, 1993, and, by April, 1994, the process produced a forest-management plan—called the Northwest Forest Plan or the President’s Forest Plan—covering all federal forests in the spotted owl region (U.S. Department of Agriculture 1994). The government took this plan to Judge Dwyer who, on December 21, 1994, found that it just barely satisfied the conditions he set in 1991 and lifted his injunction on federal timber sales.

The Northwest Forest Plan called for average annual timber harvests from federal lands in the spotted owl region of about 1.1 billion board feet⁹ (bbf) during the first decade of the plan’s implementation (U.S. Department of Agriculture and U.S. Department of the Interior 1994, 2-78). This contrasts with harvests that averaged 4.5 bbf during the 1980s. The plan envisioned that it would take about three years for the detailed scientific and administrative work to be far enough along so timber harvests would reach this level, but the work has proceeded more slowly¹⁰ Table 2.4 shows the annual targets and the actual performance. In 1995, for example, the actual harvest was about 80 percent of the target.

The adoption of the Northwest Forest Plan did much to diminish the cacophony surrounding forest issues in the Pacific Northwest, but things have not been totally silent. West of the Cascades, implementation of the Plan is being challenged by litigation claiming the level of logging is too high (Carrel 1998). To the east, the Forest Service adjusted downward its timber-sale targets. Several agencies initiated a review—the Interior Columbia Basin Ecosystem Management Project (ICBEMP)—of ecological, economic, and social issues associated with the management of 76 million acres of federal lands in the area roughly from the crest of the Cascades in Oregon and Washington eastward to the Rockies. The initial findings from ICBEMP have generally

[The Gang of Four’s report] seriously undermined those who argued that the controversy ...[was] a choice between owls and jobs. Clearly, far more was at stake.

⁹ Approximately 726 million board feet of this federal harvest will occur on National Forest and BLM lands west of the Cascades in Oregon and Washington (U.S. Department of Agriculture and U.S. Department of the Interior 1994, 3&4-268).

¹⁰ The Northwest Forest Plan proposed that 60% of the timber sales needed to fulfill the 1.1 bbf sustainable harvest level would be completed in 1995, 80% in 1996, and 100% in 1997 (Tuchman et al. 1996, p. 102).

paralleled those from FEMAT. Many species and the overall integrity of many ecosystems are in jeopardy, and reducing the jeopardy will require curtailing logging and other extractive activities, such as cattle grazing (Forest Ecosystem Management Assessment Team 1993, IV-185, 186; Quigley and Arbelbide 1997).

Table 2.4: Actual Federal Harvest Levels v. Federal Timber Sales Proposed by the Northwest Forest Plan, 1994-1997

	1994	1995	1996	1997
Northwest Forest Plan's Proposed Timber Sale Levels		436	581	726
Actual Federal Timber Harvests ^a				
Western Oregon	339	323	444	331
Western Washington	114	79	34	61
Western OR and WA	453	402	478	392
Difference		34	103	334

^a Harvests from National Forests and BLM lands only.

Source: ECONorthwest with data from the Oregon Department of Forestry, Tuchman et al. (1996), USDA Forest Service and USDI Bureau of Land Management (1994) and the Washington Department of Natural Resources.

Other factors affecting timber production include increased pressure for protecting streams and adjacent riparian areas, especially in response to the listing of salmon and other fish as either threatened or endangered under the Endangered Species Act.¹¹ The listing of the marbled murrelet as a threatened species created additional protections for coastal old-growth trees. In 1995, Congress passed a rider—similar to Section 318 passed in 1989—declaring, in effect, that the environmental laws did not apply to *salvage logging* of trees and using a broad definition of *salvage* to embrace virtually any stand of trees, dead or alive. At the state level, pressures for tighter controls on private logging included a voter-initiated ballot measure in November, 1998, which would have essentially prohibited clearcutting on private and state-owned lands in Oregon. Although voters rejected the proposal, virtually all political communities in the state expect better-crafted initiatives to be on future ballots.

In the midst of all this, local, regional, national, and global events far too numerous to mention have influenced the behavior of landowners, millowners, and markets. The overall impacts on PNW timber harvests are summarized in Table 2.1 and Figure 2.1. They show that, from the middle 1980s to the middle 1990s, federal timber harvests have fallen 87 percent for the region as a whole, and by 96 percent and 85 percent, respectively, for western Washington and western Oregon. It is against this backdrop that we evaluate the economic consequences.

¹¹ In 1993 there were 314 “at risk” species in the spotted-owl region, 259 of whom were located on federal lands (Forest Ecosystem Management Assessment Team 1993, V-10).

The Economy: Predictions of Catastrophe Did Not Materialize

It is hard now to recall the intensity of the fear that accompanied Judge Dwyer's injunction and the events that surrounded it. Workers feared losing their jobs, communities their very existence. Ignorance and propaganda increased these fears. Few understood how the economy would respond to a major, abrupt reduction in federal timber harvests. Such an event had never occurred before. Numerous groups, with their own agendas and uninhibited by their ignorance, wildly predicted economic and social catastrophe. Table 2.5 samples the predictions of direct, i.e., in the industry, and total job losses published between 1989 and 1991. Figure 2.3 shows representative public statements expressing fears, fanning them, or both.

Table 2.5: Predictions of Timber-Related Employment Losses, 1989-1991

Author/Sponsor	Date	Direct Employment Losses	Total Employment Losses
K.N. Johnson, J.F. Franklin, J.W. Ward, J. Gordon	October, 1991	--	11,000-61,000 Jobs in the "Owl Region"
M. Rasmussen, W. Maki, D. Olson	1990	--	109,466 jobs in the "Owl Region"
Institute of Forest Resources based on studies at the University of Washington, University of California, and Oregon State University	September, 1990	23,000 Jobs in the "Owl Region" (midrange assumption)	48,000 Jobs in the "Owl Region" (midrange assumption)
D. Olson, J. Beuter, W. Maki (various independent reports)	Summer, 1990		147,193 Jobs in the "Owl Region"
USDA Forest Service, USDI Bureau of Land Management	May, 1990		25,409 Jobs in the "Owl Region"
Hamilton et al.	1990		28,165 Jobs in the "Owl Region" by the Year 2000
Northwest Forest Resource Council	May, 1989		131,400 Jobs in Oregon and Washington
E.C. Waters, D.W. Holland, B.A. Weber	1990	16,000 Jobs in the "Owl Region"	37,100 Jobs in the "Owl Region".
W.J. Mead, D.D. Muraoka, M. Schniepp, R.B. Watson	October, 1990	7,225 Jobs in Oregon and Washington	10,000-20,000 Jobs in Oregon and Washington

Source: ECONorthwest with data from Beuter (1990), Hamilton et al. (1990), Institute of Forest Resources (1990), Johnson et al. (1991), Maki (no date), Mead et al. (1990), Olson (1990), USDA Forest Service and USDI Bureau of Land Management (1990), and Waters et al. (no date).

Figure 2.3: Public Expressions of the Economic Fears Associated with Potential Declines in Timber Harvests, 1989-92

"I don't think we can accept an answer that is going to paralyze employment in the Northwest."

"It is time we worried not only about endangered species, but about endangered jobs."

President George Bush
(Oregonian, B1, 7/2/90; Business Week, 108, 10/19/92)

"The almost total absence of a [Forest Service] timber sale program in Western Oregon for the two years, FY 1991 and FY 1992, and the major curtailments in the BLM program have brought the industry and local communities to their knees.....What is actually occurring is a series of local economic disasters combined into a regional disaster, which is being ignored because it is not understood in all of its ramifications.....Relief of any degree must come NOW -- not later if we are to slow down the free fall of the timber economy, and in many cases the free fall of the total economy, in Western Oregon."

Paul F. Ehinger, Forest Products Consultant
(Testimony to the Endangered Species Committee, 1991)

"A permanent rural underclass will be created, with all the social economic, and resource conservation problems found in other economically depressed rural regions: persistent poverty, substandard education and medical care, lawlessness, hostility toward outsiders, and unstable family structure."

"The northern spotted owl listing will "wreak havoc on the people and economy of the Pacific Northwest."

Rep. Bob Smith (Oregonian, A15, 6/23/90)

"The crisis is here. The timber supply in Western Oregon and Western Washington has dried up."

Robert Lee, University of Washington Natural Resource Sociologist
(Social and Cultural Implications of Implementing "A Conservation Strategy for the Northern Spotted Owl")

Chris West, Northwest Forestry Association
(Register Guard, B, 5/28/89)

"We Oregonians have responsibly managed our forests for 140 years, but here comes Vento and his group of liberal, special interest organizations who want to shut down Oregon.... Anti-timber groups like Earth First!, the Sierra Club, the Wilderness Society, the Audobon Society, the Oregon Natural Resources Council and the National Wildlife Federation don't want to understand how we live, work and raise our families in Oregon."

Rep. Denny Smith, R-Ore. (Register Guard, 5B, 7/20/90)

"This decision (Dwyer's decision to keep the timber sales ban in place) will mean more families will be torn apart, lose their homes and lose their dreams."

Troy Reinhart,
Douglas Timber Operators
(Register Guard, A, 5/29/92)

"If I read it correctly, it looks to me like you're talking about thousands and thousands of jobs lost. I cannot countenance that. It would be disastrous for Springfield, Roseburg, and Grants Pass."

Senator Bob Packwood, R-Ore.
(Oregonian, A, 4/5/90)

"Never in recorded history has there ever been a decision regarding wildlife protection that has threatened the livelihood of upward of 50,000 people."

John Hampton, President of the Northwest Forest Resource Council (Oregonian, A1, 6/23/90)

"If a major portion of the remaining wood products mill capacity is shut down in Oregon, Washington and northern California, what economic impact will this have aside from the pain and suffering in the communities where the closures occur? It is my judgement that the mill closures that will occur in 1992, on top of those that have already taken place.....could have a profound effect on the national economy and its prospects for recovery from recession."

"We're looking at tens of thousands of families not knowing whether they're going to be able to make their mortgage payments."

Charlie Janz, owner of Janz Logging
(Oregonian, A14, 6/23/90)

Daniel L. Goldy, consulting economist
(Testimony from the God Squad, BLM vs. U.S. Fish and Wildlife Service)

"If we cut off the renewable resource for homes, we are turning our backs on the homelessness."

"Let me put the people dimension in this... Mill towns into ghost towns- that's what the Fowler Amendment (cuts budget for building logging roads) would create... It's so easy to polarize the issues and forget the people."

Senator Mark Hatfield, R-Ore. (Oregonian, E15, 10/28/90)

The predictions typically linked the anticipated collapse of small communities to the prospect of massive unemployment. Many in the PNW found this plausible. The fear of community instability often rested on the fear that actions to protect owls, salmon, and other species would cause massive unemployment.

Unemployment Predictions. The acme in unemployment predictions came in 1990. The American Forest Resources Association, a timber-industry group, predicted that implementation of proposed owl protections would reduce total employment in Oregon by 102,000. At the same time, Doug Olson, John Beuter, and Wilbur Maki—long-time advocates of the timber industry’s paramount economic importance—predicted a loss of almost 150,000 jobs.

Forecasters often assumed ... that people in the region were stupid, powerless, or both. In truth, they were neither.

These and most of the other prophets of economic disaster based their job-loss predictions on a simplistic model. The assumptions underlying this model systematically exaggerated the impacts of logging reductions attributable to owl protections. The forecasts were way off the mark because they made assumptions that proved out of touch with economic reality. We discuss the assumptions at length in the next chapter. Here, it is enough to say that the predictions were based on a simplistic model with the four steps shown in Figure 2.4

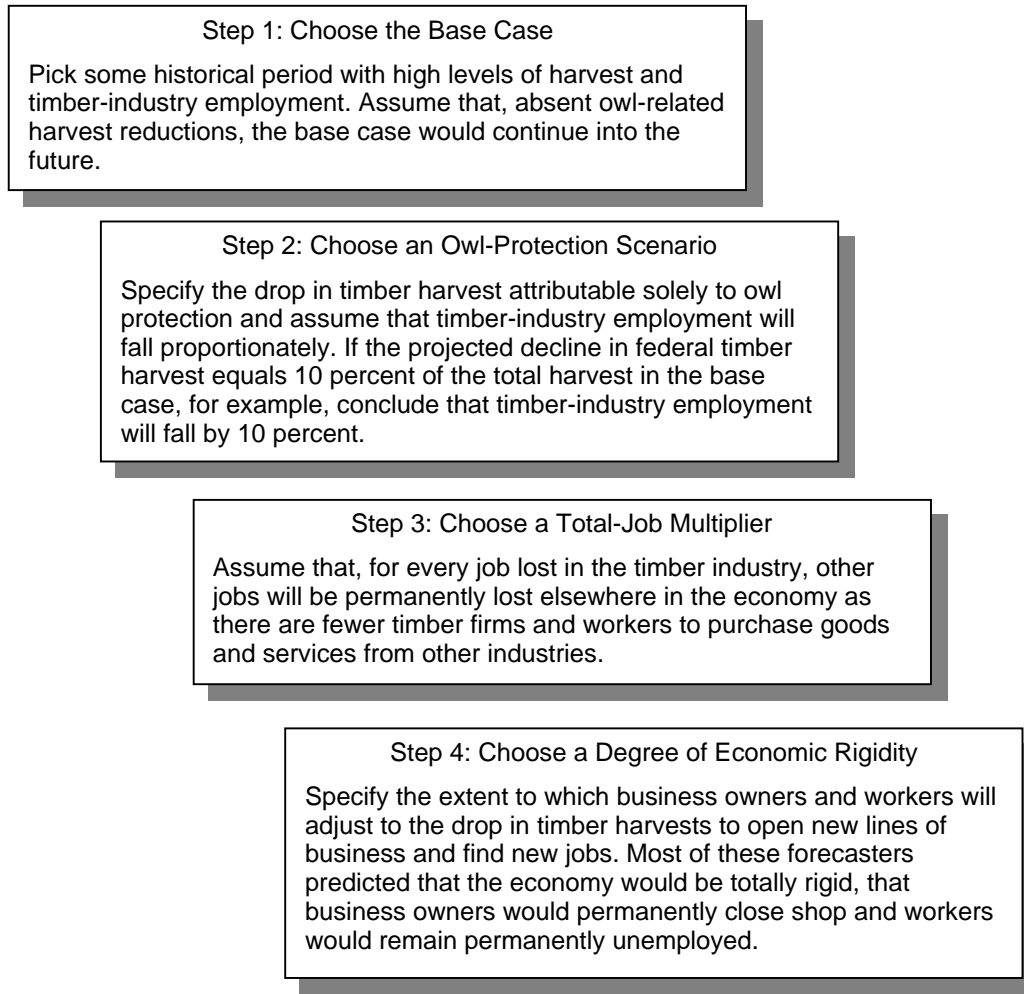
In Step 1, forecasters often assumed that high historical levels of timber-industry employment would continue, if only the owls, salmon, and other species adversely affected by logging would disappear. This assumption was wrong for two major reasons. One, the timber industry already was dramatically reducing the number of workers it took to process a given amount of timber. Two, the industry had been logging at rates that the forest simply could not sustain, regardless of environmental concerns.

In Step 2, forecasters often assumed that a reduction in timber from federal lands would abruptly leave a hole in the supply of timber that could not be filled, so that milling activity would decline proportionately. This outcome did not materialize as some nonindustrial landowners began selling timber in response to higher prices, some industrial landowners curtailed log exports or began rushing smaller logs to their mills, and mills imported logs from other states and countries.

In Step 3, forecasters often assumed that the economy was constructed like a house, with the timber industry as the foundation, or **economic base**, atop which the remainder of the economy rested. Hence, any crumbling of the base would be multiplied in the superstructure. Although this model of economic structure may have had some merit decades ago when local and regional economies were pretty simple. But as economies become more diverse and dynamic, the model becomes increasingly misleading.

In Step 4, forecasters often assumed that workers, business owners, and others would not, or could not, find ways to shrink the negative economic effects of any logging reductions stemming from efforts to protect owls, salmon, and other species. In effect, they assumed that people in the region were stupid, powerless, or both. In truth, they were neither. Most displaced workers found new jobs and most firms held onto existing customers or cultivated new ones.

Figure 2.4: Analytical Steps Underlying Most Predictions of High Unemployment



Source: ECONorthwest

Community-Instability Predictions. A similar evaluation applies to the various predictions about community stability. Numerous local officials, timber-industry advocates, political leaders, and social scientists argued that the spotted owl threatened to wreck the many communities they deemed timber-dependent. The community-instability predictions often began with the premise that historically high logging levels on federal lands produced stable communities. Absent the owl (and salmon, etc.), this golden age would continue. The forecasters often assumed that any reduction in federal logging would lead to proportionate reductions in stable employment, commercial activity, tax revenues, volunteerism, and other characteristics of local communities. The ability of private and public institutions to provide services to workers, families, and firms in trouble would plummet, just as the demand for these services would skyrocket. From this foundation, the

forecasters often predicted uncontrollable increases in homelessness, poverty, substance abuse, family violence, crime, and municipal bankruptcies (U.S. Department of Agriculture and U.S. Department of the Interior 1994; Forest Ecosystem Management Assessment Team 1993; Clinton and Gore 1993).

Some social-science researchers and community officials extended the predictions even further. They concluded that any reduction in logging from federal decisions to obey environmental laws would be especially damaging to community stability (Lee 1990). This conclusion rested on an assumption that timber workers, their families, and their neighbors believed the federal government had promised to continue high levels of logging on federal lands. Any reduction, therefore, would be seen as a betrayal. This sense of betrayal, it was argued, would have debilitating effects on workers, families, and the stability of communities that, in contrast, would have coped quite well if logging reductions of similar magnitude had materialized from within the private sector.

In other words, the proponents of this argument concluded that logging reductions stemming from environmental protections are especially pernicious. If an industrial landowner closed mills after exhausting its timber by logging at an unsustainable rate or laid-off hundreds of workers after investing in labor-saving machinery, the social trauma would have been acceptable. But not if it originated from environmental protection efforts on federal lands. The political winds behind this argument had considerable strength in the region through the development of the Northwest Forest Plan. They have since waned as the predicted trauma failed to materialize and a growing number of economic and political leaders recognized the considerable economic and social benefits derived from logging reductions.

As with the unemployment predictions, those that predicted widespread, permanent community instability fell far short of the mark, and for similar reasons. As we discuss in the next chapter, considerable research has revealed that high logging levels never produced the community stability that advocates promised. This was especially the case in the 1980s, as the timber industry dramatically reduced its labor costs per unit of timber processed and permanently laid-off thousands of workers. Furthermore, the very notion of timber-dependent communities proved incorrect. Most of the milling capacity had concentrated near diversified metropolitan centers. Even distant communities realized that they were comprised of much more than the timber industry. As a consequence, communities throughout the spotted-owl region demonstrated that they were far more capable of adjusting to reductions in federal logging than many forecasters had predicted.

Reflections

Judge Dwyer's order prohibiting new timber sales on the national forests marked the first time environmental laws aimed at protecting species and the integrity of ecosystems had dramatically arrested the behavior of a major industry covering a broad landscape. The region was moving through uncharted waters, and it is no wonder that workers, business owners, families, and community leaders were frightened. In the ensuing years, as they adjusted to the decisions of Judge Dwyer and others, the residents of the Pacific Northwest have learned a lot about who they are. They are not stuck in an economic backwater, out of the national and global mainstream,

and heavily dependent on the timber industry for their individual and communal well-being. Instead, throughout the region individuals and communities have demonstrated—perhaps discovered is more accurate—that they have tremendous economic and social strength.

Prior to May 29, 1991, American society had imposed environmental-protection burdens on industries primarily to prevent the emission of noxious and toxic materials that had a direct bearing on the health and welfare of humans. Though contentious to be sure, whatever economic trauma the laws underlying improvements in air and water quality caused was deemed necessary because it yielded improvements in other aspects of human life. Jobs were traded for good lungs and other improvements in human health.¹²

The long history associated with the management of PNW forests to protect spotted owls—and salmon, marbled murrelets, and other species, even the overall integrity of the forest ecosystem—represents a different sort of perceived tradeoff. Especially in the early years, many in the region struggled with how to weigh the continued existence of an owl against the livelihoods of loggers and millworkers. There was no easy answer because the region, and, indeed, the nation, had never before confronted such a question with such harsh immediacy.

Thus, the story of PNW forests is interesting from an economic perspective because it reveals much about the economic consequences that arise when society acts to protect species and ecosystems, with no direct linkage to protecting human health. As a result, it also helps everyone understand the value of the species and ecosystems, themselves. We discuss these issues further in the next chapter.

The story of PNW forests...reveals much about the economic consequences that arise when society acts to protect species and ecosystems.

¹² Many researchers doubt whether even these environmental-protection efforts have had a negative effect on jobs. See, for example, Meyer (1992), Goodstein (1995), and Templet (1995).

Chapter 3: The Response of the PNW's Economy to Logging Reductions

The worst economic fears never materialized. Oregon and Washington (the Pacific Northwest, or PNW) avoided the widespread unemployment and community collapse that many believed would accompany the logging prohibitions to protect owls, salmon, and other species. Without doubt, some communities have had to cope with substantial, even wrenching, change. Some workers lost jobs that they otherwise would have had if American society had abandoned its commitment to prevent the extinction of species and its expectation that federal land managers should obey the nation's environmental laws. But the PNW did not become an Appalachian-style region of entrenched poverty, as many had predicted. Instead, the region's economy has persistently outperformed the rest of the nation in terms of growth in jobs and incomes.

In this chapter we describe how the economy responded to the logging reductions. This description sets the stage for the next chapter's explanation of why the actual response differed so markedly from what was predicted.

The Regional Economy's Response to Logging Reductions

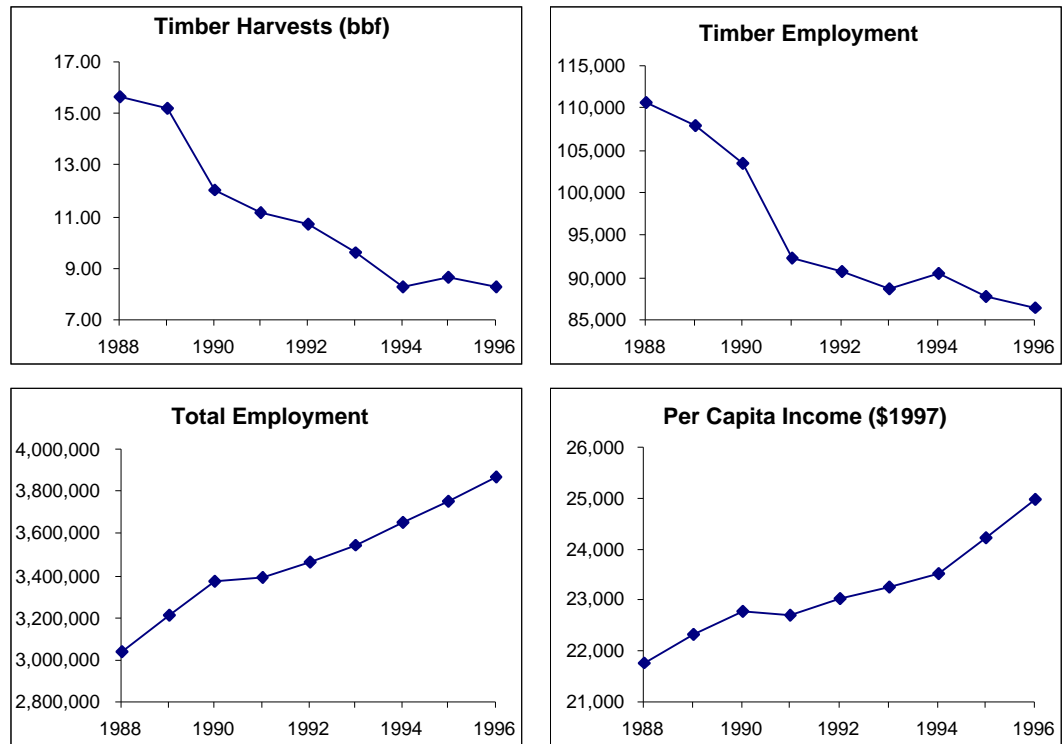
In 1988, when logging peaked prior to the onset of actions to protect spotted owls and other species, 6.4 billion board feet (bbf) of timber were cut on the national forests in Oregon and Washington and 15.7 bbf were cut on all lands. Of the 3,045,584 workers employed in both states, 110,684 worked in the timber industry.¹ The average per capita income was \$21,775.

Figure 3.1 shows how each of these variables has changed through 1996, the last year for which complete data are available. In 1996, logging on federal lands had fallen 86 percent from the 1988 level, overall logging had declined 47 percent and employment in the timber industry had dropped 22 percent. In contrast, total employment and per capita income (adjusted for inflation) had grown 27 percent and 15 percent, respectively.

If logging on federal lands had driven overall employment and income in the PNW, then, as logging declined, the others would have followed. They did not. Instead, they moved in the opposite direction. This outcome and its implications are a dramatic departure from the fears of the late 1980s and early 1990s. Limiting the industrial exploitation of forest resources did not,

¹ Throughout this report the timber industry refers to SIC 24, lumber-and-wood-products. SIC 25, furniture and fixtures, and SIC 26, paper and allied products, are not included because the amount of timber harvested in the Pacific Northwest has little effect upon employment in either of these industries (Personal Communication with Richard Haynes, Program Manager for the Forest Service at the Pacific Northwest Research Station, October, 1998).

Figure 3.1: Logging, Employment, and Income in Oregon and Washington, 1988-1996

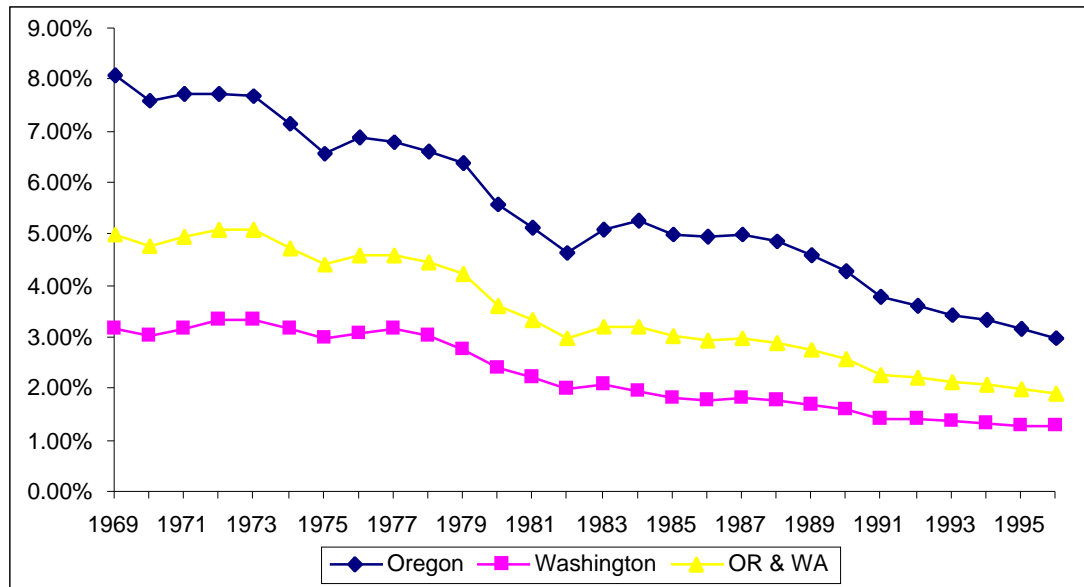


Source: ECONorthwest with data from the Oregon Department of Forestry (various years), the Oregon Employment Department (various years), the U.S. Department of Commerce, Bureau of Economic Analysis (1998), the Washington Department of Natural Resources (various years), and Washington State Employment Security (various years).

as many had predicted, cause widespread economic calamity. To the contrary, the events of this decade clearly show that the timber industry is no more than a minor player in a diverse, powerful economy, an economy that easily accommodated logging reductions aimed at reversing the industry’s considerable damage to the environment.

Furthermore, the timber industry’s importance to the overall economy undoubtedly will become even smaller in the foreseeable future. As Figure 3.2 shows, employment in the timber industry, as a percent of total employment has declined for nearly three decades. The industry provided less than 2 percent of Oregon’s and Washington’s total employment in 1996. Table 3.1 shows that the timber industry’s percentage of total employment is small enough that since 1994, the annual *growth* of jobs in the region has exceeded the *total* number of timber jobs.

Figure 3.2: Lumber-and-Wood-Products Employment as a Percent of Total Employment, Oregon and Washington, 1969-1996



Source: ECONorthwest with data from the U.S. Department of Commerce, Bureau of Economic Analysis (1998).

The decline in timber's importance to the overall economy is commonly attributed to the declines in timber harvest, but a more fundamental reason is the essential character of the industry itself. The industry is mature, with few new products to excite consumers' interest, and each firm has strong incentives to lower its costs if it is to remain competitive in a global market. The cost-cutting pressures have been especially strong in the Douglas fir region west of the Cascades (Westside) where, until the 1980s, the industry was highly unionized and had high labor costs relative to competitors elsewhere in the nation. For a long while, the industry was able to live with the higher costs because the lumber it produced came largely from old-growth trees with wood that had highly desired characteristics, such as strength and aesthetic appeal. Consequently, the region's mills were able to command a price premium relative to lumber produced elsewhere and used part of this premium to cover labor costs. As the supply of old-growth logs dwindled, so too did the price premium. At the same time, new technologies, such as highly computerized mills that could handle small logs with few workers, reduced the demand for labor.

As a result, in the 1980s the industry broke the unions,² laid off thousands of workers and reduced the pay of those that remained. Table 3.2 compares two peak years, 1979 and 1989. Historically, timber has been a highly cyclical industry and the number of workers per unit of timber processed varied widely from the cycle's peak to trough. In 1989, even though the amount logged in Oregon was 9 percent *higher* than in 1979, the number of employees was 17 percent *lower* and the total payroll (adjusted

² For additional discussion of the International Woodworkers of America and the structure of collective bargaining the 1980s, see Widenor (1991; 1995).

for inflation) was 32 percent *lower*. Washington's experience was similar, though not as pronounced.

Table 3.1: Lumber-and-Wood-Products Jobs vs. Annual Growth in Total Jobs in Western Oregon and Washington, 1991-1996

	1991	1992	1993	1994	1995	1996
Western Oregon						
Lumber-and-Wood-Products Jobs	42,733	41,134	40,266	41,297	40,581	40,347
Annual Growth in Total Jobs	-4,019	17,072	37,303	54,367	48,325	48,084
Western Washington						
Lumber-and-Wood-Products Jobs	28,739	28,707	27,693	28,229	27,892	27,548
Annual Growth in Total Jobs	9,273	26,507	26,120	33,818	37,388	57,444
Total Western OR & WA						
Lumber-and-Wood-Products Jobs	71,472	69,841	67,959	69,526	68,473	67,895
Annual Growth in Total Jobs	5,254	43,579	63,423	88,185	85,713	105,528

Source: ECONorthwest with data from the Oregon Employment Department (various years), and Washington State Employment Security (various years).

Through the 1980s, the industry lowered its payroll (adjusted for inflation) per unit of timber by more than one-third. In other words, for each truckload of logs in 1989, timber workers in the region, as a whole, received paychecks that were less than two-thirds of those they had received ten years earlier.

This shift meant the industry, itself, markedly diminished its own role in the economy during the lead-up to Judge Dwyer's injunction and other actions that reduced federal timber harvests. Nonetheless, many in the region, including, ironically, the managers and workers in the industry who had implemented and felt the brunt of the industry's labor cutbacks, often failed to acknowledge both the industry's diminished role and the factors that brought it about. For example, Mike Draper, Executive Secretary, United Brotherhood of Carpenters, Western Council of Industrial Workers, stated at the 1993 Northwest Forest Conference, "Our workers deserve and need a healthy forest products industry to maintain the economic stability and viability of the region." (FEMAT, Appendix VII-A, p. 63.) This, and similar statements ignored the historical facts that owners and managers had established "a healthy industry" during the 1980s by eliminating jobs and reducing wages.

As the industry faces increasing competition from other regions and countries, it will seek to lower its costs further. Besides coping with changes in the supply of large logs from federal lands, firms in the industry also face tighter restrictions on their access to capital from lending institutions that see the industry as risky relative to others (Greber 1991). In response to these pressures, the industry is likely to continue squeezing payments to workers, as it investigates ways to produce engineered wood products that increase the value of wood from smaller, less-desirable logs. The end result is that the job prospects for unskilled workers, especially, are likely to become dimmer and dimmer.

Table 3.2: Declines in Payments to Timber^a Workers in Oregon and Washington, 1979 vs. 1989^b

	Change Between 1979 and 1989	
	Percent	Amount
Pacific Northwest		
Harvest (million board feet)	3.7	545
Jobs in Lumber-and-Wood Products	-20.0	-27,047
Jobs per Million Board Feet	-22.9	-2.11
Payroll ^c per Timber Employee	-18.2	-\$7,060
Payroll ^c per Million Board Feet	-37.0	-\$131,787
Oregon		
Harvest (million board feet)	9.4	726
Jobs in Lumber-and-Wood Products	-16.9	-13,712
Jobs per Million Board Feet	-24.0	-2.54
Payroll ^c per Timber Employee	-17.8	-\$6,843
Payroll ^c per Million Board Feet	-37.6	-\$152,302
Washington		
Harvest (million board feet)	-2.6	-181
Jobs in Lumber-and-Wood Products	-24.8	-13,335
Jobs per Million Board Feet	-22.8	-1.76
Payroll ^c per Timber Employee	-18.8	-\$7,366
Payroll ^c per Million Board Feet	-37.3	-\$112,959

^a Timber refers to employment and payrolls in SIC 24, lumber-and-wood products.

^b In the highly cyclical timber industry it is important to examine changes over time by looking at comparable parts of the cycle. The last two cyclical peaks are 1979 and 1989.

^c 1997 dollars.

Source: ECONorthwest with data from the Oregon Department of Forestry (various years), the Oregon Employment Department (various years), the Washington Department of Natural Resources (various years), and Washington State Employment Security (various years).

A simple comparison provides insight into the importance of the reductions in federal logging, as a cause of the industry's shrinking contribution to the regional economy, relative to the industry's own actions. Between 1988, the year of peak harvests in the 1980s, and 1996, employment in the lumber-and-wood-products industry in Washington and Oregon declined by 24,104. Between 1979 and 1989, however, the timber industry eliminated 27,047 jobs (Oregon Employment Department various years; Washington State Employment Security various years). Even if *all* of the decline 1990s was attributable to spotted owls, salmon, and other environmental concerns—and we demonstrate below that it was not—then environmental protection has eliminated fewer jobs than the industry's managers eliminated through their union-busting and cost-cutting during the 1980s.

Furthermore, by the time environmental concerns contributed to the loss of timber jobs, the jobs no longer paid high wages. As Table 3.3 shows, wages in the lumber-and-wood-products industry, which were among the highest in 1979, sharply declined by 1989, and increased slightly by 1996. Thus, even under worst-case assumptions, the logging restrictions on federal lands have posed less of a threat to timber workers than the industry's own actions to eliminate jobs and lower wages. Wages in other industries, especially high-tech, performed considerably better.

Table 3.3: The Lumber-and-Wood-Products Industry in the Pacific Northwest No Longer Pays High Wages^a

	1979	1989	1996
Timber Employee Average Wage	\$38,732	\$31,672	\$32,422
Percentage Change	--	-18.2%	2.4%
Manufacturing Employee Average Wage	\$37,893	\$36,212	\$38,125
Percentage Change	--	-4.4%	5.3%
High Tech ^b Employee Average Wage	\$32,678	\$38,897	\$59,762 ^c
Percentage Change	--	19.0%	53.6%

^a All data in 1997 dollars.

^b The Oregon Employment Department defines high tech as the office and computing machines industry (SIC 357), electronic equipment (SIC 36), instruments and related products (SIC 38), and the computer and data processing services (SIC 737).

^c Oregon's payroll per employee for high tech was \$47,622 in 1996; the PNW payroll per employee is higher because of the 19,747 employees in Washington's prepackaged software industry who average \$140,260 a year.

Source: ECONorthwest with data from the Oregon Employment Department (various years) and Washington State Employment Security (various years).

What does all this mean? Although industry advocates in the late 1980s and early 1990s often asserted that the timber industry was in the regional economy's driver's seat, the truth was far different. The timber industry did not sit in the driver's seat of the regional economic bus in 1991, when Judge Dwyer halted timber sales to protect the owl, and it had not done so for at least a decade. Indeed, the industry's managers made certain that timber was not in the driver's seat when they slashed jobs and payrolls in the 1980s. Looking forward, as the rest of the economy grows around it, timber's influence on the overall speed and direction of the economic bus will continue to dwindle.

Of course, the industry's influence is greater in some parts of the region, and smaller in others, and the robust economic growth of the overall regional economy since Judge Dwyer's ruling masks the fact that some communities and workers were affected more directly and strongly than others. To assess the subregional impacts, in the next section we trace the timber-harvest and employment data for individual counties and metropolitan areas. We then turn our attention to the impacts on workers.

Impacts on Counties and Metropolitan Areas

There are 38 counties and nine metropolitan areas in the spotted-owl region of Washington and Oregon, on the Westside of the Cascades. Table 3.4 shows how each has fared—measured by timber harvest, lumber-and-wood-products employment, and total employment since 1990, the year before Judge Dwyer's ruling. The table contains the data for 1990 and 1996 as well as the percentage change between the two years. The right side of Table 3.4 shows that all but two counties and each metropolitan area had higher total employment in 1996 than in 1990. The two counties that did experience a

decline, Grays Harbor (WA) and Columbia (OR), represent less than one percent of the region's total employment. Only a few counties and metropolitan areas experienced an increase in timber harvest and lumber-and-wood-products employment, but this did not mean that these counties grew faster than the others. In general, the metropolitan areas experienced the fastest growth in total employment. Although metropolitan areas accounted for only 28 percent of the total harvests in the region in 1996, they accounted for 47 percent of timber employment and 73 percent of total employment.

It is possible, of course, that a county or metropolitan area showing growth in total employment by 1996 could have experienced downturns in the intervening years. Table 3.5 provides data showing total employment in 1990 and the annual changes for each following year. No metropolitan area, except for Eugene-Springfield and Medford in 1991, ever experienced a decline in total employment. Thirteen counties experienced a decline in 1991, seven counties experienced a decline in 1992, two counties experienced a decline in 1993, five counties experienced a decline in 1994, one county experienced a decline in 1995, and five counties experienced a decline in 1996. With the exceptions of the Oregon counties in 1991 and Clallam County in 1996, each county that experienced a decline in total employment was adjacent to one or more that experienced an increase at least as large.

In other words, quantifiable job losses following Judge Dwyer's ban on timber sales occurred in only a few places and for only a short time. Moreover, the losses that did occur cannot all be attributed to Judge Dwyer's decision and related environmental-protection actions. The nation's economy entered a recession soon after Judge Dwyer's decision and, although the PNW region as a whole generally shrugged off its effects, the recession undoubtedly had a negative effect on jobs in some places. Many, if not most, of the job losses in 1991 may have been caused by the recession, not Judge Dwyer's decision, insofar as the decision banned additional sales of timber, but did not keep logging companies from logging timber that they already had purchased from the federal agencies (Goodstein forthcoming). At the end of 1990, there was 6.5 bbf of federal timber that had been sold, but not logged in Oregon and Washington (Warren 1994).

The limited spatial distribution and duration of the job losses also reflects the industry's concentration near large urban centers. When Judge Dwyer prohibited timber sales on the national forests in 1991, the prevailing wisdom in the region was that the bulk of its economic effects would befall numerous isolated, rural communities, where most of the lumber-and-wood-products industry was believed to be located. The prevailing wisdom was wrong. Although most trees grow in rural areas, the bulk of the lumber-and-wood-products industry is located in or near the region's metropolitan areas. More than 80 percent of the jobs in Lane County's lumber-and-wood products mills, for example, lie in or adjacent to the county's urban core, Eugene-Springfield (Niemi and Whitelaw 1994). Almost half of Washington's timber jobs occur in the Puget Sound area (Conway et al. 1991), and many of the remaining lie within commuting distance of Olympia and Vancouver.

In other words, quantifiable job losses following Judge Dwyer's ban on timber sales occurred in only a few places and for only a short time. Moreover, the losses that did occur cannot all be attributed to Judge Dwyer's decision and related environmental-protection actions.

Table 3.4: Changes in Timber Harvest, Lumber-and-Wood Products Employment, and Total Employment, by County and Metropolitan Area, 1990-1996

Area	Timber Harvests (in mbf)			Timber Employment			Total Employment		
	1990	1996	Percent Change	1990	1996	Percent Change	1990	1996	Percent Change
<i>Bellingham MSA (Whatcom County)</i>	179,015	91,549	-48.9%	1,224	1,360	11.1%	53,178	62,405	17.4%
Skagit County (WA)	287,697	150,370	-47.7%	851	583	-31.5%	30,858	37,632	22.0%
San Juan County (WA)	5,608	6,906	23.1%	45	46	2.2%	3,660	4,046	10.5%
<i>Seattle-Bellevue-Everett MSA</i>	634,862	353,231	-44.4%	10,472	8,795	-16.0%	1,093,995	1,192,504	9.0%
Snohomish County (WA)	325,674	163,577	-49.8%	3,097	2,639	-14.8%	159,059	188,711	18.6%
Island County (WA)	12,006	15,355	27.9%	34	25	-26.5%	11,221	13,500	20.3%
King County (WA)	297,182	174,299	-41.3%	7,341	6,131	-16.5%	923,715	990,293	7.2%
Clallam County (WA)	356,899	256,486	-28.1%	1,411	908	-35.6%	17,906	18,605	3.9%
Jefferson County (WA)	208,499	86,106	-58.7%	90	67	-25.6%	5,693	6,835	20.1%
<i>Bremerton MSA (Kitsap County)</i>	36,041	38,393	6.5%	302	105	-65.2%	64,207	69,511	8.3%
Mason County (WA)	296,218	186,155	-37.2%	1,414	1,394	-1.4%	9,775	11,600	18.7%
Grays Harbor (WA)	597,317	538,452	-9.9%	2,798	2,205	-21.2%	23,068	22,698	-1.6%
<i>Tacoma MSA (Pierce County)</i>	204,948	229,555	12.0%	4,419	3,917	-11.4%	187,853	214,066	14.0%
<i>Olympia MSA (Thurston County)</i>	146,429	133,529	-8.8%	995	1,038	4.3%	64,449	76,584	18.8%
Pacific County (WA)	286,495	254,562	-11.1%	647	557	-13.9%	5,674	5,928	4.5%
Lewis County (WA)	531,599	415,748	-21.8%	2,503	2,650	5.9%	21,023	24,700	17.5%
Wahkiakum County (WA)	85,434	73,346	-14.1%	--	--	--	643	730	13.5%
Cowlitz County (WA)	454,579	352,836	-22.4%	3,122	2,556	-18.1%	33,970	36,104	6.3%
Skamania County (WA)	234,532	35,925	-84.7%	469	178	-62.0%	1,855	1,871	0.9%
<i>Portland-Vancouver MSA</i>	704,591	634,907	-9.9%	10,223	8,583	-16.0%	715,455	865,831	21.0%
Clark County (WA)	127,263	85,038	-33.2%	1,564	1,189	-24.0%	77,836	100,374	29.0%
Columbia County (OR)	186,889	200,995	7.5%	1,054	821	-22.1%	9,417	9,264	-1.6%
Washington County (OR)	74,605	136,470	82.9%	1,994	1,994	0.0%	139,131	189,120	35.9%
Multnomah County (OR)	35,420	9,077	-74.4%	2,248	1,835	-18.4%	375,768	425,566	13.3%
Yamhill County (OR)	89,948	100,226	11.4%	1,299	1,262	-2.8%	21,035	27,002	28.4%
Clackamas County (OR)	190,466	103,101	-45.9%	2,064	1,482	-28.2%	92,268	114,505	24.1%
Clatsop County (OR)	132,677	186,277	40.4%	783	533	-31.9%	13,699	14,870	8.5%
Tillamook County (OR)	139,230	107,135	-23.1%	389	498	28.0%	6,146	7,637	24.3%
Hood River County (OR)	30,393	19,608	-35.5%	557	340	-39.0%	8,328	9,410	13.0%
<i>Salem MSA</i>	189,806	199,929	5.3%	4,108	4,407	7.3%	111,854	134,478	20.2%
Marion County (OR)	72,490	73,138	0.9%	3,219	3,658	13.6%	101,068	120,427	19.2%
Polk County (OR)	117,316	126,791	8.1%	889	749	-15.7%	10,786	14,051	30.3%
Lincoln County (OR)	294,736	153,951	-47.8%	482	245	-49.2%	14,075	16,683	18.5%
Benton County (OR)	124,553	106,482	-14.5%	1,392	1,049	-24.6%	27,433	34,185	24.6%
Linn County (OR)	279,537	258,376	-7.6%	4,127	3,881	-6.0%	32,977	40,235	22.0%
<i>Eugene-Springfield MSA (Lane County)</i>	890,158	501,009	-43.7%	10,229	7,435	-27.3%	113,376	128,251	13.1%
Douglas County (OR)	980,300	436,674	-55.5%	8,428	6,106	-27.6%	33,640	34,760	3.3%
Coos County (OR)	409,373	341,497	-16.6%	2,311	1,718	-25.7%	19,469	21,162	8.7%
Curry County (OR)	122,505	68,610	-44.0%	727	632	-13.1%	5,525	5,874	6.3%
Josephine County (OR)	80,891	56,184	-30.5%	1,969	1,324	-32.8%	18,125	19,769	9.1%
<i>Medford MSA (Jackson County)</i>	274,848	105,373	-61.7%	5,225	4,785	-8.4%	54,220	64,847	19.6%

Note: Data unavailable for Wahkiakum County's timber employment to protect confidentiality.

Source: ECONorthwest with data from the Oregon Department of Forestry (various years), the Oregon Employment Department (various years), the Washington Department of Natural Resources (various years), and Washington State Employment Security (various years).

Table 3.5: Changes in Total Employment, by County and Metropolitan Area, by Year, 1990-1996 (declines in bold)

Area	1990	1991	1992	1993	1994	1995	1996
<i>Bellingham MSA (Whatcom County)</i>	53,178	54,236	56,689	57,914	59,434	60,559	62,405
Skagit County (WA)	30,858	32,392	33,250	34,179	35,786	36,575	37,632
San Juan County (WA)	3,660	3,872	3,881	3,800	3,960	4,053	4,046
<i>Seattle-Bellevue-Everett MSA</i>	1,093,995	1,095,255	1,109,030	1,118,311	1,126,600	1,147,288	1,192,504
Snohomish County (WA)	159,059	165,358	170,792	178,777	181,104	182,076	188,711
Island County (WA)	11,221	11,943	12,172	12,194	12,750	13,267	13,500
King County (WA)	923,715	917,954	926,066	927,340	932,746	951,945	990,293
Clallam County (WA)	17,906	18,029	18,286	18,337	18,331	18,850	18,605
Jefferson County (WA)	5,693	5,714	5,906	6,413	6,546	6,779	6,835
<i>Bremerton MSA (Kitsap County)</i>	64,207	66,077	66,938	67,061	67,961	68,348	69,511
Mason County (WA)	9,775	9,619	9,604	10,021	10,475	11,091	11,600
Grays Harbor (WA)	23,068	22,663	23,181	22,488	22,441	22,883	22,698
<i>Tacoma MSA (Pierce County)</i>	187,853	188,802	192,899	198,790	207,599	212,482	214,066
<i>Olympia MSA (Thurston County)</i>	64,449	66,438	68,402	70,913	74,048	74,444	76,584
Pacific County (WA)	5,674	5,718	5,742	5,803	5,786	5,976	5,928
Lewis County (WA)	21,023	20,739	21,099	21,970	23,278	24,396	24,700
Wahkiakum County (WA)	643	649	666	707	698	715	730
Cowlitz County (WA)	33,970	34,669	33,122	33,541	34,704	36,106	36,104
Skamania County (WA)	1,855	1,884	1,666	1,885	1,912	1,864	1,871
<i>Portland-Vancouver MSA</i>	715,455	716,879	728,716	755,601	792,558	830,235	865,831
Clark County (WA)	77,836	78,160	81,062	85,410	91,802	96,340	100,374
Columbia County (OR)	9,417	9,712	9,363	8,740	8,665	8,913	9,264
Washington County (OR)	139,131	144,255	146,974	155,061	163,724	173,238	189,120
Multnomah County (OR)	375,768	369,348	373,059	381,842	396,726	415,113	425,566
Yamhill County (OR)	21,035	21,224	22,116	23,348	24,824	25,573	27,002
Clackamas County (OR)	92,268	94,180	96,142	101,200	106,817	111,058	114,505
Clatsop County (OR)	13,699	13,262	13,587	13,734	14,197	14,636	14,870
Tillamook County (OR)	6,146	6,483	6,504	6,640	7,069	7,319	7,637
Hood River County (OR)	8,328	8,379	8,233	8,696	9,113	9,455	9,410
<i>Salem MSA</i>	111,854	112,820	116,384	120,794	126,157	129,752	134,478
Marion County (OR)	101,068	101,962	105,090	109,233	114,017	116,830	120,427
Polk County (OR)	10,786	10,858	11,294	11,561	12,140	12,922	14,051
Lincoln County (OR)	14,075	14,334	14,920	15,280	15,743	15,985	16,683
Benton County (OR)	27,433	27,084	27,671	29,136	30,580	32,353	34,185
Linn County (OR)	32,977	32,689	32,764	33,883	35,993	38,381	40,235
<i>Eugene-Springfield MSA (Lane County)</i>	113,376	110,754	112,123	115,199	122,031	125,165	128,251
Douglas County (OR)	33,640	31,702	31,456	31,893	32,915	33,871	34,760
Coos County (OR)	19,469	19,405	19,423	19,769	20,310	20,648	21,162
Curry County (OR)	5,525	5,549	5,374	5,478	5,765	5,792	5,874
Josephine County (OR)	18,125	17,394	17,727	18,494	19,244	19,502	19,769
<i>Medford MSA (Jackson County)</i>	54,220	53,893	55,719	57,655	61,336	62,780	64,847
Western Oregon and Washington	2,792,129	2,797,383	2,840,962	2,904,385	2,992,570	3,078,283	3,183,811

Source: ECONorthwest with data from the Oregon Employment Department (various years) and Washington State Employment Security (various years).

In sum, the western Oregon and Washington region never experienced a decline in employment and only 14 counties exhibited any reduction in employment following the ban on logging on 24.5 million acres of federal lands that Judge Dwyer's ruling initiated. Of the 14 counties with job reductions in 1991, all but Douglas (OR) and Grays Harbor (WA) counties saw growth in jobs within three years. Most of the job losses in the industry

occurred in or near metropolitan centers, where the economy has been most robust and the opportunities for dislocated workers to find replacement jobs have been the greatest.

The Injunctions Caused How Many Workers To Lose Their Jobs?

Just how many timber workers lost their jobs because of the protections ordered by Judge Dwyer's injunction and subsequent actions? There are too many holes in the relevant data to answer this question precisely, but here we examine the available data and conclude that about 9,300—and perhaps fewer than 6,200—workers lost their jobs. In the next section we examine what happened to them.

Eban Goodstein (forthcoming) recently estimated that the job losses through 1994 from logging reductions attributable to Judge Dwyer's injunction and subsequent actions were between 6,200 and 7,500. Insofar as federal harvests have risen since 1994 (see Table 2.4) applying the same estimation technique to subsequent years would yield smaller numbers.

We develop a separate estimate for two reasons. First, we want to check the reasonableness of Goodstein's estimates. Using different assumptions and data, we arrive at 9,300 lost jobs, a number only slightly higher than his. Second, we want to illustrate the major sources of the errors in the many dire predictions of the late 1980s and early 1990s. Hence, we follow the basic analytical steps we outline in Figure 2.5 and describe in the previous chapter. The four steps are (1) Choose the Base Case; (2) Choose an Owl-Protection Scenario; (3) Choose a Total-Job Multiplier; and (4) Choose a Degree of Economic Rigidity. In this instance, however, we proceed through the steps paying careful attention to avoid the biases pervading the exaggerated predictions we described earlier and illustrated in Figure 2.4.

Step 1: Choose the Base Case. The first step entails determining what the employment would have been, if not for the judicial and administrative decisions since the late 1980s to protect owls, other at-risk species, and the integrity of the forest ecosystem. The most common approach is to pick a year, or set of years, and use this as the Base Case. Many studies, such as the FEMAT analysis that underlies the Northwest Forest Plan, have used some combination of the years between 1983 and 1989.

We use the period 1983-87 as the Base Case so we can take advantage of the data in a major study that also used this period. We do not, however, simply assume that, in the absence of Judge Dwyer's ruling and its aftermath, timber harvests would have remained at the 1983-87 level throughout the 1990s. Instead, we adjust it to account for reductions in logging that would have occurred because the industry has logged at unsustainable rates.

Analysts have known for several decades that the industry has been liquidating the stock of timber at unsustainable rates so that, sooner or later, the cut would have to go down (Haynes 1991). This is just what happened on forest-industry lands in Oregon and Washington in 1983 (see Figure 3.3), when harvests began a decline that continues today. Researchers at Oregon

State University examined Oregon's rate of harvest more broadly and reported this question and answer:

“Are We Currently Cutting More Than the Sustainable Harvest?”

Answer: When 1983-87 is used as the frame of reference ... the answer is YES, both in cubic feet and board feet. ... This suggests that a harvest decline is likely within the next decade” (Sessions et al. 1990 p. 5) [emphasis in original].

They went on to explain that, throughout Westside Oregon, the large stocks of old-growth had, over the past few decades, been liquidated faster than replacement trees could produce new wood fiber. Hence, harvests would have to drop. They estimated the size of the drop, assuming that it would be determined solely by the reduced supply of wood fiber. Other factors, however, may exacerbate the drop. For example, the replacement trees will be smaller and logs from them will be less desirable than those from large, old-growth trees. Hence, for some of the replacements, the demand may be too low to warrant logging.

If the logging had not been too extreme, the forests could have supported an orderly decline to what foresters call the long-term sustained yield (LTSY), where the annual amount logged equals the amount of wood fiber added to the forest each year. This option had been closed, however, as logging had occurred so rapidly that the current stock of trees big enough to log would be exhausted before the young trees came of age.

Figure 3.3 shows the results of the analysis by Sessions and his co-authors. In 1983-87, the average Oregon harvest was 8,020 million board feet (mmbf). They determined that, to reach sustainable levels in the most reasonable period of time, the harvest on Westside federal forests and forest-industry lands where logging had been most intensive during the previous several decades would have to decline in the 1990s by 829 mmbf, or 10.3 percent of the 1983-87 average.³ Further declines would be required east of the Cascades but these, plus some of the Westside decline, would be offset by increases in a few areas, especially the North Coast, where trees that started to grow after extensive logging and the massive Tillamook Burn early in the century are becoming large enough to be logged.⁴ Overall, Sessions and his co-authors determined that logging in Oregon in the 1990s would have to fall 8 percent below the 1983-87 average.

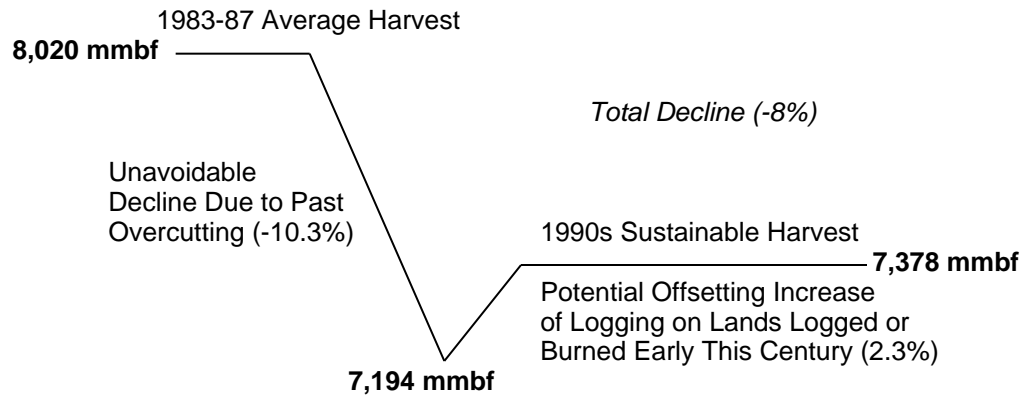
Absent a study in Washington comparable to the one in Oregon by Sessions and his co-authors, we assume that this percentage applies to Washington as well. All else equal, lumber-and-wood-products employment in the two states would have fallen by the same percentage. In other words,

³ This includes the national forests, with a reduction of 18 percent, BLM lands (increase of 7 percent), and forest industry (reduction of 28 percent). It excludes lands in the North Coast, all state lands (much of which are in the North Coast), and non-industrial lands.

⁴ Eastside forests are expected to decline by 12 percent; the North coast to increase by 27 percent.

the analysis by Sessions and his co-authors indicates that, because harvests had to fall to compensate for past harvest levels that outstripped the forest's ability to sustain them, lumber-and-wood-products employment in the two states would have fallen from the 1983-87 average, 103,600 (Warren 1995), by eight percent, to 95,300 throughout the 1990s.

**Figure 3.3: Adjustments in Oregon's Logging Levels:
The 1990s vs. 1983-87**



Source: ECONorthwest with data from Sessions, et al. (1990).

We use 95,300 as the Base Case level of lumber-and-wood-products employment for the PNW in the 1990s. This is a rough estimate that probably overestimates the industry's employment in the absence of environment-related logging reductions. It does not, for example, take into account the likelihood that the Base Case employment would have been lower because the demand for smaller logs might not be sufficiently strong to warrant logging. Nor does it reflect the additional job losses that would materialize in response to labor-saving pressures. Arising as the region's industry continually encounters competition from other regions and countries, these pressures encourage firms to substitute capital for labor, and one highly skilled worker for more than one worker with lower skills.

All these factors have lowered the industry's demand for labor relative to the conditions inherent in the analysis by when Sessions, et al. Nonetheless, using 95,300 as the Base Case provides a reasonable, upper bound estimate of what lumber-and-wood-products employment would have been in the PNW in the 1990s, absent decisions to protect at-risk species, such as spotted owls and salmon, as well as the overall integrity of the forest ecosystem.

**Table 3.6: PNW Timber Employment:
Base Case and Owl-Protection Scenario**

Timber Employment	1990	1996
Base Case: Sustainable Harvest Level	95,300	95,300
Actual	103,600	86,000
Difference	8,300	-9,300

Source: ECONorthwest with data from Warren (1998).

Step 2: Choose an Owl-Protection Scenario. This step entails determining an average level of timber employment, given the several judicial and administrative decisions to protect at-risk species and the overall ecological integrity of federal forests. To make this determination, we turn to the Northwest Forest Plan. Adopted in 1994, it calls for the federal lands in Oregon and Washington to produce 807 million board feet (mmbf) of timber annually, on average, over the next decade.⁵ In 1996, the most recent year for which data are available, federal lands produced 776 mmbf, which is close to the target, and the lowest harvest level since Judge Dwyer's ruling. Insofar as forest-management agencies anticipate that federal harvests will increase in the future to meet the Plan's target, 1996 represents a reasonable worst-case scenario of the job impacts attributable to the owl, salmon, etc.

The right side of Table 3.6 shows that 86,000 workers were employed in the timber employment in Washington and Oregon in 1996. This level was 17,600 below the 1990 level, and is attributable to two factors: the earlier level was unsustainable measured in terms of logs and owls and other forest species. Comparison with the Base Case shows that the decisions in the 1990s to protect owls and other environmental concerns have caused employment in the lumber-and-wood-products industry to decline by about 9,300.

Step 3: Choose a Total-Job Multiplier. Anytime a business cuts back and lays off workers, the effects ripple through the rest of the economy. As the business and the laid-off workers reduce their spending, other firms and workers feel the pinch, and they too cut back their spending. Over time, the ripple dies out. Economists have tried to sum up the total reduction in jobs associated with the loss of one job in different types of industries, and such totals are known as total-job multipliers.

Most studies of the issue have concluded that the total-job multiplier associated with the loss of one job in the PNW timber industry is about 2.0. That is, roughly one job is affected outside the timber industry for every job

⁵ The Plan stipulates that amount to be sold each year. The annual harvest will vary but, on average, it should equal the annual sales target. The 807 mmbf is for all federal lands in the two states, not just those in the spotted-owl region. The Plan also anticipates that federal lands in the spotted-owl region of Northern California would produce 246 mmbf, for a total of 1,053 mmbf.

affected within the industry.⁶ One must use these numbers carefully, however. *It is incorrect* to conclude from them that, every time a timber worker loses his or her job another worker loses his or her job, so that the total loss is 2. If the decisions to protect owls and accomplish other environmental objectives caused the loss of 9,300 timber jobs, as we estimated above, one *should not* apply the total-job multipliers and conclude that 18,800 was the total job loss.

Instead, a total-job multiplier does no more than provide a general sense of the maximum amount of adjusting that workers face following a given economic shock, such as the closure of a sawmill. Far more important is the ease with which the adjustment occurs. The adjustment can be easy, hard, or anywhere in between. As we demonstrate in the earlier sections of this chapter, most areas of the PNW adjusted quickly to Judge Dwyer's decision and its aftermath. In these areas, as a mill laid off workers and cut back its purchases from vendors of electricity, trucking services, office supplies, and so forth, the vendors were able to find other, replacement customers. And, as the laid-off workers cut back their purchases from the gas station, supermarket, and pharmacy, these firms found replacement customers. Sure, it didn't always happen this easily, but the job-loss ripples coming from the timber industry quickly were swamped by the job-creation ripples emanating from the rapid economic growth taking place in non-timber sectors of the economy and the continuing, large influx of immigrants to most parts of the PNW.

Between Judge Dwyer's injunction prohibiting timber sales on national forests in 1991, and his lifting of the injunction in response to the Northwest Forest Plan in 1994, much concern was voiced about how the ripple effects would swamp small communities. In fact, though, the smaller the community, the smaller the ripple effects. Most of the ripple effect—and most of the total-job multiplier—materializes in the metropolitan areas, where most of the region's economic activity occurs and where economic growth has been the most robust during the past decade.

Thus, if we went back to 1991 and looked at the prospect of losing about 9,300 jobs in the timber industry, the estimates of total-job multipliers would have led us to expect nontimber job losses of about the same magnitude. But most of these nontimber losses never materialized. For those that did, the dislocated workers generally found replacement jobs quickly, so that the ripple effect was far smaller than expected and it quickly petered out.

Assume the Economy is Rigid. A common perception during the past decade's intense controversy over forest management was that, once timber harvests declined and timber workers lost their jobs, the total number of jobs in the economy would be permanently reduced and the dislocated workers would be permanently unemployed. This is a static, and therefore incorrect, view of the economy. The real economy is far more dynamic. Few, if any, workers lost their jobs and remained permanently unemployed

⁶ Some analysts believe that the multiplier is considerably larger. Conway et al. (1991), for example, concluded that the multiplier for Washington was 5.1. We believe these estimates are too high.

because of Judge Dwyer's injunction and the other related decisions. Most dislocated workers either retired from the workforce or found replacement jobs. To quantify this conclusion, we'd like to have information specific to the work-histories of dislocated timber workers in Oregon and Washington. Unfortunately, such data do not exist, and, so, we cobble together what data exist from the region with information derived from studies of dislocated workers elsewhere.

As we indicated above, most of the job losses arising from environmental-protection decisions in the PNW's forests have occurred in or near metropolitan areas. Wherever they occur, though, the dislocated workers probably drew on unemployment-insurance benefits and whatever savings and other resources they had available to offset a portion of their lost wages. Many had access to timber-retraining benefits, including community college programs, and other assistance programs such as those coordinated in the past few years by the Governor's Timber Team in Washington (Governor's Timber Team 1993; Judd 1995). Most dislocated workers found replacement jobs, though the search for new employment was not without social, emotional, and economic cost to the workers and their families (U.S. Department of Labor 1993).

The impact on the individual who lost his or her job probably was different and more intense than those on the overall labor market. Some workers undoubtedly experienced prolonged unemployment and severe reductions in incomes, others experienced brief unemployment and limited reductions in incomes, and still others moved quickly to equal- or higher-paying jobs. Of the workers nationwide who lost their jobs because of plant closures or other mass layoffs in the 1980s, about half were unemployed less than 10 weeks and the percent remaining unemployed after twelve months was roughly the same as the rate of unemployment for the overall labor force (Power 1996). Washington state's Timber Retraining Benefits Program reportedly had a high success rate of training dislocated timber workers for jobs in other fields (Seppanen and Bodeutsch no date). On average, 79 percent of the 2,147 dislocated timber workers who participated in the program were employed 7 to 9 months after completing training. Those who graduated from vocational programs had an even higher employment rate of 84 percent. Most graduates of the program also had a high wage-recovery rate. On average, graduates earned 87 percent of their former wages.

The greater the distance between a dislocated worker's residence and one of the area's metropolitan centers, the smaller the set of replacement-job opportunities readily available to him or her. As we explain above, however, most of the workers dislocated by the environmental-protection decisions resided in or near metropolitan centers, giving them access to a wide range of employment alternatives.

The greatest number of opportunities were open to those who fit into structural changes taking place in the nation's overall labor markets. In general, dislocated workers and their families who could draw on more financial and human capital (e.g., education and training) resources faced a brighter prospect of making the transition to a new job than workers and their families who lacked these resources. During the past fifteen years, the structure of wages and earnings throughout the US has undergone pronounced changes. Among the most prominent are (1) a climb in the

Some workers undoubtedly experienced prolonged unemployment and severe reductions in incomes, others experienced brief unemployment and limited reductions in incomes, and still others moved quickly to equal- or higher-paying jobs.

To many, Judge Dwyer's 1991 injunction banning timber sales on the spotted-owl forests triggered an abrupt change of direction for the PNW's economy and the change was imposed on the region by the small groups of environmentalists who brought the lawsuit that led to the injunction...

earnings of more-educated workers relative to the earnings of less-educated workers; and (2) a drop in the wages of younger workers who are not college-educated relative to the wages of older workers with similar education. There are multiple explanations for these phenomena, but the most important appears to be a pervasive shift in the methods of production—coinciding with explosive growth in the use of computers—that increases the demand for workers with “relatively high intellectual as opposed to manual ability” (Bound and Johnson 1995). The supply of workers with the requisite skills has not grown enough to keep pace with the increase in demand, and the resulting shortage has increased wages for this group. Conversely, the supply of less-skilled workers has grown faster than demand, and wages for this group have fallen.

All dislocated workers, no matter their levels of financial and human capital, faced social, emotional, and economic costs in making the transition to new employment. The longer a dislocated worker and his or her family delayed in seeking new employment or training, the more they had to draw down their financial resources, increasing the social and emotional costs of finding replacement employment.

In sum, the environmental-protection decisions of the 1990s have had a minimal long-run impact on labor markets, in large part because these markets are not static but highly dynamic. Some workers lost jobs, and they and their families incurred the intense distress that accompanies the loss of a job. Most dislocated families, however, had access to assistance programs and found replacement jobs within a less than a year. Although no study tracked the experiences of dislocated timber workers, national studies have found that dislocated workers typically find a replacement job paying about 87 percent of the prior wage. This new job, though, may offer the prospects of faster wage increases, insofar as wages in the lumber-and-wood-products industry have a pronounced history of stagnation and declines.

Reflections

To many, Judge Dwyer's 1991 injunction banning timber sales on the spotted-owl forests triggered an abrupt change of direction for the PNW's economy and the change was imposed on the region by the small group of environmentalists who brought the lawsuit that led to the injunction. Neither conclusion is correct. The change was neither abrupt nor imposed by environmentalists. Instead, we now can look back on the events that preceded and followed the injunction and see that change had been brewing, both in the timber industry and in the overall regional economy, for more than a decade.

The timber industry had made change inevitable by rapidly liquidating old-growth forests. Despite promises to the contrary, the industry had been cutting old-growth trees at unsustainable rates since at least World War II. By the mid-1970s, concern over the rate of logging had prompted a major study of the outlook for logging in Oregon, and researchers at Oregon State University concluded that, absent major changes in forest-management policies, the industry would exhaust the supply of old-growth timber available to it in the 1990s (Beuter et al. 1976). Thus, 15 years before Judge

Dwyer's injunction and with no imposition by environmentalists, the timber industry, itself, had made a slump in logging-related jobs inevitable.

Throughout the 1980s, the industry further exacerbated the impact on workers by slashing jobs and the wages of remaining workers in the 1980s. In the process, it severed much of the industry's links with the rest of the regional economy. By 1991, the industry's total payroll (adjusted for inflation) per acre of timber logged was about half what it was in 1979.

Outside the timber industry, the rest of society was pressing for more recreational and other services from the region's forests. Moreover, increasing numbers of Americans were losing patience with the persistent subsidies the industry, here and elsewhere, extracted from households and other industries, especially the subsidies associated with logging on the national forests. Over time, it also became apparent that the timber industry's activities were having deleterious effects on jobs in other sectors of the regional economy, especially on the jobs associated with commercial and recreational fishing. These effects became less acceptable as the public realized that it would have to foot much of the bill for coping with declines in populations of salmon and other anadromous fish dependent on the forest habitat destroyed by logging and related activities.

By the early 1990s, the pressure these and similar long-run trends exerted to reduce logging was climbing to levels never before seen. Nonetheless, elected officials and federal bureaucrats resisted the pressure, but found they could do so only by frantically finding ways to ignore and violate the nation's environmental and administrative laws. It was against this backdrop that environmentalists sued and Judge Dwyer ruled. Rather than being the source of change, Judge Dwyer's injunction merely released these pent-up pressures.

In the next two chapters we examine the nature of the economic forces associated with the pressures for logging reductions and the region's adjustment to them. We first look at an economic model that does NOT explain these economic forces well, a model that opponents of logging reductions have often employed in their doom-and-gloom predictions. We then explain a model that does work.

...Neither conclusion is correct. The change was neither abrupt nor imposed by environmentalists.

Chapter 4: Explaining the Economy's Response—A Model that Does NOT Work

Why did the Pacific Northwest's economy fail to exhibit the convulsions that so many had predicted? The answer lies in the flawed assumptions and logic the doomsayers used.

In this chapter we present the model underlying the predictions and show why it does **NOT** explain how reductions in logging and increases in environmental protection affect the economy. In the next chapter we present an alternative analytical model that **DOES**.

Nearly every prediction—whether part of a formal study or an informal judgment—that foresaw economic disaster from the logging cutbacks triggered by Judge Dwyer's ruling in 1991, rested on a model known as the *economic-base model*. Because it is so frequently applied, and almost as frequently yields results so misleading, we examine it in some detail. First we briefly describe it, and then we explain why it doesn't work.

The Economic-Base Model

An economic-base model divides the economy of an area into two sectors: the *export sector*, which produces goods and services sold to buyers outside the area, and the *local sector*, which sells its products within the area. Proponents of the economic-base model conclude that, because the export sector brings in from the outside money that is spent and respent on local goods, it is the "economic base" that "supports" the local sector. Because the timber industry of the Pacific Northwest (PNW) typically exports its products to other regions or countries, proponents of the timber industry frequently rely on the economic-base model to conclude that this industry supports—or plays the primary role in supporting—the PNW economy (Beuter 1995; Schallau 1994).

An economic-base analysis of the timber industry typically proceeds in a straightforward manner. The analyst first assumes that the *export sector* consists of just those industries with certain characteristics. Besides timber, they almost always focus on other resource-extraction or manufacturing industries, although sometimes they include major industries in the service and trade sectors, such as tourism, universities, or a concentration of government agencies. After deciding which industries are included in the *export sector* pie, the analyst then decides how big a slice to allocate to the timber industry. This typically is done by looking at the percent of local employment in each of the so-called exporting industries and comparing it to the industry's national percentage. The reasoning is that the more the local percentage exceeds its national counterpart, the more the industry contributes to the local economy's total exports. Having determined that the timber industry produces X percent of the total exports from the *export sector* the analyst concludes that the industry supports the same percentage of the *local sector*.

With this line of reasoning, economic-base studies have found that the timber industry exerts tremendous leverage over the economies of the Pacific Northwest and its local communities. During the late 1980s and early 1990s, economic-base studies commonly concluded that the timber industry, which directly employed about 5 to 10 percent of the workers in the region or in one of its subregions, supported 50 percent or more of the total employment. Often, these numbers were expressed by declaring that 50 percent, or more, of the overall economy depended on the timber industry. Not surprisingly, with these results, both the analysts who applied such models and the lay members of the community who accepted the reasoning of the economic-base model readily believed that any curtailment in logging in the region would have devastating economic and social consequences.

Why the Economic-Base Model Doesn't Work

Several serious flaws in reasoning cause economic-base models to give a highly inflated sense of the timber industry's economic importance. It takes only some common sense, plus a quick look at the region's economic history, to expose these flaws.

The ultimate flaw, of course, is that the model gives the wrong answer. If the ultimate test of a pudding is its taste, then the ultimate test of economic-base models applied to the timber industry is the accuracy of their predictions. Table 4.1 lists several economic-base studies of the PNW's timber industry and shows their findings for the subject economy's timber dependency, i.e., the percentage of total employment dependent on the timber industry. Table 4.1 then shows the decline in employment that, according to each study, should have occurred following Judge Dwyer's 1991 ruling prohibiting timber sales on the spotted-owl national forests, and compares this with the actual change in employment. In every case, the economic-base model **predicted a decrease** but total employment **actually increased**.

It is nonsense to say that the timber industry is a substantial part of the PNW's economic base when **decreases** in timber employment are accompanied by **increases** in total employment. It is also nonsense to say that the economies of such areas depend on the timber industry. The disconnect between the PNW's real economic landscape and the economic-base view of that landscape is so great that the only reasonable response is to sack the entire line of reasoning underlying the economic-base model. To help drive home this message, in the following paragraphs we discuss some of the particular flaws in this line of reasoning.

The initial steps of an economic-base analysis entail identifying the industries included in the **export sector** and determining their relative strengths. The typical approach is to look only at an area's big industries, especially resource extraction and manufacturing, and to concentrate on those whose percentage of the subject area's total employment exceeds the comparable, national percentage. Here's how one such study explains the process:

"The primary wood products sector provides a telling example. It made up 4.18 percent of Oregon's employment in 1990. However, it accounted for .57 percent of the nation's employment. The higher

It is nonsense to say that the timber industry is a substantial part of the PNW's economic base when *decreases* in timber employment are accompanied by *increases* in total employment.

percentage for Oregon suggests that the wood products industry is part of the state's economic base. The difference between the state and the nation, 3.61 percent is a relative index of how much 'excess' employment Oregon has in the wood products industry. The sum of the comparable indices for all basic industry sectors in Oregon was 9.75 percent. Thus, the relative importance of primary wood products among all of Oregon's basic industrial sectors is estimated by the percentage determined from the ratio 3.61/9.75, or 37 percent" Beuter (1995).

Table 4.1: Dependency Ratios from Timber-Related Economic-Base Models Are Out-of-Touch with the Economy's Actual Behavior

Study	Area Covered in Study	Dependency Ratio	Predicted Decline in Employment From 1990 Using the Dependency Ratio ^a	Actual Change in Employment from 1990 to 1996
Economic Impact Projections for Alternative Levels of Timber Production in the Douglas-Fir Region Schallau, Maki, and Beuter, 1969	Douglas-fir region (roughly the total Spotted Owl Region ^b)	44.8%	-211,515	391,682
Final Supplement to the Environmental Impact Statement for an Amendment to the Pacific Northwest Regional Guide, Volume 1, Spotted Owl Region USDA Forest Service 1988	Oregon and Washington	44.0% in Oregon, 28.0 % in Washington	-102,991 for Oregon and -73,002 in Washington	229,833 for Oregon and 260,666 for Washington
Economic Impacts of the ISC Northern Spotted Owl Conservation Strategy for Washington, Oregon, and Northern California D. Olson, 1990	Spotted Owl Region of Washington, Oregon, and California	20.5%	-96,645	391,682
Legacy and Promise: Oregon's Forests and and Wood Products Industry Beuter, 1995	Oregon	33.0%	-77,243	229,883
Legacy and Promise: Oregon's Forests and and Wood Products Industry (Revised and Updated) Beuter, 1998	Oregon	18.0%	-42,133	229,883

^a To figure out the decline in employment predicted by each dependency ratio we multiplied the percentage decline in timber employment between 1990 and 1996 by the dependency ratio and then multiplied that number by the total employment in the economy in 1990.

^b For this exercise we define the "Owl Region" as Western Oregon and Washington.

Source: ECONorthwest with data from Beuter (1995; 1998), Olson (1990), Schallau, Maki, and Beuter (1969), and US Department of Agriculture (1988).

This reasoning seems reasonable at first blush, until one considers the implications. What happens, for example, if the economic mix of a community, state, or region exactly matches the national mix? In the economic-base framework, such an economy would be dead in the water, with **no export sector**, no economic base and, hence, nothing to support the **local sector**. Furthermore, even if one accepts all the rest of the economic-base reasoning, consider how it views an industry that exports all of its

product, but has a smaller percentage of local employment than its national counterpart has of total, national employment. The analyst would exclude the industry from the **export sector** even though it is entirely an exporting industry. These and other logical inconsistencies render the exercise meaningless.

Economic-base models also take a snapshot of the economy and pretend it is a movie.

Economic-base models also take a snapshot of the economy and pretend it is a movie. That is, they contain a simplifying assumption that arrests the economy in its current configuration so that any increase or decrease in the supply of timber can be traced through the now-assumed-to-be-static economy. In general, the results from this approach tend to overestimate the negative impacts and underestimate, even ignore, the positive impacts of any change from the status quo. This bias can be called the dumb-person bias, because the technique explicitly assumes that investors, managers of firms, workers, and consumers will not adapt to the forest-management decision but instead will continue to behave as if the management decision had not occurred (Mendelsohn et al. 1994). In reality, though, investors, managers, workers, and consumers are neither static nor dumb. The regional and subregional economies of the U.S. are tremendously dynamic, and they adapt remarkably to changing conditions. If the supply of a productive input is restricted, or if the demand for a final product falls, investors will try to reduce their risks and the managers of firms will adapt their production processes accordingly.

Courant, et al. (1997) demonstrate that using an economic-base model to crank through the effect on employment or income of eliminating a given amount of employment in the basic industry, an analyst is answering the following question: What would happen if the given amount of timber employment were eliminated, and

- Those who lost their jobs as a result never worked again, but also did not move.
- The local and regional establishments that sold goods and services to the dislocated timber workers permanently lost that business and obtained no replacement business (and also did not move).
- Those enterprises in the region that used the output of the original workers when they had timber jobs obtained no replacement inputs from elsewhere (and also did not move).
- Everyone throughout this chain who lost her or his job acted exactly the same way as the original job losers, in that they never worked again and stayed put?

There may be good reasons for answering this question: it puts an upper bound on the extent of adjustment an economic region will have to undergo in response to a change in policy (or technology, or demand). However, as Power (1996) so nicely puts it, using the economic-base model for forecasting is like driving by looking in the rear-view mirror. The economic-base model generates a measure of the maximum extent to which changes might take place, but this is very different from a **forecast** of what will actually happen. Economic-base models tell us how many jobs (or, more generally, how much economic activity) **currently** depend on a given industry or line of work.

Economic-Base Theory Applied to Resource-Conservation and Economic-Development Strategies: Exactly Backwards and Out of Touch With Economic Reality

In January, 1995, John Beuter, one of the nation's leading consulting foresters, used an economic-base model to assert, "it is not unreasonable to conclude that about one-third of Oregon's employment in 1990 depended on ... the wood products sector." Statements of this kind have been a part of economic lore in the Pacific Northwest for years, which is surprising since it takes only a little empirical work and common sense to see how seriously wrong they are.

In 1990, Oregon's economy employed 1.25 million workers. By the reasoning in the report, then 416,700 (one-third of 1.25 million) of Oregon's jobs in 1990 depended on the timber industry. Furthermore, when the timber industry's employment decreased by 16 percent between 1990 and 1993, then total employment must have decreased by 66,700 jobs (16 percent of 416,700). *But total employment didn't decrease; it increased*, to 1.31 million by 1993. In other words, the economic-base model indicates that one-third of Oregon's economy was in free-fall, but total employment grew because the other two-thirds of the economy was skyrocketing. There's no evidence to support this. Even a casual review of the state's economy during 1990-93 fails to find one-third of the state's households, banks and supermarkets in a bust and two-thirds in a boom. Instead, there was growth across the entire state.

The magnitude of the error is seen by comparing the role the economic-base model assigns the timber industry with the role it assigns the high-tech industry. The report argues that, whereas the timber industry supports one in three jobs, only one in a hundred jobs in Oregon depends on the high-tech industry. To put this in perspective, Oregon's high-tech industry employed 51,700 in 1990 compared to the timber industry's 63,600, and each had a payroll of \$1.6 billion. By 1993, however, the high-tech industry's payroll had expanded to \$1.9 billion, while the timber industry's payroll had contracted to \$1.5 billion. And yet the report concludes that the timber industry contributes thirty-three times more to Oregon's economy than the high-tech industry.

The report's author concludes that one-third of Oregon's jobs in its schools, hospitals, engineering firms, banks and other non-exporting firms rests on the shoulders of the timber industry. But he has it exactly backwards. The timber industry, struggling to remain competitive in a global market, cannot generate new jobs and higher earnings. Furthermore, it can succeed in its struggles only if Oregon has world-class schools, hospitals, engineers, banks, and—in the words of economist Wilbur Thompson—"all the other dimensions of infrastructure that facilitate the quick and orderly transfer from old dying [industries] to growing ones." That is, the so-called non-basic activities that are given such short shrift by this report and others are the cause, not the effect, of a robust, dynamic economy.

Getting the correct economic theory has important practical consequences, because one's understanding of the economy affects one's policies and actions toward it. By Beuter's theory, Oregonians should encourage the state's schools to prepare students to work in timber-related industries rather than in high-tech industries, its banks to invest in lumber rather than computer chips, and its timber industry to ignore the impact that clearcut hillsides and muddy streams have on the state's economy. This conclusion is simply out of touch with Oregon's economy and the process through which state and regional economies grow. Worse, it is a prescription for economic disaster.

Source: Whitelaw, 1995

Economic base models also tell us who stands to gain or lose in the short run, which can aid in the design of policies and programs designed to help people who may suffer dislocation.¹ They tell us very little, however, about what the local economy will look like after it adjusts to growth, decline, or other change in a basic industry.

Those ... who applied [the economic-base model] to the PNW's timber industry did everyone a disservice. At the least, they created mischief. More likely, they imposed real economic injury.

Adjusting to change is one of the widely-trumpeted virtues of market economies. When a specific industry in a specific location goes into decline, for whatever reasons, two sets of things must happen in some combination: (1) other activities will replace the industry in decline; and (2) capital and people whose incomes fall will leave the area. To forecast how a given local economy will adjust requires not only a detailed knowledge of what that economy currently does, but also knowledge of other things that it might do. Where the local economy has few economic assets, activity can be expected to decline and population to fall. Even then, though, the overwhelming majority of the people affected will find other work, at an average of about 75 to 90 percent of their old pay (Jacobson et al. 1993; Ruhm 1991). Where assets are more plentiful, the local economy will do better. When natural resources are important assets, it is quite likely that current activities commonly coded as "basic" are competitive with each other (e.g., logging vs. fishing) or that current "basic" activities are competitive with unseen alternatives (e.g., logging vs. retirement homes). In these cases, coding of the economy's current activities as "basic" and "other" will not be at all helpful in forecasting the economy's adjustment to change.

Reflections

The economic-base model is popular, but almost invariably badly used. Those—the analysts cranking the numbers, public officials offering leadership, and individuals making decisions about their family's future—who applied it to the PNW's timber industry did everyone a disservice. At the least, they created mischief. More likely, they imposed real economic injury. Sowing Chicken Little's seeds of panic, they promised dire consequences if anything disrupted the timber industry and roused deep anxiety and rage. Countless dollars were wasted fighting unfounded fears.

If the PNW's experience over the past decade teaches anything it is that the economy is far more complicated than the economic-base and other simplistic models would have us believe. If the economic-base model ever could be justified, it was only in the distant past, when manufacturing played a much larger economic role, capital and workers moved from place to place with difficulty, and incomes were much lower. At least since the 1980s, however, using economic-base reasoning as the basis for forest-management or economic-development decisions in the PNW has been both dumb and dangerous, so that decreases are called increases, and up is called down. In the next chapter we offer an alternative model that works.

¹ These are the workers who lose most, and the losses average much less than 100 percent. See, for example, Farber (1996), Heberlein (1994), Herzog and Schlottmann (1995), Jacobson et al. (1993), and Ruhm (1991).

Chapter 5: Explaining the Economy's Response—A Model that DOES Work

Judge Dwyer's 1991 prohibitions on new federal timber sales in the Pacific Northwest (PNW) marked a turning point not just in the management of the region's forests but also in economists' understanding of the different roles forests play in the PNW's local and regional economies. Prior to this time, the prevailing view was that forests were important to the economy only when they were logged. On the surface, this view seemed reasonable. Ever since settlers from other states came to the region, logging had produced wood-product commodities for consumers, and, in the process, contributed to the economic well-being of workers, communities, and the overall region. Standing, unlogged forests, by contrast, produced none of these economic benefits. Besides, the apparent abundance of our forests obscured the costs of logging them.

Following Judge Dwyer's ruling, though, economists have taken a harder look and found a different reality.¹ They found that industrial timber production generates not just benefits for the economy but also costs. Furthermore, whereas the benefits accrue largely within a timber industry with little or no prospects for expanding, the costs fall onto and inhibit the region's growth sectors. Rather than stabilizing communities, the timber industry, with its dangerous work conditions, declining wages, and erratic, declining employment patterns, often does the reverse. Conversely, communities adjacent to forests protected from logging generally exhibit above-average levels of prosperity and growth.

In this chapter we summarize a model of the forest-economy relationship that explains these and similar findings. It has three central premises:

- (1) Forests are more than just trees. They are capable of producing not just logs but myriad goods and services, including clean water and the habitat essential for the birth and growth of salmon and other fish and wildlife.
- (2) The competition for forest resources is intense, so that **any** forest use generates benefits for some and costs for others. Some of this competition manifests itself in markets, but most of it occurs through political and other nonmarket mechanisms. To understand the economic consequences of logging restrictions that increase environmental protection, one must examine their effects on the competition for forest resources. In general, the level of services demanded from forests exceeds and is growing faster than the volume of logs demanded.

¹ In 1995, for example, more than 65 economists endorsed a brief paper (Power 1995) describing the shift in the economic roles of the region's forests and other natural resources.

- (3) Numerous factors other than decisions about logging levels affect the competition for forest resources. These factors tend to diminish the economic importance of logging relative to that of other forest uses.

This chapter discusses these three premises in more detail.

Forests and the Economy: More Than Just Trees

Forested ecosystems play important roles in the economy by producing things that benefit humans, things that impose costs on humans, or both.² They affect our well-being either along paths commonly associated with the economy and our standard of living—subsistence, commercial production, and property development—or along paths no less important economically, but associated with the quality of life in our communities—attractive neighborhoods, recreation, and the presence of wildlife. In addition, there are important interactions with spirituality/religion, aesthetics, community comity, and the sense of obligation to future generations. In short, forests are important to the economy because they can affect—and be affected by—all types of human activity.

Production Amenities, Consumption Amenities, and Intrinsic Values

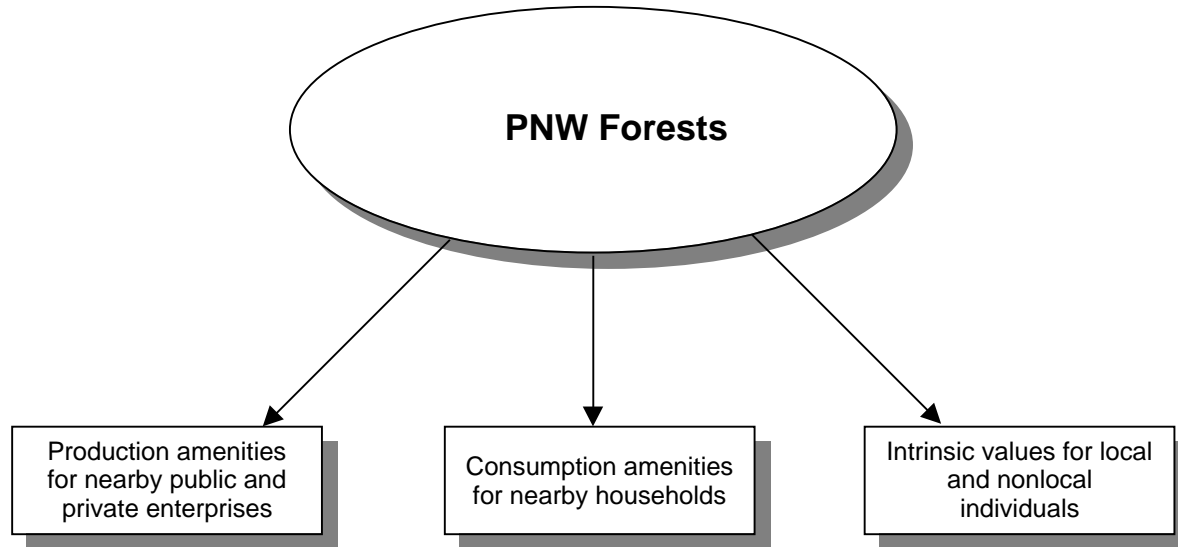
There are any number of ways to describe the forest's many roles in the PNW's economy. One especially useful way is illustrated in Figure 5.1. It shows that the economy derives value from the region's forests in three ways: production amenities to nearby public and private enterprises; consumption amenities to nearby households; and intrinsic values to those, both near and far, who cherish the forests themselves and the streams, flora, and fauna they support. The term, amenities, has a particular meaning in this context. When a forest provides *production amenities* to an enterprise, it facilitates the production process by lowering costs or increasing output.³ In some instances, a forest resource is an essential element of the production process, as when trees become lumber and a silicon-chip manufacturer uses water from forest streams in the production of silicon chips. Sometimes the

² This formulation of the interaction between forests and the economy inherently views forests as important only insofar as they affect the quality of life of human society, or parts thereof. We recognize that many find this anthropocentric view, at best, incomplete. It ignores the biocentric view that a forest has value in and of itself. It also artificially views humans as exogenous to the forest. We narrow our scope because the focus on a forest's contribution to human quality of life mirrors a central consideration underlying human actions affecting the forest. We take a broad view, however, of the ways in which the forest affects human standards of living and quality of life, including humans' aesthetic, cultural, and spiritual values and motivations.

³ Conversely, *disamenities* derived from the forest increase an enterprise's costs or lower its output but, to conserve space, we focus the discussion on the amenities. Potential production disamenities include the presence of naturally-occurring pathogens in water supplies derived from forests, floods fed by forest streams, and air pollution from forest fires. Analogous disamenities exist for consumption and intrinsic values.

connection is less direct, as when urban developers earn a premium for houses with good views of nearby forests.

Figure 5.1: Forests Make Many Contributions to the Economy



Source: ECONorthwest.

When a forest provides **consumption amenities** to a household, it increases the quality of life of those in the household by lowering the cost or increasing the availability of goods and services for consumption. Local residents often enjoy these amenities inside the forest itself, through hiking, subsistence hunting, recreational driving on forest roads, and so forth. They also may enjoy some amenities outside forest boundaries. This occurs, for example, when urban dwellers have access to low-cost, high-quality, municipal water derived from forest streams or derive pleasure from seeing distant forest vistas on their daily commute.

The term, **intrinsic value**, reflects the preference some people have for protecting, preserving, or enhancing the intrinsic properties of the PNW's forests, as well as the streams, flora, fauna and other forest components. Intrinsic values do not entail or arise from, an explicit current use of the forest.⁴ They arise, instead, whenever individuals place a value on

⁴ We use the phrase, intrinsic, because it is more accessible to a layperson than equivalent phrases, such as passive nonuse value, that economists commonly employ. It refers to value separate from the current or expected use of a resource, including both consumptive and nonconsumptive use. Economists have devised several approaches for dividing the intrinsic value of a resource into component parts. A common approach is to distinguish between option value and existence value (Cicchetti and Wilde 1992). Option value is the value one derives from knowing that the resource will be available for one's use in the future. Existence value can be either the inherent value one places on the existence of the resource, itself, or the vicarious value of knowing that the resource is or will be available for others. The vicarious value of knowing that the resource will be available for future generations is commonly called bequest value. For the purposes of this discussion it is not necessary to examine these components separately. Some ecologists argue that none

maintaining the existence of old trees, clean streams, a species, a scenic waterfall, or some other forest resource, either for its own sake, or on the prospect that the resource will be useful in the future, even to future generations. Actions that increase the robustness of the resources, for example, by preventing degradation of critical habitat for an endangered species or by ensuring the flow of a waterfall, increase the welfare of those concerned about these issues, and actions that degrade the resources decrease this welfare. One need not live near a forest to recognize the intrinsic values of forests in the PNW.

The relationships in Figure 5.1 lay the foundation for a model able to explain the many, diverse, economic consequences of actions limiting logging in the PNW to protect owls and accomplish other environmental objectives. We dedicate the bulk of this chapter to elaborating the details of the model. Before turning to that discussion, however, we briefly describe how an alternative approach, derived from the ecologists' perspective of forests, also yields the conclusion that there is more to the forest than trees.

Economically Important Goods and Services from Forested Wetlands and Rivers

Water Supply for

Household use (drinking, cooking, washing, waste disposal)

Industrial use (production input, process medium, heating and cooling)

Irrigation (commercial agriculture, subsistence gardens, lawns and flowers, parks and golf courses)

Aquaculture

Aesthetics (fountains, swimming pools)

Goods Other than Water

Animal products (fish, shellfish, fur-bearers)

Plant products (cereals, landscaping)

Mineral products (nutrients, gravel)

Nonextractive Goods and Services

Flood control

Soil fertilization

Aesthetics (scenery)

Waterborne transportation

Hydroelectric generation

Recreation (boating, swimming, fishing, wildlife viewing, hunting)

Pollution control (dilution of effluent, removal of pollutants)

Source: Based on Postel (1997).

The Ecological Perspective

The ecological approach focuses on three building blocks: ecosystem goods and services, functions, and states (Quigley et al. 1996).⁵ **Ecosystem goods and services** are specific components of ecosystems that might be extracted (e.g., timber or forage) or remain *in situ*, as when sections of a forest are used for recreational hiking, and a waterfall is a notable landmark. **Ecosystem functions** are processes, such as the stabilization of soils on upland slopes or a riparian zone's filtration of sediment in runoff from uplands. **Ecosystem states** are systemic or integrated characteristics, such as those associated with old-growth forests, scenic landscapes, and watersheds with low flood risk.

An ecosystem's goods, functions, and states all contribute to the economy. The adjacent text box, for example, illustrates some of the economically important goods and services from forested wetlands and rivers. These are produced as the forested wetlands and rivers perform various

of these categories fully recognizes the value of the life-support services ecosystems provide that make the earth habitable (Baskin 1997). It could be argued that life support services constitute a fourth category in Figure 5.1. On the other hand, a case could also be made that without life-support services, public and private enterprises, and households would be faced with large problems. We do not debate the point here but, instead, expand the category of intrinsic values to include this life-support value.

⁵ For a wide-ranging discussion, from an ecological perspective, of the economic importance of ecosystems, see Daily (1997).

functions. The set of functions and their robustness are determined, in turn, by the state of the forested wetlands and rivers.

Looking at economic issues from the ecological perspective is useful because it drives home the fact that a forested ecosystem and the surrounding economy continuously interact with one another in many, complicated ways. Human activities associated with the production, distribution, and consumption of wealth derive many different goods and services from the ecosystem but, in doing so, they alter the ecosystem's physical and biological characteristics. These changes, in turn, affect the state of the ecosystem and the stock of goods and services available for enhancing human standards of living, thereby altering future human activities. So the cycle of interactions between the ecological system and economic system continues.

The ecological perspective makes clear that the evaluation of how logging reductions affect the economy must embrace, at least in principle, a complicated, dynamic exercise. This conclusion lies at the heart of our model and stands in stark contrast with the simplistic economic-base model so many have used to predict the consequences of logging reductions.

The Competition for Forest Resources

No forest can satisfy the demands for all goods and services and so there is competition for forest resources. This leads to an inescapable conclusion: it is impossible to understand the economic consequences of a forest-management decision without understanding how it affects the competition for forest resources.

This section describes the general categories of competing demands for a forest. The discussion is primarily intended for an audience with some basic training in economics, particularly micro-economic analysis. For those more skilled in economics, we recommend the more technical discussion in Courant et al. (1997). The discussion aims to demonstrate how forest-management decisions, such as a decision to restrict logging, can shift the competitive outcome by altering (1) the overall value of goods and services derived from the forest; (2) the mix of goods and services (holding the overall value constant); or (3) the distribution of goods and services among current human groups or between this generation and future ones.

To categorize the competition we use a taxonomy that distinguishes among four types of products derived from the goods and services forests provide. The four types of products are illustrated in Figure 5.2.⁶ The left side of Figure 5.2 shows two types of demand for production amenities; the right side shows two types of demand for consumption amenities. Each type of demand exists independently, but the competition among them is best understood by assuming that one type (Type 1) prevails, and then looking at the consequences for the others.

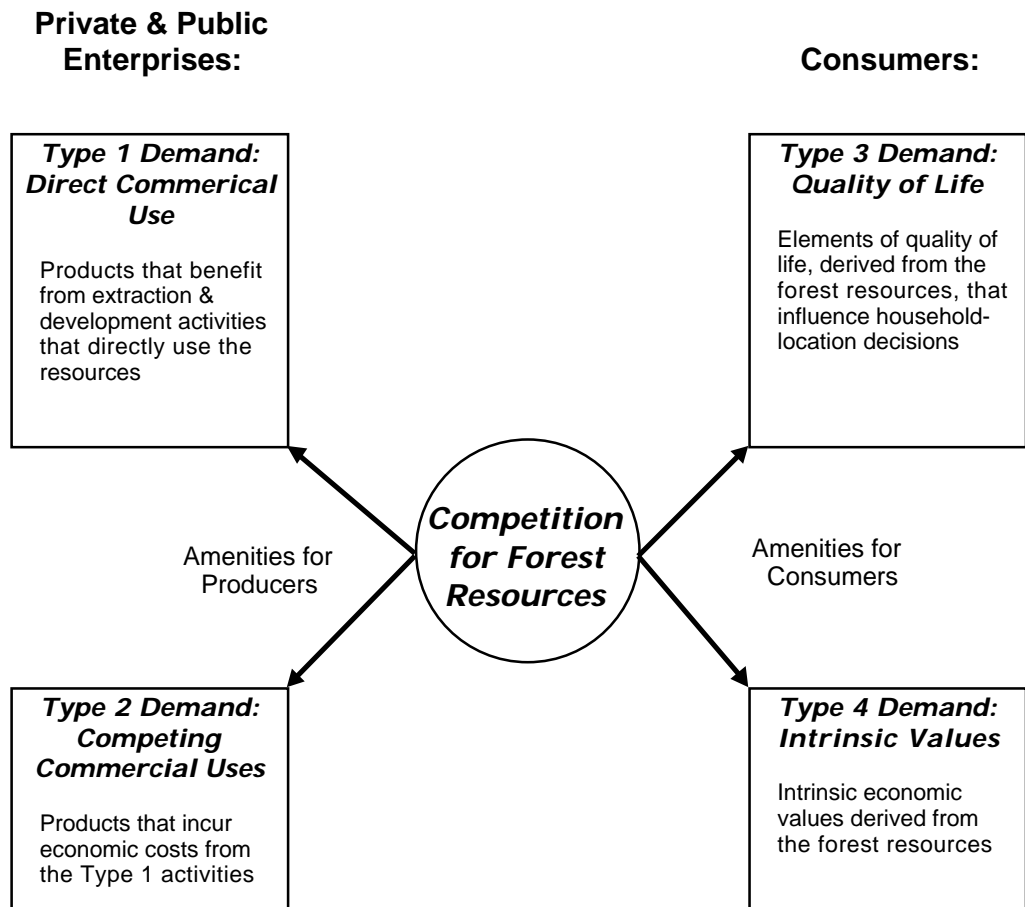
It is impossible to understand the economic consequences of a forest-management decision without understanding how it affects the competition for forest resources.

⁶ For a more thorough treatment of competitive products and the interactions among them, see Courant et al. (1997).

Competition for Production Amenities

The most easily identifiable demands for productive amenities entail the extraction or development of forest resources. We use the term, extraction, to embrace activities, resource uses, and industries associated with crop production, grazing, timber production, mining, and other activities that chemically, electrically, or physically remove one or more elements (flora, fauna, mineral, or energy) of the ecosystem from its source.

Figure 5.2: The Competing Demands for Forest Resources



Source: ECONorthwest.

We use the term, development, to refer to the occupation of a site by human structures, such as occurs during urbanization. Development also includes intense human activity—draining a wetland, changing the composition of a forest’s floral community, concentrating off-road-vehicle traffic, and so forth—that substantially alters a forest’s ecosystem processes. Logging, mining, ranching, and development are the most important of the demands for the production amenities of PNW forests, although there are many others, including commercial fishing, and, to a certain extent, tourism. Demand for the productive amenities of a forested ecosystem comes from “private and public enterprises,” which we define broadly, to include

chartered institutions, such as private corporations, incorporated cities, and public agencies, as well as to households that farm land, build a house, and recreate, and to other groups that sponsor extractive or development activities.

Type 1 Products - Extractive and Development Activities. We separate the demands for productive amenities into two groups. We first identify a specific extractive or development product derived from a forest and call it Type 1. Type 1 products have two important characteristics: they directly use natural resources and they deplete the stocks of resources. The identification of a particular product as Type 1 is arbitrary, but purposeful. This type of demand usually is associated with a familiar extractive industry, such as farming, ranching, logging, or mining, or with common development activities: developed recreation, urbanization, bridge construction, and the like. In general, only one Type 1 product benefits from a particular use of forest resources, but sometimes there may be more than one. The construction and operation of a dam may benefit irrigators, barge companies, and consumers of hydroelectricity, for example, or logging may benefit the timber industry and some sectors of the recreation industry (Quigley et al. 1996).

Type 2 Products - Products Upon Which Type 1 Production Imposes Costs. After identifying the products that benefit from a specific resource use, we then identify those that incur costs from that use, and call these Type 2 products. We purposefully distinguish between Type 1 and Type 2 products to drive home the message that there often is competition, within the extractive and development sectors, for forest resources. This message is important because, too often, the competition for forest resources is characterized as simply a jobs-vs.-environment contest between an industry seeking to use a resource as a productive input and those who want to protect the environment. By highlighting products that incur economic costs from extractive and development activities, we emphasize the point that the positive consequences arising from one set of extractive or development activities frequently has negative effects on one or more others.

There are three mechanisms by which production of outputs associated with extractive and development activities (Type 1 products) can impose costs on Type 2 products: direct displacement of resource-related production; displacement through the existence of negative externalities; and subsidies. It is important to note that, although we discuss these mechanisms here in the context of Type 1 products imposing costs on Type 2 products, *the same mechanisms apply to all types of products derived from forest resources*. It is only to conserve space that we do not repeat the discussion as we subsequently address the remaining elements of Figure 5.2.

Direct displacement occurs when two or more enterprises compete directly for a forest's natural-resource amenities. An increase in the output of a given Type 1 product, other things equal, will reduce the output of a Type 2 product by reducing the supply of some ecosystem amenities for Type 2 production. Direct displacement generally occurs through a formal or informal competitive-bidding process. Through this process, a Type 1 use of a resource decreases the resource's availability for use in the production of some Type 2 product. As a result, the Type 2 product becomes either more scarce or more costly than would otherwise be the case. There currently is considerable concern in the Pacific Northwest, for example, about the impacts of logging and related activities on the quality of surface water

available downstream for municipal-industrial water use (Bernton 1996). With reductions in water quality, the affected water utility would have to curtail production or incur additional costs to obtain water from other sources.

Displacement also occurs when the production of a Type 1 product is accompanied by negative externalities.⁷ Negative externalities are ubiquitous when Type 1 activities affect the quality of air, water, habitat and landscapes.⁸ Increased sedimentation from timber production, for example, can create additional costs for downstream fisheries, landowners, municipal-industrial water users, and public agencies (Meehan 1991; Reid 1993). These costs arise not because of competitive bidding for the use of stream water, but because the downstream effects are external to the incentives facing upstream loggers. Externalities are an important source of market failure. Generally, solving market failures requires public policies that attempt to make individual incentives compatible with collective objectives (Field 1997; Goodstein 1995; Tietenberg 1996).

The third mechanism by which a Type 1 use of forest resources can impose costs on other producers comes into play when government subsidies distort the prices or production levels of a Type 1 product. Similar distortions can arise from regulatory and other actions, such as trade policy, but, to conserve space, we lump them all under the rubric of subsidies. Subsidies draw money from, and thereby restrict the output and profits of, other producers, including some who have no other relationship to the Type 1 product or its use of forest resources. Hence, subsidies are akin to externalities.

Subsidies can arise in three ways. One entails subsidies to the Type 1 product itself, for example, price-support payments for certain products for overseas export (Environmental Working Group 1995; Offutt and Shoemaker 1990). Another occurs through subsidies to the Type 1 use of a resource as a productive input, for example, below-cost pricing for timber, forage, hydropower, and navigation derived from federal lands and facilities (Council of Economic Advisors 1994; U.S. House of Representatives 1994). Subsidies also can be directed at labor, capital, or some other nonresource input to the Type 1 production process (Black and Smillie 1988; Meyer and Rosenbaum 1996; Nauth 1992).

⁷ In some cases externalities are positive. We include such cases as a part of the input demand.

⁸ There is an extensive literature regarding when a particular cost or benefit is or is not an externality, or whether a particular price or production phenomenon stems from displacement, an externality, or a subsidy. Baumol and Oates (1988, pp. 14-15), in an important text on environmental externalities, provide a useful background regarding the vague boundaries among these:

“The externality is in some ways a straightforward concept; yet, in others, it is extraordinarily elusive. We know how to take it into account in our analysis, and we are aware of many of its implications, but, despite a number of illuminating attempts to define the notion, [footnote omitted] one is left with the feeling that we still have not captured all its ramifications. Perhaps this does not matter greatly. ... Ultimately, definitions are a matter of taste and convenience.”

Subsidies may be conspicuous, as when states give tax concessions to Type 1 industries or protect them from competition (Black and Smillie 1988; Nauth 1992), but they may be more hidden, as when firms in other sectors of the economy subsidize (relative to actuarial cost) unemployment insurance in some highly cyclical resource-extraction industries (Meyer and Rosenbaum 1996). Regardless of their visibility, subsidies suppress the level of Type 2 production and lower the well-being of those who otherwise would benefit from the forgone production and enjoyment of Type 2 products. These effects may materialize in the vicinity of the forest resources used in the production of the Type 1 product, but not necessarily.

Competition Directly from Consumers

On the left side of Figure 5.2, forest resources are economically important because they are inputs in the production of other things, such as housing, transportation systems (e.g., pallets), and hydroelectricity that consumers want to have. On the right side, the connection between these resources and consumers is more direct. That is, consumers consider these resources economically important for what they are and for how they directly contribute to consumers' well-being. Figure 5.2 shows there are two types of demand for forest resources coming directly from consumers: one affects consumers' residential location decisions; the other does not.

Type 3 Products - Consumption Amenities and Residential Location.

Sometimes a forest produces amenities, such as recreational opportunities, scenic vistas, and healthy environments, that contribute directly to the well-being of people who have access to them. In economic parlance, these are known as consumption amenities. Their contribution to consumers' well-being makes consumption amenities economically important in their own right, but they also influence the location decisions of households and firms (Knapp and Graves 1989; Mathur 1993; Mueser and Graves 1995), thus, adding to their economic interest. We use the term, Type 3 products, to represent consumption amenities that influence location decisions and, as Figure 5.2 shows, they represent a significant source of competition for forest resources.

Economists' explanation of why some consumption amenities can influence location revolves around the concept of consumer surplus. Whenever a consumer derives benefits (increases in well-being) from a good or service that exceed the costs the consumer pays to obtain it, the net benefit represents a net increase in well-being. This increment is called consumer surplus. In general, consumption amenities offer the prospect of positive consumer surplus. The nearer that people live to such amenities, the better their access, and the lower their cost of taking advantage of them. Thus, consumers can increase their consumer surplus—their economic well-being—by living near forests that offer recreational opportunities, wildlife viewing, and other amenities.

Whitelaw and Niemi (1989) have likened this consumer surplus to a **second paycheck** residents receive from living in a place where they have easy access to amenities, so that the total welfare of residents within commuting distance of the amenities is the sum of this second paycheck plus the purchasing power of their money income. The size of the second paycheck affects behavior in the local and regional economies by influencing household demand for residential location. In equilibrium, changes in the value of amenities must also affect money wages and housing costs, and

thereby the real wage. All else equal, if amenities in a region improve, people will tend to move to that region, bidding housing prices up and wages down, until there is no net advantage from further migration. That location-specific consumption amenities are an important influence in residential location decisions is well documented.⁹

Essentially all of the existing literature on the value of amenities implicitly assumes that the amenity value is reflected in wages and prices in the same county or city as the amenity itself. This view probably is too restrictive. Natural-resource amenities a few hours drive from an urban area also will plausibly contribute to the quality of life in that area, showing up as lower wages and higher housing costs at locations that are some distance from the amenity itself. Furthermore, forest resources in one place can materially influence the quality and quantity of recreational opportunities and other amenities some distance away.

As pointed out by Roback (1988) and others, lower real wages that arise from consumption amenities act as a special type of production amenity for firms that are able to reduce their costs by locating where wages are lower. This mechanism allows natural-resource consumption amenities to affect where goods and services are produced. Thus, the quantity and quality of natural resource amenities can affect the levels and types of jobs (and economic activities in general) throughout the local and regional economies, including sectors with no direct link to the use of ecosystem resources.

Type 4 Products - Intrinsic Economic Value. The Type 4 products shown in Figure 5.2 are ecosystem products people value for their intrinsic properties. Intrinsic values, often termed “existence values,” do not entail an explicit current use of the resource.¹⁰ They arise whenever individuals place a value on maintaining the existence of a species, scenic waterfall, or other resource for its own sake, or on the prospect that the resource will be useful, for example, to future generations. Actions that increase the robustness of the resources, for example, by preventing degradation of critical habitat for an endangered species or by ensuring the flow of the waterfall, increase the welfare of those concerned about these issues, and actions that degrade the resources decrease this welfare.

Unlike the other three uses of ecosystem amenities that we have discussed, Type 4 products, by themselves, are unlikely to have any manifest

⁹ The early contributions are Rosen (1979) and Roback (1982). For more recent work on this topic see Beeson (1991), Berger and Blomquist (1992), Blomquist et al. (1988), Brady (1995), Brown (1994), Browne (1984), Cooper (1994), Cromartie (1998), Cushing (1987), Figlio (1996), Gabriel et al. (1996), Gottlieb (1994), Greenwood et al. (1991), and Sherwood-Call (1994).

¹⁰ Some argue that none of the intrinsic value categories fully recognize the value of the life-support services ecosystems provide that make the earth habitable (Baskin 1997). Although some economists have attempted to include biological diversity in their calculations of the value of life support services, they have not been able to directly get at what it is worth to have species work together within ecosystems to provide these services. It could be argued that they constitute a fifth type of demand in our typology. On the other hand, a case could also be made that without life-support services, Types 1–4 would be faced with large problems. We do not debate the point here but, instead, expand the category of Type 4 products to include this life-support value.

economic effect on jobs, income, or other indicators of economic activity. The forests of Washington and Oregon may be of intrinsic value to some residents of Miami, Los Angeles, and other distant places, but the effect of this on economic activity in the PNW will be small unless it is articulated through the political system. Still, the resource affects the real well-being of real people, and this well-being belongs in any comprehensive analysis of the value of the resource.¹¹ For some environmental issues, such as maintaining the biodiversity and integrity of ecosystems passed to future generations, Type 4 values may be very large.

Other Factors Influencing Forest-Resource Competition

The conceptual framework associated with Figures 5.1 and 5.2 brings into focus several critical issues that inevitably arise whenever one is analyzing the ecosystem-economy relationship for forest resources. For the purposes of this discussion, we focus on two of the most important ones:¹²

- Defining the spatial characteristics of the relevant economy.
- Selecting appropriate variables and time periods for measuring the economic consequences of ecosystem-management policies and activities.

The Relevant Economy

The competing demands for a forest's resources generally do not originate from a common set of workers, households, firms, communities, and regions.¹³ Only by chance will all the competing demands for a forest's resources share a common boundary. In most situations, the relevant *economic* landscape extends far beyond the forest itself.

A general, but typical, illustration reinforces this conclusion. In a given situation, the competition for forest resources coming from those who benefit from timber production (Type 1) might be concentrated on one side of the forest, in nearby communities having both milling capacity and transportation facilities appropriate for hauling heavy loads. If the timber production degrades salmon habitat and increases turbidity and flooding in

¹¹ While there is general agreement on the statement in the text as a matter of principle, the literature is sharply divided on the question of whether such value can be accurately measured. See Arrow et al. (1993), Castle et al. (1994), Coursey et al. (1987), Eberle and Hayden (1991), Gregory et al. (1995), and Stevens et al. (1991).

¹² In a more complete discussion of analytical issues, one should consider several additional issues. Foremost among these are (a) placing ecosystem-management decisions in the context of autonomous factors, such as the declining ability of unskilled workers to earn high wages, (b) understanding concerns about sustainability, and (c) evaluating the interactions among economic values, impacts, and equity. For a discussion of these issues, see Courant, et al. (1997).

¹³ A particular individual, household, or community may, however, express all four types of demand. A timber worker, for example, may lobby for more trees to be cut in part of the forest, oppose logging elsewhere to reduce logging's adverse effects on the quality of water his wife uses in her food-processing enterprise, live where he does largely to have easy access to unlogged-forest recreation, and place an intrinsic value on protecting spotted owls.

streams, the competition coming from those who incur these environmental externalities (Type 2) might encompass residents of the mill communities as well as others living hundreds of miles downstream in the watershed. The competition coming from those who see timber production as having an adverse impact on the quality of life (Type 3) might include residents of the watershed, as well as residents who live nearby but are outside the watershed. Those competing for forest resources because they place an intrinsic value on forest resources affected by timber production (Type 4) may live in the vicinity of the forest or far afield.

Even this casual view of the relevant economic region(s) has important implications for understanding the economic consequences of decisions to restrict logging and enhance the forest environment in the PNW. Many, if not most, of the economic consequences have occurred away from the forest. This is true even if one looks at consequences associated with the timber industry itself. Loggers in the Pacific Northwest often travel long distances to find work and mills compete intensely for logs over distances of several hundred miles (ECONorthwest 1996). Within this environment of area-wide competition, employment reductions arising from a reduction in timber harvest in one locality are likely to occur at the least efficient sawmill in the entire area, rather than at the mill closest to the site of the reduced harvest. Similarly, the timber-harvest reduction might affect the paycheck, not of the logger who lives nearby, but of the one who lives several hundred miles away. In short, the distribution of economic impacts that follow from a specific environmental-decision will generally be complicated and dispersed.

Incorporating metropolitan areas into the analysis is especially important. Forest-policy analysts often assume that the economic effects of forest-management decisions will impinge primarily on rural communities. They conclude that, because these communities are isolated, they are necessarily dependent on the production of extractive products, primarily timber, from the adjacent forest and, hence, they are especially fragile with respect to changes in the flow of these products. Using this logic, the community-impact section of the environmental impact statement accompanying the Northwest Forest Plan, for example, focuses exclusively on the region's rural counties and communities and assesses the extent to which reductions in timber production would place these communities "at risk" (U.S. Department of Agriculture and U.S. Department of the Interior 1994, 3&4 p. 298).

This view is too simple. It sees the forest's importance to the economy primarily, if not solely, through its production of extractive and development products (Type 1 in Figure 2.2), overlooking the offsetting consequences for competing demands and products (Types 2-4). Further, it exaggerates the economic isolation of rural communities and the economy's sensitivity to changes in timber and other commodities.

A common denominator in these shortcomings is the failure to acknowledge the importance of metropolitan areas to the relationship between forested ecosystems and the economy. The historical economic isolation of nonmetropolitan communities is diminishing and, in many respects, it has expired. Clearly, some communities are more isolated than others, and within a given community, some residents are more integrated than others. But virtually all nonmetropolitan residents are getting closer *economically* to metropolitan centers.

The timber industry, itself, illustrates this trend. Historically, mills were located near the woods to reduce log-transportation costs. Because of technological changes that both allow and require additional processing per unit of final output, however, raw materials are now a smaller component of costs for most final products, and many manufacturers seek to locate, not near the raw material, but near large markets and large pools of qualified workers (Duffy 1994).

Thus, in all respects, the notion that forests are economically important only to local communities is coming undone. To understand the full economic consequences of logging reductions one must look farther afield, and especially to the metropolitan centers. Apart from the logging itself, the economic activity that flows from logging increasingly occurs in these centers. Many of the subsidies to logging are borne by city residents and, perhaps most important of all, the consumption amenities that we discuss as Type 3 products may induce migration to cities that are near, but not directly part of, the forest.

This broad spatial view of the forest-economy relationship is fundamental to explaining how the PNW's economy responded to logging reductions. Most of the doom-and-gloom predictions assumed that logging reductions would generate only job losses and these would occur largely in isolated communities where dislocated workers had few options. In reality the logging reductions caused job gains as well as losses, and both were concentrated in or near metropolitan areas.

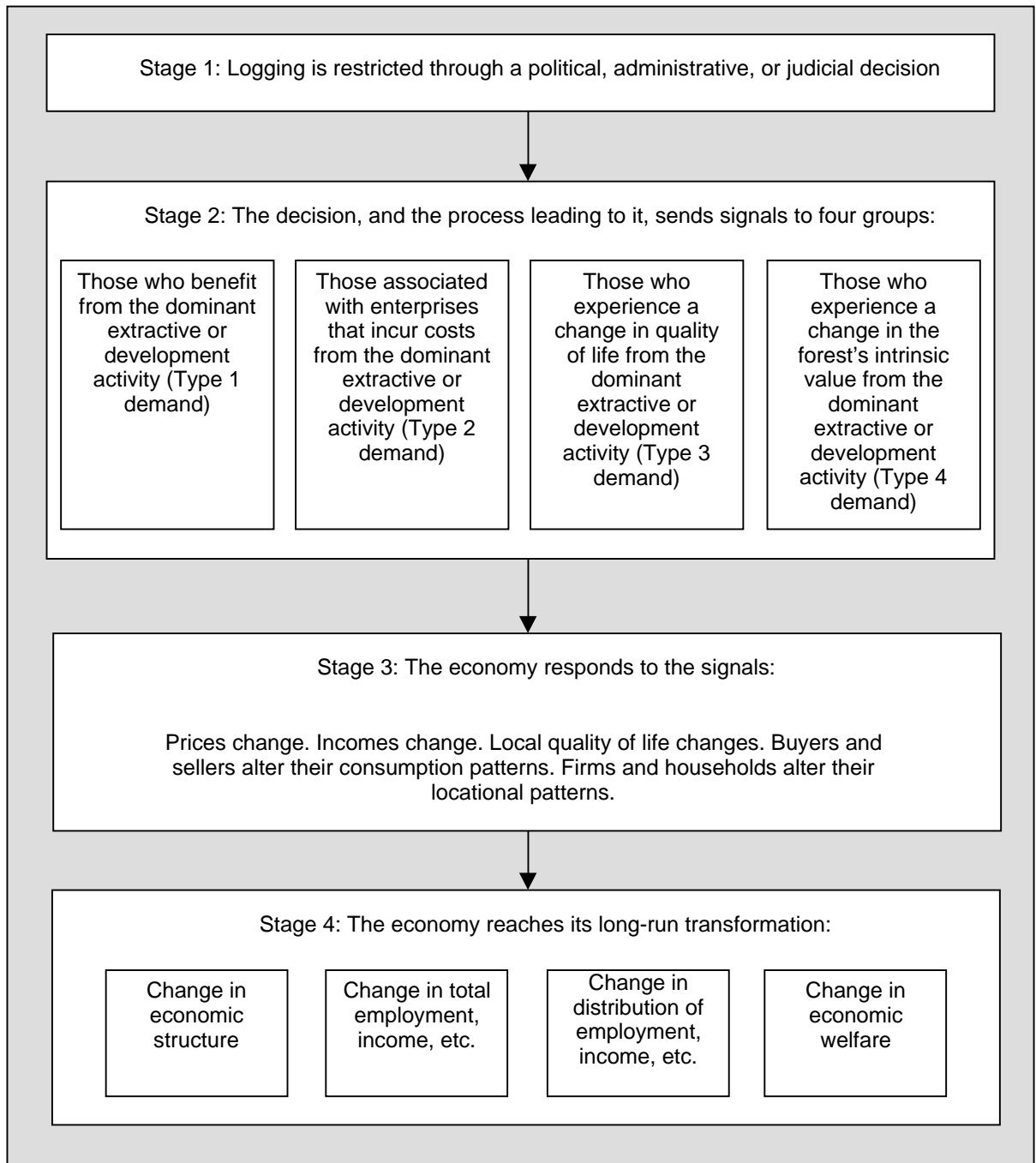
Relevant Time Periods

Logging restrictions do not have a single, one-time-only impact on the economy. Instead, the economy's response evolves over time. Whatever the initial, adverse economic impacts, the economy attempts to mitigate. Whatever the initial positive impacts, it tries to accentuate.

The evolution occurs in four general stages, shown in Figure 5.3. In Stage 1, a restriction on logging in the PNW is adopted and, in Stage 2, this action sends economic signals to the local, statewide, regional, and national economies, indicating a change in the economic role of the PNW's forest resources. The signals have four major destinations, represented by the four types of competing demands for the forest resources, as indicated in Figure 5.2. Although Figure 5.3 shows Stages 1 and 2 occurring as a single, abrupt event, they generally transpire over a longer period, especially for public lands or whenever the forest-management decisions are subject to public regulation.

Stages 3 and 4 of Figure 5.3 illustrate the dynamic character of the economy's response to the adoption of the logging restriction. In Stage 3, the economy responds to the economic signals sent in the second stage through changes in prices or incomes or both. In Stage 4, prices and incomes reach their new levels, and the economy exhibits the long-run effects of the adoption of the forest-management decision. The long-run adjustment may entail feedback loops, through which changes in prices and incomes may influence future forest-management decisions.

Figure 5.3: The General Transition Process by Which a Logging Restriction Leads to Changes in the Economy



Source: ECONorthwest.

The precise path through Stages 3 and 4—the transition—will depend, not just on the characteristics of the logging restriction, itself, but also on the multiple economic forces and trends that are continuously altering and shaping the economy at all levels. Concern often is raised about the impacts of the transition on capital, property, and labor markets. Most markets should adjust quickly to the logging restriction, however, and they may adjust fully in anticipation of the decision. The larger and more diverse the affected economy, the smoother the transition.

How long does the transition take? There is no single, simple answer to this question: both the nature and the duration of the economy's response depend on many variables.

There are good reasons, however, to believe that many aspects of the economy are adjusting more quickly than in the past to changes in forest-management policy. For example, by the middle of 1997, lumber prices throughout the U.S. had stabilized in response to the April 1994 adoption of the Northwest Forest Plan. This was far quicker than many industry analysts had expected (Bernton 1997). Labor markets also are dynamic. Power (1996) reports that, of the workers nationwide who lost their jobs because of plant closures or other mass layoffs in the 1980s, about half were unemployed 10 weeks later and the percent remaining unemployed after twelve months was roughly the same as the background rate of unemployment in the overall labor force.

This is not to say that everyone adjusts this quickly, or that the costs of adjusting to logging reductions are trivial. Instead, we are only pointing out that adjusting to change is one of the widely-trumpeted virtues of market economies. To understand the economic consequences triggered by Judge Dwyer's injunction and the related restrictions on logging, one must take this dynamism into account. Ignoring it invariably leads to exaggerated estimates of job losses and unrealistic predictions of economic catastrophe.

Reflections

The forests of the Pacific Northwest are important to the economy because they produce both goods, such as logs that are made into timber, and services, such as recreational opportunities. This fact was overlooked by those who feared that the logging reductions triggered by Judge Dwyer's injunction and related decisions would decimate the economy. They believed only the logs mattered, and downplayed the importance of the services.

They made at least three other critical errors. One, they forgot the fact that the industry had shrunk in importance. Two, they ignored the metropolitan areas and assumed that hundreds of smaller communities were isolated from the metropolitan economies. Three, they turned a blind eye to the economy's ability to adjust quickly to mitigate the negative and enhance the positive impacts of logging reductions.

The analytical model we describe here corrects these errors. In the next chapter, we apply it to drive home the point that there is a sound economic explanation for why the sky did not fall on the PNW's economy when logging declined in the late 1980s and early 1990s.

Chapter 6: Reexamining the Evidence: Why the Sky Did NOT Fall

The economic sky over the Pacific Northwest (PNW) did NOT fall as logging plummeted during the past decade. Federal timber harvest fell 5.5 billion board feet (bbf) (86 percent) between 1988 and 1996, and the total harvest fell 7.4 bbf (47 percent).¹ At the beginning of the period many, perhaps most, in the region had no doubt: reductions of this magnitude must trigger widespread, severe, unemployment. Instead, total PNW employment *increased* by 825,165 (27 percent).

How could this be? How could the regional economy expand while logging contracted? There are two possibilities:

1. The economy grew *despite* the decline in logging.
2. The economy grew *because of* the decline in logging.

In this chapter we use the model described in Chapter 5 to reexamine the evidence and conclude that both mechanisms have been in operation during the past decade. Implicit in the first explanation is the likelihood that the timber industry has been too small to hold much sway over a dynamic and highly adaptable regional economy. The second explanation recognizes that logging reductions have positive as well as negative economic effects. We briefly address each of these explanations and conclude with a discussion of what to expect in the future.

The Economy Grew *Despite* Logging Reductions

Table 6.1 shows some of the most common, conventional measures of the timber industry's importance to the regional economy and how they changed from 1988, when logging peaked prior to the onset of actions to protect the spotted owls and other species, to 1996, the most recent year for which data are available. The data in the table indicate that, given the general economic conditions in the PNW during the period, drops over eight years of 24,104 in timber employment, \$774,000,000 in timber payrolls (1997 dollars), \$2,482,000,000 in timber output, and \$1,056,000,000 in timber exports were insufficiently large to have a demonstrable, negative effect on the comparable regional totals. Despite the timber-industry contractions, the region's performance in jobs and income exceeded the national average. Indeed, during this period the regional economy merely slowed for a bit and then charged forward again, while the nation experienced a severe recession.

¹ Federal timber harvests include harvests from National Forests and the Bureau of Land Management. Harvests by the Bureau of Indian Affairs, National Parks, and other federal agencies were excluded.

Table 6.1: Measures of the Timber Industry's Importance to the Pacific Northwest Economy, During the Logging Reduction: 1988 to 1996

1988				
	PNW	Lumber & Wood Products		
		Total	% of PNW	
Total Timber Harvest (bbf)	15.66	15.66	100.0%	
Federal Timber Harvest ^a	6.41	6.41	100.0%	
Employment	3,045,584	110,684	3.6%	
Payroll ^b	82,695	3,581	4.3%	
Output ^b	191,768	8,424	4.4%	
International Exports ^{b,c}	22,697	3,233	14.2%	
1996				
	PNW	Lumber & Wood Products		
		Total	% of PNW	
Total Timber Harvest (bbf)	8.29	8.29	100.0%	
Federal Timber Harvest ^a	0.87	0.87	100.0%	
Employment	3,870,749	86,580	2.2%	
Payroll ^b	111,325	2,807	2.5%	
Output ^b	251,580	5,942	2.4%	
International Exports ^{b,c}	36,150	2,177	6.0%	
Change, 1988 to 1996				
	PNW		Lumber & Wood Products	
	Total Change	% Change	Total Change	% Change
Total Timber Harvest (bbf)	-7.37	-47.1%	-7.37	-47.1%
Federal Timber Harvest ^a	-5.54	-86.4%	-5.54	-86.4%
Employment	825,165	27.1%	-24,104	-21.8%
Payroll ^b	28,630	34.6%	-774	-21.6%
Output ^b	59,812	31.2%	-2,482	-29.5%
International Exports ^{b,c}	13,453	59.3%	-1,056	-32.7%

^a Federal timber harvests only include harvests from National Forests and the Bureau of Land Management.

^b Payroll, output, and international exports are all in millions of 1997 dollars.

^c International exports for lumber-and-wood-products include logs, pulpwood chips, lumber, plywood, and veneer.

Source: ECONorthwest with data from the Oregon Department of Forestry (various years), the Oregon Employment Department (various years), the U.S. Department of Commerce, Bureau of the Census (various years), the U.S. Department of Commerce, Bureau of Economic Analysis (1998), Warren (various years), the Washington Department of Natural Resources (various years), and Washington State Employment Security (various years).

Across the measures of employment, payroll, output, and exports, Table 6.1 indicates the timber industry represented about 3 to 14 percent of the regional economic pie that existed in 1988. Within the next seven years, the industry's decline removed a slice equal to about 1 to 8 percent of that economic pie, but, in the meantime, the remainder of pie had grown so rapidly the slice was hardly missed. Under the economic conditions of the time, contractions of 21 to 33 percent in a timber industry with 2 to 6 percent of the total economy were simply too small to exert much influence over the regional economy.

Why was the economy so insensitive to the timber industry's decline in the late 1980s and early 1990s? To answer the question, one must look both to the industry and to the surrounding regional economy.

The timber industry shrank in important ways during the 1980s, significantly reducing its employment and payroll per unit of timber logged (see the discussion in Chapter 3). This adjustment, though hard on workers, families, and communities, increased the competitiveness and adaptability of timber firms throughout the region. Hence, as logging on federal lands began to decline at the end of the 1980s, mills were more adept at securing log supplies from elsewhere and getting more from each log.

The industry obtained new log supplies from lands outside the region as well as within. Consultants inside the industry reported that, during 1994 and 1995, mills in Oregon obtained logs from thirteen other states as well as from Chile, other countries in South America, Mexico, and New Zealand (Ehinger and Associates 1995).² Within the region, mills looked to both industrial and nonindustrial lands for new log supplies. Increases in domestic prices caused logs that otherwise would have been exported to be diverted to mills in Oregon and Washington. Technological changes that facilitated the processing of small logs induced many industrial landowners to log second-growth trees that previously were considered too small. As a result, log trucks that a decade earlier carried one, two, or three logs per load now carry scores of logs.

As log prices rose and mills put more effort into finding logs, logging increased on non-industrial timberland. Moreover, domestic mills began outbidding overseas competitors for logs that otherwise would have been exported. By 1995, non-industrial logging in Western Oregon increased 103 percent from the 83-87 average, from 275 to 559 million board feet (mmbf) (Lettman and Campbell 1997). During the same period, log exports declined 44 percent, from 2.9 to 1.6 bbf (Warren 1994; 1998).

The industry also subjected the raw material that was available to additional stages of manufacturing. As an indicator of this change, employment in the PNW's secondary processing sector³ increased 14.8 percent, from 23,192 in 1988 to 26,616 in 1996. This increase offset some of the employment reductions in the primary wood-processing section.

...contractions of 21 to 33 percent in a timber industry with 2 to 6 percent of the total economy were simply too small to exert much influence over the regional economy.

² The states were Alaska, Arkansas, California, Colorado, Idaho, Louisiana, Montana, Nevada, New Mexico, Texas, Utah, Washington, and Wyoming.

³ Rufolo and Strathman (1990) identify the secondary processing sector as SIC 2431, 2434, 2439, 244, 245, 2511, and 2541.

The changes in the timber industry seem to explain a lot of why the reduction in federal logging between 1988 and 1996 had such a negligible effect on the economy. Changes in the economy itself were also important. We describe some of the salient changes in the next section.

The Economy Grew *Because of* Logging Reductions

At the core of the economic model described in Chapter 5 lies the strong, evolving competition for forest resources. There are four types of demand. Type 1, the dominant commercial use of forest resources competes with other commercial users that are adversely affected by logging (Type 2 demand), consumers who base their household-location decisions on the flow of goods and services from the forest (Type 3 demand), and individuals who place an intrinsic value on the forest (Type 4 demand).

This model reveals that, as it generates benefits for itself and its associates, the timber industry imposes costs on other components of the economy of the Pacific Northwest. The timber-related benefits have decreased, while the costs have increased, raising the probability that at least some logging has a net negative effect on the overall economy. Thus, the logging reductions triggered by concerns about spotted owls, by preventing such logging, may have provided a regional economic stimulus.

The evidence we present below strongly supports this conclusion. We organize the evidence by looking in turn at each of the four types of demand.

Logging: the Dominant, but Shrinking, Commercial Use of Forest Resources (Type 1 Demand)

This type of demand has been weakening. That is, the industry no longer can make as strong a case as in the past to justify allocating forest resources to timber production rather than to alternative uses. The timber industry once could buttress its claim on forest resources by arguing that it produced not only valuable lumber-and-wood products but also many high-paying jobs and stable communities. All three elements of this argument have diminished. The lumber-and-wood products are not as valuable, relative to alternative supplies, the industry slashed jobs and wages, and researchers have documented widespread instability and social problems in communities closely linked to the industry.

Murray and Wear (1998) examined the extent to which the lumber-and-wood-products industry of the Pacific Northwest is integrated with the nation's other major producing area, the South. They found that, until about 1988, prices in the PNW were generally not influenced by, but had a dominant influence on, prices in the South. Afterward, the relationship reversed itself. The authors suggest that the immediate trigger for the reversal was the listing of the northern spotted owl as a threatened species, but there were deeper contributing factors. One was the expiration of the price premium PNW lumber once commanded. As we discussed earlier, lumber from old-growth Douglas fir has several superior characteristics relative to lumber from the South, but lumber from smaller and younger Douglas fir does not. Hence, as the timber industry logged the old-growth forests to near exhaustion, its lumber-and-wood products became less

valuable, relative to products from the South, and the industry's demands for forest resources became less compelling.

The industry's demands weakened further as firms slashed jobs and payrolls in the 1980s, as we discussed in earlier chapters. Between 1979 and 1989, consecutive peaks in the national economic cycle, the industry reduced the jobs per million board feet (mmbf) by 24 percent, from 10.6 to 8.0, and the payroll per mmbf by 37 percent, from \$405,170 to \$252,868 (measured in 1997 dollars). When one looks at the jobs and payroll per unit of land given to industrial timber production the declines are even more dramatic. Until recently, nearly all timber came from the land that was being logged for the first time. In western Oregon and Washington, such land, on average, produces about 60 thousand board feet (mbf) per acre, whereas land being logged for the second time produces about 30 mbf per acre (Haynes 1986). This difference in yield per acre indicates that, all else equal, as the industry shifts from first to second harvest, the jobs and payroll per acre will fall about 50 percent.

The industry's behavior also undermines its claim to provide community stability. A large body of research in the Pacific Northwest and California has found that, contrary to the industry's assertions, communities with high concentrations of timber-related activity do not exhibit stable employment and high levels of prosperity. Instead, they typically have high unemployment levels and other indicators of social and economic distress (Cook 1995; Fortmann et al. 1991; Heberlein 1994; Hibbard and Elias 1993; Niemi and Whitelaw 1994). Past attempts by federal land-management agencies to produce community stability and prosperity by selling high levels of timber have failed repeatedly (Fortmann et al. 1989; Stewart 1993; Whitelaw 1992).

In sum, the timber industry's own actions, and not owls, diminished the strength of its claim that the forest must be logged to generate economic benefits for the economy, good jobs for workers, and stable communities. All of these actions were part of an evolution driven by ecological and economic realities. Less than a year following Judge Dwyer's 1991 prohibition on timber sales from the spotted-owl national forests, Richard Haynes, the Forest Service's leading economist in the region, concluded that, "One consequence of [this and related] events has been to compress changes expected in timber harvests in another decade into this year and next year. Where the transition from an old growth to second growth industry, thought to be about half completed, was expected to continue through this decade it will be mostly completed in the next 3-4 years" (Haynes 1991). Running out of old-growth trees and pressured to reduce costs, the industry's economic importance had to decline.

Thus, even if competing demands had remained unchanged, the reduced strength of timber's demand means that the economy would benefit from federal logging restrictions that shifted some forest resources targeted for logging to alternative uses. As we discuss below, though, the competing demands were growing, increasing the likelihood that the logging reductions benefited the overall economy.

...all else equal, as the industry shifts from first to second harvest, the jobs and payroll per acre will fall about 50 percent.

Logging Reductions Reduce Logging's Adverse Effects on Other Commercial Users (Type 2 Demand)

Logging adversely affects other industries that would commercially use forest resources, largely by imposing costs on them through a widespread network of logging subsidies and environmental externalities. Together, these are called spillover costs.

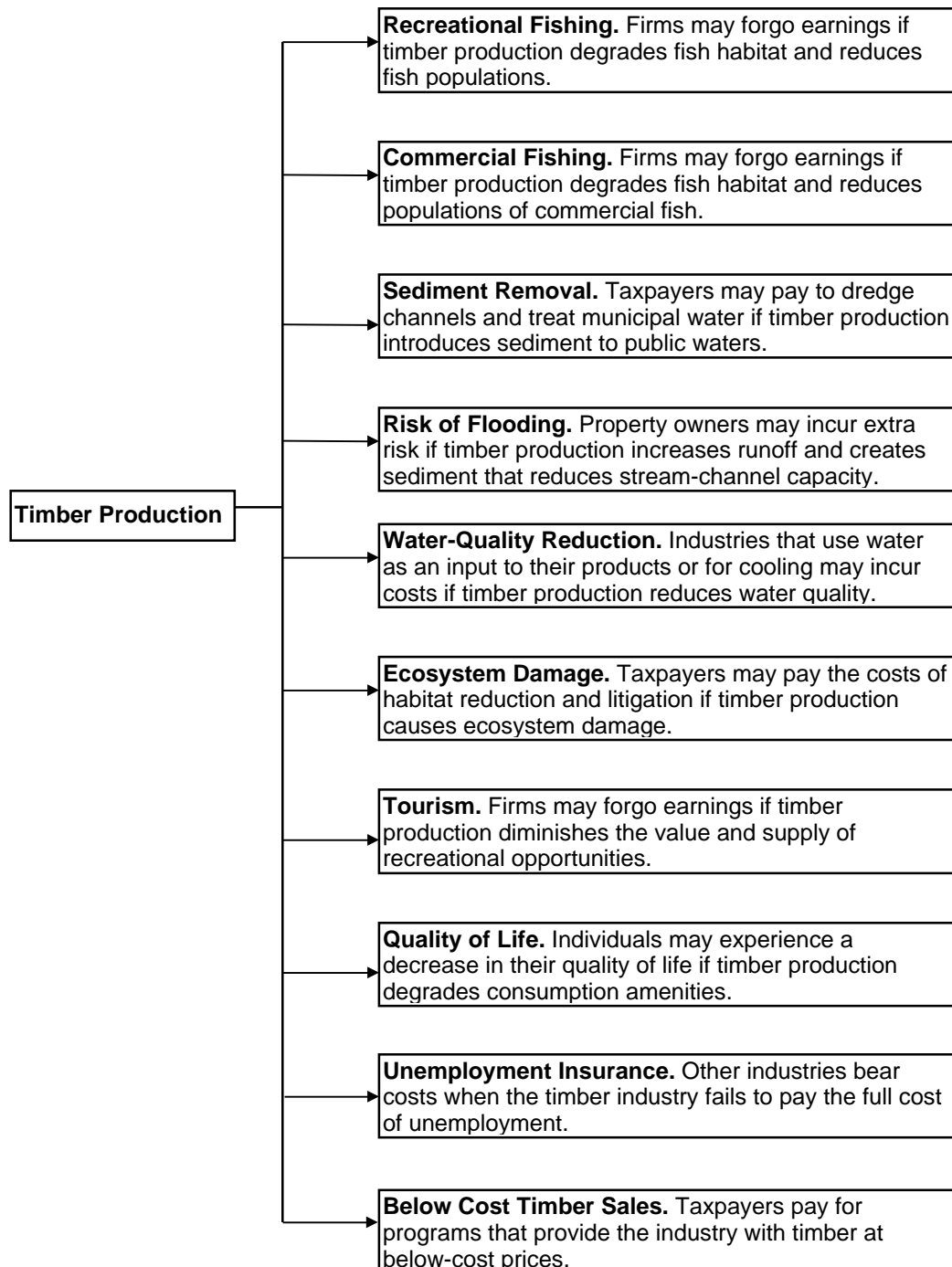
Figure 6.1 identifies ten categories of spillover costs that were avoided through reductions in logging. Most of the spillover costs shown in Figure 6.1 stem from the impacts on streams of logging and related activities, such as road construction. In general, these activities can alter streams by increasing the level of sediment, raising the water temperature, and increasing streamflows during some periods. In addition, they can alter riparian vegetation and the hydrologic structure of stream channels (Brown and Binkley 1994; Jones and Grant 1996; Meehan 1991; Reid 1993). These alterations, in turn, can degrade the productivity of fish habitat and reduce fish populations (Beschta et al. 1995), which has an adverse impact on the recreational and commercial fishing industries.

Sediment in streams fills stream channels and increases costs to taxpayers, land owners, and water consumers who must pay to remove the sediment. Industries that use sediment-laden water in their industrial processes often incur additional costs to maintain their machinery, remove the sediment, or both. As sediment clogs stream channels, the risk of flooding increases for owners of adjacent land, and this risk is increased further whenever logging leads to increases in runoff.

Although there is no study that estimates directly the spillover costs associated with the lands affected by the reductions in logging in the PNW, there is evidence one can use to estimate the general magnitude of some of the costs. Of particular interest are the sediment-related costs. According to a study by the US Department of Agriculture (Ribaudo 1989), the off-site economic costs imposed on others by the runoff of sediment in the Pacific states averages \$3.29 per ton of sediment (measured in 1993 dollars). Other studies, such as Grant and Wolff (1991) and Weaver and Hagans (1994) have estimated the impacts of logging and related activities on the amount of sediment in streams, and found that the impact varies from place to place and according to the logging techniques that are employed. Based on 30 years of data associated with a research forest, though, Grant and Wolff determined that clearcutting, alone, can generate an additional one ton, and clearcutting plus roads can generate 3.5 tons per acre per year for about 25 years. These numbers indicate that the off-site spillover costs that logging imposes on others because of sediment-related damage, alone, can be more than \$250 per acre.

With the Northwest Forest Plan, a total of 18.8 million acres are removed from logging. All else equal, this land area reduces the potential sediment-related costs imposed on the general economy by \$4.7 billion over 25 years. This estimate does not take into account the potential threats logging-induced acceleration of landslides pose to human health. Such landslides resulted in the death of four people in Oregon in 1996.

Figure 6.1: Spillover Costs from the Timber Industry That Were Avoided Because of Logging Reductions



Source: ECONorthwest.

The sediment-related costs would be magnified by the costs that arise because conventional logging and related practices increase the flow of flood water from forest lands. From their review of 34 years of data from a research forest in the Oregon Cascades Jones and Grant (1996) found that clearcut areas have higher peak discharges and greater volumes of storm-water runoff than forested areas, and that roads exacerbate these effects. The authors concluded that "Forest harvesting has increased peak discharges [of runoff water] by as much as 50% in [small] basins and 100% in large basins over the past 50 years." These effects persisted for 25 years after an area was logged or roaded. Research to estimate the economic damages associated with such increases in runoff has not yet been completed.

In sum, by reducing logging on federal lands, the decisions to protect owls, salmon, and other environmental concerns have reduced the logging-related spillover costs that otherwise would have accrued to firms in other industries and to workers and households.

Another spillover cost occurs when the timber industry fails to pay the full costs of labor practices that yield high unemployment for the industry's workers. Virtually all employers must pay an annual premium to provide unemployment insurance for their employees. The unemployment-insurance program, in concept, is designed so that, over time, each firm's premiums would balance the amount of unemployment-insurance benefits paid to its laid-off workers. In the past, however, the amount of benefits paid to workers in the timber industry have exceeded the amount of the industry's premiums. For example, between 1980 and 1991 the unemployment-insurance benefits paid to workers laid off from Oregon's lumber-and-wood-products industry exceeded the industry's total premiums by more than \$249 million (measured in 1997 dollars) (Clark 1994). Business owners in other industries, and their workers, bore the burden of making up this difference.

One element of logging's spillover costs that has received a lot of attention is the direct subsidies the timber industry has received from the federal government. The Forest Service has never fully accounted for the monetary costs it has incurred to sell timber, let alone the nonmonetary costs. The Wilderness Society and others have attempted to fill the void and concluded that the timber-sale program consistently has not covered the agency's monetary costs (Wilderness Society 1997; Wolf 1994). Wolf estimates that, between 1983 and 1994, the timber-sale programs of 20 national forests in eastern Oregon, eastern Washington, and Idaho consistently failed to yield a positive return to the Treasury. For the period as a whole, the total appropriations exceeded returns to the Treasury by \$1.3 billion (measured in 1997 dollars). Businesses, investors, and workers outside the timber industry bear nearly all the burden of these subsidies.

In sum, by reducing logging on federal lands, the decisions to protect owls, salmon, and other environmental concerns have reduced the logging-related spillover costs that otherwise would have accrued to firms in other industries and to workers and households. Firms that otherwise would have borne these costs presumably increased their investment, hired additional employees, and paid owners higher profits. This has boosted the regional economy insofar as the sectors that have benefited from the logging reductions exhibit a far greater ability, relative to the timber industry, to generate new jobs and higher incomes.

Logging Reductions Reduce Logging's Adverse Effects on Local Quality of Life (Type 3 Demand)

The quality of life in the Pacific Northwest comprises the various location-specific benefits and costs individuals enjoy or endure by living in the area. The benefits include access to social, cultural, and environmental amenities, and the costs include exposure to social, cultural, and environmental disamenities. As we describe in Chapter 5, if the net quality-of-life benefits are positive, they are analogous to a second paycheck each resident receives, supplementing the first paycheck one receives from an employer or other source of income. The sum of the first and second paychecks determines the overall standard of living for the area's residents. Through its impact on local quality of life, the reduction in logging since 1988 has affected the economic welfare of local residents by changing the current and expected future values of the second paycheck.

The change in these values reflects changes in any or all of the environmental, social, and cultural aspects of the region's quality of life. The most direct effect would occur through the logging-reduction's impact on current and future residents' access to the area's forest amenities. Much of this access and use of forest amenities occurs through self-directed recreation. Although logging can increase some types of recreation, notably motorized sightseeing and exploring, the FEMAT report concluded that, at least on the spotted-owl forests, "there is evidence that there is an excess supply of these more developed, motorized forms of recreation" (Forest Ecosystem Management Assessment Team 1993 p. VI-16). FEMAT researchers also concluded that fishing is one of the highest-valued recreational activities in the Pacific Northwest, and that catch rates and angler days have declined significantly from past decades. These declines are partly attributable to forest-management practices that degrade stream habitat (see, e.g., Meehan (1991)).

In short, logging reductions precluded the expansion of road-related recreation opportunities but, because there are so many miles of forest roads already, the forgone value was negligible. In contrast, by avoiding adverse impacts on streams, the logging reductions had a positive impact on high-value fishing recreation.

Insofar as the logging reductions reduced the amount of environmental degradation, the federal forests are producing a higher level of forest-resource amenities for residents of the Pacific Northwest than otherwise would exist. Among the enhanced amenities are these:

The visual aesthetics of riparian areas. In general, the more natural the appearance of these areas, the greater their aesthetic value. Insofar as the logging reductions maintained the natural appearance, the forests have maintained their amenity value.

The visual aesthetics of some upland areas that otherwise would have experienced timber harvests. The logging reductions allowed these areas to retain their natural appearance.

The aesthetics and water-related recreation associated with streams that experience improvements in water quality, including reductions in sediment.

The aesthetics and recreational opportunities, e.g., whitewater rafting, associated with changes in the quantity and timing of water runoff so that less runoff occurs as peak flow in the spring and more occurs as base flow during the summer.

The visual aesthetics and recreational opportunities associated with increased populations of wildlife related to riparian areas.

It is important to recognize that the quality-of-life values supplement the benefits residents and others derive from the actual recreational use of these amenities. Economic convention ascribes the term, recreational use, to specific trips made to use specific recreational resources. Using appropriately labeled “travel-cost” methods, economists measure the value of such trips by looking at consumers’ willingness to incur costs to travel from their homes to recreational sites, e.g., the fishing hole. Implicitly, economists assume that people decide where to live and work independent of the recreational resource. Hence, if one angler travels from her home in Los Angeles to fish for salmon on a river in western Washington, these techniques would conclude that she places a greater value on the salmon than another who travels from his home in Portland because she incurs greater travel costs. Furthermore, they would conclude that a third angler, who has purchased a house on the river and fishes off the back porch, places very little value on the salmon because he incurs essentially no travel costs to go fishing.

Clearly, this reasoning overlooks the possibility that the third angler places the greatest value on salmon and has based his residential-location decision on a desire to live next to the river. It also overlooks the possibility that the second angler also based his residential-location decision at least in part on a desire to live near the salmon and, on balance chose to live in Portland rather than on the river, or in Los Angeles, or anyplace else. Both the angler living on the river and the one living in Portland may have accepted a reduction in incomes, an increase in housing costs, or both to live closer to the salmon.

How important are quality-of-life considerations in the Pacific Northwest? Although there is no comprehensive answer to this question, there is some strong evidence.

Richard Haynes and other economists at the Forest Service (1992) assessed the economic effects of shutting down various recreation, timber, range, and mineral programs on nine national forests in the Snake River Basin (Oregon, Washington, and Idaho) to protect critical habitat for endangered sockeye salmon. They found that society valued the forgone recreational resources 3-to-4 times more than the sum of the forgone timber, grazing, and mining. Haynes and a colleague, Amy Horne, subsequently compared the value of logs versus the value of services derived from federal lands in the interior Columbia River Basin between the Cascades and Rockies (Haynes and Horne 1997). They found that the services associated with unroaded areas, camping spots, fishing holes, and so forth, provided 89 percent of the total value of all commodities and services derived from those lands in 1995. The value of timber was only 11 percent of the total. Their analysis indicated that, by 2045, timber will have decreased to just 5 percent of the total.

[Haynes and Horne (1997)] found that the services associated with unroaded areas, camping spots, fishing holes, and so forth, provided 89 percent of the total value of all commodities and services derived from [federal lands in the interior Columbia River Basin].

Numerous observers, including the Oregon Employment Division (1993), the Oregon Business Council (1993), the Washington Office of Forecast Council (1994), and various researchers, e.g., Johnson and Beale (1994), have concluded that quality-of-life factors play an important role in local economies. In the 1993 survey of in-migrants to Oregon, conducted by the Oregon Employment Division, for example, most respondents said they moved to Oregon not for direct economic reasons, such as to get a better job, but for quality-of-life reasons. A companion sentiment was expressed the same by Oregonians in a survey conducted by a business group, the Oregon Business Council. When asked if they thought tighter environmental protections would help or hurt the state's economic outlook, three-quarters said it would help.

Without the logging reductions, federal forest resources would have been used to give a short-run boost to the first paychecks of about 9,300 timber workers in the PNW (see the discussion in chapter 3). They also would have boosted the second paychecks for those who prefer the lifestyle associated with logging. With the reductions, the resources give a long-run boost to the second paychecks of everyone in the region who values living in proximity to unlogged forests. Insofar as this shift affects the locational decisions of households, it also affects the size and skills of the region's workforce, and the number and diversity of the firms seeking to employ the workers and/or sell goods and services to the region's households. On average, one should expect that this second-paycheck mechanism favors sectors of the economy with the potential to create jobs and incomes faster than the timber industry. Hence, the net result is that the logging reductions, acting through this mechanism, have stimulated the regional economy.

Logging Reductions Reduce Logging's Adverse Effects on the Forest's Intrinsic Value (Type 4 Demand)

Much of the rhetoric regarding the intrinsic values affected by logging reductions on federal lands in the Pacific Northwest focused on preventing the extinction of spotted owls. In truth, though, much more has been at stake. Economists from the U.S. Fish and Wildlife Service observed that the spotted owl ...

“... is only one of several hundred vertebrate species occurring in the Pacific Northwest. Among ecosystems in the United States and Canada, the Pacific Northwest has one of the highest numbers of bird species, the most bird families, the second highest number of mammal species, and many endemic or relic amphibian species and many unique species of birds, mammals, amphibians, arthropods, soil organisms, plants, and fungi. Redwood and Douglas fir forests accumulate more biomass than tropical forests. Most of these species are dependent on forested habitats of the Pacific Northwest. This species richness and abundance of wildlife depends to a large extent on the presence of mature and older forests, and as forests decline in size or are further fragmented, additional species may become threatened or endangered. The forests also provide protection to the soils, particularly on steeper slopes, and maintain higher water quality with lower sediment yield. The river systems draining these watersheds continued an abundance of salmonid species as well as other instream fauna and flora.”

“Timber harvest followed by slash burning has resulted in a dramatic alteration of the natural system, changing the forest structure, function, and composition. ... In an effort to promote maximum forest product yield, managed stands are scheduled for harvest every 50 to 90 years, preventing the development of older forest characteristics and maintaining early successional stages. ... Management strategies designed to provide 50 to 90 year old trees for harvest on public lands in the Northwest are not likely to provide the same benefits to regional biodiversity as would stands managed at longer rotation lengths, nor will they provide the same benefits that are found in areas protected from clearcut techniques” (Schamberger et al. 1992 pp. 71-72, citations deleted).

In short, the ecological stakes in the PNW forests are high. They have become even higher since Judge Dwyer’s ruling in 1991, as the region has learned more about the significance of declining populations of salmon, bull trout, marbled murrelets, and other species dependent on old-growth forests.

The ecological threats are important economically, and not just inside the region. Swanson and Loomis (1993) demonstrate that essentially all Americans place a high value on maintaining the viability of ecosystems throughout the country, even ecosystems far removed from their homes. Hagen, Vincent, and Welle (1992) tested this notion by conducting a nationwide survey to determine the extent to which Americans will state that they are willing to pay money to protect the spotted-owl forests. The results were powerful. Respondents indicated they believed the benefits of protecting the old-growth, spotted-owl forests would be between 3.5 and 14.1 times greater than the costs. This ratio has undoubtedly grown since then. When the survey was conducted, timber-industry supporters largely held the public-relations stage with their message of certain economic calamity if decisions to protect spotted owls were sustained. Since then, the region has demonstrated that the costs of logging reductions are much smaller than predicted, and the increasing peril to salmon and other species has accentuated the importance of taking actions to prevent ecological deterioration.

Reflections

Many things have changed in the PNW’s timber industry and regional economy since the spotted owl flew into the region’s collective consciousness. By the time Judge Dwyer prohibited timber sales on the spotted-owl national forests, the timber industry had nearly completed the shift from an industry with a surfeit of large, old trees enabling it to produce products and pay wages superior to those elsewhere, to an industry using small trees, employing far fewer workers at lower wages, and encountering strong national and global competition. Despite this shrinkage in economic stature, the industry’s advocates clung to their memories. In their denial of reality, they believed, often fervently, that the industry would reenter the Golden Age of abundant jobs and high wages, if only the American people—the owners of federal lands—would ignore the adverse economic and environmental consequences of logging and continue to allow high levels of logging.

The juxtaposition of the changes in the timber industry with those in the economy strongly suggests that the economy now derives more strength from the various services provided by the region’s forest than it derives from logs.

Why Did Logging Reductions in the 1990s Have So Little Economic Impact, Compared to Those in the Early 1980s?

The timber industry was smaller—it had slashed jobs and wages since 1979.

Instead of exporting logs, the timber industry processed them in PNW mills.

The timber industry increased imports of logs for processing in PNW mills.

The timber industry retooled so it could use the small logs available in the 1990s.

The timber industry increased value-added manufacturing of raw material.

The timber industry was a smaller part of the 1990s' larger, more diversified economy.

The timber industry could not provide stable communities.

The logging reductions stimulated some non-timber components of the economy:

- They increased the PNW's quality-of-life attractions for many workers, business managers, and investors

- They reduced the spillover costs the timber industry imposes on business and households

- They reallocated resources to industries that have a greater ability, relative to timber, to generate jobs and incomes

The change in the regional economy has been no less profound than what occurred in the timber industry. Where business leaders and public officials once saw the necessity of developing more land and logging more trees to increase prosperity and maintain interregional competitiveness, they now speak of curtailing growth, increasing education, and maintaining environmental quality as the keys to competing in a global economy. In 1989, the State of Oregon adopted a strategic plan focused on enhancing education, environmental quality, and international connections and addressing concerns for the timber industry almost as an afterthought (State of Oregon 1989). A survey of in-migrants in Washington (Salant et al. 1996) found that more than 2,500 per year are engineers, writers, small manufacturers and others who bring their jobs with them and live wherever they want. These so-called lone eagles—which, together, have economic impacts equivalent to a new industrial plant with more than 2,500 employees—are the most obvious segment of the population that chooses to work and live in the PNW based largely on quality-of-life considerations.

The juxtaposition of the changes in the timber industry with those in the economy strongly suggests that the economy now derives more strength from the various services provided by the region's forests than it derives from logs. Clean water is more important to the region's economic health than streams muddied by logging roads, scenic vistas are more important than clearcuts, and ecosystem integrity is more important than fragmentation.

Many remain uncomfortable with the notion that intangible forest-related services are more valuable than tangible logs, however, and believe these changes are unique to one region and one point in time. Will other regions necessarily prefer logs to forest-related services? Will the Pacific Northwest eventually have to turn its back on logging-reduction decisions of the past decade and once again turn to the forests primarily for logs? No, and no. The experience of this region's response to logging reductions is part of larger forces and trends:

States with the best economic performance typically have the highest environmental quality (Meyer 1993; Templet 1995).

States with the most stringent actions to protect threatened and endangered species typically have the best economic performance (Meyer 1995).

Counties with scenic and other natural-resource amenities typically exhibit stronger economic performance, in terms of jobs and incomes, than counties with concentrations of extractive industries, such as logging, agriculture, and mining (Drabenstott and Smith 1996).

Counties adjacent to wilderness typically exhibit stronger economic performance, measured in of jobs and incomes, than others (Rudzitis and Johansen 1991; von Reichert and Rudzitis 1992).

A tiny fraction of the workers affected by layoffs involving more than 50 manufacturing workers are laid off for environmental reasons (Goodstein 1995).

Decisions to promote environmental quality have not created long-run unemployment in the U.S., caused plant shutdowns, or forced U.S. firms to flee to developing countries with lax environmental regulations (Goodstein forthcoming).

Taken together, the information in this report tells us that the logging reductions on federal lands in the Pacific Northwest are an integral part of, and not an impediment to, the region's economic evolution. Although judicial, administrative, and political processes triggered the logging reductions, the reductions were manifestations of market forces. These alternative mechanisms were the only means available to respond to shifts in the competition for forest resources. As the economic forces underlying the recent logging reductions push forward, they will continue to exert powerful, mounting pressure for additional reductions in the future.

Taken together, the information in this report tells us that the logging reductions on federal lands in the Pacific Northwest are an integral part of, and not an impediment to, the region's economic evolution

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