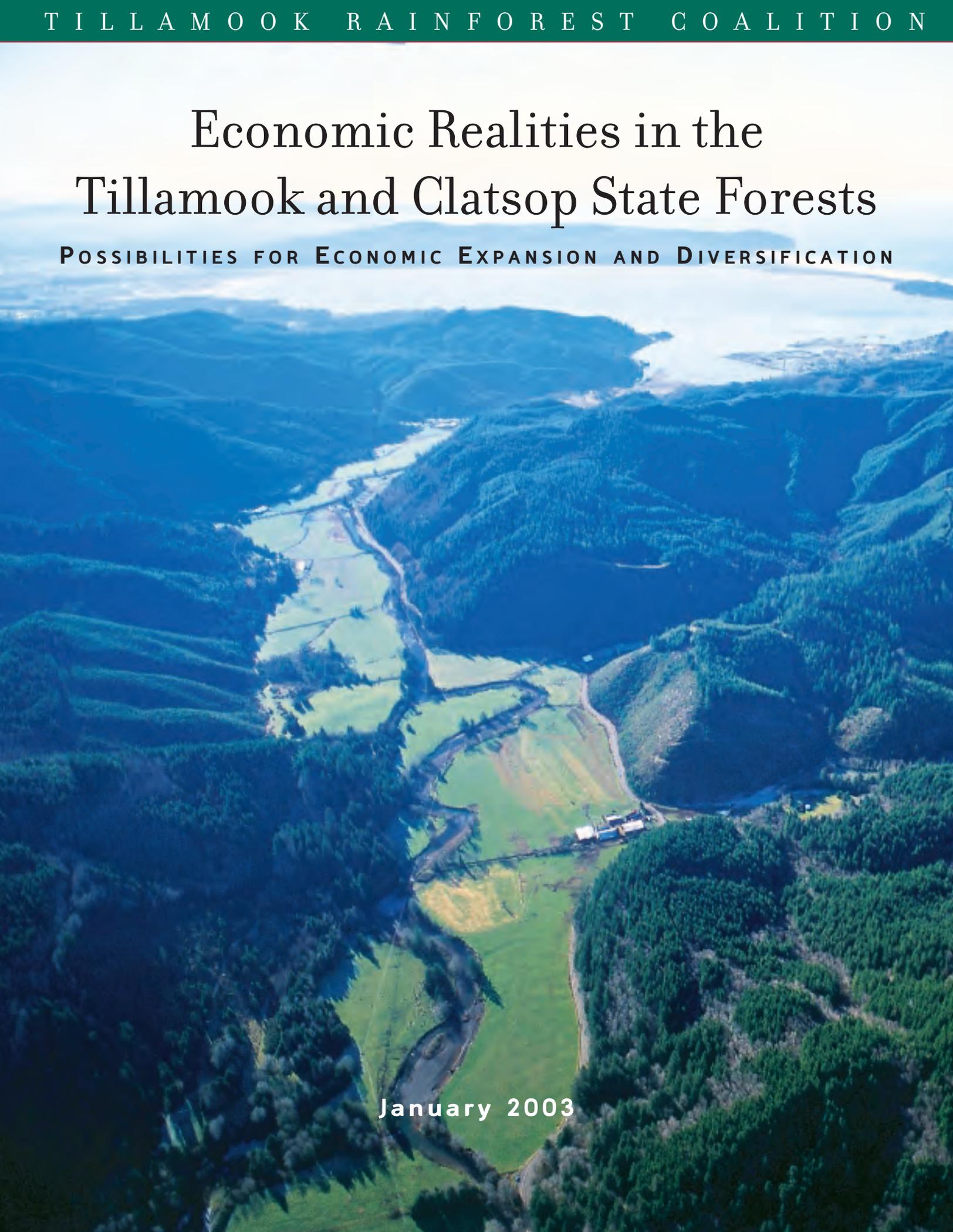


Economic Realities in the Tillamook and Clatsop State Forests

POSSIBILITIES FOR ECONOMIC EXPANSION AND DIVERSIFICATION

January 2003



MISSION STATEMENT

for the Tillamook Rainforest Coalition

Inspire Oregonians to protect the health of the Tillamook, Oregon's Coastal Rainforest, to provide clean drinking water, abundant fish and wildlife, recreational opportunities, livable communities and healthy economies—today, for tomorrow.



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Economic Realities in the Tillamook and Clatsop State Forests

POSSIBILITIES FOR ECONOMIC EXPANSION AND DIVERSIFICATION

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January 2003



:: Foreword

The Tillamook Rainforest Coalition, an alliance of businesses, non-profits, and individuals, is pleased to present an independent study entitled: "The Economic Realities in the Tillamook and Clatsop State Forests: Possibilities for Economic Expansion and Diversification"

We'd like to thank the Bullitt Foundation for their generous support of this study. We'd also like to recognize authors Thomas Power, Professor of Economics and Chairman of the Economics Department at the University of Montana and Phil Ruder, Associate Professor of Economics at Pacific University in Oregon.

The Tillamook Rainforest Coalition focuses its efforts to preserve key watersheds within the last, largest, unfragmented expanse of unprotected coastal temperate rainforest in the lower 48 states. Encompassing over 500,000 acres, these state lands provide clean drinking water, abundant fish, diverse wildlife, recreational activities and economic opportunities to the citizens of Oregon.

Many people still associate this area with "The Tillamook Burn" — a series of forest fires attributed to archaic logging practices — that swept the area in the 1930's, 40's, and 50's. After the fires and intensive salvage logging, Oregonians adopted this area and restored it to health utilizing their tax dollars for reforestation.

Now that the Oregon Department of Forestry plans to log more than 85% of the forest over the next century, Oregonians are once again becoming involved.

Power and Ruder analyzed the economic ramifications of a 50% reserve based forest management plan and compared them to the current management plan. They came to the following conclusion:

Upon consideration of the economic effects of an alternative management plan... we have concluded that a 50% reserve plan is more likely to lead to increased economic growth than the ODF's current plan.

Through their findings, reported here, we hope that the reader will agree that the protection and sustainable use of the Tillamook Rainforest will be good for the health of our environment and the economic prosperity of northwest Oregon.

Please take the time to review the enclosed study. We welcome your questions and comments.

Sincerely,

Guido Rahr, Chairman

Tillamook Rainforest Coalition

:: Table of Contents

Executive Summary	i
1. Introduction	1
2. Measuring the Economic Consequences of State Forest Management Decisions	7
3. Lumber and Wood Products Industry Impacts	15
4. Impacts on Local Schools and County Governments	37
5. The Economic Consequences of the Fifty Percent Reserve Proposal	47
Appendices	
I. The Role Protected Landscapes Play in Supporting Local Economic Vitality	59
II. Verifying Employment Effects	65
References	69
About The Authors	75



Bob Fields

State forest managers must balance timber production with clean water, recreation, and healthy ecosystems for Oregon's economic prosperity in the 21st century.

:: Executive Summary

Economic Realities in the Tillamook and Clatsop State Forests: Possibilities for Economic Expansion and Diversification

OREGON'S RAINFOREST

The Tillamook and Clatsop State Forests, which consist of low-elevation temperate rainforests situated between the Portland Metropolitan Area and the Pacific Coast, provide unique wildlife habitat in an area of the state where little other public land exists. The Tillamook and Clatsop State Forests together constitute more than half of all state lands in Oregon – 518,000 (57.6 percent) of the 899,000 total acres. These State Forests have supported logging operations overseen by the Oregon Department of Forestry (ODF).

Historically, timber harvests on state lands have made up a small fraction of total Oregon harvests due to the

relatively small land base owned by the state and, until recently, the immaturity of much of the timber on state lands. Between 1980 and 1996, log flows from state lands made up an average of 2.8 percent of the total harvest in the state. In 1997 and 1998 harvest levels on state forests increased, while harvests on federal lands continued to plummet; harvests from state lands then reached 4.2 percent of the total harvest in the state.

By 1999 and 2000 harvest volumes on the Tillamook and Clatsop State Forests more than doubled in size relative to the first half of the 1990s. The share of harvests on state lands in the total state harvest amounted to 6.6 percent. Locally, in Clatsop and Tillamook Counties timber harvests



Jeffrey Lee Mischler

Oregon's coastal temperate rainforest is home to more than 100 species of fish and wildlife.

Despite the cautions of independent forest biologists and the agency's own scientific advisory panel, the ODF has rejected alternative management approaches, including a plan to designate fifty percent of the forests as reserves to be managed primarily for habitat and recreation.

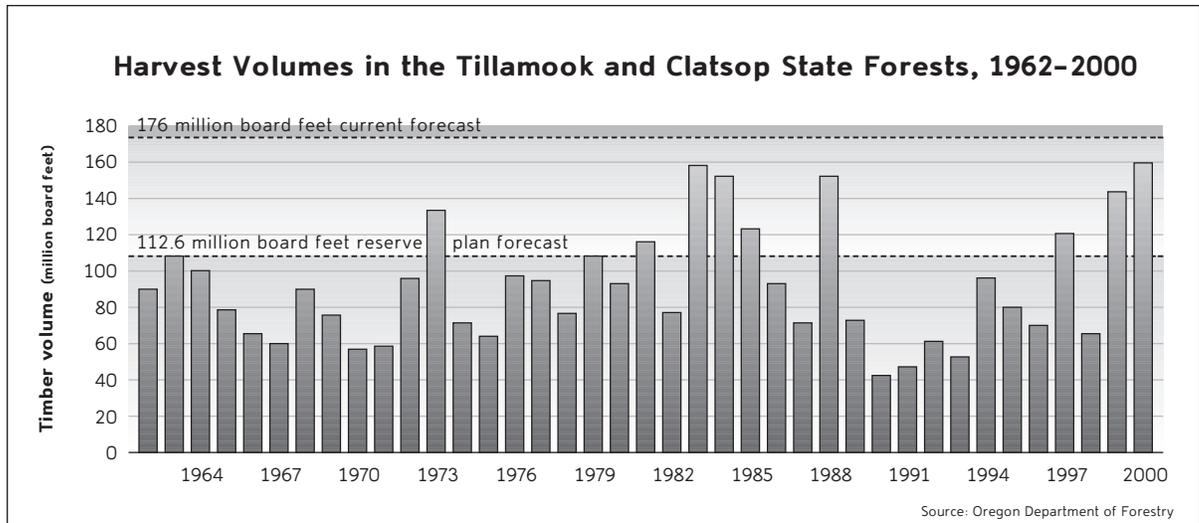
from state lands comprise a considerably higher share of total harvests. Between 1980 and 1996, timber harvests from state lands in Clatsop and Tillamook Counties made up 21.6 percent of total harvests in those counties. In 1997 and 1998 harvests from state lands constituted 25.4 percent of the total in those counties, and, by 1999 and 2000, that share had grown to 36.5 percent as the harvest from state lands swelled.

The current management plan, approved by the Board of Forestry in January 2001, envisions a continued aggressive increase in timber harvest volumes on the forest.

THE WRITING ON THE WALL

Despite the cautions of independent forest biologists and the agency's own scientific advisory panel, the ODF has rejected alternative management approaches, including a plan to designate fifty percent of the forests as reserves to be managed primarily for habitat and recreation.¹ Historically, local county officials, dependent on timber revenues for part of their budgets and long used to considering the state forests as tree farms to be managed to generate revenues for local government units, have supported ODF plans to increase timber harvests. At present, approximately fifty percent of gross revenues from timber operations on the Tillamook and Clatsop State Forests fund the costs of government operations such as road building and ODF administration, while the remainder is distributed to Clatsop, Columbia, Tillamook and Washington Counties.

Although the ODF differentiates its forest management strategy from nearby privately owned timber lands by maintaining comparatively long



Based on ODF data, timber harvest volume levels have only exceeded those called for in the 50% reserve plan 9 out the last 38 years.

rotations, the ODF has emphasized narrowly defined economic considerations as it has approved timber sales and neglected important forest values such as recreational opportunities, fish and wildlife habitat, and water quality.

QUESTIONABLE ASSUMPTIONS

In its own economic analysis of the current plan, the ODF makes a number of questionable assumptions about the impact of logging activity in the state forest. This study challenges those assumptions and compares the economic impact of the current plan with the economic impact of an alternative fifty-percent reserve plan. It is our contention that the ODF has misrepresented the economic ramifications of the various management alternatives open to it as it accelerates logging on the maturing state forests in Tillamook and Clatsop State Forests. ODF analysts have inflated predictions of positive impacts on area economies associated with the increased commercial timber harvests under its current plan. The relationship between harvest from one source of supply and forest products employment is not a fixed arithmetic relationship that can be accurately captured through the use of multipliers such as those used by the ODF in its analysis.

ECONOMIC REALITIES

Upon considering the economic effects of an alternative fifty-percent reserve plan for the state forests, we have concluded that the fifty-percent reserve plan is more likely to lead to increased economic growth, both for the Portland Metro Area economies and for the economies of the rural counties adjacent to the forests, than the ODF's current plan. Given the importance of natural amenities in attracting businesses and households to a region, the reserve strategy seems more likely than the current forest management plan to support expanded job and income creation and economic vitality in Clatsop and Tillamook Counties during coming decades.

While the slower growth in timber harvest volumes under the fifty-percent reserve strategy would lead to less growth in local lumber and wood products industries, the job and income creation at stake in those sectors is certainly less than predicted by the ODF. Moreover, the slower growth in forest products

ODF analysts have inflated predictions of positive impacts on area economies associated with the increased commercial timber harvests under its current plan.

iv :: Economic Realities in the Tillamook and Clatsop State Forests

sectors will allow increased growth in other sectors of the economy. The actual performance of the Clatsop and Tillamook County economy during the past three decades provides evidence supporting our predictions rather than those produced by the ODF. The effect of historical changes in harvest levels on state lands on total employment in Clatsop and Tillamook Counties appears to be zero. For that

Given the importance of natural amenities in attracting businesses and households to a region, the fifty-percent reserve plan seems more likely than the current forest management plan to support expanded job and income creation and economic vitality in Clatsop and Tillamook Counties during coming decades.

reason, although the different timber harvest volumes under the current management plan and the fifty-percent reserve alternative would likely affect the size of the local lumber and wood products industries, it would not impact the size of the local economies as a whole.

SCHOOL FUNDING

Contrary to the contention of the ODF, changes in county school revenue from the Tillamook and Clatsop State Forests would have virtually no effect on school budgets in the counties because of offsetting changes in payments from the state. In addition, only about a fifth of any change in gross county timber revenues would affect government services in Clatsop and Tillamook Counties. While the fifty-percent reserve plan would result in a small (\$500,000) reduction in timber revenues funding county governments relative to average levels between 1992 and 2001, this small reduction in county government timber revenues would likely be eclipsed by economic gains elsewhere in the counties resulting from forest protection.

At the state level, the small share of the state forests in the Oregon state total harvest – 3.0 percent on average during the 1990s, though 6.6 percent in 2000 – implies that changes in the timber harvest on the Tillamook and Clatsop State Forests would have little impact on the state timber industry and on the Oregon economy. Slower growth in timber harvests from these state forests will affect the forestry and wood products industries in Clatsop, Tillamook, and Washington Counties. However, wood products industries comprise a very small part of the Washington County economy. Even in the coastal counties wood products industries do not dominate local economies as in years past, and the impact of a fifty-percent reserve plan would in all likelihood be small relative to other economic events affecting the counties during the next decade.

REAL NUMBERS

Placed in the context of the broad local and state economies, the impact of slower state timber harvest growth on forest products industries seems unlikely to dampen long-run growth in the region. Clatsop and Tillamook counties combined added about 600 jobs a year between 1988 and 1999. Washington County added 10,000 jobs a year. Over a ten-year period, those rates of job creation would add 6,000 and 100,000 jobs, respectively, in Northwest Oregon. The employment opportunity cost of establishing a permanent forest preserve that would provide valuable environmental services indefinitely into the future would be that employment over the next two decades would grow at 2.3 percent per year instead of 2.4 percent per year. In that context, a predicted difference of 200 logging and wood products jobs over a twenty-year period would not appear to be a primary determinant of local economic vitality.

According to Oregon Employment Department Covered Employment and Payroll data, 10.4 percent of the state's 831,216 employees covered by unemployment insurance worked in wood products

industries in 1976. Twenty-four years later, forest products industry operations employed only 3.5 percent of Oregon’s 1,607,911 workers. **The decline in income and jobs in forest products industries occurred primarily in the wake of the deep recession of the early 1980s, even before the spotted owl controversies that drastically reduced the flow of timber from federal forest lands.** The planned increases in timber harvests on state lands would not reverse that decline in the forest products industries.

The decline of the share of personal income and jobs provided by lumber and wood products industries in Clatsop and Tillamook Counties has been far more dramatic than that in the state as a whole. By 2000, only 4.6 percent of 23,571 covered workers were employed by the wood products industry in Clatsop and Tillamook Counties and the share of personal income produced in these industries fell from 14.3 percent in 1969 to just 3.3 percent in 1999. Retirement, investment, and public assistance income in the counties ballooned from a 27.4 percent share of personal income in 1969 to a 44.3 percent share in 1999, reflecting primarily a large increase in the retiree population in the counties.

ODF’S PLAN

The 10-year Implementation Plans (IPs) derived from the current ODF Forest Management Plan (FMP) project sustained harvests from the Tillamook and Clatsop State Forests at levels even higher than those of 1999 and 2000. The IPs predict average annual harvest levels of 175 million board feet from the Tillamook and Clatsop State Forests between 2001 and 2010, a 16.1 percent increase over the 151.6 million board feet average annual harvest in 1999 and 2000 (ODF 2002c). The fifty-percent reserve alternative management approach is predicted to result in harvest levels from the Tillamook and Clatsop State Forests of 112.6 million board feet per year for the next twenty years – higher than average harvests before 1999, but below projections based on the current FMP.

The difference between county government revenue in fiscal year 2001 and projected revenue under a fifty-percent reserve plan is small when compared to the volatile changes in timber revenues to which the counties have adjusted during the past decade.

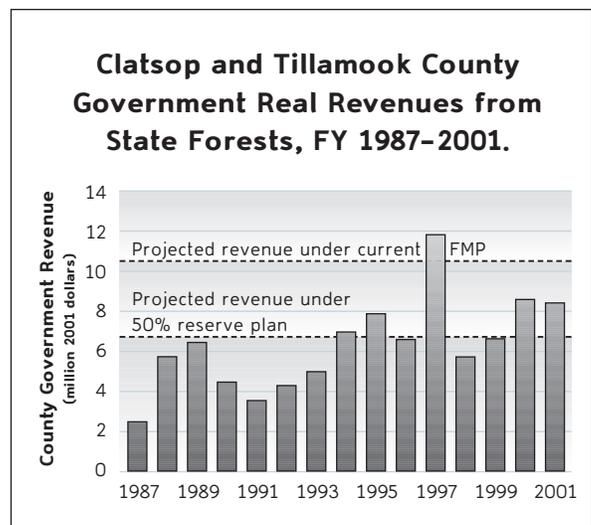
In particular, the adjustment between fiscal years 1996 and 1998 stands out. Revenues nearly doubled in real terms between fiscal years 1996 and 1997 and then fell by half, yet swings in county government

spending were not nearly as pronounced. Phasing in a reserve plan on the Tillamook and

The planned increases in timber harvests on state lands would not reverse that decline in the forest products industries.

Clatsop State Forests over several years would be expected to cause little disruption in county services given the small magnitude of the changes in revenue as a proportion of historical timber revenues and as a share of total revenues.

The reduction in Clatsop and Tillamook County government revenues from timber sales on state lands in the counties appears especially modest when considered in the context of county revenues from all sources. Even if no funding from other sources replaces the timber revenues in question, the predicted \$1.8 million (3.3 percent) decrease in county government revenues from present levels





Coast Range Association

The Oregon Department of Forestry plans to significantly increase roadbuilding and logging on Tillamook State Forest lands surrounding Barney Reservoir, a major source of clean drinking water for hundreds of thousands of Washington County residents.

would not spell catastrophe for the counties.

Unfortunately, the ODF has neglected other economic values associated with the Tillamook and Clatsop State Forests. These include recreational values, salmon-fishery values, drinking water values,

and tourism. For the larger 14-county Northwestern Oregon region, tourist spending reached \$3.8 billion in 2000, increasing 52 percent in real

By 2000 tourist spending was directly responsible for 65,000 jobs, generated \$1.1 billion in earnings, and contributed \$58 million to local taxes.

terms since 1991. By 2000 that tourist spending was directly responsible for 65,000 jobs, generated \$1.1 billion in earnings, and contributed \$58 million to local taxes.

A 1994-1995 survey of recreation use of Oregon State Forests by Oregon State University and the Oregon

Department of Forestry estimated that the net economic value received by visitors to the forests was \$128.11 per trip. Adjusting for inflation, this would be \$151 per trip in 2002 dollars. The net economic value to hunters was even higher, \$191 per trip.

A BALANCED APPROACH

A change in management strategy that placed primary emphasis on habitat values and recreation opportunities promises to increase substantially the number of visits to the forest. **At present, the recreation potential of the forests remains largely untapped due to management policies that emphasize commercial timber production over providing recreation opportunities.** The proportion of logging roads to hiking and biking trail miles provides evidence of the historical neglect of the recreation potential of the forests.



Bob Van Dyk

Roads like this one on state land block streams and can cause severe erosion during big storms.

MISPLACED PRIORITIES

ODF management budgets underscore the low priority assigned to recreation on the Clatsop and Tillamook State Forests (Table 5.2). In fiscal year 2001, functions related to social objectives – including recreation – received 8.2 percent of total funding at the district level. The Forest Grove District, situated closest to Washington County communities, devoted by far the most resources (16.2 percent) in proportion to its total budget to social objectives. The Tillamook District spent 10.4 percent of its budget on non-timber objectives. The Astoria District, which constitutes all 154,000 acres of the Clatsop State Forest, is situated just a short drive to the east of the thriving tourist centers on the coast and contains nearly all of the older, more complex forests in the Oregon North Coast Range as well as renowned fishing streams. **The Astoria District allocated only 1.1 percent of its expenditures to non-timber objectives.**

The limited information about recreational opportunities and the limited infrastructure maintained in the Tillamook and Clatsop State Forests have limited their appeal to visitors in the region. At the time of this printing, virtually no mention is made of the trails and campsites in the state forests in Web sites maintained by the many Chambers of Commerce hoping to draw visitors to coastal towns in Clatsop and Tillamook County. At the time of this writing, even the Web site of the Oregon Tourism Commission (<http://www.traveloregon.com/>) makes no mention of outdoor recreation on the Tillamook and Clatsop State Forests, nor does the site offer a link to ODF information sources. While ODF recreation managers have recently published an excellent map of the Tillamook State Forest for recreationists and are working to increase trail miles and visibility, making recreation a priority over commercial timber on half of the forests would certainly increase visits to the forests and create value for the citizens of Northwest Oregon.

ABUNDANT FISH & WILDLIFE

The Tillamook and Clatsop State Forests provide the habitat for rearing salmon, steelhead, and cutthroat trout. One economic study focused on the Tillamook Bay Basin alone estimated that management of that watershed in a way that supported recovery of the salmon fishery to historical levels would generate \$26.2 to \$52.4 million dollars a year in annual benefits (Radtke and Davis 1997 pp. 26-29). This study also estimated that the annual economic return in salmon values to a mile of forest stream that is not damaged by timber harvest may be as high as \$4,500 (Radtke and Davis 1997 p. 14).

CLEAN WATER

About 350,000 people residing in Washington County and in many coastal communities obtain drinking water from streams that originate in the Tillamook and Clatsop State Forests. Two major reservoirs for water systems in Washington County – Barney Reservoir and Hagg Lake – lie in watersheds made up in large part by Tillamook State Forest Land (Bushman 2002).

In some areas of the Coast Range, logging and road-building have been associated with a five-fold increase in slide activity. The road construction necessary to conduct timber operations is known to increase the sedimentation of streams and reservoirs (Harr and Fredriksen 1988, Miner 1968, Beschta 1978, Fredriksen 1965 and 1970, and Harr et al. 1975 cited in Radtke and Davis 1996). In some areas of the Coast Range, logging and road-building have been associated with a five-fold increase in slide activity (Radtke and Davis 1996). Increased sedimentation results in higher filtration costs as well as the need to

expand reservoir capacity. The costs of removing sediment from water at treatment plants amounts to \$17.11 per thousand tons discharged (Holmes 1988, cited in Radtke and Davis 1996). The costs of raising the Hagg Lake Dam to increase capacity have been estimated to lie between \$1500 and \$2200 per acre foot of added capacity (Montgomery Watson 1999). Decreasing sedimentation through forest protection can provide significant cost savings.

CONCLUSION

Population growth, continued growth in real personal incomes, and increasing scarcity of natural forest land assures increasing value of standing, mature forests to the local economy. The attractiveness of the natural setting in Oregon is important for businesses increasingly free to choose their geographical location. **Many residents are drawn here because of the outdoor recreation, wildlife habitat, fisheries, open space, and water quality of the region. Because of this, accessible forested public land such as those found in the Tillamook and Clatsop State Forests offer the promise of greater economic vitality and prosperity to Oregon residents.**

¹The management plan passed by the Board of Forestry in 2001 corresponds to Sessions alternative 1C-2 in the Sessions (2000) report: structure-based management (SBM) with a Habitat Conservation Plan (HCP) and aggressive treatment (clearcutting) of stands affected by Swiss needle cast.

:: Chapter 1

Introduction¹

The Tillamook and Clatsop Oregon State Forests consist of 518,000 acres in more than 800 square miles of temperate rainforests situated between the Portland Metropolitan Area and the Pacific Coast. Although the long history of logging and fires on these forests has eliminated all but a few remnants of old growth, the vast forested landscape provides unique wildlife habitat in an area of the state where little public land exists outside of the state forests. The steep, rugged valleys of the forests have been shaped by some of the healthiest salmon streams in the Pacific Rim. The forests lie at the edge of the prosperous Portland Metropolitan Area whose residents are noted for their concern for environmental quality and access to outdoor recreation opportunities. Despite a long and precipitous decline in once-dominant lumber and wood products industries, many coastal communities now thrive by attracting visitors from the Portland Metropolitan Area and elsewhere in the Pacific Northwest.

The Oregon Department of Forestry (ODF) recognizes the importance of what it labels "social" and "environmental" values and has adopted longer rotation cycles and otherwise differentiated itself from the private industrial forest managers operating on adjacent lands. However, despite the cautions of independent forest biologists and the agency's own scientific advisory panel, during future decades the ODF plans to log virtually all but the "silviculturally incapable" (rocky) land, riparian buffers, and possibly several spotted owl sites in the Tillamook and Clatsop State Forests.² The ODF has rejected alternative management approaches, including a plan to designate fifty percent of the forests as reserves to be managed primarily for habitat and recreation, in large part because of what it labels "economic" values. Local county officials, dependent on timber revenues for part of their budgets and long used to considering the state forests as tree farms to be managed to generate revenues for government units, have exerted constant pressure on the ODF to increase timber harvests, also citing "economic" considerations.

We contend that the economic ramifications of the various management alternatives open to the ODF have been fundamentally miscast during the long planning process that resulted in the current management approach. The ODF analysts have inflated predictions of positive impacts on area economies associated with the increased commercial timber harvests under the current plan. More problematically, the economic reports prepared as the current management plan was developed entirely ignored the positive economic impacts associated with preserving half of the forests. Upon considering the economic effects of a fifty-

2 :: Economic Realities in the Tillamook and Clatsop State Forests

percent reserve plan for the state forests, we have concluded that the fifty-percent reserve plan is more likely to lead to increased economic growth both for the Portland Metro Area economies and for the economies of the rural counties adjacent to the forests.

We wish to provide a more accurate picture of the economy to guide forest managers as they develop future plans for the forest. In many ways, a more preservationist approach to managing the Tillamook and Clatsop State Forests would result in economic benefits for residents of nearby counties. The choice between emphasizing commercial timber harvests throughout the state forests and an alternative approach that designates half the forests to be managed primarily for water quality, habitat, and recreation should not be characterized as a choice between economic and environmental values. Rather, planners should understand the alternatives they will consider as competing visions of economic prosperity.

Increasing timber harvests by conducting commercial timber operations throughout the state forests represents an attempt to boost traditional natural resource industries that have been in decline for a quarter century, a trend that is expected to continue regardless of management practices on state lands. The expected increase in timber operations during the coming decades diminishes the environmental values that have played an important role in the economic success story of the region during the past decade. Managing half of the state forests to foster environmental values rather than commercial timber values will enhance the values upon which the growing sectors of the adjacent economies depend.

ODF analysts projecting dramatic local employment changes as a result of changes in harvest volumes on state forests have relied on the economic-base model that views lumber and wood products shipments from the local economy as supporting the local sector.³ Within the framework of the economic-base model, a region can finance local economic activity only by earning income through exporting goods and services to other regions. The economic-base model predicted economic collapse in Oregon due to reductions in federal timber harvests during the 1990s. The model's prediction of an economic boom in the rural counties adjacent to the Tillamook and Clatsop State Forests if timber harvests from state lands are increased seems certain to be just as wrong as the earlier prediction of economic collapse proved to be.

The perception that the health of the coastal county economies depends on the historically important lumber and wood products industries results from a backward-looking "rearview mirror" perspective on economic vitality. Careful examination of present circumstances and future prospects in the Portland Metropolitan Area and in the rural counties surrounding the state forests leads to a very different understanding of the economy. In the forward-looking view through the windshield, the health of a regional economy depends on its ability to attract households and businesses to locate in the region. The great success of the high-tech industry in Washington County and the growth of the coastal economies due to the in-migration of numerous retirees and to burgeoning tourist visits cannot be explained by the economic-base model but, rather, have depended on the high-quality natural amenities offered by towns and cities in Northwest Oregon.

Future developments in the rural counties adjacent to the Tillamook and Clatsop State Forests seem likely to increase the role of environmental amenities in supporting economic vitality. Not only are the current positive trends in industries dependent on new residents, retirees, and tourists likely to continue but so, too, is the decline in lumber and wood products industries employment and income. The coastal communities adjacent to the state forests are more closely connected with the urban economies of the Willamette Valley than are rural areas elsewhere in the state. As developments in Information Technology continue to shrink the globe, the positive spillovers from the Willamette Valley to the coastal communities seem likely to increase in part due to the presence of environmental amenities offered by surrounding ocean and forests.

The fifty-percent reserve

The fifty-percent reserve strategy represents the midpoint between the extremes studied by the ODF – managing the entire forests for commercial timber and designating the entire forest a reserve – and thus seems an appropriate focus of our effort to broaden understanding of the contribution of the forests to economic value and economic activity in the Northwest Oregon. The availability of the ODF’s analyses of the fifty-percent reserve scenario, in particular that by Sessions (2000), made it possible to examine in detail the likely impacts of changing harvests from the state forests. The fifty-percent reserve alternative is also predicted to leave harvest volumes and county revenue forecasts very near their average levels during the past decade, so the prospect of designating large reserve areas is not likely to be accompanied by economic dislocation in lumber and wood products sectors. As the forestlands rehabilitated in the 1950s and 1960s continue to mature, their productive capacity is growing rapidly so half the forest area can now sustain harvest levels close to those of the entire forest during the 1990s. Since thinning would continue for several decades until the young stands in reserve areas reach older forest structure (OFS), harvests during the first decades of the reserve plan studied would exceed average levels during the 1990s.

We adopt Sessions’ (2000) assumptions regarding the fifty-percent reserve strategy. Fifty percent of the management basins are assumed to be reserves, thinned until OFS is achieved; the other fifty percent is assumed to be managed according to the structure-based management (SBM) policies developed by the ODF (2001a). OFS and Layered (LYR) stands cover 20 percent–30 percent of the managed forest each, averaging 25 percent each. Northern spotted owl and marbled murrelet habitat is assumed to be accommodated within the 50 percent managed reserve areas. No harvest is assumed to take place in aquatic and riparian areas. A habitat conservation plan (HCP) is assumed to be in place and based on reserve areas rather than take avoidance or other strategies in the 50 percent of the forests managed by the ODF. No flow constraints have been placed on harvest volumes in this iteration of the Sessions model. In addition to basins containing presently known spotted owl and murrelet habitat, Sessions placed basins initially identified by Oregon Department of Fish and Wildlife as “core areas” for coho in the reserve area for the purposes of his modeling exercise.⁴

If the ODF moved to consider seriously a fifty-percent reserve plan, no doubt the details of the plan would differ from those assumed by Sessions (2000) and here. For example, if the ODF responds aggressively to Swiss needle cast in ODF managed areas under a reserve plan, harvest volumes during the first two decades of the plan will be higher and our estimates will have overstated the reduction in harvest volume growth under the reserve plan. On the other hand, if thinning occurs in reserve areas only until stands reach LYR, our estimates will understate those impacts.

The scope of analysis

Substantial portions of the Tillamook and Clatsop State Forests lie in Clatsop, Tillamook, and Washington Counties. A small part of the forest lies in Columbia County. Schools and local governments in those four counties receive about half of the gross revenue generated by timber sales on the state forests. Mills in those counties and elsewhere in Northwest Oregon process logs harvested in the Tillamook and Clatsop State Forests.

4 :: Economic Realities in the Tillamook and Clatsop State Forests

Because of the concentration of about 90 percent of these state forests in Clatsop and Tillamook Counties, the impact of lumber and wood products industry effects and government payments in Washington County are very small relative to other economic activity there. Because of the small size of those Washington County effects and limits on the resources available for this study, we focus primarily on economic impacts in Clatsop and Tillamook Counties. Where relevant, we broaden our analysis to include effects in Washington County and in Northwest Oregon. The ODF (1996) notes that employment and income impacts in the wider region are about double those in Clatsop and Tillamook Counties alone, and this ratio can be applied to our estimates to approximate possible impacts in Northwest Oregon.⁵

Overview of the study

The next chapter of this study presents our understanding of the economy. This understanding conflicts deeply with the economic-base model employed by the ODF (1996). It is important to clarify the differences in methodology that lead to very different predictions regarding economic outcomes under current management practices in the forests and under a fifty-percent reserve plan.

In chapter three we examine the impact of the fifty-percent reserve plan on economic activity in lumber and wood products industries in the counties. Impacts in lumber and wood products sectors are not necessarily the largest or most important impacts expected to result from a fifty-percent reserve plan, but these impacts have dominated earlier expositions on the topic, and we address them first. We adopt ODF (1996) parameters to predict maximum direct impacts of the fifty-percent reserve plan on lumber and wood products sectors of the economy, but we differ considerably regarding employment effects elsewhere in the economy. We find that the fifty-percent reserve plan would likely result in a small increase in employment and income in lumber and wood products sectors relative to average levels during the past decade. A considerably larger increase in these sectors is anticipated under the current management plan.

Advocates and critics alike have emphasized impacts of the current management plan for the state forests on county schools and county government services. We present our findings regarding these effects in chapter 4. Because of Oregon state law ensuring equal spending per student in the state, changes in county school revenue from the Tillamook and Clatsop State Forests would have virtually no effect on school budgets in the counties because of offsetting changes in payments from the state would result. Only about a fifth of any change in gross county timber revenues would affect government services in Clatsop and Tillamook Counties. We expect the fifty-percent reserve plan to result in a small (\$500,000) reduction in timber revenues funding county governments relative to average levels between 1992 and 2001. The prediction of a reduction in county government revenues results despite the increase in harvest volumes relative to the previous decade because we do not anticipate that stumpage values will reach the high levels of the mid-1990s during the next decade.

In chapter five we turn to a more comprehensive analysis of the costs and benefits of the fifty-percent reserve plan. We place the reduction in net economic value resulting from commercial timber harvest in the context of economic values associated with the increased quality of environmental services under the reserve plan. The fifty-percent reserve plan would increase aggregate economic value only if the value of the increased environmental services exceeds the net value of the foregone timber harvests. Because lumber is traded in markets, the associated economic values are much easier to specify than those associated with environmental

services. Values estimated by other studies are used to gain a sense of the range of possible values for the increased environmental services.

Finally, we turn to the impact of the fifty-percent reserve plan on the level of economic activity in Clatsop and Tillamook Counties. We find that increases in employment and income in growing sectors likely to benefit from the increase in environmental services under a fifty-percent reserve plan likely outweigh the increase in lumber and wood products jobs at stake. This is the case even when the somewhat higher incomes in lumber and wood products jobs are taken into account. Supporting the fifty-percent reserve plan would be a more sound economic development strategy than is advocating higher timber harvests to bolster a waning industry.

¹ Power and Ruder owe great thanks to John Trombold for his excellent editorial assistance. All responsibility for the contents of this report remains their own.

² In the absence of an habitat conservation plan (HCP) approved by federal authorities, current management practices restrict timber harvests in areas known to be owl habitat. In the future, if an HCP is approved and forest managers succeed in developing abundant owl habitat in the state forests then current owl sites could be logged.

³ John Maynard Keynes once pointed out that “[t]he ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct economist” (Keynes 1936). In this case, the economic-base model is the defunct economic idea that rules ODF managers and county officials.

⁴ The basins specified by Sessions (2000) are Beneke, Buster, Crawford, Lousignot, North Fork Nehalem, Northrup, Plympton, Sweethome, Lower Nehalem, Short Sands, Kilchis, Miami, Tillamook Bay, McGregor, Gales Creek, Upper Salmonberry, and Wheeler.

⁵ “Northwest Oregon” is the 14-county study area adopted by the Oregon Department of Forestry for its economic analysis of alternative management plans for the State Forests. Oregon Department of Forestry, *op. cit.*, p. 29. It includes Clatsop, Tillamook, Washington, Columbia, Multnomah, Clackamas, Yamhill, Polk, Lincoln, Marion, Benton, Linn, Lane, and Hood Counties.

:: Chapter 2

Measuring the Economic Consequences of State Forest Management Decisions

Introduction

There is considerable public concern about the economic consequences of managing a substantial part of Oregon's state forests as reserves that will be largely committed to resource values other than commercial timber harvest. Yet this economic concern, is not well focused or defined. Often the same commentators mix several different economic concerns together in a confusing way. This section of the report seeks to clarify those economic concerns by distinguishing the different types of economic consequences that might flow from the proposed forest reserve strategy. Then, in the rest of the report, we will separately look in detail at the size and character of those different economic consequences.

There are two important but quite different sets of economic consequences associated with the forest reserve strategy. One involves how the maintenance of forest reserves is likely to affect the economic well-being of citizens. This concern focuses on the way the forest reserve strategy would affect the flow of benefits from those forest lands and the costs associated with implementing that strategy. This set of economic consequences focuses on whether there is likely to be a net gain or loss to citizen well-being when all benefits and costs are accounted for. Economists describe this set of concerns as net changes in economic value or economic well-being.

The second important set of economic consequences that citizens are concerned about is the impact of the forest-reserve strategy on the level of local economic activity as measured by local jobs, local incomes, and the dollar volume of business activity. This concern focuses on those impacts influencing the local market economy and reflected in the local commercial economy's use of inputs, production of outputs, and the dollar volume of exchange. Economists describe this set of concerns as local economic impacts.

Although to many these two approaches may appear to be quite similar if not identical, such is not the case. For example, if, because of an aggressive timber harvest program, soil loss increases and sediment loads carried into water reservoirs likewise increase, the storage capacity of those reservoirs will decline. In order

8 :: Economic Realities in the Tillamook and Clatsop State Forests

to maintain the same water storage, either the height of the reservoir dams would have to be raised or the reservoirs would have to be dredged to remove the sediment. From a local economic impact point of view, the rebuilding of the dam or the dredging of the reservoirs would be positive: Workers would be hired, local construction firms would receive contracts, and local businesses would sell fuel and equipment to those firms. The overall level of economic activity would rise, but net economic value may or may not rise. The expenditures on raising the dam or dredging the reservoirs are economic costs associated with the sediment flows triggered by the timber harvest. Scarce resources that could have been devoted to other purposes will have been used to repair damage done by the timber harvests. Either water users who have less water available or citizens who have to pay the bill to solve the problem created by the logging will have to pay these costs. Whether or not there is a net gain in economic well being as a result of the logging and reservoir repair can be determined only by weighing all of the costs and benefits, not by looking at how many jobs were created or how the dollar volume of business changed.

Consider another example. Suppose that high levels of logging reduce the recreation value of the state forestlands to local residents. As a result of the loss of those recreation opportunities, residents may travel to other locations for their recreation, either other forested areas or to urban areas for other types of entertainment. Dollar expenditures will rise as money is spent on fuel, food, lodging, and entrance fees. The volume of business activity will rise; more people will be employed. It is likely, however, that economic well being will have declined since residents' preferences for local outdoor recreation on those state forest lands will have been frustrated, and they will have been forced to incur costs in the pursuit of what they originally saw as inferior recreational activity. Again, the increased economic activity is associated with increased costs and potentially reduced economic well-being.

From an economist's perspective there is a significant problem in judging the social rationality of a resource policy by the volume of economic activity and the number of jobs generated. The local economic impact approach treats important costs as if they were benefits, which amounts to ignoring the difference between a gain and a loss. Economists commonly fear that a focus primarily on job creation and local business impacts tends to transform the economy into a gigantic "make work" project and turns public economic policy towards wasteful choices that generate more costs than benefits and leave citizens, overall, worse off. For this reason, the social rationality of a public policy is best judged in relation to the net economic value it creates rather than in relation to its local impact on jobs and the volume of economic activity.

The distinction between these two quite different economic approaches led the federal government to require that official economic analysis of federal projects carefully distinguish between these two approaches. U.S. Water Resources Council guidelines, for instance, labeled the net economic value approach a "national economic development" accounting approach and the local economic impact approach a "regional economic development" accounting approach. Separate rules were developed to keep these two approaches from being run together and confused. Federal benefit-cost analysis of projects is required to treat payrolls as a cost, not as a benefit (U.S. Water Resources Council, 1978 and 1983).

The popular attraction of a local economic impact approach is tied to a perception that there is always a substantial pool of locally unemployed workers, a pool that tends to grow over time if public policy does not act vigorously to reduce it. If that were the case, then putting those unemployed people to work would have almost no economic cost associated with it. But it could generate a substantial economic benefit since those workers wanted to work and their productivity would go from near zero to something significant. If the people put to work would otherwise be involuntarily unemployed, then economists would agree that there

may be a significant economic gain associated with job creation.

But market economies tend to employ fully the scarce resources available for production. Except for brief and widely spaced recessions (that is, 1981, 1990 and 2001), there are not large and growing pools of productive workers who sit idle. Even during periods of economic dislocation when one important industry is in decline as a source of employment, the labor force tends to be fully employed. For instance, between 1988 and 1999 Oregon lost 21,000 forest products, but 49,000 other manufacturing jobs were created as well as 521,000 non-manufacturing jobs (U.S. B.E.A. REIS). In the two rural Northwest Oregon counties of Clatsop and Tillamook, between 1988 and 2000 about 14 percent of wood products jobs were lost, but overall employment expanded by 29 percent. The 172 wood products jobs lost were swamped by the net increase of 5,300 jobs (OED LMIS Covered Employment Data). Even as federal and total timber harvests fell and forest products employment declined in Oregon during the 1990s, the unemployment rate declined both across Oregon as a whole and in the rural northwest counties of Clatsop and Tillamook. When timber harvests and employment were at a peak in 1988, the Oregon unemployment rate was 5.8 percent and the unemployment rates in Clatsop and Tillamook were 5.8 and 7.1 percent respectively. In the year 2000, the Oregon unemployment rate had fallen to 4.9 percent and the unemployment rate in those two rural counties was even lower, 4.6 percent in Clatsop and 4.4 percent in Tillamook (OED LMIS Covered Employment Data). Clearly there was not a tendency towards a growing pool of unemployed workers who could be put to work in a costless fashion. The temporarily high unemployment rates associated with the 2001-2002 recession should not be allowed to obscure this fundamental fact. As the recovery from the recession continues, unemployment rates will again drop as Oregon moves back toward full employment.

In this report we will first focus on local economic impacts. We will then turn to a discussion of the direct benefits and costs associated with the proposed forest reserve strategy. We do this not because local economic impacts are most important in judging the social rationality of the forest reserve proposal, but rather for several other reasons. Much of the public dialogue about the management of Oregon's state forests focuses on local economic impacts. In that sense, we join the public dialogue where it is already focused and attempt to contribute to clarifying that dialogue.

Secondly, measuring local economic impacts is much easier than quantifying many of the economic benefits and costs associated with the forest-preserve proposal. Forest reserves are proposed largely for environmental reasons. The environmental benefits are largely non-commercial, non-market values that are not automatically quantified in dollar terms as market exchanges take place. To quantify those non-market environmental benefits would require extensive survey work and analysis. Quantifying non-market economic values is data- and resource-intensive and, as a result, very expensive. Even then, to many people, the resulting estimates of non-market economic values are considered controversial and unreliable. This reduces the cost-effectiveness of putting a lot of resources into quantifying the environmental values at stake in dollar terms.

Finally, because the resource management decision that is at issue will have a significant impact on the natural landscape of northwestern Oregon, local economic impacts and economic benefits and costs may move together in important ways. As will be discussed below, high-quality natural landscapes provide a valuable flow of environmental services to those who live in or adjacent to those landscapes. Because people recognize the value of those environmental services, those environmental qualities help to hold and attract residents and economic activity. As people act to retain or gain access to those landscape values, local economic vitality is supported and stimulated. Such amenity-supported local economic vitality links the

10 :: Economic Realities in the Tillamook and Clatsop State Forests

environmental values associated with the natural landscape to local economic impacts. In that sense, landscape-related benefits and costs affect the local commercial economy. Because of that, the local economic impact approach and the net economic value approach are more likely to be positively correlated than in conflict.

Measuring Local Economic Impacts

Local economic-impact analysis seeks to depict how local economic activity, including local employment and income opportunities, will be changed by a particular economic event or series of economic events. Our focus here is on changes in the level of timber harvest that will take place on state forests in Northwest Oregon. Typically, the local economic impacts are traced by highlighting the interconnections within the local economy. The direct impact of increased harvests is the need for a larger work force in logging, hauling, and processing the harvested timber. In addition, the indirect impact of increased harvests is the need for the equipment, tools, and materials necessary for those tasks of the workers and firms carrying out this wood products activity. The induced impact is reflected in the spending habits of those who earn income in carrying out these activities.

There are a variety of economic models, some simple, some very complex, that can be used to describe these different economic connections among various economic actors in a local economy. Using information on those economic interconnections, one can estimate how a particular change in the local economy such as increased timber harvests will trigger rounds of changes throughout the local economy. The Oregon Department of Forestry has used an economic model originally developed by the US Forest Service, IMPLAN, to estimate the local impacts of changes in the level of timber harvests on state forests in northwest Oregon.

Before considering in detail the Department of Forestry's estimates of the local economic impacts of changes in the level of state forest harvest, it is important to understand the dangers, weaknesses, and limitations of such local economic impact modeling. Here we discuss some basic rules for carrying out and interpreting local impact modeling.

Modeling is built around assumed economic connections. It is important that those assumptions mirror reality as closely as possible or the familiar modelers' warning applies: "Garbage in, garbage out." For instance, a large part of the local economic impact of a change in state forest harvest projected by the Department of Forestry takes place because local schools are assumed to rely on the stumpage revenues from local state forest harvests. Those harvest revenues are assumed to allow the schools to hire teachers and staff and make local purchases that otherwise would not be possible. If that is not how local school revenues are determined, those significant projected local impacts are likely to be in error.

Economic modeling also has to make use of assumptions about prices and technological relationships. If these are not accurate, the impacts projected are not likely to be realistic. For instance, if the money the state will gain from the sale of trees from the state forests (the stumpage value) is based on a brief, unusually high value in the recent past that is unlikely to characterize the future, such calculations could distort the projected impacts.

Most local economic impact analysis does not attempt to forecast future economic conditions, but those results are often misleadingly presented as such.¹ Local economic impact models seek to answer a

hypothetical question: What will happen in the economy if a carefully limited and specified change is made but most other relationships within the economy are held fixed? Accounting-like balances are maintained so that inputs and outputs are consistent with one another. If the inputs to a lumber mill are reduced, the flow of outputs from the mill are appropriately reduced and the whole set of adjustments within the economy necessary to facilitate this are also allowed to take place. In these models, it is assumed that no other changes in the economy take place. The economy and economic actors are frozen in this snapshot of the economy, adjusting mechanically to just this one change. Labor, capital, and raw materials are allowed to become unemployed or to expand to any level called for. Relative prices are not allowed to change. Economic actors are not allowed to act to offset negative impacts or to take advantage of positive potentials. In short, markets are largely assumed to be inactive.

This approach need not be a misleading analytical exercise when its purpose is understood, but these models can be misunderstood if their limitations are not constantly kept in mind. The purpose in such modeling is to study the impacts of certain types of shocks when the range of adjustments that is allowed is purposely constrained. This type of study is done both to simplify an otherwise complicated reality and to focus on how particular parts of the economy operate in isolation. Like all scientific experiments, it can be an exceedingly valuable and insightful analytical process. This analytical process should not be confused, however, with economic prediction or forecasting. In order to make an accurate forecast, all of the other changes taking place in the economy, especially those triggered by the initial shock or change, also have to be taken into account.

Local economic impact analysis usually focuses on estimating the impact of a change in policy on total employment, income, or business revenues. The impacts on total employment are often expressed as a number representing job losses or "jobs created. This characterization carries considerable rhetorical weight. All of us are aware of the personal and financial trauma that can accompany being laid off. Losing one's job, especially unexpectedly, can be painful and disruptive. Its personal costs should not be minimized. But that personal experience is not what the job losses calculated in local economic impact analysis usually concern. The calculated local job losses may simply be potential jobs that could be created if a project proceeds. Alternatively, they may represent the jobs that would be created if the economy were to expand somewhat faster than what is expected under normal circumstances. The apparent losses may represent the difference between one rate of job creation and a slightly faster one. No one may actually be projected to be laid off; instead, some additional hiring that might have taken place does not take place. Such is the case with the state forest management decisions at issue here. Regardless of whether the forest reserve strategy is adopted, the level of harvest from the state forests in the future will be higher than it has been in the past. The choice may be between one higher level of harvest and another. Additional jobs would be associated with both management decisions. Rather than there being job losses, there will simply be a difference in the number of forest products jobs gained.

Whatever local impacts are calculated from the modeling, their significance can be determined only by putting them in the context of the overall local economy and the economic trends that characterize it. Creating 200 fewer jobs under one scenario than might be created under another can appear to be a quite large impact or a trivially small impact, depending on the size and condition of the local economy. If, for instance, a forest-reserve strategy would lead to future harvests from state forests not expanding as much over the next 20 years as they would if there were no forest reserves, one would expect employment in logging and wood products to grow more slowly than it would otherwise. But Clatsop and Tillamook counties combined added about 600 jobs a year between 1988 and 1999. Washington County added 10,000 jobs a

12 :: Economic Realities in the Tillamook and Clatsop State Forests

year. Over a ten-year period, those rates of job creation would add 6,000 and 100,000 jobs, respectively in northwest Oregon. In that context, a difference in 200 logging and wood products jobs over a twenty year period would not appear to be a primary determinant of local economic vitality.

Local economic impact analysis often is completely static in character. It assumes that some “shock” hits the local economy and local economic actors respond in a completely passive manner. For instance, if employment opportunities in a particular industry are projected to decline, those “job losses” are assumed to be permanent, with population adjusting downward through out-migration to the reduced set of local economic opportunities. Such a static depiction of how a local economy adjusts to economic change is inappropriate in all but the most isolated and under-developed economies. Market economies are known for their adaptability to changed conditions. Entrepreneurial response to change seeks to minimize the negative impacts and maximize the positive. As a result, valuable resources shift from one type of economic activity to another, generating economic activity in new fields as economic activity declines in previous economic pursuits. Labor, land, and capital rarely remain unemployed for long periods of time. They quickly are re-employed in other productive activities. As a result there are few permanent losses as a result of economic change. In contrast, the picture often painted by local economic impact analysis can present resources as if permanently unemployed. Accurate impact analysis should seek to incorporate the cost-minimizing adjustments that economic actors will make in response to economic change and the ongoing transformation of local economies. It is the net change after these economic adjustments has been made that represents the relevant economic impact.

The adjustment of the Oregon economy to the dramatic reductions in harvest from federal lands provides a good case in point. Although the forest products industry in 1988 was Oregon’s primary manufacturing activity, federal timber harvests fell 93 percent, and total harvests fell 55 percent between 1988 and 2000, Oregon’s economy was not pitched into a crisis. After 1988, unemployment declined rather than increasing, and Oregon experienced a 12-year period of sustained economic expansion. The Oregon economy adapted to and productively digested the changes in the forest products industry rather than passively collapsing in the face of dramatic declines in timber harvest. This actual Oregon experience of and adjustment to reductions in timber harvest stands should be seen as an important warning against static modeling of how the economy is likely to respond to future changes in the level of timber harvest.

It is not by way of commercial timber harvests alone that forests support local economic vitality, but also forested landscapes that provide a broad range of valuable environmental services: watershed values (water quantity, quality, and timing), wildlife habitat, fisheries, recreation opportunities, scenic beauty, carbon sequestration and climate stabilization, open space, and biodiversity. Because living adjacent or close to natural forests provides access to many of these environmental services, protected natural forests may draw and hold people and the economic activity associated with them. In that way natural forests may support local economic vitality even if no commercial timber harvests takes place on them. The next section discusses the considerable empirical evidence that documents the reality of such “amenity-supported” local economic vitality. One could include in this the economic vitality in western and central Oregon between 1988 and the beginning of the current recession despite the declines in the forest products industry. There are few economic commentators who, in explaining the ways in which the Oregon economy was transformed during that time period, have not mentioned the role played by Oregon’s natural amenities in attracting both new residents and businesses.

Knowing that natural amenities are likely to play a positive role in supporting local economic vitality does not

necessarily allow one to predict exactly what the impact on the local economy will be if a certain part of the forested landscape is managed for something other than commercial timber production. While it is possible to say something fairly explicit about how increased timber harvests will impact employment in the wood and forest products mills, the same cannot be said for the impact of managing a certain percentage of those forest lands as forest reserves. We know that the direction of the change is positive and that it can be cumulatively very important (that is, Western and Central Oregon, or the Mountain West.), but a quantitative modeling of this impact is not possible. This fact does not mean that protected landscapes have no positive impact on the local economy or that this impact can be safely ignored. It means simply that the impact has to be considered in a qualitative manner when making public policy decisions.

All of the last four points underline why a mechanical calculation of multiplier impacts from a change in the level of timber harvest is inappropriate. Conventional economic base modeling of local economic impacts such as those the Oregon Department of Forestry has used for changes in the level of state forest harvests assumes a relatively fixed relationship between the level of timber harvest and the direct, indirect, and induced jobs that result. The harvest of a million board feet of timber has a direct impact on logging and forest products mill employment of either 2.2 or 2.86 jobs in Clatsop and Tillamook Counties, depending on whether it is carried out by clear-cutting or by thinning. Businesses that supply those firms and businesses in which those workers spend their incomes are also affected, creating indirect and induced jobs. As calculated by the Oregon Department of Forestry, those additional jobs would be about equal in number to the direct wood products jobs. As a result, the total number of jobs created is projected to be about twice the number of direct jobs. The employment multiplier is about two.²

It is not clear how reliable any of these multiplier relationships are. As will be reported later, changes in timber harvests within Oregon counties is not statistically correlated with changes in employment in those counties. The actual economy is far too dynamic to be accurately described in such static terms. At any given moment, unlimited amounts of economic activity cannot take place. In order for one type of economic activity to proceed, resources have to be diverted from other types of economic activities. People, capital, and natural resources employed producing one type of good or service cannot simultaneously be employed producing a different good. In general one type of economic activity takes place by displacing another type of economic activity. Of course, with rising productivity, overall levels of production can rise, economic development does take place, and overall standards of living improve. But it is still the case that implicitly trade-offs are taking place as resources move away from certain economic activities towards more rewarding economic activities. This implicit displacement of economic activities as certain industries expand is completely ignored in the multiplier analysis that lies behind local economic impact analysis. The result exaggerates the job gains that are expected from the expansion of certain types of economic activities and the job losses that are expected as other types of economic activities contract. Much of those projected impacts are never empirically documented as having actually taken place, and they are never actually felt within the local economy.

Economic-base impact modeling implicitly assumes that all jobs that are created are filled by the currently unemployed and that all jobs lost result in workers being permanently unemployed. Neither of these is factually accurate. Both of these counterfactual assumptions tend to exaggerate both projected jobs gains and job losses.

If, because an industry is contracting, employment in the industry declines, but, simultaneously, because labor is readily available at a reasonable cost, other local industries are expanding, there may well be no job

14 :: Economic Realities in the Tillamook and Clatsop State Forests

loss as a result of the contracting industry. One dramatic example from American economic history is the dramatic decline in the number of farmers. Between 1935 and 1999 the number of farms declined by 4.4 million, a 65 percent decline (US Department of Agriculture, National Agricultural Statistics Service). One could treat this figure as a massive job loss that crippled the American economy, but most economic historians would laugh as such a suggestion. It was partly the labor freed up from our farms that provided the workforce that allowed the industrialization of the American economy. This change was not primarily a loss of jobs, but the shifting of a scarce resource from a less productive sector to more productive sectors. The net result was an expansion of both jobs and income and the ongoing economic development of the American economy.

The same is true of the Oregon economy. The primary economic story over the last decade and a half is not that jobs were lost in Oregon's traditional economic base but that the Oregon economy made a successful transition from one type of economic activity to another as part of its ongoing economic development. Healthy, dynamic economies are not static economies. Declines in employment in one set of industries are not signs of economic failure when they are offset by expansion in employment in other economic sectors. Yet economic-base multiplier analysis of the sort used by the Oregon Department of Forestry to evaluate state forest management policy ignores this dynamic economic reality.

¹ In economic terminology, most local impact models allow the analyst to conduct a comparative statics study in which a certain set of specified changes are assumed to take place while other things that might also be changing are held constant so that the consequences of the change under study can be isolated. Such local impact models can be combined with econometric models in order to develop hybrid models that approach being forecasting models. See Sullivan, Jay and J. Keith Gilles, 1990, "Hybrid Econometric/Input-Output Modeling of the Cumulative Economic Impact of National Forest Harvest Levels," *Forest Science* 36(4):863-877, December. In addition, it is possible to model the regional economy in a way that relaxes many of the assumptions of impact models through the use of computable general equilibrium models. These models, however, also tend to be comparative statics models. See Hoffman, Sandra, Sherman Robinson, and Shankar Subramanian. 1996. "The Role of Defense Cuts in the California Recession: Computable General Equilibrium Models and Interstate Factor Mobility. *Journal of Regional Science* 36(4):571.

² ODF, "Northwest Oregon State Forests Management Plan: Connection to State and Local Economies, November 1996, p. 184. For the larger region of Northwest Oregon, including the Portland metro area, the direct job impact per mmbf was 5.03 and 6.25 for clear-cutting and thinning, respectively.

:: Chapter 3

Lumber and Wood Products Industry Impacts

Introduction

Reduced timber revenues relative to current forecasts have dominated the discussion of the economic consequences of a fifty-percent reserve plan. Indeed, harvests under a fifty-percent reserve plan would be smaller than those forecast under the current management plan. However, harvests under a reserve plan are predicted to be considerably larger than average volumes during the past decade. While adopting a fifty-percent reserve plan would involve a very real opportunity cost in the form of the foregone harvest increases currently forecast, a reserve plan would not result in a substantial contraction either in timber harvests or in lumber and wood product sectors of Clatsop and Tillamook Counties.

Timber harvest volumes in the Tillamook and Clatsop State Forests have doubled during the past five years as stands replanted in the 1950s and 1960s after the great fires of previous decades have matured and management practices have become more aggressive. The current management plan, approved by the Board of Forestry in January 2001, projects still further increases that will be sustained indefinitely. These increased harvests are expected to bolster the lumber and wood products sectors in Clatsop and Tillamook Counties as well as elsewhere in Northwest Oregon.

Managing the Tillamook and Clatsop Oregon State Forests according to a fifty-percent reserve strategy would increase harvest volumes relative to recent 10-year average levels but, of course, the size of the increase would be smaller than that of the current management plan. Because thinning in younger stands in reserve areas would continue under a fifty-percent reserve strategy until those stands reach older forest structure, considerably less than a fifty percent reduction in harvest volume relative to levels predicted under the current plan would occur for the first several decades. Eventually the fifty-percent reserve strategy does amount to a reduction of timber harvest levels by half relative to the current forest management plan, but that harvest reduction is not realized for 50 years, at which time the economy is likely to look much different than it does today.

Expectations regarding the local economic impacts of the Northwest Oregon State Forests figured

prominently as various management alternatives were considered before the Board of Forestry approved the current plan in January 2001. Forest managers have consistently cited economic considerations in rejecting management alternatives that place greater emphasis on providing wildlife habitat and recreation opportunities. The history of the forests as private timberland, the orientation toward timber harvests of the institutions managing the forests, and the economic base approach used to estimate local impacts emphasized the potential contribution of the forests to economic activities in lumber and wood products industries. The anticipated growth in timber harvests led to predictions of fantastic growth in the sectors of the local economy that harvest or process wood fiber. Discussion of the economics of the state forests largely ignored the roles of these forests in creating value for citizens of the region and in supporting economic activity outside lumber and wood products.

The consideration of timber harvests in the Clatsop and Tillamook County economies within the simplistic economic-base framework might have been reasonable several decades ago when natural resource industries dominated economic activity and households and businesses seemed less influenced by the presence of natural amenities as they made location decisions. However, that approach seems certain to misrepresent entirely the role of the state forests in today's economy. While the slower growth from recent levels in timber harvest volumes under the fifty-percent reserve strategy would lead to less growth in local lumber and wood products industries, the job and income creation at stake in those sectors is certainly less than predicted by the ODF (1996). The recent history and future prospect of vigorous growth elsewhere in the local economies far outweigh the impact of the reserve strategy on local economic activity in Clatsop and Tillamook Counties.

In this chapter we examine the diminished role of lumber and wood products industries in the Oregon economy and in the economies of the counties adjacent to the Tillamook and Clatsop State Forests. We then consider the importance of timber harvests from state lands for those industries. Next, we turn to the job and income impacts predicted by the ODF (1996). We argue that the predicted local impact of the growth in harvest volumes on the state forests has been greatly exaggerated. We modify the ODF's (1996) calculations to produce more plausible estimates of the local economic impact of increased harvests. Finally, we consider the economic future of Clatsop and Tillamook Counties under two scenarios: the high growth in state timber harvests relative to the previous decade envisioned by the current management approach and the slower growth in harvests that would result from a fifty-percent reserve plan.

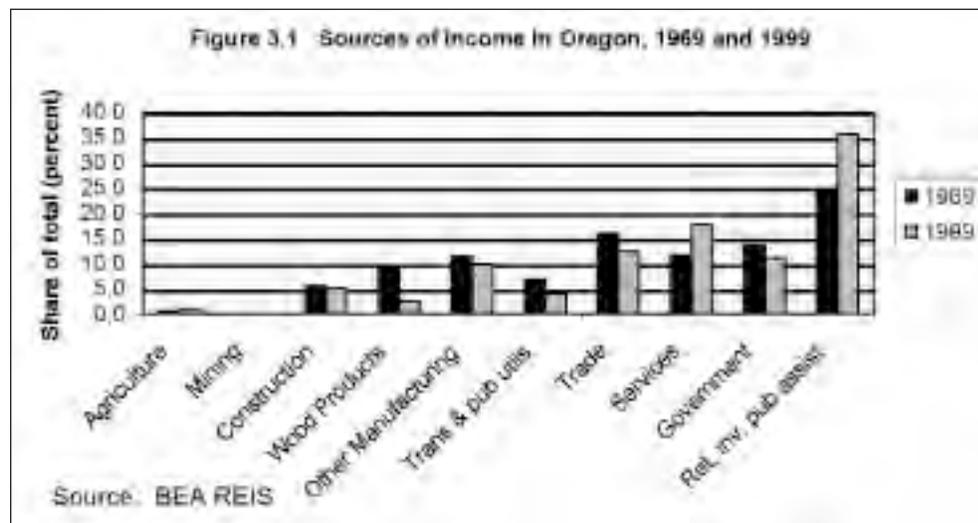
To preview our conclusions, the small share of the state forests in the Oregon state total harvest — 3.0 percent on average during the 1990s, though 6.6 percent in 2000 — implies that changes in the timber harvest on the Tillamook and Clatsop State Forests would have small impacts on the state timber industry and on the Oregon economy. The slower growth in timber harvests from these state forests will affect more dramatically the forestry and wood products industries in Clatsop, Tillamook, and Washington Counties. However, wood products industries comprise a very small part of the Washington County economy. Even in the coastal counties wood products industries do not dominate local economies as in years past, and the impact of a fifty-percent reserve plan is expected to be small relative to other economic events affecting the counties during the next decade.

The choice between alternative management plans for the state forests will not reverse the long decline in importance of the timber industry in Clatsop and Tillamook Counties. Aggressive harvest levels on the Northwest Oregon State Forests would not restore wood products industries to their former prominence in the areas adjacent to the Northwest Oregon state forests. The more modest growth in timber harvest under a fifty-percent reserve plan would not spell doom for these industries. Lumber and wood products industries

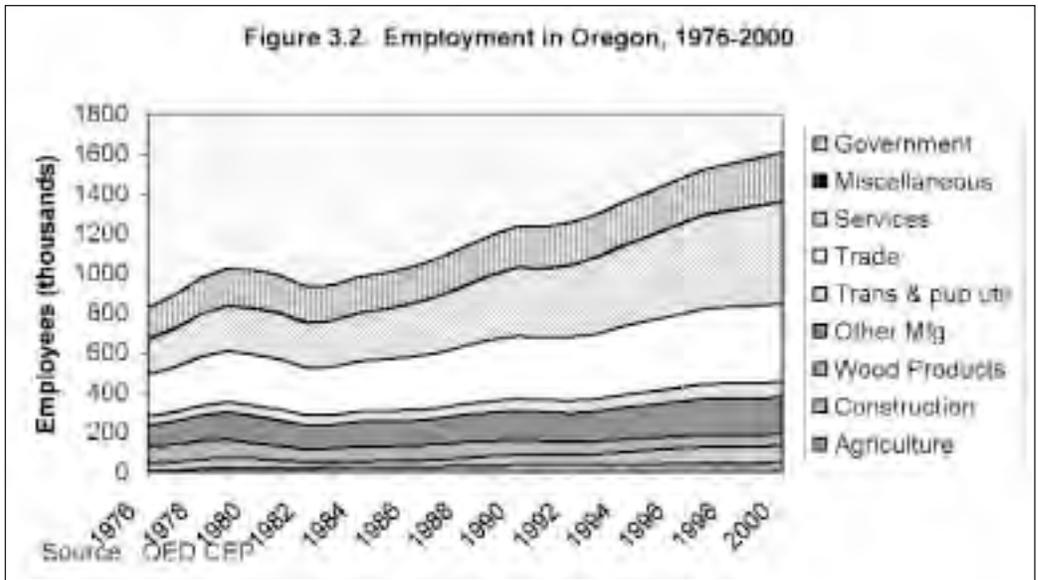
have diminished in importance during recent decades as harvest levels on other lands have fallen, mills have become increasingly automated, and other industries have grown rapidly. Far from economic disaster, the contraction of lumber and wood products industries has coincided with the healthy diversification and expansion of the economies in the coastal counties. Managing half of the Tillamook and Clatsop State Forests primarily for ecosystem services and recreation would reinforce recent positive trends toward economic diversification and job and income growth in both rural and urban areas of Northwest Oregon.

Wood products industries in the economy

Though once central to the fortunes of the regional economy, today the timber industry forms a small part of the economy in the state and in the northwest counties adjacent to the Tillamook and Clatsop State Forests. Together, the forest products industries — the three-digit SIC industries lumber and wood products (SIC 413) and paper and allied products (SIC 465) — accounted for 9.2 percent of the personal income received in Oregon in 1969, according to the Regional Economic Information System (REIS) data published by the Bureau of Economic Analysis (figure 3.1). By 1999, the forest products industries in Oregon contributed a mere 2.8 percent share of personal income in the state. In real terms, personal income in Oregon more than tripled, growing from \$30.0 to \$92.9 billion (2001 dollars) between 1969 and 1999 (REIS, 1969-1999). During the same period, real forest products sector income contracted slightly from \$2.8 to \$2.5 billion (2001 dollars).

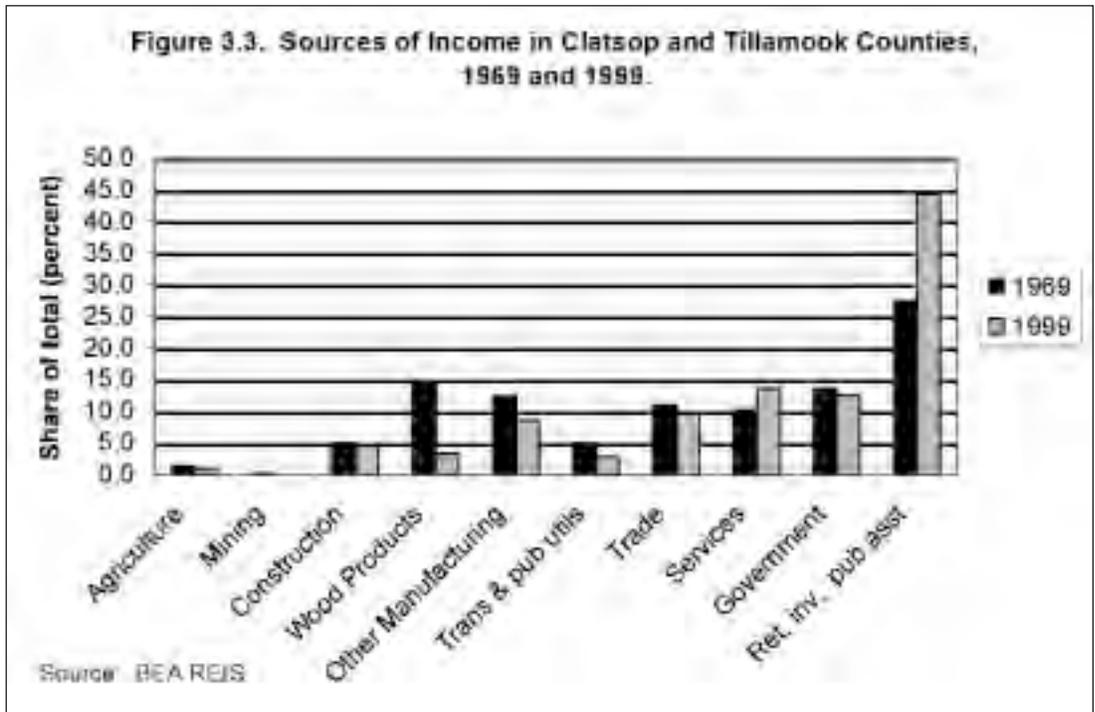


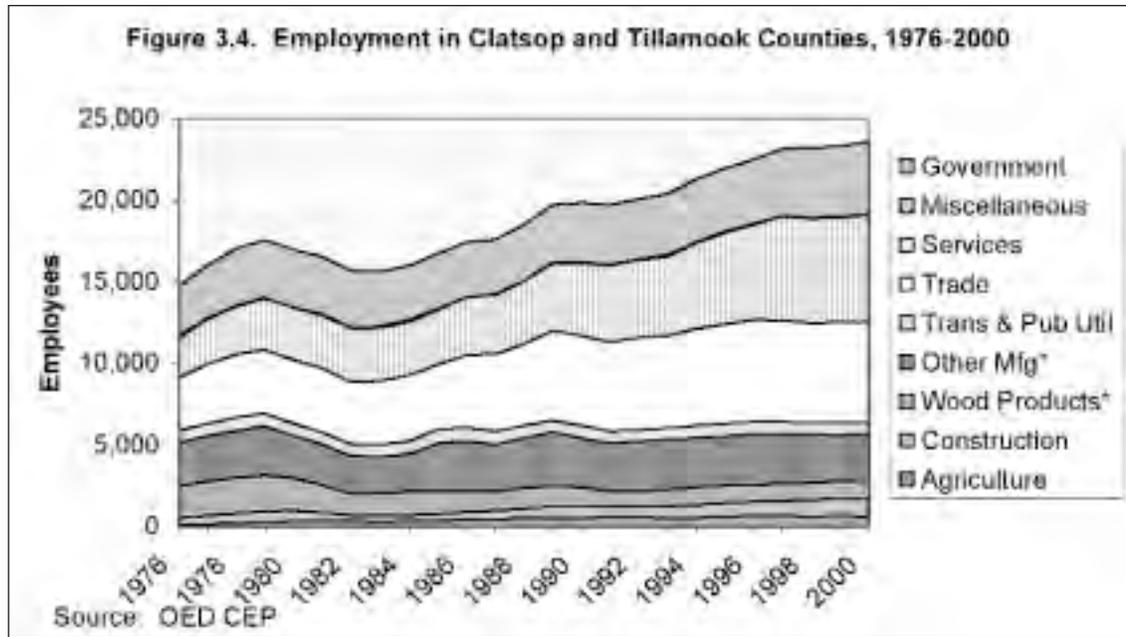
The forest products industry's share of jobs in Oregon has mirrored the changes in personal income. According to Oregon Employment Department (OED) Covered Employment and Payroll (CEP) data on jobs covered by unemployment insurance, 86,404 (10.4 percent) of the state's 831,216 covered employees worked in wood products industries in 1976.¹ Twenty-four years later, forest products industry operations employed only 56,870 (3.5 percent) of Oregon's 1,607,911 workers (figure 3.2). The decline in income and jobs in forest products industries occurred primarily in the wake of the deep recession of the early 1980s, even before the spotted owl controversies that drastically reduced the flow of timber from federal lands. According to Niemi and others (1999), the decline in forest products employment came about due to labor-



saving technological advances and cost-cutting measures by the industry as the “supply of old-growth logs dwindled,” eliminating the price premium that had allowed mills to pay workers the relatively high wages Northwest workers in these sectors had enjoyed.

Other structural changes of note in the Oregon economy between 1969 and 1999 include the almost five-fold growth in income from employment in services industries and from investments and transfers (including social security payments and public assistance). Service industries include finance, insurance, and real estate (SIC 700) and other service industries (SIC 800) such as hotels, auto repair, health care, and legal services. Jobs in the service sector include both high- and low-paying jobs.² Paralleling national trends, service sector income grew in importance from 12 percent to 18 percent of personal income in Oregon between 1969 and 1999 (BEA REIS). Changes in the sources of jobs in Oregon also reflect this shift as service





sector employment grew from a 22 percent share of jobs in Oregon in 1976 to a 31 percent share in 2000.³ Retirement, investment, and public assistance income accounted for 23 percent of personal income in Oregon in 1969 and 36 percent of income in 1999.

The decline of the share of personal income and jobs provided by lumber and wood products industries in Clatsop and Tillamook Counties has been far more dramatic than that in the state (figure 3.3). The share of income produced in wood products industries (SIC 413) fell from 14.3 percent in 1969 (\$85.7 million of the \$597.5 million total in 2001 dollars) to just 3.3 percent in 1999 (\$46.7 million of the \$1,429.8 million total in 2001 dollars)(BEA REIS, 1969-99).⁴ Wood products jobs are fewer in number and comprise a smaller share of total employment in Clatsop and Tillamook Counties in 2000 relative to 1976. One thousand, nine hundred and fifty (13.2 percent) of 14,765 covered employees worked in wood products industries in the counties in 1976. By 2000, only 1,092 (4.6 percent) of 23,571 covered workers were employed by the wood products industry in Clatsop and Tillamook Counties (OED CEP, 1976-2000)(figure 3.4).⁵

The share of income earned in service sector industries in Clatsop and Tillamook Counties grew from 10.2 percent in 1969 to 13.5 percent in 1999 as real income generated in service sectors tripled between 1969 and 1999 from \$20.2 to \$62.8 million 2001 dollars. The service sector also grew in importance for the local job base during those years. Between 1976 and 2000 employment in service sectors in the counties grew from 16.6 percent to 27.8 percent of total covered employment.

Between 1969 and 1999 the share of income generated in manufacturing industries other than wood products fell in Clatsop and Tillamook Counties from 12.3 percent to 8.5 percent. Real income earned in other manufacturing industries grew more slowly – from \$73.4 million in 1969 to \$121.9 million in 1999 (2001 dollars) than did real income in other areas of the local economy. The share of employment in manufacturing sectors other than wood products declined from 17.8 percent to 12.3 percent of the local job base between 1976 and 2000. Although food processing (SIC 453) firms in Tillamook County grew in importance during the past thirty years, most other manufacturing industries in Clatsop and Tillamook Counties grew more slowly than did the rest of the economy.

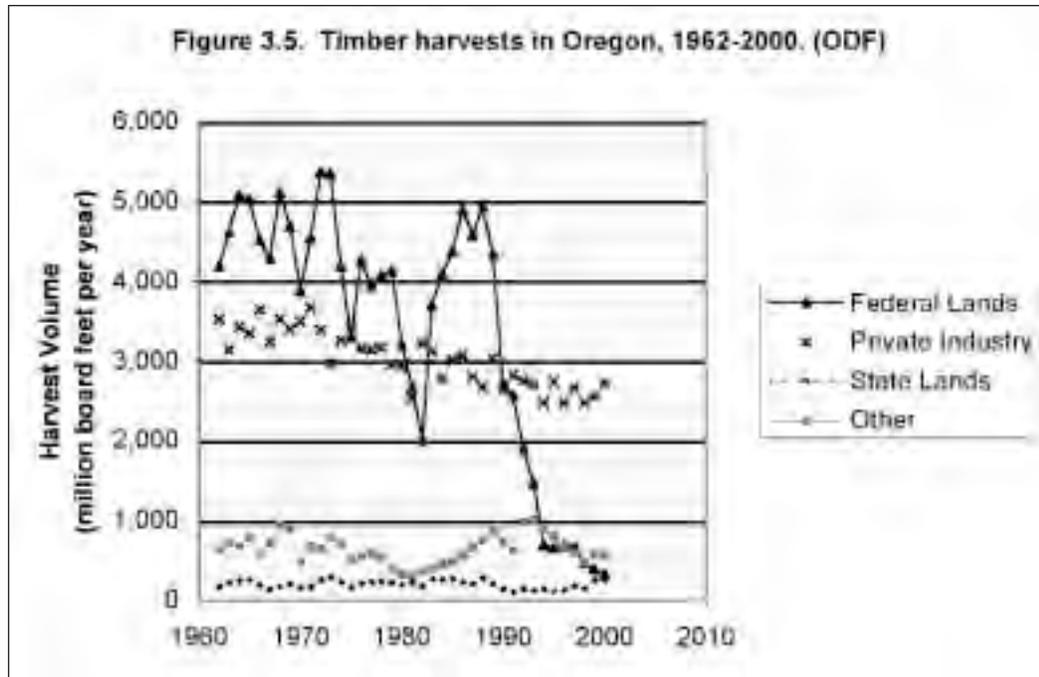
Retirement, investment, and public assistance income in the counties ballooned from a 27.4 percent share of personal income in 1969 to a 44.3 percent share in 1999, reflecting primarily a large increase in the retiree population in the counties. In real terms, the income generated in Clatsop and Tillamook Counties by investments, transfers to retirees, public assistance, and unemployment insurance benefits grew nearly fourfold — from \$163.7 to \$633.2 million (2001 dollars) — between 1969 and 1999.⁶

Washington County is very different from other counties in which the Tillamook and Clatsop State Forests are located. Nearly every broad sector of the economy on the west side of the Portland Metropolitan area grew vigorously between 1969 and 1999. Although wood products industries in Washington County are healthier than their counterparts in the coastal counties, their importance to the county as a source of income and jobs is very small. Wood products industries accounted for a small share of personal income in Washington County in 1969 (1.8 percent) and by 1999 that share was smaller still (0.8 percent) (BEA REIS, 1969-99). In real terms personal income in Washington County grew from \$1,787.5 million in 1969 to \$13,845.1 million in 1999 (2001 dollars). Personal income derived from wood products industries in Washington County grew in real terms from \$32.0 million to \$114.5 million (2001 dollars) during the same period. In 1976 1,395 (2.4 percent) of Washington County's 58,569 covered employees worked in wood products industries. By 2000, employment in Washington County wood products industries had grown to 2,925 but accounted for just 1.3 percent of the 224,015 covered employees in the county (OED CEP, 1976-2000).⁷

Service-sector income and jobs grew in importance in Washington County during the past three decades. Real income earned in service sector jobs in Washington County grew from \$199.7 million (11.2 percent of total personal income) in 1969 to \$2,607.4 million (18.8 percent) in 1999 (2001 dollars). The number of such jobs increased from 10,320 (17.6 percent of total employment) in 1976 to 73,682 (32.9 percent) in 2000. Manufacturing industries other than wood products accounted for a much higher proportion of income and jobs in Washington County than elsewhere in the state, though the income share of those industries fell from 27.6 percent in 1969 to 23.4 percent in 1999. Eighteen thousand, six hundred and sixty-seven (31.9 percent) of workers reported for work at firms in manufacturing industries other than wood products in Washington County in 1976; 47,083 (21.0 percent) in 2000. Unlike the experience in the coastal counties, the share of income from investments and transfers including social security payments and public assistance in Washington County fell from 28.9 percent in 1969 to 25.8 percent in 1999.

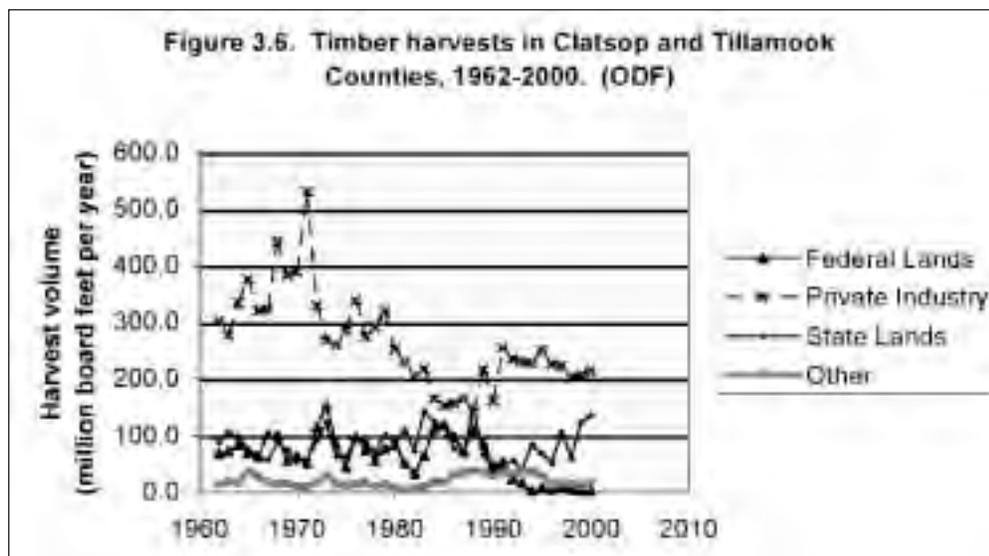
State forests and the local timber harvest

Log flows from federal and private industrial forests have dominated the Oregon timber market for many decades (figure 3.5). Harvests on state lands have made up a small fraction of state totals due to the relatively small land base owned by the state and, until recently, the immaturity of much of the timber on state lands. The Tillamook and Clatsop State Forests constitute more than half of all state lands in Oregon — 518,000 (57.6 percent) of the 899,000 total acres. Between 1980 and 1996 log flows from state lands made up an average of 2.8 percent of the total harvest in the state. In 1997 and 1998 harvest levels on state forests increased while harvests on federal lands continued to plummet; harvests from state lands reached 4.2 percent of the total harvest in the state. By 1999 and 2000 harvest volumes on the Tillamook and Clatsop State Forests more than doubled in size relative to the first half of the 1990s, and the share of harvests on state lands in the total state harvest amounted to 6.6 percent.



Timber harvests from state lands comprise a considerably higher share of total harvests in Clatsop and Tillamook Counties (figure 3.6). Between 1980 and 1996, timber harvests from state lands in Clatsop and Tillamook Counties made up 21.6 percent of total harvests in those counties. In 1997 and 1998 harvests from state lands constituted 25.4 percent of the total in those counties, and by 1999 and 2000 that share had grown to 36.5 percent as the harvest from state lands swelled.

The ten-year implementation plans (IPs) derived from the current FMP project sustained harvests from the Tillamook and Clatsop State Forests at levels even higher than those of 1999 and 2000. The IPs predict average annual harvest levels of 175 million board feet from the Tillamook and Clatsop State Forests between 2001 and 2010, a 16.1 percent increase over the 151.6 million board feet average annual harvest in 1999 and 2000 (ODF 2002c). As will be documented later in our report, the fifty-percent reserve alternative management approach is predicted to result in harvest levels from the Tillamook and Clatsop State Forests of



22 :: Economic Realities in the Tillamook and Clatsop State Forests

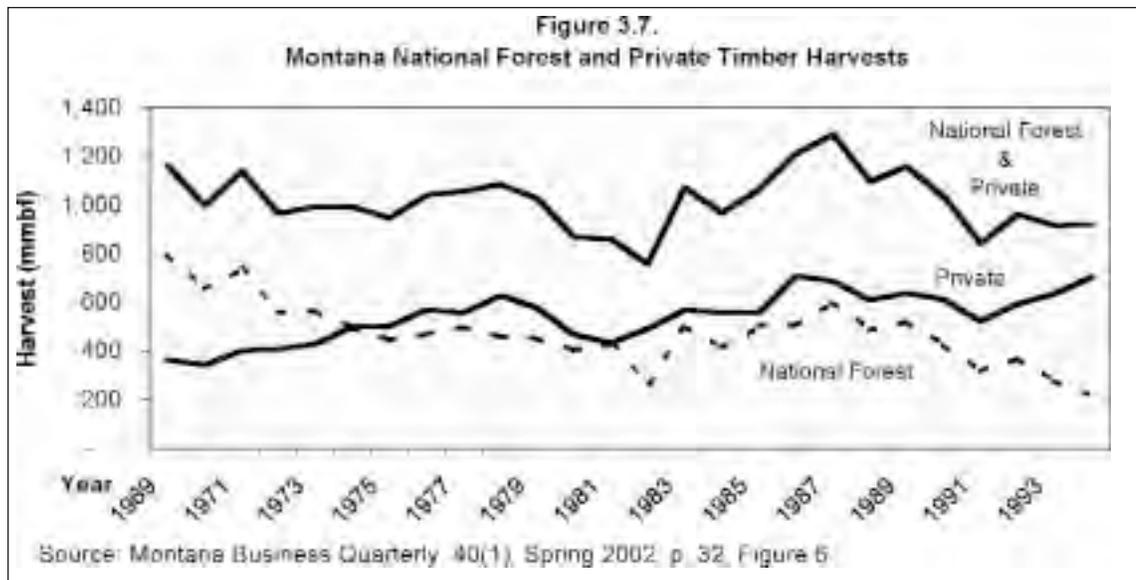
112.6 million board feet per year for the next twenty years — higher than average harvests before 1999 but below projections based on the current FMP.

If harvests on state lands outside the Tillamook and Clatsop State Forests and on lands controlled by other agencies remained constant at their average levels between 1996 and 2000, predicted timber harvests on state lands would make up 4.5 percent of total harvests in the state under the current plan. Under the fifty-percent reserve plan and similar assumptions regarding harvests on other lands the harvest on state lands would make up 2.9 percent of the total harvest in Oregon. The 1.6 percent reduction in state harvests due to the adoption of a fifty-percent reserve strategy would be expected to have a small impact on the timber industry in the state and almost no impact on the economy of the state as a whole.

The impact of a change in harvests from the Tillamook and Clatsop State Forests would have a more pronounced impact in Clatsop and Tillamook Counties. If harvests on lands controlled by other agencies in Clatsop and Tillamook Counties were assumed to remain constant at their average levels between 1996 and 2000, projected timber harvests on state lands in the counties would amount to 39.2 percent of total harvests in those counties. Under the reserve alternative on state lands and similar assumptions about harvests elsewhere, the harvests on state lands would constitute 29.2 percent of total harvests in the counties. It is this 14.1 percent reduction in timber harvests in Clatsop and Tillamook Counties under a fifty-percent reserve management alternative that the ODF has projected to have a large effect on wood products industries and the wider economies of those counties.

In fact, increased harvests from state lands in Clatsop and Tillamook Counties are likely to influence production on other lands in the counties, at least partly offsetting the impact of state harvests on total harvests in the region. Even within a given region, the reduction in harvest from one ownership can encourage increased harvests on other ownerships. Markets link these harvests because all forestland owners sell into a common market in which there is not an unlimited (perfectly elastic) level of demand. Expanded harvests from one source tend to reduce the incentive to harvest from other sources. High levels of state forest harvest can reduce wood fiber prices that in turn will discourage harvest on private timberlands and investments in increasing the future productivity of those lands. Significant reductions in state forest harvest can have the opposite impact. As indicated in figure 3.6, harvests on private lands have fallen in Clatsop and Tillamook Counties as harvests from state forests have risen during the early 1970s, in the mid-1980s, and in the late 1990s. Spikes in local private industry harvests accompanied dramatic reductions in harvests on state lands in the counties in the late 1980s. Overall, the correlation coefficient between harvests on state and private industry lands in Clatsop and Tillamook Counties between 1962 and 2000 is -0.24 , indicative of an inverse relationship between harvests from the different sources.

The experience of several Western States during recent decades provides additional evidence for inverse relationships between harvests on public and private lands. For instance, as the reduction in federal timber harvests in both the Pacific Northwest and the Northern Rockies drove stumpage values to their peak during the first half of the 1990s, harvests on non-industrial private forestlands spiked. The expansion of industrial harvests during the 1970s as National Forest harvests fell from their peak level of the late 1960s also demonstrate the link between these different sources of regional timber supply. In Montana between 1969 and 1994, National Forest harvests fell from about 850 to 350 mmbf, but total private harvests increased from about 350 to 750 mmbf (figure 3.7).⁸ Such offsetting effects on other forestlands in the region make clear that using fixed coefficients to model the relationship between a million board feet of timber harvested and local employment and income effects will overstate the true impact of changes in harvest levels on state lands.

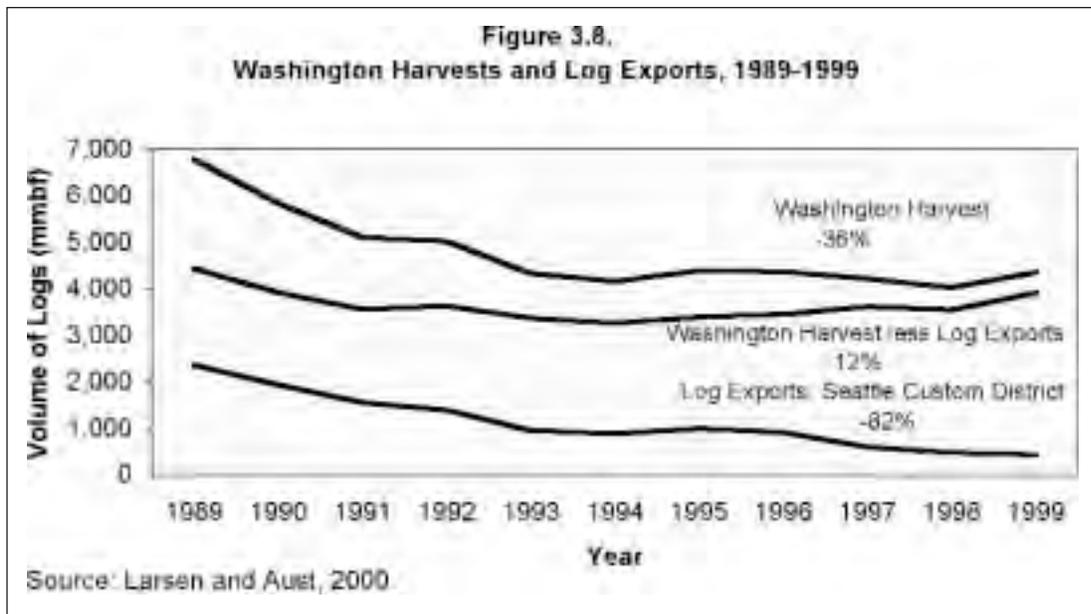


Timber harvests and the local wood products industries

Changes in the harvest volume in a particular region can influence directly local wood products industries through several channels. If wood product demand and prices are high enough, having more trees available for harvest should support higher levels of employment and income in logging contractor, wood hauling, and logging firms. If there exists unused local mill capacity, the greater local availability of trees seems likely to boost local production, incomes, and employment at lumber, other wood product, and paper mills. The direct connection between timber harvests on the Tillamook and Clatsop State Forests and local wood products industries will be weaker if increased local harvests simply displace logs that were formerly imported by local mills from elsewhere in the United States or the world. Likewise, if more logs are exported to other regions of the United States or to other countries as a result of increased timber harvests, the connection between local harvests and local wood products jobs will be severed.

The ODF (1996) reports on the connection between timber harvests in Clatsop and Tillamook Counties and jobs and income of local logging contractors, log haulers, logging firms, and firms involved in other aspects of timber management. Between 1990 and 1994, about half of the businesses and individuals engaged in these activities in operations on state forests in Clatsop and Tillamook Counties were located in Tillamook and Clatsop Counties. The rest were located elsewhere in Northwest Oregon.⁹ Virtually none of the providers of forestry services on state lands in those counties were located outside Northwest Oregon (ODF 1996, pps. 181 and 182).

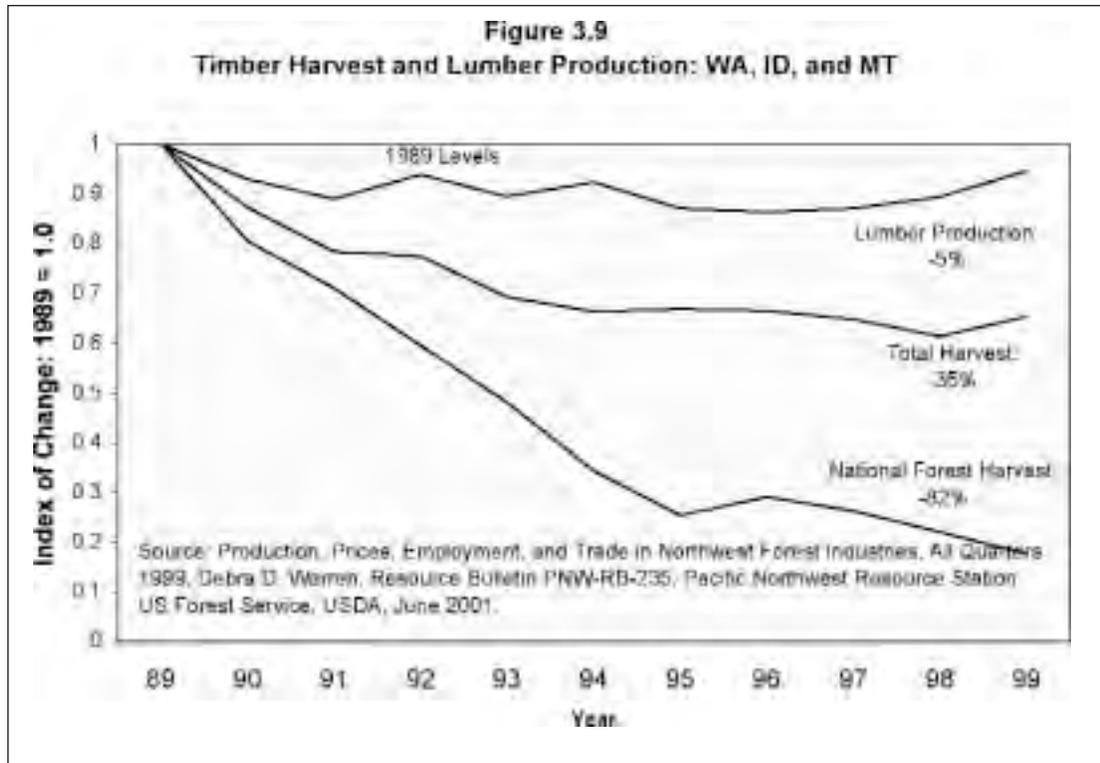
The ODF (1996) reports the results of a one-time survey of log flows from Oregon forests in Clatsop and Tillamook Counties to processing locations between 1990 and 1994. During those years, 44 percent of the logs cut on state forests in Clatsop and Tillamook Counties were processed by mills located in those counties, 53 percent of the logs fed mills elsewhere in Northwest Oregon, and 3 percent of the logs were exported out of state. No time series data are presented to reveal the connection between harvest levels and local employment in wood products industries, but the ODF (1996) does report that between 2.20 and 2.86 (depending on harvest technique) local lumber and wood products jobs are associated with each million board feet of additional harvest on state forests in Clatsop and Tillamook Counties (ODF 1996, p. 184).



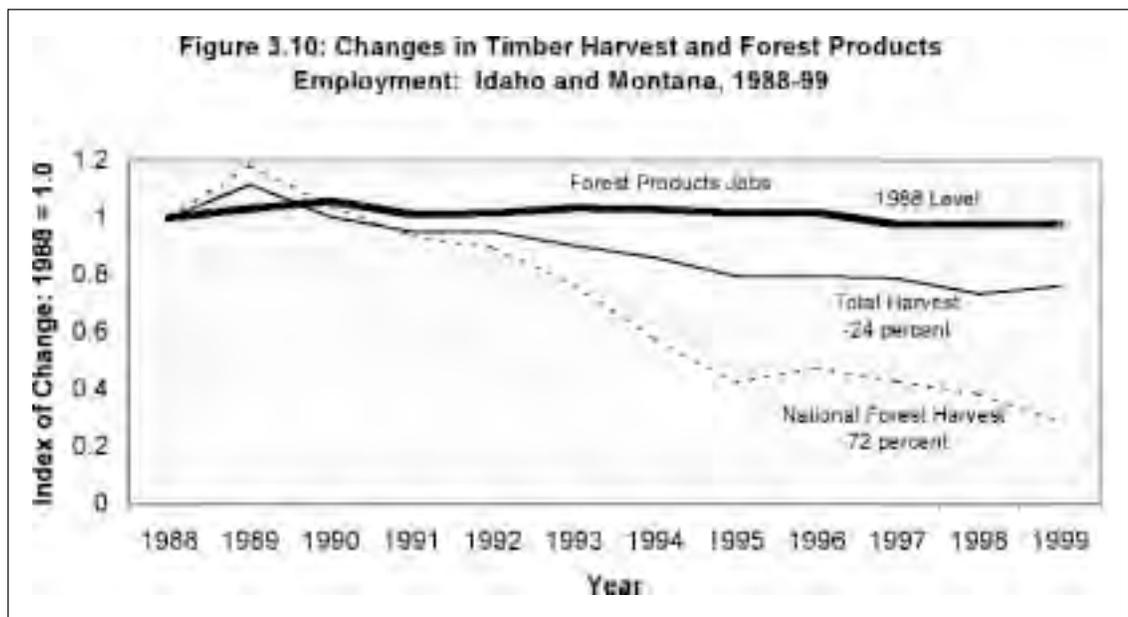
Though logs harvested on Oregon state forests cannot legally be exported abroad, the availability of logs from state forests can free other logs for export. In 1998, logs measuring 27.2 million board feet (2.9 percent) were exported from Northwest Oregon out of a total harvest of 932.0 million board feet (Ward, et al 1998 and ODF 2002a). Of the 1,268.7 million board feet of logs consumed by Northwest mills in 1998, 612.1 million board feet (48.2 percent) were imported from elsewhere in Oregon, other states, or other countries. One would expect that increased local harvest levels from state lands will be partially offset by either a reduction in imports to local mills or an increase in log exports from the area. The recent history of the Pacific Northwest illustrates the connection between local wood fiber markets and trade in raw logs. As wood fiber values rose steeply in the early 1990s in the Pacific Northwest, exports of unprocessed logs declined dramatically. Those logs, instead, became available for processing in regional mills. The net result was to stabilize the timber supply available for processing in the region (figure 3.8).

Other market responses to changes in wood fiber values can be expected to reduce the impact of the increase in harvest levels on state lands in Clatsop and Tillamook Counties on wood products industries in those counties. As local harvests change, so, too, do local stumpage prices. Markets can be expected to adjust fairly quickly in a manner that weakens the link between local harvests and local wood products jobs. For example, during the 1990s when wood fiber values were high, the use of round wood in paper production declined as the round wood flowed to lumber mills first and then the waste products from those mills flowed to pulp and paper mills. In addition, the use of recycled paper fiber in regional mills increased. As a result, despite the dramatic declines in federal timber harvests, both lumber and paper production remained relatively constant during the 1990s in Washington.¹⁰ For the three states of Washington, Idaho, and Montana combined, the 82 percent decline in National Forest harvests was associated with only a 5 percent decline in lumber production (figure 3.9).

In Oregon, lumber production also increased after 1994 despite ongoing declines in National Forest harvests. Across the Pacific Northwest, the higher stumpage prices justified more labor-intensive efforts to increase wood fiber utilization, helping to stabilize wood products employment. This pattern was especially clear in Montana and Idaho. Wood products employment in Montana in 1999 was only 9 percent below the 1988 level



of employment despite a 65 percent decline in the federal harvest and a 25 percent decline in total harvest. In Idaho, forest products employment was the same in 1999 and 1988 despite the 72 percent decline in National Forest timber harvest and 24 percent decline in total harvest. For Montana and Idaho combined, the loss of 72 percent of the National Forest harvest had almost no impact on the overall level of employment in the forest products industry. The decline in federal timber harvest was 827 million board feet, almost 30 percent of total harvest in those two states in 1988. Yet forest products employment declined by only 2.5 percent (figure 3.10).



Though the changes brought about by an increase in state harvests in Clatsop and Tillamook County would be opposite in direction, clearly it is not possible to be confident about making projections of future employment impacts by simply multiplying a change in the number of board feet harvested times some employment or income “multiplier.” The relationship between harvest from one source of supply and forest products employment is not a fixed arithmetic relationship that can be captured through the use of such multipliers. Although the region expected that, as a result of the decline in federal timber harvests, it would lose over 100,000 jobs and become impoverished. Yet nothing of the sort happened. Timber multipliers have been dramatically shown to be an inaccurate way of modeling how a local economy adjusts to changes in one source of timber supply.

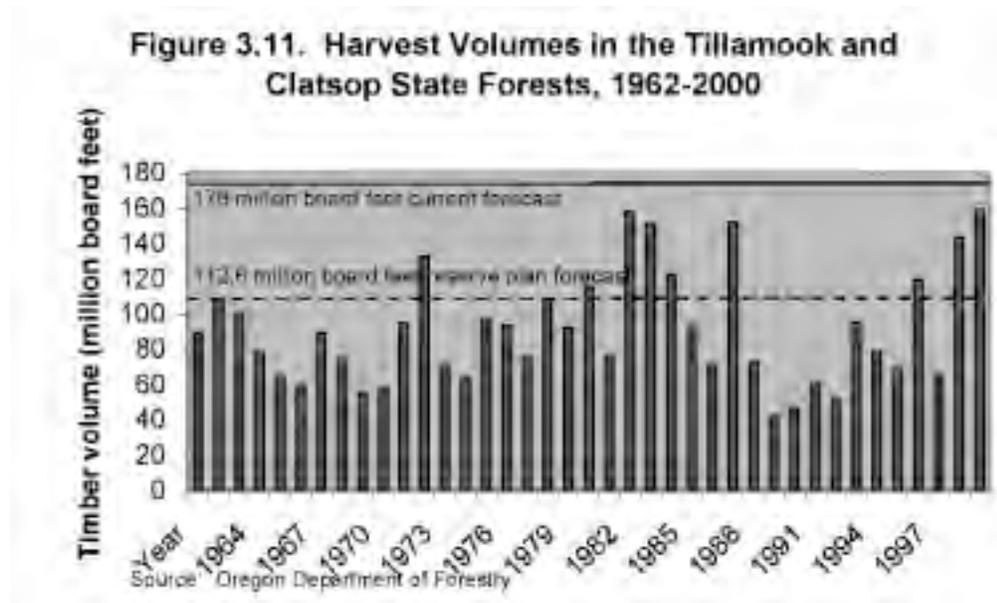
Impact of reserve strategy on wood products industries

The change to a reserve-based management strategy for the Tillamook and Clatsop State Forests would reduce harvest levels by approximately 36 percent during the first two decades of the plan, according to the Sessions (2000) report on alternative management scenarios.¹¹ The timber harvest reduction would be less than fifty percent early in the alternative management scenario, because thinning would continue in stands in the reserve area until they reached older forest structure. As stands in the reserve area reach older forest structure, the difference between harvest levels under the current and alternative management plans increases. Because of the young age of so much of the forest, a fifty-percent decline in timber volumes under a reserve plan is not predicted to occur until fifty years in the future.

The alternative management plan would result in lower job growth and lower increases in income in logging, forest management, and wood products sectors in Tillamook and Clatsop Counties relative to forecasts under the current FMP. However, because timber volumes on state forestlands are rising dramatically as young stands reach harvestable age, even under the alternative management plan harvest levels would greatly exceed average harvests during previous decades. The reserve plan is projected to increase harvest volumes during the next two decades by 26% relative to average harvests during the nineties. Managing half the forest primarily for habitat and recreation would thus result in more jobs and income in logging, forest management, and wood products industries relative to 1990s levels.

The ODF foresees average annual harvest levels during the next decade of 175 million board feet per year from the Tillamook, Astoria, and Forest Grove Districts of the Tillamook and Clatsop State Forests (ODF 2002). The modeling of various alternative management strategies done by John Sessions (2000) enables the comparison of ODF forecasts with outcomes under a fifty-percent reserve strategy. The ratio of the Sessions outputs under the reserve strategy to outputs under the present management strategy in combination with current ODF forecasts produces a prediction of outputs under the reserve strategy. The ODF has published harvest forecasts only for the coming ten years. The Sessions model results for the current management plan during future decades can be used in a similar fashion to derive predictions for ODF harvest levels in future decades under the current management plan.

The management plan passed by the Board of Forestry in 2001 corresponded to Sessions alternative 1C-2: structure-based management (SBM) with a Habitat Conservation Plan (HCP) and aggressive treatment (clearcutting) of stands affected by Swiss needle cast. Despite the fact that no HCP seems close to approval, the ODF maintains that the draft Implementation Plans correspond to alternative 1C-2. The Sessions model



predicts a small increase in harvest volumes for the second decade of an SBM without an HCP management scenario, so this study will use 176 million board feet per year as the twenty-year average annual harvest prediction for the current plan.¹² According to the Sessions model, the fifty-percent reserve alternative (alternative 6B in Sessions' report) would result in a 36 percent reduction of the average annual harvest for the next two decades.¹³ Thus, this study predicts an average annual harvest level of 112.6 million board feet during the next twenty years under a reserve-based management strategy.

Figure 3.11 below presents information on harvest levels in the Tillamook and Clatsop State Forests in relation to harvest levels predicted under the current management plan and the reserve-based alternative under study here. Table 3.1 presents the twenty-year predictions in the context of average harvest levels in previous decades. The 176 million board feet per year harvest level currently expected would approximately double harvest levels of the 1990s. The 112.6 million board feet per year anticipated from a reserve-based management plan amounts to a 26 percent increase relative to the previous decade and a 7 percent increase relative to harvest levels in the 1980s, the highest previous decade average harvest for which information is available.

Table 3.1. Average annual harvest levels for past decades and management alternatives.

1962-70	80.3
1971-80	89.0
1981-90	105.5
1991-2000	89.4
2001-2020 current FMP	176.0
2001-2020 fifty-percent reserve plan	112.6

Sources: ODF Complete Harvest History (2002), ODF Northwest Oregon State Forests District Implementation Plans (2002), and Sessions (2000)

28 :: Economic Realities in the Tillamook and Clatsop State Forests

The economic impact in Clatsop and Tillamook Counties of changes in timber harvests on the Tillamook and Clatsop State Forests would result primarily from changes in timber harvested on the state lands within these counties because virtually all the lumber harvested in the portion of the state forests in Washington and Columbia Counties is harvested by contractors outside Tillamook and Clatsop County and goes to mills outside these counties (ODF 1996).¹⁴ In the 2001 fiscal year, the latest period for which data are available (ODF 2001), harvests on state lands in Tillamook and Clatsop Counties comprised 85 percent of all harvests from the Tillamook and Clatsop State Forests.¹⁵ If the geographic distribution of the harvest is stable at these levels, the predicted harvest in these counties is 149.6 million board feet per year under the current management plan; 95.7 under the fifty-percent reserve alternative – a difference of approximately 55 million board feet.

The ODF (1996, p. 184) asserts that each increase of one million board feet of timber harvested on state forests in Clatsop and Tillamook Counties would result in between 10.87 and 11.39 new jobs in Clatsop and Tillamook Counties depending on whether clearcut or partial cut harvest methods are employed. The ODF study predicts that the distribution of the job creation across various sectors of the economies would result in direct effects of between 2.20 and 2.86 new jobs in lumber and wood products sectors, and between 2.79 and 3.29 new jobs in school and government, along with indirect and induced effects of between 5.38 and 5.74 new jobs in other sectors. These figures combined with the Sessions (2000) forecast of the proportions of clearcut and partial cut harvests under scenarios 1C-2 (the current plan) and 6B (the fifty-percent reserve plan) suggest that the 55-million-board-foot difference between the current management plan and the reserve-based alternative amounts to a difference of 600 jobs in Tillamook and Clatsop Counties. The difference is substantial in counties where year 2000 employment in wood products industries was 1,092 and total employment was 23,571. It should not be a surprise that harvest levels from state lands are contentious issues among forest products industry groups in those counties and in the state.

The ODF figures of about eleven jobs per million board feet certainly overstates the true impact of changes in harvest levels on jobs in Tillamook and Clatsop Counties. Increased harvest revenues are assumed incorrectly to result in dramatic job increases in county government and schools sectors. In fact, school funding would not be affected by increased harvest levels because legislative changes in 1991 to equalize spending per pupil throughout the state result in timber revenue fluctuations offsetting dollars distributed by the state's general fund rather than variations in service levels. Timber revenue fluctuations are so small relative to state spending on education that changes in school funding as a result of fluctuations in harvest revenues would be nil. The ODF (1996, p. 191) acknowledges this point in a section that considers impacts on schools but does not adjust the earlier analysis and reports in the executive summary of the document that assume timber revenues would boost spending on schools.

Because roughly 70 percent of county timber receipts were directed to schools as the ODF study was prepared (ODF 1996, p. 189), the impact of a million-board-foot increase in harvest on state lands in the counties would be considerably smaller than the 2.79 to 3.29 jobs reported by the ODF study. If job creation per dollar revenue is assumed to be the same in county government as in schools, the correct figures for county government job creation per million board feet of timber should be 30 percent of the ODF estimate, that is, between 0.84 and 0.99 jobs.

The ODF (1996) predictions of job creation connected with increases in timber harvest further overstate likely actual magnitudes because the timber prices used to model these effects – \$540 per thousand board feet for clearcut harvests, \$415 per thousand board feet for partial cuts – are considerably higher than prices

today. Current prices have fallen by 25 percent in real terms relative to the prices used in the ODF (1996) models (ODF 2002 and BEA 2002). Since the Sessions (2000) analysis assumes an even flow of timber with deviations only for the management of stands affected by Swiss Needle Cast, the flow of timber— and presumably employment predictions for lumber and wood products industries— would not be affected. County government revenue predictions are influenced by the predicted stumpage values. As a result, estimated employment and income effects in county government should be scaled down by 25 percent to reflect the real change in timber prices. The adjusted local job changes associated with a million-board-foot change in timber harvests on state lands in Tillamook and Clatsop Counties are between 0.63 and 0.74 new jobs in county government, again adopting the ODF's (1996) implicit assumption that the increased revenue will result in expanded county services.

The ODF (1996) uses multipliers of 2.18 for lumber and wood products industries and 1.84 for schools and county government to inflate the estimated employment impacts in Clatsop and Tillamook Counties of a million-board-foot change in harvests on state lands in those counties.¹⁶ Thus, the direct employment impacts in lumber and wood products industries are estimated to lead to somewhat greater employment effects in unspecified other sectors. For every job gained in schools and county government, 0.84 of a job is gained in other sectors. The multipliers purport to capture both indirect employment effects resulting as firms, schools, and county governments increase their spending on supplies and induced employment effects created as newly hired workers spend their new income in local businesses.

As noted earlier, the miscalculation of local school impacts combined with the very high stumpage values used to make revenue forecasts led to the ODF's overstatement jobs of the direct employment impacts in Clatsop and Tillamook Counties of a million board feet change in harvest on state forests in those counties by between 2.16 and 2.55 jobs. Because of the multipliers used, the calculation error has been amplified to between 3.97 and 4.69 jobs, or between 34.9 percent and 43.1 percent of the total impact reported.

Even where direct employment effects might be stated accurately, the use of multipliers to estimate local economic impacts relies on a series of untenable assertions about the local economy. Indeed, to conclude that the direct employment effects in a particular sector represent the net impact of the change in harvest on the entire local economy requires similar unrealistic assertions about the economy. To derive predictions of local economic impacts of increased state harvests by multiplying direct effects implicitly assumes that there exists a large pool of workers who are unemployed, who have left the workforce but might be motivated to re-enter the workforce, or who might be attracted to the region to fill the new jobs. None of these conditions appears to be met in Clatsop and Tillamook Counties. Except for the current recession, recent unemployment rates have been quite low – 4.6 percent in Clatsop County, and 4.4 percent in Tillamook County in 2000 (OED LMIS). Vigorous local job creation during the past decade even while lumber and wood products sectors declined – about 600 jobs per year between 1988 and 1999 in Clatsop and Tillamook Counties combined (BEA REIS) – makes it unlikely that there exists a large reservoir of discouraged workers in the region. Finally, given the importance of natural amenities in attracting businesses and households to a region, the reserve strategy seems more likely than the current forest management plan to result in net migration into Clatsop and Tillamook Counties during coming decades.

In fact, the boost to lumber and wood products sectors and supporting industries that is envisioned by the current forest management plan would likely require the diversion of resources from other economic activities in Clatsop and Tillamook Counties. Just as the decline of lumber and wood products industries in Clatsop and Tillamook Counties freed up resources for employment in growing sectors during the 1980s and

1990s, job and income gains in these sectors would likely lure employees away from other endeavors in the economy. While the direct employment effects in lumber and wood products sectors associated with increased harvests on state lands may provide a reasonable estimate for changes in these sectors, using these effects at all — let alone multiplying them — to assert net changes in the broader economy results in misleading forecasts of likely future changes.

While this study lacks the resources for constructing an elaborate empirical model of the Clatsop and Tillamook economies, basic time series regression analysis using county harvest and employment data from 1976 to 2000 lends some weak support for using the direct employment effects to predict change in lumber and wood products sectors resulting from increased harvests on state lands.¹⁷ However, no evidence is found for direct effects on employment in county government associated with increased harvests on state lands in Clatsop and Tillamook Counties. Likewise, the effect of historical changes in harvest levels on state lands on total employment in Clatsop and Tillamook Counties appears to be zero. Far from surprising, this evidence is consistent with findings about the economic impact of reduced federal harvests in Oregon (Niemi, et al. 1999). The effects evident in this relatively unsophisticated regression analysis are exactly those predicted by models of the economy that anticipate rational responses to changing incentives by participants and institutions in the economy.

Despite these empirical and conceptual challenges to the use of harvest employment multipliers, to be conservative, this study accepts the ODF's (1996) findings regarding the direct effects associated with a change of one million board feet in harvests from state lands on lumber and wood products industries in Clatsop and Tillamook Counties. As discussed earlier, because of likely changes on private forest lands and in log imports to the counties in the event of the expansion of harvests on state lands, these direct effects comprise an upper bound on possible effects. Actual employment effects would very likely be much smaller. Sectoral local economic impact estimates based on direct job figures alone have become common practice in federal studies of changes in forest policy. According to United States Forest Service Pacific Northwest Unit researcher Richard Haynes, "Controversy has often surrounded the choice of direct and/or indirect job measures and by the early 1990s job estimates were based on only direct jobs." (Haynes, 2002 citing FEMAT, 1993) Haynes goes on to say, "By the 1990s policy impacts were being measured using broader notions of economic well-being of associated communities (both group and place). Job estimates still play a role as a policy variable but their power to persuade has diminished." (Haynes, 2002 citing McDool, S.F. et al. 1997)

Despite the lack of empirical evidence for the effects on employment in county government, the ODF's (1996) estimates of direct effects of changes in the state harvest on this sector will be accepted, though corrected for the true effect on schools and by a more reasonable forecast for future stumpage values. This study rejects the inflation of sectoral impacts by multipliers to estimate net local impacts. Moreover, the direct effects are considered to indicate the maximum possible impact on the lumber and wood products industries and on county governments and are not considered indicative of the probable net total impact of changes in state timber harvests on the Clatsop and Tillamook County economies. Table 4.2 summarizes the differences between the ODF (1996) and this study in projected annual changes to employment and income in Clatsop and Tillamook Counties resulting from changing timber harvest on state forests in Clatsop and Tillamook Counties by one million board feet.

Applying the modified parameters reported in table 4.2 to the different harvest levels and harvest methods of the current forest management plan and the fifty-percent reserve plan for the Tillamook and Clatsop State Forests results in the prediction of differences of at most 136 jobs created in lumber and wood products and

Table 3.2. Projected annual changes to employment and income in Clatsop and Tillamook Counties resulting from changing timber harvest on state forests in Clatsop and Tillamook Counties by one million board feet.

SECTOR	ODF (1996) ESTIMATES		MODIFIED ESTIMATES	
	Clearcut	Partial cut	Clearcut	Partial cut
Lumber and Wood Prod.	2.20	2.86	2.20	2.86
School & Government	3.29	2.79	0.74	0.63
Other	5.38	5.74	0	0
Total	10.87	11.39	2.94	3.49

37 jobs created in county government — a total of 173 jobs created — between the two management approaches. Personal income associated with difference in job creation can be estimated by multiplying the difference in job creation in each sector by average wages in each sector. According to OED (2001) data, in Clatsop and Tillamook Counties in the year 2000, average pay of workers in lumber and wood products industries was \$35,317 per year and \$27,664 per year in local government. The estimated maximum difference in new annual personal income in the lumber and wood products and county government sectors of Clatsop and Tillamook Counties resulting from timber harvests under the current management plan and under a fifty-percent reserve alternative is \$5,826,680.

The future of lumber and wood products sectors in the local economies

Changing the current management plan for the Tillamook and Clatsop State Forests to designate fifty percent of the forest as reserve areas to be managed primarily for fish and wildlife habitat, water quality, and recreation would not alter the small role played by wood products industries in the creation of income and jobs in the state. Even if the statewide impact on jobs and income of changing harvest levels in Tillamook and Clatsop State Forests were double that in Clatsop and Tillamook Counties, as is approximately the estimate in the ODF study (1996), the 346 difference in jobs created and \$11,653,360 per year difference in personal income growth primarily in lumber and wood products sectors in the state would be imperceptible in an economy that in 1999 consisted of 2,080,821 jobs and \$89.4 billion in personal income (BEA REIS).

The difference between the current management plan and a fifty-percent reserve alternative would be somewhat more significant in Clatsop and Tillamook Counties. The estimated difference between the current plan and a fifty-percent reserve alternative of 173 new jobs amounts to 0.5 percent of all jobs in the counties in 1999; the \$5,826,680 in new personal income comprises 0.6 percent of all income earned in those counties in 1999 (BEA REIS).

In 2000, the latest year for which data are available, lumber and wood products jobs made up 4.6 percent of all employment in Clatsop and Tillamook Counties. (OED LMIS). If harvest targets under the current plan had been reached in 2000 and if the direct effect of each million board feet of timber were that reported by the

32 :: Economic Realities in the Tillamook and Clatsop State Forests

ODF (1996) and table 3.2 above, lumber and wood products sector jobs would have comprised 5.1 percent of all jobs in Clatsop and Tillamook Counties.¹⁸ If, instead, the harvest levels predicted under the fifty-percent reserve alternative had been realized, lumber and wood products jobs would have constituted 4.4 percent of all jobs in the counties.¹⁹ Income effects would be similar. Given the likelihood of ongoing contraction of employment and income in lumber and wood products in the counties due to technological change and the anticipated continuation of healthy growth in other sectors of the local economy, the local impact of the smaller harvest volume under a fifty-percent reserve plan would become even smaller over time.

The projected increases in harvest from state lands at most would provide a small, one-time boost to local wood products industries. The change in forest management strategy to manage half of the Tillamook and Clatsop State Forests primarily for habitat and recreation would result in a smaller increase in local wood fiber production relative to the previous decade. If the direct effects reported by the ODF (1996) correctly portray the relationship between local harvests and local wood products industries, the fifty-percent reserve strategy would lead to smaller growth in lumber and wood products industries relative to the previous decade and a slight decline in those industries relative to present levels.

Because of offsetting reactions to increased state harvests in related areas of the economy, it is likely that the actual direct impacts of the increased harvests on local lumber and wood products industries will be smaller than those predicted using even the timber multipliers alone that are reported in the ODF study (1996). In this case, the likely impact of either the increased harvests of the current forest management plan or the smaller increases under a fifty-percent reserve plan on local lumber and wood products industry would be considerably smaller even than the modest effects predicted here. Certainly, the increased harvests on state lands will not be an important part of any successful economic development plan for Clatsop and Tillamook Counties.

Whether the current management plan governs decisions on the Tillamook and Clatsop State Forest or far-sighted county commissioners convince the Board of Forestry that the fifty-percent reserve strategy holds greater promise for the well-being of the region and the state, the role of state timber harvests in driving local economic development will be very small. The job gains that result from putting vast acreages into more intensive production are one-time-only events. Labor saving technological advances have eliminated many of the high-paying jobs once associated with the lumber and wood products industries. Such technological change can be expected to continue as capital costs remain low relative to skilled labor wage rates. In contrast to service and many other manufacturing industry products, lumber and wood products often face demands that are relatively price and income inelastic. As a result, supply events can result in volatile changes in price in the short run even while the long-run trend in real prices tends to be relatively flat. Lastly, economic dependence on commercial timber harvest can diminish the environmental amenities that play an important role in attracting households and businesses necessary for the health of other sectors of the economy.

Clatsop and Tillamook Counties share these realities not only with other rural counties in Oregon, the West, and elsewhere in the United States but also with the economies of the less developed nations of the world. United States Forest Service Pacific Northwest Research Station economist Richard Haynes points out that economists have been disputing the idea that manipulating harvests can enhance local economic development since the early 1970s (Haynes, 2002 citing Kromm, 1972). Managing forestlands for multiple uses promises to sustain wood products industries while encouraging economic development in other areas of the economy by increasing the environmental amenities attracting households and businesses to communities adjacent to the forestlands and by supporting local businesses dependent on recreation and

tourism. Haynes and Quigley (2001) support the assertion that refocusing forest management on a broad scale toward providing wildlife habitat and recreation opportunity can increase other dimensions of the economy without eroding employment and income in lumber and wood products sectors.

Summary and Conclusions

The fifty-percent reserve plan would result in smaller future harvest from the Tillamook and Clatsop State Forests than envisioned under the current management plan. Harvests during the first decades of a fifty-percent reserve plan would be about 35 percent smaller than those foreseen under the current plan because thinning would continue in younger stands in reserve areas until those stands reached older forest structure. Harvest volumes under the fifty-percent reserve plan would exceed average levels during the past decade so the adoption of a fifty-percent reserve plan would not result in great economic dislocation in counties adjacent to the forests or in the larger surrounding region.

The ODF (1996) has used a deeply flawed economic model to predict large gains in lumber and wood products and other sectors of Clatsop and Tillamook Counties under the current management plan. The Oregon Board of Forestry rejected the fifty-percent reserve alternative in part because of the assertion that the preservation of half of the Tillamook and Clatsop State Forests for fish and wildlife habitat would result in much smaller economic growth for Clatsop and Tillamook Counties.

In fact, the economic outcomes brought about by the different timber harvest volumes under the current management plan and the fifty-percent reserve alternative would likely affect the size of lumber and wood products industries but not the size of the local economies as a whole. This expectation is confirmed by modeling that better captures the function of the economy and that corrects fundamental errors in the economic base modeling done by the ODF (1996). Evidence from the behavior of the Clatsop and Tillamook County economy during the past 25 years also confirms that lumber and wood products industry growth in the wake of increased harvests from state lands would replace growth elsewhere in the economy rather than increase the total level of economic activity in the counties.

Even the impact on wood products industries is likely to be considerably smaller than that predicted by the ODF (1996) because of likely reductions in harvests on private lands as well as reductions in log imports to the region accompanying the growth in harvest from state lands.

Contrary to popular perceptions, lumber and wood products industry employment and income in the State of Oregon and even in Clatsop and Tillamook Counties has become quite small. Management decisions regarding these state forests will have no perceptible impact on statewide lumber and wood products industries. At best, the share of these sectors in the Clatsop and Tillamook Counties' economies will grow slightly under the current management plan, almost certainly by attracting resources from other areas of the economy. Compared to the current plan, the fifty-percent reserve strategy would result in slightly slower growth in lumber and wood products sectors relative to recent average levels. The fifty-percent reserve strategy would result in a small reduction in timber harvest relative to the high levels of the past few years. If the direct employment effects asserted by the ODF (1996) hold, the fifty-percent reserve plan would result in a small contraction in local lumber and wood products industries from their most recent levels.

The decision to manage the Tillamook and Clatsop State Forests primarily for commercial timber has resulted

34 :: Economic Realities in the Tillamook and Clatsop State Forests

from looking at the local economy through the rearview mirror. The small benefit to lumber and wood products sectors anticipated under the current plan does not seem likely to warrant passing up the chance to manage much of these forests to produce the environmental values that are essential to the future health of the economy in Clatsop and Tillamook County and in Northwest Oregon.

- ¹ The OED data portray a large part of the state employment situation but miss some important elements. For example, the OED data exclude interstate railroad workers covered under a separate unemployment insurance law, self employed persons, small farm agricultural labor, and domestic service earning less than \$1,000 per quarter. The OED data set is superior to other data sets because it provides more detail on employment by industry category. However, the OED data undercount employment because of reduced coverage. In 1999, the latest year for which both data sets are available, OED reports a total of 1,577,666 covered employees in Oregon, just 75.8 percent of the 2,080,821 Oregon jobs reported in the REIS data set that year.
- ² The menial jobs in the fast food industry often associated with service employment are actually classified in the retail trade industry category (SIC 620) that has contributed a steady share of about 11 percent of personal income and 19 percent of jobs in Oregon during the past three decades.
- ³ The proportion of service sector jobs to total employment exceeds the proportion of service sector income to all income in part because of the different coverage of the CEP and REIS data sets. In addition, service sector jobs do pay somewhat less on average than do jobs in most other sectors of the economy. In 2000, the average payroll for service sector jobs was \$30,644 per worker; the average payroll for all industries was \$32,776 per worker, a seven percent difference (OED CEP 2000).
- ⁴ The lumber and wood products industry declined much more sharply in Tillamook County (from 22 percent to 4 percent of personal income, from 21 percent to 7 percent of jobs in the county) than in Clatsop County (from 10 percent to 3 percent of personal income, from 10 percent to 4 percent of jobs in the county).
- ⁵ Again, the OED data provide more detail on employment category but undercount actual employment. In 1999, OED CEP data report 23,331 total jobs in Clatsop and Tillamook Counties, 68.6 percent of the REIS count of 34,017 that year.
- ⁶ The growth in real personal income derived from retirement, investment, or public assistance income between 1969 and 1999 was much more dramatic in Tillamook than in Clatsop County. In Tillamook County, income from these sources grew 465 percent during the period, while the growth in income of this type in Clatsop County amounted to 344 percent.
- ⁷ In 1999, OED CEP data report 214,805 total jobs in Washington County, 78.8 percent of the REIS count of 272,755 that year.
- ⁸ Montana Business Quarterly, 40(1), Spring 2002, p. 32, Figure 6.
- ⁹ Northwest Oregon consists of Clackamas, Clatsop, Columbia, Hood River, Marion, Multnomah, Polk, Tillamook, Washington, and Yamhill Counties. Although our study focuses on the economic impacts of the fifty-percent reserve strategy in Clatsop and Tillamook Counties, timber-related activities in other nearby counties are affected as changes in the demand for forestry services and in the supply of raw material for wood products industries would result from management decisions regarding the Tillamook and Clatsop State Forests.
- ¹⁰ Washington Mill Survey 1986–1996: Has the Sun Really Set on Washington State's Forest Products' Industry?, Dave Larsen and Phil Aust, Washington State Department of Natural Resources, a paper prepared for the 34th Annual Pacific Northwest Regional Economic Conference, April 26, 2000.
- ¹¹ The reduction in harvests during the next decade would be smaller still if the aggressive treatment (clearcutting) of stands affected by Swiss Needle Cast modeled by Sessions in alternative 1C–2 (the scenario approved in January 2001) but not alternative 6B (the fifty-percent reserve scenario) were part of a reserve plan, even if only for stands outside the reserve area. We lack the resources to revise the Sessions study to consider that possibility but it is likely that we overstate the reduction in harvest during the immediate future.
- ¹² The Sessions model of Alternative 1C–2 predicts an output of 279 million board feet per year from the combined Tillamook, Astoria, and Forest Grove Districts of the Tillamook and Clatsop State Forests during the first decade of the plan and 282 million board feet per year for the second decade of the plan.
- ¹³ The Sessions model of Alternative 6B predicts an output of 140 million board feet per year from the combined Tillamook, Astoria, and Forest Grove Districts of the Tillamook and Clatsop State Forests during the first decade of the plan and 220 million board feet per year for the second decade of the plan. Because of the dramatic difference in harvest levels during the first two decades and uncertainties regarding the implementation of a fifty-percent reserve plan, the 20- rather than a 10-year average is considered here.
- ¹⁴ The impacts in other counties, though real, lie beyond the scope of this study. The impact in Washington, Multnomah, and Clackamas Counties would be miniscule relative to other economic activity in those counties. The reduction in harvest levels from the Tillamook and Clatsop State Forests would affect the flow of logs to mills in nearby rural counties where the economic impacts would be more significant.

¹⁵ Washington County harvests amounted to 14.3 percent of the total from the two state forests; Columbia County harvests, 0.7 percent.

¹⁶ ODF (1996) does not report these multipliers directly, but they can be inferred from the information provided. Specifically, the information reported in Table 48 in ODF (1996, p. 184) and restated below in table 3.2 indicates the following relationships:

$$2.20x + 3.29y = 10.87$$

$$2.86x + 2.79y = 11.39$$

where x is the multiplier for lumber and wood products industries and y is the multiplier for schools and county government. Solving this system of equations yields $x = 2.18$ and $y = 1.84$.

Presumably, the ODF (1996) model includes more industry detail than is provided in their report. In this case, the multipliers for lumber and wood products industries and for schools and county government are weighted averages of the multipliers for the subcategories of each broad sector.

¹⁷ The regression analysis indicates direct effects of a smaller magnitude than those reported in ODF (1996). The largest coefficient estimate among several econometric models tested indicated a 1.17 local job increase in lumber and wood products sectors associated with a one-million-board-foot change in harvest on state forests in Clatsop and Tillamook Counties. The 95 percent confidence interval from that coefficient estimate fell between -0.60 and 2.95 jobs per million-board-foot change in harvest from state lands in the counties and, of course, the hypothesis that the true value of the coefficient is zero could not be rejected at the 5 percent level of significance.

¹⁸ Because the OED data set undercounts workers and the direct effects used to calculate the change in lumber and wood products jobs, it should be interpreted as the upper bound for possible effects. The impact on lumber and wood products employment is almost certainly overstated.

¹⁹ Recall that, while harvest volumes under the fifty-percent reserve plan would be substantially larger than average harvests during the past decade, they would be somewhat smaller than recent harvest volumes.

:: Chapter 4

Impacts on Local Schools and County Governments

Introduction

As best management practices for the Tillamook and Clatsop State Forests are contested, the Board of Forestry, local County Commissioners, and, ultimately, voters in the state must consider distributional implications as well as the levels of economic value and the levels of economic activity resulting from various management alternatives. At present, nearly fifty percent of gross revenues from timber operations on the Tillamook and Clatsop State Forests fund operational costs such as road building and ODF administration but the remainder is distributed to Clatsop, Columbia, Tillamook and Washington Counties.¹ This revenue net of operational costs and repayment of expenses to rehabilitate the lands decades ago can be considered a rough estimate of the net economic value resulting from timber operations on the forests. The net revenue flows to county schools, county government, and various municipalities in the counties.

The citizens in Clatsop and Tillamook Counties have an important stake in management decisions regarding the state forests because of their proximity to the forest land, the current importance of state timber revenues to county government budgets, and the dependence of the counties on two of the industries most likely to be affected by changes in forest management, tourism and wood products. The history of the state forests as county lands has resulted in institutional arrangements that give the counties considerable power in determining management practices in the forests. County leaders have historically advocated high harvest levels in the state forests in part because of their perception of the role of lumber and wood products industries in the local economy and in part because of the desire to fund county services without increasing the taxes and fees that comprise the main source of revenue for the counties.

Even if a fifty-percent reserve plan for the Tillamook and Clatsop State Forests improves the economic well-being of Northwest Oregonians as a group, unless the net impact of the plan on the rural counties adjacent to the forests is perceived as positive, those counties can be expected to oppose the plan. Moreover, even when net benefits to the rural counties are accepted as likely to be positive, County Commissioners might be reluctant to support the fifty-percent reserve plan because the foregone state timber revenue requires

funding county services by other means and property tax rates are constrained by Oregon state law. However, if the net benefits in Clatsop and Tillamook County of a fifty-percent reserve plan are expected to be positive, county leaders have an obligation to their constituents to support the change in management plan. Replacing some timber revenues with alternative funding sources will be more than justified in that case. If the fifty-percent reserve plan is expected to stimulate local economic activity while increasing local economic value, potential alternative funding sources would be expected to increase as well.

In dismissing the fifty-percent reserve plan and other management alternatives that would place less emphasis on commercial timber harvests, the ODF has emphasized the importance of timber revenues in funding county schools and public services. In fact, local school budgets would remain virtually unchanged by changes in county harvest revenues from the state forests because public school spending in Oregon is determined by a statewide formula based on the number and type of students in attendance as well as the transportation needs of each district. For the vast majority of school districts, any changes in school timber revenues are matched by exactly equal and offsetting changes in state payments to schools. The Jewell and Neah-Kah-Nie School Districts are the only districts that collect so much local revenues that they receive no payments from the state school fund. Only in these two instances would differences in local timber revenues result in differences in local school funding.

Only about 20 percent of state timber revenues from county lands actually fund services in Clatsop and Tillamook Counties. The fifty-percent reserve plan would likely lead to a \$500,000 annual reduction in state timber payments to county governments relative to the average during the past decade. The reserve plan is expected to lead to a \$1.8 million reduction in timber revenues to county governments from their relatively high level in fiscal year 2001. Total county government revenues for the two counties amounted to \$54.9 million in 2001.

Despite the large share of the extraordinarily high state timber revenues of the past eight years directed to local schools, only in the Jewell and Neah-Kah-Nie School Districts did any increase in school spending result. An example will clarify the impact of timber revenues on the availability of public resources in Clatsop and Tillamook Counties. Suppose that a spike in timber prices increases timber revenues in the counties by \$10 million. Recent distribution patterns imply that approximately \$5 million of the additional revenues would support ODF administration of the forests and projects in the forests. A bit over \$3 million of the revenues would be directed to schools in the county. But those payments would trigger an equal and exactly offsetting reduction in state payments to local schools so service levels would remain the same. Less than \$2 million of the increase in timber revenues would relieve county and municipal government budgets in Clatsop and Tillamook County.

In this chapter we examine the financial relationship between the state forests and public services in Clatsop and Tillamook Counties. We then proceed to analyze the impact of the fifty-percent reserve plan on county governments. We will demonstrate that the fifty-percent reserve plan would have no effect on local school budgets in the counties. County governments would receive slightly less timber revenue under the fifty-percent reserve plan than they did during the past decade. However, timber revenue flows to county governments under a fifty-percent reserve plan would exceed real revenue levels prior to fiscal year 1994, before timber prices soared and harvest levels increased.

Timber revenues and school budgets

Given the large flow of state timber funds to schools in Clatsop, Tillamook, and Washington Counties, it seems reasonable to conclude that local school budgets depend heavily on the level of harvest on state lands and the price of timber. In fact, for the vast majority of local schools, funding in the local counties does not fluctuate with timber revenues because Oregon state law mandates equal spending on every student in the state. State funds finance 70 percent of K-12 education expenditures statewide and state payments to schools are determined by the formula²

$$\text{State School Fund Grant} + \text{Local Revenue} + \text{Students (ADMw)} + \$4500 \text{ adjusted by teacher experience and to total} + \text{Transportation \& facilities grants}$$

For all but two small districts, changes in local revenue due to fluctuations in harvest income are completely offset by changes in the level of state funding directed to local schools.³

The determination of funding for schools throughout Oregon, including those in Clatsop, Tillamook, and Washington Counties, by a statewide formula and the variation in payments from the state school grant fund to offset fluctuations in local revenue imply that the state timber revenues funding county schools essentially accrue to the state general fund. In fiscal year 2001, state timber sales directed \$15.5 million to schools in Clatsop, Tillamook, and Washington Counties. State spending that year totaled about \$6 billion, of which \$2.3 billion supported K-12 public schools. Even if the timber revenues allocated to local schools were to disappear completely, there would be little or no impact on local school funding.⁴ Likewise, a doubling of total timber revenues would not significantly increase the resources available to local schools.

State timber revenue support of local public services

Timber harvests on state lands in Clatsop and Tillamook Counties generated \$41.0 million during fiscal year 2001 (table 4.1). Oregon state law (ORS 530.115(1)) and the magnitude of forest projects associated with timber sales in a given year determine the distribution of gross revenues among forest management, county schools, and county and municipal governments. During fiscal year 2001, over half – \$20.8 million (50.7 percent) – of gross timber revenues funded ODF administration, forest projects, and, in Tillamook County, forest rehabilitation bond repayments (figure 4.1). Reducing the size of payments to the county schools that would otherwise have been made by the state school fund, \$11.4 million (27.8 percent) was directed to K-12 school districts in the counties. Just \$8.8 million (21.5 percent) of the gross revenues funded public services in the counties, mostly at the county government level.

Forest projects and ODF administration claimed a considerably larger proportion of gross revenues in Tillamook County (59.2 percent) than in Clatsop County (44.8 percent) due in large part to the \$1.4 million repayment of rehabilitation costs incurred by the state there during the 1950s and 1960s.⁵ More forest projects were tied to timber sales on state lands in Tillamook County than in Clatsop County in fiscal year 2001. The share of gross revenues in Clatsop County that funds public services there through county and municipal governments was 25.4 percent compared with a 16.0 percent share in Tillamook County.

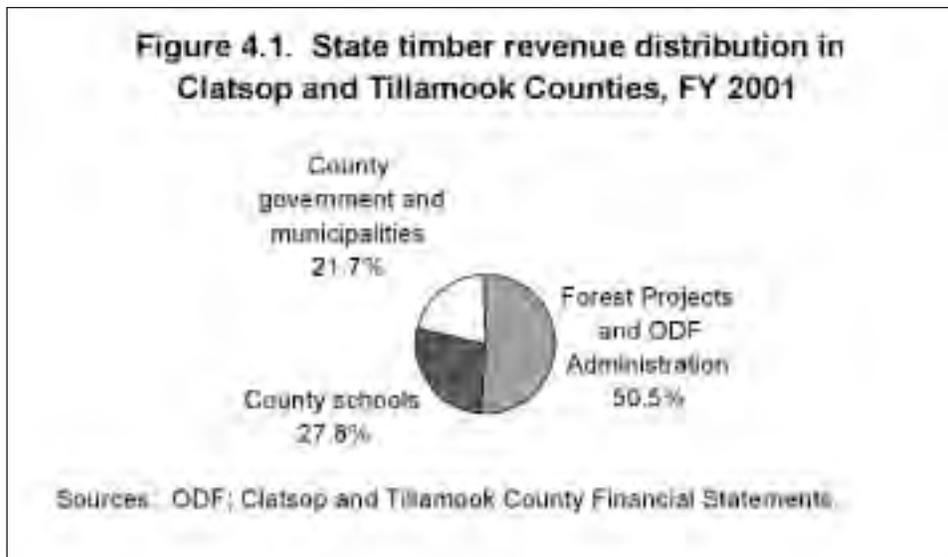


Table 4.1. Distribution of Timber Revenues, FY 2001. (millions of dollars)

County	Forest Projects & ODF Administration	K-12 Schools	County Government	Municipalities	Total
Clatsop	10.8	7.2	5.7	0.4	24.1
Tillamook	10.0	4.2	2.6	0.1	16.9
Total	20.8	11.4	8.3	0.5	41.0

Sources: ODF, State Forester's Report for the Council of Forest Trust Land Counties, November 2001, County Financial Reports.

The fifty-percent reserve plan and county government budgets

We project that Clatsop and Tillamook County governments would receive slightly less revenue from timber operations on state lands in the counties than they did during the last decade during the first ten years of a fifty-percent reserve management plan for the Tillamook and Clatsop State Forests. However, county government timber revenue levels are expected to exceed those prior to the dramatic rise in lumber prices of the mid-1990s and the jump in harvest levels of the end of that decade. The predicted decline in timber revenues amounts to a 7.0 percent reduction from average levels during the past decade and a 21.4 percent decline from the relatively high timber revenues of fiscal year 2001. As a proportion of total county government revenues, the reduction in state timber revenues funding Clatsop and Tillamook County governments amounts to a 1.1 percent reduction relative to average revenue levels during the past decade and a 3.3 percent drop relative to county government revenues during fiscal year 2001.

Comparing revenues under the reserve plan with a decade-long average leads to a better sense of the impact of a change in forest management on county government budgets because the volatility of lumber prices combined with the variation in harvest levels can lead to considerable swings in state timber revenues for the

Table 4.2. Average Stumpage Values for Harvests on State Lands, by County, Fiscal Years 1998–2001. (2001 dollars)

County	Average Volume (mbf)	Average Value (\$)	Average Stumpage (\$/mbf)
Clatsop	52,355	19,362,092	369.82
Tillamook	53,276	16,487,113	309.47
Total	105,631	35,849,205	339.38

Source: ODF, State Forester's Report for the Council of Forest Trust Land Counties AOC Annual Conference, 1998–2001

county governments. Even comparing outcomes under a reserve plan with the past decade can be misleading because eight of the past ten years saw extraordinarily high state timber revenues because prices soared from 1994 through 1997 and in the last years of the decade harvest volumes nearly doubled relative to their levels in the mid-1990s. We consider the impacts of the reserve plan during the first ten years of its implementation because forecasting beyond that point makes little sense given the certainty of great change in the economy of Northwest Oregon during that span. Indeed, it is probable we overstate the impact of the fifty-percent reserve plan on county government budgets during the coming decade because growth in sectors of the economy other than lumber and wood products seems likely to reduce still further the dependence of the county governments on revenues from logging on the state forests.

In order to predict revenue flows to counties from timber harvests on state lands, it is first necessary to forecast future stumpage values. That price information can then be combined with forecasted harvest levels to predict revenue levels. One must predict the grade of lumber harvested, the price of each grade, and the mix of clearcut and partial cut harvest methods to develop a weighted average price per thousand board feet of lumber. We combine ODF data on volume harvested with total harvest revenue by county for recent fiscal years (ODF 1998–2001) to derive for each county recent average lumber prices weighted by grade of timber harvested and combination of harvest methods in that county.⁶

Using this average price to predict future prices implicitly assumes not only that recent real prices are reasonable predictors for future prices but also that the mixture of species, quality of timber, and combination of harvest technique will not vary greatly from recent historical levels. The resulting prediction for stumpage values for the coming decade is \$339.38 per thousand board feet in the two counties (table 4.2).⁷ Stumpage values in Clatsop County are predicted to remain higher (\$369.82/mbf) than those in Tillamook County (\$309.47/mbf) because of the larger trees and greater use of clearcut harvest techniques in the generally older stands in Clatsop County, which for the most part did not burn in the fires between 1933 and 1951.

As estimated in the previous chapter, harvests would average 53 million board feet per year in Clatsop County and 43 million board feet per year in Tillamook County under the fifty-percent reserve alternative. Multiplying these volume forecasts with the predicted stumpage values reported in table 4.2 produces a forecast for gross revenues from timber sales on state lands of \$19.6 million in Clatsop County and \$13.3 million in Tillamook County. If county government shares of the gross revenues remain at their fiscal year 2001 levels, Clatsop County government would be expected to receive \$4.6 million per year, Tillamook County government \$2.0 million per year under the fifty-percent reserve plan.⁸

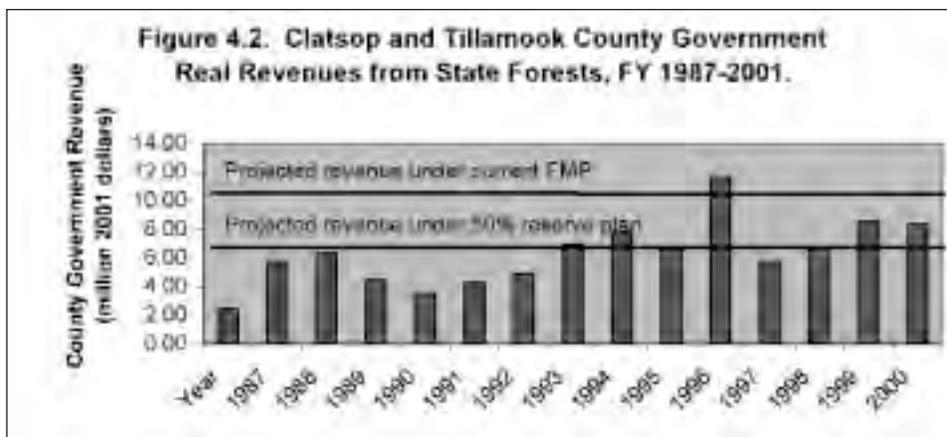


Table 4.3. County Government Real Annual Timber Revenues under fifty percent Reserve Plan (million 2001 dollars)

County	FY 1992-2001 avg	FY 2001	fifty-percent reserve	Current FMP forecast
Clatsop	4.7	5.7	4.6	7.3
Tillamook	2.5	2.6	2.0	3.2
Total	7.1	8.4	6.6	10.5

Sources: ODF, State Forester's Report for the CFTLC AOC Annual Conference, November 2001; County Financial Statements; US BEA, GDP Chain Price Deflators

The projected revenues of \$6.6 million per year for the governments of Clatsop and Tillamook Counties under a fifty-percent reserve plan lie slightly below 10-year average real revenues of \$7.1 million (2001 dollars) for the two county governments (table 4.3).⁹ However, projected real county government revenues under the fifty-percent reserve plan would exceed county government real revenues for all but five of the fifteen years between fiscal 1987 and 2001 (figure 4.2). Though under a fifty-percent reserve plan Tillamook and Clatsop County governments would not receive the windfall predicted under the current forest management plan, neither would drastic tax increases or reductions in county public service levels be necessitated by managing half of the state forests primarily for values other than commercial timber.

The difference between county government revenue in fiscal year 2001 and projected revenue under a fifty-percent reserve plan is small when compared to the volatile changes in timber revenues to which the counties have adjusted during the past decade. In particular, the adjustment between fiscal years 1996 and 1998 stands out. Revenues nearly doubled in real terms between fiscal years 1996 and 1997, and then fell by half yet swings in county government spending were not nearly as pronounced. Phasing in a reserve plan on the Tillamook and Clatsop State Forests over several years would be expected to cause little disruption in county services given the small magnitude of the changes in revenue as a proportion of historical timber revenues and as a share of total revenues.

The reduction in Clatsop and Tillamook County government revenues from timber sales on state lands in the counties appears modest when considered in the context of county revenues from all sources. Clatsop and Tillamook County governments depended on revenues from timber operations on state lands in the counties

Table 4.4. Timber Revenues and Clatsop and Tillamook County Government, FY 2001.

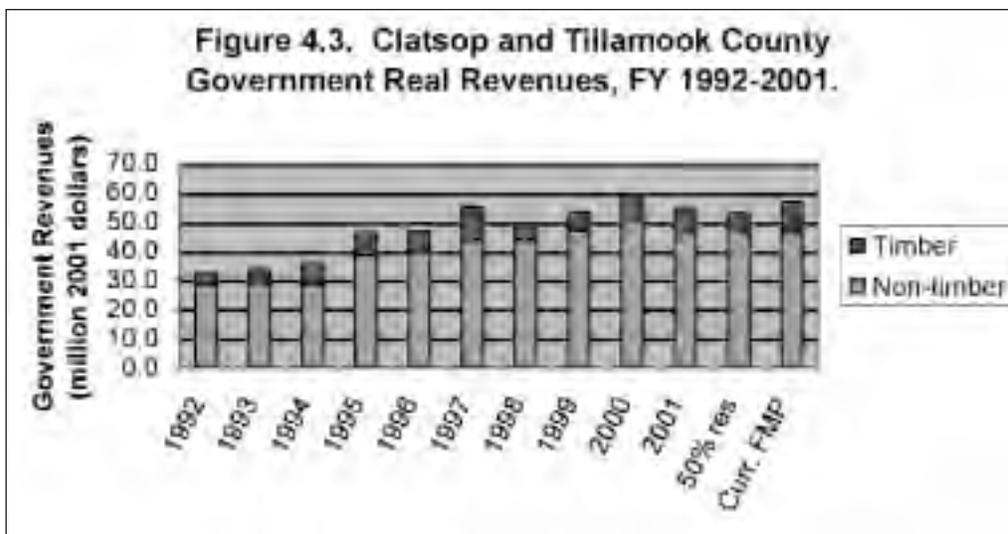
County	Population*	Government Revenues (\$million)	Timber Revenues (\$million)	Timber Rev Share (percent)
Clatsop	35,546	28.0	5.7	20.4%
Tillamook	24,384	26.8	2.6	9.7%
Total	59,930	54.9	8.3	15.1%

*Population data are for July 1, 1997
Sources: U.S. Census Bureau, USA Counties 1998; ODF, State Forester's Report for the CFTLC AOC Annual Conference, November 2001; County Financial Statements

for \$8.3 million (15.1 percent) of \$54.9 million total revenues during fiscal year 2001 (table 4.4). State timber revenues provided 20.4 percent of county government revenues in Clatsop County. Tillamook County government relied on state timber receipts for 9.7 percent of total revenues. By comparison, taxes accounted for 25.7 percent of Clatsop County revenues and 23.9 percent of Tillamook County revenues during fiscal year 2001. The contribution of taxes to total county government revenues in Clatsop and Tillamook Counties is considerably less than the average for all counties in the state. In 1997, the latest year for which statewide data are available, taxes made up an average of 29.6 percent of county government revenues in Oregon. (U.S.D.C. Economics and Statistics Administration, 2000). The relatively low portion of Clatsop and Tillamook County services funded by taxes suggests the importance of the state forest timber revenues in reducing reliance on other funding sources.

Intergovernmental revenue other than state timber income comprised the largest single source of revenue during fiscal year 2001 for both Clatsop County (39.6 percent of total revenues) and Tillamook County (35.4 percent). Other important sources of revenue for the counties in fiscal year 2001 included charges for services (5.0 percent of Clatsop and 9.0 percent of Tillamook County government revenues) and licenses, permits, and fees (0.7 percent of Clatsop and 4.5 percent of Tillamook County revenues). The difference between the reliance by Clatsop and Tillamook Counties on revenues generated by charges for services and licenses, permits, and fees results in part from the fact that the larger timber revenues in Clatsop County have made it unnecessary to raise as much revenue from these alternative sources.

County government revenues in the two counties totaled \$54.9 million in fiscal year 2001. If Non-timber revenues are predicted to remain constant during the next decade the timber revenues forecast for the fifty-percent reserve plan lead to a prediction of \$53.1 million in total revenues from all sources for the county governments, a 3.3 percent decline (figure 4.3).¹⁰ Of course, revenues from other sources would not remain constant and the revenue impact of a fifty-percent reserve plan would likely be considerably smaller.



Summary and conclusions

The link between timber sales on state lands in Clatsop and Tillamook Counties and the provision of public services in those counties is much weaker than implied by a cursory examination of the flow of funds would suggest. Because a large portion of the gross proceeds from timber sales on state lands in the counties funds forest projects and forest administration and because two thirds of the remaining funds result in offsetting changes in state payments to schools, only about a fifth of the money received for timber on state lands in the counties influence the availability of funds for public services in the counties, almost entirely at the county government level.

A fifty-percent reserve plan for the Tillamook and Clatsop State Forests is predicted to lead to a \$500,000 reduction in county timber revenues relative to 10-year average levels. The high volumes of recent harvests result in a steeper reduction in county government timber revenues from their most recent levels. However, the forecasted county government timber revenues lie well within the range in which these revenues have fluctuated during the past decade. Even if no funding from other sources replaces the timber revenues in question, the predicted \$1.8 million (3.3 percent) decrease in county government revenues from present levels would not spell catastrophe for the counties.

A reserve plan would increase non-timber values streaming from the state forests to citizens of the county, particularly commercial and sports fishermen, hunters, and hikers. A reserve plan might stimulate the level of economic activity in the counties even in the short run through impacts on tourism and services to recreationists. In the long run, the increased environmental amenities will make it easier to attract residents, thus bolstering the economic future of the counties. These effects are considered in the next chapter.

If the net impact of the fifty-percent reserve plan on economic values and economic activity in Clatsop and Tillamook Counties is likely to be positive, county leaders should rethink their long practice of advocating increased harvest levels on the state forests. Increased payments from the state for K-12 schools would replace two thirds of the foregone timber revenues. The reduction in county government revenues would be more than made up in increased values accruing to county citizens.

- ¹ Only a very small portion of the state forests is situated in Columbia County. State timber payments comprise a trivially small share of Washington County revenues. Here we focus on Clatsop and Tillamook County impacts alone.
- ² Oregon Legislative Revenue Office, "Oregon Public Finance: Basic Facts" (January, 2001).
- ³ The Jewell and Neah-Kah-Nie Districts are exceptional cases because local revenues are high enough to allow school spending in excess of that determined by the statewide formula.
- ⁴ If no alternative funding replaced the timber revenues, the impact on local schools would lie between zero if the state general fund absorbed the loss without reducing overall school funding and a maximum of the share of the timber revenues in the state budget, that is, a 0.25 percent change.
- ⁵ Had Tillamook County not made any repayments on the rehabilitation bonds, the share of gross revenues funding forest projects and ODF administration would have been 50.9 percent. In 1948, the state passed a bond measure to finance the rehabilitation of burned-over lands in these forests. Legislative action changed the terms of repayment to favor the counties several times during ensuing decades. In 1969, the county obligations to make payments before 1990 or to pay any interest on the bonds were waived in part to acknowledge that state law requires that the state forests be managed for the benefit of citizens of the state as a whole, not solely to produce timber revenue for the local counties.
- ⁶ Four-year average real prices are used to develop forecasts for the next decade in part because of data availability. However, the four-year average is intuitively appealing because, while it seems likely that lumber prices will recover somewhat from their depressed levels in fiscal year 2001 even in the near term, it seems unreasonable to expect a return to the extraordinarily high prices of the mid-1990s. Our forecast is consistent with that of the U.S. Forest Service (2002).
- ⁷ By comparison, ODF (1996) used stumpage values of approximately \$526.35 (2001 dollars) for their forecasts.
- ⁸ Assuming the current rate of repayment, Tillamook County government revenues would jump by about \$0.5 million in five years when rehabilitation costs will have been repaid to the state.
- ⁹ Clatsop County government revenue for years prior to 2000 was estimated using the average county share of gross revenues in fiscal years 2000 and 2001. Tillamook County government revenue for years prior to 1997 was estimated using the average county share of gross revenues between 1997 and 2001, adjusted by reimbursement of rehabilitation costs.
- ¹⁰ Similar methodology leads to a prediction of \$57.0 million in total revenues for the two county governments, a 3.8 percent increase, under the current forest management plan.

:: Chapter 5

The Economic Consequences of the Fifty-percent reserve Proposal

As discussed earlier, there are two quite different economic consequences of public forest policy about which people are concerned. One is the direct impact on human well being in the form of the benefits received and the costs incurred known as economic value. The other economic consequence of great public interest is the impact of public forest policy on local economic vitality, in particular the impact on local employment and income opportunities, or local economic impacts.

This chapter first discusses the economic values at issue in the State Forest reserve proposal. Then it turns to a discussion of the local economic impacts.

Economic Values: The Benefits and Costs of the Fifty-percent reserve

Natural forests can provide diverse flows of valuable environmental services including outdoor recreation opportunities, scenic beauty and open space, wildlife habitat, fisheries, watershed stabilization, and climate stabilization. In addition, forests can be harvested for their commercially valuable timber. Table 5.1 provides a partial list of the values associated natural forests. Because these values can only be pursued by using scarce resources that have alternative uses, all of these natural forest values are also economic values, or at least have an economic aspect to them.

The evidence that these are economic values, even if most of them are not given dollar value expression by businesses, is that people, communities, and organizations are willing to sacrifice other things they value to gain or protect access to these environmental services. For example, recreationists sacrifice time and income to visit forest sites. Communities commit considerable resources in order to provide safe water supplies. Households living in rural forested areas accept lower incomes than are available in larger urban settings. It is this willingness to sacrifice or willingness to pay that economists use to measure the relative size of these

non-commercial forest values.

Through harvest forests can also provide commercially valuable logs. Such economic potential, because it is commercial in nature, is easily given expression in dollar terms.

The fifty-percent forest reserve policy would sacrifice some of the commercial timber harvest potential associated with the Tillamook and Clatsop State Forests in the pursuit of the non-timber forest values. One important economic question this proposal raises concerns how commercial timber values compare to the diverse set of non-commercial forest values. How much is gained in non-commercial values if timber harvests are reduced?

Economists have developed tools to quantify in dollar terms the types of non-commercial forest values listed in table 5.1. Those tools, however, are very time- and human-labor-effort intensive; they are costly to implement in a careful and comprehensive way. In addition, because it is researchers who estimate these values rather than markets that automatically generate them, many citizens doubt the reliability of these estimated non-commercial economic values.

We will explore the relative size of the commercial timber and non-commercial forest values below using a variety of techniques. We will use estimates of these values obtained in other studies. We will look at replacement costs or the costs of substitutes. In addition, we will ask the simple question of how much this broad array of environmental services would have to be worth in order for those non-commercial forest values to outweigh the commercial forest values. Knowing that, one can then ask whether peoples' regular expenditure patterns suggest that those non-timber, natural forest values are, in fact, valued as highly.

Timber Values

The net value of forest land for commercial timber harvest is indicated by the price logging companies are willing to bid (the stumpage value) in order to obtain the right to harvest those trees. The owner, in this case the State of Oregon, expends considerable money managing those forest lands, planning and supervising timber sales, and maintaining a transportation infrastructure. These timber management costs have to be subtracted from the stumpage values to obtain the net economic value of the forested landscape for commercial timber harvest.

We make approximate timber values here by using the part of the State Forest stumpage value that is turned over to county governments. County governments get the stumpage value less the amounts withheld for the protection and management of the forests, the payments for rehabilitation of harvested forestlands, and the amounts that are paid to the Oregon Department of Forestry for its forest management activities. In the late 1990s about half of the stumpage value was paid to county governments, which represented about \$34.6 million per year for the northwest Oregon counties. Assuming that the counties continue to receive 50 percent of gross timber harvest revenue, that the stumpage value of timber in the coming decades will be the \$339.38 per thousand board feet calculated in chapter three, and that the forest reserve plan will reduce timber harvest volumes on the Tillamook and Clatsop State Forests by 63.4 million board feet, then the reduction in timber values under the reserve plan would amount to \$10.76 million per year.¹

Table 5.1. Natural Forest Values: A Partial List**1. WATERSHED VALUES**

water quantity

water quality

reduced sedimentation of reservoirs

timing of water flows

flood control

headwater fisheries support

upriver freshwater fish, crabs, clams

impacts on bay and estuary fish, shrimp,
clams, oysters

impacts on waterfowl habitat

impact on ocean salmon fishery

2. RECREATION VALUES

wildlife viewing

hunting

angling

within the forestlands

forest-supported off-forest fisheries

forest travel and experience

adventure recreation

other dispersed recreation

3. SCENIC INTEGRITY

scenic beauty

open space

natural vistas

4. SPIRITUAL / CULTURAL VALUES

opportunities for solitude in a natural setting

interaction with and experience of natural
systemsmaintenance of traditional livelihoods,
that is, fisheries, wood products**5. PASSIVE USE VALUES**

existence of natural wildlands

existence of endangered species,
including salmon**6. CLIMATE STABILIZATION**

carbon storage

micro climates

air quality

7. OTHER NATURAL SYSTEM VALUES

ecosystem health

soil productivity

resistance to catastrophic fire

scientific understanding

stability and resilience

8. COMMERCIAL GOODS

timber harvest

forest-supported ocean-based
commercial salmon fishery

special forest products

commercial recreation

outfitting

other guided recreation

The fifty-percent forest reserve strategy would set half of the Clatsop and Tillamook State Forest lands aside to be managed primarily for non-commercial forest values. That represents about 259,000 acres of forest reserves. The \$10.76 million dollar reduction in annual commercial timber value represents \$41.54 per acre per year put into reserves. That is the commercial timber opportunity cost of managing these forestlands primarily for non-timber values. If this cost, instead, is calculated on a per person basis, for the entire population living in the 14-county northwest Oregon State Forest study area, the timber opportunity cost is \$4.14 per person per year. ² If, instead, it is spread over the residents of Clatsop and Tillamook Counties only, the timber opportunity cost is \$179.05 per person per year.

Non-Commercial Forest Values: Environmental Services

From the point of view of economic well being or net economic value, the question is whether the value of the environmental services that are enhanced by the forest reserve strategy are at least as high as this timber opportunity cost. There are some limited data that are directly relevant to this question.

i. Recreation values

A 1994-1995 survey of recreation use of Oregon State Forests by Oregon State University and the Oregon Department of Forestry estimated that the net economic value received by visitors to the forests was \$128.11 per trip. Adjusting for inflation, this figure would be \$151 per trip in 2002 dollars. The net economic value to hunters was even higher: \$191 per trip (ODF 1996).

A change in management strategy that placed primary emphasis on habitat values and recreation opportunities promises to increase substantially the number of visits to the forest. At present, the recreation potential of the forests remains largely untapped due to management policies that emphasize commercial timber production over providing recreation opportunities. The proportion of logging roads to hiking and biking trail miles as well as management budgets provide evidence of the historical neglect of the recreation potential of the forests.

The ODF has put considerably more effort into developing recreation opportunities in the Tillamook State Forest than in the Clatsop State Forest. Even so, as of 2001 there exist fewer than 50 miles of hiking, biking, and horse trails and 200 miles of off-highway vehicle trails in the Tillamook State Forest, an area 570 square miles in size. By contrast, 2,000 miles of logging roads span that forest.

ODF management budgets underscore the low priority assigned to recreation on the Clatsop and Tillamook State Forests (Figure 5.1 and Table 5.2). In fiscal year 2001, functions related to social objectives – including recreation, – received 8.2 percent of total funding at the district level. The Forest Grove District, situated closest to Washington County communities devoted by far the most resources (16.2 percent) in proportion to its total budget to social objectives. The Tillamook District spent 10.4 percent of its budget on non-timber objectives. The Astoria District, which constitutes all 154,000 acres of the Clatsop State Forest, is situated just a short drive to the east of the thriving tourist centers on the coast, and contains nearly all of the older, more complex forests in the Oregon North Coast Range as well as renowned fishing streams. The Astoria District allocated only 1.1 percent of its expenditures to non-timber objectives.

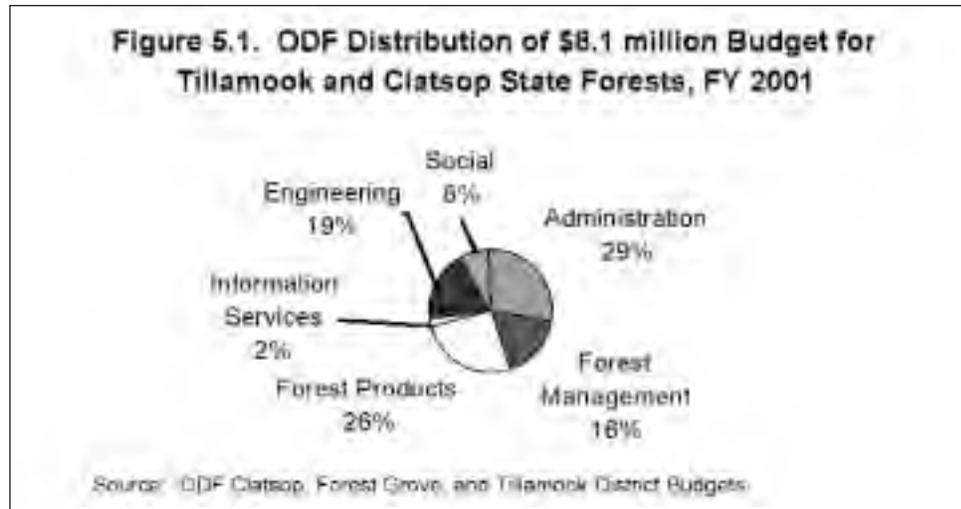


Table 5.2. ODF District Budgets, FY 2001

Objective	Tillamook Forest 364,000 acres		Clatsop Forest 154,000 acres	Total
	Forest Grove District	Tillamook District	Astoria District	
Administration	384,311	963,024	957,731	2,305,066
Forest Management	229,374	446,562	642,052	1,317,988
Forest Products	510,717	801,479	734,374	2,046,570
Information Services	10,619	93,344	90,768	194,731
Engineering	428,736	507,994	633,504	1,570,234
Social	302,792	326,378	35,300	664,470
Total	1,866,549	3,138,781	3,093,729	8,099,059

Source: ODF District Budgets, FY 2001

The low profile maintained by recreation opportunities in the Tillamook and Clatsop State Forests has limited their appeal to visitors in the region. Virtually no mention is made of the trails and campsites in the state forests in Web sites maintained by the many Chambers of Commerce hoping to draw visitors to coastal towns in Clatsop and Tillamook County. At the time of this writing, even the Web site of the Oregon Tourism Commission (<http://www.traveloregon.com/>) makes no mention of outdoor recreation on the Tillamook and Clatsop State Forests, nor does that site offer a link to ODF information sources. While ODF recreation managers have recently published an excellent map of the Tillamook State Forest for recreationists and are working to increase trail miles and visibility, prioritizing recreation over commercial timber on half of the forests seems certain to increase visits to the forests and create value for the citizens of Northwest Oregon.

ii. Forest-related salmon fishery values

The Tillamook and Clatsop State Forests provide the habitat for rearing salmon, steelhead, and cutthroat trout. Other marine wildlife also depends on the water quality and quantity of the rivers and estuaries of, for instance, the Tillamook watershed. The abundant marine wildlife supported by these State Forest headwaters has supported commercial and recreational activities of significant economic value. Much of this economic value is realized outside of the State Forest boundaries but is tied directly to State Forest resources. For instance, salmon produced in State Forest streams may be caught in ocean commercial fishing. These off-forest economic values may be as important or even more important than the on-forest economic contributions such as recreational fishing in forest streams (Radtke and Davis 1997 pp. 6-8).

One economic study focused on just the Tillamook Bay Basin estimated that management of that watershed in a way that supported recovery of the salmon fishery to historical levels would generate \$26.2 to \$52.4 million dollars a year in annual benefits (Radtke and Davis 1997 pp. 26-29). This study also estimated that the annual economic return in terms of salmon values to a mile of forest stream that is not damaged by timber harvest may be as high as \$4,500 (Radtke and Davis 1997 p. 14). Put the other way around, management of the Northwest Oregon State Forests in such a way that recovery of this salmon fishery was hampered or prevented has a very substantial opportunity cost.

iii. Drinking water values

About 350,000 people residing in Washington County and in many coastal communities obtain drinking water from streams that originate in the Tillamook and Clatsop State Forests. Two major reservoirs for water systems in Washington County – Barney Reservoir and Hagg Lake – lie in watersheds made up in large part by Tillamook State Forest Land (Bushman 2002).

The road construction necessary to conduct timber operations is well-known to increase the sedimentation of streams and reservoirs (Harr and Fredriksen 1988, Miner 1968, Beschta 1978, Fredriksen 1965 and 1970, and Harr et al. 1975, cited in Radtke and Davis 1996). In some areas of the Coast Range, logging and road-building have been associated with a five-fold increase in slide activity (Radtke and Davis 1996). Increased sedimentation results in higher filtration costs as well as the need to expand reservoir capacity. The costs of removing sediment from water at treatment plants amounts to \$17.11 per thousand tons discharged (Holmes 1988 cited in Radtke and Davis 1996). The costs of raising the Hagg Lake Dam to increase capacity have been estimated to lie between \$1500 and \$2200 per acre foot of added capacity (Montgomery Watson 1999).

iv. Carbon Sequestration Values

Harmon (2001) suggests that the transition of stands in the forest reserves to older forest structure will result in an increase in carbon acquisition rate of those stands. Forest Service economists estimate that each ton of carbon sequestered provides a value of \$65 (Haynes and Horne 1997).

v. Amenity Values in Clatsop and Tillamook Counties

Average incomes in Clatsop and Tillamook Counties are significantly below those in the Portland metropolitan area. In 1999 the weighted average difference in incomes between these two counties and the

Portland area was \$7,238 per year for every resident. The residents in these two counties both know that these income differences exist and could relocate to the Portland area or one of the other higher-income metro areas in northwest Oregon but, in general, do not. This is clear evidence that there must be valuable characteristics associated with residence in these two counties that offset the lower money incomes. The lower cost of living, less congestion, and the qualities of small town and rural life are some of the possible explanations, as are living amidst high quality natural landscapes, scenic beauty, and high quality outdoor recreation opportunities. Residents of the areas adjacent to the State Forests get a "second paycheck" in the form of the flow of the valuable environmental services those State Forest provide that partially offsets the lower money income.³ Given existing residents' continued presence in these "low income" counties and the continued in-migration of new residents, the combined "second paychecks" associated with the region's amenities must be worth at least the \$7,200 per year that each resident sacrifices to continue to live in the region rather than move to adjacent metro areas.

vi. Passive Use Values

Even those residents of northwest Oregon who do not directly benefit from the State Forests through their residential location or their recreational visits may still place a value on protecting the non-commercial forest values associated with those public lands. For instance, they may feel that it is important that a significant part of Oregon's natural landscapes, especially public lands, be protected from the change and damage that comes with commercial development. Their motivation may be personal, or it could be focused on leaving options open for future generations by minimizing the irreversible damage done by current generations. Economists have labeled these types of values "passive use values," and these two examples of such values "existence" and "bequest" values. Depending on the location and size of the particular natural landscapes that have been studied, estimates of these passive use values have ranged from \$21 to \$140 per household per year⁴ (Loomis 2000 and Loomis and Richardson 2000). When several million people who appreciate and value these natural landscapes live adjacent to them, even the values at the lower end of this range can result in very high aggregate values. For instance according to the 2000 Census there were 990,000 households in the 14-county Northwestern region of Oregon. At \$21 per household per year, the aggregate passive use value would be almost \$21 million per year.

vii. Household Expenditure Patterns

Finally, regular individual and household expenditures tell us something about the relative values of certain types of experiences. People regularly pay \$5 to \$10 to attend a movie, gain admittance to a museum or gallery or other entertainment facility. People pay substantially more for certain types of recreational experiences such as golf, sports events, and music concerts. As mentioned above, surveys of visitors to the northwest Oregon State Forests indicate that the net economic value of a visit is almost \$130. The regular expenditures of households in leisure activities document the reasonable range for values that might be associated with the environmental services that the Tillamook and Clatsop State Forests provide.

Approximating NW Oregon State Forest Amenity Values

The Static View

It is likely that those who live adjacent to the State Forests place a higher value on the non-timber values associated with them than those living greater distances from those forestlands. After all, residents have chosen, voting with their feet, to live in close proximity to those State Forests. If that were the case, those who live in Clatsop and Tillamook would value the natural forest qualities of the State Forests more highly than other residents of northwest Oregon. Residents of Washington County, within easy travel distance to the State Forest would be expected to place a higher value on non-timber forest values associated with the State Forests than those living in more distant location but not as high a value as the residents of Clatsop and Tillamook Counties who live adjacent to the State Forests.

If the residents of Clatsop and Tillamook Counties valued the environmental services associated with protecting half of the State Forests as reserves at \$25 per year, residents of Washington County valued them at \$15 per year, and other residents of northwest Oregon valued them at \$2 per year, the annual value associated with those reserves would be \$12.5 million, the same as the commercial timber values. If residents of Northwest Oregon placed higher values than these on the environmental services provided by the forest reserve strategy, those environmental and recreation values would outweigh the commercial timber values.

The Dynamic View

The State Forest reserves, however, have not been proposed just to serve the interests of existing residents of northwest Oregon now and in the immediate future. The forest reserve proposal represents a long-run strategy aimed at giving permanent protection to certain non-commercial forest values. Those forest values would then be available indefinitely into the future. The discussion above took the current situation in northwest Oregon as an accurate indication of the future situation, which is a questionable projection. The population of northwest Oregon will continue to grow over the coming decades, increasing the number of people who will be able to enjoy the benefits associated with the proposed forest reserves. As incomes rise, a more affluent population will also make heavier use of the opportunities those forest reserves provide and may be willing to make larger economic sacrifices to maintain access to those recreation and environmental values.⁵ At the same time, the population and income growth and the economic development associated with it will also lead more and more of the northwest Oregon landscape to be developed for residential and commercial purposes. In addition, the managers of private industrial forestlands are entering their second growth forests on a more frequent basis than they did when these were old growth forests. The result is a more regularly disturbed forested landscape. In this setting natural forestlands will become more and more scarce just as they come to be more and more highly valued. The result can only be a steady increase in those non-commercial, non-timber values over time.

These three ongoing economic changes, continued population growth, continued growth in real personal incomes, and the increasing scarcity of natural forest land, assure that the value of the forest reserves will rise relative to commercially produced commodities. For commercially produced commodities, technological changes and the development of substitutes keep downward pressure on prices. The steady fall in the cost of

increasingly sophisticated computers is only one dramatic example of this phenomenon. Food, energy, and most natural resource prices have also declined in real terms over the last half-century as have the cost of the products manufactured from them.

The supply of undeveloped natural landscapes, however, cannot be easily or quickly expanded. In general, the supply steadily shrinks as the population and economy expand. In addition, because those who visit natural forests value that experience directly, rather than, say, indirectly through a video or picture, it is not easy for technology to increase the supply or create real substitutes for natural forests. A Disney wilderness theme park is not a close substitute for a natural forest. For all of these reasons, the value of the state forest reserves is likely to rise over time relative to their value for commercial timber.⁶

One consequence of this rising value of state forest reserves is that current values placed on the environmental services provided by the State Forest reserves do not have to be as great as calculated above in order for them, in the aggregate, to be greater than the commercial timber values. If we assume population growth over the next century will be only half as fast as over the last 40 years, that average real incomes will grow slightly more slowly, and that the non-commercial forest values will grow one-quarter of one percent faster than commercial timber values, the current values on the environmental services provided by the forest reserves could be about 40 percent below those discussed above and still outweigh the commercial timber values.⁷ If, for instance, residents of Clatsop and Tillamook Counties value the environmental services from the forest reserves at \$12.50 per person per year, residents of Washington County valued them at \$9 per person per year, and other residents of northwest Oregon valued them at \$1.15 per person per year, the non-commercial forest values would exceed the timber values. Given that a single bottle of water or a cup of coffee or a bottle of beer can cost \$1.15, it would seem almost certain that residents of northwest Oregon would value the protected forest values of the northwest State Forest by at least this amount. If they do, then the higher-valued use of these State Forests would be management for non-timber values.

Local Economic Impacts of the Reserve Forests

In an earlier chapter we estimated that although timber harvests under the forest reserve strategy would be 26 percent higher than they were in the 1990s, timber harvest would be still higher if the reserves were not established. Without the forest reserves, timber harvests and wood products jobs would grow at a faster rate. We estimated that state forest timber harvests would be about 36 percent or 63.4 million board feet lower if the forest reserves were established than if all of the northwest State Forest were managed for commercial timber values.

We also estimated that the direct impact of the harvest of a million board feet of timber on employment would be at most 3.2 jobs, 2.5 in lumber and wood products and 0.7 in local government jobs. If 85 percent of the harvested timber is processed in Clatsop and Tillamook Counties, no logs currently imported to mills in the counties are displaced by the increased local production and the additional county revenue results in increased county services, the direct employment impact of this higher level of timber harvest would be 173 jobs. This number is the maximum direct job opportunity cost of creating the forest reserves. For those primarily concerned about employment opportunities, the important question is whether or not the establishment of the forest reserves has employment impacts that partially or completely offset this negative direct job impact of reduced timber harvests.

It is important to put this estimated impact of 173 jobs in a quantitative perspective. In 1999 there were about 24,000 jobs in Clatsop and Tillamook Counties combined. These 173 jobs represent about seven-tenths of one percent of total employment. As these economies expand, the relative importance of this number of jobs will shrink further. During 1988-1999 period, the Clatsop and Tillamook economies added, on average, 574 jobs per year. The 173 jobs that would be put at risk by the proposed forest reserves represent about 4 months of normal job growth during the 1990s.

This issue can be described a little differently using the growth rates of employment in Clatsop and Tillamook Counties over the last decade to represent future growth rates. Keep in mind that this growth took place in these two counties despite an overall decline in wood products jobs. The employment opportunity cost of establishing a permanent forest preserve that would provide valuable environmental services indefinitely into the future would be that employment over the next two decades would grow at 2.3 percent per year instead of 2.4 percent per year. The question is whether the forest reserves would trigger economic changes that would offset this one-tenth of one percent slower growth rate or, if they would not, whether this tiny difference in employment growth was too high a cost to pay for the permanent protection for one of Northwest Oregon's natural jewels.

There are several reasons to believe that establishing the forest reserves would have positive impacts on employment:

Establishing the forest reserves would protect scenic beauty, outdoor recreation opportunities, wildlife habitat, fisheries, open space, and water quality. As discussed earlier, one cannot explain the growth in the Northwest Oregon economy as the expansion in its historic economic base. In particular, one cannot explain why a new economic base built around high-tech and other manufacturing as well as information technologies developed in northwestern Oregon without mentioning the region's attractiveness and the ease with which a new, skilled labor force could be attracted.

In counties such as Clatsop and Tillamook, non-employment income, largely retirement income, makes up 40 to 50 percent of personal income and was the source of 40 to 60 percent of the growth in personal income between 1989 and 1999. Clearly the attractiveness of these counties to retirees was central to local economic vitality. But retirees are just one example of relatively mobile sources of economic activity that are drawn to attractive areas. Anything that undermines those residential location choices could have a significant negative impact on local economic vitality.

This point does not apply to Clatsop and Tillamook Counties only. Protecting the outdoor recreation opportunities, scenic beauty, wildlife, water quality, etc. associated with the forest reserves makes the larger urban areas of northwest Oregon more attractive to people, workers, and business firms. These forest reserves are within an easy commute from these metropolitan areas and therefore are part of the "quality of life" that those urban areas offer potential residents. There are also significant spill-over impacts of the forest reserves on the economic vitality of the larger urban areas.

The future economic vitality of the northwest Oregon economy and of the communities adjacent to the State Forests is closely tied to maintaining a high quality of life and high-quality natural landscapes. In a very important way, the region faces an important choice between trying to re-hitch the regional economy to the old and declining timber economic base or recognizing the new economic base provided by Northwestern Oregon's attractive natural landscapes and guiding public economic policy to take advantage of the opportunities for enhanced economic vitality that that new economic base provides.

The forest reserve strategy also provides the basis for future expansion of commercial recreation and tourism serving the growing urban population centers of northwest Oregon. This strategy provides a means of recycling some of the vast income generated in the metropolitan areas to the less densely settled and rural counties, helping to diversify those counties' economies.

Between 1991 and 2000 direct real tourist spending in Clatsop and Tillamook Counties increased by one third as did real earnings from tourist related spending. Employment directly related to this tourist spending increased by 1,400 jobs, or 19 percent. Local taxes tied to tourist spending rose by 58 percent in real terms. By 2000, tourist-related jobs were responsible for a quarter of all jobs in these two counties combined. Clearly, tourism, recreation, and travel are very important sources of economic vitality in these two counties and a very important source of employment.

For the larger 14-county Northwestern Oregon region, tourist spending reached \$3.8 billion in 2000, increasing 52 percent in real terms since 1991. By 2000 this tourist spending was directly responsible for 65,000 jobs, generated \$1.1 billion in earnings, and contributed \$58 million to local taxes.

Protecting substantial parts of the Northwest Oregon State Forests helps support a very dynamic, growing part of the local economy that is already an extremely important part of the local economy. This growth contrasts with the contraction of the forest products sector that has been the source of a shrinking number of jobs and is likely to continue in that trend no matter how the state forests are managed. Local economic development policy should play to a region's economic strengths, not focus on trying to prop up sectors of the economy that are shrinking in relative importance. The approximately 173 additional direct forest products jobs in Clatsop and Tillamook Counties associated with rejecting the forest reserve strategy are equivalent to only one-eighth of the additional tourist jobs created during the 1990s. If the damage during the next decade to recreation, and scenic beauty due to accelerating commercial timber harvests in the Tillamook and Clatsop State Forests reduced the growth of tourism from the 1990s annual growth rate of 1.75 percent to 1.6 percent (adding 152 tourist jobs a year instead of 169), there would be no net job growth due to the additional harvest.

Of course, tourist-related jobs pay less than wood products and local government jobs. In 2000, the Oregon Tourism Council's study indicated that tourism jobs in Clatsop and Tillamook Counties paid about \$22,000 per year (Dean Runyan Associates 2001). Manufacturing jobs in those two counties paid about \$36,000 per year and local government jobs paid \$32,000 (BEA REIS 1999). If the state forest reserve strategy is rejected, our estimate is that there would be at most 135 additional wood products and forest management jobs and at most 38 additional local government jobs generating \$6.1 million in earnings. If tourism continues to grow as rapidly in the 2001-2010 period as it did during the previous decade, earnings in tourist-related businesses will increase from \$118 million to \$161 million in Clatsop and Tillamook Counties. But if the damage done by timber harvest or the stimulus provided by the forest reserve strategy only slightly modified this tourist growth, the \$6.1 million in earnings associated with the higher timber harvest would be offset by losses in tourism earnings. All it would take is for tourism earnings growth to be slowed from 3.1 percent per year to 2.7 percent for annual tourism earnings growth to fall from \$4.25 million to \$3.64 million and completely displace the gain in earnings from the higher timber harvest.

As mentioned in the discussion of the economic values associated with the creation of the State Forest reserves, the headwaters of many northwest Oregon rivers and streams are currently protected by the State Forests. Those streams provide the water quality and quantity and the fisheries habitat that support salmon and other seafood production in the bays, estuaries, and ocean. This off-forest production is directly tied to forest management and the impact of timber harvests on fish habitat and water quality. There is substantial

58 :: Economic Realities in the Tillamook and Clatsop State Forests

local economic activity tied to this marine production. This activity includes commercial fishing and seafood production as well as recreational fishing. In Tillamook Bay alone, commercial seafood production was the source of about \$5 million in personal income and recreational fishing generated an additional \$1.1 million. The total local contribution from this one fishery was over \$15 million in 1994 (Radtke and Davis 1997). Timber harvest, especially clearcutting, damages fish habitat and significantly depresses fish production, with the result that local jobs and income tied to fishing and seafood production are lost as timber harvest in these headwater areas proceeds.

Given the very small additional job growth that increased State Forest harvests would generate if the forest reserve concept were rejected, it seems highly likely that the positive impacts that the forest reserves would have on local economic vitality would be significantly greater than the additional jobs and income associated with a higher timber harvest, leading to net gains in local economic vitality. In any case, creating the forest reserves represents to a comparatively risk-free economic development strategy. The negative impacts on local economic vitality are near zero, while the potential positive impacts on economic well-being and on future local economic vitality are quite large and permanent. With such knowledge, only someone badly hypnotized by the view in the rear-view mirror would sacrifice the permanent benefits provided by the forest reserves for a tiny one-time-only expansion in the timber economic base.

- ¹ The 36 percent reduction in timber harvest associated with the 50 percent reserve strategy comes from Sessions (2000), and ODF (2002c). Harvest during the first decades with the 50 percent reserve is estimated to be 112.6 mmbf, 36 percent lower than the 176 mmbf under the management plan adopted in 2001.
- ² Northwest Oregon is defined as the 14-county study area adopted by the Oregon Department of Forestry for its economic analysis of alternative management plans for the State Forests. Oregon Department of Forestry, *op. cit.*, p. 29. The area includes Clatsop, Tillamook, Washington, Columbia, Multnomah, Clackamas, Yamhill, Polk, Lincoln, Marion, Benton, Linn, Lane, and Hood Counties.
- ³ Economist Ed Whitelaw from the University of Oregon coined the phrase “second paycheck” to explain what economists label “compensating pay or income differentials.”
- ⁴ These 1980 and 1987 dollar values have been expressed in year 2000 dollars using the Consumer Price Index.
- ⁵ Increasing consumption with increasing real income is typical of what economists label “normal goods,” as opposed to goods that are consumed only because people are too poor to consume what they really preferred. Some economists have long argued that appreciation of environmental quality and its pursuit becomes more prevalent with higher incomes and educations (the environmental “Kuznet” relationship).
- ⁶ Krutilla, J. 1967. “Conservation Reconsidered,” *American Economic Review*, 57, pp.787–796. Also see Krutilla, J.V. and A.C. Fisher. 1985. *The Economics of Natural Environments: Studies in the Valuation of Commodity and Amenity Resources*. Washington, DC: Resources for the Future and Krutilla, J.V. and A.C. Fischer, 1985. *The Economics of Natural Environments, Resources for the Future*, Washington DC.
- ⁷ Population was assumed to grow at 0.625 percent per year; average real income at one percent per year, and environmental values relative to timber values at 0.25 percent per year. The compound impact of these is that the value of the non-commercial forest values grows 1.89 percent per year relative to timber values. A four percent real discount rate was used.
- ⁸ “Tourism” is defined here as all travel activity that has these particular areas as a destination. It excludes people who are just passing through on the way to some other location. Data come from Dean Runyan Associates (2001).

:: Appendix I

The Role Protected Landscapes Play in Supporting Local Economic Vitality

Why Local Amenities Increasingly Matter to Local Economic Development

Economic base analysis of the sort used by the Oregon Department of Forestry to estimate the local impact of changes in timber harvests focuses exclusively on labor demand. Business firms are assumed to locate in a particular area because of certain site-specific characteristics such as the available timber supply. These business firms create a local demand for labor to which the workforce responds. Labor moves to where the demand for workers happens to be located. People move to where the jobs are located. Jobs do not move to where people are located. Or so the economic base approach to local impact modeling assumes.

To many, this is just hard-nosed economic realism: "That's the way the economy is." Yet this exclusive emphasis on labor demand and rejection of the relevance of labor supply is more than a little suspect. It is usually the case, in most market settings, that demand and supply interact in important ways to determine the economic outcome. It is rarely safe to assume that only one of these two important economic forces is operating.

To say that only labor demand matters is implicitly to make two assumptions that, when stated, most analysts would agree are untenable. The first is that people do not care where they live. They simply move to where the economy demands. The second is that business firms do not care about the location of either labor supply or markets for their products. The location of the population determines both of these, but firms are assumed to ignore both and choose their location on some other basis. Neither of these assumptions can be defended on either theoretical or empirical grounds. Abandoning them reintroduces labor supply as an important economic force in determining the location of economic activity and seriously undermines the economic-base approach.

During the second half of the twentieth century, changes in the American economy have made residential location choices increasingly important as determinants of the location of economic activity. These changes have made both people and businesses more footloose. Those changes include the following:

i. Improvements in transportation and communications that have drastically reduced the costs associated with geographic distance from economic centers. These changes include the interstate highway system, the extension of regular airline service to small cities, the development of modern telecommunications networks and technologies, and the emergence of competing next-day courier service. These changes significantly reduce the degree of isolation from the national economy and culture.

ii. Changes in what it is the economy produces have also had an important impact on the location of economic activity. With the shift from the dominance of extractive and heavy industry to light manufacturing and services, the relative importance of transportation costs has declined as the value-to-weight ratio has risen dramatically. Transportation costs no longer tie economic activity as tightly to particular locations (Mills 1987 and Mills and Chodes 1988).

iii. The rise in importance of non-employment income including retirement income (Social Security, Medicare reimbursement, private pension programs) and investment income (dividends, interest, and rent). These sources of income follow people wherever they choose to reside. This allows people to make residential location decisions partially independent of employment opportunities. In Tillamook County the influx of retirees has led almost half of all personal income today to take the form of non-employment income. In 1969 only a quarter of personal income in Tillamook County took this form. In Clatsop County 40 percent of personal income is non-employment income.

As a result of these changes, it is less costly for citizens to act on their preferences for certain types of living environments. Similarly, these changes have made it more feasible for economic activity to follow the population as it makes residential location decisions. The result is that economic activity increasingly follows people rather than people passively following businesses. Consider the shift in population from center cities to suburbs: First people moved away from the centers of employment and commercial activity and commuted back for work and shopping. Later the manufacturing base followed the population to the suburbs, as did the shopping centers. This was clearly the pattern in Washington County where at the beginning of the 1970s almost 40 percent of the labor earnings of residents came from commuting out of the county to work, primarily into Portland. By the end of the 1990s, enough economic activity had shifted to Washington County that those who commute out and those who commute in more or less cancel each other out.

Since the mid-1950s economists have emphasized the importance of residential location decisions as a powerful economic force. They have documented the role of local "amenities" in the settlement of the desert southwest, Florida, and the Pacific Northwest. (Ullman 1954) Tiebout (1956) underlined the fact that people "shop around" for the social amenities produced by different levels of local government taxation and different public spending patterns. Borts and Stein (1964) argued that in a mobile, open economy, it would be an area's ability to attract and hold a labor force without bidding labor costs up that would determine the geographic distribution of economic activity. These economic forces tied to local amenities continue to operate in important ways today, helping to explain the above average economic performances of the Pacific Northwest (Power 1995) and Rocky Mountain states (U.S.D.A. 1999) over the last decade. A comprehensive study of all 254 non-metropolitan counties in the Mountain West for three time periods, the 1970s, 1980s, and 1990-1995, found that, not only was population growth driving employment growth, but also that the value of amenities in driving that population growth had been increasing over time (Vias 1997 and U.S.D.A. 1999).

This pattern has important implications in the economic analysis of the impact of public policies affecting the natural and social environment. Measures that improve the attractiveness of an area to current and

potential residents will tend to increase the level of local economic activity. Changes that cause deterioration in the local quality of life will tend to discourage the retention and attraction of economic activity. Such changes, of course, may well not be economically dominant. Their degree of dominance will depend on the size of the change, the population's preferences for the environmental amenities at issue, and other offsetting or reinforcing economic changes. What is important to realize, however, is that public policies affecting the ability of an area to attract and hold a population can have significant economic consequences that need to be analyzed separately from conventional economic-base analysis.

Conventional regional economic analysis now regularly takes into account the role of social and natural amenities in explaining migration patterns and regional development patterns. The US Department of Agriculture, for instance, which long has used farm, manufacturing, and mining to classify the major economic characteristic of non-metropolitan counties in harmony with the economic-base approach, has expanded its economic classification to include amenity, recreation, and retirement counties. This expansion of classification became necessary in the 1980s when a group of non-metropolitan counties showed ongoing growth despite the economic difficulties most non-metro counties were having. The common denominator in these counties was their attractive landscape and climatic features that attracted recreationists, retirees, and other new residents. This impact of amenities has accelerated in the 1990s (U.S.D.A. 1996). Similarly, most migration modeling now takes into account the role of local amenities along with employment and income opportunities and cost of living (Greenwood et al. 1991 and Berger and Blomquist 1992).

Of course, most areas are not amenity magnets that draw national attention. Yet the attractiveness of a particular area to current and potential residents is still important. Many small towns and rural areas during the 1990s gained population and the new economic activity that supported it. The characteristics of a local area that allow it to attract and hold people are an important part of the area's economic base. If this is not recognized, that part of the economic base may be irreversibly damaged to the detriment of the future of the local economy. Likewise, if this significant economic force is ignored, local economic planning efforts may become largely confused and ineffective.

Empirical Evidence of the Impact of Protected Landscapes on Local Economic Vitality

Economic research has repeatedly demonstrated that areas with high-quality natural environments that are officially protected have been able to attract higher levels of economic activity. As a result, those areas show signs of superior economic vitality. Much of that research has centered on the western United States because of the concentration there of many large national and state parks, national wilderness areas, as well as national and state forests. But other areas of the nation, including the Northern Forests of the nation's Northeastern tier have also been studied. There have also been some studies that have been national in scope.

Statistical analysis of the economies of all of the counties of the western states showed that higher percentages of county land protected by National Park, National Monument, and National Wilderness System status were associated with higher rates of employment growth between 1969 and 1997. Even when only the more rural (non-metropolitan) counties in the West were considered, those counties with more than ten

percent of their land in National Parks, Monuments, and Wilderness saw job growth 1.85 times the average for western non-metropolitan counties; income grew 1.43 times faster. The correlation between the amount of National Park, Monument, and Wilderness within 50 miles of a rural western county's center was positively correlated with both income and employment growth for both the 1969-1997 and 1990-1997 periods. Finally, unprotected wildlands that have yet to face roaded development also appeared to attract economic activity. The acreage of US Forest Service inventoried roadless areas within 50 miles of a county's center was also positively correlated with employment and income growth. The strength of that correlation increased as the analysis shifted from all counties to just the non-metropolitan counties (that is, no cities larger than 50,000) to the purely rural counties (that is, no cities greater than 2,500) of the western states.¹

Analysis of economic development in rural counties near large wilderness areas has found that population growth in those counties is somewhat higher than the growth rate for either the state as a whole or the major urban areas in the state. During the 1990s, the economic advantage of the rural wilderness counties over the state and urban averages expanded (Booth 1996). Another researcher found similar results for the Mountain West even when he focused on truly rural counties, those that had no communities with more than 2,500 residents. This study included as federally protected natural areas not only federal Wilderness Areas but also National Parks and National Monuments. Relatively high correlations ($r = .5$) were found between measures of the relative importance of these protected national lands as a percentage of total county land and several measures of economic vitality: employment, per capita income, total aggregate income, and population growth (Lorah 2000)—that is, in rural areas with only small cities and towns, the greater the land base in National Wilderness, Parks, and Monuments the higher were the measures of local economic vitality.

Rudzitis has also shown that federal protection of landscapes through National Parks and Wilderness designations does not slow local economic growth. In fact, such protection was associated with growth rates two to six times those for both other non-metropolitan areas and two to three times those of metropolitan areas over the 1960-1990 period. His research clearly indicated that the protected lands drew new residents who were willing to sacrifice a certain amount of income in order to live in the higher quality natural environments that they perceived federal protected landscapes provided (Rudzitis and Johnson 2000 and Rudzitis 1996 figure 7 and pp. 112-116).

Researchers puzzled by the growth of population in Western Montana despite low wages and incomes studied the location of new residential housing to determine what locational characteristics explained the decisions homebuilders were making. They found that the closer a location was to a designated Wilderness Area, the higher the likelihood of new construction. The same was true of National Parks. Distance to Montana's larger population centers and access to major highways was also important. These new homeowners want to live near protected natural areas but also value ease of access to trade centers and regional airports (Jackson and Wall 1995). Another economist seeking to understand the spatial patterns of economic development in the rural Mountain West also focused on the tension between access to urban areas and closeness to protected natural areas. In this case the focus was on urban centers that were not within commuting distance. He also found that the presence of a National Park led to faster rates of both employment and population growth, but that growth decreased with distance from a metropolitan area. So, again, people seek to enjoy the protected natural landscapes while maintaining at least some loose links with metropolitan areas (Booth 1999).

The impact of protected landscapes on the attractiveness of areas as residential locations has also been documented in New England as well as in other regions. A statistical analysis of the value of over 6,000 land parcels that were transferred in Vermont's Green Mountains revealed that the existence of designated federal

Wilderness enhanced nearby land values. Parcels of land in towns near designated Wilderness sold at prices 13 percent higher than in towns not located near Wilderness. Land prices decreased by 0.8 percent with each kilometer of distance away from the nearest Wilderness Area boundary (Phillips 1999 and 2000).

A recent University of Maine analysis of migration patterns in the Northern Forest region of the United States confirms the positive impact on in-migration of public lands dedicated to conservation. The study looked at rural forested counties in northern Maine, New Hampshire, New York, Michigan, Wisconsin, and Minnesota. It sought to determine the impact of increased concentrations of public conservation lands on in-migration and employment in these rural forested counties. Conservation lands included national and state forests, national and state parks, and public wildlife refuges. The focus was on the years 1990-1997, when timber harvests on federal lands declined dramatically as conservation objectives increasingly limited commodity production. The study, like many others, found that, in general, jobs were following people rather than people following jobs. In addition, the more of a county that was publicly owned land managed for conservation objectives, the higher was the rate of economic growth: An 11-percentage-point increase in the share of the county that fell into the conservation land category led to a one percent point increase in the net in-migration rate. Such enhanced in-migration then had an indirect impact on employment that was similar in size: a ten-percentage-point increase in the share of the county that was in conservation lands led to a one percentage point increase in the employment growth between 1990 and 1997 (Lewis and Plantinga 2000). Given that timber harvests were falling on federal conservation lands during this time period, the positive impact of the presence of these lands on in-migration and employment was impressive.

This University of Maine analysis of the impact of public conservation lands also sought to determine if more restrictive protection had positive or negative impacts on local economic vitality. The more restrictive preservation category included federally designated Wilderness Areas as well as National and State Parks. There are no large National Parks in this Northern Forest area. The preservation lands category was dominated by the Adirondack State Park in New York and the Boundary Waters Canoe Area Wilderness in Minnesota. The study found that the presence of such more restricted-use public lands had no significant impact on county economies, either positive or negative.² Since conservation public lands had a significant impact but the preservation component of those lands did not, it was clearly the less restricted public lands that were responsible for the positive impact. As the study pointed out, however, much of the preservation restrictions were adopted many decades ago (for Adirondack State Park, over a century ago) but the study was focused on the 1990s. Thus the positive (or negative) impact of the restrictions may have been experienced many years earlier. Finally, the period of the study's focus, the 1990s, was a period during which timber harvests on National Forests fell towards zero and those public lands were managed better for wildlife, recreation, and other environmental values, similar to the way a preservation area would be managed. In that sense, the study confirmed that shifts towards preservation and away from commodity production had positive impacts on local economies, not negative impacts

Counties across the nation containing National Parks and Monuments have also shown impressive economic vitality, including high rates of population, job, and real income growth. A review of all of the large National Parks in the nation over the last 30 years indicates that population growth was almost four times faster than the national average. Job growth was almost 3 times faster. Aggregate real income grew twice as fast as the national average. Over the last 30 years (1969-98) most large National Park counties have experienced robust economic vitality. Eighty-four percent of the large National Park counties had above average population growth; 82 percent had above average job growth; and 80 percent had above average aggregate real income growth (Power 2001).³

A study of the impact of state parks on employment and population growth in 250 rural western counties found that state parks also served as an amenity, attracting population and supporting employment growth (Duffy-Deno 1997). A similar analysis of the impact of federal Wilderness Areas and National Parks in the Mountain West found that when a rural county was adjacent to a National Park population growth was higher compared to counties not adjacent to Parks. In addition, there was no negative impact of Wilderness designation on employment or income (Duffy-Deno 1998).

Other researchers have focused on a broader range of local amenities, locally specific qualities that make a location attractive to potential residents. They have included climate, air and water pollution, crime rates, the quality of schools, etc. These studies also confirm that people care where they live and act on those preferences, leading to in-migration and job creation in areas perceived to have higher quality living environments (Clark and Hunter 1992, McGranahan 1999, Nord and Cromartie 1997, Rudzitis 1999, and von Reichert and Rudzitis 1994).

Some research has focused not on the location decisions made by individuals but those made by business firms. With the shift from goods production to the production of services, in particular knowledge-based services such as those involved in research, insurance, finance, and high technology, more firms have become relatively footloose. The success of these companies is less dependent on location than on obtaining the highly qualified personnel they need at a reasonable cost. National Parks and other protected natural landscapes appear to draw economic activity to nearby communities (Crompton et al. 1997, Johnson and Rasker 1993, Rasker 1994, Arora et al. 2000, Gottlieb 1995). As a result, natural amenities become an important part of a region's economic base. As one recent study of the role of environmental quality on the location of high-tech firms put it:

Amenities and the environment – particularly natural, recreational, and lifestyle amenities – are absolutely vital in attracting knowledge workers and in supporting leading-edge high technology firms and industries. Knowledge workers essentially balance economic opportunity and lifestyle in selecting a place to live and work. Thus, lifestyle factors are as important as traditional economic factors such as jobs and career opportunity in attracting knowledge workers in high technology fields. Given that they have a wealth of job opportunities, knowledge workers have the ability to choose cities and regions that are attractive places to live as well as work. The new economy dramatically transforms the role of the environment and natural amenities from a source of raw material and a sink for waste disposal to a key component of the total package required to attract talent and in doing so generate economic growth (Florida 2000, p. 5).

¹ Southwich Associates, 2000, Historical Economic Performance of Oregon and Western Counties Associated with Roadless and Wilderness Areas, pp. 19 and 24. The correlation coefficients for the most rural counties (no city greater than 2,500) were 0.33 and highly significant. The correlation was also significant for all Western counties as well as all Western non-metropolitan counties. The states included were Montana, Wyoming, Colorado, New Mexico, Idaho, Utah, Arizona, Nevada, California, Oregon, and Washington.

² Lewis and Plantinga 2000, pp. 24–25.

³ The time period was 1969–1998.

:: Appendix II

Verifying Employment Effects

The adaptive expectations econometric model can provide some insight regarding the impact of a million-board-foot change in state timber harvests on employment in lumber and wood products and other sectors and on total employment in the Clatsop and Tillamook Counties economy. We acknowledge that our very basic approach misses much that should be captured by a more sophisticated mode: namely, using supply and demand functions for final outputs as well as production functions linking outputs and prices for factoring use. Yet this basic approach will serve to indicate the direction and approximate magnitude of the effects under study.

Suppose that employment in wood products sectors depends entirely on expectations regarding the long-run size of the local harvest from state lands. In this case, one might represent employment in these sectors by the function that follows.

$$L_t = b_0 + b_1 V_t^* = u_t \quad (1)$$

where L_t is the quantity of labor employed by lumber and wood products sectors in period t , V_t^* is the expected long-run harvest from state lands in period t expressed in units of one million board feet, and u_t is the error term capturing random deviations from the basic relationship as well as measurement error and the effects of excluded variables. b_0 and b_1 are parameters of the linear model capturing the y-intercept and the impact of a one-million-board-foot change in expected state harvest on employment. ¹

Since the expected long-run harvest V^* is not directly observable, we must suppose that expectations are formed according to a process such as the following:

$$V_t^* - V_{t-1}^* = g(V_t^* - V_{t-1}^*) \quad (2)$$

66 :: Economic Realities in the Tillamook and Clatsop State Forests

where V_t is actual harvest in period t and g , such that $0 < g < 1$, is the coefficient of expectation. Expressions (1) and (2) can be manipulated to produce the following relationship that lends itself to investigation with data at hand (Labor force data from OED LMIS and harvest data from ODF 2002a).

$$L_t = gb_0 + gb_1V_t + (1 - g)L_{t-1} + v_t \quad (3)$$

where $v_t = u_t - (1 - g)u_{t-1}$. Here, gb_1 captures the average response of L to a one-million-board-foot change in V . Estimating equation (3) with data from 1976 through 2000 yields the following results.

$$\begin{aligned} \hat{L}_t &= 9.785 + 1.172V_t + 0.894L_{t-1} \\ &\quad (0.085) \quad (1.373) \quad (12.991) \\ n &= 24 \quad R^2 = 0.90 \end{aligned}$$

The t -stats are in parentheses below coefficient estimates. The estimated effect of a one-million-board-foot change in state harvest in Clatsop and Tillamook Counties on employment in lumber and wood products sectors in those counties is an increase of 1.172 jobs, though the hypothesis that the actual effect on employment is zero cannot be rejected even at the 10% confidence level.²

Similar reasoning can be applied to county government employment if employment is a function of expected revenue from timber sales on state land and harvest levels determine revenue expectations. Estimation of such a model produces the following results:

$$\begin{aligned} \hat{L}_t &= -37.111 - 0.369V_t + 1.035L_{t-1} \\ &\quad (-0.172) \quad (-0.651) \quad (17.787) \\ n &= 24 \quad R^2 = 0.94 \end{aligned}$$

where in this case L represents county government employment in Clatsop and Tillamook Counties. t -stats are in parentheses below coefficient estimates. Given the negative coefficient estimate for the effect of increased harvests on county government employment and the large standard error, one should interpret these results as evidence that increased harvests have no effect on county government employment.

It is not possible to apply this model sensibly to the determination of overall employment in Clatsop and Tillamook Counties. A very simple technique to gauge the relationship between harvests on state lands and total employment in the counties employs the following simple regression model.

$$L_t - L_{t-1} = b_0 + b_1(V_t - V_{t-1}) + u_t \quad (4)$$

Estimating equation (4) produces the following results, typical of the results of several attempts to investigate the relationship between harvests on state forests and total employment in Clatsop and Tillamook Counties.

$$\widehat{L_t - L_{t-1}} = 367.129 - 0.124 (V_t - V_{t-1})$$

(3.240) (-0.043)

$n = 24$ $R^2 = 0.00$

Given the small magnitude of the coefficient estimate, the large standard error, and the very small proportion of the variation in total employment differences explained by the relationship, these results show that the estimated impact of changes in harvests on state lands on changes in total employment in Clatsop and Tillamook Counties is zero.

¹ Please refer to Gujarati (1995) or most other introductory econometrics texts for more detail on the adaptive expectation model in particular or on multiple regression estimation in general.

² Several alternative time-series models were employed to estimate the impact of million-board-foot changes in state harvests on lumber and wood products industries in the counties. Resulting coefficient estimates for the alternative models were generally smaller in size than the estimate reported here and statistically insignificant.

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70 :: Economic Realities in the Tillamook and Clatsop State Forests

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72 :: Economic Realities in the Tillamook and Clatsop State Forests

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74 :: Economic Realities in the Tillamook and Clatsop State Forests

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Professor Ruder has written scholarly papers on industry adjustment to free trade agreements and on pedagogy in economics. During the past five years he has taught his environmental economics classes by using a case-based approach centered on state forest management in Northwest Oregon.

Professor Ruder was a member of the Oregon Department of Forestry Forest Grove Focus Group on the Implementation of the Forest Management Plan in 2001. Professor Ruder has contributed several editorials to The Oregonian on the politics and economics of state forest management in Oregon. With Pacific colleague Political Science Professor Bob Van Dyk, Professor Ruder authored "Of Salmon, Jobs, and Equity" in Oregon Salmon (Oregon Trout 2001) and contributed to 50 Hikes in the Tillamook State Forest (Sierra Club 2001).

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76 :: Economic Realities in the Tillamook and Clatsop State Forests

Professor Power has taught at Princeton, Lehigh, and the University of Montana where he has been since 1968. He has been Chairman of the Economics Department since 1978.

Professor Power's most recent book, *Post-Cowboy Economics: Pay and Prosperity in the New American West*, was published in 2001 by Island Press. In 1996 Island Press published his *Lost Landscapes and Failed Economies: The Search for a Value of Place*. An earlier book, *The Economic Pursuit of Quality* (M.E. Sharpe Publishers, 1988) was revised, rewritten, and published in 1996 under the title *Environmental Protection and Economic Well Being: The Economic Pursuit of Quality*. Dr. Power is also the author of *The Economic Value of the Quality of Life* (Westview, 1980). He is currently working on his sixth book that analyzes the impact of natural landscape protection on regional economies across the US and around the world.

In addition he has written a dozen book chapters and over a hundred papers, reports, and monographs in the field of resource economics and regional economic development. He regularly testifies before state and federal regulatory agencies on energy policy, natural resource development, environmental protection, and local economic development. He is a regular commentator on economic issues on Montana Public Radio and in the national press.

MISSION STATEMENT

for the Tillamook Rainforest Coalition

Inspire Oregonians to protect the health of the Tillamook, Oregon's Coastal Rainforest, to provide clean drinking water, abundant fish and wildlife, recreational opportunities, livable communities and healthy economies—today, for tomorrow.



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