

The top half of the cover features a stylized landscape. The background is a dark blue field filled with numerous concentric white arcs that create a sense of depth and movement, resembling a sunset or a series of ripples. In the foreground, a dark blue silhouette of a mountain range is shown, with a prominent peak on the left and a smaller one on the right. The overall design is minimalist and graphic.

*The 1989
Starker Lectures*

Oregon's Forestry Outlook: An Uncertain Future

College of Forestry
Oregon State University
Corvallis, Oregon

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Foreword



**Robert E. Buckman, Professor
Department of Forest Resources
Oregon State University**

The theme for the 1989 Starker Lectures concerned uncertainty surrounding forests and forestry in Oregon and the Pacific Northwest. It was a timely theme. Indeed, the uncertainties concerning trade-offs among commodity production and environment and the allocation of forest land, especially public lands, loom large as we enter the decade of the 90's.

We invited for the 1989 lectures speakers who would address current issues not in the value-laden terms of the day, but in a more detached and analytical way, an approach that better permits the listener or reader to make judgements based on factual and scientific information. This, we believe, is a proper role for the College of Forestry.

Richard Plochmann, professor of forest policy at the University of Munich, describes the evolution of forestry in central Europe from the 18th century to the present. From the severely degraded forests of the 1700's, to the intensively managed man-made forests of the next two centuries, forests and forestry are turning today toward a more naturalistic composition.

Don Flora, senior researcher in international trade, examines questions

surrounding timber trade. His research suggests that there will be winners, but there will also be losers, in proposed changes in timber trade policy—some of whom are not readily apparent in today's debate.

John Mitchell, policy analyst, paints an optimistic picture of overall economic growth for Oregon. Gains will come from a larger retirement community and high-tech and service industries, but forest industries are likely to lag.

The concluding 1989 lecture was a panel report of a major study undertaken by the College of Forestry titled "Timber for Oregon's Tomorrow: The 1989 Update." The panelists, Professors John Sessions, Brian Greber, and Norm Johnson (also advisor to Governor Goldschmidt), John Beuter (consulting firm, Mason, Bruce, and Girard) and Gary Lettman (Oregon State Department of Forestry) presented a description of the forests of Oregon in both the near and the long term. The thoughtful reader will gain valuable insights about timber, environmental, and socio-economic consequences of the changing timber supply situation in Oregon. The executive summary of the study is presented herein; the larger study is available from the College of Forestry.

Dedication



Bruce Starker

This is the fifth in a series of lectures sponsored by the Starker family in memory of T.J. (1890-1983) and Bruce Starker (1918-1975), who were respectively first- and second-generation founders of what is now Starker Forests, Incorporated.

T.J. and Bruce rarely missed an opportunity to share their views on forestry with foresters and citizens alike. This is a tradition the Starker family continues—making themselves available for all manner of comment and demonstrations on their 55,000-acre forest lands. Sponsorship of these lectures is a manifestation of that interest.

The College of Forestry is proud to join with the Starker family in offering

these lectures and pointing out that three generations of Starker foresters are graduates of the College.

Two additional acknowledgements are in order. Carl Stoltenberg, Dean of the College of Forestry for 23 years, retired on December 31, 1989. His imprint on Oregon forestry was powerful and will be long-lasting. Carl worked with these Starker foresters and joined with them in organizing these lectures.

We also gratefully acknowledge the artistic and editorial assistance of Susan Lewis, Gail Wells, Rebecca Chladek, and Lola Hickey, who prepared these manuscripts for publication.



T.J. Starker



Early-day pioneer work in forestry research was initiated in 1927 when T.J. Starker (shown) established his famous “post farm” which was used to test the durability of different wood species. (OSU Archives photo)

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The Forests of Central Europe: A Changing View

by Richard Plochmann



Richard Plochmann is a professor of forest policy at the University of Munich, Federal Republic of Germany. This lecture was delivered October 12, 1989, at Peavy Hall, Oregon State University, Corvallis, Oregon.

“Not one acre of forest was left untouched, and therefore, not one acre of virgin forest still exists. All central European forests are man-made.”

Exactly 23 years ago I had the chance to spend a term at Oregon State University as a visiting professor sponsored by the Hill Family Foundation. During my stay, I had the privilege of meeting Professor T.J. Starker, who kindly showed me his forests. I was deeply impressed by the man and by his forests.

You will understand what it means to me to be here again and to give one of the Starker Lectures. I am aware of the honor of being invited as a foreign speaker. And I am especially aware of the honor of being invited as a German forester. I know that many American colleagues, on the one hand, see Germany as the cradle of forest science and forest management; but on the other hand, they have the opinion that German foresters must be either ecological freaks or economic failures, or both. I am most thankful and happy to get the chance to explain—at least to try to explain—why we have a different, changing view of ourselves.

Before I start, let me tell two stories

about German foresters to give you a feeling for our thoughts and ideas. A couple of years ago Professor Libby, the famous expert from Berkeley on *Sequoia gigantea*, came to Germany to visit big tree plantations. He was impressed by their excellent growth and asked his German guide, “What is the rotation you are planning for these trees?” He got the answer: “I am considering 3,000 years, after learning that trees will easily live that long.”

A while ago I met one of our students a few years after he graduated. He was driving a Mercedes 500 and seemed to be very well off. I asked him what he was doing. He told me, “I opened my own business. I am dealing in birch brooms. I buy a piece for a dollar and I sell it for four. On that 3 percent I can make a living. I am really thankful to you,” he said, “because you taught me my economics. I had not believed how handy the soil rent theory and the Faustmann formula would be in practical life.”

Neither 3,000-year rotations nor 3 percent soil rent are typical for central European forestry. Besides, I am not supposed to talk about rotations and rents, but about the forests of central Europe—a changing view. In doing so, my problems start with the definition of central Europe. It does not exist as a state. You won’t find it on a map. In the European *Timber Trends and Prospects* of the FAO, central Europe consists only of Austria and Switzerland. When I use the term central Europe here, I define it not as a political or geographical entity, but as the densely populated and highly industrialized center of continental Europe, whose forests have a similar history and whose actual problems of land use

are about the same in spite of different political, economic, and social situations and circumstances. The Federal Republic of Germany is not only part of central Europe, but with respect to forests and forestry, quite typical of it. When I use data, I will therefore rely on the statistics of the Federal Republic of Germany.

If left to nature, central Europe would be a wooded land with over 90 percent of its area under forest cover, consisting of cool temperate hardwood forests, mainly beech and two species of white oak; mixed hardwood/Scotch pine forests; and mountainous hardwood-coniferous forests, the coniferous species being mainly Norway spruce and European fir. Hardwoods clearly dominated central European forests, with an estimated proportion of around 80 to 85 percent (Figure 1).

Since human beings started to farm in central Europe about 7,000 to 8,000 years ago, about two-thirds of the forest area has been cleared for other types of land use. In many areas the land use has changed once or even more often between farms and forests. Because of the nature of the clearing process, which peaked between the years 1000 and 1300, the forests were removed from the most productive sites and were preserved mainly where no other type of land use with higher returns

“At the end of the 18th century, central European forests were in bad shape. These forests had to supply the timber for a rapidly growing population and economy.”

was possible. On the remaining forests, these long periods of utilization and management have had great impact on the composition, structure, and productivity of the remaining forests. Not one acre of forest was left untouched and therefore, not one acre of virgin forest still exists. All central

European forests are man-made.

In talking about forests in central Europe, and about our goals, objectives, and ways to utilize and manage the forests, I will structure my presentation into three parts:

- What did our ancestors aim at over the last 150 years, and what were the results of their management? I will begin here with a short historical review.
- What were the main reasons we changed our view in the last two decades? I will continue with a short political and socio-economic analysis.
- What is our general concept of forestry today? What is its rationale? What are the problems and obstacles in realizing the concept? I will end with a short description of the goals and practices of central European forestry today.

I. Historical Review

At the end of the 18th century, central European forests were in very bad shape. These forests had to supply the timber for a rapidly growing population and economy. They were exploited by exporting large quantities of logs to the seagoing Netherlands and United Kingdom—always timber-hungry—and they had to provide the farms with leaf fodder for livestock and litter for the stables. They were also habitat for the large game populations that were tended and strictly protected by the despotic territorial rulers who had the sole right to hunt. For 150 years the forests were overcut, overgrazed, overraked, and overbrowsed. From the end of the Thirty Years War to the beginning of the Napoleonic Wars, the forests were exhausted and degraded.

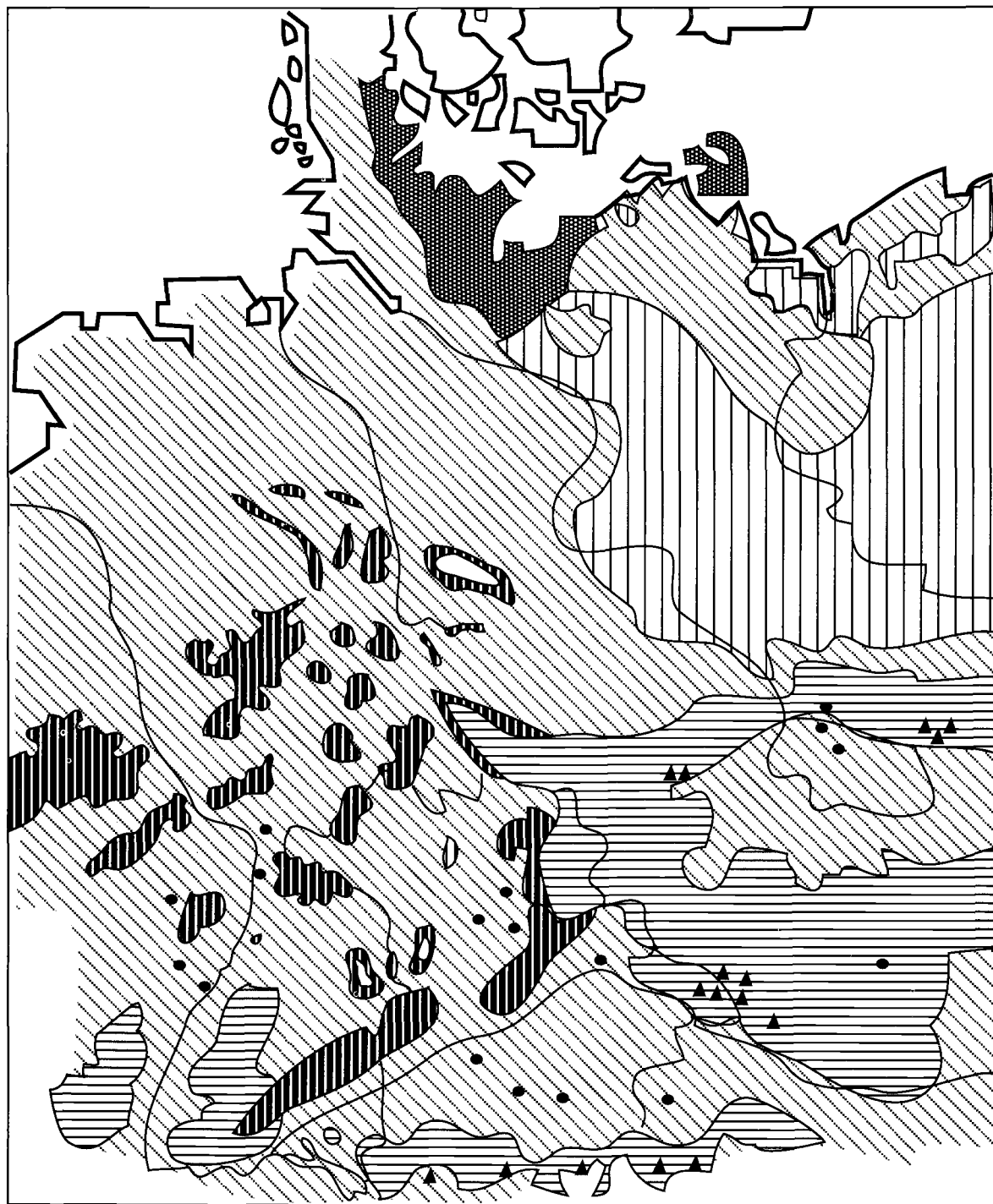
Many writers have described the poor state the forests were in, often in quite drastic terms. One writer claimed that on 10,000 acres of a certain forest district, no tree could be found strong enough to hang a forester on it. Only the political, social, and economic

reforms in the wake of the Napoleonic Wars opened the opportunity to rebuild the ravaged forests.

A number of other factors helped to achieve that goal. For example:

- Forestry had been developed as a new field of science and had been established at universities and academies.
- These institutions produced well-trained professionals able to tackle the tasks.
- The newly formed states created modern and effective forest services fully responsible for the management of the forest.
- Modern forms of agriculture made grazing, hog masting, and leaf fodder in forests unattractive.
- The feudal hunting monopoly was abolished.

The principles of the previously used mercantilistic economic policy—concerned more with meeting timber demand than making high profits—did not lend themselves to the rehabilitation of forests. After Adam Smith and David Ricardo published their economic theories, their ideas quickly gained a foothold in mainland Europe, where they were adopted by forest scientists and applied to forest economics. The result of these efforts was the soil rent theory, the foundation of which was laid by Johann Christian Hundeshagen in the early 19th century. It received its final form and mathematical formulation through the work of Faustmann and Pressler in the mid-1800's. The soil rent method furnished foresters with an ideal planning tool for calculating the species with the highest monetary return and the financial rotation with the highest internal rate of interest on a given site. It fit perfectly with classic liberal economic theory, which set the maximization of profit as the general objective of economic activities and therefore the general objective for forestry as well.








- | | |
|---|--|
|  Mixed beech forest in low lands |  Mountainous beech forests with Norway spruce and white fir |
|  Mountainous beech forests without softwoods |  Scotch pine forests with oaks |
|  Mixed beech forest with some Scotch pine moraines | — Bavarian border |
| | • Scotch pine forests locally dominant |
| | ▲ Norway spruce forests locally dominant |

Figure 1. Natural forest vegetation types in West Germany

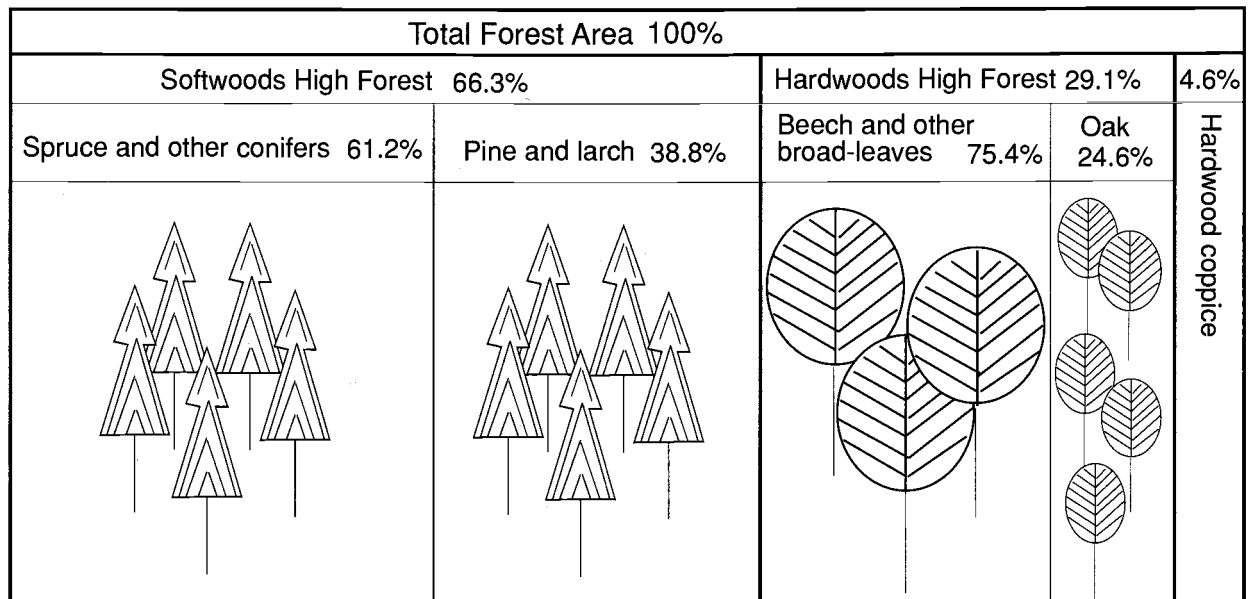


Figure 2. Distribution of tree species and management types
 Source: Forestry Statistics, Federal Republic of Germany, 1961

As the rehabilitation of forests began in the 1820's, central European foresters were already deeply influenced by these ideas. They started to calculate, and came easily to the result that Scotch pine, Norway spruce, black locust, white pine, and after 1880 Douglas-fir, promised much higher returns and soil rents than the natural hardwood forests. In addition, spruce and pine had the advantage of being hardy species which could be easily seeded or planted on open land.

And so the rehabilitation of the central European forests was achieved mainly with an early form of plantation management. The hardwood thickets and hardwood stands within conifer forests, comprising around 50 percent of the forest area at that time, were cleared away and replaced by conifer plantations. Today, not even 3 percent of the hardwood stands are left.

The deciduous high forests were converted by seeding and planting into

softwood monocultures. Rotations were shortened, natural regeneration was replaced by plantations, and old forms of silviculture, like single tree selection, replaced by clearcutting.

The soil rent theory was not undisputed. Criticism arose in the last quarter of the 19th century. A long and heated conflict developed between the advocates of the soil rent and the forest rent theories.¹ But there is no doubt that the rehabilitation of central European forests was deeply influenced by liberal economic theory. Besides, such rehabilitation could probably be achieved only by artificially establishing large monocultures and by using tough and hardy conifers to do so.

The results were amazing. Rehabilitation was completed in less than a century. Standing volume, annual increment, and the flow of harvested timber increased remarkably—even doubled and tripled. On the whole, a more or less even age class distribu-

tion was reached. The fame of German forestry was based mainly on that success.

The price that had to be paid, however, was a deep change in the composition of the forest. The rehabilitation effort turned the hardwood forests of central Europe into forests dominated by conifers. From 1820 to 1960, the forest composition shifted from about two-thirds hardwood and one-third conifers to exactly the reverse. On about 40 percent of the forested area, naturally mixed stands were replaced by monocultures. Of the stands established between 1900 and 1950, conifers constitute more than two-thirds of the forest (Figure 2).

II. The Political and Socio-economic Analysis

Let's turn to a short political and socio-economic analysis. You will first need a few facts.

¹ Editors note: Forest rent theory assumes that interest charges are inappropriate on land, timber capital, and silvicultural expenses. Soil rent theory, in contrast, assumes that interest should be earned on these assets and costs. Forest rent analysis leads to longer rotations than soil rent calculations. Only in the special case of zero interest rates do the two methods lead to identical rotation ages. For more information see G. Robinson Gregory, 1987, *Resource Economics for Foresters*. John Wiley & Sons, Inc. 477 pp.

Central Europe belongs to one of the most densely populated areas of the globe. Population density reaches its maximum in the Netherlands, with more than one thousand people per square mile. The Federal Republic of Germany has 650 people per square mile. In Austria and Switzerland that figure reaches 290. Just for comparison: The population per square mile of the United States of America is 56. Oregon has practically the same land area as the Federal Republic of Germany. Just imagine a population of 61 million for Oregon and you will have a pretty good idea of what densely populated means.

Central Europe is one of the most highly industrialized regions of the globe. The Federal Republic of Germany is the biggest net exporter of industrial goods in the world, far bigger than Japan. Our neighbors in the West and the East and even in the Alps have a similar degree of industrialization. Population and industrialization lead to dense settlements and infrastructures. Over 11 percent of the land area in the Federal Republic of Germany is covered by human settlements, under construction, or paved over (Figure 3). Significant areas uncut by public roads or rails have become rare. If one set a standard of only 39 square miles uncut by roads or rails, one would discover that not even 20 percent of the area meets that description.

Less than 4 percent of the total area of the Federal Republic of Germany is water, marshes, wetlands, bogs, or unused wasteland. The amount of waste— assimilative environment or dissipative systems, in the terminology of Odum (1983), is therefore astonishingly small, while farmland as a productive life-support or growth system is large at 55.4 percent.

Forests are, in general, the sole ecosystems left in central Europe that could be used as protective life support environments or as mature systems. As in the United States, they comprise about 30 percent of the land area of central Europe. In states which do not belong to the Eastern bloc, the majority of forest land is privately owned. On the average these owner-

ships are very small. FAO estimates that there are 15 to 20 million private forest holdings in Europe, owned by some 7 to 10 million persons. They became owners when feudal systems broke up, after commons were divided among their users or after user rights on forests were brought out by forest land substitution.

Again, let us take the Federal Republic of Germany as an example for central Europe. In contrast to the United States, the ownership structure in the Federal Republic of Germany is characterized by three facts. First, the amount of federal forests is nearly negligible. The large forest owners

are the states and not the Federation. Second, industrial forests do not exist. All private forests are nonindustrial. The number of forest owners is well above 700,000, and the size of the individual holding is around 10 acres, split into average 2.7 acre parcels. About three-quarters of that forest land is still connected to farms. Third, 25 percent of the forest area is still in community ownership. Here the old commons were not divided among their users, but turned over to the political community. Quite often members of the old commons hold user rights on the communal forests (Figure 4).

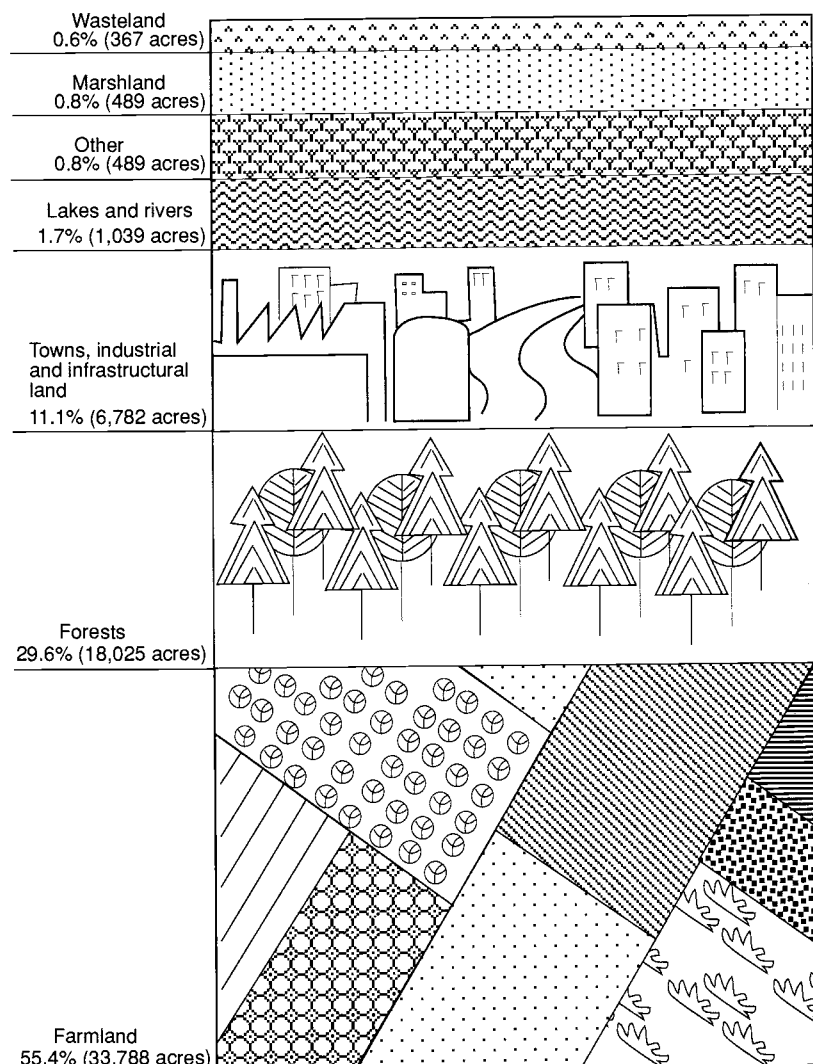


Figure 3. Land use in the Federal Republic of Germany
Source: Statistical Yearbook 1983 for the Federal Republic of Germany

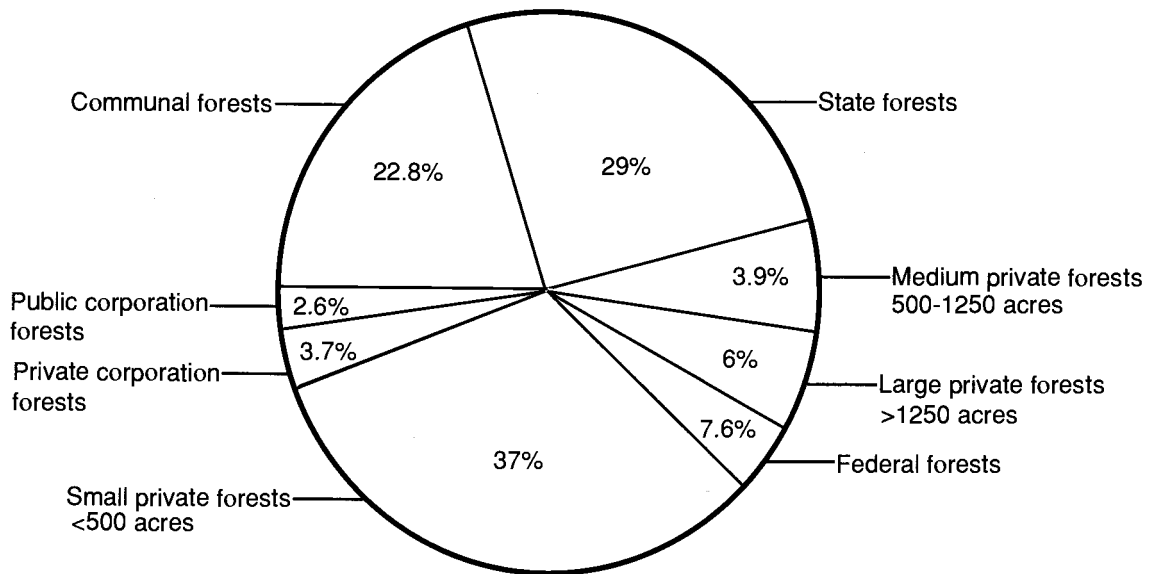


Figure 4. Percentage of forest ownership
Source: Forest Statistics, Federal Republic of Germany

So much for the facts. Let us turn now to the change of ideas. In the decade between 1950 and 1960, fundamental changes in the society began to take shape. The tremendous boom of the economy raised the standard of living, increased mobility, increased leisure time, and deeply transformed the way of life and the behavior of the people. With growing wealth and urbanization came a fear that we might exploit our natural resources and destroy our natural heritage.

It was in the 60's that forestry came under public criticism. This boiled down to the general reproach that forestry solely oriented towards the maximization of profit can no longer meet the expectations and needs of society. That criticism came from different sectors of society, but mainly from four constituencies: Those concerned with recreation, the preservation of nature, the protection of landscape, and the protection of water resources.

Central Europeans, and especially Germans, have a particular emotional connection to forests and trees. Forests are for them—whether true or not—the living image of nature, the only “nature” which is legally open for their recreational use 365 days a

year and 24 hours a day whether that forest is in public or private ownership. They make use of that right of entrance. In the Federal Republic of

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Germany, about 70 percent of the public participate in forest recreation not only in county, state, and federal parks but everywhere, in all forests. The public has complained that the forests as monocultures would be too monotonous; that they would lack diversity in composition, structure, and density; that there would not be enough

old and big trees and not enough edge effects.

The preservation of nature was for a long time the domain of foresters. But now forestry and foresters have come under the fire of conservationists who claim that the change in forest composition—the large areas of monocultures; the short rotations; the use of soil preparation, fertilization and pesticides—that all of these not only changed the character of the landscape but led to the extinction and the endangering of many species of flora and fauna. In particular, the lack of old and rotting trees, snags, and dead timber in the stands—nightmares for hygiene-conscious foresters—would be a main problem for habitat and species protection. You can see that we have our owl problems as well. Conservationists demanded that large forest areas be taken out of any utilization and that the rest be managed in a nature-friendly way.

A field of rapidly growing concern is water supply. Groundwater provides 70 percent of the water supply of the Federal Republic, and 50 percent of the groundwater is taken from resources under forests. The groundwater resources under agricultural land are more and more contaminated with

nitrate and pesticides. There is growing pressure on forestry, on the one hand, to practice management regimes that maximize the refilling of groundwater reservoirs, and on the other hand, to protect them from contamination. Plantation forestry would not meet such expectations.

Another area of concern is the mountain regions, especially the Alps. Their explosive growth in population, settlement, and industry—mainly a tourist industry infrastructure—have greatly increased the importance of the capabilities of forests to protect against erosion, snow and mud avalanches, and floods. Again, forestry is blamed for reducing the protective capacities of mountain forests through its profit-oriented management.

Finally, criticism arose from within the profession itself. The arguments are mainly two: One economical and one ecological. The first argument states that with forest management oriented towards maximization of soil rent, we can produce only standard-quality industrial timber. But with that product line we will never be able to compete. Either our competitors will grow more fiber, or they will produce it much more cheaply. In most cases both are true. Economically, the future of central European forestry can never include timber as a staple commodity. We can survive only with higher-quality timber—thick and clean logs. The conditions for production of high-quality timber are dictated by site, technical knowledge, and the even age-class distribution of our forests. The faster the supply is exploited worldwide, the better our chances will become. The price of high-quality timber is already today two to ten times higher than that of average quality.

The second argument states that ecologically we made two mistakes. We used conifers quite often in large monocultures where they were not indigenous and/or did not fit the site. That was bad enough, but on top of it we tried to use rotations not according to soil rent standards, but according to forest rent standards, and that meant remarkably longer rotations. Both facts

measured risk. The amount of unplanned cuts forced by storms, snow, and insects grew to one-third of the total harvest. Such levels were and are intolerable for sound management. To avoid such risk, we will either have to shorten our rotations, or we will have to turn back to more stable stand com-

“Economically, the future of central European forestry can never include timber as a staple commodity. We can survive only with higher-quality timber—thick and clean logs.”

positions. If we accept the first argument, only the second solution can be chosen.

In any case, forestry by itself came to the conclusion that a new concept of management should be found to meet future demands and developments. In the western societies of central Europe, it took between one and two decades for the controversies about a new management concept—controversies both within the forestry sector and outside of it—to provoke a reaction in the political system. In the 70's and the 80's, all the western states of central Europe passed new forest laws. The Bavarian Forest Law of 1974 can serve as an example. Section 18 is translated as follows:

“Section 18, paragraph 1: The state forests must serve the public welfare to a high degree. They are therefore to be managed in an exemplary fashion. The managing agencies must preserve or establish particularly healthy, productive, and stable forests according to the requirements of sites. They are also required:

- “1. to guarantee and to improve the protection and recreation functions while taking into consideration the concerns of nature preservation, land-

scape protection, and the management of water resources by all management activities; and

- “2. to increase timber production, to preserve the needed timber inventories, and to market timber according to economic principles. Paragraph 2: The objectives mentioned before can be prioritized according to local needs and the objectives set by forest planning . . .”

Section 19 of the law makes the regulations of Section 18 compulsory for all public forests.

This planning process can, by the way, be compared with the one mandated by the Forest and Rangeland Renewable Resources Planning Act in the United States.

It might be of interest to you that the political process of the renewal of forest legislation was controversial in its details, but not in the essentials. All the federal and state forest laws in the Federal Republic of Germany were, in the end, passed unanimously. That happened nearly a decade before the party of the Greens was formed and could send members into the parliament.

III. The General Concept of Forestry

If we ask now, what will be the consequences of such a changed view for the central European forests, we have to recapitulate the expectations of different interest groups with respect to those future forests:

- *From the point of view of recreation (under central European conditions, recreation does not include hunting and fishing). The suitability of forests for recreation will improve with their increasing age, their diversity of composition and structure, their accessibility to the visitor, and their resistance to damage by recreational visitors.*

•*From the point of view of water resources.* While our knowledge is still insufficient concerning optimal refill conditions for groundwater, we do know that in order to protect groundwater resources from contamination, large clearcuttings, fertilization, the application of herbicides, and the use of heavy machinery should be avoided.

•*From the point of view of landscape protection.* The capacity of forests to protect against erosion, avalanches, and floods depends mainly on high stand densities for an indefinite period. This protective capability also depends on the forest's resistance to change and its resilience to disturbances. Naturally composed forests under selection or group selection management will meet such expectations best.

•*From the point of view of nature preservation.* Under the assumption that only 3 percent to 5 percent of the forest area will be placed under strict preservation, the large majority of forests should be managed as "mature systems," which means managing for long life cycles, natural rehabilitation, a sufficient amount of remaining dead timber, and the lowest possible input of artificial energy.

•*From the point of view of forestry.* What needs to be achieved is not the highest volume, but the highest value per unit area per year. That means diameters at breast height not below 20 inches and clean boles of 15 to 50 feet over rotations of 80 to 250 years, depending on species and site.

There is no question that forests in central Europe have to produce both goods and services on the same area and have, therefore, to be managed under a multiple-use concept. The land base of central Europe is too small, and the population too dense, to segregate different land uses in different areas. The product mix for each man-

agement unit, some of them quite small, must be planned according to biological, economic, and social parameters. In spite of the wide variation of possible product mixes, a general management concept can be drawn up. Such a concept would include:

- mixtures of two or three species, at least one being indigenous.
- rotations according to the highest value production, on the average 120 to 140 years.
- natural regeneration wherever possible; therefore using shelterwood, group cutting, or selection harvest systems rather than clearcutting.
- no herbicides and rare use of insecticides and fertilizers. In 1985 the total consumption of pesticides in the Federal Republic of Germany was 30,000 tons. Only 43 tons were applied on the 17.5 million acres of forest land.
- no highly mechanized operations within the forest stand.

The general concept is followed today by all public forest services in central Europe and by many private owners as well. Private forest owners who manage according to this concept get public aid by extension services and monetary incentives.

Two main obstacles remain which hamper, and sometimes prevent, the smooth and efficient practice of this concept. One is forest decline, and the other is excessive deer populations.

Each would be a topic of its own. Let me just remark: Forest decline—the suffering or dying of trees in forests—has up to now been strictly regional in character, involving especially the forests in the middle European mountain ranges. The Alps and the Black Forest show the worst symptoms. All are in areas where the protective, recreational, and water-protection functions of the forests are of special importance. We will have to rehabilitate here much faster than we

would do elsewhere.

On larger areas, we are deeply concerned about the effects of acid rain on soil productivity. We will have to use fertilization to compensate for heavy nutrient losses through leaching, without being sure whether this will be possible at all, or what side effects might result. In any case, such a course will be expensive.

One might think that the second obstacle, high deer populations, could be solved much more easily. But all our experience shows that no hunting system, no political or economic system, and no legal regulations have been able to reduce the deer population to a level that would not hamper or prevent the realization of the concepts here. For the time being, fencing seems to be the only helpful alternative. But fencing is technically impossible in steep mountain terrain. In deep snow it is difficult to determine exactly where we need fencing most. In

“The forest of the future will not be the natural one, but it will come much closer to it than today's forests.”

other areas where fencing is possible, it is costly and only partly effective. How we can effectively control deer is an unsolved social and political problem.

IV. Conclusion

At the end of my talk, I want to show you a practical example of what the consequences of our changed view would be for the forests in central Europe. The Sellhorn forest district of the Lower Saxony Forest Service provides it. The district has about 15,000 acres of forest land located in the north German lowlands on relatively poor glacial sands. We have a pretty good idea about its potential natural forest composition. And we know exactly what we have today.

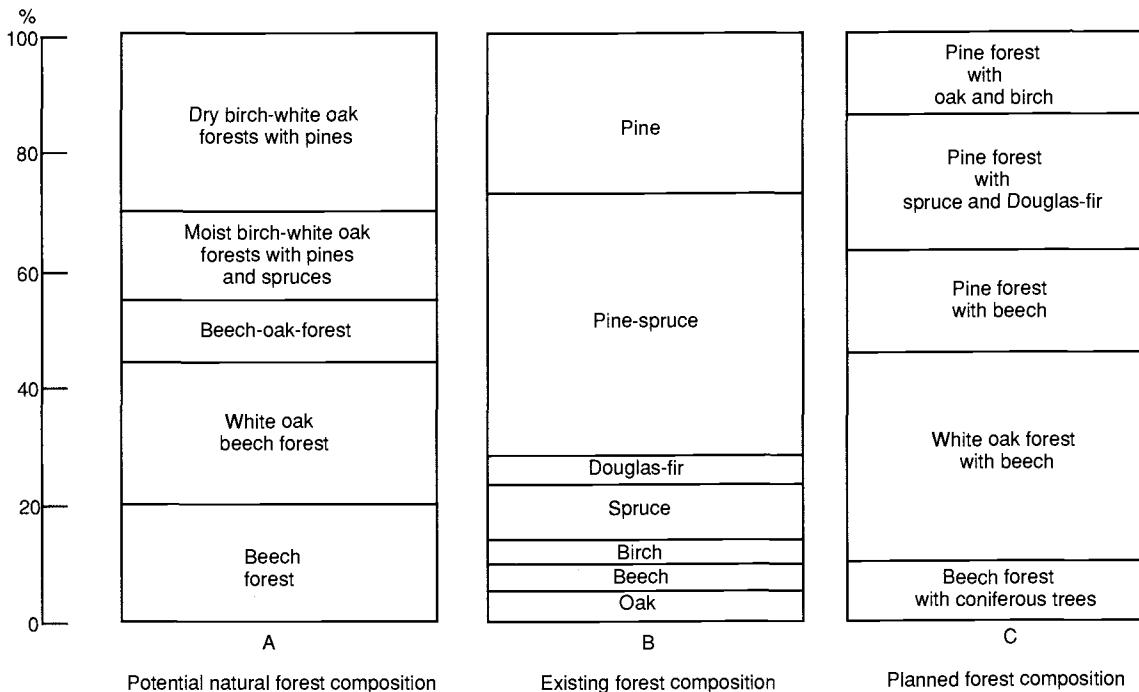


Figure 5. Changing forest composition, Sellhorn Forest District, Lower Saxony Forest Service
Source: Hanstein, U., 1984

Between columns A and B of Figure 5, you can see the result of rehabilitation and reforestation. The amount of pine, spruce, and Douglas-fir rose from about 20 percent to over 90 percent. Column C shows you the planned forest composition in the future. The conifers will be reduced to less than 50 percent, and where possible, they will be mixed with hardwoods. The naturally mixed hardwood stands will return in substantial areas. The forest of the future will not be the natural one, but it will come much closer to it than today's forests.

We are aware that the realization of our changed view will take a long time. After a century of forest rehabilitation, we have now another one of conversion ahead of us. We are convinced that the new concept is a fair compromise of ecological, social, and economic goals and therefore can be jointly carried out by a large majority of our public. We started it on its way. We hope it too will be a success.



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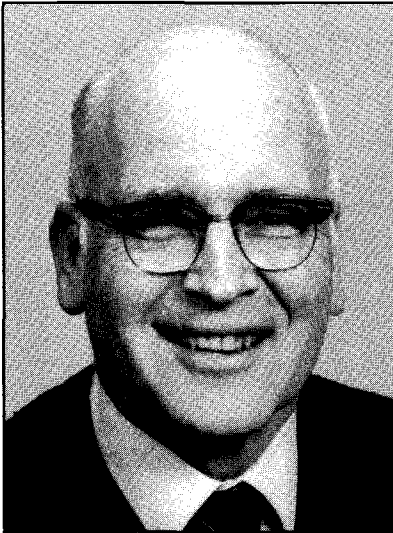
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Timber Exports: Winners and Losers

by Donald F. Flora



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“For as long as timber has been harvested along the Northwest Coast—almost 200 years—there have been exports of wood products. And for two centuries there have been successes, failures, and controversy.”

As has been the case recently, one of the major tension zones of forestry in the 1990's is apt to be sending logs abroad. Described are the major rationales in the arguments for and against exporting value-added products instead of raw materials. The success of nations in meeting those goals is discussed briefly. To the extent that analysts have developed quantitative estimates of gains and costs, those estimates are included.

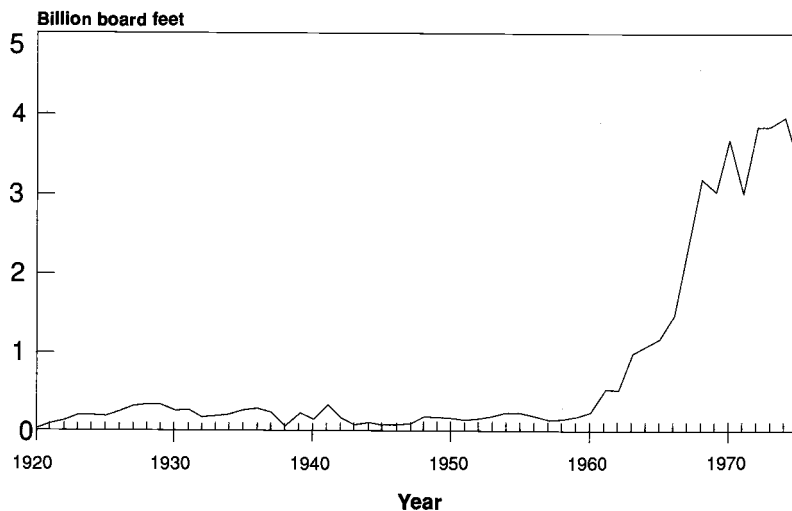
Controversy and Controls, Old and New

For as long as timber has been harvested along the Northwest Coast—almost 200 years—there have been exports of wood products. And for two centuries there have been successes, failures, and controversy. For instance, in 1849, on the Strait of Juan de Fuca, Englishman William Brotchie, aware of the worldwide need for long spars, assembled a shipload

of masts, only to have it confiscated by U.S. customs agents. Undaunted, he gathered another supply and waited, literally, for his ship to come in. It did not. British middlemen realized that a shipload would flood the market, that a 17,000-mile pipeline couldn't be spigoted to coincide with shipbuilding cycles, that there would be further troubles with the Americans at a time when calm was prudent, and that timbers nearly as suitable were available from the nearby Baltic countries.

Troubles between Canada and the United States, familiar to the timber industry today, continued. Lumber orders from California were being filled by shipments from Canadian mills because of lower production costs northward. United States mill owners lobbied hard, and by 1849 a 20 percent tariff was placed on Canadian lumber entering the United States.

Until the 1960's, there was little controversy over logs. Small volumes of U.S. logs were moved to mills around Vancouver, B.C., and occasional rafts had been floated from British Columbia to Puget Sound. As Figure 1 shows, U.S. and Canadian log exports to other Pacific Rim countries became significant after World War I. The offshore log trade expanded during the 1920's, mostly toward Japan. The world depression of the 1930's constricted all timber trade, and World War II brought it to a halt except for military shipments. The war decimated forests in Europe and eastern Asia, and reconstruction generated a flush of demand. After rebuilding its industrial base, Japan turned to housing, thereby causing its imports of lumber and logs to grow rapidly. Between 1953 and 1960,



Note: Pre-1941 volumes were divided by 1.8 to convert from Brereton to Scribner scale.

Figure 1. United States and Canada softwood log exports to all destinations, 1920-75

Japanese imports of U.S. softwood timber grew at an average rate of 15 percent per year. Log imports from Canada were minor because of a long-standing Canadian policy favoring domestic processing.

By the 1960's, Japan was emphasizing logs rather than lumber in the import mix. There were several reasons. The sawmill industry there, which employed over 220,000 people, was forceful politically and short of domestic timber. Prices of North American lumber (mostly roughly squared logs) were rising. Labor costs in Japan were far lower than those in North America. And U.S. mills were reluctant to tool themselves for product sizes preferred abroad, which were different from those in demand in the much larger U.S. market.

In 1962, a brief but intense wind-storm in the Northwest blew down a volume of timber equal to 1.5 times the annual harvest in Washington and Oregon. This surge overwhelmed the capacity of Northwest mills, and foreign purchasers were invited to help absorb the supply. They responded. Figure 2 traces U.S. softwood log exports to the Pacific (mainly Japan) since 1960.

In general, the Japanese outlet was welcomed. It was reasoned that, after the salvage work was done, there would

be an offshore market for thinnings and other material economically unattractive to Northwest mills. Soon, though, the Japanese were drawn toward larger, higher-graded logs because of the greater value yield per unit of wood. In addition, the Japanese prefer knot-free, close-grained, appearance-grade lumber. Such logs were important to U.S. sawmills and plywood plants, and their export was seen to be rising even as the salvage of blowdown declined. The offshore competition clearly was leading to

tighter log supplies and higher prices.

During the late 1960's, controversy over log exporting was every bit as intense as in 1989. In 1968, the Morse Amendment, promoted by Oregon's renowned Senator, was added to a foreign-assistance act. It limited the export of logs from western federal lands to 350 million board feet per year, a level typical of the mid-1960's. In 1973, the quantity was dropped to zero and a provision was added for exemptions, which were to be administered by the Secretaries of Agriculture and the Interior. Port-Orford-cedar is an exempted species; I know of no others. After 1973, Alaska was not included in the export constraint; there, log exports from National Forests have been prohibited, with certain exceptions, by regulations set by the regional forester (Lindell, 1978).

I mentioned Canadian domestic-manufacture policy above. Dominion and British Columbia policy has been the same since early in the 20th century: logs can be exported only if they are surplus to domestic needs or cannot be processed economically within the country (Shinn, 1989). Numerous exemptions were granted during the 1980's recession; at present, roundwood exports are small (Figure 3).

The situation with respect to logs from state-owned land has varied greatly among jurisdictions. Until re-

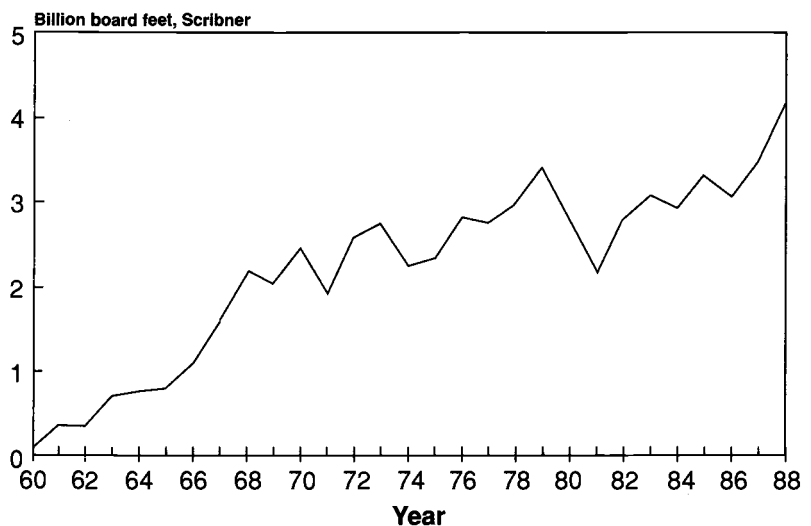


Figure 2. United States softwood log exports to the Pacific Rim, 1960-88

cently, Alaska, Oregon, California, and Idaho forbade the export of logs from state lands. In 1984, the Supreme Court invalidated the Alaska restriction, and the decision has had clear implications for other states. As you know, Oregon voters endorsed, via referendum in 1989, a renewed export embargo on state-owned logs. The 9 to 1 margin of approval drew national attention. In Washington, an initiative with similar intent was defeated in 1968; the issue has not been addressed by voters since then.

The Oregon mandate will become effective only if Congress permits states to take such action. As we meet, Congress is considering a bill, initiated by Senator Bob Packwood and Representative Peter DeFazio, that would give the states the option of applying such constraints. A companion bill would make permanent the annual congressional embargo on logs from federal lands.

A complete picture of regional log-export constraints should include the 1979 congressionally legislated ban on exports of western redcedar logs and waney cants, harvested from federal and state lands. The ban, which does not apply to Alaska, is intended to reserve rapidly declining supplies of cedar for the domestic industry.

You will note that all these protective measures are export volume limitations, not export taxes. That is because of a constitutional prohibition of export tariffs.

How Large the Log Trade Looms

In the face of these several barriers to exporting, does the log trade make a difference? Billions of board feet are hard to visualize. But the flow of logs westward from the Pacific coastal states is equal to about one-fourth of the all-owner harvest in the Douglas-fir region, or about half the total cut in Oregon. The 4 billion board feet exported last year to Pacific Rim nations was about a million truckloads. Revenues of \$2 billion were generated at dockside and percolated broadly thereafter through port communities, across

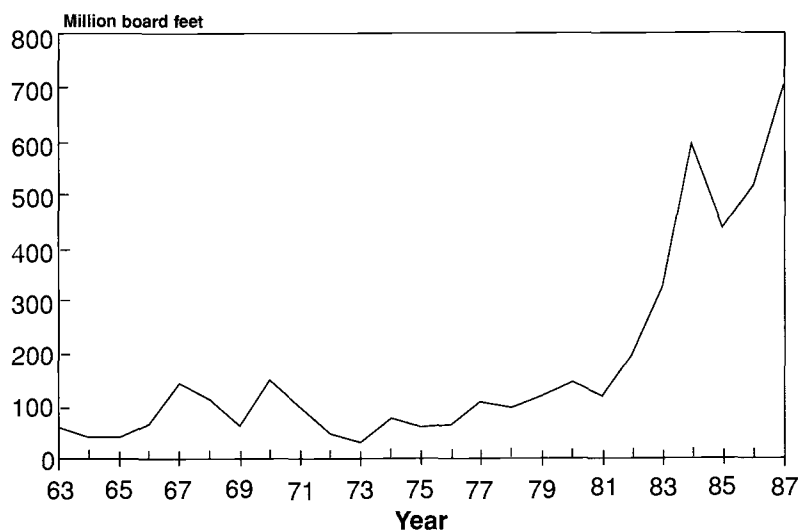


Figure 3. British Columbia softwood exports to the Pacific Rim, 1963-87

the region, and beyond. An analysis of employment data by Janet Baker at Northwest Economic Associates (1989) suggests that log exports account for about 5,800 jobs directly associated with buying, handling, and selling export logs.

The Merits of Trade

Such numbers do not in themselves argue for exports as a preferred use of softwood logs. That argument resides to a large degree in the principle of comparative advantage, whereby any nation (or region) will be best served and will contribute most to aggregate world economic welfare if it exports the products and services that it produces most efficiently, even if other nations export the same items.

Whether timbering is one of the things the United States does best is a complex matter. As John Zivnaska (1977) has said,

While the principle is simple, research to determine whether or not forest products constitute one of the areas in which the U.S. can operate at high comparative advantage promises to be difficult, since the question at issue involves not only a comparison of the costs of U.S. forest product exports versus other potential or actual sources of such exports,

but also similar comparisons for all other important product groups within the totality of U.S. international trade.

In a complex but competitive world, markets signal their preferences and best opportunities through prices. And although markets are typically distorted somewhat by trade barriers, cartels, and managed exchange rates, supply prices serve rather well as indicators of what each nation does best. Here in the Northwest, for many years, average export-log prices have exceeded average prices of logs for domestic manufacture, always substantially and sometimes several-fold. Some of the apparent export premium reflects the different places where prices are surveyed, and for lower grades the premium has been small (Flora et al., 1990). But it is clear that, on average, better-grade logs are worth more in export, and so they are exported.

McGinnis and I have estimated (1989) that there has been an average price difference of \$200 between upper-grade logs sold domestically and those exported. The difference is attributable to the embargo-partitioned market; the price in each market presumably reflects the relative economics of making and selling wood products at home versus doing so abroad. And that partition restrains a price-

induced surge of roundwood that would otherwise respond to our comparative advantage in supply and an offshore comparative advantage in processing.

Generally, around the world, forested regions have a comparative advantage in timber, which reflects several economic factors that are peculiar to raw materials. Their supply is inelastic and production costs are largely sunk. Simply put, the availability of the resource is not very sensitive to price, and supply prices are low, either because little money has been spent in creating the resource, or because that money was spent in times past and is no longer relevant to the supply decision. Thus, even in regions with high labor costs (such as Alaska) or difficulties with extraction (as in the eastern Soviet Union), log exporting may be the trade option of choice.

It does not necessarily follow that countries with a comparative advantage in log exports will enjoy the same comparative advantage in export of lumber and other processed wood. Comparative advantage may not extend, for example, to labor- and capital-intensive products. Even for a timbered district with low-cost labor and well-developed infrastructure, committing scarce capital to an uncertain lumber manufacturing activity may be less prudent than investment in, say, agriculture, minerals, or recreation. That has been true for Chile and may soon be appropriate in New Zealand. For most importing countries, however, comparative advantage has favored raw materials over finished products.

Why Trade is Constrained

Every supply country has policies clearly favoring sales of value-added products. Foreign exchange, keeping jobs at home, self-sufficiency, and economic development are goals affecting trade almost everywhere. These aims lead exporters to emphasize final products, and importers to penalize them.

Foreign Exchange—This is a primary driver of timber trade policies in

New Zealand and the Soviet Union and, on the demand side, in China. Attracting foreign capital to underwrite expanded processing facilities is a clear aim of current Soviet planning for the eastern USSR. I judge that barring an increase in the price of oil, the USSR's principal export, the Soviets will succeed in expanding value-added timber shipments to the Pacific region, probably even to the United States. Retaining export earnings can be difficult, however, because the ownership of the invested capital and often the entrepreneurship

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reside abroad. This is the famous “multinational corporation” problem, about which entire books have been written (e.g., Fatemi and Williams, 1975).

Keeping Jobs at Home—Protecting and expanding domestic employment is the often-stated objective of Canadian and U.S. wood export policies. It seems that domestic employment is becoming an increasing concern in New Zealand as that nation's economy shifts downward. In Canada, there is an underlying presumption that manufactured products will be accepted by foreign buyers, principally the United States, in lieu of logs—a seemingly correct assumption. In this country, export substitution does not seem to be part of the rationale. This is appropriate considering that only about 7 percent of U.S. lumber production is exported, with 2.5 percent and 7 percent for plywood and pulp and paper, respectively.

Self-sufficiency—Reforestation in war-torn countries, such as Japan and

Great Britain, has been predicated on potential domestic needs, with the implication that military intervention or economic paucity may discourage future imports of wood products. The unexpected intrusion of the Green movement in Scotland and rising labor costs in Japan have lately discouraged those reforestation programs. In the United States, self-sufficiency has been manifested in the Forest Service's Renewable Resources Planning Act programs and also in statements derived from the President's Commission on Materials Policy, which is concerned with strategic raw materials. The self-sufficiency philosophy does not seem to distinguish between logs and finished-wood products.

Economic Development—Expansion of national or regional economic well-being through the building of industry and related infrastructure has been a major intent of restraints on log exports in Alaska, British Columbia, the hardwood-producing nations of southeast Asia, and Chile during an earlier political era. In Washington State, log-sale revenues from state-owned timber are an important source of funds for school construction—a particular case of economic development. Economic expansion is a rationale in the materials policy and export programs of most other timbered Pacific Rim countries, emphasizing value-added exports. A premier instance is Indonesia, where that federal government halted log exports altogether and promoted, in the early 1980's, construction of over 100 plywood plants, which resulted in a wood-products boom there (and depressed world prices for plywood). The antithesis, I suppose, is China, where policy discourages use of logs, lumber, and panel products, and yet where substantial log imports have been necessary to meet basic requirements. China imports virtually no sawnwood.

The Mixed Export Bag—In the face of these several goals, why do some—indeed all—Pacific Rim softwood countries export both logs and lumber? Three difficulties confront exporting nations that want to substitute processed goods for raw-material

exports. One is costs, already mentioned. Another is the availability of capital. In some regions (exemplified by Canada and the Soviet Union), capital may be scant. Third, timber ranges widely in its quality and merchantability. An export policy appropriate to the best timber in the best times may leave lower-valued timber without an outlet in lean times or in economically disadvantaged places. In hard times the fallback strategy, usually, is to allow—even encourage—log exports even as strategic planning focuses on manufactured goods.

Winners and Losers as Export Policies Change

A few months ago, Oregon voters indicated, by a remarkable majority, that they do not want state-owned logs to be exported. Presumably, voters were concerned about one or more of the goals discussed above. I believe the primary concerns were export of old growth and export of jobs. The timber flows that would be affected are relatively small, but the Oregon decision occurred in a larger context of questions about the exporting of logs from the Northwest. Some quantitative estimates and a few general remarks about gains and costs of changing the rules follow.

Foreign Exchange—I have mentioned that the log-price and export-volume effects of curtailing exports of logs harvested from state-owned lands in Oregon and Washington have been estimated (Flora and McGinnis, 1989). It seems that prices of upper-grade logs would rise about 25 percent and the volume of exports in those grades would decline about 37 percent. This would produce a net revenue decline of 20 percent, or about \$140 million annually in export earnings. If Oregon were to act alone, the decline would be about 15 percent of that amount, or about \$21 million per year. For lower-grade logs, a small price increase would be offset by an equally modest decline in log shipments. Offshore, the loss of access to our old growth would be partly replaced by access to lower-

quality timber from other countries and from here—old-growth logs from private Northwest sellers, logs from Alaska, and old-growth lumber from Alaska, British Columbia, and elsewhere in the Northwest. The number of houses built abroad would change little, but the quality of wood used in them would decline.

The usual assumption is that old growth logs not exported will mean more logs in Northwest mills. Flora and McGinnis (1989) estimated that Northwest mills would absorb about 70 percent of the increased regional supply, and that the increased log supplies would depress prices about 12 percent for the near term at least. This conclusion implies a lot of sec-

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ond and third shifts starting up in the short run, until new capacity appears. The decline in log supplies from the United States would cause foreign customers to buy logs and lumber elsewhere. Thus, their inclination to buy Northwest lumber would be muted.

A year ago, I thought that some of the decrease in old-growth supplies would be replaced by increased exports of U.S. second-growth logs. With recent rapid growth in mill capacity geared to offshore specifications, and with increased Japanese imports of lumber oriented to North American sizes, I now judge that our old-growth logs would be replaced in these markets mainly by lumber manufactured

from old-growth timber. However, Canadian producers are likely to expand their share. The export value of the U.S. share of the expanded lumber market would be about \$126 million per year.

The net change in export earnings associated with restrictions of logs exported from state land and adjustments in lumber exports would be a loss of about \$14 million per year. Oregon's share, about 15 percent, would be about \$2 million per year.

Calculations for second-growth logs follow the same path, but the cutback in exports of logs from state land would be offset in a musical-chairs tradeoff with private U.S. sources. The analysis we have so far completed involves a good deal of complexity—two categories each of logs and lumber, as well as nine countries, domestic and export supply and demand, and various competitive and substitution relations. A key point, then, is that the equally complex trade world integrates many variables. Because of these complexities the issue is not as simple as substituting lumber for logs.

Regional Income—The dollar figures have not yet included the value of increases of lumber production for the domestic market, which would be driven by an increased supply of old-growth logs. It is possible, of course, that those logs would drive inferior logs out, especially when most mills are running at full capacity. In time, and perhaps quickly, capacity would emerge to handle the extra volume.

For now, assume the logs would be admitted to mills, that extra people are hired, and that more lumber would be sold. In addition to the dockside export earnings already mentioned, sales of upper-grade lumber (to the U.S. market) would increase about \$174 million per year to produce a total regional income gain of about \$160 million a year. That figure is equivalent to a gain of about \$250 for each thousand board feet of state-owned timber currently being exported. However, the gainers are not the same as the losers. The figures include payments to workers, rents or capitalization of machines and plants, taxes,

insurance, legal fees, payments to shareholders, interest payments on operating capital, and the myriad other expenses that accrue to log trade and processing. Some of these expenses involve bidding resources away from other activities in which they were previously engaged, so that the net increase in regional income is probably significantly lower.

It is hard to reckon the proportion of gross income that would stay within the region both at the outset and after passing through local pockets. I suppose that leakage to the outside, during the first round of spending, would be less than 10 percent.

Regional Development—This is quite a different matter from regional income. Economic growth involves more than cash flows: It means an enduring infrastructure and productivity base that goes beyond resource exploitation. Recently I wrote two papers for a development meeting. The first pointed out that every forested Pacific Rim country has assigned a development role to timbering. The second said that in no country are wood products a significant fraction of exports. It is a region's dollar volume of export, not its domestic consumption, that fuels economic growth. Certainly there is a high correlation between poverty and trees. There are still softwood regions, including Scandinavia, where old people gather fallen sticks for firewood and carry them home on their backs. The most poverty-stricken counties of the United States are either desert or heavily wooded.

In most parts of the world, efforts to build on forests as a fount of local long-term economic growth have been discouraged because of sparse populations, thin infrastructure, and low intensity of economic activity. Analysts have been especially challenged by the development enigma in British Columbia (e.g., Marchak, 1983). Despite a century of keeping logs at home for primary manufacture, the province's coast is largely devoid of towns, much less economic growth. Apparently, in these times, high per-capita incomes are associated with

metropolitan areas, which reflect services more than manufacture. Where manufacture exists in these areas, it is more likely to involve airplanes and computers than raw-material processing. Thus, it is by no means clear that banning log exports from state lands will contribute significantly to the rural economy of Oregon.

Employment—Janet Baker has explored the employment aspects of export constraints (Northwest Economic Associates, 1989). She points out that direct employment in exporting involves about 1.3 persons per million board feet of annual shipments. The average for existing sawmills is about 4.8, and for new mills about 1.75. The implication is plain: Value-added manufacture seems to support more employment than does log exporting.

Assuming that lumber, much of it from areas other than the Pacific Rim, substantially replaces the logs that have been kept from export, there may be a net loss of jobs rather than a gain. With Baker's employment factors, I judge that, if new mills are constructed, di-

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rect employment in exporting and milling would decline by about 170 jobs. In contrast, if extra shifts were to be added in relatively labor-intensive older plants, there would be a gain of about 700 jobs (Flora and McGinnis, 1989).

Results are different for personal incomes. The per-hour wage for longshoring is almost twice as high as the

wage for working in sawmills. Thus, if a policy change generates new mill capacity—a key assumption of the economic-growth argument for export constraints—payrolls would have been higher in exporting. If incomes are expressed in mill-job equivalents, the log export restrictions would produce personal-income changes equivalent to a loss of 580 jobs.

Some Special Features of Timber Trade Tradeoffs

Although stumpage payments rarely cover production costs (an argument that I will elaborate on at another time), the land-intensive nature of timbering raises questions about the impacts of export policy changes on the income and value of forest land. An export embargo from state lands would raise prices of export logs and reduce domestic log prices, at least for high-grade logs. The net effect, then, would be to broaden the stumpage price spread between export-quality and ordinary logs, and to raise private stumpage values on average. Stumpage prices of mature second growth within economic range of ports might rise as much as \$100 per thousand board feet. And that would affect forest-land prices.

Returns to state agencies would fall substantially, a matter of great concern in Washington State, where state timber revenues finance school construction. Baker has estimated that revenue loss at over \$85 million annually.

Because wood-products work is largely an industry of small towns, a changing job mix and the associated changing geography can severely affect not only jobs but also workers' assets, especially home values. Labor-force displacement is, of course, a two-way street economically. Real estate values go down in the community departed and up in the community of destination. Displaced workers, therefore, are penalized at both ends. This circumstance seems to argue against change for its own sake, a tenuous argument in a fast-changing and mobile society. Nonetheless, ru-

ral workers and country communities have clearly paid a high price for progress.

Economic cycles press hard on the wood products industries, and they do not spare log exporting. In general, demand fluctuations at the consumer level move directly to producers, affecting both order volumes and prices. Raw-material owners and producers are especially affected by price fluctuations because of the tendency for price changes to move directly down the processing ladder. That is a consequence of inelastic supply and demand, and it applies abroad as well. Usually, end-product manufacturers are less affected by price changes than are timber people close to the stump, an argument for value-added emphasis here in the Northwest. There is a stabilizing influence on the log-export industry overseas, however. Centrally managed economies like China are somewhat less susceptible to world economic cycles, though they have other economic problems.

Two Large Issues

The state policy changes, discussed here because of their timeliness, are fairly small in the context of global trade. Timber from state lands accounts for about 4 percent of logs moving around the Pacific Ocean. And Pacific Northwest lumber, including that from Alaska, accounts for only about 5 percent of world softwood trade in sawnwood.

There have been occasional discussions of a complete embargo on log exports from all ownerships. We do not have quantitative analyses of that possibility, but the effects here in the Northwest and around the Pacific would be profound. Two billion dollars of sales would cease, thereby bankrupting several ports and numerous firms, the number depending on the general state of the world economy. About 9,000 workers in coastal communities would be displaced—not many by Boeing standards, but many of them victims of the double-edged real-estate sword mentioned earlier. Some of those jobs would be

replaced locally, however, with an increase in lumber produced for foreign buyers, and some of that would

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occur near the coast. It seems likely that the reduction in log exports would generate less-than-equivalent volume increases in Northwest lumber production because former offshore log customers would turn to logs from several other countries and lumber from even more sources. The price increases of high-grade logs would radiate around the Pacific and there would be some, probably small, reductions in construction.

In the Pacific Northwest, log prices, stumpage receipts, and forest-land values would fall; how much remains to be estimated. Economic effects would be felt across the country; presumably lumber prices would decline because of lower log costs. Plywood and chips would be cheaper, too. In a scenario involving offshore substitution of Canadian and U.S. lumber for U.S. logs, it was estimated that U.S. softwood lumber production would increase about 10 percent, U.S. lumber consumption would decline about 1 percent, and lumber imports from Canada would increase about 20 percent (Darr and others, 1980).

The second big issue is the interaction of the spotted owl and old-growth on one hand with export policy on the other. It is widely assumed that, along with jobs, priceless old-growth trees are being shipped abroad. Certain old-growth trees are indeed priceless, but few ancient trees are going offshore. Data are not available on the subject, but observation indicates that, soon,

less than one-eighth of log exports will involve old-growth, and the fraction is falling rapidly. Apparently about half the old-growth logs entering export are from state lands. That source, too, is in rapid decline. It seems, then, that old-growth exporting will shortly be a non-issue. It has been argued that log exports, whatever their character, put pressure on federal old-growth resources for domestic use because logs from private and state lands are going abroad. That pressure is hard to gauge; but the era of declining federal timber harvests may well override even this concern.

Conclusion

I trust that I have left you without an easy conclusion. Log exporting is a major economic activity here in the Northwest. Significant effects spread through the region from any policy that expands, shrinks, or changes the character of the export industry.

Although this analysis has revolved around upper-grade logs, old growth may soon occupy a very small part of the log export manifest. Thereafter, U.S. log exporters will face formidable competition offshore, and the likelihood that almost all roundwood exports curtailed here will be replaced completely by offshore logs, privately owned U.S. logs, and foreign lumber. Pacific Northwest lumber will likely become a replacement commodity of lower preference.

Around the world, regional raw-material trade economies are influenced by national objectives, often through substituting value-added exports for primary-product sales. The several objectives for this distortion of an otherwise largely competitive trade are only occasionally attained, usually because timbering has relatively small leverage on national economies. Nonetheless, if the objectives are laudable, the economic and social costs of these distortions may be warranted even for small progress toward nationally important goals.

An embargo on logs from state lands would raise export incomes for pri-

vate owners and create foreign exchange. The amount is sensitive to how aggressively other nations market lumber as a substitute for logs, and whether young-growth logs would supplant old growth.

Regional income, from processed wood exports and domestic wood-products sales, would apparently rise considerably. The estimates made here are either high or low, depending on whether one assumes that only previously idle equipment and services should be counted (high), or that secondary manufacturing and indirect supporting activities should be included (low).

Whether jobs would be protected, or restored, seems to depend on whether embargo-protected logs would go into existing mills (probably in the short term) or new plants (likely in the longer run), and what proportion would not be harvested. There may have been two recent periods in which domestic manufacture has been less productive of employment than log exporting. The first was in the early 1960's (Adams and Hamilton, 1965), when the volume of log trade was relatively low, loading was virtually on a log-by-log basis, and logs had to be tugged belowdecks through hatches of modest dimension. The second period may be right now.



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Peering Through the Trees: One Forecaster's View of Oregon's Economic Future

by John W. Mitchell



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“Forest products permeate the Oregon economy, from the direct employment to the truck drivers in the transportation sector, the machine shops, the independent foresters, and the government employment from shared revenues.”

Twenty-five years ago I drove from Connecticut to Oregon to start graduate school at an institution that shall remain nameless, located about 40 miles from here. I remember driving across the bridge at Ontario and being absolutely stunned that there was no vista of trees as far as the eye could see. It was even more shocking that one had to drive almost to Bend before one really got into trees. You must understand that when you grow up in New England and can be in several states in a hour or two, this is mind-boggling. Oregon, in my mind, was trees, and I knew little else about the state or its economy. There are many people in the nation for whom that notion is still true—as I am reminded when making the U.S. Bancorp investor relations trips to the east coast, as I did last week.

Phil Bourque of the University of Washington perhaps said it best when he called the Pacific Northwest the Persian Gulf of timber. Oregon is, of course, the nation's leading producer

of lumber and plywood, and Washington is third. The industry is a common element in the states and provinces stretching from California to Alaska and east to Alberta and Montana. Forest products permeate the Oregon economy, from the direct employment to the truck drivers in the transportation sector, the port activity, the machine shops, the independent foresters, and the government employment from shared revenues. The fluctuations in the forest-products sector are perceived by some as the driving force in the Oregon economy. We hear of the timber recession of the early 1980's, even though there were numerous other basic sectors that were hit during that period. At present we are talking about a sector that accounts for more than one-third of the manufacturing employment in the state and about 7 percent of the total. This is direct employment, conservatively estimated. With the multiplier effect, the figures would be substantially larger.

Ownership

This year we have seen, on the one hand, an industry where production has continued at relatively high levels—about 96 percent of last year's—and good earnings by many producers; and on the other hand, rallies, yellow ribbons on cars, and concerns expressed about the future. Why? In a word, it comes down to ownership. In 1988, 57 percent of the timber harvested in Oregon came from federal lands (Figure 1). This public ownership means that decisions made about the use of the land are not made locally, but rather, made in the crucible of the national political process. This

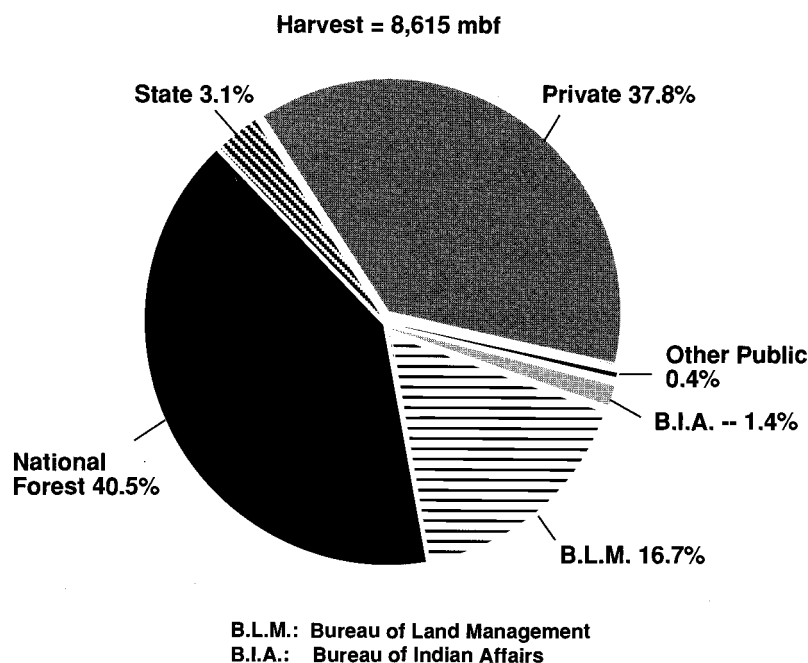


Figure 1. Oregon timber harvest by ownership in 1988

is an arena of clashing interest groups where politicians are PAC-ed, an arena where perceptions are as important as

“The person in Roseburg, or Mill City, or Klamath Falls has the same ownership rights to the publicly owned land as the person in New York, Cambridge, or Beverly Hills, and therein lies a major problem for the industry.”

reality. The recent revelations of the savings-and-loan fiasco stand as an example of the former. For the latter, let me read you a headline from the *Wall Street Journal* of September 7, 1989: “Timber Firms Allowed by

Court To Fell The Ancient Forests of Western Oregon.” The article went on to discuss the harvesting of redwoods in the Cascade Mountains. Think about the dispute over oil drilling in the Arctic National Wildlife Refuge, a place that few Americans will ever visit. The forests of the Northwest are a similar emotional issue. I suspect that problems are compounded in the case of timber; the connections between the forests and the lumber, plywood, and paper that come from them are very vague for many Americans, since most of them live far from this part of the world.

The person in Roseburg, or Mill City, or Klamath Falls has the same ownership rights to the publicly owned land as the person in New York, Cambridge, or Beverly Hills, and therein lies a major problem for the industry. In bouts of concern some issues move to the fore, and legislation is passed.

Environment

Some of us are old enough to remember the War On Poverty, the fo-

cus on clean air and water, and the civil rights laws. The issues change, and sometimes they come back, as we are currently seeing in the environmental area. The interest in this area will be a characteristic of the coming decade. We have the ideal of a “kinder, gentler nation” and a presidential commitment to the environment. I think that it is more than a coincidence that Earth Day, which occurred 20 years ago, happened after the longest economic expansion in U.S. history. When I was teaching economics in a previous life, I always liked the phrase, “cleanliness is next to affluence,” when thinking about environmental policy. The nationwide interest in the environment will be a continuing source of pressure on the industry in the region.

Earlier this year when the hull of the Exxon Valdez ground against Bligh Reef, the Pacific Northwest forest-products industry was affected. Environmental passions were further aroused from an already excited state. As more of us are employed far from the resource base, the connection between crude oil, trees, and, ores and things like cars, paper, and fuel becomes a bit more fuzzy. When people advocate leaving natural resources undeveloped, they don’t always consider the full implications of that position—that it will mean fewer products for people to use. I certainly knew as a child that milk came from the milkman in glass containers.

The renewed interest in environmental issues is global, encompassing everything from the Greenhouse Effect to the burning of South American rain forests. The last economic summit has been called the Green Summit. The issue of the management of old-growth forests has been caught up in this maelstrom. The fight over Pacific Northwest timber has been covered in the *London Economist Magazine*, in a *National Geographic* television special, in nightly news segments, and in *Business Week* it is a national issue. I was asked about the issue last week in Baltimore, Boston, and New York at meetings with bank analysts and rating agencies. In one case I was asked if the industry replants after harvest.

Demands on the Forests

One of the pressures on the industry today comes from the forest planning process mandated in 1976, which in essence calls for the Forest Service to meet a diverse set of goals encompassing timber, wildlife, scenic, and recreational considerations. That process will result in a decline in timber availability from the public lands. In the

“What does this mean for Oregon, the nation’s leading producer of lumber and plywood? It means that the basic industries that drive the state will continue to decline in relative importance to the rest of the economy.”

Pacific Northwest only four plans have been adopted, and all are being challenged. On top of that process we have the disputes over the northern spotted owl, which is really a dispute over the allocation of old-growth forests. The forest plans and the spotted owl are two facets of the same issue, which is the multiplicity of demands on a resource. The issue forces choices, which is what economics is about. However, the decision-making mechanism is not markets, but rather the political process. Hence we saw, in the recently passed compromise, final negotiations between Senators Hatfield and Adams, Representatives AuCoin and Dicks, an Illinois congressman, Sidney Yates, and a Massachusetts congressman, Chester Atkins.

This conflict is not over. We will be back in this situation in less than a year, and very likely it will be a part of the political environment for the rest of this century. I believe that the result will be an ongoing decline in timber harvest from the federal lands. The changes in management practices, such

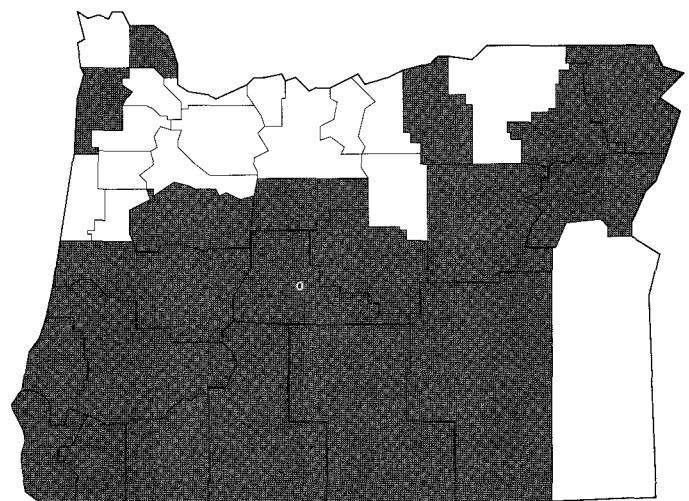
as the recently announced policy to manage and protect old-growth forests, will also be to the detriment of the industry in Oregon. And in the decision-making process, the effects on the state and region will be a high-priority concern only for state and local politicians. The membership of the National Wildlife Federation is about twice the Oregon population, according to the August issue of *Oregon Business Magazine*, and will strongly influence local and regional outcomes.

Employment

From an employment perspective we are talking about a decline resulting from reduced timber supply, coming on top of increases in labor productivity. The decline may be offset by log imports. We will likely see such things as increases in Canadian imports, imports of logs from the Soviet Union, New Zealand, or South America, and increased use of alternative products such as vinyl, wafer board, or laminated beams. With higher costs of logs, one would expect to see more-intensive processing to maximize the value of the output. We would expect to see more-intensive work on private lands, given the returns from the higher log prices. These are the kinds of things that follow

from thinking about the economics of substitution and production.

What does this mean for Oregon, the nation’s leading producer of lumber and plywood? It means that the basic industries that drive the state will continue to decline in relative importance to the rest of the economy. How fast that will happen depends heavily on public policy. Lumber and wood products accounted for about 18 percent of wage and salary employment in 1950. That figure is now down to about 7 percent. Exact numbers are not important, but the trend is clear. Production in recent years has surpassed the level of the late 1970’s, but employment in the industry has not, due in large part to massive increases in productivity. Harvest declines and productivity increases will continue to accelerate the decline in employment, although the rate of increase in productivity may slow because uncertain timber supply may dampen incentive to invest in new and more efficient capital equipment. This decline in employment will impose adjustments in some areas of the state that are particularly dependent on timber, places like Mill City up on the Santiam, or Douglas County, where forest products represent about 27 percent of total employment and about 84 percent of the manufacturing workforce (Figure 2).



■ Counties where more than 10% of employment is in forest products

Figure 2. Oregon employment in forest products

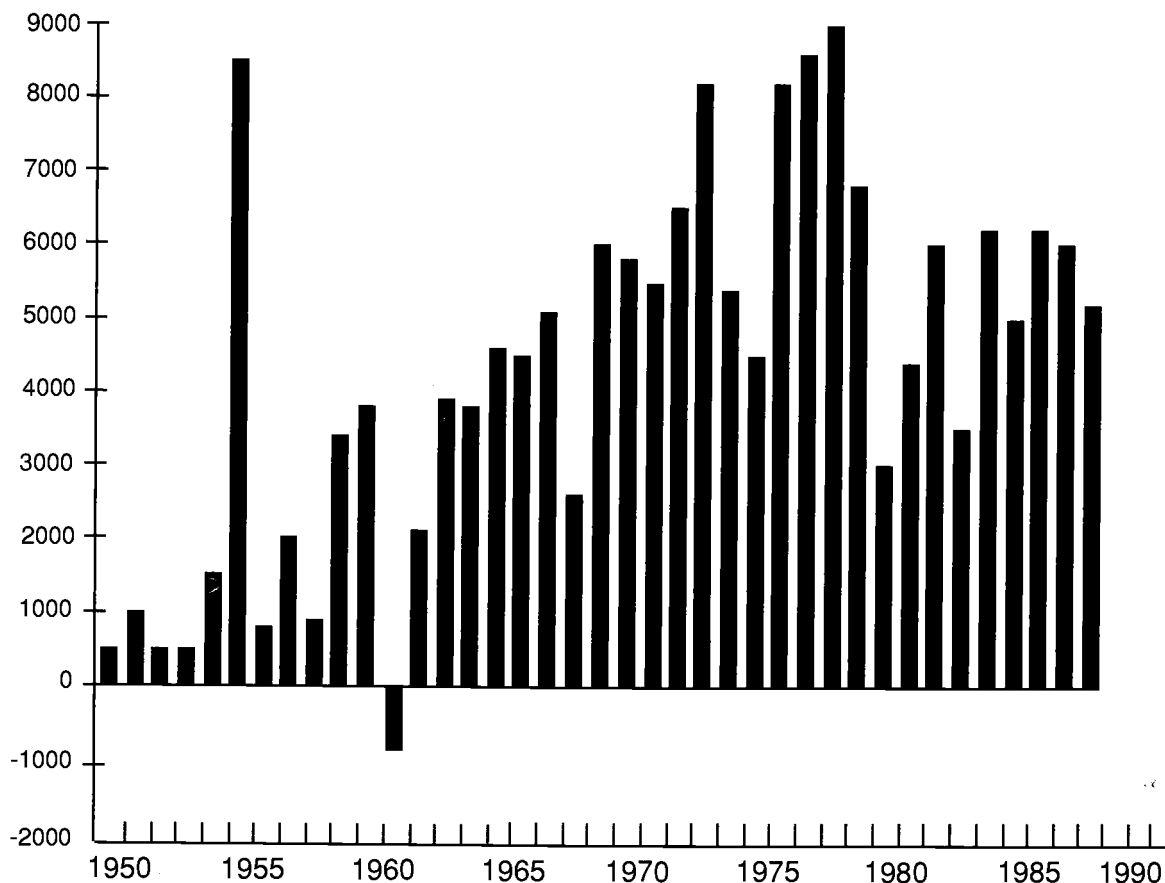


Figure 3. Average number of entrants per day into the U.S. civilian labor force

These things are not said lightly. We are talking about changes that can be very difficult for individuals, but in a broader sense are no different from the changes that result from buying a VCR rather than a video disk player, or switching from beef to chicken in an attempt to reduce serum cholesterol. These changes in patterns of demand or taste have implications for income and employment in producing regions. One difference in this case is that the federal government is a major factor in the timber-supply equation. This may well mean that declines in employment tied to reduced timber supply will be accompanied by adjustment assistance for those displaced. This could take the form of federal assistance for retraining or relocation.

Economic Upswing

Sometime this month the nation will start the eighth year of its economic upturn, making this the second long-

est expansion in U.S. history—exceeded only by the 106-month upswing that was associated with the Vietnam War (Figure 3). Oregon too is ending the seventh year of its upturn from the nightmare of the recession of 1979-1982. We had a downturn as bad

“Right now we are among the fastest growing states in the nation. During the first half of this year we were number four, behind only Nevada, Washington, and Florida.”

as Michigan’s, about 12 percent in terms of wage and salary employment. That recession was a part of the national effort to crush double-digit inflation. The forest industry was hit

hard, but so were others; the largest decline was in the construction sector. However, since late 1982 the state has been experiencing employment growth; the employment rate passed the 1979 level in 1986.

Now, I must add that to talk about the Oregon economy as an integrated whole is somewhat simplistic or even artificial. Booming Brookings would seem to have little in common with Joseph, or Burns. The driving forces in Medford and Portland are hardly one and the same, and Ontario likely has more to do with Boise than with the western portion of Oregon. Notwithstanding these differences, there are broader forces that are likely to affect Oregon in the years ahead. This event offers an opportunity and challenge for me to address some of these things. The present situation can be seen in the chart showing the pattern of decline and expansion of employment, over the course of this most recent cycle (Table 1).

Table 1. Oregon wage and salary employment

Oregon	September	September	September	Employment as a	
	1979	1982	1989	1982	1989
Total Wage & Salary Employment	1,088,000	972,000	1,215,000	89.34%	111.68%
Manufacturing	243,100	195,500	227,400	80.42%	93.54%
Durable goods	178,600	136,200	161,500	76.26%	90.43%
Lumber and wood	84,200	59,100	68,900	70.19%	81.83%
Logging and sawmills	44,400	32,000	35,200	72.07%	79.28%
Veneer and plywood	24,500	17,000	16,300	69.39%	66.53%
Millwork and struc. wood	7,700	5,500	10,900	71.43%	141.56%
Mobile homes	3,200	1,200	1,900	37.50%	59.38%
Other wood products	4,400	3,400	4,600	77.27%	104.55%
Furniture and fixtures	3,200	2,400	2,900	75.00%	90.63%
Stone, clay, and glass	4,700	3,700	4,600	78.72%	97.87%
Primary metals	11,500	7,600	11,500	66.09%	100.00%
Fabricated metals	14,200	9,900	11,000	69.72%	77.46%
Machinery	17,900	16,100	18,800	89.94%	105.03%
Electrical equipment	8,900	10,200	17,300	114.61%	194.38%
Transportation equipment	12,900	8,000	11,600	62.02%	89.92%
Instruments	18,900	16,800	11,200	88.89%	59.26%
Miscellaneous	2,200	2,400	3,700	109.09%	168.18%
Non-durable goods	64,500	59,300	65,900	91.94%	102.17%
Food and kindred	31,900	30,000	29,900	94.04%	93.73%
Other food products	10,500	10,400	11,800	99.05%	112.38%
Textile mill products	2,200	1,900	1,700	86.36%	77.27%
Apparel	3,600	2,700	2,600	75.00%	72.22%
Paper	10,700	9,500	9,200	88.79%	85.98%
Printing	10,100	10,100	13,900	100.00%	137.62%
Chemicals	2,400	2,000	2,400	83.33%	100.00%
Petroleum refining	700	500	600	71.43%	85.71%
Rubber and plastic	2,600	2,300	5,000	88.46%	192.31%
Leather products	300	300	600	100.00%	200.00%
Non-manufacturing	844,900	776,500	987,700	91.90%	116.90%
Mining	2,700	2,000	1,700	74.07%	62.96%
Construction	58,900	31,200	47,200	52.97%	80.14%
Transportation, communication, utilities	62,200	57,200	64,700	91.96%	104.02%
Trade	264,000	242,700	313,200	91.93%	118.64%
Wholesale trade	70,400	64,100	79,600	91.05%	113.07%
Retail trade	193,600	178,600	233,600	92.25%	120.66%
Fire	71,300	65,500	75,600	91.87%	106.03%
Services	188,600	190,100	276,500	100.80%	146.61%
Federal government	31,900	30,600	32,800	95.92%	102.82%
State government	52,900	47,900	56,000	90.55%	105.86%
Local government	112,400	109,300	120,000	97.24%	106.76%

Obviously the economic activity that takes place in Oregon is much affected by global forces and national policies that are beyond the ability of local policymakers to control—exchange rates, interest rates, demographics, and the structure of demand, to name a few. I am not going to try to call business cycles, but I will say that sooner or later a downturn is inevitable. The risks have increased, but I suspect that we will be able to make it through the balance of this year and 1990 without a full-blown recession. I believe that the soft landing will be achieved, but that is not the focus of my remarks this afternoon. I want rather to speculate on other forces that will affect the complex of activities that takes place within the boundaries of the place called Oregon.

Patterns of Performance

Right now we are among the fastest-growing states in the nation. During the first half of this year we were number four, behind only Nevada, Washington, and Florida in non-agricultural job growth (Figure 4). We have been experiencing strong growth in construction, machinery, electronic equipment, primary metals, trade, and services. We have been growing rapidly in the context of a national economy that has seen strength in business investment and exports along with slow growth in consumption. This was the pattern through the second quarter of 1989. Personal income in Oregon has been growing at above-average rates.

Demographics, the internationali-

zation of the economy, the implications of being just north of one tenth of the nation and south of the exploding metropolis of the central Puget Sound region—I believe these patterns and events will give rise to a period of above-average performance in the region and the state in the decade ahead. I say that as an observer independent of my job at U.S. Bancorp.

The demographics that I refer to is the slower growth of the labor force. Richard Hokenson, of Donaldson, Lufkin, and Jenrette, indicated that in the late 1970's there were about 9,000 new entrants a day into the American labor force, whereas now there are only about 5,000.

We are seeing increasing wage pressures at the entry level. The abundance of entry level vacancies is obvious to anyone who drives around Oregon and much of the rest of the nation. The slow growth in the labor force implies that there will be increased incentive for expansion to enhance the productivity of this higher-priced labor. This would imply that Oregon's industrial structure, with its relative abundance of durable goods producers, would stand to do well. The search for lower labor costs may well offer opportunities for some of the more rural regions of the nation that have not shared in the recent expansion.

The role of retirees is another aspect of demographics that is now significant and will come even more into

“The role of retirees is another aspect of demographics that is now significant and will come even more into play after the turn of the century.”

play after the turn of the century. The same attributes that the state promotes in its tourist campaigns are the stuff that gets people to come and stay. The

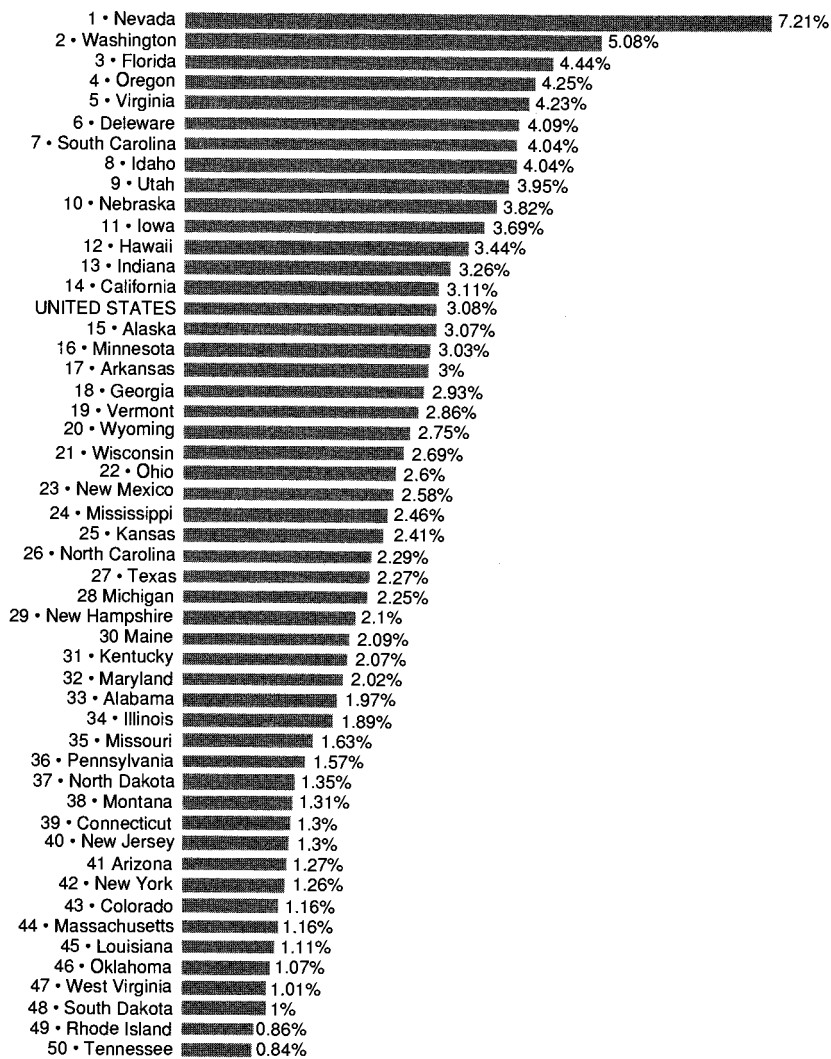


Figure 4. Percent change in non-agricultural job growth in the United States; first half of 1989 compared with first half of 1988
Source: United States Bureau of Labor Statistics

mild climate in some areas, the coast, the forests, and the recreational opportunities, many of which are tied to the public lands, can offer attractive places to retire. The October 1989 issue of *American Demographics* has an article on retirees and the resulting income transfers between states as people move and bring their income with them. This becomes a part of the economic base. Oregon was listed as one of the top 10 states on the receiving end of the distribution. Any of you who have spent time recently in Brookings, Ashland, Medford, Jacksonville, or Grants Pass can attest to this increased flow of retirees into these areas.

Quality of Life

“Quality of life” is a concept that may seem more at home in a Chamber of Commerce brochure than a discussion of a state’s economy. Nevertheless, it deserves consideration here. Oregon has demonstrated an ability to attract people when the economic conditions are right. This was very evident in the 1970’s and is the case again now. In an environment characterized by the difficulty of attracting good workers, this may be a real advantage. A recent business publication cited the success of the Eddie Bauer chain, which was purchased by

Spiegel, saying that the Pacific Northwest image sells.

The livability question does, however, cause problems for the lumber and wood-products business. I was recently struck by that fact while flying between Portland and Seattle. I was seated next to a recently arrived resident who looked out the window at some logged-over areas of the Cascades and said, “Look what they are doing to the forest. It’s horrible.” I pointed out that the areas were replanted and in a few years would be covered again. The new residents may hold a very different view of the publicly owned resource than native Oregonians—compounding the decision-making process for the industry.

International Trade

The internationalization or global integration of economic activity that we are seeing now is not new. In a sense, for the United States, it is a return to a situation that characterized us when we were a few colonies on the east coast with major international flows of goods, capital, and labor. But there was this massive continent to develop, and during much of the time since then our focus has been internal. Our trade flows bulked large internationally, but as a fraction of our total production they were small. At the end of the second World War, the U.S. accounted for about half the world’s production, according to Samuel Huntington. That was bound to change as the postwar reconstruction took place, and, moreover, we have subsequently seen the rise of additional competitors. Our share of global activity has declined to between 22 and 25 percent for the last quarter century, according to Huntington.

We have seen the value of exports and imports of goods go from 6.7 percent of the GNP in 1950 and 1960, to 8.1 percent in 1970, 17.3 percent in 1980, 24 percent in 1988. The U.S. has been on the receiving end of capital flows in the 1980’s, as we were in the 1880’s. The inflow has taken the form primarily of portfolio investment, but also of direct investment in the

form of ownership of businesses, factories, and real estate. The United States may or may not be a net debtor nation—there are some valuation questions—but the inflow has been there and it has already started to decline.

I suspect that in the years ahead, as those who have invested obtain returns, the U.S. will have to pay for its borrowing with exports. During the last two years, we have seen exports from the U.S. grow at double-digit

and I suspect it is the major source of people moving to the state. The rapid escalation of housing costs, congestion, and pollution in California are likely to mean spillover into nearby areas—firms in search of lower costs and people looking for a different style of living. Certainly there is money to be made doing business or living in areas with large, urban economies, but the economic gain may not be sufficient to offset other cost pressures. The attractiveness of Oregon for Californians was perhaps best summarized by a recent arrival to the Northwest, interviewed in Mike Parks's *Marple's Newsletter*: "For Californians, the Northwest is the last bastion on the Pacific Coast of affordable real estate, natural beauty, and jobs."

It is reasonable to expect that Oregon will attract relocations and expansions just as the central Puget Sound area has. As I've already pointed out, the migration of businesses and people into the state holds certain implications for Oregon's population, its workforce, and its values with respect to natural resources. A recent article by Peter Drucker talked about the outflow of back-office functions from major urban centers to lower-cost regions. In the Northwest, we have seen Seafirst Bank move credit-card processing from Seattle to Spokane. This is a foretaste of the kinds of things that I think will be significant in Oregon's future.

the adjustments.

To sum up, the only certainty in economics is change—change in markets, change in the labor supply, change in the skills required to make a living, change in technology, and change in the competitive environment. The driving forces, however, would seem to be going our way at the moment.



“The demographics, the internationalization, and the proximity to California will, on balance, imply a relative strengthening in the Oregon economy in the decade ahead.”

rates. These have slowed, but the years ahead will offer opportunities for export industries, including both agriculture and other manufacturing sectors, including forest products. This will require, for some, a reorientation in marketing and thinking as the process becomes more complicated and as the demands and customs shift over time.

In this environment, Oregon should do relatively well. The industry mix—forest products, agriculture, and durables manufacturing, as well as port facilities and international air service—will enable us to participate. The environment will pose a particular challenge for smaller firms, which may be able to get involved with joint ventures and new marketing arrangements.

Regional Shifts

Oregon's proximity to California has and will continue to have an influence. California is a major market for the region's forest products, it is the major source of tourists for the region,

In Summary

The demographics, the internationalization, and the proximity to California will, on balance, imply a relative strengthening in the Oregon economy in the decade ahead. The state's economic activity will tend to expand faster than that of the nation as a whole. For the forest products industry, there would seem to be both challenges from the competing pressures on the publicly owned resources, and opportunities, especially in the area of international markets. For those whose livelihood is threatened by the changes that are taking place, the relative strength of the economy will soften

Timber for Oregon's Tomorrow: The 1989 Update

Oregon Overview: Summary of Findings



John Sessions,
Chairman of the panel
and professor of forest
engineering, College of
Forestry, Oregon State
University

Editor's note: The fourth and concluding Starker Lecture consisted of a panel presentation of a major study by the College of Forestry updating the timber situation in Oregon. The five panelists describe various aspects of the current and future outlook for timber and its economic and social consequences.

A summary of the findings is presented here. Single copies of the full report are available from:

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K. Norman Johnson,
Associate professor of
forest resources,
Oregon State
University, and forest
plans coordinator for
Governor Neil
Goldschmidt

This study, conducted by the College of Forestry at Oregon State University, provides information needed by Oregon's Governor, Board of Forestry, legislators, and interested citizens so that they can better understand issues of timber availability in the state. The study makes four contributions: (1) it draws together into a single document management plans for public lands in Oregon; (2) it provides up-to-date timber inventories, information on forest management practices and growth, and projections of future timber availability from private lands in Oregon; (3) it provides projections by us and others of the sustainable (baseline) harvests for different regions of the state, their varied impacts on the forest, and their contributions to the economics of local areas (timbersheds) within the state; and (4) it discusses possible events that could affect the level of the projected sustainable harvest.

Timber availability in Oregon varies now, and will continue to vary, by geographic area within the state and by the resources, policies, and actions of the owners of Oregon's forest lands. Over the past 20 years, the harvest has drifted generally downward, reaching a low at the depth of the 1981 recession and then climbing in 1988 to the highest level since 1973 (Figure 1).

The public lands account for most of the variability in total harvest. Although decreasing gradually, the harvest from private land, especially that owned by forest industry—which is by far the larger component of the private harvest—has been relatively stable. This does not mean, necessarily, that public timber offerings have been unstable over time but rather that

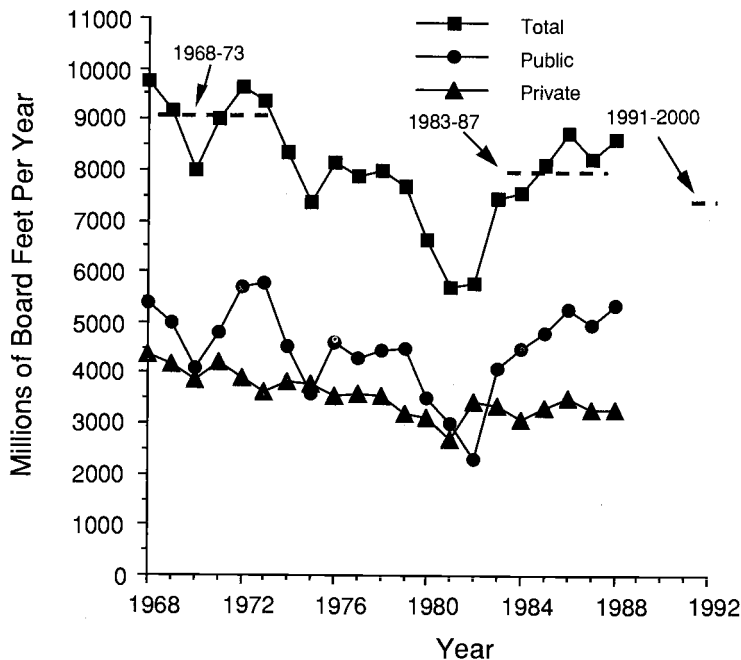


Figure 1. Board-foot harvest for Oregon, 1968 through 1988. Broken lines indicate harvests in the reference periods 1968-1973 (1976 study); 1983-1987 (this study); and projected 1991-2000 base-line harvest

the harvest rate reflects market conditions for timber. Under terms of sale, timber purchasers have several years during which to harvest the timber purchased. When product demand is high, purchasers harvest; when demand is low, they hold the timber on the stump.

For this analysis, we divided the state into nine timbersheds (Figure 2), six in western Oregon (west of the Cascade Mountains), and three in eastern Oregon (east of the Cascade Mountains). Each timbershed contains at least one major timber-processing center heavily dependent on timber harvested within that timbershed. Currently, approximately 60 percent or more of the timber processed in each timbershed is also harvested there.

Five owner classes were recognized in each western Oregon timbershed: National Forest; Bureau of Land Management (BLM); state and other public; forest industry; and nonindustrial private. In eastern Oregon, the BLM and state and other public classes were combined into "other public." All other classes were the same as for western Oregon.

The contrasting conditions among owner classes in Oregon have been well described in the 1976 study conducted by John H. Beuter, K. Norman Johnson, and H. Lynn Scheurman (Beuter et al., 1976), popularly known as the "Beuter Report." Generally, the

Federal lands (National Forest and BLM) are characterized by inventories of older trees (160+ years old), low growth rates of trees, and demand for "non-timber resources" such as recreation, water, and wildlife habitat. The private lands contain little timber over 100 years of age and a considerable inventory of young (less than 40 years), rapidly growing trees. Thus, these lands will have less merchantable timber available in the near term, 1991-2000, but will have substantial harvest potential for the more distant future, 2011-2020, and beyond.

A base-line harvest projection is presented for each owner class in each timbershed. These projections cover the next 10 decades (called the projection cycle). Decade 1 covers 1991-2000, decade 2 covers 2001-2010, and so forth. We used the average harvest for the years 1983-1987 as a basis against which to compare the projections because it represents what we have become accustomed to in the recent past; it is not meant to connote "what ought to be."

For public owners, the base-line projection comes from an aggregation of their existing management plans (BLM and state) or proposed management plans (National Forests). For forest industry, the projection is a

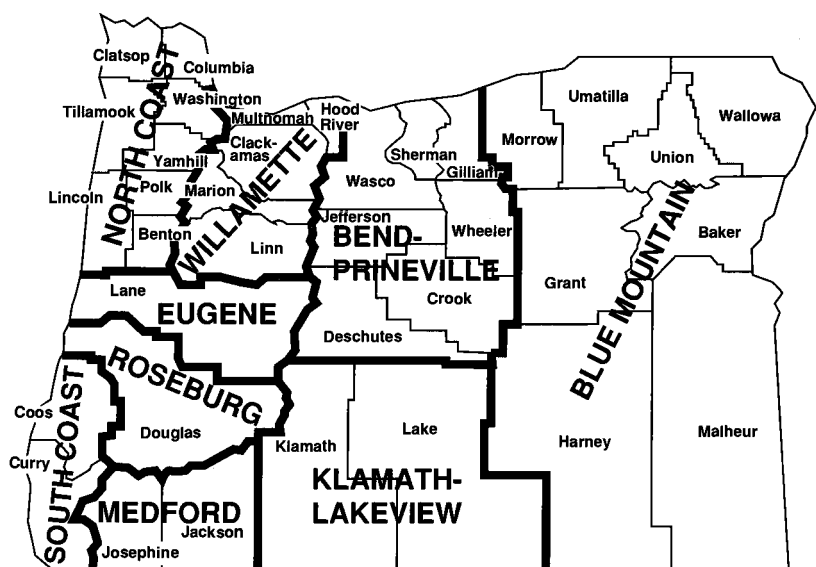


Figure 2. Oregon timbersheds

computer simulation of the maximum sustainable harvest from period to period and is based on beginning timber inventories and assumptions about management intensity collected by confidential survey. For nonindustrial private owners, we ran two projections: One assumed these owners would continue to manage their lands as they have in the recent past and would continue to harvest at their 1983-1987 level; the other assumed they would manage their lands somewhat more intensively in the future and would harvest in each period at their sustainable capability.

Our projections are predicated on the following assumptions:

(1) Public managers will have the administrative direction and resources to implement their management plans, which are generally based on intensive management and nondeclining harvest flow (that is, harvest does not decline from decade to decade).

(2) Forest industry, which has now largely completed the transition from old growth to young plantations, will grow and harvest their stands consistent with the management objectives specified in the confidential survey. Forest industry owners do not necessarily manage their lands under non-declining flow. Nevertheless, considering the current distribution of age classes on these lands, with large acreages of immature stands more or less evenly distributed over the younger age classes, and the financial objectives of industry owners, we have assumed that this group, in aggregate, will harvest at the sustainable rate in the future. As the immature stands reach ages consistent with harvesting objectives, they are projected to be harvested and regenerated. Although forest industry could continue harvesting at the rate of the recent past (1983-87) for at least one more decade, they are unlikely to do so because the age of the trees cut would not be consistent with the reported management objectives. Thus, the maximum rate of harvest will be limited by the number of acres of trees reaching acceptable harvest age. Each passing decade over the next several decades

will see a greater number of acres approaching merchantable age, in effect permitting harvest to increase on forest industry lands.

(3) At the time of this analysis, it seemed likely that nonindustrial private owners would continue to harvest at levels of the recent past, even though they could harvest more. Increasing harvest levels in 1987 and 1988 suggest that recent market conditions may be inducing these owners to increase their rate of harvest toward their capability.

The harvest projections in the report are not intended to be forecasts of what will happen—and should not be

interpreted as such. Instead, they indicate what is likely to happen if an assumed set of conditions is realized. Through these projections, we address the following major (and subsidiary) questions relating to the base-line harvest projection and its impact on the forest over the next century.

Are we currently cutting more than the sustainable harvest?

Answer: When 1983-1987 is used as the frame of reference (Figure 3), the answer is yes, both in cubic feet and board feet. This is evident in the 4 percent decline in cubic-foot harvest

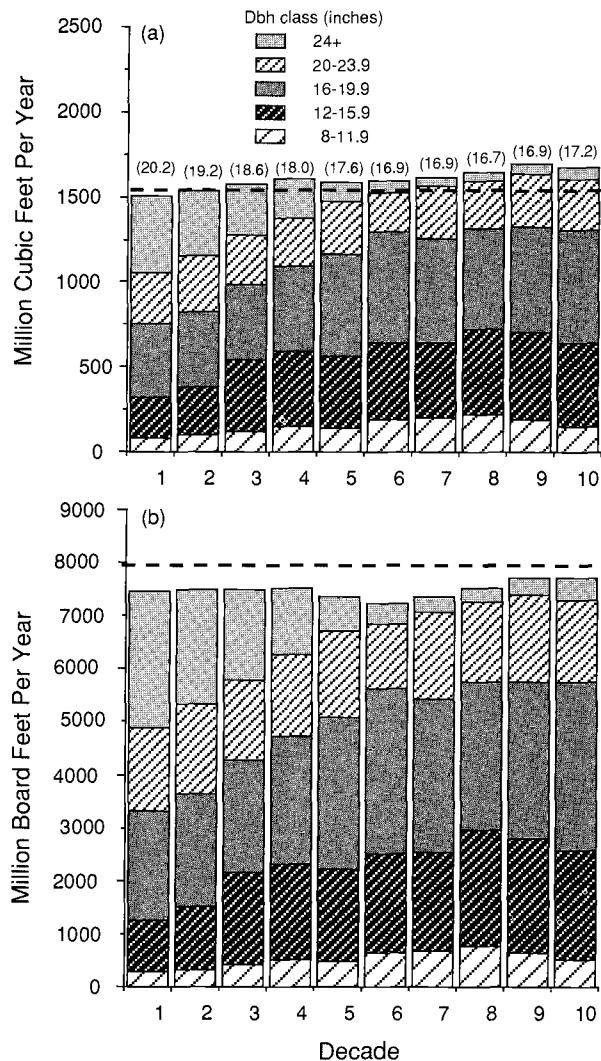


Figure 3. Sustainable harvest for Oregon, by dbh class, in (a) cubic feet and (b) board feet. Broken line indicates harvest in the reference period, 1983-1987. Average dbh for the decade is given in parentheses

Table 1. Average annual base-line harvest by timbershed, relative to 1983-1987 reference period average, for the short term (decade 1, 1991-2000) and long term (decade 10, 2081-2090).

Half-state by timbershed	Million board feet per year			Million cubic feet per year		
	1983- 1987 ¹	1991- 2000 ²	Percent change	1983- 1987	2081- 2090	Percent change
Western Oregon						
North Coast	1289	1640	+27	279	410	+47
Willamette	1164	862	-26	227	205	-10
Eugene	1246	1085	-13	234	227	-3
Roseburg	1332	1095	-18	252	241	-4
Medford	497	448	-10	97	113	+16
South Coast	568	550	-3	108	154	+43
Half-state total or average	6096	5680	-7	1197	1350	+13
Eastern Oregon						
Klamath-Lakeview	637	610	-4	131	130	-1
Bend-Prineville	481	427	-11	100	81	-19
Blue Mountain	806	658	-18	157	139	-11
Half-state total or average	1924	1695	-12	388	350	-10
State total or average	8020	7375	-8	1585	1700	+7

¹ Includes unknown amount of submerchantable material.

² Includes no submerchantable material.

projected for 1991-2000. This trend suggests that a harvest decline is likely within the next decade. However, if it does occur, harvest would probably recover to the 1983-1987 level by the fourth decade and subsequently rise to 7 percent above the 1983-1987 levels.

It is important to understand that the relative decline in board-foot harvest will exceed that for cubic feet because of the smaller stand diameters to be harvested in the future (Figure 3). Board-foot harvest will decline by 8 percent in decade 1.

Are all timber-producing areas equally affected?

Answer: No. The effects will not be felt evenly around the state (Table 1) because of the differing contributions of public and private harvest among timbersheds, differences in the age class distributions on private lands, and the impacts of proposed land re-allocations on individual National Forests. In Table 1, the board-foot harvest is presented for the short term as it is

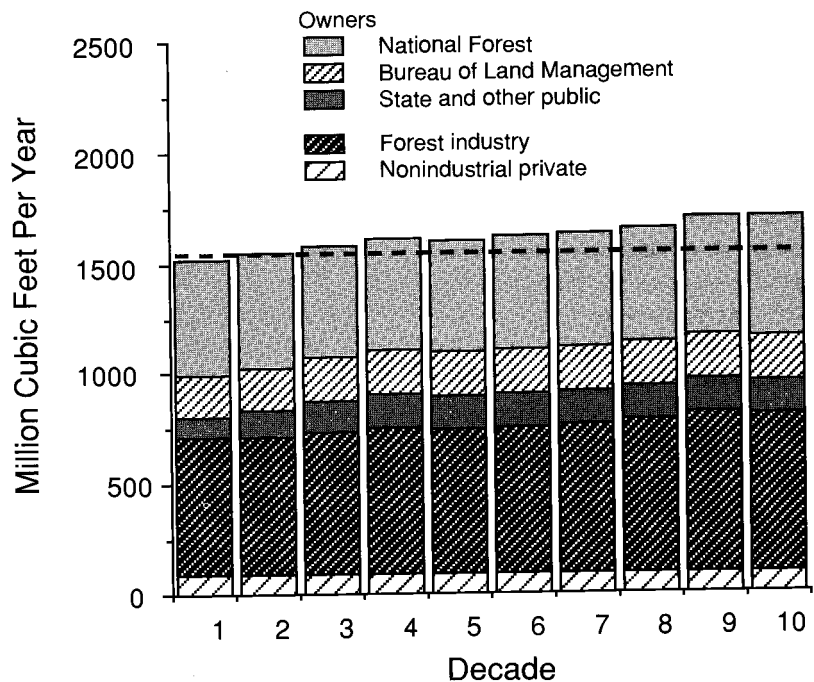


Figure 4. Contribution to the total Oregon harvest, by owner class. Broken line indicates harvest in the reference period, 1983-1987

the measure currently used in timber sales. However, the cubic-foot harvest is more appropriate over the long term because it better reflects the volume of timber available for processing in the future.

Who is growing the trees to be harvested for the future?

Answer: Under the base-line harvest projection, roughly 53 percent of the cubic-foot harvest will come from public lands and 47 percent from private lands in decade 1. These proportions are projected to remain fairly constant over the next 10 decades (Figure 4). During the 1983-1987 period, the private contribution was about 44 percent of the cubic-foot harvest (Table 2).

Will any stands of old trees remain?

Answer: Yes. The area in older stands is an important issue in western Oregon where, at the beginning of decade 1, about half of the 3 million acres in stands 160 years or older is forecast to be unavailable for harvest because of wilderness designations, management requirements, or discretionary decisions by the National Forests and BLM (Figure 5a). Barring catastrophic events, it is estimated that there will be

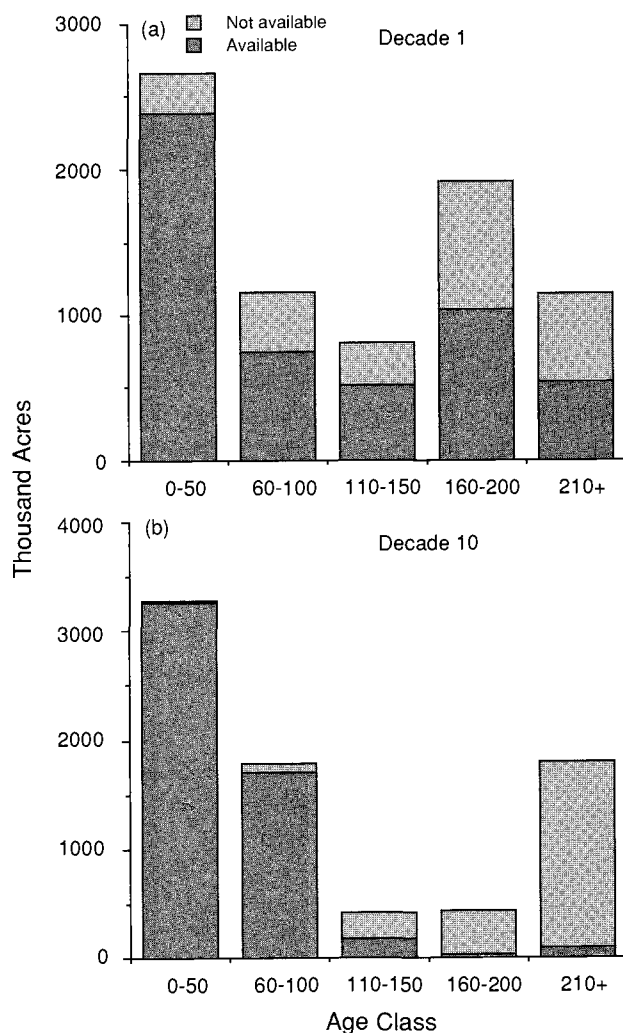


Figure 5. Acreage of public forest land in western Oregon at the beginning of decades 1 (a) and 10 (b), by age class

Table 2. Change in average annual base-line harvest by owner, relative to 1983-1987 reference period average, for the short term (decade 1, 1991-2000) and long term (decade 10, 2081-2090)

Owner	Million board feet per year			Million cubic feet per year		
	1983-1987 ¹	1991-2000 ²	Percent change	1983-1987	2081-2090	Percent change
Public						
National Forest	3369	2802	-17	628	547	-13
Bureau of Land Management	951	1019	+7	184	198	+8
State and other	387	438	+13	79	157	+99
Private						
Forest industry	2952	2755	-7	608	712	+17
Nonindustrial	361	361	0	86	86	0
Total or average	8020	7375	-8	1585	1700	+7

¹ Includes unknown amount of submerchantable material.

² Includes no submerchantable material.

2.2 million acres of stands greater than 160 years of age by the beginning of decade 10.

Will we continue to harvest the same species?

Answer: Yes—in western Oregon for the short term, but species types will shift somewhat on National Forest lands in later decades from Douglas-fir to high-elevation true fir and mountain hemlock. Public owners plan to manage primarily for softwoods, with only the Siuslaw National Forest including hardwoods in the base-line harvest. Forest industry will probably continue to harvest hardwoods, but in declining amounts, because of their emphasis on converting hardwoods to commercially valuable softwoods. Nonindustrial private owners are expected to continue to concentrate their harvesting on softwoods.

No—in eastern Oregon for the short term, when the proportion of pines is projected to fall rapidly. Ponderosa pine contributed just over half of the 1983-1987 board-foot harvest from National Forest lands. As a result of past selective harvests that emphasized ponderosa pine on both public and private lands, however, this contribution is projected to decline to about 40 percent of the harvest in decade 1. Harvest of lodgepole pine also will decline during decade 1 as salvage logging in connection with the mountain pine beetle epidemic comes to a close, particularly in the Bend-Prineville timbershed. Lodgepole pine will not be available again in large quantities for another 40-50 years. Thus, if the projected harvest levels are to be sustained, mixed conifers (Douglas-fir, true fir, spruce) will have to be harvested to offset the loss of the pines.

Will the average age of trees at harvest change?

Answer: No in the short term, yes in the longer term. Harvest ages will remain nearly the same for at least decades 1 and 2 on National Forest lands and for at least decade 1 on BLM lands, although average ages will vary

by timbershed, with the northern BLM districts having the smallest inventory of older trees and the southern districts the largest. The average harvest age for the National Forest lands is projected to shift from the current 160+ years to 80-90 years over the next 5 decades. Three to 5 decades from now, the average harvest age for BLM lands is projected to drop toward 50 years and then rise to 60 to 80 years by decade 10. On state lands, the current harvest age of 70 to 110 years is projected to fall to 60 to 90 years; on forest industry lands, it is projected to fall toward the 45 to 65 year range, depending on timbershed and decade.

Will we rely on clearcutting in the future?

Answer: Yes—in western Oregon in the short term, where clearcutting is projected to continue to be the predominant harvest system. However, the number of acres clearcut will decline slightly over time, and the number of acres thinned will increase. An increasing proportion of the harvest will come from thinnings, so the number of acres subject to some form of harvesting will increase.

No—in eastern Oregon clearcutting will be relied upon less than in western Oregon. However, acres clearcut are forecast to remain at a relatively high level for decades 1 and 2 because of the accelerated harvest of lodgepole pine and then decline rapidly to about 20 percent of the decade 1 level by decade 7. Thinnings will increase rapidly to four times their decade 1 level by decade 10, and shelterwood harvests will increase. Selection harvests, once thought to be on the decline, will remain constant over the 10 decades.

Will management intensity increase?

Answer: Yes—for National Forest and BLM lands but not much for other owner classes.

The National Forests and BLM plan to implement intensive forest management on virtually all of their for-

ested acres allocated to timber production in western Oregon. These management plans require that thinning be increased 5 times the decade 1 acreages over the 100-year projection. In addition, the area fertilized is to be doubled, and virtually all low-elevation acres are to be planted with genetically improved stock and precommercially thinned.

The Oregon Department of Forestry manages young-growth State Forests and has been active in management intensification for many years. Their forest plans for the future call for a more moderate level of management intensity, as measured by the amount of investment, than do those of the Forest Service and the BLM.

Forest industry landowners are continuing to manage many acres intensively, but their level of intensification is not projected to be as great as that of the Federal forests. No evidence suggests that nonindustrial private owners in aggregate are intensifying their management practices to any significant extent; however, that is not to say that individuals among the 20,000 owners are not practicing intensive management. Many are, but their acreage is not significant enough to change the average for the owner class.

How do harvest and growth relate?

Answer: In aggregate, harvest from Oregon's public forests still exceeds growth by about 37 percent; this relation reflects the large proportion of slow-growing older stands that remain on National Forest and BLM lands. As older stands are replaced by young, faster-growing stands, growth and harvest will come into balance. We expect growth to equal harvest by decade 5 and then to exceed harvest through decade 10 (Figure 6a).

Growth on private lands currently exceeds harvest there because of the large acreages of young plantations on forest industry lands and the low harvest rate, relative to available inventory, on nonindustrial private lands (Figure 6b).

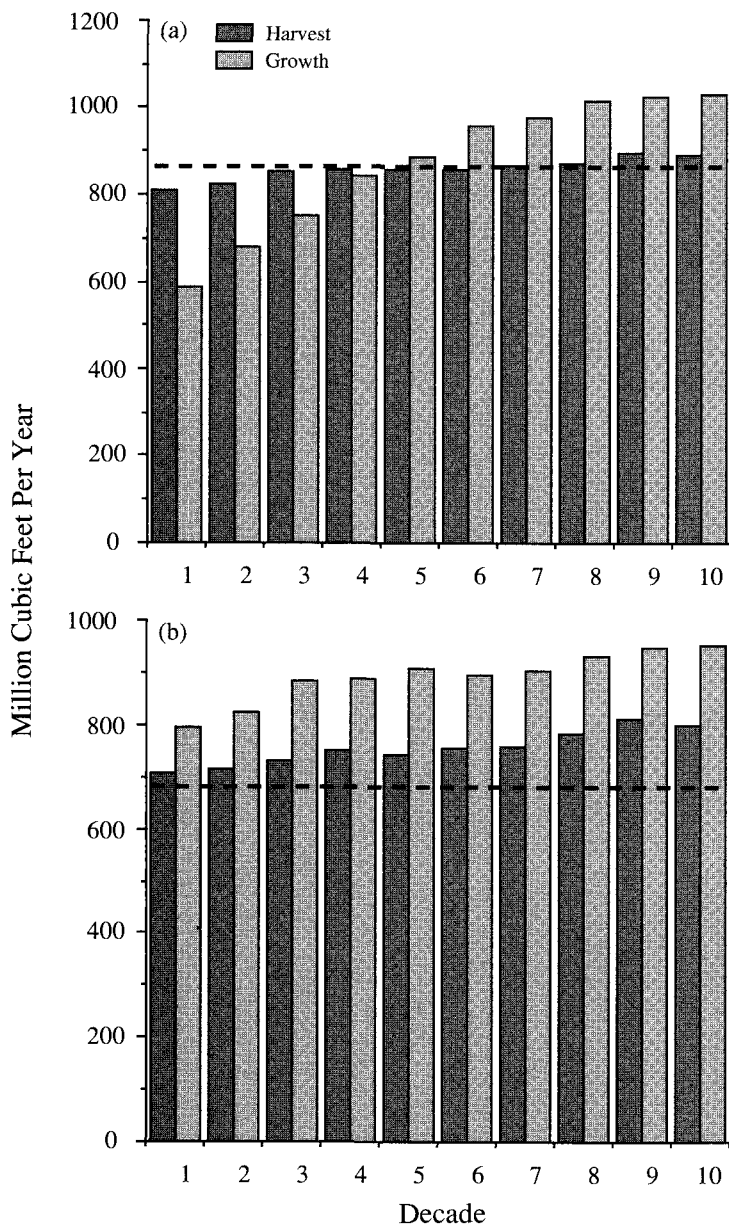


Figure 6. Growth and harvest on (a) public and (b) private lands in Oregon. Broken line indicates harvest in the reference period, 1983-1987

What are the economic costs of harvesting at the base-line harvest level, as opposed to continuing to harvest at the 1983-1987 level?

Answer: In the primary timber industry sector (logging, sawmilling, veneer, plywood, pulp, and paper) there would be 2,800 jobs displaced by 1995 due to the lower base-line harvest levels. In secondary and composite wood products sector there would 800 fewer jobs by 1995 than would have

occurred if the 1983-1987 harvest levels continued. The declines in the timber industry that could accompany the lower base-line harvest levels would ripple through the economy: Statewide, the 3,600 fewer wage and salary jobs in the timber industry in 1995 could cost an additional 5,000 jobs in other economic sectors and as much as \$340 million per year in wage and salary income (in 1988 dollars). In addition, 2,700 jobs in the primary timber industry sector would be ex-

pected to be lost due to continuing technological change.

Will economic impacts of adopting base-line harvest levels be similar throughout Oregon's timbersheds?

Answer: No. Following the distribution of harvest increases and declines, the largest negative impacts will occur in the timbersheds along the Cascade Range and the Blue Mountains.

Looking more broadly at Oregon's economic future, metropolitan areas will likely absorb most of Oregon's future economic growth, largely in the non-manufacturing sector, while the manufacturing sector outside the Portland metropolitan area is likely to decline. Despite harvest reductions to base-line levels, Oregon's total wage and salary employment is expected to grow 2.4 percent per year through 1995, but this growth will be concentrated in metropolitan areas.

Will the importance of timber in Oregon's economy change?

Answer: Yes, if harvest levels drop to those projected as sustainable, wage and salary employment in the timber industry will drop from 6.8 percent of the total statewide wage and salary employment in 1988 to 5.3 percent in 1995, and from 36 percent of the wage and salary employment in manufacturing in 1988 to 31 percent in 1995. Even if 1983-1987 harvest levels could be maintained, wage and salary employment in the timber industry would drop to 5.6 percent of the total and to 32 percent of manufacturing by 1995.

Can growth in the manufacture of secondary and composite wood products offset losses in employment in the primary timber industry that would accompany a declining harvest Level?

Answer: Not likely. Wage and salary employment in the manufacture of secondary and composite wood prod-

ucts has increased at a rate of 4.9 percent per year since 1980, to 16,400 employees in 1988. By the mid-1990's, the employment in secondary and composite wood products could grow by 2,500 employees, even with a decline in the projected harvest. However, this growth is not sufficient to offset the projected 7,800 jobs lost from 1988 employment in primary timber industry jobs: 2,800 jobs due to harvest levels being below the 1983-1987 level; 3,000 jobs due to changing technologies; and an additional 2,000 jobs due to the late 1980's surge in harvest *above* the 1983-1987 average levels.

How will funding of local governments be affected if harvests decline to projected base-line levels?

Answer: Statewide, funding to local governments will be minimally affected, but impacts on particular taxing districts may be substantial. Local taxing districts (including county governments, school districts, road districts, educational special districts, and fire districts) relied upon timber-derived funds for 10 percent of their

“County governments rely upon timber-derived revenues for over 25 percent of their funding, and the projected decline in timber harvests could decrease county funds substantially.”

total funding over the reference periods. Thus, the projected decline in timber availability reduces total funds available to local governments by less than 1 percent.

These values, however, are influenced heavily by school districts, which account for over 70 percent of

the total local government budgets and rely on timber revenues for less than 4 percent of their funding as a result of the infusion of State and Federal monies to education. County governments themselves rely upon timber-derived revenues for over 25 percent of their funding, and the projected decline in timber harvests could decrease county funds by substantial amounts.

Can owners produce more timber than indicated by our projections through (a) further management intensification?

Answer: For the National Forests and BLM, yes but unlikely. For the State and forest industry, possibly. For nonindustrial private owners, yes.

The National Forests are expected to manage much more intensively over our projection cycle than they have in the past. It is unlikely that major additional opportunities for intensification exist. Harvest levels could rise if National Forests reduced minimum final harvest age. Such a change, in combination with some limited opportunities to intensify, might increase National Forest harvests in the southwest timbersheds by 5 to 10 percent, with lesser increases elsewhere.

The BLM is also expected to manage much more intensively over the projection cycle than it has in the past. Some limited opportunities for managing more intensively appear to exist in the northern and southern districts. Harvest levels could rise slightly in these areas as a result.

More likely, it may prove difficult for Federal landowners to obtain the budget needed to fund intensification measures imbedded in the base-line projection. Further intensification on a broad scale beyond these levels seems unrealistic.

The Oregon Department of Forestry has a commitment to growing quality wood and making each investment in management intensification pay its own way on state lands. Both of these commitments may reduce the sustainable harvest level that can be achieved. Lowering the minimum diameter for

harvest could increase the harvest level in the state holdings on the north coast and north Willamette Valley, but at a cost of producing a somewhat smaller and poorer quality product. Increased management intensification, such as additional fertilization, combined with a smaller minimum diameter for harvest, could raise the sustainable level in these two areas still further.

Forest industry has been implementing intensive forest-management practices consistent with economic viability. Undoubtedly, some additional harvest could be gained above that reported in the confidential survey, but we did not investigate that possibility here.

Nonindustrial private owners have sufficient inventory to increase their sustainable harvest. They could, in aggregate, increase their harvest during decade 1 by 350 million board feet over that in 1983-1987 (almost a doubling of their harvest); however, a significant proportion of that potential is hardwoods. By increasing their management intensity to include full conifer stocking and thinning, these owners could more than double their 1983-1987 harvest—an increase that could substantially offset the harvest reductions anticipated for forest industry over the next several decades.

Through (b) a departure from the sustainable level?

Answer: On public lands, increasing the harvest above the sustainable level will generally increase harvests in decade 1 and reduce them in later decades—with no overall net gain. Public lands no longer contain a “surplus” of mature timber that would allow an increase in short term harvest with little effect on future levels.

On forest industry lands, increasing the harvest above the sustainable level could maintain their historic 1983-1987 level for one decade in all western Oregon timbersheds where it is projected to decline, but doing so would result in final harvesting of rapidly growing immature stands 35 through 40 years old. Indeed, harvesting these stands early will result in less

cubic-foot volume and lower wood quality over time.

Through (c) other measures?

Answer: For both Federal forest owners, some forested lands have been allocated at the discretion of the agencies to uses that preclude timber production or allow less than full production. Examples of these uses include "backcountry recreation", which allows neither roads nor timber harvest and, "big-game habitat", which involves longer rotations than normal. While these allocations go beyond legal requirements, we consider it unlikely that these lands will be reallocated to intensive timber production and did not evaluate that option.

On the National Forests, the sustainable harvest reported here does not include volume produced through special salvage sales or submerchantable material such as cull logs (logs with considerable rot) in old-growth forests. In western Oregon, these additional volumes could increase the National Forest harvest by up to 14 percent and the total harvest by up to 4 percent above the base-line projected here. In eastern Oregon, the increases could be up to 9 percent on the National Forests and up to 6 percent in total.

We do not know how much of this salvage and cull volume will find its way to the market place in the future. With the emerging emphasis on leaving standing dead trees and down trees, the amount of salvage and cull material offered for sale may rapidly dwindle. Still, these volumes offer the potential for a somewhat higher harvest volume from the National Forests than reported here as the sustainable harvest.

Can nonindustrial private timber offset economic impacts of changing timber availabilities on public or forest industry lands?

Answer: Yes, almost 50 percent of the economic declines could be mitigated. If nonindustrial private owners were to harvest closer to their poten-

tial and adopt moderate increases in management intensity, then 53 percent (1,900) of the displaced timber jobs could be recovered. Accompany-

"If the northern spotted owl is listed as threatened or endangered, it seems likely that additional low- and mid-elevation land with mature and old-growth stands will be reserved."

ing the increases in timber-industry activity would be an additional 2,800 jobs in other economic sectors and \$190 million per year in wage and salary payrolls.

How much could decisions about protection of the northern spotted owl affect Oregon's harvest and economy?

Answer: Some protection of habitat for the northern spotted owl has already been provided in National Forest and BLM management plans used to calculate the sustainable harvest under current agency guidelines. Debate continues, however, over whether this is adequate protection and the outcome is not clear.

If the northern spotted owl is listed as threatened, or endangered, it seems likely that additional low- and mid-elevation land with mature and old-growth stands will be reserved. Under the most restrictive scenario—withdrawing most mature and old growth on the National Forests and BLM in western Oregon—the base-line harvest could drop at least 1.1 billion board feet per year in decade 1. In western Oregon, this is almost 40 percent of the base-line public harvest and 20 percent of the base-line total harvest. Under this scenario an additional 6,400 timber industry jobs could

be lost plus an additional 9,000 jobs in other economic sections as compared to the base-line projection. The estimated added loss in total wage and salary income would be \$610 million per year.

Following recommendations of the Oregon Department of Fish and Wildlife (BLM lands) and the Blue Ribbon Audubon Panel (National Forest lands) would lead to a more moderate decline in the base-line harvest of approximately 330 million board feet per year. Under this scenario an additional 1,800 timber industry jobs could be lost plus an additional 2,600 jobs in other economic sectors. The estimated loss in total wage and salary income would be \$170 million per year.



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