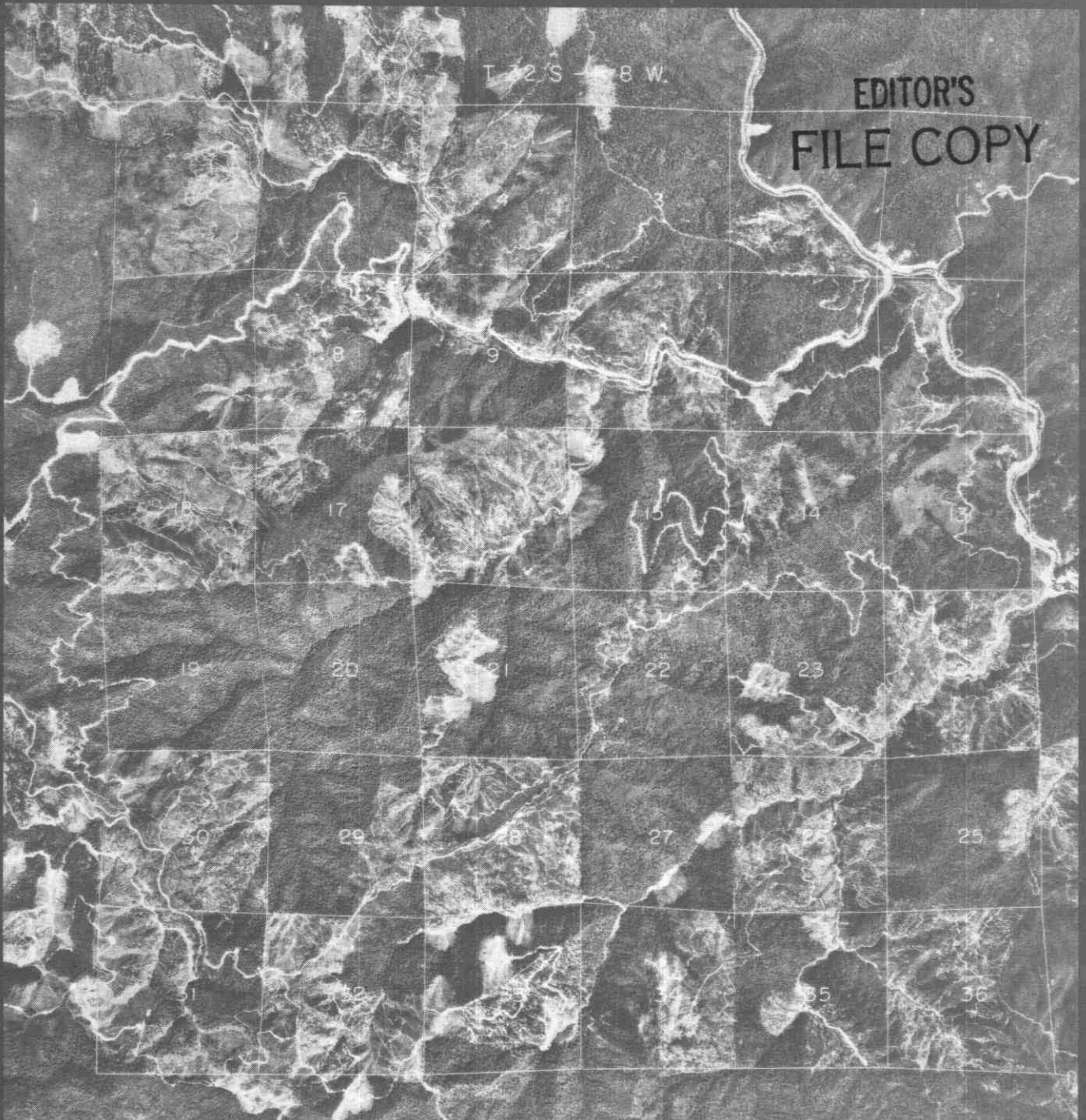


Timber Resources of Douglas County, Oregon

Colin D. MacLean



Forest Resources Evaluation Work Unit

Charles Van Sickle, *Project Leader*
Donald R. Gedney, *Principal Resource Analyst*
John M. Berger, *Compilation Supervisor*
Dale R. Baer, *Field Supervisor*

Field and Office Work for Douglas County

Field Supervisor

Charles L. Bolsinger

Survey Design

Colin D. MacLean

Data Collection

Steven Bush

Chris Carter

Perry Colclasure

Terry Graham

Bruce Hiserote

Mike House

Warren Sasaki

Brian Wood

Assistant Field Supervisors

Dale R. Baer

Hal A. Arbogast

J. D. Lloyd, Jr.

Data Compilation

Paulma Allord

Patricia M. Bassett

Ed Holt

David Jacobs

Mary Anne Mei

Marian Simons

Susan Weaver

Office Staff

Grace Begay

Linda Brown

Ardella DeVan

Fay Page

Kathleen Wutzke

Acknowledgment is made of the cooperation and assistance of many public agencies and private timber companies.

The U.S. Forest Service supplied forest resource data for National Forests. The Bureau of Land Management, U.S. Department of the Interior, supplied resource data for Bureau of Land Management lands.

The county assessor and several private timber companies furnished ownership information. The Douglas County Forest Protective Association, U.S. Forest Service, Bureau of Land Management, and several private timber companies provided maps and information on access to forest lands as well as general information related to forest management practices in Douglas County.

TIMBER RESOURCES OF DOUGLAS COUNTY, OREGON

Reference Abstract

MacLean, Colin D.

1976. Timber resources of Douglas County, Oregon.
USDA For. Serv. Resour. Bull. PNW-66, 42 p.,
illus. Pacific Northwest Forest and Range
Experiment Station, Portland, Oregon.

This report summarizes a 1973 timber resource inventory of Douglas County, Oregon. Detailed tables of forest area, timber volume, growth, mortality, and cut are presented. A discussion of the present resource situation highlights the condition of cutover lands and the opportunities for silvicultural treatment.

KEYWORDS: Forest surveys, statistics (forest), resources (timber), southwest Oregon, Douglas County.

RESEARCH SUMMARY

Resource Bulletin PNW-66

1976

Douglas County has 66 billion board feet of sawtimber--75 percent of it Federally owned and 21 percent owned by forest industry. Sixty percent of the private commercial forest land has been clearcut and an additional 20 percent partially cut. At the current rate of harvest, the private sawtimber inventory will not last 20 years.

Poor conifer stocking prevails on over half of the county's clearcut area. About one-third of the Federal clearcut area, over half of the forest industry clearcuts, and over two-thirds of the other private clearcut lands are inadequately stocked with conifers. Many of the poorly stocked acres are on "tough sites" where planting is both expensive and uncertain of success.

About half the commercial forest area in the county is suitable for final or intermediate harvest. Another 20 percent is either nonstocked or partially stocked with conifers and needs planting or stand conversion. Many of the poorly stocked acres are now covered with brush or hardwoods. Four percent of the commercial forest land--all in nonindustrial private ownership--is brushy, nonstocked cutover on low site where treatment is not feasible because of high cost, low return, and the likelihood of failure.

Immature stands of conifer stock 22 percent of the county's commercial forest land. However, over half these stands would grow faster if excess competition were removed, either through cleaning of brush and hardwoods or through precommercial thinning.

Preface

This report summarizes some of the findings of the fourth inventory of the timber resources of Douglas County, Oregon. It has two parts. The first describes the current resource--the area of commercial forest land and the timber volume on that land by species, owner, and tree size. The second part describes the condition of the forest land as a base for growing future crops of timber. The changes in resources since the previous (1962) inventory are not examined in this report.

Field data for all lands except National Forests and lands administered by the Bureau of Land Management were collected by the Forest Resources Evaluation Work Unit of the Pacific Northwest Forest and Range Experiment Station. Resources Evaluation (formerly Forest Survey) is a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928 and amended by the Forest and Rangeland Renewable Resources Planning Act of 1974. The purposes of Forest Resources Evaluation are (1) to obtain comprehensive information on timber and other forest resources, including the extent and condition of forest lands, the amount and kind of timber growing on these lands, the rate of forest growth and depletion, the amount of timber cut, and probable future trends in timber requirements; and (2) to analyze and make available resource information needed to formulate forest policies and programs. Resurveys are made periodically to update basic information.

Resources evaluations are conducted throughout the 50 States by the U.S. Forest Service Experiment Stations. The Pacific Northwest Forest and Range Experiment Station at Portland, Oregon, is responsible for resources evaluation in the States of Alaska, California, Hawaii, Oregon, and Washington.

The basic inventory data for lands administered by the Bureau of Land Management (BLM) were collected by that agency in 1966 on the Medford District and 1968-69 on other BLM lands. Current (1973) data were furnished by the agency on all field plots silviculturally treated or cutover since inventory, including the status of all plantations. National Forest inventory data were collected by personnel at each National Forest. Dates of the basic inventories were 1963 on the Siuslaw National Forest, 1967 on the Rogue River National Forest, 1968 on the Umpqua National Forest, and 1970 on the Willamette National Forest. All except the Willamette were updated to 1973 in the same manner as the BLM inventories. Field data for other ownerships were collected by Forest Resources Evaluation personnel during the summer of 1973.

Contents

	Page
INTRODUCTION	1
THE CURRENT TIMBER SITUATION	1
The Total Inventory	1
Who Owns the Timber?	2
The National Forests	2
Bureau of Land Management Lands	4
Forest Industry Lands	6
Other Private Lands	7
Other Public Lands	9
Growth and Mortality	9
OPPORTUNITIES FOR SILVICULTURAL TREATMENT	10
The National Forest and BLM Lands	11
Forest Industry Lands	12
Other Private Lands	14
Other Public Lands	15
CONCLUSION	15
TABLES FOR DOUGLAS COUNTY, OREGON, JANUARY 1, 1974	16
STOCKING	33
PLANT SPECIES	35
INVENTORY PROCEDURES	37
National Forest and BLM Inventories	37
The Inventory of Private and Other Public Lands	38
DEFINITION OF TERMS	38
LITERATURE CITED	42

Tables for Douglas County, Oregon, January 1, 1974

	Page
1. Area by land class	16
2. Area of commercial forest land by ownership class	17
3. Area of commercial forest land by cubic-foot site and ownership classes	17
4. Area of commercial forest land on conifer sites by ownership, conifer stocking, and stand-size classes	18
5. Area of commercial forest land by forest type and ownership class . .	19
6. Volume of growing stock and sawtimber on commercial forest land by ownership class and by softwood and hardwoods	20
7. Net volume of growing stock on commercial forest land by species and ownership class	21
8. Net volume of growing stock on commercial forest land by species and ownership class (International 1/4-inch rule)	22
9. Net volume of growing stock on commercial forest land by species and ownership class (Scribner rule)	23
10. Volume of timber on commercial forest land by class of timber and by softwoods and hardwoods	24
11. Net annual growth of growing stock and sawtimber on commercial forest land by ownership class and by softwood and hardwoods	25
12. Net annual growth of growing stock on commercial forest land by species and ownership class	26
13. Net annual growth of sawtimber on commercial forest land by species and ownership class (International 1/4-inch rule)	27
14. Average annual mortality of growing stock and sawtimber on commercial forest land by ownership class and by softwoods and hardwoods	28
15. Average annual mortality of growing stock on commercial forest land by species and ownership class	29
16. Average annual mortality of sawtimber on commercial forest land by species and ownership class (International 1/4-inch rule)	30
17. Timber harvest by ownership class, Douglas County, Oregon, 1950-73 (International 1/4-inch rule)	31
18. Area by treatment and ownership class	31

Introduction

Douglas County, with a gross area of over 3 million acres, is the largest county in western Oregon and the fourth largest in the State. Except for a belt of agricultural land and oak woodland paralleling the Umpqua River in the central interior, the county is predominantly coniferous forest. With 2.6 million acres of commercial forest land, it has more area devoted to timber production than any other county in the State. Douglas County land supports a high timber volume and, together with neighboring Lane County, leads the State in both timber inventory and log production.

As recently as 1933 (USDA Forest Service 1934), three-quarters of the county's commercial forest land was dominated by large conifer sawtimber trees. Since then, some 50 billion board feet^{1/} of timber have been removed (Wall 1972), supporting a timber industry that dominates the economy of the county. Although 42 years of cutting have substantially reduced the volume of standing timber, the remaining board-foot inventory still exceeds that of 44 of the 50 States (USDA Forest Service 1973).

Directly or indirectly, the economy of Douglas County depends almost entirely on timber (Darr and Fight 1974). As the stockpile of old-growth timber declines, local and regional planners are asking increasingly urgent questions. They still need to

know how much of the old-growth timber remains; but they are also vitally interested in the condition of the rest of the resource--the cutover lands from which future timber supplies must come. This new inventory provides essential data for answering both kinds of questions.

The Current Timber Situation

THE TOTAL INVENTORY

Douglas County is over 80-percent commercial forest land with a sawtimber inventory volume of 65.9 billion board feet. Small amounts of the productive forest land have been reserved from cutting by statute or administrative order--a portion of the Oregon Dunes National Recreation Area and several small public parks. Approximately 5 percent of the county is unproductive forest land: two-thirds oak woodlands and one-third rough land, too steep and rocky for timber production on a continuous basis. Less than 14 percent of the county is nonforest land.

Area in each land class in Douglas County is shown below:

<u>Land class</u>	<u>Area</u> (Thousand acres)
Commercial forest	2,641
Productive reserved forest	7
Unproductive forest	150
Nonforest	442
All classes	3,240

^{1/} Board-foot volumes in this report are according to the International 1/4-inch rule.

WHO OWNS THE TIMBER?

The U.S. Government is the single largest timber owner in Douglas County with 57 percent of the commercial forest land (fig. 1) and 75 percent of the sawtimber volume (fig. 2). An additional 2 percent of both land and volume is held by the State, the county, and several municipalities. Forest industries hold 29 percent of the commercial forest land and 21 percent of the volume. The remaining 12 percent of the commercial forest land is owned by other private owners. These lands have been almost entirely cutover and have negligible timber volume.

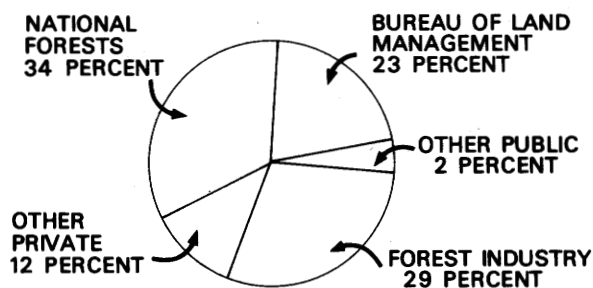


Figure 1.--Distribution of commercial forest land area by owner, January 1, 1974.

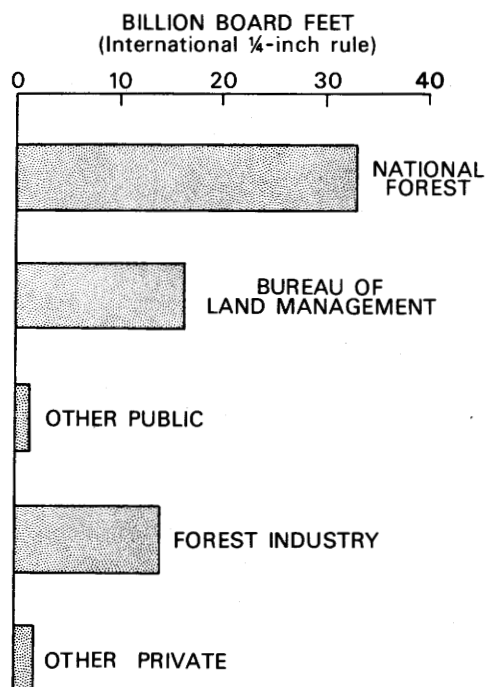


Figure 2.--Volume of sawtimber on commercial forest land by owner, January 1, 1974.

THE NATIONAL FORESTS

Most of the Umpqua National Forest and parts of three other forests--the Siuslaw, the Rogue River, and the Willamette--fall within the boundaries of Douglas County. With 34 percent of the commercial forest land in the county, the National Forests represent the largest single forest land owner. Of that land 70 percent is occupied by timber stands that are over 100 years old, making the National Forests the largest remaining reserve of old-growth timber in the county. The sawtimber inventory of over 32 billion board feet (fig. 2) represents half the volume in the county.

Douglas-fir type predominates (fig. 3), but over one-fifth of the commercial forest land is in true fir-mountain hemlock and lodgepole pine types. These types occur at higher elevations where growth rates are characteristically slow, particularly during the early life of the stand, and where regeneration problems are often encountered. Such areas are valuable for recreation, watershed protection, and scenery. Although currently supporting a large sawtimber inventory accumulated over several hundred years, these lands are likely to contribute less to future timber supply than more productive but less scenic lands at lower elevations.



Figure 3.--Mature stands of Douglas-fir like this predominate on Federal lands.

Before World War II, little logging took place on National Forest land in Douglas County. Since that time, about 109,000 acres have been clearcut and another 43,000 acres have been partially cut (fig. 4). Eighty-three percent of the commercial

forest land on National Forests is still uncut and all but 75,000 acres are stocked with sawtimber stands--90 percent of them over 100 years old.

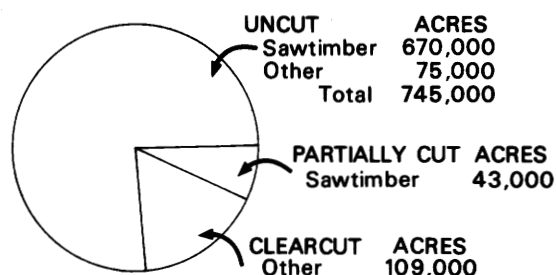


Figure 4.--Commercial forest land on National Forests by cutting history and stand-size class, January 1, 1974.

Not all the National Forest sawtimber is equally available for harvest. Only 58 percent^{2/} of the commercial forest area is considered part of the "standard component" (defined in the Forest Service Manual as "...regulated commercial forest land area on which crops of industrial wood can be grown and harvested with adequate protection of the forest resource under the usual provisions of the timber sale contract."). An additional 26 percent--the "special component"--falls in travel and water influence zones and on the peripheral portions of developed sites where various harvesting restrictions reduce yields, raise logging costs, or both. The remaining 16 percent--the "marginal component"--includes timber that is unlikely to be sold within the next 10 years

^{2/} Data as of January 1, 1974. Component classification is subject to periodic revision.

because of high development costs, low product values, or resource protection constraints. The commercial forest area on National Forest land is distributed among the components as follows:

<u>Component</u>	<u>Area</u> (Thousand acres)
Standard	515
Special	236
Marginal	146
Total commercial forest	897

Almost 4 percent of the clearcut acres are recent clearcuts scheduled for planting. Another 59 percent have been satisfactorily restocked (stocking definitions on page 32). Conifer stocking on an additional 23 percent of the clearcut acres is insufficient for full utilization of the site. The remaining 14 percent are nonstocked (fig. 5). Three-quarters of the unsatisfactorily stocked clearcuts are on harsh sites with shallow soil (called "tough sites" in this report). These areas have proved difficult to regenerate and plantation failures are common, especially in the South Umpqua River drainage, where the soil and climate are particularly inhospitable to young seedlings. Currently, large clearcuts are avoided on these tough sites. Instead, a shelterwood overstory is left to provide shade until the young seedlings are established. Forest silviculturists hope this practice will permit better regeneration success in the future.

Today, National Forest lands in Douglas County are still dominated by mature stands of conifer; but eventually, the old growth will be gone and the harvest

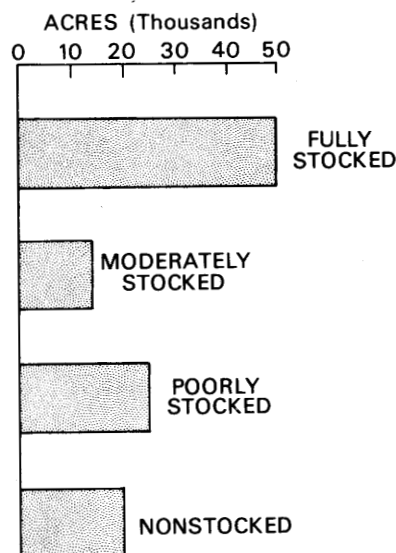


Figure 5.--Acres clearcut on National Forest land by stocking class, January 1, 1974. "Nonstocked" includes recent clearcuts.

will come from regenerated stands. Then, stands that were inadequately restocked will produce low yields.

Although 41 percent of the clearcut areas are not satisfactorily stocked, the acreage involved is fairly small. However, many uncut stands pose the same regeneration hazards that have proved so vexing in the past. Unless tough site regeneration problems are solved, large areas of poorly stocked cut-over may be created, proportionately lowering future timber yields.

BUREAU OF LAND MANAGEMENT LANDS

The Bureau of Land Management (BLM) administers 609,000 acres of commercial forest land within Douglas County. Four Districts are represented--Roseburg, Medford, Coos Bay, and Eugene. In total, the BLM land includes 23 percent

of the commercial forest land and 25 percent of the sawtimber volume in the county.

Generally, the BLM lands lie at lower elevations and are closer to settled areas than the National Forests. Thus, they show greater evidence of both fire and cutting activities than the National Forest lands, with regeneration and immature sawtimber stands more common. Still, 45 percent of the BLM's commercial forest is sawtimber over 100 years old--37 percent uncut sawtimber and 8 percent partially cut sawtimber. In addition, there are 104,000 acres of younger sawtimber--27,000 of them partially cut. In total, 62 percent of the commercial forest area supports sawtimber stands (fig. 6).

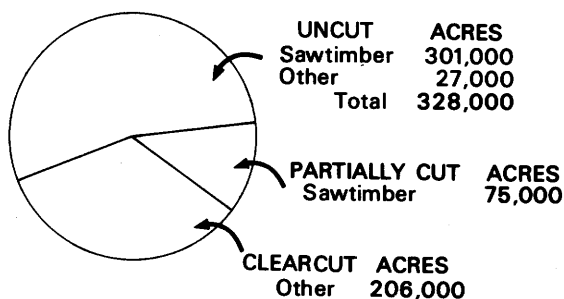


Figure 6.--Commercial forest land administered by the Bureau of Land Management by cutting history and stand-size class, January 1, 1974.

With an inventory of over 17 billion board feet, the BLM has the second largest volume of sawtimber in the county. BLM land is typically lower elevation Douglas-fir type, checkerboarded with private cutover (see cover). Fragile higher elevation sites are uncommon, and

recreation pressure is relatively light compared with the National Forests. As a result, land use restrictions on timber harvest are few. Most of the BLM area is comparable to the "standard component" on National Forests.

Although the BLM sawtimber inventory is only one-half that of the National Forests, the annual harvest on the two ownerships is nearly equal. This difference occurs, at least partly, because BLM lands are inherently more productive than National Forest lands and are subject to fewer restraints on timber harvest. The net effect is that the stocks of mature timber on BLM lands are being harvested at a faster rate than on National Forest lands. Even so, complete conversion to second-growth management is at least 40 or 50 years away. In the meantime, the timber harvest will come from stands now classed as sawtimber.

One-third of the commercial forest land administered by BLM has been clearcut. Sixty-eight percent of the clearcut acres have satisfactorily restocked, 21 percent are poorly stocked, and the remaining 11 percent are nonstocked (fig. 7). More than half the nonstocked area has been cutover in the last 5 years and is scheduled for planting.

BLM clearcuts have been regenerated more successfully than those of any other ownership. Still, one-fourth of the area that was clearcut more than 5 years ago is unsatisfactorily stocked. As on National Forests, tough site regeneration problems must be solved if production goals are to be met.

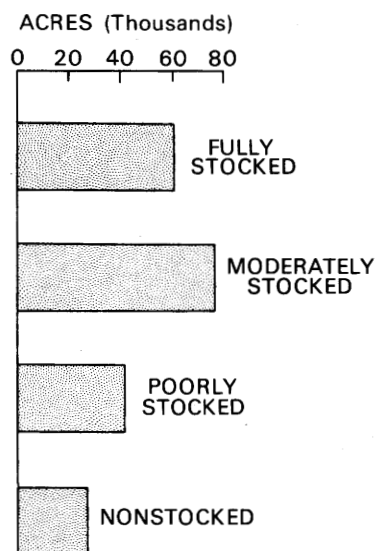


Figure 7.--Acres clearcut on Bureau of Land Management land by stocking class, January 1, 1974. "Non-stocked" includes recent clearcuts.

FOREST INDUSTRY LANDS

Forest industry owns 773,000 acres of commercial forest land in Douglas County. Although logging history on these lands dates back to the turn of the century, most areas were untouched until the 1940's. Then, after World War II, log harvest was greatly accelerated. During the late 1940's and early 1950's, 80 to 90 percent of the total log harvest was from private lands--predominantly forest industry. Since that time, cut has dropped on private lands and increased on public lands until, by the early 1970's, the forest industry share of the total log harvest was about 40 percent. Not surprisingly, the saw-log inventory on forest industry lands has been substantially reduced as a result of this cutting.

Forest industry owns 21 percent of the sawtimber volume on 29 percent of the commercial forest acres in the county. Forty-three percent of the commercial forest area still supports sawtimber stands, but half has been partially cut (fig. 8). Most of the sawtimber is over 100 years old; however, a third is younger. Some of the younger stands were regenerated after clearcutting in the early part of the century.

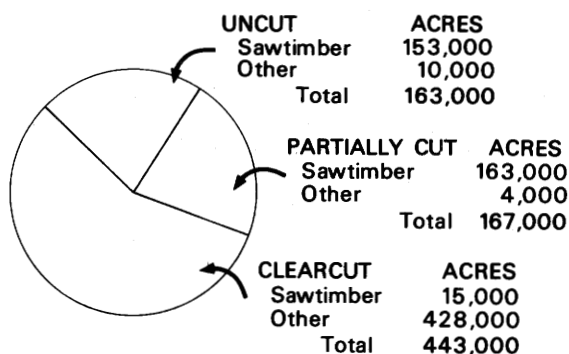


Figure 8.--Commercial forest land owned by forest industry by cutting history and stand-size class, January 1, 1974.

Forest industry land supports a sawtimber inventory of almost 14 billion board feet. At the current rate of harvest, the inventory will not last more than 20 years. Although this supply will be supplemented by stands which grow to sawtimber size, such stands are limited. Forest industry owns only 52,000 acres of poletimber lands; over half of these are understocked. These data appear to confirm the conclusion reached by Beuter et al. (1976) that the timber harvest from industrial lands

in Douglas County will be greatly reduced by the year 2000.

What will be the timber harvest from forest industry lands during the early decades of the next century? The answer will depend on how well the cutover is regenerated and on the intensity of timber management. Future yields may be enhanced by good silviculture provided the growing stock is there to manage. Poorly stocked forest lands will produce low yields, regardless of management efforts.

Because of low conifer stocking, 62 percent of the forest industry clearcut area is underutilized (fig. 9)--24 percent nonstocked and 38 percent poorly stocked.

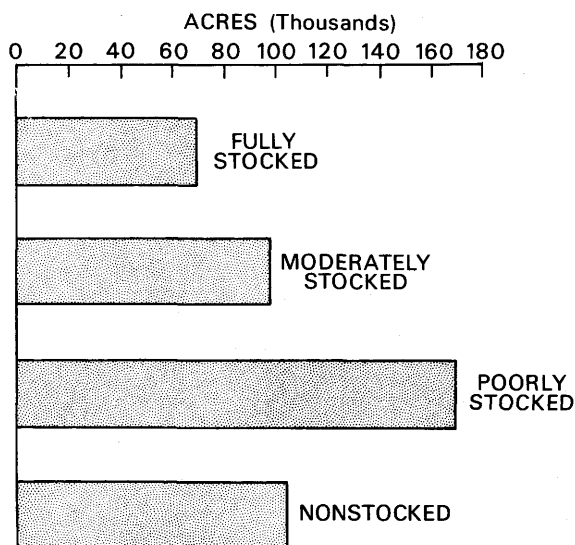


Figure 9.--Acres clearcut on forest industry land by stocking class, January 1, 1974. "Nonstocked" includes recent clearcuts.

Stocking class distribution on forest industry land by date of cutting is:

<u>Date of clearcutting</u>	<u>Satisfactorily stocked</u>
	(Percent)
1968-70	54
1963-67	41
1953-62	53
Before 1953	48

Regeneration problems obviously still exist on forest industry lands as well as on other ownerships. Data for the years 1971-73 were not included in this analysis because many of the recent clearcuts had not yet been planted.

Accelerated management efforts may alter this picture. Nevertheless, any projection of future yields from regenerated stands on industrial lands must take into account the impact of sparse conifer stocking.

OTHER PRIVATE LANDS

Farmers own 235,000 acres of commercial forest land in Douglas County; an additional 71,000 acres are owned by other miscellaneous private owners. These lands are concentrated at lower elevations on hot, dry sites (fig. 10). In general, they tend to be less productive and more subject to regeneration failure than other forest lands in the county. Heavy logging during the years immediately after World War II removed most of the original sawtimber (fig. 11). Only 1.6 billion board feet remain--an average of only 5,216 board feet per acre.



Figure 10.--Many of the other private lands occur at lower elevations, and the hot dry sites are difficult to regenerate.

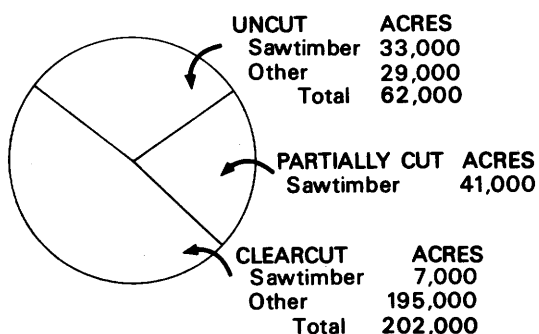


Figure 11.--Commercial forest land owned by other private owners by cutting history and stand-size class, January 1, 1974.

Stocking is typically poor on the cutover lands of other private owners (fig. 12). Only one-fourth of the clearcut area is satisfactorily stocked and 65 percent nonstocked. Seventy percent of the nonstocked land was logged more than 20 years ago; an additional 23 percent was logged more than 15 years ago. This land is now dominated by a heavy hardwood and brush cover. Reforestation is generally difficult and expensive.

The current inventory is low on other private lands in Douglas County. In addition, there is little immature growing stock to provide future harvests. Other private lands are unlikely to contribute materially to the Douglas County timber supply in the foreseeable future.

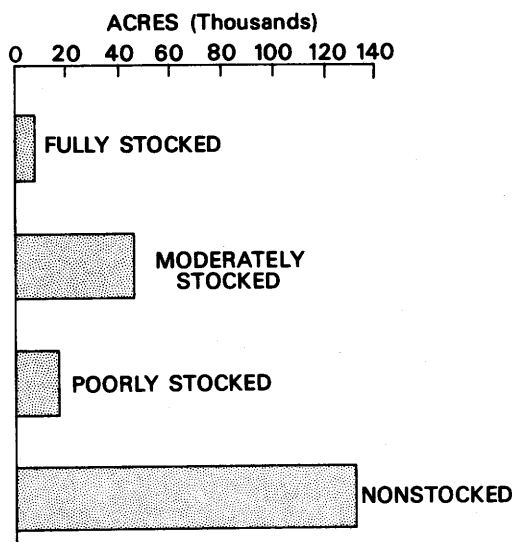


Figure 12.--Acres clearcut on other private commercial forest lands by stocking class, January 1, 1974. "Nonstocked" includes recent clearcuts.

OTHER PUBLIC LANDS

State, county, and municipal governments own only 56,000 acres of commercial forest land in Douglas County. The total sawtimber volume on these lands is about 1 billion board feet. The inventory sample on these lands was too small to permit a meaningful breakdown of the area into condition classes. Based on our limited sample, they appear to resemble forest industry lands more than any other owner group.

GROWTH AND MORTALITY

The following tabulation compares rates of conifer growth found on the five major forest owner groups:

<u>Owner</u>	<u>Annual gross growth/acre</u>	<u>Annual mortality/acre</u>	<u>Net annual growth/acre</u>
		(Cubic feet)	
National Forests	60	22	38
Bureau of Land Management	58	31	27
Other public	59	14	45
Forest industry	38	15	23
Other private	37	1	36

Growth rates are low in Douglas County relative to their potential. The reason varies between owner groups. Growth rates reflect the basic productivity of the land; but more important, they also reflect the stage of development and the stocking level of the stands.

Public lands are predominantly well stocked with mature timber. For these trees, the period of rapid growth has already passed. Even so, they are growing at a rate comparable to that for normal 150-year-old stands growing on site III (McArdle et al. 1961). Gross growth still exceeds mortality by about 40 cubic feet per acre per year.

Forest industry land also supports some mature timber stands growing at a rate comparable to the public forests. However, half of the industry land is either occupied by seedling and sapling stands or nonstocked. Since volume growth is measured only on trees 5 inches and larger in diameter, no growth is measured on these stands. Stands in the highly productive 30- to 60-year age range are rare on forest industry lands. The net result is a growth rate considerably lower than that found on public lands.

Other private lands do support some stands which are at the age where growth rates range from 100 to 200 cubic feet per acre per

year. However, 2 out of every 3 acres are poorly stocked or nonstocked. As long as this condition prevails, growth rates will remain far below the potential for the ownership.

Given the present imbalance of age classes, growth rates are not really a useful tool for assessing the status of timber management in Douglas County. A more effective approach is to assess the condition of the land and to determine what silvicultural practices would be required to bring the land into full production. The next section of this report will consider these questions.

Opportunities for Silvicultural Treatment

Timber volume inventories are usually used to estimate shortrun timber supply, and stocking surveys typically describe the condition of the cutover lands--the source of supply in the more distant future. Additional information is needed to learn how thinning, planting, and control of competing vegetation can contribute to increased wood production. By analyzing supplemental data collected as part of the Douglas County inventory, we have identified the silvicultural activities needed to bring the land up to full timber production. Although fertilization is not specifically identified as a treatment in the discussion that follows, it will probably increase yields of adequately stocked stands, particularly when combined with other treatments (Miller and Williamson 1974). Likewise, when planting is prescribed, high quality stock can be expected to increase future yields.

Specific treatments identified in the inventory include:

Regeneration cutting.--Stands past the age of culmination of mean annual cubic-foot increment are regeneration cutting opportunities.

Commercial thinning.--Stands younger than the age of culmination with more conifer stocking than is needed to exploit the growth potential of the site are candidates for commercial thinning, provided the mean stand diameter is at least 8 inches.

Precommercial thinning.--Smaller stands with surplus stocking are precommercial thinning opportunities, provided stand height is between 10 and 30 feet. Such thinnings should increase timber yields.

Cleaning or release.--Sometimes conifer seedling and sapling stands are intermixed with brush and small hardwoods. If this broadleaf competition threatens to crowd and overtop the conifers, a cleaning or release is needed.

Improvement cutting.--When large hardwoods and cull conifers are using valuable growing space and competing with crop trees, an improvement cut is prescribed.

Planting.--Areas with little or no conifer stocking are considered planting opportunities, usually preceded by site preparation.

Stand conversion.--When the site is already occupied by trees that are neither presently nor prospectively merchantable and are too large for herbicide treatment, a stand conversion is called for.

Planting of openings.--Seedling and sapling stands with large, nonstocked openings are identified separately as opportunities for planting (fig. 13).



Figure 13.--Large openings need to be planted if full production is to be achieved in the future.

We have not attempted to quantify the increases in yields that can be achieved through treatment nor have we made any assessment of the economic feasibility of treatment.

THE NATIONAL FOREST AND BLM LANDS

Lands administered by the U.S. Forest Service and by the Bureau of Land Management are predominantly stocked with stands of mature timber--mature in the sense that growth rates have slowed down. There are 630,000 acres of this timber on National Forest and another 335,000 acres on BLM lands. In a regulated forest, these stands would be harvested as they reached rotation age. In an unregulated mature forest, such a policy would lead to immediate liquidation of most of the growing stock. Both National Forest and BLM policies dictate an allowable annual harvest that does not exceed the future annual harvest attainable under management--one which will not decline after the old-growth timber is gone. To implement this policy, the Federal agencies will harvest current inventory relatively slowly over many decades. In the meantime, most of the existing forest will be stored on the stump. If growth continues to exceed mortality, inventory loss during storage may be minimal. By scheduling harvest in the most decadent stands first and by sanitation salvage logging, the Federal agencies hope to forestall or capture part of the mortality.

The opportunities for silvicultural treatment on Federal lands are:

<u>Treatment</u>	<u>Bureau of Land Management</u>	<u>National Forest</u>
	(Thousand acres)	
Harvest:		
Regeneration cutting	335	630
Commercial thinning	10	47
Reduce competition:		
Precommercial thinning	42	49
Cleaning or release	25	2
Improvement cutting	10	--
Plant:		
Site preparation and planting	8	22
Site preparation and planting of openings	58	32
Stand conversion	5	--
No current treatment recommended:		
Recent clearcut	15	4
Satisfactory stocking	89	46
Treatment impractical:		
High elevation low site	--	65
Tough site areas	12	--
Total commercial forest area	609	897

At least 40 percent of the mature timber on National Forest land and at least 25 percent of the mature timber on BLM land will be harvested by some form of partial cutting. Shelterwood cutting is often used to protect nontimber resource values or because tough site regeneration problems make clearcutting inadvisable. In some cases, restrictive cutting regulations will reduce future yields; in other instances, yields may be improved by prompt regeneration.

In addition to the mature timber mentioned above, there are 49,000 acres of mature timber growing on low sites at higher elevations on the Umpqua National Forest and 16,000 similar acres growing immature timber. These small diameter stands with comparatively low productivity and limited merchantability are unlikely to be intensively managed for timber production.

Only 5 percent of National Forest timber and 2 percent of BLM timber are suitable for commercial thinning. Many of the opportunities for treatment in National Forests are in stands which, although relatively young, are past the usual rotation age. Such stands, when still young and vigorous enough to respond, are scheduled for commercial thinning because the long storage period precludes early final harvest.

Opportunities for other types of cultural activities are limited in these predominantly old-growth forests. Dense sapling stands suitable for precommercial thinning are found on only 6 percent of the Federally owned commercial forest land. Site preparation and planting are needed on 22,000 acres of National Forest land and 8,000 acres of BLM land. An additional 32,000 acres on National Forests and 58,000 acres on BLM land are occupied by young stands with openings that could be planted after suitable site preparation. Typically, the planting backlog is on tough sites where the cost of successful regeneration will be high. Inventory data showed only a scattered acreage of young stands in need of release from competing hardwoods, shrubs, and other plants. However, data on competing vegetation were not collected on the Federal agency inventories and could only be inferred from hardwood tally and cover classes. The actual acreage in need of release could be considerably larger than reported here.

There are 12,000 acres of BLM land classed as "treatment unknown" in stands of mixed age and mixed species on tough sites. Current productivity is very low in these stands, with hardwood species such as madrone predominating.

The prescription would be "stand conversion" except for the high risk of regeneration failure. More research is needed on how to replace these stands with more productive ones.

A considerable acreage--104,000 acres of BLM land and 50,000 acres of National Forest land--was placed in "no current treatment" (includes recently cutover acreage scheduled for planting). Some of these acres represent recent clearcuts scheduled for planting. Others are stocked with dense regeneration too young to be precommercially thinned. Many acres, however, are too sparse to qualify for thinning. Such stands may be fully utilizing the site or they may be understocked but too old for interplanting. The latter type of stand will probably be fully stocked by maturity, but intermediate harvests are likely to be forgone.

In summary, opportunities for cultural practices other than harvest cutting are limited on Federal land in Douglas County. Because of the relative scarcity of immature stands, the opportunities will probably remain limited for some years.

FOREST INDUSTRY LANDS

Only one-fourth of forest industry's commercial forest area is stocked with mature timber ready for harvest. If present harvest levels continue, most of these stands will be logged within 20 years, presenting opportunities for intensive management of the new stands that replace them. In the meantime, these stands, like those on Federal forest land, present little opportunity for silvicultural treatment other than sanitation salvage of dead and weakened trees.

Unlike the Federal forests, a substantial portion of industrial lands have been cutover, creating opportunities for young-growth management. Future yields on the one-tenth of the commercial forest area that is in dense regeneration could be increased by precommercial thinning (fig. 14). Almost as many acres of immature conifer stands are growing slowly because of severe competition from brush and hardwoods.



Figure 14.--Precommercial thinning opportunities are concentrated on forest industry lands.

Of the industrial forest land 8 percent is growing madrone, cull remnants left after logging, and other unsalvable material. This land will not be productive until it is cleared and planted--an expensive undertaking. An additional 18 percent is occupied by varying amounts of brush, ferns, grass, and hardwood saplings. Site preparation and planting are needed before this land will contribute to future timber supplies. On another 11 percent of the area, clumps of conifer regeneration alternate with nonstocked openings. Site preparation and planting of these openings could increase future timber yields.

Finally, 14 percent of the forest industry-owned land is not now suitable for silvicultural treatment. Two percent is recent cutover scheduled for planting, 3 percent is reforested with trees too young for thinning, 3 percent is understocked with immature stands too old for interplanting, and 2 percent is on tough sites where timber values are low and silvicultural treatments are likely to fail. The remaining 4 percent of the area is stocked at the level recommended for maximum timber production.

Acreages available for silvicultural treatment are:

<u>Treatment</u>	<u>Area</u> (Thousand acres)
Harvest:	
Regeneration cutting	210
Commercial thinning	14
Reduce competition:	
Precommercial thinning	87
Cleaning or release	59
Improvement cutting	8
Plant:	
Site preparation and planting	140
Site preparation and planting of openings	83
Stand conversion	65
No current treatment:	
Recent clearcut	14
Satisfactory stocking	79
Treatment impractical:	
Tough site areas	<u>14</u>
Total commercial forest area	773

In the long run, the single greatest opportunity to increase timber supplies is through site preparation and planting. Over 200,000 acres of industrial forest land in Douglas County is unproductive for lack of conifer stocking.

An additional 83,000 acres are stocked with patches of conifer trees interspersed with patches of brush and hardwoods (fig. 15). Although these lands could be highly productive if properly stocked with conifers, treatment would be expensive. Much of the land has been out of production for 20 or more years and is now supporting a lush growth of brush and hardwoods. A separate study is needed to determine the costs associated with treatment.



Figure 15.--Although clearcut 10-15 years ago, some forest industry lands remain poorly stocked. This is a tough site stocked with madrone and canyon live oak.

OTHER PRIVATE LANDS

Other private forest lands support little mature timber. Only 48,000 acres are ready for harvest, and half of these have already been partially cut. There are few opportunities for thinning or release from overtopping brush or hardwoods. About 10 percent of the area does not need treatment because it is stocked at or near the recommended level for timber production.

The opportunities for silvicultural treatment on commercial

forest lands of other private owners are:

<u>Treatment</u>	<u>Area</u> (Thousand acres)
Harvest:	
Regeneration cutting	48
Commercial thinning	4
Reduce competition:	
Precommercial thinning	8
Cleaning or release	13
Plant:	
Site preparation and planting	40
Site preparation and planting of openings	38
Stand conversion	25
No current treatment:	
Recent clearcut	4
Satisfactory stocking	30
Treatment impractical:	
Nonstocked tough sites	<u>96</u>
Total commercial forest land	306

The predominant silvicultural opportunity on these private lands is site preparation and planting. Less than half the commercial forest land held by other private owners is now producing conifers; 8 percent is currently stocked with madrone, cull conifers, and other unsalable material. Another 13 percent is stocked with varying amounts of brush, hardwood saplings, bracken fern, and grass; an equal area is covered by a mixture of brush, and conifer clumps. Finally, 31 percent is in brushy cutover sites too hot and dry to successfully regenerate after they are clearcut.^{3/} These tough sites were almost all clearcut in the late 1940's and have failed to restock. Efforts to reforest these areas would be expensive and uncertain of success. Furthermore, even after complete regeneration,

^{3/} Richard E. Carkin and Don Minore. Harvest cutting prescriptions based on an environmental classification. Report on file at Forestry Sciences Laboratory, Pacific Northwest Forest and Range Experiment Station, Corvallis, Oregon.

yields would probably not exceed 50 cubic feet per acre per year.

Although other private lands are in poorer condition for timber production than other lands, they offer few attractive opportunities for investment in silvicultural treatment. Typically, they are cutover lands at lower elevations on hot dry sites with lower than average productivity. Most areas were logged after World War II and have never restocked. Treatment now would be difficult and expensive.

OTHER PUBLIC LANDS

Because State, county, and municipal lands were sampled with only a few field plots, the inventory provides only an indication of the condition of these lands. In general, lands in this group resemble those belonging to forest industry; conclusions reached there are probably applicable to State, county, and municipal lands as well.

<u>Treatment</u>	<u>Area</u> (Thousand acres)
Harvest:	
Regeneration cutting	18
Reduce competition:	
Cleaning or release	8
Precommercial thinning	6
Plant:	
Site preparation and planting	12
No treatment:	
Acceptable stocking	<u>12</u>
Total commercial forest land	56

Conclusion

Douglas County still has a large inventory of conifer

sawtimber--63.9 billion board feet--but 76 percent of it is publicly owned. Declining inventories will necessitate substantial reductions in the private timber harvest during the next two decades.

About half of Douglas County's commercial forest area is either occupied by stands too young for harvest or is nonstocked. Many of these acres are growing less than their productive capacity either because of sparse or overly dense stocking or because of excessive competition from brush and hardwoods. A summary of these treatment opportunities follows:

<u>Treatment</u>	<u>Acres</u> <u>available</u> <u>for</u> <u>treatment</u>	<u>Percent</u> <u>of total</u> <u>commercial</u> <u>forest area</u>
Plant or start over	317,000	12
Plant openings in stand	211,000	8
Remove broadleaf competition	125,000	5
Precommercial thinning	<u>192,000</u>	<u>7</u>
Total precommercial treatment opportunities	845,000	32

In the long run, Douglas County's timber supply will come from the acres treated and from the stands that will be formed after harvest of the remaining old growth. It is therefore significant that 20 percent of the commercial forest land in the county needs planting. Although poor stocking is, in part, a result of past inattention, this is not the whole story. In much of Douglas County, regeneration problems present a real challenge to the land manager. Repeated plantation failures are common, particularly in the South Umpqua drainage. If regeneration failures are to be avoided, more research is needed in regeneration techniques on tough sites. The rehabilitation of nonstocked lands will require both research and a large investment in site preparation and planting.

Tables

METRIC CONVERSIONS

1,000 acres	= 404.69 hectares
1,000 cubic feet	= 28.3 cubic meters
1 cubic foot per acre	= 0.0700 cubic meter per hectare
1 square foot basal area per acre	= 0.2296 square meter per hectare
1 foot	= 30.48 centimeters

Table 1.--Area by land class, Douglas County,
Oregon, January 1, 1974
(In thousand acres)

Land class	Area
Forest land:	
Commercial	2,641
Productive reserved	7
Unproductive	150
Total	2,798
Nonforest land ¹	442
Total area ²	3,240

¹Includes cropland, pasture and range, swampland, industrial and urban areas, powerline clearings, railroads, all improved roads and highways, and water as classified by Forest Survey standards but defined by the Bureau of Census as land.

²Source: United States Bureau of the Census, Land and Water Area of the United States, 1970.

Table 2.--Area of commercial forest land by
ownership class, Douglas County,
Oregon, January 1, 1974
(In thousand acres)

Ownership class	Area
National Forest	897
Other public:	
Bureau of Land Management	609
State	48
County and municipal	8
Total	665
Private:	
Forest industry	773
Other private:	
Farmer owned	235
Miscellaneous	71
Total	1,079
All ownerships	2,641

Table 3.--Area of commercial forest land by cubic-foot site and ownership classes,
Douglas County, Oregon, January 1, 1974
(In thousand acres)

Site class ¹ (cubic feet)	All ownerships	National Forest	Bureau of Land Management	Other public	Forest industry	Other private
225 or more	22	4	1	--	17	--
165 to 224	191	53	41	9	73	15
120 to 164	974	253	267	19	396	39
85 to 119	754	274	152	8	207	113
50 to 84	566	284	140	8	37	97
20 to 49	134	29	8	12	43	42
All classes	2,641	897	609	56	773	306

¹A classification in terms of capacity for cubic-foot annual growth per acre at culmination of mean annual growth in fully stocked natural stands.

Table 4.--Area of commercial forest land on conifer sites¹ by ownership,
conifer stocking, and stand-size classes, Douglas County,
Oregon, January 1, 1974

(In thousand acres)

Ownership and conifer stocking classes	Stand-size class					Total
	Large sawtimber	Small sawtimber	Poletimber	Seedlings and saplings	Nonstocked	
National Forest:						
Full	433	120	38	76	--	667
Moderate	102	33	5	14	--	154
Poor	19	6	2	27	--	54
Nonstocked	--	--	--	--	22	22
Total	554	159	45	117	22	897
Bureau of Land Management:						
Full	173	32	10	67	--	282
Moderate	111	17	10	77	--	215
Poor	30	8	2	43	--	83
Nonstocked	--	--	--	--	29	29
Total	314	57	22	187	29	609
Other public:						
Full	9	--	12	--	--	21
Moderate	3	--	--	--	--	3
Poor	--	5	--	--	--	5
Nonstocked	--	--	--	--	15	15
Total	12	5	12	--	15	44
Forest industry:						
Full	51	35	--	70	--	156
Moderate	96	64	24	53	--	237
Poor	56	33	28	158	--	275
Nonstocked	--	--	--	--	105	105
Total	203	132	52	281	105	773
Other private:						
Full	--	1	7	7	--	15
Moderate	22	22	12	32	--	88
Poor	6	28	22	14	--	70
Nonstocked	--	--	--	--	133	133
Total	28	51	41	53	133	306
Grand total	1,111	404	172	638	304	2,629

¹Excludes 12,000 acres of commercial forest land on hardwood sites.

Table 5.--Area of commercial forest land by forest type and ownership class,

Douglas County, Oregon, January 1, 1974

(In thousand acres)

Forest type	All ownerships	National Forest	Bureau of Land Management	Other public	Forest industry	Other private
Douglas-fir	1,735	593	538	24	505	75
White fir	12	12	--	--	--	--
Shasta red fir	27	27	--	--	--	--
Grand fir	48	20	1	--	10	17
Subalpine fir	5	5	--	--	--	--
Pacific silver fir	14	14	--	--	--	--
Noble fir	18	18	--	--	--	--
Ponderosa pine	21	5	2	--	9	5
Jeffrey pine	23	--	--	--	23	--
Sugar pine	5	5	--	--	--	--
Western white pine	2	2	--	--	--	--
Lodgepole pine	65	65	--	--	--	--
Sitka spruce	4	--	--	--	4	--
Mountain hemlock	57	57	--	--	--	--
Western hemlock	71	29	18	--	24	--
Incense-cedar	43	5	3	--	--	35
Port-Orford-cedar	10	--	--	--	10	--
Western redcedar	41	4	6	--	31	--
Red alder	44	8	4	12	13	7
Maple	22	--	4	--	10	8
California black oak	2	--	--	--	2	--
Oregon white oak	64	--	--	8	--	56
Chinkapin	5	4	1	--	--	--
Madrone	126	2	8	--	47	69
Other commercial hardwoods	37	--	1	12	20	4
Noncommercial hardwoods	8	--	1	--	--	7
Nonstocked	132	22	22	--	65	23
All types	2,641	897	609	56	773	306

Table 6.--Volume of growing stock and sawtimber on commercial forest land
by ownership class and by softwoods and hardwoods,
Douglas County, Oregon, January 1, 1974

Ownership class	Average volume per acre	All species	Softwoods	Hardwoods
	<i>Cubic feet</i>	<i>- - - - - Million cubic feet - - - - -</i>		
Growing stock: ¹				
National Forest	6,173	5,537	5,469	68
Bureau of Land Management	4,695	2,859	2,648	211
Other public	2,946	165	114	51
Forest industry	2,517	1,946	1,821	125
Other private	1,098	336	245	91
All ownerships	4,106	10,843	10,297	546
	<i>Board feet</i>	<i>- - - - - Million board feet - - - - -</i>		
Sawtimber (International 1/4-inch rule): ²				
National Forest	36,443	32,689	32,274	415
Bureau of Land Management	27,117	16,514	15,805	709
Other public	19,625	1,099	824	275
Forest industry	18,082	13,977	13,596	381
Other private	5,216	1,596	1,430	166
All ownerships	24,943	65,875	63,929	1,946
Sawtimber (Scribner rule): ³				
National Forest	28,415	25,488	25,212	276
Bureau of Land Management	25,133	15,306	14,607	699
Other public	15,054	843	620	223
Forest industry	13,935	10,772	10,461	311
Other private	3,376	1,033	894	139
All ownerships	20,236	53,442	51,794	1,648

¹Includes trees 5.0 inches in d.b.h. and larger.

²Includes softwood trees 9.0 inches in d.b.h. and larger and hardwood trees 11.0 inches in d.b.h. and larger.

³Includes trees 11.0 inches in d.b.h. and larger.

Table 7.--Net volume of growing stock on commercial forest land by species and ownership class, Douglas County, Oregon, January 1, 1974

(In million cubic feet)

Species	All ownerships	National Forest	Bureau of Land Management	Other public	Forest industry	Other private
Softwoods:						
Douglas-fir	7,492	3,633	2,181	109	1,431	138
True firs	731	643	59	1	15	13
Ponderosa and Jeffrey pines	156	48	20	--	73	15
Sugar pine	241	166	43	--	32	--
Western white pine	90	87	3	--	--	--
Lodgepole pine	94	94	--	--	--	--
Hemlocks	970	616	194	(¹)	154	6
Incense-cedar	258	98	65	4	22	69
Western redcedar	243	66	83	--	90	4
Other softwoods ²	22	18	--	--	4	--
Total	10,297	5,469	2,648	114	1,821	245
Hardwoods:						
Red alder	162	54	27	44	25	12
Other hardwoods ³	384	14	184	7	100	79
Total	546	68	211	51	125	91
All species	10,843	5,537	2,859	165	1,946	336

¹Less than 500,000 cubic feet.

²Includes knobcone pine, Port-Orford-cedar, and Engelmann and Sitka spruces.

³Includes bigleaf maple, madrone, golden chinkapin, Oregon ash, cottonwood, oaks, and California laurel (Oregon myrtle).

Table 8.--Net volume of growing stock on commercial forest land by species and ownership class,

Douglas County, Oregon, January 1, 1974 (International 1/4-inch rule)

(In million board feet)

Species	All ownerships	National Forest	Bureau of Land Management	Other public	Forest industry	Other private
Softwoods:						
Douglas-fir	48,534	23,022	13,284	786	10,727	715
True firs	3,974	3,507	306	6	88	67
Ponderosa and Jeffrey pines	1,115	326	123	--	551	115
Sugar pine	1,639	1,124	263	--	252	--
Western white pine	500	484	16	--	--	--
Lodgepole pine	176	176	--	--	--	--
Hemlocks	4,966	2,722	1,067	4	1,132	41
Incense-cedar	1,473	520	323	28	139	463
Western redcedar	1,437	299	423	--	686	29
Other softwoods ¹	115	94	--	--	21	--
Total	63,929	32,274	15,805	824	13,596	1,430
Hardwoods:						
Red alder	835	358	126	246	93	12
Other hardwoods ²	1,111	57	583	29	288	154
Total	1,946	415	709	275	381	166
All species	65,875	32,689	16,514	1,099	13,977	1,596

¹Includes knobcone pine, Port-Orford-cedar and Engelmann and Sitka spruces.²Includes bigleaf maple, madrone, golden chinkapin, Oregon ash, cottonwood, oaks, and California laurel (Oregon myrtle).

Table 9.--Net volume of growing stock on commercial forest land by species and ownership class,Douglas County, Oregon, January 1, 1974 (Scribner rule)

(In million board feet)

Species	All ownerships	National Forest	Bureau of Land Management	Other public	Forest industry	Other private
Softwoods:						
Douglas-fir	39,799	17,972	12,360	598	8,452	417
True firs	3,106	2,755	269	--	44	38
Ponderosa and Jeffrey pines	842	257	115	--	387	83
Sugar pine	1,323	876	256	--	191	--
Western white pine	393	379	14	--	--	--
Lodgepole pine	136	136	--	--	--	--
Hemlocks	3,820	2,123	912	2	755	28
Incense-cedar	1,129	405	299	20	95	310
Western redcedar	1,160	234	382	--	526	18
Other softwoods ¹	86	75	--	--	11	--
Total	51,794	25,212	14,607	620	10,461	894
Hardwoods:						
Red alder	644	234	125	199	76	10
Other hardwoods ²	1,004	42	574	24	235	129
Total	1,648	276	699	223	311	139
All species	53,442	25,488	15,306	843	10,772	1,033

¹Includes knobcone pine, Port-Orford-cedar, Engelmann and Sitka spruces.²Includes bigleaf maple, madrone, golden chinkapin, Oregon ash, cottonwood, oaks, and California laurel (Oregon myrtle).

Table 10.--Volume of timber on commercial forest land by class of timber and by
softwoods and hardwoods, Douglas County, Oregon, January 1, 1974

(In million cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Saw-log portion	9,275	8,944	331
Upper-stem portion	910	873	37
Total	10,185	9,817	368
Poletimber trees	658	480	178
All growing stock trees	10,843	10,297	546
Sound cull trees	210	45	165
Rotten cull trees	384	353	31
Salvable dead trees	204	204	--
All timber	11,641	10,899	742

Table 11.--Net annual growth of growing stock and sawtimber on commercial forest land
by ownership class and by softwoods and hardwoods,
Douglas County, Oregon, January 1, 1974

Ownership class	Average volume per acre	All species	Softwoods	Hardwoods
<i>Cubic feet - - - - - Thousand cubic feet - - - - -</i>				
Growing stock: ¹				
National Forest	39	34,600	34,100	500
Bureau of Land Management	35	21,400	16,500	4,900
Other public	52	2,900	2,500	400
Forest industry	22	20,200	17,500	2,700
Other private	56	17,100	11,000	6,100
All ownerships	36	96,200	81,600	14,600
<i>Board feet - - - - - Thousand board feet - - - - -</i>				
Sawtimber (International 1/4-inch rule): ²				
National Forest	232	207,800	202,800	5,000
Bureau of Land Management	161	98,000	83,900	14,100
Other public	213	11,900	8,700	3,200
Forest industry	202	156,400	133,400	23,000
Other private	207	63,400	58,800	4,600
All ownerships	203	537,500	487,600	49,900
Sawtimber (Scribner rule): ³				
National Forest	181	162,800	159,800	3,000
Bureau of Land Management	150	91,400	77,500	13,900
Other public	146	8,200	5,300	2,900
Forest industry	121	93,800	76,600	17,200
Other private	138	42,200	38,400	3,800
All ownerships	151	398,400	357,600	40,800

¹Includes trees 5.0 inches in d.b.h. and larger.

²Includes softwood trees 9.0 inches in d.b.h. and larger and hardwood trees 11.0 inches in d.b.h. and larger.

³Includes trees 11.0 inches in d.b.h. and larger.

Table 12.--Net annual growth of growing stock on commercial forest land by speciesand ownership class, Douglas County, Oregon, January 1, 1974

(In thousand cubic feet)

Species	All ownerships	National Forest	Bureau of Land Management	Other public	Forest industry	Other private
Softwoods:						
Douglas-fir	55,400	20,000	12,600	2,600	11,600	8,600
True firs	7,500	5,000	900	100	700	800
Ponderosa and Jeffrey pines	1,100	200	100	--	500	300
Sugar pine	1-200	--	(2)	1-200	(2)	--
Western white pine	1-1,200	1-1,200	(2)	--	--	--
Lodgepole pine	1,000	1,000	--	--	--	--
Hemlocks	12,600	6,900	2,000	(2)	3,500	200
Incense-cedar	2,300	800	300	(2)	200	1,000
Western redcedar	2,500	1,100	600	--	700	100
Other softwoods ³	600	300	--	--	300	--
Total	81,600	34,100	16,500	2,500	17,500	11,000
Hardwoods:						
Red alder	3,100	400	700	300	900	800
Other hardwoods ⁴	11,500	100	4,200	100	1,800	5,300
Total	14,600	500	4,900	400	2,700	6,100
All species	96,200	34,600	21,400	2,900	20,200	17,100

¹Negative net annual growth is the result of net annual mortality exceeding gross annual growth.

²Less than 50,000 cubic feet.

³Includes knobcone pine, Port-Orford-cedar, and Sitka spruce.

⁴Includes bigleaf maple, madrone, golden chinkapin, Oregon ash, cottonwood, oaks, and California laurel (Oregon myrtle).

Table 13.--Net annual growth of sawtimber on commercial forest land by species and ownership class, Douglas County, Oregon, January 1, 1974
(International 1/4-inch rule)

(In thousand board feet)

Species	All ownerships	National Forest	Bureau of Land Management	Other public	Forest industry	Other private
Softwoods:						
Douglas-fir	326,200	131,900	66,700	9,600	74,400	43,600
True firs	38,200	28,500	2,400	400	3,900	3,000
Ponderosa and Jeffrey pines	10,700	2,400	200	--	4,800	2,900
Sugar pine	900	2,200	1-100	1-1,300	(²)	--
Western white pine	1-5,900	1-6,100	200	--	--	--
Lodgepole pine	4,600	4,600	--	--	--	--
Hemlocks	79,100	29,300	10,000	200	38,600	1,100
Incense-cedar	13,800	3,300	1,300	1-200	1,900	7,500
Western redcedar	15,800	4,300	2,800	--	8,000	700
Other softwoods ³	4,200	2,400	--	--	1,800	--
Total	487,600	202,800	83,900	8,700	133,400	58,800
Hardwoods:						
Red alder	13,000	4,000	3,000	2,700	3,100	200
Other hardwoods ⁴	36,900	1,000	11,100	500	19,900	4,400
Total	49,900	5,000	14,100	3,200	23,000	4,600
All species	537,500	207,800	98,000	11,900	156,400	63,400

¹Negative net annual growth is the result of net annual mortality exceeding gross annual growth.

²Less than 50,000 board feet.

³Includes knobcone pine, Port-Orford-cedar, and Sitka spruce.

⁴Includes bigleaf maple, madrone, golden chinkapin, Oregon ash, cottonwood, oaks, and California laurel (Oregon myrtle).

Table 14.--Average annual mortality of growing stock and sawtimber on commercial forest
land by ownership class and by softwoods and hardwoods,
Douglas County, Oregon, January 1, 1974

Ownership class	Average volume per acre	All species	Softwoods	Hardwoods
<i>Cubic feet - - - - - Thousand cubic feet - - - - -</i>				
Growing stock: ¹				
National Forest	23	20,600	20,000	600
Bureau of Land Management	33	20,400	18,700	1,700
Other public	20	1,100	800	300
Forest industry	17	13,100	11,600	1,500
Other private	3	900	400	500
All ownerships	21	56,100	51,500	4,600
<i>Board feet - - - - - Thousand board feet - - - - -</i>				
Sawtimber (International 1/4-inch rule): ²				
National Forest	135	121,000	117,000	4,000
Bureau of Land Management	177	107,800	103,800	4,000
Other public	134	7,500	5,800	1,700
Forest industry	100	77,100	75,400	1,700
Other private	5	1,400	1,200	200
All ownerships	119	314,800	303,200	11,600
Sawtimber (Scribner rule): ³				
National Forest	104	93,000	91,000	2,000
Bureau of Land Management	139	84,700	80,800	3,900
Other public	101	5,700	4,400	1,300
Forest industry	73	56,600	55,100	1,500
Other private	3	900	700	200
All ownerships	91	240,900	232,000	8,900

¹Includes trees 5.0 inches in d.b.h. and larger.

²Includes softwood trees 9.0 inches in d.b.h. and larger and hardwood trees 11.0 inches in d.b.h. and larger.

³Includes trees 11.0 inches in d.b.h. and larger.

Table 15.--Average annual mortality of growing stock on commercial forest land by
species and ownership class, Douglas County, Oregon, January 1, 1974
(In thousand cubic feet)

Species	All ownerships	National Forest	Bureau of Land Management	Other public	Fore t industry	Other private
Softwoods:						
Douglas-fir	34,700	10,100	14,800	500	9,000	300
True firs	4,600	3,700	900	--	--	(¹)
Ponderosa and Jeffrey pines	1,200	100	300	--	700	100
Sugar pine	2,600	1,200	800	200	400	--
Western white pine	1,800	1,700	100	--	--	--
Lodgepole pine	1,000	1,000	--	--	--	--
Hemlocks	4,000	2,100	1,000	--	900	--
Incense-cedar	700	(¹)	500	100	100	--
Western redcedar	800	(¹)	300	--	500	--
Other softwoods ²	100	100	--	--	--	--
Total	51,500	20,000	18,700	800	11,600	400
Hardwoods:						
Red alder	1,700	600	600	300	100	100
Other hardwoods ³	2,900	--	1,100	--	1,400	400
Total	4,600	600	1,700	300	1,500	500
All species	56,100	20,600	20,400	1,100	13,100	900

¹Less than 50,000 cubic feet.

²Includes knobcone pine, Port-Orford-cedar, and Sitka spruce.

³Includes bigleaf maple, madrone, golden chinkapin, cottonwood, and oaks.

Table 16.--Average annual mortality of sawtimber on commercial forest land by species
and ownership class, Douglas County, Oregon, January 1, 1974
(International 1/4-inch rule)

(In thousand board feet)

Species	All ownerships	National Forest	Bureau of Land Management	Other public	Forest industry	Other private
Softwoods:						
Douglas-fir	217,500	66,500	83,700	4,000	62,800	500
True firs	26,100	21,100	5,000	--	--	--
Ponderosa and Jeffrey pines	7,100	700	1,400	--	4,300	700
Sugar pine	16,300	7,700	4,100	1,400	3,100	--
Western white pine	11,400	10,600	800	--	--	--
Lodgepole pine	1,900	1,900	--	--	--	--
Hemlocks	18,000	8,200	5,400	--	4,400	--
Incense-cedar	2,700	100	1,900	400	300	--
Western redcedar	2,100	100	1,500	--	500	--
Other softwoods ¹	100	100	--	--	--	--
Total	303,200	117,000	103,800	5,800	75,400	1,200
Hardwoods:						
Red alder	7,900	3,900	2,000	1,700	300	--
Other hardwoods ²	3,700	100	2,000	--	1,400	200
Total	11,600	4,000	4,000	1,700	1,700	200
All species	314,800	121,000	107,800	7,500	77,100	1,400

¹Includes knobcone pine, Port-Orford-cedar, and Sitka spruce.

²Includes bigleaf maple, madrone, golden chinkapin, cottonwood, and oaks.

Table 17.--Timber harvest by ownership class, Douglas County, Oregon,

1950-73 (International 1/4-inch scale)

(In million board feet)

Year	All ownerships	Private	National Forest	Bureau of Land Management	Other public
1950	1,355	1,054	151	131	19
1951	1,607	1,333	156	109	9
1952	1,932	1,616	149	167	--
1953	1,779	1,414	177	188	--
1954	1,893	1,377	247	268	1
1955	2,352	1,902	265	184	--
1956	2,116	1,624	287	202	3
1957	1,556	1,108	205	236	7
1958	1,605	1,032	287	273	13
1959	1,895	1,120	396	367	12
1960	1,822	1,212	294	298	18
1961	1,245	575	333	304	33
1962	1,542	722	427	361	32
1963	1,499	605	453	427	14
1964	1,862	776	574	466	46
1965	1,936	856	638	404	38
1966	1,735	817	476	404	38
1967	1,718	858	402	427	31
1968	2,161	981	571	587	22
1969	1,966	1,041	501	381	43
1970	1,630	839	407	361	23
1971	1,870	875	470	489	36
1972	1,851	856	564	407	24
1973	1,749	710	548	452	39

Table 18.--Area by treatment and ownership class, Douglas County, Oregon,

January 1, 1974

(In thousand acres)

Treatment	Bureau of Land Management	National Forest	Other public	Forest industry	Other private	Total
Regeneration cut	335	630	18	210	48	1,241
Commercial thinning	10	47	--	14	4	75
Improvement cutting	10	--	--	8	--	18
No treatment ¹	104	50	12	93	34	293
Precommercial thinning (stand)	39	49	6	69	8	171
Precommercial thinning (clumps)	3	--	--	18	--	21
Cleaning or release	25	2	8	59	13	107
Site preparation and plant openings	58	32	--	83	38	211
Site preparation and plant entire area	8	22	12	140	40	222
Tough site ² areas	12	--	--	14	96	122
Stand conversion	5	--	--	65	25	95
High elevation low site	--	65	--	--	--	65
Total	609	897	56	773	306	2,641

¹Includes recent cutover scheduled for planting.²Harsh sites with shallow soil.

Stocking

Stocking measures how well the productive potential of the forest is being utilized by trees. It is both a useful measure of the condition of the forest and a basis for assessing treatment opportunities. Stands with more than enough trees to realize the productive potential of the site may be candidates for thinning, and stands with low stocking may need reinforcement planting or replacement.

In general, stocking standards are based on normal yield tables such as USDA Technical Bulletin No. 201 (McArdle et al. 1961). However, some sites, because of hot dry conditions, serpentine soils, rock outcrops, or other restrictions, are unable to support the density of trees indicated by the normal yield tables. On such areas, stocking standards are adjusted to reflect lower stocking capacity, using the techniques outlined by MacLean and Bolsinger (1973).

For this report, we have grouped stocking into four broad classes: fully stocked, moderately stocked, poorly stocked, and non-stocked. In rating stocking, we have considered only conifer trees except where hardwood trees are growing on hardwood sites. Stands with a mean diameter^{4/} of at least 8 inches and a normal stocking density of at least 60 percent are classed as fully stocked.

^{4/} In this report, mean diameter refers to the diameter of the tree of average basal area.

We assume that these stands fully occupy the site. Moderately stocked stands with a mean diameter of at least 8 inches are stocked to a density of 36-59 percent of normal. When normal stocking levels are between 10 and 35 percent, the stands are classed as poorly stocked. Stands with less than 10 percent stocking are considered nonstocked. In this report, we have often combined full and moderate stocking into a single class--satisfactorily stocked.

Stands with a mean diameter of less than 8 inches are treated a little differently. Stocking level for such stands does not indicate the current level of site utilization but rather suggests the degree to which the stands can be expected to utilize the site when their mean diameter reaches 8 inches--the time when a commercial thinning first becomes feasible. Fully stocked regeneration stands can be expected to produce full yields of both intermediate and final harvests. Moderately stocked regeneration should also provide full yield at final harvest, but intermediate harvests may be forgone. Poorly stocked stands are unlikely to provide full yield, even at final harvest.

The following tabulation indicates the number of seedlings necessary to meet the above standards. As stand diameter increases, fewer trees are required.

<u>Species</u>	<u>Poorly stocked</u>	<u>Moderately stocked</u>	<u>Fully stocked</u>
Douglas-fir	72-256	257-428	429+
Western hemlock and true firs	99-344	345-591	592+
Ponderosa pine	73-255	256-438	439+

The standards used here and those used in measuring compliance with the Oregon Forest Practices Act (ORS 527.680; Forest Practice Rules, OAR 24-600 through 24-604) are not directly comparable. Ours relates to fiber productivity potential, and the Forest Practices Act sets a minimum socially acceptable standard. In general, though, stands that we classed as moderately or fully stocked will meet State standards as will many of the stands classed as poorly stocked. The nonstocked areas and some of the poorly stocked areas will not meet the standards adopted by the State of Oregon.

Plant Species

This list includes the important tree species occurring in Douglas County. The source for scientific names is Little (1953).

<u>Scientific name</u>	<u>Common name</u>	<u>Douglas County</u>
<u>Softwood trees:</u>		
<i>Abies amabilis</i> (Dougl.) Forbes	Pacific silver fir	High elevations of Cascade Range
<i>Abies concolor</i> (Gord. & Glend.) Lindl.	white fir	Cascade Range in South Umpqua drainage
<i>Abies grandis</i> (Dougl.) Lindl.	grand fir	Coast Ranges and North Umpqua
<i>Abies lasiocarpa</i> (Hook.) Nutt.	subalpine fir	High elevations of Cascade Range
<i>Abies magnifica</i> var. <i>shastensis</i> Lemm.	Shasta red fir	High elevations of Cascade Range
<i>Abies procera</i> Rehd.	noble fir	High elevations of Cascade Range
<i>Chamaecyparis lawsoniana</i> (A. Murr.) Parl.	Port-Orford-cedar	Cow Creek
<i>Chamaecyparis nootkatensis</i> (D. Don) Spach	Alaska-cedar	High elevations of Cascade Range
<i>Libocedrus decurrens</i> Torr.	incense-cedar	Interior valleys and Cascade Range
<i>Picea engelmannii</i> Parry	Engelmann spruce	High elevations of Cascade Range
<i>Picea sitchensis</i> (Bong.) Carr.	Sitka spruce	Coast Ranges
<i>Pinus albicaulis</i> Engelm.	whitebark pine	At timberline in Cascade Range
<i>Pinus attenuata</i> Lemm.	knobcone pine	Interior valleys and Cascade Range
<i>Pinus contorta</i> Dougl.	lodgepole pine	Cascade Range
<i>Pinus jeffreyi</i> Grev. & Balf.	Jeffrey pine	Interior valleys on serpentine soil
<i>Pinus lambertiana</i> Dougl.	sugar pine	Interior valleys and Cascade Range

<u>Scientific name</u>	<u>Common name</u>	<u>Where found in Douglas County</u>
<i>Pinus monticola</i> Dougl.	western white pine	High elevations of Cascade Range
<i>Pinus ponderosa</i> Laws.	ponderosa pine	Interior valleys and Cascade Range
<i>Pseudotsuga menziesii</i> (Mirb.) Franco	Douglas-fir	All parts
<i>Taxus brevifolia</i> Nutt.	Pacific yew	All parts
<i>Thuja plicata</i> Donn	western redcedar	All parts
<i>Tsuga heterophylla</i> (Raf.) Sarg.	western hemlock	Coast and Cascade Ranges
<i>Tsuga mertensiana</i> (Bong.) Carr.	mountain hemlock	High elevations of Cascade Range
<u>Hardwood trees:</u>		
<i>Acer macrophyllum</i> Pursh	bigleaf maple	All parts
<i>Alnus rubra</i> Bong.	red alder	Coast Ranges
<i>Arbutus menziesii</i> Pursh	Pacific madrone	All parts
<i>Castanopsis chrysophylla</i> Dougl. A. DC.	golden chinkapin	Coast and Cascade Ranges
<i>Fraxinus latifolia</i> Benth.	Oregon ash	Interior valleys and Coast Ranges
<i>Lithocarpus densiflorus</i> (Hook. & Arn.) Rehd.	tanoak	Coast Ranges and Cow Creek
<i>Populus trichocarpa</i> Torr. & Gray	black cottonwood	Moist sites
<i>Quercus chrysolepis</i> Liebm.	canyon live oak	Interior valleys and Coast Ranges
<i>Quercus garryana</i> Dougl.	Oregon white oak	Interior valleys
<i>Quercus kelloggii</i> Newb.	California black oak	Interior valleys
<i>Umbellularia californica</i> (Hook. & Arn.) Nutt.	California-laurel (Oregon myrtle)	Coast Ranges

Inventory Procedures

This report of Douglas County's forest resources combines data from four National Forest inventories, four BLM inventories, and an inventory of the private, State, county, and municipal lands conducted by the Forest Resources Evaluation Project of the Pacific Northwest Forest and Range Experiment Station. All of the BLM inventories and three of the National Forest inventories have been updated to 1973 to account for cutting, reforestation, growth, and mortality since the dates of inventory. A summary of the various inventories follows:

<u>Inventory</u>	<u>Number of plots</u>	<u>Field plot grid intensity</u> (Miles)	<u>Inventory date</u>	<u>Updated to</u>
Umpqua National Forest	459	1.7	1968	1973
Siuslaw National Forest	29	1.7	1963	1973
Willamette National Forest	23	1.7	1971	--
Rogue River National Forest	34	1.7	1967	1973
Roseburg BLM District	428	1.2	1969	1973
Coos Bay BLM District	130	1.2	1968	1973
Eugene BLM District	19	1.2	1968	1973
Medford BLM District	39	1.7	1966	1973
Private, State, county, and municipal lands:				
Timber zone	141	3.4	1973	--
Agricultural zone	27	6.8	1973	--

NATIONAL FOREST AND BLM INVENTORIES

The National Forest and BLM inventories were all simple systematic samples with field plots distributed on a square grid. For all except the Willamette National Forest inventory, volume, area, and growth data were expanded from field plots, with each plot having equal weight.

On the Willamette National Forest, nonforest, noncommercial forest, and clearcut areas were mapped and the field sample restricted to commercial forest land, exclusive of clearcuts. Inventory data on clearcuts came from forest records based on plantation and compartment examinations.

For the Siuslaw National Forest inventory, three 1/5-acre plots were established at each field plot location. On all other National Forest and BLM inventories, the field plot used was a cluster of 10 variable-radius points sampling an acre. Seedlings and saplings were sampled on small fixed-radius plots located at each of the 10 points.

For all but the Willamette National Forest inventory, growth and mortality were updated by stand projection (Larson and Goforth 1970). In addition, all plots cut since inventory were identified and assigned new area classifications based on data furnished by the BLM and the U.S. Forest Service. Treatment prescriptions were based on inventory data, except where better data were furnished by the agencies.

THE INVENTORY OF PRIVATE AND OTHER PUBLIC LANDS

The sampling design used was double sampling for stratification (Cochran 1963). Classifications on about 3,500 photo points were used to divide the inventory unit into a series of strata based on: (1) owner group; (2) major land class (commercial forest, non-commercial forest, and nonforest); and (3) stand volume class. In addition, the entire inventory unit was divided into two zones: the timber zone and the agricultural zone. Permanent field plots were remeasured on a 3.4-mile grid in the timber zone and on a 6.8-mile grid in the agricultural zone. Field plot weights were calculated separately for each owner-land class-stand volume stratum in each zone. To provide at least two field plots for each stratum, 14 supplemental plots were added.

The same 10-point field plot was used in this inventory that had been used on the National Forest and BLM inventories. However, unlike those inventories, most of these field plots were originally established earlier in 1962 and were remeasured for this inventory. Growth and mortality estimates were made by comparing old and new tallies on remeasured plots and from increment cores and ocular mortality estimates on supplemental plots.

At all field plot locations and at 60 other randomly selected locations, we identified and sampled 10-acre management units that represented single forest conditions. These data were then used to identify physical opportunities for silvicultural treatment.

Definition of Terms

Land Area

Total land area is that reported by the Bureau of the Census and includes dry land and land temporarily or partially covered by water (such as marshes, swamps, and river flood plains), streams, sloughs, and canals less than 1/8-mile wide, and lakes, reservoirs, and ponds less than 40 acres in area.

Forest land is at least 10 percent stocked by trees of any size or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized is 1 acre.

Nonforest land has never supported forests or was formerly forested and is currently developed for nonforest uses. Included are areas used for agricultural crops, improved pasture, residential areas, city parks, improved roads, and operating railroads and their right-of-way clearings, powerline and pipeline clearings, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and other nonforest strips must be more than 120 feet wide, and clearings, etc., more than 1 acre in size, to qualify as nonforest land.

Forest-land Classes

Commercial forest land is capable of producing 20 cubic feet per acre per year of industrial wood and not withdrawn from timber utilization.

Noncommercial forest land is land incapable of yielding crops of industrial wood because of adverse site conditions, or is productive public forest land withdrawn from

commercial timber use through statute or administrative regulation.

Productive-reserved forest land is public land withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land.

Unproductive forest land is land incapable of yielding crops of industrial wood products because of adverse site conditions such as sterile soils, poor drainage, high elevation, steepness, and rockiness.

Forest Types

Stands with 50 percent or more stocking in live conifer trees are called softwood types. Stands with a majority of stocking in live hardwood trees are classed as hardwood types. Within these two type groups, the individual forest type is determined by plurality of stocking by species of live softwood or hardwood trees.

Tree Classes

Growing Stock

Growing stock trees are live trees of commercial species which meet the minimum merchantability standards for sawtimber, poletimber, or seedling and sapling trees.

Sawtimber trees are growing stock trees and are at least 9.0 inches in d.b.h. if they are softwoods and at least 11.0 inches in d.b.h. if they are hardwoods. At least 25 percent of the board-foot volume in any sawtimber tree must be free from defect. Softwood trees must contain at least one 12-foot saw log with a top diameter of not less than 6 inches inside the bark; hardwood trees must contain at least one 8-foot saw log with a top diameter of not less than 8 inches inside the bark.

Poletimber trees are growing stock trees 5.0 to 8.9 inches in d.b.h. with a cubic-foot volume of wood that is at least 50 percent free from defect. They are free from any disease, defect, or deformity which is likely to prevent their becoming sawtimber trees.

Sapling and seedling trees are growing stock trees that are less than 5.0 inches in d.b.h. and have no disease, defects, or deformities which are likely to prevent their becoming growing stock poletimber trees.

Nongrowing Stock

Cull trees are noncommercial species or commercial species which are too defective or which are unlikely to become growing stock trees due to deformity, disease, low vigor, etc.

Sound cull trees are noncommercial species or commercial species with excessive defect due to form, roughness, etc.

Rotten cull trees have excessive defect due primarily to rot.

Mortality trees are commercial species which have died from natural causes within a specified period and which were growing stock trees at the time of death.

Salvable dead trees are standing or down trees of commercial species, 9.0 inches or more in diameter, containing 25 percent or more of sound volume and at least one merchantable 16-foot log if a softwood or one merchantable 8-foot log if a hardwood.

Stand-size Classes

Sawtimber stands are at least 10 percent stocked with growing stock trees, with half or more of this stocking in sawtimber and poletimber trees and with sawtimber stocking equal to or greater than poletimber stocking. In *large sawtimber stands*, the majority of the sawtimber stocking is in trees 21.0 inches and larger at breast height. In *small sawtimber stands*, the majority of the sawtimber stocking is in trees from 9.0 to 20.9 inches at breast height.

Poletimber stands are at least 10 percent stocked with growing stock trees, with half or more of this stocking in sawtimber and poletimber trees, and with poletimber stocking exceeding sawtimber stocking.

Sapling and seedlings stands are at least 10 percent stocked with growing stock trees, with more than half of this stocking in saplings, seedlings, or both.

Nonstocked areas of commercial forest land are less than 10 percent stocked with growing stock trees.

Timber Volume

Live Sawtimber

Net volume of live sawtimber trees of commercial species is measured in board feet. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Scribner rule is the common board-foot log rule used locally in determining volume of sawtimber. Scribner volume is measured in terms of 32-foot logs.

International 1/4-inch rule is the standard board-foot log rule adopted nationally by the Forest Service for the presentation of Forest Survey volume statistics.

Saw-log portion is the bole of sawtimber trees between the stump and the saw-log top.

Upper stem portion includes the bole of sawtimber trees above the saw-log top of 7.0 inches outside bark for softwoods and 8.0 inches outside for hardwoods to a minimum top diameter of 4.0 inches outside bark; or to the point where the central stem breaks into limbs.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark is measured. Net volume equals gross volume less deduction for rot and missing bole sections.

All Timber

Net volume in cubic feet of live growing stock poletimber and sawtimber trees and salvable dead sawtimber trees of commercial species; and gross volume of cull trees of all species. Volume is measured from stump to a minimum 4.0-inch top outside bark.

Industrial Wood

All roundwood products except fuelwood are included.

Net Annual Growth

The net increase in volume of trees during a specified year is included. Components of net annual growth include: (a) the increment in net volume of trees at the beginning of the specified year surviving to the year's end plus (b) the net volume of trees reaching the size class during the year minus (c) the net volume of trees that died during the year minus (d) the net volume of trees that became culls during the year.

Ownership Classes

National Forest lands are Federal lands which have been designated by Executive Order or statute as National Forests or purchase units and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones title III lands.

Other public lands are Federal lands other than National Forests or lands administered by the Bureau of Land Management and lands owned by States, counties, and local public agencies or leased by these governmental units for more than 50 years.

Forest industry lands are owned by companies or individuals operating wood-using plants or whose primary operation is growing wood for industrial use.

Other private lands include all private lands except those classed as forest industry lands.

Treatment opportunities are physical opportunities to manipulate either the growing stock or competing vegetation to increase wood production.

A *regeneration cut* is the harvest cut that immediately precedes regeneration of the stand. Stands which exceed the age of culmination of mean annual cubic-foot increment are usually considered candidates for regeneration cutting.

A *thinning* is an intermediate cutting in an immature stand to increase growth, increase average tree size, capture potential mortality, and increase total net yield.

A *commercial thinning* is one which produces enough salable products to cover the cost of operation.

Stands with a mean diameter of at least 8 inches and with stocking that exceeds the maximum level^{5/} are assumed to be eligible for commercial thinning.

A *precommercial thinning* is a thinning in a stand too young to produce salable products. Stands between 10 and 30 feet high which exceed the maximum stocking level (see footnote 2) are considered candidates for precommercial thinning.

A *cleaning or release* is a treatment (usually herbicidal spray) in a seedling or sapling stand to remove undesirable brush, grass, or hardwood competition.

Site preparation is the chemical or mechanical treatment of a site to remove inhibiting material prior to planting.

Planting is the establishment of a forest by setting out seedlings. To qualify for fill-in planting in partially stocked stands, openings must be at least 40 feet in diameter and free of trees over 4 feet in height.

Stand conversion is an operation performed on stands which lack stocking of trees that are presently or potentially salable.

^{5/} David Bruce and Donald L. Reukema. Derivation of stocking guides for Douglas-fir and hemlock spruce. Unpublished manuscript on file at Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Literature Cited

- Beuter, John H., K. Norman Johnson, and H. Lynn Scheurman.
1976. Timber for Oregon's tomorrow. Oreg. State Univ. For. Res. Lab. Res. Bull. 19, 111 p., illus. Corvallis.
- Cochran, W. G.
1963. Sampling techniques. 2d ed. 413 p. John Wiley & Sons, Inc., New York.
- Darr, David R. and Roger D. Fight.
1974. Douglas County, Oregon: Potential economic impacts of a changing timber resource base. USDA For. Serv. Res. Pap. PNW-179, 41 p., illus. Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.
- Larson, Robert W. and Marcus H. Goforth.
1970. TRAS, a computer program for the projection of timber volume. U.S. Dep. Agric. Agric. Handb. 377, 24 p., illus.
- Little, Elbert L., Jr.
1953. Check list of native and naturalized trees of the United States (including Alaska). U.S. Dep. Agric. Agric. Handb. 41, 472 p.
- MacLean, Colin D., and Charles L. Bolsinger.
1973. Estimating productivity on sites with a low stocking capacity. USDA For. Serv. Res. Pap. PNW-152, 18 p., illus. Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.
- McArdle, Richard E., Walter H. Meyer, and Donald Bruce.
1961. The yield of Douglas-fir in the Pacific Northwest. U.S. Dep. Agric. Tech. Bull. 201 (rev.), 74 p., illus.
- Miller, Richard E., and Richard L. Williamson.
1974. Dominant Douglas-fir respond to fertilizing and thinning in southwest Oregon. USDA For. Serv. Res. Note PNW-216, 8 p. Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.
- U.S. Department of Agriculture, Forest Service.
1934. Forest statistics for Douglas County. USDA For. Serv. Pac. Northwest For. and Range Exp. Stn., 6 p., illus. Portland, Oreg.
- U.S. Department of Agriculture, Forest Service.
1973. The outlook for timber in the United States. USDA For. Serv. For. Resour. Rep. FRR-20, 367 p., illus.
- Wall, Brian R.
1972. Log production in Washington and Oregon--An historical perspective. USDA For. Serv. Resour. Bull. PNW-42, 89 p., illus. Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.

MacLean, Colin D.

1976. Timber resources of Douglas County, Oregon. USDA For. Serv. Resour. Bull. PNW-66, 42 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

This report summarizes a 1973 timber resource inventory of Douglas County, Oregon. Detailed tables of forest area, timber volume, growth, mortality, and cut are presented. A discussion of the present resource situation highlights the condition of cutover lands and the opportunities for silvicultural treatment.

KEYWORDS: Forest surveys, statistics (forest), resources (timber), southwest Oregon, Douglas County.

MacLean, Colin D.

1976. Timber resources of Douglas County, Oregon. USDA For. Serv. Resour. Bull. PNW-66, 42 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

This report summarizes a 1973 timber resource inventory of Douglas County, Oregon. Detailed tables of forest area, timber volume, growth, mortality, and cut are presented. A discussion of the present resource situation highlights the condition of cutover lands and the opportunities for silvicultural treatment.

KEYWORDS: Forest surveys, statistics (forest), resources (timber), southwest Oregon, Douglas County.

MacLean, Colin D.

1976. Timber resources of Douglas County, Oregon. USDA For. Serv. Resour. Bull. PNW-66, 42 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

This report summarizes a 1973 timber resource inventory of Douglas County, Oregon. Detailed tables of forest area, timber volume, growth, mortality, and cut are presented. A discussion of the present resource situation highlights the condition of cutover lands and the opportunities for silvicultural treatment.

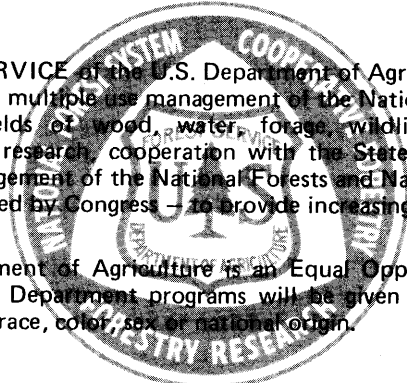
KEYWORDS: Forest surveys, statistics (forest), resources (timber), southwest Oregon, Douglas County.

MacLean, Colin D.

1976. Timber resources of Douglas County, Oregon. USDA For. Serv. Resour. Bull. PNW-66, 42 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

This report summarizes a 1973 timber resource inventory of Douglas County, Oregon. Detailed tables of forest area, timber volume, growth, mortality, and cut are presented. A discussion of the present resource situation highlights the condition of cutover lands and the opportunities for silvicultural treatment.

KEYWORDS: Forest surveys, statistics (forest), resources (timber), southwest Oregon, Douglas County.

The seal of the U.S. Forest Service is a circular emblem. It features a central shield with a stylized tree and the letters 'U.S.' above it. The shield is flanked by two olive branches. The outer ring of the seal contains the text 'FOREST SERVICE' at the top and 'DEPARTMENT OF AGRICULTURE' at the bottom. The words 'COOPERATION' and 'RESEARCH' are also visible on the sides.

The FOREST SERVICE of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

The U.S. Department of Agriculture is an Equal Opportunity Employer. Applicants for all Department programs will be given equal consideration without regard to race, color, sex, or national origin.