

RESOURCE BULLETIN PNW-83 • MAY 1979

**FORESTS
AND
TIMBER
RESOURCES OF
CALIFORNIA'S
CENTRAL COAST**

Daniel D. Oswald

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE

METRIC EQUIVALENTS

1,000 acres = 404.69 hectares
1,000 cubic feet = 28.3 cubic meters
1 cubic foot per acre = 0.070 0 cubic meter per hectare
1 square foot basal area per acre = 0.229 6 square meter per hectare
1 foot = 30.48 centimeters
1 inch = 2.540 centimeters

FORESTS AND TIMBER RESOURCES OF CALIFORNIA'S CENTRAL COAST

REFERENCE ABSTRACT

Oswald, Daniel D.

1979. Forests and timber resources of California's central coast. USDA For. Serv. Resour. Bull. PNW-83, 56 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

This report summarizes the findings of a 1972 inventory of the forest land area and timber resources of a 10-county area on California's central coast. Included are detailed tables of area, timber volume, timber growth and harvest, and mortality. The report includes a discussion of the current timber resources and some potential limitations on their availability.

KEYWORDS: Forest surveys, timber resources, resources (forest), California (coastal).

Research Summary

RESOURCE BULLETIN PNW-83

1979

California's central coast is a mountainous region with forests covering 2.3 million acres, more than one-third of the area. Only 339,000 acres of the forested area are capable of producing commercial crops of timber; of this total, 79,000 acres have been reserved from commercial timber operations.

The 260,000-acre total of unreserved commercial forest land is concentrated in 5 of the area's 10 counties. Commercial timber operations center on 193,000 acres of unreserved commercial forests in the Santa Cruz Mountains of San Mateo, Santa Clara, and Santa Cruz Counties.

An estimated 6.1 billion board feet (Scribner rule) of sawtimber, 93 percent of it in softwood species, is contained within the central coast's 260,000 acres of unreserved commercial forests. Redwood and Douglas-fir account for most of the softwood volume. Current annual growth in the region's forests totals 128 million board feet (26 million cubic feet).

Most (207,000 acres) of the commercial timberland is held by miscellaneous private owners. Forest industries own approximately 10,000 acres of timberlands in the region. Public timberlands total 43,000 acres, three-fourths of which are in the Los Padres National Forest in Monterey County.

Potential productivity of the central coast's commercial forests is high. Of 221,000 acres for which data are available, 89 percent is capable of producing 120 cubic feet or more of industrial wood per acre each year. The average potential for this area exceeds 175 cubic feet per acre per year.

There are two forest types of commercial importance in the region. Redwood predominates on 127,000 acres which contain 4.3 billion board feet of sawtimber and which are accruing 82 million board feet of growth annually. Douglas-fir is predominant on 27,000 acres, accounting for almost 1 billion board feet of sawtimber. Hardwoods are the predominant vegetation on 68,000 acres.

Three-fourths of the current forest is less than 100 years old. These young forests contain almost half the region's sawtimber. The older forests (100 years plus) cover only one-fourth of the area.

Production from the central coast's commercial timberlands is limited in a number of ways. Perhaps the most important limitations are those placed by miscellaneous private owners, many of whom have primary objectives for their landholdings other than timber production.

Forest practice regulations can affect potential output from current timber stocks. The central coast has the most stringent set of forest practice regulations in the State. On the average, 40 percent of the standing softwood sawtimber volume in a stand would likely be reserved from cutting at any one time under these regulations.

PREFACE

This report presents the findings of inventories of forests and timber resources conducted in a 10-county area on California's central coast: Alameda, Contra Costa, Marin, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, and Solano. The forests of this region had been inventoried in the late 1940's (USDA Forest Service 1953, 1954; Baker and Poli 1953, 1954).

The inventory summarized herein was conducted in most of the forested area of the region in 1972. The lands of the Los Padres National Forest in Monterey County were inventoried in 1974.

Most of the forested area in this region has changed little since these inventories. In Monterey County, however, the catastrophic Marble Cone fire in the summer of 1977 burned 178,000 acres of wildlands--much of the area of the Los Padres National Forest, including most of the Ventana Wilderness.

A preliminary appraisal by Los Padres National Forest personnel of the effects of that fire indicates little impact on commercial timber stands; heavy damage is likely only on 2,000 acres of Coulter pine. But in the Wilderness Area, 6,000 acres of ponderosa pine sustained heavy damage. The greatest loss was the temporary removal of protective vegetation on tens of thousands of acres of Monterey County's watershed lands.

As a consequence of the fire, the inventory findings pertaining to vegetative cover in Monterey County and on National Forest land no longer reflect the current status of those resources.

In addition to vegetative changes resulting from fire, a major land use status change--not reflected in this report--occurred in 1978. About 61,000 acres of formerly unreserved National Forest land has been added to the Ventana Wilderness.

CONTENTS

INTRODUCTION	1
THE FORESTS CHARACTERIZED	3
RECENT CHANGES IN FOREST AREA	6
THE REGION'S TIMBERLANDS AND TIMBER RESOURCES	9
Ownership	10
Productivity of the Forest Land	10
Forest Types	11
Stocking	13
Stand Age	14
THE POTENTIAL IMPACTS OF HARVEST LIMITATIONS	16
Impact of Forest Practice Regulations	16
LITERATURE CITED	19
APPENDIX	21
Tables 1-27 (See table listing next page)	22
Inventory Procedures	48
Reliability of Forest Resource Estimates	49
Forest Land Area and Timber Volume	49
Definition of Terms	50
Land Area	50
Forest Land Classes	52
Forest Types	52
Tree Classes	52
Stand Size Classes	53
Stocking	54
Timber Volume	54
Ownership Classes	55
Scientific and Common Names of Plants Mentioned in This Report	56

TABLES

Table 1--Area by land class and county, California's central coast, January 1, 1973	22
Table 2--Area of commercial forest land by ownership and county, California's central coast, January 1, 1973	23
Table 3--Area of noncommercial forest land by land class and forest type and by ownership, California's central coast, January 1, 1973	24
Table 4--Area of commercial forest land by site class and ownership, California's central coast, January 1, 1973	25
Table 5--Area of commercial forest land by stand-size class and ownership, California's central coast, January 1, 1973	26
Table 6--Area of commercial forest land by stand volume and ownership, California's central coast, January 1, 1973	27
Table 7--Area of commercial forest land by forest type and ownership, California's central coast, January 1, 1973	28
Table 8--Area of commercial forest land by stocking percent and stand component, California's central coast, January 1, 1973	28
Table 9--Volume of timber on commercial forest land by class of timber and by softwoods and hardwoods, California's central coast, January 1, 1973	29
Table 10--Volume of growing stock and sawtimber on commercial forest land by stand-size class and by softwoods and hardwoods, California's central coast, January 1, 1973	30
Table 11--Volume of growing stock and sawtimber on commercial forest land by ownership and by softwoods and hardwoods, California's central coast, January 1, 1973	31
Table 12--Volume of growing stock and sawtimber on commercial forest land by county and ownership, California's central coast, January 1, 1973	32
Table 13--Volume of growing stock and sawtimber on commercial forest land by species, California's central coast, January 1, 1973	33
Table 14--Volume of growing stock on commercial forest land by species and diameter class, California's central coast, January 1, 1973	34
Table 15--Volume of sawtimber on commercial forest land by species and diameter class, California's central coast, January 1, 1973	35

Table 16--Area of commercial land and volume and net growth of growing stock and sawtimber by forest type, California's central coast, January 1, 1973	36
Table 17--Area of commercial forest land and volume and net growth of growing stock and sawtimber by stand age, California's central coast, January 1, 1973	37
Table 18--Net annual growth of growing stock and sawtimber on commercial forest land by ownership and by softwoods and hardwoods, California's central coast, 1972	38
Table 19--Net annual growth of growing stock and sawtimber on commercial forest land by species, California's central coast, 1972	39
Table 20--Average annual mortality of growing stock and sawtimber on commercial forest land by species, California's central coast, 1968-72	40
Table 21--Average annual mortality of growing stock and sawtimber on commercial forest land by cause of death and by softwoods and hardwoods, California's central coast, 1968-72	41
Table 22--Net volume of salvable dead sawtimber on commercial forest land by volume per acre class, California's central coast, January 1, 1973	42
Table 23--Reported timber production in California's central coast counties, 1947-76	43
Table 24--Area of commercial forest land by stand-size class and ownership, Santa Cruz County, California, January 1, 1973	44
Table 25--Area of commercial forest land by site class and ownership, Santa Cruz County, California, January 1, 1973	45
Table 26--Area of commercial forest land and volume and net growth of growing stock and sawtimber by forest type, Santa Cruz County, California, January 1, 1973	46
Table 27--Volume and net annual growth of growing stock and sawtimber on commercial forest land by species, Santa Cruz County, California, January 1, 1973	47
Table 28--Confidence intervals for estimates of forest area and timber volume, California's central coast, January 1, 1973	49
Table 29--Approximate confidence interval by size of estimate, California's central coast, January 1, 1973	51

INTRODUCTION

California's central coast is a unique forested region which stretches from Marin County southward across San Francisco Bay to Monterey County (fig. 1), a length of 200 miles. This 10-county area, like California's major forest regions, is mostly mountainous; and 37 percent of its 6.24 million acres is forested. The uniqueness of its forests lies in their isolation from the State's major forested regions, the complexity of their makeup, and their proximity to the Region's 5 million residents.

Because most of the Region's commercial timberlands are situated near San Francisco Bay and its surrounding communities, their virgin timber was rapidly exploited and depleted; as old forests fell to the saw and ax, they were reborn in the structures of early San Francisco, Oakland, and San Jose. Logging activities in those early years and the fires that followed did much to shape the central coast's current forests.

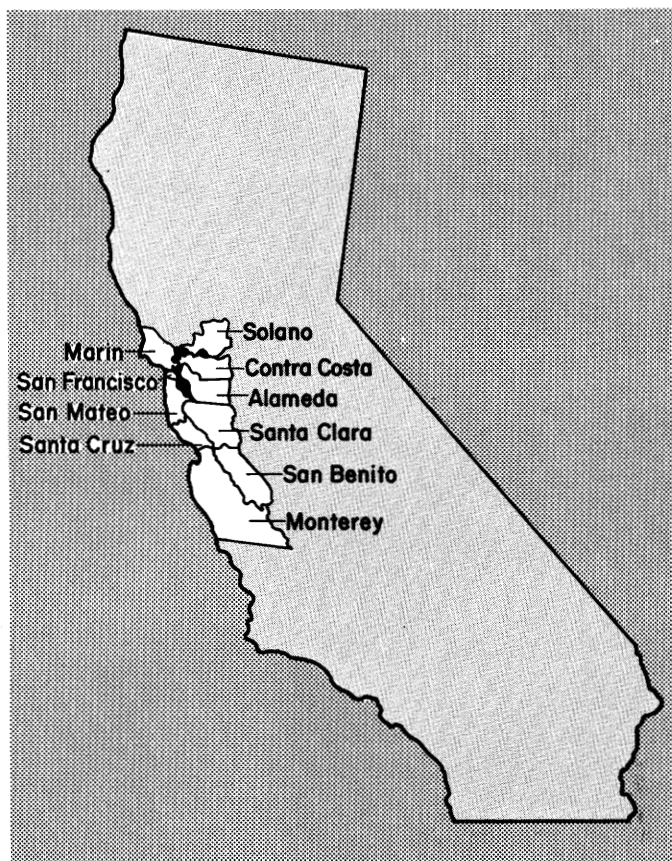


Figure 1.--The counties of California's central coast.

Today, the region's populace has different needs and desires for the forests. Watershed protection has become paramount, and the recreational value of the central coast's forests affects decisions about their allocation and use.

Yet, little noticed by many of the region's residents and visitors, timber harvesting continues on a commercial scale on some of the timberlands (fig. 2). This commercial timber enterprise is much scaled down from its heyday, but it supports local sawmills as it has for more than 125 years. Planners in the two most important timber counties in the region--San Mateo and Santa Cruz--believe that commercial timber operations will continue in those counties at levels compatible with other forest resource uses.

The forest inventory reported on herein provides a glimpse of the region's forests as they exist today, different in many respects from what they were in the past. Some of the important trends evident in these forests have



Figure 2.--Saw logs from partial harvest of young-growth redwood stands are the mainstay of the central coast's timber industry.

been identified and will be discussed. Detailed tables, which summarize the findings of the inventories, immediately follow the text. Although most of the tables contain data for the entire central coast, tables 24-27 are for Santa Cruz County, the most important timber producing county in the region.

THE FORESTS CHARACTERIZED

California's 10 central coast counties contain an estimated 2.3 million acres of forest land.¹ Though the region is 37 percent forested, the extent of the forests varies widely from county to county. At one extreme are San Francisco, the only county of the group that has no forest land, and Solano County, with only 7 percent of its area forested; at the other is Santa Cruz which is two-thirds forested.

Though much of the region is forested, areas supporting commercially valuable stands of timber, or with the potential to do so, are limited. Only 339,000 acres of forested land fall in this class; of that area, almost one-fourth has been formally reserved from commercial timber operations. Unreserved commercial forest land totals 260,000 acres and is found in only 5 of the Region's 10 counties:

<u>County</u>	<u>Commercial forest area</u> (Acres)
Marin	7,000
Monterey	60,000
San Mateo	44,000
Santa Clara	14,000
Santa Cruz	<u>135,000</u>
Total	260,000

The unreserved commercial forests of Marin County are only a fraction of the county's 30,000 acres of productive forests. The Marin forests are an isolated "island" of redwood and Douglas-fir,² separated by many miles from the

¹The terms used in this report are defined in "Definition of Terms," page 50.

²See last page of appendix for scientific names of trees and plants according to Little (1953) and Munz and Keck (1970).

redwood forests of Sonoma County to the north and those of San Mateo to the south. In recent years, most of this county's productive forests have been reserved from commercial timber operations by inclusion in the Point Reyes National Seashore, the Golden Gate National Recreation Area, and the county's protected watersheds. The remaining unreserved commercial forests are too small to produce significant quantities of timber.

Monterey, the central coast's largest county, has vast areas of mountainous forested land. But the areas containing commercially valuable conifers, located in the Santa Lucia Mountains, are scattered and small. Consequently, commercial timber operations are infrequent in Monterey's coniferous forests.

These forests are unique in several respects. The redwood forests, which account for most of the commercial forest area, are found in the canyon bottoms of many small coastal streams. Redwood reaches its southernmost point on the south coast of this county.

Monterey pine, which occurs naturally in only three isolated locations on California's coast, is most abundant on the Monterey Peninsula. Coulter pine and ponderosa pine occur in many areas of the county; sugar pine and bishop pine are rare and isolated.

The USDA Forest Service, which manages over half of Monterey County's commercial forest area (as part of the Los Padres National Forest), has classed those lands as "unregulated"; i.e., lands not suited or desirable for sustained timber production. These lands are managed to retain vegetation and for recreation. Redwood, ponderosa pine, and Coulter pine are harvested only to recover dead timber or to maintain the health of stands. Sugar pine is protected because its occurrence here is disjunct from the main concentrations of sugar pine in California.

The most significant commercial stands of timber in the region are the redwood and Douglas-fir forests of the Santa Cruz Mountains. These forests, intermingled with stands of hardwoods, occupy a mostly contiguous area of 234,000 acres in San Mateo, Santa Clara, and Santa Cruz Counties. Within this area are 193,000 acres of commercial forest land not formally reserved from timber production; the remainder has been set aside, primarily in parks. The redwood and Douglas-fir forests of the Santa Cruz Mountains, sites of some of California's earliest commercial timber operations, are the only areas within the central coast where logging is likely to continue on a commercial scale.

Most of the central coast's forest area is unproductive from the standpoint of timber production. These noncommercial forest lands are covered by trees or woody shrubs, but because of soils, topography, climate, or a combination of these factors, they are not suitable for management for the production of timber crops. The trees that do grow on much of this area are typically crooked and limby and do not yield industrial roundwood products (fig. 3). The

Figure 3.--Live oak trees are the major component of the central coast's evergreen broad-leaved forests. They are usually crooked and limby and not suited for use as industrial roundwood.



noncommercial forest lands total 1.95 million acres, and are found in every county in the region except San Francisco. Three counties--Monterey, Santa Clara, and San Benito--account for 80 percent of this area.

The noncommercial forest land of this region has a variety of vegetative covers. But the cover types fall into two major vegetative associations. About one-third of this area is inhabited by associations of woody shrubs commonly known as chaparral. Common species found in the chaparral

association include chamise, manzanita, scrub oak, and *Ceanothus* spp. Although the chaparral cover provides wildlife habitat and stabilizes watersheds, it is highly susceptible to periodic loss through wildfire.

Approximately two-thirds of the unproductive forest land is covered by mixed evergreen forests comprised of broad-leaved trees (including coast live oak, canyon live oak, interior live oak, Pacific madrone, and California-laurel), or by forests of deciduous oaks (blue oak, California black oak, California white oak). In some locations the broad-leaved forests include scattered Coulter pine and Digger pine. Although these hardwood forests do not produce industrial roundwood, in aggregate they contain a large volume of dense wood well suited for use as fuel.

RECENT CHANGES IN FOREST AREA

The forests of the central coast were previously inventoried in 1948 and updated to 1953 (USDA Forest Service 1954). The current inventory is independent of that earlier effort, so sampling errors and design and definitional differences complicate use of direct comparisons to determine the magnitude of area change. But aided by type maps from the earlier inventory and information from sources other than the inventories, we have identified elements of change in forest area that confirm the direction of change indicated by such comparisons.

	<u>1953</u>	<u>1973</u>
	(Thousand acres)	
Forest land:	2,598	2,293
Unproductive	2,321	1,954
Productive	277	339

The apparent 12-percent decrease in forest land area is due to the decreased estimate of unproductive forest land. Change in land use and vegetative cover has been considerable. From 1953 through 1972, 122,000 acres of brush covered forest was burned under permit for range improvement in the central coast (California Division of Forestry 1954-74). This program centered on Monterey, Santa Clara, and San Benito Counties. An additional 164,000 acres of noncommercial forest burned in wildfires on State-protected lands in the central coast from 1953 through 1972; some of this area has most likely been converted from forest to rangeland by grazing after the fires (California Division of Forestry 1953-72).

Besides actual changes in forest area by intent or catastrophe, some of the apparent shift in acreage comes from changes in classification. For example, some woodland grass areas that were classed in 1953 as noncommercial forest became "nonforest" in the recent inventory by a change in the minimum size of the classification area. Then too, sampling error associated with estimates of area could account for some of the apparent differences in the region's total forest acreage.

There has been considerable shifting of acreage within the area that was called forest land in both inventories. These shifts have resulted from classification changes; none derived from physical changes. Productive forest land--both commercial and reserved--increased 62,000 acres from 1953 to 1973, mainly because of classification changes that have resulted in current inclusion in the productive forest base of isolated timber patches, narrow timbered stringers, and minor conifers, which were previously classed as nonproductive from the timber standpoint. Although these areas meet our current definition of productive forest land, in many instances their value for producing timber as a crop is marginal.

Productive forest land in reserved status has increased from an estimated 20,000 acres in 1953 to 79,000 acres in 1973. Most of this increase can be accounted for by the dedication of formerly unreserved lands to uses that preclude timber production. If we consider the limited size of the timbered forest resource area in the central coast, the estimated increase is substantial. It indicates, as detail and discussion will show, the trend in priorities for the use of the region's timberlands:

Productive forest land reserved from timber production

<u>County</u>	<u>1953</u>	<u>1973</u>
	(Thousand acres)	
Marin	1	23
Monterey	4	10
San Mateo	3	16
Santa Clara	2	6
Santa Cruz	9	19
Other counties	<u>1</u>	<u>5</u>
Total	20	79

In Marin County, municipal watershed lands have been set aside from commercial timber operations. Beyond that, the creation of Point Reyes National Seashore and the Golden Gate National Recreation Area have brought about withdrawal of most of the remaining productive forests in this county.

San Mateo County's increased reserve of productive forest land resulted from expansion of State parks, new county parks, and the dedication of the city of San Francisco's San Mateo watershed lands as an open space and recreation preserve.

The increase in productive reserved land in Santa Cruz County is due to creation of the Santa Cruz campus of the University of California and to expansion of State parks (fig. 4). In the other counties as well, increases in productive reserved land resulted largely from park expansion.

These increases in reserved forest land document a continuing effort in this region to reserve timbered forests for uses other than timber production, an effort that started in 1902 with the establishment of the State's first redwood park.

The area of commercial timberlands potentially available for timber production appears to be essentially unchanged from the earlier estimate; but, in fact, a substantial acreage has since been dedicated to noncommodity uses. What has happened is that in Santa Cruz and Monterey Counties some areas classed in the earlier inventory as noncommercial have now been designated potentially productive. These areas are of three types: (1) small isolated patches or stringers of timber, (2) areas presently without commercially valuable tree cover because of fires, and (3) areas with minor conifers of marginal commercial value, primarily Coulter and knobcone pines. Although these areas meet the



Figure 4.--This stand of young-growth redwood is a recent addition to the State Park system in Santa Cruz County.

current definitions of commercial forest land, their prospects for commercial timber operations and management are poor. So, although they appear to have offset the productive acres that have been dedicated to parks, they do not. It is more likely that the manageable commercial forest base has decreased.

Estimated unreserved commercial forest area

<u>County</u>	<u>1953</u>	<u>1973</u>
	(Thousand acres)	
Marin	31	7
Monterey	16	60
San Mateo	59	44
Santa Clara	25	14
Santa Cruz	<u>125</u>	<u>135</u>
Total	256	260

THE REGION'S TIMBERLANDS AND TIMBER RESOURCES

This section of the report discusses the central coast's unreserved commercial forest land and timber resources. Detailed statistics are given in the tables following the text.

A caution is in order here: In the following discussions of timber resource characteristics, some descriptive elements were not available for the entire resource. For example, information on site class, stand age, and species volume was not available for the 33,000 acres of commercial forests on the Los Padres National Forest nor for a 6,000-acre area of privately owned Monterey pine on the Monterey Peninsula. Timber values in both these areas are of secondary concern, so the lack of details for these resources is not vital. And in the following discussion of area, volume, and growth, the base for comparisons and proportions varies, depending on availability of data for these two areas. Missing data in the tables are indicated by footnotes.

The central coast's 260,000 acres of unreserved commercial forests contain an estimated 6.1 billion board feet (Scribner rule) of sawtimber. Coniferous species account for 93 percent (5.7 billion board feet) of all sawtimber volume; 71 percent of the conifer sawtimber volume is redwood, 24 percent Douglas-fir. The cubic-foot volume of all growing stock trees totals 1.3 billion.

Tanoak and madrone are the most abundant hardwoods in the region's commercial forests, accounting for about three-fourths of the hardwood volume on commercial forest land. The hardwood volume estimates reported herein, however, do not indicate the total extent of hardwoods in the central coast. This region has 1.2 million acres of noncommercial forest land occupied by hardwood forests. Since these forests were not inventoried for timber volumes, no estimates of the hardwood volume on this large forested area are available.

Current net annual growth on the region's commercial forests is estimated at 26 million cubic feet. Sawtimber growth amounts to 128 million board feet, 95 percent of which is conifer species--mostly redwood and Douglas-fir.

The average acre in the central coast has 24,000 board feet of sawtimber and is growing 550 board feet per year. These averages indicate that the central coast's forests have relatively high sawtimber volume and high annual growth compared with California's other timbered regions.

Ownership

The timberlands of the central coast are essentially a privately owned resource. This region's many private owners control 217,000 acres, or 83 percent of the region's timberlands and 83 percent of the sawtimber volume. Of this area, forest industry owns only about 10,000 acres. Two-thirds of the privately owned timberlands are controlled by farmers and other individual owners of small tracts, and 29 percent is owned by corporate owners not involved in the manufacture of wood products. Most of the private timberland in the region is controlled by owners who apparently are not holding their land primarily for its timber production. An indicator that many of the owners are not interested in producing and marketing timber is that the region's per-acre timber output is 115 board feet per year, low compared with the average sawtimber volume and growth on the central coast's timberlands.

Public ownerships account for 17 percent of the region's commercial forests and sawtimber volume. The portion of the Los Padres National Forest in Monterey County contains an estimated 33,000 acres classed as commercial forests. These lands, however, are marginal in potential timber production; over half the area is in isolated stands of redwood in canyon bottoms, and 30 percent is in mostly open stands of Coulter pine--a species with little commercial use.

Public timberlands other than National Forest total 10,000 acres, mostly in county or municipal ownership. The municipal watersheds of Santa Cruz County are managed for timber production as well as water.

Productivity of the Forest Land

The central coast timberlands vary in potential for wood production. They have been placed in cubic-foot site classes based on potential mean annual growth (per acre) in fully stocked natural timber stands. Although neither the yield of existing stands is reflected nor what might be produced in managed stands, the classes provide a relative measure to rate timberlands.

Of the central coast's 221,000 acres rated for productivity, 89 percent is capable of producing 120 cubic feet or more per acre per year. The average site class for this region

exceeds 175 cubic-feet, making it potentially the most productive timber region--on a per-acre basis--in California. Other regions in the State have high-site timberlands, but they also have large areas of low productivity. Except for Monterey County, most of which was not classed as to productivity, the central coast has essentially no timberland of low productivity.

The 221,000-acre area rated for productivity has an average net annual growth of 115 cubic feet per acre, about two-thirds of the rated potential for the area. Considering the voluntary origins of the stands, varied stocking, and uneven distribution of age classes, a high proportion of the estimated potential of the region's forests has been realized in the existing stands.

Forest Types

The commercial forests of the central coast include many tree species. But one conifer, coastal redwood, is most evident in the commercial forests of the region. This species supported early development of the forest industries and continues to be the primary commercial resource. The

Figure 5.--Most forests in the central coast have several tree species. This redwood stand has numerous Douglas-firs and hardwoods.



redwood forest type totals 127,000 acres and accounts for 70 percent (4.3 billion board feet) of the region's sawtimber volume and for 64 percent (82 million board feet) of the current sawtimber growth. Although the volume in this type is mostly redwood, Douglas-fir and hardwoods are also found on much of this area (fig. 5).

The other important commercial conifer in the region, Douglas-fir, predominates on 27,000 acres. This forest type contains almost 1 billion board feet of sawtimber and has a current annual growth of 17 million board feet.

Pines--Coulter, knobcone, ponderosa, or Monterey--predominate on a total of 38,000 acres in the central coast (fig. 6). These pine forests, which are scattered and not in large concentrations, hold 292 million board feet of sawtimber and account for 11 percent (14 million board feet) of the region's sawtimber growth.

Tanoak, Pacific madrone, and several other hardwoods, singly or in combination, are the predominant tree species on about one-quarter (68,000 acres) of the region's commercial timberlands. These hardwood forests contain almost 600 million board feet of sawtimber, of which more than three-fourths is

Figure 6.--A sparse stand of knobcone pine on shallow soil in Santa Cruz County. Pine stands in the central coast are of little importance for timber value.



softwoods. This apparent anomaly--hardwood forest type with sawtimber mostly in softwoods--results because forest type is determined by trees of all sizes. These hardwood stands often are characterized by a scattering of large conifers and many small hardwoods, the latter accounting for a greater total of stocking but providing little sawtimber volume. The hardwood forests account for 14 million board feet of current growth, most of it on the conifers within the stands.

Stocking

Stocking is a measure of the degree to which the existing stand is utilizing the capability of the site to grow trees (a measure of how effectively the land is being used from the standpoint of producing timber). In the central coast, stocking was separated into two components: (1) softwood growing stock which, with respect to timber values, is considered the desirable component; and (2) hardwoods and cull softwoods, which could be considered an impediment to timber production though not to watershed protection, wildlife habitat, recreation, or other nontimber values.

No commercial forest lands in the central coast were found unstocked with trees. The areas that were lightly stocked or nonstocked with softwood growing stock were at least moderately stocked with hardwoods. Conversely, areas with few hardwoods were moderately to fully stocked with softwood growing stock.

Of the 221,000-acre area for which we have stocking information, 71 percent is moderately to fully stocked with growing stock softwoods; 24 percent lightly stocked; 5 percent nonstocked. The impressive stocking condition of the central coast's commercial forests comes from a combination of factors. The region's forest lands are of high productivity. Redwood, the predominant coniferous species, readily sprouts after cutting, and the region's hardwoods are aggressive in occupying areas where vegetation has been removed (fig. 7). In most years, moisture is not a limiting factor in stand establishment.

Since the first harvests in the region and the fires that followed, the young forests have developed relatively undisturbed. The industry that has depended on the young timber resource in recent decades has been small so the acreage annually harvested has been small. Also, the harvest methods used in recent years usually have left a residual stand. Our inventory indicated that 77,000 acres had undergone partial harvest in the present stands; about 14,000 acres underwent partial harvest in the 5 years before inventory. This is a modest amount for partial harvest if we consider the region's entire inventory of unreserved forests.

Of the area partially harvested, only one-fourth is predominantly stocked with hardwoods, and all these areas have some softwoods as well. The practice of partial harvest in the central coast does not appear to have resulted in conversion of softwood stands to hardwoods.



Figure 7.--Redwood stumps sprout vigorously at the root collar shortly after trees are cut. These sprouts provide almost immediate restocking of harvested redwood areas.

Stand Age

As a consequence of the extensive harvests of virgin timber and the massive fires that were characteristic of this region in the latter part of the 19th century and the early years of this century, young forests predominate in the central coast. Three-fourths of the region's timberland has forest stands less than 100 years old; 92,000 acres with stands less than 50 years old; and 71,000 acres with stands 50 to 100 years old.

Collectively, these young stands contain 2.5 billion board feet of sawtimber and account for two-thirds (84 million board feet) of the region's sawtimber growth and almost three-fourths of its cubic-foot growing stock growth. Within the young forests, two-thirds of the sawtimber volume is concentrated in the 50- to 100-year-old stands.

The stands more than 100 years old total 58,000 acres and are of several origins. Some are only slightly over 100 years old and probably originated after the earliest logging. Others show no evidence of past harvest; and yet others (22,000 acres) are partially harvested stands of mature timber. Even though they occupy only one-fourth of the commercial forest area,

these old stands, because of their higher volume concentrations, account for more than half (2.8 billion board feet) of the region's sawtimber.

In contrast with the young stands, which average about 15,000 board feet of sawtimber per acre, the old stands average 48,000 board feet; and some exceed 90,000 board feet. The current annual growth is 768 board feet per acre in these old stands compared with 512 in the young stands.

In summary, the central coast's commercial forests can be characterized as rapidly growing, mostly young forests. They are of mixed species, but redwood or hardwoods (Pacific madrone and tanoak) most often predominate. Across almost the entire commercial forest area, both hardwoods and conifers are present (fig. 8). The impression from flying over or traveling through the region's forests is that the tree cover is almost unbroken. The clearcutting and massive fires of decades ago left in their wake extensive areas that now are vegetated with mixed forests of hardwoods and conifers. The fire protection of recent decades and the practice of partial harvests, now mandated by forest practices regulations, have fostered the continuous forest cover characteristic of the central coast today.

Figure 8.--A mixed stand of tanoak and redwood. Both hardwoods and softwoods are usually present on productive forest land in the central coast.



THE POTENTIAL IMPACTS OF HARVEST LIMITATIONS

A number of limitations may affect the availability of timber in the central coast. The first category of limitations is economic and includes species of low value, concentrations of low volumes, inaccessibility, and lack of processing facilities. Much of the scattered timber in Monterey County has one or more of these limitations.

Another limitation, perhaps more important than any other in this region, is the pattern of timberland ownership and owners' objectives. The central coast's timberlands are held primarily by many owners, in small woodland tracts (Baker and Poli 1953, 1954). Although no survey of owner intent has been made, the ownership pattern suggests that much--perhaps most--of the forested area is owned for reasons other than the production of timber. Although many of these owners do sell timber at one time or another, at any given time much of the timber probably is not available regardless of market conditions (demand). Moreover, investments in timber growing are likely minimal in most cases. The ownership pattern in this region, then, is probably the most significant reason for the small scale of the resident forest industry. As one consequence of the ownership pattern, owner objectives, and small scale of industry, timber stocks in the central coast have built up until this region has the highest average per-acre concentration of sawtimber of all timber-producing regions in California.

Local government zoning regulations, restricting the uses on lands within well-defined geographic boundaries, can also affect timber availability. The impacts of such zoning limitations were not investigated in this inventory, but the intensified land-use planning efforts that can be anticipated with expanding population in this region likely will result in zoning impacts on some of the commercial forest land.

Another important set of limitations on the availability of timber is local and State forest practice regulations, which affect the availability of timber on almost all the region's timberlands. These regulations vary somewhat from county to county in the central coast, but all have specific requirements about conditions of forest lands subsequent to harvest operations.

The forest practice regulations that apply to the central coast counties are more stringent than those of other timbered regions in California; they require that a significant residual stand of trees be left after harvest (fig. 9). So only part of the timber stand is available for harvest at any time, and stands cannot be reentered for subsequent harvest until they meet specified minimal stocking standards, which means that residual volume might not be available for extended periods.

Impact of Forest Practice Regulations

Most of the limitations on timber availability affect only one portion or another of the region's timber resource. But forest practice regulations affect availability of the entire

Figure 9.--The appearance of this open stand of redwood was little changed by recent partial harvest in accordance with forest practice regulations. Some trees were left in each cluster of trees, which originated from sprouts. After harvest, logging slash was removed and the area was seeded to annual grasses, an indication that the owner places high value on the restoration of the appearance of the forest.



timber base and deserve a brief discussion here as a potential limitation on availability of the region's current timber stocks.

Forest practice regulations in the central coast vary among counties; but they all require that a well-distributed residual stand of thrifty, vigorous, coniferous trees with full crowns--40 to 50 percent of the original stand--be left after harvest. To approximate the impact of these regulations on current availability of the region's sawtimber resource, I screened each forest inventory sample plot. Tree distribution, crown position, tree diameter, and numbers of trees were considered in an attempt to estimate the minimum residual stand that would be required by the appropriate set of regulations.^{3/}

³For San Mateo County, the county's 1972 harvest regulations were used. For Monterey County, the Southern Forest District high-use subdistrict rules were used (California Administrative Code, Title 14, Division 2, Chapter 2, subchapter 2, Article 3 (953.8)). For Marin, Santa Clara, and Santa Cruz Counties, the Coast Forest District, southern area rules were used (California Administrative Code, Title 14, Division 2, Chapter 2, subchapter 1, Article 3 (913.9a)).

The trees on each plot not needed to meet the minimum requirements for the residual stand were considered "available" for harvest; the volumes of these trees were then summed to provide estimate of available softwood sawtimber volume for each plot.

The following tabulation shows estimated acres and volume of softwood sawtimber in each of five broad volume classes, before and after volume data were adjusted for estimated impacts of the regulations on timber availability:

<u>Volume class</u>	<u>Thousand acres</u>	<u>Total volume</u>	<u>Thousand acres</u>	<u>Available volume</u>
(M bd ft)		(MM bd ft)		(MM bd ft)
0-5	55	126	94	104
5-10	38	284	34	286
10-25	42	669	55	894
25-50	62	2,082	25	889
50+	24	1,801	13	803
Total	221	4,962	221	2,976

Analysis of the data (after screening and adjustment of volume) indicates the following:

1. On the average, the central coast's timber stands can be expected to yield approximately 60 percent of their total sawtimber volume when harvested in compliance with forest practice regulations pertaining to minimum residual stocking levels.
2. An estimated 93,000 acres--43 percent of the timbered area for which sample plots were analyzed--has less than 5,000 board feet per acre of available sawtimber.
3. The percentage of total stand volume that is available is quite variable and is not predictable on the basis of total stand volume. Some stands have as much as 80 percent of their total sawtimber volume available.

It is important to recognize that the sawtimber trees left standing after harvest can, in most cases, be harvested at a later date when the stands have restocked sufficiently to meet minimum stocking standards specified by the regulations.

The forest practice regulations governing logging in the central coast were drafted to insure maintenance of a sawtimber conifer component in the region's forests, in recognition of the multiple resource values associated with the forests and their use. Through deferral of harvest of some of the conifer sawtimber in each stand, the continuous forest cover that characterizes most of this region's forested area can be maintained.

LITERATURE CITED

- Baker, Harold L., and Adon Poli.
1953. Area and ownership of forest land in Santa Cruz County, California. USDA For. Serv. Calif. For. and Range Exp. Stn. For. Surv. Release 21, 22 p. Berkeley, Calif.
- Baker, Harold L., and Adon Poli.
1954. Area and ownership of forest land in San Mateo County, California. USDA For. Serv. Calif. For. and Range Exp. Stn. For. Surv. Release 22, 22 p. Berkeley, Calif.
- California Division of Forestry.
1948-77. Production of California timber operators. State For. Notes (published annually). Sacramento, Calif.
- California Division of Forestry.
1953-72. Wildfire statistics. (Published annually.) Sacramento, Calif.
- California Division of Forestry.
1954-74. Brushland range improvement (annual report). Sacramento, Calif.
- 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. Washington, D.C.
- Munz, Philip A., and David D. Keck.
1970. A California flora. 1,681 p. Univ. Calif. Press, Berkeley.
- U.S. Department of Agriculture, Forest Service.
1953. Forest statistics for the redwood-Douglas-fir subregion in California. Calif. For. and Range Exp. Stn. For. Surv. Release 19, 54 p. Berkeley, Calif.
- U.S. Department of Agriculture, Forest Service.
1954. Forest statistics for California. Calif. For. and Range Exp. Stn., For. Surv. Release 25, 63 p. Berkeley, Calif.

APPENDIX

Table 1--Area by land class and county, California's central coast, January 1, 1973

(In thousand acres)

Land class	Alameda	Contra Costa	Marin	Monterey	San Benito	San Francisco	San Mateo	Santa Clara	Santa Cruz	Solano	All counties
Forest land:											
Commercial	--	--	7	60	--	--	44	14	135	--	260
Productive reserved	3	2	23	10	--	--	16	6	19	--	79
Unproductive	95	67	94	892	324	--	60	357	28	37	1,954
Total	98	69	124	962	324	--	120	377	182	37	2,293
Nonforest land	370	399	209	1,160	569	29	166	455	99	492	3,948
Total area	468	468	333	2,122	893	29	286	832	281	529	6,241

Source: United States Bureau of the Census, Land and Water Area of the United States, 1971.

Table 2--Area of commercial forest land by ownership and county,
California's central coast, January 1, 1973
(In thousand acres)

Ownership	Marin	Monterey	San Mateo	Santa Clara	Santa Cruz	All counties
National Forest		33				33
Other public:						
Miscellaneous Federal		$\frac{1}{1}$				$\frac{1}{1}$
State		$\frac{1}{1}$			$\frac{1}{6}$	$\frac{1}{1}$
County and municipal			1	2	$\frac{1}{6}$	9
Total other public		1	1	2	6	10
Private:						
Forest industry			8		2	10
Farmer-owned	3	13	2	$\frac{1}{1}$	7	25
Miscellaneous private--corporate	1	5	7	3	47	63
Miscellaneous private--noncorporate	3	8	26	9	73	119
Total private	7	26	43	12	129	217
All ownerships	7	60	44	14	135	260

$\frac{1}{1}$ Less than 500 acres.

Table 3--Area of noncommercial forest land by land class
and forest type and by ownership, California's
central coast, January 1, 1973

(In thousand acres)

Land class and forest type	National Forest	Other public	Private	All ownerships
RESERVED				
Productive forest land:				
Douglas-fir		6		6
Ponderosa pine	7	3		10
Monterey pine		1		1
Redwood	2	36		38
Black oak		1		1
Pacific madrone		1		1
Other hardwoods		7		7
Noncommercial conifers		2		2
Unclassified		11	2	13
Total	9	68	2	79
Unproductive forest land:				
Oaks		36		36
Chaparral		88		88
Unclassified	86			86
Total	86	124		210
Total reserved	95	192	2	289
UNRESERVED				
Unproductive forest land:				
Douglas-fir			2	2
Noncommercial conifers			5	5
Oaks	30	131	1,036	1,197
Chaparral	28	187	292	507
Pinyon-juniper	1			1
Unclassified	32			32
Total unreserved	91	318	1,335	1,744

Table 4--Area of commercial forest land by site
class and ownership, California's
central coast, January 1, 1973

Site class ^{1/}	Public	Private	All ownerships
<u>Cubic feet</u>	<u>- - - -In thousand acres- - - -</u>		
225 or more	2	62	64
165 to 224	3	47	50
120 to 164	1	81	82
85 to 119	2	18	20
50 to 84	2	--	2
20 to 49	--	3	3
Unclassified	33	6	39
All classes	43	217	260

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

Table 5--Area of commercial forest land by stand-size class and
ownership, California's central coast, January 1, 1973
(In thousand acres)

Stand-size class	Public	Private	All ownerships
Sawtimber stands:			
Large sawtimber ^{1/}	4	93	97
Small sawtimber ^{2/}	4	80	84
Total	8	173	181
Poletimber	2	13	15
Sapling and seedling stands	--	25	25
Nonstocked areas	--	--	--
Unclassified	33	6	39
All classes	43	217	260

^{1/} Large sawtimber includes trees 21.0-inch d.b.h. and larger.

^{2/} Small sawtimber includes softwood trees 9.0- to 20.9-inch d.b.h. and hardwood trees 11.0- to 20.9-inch d.b.h.

Table 6--Area of commercial forest land by stand volume and ownership,
California's central coast, January 1, 1973

Stand volumes per acre ^{1/}	Public	Private	All ownerships
<u>Board feet</u>	<u>- - - - Thousand acres- - - -</u>		
Less than 1,500		14	14
1,500 to 4,999		20	20
5,000 to 9,999	4	34	38
10,000 to 19,999	2	38	40
20,000 to 29,999	2	22	24
30,000 to 39,999		41	41
40,000 to 49,999	2	12	14
50,000 to 59,999		3	3
60,000 to 69,999		9	9
70,000 to 79,999		5	5
80,000 to 89,999		9	9
90,000 or more		4	4
Unclassified	33	6	39
Total	43	217	260

^{1/}Net volume, International 1/4-inch rule.

Table 7--Area of commercial forest land by forest type and ownership,
California's central coast, January 1, 1973
(In thousand acres)

Forest type	National Forest	Other public	Private	All ownerships
Redwood	17	4	106	127
Douglas-fir	--	--	27	27
Coulter pine	10	--	3	13
Knobcone pine	--	--	10	10
Ponderosa pine	6	--	--	6
Monterey pine	--	--	9	9
Pacific madrone	--	1	16	17
Tanoak	--	--	24	24
Other hardwoods	--	5	22	27
All types	33	10	217	260

Table 8--Area of commercial forest land by stocking percent and stand
component, California's central coast, January 1, 1973^{1/}

Stocking in softwood growing stock	Stocking in hardwoods and cull softwoods (percent)					Total
	0-10	11-35	36-60	61-80	81+	
<u>Percent</u>	<u>-Thousand acres-</u>					
0-10	--	--	--	--	11	11
11-35	--	--	10	3	39	52
36-60	4	4	22	6	30	66
61-80	--	1	4	24	3	32
81+	6	27	20	7	--	60
All stocking levels	10	32	56	40	83	221

^{1/} Excludes 33,000 acres of Los Padres National Forest and 6,000 acres of privately owned forest, for which data were not available.

Table 9--Volume of timber on commercial forest land by class of
timber and by softwoods and hardwoods, California's
central coast, January 1, 1973^{1/}

(In million cubic feet)

Class of timber	Softwoods	Hardwoods	All species
Sawtimber trees:			
Saw-log portion	882	62	944
Upper-stem portion	121	59	180
Total	1,003	121	1,124
Poletimber trees	31	43	74
All growing stock trees	1,034	164	1,198
Sound cull trees	1	33	34
Rotten cull trees	1	4	5
Salvable dead trees	4	--	4
All timber	1,040	201	1,241

^{1/}Excludes volume on 33,000 acres of Los Padres National Forest and on 6,000 acres of privately owned forests, for which data were not available.

Table 10--Volume of growing stock and sawtimber on commercial forest land by stand-size class and by softwoods and hardwoods, California's central coast, January 1, 1973^{1/}

Stand-size class	Average volume per acre	Softwoods	Hardwoods	All species
	<u>Cubic feet</u>	<u>- - -Million cubic feet- - -</u>		
Growing stock: ^{2/}				
Large sawtimber stands	8,371	736	76	812
Small sawtimber stands	3,940	251	80	331
Poletimber stands	2,267	27	7	34
Sapling and seedling stands	840	20	1	21
Nonstocked areas	--	--	--	--
All stands	5,421	1,034	164	1,198
	<u>Board feet</u>	<u>- - -Million board feet- - -</u>		
Sawtimber (International 1/4-inch rule): ^{3/}				
Large sawtimber stands	44,433	4,133	177	4,310
Small sawtimber stands	16,369	1,243	132	1,375
Poletimber stands	9,000	133	2	135
Sapling and seedling stands	2,800	68	2	70
Nonstocked areas	--	--	--	--
All stands	26,652	5,577	313	5,890
Sawtimber (Scribner rule): ^{4/}				
Large sawtimber stands	40,732	3,778	173	3,951
Small sawtimber stands	13,750	1,026	129	1,155
Poletimber stands	7,600	112	2	114
Sapling and seedling stands	1,920	46	2	48
Nonstocked areas	--	--	--	--
All stands	23,837	4,962	306	5,268

^{1/} Excludes volume on 33,000 acres of Los Padres National Forest and 6,000 acres of privately owned forest, for which detailed data were not available.

^{2/} Includes trees 5.0-inch d.b.h. and larger.

^{3/} Includes softwood trees 9.0-inch d.b.h. and larger and hardwood trees 11.0-inch d.b.h. and larger.

^{4/} Includes trees 11.0-inch d.b.h. and larger.

Table 11--Volume of growing stock and sawtimber on commercial forest land
by ownership and by softwoods and hardwoods, California's
central coast, January 1, 1973

Ownership	Average volume per acre	Softwoods	Hardwoods	All species
	<u>Cubic feet</u>	<u>- - -Million cubic feet- - -</u>		
Growing stock: ^{1/}				
National Forest	4,121	117	19	136
Other public	4,500	33	12	45
Private ^{2/}	5,464	1,001	152	1,153
All ownerships	5,252	1,151	183	1,334
	<u>Board feet</u>	<u>- - -Million board feet- - -</u>		
Sawtimber (International 1/4-inch rule): ^{3/}				
National forest ^{4/}	--	--	--	--
Other public	20,800	188	20	208
Private ^{2/}	26,929	5,389	293	5,682
All ownerships	26,652	5,577	313	5,890
Sawtimber (Scribner rule): ^{5/}				
National Forest	26,182	741	123	864
Other public	18,400	164	20	184
Private ^{2/}	24,095	4,798	286	5,084
All ownerships	24,142	5,703	429	6,132

^{1/} Includes trees 5.0-inch d.b.h. and larger.

^{2/} Excludes 6,000 acres of privately owned forests, for which data were not available.

^{3/} Includes softwood trees 9.0-inch d.b.h. and larger and hardwood trees 11.0-inch d.b.h. and larger.

^{4/} Excludes 33,000 acres of Los Padres National Forest for which data were not available.

^{5/} Includes trees 11.0-inch d.b.h. and larger.

Table 12--Volume of growing stock and sawtimber on commercial forest
land by county and ownership, California's central coast,
January 1, 1973^{1/}

County	National Forest	Other public	Private	Total
- - - - <u>-Million cubic feet-</u> - - - -				
Growing stock: ^{2/}				
Marin			43	43
Monterey	136	2	131	269
San Mateo		1	281	282
Santa Clara		2	77	79
Santa Cruz		40	621	661
Total	136	45	1,153	1,334
- - - - <u>-Million board feet-</u> - - - -				
Sawtimber (Scribner rule): ^{3/}				
Marin			204	204
Monterey	864	7	627	1,498
San Mateo		6	1,325	1,331
Santa Clara		11	357	368
Santa Cruz		160	2,571	2,731
Total	864	184	5,084	6,132

^{1/} Excludes volume on 6,000 acres of privately owned forests.

^{2/} Includes trees 5.0-inch d.b.h. and larger.

^{3/} Includes trees 11.0-inch d.b.h. and larger.

Table 13--Volume of growing stock and sawtimber on commercial
forest land by species, California's central coast,
January 1, 1973^{1/}

Species	Growing stock	Sawtimber
	<u>Million cubic feet</u>	<u>Million board feet, Scribner rule</u>
Softwoods:		
Redwood	772	3,526
Douglas-fir	206	1,196
Coulter pine	10	54
Knobcone pine	21	46
Ponderosa pine	10	60
Monterey pine	15	80
Unclassified	117	741
Total	1,151	5,703
Hardwoods:		
Pacific madrone	48	89
Tanoak	78	132
Other hardwoods	38	85
Unclassified	19	123
Total	183	429
All species	1,334	6,132

^{1/} Excludes volume on 6,000 acres of privately owned forests.

Table 14--Volume of growing stock on commercial forest land by species and diameter class, California's
central coast, January 1, 1973^{1/}

(In million cubic feet)

Species	Diameter class (inches at breast height)											
	5.0- 6.9	7.0- 8.9	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0- 38.9	39.0 and larger	All classes
Softwoods:												
Redwoods	6	12	16	17	27	33	42	52	135	135	298	772
Douglas-fir	1	5	--	6	2	5	2	5	35	45	102	206
Pines	4	3	5	5	2	3	1	4	14	10	5	56
Total ^{2/}	11	20	21	28	31	41	45	61	181	190	405	1,034
Hardwoods:												
Pacific madrone	1	2	5	10	5	6	5	1	9	4	--	48
Tanoak	4	8	11	10	9	7	6	6	14	3	--	78
Other hardwoods	3	4	4	5	4	2	4	2	9	1	--	38
Total ^{2/}	8	14	20	25	18	15	15	9	32	8	--	164
All species ^{2/}	19	34	41	53	49	56	60	70	213	198	405	1,198

^{1/}Excludes volume on 33,000 acres of Los Padres National Forest and 6,000 acres of privately owned forests, for which detailed data were not available.

^{2/}Totals may be off because of rounding.

Table 15--Volume of sawtimber on commercial forest land by species and diameter class,

California's central coast, January 1, 1973^{1/}

(In million board feet, Scribner rule)

Species	Diameter class (inches at breast height)								All classes
	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0- 38.9	39.0 and larger	
Softwoods:									
Redwood	41	80	129	185	242	644	615	1,590	3,526
Douglas-fir	21	9	18	8	25	175	266	673	1,196
Pines	14	9	13	6	21	74	64	40	240
Total ^{2/}	76	99	160	198	286	893	947	2,303	4,962
Hardwoods:									
Pacific madrone	20	10	14	11	3	23	9	--	89
Tanoak	16	18	16	16	16	38	10	--	132
Other hardwoods	12	13	6	11	5	36	3	--	85
Total ^{2/}	48	41	36	38	24	97	22	--	306
All species ^{2/}	124	140	196	236	310	990	969	2,303	5,268

^{1/}Excludes volume on 33,000 acres of Los Padres National Forest and 6,000 acres of privately owned forests, for which detailed data were not available.

^{2/}Totals may be off because of rounding.

Table 16--Area of commercial forest land and volume and net growth of growing stock and sawtimber by forest type, California's central coast, January 1, 1973

Forest type	Area	Volume		Net growth	
		Growing stock	Saw-timber	Growing stock	Saw-timber
	Thousand acres	Million cubic feet	Million board feet ^{1/}	Thousand cubic feet	Thousand board feet ^{1/}
Redwood	127	921	4,304	15,992	82,345
Douglas-fir	27	177	952	2,998	17,195
Coulter pine	13	19	105	438	2,375
Knobcone pine	10	14	16	693	589
Ponderosa pine	6	9	57	51	0
Monterey pine ^{2/}	3	22	114	1,716	11,341
Pacific madrone	17	33	108	407	619
Tanoak	24	87	269	2,429	7,888
Other hardwoods	27	52	207	1,240	5,718
All types	^{2/} 254	^{2/} 1,334	^{2/} 6,132	^{2/} 25,964	^{2/} ^{3/} 128,070

^{1/} Scribner rule.

^{2/} Excludes area, volume, and growth on 6,000 acres of privately owned forest.

^{3/} Excludes sawtimber growth on 33,000 acres of Los Padres National Forest.

Table 17--Area of commercial forest land and volume and net growth of growing stock and sawtimber by stand age, California's central coast, January 1, 1973^{1/}

Stand age class	Area	Volume		Net growth	
		Growing stock	Saw-timber	Growing stock	Saw-timber
<u>Years</u>	<u>Thousand acres</u>	<u>Million cubic feet</u>	<u>Million board feet^{2/}</u>	<u>Thousand cubic feet</u>	<u>Thousand board feet^{2/}</u>
Nonstocked areas:					
0-9	12	8	24	711	4,282
10-19	3	2	--	208	--
20-29	6	9	22	313	1,019
30-39	14	56	199	2,431	13,425
40-49	20	76	249	3,391	12,734
50-59	6	16	50	607	2,326
60-69	6	41	172	1,057	5,773
70-79	7	37	149	600	2,666
80-89	--	--	--	--	--
90-99	--	--	--	--	--
100-119	--	--	--	--	--
120-139	3	33	204	847	5,719
140-159	--	--	--	--	--
160-179	--	--	--	--	--
180-199	--	--	--	--	--
200 and over	10	114	582	598	3,000
Uneven-aged stands:					
Less than 50	37	94	350	2,334	9,881
50-99	52	305	1,285	6,591	31,424
100 and over	45	409	1,981	5,792	35,821
All classes ^{2/}	221	1,198	5,268	25,480	128,070

^{1/}Excludes 33,000 acres of Los Padres National Forest and 6,000 acres of privately owned forests, for which detailed data were not available.

^{2/}Scribner rule.

Table 18--Net annual growth of growing stock and sawtimber on commercial forest land by ownership and by softwoods and hardwoods, California's central coast, 1972

Ownership	Average volume per acre	Softwoods	Hardwoods	All species
	<u>Cubic feet</u>	- - - <u>Thousand cubic feet</u> - - -		
Growing stock: ^{1/}				
National Forest	15	484	2/	484
Other public	95	232	721	953
Private ^{3/}	111	21,085	3,442	24,527
All ownerships	102	21,801	4,163	25,964
	<u>Board feet</u>	- - - <u>Thousand board feet</u> - - -		
Sawtimber (International 1/4-inch rule): ^{4/}				
National Forest ^{2/}	--	--	--	--
Other public	266	1,679	979	2,658
Private ^{3/}	614	130,305	5,470	135,775
All ownerships	599	131,984	6,449	138,433
Sawtimber (Scribner rule): ^{5/}				
National Forest ^{2/}	--	--	--	--
Other public	258	1,630	955	2,585
Private ^{3/}	568	120,090	5,395	125,485
All ownerships	554	121,720	6,350	128,070

^{1/} Includes trees 5.0-inch d.b.h. and larger.

^{2/} Not available.

^{3/} Excludes 6,000 acres of privately owned forests, for which growth data were not available.

^{4/} Includes softwood trees 9.0-inch d.b.h. and larger and hardwood trees 11.0-inch d.b.h. and larger

^{5/} Includes trees 11.0-inch d.b.h. and larger.

Table 19--Net annual growth of growing stock and sawtimber on
commercial forest land by species, California's
central coast, 1972

Species	Growing stock	Sawtimber
	<u>Thousand cubic feet</u>	<u>Thousand board feet</u> ^{1/}
Softwoods:		
Redwood	14,547	80,186
Douglas-fir	3,612	21,495
Coulter pine	358	2,375
Knobcone pine	1,163	6,827
Ponderosa pine	<u>2/-79</u>	<u>2/-504</u>
Monterey pine	1,716	11,341
Unclassified	484	--
Total	21,801	121,720
Hardwoods:		
Pacific madrone	1,046	1,430
Tanoak	2,269	3,231
Other hardwoods	848	1,689
Total	<u>3/4,163</u>	<u>3/6,350</u>
All species	<u>3/4/25,964</u>	<u>5/128,070</u>

^{1/} Scribner rule.

^{2/} Negative growth is the result of mortality in excess of gross growth.

^{3/} Does not include growth of hardwoods on National Forest lands.

^{4/} Excludes growth on 6,000 acres of privately owned forests.

^{5/} Excludes growth on 33,000 acres of Los Padres National Forest and 6,000 acres of privately owned forests.

Table 20--Average annual mortality of growing stock and sawtimber on commercial forest land by species, California's central coast, 1968-72^{1/}

Species	Growing stock	Sawtimber	
		International 1/4-inch rule	Scribner rule
	<u>Thousand cubic feet</u>	<u>- -Thousand board feet- -</u>	
Softwoods:			
Redwood	48	175	--
Douglas-fir	320	2,077	1,855
Knobcone pine	150	963	850
Ponderosa pine	112	776	738
Total	630	3,991	3,443
Hardwoods:			
Pacific madrone	125	--	--
Tanoak	123	--	--
Total	258	--	--
All species	888	3,991	3,443

^{1/} Excludes mortality on 33,000 acres of Los Padres National Forest and 6,000 acres of privately owned forests.

Table 21--Average annual mortality of growing stock and sawtimber on commercial forest land by cause of death and by softwoods and hardwoods, California's central coast, 1968-72^{1/}

Cause of death	Growing stock			Sawtimber		
	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species
	- - -Thousand cubic feet- - -			- - -Thousand board feet ^{2/} - - -		
Fire	112	--	112	738	--	738
Insects	192	--	192	1,204	--	1,204
Disease	--	--	--	--	--	--
Weather	150	90	240	850	--	850
Suppression	47	--	47	--	--	--
Animal	--	45	45	--	--	--
Unknown	129	123	252	651	--	651
Other	--	--	--	--	--	--
All causes	630	258	888	3,443	--	3,443

^{1/}Excludes mortality on 33,000 acres of Los Padres National Forest and 6,000 acres of privately owned forests.

^{2/}Scribner rule.

Table 22--Net volume of salvable dead sawtimber on commercial forest land by volume per acre class, California's central coast, January 1, 1973^{1/}

Volume per acre class	Sawtimber	
	International 1/4-inch rule	Scribner rule
<u>Board feet</u>	<u>- - - -Thousand board feet- - - -</u>	
1- 499	1,148	846
500- 999	--	--
1,000-2,499	19,106	17,628
2,500-4,999	7,855	7,153
Total	28,109	25,628

^{1/} Excludes salvable dead sawtimber on 33,000 acres of Los Padres National Forest and 6,000 acres of privately owned forests.

Table 23--Reported timber production in California's central coast counties,

1947-76

(In thousand board feet)^{1/}

Year	Marin ^{2/}	Monterey ^{3/}	San Mateo	Santa Clara ^{4/}	Santa Cruz	Total
1947	--	4,332	20,477	10	1,821	26,640
1948	--	1,918	17,762	--	8,452	28,132
1949	--	1,493	16,500	--	4,911	22,904
1950	180	2,355	17,520	--	2,959	23,014
1951	--	1,987	19,795	--	5,692	27,474
1952	620	950	20,371	--	4,684	26,625
1953	--	650	21,803	75	4,073	26,601
1954	719	221	20,081	--	8,018	29,039
1955	10,010	535	24,644	500	20,127	55,816
1956	5,256	2,075	20,811	1,750	19,072	48,964
1957	2,595	4,525	17,013	1,555	14,877	40,565
1958	8,643	7,212	19,213	632	28,668	64,368
1959	25,906	4,195	24,256	1,309	21,964	77,630
1960	9,165	4,579	19,046	3,035	22,778	58,603
1961	3,890	4,637	19,698	2,110	23,686	54,021
1962	1,575	6,331	21,058	1,504	26,850	57,318
1963	9,076	6,103	37,016	3,656	12,518	68,369
1964	2,095	3,461	32,642	1,732	20,596	60,526
1965	4,021	3,782	25,791	1,866	20,763	56,223
1966	948	6,821	24,322	10	18,483	50,584
1967	2	8,559	15,849	35	20,570	45,015
1968	117	4,292	22,160	125	19,989	46,683
1969	8	718	21,778	3,790	34,900	61,194
1970	341	2,870	14,689	30	19,418	37,348
1971	690	2,920	21,659	34	13,489	38,792
1972	105	1,808	6,381	757	21,245	30,296
1973	--	612	5,292	4,344	19,692	29,940
1974	12	3,192	5,583	60	21,737	30,584
1975	--	20	6,671	200	10,335	17,226
1976	523	155	5,843	903	12,619	20,043

^{1/} Log rule unspecified--primarily short log Scribner scale.^{2/} Includes Napa and Solano.^{3/} Includes San Luis Obispo.^{4/} Includes Alameda, Contra Costa, San Benito, and Stanislaus.

Source: California Division of Forestry (1948-77).

Table 24--Area of commercial forest land by stand-size class
and ownership, Santa Cruz County, California,
January 1, 1973

(In thousand acres)

Stand-size class	Public	Private	All ownerships
Sawtimber stands:			
Large sawtimber ^{1/}	2	38	40
Small sawtimber ^{2/}	4	56	60
Total	6	94	100
Poletimber stands	--	14	14
Sapling and seedling stands	--	21	21
Nonstocked areas	--	--	--
All classes	6	129	135

^{1/} Large sawtimber includes trees 21.0-inch d.b.h. and larger.

^{2/} Small sawtimber includes softwood trees 9.0- to 20.9-inch d.b.h. and hardwood trees 11.0- to 20.9-inch d.b.h.

Table 25--Area of commercial forest land by site class
and ownership, Santa Cruz County, California,
January 1, 1973

Site class ^{1/}	Public	Private	All ownerships
<u>Cubic feet</u>	<u>- - - -Thousand acres- - - -</u>		
225 or more	2	51	53
165 to 224	3	28	31
120 to 164	1	32	33
85 to 119	--	18	18
50 to 84	--	--	--
20 to 49	--	--	--
All classes	6	129	135

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

Table 26--Area of commercial forest land and volume and net growth of growing stock and sawtimber by forest type, Santa Cruz County, California, January 1, 1973

Forest type	Area	Volume		Net growth	
		Growing stock	Saw-timber	Growing stock	Saw-timber
	Thousand acres	Million cubic feet	Million board feet ^{1/}	Thousand cubic feet	Thousand board feet ^{1/}
Redwood	68	462	1,968	11,946	61,502
Douglas-fir	13	65	325	997	4,286
Knobcone pine	10	14	16	693	589
Monterey pine	3	22	114	1,716	11,341
Pacific madrone	12	22	67	329	939
Tanoak	14	48	143	1,711	6,309
Other hardwoods	15	28	98	790	3,688
All types	135	661	2,731	18,182	88,654

^{1/} Scribner rule.

Table 27--Volume and net annual growth of growing stock and
sawtimber on commercial forest land by species,
Santa Cruz County, California, January 1, 1973

Species	Volume		Growth ^{1/}	
	Growing stock	Saw- timber	Growing stock	Saw- timber
	Million cubic feet	Million board feet ^{2/}	Thousand cubic feet	Thousand board feet ^{2/}
Softwoods:				
Redwood	435	1,932	10,841	61,889
Douglas-fir	89	469	1,771	9,659
Knobcone pine	15	31	802	1,315
Ponderosa pine	7	46	20	141
Monterey pine	15	80	1,716	11,341
Total	561	2,558	15,150	84,345
Hardwoods:				
Pacific madrone	35	64	735	1,089
Tanoak	37	48	1,526	1,746
Other hardwoods	28	61	771	1,474
Total	100	173	3,032	4,309
All species	661	2,731	18,182	88,654

^{1/} Growth is for 1972.

^{2/} Scribner rule.

Inventory Procedures

The statistics for forest lands outside National Forests were collected in 1972 by Renewable Resources Evaluation Work Unit personnel of the Pacific Northwest Forest and Range Experiment Station. The procedures used for these lands were designed specifically to obtain the kinds of data shown in this report. The forest statistics for the Los Padres National Forest were collected in 1974 by National Forest personnel.

For *lands outside National Forest*, a double sampling for stratification inventory design was used. First, aerial photo sample plots 1 acre in size were distributed systematically across the area and classified as commercial forest, noncommercial forest, or nonforest. Commercial forest plots were further classified into several stand volume strata. In addition, plots were stratified by kind of owner from county tax assessor records. A random sample of field plots was selected from the aerial photo plots, proportional to the number of aerial photo plots in each land class, volume class, and ownership class. The sample on lands outside National Forests consisted of over 9,000 aerial photo plots in all land classes, from which were selected 77 commercial forest field plots and 109 noncommercial forest field plots.

The field sample was used to adjust the aerial photo sample for photo interpretation errors and changes since date of photography; it also provided detailed stand data such as stocking by species, volume by size class, etc. Field plots consisted of 10 sample points distributed over an acre. The variable radius plot sampling principle was used to select trees 5.0-inch d.b.h. and larger to be tallied. Trees smaller than 5-inch d.b.h. were tallied on a circular fixed radius plot. Where no trees were tallied, a ground cover class was recorded. Information on past disturbance or treatment and nontimber uses was also recorded. Increment cores were taken from all trees 5.0-inch d.b.h. and larger on 3 of the 10 points to determine radial growth. These radial growth data were used to estimate basal area and volume growth in the current forest stand. Mortality was estimated over a 5-year period by postdating *all* dead trees tallied.

On the Los Padres National Forest, commercial, noncommercial, and nonforest land classes were delineated on aerial photos, and type maps were constructed. Commercial forest areas were further divided into condition classes and major types. Mapped areas of noncommercial forest and nonforest land were accepted without ground checking. The commercial forest area was sampled with field plots proportionally distributed to area by condition class and major type. Field plots consisted of five sample points 132 feet apart in an L-shape. At each point, the variable radius plot sampling principle was used to select tally trees 1-

inch d.b.h. and larger. Trees smaller than 1-inch d.b.h. were tallied on a circular fixed radius plot. Growth and mortality estimates were developed from 10-year increment borings and 5-year postdating of dead trees.

Reliability of Forest Resource Estimates

FOREST LAND AREA AND TIMBER VOLUME

The estimates of forest land area and timber volume outside National Forests in the central coast region were derived by sampling and thus have predictable errors associated with sampling. Confidence intervals have been computed for the estimate of commercial forest land area, noncommercial forest land area, net cubic-foot volume of growing stock, and net board-foot volume (International 1/4-inch rule) of sawtimber. These confidence intervals are presented in table 28 as a percent of the estimated total at

Table 28--Confidence intervals for estimates of forest area and timber volume, California's central coast, January 1, 1973

Item	Estimated total	Confidence interval	
		68-percent probability	95-percent probability
		- - -Percent- - -	
Commercial forest land	227,000 acres ^{1/}	±5.0	±9.8
Noncommercial forest land	1,653,000 acres ^{2/}	±1.6	±3.1
Volume:			
Growing stock	1,198 million cubic feet ^{3/}	±9.1	±17.8
Sawtimber (International 1/4-inch rule)	5,890 million board feet ^{3/}	±10.4	±20.4

^{1/} Excludes area on the Los Padres National Forest.

^{2/} Includes only the forest area determined by sampling methods. Forest area in the Los Padres National Forest and within parks and other reservations was determined by type-mapping procedures not subject to sampling error.

^{3/} Excludes volume on the Los Padres National Forest and on 6,000 acres of privately owned forests.

the 68-percent and 95-percent probability levels. They may be interpreted as meaning that the odds are two out of three for 68-percent probability or 19 out of 20 for 95-percent probability that the ranges shown include the true value (i.e., the results of a 100-percent inventory). For example, we can expect, with 95-percent confidence, that the estimate of commercial forest land area--227,000 acres $\pm$ 9.8 percent (22,246 acres)--includes the true value.

The confidence interval for any breakdown of these totals will be substantially greater than for the totals. An approximation of confidence intervals associated with estimates smaller than the totals is shown in table 29.

In addition to measurable sampling errors, there may be nonsampling errors caused by mistakes in judgment, measurement, and compilation. The magnitude of errors of this nature cannot be determined. Such errors are kept to a minimum through training and supervising personnel, checking for errors in the field, and careful editing and machine verification of the data.

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 size.

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

Table 29--Approximate confidence interval by size of estimate, California's central coast,

January 1, 1973^{1/}

Commercial forest land		Noncommercial forest land		Growing stock		Sawtimber	
Area	Confidence interval ^{2/ 3/}	Area	Confidence interval ^{3/}	Volume	Confidence interval ^{3/}	Volume	Confidence interval ^{3/}
Thousand acres	Percent (±)	Thousand acres	Percent (±)	Million cubic feet	Percent (±)	Million board feet ^{4/}	Percent (±)
260	4.7	1,700	1.6	1,200	9.1	6,000	10.3
100	7.5	1,000	2.1	1,000	10.1	4,000	12.6
50	10.6	500	2.9	500	14.1	2,000	17.8
25	15.0	250	4.1	250	19.9	1,000	25.2
10	23.8	100	6.5	100	31.5	500	35.7
5	33.7	50	9.3	50	44.5	250	50.5
3	43.4	25	13.1	25	63.0	100	79.8
--	--	10	20.7	--	--	--	--
--	--	5	29.3	--	--	--	--
--	--	3	37.8	--	--	--	--

^{1/}Excludes area and volume on Los Padres National Forest.

^{2/}Applies only to estimates in tables 1 and 2, which are based on double sampling. Confidence intervals for area breakdowns that are based only on field plots (such as area of forest type, area by age class, etc.) might be considerably larger.

^{3/}By random sampling formula: 68-percent probability.

^{4/}International 1/4-inch rule.

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 of any width and their right-of-way clearings, power-line clearings of any width, 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 is not withdrawn from timber utilization.

Noncommercial forest land consists of unproductive forest land and productive reserved forest land.

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

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

FOREST TYPES

Forest types are determined on the basis of species plurality of all live trees that contribute to stocking; both size and spacing are considered.

TREE CLASSES

Growing Stock

Sawtimber trees, poletimber trees, saplings, and seedlings are considered growing stock (all live trees except cull trees).

Sawtimber trees are growing-stock trees at least 9.0-inch d.b.h. if they are softwoods, and at least 11.0-inch 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 5.0- to 8.9-inch d.b.h., live commercial species, not less than 25 percent sound on a

cubic-foot basis; they have no disease, defects, or deformities likely to prevent them from becoming growing stock sawtimber trees.

Sapling and seedling trees are less than 5.0-inch d.b.h., live commercial species and have no disease, defects, or deformities likely to prevent them from 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 because of deformity, disease, low vigor, etc.

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

Rotten cull trees have excessive defect, primarily from rot.

Mortality trees are commercial species which have died from natural causes within a specified period and which were not cull trees at the time of death.

Salvable dead trees are standing or down commercial species, 11.0 inches or more in diameter, containing 25 percent or more of sound volume and at least one merchantable 16-foot log for softwoods or one merchantable 8-foot log for hardwoods.

STAND SIZE CLASSES

Sawtimber stands are at least 10.0 percent stocked with growing stock trees; half or more of this stocking is in sawtimber and poletimber trees and sawtimber stocking is 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 softwood trees from 9.0- to 20.9-inch d.b.h. and hardwood trees 11.0- to 20.9-inch d.b.h.

Poletimber stands are at least 10.0 percent stocked with growing stock trees; half or more of this stocking is in sawtimber and poletimber trees, and poletimber stocking exceeds sawtimber stocking.

Sapling and seedling stands are at least 10.0 percent stocked with growing stock trees; more than half of this stocking is in saplings and seedlings.

Nonstocked areas of commercial forest land are less than 10.0 percent stocked with growing stock trees.

STOCKING

Stocking is a measure of how well the productive potential of the site is utilized by trees. For stands with a mean d.b.h. of at least 8 inches, the measure of stocking is relative density expressed as a percentage of normal stocking; i.e., the current number of trees per acre expressed as a percentage of the normal number indicated for a stand of the same mean diameter and species. For stands with a mean diameter of less than 8 inches, stocking does not indicate the current level of site utilization but rather is an estimate of the degree of site utilization expected when the stand reaches 8 inches in mean diameter. For such stands, the stocking standard is the normal number of trees for an 8-inch stand, adjusted for expected mortality. In stands of mixed size and species, the density standard is a weighted average for the various species and sizes of trees present.

In general, stocking standards are based on normal yield tables. But full normal stocking (100 percent in this report) requires far more trees than are needed to fully occupy the site. Stands in excess of 60-percent stocking are often considered as fully occupying their sites.

TIMBER VOLUME

Live Sawtimber

Net volume of live sawtimber trees of commercial species is estimated 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 was computed on a 16-foot log basis to a utilized top for trees 11.0-inch d.b.h. and larger.

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. For International 1/4-inch board-foot volume, the minimum diameter for softwood trees is 9.0 inches b.h.; the minimum log length, 12 feet; and the small end diameter, 7.0-inch outside bark. The minimum diameter for hardwoods is 11.0 inches b.h.; the minimum log length, 8 feet; and the small end diameter, 9.0-inch outside bark.

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.

Industrial Wood

All roundwood products, except fuelwood, are included.

Net Annual Growth

Net annual growth is the net increase in volume of trees during a specified year. Components of net annual growth are: (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 minimum pole timber or saw timber diameter during the year minus (c) the net volume of trees that died during the year minus (d) the net volume of trees that become 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, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and miscellaneous Federal agencies; and lands owned by States, counties, and local public agencies or lands leased by these governmental units for more than 50 years.

Forest industry lands are owned by companies or individuals operating wood-using plants.

Farmer-owned lands are lands owned by operators of farms.

Miscellaneous private-corporate lands are owned by companies or corporations that do not operate wood-using plants. Included are corporate farms, some railroad lands, oil company lands, real estate and land-holding company lands, and lands held by banks and other financial institutions and various other companies and corporations.

Miscellaneous private-noncorporate lands are privately owned lands other than forest industry, farmer-owned, or corporate lands.

Scientific and Common Names of Plants Mentioned in This Report

<i>Adenostoma fasciculatum</i>	chamise
<i>Arbutus menziesii</i> Pursh	Pacific madrone
<i>Arctostaphylos</i> spp.	manzanita
<i>Ceanothus</i> spp.	ceanothus
<i>Juniperus californica</i> Carr.	California juniper
<i>Lithocarpus densiflorus</i> (Hook. & Arn.) Rehd.	tanoak
<i>Pinus attenuata</i> Lemm.	knobcone pine
<i>Pinus coulteri</i> D. Don	Coulter pine
<i>Pinus lambertiana</i> Dougl.	sugar pine
<i>Pinus muricata</i> D. Don	bishop pine
<i>Pinus ponderosa</i> Laws.	ponderosa pine
<i>Pinus radiata</i> D. Don	Monterey pine
<i>Pinus sabiniana</i> Dougl.	Digger pine
<i>Pseudotsuga mensiesii</i> (Mirb) Franco	Douglas-fir
<i>Quercus agrifolia</i> Nee	coast live oak
<i>Quercus chrysolepis</i> Liebm.	canyon live oak
<i>Quercus dumosa</i>	scrub oak
<i>Quercus douglasii</i> Hook. & Arn.	blue oak
<i>Quercus kelloggii</i> Newb.	California black oak
<i>Quercus lobata</i> Nee	California white oak
<i>Quercus wislizenii</i> A. DC.	interior live oak
<i>Sequoia sempervirens</i> (D. Don) Endl.	redwood
<i>Umbellularia californica</i> (Hook. & Arn.) Nutt.	California-laurel