

AN OVERVIEW OF CURRENT FOREST RESOURCES AND TRENDS IN  
THE EASTSIDE PINE TYPE OF CALIFORNIA

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ABSTRACT

The eastside pine type of northeastern California covers about 1.2 million acres, of which 74 percent is public land and 26 percent is privately owned. Sites are low--less than 20 percent is capable of growing 85 cubic feet per acre annually. Stands tend to be open with timber volume averaging 7,000 board feet. Because of the widespread practice of light selective cutting and re-establishment of stands logged in the early 1900's, most of the area is in sawtimber stands. A close look at Lassen County shows that yields are about 60 percent of their potential. Slow-growing stands are stocked with low-vigor trees, and dwarf mistletoe is prevalent. Since 1953, total volume of pine in the State has declined 25 percent. Timber harvest in the eastside pine type has fluctuated and shifted geographically. In Lassen and Modoc Counties, timber harvest dropped from 550 million board feet in the 1940's to 200 million in recent years. Current growth and harvest are almost equal. Intensive management could increase yields, and the sustainable harvest,

sive areas of true fir, mixed conifer, and other forest types, as well as ponderosa pine (*Pinus ponderosa* Dougl. ex Laws) and Jeffrey pine (*Pinus jeffreyi* Grev. & Balf.). This area amounted to 22 percent of the total commercial forest in California. The estimated volume of wood in the subregion in trees 12-inch d.b.h. and larger was 28.8 billion board feet, or about 16 percent of the State's total.

The eastside pine type, as defined by this symposium, is a smaller area than that defined by Wieslander and Jensen as the Eastside Sierra Pine Subregion. McDonald<sup>1/</sup> has defined the eastside pine type as that area east of the Cascade-Sierra crest where ponderosa and/or Jeffrey pines are the dominant or potentially dominant trees. Elevational range of the type is 4,000 to 6,500 feet. The climate is dry; the winters are cold; and the growing season is short; effective moisture is present only in the early summer; and diurnal temperature fluctuation is extreme. The major portion of the eastside pine type, as defined above, is in northeastern California. Here extensive areas are managed for timber to support established forest industries.

INTRODUCTION

The eastside pine type of California has long been recognized as a separate entity from the Pacific ponderosa pine and Sierra Nevada mixed-conifer types. About 40 years ago, Wieslander and Jensen (1946) identified an "Eastside Sierra Pine Timber Cropland Subregion" in California (fig. 1). This subregion included the forested northeast slopes of the southern California mountains from San Diego County to Kern County and the east slopes of the Sierra Nevada and Cascade Ranges to the Oregon border. In Siskiyou County this subregion included all forested land east of present-day Interstate 5. Within their eastside Sierra Pine Subregion, Wieslander and Hensen estimated the total commercial forest area to be 3.8 million acres, including exten-

The eastside pine type in California has never been mapped as such but, as defined above, is separated from the forests to the west and south by a diagonal line extending from Lake Tahoe to the Oregon border near the Klamath River (fig. 1).

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<sup>1/</sup>McDonald, Philip M. Climate, history, and vegetation of the eastside pine type in California, paper presented at a Symposium on the Management of the Eastside Pine Type in Northeastern California, Susanville, California; 1982, June 15-17.

# TIMBER CROPLAND SUBREGIONS IN CALIFORNIA 1945

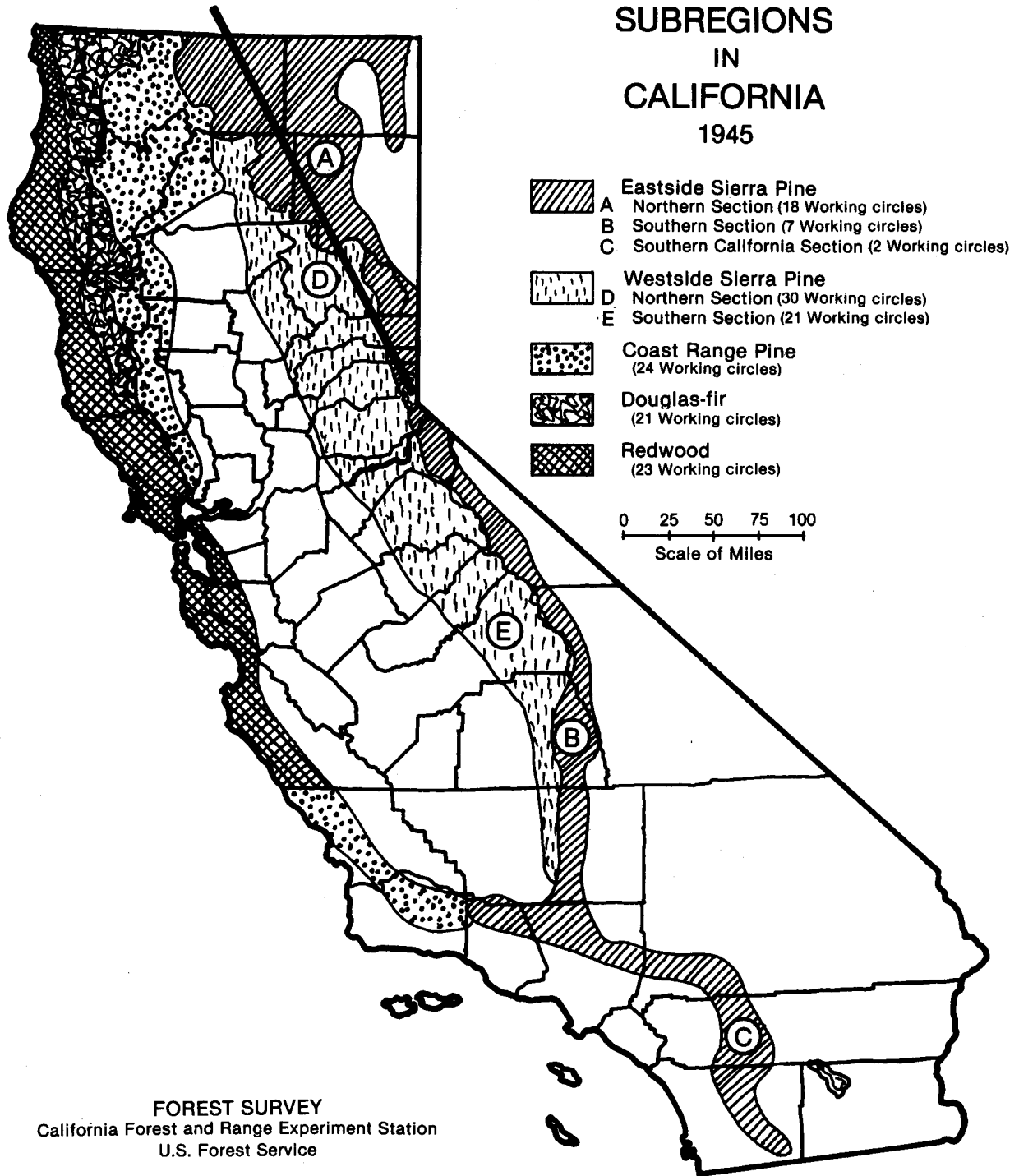


Figure 1.--Timber cropland subregions in California, 1945.

Table 1--Area of commercial forest land by ownership and forest type in the eastside pine region of northern California

Ownership	Forest type				All types
	Ponderosa and Jeffrey pines	Mixed Conifer	True fir	Other	
	-----Thousand acres-----				
National Forest	873	392	23	35	1,323
Other public	21	3	10	--	34
Forest industry	204	321	86	16	627
Other private	116	96	69	--	281
<b>Total</b>	<b>1,214</b>	<b>812</b>	<b>188</b>	<b>51</b>	<b>2,265</b>

Table 2--Area of eastside pine type in northern California by ownership and stand size class

Ownership	Stand Size					Total
	Nonstocked <sup>1/</sup> (Less than 10 percent stocked)	Seedling/sapling	Poletimber (5 to 10.9 in)	Small sawtimber (11.0 to 20.9 in)	Large sawtimber (21+ in)	
	-----Thousand acres-----					
National Forest	9	36	58	513	257	873
Other public	4	5	5	5	2	21
Forest industry	48	21	13	90	32	204
Other private	12	10	27	67	0	116
<b>Total</b>	<b>73</b>	<b>72</b>	<b>103</b>	<b>675</b>	<b>291</b>	<b>1,214</b>

<sup>1/</sup>For National Forest, basis is stand mapping. For outside National Forests, basis is 10-point sample plots. Plots were classified as nonstocked if 9 or 10 fixed-radius subplots out of 10 were devoid of seedlings and/or saplings (subplots were 1/300-acre, so each subplot represented 1/30 of plot area), and no larger trees were tallied with a prism.

Table 3--Percent of area in eastside pine type by volume class for National Forests and other ownerships

Ownership	Scribner board feet per acre				Total
	No volume	1 to 4,999	5,000 to 9,999	10,000+	
-----Percent of area-----					
National Forest	4	41	32	23	100
All other ownerships	9	52	34	5	100
<b>Total all ownerships</b>	<b>5</b>	<b>44</b>	<b>33</b>	<b>18</b>	<b>100</b>

Table 4--Net annual growth of timber on commercial forest land by ownership class and forest type in the eastside pine region of northern California

Ownership	Forest type				All types
	Ponderosa and Jeffrey pines	Mixed conifer	True fir	Other	
-----Million Scribner board feet-----					
National Forest	84.4	71.1	5.9	2.1	163.5
Other public	3.6	.3	1.1	--	5.0
Forest industry	17.0	48.8	17.1	6.2	89.1
Other private	20.7	22.9	6.7	--	50.3
<b>Total</b>	<b>125.7</b>	<b>143.1</b>	<b>30.8</b>	<b>8.3</b>	<b>307.9</b>

## FOREST AREA

The total area of commercial forest land<sup>2/</sup> in all forest types within the general region of the eastside pine type is estimated to be 2.3 million acres (Table 1).<sup>3/</sup> This is 14 percent of the total commercial forest area in California. The volume of timber in trees 11.0 inches in d.b.h. and larger for all species in the eastside pine region is estimated at 22.5 billion board feet (+4.5 percent at the 68-percent probability level).<sup>4/</sup> This is about 10 percent of the State's total.

### RESOURCES OF THE EASTSIDE PINE TYPE

As indicated by McDonald, extensive areas within the general eastside pine region are occupied by vegetation types other than ponderosa and Jeffrey pines. Of the 2.3 million acres classified as commercial forest, 1.1 million are mixed conifer, true fir, lodgepole pine, (*Pinus contorta* Dougl. ex Loud), and subalpine types. About 1.2 million acres are ponderosa and Jeffrey pines which together form the eastside pine type as defined at this symposium. The eastside pine type amounts to about 7.5 percent of California's commercial forest land.

Areas 80 percent stocked with ponderosa and/or Jeffrey pine were described as "eastside pine type" without regard to what type they might progress to, with or without management, or what type they had been in the past. Many

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<sup>2/</sup>Commercial forest land is capable of growing at least 20 cubic feet per acre per year in trees of commercial species and merchantable size and form.

<sup>3/</sup>Includes 942,000 acres with a  $\pm 2.8$ -percent confidence interval (68-percent probability) and 1,323,000 acres type-mapped and hence without sampling error.

<sup>4/</sup> Forest resource statistics for National Forests are based on ground plots established in type-mapped areas. For lands outside National Forests, forest statistics are based on a two-phase sample of aerial photographs and ground plots. See Bolsinger (1976) for details on the forest inventory procedures.

pine stands have an understory of white fir (*Abies concolor* [Gord. & Glend.] Lindl. ex Hildebr.) which may eventually dominate, while some openings within mixed-conifer or white fir stands are restocking to pine. In many areas, type changes apparently have been hastened by fire, logging, grazing, insects, and disease.

The following tabulation shows the area of eastside pine type by ownership:

<u>Ownership</u>	<u>Thousand acres</u>	<u>Percent</u>
National Forest	873	72
Other public	21	2
Forest industry	204	17
Other private	<u>116</u>	<u>9</u>
All ownerships	1,214	100

### FOREST PRODUCTIVITY

The productivity of forest land in the eastside pine region of California is probably slightly higher on the average than that of the ponderosa pine region of the western United States exclusive of the Pacific ponderosa pine type of the westside Sierra Nevada. Compared with other commercial timber types in California, however, the land is less productive. In 1942 California's timber cropland was typed into three site classes--high, medium, and low (Dunning 1942). A dot count showed that 25 percent of Wieslander's eastside Sierra pine subregion was medium site and 75 percent low site. No high site land occurred in the area.

Sample plots established in a forest inventory in the 1970's in the eastside pine type outside National Forests were classified by cubic-foot site potential based on site trees and Walter Meyer's (1961) yield table. Site potential based on site trees was discounted in areas incapable of supporting full yield table stocking (Maclean and Bolsinger 1973). This sample shows that 84 percent of the eastside pine type is in the low site category (see following tabulation).

<u>Site potential in cubic feet per acre per year<sup>5/</sup></u>	<u>Percent of area</u>
165+	0
85 - 164 (medium)	16
20 - 84 (low)	<u>84</u>
	100

The eastside pine type has had a long history of logging; yet in 1982, 80 percent of the area supported sawtimber stands. About 6 percent of commercial forest land in the type is nonstocked and 14 percent occupied by seedling, sapling, and pole timber stands (Table 2). The extensive area in sawtimber-size trees is partly a result of trees standing in logged-over areas and partly the result of natural and artificial re-establishment of stands logged in the early 1900's. Though sawtimber stands are the major cover, many are somewhat open, with low volumes per acre. For all ownerships, about half of the area in the eastside pine type has less than 5,000 board feet per acre; 18 percent has more than 10,000 (Table 3).

#### TIMBER VOLUME AND GROWTH

The estimated volume of timber in trees 11-inch d.b.h. and larger within California's eastside pine type as of 1980 is 8.3 million board feet (+7.0 percent, 68-percent probability). The following tabulation shows total volume and average volume per acre by ownership.

<u>Ownership</u>	<u>Standing live sawtimber volume</u>	<u>Average board-foot volume per acre</u>
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Million board feet,  
Scribner rule

National Forest	7,040	8,064
Other public	105	5,000
Forest industry	715	3,505
Other private	<u>458</u>	<u>3,948</u>
All ownerships	8,318	6,852

Management of the eastside pine type is viewed in the context of management of all forest stands within the general area. Although about half of the total commercial

forest in the eastside pine region is composed of ponderosa and/or Jeffrey pine, only 37 percent of the volume is in these two species of pine.

<u>Forest type</u>	<u>Sawtimber volume</u>	<u>Percent</u>	<u>Average board-foot volume per acre</u>
Ponderosa and Jeffrey pines	8,318	37	6,852
Mixed conifer	10,772	48	13,266
White and red firs	2,352	10	12,511
All others	<u>1,009</u>	<u>5</u>	<u>19,784</u>
All types	22,451	100	9,912

The lower volumes in the eastside pine type are matched by lower growth rates. Total net periodic annual growth as of 1980 was 126 million board feet in the eastside pine type (Table 4), about 4 percent of the total annual forest growth in California. It occurred on 7.5 percent of the State's commercial forest land.

Over all ownerships, growth in the eastside pine type averaged 104 board feet per acre per year. The average for all species in the general and mixed-conifer stands that are intermingled with the pine--on the north slopes and at higher elevations--averaged about 60 to 70 percent higher in annual growth than the eastside pine type (Table 5).

The lower volumes and growth rates of ponderosa and Jeffrey pine are offset somewhat by the higher market value. Of the associated conifer species within the eastside pine type, only sugar pine commanded a higher price from 1970 to 1981 (Ruderman 1982) (Table 6).

#### FOREST CONDITION

Forest managers and planners would expect the lower sites of the eastside pine type to produce lower yields. Still they need to know how current growth compares with potential yields, and what problems and opportunities exist. As an objective measure of forest yield efficiency, past 10-year periodic net annual growth was compared with yield table values in 44 stands selected at random in Lassen County (see Bolsinger 1976 for details of procedures). Growth was up to yield table standards in 41 percent of the stands (fig. 2). The remaining 59 percent included stands producing from 60 to 75 percent of normal to stands with negative growth (mortality exceeded gross growth).

<sup>5/</sup>Potential is based on yield at culmination of mean annual increment, as shown in Meyer's (1961) yield table.

Table 5--Average net annual growth per acre by ownership class and forest type for eastside pine region of northern California

Ownership	Forest type				
	Ponderosa and Jeffrey pines	Mixed conifer	True fir	Other	All types
	-----Scribner volume per acre per year-----				
National Forest	97	181	256	60	124
Other public	171	100	110	--	147
Forest industry	83	152	198	388	142
Other private	178	238	97	--	186
Average for all ownerships	104	176	164	163	136

Table 6--Average stumpage prices for sawtimber sold on National Forests in California, by species, 1970-81<sup>1/</sup>

Year	Species <sup>2/</sup>				
	Douglas-fir	Jeffrey pines	Sugar pine	Lodgepole pine	True firs
1970	\$ 25.60	\$ 32.20	\$ 38.60	\$ 3.70	\$ 4.20
1971	27.50	33.00	46.40	2.40	7.10
1972	40.70	65.80	66.60	5.40	30.20
1973	84.80	108.60	89.30	12.40	70.20
1974	87.00	101.40	104.00	6.50	41.70
1975	51.40	71.00	99.00	22.40	19.70
1976	76.00	101.80	185.00	6.50	23.40
1977	124.30	131.40	168.50	165.20	50.60
1978	131.10	164.70	169.20	136.20	79.80
1979	186.60	239.00	375.40	25.40	96.00
1980	189.50	206.10	671.40	252.80	133.40
1981	146.70	196.20	224.10	123.60	90.30

<sup>1/</sup>Source: Ruderman (1982)

<sup>2/</sup>Price data were not available for incense-cedar, which occurs in scattered locations within the eastside pine type.

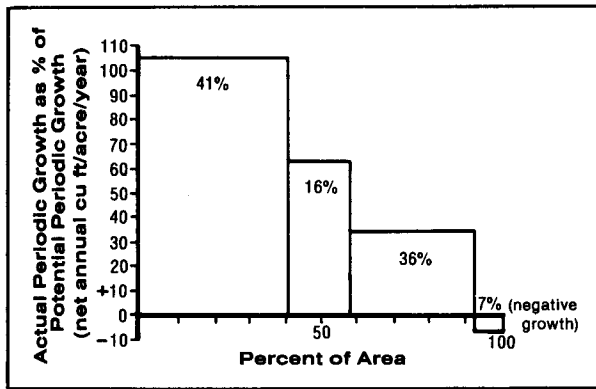


Figure 2.--Periodic growth compared with yield potential in 44 stands in private ownership in Lassen County, California.

The stands with low growth rates were, on the whole, as well stocked as those with high growth, but the trees making up the stocking were often damaged, diseased, and low in vigor. In some instances, the trees had been suppressed before logging and though they had been "released" they were still growing slowly.

Dwarf mistletoe (*Arceuthobium* spp.) was present in 40 percent of all pine stands sampled in Lassen County, though in many stands infection was light. True firs were also infected with dwarf mistletoe, and incense-cedars (*Libocedrus decurrens* Torr.) often had true mistletoe (*Phoradendron juniperinum* var. *libocedri* Engelm.) infections. In the entire eastside pine region 343,000 acres or 22 percent of the forest land outside National Forests was found to have dwarf mistletoe or true mistletoe infections (Table 7). In the very worst stands sampled, all merchantable trees had been removed and those left were misshapen and dying from massive dwarf mistletoe infections.

The study in Lassen County showed that on the whole forest yields are about 60 percent of their potential as expressed in normal yield tables. Under careful management, many foresters feel the yields can be increased beyond that shown in normal yield tables. The fact that growth in some stands was above normal yield table levels (115 percent in the very best) seems to confirm this.

Current yields are basically the result of natural growth and development in stands that have had little or no silvicultural

treatment except that incidental to logging. Although tree planting and other silvicultural practices have been used for a long time, the total area treated has been small. In recent years, however, forest management activities have increased. Noteworthy is the marked increase in reforestation efforts on private land (U.S. Department of Agriculture 1966 to 1980). In all of California's interior, forest seeding and planting increased from less than 5 thousand acres per year in the mid-1960's to 50 thousand acres in 1979.

#### TRENDS IN FOREST AREA, INVENTORY, VOLUME, AND HARVEST

McDonald (these Proceedings) details the long history of land use in the eastside pine type. Recently, recreational and urban developments, especially in the southern end of the eastside pine region, have converted pine stands to houses, roads, and commercial centers. To date, the area affected is relatively small.

Trend data are not available specifically for the eastside pine type; but in the entire State of California, a steady downward trend in softwood forest inventory has prevailed for several decades. From 1953 to 1977 the total volume of ponderosa and Jeffrey pines declined 24 percent (Table 8), while most other softwoods except white fir and incense-cedar declined even more. Ponderosa, Jeffrey, and sugar pines collectively accounted for the majority of California's log consumption in the mid- to late-1800's, until they were surpassed by redwood (fig. 3). Then they again climbed to the number 1 position in the 1920's and stayed there until the Douglas-fir plywood boom in the 1950's caused this heretofore relatively little-used California species to become valuable. For the past 25 years, the three pine species have held fairly steady at 23 to 27 percent of California's industrial wood consumption. In 1981 ponderosa and Jeffrey pines accounted for 20.5 percent of the timber harvest and sugar pine 7.0 percent.

Timber harvest in the eastside pine type has fluctuated sharply over the years. Since the late 1940's, the volume cut in Lassen and Modoc Counties dropped from a high of 575 million in recent years (fig. 4). Siskiyou and Shasta Counties are neighbors to the west and are subjected to somewhat similar forest mar-

Table 7--Area of commercial forest land outside National Forests in the eastside pine region having true and dwarf mistletoe infection, by species infected

Species Infected	Thousand acres	Percent of total commercial forest area outside National Forests
Ponderosa and Jeffrey pines	160	10
White and red firs	125	8
Douglas-fir	11	1
Incense-cedar	47	3
<b>Total area infected</b>	<b>343</b>	<b>22</b>

Table 8--Trend in standing live timber volume by species, in California, 1953-1977

Species	1953	1977	Percent change
	<u>Billion board feet</u>		
Douglas-fir	117	72	-38
Ponderosa and Jeffrey pines	67	51	-24
Sugar and western white pines	30	22	-27
Coast redwood	36	21	-42
True firs	89	72	-19
Incense-cedar and minor softwoods	16	16	0
Hardwoods	6	8	+33
<b>All species</b>	<b>361</b>	<b>262</b>	<b>-28</b>

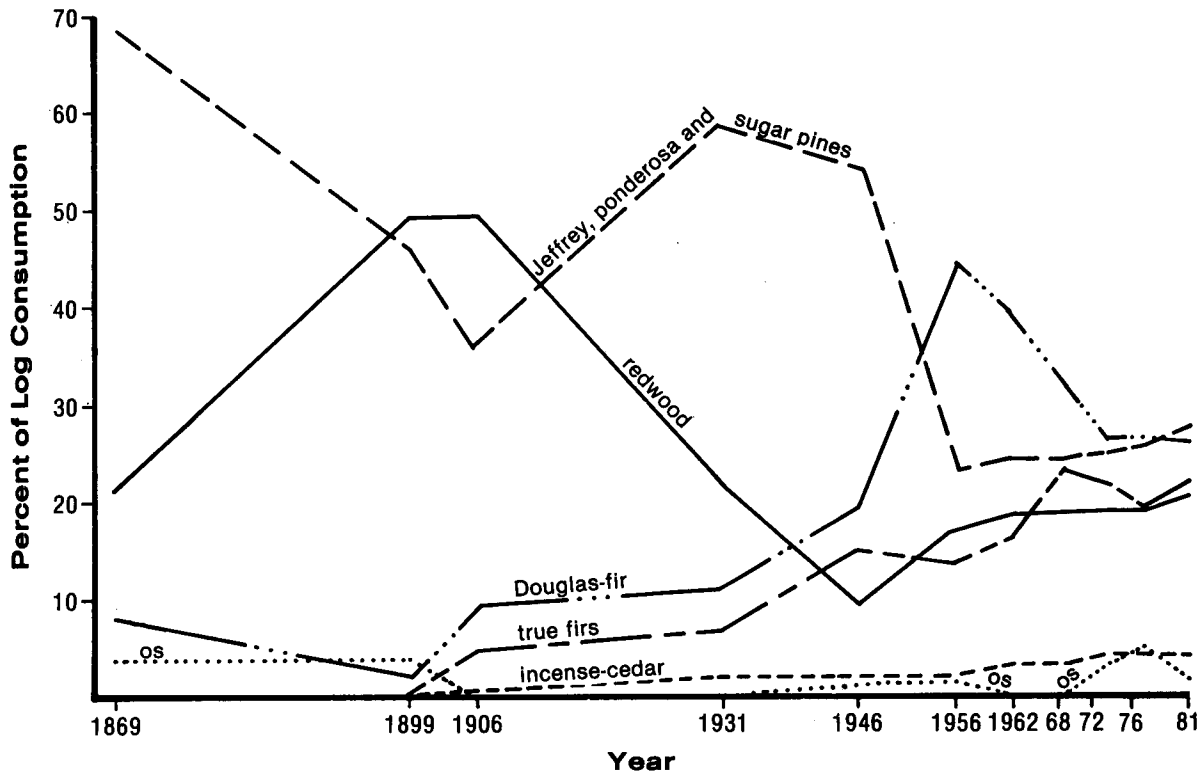


Figure 3.--Log consumption by species in California from 1869 to 1981.

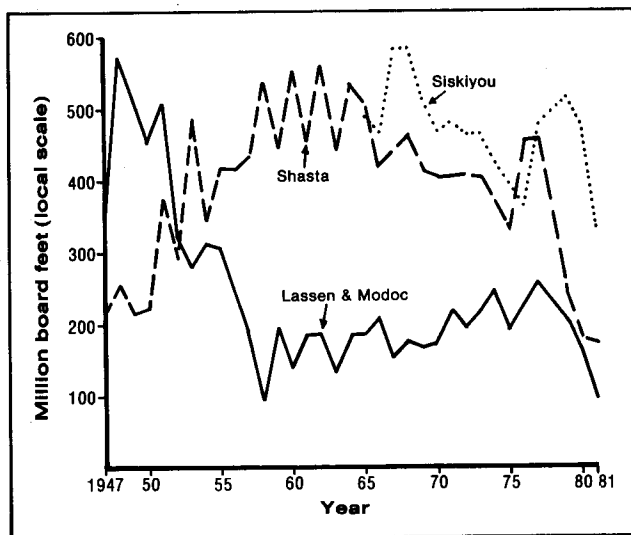


Figure 4.--Total timber harvested in Lassen, Modoc, Shasta, and Siskiyou Counties, California, 1947 to 1981.

ket conditions. Their timber harvest increased as that in Lassen and Modoc declined.

Coincidentally, perhaps, timber harvest from 1965 to 1980 in Lassen and Modoc Counties has been about equal to total forest growth in these counties--roughly 200 million board feet.

#### LITERATURE CITED

- Bolsinger, Charles L. 1976. Timber resources of northern interior California, 1970. USDA For. Serv. Resour. Bull. PNW-65, 75 p. Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.
- Dunning, Duncan. 1942. A site classification for the mixed-conifer selection forests of the Sierra Nevada. USDA For. Serv. For. Res. Note No. 28, 20 p. California For. and Range Exp. Stn. Berkeley, Calif.
- 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. Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.
- Meyer, Walter H. 1961. Yield of even-aged stands of ponderosa pine. U.S. Dept. of Agric. Tech. Bull. 630, 59 p. Washington, DC.
- Ruderman, Florence K. 1982. Production, prices, employment, and trade in Northwest forest industries, first quarter 1982. 50 p. USDA For. Serv., Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.
- U.S. Department of Agriculture, Forest Service. Forest planting, seeding, and silvical treatment in the United States, Washington, DC: 1966 to 1980.
- Wieslander, A. E., and Herbert A. Jensen. 1946. Forest areas, timber volumes and vegetation types in California. USDA For. Serv. For. Surv. Release 4, 66 p. California For. and Range Exp. Stn., Berkeley, Calif.