

# *Christmas Of White Fir In a Giant*

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Understory of white fir around giant sequoias at Whitaker's Forest. Photo by Harold Weaver.

**H**ARVESTING OF TREES in Whitaker's Forest on the western slope of Redwood Mountain, Tulare County, has continued intermittently since 1873. In the first logging operation—1873 to 1879—roughly one half of the giant sequoias were felled, and most of the sugar pine and ponderosa pine were harvested. Whitaker's Forest was willed to the University of California in 1910 with the stipulation that "no sequoia or redwood trees growing or that may grow on said premises shall be felled or cut down." Selective logging operations later removed more of the pines. Between 1939 and 1949, 5500 white fir Christmas trees were cut from this 320-acre forest. This study was to determine the economics of Christmas tree production within such a forest.

Whitaker's Forest is characterized by second-growth trees with a dense understory. The most abundant species is white fir, followed by incense-cedar and giant sequoia. The white fir is a very shade-tolerant species which grows in dense thickets in the understory and is represented by a continuum of ages and sizes in the stands. These thickets, present in most areas, represent an extreme fire hazard to the giant sequoias because they provide a dense fuel reaching far up the stems of the larger trees. Moreover, the understory

trees limit the vistas to the giant sequoias and hinder growth of the herbaceous understory.

Manipulation of the understory of trees was begun in 1964 to reduce fire hazards, to lessen competition to the giant sequoias, and to enhance scenic and wildlife values. Understory trees of white fir and incense-cedar from one to 11 ft tall are being thinned out. Of the trees removed, many are white firs of optimum size for Christmas trees. Since the understory manipulation is costly, income from the harvested trees could be very important in justifying the expense of the clearing. A study was conducted to determine their quality for Christmas tree markets.

White firs account for 19% of the Christmas trees sold in California. Other species growing on Whitaker's Forest account for very little of the market and were ignored in the study. Tree quality was determined by use of a photo key. It was composed of examples of white fir trees for the grades developed by the California Christmas Trees Growers (see "Managing and Marketing California Forest-Grown Christmas Trees," Agricultural Extension Service AXT-182). The trees are graded on a number of characteristics, including: taper, density, height, number of good faces, health, cleanliness,

freshness, obvious defects, and amount of damage. The four quality classes are Premium, Choice, Standard, and Utility, as shown in the sketches. Cull is reserved for trees that do not meet the requirements of Utility trees.

The sampling was conducted on two 20-acre unmanipulated plots. A series of five 10 ft wide belt transects was established on each plot, making a total of approximately 8500 ft of transect, or 1.95 acres. White fir trees between one and 11 ft tall were recorded along the transect, and individually graded. Height was used only to select the trees to be graded, and not as a quality characteristic in the grading process. In addition, the type of canopy under which the trees were growing was classified and recorded as open, moderate, or dense. The absence of an overstory directly above the tree was considered to be an open canopy. A moderate canopy was defined as a foliage cover with some direct penetration of sunlight. A dense canopy was considered to be a complete foliage cover with little direct light penetration.

Most of the total of 817 trees graded were growing under a moderate canopy (see table). Under all three canopy classes, Christmas tree quality was low, the percentage of culls ranging from 59.2

# Tree Quality Understory Sequoia Forest

QUALITY AND NUMBER OF WHITE FIR CHRISTMAS TREES UNDER THREE CANOPY DENSITIES IN A SECOND-GROWTH GIANT SEQUOIA FOREST

Canopy		Grade					Total
		Premium	Choice	Standard	Utility	Cull	
Dense	nos.	0	0	0	12	145	157
	% of dense	0	0	0	7.6	92.4	100
Moderate	nos.	0	1	16	118	388	523
	% of moderate	0	0.2	3.1	22.5	74.2	100
Open	nos.	4	8	19	25	81	137
	% of open	2.9	5.8	13.9	18.2	59.2	100
All trees	nos.	4	9	35	155	614	817
	% of total	0.5	1.1	4.3	19.0	75.1	100

Very few Choice or Premium grade White Fir Christmas trees were found growing in the understory of giant sequoias at Whitaker's Forest, Tulare County.

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to 92.4%. Quality increased as the tree overstory became less dense.

The trees growing under dense canopies were almost entirely cull trees. Most of them were spindly and crooked, due to low light intensities and the heavy accumulations of debris found on the forest floor. Trees growing under moderate canopies were also affected by deer browsing. Hence, these trees, too, had a high cull rate. The open-grown trees, though not affected by lack of light or excess of debris, were also severely browsed by deer. Many of the trees were shrubby and gnarled because of the continuing pressure of the

deer. The open-grown trees were of superior quality to those grown under tree canopies, however, even with the excessive browsing pressure from deer. Most all of the Premium and Choice grades, and half of the Standard-grade trees were found in the open.

There were 203 marketable trees on the 1.95-acre sample, or roughly 100 trees per acre. Although this number indicates very high Christmas tree production, most of the trees are Utility grade, with some Standard and very few of Choice or Premium quality. Although the Utility and Standard grade trees are classified as

marketable, demand is very low and they are usually the last trees left on a retail lot. Tree quality in a cutting area is usually determined by the number of high-demand Premium and Choice grade trees present. Ten to fifteen trees of this type per acre are considered good production. On the Whitaker's Forest sample, 13 such trees were found, or seven per acre, which is below the level of good production. Further studies should determine the economic feasibility of selecting and harvesting the salable Christmas trees out of such a dense second-growth forest.

Since 1964, in the areas already manipulated, white fir is regenerating quite successfully and seedlings are growing under more open conditions than in the unmanipulated plots. Future studies will determine the rate at which white fir trees increase and grow in manipulated areas. Research is also needed on the feasibility of harvesting these trees to aid in the maintenance of low fire hazard conditions, enhancement of scenic values and herbaceous vegetation, and the growing of giant sequoia forests.

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Sketches showing grades of white fir Christmas trees.

