Management of Giant Sequoia on Mountain Home Demonstration State Forest[1]

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Abstract: Established in 1946, the Mountain Home Demonstration State Forest, Tulare County, California, is managed by the California Department of Forestry. It is a multiple-use forest with recreation as its primary focus, although timber management has always played an important role. Giant sequoia (*Sequoiadendron giganteum* [Lindl.] Buchholz) occurs in isolated groves in the Sierra Nevada and grows on about half the acreage of the Mountain Home Forest. Old-growth specimens are protected, and selected young-growth trees are encouraged to grow to old-growth. Young sequoias are a valuable resource and are managed for timber production. A long-term study indicates that logging encourages sequoia reproduction by providing a suitable seedbed.

The California Department of Forestry manages seven State Forests to demonstrate continuous forest production practices, with due regard for conservation of soil, watershed, scenic, wildlife, and recreation values. Four of the seven State Forests are large enough to warrant a full-time staff. One of these---the Mountain Home Forest---occupies 4,562 acres (1846 ha) and has an extensive recreation program with 96 campsites in Tulare County in central California. A unique characteristic of the Forest is an extensive stand of giant sequoia (*Sequoiadendron giganteum* [Lindl.] Buchholz), which occurs only in isolated groves in the Sierra Nevada from Placer County south to Tulare County. Logging on what is now the Mountain Home Demonstration State Forest began in 1880, and most of the area has been cut over at least once. Public outcry against large-scale destruction of old-growth giant sequoias prompted the State Legislature to appropriate $550,000 to purchase the land in 1946 from the Michigan Trust Company.

This paper describes the history, physical characteristics, and management objectives of the Mountain Home Demonstration State Forest, with emphasis on management of giant sequoia. It also describes a study begun in 1966 to determine the benefits of logging on reproduction -and survival of giant sequoia seedlings. Seedlings were only produced on the logged plot and not on the unlogged plot, but subsequent brush competition may have reduced survival of seedlings on the logged plot.

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MOUNTAIN HOME STATE FOREST

Elevations on the Forest range from 5500 to 7500 feet (1680-2290 m), with mostly moderate slopes. Site quality is high, mostly I and IA. Climate is characterized by cool, wet winters and warm, dry summers. Average annual precipitation, primarily snow, is 40 inches (102 cm).

In contrast to the other six State Forests, which emphasize timber management, the Mountain Home Forest is managed primarily for public recreation. This objective, however, does not exclude timber production. Rather, timber management enhances and complements recreational values. The annual allowable cut is about 1.5 million board feet (Mfbm). Since 1946, the Forest has harvested 57 Mfbm of all tree species---including young-growth sequoia---without depleting the timber inventory. During this time annual recreation use has increased from 1,000 to 51,000 visitor-days.

Practices governing management of giant sequoia on the Forest are:

- Old-growth sequoia are protected during all management activities.
- Young-growth sequoias are considered a valuable and marketable resource.
- Selected young-growth sequoias are encouraged to grow into specimen trees.
- Campgrounds are located away from old-growth sequoias.

Old-growth giant sequoia is characterized by a rounded top with large limbs in the upper part of the bole and with the lower one-third of the bole free of branches. Growth is slow, with annual rings often only a few millimeters wide. The wood is brittle and not suitable for use in construction. Young-growth sequoia is characterized by a pointed top and branches persisting on the entire bole. Growth is rapid, with annual rings often one-half inch (1.3 cm) wide. The wood is considered better than white fir for construction uses.

Continuous Forest Inventory (CFI) data, which include trees over 5 inches (12.7 cm) in diameter at breast height (d.b.h.) indicate that the Forest has 7.8 (19.3/ha) young growth and 0.9 (2.2/ha) old-growth giant sequoias per acre. Old-growth sequoia volume was estimated at 138 Mfbm in 1907 by the James D. Lacy Company of Portland, Oregon (Goldsmith 1945). No estimate of volume for old-growth giant sequoia is available today. There are 5.72 Mfbm of young-growth sequoia. Basal area for old-growth sequoia is 61 ft^2/acre (14 m^2/ha) and for young-growth is 14 ft^2/acre (3.2 m^2/ha), which together make up 39 percent of the total basal area on the Forest.

METHODS

A study was begun at Moses Mountain in 1966 to investigate the long-term effects of logging on the establishment and sur-

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Table 1-*Merchantable trees on one unlogged and one logged 5-acre plot before (1966) and after (1968) logging, Moses Mountain, Mountain Home State Forest, California*

Species	Trees/acres		Volume		Basal area	
	1966	1968	1966	1968	1966	1968
			Tfbm/acre[1]		*Ft*^{2}*/acre*	
White fir:						
Unlogged	39.4	[2]---	39.8	---	143.9	---
Logged	31.0	---	39.7	7.0	129.3	35.3
		15.6				
Sugar pine:						
Unlogged	6.2	---	20.9	---	52.2	---
Logged	8.6	5.0	28.6	11.5	72.3	32.6
Giant sequoia:						
Unlogged	9.8	---	125.0	---	295.6	---
Logged	4.2	3.6	151.4	144.3	299.4	282.9
Total						
Unlogged	55.6	---	185.7	---	492.1	---
Logged	43.8	24.2	219.7		501.0	350.8

[1]Thousand board feet per acre.

[2]Unlogged plot was not measured in 1968.

vival of giant sequoia seedlings (Schoenheide 1971). Two similar 5-acre (2-ha) plots 0.01 miles (0.016 km) apart were selected in an area where no fire or logging had occurred for more than 60 years. Both plots were inventoried *(table 1)* as follows:

•All trees over 11 inches (28 cm) d.b.h. were measured and labelled with numbered tags.

•Pole-size trees 5 to 11 inches (12.7 to 28.0 cm) d.b.h. were tallied.

•Reproduction was sampled and placed into one of two categories: less than 1 foot (30 cm) tall or 1 foot tall to 5 inches (12.7 cm) d.b.h.

•Other vegetation was sampled and identified.

One of the plots received only custodial care. The other plot was logged in 1968 as part of a timber sale. Over 70 percent of the softwood volume (not counting old-growth sequoia volume) was harvested, to remove the acreage from the tax rolls. This plot was then reinventoried in 1968 (*table 1*). Giant sequoia seedlings were sampled on both plots starting in 1967 using mil-acre strips. The unlogged plot was burned in summer 1985 removing much of the duff and preparing an excellent seedbed. The State Forest staff plans to compare seedling survival on this plot with survival on the logged plot.

RESULTS AND CONCLUSIONS

The unlogged plot has had no sequoia reproduction, but the logged plot had a high number of seedlings immediately after logging, followed by a dramatic decline:

Year	Seedlings/acre
1967	0
1969	332
1971	87
1973	28
1976	17
1981	8

This decline in the number of seedlings was probably due to increasing brush competition. These results indicate that sequoia reproduction can be enhanced by disturbance of the soil during logging, but brush competition can subsequently reduce seedling survival.

The Mountain Home Forest is unique among the public forests in California, because it is managed primarily for public recreation and the other Forests are managed primarily for timber production or multiple use. It is also the only State Forest with giant sequoias, which are managed to perpetuate old-growth specimens and to provide a sustained harvest of young-growth trees.

The State Forest staff plans to conduct further studies on the effects of logging on growth and yield, and to determine optimum stocking levels.

REFERENCES

Goldsmith, Belknap G. [Personal notes]. 1945. Located at: Mountain Home State Forest, Springville, California.

Schoenheide, Richard L. The manipulation of vegetation of Sierra redwood lands on Mountain Home State Forest. 1971. Unpublished report on file at Mountain Home State Forest, Springville, California.