Remarks for the Giant Sequoia Symposium

Douglas R. Leisz

Abstract: Giant sequoia groves are part of a complex ecosystem which has evolved over thousands of years. European man's influence on the species began with the discovery over 140 years ago. Major discussion items are the species unique characteristics and habitat, natural enemies, the discovery of the species, early logging history, public grove acquisition, and various management strategies employed for perpetuating the groves. The sharp conflicts between the public agencies and preservation groups over the management practices are noted. Important issues are listed which require resolution to insure the perpetuation of giant sequoia groves, the specimen trees and the associated ecosystems.

California's rich diversity of forest trees provides an awesome resource base with an extraordinary range of values. Our Mediterranean climate, good soils and adequate moisture create very productive forest communities. With the involvement of a large population of people who are deeply dependent on forest resources and keenly interested in preservation, aesthetics, renewability and utility of the forest resources, forest managers face a demanding job. They must consider forest history and all of the ecosystem components and they must provide especially for endangered species, responding to both public sentiment and needs, and science and politics as they develop management strategies.

Old-growth giant sequoia (Sequoiadendron giganteum) is a unique component of the Sierra Nevada mixed-conifer type. The natural range is restricted to 75 groves scattered along the western slope of the Sierra Nevada, between the American River and southern Tulare County. The large groves are concentrated between the Kings River and the Deer Creek Grove. The 75 groves occupy about 36,000 acres, ranging in size from 1 acre to about 4,000 acres.

Characteristics and Habitat

The Sierra Redwood is noted world wide for its great longevity, enormous size, awe inspiring beauty, ruggedness, decay resistant wood properties and its adaptability to thrive as both an ornamental and a timber producing tree in many locations around the world.

Everything about the tree is intriguing from the tiny seeds (91,000/lb.) to the huge mass of the thousand (or more) year old giants and the beauty of the distinctive pyramid shaped crown of young giant sequoias. Seed production is very high, as many as 1,500 new cones per year from a mature tree, but viability is often as low as 1 percent with cones collected from the forest floor.

Successful natural giant sequoia regeneration requires soil disturbance that bares mineral soil and adequate soil moisture for the entire growing season. The giant sequoia is less likely than any of its associated conifers to become established without the required sunlight and soil disturbance. Established sequoia seedlings, growing out in the open with good soil and moisture, will equal or outgrow any of the associated species.

Giant sequoia is intolerant of shade throughout every stage of its life. Fires that cause enough disturbance to bare mineral soil and open the canopy to full sunlight benefit shade intolerant species such as giant sequoia and support earlier successional stages of plant communities. Sierra redwoods are but one part of a complex ecosystem. Perpetuation of old-growth redwoods is a difficult management job.

At maturity giant sequoias are the tallest trees in the forest, dwarfing other conifers so that other sizable trees may go unnoticed. The giant sequoia is not a true climax species, as it does not reproduce itself in an undisturbed forest. However, any tree persisting for three thousand years or more, exerts a major influence on the ecosystem vegetation. Mature trees are successional relics, living for many years, continuing to meet their light requirements by their dominant height position in the forest.

If we were able to design the ideal conifer for our Sierra Nevada forests, it might look a lot like the giant sequoia. Examine some of the trees' attributes: highly adaptable to many changes in the environment, a fast grower with few natural enemies, extremely attractive as a young tree, able to reproduce by seed or by rooted cuttings, great longevity, good wood quality in young trees, and continued rapid growth even into old age. Giant sequoia has enormous potential for carbon storage and has demonstrated resistance to smog.

It has been reported that the General Sherman Tree, at approximately 2,500 years has an average volume growth increment of 40 to 51 cubic feet per year, which may be the world's fastest growing tree!

Natural Enemies

For many years it was thought that the giant sequoia was free of insect and disease problems and able to cope with the natural phenomenon of fire and flood. Instead, research shows that seedlings and saplings are highly susceptible to injury by fire; large sequoias may be damaged by repeated fires causing loss of supporting wood, which may result in the tree toppling or provide an entry for fungi responsible for root disease and heart rot. Mortality in old giant sequoias is usually by toppling from weakened boles, decay of roots, undercutting by streams or excessive snow loads. Diseases often contribute to root or stem failure. At least nine separate
fungi have been identified with decayed giant sequoia wood. Giant sequoias have proven to be wind firm in spite of their height and large crown exposure.

Discovery

In 1852 the Sonora Herald reported the discovery by Dowd of the giant sequoia while he was meat hunting for a water company. What an inspiring sight that must have been! Discovery triggered the need to provide evidence of the size and character of these trees to people in distant places. This need led to the destruction of specimen trees, as bark and cross sections were displayed in the eastern U.S. and Europe.

John Muir viewing the destruction at a specimen gathering site was greatly disturbed and was reported to have remarked that this was "as sensible a scheme as skinning our great men, to prove their greatness."

Logging

Logging began in 1856 and continued intermittently until the 1950s, although at a much reduced rate after 1935. One operation in Converse Basin cut an estimated 8,000 giant sequoias. Logging of the giants was enormously complicated. Flaws in the felling methodology employed in the rough terrain led to a great waste by breakage. Bucking the trees into logs, splitting the logs and moving the enormous log sections to the mill by chute was a challenging job. Milling logs sometimes required enlarging the mill's entrance. Transporting the rough sawn lumber by rail and chute was accompanied with never ending problems of maintenance of the chutes and trestles supporting them. Repeated losses of mill facilities due to fire, coupled with construction and high maintenance costs proved to be prohibitive. Reportedly no profit was realized from this operation and the largest tree, which remains standing, is named after logging superintendent Frank Boule.

Public Acquisition

In 1873, a State law was enacted, which prohibited the cutting of any tree over 16 feet in diameter in Fresno, Kern or Tulare Counties. There is no record, however, of this law ever being enforced.

The movement to place the giant sequoia groves in public ownership began in 1864 when the Federal government deeded the Mariposa Grove to the State of California. Sequoia, General Grant and Yosemite Parks were created in 1890, including considerable giant sequoia acreage. The Calaveras Big Trees National Forest was created in 1909. The Nelder Grove was added to the Sierra National Forest in 1928. The Redwood Mountain Grove became part of the Sequoia, Kings Canyon National Park in 1940. Between 1935 and 1975 all or portions of many groves in private ownership, within the Sequoia National Forest, were acquired by the U.S.D.A. Forest Service. One of the most significant acquisitions occurred in 1935 when over 20,000 acres, including Hume Lake, the Converse Basin, 10 other groves and the surrounding lands, were sold to the Forest Service for less than $15.00 an acre. The purchase included the remnants of 11 redwood groves, logging camps, lumber, chutes, trestles and abandoned machinery. One grove included trees which had been felled and abandoned when the mill at Sanger burned. Hume Lake was full of stumps and sinker logs. The Forest Service undertook a monumental cleanup job, which was to last for more than twenty years.

Public acquisition continued with the State of California acquiring Mountain Home in 1946. By 1962, the Black Mountain, Freeman Creek, Long Meadow and Peyrone Groves had been added to the Sequoia National Forest.

Acquisitions were not without problems. There was heavy competition for the small amount of purchase funds available. Periodically, strong political opposition restrained acquisitions. While I was on the Sequoia National Forest in the 1960s, the General Accounting Office challenged a grove appraisal, stating there was no commercial market for Sierra redwood. We overcame that problem and the acquisition was completed, once again trying the patience of the willing seller. Other acquisitions reserved to the previous owner the right to cut and remove selected white woods for a period following the transfer of ownership. In many cases, the private owners had to wait for long periods for the tedious acquisition process to be completed. A few are still waiting!

Today 90 percent of the giant sequoia groves are in public ownership. Public acquisition of groves that remain in private ownership continues today.

Research

Significant research has been done on giant sequoias. Various individuals have and are making major contributions to what we know about the species. Unfortunately, there has not been a focused, continuous research program adequate to support all needs. Many opinions exist, but very little is known with certainty of long-term effects of the various management strategies. The National Park Service, the Forest Service, the University of California and the California Department of Forestry and Fire Protection as well as others have made significant contributions.

The National Park Service appointed a committee in 1986 and charged them with reviewing the history, current status and scientific basis for the sequoia/mixed-conifer fire management program. Following their report, a joint funding effort was undertaken by the National Park Service, the Forest Service and the Sequoia Natural History Association to support a comprehensive research program.

We are indeed fortunate to have as speakers and moderators many of the people who have made significant contributions to our knowledge of giant sequoias and their place in the ecosystem.
Grove Ownership

Ten percent of the groves are in private ownership. Three of these private groves are being managed for the production of forest products; three others are residential sites.

Another 14 percent are managed by the State of California Departments of Forestry and Fire Protection and Recreation, Tulare County, Bureau of Land Management, the Tule Indian Reservation, and the University of California.

The National Park Service manages 34 percent in Sequoia, Kings Canyon, and Yosemite National Parks, and the Forest Service manages 42 percent in the Sierra, Sequoia, Stanislaus and Tahoe National Forests.

Grove Management

Much has been done by the Federal and State agencies toward protecting and enhancing the giant sequoias under their jurisdictions. None of the agencies have, or plan to harvest or injure any of the large specimen giant sequoia trees. All are concerned over the difficulty in recruiting new giant sequoia trees into the overstory.

Management of giant sequoia by the various public agencies and private owners provides an opportunity for observation and evaluation of results of the different management strategies. Different techniques have been used in response to the various goals and grove conditions, as well as the preferences of managers.

The California Department of Forestry and Fire Protection has employed a combination of forest harvesting and prescribed fire for the Mountain Home Demonstration Forest. Management goals for the area are multiple use, with emphasis on recreation and perpetuation of groves.

The USDI National Park Service has employed prescribed fire as the primary tool to reduce fuel and return groves to natural fire regimes with a goal of restoring natural ecosystem processes. Prescribed fire practices are modified where public use and visitation are in conflict.

The Forest Service has used a combination of silvicultural practices and prescribed fire to achieve management objectives for about 10 percent of their groves. Other groves, which had been logged of both white woods and most specimen redwoods before acquisition, have been thinned and planted with redwood seedlings. Still other groves have received only custodial protection. The Forest Service has created some of the largest disturbances and have successfully established many young giant sequoias through planting and natural seeding. As for the Forest Service's logging of white woods in and around the groves, (which has been severely criticized by the Sierra Club and the Audubon Society), Piirto (1991) reports, "There appears to be no evidence that the recent logging of the 1970's and 1980's has resulted in any major detrimental effects. While there are a few recent tree failures of specimen old-growth giant sequoias in, or near recently logged areas, there are equally as many or more old-growth tree failures in the National and State Parks where custodial protection and prescribed burning occur."

The Forest Service multiple use management direction has been modified by the mediated settlement agreement reached in 1990. The agreement removed sustained yield timber management as a grove objective for all but a portion of the Converse Basin Grove. Other multiple uses will continue. This agreement will be discussed in depth later in the program.

The California Department of Parks and Recreation largely relies on prescribed fire in managing the Calaveras Big Trees State Park; some fuel reduction work has also been done through hand labor. The University of California has used prescribed fire on a continuing basis at Whitakers Forest to thin the stand and reduce the fire load. Some selection harvest has also been practiced.

Increasing management activities by the agencies has brought some criticism and unsubstantiated claims of impending grove destruction. Some groups have proposed elimination of all management activities and suggested the groves be given monument status. The role of fire as a management tool for groves remains controversial. All forms of silvicultural practices which include the harvesting of white wood trees and thinning of young redwoods has been assailed, by some, as leading to grove destruction. Unfortunately, some political activists have worked hard to create a public perception that giant sequoia groves managed by the Forest Service are being devastated and soon no big trees will remain. This fabrication could lead to government action precipitated by environmental scare tactics and media sensationalism, resulting in over-regulating which will likely work to the long-term disadvantage of the grove ecosystems. We can ill afford manipulation of fact, somehow justified by the noblest of causes.

Issues for Discussion

A number of issues are ripe for discussion and resolution during and following this symposium. These issues and points of differences must have resolution if this symposium is to be useful in charting the future management of giant sequoia groves. The following questions should be given consideration:

- What is the best method to reduce the fuels which have built up in the groves during the years of fire protection? Certainly the variable conditions of individual groves will require a variety of prescriptions.
- How can the giant sequoia fire controversy be resolved? Prescribed fire has both positive and negative effects on the giant sequoia groves. Under what circumstances and to what intensity and frequency should fire be used within the groves?

---

• Which silvicultural practices should be employed in management of groves? When should thinned trees be used for commercial purposes?
• What is the best method to recruit giant sequoias into the overstory to provide future large trees in the stands? Failure to recognize the need and provide for recruitment will eventually lead to the reduction or loss of the old-growth giant sequoia stand component.
• Much of our understanding of sequoia ecology is based on limited research. How can we best establish and support a program of coordinated research, involving all interested parties? Funding and maintaining a research program in these times of tight budgets will be difficult and require widespread support.
• What is the best method to identify the successes, findings and failures from past management of giant sequoia groves? Mountain Home State Forest, Sequoia, Kings Canyon and Yosemite National Parks, Whitakers and Blodgett Forests, Sequoia, Sierra, Stanislaus and Tahoe National Forests, and other groves in public and private ownership, all offer opportunities for increasing our knowledge with respect to sequoia groves and associated ecosystems.
• Giant sequoia has been planted along with other species following logging on many National Forests in California and on the University and State Forests. It is common for giant sequoia to make up from 3 to 20 percent of the planting mix in the general forest zone of the west side of the Sierra Nevada on the National Forests and at Blodgett Forest. What should be done to promote the understanding of giant sequoia as a part of the commercially harvested species in areas outside the old-growth groves?
• Do giant sequoia groves need special legislated protection? Is present criticism of grove management really driven by a background goal of creating a Range of Light National Park, or as part of the effort to eliminate all timber harvesting on the National Forests in California?
• Which process or combination of processes is best for the long-term survival, restoration and perpetuation of the groves? The 75 groves are quite variable in composition, largely due to past activities but also because of soils, moisture conditions, associated species, and other factors. For example, the Forest Service has responsibility for a great variety of groves; some were acquired with the old-growth and other components intact; others were heavily logged with only a few old-growth trees remaining and now contain young giant sequoias; still others were acquired after the desirable white woods were removed and specimen redwoods were left standing. The various groves, irrespective of ownership, will likely require quite different management practices due to the great variability in stand structure, composition, management objectives and past activities in the groves. The influences of visitor use and the need for public understanding cannot be overlooked.

• The role of science in natural ecosystem management must include full consideration of human values, as well as of policy and political practicality. What's the best forum for bringing these together, so the long-term benefits accrue for the giant sequoia groves?
• What is the best method to gain recognition and understanding for all interested parties of the variability and complexities of the successional processes associated with giant sequoia groves?
• What is the best method to establish monitoring systems so that short and long term ecosystem changes can be measured to provide the feedback to managers and interested parties? These systems would provide opportunities for an evaluation of management's success in attaining grove objectives, or a basis for the modification of practices.
• The current discussion and conflict seems to focus on how to best preserve naturally occurring giant sequoia groves. But an equally important question should focus on how to manage giant sequoia groves including the establishment and recruitment of young giant sequoia trees into the overstory to become the giants of the future.
• What is the best method to re-establish a relationship between the public agency professionals and the outspoken interested public? This is a serious problem and will not go away unless it is dealt with openly and honestly.
• Outright preservation of groves, especially those within designated wilderness will most likely result in recruitment failures. This issue needs full discussion and understanding.
• What is the best method to bring about public acquisition of the groves that remain in private ownership?

**Dialog Required**

Some participants at this symposium have devoted the majority of their lives working with giant sequoias. There are also many attending this symposium who have gained knowledge and expertise regarding giant sequoia who are not on the program. This symposium provides an opportunity to join in a dedicated effort to learn more about giant sequoia and its place in the ecosystem. The information gathered here can then be applied to future research and management activities which will perpetuate the groves, restore the full ecosystem and provide for the recruitment of new dominant trees into the forest canopy.

Our society can afford to spend the resources to provide for the perpetuation of the magnificent giant sequoia groves. Perhaps John Muir said it best, "The Big Tree is Nature's forest masterpiece and so far as I know, the greatest of living things. It belongs to an ancient stock—and has a strange air of other days about it, a thoroughbred look inherited from the long ago—the Auld Lang Syne of trees."