

COORDINATING WILDLIFE MANAGEMENT WITH HARDWOOD CONSERVATION: THE EXTENSION APPROACH

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Abstract: The conservation of the hardwood resource in California is a major concern. Hardwoods, especially oaks (*Quercus* spp.), are an important habitat component for many wildlife species. In recent years demands for lumber and wood products, firewood, urban development, and forage enhancement programs for livestock have resulted in a decreasing acreage of hardwoods. Regeneration of some oak species has been poor. To address these issues, the University of California, Division of Agriculture and Natural Resources, has established a new hardwood range program. This paper reviews the program and describes its potential impact on wildlife in California.

California's oak woodlands harbor a great diversity of vertebrate species. Mayer et al. (1986) reported 331 species of wildlife breeding in hardwood habitats, as opposed to 311 for conifer habitats, 230 in desert habitats, and 165 in grassland habitats. Hardwood forests occupy about 9.6 million acres in California, with over 7 million acres occurring on hardwood range (Mayer et al. 1986). The main use of California's hardwood rangeland is livestock production.

Recently, concerns have been raised about decreasing acreage of hardwood rangeland statewide and the failure of some species to demonstrate adequate regeneration (Mayer et al. 1986). These concerns have led to increased interest, educational efforts, and research directed toward California hardwoods, especially oaks (*Quercus* spp.) (Plumb 1980, Fitzhugh et al. 1985, Muick and Bartolome 1985).

Three separate incidents initiated the hardwood management controversy in California (Walt et al. 1985). The first was concern in Monterey and Santa Clara Counties that excess hardwood harvesting would damage the aesthetic qualities of the oak woodland landscape. The second incident involved a commercial timber harvest plan to remove a large acreage of oaks in a deer (*Odocoileus hemionus*) migration corridor on the western slopes of the Sierra Nevada Mountains. Third, environmentalists expressed concern for the impact of harvesting oaks for use in the biomass-fueled power plants planned for development in the state. These controversies resulted in the California State Board of Forestry considering whether hardwood harvesting operations should be regulated.

Within the hardwoods, most attention has focused on oaks. Three species, valley oak (*Quercus lobata*), blue oak (*Q. douglasii*), and Engelmann oak (*Q. engelmannii*) have been recognized as suffering from poor regeneration on a statewide basis (Muick and Bartolome 1986, Mayer et al. 1986), and there are regional and site-specific concerns for other oak species.

This paper addresses the probable causes of the

decline in acreage of hardwoods, and reviews the mechanisms which contribute to regeneration problems. In addition, we introduce the Integrated Hardwood Range Management Program in the University of California's Division of Agriculture and Natural Resources.

OAK MANAGEMENT CONCERNS

Oaks are beset with two separate management issues: decreasing acreage as a result of management and conversion, and poor natural regeneration of at least some of the species. Reasons for declining acreage over the past 40 years are varied and include residential development, rangeland conversion and enhancement projects, firewood cutting, construction of roads, reservoirs, and power line right-of-ways, timber harvesting or enhancement programs, and increasing rates of oak mortality ("oak decline"). Currently, residential development is considered a primary factor in the reduction of hardwoods statewide. However, other reasons (listed above) are of primary importance on a regional or site-specific basis.

Actual mechanisms responsible for poor regeneration success of blue, valley, and Engelmann oaks have not been verified, but the following factors, acting in concert or alone, are presumed responsible: (1) rodent, bird, pig (*Sus scrofa*), and deer (*Odocoileus hemionus*) predation on acorns, (2) rodent, rabbit (*Lepus* and *Sylvilagus* spp.), and deer browsing on seedlings, (3) livestock consumption of acorns and seedlings, (4) interspecific competition for water and nutrients with non-native annual grasses, and, (5) modified soil dynamics. There appears to be no simple solution, such as removing livestock from an area, that assures natural regeneration of these species of oaks (Muick and Bartolome 1986). Artificial regeneration techniques will need to be developed. These techniques will include cost-effective seedling protection devices, chemical repellents for preventing animal damage, methods for decreasing grass-seedling competition, and integrated pest management systems for decreasing tree mortality

(Schmidt 1987).

INTEGRATED HARDWOOD RANGE MANAGEMENT PROGRAM

In response to increased interest in hardwood range management concerns, the University of California, Division of Agriculture and Natural Resources, expanded its education and research programs on hardwood rangeland issues. An intensive and long-term research and extension program was proposed in 1985 by Passof and Bartolome (1985) with objectives to slow and to reverse the rate of hardwood range conversions and to increase oak regeneration.

In cooperation with the California Department of Forestry and Fire Protection, this proposal was accepted, and an initial budget of \$1,000,000 was used to develop five new regional positions in the University of California Cooperative Extension's Natural Resources Program (Area Natural Resource Specialists), to conduct research and to develop and extend educational material regarding hardwood range and oaks. The program also initiated contracts with research agencies for mission-specific research relating to the hardwood range issue (Table 1).

The major goals of this new program are to: (1) improve regeneration for species with recognized regeneration problems, (2) maintain wildlife habitat diversity in hardwood rangeland, (3) demonstrate the consequences of hardwood range conversions, and (4) develop feasible alternative management strategies for hardwood rangeland.

Although any program that is primarily concerned with the multiple-use management of hardwood rangeland must include wildlife as an important component to be considered, the Integrated Hardwood Range Management Program specifically addresses wildlife issues. First, since oak woodlands are an important habitat type for wildlife (Wilburn 1984), a program objective is to document and evaluate the costs and benefits of maintaining wildlife habitat and make this information available to the general public, landowners, land managers, and interested agencies. A critical issue is to establish real economic value for wildlife. This value will be tremendously important when decisions regarding particular management strategies are to be made. Currently, there is hope that the demand for trespass rights for hunting and fishing access may encourage many landowners to maintain prime wildlife habitat sites when alternative management schemes are being considered (Hoffman 1986, Nielsen et al. 1986). The economic value of wildlife may be more than the economic return from alternative uses of the land.

A second program objective is to familiarize landowners and land managers with state and federal

Table 1. Project titles for research projects jointly funded by the California Department of Forestry and Fire Protection and the University of California in support of the Integrated Hardwood Range Management Program.

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1. Ecology and regeneration of hardwood rangelands: the influence of water, herbivory, and competition on stability, productivity, and management options.
 2. Natural regeneration of hardwood range species in California.
 3. Oak woodland regeneration project.
 4. Effect of fire on seedlings and saplings of coast live oak and Engelmann oak.
 5. Ecophysical responses of oak seedlings during establishment: influence of water stress, nutrient stress, and mycorrhizae on survival, growth and establishment of oak seedlings.
 6. Genetic variability of three California oak species: implications for regeneration of hardwood range.
 7. Oak regeneration assessment.
 8. Wildlife-habitat relationships in oak woodlands of California.
 9. An investigation of the breeding habitat of cavity-nesting birds in a hardwood range habitat.
 10. Mitigating unsound conversions of hardwood rangelands.
 11. Inventory and analysis of the federal and state statutory environment for hardwood rangeland ownerships.
 12. Alternative management strategies for hardwood range.
 13. Price structures at big game hunting clubs in California.
 14. Development of a ranch model of California's hardwood rangeland.
 15. California livestock industry economic model.
 16. Overstory canopy effects on forage production, quality and utilization and soil characteristics on hardwood rangelands.
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programs designed to encourage wildlife management. An example of this would be the Private Lands Wildlife Management Program (Ranching for Wildlife) administered by the California Department of Fish and Game. In 1986 this program involved 39 areas in 16 counties totaling nearly 240,000 ha (Mansfield 1986). This type of program tends to enhance the already existing habitat, enabling it to support more wildlife.

And finally, a major program objective is to encourage landowners and land managers to assess wildlife habitat diversity on their property, and to incorporate this information actively when making management decisions. A publication has been prepared that details methods for assessing the impact of management practices on wildlife populations and describes procedures for mitigating the negative impacts (Passof et al. 1985). In addition, several demonstration areas detailing these methods will be established throughout the state. Our hope is that these programs will encourage land managers to maintain or enhance the

ability of hardwood rangeland to support populations of wildlife.

SUMMARY

The University of California's Division of Agriculture and Natural Resources, in cooperation with the California Department of Forestry and Fire Protection, has made a long-term commitment to multiple-use management of hardwood rangeland, with emphasis on oaks. It is our hope that this program enhances the values associated with hardwood range, especially the wildlife values. This paper introduces the program to wildlife biologists and others interested in the multiple-use management of California's hardwood rangeland. Other agencies and individuals are encouraged to become involved with this program.

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