

Managing Development in California's Oak Woodlands¹

Bruce W. Hagen²

***Abstract:** Much of California's oak woodland habitat is at risk from urban expansion. Growth continues with little regard for wildlife habit, open space preservation, soil erosion, and risk of wildfire. Local planners must develop an effective natural resource management strategy, based on a careful assessment of the local oak/hardwood resources. In this manner, they can identify critical areas, e.g., wetlands, riparian corridors, steep slopes, unstable soils, wildfire prone vegetation and terrain, and lowlands subject to flooding. Thus, specific areas can be targeted for growth, preservation, or other compatible uses. Planners will be more successful by working closely with landowners, the public, other governmental agencies, and environmental groups to promote education, land stewardship, local assistance programs, and by offering incentives. In addition, more effective tree preservation ordinances must be developed to minimize tree losses during development. Successful tree retention programs begin at project conception, and continue through planning, design, construction, post-construction, and landscaping.*

Urban expansion into the surrounding wildlands has destroyed or degraded much of California's oak woodlands and created a serious wildfire hazard. Furthermore, concerns about fire hazard, flood potential, soil stability, and open space preservation have not been adequately addressed. Since the mid-1940's, more than 1.2 million acres of oak woodland habitat have been converted to urban and agricultural uses, and another 0.25 million acres are at risk. An estimated 14,000 acres are lost each year primarily to residential development. Wood cutting accounts for a similar amount, although the effects are reversible. Oak woodlands are a significant natural resource providing soil stabilization, ground water recharge, air and water quality, wildlife habitat, nutrient cycling, recreational opportunities, wood production, livestock grazing, and esthetic qualities. Urban development, undeniably, has had a major impact on these values. Current building policies seldom require careful site assessment of oak woodlands before development, to minimize tree removal and/or protect high-value trees, stands, or critical habitat areas. In addition, the cumulative environmental effects of unrestricted development are rarely considered. It is still permissible, in some counties, to clear and mass-grade wooded land to facilitate development. Moreover, many cities and counties lack effective tree preservation ordinances or staffing for enforcement. Thus, more trees are removed than necessary, and those designated for retention are often inadvertently killed or damaged. Attempts to preserve important stands or groups of oaks and individual trees during development are often unsuccessful because of poor planning, lack of coordination, and inadequate tree protection measures.

Habitat Fragmentation

Remaining oak woodlands are becoming increasingly fragmented as large blocks are progressively subdivided. The end result is reduced wildlife habitat.

¹An abbreviated form of this paper was presented at the Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues, March 19-22, 1996, San Luis Obispo, Calif.

²Urban forester, California Department of Forestry and Fire Protection, P.O. Box 670, Santa Rosa, CA 95402-0670.

Fragmentation isolates plant and animal populations by restricting their movement/dispersal. Many animals must move daily in search for food, water, and shelter. Their survival is dependent on access to favorable habitat. Wildlife abundance and diversity depend on large-scale, interconnected open space. Roads, fences, structures, and other barriers which limit movement to suitable habitat affect dispersal and/or migration. Isolated populations face greater competition for limited resources and are unable to interbreed with other populations. Consequently species' health may suffer. In addition, many native plants depend on wildlife to disperse their seed to maintain or increase distribution. When roads and homes are built in the wildlands, vegetation is removed, streams are often diverted or channelized, drainage patterns are altered, wildfire is suppressed, and exotic plants and animals are introduced. Species adapted to the native habitat and to the natural ecological processes may not survive.

Planning and Resource Management

Many municipalities under pressure for residential development have expanded rapidly into their surrounding oak woodlands with little regard for natural resource management and open space planning. Local, county, and regional planners and political leaders thus play key roles in managing the remaining oak woodlands and their associated values. Planning must address the impacts of development on a large scale (landscape, county, or regional basis), rather than on an individual tree or stand basis. Instead of passing ordinances that prevent the removal of trees during development or on private property, it is more important to plan for the long-term maintenance of large blocks of interconnected open space. Planners must balance the need to preserve valuable oak resources with the need for some economic development and urbanization.

Elements of Successful Planning and Resource Management

- Recognize the inherent community and ecological value of oak woodlands.
- Survey and assess the local oak/hardwood habitats and associated plant and animal populations.
- Obtain technical input from staff specialists or private consultants.
- Identify species most sensitive to development.
- Identify habitat with highest wildlife values, e.g., riparian areas.
- Understand local ecological processes, e.g., fire, flooding, water flow, etc.
- Identify areas of high fire hazard and determine whether and how development in such areas should take place, e.g., fuel modification requirements, building material standards, structure siting, and landscaping restrictions, etc.
- Define local development goals and policies regarding public and private land use, and provide for adequate open space preservation and resource management in the general plan.
- Set urban growth boundaries and future development zones.
- Develop a natural resources management strategy.
- Target specific habitats for preservation and other compatible uses.
- Regulate land use by zoning (mapping based on habitat/species survey).

- Specify management practices for targeted habitat areas.
- Shift development away from high-quality habitat or protect it while allowing some economic use, e.g., cluster housing to retain larger open space and reduce fragmentation and other environmental impacts.
- Maintain corridors between targeted habitat areas.
- Plan for public access and trails.
- Seek permanent protection of targeted habitat through legislation and acquisition.
- Encourage local conservation districts to develop oak woodland management guidelines for landowners.
- Encourage landowners to develop forestry/resource management plans for their holdings.
- Encourage education and land stewardship by distributing information on tree and land management, and State and Federal incentive programs.
- Offer landowner incentives to encourage cooperation, e.g., sale or transfer of development rights, sale of conservation easements, tax reduction, etc.
- Regulate tree removal during development through a tree preservation ordinance.
- Require the posting of substantial performance bonds.
- Outline tree removal procedures, replacement standards, and required construction/excavation practices for developing around trees.
- Require mapping of oak trees and habitat on proposed subdivision maps.
- Inspect site for mapping accuracy.
- Analyze proposed subdivision plan, and suggest or require changes to minimize tree removals and impacts to existing trees/habitat.
- Inspect site during and after construction to check for compliance.
- Review proposed landscaping plan and require modification as necessary for approval.
- Require planting to mitigate for the removal of mature oaks.
- Where appropriate, regulate tree removal following development through an ordinance permitting process. Effective ordinances allow for a case-by-case review, considering the owner's needs, fire hazard or safety concerns, community benefit, and habitat degradation.
- Monitor and evaluate effectiveness of proposed habitat management measures.

Development and Oak Tree Preservation

A successful tree retention program begins with project conception and continues through the planning, design, construction, and maintenance phases. When retention efforts are delayed or ignored, tree health and survival are compromised.

Elements of a Successful Tree Retention Program

Site Evaluation (conceptual phase): A resource specialist may be required to

- Accurately map location of tree stands, groups of trees, and significant individual trees;

- Map water courses, wetlands, flood plains, unstable areas, rock outcroppings, meadows, scenic views, etc. ;
- Identify important wildlife habitat and migration corridors;
- Characterize soil conditions and drainage patterns;
- Prepare preliminary site map (building envelope, roads, parking, utility routing, etc.).

Arborist Report/Tree inventory (based on a preliminary plan):

- Accurately map all trees to be impacted by construction activities, indicating their respective root protection zones (RPZ).
- Determine which RPZ you will use:
 - Dripline (industry standard).
 - Dripline plus ten feet (better).
 - Dripline plus 0.5 radius (best).
 - 40 percent tree height (conifers and fastigate hardwoods).
 - One foot of clearance for each inch of diameter at breast height (wide- spreading crowns and young trees).
- Number and describe all trees in list form, e.g., species, height, diameter class, condition, health, defects, etc.
- Indicate all trees to be removed and evaluate border-line trees for removal or retention.
- Estimate percent root loss.
- Consider cumulative impacts based on local species profile.
- Recommend changes and alternatives to minimize tree loss or construction impacts.
- Base priority for tree retention on health, stability, esthetics, expected longevity, and probability of surviving construction impacts.
- Designate hazardous trees for removal.
- Recommend arboricultural care: pruning, root pruning, irrigation, hazard abatement, removals, tree wells, aeration systems, retaining walls, foundation construction (pier and beam), and other protection measures, etc.
- Provide education and facilitate cooperation.

Tree conservation plan:

- Use a team approach: include developer, owner(s), contractors, construction superintendent, architect(s), engineer(s), landscape architect(s), and arborist.
- Develop preliminary grading plan, establish building site, delineate parking, location of roads, and routing of utilities, etc., emphasizing the least impact on existing trees.
- Designate trees to remove/retain on the map and clearly mark in the field.
- Accurately map all trees that will be impacted by construction activities on the plat map.
- Delineate RPZ on the plat map.
- Indicate trees to be removed or retained on the map, and clearly mark them in the
- Prescribe arboricultural work, e.g., clearance pruning, hazard abatement, irrigation, root pruning, aeration systems, chip mulch installation to reduce soil compaction, etc.
- Stipulate all concerns to architect for final layout, e.g., utility routing, grade change, retaining walls, foundations, pavement, changes in drainage, etc.

- Recommend alternatives to minimize tree removal while retraining the most valuable trees.
- Outline **all** tree protection requirements/restrictions, and include in all construction plans and documents:
 - Designated area(s) for soil and building materials storage.
 - Method of trenching within dripline (hand dig or auger) and/or minimum distance to trunk , e.g., one foot per inch or trunk diameter.
 - Machinery access routes.
 - Location and specifications for wood chip mulch installation.
 - Designated employee parking area.
 - Designated site to clean equipment or dump toxic building materials.
 - Construction specifications for aeration systems, tree wells, and retaining walls.
 - Drainage structures and placement.
 - Method of marking trees for removal/retention.
 - Location of fencing, type of material and installation procedure, and define encroachment procedures.
- Discuss tree preservation concerns with foremen, subcontractors, equipment operators, and utility representatives.
- Require performance bonds to assure compliance and set penalties for infractions.

Plan review: (arborist reviews preliminary excavation/construction/landscaping plan:

- Look for discrepancies.
- Ensure that adequate root protection measures will be taken.
- Provide guidance, list alternatives and negotiate with engineer to modify plan.
- Plan to minimize impacts where possible.

Pre-construction:

- Mark and fence RPZ's, and clearly mark trees for removal retention.
- Post signs to warn equipment operators and contractors.
- Clear brush, prune trees, remove hazard and marked tree, do root pruning, Irrigation, install chip mulch, etc.
- Stake or mark utility routing, roads, foundations, and retaining walls.

Construction:

- Provide for periodic arborist supervision, especially during critical phases, e.g., grade change, road construction, aeration and drainage system installation, trenching for footings, foundations and utilities near trees.
- Report infractions to construction supervisor and assess fines for tree damage or death. Use the International Society of Arboriculture tree valuation method to determine value.
- Provide education and facilitate cooperation.

Post construction:

- Pruning of damaged limbs.
- Irrigation, fertilization, mulching, etc.
- Soil aeration
- Monitoring, pest management.
- Education of new owner about landscape maintenance.
- Review landscaping plan and make appropriate recommendations.

Managing California's remaining native oak resources is largely dependent on a combination of strategies, e.g., General Plan development, resource conservation planning, development standards, ordinances, education, and incentive programs.

Available Resources

Technical Advice: Integrated Hardwood and Range Management Program (University of California at Berkeley); Natural Diversity Data Base (California Department of Fish and Game, Sacramento).

Resource mapping: Oak Woodland Mapping (California Department of Forestry and Fire Protection, Strategic Planning Program, Geological Information Survey, Sacramento; California Wildlife Habitat Relationships (WHR Data Base) (California Department of Fish and Game, Sacramento).