Oak Management by County Jurisdictions in the Central Sierra Nevada, California[1]

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Abstract

We evaluated county planning policies and procedures to determine what protection is provided to oak woodlands during the land development process. We selected three Sierra Nevada counties to do a pilot assessment: El Dorado, Placer and Madera. The assessment methodology included three components: 1) analysis of county plans, policies, guidelines, and ordinances to determine if oak woodland management is addressed and if so, how; 2) analysis of development case studies to document the planning process used to conserve oak woodland; and 3) field evaluation of typical oak management activities at the site scale. The counties vary widely in the extent and detail of their oak protection policies and in how they approach oak conservation at the landscape, stand and site scales. In particular, conservation and protection measures often focus on individual trees or groves at the expense of larger woodlands. At the site scale, we observed both ineffective protective measures as well as innovative approaches to site planning that resulted in the protection of oak groves or specimen trees. The results of our assessment should prove useful to county and local agencies interested in oak conservation. This research also provides an assessment methodology for a statewide evaluation of county policies and procedures.

Introduction

In California, there is presently a great deal of controversy concerning the protection of native oak woodlands. It is certain that the status and treatment of oak woodlands varies from place to place in the state. In the absence of any comprehensive statewide oak specific regulations, conservation and protection of oak woodlands falls to county and city governments. State (or Federal) regulatory requirements usually only come to bear when other resources, such as streams, wetlands and endangered species, are also involved.

The University of California, Integrated Hardwood Range Management Program (IHRMP) approached the authors and requested that we conduct a study of the effectiveness of county management of oak woodlands in the Sierra Nevada. We were asked to use a methodology that we had applied previously to assessments of county management of anadromous fish (Harris and Kocher 1998, Harris and others

[1] An abbreviated version of this paper was presented at the Fifth Symposium on Oak Woodlands: Oaks in California's Changing Landscape, October 22-25, 2001, San Diego, California.

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2000). The results of that research are summarized in this paper and presented in greater detail in a report to IHRMP (currently in review).

This research was not intended to be definitive but rather, to indicate through a pilot study, what the main issues are and what additional research might be conducted. It is a case study approach involving only a few counties. It is probable that conditions in other counties are quite different than the ones we studied. However, we do feel that some of the major issues related to local management of oak woodlands have been determined. The results should be useful to researchers and policy makers wishing to gain a better understanding of the constraints to effective oak woodland conservation in the foothill counties.

Methods

The study area for this research was El Dorado, Placer and Madera Counties in the California Sierra Nevada foothills. Research goals were: 1) to determine how existing policies, regulations, California Environmental Quality Act (CEQA) process, mitigation measures and land use practices are used to minimize the adverse effects of county-regulated or funded activities in California oak woodlands. The primary focus was on land development. The scope of review spanned planning and approval processes through implementation; and 2) to determine the degree to which the approaches to oak management in the counties are consistent and effective. Consistency was evaluated through tracking policies and procedures and their implementation during project approval processes and effectiveness was evaluated by field studies of post-development conditions.

County-regulated activities may affect oak woodlands in different ways at different scales. To provide an orientation for our study, potential impacts on oaks were classified as either direct or indirect occurring at the individual tree, stand/grove, or landscape scales. A direct impact was defined as partial or total removal of trees, patches of trees or large-scale clearing. An indirect impact was defined as an alteration of environmental (e.g., soil or water status) or ecological (e.g., species composition or stand structure) conditions that would affect oak health, vigor or life span. We operationally defined a tree's impact area by its crown as projected onto the ground surface (i.e., within its drip-line). A stand or grove was defined as a vegetation patch dominated by native oaks and generally less than a few acres in size. The landscape scale was defined as a relatively large patch (tens of acres) of oak woodland with continuous crown cover (more than 50 percent cover). Under these definitions, an oak savanna would normally qualify as individual trees but could be called a woodland, depending on its density. Groups of oaks separated in space by other vegetation types or by development were treated as groves. An oak woodland-dominated landscape could have one or more of several vegetation types found in the study area, including mixtures of oaks, pines and shrubs.

We met with county planning and public works staff and they indicated that the primary activities, which affect oaks within their jurisdictions, were residential, commercial, and recreational development (golf courses). They also expressed concern about road construction and reconstruction projects. Therefore, our work focused on these activities in oak woodlands.

After we determined the important activities, we inventoried all of the policies and procedures that each county uses to prevent or reduce potential effects on oak

woodlands. These tools included formal adopted policy (e.g., general plans, subdivision, zoning and other ordinances, etc.) as well as planning and environmental review procedures as documented in CEQA reports, planning reports and permit conditions. We also identified practices used in the field, such as methods used to protect oaks at construction sites.

After conducting the inventory we reviewed all applicable plans and policies to determine how oak woodlands were addressed (planning policy analysis). This was followed by an analysis of how policies were applied to projects during the approval process and environmental review (development processing). We then evaluated implementation of mitigation measures at specific sites (field assessment). Essentially, we followed policies from their origin in plans and ordinances through the development review process to the ground. Case studies and field sites were jointly chosen by county staff and UC researchers. Field site inspections were conducted by a team consisting of county staff and UC researchers. Field observations were recorded on standardized forms.

The products of this research are: 1) an inventory of policies and regulations in place for protecting oak woodlands; 2) a qualitative evaluation of the adequacy of the project review process in protecting oak woodlands; and 3) a qualitative evaluation of mitigation measures used in the field to protect oak woodlands. These products can be used as the basis for proposing modifications of procedures or additional procedures to bolster existing mitigation tools.

Results

Planning Policy Analysis

Every county's general plan and ordinances have developed over time in place and each uses different approaches for conservation of natural vegetation. The general plans for all three counties advocate conservation of oak woodland resources for their wildlife habitat values. They also recommend that new developments preserve natural woodlands to the maximum extent possible. However, the methods used to achieve these goals, the types of projects that are regulated, and the scales at which efforts are focused are different in each county.

Placer County

In Placer County, the General Plan, Tree Protection Ordinance and Placer Legacy program together establish oak conservation programs at the tree, stand, and landscape scales. As previously mentioned, the General Plan contains substantive language aimed at protecting oak woodlands. Placer County's Tree Protection Ordinance requires virtually all development projects (and landowners) to avoid or mitigate tree removal. A developer must submit information for all trees on the site and based on this information, specific conditions are imposed for tree retention and mitigation. Approval for tree removal requires in-kind replacement or payment into the Tree Planting Fund. Proposals for replanting or relocating trees require assurances of maintenance and survival. The Ordinance lists standards that must be used to protect retained trees during construction within 50 feet of any development activity. A deposit may be required to insure tree preservation during grading and damage to trees may incur a financial penalty. Preservation devices such as aeration systems, oak tree walls, drains, special paving and cabling systems may be required.

The Placer Legacy Program is an initiative to preserve oak woodlands at the landscape level. The Program acknowledges that foothill oak woodlands have little regulatory protection and directs the County to preserve oak woodland through a variety of means. Areas of oak woodland with particularly high ecological value have been identified throughout the County and preservation mechanisms such as conservation easements, agency land trades, riparian setbacks, and fee title acquisition have been proposed for them. Direct acquisition is recommended in areas of relatively intact oak woodlands in the northern, less developed parts of the County's foothill region. At the present time, funding for implementing the Placer Legacy Program has not been secured.

El Dorado County

In El Dorado County, canopy retention and open space requirements found in the General Plan are the basis for oak woodland conservation. The canopy retention standards require discretionary projects on parcels having oak woodland canopy cover of at least 10 percent to retain or replace the existing tree canopy on an area basis, e.g., if one acre of trees is removed, another must be planted. In locations with an existing canopy cover of 80 to 100 percent, 60 percent of the existing canopy must be retained or replaced. Retention requirements increase as canopy cover decreases, e.g., for sites with less than 20 percent canopy cover, 90 percent of the existing canopy must be retained or replaced. Proposed Oak Woodland Guidelines would add a requirement to discretionary projects for a woodland conservation plan that describes oak woodland conditions before and after the proposed project.

The County's General Plan also emphasizes the use of clustered development to retain natural vegetation. Planned development projects, including all subdivisions that create more than 50 new lots, must set aside at least 30 percent of the project area as open space land. These open space areas can be used to meet canopy retention requirements.

Standards for protection of retained oaks are established in the El Dorado County Design and Improvement Standards Manual, which prohibits disturbance or changes within the drip-line of any oak tree during construction. This is a guide, not an ordinance.

Madera County

In Madera County, the General Plan calls for protection of oak woodlands. The main vehicle for enforcing these provisions is the CEQA/environmental review process. Several discretionary projects we reviewed during the field assessment of practices contained what appeared to be effective oak mitigation measures that were imposed by the County during the environmental review process. However, most discretionary projects and all ministerial projects visited did not appear to have been required to mitigate impacts on oaks.

The Madera County Board of Supervisors has adopted a set of voluntary guidelines developed by the Coarsegold Resource Conservation District to assist landowners in the management and stewardship of private property. These guidelines list specific standards and measures for conservation of oaks and oak woodland during building, agricultural operations, and fire safety clearing, and to promote

wildlife habitat. We did not determine whether or not these guidelines have an effect on oak woodland management by private landowners.

Development Review Process

Eight case studies, including residential, commercial and golf course developments were reviewed to determine the environmental and planning review procedures followed by the counties and the degree to which they addressed effects on oaks at the individual tree, stand/grove or landscape level. Documents reviewed included Environmental Impact Reports (EIRs), staff reports, and approving resolutions, if available. Some of the projects were visited in the field as well and observations on them were recorded. Several conclusions were drawn from review and comparison of the case studies.

Generally, the scope and level of detail with which projects were reviewed varied with their scale and degree of public controversy. Involvement of outside state or federal agencies, such as the Department of Fish and Game or US Fish and Wildlife Service, and presence of environmental or ecological resources other than oak woodlands, such as streams or wetlands, also influenced the degree of environmental analysis conducted. General plan and other policies regarding oak woodlands were used in the planning and environmental review process to establish criteria for assessment and mitigation. However, there were few ecological criteria applied to the evaluation of oak woodlands unless other important resource values were associated with them, such as endangered species. For example, standard plant community nomenclature was not used to describe oak woodlands.

The assessment of existing oak woodland was done differently in each case (tree surveys, canopy surveys, qualitative descriptions) and by different people (general environmental specialists, arborists, foresters). In some cases, detailed descriptions of individual trees were provided but there was no description of the stand or the landscape. This is partly a consequence of the different policies and procedures used in the counties: Placer County requires tree surveys, El Dorado County requires canopy analysis and Madera County has no standardized assessment methodology.

In accordance with different policies, different definitions were used for a "tree," e.g., 3 inches diameter breast height (dbh), 6 inches dbh, 24 inches dbh, and for tree impact areas, e.g., 50 feet to 200 feet from construction activities. Different methods were used for assessing impacts, e.g., analysis of changes in canopy, evaluation of individual tree losses, areas of habitat lost or qualitative only. Generally, no quantitative methods for detailed ecological characterization of oak groves or landscapes were used. Impacts on trees, rather than groves or landscapes, were the main focus of analysis and mitigation.

Different standards were proposed for protecting trees from construction or long-term impacts, e.g., within drip-line, one foot from drip line, five feet from drip line, 10 feet from drip line. These were sometimes, but not always consistent with county standards. Different methods for mitigating or preventing losses were proposed as well, e.g., avoidance, tree planting, open space easements, etc. None of the case studies provided documentation that tree planting can effectively mitigate losses at the stand or landscape level. Different planting guidelines and maintenance requirements were recommended and responsibilities for implementing mitigation varied, e.g., individual homeowner, homeowners' associations, county, developer.

The methods proposed to preserve areas of oak woodland varied (e.g., open space easements, open space parcels, large lot sizes), as did their proposed means of management and protection, e.g., fenced or not fenced, subject to vegetation management or not, etc.

The question of the sustainability of small patches of preserved woodland within urbanized landscapes was not addressed in any case studies. For example, in subdivision designs that created several open space parcels, the issues of use by residents were not often addressed. In some open space parcels, we observed vegetation management occurring that appeared to be in violation of restrictions on use.

For planting projects or open space preservation, monitoring requirements varied, as did measures of mitigation performance, e.g., tree survival rates, canopy replacement goals, etc. No information on the effectiveness of off-site mitigation methods, including tree planting funds, mitigation banking and planting at off-site locations were presented to justify their use in replacing lost resources. Long-term vegetation management impacts on planted or preserved oak woodlands were not often considered, e.g., roadside vegetation management, clearing for fire protection.

We found that within a county, the planning and environmental review process used for case studies was similar although the results differed depending on project type and scale. However, among counties, the procedures varied greatly. Our overriding conclusion was that there was substantial variability in approaches to resource description, impact assessment and mitigation. This reduces the certainty of consistent protection throughout the region. Although it was clear that some projects did have designs that would protect at least some resources, this was not true everywhere. One important consequence of the inconsistent framework for analysis and protection is that oak woodlands of county-wide or regional significance cannot be identified during the project review process. Each project is dealt with in isolation from others and cumulative impacts cannot be assessed.

Field Assessment of Practices

Thirty-one development sites were formally evaluated in the three counties and many more were observed in passing. The activities observed and the practices applied appeared to be representative of the range of projects in the counties, but the sample was not intended to be statistically significant. The projects included 15 residential developments, nine commercial developments, four golf courses and three road construction projects.

Residential Development

The fifteen residential developments ranged widely in their design characteristics, size and degree of regulatory complexity. Generally, all but one of these projects involved some amount of tree removal to enable construction of roads, clearing of building sites and house construction. The number of trees removed was a function of the density of the woodland affected and intensity of development, i.e., amount of grading and size and density of building sites. The mitigation measures applied to tree removal were both voluntary and regulatory. They included avoidance through site planning and restrictions on building site locations through definition of building envelopes on recorded maps. Some of the projects were required to quantify

the number of trees removed and replace them either on or off site. Plantings observed were opportunistic, and the planting methods and maintenance practices varied. Most of the projects also involved fragmentation at the stand level. This included removing trees and understory and reducing stands to isolated residual trees. To achieve mitigation in some cases, groves were preserved in association with open space or riparian easements. In a couple of cases, fragmentation also occurred at the landscape level. These were large developments in extensive, dense oak woodlands where roads and building sites created multiple openings or large clearings. No specific measures to avoid landscape-level fragmentation were observed.

At every site where construction was underway and at some completed projects, construction or use-related damage to residual trees was observed. This included machinery operations under trees, grading, construction and trenching beneath trees, machinery damage to stems and branches, and equipment storage beneath trees. Permanent changes observed beneath trees included housing foundations, landscaping, paving and grading. In some cases, rather detailed mitigation measures for avoiding such damage had been recommended but implemented only in part or not at all. In other cases, there were no specific measures applied and avoidance was voluntary but inconsistent.

At three sites extensive clearing for fire protection (i.e., creation of "defensible space") was observed. In these cases, complex multi-storied oak woodland stands were cleared of understory shrubs and trees and thinned. The resulting condition was individual trees without overlapping crowns and with open understory or bare ground underneath. There was an attendant loss of species and structural diversity. This practice is actively promoted and no mitigation measures to prevent it are applied.

Commercial Development

We reviewed nine commercial and industrial developments, including some churches. Most were conditional use permits on existing parcels involving various levels of regulatory review. The nature of commercial or light industrial development is such that site coverage is greater and buildings are larger than residential development. As a result, larger areas and perhaps, a greater proportion of the site are subjected to clearing and construction impacts. In a few of the reviewed cases, trees were avoided through site planning, but mostly trees in the path of development were lost. Mitigation measures applied to avoid trees included cut-outs in parking lots or creation of "islands" with trees on them. In four cases, stands were either removed or fragmented into individual trees. On one site, a stream and associated oak riparian zone were relocated from the center of the parcel to the periphery to allow construction of a parking lot. Mitigation measures applied to groves included their protection as undeveloped open space and replanting of trees pursuant to ordinances. Some residual trees suffered construction-related damage or had permanent changes beneath their crowns, such as paving. In applicable cases, landscaping and irrigation beneath retained oaks were minimized. There was evidence of involvement by an arborist or forester only on one site.

Road Projects

Three road reconstruction projects were evaluated. All of these involved widening existing roads within defined rights of way, and options for site planning to

avoid oak losses were limited. The primary impacts were losses of individual roadside trees but in one case, a grove will be lost due to an intersection re-alignment. Mitigation measures included replanting trees either within the road right of way or at off-site locations or contribution to a tree planting fund. The main limitation to mitigation was availability of sites for replacement plantings.

Golf Courses

Four golf courses were evaluated. In the three golf courses that were constructed in relatively dense oak woodland, the landscape was reduced from continuous canopy to individual trees, lines of trees and isolated groves. In the other case, the golf course was situated in a floodplain between a river channel and overflow channel. It may have been riparian forest in the past but had been cleared long before the golf course project. Treatment of retained trees within or adjacent to groomed areas varied. In some projects or parts of projects landscaping and irrigation were restricted in the vicinity of retained trees. In other situations, no restrictions were evident. Some retained trees were located within fairways and subject to all grooming and irrigation practices. Results varied. No ill effects were observed in some retained trees while others had clearly suffered or died. Mitigation measures for lost trees included replanting on site, in or around fairways, with and without turf and irrigation underneath. On one site, trees planted in fairways where they were irrigated and fertilized were growing extremely well. There were also restrictions placed on grading or paving beneath retained trees. Some groves were retained as open space and on one site, 300 acres were preserved, mitigating landscape-level fragmentation to some extent.

Discussion

Our review showed that Placer County has the most comprehensive set of policies addressing oak woodland conservation. In Placer County case studies, there was a clear linkage between policies and development processing. However, lack of funding for the Placer Legacy Program may prevent effective conservation at the landscape level. El Dorado County's main tool for oak conservation, requirements for canopy analysis, provides some benefits that a tree protection ordinance does not. However, in the El Dorado County case studies and in the site review, some projects had high enough initial oak woodland densities so that the canopy analysis requirement was not triggered. Also, unlike Placer County's tree ordinance, which applies to any tree removal, the canopy analysis procedure only applies to discretionary projects. Madera County has the least assertive policies but it implements oak conservation through the CEQA process. The scale and visibility of a project and the presence of resources other than oak woodlands, especially wetlands and riparian zones, had definite effects on the intensity of environmental review and the quality of mitigation measures applied.

In all counties, the site reviews indicated that implementation of mitigation measures was not consistent or effective. In every county, conditions on sites undergoing development appeared similar. That is, oak protection at the site level is ineffective. The most significant impacts observed were construction or use-related damage to residual trees. According to County staff, the ubiquitous damage to residual trees was due to several causes including a lack of coordination between

planning and building departments regarding conditions on development permits, lack of enforcement or monitoring, field judgment calls on grading or building siting by building contractors and pure accident.

On several field sites in which open space parcels had been preserved, they appeared to be reasonably planned and potentially effective in protecting resources. In the long term, the management of these open space areas will determine their sustainability. Management guidelines and implementation varied from site to site.

Practices used for planting of new oaks and management of residual oaks varied as did the observed results. For example, we observed places where oaks were subjected to irrigation and had died and other places where they were irrigated with no apparent ill effects. Several different planting methods were observed using differently sized planting stock, from pre-sprouted acorns to 15-gallon container stock. Better practices for regenerating and managing native oaks are probably needed to obtain more consistently successful results.

The practice of planting to mitigate losses is itself questionable. We observed planting oaks underneath existing woodlands, planting in median strips and along property lines and planting on cut and fill slopes. These plantings were often aimed at mitigating losses of stands or groves. They would function ecologically as replacements for groves only in a few cases. Off-site planting, in general, is constrained by the availability of suitable planting sites.

Finally, there is an inherent conflict between protecting and enhancing the biological diversity of oak woodlands and the implementation of strict "fire-safe" development guidelines. Further study of this would be warranted, especially in view of the assertive efforts being taken to reduce fire hazard. The trade-off for marginal reductions in fire risk may be significant decreases in the biological diversity of oak woodlands.

Conclusions

Our conclusions, presented below, are provided with two goals in mind: achieve better regional consistency in protecting oak woodlands and achieve better mitigation effectiveness.

There appears to be a need to improve the methods used to evaluate and assess impacts on oak woodlands. Descriptions at multiple scales are needed if the ecological significance of specific oak woodlands is to be understood by decision makers. Better ecological descriptions would enable better predictions of the consequences of their fragmentation or loss.

Improving protection of oaks on construction sites appears to be as much an educational issue as a regulatory one. In particular, there appears to be a need to provide a better understanding of oak protective measures to construction workers. The need for additional regulatory tools might be avoided if better educational programs are developed.

Better information on management of oak woodland open spaces should be provided to the many entities that are assuming responsibilities for their sustainability. This is not being adequately addressed in either CEQA process or in conditions on developments. The future ecological integrity of many oak woodlands is at stake.

There is an apparent need for dissemination of information on "best management practices" for oak planting and maintenance. These may vary considerably by species and site. There is a multitude of practitioners who could benefit from this information.

Additional research or monitoring is needed to determine if on-site or off-site compensatory planting are suitable mitigation measures for losses of mature oak trees and stands and for landscape fragmentation.

Research is also needed on the ecological and environmental effects of "fire-safe" treatments and fuels management on oak woodlands.

References

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