

Land Use Planning



Identifying and Prioritizing Critical Hardwood Resources¹

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Abstract: A logical framework is required to provide a focus for the implementation of a variety of landowner incentive techniques in accordance with existing goals to protect and enhance hardwood resources. A system is presented for identifying and prioritizing critical hardwood resources for site specific conservation purposes. Flexibility is built into this system so that various sources of information can be utilized, the scope can vary from state-wide to local perspectives, and additional criteria can be added within specified system parameters.

Concern over California's hardwood resource has focused on: (1) decreased stocking of hardwood stands due to increased removals and limited successful regeneration; and (2) reduction in the extent, or number of acres, of hardwood land caused by conversion to more intensive uses. These changes, combined with a general shift in ownership and management of hardwood land, are resulting in a general decline in the diversity and quality of benefits available from the hardwood resource.

To address this concern, the California State Board of Forestry (BOF) has adopted a policy of protection, enhancement and restoration of hardwood habitat to assure that (1) all hardwood species are regenerating; (2) soil and water quality are preserved; and (3) sufficient habitat diversity is maintained statewide to protect the viability of wildlife species. Currently, the Board relies on a program of research, education and monitoring to implement this policy. Most of the responsibility for management of hardwood resources remains with private landowners and local governments.

This non-regulatory approach provides opportunities to utilize an array of conservation incentive techniques such as easements, land purchases, and landowner registry programs to protect important hardwood habitat that otherwise may be lost under overwhelming economic and social pressures. Given careful guidelines, these types of conservation efforts can supplement the BOF's program by addressing the short-term need to protect 'critical' hardwood areas. In order to provide a focus for these types of conservation efforts, it is first necessary to devise a system for defining, identifying and prioritizing these 'critical' hardwood areas.

Numerous criteria have been utilized in the development of systems to identify and rank areas for conservation purposes.

Efforts to evaluate the significance of natural areas and potential wildlife conservation areas have used both quantitative and qualitative criteria such as: rarity or uniqueness; diversity; size; naturalness; productivity; representativeness; educational value; amenity value; scientific value; ecological fragility; replicability; and threat (Smith and Theberge 1986; Margules and Usher 1981). All but one of these criteria speak to some type of value, whether ecological or cultural. The last criteria, threat, introduces the risk of resource value loss due to a potential change in land use or an undesirable management goal. The juxtaposition of value criteria and risk criteria provide opportunities to narrow the field of interest based on a sense of urgency of effort.

Identifying hardwood resource conservation targets based on both value and risk criteria requires a system for identifying and prioritizing critical areas that can be readily utilized at statewide, regional and local levels. Such a system must be flexible enough both to respond to variations in both ecological and cultural characteristics and to utilize information sources of varying scope and intensity. It should be reasonably unconstrained, however, by lack of suitable information at any one level. This paper reports on the development of a flexible system responding to this need to:

- 1) define and identify critical hardwood resources using various ecological and cultural attributes; and
- 2) prioritize critical areas by relative need for conservation action.

CRITICAL DEFINITION CRITERIA

In the system proposed here, the definition of critical hardwood resources is the initial decision variable in the allocation of possible conservation strategies. Only those areas identified as critical will be considered for conservation action under this system. Critical resources are defined here in terms of:

- 1) resource attributes of concern; and
- 2) activities that threaten to diminish the value of those resource attributes.

Since this system is intended to dovetail with current state efforts and programs, the goals of the BOF will act as a guide in identifying resource attributes of concern. For purposes of defining critical hardwood resources these attributes will be limited to:

- 1) the extent and distribution of hardwood species;
- 2) water and soil quality risks; and

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3) wildlife habitat diversity.

These attributes are quite broad, and additional criteria are necessary to narrow the scope of interest. Hardwood resources that encompass the attributes stated above will be deemed *critical* only when their status is *threatened* by one of the following types of activities:

- 1) removal or harvesting of hardwoods;
- 2) conversion to intensive agricultural use or residential or commercial development; and
- 3) management activities (such as grazing, hydrologic manipulation, clearing, etc.).

Critical hardwood resources then, are defined here as a function of (1) resource attributes of concern, and (2) activities which threaten their stability. That is:

Critical Hardwood Resource $f(R_c, T_a)$

where: R = hardwood related resources
c = species extent & distribution, water & soil,
and wildlife habitat diversity
T = threats
a = harvesting, conversion or management
activities

PRIORITIZATION CRITERIA

The scope of potential critical areas, as defined above, is too broad to efficiently target sites for conservation. Further criteria are needed to prioritize areas by relative need for action. For example, endangered species habitat that is currently in the development permit process should logically receive a higher priority than similar areas under less immediate or damaging threats.

Site prioritization will be achieved by:

- 1) ranking the resource value of each threatened hardwood area under consideration;
- 2) ranking the importance of the perceived threat(s); and
- 3) combining threat and resource value rankings to derive final site priority rankings.

While initial identification of broad critical areas may occur at statewide and regional levels, prioritization of these sites will likely occur at more local levels. To aid in the prioritization process, two other resource categories will be considered in addition to the three primary resource attribute criteria used to identify critical hardwood resources. These additional categories are: (1) range industry value; and (2) resources of particular local interest.

Traditionally, livestock production has been the dominant renewable resource use on California's hardwood lands, and the range industry has been a vital force in sustaining vast areas of hardwood lands in open space. Retention of a viable range industry provides greater opportunities for maintaining the level

of open space required by many wildlife populations. The viability of the livestock industry depends, among other things, upon maintaining a flexible range of management options for operators while ensuring sound conservation practices.

Local interest in hardwoods reaches from individual character trees in urban settings to extensive areas of rural open space. Concern over change in the hardwood landscape often originates from local individuals or groups. This concern may be driven by a variety of factors including aesthetics, symbolism, and recreation. Moreover, most attempts to initiate conservation measures must involve both landowners and local government since these groups generally have the most discretion over hardwood land use (Doak and others 1989). Hardwood-related resources of particular local interest should be incorporated into the broader state-wide goals to ensure overall program support and success.

ISSUES AND ASSUMPTIONS

Several issues arise when considering criteria for defining and prioritizing 'critical' resources:

- What level of information should be used to identify and rank critical areas? What is the relative availability of information? Should criteria vary from local to regional and statewide perspectives based on information type and availability?
- Should protection efforts be focused on only the most viable areas, or should restoration potential be considered as well? In other words, should only the best be preserved, or should areas in poor condition be restored to their full biological potential?
- How do size and biogeographic factors affect identification and ranking? When does a parcel become too small to be a viable conservation target? How does adjacency of different ownerships and land uses affect viability?
- Should off-site mitigation be considered in the ranking process? That is, should preservation of areas under relatively low threat of destruction be considered as mitigation for the inevitable loss of ecologically similar sites?
- How does 'do-ability' factor into the identification and ranking of critical sites? That is, given the socio-economic environment affecting a given parcel, is it realistic to assume that desirable resource attributes can actually be preserved?

The system developed here is designed to be flexible in terms of the type of information used to describe resource characteristics. Broad statewide information can be used in initial assessments, but more refined data can be utilized at focused site-specific levels. Moreover, the nature of the scoring system ensures that lack of information at any level will not

impede the evaluation process. The system is also designed so that additional criteria can be added, under the appropriate resource heading, without upsetting the overall process.

In general, the focus of conservation efforts under this system is on sites that are ecologically viable. Opportunities do exist, however, for the inclusion of hardwood sites in need of restoration. While restoration of degraded sites is not a major focus of this system, it is considered when evaluating regeneration potential and the reversibility of the effects of various land use activities.

Biogeographic factors and individual parcel size are important factors in ranking critical sites. It is extremely difficult, however, to provide meaningful quantitative guidelines for size and spatial relationships as these are likely to vary considerably with the nature of the resource in question. For example, the preservation of a one acre lot may be critical to an endangered species, but the fate of a 40 acre parcel may have relatively little effect on soil and water quality. For these reasons, size and biogeographic factors are included only in general qualitative considerations.

The concept of off-site mitigation is not incorporated into this particular system. More likely, the process itself will be used in off-site mitigation efforts to identify certain types of resources. While the relative probability of conservation success, or 'do-ability,' is a critical question in directing resource conservation efforts, it is not incorporated in the system, but should be considered later when defining criteria for implementation.

THE CHRIP SYSTEM

The Critical Hardwood Resource Identification and Prioritization (CHRIIP) System outlined here and presented in table 1, combines the criteria described above for defining, identifying and prioritizing critical hardwood areas. While each of the five resource attributes (hardwood stand characteristics, water and soil, wildlife habitat, range industry, and local resources) receive equal weight in the prioritization process, only the first three are considered in the initial identification of critical sites. Each attribute is represented by one or more categories (e.g., species of special concern and habitat diversity) which are rated individually within each attribute. If information is not available for one category, it can be by-passed without impeding the evaluation process. Likewise, additional categories can be added under the primary attributes as more information becomes available.

The extent and distribution of California's hardwood species varies considerably. Blue oak has the most extensive range and also occupies the greatest area. The blue oak type covers about 2.9 million acres, or almost 40 percent of the 7.4 million acres of hardwood woodland in the state. Engelmann oak, on the other hand, has a very limited range, occurring only in southern

California and Baja California on about 39,000 acres (Bolsinger 1988). Valley oak has a fairly extensive range, but its actual distribution is quite limited. Adequate regeneration and recruitment has been a concern in several hardwood species, particularly valley oak, blue oak and Engelmann oak. Hardwood stand characteristics are rated here according to the status of existing or potential regeneration and recruitment, presence of scarce species or types, and relative significance of sites to the overall extent of certain species.

The maintenance of water quality and soil productivity are constant concerns in land management. Land use activities that typically occur on hardwood lands—such as residential and commercial development, agricultural conversion, wood harvesting, and livestock grazing—all have the potential to adversely affect both water quality and soil productivity. Soil and water characteristics are rated here according to regional watershed values, erosion hazard ratings, and proximity to various stream classes.

Wildlife habitat characteristics are rated according to the status of species of critical concern, importance as habitat for migratory deer, and overall habitat diversity. Hardwoods support more wildlife species than any other habitat type in California. The broad array of wildlife species found in hardwood habitats depend upon the extensive diversity of vegetative composition and structural characteristic of hardwood types. Broad habitat management goals, then, focus on the maintenance of an array of habitat components related to compositional and structural diversity. The Interim Wildlife/Hardwood Management Guidelines of the California Department of Fish and Game (1989) emphasize the importance of minimizing drastic changes in hardwood canopy cover and in maintaining overall structural diversity.

Rating range industry values can be problematic, and is best accomplished at the local level by those familiar with local industry practices. Groups of resource professionals should be formed at the local level to rate critical hardwood areas according to their value to the range industry. Criteria is likely to vary from area to area but may include location, size, topography, accessibility, proximity to other forage, irrigation, and distance from sources of conflict.

Local resource characteristics can only be evaluated by local interest groups, established in more focused phases of the prioritization process and using self-defined criteria. These criteria may include contribution to open space, historical significance, scenic beauty and other local amenity values.

The immediacy, intensity, and potential effect of perceived threats to hardwood-related resource values may vary considerably. Areas that are currently involved in the development permit process, for example, are more immediately threatened than similar areas that, given their demographic and legal environment, are likely to be developed within five years. The potential effect of certain activities, such as over-grazing, may be reversible upon cessation whereas the impact of other activities, such as commercial development, are essentially permanent. Potential and existing threats affecting a site are rated based on the relative immediacy of threatening activities, the expected permanence of potential effects, and perceived extent of the

effects on hardwood-related resources within and beyond the immediate area of concern.

SUMMARY

The CHRIP system for identifying and prioritizing critical hardwood areas provides basic guidelines for focusing conservation incentive programs on significant hardwood resources that may be lost under overwhelming socio-economic pressure. The flexibility designed into this method allows the incorporation of multiple levels of information from various sources and provides opportunities for adding criteria as more information becomes available. Given this flexibility, the basic structure can be used to identify broad areas at statewide and regional levels, and specific sites at local levels. This flexibility, however, also presents an inherent level of ambiguity in terms of the exact nature of criteria to be utilized. For this reason, the guidelines presented here should be viewed as a framework to be filled in as circumstances allow rather than a rigid, airtight system.

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REFERENCES

- Bolsinger, Charles L. 1988. The hardwoods of California's timberlands, woodlands, and savannas. USDA-Forest Service, PNW-RB-148. 148 p.
- California Department of Fish and Game. 1989. Interim wildlife/hardwood management guidelines. January 6, 1989. Sacramento: California Department of Fish and Game.
- Doak, Sam C.; Green, Kass; Fairfax, Sally K.; Johnson, Sharon. 1988. The legal environment for hardwood lands in California. Oakland: Hammon, Jensen, Wallen and Associates. 123 p.
- Margules, C.; M.B. Usher. 1981. Criteria used in assessing wildlife conservation potential: a review. *Biological Conservation* 21: 79-109.
- Smith, Paul G.R.; Theberge, John B. 1986. A review of criteria for evaluating natural areas. *Environmental Management* 10(6): 715-734.

Table 1: Critical Hardwood Identification and Prioritization System

Use the following five step key to identify critical areas (I) and prioritize them by relative need for conservation action (II, III, IV).

-I-

Is: (1) the extent and distribution of hardwood species; (2) water and soil quality stability; or (3) wildlife habitat diversity threatened by: (1) commercial harvesting of hardwoods; (2) conversion to intensive agricultural use or residential or commercial development; or (3) other land management activities?

NO Not a critical hardwood resource

YES Critical hardwood resource. Continue to II.

-II-

Evaluate each of the following five resource categories. Ratings are normalized within each category and may range from 0 to 100. If the status of a particular category is unknown it will be represented by a "U" and will not be considered in the ranking process.³

A. Hardwood Resource Value Point Allocation

Condition	Points
<i>—hardwood regeneration and recruitment—</i>	
status unknown	U
no hardwoods present	0
poor or inadequate regeneration	1
fair or potentially good regeneration	3
good regeneration and recruitment	5
<i>—presence of particular oak species or types—</i>	
status unknown	U
no hardwoods present	0
hardwoods present	1
blue oak present	3
valley oak present	4
Engelmann oak present	5
<i>—extent of species range—</i>	
status unknown	U
no hardwoods present	0
hardwoods present	1
hardwood species on the extreme of range	3
Engelmann oak or valley oak on the extreme of range	5
Total points	—
<u>Hardwood Resource rating</u> (total points / maximum possible points * 100 for those categories not answered with a "U")	

³Just as some categories may be bypassed in this process, others may be added under the appropriate resource heading.

B. Soil and Water Resource Value Point Allocation

Condition	Points
<i>—regional watershed value—</i>	
status unknown	U
below average regional watershed value	0
moderate regional watershed value	1
high regional watershed value	3
very high regional watershed value	5
<i>—erosion hazard rating—</i>	
status unknown	U
75% of site dominated by low erosion hazard	0
75% of site dominated by medium erosion hazard	1
75% of site dominated by high erosion hazard	3
75% of site dominated by extreme erosion hazard	5
<i>—proximity to stream classes—</i>	
status unknown	U
not within 500 feet of Class I or II stream	0
within 500 feet of Class I or II stream	1
bisected by or adjacent to Class II stream	3
bisected by or adjacent to Class I stream	5
Total points	—

Soil and Water-Resource rating (total points / maximum possible points * 100 for those categories not answered with a "U")

C. Wildlife Resource Value Point Allocation

Condition	Points
<i>—species of special concern—</i>	
status unknown	U
unlikely habitat for species of special concern	0
potential habitat for species of special concern	1
species of special concern present	3
threatened or endangered species present	5
<i>—migratory deer—</i>	
status unknown	U
not migratory deer habitat	0
migratory deer corridor	3
fawning beds	5
<i>—habitat diversity—</i>	
status unknown	U
low habitat diversity	1
medium habitat diversity	3
high habitat diversity	5
<i>—riparian habitat status—</i>	
status unknown	U
not supporting or adjacent to hardwood riparian area	0
adjacent to hardwood riparian area	1
contains or is potential hardwood riparian area	3
over 50% of site hardwood riparian area	5
Total points	—

Wildlife Resource rating (total points / maximum possible points * 100 for those categories not answered with a "U")

D. Range Industry Resource Value Rating

— <i>AUM value</i> —	
status unknown	U
no value to range industry	0
low value to range industry	1
medium value to range industry	3
high value to range industry	5

Total points _____

Range Resource rating (total points / maximum possible points * 100 for those categories not answered with a "U") _____

E. Local Resource Value Rating

— <i>local values</i> —	
status unknown	U
no local value	0
low local value	1
medium local value	3
high local value	5

Total points _____

Local Resource rating (total points / maximum possible points * 100 for those categories not answered with a "U") _____

- III -

Evaluate the status of threats affecting or perceived to threaten hardwood resources. Ratings are normalized within each category and may range from 0 to 100. If the status of the threat is unknown it will be represented by a "U" and the site will be considered NOT critical.

Threatening Activity Point Allocation

Condition	Points
— <i>immediacy</i> —	
status unknown	U
no foreseen threats	0
likely within 5 years given socio-political environment	1
likely within 1 year given socio-political environment	3
activity proposed or application filed	4
activity in process	5

— <i>permanence</i> —	
status unknown	U
no foreseen negative effects	0
effects of activity reversible following cessation	1
effects reversible only with restoration effort	3
effects essentially permanent	5

— <i>potential extent</i> —	
status unknown	U
no foreseen negative effects	0
effects limited to immediate area	1
effects likely to extend to adjacent areas	3
effects likely to extend more than one mile beyond site	5

Total points _____

Threatening Activity rating (total points / maximum possible points * 100 for those categories not answered with a "U") _____

- IV -

Compute individual scores by multiplying the threatening activity rating by resource ratings only where indicated.

A. Is the extent and/or distribution of hardwood species threatened?
Yes — hardwood stand rating * threat rating = **Score-A** _____
No **Score-A** = 0
Rating = 'U' **Score-A** = 'U'

B. Are water and soil quality threatened?
Yes water & soil rating * threat rating = **Score-B** _____
No **Score-B** = 0
Rating = 'U' **Score-B** = 'U'

C. Is wildlife habitat diversity threatened?
Yes wildlife habitat rating * threat rating = **Score-C** _____
No **Score-C** = 0
Rating = 'U' **Score-C** = 'U'

D. Are range industry values threatened?
Yes range industry value rating * threat rating = **Score-D** _____
No **Score-D** = 0
Rating = 'U' **Score-D** = 'U'

E. Are resources of local importance threatened?
Yes local resource value rating * threat rating = **Score-E** _____
No **Score-E** = 0
Rating = 'U' **Score-E** = 'U'

- V -

Compute the normalized site ranking by totaling values for all five scores (Score A - E) that do not equal 'U' and divide by the total number summed (0 - 5). That is:

$$\text{Site Rank} = [(\Sigma \text{ Score (A-E)}) / N]$$

Where N = number of scores not = 'U'