

Monterey County

Voluntary Oak Woodland Stewardship Guidelines



Monterey County

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Monterey County Voluntary Oak Woodland Stewardship Guidelines

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Executive Summary

This document is designed to promote the voluntary long-term conservation of Monterey County's oak woodlands. It provides information on the cultural, economic and ecological values of Monterey County's oak woodlands and encourages their conservation through voluntary stewardship, habitat protection, education, and outreach.

1. Conservation Opportunity

The California Oak Woodlands Conservation Program (OWCP) is a voluntary program implemented by the State Wildlife Conservation Board (WCB) designed to conserve the integrity and diversity of oak woodlands across California's working landscapes through incentives and education. Specifically, the WCB funds projects conducted by landowners, public agencies and nonprofit organizations to conserve and restore oak woodlands, educate county residents about the values of oaks, and provide landowners with assistance in voluntary oak conservation.

To participate in the OWCP, each county in which the project occurs must first develop and adopt by resolution by the board of supervisors an Oak Woodlands Management Plan to promote oak woodland conservation and education. When adopted by a resolution by the Monterey County Board of Supervisors, the *Voluntary Oak Woodland Stewardship Guidelines* is intended to serve as to the County's Oak Woodlands Management Plan so that the citizens of Monterey County can participate in the OWCP.

2. Status of Oak Woodlands in Monterey County

Monterey County supports 11 species of oak trees and an estimated 538,000 acres of oak woodlands which span the county. Coast live oak woodlands and tanoak woodlands dominate the coastal watersheds, while blue oak woodlands cover a broad expanse of hills and valleys that are sheltered from the coast. Patches of valley oak woodlands line reaches of Monterey County's rivers, and also dot rounded mountain peaks.

Oaks and oak woodlands are threatened by a variety of factors including: 1) conversion of oak woodlands for other uses, 2) fragmentation and isolation, 3) lack of recruitment necessary to maintain the stands, 4) sudden oak death, a new disease that causes rapid oak mortality, 5) woodcutting for firewood or other uses, and 6) climate change, which threatens to reduce the availability of habitat for oaks within Monterey County.

3. Values of Oak Woodlands to Community

Oak woodlands play an important role in Monterey County communities. They provide valuable rangelands essential to Monterey County's ranching operations, which produced \$20 million in income in 2006. Through their scenic qualities, oaks increase quality of life as well as real estate values.

4. Oak Woodland Natural Resource Values

Oak woodlands have exceptional natural resource value and provide a host of ecosystem services. Much of Monterey County's high level of biodiversity (i.e., number of species) is due to the various oak woodlands, which provide year-round habitat for native species. Oak woodlands are complex ecosystems that provide an array of additional benefits and services,

including: 1) protecting water quality and quantity by filtering runoff during winter rains and increasing infiltration and ground water storage, 2) enhancing soil quality by preventing erosion and increasing soil productivity, and 3) sequestering carbon—a leading greenhouse gas contributing to climate change. Changes in the historic natural fire frequency and unmanaged vegetation areas can also contribute to the loss of oak woodlands and associated habitat and ecosystem functions.

5. Impacts of Oak Woodland Loss

Given the benefits of oaks and oak woodlands for Monterey County's communities and natural resources, oak woodland conversion, fragmentation, and degradation can impact:

- important wildlife habitat and native biodiversity
- rangelands essential for livestock grazing and the local economy
- soil, water, and air resources, including greenhouse gases
- scenery, real estate values, and quality of life.

Planning decisions for oak woodlands should take into account these potential effects on oak woodlands.

6. Participation in the California Oak Woodland Conservation Program

In recognition of the social, economic, agricultural, and biological benefits of conserving oak woodlands, Monterey County residents are encouraged to participate in the California Oak Woodland Conservation Program (OWCP)—a voluntary program designed to protect and enhance oak woodland resources by providing grants in support of:

1. Easements: Grants to purchase oak woodland conservation easements
2. Restoration: Grants to fund restoration and enhancement of oak woodlands
3. Long-Term Landowner Agreements: Grants to fund long-term leases or other landowner agreements such as cost-sharing incentive payments that promote oak woodland conservation
4. Education, Outreach, and Technical Assistance: Grants to fund public education, outreach and technical assistance projects that promote oak woodland conservation

The *Voluntary Oak Woodland Stewardship Guidelines* provides criteria for education and conservation projects that Monterey County will use to certify that proposals to the OWCP are consistent with the guidelines. These criteria mirror those established by the Wildlife Conservation Board for the OWCP.

7. Education and Outreach for Oak Woodland Conservation

Oak woodland conservation in Monterey County can be promoted by education and outreach programs that provide information about the values of oak woodlands and assist landowners seeking to conserve and restore oak woodlands on their properties. This document outlines aspects of outreach and education programs designed to accomplish these goals.

8. Oak Woodland Stewardship Guidelines Update

As new research increases understanding of aspects of oak woodlands necessary to promote their conservation, this document will be updated periodically to incorporate new information that would influence the guidelines.

Section 1: Conservation Opportunity

Enacted in 2001, the California Oak Woodlands Conservation Act (OWCA) established a bond fund and mandated the State Wildlife Conservation Board (WCB) to implement a voluntary grant program to fund oak woodland conservation. Developed as that program, the State Oak Woodlands Conservation Program (OWCP) is a voluntary program designed to conserve the integrity and diversity of oak woodlands across California's working landscapes through incentives and education. It enables landowners, public agencies and nonprofit organizations to seek grant funding for voluntary projects designed to conserve and restore oak woodlands, educate county residents about the values of oaks, and provide landowners with assistance in voluntary oak conservation.

To be eligible to participate in the OWCP, each county in which a project occurs must develop an Oak Woodlands Management Plan adopted by a resolution by the County Board of Supervisors. The OWCA requires the plan to include a description of all native oak species location within the county's jurisdiction. Such resolutions, which have been adopted by many California counties, do not establish any policies, ordinances, or other regulations.



Native wildflowers within a Monterey County Oak Woodland.

The *Voluntary Oak Woodland Stewardship Guidelines* were prepared to promote the appreciation and conservation of Monterey County's oak woodlands, and to encourage the voluntary stewardship of oak woodlands by farmers, ranchers, developers, as well as planners, conservationists, educators and others interested in oak woodland conservation. The adoption of these guidelines by a resolution of the County Board of Supervisors will enable partnerships of landowners and qualified non-profits, local governments and resource districts, to conserve oak woodlands through projects eligible for grant funding through the OWCP. The California Oak Woodlands Conservation Program provides funding for voluntary projects designed to

conserve and restore oak woodlands, educate county residents about the values of oaks, and provide landowners with assistance in voluntary long-term oak conservation. It offers pathways and incentives to help address oak woodland conservation at the county-wide level and to help support farming, ranching and grazing operations on lands that support oak woodlands.

Conservation of oak woodlands requires an understanding of the relevant science including the structure and function of the ecosystems. *Oak Woodlands in Monterey County* (Stromberg 2009) provides background information, a summary of current scientific studies regarding oak woodlands of California and Monterey County, and the references used to inform development of these guidelines.

Section 2: Status of Oak Woodlands in Monterey County

Oak Woodlands are a major component of Monterey County’s rural landscape. As of 2000, oak woodlands covered more than 22 percent (537,600 acres) of the total land area of the County and is one of the top three largest acreage of all California counties. Although much of Monterey County’s oak woodlands are on federal lands, including the Los Padres National Forest and in Fort Hunter Liggett, extensive oak woodlands occur on privately owned lands, which are primarily used as rangeland (1,038,000 acres). To conserve this valuable natural heritage and resource, Monterey County residents can cooperate to conserve and manage oak woodlands and protect their natural, cultural, and economic values including the ranches, scenic landscapes, ecosystem services, and important wildlife habitats they provide.

2.1 Oak Species in Monterey County

Monterey County supports 10 species of “true oaks”: plant species that are included in the genus *Quercus*. It also supports tanoaks, which are closely related to true oaks, but are not a true oak and are not included in this program (Table 1).

Table 1: Species of oaks that occur within Monterey County, noting whether they are evergreen or deciduous.

Common Name	Scientific Name	Leaves
Dominant oak species in Monterey County:		
Coast Live Oak	<i>Quercus agrifolia</i>	Evergreen
Blue Oak	<i>Quercus douglasii</i>	Deciduous
Valley oak	<i>Quercus lobata</i>	Deciduous
Less common or scattered oak species:		
Oracle Oak	<i>Quercus parvula</i>	Evergreen
Canyon Live Oak	<i>Quercus chrysolepis</i>	Evergreen
Leather Oak	<i>Quercus durata</i>	Evergreen
Oregon Oak	<i>Quercus garryana</i>	Deciduous
Black Oak	<i>Quercus kelloggii</i>	Deciduous
Interior Live Oak	<i>Quercus wislizenii</i>	Evergreen
Scrub Oak	<i>Quercus berberidifolia</i>	Evergreen

2.2 Oak Woodlands in Monterey County

Four of the oak species occur as the dominant tree within a vegetation type that has been named after them. Table 2 identifies their approximate current acreage while Figure 1 illustrates their distribution in Monterey County. There are no known available estimates of their historical acreage. The following sections describe each of the four common oak woodlands and their threats. Representative photographs of select oak woodlands are provided in Figure 2.

Table 2: Oak Woodland communities within Monterey County, noting their estimated acreage, percent of the total Monterey County oak woodland acreage, and percent of the total acreage of Monterey County (CalVeg 2000).

Oak Woodland Type	Acreage in Monterey County	Percent of Total Oak Woodland Acres in Monterey County	Percent of Monterey County Acreage
Coast Live Oak Woodland	252,500	47%	10%
Blue Oak Woodland	249,200	46%	10%
Valley oak Woodland	6,600	1%	0%
Mixed Black Oak Woodlands	6,000	1%	0%
Total	537,600	100%	22%

2.2.1 Coast Live Oak Woodlands

Dominated by the evergreen coast live oak, this woodland is widespread in places with moderate climates and thrives in Monterey’s cool, foggy coastal areas. In moist areas, associated species are pacific madrone, California bay, poison oak, tanoak, and canyon live oak. In dryer areas, coast live oak woodlands include valley oak, blue oak, and foothill pine.

Coast live oaks grow rapidly and produce many seedlings that rapidly become saplings and large trees. A large mature coast live oak may be 200 years old. They are susceptible to a uncontrolled plant disease that has been aptly named “sudden oak death” (SOD; Section 2.3.3). The loss of these large, majestic oaks would dramatically change the look of the Monterey County landscape.

2.2.2 Blue Oak Woodlands

Blue oak is often the dominant tree in the woodlands where they occur, and can be the only tree in large areas of these woodlands. Patches of blue oak can extend from a few trees to several miles in extent and often include very old trees (300-800 years old). Blue oak woodlands are generally associated with steep, hot, dry, often west-facing or south-facing hillsides. The understory vegetation is comprised of wildflowers, non-native annual grassland, and patches of native perennial grasses such as needle grass, California melic, and June grass (Figure 1b). Blue oaks grow slowly and even knee-high saplings can be 50 years old. In Monterey County, blue oak woodlands with enough saplings currently thought necessary to replace the mature trees and maintain the stands through time are uncommon.

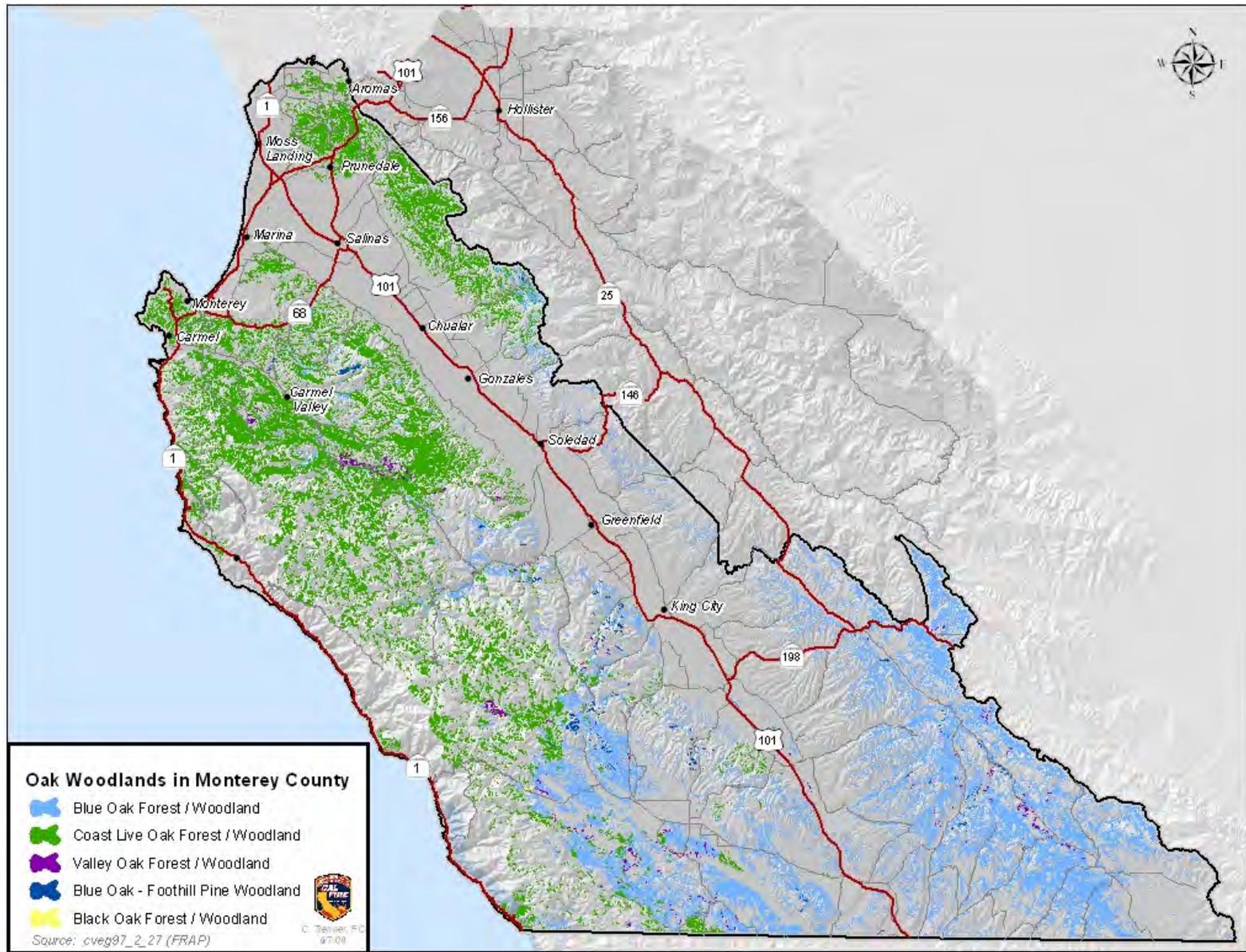


Figure 1: Map of the oak woodlands in Monterey County (cveg 97_2_27_(FRAP)).

a)



b)



c)



d)



Figure 2: Monterey County oak woodlands, showing: a) an expanse of blue oak and valley oak woodlands atop the rounded hills in the Sierra de Salinas Range, b) a stand of blue oaks with an understory of native perennial needle grasses, c) two mature valley oaks on a river bench above the Arroyo Seco, and d) coast live oak woodland on ancient dunes in Fort Ord.

2.2.3 Valley Oak Woodlands

Valley oaks occur in small pockets, relatively undisturbed valley floor habitat, and also high on ridges above the valleys. They typically have a grassy understory and vary from open savannas to forest-like stands with partially closed canopies.

Valley oaks, which can live as long as 800 years and reach over 100 feet in height, are slow growing. Like the blue oaks, valley oaks are rarely found in populations featuring enough saplings to replace the mature trees. There are no detailed accounts of the current or past extent of the valley oak woodland in Monterey County, though exemplary stands occur near Fort Hunter Liggett and in Carmel Valley.

2.3 Threats to Oak Woodlands

Oak species and oak woodland communities in Monterey County are threatened by a variety of factors.

2.3.1 Habitat Conversion

Oak woodlands are threatened by conversion of the land for other uses, including development and agriculture. Though there are no data available for the amount of oak woodland conversion that has occurred to date in Monterey County, more than 50% of the original oak woodlands (10-12 million acres) has been removed in California. A better understanding of the current status and trends in conversion of oak woodlands in Monterey County could help focus conservation work.

Disruption of the natural fire regime may be contributing to loss of oak woodland habitat, by facilitating succession of oak woodlands to other types of vegetation. More information is needed to understand this trend, as well as other factors that threaten to convert oak woodlands including: groundwater pumping, the invasion and spread of non-native plant species, compaction of soil by humans and animals, and loss of riparian corridors.

2.3.2 Habitat Fragmentation and Isolation

As human development continues in Monterey County, intact oak woodlands and habitat will become more fragmented and degraded. Smaller oak woodlands that are isolated from other habitats are less able to support certain plants and animal species, which can become extirpated (i.e. locally extinct). For example, many birds and mammals need oak woodland and will not venture out to open areas, or even cross open areas. Thus some oak woodlands become critical corridors for dispersal of young and movement of wide-ranging adults. As an ecosystem is simplified (i.e. has fewer species), it becomes weakened and less resilient.

The system further erodes as individual trees become isolated. Oak trees can only cross-pollinate if they are within approximately 1,000 yards of another oak. Declines in acorn production amongst isolated oaks not only reduce oak establishment, thus potentially reducing the oak population, but also decrease food availability for the numerous animal species that forage on acorns.

2.3.3 Low Recruitment

Throughout much of Monterey County, populations of certain oak species are not regenerating: that is, young trees are not replacing older trees that are removed or die of natural causes. Oak species that are particularly impacted by the lack of regeneration include the valley oak and blue oak, though coast live oak and California black oak recruitment are also low in some areas.

The factors affecting regeneration are varied and complex, and may include fire suppression, competition from non-native annual grasses, herbivory by wildlife and livestock, and climate, among others.

Where oak regeneration is limited, it can be facilitated by installing shelters to protect seedlings and saplings from excessive herbivory, controlling non-native plant species, and adjusting the intensity and seasonality of livestock grazing. A common concern in all of California's oak woodlands is reproduction of the oaks, particularly the valley oak and blue oak. Further science-based information and long-term monitoring is needed to understand the causes and consequences of low oak recruitment.

2.3.4 Sudden Oak Death

In 1995, scientists discovered a plant pathogen, *Phytophthora ramorum*, which causes rapid death of infected oaks and was thus named sudden oak death (SOD). Dispersed through water and able to persist for years in the soil, the disease spores are readily moved by wildlife, humans, and other vectors. Presently, there is no treatment to stop its spread or cure infected trees.

In Monterey County, sudden oak death (SOD) has caused extensive mortality in coast live oaks and tanoaks in coastal areas. Drier conditions within the interior of the county may be slowing spread of the disease. However, this disease is new and its ecology and potential impacts remain poorly understood.

2.3.5 Woodcutting/Energy

Oaks are desirable for firewood, and as prices for fossil fuels rise, oak woodlands may face increased use for fuel wood. Because oak recruitment is low, even selective harvest can reduce populations of oaks and alter the structure of oak woodlands.

2.3.6 Climate Change

California's endemic oak species are sensitive to climate and are distributed in relatively narrow, species-specific 'climatic envelopes'—unique combinations of temperature and precipitation. As California's climate becomes warmer and possibly drier, as predicted by current climate change models, oak distributions are anticipated to shift. In Monterey County, valley oak and blue oak ranges are expected to contract overall, though the scale, specific location, and magnitude of these shifts cannot be predicted with certainty.

Section 3: Values of Oak Woodlands to Community

As throughout much of California, oak woodlands play an important role in Monterey County communities. In addition to providing wonderful recreational opportunities, oak woodlands on private land also benefit landowners and the broader community.

3.1 Livestock Grazing

In Monterey County, oak woodlands through much of the Santa Lucia, Sierra de Salinas and Gabilan mountain ranges are predominantly used to graze cattle. Oak woodlands are valuable to ranching operations because the amount and quality of forage tend to be higher than in rangelands without oaks. Oak trees act as water pumps, bringing up deep water and making it available to forage plants. These patches of green around oak trees increase soil fertility under oak canopy and produce better forage. Countywide, ranching in oak woodlands produced an income of over \$20 million in 2006.

Well-managed ranches provide many benefits including wildlife habitat, open-space, fire control, weed management, recreational opportunities, and watersheds that produce abundant clean water. Ranching is a vital and integral part of the economy and culture of Monterey County, and oak woodlands are an essential part of the cattle industry.

3.2 Real Estate and Scenery

Whether in woodlands or as majestic individual trees, oaks are highly regarded and valued for their scenic qualities. Oak woodlands can increase the quality of life for residents and contribute to a community's economic well-being. In Monterey County, "oak" is a frequent component of street, business and place names—a testament to their important role Monterey County's landscape and communities.

Oak woodlands and oak trees can directly enhance the value of real estate. In one study, land with 40 trees per acre appraised at 22-28% more than bare lots, while homes having mature oak trees typically sell for up to 30% more than homes without them. For example, individual oak trees of large size or landmark status within a community can have exceptional value: \$18,000 - \$50,000 in 1999. In an urban setting, a single mature tree provides measurable economic benefit each year related to storm water runoff control, increased groundwater infiltration, temperature moderation, air pollution reduction and carbon sequestration.

Section 4: Oak Woodland Natural Resource Values

Oak woodlands have exceptional natural resource value and provide a host of ecosystem services.

4.1 Wildlife Habitat and Species Diversity

Monterey County is unusual in that it harbors more native plant and animal species than comparably sized areas elsewhere in the United States. Much of this biodiversity lives in and around the oak woodlands, where the mild Mediterranean climate combines with the abundant

acorn crop to create suitable year-round habitat for many animal species. Over 1,600 plant and animal species live in and among Monterey County's oaks (Table 3). At least fifteen of these species are rare.

Many readily recognized and appreciated wildlife, including deer, band-tailed pigeons, and squirrels, depend on acorns and oaks for much of their food. Most of the small mammals including mice and woodrats also depend on acorns and, in turn, provide abundant food for predators like bobcat, mountain lions, hawks, owls and eagles. As a result, oak woodlands also have the greatest wildlife species abundance of any terrestrial habitat in California.

This diversity of animals can have surprising benefits to people. For example, in California the western fence lizard is the preferred host in the early life of the tick that carries Lyme disease. A protein in the lizard's blood kills the microbe that causes Lyme disease and thus reduces the probability that a tick bite in Monterey County will transmit the disease to humans. This may explain why the risk of contracting Lyme disease in Monterey County is small while the disease is epidemic in some northeastern states where lizards are rare.

Table 3. Approximate number of species of various life forms in Monterey County Oak Woodlands (Stromberg 2009).

Life Form	Estimated Number of Species
Vascular Plants	600
Mosses, Liverworts, and Lichens	175
Invertebrates (insects, etc.)	580
Birds	200
Mammals	50
Amphibians and Reptiles	30
Total	1,635

4.2 Carbon Sequestration

Carbon dioxide is a greenhouse gas that is increasing in the Earth's atmosphere as a result of human activities. Through photosynthesis, oaks convert carbon dioxide into leaves, roots, and wood, which sequesters the carbon dioxide and keeps it from entering the atmosphere.

In Monterey County, oak woodlands sequester an estimated 5,300,000 metric tons of carbon dioxide each year. Oak woodlands may therefore have new value in the emerging market of carbon credits. Land owners with oak woodlands may be able to sell carbon credits to those wishing to purchase credits to offset the production of carbon dioxide elsewhere.

4.3 Additional Resource Values

Oak woodlands are complex ecosystems that provide an array of additional benefits and services. For example, oaks protect water quality and quantity by filtering and slowing runoff during winter rains and increasing infiltration and ground water storage. Oaks protect soil by decreasing erosion. They also improve soil quality by adding organic matter (e.g. leaves) and

releasing groundwater pumped from depth near the soil surface, where it enriches the surface soil and promotes plant growth. Compared to annual grasslands, the soil under oaks is less dense, has higher pH and greater concentrations of organic carbon, phosphorus, nitrogen and other soil nutrients.

Oak woodlands enhance our quality of life by providing open space, scenic landscapes, areas for recreation such as hiking, hunting, fishing, and nature photography; and providing habitat that supports hundreds of life forms, plants and wildlife in fascinating and complex natural communities.

Fire is a natural part of oak woodland life history. A change in the historic natural fire frequency and unmanaged conservation areas could be reasons that oak woodlands convert to other vegetation and habitat types. Fire suppression has led to the build-up of woody vegetation in the under story, increasing “ladder” fuels connecting ground vegetation to tree canopies. This has resulted in oak woodlands that are more susceptible to catastrophic crown-consuming fires where more frequent low-intensity fires could reduce fire fuel buildup. Severe fires can also have negative consequences to other ecosystem functions such as regeneration, erosion and impacts to water quality when fires are followed by severe rain events and sediment from burned slopes clog streams. Conservation-based, fire-wise, vegetation management in woodlands, as has been promoted by the local fire authorities and the Fire Safe Council, should be encouraged in areas of Monterey County at the wildland-urban interface. For example wildfire management methods such as “shaded fire breaks”, where instead of clear-cutting vegetation, trees can be thinned and limbed up from the ground to reduce wildfire hazards while preserving the tree canopy.

Section 5: Impacts of Oak Woodland Loss

Given the benefits of oaks and oak woodlands for Monterey County’s communities (Section 3) and natural resources (Section 4), oak woodland conversion, fragmentation, and degradation can impact:

- important wildlife habitat and native biodiversity
- rangelands essential for livestock grazing and the local economy
- soil, water, and air resources, including greenhouse gases
- scenery, real estate values, and quality of life.

Planning decisions for oak woodlands should take into account these potential effects on oak woodlands.

Section 6: Participation in the California Oak Woodland Conservation Program

Because of the social, economic, agricultural, and biological benefits of conserving oak woodlands, Monterey County residents are encouraged to participate in the California Oak Woodland Conservation Program (OWCP)—a voluntary program designed to protect and enhance oak woodland resources by providing grants in support of:

1. Easements: Grants to purchase oak woodland conservation easements

2. Restoration: Grants to fund restoration and enhancement of oak woodlands
3. Long-Term Landowner Agreements: Grants to fund long-term leases or other landowner agreements such as cost-sharing incentive payments that promote oak woodland conservation.
4. Education, Outreach, and Technical Assistance: Grants to fund public education, outreach and technical assistance projects that promote oak woodland conservation

The Act requires that 80% of funds be used for the purchase of conservation easements, restoration and long-term landowner agreements. Twenty percent of the funds can be used for public education, outreach and technical assistance projects. The Oak Woodlands Conservation program promotes the conservation of privately owned oak woodlands; however, the easement acquisition part of the program is not designed to accept applications directly from private landowners. Conservation easements must be held by entities authorized under California Civil Code section 815.3, which includes governmental entities or nonprofit land conservation organizations such a land trust.

Conservation easements are legal agreements, entered into voluntarily, between a landowner and a non-profit organization or government agency that limits certain uses of the land in order to protect specific conservation values. Each conservation easement is individually tailored to the site and is negotiated with the owner and private nonprofit organization or public agency that will hold and monitor the easement. The terms, allowed uses, maintenance, and specific conservation values to be protected will be determined in collaboration with the landowner, partner organizations and resource specialists, including State Fish and Game biologists, Federal Fish and Wildlife Service in order to protect conservation values in perpetuity.

Before the WCB can evaluate a project for funding under the OWCP, the city or county in which the project occurs must prepare an oak woodlands management plan, pursuant Section 1366 of the California Fish and Game Code. The Board of Supervisors of the County must adopt the plan by resolution.

After the *Voluntary Oak Woodland Stewardship Guidelines* are adopted by the Monterey County Board of Supervisors, grant proposals submitted to the Wildlife Conservation Board for funding under the OWCP must be certified by the County to be consistent with the criteria below. These criteria mirror those established by the Wildlife Conservation Board for the OWCP designed to encourage the long-term conservation of oak woodlands. To qualify for a grant, the applicant must certify that the proposed project is not required to satisfy a condition imposed upon the landowner by any lease, permit, or other entitlement issued by a public agency, including a mitigation under the California Environmental Quality Act. The OWCP application packet is available on the WCB website: www.wcb.ca.gov. See Exhibit B outlining the OWCP application process.

6.1 Criteria for Projects

6.1.1 Criteria for Easement Acquisition, Restoration or Long-Term Agreement Projects

To qualify for funding consideration for restoration, enhancement, purchase of an oak conservation easement, or long-term agreement, projects must meet one or more of the following criteria, must contain an appropriate management plan to assure project goals are maintained, and the oak stand that is the subject of the proposal must have greater than 10

percent canopy.

- The project is of sufficient size to promote biological integrity and provide superior wildlife values.
- The project area contains a diverse size-class structure of oak woodlands and/or a diversity of oak species that will promote the sustainability and perpetuation of oak woodlands.
- The property is adjacent to other protected areas or will contribute toward ease of wildlife movement across ownerships (wildlife corridors).
- The project contributes to regional and/or community goals, provides scenic open-space, protects historic or archeological values, or contains unique geologic features.
- The property is a working landscape. The landowners have implemented or agree to implement stewardship practices that recognize and incorporate the ecological requirements of oak woodlands and associated habitats, thus promoting economic and resource sustainability of the farming and ranching operation.
- The property removes or reduces the threat of habitat conversion from oak woodlands to some other use.
- The project has the potential to serve as a stewardship model for other landowners.

6.1.2 Criteria for Outreach and Education Projects and Technical Assistance Projects

To qualify for funding consideration for a public education and outreach and technical assistance proposal, the project must satisfy the following criteria:

- The project shall be designed to identify and communicate the social, economic, agricultural and biological benefits of conserving oak woodlands.
- The project shall be designed and targeted to reach the maximum number of local landowners that could benefit from public education and outreach efforts.
- The project shall be designed and implemented as a collective effort or partnership that, where appropriate, includes local entities such as: landowners, the Resource Conservation District, the California Fish and Game biologist, University of California Cooperative Extension (UCCE) Farm Advisor, representatives from farming or ranching organizations; California Department of Forestry and Fire Protection (Cal Fire) or local fire authority; and the county or city planning department.
- The project shall be designed to promote and encourage oak woodland conservation through voluntary approaches.
- The project shall provide sources of available financial and/or technical information to assist landowners conserve their oak woodlands.
- The project will identify measurable goals and objectives to evaluate the success of the project. For projects not completed within one year of the approval date, the proposal shall include specific interim deliverables or benchmarks and a timeline for completion.
- If requested by the WCB, project sponsors must be willing to make project information available online so that other project proponents may benefit from the education and outreach effort. Such information should not include private or proprietary information

about private landowners or their operations.

6.2 Voluntary Program

The conservation of oak woodlands in Monterey County is dependent on the voluntary actions of residents and landowners who value the scenic, ecological, and economic benefits of these unique trees and habitats. Landowner participation in the OWCP is entirely voluntary and neither the program nor this document outlining guidelines for participation has a regulatory component or role.

As part of a separate process, Monterey County will address the requirements of Senate Bill 1334 (Kuehl) passed by the California Legislature in 2004, which adds Section 21083.4 to the Public Resources Code related to oak woodland conversion. Section 21083.4 requires consideration of the conversion of oak woodlands as part of review under the California Environmental Quality Act (CEQA). Specifically, it requires that the County determine whether a project may result in a potentially significant effect on the environment by conversion of oak woodlands, as part of environmental review of projects under CEQA. If the County determines that a project may have a significant effect on oak woodlands, the County must require one or more specified measures to mitigate the effect of woodland conversion. As noted above, the Monterey County Voluntary Oak Woodland Conservation Guidelines are not part of this regulatory requirement.

Section 7: Education and Outreach for Oak Woodland Conservation

Conservation of oak woodlands within Monterey County can be promoted by education and outreach programs that provide information about the values of oak woodlands. The following are some specific objectives or actions for education and outreach programs that would accomplish this goal.

- Educate county landowners on the long-term economic benefits of maintaining and restoring oak woodlands.
- Refer to resources such as University of California Cooperative Extension practices regarding harvesting, which currently include: maintaining an average leaf canopy of at least 30%, retaining trees of all sizes and species at the site, maintaining old hollow trees for nesting, roosting, and feeding wildlife, piling brush to provide wildlife cover, and seeking professional advice before conducting harvesting. Hundreds of publications have been produced aimed at helping individual homeowners, ranching families and large agricultural operations to conserve and steward their oak woodlands, including conservation-based fire-wise vegetation management practices.
- Articulate the importance of landscape variables (size, shape, connectivity to other woodlands and important habitats, etc.) that support rich, sustainable wildlife populations associated with oak woodlands.
- Encourage landscape design and development that can enhance property values and retain intact oak woodlands
- Provide technical assistance to reduce impacts of construction practices, roads, hard surface run-off, and utilities on the long-term survivorship of oaks.

- Describe how homes can be clustered to help protect wildlife corridors and maintain more wildlife habitat.
- Assist private landowners with information on the values of using oaks in the urban landscapes and at the urban-wildland interface.
- Promote conservation-based, fire-wise, vegetation management in woodlands in consultation with fire control agencies and other resource specialists to avoid conversion to other vegetation and habitat types, reduced regeneration, and susceptibility to severe fires that can also have negative consequences to other ecosystem functions.
- Promote the important role of land management programs using low intensity fires to manage and maintain oak woodlands, particular on federal lands.
- Restore areas where oaks have been removed and/or are not regenerating, particularly for valley oak woodlands on deep, level soils.
- Promote voluntary tree planting programs that provide protection of oak seedlings from rodents, browsing by deer and domestic animals, and weeds, and incorporate long-term monitoring.

A second main goal of the education and outreach for oak woodlands is to assist landowners seeking to conserve and restore oak woodlands on their properties. The following are actions for specific outreach and education programs that would accomplish this goal.

- Identify programs available to assist landowners seeking to voluntarily protect and manage oak woodlands.
- Describe techniques to restore degraded oak woodlands, including tree planting programs or mechanisms to protect oak seedlings from herbivory by deer, rodents, and domestic animals, and from competition from non-native plants or other weeds.
- Identify state and federal cost share programs and grants for restoration projects.
- Describe planting guidelines for oak woodland restoration, which include planting the appropriate species of oak and using native plants in the understory. In general, the species of oak to be replaced should be the same species as was removed.
- Describe methods to control invasive, non-native weeds in oak woodlands, particularly along county road rights-of-way that link agricultural lands to oak woodlands and provide a corridor for weed movement.
- Promote control of invasive, non-native weeds in oak woodlands. This can be particularly effective along county rights-of-way on roads that go from agricultural lands where invasive weeds are largely controlled to sites along roads where the weeds are establishing pioneer populations.
- Study and educate how prescribed fire can be safely used as a management tool for invasive species and potentially to promote oak regeneration.
- Promote and encourage conservation-based, fire-wise, vegetation management in woodlands in consultation with fire control agencies and other resources specialists, in areas of Monterey County at the wildland-urban interface.
- Encourage County ranching and farming operations that support large stands of oak woodlands.
- Encourage continuation and initiation of Williamson Act contracts to maintain large

parcels in agricultural and grazing uses.

- Build partnerships between local government, the development community and non-profits for targeted and meaningful conservation efforts.
- Encourage conservation easements and other forms of land conservation action.
- Assess and track progress of voluntary conservation and stewardship programs.
- Study and document the rate of loss/gain of woodlands in Monterey County. Modern remote sensing could be used to assess the areas of various categories of oak woodlands. These need to be backed up with ground surveys. Consider repeated surveys, at perhaps 5-10 year intervals to provide the information on the certainty and urgency of the problem.

Section 8: Oak Woodland Stewardship Guidelines Update

Research and other studies will increase understanding of oak woodlands, including their ecology, value to the community, threats, and factors necessary to promote their conservation. Accordingly, this document should be periodically updated as needed to incorporate new information that would influence the guidelines. The RMA - Planning Department shall review the Guidelines every five years and present a status report to the Planning Commission every five years to determine if an update is warranted.

Conclusion

Since 80% of the state's oak hardwood rangelands are in private ownership, voluntary efforts by landowners can be the most effective conservation measures. Residents, landowners and decision makers can work together cooperatively to conserve and manage oak woodlands and protect their natural, scenic, cultural and economic, ecosystems and habitats values they provide. Education, outreach and encouraging conservation and promoting programs will serve to achieve the County's diverse and often mutual goals.

More science-based information about the relationships among oak regeneration, fire, wildlife, grazing practices, agricultural and other land uses, and any other factors affecting the oaks can help inform conservation and education programs.

EXHIBIT A: References and Resources for Additional Reading

- Adams, T. E. and W. H. Weitkamp. 1992. Gophers love oak- to death. *California Agriculture* 46:27-32.
- Allen-Diaz, B. H., R. B. Standiford, and R. D. Jackson. 2007. Oak woodlands and forests. Pages 313-338 in M. G. Barbour, T. Keeler-Wolf, and A. A. Schoenherr, editors. *Terrestrial Vegetation of California*. University of California Press, Berkeley, CA.
- Anderson, M. K. 2005. *Tending the Wild: Native American knowledge and the management of California's natural resources*. University of California Press, Berkeley.
- Anon. 1881. *History of Monterey County, California with illustrations descriptive of its scenery, farms, residences, public buildings, factories, hotels, business houses, schools, churches, and mines : with biographical sketches of prominent citizens*. Elliott & Moore, Publishers,, San Francisco, Calif.
- BAER. 2008. Basin/Indians Complex BAER Initial Assessment. Monterey District, Los Padres National Forest, USDA Forest Service, Monterey, CA.
- Barbour, M. G., T. Keeler-Wolf, and A. A. Schoenherr, editors. 2007. *Terrestrial Vegetation of California*. 3rd Edition edition. University of California Press, Berkeley, CA.
- Barrett, R. H. and M. White. 1999. *Guide for Designing Field Validation Studies of the California Wildlife Habitat Relationships System*. Technical Report, California Department of Fish and Game, Sacramento, CA.
- Bartolome, J. W., W. E. Frost, N. K. McDougald, and M. Connor. 2002. *California guidelines for residual dry matter management on coastal and foothill annual rangelands*. University of California Division of Agriculture and Natural Resources, Berkeley.
- Bolsinger, C. L. 1988. *The Hardwoods of California's Timberlands:Woodlands and Savannas*. Resource Bulletin PNW-RB-148 US Department of Agriculture, Forest Service Pacific Northwest Research Station, Portland, OR.
- Borza, E. N. 1987. Timber and Politics in the Ancient World: Macedon and the Greeks. *Proceedings of the American Philosophical Society* 131:32-52.
- Brown, R. W. and F. W. Davis. 1991. Historic mortality of valley oak in the Santa Ynez Valley, Santa Barbara County, CA. Pages 202-207 in R. B. Standiford, editor. *Proceedings of the Symposium on Oak Woodlands and Hardwood Rangeland Management*. USDA Forest Service General Technical Report PSW-126, Albany, CA.
- Caldwell, M. M., T. E. Dawson, and J. H. Richards. 1998. Hydraulic lift: Consequences of water efflux from the roots of plants. *Oecologia (Berlin)* 113:151-161.
- Callaway, R. M. 1990. Effects fo soil water distribution on the lateral root development of three species of California oaks *American Journal of Botany* 77:1469-1474.
- Callaway, R. M. and C. M. D'Antonio. 1991. Shrub facilitation of coast live oak establishment in central California. *Madrono* 38:158-169.
- Carmen, W. J. 2004. Noncooperative breeding in the California Scrub-Jay. *Studies in Avian Biology*.(28):1-100.
- Clark, D. T. 1991. *Monterey County Place Names*. Kestrel Press737, Carmel Valley, CA.
- Crous, Y., C. Evelyn, R. Larkin, H. Muller, and T. Perry. 2007. *Conserving Monterey County's Ranchland: Trends and Strategies*. MS. University of California, Santa Barbara, CA.
- Dahlgren, R. A., M. J. Singer, and X. Huang. 1997. Oak tree and grazing impacts on soil properties and nutrients in a California oak woodland. *Biogeochemistry (Dordrecht)* 39:45-64.
- Davis, F. W. 2000. *Santa Barbara County Oak Woodland Inventory and Monitoring Program: Pilot Mapping and Modeling Study*. University of California, Santa Barbara, Bren School of Environmental Science and Management, Santa Barbara, CA.
- DeGange, A. R., J. W. Fitzpatrick, J. N. Layne, and G. E. Woolfenden. 1989. Acorn Harvesting by Florida Scrub Jays. *Ecology* 70:348-356.

- Dutech, C., V. L. Sork, A. J. Irwin, P. E. Smouse, and F. W. Davis. 2005. Gene flow and fine-scale genetic structure in a wind-pollinated tree species *Quercus lobata* (Fagaceae). *American Journal of Botany* 92:252-261.
- EIA. 2008. History of Energy in the United States: 1635-2000. U. S. Department of Energy, Energy Information Administration. September 27 2008. <http://www.eia.doe.gov/emeu/aer/eh/frame.html>
- Farnham, D. S. 1995. A property owners guide to reducing the wildfire threat. University of California, Agriculture and Natural Resources.6 pp, <http://anrcatalog.ucdavis.edu/FireSafety/21539.aspx>
- Fisher, J. B., D. D. Baldocchi, L. Misson, T. E. Dawson, and A. H. Goldstein. 2007. What the towers don't see at night: nocturnal sap flow in trees and shrubs at two AmeriFlux sites in California. *Tree Physiology* 27:597-610.
- Frankel, S. J., J. T. Kliejunas, and K. M. Palmieri, editors. 2008. Proceedings of the sudden oak death third science symposium. Gen. Tech. Rep. PSW-GTR-214, Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, Albany, CA.
- Frankel, S. J., P. J. Shea, and M. I. Haverty, editors. 2005. Proceedings of the sudden oak death second science symposium: the state of our knowledge. General Technical Report PSW-GTR-196. Pacific Southwest Research Station, USDA, Forest Service, Albany, CA.
- FRAP. 2008. Forest and Range Assessment Program. California Department of Forestry and Fire Protection. Oct 1, 2008. <http://frap.cdf.ca.gov/>
- Frost, W. E., N. K. McDougald, and M. W. Demment. 1991. Blue oak canopy effect on seasonal forage production and quality. Symposium on Oak Woodlands and Hardwood Rangeland Management. USDA Forest Service General Technical Report PWS-126, Davis, CA.
- Furlich, D. S. 2008. Mediterranean SOS. *Nature Conservancy Magazine*.
- Gaman, T. 2008. Oaks 2040: Carbon Resources in California Oak Woodlands. California Oak Foundation. 12/17/2008. <http://www.californiaoaks.org/html/2040.html>
- Gaman, T. and J. Firman. 2006. Oaks 2040: The status and future of oaks in California. California Oak Foundation, 1212 Broadway, Oakland, CA.
- Geniella, M. 2006. *Press Democrat*. 2. <http://www1.pressdemocrat.com/apps/pbcs.dll/article?AID=/20060310/NEWS/603100305/1033/NEWS01>
- Gordon, D. R. and K. J. Rice. 1993. Competitive effects of grassland annuals on soil water and blue oak (*Quercus douglasii*) seedlings. *Ecology* 74:68-82.
- Griffin, J. R. 1971. Oak regeneration in the upper Carmel Valley. *Ecology* 52:862-868.
- Griffin, J. R. 1976. Regeneration in *Quercus lobata* savannas, Santa Lucia mountains, California. *American Midland Naturalist* 95:422-435.
- Grossinger, R. M., C. J. Striplen, R. A. Askevold, E. Brewster, and E. E. Beller. 2007. Historical landscape ecology of an urbanized California valley: wetlands and woodlands in the Santa Clara Valley. *Landscape Ecology* 22:103-120.
- Guisti, G. A., R. B. Standiford, D. D. McCreary, A. M. Merenlender, and T. Scott. 2004. Oak woodland conservation in California's changing landscape: A White Paper. Integrated Hardwood and Range Management Program, Berkeley, CA.
- Hagen, B. W. 2009. California Forest Stewardship Program: Firewise Landscaping. California Department of Forestry and Fire Protection. 3/3/09. <http://ceres.ca.gov/foreststeward/html/landowners.html>
- Harris, J. A., R. J. Hobbs, E. Higgs, and J. Aronson. 2006. Ecological restoration and global climate change. *Restoration Ecology* 14:170-176.

- Hayhoe, K., D. Cayan, C. B. Field, P. C. Frumhoff, E. P. Maurer, N. L. Miller, S. C. Moser, S. H. Schneider, K. N. Cahill, E. E. Cleland, L. Dale, R. Drapek, R. M. Hanemann, L. S. Kalkstein, J. Lenihan, C. K. Lunch, R. P. Neilson, S. C. Sheridan, and J. H. Verville. 2004. Emissions pathways, climate change, and impacts on California. *Proceedings of the National Academy of Sciences of the United States of America* 101:12422-12427.
- Hickman, J. C., editor. 1993. *The Jepson Manual, Higher Plants of California*. University of California Press, Berkeley, CA.
- Hilty, J. A., C. Brooks, E. Heaton, and A. M. Merenlender. 2006. Forecasting the effect of land-use change on native and non-native mammalian predator distributions. *Biodiversity and Conservation* 15:2853-2871.
- Hilty, J. A. and A. M. Merenlender. 2002a. Vineyard Landscape: Wildlife activity along creek corridors. *Practical Winery and Vineyard*.
- Hilty, J. A. and A. M. Merenlender. 2002b. Wildlife activity along creek corridors. Pages 2-4 *Practical Winery and Vineyard*.
- Holland, V. L. 1980. Effect of blue oak on rangeland forage production in central California. Symposium on the ecology, management and utilization of California Oaks. US Department of Agriculture, Forest Service, Gen. Tech. Rep. PWS-44, Berkeley, CA, Claremont, CA.
- Houghton, J. T., G. J. Jenkins, and J. J. Ephraim, editors. 1990. *Scientific Assessment of Climate Change- Report of Working Group 1*. IPCC, Cambridge University Press, Cambridge, UK.
- Hunter, J. C. 1997. Fourteen years of change in two old-growth *Pseudotsuga-Lithocarpus* forests in northern California. *Journal of the Torrey Botanical Society* 124:273-279.
- Huntsinger, L., J. W. Bartolome, and C. M. D'Antonio. 2007. Grazing management on California's Mediterranean grasslands. Pages 233-253 in M. R. Stromberg, J. D. Corbin, and C. M. D'Antonio, editors. *California Grasslands: Ecology and Management*. University of California Press, Berkeley, CA.
- IHRMP. 2008. All Publications. University of California Division of Agriculture and Natural Resources, Integrated Hardwood Range Management Program. 9/25/2008. <http://danr.ucop.edu/ihrmp/all.html>
- ISA. 2005. i-Tree: Linking urban forests, benefits, costs and management. International Society of Arboriculturalists. Oct 1, 2008. http://www.itreetools.org/pdfs/itree_fact_sheet_isa_final.pdf
- Ishikawa, C. M. and C. S. Bledsoe. 2000. Seasonal and diurnal patterns of soil water potential in the rhizosphere of blue oaks: Evidence for hydraulic lift. *Oecologia (Berlin)* 125:459-465.
- Jackson, R. D. and J. W. Bartolome. 2007. Grazing Ecology of California Grasslands. in M. R. Stromberg, J. D. Corbin, and C. M. D'Antonio, editors. *California Grasslands: Ecology and Management*. University of California Press, In Press, Berkeley, CA.
- Johnson, S. 1997. Factors contributing to land use changes in the hardwood rangelands of two central Sierran counties. *Oak Woodlands: Ecology, Management and Urban Interface Issues*. USDA Forest Service Research Paper PSW-GTR-160, San Luis Obispo, CA.
- Keator, G. and S. Bazell. 1998. *The Life of an Oak: an intimate portrait*. Heyday Books, California Oak Foundation, Oakland, CA.
- Keeley, J. E. 2002. Native American impacts on fire regimes of the California coastal ranges. *Journal of Biogeography* 29:303-320.
- Keeley, J. E., C. J. Fotheringham, and M. Morais. 1999. Reexamining fire suppression impacts on brushland fire regimes. *Science (Washington D C)* 284:1829-1832.
- Kelly, M., K.-I. Ueda, and B. Allen-Diaz. 2008. Considerations for ecological reconstruction of historic vegetation: Analysis of the spatial uncertainties in the California Vegetation Type Map dataset. *Plant Ecology* 194:37-49.

- Knops, J. H. M. 1994. The influence of epiphytic lichens on the nutrient cycling of an oak woodland. Arizona State University, Tempe, AZ.
- Koenig, W. D. and J. M. H. Knops. 2007. Long-term growth and persistence of blue oak (*Quercus douglasii*) seedlings in a California oak savanna. *Madrono* 54:269-274.
- Koenig, W. D., J. M. H. Knops, W. J. Carmen, and M. T. Stanback. 1999. Spatial dynamics in the absence of dispersal: Acorn production by oaks in central coastal California. *Ecography* 22:499-506.
- Koenig, W. D., J. M. H. Knops, W. J. Carmen, M. T. Stanback, and R. L. Mumme. 1996. Acorn production by oaks in central coastal California: influence of weather at three levels. *Canadian Journal of Forestry Research* 26:1677-1683.
- Koenig, W. D., R. L. Mumme, W. J. Carmen, and M. T. Stanback. 1994. Acorn production by oaks in central coastal California: variation within and among years. *Ecology* 75:99-109.
- Kueppers, L. M., M. A. Snyder, L. C. Sloan, E. S. Zavaleta, and B. Fulfrost. 2005. Modeled regional climate change and California endemic oak ranges. *Proceedings of the National Academy of Sciences of the United States of America* 102:16281-16286.
- Lane, R. S. and J. E. Loye. 1989. Lyme disease in California: interrelationship of *Ixodes pacificus* (Acari: Ixodoidea), the Western Fence Lizard (*Sceloporus occidentalis*), and *Borrelia burgdorferi*. *Journal of Medical Entomology* 26:272-278.
- Lee, D. E. and W. D. Tietje. 2005. Dusky-footed woodrat demography and prescribed fire in a California oak woodland. *Journal of Wildlife Management* 69:1211-1220.
- Loarie, S. R., B. E. Carter, K. Hayhoe, S. McMahon, R. Moe, C. A. Knight, and D. D. Ackerly. 2008. Climate change and the future of California's endemic flora. *PLoS ONE* 3:e2502.
- Logan, W. B. 2005. *Oak: The Frame of Civilization*. W. W. Knopf, New York, NY.
- Luther, D., J. Hilty, J. Weiss, C. Cornwall, M. Wipf, and G. Ballard. 2008. Assessing the impact of local habitat variables and landscape context on riparian birds in agricultural, urbanized, and native landscapes. *Biodiversity and Conservation* 17:1923-1935.
- Mader, S. 2007. *Climate Project: Carbon sequestration and storage by California forests and forest products*. CH2M Hill, Inc. and California Forests for the Next Century.
- Mascheretti, S., P. J. P. Croucher, A. Vettraino, S. Prospero, and M. Garbelotto. 2008. Reconstruction of the Sudden Oak Death epidemic in California through microsatellite analysis of the pathogen *Phytophthora ramorum*. *Molecular Ecology* 17:2755-2768.
- Matthews, M. A. 1997. *An illustrated key to the vascular plants of Monterey county*. Special Report 378 pp., First Edition, California Native Plant Society.
- McCreary, D. 2000. *How to Grow California Oaks*. Integrated Hardwood Range Management Program University of California, Agriculture and Natural Resources. Sept 28 2008. <http://danr.ucop.edu/ihrmp/oak04.htm>
- McCreary, D. 2007. *Small-parcel landowner's guide to woodland management*. University of California, Div. Ag and Nat. Resources., Oakland, CA.
- Meadows, R. 2007. Research and outreach to prevent woodland loss. *California Agriculture* 61:7-10.
- Mensing, S. 1991. The effect of land use changes on blue oak regeneration and recruitment. Pages 230-323 in *Proceedings of the symposium on oak woodlands and hardwood rangeland management*. USDA, Forest Service, Pacific Southwest Research Station, Gen. Tech. Rep. PSW-126, Davis, CA.
- Merenlender, A. M. and K. Heise. 2000. *Wildlife response to different kinds of residential development*. University of California Integrated Hardwood Range Management Program, UC Berkeley, Berkeley, CA.
- Mills, G. S., J. B. J. Dunning, and J. M. Bates. 1991. THE RELATIONSHIP BETWEEN BREEDING BIRD DENSITY AND VEGETATION VOLUME. *Wilson Bulletin* 103:468-479.

- Pachauri, R. K. and A. Reisinger, editors. 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). IPCC, Geneva, Switzerland.
- Pavlik, B. M., P. C. Muick, and M. Popper. 1991. Oaks of California. Cachuma Press, Los Olivos, CA.
- Pillsbury, N. H., L. E. Bonner, R. P. Thompson, W. R. Mark, and R. D. Cuzick. 2004. Long-term growth, sudden oak death assessment and economic viability of coast live oak in three California Counties. Urban Forest Ecosystems Institute, Natural Resources Management Department, Cal Poly State University, San Luis Obispo, CA.
- Pillsbury, N. H., M. J. De Lasaux, R. D. Pryor, and W. Bremer. 1991. Mapping and GIS database development for California's hardwood resources. California Department of Forestry and Fire Protection Forest and Rangeland Resources Assessment Program Report for Contract 8CA63963,, Sacramento, CA.
- Pillsbury, N. H., J. Verner, and W. D. Tietje. 1997. Proceedings of a Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues. Page 738.
- Purcell, K. L. and S. L. Stephens. 2005. Changing fire regimes and the avifauna of California oak woodlands. *Studies in Avian Biology*:33-45.
- Querejeta, J. I., L. M. Egerton-Warburton, and M. F. Allen. 2007. Hydraulic lift may buffer rhizosphere hyphae against the negative effects of severe soil drying in a California Oak savanna. *Soil Biology & Biochemistry* 39:409-417.
- RCDSMM. 2008. What is my oak worth? Resource Conservation District of the Santa Monica Mountains. Oct 1, 2008. <http://www.rcdsmm.org/html/oaktrees.html>
- Readdie, M. 2008. Landels-Hill Big Creek Reserve Habitat Schematic. UC Santa Cruz. 9/30/08. <http://ucreserve.ucsc.edu/bigcreek/description/HS/index.html>
- Sandiford, R. D., J. K. Vreeland, and W. Tietje. 2000. California's Hardwood Rangelands: Production and Conservation Values. On-line Leaflet IHRMP-51 University of California Cooperative Extension; Integrated Hardwood Range Management Program, Division of Agriculture and Natural Resources, Oakland, CA. . October 12, 2008. <http://danr.ucop.edu/ihrmp/oak89.htm>
- Schick, K. N. 2002. Cynipid-induced galls and California oaks. *Fremontia* 30:15-18.
- Shaffer, K. E. and W. F. Laudenslayter. 2006. Fire and Animal Interactions. Pages 118-146 in N. G. Sugihara, J. W. V. Wagtendonk, J. Fites-Kaufman, K. E. Shaffer, and A. E. Thode, editors. *Fire in California's Ecosystems*. University of California Press, Berkeley, CA.
- Shreve, F. 1927. The vegetation of a coastal mountain range. *Ecology* 8:27-44.
- B. Kuhn. 2002. Pollen movement in declining populations of California Valley oak, *Quercus lobata*: Where have all the fathers gone? *Molecular Ecology* 11:1657-1668.
- Stahle, D. 2004. The Ancient Blue Oak Woodlands of California. University of Arkansas. Sept 26, 2008. <http://www.uark.edu/blueoak/>
- Standiford, R., N. McDougald, W. Frost, and R. Phillips. 1997. Factors influencing the probability of oak regeneration on southern Sierra Nevada woodlands in California. *Madrono* 44:170-183.
- Standiford, R. B., D. McCreary, and K. L. Purcell. 2002. Proceedings of the fifth symposium on oak woodlands: oaks in California's changing landscape. Oct 22-25, 2001, San Diego, CA. Page 846 in Pacific Southwest Research Station, Albany, CA. U. S. Department of Agriculture, Forest Service, PWS-GTR-184.
- Stein, B. A., L. S. Kutner, and J. S. Adams, editors. 2000. *Precious Heritage; The status of biodiversity in the United States*. Oxford University Press, New York.
- Stromberg, M. R. 1997. *Taricha torosa* (California newt) response to fire. *Hepetological Review* 28:82-83.
- Stromberg, M. R., J. D. Corbin, and C. M. D'Antonio, editors. 2007. *California Grasslands: Ecology and Management*. University of California Press, Berkeley, CA.

- Sulak, A., L. Huntsinger, R. Standiford, A. Merenlender, and S. K. Fairfax. 2004. A strategy for oak woodland conservation: The conservation easement in California. Pages 353-364 *Advances in Geocology*. Catena Verlag.
- Syphard, A. D., V. C. Radeloff, J. E. Keeley, T. J. Hawbaker, M. K. Clayton, S. I. Stewart, and R. B. Hammer. 2007. Human influence on California fire regimes. *Ecological Applications* 17:1388-1402.
- Talley, S. N. and J. R. Griffin. 1976. Fire ecology of a montane pine forest, Junipero Serra Peak, California. Page 23 *UC Hastings Reserve Archives*. Hastings Reserve website, Carmel Valley, CA.
- Tietje, W., D. A. Kelt, D. H. Van Vuren, and M. L. Johnson. 2008. Survival and abundance of three species of mice in relation to density of shrubs and prescribed fire in understory of an oak woodland in California. *Southwestern Naturalist* 53:357-369.
- Tyler, C., B. Kuhn, and F. W. Davis. 2006a. Demography and recruitment limitations of three oak species in California. *Quarterly Review of Biology* 81:127-152.
- Tyler, C. M., B. Kuhn, and F. W. Davis. 2006b. Demography and recruitment limitation of three oak species in California. *Quarterly Review of Biology* 81:127-152.
- USDA-NRCS. 2003. Managing soil organic matter, the key to air and water quality. Page 4 in N. R. C. S. U. S. Department of Agriculture, editor. *Soil Quality Institute*.
- White, K. L. 1966. Structure and composition of foothill woodland in central coastal California. *Ecology* 47:229-237.
- Wieslander, A. E. 1935. A vegetation type map of California. *Madrono* 3:140-144.
- Wieslander, A. E. 1946. Forest areas, timber volumes and vegetation types in California. California Forest and Range Experiment Station, Berkeley, CA.
- Zavaleta, E. S., K. B. Hulvey, and B. Fulfrost. 2007. Regional patterns of recruitment success and failure in two endemic California oaks. *Diversity and Distributions* 13:735-745.

A compilation and discussion of these references, in "Monterey County Oak Woodlands" online at: <http://www.hastingsreserve.org/OakStory/OakIntro.htm>



Valley oak at sunset, Sierra de Salinas, Monterey County, California.

EXHIBIT B: Oak Woodland Conservation Program Submittals

The Oak Woodlands Conservation Program, implemented by the Wildlife Conservation Board (WCB) offers landowners, conservation organizations, cities and counties, an opportunity to obtain funding for projects designed to conserve and restore California's oak woodlands. While the Program is statewide in nature, it provides opportunities to address oak woodland issues on a regional priority basis.

This voluntary State Program is designed to provide incentives for local efforts to achieve oak woodland protection. More importantly, this Program provides a mechanism to bring farmers, ranchers and conservationists together in a manner that allows both to achieve that which is so valued — sustainable ranch and farming operations and healthy oak woodlands.

The program is not designed to accept applications directly from private property owners. Proposals developed in partnership with landowners, nonprofit organizations, and local, regional and state resource specialists bring a diversity of skills, expertise, ideas, and often the ability to leverage funds not otherwise available for a project. Please refer to the References and Resources section of the Voluntary Oak Woodlands Stewardship Guidelines for additional information on oak woodlands.

STEP 1: Contact the WCB for an Oak Woodlands Conservation Program application package: www.dfg.ca.gov/wcb or call (916) 445-8448.

STEP 2: Applications for public education and outreach and technical assistance should be designed and implemented as a partnership with local entities such as: landowners, Resource Conservation District, California Fish and Game Department, University of California Cooperative Extension Farm Advisor, representatives from farming and ranching organizations, the County Planning Department, and others.

Contact information for these agencies:

State Department of Fish and Game

www.dfg.ca.gov

Central Region (559)-243-4005

State Department of Forestry and Fire Protection

www.fire.ca.gov

Cal Fire San Benito-Monterey Unit (831) 333-2600 (ask for the unit forester)

University of California Cooperative Extension <http://danr.ucop.edu>
and **Integrated Hardwoods Management Program**

<http://danr.ucop.edu/ihrmp>

UCCE San Luis Obispo County) (805) 781-5938

Natural Resources Conservation District (NRCS) and Resource Conservation District www.ca.nrcs.usda.gov

Salinas office (831) 424-1036

Applications for conservation easements, restoration or other long-term land conservation methods, also contact an eligible participant such as a nonprofit land trust to discuss your goals. A number of nonprofit land trusts are actively conserving land with conservation easements and other methods in Monterey County. Currently the land trusts listed below have the expertise to work with homeowners to develop customized land conservation easements, the legal authority to acquire and manage conservation easements (deed of conservation easement), and the capacity to perform the required monitoring.

Big Sur Land Trust www.bigsurlandtrust.org
(831) 625-5523

California Rangeland Trust www.rangelandtrust.org
(805) 688-8466

Ag Land Trust www.aqlandconservancy.org
(831) 422-5868

Elkhorn Slough Foundation and Elkhorn Slough National Estuarine Research Reserve www.elkhornslough.org
(831) 728-5939

The Nature Conservancy www.nature.org
(831) 333-2047

Land Trust Alliance www.lta.org for more information on land trusts and conservation easements

STEP 3: County Certification

Contact the Monterey County Resource Management Agency - Planning Department for certification that the grant proposal is consistent with the Monterey County Voluntary Oak Woodland Stewardship Guidelines. The appropriate authority to review and certify grant proposals consistency is the RMA - Planning Director. A fee will be charged for the review and certification process. The applicant is also required to certify that the proposal is not required to satisfy a condition imposed on the landowner by any lease, permit, license, certificate or other entitlement, or mitigation of significant effects on the environment.

County of Monterey Resource Management Agency – Planning Department
www.co.monterey.ca.us (831) 755-5025

STEP 4: Once an application proposal is completed and certified by the County RMA-Planning Director, submit it to the WCB for review and consideration for funding. Applications are accepted year round; however WCB Board meetings are held quarterly.