



A Tradition of Stewardship
A Commitment to Service

2010

Napa County Voluntary Oak Woodland Management Plan



Conservation, Development & Planning Department
1195 Third St. Suite 210 Napa, CA 94559

September 1, 2010

This page intentionally left blank

Napa County Voluntary Oak Woodland Management Plan

September 1, 2010

Table of Contents

I.	Introduction	6
A.	PURPOSE.....	6
B.	PREPARATION OF THE PLAN.....	7
C.	FOCUS ON VOLUNTARY ACTIONS.....	7
II.	Value of Oak Woodlands	8
A.	CULTURAL/HISTORICAL.....	8
B.	FLOOD PROTECTION.....	8
C.	EROSION CONTROL.....	9
D.	WATER QUANTITY & QUALITY PROTECTION.....	9
E.	AIR QUALITY/CARBON SEQUESTRATION.....	10
F.	PLANT & WILDLIFE HABITAT.....	10
G.	SCENIC & PUBLIC RECREATION.....	10
H.	ENHANCED PROPERTY VALUE.....	11
I.	VITICULTURAL/AGRICULTURAL.....	11
J.	OTHER VALUES.....	11
III.	Oak Woodland Communities in Napa County	12
A.	HISTORICAL EXTENT OF OAK WOODLANDS.....	12
B.	CURRENT STATUS OF OAK WOODLAND COMMUNITIES.....	13
1.	Oak Woodland Communities.....	14
2.	Protected Oak Woodlands in Napa County.....	15
IV.	Current Oak Woodland Policies & Regulations	16
A.	COUNTY POLICIES & REGULATIONS.....	16
1.	Napa County General Plan.....	16
a)	Goals, Policies & Implementation Actions.....	17
2.	Napa County Code.....	19
a)	Conservation Regulations.....	19
b)	Floodplain Management Regulations.....	20
c)	Viewshed Protection.....	20

A.	OTHER LOCAL POLICIES.....	21
1.	Watershed Information Center & Conservancy (WICC) Strategic Plan.....	21
2.	Napa County Regional Park & Open Space District (RPOSD)Master Plan.....	22
B.	STATE POLICIES & REGULATIONS.....	23
1.	California Endangered Species Act.....	23
2.	California Environmental Quality Act (CEQA).....	23
3.	California Oak Woodland Conservation Act (2001) and Oak Woodlands Conservation Act (SB 1334-2004).....	24
4.	Natural Heritage Preservation Tax Credit Act (AB 94-2009).....	25
5.	Z’Berg Nejedly Forest Practice Act (1973).....	26
6.	California Fish & Game Code.....	26
7.	Greenhouse Gas (GHG) Emission Reduction (AB32 & SB375)	27
C.	FEDERAL POLICIES & REGULATIONS.....	28
1.	Endangered Species Act.....	28
2.	Clean Water Act.....	28
3.	Other Federal Policies/Regulations.....	29
V.	Threats to Oak Woodlands.....	30
A.	LACK OF REGENERATION.....	30
1.	Low Acorn Production.....	31
2.	Poor Seedbed Conditions.....	31
3.	Herbivory on Seedlings/Sapling.....	31
4.	Water Stress and Groundwater.....	32
B.	FIRE FREQUENCY AND SEVERITY.....	33
C.	LAND USE/HABITAT CONVERSION.....	34
1.	Rural Residential & Urban Development.....	34
2.	Agricultural Conversion.....	34
3.	Infrastructure Development.....	35
D.	DISEASES: SUDDEN OAK DEATH & OTHERS.....	35
E.	CLIMATE CHANGE AND ECOTONE/SPECIES MIGRATION.....	36
F.	WOODCUTTING FOR FIREWOOD PRODUCTION.....	36

VI. Establishing Priorities for Oak Woodland Conservation & Restoration	37
A. CURRENT EFFORTS UNDERWAY.....	37
B. PRIORITY CONSERVATION & RESTORATION CRITERIA.....	39
VII. Voluntary Mechanisms for Encouraging Long-term Oak Woodland Conservation	40
A. OUTREACH & EDUCATION	40
B. CALIFORNIA OAK WOODLAND CONSERVATION PROGRAM	40
C. OAK WOODLAND CONSERVATION EASEMENTS.....	41
D. COST-SHARING & FINANCIAL AGREEMENTS.....	42
E. NEW GRANT FUNDING OPPORTUNITIES.....	42
F. WILLIAMSON ACT.....	43
G. OPPORTUNITIES FOR COLLABORATION.....	43
VIII. Oak Woodland Protection through Sustainable Best Management Practices (BMPs) and CEQA Mitigation	44
A. SUSTAINABLE BEST MANAGEMENT PRACTICES.....	45
B. CEQA MITIGATION MEASURES.....	46
IX. Recommendations for the Future	47
A. EDUCATION & OUTREACH.....	47
B. MITIGATION BANK.....	48
C. PILOT RESTORATION PROJECTS.....	48
D. RESEARCH & MONITORING.....	48
E. REMOVING OBSTACLES TO RESTORATION.....	48
F. NURSERY PROPAGATION PROGRAM	48
 Appendices	 50
List of Sources	51
Endnotes	52

Napa County Voluntary Oak Woodland Management Plan

September 1, 2010

I. Introduction

Napa County has the greatest density of oaks of any county in California, with thirty-three percent of the county covered by oak woodlands¹. These oak woodlands are one of the defining features of Napa County's scenery, and provide numerous recreational and ecological benefits. In addition to more common species of oak, Napa County contains many of California's remaining vanishing valley oaks, which make up only one percent of the state's oak population, but almost six percent of Napa County's oaks².

Despite Napa County's slow growth conservation efforts, oak woodlands remain at risk from development and natural hazards. To address these and other risks, public agencies, non-profit organizations, and property owners can all work together to protect our natural resources. This voluntary management plan will help to coordinate conservation efforts to preserve and restore Napa County's oak woodland resources.



A. PURPOSE

The purpose of this Voluntary Oak Woodlands Management Plan is to provide a conservation framework for the preservation of our oak woodland resources. This Plan provides a summary of the location, condition and value of Napa County's oak woodlands; identifies potential threats; outlines conservation strategies; supports landowners/agencies/non-profits eligibility for grants under the California Oak Woodlands Conservation Program; and improves communication and collaboration among those interested in the long-term health and viability of Napa County's oak woodlands.

This Oak Woodlands Management Plan will help to achieve the following:

1. Protect existing oak woodlands by creating a voluntary protection and conservation program, including landowner incentives, for conservation and enhancement of oak woodland;
2. Direct conservation and enhancement funding toward areas that have the highest oak woodland resource values;

3. Direct mitigation for oak woodland impacts to areas that have the highest oak woodland resource values and are in need of protection and/ or enhancement;
4. Encourage the long-term stewardship and vitality of existing oak woodlands to maintain or improve oak woodland resource values;
5. Provide funding and technical assistance for oak woodland enhancement efforts that help achieve multiple benefits;
6. Increase the area covered by oak species that are now uncommon in Napa County because they have been cleared from much of their historical range in the county;
7. Encourage land use, transportation, and infrastructure planning that is consistent with oak woodlands conservation efforts; and
8. Maximize the total amount of oak woodland canopy cover to achieve erosion, flood, habitat, and air quality protection benefits, while recognizing the importance of including a variety of canopy cover levels within conserved and restored woodlands to provide habitat diversity.

This Oak Woodlands Management Plan has been designed to be consistent with the Napa County General Plan, the Napa County Regional Parks and Open Space Master Plan, and other applicable local and state conservation plans. The adoption of this Plan by a resolution of the County Board of Supervisors will also enable the County to obtain funding support through the California Oak Woodlands Conservation Act of 2001. The Act provides funding for projects designed to conserve and restore oak woodlands, public education/ outreach, and for landowner assistance.

B. PREPARATION OF THE PLAN

While California state law does not require that cities and counties adopt oak woodland management plans, the development and adoption of a plan will help to protect this important resource and enable private landowners, public agencies, and non-profit organizations to seek grant funding under the California Oak Woodlands Conservation Act (see Appendix A). This Voluntary Oak Woodland Management Plan was prepared with input from a wide range of community stakeholder groups and representatives concerned about the conservation of oak woodlands in Napa County, which included the Napa Valley Vintners, Sierra Club, Napa County Farm Bureau, Napa Valley Grape Growers, Napa County Resource Conservation District, Natural Resources Conservation Service, and others.

C. FOCUS ON VOLUNTARY ACTIONS

The focus of this Plan is on achieving oak woodlands conservation through voluntary, collaborative action by private and public landowners, public agencies, non-profit and other community organizations, and community volunteers. This Plan establishes the foundation upon which agencies, conservation groups and non-profits will take the lead in working with willing landowners, seeking grants, preparing and holding conservation easements, and designing and implementing stewardship plans to

preserve and restore Napa County's oak woodlands. It is anticipated that Napa County, local cities and towns, Napa County Regional Park and Open Space District, the Land Trust of Napa County, Napa County Resource Conservation District, U.S. Natural Resources Conservation Service, and other non-profit conservation organizations will use this Plan as a basis for cooperation.

II. The Value of Oak Woodlands

Oak woodlands provide residents and visitors of Napa County with scenic opportunities and important reminders of our unique local history and ecology. They also provide important wildlife habitat, help improve air and water quality, slow runoff, prevent erosion, mitigate flooding, provide recreational opportunities and benefit vineyard owners through pest management. This section provides a brief overview of these and other resource values provided by oak woodlands

A. CULTURAL/HISTORICAL

Artifacts of the Native American people who historically lived in Napa County tend to be co-located with oak woodlands, which provided them with the acorns they relied upon for food. According to local historian Lin Weber, shamans of the Wappo people would offer prayers for the health of the oak trees, and the Wappo named months of the year after the seasonal phases of oaks.³ Present day oak stands or individual trees may have historical significance due to past events or structures that were associated with them. Many historical accounts mention the trees and the use of specific trees as landmarks or as boundary markers. The earliest European settlers found refuge from the hot valley sun for themselves and their livestock under oaks and benefited economically from the use of oaks for building material and firewood. Oak woodlands also created venues for recreation and public events. Napa County's remaining oak woodlands continue to serve as a reminder of our cultural and historical heritage.



B. FLOOD PROTECTION

The Napa River is historically prone to flooding, causing damage to homes and vineyards within its floodplains. Oak woodlands play a part in minimizing the strength and effect of the river's floodwaters. Oaks slow the eroding energy of rainfall with their canopies by temporarily hold rainwater on their leaf and stem surfaces during a rainstorm, increasing the amount of time rain takes to reach the ground and contribute to runoff. Oak woodland canopies capture 20-30% more rainfall than do grasslands, and their contribution to organic matter in the soil improves its water holding capacity.⁴ As a result, they have a high capacity for detaining peak flows from rainfall events that

would otherwise run in larger volumes and at higher velocities into streams, contributing to flooding, erosion, and sediment and nutrient concentrations that can harm water quality. The greatest flood protection/attenuation benefits related to tree canopy cover are in watersheds that quickly concentrate flows and pose a risk of flash flooding and in areas where runoff conveyance is already near capacity. Oak trees also capture and transpire moisture from the soil during the growing season. Compared to annual vegetation, oaks can extract water from the soil profile to a greater depth. Consequently, soils under oak woodland canopy are able to absorb and hold greater amounts of rainfall than equivalent soils with only annual grassland cover. This extra storage capacity further reduces the potential for flooding during the rainy season and promotes groundwater recharge.

C. EROSION CONTROL

Oaks help control soil erosion in several ways. Oak woodland canopy intercepts raindrops and dissipates rainfall energy, reducing potential surface erosion. Oak leaf-fall and twigs that accumulate on the soil surface under oak woodland canopy also provide further protection against the erosive action of rainfall. In addition, tree roots and their associated symbiotic soil fungi promote the formation and stability of fine and coarse soil aggregates which help to promote soil cohesion and stability, reducing the risk of landslides and gully/rill erosion. Oak woodlands located on soils and slopes prone to erosion can also help prevent degradation in water quality and uphold soil/land productivity. The planting of oaks in areas historically known to support oak woodland that currently exhibit accelerated erosion from lack of tree cover can help to stabilize and prevent further erosion in these areas.

D. WATER QUALITY PROTECTION

Oak woodlands, whether located on the hillsides or on level lands near streams, play an important role in protecting water quality. By minimizing soil erosion as noted above, oak woodlands can help reduce sediment transport and washing of fine sediments into local waterways. High levels of sediment in waterways can negatively impact the aquatic food supply by reducing habitat available for fish, aquatic invertebrates and other organisms



important to the diets of fish and birds. The Napa River is currently listed as impaired for sediment and a Sediment Total Maximum Daily Load(TMDL) is in the process of being adopted by the State.

The contribution of oaks and other vegetation to erosion prevention near waterways is especially important if soils contain excessive nutrients, pathogens or high levels of toxic material (natural or human concentrated), such as chemical contaminants, mercury or other heavy metals. Putah Creek, for example, has elevated levels of mercury in the soils of the bed and banks of its tributaries and is the focus of State regulatory efforts (TMDL)

to reduce mercury levels. Oaks and other vegetation also help reduce soil contamination by absorbing heavy metals, fertilizer nutrients, and pesticides from the soil and intercepting sediments containing these pollutants, thereby preventing these materials from reaching surface waters. Oaks and associated permanent vegetation along waterways can also reduce potential waterway contamination from airborne pesticide or herbicide drift, since oak foliage can intercept airborne pesticides/ herbicides.

E. AIR QUALITY PROTECTION AND CARBON SEQUESTRATION

Oaks and other plants directly reduce ozone pollution by absorbing and destroying ozone within their leaves. The leaves also intercept airborne particulates, helping to lower ground level concentration of these pollutants. Oaks, as well as other trees, also sequester carbon in their mass as they grow. Large, long-lived trees such as oaks convert large quantities of carbon dioxide to various organic compounds that make up wood. Oak woodlands therefore provide a means for helping to offset the increase in atmospheric carbon dioxide levels related to the use of fossil fuels. Soils can also sequester carbon, and soils with high organic content such as those found under oak canopies can hold larger amounts of carbon, thereby reducing the amount of greenhouse gasses that contribute to global warming.⁵ Oak canopies also mitigate the effects of global warming by reducing ground surface temperatures. In urban/ developed areas oak trees provide protective shading for houses and people, lowering the need for air conditioning and aiding in the maintenance of air quality. Shading provided by trees can also reduce the amount of volatile organic compounds (VOCs) released from vehicles⁶. Because VOCs are precursors to photochemical smog, lower VOC levels result in lower levels of ground-level ozone.

F. PLANT AND WILDLIFE HABITAT

Oak woodlands are the most diverse terrestrial ecosystems in California, supporting at least 300 vertebrate species (including at least 120 mammal, 147 bird, 60 reptile and amphibian species), 1,100 plant species, 370 fungal species, and 5,000 arthropods species (insects and mites).⁷ In Napa County, oak woodlands provide habitats for a wide range of flora and fauna, many of which are threatened or endangered at the state and federal level. Each type of oak woodland found provides unique habitat structure for the plants, invertebrates, fish, and wildlife that inhabit them. Some oak woodland types provide a greater diversity of ecological benefits than others, depending on the complexity of the vegetation structure, oak density (trees per acre), level of canopy cover, distribution of tree sizes and ages, and other factors. The habitat value of any oak woodland type may also vary according to its health, location in the landscape, extent, and current management strategies.

G. SCENIC AND PUBLIC RECREATION

Oak woodlands are enjoyed by Napa County residents and visitors alike, simply for their beauty, whether driving or cycling along the roadways or through hiking, birdwatching, equestrian, or other recreational opportunities. Many recreational trails in Napa County are located in or pass through oak woodlands. Recreational activities contribute significantly to the quality of life as well as providing local economic benefits

generated by visitors enjoying this important and unique resource. Tourism remains one of Napa County's primary industries. The scenic beauty of the area, known for its lush vineyards against a backdrop of grassy, oak-covered hills, complements and adds to the draw of Napa County as a world renowned destination.



H. ENHANCED PROPERTY VALUES

The retention of oak woodlands within a community can contribute to a community's overall economic well being. Woodlands contribute to increased property values and a subsequent increase in property tax revenues. One study in Southern California showed that a 10% decrease in the distance to an open space preserve increased the value of 4,800 surrounding lots by over \$20 million dollars, significantly increasing tax revenue to the county. In addition, lots containing native oaks have been found to be valued at a 27% premium over properties having no trees. Individual trees of large size or landmark status within a community were found to increase property values by an additional \$18,000 to \$50,000 each (Standiford 1999). Studies comparing tree populations and property values also indicate that retaining approximately 40 trees per acre generally provides optimal lot coverage and yields the highest market value premium, roughly 22% to 27%, over bare land (Standiford 1999).⁸

I. VITICULTURAL/AGRICULTURAL

Sustainable vineyard practices incorporate biodiversity throughout the vineyard to help minimize insect pests and disease. Oak woodlands are the most diverse ecosystems in California, and when they are in proximity to vineyards they provide habitat for predatory species that help manage the populations of vineyard pests such as deer, rabbits, gophers, and starlings. Cutting down oak trees on the edge of vineyards can increase the chances of Armillaria root rot infecting the vineyards, and may recruit recolonizing species that host Peirce Disease. Sustainable vineyard practices are also being promoted by the Napa Sustainable Winegrowing Group (NSWG), Napa County Farm Bureau, Napa Valley Grapegrowers, the Napa Valley Vintners/ Napa Green Certified Land Program (third party certified voluntary program) and others that seek to restore, protect and enhance the watershed, as well as through various river and stream restoration efforts (eg- Napa River Rutherford Reach Restoration Project).

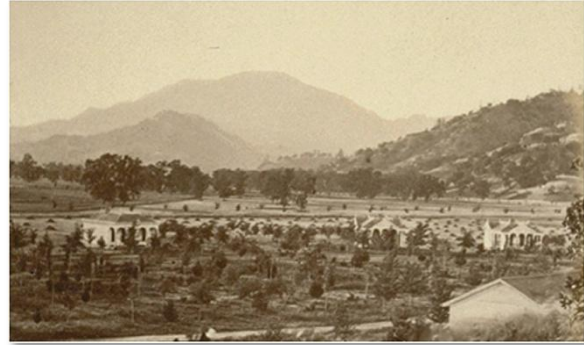
J. OTHER VALUES

- provide fodder for grazing livestock;
- provide fuel/ firewood;
- provide wood products
- spiritual/ emotional
- *and others.....*

III. Oak Woodland Communities of Napa County

A. HISTORIC EXTENT OF OAK WOODLAND COMMUNITIES

An often overlooked impact to native California habitats is the loss of the state's once expansive valley oak savannas. Among the most iconic and common California landscapes 150 years ago, the open valley floor of Napa County historically contained extensive communities of Valley oak woodland (see map-Appendix B-1). Canopy cover is thought to have been open to locally dense with valley oak the dominant tree.



Blue oak, California black oak, and coast live oak were probably minor constituents of this community. The understory was similar to that of native grassland communities, with a mosaic of seasonal wetland interspersed.

The Wappo Native Americans were the sole inhabitants of the Napa Valley until the late 1700's. Their cultural practices included hunting and the selective gathering of plants, including acorns from several oak species, which were made into flour and comprised an important part of their diet. Spanish colonization began in 1769, when the first expedition to the Bay area arrived, which initiated the decline of the indigenous cultures and began to alter the land use practices. Sheep and cattle ranching began in the early-mid 1800's and intensified following the land grants of this time. As development increased along the valley floors in the mid to late 1800s, Napa County's oaks, particularly valley oaks, decreased in number. A range of more intensive land uses were introduced from 1848-70 including agriculture, with cattle grazing eventually giving way to grain production, followed closely by vineyards.



Napa County was created in 1850, as one of the original 27 counties of California. One of the first known hillside vineyards would be planted just south of Calistoga in 1852 by Jacob Schram and vineyard development would continue to grow throughout the 1860-70s. Viticulture would replace grain as the predominant crop by the 1880's and by 1890 there were approximately 18,000 acres in vines.⁹ But it would be decimated by disease (phylloxera) in the 1890's leading to a

substantial conversion to orchards and by 1900 there were only 2,000 acres remaining.¹⁰

However, by 1910 the acreage of bearing vines was recovering, with approximately 13,000 acres¹¹ in vineyards. But orchards remained important, with grapes and prunes the dominant crops along with smaller amounts of pears and walnuts. Prohibition would significantly impact the wine industry from 1919-1933 after which it would begin a gradual recovery until the 1960s, when more rapid expansion would begin again. From the 1970s to the present day, hillside oaks would come under increasing pressure from vineyard conversions as the county's rocky, steep slopes were discovered to produce excellent grapes and wine.

The historical land use and extent of oak woodlands in the Napa Valley from the 1800's to the present day has been studied by the San Francisco Estuary Institute (SFEI) and their work has contributed to our current understanding of the changes that have occurred in our oak communities over time. This historical context plays an important part in developing future restoration and conservation priority areas for valley and riparian oak woodlands. SFEI's research will be published by University Press in the upcoming "Napa Valley Historical Ecology Atlas".

Note: A map of the estimated Historical Extent of Oak Woodlands and other natural features for valley floor portions of the Napa Valley of the 19th century is provided in Appendix B-1. Additional mapping of the hillsides is currently under development by the San Francisco Estuary Institute (SFEI) and other areas of Napa County have not been mapped at this time.

B. CURRENT STATUS OF OAK WOODLAND COMMUNITIES

There is a great diversity of oaks in California and within Napa County, exhibiting a widespread distribution and a persistence throughout geological time. Some grow as tall and stately trees with large undivided trunks, while others are ground hugging shrubs that are densely branched. Oaks are flowering plants belonging to the genus *Quercus*, which is the Latin name for oak. It is derived from two Celtic words, *quer*, meaning fine and *cuez*, meaning tree. Oak trees also have a unique combination of features which include distinctive wind pollinated flowers, a fruit we all know as the acorn, a strong complex wood, and the ability to live for many decades, and even centuries.¹²

The Valley's Great Oaks....

Before 19th-century impacts of orchard agriculture, valley oaks formed a relatively dispersed, open pattern of light and shade that dominated many California valleys, from Ojai to Napa. These oaks provided critical food and habitat for native wildlife, shade and beauty for local people and their livestock, and healthy creeks through nutrient and water retention. Scattered, stately valley oak trees were fundamental to the character of the Napa Valley, and were one of the most celebrated characteristics of the area in early accounts:

"The magnificent oaks are one great secret of Napa's beauty. Their rustling leaves and finely formed tops are the glory of the landscape scenery..." (Smith and Elliott -1878)

The landscape photograph on the opposite page, taken between 1900 and 1910, depicts the dispersed, open pattern of a typical valley oak savanna. The trees dominated the valley landscape and yet, almost paradoxically, they took up relatively little space. The valley was "studded with gigantic oaks.....though not so close together as to render it necessary to cut away to prepare the land for cultivation" (Bartlett -1854).

"A great variety of oaks stood, now severally, now in a becoming grove, among the fields and vineyards" (Stevenson -1883)

Depending upon various environmental factors, oaks contribute to three *structural* types of natural vegetation: forest, woodland, and savannah. In forests their leaf canopy overlaps to produce a deep and constant shade, usually associated with streams and rivers(riparian) or moist upland slopes(montane). Oak trees also form woodlands which are more open and where sunlight is more penetrating because leaf canopies touch but seldom overlap. Savannahs are the most open and spacious with oak trees far apart and scattered over the grassland, and they are usually the driest and warmest environments¹³.



To gain a better understanding of the distribution of oaks you must also look at their natural environment. How an oak grows and reproduces is affected by physical factors such as climate, soil, fire, light and also by biological factors such as the animals and other plants that occur in the same landscape. When considered together oaks and other associated species form an oak community, which reflects the various interactions between the species including competition, herbivory and predation¹⁴.

An overview of the oak woodland communities of Napa County is provided in the following section, along with additional details which can be found in Appendix B.

1. Oak Woodland Communities

Oak woodland communities are categorized by the dominant tree species and the degree of foliage cover, with woodland defined as having a canopy coverage of 10%¹⁵ or greater and trees spaced far enough apart to allow for a variety of shrubs, herbaceous plants, and grasses in the understory¹⁶. Mixed and coast live oak communities tend to dominate in the southwest of the county, while blue, leather and interior live oak dominate the communities on the hotter, drier eastern areas. California black oak woodlands are found at higher elevations, especially in the Atlas Peak region. Valley oak and associated communities are common within the flat alluvium of the Napa River and its tributaries. Oak riparian woodland resides adjacent to the County's streams and waterways, protected from present day development through local stream buffer regulations and state and federal fish and water quality protection programs.

Due to Napa County's slow growth and agricultural preservation policies, nearly 90% of the county remains as open space, including grazing lands, agricultural crops, woodland and forest, with oak woodlands the most common land cover. Oak woodland is the most common land cover in the County, occurring on over 167,000 acres or 33% of the County's area¹⁷ (see Appendix B and B-2/ map). It occurs throughout the County across a broad range of elevations, on gentle to steep slopes. It is most common in the Southern Interior Valleys of Napa County, where it constitutes almost 70% of the land cover. There are 13 vegetation types (alliances or associations) recognized within the Information Center for the Environment Map (ICE Map/ UC Davis) oak woodland group (BDR-2005). Six of these are dominated by evergreen oak species, six are dominated by deciduous oak species, and one is a mixture of deciduous and evergreen

oaks. The four most common oak woodland types in the County are mixed oak woodlands, (evergreen) coast live oak (*Quercus agrifolia*) woodlands and interior live oak woodlands, and (deciduous) blue oak woodlands. Oregon white oak (*Quercus garryana*) woodland and California bay woodlands are considered sensitive communities by the California Department of Fish and Game (DFG 2000). Valley oak woodlands were identified by the *San Francisco Bay Area Gap Analysis* as a high priority for conservation (Wild 2002). Vernal pools, which are also a sensitive community, have been documented to occur within the County's oak woodlands.

Note: For a more detailed description of Oak Woodland Vegetation Types/Wildlife/Special Status Species in Napa County see Appendix B. The current mapped Distribution of Oak Woodlands in Napa County(2009) is provided in Appendix B-2.

2. Protected Oak Woodlands

Almost 25 percent or 123,619 acres of the land in Napa County is dedicated open space owned in fee title by public agencies or land conservation organizations, such as the Land Trust of Napa County.¹⁸ The Federal Government is the largest public property owner with nearly 63,000 acres of land and water. The Federal Bureau of Land Management manages most of this land in the northeastern part of Napa County with the Federal Bureau of Reclamation managing the remainder around Lake Berryessa. The State of California is the second largest owner of public open space lands with 42,393 acres. Most of this land is managed by the State Department of Fish and Game and includes the Napa-Sonoma Marshes near the mouth of the Napa River, and property north of Lake Berryessa, including the Knoxville Wildlife Area.

The State Department of Parks and Recreation owns and operates the Robert Louis Stevenson, and Bothe-Napa State Parks. Other State agencies such as the Department of Veterans Affairs own smaller parcels of land. Local governmental agencies such as the cities of Napa and Vallejo which operate domestic water systems own important properties associated with their water supply reservoirs and American Canyon owns the Newell Open Space Preserve. Napa County holds a lease from the state for Skyline Park until the year 2030, and operates the park through a concessionaire agreement with a local non-profit association. These lands provide an important measure of protection for Napa County's oak woodlands.

In areas that are privately owned, oak woodlands are effectively protected if they are located on slopes over 35%, within stream setbacks (35-150 ft), or within sensitive domestic watersheds (60/ 40 canopy retention), because of the provisions of Napa County's Conservation Regulations(see Section IV.A.3). Oak woodlands that are privately owned and protected through these regulations, compliment the protection provided via public ownership and conservation easements.

Note: A map of Protected Oak Woodlands in Napa County (2009) is provided in Appendix B-3.

IV. Current Oak Woodlands Policies & Regulations

A broad range of existing policies, state and federal regulations, and local ordinances assist Napa County in conserving and protecting oak woodlands. This section discusses the local, state, and federal policies and regulations that are relevant to the protection of oak woodland resources in Napa County.

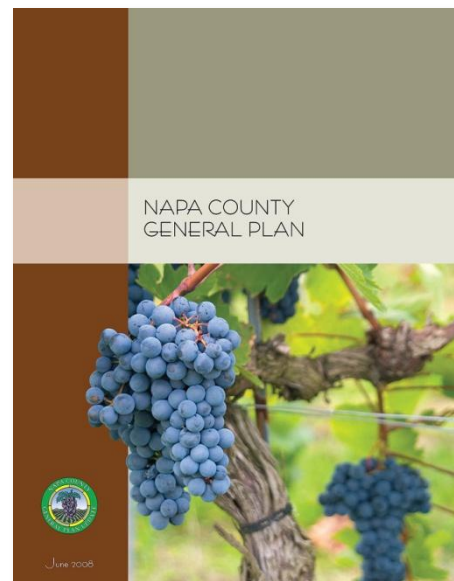
A. COUNTY POLICIES & REGULATIONS

Napa County has a number of existing policies and regulations that provide for the protection and management of oak woodlands. The following are excerpted or summarized from the Napa County 2008 General Plan Update and associated Environmental Impact Report (EIR) and related implementing actions, mitigation measures and ordinances.

1. Napa County General Plan

The Napa County General Plan serves as a broad framework for planning the future of Napa County and it is the official policy statement of the Board of Supervisors to guide private and public development. The Zoning Ordinance, individual development project proposals, and other related plans and ordinances must be consistent with the goals and policies of the General Plan. While the General Plan was prepared with a time horizon of at least 20 years, periodic review and possible amendment is required to adjust to changing conditions, values, expectations, and needs of the community.

The General Plan program level EIR, certified in June 2008, identified potential future impacts and determined that the impact to sensitive biotic communities, including oak woodlands, would be significant and unavoidable because the potential loss of sensitive biotic communities anticipated by the year 2030 cannot be fully mitigated. However, a number of mitigation measures were identified to lessen anticipated impacts, and were included in the Conservation Element of the General Plan. Oak Woodlands protection is addressed by many of the resulting policies, most specifically in Policy CON-24 and Action Item CON NR-7.



Conservation Element

a) Natural Resources Goals and Policies

- Goal CON-2: Maintain and enhance the existing level of biodiversity.
- Goal CON-3: Protect the continued presence of special-status species, including special-status plants, special-status wildlife, and their habitats, and comply with all applicable state, federal, or local laws or regulations.
- Goal CON-4: Conserve, protect, and improve plant, wildlife, and fishery habitats for all native species in Napa County.
- Goal CON-5: Protect connectivity and continuous habitat areas for wildlife movement.
- Goal CON-6: Preserve, sustain, and restore forests, woodlands, and commercial timberland for their economic, environmental, recreation, and open space values.
- Policy CON-15: The County shall establish and update management plans protecting and enhancing the County's biodiversity and identify threats to biological resources within appropriate evaluation areas, and shall use those plans to create programs to protect and enhance biological resources and to inform mitigation measures resulting from development projects.[Implemented by Action Item CON NR-2]
- Policy CON-18: To reduce impacts on habitat conservation and connectivity:
- 1) In sensitive domestic water supply drainages where new development is required to retain between 40 and 60 percent of the existing (as of June 16, 1993) vegetation on-site, the vegetation selected for retention should be in areas designed to maximize habitat value and connectivity.
- Policy CON-22: The County shall encourage the protection and enhancement of natural habitats which provide ecological and other scientific purposes. As areas are identified, they should be delineated on environmental constraints maps so that appropriate steps can be taken to appropriately manage and protect them.
- Policy CON-24: Maintain and improve **oak woodland habitat** to provide for slope stabilization, soil protection, species diversity, and wildlife habitat through appropriate measures including one or more of the following:
- 1) Preserve, to the extent feasible, oak trees and other significant vegetation that occur near the heads of drainages or depressions to maintain diversity of vegetation type and wildlife habitat as part of agricultural projects.

- 2) Comply with the Oak Woodlands Preservation Act (PRC Section 21083.4) regarding oak woodland preservation to conserve the integrity and diversity of oak woodlands, and retain, to the maximum extent feasible, existing oak woodland and chaparral communities and other significant vegetation as part of residential, commercial, and industrial approvals.
- 3) Provide replacement of lost oak woodlands or preservation of like habitat at a 2:1 ratio when retention of existing vegetation is found to be infeasible. Removal of oak species limited in distribution shall be avoided to the maximum extent feasible.
- 4) Support hardwood cutting criteria that require retention of adequate stands of oak trees sufficient for wildlife, slope stabilization, soil protection, and soil production be left standing.
- 5) Maintain, to the extent feasible, a mixture of oak species which is needed to ensure acorn production. Black, canyon, live, and brewer oaks as well as blue, white, scrub, and live oaks are common associations.
- 6) Encourage and support the County Agricultural Commission's enforcement of state and federal regulations concerning Sudden Oak Death and similar future threats to woodlands.[Implemented by Action Item CON NR-7]

Action Item CON NR-7:

The County shall adopt a voluntary Oak Woodland Management Plan to identify and mitigate significant direct and indirect impacts to oak woodlands. Mitigation may be accomplished through a combination of the following measures:

- 1) Conservation easement and land dedication for habitat preservation;
- 2) Payment of in-lieu fees; and/ or
- 3) Replacement planting of appropriate size, species, area, and ratio.

Policy CON-25: The County shall disseminate information to land owners regarding habitat conservation and other natural resources goals and build partnerships to accomplish effective outreach regarding policies, incentives, and regulations.

Policy CON-28: To offset possible additional losses of riparian woodland due to discretionary development projects and conversions, developers shall provide and maintain similar quality and quantity of replacement habitat or in-kind funds to an approved riparian woodland habitat improvement and acquisition fund in Napa County. While on-site replacement is preferred where feasible, replacement habitat may be either on-site or off-site as approved by the County.

b) Climate Protection and Sustainable Practices for Environmental Health Policies

Policy CON-65: The County shall support efforts to reduce and offset greenhouse gas (GHG) emissions and strive to maintain and enhance the County's current level of carbon sequestration functions through the following measures:

- 1) Study the County's natural, agricultural, and urban ecosystems to determine their value as carbon sequesters and how they may potentially increase.
- 2) Preserve and enhance the values of Napa County's plant life as carbon sequestration systems to recycle greenhouse gases.

Oak Woodlands policies in the General Plan's Conservation Element are complemented by the goals and policies provided in other elements of the General Plan. Agricultural preservation policies, including large minimum lot sizes, concentration of urban uses in designated urban areas, and "Measure J/ P" requirements for a public vote to change the General Plan land use designation from agricultural to non-agricultural uses have minimized the conversion of oak woodlands and other open spaces. In addition, Recreation and Open Space policies support the acquisition of open space through financial and other incentives to encourage dedication in easement or fee title of significant fish and wildlife habitats and other open space resources to public agencies and non-profit land conservation organizations, acceptance of mitigation funds and dedications of easements or property for the purpose of resource protection, consistent with program goals, and utilization of federal, state, and regional funding to supplement local funding for providing sustainable, long-term stewardship of open space resources and habitats.

2. Napa County Code

The Napa County Code contains a number of ordinances and regulations whose provisions directly and indirectly serve to support the protection, conservation and management of oaks and oak woodlands throughout Napa County. These include the Zoning Ordinance (Title 18), which contains the Conservation Regulations (Chapter 18.108) and the Viewshed Protection Regulations (Chapter 18.106), and the Environment (Title 16) which contains the Floodplain Management Regulations (Chapter 16.04). A summary of some of the applicable provisions of these chapters is provided below.

A. CONSERVATION REGULATIONS – CHAPTER 18.108

The Conservation Regulations were adopted in 1991 and were intended to balance the desires for environmental and agricultural sustainability in Napa County. These regulations established procedures for review of projects that might have an effect on water quality or other natural resources issues. Some of the protections provided by the Conservation Regulations include:

- Preservation of existing vegetation/ trees where necessary for the preservation of threatened plant or animal species(18.108.100);

- Protection of streams with setbacks of 35-150 feet based upon slope, to provide for the retention of existing riparian oak woodland and forest, as well as other riparian plant species (18.108.025);
- Protection of sensitive domestic water supply drainages through maintenance of 60% of tree canopy cover and 40% of shrubby/ herbaceous cover(1993) to help provide water quality protection and the long-term retention of oak and other woodlands, as well as other plant species(18.108.027);
- Protection of erosion hazard areas (18.108.070) by requiring erosion control plans for agricultural projects on slopes over 5%. Discretionary projects also require CEQA review which provides for the evaluation of potential oak woodlands impacts (see Section IV.C.2 on CEQA)

B. FLOODPLAIN MANAGEMENT REGULATIONS – CHAPTER 16

The Floodplain Management Regulations (Chapter 16.04) cover a variety of activities, including the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters. Floodplain management provisions seek to preserve riparian vegetation in order to preserve fish and game habitats; prevent or reduce erosion; maintain cool water temperatures for fish; prevent or reduce siltation; and promote wise uses and conservation of woodland and wildlife resources of the county. All development activities within riparian zones, 50 feet from the top of stream banks or 100 feet from the top of bank of the Napa River downstream of Zinfandel Lane, require a permit. These regulations also limit the type and amount of riparian vegetation that may be removed within the riparian zone (Sec 16.04.750).

C. VIEWSHED PROTECTION REGULATIONS – CHAPTER 18.106

The Viewshed Protection Regulations were adopted to protect the scenic quality of the County by ensuring that improvements are compatible with existing land forms, particularly ridgelines, and that views of the unique geologic features and existing landscape of hillside areas are protected and preserved. These regulations are intended to:

- Provide hillside development standards to minimize the impact of man-made structures and grading on views of existing landforms, unique geologic features, existing landscape features and open space as seen from designated public roads within the County;
- Protect and preserve views of major and minor ridgelines from designated public roads;
- Minimize cut and fill, earthmoving, grading operations and other such man-made effects on the natural terrain to ensure that finished slopes are compatible with existing land character; and
- Promote architecture and designs that are compatible with hillside terrain and minimize visual impacts.

B. OTHER LOCAL POLICIES

1. WICC Strategic Plan

The Watershed Information Center and Conservancy (WICC) educates and supports the community in its efforts to maintain and improve the health of Napa County's watershed lands.



The WICC Board of directors serves as an advisory committee to the Napa County Board of Supervisors. The role of the WICC is to assist the Board of Supervisors in their decision-making process and serve as a conduit for citizen input by gathering, analyzing and recommending options related to the management of watershed resources. Although the WICC's focus is more expansive than just oak and oak woodlands, the watershed conservation and management goals and strategies of the WICC serve well to forward the

protection and conservation of the County's oak woodlands. The following are excerpts and summaries from the WICC Board's Strategic Plan:

Vision

Napa County's watersheds will maintain a balance of natural processes to support healthy native fisheries, an abundance of native plants and wildlife, and water quality that meets state standards. The Napa River and its tributaries, no longer listed as impaired, will be a nationwide example of what a community, working together, can do to improve the health of its watersheds(*excerpt*).

Goals

Watershed Conservation & Management

Improve watershed health throughout the entirety of Napa County, which includes its cities and towns, by supporting community efforts to protect and enhance all watershed lands and natural processes with an emphasis on riparian corridors and native species and their habitats.

- Identify, conduct and coordinate watershed studies and monitoring that will improve the community's understanding and management of its watershed resources.
- Identify key watershed areas for restoration, enhancement, and/ or permanent protection.
- Work with and support landowners, citizen organizations, districts and agencies to permanently protect key watershed lands.

Communication, Coordination & Partnerships

Build and strengthen effective partnerships to foster communication, coordination and involvement among all those working to improve the health of Napa County's watersheds.

- Coordinate and facilitate watershed planning, research, and monitoring efforts among Napa County organizations, agencies, landowners, and citizen organizations to limit gaps and overlaps and improve consistency between watershed-related activities.
- Support organizations with a watershed restoration focus.

Education and Outreach

Enable the community - those who live in, work in and visit the County's watersheds - to understand the importance of watershed stewardship and watershed health and be actively involved in improving the health of the County's watersheds.

- Provide targeted watershed conservation and stewardship-related education and information to various subsets of the community including the agricultural community, educators, urban and rural residents, and sub-watershed organizations of Napa County.
- Support appropriate public access to Napa County's watershed lands where suitable to build appreciation and understanding of the County's watersheds and their resources.

2. Napa County Regional Park & Open Space District Master Plan

The Regional Park and Open Space District (RPOSD) Master Plan (2008-13) is organized around four broad goals of facility development, open space preservation, educational programs and District operations and partnerships. The first three goals are derived from the County General Plan and the resolutions establishing the function and responsibility of the District. The fourth goal addresses District operations and management.



These goals are as follows:

- Provide opportunities for outdoor recreation through the development of a system of parks, trails, water resource activities, open space and related facilities.
- Preserve, restore and protect open space lands, natural resources and special habitat areas.
- Provide historical, cultural and environmental education programming opportunities.
- Provide for District management and interagency partnerships.

In addition to the four goals, the Master Plan identifies and incorporates a number of guiding principals that are intended to define general policies the District should follow during this five year period. Some examples of the guiding principles that provide for the protection of woodland and other natural resources are as follows:

- Pursue acquisitions from willing sellers that will help round out the boundaries of or connect together currently isolated tracts of public lands, in order to improve resource stewardship, protect core habitats as well as habitat corridors and to allow trail connections.
- Within the context of the long-term goals and objectives contained in this Master Plan, take advantage of unique time-sensitive opportunities to acquire or protect significant open spaces and habitat.

C. STATE POLICIES & REGULATIONS

1. California Endangered Species Act

The California Endangered Species Act (CESA) protects wildlife and plants listed as endangered or threatened by the California Fish and Game Commission. The CESA is administered by the California Department of Fish and Game (DFG). The CESA prohibits all persons from taking species that are state listed as endangered or threatened except under certain circumstances. The CESA definition of *take* is any action or attempt to “hunt, pursue, catch, capture, or kill.” Section 2081 of the Fish and Game Code provides a means by which agencies or individuals may obtain authorization for incidental take of state-listed species, except for certain species designated as “fully protected” under the California Fish and Game Code. A take must be incidental to, not the purpose of, an otherwise lawful activity. Requirements for a Section 2081 permit are similar to those used in the federal Endangered Species Act (ESA) Section 7 process, including identification of impacts on listed species, development of mitigation measures that minimize and fully mitigate impacts, development of a monitoring plan, and assurance of funding to implement mitigation and monitoring. Since a number of CESA species rely upon oak woodlands for food, shelter and migration, the CESA provides an important means of offering protection for oak woodlands in Napa County.

2. California Environmental Quality Act

The California Environmental Quality Act (CEQA) is the regulatory framework that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. A “project” (as defined under statute) would have a significant environmental impact on biological resources if it has the potential to substantially affect a rare or endangered species or the habitat of that species; riparian habitat, wetlands or other sensitive communities; interfere with the movement of resident or migratory fish or wildlife; or diminish habitat for fish, wildlife, or plants. Analysis of environmental impacts under CEQA begins by establishing a baseline of current conditions that may be impacted by a proposed project. Potential oak woodland impacts are currently evaluated through the CEQA review process conducted for discretionary projects. Oak woodland management planning can help to identify oak

woodland resources, assess baseline conditions, assist in determining thresholds of significance and offer appropriate and effective impact mitigation opportunities and or programs. Napa County has also adopted Local Procedures for Implementing CEQA (2006) to provide the public with information on the criteria, policies, and procedures used in the environmental review process (www.countyofnapa.org/ceqa). Changes to CEQA specifically addressing oak woodlands were included in the Oak Woodlands Conservation Act described below. Updates to the CEQA Guidelines specific to climate change and greenhouse gas(GHG) emissions are expected in January, 2010.

3. California Oak Woodlands Conservation Act (AB 242-2001) and the Oak Woodlands Conservation Act (SB 1334 - 2004)

The California Oak Woodlands Conservation Act(COWCA)(Assembly Bill 242), enacted in 2001, recognizes the importance of California's oak woodlands, the critical role of private landowners, and the importance of private land stewardship. The Act further acknowledges how oak woodlands increase the monetary and ecological value of real property and promote ecological balance. The Legislature created the Oak Woodlands Program with the expressed intent of accomplishing the following:

1. Support and encourage voluntary, long-term private stewardship and conservation of California oak woodlands by offering landowners financial incentives to protect and promote biologically functional oak woodlands;
2. Provide incentives to protect and encourage farming and ranching operations that are operated in a manner that protect and promote healthy oak woodlands;
3. Provide incentives for the protection of oak trees providing superior wildlife values on private land: and
4. Encourage planning that is consistent with oak woodlands preservation.

To accomplish the legislative intent, the Act identifies the Wildlife Conservation Board (WCB) as the responsible entity to implement the Oak Woodlands Conservation Program. The Act authorizes the WCB to purchase oak woodland conservation easements and provide grants for land improvements and restoration efforts. In addition, the WCB is authorized to award cost-sharing incentive payments to private landowners who enter into long-term agreements, which include management practices that benefit oak woodlands and promote the economic sustainability of farming/ ranching operations. To qualify for grant funding, a county or city must have an adopted Oak Woodlands Management Plan, and also certify that grant proposals are consistent with the Plan.

The Act requires that at least 80 percent of the money be used for grants for the purchase of easements, for restoration activities or for enhancement projects. In addition, the funds may be used for grants that provide cost-share incentive payments and long-term agreements. The remaining 20 percent may be used for public education and outreach efforts by



local governments, park and open space districts, resource conservation districts and nonprofit organizations. Within the 20 percent category, funds may also be used for grants designed to provide technical assistance and to develop and implement oak conservation elements in local general plans. While the Act specifies how the monies are to be allocated, the Act requires that priority be given to grants that result in the purchase of oak woodland conservation easements.

The Oak Woodlands Conservation Program 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. The Program is designed to help local efforts 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 Oak Woodlands Conservation Act (Senate Bill 1334) became law on January 1, 2005 and was added to the CEQA statutes as Public Resources Code Section 21083.4. This act requires that a county must determine whether or not a project would result in a significant impact on oak woodlands. If it is determined that a project may result in a significant impact on oak woodlands, then one or more of the following mitigation measures are required:

1. Conserve oak woodlands through the use of conservation easements;
2. Plant an appropriate number of trees, including maintenance of plantings and replacement of failed plantings;
3. Contribute funds to the Oak Woodlands Conservation Fund for the purpose of purchasing oak woodlands conservation easements; and
4. Other mitigation measures developed by the county.

Exemptions are allowed for certain purposes (CEQA 21083.4.d), including affordable housing projects, and conversion of oak woodlands on agricultural land that includes land that is used to produce or process plant and animal products for commercial purposes.

4. Natural Heritage Preservation Tax Credit Act of 2000 (as amended, AB 94 - 2009)

This Assembly Bill (AB 94) reauthorized the Natural Heritage Preservation Tax Credit Act. The purpose of this Tax Credit Program is to protect wildlife habitat, parks and open space, archaeological resources, agricultural land and water by providing state tax credits for donations of qualified land (fee title or conservation easement) and water rights to a designated organization or agency (state/ local government or non-profit). The program objectives include the fostering of public/ private partnerships to resolve land use and water disputes; assisting habitat stewardship; and demonstrating the state's commitment to protect natural resources by rewarding landowners who perceive habitat as an asset rather than a liability. The property and contribution must be approved by the California Wildlife Conservation Board. A taxpayer is allowed an

income tax credit of up to 55% of the donated property's fair market value for donations made on or after January 1, 2010. Any unused credit may be carried over for eight years. The Franchise Tax Board (FTB) is required to report the amount of NHP credit claimed by tax year to the WCB. Protection of oak woodlands through this act provides a tax incentive to landowners wishing to donate their property to a state or locally designated agency or non-profit.

5. Z'berg Nejedly Forest Practice Act(1973)(California Forest Practice Rules)

The California Forest Practice Rules (Rules) (Title 14, California Code of Regulations Chapters 4, 4.5 and 10) implement the provisions of the Z'berg-Nejedly Forest Practice Act of 1973. Under the Rules, owners of timberland proposing to convert that timberland to another use (as defined in Section 1102) must obtain a Timberland Conversion Permit (TCP) from the California Department of Forestry and Fire Protection. As part of the permitting process, the applicant is also required to submit a Timber Harvest Plan (THP), prepared by a licensed forester, demonstrating that the timber harvest will incorporate feasible mitigation measures to substantially lessen or avoid significant adverse environmental impacts. While oaks are a non-timberland species not directly regulated, a THP/ TCP cannot be approved if implementation of the plan as proposed would result in either a "taking" or finding of jeopardy of a listed species.

6. California Fish and Game Code

The California Fish and Game Code offers protection for a variety of fish and game species and the habitats they rely upon. Oak woodlands offer habitat, shelter and forage for many of California's protected species. Management of oak woodlands for the protection and conservation of California's fish and game go hand in hand with oak woodland preservation goals locally and across the state.



Fully Protected Species

The California Fish and Game Code provides protection from take for a variety of species. Certain species are considered *fully protected*, meaning that the code explicitly prohibits all take of individuals of these species except for take permitted for scientific research. Some species are protected under the California Fish and Game Code, but not fully protected.

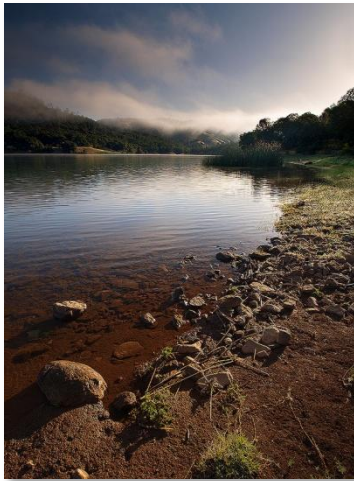
The Department of Fish and Game (DFG) maintains the California Natural Diversity Database (CNDDDB), a database containing information on the location and characteristics of special-status species occurrences. The database contains information related to the accuracy of each occurrence, such as the spatial resolution of the occurrence mapping, the year when the occurrence was last documented, and the

identity of the person who documented the occurrence. Updated CNDDDB data are released every six months. Special status species are plants and animals that are legally protected under the federal Endangered Species Act (ESA), California Endangered Species Act (CESA) or other federal, state or local regulations and are designated as endangered, rare, or threatened. Napa County is home to approximately 114 special status plant species and 24 special status wildlife species, with more than 50 special status plant and wildlife species associated with oak woodlands (BDR, 2005).

Protection of Birds and their Nests

Eggs and nests of all birds are protected under Fish and Game Code Section 3503, nesting birds (including raptors and passerines) under Sections 3503.5 and 3513, and birds of prey under Section 3503.5. Migratory non-game birds are protected under Section 3800, and other specified birds under Section 3505.

Stream and Lake Protection



DFG has jurisdictional authority over streams and lakes and the wetland resources associated with these aquatic systems under California Fish and Game Code Sections 1600 et seq. California Fish and Game Code Section 1600 et seq. was repealed and replaced in October of 2003 with new Sections 1600–1616 that took effect on January 1, 2004 (Senate Bill No. 418 Sher). DFG has the authority to regulate work that will “substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.” DFG enters into a streambed or lakebed alteration

agreement with the project proponent and can impose conditions in the agreement to minimize and mitigate impacts to fish and wildlife resources. A lake or streambed alteration agreement is not a permit, but rather a mutual agreement between DFG and the project proponent. Because DFG includes under its jurisdiction streamside habitats that may not qualify as wetlands under the Federal Clean Water Act (CWA) definition, DFG jurisdiction may be broader than Corps jurisdiction.

7. Greenhouse Gas (GHG) Emission Reduction (AB32 & SB375)

In 2006, the State Legislature enacted Assembly Bill 32 (AB 32), requiring the California Air Resources Board (CARB) to design measures and rules to reduce GHG emissions statewide to 1990 levels no later than 2020. The measures and regulations to meet the 2020 target are to be put in effect by 2012, and the regulatory development of these measures is ongoing by CARB, the designated lead agency. A Scoping Plan was approved by the CARB on December 12, 2008 which provides the outline for actions to reduce California’s GHG emissions. The Scoping Plan now requires CARB and other state agencies to adopt regulations and other initiatives reducing GHGs. CARB also

adopted California Climate Action Registry (CCAR) Forestry Protocols in 2007 (updated in 2009) to provide tools for voluntary carbon accounting in the forest sector. Forests can absorb (sequester) and store carbon long-term, and they have the potential to provide significant greenhouse gas (GHG) reductions when managed for carbon benefits. Adoption of the protocols represented the Board's endorsement of a technically sound approach for carbon accounting in voluntary forest projects.

In September 2008, the Legislature enacted Senate Bill 375, which established a process for the development of regional targets for reducing passenger vehicle GHG emissions. Through the SB 375 process, regions throughout the state will develop plans designed to integrate development patterns and transportation networks in a manner intended to reduce GHG emissions.

Neither the State nor Napa County has adopted explicit thresholds of significance for GHG emissions. While some might argue that *any* new emission would be significant under CEQA, recent amendments to the State CEQA guidelines suggest that agencies must consider the extent to which a project complies with requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. The Bay Area Air Quality Management District adopted CEQA significance thresholds on June 2, 2010 for GHG emissions related to development projects, such as industrial/ commercial and residential development. The BAAQMD guidelines also place emphasis on climate action plans.

D. FEDERAL POLICIES & REGULATIONS

1. Endangered Species Act

The federal Endangered Species Act (ESA) protects fish and wildlife species that have been identified by the U.S. Fish and Wildlife Service and/ or the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) as endangered or threatened. It also protects the habitats in which they live. *Endangered* refers to species, subspecies, or distinct population segments that are in danger of extinction throughout all or a significant portion of their range while *threatened* applies to species, subspecies, or distinct population segments that are likely to become endangered in the near future. The ESA protects oak woodlands when they are habitat to an endangered species such as the pallid bat or the Cooper's hawk, both resident species of Napa County's oak woodlands. USFWS and NOAA Fisheries administer the ESA directly or through state and local public trust agencies.

2. Clean Water Act

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. "Clean Water Act" became the Act's common name with amendments in 1977.

The CWA is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water nor with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

For many years following the passage of the CWA, EPA, states, and Indian tribes focused mainly on the chemical aspects of the "integrity" goal. During the last decade, however, more attention has been given to physical and biological integrity. Starting in the late 1980s, efforts to address polluted runoff have increased significantly. For "nonpoint" runoff, voluntary programs, including cost-sharing with landowners are the key tool. For "wet weather point sources" like urban storm sewer systems and construction sites, a regulatory approach is being employed.

Evolution of CWA programs over the last decade has also included something of a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach equal emphasis is placed on protecting healthy waters and restoring impaired ones. A watershed approach addresses a full array of issues, including riparian oak woodland services to improve water quality, not just those issues subject to CWA direct regulatory authority.

3. Other Federal Policies/Regulations

At the federal level, the Bureau of Reclamation's (BOR) Lake Berryessa property is governed by a Visitors Services Plan (VSP) as presented in a Record of Decision (ROD). The VSP ROD, released in June 2006, prescribes basic management principles to guide and support lake-wide integration of Government and commercial operations in the best interests of the visiting public. The VSP ROD limits future development of the concession areas to facilities that support short-term, traditional, non-exclusive, and diverse recreation opportunities at the lake. Reclamation will partner with other Government agencies, private landowners, and private organizations to design/construct a regional trail system for non-motorized recreation, to include a multipurpose shoreline trail.

The other major federal agency is the Bureau of Land Management (BLM). The lands under its ownership within Napa County are governed by a Resource Management Plan (RMP) approved in 2006. BLM's mission is very broad, encompassing resource protection, resource development, hunting, off-road vehicle use, hiking, camping, mountain bicycling and horseback riding. Each federal agency generally has its own policies to protect oak woodlands, and they are subject to the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Federal Land Policy & Management Act (FLPMA), and other internal agency laws, policies, and regulations.

V. Threats to Oak Woodland Communities

Because Napa County has a long history of open space and agricultural preservation policies, the county's oaks are at less risk from development than are other counties in our region, but conversion of oak woodlands does occur and is projected to continue. Conservation of the existing oak woodlands in Napa County is a challenge due to a number of factors that threaten their continued health and longevity. Some of these threats include: lack of regeneration, conversion to agricultural land (primarily vineyards), fragmentation of oak communities, sudden oak death, reduced access to groundwater, increased suppression of fire and risk of catastrophic fire damage both human and natural caused. A summary of current potential threats to our oak woodlands are provided below.

A. LACK OF REGENERATION

Throughout California, the lack of regeneration in various native oaks has raised serious concern for landowners and managers, public trust agencies, policy makers and the public in general. Several statewide surveys have shown that some native oak species, including blue and valley oak, have inadequate levels of regeneration to sustain their populations over the long term. To be sustainable, oak woodlands need to produce



enough new trees to offset the loss of mature trees due to natural mortality as well as human caused factors. The regeneration process relies on the successful establishment and growth of new seedlings and eventual recruitment of these seedlings to the sapling and tree stages. Without adequate regeneration, oak stands thin out over time and eventually disappear as the last remaining oaks die.

Acorn production varies widely from year to year. Most oaks regenerate from a bank of persistent seedlings beneath the canopy, or a "seedling bank." Some species germinate in the winter after they have dropped and do not persist as a seed bank in the soil from year to year. Since most acorns land under or near the canopy of the parent tree, most of the seedling bank is in a very localized area. The shading and buildup of organic mulch beneath oak canopies favors acorn germination and early seedling growth. Although oak canopy enhances seedling establishment, it suppresses the transition of seedlings to saplings. Persistent oak seedlings, which may be no taller than 6 inches in species such as blue oak, may survive for years in the understory. These seedlings can produce a strong root system but show little shoot growth. In fact, shoots of persistent seedlings may periodically die back to the ground, and re-sprout from the seedling base in the following growing season.

Understory seedlings typically remain suppressed until competition is removed or eliminated by the decline, death, or removal of overstory trees. Seedlings released from overstory suppression can respond with relatively rapid shoot growth and can grow into saplings that eventually refill the canopy gap. Although a lack of sapling-sized oaks has been used to suggest that oak regeneration is inadequate, oak saplings are not likely

to be found in well-stocked woodlands. A lack of saplings in and near recent canopy gaps, however, is clear evidence of inadequate regeneration. In woodlands with stable canopy cover, low populations of persistent seedlings in the understory are the primary indicators of inadequate regeneration.

Although most oak regeneration occurs through this near-canopy pattern, some acorns are planted beyond the oak canopy by seed-eating animals, especially scrub jays. If these acorns are placed in a favorable seedbed, in areas that have good levels of soil moisture, minimal amounts of plant competition, and little or no impact from herbivores, the acorns can produce vigorous seedlings. Pioneer colonization of this type is seen in gardens, landscape beds, and sometimes along roadsides beyond pasture fences where browsing is minimal and road runoff provides additional soil moisture. Artificial methods for establishing oaks from seed are based on creating favorable germination and growth conditions through weed control and protective enclosures. These conditions are uncommon in open grasslands used for ranging livestock, so oaks do not typically colonize active pastures even if they have historically supported oak woodlands.

Some or all of the following factors may constrain oak regeneration at a given site. Alleviating only one constraint may or may not be adequate to ensure successful regeneration.

1. Low acorn production

Most California oaks that have been studied appear to require cross pollination to produce adequate acorn crops. Because oak pollen is dispersed by wind, adequate pollination will not occur in oaks that are far from others of the same species. Hence, isolated trees may produce few if any acorns.



2. Poor seedbed conditions

Healthy mature acorns normally fall from trees between September and October, often well before the soil has been wetted by fall rains. Natural mulch composed of leaf litter provides protection for acorns. Mulch prevents acorns from being overheated and desiccated and also protects at least some from being eaten. In areas that lack natural mulch and have been compacted by livestock, few acorns may be able to survive and germinate.



3. Herbivory

Animals that eat acorns and seedlings can substantially impact the growth and survival of oak seedlings and saplings. Rodents, deer, wild turkeys and pigs, and livestock all have the potential to limit or eliminate oak reproduction, but the relative importance of each herbivore varies by location. Gophers, ground squirrels,

and voles can kill juvenile oaks by chewing and girdling stems. Livestock eat and trample understory seedlings, depleting or eliminating understory advance regeneration. Heavy browsing of released seedlings by livestock or deer can indefinitely suppress their growth and inhibit recruitment to sapling and tree size classes. Interior live oak is less palatable to livestock than valley and blue oak, so grazing impacts these species differently.

4. Water Stress and Groundwater

Due to California's Mediterranean climate, water stress associated with summer drought is an important factor limiting oak seedling survival and growth. Water stress is increased by the presence of non-native annual grasses and forbs in the understory that deplete soil moisture rapidly in the late spring. Shading provided by the oak canopy reduces impacts from temperature and wind speed, thereby reducing water stress. However, overstory oaks ultimately compete with seedlings for soil moisture, suppressing their growth. In riparian areas where soil moisture is less limited, valley oak regeneration can advance to the sapling size class even in the presence of overstory canopy.

Changes in groundwater tables/ levels resulting from overdraft conditions or "losing" streams and waterways can be particularly problematic for valley oak survivorship. Valley oaks often produce deep sinker roots that can reach the ground water. This allows the tree to access a constant supply of moisture throughout the summer and permits fast growth of the canopy. Because the tree canopy is dependent on this permanent source of water, a substantial drop in the depth of the water table puts the tree under severe water stress. Although root growth can keep pace with minor fluctuations in the groundwater table, roots cannot grow fast enough to compensate for a rapid drop of several feet or more. Furthermore, once the tree becomes severely water stressed, root growth is adversely affected, which can cause a spiraling cycle of increasing water stress that can severely debilitate or kill mature trees. Large, mature valley oaks are more susceptible to rapid reductions in water table depth than are younger trees that may be able to adapt more rapidly to changing conditions.

At any given site, a number of factors may be constraining seedling establishment and growth. Restoring regeneration potential may require changes in management practices to alleviate those factors that completely inhibit oak seedling establishment and sapling recruitment. Management changes can have both positive and negative impacts, however. In some areas, complete cessation of grazing can lead to greater competition from non-native grasses and increased vole populations, leading to more seedling damage and reduced oak seedling establishment. Site-specific assessments are generally needed to assess the status of oak regeneration, identify factors that may be limiting regeneration, and develop management strategies that can promote natural regeneration. These same principles apply in areas where attempts are being made to restore oak woodlands.

B. FIRE FREQUENCY AND SEVERITY

Napa County has a long and active wildfire history. The County is characterized by narrow valleys surrounded by steep, hilly terrain. With its long, dry summers and rugged topography, Napa County has a high wildland fire potential. In the last several decades the combination of firefighting technology, fire suppression policy, environmental regulations and developmental trends has led to increasing fuel loads, greater occupancy of remote wildlands and greater potential for catastrophic wildfire. Over the past 30 years (mid-1970s to 2004) wildfires have burned approximately 232,000 acres of land in or directly adjacent to Napa County; a County of approximately 482,000 acres (BDR, 2005). The Rumsey fire, which burned 40,000 acres in October of 2004, was the largest of the year. Spread across Yolo and Napa Counties, it cost over \$10,000,000 to suppress and caused \$1,000,000 in damages. And in 2008, the Wild Horse Valley fire burned more than 4000 acres in eastern hills along the Napa and Solano county line.

Climate and landscape characteristics are among the most important factors influencing hazard levels. Weather characteristics such as wind, temperature, humidity and fuel moisture content affect the potential for fire. Of these four, wind is the dominant factor in spreading fire since burning embers can easily be carried with the wind to adjacent exposed areas, starting additional fires. While the County has a characteristic southerly wind that originates from the San Francisco Bay



(which becomes a factor in fire suppression), during the dry season the County experiences an occasional strong north wind that is recognized as a significant factor in the spread of wildland fires (City of Napa 2004). Landscape characteristics such as steep slopes also contribute to fire hazard by intensifying the effects of wind and making fire suppression difficult. Vegetation type influences wildfire hazard levels as well. For example, landscapes dominated by chaparral are more flammable than other vegetation types. The combination of highly flammable vegetation, steep inaccessible wildlands, and high levels of recreational use can result in wildfire risk and hazards of major proportions.

Most of the tree oak species in California are adapted to tolerate fire in varying degrees. Mature oaks can survive frequent, low intensity fires, while younger trees regenerate after low-intensity fires by resprouting. However, studies indicate that while oak seedlings and saplings resprout readily after topkill, many juvenile oaks are killed by fire. After resprouting oak saplings require several to many years to recover their aboveground biomass. Repeated destruction of oak shoots in successive years depletes seedling energy reserves and increases the likelihood of disease and mortality. The combination of repeated fire and grazing is especially damaging to oak regeneration, and was historically used to convert woodlands to grasslands. Native Americans used

fire as a tool to manage oak woodlands, although the frequency of anthropogenic burning during the Native American period is unknown. European ranchers used fire to keep rangeland open and to stimulate forage production, probably burning every 8–15 years (Sandiford 1994). Fire suppression beginning in the 1950s has changed the fire regime in oak woodlands from frequent, low-intensity fires to infrequent, high intensity, fires. Such high-intensity fires can lead to the loss of oak woodlands. Approximately 52% of Napa County’s oak woodlands are at high or very high risk for fire.¹⁹

C. LAND USE/HABITAT CONVERSION

Oak woodlands in the County are being lost through conversion to agriculture, urban and rural residential development and to a lesser extent commercial development and infrastructure. In some areas, such as the eastern hills, the rate of oak woodland conversion to vineyards has been higher than in other areas of the county. However, Napa County’s large minimum lot sizes, one percent annual limit on growth and urban-centered growth policies have restrained development in the unincorporated county, essentially conserving many natural areas containing oak woodlands.

1. Rural Residential and Urban Development.

Rural residential and urban development may result in the conversion of oak woodlands to other uses if the development occurs in areas where oak woodlands exist today. However, Napa County has historically directed growth to the incorporated cities/ town and to a limited number of designated urbanized areas. The 2008 General Plan Update maintained this policy framework and perpetuated restrictions on the subdivision of large private parcels in the unincorporated area. These growth policies have resulted in the protection of oak woodlands (as well as locally important agricultural land), and the Draft EIR prepared for the General Plan Update estimated that only 119 to 145 acres of woodland (deciduous oak woodland, evergreen oak woodland, and mixed willow woodland) will be lost due to rural residential and urban development in the County between 2005 and 2030.

2. Agricultural Conversion.

Approximately 20 percent of the land area in Napa County is committed to agriculture, including vineyards, orchards, rangeland, and other crops. The extent of vineyard acreage has grown steadily in more recent years due to the growing demand for premium wine and winegrapes. The Draft EIR prepared for the General Plan Update in 2008 assessed the impacts of continued vineyard development by developing a projection of new vineyards (specifically, 10,000 to 12,500 new acres between 2005 and 2030), and by assessing a number of scenarios representing possible distribution (i.e. the location) of vineyard development. The result of this analysis was an estimate that between 2,682



and 3,065 acres of woodlands (deciduous oak woodland, evergreen oak woodland, and mixed willow woodland, non-native woodland, valley oak woodland, and white alder woodland) will be lost due to vineyard development in the County between 2005 and 2030.

While current market conditions have the potential to slow the rate of conversion of oak woodlands to intensive agriculture, oak woodlands that are located on potentially productive agricultural soils remain at risk and make up 58,526 acres, or 36% of Napa County's current oak woodlands. Between 1993 and 2002, one half of one percent of Napa County's oak woodlands (approx. 733 acres) were converted to vineyards, including several acres of sensitive oak communities.²⁰

3. Infrastructure Development.

Local and regional growth in tourism, jobs, and housing increases demand for new infrastructure, including highway and road expansion, as well as electrical, water and wastewater services. The end result of this demand is often the expansion of infrastructure projects which can temporarily or permanently impact existing oak woodlands. On a more regional level, large roadway expansion projects will likely continue to threaten California's oak woodland resources.

D. DISEASE: SUDDEN OAK DEATH

Oak woodlands in Napa County are also threatened by Sudden Oak Death (SOD), a fungal disease caused by the pathogen *Phyophthora ramorum*. First detected in the mid-1990's, the disease is responsible for widespread tree mortality in the central coast region of California. It is now known to infect over 70 ornamental and wildland plant species and genera and that number has been dramatically increasing every year. SOD is usually recognized as a forest phenomenon and it is not typically seen in true landscape settings, although more recent findings at numerous retail nurseries and wholesale growing grounds may alter that picture. While the term "sudden" refers to the relatively rapid browning of the foliage, a tree showing these symptoms has in actuality already been infected for months or years with the pathogen.

Fourteen counties in California – from Monterey to Humboldt – are currently known to be infested with SOD in natural settings. Because the pathogen requires a moist environment to germinate and disperse, most infestations are found in fog-belt or densely wooded, riparian areas. Natural spread usually occurs by wind-driven rain, soil erosion, and streams. In Napa County, with a few exceptions, SOD has been confirmed mostly on the western side of the county – in the Mayacamas Mountains. The disease is not expected to survive in hot, dry climatic conditions that exist in such areas as Pope Valley and Lake Berryessa. However, wet years may allow for the spread of the disease throughout the County and there is some concern that the pathogen could adapt to Napa County's warmer, drier climate. In Napa County, SOD mainly affects Coast Live Oak, California Black Oak, Tanoak, and California Bay Laurel. Valley Oak, Blue Oak, Oregon Oak, "scrub" oaks, and other members of the so-called "white oak" group are

not susceptible to SOD. While certain oaks may die from the disease, most other host plants display only leaf spots and/ or branch/ twig dieback, mortality occurring only under extreme conditions. The Bay Laurel is the primary culprit responsible in California for allowing the spores of *P. ramorum* to germinate and spread to the oaks.

The vast majority of oak mortality seen in Napa County is due to causes other than SOD. Other diseases and pests like oak root fungus, crown rot, and various insects, as well as soil compaction, grade changes, and root injury contribute significantly to the decline and eventual death of numerous trees.

Comprehensive state, federal, and international quarantine measures have been instituted to minimize the likelihood of the artificial (ie-human) spread of SOD. The movement of host plant material, such as nursery stock, firewood, and green waste out of Napa County is tightly restricted. The Napa County Agricultural Commissioner's Office has information available for property owners to help reduce the chances of spreading the disease, as well as for those who take part in recreational activities, such as hikers, mountain bikers, and horse riders, in areas that may be experiencing SOD.

E. CLIMATE CHANGE AND ECOTONE/SPECIES MIGRATION

Napa County is home to a diverse population of plants species which in turn support a wide range of wildlife species, including many rare, threatened and endangered species. Native plants and animals are increasingly at risk as temperatures rise and scientists are reporting more species moving to higher elevations or more northerly latitudes in response. Increased temperatures also provide a foothold for invasive species of weeds, insects and other threats to native species. The increased salinity and flow of water resources could adversely affect the food supply and spawning conditions for native fish, and the natural cycle of plant flowering and pollination could be affected.

In Napa County, climate change may result in decreased genetic diversity, a reduction in seed dispersal, decreased or extirpated populations, and long-term distribution changes. Currently there is an invasion of Douglas Fir in the west and Foothill Pine in the east with subsequent succession causing many oak stands to become overtopped and lose vigor. The current fir and pine populations expansions are taking place to the detriment of oak and other hardwoods.²¹

Natural disasters such as drought, wildfires, and flooding can be instigated by temperature and precipitation changes.²² Scientists at U.C. Santa Cruz are concerned that rising temperatures and decreasing rainfall associated with global climate change will cause almost half of California's oaks to die out by 2090.²³ These forecasts focus particularly on blue oak and valley oak species, both of which are represented in continually decreasing numbers in Napa County.

F. WOODCUTTING FOR FIREWOOD PRODUCTION

Woodcutting can be an integral part of a sustainable woodland management plan that balances sustainable yield harvesting with habitat protection and agricultural use. If

firewood harvesting is not severe, effects on wildlife and stand structure can be negligible (Garrison and Standiford 1997). However, indiscriminate cutting without regard for habitat continuity, lack of replanting or protection of saplings, removal of nest or wildlife trees, and thinning to produce a monoculture can all contribute to reduction of overall quality of the woodland habitat and eventual loss of the woodland resources. From an economic (and recreational) perspective, removal of oak trees or damage to the viability of the woodland may also decrease the habitat potential for game species.

VI. Establishing Priorities for Oak Woodland Conservation and Restoration

Successful oak woodland conservation efforts will require an on-going commitment by the community based upon cooperation and collaboration among private landowners, public agencies, non-profits, and others. Napa County has already begun efforts in support of oak woodland conservation and restoration, including several on-the-ground projects, property acquisitions by the Regional Park and Open Space District, and others.

A. CURRENT EFFORTS

Some of the priority projects currently underway in the County include:

- **Rutherford Dust Napa River Restoration Project** . A plan to provide for the long-term management and restoration of a 4.5 mile reach of the Napa River from Zinfandel Lane bridge to the Oakville Crossroad. Initiated in 2002 by the Rutherford Dust Society(RDS), the RDS and Napa County pioneered an innovative partnership to realize this vision. Project objectives include the reduction of erosion, flood damage and sediment loading, and the restoration of salmonid/ aquatic habitat and riparian habitat, including oak woodlands. Project development and funding was provided by the property owners, Napa County/ Flood District and multiple state agencies. A comprehensive design for the project was completed in October 2008 and construction began in July 2009. For California’s agricultural sector and beyond, this project provides a community-based leadership model for watershed restoration.
- **Oakville Napa River Restoration Project**. The second large-scale Napa River restoration project, this plan provides for the restoration of a 10 mile reach of the river between Oakville Crossroad and Oak Knoll Avenue. As with the RDRT project, the Oak Knoll project is a collaborative effort supported by property owners along the reach. The project is intended to control erosion



and flooding, and preserve/ restore salmonid and riparian habitats, including oak woodlands. Napa County provided local matching funding to enable the project to acquire a grant from the State Water Board for the first phase of work. A conceptual design for the project is currently underway.

- **South Wetland Opportunity Area Restoration Project (SWOA).** As part of the restoration objectives for the Napa County Flood Protection Project (Project) the Napa County Flood Control and Water Conservation District (District), in partnership with the Army Corps of Engineers, restored physical processes and enhanced ecological functions and habitat to over 850 acres of naturally functioning floodplains and tidal marshes within the Napa River Watershed; including the creation of over 77 acres of valley oak woodland habitat. The SWOA, purchased with funds from the District and protected in perpetuity through a conservation easement, ensures the permanent protection of a mosaic of native habitat types within Napa County.
- **Acquisition of Berryessa Vista Wilderness Park.** The County in 2008 granted the Napa County Regional Park and Open Space District Proposition 12 capital grant funds available to the County, to assist the District in acquiring 224 acres south of Lake Berryessa. The acquisition ensures permanent protection of this natural landscape, one-third of which consists of oak woodlands comprised of Interior Live Oak.
- **Acquisition of Moore Creek Watershed Lands.** The County in 2008 granted funds to the Napa County Regional Park and Open Space District to match other funding for the acquisition and improvement of 673 acres of open space in the Moore Creek watershed. Approximately one-third of this property is oak woodlands containing valley oak, coast live oak and blue oak.
- **Support for the Napa County Regional Park and Open Space District.** The County annually provides operational funding for the District, which in part assists with preservation and restoration of oak woodlands. In 2008 the District obtained a conservation easement to 39 acres at Linda Falls; approximately 10 acres of this property consists of mixed oak alliance (coast live oak, others). In 2009 the District planted valley oaks and coast live oak as part of the restoration of approximately 1,000 feet of Moore Creek. In addition, in 2010 the District is planning on restoration of 5 acres of valley oak and coast live oak woodland at the Napa River Ecological Reserve.
- **Support for California Native Plant Society.** In 2009 the County's Wildlife Conservation Commission awarded a grant to the California Native Plant Society-Napa Chapter to support their native plant garden and nursery located at Skyline Wilderness Park. The garden helps educate the public about the value of native oaks, and the nursery propagates many species of native plants including local oak varieties for use in restoration projects in many parts of Napa County.

B. PRIORITY CONSERVATION & RESTORATION CRITERIA²⁴

To support continued conservation and restoration efforts throughout the County, evaluation criteria can help to identify high-priority, voluntary oak woodland conservation and restoration opportunities. This section provides an overview of suggested criteria that can assist willing landowners, public agencies, nonprofit organizations and other project partners in identifying priority areas with the highest oak woodland resource values. The evaluation criteria assess a broad range of oak woodland resource values, such as stand composition and distribution, tree cover and density, plant and wildlife habitat availability (including special status species), historical and cultural significance, and recreational opportunities (see Appendix D-Conservation & Restoration Evaluation Criteria). In addition, the criteria factor in the threat of loss and potential management constraints, and complement countywide conservation and watershed planning efforts.

The evaluation criteria assist in establishing priorities by using a three (3) layered approach to assign an overall priority to a parcel which can be tailored to the specific landowner or funding source requirements. The three-layers considered in the ranking system are:

- (1) **resource value** - an aggregate assessment of the natural resource values associated with a-given oak woodland (most important layer in the prioritization system);
- (2) **risk category** - an assessment of the likelihood that the resource will be lost or seriously-degraded over various time horizons if no conservation actions are instituted; and
- (3) **management constraints** – a measure reflecting the level of land management inputs needed to maintain the resource value (e.g-control invasive species, promote oak regeneration).

The evaluation criteria are designed to provide flexibility and can be modified over time by adding criteria or adjusting thresholds for priority rankings as needed to address changing resource needs. Specific weighting has not been assigned to the various criteria, as their relative importance may change over time based on the locations and types of conservation projects that are implemented and their effectiveness. The County's Geographic Information System (GIS) provides data on oak woodland species, density and distribution, which can be supplemented by field and other site specific information in areas where the scope and resolution of GIS data may be limited.

Napa County encourages organizations and agencies working on oak woodland conservation activities to use the criteria for establishing priorities for conservation and restoration, and to facilitate projects that are consistent with these priorities through advance planning and transactional assistance. Napa County will use the criteria as part of the process to determine if conservation projects are consistent with the County's Voluntary Oak Woodland Management Plan, as required by the Wildlife Conservation Board's oak woodland grant program. A higher priority will be assigned for conservation or enhancement/ restoration-projects on oak woodland parcels that provide the greatest overall level of benefits based upon the ranking system, with input from property owners and their consulting oak woodland ecologist, the Napa County Regional Park & Open Space District, and the public.

VII. Voluntary Mechanisms to Encourage Long-term Conservation by Private Landowners

A. OUTREACH & EDUCATION

Outreach and education are important cornerstone components in the protection, restoration and enhancement of Napa County's oak woodlands. Targeted outreach and education provides improved awareness, understanding and needed volunteerism. These efforts should be directed toward several key audiences:

- Public at-large
- Private landowners in oak woodland areas
- Public agency managers and decision makers
- Local government decision makers and planners
- Non-profit and volunteer organizations



Implementation actions may include:

- Website/ Online information
- Workshops
- Brochures/ Handouts
- Oaks Appreciation Day/ Week/ Month
- Environmental/ Green event participation/ sponsorship
- Distribution of information to teachers, landowners, decision makers
- Establishment of a Speakers Bureau
- Public service announcements (radio, cable, print)
- Local Cable Access Channel
- Inclusive project coordination and participation
- Others opportunities as they arise.

B. CALIFORNIA OAK WOODLAND CONSERVATION PROGRAM

In 2001, the California Legislature passed the California Oak Woodland Conservation Act (COWCA). The Act acknowledged the positive impact that oak woodlands have on the monetary and ecological values of property within these environments. As a result of the COWCA, the Oak Woodland Conservation Program was established within the Wildlife Conservation Board (WCB). The program was designed to provide \$10 million annually to help local jurisdictions protect and enhance their oak woodland resources. It offers landowners, conservation organizations, cities, and counties an opportunity to obtain funding for projects designed to conserve and restore California's oak woodlands. It authorizes the WCB to fund land protection, land improvements, oak education, and restoration.

The Act requires that at least 80 percent of program dollars be used for grants that fund land protection, restoration or enhancement projects within oak woodlands. The remaining 20 percent of the funds can be used for public education and outreach efforts by local governments, park and open space districts, resource conservation districts, and nonprofit organizations. Within the 20 percent category, funds can also be used for grants designed to provide technical assistance and to develop and implement oak conservation elements in local general plans (McCreary 2004) (CWCB 2001). The WCB's funding in recent years has derived primarily from several large bond initiatives. In 2008, the WCB contributed to more than 100 projects with approximately \$112 million of WCB grant expenditures matched by nearly \$143 million in partner contributions.

A requirement for program funding under the Act is the preparation of an oak woodland management plan. To qualify for grant funding, a county or city must have an adopted Oak Woodlands Management Plan, and also certify that grant proposals are consistent with the Plan. This document has been prepared to satisfy the Act's requirements. Once adopted by the Napa County Board of Supervisors, Napa County and its residents will be eligible for grant funding under the COWCA.

C. OAK WOODLAND CONSERVATION EASEMENTS

A conservation easement is a legal agreement between a landowner and a non-profit organization or government agency that restricts the type of uses allowed on the property in order to protect its conservation values. It allows the landowner to continue to own and use the land, within the constraints of the contract, and to sell it or pass it on to heirs. Each easement is individually negotiated and only certain rights to the land are purchased or donated. For example, the landowner might give up the right to build additional structures, while retaining the right to ranch or grow crops.

Conservation easements run with the land and are generally permanent, with future owners also bound by the terms of the agreement. An easement may apply to just a portion of a parcel and usually does not need to allow public access. In some cases, fee simple purchase may be a preferred alternative, when public ownership and access is also warranted, as in a public park or trails. Currently there are more than 15,000 acres under conservation easements in Napa County, not including lands with easements also owned in fee title by a public agency.²⁵ If an easement is donated to a qualified public agency or land conservation organization, and benefits the public by permanently protecting important resources, such as oak woodlands, it may qualify as a tax-deductible charitable donation. Conservation easements may also lower the property's assessed value (annual property tax), and estate tax when passing land on to the next generation.



In Napa County, lands under a conservation easement are usually assessed at a similar rate as properties protected under the Williamson Act (California Land Conservation

Act of 1965). Conservation easements may also enable landowners and/ or their heirs to avoid paying capital gains taxes. In addition, the State of California offers up to a 55 percent state income tax credit for donations of conservation easements, subject to various limitations.

D. COST SHARING AGREEMENTS

According to information provided by the Wildlife Conservation Board under the Oak Woodlands Conservation Program, agreements for cost-sharing incentive payments can include management practices that benefit the goals of the landowner and oak woodlands. The length of the long-term agreement is dependent upon the nature of the project, the goals of the landowner and benefits to the oak woodlands. Typical long-term agreements could run 15 to 45 years. Cost-share incentive payments could include, but are not necessarily limited to: compensation for not cutting trees for firewood; long-term payment to keep the land in open space, management cost to implement a plan designed to benefit the landowner and the oak woodlands; reimbursements for conservation improvements; and compensation for alternative grazing or farming practices.

The Napa Field Office of the USDA Natural Resource Conservation Service (NRCS) is the largest provider of cost sharing agreements in Napa County. The NRCS provides approximately \$100,000 annually in cost share funding for conservation practices, some of which directly benefit native oaks. For the five year duration of the 2008 Farm Bill, the NRCS will continue to provide cost share agreement funding through two USDA programs. The Environmental Quality Incentives Program (EQIP) provides cost share funding for conservation practices by farmers and ranchers and the Wildlife Habitat Incentives Program (WHIP) provides cost share funding for conservation practices benefiting wildlife for any landowner.

E. NEW GRANT FUNDING OPPORTUNITIES

While State grant funding opportunities have become more difficult to come by due to the current economic conditions and budget problems, other sources are available to potentially fund oak restoration and conservation efforts. The Wildlife Conservation Commission of Napa County provides annual grants that are intended to support the preservation, propagation, and protection of fish and wildlife in Napa County. The funding for these grants is provided by California Department of Fish and Game fines and settlements, as well as local fines and settlements that are designated for this purpose from enforcement actions.

The Wildlife Conservation Commission consists of eight (8) members: Four (4) At-Large/ Citizen Representatives, One (1) Sportsperson or Angler, One (1) Youth, One (1) Wildlife Conservation Representative and One (1) Member of the Conservation, Development and Planning Commission. The Commission meets annually in August to review the grant applications and make recommendations to the Napa County Board of Supervisors on the expenditure of funds. The total amount of grant funds available for project proposals is typically \$12,000 to \$15,000, but may be up to \$50,000 depending upon funding availability and demonstrated project needs in any given year. Past

project proposals have included wildlife rehabilitation, native habitat enhancement, environmental education programs and species monitoring studies.

F. WILLIAMSON ACT

The California Land Conservation Act of 1965, also known as the Williamson Act, is a land protection program established to preserve agricultural and open space lands. By participating in the Williamson Act (Act), landowners are able to protect large tracts of farmland and open space from development and reserve it for agricultural use. Much of this contracted land in Napa County also contains contiguous areas of oak woodland habitat. Williamson Act contracts are established for a rolling term of 10 years. In return, parcels are assessed at a rate which reflects their agricultural and open space uses rather than their full market value. If a contract is not renewed, it normally terminates nine years after non-renewal. Early cancellation of a contract can result in substantial penalties. Currently, there are more than 71,000 acres restricted by Williamson Act contracts²⁶ in Napa County of which approximately 40 percent²⁷ is oak woodland.

G. OPPORTUNITIES FOR COLLABORATION

Numerous collaborative efforts are currently underway throughout Napa County that provide excellent examples of voluntary efforts. Some of the more notable projects of the Napa County Regional Park and Open Space District, the Land Trust of Napa County, the Napa Green Certified Land program, and the Napa River Rutherford Dust Restoration Project are outlined below.

The Napa County Regional Park and Open Space District, approved by the voters in 2006, was established to partner with other public agencies and land conservation organizations in protecting open space, preserving natural resources and enhancing habitat. Since its formation, examples of District projects included (1) protecting 224 acres of oak woodlands by acquiring the property through a bargain sale from the Land Trust of Napa



County, (2) forming a partnership with the Napa County Resource Conservation District and the Department of Fish and Game to restore Valley Oak habitat at the Napa River Ecological Reserve, (3) initiating a partnership with the Napa County Flood Control District for the long-term protection of riparian habitat, oak woodland restoration and improved environmental education opportunities in the South Napa Wetlands, as well as other stream bank restoration efforts, and (4) obtaining grant funding from the State Coastal Conservancy to acquire and protect 673 acres of open space including extensive oak woodlands in the Moore Creek watershed.

The **Land Trust of Napa County** has been conserving agricultural and natural open space for several decades. In addition to holding thousands of acres of oak woodland which are protected through donated conservation easements, the land trust has helped broker major transactions which have enabled other agencies to protect more than

12,000 acres of oak woodlands; the most notable of these is the extensive Knoxville Wildlife Area now managed by the Department of Fish and Game. The Land Trust has completed the acquisition of more than 4,165 acres of open space in Palisades northwest of Angwin. Known as the Wildlake-Duff property, the area contains the Bell Canyon watershed, which provides 80 percent of the drinking water for St. Helena, and will forever provide oak woodland habitat for wildlife, allowing native plant species to thrive in a pristine area. Long-term preservation of the area will likely include cooperative management by the Land Trust, the California Department of Parks and Recreation and the Napa County Regional Park and Open Space District, as well as additional funding from both public and private sources.

Sustainable vineyard practices are being introduced through the **Napa Green Certified Land Program**, a third party certified, voluntary program for Napa County vintners and grape growers that seeks to restore, protect and enhance the regional watershed. The program includes not only farmed or vineyard land, but also non-farmed and wild land, roadways, stream banks, drainage and more within a specific property. Plan details are unique to each owner's property and include restoration of wildlife habitat, healthy riparian environments and more with sustainable agriculture practices. Approximately 33,150 acres are currently enrolled in the program and more than 16,900 acres are certified, with thousands more about to receive official certification. A majority (90%) of the Napa River watershed is in private ownership making this public/private partnership, Napa Green, vital to our community. The certification is in partnership with Fish Friendly Farming, National Marine Fisheries Service, the Napa County Department of Agriculture's Department of Pesticide Regulation, and the Regional Water Quality Control Board among others.

In 2002, the Rutherford Dust Society Board of Directors voted unanimously to empower a subcommittee, the **Rutherford Dust (Napa River) Restoration Team** (RDRT or "our dirt"), to initiate a plan to manage and restore the river. This committee includes over 25 riverside property owners. Since that date, RDRT has successfully pioneered an innovative partnership with Napa County to realize this vision. Building upon over 5 years of detailed engineering and ecological studies, a comprehensive design for the entire 4.5 mile reach was released in October of 2008 for environmental and regulatory review. Project construction commenced with Phase 1 in July 2009, starting at the upstream boundary of the project area at the Zinfandel Lane Bridge. For California's agricultural sector and beyond, this project provides a community-based leadership model for watershed restoration. It is arguably one of the most ambitious initiatives of its kind, and one of the few comprehensive reach-scale restoration projects in the region to move beyond just planning into on-the-ground implementation.

VIII Sustainable/Best Management Practices (BMPs) & CEQA Mitigation for Oak Woodland Protection

In addition to adopting and implementing protective policies and regulations, Napa County also supports oak woodland conservation by working with individual applicants to create development plans that optimally preserve oak woodlands while

meeting the applicants' needs. This may include the incorporation of a wide range of Sustainable/ Best Management Practices (BMPs) into the design of the projects, as well as the incorporation of effective environmental impact (CEQA) mitigation measures.

A. Sustainable Best Management Practices (BMPs)

For oak woodland as well as other natural resource protection, a wide range of sustainable BMPs can be incorporated into the project design (vineyard, winery or other projects). Project planning and BMPs are important components to developing effective management plans that address all aspects of the property and its use. A set of BMPs can be developed to promote oak woodland management, and outline a suite of practices to achieve soil and water conservation, stable drainage, riparian corridor enhancement, fisheries enhancement and long-term improvement and sustainability.



These are an important part of the Napa Green Certified Land Program and Fish Friendly Farming, where Farm Plans are developed to address all aspects of the vineyard/ property. The planning process involves several steps, which include:

- 1) An inventory/ assessment of the natural resources, streams, soils, topography, and vegetation of the property as well as an analysis of current management practices;
- 2) Identification of needed changes to management practices or new vineyard design and application of program Beneficial Management Practices (BMP's) to the property;
- 3) Identification of erosion site or road repair projects; stream corridor and fisheries habitat projects and other improvements; preparation of an implementation program for both vineyard management changes and restoration projects including potential cost share sources; and
- 4) A requirement for photo documentation of changing site conditions and progress towards the goals and objectives of the plan and BMP implementation.

Recommendations for Best Management Practices are summarized in Appendix D from various publications on oak woodland protection, maintenance, and restoration, as well as contributions by local and other experts. These include information/guidelines for the maintenance, restoration, and rehabilitation of oak woodlands, disturbance around oaks and protecting trees from construction impacts, care of oak trees, building around oaks and oaks in the home garden, and others. Interested property owners as well as various professionals are encouraged to consult these resources for additional information.

Note: A summary of Sustainable BMPs for Oak Woodlands is provided in Appendix D.

B. CEQA Mitigation

Through the CEQA review process for discretionary projects, such as vineyards and wineries, mitigation measures are included to ensure that potential impacts are addressed. The General Plan Natural Resource Goals and Policies provide the primary direction for oak woodland protection and conservation in Napa County and require the following actions:

Policy CON-24 Maintain and improve **oak woodland habitat** to provide for slope stabilization, soil protection, species diversity, and wildlife habitat through appropriate measures including one or more of the following:

- 1) Preserve, to the extent feasible, oak trees and other significant vegetation that occur near the heads of drainages or depressions to maintain diversity of vegetation type and wildlife habitat as part of agricultural projects.
- 2) Comply with the Oak Woodlands Preservation Act (PRC Section 21083.4) regarding oak woodland preservation to conserve the integrity and diversity of oak woodlands, and retain, to the maximum extent feasible, existing oak woodland and chaparral communities and other significant vegetation as part of residential, commercial, and industrial approvals.
- 3) Provide replacement of lost oak woodlands or preservation of like habitat at a 2:1 ratio when retention of existing vegetation is found to be infeasible. Removal of oak species limited in distribution shall be avoided to the maximum extent feasible.
- 4) Support hardwood cutting criteria that require retention of adequate stands of oak trees sufficient for wildlife, slope stabilization, soil protection, and soil production be left standing.
- 5) Maintain, to the extent feasible, a mixture of oak species which is needed to ensure acorn production. Black, canyon, live, and brewer oaks as well as blue, white, scrub, and live oaks are common associations.
- 6) Encourage and support the County Agricultural Commission's enforcement of state and federal regulations concerning Sudden Oak Death and similar future threats to woodlands.

Policy CON-24(c) specifically requires preservation of like habitat at a 2:1 ratio when retention is determined to be infeasible and oak woodlands are converted. For those areas designated as sensitive or habitats of limited distribution, the policy requires avoidance to the extent feasible.

For green house gases(GHG) and carbon sequestration, the Napa County General Plan calls on the County to complete an inventory of green house gas emissions from all major sources in the County by the end of 2008, and then to seek reductions such that emissions are equivalent to year 1990 levels by 2020. The General Plan also states that "development of a reduction plan shall include consideration of a 'green building'

ordinance and other mechanisms that are shown to be effective at reducing emissions." Overall increases in GHG emissions in Napa County were assessed in the Environmental Impact Report (EIR) prepared for the Napa County General Plan Update and certified in June 2008. GHG emissions were found to be significant and unavoidable despite adoption of mitigation measures that incorporated specific policies and action items into the General Plan.

Napa County is currently developing an emission reduction plan, and in the interim requires project applicants to quantify and reduce GHG emission through a variety of strategies. For larger land and agricultural/ vineyard conversion projects involving proposed oak tree removal, the county requires an analysis of pre- and post project change in carbon storage capacity and sequestration rate for remaining and future vegetation. Until the County's Climate Action Plan is complete, determination of significance and applicable mitigations are made on a case by case basis. If impacts are found to be significant, projects may be required to incorporate GHG reduction methods, which could include: avoidance, conservation or preservation of oaks/ trees, replanting native/ drought tolerant vegetation, use of ground cover and limited tilling, limiting the amount of non-pervious materials, building on existing and/ or degraded sites, using existing materials, limiting new vehicle trips, improving the overall energy efficiency and environmental sustainability of the proposed project/ operation, and GHG offsets. Additional mitigation strategies may be developed as a result of the Climate Action Plan effort currently underway (*also see Recommendations for the Future*).

IX. Recommendations for the Future

Oak woodland conservation will require a sustained commitment by the community in order to assure that we will pass on healthy and productive oak woodlands to future generations. Napa County will continue to implement the policies and action items contained in the General Plan as a part of the County's continued commitment to the conservation of natural resources, and the protection of agriculture and open space. Development of a Climate Action Plan for Napa County is also on-going at this time and it is expected to provide further support for the county's oak woodland conservation efforts. Additional recommendations to support the current Oak Woodland protection efforts that are underway in Napa County include:

A. EDUCATION & OUTREACH

- Publications about Napa County's historical and current oak woodland resources (eg-SFEI Historical Ecology Atlas)
- Recognition or Designation of Heritage Oak Trees
- Promoting efforts to "re-oak" the valley by incorporating oak trees into designed landscapes associated with roads, parking lots, residential and non-residential developments.
- Encourage the proper management of existing oak woodlands in Napa County, including the reduction of fire hazard, which can be a significant threat to oak woodlands.

B. MITIGATION BANK

- Development of an Oak woodlands conservation and enhancement fund (*in-lieu mitigation fee, carbon trading/offsets*)

C. PILOT RESTORATION PROJECTS

- Pilot projects/ small experiments to demonstrate or test different methods of oak woodland conservation
- Information sharing regarding projects/ experiments results

D. RESEARCH & MONITORING

- South Wetlands Opportunity Area(SWOA) monitoring/ data
- Hyper-spectral/ remote sensing of vegetation types
- Carbon Sequestration

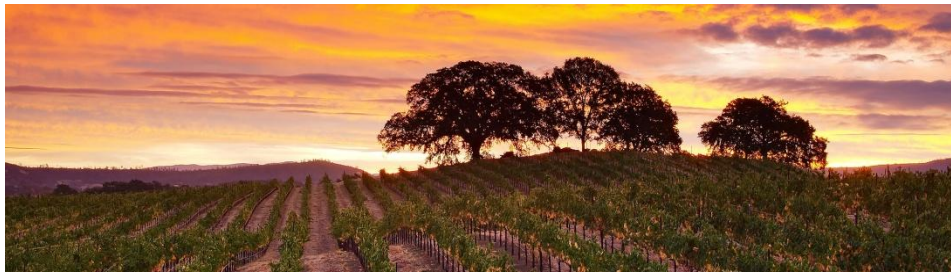
E. REMOVING OBSTACLES TO RESTORATION

Streamlined permitting from Resource Agencies

F. NURSERY PROPAGATION PROGRAM

Support for local propagation (nursery programs) and availability of seedlings and saplings for replanting and restoration





Re-Oaking the Valleys.....

While the old oak savannas are nearly gone, naturalistic patterns of valley oaks and other native trees could be recreated, even in highly developed areas. Such a re-oaking plan needs to occur at a landscape scale to consider how oaks fit in to the larger picture of natural spaces for humans and wildlife. Within this landscape context, trees could be strategically reintroduced along roads, fence lines, and public spaces, and focused on the several soil types that correlate with most of the historical trees (>50% of trees are associated with ~20% of the soil area). These efforts would build on a significant number of surviving trees that have been maintained as shade trees and landscape elements in public spaces, private residences, wineries and vineyards, and would help reverse the long-term decline in valley oaks. As well as returning a signature part of our California heritage to everyday life, such an effort would also provide.

a number of other valuable ecological services to the contemporary landscape trends and restoration opportunities are currently being observed through projects in Napa Valley, Sonoma Valley, and eastern Contra Costa County. Preliminary investigations with plant ecologists, wildlife ecologists, and urban foresters indicate that the native trees could, with careful design, be re-integrated within developed landscapes in densities and patterns reflective of the historical landscape. Such an effort, coordinated at a regional scale, would benefit native oaks, especially the now relatively rare valley oak, and a range of other native wildlife. It would also provide urban forestry functions such as shading, urban runoff reduction, carbon storage, and aesthetic/ cultural value. A re-oaking plan would show how to maximize ecological benefits, while addressing challenges of appropriate planting context, maintenance issues, and jurisdictional approaches.

Some of the potential benefits include:

- Return a signature aspect of California's heritage to local valley communities
- Improve habitat quality and connectivity for species such as the acorn woodpecker, white-breasted nuthatch, oak titmouse, and pallid bat
- Increase valley oak distribution, population connectivity, and genetic viability
- Add younger age-classes to the oak population to prevent eventual extinction
- Increase nutrient and water retention to improve creek and Bay health
- Increase resiliency of the oaks to climate change
- Reduce heat island effect of urbanized areas
- Carbon offsets for municipalities
- Add value to homes and businesses from the aesthetic and shade benefits of oaks
- Create opportunities for local residents to learn about and participate in urban ecology.

While more attention is often focused on the environmental enhancement of our coasts, rivers, and uplands, the valleys -- where most people live -- receive little restoration effort because of a perceived lack of ecological opportunity. However, the structure of the native valley oak landscape lends itself to the integration of ecological values with social needs. The potential to dramatically increase oak presence and native wildlife habitat in once prime habitat areas should be recognized.

Note: A concept to reintegrate or in-fill native oak trees within developed landscapes, such as along roads and public spaces (parks, trails), as well as restoration projects and other opportunities.

San Francisco Estuary Institute (SFEI) 2010

Appendices

Appendix A

Appendix A: California Oak Woodlands Conservation Act (AB 242 - 2001)
Oak Woodlands Conservation Act (SB1334 - 2004)

Appendix B

Appendix B: Oak Woodland Communities

Appendix B-1 to 4: Oak Woodland Maps

- B-1 Map of the estimated Historical Extent of Oak Woodlands and other natural features in the Napa Valley of the 19th century
- B-2 Map of the current Distribution of Oak Woodlands in Napa County(2009)
- B-3 Map of the Protected Oak Woodlands in Napa County(2009)
- B-4 Map of the Oak Woodlands at Risk in Napa County(2009)

Appendix C

Appendix C: Oak Woodlands Conservation & Restoration Evaluation Criteria

Appendix D

Appendix D: Sustainable Best Management Practices (BMPs) for Oak Woodlands

Appendix E

Appendix E: Guidelines for Oak Woodland Conservation Program Submittals

Appendix F

Appendix F: Resolution of Adoption for the Napa County Voluntary Oak Woodland Management Plan

List of Sources

- Agricultural Commissioner's Office, Napa County
State Board of Agriculture-Horticultural Commissioners Report. 1910/1916.
Walker, Andrew. *American Society for Enology/Viticulture Meeting Proceedings*. 2000
- California Oaks Foundation. *Oaks 2040: The Status and Future of Oaks in California*.
Online: [<http://www.californiaoaks.org/html/2040.html>]
- Calaveras County. *Calaveras County Voluntary Oak Woodland Management Plan*. 2007
- Department of Energy. *FAQ; DOE Consortium for Research on Enhancing Carbon Sequestration in Terrestrial Ecosystems*. Online: [<http://csite.esd.ornl.gov/faqs.html>]
- El Dorado County. *El Dorado County Oak Woodland Management Plan*. 2008
- Gasser, Don. Registered Professional Forester/Certified Forester/Arborist. *Interview*. 2010
- Giusti, Gregory A., Douglas D. McCreary and Richard B. Standiford. *A Planner's Guide for Oak Woodlands*. University of California Agriculture and Natural Resources. 2005.
- Giusti, GA. *Oak Woodlands of Mendocino County: An Assessment of Their Distribution, Ownership Patterns, and Policies and Projects Affecting Their Conservation*. 2001
- Grossinger, Robin. *Re-Oaking the Valleys: A Strategy to Re-integrate Native Trees within Developed Landscapes*. San Francisco Estuary Institute. 2009
- Grossinger, Robin , Erin Beller, Josh Collins and Shari Gardner. *The Napa River Watershed Historical Ecology Project*. San Francisco Estuary Institute. 2008
- Le Roux, Kerry. "Global Warming Threatens California's Oak Trees," *Mid-County Post*.
- Merenlender, Adina M. and Julia Crawford. "Vineyards in an Oak Landscape." University Division of Agriculture and Natural Resources. 1998.
- Napa County. *Napa County General Plan & Environmental Impact Report*. 2008
- Napa County. *Napa County Baseline Data Report*. 2005.
- Napa County Transportation & Planning Agency. *Napa Countywide Community Climate Action Plan(draft)*. 2009
- Napa County. *Watershed Information Center & Conservancy(WICC) of Napa County Strategic Plan*. 2005.
- Pavlik, Bruce M. et al. *Oaks of California*. Cachuma Press Inc. 1991, June 2006rev
- Pinney, Thomas. *A History of Wine in America - From the Beginning to Prohibition*. UC Press. 1989
- Placer County. *Placer County Oak Woodland Management Plan*.

Public Resources Code. Oak woodland definition, PRC 4793(e); also F&G Code 1361(h).

Napa County Regional Park & Open Space District. *Master Plan 2008-2013*. 2009

San Luis Obispo County. *San Luis Obispo County Voluntary Oak Woodland Management Plan*. 2003

Santa Barbara County. *Santa Barbara County Oak Restoration Program 1994-2005 Final Report*.

Santa Clara County. *An Oak Woodlands Management Plan for Santa Clara County*. 2005

Tehama County. *Tehama County Voluntary Oak Woodland Management Plan*. 2005

Ventura County. *Ventura County Oak Woodland Management Plan*. 2007

Weber, Lin. *Old Napa Valley: The History to 1900*. Wine Ventures Publishing. 1998.

Yolo County. *Yolo County Oak Woodland Conservation and Enhancement Plan*. 2007.

End Notes

- ¹ NC BDR, 2005
- ² NC BDR, 2005
- ³ Weber, 1998
- ⁴ Giusti et al, 2005
- ⁵ Dept. of Energy
- ⁶ Yolo-OWCEP, 2007
- ⁷ Yolo-OWCEP, 2007
- ⁸ Tehama-VOWMP, 2005
- ⁹ Ag Comm/Walker, ASEV, 2000
- ¹⁰ Pinney, History of Wine, 1989
- ¹¹ Ag Comm/Hort Comm Report, 1910/1916
- ¹² Pavlik, Oaks of Calif, 1991/2006
- ¹³ Pavlik, Oaks of Calif, 1991/2006
- ¹⁴ Pavlik, Oaks of Calif, 1991/2006
- ¹⁵ BOF/PRC4793e/F&GC1361h
- ¹⁶ SCC-OWMP, 2005
- ¹⁷ NC BDR, 2005
- ¹⁸ NC RPOSD, 2009
- ¹⁹ NC GP/EIR, 2008
- ²⁰ NC BDR, 2005
- ²¹ Don Gasser, Interview, 2010
- ²² NCTPA CAP, 2009
- ²³ Le Roux
- ²⁴ Yolo-OWCEP, 2007
- ²⁵ NC RPOSD, 2009
- ²⁶ Napa County Assessor
- ²⁷ Napa County GIS