

VOLUME 3 - RESOURCE MANAGEMENT STRATEGIES
CHAPTER 21

Agricultural Land Stewardship





Yuba County. Pasture land near Beale Air Force Base, approximately 3 miles east of Marysville, CA.

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Chapter 21. Agricultural Land Stewardship

This resource management strategy focuses primarily on private land in agriculture including cultivated land and rangeland. Agricultural land in California comprises about 31.6 million acres (California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program 2008). About 12.4 million of these acres are cultivated, while the remaining 19.2 million acres are rangeland (California Department of Forestry and Fire Protection 2010). (Information about forest land can be found in Chapter 23, “Forest Management,” in this volume.)

Agricultural systems in California are varied in the way resources are used, ranging from intensive conventional agriculture (irrigated crop cultivation) to more extensive systems such as livestock grazing, each with a different relationship to natural resources. They also affect and are affected by surface hydrology and groundwater recharge in different ways. Stewardship of this land requires constant balancing among natural constraints, market forces, and ever-changing social expectations. Institutions and policies have been developed in response to these challenges. Public investment in water infrastructure (reservoirs, canals, drains, levees, dykes) has been in the forefront of these. This chapter focuses on agricultural land stewardship (ALS) strategies that can be incorporated into relevant adaptive management of agricultural land at different levels, including landscape, regional and project.

”Agricultural land stewardship” means farm and ranch landowners — the stewards of the state’s agricultural land — producing public environmental benefits in conjunction with the food and fiber they have historically provided while keeping land in private ownership.

California Water Plan Update 2005
Agricultural Land Resource Management Strategy

Land managers practice ALS by conserving and improving land for food, fiber, biofuel production, watershed functions, and soil, air, energy, plants, animals, and other conservation purposes. ALS also protects open space and the traditional characteristics of rural communities, as well as open space within urban areas. Moreover, support for public benefits from ALS activities helps landowners maintain their farms and ranches in the face of expanding urban development.

ALS continue to be a leading priority in implementing *California Water Plan Update 2013*. Conversion of agricultural lands to developmental other uses (i.e., urban, industrial) can compromise a landscape’s ability to provide ecosystem services to the public. Working landscapes will increasingly be relied on for flood management and water storage and conservation, as well as providing critical habitat at key locations and sequestering carbon, while maintaining ongoing primary productivity of food and fiber. It is also anticipated that difficult decisions will need to be made with regard to taking some productive agricultural land out of production to provide land for ecological functions, to fulfill the goals of flood management, reliable water supplies, and functional ecosystems. Questions persist about the appropriate role of the State in the purchase of development easements and the custodianship of these easements

in light of the financial failure of land trusts around the country. Conversion of agricultural lands to developmental other uses (e.g., urban, industrial), can compromise a landscape's ability to provide ecosystem services to the public. For a more detailed discussion of this emerging issue, see the discussion on ALS later in this chapter.

Laws and Programs Relating to Agricultural Land Stewardship in California

Article 13, Section 8 of the California Constitution

Article 13, Section 8 of the California Constitution restricts taxation of open space land, including farmland, to promote conservation, preservation, and continued existence of this necessary resource.

California Land Conservation (Williamson) Act of 1965

Underscoring the economic importance of agricultural land, California lawmakers enacted the California Land Conservation Act of 1965 (Williamson Act) in order to protect agricultural land and open space from premature conversion to urban uses. The Williamson Act program is administered through the California Department of Conservation (DOC) Division of Land Resource Protection (DLRP), to promote land use planning decisions, which conserve farmland to the greatest extent feasible. About 16 million acres, roughly half of the farmland in California (cropland and rangeland), is covered by long-term contractual protections under the Williamson Act. At the time of this writing, the State no longer funds subvention payments to counties, which places this program and its inherent benefits at substantial risk. Permanent protection of farmland through agricultural easements is partially funded by matching fund grants administered by DLRP, as part of the California Farmland Conservancy Program (CFCP).

The Watershed Coordinator Grant Program

Also administered by DLRP, the Watershed Coordinator Grant Program supports projects implementing integrated resource management. This program works with landowners by building relationships to build better, healthier watersheds. The projects include water conservation, erosion prevention, and public education for water quality, best management practices (BMPs), science, and planning in watershed management. Other institutions supporting ALS include resource conservation districts (RCDs), University of California Cooperative Extension offices (UCCE), Natural Resource Conservation Service field offices (NRCS), county Agriculture Commissioners, and the California Department of Food and Agriculture (CDFA).

California Department of Food and Agriculture Environmental Farming Science Panel

CDFA organized the Environmental Farming Act Science Advisory Panel in August 2011 (see <http://www.cdffa.ca.gov/environmentalstewardship>). The panel is working toward the development of a market-based trading system to incentivize growers to implement management practices that contribute to the overall environmental quality of their working lands. Working

toward that end, CDFA and the Science Panel have developed a definition of ecosystem services, developed a Qualitative Assessment Model, and released the Ecosystems Services database.

The Ecosystem Services database is collected from various sources including voluntary submission from growers and ranchers. The database is a communication tool to show the many social and environmental benefits offered by growers and ranches in California, including food production. To date, nearly 400 farms and ranches are included.

The California Ag Visions Reports and Ag Vision Advisory Committee

CDFA sponsored an Ag Vision Advisory Committee that led to the development of the California Agricultural Vision Reports (see the *California Agricultural Vision: Strategies for Sustainability Report* and the *California Agricultural Vision: From Strategies to Results Report*, at http://www.cdfa.ca.gov/agvision/docs/Ag_Vision_Final_Report_Dec_2010.pdf and http://www.cdfa.ca.gov/agvision/docs/Ag_Vision_Progress_Report.pdf, respectively).

The Farm Security and Rural Investment Act of 2012

The reauthorized federal 2008 Farm Bill provided several new and traditional agricultural conservation programs that exemplify an ALS strategy. All programs are voluntary. Many programs may include technical assistance, financial incentives, or temporary and permanent set-aside payments for various purposes. At the time of this writing, the current reauthorization of the Farm Bill (2012) awaits action by Congress.

California Agricultural Water Stewardship Initiative (CAWSI)

CAWSI raises awareness about approaches to agricultural water management that support the viability of agriculture, conserve water, and protect ecological integrity in California. This effort of the multi-stakeholder group, the California Roundtable on Water and Food Supply, includes an online resource center of agricultural water stewardship practices and a host of additional useful resources. (See the California Water Stewardship Initiative at <http://www.agwaterstewards.org/>.)

California Roundtable on Water and Food Supply

The California Roundtable on Water and Food Supply (<http://aginnovations.org/roundtables/crwfs/>) is a forum for select leaders at the intersection of agriculture and water management to uncover obstacles, identify strategic and widely accepted solutions, and generate recommendations to ensure a reliable, long-term supply of water to California's specialty crop producers while optimizing other beneficial uses of water. The Roundtable is a forum where these thoughtful and committed leaders can engage in a facilitated, off-the-record dialogue where creativity and wisdom can flourish and new thinking and paths forward for sound water management can emerge. Recent publications can be found on their Web site.

California Rangeland Water Quality Management Plan

In 1990, California's range livestock industry led by the California Cattlemen's Association developed a program of voluntary compliance with the Federal Clean Water Act, federal and State coastal zone regulations, and California's Porter-Cologne Act. This initiative led to the development of the California Rangeland Water Quality Management Plan (CRWQMP) for nonfederal rangelands, which was approved by the State Water Resources Control Board in 1995. The management plan provides for development and implementation of ranch water quality plans on a voluntary basis. In 1994, the University of California Cooperative Extension (UCCE) and NRCS began to develop education programs to support landowners in the development of individual water quality management plans. These plans focused on non-point-source assessment, development of water quality protection objectives, implementation of practices, and monitoring in the short- and long-terms. Several workshops targeting landowners have been conducted throughout the state by UCCE. The program has been effective; the majority of ranchers who developed management plans went on to implement BMPs.

Payments for Watershed Services

These are new and voluntary market-based mechanisms that fund conservation easements and/or conservation practices on private lands for watershed services (i.e., to protect water sources and maintain and improve water quality). These programs include one or several buyers (e.g., public agencies, private companies, non-profits, consumers). Several of these programs are being implemented in the United States and in California.

Agricultural Land Stewardship Strategies

California Water Plan Resource Management Strategies

The size and terrain of California allows for a diverse agriculture sector that includes extensive and intensive systems. This comes with costs, not the least of which are the large amounts of capital and land needed for water capture, storage, transport, and disposal (i.e., Lower Klamath Lake, Salton Sea). Other resource management strategies requiring significant land resources may be compatible or conflict with ongoing agricultural uses. Among these are flood management, ecosystem restoration, watershed management, forest management, economic incentives, water transfers, agricultural water use efficiency, and land use management. Although this narrative does not discuss the overlap with these other strategies in any detail, the interrelationship among these strategies highlights the need for integrated water management that takes into consideration the land that is affected by these strategies.

Agricultural Land Stewardship Approaches

ALS is not a new concept. Under various names, it has been practiced by many farmers and ranchers and encouraged by the California Department of Conservation's programs and the U.S. Department of Agriculture (USDA) through the NRCS and various nongovernmental entities for many years. The California RCDs and other entities specialize in working with private landowners in watershed management and coordination strategies. There are many ways that agricultural land can provide conservation benefits and be profitably managed. Cropland and

rangeland can be managed to reduce or avoid streambank erosion or rapid stormwater runoff. Streambank stabilization may include a buffer strip of riparian vegetation, which slows bank erosion and filters drainage water from the fields. Measures such as these can minimize or reduce the effects of agricultural practices on the environment and help meet governmental regulatory requirements while also reducing long-term maintenance problems for the landowner and providing environmental co-benefits.

California's 19.2 million acres of privately held rangeland strongly differ from cropping systems in their impacts on water, and the management strategies to enhance water quality and quantity. Eight of California's 12 major drainage basins are dominated by vegetation types that are commonly grazed rangeland, which occurs on roughly 20 ecosystems in California. These have a rich diversity of species. Two-thirds of the major reservoirs in the state are located on public and private rangeland. The location of rangeland, between the forested areas and major river systems, means that almost all surface water in California passes through rangeland. Rangeland plays a key role in ensuring watershed function in California. A recent publication from the NRCS provides the additional background on the practices and benefits of rangeland management. (United States Department of Agriculture, Natural Resources Conservation Service 2011) Investment in naturally occurring, "green" infrastructure is a cost-effective way of protecting and maintaining healthy watersheds in California. This is accomplished through rangeland conservation programs that aim to secure beneficial land uses through conservation easements and BMPs, in order to protect both water supplies and water quality.

A range of private and public programs and initiatives already exist that fit the stewardship model (see *California Water Plan Update 2009* for a list of these programs). Many public programs provide technical assistance on what crops to plant and how to plant, cultivate, and irrigate them. Similarly, programs in rangelands enhance water quantity and quality, and other ecosystem services by providing information on grazing intensity and timing, and strategies for fencing and developing infrastructure to provide water to livestock. Other programs provide technical help on wildlife-friendly farming and ranching techniques for terrestrial and aquatic ecosystems. Additional types of programs cover soil, water, and habitat conservation planning. These efforts can identify suitable areas for farming and habitat management, and identify key rangelands and croplands that should be protected from development due to the multiple services they can provide. Urban planning programs can also be used to avoid agricultural land fragmentation and permanent loss of valuable agricultural land because of urban development (see the Land Use Planning and Management resource management strategy).

More recently, there are programs that limit or cease commercial agricultural use to promote flood management or to protect and restore wetlands and other wildlife sensitive areas. In the past, these programs have not affected a large portion of agricultural land. Now, however, several large programs anticipate taking a significant amount of land out of production. Although governmental land acquisition programs may not be considered ALS programs when they take farmland out of production, ALS is being increasingly considered by governmental and nongovernmental organizations (NGOs) as a way to avoid taking agricultural land out of production, where possible, and for protecting natural resources while keeping the land in productive private ownership.

Update 2009 provides an Annotated List of Agricultural Land Stewardship Best Management Practices, by Resource Issue Addressed and Hydrologic Regions of Greatest Applicability (see Update 2009 Resource Management Strategies, Chapter 20, "Agricultural Land Stewardship," at http://www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v2c20_aglands_cwp2009.pdf).

Governmental land acquisition programs do not constitute agricultural stewardship when they take farmland out of production. These programs have been limited, because they have affected only a small portion of agricultural land. More recently, several large programs, such as the Bay Delta Conservation Program (BDCP) and the Central Valley Flood Protection Program, anticipate taking a significant amount of land out of production. ALS is being increasingly considered by governmental and NGOs as a way to avoid taking agricultural land out of production where possible and for protecting natural resources while keeping the land in productive private ownership.

Agricultural Land Stewardship and Planning in the Delta

The State and other entities are pursuing multiple activities in the Delta that could affect Delta farmland. These include near-term projects of the State and federal water projects to meet current endangered species requirements and future projects under the BDCP. The conversion of important farmland to other uses may be significant and result in mitigation under the California Environmental Quality Act (CEQA) depending on the nature and quality of the lands to be converted. In addition, conversion of important farmland may adversely affect habitat for native terrestrial species.

CEQA focuses on the environmental impact, not the economic impact of a project — a distinction that is sometimes difficult to make in the context of agricultural resources. Farmland conversion may have impacts in terms of changes to high quality soils, changes to land use, and loss of habitat. After avoidance and minimization, the conventional mitigation approach for these types of impacts has been to acquire conservation easements over existing farmlands elsewhere near the project area, usually on lands that are in the path of urban development.

In 2012, an interdisciplinary, interagency workgroup developed a concept paper describing a proposal that would explore with the agricultural community an ALS approach to the conversion of agricultural land that would offer a more integrated and collaborative effort using a variety of ALS principles and strategies. An underlying premise of the discussion was to work on developing an approach that strives to minimize impacts to the agricultural land resources in the Delta and to avoid long-term cumulative impacts to the agricultural economy and/or to wildlife that depends on farmland for habitat. It does not attempt to distinguish between environmental or economic impacts, but rather focuses on maintaining the viability of Delta agriculture.

The approach takes into account the desire of individual Delta farmers to continue working on their land, the long-term viability of regional agricultural economies, the economic health of local governments and special districts, and the Delta as an evolving place. This approach is designed to encourage early planning that will result in multiple benefits and long-term partnerships with local interests with a goal of developing projects with sustainable outcomes that benefit both the environmental and social-economic communities in the Delta. Finally, the approach recognizes that local interests, including Delta farmers, have unique and specialized knowledge and would seek to involve these interests in the process.

The workgroup received positive input as a result of discussions on the concept paper and in early 2013 began work on describing in more detail different ALS strategies and developing a framework for ALS planning that integrates the strategies. As the work progressed, it became clear that most of these strategies have broader applicability statewide and can be used in

considering ways to reduce the negative impacts of many land use decisions on agricultural productivity.

Agricultural Land Stewardship Framework for Planning

ALS planning can provide an integrated and collaborative approach for addressing the use of farmland for project purposes and the conversion of farmland to different uses, especially uses that continue an open space use of the land.

It encourages exploration of a voluntary framework for project proponents to pursue that is consistent with State and regional policies and that would provide the environmental and habitat benefits that are part of the project while maintaining agricultural and economic viability in the area where the project is located and supporting the stability of local government and special districts.

A comprehensive tool box of ALS strategies and a framework for considering them can help develop informed ALS activities at different levels of planning, including landscape, regional and project. It can also be useful for making funding decisions.

At its core, it can be used by project proponents in developing projects that affect agricultural land through an agricultural land stewardship plan (ALSP). To the extent they apply, the ALS strategies should be considered in developing the ALSP. Not all of the ALS strategies will apply to a specific project. In fact, some of them provide different approaches that are not compatible. The framework for developing an ALSP first suggests that the parties evaluate the extent to which the project can be part of or complement existing or planned land uses for the area involved, including mitigation and enhancement relating to aquatic and terrestrial habitat, agricultural use, recreation, agritourism, ecotourism, and flood management. As a threshold issue, this means thinking about ways to prevent or avoid farmland loss. To the extent that impacts to farmland cannot be avoided, consideration should be given to developing working landscapes on project lands that take into account the possibility of multiple benefits. If a project cannot avoid agricultural impacts, then project proponents should consider different strategies for mitigation of environmental, as well as economic, impacts.

The primary responsibility for preparing and implementing an ALSP would be with the project proponent. Entities such as the local counties or regional entities may want to consider developing a regional plan that can help identify places where special attention should be given to preserving agricultural land for a variety of reasons, including that it is in the path of development, is unique, or is critical to preserving important infrastructure. To the extent that there are regional conservation plans, they can also be considered. If the farmer is involved in carrying out the project, a more specific agreement may be involved that sets for the responsibilities of the farmer. Part of this may be a requirement that the farmer propose and carry out more specific implementing ALSPs.

Agricultural land stewardship planning should involve the local community in the planning process, along with local, State and federal agencies. At its core is involvement of the landowner and the county where the property is located, recognizing that local interests have unique and specialized knowledge. In addition to the landowner and/or farmers affected, at a minimum, the following organizations or types of organizations should also be consulted: local government, Sacramento Area Council of Governments, and other councils of government; federal, State

resource and regulatory agencies; organizations with a regional focus; RCDs; local colleges and universities, including agricultural extension; local labor and farm worker organizations; Economic Development Corporations; NGOs representing farmers; and NGOs representing entities that promote habitat protection and restoration activities.

The framework for ALS, the ALS strategies, and other information, including samples of proposed or actual ALSPs can be found on the ALS Web site at <https://AgriculturalLandStewardship.water.ca.gov/>.

Potential Benefits of Agricultural Land Stewardship

ALS should be included as an integral component of regional integrated resource planning, including watershed planning and implementation. ALS can use stewardship practices to protect the health of environmentally sensitive land, recharge groundwater, improve water quality, provide water for wetland protection and restoration, reduce costs to the State for flood management, and aid riparian reforestation and management projects. Land can also be managed to improve water management, urban runoff control, water storage, conveyance, and groundwater recharge. These stewardship practices are attractive since they do not rely on construction of major facilities and provide a range of environmental co-benefits.

Agricultural Land Stewardship as Part of a Regional Strategy of Urban Growth Management

Agricultural land provides public benefits for floodplain management, scenic open space, wildlife habitat, and defined boundaries to urban growth. Stewardship provides the rural counterpart to urban efforts to encourage more water efficient development patterns. It also can minimize fragmentation of agricultural land by development that can decrease productivity and decrease the provision of ecosystem services. Maximizing co-benefits, while respecting private property rights of owners of agricultural land, landowner incentives, including payments for watershed services, need to be expanded carefully.

Update 2009 provides an Annotated List of Agricultural Land Stewardship Best Management Practices, by Resource Issue Addressed and Hydrologic Regions of Greatest Applicability (see Update 2009 Volume 2, *Resource Management Strategies*, Chapter 20, “Agricultural Land Stewardship,” at http://www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v2c20_aglands_cwp2009.pdf).

Climate Change

Climate change is anticipated to increase average temperatures and cause changes to hydrology, which will have many direct and indirect impacts on agriculture in California. These impacts include a reduced snowpack, decreased water availability, increased evapotranspiration, and more intense flood events and droughts (California Department of Water Resources 2008). Climate change will lead to increased evapotranspiration and moisture deficits during potentially longer drought periods, concurrent with increased water demand (California Department of Water Resources 2008). ALS provides potential benefits in relation to climate change, including both mitigation (reduction of overall impact) and adaptation (preparation for unavoidable changes).

Adaptation

Stewardship of agricultural soils improves capacity to retain water and promotes resilience to dry periods. Likewise, soils that are rich in organic matter absorb water better which will be beneficial during unusually high rainfall events that are anticipated under a changing hydrologic regime. Increasing flexibility in cropping patterns will be important in a more variable climate, which may yield fewer freeze days and a longer growing season. The protection of small patches of wildlife habitat on portions of cultivated or fallowed land would provide multiple climate adaptation benefits such as providing habitat for pollinators and refugia for other species that may need to migrate across the landscape to find suitable habitat. Higher temperatures and dryer conditions will lead to increased wildfires in some parts of California. Grazing and brush management on rangelands can be used to reduce the risks of wildfire and subsequent impacts to watersheds and downstream agricultural land.

Mitigation

Mitigation is accomplished by reducing or offsetting greenhouse gas (GHG) emissions in an effort to lessen contributions to climate change. ALS is a valuable mitigation tool. Energy conservation measures associated with ALS lead to a direct reduction in the production of GHG emissions, and practices that encourage soil sequestration take carbon out of the atmosphere while protecting soils that will be subjected to an increasingly variable hydrologic regime in the future. On-farm management of green waste and other soil-building practices can retain carbon and nitrogen within the soil, benefitting both tilth and overall soil health while sequestering GHGs. Enhancing soil organic matter also increases water retention in soils, thereby reducing additional energy spent through irrigation. Conservation tillage reduces on-farm energy use, while improving soil organic content and carbon sequestration. On-farm power generation through anaerobic digestion, photovoltaic panel installation, and wind turbines reduces the use of GHG-intensive fossil fuels. Developing on-farm water sources, such as ponds, reduces the energy required for pumping groundwater. Management practices in rangelands, such as prescribed grazing and management of woody vegetation, have the potential to increase carbon.

Climate Change Impacts on Rangeland

More than 16,000 acres of rangelands are converted every year in California, primarily due to urbanization and irrigated agriculture (California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program 2008). Climate change will pose a new threat to rangelands by changing water availability and species distributions. Climate modeling scenarios showed that a loss of rangelands will lead to loss of biodiversity, impaired water quality, less carbon sequestration, less groundwater recharge, and in some cases, less input to food production. Ecosystem services (resources and processes supplied by natural ecosystems) provided by rangelands include wildlife habitat, groundwater recharge, and carbon sequestration. Recent studies have attempted to assess potential threats to rangeland ecosystem services and to quantify the economic costs and benefits. The key threats for ranching in the future include limited availability of grazing land for lease, fragmentation of grazing land, declining forage quality and quantity, and high start-up investment cost. Economic analysis of ecosystem services included 1) identifying affected ecosystem services and their economic importance, 2) compiling a provisional estimation of costs-and-benefits-by-scenario impact, and 3) identifying economic incentives to maintain rangeland habitats.

In September 2013, CDFA's Climate Change Consortium released a report that outlines climate change impacts and discusses strategies for resilience. The paper focuses on California's significant specialty crop sector (see <http://www.cdfa.ca.gov/environmentalstewardship/pdfs/ccc-report.pdf>).

Potential Economic Costs of Agricultural Land Stewardship

Governmental and nongovernmental entities are seeking ways to secure funds for conservation practices that can be part of stewardship. In general, there is agreement by economists on three questions:

- What are the direct costs for supporting stewardship programs?
- What are the common ways to measure the costs for the wide range of environmental values?
- What current level of investment is needed to sustain stewardship for the long term?

Developing stewardship costs is similar to estimating costs of managing land to avoid environmental impacts such as air and water pollution, or to provide wildlife habitat or secure food and fiber production. Stewardship is a way of doing business and should be a part of an economic model that shows a return on investment by placing a value on healthy communities and their quality of life. In addition, ALS helps avoid costs associated with urban land use. Typically, landowners pay for conservation practices out of their own pockets, with cost-share programs offsetting a fraction of these costs for landowners willing to access government funding. It is difficult to quantify the costs that are prevented by ALS. Not only are there cost savings by avoiding expansion of infrastructure, but also there are avoided costs for flood damage reduction measures and urban runoff. These costs have not been quantified for broad reference and application.

There are at least three ways to deal with costs of implementing ALS.

1. Actual costs of BMPs that have been documented in recent studies or projects, or by conservation or agricultural agencies, such as the USDA NRCS. Costs would be expressed in terms of dollars per acre or mile, for example, or for installation of a structure.
2. A range of costs based on past experience or range of levels of implementation of an ALS practice or strategy. An example would be the cost of agricultural easement acquisition, which would vary from place to place, and would also vary based on the extent of property interests purchased by an easement agreement (e.g., just development rights, or development rights plus flowage rights including restrictions on crops that can be planted under the easement agreement).
3. Cost estimates in reports and studies of solving a resource issue in a region or statewide. An example might be a State agency's estimate of the current cost of installing riparian buffers to protect water quality on high-priority water bodies in a particular regional water quality control board's area.

Major Implementation Issues

There are major issues related to improving ALS, include mixing economic endeavors with environmental goals, economic markets, and land conversion. Increased focus on this strategy is necessary to implement regional integrated resource planning and management, and to demonstrate to the public the measurable benefits of stewardship. Land use change is a critical issue, as conversion from agriculture to urban and industrial land use can result in irreversible loss of a landscape's potential to provide food and multiple ecosystem services that benefit the public. Every year about 20,000 acres of rangelands are converted to other uses, which negatively impacts water provisioning, conservation of biodiversity, and open space (California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program 2008).

Landowner Confidentiality and Privacy Protection

Many environmental regulatory programs understandably require information from working landowners about the effectiveness of grant funding made to help landowners comply with regulations. The issue has at least two facets. First, agencies have a responsibility to account for the expenditure of public funds to achieve resource protection and conservation. Second, there is an enforcement-related and scientific need for data on the effectiveness of funded ALS practices. These data are necessary to document compliance and to document value of ALS practices to the conservation objectives of the regulatory agency. For example, the State Water Resources Control Board has required farm-specific information as part of the public record of its agricultural water quality grant programs. Besides the vulnerability that farmers and ranchers feel from other regulatory programs that might use the information, the requirement conflicts with USDA's conservation assistance programs and may prevent better leveraging of funds and coordination among agencies with similar goals of ALS.

Leadership

Most states maintain a State council or similar leadership and coordinating body that provide guidance to federal, State, and local programs to achieve ALS. Some have regulatory or oversight authority over local conservation work that uses State and federal funding; others simply set state goals for conservation and serve as a venue for coordination and problem-solving for State programs as well as local conservation entities, especially RCDs.

California once supported a governor-appointed Resource Conservation Commission that served primarily in the former capacity. The commission failed to keep pace with the changing paradigms of conservation, including the definition of conservation, with the move from structural solutions to bioengineering technologies. The Commission, though still authorized in statute, has ceased to operate due to a lack of funding and commissioner appointments. The California Association of Resource Conservation Districts, among others, has called for the recreation of at least a State conservation advisory council. Based in part on the positive experience with the former CALFED Bay Delta Program Working Landscape Subcommittee, the secretaries of the California Natural Resources Agency (CNRA) and the CDFA explored the creation of a working land stewardship council made up of stakeholders and agencies to identify and pursue coordinated initiatives in support of ALS. To date, no such State leadership body exists. It is recommended that CDFA follow up on forming a council to fill this gap.

Underserved Agricultural Land Stewardship Stakeholders, Communities, and Regions

For a variety of reasons, including language barriers, the remoteness and size of communities that affect their capacity to be heard, some landowners, communities, and regions may not receive the share of ALS resources that is warranted by their ALS resource problems.

Regulatory Barriers to Agricultural Land Stewardship, the Burden of Bureaucracy, and Regulatory Assurances

There is an ongoing need for interagency coordination and alignment of policies and regulations to clarify regulatory barriers, reduce unnecessary burden of multiple bureaucracies, and provide greater regulatory assurances to landowners that complying with one agency's programs will not put them at fault with another agency's regulations. In December 2010, the California Roundtable on Agriculture and the Environment (CRAE) members reached consensus on a set of recommendations to facilitate the permitting processes for on-farm environmental restoration projects. These recommendations are detailed in the CRAE report, *Permitting Restoration: Helping Agricultural Land Stewards Succeed in Meeting California Regulatory Requirements for Environmental Restoration Projects* (see http://aginnovations.org/images/uploads/Permitting_Restoration.pdf).

Federal, State, and local regulations and permits may present crippling barriers to ALS. The issue may simply be the time, complexity, and cost of complying with regulations relative to the ALS benefits to be achieved. The issue may be the costs and bad fit of regulations resulting from the application of regulations intended for urban land uses and settings to the rural conditions of the agricultural working landscapes. In at least a few circumstances, the application of one ALS practice may place a landowner in jeopardy with another environmental protection standard. The application of a conservation practice that could result in the incidental take of listed Endangered Species Act species is one example.

Landowners often do not pursue available conservation financial assistance because of the amount of paperwork and the process that they must go through to receive funding. This issue is often a problem of striking a balance between funding accessibility and the need to be accountable to the public for the effective and legal expenditure of funds. The liability that administrators face can lead to a cumbersome bureaucracy that is not commensurate with level of assistance being offered. In addition, farmers and ranchers may have an inherent mistrust of government entities, which prevents them from participating in stewardship programs.

As previously noted, divulging personal or site-specific information to a granting agency can open a landowner to further regulatory liability. Similarly, there remains an issue that “no good deed goes unpunished” among some landowners who fear that on-farm conservation, for example, can lead to the improved health in the population of a listed species, leaving the landowner at greater risk of Endangered Species Act sanctions. If a landowner improves the protection of listed species, and the species become more abundant on their land, regulators have been known add greater restrictions onto the landowner to protect the now-abundant local population. The issue is the need for more and easier-to-employ opportunities for regulatory assurances that good conservation deeds will not be punished, but will be rewarded.

Outreach and Demonstration

Due to cutbacks in the UCCE, the NRCS Environmental Quality Incentives Program (EQIP) education and demonstration funding and authority, among other reductions in conservation programs, there are many untold success stories and how they were achieved. Too few working landowners are aware of the technical and financial assistance that is available to them. There are too few opportunities for landowners to see what their neighbors are doing to save natural resources while saving money. Farm tours, tailgate sessions, workshops, and meetings out on the working landscape are needed to spread information and inspiration. There are good examples that could be replicated with funding and staff assistance. Otherwise, insufficient outreach, education, demonstration, and storytelling opportunities are barriers to ALS.

Some examples include stories of stewardship published by the USDA NRCS, RCDs, California Farm Bureau Federation, wildlife conservation agencies and organizations like Farming for Wildlife, the California Cattlemen Association, the California Rice Commission, and the California Rangeland Conservation Coalition, to name a few. Also, there are a growing number of ALS-consistent workshops and training sessions being sponsored sporadically around the state, such as by the University of California Small Farm Program, county-level farm marketing associations such as PlacerGROWN in Placer County, the EcoFarm Conference in Asilomar each winter, the California Association of Resource Conservation Districts and member RCDs, and others.

Measuring Performance of Conservation

There is a need to develop metrics and standards to measure and evaluate the efficiency and efficacy of stewardship practices. Metrics need to balance the need for accuracy (i.e., scientifically based) and practicality so they are simple to use and are inexpensive to generate. The previously cited NRCS Conservation Effectiveness Assessment Program (CEAP) has been launched to address this need. See <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/>.

Documenting Performance of Conservation

There should be a focus on the need for information that makes it clear to funding organizations and landowners that ALS practices are worth the investment, in part because the practice will clean up the water enough to meeting regulatory standards or the personal stewardship goals of the landowner. Priority for this investment has been given to practices that deliver multiple benefits and in areas of higher conservation value.

Food Safety and Co-Management

The September 2006 outbreak of *E. coli* O157:H7 in the Salinas Valley galvanized the grower community and the food processing industry to orchestrate intensive efforts to prevent crop contamination by developing and implementing rigorous food safety programs. However, some food safety programs conflict with environmental goals by targeting the elimination of wildlife and habitat, and removal or discouragement of conservation practices intended to improve and protect water quality by attenuating sediment, nutrients, and pesticides in tailwater and

stormwater runoff (e.g., vegetative filters, grassed waterways, constructed wetlands, etc.). State and federal public funds have supported growers' efforts to develop farm water quality plans and implement conservation practices (e.g., Farm Bill/Environmental Quality Incentives Program, Clean Water Act — Section 319 Nonpoint Source Program grants). Many farmers are required to comply with regulatory mandates (e.g., the regional water quality control boards' Irrigated Lands Regulatory Program) and implement BMPs to reduce, control, or prevent pollution. The U.S. Food and Drug Administration is expected to promulgate federal food safety regulations in 2012, which places emphasis on the co-management of food safety and environmental requirements to avoid conflict.

Energy Crops and Climate Change

Market forces encourage growers to plant energy crops, such as corn and soybeans. While these crops have increased the farming profitability in many regions, the new cropping patterns can also lead to increased cultivation of new land, higher use of fertilizers and volatile organic carbons for pest management, and thus increasing energy use and GHG emissions. Cropping and ranching practices that sequester carbon, on the other hand, are best suited to the production of cellulosic ethanol, whose technology is not yet developed for commercial-scale use. Carbon sequestration in rice cultivation and wetland production has been demonstrated to have immediate potential benefits.

Floodplain Protection and Farming

The working landscape approach to agriculture often advocates the use of agricultural conservation easements to keep land in private ownership and management, while permanently removing the development rights from the land and altering farming and ranching practices to those compatible with floodplain management. Among the common easement restrictions is the limitation on types of crops grown to crops that will not impede flood flows or lead to excessive crop loss claims. As such, flood easements often prohibit the planting of high-value and flow-impeding permanent tree and vine crops. Farmers who may otherwise be interested in flood easements may be reticent to participate knowing that their "palette" of crops available to respond to market opportunities will be limited. Increased implementation of "flood-friendly farming" can reduce the inherent conflicts between floodway easements and reliable crop production. Additional information on floodplain protection can be found in Chapter 4, "Flood Management," in this volume.

Water Conservation and Water Rights

The conservation of water on agricultural land, depending on the nature of water contracts and rights, could result in the loss of water availability. For example, conservation of water could lead to a base of water use that may be used in the future for calculating cutbacks in water allocations.

Water Transfers

Idling of agricultural land for the temporary or permanent transfer of water or water rights is a strategy to meet urban and environmental water needs in times of shortage. This has become an increasingly normal condition with climate change and population growth. Idling of cropland can

result in a degradation of soils from salt accumulation absent the leaching fraction component of irrigation, erosion, or invasive plant species. Strategies are needed that integrate water transfers with crop rotation/agronomic fallowing, and soil-building schemes that also provide conjunctive wildlife habitat benefits. Additional information about water transfers can be found in Chapter 2, “Agricultural Water Use Efficiency,” and in Chapter 8, “Water Transfers,” in this volume.

Agricultural Conservation Easements Are Forever

There is a growing awareness of the need for agricultural conservation easements to protect land from the fragmentation of agricultural landscapes into parcels that are too large to mow and too small to farm. Yet, producers often loathe giving up their future “retirement account” of subdivision potential forever. There are available ways to enable producers to use easements as an aid to financial and estate planning, but too few producers know about them. One example is the use of clustering development to gain development value income while protecting the bulk of the land for agriculture in ways that do not impede surrounding agricultural uses or exacerbate the provision of urban services by cash-strapped counties.

Farm Market and Economic Considerations

The three legs of sustainability include economic, environmental, and social equity sustainability. A growing body of environmental, labor, food safety, land use, and other regulations has increased the cost of doing business in California. Land costs have increased as demands for housing and open space compete for land. Trade liberalization and international competition from developing countries with lower labor costs and regulatory standards have driven up the prices California producers can command in the marketplace. These issues and other factors make choices to invest in ALS practices difficult. Finding market value for the environmental services that Californians demand from agriculture is one key to keeping the California working landscapes profitable and sustainable. These services include:

- Spreading floodwater during high flows.
- Settling sediment during flood flows.
- Improving wildlife habitat and recreational opportunities, scenic places, and open space.
- Harvesting renewable energy.
- Sequestering carbon and providing clean air.
- Recharging groundwater.
- Providing clean and more abundant water supplies.

Landowner Concerns

Landowners are concerned that environmental programs that help them improve habitat might attract more threatened and endangered species affecting landowners’ use of land. Thus, some landowners are reluctant to be involved with government agencies, even though some of these agencies might help landowners to comply with regulatory requirements.

Federal Endangered Species Act assurances can be granted only by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. To determine what type of species must be covered and the possible protective measures that may be required, surveys are necessary to

determine what species are present. This only increases landowner concerns that they will be subject to increased restrictions if the presence of endangered species is verified on their property.

Some landowners question how they can adequately maintain their privacy and, at the same time, satisfy the public need for information of farm activities supported by public resources. In addition, there is landowner confusion regarding what type of assurances can be provided. One perspective is that the economic return from certain land stewardship programs may often be less than the return from other options for land use, especially when urban development is an option.

Lack of Information

There is a lack of scientific, economic, social, and environmental studies and monitoring of ALS programs to evaluate their merits for ecosystem restoration, water quality, and agricultural economics for large and small agricultural operations. Reports conflict about the compatibility of certain ALS and ecosystem restoration programs. Investment in research to address these issues is much needed. To justify public investment in stewardship, there must be accountability in terms of monitoring.

Complex Regulations and Programs

Institutional regulations and programs are complex and sometimes conflict. Agricultural landowners may be discouraged when developing a stewardship program for multiple purposes, such as water and soil conservation, ecosystems restoration, floodplain and wetlands management, water quality, and land use planning. The regulations may seem intrusive to the private landowner, but are essential for those government agencies and others responsible for environmental protection and restoration programs.

Federal Funding

California has received proportionately less funding traditionally from the federal Farm Bill's conservation provisions relative to its agricultural standing, the value of the threatened resources, the population served, and the interests of the landowner community. Although California farmers and ranchers provide more than 13 percent of the nation's food and fiber, historically they receive less than 3 percent of federal farm conservation funding. Commodity support programs influence stewardship management. California is dominated by specialty crops rather than traditional price-supported commodity programs. The funding inequities of the Farm Bill will become increasingly apparent in the future as production of California cotton, alfalfa, irrigated pasture, and possibly rice decreases and as production of specialty crops increases.

Regional Cooperation

The effectiveness of ALS depends on having a sufficient number of landowners implementing conservation practices within a watershed. Without regional cooperation, private landowners may be frustrated in reaching their management goals by adjacent operations or watershed activities that do not contribute to better management for environmental functions and values. These values include protecting and re-establishing riparian corridors or water quality within a watershed.

Watershed stewardship is an approach that can help build partnerships, increasing overall success of conservation practices within a watershed. Chapter 27, “Watershed Management,” in this volume addresses these concepts in greater detail.

Public Perception of State Policy Goals

In general, land use is a local planning issue subject to local regulation. Statewide planning goals or restrictions may be seen as an intrusion on local governmental powers. When there is a conflict between private property and public commitments, many landowners prefer such programs as the Williamson Act because these are temporary land-use restrictions from which landowners can ultimately “opt out,” if they later decide to sell land to development and the asking price justifies the cancellation penalty. As a result, many landowners are wary that they may lose future economic opportunities by committing to permanent restrictions. Likewise, the public may be unwilling to fund the necessary incentive (e.g., rental, technical assistance) programs essential to successful stewardship without a clear understanding of long-term benefits from such programs.

Changing Demographics of Farmers and Farms

As agricultural land stewards age, and lacking a new generation of farmers to take the reins, there is a shift away from mid-sized farms toward large and small farms; the former sometimes held and managed by commercial interests with non-resident managers, and the latter being a collection of smaller boutique farming operations. Meanwhile, mid-size, owner operated farms are vanishing. At the same time, some farming families are diversifying, creating a vertical integration of production, processing, packaging, marketing, with the new generation filling both the administrative and farming roles.

Recommendations to Promote and Facilitate Agricultural Land Stewardship

I. Recommendations for State Action

A. Institutional and Leadership Recommendations

1. The secretaries of the CNRA and the CDFA, in consultation with the California State Board of Food and Agriculture, U.S. Environmental Protection Agency, U.S. Department of Interior, USDA, U.S. Department of Commerce, and the National Oceanic and Atmospheric Administration, should assess ALS assistance, information and regulatory programs, their effectiveness, and level of coordination. The performance measure is the completion of the assessment report that addresses the issues listed below.
 - A. The assessment should address the need for better coordination between regulatory and assistance programs, as well as between assistance and information programs, of State and federal agencies. Recommendations should include mechanisms for improving coordination among State assistance programs, and opportunities for leveraging State, federal, and local resources to address ALS issues on a local and regional basis. Recommendations should also address ways for voluntary assistance programs to help

producers better meet State resource regulatory mandates. The latter recommendations should include actions for better coordination between State and federal assistance and regulatory programs.

- B. The assessment should address the need for a statewide ALS leadership and coordination entity, such as a governor-appointed council or re-establishing the former Resource Conservation Commission.
- C. Measures to ensure implementation of findings should be included in assessment mandate.
- D. State and federal agencies should work with stakeholders to develop and implement payments for ecosystem services programs that compensate landowners for their stewardship while reducing the cost of regulatory compliance and delivering measurable conservation benefits

B. Regulatory and Process Recommendations

- 2. State funding and staff should be made available through collaboration with the USDA NRCS, State RCDs, and appropriate non-profit conservation organizations to develop a one-stop shop for local and regional-level permit coordination and assistance programs. The California Environmental Protection Agency and the CNRA should implement this recommendation through use of bond funds, redirection of staff, and use of existing local capacity-building programs, such as the Department of Conservation's Watershed Coordinator Program. This recommendation should be implemented immediately. Performance measures include reduced cost, time, and liability for landowners to implement ALS practices and strategies.
- 3. State resource protection regulations should be amended to allow qualified third-party verification that grant funding to assist landowners in complying with regulations is spent appropriately and effectively. Regulations should also be amended to support collection of monitoring data in a manner that protects landowner confidentiality and enables federal participation in conservation actions that assist with regulatory compliance and the development of data on the effectiveness of ALS practices. Regulatory agencies, particularly the California Air Resources Board (ARB), the regional water quality control boards, and the California Department of Fish and Wildlife should assess regulations and the need for amendments in the near-term, and propose changes for mid-term achievement of this recommendation. Performance measures would include greater State and federal collaboration in assisting landowners in meeting regulatory requirements, providing sufficient data on the effectiveness of ALS practices in meeting resource protection regulatory requirements, and an increased level of participation among private landowners in State grant programs intended to assist regulatory compliance.
- 4. The CNRA is facilitating the development of the BDCP and the California Department of Fish and Wildlife's Natural Community Conservation Plan to provide regulatory assurances and incidental take permits for water agencies to pump water from the Delta while also implementing a conservation plan to protect Endangered Species Act-listed fish species. The CNRA and CDFA should offer similar leadership as needed to implement Integrated Regional Water Management Plans where ALS is a key component of the regional plans. This is a mid-term recommendation pending adequate staff resources and bond funding availability. A performance measure would be increased implementation of ALS practices that improve terrestrial and aquatic habitat and species diversity.

5. Responses should be integrated with regard to the overlap of existing and forthcoming regulations on climate change, flood control, air and water quality, biodiversity protection, etc., to achieve greater compliance and efficiencies.

C. Financial and Technical Assistance Recommendations

6. A partnership between the CNRA, the CDFA, and the USDA NRCS should be formalized to build on existing needs assessments to perform a gap analysis of ALS needs and existing program resources to meet them. The analysis would become the basis for developing a strategy for the use of existing and new bond measure funding, existing General Fund conservation programs, and federal conservation programs to fill the identified gaps. The analysis and strategic funding plan should be conducted under the leadership structures recommended in 1A above. The analysis and strategy should be conducted pursuant to an executive directive or via a legislative proposal, or both, immediately with results provided before the next California Water Plan update. The performance measures would be increased funding for ALS top priority resource issues, increased State and federal coordination of funding, and better information on which to allocate available funding to meet the most important ALS needs of California.
7. The CNRA, the CDFA, and the California Environmental Protection Agency should establish a Farm Bill Interagency Agreement under which California establishes an ongoing presence in the debate over conservation provisions of reauthorized Farm Bills, and in the annual appropriations of funding for conservation to meet the needs of California as identified by the assessment and strategy of recommendation (6), above. This recommendation should be carried out after consultation with the NRCS, appropriate farm and conservation interest groups, and non-profits. In this spirit, a collaborative, interagency letter was prepared and submitted regarding the pending 2012 Farm Bill.
8. The governor should establish a coordinated conservation easement acquisition program based on a preference for maintaining working land in private ownership by using conservation easements. Currently, there are a number of State and federal easement programs for wildlife, agricultural land, grasslands, forestlands, floodplains, and scenic and recreational open space. These programs need better coordination to ensure that the highest priority resource lands are protected and that the protected lands are conserving multiple values simultaneously. The funding gap analysis and strategic plan should include an identification of needs for resource land acquisition programs and seek State bond and federal farm, highway, and wildlife easement funding to acquire the highest priority agricultural land (among other types of land), which would also help to accomplish drought preparedness and flood management goals. This executive action should occur immediately, tied with the implementation of recommendation 6 above.
9. Funding for ALS programs should be made available on a voluntary participation basis, but with funding allocation based on priority conservation needs (recommendation 6 above) and regulatory compliance needs. Financial and technical assistance should be in the form of grants, cost-share, regulatory relief, and tax incentives. Most financial and technical assistance should be contingent on a meaningful and feasible level of landowner contributions.
10. Relevant agencies should explore the feasibility of a coordinated statewide effort to develop on-farm irrigation ponds that provide offstream capture of winter stormwater for summer

use. Evaluate current pilot pond projects, obstacles to broader adoption, and benefits for economic viability, local water supply, watershed management, flood control, groundwater recharge, mitigation of climate change, wildlife habitat, etc. Pilot projects for these efforts have been investigated by the California Roundtable for Water and Food Supply, as well as the California Roundtable for Agriculture and the Environment. Sustainable Conservation is one group that has been a leader in carrying out pilot projects (e.g., Pine Gulch Creek in west Marin County).

D. Data and Research Recommendations

11. The USDA's Agricultural Resource Service, UCCE, and the USDA Economics Research Service should conduct cost-benefit analyses for ALS practices, in particular for new and emerging strategies such as keylines and dry farming. California government leaders should request that funding be directed or appropriated from the federal and State budgets to conduct such research. This is essential research for effectively spending limited conservation assistance funding. Further, if a regulatory approach to working landscapes natural resource issues is intended to be collaborative, depending on conservation planning and the use of certified BMPs, regulators should ensure that practices employed to improve water and air quality or improve biodiversity are documented as effective. Recently, the University of California, Davis, and the USDA NRCS have collaborated to document the costs and benefits of conservation tillage systems. This research should be implemented immediately. Performance measures should include increased confidence in ALS practices as exemplified by greater State and federal funding to support their use by growers, and increased use of certification programs to assist growers in complying with environmental regulations.
12. Agricultural, conservation, and food safety organizations and agencies should continue to identify and support needed research on the causes of food contamination to determine the extent to which ALS practices may play a role in causing or resolving the contamination. When research identifies food contamination risks from conservation practices, further research should be supported to adapt existing or develop alternative conservation practices that protect water and air quality, for example, while lowering the risk to food safety. Identification of research needs should be continued under the leadership of the University of California and industry and there should be funding found immediately to support research and extension. Performance measure should include both known risks and known benefits of common conservation practices, and should measure increased, widespread adoption of conservation practices that contribute to food safety.
13. The USDA, CDFA, California Energy Commission, ARB, and other agencies should support research of ALS practices and strategies with respect to net GHG emissions and carbon sequestration, including the cultivation of alternative biofuel crops and use of agricultural residues. This research should be conducted immediately for application to ALS practices by the next California Water Plan update. Performance measures are the application of ALS practices that reduce GHG emissions and increase carbon retention in the soil.
14. Periodic inventory of soil organic carbon content can be performed with existing technologies. DWR should partner with the CDFA and the ARB to develop a program employing these technologies. Performance measures are protocols and a program to measure soil organic carbon content.

E. Climate Change

15. Recommendations of the Agricultural Working Group of the Climate Action Team (AgCAT) should be incorporated into financial and technical assistance programs, particularly those of the Farm Bill's conservation programs. Assistance programs should support only agricultural practices and crop systems that result in lower GHG emissions as determined by a life-cycle analysis of the carbon budget of a practice. For additional information, see the AgCAT page of the Climate Action Team Web site (http://www.climatechange.ca.gov/climate_action_team/agriculture.html).

F. Floodplain Management and Agricultural Land Stewardship

16. The Legislature and Congress should appropriate bond and Farm Bill funding, respectively, to continue floodplain protection easement programs that allow conjunctive agricultural uses. This should allow as much flexibility for crop selection under easement agreements as possible to avoid limiting grower response to market signals, thereby limiting farming profitability. At the same time, growers should assume the risk of growing high value, permanent crops on flood easement-restricted cropland. The latter recommendation may require immediate changes to statutory or regulatory rules affecting floodplain easement programs. Performance measure is increased participation by growers in floodplain corridor protection grant programs. Chapter 4, "Flood Management," in this volume provides additional details about this topic.

G. Water Conservation, Water Rights, and Water Transfers

17. State and federal water providers should reward conservation by their customers through the use of conservation incentives in water delivery contracts, such as by increasing the water delivery priority to those producers practicing water conservation and ALS measures.
18. DWR and U.S. Bureau of Reclamation should establish a water transfer oversight entity that ensures water transfers do not result in a long-term negative impact on the state's food production capacity, or have an adverse impact on rural community economics. The protection of soil health and enhancement of wildlife habitat should be considerations in approving water transfers. For example, temporary crop idling for water transfers should be designed to contribute to a crop rotation system that includes fallowing to build soil moisture and organic carbon content, and to provide conjunctive wildlife habitat for such species as the giant garter snake (*Thamnophis gigas*). Transfers should reserve sufficient water on transferring land in order to establish a cover crop. Performance measures are acres of land in rotational conservation fallow programs, and the amount of water not used (saved) for those acres during fallow periods.

H. Education, Demonstration, and Outreach

19. The federal Farm Bill should be amended, and appropriations should be made to support a return to farmer-to-farmer education, demonstration, and outreach on successful conservation programs. The Environmental Quality Incentives Program once included funding for such work. This authority and needed funding should be returned to the NRCS as part of its conservation operations and technical assistance budgets. Every Farm Bill conservation program should include funding to document not only program effectiveness, but also to

share information about the programs and their supported practices with other growers through educational materials, field demonstrations, and workshops. This recommendation should be implemented immediately in the near- and long-term as USDA's budget appropriations are made each year, and as Farm Bill reauthorizations occur every five or so years. Although current demand is about three times the amount of current funding, performance measures for this recommendation would be greater demand for USDA's conservation program funding and technical assistance, and greater awareness among working landowners of conservation programs.

20. State grants that support ALS should likewise include a requirement that each grantee document project success and share lessons learned and successes with other growers and granting agency managers. This recommendation should be implemented, as bond authorities allow, immediately. As with demand for federal funding, current demand for State grants exceeds available resources. Performance measures for this recommendation would be greater demand among stakeholders and agencies for funding of effective ALS practices and strategies, and the requirement that such funding includes funding for demonstration and outreach.
21. The Department of Conservation Farmland Conservancy Program's funding for planning grants should be expanded in support of recommendations 22 and 23 below. The Governor's Office should work with the Legislature to acquire bond measure appropriations that support the Farmland Conservancy Program, specifically for its planning grants. This recommendation should be implemented immediately and in the long term as new bond measures are placed on the ballot. See the performance measure for recommendation 22.
22. The CDFA and the Department of Conservation should seek funding to support an interagency technical outreach team to facilitate the transfer of technology with respect to agricultural land protection via agricultural conservation easements. The team would work with county planners and agricultural commissioners by sharing information on innovative farmland protection programs and ordinances in other counties. The team would also educate landowners about the tax relief, estate planning, and other benefits of agricultural conservation easement. This recommendation could be implemented immediately through an interagency agreement and a minor reallocation of staff resources. Performance measures for this recommendation would be transfer of successful agricultural land protection programs to other counties, and a greater demand for agricultural conservation easements and the funding to purchase them.

II. Recommendations for Local Action

23. Integrated regional water management plan (IRWMP) applications for funding should embody ALS components where the region addressed by the plan includes agricultural land. Criteria, incentives, and education should focus on these goals. This recommendation should be implemented immediately, if it has not already. Performance measure involves IRWMPs being comprehensive and integrated, and containing supportive ALS measures and strategies, where appropriate.
24. Where appropriate, cities and counties should consider adding agricultural land preservation policies to their general plans and designating supportive agricultural districts that enhance ALS on high-priority, productive agricultural land. These districts should focus on regulatory assistance through county agricultural ombudsmen. These districts should also be the focus

of local agricultural infrastructure investment, marketing assistance, and the development of ALS practices and strategies in cooperation with local, State, and federal agricultural conservation entities. Districts should also be the focus of land protection instruments, such as the Williamson Act, and agricultural conservation easements. Other strategies to enhance agricultural resources locally should engage such resource organizations as RCDs, the American Farmland Trust, and Ag Futures Alliances (via Ag Innovations Network), and be integrated with IRWMP and habitat conservation plans, where appropriate. This recommendation should be implemented over the long term as each county general plan is updated. Performance measure is the number of general plans that include comprehensive plans for sustaining local agricultural working landscapes.

25. Local entities should look for alternative sources of funding for ALS, such as payments for watershed services.

References

References Cited

- Briske DD (editor) 2011. *Conservation Benefits of Rangeland Practices: Assessment, Recommendations, and Knowledge Gaps*. Washington (DC): United States Department of Agriculture, Natural Resources Conservation Service. 429 pp. Viewed online at: <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/?&cid=stelprdb1045811>.
- California Department of Conservation. 2008. *California Farmland Conversion Report 2006-2008*. Sacramento (CA): California Department of Conservation, Division of Land Resource Protection. Farmland Mapping and Monitoring Program. 108 pp. Viewed online at: http://www.consrv.ca.gov/dlrp/fmmp/Documents/fmmp/pubs/2006-2008/fcr/FCR%200608_intro.pdf
- California Department of Forestry and Fire Protection. 2010. *California's Forests and Rangelands: 2010 Assessment*. Sacramento (CA): California Department of Forestry and Fire Protection Fire and Resource Assessment Program. 353 pp. Viewed online at: http://frap.fire.ca.gov/assessment2010/pdfs/california_forest_assessment_nov22.pdf.
- California Department of Water Resources. 2008. *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water*. Sacramento (CA): California Department of Water Resources. 34 pp. Viewed online at: <http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf>.
- California Roundtable on Agriculture and the Environment. 2010. *Permitting Restoration: Helping Agricultural Land Stewards Succeed in Meeting California Regulatory Requirements for Environmental Restoration Projects*. Sebastopol, (CA): Ag Innovations Network. California Roundtable on Agriculture and the Environment. 20 pp. Viewed online at: http://aginnovations.org/images/uploads/Permitting_Restoration.pdf.
- California Roundtable on Water and Food Supply. 2012. *From Storage to Retention: Expanding California's Options for Meeting Its Water Needs*. Sebastopol, (CA): Ag Innovations Network. California Roundtable on Water and Food Supply. 20 pp. Viewed online at: http://aginnovations.org/images/uploads/CRWFS_Storage_to_Retention.pdf.

Additional References

- Abberton M, Conant R, Batello C, editors. 2010. Grassland carbon sequestration: management, policy and economics. Proceedings of the Workshop on the role of grassland carbon sequestration in the mitigation of climate change. April 2009. Rome, Italy. Food and Agriculture Organization of the United Nations. 342 pp. Viewed online at: <http://www.fao.org/docrep/013/i1880e/i1880e.pdf>. Accessed: March, 2012.
- Allen-Diaz B, Standiford R, Jackson RD. 2007. "Oak woodlands and forests." In: Barbour MG, Keeler-Wolf T, Schoenherr AA, editors. *Terrestrial Vegetation of California*. Berkeley (CA): University of California Press. pp. 313-338.

- American Farmland Trust. 2009. Washington (DC): [Web site.] Viewed online at: <http://www.farmland.org/>. Accessed: Dec., 2009.
- Barrett RH. 1980. "Mammals of California oak habitats--management implications." In: *Proceedings of the Symposium on the Ecology, Management, and Utilization of California Oaks*. USDA Forest Service General Technical Report PSW-44. pp. 275-291.
- Bay-Delta Habitat Conservation Plan. 2009. Sacramento (CA): [Web site.] Viewed online at: <http://baydeltaconservationplan.com/Home.aspx>. Accessed: Dec., 2009.
- Bio-Business Support Services. 2009. Charlottesville (VA): [Web site.] Viewed online at: <http://privatelands.org/bio/contents.htm>. Accessed Nov., 2009.
- Briske, DD., editor. 2011. Conservation Benefits of Rangeland Practices: Assessment, Recommendations, and Knowledge Gaps. United States Department of Agriculture, Natural Resources Conservation Service. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/?&cid=stelprdb1045811>.
- California Agricultural Water Stewardship Initiative. 2009. Sebastopol (CA): [Web site.] Viewed online at: <http://agwaterstewards.org/txp/index.php>. Accessed: Nov., 2009.
- California Association of Resource Conservation Districts. 2009. Sacramento (CA): [Web site.] Viewed online at: <http://www.carcd.org/>. Accessed: Dec., 2009. California Department of Conservation. 2006. California farmland conversion report 2002-2004. Sacramento (CA): California Department of Conservation, Division of Land Resource Protection. Farmland Mapping and Monitoring Program. 104 pp. Viewed online at: http://www.conservation.ca.gov/dlrp/fmmp/pubs/2002-2004/Pages/FMMP_2002-2004_FCR.aspx.
- California Department of Conservation. 2009. "The Williamson Act." Sacramento (CA): Division of Land Resource Protection. [Web site.] Viewed online at: <http://www.conservation.ca.gov/dlrp/Pages/Index.aspx>. Accessed: Nov., 2009.
- . 2009. Watershed Coordinator Grant Program. Sacramento (CA): Division of Land Resource Protection. [Web site.] Viewed online at: http://www.conservation.ca.gov/dlrp/wp/grants/Pages/wcgp_intro.aspx. Accessed: Dec., 2009.
- . 2009. Resource Conservation District Assistance. Sacramento (CA): Division of Land Resource Protection. [Web site.] Viewed online at: <http://www.conservation.ca.gov/dlrp/rcd/Pages/Index.aspx>. Accessed: Dec., 2009.
- . 2009. California Farmland Conservancy Program. Sacramento (CA): Division of Land Resource Protection. [Web site.] Viewed online at: <http://www.conservation.ca.gov/dlrp/cfcp/Pages/Index.aspx>. Accessed: Dec., 2009.
- California Department of Fish and Wildlife. 2009. Sacramento (CA): Natural Community Conservation Planning (NCCP). [Web site.] Viewed online at: <http://www.dfg.ca.gov/habcon/nccp/>. Accessed: Dec., 2009.
- California Department of Food and Agriculture. 2009. Programs and services. Sacramento (CA): Web site. [Web site.] Viewed online at: <http://www.cdfa.ca.gov/Programs.html>. Accessed: Nov., 2009.
- California Department of Water Resources. 2005. *California Water Plan Update 2005*. Volume 2, "Resource Management Strategies", Chapter 2, "Agricultural Lands Stewardship." Sacramento (CA): California Department of Water Resources.
- California Floodplain Management Task Force. 2002. *California Floodplain Management Report*. Sacramento (CA): California Floodplain Management Task Force. California Department of Water Resources. Report No. 29.79 pp. [Web site.] Viewed online at: <http://www.water.ca.gov/floodmgmt/lrafmo/fmb/fas/specialprojects/taskforce.cfm>.
- California Green Solutions. 2009. "Solutions For Green." Los Angeles (CA): [Web site.] Viewed online at: <http://www.californiagreensolutions.com/>. Accessed: Nov., 2009.
- Cheatum M, Casey F, Alvarez P, Parkhurst B. 2011. *Payments for ecosystem services: A California rancher perspective*. Washington (DC): Conservation Economics [White paper.] Conservation Economics and Finance Program. Defenders of Wildlife. 65pp.
- Cochrane WW. 1993. *The Development of American Agriculture: A Historical Analysis*. 2nd edition. Minneapolis (MN): University of Minnesota Press. 500 pp.

- Conant RT, Paustian K, Elliott ET. 2001. "Grassland management and conversion into grassland: Effects on soil carbon." *Ecological Applications* 11(2): pp. 343–355.
- Dahlgren RA, Singer MJ, Huang X. 1997. Oak tree and grazing impacts on soil properties and nutrients in a California oak woodland. *Biogeochemistry* 39: pp.45-64.
- Derner JD, Schuman GE. 2007. Carbon sequestration and rangelands: A synthesis of land management and precipitation effects. *Journal of Soil and Water Conservation* 62(2): pp. 77-85.
- Ecological Farming Association. 2009. Soquel (CA): EcoFarm Conference. Ecological Farming Association. [Web site.] Viewed online at: <http://www.eco-farm.org/programs/efc/>. Accessed: Dec., 2009.
- Gamekeepers - Farming for Wildlife. 2009. West Point (MS): Mossy Oak - Haas Outdoors Inc. [Online magazine.] Viewed online at: <http://farmingforwildlife.com/>. Accessed: Dec., 2009.
- Garrison B, Standiford RB. 1996. "Oaks and habitats of the hardwood rangeland." In: Standiford RB and Tinnin P, editors. *Guidelines for Managing California's Hardwood Rangelands*. Publication no. 3368. Oakland (CA): University of California Division of Agriculture and Natural Resources.
- Governor's Office of Planning and Research. 2003. *General Plan Guidelines Update*. Sacramento (CA): Governor's Office of Planning and Research. 290 pp. Viewed online at: <http://www.opr.ca.gov/index.php?a=planning/gpg.html>.
- Johnston WE, McCalla AF. 2004. "A Stylized History of California Agriculture from 1769 to 2000." In: Section II Whither California Agriculture: Up, Down or Out? Some Thoughts About the Future. Berkeley (CA): University of California, Giannini Foundation of Agricultural Economics. 15 pp. Special Report 04-1. Viewed online at: <http://giannini.ucop.edu/calag.htm>.
- Keyline Designs. 2009. Keyline Designs. Queensland (Australia): [Web site.] Viewed online at: <http://www.keyline.com.au/>. Accessed Nov., 2009.
- Kresge L, Mamen K. 2009. *California Water Stewards: Innovative On-farm Water Management Practices*. Davis (CA): California Institute for Rural Studies. 27 pp. Viewed online at: <http://www.cirsinc.org/index.php/publications/current-publications.html>.
- Kroeger T, Casey F, Alvarez P, Cheatum M, Tavassoli L. 2010. *An economic analysis of the benefits of habitat conservation on California rangelands*. Washington (DC): Conservation Economics [White paper.] Conservation Economics Program. Defenders of Wildlife. 91 pp.
- Lewis DJ, Atwill ER, Lennox MS, Pereira MDG, Miller WA, Conrad PA, Tate KW. 2010. "Management of microbial contamination in storm runoff from California coastal dairy pastures." *Journal of Environmental Quality*. 39: pp. 1782–1789.
- . 2009. "Reducing microbial contamination in storm runoff from high use areas on California coastal dairies." *Water Science and Technology*. 60: pp. 1731-1743.
- Lewis DJ, Tate KW, Harper JM. 2000. *Sediment Delivery Inventory and Monitoring: A Method for Water Quality Management in Rangeland Watersheds*. Oakland (CA): Publication 8014. University of California Division of Agriculture and Natural Resources.
- Lewis DJ, Atwill ER, Lennox MS, Hou L, B. Karle B, Tate KW. 2005. "Linking on-farm dairy management practices to storm-flow fecal coliform loading for California coastal watersheds." *Environmental Monitoring and Assessment*. 107: pp. 407-425.
- Lewis DJ, Tate KW, Harper JM, Price J. 2001. "Survey identifies sediment sources in North Coast rangelands." *California Agriculture*. 55(4):32-38
- Lewis DJ, Singer MJ, Dahlgren RA, Tate KW. 2000. "Hydrology in a California oak woodland watershed: A 17-year study." *Journal of Hydrology*. 230: pp. 106-117.
- . 2000. "Applicability of SCS curve number method for a California oak woodland watershed." *Journal of Soil and Water Conservation*. 55: pp. 226-230.

- Majanen T, Friedman, Milder JC. 2011. *Innovations in Market-based Watershed Conservation in the United States*. Washington (DC): EcoAgriculture Partners. 42 pp. Viewed online at: http://www.ecoagriculture.org/publication_details.php?publicationID=362. Accessed: March, 2012.
- Marin Carbon Project. 2009. Nicasio (CA): [Web site.] Viewed online at: <http://www.marincarbonproject.org/>. Accessed: Nov., 2009.
- National Governors Association/Center for Best Practices. 2001. *Private Lands, Public Benefits: Principles for Advancing Working Lands Conservation*. Washington (DC): National Governors Association Center for Best Practices. 57 pp. Viewed online at: <http://www.nga.org/files/live/sites/NGA/files/pdf/01022PRIVATELANDS.pdf>.
- Natural Resources Conservation Service Environmental Quality Incentives Program (EQIP). 2009. Washington (DC): U.S. Department of Agriculture, Natural Resources Conservation Service. [Web site.] Viewed online at: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/>. Accessed: Dec., 2009.
- Natural Resources Conservation Service Conservation Effectiveness Assessment Program (CEAP). 2011. Washington (DC): U.S. Department of Agriculture, Natural Resources Conservation Service. [Web site.] Viewed online at: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap>. Accessed: Feb., 2012.
- National Sustainable Agriculture Information Service. 2009. Fayetteville (AR): National Center for Appropriate Technology. [Web site.] Viewed online at: http://attra.ncat.org/intern_handbook/water_harvest.html. Accessed: Nov., 2009.
- Pineiro G, Paruelo JM, Oesterheld M, Jobbagy EG. 2010. "Pathways of grazing effects on soil organic carbon and nitrogen." *Rangeland Ecology and Management*. 63: pp. 109–119.
- PlacerGROWN. 2009. Placer County (CA): [Web site.] Viewed online at: <http://www.placergrown.org/>. Accessed: Dec., 2009.
- Runsten D. 2010. *Why Water Stewardship for Agriculture?* Somis (CA): California Agricultural Water Stewardship Initiative. Ventura County Resource Conservation District. Viewed online at <http://www.vcrd.org/PDFs/WhyWaterStewardshipfor%20Ag.pdf>.
- Silver WE, Ryals R, Eviner V. 2010. "Soil carbon pools in California's annual grassland ecosystems." *Rangeland Ecology and Management*. 63: pp.128–136.
- State Water Resources Control Board. 1995. *California Rangeland Water Quality Management Plan*. Sacramento (CA): State Water Resources Control Board. Division of Water Quality Nonpoint Source Program. 75 pp.
- Sustainable Conservation. 2012. San Francisco (CA): [Web site.] Viewed online at: <http://suscon.org/pir/pirreport/PIRreport.php>. Accessed Feb., 2012.
- University of California Small Farm Program. 2009. Davis (CA): University of California Cooperative Extension, Division of Agriculture and Natural Resources. Viewed online at: <http://www.sfc.ucdavis.edu/>. Accessed December 2009.
- U.S. Environmental Protection Agency. 2009. National Agricultural Center (Ag Center). Washington (DC): [Web site.] Viewed online at: <http://www.epa.gov/agriculture/agctr.html>. Accessed: Nov., 2009.
- USDA Natural Resources Conservation Service. 2009. Electronic Field Office Technical Guide (eFOTG) County Locator (interactive map of California counties). [Web site.] Viewed online at: http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=CA. Accessed Dec., 2009.
- Verner J. 1980. "Birds of California Oak Habitats — Management Implications." In: *Proceedings of the Symposium on the Ecology, Management, and Utilization of California Oaks*. USDA Forest Service General Technical Report PSW-44 . pp. 246-264.