INTRODUCTION

This interim report is a compilation of the work SACOG has conducted for the Rural-Urban Connections Strategy (RUCS) since late 2007. In it, the SACOG region’s rural communities are profiled, new research and technical work is outlined, and best practices within the region and across the United States are summarized. This work highlights for the region what stakeholders believe is critical to the success of rural areas. In essence, RUCS is a toolkit of ideas, best practices and technical tools for SACOG member jurisdictions to consider for local and regional planning. This report was originally compiled and published in 2011 and has been updated in 2015 to include the addition of the “Food Hub Analysis”, “Labor”, and “Case Studies” sections to reflect recent RUCS work to date.

Through years of SACOG Board meetings and workshops, retreats, rural area tours, and a regional forum, rural issues discussed in this mid-project progress report have been the subject of numerous Board conversations about regional growth and economic development strategies that better incorporate rural challenges and opportunities. Though it started as a 3-year project required by a 2008 MTP EIR mitigation measure and Transportation Control Measure, RUCS has become an ongoing effort and a valuable toolkit for the region to help build an understanding and appreciation of the value our rural areas bring to the region. It is helping build a richer understanding of the rural land use and economic conditions that can benefit from regional and local investments in transportation and agricultural infrastructure and how those systems may be impacted by growth and changing markets.

RUCS findings have helped inform many chapters of the MTP/SCS and broadened both the rural and urban considerations in crafting the plan. In Chapter 6, Policies and Strategies, the integrated relationship between the Sacramento Region’s Blueprint, Rural-Urban Connections Strategy and the
MTP/SCS is cited as significant to the region’s efforts toward economic and environmental sustainability. Specific policies and strategies are identified to guide future SACOG’s work on rural issues relates broadly to the full body of policy work for the agency, and specifically within the context of regional goods movement, rural transportation, and use of RUCS data and tools to analyze agriculture and natural resource impacts from urban growth and other impacts. Within Policy 7 in that chapter are specific strategies to implement RUCS to ensure good rural-urban connections that promote the economic viability of rural lands. As the RUCS project evolves, there will be more opportunity to use the toolkit to integrate rural and urban issues into an even more comprehensive regional land use and transportation plan.

Through recently awarded grants—discussed in the last section of this report—SACOG will continue to work with public and private stakeholders to add more capacity to the RUCS toolkit and educate the region about ways to enhance rural economic and environmental sustainability. The project is wide-ranging and continued work will help deepen the understanding of many of the topic areas. This nationally-recognized project is keeping SACOG and its members in the vanguard of regional planning and the region on a path toward improving its quality of life. Documentation of the RUCS project and integration of that work into the MTP/SCS provides transferrable lessons to regions across the United States.

OUR REGION FROM THE RURAL PERSPECTIVE

Although most of the Sacramento region’s 2.3 million residents live in and work in urban areas, the region spans an extraordinary range of landscapes. From farming communities to historic mining towns, from the forests of the Sierra Nevada to fields that feed the world, our region enjoys remarkably diverse lands and natural resources. Across the six counties of El Dorado, Placer, Sacramento, Sutter, Yolo and Yuba, approximately 75 percent of our lands are agricultural, forest, or other open space, yet only about 13 percent of the region’s population lives here. More than one third of this land is forested, while close to 50 percent is in agricultural production. The remaining land is either set aside as habitat or other open space or functions more as rural residential areas than as agriculture. The rural landscape is also host to small communities that were established to serve the agriculture and forestry industries, many during the gold rush. Agriculture and natural resources benefit directly from education and research activity at the renowned UC Davis School of Agricultural and Environmental Sciences, and its cooperative extension programs.

Agriculture has deep roots in our region’s history, and future. The Sacramento region has some of the most productive farmland in the world. We have great soil, high-quality water, and a Mediterranean climate that can grow almost anything. Agricultural production is mainly on the valley floor, but there is important grazing, orchard and vineyard production in the Sierra Nevada foothills. Above that, forests provide timber and open space benefits including a high quality water supply. California is the fourth largest agricultural economy in the world, and our region is an important part of that. In our region
alone, agriculture is a $2 billion industry. But there’s more to what we get from agriculture than direct revenue. Growing food and fiber in our region also creates jobs and income off of the farm. In economic terms, this multiplier effect means that the value of agriculture here is even greater than the direct revenue it brings in, approximately $4.5 billion in total.

The region’s agriculture and forest lands offer important environmental services. In addition to providing valuable wildlife habitat for a number of species, rural lands also provide the region with flood protection, groundwater recharge, carbon sequestration, energy production and recreation. These assets and services benefit rural and urban residents and they are an important part of our quality of life and connection to the natural environment.

Rural lands are productive in a number of ways that reflect our heritage and opportunities for our future. The contributions of small towns, farms and open spaces are vital to the success of our entire region. It is with this backdrop that SACOG launched the Rural-Urban Connections Strategy (RUCS) project. The project looks at the region’s growth, economic development and environmental sustainability objectives from a rural perspective. Through stakeholder outreach, SACOG board tours of rural areas with policy makers, public workshops, and technical work, the project is enriching the region’s understanding of the unique challenges and opportunities that rural areas face. RUCS technical work enables the region to assess both urban and rural land use and economic development issues and compare strategies that address challenges and promote opportunities. As the RUCS project evolves, findings and recommendations will help local and regional decision makers support and enhance the benefits the region derives from rural open land and integrate those strategies into regional land use, economic development and transportation plans. RUCS is a big step forward in truly comprehensive regional planning.

**ABOUT RUCS**

In many respects, the RUCS project started with the Blueprint. The growth principles that guided the Blueprint concentrate development in a more compact urban footprint, which supports the principle of preservation of open lands. Comparing the Base Case scenario to the Blueprint, those growth principles will reduce by 230,000 acres the land needed for homes and jobs. These lands
sustain grazing, annual and perennial crop production and natural resources, such as habitat or flood protection. The Blueprint also catapulted the regional dialog about growth, economic development and quality of life. While many in the region focused this dialog on urban issues, a growing number of local, state and federal observers began to ask how the Blueprint also could address the rural issues facing the region. At the same time, the 2035 Metropolitan Transportation Plan (MTP) was incorporating the Blueprint growth principles, the MTP’s Environmental Impact Report (EIR) called for the RUCS project as a mitigation measure to address the impacts to agricultural land. RUCS was also identified as a Transportation Control Measure (TCM) for the State Implementation Plan (SIP) for air quality. The mitigation and TCM language is the same and provided below. Through efforts to gather resource data and conduct analysis, RUCS is also part of the on-going National Environmental Protection Act (NEPA) streamlining effort.

**Mitigation Measure AG - 1: Develop Rural-Urban Connections Strategy and Create Best Practices Toolkit**

**CONTROL MEASURE NUMBER: RP-2 (TCM ID: RP-2)**

**Control Measure Title: Rural-Urban Connections Strategy & Best Practices Toolkit**

*Within 3 years of adoption of the MTP 2035, SACOG shall develop a Rural-Urban Connections Strategy, to expand on and help to support implementation of, the Blueprint growth strategy and the MTP. The Rural-Urban Connections Strategy will utilize state-of-the-practice data collection, modeling, research and participation practices to develop a toolkit of best practices to promote land use practices in rural areas that are economically viable for land owners and local governments and environmentally sustainable. Issues to be addressed include, but are not limited, to: agricultural practices, natural resource protection, development practices that support agricultural and natural resource values, infrastructure needs in rural areas, energy production, and methods to promote jobs-housing balance (with a specific emphasis on effective jobs-generating practices in appropriate areas.) The toolkit of best practices will include assessment of vehicle miles traveled and air emissions, including greenhouse gases. Building on local conservation efforts, the strategy will identify areas where mitigation for development should be directed to maximize the benefit of such acquisitions. Another important outcome will be the identification of environmental services, such as flood control, groundwater recharge, and carbon sequestration, which are enhanced through a comprehensive approach to urban and rural planning. It is anticipated that the Rural-Urban Connections Strategy effort will be completed within 3 years.*

By late 2007, the SACOG Board of Directors had kicked off the RUCS project and begun a new approach to addressing transportation, land use, and air quality issues. A key question before the SACOG Board and the region is how to best ensure long-term economic success in our rural areas. The answer is complex, and requires public and private stakeholders from all sectors and all parts of the region to support agricultural viability and rural communities, linking the long-term success of rural areas to the success of the region as a whole. In the same way that Blueprint is an economic development strategy
for urban areas; RUCS strives to be an economic and environmental sustainability strategy for rural areas. Given that agriculture is the main rural land use and economic activity, RUCS started with a focus on agricultural viability as its key objective and means to support the environmental benefits provided by open land. As SACOG and the region move forward with the implementation of the MTP/SCS and other regional initiatives, RUCS will help stakeholders understand the unique rural challenges and opportunities in order to better integrate rural issues into the region’s planning objectives.

**THE APPROACH**

**Working Paper and Workshops**

SACOG started the RUCS project by reaching out to rural stakeholders to hear directly from the experts about the challenges and opportunities in our rural areas. Those issues formed the underpinning for engagement with both rural and urban stakeholders beginning with a retreat with the SACOG Board of Directors. At the retreat, the SACOG Board learned about rural issues and heard from agricultural leaders in the region about the industry. Soon after the retreat, SACOG staff engaged with local jurisdictions to introduce the project and develop a better understanding of their challenges and opportunities. This phase was followed by a series of agricultural tours that continued to build Board understanding and appreciation of rural issues. It did not take long for Board members and stakeholders to begin seeing how rural issues are integral to the regional planning objectives that SACOG and others are working to advance.

The next step was to begin digging into the issues with stakeholders. SACOG started by developing working papers about key topic areas described below. Those papers were posted to a wiki for comment and were the basis for workshops with stakeholders. The first working paper for a topic was a current conditions assessment. The paper was distributed to stakeholders that were then convened in a workshop where those current conditions could be reviewed and edited based on feedback from stakeholders. Once the current conditions were established, a working paper on innovations was written to look at ways to address challenges and promote opportunities. The working group was then given this paper and a second workshop was convened. Stakeholders vetted the challenges and opportunities and identified those that are most significant in the region. Finally, stakeholders from all topic areas were invited to two workshops where ideas were shared across topic areas to identify how innovations in one topic may affect another topic. Workshop feedback was used to distill the current conditions and innovations papers into topic summaries that were presented to the SACOG Board for project updates.

In December 2010, SACOG hosted a RUCS Regional Forum bringing the findings of the RUCS project to over 600 stakeholders—rural and urban, private and public—to expand on the understanding of the integrated relationships between rural and urban communities and how they support one another in the greater Sacramento region. The keynote presentation from Glenda Humiston, USDA California State Director of Regional Development, and the panel of local agricultural leaders brought context to the value and unprecedented work of the Sacramento region. The forum highlighted the role of agriculture...
in the region, explored rural challenges and opportunities, and shared innovations from the project that will help shape our region's future economic and environmental health. The forum included videos about the region and presentations from SACOG staff, board members, and the keynote speaker. The videos, slides for staff presentations, keynote presentation and panel discussion can be found at the RUCS website, www.sacog.org/rucs/forum2010. Going forward, SACOG will be working on strategies to implement the innovations identified through the RUCS project working directly with public and private stakeholders with a focus on enhancing agriculture, rural economies, resource conservation, recreation, quality of life, and regional sustainability. This work will broaden the region’s understanding of how to support and enhance rural economies and how land use and transportation investments affect rural areas and the whole region.

**Working Paper/Working Group Process**
- **Current Conditions Working Paper**
  - (Challenges and Opportunities)
  - ➔ Current Conditions Workshop
  - ➔ Innovations Working Paper
  - ➔ Innovations Workshop
  - ➔ Summary Report
  - ➔ Implementation

**RUCS Stakeholders**
- Local planners and engineers
- Economic development
- Farm bureaus
- Ag commissioners
- Ag interest groups
- Forest managers
- Forestry interest groups
- Resource conservation groups
- Environmental groups
- Local food system groups
- Health and nutrition groups
- Civic engagement groups
- Elected officials

**RUCS Technical Work**
A cornerstone of SACOG’s work is to offer better information for better decision making. Community leaders and agricultural businesses often lack access to good data and technical information to inform regional decisions that affect agriculture. Where do public agencies need to supply roads, water, and
housing? How do the prices of inputs affect agricultural products? What is the economic return? SACOG builds technical analysis capacity that helps stakeholders move beyond ideology to address issues using data and analytical tools to compare the implications of possible future scenarios.

The technical toolkit for RUCS is unique and provides detailed performance indicators that improve the region’s understanding of possible economic and environmental outcomes. SACOG has worked with consultants to create several tools based on feedback from stakeholders about what would be most useful to understand the agricultural economy and improve its viability. The methodology and tools developed by SACOG are transferable and scalable, so any local, regional, state or federal organization could adapt them. SACOG is using crop maps, production data, and GIS to put related data together in a set of cutting-edge, practical, tools.

SACOG’s expertise in mapping and computer modeling has produced an unprecedented level of data regarding the region’s rural areas. The tools have been shared and refined with many partners, including Farm Bureaus, local planners, and county agricultural commissioners. They include:

- Compilation of crop reports comparing the volume and value of individual crops over 20 years
- Parcel-level crop maps showing what is grown in generalized agricultural “landscape types”
- Cost and revenue data for various crops to better understand agricultural viability
- Loss of farmland, actual and projected, given change in population and possible growth patterns
- Research of general plans, agricultural zoning
- Mapping of Williamson Act lands and analysis of potential land conversion impacts on air quality
- Mapping of traffic volume, safety data and key farm-to-market routes for rural roads
- Analysis of labor needs for potential changes in cropping
- Mapping of environmental data such as vernal pool locations and other protected lands
- Econometric model to estimate changes in cropping patterns given changes in input cost or commodity prices
- Diet-Land Needs model to better understand how much land is needed to feed the region from local sources of food
- GIS applications for envisioning rural development scenarios, to help rural residents and planners evaluate and shape the long-range future of land use
- GIS applications for agriculture analysis to provide indicators on agricultural viability
- Economic indicators (potential costs and revenues) for varying types of agricultural land use
- IMPACS modeling provides information on infrastructure demand, capacity, cost, and revenue which allows local governments to better understand the fiscal implications of different growth patterns
- Food hub analysis assessing the viability of aggregation and processing for a regional food system
- Carbon emissions analysis linked to production and processing
- Case studies that use RUCS tools to help local stakeholders understand the opportunities and challenges in agriculture and food systems.

**RUCS Technical Toolkit**

The application of these tools will be highlighted throughout this report. While SACOG is continuing to refine the technical work with new data and model updates, the tools provide a unique perspective and understanding of the issues facing rural areas.

**CHALLENGES AND OPPORTUNITIES FOR OUR RURAL ASSETS**

Much of the rural landscape can be understood by the challenges and opportunities these areas face. SACOG met with a number of rural stakeholders when first starting RUCS to become more familiar with these issues. This became the launching point for the project and for developing the current conditions...
and innovations working papers. Below are brief descriptions of these challenges and opportunities many of which are discussed in more detail in this report. Those areas not discussed here will be studied in detail as part of future RU CS work.

**Challenges in Our Rural Areas**

**Roads**
Urban, rural residential and recreational uses increasingly conflict with the movement of farm equipment and access to markets.

Rural roads are the only means of access between farm and market in most parts of the region. Farmers and ranchers are increasingly contending with traffic from urban areas as drivers use rural roads to avoid congestion. Existing agritourism, such as wine tasting, and plans for new tourism opportunities also create trips on roads originally designed for low traffic volumes. Casinos in rural areas are another land use that generates urban levels of traffic. While road improvements can help farmers and ranchers, the net impacts may be negative if better roads also lead to speeding and more development in rural areas. Perhaps even more challenging is reaching agreement between cities and counties on a “fair share” accounting of impacts to rural roads and apportioning local sales or property tax, or developer impact fees to pay for needed improvements.

**Labor**
Supply shortages and wage increases sometimes result in crops being left in the field and affect profitability.

Thick profit margins and international competition keep wages low, which, coupled with hard manual labor, make agricultural jobs unattractive to many people. National immigration policies are making it more difficult for people who are willing to do this work to enter the United States. Furthermore, those that are able and willing to do farm labor are faced with a lack of affordable housing and transportation to job sites. These factors lead to shortages in farm labor, which reduces harvests and drives up wages, thereby reducing profitability. Couple this with the aging population of farmers and ranchers and a decline in young people entering the industry, and many
people are beginning to wonder who will be growing and processing our food in the future. A recently completed white paper on the labor issues facing the SACOG region is included later in this appendix.

**Processing Facilities**
Local closures affect which crops are grown, eliminate rural jobs, and increase transport distance, emissions and cost for local products.

The region has experienced a number of processing facility closures. Many economic factors—some of them international—contribute to these closures, although urban encroachment can also lead to closures. Trucking products to facilities outside of the region increases vehicle miles of travel, emissions, transport costs, and potentially reduces product quality and therefore price. In some cases, the loss of a processing facility causes farmers to cease growing a particular crop altogether. For example, the closure of the peach processing facility in Yuba City reduced the acres of peaches in Sutter and Yuba counties. Such closures also eliminate direct and indirect processing jobs, as well as the economic multiplier effect associated with those jobs and the facility.

**Forests**
Fire suppression and overgrowth can impact environmental services and increase the number and intensity of wildfires, creating higher risk for some housing developments.

In June 2007, the Angora wildfire burned more than 3,000 acres and destroyed more than 250 homes. This was the most recent example of intense wildfires that result from large amounts of “fuel” in the forest due to fire suppression and overgrowth. While the ecology of the Sierra Nevada evolved with forest fires, today’s fires are more intense, reaching temperatures high enough to scorch the ground and devoid it of the nutrients needed to re-establish the forest. These fires also increase erosion and impact water quality, habitat and recreation. Climate change could exacerbate these results. Fighting these fires also costs more and
strains already challenged budgets. Moreover, poorly managed forests reduce the quality of timber (tight spacing produces small trees prone to insect infestation), the ability of the forest to retain and store runoff (which increases flood risk and reduces water supply), and its ability to sequester carbon (tight spacing stunts tree growth and therefore carbon uptake). Timber harvests and infrastructure have declined for the last 20 years for a number of reasons, which impacts local economies and forest density. While often subject to lawsuits and expensive to develop, Timber Harvest Plans, particularly those that include eradication of dead and dying timber and excess forest fuels, can address many of these issues by incorporating state-required sustainable forest management practices.

---

**Small Communities**

Infrastructure needs and demand for municipal and commercial services can increase pressure for higher levels of growth, sometimes resulting in more housing that is not balanced with local jobs.

Small communities are generally agriculturally-based towns that appeal to those seeking a slower pace of life and would ideally like to preserve smaller communities. However, many of these communities are having trouble maintaining that way of life, as road, sewer and water infrastructure breaks down. In the city of Winters, the long-closed city swimming pool has only recently been opened after a developer helped pay for improvements. Other services, however, still fall short: of 28 police shifts, 16 have only one patrolling officer, and fire services rely on volunteers for night and weekend shifts. Like many small communities, the city of Colfax has struggled for years to build a new wastewater treatment plant to meet federal and state clean water requirements. Required infrastructure improvements for the potability of water do not take into account the fact that for example, the City of Sacramento and the City of Colfax have the same burden of potability, despite a huge discrepancy in the number of rate payers. Additionally, residents leave town for shopping, professional services, and employment, thereby increasing longer distance travel to other communities. They also leave much of their tax dollars in the coffers of other communities.

These infrastructure and service needs often leave small communities feeling forced to incentivize new development in order to pay for improvements and add enough housing units to attract commercial and professional services. This development, however, also consumes and impacts much of the agricultural land that creates the base economy for many of these communities, creates more traffic from long distance commuting to regional job centers, and diminishes the small town character.
Water

Competition for surface supply and rising pumping expenses are driving up irrigation costs and limiting availability, potentially threatening economic viability for some farmers and ranchers.

Water supply sustains the agriculture industry in our region and beyond. Competition for surface water and rising pumping costs could threaten economic viability for some farmers and ranchers. Drought has challenged supplies for today’s demand, causing mandated conservation in urban areas, curtailed water deliveries to agriculture and strain on environmental systems. Continued statewide shortages and Delta ecosystem concerns may increase pressure or incentives for agriculture to help address these issues by leaving more water in the rivers for Delta and other downstream users. Pressure on agriculture may also result from urbanization, particularly where non-irrigated lands are converted to urban uses that create new demand. Unlike agriculture’s seasonal demand, urban areas need water throughout the year. This increases pressure on groundwater supplies to manage shortages. Farmers and ranchers have more difficulty than urban ratepayers in paying for the cost of pumping increases particularly with rising fuel and electricity prices, contamination, and falling aquifers.

State Regulations

Safety and environmental restrictions and reporting requirements can add time and cost to farm and ranch operations and reduce their economic viability.

Like any industry, agriculture is subject to state regulations. The California Air Resources Board currently uses the Carl Moyer Memorial Air Quality Standards Attainment Program as an incentive to convert diesel engines to cleaner technology. The program is voluntary, but mandatory diesel engine conversion will soon be in place and stationary engine regulations are already subject to stricter standards. Other air quality regulations include burning restrictions and controls on dust particulate and methane generation. The Central Valley Regional Water
Control Board enforces the Irrigated Land Regulatory Program, which requires farmers and ranchers to monitor water quality either individually or as part of a watershed coalition. Other programs exist for confined animal waste discharge and food processing waste discharge. The Department of Pesticide Regulation regulates pesticide sales and use and requires regular reporting. These regulations add cost to a farmer’s or rancher’s budget and place some limitations on operations. These types of regulations, while based on sound public policy values, can be particularly challenging for small farms.

**Federal Regulations**

Implementation of environmental regulations sometimes creates unintended consequences, including pushing development farther away from existing urban infrastructure.

In addition to the clean water requirement hurdles faced by small communities, the federal Clean Water Act also places sometimes challenging requirements on development projects which impact waters that fall under statutes of the Act. Most areas of the region do not yet have large-scale Habitat Conservation Plans, Special Area Management Plans, or Natural Communities Conservation Plans in place. Until such plans are successfully completed the U.S. Army Corps of Engineers typically implements the regulations of the Act on a project-by-project basis and generally requires on-site mitigation that can end up negatively impacting a project’s economic viability. This is especially true for projects that are within the urban footprint, where there is often no possibility for on-site mitigation. This piecemeal mitigation approach runs in conflict with the U.S. Fish and Wildlife Service mandate to preserve resources in a contiguous fashion. It can also cause developers to look beyond the urban edge to find lands where development and mitigation can comply with federal standards, thereby creating development that generates longer commutes and more emissions. The Corps’ regulatory guidance to implement the Clean Water Act also affects rice farmers who can face possible regulatory action if a property is determined to be a wetland and waters of the U.S. In those cases, farmers who wish to convert their land to another agricultural or non-agriculture use are faced with a burden of proof that can require them to leave their land dry and fallow for up to five years. This affects not only impact the economic viability of this farmland, but also the habitat that annually supports the most abundant array of migrating waterfowl in North America.
OPPORTUNITIES IN OUR RURAL AREAS

Local Markets
Local sales to restaurants, farmers' markets and households improve profits and reduce the distance our food travels.

Public interest is increasing in not only how food is grown and produced, but where it is grown. More and more, consumers are seeking locally grown products. The popularity of farmers’ markets continues to increase; there are regularly scheduled markets throughout the region, and for part of the year in Sacramento County there is a farmers’ market every day except Monday. Community Supported Agriculture, where a person becomes a “shareholder” in exchange for a regular delivery of seasonal produce, is also gaining popularity as evidenced by the success of Farm Fresh to You in West Sacramento. Wholesale suppliers, such as Produce Express, are expanding deliveries of locally grown produce to restaurants throughout their service area, and Whole Foods Market and large grocery stores have started selling local produce in their stores. Capay Valley is working on a model of using distribution centers where farmers can make one stop to deliver produce that then gets distributed by a third party. Value-added local products, such as jams and sauces, are also making their way into more local gift shops and restaurants (e.g., Ikeda’s restaurants and fruit stands in Auburn and Davis, Lincoln Produce Market, and Newcastle Produce in Placer County). Local farmers who sell directly to consumers can improve their margins by eliminating the middleman and reducing the cost of transport to market. Furthermore, institutions such as schools and hospitals are seeking local sources of food for their operations and healthy eating initiatives. This is driving the need for and interest in creating food hubs to aggregate and process food in greater volumes to serve these markets. Many consumers believe they get a better product from local growers and can reduce their carbon footprint by buying food that is transported far fewer miles than by conventional distribution systems.

Agritourism
The “locally grown” trend is also creating interest in farm and ranch tours, adding a potential revenue stream to agriculture operations.

Winery visits in the region continue to grow, but agritourism has expanded beyond sniffing, swirling and sipping. As part of the trend toward locally grown food, consumers are becoming more interested in visiting the farms and ranches where their food is grown. Local economic development and tourism bureaus are working to develop more tours and eventually draw out-of-region travelers to these destinations. Agritourism is a key component of Yolo County’s economic development planning; Sutter and Yuba counties recently published a map of farms and fruit stands; Placer County has its annual Farm and Barn Tour and the “Placer Grown” initiative; El Dorado County has been a popular wine tasting destination for a number of years and is home to the very popular Apple Hill district; and Sacramento County is working to develop a Delta farm tour. These tours not only connect consumers to the source of their food, but also enable farmers to eliminate transport costs altogether if they sell products on-site. Produce stands have traditionally been an outlet for local fruits and vegetables, but they have also become a venue for offering value-added products. Just as El Dorado County is looking to do in their wine district, agritourism can also include restaurants and hotels for visitors from out of the region, which keeps tourists in the region longer and increases the potential revenue for this industry.

**Energy Production**

Forest and farm byproducts can generate energy.

Fluctuating oil prices, carbon reduction strategies and national security are driving the market for alternative energy. Much progress has been made in deriving fuels from crops, particularly corn, but new technology is improving the efficiency in fermenting any form of biomass to produce biofuels. UC Davis is one of the lead institutions developing biomass fuel and energy technology. Biomass can also be used in cogeneration facilities as has been implemented by Placer County. A partner in the program, Sierra Pacific Industries, produces seven megawatts of power for use at their Lincoln plant and also sells up to 13 megawatts to PG&E. Not only does this effort produce energy and revenue, it cleans up the forest to help prevent wildfires. CleanWorld Partners is also converting biomass to renewable energy, using both urban and agricultural waste for their feedstock. The development of an alternative energy industry will help create economic opportunity not only for farmers disposing farm byproducts (e.g., rice straw), but for alternative energy companies that may find the region attractive due to the research at UC Davis and the availability of abundant agriculture biomass. Add to this the growing practice of capturing methane at dairies and feedlots and the region hosts a range of alternative energy opportunities.
Carbon Sequestration

Fast-growing forests and low-impact farming practices can take carbon out of the atmosphere.

The Sierra Nevada hosts some of the fastest growing conifers on the planet. These trees can absorb tremendous amounts of carbon and form a large carbon “sink” or reservoir. This ability to take up and store carbon creates economic opportunity, as the carbon trading market becomes an increasingly important part of controlling greenhouse gases and implementing California’s Global Warming Solutions Act (AB 32). Forest management practices set by the state can maximize the potential for the forests to absorb carbon, while at the same time increasing timber yields. Carbon sinks can also be developed on agriculture lands by switching from row crops to orchards or pastures, employing managed grazing (grasses absorb more carbon when they are not overgrazed), using less intensive tillage (only plow where you plant, undisturbed soil can absorb carbon and minimize the release of carbon and nitrogen), and retiring land. At a minimum, agricultural practices can mitigate greenhouse gas emissions by reducing diesel emissions, converting to biofuels, or capturing methane from manure. These agriculture practices have the potential to create revenue for farmers and ranchers that participate in carbon trading markets, while also helping to maintain the quality of farmland.

Easements

Conservation easements on agricultural lands can add a revenue stream that helps improve economic viability.

Many agricultural lands also serve as habitat for threatened or endangered species. In fact, many listed species in this region depend on agriculture since they have adapted to those practices over the last 100 years. Where land cannot be set aside in fee title, Habitat Conservation Plans, Natural Communities Conservation Plans, and other preservation efforts rely on conservation easements, transfer of development rights (TDR), or Williamson Act contracts to protect land for habitat or agriculture. The Sacramento Area Flood Control Agency (SAFCA) is also active in the purchase of agricultural easements in Sutter and Yolo counties in areas upstream and immediately downstream of the Fremont Weir, which could absorb some of the impact of an extreme flood event. Some easement or TDR programs make a lump sum payment, but recently farmers and ranchers have shown more interest in participating if they
instead receive annual payments. These easements not only preserve a resource, they provide an income stream for land owners. A couple examples of these multipurpose opportunities include field crops, such as alfalfa or wheat, which provide Swainson’s hawk habitat, and cattle grazing in vernal pool areas, which keeps non-native grasses in check. These grasslands also provide habitat for native pollinators, which can supplement commercial hives that are suffering from colony collapse disorder.

**Habitat Conservation Plans**

Comprehensive conservation plans show promise of reducing development permitting time and cost and improving resource protection compared to project-by-project review and mitigation.

There are several Habitat Conservation Plans (HCP) and Natural Community Conservation Programs (NCCP) underway in the region, including the Yolo Natural Heritage Program, the Yuba-Sutter NCCP/HCP, the Placer County Conservation Plan, the South Sacramento HCP, and El Dorado County’s Integrated Natural Resource Management Plan. These efforts involve a range of stakeholders and deal with a variety of resource conservation issues in order to address federal requirements for HCPs and state requirements for NCCPs. While these efforts take a number of years to complete, they are worth it. First and foremost, they help protect lands that are valuable for habitat, agriculture, environmental services (e.g., water purification), and recreation. HCPs provide clarity on where development is envisioned, what resource impacts need to be mitigated, and where that mitigation should occur. They also define mitigation ratios, impact fees, and how resource lands will be managed. This transparency reduces the time and cost of environmental review and permitting for land use and transportation projects, a welcomed improvement from the often lengthy and uncertain project-by-project review and permitting process, which apply to most projects currently.

**Water Use Efficiency**

Saving water and money helps farmers and ranchers stay afloat, and offset requirements for habitat and urban uses.

Where it can be applied, drip irrigation has been used by farmers for a number of years and saves substantial amounts of water, energy and cost. Processing tomato production provides a great example of this technology where subsurface drip
tape has maintained or improved yields with roughly 40 percent less water. Irrigation Management Services (IMS) are being employed by the irrigation districts in El Dorado and Placer counties as another way to address agricultural water demand. IMS uses data collected from soil moisture sensors to customize irrigation schedules based on the crop and soil moisture conditions. In Placer County, the ditch system, which dates back to the Gold Rush, is being lined or buried to prevent the loss of water during delivery. These conservation efforts help reduce costs to farmers and ranchers and keep as many acres as possible supplied with water. Also helpful are Integrated Regional Water Management Plans (IRWMP), which are comprehensive, inter-jurisdictional studies of how to manage the supply and use of water for urban and non-urban uses. IRWMPs offer tremendous opportunity to improve the efficiency of water use and find solutions that help all stakeholders. IRWMPs are also important because they are required to qualify for many sources of state funding for water infrastructure improvements.

**Forestry**

New industry practices and state requirements for forest management show promise of increasing harvests, as well as improving habitat and environmental services.

Years of research and practice have taught foresters that mimicking natural systems produces the most benefit to industry and the environment. Forest management experts are working to return the forest back to conditions observed when settlers first explored the Sierra Nevada: tree densities of 50 to 150 per acre and large areas cleared by wildfires, which were less intense and helped also clear the understory, the vegetation beneath the forest canopy. Today, we have 300 to 400 trees per acre, fewer large openings in the canopy, and a very dense understory that increases the risk and intensity of wildfires. Forest managers are using controlled burns to clear the understory or removing that biomass for use in cogeneration facilities. Forest thinning and tree planting practices can bring densities down to about 200 trees per acre, which allows more robust growth and increases timber quality and carbon sequestration. State and federal regulations require that tree diversity be maintained (i.e., they cannot cut just the larger trees) so that habitat quality is improved, which also improves the recreational experience. Lower density forests with a well-managed understory also retain and filter more runoff, which improves water storage, water quality and flood control.
Recreation
Parks, trails and wildlife areas support not only recreational activities, but also educational opportunities and the connection between built and natural environments.

Public parks, trails and wildlife preserves are the dominant means by which people connect with nature. This recreational “infrastructure” presents opportunities to understand our natural heritage and how it relates with our built environment. Private assets such as the Nature Conservancy’s Cosumnes River Preserve adds to the inventory of public recreational and wildlife areas that are part of the region’s rural fabric. Fishing opportunities abound, while many rice fields are purposely flooded for duck hunting and other types of fields support pheasant and quail hunting. The Yolo Bypass Wildlife Area and other regional locations provide opportunities for watching hundreds of species of birds and waterfowl. Add to that the hiking, biking, skiing, rafting, horseback riding, and boating opportunities and you find that the region offers a diversity of recreational activities, as well as a robust economy around those activities. Beyond recreation, many of these areas are also educational outlets. Roughly 4,000 students visit the Yolo Bypass Wildlife Area annually, and salmon runs on the American River are another popular field trip. These recreational and educational opportunities provide places where children can connect with their natural environment.

TOPIC AREAS

Many of the challenges and opportunities associated with rural and agricultural areas are interrelated. Within the Rural-Urban Connections Strategy research these issues were assembled into five topic areas to organize the project and kick off the workgroups and working papers. The forest management topic stands on its own since forestry issues span as wide as the forested geography. The regulations topic will draw from other topic areas, but was identified specifically since regulations are consistently identified as a primary challenge and addressing them is an important part of implementing the innovations and strategies that will come out of the RUCS project.
- **Land Use and Conservation**: Policies and Plans that Shape Rural Areas

  This topic area examines the policies and plans that affect the use of rural lands. Understanding how development and economic conditions may impact rural industries is important; however, the location of conservation and recreational areas also influences how rural areas may function in the future. The interface between urban and rural areas is a key factor.

- **The Infrastructure of Agriculture**: Challenges to the Production Process

  This topic area covers the basic input and output components of the agriculture production process. This is a diverse topic area covering a range of subjects including transportation, aggregation, processing distribution, storage, labor, and water supply.

- **Economic Opportunities**: New Ways to Grow Revenue

  This topic area covers a number of opportunities for farmers and ranchers to increase revenues beyond traditional agriculture markets. These opportunities include agritourism, local markets, carbon markets, energy markets, and increasing national and international market demand for food.

- **Forest Management**: Growing Economic and Environmental Value

  This topic looks at the challenges and opportunities in the region’s forests including: fires, reduced timber harvests, recreation, habitat, and watershed issues. New management practices and how the aforementioned issues can be mitigated are also studied. Watershed opportunities in water storage, water quality and flood control are examined. Carbon sequestration potential is a key issue.

- **Regulations**: Navigating Federal and State Environmental Guidelines

  This topic will focus on understanding and meeting federal and state environmental requirements that affect rural areas including: water quality, air quality, endangered species, flood control, and pesticide use. Challenges to meeting those requirements and impacts on agriculture and land use patterns will be identified. Possible ways to expedite review and permitting will be explored, as will regulatory reform ideas.

---

**RURAL INDUSTRIES**

**Agricultural Production**

There are approximately 1.54 million acres of land in agricultural production. The region grows upwards of 120 crops that feed local, national and international markets. Despite a loss of farmland and commensurate agricultural value over the last 20 years, agriculture was one of the few bright spots in our regional economy during the recession. The impact of this trend on the rural economy is illustrated in Figure 1. From 1985 to 2005, the value of agricultural commodities in the region declined in near parallel with the decline in agricultural acres. Record commodity prices since then have somewhat
reversed this trend where it appears that some fallowed land has been brought back into production to take advantage of the higher prices. According to county crop reports for the six-county region, the value of agricultural production from 2005 to 2011 has increased by more than $400 million or roughly 28 percent. Today, our region’s $2 billion agricultural output is part of California’s approximately $46 billion industry. And for every $1 change in agricultural output, there is a $2.25 change in total economic output. This translates to approximately $4.5 billion in economic output related to agriculture. The State Employment Development Department (EDD) reports close to 21,000 jobs in distribution, processing, production and support related to agriculture (see Figure 2).

Figure 1: Agriculture Land in Production and Commodity Value

![Agricultural Commodity Chart](image-url)

Figure 2: Agriculture Employment
The SACOG region has over 7,200 farms that range in size and value. While averages can be somewhat misleading, Table 1 below helps illustrate how farm size and value varies across the region. Foothill farms tend to be smaller and generate less revenue than farms on the valley floor, yet these counties have a relative high number of farms compared to land in production. Table 2 provides a breakdown of crops and values in the region. Field crops, which include vegetable production, and fruit and nut orchards, make up the bulk of the region’s agricultural value; however, there is significant revenue in other crop categories. Table 3 shows that the majority of our farms (83 percent) are less than 180 acres and Table 4 illustrates that 64 percent of our farms earn less than $25,000 per year. Larger operations with higher revenues are seen throughout the region, but there is a higher proportion in Sacramento, Sutter, and Yolo counties. As with the rest of the state, our region is made up of mostly small family farm operations and most of those rely heavily on off-farm income.

Table 1: SACOG Regional Agriculture Summary

<table>
<thead>
<tr>
<th>County</th>
<th># of Farms</th>
<th>Acres</th>
<th>Avg farm size</th>
<th>Farmgate Value¹</th>
<th>Farmgate Value/Farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Dorado</td>
<td>1,358</td>
<td>128,365</td>
<td>95</td>
<td>$57,240,760</td>
<td>$42,151</td>
</tr>
<tr>
<td>Placer</td>
<td>1,355</td>
<td>91,403</td>
<td>67</td>
<td>$82,625,000</td>
<td>$60,978</td>
</tr>
<tr>
<td>Sacramento</td>
<td>1,352</td>
<td>246,840</td>
<td>183</td>
<td>$457,348,055</td>
<td>$338,275</td>
</tr>
<tr>
<td>Sutter</td>
<td>1,358</td>
<td>375,174</td>
<td>276</td>
<td>$599,292,000</td>
<td>$441,305</td>
</tr>
<tr>
<td>Yolo</td>
<td>1,011</td>
<td>460,824</td>
<td>456</td>
<td>$721,636,091</td>
<td>$713,784</td>
</tr>
<tr>
<td>Yuba</td>
<td>795</td>
<td>187,638</td>
<td>236</td>
<td>$234,927,000</td>
<td>$295,506</td>
</tr>
<tr>
<td>REGION</td>
<td>7,229</td>
<td>1,490,244</td>
<td>206</td>
<td>$2,153,068,906</td>
<td>$297,838</td>
</tr>
</tbody>
</table>

¹ – Values derived from 2013 crop reports
These figures highlight the importance of supporting all levels of agriculture in our region and the role it plays in our economy. The needs of large and small farms are in many ways the same, but we must also recognize their differences for both to succeed. As local and global demand for food continues to increase, our region is well positioned to take advantage of these market opportunities. RUCS is laying the groundwork—in policy analysis, regional planning innovations and education—to support and enhance agricultural production and the businesses on which the industry relies. Enhancing the business that make up the food chain in the region will add value to the industry, as well as create jobs.
Timber Production

Timber production in the three counties has declined markedly over the past 20 years. This is due in part to reduced harvest on national forests as compared with harvest levels in the 1990’s, but harvest levels on private lands have also declined markedly (Table 5).

Table 5: Timber Harvest Levels, El Dorado, Placer & Yuba Counties, 1990-2008 (million board-feet)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>El Dorado</td>
<td>157</td>
<td>169</td>
<td>14</td>
<td>112</td>
<td>59</td>
<td>48</td>
<td>6</td>
<td>39</td>
</tr>
<tr>
<td>Placer</td>
<td>32</td>
<td>143</td>
<td>8</td>
<td>46</td>
<td>6</td>
<td>27</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Yuba</td>
<td>7</td>
<td>19</td>
<td>3</td>
<td>24</td>
<td>17</td>
<td>30</td>
<td>&lt;1</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>196</td>
<td>331</td>
<td>25</td>
<td>182</td>
<td>82</td>
<td>105</td>
<td>14</td>
<td>65</td>
</tr>
</tbody>
</table>

Source: California State Board of Equalization.

The causes for reduced timber harvest on national forests include changes in policy, budget limitations, and appeals and litigation. On private lands subject to regulation under the Z’Berg-Nejedly Forest Practice Act, the reduced level of harvesting is due to other causes including competition from sources of lumber outside the state, poor local markets (low log and lumber prices; limited number of processing facilities), increased costs of regulation, and possibly limited inventory.

In general, the economics of timber harvesting are extremely unfavorable at the present time. Log prices and consequently stumpage values are at an all-time low. In 2000, the statewide average stumpage value was $461/thousand board-feet. In 2008, that value was $122/thousand board-feet, reflecting the currently depressed lumber market. In the 1990’s, public and private timber harvesting in the three counties produced annual stumpage revenues in excess of $150 million. A proportion of these revenues supported local businesses and communities. In 2008, the total stumpage revenues generated from timber harvesting had declined to less than $22 million. Concurrently with the reduction in harvesting on national forests there has been a reduction in revenues to counties (payments in lieu of taxes). Yield tax revenues to the state have also been affected by reduced harvesting on both national forests and private lands along with depressed timber values. Despite the decline in the timber industry, timber is still among the top five crops in El Dorado and Placer counties. It was number nine in Yuba County in 2008.

Over the past decade several wood products manufacturing facilities in the SACOG region have closed. At the present time, there are two wood products manufacturing facilities operating within the SACOG region that

---

1 A board foot is defined as a board one inch thick, one foot wide and one foot long.
3 Stumpage revenue is defined as the amount of money realized from a timber sale after all harvesting and hauling costs have been paid i.e., it is the price paid by the mill for the timber minus these costs.
derive supply from the forested parts of Yuba, Placer and El Dorado counties. These plants have recently experienced difficulties in obtaining supply (chips and residues from primary manufacturing) and their operating future is uncertain. There are a number of other manufacturing establishments in the three-county area that utilize wood. These include cabinet shops, specialty fabricators, etc. As of 2008, there were approximately 26 such businesses, down from 49 in 1990. Relatively minor economic activity is associated with other forest uses (use of biomass to generate electricity is covered in a following section). The El Dorado County Agricultural Commissioner reports the harvest of Christmas trees as a crop. In 2007, Christmas trees accounted for $2.7 million; this declined to $2.5 million in 2008. Some Christmas tree growing occurs on private lands in Placer and Yuba counties as well. Woodcutting for firewood occurs on both national forests and on private lands.
LAND USE

The opportunities and challenges in rural parts of our region are directly affected by the Sacramento region’s strong population growth and commensurate development pressure; particularly over the last ten years. From 1988 to 2012, the region grew by more than 750,000 people. In that same time, approximately 214,000 acres of farmland were converted to urban and rural development. That is over 5 percent of the total farmland acres existing in the region, much of which is higher quality farmland. While the last recession may have taken development pressure off most rural lands, the six counties in the SACOG region all face similar challenges when it comes to policy making to balance the competing demands of maintaining agricultural and open space, funding infrastructure and public services, economic development, growth pressures and land rights. However, while the draft 2016 MTP/SCS anticipates 811,000 new residents—using land use, housing and jobs growth forecasts—only 37,215 acres of farmland are projected to be lost to urban and rural development during the planning period. This is a substantial reduction in the land needed to accommodate future growth and shows the benefits to conserving the region’s open space resources by employing smart growth policies.

Rural Land Use Designations

Across the region, rural uses are generally designated as agricultural (intensive and extensive agriculture), open space, recreation, forest (or timber) and rural or agricultural residential. With 64 percent of the region’s acreage designated as agriculture or timber, and another 21 percent designated as other types of open space, rural land uses comprise a majority of the region’s land uses. Development standards typically require minimum lot sizes of 10 or 20 acres for agricultural and forested lands and 1 or 5 acres in the case of rural residential lands. Hence, by policy, agriculture generally starts at parcel sizes of 10 acres, with the exception of Placer County where its “Farm” zone has a minimum lot size of 4.6 acres and some parcels as small as one acre. Current land conditions reflect this policy: a 2008 survey of commodity agriculture crops in the region indicates that over 90 percent of the region’s crops are grown on lands designated for agriculture at 20 acre minimums or greater.

While this picture probably captures the vast majority of farming activity in the region, it does not fully represent the activities on parcels smaller than 10 acres in size. Parcels of 10 acres and smaller tend to be categorized by rural residential or agricultural-residential general plan designations. Rural or agricultural residential designations are intended primarily for residential use, but also allow for at least limited agricultural use where ample water supply and suitable soils are available. Parcels designated by this land use may have small-scale agriculture in addition to residential uses, but the scale of agriculture

---


5 SACOG Agricultural Crop Inventory, 2008.
is sometimes difficult to capture in a land use survey. Examples of these small-scale agriculture areas include Apple Hill in El Dorado County, where an agritourism industry thrives on average parcel sizes of 8 acres, and in the Newcastle area of Placer County, where small farms operate on average parcel sizes of 5 acres. The emphasis of use is reversed in other rural land use designations (agricultural, timber, and open space); most are intended primarily for agricultural production or resource protection but allow for the development of at least one home site.

The map below provides a starting point for understanding rural economic and environmental systems by generalizing the landscape into four themes:

- **Large-Scale Agriculture**: Areas with larger operations growing crops that are trucked out of the region for national and international markets
- **Small-Scale Agriculture and Agritourism**: Areas with smaller operations generally serving local markets
- **Large Lot Residential**: Areas that are mostly rural residential housing, but still have some agriculture activity
- **Open Space and Recreation**: Areas with concentrations of protected land for habitat and other open space purposes that often also include agriculture. Focusing on one type of farmland misses the system of agriculture that grows a diversity of products for this region and the world. Keeping this perspective on the landscape can help foster supportive policies and plans that recognize all agricultural lands as important to maintaining viable agricultural production and environmental services in our region.
Conflicts Between Land Uses

One of the most fundamental policy issues at the rural-urban interface is striking a balance between expansion of urban areas to support a growing population and supporting productive agricultural operations and/or important natural resources. All six counties have general plan policies that direct or limit urban growth to urban areas, community areas, or cities’ spheres of influence. These policies aim to preserve agricultural and natural resource lands and also promote orderly growth. Yolo and Sutter counties have the strongest farmland protection policies, directing urban development to existing cities and/or their spheres of influence and to existing unincorporated communities. In Sutter County, land use planning for the spheres of influences of Yuba City and Live Oak are the responsibility of those cities, subject to county approval. Similarly, Yolo County requires urban uses to be placed within incorporated cities or within the urban service areas of unincorporated urban areas and as a matter of policy responds negatively to proposals to extend existing service facilities outside of urban areas.

In addition to city and county policies, Local Agency Formation Commissions (LAFCOs) are governed in their review and approval of spheres of influence and city boundary changes by the Cortese-Knox-Hertzberg Local Government Reorganization (CKH) Act of 2000. As a protection for lands under Williamson Act contract, the CKH Act prohibits LAFCOs from including such lands in a sphere adjustment or city annexation without first making certain findings and/or the Williamson Act contract meeting certain provisions. Additionally, the Yolo County LAFCO has adopted an agricultural mitigation policy that is required for annexations if a jurisdiction doesn’t have a formal agricultural mitigation policy adopted.

Outside of spheres of influence, El Dorado, Placer, Sacramento, and Yuba counties direct urban growth into community area boundaries in unincorporated parts of the counties. In El Dorado County, it is Rural Centers and Community Regions, and in Yuba County and Placer County, it is community boundaries. In the Sacramento County General Plan, land expected to receive urban levels of public infrastructure and services within the planning period is defined by the Urban Policy Area (UPA). The County’s Urban Services Boundary (USB) indicates the ultimate boundary of the urban area in the unincorporated county. These boundaries establish infrastructure extension limitations; therefore these are currently the limitations of urban expansion into rural areas. However, rural residential development is still allowed outside of the boundary. Where rural and urban uses abut, there is the potential for land use conflict between agriculture and non-agricultural uses in the form of dust, odor, noise, traffic, theft, and other nuisances from encroaching housing or other non-agriculture. Land use conflicts compounded by high land values at the rural-urban edge, make it difficult for farmers to maintain economically viable

---

6 The Williamson Act enables local governments to enter into 10-year contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments which are much lower than normal.
operations. Despite right-to-farm ordinances, agriculture commissioners regularly receive complaints from residents about farming practices requiring the commissioner to investigate and remediate as needed. Some have reported that such complaints affect what crops are grown and in some case whether farming continues.

Transportation Conflicts

In many parts of the rural region, agriculture and other open space uses share roadways with rural housing development. A 2008 inventory of the region showed that the region has approximately 246,000 acres of existing rural housing (roughly 57,000 units) and another 337,000 acres of potential rural housing according to rural residential general plan designations. The capacity for additional rural housing in the region is anywhere between 28,000 and 67,000 housing units (assuming 1 acre per house and 5 acres per house, respectively). Given the potential new rural housing, traffic impacts on agriculture operations from both rural residential and urban uses may continue to increase, exacerbating one of the key conflicts in rural areas. SACOG’s transportation modeling shows that on average, non-agricultural rural residents have a much higher VMT than residents in urban areas. Rural economic development and agritourism objectives may exacerbate this conflict. As well, a lack of farmworker housing not only challenges labor supply, it may contribute to traffic impacts as workers drive or are transported sometimes long distances. And in some areas, farmworker housing that is available is generally far from retail, medical and other services creating another source of traffic on rural roadways. Collectively, these sources of travel on rural roads can negatively affect agricultural operations.
Rural-Rural Conflicts

There can also be conflict between habitat conservation and agricultural land. Parts of the region are experiencing a conversion of agricultural land to habitat preservation for development mitigation purposes, which can have the effect of removing land from agricultural use (and into habitat conservation) and sometimes creates difficulties for adjacent agricultural lands with the invasion of weeds, rodents, birds, and waterfowl. However, there can also be “working” relationships between the two land uses in which both needs can be met: rice fields have become part of the Pacific Flyway, alfalfa is good foraging habitat for Swainson’s hawk, while grazing helps keep non-native grasses in check and helps vernal pools function. Yolo, Sacramento, and Placer counties are addressing this and planning for these working relationships in their habitat conservation plans (HCPs). Sutter and Yuba counties have begun developing a joint HCP that will also address these issues. Yolo and Sacramento county staffs indicate that some components of their HCPs will be dependent on agricultural land preservation for implementation; in Sacramento County as much as 90 percent is dependent on agriculture. Yolo County’s General Plan allows out-of-county mitigation easements in Yolo County provided several criteria are met, including requirements that existing agricultural operations continue to be farmed for commercial gain. The policy also requires compensation to Yolo County of all lost direct and indirect revenue, which is an unintended consequence of conservation easements.
Transition Zones: Managing Conflicts at the Rural–Urban Edge

Policy makers for a long time have searched for effective means for transitioning between urban and rural uses, contemplating what types of agricultural uses work most harmoniously near urban uses and vice versa. In a few areas of the region, a hard-edge has been delineated between urban and rural uses (Figure 3). Yolo County, for example, supports a “hard line” between urban and agricultural areas by means of an agreement with its cities to direct growth to urban areas in exchange for a “pass through” of redevelopment tax increment revenue to the county. In other parts of the region, rural residential or agricultural residential zoning have been seen as “soft-edge” transition zone from urban to agricultural uses (Figure 4). An example of this is the western edge of the Yuba City Sphere of Influence in Sutter County. These two approaches to demarcating rural and urban uses raise some questions about the effect such policies have on minimizing urban encroachment and agricultural viability.

Figure 3: Example of a Hard-Edge Transition Zone (City limits of Davis, Yolo County)
Hard Edge Issues

In hard-edge transition areas, the abrupt change from urban uses, often residential, to agriculture, can precipitate conflicts if adequate buffer distances are not enforced. Members of the land use stakeholder group indicate that buffer size should vary with size of parcels and the permanence of the type of agriculture (e.g. row crops versus orchards); the more permanent the type of agriculture, the bigger a buffer needs to be in order to be effective. The proximity of urban infrastructure in a hard-edge transition area and the large parcel sizes of the unincorporated land can be ideal ingredients for new development. The combination of land use conflicts and development pressure may lead the farmer to remove land from agricultural production and/or sell it off. In order for the hard-edge transition to work, strong city and county policies regarding the urban-rural interface are important to protecting long-term agricultural use at the urban edge.

Soft Edge Issues

In soft-edge areas, some land use planners assert that rural residential areas are effective buffers between urban and rural areas because the nature of rural residential parcel sizes makes it difficult to provide urban infrastructure to these areas. Infrastructure provision constraints, coupled with the 1 to 10 acre parcel sizes of these areas make it unlikely that land would be further subdivided to urban standards. However, these conditions have potential implications for the land on either side of a rural residential area. A rural residential buffer, without strong policies to direct new growth to existing urban lands and infrastructure, could set up a leap-frog development pattern whereby new development occurs on the rural side of a transition zone. On the rural side of this transition zone, rural residential development, can conflict with industrial agricultural practices, with the potential effect of pressuring agriculture at the edge to change practices or cease entirely. On the urban side of a rural residential transition zone, the residential transition area can put demands on city infrastructure and services without fully paying into those services.
One consideration is whether rural residential parcelization reduces the likelihood that these areas will eventually convert to urban uses. Given the difficulty of assembling parcels and building urban infrastructure, some planners assert that rural residential areas will remain basically as they are, aside from occasional parcel splits. If this is the case, these areas may in fact reduce the likelihood that urban development will encroach, thereby acting as buffer or transition zone.

To the extent that rural residential parcelization occurs within spheres and community plans, the effectiveness of these areas to manage urban growth may be limited. With parcel sizes ranging from 1-10 acres, rural residential uses within an urban boundary can reduce urban land supply more rapidly than expected. Figure 5, below, shows that within the region’s SOIs and community plan areas 19 percent of recent new housing permits are for rural residential units on 80 percent of the developed land. Using assessor data, SACOG estimates that of the 504,000 unincorporated acres in spheres and community areas, approximately 24 percent is developed parcels of 1 to 10 acres and of that approximately half, or 59,000 acres, is for rural residential use. At this rate, the value of rural residential areas acting as a transition zone may be limited if the result is more land supply being needed more rapidly for urban development in the future.

Figure 5: Finalized Housing Permits by Housing Type

A key concern about the rural-urban edge is the amount of fallow land in these areas. As noted earlier, agricultural viability is correlated to the amount of land in production. Research conducted for SACOG at UC Berkeley found that on average about 8 percent of farmland is fallow in a given year; however, at the edge the rate of fallowing increases substantially. At a hard edge, the rate of fallowing is more than 30 percent and at the soft edge, it exceeds 40 percent. Conflict and development speculation are likely causes of this increased fallowing. As urbanization pushes outward, the edge becomes longer, which increases the amount of land that will likely have a higher rate of fallowing.
Economic Development and Agritourism

Policies supporting the agriculture economy are numerous and in every county. Sacramento County’s draft General Plan Update (November, 2011) includes policies that encourage the expansion of local agricultural products into local, national and international markets and encourages the growth of commercial agricultural businesses (Policies ED-14 and ED-19). The Sutter County General Plan, updated in 2011, encourages the export of local products into the foreign market (Policy AG 4.9) and also has policies in place supporting the expansion of agricultural businesses in the county (Policy AG 4.5). Yuba County’s 2030 General Plan (adopted November 10, 2009) encourages businesses that promote, provide services, and support farming, with an emphasis on value-added agriculture, agritourism, food processing and agricultural suppliers (Policy ED 1.3). Placer County allows on-farm product handling and selling, including farm stands, in any agricultural land use designation. Additionally Placer County has several general plan policies supporting the development of tourist and recreational facilities (Policies 1.N.1, 1.N.3, 1.N.14).

Yolo County has a General Policy Goal to expand agricultural tourism by providing a variety of tourism and recreational opportunities to expand the local economy in a manner consistent with Yolo County’s agricultural and open space emphasis (Goal ED-4). In January of 2008, the County established its first Agricultural District to explore ways to encourage agricultural business development and expansion. General Plan Policy AG 3.1 establishes an Agricultural Overlay district to aggressively promote agricultural and recreational areas of the county.

Agritourism businesses also tend to coincide with or locate in the same areas as small-scale farms. SACOG’s data on agritourism and small scale farms, while not comprehensive for the whole region,
shows a high incidence of small farms with an agritourism component. Some counties explicitly promote or encourage agritourism in this context, with policies tailored to the land uses and farming activities of that county. For example, El Dorado County Policy 10.1.6.1 states that “The County shall encourage expansion of the types of local industries that promote tourism including but not limited to Christmas tree farms, wineries, outdoor sports facilities, Apple Hill and other agricultural-related activities, the County Fairground, bed and breakfast inns, and ranch marketing activities.” El Dorado County also has a policy that directs the majority of its transient occupancy tax-generated revenue towards the promotion of general tourism, entertainment, business, and leisure travel in the county (General Plan Policy 10.1.6.4).

Jobs-Housing Ratio Standards

Most counties do not have jobs-housing ratio policies for rural areas. El Dorado, Placer, Sacramento and Yuba Counties address jobs-housing ratios for their urbanized unincorporated areas. In Yolo County’s 2030 General Plan, it has a policy to achieve a minimum jobs/housing balance of 1.2 jobs for every dwelling unit on average within each unincorporated community, to the greatest extent feasible (Policy CC-2.10).

Farm Worker Housing in Rural Areas

The need for farm worker housing in the SACOG region is a greater issue for farming operations in the valley than in the foothills due to the types of crops and amount of production in these areas. Housing Authorities in the region provide some publicly owned and/or managed dedicated farm worker housing. Some of these units provide seasonal housing and others permanent housing. Nonetheless, Sutter County Housing Authority and Yolo County Housing Authority reported having waiting lists for their permanent housing units in 2008, when research was first started for this paper. Farm labor camps are permitted by use permit in all of the region’s counties.

Each county has policies encouraging some farm worker housing on-site (via an accessory unit) and all of the agricultural zoning codes in the region allow for secondary units on-site, either by right or with an additional permit. The number of second units that currently exist in the region and the percentage of these used for farm worker housing is unknown. To support the goal of a healthy farm economy, the agriculture element of Yolo County's 2030 General Plan contains policies to streamline permitting requirements for farmworker housing, including reducing fees and requiring inclusionary housing within established communities (Policy AG-3.5). The draft element further encourages cities to share in the responsibility for providing adequate sites to accommodate farm labor housing (Policy AG-3.6). Through their housing elements, all of the counties have policies that encourage the use of state and federal housing aid programs to provide farmworker housing. This report includes a section below with much more detail on labor issues and opportunities to better support those workers.

Flood Control

Four counties (Sutter, Yuba, Yolo, and Sacramento) have large floodplains along the Sacramento, Yuba, Feather, and American rivers and their tributaries. Flood control projects – dams and levees – have
made it possible to develop urban areas in these floodplains. However, recent state legislation imposing a higher level of protection (200-year v. 100-year) for urban areas (defined as 10,000 people or more) and changing Army Corps of Engineers levee standards are making it more difficult and expensive to protect areas already fortified with urban levees, let alone areas that might want to urbanize outside of these urban levees. To date, there are no plans to build new urban levees; jurisdictions are simply focused on improving the urban levees they already have. This may have implications for limiting the spread of development beyond those areas currently planned for urbanization in the floodplain.

Some flood control plans include setting aside farmland to reduce the amount of land needing an urban level of protection in the future and thereby minimizing overall flood risk. In some cases, levee improvements may impact agricultural lands within the basin being protected. In Yuba County, for example, setback levees will be built over as much as 1,500 acres of farmland and will bisect orchards and other farmland in areas with high quality soils. In southern Sutter County and northern Sacramento County, levee improvements in the Natomas basin are estimated to impact more than 1,600 acres of farmland that also serve as habitat for the Giant Garter Snake and Swainson’s Hawk. Additionally, up to 700 acres of farmland will be converted to habitat for required mitigation. Similar impacts may be seen for other levee improvement projects in the region. The Delta Protection Commission is considering the use of “ring levees” around legacy Delta communities. Other small towns, such as Knights Landing in Yolo, are considering the development of new levees to provide 100-year flood protection.

**Water Quality and Supply**

The issues surrounding water quality and supply are more complex than strictly the land uses that ensure reliable and safe water supplies for the region and will be further explored in a separate working paper. Later in this report, the importance of water quality and supply is examined from the perspective of rural land, conservation and open space policies. Local general plan policies typically protect water quality and supply through the land use designations assigned to areas important to or containing sensitive water resources. These are low-intensity uses such as open space, agriculture, or natural resource.

**Recreation**

In addition to their other environmental benefits, rural landscapes provide many benefits under the broad title of “recreation,” from passive recreation uses such as bird-watching to more active uses such as hiking or boating. Yuba County’s general plan designates an area of rice land north of the City of Marysville for agriculture in order to promote their retention for multiple uses, including agriculture, waterfowl habitat and waterfowl hunting clubs (Policy 79-OSCP). Yuba County sees the retention of natural areas as important to maintaining adequate supplies of game for not only the habitat preservation of them but also for importance to the local economy. In Sacramento County, the draft general plan Open Space Vision identifies open space corridors, or greenbelts, for multiple purposes including community separators, habitat corridors, and recreation trails. In Placer and El Dorado counties, tourist recreational uses such as camping and skiing are defined by recreation land use designations. In El Dorado County, the “Tourist Recreational” designations are further defined by their surroundings: recreational activities in Rural Regions, the county’s most rural community areas, must be
less intensive than recreational activities in Community Regions and Rural Centers, where infrastructure exists or can be extended to support more intensive uses. In Placer County, the “Resorts and Recreation” designation applies to mountain, water-oriented, and other areas of existing and potential public and commercial recreational use.

**Viewshed**

Viewsheds, or scenic vistas, are protected for their recreation and tourism benefits, but also as visual amenities to residents of an area. Most jurisdictions address the viewshed benefits of rural landscapes by imposing design standards on development to minimize its impact on scenic rural vistas. El Dorado and Placer counties have policies that specifically regulate development to minimize impacts to rural viewsheds. In El Dorado County, a scenic corridor ordinance regulates uses that might impede views of rural landscapes (Policy 2.6.1.1). Placer County has a policy to protect and enhance scenic corridors through means of development standards as well as open space easements and land conservation contracts (Policy 1.L.3).

**Rural Lifestyle, Culture and Heritage**

The rural lifestyle, culture and heritage of rural areas that are provided by rural landscapes are not only intangible but difficult to quantify. The policies that protect these assets of rural areas, therefore, are broad in scope. Land use designations, through development standards, aim to protect or preserve the rural lifestyle attributes of an area. The rural residential designation is most commonly associated with the preservation of rural lifestyle; most descriptions of the designation emphasize the importance of maintaining “rural character and lifestyle.”

**Rural Communities**

Small rural communities are important hubs for housing and commerce in the rural parts of our region. Historically focused on supporting agriculture and forestry through housing, supply stores, banks, restaurants, and professional services, these communities are still key components of the rural economy. Today, these communities also support recreation and tourism industries in our rural areas. Small communities also appeal to those seeking a slower pace of life, the charm of historic buildings, and easy access to recreation and other open space amenities.

Many of these communities, however, are having trouble maintaining public infrastructure and providing services. Often rural communities have responded to rising infrastructure and service costs by embracing growth to increase the ratepayer base as well as private investment in public infrastructure. Since much of this growth has been residential development, many new residents in these communities travel long distances on rural roads and highways to access jobs and services in more urbanized cities. This traffic increases conflicts on rural roads, adds congestion to highways and roadways, and produces more vehicle emissions. The land use imbalance in these communities also means that sales tax revenue is lost to those communities where residents have more work and shopping opportunities.
**IMPACS – Integrated Model for Planning and Cost Scenarios**

One tool SACOG has created to assist small communities is an infrastructure fiscal model (IMPACS). This tool can estimate infrastructure and service costs, which helps local officials evaluate the fiscal sustainability of their growth plans through balanced growth that still maintains the unique quality of life in these communities. Early results from test runs of the model suggest that Blueprint smart growth principles may help not only reduce travel and tax revenue loss, but also reduce the infrastructure cost per unit and the time it takes to pay off public infrastructure investments. The model and work with rural community stakeholders will also be useful to help analyze strategies that support the agriculture industry by providing more agricultural housing and aggregation, distribution, and processing capacity in rural communities.

The model provides local governments a means of evaluating the fiscal challenges and opportunities of providing infrastructure and services in their communities. IMPACS allows communities to analyze the infrastructure, parks, and certain public service requirements and understand the fiscal impacts of different development scenarios. The model can help jurisdictions:

- Determine infrastructure demand from proposed development.
- Estimate the capacity of existing infrastructure.
- Determine whether new infrastructure is required for a proposed development project.
- Estimate capital costs and operational costs needed for the new infrastructure.
- Determine law enforcement, emergency service, library, and park and recreation needs.
- Evaluate expected revenues from development and compares with cost and expenditures.
- Identify thresholds in land use patterns that trigger the need for new, larger, or smaller infrastructure.

The IMPACS model has been designed to integrate with spatial land use models. IMPACS is intended to supplement scenario planning in which several land use options are considered and objectively evaluated against quantifiable criteria. IMPACS augments land use modeling capabilities by providing information on infrastructure demand, capacity, cost, and revenue to allow SACOG member jurisdictions to better understand the fiscal implications of different growth patterns, particularly at the rural-urban fringe. In addition, land use models and IMPACS can share land use scenarios so that the jobs, housing, and transportation impacts of these scenarios can be evaluated in the context of fiscal impacts. SACOG offers IMPACS model training which increases the user’s understanding of the functionality and limitations of the model.
This section describes policy innovations related to agricultural viability and preservation of open space uses. Many of these policy innovations are in practice in the Sacramento Region; some are very successful, others have not yet been tested. Additional innovations from outside of the region and California have also been collected. Some policies may not be relevant to every area of the region, but are presented here so that they may be assessed for their potential applications.

One of the challenges facing agriculture is the potential for conflict between farming and development at the rural-urban “edge.” The previous section discussed both hard transition edges, where urban development patterns abruptly give way to agricultural land uses, and soft edges, where urban development patterns meet ranchette, or exurban-type development, beyond which lies agricultural uses. In either case, the proximity of urban or rural residential to working farms increases potential conflicts and increases the rate of fallowing, which impacts the viability of the agriculture.

Other open space uses are also challenged in the face of expanding urban and rural development. For example, habitat land and floodplain land can be strained by encroaching development. Many open space uses require large tracts of contiguous land in order to function, yet scattered rural development or urban leapfrog development can cause fragmentation of such large tracts.

There are many challenges in preserving agriculture and there is no one-size-fits-all policy prescription. The policy innovations classified here as “edge” policies have generally been used to protect and/or manage urban encroachment upon agriculture. These challenges can include: rapid and/or inefficient development of farmland, uncertain boundaries between urban and rural areas leading to land speculation, scattered rural residential development, and differing visions for land use between cities and counties. The innovations for agricultural viability and environmental sustainability are not necessarily specifically directed at the challenges facing agricultural at the urban edge, but rather are generally focused on supporting viable agriculture and/or environmental resources in rural areas. While this method of organization is intended to provide focused discussion on each of these two groups of innovations it is recognized that both are inter-related and that all of the listed innovations could potentially be applicable to the rural-urban edge and all other agriculture and open space lands. The innovations in those sections include:

**Innovations at the Rural-Urban Edge**

- Growth Boundaries
- Rural Reserves
- Re-examine Spheres of Influence
- City-County Agreements to “Plan for Agriculture”
- Voter Initiatives on General Plan Amendments of Agricultural Land
- Stricter Policies Regulating Rural Residential Rezoning
- Infill and Revitalization of Existing Communities
INNOVATIONS AT THE RURAL-URBAN EDGE

Urban Growth Boundaries

An urban growth boundary, or urban limit line, is a policy boundary that designates where urban growth is to occur and where agriculture and other rural uses should remain more certain. In some applications,
Urban growth boundaries are held constant, representing the ultimate extent of an urban footprint; in other instances, the boundary accommodates growth for a period of time (e.g. 20 years) and is expanded periodically based on population or vacant land performance standards to maintain a land supply for the designated time period. In the RUCS stakeholder meetings, growth boundaries were identified as one of the most important land use innovations for protecting agricultural viability.

Urban growth boundaries have been adopted by a number of communities, including Sacramento and Tulare counties (for their unincorporated communities).

Examples:

**Sacramento County’s Urban Services Boundary (USB)**

Sacramento County’s USB marks the ultimate boundary of the urban area in the unincorporated county. The Sacramento County General Plan states that the USB “is intended to be a permanent growth boundary not subject to modification except under extraordinary circumstances.” A change to the USB under this policy would require a fourth-fifths vote of the Board of Supervisors, although in the context of a general plan update, the policy can be changed with a three-two vote of the Board of Supervisors. The Urban Policy Area is a companion to the USB that defines the area within the USB expected to receive urban levels of public infrastructure and services within the general plan planning period.

**City of Woodland Urban Limit Line**

As part of the 2002 General Plan, the city created an urban limit line for planning purposes. This planning boundary defined the areas available for urbanization by the city within the time period of the general plan. Subsequently, the citizens of Woodland passed Measure A (2006), which established a permanent urban limit line around the city (see the Voter Initiatives on General Plan Amendments of Agricultural Land section of this paper for more information).

**Portland Metropolitan Urban Growth Boundary**

Portland Metro, that region’s planning agency, manages the state-required urban growth boundary (UGB) for the Portland area. The boundary is flexible since it must maintain a 20-year supply of land for future development. The land supply and boundary are reviewed every five years and land is brought into the UGB as needed. State law determines the priority by which lands can be added. Highest priority for inclusion in the UGB is given to urban reserve lands.

---

7 Sacramento County (California). General Plan 1993, Land Use Element, pg. 79. [http://www.planning.saccounty.net/general-plan/](http://www.planning.saccounty.net/general-plan/)

then non-resource lands, and marginal land; farm and forest lands are lowest priority. In addition to this technical review, the expansion must also be approved by a designated body of local elected officials and the Metro Council.

Benefits and Drawbacks

Where in place, urban growth boundaries can provide a policy framework for land use and infrastructure planning. Such boundaries create some certainty for developers that growth is encouraged within an area, if policies are upheld by the local government. They can also give assurances to rural interests in making investments in land improvements and infrastructure to support rural economic development.

In California, most urban growth boundaries are enacted legislatively and therefore, easy to modify. In fact, language in most general plans specifies that urban growth boundaries limit growth for the planning period of the general plan, implying that the boundary will change with a general plan update. In this application, they are perhaps best at directing growth within an urban area, but do not represent a hard, permanent boundary. An additional complication arises when neighboring jurisdictions (e.g. a city and county) have differing land use visions for an overlapping area of interest. Where one government may have an urban growth boundary to preserve undeveloped lands for agriculture, the other may see the area as a potential new growth area. Furthermore, unless strong policies control development (e.g., ranchette development) outside of an urban growth boundary, the boundary’s effectiveness at reducing exurban development is more limited. . Agreements between cities and counties can help reduce difficulties that may arise in establishing and implementing growth boundaries.

Rural Reserves

“Rural Reserves” aim to provide greater predictability to land owners, farmers, and communities as to where future growth may and may not occur outside of an urban growth boundary. Areas defined as “Rural Reserves” are located outside of an urban growth boundary to protect valuable farm and forestland for a time period similar to the life of the urban growth boundary.

Example:

State of Oregon: Metro and Clackamas, Multnomah and Washington counties

The three counties of the Portland metropolitan area, along with the regional planning agency, Metro, are leading a regional effort to designate urban and rural reserves to accommodate future growth and protect valuable farmland, forest land and natural areas that define the character of the region.

Urban and rural reserves are intended to provide greater predictability for landowners, farmers, and communities as to where future growth may take place outside the current urban growth boundary over the next 40 to 50 years, while protecting important farmland and natural areas.
from urbanization for that same period of time. Designated reserves would also provide greater predictability in the type and extent of infrastructure needed for both urban and rural uses. The process for designating these reserves is intended to offer the region greater flexibility in determining which areas are more suitable for accommodating growth than others.

In this process, some factors being considered in the creation of rural reserves include whether or not an area is potentially subject to urbanization, capable of sustaining long-term agriculture or forestry operation, or includes important natural landscape features (e.g. natural hazards, lands to protect water quality, important habitat).9

Once the rural reserve designation is in effect, lands under the designation cannot be rezoned or re-designated to allow uses that were not allowed, or smaller lots or parcels than were allowed, until the rural reserves classification is removed from those lands.

Benefits/Drawbacks

Since Rural Reserves have yet to be implemented, it is difficult to assess their strengths and weaknesses as conservation tools. The circumstances of the Portland, OR example are unique in that state legislation sanctioned the rural and urban reserves process as an alternative to a state-mandated existing growth management process. Arguably, local zoning and general plan policies can operate in a similar manner as the rural reserve, with the exception that the cross-county collaboration of the rural reserves, and their life span of 40 to 50 years, might signal to the public that such areas have more permanence as rural areas than zoning or general plan designation might imply.

Re-Examine City Spheres of Influence

Representing the probable ultimate physical boundary and service area of a local government agency, spheres of influence are a prominent mechanism for planning and growth management in California. Typically, if a county wants to preserve agriculture and rural character, it will limit new development to existing rural communities and/or within existing cities and city spheres of influence (as noted in “Infill and Revitalization of Existing Communities”). It is, however, the extent of these community boundaries and particularly spheres of influence that could be re-examined to determine what role they play in open space and agriculture preservation.

LAFCOs make the ultimate determination on the spheres of influences of cities. Current state law (Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000) directs LAFCOs to consider several factors in determining the sphere of influence of a local jurisdiction, among them, the present and planned uses in the proposed SOI, including agriculture and open space. A LAFCO may not approve a

9 Oregon Administrative Rules, chapter 660, rule 660-027-0060.
change to a sphere of influence of a local government agency of land that is subject to a Williamson Act contract if that local agency would provide urban facilities or services to the area, unless those facilities or services would benefit the land uses allowed under the contract or would facilitate planned, orderly, and efficient patterns of land use or provision of services.  

Consideration of such factors can lead a LAFCO to impose conditions of approval on spheres of influence.

Example:

*Kings County LAFCO*

In Kings County, the LAFCO, as part of its regular review and update of spheres of influence, recently reduced the spheres of all of the cities to coincide with planned urban uses and areas that could be adequately serviced by municipal service providers, and to avoid lands in Williamson Act or Super Williamson Act. Cities in Kings County have both a primary Sphere of Influence (SOI), which serves as the legal boundary within which a city may apply to LAFCO for annexation of territory, and a secondary SOI, which serves as an indication of the “Area of Planning Interest” of the local jurisdiction. The secondary SOI has no basis in State Law, but serves to recognize an area of mutual interest between city and county.

*The City of Folsom*

In this example, the Sacramento LAFCO placed a condition of approval on the Folsom sphere of influence, which required set aside of at least 30 percent of the land in the SOI as natural open space to preserve oak woodlands and sensitive habitat areas.

*Benefits/Drawbacks*

In some areas, spheres of influence substantially exceed the amount of land a city will need to accommodate future urbanization. One potential consequence to spheres that are too large is inefficient use of the land within the sphere. In some parts of the Sacramento region, SOIs have become de facto urban-rural transition zones, marked by rural residential land uses. Within the SACOG region, 80 percent of the acres developed within sphere of influence areas over the last five years are new large lot residential development on parcels 1 to 10 acres in size.
City-County Agreements to “Plan for Agriculture”

Cities and county adopt coordinated/joint policies or agreements to direct urban development to cities and preserve agricultural land in the unincorporated areas. An agreement between a county and city, or multiple cities, is formally recorded, for example, through General Plan policy or a Memorandum of Understanding. In any example, the jurisdictions agree that the county's role is to promote and support agricultural preservation and viability in the area covered by the agreement, and that the city's role is to ensure compact growth that minimizes and mitigates impacts to agriculture. In some cases, city-county agreements including shared tax revenue, from city to county, to support the county's role in promoting agriculture and containing urban development.

Example:

Yolo County and the Cities of Davis, West Sacramento, Winters, and Woodland

Yolo County has a pass through agreement with its cities whereby urban development is directed to incorporated areas and the cities “pass through” a portion of the tax increment from their redevelopment districts on to the county. Pass through agreements between a city and the county must be re-negotiated with each annexation.

In a subarea of the county, in recognition of the development pressures on the prime farmland between the cities of Davis and Woodland, Yolo County and the two cities entered into an agreement to preserve the unincorporated lands between the cities of Woodland and Davis for agriculture.13

Sutter County and Cities of Yuba City and Live Oak

As a general plan policy, Sutter County does not provide urban services, but rather directs all urban growth to cities and their spheres of influence. The Sutter County General Plan states that the cities are responsible for planning their respective spheres of influence, subject to county approval.14

Solano County and Cities of Vallejo, Benicia and Fairfield


Solano Counties and the three cities entered a Joint Powers Agreement (JPA) in 1992 to jointly and cooperatively plan for, manage and maintain the open space land between the three cities for open space preservation, conservation and enhancement uses, agricultural production, and regional parkland recreation. The JPA created a Tri-City and County Cooperative Planning Group to develop a plan for open space and agriculture preservation for the unincorporated area between the cities of Vallejo, Benicia, and Fairfield. This group is led by a governing board comprised of one elected official from each of the four member agencies.

The Tri-City and County Cooperative Plan, adopted by the group in 1994, lays out objectives, policies and guidelines intended to guide future land use within the Cooperative Planning Area, including measures to preclude urban development, protect the right-to-farm in the Cooperative Planning Area, and create incentives for land uses that contribute to the permanent protection of open space there. The plan has been adopted by the county and three cities and coordination between the entities occurs through the Tri-City and County Cooperative Planning Group. While the governing board has decision-making authority, many of its decisions, in particular any that amend the Tri-City and County Cooperative Plan, must be ratified by each of the four local governments in order to take effect. \(^{15}\)

**Benefits and Drawbacks**

Agreements between cities and counties can have added effects of bolstering infill development and revitalization policies, and in fact both infill and revitalization policies and city-county agreements to plan for agriculture work as tandem innovations. General plan updates can and have been used as methods of city-county joint planning, as ways for cities and a county to more closely align their expectations for future growth in an area of mutual interest. The difficulty with this and other forms of city-county agreements is that both parties must be willing to agree to and uphold the plans and policies created by the agreements in order for them to be effective.

In the Yolo County experience of revenue sharing, the pass through agreements and commitment to a “hard edge” between urban and rural areas has put the county in a difficult financial situation. The goal of revenue sharing is to support economic viability of both the city and the county for the commitments each make; but this is a difficult balance to strike.

**Voter Initiatives on General Plan Amendments of Agricultural Land**

Some jurisdictions have policies that restrict the conversion of agricultural-designated land to non-agricultural use. In most cases, these policies were incorporated into general plans by initiative measure. For agricultural land to be re-designated to a non-agricultural use, the proposal must go to a vote in the local election.

Examples:

Stanislaus County and Measure E

In 2008, Stanislaus County voters approved a measure that restricts, for a period of 30 years, the Board of Supervisors from approving the redesignation or rezoning of land in the unincorporated county from agriculture or open space to a residential use without the approval of a majority of voters of the county. Some exemptions apply to lands to be redesignated to meet the county's fair share housing obligations.16

Solano County Measure T/Orderly Growth Initiative

Solano County has operated under an Orderly Growth Initiative since 1994. This initiative, also known as Measure A, required that redesignations of agriculture to urban designations be approved by a majority of county voters. Measure T, passed in 2008, is an update of the Orderly Growth Initiative, effective for 20 years. It allows some exemptions to the original initiative, including lands to be redesignated to meet the county's fair share of housing and lands in certain areas to be redesignated to a more intensive agriculture designation.17

City of Woodland Urban Limit Line

In 2006, the citizens of Woodland passed Measure A, which established a permanent Urban Limit Line around the city. These boundaries are permanent regardless of any planning horizon and can only be modified with voter approval.18

Benefits/Drawbacks


Voter initiatives are used to provide the electorate a direct say on growth issues, usually unwanted development, in a jurisdiction. To this end, they are successful tools of public participation. At the same time, such voter initiatives can sometimes hinder the planning process as voters are not always aware of all of the issues related to a particular ballot initiative and most likely receive their information from the better-funded side of the debate. Unintended consequences can result from voter initiatives. Where an initiative is intended to affect an area of overlapping jurisdiction – the edge between a city and county, for example, a ballot initiative can be rendered ineffective if the city and county do not share the same vision for that edge. Furthermore, tight controls on urban expansion can also affect the ability of a local government to provide an adequate housing supply to keep up with job growth, resulting in longer distance commute trips.

**Stricter Policies Regulating Rural Residential Rezones**

Demand for rural residential home sites can be managed in areas of active agriculture through policies and procedures that regulate the conversion of agricultural land to rural residential use. Rural residential uses often entail small parcel sizes (typically between 1 and 10 acres) that allow housing as the primary use of the parcel. When adjacent to or intermixed with active agriculture parcels, the combination of uses can lead to conflicts between the residential parcel and agricultural activity. At the same time, many rural residential communities are historic rural towns that have been in existence for as long as the agricultural operations around them. To balance the goals of preserving rural character in these areas, meeting the demand for rural residential parcels, and preserving farm land, check lists or scoring systems have been developed to assess the feasibility of converting existing agricultural land to rural residential.

Examples:

*Tulare County Rural Valley Lands Plan*

Tulare County developed a point system as part of its Rural Valley Land Plan, which scores proposed rezones from agriculture to any non-agricultural use (including residential, employment, and rural residential). Factors considered by the point system include agricultural preserve status and proximity to agriculture preserves, land capability (soils), existing parcel size, existing land use (active farming or not), surrounding parcel size and land use, proximity to “inharmonious uses” such as dairies or feed lots, proximity and access to various services and infrastructure, flood status and groundwater recharge potential. If a parcel scores 17 points or more, the parcel remains agriculturally zoned; if the parcel scores 11 points or less, the parcel may be considered for non-agricultural zoning. If the parcel receives a score between 11 and 17
points, the policy decision goes to the Planning Commission and Board of Supervisors, which make a determination based on the unique circumstances of the particular parcels.19

Sutter County Ranchette Evaluation Criteria

In its General Plan adopted in 2011, the Sutter County Board of Supervisors adopted a new zoning designation called “Estate Residential”. This zoning category allows half to three acre residential zoned parcels but only in designated areas in the County. All of these designated areas are near or adjacent to the city limits of Yuba City. The County no longer allows new “Ranchettes” designations, which were residential parcels allowed in agricultural areas anywhere in the county. This designation was eliminated with the update of the General Plan.

Benefits and Drawbacks

Ranchette evaluation criteria and processes are beneficial to both the county and property owners in that they provide objective criteria by which to judge development proposals based on location and purpose. They also allow rural land owners to maximize the utility of their land while preserving agricultural viability in other parts of the county.

Ultimately, these land divisions reduce the potential for agriculture in these areas since smaller parcels are less likely to have agricultural production. While ranchette evaluation criteria have been shown to be effective in areas where rural residential zoning occurs, they have no restrictions on residential development outside of rural residential districts where home sites are allowed uses. Home sites without accompanying agricultural operations can still be built on agriculture parcels outside of rural residential districts. This type of development, viewed as an incompatible use with farming, would need to be addressed by other policy innovations.

Infill and Revitalization of Existing Communities

Infill development accommodates growth without consuming farmland. Policies supportive of infill development might direct population growth to cities and urban communities. Each of the six counties in the SACOG region have general plan policies that direct or limit urban growth to urban areas, community areas, or spheres of influences of cities. Additionally, each county has policies in place to encourage infill and/or revitalization within existing communities. In addition to protecting open space

and agricultural lands, infill development generally has other public benefits, such as reducing traffic and improving air quality, and reducing the cost of infrastructure and demand for water.

Benefits and Drawbacks

Infill policies support agriculture preservation by promoting and directing development to areas that already have infrastructure. However, sometimes under capacity or aging infrastructure in infill areas can provide a significant cost barrier to new development.

Agricultural Parks

An Agricultural Park is a combination of working farm and Municipal Park. Ag Parks can serve as transition or buffer zones between urban and agricultural uses. They are designed for multiple uses that accommodate small farms, public areas and natural habitat. They allow small farm operations access to secure land and local markets. They provide fresh food, and an educational, environmental and aesthetic amenity for nearby communities. Ag Parks can be located on either public or private land, vary in acreage, host single or multiple tenants, and have a variety of both agricultural and park components. According to SAGE (Sustainable Agriculture Education) Ag Parks are suitable for public lands that:

- have existing mandates for agriculture, agricultural education, passive recreation, natural resource protection, curation of cultural and historical artifacts, and community linkages
- can contract with partners to help fulfill this mandate.

Ag Parks are also suitable/adaptable for private lands that:

- are permanently preserved for agriculture or have the potential to be set aside permanently as farmland
- are viable for small scale agriculture
- have potential for home sites affordable by farm families
- are located within a place-based agricultural marketing initiative area
- have regulations that permit farmers to operate value-added types of enterprises.\(^\text{20}\)

Example:

Sunol Water Temple Agricultural Park

This model Ag Park is located on 18 acres of land leased by the non-profit group, SAGE, for nine years from the San Francisco Public Utilities Commission. Six farmer tenants work rented plots in the park and sell their produce at farmers’ markets, produce stands, to restaurants and through CSA (Community Supported Agriculture). Tenants share infrastructure, get training in organic agriculture practices and pay rent and water costs.\(^{21}\)

Benefits and Drawbacks

Agriculture parks provide one type of transition zone between urban and agricultural uses, which is lacking in many areas. In the instance of a transition zone between two jurisdictions, an ag park would require city-county coordination in order to be successful. Otherwise, as with any transition zone, an ag park could potentially generate conflict between the planning vision of two jurisdictions. Ag parks may potentially have only small-scale applications though the size limit of such uses has not been tested.

Buffers

One consequence of development in the rural areas is the potential for conflict between agriculture and non-agricultural uses. Buffers can assist in reducing land use conflicts. Buffers are generally imposed on new development, rather than on farming operations. Buffers should be wide enough to protect the farming operation from lawn fertilizers, playing children, and other conflicts. The buffer is generally left as open space though occasionally it is part of the new adjacent development and maintained by the home owners association. Sometimes it is maintained by the county and other times it is not maintained at all.

Sutter and Placer counties\(^{22}\) agricultural buffers range from 100-800 feet depending on crop type, Yuba and Yolo counties require a minimum 100-300 foot buffer, Sacramento County ranges from 300-500 feet, and El Dorado County requires 200 foot buffer that may be administratively reduced if certain Board of Supervisors adopted criteria are met. However, El Dorado County requires a 10 acre buffer for development within designated agricultural districts.

Benefits/Drawbacks

Depending on a jurisdiction’s policy language for buffer requirements, buffers can be very effective. Strong buffer policies and consistent application of them can strengthen right-to-farm ordinances by

---

\(^{21}\) Ibid., Sunol Water Temple Agricultural Park [http://www.sagecenter.org/Projectareas/AgParks/Sunol.htm](http://www.sagecenter.org/Projectareas/AgParks/Sunol.htm) (November 24, 2008).

further minimizing use incompatibilities. However, when they can be waived or the buffer distance reduced, buffers are less effective on a county-wide basis.

**Right-to-Farm Ordinances**

The Right-to-Farm Ordinance requires a real estate disclosure be given to all new property owners in active farming areas, explaining the farmer’s right to farm and that sounds, smells, etc. are part of a normal farming practice and shall not be considered a nuisance. In the Sacramento region, all six counties maintain right-to-farm ordinances. In response to complaints around agritourism activities, specifically near wineries, Placer and El Dorado Counties have also developed Winery Ordinances to regulate traffic- and noise-generating activities (e.g. tastings, promotional events). Placer County’s Winery Ordinance was adopted at the end of August 2008, while El Dorado County’s was adopted February 2009.

*Benefits/Drawbacks*

Right-to-farm ordinances make important policy statements about the preeminence of farming in agricultural areas. At the same time, they do not prohibit the siting of incompatible uses near agriculture: agricultural commissioners in each of the region’s counties reported that they still receive complaints on a regular basis. As a stand-alone tool, the right-to-farm ordinance appears to have limited success in supporting agricultural operations adjacent to residential uses.

**INNOVATIONS SUPPORT AG VIABILITY BEYOND THE EDGE**

**Agricultural Mitigation**

Agricultural, or farmland, mitigation policies are typically used by local governments to compensate for the conversion of agricultural land to another use by requiring protection of comparable agricultural land. Typically these policies require developers to purchase an agricultural conservation easement (see “Agricultural Conservation Easements”) on farmland in a different part of the county, or pay an in-lieu fee, in order to permanently protect a comparable piece of farmland. Most agricultural mitigation policies require compensation for every acre of farmland converted to urban use at a 1:1 ratio. If the policy allows fee payment instead of the purchase of an agricultural easement, the funds are usually invested in a conservation easement program by the jurisdiction to purchase lands later. Generally, the purchase of an easement is preferred over collecting the fee because it ensures the permanent protection of farmland at the 1:1 ratio. However, as noted by the American Farmland Trust, if the option of a fee is used, “one way to implement development efficiency standards would be to have a sliding scale of fees. For example, the amount that would have to be paid would be greater if housing or
commercial facilities use more land per person or job. The justification for this approach is that every acre developed at low intensity represents an opportunity cost to the community in terms of the additional acres of farmland that will have to be converted to satisfy the demand for growth."23

In our region, El Dorado, Sacramento, and Yolo counties all have varying degrees of agricultural mitigation policies in their general plans. Additionally, the city of Davis has agricultural mitigation policies in its general plan. The Yolo County LAFCC also requires agricultural mitigation (in lieu of an existing city requirement) when agricultural land is lost as a result of annexation.

Example:

Yolo County - Agricultural Mitigation Ordinance

In addition to its general plan policies requiring agricultural mitigation, Yolo County adopted an Agricultural Mitigation Ordinance. Similar to many agricultural mitigation requirements, the ordinance mandates that all projects that result in a permanent loss of either farmland and/or habitat are required to mitigate an equal amount of land. A unique component to Yolo County’s ordinance is that it also requires agricultural conservation easements be located within two miles of the development that is being mitigated. The purpose of this is to give first priority protection to lands close to urban areas as they are seen as more at risk of conversion. Another potential unique component to Yolo County’s mitigation requirement is in the County’s General Plan, which includes an action to verify that easements used for mitigation require the landowner to maintain adequate water rights to support agricultural productivity on the land.24

Benefits and Drawbacks

Agricultural land mitigation is used extensively in the CEQA review process for projects that will convert agricultural land. As such, agricultural land mitigation manages to preserve existing farmland. It stops short, however, of creating “new” farmland to replace farmland lost to development.

Transfer of Development Rights/Credits

Transfers of development rights (TDR) programs allow landowners to transfer the right to develop one parcel of land to a different parcel of land. Generally established through local zoning ordinances, TDR programs can protect farmland by shifting development from agricultural areas to areas planned for


growth. TDR programs consist of “sending” areas and “receiving areas” with voluntary landowners in each area. When the development rights are transferred from a piece of property in a sending area, the land is typically restricted with a permanent agricultural conservation easement.

TDR programs are very similar to PACE programs (see “Agricultural Conservation Easements”) in that their goal is to prevent non-agricultural development of farmland, reduce the market value of protected farms and provide farmland owners with liquid capital that can be used to enhance farm viability. In the case of TDRs, local governments generally approve transactions and monitor easements.

Examples:

King County, Washington TDR Program

Since the year 2000, 137,500 acres of rural lands have been protected from development by King County's TDR Program. Buyers and sellers can connect via an on-line exchange that walks them through the administrative steps to complete the transaction. Buyers (developers) can purchase from multiple sending sites and can plan with more certainty regarding the amount of increased density they can expect. Development projects using TDRs are not held to the state’s concurrency requirement for adequate transportation infrastructure for their project and will also qualify for credit in meeting the county’s greenhouse gas emissions requirements. Sellers with land “certified” for TDR qualify for property tax reductions based on current use rather than the highest and best use. Though the program is currently expired, efforts are underway to initiate a new program via the Puget Sound Regional Council and expand it to the four-county Seattle region.

Hillsborough County, Florida- TDR Program

A typical example of a TDR program is in Hillsborough, where a transfer of development rights is used in preserving farmland for agricultural purposes, providing public waterfront access or farm worker housing. The program permits the transfer of densities or floor area between two separately owned or commonly held properties, whether or not they are contiguous to each other.25

Benefits and Drawbacks

TDR helps identify areas that should be preserved and gives incentives to preserve those areas. As a market-driven program, however, it may also encourage growth if not crafted properly. In order to

work, the market value of the “sending” and “receiving” area must be comparable, and there must be sufficient market demand for development in the “receiving” areas. In many cases of TDR, the development potential in receiving areas is in the low density ranges, which, depending on the location of the receiving area, doesn’t necessarily support the goals of land conservation. In fact, while sending areas are typically easy to identify, receiving areas are usually difficult to find because of community resistance to increased density. TDR programs are very complex to develop and administer, which may be part of the reason so few TDR programs have actually been used across the county. A year 2000 survey by the American Farmland Trust found 50 jurisdictions with TDR ordinances, only 15 of which had protected more than 100 acres of farmland, and 22 of which had protected no farmland. \(^{26}\)

**Williamson Act and Super Williamson Act**

The Williamson Act, or California Land Conservation Act, was enacted in 1965 and enables local governments to enter into 10-year contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments which are much lower than normal, because they are based upon farming and open space uses as opposed to full market value. Until recently suspended, local governments received an annual subvention of forgone property tax revenues from the state via the Open Space Subvention Act of 1971. In response, the legislature approve a bill allowing counties to reduce contract terms to nine years (18 for Super Williamson Act), which reduces the property tax relief (i.e., increases property tax revenues).

The California Department of Conservation reports that the Williamson Act program saves agricultural landowners between 20 and 75 percent in property tax liability each year. One in three Williamson Act farmers and ranchers said in a survey that without the Act they would no longer own their parcel. \(^{27}\) All but five California counties participate in the Williamson Act program and have general plan policies encouraging enrollment and/or discouraging non-renewal. The SACOG region currently has roughly 740,000 acres of land in Williamson Act contracts. Yolo County also participates in the Farmland Security Zone (Super Williamson Act) program, which extends the contract period to 20 years and reduces the tax burden even further; Sacramento County also supports this program. About 36,024 acres of farmland in the SACOG are scheduled for non-renewal of their Williamson Act contract (about 5 percent of the lands in contract).

Example:

*Yolo County- Super Williamson Act*


\(^{27}\) Land in the Balance, University of California: December 1989.
The minimum term for a Williamson Act contract is ten years. However, some jurisdictions, including Yolo County, exercise the option of making the term longer, up to twenty years. This is referred to as the “Super Williamson Act”. Yolo County allows the Super Williamson Act if the subject property is within four miles of an existing city limit. The County has property owners participating in both the Williamson Act and the Super Williamson Act.

Benefits/Drawbacks

The Williamson Act makes it economically feasible for a farmer-owner to keep large parcels in production. The short-term conservation provided by a Williamson Act contract provides land owners more choices regarding the fate of their land, though this flexibility can be contradictory to open space, habitat, or other long-term agricultural preservation objectives. Funding for the Williamson Act from the State has been suspended, which undermines the commitment of a county and/or participants. Different interests see Williamson Act contracts as either too easy to exit from or too restrictive when in place. The legislature responded to the loss of subventions by allowing shorter contracts, which enabled counties to offset the loss of the subvention with a resulting decrease in property tax breaks to landowners. Nonetheless, some counties are not renewing contracts and the legislation is due to sunset in 2016, so the effectiveness of the Williamson Act may be on a slow and continual decline.

Agricultural zoning and farm home sites for owners and workers

Most agricultural zoning allows for one dwelling unit and in some cases additional accessory dwelling units. However, some jurisdictions have used zoning designations to limit the proliferation of housing as a primary use on agricultural parcels while still allowing for farm home sites for farmer-owners. Balancing this objective with the need for farm worker housing in the Sacramento region is also an important consideration in rural housing issues.

Examples:

Tulare County- Agriculture Exclusive (AE) Zoning- 80 acre minimum

Tulare County’s AE zone requires a minimum lot size of 80 acres and allows one additional residence for each 20 acres in the property. This zoning designation is unique because it further specifies that any residences must be occupied by the farmer-owner, relatives, or employees who work on the property.28

DeKalb County, Illinois - Agricultural Zoning (A-1) - 40 acre minimum

For the A-1 zoning district, DeKalb County’s zoning code states that in order to obtain a building permit for a new home, the landowner must have the land engaged in active farming.29

Sutter County - Agricultural Zoning

Another local example of this can be found in Sutter County. Sutter County’s agricultural zoning code specifies that agricultural districts (20 and 80 acre minimum lot sizes), allow 2-acre home sites for one-family residences for the farmer-owner and agricultural employees.30

Yolo County Farm Worker Housing Policies

The Agriculture Element of Yolo County’s Draft General Plan contains policies to streamline permitting requirements for farmworker housing, including reducing fees and requiring inclusionary housing within established communities. The element further encourages cities to share in the responsibility for providing adequate sites to accommodate farm labor housing. Through their housing elements, all of the counties have policies that encourage the use of state and federal housing aid programs to provide farm worker housing.

Benefits and Drawbacks

Farm home regulations further restrict a property owner’s use of their property. As such, they are an effective means of limiting rural residential development on agricultural land, though they pertain only to the construction of new homes. In order to support construction of homes for the intended use of farm family members and workers, other local regulations need to reflect the priority of the farm home policy, which is not always the case.

Less restrictive zoning for onsite processing and sales, and agritourism


Although restrictive zoning requirements such as minimum lot size and lot splitting restrictions help to preserve farmland, zoning that restricts the processing and sale of products grown on site can be problematic for the economic viability of the farm. Most agricultural zoning codes do not restrict the land in terms of what type of agricultural activity is allowed on the land; however, many do have restrictions when it comes to sales and the processing and distribution of value-added products onsite. For example, most zoning codes will allow for an apple orchard and the sale of those apples onsite; however, many would not allow, by right, the production and sale of apple pie or apple butter made onsite. Depending on the zoning code, a farming operation might be able to apply for a conditional use permit to allow this. One way to allow farmers to expand their businesses would be to have less restrictive zoning relating to the onsite sale and processing of value added products. In the RUCS stakeholder meetings, less-restrictive zoning to support on-site processing and agritourism was consistently identified as a critical innovation to support agricultural viability.

Examples:

El Dorado County- Agricultural Zoning Districts

Agricultural Districts in El Dorado County have zoning that allows, by right, packing, processing and sale of agricultural products and edible byproducts grown on-site. Zoning also allows the packing, processing and sale of agricultural products grown off-site in conjunction with the processing or sale of products produced on site.  

Yolo County- Agriculture General and Agriculture Exclusive Zoning Codes

The Yolo County zoning code allows service, storage and processing facilities as an accessory use to “normal” agricultural activities.

Yolo County General Plan Agricultural Economic Development Element


Beyond encouraging the expansion of agritourism in the county, the Yolo County General Plan includes policies specifically promoting agricultural innovation, including biotechnology, carbon sequestration and methane recovery.

**Benefits and Drawbacks**

On-site processing and sales can support improved farm-to-market efficiency. Supportive zoning can help bolster agritourism, encouraging landowners to continue farming in the face of development pressures. These economic activities can bring in jobs, sales tax, property tax, and support family farm operations. While promotion of agriculture-related industry can revitalize farming activities, it does not on its own resolve the basic conflicts between the pressures to convert and conserve agricultural land. In fact, without other supporting programs to encourage and sustain these industries, lands can convert to non-agriculture use. By the same token, zoning that allows for significant infrastructure investment may also set up land to be converted to development. It also may result in some conflicting uses, particularly in areas of increased rural residential growth and increases in traffic and noise during business hours. Related to this, the question of minimum parcel size for zones that allow agritourism or ag-industry can make rezoning of prospective lands a politically difficult task.

**Agricultural Districts**

Agricultural Districts are special geographic areas where agriculture is encouraged and protected. They can be used in conjunction with growth boundaries to protect farmland from urban encroachment. They are intended to be a comprehensive response to the challenges facing farmers in developing communities. To maintain the land base for agriculture, some agricultural district programs protect farmland from annexation and eminent domain. Some increase restrictions on minimum lot sizes, buffer requirements, and non-agricultural development. Many also require that state agencies limit construction of infrastructure, such as roads and sewers, in agricultural districts.

Agricultural Districts are typically based on a number of criteria including soils, topographical features, location, lands currently in agricultural easements or preserve contracts, and development densities.

The term “agriculture” can include grazing lands or not, depending on the context. In this report, references to “agriculture” include grazing lands. If grazing exists in an area, it could be considered in the formation of agricultural districts, or distinct grazing districts could even be formed.

**Examples:**

**El Dorado County- Agricultural Districts**

A typical example of agriculture districts being used to protect and encourage agriculture is in El Dorado County. The El Dorado County General Plan established agricultural districts to conserve, protect, and maintain agricultural use. Within these districts, there are stronger policies on
buffer requirements and non-agricultural development, intended to protect agriculture as the preeminent use in the districts.33

**Yolo County- Agricultural Districts**

In its General Plan, Yolo County defines for the first time an agricultural district in the Clarksburg area and has a policy to create additional agricultural districts in other parts of the county. In this example, the agricultural district is used to explore ways to encourage agricultural business development and expansion. The county is considering a number of tools which could be applied within the district to achieve this goal, including but not limited to designating specific economic focal points, subsidizing marketing efforts, and some regulatory relief.34

**Benefits and Drawbacks**

At a minimum, agricultural districting provides policy-level acknowledgement in a geographic context of where agriculture is important, though such a purpose in and of itself can be of limited value to agricultural protection. Most agricultural districts provide preferential treatment to agricultural uses within district boundaries, for example, through more stringent buffer policies or preferential ranking for agricultural easements. Agricultural operations within the boundaries of such districts usually win in any conflict of use disputes. Perhaps an unintended consequence and drawback of agricultural districts occurs when districting draws certain agricultural lands out of district boundaries. Lands left out of districts are effectively told that they are not as important and the pressure to convert to other uses is perceived to be greater.

In a county where agricultural preservation is not a coordinated effort between city and county, agricultural districts at the edge of jurisdictions are challenged by landowners looking to convert agricultural land to another use.

**Conservation Easements**

A conservation easement is a tool used by mitigation programs, habitat conservation plans, and other open space planning efforts, to secure the open status of land. Individual landowners sell easements in a willing seller (or donor) and willing buyer (or recipient) arrangement. Easements are also used by land trusts, non-profit organizations that partner with local communities and landowners to identify, protect


and steward important conservation lands. Two easement programs at the state and federal levels fund easements specifically for farm and ranchland; however, most state and federally funded easement programs are geared toward conservation of habitat or another open space resource. Easements for habitat or other open space uses can have the effect of protecting agriculture as well. For example, conservation easements are being used by the Sacramento Area Flood Control Agency as part of their flood control plans as setting aside farmland reduces the amount of land needing an urban level of protection in the future and thereby minimizing overall flood risk.

In the Sacramento region, all counties encourage the use of easements to support a variety of conservation goals. Currently, most easement acquisition funds, whether from development mitigation programs or state or federal grant programs, are targeted at habitat. Although some habitat easement programs simultaneously preserve both habitat and agriculture (mainly rangeland) there are not many funds available specifically for agricultural preservation, despite the importance of agricultural preservation to most public agencies and conservation groups. In the Sacramento Valley, various open space programs have been used to protect farmland and grazing land in particular. The California Department of Water Resources Flood Protection Corridor Program, which offers grants for nonstructural flood management that enhances wildlife habitat or protects agricultural uses on private lands, has been used in the past to acquire conservation easements on farmland. Table 6 includes a list of state and federal easement programs and their primary conservation focus.

Most funding programs do not fully fund an easement purchase and consequently, most conservation easements are purchased with funds from multiple sources. Because each funding program comes with its own set of requirements, and because each easement may have a unique set of conservation objectives, not all funds can be combined with each other and not all easements can be funded by all programs. For example, a Swainson’s Hawk habitat easement over row crop lands might be eligible for funding through a habitat grant program, but not through an exclusive agricultural grant program that prohibits restrictions on types of agriculture. In a survey of local public and private organizations with interest in land conservation and stewardship, SACOG learned that of the respondents that used at least one easement program in their conservation work all had used the California Farmland Conservancy Program (CFCP) for acquiring agricultural easements. Other programs identified in the survey for easement acquisition include three California Wildlife Conservation Board’s easement programs (ecosystems restoration, wetlands restoration/enhancement, and grazing land), the California Department of Water Resources Flood Protection Corridor Program, and the USDA Farm and Ranchland Protection Program. In Yolo County, two local programs were identified as easement funding programs: the city of Davis’ Measure O and the joint Yolo County, Yolo LAFCO, and city of Davis Agricultural Mitigation Ordinance.

Table 6: Easement Funding Programs and their Conservation Focus

<table>
<thead>
<tr>
<th>Grant Program Name</th>
<th>Conservation Focus</th>
<th>Managing Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Farmland</td>
<td>Agricultural Land</td>
<td>CA Department of</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Program</th>
<th>Land Use / Eligibility</th>
<th>Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservancy Program</td>
<td>Agricultural Land</td>
<td>U.S. Natural Resource Conservation Service</td>
</tr>
<tr>
<td>Farm and Ranch Lands Protection Program</td>
<td>Grazing land (limited eligibility for other agricultural uses)</td>
<td>U.S. Farm Service Agency</td>
</tr>
<tr>
<td>Grassland Reserve Program</td>
<td>Grazing land (other agricultural uses not eligible)</td>
<td>CA Wildlife Conservation Board</td>
</tr>
<tr>
<td>Rangeland, Grazing and Grassland Protective Act of 2002</td>
<td>Habitat on agricultural land</td>
<td>CA Wildlife Conservation Board</td>
</tr>
<tr>
<td>Ecosystem Restoration on Agricultural Lands</td>
<td>Wetlands (may or may not coincide with agricultural land)</td>
<td>CA Wildlife Conservation Board</td>
</tr>
<tr>
<td>Inland Wetlands Conservation Program</td>
<td>Wetlands</td>
<td>CA Wildlife Conservation Board</td>
</tr>
<tr>
<td>North American Wetlands Conservation Act</td>
<td>Wetlands</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>California River Parkways and Urban Streams Restoration Grant Program</td>
<td>River parkways, recreation, flood management, habitat</td>
<td>CA Resources Agency</td>
</tr>
</tbody>
</table>

From the farming perspective, a habitat conservation easement may generate revenue from the easement value, but may limit a landowner’s ability to adapt to changing market demands for agricultural products. In the example above, a parcel restricted to row crops as part of a habitat conservation easement may lose out on a market shift favoring tree crops, because of the habitat restrictions of the easement.

**Agricultural Conservation Easements**

Agricultural conservation easements are designed to keep land available for agriculture. They can be placed on the land voluntarily by the property owner to protect farmland and provide several tax benefits, or, where programs exist, they can be purchased by government agencies or private conservation organizations as a way to protect farmland and provide farmers a financially competitive alternative to development. Agricultural easements can also provide farmers with tax benefits such as income and/or property tax reductions.

**Non-Purchased Agricultural Conservation Easements**
Agricultural easements are deed restrictions that are voluntarily placed on land by the property owner. Because they are voluntary, conservation easements are typically flexible documents that can be tailored to individual property owners. They can cover the entire parcel, or a portion of it. In general, agricultural easements are used to limit non-farm development and do not limit other private property rights. After a conservation easement is established, the land use restrictions on the property are usually monitored and enforced by the local jurisdiction or conservation organization. The landowner retains the right to sell the property; however, most agricultural conservation easements are permanent and legally binding for future landowners.35

Purchase of Agricultural Conservation Easement Programs (PACE)

Similar to other agricultural conservation easement programs, the easement contracts are voluntarily agreed to by the landowner; however, in this case the easements are purchased.36 Typically they are applied in response to development mitigation (see “Agricultural Mitigation”), but they can also be unrelated to development impacts. With purchased agricultural conservation easements, the landowner sells his development rights to a government agency or private conservation agency, who pays the landowner the difference between the value of the land for agriculture and the value of the land for its “highest and best use”, which is generally residential or commercial development. Selling an easement allows farmers to cash in a percentage of the equity in their land, thus creating a financially competitive alternative to development.

Similar to other conservation easements, purchased agricultural conservation easements restrict only the development potential of the land, not other property rights, and the easements are binding for future landowners.

PACE programs can be implemented through state governments, local governments, and/or private conservation organizations. However, PACE programs are expensive and usually benefit from cooperative programs.

Land trusts, which are typically private, non-profit corporations, are active in the Sacramento region in the purchase of agriculture conservation easements. A land trust exists within each of the six counties and at times work directly with the counties on joint preservation efforts.

35 An example of a typical agricultural conservation easement deed can be found at http://www.conservation.ca.gov/dlrp/cfcp/overview/Pages/cfcp_model_easement.aspx (California Farmland Conservancy Program Model Easement 2006).

Williamson Act Easement Exchange Program

Generally, when a landowner files for cancellation of a Williamson Act contract, the cancellation fees are paid into the State General Fund. Under the Easement Exchange Program, the local government and landowner(s) put those cancellation fees toward an agricultural conservation easement elsewhere in the local area. The appraised value of the proposed easement land must be equal to or greater than the value of the cancellation fee required to cancel the existing contract, the proposed easement land must be of equal size or larger than the contract land, and the board or council of the local jurisdiction must make specific findings in order to cancel a contract. The easement exchange must furthermore meet the criteria established under the California Farmland Conservancy Program.

Examples:

*Equity Trust*

Equity Trust is a national non-profit organization that finds equitable solutions to economic problems relating to farming and affordable housing. Most agricultural conservation easements limit development to protect agricultural viability on the land, but do not require the land to be in active agricultural use; however, Equity Trust has a new easement model which requires that the property is actively used for agricultural purposes.37

*State of California Wildlife Conservation Board- California Rangeland, Grazing Land, and Grassland Protection Program*

This agricultural conservation easement program is unique to protecting range land and grazing land.38

*Lancaster County, Pennsylvania*


A typical example of a PACE program is in Lancaster County where the program is managed by a nine-member Agricultural Preserve Board appointed by the County Commissioners. Established in the early 1980s, the Preserve Board is a county department with its own staff that administers the county’s PACE program. The board receives funding from both the county and the state of Pennsylvania and participates in a statewide PACE program.\(^\text{39}\)

*City of Davis-Yolo Land Trust-Solano Land Trust Partnership*

In 2000, the citizens of Davis voted to establish a parcel tax to fund open space acquisition around the city of Davis. The city partnered with the private Yolo and Solano Land Trusts to leverage this local funding to secure conservation easement grants for open space land acquisition. See *Regional Open Space Collaborative*, below, for more discussion of this type of innovation.

**Benefits and Drawbacks**

Purchased conservation easements provide win-wins for agricultural land by conserving important lands while keeping them in production. However, it can be difficult to find willing sellers in areas under development pressure and funding is often insufficient. A constant deficiency in funding also makes it difficult to preserve enough land to make an appreciable change in the rural landscape. Other concerns include decreased tax base and the perception that conservation easements form a de facto subsidy for agriculture. Where land speculation is rampant, land owners are disinclined to easements because they restrict development potential for long periods of time.

Conservation easements have the potential to work in concert with urban growth boundaries, forming a second, natural buffer beyond the edge of urban growth boundaries to help contain urban development.

**Habitat Conservation Plans and Agriculture-Friendly Easements**

In the context of habitat conservation plans, the term “habitat” is synonymous with natural resources. This can include any combination of wetlands, rare and endangered species, riparian corridors, woodlands, fish, floodplains, streams, rivers, vegetation, plants and other wildlife. Much of the rural landscape in this region provides habitat for threatened and endangered species. All of the counties’

general plan policies have mitigation requirements for habitat land loss due to development impacts. To that end, each county is also working on a Habitat Conservation Plan (HCP) or some form of conservation strategy to identify areas that are important for species protection and areas where development may occur. However, there can be conflict between habitat conservation and agricultural land. Parts of the region are experiencing a conversion of agricultural land to habitat preservation for development mitigation purposes, which has the effect of removing land from agricultural use (and into habitat conservation). This type of farmland conversion can create difficulties for adjacent agricultural lands with the invasion of weeds, rodents, birds, and waterfowl.

Nonetheless, there can also be “working” relationships between the two land uses in which both needs can be met: rice fields have become part of the Pacific Flyway, alfalfa is great foraging habitat for Swainson’s Hawk, grazing helps keep non-native grasses in check and helps vernal pools function. Identifying and planning for these working relationships can benefit the farmer and help preserve farmland. Yolo, Sacramento, and Placer counties are all currently working on habitat conservation plans that will incorporate, if not depend on, agriculture. Agriculture easement programs will likely be a key mechanism to implement these HCPs.

Example:

Solano County

Although not a Habitat Conservation Plan, this is an example of a jurisdiction trying to balance the interests of habitat conservation and farmland preservation. Solano County zoning code requires a conditional use permit for conservation banks within the county’s agricultural zoning district. This regulation arose out of a concern that habitat conservation banks, which could previously be established without county knowledge or approval, were being cited in the county without consideration of impacts on farmland (loss of farmland and conflict with adjacent farms). The conditional use permit will allow local officials to evaluate the potential impacts on adjacent farms before deciding whether or not to allow the habitat conservation project.40

Benefits and Drawbacks

Habitat conservation plans relying on agricultural use can provide a funding source for landscape-level ag land conservation that might not otherwise be available. There is, however, a delicate balance between meeting the habitat needs of species and maintaining farm viability. A side effect of HCP easements is that they can devalue neighboring parcels by restricting uses on them. They can also limit the types of crops or farming practices of a piece of land in the interest of preserving habitat. For example, an HCP easement for a Swainson’s Hawk might restrict the underlying land to a limited

selection of crops that support hawk foraging. This type of restriction limits the ability of a farmer to adapt to changing market forces.

**Agritourism and Ag-Industry**

Agritourism and other revenue generating opportunities within agricultural areas are one way to improve economic vitality of agriculture in the region. Landowners are likely to remain in the business of farming if it’s more profitable. Agritourism spans a wide spectrum. In this region, it can mean having an onsite farm stand that sells onsite produce or a multi-million dollar operation such as Apple Hill in El Dorado County.

In the SACOG region, all six counties have general plan policies that support and encourage agritourism opportunities.

Example:

*Yolo County- Draft General Plan Agricultural Economic Development Element*

Beyond encouraging the expansion of agritourism in the county, in the Yolo County Draft General Plan policies specifically promote agricultural innovation, including biotechnology, carbon sequestration and methane recovery.

**Benefits and Drawbacks**

Agritourism and ag-industry can bring in jobs, sales tax, property tax, and support family farm operations. But at the same time, success can mean traffic and noise nuisances for adjacent uses. While promotion of agritourism and ag-industry can revitalize farming activities, it does not on its own resolve the basic conflicts between the pressures to convert and conserve agricultural land. In fact, without other supporting programs to encourage and sustain these industries, lands can convert to non-ag use and the existing infrastructure used to support higher intensities of development.

**Stewardship Programs**

Outside of local land use policies, there are many programs available to landowners for the stewardship of open space lands. These state and federal programs focus on environmental benefits such as water quality, water supply, flood control and habitat. Programs provide grants or low-interest loans to applicants to fund conservation or stewardship practices that protect open land and/or make it economically viable to do so. Stewardship programs are available directly to landowners or to entities that work with landowners, such as local governments, resource conservation districts, and non-profit land trusts. In SACOG’s land conservation and stewardship survey, respondents were asked to indicate which of these programs they had used in the past and for what purpose. Collectively, respondents used 24 out of 37 listed programs for a wide variety of uses including agricultural easement acquisition,
habitat restoration, river parkway and trail projects, wildlife friendly farming practices, water quality improvement, irrigation efficiency, and flood capacity improvements. Several programs identified by respondents are focused on multiple conservation objectives, usually farmland and habitat preservation or farmland and water quality protection. Although respondents, a collection of both public and private entities, do not represent the full breadth of conservation and stewardship activity in the Sacramento region, they do demonstrate that the region is tapping into available programs for a variety of stewardship and conservation objectives.

Example:

*Environmental Quality Incentive Program (EQIP)*

This federal stewardship program through the Natural Resource Conservation Service (NRCS) awards cost share assistance to stewardship projects which provide significant environmental benefit as identified by local, state and national priorities. Individual land owners qualify their enhancement projects through and application and review process with the local NRCS office. EQIP is used widely to help improve not only environmental function, but business operations.

*Benefits and Drawbacks*

Federal and state stewardship programs pay farmers to provide various environmental benefits on their land, which also contributes to that land remaining open in either agricultural or open space. However, these programs are also criticized for highly complicated application processes and difficult monitoring requirements, which can be discouraging to farmers who might otherwise be inclined to take advantage of the programs’ financial incentives. They are also less applicable to some types of agriculture where there are fewer opportunity for environmental enhancements.

*Regional Open Space Collaborative*

A cooperative effort of multiple land conservation organizations to create a regional priority for land conservation that considers all of the open space land uses that benefit the region from environmental, economic, and quality of life perspectives. In addition to these benefits, rural lands also provide many benefits under the broad title of “recreation,” from passive recreation uses such as bird-watching to more active uses such as hiking or bicycling. The goal of such a collaborative is to elevate the importance of open space in the general public, thus broadening regional appreciation for the need for a healthy open space system in rural areas. Multi-party collaboration at a regional scale can elevate the conservation profile of a region and in doing so, can also attract larger conservation funding sources than any individual group might be able to attract. In the RUCS stakeholder meetings, public-private partnerships around public education, fundraising for conservation efforts, and inter-jurisdictional collaboration were identified as valuable innovations for protecting open space and farmland.

Example:
Bay Area Open Space Council

This partnership of public and non-profit open space groups covers the nine-county San Francisco Bay Area. The Open Space Council has built a regional funding, education and coordination strategy to support its mission of fostering an interconnected system of healthy communities with parks, trails, agricultural lands and natural areas throughout the region. A mapping effort identified existing open lands and helped council members to develop a vision for open space needs and opportunities in the Bay Area. This mapping and collaboration enabled the region to receive over $125 million in funding for open space protection in the nine-county region through a special conservancy established by the state Legislature for the San Francisco Bay Area.41

City of Davis-Yolo Land Trust-Solano Land Trust Partnership

The city of Davis’ Measure O parcel tax will provide $17.5 million through 2030 to fund open space acquisition and management in and around the city. The city has partnered with the Yolo and Solano Land Trusts to leverage funding for conservation grant programs. The close collaboration between the city and the land trusts allowed these organizations to identify common objectives in open space conservation.

Northern Sierra Partnership

The Northern Sierra Partnership is a collaboration of local, national and international land trusts (Feather River Land Trust, The Nature Conservancy, Trust for Public Land, and Truckee Donner Land Trust) and private businesses (Sierra Business Council) in the northern Sierra region of California. The partnership was created to stimulate conservation action and private fundraising and to complement the goals of the Sierra Nevada Conservancy, a relatively new state agency that will guide public spending on conservation in the Sierra Nevada. The partnership’s strategic objectives include the protection of at least 100,000 acres of high priority lands over the next five to 10 years, proactive climate change solutions, and enhancing local economies through sustainable land use programs.42

Benefits and Drawbacks

Regional collaboration for open space conservation can elevate the importance of open space in the public eye, and in the eyes of potential funders. These effects can provide more momentum to conservation activities and were part of the motivation for forming the above examples of regional collaboratives. The difficulty with regional collaborations is ensuring that all participants maintain a shared vision of the priorities and strategies for the region over time.

**Agricultural Resources and Training Center**

A facility located conveniently to a region’s farming sub-regions government and non-profit organizations that provide assistance to farmers. While such a center would serve a broader array of needs, part of its role would be to provide grant writing assistance and grant administrating assistance to farmers pursuing land conservation and stewardship funding.

Example:

*Sutter County Agricultural Resources and Training Center*

A proposal by the Sutter County Resource Conservation District (RCD) to construct a building in Yuba City, that provides conveniently located support services to the county’s farming and farming-related businesses. The center would house local, state and federal entities that regulate or provide support to local growers, including the local community college, University of California Cooperative Extension, the Sutter County Agricultural Commissioner, U.S. Department of Agriculture, and the local Resource Conservation District. Conference rooms, business incubator spaces, and a resource center will also be available. The goal of the resource center is to provide a “one-stop-shop” for local growers strengthening working relationships between the various entities involved in regulating the agricultural industry.

*Benefits and Drawbacks*

The Agricultural Resource Center is still a fairly new concept. In the case of the Sutter County Agricultural Resource Center, the Sutter RCD hopes the center will provide growers an efficient, direct connection to regulators and training and business development opportunities.

**TECHNICAL TOOLS THAT SUPPORT AGRICULTURAL LAND USE**

The previous section discussed the policies and plans that can conserve agricultural land and support the industry. Coupled with policy decisions, economic and market forces also drive cropping and land use decisions. Agricultural viability is therefore an important part of conserving not only agricultural production, but the environmental services the land provides. SACOG has developed tools to help the region understand what factors impact rural economic viability and how those factors may affect the use of rural lands in the future. The various models and how they fit together are described below.
Crop Map

While there are dozens of general plan designations for urban uses, the diverse types of agriculture—from rice fields to peach orchards to diversified farms—are all labeled “agriculture”. This simplified view makes it hard for policy makers and economic development agencies to help growers, processors or distributors. Crop data were collected at the field level across more than 2 million acres of farmland as part of SACOG’s RUCS project. The 2008 map represents about 120 crops simplified into 33 landscape types. Each landscape type is backed by input cost, yield, price, and other factors such as habitat. Developing this crop map was an important milestone in the RUCS project since it dramatically shifted the view of rural areas from just agriculture to a representation of the cropping (i.e., business) decisions by farmers and ranchers. The crop map provides a basis to compare possible future land use patterns to today’s conditions. It also provides a common platform for various land use, economic development and environmental interests to work from. The crop map is also what drives the models used to assess agricultural viability today and in the future. In some respects, the crop map is like a general plan for agriculture and a key component to helping the region plan for and enhances the agriculture industry.
SACOG Region Crop Map, 2008
Econometric Model

Building on the crop map and the return-on-investment calculator, SACOG worked with an agricultural economist to build an econometric model, which combines economic theories with data to test how growing decisions and cropping patterns would change under different conditions. The model was build using historical cropping data from the last seven years to correlate physical factors such as soil quality, access to water, and proximity to transportation infrastructure to create a probability map for a given crop types. Since annual crops change regularly, the model was used to estimate the frequency (probability) with which crops are grown and used that information to determine four distinct crop districts: alfalfa, grain, processing tomatoes, and rice. Within each district a variety of crops can be grown, but there is one crop in particular that is grown frequently enough that it defines that district. As an example, Figure 6 shows the probability map for tomato production in the region. Crop probabilities information was used to finalize the crop map and is also used as the starting point for testing the impact on cropping patterns from changes in cost and price variables, which are listed below. The model can then predict how much land would become fallow (unused) in a variety of possible future market conditions.

Figure 7 shows an example of the impact a doubling of fuel prices might have on processing tomato districts. Such results from the econometric model can be linked into the I-PLACE3S software to help build scenarios that can then be tested with that software. By running and number of scenarios through the econometric model and I-PLACE3S software, SACOG was able to graph the effect of cost and commodity price and the rate of fallowing in the region (Figure 8). These results help stakeholders understand possible cropping impacts from market changes, which can be used to come up with strategies to respond to future condition.

Possible Market Scenarios

Russian drought and fire reduce wheat harvest
   → Grain prices increase

Oil resources become scarcer
   → Fuel, chemical and fertilizer prices increase

Construction industry heats up again
   → Labor prices increase

Drought persists
   → Surface water decrease, Irrigation costs increase
Figure 6: Probability Map for Tomato Production

Legend
P(Tomato / Sunflower)
- High: 50%
- Low: 0%

Figure 7: Impact on Tomato District from Doubling Fuel Prices
Scenario: Fuel Prices Double
Crop: Processing Tomato Area
Figure 8: Impacts on Fallowing from Changes in Input Cost and Commodity Price

Land Use Model

SACOG uses GIS tools to conduct land use scenario analyses. The tools are used by planners to work with stakeholders on planning efforts and works at a parcel level to provide a range of indicators to assess how a plan is performing relative to a baseline condition. As part of the RUCS project, the GIS tools have been adapted to include rural land use analysis. The tools have the capacity to analyze how cropping pattern changes affect the viability of agriculture. Much like changing an urban land use plan, the rural application allows the user to change crops field-by-field to see how those changes impact agriculture viability. Using information from the crop map, SACOG can assign production input and cost, yield, price, and non-production factors (e.g., habitat, easement value, energy production, carbon sequestration) to each crop type. This tool can model how changing crop patterns, market conditions, and policy and business decisions may affect the viability of agriculture. The specific outputs include: yield and value of production, demand for inputs (e.g., labor, water, fuel, seed, trucking), and net returns. This analysis capacity helps decision makers craft better policies and plans, agricultural businesses make operational decisions, and the public understand the importance of protecting agricultural land and supporting growers in the region.
An example of the RUCS toolkit is provided below. In this example, a hypothetical farmer is considering what to do with his 2,000 acres of alfalfa production. The current return on his operation is anywhere from 1 percent to 10 percent annually. The farmer would like to see a higher return on this land and decides to “run the numbers” on a dried plum (formally known as “prunes”) operation. The tools can be used to compare alfalfa production to dried plum production. Once the orchard is established and the initial investment is paid, the model shows that the farmer’s return could increase to 20 percent to 30 percent annually. This would be an $8 million increase in agricultural value in the county and an increase of $2 million in net return on investment. The farmer would need an additional 1,000 acre-feet of water and 35 more farm workers to run the operation; however, the would be few truck trips generated by the orchard.

**Study Area**

![Map of Study Area](image)

**Current Crop and Return**
Scenarios like this example can be run at any scale of geography: by operation, by county, or by region. Since the model operates on user-defined input values (i.e., the user can change cost or price variables), each geography scale can be “tuned” with input values that range from operation specific to regional averages. Therefore, the model can be used by a single grower, or by a county, or regional agency. All scales of modeling can provide valuable results that help public and private stakeholders understand
how agricultural viability may change given changes in policy, markets, weather, or other factors that can impact agriculture.

The results can be shown graphically as tables, but also as maps. This allows stakeholder to quickly see where there are “hot spots” for variables such as labor demand, water demand or truck trips. The modeling can also show maps of return on investment. These results help the region understand where it may be beneficial to invest in housing for labor, irrigation/water delivery improvements or road improvements. This may be particularly useful when comparing these results to the return on investment results. In an area where returns are lower and therefore operations are more vulnerable to changes in markets or policies, local investments such as those mentioned could mean the difference between profitability and failure. As stakeholders assess trends and plan for the future, RUCS tools will be available to help them assess how the region can promote opportunities and address challenges.

**Crop Map, 2008**

![Crop Map](image)

**Return**
Labor Demand

Water Demand
Truck Trips
Current Conditions, 2000

Rural Travel Behavior
The six-county SACOG planning area is as diverse as it is large. In addition to a major urban area, this region includes many smaller, but very distinct, urban centers, and vast rural lands. The economic and social relationships the more rural localities have with each other, and with the Sacramento urban area, comprise a complex web of travel behavior and demands a wide variety of transportation trips. But trip taking in Live Oak or Colfax does not necessarily resemble trip taking in urban Sacramento for the same needs.

Journey to Work
The journey to work is a keystone daily trip for many citizens. The nature of work trips, and how they flow from one part of the region to another, can tell us a great deal about the demand for rural transportation resources. SACOG analyzed the Census 2000 CTPP dataset at the Census Designated Place (CDP) level to inform the RUCS dialogue and to illuminate the importance of the work trip.

The journey to work (JTW) analysis shows, with few exceptions, that the largest work destination category will be the same place where the worker lives. However, the analysis also bears out the importance of the rural job market to the smaller urban areas. For example, 16 percent of the workers in Yuba City go to jobs in rural parts of Yuba and Sutter counties, while only nine percent of Sacramento workers go to rural jobs anywhere in the region.

A large percentage of Auburn residents commute to the urbanized area (33%), which includes Sacramento and the cities in southwest Placer County (Roseville, Rocklin, Loomis, and
Lincoln). In contrast, only 26 percent of Davis workers commute to the large urban area (Sacramento and West Sacramento). Both of the highlighted small urban centers rely on the rural parts of their counties for significant numbers of jobs and export a non-trivial number of workers outside the region to Solano and Nevada counties.

The two example small urban areas have more in common with each other than they do with the major urban core of Sacramento. The Sacramento urbanized area (also called “large urban”) has a worker commute destination profile not dissimilar to other large cities. With a large concentration of employers in the urbanized area, a significant majority of workers live relatively close to their job locations. Sacramento's reliance on the rural economy is far less than Auburn, Davis, and other smaller urban areas.

Another aspect of rural travel behavior is the number of vehicle miles traveled (VMT) to reach destinations. As shown in the table below, VMT is proportionately higher in the more rural areas, reflecting the remote nature of rural areas, where destinations are often inaccessible by non-motorized modes of transportation. One consequence of higher VMT is that households in rural areas are disproportionately impacted by the rapid rise in gasoline prices. Because only 3.6 percent of rural households do not own a vehicle and because fuel comprises a much larger share of expenses in rural households compared to their urban counterparts, fuel fluctuations and increases can quite dramatically affect rural travel behavior.

**Urbanizing Rural Roads: Conflict at the Rural-Urban Interface**

Historically, rural communities have had economies based on agriculture or natural resource extraction (timber, grazing, mining, etc.). Until the recent recession, rural communities have been feeling the pressure to grow as urban boundaries spread outward and people willing to commute long distances have fled city and suburban living for the additional elbow room rural living affords. As mentioned earlier, approximately 200,000 acres of farmland were transitioned to urban or rural residential and commercial land uses over the last 20 years.
As rural land transitions into non-agricultural uses, more and more rural roads are seeing urban traffic patterns. The typical urban pattern includes strongly defined peaks during commute hours, and those peaks may be directionally different (i.e. the PM peak in volume is the opposite direction of the AM peak). The typical rural pattern, in addition to lower volumes overall, has little-to-no observable peaking, with traffic volumes spread out more evenly over the course of the day. A road is considered transitional (also called a rural-urban interface roadway) if it serves rural adjacent land uses and has design characteristics meant for low-volume rural traffic but exhibits considerable fluctuations in peak and off-peak traffic volume.

Frequently, nearby development or bottlenecks on major commuter routes cause an increase in traffic volumes as drivers begin using rural roads as supplementary commuter routes. In some instances, recreational opportunities can create similar conflicts as they draw traffic from urban areas onto rural roads. For example, holiday and weekend traffic near the region’s many agritourism sites creates localized traffic congestion and parking problems on roads that are otherwise lightly used.

When rural roads begin to transition, the potential for conflict among users rises quickly. Chief among these concerns is safety, especially the safety of farmers moving farm implements between fields. High-speed commuter traffic is exceedingly dangerous to slow-moving vehicles. Likewise, slow-moving and oversized vehicles may pose a safety threat to impatient motorists who...
attempt risky passing maneuvers without checking for oncoming traffic or giving enough clearance to the vehicle being passed. Especially during the growing season and harvest months, user safety is a considerable concern for transitioning rural roads.

Conflict also arises as residents and development interests debate the appropriate level of infrastructure improvement. Rural residents are often reluctant to abandon the narrow, two-lane roads that give rural areas their distinctive charm, while economic development groups push for major expansions and wider roads. In reality, the solution usually involves a balanced approach between the two objectives that accounts for the practical demands of increased traffic flow without losing the character of the surrounding land uses.

From the travel demand side, transitioning roads, which were originally designed as farm-to-market, low-volume roads, must now serve additional purposes. Rural areas have small tax bases, bring in little developer fee revenue, and do not qualify for other types of funding, leaving them without adequate resources to maintain and improve the disproportionate number of roadway miles in their care. This topic is discussed more thoroughly below in the System Maintenance section.

**Rural Mobility**

Mobility, in the context of the RUCS project, focuses on how residents in rural areas move within their communities and throughout the region. In exploring the issue of mobility, it is helpful to break the topic into two broad categories: accessibility and connectivity. Accessibility is a measurement of the ease and convenience of reaching any given destination or service. The degree to which a destination is accessible is dependent on how efficiently and safely it can be reached by transit, bicycle, walking, and automobile. Connectivity, or continuity, is a measurement of the general consistency of mode specific facilities and services in a transportation system. The degree to which a transportation system is connected is dependent on the existence and maintenance of facilities and services connecting all destinations in an area.

**Bicycle, Pedestrian, and Transit Infrastructure**

Bicycle and pedestrian facilities in rural or small urban areas are similar in many ways to those in more urban places. It is the frequency and context in which these facilities exist that make them different in rural situations. There are currently almost 2,000 miles of bicycle routes in the region, 44 percent of which exist outside of urbanized boundaries in small urban or rural areas. Unlike in urban areas where many bike routes are Class I (separate right-of-way) or Class II (designated lane in a common right-of-way), the majority of rural routes (79%) exist on the shoulder of roadways as Class III bike routes.

Despite the sheer number of miles of bicycle facilities, system fragmentation makes intercity and inter-county travel quite challenging. Fragmentation occurs because of both natural and manmade obstacles.
Spacing is of particular concern among bicyclists and pedestrians who are only willing (or able) to travel relatively short distances between destinations. For example, cyclists wanting to bike to agritourism or recreation activities in our region’s rural areas often find themselves going out of the way to connect with appropriate facilities. Bridges can be expensive and controversial to build and are therefore typically spaced far apart at distances more suitable for automobile traffic. Highway crossings, particularly in less urbanized areas, are often few and far between. In addition, seasonal barriers such as floods or mudslides affect both vehicular and bicycle/pedestrian traffic, but local agencies are not always equipped to respond as quickly to bicycle and pedestrian impediments as they are to automobile impediments.

**Rural Transit**

Regionwide, 73 percent of transit routes fall within an urban area, while less than 14 percent serve rural areas. Annual ridership on SACOG region rural bus routes is significantly lower than both small urban and large urban routes. In 2006 and 2007, the average number of annual passenger trips on urban routes was more than 30 times greater than the rural average. Additionally, the number of passengers per rural vehicle service hour was less than half that of small urban routes and only a tenth of that on urban routes. Yet, rural transit trips are of high importance to the individuals taking them. Rural transit routes provide lifeline service to employment and medical centers, grocery stores, and other human services and social destinations. Unfortunately, fewer residents and riders in rural areas typically translates into less need for service under conventional funding and planning schemes.

Although it is true that rural transit services cost only a fraction of urban services in total dollars, the per passenger cost of rural transit and low ridership create funding challenges for rural operators. For example, every bus that Sacramento Regional Transit operates costs an average of $300,000 annually to run; however, some of the smaller operators can operate buses for significantly less due to non-union labor contracts. This leads to a lower operating cost per vehicle service hour (VSH): $73 and $82 per VSH among rural and small urban operators respectively, compared to $114 per VSH for larger urban operators like Sacramento RT. Despite lower total and per VSH operating costs, the per passenger cost of rural transit is more than double that of small urban service and six times that of large urban service.

Another challenge for rural transit operators is the friction between frequency and coverage. Because rural routes cover such a vast area, headways, or the time interval between vehicles moving in the same direction on a particular route, are often quite long. Rural operators cannot easily expand the service area or increase frequency without first attracting new passengers (to get more funding), but passengers are largely unwilling to switch to transit unless it is convenient. Thus, rural operators are stuck in a Catch-22. Although transit operators in all areas feel these pressures, they are especially relevant to rural operators because of the large geographic area covered and the funding issues discussed above.
Seniors
Like the rest of the country, the SACOG region is graying. In 2008, 18 percent of the region’s population was 55 and older. By 2030 that number will reach 33 percent. In Placer and El Dorado counties, the shift is expected to be even more dramatic. Not only are Californians getting older, they are living longer as well. Those who survive to age 65 can expect to live an average of 18.7 more years. Those who survive to age 85 can expect another 7.2 years (women) and 6.1 years (men).

Unlike more affluent seniors in previous generations, the baby boom generation is retiring in place, meaning in the same community or same house they lived in before retirement. Census 2000 data show that more than 90 percent of Americans retire in place, which logically leads to the conclusion that many seniors are retiring or will retire in small urban and rural communities. Aging in place is an excellent option for seniors who are in good health and have access to transportation because they can take advantage of the lower cost of living in rural areas. However, most seniors plan their living situation based on their health and mobility now, rather than their situation ten years from now.

While urban seniors can choose from a variety of transportation options, including transit, walking, or taking a taxi, rural seniors have far fewer options. Fixed-route transit has limited service in outlying areas, and walking is often impractical given the low-density makeup of rural communities and the less-developed pedestrian infrastructure. In addition, major medical centers tend to be in urban or suburban locations, which makes taxi rides extremely expensive for those living on a fixed income. Demand response transit is available in some rural areas, but outlying areas are underserved, and funding constraints keep programs from expanding. Because rural seniors have fewer transportation options, they make 15 percent fewer trips to the doctor.

Rural Goods Movement
Within the Sacramento region, an estimated 90.6 percent of freight tonnage is carried by truck, 2.9 percent by rail, 0.4 percent by ship, and 0.1 percent by air. The remainder is carried by some combination of modes or by pipeline. It is important to remember that even freight moved by ship or train still must almost always travel “the last mile” to its destination by truck. Freight-dependent industries, such as agricultural processing, can be more easily attracted to regions with modern, uncongested infrastructure, and are discouraged from locating along crowded highways or older arterials that restrict truck flow. A region that has adequate goods movement infrastructure and is strategically located from a trade perspective can profit considerably from its ability to receive, sort, and deliver goods and services quickly, cheaply, and effectively.

Therefore, sound goods movement infrastructure is essential to the economic vitality of the SACOG region, where farmers and ranchers produce approximately 3.4 million tons of food annually. As noted in the local markets section, this far
exceeds the 2.2 million tons of food we consume; it does not necessarily reflect what we eat. For example, 93 percent of the 1,813,000 tons of vegetables produced are tomatoes and 90 percent of the 760,000 tons of grain produced in the region is rice. The vast majority of these products are transported out of the region. This mismatch between what the region produces and what the region consumes generates tens of thousands of truck trips into and out of the region. In some cases, the products shipped out of the region for processing travel the very same roads when they are shipped back into the region as final products.

Getting a product from the farm to the consumer requires the transportation system to accommodate a variety of uses. During the growing season, farmers use rural roads to move farm equipment between fields, and farmworkers use rural roads to get to work. At harvest time, large trucks use rural roads to transport raw products to post harvest and processing facilities. In fact, from July to October 2007, 650 trucks were required daily to haul more than 52,000 acres of tomatoes grown in Sacramento, Sutter, and Yolo counties to processing facilities from Woodland to Bakersfield. Finished products are then trucked to distribution facilities, retailers, direct marketers, institutions, restaurants, community food banks, or straight to consumers. Smaller producers also rely on rural roads to access local markets. The local markets section above discusses the region’s food system at length.

**Annual Truck Trips per 10 Acres**

As mentioned above, raw products are often shipped out of the SACOG region for processing. Whereas previously, processing plants where scattered around the region, today many have been consolidated, particularly in the central and southern San Joaquin Valley. Consolidating processing plants creates a situation where trucks that would have previously traveled a short distance to a local facility are forced to travel much farther, thereby increasing VMT, congestion, and wear and tear on rural roads. Additional VMT leads to one of the biggest challenges of a modern, efficient goods movement network: pavement deterioration.
Local agencies have identified wear and tear damage from heavy trucks on arterial streets as a rising factor in poor pavement condition because many of our region’s rural roads were not built to accommodate heavy truck traffic. In fact, heavy-truck traffic and wet weather comprise the two most critical factors in pavement deterioration. Since 1990, heavy-truck travel has grown at a rate 50 percent greater than that of automobile travel. Rural roads are thus less likely to be "lightly used" than in the past. To the extent that they are still narrow and lightly paved, they are likely to be inadequate to meet future demands. With approximately 46 percent of the region’s road miles located in rural areas, the proportion of road miles to population creates a far larger maintenance responsibility in rural areas without the economic means to address it. The funding challenges of maintaining rural roads are discussed below in the System Maintenance section.

**Agricultural Worker Transportation**

Supporting the region’s agricultural economy are approximately 34,000 seasonal farm workers who face numerous challenges in securing safe, reliable, and affordable transportation to, from, and around their places of employment. Farm worker transportation problems were highlighted in 1999 after several fatal accidents occurred in the Central Valley. The most tragic of these accidents occurred when a van, transporting workers that were sitting on bare benches without seatbelts, collided with a semi-truck and killed 13 workers. From 1994 to 1999, 63 farm workers were killed while riding aboard farm labor transportation.

Seventy-two percent of agricultural workers surveyed in California do not have reliable transportation. The average farm worker makes around $11,500 a year, which makes buying and maintaining a personal vehicle a significant financial burden. Vehicles that farm workers do own are often in poor condition, as maintenance costs are prohibitively expensive. Furthermore, a significant percentage of agricultural workers do not have legal documentation and are unable to acquire driver’s education, a driver’s license, and vehicle insurance.

While some farm workers do use public transit, limited English proficiency prevents many workers from receiving information about transit or supplemental transportation services. The seasonal and remote nature of agricultural work also makes traditional fixed-route transit and non-motorized transportation impractical. Farm workers work long and varying hours that often change and lengthen during the harvest season and do not conform to rigid transit schedules. In addition, farms are generally too spread out for walking or biking, and most rural roads do not have adequate bicycle and pedestrian facilities, even for short trips. Thus, workers are habitually transported from field to field by piling into crowded vans or the back of pick-up trucks.

Most agricultural workers who cannot afford to own or share a personal vehicle ride with “raiteros,” drivers who own or have access to a vehicle and transport workers for a per trip fee. Raiteros are accused of providing unsafe riding conditions (as they may not have a license, insurance, or training), driving under the influence of drugs and alcohol, and charging workers
$5.00 to $8.00 for a one-way ride. Vehicles are often modified to hold the greatest number of passengers possible while neglecting important safety features like proper seats and safety restraints.

Rural Safety and Security

Roadway Safety

Rural collisions account for a disproportionate number of roadway fatalities. Nationally, only 20 percent of the population lives in rural areas, but 40 percent of the vehicle miles traveled and 60 percent of fatal crashes occur there. Although California fares better than the national average, 37 percent of fatal collisions still occur in rural areas. In addition, the California transportation fatality rate is 16 deaths per 100,000 persons in rural areas compared to 9.3 deaths per 100,000 persons in urban areas.

In 2006, there were 979 fatal and severe injury collisions in the SACOG region. Of those, 269 occurred in RUCS-defined rural areas, 640 occurred in large or small urban areas, and 70 occurred in an undetermined location. In terms of fatalities, 56 percent occurred in urban areas and 44 percent occurred in rural areas, despite rural areas making up less than 15 percent of the SACOG region population. A number of factors contribute to a higher rural fatality rate, including higher speed crashes, more alcohol-related crashes, and longer emergency medical services (EMS) response times. Driving under the influence of drugs or alcohol was the primary collision factor in 32 percent of SACOG-region rural fatal collisions compared with 24 percent of urban fatal collisions. Improper turning and wrong side of the road collisions were also more likely in rural areas, while automobile right-of-way and pedestrian violations
were more likely to cause collisions in urban areas (see chart above).

In raw numbers, there were more fixed object collisions in urban areas than in rural areas, but fixed object collisions accounted for a much greater percentage of collisions in rural areas than in urban areas. However, collisions with other motor vehicles and pedestrians were more common in urban areas.

As for rural transit safety, the biggest concern is that rural transit routes often do not have regular fixed stops. Those wishing to board a bus must flag it down while waiting on the side of the road. Bus pullouts or waiting areas are rare, so passengers are subjected to high-speed traffic while they wait. Some rural operators do offer deviated fixed-route service in which bus drivers can deviate from the fixed route to drop passengers at or nearer to their final destination.

Disaster and Emergency Preparedness
Much thought is now given to transportation security issues. Especially in light of the September 11 attacks and Hurricane Katrina, new emphasis has been placed on emergency evacuation procedure. On a regional planning scale, three key areas of concern have been identified:

- the ability to plan for and react to natural disasters,
- the capability to respond effectively to man-made events, and
- the interoperability of various public safety communication systems.

Yet, most of the focus has been on urban areas. Rural areas, though much less likely to be the target of a terrorist attack, still face threats from natural disasters. Forest fires are an especially significant risk in the foothill and rural areas, as evidenced in 2008 when California experienced a record number of forest fires that burned nearly 300,000 acres of land. Fires burned over 1,000 acres in Placer and Yuba counties alone. The threat of natural (as well as man-made) emergencies establishes the need for good emergency planning in both urban and rural areas.

Evacuation of rural areas presents certain challenges that are not so prevalent in urban areas. Rural areas are much less dense than urban areas. This means that using mass transit vehicles to transport residents to safety is harder because the population is spread out over a larger land mass. In addition, transit-dependent populations are harder to serve because many may not be able to make it to central evacuation locations. Rural evacuation plans, therefore, need to carefully address transit-dependent populations so that no one gets left behind in an emergency situation.

Rural System Maintenance
A critical challenge for the SACOG region is providing adequate road maintenance and rehabilitation,
especially in the rural portions of the region. Key issues to address include how to handle chronic road maintenance funding shortfalls, the consequences of continuing to defer maintenance, and tradeoffs between road maintenance and road expansion and improvements.

Preventive maintenance and rehabilitation for deteriorated roads are crucial for our transportation system. In 2009, a coalition including the California State Association of Counties, League of California Cities, County Engineers Association of California, Los Angeles County, California Regional Transportation Planning Agencies, and the California Rural Counties Task Force conducted a statewide study of the condition of local streets and roads. The study ranked road conditions using a pavement condition index with values of zero to 100. Five of the SACOG region’s six counties had PCI scores equal to or better than the state average of 68. El Dorado, Sacramento, and Yolo counties have PCI scores in the “At Risk” category (50-69), while Placer, Sutter, and Yuba counties have PCI’s in the “Good-Excellent” category (70-100). Placer County has the highest score in the state with a PCI of 79. None of the counties in the region received a “Poor” or “Failed” score on either major or local roads.

The coalition’s report estimates the cost of bringing all roads up to a PCI of 80 or better over a 10-year period. At this level, roads will require only the most cost-effective pavement preservation treatments to remain in “Good-Excellent” condition. To bring all of the counties in the SACOG region to this level would require investments in maintenance and reconstruction of about $430 million annually. Given the most recent annual investment in maintaining local transportation infrastructure, the cities and counties in the region would need to find an additional $100 million annually to meet this need.

Even in robust economic climates, rural localities have a difficult time securing enough resources to maintain and make improvements to the disproportionate share of road miles in their care. Though rural areas in the SACOG region account for just 13 percent of the population, they contain 48 percent (8,258 miles) of the region’s road miles. Large urban areas account for 73 percent of the population and contain 41 percent (7,054 miles) of the road miles. Small urban areas make up 13 percent of the population and contain 10 percent (1,723 miles) of the road miles. Since many programs are population-based, rural areas are left with fewer funding options.

The only available funds to pay for road maintenance are the local share of the gas tax, sales taxes, and general fund revenues. In rural counties, Transportation Development Act (TDA) funds can be used for road purposes once transit needs are met. Today, the state gas tax covers only 25 percent of actual local road maintenance and rehabilitation needs. For rural counties, none of which have enacted transportation sales tax measures, TDA funds cover 10 to 30 percent of road maintenance costs. The
funding challenges rural agencies face are daunting without even considering the cost of new projects; but, of course, rural agencies must also secure funding for new construction, intersection improvements, signalization, safety improvements, etc.

**Innovative Implementation Strategies and Tools**

Implementation of the RUCS project will be an on-going process as rural transportation planning continues to evolve in response to new land use patterns, economic pressures, and infrastructure needs. Therefore, SACOG will pursue both short-term and long-term implementation strategies.

Short-term strategies will focus on the three major themes identified earlier: the need for additional funding, the need for additional data, and the need for better coordination of transportation strategies. Long-term strategies will be shaped by the SACOG Board of Directors with input from RUCS stakeholders.

**Goods Movement Route Network**

The importance of goods movement in sustaining the region’s rural economies makes it advantageous to maintain a robust network of routes that serve processing facilities, distribution centers, and farms. SACOG staff worked with county farm bureaus, farmers, and city and county transportation planners to identify goods movement corridors throughout the region.

In developing the goods movement network, SACOG included:

- STAA routes,
- state and local terminal access (TA) routes,
- routes identified in county general plans or other planning documents, and
- routes identified by RUCS stakeholders.

STAA routes are defined by the Surface Transportation Assistance Act (STAA) of 1982. The Federal Highway Administration (FHWA) provides standards for STAA trucks based on the Code of Federal Regulations Title 23 Part 658. These standards designate the minimum truck sizes that all states must
allow on roads identified in the National Network. The National Network includes the interstate system
and other designated highways.

States and local governments can also designate state and local routes as terminal access (TA) routes. TA
routes connect federal STAA routes to local terminal access points and must be able to accommodate
STAA trucks. Stakeholder routes are routes that do not belong to the STAA or TA network but have been
identified—at RUCS workshops or through direct outreach to stakeholders—as important for local
market access or as a connection to a key goods movement corridor.

In addition to simply knowing which roads carry goods movement traffic, defining the goods movement
network has distinct policy advantages. Identifying goods movement corridors can help focus
improvements and maintenance activities on the rural roads most likely to be affected by heavy and
frequent truck traffic. Creating a regional goods movement network also helps support existing and
future land uses as defined in current planning documents by guiding development to minimize
potential conflicts.

**Agricultural Worker Transportation Program**

Hardships faced by agricultural workers in securing safe, affordable, and reliable transportation to work
were identified earlier. To determine the existence and extent of the unmet transportation needs
among the agricultural worker population in the Sacramento region, SACOG applied for and received a
$2 million Caltrans Agricultural Worker Transportation Program (AWTP) grant to study and implement
an agricultural worker transportation vanpool program in Sacramento, Sutter, Yolo, and Yuba counties.

In February 2010, SACOG released the *AWTP Business Plan*. The *Business Plan* presents market research,
community profiles, and detailed analysis that support the implementation of an agricultural worker
vanpool system.

Key findings from the *Business Plan* include:

- The development of a self-sustaining vanpool program over 15-18 months is feasible.
- A strong, strategic marketing and business development campaign specifically targeting Latinos is essential in rolling out the vanpool program.
- The vanpool program should be modeled after the Agricultural Industries Transportation Services (AITS) Program run by the Kings County Area Public Transportation Authority (KCAPTA).

The findings and recommendations of the *Business Plan* are informed by focus group sessions, interviews, and nearly 1,600 agricultural worker survey responses.
Safety Analysis Tools and Technical Assistance

National, state, and regional safety data can be useful in stimulating conversations about rural roadway safety, but having detailed local data is critical for identifying high priority roads and for securing funding to make necessary roadway safety improvements. Fortunately, California’s collisions database, the Statewide Integrated Traffic Records System (SWITRS), provides the kind of detailed collisions data required for safety grant applications.

With this in mind, SACOG created a safety summary for each county in the six-county region. The summaries cover the period from 1998 – 2007. They are designed to give a broad overview of roadway safety conditions in our region’s rural areas. The summaries report only a small portion of the data available for future analysis. In addition to the tabular database used to create the safety summaries, SACOG has also geocoded five years (2002-2006) of collisions data into a Geographic Information System (GIS). SACOG will continue to update both the tabular and geocoded databases as new SWITRS data become available. SACOG believes this type of detailed data can make our region’s safety improvement projects very competitive for funding programs.

One such funding program is the High Risk Rural Roads (HRRR) program. Using a “safety index” to evaluate projects, the program aims to reduce rural roadway fatalities by targeting improvements to the roadways in greatest need. Eligible projects include, but are not limited to, widening shoulders, striping roadways, mounting road signs, improving sight distance, realigning roadways, installing rumble strips and guardrails, and creating turn or passing lanes. El Dorado, Placer, Yolo, and Yuba counties have all received funds from the HRRR program. SACOG believes that other local agencies could successfully fund projects in the future.

Because HRRR and other safety grant applications require detailed collisions data, SACOG is offering technical assistance in preparing grant applications. Through this technical assistance program, SACOG staff is available to help locate high risk roads and prepare accompanying collision data. The figure below is an example of spatial analysis that can help to identify high risk roads.
It is SACOG’s hope that offering technical assistance will bolster our region’s safety grant applications and capture the most possible funding for roadway safety improvements.

In addition to providing project-level support, SACOG staff is also evaluating a collision modeling shareware package for use at the regional scale in the MTP update for 2011. The software, PLANSAFE, is intended to support regional safety planning efforts by providing reliable estimates for the safety impacts of behavioral safety countermeasures and engineering under different growth scenarios. The ability to forecast future safety given both socio-demographic changes and safety investments is central to an effective transportation planning process. PLANSAFE uses a variety of spatial and tabular inputs, ranging from existing collisions data and street network characteristics to the proximity of schools and number of children in an area, to predict future safety. The software is flexible enough to also incorporate user-defined variables, ensuring that regional traits are accounted for in the model. After entering base year data, users can apply different growth factors and safety improvements to create multiple scenarios for future roadway safety. Unlike project-level analysis tools, PLANSAFE estimates collisions at the traffic analysis zone (TAZ) level, not at the facility level. So, the software is not used as an evaluation method for site-specific projects; rather, it can be used in scenario planning to predict how changes in traffic patterns, infrastructure investments, and population growth affect safety outcomes at the aggregate level.

**Rural Transportation Funding Handbook**

Getting a transportation project funded is a complex, often confusing, process. Projects usually require multiple-year funding commitments, and relatively few are funded by a single revenue source. To move a project towards construction, project proponents and policy makers must shape comprehensive funding packages based on this puzzling array of programs and funds. Funding transportation projects is an even greater challenge in rural areas because many agencies do not have the time or the manpower to research and prepare multiple grant applications.

SACOG understands the inherent difficulties in securing funding and has created the *Rural Transportation Funding Handbook* to help guide grant applicants through the process of identifying, applying for, and receiving funding. The *Funding Handbook* is by no means comprehensive. Instead, it focuses on programs that are geared towards or allow applicants from rural areas. Rural applicants from the SACOG region have been successful in securing funding from many of these programs.

The *Funding Handbook* provides basic information about each funding program such as the program description, eligibility requirements, funding level, deadlines, and potential SACOG assistance.
Oftentimes, knowing which funding programs fund certain types of projects is the most confusing part of the application process. For this reason, SACOG included a matrix that lists an assortment of project types and matches them up with funding programs for which they are eligible. The quick reference matrix and the more detailed program descriptions are intended to make researching grant opportunities less time and labor intensive.

The full Rural Transportation Funding Handbook is available online at http://www.sacog.org/rucs/pdf/Rural%20Funding%20Guide.pdf. After locating an appropriate funding source, local agencies are encouraged to contact SACOG for data analysis assistance, general grant application assistance, and other technical assistance.

The Future of RUCS Transportation

Expanding rural mobility options and increasing the level of funding to maintain rural corridors in a state of good repair are primary focus areas for ongoing RUCS Transportation efforts. The previous section describes a series of innovations that are actively being implemented or already completed. Much of the SACOG focus has been on technical assistance and tools to assist local agencies in getting more funding. This section identifies a number of longer-term implementation strategies for Board consideration. Pursuing new sources of funding and optimizing existing resources will be key to further success on RUCS Transportation implementation efforts.

Proposed longer-term RUCS Transportation implementation strategies involve related efforts:

- Capturing more funding from competitive grants;
- Advocating for changes in federal and state formula funding for transportation investments;
- Increasing the coordination of rural transportation services;
- Expanding rural mobility options through new, innovative programs;
- Increasing the collection of traffic count data and monitoring;
- Estimating a “vulnerability index” that relates pavement and road conditions to type and amount of traffic activity;
- Working with partner organization to develop improved metrics that can be used to evaluate rural transportation projects for funding; and
- Implementing innovations from other rural transportation issues studied through RUCS.

Potential Efforts to Increase Funding Levels
Capturing More Funding from Competitive Grants
Since the RUCS project was launched in 2008, SACOG has been successful in securing more than $3 million in competitive state grants for rural transportation efforts. The grant funds received are going towards a diverse range of efforts that include the launch of an agricultural worker vanpool program, goods movement / farm-to-market route coordination between Sacramento and San Joaquin counties, and marketing inter-community transit services for small communities in Sutter and Yuba counties. Additional rural transportation grant funds for safety improvements and safe routes to schools have been realized by member agencies incorporating RUCS Transportation data and maps into their grant applications.

In addition to the opportunities realized from state grants, recent federal grant programs are providing other opportunities. A good example is the federal partnership between the United States Departments of Transportation (USDOT) and Environmental Protection Agency (USEPA) that resulted in the Transportation Investment Generating Economic Recovery (TIGER) program. One of the SACOG-endorsed projects from the first round of TIGER was among the fifty projects funded in a field of 1,400 applications. That project, improvements to the Port of West Sacramento, will help the rural economy of the region.

Recognizing the value of the emerging federal partnerships, there may be an opportunity for the United States Department of Agriculture (USDA) to join this federal coalition or create new rural transportation funding programs on its own. The USDA already has a Rural Development Community Facilities Program that offers grants to key infrastructure improvements. Expanding this program to support more rural transportation efforts or establishing a new demonstration grant program could become a critical means to support farm-to-market corridor improvements that directly support agriculture distribution.

Capturing more federal and state grants for rural transportation needs will involve ongoing SACOG technical assistance efforts and a commitment to data development and monitoring. Resource planning is being made to maintain the new rural safety and traffic counts data collected that can support new opportunities, such as the PLANSAFE initiative described in Section 2. Funding to support data collection on walking and biking accessibility in small towns and rural areas is also being pursued in anticipation that it can help member jurisdictions compete for more funding through the State’s Safe Routes to Schools Program and the Bicycle Transportation Account.

Expanding Mobility Options and Exploring Innovative Solutions
Increasing the Coordination of Rural Transportation Services
Rural communities that are faced with limited transit service and inadequate funding resources can take advantage of coordination by leveraging resources from multiple service agencies to make service delivery more efficient. Rural communities often have some public and private agencies and organizations that provide specialized transportation services, including non-emergency medical transportation. Bringing these providers together with employers, human and social service agencies, agencies on aging, educational institutions, and other non-profit organizations allows for collaborative coordination that avoids duplicative or inefficient service, while allocating limited resources to their most productive uses.

In the SACOG region, each county has a designated Coordinated Transportation Service Agency (CTSA) that seeks to coordinate and expand the availability of specialized transportation services within their county. There
have been numerous successful CTSA programs in the region, but budget and staff resource constraints limit the range of programs most CTSA are able to provide. SACOG may have role in assisting the CTSA meet rural mobility needs through a regional perspective. An initial effort could involve SACOG facilitating quarterly meetings of the Social Service Technical Advisory Committees (SSTACs) in the four counties SACOG has Transportation Development Act (TDA) administration responsibilities. These quarterly meetings could inform both the TDA transit unmet needs process and be a forum for matching rural mobility needs to public and social service transportation providers. In some cases, rural transportation services require crossing over county boundaries and engaging organizations and groups that do not normally work together.

Expanding Rural Mobility Options through New, Innovative Programs
The case studies below provide examples of programs that could lead to cost savings and more efficient rural transportation services. Staff can further investigate these programs and discuss implementation opportunities with the CTSA.

Non-Traditional Rural Transit
Agricultural worker vanpools are an excellent example of the type of non-traditional options that exist for meeting rural transportation needs. Another transportation need in rural is non-emergency medical transportation for seniors. Today, retirees choose to “age in place,” meaning that they retire in same house or community in which they had been living retirement. This trend is not surprising given that Americans living longer; it makes sense for seniors living on fixed incomes to take advantage of the lower cost of living in rural areas.

However, an aging rural population with an increasing need for medical services creates unique challenges for rural transportation planning. Conditions are ideal for volunteer driver programs to provide low- to no-cost transportation to and from non-emergency medical appointments for seniors, persons with disabilities, and the general public. Expanding these types of programs can ensure that rural seniors receive the medical care they need.

Another non-traditional transit solution that deserves further study is agritourism and recreation park-and-ride shuttles. By using existing park-and-ride facilities, those wishing to visit our region’s wineries, orchards, pumpkin patches, harvest festivals, etc. can meet in a central location and carpool or catch a privately or publicly operated shuttle. This type of solution would relieve weekend and holiday congestion on rural roads and reduce the demand for parking.

In a similar vein, areas with many agritourism sites may consider recreational road striping to map out tourist destinations. In addition to helping motorists find their destination quickly, road striping would also increase
safety because motorists would not have to consult maps or printed directions while traveling on high-speed rural roads. An example of recreational road striping is the 17-Mile Drive in Monterey, California. The loop is clearly delineated by red centerline striping. A similar concept could be applied in our region’s rural areas with high concentrations of agritourism and recreation destinations, such as Apple Hill in El Dorado County.

A successful Agricultural Worker Transportation Program (AWTP) can demonstrate that small vanpool operations in rural areas are feasible. Non-emergency medical and agritourism vanpools can learn from the AWTP and even use the business model as a starting point for their own services. Leveraging existing contacts, capital, and infrastructure can help jumpstart additional vanpool and shuttle services in places where fixed route transit is not feasible.

**Rural Commuting: Comuter Club/511 Website Resources for Rural Workers**

The Sacramento Region Commuter Club is an online service that matches people wishing to carpool, vanpool, or bicycle based on home and work (or school) location and schedules. After signing up and filling out a commuter profile, interested commuters receive names of others with similar commute routes and work hours who have expressed interest in carpooling or cycling. This service has immense potential for connecting rural workers with other individuals who share similar schedules.

Another service highlighted on the 511 website is the Vanpool Incentive Program. A vanpool usually works for distances of 20 or more miles, making it ideal for residents with a common work destination. Under Vanpool Incentive Program, newly created vanpools eligible for a $300 per month incentive for the first six months of the vanpool’s operation. After six months, driver receives a $200 gas card, for a total incentive of $2,000. Especially in rural areas where transit is not available, the Commuter Club website and the Vanpool Incentive Program can provide resources and transportation alternatives for rural workers.

A complementary program to the Commuter Club and the Vanpool Incentive Program is the Emergency Ride Home Program. The Emergency Ride Home Program provides emergency transportation services via Yellow Cab or Enterprise Rent-A-Car to individuals when their normal transportation options are unexpectedly unavailable. In this way, the program provides a safety net for individuals who want to try carpooling, vanpooling, or bicycling but are worried about how they will get home in an emergency. Having a backup plan for emergency situations is especially important for rural commuters who may not have other options if their normal carpool or vanpool is unavailable. The Emergency Ride Home Program prevents rural commuters from being stranded unexpectedly and can help to alleviate fears and reservations common among first-time commuters.

The Commuter Club, Vanpool Incentive Program, and Emergency Ride Home Program already exist and can currently be used by rural residents. Future RUCS efforts could focus on expanding these programs and creating
education and marketing campaigns specifically targeted to rural areas, where commuters may not be aware of the services or may be less willing to try commuting for fear of being stranded in an emergency.

**Vehicle Pools: Sharing Demand Response Vehicles in the Community**

Small non-profit organizations often have need for service vehicles but are unable to compete with larger non-profits for Section 5310 vehicles. In a vehicle pool, a larger agency applies for a Section 5310 grant, and the small organization pays the 20 percent matching requirement. Then, the larger agency gives the small agency a well-maintained used vehicle and keeps the new vehicle for itself. Once the new vehicle has reached the end of its grant life, the larger agency signs the title over to the agency that supplied the original matching funds. The net result for the small non-profit agency is that it receives one well-maintained used vehicle and, several years later, a second used vehicle in exchange for its initial 20 percent match funds. Vehicle Pools have been used to great success by the Council on Aging and Human Services in Colfax, Washington.

**Insurance Pools and Indemnification Waivers for Volunteer Driver Programs**

Volunteer agencies can be especially helpful in providing transportation services that transit operators cannot, such as service to medical facilities in other counties. However, many social service agencies are worried about liability issues with volunteer drivers. Agencies can protect themselves by requiring passengers to sign forms that release the volunteer agency, its volunteer drivers, affiliated authorities from liability. Such forms can lower insurance costs and prevent lawsuits should an accident occur.

Despite requiring volunteer drivers to sign waivers, small human service providers still may not be able to afford insurance for volunteer transportation programs. This challenge can be overcome if the largest human service provider in the area invites smaller agencies to acquire insurance through the larger agencies plan. The large agency holds the master insurance policy, insuring its own vehicles and vehicles from smaller agencies, with smaller agencies contributing a set amount for their coverage. Small agencies obtain insurance at a lower rate and can use the cost savings to better serve community members. COAST, a transportation provider for human services agencies in Colfax, Washington uses indemnification waivers and an insurance pool to successfully operate a volunteer driver program. SACOG has submitted a grant application for developing an implementation strategy for a volunteer driver program through the 2010/11 Caltrans discretionary grant program.

**Buying Bus Tickets with Section 5310 Funds**
Human service agencies usually use 5310 funds to purchase their own vehicles to provide transportation to elderly, disabled, or disadvantaged clients. The Rural Coordinated Transportation Council in central Texas instead uses 5310 funds to purchase transportation services directly from transit providers. The Council purchases transportation from local providers and then distributes bus tickets to local human service agencies for their clients. This is an ideal coordination strategy when the local transit agency already provides sufficient service and can do so at a lower cost than the human services agency could do itself.

Implementing Innovations from Other Rural Transportation Issues Studied through RUCS

Habitat Crossings
Roads and highways create a barrier effect for wildlife movement, resulting in habitat fragmentation and habitat loss, the two leading causes of species decline. According to Dr. Fraser Shilling, Co-Director of the UC Davis Road Ecology Center, roads should be thought of as “continuous obstacles to habitat connectivity,” necessitating solutions that fit the context of the problem. For example, removing barriers for large mammals is different from removing obstacles for birds. The former often require greater infrastructure investments, whereas the latter may require something as simple as planting trees along the highway to force birds to fly above vehicles.

Part of the problem in knowing where habitat crossings are most needed. A statewide analysis of habitat connectivity commissioned by the California Department of Fish and Game (DFG) and the California Department of Transportation (Caltrans) identifies large remaining blocks of intact habitat or natural landscape and models linkages between them that need to be maintained, particularly as corridors for wildlife. The California Essential Habitat Connectivity Project will enable planning agencies to evaluate wildlife needs earlier in state and regional planning processes, thereby allowing planners to avoid, minimize, or mitigate impacts to habitat and wildlife connectivity in scenario and long-range planning. Final products, including the final report, GIS layers, fact sheets, FAQ's, and other information, can be found online at http://www.dfg.ca.gov/habcon/connectivity/.

Emergency Response
As evidenced in the “Rural Safety and Security” section above, the risk of natural disasters in the region’s rural areas establishes the need for coordinated emergency procedures. Urban emergency response personnel take advantage of emergency responders’ proximity to each other and to vulnerable populations when coordinating evacuations. However, rural evacuations often take place far from command centers, and because of the remote nature of rural areas, coordination strategies are more difficult to execute. Many difficulties during emergencies are encountered when information is not accurate for first responders, emergency planners, and incident commanders.

SACOG is working with partner agencies to implement an Intelligent Transportation System (ITS) project called the Sacramento Transportation Area Network (STARNET) system. Transit operators and emergency responders can use STARNET to exchange information and coordinate operations. STARNET allows real-time sharing of
data and live video, as well as adjustment of joint procedures pertaining to roadways and public transit operation, and public safety activities. It also provides more information for travelers via the region’s 511 web site and interactive telephone service. Travelers can access the 511 portion of the system by visiting http://saweb.carsprogram.org/main.jsf.

**Regional Bike Network**

The SACOG region has a robust bicycle network, simply having miles and miles of bikeways is not enough if connectivity is limited by city and county boundaries. One effort to increase connectivity is creation of the *Regional Bicycle, Pedestrian, and Master Plan*. Some of the Master Plan’s goals include providing bicycle and pedestrian connections between, through, and within all cities and towns in the six-county region; providing connections to transit and park-and-ride facilities; filling gaps in existing, planned, or proposed interregional bicycle or pedestrian routes; and providing bicycle and pedestrian access across barriers such as arterial roads, highways, freeways, rivers, canals, creeks, and railroads.

Complementing the *Master Plan* is the SACOG Bicycle and Pedestrian Funding Program. This funding program provides funding for capital and non-capital (up to 10 percent of program funds) projects. The funding program emphasizes projects that provide facilities for walking and biking, provide connections between cities and towns, and are oriented toward utilitarian or work-related trips.

To learn more about the *Regional Bicycle, Pedestrian, and Trails Master Plan* or the SACOG Bicycle and Pedestrian Funding Program please visit [http://www.sacog.org/bikeinfo/bikeped.cfm](http://www.sacog.org/bikeinfo/bikeped.cfm).
Local Markets

Introduction

The local markets topic is examining the policies, programs, and infrastructure needed to support a local food system, which is seen as a promising area to expand markets for farmers and ranchers in the region to support and expand agricultural viability. Local markets also connect consumers to their food source and provide a direct source to fresh and healthy food. Issues that affect the viability of this system are noted below and are followed by descriptions of innovations to address those issues. The innovations were the result of stakeholder feedback on working papers assembled by the RUCS team. Those results came mainly from three stakeholder workshops, the first on existing conditions, which informed the second on innovations. The third workshop was held with stakeholders from the land use and transportation working groups to facilitate discussion about how local markets are linked to other RUCS topics.

The Food System

Production and Consumption

Farmers and ranchers in the SACOG region produce approximately 3.4 million tons of food annually. While this far exceeds the 2.2 million tons of food we consume, it does not necessarily reflect what we eat. For example, the regional production of vegetables is more than 1,813,000 tons annually—about five times our consumption—however, 93 percent of that number is in tomato production, much of which leaves the region for processing. Of the 760,000 tons of grain produced in the region—about four times our consumption—90 percent of that is in rice, the vast majority of which is exported to Asia and the Middle East. And where there is the diversity of food production that could meet consumer demand, there is a lack of local distribution and processing infrastructure to serve those markets. Moreover, not only do most of our crops leave the region, but there is also a lack of production of certain foods. For example, in the category of meat and eggs, the region consumes nearly 1,300 percent of what is produced locally, meaning this food sector is served almost exclusively by products transported into the region.

So what do we eat? Using USDA Loss Adjusted Food Availability figures, which are derived from the USDA’s Economic Research Service per capita food availability data and is adjusted for food spoilage, plate waste, and other market loses, SACOG estimated food consumption in the six-county region is summarized in Tables 6 and 7 below. This is the market for food; however, using the U.S. Agriculture Census, SACOG estimates that less than 2 percent of that market is being met by growers within our region whose products are available only at farmers markets, in community supported agriculture (CSA) boxes, and a handful of restaurants and stores. Due to the structure of our food production system and the markets they serve, the region’s producers and consumers rely on producers, aggregators, processors, and in many cases distributors and wholesalers outside the region to sell and supply nearly all of the food we produce and consume.
Diet-Land Needs Model

SACOG has developed a tool that helps analyze the production-consumption connection for a local food system. SACOG’s diet-land needs model converts food demand into farmland needs based on diet profiles and the type of agricultural production system being employed. The model estimates food demand by food group and converts it into farmland needs.
category for a range of diets, vegan to carnivore. The user can specify the type of production (diversified small farm or conventional systems) and even make adjustments for farmers’ skill level (where novice farmers produce less volume than experienced farmers). The other key model input is the percentage of food consumed supplied by local growers. While more work is needed to refine the model, SACOG tested land need scenarios where local food was anywhere from 10 percent of consumption to 50 percent of consumption and the farmers growing the food were predominately expert diversified farmers that rotated crops year-round (i.e., they produced a high volume of food per acre per year). The results for that preliminary are shown in Figure 5.

**Figure 5: Land Needs for Regional Demand of Local Food**

*As a percent of total regional consumption*

<table>
<thead>
<tr>
<th>Percentage of Local Food</th>
<th>Acres (excluding meat production)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% Local</td>
<td>30,000</td>
</tr>
<tr>
<td>20% Local</td>
<td>60,000</td>
</tr>
<tr>
<td>30% Local</td>
<td>90,000</td>
</tr>
<tr>
<td>40% Local</td>
<td>120,000</td>
</tr>
<tr>
<td>50% Local</td>
<td>150,000</td>
</tr>
</tbody>
</table>

*Based on USDA recommended diet*

**Distribution and Processing**

The way that food reaches our tables is complicated, yet remarkable, as fresh and processed food travels, mostly by truck, in and out of our region daily. To do so, the system depends on economies of scale, an array of food and farm safety regulations, and an aggregation, distribution and processing system that is global in scale. Distribution encompasses every stage from farm to consumer. Some of these pathways are shorter; others are more circuitous, as shown in Figure 6.

**Figure 6: Food System**
Although some products arrive “raw,” most are transformed into processed or packaged goods along the way. On the whole, the food distribution system encompasses multiple business sectors providing a range of services that move food products from farms, orchards, and ranches to consumers. These services include transportation, post-harvest handling, processing, storage, shipping, and sales. Below are thumbnail descriptions of each of these sectors:

- **Post-harvest handling facilities** can be on- or off-farm and provide services such as cleaning, cooling, drying, grading, ripening, and packing.
- **Manufacturers** and **processors** transform raw farm products into simply processed to multi-ingredient foods. Low-tech processing facilities, for example those that might make juice or conserves, may be located on the farm.
- **Shippers** move raw and processed food by truck, train, ship, and air.
- **Packers/shippers** provide post-harvest and shipping services and are also often consolidators and farmers.
- **Brokers** consolidate products for sale, but usually do not take physical possession.
- **Distribution centers** are large facilities, from 10 to over 100 acres in size. They serve as the consolidation and distribution points for retailers, restaurants, and institutions. More and more large national and international retailers are no longer outsourcing their distribution needs and are doing it in house. State-
owned distribution centers serve as hubs for food commodity recipients like schools, prisons, and senior homes.

- **Wholesalers** buy raw food products in large quantities from producers, processors, packer/shippers, and brokers. They then sell these products in bulk to retail, food services, and restaurant outlets. The terms wholesaler and distributor are sometimes used interchangeably and are combined in the name, wholesale distribution center. A wholesale terminal refers to an area owned and managed as a single entity by public or private management. A wholesale district refers to an area where many wholesalers are co-located.

- **Retailers** include large chains that usually have their own distribution centers and purchase directly from large farms and brokers, often through purchasing contracts. Smaller retail chains and independent markets usually buy from wholesalers, distributors and sometimes buy directly from farms.

- **Direct markets** include farmers markets, CSA’s, and on-farm sales through farm stands and u-pick operations.

- **Food service companies** and institutions, depending on their size, operate like large or small retailers.

- **Public institutions** like schools also often participate in government-run bulk commodity purchasing programs but there is growing interest and participation in programs such as farm-to-school and farm-to-institution.

- **Restaurants**, including restaurant chains, independent restaurants, and caterers, usually operate like retail markets. Ingredient-focused restaurants emphasize seasonal and local purchases and have the flexibility to adapt to availability.

- **Food banks** and community food programs tend to glean from the rest of the food distribution system but also sometimes have purchasing contracts.

---

**Food System Economics**

This food system has tremendous economic value. The region’s farm gate value—the price paid to the farmer for the raw product—stands at roughly $1.66 billion today. However, by the time that food reaches the consumer, its value has increased substantially. Based on the 2007 Economic Census, there were 180 wholesalers in the region making around $3.3 billion annually, 849 retailers earning $4.7 billion, and 4,206 food and beverage service outlets bringing in approximately $2.1 billion annually. A local food system could capture more of this economic activity within the region as more value-added processing, marketing, and distribution take place here rather than outside the region.
LOCAL MARKET INNOVATIONS

Growing demand for local food can be seen in the increase in farmers markets throughout the region, Community Supported Agriculture (CSA) boxes, and a growing number of stores and restaurants featuring local food. Opportunities to expand these outlets, as well as growing demand from institutions such as schools or hospitals, center on the region’s ability to increase the volume of food grown for local markets and capacity of value-added processing needed to meet market demands. This report describes innovations in the local food system needed for this expansion. The following objectives and their corresponding innovations were distilled from the research and feedback received from the local markets working group. The order of the objectives does not denote priorities; rather it represents the food system from production to consumption, tied together by infrastructure such as processing and distribution. Major themes heard throughout the stakeholder process include the need for more education and marketing, food system infrastructure, institutional buying, and policies supporting local markets.
Local market objectives have been assembled into three main components with corresponding innovations:

- **Production**
  - Connect Farmers to Available Land
  - Provide Business Training Opportunities to Farmers

- **Infrastructure**
  - Increase Local Processing Capacity
  - Increase Local Distribution

- **Consumption**
  - Expand Farm-to-Institution Programs
  - Increase the Number and Types of Food Outlets
  - Promote Agritourism
  - Increase Consumer Education and Marketing
  - Consider a Regional Food and Agriculture Policy Council

Figure 7 below shows a graphical representation of areas where SACOG is building analysis capacity to study the local food system. Much of that work will be part of the I-PLACE³S model and linked to the crop mapping and farm viability modeling being built as part of the RUCS project. These data, mapping, and pro forma analysis tools will be available for public and private stakeholders to help form policies and plans that can expand the local food system.
Objective: Connect Farmers to Available Land

The cost of land and starting a farm can be prohibitive for many people who want to farm. Yet, fallow farmland exists and as the population ages, there are some retiring farmers without succession plans who would like to keep their land in agriculture. There are also opportunities for production on public and private lands that are idle or have been set aside for agriculture. Making connections between farmers without land and land without farmers will help foster a new cohort of farmers and ranchers interested in serving the local marketplace.

According to California FarmLink, a nonprofit organization that facilitates connecting farmers to land, California farmers over the age of 65 outnumber farmers under the age of 25 by approximately 60 to one. The number of farmers under the age of 35 declined 43 percent between 1992 and 2002. Complicating this situation, most beginning farmers have very little capital and financing options relative to the high costs of agricultural property, equipment, and other inputs like seeds or livestock. Others who may be more prepared financially still lack access to land and other resources to start an operation. At the same time, retiring farmers lack information about ways to keep land in agricultural production while simultaneously meeting financial goals related to retirement and estate planning.

A starting point for these connecting efforts is identifying how much land is needed to meet local market demand. The region currently has approximately 1.54 million acres in production. Using the consumption tables presented above, SACOG has developed methods to estimate how much land is needed to grow enough food for each of the food categories. The model uses crop yield estimates and user-specified production practices to calculate land needs. The table below shows land needs for various levels of food sourced from local growers.

In addition to urban growth policies and plans that minimize agriculture land consumption and conflict with other uses—discussed in the RUCS Land Use topic—there are innovations that can help increase the amount of land in production for local markets. The top innovations identified by stakeholders are discussed below.

Agricultural Parks at the Urban Edge

The concept of Urban Edge Agricultural Parks (AgParks) has been pioneered by Sustainable Agriculture Education (SAGE). SAGE defines AgParks as “part working farmland for small farmers, and part parkland for local communities.” AgParks provide fresh food, as well as educational, environmental, and aesthetic amenities for nearby urban and suburban communities. They support small farmers with opportunities for affordable land, shared infrastructure, and direct marketing of agricultural products. Once capitalized, Ag Parks aim to be self-sustaining. They are suitable for public or private landowners who want to establish agriculture as a valued urban-edge amenity.

SAGE has published the Urban Edge Ag Park Toolkit, a tool for public and private landowners considering urban-edge agriculture. It also operates its own AgPark, the Sunol Water Temple Agricultural Park, on 18 acres of public watershed land in Sunol, California leased from the San Francisco Public Utilities Commission. That site hosts six farmers who sell their produce at farmers markets, produce stands, restaurants, and CSAs. This innovation will be discussed further in the upcoming RUCS Land Use paper and board workshop. More information can be found at: www.sagecenter.org/projects/urban-edge-agricultural-parks.

Connecting Farmers and Available Land
California FarmLink, which has an office in Davis, connects potential farmers with available farming opportunities around the state. Their stated mission is "to build family farming and conserve farmland in California by linking aspiring and retiring farmers; promoting techniques and disseminating information that facilitate intergenerational farm transitions." Working closely with both incoming and outgoing farmers, FarmLink has developed a database of land opportunities that includes crop leasing, land sales, partnerships, and more. The searchable database also includes a map showing all of the opportunities in the state. They offer options to retiring farmers other than outright land sales including leasing and farm business partnerships. FarmLink conducts comprehensive workshops and provides other support for farm succession. Their Intergenerational Farm Transition program helps farmers whose children may not be interested in farming keep their land in agriculture while also meeting their family's financial needs. More information on California FarmLink can be found at www.californiafarmlink.org.

**Objective: Provide Business Training Opportunities to Farmers**

Farmers are entrepreneurs, needing both farming and business skills. Supporting business training opportunities that help farmers learn or update business and financial planning skills can help increase profitability and access to the local market. Examples of innovative efforts in this region to assist farmers with business development are described below.

SACOG has developed a small farm pro forma analysis tools to assist these market development and business training efforts, as well as individual growers. A typology assembled for use in the RUCS analysis tools includes cost of production, as well as yield and revenues from various market outlets for a range of production including fruits, nuts, vegetables, and meat. Each farm type can be updated with local data and adjusted to analyze various operations and market opportunities. The tools will be a helpful starting point for farmers and ranchers considering growing for local markets and is useful to assist with economic development and planning departments developing programs and plans to assist these types of operations.

An important finding from SACOG’s pro forma tool is that scale of a farm operation is important when considering which market segments to sell to. In the example below, three market scenarios are modeled for two different farm operations, a 20-acre farm and a 60-acre farm:

- direct markets (Farmers Markets and Community Supported Agriculture)
- direct markets + high-end wholesale
- direct markets + high-end wholesale + conventional wholesale and institutional markets
The graph shows possible income for these two farms given the markets that they might sell to. Since wholesale and institutional markets have a lower price point, revenue declines as the farmer shifts to these markets. The results suggest that smaller operations may likely focus mostly on direct markets given the difficulty of sustaining an operation when selling to larger buyers. However, a larger farm—with its relatively lower cost per acre and larger production volume—may take advantage of the wholesale and institutional market opportunities since they can still make a good return even with smaller margins. There is also an advantage to selling to larger markets; farmers can lock in contracts, reduce trips to market and transportation cost, and reduce loss to spoilage or damage from transport.

![Markets and Revenue Graph](image)

**Start-up Farmer Training Programs**

As part of their land connecting program, California FarmLink provides workshops and support to help new or small farmers get credit to start or expand their businesses. They provide technical assistance with business planning, farm financing, and structuring deals to secure farmland. California FarmLink has also developed an Individual Development Account (IDA) program focused on agricultural businesses. The IDA program, which was passed by Congress in the 2008 Farm Bill, provides $3 in matching funds to every $1 saved by the participant. These funds are generally used to purchase land and farm equipment. The program helps participants develop business skills including business plans, cash-flow projections, tax preparation, and more.
The five-year-old program has helped 25 beginning farmers in California develop their businesses. Information on California FarmLink can be found at: www.californiafarmlink.org.

The UC Cooperative Extension (UCCE) also provides farmer training programs. While these tend to be more oriented toward production, the UCCE also helps farmers identify new market opportunities and ways to improve their businesses. The Los Rios Community College Center for International Trade Development also works with farmers to identify new international market opportunities and the types of production and processing needed to serve those markets.

The Center for Land-Based Learning has a beginning farmer training and incubator program called the California Farm Academy. The program trains 20 new farmers and individuals interested in farming per year. New and prospective farmer candidates generally have some experience in agriculture — currently as farmer/landowner, farm worker, immigrant farmers, children of farmers, or students from community or college agriculture programs. A survey of potential farmers/participants indicated interest in a range of issues including technical skills, knowledge of agriculture sciences, and business training. Recently, incubator sites at Sierra Orchards, and parts of Yolo County including West Sacramento and Davis will augment training with hands-on practice. A mentor/apprentice component — someone to call with questions — will give new farmers access to knowledge and skills of established farmers. Funding comes from a USDA specialty crop grant, among other sources.

**Agriculture Resource Center**

Agriculture Resource Centers offer production and business training classes, among other services, to help new and old farmers. Two examples highlight services a resource center can provide.

The UC Cooperative Extension Stanislaus County, located in Modesto, offers seminars and classes to producers in the county and nearby counties on crops typical of the area, dairy, livestock and natural resources. The Nutrition, Family and Consumer Science program provides classes to individuals and families on subjects such as gardening, cooking, home food preservation and food safety. The Center also houses 4-H programs. Newsletters address issues related to all crops and products and current agricultural research, by UC Davis and other experts, all available on the website. Topics range from irrigation methods, pest management and weather to labor management.

The UC Solano County Agricultural Resource Center functions as a web-based center to provide production and marketing information to benefit the county’s growers. The site highlights where to find locally-grown produce in Solano, listing all farms by type of product. The site provides growers with documents on regulations and permits and agriculture support services in the county. This website is affiliated with the UCCE Small Farm Advisor’s office in Fairfield.

**Objective: Increase Local Processing Capacity**

It is estimated that there are 112 food manufactures in the region for various products and at various scales; however, many are first processors (e.g., rice drier, grain elevator, nut huller), while others further process products (e.g., rice mills, plum driers) are
generally shipping those products to wholesalers, distributors and other processors beyond our region that are serving national and international markets. For many products, such as tomatoes or peaches, which are grown in large volumes, there is relatively little processing capacity in the region. At the same time, most value-added processors in the region are sourcing raw product from outside the region (e.g., flour for bakeries, meat for cut and wrap, fruits and vegetables for packages of pre-cut food).

The disconnection between production and processing locally is an important contributor to the volume of trucks moving food into and out of the region. The loss of processing also affects cropping patterns as seen in dramatic reductions in tomato and peach production after canneries were closed in the 1990s. With agriculture as the main rural industry, these changes in processing and cropping affect rural economic development and job opportunities.

Most of the remaining processing capacity in our region is in large-scale processors of major commodities. As a consequence, small and medium-sized farming and ranching operations that primarily sell (or would like to sell) to a local market are left with few local processing options that are economical. Many are forced to drive long distances for processing relatively small amounts of product. This lack of processing capacity affects local growers’ ability to offer greater diversity of products in the marketplace. Developing a new infrastructure of processing facilities to serve the region’s local marketplace could increase and extend the market viability of these value-added products thereby generating new revenue prospects, producing new job opportunities and tax revenues, reducing truck trips, and providing buyers with the option to purchase more goods grown or raised locally. Additionally, processing facilities would help local growers sell to institutions that often need pre-cut and packaged foods for their services.

Shared Processing Facilities
Stakeholders ranked processing as an innovation to advance the local food system second only behind distribution. Workshop participants focused particular attention on shared facilities for a number of reasons. Rather than investing in real estate and expensive processing equipment individually, small- to medium-sized farms or ranches could consider business arrangements to share new or existing processing facilities that are sized and equipped to handle multiple customers and in some cases multiple products. For example, olive growers see opportunities to collaborate with wineries since much of the equipment used to make wine and oil is the same. With a centralized facility, economies of scale are created leading to increased affordability and improved market access. Business synergies are created that help small-scale producers attract customers and sell directly at a larger-scale processing location or under a common marketing label. Co-location also allows producers to exchange ideas, share knowledge, rent or borrow equipment, and control costs.

Three examples below show the range of possible facilities that can serve the region:

- **Repurposed Existing Processing Facilities**
  A prominent example of a share facility is the Sugar Mill in Clarksburg. From 1935 to 1993, facility processed sugar beets into liquid and granulated sugar. In 1993, the mill was shuttered, a victim of poor economics when stacked up against international rivals, and
became a 106-acre abandoned industrial site. Today, the facility has been transformed into a micro-commercial center where locals and visitors can walk to dining, recreation, art, and entertainment. It features the Clarksburg Wine Company (CWC), a state-of-the-art custom crush facility featuring 20,000 square-feet of cellar space, presses, rotary and open top fermenters, stainless tanks, chillers, overhead hoists for trucks, among other features. CWC offers producers custom crushing and fermenting and winemaking services, storage, and lab analysis – meeting the needs of at least five other grape producers in the region. More than 75,000 square feet of warehouse and office space and more than 12 acres of yard use are available for lease. Retail, restaurant, light manufacturing, and additional office space is currently under renovation. More information is available at http://oldsugarmill.com.

- **Commercial Kitchens**
  Commercial kitchens may be one of the primary processing facilities for many small- to medium-sized operations; however, most producers find it a daunting endeavor because of the time, expense, and regulatory process involved in building and maintaining a commercial kitchen. For example, a well-known community kitchen project in Canada, Fresh Choice Kitchen, estimated the total cost for kitchen equipment necessary to start a community kitchen to be around $23,400 and about $700 for additional kitchenware. Such costs make shared commercial kitchens an attractive option for many looking for opportunities to serve the value-added food market.

  A good example is Chef’s Kitchen in Los Angeles (www.chefskitchens.com) which offers space by the health department) for rent on an on-going or as needed basis to chefs, caterers, cooking restaurateurs, as well as many other small related businesses. Because the kitchen is owned, the hours are set by the clients. Members have access to the online real time and can reserve times. Priority access is given time chefs who rent the space on an on-going basis. Rental rates and deposits are dependent on needed per month. Renters must pay a one-time registration fee and submit a ServSafe (food handler’s) certificate as well as proof of insurance. General liability insurance listing the property as additionally insured is required and covers the facility, equipment, and the renter’s equipment and products. If you are a permanent tenant, renting 60 hours a month or more, you get additional benefits of the facility including cold and dry storage, a mailbox, lockers, and the ability to share the existing health department license, which you can use to validate your food products.

- **Mobile Processing**
  Mobile processing is another example of locally scaled processing used by multiple growers. This innovation is particularly applicable to meat production and the San Juan Islands in Washington State offer a relevant example. The closest U.S. Department of Agriculture (USDA)-approved slaughter facility was 200 miles away by land and sea before the first-of-its-kind mobile meat processing unit was put
into operation in 2002. It provides an efficient alternative that increases return and a local customer base for farmers. The 26-foot mobile meat slaughter unit is attended by a USDA inspector and is equipped for the on-farm slaughter of cows, sheep, hogs, and goats. The truck is self-contained and hauls carcasses to a separate wrapping and packing facility. The Lopez Community Land Trust owns the facility and leases it for a nominal fee to the Island Grown Farmers’ Cooperative. They purchased the trailer and the tow vehicle for just under $100,000 and from start to finish the group estimates the project costs about $350,000. The slaughter truck and the cut-and-wrap facility employ six people full-time. Membership and user fees sustain the facilities financially. More information can be found at www.mobileslaughter.com.

Supportive Plans, Policies and Zoning
Multiple stakeholders noted regulations and permitting as a challenge to constructing or repurposing facilities for processing. While local health codes are largely set by federal and state regulations, stakeholders suggested that more consistent interpretation and application of those regulations could help producers and processors plan for and work through the process of establishing a facility. Land use regulations were also mentioned as sometimes limiting where processing facilities can be located. El Dorado County among others offers a good example of zoning in agricultural areas that permits growers to have on-site processing. This subject is addressed in more detail in the RUCS Land Use topic.

Objective: Increase Local Distribution
As discussed earlier, the distribution system is made up of multiple components that move food from the field to the consumer. Distilling this system down to its basic elements, the primary functions needed are points where aggregated and then distributed. The region currently has wholesale produce distributors, not including distributors that serve chain grocery stores. Some distributors outside the region also serve the area. Many are interested in local food due to market demand, but currently the few more aggressive distributors source no more than 2 to 3 percent locally (one distributor estimates they source about 10 percent locally). The hurdles for sourcing locally included logistical challenges of purchasing from multiple small growers, seasonality of local produce, limited volume and food safety concerns. Some distributors have also suggested that market demand for local food is still not high enough to proactively pursue this sector and call for more local food marketing and consumer education to increase demand. Furthermore, some note that currently local food tends to be too expensive for many of their retail or institutional customers.

Locally focused food distribution centers can provide a valuable connection between local producers and local markets including wholesale, retail, food service, institutional and other food outlets. A distribution center can relieve a producer of the responsibility of aggregating, marketing, and distributing product. While such centers would be particularly beneficial for smaller farms and ranches, all scales of operation could better connect with local food outlets. This would give buyers more purchasing options for local food, as well as giving growers
additional outlets and income opportunities. Local aggregation and distribution centers could also decrease VMT by growers who currently deliver to multiple sites, leaving more time for farming while also potentially reducing the region’s carbon footprint. Moreover, local aggregators can achieve the volume and consistency that larger distributors, retailers and institutions need, essentially acting as “feeders” to more conventional distribution channels and taking advantage of those well-established delivery systems, trucks and customer relationships.

**Shared Distribution Facilities**
Establishing shared local aggregation and distribution facilities was the top innovation identified by stakeholders. As with processing, stakeholders emphasized “shared” distribution centers as essential to providing small- and medium-sized producers access to needed distribution that otherwise they could not afford to establish independently. The following examples provide a range of possibilities that can be applied in the region.

- **Grower-owned Rural Aggregation Center**
  A group of Amish farmers in rural Wisconsin formed the Fennimore Produce Auction in 2007. The organization pays a commission of sales to a local realtor company to market, manage and truck product. Auctions are held three times a week for roadside stands, wholesale grocery and food service buyers. Most customers transport their own product but the realtor offers trucking services for any customer within a hundred mile radius. Go to [www.cias.wisc.edu/wp-content/uploads/2010/01/fennimore_auction.pdf](http://www.cias.wisc.edu/wp-content/uploads/2010/01/fennimore_auction.pdf) for more information.

  In 1999, GROWN Locally opened its doors in Northeastern, Iowa. GROWN is a 22-member cooperative. Farmers harvest, wash, pack, and deliver product to a central location for aggregation and further distribution. Originally focused on online sales and aggregated CSA, they have since transitioned towards marketing to institutional buyers. They have one full-time coordinator. The website for GROWN is [www.grownlocally.com](http://www.grownlocally.com).

- **Distributor-owned Rural or Urban Aggregation Center**
  Produce Express has been working on developing a local food aggregation and distribution network for close to 10 years. The Sales Manager, Jim Mills, has made a large part of his mission to connection customers with farmers. The company mainly supplies restaurants and sources most of its product from conventional wholesalers. However, Produce Express is now sourcing product from 14 local farms and always looking for more. Mills will pick up produce when needed thereby making it easier for the farmer to connect with customers, save on transportation costs and do what most want to do, farm. He also helps facilitate for specific products so when a chef wants, for example, a certain kind of chilies. The company has a well-established distribution network.
and customer base that can be leveraged to aggregate and distribute local products throughout the region. Mills sees plenty of demand for locally grown products. He is positioning Produce Express to be a key player in aggregating and distributing product as more growers seek opportunity in the local food movement.

• **Co-op Grocery Store Aggregation Warehouse**
  In 1997, the Wedge Community Co-op in Minneapolis began the Co-op Partners Warehouse (CPW), 45,000 sq. ft. of warehouse space that provides storage and delivery for local growers that sell to Wedge and other co-operatives in the region. This has increased the product mix for the cooperatives and increased the Wedge’s volume, resulting in better pricing and efficiency. In addition to acting as a local distributor for growers and other co-ops, CPW has developed an alternative distribution method for producers who prefer to have a direct relationship with the consumer. CPW’s drop-shipping program consolidates products at the warehouse and delivers them to the end consumer, while customer orders and billing still go through the producer. CPW assesses the producer a small delivery fee. This program provides efficiency in both fuel and labor, allows the producer to maintain a direct relationship with the consumer, and maximum income for their product. To find out more about the warehouse, go to [www.wedge.coop/about/about-warehouse.html](http://www.wedge.coop/about/about-warehouse.html).

• **Online Distribution**
  Virtual distributors have no bricks and mortar warehouse, rather inventory is kept at the farm. When orders are made, the farmer is informed and then delivers the product either to a central location or directly to buyer. The distributor is in charge of marketing and management, including identifying buyers, labeling and invoicing.

  Red Tomato ([www.redtomato.org](http://www.redtomato.org)) is a distributor located in the Northeast United States and has undergone a number of iterations of its distribution system. From 1999 to 2002, it was a bricks and mortar operation with its own trucks and food aggregation site. Red Tomato decided that it cost too much money and time to maintain the transportation and buildings and felt that they had lost focus of their original goal: helping farmers connect to new markets. In 2003, they transitioned to an online organization that coordinates purchases between growers and buyers. The online structure has allowed the organization to grow without being overwhelmed by increases in expanding infrastructure and maintenance cost. During the period of transition from about 2003 to 2007, the organization saw their total sales more than quadruple. Today, they work with about 35 farmers located through the Northeast, and sell to retailers, and institutions in Massachusetts, New York, New Jersey, and Pennsylvania.

**Supportive Plans, Policies and Zoning**
As with processing, stakeholders identified regulations and permitting as a challenge to constructing or repurposing facilities for distribution. Though local health codes are largely set by federal and state regulations, stakeholders suggested that more consistent interpretation and application of those regulations could help producers and distributors establish a facility. Land use regulations were also mentioned as sometimes limiting where distribution facilities can be located. This subject is addressed in more detail in the RUCS Land Use topic.
Objective: Expand Farm-to-Institution Programs

Stakeholders identified farm-to-institution programs as an important innovation for farmers to sell their products locally, reaching a market that has purchasing power on a much larger scale than individual consumers and single restaurants and stores. Farm-to-institution programs can include, but are not necessarily limited to schools, hospitals, correctional facilities and other public institutions, as well as corporate sites. A number of institutions in the region are looking for possibilities to source more of their food locally, which provides a ready market for growers, distributors, and processors that can accommodate institutional needs.

There are important logistical and market considerations needed to serve these institutions effectively; probably the most important is volume. As noted above, many distributors see opportunity in providing locally grown food, but need higher and more consistent volume and product quality to supply larger customers. Aggregation and distribution centers oriented toward locally grown food can provide that volume and consistency, while institutional demand can influence what growers produce to serve that market. Higher volumes and consistent demand can help bring down the cost of local food, which is needed to broaden this market potential, particularly for institutions that operate with limited budgets.

Another important factor in serving institutions is having local processing capacity to prepare food for these customers. For many institutions, pre-processed food is essential since they do not have staff or facilities to prepare food on-site. For example, many school districts serve pre-packaged lunches or quickly unpack and serve prepared food for students. Processing facilities that provide pre-cut fruits and vegetables to those preparing full meals will help increase the potential for locally grown food to penetrate institutional markets.

Farm-to-School Programs

A prime example of a local farm-to-institution effort is the Davis Farm-to-School Connection (www.davisfarmtoschool.org). The comprehensive program includes: local purchasing for school meals, school gardens, nutrition and food education, farm tours, and recycling and composting programs. The Davis Farmers Market Foundation sponsors the program, which has a steering committee that reports to the foundation’s board of directors. While the vision is to have a county-wide program, the committee is currently only working with the Davis Joint Unified School District. The program started in 2001 with salad bars, because the district did not have kitchen facilities to prepare meals. Once the district was able to build a new, commercial kitchen, they had the ability to prepare fresh, hot foods. Funding staff to prepare food and tend the salad bars was a challenge and limited the amount of local fresh food that could be offered to students. In 2007, renewal of a local parcel tax provided the school district with $70,000. This funding supplied, among other things, staffing for the salad bars. The program has also benefited from having collaborative sources for purchase of local foods. The food is mostly purchased through Ripper, Riley & Thomas in Ukiah and Produce Express in Sacramento. Since purchasing from Produce Express they have since shifted Produce Express’ approach to listing its produce; they now include the name and location of the farm.
By having one or two sources representing multiple producers, the district is able to purchase a large amount of produce without dealing with multiple invoices, deliveries, representatives, etc.

UC Davis provides another farm-to-institution example. University Dining Services is committed to actively engaging in procedures, policies and practices that foster sustainability of the regional food system and the livelihood of growers, producers and processors. They have identified seven core practices for their business: waste reduction and elimination, environmental stewardship, locally grown and produced, supporting sustainable agriculture, health and wellness, building community and culture, and education. There are 5,300 meal plan holders, who have the option to eat at one of the campus dining locations, for all three meals of the day. University Dining Services will increase sourcing of locally grown and locally processed foods—their target is 30 percent sourced locally by fall 2010—and prominently display information about all local products in the dining halls. For more information, go to http://dining.ucdavis.edu/sus-locally.html.

Objective: Increase the Number and Types of Food Outlets

There are 180 wholesalers and 849 retailers in the region according to the 2007 Economic Census; however, many of these food outlets are supplied through the conventional food system. As noted above, volume, consistency and the convenience of dealing with one supplier and invoice is a hurdle to overcome in order for local food to make its way into conventional food outlets. Nonetheless, there has been an increase in the number of food outlets for locally grown food. The region has seen continued increases in the number of farmers markets (40), farm stands (at least 50, but they are difficult to inventory), and community supported agriculture operations (33), while a handful of restaurants and stores feature local food.

Many stakeholders identified two barriers to consumers purchasing local foods; convenience and cost. Although more people are becoming aware of the benefits of purchasing locally produced food, many will only begin to purchase these foods if it is as convenient as their regular food purchasing. For others, there is an additional barrier, which is the higher cost of these foods. Innovations in expanding consumers’ options of where to buy local food, and increasing the affordability to low income consumers, will help to expand the local food market. While there are many possibilities to increase consumer options for purchasing local food, a few stand out when considering the characteristics of the Sacramento region.

Farm Stands

Workshop participants viewed farm stands as key outlets for locally grown food. Farm stands have a number of compelling attributes. First, they are very mobile, can be scaled to “fit” into a community, and are inexpensive to “own” and operate. In its most basic form, a farm stand involves setting up and breaking down a few canopies and tables, but also may include other services such as cooking or nutrition classes. Mobility and scale is important when targeting communities where no grocery store exists. Not only can a farm stand offer fresh food in underserved communities, they can be the assembly and pick up point for CSA boxes for that community. Their flexibility is also important when considering locations such as churches, hospitals, schools, libraries, office parks and other
locations, which offer parking and space to operate a stand for a few hours. Alchemist Community Development Corporation in Sacramento (www.alchemistcdc.org) provides an example of urban farm stands.

**Grocery Stores**

On the other end of the outlet spectrum, grocery stores were viewed by stakeholder as equally important as farm stands. Whereas a farm stand offers a lot of flexibility in its mobility and scale in bringing food to consumers, a grocery store offers the convenience of a fixed location that is open daily. Some local grocery stores in the region feature locally-produced foods. For example, both the Sacramento and Davis Food Cooperatives (www.sacfoodcoop.com or www.daviscoop.com) work with many local farmers and other product vendors carrying local produce, meat, and some processed goods. Some grocers, including large retailers like Raley’s and Whole Foods, have begun to carry some locally-produced foods as well. Additionally, Whole Foods in Roseville helped to create a year round weekly farmers market in front of their store.

**Permanent Farmers Markets**

Though not ranked as high as farm stands and grocery stores, participants also saw value in establishing permanent farmers markets in the region. Permanent farmers markets and structured or covered farmers markets are developing in many locations. In many instances, permanent farmers markets serve not only as a showcase for local foods, but also serve as community gathering places. One local example is in Davis where a permanent covered structure for its markets was erected in Central Park (www.davisfarmersmarket.org). Another is the San Francisco Ferry Building (www.ferrybuildingmarketplace.com), which offers outdoor farmers market three days a week and 41 in 65,000 square feet of space.

Another example outside of our region is in Santa Fe, New Mexico. The non-profit Santa Fe Farmer’s Market Institute’s purpose is to fund and support a permanent farmers’ market building, promote agriculture and land-based activities, and educate consumers about the benefits of buying local. The Institute owns the farmers market building and signed a long-term lease to operate it as part of a larger infill project—an old rail yard area being renovated with green construction. Their "Roots in the Railyard" campaign raised about half of the $4.6 million needed to complete the project through private funding and half through local and regional public funding. Office and restaurant spaces in the building help support the building and market. The Market Hall is available for community-based events and some private events when not being used for the market. More information can be found at www.santafefarmersmarket.com.

**Objective: Promote Agritourism**

Agritourism is an important means for connecting urban and suburban residents with the rural landscape, and can also provide new economic opportunities to local farms and ranches. It links the purchase of farm products with on-farm experiences like participating in or observing farm operations, picking fruit, etc. Beyond sales of
agricultural products, additional agritourism activities include farm stays, events, picnics, and educational programs. Agritourism can bring in jobs, sales tax and property tax revenue, increase visibility of local agriculture, and support local farm operations.

According to a recent statewide agritourism survey by the UC Small Farm Center, just over half of the operators surveyed reported gross revenues from agritourism operations of more than $10,000, while 22 percent reported gross agritourism revenues of more than $100,000. Most agritourism operators rated their operation as “somewhat profitable,” and 64 percent expect to expand or diversify their agritourism operations over the next five years.

The region has an estimated 450 agritourism sites or events. Examples include:

- Apple Hill, Camino
- Hoes Down Harvest Celebration, Capay Valley
- Mountain Mandarin Festival, Auburn
- Pear Festival, Courtland
- California Peach Fest, Marysville
- Pumpkin patches, Christmas tree farms, u-pick orchards, wineries, farm stands, and other sites throughout the region

Supportive Policies and Zoning
Workshop participants identified regulations as a key challenge to establishing and operating an agritourism venue. Zoning may prohibit, or require special permitting for certain activities, while building and health codes can impose numerous and expensive standards. There can also be conflicts with neighbors regarding issues such as noise, traffic, and parking impacts on surrounding agriculture operations and residences. Some jurisdictions, such as El Dorado County and Placer County have responded by establishing specific ordinances for agritourism sites to reduce the impact of these operations on the surrounding areas. These and other innovations that support agritourism events and related processing are explored in detail in the RUCS Land Use topic.

Improve Access
Agritourism is also addressed in the RUCS Transportation topic as many stakeholders identified access as a challenge. In addition to investing in key rural corridors, transportation innovations included signage and pavement markers that identify agritourism routes and locations, which is particularly important when sites are dispersed over a wide area. While agritourism clusters, such as Apple Hill, were not identified as a top innovation, there was some discussion around advantages from shared parking and ease of providing transit service for agritourism clusters. These innovations will be addressed in detail in the RUCS Transportation topic.

Objective: Increase Consumer Education and Marketing
Behind distribution and processing, stakeholders highly ranked consumer education as an important component of the local food system. This innovation aims to build awareness of the benefits of purchasing and consuming fresh local foods and how to access it. Local marketing efforts help raise awareness and visibility of
locally-focused agriculture operations and helps consumers identify and purchase local foods. In this way, many of the local marketing campaigns also double as education efforts. Both consumer education efforts and local food marketing programs can happen at varying scales, ranging from one farm to one county to a region or entire state. Ultimately, successful efforts result in more consumers purchasing local foods directly or indirectly.

Marketing and Branding
Successful marketing and branding efforts can be found throughout the region at varying levels. Some marketing efforts can be seen on a single farm, others branding a region within a county, and still other efforts aimed at marketing the agriculture of the entire county. Examples include:

- **Membership Organizations**
  An example of a membership organization effort is PlacerGROWN, a nonprofit organization formed to help Placer County growers market their produce and agricultural products. PlacerGROWN ([www.placergrown.org](http://www.placergrown.org)) has different levels of membership for community members, growers, and businesses. As a grower, membership benefits include a suite of marketing tools provided by PlacerGROWN, including logos, signage, and networking opportunities. All members benefit from the direct connection between the consumer and local producer.

- **Agritourism Associations**
  An agritourism-based effort example is the Apple Hill Association in El Dorado County ([www.applehill.com](http://www.applehill.com)). This cluster of agritourism operations has a distinctive character that a market identity for Apple Hill products. The Association has more than 50 members, including orchards, wineries, Christmas tree growers, a microbrewery and spa. Coordinated marketing efforts help enhance the visibility area, while reducing the need for each individual operation promote itself.

- **County Campaigns**
  A good example of a county effort is *A Taste of Yolo*, a marketing campaign launched by Yolo County to promote its agricultural products ([www.atasteofyolo.com](http://www.atasteofyolo.com)). The campaign highlights the agricultural values of the county and emphasizes seasonal foods and specialties such as olive oil, wine, and fresh produce. Other efforts in the region include Capay Valley Grown ([www.capayvalleygrown.com](http://www.capayvalleygrown.com)), Sacramento County Grow and Buy Local ([http://sacfarmbureau.org/GrowBuyLocal.htm](http://sacfarmbureau.org/GrowBuyLocal.htm)), Yuba-Sutter Farm Stands ([www.visityubasutter.com/Agriculture.aspx](http://www.visityubasutter.com/Agriculture.aspx)), and El Dorado County Farm Trails ([http://edc-farmtrails.org](http://edc-farmtrails.org)).

- **Internet-based Efforts**
  An on-line example is the *Buy Fresh, Buy Local*, produced for various California regions, by the Community Alliance with Family Farmers (CAFF). The guide includes the location of information about
local farmers. The CAFF website (http://guide.buylocalca.org) also has a unique online tool where users can type in their zip code and search for “fresh food” within 10 miles (or more) of their area.

**Food Education in Schools and Low-income Communities**
The top innovation under marketing and education was expanding education in schools and low-income communities. There are many examples in the region of organizations promoting local foods and educating the community about the benefits of buying local. One effort that combines the two objectives is Fresh Producers, a local high school student managed non-profit organization that provides low-income community education about the importance of fresh produce in a healthy diet, and offers a way for the community to shift to purchases of local foods (http://freshproducers.org). CEO and Founding Director Rabbi David Wechsler-Azen decided the best way to educate young people and engage them in eating better was to enable them to play a role in selling fruits and vegetables in their community, and link their own wealth with their health. Furthermore, by getting students engaged in a business model approach, some of the profits could be allocated to support their future education plans. With the help of investments from Kaiser Permanente and the California Endowment, Fresh Producers kicked off the project in 2008 at Hiram Johnson High School in Sacramento. They have partnered with Meals on Wheels, which had excess space in their distribution warehouse and could accommodate Fresh Producers’ need for a repackaging site, a task which they now handle using volunteers from local congregations. After testing some packaging and pricing schemes, the group decided they would get greater participation if they assembled $10 bags of food for their customers. Of those fees, 70 percent pay for the fruits and vegetables, 10 percent supports the school, 10 percent returns to support the purchasing site, and 10 percent covers the project management costs. Using this fee model and assuming growth to 1,000 weekly orders, Rabbi David expects the program to be self-sustaining within three years.

**Regional Buyers Guide**
Another top ranked education and marketing innovation is a regional buyer guide or food atlas. A good example of such a guide is Wisconsin’s Farm Fresh Atlases. They have produced local food outreach materials for multiple regions of the state, and have commitments from a broad range of organizations to keep the effort moving forward every year.

The REAP Food Group (Research, Education, Action and Policy on Food) is a nonprofit organization that created a food atlas for Dane County, with a focus on farmers who are committed to sustainable production practices and focused on the local marketplace. The first outreach piece in 2002 was a fold-out map including 40 local farms. The goal was to get people more aware of their food comes from and familiar with the products available from local producers in the southern third of Wisconsin. Farmers were asked to pay a listing fee between $20 and $50 and 20,000 “Southern Wisconsin Farm Fresh Atlas” were distributed. Between 80 – 90 percent of participating farmers recommitted for the second publication.

The atlas has become too big to be just a map, and the annual publication is now in booklet form. The booklet includes a map of all of the locally-serving farms, lists of farmers markets, a business section on restaurants and grocery stores that feature foods produced in the region, and an agricultural production calendar. The REAP
Food Group now sells print advertising in addition to listing charges to help offset productions costs. Farm listings sell for $55, business listings sell for $110, and display ads range from $250 to $550 depending upon size. The local credit union serves as a project underwriter and has the back cover display ad as a benefit for their $7,000 contribution. Even with all of these new revenue streams, the project continues to demand a lot of volunteer energy. Nonetheless, the project has been successful and there are now a total of five Farm Fresh Atlases in Wisconsin. See www.farmfreshatlas.org for more information.

There are plans to do a similar regional buyers guide for the Sacramento Valley Region this year, spearheaded by the California Alliance for Family Farmers. The goal is to publish 30,000 copies of the Sacramento Valley Eater’s Guide to Local Food, which will include farms, CSAs, restaurants, grocers, farm stands, farmers markets, organizations and u-picks who are all enriching the local food system and are either selling or buying a percentage locally. There are already regional buyers guides for three other regions in California: Central Coast, Bay Area, and Humboldt County.

Food Hub Analysis
To address many of the food system challenges and opportunities noted above, SACOG sought and received funding from the California Strategic Growth Council and the California Department of Food and Agriculture to conduct an pro forma assessment of a food hub facility. This facility would aggregate, process, store and distribute locally grown food to markets within the region.

To conduct the project, SACOG contracted with a consulting team (Project Team) led by Applied Development Economics, Inc., in partnership with Foodpro International, Inc., the Hatamiya Group, and DH Consulting. The Project Team, along with SACOG, prepared several interrelated reports, described below, which contain findings resulting from detailed market and financial research, consultation and analyses.

<table>
<thead>
<tr>
<th>SACRAMENTO REGION FOOD HUB FEASIBILITY ANALYSIS REPORTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- <strong>Research Analysis of Food Hub Trends and Characteristics</strong>: Overview of national trends on food hubs, market context including information on illustrative suppliers and institutional/business consumers of fresh produce in the region, and examples of successful/promising types of hub business models.</td>
</tr>
<tr>
<td>- <strong>Sacramento Region Food Hub Cost Estimate Analysis</strong>: Capital and operating costs for a prototypical 22,150 square foot hub enterprise with mid-scale aggregation, distribution and processing functions.</td>
</tr>
<tr>
<td>- <strong>Sacramento Region Food Banks and Food Hub Development</strong>: Capability of food banks to incubate and/or support a regional food hub, and their role in transforming the regional food system by sourcing and promoting healthy, locally grown foods and expanding their own infrastructure/facilities.</td>
</tr>
<tr>
<td>- <strong>Sacramento Region Food Hub Business Plan</strong>: A business model, financial feasibility analytic tools and business plan for the proposed hub, including information on regional market demand, illustrative target crops, and findings of the feasibility analysis. It is supplemented by the <em>Financial</em></td>
</tr>
</tbody>
</table>
**Feasibility Toolkit,** a user manual that accompanies pro forma worksheets and illustrates how the business model feasibility analysis works.

- **Impediments to Supplying Locally Grown Specialty Crops:** Identification of barriers for both growers and food hubs in building and scaling up the local food system, and analysis of possible economic development incentives aimed at overcoming barriers for specialty crop market avenues.

### KEY FINDINGS

#### The Sacramento Region Market Opportunity

**Fresh Produce Regional Demand**

Residents in the six-county Sacramento region consumed almost 1.9 million tons of food in 2012. More than half of this total came from fruits, nuts and vegetables (specialty crops), showcasing the significant existing demand for fresh produce in the region.

<table>
<thead>
<tr>
<th>Food Group</th>
<th>SACOG Region</th>
<th>Sacramento</th>
<th>El Dorado</th>
<th>Placer</th>
<th>Sutter</th>
<th>Yolo</th>
<th>Yuba</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits</td>
<td>385,393</td>
<td>236,356</td>
<td>29,432</td>
<td>58,956</td>
<td>15,489</td>
<td>33,272</td>
<td>11,887</td>
</tr>
<tr>
<td>Vegetables</td>
<td>669,185</td>
<td>410,403</td>
<td>51,105</td>
<td>102,369</td>
<td>26,895</td>
<td>57,773</td>
<td>20,641</td>
</tr>
<tr>
<td>Nuts</td>
<td>5,968</td>
<td>3,660</td>
<td>456</td>
<td>913</td>
<td>240</td>
<td>515</td>
<td>184</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>1,060,546</strong></td>
<td><strong>650,419</strong></td>
<td><strong>80,993</strong></td>
<td><strong>162,238</strong></td>
<td><strong>42,624</strong></td>
<td><strong>91,560</strong></td>
<td><strong>32,712</strong></td>
</tr>
<tr>
<td>All Other Foods (1)</td>
<td>837,127</td>
<td>513,399</td>
<td>63,931</td>
<td>128,060</td>
<td>33,644</td>
<td>72,272</td>
<td>25,821</td>
</tr>
<tr>
<td><strong>TOTAL tons</strong></td>
<td><strong>1,897,673</strong></td>
<td><strong>1,163,818</strong></td>
<td><strong>144,924</strong></td>
<td><strong>290,298</strong></td>
<td><strong>76,268</strong></td>
<td><strong>163,832</strong></td>
<td><strong>58,533</strong></td>
</tr>
</tbody>
</table>

(1) Other Foods includes meat, eggs, grains, fat/oils, dairy, sugar

Source: SACOG Regional Food Consumption Calculator analysis of USDA’s FICRCD and LAFA data bases.

The demand for locally grown, source-identified, healthy and sustainably produced food is growing rapidly. The box below highlights just some of the market trends and policy market drivers that will accelerate the demand for locally grown food in the next several years.

#### TRENDS AND MARKET DRIVERS FOR LOCALLY GROWN FOOD

- National consumer surveys document local and sustainably produced foods as a major market trend. Project interviews with a wide range of local stakeholders, including industry associations, hospitals, restaurants, schools, food banks, distributors, growers, and jurisdictions all validated this trend.
- In May 2014 the California State University Board of Trustees approved a statewide Sustainable Food Policy dictating at least 20% of all campus food spending by 2020 goes to local farms and businesses. Likewise, in July 2014 the University of California President announced the UC Global Food Initiative to explore new policies whereby local growers can become campus suppliers.
- Hospital systems and school districts throughout Northern California are working to increase the purchasing of sustainably and regionally grown fresh produce, impacting future supply chains.
In October 2014 the Sacramento Kings announced they will work with local chefs, farms, vineyards, breweries and other companies to source 90 percent of the new downtown arena’s food and beverages from within 150 miles.

**Supply/Demand Imbalance of Crop Production/Consumption**

The existing and future consumption of specialty crops is a strong market driver for the sourcing of locally grown foods. However, as noted above, in spite of the huge volume of crops grown within the region (3.4 million tons), SACOG estimates that only two percent of the 1.9 million tons of food consumed within the region is grown within the region. This gap signals a major market disconnect, with a great deal of our food dollars leaving the region, but it also represents a very significant market opportunity.

The Project Team further explored this market opportunity by identifying supply/demand imbalances for 23 specific target crops that exhibit strong market opportunity to supply a regional food hub. While there are some data limitations, the analysis provides a good indication of existing market gaps, as shown in Table 2.

For four crops - lima beans, peaches, tomatoes and walnuts - the amount of produce grown far exceeded the amount needed to provide for local consumption levels, but most of these crops are exported from the region. Excluding these crops from the supply/demand calculation, there were 3,519 acres of target specialty crops in production in the region in 2012, with 20,858 acres needed to meet demand (at existing consumption levels) – a gap of more than 17,000 acres.

**TABLE 2. SACRAMENTO REGION PRODUCTION (SUPPLY) VS. CONSUMPTION (DEMAND) OF TARGET SPECIALTY CROPS, 2012**

<table>
<thead>
<tr>
<th>Target Crop</th>
<th>Acres in Production</th>
<th>Acres Needed to Meet Regional Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>1,723</td>
<td>8,129</td>
</tr>
<tr>
<td>Apricots</td>
<td>118</td>
<td>225</td>
</tr>
<tr>
<td>Asparagus</td>
<td>63</td>
<td>1,721</td>
</tr>
<tr>
<td>Bell Peppers</td>
<td>32</td>
<td>323</td>
</tr>
<tr>
<td>Blackberries</td>
<td>102</td>
<td>10</td>
</tr>
<tr>
<td>Blueberries</td>
<td>92</td>
<td>570</td>
</tr>
<tr>
<td>Broccoli</td>
<td>56</td>
<td>1,497</td>
</tr>
<tr>
<td>Carrots</td>
<td>17</td>
<td>940</td>
</tr>
<tr>
<td>Celery</td>
<td>7</td>
<td>167</td>
</tr>
<tr>
<td>Chili Peppers</td>
<td>144</td>
<td>258</td>
</tr>
<tr>
<td>Eggplant</td>
<td>84</td>
<td>79</td>
</tr>
<tr>
<td>Kale</td>
<td>10</td>
<td>307</td>
</tr>
<tr>
<td>Lettuce (all)</td>
<td>83</td>
<td>2,755</td>
</tr>
<tr>
<td>Lima Beans</td>
<td>2,189</td>
<td>940</td>
</tr>
<tr>
<td>Onions</td>
<td>222</td>
<td>1,028</td>
</tr>
<tr>
<td>Peaches</td>
<td>9,668</td>
<td>747</td>
</tr>
<tr>
<td>Raspberries</td>
<td>14</td>
<td>47</td>
</tr>
<tr>
<td>Spinach</td>
<td>23</td>
<td>522</td>
</tr>
<tr>
<td>Squash</td>
<td>606</td>
<td>729</td>
</tr>
<tr>
<td>Strawberries</td>
<td>123</td>
<td>781</td>
</tr>
<tr>
<td>Sweet Potatoes/Yams</td>
<td>2</td>
<td>770</td>
</tr>
<tr>
<td>Tomatoes (both fresh &amp; processing)</td>
<td>54,491</td>
<td>9,475</td>
</tr>
<tr>
<td>Walnuts</td>
<td>69,175</td>
<td>219</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>139,041</strong></td>
<td><strong>32,239</strong></td>
</tr>
<tr>
<td><strong>TOTAL - Less Lima Beans, Peaches, Tomatoes and Walnuts</strong></td>
<td><strong>3,519</strong></td>
<td><strong>20,858</strong></td>
</tr>
</tbody>
</table>

Sources: For production- 2012 USDA Census of Agriculture
For consumption- SACOG food calculator and USDA National Agricultural Statistics Service NASS 8 year CA average yields per ton
Sacramento Region Food System Capacity, Gaps, Impediments

As a major agricultural economy, the Sacramento region has significant existing aggregation, processing and distribution capacity, but much of this agricultural infrastructure is geared for large production volume crops such as nuts, rice and processing tomatoes which are mostly exported from the region. The region also has strong, although unevenly distributed, direct market assets including farmers’ markets, Community Supported Agriculture (CSA subscription food box programs), farm stands and agri-tourism.

While the area has developed agricultural infrastructure covering large export and direct market access, SACOG and RUCS stakeholders identified a lack of mid-scale produce handling and processing capacity as a gap in the regional food system. Without this locally-serving infrastructure, produce distributors and wholesalers serving institutional and commercial food service customers are challenged to source locally grown produce at a cost-effective, consistent and reliable scale, often purchasing large amounts of produce from outside the region. Further local food system challenges include:

- The strength of the current national and international commodity system and the contracts that farmers receive to grow for this system create a disincentive for many producers to expand into local production.
- Small to mid-size growers in particular face many challenges in growing produce for local consumption, including a shortage of supply chain infrastructure, lack of access to larger markets, labor costs and complex regulatory requirements.
- Existing procurement policies make it difficult for many institutions to purchase locally grown specialty crops. There is fragmentation of purchasing power across types of customers such as schools and hospitals.

Sacramento Region Food Hub Model

Through research, stakeholder input and analysis, the Project Team has identified the need for a locally-serving food hub to overcome supply chain challenges and help realize the local market opportunity. Several types of food hub business structures exist, including for-profit, non-profit and cooperative, that target different market segments and objectives. This study offers a regionally-tailored food hub model to capitalize on regional assets while building capacity in the local food system:

The Project Team has developed a Sacramento Region Food Hub Business Model that focuses on creating a direct market channel for local source-identified fresh produce geared to distributors, wholesalers and institutions. The model targets the region’s critical food system gaps while building on existing distributor contracts and relationships. Additionally, the model assists smaller and mid-sized growers, builds efficiencies in the institutional markets and can help address community food access and health issues. A for-profit business enterprise targeting significant regional demand for fresh food appears to be the most likely to succeed in reaching a viable level of operations within
Capital Costs and Phasing of the Business Model

The Project Team’s detailed cost analysis estimates the food hub business model would require a **total project investment of $6.9 million**. As with any business, the food hub enterprise will undergo several phases of growth. As shown below, this phasing over seven years will allow a reasonable entry point into the regional food system and time for the hub operator to build market relationships and capacity.

### Phase I
**Year 1: Start-Up**
The operation locates within an existing facility, incubating with an existing partner if possible, with 2 limited sorting and packing production lines.

### Phase II
**Years 2-3: Scaling Up**
One to two years of growth in a leased facility as the hub scales up operations for aggregation, sorting, packing, storing, packaging and distribution of fresh produce.

### Phase III
**Years 4-5: Stabilization**
The hub moves into its own 22,000 square foot facility and adds processing functions, gaining the ability to sell consistently to larger institutional buyers, with a stabilized level of operation on 2+ production lines.

### Phase IV
**Years 6-7: Full Capacity**
The facility reaches full capacity, with three production lines during Year 6, and expanding in Year 7 with four production lines as the market grows for the hub's services and products and more processing equipment is added.

The project’s expansion results in the phased capital outlays shown in Table 3, for equipment and systems starting in Year 2, and design and construction of a mid-scale food hub facility (22,150 s.f.) which would be ready for operations in Year 4.

Several factors could reduce the project's overall cost estimate, including the costs of land, permits and infrastructure as well as incentives such as a new sales tax exemption for the purchase of manufacturing equipment, energy and utility rebates, permit streamlining, or land write-downs by a jurisdiction. The project’s investors could also choose to retrofit an existing facility, though it would be important to do a comparative cost analysis with new construction.

<table>
<thead>
<tr>
<th>Cost Center Category</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Project Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAND TOTAL PROJECT VALUE (CAPITAL TO BUILD &amp; INSTALL)</td>
<td>$884,903</td>
<td>$3,198,539</td>
<td>$574,308</td>
<td>$515,667</td>
<td>$829,685</td>
<td>$918,754</td>
<td>$6,921,856</td>
</tr>
</tbody>
</table>

*Source: Foodpro International, Inc.*

### Food Hub Level of Production and Needed Agricultural Supply

Table 4 on the following page illustrates the levels of throughput (tons of produce per hour) and the associated agricultural acreage needed to supply hub operations by year. Processing lines added over time provide for additional value-added activities such as freezing and drying. During each phase, the volume of product moved through the hub increases as hub managers develop market and supplier networks. Participation of larger growers, especially in the initial phase of the hub, could help provide the product volumes and competitive pricing necessary to achieve economies of scale.
The project’s phasing structure results in a manageable expansion plan, requiring only 27 acres of supporting agricultural production in the hub’s first year of operation and 351 acres by year five. **There are at least 526,000 acres of specialty crop production in the region.** Given this existing acreage, there is enough existing production to support several food hubs at various locations in the region.

**Food Hub Financial Feasibility Analysis Results**

The Project Team conducted a detailed financial feasibility analysis for the prototypical food hub business model, developing a set of pro forma analytic business tools for each year of operations, from start-up to scaling up of operations to a profitable level of operation. The analysis tested various alternatives of crop volumes, types and mixes across the hub’s processing lines using actual 2013 wholesale commodity price data for the 23 target crops. The analysis assumes the hub operator finances 80 percent of the capital cost and fronts half the first year’s operating expenses as an equity investment.

Table 5 on the following page reports the top-level findings of the financial feasibility analysis, and demonstrates that the proposed food hub model can be a viable business enterprise in the region. Given the assumptions of the financial analysis, the hub produces **a positive net cash flow by Year 5 and achieves a positive Internal Rate of Return (IRR) by Year 8.** At stable operations in Year 7 the food hub model generates revenues of over $18 million a year and an annual net cash flow of $2.25 million, with an IRR of 24 percent by the end of the 20 year pro forma. To realize these economic returns the hub model requires an estimated cash investment of $3.6 million to cover expenses in excess of operating income until the facility generates a positive net cash flow.

The financial feasibility analysis is based on wholesale prices and estimates for the more basic levels of processing. As the hub is viable at this level of operations, it will have the opportunity to generate higher levels of revenue and return with more value-adding activities and services such as providing liability insurance, certification and training for growers.

---

### TABLE 4. ESTIMATED LEVELS OF PRODUCTION AND ACREAGE NEEDED FOR HUB OPERATIONS, BY YEAR

<table>
<thead>
<tr>
<th>Processing lines</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tons of production/hr.</td>
<td>2 limited</td>
<td>2 limited</td>
<td>2 limited</td>
<td>2</td>
<td>2+</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total tons</td>
<td>312</td>
<td>572</td>
<td>832</td>
<td>2,059</td>
<td>4,076</td>
<td>5,830</td>
<td>7,787</td>
</tr>
</tbody>
</table>

Source: Project Team Analysis
<table>
<thead>
<tr>
<th>Year</th>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
<th>Year 9</th>
<th>Year 10</th>
<th>Year 15</th>
<th>Year 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>$459,030</td>
<td>$858,000</td>
<td>$1,248,000</td>
<td>$4,609,774</td>
<td>$8,828,863</td>
<td>$12,980,958</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
</tr>
<tr>
<td>Processing Lines</td>
<td>$459,030</td>
<td>$858,000</td>
<td>$1,248,000</td>
<td>$4,609,774</td>
<td>$8,828,863</td>
<td>$12,980,958</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
</tr>
<tr>
<td>Add'l Services Revenue</td>
<td>$459,030</td>
<td>$858,000</td>
<td>$1,248,000</td>
<td>$4,609,774</td>
<td>$8,828,863</td>
<td>$12,980,958</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
<td>$18,257,245</td>
</tr>
<tr>
<td>Expenditures</td>
<td>$707,462</td>
<td>$1,113,213</td>
<td>$1,500,862</td>
<td>$4,211,981</td>
<td>$7,530,961</td>
<td>$10,989,236</td>
<td>$16,004,295</td>
<td>$16,004,295</td>
<td>$16,004,295</td>
<td>$16,004,295</td>
<td>$16,004,295</td>
<td>$16,004,295</td>
<td>$16,004,295</td>
</tr>
<tr>
<td>COGS (w/pkging)</td>
<td>$383,609</td>
<td>$734,448</td>
<td>$1,068,288</td>
<td>$2,644,131</td>
<td>$5,018,658</td>
<td>$7,625,788</td>
<td>$11,642,894</td>
<td>$11,642,894</td>
<td>$11,642,894</td>
<td>$11,642,894</td>
<td>$11,642,894</td>
<td>$11,642,894</td>
<td>$11,642,894</td>
</tr>
<tr>
<td>Labor</td>
<td>$271,863</td>
<td>$324,643</td>
<td>$368,368</td>
<td>$894,823</td>
<td>$1,305,793</td>
<td>$1,678,306</td>
<td>$2,094,198</td>
<td>$2,094,198</td>
<td>$2,094,198</td>
<td>$2,094,198</td>
<td>$2,094,198</td>
<td>$2,094,198</td>
<td>$2,094,198</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>$51,989</td>
<td>$54,122</td>
<td>$64,206</td>
<td>$673,027</td>
<td>$1,206,511</td>
<td>$1,685,141</td>
<td>$2,267,204</td>
<td>$2,267,204</td>
<td>$2,267,204</td>
<td>$2,267,204</td>
<td>$2,267,204</td>
<td>$2,267,204</td>
<td>$2,267,204</td>
</tr>
<tr>
<td>Percent of Sales</td>
<td>-54%</td>
<td>-30%</td>
<td>-20%</td>
<td>9%</td>
<td>15%</td>
<td>15%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Debt Serv. On Capital</td>
<td>($103,578)</td>
<td>($484,660)</td>
<td>($541,354)</td>
<td>($601,457)</td>
<td>($698,523)</td>
<td>($744,466)</td>
<td>($744,466)</td>
<td>($143,611)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Equity Investments</td>
<td>($353,731)</td>
<td>($255,213)</td>
<td>($695,434)</td>
<td>($664,297)</td>
<td>($105,140)</td>
<td>($105,531)</td>
<td>($169,796)</td>
<td>($82,369)</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Net Cash Flow</td>
<td>($353,731)</td>
<td>($503,464)</td>
<td>($1,401,820)</td>
<td>($248,700)</td>
<td>($590,915)</td>
<td>($1,123,403)</td>
<td>($1,425,646)</td>
<td>($1,508,484)</td>
<td>($1,508,484)</td>
<td>($2,109,339)</td>
<td>$2,252,950</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Rate of Return</td>
<td>-20%</td>
<td>-3%</td>
<td>6%</td>
<td>15%</td>
<td>22%</td>
<td>24%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Tons Processed</td>
<td>312</td>
<td>572</td>
<td>832</td>
<td>2,059</td>
<td>4,076</td>
<td>5,830</td>
<td>7,787</td>
<td>7,787</td>
<td>7,787</td>
<td>7,787</td>
<td>7,787</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue per lbs</td>
<td>$0.74</td>
<td>$0.75</td>
<td>$0.75</td>
<td>$1.13</td>
<td>$1.07</td>
<td>$1.11</td>
<td>$1.17</td>
<td>$1.17</td>
<td>$1.17</td>
<td>$1.17</td>
<td>$1.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COGS per lbs</td>
<td>$0.61</td>
<td>$0.50</td>
<td>$0.50</td>
<td>$0.65</td>
<td>$0.61</td>
<td>$0.65</td>
<td>$0.75</td>
<td>$0.75</td>
<td>$0.75</td>
<td>$0.75</td>
<td>$0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Margin</td>
<td>$0.12</td>
<td>$0.25</td>
<td>$0.25</td>
<td>$0.48</td>
<td>$0.46</td>
<td>$0.46</td>
<td>$0.42</td>
<td>$0.42</td>
<td>$0.42</td>
<td>$0.42</td>
<td>$0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Sales</td>
<td>16%</td>
<td>33%</td>
<td>33%</td>
<td>43%</td>
<td>43%</td>
<td>41%</td>
<td>36%</td>
<td>36%</td>
<td>36%</td>
<td>36%</td>
<td>36%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TARGETED PROJECT FINDINGS
FOR INVESTORS

Hub Business Model

The Project Team found that a for-profit business model for a Sacramento region food hub is the best approach. The Project Team considered a number of important factors in reaching this conclusion, including:

- Diversity of current regional crop production as well as the potential for future production
- Scalability of crop production mix and market distribution opportunities
- Flexibility of the proposed food hub processing lines to meet market demand
- Strong potential for short-term profitability and ongoing viability
- Reasonable initial capital investment, and
- Lack of need for public subsidy

The project’s pro forma shows that the hub needs to reach an expanded scale of operations to achieve profitability and sustained viability over the long-term. Many nonprofit hubs across the country do not operate at this projected level of scale and can face difficulty achieving the level of private capital investment needed without some form of public subsidy. In contrast, the for-profit model helps overcome funding challenges and offers flexibility to respond to market conditions and opportunities well into the future. The hub's business model is designed with the capacity to quickly adapt processing lines for different crop mixes depending on market opportunities and emerging food trends.

Hub Target Markets, Functions and Services

The hub's business model provides a market channel for locally sourced and identified foods to access the region’s institutional and large-customer markets using existing supply networks. To fill this market niche the proposed Sacramento region hub model incorporates a continuum of activities and services beyond a basic hub facility, including light food processing, marketing, branding and technical assistance to farmers. Two functions are essential—marketing and creating a clear and compelling brand for the hub, and providing technical assistance and capacity building to farmers. Research shows that growers working with food hubs improve their business and crop planning, which often results in better financial outcomes. Emphasizing a strong relationship with growers will help ensure a consistent, quality supply of produce, especially during the first few years of the hub. The graphic below illustrates the hub's proposed markets, functions and services, which are described in detail in the Cost Estimate Analysis and Business Plan reports.
Partnerships

As a for-profit enterprise, the hub should look to partner with a wide range of entities involved in the regional food system. Formalized partnerships with nonprofits and other entities would enable the region to leverage features of nonprofit hub models – including the ability to generate funding support from government and philanthropic sources. As an example, complementary hub-related services such as workforce training and social enterprise activities could be provided by a nonprofit partner such as a food bank, a training organization, or an economic development entity. Community and environmental services could be provided by partner organizations to improve access to healthy foods in underserved neighborhoods and strengthen the overall sustainability of the regional food system. The Business Plan provides information on partner organizations and roles they could play in providing support for locally grown and source-identified foods.

In particular, the region’s food banks are playing an important role catalyzing the budding regional food system. The food banks have been instrumental in increasing procurement of fresh locally grown produce and building more robust local food distribution channels to underserved
communities. In addition to these social enterprise functions, the food banks can be an important logistics and transportation partner to the hub.

**For Growers**

**Hub Target Crops, Consumption and Production**

The project analysis used a set of market, consumption and production data bases and criteria to identify a target list of 23 specialty crops that represent a strong market opportunity for the hub and for growers supplying the hub (shown in Table 2). The list was refined using the following set of criteria for crop selection:

- Are available locally or could be grown in the region
- Have a high ratio between purchase and sales prices
- Have a high potential for value-added activities
- Extend the seasonality of fresh produce and provide year-round supply to the hub
- Capture innovations in food trends

The pro forma analysis used 2013 farmgate commodity price data, which reflects the prices growers have actually received; these prices are a good proxy for what growers could expect to receive from the hub for the selected set of crops during early years of operation. The analysis suggests it would be profitable for farmers in aggregate to grow for the hub at the pro forma prices. Table 4 above illustrates how the acreage requirement to supply a local hub is minimal relative to the total amount of specialty crop production in the region. Overall, many existing and new farmers already have indicated an interest to supply produce for a hub.

**For Jurisdictions**

Jurisdictions throughout the region have expressed support to expand and develop regional agricultural infrastructure. While the food hub market and financial analyses show the hub can be a viable business operation, local jurisdictions can help create an environment conducive to investment through site location, infrastructure readiness, regulatory barriers removal and provision or leveraging of incentive programs. The *Business Plan* identifies some key barriers and potential solution-oriented actions in zoning and local permitting processes as well as financing options and overall regulatory compliance. Likewise, the *Impediments* report delves into possible state and local incentives that local governments can employ so that farmers need not shoulder the full burden of scaling up the local food system. These include local purchasing requirements, sales tax exemptions, new hiring credits and permit streamlining.

The project analysis is *location neutral* instead documenting key location criteria for site selection: the hub itself should be centrally located to suppliers and customers, have access to major transportation routes, be on a site that is fully serviced with infrastructure if possible, and have expansion potential, with five acres optimal. Importantly, local jurisdictions should ensure that sites are appropriately zoned and serviced and that the permitting process is supportive of agricultural and food-related businesses.
The project analysis indicates sufficient demand to support more than one hub in the region as hub operations expand, regional demand for locally grown produce increases and markets outside of the region—most notably the San Francisco Bay Area—also increase. As such, there is opportunity for several communities to benefit from serving as a hub location.

CONCLUSIONS

The research reports, feasibility tools, hub business plan, analysis of impediments and incentives, and case studies and models that are components of the Sacramento Region Food Hub Feasibility Analysis show that:

- There is strong market demand and large gaps between the consumption of fresh produce and amount of produce sourced locally. This is an important economic development opportunity.
- In order to meet this market opportunity and decrease the loss of food dollars outside the region, a food hub model that increases local sourcing for local markets offers a solution.
- A key hub objective is to create a dedicated market channel primarily for large-scale consumers, including existing fresh produce distributors and wholesalers serving institutions such as schools and hospitals, and food banks, governments, businesses and other commercial and nonprofit customers which are seeking locally and sustainably grown, source-identified food.
- A Sacramento region food hub can be a feasible business operation. The most promising model appears to be a for-profit business to reach the scale of operations needed for long term financial sustainability.
- The conceptual hub business model demonstrates potential feasibility with basic aggregation, sorting, packing, storing and distribution functions, reaching a positive cash flow in five years and a positive Internal Rate of Return (IRR) after eight years. Increasing value-added activities such as a variety of niche processing will accelerate and increase the economics of the hub.
- There is enough market demand in the region to support more than one hub as the system scales up over time.
- There are continually emerging market drivers such as procurement and other policies by major institutions like universities and hospitals that will expand the market demand for locally sourced foods; the region must be prepared to handle this demand.
- Knowledgeable staff and delivery of supportive services to growers, such as business planning, branding and marketing, and food safety training and certification, are vital components for the scaling up and long term success of the hub.
- The conceptual hub model is a pilot that could be developed in many locales throughout the region, although ideally the hub should be centrally located to transportation facilities and markets.
- Many jurisdictions throughout the region are interested in participating in food system-related economic development activities and need to ensure they are ready with sites, facilities, infrastructure, land use and zoning ordinances and other policies.
Plan provides information on financing resources that could be leveraged for development and operations of the hub.

- The regional food system will be enhanced by collaboration among business, nonprofit, public and civic sector partners, as described in the Business Plan, especially to address impediments to increasing locally-oriented agricultural production, developing regional agricultural infrastructure and expanding economic opportunity throughout the region.

FORESTRY

Introduction
The forested landscape consists of a complex and varied pattern of ecological conditions, land ownership and management history. There are considerable challenges facing the region, some of which are of global significance. Moving forward into the future, there will be a need for public and private local, regional, state and federal partners to collaborate on finding ways to address the challenges and opportunities to enhance economic development and protect the environmental quality that is the natural heritage of the region.

Current Conditions: Forested Lands of Yuba, El Dorado and Placer Counties
The conifer forest types within the three counties are dominated by Ponderosa Pine, mixtures of pine, Fir, Douglas-fir and Incense Cedar and True Fir. There are roughly 1.2 million acres of conifer forest; 60 percent of it is National Forest Land. The National Forests located within the SACOG region are the Tahoe National Forest, El Dorado National Forest, and Plumas National Forest. The ownerships and uses section will describe the diversity of the stakeholders that have responsibility for maintaining these lands.

Private land that is primarily used for timber production is generally zoned Timber Production Zone (TPZ). That zoning stipulates 160-acre minimum parcel size in all three counties. The TPZ is analogous to the Williamson Act in that it exchanges reduced property taxes for a commitment to provide timber and other wood products (food in the case of the Williamson Act) for society’s uses. Secondary benefits such as open space and wildlife habitat are also provided. Under current conditions, it is not economically feasible for many forest landowners within the three counties to conduct timber harvesting operations.

<table>
<thead>
<tr>
<th>County</th>
<th>Private Conifer Forest (acres)</th>
<th>Public Conifer Forest (acres)</th>
<th>Total Conifer Forest (acres)</th>
<th>Timber Production Zone (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuba</td>
<td>55,000</td>
<td>40,000</td>
<td>95,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Placer</td>
<td>173,000</td>
<td>272,000</td>
<td>445,000</td>
<td>116,000</td>
</tr>
</tbody>
</table>
El Dorado | 222,000 | 411,000 | 633,000 | 161,000 |
--- | --- | --- | --- | --- |
Total | 450,000 | 723,000 | 1,173,000 | 307,000 |

Source: Hickey (2005). Areas approximate. Excludes public lands (National Forest) that are not in conifer vegetation types. Figures do not include the Tahoe Basin. TPZ acres approximate based on data from 2000-2001 (Shih 2002) for Placer and Yuba counties. El Dorado County data provided by Peter Maurer, El Dorado County Planning Department. Figures do not include the Tahoe Basin.

**Figure 8: Transect of CA Vegetation Types from the Coast to the East Slope of the Sierra Nevada.**

![Vegetation Transect of Northern California](image_url)

Source: Dr. Joe R. McBride, University of California, Berkeley.

**Historical Context**

The forests of the Sierra Nevada have experienced over 150 years of management and use that has varied from outright exploitation to over-protection. Prior to the Gold Rush, much of the lower elevation conifer forest was exposed to frequent low intensity wildfire that created relatively open conditions. After about 1900, an aggressive policy of suppressing wildfires was implemented that has left many forest stands over-stocked with trees and brush, contributing to a high fire hazard. Prior to settlement in the Sierra Nevada, stands averaged approximately 100 trees per acre; today stands range from 300 to 400 trees per acre in many areas. In some locations, habitat degradation has occurred due to wildfire, inadequate re-forestation after harvesting or other disturbance, or mortality caused by tree-killing insects and diseases. The timber harvest and forest products industry historically has been the largest industry that the forested lands support. Timber harvest levels within the Sierra Nevada have fluctuated over time for a number of reasons. Historical and current policies regarding active and passive management of the forested lands provide the context for the issues and challenges that currently face the stakeholders in the region.
Ownership and Uses
Rural communities are located throughout the forested landscape, generally along major road corridors. These communities have not experienced extreme growth pressures to date (compared to growth experienced within the Sacramento Valley). Existing general plans and zoning do not project substantial new growth in the future. That could change however, if development pressures and economics force changes in land ownership. In locations where rural community housing expansion has occurred, residents that have migrated to these communities generally have little knowledge about forest management strategies and responsibilities. This lack of understanding can lead to hazards and liabilities for the greater forested region, such as wildfire risk and erosion from unmaintained roads. Fire Safe Councils and other organizations work to educate residents and play a crucial role in reducing the potential risk to human assets and natural resources within the wildland-urban interface.

The US Forest Service is the largest single landowner within the forested region; managing approximately 60 percent of the land. At the present time, management direction on the National Forests is primarily focused on ecosystem management and restoration rather than commodity (timber) production. Private forestland is owned by companies and individuals involved in timber production, numerous “rural residential” owners, and water and hydropower producers. Each of these entities manages their land according to their objectives, within the limitations of governing policies and regulations. Water and hydropower are by far the most important commodities currently derived from the forested region. Timber is still one of the top five crops in El Dorado and Placer counties, but production levels have declined substantially over the past decade. The forested region sustains an immense amount of active and passive recreational use both on the National Forests and on private sites such as ski resorts. The diversity of ownership and uses within the Central Sierra Nevada along with the large number of stakeholders with diverse views present challenges to the development of a consensus-based approach to resource management in the region.

Existing Organizations and Service Providers
Governmental and non-governmental organizations provide a wide variety of technical and financial assistance to the residents of the forested region. Some of the most important of these are the Resource Conservation Districts, University of California Cooperative Extension and Fire Safe Councils. Collaborative efforts between these various service providers and landowners, particularly in the area of fuels treatments, provide examples of attempts to actively manage and protect economic and environmental assets.

The Sierra Nevada Conservancy has recently proposed the “Sustainable Sierra Nevada Initiative” to promote fire hazard reduction and sustainable forest management throughout the Sierra Nevada. This initiative has promise for resolving some of the long-standing controversies over forest management in the region and provides a model for developing other innovative approaches to seek alternative forested land management opportunities in a forum where the stakeholders are very diverse.

Challenges and Opportunities
Rural Communities
Over the past 15 years, Placer and El Dorado counties have experienced some of the greatest population increase in the state (change on a percentage basis). Yuba County growth has been more modest. Current population centers are located near major transportation corridors. Major industries within these communities rely primarily on service-based industries and on limited industrial timber production. Growth within these rural communities has been modest compared to the urban growth experienced in the Sacramento Valley; however, economic issues and natural disaster risks presented to Sierra rural communities are unique. The overall demographic makeup of the rural communities is diverse and there has been an influx of residents that have moved into these rural communities from urban and suburban locations. This influx of residents has introduced individuals who are not experienced with forest management practices and how to manage risks to human assets and the natural habitat. Although development pressure is limited, existing development presents a risk in the Wildland-Urban Interface (WUI) where human infrastructure including residences and commercial buildings intermingle with the natural forest landscape. This WUI zone is a location where risk to natural habitat and wildfire risk exist when residents do not properly manage the forested boundaries to their property. There is both a challenge and opportunity to provide targeted wildfire risk reduction treatment activities and education to residents to mitigate wildfire risk in areas where human assets exist.

Wildfire
A large proportion of the forested landscape is currently at risk of destruction by catastrophic wildfire. Human assets and settlements nestled within the forest landscape are accordingly at risk. A policy of fire suppression over the past 100 years has contributed to high accumulations of woody fuels in forest stands. Consequently when wildfires do occur, they tend to be severe, causing widespread tree mortality. Unnaturally dense forest landscapes are partially a result of limited investments in active management to reduce fuel loads. Catastrophic wildfire events generally have a negative impact on forest watersheds and communities, and mitigating wildfire risk is a high priority for resource managers and rural communities. Treating overly dense forest landscapes through practices such as thinning can effectively reduce risk while providing rural communities economic activity, maintaining local jobs and forest infrastructure, and reducing the economic, environmental, and human health impacts of catastrophic wildfire on forested communities.
Source: Hugh Safford, US Forest Service and UC Davis 2010. The graph indicates the trend towards an increased area of forest burned at high fire severity as compared to pre-settlement Sierra Nevada forests (average plus or minus 33 percent shown as shaded area within the graph). The amount of forest burned at high severity has exceeded the presumed natural range of variability in recent years.
Timber Industry

The three counties have realized many economic benefits from the timber industry. However, since the mid-1990’s, the level of harvest has declined drastically, processing facilities have closed and support industries such as logging companies have either closed or moved away from rural communities in the region. Annual revenues from timber production have gone from in excess of $150 million in the 1990’s to less than $22 million in 2008. This is due to a number of factors including forest products sourced from out-of-state (Canada, Oregon, Washington), decreased public land timber harvest opportunities, poor local markets and regulatory costs. In general, the economics of timber harvesting are extremely unfavorable as log prices and consequently stumpage values are at an all-time low. Concurrently with reduced demand for lumber, mill closures and low timber prices the costs for preparing Timber Harvest Plans (THPs) on private lands have increased significantly due in part to fees charged by resource agencies. The minimum cost is in the range of $10,000 to 15,000. THP costs combined with harvesting, hauling and reforestation costs may exceed revenues received at current low log prices. In recent years, there has been a substantial decline in the number of THPs filed, approved and completed.
It is unlikely that a return to former harvesting levels will occur without significant state and federal policy changes. The reduction in level of harvest over the past 15 to 20 years has reduced the forest products infrastructure and local employment required to maintain this industry. Opportunities exist to redevelop local expertise and create opportunities for individuals that have previously worked in this industry to engage in other land management activities that support the economic and environmental goals of the local communities. Additional alternatives include tourism, development of biomass energy (including liquid fuels), or carbon sequestration.

**Table 8: Timber Harvest Levels, El Dorado, Placer & Yuba Counties, 1990-2008 (million board-feet)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>El Dorado</td>
<td>157</td>
<td>169</td>
<td>14</td>
<td>112</td>
<td>59</td>
<td>48</td>
<td>6</td>
<td>39</td>
</tr>
<tr>
<td>Placer</td>
<td>32</td>
<td>143</td>
<td>8</td>
<td>46</td>
<td>6</td>
<td>27</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Yuba</td>
<td>7</td>
<td>19</td>
<td>3</td>
<td>24</td>
<td>17</td>
<td>30</td>
<td>&lt;1</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>196</td>
<td>331</td>
<td>25</td>
<td>182</td>
<td>82</td>
<td>105</td>
<td>14</td>
<td>65</td>
</tr>
</tbody>
</table>

Source: California State Board of Equalization.

**National Forest Management**

Timber harvesting on national forests was a major driver of the timber industry up until the mid-1990’s, accounting for more than half of the total harvest volumes in the three counties. Since the mid-1990’s, policy changes, administrative and budget issues, litigation, and public controversy have all acted to limit the amount of active management of all types employed in National Forests. National Forests are a key element of overall forest landscape management because they constitute more than 60 percent of the forested landscape in the SACOG forested region. The loss of economic opportunities afforded by timber harvest and active land management in National Forests has adversely affected central Sierra Nevada rural communities. Furthermore, substantial areas on National Forests within the SACOG region are over-stocked and present a high risk for catastrophic wildfire events. Although a return to a high level of commercial timber harvesting is counter to current national forest management policy that stipulates harvest levels at 30 percent of historic levels, current policy does support reducing fuel loads to achieve more fire-resistant forests. Implementing that policy represents an economic opportunity for businesses in rural communities and would help mitigate losses of property and impacts to assets (watersheds, recreation opportunities, sensitive habitat) during wildfire events occurring in National Forests. Modifications in national forest management are not decided at the local level, however SACOG and rural communities have an opportunity to play an active role as the

---

43 A board foot is defined as a board one inch thick, one foot wide and one foot long.
USDA and US Forest Service begin to incorporate considerations such as ecosystem services and carbon sequestration into their planning process.

**Water Supply and Water Quality**

Forested watersheds within the counties provide a significant amount of the water to domestic and agricultural users in the Sacramento region. These users are directly linked to the water supply and quality that is produced from these forested landscapes. There are several public and private entities responsible for managing that water supply. Some are also involved in hydroelectric power generation and are currently undergoing re-licensing pursuant to Federal Energy Regulatory Commission procedures. The outcomes of these procedures could affect the quantity of water available for downstream uses. Water suppliers also face potential economic impacts due to costs for upgrading and replacing infrastructure.

Fire and Resources Assessment Program (2010) ranks watersheds in the Sierra Nevada on the basis of three criteria: 1) levels of precipitation and runoff; 2) presence of groundwater storage basins; and 3) presence of reservoirs to capture runoff for use. Watersheds in the region with high asset values according to these criteria include the North and South Forks of the American River, the upper Yuba River and the upper Bear River. As a general rule, the higher elevations of watersheds with higher levels of precipitation will yield greater amounts of runoff. Those areas are therefore of greatest importance as sources of water supply. Factors affecting runoff and stream flow in addition to precipitation include vegetation cover, stream density and soil conditions. These are also factors in water quality.

In general, the quality of water supplied from the Sierra Nevada is good; however, there are local instances of bacterial and chemical contamination and excessive erosion and sedimentation. The principal causes of water quality degradation are wildfires and low standard un-surfaced roads. Unlike land uses such as development or timber harvesting, neither of these causes is subject to control through state and federal water pollution control regulations. Land managers in upland watersheds who manage their properties to maintain high water quality from runoff and infiltration through their property are not currently compensated for these actions. A limited number of streams, creeks, rivers, and lakes located within the SACOG forested region are designated impaired waters or 303(d) water bodies. There has been increased focus by regional and state water boards to protect water-related biological resources and this is becoming increasingly part of the high standards forest managers must meet when implementing management plans. However, it is important to note that timber harvest plans are regulated and approved by CDF and overall economics of timber harvest are greater driving factors in commercial forest management compared to water quality issues. Within national forests, the Clean Water Act has a much more prominent role as the US Forest Service implements management plans.

**Climate Change**

Climate changes projected for the future will affect temperature and precipitation throughout the forested landscape. These changes, in turn will affect the snow pack, runoff rates and timing and ultimately, water supply. Ecological changes will occur as well as forest species adapt to the changed climate through shifts in their ranges of occurrence. The number, size and severity of wildfires are expected to increase. The forested
lands are a component of California’s global warming mitigation plan as directed by regulation under AB32. Forest land management for carbon sequestration and wildfire mitigation are important components of an overall climate change mitigation strategy, however, due to the long-term nature and wide-scale impacts of climate change, it is expected that forest land owners will need to adapt their management strategies to changing climate patterns over the next 50 to 100 years. Opportunities to mitigate climate change impacts include carbon sequestration and renewable energy generation through biomass energy.

**Figure 11: Potential Decrease in April Snowpack in the Sierra Nevada (Source: California Department of Natural Resources, 2009 Climate Adaptation Strategy Report)**

Biodiversity and Forest Health

The remarkable biodiversity of the Sierra Nevada is due to the wide range of environmental conditions and ecosystems that provide habitat for innumerable plant and wildlife species. Threats to the biodiversity in the forested landscape include forest pests (insects and diseases), exotic species, habitat degradation and fragmentation and conversion of forestland to uses other than resource management. Climate change will have a potential, but uncertain effect on biodiversity. The principal ways to reduce threats to biodiversity are to minimize land use conversions and implement forest management that enhances habitat and forest health.

Significant portions of the forested landscape are considered to be unhealthy due to over-stocking and high densities of brush. Over-stocking and high brush densities have generally been caused by successful wildfire suppression. Over-stocking creates stress and competition between trees for water and plant nutrients. Stress makes trees susceptible to mortality and to attack by insects and disease. Opportunities in this area include implementing thinning and vegetation removal operations that bring the stocking down to a level that is more in balance with available water and nutrients.
Recreation

Public and private lands provide a wide variety of recreational experiences to residents and visitors to the three counties. Recreation opportunities include camping, water sports (rivers, lakes and reservoirs), hiking, skiing, biking, hunting, and fishing. Local communities benefit economically by providing services and goods to recreational users. There is unmet demand for some recreation activities that could justify investment and development in some locations. Recreation has become an essential part of the overall economic well-being of the region since the downsizing of other industries such as mining and wood products.

Table 9: Recreation Areas within the Forested Region of El Dorado, Placer and Yuba Counties

<table>
<thead>
<tr>
<th>Recreation Area/Site</th>
<th>Uses</th>
<th>Use Levels (visitations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Dorado National Forest</td>
<td>Camping, hiking, wildlife viewing, snow sports, fishing, hunting, boating, OHV use, swimming, vacation home leases</td>
<td>2,000,000 visits/year (2003 data)</td>
</tr>
<tr>
<td>Tahoe National Forest</td>
<td>Camping, hiking, wildlife viewing, snow sports, fishing, hunting, boating, OHV use, swimming, vacation home leases</td>
<td>Unknown. A survey of recreational uses and use levels is currently being conducted.</td>
</tr>
<tr>
<td>Plumas National Forest</td>
<td>Camping, hiking, wildlife viewing, snow sports, fishing, hunting, boating, OHV use, swimming</td>
<td>Unknown</td>
</tr>
<tr>
<td>El Dorado Irrigation District facilities</td>
<td>Camping, hiking, wildlife viewing, snow sports, fishing, hunting, boating, OHV use, swimming</td>
<td>200,000 visits/year</td>
</tr>
<tr>
<td>Auburn State Recreation Area</td>
<td>Camping, hiking, swimming, boating</td>
<td>900,000 visits/year</td>
</tr>
<tr>
<td>Rubicon Trail</td>
<td>OHV use</td>
<td>12,000 users who make multiple visits per year</td>
</tr>
<tr>
<td>Bullards Bar Reservoir</td>
<td>Camping, boating, fishing</td>
<td>Unknown</td>
</tr>
<tr>
<td>South Fork American River, Yuba River, American River, Bear River</td>
<td>White-water rafting, swimming</td>
<td>Unknown</td>
</tr>
<tr>
<td>Rollins Lake, Loon Lake, Echo Lake, Union Valley Reservoir, Jenkinson Lake</td>
<td>Camping, swimming, boating, fishing</td>
<td>Unknown</td>
</tr>
<tr>
<td>Sno-parks (public and private), ski resorts</td>
<td>Sledding, snowmobiling, cross-country and downhill skiing</td>
<td>Unknown</td>
</tr>
<tr>
<td>Apple Hill</td>
<td>Agri-tourism</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Transportation Infrastructure

Interstate 80, US Route 50, State Highway 49 and State Highway 20 are the backbones of the transportation system within the three counties. These roads are the major corridors for economic activity within the rural communities. They provide recreation users access to the forested landscapes and enable forest-based businesses to export their goods and services. Roads providing access within the forest are owned and
maintained by the counties, the US Forest Service and private property owners. These roads are essential for developing resources such as energy from excess biomass. In recent years, declining budgets for road maintenance have adversely affected the operability of these roads. Poorly designed and maintained roads have been identified as a major source of erosion and sedimentation in central Sierra Nevada watersheds. Transportation infrastructure planning and investment for the future development of biomass-based energy industries can support these economic opportunities.

**Table 10: Caltrans Vehicle Counts in 2002, 2005, and 2008 in SACOG Forested Region**

<table>
<thead>
<tr>
<th>Route &amp; Measurement Station</th>
<th>Year</th>
<th>Vehicle Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA 20 @ Smartville Rd.</td>
<td>2002</td>
<td>7,500</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>8,300</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>7,800</td>
</tr>
<tr>
<td>CA 49 @ Marshall Grade Rd.</td>
<td>2002</td>
<td>2,750</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>3,350</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>3,500</td>
</tr>
<tr>
<td>US 50 @ Sawmill Rd (to Pollock Pines)</td>
<td>2002</td>
<td>17,500</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>15,700</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>15,800</td>
</tr>
<tr>
<td>I-80 @ Colfax</td>
<td>2002</td>
<td>26,500</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>26,000</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>23,500</td>
</tr>
</tbody>
</table>

**Carbon Sequestration**

Existing data indicate that rates of carbon storage exceed carbon emissions in forested landscapes throughout the three counties. Under AB32, the California Air Resources Board has proposed that forested lands in California provide a net sequestration rate of 5 million metric tons/year of carbon dioxide – inclusive of current wildfire activity. California’s forests currently exceed this sequestration rate. Carbon sequestration rates are predicted to increase over the next 50 years but may decline thereafter due to the effects of wildfire, insects and disease and climate change. Currently, there are limited or inadequate incentives for landowners to manage their land for increased rates of carbon sequestration. Markets for forest carbon sequestration credits have not been established within the United States and California for regulatory compliance. Some research has shown that active, sustainable management of some forests can increase the rate of carbon sequestration. Appropriate activities include reforestation of under-stocked areas, thinning to increase growth, and reducing the effects of wildfires. Carbon sequestration is an important area to monitor for opportunities as state and federal greenhouse gas regulations are expected to be implemented in the near future.

**Biomass Energy Production**

Biomass electrical energy generated in California is considered renewable energy and qualifies for the California Renewable Portfolio Standard. Federal law and regulations provide biomass energy a limited tax...
credit through the Production Tax Credit or the Investment Tax Credit for renewable energy generators, however this tax credit is less than the credit offered to other renewable energy technologies. Biomass energy facilities are not located within or near forested landscapes (they are located in Lincoln, Rocklin and Woodland); hence they are located at distances that make utilization of biomass from forested areas economically infeasible. Opportunities exist for investment in biomass transportation infrastructure and research and development for small-scale biomass utilization facilities.

Forest Management Innovations
The economic and environmental health of many rural communities in Placer, El Dorado and Yuba Counties is often closely tied to forests and the resources they contain. This was more prevalent in the past when forest management was heavily focused on timber harvesting and wood products. Rural communities within the SACOG region formerly contained much more timber harvest-related infrastructure such as sawmills and logging companies. Since the early 1990’s, timber harvest has declined dramatically in California, especially on national forest land. This has had a big effect on many communities and the resulting economic and social impacts have varied from place to place. Some communities have had more success adapting to the changes than others but all have felt the effect.

Today, there is general agreement among Sierra stakeholders that the level of timber harvest at its peak in the early 1990’s was too high to be sustainable in the long-term. At the same time these stakeholders recognize the increase in size and intensity of wildfires and the damage they cause and generally understand that forests benefit from some level of active management. However, there are still many different opinions about what constitutes the appropriate level and type of active management.

Ironically, due to disagreement on how to best manage risks, much forestland, both private and public, is not being actively managed. This results in unsustainable forest conditions where resource values are being negatively affected, possible economic and social benefits are not being realized and there is still broad social disagreement about what should be done to appropriately manage forests in terms of location, harvesting methods and the amount and size of trees that should be cut. There is an urgent need to resolve controversy and find a widely supported approach for managing forests. Without such support, current wildfire and forest health problems will be exacerbated by the predicted effects of climate change. Some level of agreement among diverse stakeholders is one key element necessary for implementing a model for sustainable forest management.

Sustainable management can provide some of the economic benefits associated with a conventional timber industry while ensuring long-term protection and enhancement of forest resource values. To recognize the concepts of sustainability in a holistic but simple model, consider the following benefits of a fully sustainable forest management program:

- Private forest landowners are able to receive enough income from their lands to make continued management investments feasible and to reduce the need to divest some or all of their land over time. Therefore more forestland remains as working forest and continues to provide and protect multiple resource values.
• Public forestland management produces enough income to offset the cost of managing those lands. Costs are reduced in part because public acceptance of management practices reduces the number of appeals and court suits filed against forest management projects and associated legal costs.

• On public forestland, increased income and a lower level of controversy about forest management projects allow a greater focus on forest ecosystem maintenance and restoration on sufficient acres to provide long-term protection of all forest resources. An additional benefit is increased stability/certainty of forest products that allows forest management businesses to plan for the future and make wise investments in both staffing and equipment.

• Multiple benefits are derived from having forests managed in a sustainable manner. These benefits include:
  
  o Forest management businesses pay taxes and employ local residents who in turn support other local businesses. Improved economic conditions make local communities more livable.

  o There is a reduction in the size and severity of wildfires. This increases protection of communities and reduces negative impacts on water supply and water quality, wildlife habitat and sensitive species, air quality, soil productivity, recreation and scenic quality. Increased protection of local non-commodity resources like recreation and scenic quality that provide community income contributes to local community well-being.

  o Healthy forests sequester more atmospheric carbon and less carbon and greenhouse gases are emitted into the atmosphere from wildfires, thus helping reduce the effects of climate change.

  o Assuming the expansion of local biomass energy production facilities (as described in a following section), excess forest biomass is utilized to provide energy in the form of electricity or fuel to local communities, reduce the use of fossil fuels, and provide local employment.

  o Sustainable active management occurring in appropriate places across the landscape lessens the threat and effects of wildfire on the greater landscape and thus provides increased protection for areas where little or no active management takes place. These areas include wilderness, roadless areas, wild and scenic river corridors, and critical wildlife habitat.
Innovations for Achieving Sustainable Forest Management and Community Well-being

There are two prerequisites that seem necessary to achieve sustainable forest management and community well-being:

1. Active management of forests that produces economic value and ensures long-term protection of forests and forest resources.
2. For the first point to be achievable, there needs to be a broad public consensus for management of forests.

There are many possible actions to consider in pursuit of these two prerequisites. Those actions include, but are not limited to, the following three broad innovation concepts:

1. Promote collaborative efforts to reach agreement among various interests on what constitutes desirable and appropriate forest management;
2. Utilize ecosystem services payments to reward forest landowners and public land agencies for long-term protection and enhancement of forest resources; and
3. Maintain and re-establish local forest management infrastructure.

Included at the end of this working paper is a matrix overview of the innovation concepts and the related actions/programs that could be utilized to achieve each innovation concept’s intended impact.

Innovation Concept 1

Promote collaborative efforts to reach agreement among various interests on what constitutes desirable and appropriate forest management.

Why This Is Important: Reaching a broad-based, stakeholder supported, regional agreement on forest management would allow a stable level of management to occur and would help move toward long-term sustainability and resource protection.

Innovations Under Concept 1:

1. Support Regional Collaborative Efforts.

Regional-level collaborative efforts offer opportunities to develop the kind of agreement that would allow widespread implementation of sustainable forest management that can benefit forests, communities and the region in general. While this innovation is far from novel for many organizations—including watershed groups, Fire Safe Councils and other local organizations —
regional collaboration across many jurisdictions and agencies is uncommon when addressing forest management issues.

**Impact of Innovation:** While existing collaborative efforts have received support from a broad spectrum of interests, additional support for this particular effort (and others) will help create the kind of critical mass that is necessary to ensure success.

2. **Support other, more local, efforts to reach agreement on forest management issues.**

Regional collaborative efforts are important, but in regard to National Forest management, in some cases, more local efforts can be undertaken successfully and more quickly to reach agreement on forest-specific issues/conflict.

**Impact of Innovation:** Similar impact as Innovation 1, but with focus on smaller geographic areas.

3. **Support establishment of local “Forestry Certification Cooperatives.”**

Such cooperatives would help landowners get their forest management operations certified as “sustainable.” Certification is completed by private organizations and is typically too expensive to pursue for owners of small- and medium-sized forestland parcels. But if owners joined together in cooperatives, the cost would be more reasonable and worth pursuing. Organizations and/or local government entities could help establish a pilot cooperative and perhaps even help provide upfront funding to begin the certification process. Forestland owners who participate would be able to repay the certification fee over time. It would be worthwhile for these owners to pursue certification, because their management activities would receive less outside scrutiny.

**Impact of Innovation:** Having forestland ownerships and their management certified as “sustainable” would lessen concerns about active forest management among those interests that are most active in opposing forest management activities. Addressing concerns early could result in less time and effort by forest landowners to deal with challenges to their management activities and perhaps, ultimately, even in streamline the processes necessary to plan and carry out management activities.

4. **Support certification of National Forests.**

Similar to certification of private forestlands, certification of National Forests can be completed in order to document and ensure that management is done in a sustainable manner. Organizations and/or public agencies can voice support for the concept by communicating with the Forest Service’s national office, the Secretary of Agriculture and California’s elected Representatives and Senators.

**Impact of Innovation:** Certifying National Forest management as “sustainable” could ultimately contribute to building consensus and achieving a stable level of management on National Forests.

5. **Develop education and outreach materials that can be used by a range of organizations to inform decision-makers and public and private stakeholders**
Education and outreach can be very effective in helping people understand issues related to forestry. Some of those issues include:

- The benefits of sustainable forest management for reduction of wildfire effects, protection and enhancement of forest resources, protection of communities, enhancing local economies, and reduction of fire suppression costs.
- The processes that landowners must follow to satisfy the laws and regulations that govern forest management—not the laws and regulations themselves.
- The benefits of maintaining forests in forestland ownership, such as watershed integrity and wildlife habitat, reducing vehicle-related impacts that result when rural areas are subdivided, and reducing the need for additional infrastructure and public safety investments associated with rural subdivisions.

**Impact of Action:** This action would raise awareness of the benefits of sustainable forest management and how regulatory processes can sometimes slow the implementation of certain forest management practices.

**Innovation Concept 2**

**Utilize ecosystem services payments to reward forest landowners and public land agencies for long-term protection and enhancement of forest resources.**

**Why This Is Important:** With few to no options to provide forest-based revenue streams for the management of forest resources, land management agencies and many private landowners depend on public funding to support their activities, especially fuels reduction activities. It seems quite reasonable for forest landowners to be compensated for helping to maintain a forest environment and forest resources that benefit the public at large. The public has demonstrated that they value these assets and services, show preference for maintaining them, and at times intervene to assert control over forest management.

**Innovations Under Concept 2:**

1. a. Conduct economic and accounting protocol studies that support the development and implementation of ecosystem services funding mechanisms.

    b. Explore ways to develop and support implementation of systems that would provide monetary compensation for sustainable management of forest resources.

    Studies conducted by unbiased third parties can provide background information for establishing the actual framework for quantifying the dollar values of specific resources.
Unbiased studies are needed to ensure credibility in setting the value of the resource, credibility in establishing the process for measuring the resource and credibility in tracking the status of the resource over time. Stakeholder involvement in such studies would be of great importance.

**Impact of Innovation**: Finding appropriate ways to compensate landowners and public agencies for protecting resources would provide funding to allow additional forest management or stable income where current practices are being done in a sustainable manner and are protecting natural resources. Such funding would also provide incentives to manage for natural resources other than forest products and could potentially create a more direct financial link between natural resource users and suppliers.

2. **Support and encourage the use of conservation easements for local forestland.**

   Conservation easements are legally binding agreements between a landowner and a private organization or public agency. A conservation easement limits certain kinds of uses and/or prevents development from taking place in perpetuity. Easements are individually tailored to meet desired resource protections and needs of the landowner. Landowners receive tax reduction benefits and/or direct payments in exchange for agreeing to the constraints on the use of their land. Forestland conservation easements provide long-term assurance and stability of forestland ownership and also provide additional economic feasibility for the owners to manage their forest in a sustainable manner, thus benefiting both society and landowners. Society benefits by having more forestland remain undeveloped.

   **Impact of Innovation**: Conservation easements place certain constraints on management of the land in the easement; however, they reduce concerns about the management of the land in the easement and can reduce in property tax or direct payments to landowners. This results in the property owner having more income to invest in management and reduces the likelihood that the property will ever be sold and developed.

3. **Support development of a guidebook for protection of watershed values in forestland areas being developed.**

   Communities within the forested area often have high impacts on watersheds, because adequate water protection measures are not followed when new development occurs. Although not designed specifically to address protection of watershed values in forestland areas subject to commercial development, there are numerous examples of watershed protection guidebooks. Many are called “Best Management Practices” (BMP) handbooks and they incorporate the latest scientific and technical knowledge in the recommended watershed protection practices they contain. BMP handbooks usually address general forest management-related activities such as harvesting and road construction. However, the recommended protection measures these handbooks contain could easily be adapted to address land development impacts.
**Impact of Innovation:** A guidebook could be used by developers, community planners and county planners to implement actions that would ensure the long-term protection of watershed values in areas being developed. Having such a guidebook would standardize permitting requirements and could help streamline permitting processes, because planners could reference the guide as the basis for project approval and implementation.

**Innovation Concept 3**

**Maintain and re-establish local forest management infrastructure.**

*Why This Is Important:* Infrastructure involved in harvesting and processing wood has declined significantly in the last decade as harvest levels dropped. Such infrastructure at one time provided many family wage jobs in local communities. Forest management infrastructure consists of businesses that are involved in all aspects of forest management. These include mills or other facilities that process wood products, logging companies that harvest and transport wood products to these facilities, companies that harvest and process smaller, non-commercial products, consulting foresters who provide advice and services to landowners, support organizations that provide thinning services and energy facilities that accept non-merchantable biomass materials. With sustainable forest management there would be an opportunity to maintain and reestablish a variety of management related businesses. This would include an opportunity for opening mills for processing small logs, for more companies to conduct small log harvesting and businesses to produce products from what has historically been considered waste—small posts and poles, shavings/chips for animal bedding and landscaping, and biomass-to-energy conversion facilities.

**Innovations Under Concept 3:**

1. **Support the Establishment of Organizations and Cooperatives Focused on Business Development, Job Creation and Training or Retraining of Employees for Forest Management-Related Employment.**

In an attempt to offset the impacts of reduced timber harvest, local community organizations were created with the objective of providing a new basis for community economic and social health to substitute for timber. In some cases, these organizations have focused on forest and watershed restoration. In other cases, they have focused on developing new forest products from formerly un-merchantable materials or on forest fuels reduction. In addition, there has been significant progress in the establishment of small sawmills, post and pole and landscape materials enterprises that are owned and operated by local firms. These enterprises typically service niche markets that are also local and utilize a variety of forest resources ranging from commercial timber to woody biomass material recovered from forest treatment activities. As these enterprises are headquartered within the local communities that they serve, they contribute to regional economic vitality and due to their small scale are sustainable long term.
Impact of Innovation: Sustainable forest management would offer the opportunity to maintain existing forest management infrastructure, but also to expand infrastructure in some cases. This would especially be true in regard to developing businesses that utilize raw materials that have typically been considered and treated as waste. Local organizations can be valuable in helping develop such businesses, find and develop markets for resulting products and train people to work in the new businesses. This innovation would provide a place for potential employees to go to learn a job skill and a place for employers to go to find employees that need less on-the-job training.

2. Support and encourage the use of stewardship contracting for implementation of USDA Forest Service forest management contracts—and encourage local Forest Service offices to utilize the stewardship contracting option of giving preferential consideration to local businesses.

USDA Forest Service forest management projects are normally accomplished through contracts. Stewardship contracts require the contractor to do various kinds of resource-specific work in addition to completing traditional forest management work. Contracts are awarded to the person or company that provides the best overall package of resource and economic benefits. One option that can be incorporated into the stewardship contracting process is the awarding of extra points to those contract proposals that include local businesses in accomplishing the contract work.

Impact of Innovation: Businesses in rural communities that are near national forests would receive additional points during the process of selecting the successful contractor. This would help support existing forest management businesses in rural communities and would encourage the establishment of new businesses.

3. Support preferential siting or permitting for biomass utilization facilities within high wildfire risk zones.

The primary factor influencing economic feasibility of biomass energy facilities is proximity of the facility to the fuel sources. Transport costs are very high. Siting small biomass energy facilities centrally located near sustainable sources of biomass—such as in and around communities where hazard reduction operations are occurring—is desirable. This would normally require new infrastructure—sites with buildings and biomass fuel storage space and in some cases, new transmission lines to tie into the electrical grid. Preferential siting would require identification of target areas that have good road access, high fuel loads, and transmission infrastructure. This concept could also give higher preference for opportunity areas where cogeneration (power and heat) could be effectively utilized. The result of this process could be a map identifying suitable sites for future location of biomass utilization facilities.

Impact of Innovation: Use of air emissions offset credits and preferred siting protocols would lessen the time and effort necessary for development of biomass power generation facilities by selecting optimized sites that are suitable and generally acceptable with the public.
4. **Support implementation of Fire Safe Community Guidelines in forestland areas.**

This innovation involves supporting adoption of standards that have been developed by the Fire Wise Community/USA organization to provide increased wildfire protection for communities. These standards were developed by fire and planning professionals to guide and encourage the development of community plans that enable communities and homeowners to have pleasant living environments while ensuring the absolute safety of people, homes and other buildings.

**Impact of Innovation:** Community wildfire protection guidelines support sustainable management of forest vegetation while increasing fire safety in the wildland-urban interface.

5. **Incorporate fire threat mapping into local and regional decisions about transportation and land use planning.**

Well-researched fire threat mapping exists for most areas in the state. This mapping is typically used to help local and regional organizations and agencies plan distribution of funding for various forest management projects and for helping agencies plan and regulate future development. Increased use of fire threat mapping in land use planning decisions would allow future communities to strategically manage the forested landscape and reduce fire threat within their communities. Similarly, such mapping could also be used to guide decisions about adding or upgrading existing transportation infrastructure to improve access to high fire threat areas that would benefit most from treatment and restoration activities and to facilitate exit routes for community residents fleeing a wildfire event. One example of an attempt to inform and advise about the benefits of fire threat mapping within the context of land use planning is a Sierra Nevada Alliance report on an analysis of fire threat acreages within parcels that were zoned for current or future development.

**Impact of Innovation:** This action would help improve the economic viability and cost-effectiveness of hazard reduction work by improving access to high fire threat areas and to the forest products and biomass material that result as a byproduct from such work. This would allow and encourage additional hazard reduction work, thereby increasing public and community fire safety.

6. **Support and encourage counties’ participation in woody waste collection and handling programs.**

Collection of woody waste that results from maintenance of small properties can be done to encourage such maintenance. Such woody waste can be utilized in various ways to offset the cost of the program—for example production of energy or miscellaneous products.

**Impact of Innovation:** This action would help encourage individuals to complete hazard reduction work on their property in the Wildland-Urban Interface area. This would contribute to better community fire safety and better protection of resources.

The forested landscape of Yuba, Placer, and El Dorado counties is a diverse environmental landscape that is home to an array of landowners and a rich history of industries. Historically, the timber industry has been a
major revenue source for rural communities; however, the service industry is predominantly the main employer in SACOG forested rural communities today. While the landowners that live on the forested landscape are the direct stakeholders involved with managing the forest, a variety of other stakeholders including the US Forest Service, California Department of Forestry (CDF), environmental groups, and industry groups are actively involved with forest management. Natural resources, recreation and other assets produced on forested lands are utilized by urban, agriculture, and environmental consumers throughout the SACOG region. By far, wildfire events and risks have the potential for the greatest amount of damage to the forested landscape and the benefits it provides. Changes in the forested landscape due to climate change are likely to increase wildfire risk and force landowners to adapt their land management methods to mitigate this risk. The overall economic health and sustainability of the SACOG forested landscape will rely on rural communities incorporating innovative methods to efficiently utilize forest resources (e.g., biomass, water) in order to effectively mitigate increasing wildfire risks in the face of climate change.
WATER RESOURCES

Introduction
This section of the RUCS report was written for SACOG by water resource consultants in the Sacramento region. It was completed in mid-2009 to provide the SACOG Board with context for the water resource issues facing the region and agriculture in particular. It is well understood that water issues are central to agriculture—as well as urban areas and the environment—but many stakeholders do not understand the broader context for these water issues. This report provides that context and is just as relevant today as it was in 2009. It does not; however, offer specific innovations like other topics areas discussed in this report, but provides a foundation for possible strategies to address water resource issues. One update has been made to the legislative section to include the results of the water package approved by the legislature and signed by the Governor in November 2009.

Background
As identified during the Blueprint process, paying close attention to the synthesis between land use and water demands can produce significant reductions in the incremental increase in water necessary to meet future growth. Without such attentiveness, the pressures felt by agricultural and environmental water users as urban needs expand become magnified — resulting in greater conflict among rural and urban water users and uses. Recognizing the concerns of each of these interests during land use planning allows for smarter growth that can successfully accommodate the needs of all.

This section serves three primary functions: 1) to provide a brief historical context of water resources available within the broader multi-county area influenced by SACOG; 2) to illustrate the technical, legal, regulatory, political and economic drivers that have recently and will continue to influence management of regional surface and groundwater resources, and thus influence rural issues addressed in RUCS; and 3) to provide a grounding for the understanding of agriculture’s concerns about the inherent costs and reliability of sustainable water supplies associated with continued increase demand from urban growth pressures and environmental requirements. If the reader is to take one single idea from this document, it should be the following: Water resources can be extremely complex and highly context-dependent.

From historical dependencies in the legal framework of water rights, to the difficulty in predicting outcomes of water-related lawsuits, to the unique economic and emotive properties of water, to the multiple attributes that determine the value of the resource, to the inherent physical variability of the

---

44 When compared to a future baseline of land use and housing products that tend to mimic today’s higher per-dwelling unit water demands, Blueprint indicated water demands could be reduced by at least 30 percent.
45 Rural areas predominately use water to sustain agricultural businesses. This is contrary to most of the urban use of water, which is to sustain a livability and to facilitate business functions. On average, 60 to 70 percent of urban water demand in the greater Sacramento region fulfills residential needs – needs for landscaping and indoor use. Of the fraction remaining, only a small percentage is actually part of commercial or industrial services. Most is used for non-residential landscape and “domestic” uses at businesses, such as bathrooms.
resource, to geographical and physical limitations imposed by the physical nature of water, understanding and addressing management of water resources for multiple interests is a unique challenge.

People have long realized in concept the interconnectedness of the physical and institutional drivers of complex water problems, but are only now grappling with integrating them in planning. While there are no one-size-fits-all solutions to the issues that SACOG and its members will inevitably face during the development of RUCS, careful consideration and a holistic approach to planning can help craft durable solutions to the problems that will arise as the Sacramento region grows and changes.

**Historical Perspective**

In 1848, James Marshall made a discovery along the south fork of the American River that would change the use and management of water resources derived from the Cosumnes, American, Bear and Yuba rivers forever. People flocked westward to search for gold, eventually developing techniques for mining that used huge quantities of pressurized water. In addition to the dams, canals, flumes and other infrastructure, a system of surface water rights grew out of the desire to protect those who made the first investments to remove water from streams for use in the new mining techniques. The influx of people increased the need for water to search for gold, to grow crops on the fertile soils and to serve the ever-growing communities. As people stretched beyond the feasible reach of rivers, they built more complex diversion and distribution systems and learned to tap the primed aquifers that often lay within several feet of the surface.

Over generations, public agencies formed to manage many of the surface water storage, diversion and distribution systems, first for agricultural and mining uses, but over time, more and more for urban needs. This was especially true for the American River system. When the federal government sought to help Sacramento with managing floods, they built new dams that also became a critical part of the Central Valley Project — serving people and farms throughout the Central Valley, including a significant number of the current water purveyors serving the urban needs within SACOG’s boundaries.

Over the past few decades, competition for the surface and groundwater resources in and around the Sacramento Metropolitan region has increased significantly — especially as demands have grown throughout the state and interests often look upstream for easy answers. Because of the seniority in water rights held by many of the agricultural and urban water purveyors in the area, water supplies locally have not been a significant concern — until the last decade. This conflict is noticeably pronounced as the state faces critical drought conditions while at the same time debate rages over the construction of a canal to transport water supplies around the imperiled Delta.

**Significance of Water History**

The history of water development in this region helps explain the complexity, and sometimes seeming irrationality, of water resources management in California. The development of today’s water infrastructure, laws and institutions was largely a haphazard affair that built on the conditions existing at
each era, rather than a series of clear planning processes that weighed the issues. (Efforts such as RUCS are a very recent development, and remain the exception rather than the norm). This historical progression has, to a large extent, constrained and directed water resources management and development and will have a unique impact on the RUCS project.

It is relevant to note that water law is a very slowly progressing branch of the law, for a circular reason — cases take many years to run to completion, and there is very little case law on which to draw precedent. Therefore, water lawsuits are high risk, and parties often settle out of court, further contributing to the dearth of case law. This is reflected in a very conservative and risk adverse culture among water managers — especially those who have long managed water supplies predominantly serving agricultural interests. Finally, it is also relevant to note that the history of California water is a history of urban-rural tensions, with more recent environmental considerations further completing the story.

**Local Water Budget Conditions:**
In the abstract, the significance of this historical context is difficult to grasp. To help, Figure 12 provides an annual snapshot of urban, agricultural and environmental water uses (A) and the water sources (B) that were used to serve the demands. These water budgets — adapted from California Department of Water Resources data – represent the six individual SACOG counties in 2003, a representative water year with slightly above-average supplies.

It is important to note that while these data provide important big-picture information, they must be treated with caution. First, as described elsewhere in this report, the technical, scientific, and institutional details are often critical to understanding even the big picture. For example, portions of “environmental flows” represent water left in rivers and streams for ecological reasons, which may have originated in other counties and be going to uses further downstream. Other portions represent water that is used consumptively, such as in evaporation and transpiration from wetlands. Thus, within each category multiple types of “demands” on water supplies are represented.

Second, although these figures are rough proxies for supplies and demands, they do not represent those concepts in the economic senses of the terms. Rather, they are a snapshot of annual water supplied, and the uses to which that water was put (e.g., more demand and/or supply may have been present, or groundwater may have been “mined” to serve a demand seen in that year). Nonetheless, while drawing strong conclusions about potential future water supplies and demands from this snapshot would require more detailed analysis, some important coarse-level inferences can be seen:

- There is great variation among the counties within the SACOG region in supply sources and uses of water. Each county will face a unique set of challenges as land use changes in coming years. These variations stem from the historic development of the water rights and uses over decades.
- Water use is dominated by agriculture in four counties (Placer, Yuba, Sutter, and Yolo), and is more evenly distributed among the categories in Sacramento and El Dorado.
Groundwater is a significant part of the water supply throughout the SACOG region. Yolo County is the most reliant on groundwater, at 40 percent of deliveries.

Generally speaking, local water supplies are those surface water resources that originate in watersheds or run through the particular county and are rights held by the local water purveyor. Contract water represents water rights held by the state and/or federal government and delivered to local purveyors under a contract agreement. For instance, for several counties, the Sacramento River represents both a source of contract water and local water, depending on the water right associated with the diversion and use. The situation on each of the local rivers and streams — including the major sources such as the Sacramento, American, Feather, Yuba, Bear, Cosumnes, Putah, and Cache — is unique for each water course.

Sacramento and Sutter counties rely on substantially larger amounts of contract water than the others. This is significant because deliveries from the State Water Project (SWP) and the Central Valley Project (CVP) have been historically unreliable, as evidenced by operations during the current drought. [Note that CVP supplies are primarily derived from the Sacramento River watersheds, although some of this also is from the American River watershed, while SWP supplies are fully derived from the Feather River watershed.]

El Dorado County has the highest proportion of contract water supplies at about 50 percent, and has the smallest proportion of local supply at 8 percent. However, most of the contract water is a reflection of an agreement between county water rights holders and the federal government recognizing the county’s historic local rights on the American River.

Sacramento County has the greatest diversity in both supplies and uses. This may indicate a more robust water portfolio.

When considering the potential impacts of land use change, current water uses can be revealing. With the exception of Sacramento County, increases in urban water use would have to be very large to significantly affect any particular county’s proportion of agricultural to urban water use. Conversely, modest percentages of agricultural water use efficiencies could provide a buffer for large urban demand growth. Though this may seem in contrast to what this paper details regarding the competition for limited water supplies, any one particular section of land that may be facing urban growth pressures most likely sees the issue differently than when looking from a countywide perspective.

Note that while this observation is an easy one to make, water use may not be a zero-sum game in practice. As discussed throughout this report, attempts to manage change can be complex given the institutional constraints on water rights and transfers.

The quantity of environmental water use, though seemingly large, is mostly water passing through each county as in-stream flows and becomes part of the supply to the next downstream county.
Overall, the trend in many of the counties that comprise SACOG, urban demand is growing, but agriculture is not necessarily diminishing in a like manner and in some instances, new irrigated farmland is being brought into production (e.g., vineyards) where non-irrigated grazing land previously existed. Environmental use, as represented in Figure 12, has not varied significantly. Instead, what have varied are the regulations and edicts that require water to remain in-stream, dedicated to riverine habitat benefits. Absent a more complete data set going back decades, any particular trend in water use throughout the collective SACOG region cannot be determined.

With the historic context and recent water budgets as a starting point, the remainder of this section will discuss the array of factors that affect on-going water management decisions, with noted focus on affects to rural areas and agricultural interests.

**Types of water use**

To understand many of the factors discussed in this paper requires an understanding of water use in general. For the purposes of this document, water use can be divided simply into consumptive use and return flows.

Consumptive use refers to water that is not available for re-use because it evaporates, transpires, becomes embodied in another product, or has its quality impacted. Return flows refer to the portion of water withdrawn from a stream or aquifer that is used for some purpose and subsequently flows back into an available supply via treatment and return to a stream, through surface runoff, or infiltration to groundwater. It is worth noting that water quality of return flow is generally degraded compared to the water that was originally withdrawn for its use. Partly because of this, water quality generally decreases when moving downstream through communities.

A typical categorization of water uses at a coarse scale would be between urban, agricultural, and environmental purposes. This framework is useful and relevant when evaluating a region’s future growth. Each of the three areas may have agencies and stakeholders with unique and conflicting interests. As land use change proceeds, water use can change in terms of its total amount, but equally important, the proportions of water use in each category can shift, with implications for management and planning.

In the Sacramento region, approximately 60 percent of the water delivered for urban uses is consumed — primarily as evapotranspiration of landscaping and evaporation. About 40 percent returns to surface streams (as treated wastewater discharge and gutter flooding return flows) or to groundwater aquifers via deep percolation of over-applied irrigation water.

---

46 For instance, the Sacramento Water Forum requires water to remain in the American River under certain circumstances, but the environment’s demand has not changed and the historic conditions are not significantly different than what this agreement is mandating for the future.
Agricultural use tends to have even higher consumptive use than urban — on the order of 70 to 80 percent — but variations between crop types, irrigation methods, and management styles results in wide-varying values on a farm-to-farm basis. For agriculture, unlike urban landscaping, most crops have physically defined water use needs that have to be met to produce the economic output (i.e., to generally produce a ton of tomatoes, a set amount of water must be consumed by the plant). Landscaping is a choice with no physical economic output, thus different choices can be met with different quantities of water.

Unlike the other uses, environmental use generally does not consume water — with the exception of wildlife refuges.\textsuperscript{47} Instead, the use represents water dedicated to remain in the streams and rivers.

Though approximately represented in the water budgets shown in Figure 12, the data to really comprehend the water supply and demand attributes in any given boundary is not readily available or readily compiled. The unique nature of water rights, groundwater use and basin conditions, as well as historic and planned uses confounds many efforts to provide a regional picture. Nonetheless, further analysis can be applied to the SACOG region to understand in more detail how various, defined sub-areas use and supply water.

The Association of California Water Agencies (ACWA) recently proposed a conceptual model for partitioning water demand between end use categories. “Business use” would encompass a broadly defined category of economically profit-driven enterprises, including use of water for industry, agricultural, and related services. “Quality of life use” would include landscaping and indoor use by private homeowners, as well as use for parks and recreation and other services aimed at non-business users. Note this conceptual model is novel, but could provide a useful framework for targeting water use efficiency measures by more accurately categorizing the potential impacts of water conservation measures. For example, ordinances to require low-water landscaping or low-flow fixtures in new or existing developments may have a perceived impact on residents that can be weighed against programs that require efficiency measures and have direct or indirect costs to businesses.

One useful result of the ACWA framing is that it leads logically to thinking of water not in terms of physical quantities, but in terms of the goods and services that humans value it for.\textsuperscript{48} For example, a residential water user may not actually care if they are served 25 gallons of water or 13 gallons of water when they turn on their washing machine. They are interested in the resulting product: clean clothes. Similarly, a semi-conductor fabrication plant may not be as concerned about how many gallons of water they use, especially compared to other, more expensive inputs when their main goal is to economically maximize chip production. These issues and the demand for water manifests, though, when questions are raised as to the value of water-demanding landscaping in an ever-increasing environment of limited supplies.

\textsuperscript{47} Sutter County is the only county within the SACOG region with significant refuge water demands.

\textsuperscript{48} This is a concept often articulated by Dr. Peter Gleick of the Pacific Institute.
Figure 12 – Representative water budgets for each of the six SACOG counties for 2003
(data and categories from the California Department of Water Resources)

A) Water uses: urban and agricultural use is from sources shown in the figure to the right and used to meet consumptive use, while environmental water is generally for in-stream flows originating within or flowing through the county.

B) Water supplied: local supply is surface water originating generally within the watershed of use under water rights owned by local entities or individuals. On the Sacramento, Feather and American rivers, this watershed also contains contract supplies under rights held by the state or federal government.
Drivers of Change
The sections that follow provide a brief overview of various key aspects of water in California. Though far from comprehensive, the discussion represents the critical factors that play into the complexity of water resources planning and decision-making — an important function for RUCS — and why a truly integrated approach to water resources is both essential for sound planning, and very difficult to do well.

The Changing Land Use Landscape
Primary to the need for integrated planning is the often-voiced concern from agricultural interests that urban growth is creating a slow, but steady erosion of both land and water away from agriculture — a business enterprise — to housing. Agricultural interests know population growth is inevitable and some can picture a future where agricultural productivity immediately around major metropolitan areas is greatly diminished as water is instead used to serve urban needs. While there are examples of this, it is likely an oversimplified representation, but illustrates existing concerns and, thus, a desire to aggressively defend both historic land and water uses.

Over the past several decades, the Sacramento region has expanded outward into otherwise rural areas. Some of this development occurs where little agricultural productivity was occurring (e.g., Folsom), while other developments converted productive agricultural land into urban uses. This change in land use has an associated change in the pattern of water use. For instance, a typical farming operation will use water in accordance with the needs of the crop — more in the hot summer, less in the spring and nothing after harvest and through the winter. That means that the demand for surface or groundwater for three to five months of the year did not exist. In contrast, people need water year round. Though over half of the water supplied for urban uses is to meet the “crop” demand of landscaping, serving the “people” portion of urban use has spread the demand for water into all months of every year. These baseline pressures impact the operation of many of the facilities design to serve agriculture — from reservoirs in the Sierras to canals that route water around the region — by changing reservoir release patterns, affecting the timing of routine maintenance, and increasing the “response” by water purveyors to issues49. The magnitude of this change has yet to be significant enough, however, for most agricultural interests to be affected, as serving agricultural continues to be the largest need.

The increased pressure from land use changes has also increased the competition for groundwater, especially during dry years when surface supplies may be short. Since agriculture always had the option of not planting (or limiting planting) during dry conditions, shortages could be managed, although with economic consequences. With the change to baseline urban demands and the inability to cease delivery under shortages, many urban water purveyors are protecting themselves with new groundwater wells — or programs that ask others to pump groundwater in exchange for limited surface supplies. Tapping

49 As a purveyor begins to serve urban demands as well as agricultural, the number of customers increases exponentially (e.g., with hundreds of customers where there was once only a few) with an accompanying increase in the demands and responsibilities on staff and resources.
groundwater during dry conditions simply increases the pressure on the groundwater basin that underlies the entire region — to the potential detriment of historic groundwater users, such as agriculture and rural homeowners. The groundwater basin under many of the counties in the SACOG region has generally been able to respond to these varied pressures, but could begin to see lowering groundwater levels (increasing the pumping costs) and ground subsidence — issues that have been experienced in the past and, in some remote areas of the six counties, are occurring today.

Many urban purveyors recognize this issue and have developed groundwater management plans. While these plans are focused on urban supply needs, they may also help manage supply for rural uses as well. Initially, many of these plans were simply “check-the-box” efforts to satisfy state legal requirements. Today, however, several coalitions have formed to study and manage the basins. Most have the following objective: protect groundwater quality and levels to ensure a safe and reliable groundwater supply. Efforts to engage affected agricultural interests have been included, although generally more in an informational rather than partnership role. Going forward, direct partnerships with agriculture will be crucial for successful groundwater management. These partnerships can help educate all stakeholders on the impacts of their own pumping as well as help manage or mitigate the potential impact on one another. The Sacramento Groundwater Authority is one example of a successful comprehensive partnership.\(^{50}\)

One significant shortcoming of the changes occurring to land uses around the greater Sacramento metropolitan area is the general lack of communication and integration between the long-range planning activities of water purveyors and those of land use planners. As has been the case throughout the state over the past several decades, land use planning often dictates the type and location of urban growth indifferent to the water resource implications. In turn, water purveyors often react to the plans, rather than influence them.

As water begins to get more attention, this necessary synergy between land and water planning is gaining a foothold. SACOG’s Blueprint was an example of how communication can begin. Additionally, newer state laws such as SB 610 and SB 221 (enacted in 2001) require urban areas to assess the sufficiency of water supplies available for new growth. When groundwater is part of the intended urban source, these planning analyses must also assess the ability to meet all demands on the basin — including the existing and future agricultural demands. These planning documents are increasingly becoming a critical step in land use approvals and an opportunity for agricultural and rural interests to raise critical concerns and seek collaborative solutions (e.g., the Sacramento Central Groundwater Authority).

Compounding the communication gap between urban land and water planners is the gap between urban interests and agriculture. Through mechanisms such as SB 610 water supply assessments, agricultural

\(^{50}\) The Sacramento Groundwater Authority is a joint powers authority joining 14 water purveyors together who use groundwater resources north of the American River to the Sacramento County line. Their mission is to help manage and protect the groundwater resources in the basin, consistent with the Water Forum Agreement.
interests are learning that they can play an effective — although unfamiliar — role influencing land use decisions. One growing point of contention by agriculture is that development should “pay its own way” with water rather than stripping it from local agriculture. Promoting water recycling, urban water conservation, new storage facilities, conjunctive management and other tools to introduce new supplies or better use existing supplies is likely to be a growing mantra from engaged agricultural interests as growth pressures continue into the future. As providing adequate water supplies becomes more challenging, regional analysis and coordination will become increasingly important to maintaining adequate supply for all users — including the often under represented environmental uses.

The Economics of Water
A discussion of the economics of water resources first needs to address the question “Why is water different?” Water is different from other commodities because it has distinctive emotive, physical, symbolic, and economic features.51 The Dublin Principles consider water an economic good, and in the claims of some scholars, water is no more a necessity than food or housing, and should be treated as such economically. Others view water as a public trust and fundamental human right. Both views have merit, and the reality lies between them. Water is different partly because it is perceived as different, and because it has certain distinct economic features.

- The physical, legal and economic properties of water lead to incentives to collectivize water provision.
- Water is mobile, and while some use is consumptive, it can also be used sequentially for multiple different uses. Sequential use is very prevalent within the agricultural sector surrounding Sacramento. This occurs when the runoff from one farmer’s irrigation becomes part of the source water for the next downstream user.
- Water is expensive to transport relative to its value, leading to sparse infrastructure networks compared to higher value liquids such as oil. It is cheap to store once infrastructure exists. In this, different provision strategies apply than for electricity, for example, such as stockpiling instead of generating new amounts of the resource.
  - Naturally occurring groundwater is one of the most economical storage and retrieval infrastructures available, but increasing pressure on groundwater sources is lowering water tables, forcing more cost to lift the water back to the surface. This is particularly burdensome to agriculture which tends to operate on thin margins and fluctuating commodity markets.

---

• Tracking flows can be difficult, leading to difficulty in establishing property rights or enforcing excludability.

• Water has large economies of scale and capital intensity, which again leads to large surface storage projects or treatment plants. This also leads to natural monopolies, and thus to the necessity of state control or strict regulation of its provision.

• Like land, water benefits ecosystems when left undisturbed by humans. Unlike land, water’s mobility and renewability means that humans can use it after or before its ecological benefits have been realized.

• Legally, in the Western United States as elsewhere, water is distinct from other commodities. This reflects some of the properties of water described above. There is no ownership of water, per se, rather usufructuary rights — water is in effect owned by the state and given away for free to those who have rights to use it. Thus, water rights are not property rights in the sense of other commodities.

• Water is scarce in many places relative to demands on the resource, whether in an absolute sense because of limited hydrology or in the sense of its actual availability, because of the lack of sufficient infrastructure or different distribution spatially or temporally from points of demand, or as a result of regulatory constraints.

• Economically, water is usually priced based on its physical supply cost, rather than scarcity value. In addition, there is a tendency to under-price water partly because of public resistance to rate increases because of the perception of water as unique, but also because agencies tend to price water based on historic rather than replacement cost of infrastructure.

• Water is an essential good, with no substitute as an input to production, but it is the additional uses of water (such as swimming pools) that determine its marginal value.

Many of these aspects of water’s uniqueness lead to sensitivity to political and institutional arrangements. If rules are simple, devised locally, transparent, with monitoring and enforcement cheap, and sanctions for non-compliance and fair adjudication, collective action is more likely to be successful in water allocation. Unfortunately, this is not always the case. Furthermore, because of the generally better funded urban users, agriculture often sees itself at an unfair disadvantage.

**Water transfers in promise and practice**
Prevailing wisdom is that the value of water will only increase as competition increases from urban, agricultural, and environmental customers. Indeed, evidence suggests that urban areas have been willing to invest large amounts to secure water through major investments in infrastructure, conjunctive use arrangements between surface water and groundwater, and other mechanisms. Water sales have been a part of this mix, but perhaps not as much as might be expected on purely economic grounds. In contrast,
many of the agricultural interests within the SACOG area made similar investments decades ago and now are the focal point for urban (and agriculture south of the Delta) as potential sources of new opportunities.

Often the willingness of urban investments are pricing agricultural interests out of the market for new or reliable supplies, which can have a detrimental effect on the economic viability for agriculture, especially within the zones of urban growth pressures.

Studies of water markets in California\textsuperscript{52} suggest that there is agreement among a broad range of stakeholders that water markets offer a potential mechanism to increase the economic efficiency of water allocation over the current method (i.e., allow those holding senior water rights to move water to more junior water users). The relatively few large water transfers that have been successfully completed, however, do not support this intuitive assertion.

One of the fundamental economic concepts motivating water transfers is that the value of water resides in reliability (or perceived reliability) of supply, rather than simple quantity. This is reflected in the importance of dry year options in water trades, where a party can buy the right to exercise a water trade in drought years — often by asking agricultural users to fallow land or to pump groundwater instead of using senior surface water rights.

Until recently, the consensus on water marketing seemed to be that fundamental changes will have to take place before water marketing meets the hopes and expectations of many in the academic and water management communities. One of the key factors is the ambiguity in water rights quantification in California — if one cannot demonstrate clearly the right to water, including its past use, then one cannot sell that water. For instance, if a water right is held for 100 units of water, but the historic use (e.g., crop consumption) is only 60 units, then only 60 units can “legally” be sold. The remaining units are assumed to still be in the surface water system and available to downstream users as was the case prior to the proposed transfer. For many agriculturists, this would require fallowing of land or shifting to lower water using crops to make water available, rather than looking to water conservation and efficiency improvements, as these are not viewed as creating saleable water that can transfer to another user in another place in the Sacramento Valley\textsuperscript{53}.

Since clear quantification of water rights is the first prerequisite to transfers in a fully allocated system, this presents a hurdle to wider use of transfers due to the limited availability of documented uses. Other hindrances to water markets include high economic and political transaction costs, third-party effects (e.g., effects on ecosystems, other rights holders, downstream users), situational dependence of each transaction,

\textsuperscript{52}For instance, the Public Policy Institute of California – California’s Water Market, By the Numbers, Ellen Hanak, 2002

\textsuperscript{53} It is possible for efficiency improvements that save water to create more available supply within the same designated place of use defined in the underlying water right. The California Water Code allows current right holders to improve their beneficial use of water within their service area, even if it impacts downstream (and/or junior right holders). In contrast, any attempt to move the same water generated through efficiency improvement to a new service area would be disallowed because of the same injury to other legal users of water (e.g., the “move” to a new use is viewed as now the most junior use of a right and therefore, the injury to another user is viewed as legitimate).
and the regional nature of water systems that limit the size of regional markets. Further obstacles include veiled speculation and constraints on transfers of water from large publicly funded water projects.

However, one cannot tell the future, and a tipping point can be imagined in the sense of a change in water law, perhaps precipitated by a perceived crisis in water supply brought on by a combination of urbanization, increased dedication of water to environmental needs and drought. This is a primary fear of the agricultural industry — wherein individual right holders’ ultimate sell water to urban areas and diminish the supply for production of food and fiber.

A study of historical records of external water transfers from 1990-200354 concludes that leases accounted for more of the water changing hands than sales. Sales are by far most commonly made from agricultural to urban buyers. Urban interests have purchased most leases and sales, but a significant number of single year leases are to irrigators or environmental organizations. Municipal water is bought for higher prices than agricultural or environmental water. Prices for both sales and leases have been increasing, as one would expect for a finite resource under pressure from more restrictive uses and increased demands. This has increased the incentive to fallow agricultural land and sell into the water market. Efficiencies in urban use as demonstrated in the Sacramento region’s Blueprint and in best management practice efforts can help temper urban water purchases going forward potentially reducing the pressure on agriculture to supply water.

As an illustration of the latest trend in single year leases, this year’s Drought Water Bank, being run by the California Department of Water Resources on behalf of the Central Valley Project and State Water Project contractors south of the Delta, has set a price of $275 per acre-foot for transferred water. However, even at this price, there is not significant participation due to a few primary factors: (1) the commodity price for rice is high, so only limited acres of rice land is being fallowed, (2) the rules and restrictions on groundwater pumping are tedious for many smaller water right holders, (3) CVP settlement contractor allocations initially were lower than expected, meaning many were not sure if they would have “extra” water to sell, and (4) the Drought Water Bank is only able to buy water in July through September, a small window that adversely affects how agriculture may operate to either fallow land or substitute with groundwater.

Originally expecting to help with several hundred thousand acre-feet of water, the Drought Water Bank is now expecting to purchase less than 100,000 acre-feet and may end up with only around 60,000 acre-feet.

Recent and Prospective Local, Regional, and Statewide Regulations and Legislation
Many pressures are being brought onto local water purveyors — often as a result of urban development pressures and land use changes — but also to address the growing sentiment that we divert too much water

from our environment and need to embrace more sustainable approaches. Through state and local laws, mandates and regulations, water purveyors are increasingly discovering the need for comprehensive planning. Examples range from Folsom’s Measure W intended to protect existing water supplies from being used for additional urban growth, to water conservation reporting requirements that can effectively keep purveyors from accessing state bond resources (e.g., the California Urban Conservation Council’s Best Management Practices reporting is required for access to state water conservation grants).

From agriculture’s perspective — the predominant holder of senior water rights — many of these efforts to impose new regulations are attacks on their water rights and thus on their right to be in business.

Some of these issues are briefly addressed in the following subsections.

**Local ordinances and mandates**
A myriad of local ordinances exist around the region that can affect how water resources are managed locally, regionally and statewide. One example is Sacramento County’s ordinance requiring its approval prior to the transfer of surface water supplies to any point outside the County (SCWA’s Code 3.40.090).

Another example is an ordinance by the city of Visalia (Chapter 16.54) which levies a fee on new developments and a volumetric charge on existing urban customers to help manage and mitigate the impacts of the city’s use of groundwater resources. In this instance, the funds collected are used to pay for actions such as new groundwater recharge basins, acquisition of surface water and other functional management tools.

When addressing growth into existing rural areas, ordinances can successfully be used to dictate types of development products, require adherence to conservation objectives, direct landscaping characteristics, and even mandate sources of water, such as non-potable, for use on residential landscaping.

This section did not intend to list all the ordinances, but rather to note that each local jurisdiction, whether municipal, special district or other, can enact ordinances, pass mandates and generally affect the relationship between land and water use. Though often these ordinances are used by urban purveyors, they are also a tool available to agricultural water districts to help dictate encroachments into their service areas. For instance, an agricultural purveyor could require that a new urban development within its service area that might use groundwater should offset that use with recharge programs to maintain a beneficial use of the surface supplies otherwise used on the lands. Though these tools are available to agriculture, they generally are not used aggressively.

**The Water Forum Agreement and Local Environmental Needs**
As people become more aware of the effect of our water use on the local environment—especially urban use—pressure is put on water purveyors and thus residents to change their behavior.
As noted on the Sacramento Area Water Forum’s website:

> The Water Forum has successfully joined together water purveyors, environmentalists, agriculturalists, business leaders, along with city and county governments in Sacramento, El Dorado and Placer counties in a monumental agreement to secure the future of the Sacramento region water supply to the year 2030.

This effort, though, took several decades to negotiate and millions of dollars to design. It will cost millions more to fully implement.

What is instructive from the success of the Water Forum is that parties agreed that collective changed behavior will be necessary as this region continues to grow in order to protect the environment. SACOG’s Blueprint is another excellent example of a multi-jurisdictional effort to understand how regional growth can be accommodated while protecting many of the environmental attributes of the region.

**Delta and Statewide pressures**

If you live elsewhere, you might view the Sacramento-San Joaquin Delta as the hub of California’s water system, an interconnected complex of channels through which water is routed on its way to the demand centers of Southern California and the Central Valley in which several endangered and threatened species live. Some members of SACOG would also refer to the Delta as home.

The Delta has been a contentious nexus for statewide conflicts over California water for over 150 years. Immense energy has been spent attempting to construct durable solutions to the Delta’s dilemma as an intersection between agricultural, urban and environmental interests.

Although many water users in and upstream of the Delta enjoy senior water rights or water rights seemingly protected by “area of origin” statutes, efforts such as the Delta Vision are beginning to ask whether those rights are prudent. Agricultural interests are by far the largest holder of these water rights and are growing ever concerned with these questions of their rights.

The state of California is under extreme pressure to supply water to its contractors, as is particularly evident during the current drought, and environmental interests are seeking water supplies to improve the vitality of the Delta ecosystem and upstream watersheds. Implications of curtailment of SWP and CVP contract water sent to the San Joaquin Valley, the Bay Area and Southern California, as has been the case in during the last few years, may cascade upstream to the Delta, and through the water rights system in general.

The public trust doctrine discussed in the Delta Vision Strategic Plan inferred that the government can maintain certain resources for the use of the public. This doctrine has been used successfully to assert public interest in environmental factors, such as the Mono Lake restoration efforts. However, the public trust doctrine contains provisions for not only environment but also commerce and navigational uses, which complicates determination of “public good.”
The risk from the perspective of water rights holders in the Sacramento region is that these legal theories have not been thoroughly tested in court or in the political sector. While wholesale challenges to prior appropriation and area of origin protections would be considered revolutionary by many, broader statewide pressures may continue to push this question forward until something gives.

Since there is inevitably a political component to legal and regulatory risk, these risks may be exaggerated in places with a reality or perception of wasteful water use (e.g., *The Sacramento Bee*’s illustration of many water purveyors in the Sacramento region being wasteful). While such direct risks to water rights are admittedly outside the realm of previous experience, there is reason to expect that such changes may be on the horizon, and prudent planning dictates examining and understanding these risks and developing strategies to react and, if necessary, re-manage.

Currently, efforts by several state agencies under the Bay Delta Conservation Plan are looking to solve the multi-faceted Delta issues through the proposed construction of an isolated canal or tunnel to route water around the Delta, significant improvements to fishery and riparian habitats in critical sectors of the Delta (e.g., Yolo County) and address the responsibilities of all water right holders to maintaining the health of the Delta ecosystem. Several of the activities being contemplated will have direct impacts to local water supplies and agricultural land uses, especially in the Yolo Causeway.

As it turned out, many of the issues discussed in this section became part of a package of bills passed by the legislature in November 2009, which seeks to improve water supply reliability throughout the state. Governor Schwarzenegger signed the bills, which addressed governance in the Sacramento-San Joaquin Delta (SB7X 1), an $11.4 billion water bond (SB 7X 2), groundwater monitoring (SB 7X 6), urban and agricultural water conservation (SB7X 7), and water diversion reporting and significant fines for failure to report (SB7X 8). Of immediate significance is SBx7 1 (the Sacramento-San Joaquin Delta Reform Act), which established the Delta Stewardship Council (DSC) and called for the development of a Delta Plan by the DSC that would achieve the coequal goals of statewide water supply reliability and Delta ecosystem restoration. Another key element of a Delta solution is the Bay-Delta Conservation Plan (BDCP), which would be incorporated into the Delta Plan if certain conditions are met. As the DSC moves toward completion of the Delta Plan in January 2012 and the BDCP process continues to move forward, many in the Sacramento region are growing concerned about the future of water resources for the region.

**Water Use Efficiency**

The concept of water use efficiency as a water management tool has been gaining momentum. With the recent drought emergencies and 2009 water conservation target of 20 percent reduction in per-capita use by 2020, the tool has been given center stage. However, hurdles exist in its implementation, even in areas where water use efficiency could be feasible using accepted cost/benefit calculations. As shown in Figure 13, the participants in the Sacramento Area Water Forum have been able to reduce their per-capita use over the last few years, but during the same time, overall growth in water demand increased.

According to information provided by the state agencies working on the 20x2020 Program, the calculated average statewide baseline water use is 192 gallons per capita per day (GPCD), and Sacramento region
(Hydrologic Region 5) water use is 253 GPCD. Region 5 is among the higher water intensity regions by this measure, as shown in Figure 14. Since conservation targets are set to a state average, reductions are not evenly distributed throughout the state — higher water-using regions such as the Sacramento region are expected to reduce their water use by a greater percentage of the average regional water use baseline, up to 20 percent reduction. This compares to the 5 percent reduction (the minimum set by the 2009 law) for lower consumption regions on the coast.

Figure 13 – Water use trends as reported by the Sacramento Area Water Forum in the Years 5 and 6 Water Conservation Report (accessed from: www.waterforum.org)

Figure 14 – Per Capita Urban Water Use
Regardless of the actual gallons per capita per day value for any particular purveyors in this region, statewide (and legislative) pressure is on our region to see dramatic reductions. Can these savings be generated? Can the savings be used to accommodate the anticipated growth while preserving other supplies for agriculture? These and other questions will be front-and-center for many local jurisdictions and regional planning efforts as they contemplate the region’s future.

**Barriers to water use efficiency**

The concept of valuing the goods and services rather than water itself may seem self-evident, but it represents a paradigm shift. This shift is relevant both in terms of consumer behavior and from the perspective of water purveyors.

To some degree the system of appropriate water rights, as discussed previously, creates disincentives to conservation at the scale of water rights holders. Because of the doctrine of adverse prescription, water rights can be lost if water, unused by the original rights holder and left in the stream is then used by another for a period of time. This creates a strong incentive for water rights holders to use their full allotment of water, even if technology is available for more efficient generation of an end product. Efforts have been made to circumvent this particular consequence of water law, but they tend towards individual negotiated solutions in the course of water transfers rather than comprehensive changes.
Again, in contrast to urban uses, water efficiency in agriculture is an economic consideration to most cost-effectively provide the crop its water. With low-cost water generally prevalent in the Sacramento region, efficiency measures for urban uses have different drivers. If savings can occur from applying water more efficiently to meet the needs of the crop, then there is opportunity to effectively reduce the overall amount of water applied while still maintaining economic viability for agricultural objectives.

Many opportunities for increasing water use efficiency exist in urban, municipal, and agricultural sectors. The obstacles to implementing such measures are often the result of misaligned incentives and institutional constraints.

**Integrated Water Planning**

Water management has long been a local affair. In spite of much effort put towards statewide planning, the even the state effectively serves local interests. For example, rather than being a truly statewide project, California’s State Water Project in effect delivers to one specific, existing set of local contractors with rights to shares of annual project deliveries and individual sets of interests.

This local focus follows directly from the structure of water rights. Where water use is treated as a property right, incentive exists for water users to manage their own affairs. However, because of the perceived importance of water, and the many ways in which water touches interests beyond those of water rights holders, there are many motivations for more coordinated planning.

Integrated water planning attempts to address the broader association water has within a region. True integrated planning addresses the intertwined cause-and-effect relationship between diverse elements such as flood management, land use planning, economic viability, water supply reliability, water quality and environmental sustainability.

Locally, efforts at integrated planning have focused most on the interrelations between and among urban and sometimes agricultural water purveyors and, in the case of the Sacramento Area Water Forum, the environmental and recreational needs of the lower American River.

To help move regions to more integrated planning, the state has offered grant funding over the last several years. Now, many of the specific project-related implementation grants require regions to demonstrate adequate integrated planning and cooperation. Without meeting minimum thresholds, entities interested in state funds are outright restricted from competing. As an example of the state’s strong push toward integrated planning, it recently required interested regions to be “accepted” via a mandated process. As noted on Department of Water Resources (DWR)’s website:

*The region acceptance process is a component of the Integrated Regional Water Management (IRWM) Program Guidelines and will be used to evaluate and accept an IRWM region into the IRWM grant program. It is not a grant funding application, however, acceptance and approval of the composition of an IRWM region into the*
IRWM grant program will be required before any region can submit an application for IRWM grant funds. DWR has not previously reviewed and accepted any region, therefore, this process applies to all IRWM regions, both existing and developing.

Water Quality
Often secondary in the thinking of many water planners, water quality regulations actually are a primary factor in how water is managed today and into the future. For urban water purveyors, threats to the quality of the source water is of paramount importance — with regulatory requirements driving frequent monitoring and testing. Locally, the groundwater contamination from past practices of corporations such as Aerojet, local military bases and even corner gas stations has forced water managers to change sources of water, shut off wells and make significant investments in new infrastructure and treatment. As groundwater is still pumped, these managers must carefully understand whether their actions exacerbate contamination or help contain it.

Once water is used for many of our indoor needs, wastewater treatment plant operators have the dubious task of cleaning the water of human and non-human wastes to meet standards for discharge. Increased regulatory pressure on these discharges can quickly domino upstream to the customer and to the water purveyor in attempts to craft the most optimum solutions — the question remains, though: optimum from whose perspective? This question alone has and will continue to affect discussions about regional water recycling, per-capita water use and even the source of water.

In a similar fashion, regulatory constraints placed on agriculturalists for discharges associated with irrigation activities are adding pressure — especially economic — to how farming operations function. Ever-changing in-stream water quality objectives, established and enforced by the state and regional water quality boards, are increasing the degree of finger-pointing among dischargers. Within this finger-pointing are opportunities for agricultural and urban interests to benefit each other. Efficiency improvements in agriculture can improve the quality of upstream water so that urban areas are discharging into “cleaner” rivers and streams — reducing the added burden on their own requirements for clean discharge. Similarly, treated urban wastewater can be a viable and reliable source for agriculture, reducing the need for urban areas to meet increasingly stringent discharge requirements. Finding economically feasible ways to pursue these options will require collaboration, willingness and a shared interest in seeing each other prevail.

Emerging Strategies in Water Management
Described in this section are some broad categories of water supply and land use planning issues and solutions, whereupon some illustrative examples are provided, and a preliminary bibliography with sources for future research is provided. Some of these may be applicable to the development of RUCS or for use by water agencies or districts as they prepare plans for future service.

This is not intended as an exhaustive or detailed overview. Rather, the goal is to give a sense of precedents and existing ideas from other regions addressing land use and water conflicts relevant to the rural-urban interface.
A repeated theme is that there are no one-size-fits-all solutions to conflicts related to water and land use. In the localized arena of water resources, successful actions related to the water-land use nexus will be highly context-specific, tailored to the specifics of each place and localized emerging conflicts. Integration does not equal centralization. The natural landscape and the institutional landscape are each very complex, and no single legislative, institutional, moral, or behavioral change will adequately protect all the values involved in land use and water changes. Also, all of these considerations are highly context-dependent, and thus a given problem must be attacked understanding the various dimensions. There is not one-size-fits-all solution, since there is no single problem to address.

- The California Water Plan updates have been important sources of information for water planners since 1957. But unlike prior Water Plan updates, which were primarily products of the Department of Water Resources, Update 2009 truly can be viewed as the State Water Plan. It has benefited from the first interagency California Water Plan steering committee representing 21 state government agencies with jurisdictions over different aspects of water resources and integrates companion planning documents of other state agencies.
  - Update 2009 provides detailed information and analysis associated with 27 different resource strategies that can be looked at by local regions in a variety of combinations to help them assess effectively managing water resources to meet future needs.
- Concerns about limited water supply can influence restrictions on growth. In the past, developments have been authorized based on “paper water” (contracts for water rights that may not materialize as physical water), or with the assumption that existing agencies would be forced to service new developments once they were in place. This is slowly changing.
  - In California, SB 610 and SB 221 require demonstration of adequate future water supply for new developments exceeding 500 homes. Arizona takes this many steps further and requires developments to prove 100 year water supplies.
  - Concern for aquifer function can also motivate land use restrictions. Aquifer recharge areas are sensitive to development, particularly that with impervious surfaces or with polluting industries. Actions such as the Model Aquifer Protection Bylaw in Cape Cod can motivate reducing new development as well as restricting certain specific types of land uses. Note that aquifer-related concerns can be motivated both by thoughts of protecting sustainable water supply and by environmental protection.
- Potential impacts on environment and water quality can provide justification for regulatory intervention in land use decisions. In particular, local land use regulation can be a powerful and underappreciated tool.
  - In one of the broadest examples of regulation extending upstream to a watershed, in New York, power was granted to New York City to regulate land use in the seven counties of its upstate watershed from where it gets its drinking water.
  - Regulatory authority is often challenged, sometimes with “takings” claims. According to the Fifth Amendment of the Constitution, private property shall not be taken for public use.
without just compensation. From this stipulation a body of law has emerged that is hotly debated in the context of changing control of water resources, including restrictions on growth. In one example, the Tahoe Regional Planning Authority put a moratorium on development for water quality reasons, which was held not to be a regulatory taking, while in other cases takings claims have been upheld in water disputes.

- Strategies for restrictions on land use that are specific to locations or types of locations have arguably been more successful than blanket regulations. For example, limiting growth in environmentally sensitive areas like riparian zones, wetlands, and shorelines has been introduced in Pennsylvania, Massachusetts, Texas and Wisconsin.

- Professor Barton Thompson suggests that “water management will not and should not serve as a means of blocking urban growth, but instead should be coordinated more closely with land use planning so as to protect the environment as urban areas grow.”\(^{55}\) He proposes several classes of tools available to mute unfettered development:
  - pricing water to reflect its true marginal cost;
  - requiring adequate water supplies from developers; and
  - requiring planners to evaluate impacts from growth.

- Watershed integrity has been discussed as an ideal of water planning since John Wesley Powell in 1878 famously recommended land management on a watershed basis, a recommendation that was not adopted by the federal government. As inter-basin movement of water has become the norm in the west, and issues resulting from this have become clear, some argue that returning to a watershed view of development may have merits.\(^{56}\) In a similar vein, Professor Freyfogle\(^{57}\) argues for the importance of recognizing the interconnectedness of the natural environment in all its aspects (i.e., land, water, biological, human, and nature).

- Water use efficiency can be a powerful tool for conservation of existing water supply.
  - The Pacific Institute\(^{58}\), among others, has reviewed the potential for significant urban and agricultural water savings. Barriers to realizing these savings may be more institutional and cultural than economic in many cases.

---


o Metropolitan Water District of Southern California restricted its growth of water use from 1983-1992 despite population growth of 30 percent, through use of aggressive conservation and water use efficiency programs.

o Demand management can use tools such as economic incentives to encourage low water use intensity by households and businesses.

• In a thorough legal review, Waterman59 describes linkages between land use and water planning, suggesting that the two should be incorporated more tightly at a statewide level. He notes that:
  o CEQA as a vehicle for land use and water planning may grow in importance as legal cases are expanded to test the adequacy of water planning to support growth.
  o Waterman describes cases from Imperial, Inyo, and Riverside counties, which have used similar techniques to link water and land use planning. “These techniques emphasize public participation in preparing the general plan, a comprehensive analysis of water management issues, a land use element that is fully integrated with the water element, regular review and update of the general plan, and provisions for collaboration and cooperation with other agencies.”

In sum, there is much experience to draw from in considering the myriad impacts resulting from connections between land use and water. However, connecting the two in scientific, legal and planning arenas remains a new area of exploration that will require creative thinking and bold ideas to come up with workable solutions to regionally specific problems.

LABOR

Introduction/Background

The Sacramento region has some of the most productive farmland in the world, generating over $1.9 billion a year in economic activity. Labor is critical to this production. However, the supply of agricultural labor has been declining in our region – particularly seasonal agricultural workers – and this trend is anticipated to continue. This comes at a time when the region is increasingly engaged in efforts to grow the agricultural economy, expand the consumption of locally grown products as the capital of “farm to fork,” and improve access to healthy foods and nutrition to combat obesity and improve public health. Unless and until mechanization and technology replace agricultural labor, the Sacramento region needs to explore strategies to attract and retain an agricultural workforce sufficient to meet these regional goals.

Data and tools to help support and enhance the vitality of the agricultural sector are a continuing focus of SACOG’s Rural Urban Connections Strategy (RUCS) project. This white paper, supported by a grant from the California Strategic Growth Council, is the first to focus on the region’s agricultural labor force. The paper seeks to provide information on current agricultural labor in the SACOG region, data limitations, challenges to recruitment and retention of agricultural labor including housing and transportation needs, various scenarios for future labor needs, examples of efforts in other states to recruit and retain agricultural workers, and potential areas for further analysis and discussion across the region.

To develop this white paper, SACOG staff:

- Gathered data on the existing agricultural labor force in the region
- Estimated future agricultural labor needs based on different cropping patterns
- Conducted research and telephone interviews to identify existing housing, transportation and services for farm laborers and identified gaps
- Researched federal and state requirements and funding sources for farm labor housing and transportation
- Researched programs and efforts in other states and localities.
- Conducted interviews and county-level workshops with stakeholders to identify and share data, confirm challenges to employee recruitment and retention, and discuss options for improving the region’s ability to address labor needs.

An additional outcome of SACOG’s research was the provision of data to member jurisdictions for updating the special needs analysis of their housing elements related to farmworkers.
Farm Labor Estimates for the Sacramento Region

The SACOG region’s agricultural industry currently relies heavily on labor. To develop this paper, SACOG first sought to identify the extent of agricultural labor in the region. However, as staff sought data on the number of farmworkers in the region, it became clear that available data is limited and questionable in terms of reliability.

The U.S. Census Bureau has begun to release farm labor data from the American Community Survey (ACS). The ACS replaced the “long form” Census sampling method used from 1940 to 2000. ACS data is provided on an annual, three-year and five-year basis. This data source provides recent estimates of workers in the “farming, fishing and forestry” industries, and is available at the jurisdiction level. Table 1 on the following page summarizes the ACS data for the region including city and county estimates for the occupation category of farming, fishing, and forestry for 2007-2011 and 2008-2012. However, data constraints are that:

- Estimates of workers are not exclusive to farm labor.
- The ACS is a survey, based on a small and annually changing sample.
- Each estimate includes a margin of error (MOE) that indicates the reliability that the Census has for each individual estimate. Some MOEs are quite high.
- The ACS does not provide data on seasonal labor.
Table 1. ACS data for Farm, Fishing and Forestry Labor, by Jurisdiction

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>2007-11 ACS</th>
<th>MOE</th>
<th>2008-12 ACS</th>
<th>MOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placerville</td>
<td>9</td>
<td>96</td>
<td>53</td>
<td>43</td>
</tr>
<tr>
<td>South Lake Tahoe</td>
<td>63</td>
<td>111</td>
<td>132</td>
<td>77</td>
</tr>
<tr>
<td>Uninc El Dorado County</td>
<td>230</td>
<td></td>
<td>731</td>
<td></td>
</tr>
<tr>
<td>El Dorado County Total</td>
<td>302</td>
<td>124</td>
<td>916</td>
<td>209</td>
</tr>
<tr>
<td>Auburn</td>
<td>-</td>
<td></td>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>Colfax</td>
<td>-</td>
<td></td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Lincoln</td>
<td>27</td>
<td>100</td>
<td>74</td>
<td>49</td>
</tr>
<tr>
<td>Loomis</td>
<td>-</td>
<td></td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Rocklin</td>
<td>52</td>
<td>111</td>
<td>173</td>
<td>112</td>
</tr>
<tr>
<td>Roseville</td>
<td>42</td>
<td>41</td>
<td>72</td>
<td>60</td>
</tr>
<tr>
<td>Uninc Placer County</td>
<td>144</td>
<td></td>
<td>431</td>
<td></td>
</tr>
<tr>
<td>Placer County Total</td>
<td>265</td>
<td>110</td>
<td>765</td>
<td>192</td>
</tr>
<tr>
<td>Citrus Heights</td>
<td>131</td>
<td>127</td>
<td>218</td>
<td>110</td>
</tr>
<tr>
<td>Elk Grove</td>
<td>122</td>
<td>75</td>
<td>315</td>
<td>147</td>
</tr>
<tr>
<td>Folsom</td>
<td>-</td>
<td></td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Galt</td>
<td>298</td>
<td>141</td>
<td>484</td>
<td>186</td>
</tr>
<tr>
<td>Isleton</td>
<td>14</td>
<td>96</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Rancho Cordova</td>
<td>54</td>
<td>107</td>
<td>91</td>
<td>72</td>
</tr>
<tr>
<td>Sacramento city</td>
<td>740</td>
<td>107</td>
<td>1,212</td>
<td>269</td>
</tr>
<tr>
<td>Uninc Sacramento County</td>
<td>831</td>
<td></td>
<td>1,713</td>
<td></td>
</tr>
<tr>
<td>Sacramento County Total</td>
<td>2,190</td>
<td>360</td>
<td>4,065</td>
<td>561</td>
</tr>
<tr>
<td>Live Oak</td>
<td>267</td>
<td>131</td>
<td>440</td>
<td>145</td>
</tr>
<tr>
<td>Yuba City</td>
<td>1,523</td>
<td>368</td>
<td>1,699</td>
<td>376</td>
</tr>
<tr>
<td>Uninc Sutter County</td>
<td>682</td>
<td></td>
<td>1,215</td>
<td></td>
</tr>
<tr>
<td>Sutter County Total</td>
<td>2,472</td>
<td>488</td>
<td>3,354</td>
<td>487</td>
</tr>
<tr>
<td>Davis city, California</td>
<td>105</td>
<td>74</td>
<td>277</td>
<td>146</td>
</tr>
<tr>
<td>West Sacramento city, California</td>
<td>209</td>
<td>109</td>
<td>331</td>
<td>160</td>
</tr>
<tr>
<td>Winters city, California</td>
<td>266</td>
<td>161</td>
<td>203</td>
<td>132</td>
</tr>
<tr>
<td>Woodland city, California</td>
<td>1,025</td>
<td>317</td>
<td>1,445</td>
<td>324</td>
</tr>
<tr>
<td>Uninc Yolo County</td>
<td>825</td>
<td></td>
<td>1,028</td>
<td></td>
</tr>
<tr>
<td>Yolo County Total</td>
<td>2,430</td>
<td>457</td>
<td>3,284</td>
<td>511</td>
</tr>
<tr>
<td>Marysville city, California</td>
<td>79</td>
<td>119</td>
<td>66</td>
<td>60</td>
</tr>
</tbody>
</table>
Another source of data comes from the United States Department of Agricultural (USDA) National Agricultural Statistics Service (NASS). The USDA conducts a Census of Agriculture inclusive of each state and county every five years. The Census of Agriculture is the most comprehensive and uniform count of the number of farms and ranches and the people who operate them, for each county in the nation. Data collected includes farm labor categorized by number of farms, total hired farm workers, workers working less than 150 days to assess seasonal labor, and workers working more than 150 days to count more permanent employees.

Table 2 summarizes the 2007 and 2012 Agricultural Census for the six SACOG counties (including the Tahoe Basin). Two notable problems with this source are that it is released two years after the survey is completed, and it only provides county-level data.

<table>
<thead>
<tr>
<th>County</th>
<th>Farms</th>
<th>Total Workers</th>
<th>Workers &gt;150 days</th>
<th>Workers &lt;150 days</th>
<th>Farms</th>
<th>Total Workers</th>
<th>Workers &gt;150 days</th>
<th>Workers &lt;150 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Dorado</td>
<td>299</td>
<td>1,521</td>
<td>316</td>
<td>1,205</td>
<td>365</td>
<td>1,537</td>
<td>355</td>
<td>315</td>
</tr>
<tr>
<td>Placer</td>
<td>246</td>
<td>1,496</td>
<td>356</td>
<td>1,140</td>
<td>280</td>
<td>1,219</td>
<td>359</td>
<td>860</td>
</tr>
<tr>
<td>Sacramento</td>
<td>354</td>
<td>4,745</td>
<td>2,286</td>
<td>2,459</td>
<td>410</td>
<td>4,778</td>
<td>1,792</td>
<td>2,986</td>
</tr>
<tr>
<td>Sutter</td>
<td>559</td>
<td>6,079</td>
<td>1,659</td>
<td>4,420</td>
<td>703</td>
<td>6,319</td>
<td>1,748</td>
<td>4,571</td>
</tr>
<tr>
<td>Yolo</td>
<td>368</td>
<td>3,953</td>
<td>2,025</td>
<td>1,928</td>
<td>438</td>
<td>5,155</td>
<td>2,581</td>
<td>2,574</td>
</tr>
<tr>
<td>Yuba</td>
<td>238</td>
<td>2,364</td>
<td>513</td>
<td>1,851</td>
<td>294</td>
<td>2,910</td>
<td>890</td>
<td>2,020</td>
</tr>
<tr>
<td>Region Total</td>
<td>2,064</td>
<td>20,158</td>
<td>7,155</td>
<td>13,003</td>
<td>2,490</td>
<td>21,918</td>
<td>7,725</td>
<td>13,326</td>
</tr>
</tbody>
</table>

Table 3 compares at a county level ACS five-year estimates to USDA Census of Agriculture data for those who work over 150 days. The 2007 USDA Census of workers regionally was within 16 percent of the 2007-11 ACS estimate, although at a county level, the percentage differences were much more variable, from a low of four percent to a high of 39 percent. The 2008-12 ACS estimate was significantly below 2012 USDA
figures. This likely is a result of both the varying population samples used for the ACS each year and the ACS period covered. Both the 2007-11 and 2008-12 ACS data included much of the recession when employment was significantly reduced, whereas the 2012 USDA data reflects some improvement in agricultural employment as the economy began to recover. Later ACS samples may come closer to the USDA data.
Another data source is the state Economic Development Department (EDD) Labor Market Information Division, which provides employment data by industry. This EDD data is based on the Current Employment Statistics (CES) survey, which is a survey of a sample of California employers. Total employment is estimated from the sample. The CES survey is subject to sampling and non-sampling errors. The size of the sampling error depends on the sample size and how much of the universe is covered in the survey.

Table 4 compares Census of Agriculture total employment figures with EDD’s peak farm employment figure\(^60\) for each county. At the regional level, USDA data exceeds EDD’s by 16-17%; there are much more significant differences at the county level.

\(^60\)Peak employment represents the highest month’s farm employment figure from EDD in each county for the year (June, July, August, September or October depending on the county)
<table>
<thead>
<tr>
<th></th>
<th>Sutter</th>
<th>Yolo</th>
<th>Yuba</th>
<th>Region Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6,079</td>
<td>3,953</td>
<td>2,364</td>
<td>20,158</td>
</tr>
<tr>
<td></td>
<td>5,600</td>
<td>5,200</td>
<td>1,700</td>
<td>17,100</td>
</tr>
<tr>
<td></td>
<td>479</td>
<td>-1,247</td>
<td>664</td>
<td>3,058</td>
</tr>
<tr>
<td></td>
<td>8%</td>
<td>-27%</td>
<td>33%</td>
<td>16%</td>
</tr>
<tr>
<td>2007</td>
<td>6,319</td>
<td>5,155</td>
<td>2,910</td>
<td>21,918</td>
</tr>
<tr>
<td></td>
<td>6,400</td>
<td>6,600</td>
<td>1,400</td>
<td>18,500</td>
</tr>
<tr>
<td>Change</td>
<td>-81</td>
<td>-1,445</td>
<td>1510</td>
<td>3,418</td>
</tr>
<tr>
<td>Percent</td>
<td>-1%</td>
<td>-25%</td>
<td>70%</td>
<td>17%</td>
</tr>
</tbody>
</table>


Farm Labor Data Limitations

SACOG’s review identified a number of challenges for obtaining reliable data on farm labor in the region, including:

- Agricultural labor includes both permanent and seasonal employees.
- Many of the farm workers in California move from county to county seasonally, working on different crops throughout the year. They may also live in one county and work in another.
- ACS data combines fishing and forestry occupations with farming.
- ACS and EDD data are estimates based on samples rather than actual counts.
- The USDA Census of Agriculture is only conducted every five years, and does not cover all farming operations in the region.
- Ag Census data exclude contract laborers.
- SACOG has documented a total of XX farms, compared with USDA’s count of 2,490. Employers are concerned with indicating they have undocumented labor, which may lead to underreporting.
- Undocumented workers, whether permanent or seasonal, often seek to remain hidden and avoid being counted for fear of identification and deportation.
- Public release of USDA data lags by about two years. Nonetheless, it is considered one of the better sources of farm-related data.

Estimating Farm Labor Demand in the Sacramento Region
As noted, counting farm workers is notoriously difficult. A different approach involves a demand for labor methodology, used in a 2000 enumeration study by Alice Larson and by SACOG in 2012. The results estimate full-time equivalent workers required for agriculture-related tasks throughout the year.

Both use calculations derived through a formula using four elements:

\[
DFL = \frac{A \times H}{W \times S}
\]

Where:

A = crop acreage

H = hours needed to perform a specific task (e.g. harvesting, weeding, cultivating) on one acre of that crop

W = work hours per farmworker per day during maximum activity

S = Season length for peak work activity

The calculations for the Larson and SACOG estimates are the same but the assumptions within the formula are different. For crop acreage, the Larson study used 1997 USDA Agriculture census acreage. SACOG’s methodology used SACOG’s 2008 crop map, completed as part of the RUCS project.

In the Larson study from 2000, the hours needed to perform a specific task (e.g. harvesting, weeding, cultivating) on one acre of crop were derived from “Crop Budgets” and other special reports prepared by agricultural economists and extension specialists. In contrast, SACOG used the University of California Cost of Production Studies.

Larson assumed 42 hours of work per week during a 5-1/2 day work week, resulting in an average 7.7 hours/day. The study used a seasonal crop calendar to determine the peak hand labor seasons for specific field crops. SACOG standardized this data by calculating full time equivalents, assuming 2,080 hours per year.

As shown in Table 6, SACOG’s calculations for full-time equivalent labor needs based on 2008 crop patterns were more consistent with USDA and ACS data findings than the Larson figures.

Table 6. Comparison of Larson and SACOG Labor Demand Calculations

<table>
<thead>
<tr>
<th>County</th>
<th>Demanded</th>
<th>Estimated</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>El Dorado</td>
<td>748</td>
<td>577</td>
<td>302</td>
<td>316</td>
<td>916</td>
</tr>
<tr>
<td>Placer</td>
<td>625</td>
<td>661</td>
<td>265</td>
<td>356</td>
<td>765</td>
</tr>
<tr>
<td>Sacramento</td>
<td>6,115</td>
<td>2,352</td>
<td>2,190</td>
<td>2,286</td>
<td>4,065</td>
</tr>
<tr>
<td>Sutter</td>
<td>11,050</td>
<td>2,356</td>
<td>2,472</td>
<td>1,659</td>
<td>3,354</td>
</tr>
<tr>
<td>Yolo</td>
<td>11,532</td>
<td>3,213</td>
<td>2,430</td>
<td>2,025</td>
<td>3,284</td>
</tr>
<tr>
<td>Yuba</td>
<td>4,169</td>
<td>1,231</td>
<td>761</td>
<td>513</td>
<td>1,249</td>
</tr>
<tr>
<td>Region Total</td>
<td>34,239</td>
<td>10,392</td>
<td>8,420</td>
<td>7,155</td>
<td>13,633</td>
</tr>
</tbody>
</table>


Future Labor Scenarios

By providing data on current and future farm labor needs, SACOG seeks to help the agricultural industry and jurisdictions be better positioned to plan for housing, transportation, and other services that support labor recruitment and retention efforts, and the vitality of the agricultural economy.

The previous demand for labor estimates were for a 2008 snapshot of production, but the region is constantly experiencing changes in the composition of agricultural production. To explore the potential impact of some of these changes on labor demand, SACOG developed three alternative scenarios to the labor demand shown in Table 8 above. The three alternative scenarios show dramatic shifts in cropping patterns as a result of potential market and environmental changes. The changes in the market and environment are supported by regional stakeholders and agricultural experts.

For purposes of this paper, the model was applied to Yolo County but the analysis could be conducted for any of the six counties in the SACOG region. The three scenarios and their sources are:

1. Drastic rise in water cost, resulting in shifts in production to low water-use crops [Bishop, Curtis, and Emm 2010]
2. Drastic rise in labor cost, resulting in shifts in production to low labor-demanding crops (CA Farm Bureau 2012)

3. Increased demand for locally grown specialty crops met by small farms, resulting in shifts from national and international export-oriented commodity production towards more fresh consumed specialty crops grown within the region (Martinez et al. 2010)

The scenarios were taken to the extreme, assuming that all production (excluding equine, fallow and pasture) would shift to crop types that exemplified the sought-after characteristics. SACOG is in no way advocating for any of these land use changes, but simply providing information on potential labor demand associated with different cropping patterns.

For the scenarios used to test model functionality, crop blends were developed based on the three crop patterns outlined above. These blends were then applied to all agricultural acreage except pasture and equine. It was assumed that pasture and equine systems do not have readily available water and therefore changes in production type would require large infrastructure investments. Table 7 shows the blends used in the scenarios. The low-water scenario used grapes and the general field crop blend. The low-labor scenario used the alfalfa blend, and the specialty crop scenario used a blend of specialty crops as outlined in Table 5.

Table 7. Scenario Crop Blends

<table>
<thead>
<tr>
<th>Low-water</th>
<th>Low-labor</th>
<th>Diversified Vegetable Production (small farm scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20% Wine Grape</td>
<td>60% Alfalfa</td>
<td>33% Leafy Greens</td>
</tr>
<tr>
<td>36% Alfalfa</td>
<td>24% Wheat</td>
<td>33% Night Shade</td>
</tr>
<tr>
<td>22% Wheat</td>
<td>7% Sunflower</td>
<td>33% Root Vegetables</td>
</tr>
<tr>
<td>10% Safflower</td>
<td>7% Corn</td>
<td></td>
</tr>
<tr>
<td>7% Sunflower</td>
<td>3% Safflower</td>
<td></td>
</tr>
<tr>
<td>4% Corn</td>
<td>0.2% Field Bean</td>
<td></td>
</tr>
<tr>
<td>.8% Field Bean</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Bishop, Curtis and Emm 2010; California Farm Bureau, 2012; Martinez et al 2010

The three scenarios were modeled with UrbanFootprint, SACOG’s modeling platform. Table 8 shows the calculated labor demand for each scenario, compared with the ACS and USDA labor estimates for Yolo County. Because the modeling was based on the 2008 cropping scenario, labor estimates from that time have also been included below.

Table 8. Modeled Scenario Results for Yolo County (Annual Totals)
This example suggests that shifts in crop production would have major implications for the region. From the Yolo County example:

- A shift to a low-labor scenario could mean employment losses among those already working in the industry.
- A shift to a low-water crop blend, which could be happening with the current drought, appears to bring labor demand closer to labor supply.
- A more diversified vegetable crop mix would increase the demand for labor, requiring strategies to improve farm labor recruitment and retention.

A more detailed discussion of these implications is contained in the concluding section of this paper.

**Farm Labor Shortage**

In 2012, the Western Growers Association reported that farmers in California saw a 20 percent drop in laborers.\(^62\) A survey conducted by the California Farm Bureau in 2012 found many growers in the SACOG region experiencing labor shortages, and reported a statewide shortage between 10 percent and 30 percent.\(^63\) Research, stakeholder interviews and county focus groups conducted by SACOG corroborated a regional reduction in labor for agricultural production.

62 [http://www.cnbc.com/id/48725145/California_Farm_Labor_Shortage_Worst_It_s_Been_Ever](http://www.cnbc.com/id/48725145/California_Farm_Labor_Shortage_Worst_It_s_Been_Ever)

### Table 9.1 Comparison of 2002, 2007 and 2012 Agricultural Census Data, by County

<table>
<thead>
<tr>
<th>County</th>
<th>2002 Census of Agriculture California</th>
<th>2007 Census of Agriculture California</th>
<th>2012 Census of Agriculture California</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Farms</td>
<td>Total Workers</td>
<td>Workers &gt;150 days</td>
</tr>
<tr>
<td>El Dorado</td>
<td>252</td>
<td>1,689</td>
<td>279</td>
</tr>
<tr>
<td>Placer</td>
<td>197</td>
<td>1,738</td>
<td>343</td>
</tr>
<tr>
<td>Sacramento</td>
<td>392</td>
<td>5,362</td>
<td>2,179</td>
</tr>
<tr>
<td>Sutter</td>
<td>733</td>
<td>9,242</td>
<td>1,840</td>
</tr>
<tr>
<td>Yolo</td>
<td>498</td>
<td>6,722</td>
<td>3,463</td>
</tr>
<tr>
<td>Yuba</td>
<td>255</td>
<td>4,058</td>
<td>879</td>
</tr>
<tr>
<td>Region Total</td>
<td>2,327</td>
<td>28,811</td>
<td>8,983</td>
</tr>
</tbody>
</table>

### Table 9.2 Percent Change, 2002-2007, 2007-2012 and 2002-2012 Agricultural Census Data, by County

<table>
<thead>
<tr>
<th>County</th>
<th>% Change 2002-2007</th>
<th>% Change 2007-2012</th>
<th>% Change 2002-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Farms</td>
<td>Total Workers</td>
<td>Workers &gt;150 days</td>
</tr>
<tr>
<td>El Dorado</td>
<td>19%</td>
<td>-10%</td>
<td>13%</td>
</tr>
<tr>
<td>Placer</td>
<td>25%</td>
<td>-14%</td>
<td>4%</td>
</tr>
<tr>
<td>Sacramento</td>
<td>-10%</td>
<td>-12%</td>
<td>5%</td>
</tr>
<tr>
<td>Sutter</td>
<td>-24%</td>
<td>-34%</td>
<td>-10%</td>
</tr>
<tr>
<td></td>
<td>-26%</td>
<td>-41%</td>
<td>-42%</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Yolo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yuba</td>
<td>-7%</td>
<td>-42%</td>
<td>-42%</td>
</tr>
<tr>
<td>Region Total</td>
<td>-11%</td>
<td>-30%</td>
<td>-20%</td>
</tr>
</tbody>
</table>
From 2002 to 2007, the region experienced a decrease of over 8,650 total workers, with all counties affected. This included a decrease of 1,828 working over 150 days and 4,115 working under 150 days. The region also saw a total decline of 263 farms. Only two counties, El Dorado and Placer, experienced a farm increase of 47 and 49 farms, respectively. Between 2007 and 2012, there was a limited region-wide return in the number of farms (21% increase) and agricultural workers (9% increase), except in Placer County, which lost another 277 workers.

Comparing 2002 with 2012, the region saw a net gain of 163 farms (7%), but a decrease of nearly 6,900 total workers (24% decline). Workers working over 150 days fell by 14 percent, workers working less than 150 days decreased by 22 percent, and farms with migrant labor decreased by 62 percent regionwide. Sacramento, Sutter and Yolo Counties had a combined loss of 1,360 workers over 150 days, while the five counties outside of Yolo saw a decrease of over 5,800 seasonal workers. Only Yolo County experienced a large net increase of over 2,000 seasonal workers (those working less than 150 days), despite a 23 percent drop in the county’s total agricultural workforce.

If the number of farms increased, how did workers decrease? An explanation may lie in changes in the size of agricultural operations. Table 10 shows the change in the reported number of farms with 1-4 workers, compared with those with 5+ workers.

### Table 10. Regionwide Farms by Number of Workers, 2002 and 2012

<table>
<thead>
<tr>
<th>Farm Size</th>
<th>2002</th>
<th>% of farms</th>
<th>2012</th>
<th>% of farms</th>
<th>Change 2002-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4 workers</td>
<td>1,225</td>
<td>53%</td>
<td>1,963</td>
<td>69%</td>
<td>60%</td>
</tr>
<tr>
<td>5+ workers</td>
<td>1,102</td>
<td>47%</td>
<td>893</td>
<td>31%</td>
<td>-19%</td>
</tr>
</tbody>
</table>

Source: USDA 2002 and 2012 Agricultural Census

A shift to smaller operations is also evidenced in Table 11, comparing the number of workers at farms of different sizes in the region in 2002 and 2012.

### Table 11. Total Workers by Farm Size, 2002 and 2012

<table>
<thead>
<tr>
<th>Farm Size</th>
<th>2002</th>
<th>2012</th>
<th>% in 2002</th>
<th>% in 2012</th>
<th>Difference 2002-12</th>
<th>% change 2002-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 worker</td>
<td>539</td>
<td>1,043</td>
<td>2%</td>
<td>5%</td>
<td>504</td>
<td>94%</td>
</tr>
<tr>
<td>2 workers</td>
<td>640</td>
<td>854</td>
<td>2%</td>
<td>4%</td>
<td>214</td>
<td>33%</td>
</tr>
<tr>
<td>3-4 workers</td>
<td>1,229</td>
<td>1,685</td>
<td>4%</td>
<td>8%</td>
<td>456</td>
<td>37%</td>
</tr>
</tbody>
</table>
As indicated, workers on small farms increased – especially those with one paid employee – while larger farms, especially those with 10 or more employees, represented most of the decline. Stakeholder interviews suggested that such declines represented growing difficulties in finding agricultural labor in the region. Stakeholders reported the greatest shortages were in labor for pruning and harvesting of fruit trees and wine grapes. On a county basis, shortages appeared to affect particularly the following crops:

- Apples (El Dorado)
- Cherries (Sacramento, Yuba)
- Olives (Sacramento, Sutter)
- Peaches (El Dorado, Sutter, Yuba)
- Pears (Sacramento)
- Prunes (Sutter, Yolo)
- Wine Grapes (El Dorado, Sacramento, Yolo)

**Reasons for Labor Shortage**

Regional stakeholders identified a number of factors underlying labor shortages, including the following:

**Immigration enforcement:** Greater enforcement combined with deportation back to workers’ countries of origin has made it more expensive and difficult for farm laborers to continue to do agricultural work in California.

**H-2A agricultural program structure:** The H-2A program for bringing in foreign labor is complicated, costly, and requires provision of free housing and transportation. The Sacramento region has seen very few H-2A applications: only 9 applications for sheep- and goat-herders. (The H-2A program is discussed in more detail on p. 18)

**Better Mexican economy:** An improved economy in Mexico – where a majority of the region’s farm laborers have come from – has created more employment opportunities in Mexican agricultural or other industries than in prior years.
**Domestic competition:** The Sacramento region has seen competition for labor from other states, such as Oregon and Washington for apple and cherry crops, and from other regions with longer growing seasons, such as Southern California and the Central Coast, and/or more expansive labor needs, such as in the Napa Valley for wine grape production. In Placer County particularly, small acreages often do not provide enough work to be attractive compared with other locations. Wage rates in the region may also not be as competitive.
Other job opportunities: Stakeholders reported that they are seeing more families seeking to settle in one place with year-round employment or relying on unemployment when seasonal work is unavailable, rather than migrating as much. Especially prior to the recent recession, industries such as construction lured away agricultural laborers through year-round employment opportunities, often at better pay. Additionally, seasonal workers may leave before a crop is finished, recognizing that it is in their economic interest to move on to the next opportunity as things are winding down at the farm where they are currently working. Seasoned workers know where the best conditions, pay and housing are and may leave the farmer with his “profit still in the field” in order to arrive first at the next job opportunity in the crop cycle.

Child labor laws: Laws prohibiting child labor have limited children working with their parents in the fields.

Less family continuity in agriculture: Many parents doing lower paid agricultural work are encouraging their children to seek an education and not to pursue farm labor as their livelihood. Many adult children of farmers and ranchers are also choosing not to continue in agriculture and the family business.

Unemployed citizens without skills or physical conditioning: Despite unemployment rates in recent years, growers have found that most unemployed U.S. citizens do not have the skills, physical conditioning, or willingness to engage in labor-intensive agricultural work. Some growers reported recruiting interns for additional labor, but increasing rules and requirements to have a curriculum have made internships a less viable option, particularly for smaller growers.

These factors have made labor recruitment and retention an ongoing challenge for many growers in the region. A number have turned to farm labor contractors to recruit sufficient labor to meet seasonal needs, but this has not always proved successful either. Some growers reported that even using farm labor contractors, they were not able to find sufficient workers with the knowledge and skills for what they grow.

Impacts of Labor Shortages

Stakeholders noted various impacts resulting from the shortage of agricultural labor, including the following:

Bidding up of wages: To seek to compete for labor, some growers have offered higher wages, but this is not necessarily sustainable for smaller farms, especially those with very low profit margins. And even with higher wages, some growers have not been able to attract and retain enough help.

Rotting fruit: Without sufficient labor, some growers have left crops unpicked, reducing income, profits, and wealth in the local/regional economy.

Pruning delays: Some growers reported missing key pruning and/or harvesting windows due to the lack of skilled labor, leading to reduced productivity and crop yields.

Mechanization: While some crops can be harvested mechanically, shifts to mechanization may lead to fewer jobs in the future, and accompanying reductions in local spending out of wages. Some areas of the region, especially El Dorado County, have trouble mechanizing at all because of the topography and steep slopes.
Some fruit crops, if picked mechanically, lose value (such as cherries without stems), are not accepted by processors or see greater rejection rates (such as mechanically harvested peaches).

**Changed production:** If there is too little labor and growers can’t mechanize, growers will likely reduce acreage in production or shift to other crops, which can be a slow and costly process. Crop shifts may result in fewer desired commodities being available or future overproduction if too many growers transition to the same crop(s).

**Reduced food production:** If there is insufficient farm labor long-term, the region may not be able to produce as much food for the region’s residents and outside markets.

**Efforts to Address Labor Shortages through the H-2A Program**

The federal H-2A Farm Labor Program is the primary legal method for bringing in farm labor from outside the U.S. To be eligible, applicants must demonstrate failure in their efforts to recruit sufficient labor despite extensive outreach. As noted, there have been few applications from the SACOG region, in part due to the extensive application process and timing issues.

Several public and private programs throughout the country have sought to try to address labor recruitment and shortages through the H-2A program or other means. Some examples include the following:

**Colorado**

The Colorado Department of Labor, at the direction of the state legislature, undertook a five-year Non-Immigrant Agricultural Seasonal Worker Pilot Program, which ended in December 2013. The program sought to facilitate use of the H-2A program by requesting waivers through the U.S. Department of Labor and the U.S. Department of Homeland Security. No growers utilized the program as they considered it too costly ($100/worker) and inconvenient.

**North Carolina**

The North Carolina Growers Association (NCGA) operates the largest H-2A program in the U.S. for approximately 800 farmer members. NCGA is a private non-profit growers cooperative. It is governed by a Board of Directors drawn from farmers who participate in the H-2A program. NCGA exists to facilitate its members’ participation in the program and promote compliance with all federal, state and local laws that govern farmworker employment. NCGA does all of the H-2A paperwork in-house on this side of the border, including working with the Department of Labor and other federal and state agencies.

NCGA and its farmer members employed approximately 7,500 H-2A workers in 2013 to fill approximately 8,400 different job opportunities that were certified by the U.S. Department of Labor (DOL) Office of Foreign Labor Certification. NCGA utilizes a joint employer Master Application Association format. This format allows H-2A workers to be transferred from farm to farm as if all NCGA members were a single employer. Fixed costs of the program (transportation, visas, etc.) are spread over a larger group and longer
employment period, which reduces per hour labor costs for individual farms. The arrangement allows farmers to grow crops with short term and/or intermittent or peak load labor needs.

For workers, the program maximizes employment opportunities by combining multiple short term labor needs into a longer period of employment – even full season employment. Approximately 85-90 percent of the H-2A workers are assigned to and remain at one farm during the entire season; the balance move from farm to farm to perform a series of shorter term jobs and/or peak season work. Approximately 92 percent of H-2A workers return year to year through a “preferred worker” program. Preferred workers are individuals whom farmers specifically request. Preferred and returning workers provide a better return for the program because they are trained, know the farmer’s fields, crops, and operations, and are more productive, which is important for growers with tight profit margins. New workers are most often selected through referrals of preferred workers – cousins, brothers, friends, etc., in Mexico.

NCGA staff note that its H-2A program has been the focus of numerous lawsuits, requiring farmers to be committed to compliance while accepting that even then there may be litigation. In 2004, faced with multiple lawsuits, the NCGA Board and membership elected to enter into a Collective Bargaining Agreement with the Farm Labor Organizing Committee (FLOC), an AFL-CIO affiliate farmworker union from Toledo, Ohio, to settle the litigation en masse. The settlement provided a grievance mechanism to settle all employment-based complaints with workers, and precludes workers from filing a lawsuit against NCGA/members as a precondition of employment.

NCGA has 12 full-time staff and an additional five season field representatives who are bilingual and travel the state to provide supportive services to farmers and their H-2A workers. NCGA does not receive public funds or grants, and is primarily funded by $200 annual membership dues and worker fees paid based on the number of workers the farmer receives. Many NCGA members note they do not worry about their labor force’s legality or reliability, but say they would exit production of labor-intensive crops if they were unable to get their preferred workers back or if the H-2A program were to end.

Washington

The Washington Farm Labor Association (WAFLA), a nonprofit association, formed after challenges with farm labor contractors and labor shortages that left apples unpicked. WAFLA has agent and association guest worker programs for farmers. In the agent model, the employer is the applicant for the H-2A program and the Association acts as the applicant’s agent working with the various government entities to secure approval. In the association model, like the NCGA process above, the Association becomes the applicant, one or more employer members are listed on the application, and the association actively assists in recruitment and becomes a joint employer with the growers. WAFLA is responsible to deliver workers to the farm and pick them up and take them home or to the next farm at the end of the contract. While workers are on on the farm, the farmer is the employer and treats them exactly the same as if he hired them directly. WAFLA writes about 50 applications per year, 90 percent of which use this association model.
In 2007, WAFLA paid NCGA to show them how to do association applications. By 2013, WAFLA brought 4,500 H-2A workers to Washington state, and the program is growing. To recruit workers, extensive outreach is conducted through newspaper advertisements and working with state employment offices. Also employers send letters to every worker who worked last year to tell them there is work available this year.

WAFLA has a staff of eight. They charge $100 per year per member, with close to 600 members. WAFLA charges members on a fee basis for specific services. Several law and accounting firms are also sponsors.

**H-2A Farm Labor Housing and Transportation Requirements**

If an employer (including a Farm Labor Contractor) does submit a successful H-2A application, the employer is required to provide workers with housing and transportation, as follows:

**Employer Housing Requirements:**

- Provide to all non-local workers free housing (employer-provided or rental or public housing paid for by the employer)
- Housing must meet federal and state regulations for migrant labor camps
- Housing must include kitchen facilities, or the employer can provide workers three meals/day with worker reimbursement

**Employer Transportation Requirements:**

- Pay for both the workers’ inbound and outbound transportation
- Provide daily transportation to and from job site(s)
- Provide transportation to town (grocery, bank, etc.) at least once a week

If immigration reform were eventually to be passed by Congress with similar provisions, it would increase the need for housing and transportation options in the SACOG region that meet federal requirements. The following sections discuss in more detail housing and transportation requirements and challenges in the SACOG region.
Employee Housing Act

California’s Employee Housing Act\(^6^4\) specifies requirements for employee housing, including farm labor housing. According to the Department of Housing and Community Development (HCD), “The Legislature enacted the Employee Housing Act for the benefit of persons living in privately owned and operated employee housing to assure their health, safety and general welfare, and to provide them a decent living environment. The Act also provides protection for the general public which may be impacted by conditions in and around employee housing.”\(^6^5\)

The Employee Housing Act generally requires annual inspections of employee housing. Inspections of farm labor camps are conducted by Department of Environmental Management staff for Sacramento County and by HCD staff in the five other counties. Inspections are conducted prior to seasonal occupancy of housing and again during occupancy. Inspectors look for any fire, electrical, plumbing, mechanical, weather protection, cleanliness, or other health and safety issues, and check the water system (usually well water) for any contamination.

There are 37 on-farm labor camps located in the region, with the ability to house over 1,100 farm laborers. Housing styles range from dormitories with centralized kitchens to single family and mobile homes. Table 12 summarizes the farm labor camps found in the Sacramento region. Many of the labor camps were built many years ago, and have been continued through repairs and renovations. Sacramento County inspection staff reported that the number of camps operating in southern Sacramento County has remained stable and there have been very few instances in which a camp was closed for violations.

Table 12. Farm Labor Camps in the SACOG Region, 2013

<table>
<thead>
<tr>
<th>County</th>
<th>Total # of farm labor camps</th>
<th>Total # of employees housed</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Dorado</td>
<td>1</td>
<td>12</td>
<td>Placerville</td>
</tr>
<tr>
<td>Sacramento</td>
<td>24</td>
<td>725</td>
<td>South of Elk Grove</td>
</tr>
<tr>
<td>Sutter</td>
<td>5</td>
<td>122</td>
<td>Live Oak, Rio Oso, Robbins, Yuba City</td>
</tr>
<tr>
<td>Yolo</td>
<td>4</td>
<td>64</td>
<td>Clarksburg, Winters, Woodland</td>
</tr>
<tr>
<td>Yuba</td>
<td>3</td>
<td>204</td>
<td>Marysville</td>
</tr>
</tbody>
</table>

\(^6^4\) In California Health and Safety Code Sections 17000-17062.5 adopted in 1979, with more recent amendments

\(^6^5\) Department of Housing and Community Development, [http://www.hcd.ca.gov/codes/eh/pp.html](http://www.hcd.ca.gov/codes/eh/pp.html)

Page 106
In addition to the farm labor camps in Table 11 above, SACOG staff inventoried other housing available to agricultural workers in the region. The SACOG region has three migrant centers offering seasonal housing in Davis, Madison, and Yuba City. There are three more centers in the neighboring areas of Lodi, Dixon, and Williams. Table 12 summarizes existing migrant centers, both in the SACOG region and nearby. The name “migrant center” may at this point be misleading, given that most now offer family apartments with child care and other amenities on-site.

### Table 13. Seasonal Migrant Centers

<table>
<thead>
<tr>
<th>Housing Authority Manager</th>
<th>County</th>
<th>Location</th>
<th># of Units</th>
<th>Details</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In SACOG Region</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Housing Authority of Sutter &amp; Nevada Counties</td>
<td>Sutter</td>
<td>Yuba City</td>
<td>79</td>
<td>62 two-bedroom, 17 three-bedroom units</td>
<td>April-Oct.</td>
</tr>
<tr>
<td>Housing Authority of the County of Yolo</td>
<td>Yolo</td>
<td>Davis</td>
<td>62</td>
<td>2- to 4-bedroom units</td>
<td>April – Oct.</td>
</tr>
<tr>
<td>Housing Authority of the County of Yolo</td>
<td>Yolo</td>
<td>Madison</td>
<td>88</td>
<td>2 – to 4 –bedroom units</td>
<td>April – Oct.</td>
</tr>
<tr>
<td><strong>Near SACOG Region</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colusa County</td>
<td>Colusa</td>
<td>Williams</td>
<td>110</td>
<td>also includes 50 units of permanent housing?</td>
<td>April-Nov.</td>
</tr>
<tr>
<td>San Joaquin</td>
<td>San Joaquin</td>
<td>Lodi</td>
<td>96</td>
<td>11 two-bedroom, 72 three-bedroom, 11 four-bedroom units</td>
<td>March 15-Dec 15</td>
</tr>
<tr>
<td>Dixon Housing Authority (Housing Authority of the County of Yolo)</td>
<td>Solano</td>
<td>Dixon</td>
<td>82</td>
<td>2 to 4 bedroom units</td>
<td>April-Oct.</td>
</tr>
<tr>
<td><strong>Region Total</strong></td>
<td></td>
<td></td>
<td><strong>517</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The region is also home to a number of complexes targeted to agriculture workers with affordable apartments or mobile homes. Table 14 provides a summary of these permanent housing options in the region for farm laborers and their families.

### Table 14. Permanent Farm Labor Housing in and near the SACOG Region
Comparing the farm labor housing inventory to permanent and seasonal worker counts from the 2012 US Census of Agriculture (Table 15) would suggest that the region provides between seven and 10 percent of farm labor housing needs. However, this analysis assumes that only one family member per apartment or unit is employed in farm labor, where in many cases spouses and other family members do agricultural work as well. The USDA counts also include all agricultural employees, including owners and workers earning higher wages for whom housing availability or costs may not necessarily be a concern.

### Table 15. Number of Agricultural Workers Compared with Region’s Permanent & Seasonal Housing Units

<table>
<thead>
<tr>
<th>County</th>
<th>2012 Workers &gt;150 days</th>
<th>Total Permanent Units</th>
<th>% of Workers &gt; 150 days</th>
<th>2012 Workers &lt;150 days</th>
<th>Total Seasonal Units</th>
<th>% of Workers &lt; 150 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Dorado County</td>
<td>355</td>
<td>-</td>
<td>-</td>
<td>315</td>
<td>12</td>
<td>4%</td>
</tr>
<tr>
<td>Placer County</td>
<td>359</td>
<td>-</td>
<td>-</td>
<td>860</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sacramento County</td>
<td>1,792</td>
<td>278</td>
<td>16%</td>
<td>4,571</td>
<td>725</td>
<td>24%</td>
</tr>
<tr>
<td>Sutter County</td>
<td>1,748</td>
<td>255</td>
<td>10%</td>
<td>2,574</td>
<td>214</td>
<td>8%</td>
</tr>
<tr>
<td>Yolo County</td>
<td>2,581</td>
<td>255</td>
<td>4%</td>
<td>2,020</td>
<td>204</td>
<td>10%</td>
</tr>
<tr>
<td>Yuba County</td>
<td>890</td>
<td>39</td>
<td>4%</td>
<td>2,020</td>
<td>204</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Region Total</strong></td>
<td><strong>7,725</strong></td>
<td><strong>572</strong></td>
<td><strong>7%</strong></td>
<td><strong>13,326</strong></td>
<td><strong>1,356</strong></td>
<td><strong>10%</strong></td>
</tr>
</tbody>
</table>

Source: USDA 2012 Census of Agriculture, HCD, Public Housing Authorities, Housing Elements
Funding

Several federal and state funding sources have supported migrant and farm labor housing. Voter-approved Propositions 46 and 1C provided state bond funding for housing programs in California. This included the Joe Serna, Jr. Farmworker Housing Grant (JSJFWHG) program. The program provided grants or loans for the new construction, rehabilitation and acquisition of owner-occupied and rental units for agricultural workers, with a priority for lower income households. Bond funds were nearly spent as of 2012.

As shown in Table 16, the SACOG region received eight JSJFWHG awards totaling over $12.1 million, primarily for multifamily rental housing for agricultural workers. USDA is another source of funding for farm labor housing. USDA’s Rural Development Program Section 514 loans and Section 516 grants help eligible entities purchase, construct, repair, or improve housing for farm laborers. Eligible tenants include those engaged in agriculture, aquaculture (fish and oyster farms), on-farm processing, and those who process agricultural or aquacultural commodities off-farm. Eligible 514 loan applicants include farmers, associations of farmers, family farm corporations, Indian tribes, nonprofit organizations, public agencies, associations of farmworkers, and limited partnerships in which the general partner is a nonprofit entity. Section 516 grants are made to farmworker associations, nonprofit organizations, Indian tribes, and public agencies. Table 14 also shows the $15,643,907 in grants and $10,127,817 in loans provided by USDA for multifamily developments.

The most recent project, Mutual Housing at Spring Lake, broke ground in December 2013. The project is being financed through a combination of sources: $14.5 million in federal and state tax credits, $5.5 from USDA; $1 million from the Serna Grant Program; $910,000 from the City of Woodland; and a $16.7 million loan commitment from Citibank for construction and $1,143,000 as a permanent loan.66

The state housing bond also included funds for migrant center construction and rehabilitation. Two migrant centers, Yuba City and Madison, received $123,000 in funds through the state Office of Migrant Services (OMS) towards construction activities. USDA also contributed $3.6 million towards three migrant centers, as shown in Table 16.

### Table 16. Awards from Joe Serna, Jr. Farmworker Housing Grant Program, Office of Migrant Services, and USDA Rural Development

<table>
<thead>
<tr>
<th>Multifamily Rental/Ownership</th>
<th>Name of Complex</th>
<th>Community</th>
<th>County</th>
<th># of Units</th>
<th>Date</th>
<th>Source</th>
<th>Total Award</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rental</td>
<td>Courtland Plaza</td>
<td>Courtland</td>
<td>Sacramento</td>
<td>32</td>
<td>2/11/2003</td>
<td>JSJFWHG</td>
<td>$610,468</td>
</tr>
<tr>
<td>Rental</td>
<td>Grizzly Hollow Phase III</td>
<td>Galt</td>
<td>Sacramento</td>
<td>54</td>
<td>6/30/2004</td>
<td>JSJFWHG</td>
<td>$2,202,655</td>
</tr>
<tr>
<td>Rental</td>
<td>Richland Homes Phases I, II and III/Richland Housing Farmworker ADA units &amp; Hans Miller Community Building</td>
<td>Yuba City</td>
<td>Sutter</td>
<td>280</td>
<td>6/30/2003</td>
<td>JSJFWHG</td>
<td>$966,665</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8/20/2003</td>
<td>USDA Loan</td>
<td>$1,500,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9/10/2007</td>
<td>USDA Loan</td>
<td>$3,000,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11/20/2008</td>
<td>JSJFWHG</td>
<td>$2,000,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9/17/2010</td>
<td>USDA Loan</td>
<td>$127,817</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9/17/2010</td>
<td>USDA Grant</td>
<td>$1,143,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6/17/2011</td>
<td>JSJFWHG</td>
<td>$2,231,425</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1/10/2013</td>
<td>USDA Grant</td>
<td>$2,346,425</td>
</tr>
<tr>
<td>Rental</td>
<td>Country West II</td>
<td>Esparto</td>
<td>Yolo</td>
<td>6</td>
<td>10/2/2003</td>
<td>JSJFWHG</td>
<td>$331,269</td>
</tr>
<tr>
<td>Rental</td>
<td>Mutual Housing at Spring Lake</td>
<td>Woodland</td>
<td>Yolo</td>
<td>101</td>
<td>9/28/2010</td>
<td>USDA Loan</td>
<td>$3,000,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6/17/2011</td>
<td>JSJFWHG</td>
<td>$3,500,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3/11/2013</td>
<td>USDA Loan</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Homeownership</td>
<td>Sierra Vista Phase I</td>
<td>Linda</td>
<td>Yuba</td>
<td>8</td>
<td>3/25/2005</td>
<td>JSJFWHG</td>
<td>$312,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>481</td>
</tr>
</tbody>
</table>

Source: Department of Housing and Community Development, USDA Rural Development

### Table 17. Migrant Centers receiving Office of Migrant Services &/or USDA Rural Development Funding

<table>
<thead>
<tr>
<th>Migrant Center</th>
<th>Community</th>
<th>County</th>
<th>Date</th>
<th>Source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuba City Migrant Center</td>
<td>Yuba City</td>
<td>Sutter</td>
<td>9/2/2005</td>
<td>OMS</td>
<td>$48,000</td>
</tr>
<tr>
<td>Davis Migrant Center</td>
<td>Davis</td>
<td>Yolo</td>
<td>9/23/2008</td>
<td>USDA Grant</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Location</td>
<td>Year</td>
<td>Type</td>
<td>Amount</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>--------</td>
<td>------------</td>
<td>------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Madison Migrant Center</td>
<td>8/26/2003</td>
<td>USDA Loan</td>
<td>$2,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Madison</td>
<td>6/3/2005</td>
<td>OMS</td>
<td>$75,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yolo</td>
<td>9/19/2006</td>
<td>USDA Grant</td>
<td>$603,410</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>$3,726,410</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Department of Housing and Community Development, USDA Rural Development
Housing Elements

First enacted in 1969, state housing element law requires that local governments adequately plan to meet the existing and projected housing needs of all economic segments of their communities. SB 375 (Chapter 728, Statutes of 2008) changed the timing to require the update of a county or city’s general plan housing element every eight years. All housing element updates in the SACOG region were due to the Department of Housing and Community Development (HCD) for review by October 2013. As part of their housing elements, jurisdictions are required to assess the special housing needs of farmworkers (permanent and seasonal), and identify potential program or policy options and resources to address those needs.

In reading drafts of these housing element updates, SACOG found that jurisdictions varied on which data source described above – USDA Census of Agriculture, ACS, or EDD – they used to estimate the number of farmworkers in their communities, reflecting the challenge of reliable data.

Housing elements identified a number of challenges that farmworkers face for obtaining adequate housing, including:

**Limited incomes:** Sacramento County’s element found that, “Farmworkers typically fall within the extremely low- or very low-income groups. The hourly mean wage for a farm worker in the Sacramento-Arden Arcade-Roseville Metropolitan Statistical Area (MSA) is $9.11 which is about $19,000 a year. A household earning $19,000 a year would be in the very low-income category.”

**Overcrowding:** The City of Galt’s housing element notes that, “Farmworkers are more likely to be affected by substandard housing conditions and overcrowding than other groups.” Because of low incomes, farmworkers often double up to afford rents. Many farmworkers’ families are also larger than average and affordable three- or four-bedroom options can be difficult to find.

**Market Discrimination:** Some farm workers do not speak English well and face discrimination in the housing market, or experience substandard conditions but do not complain for fear of losing their housing.

**Lack of Options for Single Workers:** While previously it was more difficult for farmworker families to find seasonal housing than single men, now single migrant workers are not eligible for units at most migrant centers, which have become geared to families and offer two bedroom or larger units. According to Yolo County’s Housing Element, “In order for single migrant workers to be able to occupy units at the migrant centers, changes to State and Federal admission requirements as well as other regulations would be necessary.”

---

67 County of Sacramento Housing Element 2013-2021
68 Yolo County Housing Element 2013-21
Migrant center closures: Some farm laborers seek housing outside peak seasons, but most migrant centers close between November or December and April.

Double housing costs: Migrant farmworkers who are not accompanied by their families must pay for seasonal housing for both themselves and shelter for their families back home.

Limited permanent options: Many former migrant farm laborers have now become permanent residents. They and their families face the same challenges in the housing market as other low-income households and larger families for finding affordable rentals or ownership homes.

Changing demand: According to the Yolo County Housing Element, “a memo to the Yolo County Local Agency Formation Commission (LAFCO), dated December 2006, acknowledged changing housing preferences among farmworkers with families, stating that ‘workers are obtaining permanent employment positions and establishing permanent residences in, or closer to, urban areas. Urban areas offer more amenities to farmworkers and their families.'”

Challenges to Farm Labor Housing Production

Section 17021.5(e) of the state Employee Housing Act states: “The Legislature hereby declares that it is the policy of this state that each county and city shall permit and encourage the development and use of sufficient numbers and types of employee housing facilities as are commensurate with local needs.”

The Employee Housing Act includes the following provisions that streamline approvals for farm labor housing. The full text of these sections may be found in Appendix X.

Section 17021.5 - (b) Any employee housing providing accommodations for six or fewer employees shall be deemed a single family structure with a residential land use designation for the purposes of this section... No conditional use permit, zoning variance, or other zoning clearance shall be required of employee housing that serves six or fewer employees that is not required of a family dwelling.

Section 17021.6 - (b) Any employee housing consisting of no more than 36 beds in a group quarters or 12 units or spaces designed for use by a single family or household shall be deemed an agricultural land use for the purposes of this section... No conditional use permit, zoning variance, or other zoning clearance shall be required of this employee housing that is not required of any other agricultural activity in the same zone [and]

---

69 Yolo County Housing Element 2013-21
70 Excerpt from California Health and Safety Code, Section 17021.5
(c) ... shall not be subject to any business taxes, local registration fees, use permit fees, or other fees to which other agricultural activities in the same zone are not likewise subject.71

To meet these requirements, jurisdictions in areas with farmworker populations have already made zoning code revisions or indicate they plan to make changes. More information by jurisdiction may be found in Appendix X.

Housing elements and stakeholders revealed a number of barriers to creating more housing options targeted to farmworkers, including:

**Construction costs:** During county focus groups, growers indicated that building new on-farm housing is a challenge in terms of construction requirements and costs. Any new farm labor housing must meet all current building code standards. Most agricultural producers in the region are not large ventures that can afford to construct new employee housing on their own.

**Infrastructure availability:** On-site farm labor housing requires water and sewage systems that meet building codes. Many rural communities and farm properties do not have existing infrastructure. For example, in Yolo County Esparto and Knights Landing are the only two unincorporated communities with available sewer and water. The town of Yolo has municipal water, but no sewer; the community of Madison has sewer and water but it is very constrained.72

**Reduced state subsidy:** Proposition 1C bond funds for farm labor housing programs, such as the Joe Serna, Jr. Farmworker Housing and Office of Migrant Services grants for housing construction and rehabilitation, are largely gone. In addition, migrant centers have seen significant cuts in state operations funding.

**Evictions and Liability:** According to the Yolo County Housing Element, “The difficulty of evicting tenants and the insurance liability costs of providing rental housing for families are two of the biggest obstacles.” Farm operations can also be temporarily shut down for housing violations, for example, if the well or water system serving farm labor housing residents is found to be contaminated.

**Efforts to Increase Farm Labor Housing Availability**

A number of programs in California and other states have sought to increase the availability of housing options for seasonal and permanent farm laborers.

**California**

71 Excerpt from California Health and Safety Code, Section 17021.6
72 Yolo County Housing Element, 2013-2021
**Vouchers**

Growers and FLCs report offering motel vouchers as an option for seasonal housing. A grower in the Sacramento region purchased an apartment building to insure housing availability for seasonal employees. However, even though it was not on farm property, the building would have been subject to state inspections as employee housing if held in the grower’s name – posing a dilemma as to whether or not to hold title directly and incur inspections and fees, or create an arrangement whereby someone else would hold title and manage the property.

**House Farm Workers!**

House Farm Workers! was founded in 2004 as a subcommittee of the Ventura County Ag Futures Alliance Farm Worker Housing Task Force. Its mission is to “support and promote the provision of safe, decent and affordable housing for all farm workers.” The program helps facilitate the development of farmworker housing and farmworker housing groups in local areas in Ventura County through community education, dialogue and advocacy. About 500 farmworker units have been built in the area. The program has advocated for constructing more farmworker housing, including options for single men and women, and helped educate people about the benefits of providing proper housing for farmworkers and their families.

**Napa County Service Area 4**

Napa County Service Area 4 was set up to receive a $10 per vineyard acre assessment, adopted by vineyard owners, to support housing for vineyard workers. Every five years, the land owners in the area vote whether or not to keep the vineyard assessment. The assessment was most recently reauthorized in 2012 by a 76 percent yes vote of the vineyard owners voting. The assessment provides half of the funding for Napa Valley's three farmworker housing centers, with the other half from farmworker’s rental payments. Oversight of the farmworker housing centers is provided by the Napa County Housing Commission and the Napa County Board of Supervisors.

The vineyard assessment is collected through a property tax placed on the vineyard owners. This tax is collected twice a year and transferred to the local auditor’s office. Depending on how slow certain months are out of the year, the auditor has the power to allocate extra needed funding.

73 House Farmworkers!, http://housefarmworkers.org/HFW!/Home.html
The California Human Development Corporation provides onsite management at the migrant centers all season. A season usually consists of 11 months. In Napa’s case, the majority of migrant workers are men, so the facilities have few families to accommodate; however, they do provide other affordable housing opportunities to accommodate families or spouses. Facilities do not check the legal status of workers, leaving that up to the vineyards.

The daily fee for farmworkers at the migrant centers was recently raised from $12.00 to $13.00 per day. This includes housing, breakfast, a packed lunch, and dinner. The vineyard assessment plus worker payments are not enough to cover the costs of the centers. The County of Napa contributes $200,000 annually, which includes support for staff (lawyers, auditors, etc.) The City of Napa provides an annual contribution of $10,000 towards the housing facility. Occasionally, local residents donate extra clothing or home-grown fruit to a center.

The facilities also work with Clinic Ole, a set of six health clinics in Napa County that provide health care to migrant farmworkers and other low-income individuals in the community. This includes medical, dental, mental health, and women’s health programs.

**Washington**

*Washington Farm Labor Association*

In Washington, the Bureau of Reclamation donated land to the Franklin County Farm Bureau, which in turn leased the land to the Washington Farm Labor Association (WAFLA) for the Ringold Seasonal Farmworker Housing site in Mesa, Washington.

Ringold has a total of 12 two-bedroom duplexes, offering beds for 96 individuals with a year-round resident manager. WAFLA manages the development, and rents up to 90 percent of the beds to area growers at $8.00 per night per worker. The state dictates that 10 percent of the beds are paid by workers directly, so 10 percent of beds are reserved for the farmworker public. Staff believe that growers would be willing to pay for the remaining 10 percent if this was not required. The State provides a $30,000 grant for maintenance. To break even, WAFLA holds an annual fundraiser cookout, hosted by the County Farm Bureau, to raise another $30,000.

Ringold is not allowed to house year-round workers – only migrant and seasonal workers – and is full from June 1 to October 15. There are farms in the area that have housing that is not winterized and must be shut down. Those farms send their workers to Ringold for the winter, so WAFLA keeps it open at very reduced rates – about 50 percent.

The State does not want Ringold to house families, and men and women are not allowed to share an apartment. WAFLA only allows families during the slow winter months, and only if the families guarantee that they will leave by the spring.
Office of Rural and Farmworker Housing

The Office of Rural and Farmworker Housing (ORFH) is a private, statewide nonprofit that develops and helps preserve housing for farmworkers and other rural residents of Washington State. ORFH develops both community-based multi-family rental housing and works directly with the agricultural community to develop on-farm and near-farm housing serving the needs of both farmworkers and agricultural employers. For on-farm housing, ORFH helps growers/employers with feasibility studies and cost estimation, development and financing to provide proper housing for their farmworkers. Owners, typically growers, are then responsible for housing maintenance and management.

About 85 percent of the housing developed by ORFH has been specifically limited to farmworkers. Their primary source of funding is through the USDA. Also they have been eligible to use low income housing tax credits.

State of Washington

The state of Washington also previously had a state Housing Trust Fund. Table 18 shows the investments made in farm labor housing in the decade between 1999 and 2009.

<table>
<thead>
<tr>
<th>Seasonal Housing</th>
<th>Beds</th>
<th>$ Invested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community-based</td>
<td>1,127</td>
<td>$20,990,194</td>
</tr>
<tr>
<td>Migrant camps</td>
<td>1,095</td>
<td>$13,827,213</td>
</tr>
<tr>
<td>On-farm</td>
<td>6,987</td>
<td>$16,201,038</td>
</tr>
<tr>
<td>Total Seasonal</td>
<td>9,209</td>
<td>$51,018,446</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Permanent Housing</th>
<th>Units</th>
<th>$ Invested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-family</td>
<td>1,282</td>
<td>$48,079,355</td>
</tr>
<tr>
<td>Homeownership</td>
<td>50</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>Total Permanent</td>
<td>1,332</td>
<td>$49,579,355</td>
</tr>
</tbody>
</table>

Transportation Challenges for Farm Workers

Given the rural nature of most agricultural work sites, public transit is usually too expensive and unproductive in terms of ridership and fares for local transit agencies to provide. However, the costs of owning, operating and maintaining a private vehicle can be a challenge for low-income farm laborers. Until early 2015, undocumented workers are still unable to secure a legal driver’s license in California.
The H-2A program requires employers to provide transportation to employees. In many cases, growers and Farm Labor Contractors provide transportation as a way to facilitate employees moving between fields, communities, counties or states, retain needed labor, and provide more year-round work opportunities.

The following sections discuss regulations and challenges for farm labor transportation in the SACOG region, and efforts to improve transportation options.

Farm Labor Transportation Regulations

The Migrant and Seasonal Agricultural Worker Protection Act (MSPA) is administered and enforced by the Wage and Hour Division of the U.S. Department of Labor (DOL) and provides employment-related protections for migrant and seasonal agricultural workers. If providing transportation, the MSPA requires that every agricultural employer, non-exempt farm labor contractor (FLC), and agricultural association ensure that each vehicle meets applicable federal and state safety standards and insurance requirements and that each driver is properly licensed. DOL requires vans used by growers or FLCs to transport workers to comply with the following:

- The FLC must be registered with DOL as a Farm Labor Contractor
- An FLC employee who transports migrant or seasonal agricultural workers must be registered with DOL as a Farm Labor Contractor Employee (FLCE).
- The driver or FLCE must document that s/he holds a valid drivers’ license for the vehicle type and has had a physical.
- Vehicles are listed by the grower as “approved to transport workers”
- Vehicles have insurance of at least $100,000 per seat, and routine inspections

“Raiteros,” or individuals who provide transportation for farmworkers to and from their work sites for a fee, are also supposed to comply with these requirements if the fee exceeds the cost of providing the transportation.

The following forms of transportation are exempt from MSPA requirements:

- Transportation on tractors, combines, harvesters, pickers, or other similar machinery and equipment if the worker is engaged in agricultural work;
- Carpooling arrangements in which the FLC does not participate, including when the workers make all of the arrangements themselves; the workers use one of the workers’ own vehicles; and the workers are not specifically directed or requested by the employer to participate.
• Transportation if the only other occupants of the person’s vehicle are members of his or her immediate family.74

California Vanpool Authority

The California Vanpool Authority, or CalVans, is a Joint Powers Authority of a number of regional and local agencies across California.

CalVans’ agricultural vans are equipped with first-aid kits, fire extinguishers, roadside safety items, water containers, a safe location for carrying tools, and a Global Positioning System that allows CalVans staff to monitor the driver’s performance and locate the van should an emergency arise. Every van is covered by a $10 million insurance policy. CalVans provides water containers on the front of vans to help growers meet legal requirements to make water available in the field, and in response to concerns of the California Highway Patrol that containers in a van might be a hazard in case of an accident.

Drivers are farm workers who volunteer to operate a vanpool. Vanpool drivers must have a Class C license, pass a required physical and provide a DMV printout showing proof of a clean driving record. Riders share the cost of the van based on the number of riders and mileage. The payments cover the cost of maintaining and insuring the vans and replacements when they wear out. In some cases, growers provide vouchers to riders to cover the vanpool costs for their employees.

According to CalVans, DOL has provided mixed messages concerning the agricultural vanpool program. In some cases, DOL staff has suggested that growers consider using the CalVans program to avoid conflicts with DOL regulations. Other DOL inspectors have expressed concerns that DOL laws may be violated if growers are encouraging their workers to use the program, or Farm Labor Contractors might be driving vans. Agricultural vanpools provided by CalVans comply with all DOL requirements except the requirements for FLC/FLCE registration and the vehicles being approved by a grower to transport workers. This is in part because CalVans complies with existing carpool/vanpool DOL farm labor requirements. The carpool requirements state that the driver of a carpool/vanpool cannot be an FLC or an agent of the grower.

CalVans has been working with DOL to develop an agreement that could be used with Farm Labor Contractors that would retain the carpool/vanpool designation while allowing the growers to list the vehicles as “approved to transport workers.” According to CalVans, the fact that the driver might have an FLC (Supervisor) designation should not compromise the vanpool designation. The arrangement would allow growers to continue providing vouchers to riders to cover the cost they would otherwise have to pay.

Despite the availability of CalVans and these efforts to coordinate with DOL, the SACOG region has seen very limited use of the agricultural vanpool program. This led to SACOG’s withdrawal from the formal CalVans

74 US Department of Labor, Wage and Hour Division
Joint Powers Authority in July 2014. Stakeholder interviews and focus groups identified a number of barriers to CalVans use in the region, such as:

**More permanent workforce:** SACOG research seems to indicate that a good portion of the region’s agricultural workforce lives in the region full-time and may already have transportation options.

**Raiteros:** According to the CHP, raiteros do exist in the SACOG region. The vehicles used can be unsafe, driven by unlicensed drivers, and/or the fees may be high. However, farmworkers are sometimes hesitant to stop riding with a raitero, whether because they have a personal relationship and don’t want to offend or financially impact them, or the raitero is somehow connected with the grower or another key figure.

**Less CHP enforcement:** There are only a few CHP officers targeted to farm labor vehicle enforcement in the Sacramento region. As a result, vans operating in violation of federal and state requirements are less likely to be stopped.

**Fear of government:** A CHP officer at one of the focus groups stated he provides information on CalVans if he stops a van being used to transport farm laborers that is in violation of the law. However, some agricultural workers are concerned that CalVans may be a government agency who could identify them as in the country without documentation. One CalVans vanpool in Southern California was raided by INS agents who had been searching for one of the passengers. This created some distrust that the vans, which are prominently labeled as CalVans, could become targets for INS agents.

**Shorter distances:** Vanpools become cost-effective at greater distances. Commute distances for many agricultural laborers are not as great in the Sacramento region as in other parts of the state.

**Smaller operations:** Most growers are relatively small in the Sacramento region, meaning fewer workers, even during peak season, and limiting the market for vanpool riders going to/from the same location.

**Shorter season:** In some areas of the state, agriculture continues nearly year-round, so CalVans has been able to form more vanpools. Some large labor contractors also use CalVans to move agricultural workers from California to Arizona during the winter to keep people working. Much of the Sacramento region’s agricultural work is seasonal, and growers have reported having a harder time in recent years competing for seasonal labor because of the shorter growing season.

**Little use of H-2A Program:** The federal H-2A Farm Labor Program, the primary legal method for bringing in farm labor from outside the U.S., requires the provision of housing and transportation for agricultural workers. As noted, the Sacramento region has seen almost no use of this program. There also does not seem to be movement in Congress on immigration reform legislation that might expand requirements for agricultural transportation in the region.

**Visible out-of-pocket costs:** While private vehicles can be costly in the long-run, this cost is not as apparent as when riders must reimburse a driver regularly for all CalVans vanpool expenses. According to CalVans staff, “A great deal of time and effort went into establishing several vans in [the] Punjabi community in the Sutter County area last season only to have them leave the program after four weeks citing cost as the primary reason.”
Labor and the Future of the Sacramento Region’s Agricultural Industry

This white paper has sought to document current data and issues related to agricultural labor in the Sacramento region. The following may also have significant implications for the future of this key sector in the region’s economy.

Changes in Foreign Labor Supply

A study published in 2012 by Professor J. Edward Taylor and graduate student Diane Charlton of the UC Davis Department of Agricultural and Resource Economics, and Professor Antonio Yúnez-Naude from the Center for Economic Studies at El Colegio de Mexico in Mexico City, highlights some of the potential changes in agriculture that may occur given demographic and economic changes in the world. The study abstract notes that:

An analysis of nationally representative panel data from rural Mexico, with observations in years 2002, 2007, and 2010, suggests that the same shift out of farm work that characterized U.S. labor history is well underway in Mexico. Meanwhile, the demand for agricultural labor in Mexico is rising. In the future, U.S. agriculture will compete with Mexican farms for a dwindling supply of farm labor. Since U.S. domestic workers are unwilling to do farm work and the United States can feasibly import farm workers from only a few countries in close geographic proximity, the agricultural industry will eventually need to adjust production to use less labor. The decline in foreign labor supply to farms in the United States ultimately will need to be accompanied by farm labor conservation, switching to less labor intensive crops and technologies, and labor management practices that match fewer workers with more farm jobs.75

Crop Pattern Shifts

To assess whether cropping patterns may have been changing in recent years, SACOG completed an analysis of crops using 2002 and 2012 county crop reports to correspond with the USDA Ag Census years. Table 19 shows available data for harvested acres, tonnage, and regional values for a range of fruits, nuts, vegetables, and other agricultural products. It should be noted that there are differences in what is reported each year by the county Agricultural Commissions who produce the crop reports, so comparisons are not completely consistent. However, the data still provides valuable information on crop patterns and shifts in the region.

Peaches, pears and plums showed the greatest decreases in production between 2002 and 2012. This tracks with farmer’s reports of labor shortages for these crops, which generally require hand picking and pruning. These tree fruits also have lower values than some other commodities, which reportedly led to farmers

replacing fruit trees with nut trees. High-value almonds and walnuts, which can be harvested mechanically, did show steep rises in production, as well as tomatoes, and olives due to the increasing demand for gourmet olives and olive oil. Cherries and wine grapes also increased, despite needs for skilled labor. Production likely grew due to high values and the burgeoning wine industry in the region. However, since 2012, SACOG staff has begun to hear anecdotal reports of farmers returning to peach production especially, likely because other farmers made shifts and reduced local fruit supply and competition.

Only Yolo County has begun tracking organic production, accounting for the increase shown in Table 19. Increased production is likely due to the premium consumers are willing to pay for organic produce, but these figures will be lower than actual production due to other counties’ not differentiating organic from non-organic commodities.

### Table 19. Changes in Acres, Tons Produced and Values of Crops in the Sacramento Region, 2002-2012

<table>
<thead>
<tr>
<th>Crop Type</th>
<th>Crop</th>
<th>% Change 2002-2012</th>
<th>Harvested Acres</th>
<th>Total Tons</th>
<th>Value</th>
<th>Inflation adjusted Value (2000 $)</th>
<th>Value per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fruits &amp; Nuts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Almonds</td>
<td>74%</td>
<td>105%</td>
<td>325%</td>
<td>233%</td>
<td>144%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apples</td>
<td>2%</td>
<td>98%</td>
<td>55%</td>
<td>94%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cherries</td>
<td>203%</td>
<td>829%</td>
<td>1254%</td>
<td>961%</td>
<td>346%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kiwi</td>
<td>3%</td>
<td>20%</td>
<td>33%</td>
<td>4%</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oranges/Mandarins</td>
<td>50%</td>
<td>60%</td>
<td>-12%</td>
<td>-31%</td>
<td>-41%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Peaches</td>
<td>-31%</td>
<td>-28%</td>
<td>-8%</td>
<td>-28%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pears</td>
<td>-18%</td>
<td>-4%</td>
<td>11%</td>
<td>-13%</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Persimmons</td>
<td>-91%</td>
<td>170%</td>
<td>466%</td>
<td>343%</td>
<td>6157%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plums</td>
<td>-53%</td>
<td>-72%</td>
<td>-34%</td>
<td>-48%</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prunes</td>
<td>-27%</td>
<td>17%</td>
<td>86%</td>
<td>46%</td>
<td>155%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strawberries</td>
<td>2%</td>
<td>25%</td>
<td>21%</td>
<td>-5%</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walnuts</td>
<td>55%</td>
<td>71%</td>
<td>312%</td>
<td>223%</td>
<td>165%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wine Grapes</td>
<td>23%</td>
<td>49%</td>
<td>81%</td>
<td>42%</td>
<td>46%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Misc. Fruit &amp; Nuts</td>
<td>1%</td>
<td>347%</td>
<td>59%</td>
<td>24%</td>
<td>57%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Orchard By-Products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh Tomatoes</td>
<td>850%</td>
<td>1662%</td>
<td>260%</td>
<td>182%</td>
<td>-62%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Processing Tomatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Misc. Vegetables</td>
<td>-7%</td>
<td>35%</td>
<td>6%</td>
<td>46%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organic Production</td>
<td>566%</td>
<td>342%</td>
<td>247%</td>
<td>-34%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apiary Products</td>
<td>Apiary Products</td>
<td>80%</td>
<td>41%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------</td>
<td>-----</td>
<td>-----</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grains &amp; Hay</td>
<td>Grains &amp; Hay</td>
<td>2%</td>
<td>72%</td>
<td>35%</td>
<td>68%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock &amp; Poultry</td>
<td>Livestock &amp; Poultry</td>
<td>65%</td>
<td>29%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Livestock &amp; Poultry Products</td>
<td>16%</td>
<td>-9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy &amp; Wool</td>
<td></td>
<td>52%</td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursery Stock</td>
<td>Nursery Stock</td>
<td>-77%</td>
<td>5%</td>
<td>-18%</td>
<td>355%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed Crops</td>
<td>Seed Crops</td>
<td>3%</td>
<td>213%</td>
<td>145%</td>
<td>203%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christmas Trees</td>
<td>Christmas Trees</td>
<td></td>
<td>-47%</td>
<td>-58%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber</td>
<td>Timber</td>
<td></td>
<td>-58%</td>
<td>-67%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 20 shows more detail on regional production and value figures for 2002 and 2012, including 2012 values adjusted for inflation to 2002 dollars.
<table>
<thead>
<tr>
<th>Crop Type</th>
<th>Crop</th>
<th>Harvested Acres</th>
<th>Total Tons</th>
<th>Total Value (in 2002 $)</th>
<th>Harvested Acres</th>
<th>Total Tons</th>
<th>Total Value</th>
<th>Inflation Adj’d Value (in 2002 $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits &amp; Nuts</td>
<td>Almonds</td>
<td>11,453</td>
<td>8,253</td>
<td>$13,091,200</td>
<td>19,932</td>
<td>16,934</td>
<td>$55,596,384</td>
<td>$43,564,006</td>
</tr>
<tr>
<td></td>
<td>Apples</td>
<td>835</td>
<td>11,774</td>
<td>$6,657,900</td>
<td>850</td>
<td>0</td>
<td>$13,168,166</td>
<td>$10,318,262</td>
</tr>
<tr>
<td></td>
<td>Cherries</td>
<td>358</td>
<td>324</td>
<td>$551,000</td>
<td>1,086</td>
<td>3,009</td>
<td>$7,459,000</td>
<td>$5,844,695</td>
</tr>
<tr>
<td></td>
<td>Kiwi</td>
<td>472</td>
<td>3,312</td>
<td>$4,026,400</td>
<td>485</td>
<td>3,988</td>
<td>$5,358,000</td>
<td>$4,198,402</td>
</tr>
<tr>
<td></td>
<td>Olives</td>
<td>0</td>
<td>0</td>
<td>$0</td>
<td>2,226</td>
<td>7,858</td>
<td>$3,724,262</td>
<td>$2,918,243</td>
</tr>
<tr>
<td></td>
<td>Oranges/Mandarins</td>
<td>127</td>
<td>635</td>
<td>$1,820,500</td>
<td>190</td>
<td>1,013</td>
<td>$13,168,166</td>
<td>$10,318,262</td>
</tr>
<tr>
<td></td>
<td>Peaches</td>
<td>15,842</td>
<td>248,370</td>
<td>$59,412,900</td>
<td>10,934</td>
<td>177,907</td>
<td>$54,419,880</td>
<td>$42,642,125</td>
</tr>
<tr>
<td></td>
<td>Pears</td>
<td>6,691</td>
<td>121,727</td>
<td>$29,121,600</td>
<td>5,501</td>
<td>116,270</td>
<td>$32,337,340</td>
<td>$25,338,771</td>
</tr>
<tr>
<td></td>
<td>Persimmons</td>
<td>188</td>
<td>846</td>
<td>$231,000</td>
<td>17</td>
<td>2,285</td>
<td>$1,307,000</td>
<td>$1,024,134</td>
</tr>
<tr>
<td></td>
<td>Plums</td>
<td>212</td>
<td>551</td>
<td>$651,400</td>
<td>99</td>
<td>154</td>
<td>$429,160</td>
<td>$336,280</td>
</tr>
<tr>
<td></td>
<td>Prunes</td>
<td>34,039</td>
<td>55,909</td>
<td>$45,283,000</td>
<td>24,866</td>
<td>65,381</td>
<td>$84,356,800</td>
<td>$66,099,984</td>
</tr>
<tr>
<td></td>
<td>Strawberries</td>
<td>122</td>
<td>27,598</td>
<td>$1,520,000</td>
<td>125</td>
<td>34,410</td>
<td>$1,841,000</td>
<td>$1,442,564</td>
</tr>
<tr>
<td></td>
<td>Walnuts</td>
<td>34,035</td>
<td>51,588</td>
<td>$56,086,000</td>
<td>52,843</td>
<td>88,357</td>
<td>$231,134,358</td>
<td>$181,111,392</td>
</tr>
<tr>
<td></td>
<td>Orchard By-Products</td>
<td>0</td>
<td>0</td>
<td>$2,489,600</td>
<td>0</td>
<td>0</td>
<td>$8,700,000</td>
<td>$6,817,113</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Peppers</td>
<td>111</td>
<td>1,388</td>
<td>$413,000</td>
<td>0</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>Pumpkins</td>
<td>556</td>
<td>9,952</td>
<td>$1,772,000</td>
<td>0</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>Fresh Tomatoes</td>
<td>824</td>
<td>16,810</td>
<td>$5,917,000</td>
<td>7,827</td>
<td>296,174</td>
<td>$21,325,000</td>
<td>$16,709,763</td>
</tr>
<tr>
<td></td>
<td>Processing Tomatoes</td>
<td>5,717</td>
<td>199,523</td>
<td>$9,497,000</td>
<td>0</td>
<td>0</td>
<td>$6,932,000</td>
<td>$5,431,751</td>
</tr>
<tr>
<td></td>
<td>Sweet Corn</td>
<td>491</td>
<td>2,897</td>
<td>$4,198,000</td>
<td>0</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>Misc. Vegetables</td>
<td>308,135</td>
<td>0</td>
<td>$155,168,500</td>
<td>285,373</td>
<td>1,139</td>
<td>$209,129,252</td>
<td>$163,868,713</td>
</tr>
<tr>
<td></td>
<td>Organic Production</td>
<td>5,405</td>
<td>0</td>
<td>$9,078,000</td>
<td>36,007</td>
<td>0</td>
<td>$40,162,233</td>
<td>$31,470,172</td>
</tr>
<tr>
<td>Apiary Products</td>
<td>Apiary Products</td>
<td>0</td>
<td>0</td>
<td>$7,957,000</td>
<td>0</td>
<td>0</td>
<td>$14,356,425</td>
<td>$11,249,354</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------</td>
<td>------</td>
<td>------</td>
<td>------------</td>
<td>------</td>
<td>------</td>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Grains &amp; Hay</td>
<td>Grains &amp; Hay</td>
<td>759,037</td>
<td>0</td>
<td>$302,055,200</td>
<td>777,926</td>
<td>0</td>
<td>$519,287,410</td>
<td>$406,901,277</td>
</tr>
<tr>
<td>Livestock &amp; Poultry</td>
<td>Livestock &amp; Poultry</td>
<td>0</td>
<td>0</td>
<td>$88,152,400</td>
<td>0</td>
<td>0</td>
<td>$145,338,057</td>
<td>$113,883,449</td>
</tr>
<tr>
<td></td>
<td>Livestock &amp; Poultry Products</td>
<td>0</td>
<td>0</td>
<td>$13,058,900</td>
<td>0</td>
<td>0</td>
<td>$15,112,000</td>
<td>$11,841,404</td>
</tr>
<tr>
<td></td>
<td>Dairy &amp; Wool</td>
<td>0</td>
<td>0</td>
<td>$38,824,000</td>
<td>0</td>
<td>0</td>
<td>$58,884,000</td>
<td>$46,140,103</td>
</tr>
<tr>
<td>Nursery Stock</td>
<td>Nursery Stock</td>
<td>1,472</td>
<td>0</td>
<td>$59,363,000</td>
<td>339</td>
<td>0</td>
<td>$62,253,519</td>
<td>$48,780,378</td>
</tr>
<tr>
<td>Seed Crops</td>
<td>Seed Crops</td>
<td>35,908</td>
<td>0</td>
<td>$32,008,700</td>
<td>37,055</td>
<td>0</td>
<td>$100,203,866</td>
<td>$78,517,369</td>
</tr>
<tr>
<td>Christmas Trees</td>
<td>Christmas Trees</td>
<td>0</td>
<td>0</td>
<td>$3,106,200</td>
<td>0</td>
<td>0</td>
<td>$1,649,530</td>
<td>$1,292,533</td>
</tr>
<tr>
<td>Timber</td>
<td>Timber</td>
<td>0</td>
<td>0</td>
<td>$37,020,500</td>
<td>0</td>
<td>0</td>
<td>$15,371,951</td>
<td>$12,045,096</td>
</tr>
</tbody>
</table>
Aging of Agricultural Operators

A factor that could also impact the future of agriculture in the region is the aging of the region’s farm operators. According to the Ag Census data shown in Tables 21 and 22 below, years at current farms increased 12 percent to an average of 19.4 years. In terms of age, the most significant growth has been in the group of farm operators ages 60 and over, and the average age is 59. In percentage terms, younger farmers aged 25 to 34 saw a significant increase (40 percent) between 2002 and 2012, but represent less than five percent of total farm operators in the Ag Census. As noted previously, the Ag Census does not capture information on all farms, but is one of the best data sources available. Whether or not older farmers have plans to retire, have successors to carry on their businesses, or plan to sell their land for agriculture or development will have implications for future agricultural production.

Table 21. Years on Present Farm of Farm Operators, 2002 to 2012

<table>
<thead>
<tr>
<th>Principal Farm Operator</th>
<th>Years on present farm</th>
<th>2002</th>
<th>2007</th>
<th>2012</th>
<th>% change 2002-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years or less</td>
<td></td>
<td>316</td>
<td>423</td>
<td>459</td>
<td>45%</td>
</tr>
<tr>
<td>3 or 4 years</td>
<td></td>
<td>928</td>
<td>611</td>
<td>542</td>
<td>-42%</td>
</tr>
<tr>
<td>5 to 9 years</td>
<td></td>
<td>1,482</td>
<td>1,536</td>
<td>1,187</td>
<td>-20%</td>
</tr>
<tr>
<td>10 years or more</td>
<td></td>
<td>4,870</td>
<td>4,557</td>
<td>5,082</td>
<td>4%</td>
</tr>
<tr>
<td>Average years on present farm</td>
<td></td>
<td>17.3</td>
<td>18.2</td>
<td>19.4</td>
<td>12%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>7596</td>
<td>7127</td>
<td>7270</td>
<td>-4%</td>
</tr>
</tbody>
</table>

Table 22. Age of Principal Farm Operators, 2002 to 2012

<table>
<thead>
<tr>
<th>Principal Farm Operator</th>
<th>Regionwide Total</th>
<th>% of total</th>
<th>% change 2002-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25 years</td>
<td>54</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>25 to 34 years</td>
<td>235</td>
<td>208</td>
<td>330</td>
</tr>
<tr>
<td>35 to 44 years</td>
<td>1,106</td>
<td>795</td>
<td>689</td>
</tr>
<tr>
<td>45 to 54 years</td>
<td>2,117</td>
<td>2,010</td>
<td>1,516</td>
</tr>
<tr>
<td>55 to 59 years</td>
<td>1,103</td>
<td>1,025</td>
<td>1,005</td>
</tr>
<tr>
<td>60 to 64 years</td>
<td>865</td>
<td>1,104</td>
<td>1,097</td>
</tr>
<tr>
<td>65 to 69 years</td>
<td>602</td>
<td>779</td>
<td>1,019</td>
</tr>
<tr>
<td>70 years and over</td>
<td>1,263</td>
<td>1,337</td>
<td>1,521</td>
</tr>
<tr>
<td>Average age</td>
<td>56.1</td>
<td>57.8</td>
<td>58.9</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Total</td>
<td>7345</td>
<td>7296</td>
<td>7227</td>
</tr>
</tbody>
</table>
Technology

Another emerging development that could have significant implications for farm labor needs and future cropping patterns is research to develop robots for farm work. In October 2013, the USDA provided $4.5 million in grant funding for agricultural robotics research. Private companies are also involved in developing robotic applications. Robotics research and development efforts include applications for fruit picking, weeding, nursery plant moving, monitoring plant health, watering, milking, and livestock herding. Whether or not such farm robots can be successfully developed, and the eventual costs of robots, will determine the extent to which they might replace human labor and how robots might affect the economics of producing different agricultural commodities.

SACOG Next Steps

As part of its ongoing Rural Urban Connections Strategy (RUCS) work, SACOG expects to continue to assess developments related to labor and agricultural production in the Sacramento region, and work with the region’s agricultural stakeholders to develop strategies to support this important industry.

CASE STUDIES

In the last two years, SACOG has used RUCS tools to conduct case studies for local jurisdictions to help provide data and information that helps decision makers better understand strategies to support agriculture and food industries. Currently, a Yuba County case study is completed, a Yolo County case study is nearly completed and a Delta case study is getting started. This appendix includes the results of the Yuba County case study to illustrate the capacity SACOG has built in RUCS and how that is being applied to assist local stakeholders.

Introduction

Agriculture is a way of life in Yuba County and continues to be the cornerstone of the local economy. As stated in the County’s 2030 General Plan, “agriculture represents the single most
important economic activity and most prevalent land use in Yuba County.” Next Economy, the regional economic development strategy, also highlights the importance of agriculture to economic resiliency, vitality and opportunity, with agriculture and food as one of the strategy’s core business clusters. Even when compared to other farming regions agriculture’s contribution to the local economy stands out: over 11.5 percent of gross regional product in the Yuba Metropolitan Statistical Area comes from the direct value of farm output alone (not including agriculture’s substantial multiplier effect), a rate significantly higher than the rest of the Sacramento Valley. Indeed, the relative contribution of agriculture to gross regional product in the Yuba area is 50 percent higher than in the Fresno or Bakersfield MSAs, the state’s largest agricultural regions by output.

Despite agriculture’s centrality to both the local economy and way of life, working landscapes in Yuba County are undergoing major changes as market forces, policy and environmental conditions shift. As a result, agricultural lands often face pressure from competing uses, in particular urban land development. Like other growing areas, Yuba County aims to balance agriculture and other land uses to accommodate long-term population growth, preserve quality of life and foster economic development.

This case study on current and possible future agriculture production in Yuba County provides information, data and economic modeling results that may help the County in assessing land use planning and economic development strategies. The study applies the tools developed as part of SACOG’s Agricultural Infrastructure project to Yuba County. In addition to an updated crop modeling platform these tools include refined local consumption and production estimates, fiscal results of various land use scenarios, and financial feasibility tools to respond to market opportunity. While the County is the primary audience for the study, we anticipate these tools will have relevance to local growers and investors as well and transferability to other counties or regions.

The first section of the case study identifies existing conditions in Yuba County’s agriculture cluster and how possible changes in market and natural resource conditions may affect cropping patterns and agricultural viability. The study also highlights specialty crop production for the local market and associated agriculture infrastructure as a burgeoning economic opportunity while also discussing critical infrastructure for the county’s mainstay commodity crop production. The second section of the case study assesses the emergence of a local market scenario compared to other possible future cropping patterns reflecting changes in market demand and management.

---

76 Yuba County 2030 General Plan, Chapter 7 Natural Resources Element-16.

77 The Yuba MSA includes both Yuba and Sutter counties.

objectives. This second section also showcases the economic and fiscal value of recent agricultural conservation as a result of Yuba County direction and policy. The modeling results provide the County data and comparison across numerous fiscal and economic metrics for land use and economic development strategies. Finally, the case study concludes with a section showcasing opportunities to leverage agriculture as a form of economic development in Yuba County.
Key Findings

Market Scan

➢ The last two years have provided record levels of agricultural production in Yuba County, helping fuel economic recovery from the recent recession.

➢ Yuba County’s water supply and soil quality can support a broad array of crops, granting growers flexibility to respond to new market signals. The county appears to be well positioned to capitalize on a range of market opportunities. Currently major export commodity production dominates the county’s agriculture sector. Between 2008 and 2012 growers added more acres of walnuts than any other crop in Yuba County.

➢ Specialty crop production geared to local consumption represents a growing and largely untapped market opportunity in Yuba County and the greater Sacramento region, yet barriers inhibit growth in this market segment.

➢ Local agriculture infrastructure such as a food hub can help overcome these barriers and capitalize on the burgeoning local food system. The case study shows a conceptual food hub (aggregation, processing, storage, and distribution) in Yuba County is a financially feasible business endeavor, generating a positive annual cash flow of nearly $2 million and over 11 percent return on investment by the tenth year of operation. Likewise, the case study provides the specifications of an alternative hub model geared to process walnuts, Yuba County’s top crop by value; the study shows this infrastructure serving existing production also appears to be economically viable in the county.

Scenario Analysis: Possible Agriculture Futures

➢ A regional-serving food hub would require around 530 acres of dedicated specialty crop production, depending on the facility’s crop mix and number of processing lines; the county’s existing crop acreage could easily support this total, even within currently fallow agricultural land. Growers supplying specialty crops to the single facility in aggregate would also earn estimated profits of $2.4 million. The hub could meet the full fruit and vegetable consumption of 13,165 people, or a smaller proportion of that consumption to a larger number of people (e.g., a quarter of annual fruit and vegetable consumption of 52,600 people).

➢ A variety of future cropping patterns illuminate the full economic potential of the county’s agriculture sector as market, natural resource and social factors fluctuate. A shift to high value crops within the existing cropping pattern (e.g., orchard lands stay in orchards, but switch to highest value orchard crop) could increase the sector’s gross farm gate value by two-thirds, from about $350 million based on the study’s estimates to reach $591 million a year.

➢ Further economic objectives include maximizing return on investment (ROI) to farmers. A study scenario that tested crops that have the highest return shows a cropping pattern that
produces a 43% ROI on average for farmers. This cropping pattern, however, has a more limited market and may not have the same economic impact on the entire agriculture industry since it supports less diversity in processing and other related businesses.

- In comparison, the scenario that tested extensive specialty crop production generated the highest value by far, as well as a high return on investment. Compared to the base, the specialty crop scenario quadruples overall value, increases average ROI and actually decreases agricultural water consumption by 78,000 acre-feet. A greater diversity of economic activity could occur in this scenario since processing and other related activities could generate a greater multiplier effect throughout the county. To reach these economic levels, however, the scenario results in significant additional labor demand.

- Environmental considerations are equally as important as economic ones when analyzing crop production. A scenario that tested crops with low water demand cuts water consumption by half, but also reduces agricultural value $73 million from today’s base conditions. Likewise, agriculture labor hours in the county fall by nearly 50 percent in the low water scenario compared to the base. This analysis highlights the positive correlation between agricultural value, water consumption and labor demand (i.e., they tend to move in the same direction). Generally, higher agricultural values and returns require more water and labor supply.

- Finally, the project’s analysis illuminates economic and fiscal results of agricultural land conservation in Yuba County. Recent Yuba County policy—per its 2030 General Plan—establishes long-term agriculture use in the valley floor. The case study estimates this agriculture conservation effort preserves approximately 10,000 agriculture acres from converting to urban use over the course of the plan, protecting $31 million in agricultural value—using today’s cropping pattern—while saving an estimated $40 million in future Operations and Maintenance (O&M) annual expenditures.

**Opportunities to Leverage Agriculture to Expand Economic Development in Yuba County**

- **Growers**
  - Yuba County is well positioned to grow a diversity of crops for a range of markets. Expanding national and international demand for commodity agricultural products presents continued opportunity for growers in the county, given that commensurate water and labor supply is available.
  - The local market represents an emerging opportunity, yet the success of this system is predicated on a sufficient supply of local specialty crop production. Growers in Yuba County have noted that they need to see a strong market signal to decide to produce specialty crops for the local market.
  - The regional Agricultural Infrastructure project being conducted by SACOG provides detailed evidence of the burgeoning local market opportunity, including untapped local demand and price points for local specialty crops. The financial pro forma
shows farmers in aggregate will be profitable growing at estimated prices offered by a prototypical food hub facility. This work helps document the competitiveness of specialty crop production.

➢ Yuba County

  o Yuba County's 2030 General Plan articulates the need to preserve the county's agricultural heritage and economic base. The plan re-designates almost 5,000 acres of farmland (including grazing) from future urban development to agriculture. Likewise, the plan calls for future development to be focused within the Valley Growth Boundary, in turn conserving long-term agriculture use in the valley. If this policy holds, using the development trends of the past 20 years, the county could ultimately realize 10,000 acres of agricultural land conservation over the life of the general plan. Together, this direction helps confirm the importance of agriculture in the county and provides a clear signal to growers of the long-term stability of the sector.

  o Farmers don’t have to shoulder the entire risk of building up the local food system. Yuba County can continue to support initiatives such as the grower-institution matchmaking of the Yuba-Sutter Economic Development Corporation, as well as work to update policy to support local food production such as allowing more uses on agriculturally zoned parcels. The impediments report, which is part of the larger agriculture infrastructure study, highlights other incentives the County could employ to support specialty crop production and a food hub.

➢ Investors

  o The Agricultural Infrastructure project provides a suite of business tools that help inform investment decisions. In addition to that project’s detailed pro forma and business plan, this case study reports the financial feasibility of an alternative conceptual food aggregation facility customized to Yuba County.

  o The RUCS modeling platform estimates grower revenue and costs by various future conditions such as drought, establishment, or changing market price. These data can also be of use to help steer investment to specialty crop production.

  o A prototypical food hub serving the Sacramento Valley requires a cash investment of $3.5 million and becomes cash positive by the end of the fourth year, rising to a nearly $2 million positive annual net cash flow by the tenth year of operation. Over the course of the pro forma, the facility gives a nearly 25 percent Internal Rate of Return.
Yuba County’s Agriculture Sector

Market Scan

During the recent recession agriculture was one of the few bright spots in the regional economy and has helped to fuel economic recovery—in Yuba County the last two years have provided record levels of agricultural production, showcasing the strength of the local agricultural sector.\(^{79}\) Yuba’s neighboring counties in the Sacramento Valley also evince a similar trend of record agricultural value, illustrating the vitality of the agricultural cluster identified in Next Economy’s regional prosperity plan. For example, Yolo County’s gross value of agriculture production in 2012 was at an all-time high and an increase of 17.5 percent from the previous year.\(^{80}\) In 2011 Sacramento County witnessed its highest ever level of crop production value, a level that was surpassed the following year.\(^{81}\) Indeed, agriculture in the six county region produced nearly $2 billion of value from farmgate production alone in 2012, the highest level recorded.\(^{82}\) This total does not include the additional contribution of processing, transport or other value-added activities tied to the agricultural sector, nor the increasing value of ecosystem services provided by working landscapes. In short, the region’s agricultural sector has emerged from the recession well positioned to capitalize on growing demand and higher international market prices for commodities.

Current Conditions- Commodity Production in Yuba County

As with other parts of the region, export commodity production currently dominates Yuba County’s agriculture industry. SACOG’s Agriculture Infrastructure project estimates that 98 percent of the county’s estimated $350 million agriculture output\(^{83}\) is exported, including commodities destined

---

\(^{79}\) Yuba County Department of Agriculture, “2012 Crop Report.”

\(^{80}\) Yolo County Department of Agriculture and Weights & Measures, “Yolo County 2012 Agricultural Crop Report.”

\(^{81}\) Sacramento County Department of Agriculture, “Sacramento County 2012 Crop & Livestock Report.”

\(^{82}\) SACOG analysis of 2012 County Crop Reports.

\(^{83}\) This level is based on SACOG’s 2012 Crop Map and may differ from other published sources.
for national and overseas markets. To analyze this current cropping pattern SACOG created a field-level crop map for Yuba County with the most recent 2012 data from the Pesticide Use Report from the California Department of Pesticide Regulation supplemented by satellite imagery. This map is the “base case” scenario against which future scenarios are compared as described below. Of the 281,093 agriculture acres in the county, timber encompasses 72,519 and rangeland/pasture another 114,232, with 94,342 acres of crop production. The map on the following page shows the location of major crop production in the county: half of crop coverage in the county comes from rice, but specialty crops round out the next most prevalent, with walnuts, prunes, peaches, almonds and pears the next largest crops by acreage.

2012 Field-Level Yuba Crop Map

---

The tables below compare the 2012 top crops in the county by value to their inflation-adjusted 2008 levels, and note the harvested acreage change for these crops in the same period. The review found that largest change between periods came from walnut planting, as this crop has exhibited marked increases in market value recently.

**2012 Top Yuba County Crops by Value compared to 2008 Inflation-Adjusted Levels**

<table>
<thead>
<tr>
<th>Crop</th>
<th>2008 Value (in $2012)*</th>
<th>2012 Value</th>
<th>Percent Change 2008 to 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walnuts</td>
<td>$18.6 million</td>
<td>$59.5 million</td>
<td>220%</td>
</tr>
<tr>
<td>Rice</td>
<td>$87 million</td>
<td>$57 million</td>
<td>-34%</td>
</tr>
<tr>
<td>Prunes</td>
<td>$22.1 million</td>
<td>$25.7 million</td>
<td>16%</td>
</tr>
<tr>
<td>Peaches</td>
<td>$12.5 million</td>
<td>$16.5 million</td>
<td>32%</td>
</tr>
<tr>
<td>Kiwifruit</td>
<td>$3.5 million</td>
<td>$4.5 million</td>
<td>28%</td>
</tr>
<tr>
<td>Pasture</td>
<td>$4.32 million</td>
<td>$4.3 million</td>
<td>-0.5%</td>
</tr>
<tr>
<td>Almonds</td>
<td>$1.4 million</td>
<td>$2.8 million</td>
<td>100%</td>
</tr>
</tbody>
</table>

*2008 values adjusted into 2012 dollars to account for inflation. Adjustment based on Bureau of Labor Statistics Inflation Calculator


**2012 Top Yuba County Crops by Acreage compared to 2008 Levels**

<table>
<thead>
<tr>
<th>Crop</th>
<th>2008 Harvested Acres</th>
<th>2012 Harvested Acres</th>
<th>Percent Change 2008 to 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture</td>
<td>199,600</td>
<td>198,300</td>
<td>-1%</td>
</tr>
<tr>
<td>Rice</td>
<td>35,294</td>
<td>37,600</td>
<td>7%</td>
</tr>
<tr>
<td>Walnuts</td>
<td>9,006</td>
<td>11,560</td>
<td>28%</td>
</tr>
<tr>
<td>Prunes</td>
<td>8,650</td>
<td>7,367</td>
<td>-15%</td>
</tr>
<tr>
<td>Peaches</td>
<td>2,854</td>
<td>3,632</td>
<td>27%</td>
</tr>
<tr>
<td>Almonds</td>
<td>973</td>
<td>860</td>
<td>-12%</td>
</tr>
<tr>
<td>Kiwifruit</td>
<td>285</td>
<td>319</td>
<td>12%</td>
</tr>
</tbody>
</table>
Natural assets supporting county agriculture

Yuba County's abundant agricultural output benefits from physical attributes such as good soils, mild climate, water availability and transportation connectivity. A look at Yuba County's soil quality and water supply in particular—two of the most important physical factors determining agriculture production in California—provides a measure of what forms of production are feasible in the county. This review shows an environment capable of supporting varied crop production, giving local growers a wide range of production modes and crop mix, and flexibility to respond to changing market signals.

Water

Relative to other portions of California, Yuba County is water-rich.\(^8^5\) Data provided by the Yuba County Water Agency (YCWA) show the vast majority of crops in the county are irrigated, either through surface water, ground water, or a mixture of the two.\(^8^6\) Reclamation District 10, one of the county's most productive agricultural areas, is one of the few major agricultural areas in the county still dependent primarily on groundwater.\(^8^7\) Yet overall, Yuba County agriculture relies primarily on surface water, and YCWA delivers 310,000 acre-feet of water a year to eight local irrigation districts in the county covering 79,590 acres.\(^8^8\) According to YCWA's most recent budget, the base rate for wholesale water transfer to member units is $1.93 per acre-foot, plus an additional $2 for supplemental transfer.\(^8^9\) Each individual irrigation district charges its own rate to the end agricultural user, and while costs can vary significantly even between districts within the Sacramento Valley\(^9^0\), these low wholesale rates can translate to low water costs for agriculture in Yuba County. For example, the current 2014 cost of delivered water in the Browns Valley Irrigation District—one of those wholesaled by YCWA—stands at $16.20 per acre-foot of water for the approximately 1,300 agricultural users in the district.\(^9^1\) In comparison, a snapshot of recent data

---


\(^8^7\) SACOG analysis of DWR data and the 2012 crop map.


from the University of California show much higher water costs for specialty crop production in other major agriculture areas of the state: $170 per acre-foot for production in Ventura County, $260 in the central coast, and $129 in the southern San Joaquin Valley. In interviews conducted for the project, growers noted that the water prices in the state have spiked relative to the above 2011 costs, especially given the recent drought.

An abundant water supply relative to other agriculture areas also provides stability, which is especially beneficial for high-value yet water-intensive crops. The recently constructed Yuba-Wheatland Canal expands surface water irrigation to a segment of the county previously reliant on groundwater, mitigating groundwater overdraft in the southern portion of the county and helping preserve groundwater aquifers for dry years. The canal improves the reliability of water supply, carrying up to 205 cubic feet per second of surface water to service local growers. On a county-wide level, the recently established Lower Yuba River Accord provides consensus and stability for water diversions moving forward. This accord balances uses on the river, increasing higher minimum instream flows on the lower Yuba River for fish and wildlife purposes while providing steady water supply for irrigation and power generation. Importantly, the accord overcame several decades of litigation to reach consensus on flows on the lower Yuba River.

Soil
In addition to a relatively enviable water supply, agriculture in Yuba County also benefits from good soil quality that supports major crop production. The project team obtained detailed county soil quality data and information from USDA's Natural Resources Conservation Service. This source covers over 95 percent of the United States and represents the single authoritative source of soil survey information. According to this data source, almost all of the valley floor consists of loam soil with no or slight slopes. The best soils for widespread crop production—based on USDA's Official Soil Definition Series soil quality definitions—come from the multiple river loams in the county. In addition, the project's soil review found that soil on the valley floor farther away from the rivers can


93 Yuba County Water Agency, “Yuba-Wheatland Canal Project Summary.”

also support a wide variety of crop production. For example, with over 57,500 acres in agriculture production (and another 19,000 developed by urban use), San Joaquin loam soil is the most widespread soil in the county. Currently about half of this soil type in the county is in rice production, followed by pastureland, prunes, wheat, walnuts, peaches, almonds and corn, with smaller acreage in olive, citrus, pears, mixed vegetables, strawberries, pecans, persimmons, pumpkins, alfalfa and clover production. This diversity of crop type illustrates growers’ ability to produce a wide variety of crops—including specialty crops—on the county’s most widespread soil. Overall, SACOG’s recently completed crop map combined with grower interviews show there are over 60 different crops grown at various scales in Yuba County.

Local grower and agriculture stakeholder sentiment captured as part of the case study substantiate how soil capacity is not viewed as the major constraint in Yuba County’s valley floor. In interviews, local growers related their capacity to grow almost any crop they wished due to favorable climate, soil and water supply. And while it is harder and more expensive to grow specialty crops on heavier soils, growers could make production work if they saw the end reward of a high market price. In short, growers’ production choices on the valley floor have not been dictated primarily by physical constraints but instead by market signals.

In the foothills, soil type and slopes become more of a limiting factor for commodity production, but can still support smaller-scale niche agriculture. The map below shows the ten largest soil types by acreage in the county. Generally, the soils in the foothills starting with the Auburn complex do not support full-fledged agriculture. The work of the North Yuba Grown group however illustrates how smaller-scale agriculture can be successfully conducted throughout the county. The cluster of specialty crop producers near Oregon House, for example, evidence the ability to grow in a variety of conditions: USDA’s soil data show this production to occur on gravelly soil with slopes between eight and 15 percent. Farmers who are part of the North Yuba Grown group listed crops in

---

95 The three most widespread soils in the valley floor are San Joaquin, Conejo and Kimball loans. Other prominent soils include Columbia, Hollenbeck, Holillipah, Kilaga and Shanghai loams. See USDA’s Official Soil Definition Series for a full classification of these and every soil in the county. https://soilseries.sc.egov.usda.gov/

96 2012 SACOG crop map.

97 SACOG Crop Map and local grower interviews. While many crops are grown on a smaller scale, overall the county is dominated by a few large crops. The three largest by coverage—rice, walnuts, and prunes—account for 80 percent of all crop acres in the county (excluding pasture and timber acres).


99 SACOG interview with Mark Lundy, Area Agronomy Advisor, University of California Cooperative Extension: Colusa-Sutter-Yuba Counties, July 15, 2014.

100 USDA Natural Resources Conservation Service and 2012 SACOG crop map.
production, including heirloom tomatoes, lettuce, kale, arugula, lavender, mixed vegetables and olives.\textsuperscript{101}

In short, the study’s review of natural assets supporting agriculture in Yuba County found a physical environment capable of supporting a wide range of crop production. These inherent assets provide growers flexibility to respond to changing demand, a key advantage in today’s global marketplace. Documenting Yuba County’s physical attributes also stresses the importance of maintaining and perhaps expanding the critical infrastructure that helps tap into these fundamental assets. The next section on the report delves into the market case for one such form of agriculture infrastructure, a food hub that captures more of the food system value chain within Yuba County.

\textsuperscript{101} SACOG interview with North Yuba Grown, March 5, 2014.
Largest Soil Categories in Yuba County

Source: USDA Natural Resources Conservation Service
Agricultural Infrastructure: Food Hub for the local market

Large-scale commodity production is the dominant form of agriculture in Yuba County. While commodity production for external markets will likely continue to serve as a mainstay of the county’s agricultural cluster, growers increasingly can also look to capitalize on the burgeoning local market as a new economic market outlet and means to diversify, and do so on a relatively small amount of land. This section first provides a market analysis around local demand, as it is not as well understood as national and international commodity markets, and then documents a potential food hub facility that can help address a critical infrastructure gap.

Evidencing Local demand

Currently the greater Sacramento region consumes over 1.8 million tons of food each year, with nearly 60,000 tons of this in Yuba County. Yet despite being one of the nation’s leading agricultural areas, SACOG estimates that only about two percent of food consumed in the region is grown in the region, with the remaining 98 percent imported from elsewhere. As farm-to-fork and similar trends continue to spread, local agriculture stakeholders have stressed the substantial market potential of meeting more local food demand through local production and distribution. The vast majority of this demand is for fresh fruit and vegetable specialty crops.

Several recent studies document the market demand for local product. The National Restaurant Association’s 2014 Culinary Forecast identified local sourcing as the top trend in the restaurant industry this year.102 Yet this development is not limited just to restaurants. A 2012 National Grocers Association survey for example found that over 85 percent of U.S. consumers partly base their grocery store selection on whether it carries local products while a 2014 report found that 70 percent of survey respondents will pay a premium for locally grown produce and prefer retailers that carry more locally produced items.103 Moreover, according to a Produce Marketing Association survey by the Hartman Group in 2011, U.S. consumers increased their tendency to buy locally grown fresh fruits and vegetables by 30 percent over the previous year.104 SACOG’s interviews as part of the Agricultural Infrastructure project with over 100 growers, distributors and stakeholders in the region echo these findings: local sourcing is a major market trend in the region.


## Yuba and Sacramento Region Annual Food Consumption

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Yuba County Food Consumption (tons per year)</th>
<th>SACOG Regional Food Consumption (tons per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits</td>
<td>11,888</td>
<td>384,828</td>
</tr>
<tr>
<td>Vegetables</td>
<td>20,642</td>
<td>668,204</td>
</tr>
<tr>
<td>Meat</td>
<td>6,972</td>
<td>225,678</td>
</tr>
<tr>
<td>Nuts</td>
<td>184</td>
<td>5,959</td>
</tr>
<tr>
<td>Eggs</td>
<td>1,488</td>
<td>48,178</td>
</tr>
<tr>
<td>Grains</td>
<td>3,549</td>
<td>114,877</td>
</tr>
<tr>
<td>Fats/Oils</td>
<td>1,030</td>
<td>33,357</td>
</tr>
<tr>
<td>Dairy</td>
<td>9,633</td>
<td>311,833</td>
</tr>
<tr>
<td>Sugars</td>
<td>3,150</td>
<td>101,978</td>
</tr>
<tr>
<td><strong>Total Consumption</strong></td>
<td><strong>58,536</strong></td>
<td><strong>1,894,892</strong></td>
</tr>
</tbody>
</table>

For primary food weight. Source: SACOG Food Consumption Calculator, 2014

As the above table illustrates, fruits and vegetable specialty crops account for the majority of total food consumption by primary weight each year in the region. For these specialty crops in particular the region experiences a marked supply/demand imbalance between local production and consumption. The table below estimates the number of acres in Yuba County devoted to several specific specialty crops compared to how many acres would be needed to meet current demand in both Yuba County and the entire six-county region. This analysis shows opportunities to expand local specialty crops to meet demand in the county, but tellingly, also areas to tap into greater regional demand. Local growers and stakeholders interviewed as part of this case study often equated the local market to Yuba and...
Sutter Counties, but not the other counties of the Sacramento region. This local market conception excludes the nearby consumption centers and thus major market opportunities. SACOG’s Agricultural Infrastructure project found that because of its great diversity of crops, favorable climate and other assets, the market shed for a producer to be deemed ‘local’ in Yuba County is at least 100 miles, and can even extend to neighboring regions such as the Bay Area. As such, the final column in the below table illustrates the significant market opportunity in growing specialty crop for the greater Sacramento region, and the need to increase market channels to tap into this existing demand.

### Examples of Local Market Supply/Demand Specialty Crop Imbalance

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acres in production in Yuba County</th>
<th>Acres needed to match Yuba County consumption</th>
<th>Acres needed to match regional consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>19</td>
<td>251</td>
<td>8,129</td>
</tr>
<tr>
<td>Asparagus</td>
<td>0</td>
<td>53</td>
<td>1,721</td>
</tr>
<tr>
<td>Bell Peppers</td>
<td>1</td>
<td>10</td>
<td>323</td>
</tr>
<tr>
<td>Blueberries</td>
<td>2</td>
<td>18</td>
<td>570</td>
</tr>
<tr>
<td>Broccoli</td>
<td>3</td>
<td>46</td>
<td>1,497</td>
</tr>
<tr>
<td>Carrots</td>
<td>0</td>
<td>29</td>
<td>940</td>
</tr>
<tr>
<td>Kale</td>
<td>1</td>
<td>9</td>
<td>307</td>
</tr>
<tr>
<td>Lettuce</td>
<td>7</td>
<td>85</td>
<td>2,755</td>
</tr>
<tr>
<td>Lima Bean</td>
<td>0</td>
<td>29</td>
<td>940</td>
</tr>
<tr>
<td>Onions</td>
<td>4</td>
<td>32</td>
<td>1,028</td>
</tr>
<tr>
<td>Spinach</td>
<td>0</td>
<td>16</td>
<td>522</td>
</tr>
<tr>
<td>Squash</td>
<td>3</td>
<td>22</td>
<td>729</td>
</tr>
<tr>
<td>Sweet potatoes/Yams</td>
<td>1</td>
<td>24</td>
<td>770</td>
</tr>
</tbody>
</table>
Barriers Growing for the Local Market

Despite the potential referenced above, farmers growing specialty crops for the local market face serious challenges compared to conventional commodity production. A related report included in SACOG’s Agriculture Infrastructure study, “Impediments to Supplying Locally Grown Specialty Crops,” discusses these barriers at length. The below section summarizes four of those challenges—**policy, market access, operating infrastructure** and **farmer reluctance**—most pertinent to Yuba County.

**Policy**

The rapid expansion in local market demand—epitomized by the region’s branding as the nation’s Farm-to-Fork capital—represents a relatively recent change that raises new grower needs and support. Stakeholders in Yuba County have made significant strides responding to this new market development. The Yuba-Sutter Economic Development Corporation for example is assisting the North Yuba Grown group with a local Agriculture Tourism project while the Yuba-Sutter Farm Bureau convenes young farmers with an eye towards niche markets.\(^{105}\)

Even with these steps, current and potential growers in Yuba County expressed that more could be done from a policy standpoint to foster a vibrant local market. In particular, interviewees pointed to current zoning as a possible barrier that could inhibit small local operations from expansion. Examples include growers wishing to convert a barn on the property into a farm store, but finding sales on rural agriculture parcels prohibited, or the desire to approve farm stays so agri-tourists coming to the county would have places to stay. As the County updates its agricultural zoning, changes supporting flexible mixed use on rural agriculture parcels that allow light processing and agri-tourism uses can help fully capitalize on Yuba County's growing market opportunity. An estimated 200,000 people a year come to Yuba County for recreation activities; supportive zoning can help channel this recurring demand to the county’s nascent local food system. Butte County’s agricultural overlay land use and zoning designation allows visitor-serving commercial uses, farm

\(^{105}\) SACOG interview with Brenda Stranix, Yuba-Sutter Economic Development Corporation, and SACOG interview with Megan Foster, Yuba-Sutter Farm Bureau and Yuba County Supervisor Roger Abe, February 21, 2014.
stays, education and specialty produce retail in agricultural areas and serves as one possible model of how a nearby county has supported its local food system.  

Market Access
Unlike in contract agriculture, specialty crop growers focused on local markets are seldom provided the security of a guaranteed outlet for their product. While growers expressed concern that some common market outlets—chiefly farmers markets and Community Supported Agriculture (CSAs)—may already be saturated at the regional level, these same channels may be underdeveloped specifically in Yuba County. Furthermore, growers have found it difficult to navigate procurement policies at local institutions.

Operating Infrastructure and Costs
Large-scale commodity production still dominates Yuba County's agriculture sector and the region's current agriculture infrastructure reflects this export orientation. Through interviews, growers identified the shortage of agriculture and food infrastructure tailored to regional aggregation, handling, processing and distribution as a primary constraint in meeting demand for more locally grown specialty crop. In particular, growers expressed the lack of mid-scale produce handling and processing capacity as a major constraint—growers will not produce for the local market if they do not see a viable supply chain infrastructure that enables their product to efficiently reach consumers. The subsequent section of the study focuses on the financial feasibility and structure of a food hub to provide needed local agriculture infrastructure.

In addition to off-farm infrastructure challenges, growers shifting production to new crops incur substantial costs on the farm. Costs of crop conversion include capital establishment expenses as well as the time needed to get the new crop to mature yield levels. These costs do not apply solely to new farmers; even established growers need to make capital investments when switching crops.

The recent increase in walnut production provides valuable insight into the challenges expanding specialty crops in the county. SACOG conducted an in-depth exploration of the economics of walnut production, which is included in this case study as a technical appendix, Exploring Long-Term Viability of Walnut Growers. In summary, the review highlighted the implications of converting to crops with high establishment costs and long establishment periods, such as walnuts but also other orchard or vine crops like peaches, kiwis and grapes.

For example, a typical grower must spend around $7,000 an acre the first year converting to a new walnut crop, to prepare the land and purchase and plant tree starts. Yearly costs decrease after the first year but the orchard still must be tended with irrigation, fertilizer and pesticide. The new walnut starts do not produce any harvest until the fourth year, and don’t reach full maturity until eight years after planting. In consequence, the grower incurs significant upfront costs with a delayed return. Indeed, the analysis suggests that the average grower does not make back his initial

106 Butte County General Plan, Element 7- Agriculture.
investment in walnut production until the 11th year of operation. And if walnut prices decrease by a third, the analysis indicates the grower would still not have repaid establishment costs by year 25, when he would likely need to re-establish the crop. Overall, the analysis shows that a shift to these types of specialty crops can be financially rewarding in the long-run, but also pose risk to the grower due to high capital investment, long period to maturity and the potential for a decrease in market price. Importantly, given the uptake in walnut planting in the county, the review also shows how growers are willing to take such a risk when they see a long-term market reward. It is worth noting that even specialty crops that produce immediately—such as leafy greens, brassicas, etc.—still have significant establishment costs in terms of the capital investment needed to start or change a farm operation.

Grower Reluctance
Because of the challenges of growing local and the strength of the existing commodity system, many farmers expressed reluctance about increasing the supply of product geared to the local market. Commodity production provides stability through guaranteed contracts and over time farmers have developed strategies and knowhow to deal with this regulatory system. Given this, they have capitalized their operations to grow commodities and would have to make expensive purchases to retool for other crops. With international commodity prices high, growers need to see a strong market case for increasing local production. The various components of the regional Agricultural Infrastructure Project provide metrics and data to help growers gauge local market opportunities. Furthermore, a food hub will rely on a guaranteed steady supply of the products and volumes needed to successfully operate the facility, thus providing one of farmers’ biggest incentives, a contract for product.

Food Hub: Capitalizing on Local Market Opportunity
Over the past several years, SACOG’s RUCS program has engaged local growers and agricultural stakeholders to better understand the extent of the local market opportunity. This process identified the need for expanded agricultural infrastructure for the regional food system as a key way to overcome the above barriers to producing for the local market. In particular, a food hub to aggregate, pack, process, market and distribute local specialty crops would provide a vital piece of infrastructure to help actualize the local market opportunity, especially by offering contracts for locally-grown specialty crops.

SACOG’s Agricultural Infrastructure project delves into the market case for developing a food hub in the Sacramento Valley. The project provides an overview of market drivers and trends pointing towards more local consumption, as well as how a food hub facility can help complement existing agricultural infrastructure by filling a key distribution gap. Furthermore, the project describes a detailed conceptual design, cost estimate, and operational and financial plan for the facility with value-adding processing capacity.

Financial analysis conducted by the project team shows this food hub facility and model to be a feasible business operation in the region. The project’s pro forma analysis provides costs and
revenue of the operation through time. Initially, the facility requires a cash investment of $3.5 million and runs at a financial loss in the first years of operation as the facility establishes market share (graphic below), highlighting the risk involved in the startup. The project’s phasing not only helps to spread risk, but also to build market relationships and supplier networks slowly through time. Once the food hub expands from an incubation stage to reach adequate scale, it becomes cash positive by the end of the fourth year, rising to a nearly $2 million positive annual net cash flow by the tenth year of operation. Over the course of the pro forma, the facility gives a nearly 25 percent Internal Rate of Return (IRR).107

The case study’s review of Yuba County’s agriculture sector highlights numerous assets that would support and enhance the competitiveness of a potential local food hub. First, agriculture in the county benefits from an enviable water supply and productive soils needed for the high value but water intensive specialty crops that supply the facility. As drought conditions continue to extend throughout the state, the county’s relative edge in water cost and stability in particular will likely serve as a further competitive advantage for the type of agricultural production serving a local food hub facility. Recent direction by the County and other stakeholders—such as convening young farmers interested in niche markets, updating agricultural zoning codes, and advancing policy preserving long-term agriculture—can also help showcase to potential agriculture infrastructure investors a stable and supportive environment for long-term capital appreciation.

Finally, farmers in Yuba County can likely respond more smoothly to the food hub’s proposed business model. Based on an extensive review of existing capacity in the region, the overall Agricultural Infrastructure project recommends the food hub’s initial focus to create a supply channel for large-scale buyers primarily, including existing fresh produce distributors and wholesalers, and institutions such as schools and hospitals. This model both fills a major gap in the existing distribution system and performs well on financial feasibility testing, but also operates on wholesale prices. As the Agricultural Infrastructure project team notes, this price point thus relies on the participation of large growers to provide the product volumes necessary to achieve economies of scale. Overall this business model fits well in Yuba County’s agriculture sector, where large-scale growers can dedicate a portion of their existing production to a food hub at cost-competitive pricing and where smaller growers already targeting local markets can have another market channel. Growers that can efficiently capitalize to new crops can also use the hub as a diversified market outlet. And as the food hub reaches scale it also includes service to help smaller growers increase their capacity to grow for the regional market. As such, the food hub business model offers opportunities for large scale exporters to diversify production and tap into a new market, while also serving as a possible outlet for efforts such as the North Yuba Grown group.

Infrastructure supporting commodity agriculture

In addition to the above food hub model targeting the local market, the project team also delved into agricultural infrastructure serving the county’s mainstay commodity production. First, the team customized a possible food hub model in the county that both supplies fresh specialty crops to the local market but also employs a glazing processing line that adds value to walnuts, the county’s top commodity crop by value. This processing function could capture more of the total food system value chain within Yuba County, resulting in additional local economic output and jobs. Overall, this alternative food hub model in Yuba County appears to be financially feasible, as described in this case study’s technical appendix *Yuba County Alternative Food Hub Model*.

The project’s infrastructure review also drew on recent RUCS work highlighting the importance of rural transportation infrastructure maintenance and operating efficiencies. The nearly $2 billion worth of direct farmgate value produced in the region travels over rural roads to packing, shipping or consumption points. Yet without an adequate rural transportation system this phenomenal
agriculture output can’t reach consumption markets. One relevant and important example is rice harvested in Yuba County must be trucked to the Port of West Sacramento to be shipped to markets abroad.

Maintaining the transportation system can be a major burden in rural areas which account for 48 percent of the road miles in the region, but only 13 percent of the population. In many instances, rural roads near or between residential neighborhoods and employment centers become ad hoc commuter routes creating a need for more intense maintenance in areas where resources are already limited. Heavy truck traffic can also take a serious toll on the surface conditions of rural roads that serve as connectors between fields, processing centers and markets.

**Typical Agriculture Truck Intensities in July**
Typical Agriculture Truck Intensities in September
The above maps show the average number of truck trips generated by acres of agriculture production at two different times in the year as different crops are harvested and sent to market. Maintaining the capacity of rural farm to market infrastructure is critical to the success of the agriculture sector, yet rural areas can face challenges balancing commuter, goods movement and heavy truck traffic on nearly half of the region’s total lane miles.

**Agriculture Scenarios**
The first section of this report described the current state of agriculture in Yuba County, including the role of commodity production and the emerging local market potential. Yet as market forces, policy direction and environmental conditions continue to shift, so too will agriculture in the county to remain a strong element of the county's economy. Using a recently updated RUCS crop modeling platform and fiscal impacts model, this section provides economic and fiscal metrics of various future cropping patterns that reflect changes in market demand, cost of production and management objectives for working lands.

The range of agricultural scenarios include cropping patterns that serve a potential food hub, as well as patterns that reflect other market dynamics that may impact cropping patterns. The scenarios are compared on metrics such as revenue, return on investment, water consumption and labor use. The scenarios evaluate potential changes in comparison to existing cropping patterns.

Each of these agriculture scenarios is also evaluated in the context of urbanization. Changing land use in the county will influence not only the acres available to agricultural production—and thus the economic output of the county's agriculture sector—but also the County's fiscal costs of servicing various forms of development. The fiscal component of the scenario analysis compares additional infrastructure cost and operations and maintenance to current County finances, also set to a base year of 2012. The section first looks at the various agriculture scenarios and then turns to effects of urbanization and land use decisions.

Methodology

Agricultural scenarios were built for comparison with today's cropping pattern—the base case—in order to illustrate the range of economic and natural resource impacts. The scenarios can also be compared to each other to determine favorable (or not so favorable) futures for the county's agriculture industry. Constructing these scenarios relied on two primary data components: SACOG's field-level crop map and costs and return data for each crop.

The base case was constructed with SACOG's GIS-based crop map updated with 2012 Pesticide Use Report data from the California Department of Pesticide Regulation. California's pesticide reporting program is internationally recognized as one of the most comprehensive, thereby creating an incredibly detailed database of cropping patterns. These parcel-level crop data are underpinned with cost and return data collected and published by the University of California Cooperative Extension (UCCE), which provide costs assumed by growers to establish and produce a given crop as well as the returns gained from their sales. These cost and return data, updated to the most recent figures for this case study, are broken down to line item quantities and prices, allowing detailed analysis of factors such as water consumption and labor demand. When aggregated to the county level, the combination of these crop and economic data provides a powerful and comprehensive snapshot of the agricultural industry's contribution to Yuba County's economy and resource use.

The scenario analysis tool uses per-acre quantity and cost data for production inputs including: water, labor, chemical, fuel, irrigation, etc., as well as operating costs, overhead costs, and establishment costs. These data are multiplied by acreage of a given crop in a scenario and then
summed to create county-level scenario indicators of demand for production inputs. Yield and price data are used to determine revenue from production and when compared to cost, provide net revenue and return on investment. For example, if the 4,268 of current peach production increases to 7,000 acres, the model provides a comparison of inputs, outputs and values of today's peach production to that of the future expanded production.

Several “dials” were installed in the analysis tool. These dials adjust factors such as establishment costs (modeled in phases including: newly established, producing but still repaying establishment loans, and fully established with loans repaid), land costs, water costs, labor costs, and production yield. These dials allow for analyses to show the variance in costs and returns when, for example, there is outright land ownership versus ongoing land costs, orchards or vineyards are maturity versus first established, there is readily available water versus supply shortages, etc.

Scenarios

Scenarios allow comparison between specialty crop production and a range of potential competing uses. Scenario comparison is a powerful tool to test thresholds or “boundary conditions”—economically, environmentally, socially, et cetera. Each scenario estimates the county-wide effects of different crop mixes. Of course, there are many factors affecting cropping patterns that were not considered in this exercise (e.g., market saturation or lack thereof affecting demand and prices). The study only tests high and low extremes for various factors, but offers a starting point from which more refined scenarios can be crafted to test conditions based on assumptions or forecasts of future market conditions. Furthermore, the work reveals general cause and effect conditions that may be helpful in building strategies that capitalize on potential agricultural economic development. The information produced by these scenarios is intended to help decision makers—growers, land owners, policy makers—understand opportunities and challenges from changes in market conditions, cropping patterns and land use decisions. The scenarios described below are not prescriptive—they do not tell what should be grown—and are just a small subset of possible scenarios that could be analyzed. Rather, these scenarios use data to define a spectrum of effects that could be expected from a variety of crop mixes.

**Base Case:** The base case represents the current cropping patterns as described above and is the baseline against which the specialty crop and various scenarios are compared using indicators noted earlier. Crops currently being grown are represented in the table below, grouped by crop category.

**Crops by Crop Category**

<table>
<thead>
<tr>
<th>Forage</th>
<th>Fruits</th>
<th>Fruit Trees</th>
<th>Grains</th>
<th>Orchards</th>
<th>Vegetables</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>Blueberries</td>
<td>Cherries</td>
<td>Rice</td>
<td>Almonds</td>
<td>Asparagus</td>
<td>Dried Beans</td>
</tr>
<tr>
<td>Silage Corn</td>
<td>Melons</td>
<td>Mandarins</td>
<td>Wheat</td>
<td>Olives</td>
<td>Broccoli</td>
<td>Safflower</td>
</tr>
<tr>
<td>Silage</td>
<td>Raspberries</td>
<td>Fresh Peaches</td>
<td>Walnuts</td>
<td>Celery</td>
<td>Sunflower</td>
<td></td>
</tr>
</tbody>
</table>
**Grain**

- Oat Hay
- Pasture
- Silage
- Sorghum

**Oat Hay**

- Strawberries
- Wine Grapes
- Prunes

**Pasture**

- Processing Peaches
- Pears

**Silage**

- Romaine Lettuce

**Sorghum**

- Onions
- Fresh Peppers
- Processing Peppers
- Squash
- Fresh Tomatoes

**High Revenue:** This scenario represents a crop mix that returns the highest revenue to growers while maintaining a diversity of crops across general crop types (vegetables, fruits, orchards, fruit trees, grains, forage and other). Rather than assigning every field with the single highest revenue crop, the highest-return crops within each crop category were assigned to the existing acreage for that category. For example, raspberries return the highest revenue per acre of all fruit crops grown in Yuba County—including strawberries, melons, grapes and blueberries—in total covering approximately 500 acres. Those 500 acres were converted to raspberries in this scenario to test the upper limit of revenue for that crop category. While this scenario does not maximize revenue to its fullest, it provides more realistic and useful information by showing the effects of converting crops to the highest returner within a crop category.

<table>
<thead>
<tr>
<th>Crop Category</th>
<th>Crop</th>
<th>Gross Revenue per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage</td>
<td>Corn for Silage</td>
<td>$1,440</td>
</tr>
<tr>
<td>Fruits</td>
<td>Raspberries</td>
<td>$75,000</td>
</tr>
<tr>
<td>Fruit Trees</td>
<td>Mandarins</td>
<td>$28,467</td>
</tr>
<tr>
<td>Grains</td>
<td>Rice</td>
<td>$1,547</td>
</tr>
</tbody>
</table>
Orchards  Walnuts  $7,200
Vegetables  Tomatoes for Fresh Market  $64,200
Other  Sunflower  $1,360

**Low Revenue:** Similar to the High Revenue scenario, this scenario estimates an extreme condition but at the lowest end of revenue to growers. It assigns the lowest valued crop to each crop category, again maintaining the same agricultural diversity as current conditions at the broad category level.

<table>
<thead>
<tr>
<th>Crop Category</th>
<th>Crop</th>
<th>Gross Revenue per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage</td>
<td>Oat Hay</td>
<td>$375</td>
</tr>
<tr>
<td>Fruits</td>
<td>Wine Grapes</td>
<td>$4,800</td>
</tr>
<tr>
<td>Fruit Trees</td>
<td>Pears</td>
<td>$4,567</td>
</tr>
<tr>
<td>Grains</td>
<td>Wheat</td>
<td>$950</td>
</tr>
<tr>
<td>Orchards</td>
<td>Olives</td>
<td>$3,600</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Onions</td>
<td>$3,024</td>
</tr>
<tr>
<td>Other</td>
<td>Safflower</td>
<td>$363</td>
</tr>
</tbody>
</table>

**High Return on Investment (ROI):** Slightly different from the High Revenue scenario, the Return on Investment scenario takes into account the costs of production for the crops grown as well as the revenue (revenue is exclusively the returns from selling products). Using the ratio of net returns to costs, ROI is a standard way to measure profits compared to costs. This scenario represents a crop mix with the highest ROI across the six general crop categories. In tandem with the High Revenue scenario, we can see which crops not only perform well in terms of absolute revenue, but also which will be best at keeping farmers viable, or “in the black”.

<table>
<thead>
<tr>
<th>Crop Category</th>
<th>Crop</th>
<th>Return on Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage</td>
<td>Grain for Silage</td>
<td>62%</td>
</tr>
<tr>
<td>Fruits</td>
<td>Melons</td>
<td>165%</td>
</tr>
<tr>
<td>Fruit Trees</td>
<td>Mandarins</td>
<td>17%</td>
</tr>
<tr>
<td>Grains</td>
<td>Wheat</td>
<td>13%</td>
</tr>
<tr>
<td>Orchards</td>
<td>Walnuts</td>
<td>74%</td>
</tr>
</tbody>
</table>
Vegetables  Peppers – Fresh  54%
Other  Sunflower  85%

**High Water Use:** Current drought conditions in California make water use an important metric with which to examine cropping patterns. To evaluate water use, per acre water demand was gleaned from UC Cooperative Extension’s Cost & Return studies for each crop. Some of these data were collected in regions outside of the Sacramento Valley (e.g. lettuce grown on the Central Coast of California) and will vary for crops grown in Yuba County; however, they provide a vetted basis of comparison from which to start conversations about water use. Furthermore, to be conservative with water use assumptions for crops typically grown on the cooler and damp Central Coast, water demand was increased by 10% from the base data provided in UCCE’s cost and return studies. This scenario assigns all acres within a crop category to the crop with the highest per acre water demand—for example, grain acreage assigned as rice; forage acreage assigned as silage corn.

<table>
<thead>
<tr>
<th>Crop Category</th>
<th>Crop</th>
<th>Water Demand (Ac-Ft/Ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage</td>
<td>Corn for Silage</td>
<td>4.0</td>
</tr>
<tr>
<td>Fruits</td>
<td>Blueberries</td>
<td>3.0</td>
</tr>
<tr>
<td>Fruit Trees</td>
<td>Peaches for Fresh Market</td>
<td>3.7</td>
</tr>
<tr>
<td>Grains</td>
<td>Rice</td>
<td>4.1</td>
</tr>
<tr>
<td>Orchards</td>
<td>Walnuts</td>
<td>3.5</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Eggplant</td>
<td>3.3</td>
</tr>
<tr>
<td>Other</td>
<td>Beans – Common Dried</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**Low Water Use:** The Low Water Use scenario frames the lower limit of water use while still maintaining the crop mix across general categories. It is not the bare minimum of water that could be used to produce crops in the county—in which case the entire county would be in dryland oat hay or rangeland—but a scenario that assigns low water crops to each crop category.

<table>
<thead>
<tr>
<th>Crop Category</th>
<th>Crop</th>
<th>Water Demand (Ac-Ft/Ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage</td>
<td>Oat Hay</td>
<td>0</td>
</tr>
<tr>
<td>Fruits</td>
<td>Wine Grapes</td>
<td>1.5</td>
</tr>
<tr>
<td>Fruit Trees</td>
<td>Cherries</td>
<td>2.5</td>
</tr>
</tbody>
</table>
Grains  Wheat  1.7
Orchards  Olives  3.0
Vegetables  Lettuce – Iceberg  1.4
Other  Safflower  0.5

**High Labor:** The agriculture industry relies heavily on labor to work machinery, manage fields, and harvest crops; however, a survey of agriculture labor has shown shortages in the labor supply in the recent years (SACOG Agricultural Labor Study, 2014). With growers facing challenges to recruit and retain agricultural labor, labor demand is an important metric to take into consideration when comparing scenarios. This scenario represents a crop mix that maximizes labor demand, as specified in the UCCE cost and return studies, across Yuba County, again maintaining the general crop category and distribution.

<table>
<thead>
<tr>
<th>Crop Category</th>
<th>Crop</th>
<th>Labor (Hours per Acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage</td>
<td>Alfalfa</td>
<td>6.19</td>
</tr>
<tr>
<td>Fruits</td>
<td>Blueberry</td>
<td>2,138.02</td>
</tr>
<tr>
<td>Fruit Trees</td>
<td>Mandarins</td>
<td>786.06</td>
</tr>
<tr>
<td>Grains</td>
<td>Rice</td>
<td>4.99</td>
</tr>
<tr>
<td>Orchards</td>
<td>Olives</td>
<td>27.6</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Tomatoes for Fresh Market</td>
<td>4619.16</td>
</tr>
<tr>
<td>Other</td>
<td>Beans – Common Dried</td>
<td>5.76</td>
</tr>
</tbody>
</table>

**Low Labor:** In contrast to the High Labor scenario, this scenario minimizes the labor hours across general crop types to find a cropping pattern that represents lower demand of labor demand.

<table>
<thead>
<tr>
<th>Crop Category</th>
<th>Crop</th>
<th>Labor (Hours per Acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage</td>
<td>Oat Hay</td>
<td>0.92</td>
</tr>
<tr>
<td>Fruits</td>
<td>Wine Grapes</td>
<td>68.05</td>
</tr>
<tr>
<td>Fruit Trees</td>
<td>Pears</td>
<td>35.13</td>
</tr>
<tr>
<td>Grains</td>
<td>Wheat</td>
<td>1.57</td>
</tr>
</tbody>
</table>
Local Consumption/Food Hub: This scenario is very similar to the Base Case but replaced 530 of its approximately 2,000 fallow acres with specialty crops that would be processed by the proposed food hub. The converted acres have access to irrigation from either surface water or ground water—easily accessed with Yuba County’s high water table—and have soil of suitable quality for growing vegetable crops. Fallow fields were assigned crop acres respective to the amount of crop that would be processed by the food hub. Crop acres were calculated using food hub demand and acres required to grow that amount of product. Fallow acres were used instead of replacing other crops to demonstrate that there is capacity within the county’s existing cropping patterns and agricultural infrastructure to grow for the food hub without compromising current operations.

Specialty Crops: This is the scenario that explored the impact of shifting entirely to specialty crops in Yuba County, rather than just enough specialty crop production to meet the demands of the food hub. Crop categories were not maintained when analyzing the potential of specialty crops in order to measure an unrestricted conversion away from commodity production, and further because two of the major crop types—grains and forage—are not specialty crops, along with animal products (e.g. meat, dairy, eggs), soybeans, crops used for oils (e.g. safflower, canola, sunflower), among others. Yuba County’s current crop acres were summed and divided among 26 specialty crops that are prominent in today’s market. Many of these specialty crops—walnuts and prunes, for example—are already grown in the county. Some of these specialty crops are grown elsewhere in the Sacramento Valley and would be viable given Yuba County’s similar climate, soil and water characteristics. Some of these specialty crops are currently grown in the Sacramento Valley but at smaller scales than large commercial operations in other regions—strawberries and lettuce on the Central Coast, for example. Acreage assigned to individual specialty crops took into account if they are or are not currently grown in Yuba County or the Sacramento Valley.

Specialty Crop Mix

<table>
<thead>
<tr>
<th>Almonds</th>
<th>Broccoli</th>
<th>Iceberg Lettuce</th>
<th>Olives</th>
<th>Pears</th>
<th>Raspberries</th>
<th>Walnuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asparagus</td>
<td>Celery</td>
<td>Romaine Lettuce</td>
<td>Onions</td>
<td>Fresh Peppers</td>
<td>Squash</td>
<td>Wine Grapes</td>
</tr>
</tbody>
</table>
The agricultural scenarios model various cropping patterns on the same set of acres, set as the base crops in the above map.

Agriculture Scenarios Analysis

Supplying the Local Food Hub
Modeling a local food hub scenario shows that a cropping pattern shift of 530 acres in Yuba County dedicated to specialty crop production would provide sufficient supply to serve a prototypical food hub. This scenario shows that not only would this food hub provide a positive return on investment for the hub operator, but also for growers providing the supply of specialty crop to the hub. To measure grower profitability from supplying the hub, the project team compared the estimated contract prices\(^\text{108}\) provided by the food hub to the costs to produce the crop.\(^\text{109}\) The analysis shows that overall, growers supplying a single local food hub would share in annual profits of $2.4 million.\(^\text{110}\) However, current cost of production data suggest that, at wholesale prices, local farmers would not turn a profit growing certain individual crops for a food hub, such as lettuce or squash.\(^\text{111}\)

In aggregate, supplying specialty crops for a single food hub would increase the direct farmgate value of Yuba County’s agriculture sector by 2.5 percent compared to the base case. While a 2.5 percent gain may seem small, it derives from a change in only 0.48 percent of the base crop acres. This gain demonstrates the powerful economic potential of specialty crops.

Finally, the regional food hub facility would provide an increase of fresh and locally produced specialty crop fruits and vegetables in the local food system. The hub could feed the full fruit and vegetable consumption levels of 13,165 people; more likely however the hub would meet only a portion of consumers’ total specialty crop demand. For example, the hub could provide a quarter of annual fruit and vegetable consumption to 52,600 people or ten percent of demand to 131,000 individuals.

**Scenario Comparison: Local Food Hub to the Base Case**

<table>
<thead>
<tr>
<th>Annual Ag Value</th>
<th>Base Case</th>
<th>Local Food Hub</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$360,174,281</td>
<td>$368,495,155</td>
</tr>
</tbody>
</table>

---

\(^{108}\) The estimated food hub contract prices per pound come from the SACOG’s detailed pro forma analysis. The pro forma assumes the hub sells product at wholesale prices so buys for less than wholesale, thus representing a conservative take on prices. See Applied Development Economics, Foodpro Inc., The Hatamiya Group and DH Consulting, “Comprehensive Food Hub Pro Forma.”

\(^{109}\) Growers’ costs to produce come from UC Cooperative Extension Cost and Return studies.

\(^{110}\) Based on a crop throughput of blueberries, broccoli, celery, iceberg and romaine lettuce, onions, peaches, pears, peppers, raspberries, squash and strawberries. The analysis excluded tomatoes due to the discrepancy between processing and fresh market methods of production.

\(^{111}\) The crops where production costs exceed estimated hub price are eggplant, lettuce (both iceberg and romaine) and squash. The analysis used data from the UC Cooperative Extension where some crops’ cost of production were studied in different regions with different growing conditions, such as broccoli, lettuce and celery on the Central Coast. To make these data more applicable to the Sacramento Valley, yield was reduced by 10% and water use was increased by 10%. Updated cost of production data for leafy greens in the Central Valley would provide a clearer picture of the financial feasibility of these crops.
Maximizing Revenue or Return

To compare specialty crop production in Yuba County to competing uses, the case study analyzed other various cropping patterns testing economic metrics such as gross revenue or return on investment. This comparison helps emphasize the economic potential of specialty crop production in the county.

The high and low-revenue scenarios help frame the economic potential of the county’s existing agriculture land within its current major cropping categories. As described in the methodology section, the high-revenue scenario models a shift in production patterns to provide the largest gross revenue to the county’s overall farm sector respecting the current distribution by crop type of forage, grain, vegetables, fruit, nuts, fruit orchards and other. This possible agriculture future increases the county’s annual farmgate value by two-thirds over the base case value of $350 million to an annual output of $591 million. Conversely, the low-revenue scenario produces an annual agriculture sector value of $213 million, a loss of forty percent of the base case crop value.

For comparison, the specialty crop scenario models a cropping pattern in Yuba County consisting entirely of specialty crops. The specialty crop scenario returns a remarkable $1.8 billion in total agriculture output. The scenario could meet the fruit and vegetable demand of 3.5 million people and supply 200 food hub facilities, underscoring the substantial market opportunities in specialty crop production. The scenario also shows the capacity for continued growth in the overall output of the county’s agricultural-based economy through a shift to specialty crop production.

### Gross Agriculture Value and Return on Investment by Selected Scenarios

<table>
<thead>
<tr>
<th></th>
<th>Base Case</th>
<th>High Revenue</th>
<th>Low Revenue</th>
<th>High ROI</th>
<th>Specialty Crop</th>
<th>Low Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ag Value</td>
<td>$360,174,281</td>
<td>$591,842,338</td>
<td>$213,018,538</td>
<td>$516,796,080</td>
<td>$1,824,343,487</td>
<td>$317,222,288</td>
</tr>
<tr>
<td>% Change in Ag Value</td>
<td>--</td>
<td>64%</td>
<td>-41%</td>
<td>43%</td>
<td>407%</td>
<td>-12%</td>
</tr>
<tr>
<td>Average Ag ROI</td>
<td>26%</td>
<td>29%</td>
<td>8%</td>
<td>43%</td>
<td>36%</td>
<td>41%</td>
</tr>
</tbody>
</table>

In addition to measuring annual agricultural value, which gauges the gross output of the sector by cropping pattern, the return on investment (ROI) indicator provides a metric of on-farm...
profitability or efficiency of investment. A comparison of scenarios using this metric illuminates alternative strategies growers can take to increase on-farm profitability.

One strategy to realize the high returns is for growers to shift to high value crops such as walnuts, mandarins, and melons. As discussed in the barriers section above, these crops require significant outlays during establishment and harvest, showing how high returns can sometimes depend on sizable upfront capital investments and reliance on personal equity or the means to secure credit.

Compared to the high revenue or high return scenarios, the low-labor scenario provides an alternative method to secure a favorable grower return on investment. Unlike the above, the low-labor scenario generates favorable return by shifting to crops that minimize workforce costs. At 41 percent return, the low-labor scenario provides the second highest grower return of any modeled scenario. The tradeoff, however, is in the overall agriculture value, as the low-labor scenario’s total output in dollars, at $317 million, falls well short of the high return scenarios. Furthermore, this cropping pattern supports relatively little value-added processing and jobs related to agricultural production and does little to meet the increasing demand for locally grown food. This comparison demonstrates some important trade-offs to consider in determining which strategies the county and its farmers may want to pursue in the future, as well as which metrics to use in evaluating the agriculture sector: ROI and revenue must be considered in tandem to gauge both the cash flow and economic efficiency of the food system.

The maps on the following page further illustrate the link between cropping patterns and ROI. In the top left, the base case shows existing conditions in the county and serves as a point of reference for change. The specialty crop map shows a much wider dispersion of profitable crops. Indeed, the scenario overall provides a 36 percent return on average to local growers after capital investments are paid off and marketable yields achieved.

The third map—low water (see table below)—provides a more even distribution of returns compared to the base case but with a much lower overall ROI. The scenario also results in a total agriculture value less than the base case, emphasizing the link between water availability and economic vitality.

Finally, the high revenue map shows an overall return very similar to the base, with only small differences in the distribution of those returns. This suggests that strategies to enhance grower return or overall agriculture output may require much different cropping patterns than today, not just more valuable crops. The specialty crop scenario modeled above is an example of this cropping pattern shift.

Return on Investment by Cropping Pattern
Economic and Environmental Tradeoffs: Ag Value and Water Consumption
The specialty crop scenario referenced in the above section provides very significant gains in the value of agriculture in Yuba County and profitability of local growers. A look solely at economic indicators, however, masks important natural resource considerations in agriculture production. To showcase the environmental effects of different cropping patterns, the project team calculated water consumption by scenario. This variable helps illuminate an important finding of the scenario analysis, generally that higher-valued crops tend to also require greater water consumption, an important caveat particularly given the state’s current drought. For example, while the high revenue scenario increases agriculture revenue over the base, it also raises water consumption by 35,128 acre-feet, an eight percent increase. To further make the point, a cropping pattern shift to low water crops cuts agriculture water use in half, but also reduces agriculture value by nearly $73 million a year—a 20 percent drop.

A look at the high-water scenario helps illustrate the water intensity of the county’s current cropping pattern. The high-water scenario only increases by about 10 percent the amount of water consumed compared to the base year.\(^{112}\) While Yuba County is relatively water-rich compared to other agricultural areas of the state, this tradeoff can help inform future production decisions, especially if drought conditions persist.

**High and Low-Water Scenarios Compared to Base Case**

<table>
<thead>
<tr>
<th></th>
<th>Base Case</th>
<th>Low H2O</th>
<th>High H2O</th>
<th>Specialty Crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ag Value</td>
<td>$360,174,281</td>
<td>$283,246,111</td>
<td>$434,938,759</td>
<td>$1,824,343,487</td>
</tr>
<tr>
<td>% Change Ag Value</td>
<td>--</td>
<td>-21%</td>
<td>21%</td>
<td>407%</td>
</tr>
<tr>
<td>Average Ag ROI</td>
<td>26%</td>
<td>13%</td>
<td>24%</td>
<td>36%</td>
</tr>
<tr>
<td>Ag H2O (acre-ft)</td>
<td>417,671</td>
<td>190,866</td>
<td>461,272</td>
<td>339,940</td>
</tr>
<tr>
<td>% Change H2O</td>
<td>--</td>
<td>-54%</td>
<td>10%</td>
<td>-23%</td>
</tr>
</tbody>
</table>

Finally, the maps on the following page help illustrate an important advantage of specialty crop production in the county. The base scenario map shows the current high water use of the sector. Likewise, the high revenue scenario mimics a cropping pattern also demanding a high degree of water availability. In contrast, at about 340,000 acre feet, the specialty crop scenario actually uses

\(^{112}\) With nearly 50,000 acres, rice is the county’s largest crop by acreage and is also one of the most water-intensive.
less water than these scenarios while providing the positive economic indicators as discussed above.

Water Demand by Cropping Pattern
Labor Demand
In addition to economic indicators and agricultural water consumption, the project team estimated the annual labor demand of different cropping patterns as the Sacramento region has faced challenges recruiting and retaining agriculture labor in the last decade. The region’s agriculture industry relies on workers to tend fields and harvest crops, so labor demand is an important metric on which to measure potential scenarios. Furthermore, there are significant infrastructure demands to take into consideration as the agricultural workforce grows, such as housing, transportation, education, health facilities, et cetera.

**Labor Demand of Selected Scenarios**

<table>
<thead>
<tr>
<th></th>
<th>Base Case</th>
<th>High Labor</th>
<th>Low Labor</th>
<th>Specialty Crop</th>
<th>High Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual Ag Value</strong></td>
<td>$360,174,281</td>
<td>$458,447,698</td>
<td>$317,222,288</td>
<td>$1,824,343,487</td>
<td>$591,842,338</td>
</tr>
<tr>
<td><strong>% Change in Ag Value</strong></td>
<td>--</td>
<td>27%</td>
<td>-12%</td>
<td>407%</td>
<td>64%</td>
</tr>
<tr>
<td><strong>Average Ag ROI</strong></td>
<td>26%</td>
<td>11%</td>
<td>41%</td>
<td>36%</td>
<td>29%</td>
</tr>
<tr>
<td><strong>Ag Labor (hrs)</strong></td>
<td>2,606,789</td>
<td>9,845,138</td>
<td>595,999</td>
<td>32,022,547</td>
<td>8,253,271</td>
</tr>
<tr>
<td><strong>% Change in Labor</strong></td>
<td>--</td>
<td>278%</td>
<td>-77%</td>
<td>1128%</td>
<td>217%</td>
</tr>
<tr>
<td><strong>Ag H2O (acre-ft)</strong></td>
<td>417,671</td>
<td>371,247</td>
<td>205,757</td>
<td>339,940</td>
<td>452,799</td>
</tr>
<tr>
<td><strong>% Change in H2O</strong></td>
<td>--</td>
<td>-11%</td>
<td>-54%</td>
<td>-19%</td>
<td>8%</td>
</tr>
</tbody>
</table>

The high and low-labor demand scenarios show a distinct correlation between high labor demand and high revenue; in other words, crops that require more labor hours tend to be higher value crops. (As noted earlier, these higher value crops also tend to require high amounts of water.) The high labor scenario almost quadruples labor demand (378%) compared to the base case, whereas it only increases labor demand by one-fifth (20%) relative to the high revenue scenario. The high labor scenario also generates revenue almost 30% higher than the base case. However, as referenced above, cropping patterns with low labor demand may be an alternative strategy for increasing return on investment, but not revenue. Labor is often one of the most costly line items on growers’ budgets and many crops with low labor demand have mechanized production practices to increase efficiency, resulting in a higher ROI.

As the maps on the following page show, specialty crops are particularly labor intensive: the ten most labor intensive crops are specialty crops and the ten least labor intensive crops are commodity crops. So while the specialty crop scenario would provide higher economic returns with lower water consumption in Yuba County, it would also have to be linked with farm labor housing and services to support and attract an adequate supply of agriculture workers.

**Labor Demand by Cropping Pattern**
In short, comparing possible future specialty crop production side-by-side with the base case and other possible competing use shows opportunities and trade-offs across economic, water and labor metrics. The specialty crop scenario generates the highest gross revenue by far of any scenario as well as a high return on investment. And compared to the water-intensive base, the scenario would in fact decrease agriculture water consumption in Yuba County. However, the specialty crop scenario would require a significant influx of agriculture labor. While this demand would support numerous food chain jobs, it also raises challenges in a system already facing a constricted labor supply. The matrix below captures these tradeoffs for the case study's specialty crop scenario compared to the base case and other uses.

### Summary of Agriculture Scenarios

<table>
<thead>
<tr>
<th>Summary of Agriculture Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicators</strong></td>
</tr>
<tr>
<td><strong>Scenarios</strong></td>
</tr>
<tr>
<td><strong>Overall Agriculture Output</strong></td>
</tr>
<tr>
<td>(in $ millions)</td>
</tr>
<tr>
<td>Base Case</td>
</tr>
<tr>
<td>Local Food Hub</td>
</tr>
<tr>
<td>High ROI</td>
</tr>
<tr>
<td>High Revenue</td>
</tr>
<tr>
<td>Low Revenue</td>
</tr>
<tr>
<td>High Water</td>
</tr>
<tr>
<td>Low Water</td>
</tr>
<tr>
<td>High Labor</td>
</tr>
<tr>
<td>Low Labor</td>
</tr>
<tr>
<td>Specialty Crop</td>
</tr>
<tr>
<td><strong>Labor (millions of hours)</strong></td>
</tr>
<tr>
<td><strong>Water (thousands of acre-feet)</strong></td>
</tr>
<tr>
<td><strong>Return on Investment (%)</strong></td>
</tr>
</tbody>
</table>

The matrix above captures the tradeoffs for the case study's specialty crop scenario compared to the base case and other uses.
Urbanization Scenarios

In addition to changes in market demand and costs of production tested in the agricultural scenarios, local land use decisions will affect the future of agriculture in Yuba County. In the past decade, the population of Yuba County grew by over 15 percent and growth is expected to continue in the future, adding perhaps between 75,000 and 100,000 people in the unincorporated portions of the county by 2030.113 The County's General Plan notes how most of the recent growth has occurred in unincorporated areas of the valley floor; indeed, today three-quarters of the county's population reside in these unincorporated areas.114 Yet while the county’s valley floor has been the center of most of the current and planned development in the county, the above base agricultural acreage map shows how it is also the site of existing agriculture production.

Yuba County’s 2030 General Plan includes policies and actions to balance the need for development with the need to preserve the county's agricultural economic base and rural heritage. Overall, the Plan establishes long-term agricultural areas within valley portions of the unincorporated County that preserve valuable farmland, while also establishing areas for new jobs and new residents. This section first shows the gross revenue benefits to the county’s agriculture sector from this policy direction and then turns to the fiscal savings of agriculture preservation.

Agriculture preservation

Yuba County’s 2030 General Plan re-designates nearly 5,000 acres from future development to agriculture use (including grazing) compared to the 1996 General Plan.115 In addition to this direct conservation, the project team estimates land use policies of the County’s 2030 General Plan can preserve an additional 5,000 acres by the implementation of a Valley Growth Boundary that focuses future development within its limits and minimizes growth outside it.116 This new framework changes significantly the land use trajectory of the last twenty years, in which the California Department of Conservation estimated a loss of agricultural land in Yuba County at a rate of 750 acres per year.117 In effect, this policy direction balances urban development with agriculture preservation, providing areas for new jobs and housing while also employing a tool to establish long-term agricultural areas in the valley floor.

113 U.S. Census Bureau, for period 2002-2012. Yuba County General Plan for estimated growth rates.
114 Yuba County General Plan, Vision-2
115 Yuba County General Plan Updated, “2030 General Plan Environmental Impact Report: Section 5- Alternative.”
116 The analysis compares the converted agriculture acreage in the 2030 General Plan to an alternative scenario that maintains the agricultural conversion rate of the prior twenty years.
117 2030 General Plan Environmental Impact Report Table 4.2-1.
This agriculture preservation saves significant value in the local agricultural sector and provides the opportunity for future cropping patterns and management strategies to further increase gross agricultural output. The study's crop modeling platform has estimated the following economic returns per acre of agriculture in Yuba County.

### Yearly Per Acre Costs & Returns per Acre of Agriculture

<table>
<thead>
<tr>
<th></th>
<th>Annual Agricultural Revenue</th>
<th>Annual Agricultural Costs</th>
<th>Annual Farmer Net Revenue</th>
<th>On-Farm Jobs</th>
<th>Off-Farm Jobs*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Crop Mix</strong></td>
<td>$3,176</td>
<td>$2,526</td>
<td>$651</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Possible Future Agricultural Uses:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grains</td>
<td>$1,097</td>
<td>$938</td>
<td>$159</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>Orchards</td>
<td>$5,459</td>
<td>$4,182</td>
<td>$1,277</td>
<td>0.013</td>
<td>0.015</td>
</tr>
<tr>
<td>Fruits &amp; Vegetables</td>
<td>$34,528</td>
<td>$26,773</td>
<td>$7,755</td>
<td>0.494</td>
<td>0.563</td>
</tr>
</tbody>
</table>

*Off-Farm jobs calculated by an employment multiplier of 2.2. Source: University of California Agriculture and Natural Resources, 2012.

When viewed on a 10,000-acres scale as preserved by the Valley Growth Boundary, these economic gains of agriculture preservation are significant.

### Estimated Annual Agricultural Value Preserved by Yuba County 2030 General Plan

<table>
<thead>
<tr>
<th></th>
<th>Annual Agricultural Revenue</th>
<th>Annual Agricultural Costs</th>
<th>Annual Farmer Net Revenue</th>
<th>On-Farm Jobs</th>
<th>Off-Farm Jobs*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Crop Mix</strong></td>
<td>$31,750,000</td>
<td>$25,250,000</td>
<td>$6,500,000</td>
<td>115</td>
<td>135</td>
</tr>
<tr>
<td><strong>Possible Future Agricultural Uses:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grains</td>
<td>$11,000,000</td>
<td>$9,400,000</td>
<td>$1,600,000</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Orchards</td>
<td>$54,600,000</td>
<td>$41,900,000</td>
<td>$12,700,000</td>
<td>135</td>
<td>160</td>
</tr>
<tr>
<td>Fruits &amp; Vegetables</td>
<td>$345,300,000</td>
<td>$267,800,000</td>
<td>$77,500,000</td>
<td>4,900</td>
<td>5,900</td>
</tr>
</tbody>
</table>

*Off-Farm jobs calculated by an employment multiplier of 2.2. Source: University of California Agriculture and Natural Resources, 2012.

In addition to the economic benefit of its growth policy, the county earns fiscal benefits from agriculture preservation. A national review of the fiscal costs of land use (call out box below) found that converting agricultural land into urban development tends to lead to a net fiscal loss to local government finances. Scenario analysis by the project team found this national trend to hold in Yuba County as well. Using SACOG’s fiscal impacts model, the project team estimated the capital infrastructure and ongoing operations and maintenance (O&M) costs of urbanizing agricultural
land in Yuba County’s valley floor. The following table shows the estimated annual costs and public sector revenue of converting valley agriculture to urban use at various scales of development. This analysis shows the costs the County may have likely encumbered to service new development on agricultural lands given the historical land use trajectory, and thus the avoided fiscal obligations as a result of concentrating new development within the growth boundary.

### Yearly County Costs & Revenue from Urbanizing Valley Agriculture in Yuba County

<table>
<thead>
<tr>
<th>Scale</th>
<th>Public Capital Costs 118</th>
<th>Annual O&amp;M Costs</th>
<th>Total Costs</th>
<th>Revenue</th>
<th>Net Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>On 100 acres</td>
<td>$1,101,267</td>
<td>$423,469</td>
<td>$1,524,736</td>
<td>$346,844</td>
<td>-$1,177,891</td>
</tr>
<tr>
<td>On 1,000 acres</td>
<td>$5,860,526</td>
<td>$4,138,052</td>
<td>$9,998,578</td>
<td>$3,468,440</td>
<td>-$6,530,138</td>
</tr>
<tr>
<td>On 5,000 acres</td>
<td>$27,125,021</td>
<td>$20,529,314</td>
<td>$47,654,335</td>
<td>$17,342,201</td>
<td>-$30,312,134</td>
</tr>
<tr>
<td>On 10,000 acres</td>
<td>$53,736,606</td>
<td>$41,115,481</td>
<td>$94,852,087</td>
<td>$34,684,401</td>
<td>-$60,167,685</td>
</tr>
</tbody>
</table>

In short, Yuba County policy preserves a valuable asset by keeping prime farmland in agriculture and ensures future economic revenues from its agriculture industry, while minimizing costs and still providing for economic development opportunities and strong communities.

The technical appendix *Costs of Urbanizing Agriculture Land* explains the use of SACOG’s fiscal model and explores in further depth the fiscal effects of varying land use decisions.

### Fiscal Impacts of Land Use Decisions

To help better understand the fiscal impact of land use decisions, SACOG conducted a review of national case studies identifying infrastructure and services costs and revenues from agricultural land currently in production compared to costs and revenues related to urban residential development, documenting what local governments earn in revenue, owe in debt, and spend on services. This review of over 200 examples across the nation details the fiscal contribution of agricultural and other working lands. Key findings from this work include:

118 Capital costs amortized over 20 years. In the analysis public capital costs include major streets and street upgrades, water distribution and mains, water supply, treatment and storage, stormwater collection and detention, sewer trunk, collection and treatment, parks, and services such as police, fire, health and education. Developer costs include local streets, water laterals, stormwater laterals, and sewer laterals.
Agriculture and working lands are fiscally positive land uses, generating more in local government revenue than they consume in services. Of the studied cases, agriculture cost only $0.45 on average in services for every dollar generated in revenue.

Urbanizing agricultural land requires not only significant upfront infrastructure investments, but also ongoing operations and maintenance expenditures, resulting in increased debt service levels and annual operating budgets.

Converting rural working lands into urban land uses tends to transform a fiscal surplus into a drain on city or county finances. Land converted to residential use requires $1.21 on average in local government expenditure per dollar of public revenue.


Conclusion: Opportunities to leverage agriculture as economic development

This case study conducted for Yuba County has shown the integral role that agriculture plays in the local economy and the potential for that role to increase. The study documents current conditions in the agricultural sector as well as the emerging economic opportunity of local food sourcing. Through scenario analysis the second section of the study compared specialty crop production with competing possible futures, noting the correlation between agricultural value, water consumption and labor demand. These various agricultural scenarios can also provide metrics for interim uses of the land as the regional housing market recovers.

Capitalizing on the emerging local market segment to bolster local economic development will require buy-in from numerous groups. This case study concludes by looking at three—growers, investors, and Yuba County—to showcase challenges and opportunities moving forward. Clear market signals for growers coupled with supportive county policies will be needed to entice the agriculture industry to move toward more specialty crop production. With this backdrop, investors may find Yuba County an attractive place to implement what SACOG’s analysis shows to be a promising food hub enterprise.

Overall the economic viability of the local market is predicated on a sufficient supply of local specialty crop production; without growers, there is no local system. Through interviews, growers in Yuba County noted their need to see a strong market in order to dedicate production to local market channels, especially given the strength of the export commodity market. The market scan provides data suggesting the local market is a viable option, documenting consumption levels, supply and demand imbalances, and price points for local specialty crops. The model analysis of a local food hub facility also shows how growing for the local market can be profitable for Yuba
County growers in aggregate, but that sufficient water and labor supply is critical. A full suite of business tools helps inform food hub investment decisions including a detailed pro forma customizable by specialty crop throughput and other variables. This case study delivers a conceptual facility situated within Yuba County to address a key infrastructure gap. Together these tools can help guide investment to the local food system.

Furthermore, the study provides data and tools to evaluate scenarios and educate stakeholders about current and future agriculture and its impact on the county. The study estimates grower revenue and profit across various future conditions such as drought, establishment, or changing market prices. While the data and models and corresponding results are certainly not definitive, the work provides guidance on building strategies for agriculture and other land uses, as well as a solid foundation for building even more robust tools for future analyses.

Finally, support from Yuba County can help complement grower and investor decisions. Yuba County’s General Plan makes clear the commitment to agriculture and the County can continue to support initiatives such as the grower-institution matchmaking of the Yuba-Sutter Economic Development Corporation as well as work to update policy to support the entire local food value chain from production to processing to consumption. In addition, land use planning plays a paramount role in agricultural viability. The model results of the case study show the potential for both the loss of agriculture revenue and the fiscal impacts of development decisions.

We anticipate these findings will be of use to farmers considering local production both on a full-time or supplemental basis. Through continued stakeholder engagement SACOG’s RU5S program will continue to share these data and findings on the local specialty crop market opportunity.
Appendix 1. Full Modeling Results

This appendix provides the full modeling results of the case study. The below matrix reports the economic, water, labor and fiscal indicators of each agricultural scenario across every possible urbanization scenario, resulting in 60 unique scenarios and almost 450 indicators. The fiscal indicators are reported as additions to the County’s existing 2012 budget; as such the fiscal indicators in the base year are left blank.

<table>
<thead>
<tr>
<th>Yuba County Case Study - Scenarios</th>
<th>Today</th>
<th>2020 - Short Term Land Use</th>
<th>2030 - Long Term Land Use</th>
<th>Urbanization Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Base Case</td>
</tr>
<tr>
<td>Acreage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valley Urban</td>
<td>6,075</td>
<td>7,115</td>
<td>6,675</td>
<td>11,300</td>
</tr>
<tr>
<td>Crop Acres</td>
<td>120,942</td>
<td>119,902</td>
<td>120,401</td>
<td>118,319</td>
</tr>
<tr>
<td>Range, Nat. Resources &amp; Rural Communities</td>
<td>252,801</td>
<td>252,801</td>
<td>252,742</td>
<td>250,198</td>
</tr>
<tr>
<td>Public (e.g. Beale AFB)</td>
<td>25,084</td>
<td>25,084</td>
<td>25,084</td>
<td>25,084</td>
</tr>
<tr>
<td>Annual Ag Value</td>
<td>$360,174,281</td>
<td>$358,565,127</td>
<td>$359,408,080</td>
<td>$354,282,154</td>
</tr>
<tr>
<td>Average Ag ROI</td>
<td>26%</td>
<td>26%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>County Capital Cost</td>
<td>$0</td>
<td>$52,000,000</td>
<td>$29,000,000</td>
<td>$500,000,000</td>
</tr>
<tr>
<td>Annual O&amp;M</td>
<td>from budget</td>
<td>$7,500,000</td>
<td>$5,500,000</td>
<td>$78,000,000</td>
</tr>
<tr>
<td>Annual Co. Revenue</td>
<td>from budget</td>
<td>$5,500,000</td>
<td>$6,300,000</td>
<td>$102,000,000</td>
</tr>
<tr>
<td>Ag Labor</td>
<td>2,606,789</td>
<td>2,601,600</td>
<td>2,604,273</td>
<td>2,576,815</td>
</tr>
<tr>
<td>Ag H2O</td>
<td>417,671</td>
<td>413,407</td>
<td>415,502</td>
<td>410,811</td>
</tr>
<tr>
<td>County Capital Cost</td>
<td>$52,000,000</td>
<td>$29,000,000</td>
<td>$500,000,000</td>
<td>$530,000,000</td>
</tr>
<tr>
<td>Annual O&amp;M</td>
<td>$7,500,000</td>
<td>$5,500,000</td>
<td>$500,000,000</td>
<td>$530,000,000</td>
</tr>
<tr>
<td>Annual Co. Revenue</td>
<td>$5,500,000</td>
<td>$6,300,000</td>
<td>$102,000,000</td>
<td>$95,000,000</td>
</tr>
<tr>
<td>Ag Labor</td>
<td>2,606,789</td>
<td>2,601,600</td>
<td>2,604,273</td>
<td>2,576,815</td>
</tr>
<tr>
<td>Ag H2O</td>
<td>417,671</td>
<td>413,407</td>
<td>415,502</td>
<td>410,811</td>
</tr>
<tr>
<td>County Capital Cost</td>
<td>$52,000,000</td>
<td>$29,000,000</td>
<td>$500,000,000</td>
<td>$530,000,000</td>
</tr>
<tr>
<td>Annual O&amp;M</td>
<td>$7,500,000</td>
<td>$5,500,000</td>
<td>$500,000,000</td>
<td>$530,000,000</td>
</tr>
<tr>
<td>Annual Co. Revenue</td>
<td>$5,500,000</td>
<td>$6,300,000</td>
<td>$102,000,000</td>
<td>$95,000,000</td>
</tr>
<tr>
<td>Ag Labor</td>
<td>2,606,789</td>
<td>2,601,600</td>
<td>2,604,273</td>
<td>2,576,815</td>
</tr>
<tr>
<td>Ag H2O</td>
<td>417,671</td>
<td>413,407</td>
<td>415,502</td>
<td>410,811</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agricultural Uses</th>
<th>High Revenue</th>
<th>Low Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ag Value</td>
<td>$359,182,338</td>
<td>$213,018,538</td>
</tr>
<tr>
<td>Average Ag ROI</td>
<td>29%</td>
<td>8%</td>
</tr>
<tr>
<td>County Capital Cost</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
</tr>
<tr>
<td>Annual O&amp;M</td>
<td>from budget</td>
<td>$7,500,000</td>
</tr>
<tr>
<td>Annual Co. Revenue</td>
<td>from budget</td>
<td>$5,500,000</td>
</tr>
<tr>
<td>Ag Labor</td>
<td>8,253,271</td>
<td>1,196,434</td>
</tr>
<tr>
<td>Ag H2O</td>
<td>417,671</td>
<td>417,671</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Urbanization Scenarios</th>
<th>Dispersed Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Case</td>
<td>$342,579,195</td>
</tr>
<tr>
<td>High Revenue</td>
<td>$424,579,195</td>
</tr>
<tr>
<td>Low Revenue</td>
<td>$262,871,000</td>
</tr>
</tbody>
</table>
### Yuba County Case Study - Scenarios

#### Today

<table>
<thead>
<tr>
<th>Acreage</th>
<th>Non-Contiguous</th>
<th>Contiguous</th>
<th>Infill Focus</th>
<th>Compact Growth</th>
<th>Dispersed Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valley Urban</td>
<td>6,075</td>
<td>7,115</td>
<td>6,675</td>
<td>11,300</td>
<td>15,671</td>
</tr>
<tr>
<td>Crop Acres</td>
<td>120,942</td>
<td>119,902</td>
<td>120,401</td>
<td>118,319</td>
<td>114,773</td>
</tr>
<tr>
<td>Range, Nat. Resources &amp; Rural Communities</td>
<td>252,801</td>
<td>252,801</td>
<td>252,742</td>
<td>250,198</td>
<td>249,372</td>
</tr>
<tr>
<td>Public (e.g. Belle AFB)</td>
<td>25,084</td>
<td>25,084</td>
<td>25,084</td>
<td>25,084</td>
<td>25,084</td>
</tr>
</tbody>
</table>

#### Urbanization Scenarios

### 2020 - Short Term Land Use

#### High Labor

<table>
<thead>
<tr>
<th>Acreage</th>
<th>Base Case</th>
<th>Non-Contiguous</th>
<th>Contiguous</th>
<th>Infill Focus</th>
<th>Compact Growth</th>
<th>Dispersed Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ag Value</td>
<td>$434,938,759</td>
<td>$433,329,605</td>
<td>$434,112,247</td>
<td>$427,537,806</td>
<td>$420,959,365</td>
<td>$413,494,683</td>
</tr>
<tr>
<td>Average Ag ROI</td>
<td>24%</td>
<td>25%</td>
<td>24%</td>
<td>24%</td>
<td>24%</td>
<td>25%</td>
</tr>
<tr>
<td>County Capital Cost</td>
<td>$5,500,000</td>
<td>$5,500,000</td>
<td>$5,500,000</td>
<td>$5,500,000</td>
<td>$5,500,000</td>
<td>$5,500,000</td>
</tr>
<tr>
<td>Annual O&amp;M</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
</tr>
<tr>
<td>Ag Labor</td>
<td>1,425,672</td>
<td>1,424,039</td>
<td>1,424,856</td>
<td>1,406,152</td>
<td>1,395,843</td>
<td>1,389,319</td>
</tr>
<tr>
<td>Ag H2O</td>
<td>339,430</td>
<td>339,900</td>
<td>339,430</td>
<td>338,419</td>
<td>338,419</td>
<td>338,419</td>
</tr>
</tbody>
</table>

### High H2O

<table>
<thead>
<tr>
<th>Acreage</th>
<th>Base Case</th>
<th>Non-Contiguous</th>
<th>Contiguous</th>
<th>Infill Focus</th>
<th>Compact Growth</th>
<th>Dispersed Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ag Value</td>
<td>$516,796,080</td>
<td>$515,808,080</td>
<td>$516,275,732</td>
<td>$509,525,732</td>
<td>$504,643,904</td>
<td>$499,812,512</td>
</tr>
<tr>
<td>Average Ag ROI</td>
<td>43%</td>
<td>43%</td>
<td>43%</td>
<td>42%</td>
<td>42%</td>
<td>43%</td>
</tr>
<tr>
<td>County Capital Cost</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
</tr>
<tr>
<td>Annual O&amp;M</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
</tr>
<tr>
<td>Ag Labor</td>
<td>6,104,529</td>
<td>6,102,897</td>
<td>6,103,687</td>
<td>6,064,385</td>
<td>6,054,732</td>
<td>6,047,063</td>
</tr>
<tr>
<td>Ag H2O</td>
<td>25,084</td>
<td>25,084</td>
<td>25,084</td>
<td>25,084</td>
<td>25,084</td>
<td>25,084</td>
</tr>
</tbody>
</table>

### Low H2O

<table>
<thead>
<tr>
<th>Acreage</th>
<th>Base Case</th>
<th>Non-Contiguous</th>
<th>Contiguous</th>
<th>Infill Focus</th>
<th>Compact Growth</th>
<th>Dispersed Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ag Value</td>
<td>$1,824,343,487</td>
<td>$1,808,655,195</td>
<td>$1,816,182,766</td>
<td>$1,794,776,813</td>
<td>$1,731,287,134</td>
<td>$1,656,498,124</td>
</tr>
<tr>
<td>Average Ag ROI</td>
<td>24%</td>
<td>24%</td>
<td>24%</td>
<td>24%</td>
<td>24%</td>
<td>25%</td>
</tr>
<tr>
<td>County Capital Cost</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
</tr>
<tr>
<td>Annual O&amp;M</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
</tr>
<tr>
<td>Ag Labor</td>
<td>2,930,167</td>
<td>2,924,978</td>
<td>2,927,651</td>
<td>2,900,193</td>
<td>2,878,669</td>
<td>2,861,370</td>
</tr>
<tr>
<td>Ag H2O</td>
<td>413,883</td>
<td>414,619</td>
<td>416,714</td>
<td>412,024</td>
<td>399,018</td>
<td>382,314</td>
</tr>
</tbody>
</table>

### Low Labor

<table>
<thead>
<tr>
<th>Acreage</th>
<th>Base Case</th>
<th>Non-Contiguous</th>
<th>Contiguous</th>
<th>Infill Focus</th>
<th>Compact Growth</th>
<th>Dispersed Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ag Value</td>
<td>$317,222,288</td>
<td>$316,234,288</td>
<td>$316,752,263</td>
<td>$312,078,364</td>
<td>$308,088,524</td>
<td>$304,493,549</td>
</tr>
<tr>
<td>Average Ag ROI</td>
<td>43%</td>
<td>43%</td>
<td>43%</td>
<td>43%</td>
<td>43%</td>
<td>43%</td>
</tr>
<tr>
<td>County Capital Cost</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
<td>$52,000,000</td>
</tr>
<tr>
<td>Annual O&amp;M</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
<td>$7,500,000</td>
</tr>
<tr>
<td>Ag Labor</td>
<td>89,465,138</td>
<td>89,839,948</td>
<td>91,829,345</td>
<td>91,769,596</td>
<td>91,733,659</td>
<td>90,760,584</td>
</tr>
<tr>
<td>Ag H2O</td>
<td>371,247</td>
<td>366,863</td>
<td>368,236</td>
<td>364,405</td>
<td>352,725</td>
<td>336,955</td>
</tr>
</tbody>
</table>
Appendix 2. Exploring Long-Term Viability of Walnut Growers

Walnut production has surged in Yuba County and elsewhere in the SACOG region over the last several years as the growing international market has commanded an ever-higher price. High market prices are excellent news for the County’s established walnut growers as their incomes grow, and have induced other growers to convert acres to this new cash crop. All seems well if walnut prices stay high and if these acres were to produce a harvest immediately; however, perennial crops like orchards and vineyards go through a period of “establishment”, when costs are high and harvests are low to none. During establishment, growers incur costs to prepare the land, plant trees or vines and tend them (prune, sucker, et cetera). Length of establishment depends on the crop—almond orchards return their first harvest in Year 3 and produce at full capacity in Year 7; wine grapes return their first harvest in Year 3 and produce at full capacity in Year 4 (on average). Walnuts are harvested in Year 4 at only 10% of full production and harvest approximately doubles each year until Year 8, when the harvest plateaus at 6,000 pounds per acre.

Walnut Harvest, in pounds per acre per year

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8+</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>600</td>
<td>1,200</td>
<td>2,400</td>
<td>5,000</td>
<td>6,000</td>
</tr>
</tbody>
</table>

Walnuts are currently returning high prices in the marketplace and therefore many growers have converted to walnuts; however, these orchards will take up to eight years to start generating a return and even longer for the grower to come into the “black” after the large capital investment of planting. For a time, growers may be in the optimal phase of receiving a full yearly harvest and have repaid the capital loans from establishing the orchards. At approximately Year 25, the orchards’ production wanes and growers often tear out old trees to replace with new trees, restarting the cycle of establishment.

The following is an exploration into the long-term financial viability of crops with a high establishment cost, using walnuts as an example. This analysis, however, is relevant for any grower that would need to recapitalize to break into new crop markets, such as the specialty crop expansion outlined in this case study.

Yearly Costs over the Long-Term

Walnut growers experience on average three phases of yearly costs over a 25-year lifecycle of an orchard (lifecycle may vary, but this analysis uses 25 years). Costs are highest in Year 1 due to preparing land, purchasing and planting tree starts and pruning. Yearly costs decrease after Year 1 as orchards mature but still must be tended with irrigation, fertilizer and pesticide, then rise in Year 4 as growers incur harvest costs. On average, an orchard reaches an average production and harvest year in Year 8, which remains steady for the remaining lifespan of the orchard. In this study, an orchard in an average production year costs the grower approximately $4,300 per acre. These yearly costs are illustrated in the graph below.
This yearly cost analysis would look very similar for other orchard or vine crops such as peaches, kiwis and grapes. While walnuts are used as the example here, the concepts can be readily extrapolated to other specialty crops in Yuba County.

**Yields and Income**

Yield and the associated income fluctuates over the lifespan of the orchard, as well. In the first three years, yield and income are zero as the orchard is established and matures. With the first harvest in Year 4, income increases yearly until Year 8, when it plateaus at an average yield of 6,000 pounds per acre. At today’s market price of $1.20 per pound, this translates to $7,200 return per acre. These yearly yields and income are illustrated in the graph below.
Accumulated Net Equity

Using yearly costs and income associated with establishing a walnut orchard, growers' accumulated net equity—growers' income minus debts over time—can be calculated over the lifecycle of the orchard. This calculation shows accumulated liabilities incurred over the first six years, the point at which growers start to repay these liabilities (Years 7-11), the point at which growers become solvent (repay all liabilities in Year 12), and the growth in net worth over the subsequent 14 years. The market price was held constant and the yield held at 6,000 pounds per year (average yield over the life of the orchard) for Years 8+ over the 25 years in the graph below. The graph below illustrates this cycle in net worth of a walnut production.
When these lines are overlaid, they show the comprehensive timelapse of per acre costs, yield, revenue, and accumulated net equity over the 25-year lifespan of a walnut orchard. This timelapse provides an understanding of the financial landscape of individual growers not seen in the snapshot provided by scenario modeling.

Scenarios

Using the longitudinal platform, we can explore the long-term financial effects of variables such as length of the establishment payback period, land ownership, and orchard re-establishment. These scenarios give a nuanced perspective into the potential financial scenarios of growers given various circumstances.

Paying Off Establishment

The graph below illustrates the difference in net equity by Year 25 when a grower repays establishment costs in full in 10 years compared to 25 years. The difference is significant—over $10,000 greater when establishment is repaid in 10 years. A 25-year payback was used by all of UC Cooperative Extension’s cost and return studies for orchard crops, in addition to being corroborated by an agricultural lending bank in the SACOG region.
Land Ownership

Land is one of the largest line items in a grower’s yearly budget; outright land ownership therefore plays a large role in the viability of certain crops. Growers that own land outright, such as family farmers with inherited land, have lower yearly costs as they are not making rent nor mortgage payments. This yearly savings realizes over $15,000 in net equity over the walnut orchard’s 25-year lifecycle.

Changes in Market Price
Longitudinal analysis shows what crops will be profitable in the long term, particularly those with high costs to become established, and the market price of walnuts determines viability. As with any good sold, walnut prices fluctuate. Walnut prices have almost tripled in the last 10 years according to the region’s crop reports, inducing a surge in walnut acreage. As more and more growers put equity into costly—and potentially lucrative—walnut orchards, an analysis of market prices indicates that these growers are expecting prices to hold if not continue to rise: A 33% increase in walnut prices from today’s value shows an excellent return over the 25-year horizon of an orchard; however, a 33% decrease in walnut prices indicate that a grower would not be in the black before Year 25, when they would likely re-establish their walnut crop.

**Orchard Re-Establishment**

Looking into the second lifecycle of a walnut orchard, a grower tears out their crop at approximately Year 26 and re-establishes it. Years 26 through 30 again have zero harvests and income and costs rise to prepare the land repurchase root stock. Given constant prices, growers’ finances over two lifecycles are illustrated in the graph below.
Appendix 3. Costs of urbanizing agriculture land

Urbanization Scenarios Methodology

The urbanization scenarios constructed in this technical appendix provide comparable metrics and quantifiable data to help inform land use planning. To calculate the fiscal impacts of converting agriculture and open space, the case study draws on SACOG’s Integrated Model for Planning and Cost Scenarios (IMPACS). IMPACS provides local governments and planners a means of estimating and evaluating the fiscal costs of providing infrastructure and service in their communities.119 IMPACS is tailored to help jurisdictions better understand the fiscal implications of different growth patterns, particularly at the rural-urban fringe.

The first two land use scenarios compare the economic and fiscal effects of possible immediate-term development patterns in the valley floor, including a scenario that converts 1,000 acres of agriculture land located away from current urban use, and a scenario that provides the same number of jobs and housing, but located in concomitance to existing communities. The three further urbanization scenarios compare possible valley land uses over the course of the next twenty years, including a Dispersed Development, a Compact Growth, and an Infill Focused scenario. These valley growth scenarios would account for approximately 84,000 of the 100,000 population increase (84%) and 66,000 of the 67,000 job increase (98%) in unincorporated Yuba County estimated over the course of the 2030 General Plan (using the high range estimates from the Plan’s buildout).120 The analysis below describes the full specifications of the urbanization scenarios in comparison to the base case.

Base Land Use Scenario

The base land use scenario is set as the existing crop production, open space and developed use within Yuba County’s valley floor. This base is set from SACOG’s parcel-level crop map update. As such, the urbanization scenarios only look at development within the valley floor and do not analyze changing land use in the foothills.

Short Term Comparison Scenarios

1. Non-Contiguous Development

This first of the two short term land use scenarios models the effect of urbanizing a generic 1,000 acres of current agriculture production in the valley floor. This scenario occurs away from existing valley communities in what today is full-scale agriculture production. Based


120 The remaining 16,000 in population increase and 1,000 jobs are estimated to land in the County’s Rural Community designation. Due to the lack of detailed data, the case study did not analyze changing land use patterns outside of Yuba County’s valley floor.
on satellite imagery and SACOG’s crop map, the scenario assumes these valley agriculture acres to be in rice production. Urbanizing these acres would result in around 3,300 dwelling units and 8,400 new residents to unincorporated Yuba County, as well as about 2,500 private-sector jobs.

2. **Contiguous Development**

The other near term urbanization scenario models the impact of a project producing a similar level of jobs and housing, located instead next to the existing communities in Yuba County’s valley floor. This Contiguous Development scenario encompasses 600 acres to reflect the results of a more compact site design. Compared to the first scenario which replaces full-scale agriculture, SACOG’s crop map suggests the land converted in the Contiguous Development scenario to be a combination of commodity agriculture and other open space. This holds with prior RUCS work that found the percentage likelihood of fallowing to be greater at the urban-rural edge compared to farms surrounded by other agriculture use.

**Long Term Comparison Scenarios**

3. **Dispersed Development**

This scenario models the impacts of urbanizing an additional 15,000 acres in Yuba County’s valley floor from today’s base case. Based on SACOG’s crop map, about 11,125 of these acres would be in agricultural production, with the remainder other open space. The scenario would add 85,428 new residents and 66,989 jobs in unincorporated Yuba County.

4. **Compact Growth**

The second of the long term land use scenarios models the effects of a more compact land use pattern, with new development located in immediate proximity to existing valley communities. The scenario urbanizes 9,596 acres to produce 85,919 residents and 66,265 jobs.

5. **Infill Focused**

The final land use scenario models a land use pattern based on infill development in existing communities, as new growth is allocated within the Valley Neighborhoods of Linda, Olivehurst, and the Arboga and Plumas Lake area. The scenario preserves the agricultural land outside the extent of current development plans. The scenario urbanizes 5,225 acres, resulting in 83,388 new residents and 64,462 new jobs. Note that these population and job levels are slightly lower (around three percent) than the other two long term scenarios.

**Comparison of Long Term Valley Urbanization Scenarios**
### Urbanization Scenarios Analysis

The urbanization scenarios provide a set of data point estimates that may prove helpful in assessing the link between land use and economic development strategies. The scenarios help show how fiscal and economic indicators could operate based on various future conditions. First, the different modeled development patterns to meet the valley floor population and job increases envisioned for unincorporated Yuba County have significant effects on the overall output of the agriculture sector.

For the short term scenarios, both lead to urban development on current agricultural land. As the table below shows however, the existing agricultural crop mix varies between sites.

### Modeled Crop Patterns of Short Term Urbanization Scenarios

<table>
<thead>
<tr>
<th>Crop</th>
<th>Non-Contiguous Development</th>
<th>Contiguous Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>1,000</td>
<td>456</td>
</tr>
<tr>
<td>Pastureland</td>
<td>-</td>
<td>79</td>
</tr>
<tr>
<td>Corn</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Olives</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Open Space</td>
<td>-</td>
<td>59</td>
</tr>
</tbody>
</table>

In urbanizing this land, both scenarios would add housing, jobs and their associated economic output. As the two scenarios contain similar levels of new dwelling units and jobs, the economic contribution of each would be similar as well. What differs between scenarios is the current value of agricultural output replaced by urbanization: the Non-Contiguous scenario would supplant $1.6 million of existing agriculture production, about twice the level of the Contiguous Development scenario ($766,000). The agriculture value differential between scenarios stems from the larger footprint of the Non-Contiguous scenario (replacing more acres in production) compared to the 600 acre Contiguous Development segment, as well as the higher crop value of rice relative to pastureland and open space. Note that these values include only the farmgate value of crops produced and do not capture any multiplier effects or economic value-add further along the supply chain, nor the market value or ecosystem services.
The fiscal effects of each land use plan also differ by scenario. SACOG inputted both scenarios into IMPACS incorporating existing conditions and Yuba County-specific revenue and cost data. Both scenarios operate under the same assumptions, including how much of the capital infrastructure cost of development accrues to the County and what portion is paid by the developer. Both scenarios mimic the draft technical master plan for a recent proposed development in the county that assigns most capital construction cost to the developer. The developer’s share of capital costs includes local street construction; water laterals, distribution and mains; stormwater laterals, collection and detention; and sewer laterals. The model assigns major off-site street upgrades and sewer trunk, collection and treatment as public costs, which become the prominent cost differential between scenarios. The County pays all operations and maintenance on new infrastructure and for the increase in police, fire and other local services.

Based on the above assumptions, IMPACS models a County expenditure of approximately $50 million in capital construction costs to service the Non-Contiguous scenario compared to $29 million for the Contiguous Development scenario. In addition to the one-time capital costs, IMPACS also provides estimates for ongoing County operations and maintenance (O&M) costs in the project compared to the new revenue generated by the new development. For the Non-Contiguous scenario the model estimates a total annual County O&M expenditure of $7.5 million to cover infrastructure maintenance and general government, public protection, health and sanitation, public assistance, education, and cultural and recreation outlays. The model predicts the Non-Contiguous scenario would provide $5.7 million a year in County revenues from taxes, licenses and permits, fines, forfeitures and penalties, use of money and property, intergovernmental transfers, charges for services and other revenues. For the Contiguous Development scenario IMPACS models an increase of $6.3 million a year in County revenue with an O&M annual cost of $5.5 million, resulting in a positive fiscal contribution to County finances.

The explanation of the different capital and O&M costs is twofold. First, the relatively compact site design of the Contiguous Development scenario reduces the capital and maintenance costs of laterals and collectors for water, stormwater and sewer infrastructure compared to the Non-Contiguous scenario. Additionally, the Contiguous Development scenario’s proximity to existing

\[\text{\footnotesize{121}}\] In addition to the land use allocations the major local data points for the scenarios include annual County revenues and expenditures by category; utility district service areas and existing design and capacity for sewer, water and stormwater; existing valley floor infrastructure (transportation, sewer, water, stormwater); and county residents, households, household size and employees (including the portion in unincorporated Yuba County). The sources for these data, reflecting the above order, are: California State Controller’s Office, “Local Government Annual Financial Reports: Counties Annual Report, Fiscal Year 2011-12”; MHM Incorporated, “Draft Technical Master Plan: Employment Village Infrastructure,” July 12, 2013; Magnolia Ranch Specific Plan, 2013; Olivehurst Public Utility District and Linda County Water District websites; Yuba County 2030 General Plan; California Department of Finance E5 series, 2012; and the SACOG Employment file, 2012.

infrastructure also significantly reduces costs. Notably, the Non-Contiguous scenario requires the construction of an entirely new water supply, treatment, storage and conveyance system while the Contiguous Development scenario meets the new demand by connecting to the nearby existing utility water supply and treatment system. Likewise, the Non-Contiguous scenario would need to construct several miles of new sewer infrastructure to reach the Oliverhurst Public Utility District’s extent of service area at approximately McGowan Parkway and Rancho Road. In the model both scenarios build a self-contained stormwater infrastructure.

The difference in revenue by scenario stems from the assumptions of the fiscal model. IMPACS estimates the dwelling units in the Contiguous Development scenario to produce annual property taxes 18 percent higher than the dwelling units in the Non-Contiguous scenario given the higher assessed value per occupant in the mixed use designation. The rest of the difference stems from varying revenue produced by job categories.

### Immediate-Term Urbanization Scenarios

<table>
<thead>
<tr>
<th></th>
<th>Non-Contiguous Development</th>
<th>Contiguous Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwelling Units</td>
<td>3,352</td>
<td>3,294</td>
</tr>
<tr>
<td>Jobs</td>
<td>2,496</td>
<td>2,619</td>
</tr>
<tr>
<td>Urbanized Acres</td>
<td>1,060</td>
<td>600</td>
</tr>
<tr>
<td>Value of Existing Ag Production</td>
<td>$1.6 million</td>
<td>$766,000</td>
</tr>
<tr>
<td>County Capital Costs of Development*</td>
<td>$52 million</td>
<td>$29 million</td>
</tr>
<tr>
<td>Annual County O&amp;M Costs from Development</td>
<td>$7.5 million</td>
<td>$5.5 million</td>
</tr>
<tr>
<td>Annual County Revenue from Development</td>
<td>$5.5 million</td>
<td>$6.3 million</td>
</tr>
</tbody>
</table>

*County capital costs include off-site transportation and sewer infrastructure improvements. The developer pays for all other capital costs.

The case study’s long-term scenarios show a similar pattern. The dispersed development scenario converts 11,127 agriculture acres to urban use. In comparison, the compact growth scenario urbanizes 6,169 agriculture acres and only 2,623 acres are developed in the infill scenario. The development of existing agricultural land reduces the agricultural sector’s total output, ranging

---


124 In addition to agriculture acres, each land use scenario also converts current open space and undeveloped land—2,602 acres from the infill, 3,427 from compact growth, and 4,010 from the dispersed development scenarios. This brings the scenarios’ total new urbanized acres to 5,225, 9,596 and 15,137 respectively.
from $5.6 million a year in the infill scenario to over $17 million in dispersed development based on current crop production. The case study’s agricultural scenarios show how the loss in agricultural value can be greater if future cropping patterns shift. For example, conversion of land in the specialty crop scenario could lead up to a loss of $150 million in agricultural value.

**Loss of Agriculture Land and Value by Urbanization Scenarios**

<table>
<thead>
<tr>
<th>Converted Agriculture Acres</th>
<th>Infill Focused</th>
<th>Compact Growth</th>
<th>Dispersed Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost Annual Agriculture Production (base scenario)</td>
<td>$5.6 million</td>
<td>$11.2 million</td>
<td>$17.3 million</td>
</tr>
<tr>
<td>Lost Annual Agriculture Production (specialty crop scenario)</td>
<td>$39.5 million</td>
<td>$93 million</td>
<td>$150 million</td>
</tr>
</tbody>
</table>

In addition to the changing economic impacts, the project team also analyzed the fiscal results of each urbanization scenario using the IMPACS model. The results produce general sketch-level estimates of capital investment and operations and maintenance (O&M) by development pattern. The model assigns most capital construction costs of new development to the developer. The developer’s share of capital costs includes local street construction; water laterals, distribution and mains; stormwater laterals, collection and detention; and sewer laterals. The model assigns major off-site street upgrades and sewer trunk, collection and treatment as public costs, which become the prominent cost differential between scenarios. The County pays all operations and maintenance on new infrastructure and for the increase in police, fire and other local services.

Based on the above assumptions, IMPACS models County infrastructure costs to meet approximately 84,000 new residents and 66,000 jobs in the urban land use scenarios ranging from $500 million in the infill focused to $600 million in the dispersed development scenario. Servicing the new development also varies by land use scenario: IMPACS estimates annual operations and maintenance expenditures of $78 million for the infill scenario, rising to $85 million for the compact growth and $89 million in a dispersed development of the valley floor. Operations and maintenance costs include infrastructure maintenance and general government, public protection, health and sanitation, public assistance, education, and cultural and recreation outlays.

**Fiscal Costs of Urbanization Scenarios**

<table>
<thead>
<tr>
<th>County Costs</th>
<th>Infill Focused</th>
<th>Compact Growth</th>
<th>Dispersed Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Infrastructure Costs</td>
<td>$500 million</td>
<td>$530 million</td>
<td>$600 million</td>
</tr>
</tbody>
</table>

125 The long-term scenarios use the same inputs described in the short-term scenario section.
Capital Costs per Equivalent Residential Unit (ERU)*

<table>
<thead>
<tr>
<th></th>
<th>$5,293</th>
<th>$7,174</th>
<th>$11,884</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap per ERU per year (assumes 20 year payback)</td>
<td>$268</td>
<td>$359</td>
<td>$780</td>
</tr>
<tr>
<td>Ongoing Annual O&amp;M</td>
<td>$78 million</td>
<td>$85 million</td>
<td>$89 million</td>
</tr>
</tbody>
</table>

^County capital costs include off-site transportation and sewer infrastructure improvements. The model assumes the developer pays for all other capital costs.

*ERUs include residential dwelling units plus non-residential space converted to an equivalent unit at the rate of one ERU per gross 2,500 sq ft. of non-residential space.

The above analysis provides top-level financial data on the costs of various land use patterns. In addition to these fiscal indicators, each scenario carries further opportunities and constraints not reflected in the cost analysis. For example, the infill-focused scenario would have to navigate its own unique set of challenges to realize the above financial metrics. For example, development plans affecting existing communities often face community resistance that can delay, alter, or even prevent the development from moving forward. In addition, the new jobs and housing slated for existing communities in the infill scenario would alter the makeup of these neighborhoods, and in the short term also disrupt residents through construction and redevelopment. Finally, the infill scenario may not match qualitatively with the manner of development envisioned by Yuba County stakeholders. In comparison to the infill-focused scenario, the dispersed development scenario has its own unique challenges, with the compact scenario a balance between the two. Notably, the dispersed valley growth scenario involves the risk of substantial upfront investment that only pays off if there is a market for the new development. This case study’s agricultural analysis suite can provide the county transitional land use strategies as the regional housing market rebounds.

Like other growing areas, Yuba County aims to balance agriculture and other land uses to accommodate long-term population growth, preserve quality of life and foster economic development. This case study reports agriculture data and economic modeling results that may help the County in its broader local assessment of various possible future land uses, but does not delve into the qualitative opportunities and constraints of each land use scenario such as new amenities from urban development that could help attract the modeled new residents and jobs.
Appendix 4. Yuba County alternative Food Hub Model

As part of this Yuba county case study the project team has prepared a cost estimate and financial analysis of a receiving station and processing facility within Yuba County that can serve as an interim model before construction of a full facility. This technical appendix of the case study presents a proposed conceptual layout and associated cost estimate to construct and equip the facility of approximately 16,800 sq. ft. It also contains an overall estimate for the financial viability of the enterprise. The concept was developed based on:

- An assessment of local and regional market conditions conducted by SACOG and the project team, including site visits and interviews with local government officials, local growers, the Yuba-Sutter Farm Bureau, UC Cooperative Extension, agricultural specialists including lenders and real estate agents, economic development representatives, and North Yuba Grown, a collaborative of growers and value-added producers from Yuba, Sutter and Butte counties.

- The increasing interest on the part of local government officials and agricultural stakeholders in the economic development potential of building local food system infrastructure.

- The role that such a facility could play within the context of broader development of the six-county (and beyond) regional food system infrastructure – the Sacramento Valley Food Hub –providing dedicated market channels for the aggregation, packaging, processing and distribution of fresh local produce.

The conceptual model for the Yuba County facility provides for three core functions, designed to generate revenue from different markets and across seasons as much as possible:

1) To serve as an enhanced receiving station to receive, grade, sort, and aggregate fresh produce for transfer to regional markets;

2) To serve as a local-serving hub to handle the balance of the produce with activities such as trimming and packing for distribution to the local market, especially institutions and businesses;

3) To provide a niche value-added processing line, using as a prototype, walnuts purchased from local sources to produce honey-glazed walnuts.

This piece of added agriculture infrastructure in Yuba County helps address some barriers to growing for the local market. The facility builds market channels for locally grown fresh produce to existing distribution companies and food operations contractors, including those serving schools, hospitals, government facilities and other institutions. In addition, the facility creates a link between growers and Yuba County restaurants, grocery stores and other businesses seeking to
increase their selection of local specialty crop. Finally, the Yuba County facility also will provide a market outlet on the grower side, for efforts such as North Yuba Grown.

Overall the Yuba food hub could provide a variety of services. Shown in the table below, some of these activities could generate an additional revenue stream due to the types of services provided, as well as to assist growers in business planning and market development. Research shows that many growers who work with hubs increase the scope and profitability of their farming operations.\textsuperscript{126}

**Services and Activities Offered by Regional Food Hubs**

<table>
<thead>
<tr>
<th>Operational Services</th>
<th>Producer Services</th>
<th>Community/Environmental Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution</td>
<td>Actively linking producers and buyers</td>
<td>Increasing community awareness of “buy local” benefits</td>
</tr>
<tr>
<td>Aggregation</td>
<td>Transportation, on-farm pick up</td>
<td>Distributing to nearby “food deserts”</td>
</tr>
<tr>
<td>Brokering</td>
<td>Production and post-harvest handling training</td>
<td>Food bank donations</td>
</tr>
<tr>
<td>Branding and market promotion</td>
<td>Business management services and guidance</td>
<td>Youth and community employment opportunities</td>
</tr>
<tr>
<td>Packaging and repacking</td>
<td>Value-added product development</td>
<td>SNAP (food stamp) redemption</td>
</tr>
<tr>
<td>Light processing (trimming,</td>
<td>Food safety and good agricultural process (GAP) training</td>
<td>Health screenings, cooking demonstrations</td>
</tr>
<tr>
<td>and freezing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product storage</td>
<td>Liability insurance</td>
<td>Recycling and composting programs</td>
</tr>
</tbody>
</table>

*Source: Regional Food Hub Resource Guide, USDA Agricultural Marketing Service, April 2012, p. 6*

Initially the conceptual facility in Yuba County would provide primarily operational services—receiving, grading and aggregating fresh produce to transfer to the regional food hub and distribution to the immediate local market—as well as value-adding activities on the walnut processing line. The table below summarizes assumptions regarding the estimated levels of production and acreage required to support this alternative facility model, for both fresh produce and processing of honey-glazed walnuts.

**Facility Capital Costs**

---

The graphic below provides schematic of the conceptual layout of a proposed facility to meet these functions. The main body of the facility is 16,800 s.f., with additional second level office space and mezzanine space for parts storage, and additional outside areas. The facility is designed for flexibility to accommodate diverse types of produce. The schematic illustrates areas for unloading, the shipping dock and pre-staging area, sorting line, production space for fresh pack, cold storage for raw produce and finished goods, ambient storage for supplies and walnuts, office space, and workshop (production space).

<table>
<thead>
<tr>
<th>YUBA HUB FACILITY OPERATING ASSUMPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Times.</strong> The facility would operate 7.5 hours per day, five days a week, 50 weeks per year. It assumes that the growers would drop off their produce at the facility.</td>
</tr>
<tr>
<td><strong>Production Levels for Fresh Produce.</strong> The facility will aggregate/package 1,000 pounds (lbs.) of fresh produce per hour. That adds up to 937.5 tons per year, or 18.75 tons per week (37,500 lbs. per week and 1,875,000 lbs. per year). The facility also will receive, cool and transfer 1,000 lbs. of fresh produce per hour to a larger, regional-serving hub. This adds up to another 937.5 tons per year, for a total of 1,875 tons per year for the two markets.</td>
</tr>
<tr>
<td><strong>Fresh Produce Acreage Requirements.</strong> The facility's fresh produce line requires a dedicated supply of local fruit and vegetable crop. While the crop acreage needed to provide this supply will vary on the exact crop mix, the project team estimates the alternative food hub model customized to Yuba County would need between 60 and 270 acres of specialty crop production. The range would fall somewhere in between as the hub would provide for a mix of crop types. Given that there was a total of 6,480 acres of harvested acreage in Yuba County in 2012 for miscellaneous fruits and nuts (not including walnuts, almonds, cling peaches, kiwis, or prunes/dried plums) and miscellaneous field and vegetable crops (not including rice and other crops), the acreage requirements are minimal to start.</td>
</tr>
<tr>
<td><strong>Processing Line for Glazed Walnuts.</strong> The facility will process 300 pounds per hour of honey-glazed walnuts. That adds up to 281 tons per year (11,250 lbs. per week and 562,500 lbs. per year).</td>
</tr>
</tbody>
</table>
**Walnut Acreage Requirements.** The average yield per harvested acreage of English walnuts in Yuba County in 2012 was 2.1 tons per acre, with 11,560 acres in production. The facility requirements would require production from 134 acres. While most of the County’s walnut crop is exported, the project team validated the availability of locally grown crops for the proposed processing line.

**Labor:** Three employees for the start up

Data Sources: Estimated tons per acre crop yields: 2012 National Agricultural Statistical Services, USDA, for California, UC Davis Cost of Production Studies, and 2012 Yuba County Agricultural Commissioner’s Report; 2012 harvested acreage: 2012 Yuba County Agricultural Commissioner’s Report
Conceptual Layout of Yuba Hub Facility

ENHANCED RECEIVING STATION
PACKING/PROCESSING CENTER
CONCEPTUAL LAYOUT

16,800 sqft

COLD STORAGE FINISHED GOODS
24 FLOOR SPACES
4 HIGH STACKING
96 TOTAL PALLETS (1,935 sqft)

COLD STORAGE PRODUCT
42 FLOOR SPACES
4 HIGH STACKING
168 TOTAL PALLETS (3,240 sqft)

PARTS STORAGE
ON 2ND LEVEL
(845 sqft)

REPAIR PARTS WORKSHOP
(750 sqft)

PORTABLE ACCUMULATION TABLE
TINY FILLING LINE W/SCALE

PRODUCTION (4,500 sqft)

SHIPPING DOCK & PRE-STAGING AREA
(1,500 sqft)

UNLOADING AREA
1,000 SQFT

GRAPHIC SCALE: 1"=20'

OFFICES AND EMPLOYEE FACILITIES
2 FLOORS
(1,500 sqft)

AMBENT STORAGE
24 FLOOR SPACES
4 HIGH STACKING
96 TOTAL PALLETS
(1,200 sqft)
The table below provides a summary of the major cost categories for the Yuba Facility construction budget estimate. The facility is proposed to be new construction to best meet the needs for the hub’s operational functionality, including for a processing line, as determined by the project team engineers. It is often more expensive to retrofit an existing agricultural-related facility than to build a new facility, especially to meet newer environmental and other regulatory requirements. It also must be centrally located to serve its receiving, transfer and distribution functions efficiently.

<table>
<thead>
<tr>
<th>Cost Center Category</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building (140 x 120 sq. ft.) (includes additional mezzanine space for parts storage and second floor office space, and outdoor unloading area, sorting line and area for refrigeration equipment)</td>
<td>$1,205,366</td>
</tr>
<tr>
<td>Refrigeration (includes materials and installation)</td>
<td>$248,571</td>
</tr>
<tr>
<td>Production Equipment (fresh fruits/vegetables/greens) (includes outdoor pre-grading, packing line, walnut glazing line, production related systems and equipment, contractors services, freight)</td>
<td>$694,897</td>
</tr>
<tr>
<td>Produce Handling/Storage (includes racks in storage areas)</td>
<td>$91,200</td>
</tr>
<tr>
<td>Fire Protection</td>
<td>$3,300</td>
</tr>
<tr>
<td>Auxiliary Systems and Equipment (includes power service connections, product moving equipment, utilities, office and employee space equipment)</td>
<td>$617,000</td>
</tr>
<tr>
<td>Mobilization (includes permits, testing, surveys, etc.)</td>
<td>$46,302</td>
</tr>
<tr>
<td>Engineering and Management (includes design services and construction management)</td>
<td>$348,796</td>
</tr>
<tr>
<td>Contingency (at 10%)</td>
<td>$325,543</td>
</tr>
<tr>
<td><strong>Project Value (capital required to build)</strong></td>
<td><strong>$3,580,976</strong></td>
</tr>
</tbody>
</table>

The project could be developed by a for-profit, nonprofit, or blended model enterprise. A companion document prepared for SACOG on Hub Research Findings provides examples of various hub business models. The total estimated project investment for this hub model is approximately $3,580,976, with $1,926,008 for the total building costs (including permits, testing, surveys – mobilization, design services, construction management, and contingency) and $1,654,968 for production equipment, refrigeration equipment, utilities and other costs. The budget does not include costs for the site (land). It is possible that a subsidy or assistance could be provided by the jurisdiction where the facility would be located, based on the project's economic and social benefits, or that federal or state funding could be secured to assist with project development costs. New state programs are providing resources such as rebates on manufacturing equipment and there are
utility programs, which can provide incentives to increase energy efficiencies, including for food processing companies. It is assumed that the facility will be located in an area already serviced with infrastructure, and that water for fire protection will be available at appropriate pressure. The costs for hydrants and associated piping are not included. The budget also does not include produce traceability and inventory software, which would be part of operating expenses. This technical appendix ends with a detailed estimate of the construction budget by major cost category and subcategory.

**Facility Operating Expenses and Revenues**
In addition to the capital costs of construction, once the facility is up and running it will incur ongoing operating expenses. Major operating expense categories include the purchase of fresh produce inputs (cost of goods sold – COGS), as well as labor, utilities, packing and storage supplies (including pallets, bins, and labeling materials), maintenance supplies, transportation, advertising and promotion, insurance, and produce tracking system. The result of these ongoing operations is value-adding activity through the facility’s aggregation and light processing functions that generate revenue to the facility operator. The table below compares the conceptual facility's estimated annual revenue to ongoing costs including amortization of the initial capital investment, including earnings before interest, taxes, depreciation and amortization (EBITDA), an indicator of potential profitability.  

<table>
<thead>
<tr>
<th>Yuba County Alternative Food Hub Model: Estimated Financial Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual Revenue</strong> - $4,446,700 ($2,198,700 from fresh produce and $2,248,000 from glazed walnuts)</td>
</tr>
<tr>
<td><strong>Estimated Expenditures</strong> - $3,433,000 (costs of goods sold, labor, operating costs)</td>
</tr>
<tr>
<td><strong>Net Operating Income (EBITDA)</strong> - $1,013,700</td>
</tr>
<tr>
<td><strong>Annual Profit</strong> - $273,000</td>
</tr>
</tbody>
</table>

Source: Foodpro International, Inc.

The initial financial assessment indicates that the facility would initially provide a positive although relatively small return on investment. This finding imitates the detailed pro forma the project team developed for a generic food hub in the region that realizes increasing returns by scaling up

---

127 The COGS include the cost of raw produce and the cost of packaging. As a general rule, the COGS should average about 50 percent of revenue but vary by crop. The project team’s screening criteria identified higher margin crops.
operations. The goal would be to operate the facility eventually for at least two shifts per day, which would provide the opportunity for an even higher rate of return.

The Pro Forma Toolkit prepared for the Sacramento Valley Food Hub provides information on how to conduct a more detailed financial analysis for a food hub facility.
## Line-Item Costs of Yuba Facility

<table>
<thead>
<tr>
<th>Job-Cost-Center Category</th>
<th>Quantity</th>
<th>Units</th>
<th>Unit-Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><em><em>BUILDING</em> (140 x 120 SF)</em>*</td>
<td>16,800</td>
<td>S.F.</td>
<td>70</td>
<td>1,205,366</td>
</tr>
<tr>
<td>Main Floor Building</td>
<td>16,800</td>
<td>S.F.</td>
<td>50</td>
<td>840,000</td>
</tr>
<tr>
<td>Production space, fresh pack</td>
<td>4,500</td>
<td>S.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooler, raw produce (product)</td>
<td>3,240</td>
<td>S.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooler, finished produce (goods)</td>
<td>1,935</td>
<td>S.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shipping dock &amp; prestaging area</td>
<td>1,500</td>
<td>S.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workshop and corridor</td>
<td>2,475</td>
<td>S.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient storage - supplies</td>
<td>1,200</td>
<td>S.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient storage - produce (walnuts)</td>
<td>1,200</td>
<td>S.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st floor offices</td>
<td>750</td>
<td>S.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold Store Doors, Horizontal Slide, 8x10, installed</td>
<td>3</td>
<td>EA.</td>
<td>9,456</td>
<td>28,368</td>
</tr>
<tr>
<td>Rapid Rollup Door, Staging Area, 8X10</td>
<td>1</td>
<td>EA.</td>
<td>12,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Electrical Single Slide Door, Ambient Spaces, 8x8</td>
<td>3</td>
<td>EA.</td>
<td>4,562</td>
<td>13,686</td>
</tr>
<tr>
<td>Rollup Door, Conditioned Production space</td>
<td>1</td>
<td>EA.</td>
<td>5,210</td>
<td>5,210</td>
</tr>
<tr>
<td>Metal Rollup Door, Repair Shop, 12x12</td>
<td>1</td>
<td>EA.</td>
<td>3,050</td>
<td>3,050</td>
</tr>
<tr>
<td>Man doors, 3x8, cold store, installed</td>
<td>6</td>
<td>EA.</td>
<td>1,605</td>
<td>9,632</td>
</tr>
<tr>
<td>Dock equipment (doors, seals, levelers)</td>
<td>2</td>
<td>EA.</td>
<td>12,960</td>
<td>25,920</td>
</tr>
<tr>
<td>Offices &amp; Employee facilities on 2nd Level</td>
<td>750</td>
<td>S.F.</td>
<td>50</td>
<td>37,500</td>
</tr>
<tr>
<td>Mezzanine (parts storage, second level)</td>
<td>845</td>
<td>S.F.</td>
<td>50</td>
<td>42,250</td>
</tr>
<tr>
<td>Depressed truck dock</td>
<td>1,850</td>
<td>S.F.</td>
<td>35</td>
<td>64,750</td>
</tr>
<tr>
<td>Slabs on grade w/canopy, outdoor refrigeration</td>
<td>2,800</td>
<td>S.F.</td>
<td>35</td>
<td>98,000</td>
</tr>
<tr>
<td>Unloading area</td>
<td>1,000</td>
<td>S.F.</td>
<td>25</td>
<td>25,000</td>
</tr>
</tbody>
</table>

*Includes structures & general MEP (mechanical, engineering plumbing)*

| REFRIGERATION* | 25.71 | TR | 9,667 | 248,571 |

<p>| Pre-cooler unit, portable | 1.00 | EA. | 30,000 | 30,000 |</p>
<table>
<thead>
<tr>
<th>Job-Cost-Center Category</th>
<th>Quantity</th>
<th>Units</th>
<th>Unit-Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw produce storage, 385 SF/TR</td>
<td>-</td>
<td>TR</td>
<td>8,500</td>
<td>71,532</td>
</tr>
<tr>
<td>Finished produce storage, 385 SF/TR</td>
<td>-</td>
<td>TR</td>
<td>8,500</td>
<td>42,721</td>
</tr>
<tr>
<td>Staging area &amp; dock, 200 SF/TR</td>
<td>-</td>
<td>TR</td>
<td>8,500</td>
<td>63,750</td>
</tr>
<tr>
<td>Process area at 50 dF, 440 SF/TR</td>
<td>4.77</td>
<td>TR</td>
<td>8,500</td>
<td>40,568</td>
</tr>
<tr>
<td>* includes materials and installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PRODUCTION EQUIPMENT (FRESH PRODUCE AND VALUE ADDED)**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTDOOR PRE-GRADING, 10 TONS/HR</td>
<td></td>
<td></td>
<td></td>
<td>694,897</td>
</tr>
<tr>
<td>Bin Dumper, used</td>
<td>1</td>
<td>EA.</td>
<td>2,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Receiving hopper w/take-away conveyor</td>
<td>1</td>
<td>EA.</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Transition conveyor</td>
<td>1</td>
<td>EA.</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Size grader (e.g. Kerian)</td>
<td>1</td>
<td>EA.</td>
<td>28,674</td>
<td>28,674</td>
</tr>
<tr>
<td>Take-away conveyors, variable speed, 6 ft, 30” w</td>
<td>3</td>
<td>EA.</td>
<td>3,000</td>
<td>9,000</td>
</tr>
<tr>
<td>Telescopic transfer conveyor, totes</td>
<td>1</td>
<td>EA.</td>
<td>9,000</td>
<td>9,000</td>
</tr>
<tr>
<td>Bin fill lowerator</td>
<td>3</td>
<td>EA.</td>
<td>10,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Floor platform scale</td>
<td>1</td>
<td>EA.</td>
<td>1,620</td>
<td>1,620</td>
</tr>
<tr>
<td>Peewees/trash/cull take-away conveyor</td>
<td>5</td>
<td>LF</td>
<td>350</td>
<td>1,750</td>
</tr>
</tbody>
</table>

**PACKING LINE FOR FRUITS & VEGETABLES**

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>TON/HR</th>
<th>141,356</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving hopper w/cleated take-away conveyor</td>
<td>1</td>
<td>EA.</td>
<td>5,500</td>
</tr>
<tr>
<td>Peewees/trash/cull take-away conveyor</td>
<td>10</td>
<td>LF</td>
<td>350</td>
</tr>
<tr>
<td>Brush washer</td>
<td>0</td>
<td>EA.</td>
<td>24,000</td>
</tr>
<tr>
<td>Peeler</td>
<td>0</td>
<td>EA.</td>
<td>24,000</td>
</tr>
<tr>
<td>Combo washer/peeler (Magnuson), 1 Ton/Hr</td>
<td>1</td>
<td>EA.</td>
<td>36,000</td>
</tr>
<tr>
<td>Sanitation system for the washer</td>
<td>1</td>
<td>EA.</td>
<td>7,560</td>
</tr>
<tr>
<td>Dewatering</td>
<td>1</td>
<td>EA.</td>
<td>7,000</td>
</tr>
<tr>
<td>Transfer conveyor (vibratory)</td>
<td>2</td>
<td>TON/HR</td>
<td>8,000</td>
</tr>
<tr>
<td>Take-away conveyors, variable speed, 6 ft, 30” w</td>
<td>3</td>
<td>EA.</td>
<td>3,000</td>
</tr>
<tr>
<td>Sorting conveyor</td>
<td>25</td>
<td>LF</td>
<td>1,000</td>
</tr>
<tr>
<td>Rotary packing table, 4 ft dia.</td>
<td>1</td>
<td>EA.</td>
<td>4,000</td>
</tr>
<tr>
<td>Job-Cost-Center Category</td>
<td>Quantity</td>
<td>Units</td>
<td>Unit-Cost</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------------</td>
<td>----------</td>
<td>-------</td>
<td>-----------</td>
</tr>
<tr>
<td>Roller conveyor, caster stand, 12 ft, 30” wide</td>
<td>2</td>
<td>EA</td>
<td>9,000</td>
</tr>
<tr>
<td>Roller conveyor, caster stand, 24 ft, 24”-30” wide</td>
<td>0</td>
<td>EA</td>
<td>15,000</td>
</tr>
<tr>
<td>Metal detector &amp; check weigher combo, used</td>
<td>1</td>
<td>EA</td>
<td>6,000</td>
</tr>
<tr>
<td>Inkjet coder, industrial</td>
<td>0</td>
<td>EA</td>
<td>1,615</td>
</tr>
<tr>
<td>Inkjet coder, handheld</td>
<td>2</td>
<td>EA</td>
<td>350</td>
</tr>
<tr>
<td>Carton closer/sealer, mechanical</td>
<td>0</td>
<td>EA</td>
<td>2,160</td>
</tr>
<tr>
<td>Carton sealer, handheld</td>
<td>2</td>
<td>EA</td>
<td>200</td>
</tr>
<tr>
<td>Labeler</td>
<td>1</td>
<td>EA</td>
<td>1,296</td>
</tr>
<tr>
<td>Manual scales</td>
<td>4</td>
<td>EA</td>
<td>350</td>
</tr>
<tr>
<td><strong>WALNUT GLAZING LINE</strong></td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>Belt feeder</td>
<td>1</td>
<td>EA</td>
<td>8,359</td>
</tr>
<tr>
<td>Conveyor</td>
<td>1</td>
<td>EA</td>
<td>12,636</td>
</tr>
<tr>
<td>Blancher/roaster</td>
<td>1</td>
<td>EA</td>
<td>15,044</td>
</tr>
<tr>
<td>Spreading conveyor</td>
<td>1</td>
<td>LF</td>
<td>1,296</td>
</tr>
<tr>
<td>Take-away conveyor, variable speed, 6 ft, 30” w</td>
<td>2</td>
<td>EA</td>
<td>3,240</td>
</tr>
<tr>
<td>Kettles (sugar solution, cooking, oil solution)</td>
<td>3</td>
<td>EA</td>
<td>5,130</td>
</tr>
<tr>
<td>Coating tumbler</td>
<td>1</td>
<td>EA</td>
<td>2,160</td>
</tr>
<tr>
<td>Tray dryer</td>
<td>1</td>
<td>EA</td>
<td>10,000</td>
</tr>
<tr>
<td>Bagger, semi-mechanized, used</td>
<td>1</td>
<td>EA</td>
<td>5,000</td>
</tr>
<tr>
<td>Manual scales</td>
<td>4</td>
<td>EA</td>
<td>350</td>
</tr>
<tr>
<td>Metal detector &amp; check weigher combo, used</td>
<td>1</td>
<td>EA</td>
<td>6,000</td>
</tr>
<tr>
<td><strong>PRODUCTION RELATED SYSTEMS &amp; EQUIPMENT</strong></td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>Traceability hardware (computer, scale, printer, etc.)</td>
<td>1</td>
<td>SET</td>
<td>8,000</td>
</tr>
<tr>
<td>Drip pans</td>
<td>80</td>
<td>LF</td>
<td>80</td>
</tr>
<tr>
<td>QC check weighing cart</td>
<td>1</td>
<td>EA</td>
<td>1,500</td>
</tr>
<tr>
<td>Metal detectors</td>
<td>1</td>
<td>EA</td>
<td>4,000</td>
</tr>
<tr>
<td>Box making machine</td>
<td>0</td>
<td>EA</td>
<td>34,560</td>
</tr>
<tr>
<td><strong>CONTRACTOR SERVICES</strong></td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>Job-Cost-Center Category</td>
<td>Quantity</td>
<td>Units</td>
<td>Unit-Cost</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>----------</td>
<td>---------------</td>
<td>-----------</td>
</tr>
<tr>
<td><strong>Mechanical Installation, Process Equipment</strong></td>
<td>40</td>
<td>percent</td>
<td>324,766</td>
</tr>
<tr>
<td><strong>Electrical Installation</strong></td>
<td>800</td>
<td>Amps</td>
<td>250</td>
</tr>
<tr>
<td><strong>FREIGHT</strong></td>
<td>3</td>
<td>percent</td>
<td>324,766</td>
</tr>
<tr>
<td><strong>PRODUCE HANDLING/STORAGE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racks, Cooler, raw produce</td>
<td>168</td>
<td>position</td>
<td>200</td>
</tr>
<tr>
<td>Racks, Cooler, finished produce</td>
<td>96</td>
<td>position</td>
<td>200</td>
</tr>
<tr>
<td>Racks, ambient storage</td>
<td>192</td>
<td>position</td>
<td>200</td>
</tr>
<tr>
<td><strong>FIRE PROTECTION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprinkler system</td>
<td>-</td>
<td>SF</td>
<td>2.8</td>
</tr>
<tr>
<td>Fire extinguishers - allowance</td>
<td>11</td>
<td>EA</td>
<td>300</td>
</tr>
<tr>
<td>Fire hydrant system</td>
<td>0</td>
<td>LF</td>
<td>200</td>
</tr>
<tr>
<td>Water tank</td>
<td>0</td>
<td>EA</td>
<td>52,000</td>
</tr>
<tr>
<td>Pump house</td>
<td>0</td>
<td>EA</td>
<td>50,000</td>
</tr>
<tr>
<td>Sprinkler system</td>
<td>-</td>
<td>SF</td>
<td>2.8</td>
</tr>
<tr>
<td><strong>AUXILIARY SYSTEMS &amp; EQUIPMENT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power service (PG&amp;E), 3/480, 1000 Amps</td>
<td>1</td>
<td>cnnct</td>
<td>50,000</td>
</tr>
<tr>
<td>NG service (PG&amp;E), 2000 MBTUH, allowance</td>
<td>1</td>
<td>cnnct</td>
<td>50,000</td>
</tr>
<tr>
<td>CIP skid</td>
<td>0</td>
<td>EA</td>
<td>75,000</td>
</tr>
<tr>
<td>Hot water pressure washer, electric, portable</td>
<td>1</td>
<td>EA</td>
<td>12,000</td>
</tr>
<tr>
<td>Forklift trucks, electric, w/misc. attachments</td>
<td>1</td>
<td>EA</td>
<td>36,000</td>
</tr>
<tr>
<td>Pallet jacks, electric</td>
<td>1</td>
<td>EA</td>
<td>12,000</td>
</tr>
<tr>
<td>Pallet jack, manual</td>
<td>2</td>
<td>EA</td>
<td>2,000</td>
</tr>
<tr>
<td>&quot;Big Joe&quot; lift truck</td>
<td>0</td>
<td>EA</td>
<td>15,000</td>
</tr>
<tr>
<td>Forklift battery charging station</td>
<td>1</td>
<td>EA</td>
<td>10,000</td>
</tr>
<tr>
<td>Floor scale, for pallets</td>
<td>1</td>
<td>EA</td>
<td>12,000</td>
</tr>
<tr>
<td>Truck scale</td>
<td>0</td>
<td>EA</td>
<td>75,000</td>
</tr>
<tr>
<td>Air compressor, packaged unit</td>
<td>15</td>
<td>HP</td>
<td>1,200</td>
</tr>
<tr>
<td>Job-Cost-Center Category</td>
<td>Quantity</td>
<td>Units</td>
<td>Unit-Cost</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
<td>----------</td>
<td>-------</td>
<td>-----------</td>
</tr>
<tr>
<td>Compressed air piping system, installed</td>
<td>40</td>
<td>CFM</td>
<td>650</td>
</tr>
<tr>
<td>Water well</td>
<td>0</td>
<td>LOT</td>
<td>50,000</td>
</tr>
<tr>
<td>Water treatment system allowance</td>
<td>0</td>
<td>LOT</td>
<td>40,000</td>
</tr>
<tr>
<td>Wastewater treatment allowance</td>
<td>1</td>
<td>LOT</td>
<td>25,000</td>
</tr>
<tr>
<td>Septic system (for black sewer)</td>
<td>1</td>
<td>EA.</td>
<td>40,000</td>
</tr>
<tr>
<td>Site grading incl. for retention ponds &amp; bldg pad prep.</td>
<td>1</td>
<td>LOT</td>
<td>80,000</td>
</tr>
<tr>
<td>Spent process water collection system</td>
<td>1</td>
<td>LOT</td>
<td>100,000</td>
</tr>
<tr>
<td>Storm water retention pond</td>
<td>0</td>
<td>EA.</td>
<td>180,000</td>
</tr>
<tr>
<td>Site fencing</td>
<td>1200</td>
<td>LF</td>
<td>15</td>
</tr>
<tr>
<td>Pavement (roads &amp; parking)</td>
<td>40000</td>
<td>SF</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>OFFICE &amp; EMPLOYEE SPACE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Furniture (allowance)</td>
<td>1</td>
<td>LOT</td>
<td>6,000</td>
</tr>
<tr>
<td>Computers &amp; other hardware (allowance)</td>
<td>1</td>
<td>LOT</td>
<td>6,000</td>
</tr>
<tr>
<td>Lunch room equipment, counters &amp; cabinets</td>
<td>1</td>
<td>LOT</td>
<td>12,000</td>
</tr>
<tr>
<td>Commissary kitchen (allowance)</td>
<td>0</td>
<td>LOT</td>
<td></td>
</tr>
</tbody>
</table>

**MOBILIZATION**                                               | 46,302   |
| Permits, 0.5% OF VALUATION                                   | 1        | prjct | 12,326    | 14,302     |
| Testings                                                    | 1        | prjct | 7,000     | 7,000      |
| Surveys, stacking, temporary facilities, etc.                | 1        | prjct | 25,000    | 25,000     |

**ENGINEERING & MANAGEMENT**                                   | 348,796  |
| Design services                                              | 7%       | prjct | 203,465   |
| Construction Management                                      | 5%       | prjct | 145,332   |

**CONTINGENCY**                                                | 325,543  |

**PROJECT VALUE (CAPITAL TO BUILD)**                           | $ 3,580,976 |

* Does not include traceability & inventory software

Sales Tax Rate: 8% Yuba County
FUTURE WORK FOR RUCS

Going forward, SACOG will continue to rely on the input of stakeholders from across the region as it turns to other issues critical to supporting rural areas and enhance economic growth. SACOG staff has begun to work on some of these efforts and will move forward based on direction from the SACOG Board of Directors. As with the other areas of the project and as demonstrated in the case studies, data and tools being developed in the RUCS project will be available to local officials, businesses, and advocates to use for planning and policies that address their unique challenges and opportunities. SACOG intends to continue working on case studies throughout the region. Real-world application of the RUCS toolkit is important since it will help refine RUCS data and modeling tools. This “grounding” of the tools is a necessary step toward applying them to understand what they can teach us, particularly since SACOG anticipates integrating more RUCS policies and strategies into future MTP/SCS efforts.

While still early in the process, SACOG has begun to work with local stakeholders to apply the RUCS toolkit for specific local market analysis. In Yolo County, SACOG is working with the agricultural commissioner to estimate the amount of food consumed in the county and land needed to supply that food from local sources. This study is part of Yolo County’s agricultural economic development efforts, but also serves their objectives of connecting farmers to consumers. This case study has just begun, but will help SACOG refine its diet-land needs model for application throughout the region and work with partners to examine opportunities to supply more of what the region eats from local growers. Ultimately, this activity can help inform the discussion of how much and where land could be put into production for a local food system. Work described below on diet surveys and food system infrastructure will support this effort.

Recently received grant funding from the California Strategic Growth Council and from the California Department of Food and Agriculture (USDA Specialty Crop Block Grant program) is helping start some of this work immediately. SACOG will team with stakeholders to launch other topics as resource become available.

Immediate Work (Funded by recent grants)

Market Assessment: Understanding the Unmet Demand for Locally Grown Food
A better understanding of how to connect market demand for healthy food to farmers and ranchers who can then sell their products locally can help promote market opportunities. Currently, the best information on per capita food consumption is provided by the USDA; however, these profiles are national and do not capture differences in regional diet, especially in areas like the Sacramento region with great ethnic diversity. They also do not capture diet profiles that are affected by public health initiatives or high levels of participation in WIC or school food programs. Furthermore, trends in food
consumption (e.g., seasonal eating, less meat consumption) are not represented in the USDA’s data. Understanding these trends and community diets helps to more accurately determine food demand today and establish a baseline for public health organization to assess needs to improve diet, health, access, and equity.

The six-county Sacramento region is home to a productive and diverse agriculture industry. This work will inform growers about new local market opportunities by assessing the demand for food in a number of communities using public health and nutrition diet surveys designed and applied by a selected consultant. It will also help public health organizations by providing needed data on the consumption patterns in a number of communities. The survey will include valid samples for block groups that meet disadvantaged and severely disadvantaged income criteria and SACOG’s environmental justice criteria, based on ethnicity and income. Survey results on the amount and type of food will be applied to similar communities to derive a regional demand for food. Consumption trends will be used to estimate regional food demand, which grower can use to determine market opportunities.

A second part of this work will study food deserts and food imbalance areas of our region to identify where healthy food outlets are most needed. Food deserts are defined as “areas characterized by relatively poor access to healthy and affordable food” and may contribute to “social disparities in diet and diet-related health outcomes, such as cardiovascular disease and obesity” (Beaulac, Krisjansson, Cummings 2009). Food imbalance areas tend to have concentrations of fast food outlets, but limited access to healthy and affordable food. This task will develop a process to monitor the ratio of food deserts and food imbalance areas when our region’s SCS is updated every four years. These tools will assist our region’s economic development departments to fund new food access locations.

Infrastructure: Aggregation, Distribution, Processing, and Storage
Throughout the RUCS project, stakeholders have discussed how more agricultural infrastructure can support and enhance agriculture in the region. Agricultural infrastructure includes facilities where farm products can be aggregated, distributed, processed, and stored. As mentioned above, loss of agricultural infrastructure increase truck travel and affected the kinds of crops grown in the region. This has reduced employment opportunities in rural areas where these facilities were located. Facilities that aggregate, store and distribute local food are essential for serving the local fresh food market. This region has virtually no such facilities, making us dependent on refrigerated trucks delivering food from aggregation points far outside of the region. This agriculture infrastructure is important for large production agriculture, but is critical for establishing a successful local food system. With new or expanded agriculture infrastructure in the region, both production and local agriculture can expand. These facilities also help to stabilize and grow rural economies. This infrastructure will also directly help improve food access by making more fresh and processed food available for local communities.

Agricultural crop production in our region is directly related to market signals from distributors and processors. Assessment of local demand for fresh produce as well as processing opportunities for larger market distribution represent opportunities to improve economic viability on rural lands in our region. This work will start with an assessment of the agricultural infrastructure inside and outside the region. It
will provide a starting point for understanding the aggregation, storage, processing, and distribution capacity that will be needed to fully support maximum production opportunities for local growers.

Once an inventory of facilities is assembled, the region can determine what new or expanded infrastructure is needed to support a local food system. This requires preliminary analysis of the scale and feasibility of these facilities. Another important part of this task is developing business models and pro forma analysis tools to help growers and economic development organizations plan for expanded and new agriculture infrastructure. These tools will support feasibility studies and provide guidance for where the region should concentrate funding and policy efforts. Coupling market assessment information with these assessment tools and identifying regulatory and permitting requirements will be an essential part of the feasibility studies. This project will collect and assemble information to provide preliminary level pro forma metrics for determining which infrastructure components are economically feasible. This will help local public and private organizations to do more detailed feasibility analysis.

One particularly innovative aspect of this work is analyzing whether food banks can function as a possible aggregation and distribution site for local markets. Food banks, by design, already aggregate and distribute food. They have trucks that make deliveries and some food banks are setting up mobile or remote sites for food distribution. SACOG will work with two food banks to study their operations and determine if there is opportunity to leverage these operations to add a wholesale/retail aggregation and distribution component to the operation.

Policies, Strategies and Monitoring Activities: Protecting Agricultural Lands and Improving Farm-to-Market Travel
Reducing VMT per household in the rural portions of the region supports the successful implementation of the MTP/SCS. As noted above, on average, non-agricultural rural residents (living on 1-10 acres) average 80 VMT per household, compared to an average of 30 VMT per households in urban areas. There are approximately 246,000 acres of existing rural housing, with the potential for another 337,000 acres of rural housing according to rural residential general plan designations. The impacts already present today will only increase in the future without focused action thereby increasing the conflict on rural roads between auto trips and the movement of agricultural equipment, creating unsafe conditions and interrupting vital farm-to-market travel. If a significant portion of rural lands in the region continue to transition into non-agricultural uses, the network of rural county roads will experience higher traffic volumes then they are designed to accommodate. Rural transportation funding constraints are already severe so without policies and strategies to reduce the growth in auto VMT on rural roads, there will likely be accelerated road deterioration and even greater conflicts with agriculture activity.

This effort will build upon work already completed through RUUCS. The RUUCS land use working group identified regionally relevant policies and strategies to protect farmland and/or open space from urbanization, while the RUUCS transportation working group analyzed rural travel patterns, infrastructure needs and identified existing farm-to-market routes. This effort will improve air quality and reduce fuel consumption by providing tools for stakeholder to help plan for more compact growth patterns and efficient farm to market travel. It strengthens the economy by creating better farm to market access and
focusing growth into existing urban communities. The activity also promotes public health and protects resources and natural resources and agricultural lands through promotion of the best practices toolkit.

**Future Work (Currently not funded)**

**Environmental Services: Understanding and enhance environmental sustainability**

As mentioned throughout this report, the rural landscape not only produces food and fiber, but also provides a range of recreation and environmental services including: carbon sequestration, energy production, flood protection, groundwater recharge, habitat, and a wide range recreational uses. The RUCS objective is to work with stakeholders to develop strategies that enhance economic viability and environmental sustainability. Much of the RUCS work to date has focused on policies and plans that protect rural lands and support the agricultural and forestry industries. This work is helping the region improve the economic viability of rural industries which, coupled with smart urban growth strategies, is a critical component for conserving land. It is being accomplished through understanding challenges and opportunities, and using technical tools to assess current and future conditions and compare scenarios. This same approach will be applied to environmental services topics. While some of the environmental work has been included in RUCS accomplishments to date, SACOG intends to work with stakeholders to develop a richer understanding of the parks and open space challenges and opportunities and build data and modeling tools that help the region use better information for better decision making.

SACOG envisions providing the wealth of existing information developed through RUCS and future research to all stakeholders to identify regional goals and objectives, as well as strategies for achieving them. The land use section of this report includes such an objective as an innovation for addressing land conservation and environmental sustainability. Three examples of similar efforts are cited in that discussion and could provide a framework for how a similar effort in the SACOG region could be structured. With Board direction, SACOG could be a member of this collaborative and offer its range of planning and technical capacities to support it.

To support any new regional objectives, an inventory of existing data on recreational and open space lands could be assembled and analyzed for gaps. A recent example of such an effort is the Six County Aquatic Resource Inventory, which gathered aquatic resource data in the region and then identified where more data is needed to inventory resources. A similar effort can be conducted for other resources. Some possible data include:

- Groundwater recharge areas
- Riparian areas that contribute to floodplain protection
- Carbon storage
- Habitat connectivity/critical linkages
- Soils
- Vegetation data
Habitat values for terrestrial and aquatic species
Climate adaptation (measure of stress or vulnerability)
Recreation (parks, trails and open space)
Protected areas and priority conservation lands (habitat and working lands)

Where possible, these data could be integrated with the RUCS modeling platform to perform analysis of not only agricultural viability, but also environmental sustainability. Particularly where there are market opportunities for environmental services, these data and modeling results can help stakeholders and policy makers understand and promote resource conservation opportunities.

A rich set of information on the current and prospective uses for recreational and open space lands combined with goals and strategies could help the region secure and leverage state, federal and private funds to identify and invest in key areas that serve multiple benefits, such as flood protection, groundwater recharge, recreation, and natural resources and agricultural preservation. Some possible sources of funding include:

- Mitigation funds from development and infrastructure projects
- State water bonds (current and potential future)
- Private philanthropic dollars
- AB 32 auction revenues (or other sources) for conservation actions that sequester carbon and/or avoid conversion that releases carbon

As opportunities arise, SACOG will continue to work with stakeholders to capitalize and leverage any opportunities to achieve the rural economic and environmental sustainability objectives of the RUCS project.

**Regulations: Navigating Federal and State Guidelines**
One of the first issues that SACOG learned about when starting the RUCS project was the regulations that farmers, ranchers, and forester face. As noted earlier in the report, there is a range of regulations that can at times conflict and can make it harder to conduct the business of growing food and fiber for the region and beyond. During the development of the RUCS topics, some regulatory issues were noted and incorporated into the working papers. While this was a good start, further work needs to done to understand where stakeholders in the region should focus efforts on permit streamline and regulatory reform that minimizes cost and increases clarity. Compiling a list of the regulations that impact growers is a first step, but understanding the economic impacts of the regulations is important—albeit difficult—information to gather and incorporate into SACOG’s economic viability modeling. SACOG will continue to work with stakeholders to better understand the regulations that guide their industry and look for ways to develop data that can better inform policy makers and regulators about the impacts of those regulations.