PACIFIC INSTITUTE

State and Federal Financing Accelerates Efficiency: Panoche Water and Drainage District and Sierra Orchards

By Juliet Christian-Smith

"As a taxpayer, I think it's the best thing my taxes can go to—it's the long term conservation of our food supply."—Craig McNamara, Sierra Orchards

Introduction

Agriculture is an economic endeavor. It also has great social and cultural importance, but farmers must ultimately make choices about investments based on expected costs and returns. Water efficiency improvements can be costly. For example, conversion to high-efficiency sprinkler or drip irrigation systems can cost up to $2,000 per acre. Initial investments in efficiency improvements can be offset by a reduction in operation costs or increase in crop revenue, but that may mean several years before a grower sees a return on investment. Thus, programs that help defray these upfront costs are critical to provide the right incentives for increased efficiency.

At a federal level, the Farm Bill provides cost-shares to agricultural producers who make water conservation and efficiency improvements through a series of conservation programs, including the Conservation Stewardship Program and the Environmental Quality Incentives Program (EQIP). The 2008 Farm Bill authorizes EQIP funding at $1.2 billion in 2008, rising to $1.8 billion by 2012. At the state level, California voters have repeatedly approved propositions to fund water management and protection. These propositions have helped to fund a variety of financial assistance programs, including low-interest loans to water districts for agricultural water efficiency improvements.

Finally, at the local level some water agencies are implementing new rate structures that allow funds to be collected from excessive water use and re-invested in water conservation and efficiency improvements. It is important that innovative financing options be maintained in the future in order to provide incentives for efficiency at the on-farm and district scale. This is particularly true in California, where much of the local infrastructure is outdated and serves as an impediment to better agricultural water management.

Background

A variety of grant and loan programs along with water rate structures are available that provide financial incentives for agricultural producers and water districts to make water

management improvements. This study focuses on several that have provided financing to update irrigation systems and implement best water management practices.

Federal Programs

The federal Farm Bill authorizes several voluntary conservation programs that provide payments to agricultural producers for water and land conservation efforts. EQIP is a particularly important program in terms of agricultural water management. The objective of EQIP is to optimize environmental benefits associated with agricultural production, and it focuses on several priorities areas, including: impaired water quality, conservation of ground and surface water resources, improvement of air quality, reduction of soil erosion and sedimentation, and improvement or creation of wildlife habitat for at-risk species (NRCS 2008a).

This program is administered through the U.S. Department of Agriculture's National Resource Conservation Service (NRCS), which has local offices throughout the U.S. NRCS staff members work with interested agricultural producers to develop environmental improvement plans. These plans become the basis of the EQIP contract between NRCS and the participant. Data from EQIP contracts awarded between fiscal years 2002 and 2008 demonstrate that about 25% of allocated funds address water quality concerns, 19% address soil erosion, 15% address plant condition, and 13% address water quantity (Figure 1).

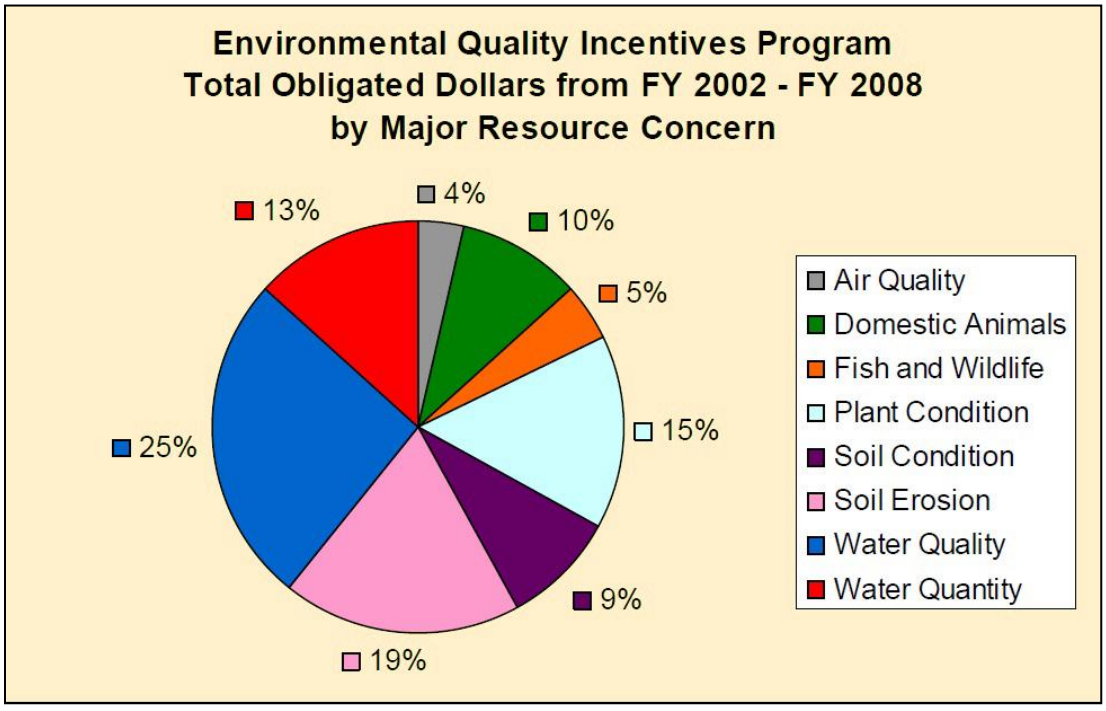

Figure 1. Environmental Quality Incentives Program funding allocation by resource concern, 2002-2008
Note: More than one resource concern may be identified in a contract. Due to this, multiple counting of funding may occur.
Source: NRCS ProTracts

EQIP provides payments for up to 75% of the incurred costs and income foregone of certain conservation practices and activities. However certain historically underserved producers (limited resource farmers/ranchers, beginning farmers/ranchers, socially disadvantaged producers) may be eligible for payments up to 90% of the estimated incurred costs and income foregone. The 2008 Farm Bill established a new payment limit of $300,000 for all program contracts entered during any six-year period, though projects determined as having special environmental significance may, with approval of the NRCS Chief, have the payment limitation raised to a maximum of $450,000.

Another important Farm Bill conservation program is the Conservation Stewardship Program (CSP). CSP payments are based on the level of conservation: the lowest level allows contracts of five years and annual payments up to $20,000; the middle level allows contracts of 5-to-10 years and annual payments up to $35,000; the top level allows contracts of 5-to-10 years and annual payments up to $45,000 (NRCS 2008b). The lowest level requires a plan that addresses at least one resource concern on the part of a farm, the middle level requires a plan that addresses at least one resource concern on the entire operation, and the top level requires a plan to address all resource concerns on the entire operation. Only a fraction of EQIP and CSP applications are funded nationwide; this means that each year we turn away thousands of farmers who are interested in improving their soil and water management practices. According to the American Farmland trust, "In 2004, there were over 180,000 applications from farmers for EQIP financial assistance. Three out of four—totaling $2.09 billion—were unfunded" (AFT 2007).

State Programs

California has largely relied on voter-approved bond measures to fund a series of water conservation programs over the last decade (Table 1). The California Department of Water Resources (DWR) and the State Water Resources Control Board (State Water Board) have run multimillion dollar bond-funded programs which have provided grant and low-interest rate loan money to many local agencies for integrated regional water management, water conservation, water recycling, distribution system rehabilitation, groundwater storage, water quality improvement, conjunctive use projects, and drinking water treatment. These programs are intended to encourage local agencies to adopt water management practices which have a statewide as well as a local benefit. Over $18.4 billion in grants and low interest loans have been authorized via state-issued bond programs since 1996 (Table 1). Propositions 204, 13, and 50 have been particularly important in terms of funding agricultural water efficiency improvements. For instance, in 2005 almost $400,000 of Proposition 50 funds were allocated to the Panoche Drainage District to install a subsurface drainage collection system and to plant approximately 270 acres of salt-tolerant crops to be irrigated with the recycled subsurface drain water in order to improve water quality in the San Joaquin River and the Bay Delta. This case will be discussed further below.

Table 1. California voter approved bonds that have provided funds for water management since 1996
Source: DWR 2009

Title	Proposition	Total amount (in million $)
The Safe, Clean, Reliable Water Supply Act of 1996	Proposition 204	$995
The Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act of 2002	Proposition 13	$1,970
California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002	Proposition 40	$2,600
Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002	Proposition 50	$3,440
Safe Drinking Water, Water Quality & Supply, Flood Control, River and Coastal Protection Bond Act of 2006	Proposition 84	$5,338
Disaster Preparedness and Flood Prevention Bond Act of 2006	Proposition 1E	$4,090
Total		$18,433

District-wide Improvements

Most irrigated areas throughout the world are partly or fully supplied from collective delivery systems (Goussard 1996). These systems provide benefits but can also limit the farmer's ability to efficiently manage water resources. In California, there are three primary methods of delivering water to farmers in California: rotational, arranged ordering, and on-demand. The most common of these systems, rotational and arranged ordering, can present significant challenges to effective water management, and therefore represent an important area for improvement.

With fixed rotational deliveries, water is delivered according to a schedule, e.g., once every two weeks, whereby an irrigator must take the whole supply of water available. These systems provide the least flexibility to the farmer, who is not able to schedule irrigation based on crop water demand or changing weather conditions but must apply water when it is delivered. With arranged ordering, the irrigator requests water for a particular date and time. Water is then delivered to the irrigation system within 1-to-48 hours from the time that the order is received, depending on system capacity. Arranged ordering is less rigid than rotational deliveries, although it does not allow the irrigator to adjust deliveries based on short-term changes in weather conditions or soil moisture. With on-demand delivery, irrigators can precisely schedule irrigations and alter the amount of water applied. Thus, on-demand delivery provides irrigators with the needed flexibility to respond to changing conditions.

In California, water is predominantly delivered through gravity-fed canals designed and constructed in the early and mid-20th century (AWMC 2008). Nearly 80% of these water systems fail to provide water to farmers on demand (Figure 2). Rather, water is primarily available on an arranged ordering system. Water deliveries for nearly half of those areas subject to an arranged ordering system must place orders 24-to-48 hours in advance,

thereby limiting the irrigator's ability to respond to changing weather conditions. About 5% of those surveyed were delivered water based on a fixed rotation and therefore must make water orders up to two weeks in advance of watering.

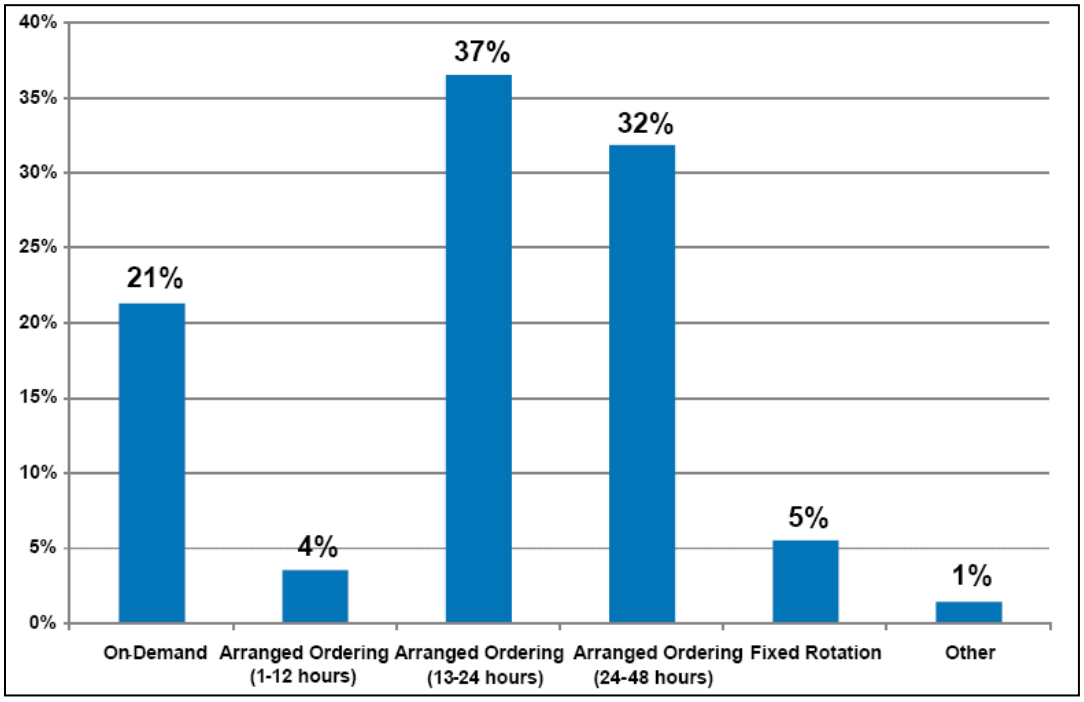

Figure 2. Water delivery systems in California
Source: AWMC 2008

Panoche Water and Drainage District

Panoche Water District serves about 38,000 acres in the Central Valley near the city of Firebaugh, and Panoche Drainage District serves another 44,000 acres, overlapping with some of the Water District's land. The District receives water from the Central Valley Project via the Delta Mendota Canal and the San Luis Canal and delivers this to over 500 farms. Typical crops in the district include almonds, tomatoes, cotton, wheat, asparagus, pistachios, and alfalfa.

Up until the mid-1980s, drainage water from the area was collected in the Kesterson National Wildlife Refuge. When it was discovered that high concentrations of selenium in the drainage water caused deformities in wildlife (Deverel et al., 1984; Presser and Barnes, 1984), the state and federal government mandated a series of strategies to decrease the quantity and improve the quality of discharged drainwater (San Joaquin Valley Drainage Program, 1990). Driven in part by this regulation, the District has implemented a variety of innovations over the last decade and has become a leader in water conservation and efficiency.

> ***"The district is continually making improvements to the water distribution system to reduce water losses and increase water delivery reliability and flexibility, making improvements to its drainage water management and reuse projects, and implementing policies to promote efficient water use and corresponding reductions in drainage flows." –Marcos Hedrick, Water Master***

Some of the projects and policies the District has implemented include a pre-irrigation tiered water-pricing program to encourage farmers to more carefully manage water deliveries in order to reduce drain water volume and selenium load. The program has been in place since 1996, and sets the maximum amount of pre-irrigation at nine inches per acre. If a grower exceeds this amount the water rate doubles. Marcos Hedrick, reports that the program has been extremely effective: "Notices were put out and all of our growers have pretty much stayed under [nine inches per acre for pre-irrigation]" (M. Hedrick, Panoche Water District Water Master, personal communication, October 27, 2009).

The district has also improved their water conveyance systems in order to increase the responsiveness to growers' water demands, allowing water to be regulated and applied precisely to meet crop needs. This has included lining irrigation canals and installing new turnouts on the San Luis Canal to increase water delivery flexibility. In addition, the district has made low-interest loans available to farmers for the purchase of gated pipe, sprinkler, and drip irrigation systems to enhance water management and reduce drain water volume.

> ***"The state's low-interest loan program [for irrigation system improvements] has been very fruitful and we hope to do more in the future because there is still quite a bit of demand for drip systems."***
>
> **–Marcos Hedrick, Panoche District Water Master**

Many of these programs were partially funded through state grants and loans. For instance, funds for the low-interest loan program were made available by the State Water Resources Control Board. Since the program's inception in 1996, farmers within the district boundaries have spent approximately $5 million dollars for improved irrigation equipment, and today nearly 70% of the district uses high-efficiency irrigation systems. State funding has greatly accelerated the installation of on-farm and district-wide water efficiency improvements.

On-Farm Improvements

While there have been significant improvements in terms of on-farm water management practices over the last several decades, there is still great room for more. The last statewide survey of on-farm irrigation methods was conducted in 2001; it found that almost 60% of irrigated acreage in the state is still flood irrigated (Figure 3). Flood, or gravity, irrigation has a lower average efficiency in comparison to other methods, particularly sprinkler and drip.[1] While some crops are most well-suited to flood irrigation,

[1] Efficiency is defined here as the volume of irrigation water beneficially used (equal to evapo-transpiration) divided by the volume of irrigation water applied minus change in storage of irrigation water.

e.g., rice, other crops have seen significant yield and quality benefits associated with switching to more precise irrigation technologies, e.g., orchards and vineyards. Yet, more than 20% of both orchards and vineyards were still flood irrigated in 2001. It is likely that these percentages are decreasing; however cost is often listed as a major impediment by farmers. Therefore, a wider availability of loans, grants, and tax incentives can speed implementation.

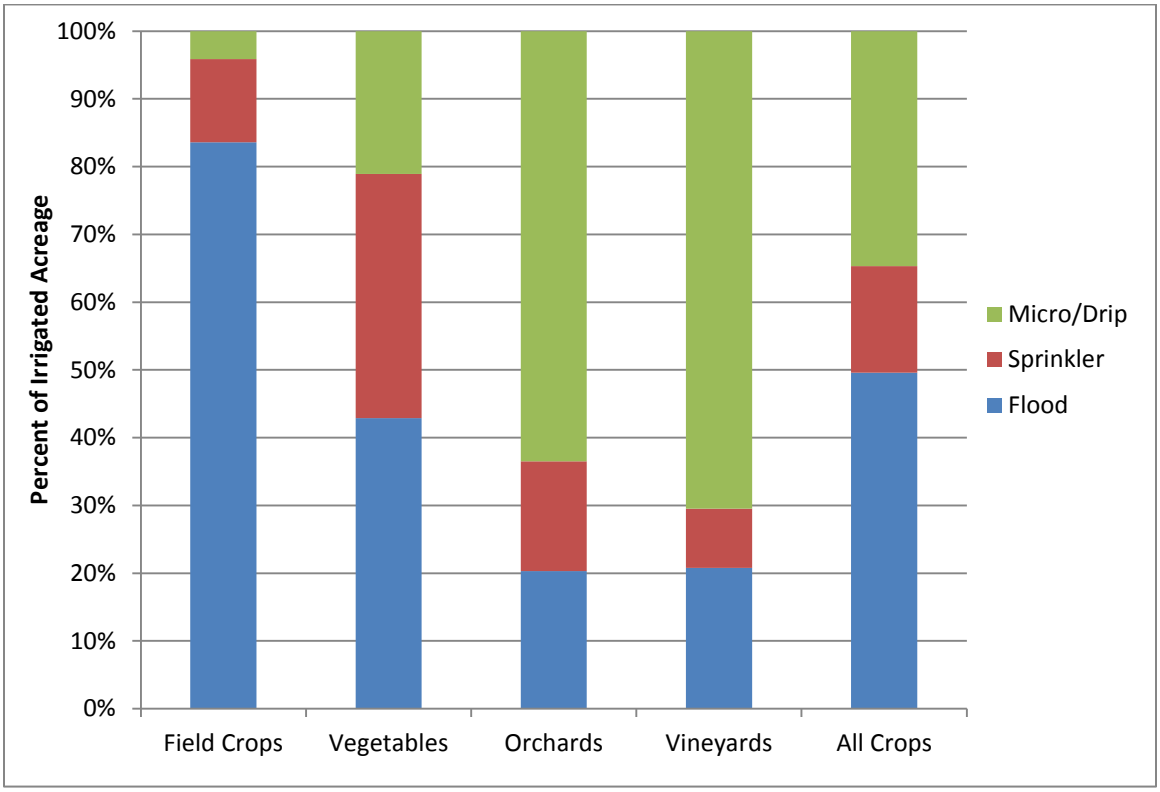

Figure 3. Irrigation technology by crop type, 2001

Source: based on data in Orang et al. 2005

Note: These data are based on a survey conducted in 2001 and published in 2005. More recent statewide data are not yet available. "Other" includes subsurface irrigation where underground pipes or open ditches are blocked to force water into a crop root zone

Salas et al. (2006) found that the average efficiency for flood, sprinkler, and drip irrigation were 73%, 78%, and 89%, respectively.

Sierra Orchards

> ***"As a farmer I think of myself first and foremost as a conservationist and environmentalist. Protecting our nation's land, water, and air resources are my most important goals."***
>
> **–Craig McNamara, Sierra Orchards**

Craig McNamara has owned and operated Sierra Orchards in Winters, California for nearly three decades (Figure 4). As an organic walnut farmer, member of the California Board of Food and Agriculture, and recipient of the Leopold Conservation Award, McNamara believes that "conservation has to be a critical part of what we're doing on the farm and as citizens of California." Sierra Orchards employs a number of innovative water management practices including buried drip irrigation on all new plantings, tailwater recovery ponds, and sediment trapping ponds.

In addition, McNamara manages for multiple benefits, looking to maximize habitat opportunities on-farm and minimize sediment inputs. He has created over two miles of hedgerows and riparian habitat on the farm. In order to stabilize the creek banks and eliminate soil erosion, they have planted over ten acres of native upland oak forest. Efforts to restore the watershed have been greatly enhanced by partnerships with willing organizations: Center for Land-Based Learning, Audubon California Landowner Stewardship Program, local Resource Conservation Districts, the Solano County Water Agency, the Community Alliance with Family Farmers, the Xerces Society, and the local Putah Creek Stream Keeper.

Figure 4. Craig McNamara at Sierra Orchards in Winters, California

While the cost for these improvements exceeds tens of thousands of dollars, Sierra Orchards was able to receive matching funds through federal Farm Bill conservation programs, including the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (C. McNamara, Owner and Operator of Sierra Orchards, personal communication, June 8, 2009). These programs defray the costs of implementing critical on-farm water conservation practices.

For instance, the land preparation and labor required to install drip irrigation systems and to restore 15 acres of upland riparian habitat cost around $150,000, yet through a combination of federal and state grant programs McNamara's out-of-pocket expenses were approximately $25,000. McNamara described the Conservation Stewardship Program as "one of the greatest acknowledgements that we have received…This funding partially compensated us for the voluntary conservation efforts that we had undertaken on our farm over the past 20 years."

In 1993, McNamara began working with local schools, and in 2001 created a nonprofit organization, the Center for Land-Based Learning, now headquartered on his property. The Center engages youth in learning experiences on the land that foster respect for the critical interplay of agriculture, nature, and society. Today, the Center for Land-Based Learning reaches thousands of high school students in 13 counties throughout the state, teaching them about on-farm conservation practices through hands-on activities. Close to 2,000 people of all ages visit the Center's headquarters, called the Farm on Putah Creek, each year.

Conclusions

When Congress passed the 2008 Farm Bill on June 18, 2008, it promised to increase funding for the most important and popular program in farm country to prevent water pollution and tackle other priority conservation problems. The Environmental Quality Incentives Program (EQIP) was to be funded at $1.337 billion dollars in fiscal year 2009–an increase of $320 million over the fiscal year 2007 funding. Just 29 days after the 2008 Farm Bill became law, the Senate Appropriations Committee proposed to fund EQIP at only $1.052 billion, which is $285 million less than what was promised in the 2008 Farm Bill. In California alone, that would amount to a loss of over $15 million that would have defrayed costs for agricultural improvements (Cox 2008).

In addition, the recent financial crisis has been particularly severe in California: state programs are being cut, and many bond-funded projects are on indefinite hold. While it is difficult to consider more funding, or even continued funding, at this moment, we are also facing on-going drought and changes in the timing and availability of water associated with climate change. Significant investment in our state's water infrastructure is unavoidable. It is critical to focus this investment not only on large supply but also on the localized distribution, conveyance, and application of irrigation water, where there is still great proven potential for increasing water quality and decreasing water demand.

References

Agricultural Water Management Council (AWMC). 2008. A Smaller Footprint: Managing Our Resources. Retrieved on February 13, 2010 from www.agwatercouncil.org.

American Farmland Trust (AFT). 2007. "Environmental Quality Incentives Program." Retrieved on Febraury 15, 2010 from http://www.farmland.org/programs/campaign/documents/AFT_EQIPbriefing_WebMar07.pdf

Deverel, S.J., R.J. Gilliom, R. Fujii, J.A. Izbicki., and J.C. Fields. 1984. Areal distribution of selenium and other inorganic constituents in shallow ground water of the San Luis Drain service area, San Joaquin Valley, California: A preliminary study: U.S. Geological Survey Water-Resources Investigations Report 84-4319, p. 67.

Cox, C. 2008. "State by State EQIP Cuts." Environmental Working Group. Retrieved on February 7, 2010 from http://www.ewg.org/conservation/report/State-by-State-EQIP-Cuts.

Goussard, J. 1996. Interaction between water delivery and irrigation scheduling. In: FAO/ICID (eds.) Irrigation Scheduling: From Theory to Practice: Proceedings of the ICID/FAO Workshop on Irrigation Scheduling. Rome, Italy, 12-13 September 1995. FAO Technical Papers, Water Reports 8.

Hedrick, M. October 27, 2009. Panoche Water District Water Master. Personal Communication.

McNamara, C. June 8, 2009. Owner and Operator of Sierra Orchards. Personal Communication.

Natural Resources Conservation Service (NRCS). 2009(a). Farm Bill 2008, Fact Sheet: Environmental Quality Incentives Program. Retrieved on February 13, 2010 from http://www.nrcs.usda.gov/programs/farmbill/2008/pdfs/EQIP_factsheet.pdf.

Natural Resources Conservation Service (NRCS). 2009(b). Farm Bill 2008, Fact Sheet: Conservation Stewardship Program. Retrieved on February 13, 2010 from http://www.nrcs.usda.gov/farmbill/pdfs/csp_fact_sheet-080709.pdf.

Orang, M.N., R.L. Snyder, and J.S. Matyac. (2005). Survey of Irrigation Methods in California in 2001. Bulletin 160-05. Sacramento, California: Department of Water Resources.

Presser, T. S., and I. Barnes. 1984. Selenium concentrations in waters tributary to and in the vicinity of the Kesterson National Wildlife Refuge, Fresno and Merced Counties, California: U.S. Geological Survey Water-Resources Investigations Report 84-4112, 26 p.

U.S. Department of the Interior and California Resources Agency. 1990. San Joaquin Valley Drainage Program : draft final report. Washington, D.C.: U.S. Government Printing Office. Retrieved on February 12, 2010 from http://ia310833.us.archive.org /2/items/sanjoaquinvalley01sacr/sanjoaquinvalley01sacr.pdf.