

SRWP Agricultural Issues White Paper

**Prepared for:
The Sacramento River Watershed Program (SRWP)
Board of Trustees**

May 31, 2005

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Funded by US Environmental Protection Agency

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Acronyms used in this White Paper

ACWA	Association of California Water Agencies
AIG	Ag. Implementation Group
APW	Ag. Practices Workgroup
BIFS	Biologically Integrated Farming Systems
BIOS	Biologically Integrated Orchard Systems
BLM	Bureau of Land Management
BMP	Best Management Practices
BMP	Best Management Practices
BOR	Bureau of Reclamation
BT	<i>Bacillus thuringensis</i>
CAFF	Community Alliance of Family Farmers
CalEPA	California Environmental Protection Agency
CARCD	California Association of Resource Conservation Districts
CCOF	California Certified Organic Farmers
CDF	California Department of Forestry
CDFA	California Department of Food and Agriculture
CDPB	California Dried Plumb Board
CFBF	California Farm Bureau Federation
CRMP	Coordinated Resource Management Programs
CRP	Conservation Reserve Program
CSP	Conservation Security Program
CURES	Coalition for Urban and Rural Environmental Stewardship
DPR	Department of Pesticide Regulation
DWR	Department of Water Resources
EFA	Ecological Farming Association
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FQPA	Food Quality Protection Act
GCM	Global Climate Model
GIS	Geographic Information System
MOU	Memorandum of Understanding
NCWA	Northern California Water Association
NGO	Non Governmental Organization
NRCS	Natural Resources Conservation Service
OP	Organophosphate
OPFG	Organophosphate Focus Group
PCA	Pest Control Advisors
PMZ	Pesticide Management Zones
POES	Public Outreach and Education Subcommittee
PRZM	Pesticide Root Zone Model
PUR	Pesticide Use Reporting
RCD	Resource Conservation Districts
RIVWQ	River Water Quality Model
SACOG	Sacramento Area Council of Governments
SAREP	Sustainable Agriculture Research and Education Program
SRCAF	Sacramento River Conservation Area Forum

SRWP	Sacramento River Watershed Group
SSURGO	Soil Survey Geographic Database
SVEWC	Sacramento Valley Environmental Water Caucus
SVWQC	Sacramento Valley Water Quality Coalition
SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
UC SAREP	University of California Sustainable Agriculture Research and Education Program
UCCE	University of California Cooperative Extension
UCD	University of California at Davis
UCIPM	University of California Integrated Pest Management Program
US EPA	United States Environmental Protection Agency
US IMP	
USDA	United States Department of Agriculture
WDR	Waste Discharge Requirements
WHIP	Wildlife Habitat Improvement Program
WMA	Weed Management Areas

SRWP Agricultural Issues White Paper

Introduction

The purpose of the Agricultural Issues White Paper is to present an update on agricultural issues from stakeholders participating in dialogues established by the Sacramento River Watershed Program (SRWP). This White Paper is funded by the Sacramento Regional County Sanitation District (Sanitation District) through an EPA grant. This paper is an outgrowth of the watershed vision and strategy developed by the Organophosphate Focus Group (OPFG), which was a subcommittee to the Toxics Committee, one of the earliest committees established by SRWP at its founding in the mid-1990's.

In the Fall of 2004 and Winter of 2005, interviews were conducted of many of the stakeholders who had been active in the OP Focus Group from 1999 to 2003. The questions asked of the stakeholders ranged from identifying current and future stressors in the watershed to the scope of agricultural issues and potential programs that might address solutions to the problems identified. Individuals from the OPFG and SRWP were interviewed; the categories were from ag industry registrants, environmental interests, regulatory agencies, and agricultural practitioners (includes farmers, pest control advisors, agriculture commissioners, etc.).

The White Paper is composed of five sections:

Section I. History of SRWP OP Focus Group—Presents an overview of agricultural issues as addressed by SRWP since its inception. Topics addressed include the original charge from SRWP, products developed by OPFG, strategic directions from OPFG, follow-up work by other organizations, and workgroup direction from the final meeting of OPFG in the Fall of 2003.

Section II. The Scope of Agricultural Issues—Includes issues (like water quality and contaminants, ecosystem concerns, etc.) in three basic geographic regions defined by elevation: valley floor, oak woodland/foothill, and upper watershed above 2,500 feet. Stressors are identified: contaminants, water temperature, water quantity, noxious weeds, and erosion and sedimentation. This section addresses other challenges to agricultural sustainability like conversion of agricultural land to urban landscape, climate change, and globalization and economic change. A final component to this section is an overview of risk areas by means of a collection of Geographic Information System (GIS) maps and modeling output showing crop distribution and issues, toxics issues, riparian issues, and areas subject to erosion.

Section III. Key Solution Oriented Programs and Innovative Initiatives—Is the suite of program/initiative suggestions made by the stakeholders. Some of these issues emerge directly from the work of the OP Focus Group. Some suggestions overlap with the work of other SRWP committees and subcommittees. Several suggestions are new to SRWP's domain of concerns until this time.

Section IV. Solution Approaches—Gives an overview of process and programmatic method that can be applied to initiatives identified in Section III, including a review of the OPFG

process, other models that have been developed to address agricultural issues, and innovative approaches that are emerging.

Section V. Framing Issues for Stakeholders and the SRWP Board—Will apply methods from Section IV to the issues of Section III, with an emphasis on the prioritized issues identified by the SRWP Board. This section is not contained within this paper, but upon completion will relate prioritized issues to the ongoing strategic planning process that is part of SRWP Board meetings throughout 2005. Section V is proposed for completion Fall 2005.

Section I. History of SRWP OP Focus Group

Background: Formation of SRWP and Organophosphate Pesticide Focus Group

SRWP was formed in 1995 when the U.S. Congress authorized a US EPA grant to the Sacramento Regional County Sanitation District (SRCSD) to create the Sacramento River Toxic Pollutant Control Program (SRTPCP). Phase I funding supported stakeholder discussions of issues of concern regarding water quality in the Sacramento River Watershed. The first general stakeholder meetings were held in 1996 and resulted in the startup of five subcommittees simultaneously: a Toxics Subcommittee, a Monitoring Subcommittee, a Public Outreach and Education Subcommittee, a Biological/Habitat Subcommittee, and an SRTPCP Grants Subcommittee. The first Monitoring Subcommittee assessed monitoring programs, and where there were gaps in existing information, and developed a baseline monitoring program for the mainstem of the Sacramento River that was implemented in 1998. The Toxics Subcommittee had the charge of discussing the broad range of water quality problems in the Sacramento River watershed area and, through stakeholder dialogue and consensus, initiating programs to respond to these water quality problems. Special studies of toxicity testing and monitoring were conducted to complement the Toxics Subcommittee's dialogue. .

The pillars of the SRWP, built upon the foundation of stakeholder involvement, are:

- A resource monitoring program;
- The education and outreach program;
- Water quality management strategies for contaminants;
- Providing information exchange and assistance for tributary watershed groups.

The mission of the SRWP, as developed by the stakeholders, is:

To ensure that current and potential uses of the watershed's resources are sustained, restored, and where possible, enhanced, while promoting the long-term social and economic vitality of the region.

Throughout 1996-98, the Toxics Subcommittee stakeholder dialogue also refined specific approaches to three areas, in addition to the Monitoring Subcommittee. Those areas were: drinking water, organophosphate pesticides, and mercury, in addition the Subcommittee identified toxicity as a priority area and formed the Toxicity Focus Group. In 1998, the SRWP stakeholders identified OP pesticides, along with mercury, as priority issues in the Sacramento River watershed. The

participants in the Toxicity Focus Group agreed, based upon a review of studies conducted in the watershed, that the presence of OP pesticides in the rivers should be managed to protect aquatic resources and recommended that an OP pesticide management plan be developed as part of Phase IV of the SRWP's EPA funding (*SRWP Water Quality Management Strategy: Background Information and Strategy Design, December 1999*).

The Central Valley Regional Water Quality Control Board (CVRWQCB) and California Department of Pesticide Regulation (DPR) entered into contractual agreements with the Sacramento Regional County Sanitation District (SRCSD), which was the primary contractor to EPA for the funding that supported the SRWP. The contract's work plan provided for the development of a water quality management strategy for diazinon in the watershed. The strategy would help answer the question, "How can we implement management practices that reduce diazinon concentrations in the Sacramento and Feather rivers so that water quality targets are met?"

The OPFG was formed in June 1999 to address the SRWP recommendations to:

- Develop an OP pesticide management plan for the Sacramento River watershed,
- Provide an opportunity for input to the Regional Board in developing a diazinon TMDL for the Sacramento and Feather Rivers.

The OPFG was a group of watershed stakeholders interested in pesticide use and its impacts on the Sacramento and Feather Rivers. The group focused on developing this OP Pesticide Management Strategy and a set of practices whose implementation were intended to significantly decrease negative impacts of pesticide use on the natural resources of the Sacramento River Watershed.

OPFG Products

The OP Focus Group produced a number of products. These products are available on the SRWP web site:

<http://www.sacriver.org/subcommittees/index.php?action=ShowNode&subcommittee=ag&node=documents>

One of the principle products was the *Water Quality Management Strategy for Diazinon in the Sacramento and Feather Rivers* (June 3, 2002). This work product addressed the objective noted above: "develop an OP pesticide management plan for the Sacramento River watershed." As part of this effort, best management plans for diazinon were developed for three areas:

- Pest Management Strategies—Including alternate year dormant applications, no dormant sprays/in-season as needed, bloomtime Bt sprays, conventional non-OP dormant sprays, pheromone mating disruption, and spinosad + oil dormant spray);
- Application Methods—Including setback zones, drift mitigation practices, sprayer calibration, nozzle selection, direct injection and closed handling systems, new equipment technology, aerial vs. ground spray, etc..
- On-Site Practices for Runoff Reduction--Including cover crops, vegetative filter strips, grassed waterways, water and sediment control basins, berms at low ends of fields, etc.); [Strategy ES 9]

An overview of existing research and an assessment of data gaps for each of the three areas was created, and is an appendix to the Management Strategy. The process used for the BMP's and data gap assessment was yet another stakeholder group, the Agricultural Practices Workgroup. This group was established by OPFG, and consisted of the agricultural interest stakeholders from OPFG plus a number of crop and field practice experts from University of California Integrated Pest Management program (UCIPM), Natural Resources Conservation Service (NRCS), University of California Cooperative Extension, farm associations, etc.

The OPFG stakeholders and the authors of the Management Strategy saw the effort as “a first step in producing a strategy document that is ‘living.’ By that, we intend for the options and implementation practices to be subject to change and adaptation as more research is accomplished, as more experience is gained, and as more monitoring point us to the specific details in need of our attention and refinement.” [Strategy, ES11] This Agricultural Issues White Paper is itself an iteration of this “living strategy”, and in part, an update on possible next steps on issues that were the focus of OPFG.

Model. A second major product developed through OPFG was the *Exposure Assessment Model for Diazinon Sources in the Sacramento River Basin's Main Drainage Canal*. This model was developed to evaluate sources of diazinon in a 38,000 acre watershed of the Main Drain in Butte County. The Pesticide Root Zone Model (PRZM) and the water quality model for riverine environments (RIVWQ) were used to evaluate diazinon application and behavior in the terrestrial and aquatic environments. The full report is available on the SRWP website referenced above.

Grants. OPFG pursued grants in order to begin to address the data gaps that were identified within the Management Strategy. One of the data gap areas was research on the efficacy of best management practices, particularly within the microclimates and site specific conditions of the Sacramento Valley. OPFG was instrumental in writing and stewarding two grants to research this critical area of concern.

An EPA 319h grant, with Gary Obenauf principal investigator, funded the Continuation of Innovative Prune Farming Practices Program. This grant expanded information outreach to growers and research in the prune and peach orchard areas of Sutter County. The educational component called for one-on-one outreach to the prune and peach farmers on the best management practices.

A CALFED grant was awarded to CURES, with Parry Klassen principal investigator. The purpose of the grant was to hold outreach meetings to growers on continuing developments in regulations, on the resources available to assist farmers, and on the best management practices. This format had been developed in the OPFG. Part of this program brought in Pest Control Advisors (PCA's) to develop water stewardship management plans, individualized from PCA to specific farms. The grant funded a survey on BMP's and compiled data in a report entitled *Survey of Orchard Practices and Pest Management Techniques*, June 2003.

Ag Implementation Group. OPFG developed a working group called the Ag Implementation Group (AIG). This group was intended to be the implementation group for the *Diazinon Management Strategy*, and is described in detail in Chapter 3 of the document. The work of AIG to

oversee implementation of the Strategy transitioned to the Irrigated Lands Waiver Coalition as a result of court rulings on waivers for agricultural discharges and a new regulatory framework (see page 7, Irrigated Lands Waiver Coalition).

Strategic Directions from OPFG. As early as the spring of 2001, OPFG stakeholders were noting that the BMP solution strategy should be applied to more constituents in more crops than was the primary focus of the subcommittee. It is important to note that OPFG had the narrow focus of diazinon application during the dormant season, in a limited number of crops (primarily plums, peaches, and almonds); diazinon is also applied to a variety of field crops during the growing season (summer application on alfalfa), but these broader uses of diazinon were not addressed by OPFG.

Participants observed that OP pesticide use was declining, and that it was being replaced by other materials, the most common being the family of pyrethroid pesticides. Spinosad and other pesticides were also used to replace diazinon application. The solution set of BMP's defined for diazinon dormant season application; however, was relevant to these and many other substances and circumstances. Some of the constituents noted during strategic planning sessions within OPFG were pyrethroids, suspended solids (erosion), nutrients (nitrogen and phosphate loading), and irrigation monitoring and efficiencies, change in applications, and carriers and sticking agents. Yet the focus of OPFG remained narrow to specifically addressing the concern of diazinon in the Sacramento and Feather Rivers. Funding mechanisms were in place to address those specific problems, and work products of OPFG remained focused in the area of tree crops, primarily stone fruits and almonds. TMDL processes were underway for diazinon in the Feather and Sacramento rivers and input into those processes remained a high priority for the subcommittee.

Irrigated Lands Waiver Coalition

The adoption of Senate Bill 390 in 1999 led to the sunset of all waivers for Waste Discharge Requirements (WDR) by January 1, 2003 if the Regional Board did not readopt them. A petition in November 2000, submitted by Deltakeeper, San Francisco Baykeeper and the California Public Interest Research Group asking the CVRWQCB to rescind the waiver and use WDRs to control discharges of pesticides from irrigated lands. This catalyzed a series of workshops and resolutions resulting in a conditional waiver for Coalition Groups or other entities, which form on behalf of individual dischargers, and a second conditional waiver for individual dischargers. The history is available at:

http://www.waterboards.ca.gov/centralvalley/programs/irrigated_land/Factsheet_History_101003.pdf.

Farmers in cooperation with their irrigation districts formed local coalitions, many of which are coincidental with irrigation district boundaries in the valley. These coalitions are charged with the responsibility to monitor discharges and mitigate violations of water quality standards. The coalitions are the mechanism by which groups of growers could cooperate to comply with the regulations, rather than having to comply with discharge permit requirements farm by farm. The impact of this new level of compliance requirement essentially took all the time, and focus of agricultural stakeholders throughout the valley and into the foothills and concentrated the agricultural communities energy on the process and outcomes of the Irrigated Lands Waiver Coalition program.

The two final meetings OPFG were held September 23, 2003 and November 18, 2003. Participation in the September meeting was high, agendized as a major strategic session defining next steps for OPFG and ag issues within SRWP. Meeting notes are available:

<http://www.sacriver.org/subcommittees/index.php?action=ShowMeetingDoc&subcommittee=ag&node=meetings&meetingdoctype=minutes&meetingdate=20030923>

At that meeting, an Ag Issues Workgroup was formed, with the charge of developing a white paper in support of development and funding of a broad agricultural strategy for the SRWP. The strategy would address outreach, research, and education, and a vision for agriculture in the watershed. The paper would integrate agricultural elements and address the question of what sustainability looks like from an integrated watershed perspective. The paper was to be circulated among the participants of the OPFG for feedback, and presented to the SRWP Board. This Agricultural Issues White Paper is the first iteration of the intention stated at the September 23, 2003 strategic session of OPFG. At that meeting, agricultural interests made clear that the Ag Waiver Coalition would be dominating their time for the foreseeable future. The final meeting of OPFG was held November 18, 2003. As predicted, participation was very low, and the decision was made to assess the direction to the Ag Issues Workgroup. This Agricultural Issues White Paper is the result, which has been developed iteratively with circulation for feedback to the OPFG stakeholder network and through presentation and feedback to the SRWP Board of Directors.

II. Scope of Agricultural Issues in the Sacramento River Watershed: Overview of Watershed-wide Agricultural Issues

The Sacramento River Watershed is host to almost a third of California's agricultural production. The products of the area include forest products (silviculture) which is acknowledged but not directly addressed by this paper, and the primary crops: alfalfa, almonds, barley, beans, corn, dairy, dry land pasture, rice, peaches, pears, pistachios, prunes, tomatoes, walnuts, wheat, wine grapes, and many other crops. Geographically, the agricultural production is shaped by the crops that are managed and cultivated within three identified regions: the valley floor (0-250 foot elevation), the foothill/oak woodland (250-2,500 foot elevation), and the upper watershed (2,500-5,000 foot plus elevation). The water quality issues, challenges, and management of these geographic regions are best addressed separately.

Valley Floor Agricultural Issues

The valley floor is the region of intense input production systems. The rich alluvial soils are some of the best in the world and their production accounts for much of the irrigated field and orchard crops in the watershed. The valley floor is irrigated with surface water from numerous irrigation districts that are allocated water from reservoirs, as well as by riparian rights, and deep and shallow wells.

Intensive agriculture in the Sacramento Valley was accelerated by the development of the primary impoundments, Shasta Dam, Oroville Dam, and Lake Berryessa. Prior to the harnessing of these rivers and other tributaries, considerable land was left unfarmed, especially in a broad riparian corridor that flooded frequently. With removal of the last 10-15% of the dense riparian forest corridor next to the rivers and the development of irrigated farmland, water quality decreased

Water Quality and Contaminants. The SRWP report, *Toxicants in Surface Water of the Sacramento River Watershed, 1998*, detailed the many constituents of concern in the past two decades, including rice pesticides and dormant spraying of organophosphates. Since then, regular rice monitoring and Best Management Practices (BMPs) by growers has reduced the impacts in drainages from molinate, thiobencarb, carbofuran, methyl parathion, and malathion. Since 2002 and the implementation of the Conditional Waiver and development of a TMDL for diazinon, many groups led by the OPFG have developed and implemented Best Management Practices to further mitigate the impacts of the contaminants.

Best Management Practices (BMP). Many Best Management Practices (BMPs) have been implemented and developed including monitoring programs for pest thresholds, shift to least toxic (Spinosad) and nontoxic (BT) pesticides, buffers, filter strips, cover crops, sprayer calibration, and reduced herbicide applications. In 2003 the Department of Pesticide Regulation proposed new dormant spray regulation language, which prohibits ground or aerial applications of dormant insecticides within two days of rain, within 100 feet of any sensitive aquatic site, and only applied when insect scouting information indicates pest populations have reached damaging levels.

Irrigated Land Waiver Implementation. The recent adoption of the Conditional Waiver of Waste Discharge Requirements for Drainage from Irrigated Lands (Conditional Waiver) has fundamentally changed the way surface water quality is viewed by the State of California and the way responsibility is assigned when surface water quality degradation occurs. The coalition waivers of waste discharge requirements are intended to minimize or eliminate water quality degradation in state water bodies. The waiver will encourage landowners adopt BMPs on their acreage to minimize the potential for discharging specific pollutants identified as harmful to the surface water body. These pollutants include pesticides, fertilizers, soil, salts, and naturally occurring trace elements.

Water Temperatures. In addition to introduced and naturally occurring contaminants drainages will also be monitored for the physical effects of farm operations. This may lead to the need to address water temperature, total organic carbons, and total dissolved oxygen.

Water Quantity/Supply. Equally as important as the water quality concerns within the Sacramento River Watershed is the water quantity. As recently as the drought years of 1988-89, many tree crop farmers who would normally have an adequate supply of district (surface) water were only allowed sufficient water to maintain the trees, resulting in only a 40-50% of normal supply and years of reduced production. Despite plans for increasing reservoirs and reservoir capacity, farmers within the watershed are not guaranteed consistent supplies.

Agricultural Sustainability. The farm community agrees that agricultural sustainability is precarious for many commodities in view of pressures from world trade. Almonds, walnuts, and some specialty crops have remained profitable within the world markets, but other commodities, such as, rice, wheat, peaches, prunes, and cotton are questionably sustainable in the face of low prices. Adding to the frustration and thin profit margins of these crops is the increasing loss of less expensive, older pesticide formulations, and increased regulations.

Agricultural Land Conversion, Urban Sprawl, and Population Growth. Another common concern of most agricultural stakeholders within the watershed includes the continued loss of farmland and open space to urbanization and commercial enterprises. This loss occurs not only on the best alluvial soils but also on the upper terraced soils. Expansion by the population centers of Sacramento, Roseville, Dixon, Winters, Williams, Yuba City, Chico, and Red Bluff continue to replace farmland and rangeland. In view of the fluctuating or depressed prices in world markets for rice, row crops, tomatoes, wheat, and even tree crops such as prunes and peaches, and the difficulty of farming adjacent to expanding residential neighborhoods and businesses, many farmers are often 'compelled' to sell prime farmland at prices above what they could ever realize through farm profits.

Water Transfers and Exports. For over a decade water transfers and conjunctive uses have led to water exports from the Sacramento River Watershed. Significant advances in mapping and understanding the volume and recharge of the region's underground aquifer are leading to management plans to further use this resource. Of concern to many agricultural users is the idling of farmland from water sales to municipal regions that require additional water and the idling of farmland for conservation uses.

Oak Woodland/Foothill Agricultural Issues

Encompassing an area twice the size of the irrigated valley floor are the foothills and oak woodlands including Placerville, Lakeport, the Sutter Buttes, Grass Valley, Paradise, and Redding. Large tracts of land are in agricultural production, primarily winter rangeland for cattle and occasionally sheep. In addition to livestock production, the lands ringing the valley are the sites of numerous ranchettes, irrigated pasture, dry land grain, and some vineyards. Compared to historical times, when much of the region was in perennial native grass and had abundant riparian vegetation, the current condition of much of the region could be considered degraded. Past tillage and overgrazing past and present has led to introduced annual grass and broadleaf weeds. Despite the success of many NRCS programs, such as land idling through the Conservation Reserve Program (CRP) and reseeding and water management through the Environmental Quality Incentives Program (EQIP), the land is still under-vegetated and contributes runoff and sediment to the lower agricultural properties and drainages.

Fire Ecosystem. The regions of the foothills are part of a natural fire ecosystem, which were manipulated by Native Americans to prevent the constant encroachment of brush. Soil depth and mineral characteristics combined with climatic rainfall patterns favor large expanses of brush or browse, (chamise, manzanita, and scrub oaks). Advances in fire suppression have allowed many of these areas to have abundant and decadent fuel loads despite attempts by rangeland managers to conduct controlled burns when possible.

Contaminants. Agricultural contaminants in the foothill regions are primarily sediments in areas of tillage and improper grazing management. Additional contaminants from ranchette operations, while small, contribute to local water quality issues. The population centers that follow urban residences include runoff from pavement, fuels, oils, detergents, and other contaminants, and have a negative impact on local tributaries.

Grazing Issues—Temperature and Water Quality. Overgrazing and loss of riparian vegetation have led to degraded water quality. The abundance of weeds along with channelized creeks and tributaries, has led to problems with both water quality and temperature. The ongoing multiyear effort of the UCD Grazing Academies along with the influx of federal funding for the past 20 years, has reduced some of the most serious problems, but the sheer size of the areas, absentee owners, and continued fragmentation of larger tracts of land have continued to compromise water quality.

Growth, Ranchette Conversion. For the past 100 years, there has been a continued growth of residential properties and ranchettes on the eastern side of the watershed from Placer County through Shasta County. Additionally, many of the areas from Solano, Yolo, Napa, and Lake Counties have been increasingly populated. The increasing density includes many agricultural enterprises, especially grazing, vineyards, orchards, and equestrian facilities. However increased fragmentation, tillage, clearing of soil in the high rain fall (50-60 inches) locations, often with steep slopes, have frequently lead to increased local erosion and sedimentation.

Upper Watershed Agricultural Issues

The upper watershed regions above 2,500 foot elevation encompass the remaining land of the Sacramento River Watershed and includes the coniferous forests of the Sierra Nevada and the rich agricultural high mountain meadows and basins. Much of the land is federally owned, including the Placer, Sierra, Plumas, Lassen, Shasta-Trinity and Modoc National Forests. These larger tracts of forested land along with extensive Bureau of Land Management properties are most frequently managed for timber production and additional grazing leases. In addition to the public land, there are also many large livestock ranches, irrigated pasture, alfalfa, grain, and strawberry nursery production in the Sierra Valley, Big Valley, and Alturas basins.

Timber Management. Timber management (silviculture) is the most significant agricultural product in the region. Though timber management is associated with agriculture management and is stewarded by the US Department of Agriculture, it will remain beyond the scope of this agricultural white paper. The concerns of water quality in current silviculture production are closely regulated to prevent water quality problems that were problematic in previous decades. For the SRWP forest management could represent another tier of interest in strategic planning.

Fire Ecosystem/watershed management. Like the foothills with their extensive mosaic of brush and oak woodlands, the coniferous forests are subject to frequent and often devastating fires. The incidences of fire can often have a singular and local impact on sedimentation that is a natural process; undoubtedly the ecosystem renews and recovers. Science continues to debate the benefit (or lack thereof) from intensive fire suppression programs, which are now focused on loss of life and property within the increasingly populated mountain regions.

Grazing and Farming. Livestock grazing on both irrigated pasture and rangeland is easily viewed as a primary agricultural practice throughout the upper watershed. Additionally, tracts of irrigated alfalfa, grain, strawberry nursery production, wild rice, and specialty crops like mint are grown within the region. Resource management by various CRMPs (Coordinated Resource Management Programs) have worked very well for the past decades in protecting and rehabilitating intermountain lands and water resources.

Growth and Land Use (Ranchettes and Inholdings). Like the foothill region, the upper watershed sees increasing urbanization and fragmentation of non-public lands. Despite the efforts in areas such as The Nature Conservancy's Lassen Foothills Project to protect ranchland through easements, there is a continuing boom in real estate in many of the more scenic and accessible areas of the upper watershed. These concentrations have led to increased water quality concerns and contamination. While the influx of new residents has revived some communities, particularly after the decline in timber production associated revenues, the increasingly urbanized areas have at times strained local resources.

Identifying stressors

The overview of the watershed-wide agricultural issues within the Sacramento River Watershed includes a discussion of the many stressors within the watershed. By their nature, these stressors are sometimes broad-based, such as increasing urban densities, but for agricultural production

systems the stressors become regionalized based upon pesticide applications, soil, slope, tillage practiced, riparian vegetation, and aquatic habitat degradation. The types of stressors from agriculture include sedimentation from tillage of dry land grains or vineyards in the foothill regions; siltation and sedimentation from grazing within the intermountain areas near riparian areas; increased water temperature due to lost riparian vegetation; the use of organophosphate pesticides for stone fruit production on deep alluvial soils; and herbicide runoff from rice production within the valley floor.

Contaminants. The SRWP Toxics Subcommittee, of which the OPFG was a subgroup, focused on mercury and organophosphate pesticides. While the goals of the Toxics Subcommittee are to document the most important stressors, monitor for their presence, and initiate the implementation of education and BMPs, the scope of contaminants for the entire watershed is necessarily broader, when considering the many crops and practices.

Pesticides. A variety of pesticides impact water quality in the Sacramento River watershed. From the early formation of SRWP, the Toxics Committee set up the Organophosphate Focus Group to specifically look at the impacts of organophosphate pesticides (Ops) on the Sacramento River and its tributaries. The usage of diazinon and, to a lesser degree, chlorpyrifos and methidathion used in wintertime dormant sprays, was the focus of the group. Other insecticides that have been implicated in water quality and wildlife loss include methyl parathion, Furadan, azinphos-methyl, and Malathion. Currently much of the watershed is still impacted by ‘legacy’ pesticides, which remain within the ecosystem even though they are no longer applied to the environment.

Other insecticides of concern to the OPFG, scientists, and regulators are the pyrethroids. These formulations include not only older generations of pyrethroids but also newer and stronger formulations. The concern about pyrethroids is not just their highly toxic effects on fish and invertebrates, but also that they bind to clays and their long half-life allows their toxic effects to remain problematic in soil and silt during flooding along the river basins. Some orchard and field crop fungicides may also be of concern to surface water toxicity, but have not been implicated to date.

During the 1980s the rice herbicides thiobencarb and molinate caused large fish kills in agricultural drainages. A multi-agency program on rice drainage has been effective in significantly reducing toxicity; levels of fungicides in surface water leading to the Sacramento River have been removed from the 303(d) list for the rice fungicides and pesticides.

There have been a number of concerns about herbicides that have led to groundwater contamination with the source from agricultural operations. This has resulted in the Department of Pesticide Regulation establishing Pesticide Management Zones (PMZ). Based upon soil characteristics, herbicides such as atrazine cannot be applied within these zones.

Nutrients. Nutrients are a concern of agricultural operations both from applied fertilizer, confined animal facilities, and sediment. While not a focus of the OPFG, nutrients were acknowledged as an area of concern and many of the BMPs recommended by the OPFG were considered mitigation measures for excess nutrient contamination. The concern regarding nutrients from livestock

operations and associated algal blooms during low flow periods is a greater concern in the foothill and upper watershed regions of the watershed.

Metals. Metals have not been shown to be a concern in agricultural operations since the banning of lead arsenate during the 1950s. The metals that are applied primarily as fungicides include copper, manganese, and zinc. Despite the annual application of over 2 million metallic pounds of copper applied to rice and walnuts in the lower watershed, these metals are not identified as pollutants within the main stem of the rivers.

Water Temperature. Water temperature and the associated environmental and water quality problems have been identified as problems in the upper watersheds for a number of years. Recently the concern about water temperature in the valley floor has been addressed; monitoring for the Conditional Waivers in 2005 will begin to track water temperature and its role in the contribution to aquatic habitat degradation. Increases to water temperature occur from discharge of warmer irrigated runoff water and from the reduction in vegetation along discharge canals, streams, and the rivers themselves.

Water Quantity. In California's Mediterranean climate, seasonal rainfall limited pre-20th century agriculture to winter farming except in the more continental upper watersheds. As irrigated agriculture developed, the technological infrastructure of drainages, riparian diversions, dams and canals were constructed. This has led to more quantity and more efficient use of irrigation water for agriculture. Wells have added to the water supply by pumping groundwater where it is available. With the exception of livestock grazing, dry land grains, some vineyards, and some delta agriculture, the majority of the crops (orchards, rice, row crops, alfalfa, and irrigated pasture) rely upon a quantity of known water in order to increase yields, improve quality, and manage harvest.

Drought and Floods. 'The only certainty in rainfall in California is uncertainty.' The entire west is subject to periodic droughts where rainfall is insufficient to support local plants, animals, and agricultural production. The recent intermountain drought of 1992 and the extended 1987 to 1993 drought in the valley floor along with decreased snow reservoirs led to rationing of irrigation water for many crops. In 1992 continued droughty conditions in the intermountain areas caused many irrigated crops to be removed and planted to annual grains that also failed to produce crop yields.

Interspersed within the droughts are periodic floods, often completely filling reservoirs within a few weeks such as 1986 and 1996. At these times, the Sacramento River Watershed floods as do the coastal and San Joaquin Valley regions, where rainfall and melting snow pack overrun the patchwork levee system that prevents valley-wide lakes from occurring.

The impact on agriculture of too much and too little water is a key point in formulation of agricultural strategy. Agriculture has relied primarily on surface water for the majority of its production; additional supplies of water have continued to evolve within the middle of the valley floor with the mapping of the Tuscan aquifer. Future deliveries of water during the drought years that have continually plagued irrigated agriculture will depend upon snow pack, shallow groundwater recharge, reservoir quantities and capacities, and deep groundwater deliveries.

Transfers and Exports. Key importance is placed upon the continuing transfers of agricultural irrigation water to municipalities outside of the Sacramento River Watershed. These water exports, with the proceeds going to irrigation districts and their members, represent another ‘conjunctive use’ of the water in the watershed. Transfers of water via the Sacramento River to the Sacramento-San Joaquin Delta and then pumped via the aqueduct to urban users in southern California has become increasingly important to unrelenting population increases, affluence, and revisions to the Colorado River allocations.

Despite efforts to increase storage and fill storage reservoirs during abundant years, the continued usage of Sacramento River water and crop idling are of concern. Current groundwater management basins are being formulated to manage the groundwater as a tool in seasonal water management.

The export and transfer of foothill and upper watershed supplies are not a pressing issue since the foothill population centers have little extra water, and the intermountain areas have their extra water impounded by Shasta, Oroville, Black Butte Reservoir, Lake Almanor, Englebright Lake, Clear Lake, or Folsom Lake.

Noxious Weeds. Among the many threats to agricultural sustainability is the loss of land from invasion by noxious weeds. The loss often includes not just agricultural productivity and profit but also loss of quality environmental habitat for California native plants. Native species are replaced by invasive plants such as johnsongrass (*Sorghum halepense*), yellow star thistle (*Centaurea solstitialis*), and giant reed (*Arundo donax*). Many agricultural operations devote considerable resources to the removal and control of weeds, which compete with the crops for moisture and nutrients. For the foothills and the upper watershed, the loss of grazing lands and meadows is of critical importance, leading to complete loss of agricultural utilization. Many sections of rangelands have been over run more than 90% by yellow star thistle, and in high mountain meadows, more than 50% by perennial pepperweed (*Lepidium latifolium*).

The main agricultural concern of noxious weeds is that they most often occur in an ecological niche that has been opened by tillage, over grazing, or disturbance. Once established, noxious weeds expand and replace productive agriculture. They change the hydrology, often resulting in a monoculture vegetation. For livestock operations that comprise so much of the watershed, there is a loss of forage. This leads to a decrease in the social and economic vitality of the region and often decreased water quality and even localized reductions to water quantity. The changes brought about by weeds leads directly to further degradation from incised channels, erosion, and sedimentation.

On the valley floor, a diverse and predominantly native habitat is the best neighbor for agriculture. Despite wildlife problems for agricultural crops near forested areas, native riparian areas provide a reservoir of beneficial insects and native pollinators.

Erosion and Sedimentation. Many efforts have been made by the USDA NRCS to protect soil from erosion and the resultant sedimentation of streams, rivers, and estuaries in the past 50 years. The practices include nontillage through affiliated RCD’s drill rentals and riparian fencing to protect wetland areas. The assistance in both farm planning and reimbursement through the USDA EQIP, CRP, and WHIP programs have been implemented to repair many of those more fragile lands, replacing disking, repairing erosion, and using sediment catch basins.

Prior to the development of herbicides, the most common form of control to remove weeds was tillage. Tillage is still practiced within 95% of all annual crops in California as compared to only 60% of the farmers who use tillage in the rest of the United States. For the annual crops, beans, corn, rice, tomatoes, wheat, etc., grown on the valley floor and in most of the intermountain areas, tillage is practiced on virtually all crops. Orchards (almonds peaches, prunes, and walnuts) by comparison are predominately managed with no-tillage floors that are mown year round. The orchards contribute considerably less sediment where there is a permanent no-tillage management system.

Other challenges to Agricultural Sustainability

Agricultural Land Conversion to Urban Landscape. The Central Valley is undergoing unprecedented growth rates. The Sacramento Metropolitan Area is expected to nearly double in size in the next fifty years. The estimate for Sacramento Metropolitan area is that nearly 450,000 acres of currently agricultural lands will be retired from agriculture and converted to urban landscape. To the north, population pressures are increasing the size of almost every town and city in the Sacramento Valley—Woodland, Chico, Marysville, Yuba City, Red Bluff, and Redding.

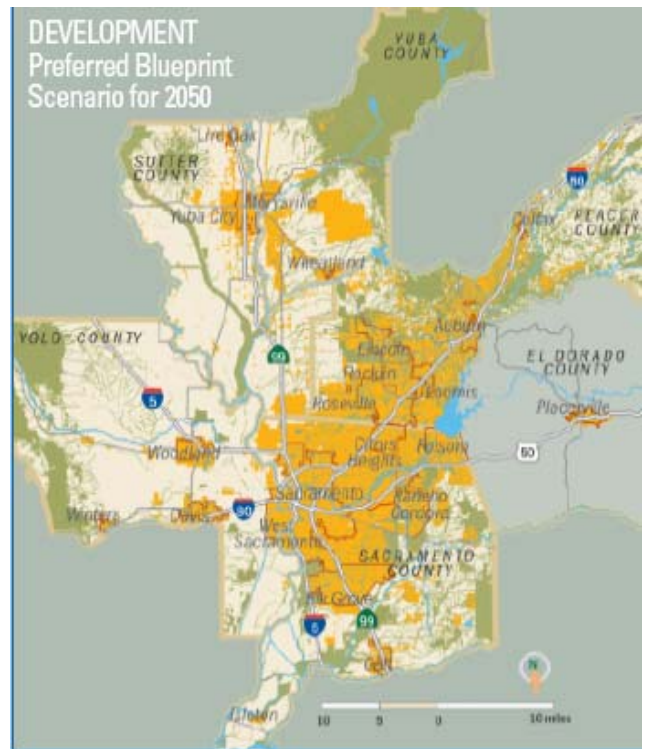
From the perspective of a sustainable agriculture, the conversion of one of the world’s greatest agricultural valleys is tragic. The marketplace is, however, transparent to that cultural value, and conversion of agricultural lands proceeds with few urban growth boundaries established anywhere in the Sacramento Valley (an exception is the Green Line in Butte County, west of Chico).

Organizations are at work on “smart” approaches to growth that may reduce the urban footprint. An example is the Sacramento Area Blueprint www.sacregionblueprint.org/sacregionblueprint/ which is a collaborative effort between the Sacramento Area Council of Governments (SACOG) and Valley Vision. These efforts are focused less on growth limitations than on “Smart Growth” principles, stated in the Sacramento Area Blueprint to be: transportation choices, mixed-use development, compact development, housing diversity, use of existing assets, quality design, and natural resources conservation. Within the last principle of “natural resources conservation” is “agricultural preservation”; however, the amount of ag land continues to diminish; additionally, commercial agriculture has traditionally had difficulty operating in the urban interface. Market pressures on farmers to sell are very strong. Land prices for development offer profits wildly in excess of what can be derived from farming. Further, there is cultural pressure to divest farmland, as the average age of farmers in the United States is approaching 60, with few direct descendents of farmers willing to continue the farming enterprise.



Key to the Map

- areas of existing and future development
- green areas (e.g. open space, parks, wetlands, vernal pools, stream corridors, hardwood stands)
- agriculture and other undeveloped lands
- rivers, streams and lakes
- city boundaries
- highways
- county boundaries



The two maps (above and to the right) are reprinted from the January 2005 Special Report from the Sacramento Area Blueprint. While the “preferred blueprint” shows less impact on agriculture than the projected base case, the impact is significant. Both scenarios indicate large acreage converted from agriculture to urban uses. Similar strong efforts to reduce growth impacts do not exist in other Sacramento Valley cities.

Climate Change. Global warming due to increases in a suite of greenhouse gasses is accepted as fact by a consensus of the world's scientific community, and a virtual consensus by the world's political leaders. There is less consensus on predicting global warming scenarios and even less consensus on specific local effects of global warming. While the level of uncertainty about the nature and severity of effects is quite high, the amount of knowledge and the skillful use of models and other tools is increasing dramatically every day. Global warming may prove to be the most challenging issue that human beings face in the current century. An ecosystem disruption of the magnitude predicted will affect all of the agricultural stressors and issues noted in this white paper, as agriculture is embedded in the ecosystem and adapts to ecosystem conditions. Agriculture is not like the created urban environment where technological solutions and changes in habits and patterns may be better suited to adapt to ecosystem disruption.

Because of the potential magnitude of impact to agriculture from climate change and global warming, a special section of this Ag Issues White Paper on Climate Change was produced, and is included as Appendix A.

Section III: Innovative Initiatives for SRWP *(as suggested by stakeholders)*

Suggested evaluation criteria:

- Does the proposed program area enhance/strengthen SRWP's unique niche as representing broad stakeholders covering the entire Sacramento River Watershed
- Is the proposed program consistent with SRWP's Mission.
- Is it doable?
- Is it timely?
- Does it leverage other partnerships and stakeholder community or resources?

Re-convene OPFG for an Annual Update

During the many years that OPFG met and shared both different and common opinions about organophosphate management, many valuable products, concepts, and alliances developed which led to research, outreach, and user educational material. A worthy initiative would be the restarting of the previous OPFG group with the multi-stakeholders who participated for five years. This group is the best suited to meet on an annual basis to revisit lessons learned, new directions, validated research, and changing pesticide usage patterns.

The OPFG provided many documents on the management of pesticides within the watershed including:

- *Water Quality Management Strategy for Diazinon,*
- *Research Prioritization as Recommended by the OPFG AG Practices Workgroup,*
- *Alternative Practices Prioritizations Recommended by the OPFG AG Practices Workgroup,*
- *Exposure Assessment Model for Diazinon Sources in the Sacramento and Feather Rivers,*
- *Study of Diazinon Runoff in the Main Canal Basis During the Winter 2000-2001 Dormant Spray Season.*

The ongoing 319(h) (California Dried Prune Board) and CalFed grants (CURES) have added to the body of knowledge that was initiated by many of these studies and models.

As the founder of the OPFG stakeholders, SRWP has the unique opportunity to restart the dialogue; it may be the only entity that could cohesively bring the conversation back together. There is a value in reconvening an annual meeting of the OPFG stakeholders to revisit the hypothesis of the past meetings and the current status of the collective knowledge. The question is, without the motivation to have input on diazinon TMDLs and other regulatory processes, would stakeholders attend OPFG meetings? Would motivation be provided by a partnership with the coalitions who have taken the leadership role in meeting regulatory requirements and developing a Management Plan with the agricultural community?

Next Steps:

- Assess motivation and interest of stakeholders to re-convene.

Interested Parties: CVRWQCB, NRCS, RCDs, UCIPM, UC SAREP, UCCE, DPR, Watershed groups, Sacramento Valley Water Quality Coalition

BMP Strategy for Water Quality Improvement

With considerable needs and few resources, it is important for SRWP to leverage improvements by focusing upon the educational opportunities that address a number of water quality attainment uses with a series of Best Management Practices (BMPs). Some BMPs address solitary solutions such as sediment basins, which trap sediment, preventing it from leaving the field. Other BMPs, such as cover crops which: trap sediments, improve water infiltration, fix nitrogen, provide beneficial habitat, sequester carbon, improve wildlife, smother weeds, and offer multiple benefits in reducing stressors to the ecosystem.

Capital expense for remediation should focus upon low cost to promote longevity. The planting and protecting of riparian vegetation to lower water temperature, traps nitrates, and prevents sedimentation resulting in many solutions through a single BMP. The approach of the USDA NRCS EQIP program is to award more points to those practices that provide cost effective solutions to multiple stressors that are integrated and provide improvements to water quality.

The SRWP, in combination with other partners; NRCS, US EPA, UCCE, RCDs, local watershed groups, and water coalitions, could facilitate the implementation of those BMPs that offer the most efficient water quality improvement practices.

Next Steps:

- Seek partnerships
- Assess who is in the business, strengths and weaknesses of SRWP.

Interested parties: Ag Coalitions, NRCS, RCDs, UC IPM, UC SAREP, UCCE, DPR, Watershed groups

BMP Grazing Opportunities Watershed Wide

There are distinct regional differences within the Sacramento River Watershed in the foothill and the upper watershed regions compared to the more intensively farmed, irrigated valley floors. The majority of these upper watersheds are in irrigated and dryland grazing livestock agriculture. Much of the water quality and quantity originates on these high precipitation agricultural lands in these regions. Addressing programs that address agriculture within these regions should be of considerable interest to the SRWP to assist in implementing BMPs that reduce run off from reaching the lower watershed.

Because livestock production within the two regions is based upon a resource management system (forage, browse, grazing), SRWP can view these two upper watershed regions as models of management. Both regions have a long-term interest in local resource management and they have used the Coordinated Resource Management and Planning (CRMP) process. The valley floor, in contrast, with its production of rice, almonds, walnuts, prunes, tomatoes, and corn, are input driven

(irrigation, fertilizers, herbicides, pesticides) and extraction based. The forgiving alluvial soils of the valley allow a production level that cannot be sustained within the upper watersheds despite the abundance of natural rainfall.

The improvement of grazing methods, resource management, and BMPs for the upper subwatersheds and facilitation of upper watershed groups will lead to considerable leveraging of existing subwatersheds, funding (USDA NRCS), and resource management through the CRMPs. The foothills and upper watersheds have had progressive weed management, controlled burns, wildlife management, and riparian protections for the past 30 years. Continued and expanded collaboration with these upper and subwatershed groups with a long history of working together will result in addressing the source of the precipitation on over two-thirds of the land area within the Sacramento River Watershed. There may be an opportunity for SRWP to take leadership in coordinating grazing management efforts on a large watershed-wide scale; this could dovetail with SRWP efforts to coordinate monitoring, consolidated permitting, and invasive plant efforts watershed-wide.

Next Steps:

- Assess if local watershed CRMPs need a large watershed coordinated approach

Interested parties: CVRWQCB, Watershed CRMP, local watershed CRMPs, NRCS, RCDs

Noxious Weeds

The problems with noxious weeds occur in all parts of the watershed. In many cases it is the same weeds that are problematic such as yellow starthistle (*Centaurea solstitialis*) and perennial pepperweed (*Lepidium latifolium*). Many noxious plants, non-native to the watershed and nonexistent in the watershed 100 years ago, now plague both the upper watershed and riparian corridors. A common theme voiced within the weed management community is no longer control but containment. Five years ago, Weed Management Areas (WMA) were funded by CDFA to bring together regional focus and collaboration on the worst weeds. After several years of funding with increasing momentum, the WMA programs are now minimally funded. This once excellent program has lost direction and there remains a lack of coordination for weed control within the remains of the WMAs.

The success spawned from the start-up WMAs several years ago could lead to improvements in water quality and possibly reductions in sediment. A common theme for all parts of the watershed led by the watershed groups, RCDs, CRMPs, and NRCS should be increased adoption and collaboration between weed management groups. Each subwatershed can adopt a weed strategy to control primary and secondary noxious weeds in principal.

Advanced weed educational meetings with intra-state information for the more mountainous areas would benefit the region and inform landowners. Current UCCE weed science support is of excellent quality but not sufficient for the many weeds, crops, and rural areas of the watershed. Improved coordination would lead to improved water quality and improve the aquatic habitat degradation of the many tributaries.

Because SRWP offers stakeholders a common forum for a diverse number of groups within its boundaries, it is in a unique position to offer its strengths to groups facing with the common problem of weed management. Weeds are a measure of watershed degradation, and those programs that coordinate weed control and containment result in an improved ecosystem and watershed health. A program in this area may dovetail with SRWP efforts to coordinate watershed groups, and potential BMP initiatives (above).

Next Steps:

- Identify prioritized noxious weed threats watershed-wide (“Dirty Dozen” “Top Ten”, etc)
- Identify possible partnerships
- Assess to see if WMAs, local watershed CRMPs, RCDs and the like would be supportive of an SRWP coordinated watershed-wide program
- Assess funding opportunities

Interested parties: WMAs, local watershed CRMPs, RCDs, NRCS

Agricultural Economic Sustainability

Agricultural sustainability is a common theme, which crosses many commodities and all regions within the watershed. World trade in commodities such as rice, cotton and grain continue to require federal support so that their production is compensated above the costs of production. Even the production of apples, honey, peaches, pears, prunes, and other ‘specialty’ crops are affected by importers and changing market conditions.

In addition to marketplace issues, every year less land is available for open space/farming and yet the urban population insists that agriculture maintain land for the esthetic, wildlife, and water quality benefits. Many within agriculture who continue to be regulated to provide these benefits believe that since the benefits are for the rest of the population, that the urban public should compensate farmers for their efforts.

The Williamson Act allows farmers to remain within an agricultural production taxation category in return for keeping the land in agricultural production for long periods of time. This Act has spared many farms from development and assisted land use planners in maintaining open space near urban areas.

SRWP may be in a position to support the Williamson Act as well as fostering a dialogue on economic ag sustainability between the different constituencies--- rural, urban, and environmental-- - to help growers remain in farming and embrace a vision for sustainable agriculture in the Sacramento Valley.

Next steps:

- Assess stakeholders receptivity to engaging in dialogue and/or visioning process

Interested parties: Farm Bureau, Great Valley Center

Ag Land Conversion

There are essentially two ways in which agricultural land is converted. The first is the encroachment of urban population and residences that continue out from cities and towns, which can be residential, commercial, or industrial. The second form of encroachment into agriculture is the retiring of agricultural lands for state and federal parks, mitigation banks, and wildlife habitat areas.

As noted in an above section, population in the Sacramento region, and in the Sacramento Metropolitan area, is at one of the highest rates of growth in the state. Almost every stakeholder interviewed, mentioned population growth as a stressor. Yet few proposed solution-oriented initiatives to address the problem. Inquiries into the Department of Conservation agricultural mapping program noted that while data is gathered throughout the Sacramento Valley, it is not often taken to an analysis or map presentation stage, as most of their work is focused on the Watsonville and Ventura areas. There have been few requests to develop presentation tools for the Sacramento Valley.

Likewise in the transfer of ag land to mitigation banks or habitat area, there is no comprehensive economic analysis that has been undertaken to measure economic loss (or gain) to communities.

Stakeholders suggested agricultural easement programs as a potential area of work for SRWP. These programs would prevent ag land conversion. Almost all conversion is between willing seller and willing buyer, and the effectiveness of these programs would have to be assessed.

One potential program is the collection of data, analysis, and presentation of the problem of ag land conversion could be undertaken by SRWP. Developing a vision for sustainable agriculture may also be a potential program.

Next steps:

- Assess potential for watershed-wide ag easement program preventing ag land conversion
- What is SRWP's role?

Interested parties: SACOG/Valley Vision/Blueprint, Butte County Green Line, Sierra Conservancy, Placer Legacy, environmental groups, and Ducks Unlimited.

Water Transfers

The goals of SRWP include the improvement in water quality. It has been often pointed out that the linkage of water quality to water quantity, should encourage SRWP to participate in the discussions regarding water transfers.

One of the proposed areas that address both concerns is the Sacramento Valley Water Management Program that developed from the Phase 8 agreement of the Northern California Water Association (NCWA). The program proposed more than fifty projects that would be part of the both short and long term work plans. The project would protect Northern California water rights that include groundwater planning and monitoring projects, system improvement and water use efficiency measures, conjunctive management and surface water re-operation projects. Groundwater protection

is central to the work plan. Phase 8 was an attempt to spread the responsibility for water quality standards in the Delta to upstream water users. D1641 on the Delta, which is being appealed, essentially froze the situation at Phase 7 status quo, at the request of DWR and Bureau Reclamation, postponing implementation of Phase 8. Phase 8 water transfers are currently being done voluntarily and singly as water districts, but a permanent decision has been deferred.

A very different focus on water transfers is held by the Sacramento Valley Environmental Water Caucus (SVEWC). SVEWC's first major campaign is focused on stopping water transfers from Sacramento Valley to Southern California. The campaign, called "Stop the Sacramento Valley Water Raid", focuses on the "Napa Agreement" among major water purveyors, which would transfer an additional 1,000,000 acre-feet of water out of the Delta and to Southern California every year. The Napa Agreement is dependent on completion of the South Delta Improvements Package; the EIR/EIS is underway currently, with numerous legal disputes pending. SVEWC characterizes the Napa Agreement as diminishing almost all beneficial uses of water in the Sacramento Valley, including water for sustaining agriculture.

The spectrum of opinion is broad with regard to water transfers, there is considerable political heat in these issues, and the political landscape changes rapidly and requires constant attention and expertise. The field of players in California water supply issues is tightly packed; SRWP would have to discover a niche that would differentiate its organizational approach from others, representing stakeholder concerns in some special way.

Next steps:

- Assess SRWP internally to see if its strength is in water transfer issues
- Assess stakeholders to determine if there is a watershed-wide perspective that would further dialogue on the issue

Interested parties: DWR, NCWA, SVEWC, ACWA, Farm Water Alliance,

Coordination of Farmers for Watershed Approach to Government Cost Share Programs

As part of the recognition that landowners and farmer tenants are often the best suited to protect the resources they manage, the USDA Natural Resources Conservation Service (NRCS) has numerous programs that will benefit water quality by cost sharing on many BMPs through the funding of the Farm Bill. The most popular among these are the Environmental Quality Incentives Program (EQIP) the Wildlife Habitat Improvement Program (WHIP), and Conservation Reserve Program (CRP). Recently areas within the Sacramento River Watershed, including the Lower Sacramento, Sacramento – Stone Corral, and Lower Butte watersheds, were qualified to receive funding under the new Conservation Security Program (CSP). Farmers and landowners within these areas would be compensated for practices that they have already implemented that have resulted in long-term improvement to the watershed.

Since its founding as the Soil Conservation Service, the current NRCS has provided the most valuable information and on-site planning for landowners, neighbors, agencies, and resource managers; this has resulted in the positive gains that have been realized in the past twenty years. Despite the applications by landowners who use the allotted funds, there are large groups of

farmers in the valley who do not apply. Recent outreach by the NRCS includes the involvement of pest control advisors (PCA)s to facilitate pest management guidance and further outreach to valley growers who do not use the services of the NRCS. Many specialty crop growers within the valley floor irrigated agriculture do not apply for funding from the many programs available for IPM, wildlife habitat, or water quality improvements. A potential role for SRWP could be to facilitate education about these NRCS programs leading to increased applications within the valley and the upper watersheds for practices that promote water quality improvements.

Next Steps:

- Inquire of NRCS offices to assess need

Interested Parties: NRCS, CRMP, local watershed CRMPs, RCDs

Modeling Pesticide Transport and BMP's

Environmental fate and transport models are being utilized to identify and quantify important regional sources of diazinon to the Sacramento and Feather Rivers in California, and to evaluate the feasibility of mitigation measures as necessary to help ensure concentrations are within compliance with TMDL target levels. Under the current USEPA grant, model simulations have been conducted for the Butte Main Drainage Canal, a 38,000-acre sub-watershed of the Sacramento River basin. The modeling approach involves the linkage of two simulation models: the U.S. Environmental Protection Agency's Pesticide Root Zone Model (PRZM) and the water quality model for riverine environments (RIVWQ). A geographical information system was used to integrate spatially varying data for model setup. Data sources include diazinon use records from the California Department of Pesticide Regulation's Pesticide Use Reports, soil properties based on the U.S. Department of Agriculture's SSURGO database, the drainage system from the National Hydrography data set, channel geometry from previous modeling by U.S. Army Corps of Engineers and the California Department of Water Resources, and historical weather data and stream flow data from the National Oceanic and Atmospheric Administration and the U.S. Geological Survey, respectively. Water quality monitoring conducted by SRWP and the U.S. Geological Survey was used for model calibration. Alternative management strategies, such as comparisons to the new regulatory label changes are compared to the historical data trends.

With this information, we can begin to understand which practices are more effective, where to effectively place BMPs to achieve greater reductions, and how to enhance monitoring of these strategies.

Next Steps:

- Expand scope of model to whole watershed, from the 38,000 acres pilot
- GIS laying and model could be applied to other contaminants, including pesticides like pyrethroids
- Link pesticide transport model to basin-wide hydrologic model, to better understand water transport in current conditions, and in different, potential climate scenarios

Interested parties: CVRWQCB, EPA, DWR, DPR

Stakeholders suggested the following initiatives, which are already ongoing projects within SRWP in other Committees:

Baseline Monitoring

Baseline monitoring is the core business of the SRWP Monitoring Subcommittee. The Monitoring Subcommittee and SRWP Board of Trustees has reaffirmed that the SRWP should continue doing baseline river water quality monitoring. Currently, the Monitoring Subcommittee is conducting a strategic planning process to examine SRWP conducting watershed monitoring and reporting beyond water quality monitoring. Public workshops were held in 2004 and 2005 to gather additional stakeholder on what such a watershed monitoring program would monitor, track, and report on. This strategic planning and watershed monitoring program development will continue through 2005. The strategic planning will define for the SRWP logical levels of collaboration in mainstem and watershed-wide monitoring efforts.

Public Outreach

SRWP addresses public outreach in two ways. First, the Public Outreach and Education Subcommittee (POES) oversees numerous public education efforts and the SRWP website (www.sacriver.org). Second, other SRWP Committees build public outreach and education into their projects (e.g. OPFG did grower outreach, grants initiated in OPFG had public site tours, and the like).

Drinking Water

The SRWP Monitoring Subcommittee conducts a full range of monitoring for drinking water parameters. The Toxics Committee sponsors the Central Valley Drinking Water Policy Workgroup. The Toxics Committee also oversees special studies, which address drinking water standards on an as-needed basis.

Coordination with Watershed Groups

Coordination with watershed groups is a priority task for the SRWP Coordinator. Potential coordination with watershed groups is implied in this paper in many of the proposed initiatives, and is indicated by watershed groups being listed as potential interested parties.

Section IV: Solution Approaches and Process Options

Different solution process approaches are available to SRWP to address the issues and potential programs described above. SRWP is evolving organizationally, and may choose to operate differently as a nonprofit corporation than it did as a stakeholder group. The purpose of this section is to describe processes that have been used by SRWP, and present a selection of alternative process approaches to problem solving. The alternatives will range from stakeholder groups, as SRWP has been and currently is, to nonprofit corporations as education and service groups, to nonprofit advocacy group models.

Applying the SRWP OPFG Approach to the Process

The Organophosphate Focus Group (OPFG) is one example of how SRWP addressed issues in the area of agriculture. OPFG was formed by the Toxics Committee in 1998 to specifically address OP pesticide use. The issue was identified first through this stakeholder dialogue, and the OPFG was charged to develop a watershed-wide approach for dormant spray OP pesticide applications. The OPFG produced the *Water Quality Management Strategy for Diazinon in the Sacramento and Feather Rivers*, which was essentially guidance from the stakeholders of the Toxics Committee.

Multi-stakeholder Dialogue as a Process Element

OPFG was another iteration of a stakeholder dialogue like the Toxics Committee, with the particular focus of organophosphate pesticide use. Representatives from organizations and individuals from various interests convened to address the specific issue. The categories of stakeholders were generally recognized to be: ag community (including farmers, ag advisors, PCAs, ag commissioners, etc), ag industry registrants, regulatory federal and state agencies, university and extension representatives, and the environmental community.

Legitimacy in a stakeholder dialogue group is defined by participation in the process by recognized representatives and organizational designees of bona fide stakeholders in the issue of focus. The decision-making process chosen by SRWP generally and OPFG specifically was facilitated consensus of the whole (“consensus of the whole” defined as not any one participant blocking). The legal structure of the program was the contractual relationship between the Sacramento Regional County Sanitation District and EPA. As a stakeholder dialogue group has no legal standing, the EPA funding was contracted through the District, providing the legal entity that was bound by contract for workplan and deliverables. The District, in turn, contracted with agencies and consultants to execute the workplan. The workplan was designed and continually refined by the stakeholder dialogue group, within the legal constraints of the contracting entities (EPA, District, and subcontracting entities).

From a process perspective, it is important to emphasize in importance of motivation to participate as a key ingredient to success. The legitimacy of stakeholder dialogue is a function of strong, diverse, and consistent participation. If the motivation is weak, participation dwindles and legitimacy is lost. Assessment of strong motivation for participation is a key consideration when considering using a stakeholder dialogue process as a program cornerstone.

Focused Work Groups as a Process Element

Several ad hoc work groups were formed during the five year history of OPFG. These subgroups were formed for their specialized expertise and to perform a specific task or produce a particular body of work, which was then delivered to the OPFG stakeholder dialogue group for acceptance. This process of focused work groups worked quite successfully. Again as in OPFG, the process was facilitated consensus dialogue.

An example of work groups was the Ag Practices Workgroup (APW). This group was established to address the challenge of formulating a set of Best Management Practices (BMPs) for OPs. It was composed predominantly from the agricultural community with university and some regulatory agency participation. APW had several facilitated sessions with over twenty participants. The work products included the list of BMPs, an assessment of available research, a gap analysis of needed research, and strawman designs for research projects to fill the gaps.

Work Teams as a Process Element

Another process used by OPFG was ad hoc work teams to oversee work products in process. These work teams were formed during OPFG meetings. Efforts were made to ensure as broad a representation on the work teams as was reasonably possible within the all-voluntary OPFG process. Work products like the modeling project, grant projects for BMP efficacy, and the like all had work teams to assure that the multi-stakeholder perspective of OPFG was carried into the projects in between meetings. Reports from the work groups were regular agenda items of the OPFG meetings.

The Process Goes to Work

With this consensus stakeholder process in place, OPFG addressed:

- Input to Regional Board on numeric targets for the diazinon TMDL for CVRWQCB consideration
- BMP strategy for OP in the Sacramento Valley
- Review of research and a gap analysis
- Initiation of two major grant projects to address the gaps in BMP efficacy
- Input to the development of diazinon model by Waterborne
- Input to SRWP Monitoring Committee for OP monitoring needs and special studies

The above products were professionally executed, often peer reviewed, and received well by the wider stakeholder community.

CRMPs. Probably the most successful model for integrating resource management is the CRMP (Coordinated Resource Management and Planning). Founded through the NRCS in the 1970's and 1980's, the model of the CRMP was formally created by 1990 with the signing of the MOU of 15 federal and state natural resource agencies and 14 organization sponsors. CRMP is a voluntary, locally led, planning process that has proven to be successful in the management of natural resources. CRMP is a people process that allows local people to actively participate in the development and implementation of proactive natural resource management decisions. CRMP

brings all the affected interests, both private and public together to establish common goals and to resolve issues as a team.

The California CRMP Council supports, encourages, and educates about the CRMP process. The CRMP Council is financed by annual dues of each of the 15 signatory members and is composed of both an executive council and technical advisory council. The CRMP Council has a part time staff member, the program director, who is housed within the California Association of Resource Conservation Districts (CARCD) in Sacramento. Among the many resources available to groups wishing to start a CRMP are the CRMP Handbook, sample documents, general funding sources, and a speaker's kit. Many CRMPs receive substantial technical assistance and financial services from local RCDs and UCCE, including coordination, in-kind services, custodian of grant funds, technical advice, and educational outreach.

Each group that is a CRMP or wishes to be a CRMP is unique, composed of local people and resource issues. Resolutions are reached at the local level and the CRMP process specifically encourages consensus decision-making and inclusion of all stakeholders. CRMP plans are then implemented through appropriate agreements between participating individuals and agencies.

The SRWP has within its boundaries 15-20 CRMPs that are currently operating to plan and manage natural resources, and call themselves by different names—councils, watershed groups, CRMPs, etc.. Some of the current CRMPs include: American River Watershed Group, Bear River Watershed Group, Yuba River Council, Colusa Basin Drainage district CRMP Project, , Sierra Valley CRMP, and others. Within Lake County alone there are six separate CRMPs.

The OPFG approach could easily be called a variation of the CRMP process. Each and every CRMP is unique and there are no required rules. Attempts to address the resource issues by SRWP are challenging on the broad scale of the entire watershed; however, the resource issues become manageable at the local level. The OPFG as a model drew heavily from the CRMP process by those stakeholders that were familiar with this resource management model. As CRMPs mature, some choose to formalize their process rules and gain a legal standing by becoming a nonprofit corporation with bylaws that reflect the process defined by stakeholders as their decision-making rules (to the extent possible under nonprofit corporate law). This evolution has both advantages and disadvantages. For example, with legal standing a group can open its own bank account, enter into contracts, and function as a business, without having to live within the constraints of a fiscal manager and project manager from a different existing entity. A disadvantage is that federal and often state employees are not allowed to sit officially on a nonprofit board of directors.

In view of the search for a model to provide solution approaches to the many diverse agricultural issues that face the SRWP, the CRMP model remains the most used, most supported, and most successful method of planning and managing the issues. Fifteen to twenty years of experience with this management model has proven it to be a solution to the many complex issues to encourage, empower, and fund local residents, RCDs, and resource agencies to manage natural resource issues.

Other Models

There are a number of other entities that offer solution approaches to potential initiatives besides the CRMP model. The entities are grouped into Federal, State, and NGOs. Each offers approaches to some but usually not all of the potential initiatives.

USDA NRCS. NRCS has a number of Farm Bill cost share programs that address water quality and habitat. As the primary planning for the funding of environmental and water quality improvements to agricultural properties in the watershed, the Natural Resources Conservation Service is of primary importance in remediation activities. The numerous programs include CSP, CRP, EQIP, and CSP; all of which address the solutions to the issues of land, air, water, and wildlife.

US EPA, Region 9 Agriculture Program. The EPA Region 9 Agriculture Program promotes the implementation of sustainable agriculture systems that are environmentally sound, economically viable, and socially responsible. This program supports farming systems and practices that reduce targeted pollutants and provide models for multi-media pollution prevention. The program accomplishes this work through grants and public-private partnerships with diverse groups of agricultural producers, researchers, regulators, federal and state resource agencies, and non-governmental organizations to provide incentives for activities that yield measurable improvements in environmental and human health. This program also works on several national priority issues including the alignment with United States Department of Agriculture–Natural Resources Conservation Service (USDA NRCS) conservation program and the Dairy Manure Collaborative, which is working to comprehensively address dairy waste issues in the San Joaquin Valley.

Partnerships and Grants. The Agriculture Program administers the *Regional Food Quality Protection Act (FQPA) Grants* and *Pesticide Environmental Stewardship Program Grants* with awards totaling approximately \$440,000 per year to fund demonstration projects that promote viable reduced risk approaches to pest management. This group has also supported small-scale partnerships on a commodity-wide scale by innovative non-government organizations. These organizations develop a set of crop-specific, verifiable production practices and standards that mitigate air and water impacts. They also educate growers and food industry members about sustainable growing practices and the market benefits.

National Policy Priorities. Working with EPA's water, air and pesticide programs and with external partners, the agriculture program leverages development on regulatory issues, policies and technologies that affect agriculture's impacts on environmental and human health. The Region 9 Agriculture Program staff coordinates activities within EPA and with sister agencies to achieve a more meaningful and coherent federal presence in the agricultural sector. Three national priorities include:

1. *Alignment with Federal Conservation Programs of USDA-NRCS*—Since 2001, funding for USDA's largest environmental program (EQIP) has increased by over 600% to \$45 million annually. This provides an enormous opportunity to help agricultural producers address environmental and regulatory priorities.

2. *Dairy Manure Collaborative*—Federal and state government, dairy industry organizations, and environmental groups are working together to initiate a coordinated strategy to comprehensively address dairy waste issues in the San Joaquin Valley.
3. *Pesticide Use Reporting*—Work closely with state and federal agencies to improve data quality, utilization and public access to California’s Pesticide Use Report data, and to assist other states interested in developing similar systems to track pesticide use.

State Agencies.

CVRWQCB. The Central Valley Regional Quality Control Board is a key governmental agency whose task is to ensure that the water of the region is clean and safe. As a catalyst stakeholder along with the Department of Pesticide Regulation (DPR) in the creation of the original SRWP when they entered into contractual agreements with the Sacramento Regional County Sanitation District (SRCSD), the primary contractor to EPA for the funding that supported SRWP. The assistance of CVRWQCB in providing the framework for the OPFG and the assistance of staff in the development of the Agricultural Workgroups that formulated the BMPs. With representation on the SRWP Board of Directors, the CVRWQCB will continue to be a guiding stakeholder in the development of SRWP and water quality attainment goals.

UCCE and UC SAREP. The University of California Cooperative Extension (UCCE) has many commodity specific programs that address weeds, BMPs for crops and grazing, and a very strong public outreach. The state agency that promotes BMPs and whole systems is UC Sustainable Agriculture Research and Education Program (SAREP). In addition to their educational components, their Biologically Integrated Farming Systems (BIFS) model combines multi stakeholders in three year programs to solve crop issues with suites of BMPs.

RCD. The Resource Conservation Districts (RCD) in California are "special districts" organized under the state Public Resources Code, Division 9. Each district has a locally elected or appointed volunteer board of directors made up of landowners in that district. RCDs address a wide variety of conservation issues such as forest fuel management, water and air quality, wildlife habitat restoration, soil erosion control, conservation education, and much more.

Non-Governmental Organizations.

CURES. The Coalition for Urban and Rural Environmental Stewardship (CURES) was founded in 1997 to support education efforts for agricultural and urban communities focusing on the proper and judicious use of pest control products. A key area of CURES activities is working with local and regional collaborators to study and promote BMP practices for protecting water quality.

The Ecological Farming Association (EFA) has for 25 years promoted holistic approaches to agriculture. The organization is noted for their annual Ecological Farming Conference every year at Asilomar, but they have often had commodity focused programs throughout California including the Sacramento Valley.

Another non profit organization that promotes best management practices in California including the Sacramento Valley is the Community Alliance of Family Farmers (CAFF). Through their Biologically Integrated Orchard Practices (BIOS) programs, CAFF had an almond BIOS program in Colusa County and a walnut BIOS program in Yolo County.

Innovative Initiatives

Pollutant Trading. Pollutant trading would provide incentives for the implementation of substitute pest management strategies and practices. Management practices may be able to reduce the diazinon contribution to surface waters, such as:

- 1) vegetative practices that would provide soil absorption;
- 2) buffers to reduce offsite movement of various pesticides;
- 3) cover crops to trap and filter sediment runoff.;
- 4) reduce herbicide applications to berm area to reduce diazinon runoff.

Through pollutant trading, incentives could be provided for implementation of these practices.

It is likely that substantive long-term water quality improvements will require an overall reduction in the use of pyrethroid and OP pesticides, rather than just substituting one material for another or making small changes to application practices. In addition, on-site mitigation such as a buffer strips and crops can significantly reduce runoff. Orchards that have runoff leaving the field or that are located along watercourses have a much greater need for careful management of diazinon and other OP pesticides, pyrethroids and carbamates. Runoff can be prevented from leaving the fields through the use of buffer strips, and cover crops. Location of the field and impacts to water quality would be evaluated to target key areas for pollutant trading. This information would come in from the modeling effects (Section III, Modeling Pesticide Transport of BMPs).

Because substantial data has been collected identifying proposed methods for control and general identification of the types of practices that provide the greatest impact on water quality, the time is opportune to develop a program to provide incentives for landowners to modify their pesticide use for the benefit of water quality.

A Sacramento River Trading Program could be presented in two phases, to develop the trading framework and secondly to implement the framework and projects. Phase one could analyze options for a trading framework based upon directives from SRWP and various agencies and entities; developing GIS tools to identify sites for most effective pesticide controls; developing trading guidelines and outlining a tracking and monitoring system for trading and related water quality improvements. Phase two could implement actual trade projects throughout the watershed, track and monitor the water quality improvements.

New Partnerships. Since the SRWP formed in the mid-1990s and established its mission, many new partnerships have developed and been incorporated into the program. With such a diverse number of issues and geographic areas, many other new partnerships become available as the outreach efforts of SRWP continue. One of the key questions of the interview process that was conducted to get the perspective and advice of past OPFG members, farmers, landowners, agencies, and environmental groups was, Who should be the partners of SRWP and what groups should they assist?

A variety of suggestions for interaction, partnerships, education, participation, new board members, and suggestions were often quickly forthcoming. The suggested new partnerships included partners, processes, and fundraising.

Potential SRWP Partners

Sacramento Valley Water Quality Coalition (SVWQC). The SRWP was instrumental in providing the associations and framework to assist the many members of the SVWQC to combine and formulate the implementation of the Irrigated Lands Waiver Coalition. With the addition of so many new partners that have formed around the Coalition including Ducks Unlimited and other non agricultural dischargers, partnering with the Coalition could provide a broad framework for both organizations.

Sacramento River Conservation Area Forum (SRCAF). Of considerable interest to all the stakeholders along the main stem of the Sacramento River, the SRCAF addresses many issues facing agriculture. The multi stakeholder process in place since 1986 helps to balance the needs of cities along the river, agriculture, easements, public land development, tourism, fishing and hunting. Among the ambitious goals of this project is to restore and protect a continuous riparian corridor along the 222 miles of the Sacramento River between Keswick and Verona.

Sacramento Valley Environmental Water Caucus (SVEWC). The SVEWC has addressed the concerns of local environmental groups in the management of surface and groundwater within the Sacramento River Valley. It is common among environmental groups to be good friends with agriculture where the issues of agricultural protection and preservation ensures the common goals of open space and rural protection. Despite being often opposed over issues such as pesticides, environmentalists recognize that the protection and enhancement of agriculture is the best neighbor for habitat preservation not urban expansion. Other interests can also link stakeholder groups and environmental groups. For example, the first major campaign chosen by SVEWC is to stop water transfers from the Sacramento Valley to Southern California urban interests. This campaign is, in part, to protect flows and temperatures for fisheries and habitat, including anadromous fisheries, but also is aimed at protecting the groundwater basin from depletion. The agricultural community relies as well on a stable and healthy groundwater basin.

California Farm Bureau Federation. The role of the Farm Bureau as a spokesperson for the majority of agriculture in the watershed, obligates their partnership. Fully 80-90% of the landowners who derive more than 50% of their income from agriculture are Farm Bureau members, especially in the highly rural and livestock oriented agriculture of the foothill and upper watersheds. The SRWP should have a partnership with the Farm Bureau as they have many common goals that combine to improve water quality.

Fundraising

For the success of the agricultural issues within SRWP, continued funding would be essential. The hiring of a grant writer who solicits funds that address the proposed initiatives would help to project which can be undertaken.

Another possible option to include as either partnerships or innovative initiatives would be the inclusion of Native Americans within the watershed to participate in SRWP and develop a mutual clean water initiative. While not a portion of the agricultural issues, the stakeholder suggestions for innovative partnerships that would supplement the common interests of SRWP includes this suggestion.

Next Steps:

At the directions of the SRWP Board, the intended final section entitled “Framing the Issues for Stakeholders and the SRWP Board” was eliminated from this Ag Issues White Paper. This section was intended to look at the ag issues of Section III, and provide implementation options from Section IV that might be best suited to each of the issues.

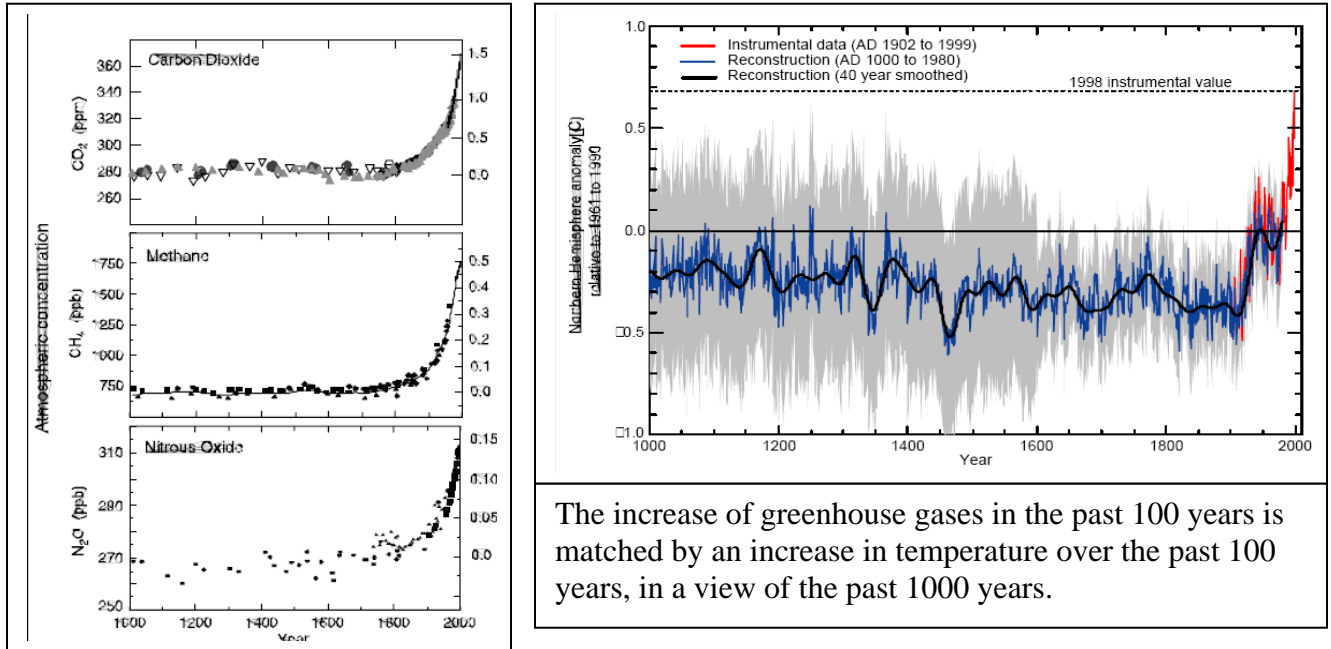
As a result of stakeholder and Board outreach, more issues were developed than anticipated, and the stakeholder outreach component of this project was more complex and time consuming than anticipated in the workplan. As a result of direction from the SRWP Board in the March 2, 2005 Board meeting, it was determined that consultants would complete the draft of the current edition without Section V, circulate the document for stakeholder feedback, and bring the final draft back to the Board in their May 4, 2005 meeting.

As discussed, this White Paper would then be integrated into the strategic planning discussions being conducted both by the Board and in the SRWP Subcommittees. Further refinement of directions for Ag Issue Workgroup efforts or this White Paper will be at the discretion of the Board, the Sanitation District and EPA through the strategic planning processes underway in 2005.

Appendix A

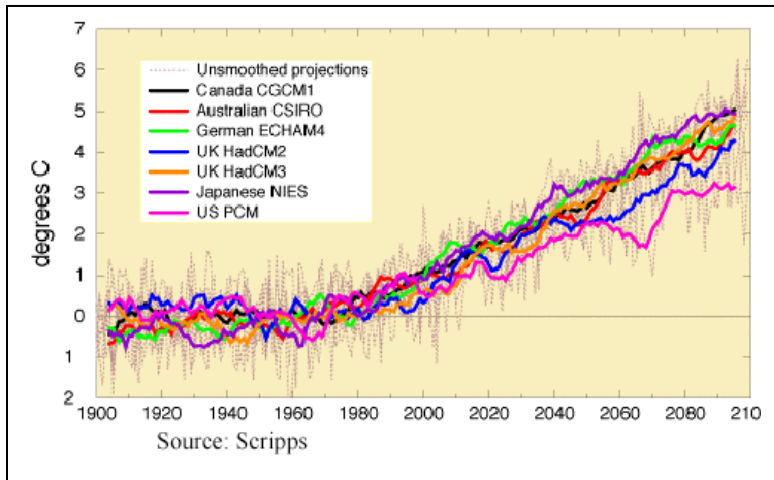
Climate Change: an Assessment for Ag Issues in the Sacramento Watershed

A summary of global warming may be presented graphically, drawn from peer reviewed studies that have the consensus of the scientific community:



The increase of greenhouse gases in the past 100 years is matched by an increase in temperature over the past 100 years, in a view of the past 1000 years.

Sophisticated models have been developed to predict how this pattern of greenhouse gas increase will inhibit re-radiation of sunlight back to space by means of infra-red radiation, thus raising earth's temperature. Models are based on numerous assumptions, how will the concentrations of greenhouse gases will increase, which in turn is based on a myriad of choices human beings will make in the future, and how ecosystem reactions will increase or decrease concentrations. Thus climate scenarios have variations, but within those ranges of response, substantial consensus has emerged. Below are the temperature projections for the next 100 years in Northern California from the major global warming models as presented by Scripps Institute. All models show an increase of temperature, with the range indicated as an increase of 3-5 degrees Centigrade over 100 years.



Northern California temperature projections were derived from the Global Climate Models, and range from 3-5+ degrees Centigrade increase over the next 100 years. This represents a 5-9+ degree Fahrenheit increase.

While there is general consensus that temperatures in Northern California will increase due to global warming, there is less consensus on precipitation, with some models predicting an increase, and some models predicting a decrease. The trend over the past 100 years, during which global warming effects have begun due to greenhouse gases, shows temperature increase and precipitation decrease. The following tables compare the past trend with the future projections.

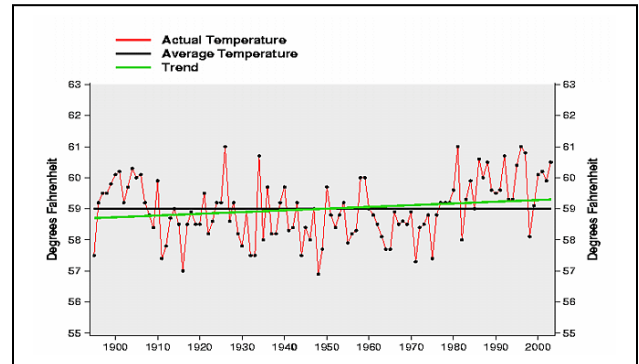
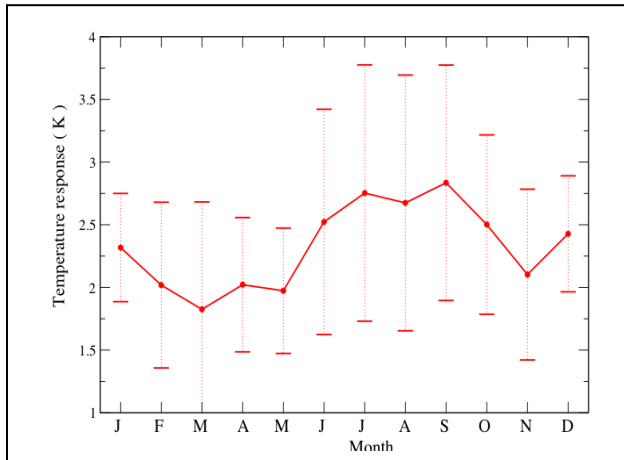


Table at left shows mean and standard deviation from fifteen GCMs with agreement that temperatures will rise; the question is by how much. The table at right above shows the historic trend of a nearly one degree F. rise over the past 100 years.

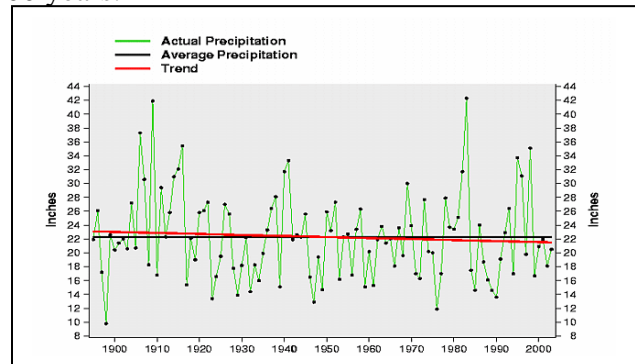
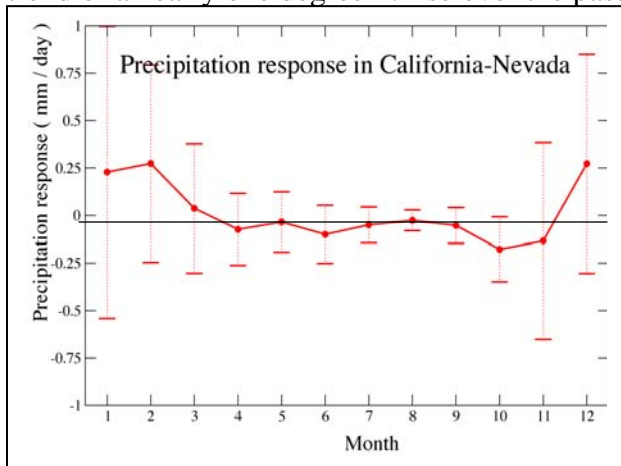
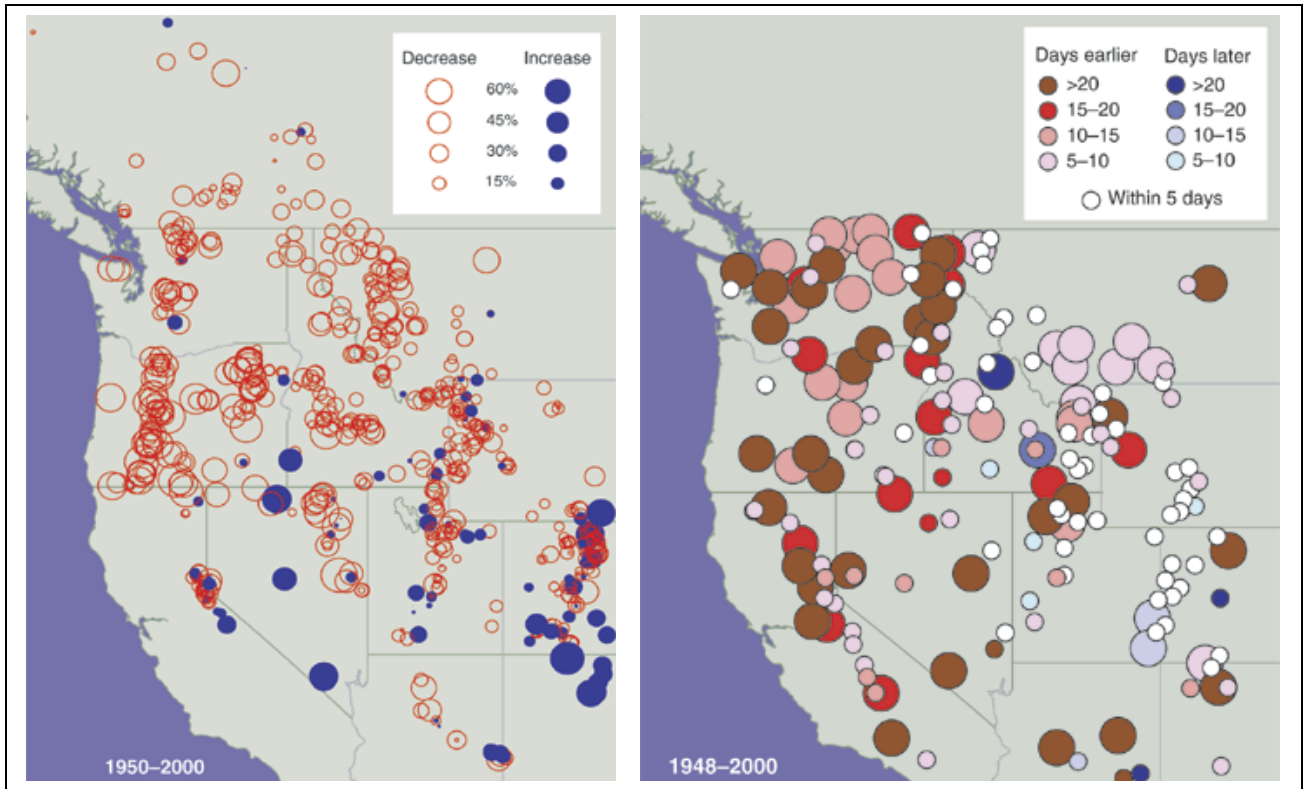
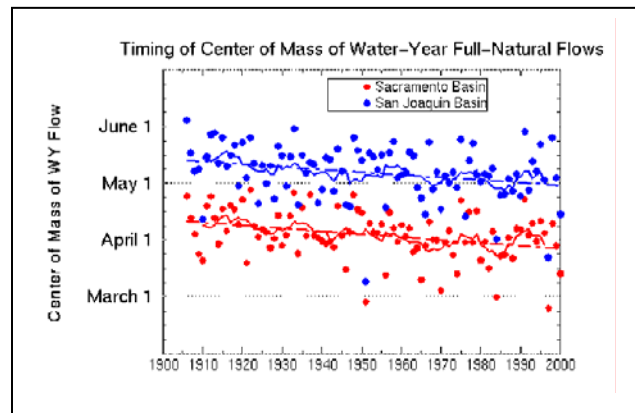
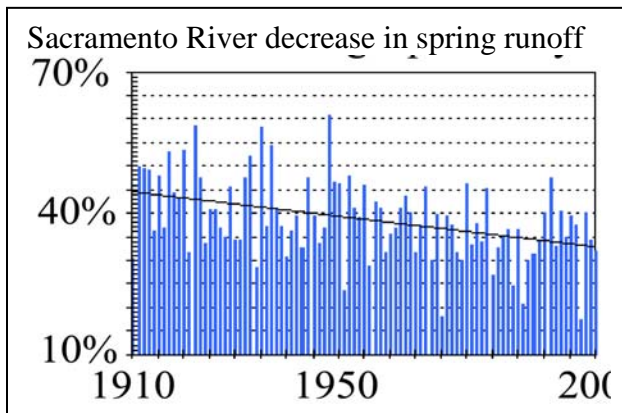


Table at left shows mean and standard deviation from fifteen GCMs with no agreement on whether there will more or less precipitation in Northern California. Note that while globally there will be an increase in temperature and precipitation, local effects will vary, particularly in precipitation. Trends have become apparent in changes to snowpack in the Western States as well.



The chart on the left shows that snow pack volume has decreased in Northern California, while it has increased slightly in Southern California. The chart on the right shows that Northern California snow pack has been melting from 15 days to more than 20 days earlier than it did fifty years ago. This has had an impact in the timing of the runoff for river systems in the Sacramento Valley and in the Sierra Nevada.



The chart on the left shows the decrease in spring runoff after April 1 in the Sacramento River system, the line representing the trend over. The chart on the right shows that the timing of the center of mass of the water year is getting earlier and earlier over the past one hundred years. The changes noted above have occurred over the past century. The temperatures predicted over the next century are 3-5 times as great. Anticipating the future is tricky. However, since the consequences to agriculture are serious, it is important to examine scenarios and to try to understand what impacts might occur as a result of the projected changes.

Potential Impacts to Agriculture from Climate Change.

This short section will speculate on potential impacts to agriculture, based on the assumption that temperatures will rise 5-9+ degrees Fahrenheit over the next century, and that precipitation will probably decrease (though this is less certain); it has also been projected that weather events themselves will intensify. A short discussion follows for each of the three elevation zones indicated in this White Paper.

Sacramento Valley.

Water flow and timing will be affected, with less water available overall, and the flows shifting from spring runoff to winter runoff.

Flooding potential will increase in winter months as runoff shifts from spring to winter.

Water supply storage (full reservoirs in spring) may be sacrificed to flood control capacity (low levels in reservoirs with more empty space for storing flood waters).

Concern for flood control may cause more pressure to increase levee setbacks.

Water supply and water right disputes may arise because of water supply reduction statewide.

Historically, urban areas have depleted agricultural valleys to meet increased demand. Sacramento Valley is one of the last remaining areas with abundant water supply. Increased demand by urban areas and transfer of that water may threaten traditional assumptions about availability and affect crop selection that depend on high volumes of water, like rice.

Annual variability may increase the uncertainty of water available on a long term sustainable basis for trees and vine crops.

Decreasing temperatures will affect crop selection, with reduced chill factors. Some crops may be drastically affected, like mandarin orange production at the base of the foothills on the eastern side of the valley.

Insect populations may become unstable or unpredictable. New insects may be inadvertently introduced that are suited to new conditions.

Insect borne diseases may increase; mosquito control will likely intensify, with greater concern for West Nile virus and malaria.

Fisheries will be affected by reduced flow, earlier flow timing, and increased temperatures.

Foothill Zone:

Water supply will very likely become a critical issue to crops that have been dependent on groundwater supply from fractured rock aquifers, like grapes and specialty crops.

The lengthening hot season will affect productivity of grazing.

Wildfires will likely increase, putting greater pressure on the mixed oak and conifer habitats and affecting grazing and the availability of fuel wood.

Population pressures have increased in areas dependent on wells. Fractured rock aquifer depletion will likely occur from increased demand and decreased recharge.

Riparian areas will be reduced, affecting fish habitat.

Mountain Zone:

Snow pack will recede, at rates of 600 or more feet elevation per degree Centigrade. Transpiration rates will increase due to longer seasons, further reducing runoff.

Forest ecosystems may see major shifts, with fir forests receding to higher elevations, and mixed oak and pine forest areas increasing.

Insect populations may increase. The fate of the San Bernardino forests, with increased drought and insect infestation causing massive forest die back, and increased fire risk, may be a pattern repeated in forests throughout the Sierra and Cascades as conditions change. One of the more recent GCMs from UCSC showed temperatures increasing in the high elevations at a rate of twice that of general global warming, or warming in the Central Valley.

Appendix B: Stakeholder Outreach and Feedback Process for the SRWP Agricultural Issues White Paper

The SRWP Agricultural Issues White Paper had several stages of outreach:

- The outline which was a product of the Ag Issues White Paper Work Team was circulated via email to the Ag Issues Work Group (successor to the OP Focus Group) in Fall of 2004. This list is maintained by SRWP, and includes several hundred stakeholders.
- A set of questions was developed for an interview process with a representative subset of stakeholders from the Ag Issues Work Group (below). Interview results were presented to the SRWP Board in the form of a matrix for their review and input.
- In addition, seven SRWP Board members were interviewed using the same process and questions. Input from SRWP Board members was then added to the paper (not the matrix).
- The draft final Ag Issues White Paper was email circulated to the Ag Issues Work Group email distribution list in April 2005.
- The draft final was presented to the SRWP Board in their May 4, 2005 Board meeting. Particular focus was given Section III for the purpose of evaluating the proposed agricultural program initiatives suggested by stakeholders.
- Section III was also distributed in May 2005 to the Ag Issues Work Group email distribution list. Stakeholder feedback to Section III will be presented to the SRWP Board in July 2005.

Interview questions: Ag Issues Work Group Stakeholders

- 1) What is your familiarity with the Sacramento River Watershed Program? Very familiar? Somewhat familiar? Not very familiar? (provide explanation based upon response.)
- 2) What are the three most important agricultural issues from your perspective--- area, issue, organizational, or other?
- 3) Identifying primary stressors in the watershed. Currently? In 10 years?
- 4) As a nonprofit what initiatives should SRWP pursue?
- 5) What partnership with agriculture should SRWP include?
- 6) How can we take two dollars and turn it into two hundred.

	Ag Industry Registrants (2)	Regulatory Agencies (4)	Environmental Interests (3)	Ag Interests (7)
Issues	<ul style="list-style-type: none"> • Need for data with focus on physical habitat • Need multi-indicator wholistic health approach • Need to bring Stakeholders to one table 	<ul style="list-style-type: none"> • Developing an effective mitigation program • Effects of pyrethroids on environment • Ag sustainability--profit margins on farms • Loss of ag lands • Implementation of ag waivers and 	<ul style="list-style-type: none"> • WQ: Contaminants, pesticides in surface water and sediment toxicity, and nutrients • Resources to help farmers implement BMP's • Crop prices, ag sustainability, limits flexibility • Population and growth • Global warming 	<ul style="list-style-type: none"> • Water quantity (involvement in integrated water resource management, Phase 8 negotiation) • Water quality impacts from ag runoff (ag waivers) • Sediment: erosion, loads and deposition and

		TMDL's	<ul style="list-style-type: none"> • Water transfers and exports • Getting ag waiver program to work well • Potential shortage of pollinators both honeybees and native pollinators. • Lack of sufficient information for Specialty crops • 	<p>relation to contaminants</p> <ul style="list-style-type: none"> • Sustainability– crop prices, income levels for farm community • Farmland conversion to ag • Excessive regulations on agriculture. • Invasive weeds • Air quality •
Stressors now	<ul style="list-style-type: none"> • Sediment loading • Contaminants (pesticides and metals) • Invasive species • Flow problems 	<ul style="list-style-type: none"> • Development and runoff, population growth • Water supply • Bioaccumulation of pesticides • Toxicity of unknown causes 	<ul style="list-style-type: none"> • Contaminants- pesticides, nutrients, sediment, legacy pesticides • New pesticides, e.g. pyrethroids • Storm Water and urban effects, agland conversion, mass loading from treatment plants • Air quality deterioration • Lack of sufficient agricultural labor force. 	<ul style="list-style-type: none"> • Population growth and land use pressures • Water competition • Ag runoff and contaminants • Pesticides • Metals (boron) • Nutrients • Sediment/erosion • Narrow profit margins
Stressors in 10	<ul style="list-style-type: none"> • Same, with some contaminant shifts (e.g. pyrethroids) 	<ul style="list-style-type: none"> • More development and runoff • Altered habitat and flow regimes • More attention to sediments, nutrients, temp • Global warming 	<ul style="list-style-type: none"> • Pharmaceuticals and personal care products • Global warming– temperature and hydro cycle • Fire ecosystem/timber practices/wildfires • Groundwater depletion • Urbanization 	<ul style="list-style-type: none"> • Ag runoff and contaminants • Drought • Urbanization and population growth • Quantity of water • Continued price competition from overseas markets
Initiatives	<ul style="list-style-type: none"> • Focus on BMP approach w. multiple solutions (e.g. BMP's for erosion/nutrients/pesticides) 	<ul style="list-style-type: none"> • SRWP has good track record in monitoring; what is baseline in ag 	<ul style="list-style-type: none"> • Comprehensive and professional baseline monitoring in mainstem and tribs 	<ul style="list-style-type: none"> • Organize interests in upper watersheds • BMP focus to

<p>(Initiatives Continued)</p>	<ul style="list-style-type: none"> • Getting all stakeholders around one table • Further track record of looking at WS holistically 	<p>dominated water bodies</p> <p>How can you tell if there is improvement</p> <ul style="list-style-type: none"> • Need more technical information; tributary WQ standards should probably be different • SRWP technical center: integrate WS group monitoring; provide training and public info <p>SWAMP is statewide; SRWP focus on WS</p> <ul style="list-style-type: none"> • Complementing Coalition with public education (Coalition does grower outreach 	<p>(e.g. SF Estuary Institute, paid for by dischargers)</p> <ul style="list-style-type: none"> • Site specific studies to understand true significance (is toxicity significant to beneficial uses) • Information sharing valley wide, include Pit/Shasta • Exotic species, central clearing house for coordination and information • Sac Bioregional library, information commons: GIS layers, data, maps, common events calendar • Coordination of all watershed groups/conservancies. 	<p>minimize ag runoff contaminants</p> <ul style="list-style-type: none"> • Continue baseline monitoring, coordinate with Ag Coalition for sites • Exotic species control and removal, coordination with other groups • Protect agriculture with easements, cooperation with other groups (TNC, Cattlemen's, Sierra Conservancy) • Reconvene OPFG to update the information that was developed. • Facilitate USDA cost share programs • Promote more equitable cost sharing of environmental benefits of farm land by urban population
<p>Partnerships</p>	<ul style="list-style-type: none"> • Pyrethroid Working Group • Registrants • Dischargers 	<ul style="list-style-type: none"> • Five legs of table: dischargers, regulators, enviros, techies, local WS groups • Ag Coalition • Growers and ranchers are key players (but might be suspicious given SRWP 	<ul style="list-style-type: none"> • Annual conference on BMP's, bringing more than just ag together • Coalitions and environmental groups (SRWP seen as an ag oriented organization) • Sac Valley EWC • Sacramento River Conservation Area 	<ul style="list-style-type: none"> • Ag Coalition— monitoring, education, engaging landowners • Irrigators • Wetlands interests (rice growers, hunters, bird sanctuary, wetlands,

		history)	Forum • Great Valley Center	USFWS) • Growers • Commodity groups (tomatoes, row crops, alfalfa, in addition to fruits and nuts) • Identify the potential stakeholder and make sure they are involved. • California Farm Bureau • Farm Water Alliance • Land Trusts, i.e., Yolo Land Trust •
Out of box	<ul style="list-style-type: none"> • When securing money from industry, need to show how dollars were used constructively, e.g. ensuring science-based decisions in regulatory arena • Grant programs- but does this have same payoff as it had in past? 	<ul style="list-style-type: none"> • People care about salmon • Air pollution is as well funded as water 	<ul style="list-style-type: none"> • Interns– link to universities and job programs • Motivation– compelling mission and program will leverage community participation and employee effectiveness • Develop new local funding base • Use NRCS funds proposed in Farm Bill to provide outreach/education of BMPs 	<ul style="list-style-type: none"> • Info transfer to larger groups to catalyze support • Formalize regular grant writing department of SRWP

Appendix C: SRWP Agricultural Issues White Paper Proposed Next Steps

Section V Framing issues for SRWP Board

[The following section was originally included in the White Paper outline; as a result of discussion at the April meeting of the Board of Trustees, it was decided to defer this part of the workplan to a follow-up effort. The Appendix C: Proposed Next Steps is the proposed follow-up to Sections I-IV of the White Paper. The consultants' recommendation is consistent with the direction of the original outline below.]

A. Watershed vision and strategy

1. Prevention
2. Restoration
3. Preservation
4. Sustainability
5. Coordination and Collaboration

B. Partnerships and collaborations

1. Cost sharing
2. Volunteers, interns, leveraging labor

C. Optional approaches to ag issues workgroup issues:

1. Diagrams of options

D. How to choose a direction

1. Tipping points
2. Non-competitive strategies
3. Divesting duplication
4. Finding leadership areas

Consultants' General Recommendation:

As a result of the evaluation process of the May 4 meeting of the Board of Trustees, the consulting team and authors of this White Paper make the following recommendation.

All of the program areas identified by the Trustees can be viewed as elements of a single SRWP approach: developing Best Management Practices for the watershed. Developing BMPs goes well with development of a vision for the watershed. If a vision identifying the Desired Future Condition of the Sacramento River Watershed is defined by the Trustees, Best Management Practices are the strategic actions (the means) that will move from existing conditions towards attainment of that Desired Future Condition (the vision).

The consultants recommend the Trustees endorse completion of Section V of the SRWP Ag Issues White Paper. Section V will expand on the three program areas recommended during the May 4 evaluation session. The strategy selected for the three program areas is the BMP development strategy, described in Section IV, and piloted successfully by the OPFG. The new Section V will follow the outline below:

- A. Three Proposed Initiatives from Section III of Ag Issues White Paper*
 - 1. BMP Strategy for Water Quality Improvement**
 - a. Concept
 - b. Potential partners
 - c. Potential work items
 - d. Proposed funding/leverage
 - e. Recommendations to SRWP to fill gaps
 - 2. BMP Grazing Opportunities Watershed-wide
 - a. Concept
 - b. Potential partners
 - c. Potential work items
 - d. Proposed funding/leverage
 - e. Recommendations to SRWP to fill gaps
 - 3. Noxious Weeds
 - a. Concept
 - b. Potential partners
 - c. Potential work items
 - d. Proposed funding/leverage
 - e. Recommendations to SRWP to fill gaps

* Support Services to Farmers for Watershed Approach to Government Cost Share Programs. Rather than consider this a separate program initiative, this element will be included as a part of all potential programs. As a matter of course, SRWP staff will be knowledgeable of potential cost share programs for collaboration and support of agriculture, and will provide clients/customers with linkage information.

** Modeling Pesticide Transport and BMPs will be included as a sub-strategy in the first initiative, BMP Strategies for Water Quality Improvement, as SRWP already has funding built into its contract with EPA for 2005-6.

B. GIS Overlays of Proposed Initiatives

Consultants will inventory what GIS resources are available from the following entities that address the issues above:

- CA Resources Department of Land Resources Protection
- CalEPA
- Ducks Unlimited
- Waterborne Environmental, Inc.
- Larry Walker and Associates, Inc.
- Fieldwise, Inc.

With this inventory, and coverages received as a part of the inventory survey process, consultants will develop maps that will assist the Board of Trustees in evaluating the potential program initiatives geographically.

C. Program evaluation for internal and external attractiveness

As part of the program evaluation, consultants will apply the MacMillan Matrix (based on I.C. MacMillan's "Competitive Strategies for Not-for-Profit Agencies" in *Advances in Strategic Management*, as modified by the Nonprofit Support Center) to the program to assist in determining which program might be successfully undertaken by SRWP.

D. Outreach and feedback from Ag Issues Stakeholders. Upon completion of the draft in Fall 2005, the draft Section V will be email distributed, with feedback compiled.

E. Presentation of final document to a Fall 2005 Board of Trustees meeting.

SRWP Agricultural Issues White Paper: Proposed SRWP Initiatives

**Prepared for:
The Sacramento River Watershed Program (SRWP)
Board of Trustees**

May 31, 2006

**Prepared by
Otis Wollan Facilitation, and
Fred Thomas, CERUS Consulting**

Funded by US Environmental Protection Agency

ACRONYMS used in this paper are defined on page 13

Section V. Proposed SRWP Initiatives

The Sacramento River Watershed Program (SRWP) commissioned an Agricultural Issues White Paper in 2004 which was completed May 31, 2005. Stakeholders were asked to identify possible future directions for SRWP, building on the foundation established by the Ag Issues Workgroup that succeeded SRWP's earlier Organo-Phosphate Focus Group (OPFG). Thirteen potential program directions were identified. Stakeholders and SRWP Trustees selected three from White Paper Section III for further investigation, which are presented in this addition to the White Paper as Section V. The preferred program approach recommended by stakeholders from White Paper Section IV for these three issues was a strategic partnership approach using stakeholder forums for developing Best Management Practices (BMPs). Section V-A follows these directions. (pps. 1-8).

During the course of the analysis, a fourth issue emerged focusing on Low Density Residential Zoning of current large acreage grazing areas in the watershed. This issue cited in White Paper Section III as "Ag Land Conversion"; it was noted at that time that the Trustees did not wish to intervene on land use zoning authorities of the counties. Geographic Information System (GIS) analysis as part of Section V investigation discovered that the land use decisions for vast areas of the watershed had already been made where agricultural grazing lands had already been rezoned to low-density residential categories. Applying the strategic partnership BMP development approach to these lands is addressed in Section V-B of this paper (pps. 9-12, and in Appendix 3 slide 22).

A. Three Proposed Initiatives from Section III of Ag Issues White Paper

BMP Strategy for Water Quality Improvement

Concept

From the May 31, 2005 Agricultural Issues White Paper, a direction was selected to explore the advancement of Best Management Practices (BMP) in a variety of ways. Using the Organo-Phosphate Focus Group (OPFG) model SRWP could facilitate with stakeholders the itemizing of existing BMPs, exploring where more research would need to be done, coordinating with partners who were already 'in the business' of promoting BMPs, and assisting farmers with information, paperwork, permitting, and implementation of practices on their land.

The concept was to leverage SRWP efforts with partners and stakeholders through educational opportunities that would address a number of water quality attainment concerns including pesticides, sediment, nutrients, water temperature, and other environmental stressors (Appendix 3 slide 2).

Potential Partners

A number of potential partners were considered in the White Paper including the USDA NRCS through their EQIP, Conservation Security Program (CSP), and other cost share programs from the federal farm bill. Other partners who were indicated to be in the BMP promotion business included the University of California, with its county-based Cooperative Extension (UCCE) and their Integrated Pest Management (UC IPM) program and Resource Conservation Districts (RCDs) within the Sacramento River Watershed. Other government partners that were considered included the Regional Board, California Department of Food and Agriculture (CDFA), and the Department of Pesticide Regulation (DPR). A non-governmental organization (NGO) partner that SRWP could join in the development of a BMP development and assistance program was the Irrigated Lands Waiver Coalition (Coalition), who represented a broad constituency of irrigation districts, private landowners, Ducks Unlimited, and environmental organizations. Individual non-profit watershed groups in each watershed were also considered to promote the development of BMPs.

Potential Work Items

The work to be done by the consultants was to assess who did BMP development and implementation and compare the strengths and weaknesses of SRWP in assisting those groups. Additionally the consultants would assess the willingness and desirability of the groups to work and partner with SRWP.

During the assessment phase of this proposed initiative, the Coalition indicated that they planned to be the primary entity that would work with the Regional Board to catalogue, develop, promote, and monitor the effectiveness of BMPs on irrigated agricultural lands to meet the requirements of the agricultural discharge waiver.

Proposed funding/leverage

The current funding from the SRWP Prop 50 funding appears to be sufficient to take a supporting role with the Coalition for SRWP. By providing the resources of the SRWP history of monitoring information, Modeling Pesticide Transport, and informational outreach, SRWP has funds in place to assist the Coalition. Additionally, the Watershed Coordinator and several SRWP Board members have been involved with the Coalition.

Recommendations to SRWP to fill gaps

The Irrigated Lands Waiver Coalition has stated the intention of developing the BMPs and monitoring of all pesticides and water quality parameters within the irrigated lands in the Sacramento Valley Watershed. In view of their desire to fulfill this large undertaking and the considerable staff necessary to catalogue and develop the BMPs for the irrigated crops within the Watershed, it is recommended that SRWP observe and support the Coalition as a collaborative stakeholder, but not attempt to develop a BMP program.

BMP Grazing Land Opportunities Watershed Wide

Concept

There are distinct regional differences within the Sacramento River Watershed between foothill and the upper watershed regions and the more intensively farmed, irrigated valley floors. The majority of these upper watersheds are in public grazing and private irrigated and dryland livestock agriculture. Much of the water quality and quantity originates on these high precipitation agricultural lands in these regions. Therefore, programs addressing agriculture within these regions should be of considerable interest to the SRWP in implementing BMPs that reduce run-off and improve water quality before reaching the lower watershed.

Because livestock production within the two regions is based upon a resource management system (forage, browse, grazing), SRWP can view these two upper watershed regions as models of management. Both regions have a long-term interest in local resource management and they have used the Coordinated Resource Management and Planning (CRMP) process. The valley floor, in contrast, with its production of rice, almonds, walnuts, prunes, tomatoes, and corn, are input driven (irrigation, fertilizers, herbicides, pesticides) and extraction based. The forgiving alluvial soils of the valley allow a production level that cannot be sustained within the upper watersheds despite the abundance of natural rainfall.

The facilitation of improved grazing methods, resource management, and BMPs for the foothill and forested watersheds will lead to considerable leveraging of existing subwatersheds, funding (USDA NRCS), and resource management through the CRMPs. The foothills and upper watersheds have had progressive weed management, controlled burns, wildlife management, and riparian protections for many years. Continued and expanded collaboration with the livestock community in these watersheds will result in addressing the source of the precipitation on over two-thirds of the land area within the Sacramento River Watershed. There may be an opportunity for SRWP to take leadership in coordinating grazing management efforts on a large watershed-wide scale; this could dovetail with SRWP efforts to coordinate monitoring, consolidated permitting, and invasive plant efforts watershed-wide. Invasive species information will be posted on the SRWP SWIM data base (see Appendix 1). Examples of GIS data layers for grazing in the Sacramento Watershed are found in Appendix 3 slides 4-8 and Appendix 2 slides 2-4

Potential partners

A number of partners are available with whom collaboration on grazing lands would be beneficial for SRWP. The Irrigated Lands Waiver Coalition has indicated that they do not plan to address grazing lands unless they are part of irrigated pasture. The other partners who do work within the grazing lands include NRCS, Bureau of Land Management (BLM), UCCE, RCDs, California Cattlemen's Association, the Society for Range Management (SRM), and local watershed planning organizations through the Consolidated Resource Management and Planning (CRMP) process. Through the CRMP process the governmental agencies and local stakeholders address a resource concern and consolidate their efforts to manage the resource for the benefit of water quality, but also

for production, wildlife, fire ecosystem management, silviculture and other resource concerns.

An interested party is the Regional Board, which is in the development stage of a Non-Point Source (NPS) Program for grazing lands that addresses water quality in the areas that are not covered by the irrigated lands discharge waiver program. Summer of 2006 is the current target for release of this regulatory program.

Potential work items

There are two potential work items that SRWP should consider. With the regulatory direction of the Regional Board on grazing lands SRWP should investigate opportunities within the evolving regulatory framework, providing input to the regulatory process, and offering policy positions. The second potential work item is to work with the CRMP partners to bring the efforts of the SRWP Sacramento River Watershed Invasive Plant Council (SRW-IPC) for improvement of the grazing lands as suggested under the Noxious Weeds initiative.

Proposed funding/leverage

There are a number of funding and leverage opportunities that can exist as the Grazing lands program develops. The development of the noxious weed management project within the current Proposition 50 funding could bring SRWP to the table in the discussion on grazing lands. The current SRWP Board additionally has a number of qualified members who have the knowledge and expertise to guide SRWP. If an opportunity for further involvement develops for SRWP, the Sierra Conservancy funding could address much of the area of concern.

Recommendations to SRWP to fill gaps

The current recommendation of the consultants is to track the Regional Board progress and take an active feedback policy position to help guide the process for SRWP stakeholders with livestock grazing lands. The SRWP Board can develop the goals through a committee, and there are a number of possible goals that can be recommended. The second recommendation is to integrate the SRW-IPC as described in the Noxious Weeds initiative with the CRMPs and other partners to leverage the existing funds and efforts to improve the health of the existing grazing lands in the watershed.

Noxious Weeds

Concept

The problem of noxious weeds occurs in all parts of the watershed. In many cases it is the same weeds that are problematic such as yellow starthistle (*Centaurea solstitialis*) and perennial pepperweed (*Lepidium latifolium*). Many noxious plants, non-native to the watershed and nonexistent in the watershed 100 years ago, now plague both the upper watershed and riparian corridors. A common theme voiced within the weed management community is no longer control but containment. Five years ago, Weed Management Areas (WMA) were funded by the California Department of Food and Agriculture (CDFA) to bring together regional focus and collaboration on the worst weeds. After several years of funding with increasing momentum, the WMA programs are now minimally funded. This once excellent program has lost direction, and there remains a lack of coordination for weed control within the remains of the WMAs.

The success spawned from the start-up WMAs several years ago could lead to improvements in water quality, possibly reductions in sediment, and removal of deep-rooted high water consuming weeds. A common theme by watershed groups, RCDs, CRMPs, and NRCS is increased collaboration between weed management groups. Each subwatershed can adopt a weed strategy to control primary and secondary noxious weeds in principal but they cannot succeed alone if adjacent watersheds do not also combat weeds.

Advanced weed educational meetings with intra-state information for the more mountainous areas would benefit the region and inform landowners. Current UCCE weed science support is of excellent quality but not sufficient for the many weeds, crops, and rural areas of the watershed. Improved coordination would lead to improved water quality and improve the aquatic habitat that is degraded in many of the tributaries.

Potential partners

With weeds, every group and stakeholder is a potential partner. Ranchers, farmers, environmentalists, educators, commodity organizations, California Farm Bureau Federation, the herbicide industry, and government agencies all have weed programs because weeds cause an economic loss. The entities that SRWP can partner with for the best collaboration include: CDFA, County Agricultural Commissioners, the existing WMAs, UCCE, NRCS, RCDs, CRMPs, watershed groups, and herbicide manufacturers.

SRWP has initiated a pilot program with many of these groups in the past year by forming the Sacramento River Watershed Invasive Plant Council (SRW-IPC). SRW-IPC meets semi-annually to provide a forum for organizations struggling with weeds. At the SRW-IPC meeting in Chico on July 12, 2005 a number of potential work items for SRW-IPC and SRWP were outlined.

Potential work items

Ideas generated from the Fall 2005 State WMA meeting in Woodland as summarized by K. Russick, Oct. 2005.

- Provide an example weed abatement ordinance on the SRWP website. John Young with the Yolo County Ag Commissioner is willing to provide an electronic copy of theirs. Need to provide information on landowner notification process that Yolo County uses with enforcing the ordinance.
- Provide training session on sustainability for weed management areas. Feature many success stories, such as John Young's ordinance as well as their fee-for-service funding approach.
- Work with Master Gardeners to offer training workshops on invasive plants.
- Provide CRMP training specialized at addressing the invasive plant problems.
- Tell the story of water consumption of these invasives—star thistle, Arundo, Tamarisk. Creeks are starting to dry up due these invasives in West Fresno—Los Gatos Creek, Panoche Creek, Silver creek, Warthen Creek. BLM is seeing these impacts and may be interested in partnering in a PR campaign.
- Have a presentation on aquatic weeds at a SRWIPC meeting.
- Develop an alert system to notify downstream WMAs about new populations of invasives that are being found upstream.
- Work with CDFA on statewide legislation to address invasive plant control.
- Streamlined permit for noxious weed control in the watershed involving water and near water pesticide applications. The aquatic weeds NPDES permit. What about terrestrial weeds that tend to grow near but not in water. Can we develop guidance on how to treat those and avoid coming under the aquatic weed NPDES permit?

Proposed funding/leverage

With many partners and potential partners, SRWP can be creative with their funding opportunities. The SRWP submitted a multi-project proposal under the 2005-06 State Board Consolidated Grant that included four invasive plant projects located throughout the lower Sacramento River Watershed. Unfortunately, that proposal was not funded but SRWP will continue to pursue and support invasive plant projects. Further long-term funding for the Noxious Weeds initiative could be available from the CALFED Watershed and or Ecosystem Restoration Programs.

The California Invasive Plant Council (Cal-IPC) held their annual symposium in Chico, Oct. 6-8, 2005. The meeting was very well attended and the theme was *Prevention Reinvention: Protocols, Information and Partnerships to Stop the Spread of Invasive Plants*. A presentation during the annual meeting by Nelroy Jackson, National Invasive Species Advisory Council, indicated that several hoped-for federal opportunities for funding had failed to develop.

At the Cal-IPC the *California Noxious & Invasive Weed Action Plan, September 2005*, a product of the CDFA and the California Invasive Weed Awareness Coalition (CALIWAC), was distributed. There are numerous sections on partners and funding, including recommendations to legislatively continue base funding for WMAs, supporting state and federal bills, and seeking funding for formal WMA coordinators, and analyzing potential effectiveness of a mill tax assessment on herbicides sales for weed programs. However, under Funding and Resources, page 26, the reality is offered that, "Funding is

crucial to the success of all phases of noxious and invasive weed management, and the current funding is chronically inadequate to address invasive plants. This is in main part due to the nature of the problem and our slowly evolving awareness of it.”

Recommendations to SRWP to fill gaps

The SRWP is in an excellent position to develop a collaborative stakeholder approach within the watershed for the noxious weeds initiative. With reduced funding to the WMAs several years ago and continued funding shortages, a void will exist within the watershed. No other group is poised to lead in this region. The consultants would recommend this as a primary initiative that will help all constituencies: agriculture, environmental, water supply, and water quality.

With the potential conversion of agriculture to low-density residential uses, a major concern that will catch the attention of ranchette landowners is noxious weeds. Attached is an article, *Small Tract Rangelands Task Force: An Effort Begun a Decade and a Half Ago*, in the most current copy of the Society for Range Management, *Rangelands*, by John Buckhouse and Angela Williams. In describing their efforts in 1990, “ First, it became abundantly clear as we dealt with horse owners (or 4-H sheep, cattle, llamas, etc) on small acreages that most were in it for the horses and were naïve or unconcerned about land use issues....these owners were very passionate about their animals. We got their attention when it was mentioned that an abused pasture was susceptible to poisonous and noxious weed invasion, they were willing to listen to techniques for manure management, land drainage, irrigation, water development, pasture rotation, dust abatement, and pasture renovation.”

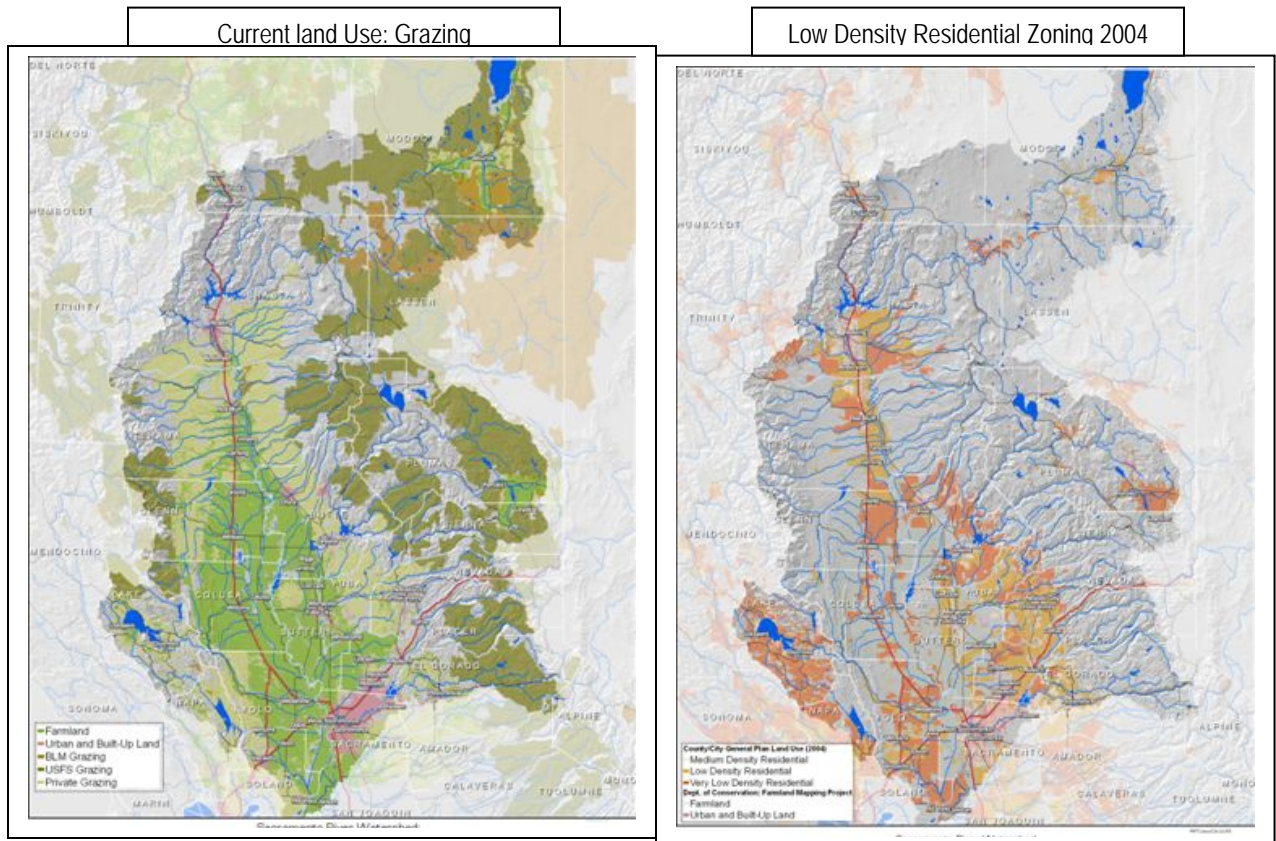
With the current SRWP’s efforts, finding funding, developing further partnerships and possibly a Project Manager for the initiative would be recommended. The initiative is solid, necessary for water quality, and supported by all partners. Finding funding that will support the program on a broad basis and help the WMAs is the current challenge.

B. Proposed Low Density Residential Initiative resulting from Ag Issues White Paper Investigation

BMP Strategies for Areas Zoned Low Density Residential

Background

During the course of investigating opportunities for the three initiatives selected from the White Paper by stakeholders (described above in Section V-A), a new issue emerged while assembling GIS layers for each of the three focus areas. In the fall 2005 the CA Department of Conservation made a new GIS layer available which combined the 2004 county general plans throughout the state. Viewing the 2004 low-density residential zoning layers was jarring to the consulting team. GIS layers of existing agricultural uses had just been assembled, including grazing layers for private and public lands. Planned future low density residential areas overlapped with present private grazing lands to a very large degree. This overlap suggests that the Sacramento Valley county planning processes have already designated future planned uses that would transform the Valley as we know it. The White Paper consulting team noted that, if fully implemented, these plans would transform vast areas of the Sacramento Valley from the agricultural use of grazing to the urban use. This would mark a paradigm shift of historical significance, as the last transformation of this scale and scope in the Sacramento Valley occurred in the early 19th century when vast areas were transformed from natural wildlands to agricultural grazing lands. This extensive conversion of land that is occurring in the



Sacramento River Watershed is likely the largest threat to the watershed's health, its waterways, and resident's quality of life. Additional examples of GIS data layers for various levels of low density development are found in Appendix 2 slides 5-9 and Appendix 3 slides 9-22. These layers will be included on the SRWP web-based SWIM in the section on plans, as described in Appendix 1.

Concept

In its first ten years, the SRWP has created strong programs of strategic approaches to watershed issues using a stakeholder approach to develop a menu of best management practices (BMPs). The fundamental concept would be for SRWP to initiate a program that would analyze the proposed areas designated by county general plans to be transformed from large parcel grazing uses to low density urban residential, and develop a strategic approach including a suite of BMPs for different areas and uses, as appropriate. Any such effort undertaken by the SRWP would be done in coordination with appropriate local, regional, and state organizations.

The proposed strategic approach and suite of BMPs would complement existing and proposed SRWP program areas. An integrative approach to this issue might strengthen existing programs, and support and expand partnerships within the SRWP stakeholder network.

Complementing SRWP Programs (existing and proposed)

Watershed Education. An inventory of educational programs that focus on the area of proposed low density residential zoning management practices would have to be conducted. Some organizations like UCCE have identified the problem, but have not developed programs to address the issue. An example of a previously successful program occurred in Oregon in 1990. The Oregon Cooperative Extension Service created a task force to investigate and educate members and the public about small acreage rangeland homesteads. Brochures were prepared, but the program was retired, and brochures are no longer in circulation. A recap of the program and a further "call to action" is provided in a December 2005 article in SRM's *Rangelands* publication.

Watershed Monitoring and Watershed Indicators. A transformation of the scale and scope indicated would have a significant impact on watershed services and values. Measuring the impacts would complement SRWP's strong current and proposed monitoring programs. Transforming extensive grazing acreage to low density residential would likely impact:

- Landscape conditions
 - o Extent of ecological system/habitat types
 - o Landscape composition
 - o Landscape pattern and structure
- Biotic Condition
 - o Ecosystems and communities (extent, composition, trophic structure, dynamics, and physical structure)

- Species and populations (size, diversity, structure, dynamics, habitat stability)
- Chemical and physical characteristics
 - Nutrient concentrations (nitrogen, other nutrients)
 - Trace inorganic and organic chemicals (metals, organic compounds)
 - Chemical parameters (pH, organic matter, etc)
- Ecological process
 - Energy flow (primary production, growth efficiency)
 - Material flow (carbon cycling, nitrogen/nutrient cycling)
- Hydrology and geomorphology
 - Surface and groundwater flows (patterns, dynamics, recharge, storage)
 - Sediment and material transport (erosion, particle size distribution)
- Natural Disturbance regimes (fire, etc)
 - Frequency and intensity, extent and duration

Most of the contemplated watershed indicators are affected by a change in land uses on the scale suggested by county zoning plans. A watershed indicator monitoring program coordinated with the many watershed organizations in the Sacramento River Watershed could begin to track and describe changes as they occur, thus possibly guiding the selection of management options for both landowners and resource managers.

Invasive weeds (proposed). A transformation from grazing to low density residential will affect the pattern and behavior of invasive weeds. If SRWP undertakes an invasive weed program, it will be necessary to develop BMPs for both existing and possible future conditions for lands in transition. For example—What will BMPs for invasive weed species be for areas in the midst of transition, where grazing has ended, and small acreage parcels remain unsold? A watershed-wide strategy and BMPs would have to be developed with the understanding that the watershed is in a dynamic period of change.

Grazing (potential opportunities proposed in “wait-and-see” mode). While a specific grazing program is not proposed at this time, if conditions change and an opportunity for SRWP becomes apparent due to the changing regulatory environment, any program for grazing should be coordinated with other programs that are focused on the transformation of grazing land to low density residential.

Watershed Stewards (in discussion). SRWP staff and consultants are in early discussions of a “Watershed Stewards” program that might link a fund-raising approach with an educational outreach. Watershed Stewards might be individuals, farms, businesses, or other entities whose care for and management practices of the watershed are exemplary. Profiling stewards could be a key component in highlighting Best Management Practices, both in existing conditions and in the transition of parts of the watershed from agriculture to urban uses.

Potential Partners

Dialogue between SRWP Board/Staff team and SACOG and Valley Vision occurred on January 20, 2006. It was indicated that the SACOG approach was focused only on the five county area of Sacramento Metropolitan Area. Valley Vision did not anticipate

expanding their area of focus beyond that same area. There seemed to be no single organization that had taken up the focus on the transformation of the Sacramento River Watershed from agriculture to urban. Possible partners are the emerging series of “COGs” (Councils of Government), which will be established over the next few years as a result of a Caltrans, grant program for COGs. It was noted that environmental groups (including Sierra Club) were seeking/brainstorming a legislative approach to slow the spread of low density residential.

Potential partners may include League of Cities (mentioned as a possible partnership by SACOG and Valley Vision), and other entities, such as the Regional Council of Rural Counties (RCRC) and Local Government Commission. Potential partners in education may include SRM (see Appendix 4), NRCS and RCDs. Watershed groups could provide an essential circle of partners in assessing and tracking the transformation, as well as in the dissemination of information from a watershed-wide strategy and BMPs addressing problems associated with the change. The expansive scope of the transformation implies broad and extensive possibilities for partnerships in several different program arenas. The above first list of potential partners is meant to be suggestive only.

Potential Work Items

Identification of the potential transformation of grazing lands to urban uses is in a very early stage. Detailed analysis of the zoning proposals for each county will be needed. Some field truthing will also be needed, as general plans are often antiquated and do not represent existing conditions or intent, but can be 5-10 years old, or even older. Networking with watershed groups may provide an essential view from the field about how extensive this is for each of the respective watersheds.

Proposed funding/leverage

Current funding from SRWP Prop 50 might be used to fund an initial exploratory assessment. If the potential impact could be significant, the foundation community might be interested in early program development, particularly in start-up indicator monitoring and ongoing education. Identifying watershed stewards could be developed into a major private donor campaign for ongoing program support.

Recommendations to SRWP

Early stage first steps of additional problem definition and assessment could be combined with other emerging SRWP programs. For example, watershed health indicators could be used to efficiently determine actual magnitude of the problem/opportunity. Problem definition and assessment could be done by taking an initial presentation of the transformation to watershed groups, key stakeholders and focus groups throughout the watershed to assess program opportunities, assess potential supporting individuals and organizations, and explore potential sources of revenue for a program addressing low density residential zoning. SRWP staff and trustees can work together over the next six to twelve months to explore a meaningful program in response to iterative proposals and stakeholder feedback, and if determined feasible can design a robust SRWP program for 2007 as a result of the assessment.

Section V Appendices

1. GIS inventory SRWP library status
2. Grazing Maps and Low Density Residential maps generated
3. Powerpoint presentation
4. SRM *Rangelands* article “Small Tract Rangelands Task Force: An Effort Begun a Decade and a Half Ago” by John Buckhouse and Angela Williams

Acronyms used in this White Paper

BLM	Bureau of Land Management
BMP	Best Management Practices
CALFED	California and Federal Agencies in the California Bay-Delta Authority
Cal-IPC	California Invasive Plant Council
CALIWAC	California Invasive Weed Awareness Coalition
CDFA	California Department of Food and Agriculture
COG	Council of Governments
CRMP	Coordinated Resource Management Programs
NPDES	National Pollution Discharge Elimination System
NPS	Non-Point Source
NRCS	Natural Resources Conservation Service
OPFG	Organophosphate Focus Group
RCD	Resource Conservation Districts
SACOG	Sacramento Area Council of Governments
SRM	Society for Range Management
SRW-IPC	Sacramento River Watershed Invasive Plant Council
SRWP	Sacramento River Watershed Group
SWIM	Sacramento Watershed Information Module
UCCE	University of California Cooperative Extension
USDA	United States Department of Agriculture
WMA	Weed Management Areas