Agricultural Water Quality Management in the Sacramento River Valley

A SURVEY OF PRODUCERS' OPINIONS

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Introduction

This report presents the results of a public opinion survey of agricultural producers' views on water quality management in the Sacramento River Valley, with a specific focus on the Conditional Waiver (Conditional Waiver) for Discharges from Irrigated Lands first adopted in June 2003. Between November 2004 and February 2005, UC Davis sent mail surveys to over 5000 producers in the Sacramento River Watershed, and received over 1200 responses. The survey asked producers about their views on water quality issues, participation in management activities, and interaction with decision-makers. The mail survey is also complimented with over 30 personal interviews of producers, several of which we report in detail here.

The primary assumption of the study is that water quality management in California is more likely to succeed with an understanding of the factors that influence producer satisfaction with policies and participation in policy implementation. Throughout this report, we will use the word "producers" to refer to the diversity of agricultural operations in the Sacramento Valley, which includes row crops, orchards, ranchers, and wetland managers.

Agricultural water quality management has emerged as an important policy challenge in California. California state authorities have identified agriculture as a source of water pollution in 255,218 acres of bays and harbors, 152,216 acres of estuaries, 100,384 acres of lakes/reservoirs, and 12,960 miles of streams/rivers (SWRCB 2000, 2002). Technical and social characteristics of this issue have caused a great deal of policy conflict. Agriculture is considered a "non-point" source of water pollution, which consists of relatively small, non-discrete discharges of irrigation return flow and stormwater from a number of operations. These discharges occur in the course of standard operations, and may contain contaminants that result in impaired water quality. Non-point sources are often difficult to identify and react with aquatic ecosystems in complex ways, many of which are not understood well by science. The cumulative effect of non-point sources is derived from the decisions of many landowners in a watershed, and no single landowner usually has a dominant effect. At the same time, as the survey will show, most producers do not believe water quality is impaired or that agriculture is a major source, and do not trust the regulatory agencies involved with water quality policies. The combination of technical and social challenges makes agricultural water quality management very difficult to achieve.

The current policy response to these challenges in the Sacramento River Valley is the Central Valley Conditional Waiver for Discharges from Irrigated Lands (Conditional Waiver) first adopted in July 2003 and recently extended until June 30, 2006. Further extension or revision of the Conditional Waiver is subject to more public hearing before the Central Valley Regional Water Quality Control Board prior to June 30, 2006. The Conditional Waiver is implemented by requiring individual producers with irrigated lands to join regional Coalition groups that share the effort of monitoring water quality, providing water quality education, and implementing management practices that protect water quality. Alternatives to comply are available to individual owners or operators of irrigated lands who are averse to joining a Coalition. The Conditional Waiver and associated Coalition groups is the main topic of the survey, and will be discussed in detail in the next section.

However, we want to emphasize that the purpose of this study is not to recommend either continuing or discontinuing the Conditional Waiver. Rather, our goal is to enhance the information basis available for making policy decisions. We strongly believe that understanding producer views on water quality management is a critical input into policy decisions. If state officials want to implement the best policy they can, they need to understand the views of producers. The overall costs of implementing the Conditional Waiver will be lower, and the benefits higher, if producers actively support and participate in management activities. The recommendations we present at the end of the report are offered as ways to make the Conditional Waiver more effective given producers' opinions about water quality management. We certainly do not expect all stakeholders to agree with our recommendations, but we do hope they are productive for facilitating dialog and decisions.

We also intend for this report to contribute to longer term development of any permanent irrigated lands program under the authority of the Regional Board. We recognize that the current Waiver program is currently operating on an interim basis, and that the survey data presented here is over one year old. However, we expect that any final irrigated lands program will substantially rely on a modified version of the Coalition group and nested watershed approach. Furthermore, many of the attitudes and behaviors reported here represent enduring cultural and political aspects of the agricultural community that will continue to be relevant for many years.

The rest of this report is organized as follows. We first describe the history, structure, and status of the Conditional Waiver. Second, we give an overview of

survey implementation and respondent characteristics. Third, we describe a series of survey results about participation and satisfaction with Coalition groups, and key producer attitudes and behaviors that may influence Coalition success. Conclusions about the relationships between these attitudes and behaviors are based on statistical analyses that are presented in Appendix A for readers who are interested in technical details. In addition, inserted throughout the report are short case studies of individual producers who agreed to be interviewed for this study. Their personal viewpoints provide a richer understanding of the issues. Lastly, we formulate recommendations about how to improve the effectiveness of the Conditional Waiver given the findings from the survey and personal interviews.

Overview of the Conditional Waiver for Discharges from Irrigated Lands

The history of the Conditional Waiver begins with the Porter-Cologne Water Quality Control Act of 1969, which is the main legal authority for water quality management in California. Porter-Cologne authorizes the State and Regional Water Quality Control Boards to regulate all discharges into waters of the state, including agricultural sources. The two main regulatory tools are a Waste Discharge Requirement (WDR) or a Conditional Waiver of Waste Discharge Requirements. A Waste Discharge Requirement prescribes water quality objectives set by the Regional Board that a discharger must achieve to discharge return flows into receiving waters. A Conditional Waiver of Waste Discharge Requirements, which may contain specific requirements for discharges, is available as a regulatory tool for discharges that pose less threat to water quality.

In 1982 the Central Valley Regional Board adopted a Conditional Waiver for discharges of storm water and return flows from irrigated lands, which was applicable until 2002. The original Conditional Waiver had a tiered structure for implementation. Tier 1 was a non-regulatory and required irrigated landowner and operators to make "self-determinations" of when changes in management practices were needed to protect water quality. The "self-determination" policy was designed to give agricultural operators greater flexibility to select appropriate water quality management practices. Failure by a landowner to recognize a water quality problem and to make the appropriate "self-determination" to correct it could result in a range of enforcement actions from the Regional Board. Tier 2 allowed for regulatory incentives and encouragement of management practices that protected water quality. Tier 3 was highly regulatory and required permits for Waste Discharge Requirements and implementation of specific management practices. The Regional Board preferred to regulate at the least intrusive level (Tier 1), if it effectively protected water quality. This also reflected that the Regional Board did not have sufficient staff and fiscal resources to verify that dischargers from irrigated lands were complying with the Conditional Waiver, thus, it was largely considered a passive regulatory program.

As the result of state legislation, SB 390, signed into law in 1999, the 1982 Conditional Waiver expired in 2002 and the Regional Board adopted a new Conditional Waiver for irrigated lands effective January 1, 2003. The Regional Board defines an agricultural discharger as any landowner or operator who discharges or poses a threat of discharging storm water, irrigation runoff, seepage, or subsurface drainage. Dischargers had three basic options to be considered compliant with the Conditional Waiver:

- Join a Coalition, which is an organized group of dischargers covered under the Waiver who work together to conduct water quality monitoring and to implement water quality management plans approved by the Regional Board.
- Request from the Regional Board coverage under the Conditional Waiver as an individual discharger apart from a Coalition.
- As an individual, submit a Request for Waste Discharge Requirements from the Regional Board and then operate under the permit.

Dischargers, whether a member of a Coalition or an individual, may continue to discharge water from irrigated lands into receiving waters as long as the monitoring plan continues to show water quality objectives are met. In the event a water quality objective is exceeded in a drainage area, management practices must be modified and water quality monitoring continued until the objectives are met. The Conditional Waiver is subject to the same enforcement options available for the original 1982 Waiver.

Early on, the Coalition approach appeared to be more attractive to producers than the options available to individual dischargers. The Coalition approach allows producers to share the costs of the monitoring program, facilitates local oversight, takes advantage of local knowledge, and is less intrusive on individuals. The Coalition approach has more characteristics of what policy analysts call "collaborative policy", which focuses on building cooperation among policy stakeholders (Sabatier et al 2005). Coalitions also focus on the watershed rather than individual farms, to consider the cumulative effects of irrigation return flow

LARRY DOMENIGHINI

Background/General Information

The Domenighini family has been farming in Glenn County since 1937. Larry has personally been involved since 1980 when he took over and expanded the company. "My father and uncle are still involved; we all work together. Hopefully it will be something that we can pass along, but there are a lot of economic pressures now days." He grows rice, corn, wheat, and barley on approximately 1260 acres. "I use surface and groundwater though mostly groundwater. The water I use is good quality and fine for both agricultural and wildlife uses."

Views on Water Quality

Domenighini reflects the common sentiment among Sacramento Valley farmers that there is no clear proof of water quality problems in the Sacramento River watershed. The Colusa Basin Subwatershed Coalition monitoring plan was approved in December of 2004 and since then according to Domenighini, monitoring has shown in the area that "overall the water quality is good. The state just doesn't know and I'm glad we have proof now to show that it isn't as bad as some of the environmental groups were saying." He acknowledges that the water in the Sacramento valley as a whole "may have problems. There is a lot of innuendo about how bad things are, and if things are really that bad, then they need to fix the problem. But I first need to be convinced about the specific problems."

Views on Coalition Groups

Domenighini is active in the Colusa Basin Subwatershed Coalition Group. He is a member of the sub-basin oversight committee and former Glenn County Farm Bureau President. He believes the Coalition Groups are a good idea due to their "efficiency, effectiveness, and local control. They are best suited to recognize and solve local problems that are unique to the area." He expects that his operation will be affected by the Coalition, through the adoption of Best Management Practices for protecting water quality. "It will be a learning process over a period of many years to come up with solutions and to implement them. There are positive and negative effects. Economically, it will cost more. Socially (state-wide), it will probably help. Politically, it will hopefully show that local control works and that the local areas should be allowed to govern themselves." Domenighini is frustrated by the assumption that agriculture cannot solve its own water quality problems. He cites the Glenn County Surface Water Stewardship Program, which began in 2000, as an example of a successful collaborative effort between growers, university researchers, and the County Ag Department to curb the potential negative impacts of non-point source pollution associated with run-off from orchards.

He has no doubt that the Coalition Groups will be successful and that they are the best solution to the problem. "They just need time, support, and guidance in order to work." He notes that "people are resistant to change and may not be convinced that change is needed. Part of the job of the Coalitions is outreach. There will be friction, but people will change their minds by talking to neighbors and seeing the practices work." He uses the example of the rice industry implementation of best management practices which began in 1983 in order to reduce high levels of rice pesticides run-off. The Rice Pesticides Program was officially adopted into the Basin Plans of the Sacramento and San Joachin Rivers in 1990. "Growers were initially resistant to the new practices and regulations, but they are now widely accepted; I imagine it'll be a similar situation here."

Overall, he believes the Coalition Groups will act as a buffer between the State and individuals and could help to improve relationships between growers and government officials as long as officials are willing to recognize the needs of local growers and adapt to them. "If they (the CVWQCB) let us do our job, it will make for better trust between the regulatory agencies and the farmers. Of course, by trust, I don't know if I necessarily mean believing everything they say but I will have more confidence in their abilities."

SARB JOHL

Background/General Information

The Johl family came to Yuba County from the Punjab region of India in 1966 and began raising peaches. Joining his father after finishing college in 1976, Sarb Johl has expanded the operation to include walnuts and prunes along with cling peaches grown on a total of 1550 acres. Most of his water comes from deep wells and he irrigates with micro-sprinklers; nothing is flooded. "In terms of our water management practices we're up to speed on all the new technology. We started transitioning about 15 years ago -it's been a good transition." He believes that there is a lot of cutting edge technology related to irrigation practices, and pesticide use that growers either are or could be implementing for more efficient and economically viable operations.

Views on Water Quality

Johl strongly believes that water quality is something we all should be concerned about. "We are all users and we just have to take care of what we use." Rather than waiting for water quality to degrade, Johl believes in a preventative approach centered on "good common sense practices and sound science so that we can all do our part."

Views on Coalition Groups

Johl is strongly in favor of the Coalition Groups and is on the Butte-Yuba-Sutter Subwatershed advisory board. He became involved after reading up on the new requirements for the Conditional Waiver. "Anything we do will help the situation. We are the biggest stewards of the environment. You hear about how agriculture destroys the environment, but that is just so wrong; that is so off base. There aren't too many violators out there, but more people like me who comply."

He says that there have been many new regulations over the past 15 years. "I pay a lot every year just to stay in compliance with all the regulations. When I look at my neighbors they don't even know anything about regulations. I do it because it is the law, the rule, and I'm concerned about the environment, concerned about what my kids and grandkids will have to live with. I also want to maintain a viable business and be able to pass along our family operation to the next generation, so it's important that these regulations achieve some benefit and aren't so burdensome that they drive family farms, like ours, of out of business. Others have the attitude that they won't do it until they are forced to do it. We have rules and they ought to be enforced because otherwise there is no use in me paying thousands of dollars a year. But rather than complain, I want to go in and try to make a difference. I can get first hand information by being involved and I always share my information with others because it's better when we're all informed. We should be preventive because it's more expensive and difficult to clean up a watershed after the fact. It's a lot better to be ahead of the curve."

Johl believes that policy makers and agriculture have the common goals of a viable California agriculture, a healthy environment, and a healthy society. "A major challenge for the Coalition Groups will be to make sure that we are not put into a situation where we cannot realistically achieve the goals set by the Regional Board." Johl also sees the costs of regulation as a challenge in getting the Coalition Groups ahead of the curve. "Any time you ask someone to do something that will cost them money, it's tough. Every time producers see a new regulation, they know it's coming out of their bottom line and will resist it for as long as possible." According to Johl, the best way to overcome these challenges is to get involved. "You've got to get in the middle rather than sitting on the sidelines –I'm not one of those guys to sit back and be the last one to get on the field, I'd rather be the first one to get on, before I'm forced to. This way, we can be a part of finding reasonable solutions."

and stormwater discharges from multiple operations. Based upon watershed evaluations, the Coalitions established priority subwatersheds to focus water quality monitoring and management efforts. Coalitions gave priority to agricultural dominated subwatersheds and agricultural constituents known to impact water quality in order to implement remediation that results in the greatest improvement in water quality.

FIGURE 1

The main regional Coalition in the Sacramento River watershed is the Sacramento Valley Water Quality Coalition (SVWQC), which is further subdivided into ten subwatershed groups based on county and hydrological boundaries. The subwatershed groups help determine where water quality monitoring should be conducted, coordinate funding to support water quality monitoring, inform producers of policy changes, and are positioned to lead management responses when water quality monitoring reveals problems in a specific area. The SVWQC encompasses many different stakeholders, but the main regional coordinators are the Northern California Water Association (NCWA), Duck's Unlimited (DU), and the Coalition for Urban Rural Environmental Stewardship (CURES). These organizations work jointly with the subwatershed groups to assure professional oversight of the water quality monitoring program, timely preparation of the required documents, and reporting of the water quality monitoring results. The regional coordinators are headquartered in Sacramento to provide an efficient liaison between the Regional Board and producers in the distant, rural areas of the Sacramento Valley.

The subwatershed groups are typically headquartered locally with organizations such as the County Agricultural Commissioner, County Farm Bureau, or an established watershed group, but involve many other collaborators in implementation such as the Resource Conservation Districts, UC Cooperative Extension, and the Natural Resource Conservation Service. The lead organization and exact structure of the partnerships is different in each subwatershed.

See Figure 1 for a map of the subwatershed boundaries.

Current Participation Rates in Coalition Groups

To further understand the current status of the SVWQC (including the time passed since this survey was conducted), it is useful to examine producer participation rates and progress with implementing water quality monitoring. Table 1 provides the number of producers who have enrolled with a subwatershed in their local area to seek coverage under the Conditional Waiver as a Coalition member. The table also shows the percent of the irrigated acres enrolled in each subwatershed of the SVWQC. These figures were reported to the authors by officials of the SVWQC in May 2006.

Three facts are apparent from these enrollment numbers. First, there are challenges determining exactly how many total irrigated acres are eligible for and enrolled in the Waiver program. Officials with the SVWQC estimate that 1.7 million acres are eligible for enrollment. However, the quality of the land-use data available to identify irrigated acres produces considerable uncertainty in these estimates. One of the main state data sources was a 2002 Department of Water Resources land-use database, and there have been substantial changes in land-use since that time. Local data sources also lag behind current land-use patterns. The SVWQC and subwatersheds are continuing to work with various agencies to gather more precise estimates of the total number of irrigated acres and producers eligible for the program. However, because the criteria for eligibility may change in the future, these numbers will continue to fluctuate.

Second, not all of the eligible acres are currently enrolled in the program. The SVWQC estimates approximately 1.2 million acres are currently enrolled in the program, but the enrollment estimates remain uncertain at the subwatershed level due to unresolved differences among land-use databases. Several factors may contribute to

TABLE 1 Number of Participants and Percentage of Irrigated Acres in Subwatersheds of the SVWQC as of May, 2006 *(*Included in Survey)*

Subwatershed	Number of Participants	Current Estimate of Percentage of Irrigated Acreage Enrolled
Pit River	149	33%
Shasta-Tehama*	1,437	41%
Glenn-Colusa*	Determination in progress	Determination in progress
Napa	42	69%
Lake	149	90%
Yolo*	1,647	Determination in progress
Solano*	642	84%
Upper Feather River	97	Determination in progress
Butte-Sutter-Yuba*	750	42%
El Dorado	317	Determination in progress
Amador-Southern Sacramento County	442	47%
Placer-Northern Sacramento County	557	Determination in progress

incomplete participation at this time. Perhaps most fundamentally, it takes time to implement policies that require widespread awareness and decision-making among thousands of people. Also, given the remaining uncertainty about who exactly is eligible, there are many producers who do not think they must comply with the Waiver. For example, policy makers have not come to full agreement about what constitutes a discharger or about whether or not non-commercial irrigated agriculture should be eligible for the Waiver. Future elements of the Waiver program may provide clearer distinctions and different participation options depending on type of operation. However, at the time of the survey, many of the respondents reported being unsure as to whether or not they were required to participate in the Coalition, and this uncertainty explains some portion of the non-participation.

There are also some operators who will continue to refuse to participate regardless of the structure of the policies. These operators are likely to be targeted by enforcement actions by the Regional Board. The Regional Board has taken some steps towards enforcement in 2005 such as issuing over 300 letters (officially designated Water Code Section 13267 Orders) to dischargers in Yolo, Madera, Fresno, Sutter, Butte, Yuba, and Colusa Counties. These letters served to inform producers of their options to comply with Water Code and required them to submit a response proving their compliance with the Conditional Waiver. In November 2005, the Regional Board required the SVWQC and other Coalitions throughout the Central Valley to submit membership lists of irrigated landowners who are covered under the Waiver or alternatively names of irrigated landowners or operators who have not responded to Coalition efforts.

Third, there is variance in the rate of enrollment across subwatersheds. The variance is attributable to several factors: 1) differences in landscape and types of operations that are unique to each subwatershed (for example, areas with more small irrigated acreages are more challenging because there are more operators to contact and many of them do not believe the Conditional Waiver applies to their situation); 2) general receptiveness among producers in each area; and 3) timeliness in organizing at the sub-watershed level (i.e. some sub-watersheds organized and actively pursued membership before other watersheds). The current status of participation highlights the importance of this study's goal of understanding producer's views and decisions.

Water Quality Monitoring: March 1 – December 31, 2005

An important component of the Coalition process is a water quality monitoring program that seeks to identify existence, sources, and solutions to water quality problems. The Coalition is currently operating according to a Monitoring and Reporting Plan that was approved by the Regional Board on January 19, 2005 with revisions through August 2005 (CVRB 2005). Key elements of the monitoring plan include the identification of monitoring sites and a three-phased approach to measuring water quality. The 2005 monitoring results were based on water samples from 26 water quality sampling sites distributed throughout the watershed. Water column

MIKE VERESCHAGIN

Background/General Information

Mike Vereschagin's great-grandfather settled in the Orland area in 1916. Four generations later, the family is still farming in Glenn County. Mike, who is the current Glenn County Farm Bureau vice-president and past president, and board member of the Orland-Artois Water District, also runs the Vereschagin family farm operation with three of his cousins. They grow almonds, dried plums and olives on approximately 1700 acres. The majority of water for the orchards is Central Valley Project water coming from the Orland-Artois Water District through the Tehama-Colusa Canal; the rest is groundwater. He has implemented Best Management Practices to reduce runoff which include: nine return systems to "catch every drop of irrigation water runoff," nutrient management practices and micro-sprinklers.

Views on Water Quality

Vereschagin believes that there are many variables contributing to water quality issues but that agriculture is being singled-out as an easy target. "Homeowners are unregulated and untrained in the concept of using BMPs and have no training or oversight in the proper and legal use of pesticides and fertilizers. Every motor vehicle traveling roads has the potential to impact water quality through oil and antifreeze leaks and emissions." If science shows that agriculture is contributing to the degradation of water quality, agriculture will make changes to address problems directly attributed to farming practices. Vereschagin thinks it very important for farmers to have available a wide range of effective and affordable new products and technology that would replace current practices. "We must be allowed the opportunity to have time to make the transition and figure out what will work on our individual operations."

Views on Coalition Groups

If there is a problem with water quality, Vereschagin believes the Coalition Groups will have a positive effect by providing growers with an opportunity to create a plan of action that will solve any problems that exist on their own and that local input is of the utmost importance. "The local community has the best knowledge of its area and local practices. For example, one of the monitoring sites chosen by the Regional Board did not meet the legal criteria for a proper monitoring site. Because of local knowledge, we were able to show that the site chosen was a closed system during the summer and water did not reach a state water system. The sampling would have been testing water from a specific farm or two and would not have been indicative to a watershed system."

Vereschagin is very active in his local Coalition Group. He is a sub-basin oversight committee member and says, "There's a better level of trust when farmers have people they know or in the same profession as they are running the committees." He is also on the board of directors for the Colusa Basin Drainage District, which is the agency responsible for collecting Coalition Group fees in Glenn County. "The Coalition Groups will reduce costs, work, time, and paperwork relative to individual monitoring. They will act as an intermediary between growers and government officials and will improve communication between the two. The Groups will speak as one voice to the Regional Board, and through education and outreach, the Board can address the growers." Ultimately, Vereschagin believes that "there must be a balanced approach. We must have people on both sides of the issue working together. Let's sit down together and work out our differences to see where there's common ground, don't just throw regulations at us. That's the only way we're going to go forward. To have someone be either yes or no with nothing in-between, we're not going to get anyplace. We need to work together and all benefit together and still all be in the business."

VIEVA SWEARINGEN

Background/General Information

Before moving to Shasta County 20 years ago, Oregon native Vieva Swearingen worked for the Klamath Irrigation District –she is no stranger to watershed controversy. Swearingen raises hair sheep on five acres in the Cottonwood Creek watershed. "I enjoy ranching very much, but my kids won't do it and my grandkids aren't interested. They love the land and they love the animals, but they don't want the hardship. Often, kids who grow up on a farm see their parents struggling and decide to do something that is less dependent on weather and market conditions – farming is very risky." Swearingen gets her water from the Anderson-Cottonwood Irrigation District. Working with the NRCS, Swearingen got an EQIP grant to create grass buffer zones, which lessen the runoff from her land. "We don't use any pesticides or herbicides but if you raise animals, you have to be concerned about your runoff. I also just wanted to go through the EQIP process so I could tell other people in the watershed what it's all about."

Views on Water Quality

Overall, Swearingen believes the Sacramento River Watershed is in pretty good shape. She holds that solutions to water quality issues do not lie exclusively with irrigated agriculture. "Agriculture is regulated, but private homeowners are not and often do not understand that the chemicals they put on their lawns eventually end up in the creek." Swearingen feels that education efforts are central to solving any water quality problems that exist. Education is the key and by that I mean educating everybody from kindergarten students to private homeowners to retired farmers." According to Swearingen, educating the public on the negative affects things like garbage dumping and unregulated pesticide use have on creeks is a place to start. "We should all be doing whatever we are able to help people become more aware and realize that there are a number of actions we can take as an entire population to make the water better for everyone. Improvements in water quality, habitat quality, and management of agricultural operations will happen, but it's not going to happen overnight. We've made tremendous strides just in the little bit of time we've been here."

Views on Coalition Groups

In addition to her role as tireless Director of the Cottonwood Creek Watershed Group, Swearingen also serves on the board of the Shasta-Tehama Education Coalition and has been active in the Group since its inception. Swearingen believes that her personal experience has made her uniquely qualified for the job which she views in part as fighting for a voice for agriculture. "Being a woman in a male dominated industry I have often had to work twice as hard and talk twice as loud just to be heard. I understand how important it is that we are dedicated to making this work so that agriculture can be heard."

Swearingen believes that agriculture is tired of being regulated and views the Coalition Groups as a much better way to solve water quality issues. "Through the Coalition Group we've had very good success because people know that we're part of the community, that we're not there to control them, but to help them. They trust me better than they do the guy in Sacramento." Swearingen believes the widespread distrust of regulatory agencies could improve over time but that any improvements will begin at the local level. "Trust increases over time and it works both ways. Most of us don't have the time for face-to-face contact or meetings and without that there aren't many opportunities to develop trusting relationships. Lack of time combined with the fact that so many people out there have been burned by these agencies before makes rebuilding trust very difficult."

and sediment samples were collected from these sites during storm events in winter 2005, and during the irrigation season in Spring through Fall 2005.

Because the structure of the monitoring program is complex, we briefly describe the 2005 results here and provide a full discussion in Appendix B. The basic strategy of the monitoring program is to test water and sediment samples for biological toxicity, as well as evaluate levels of conventional water pollutants and pesticides. From a total of 141 water column samples, toxicity was observed in nine samples (6.4 % of all samples) collected from six (23% of all monitoring sites) different monitoring sites. From a total of 20 sediment samples, 13 (65%) reported statistically significant toxicity, and toxicity in general was higher in sediment samples. Of 800 water samples analyzed for conventional water quality parameters, 71 (9% of the total) exceeded a water quality objective. The highest frequency of exceedences occurred for E.Coli bacteria, which was above the basin plan objective for 37 out 191 samples (19%). Water quality monitoring will continue to occure as the Waiver program evolves, and will respond to the various results seen in 2005 and 2006.

Survey Methods and Results

The survey was delivered by mail to a total of 5514 producers from nine counties: Butte, Colusa, Glenn, Shasta, Solano, Sutter, Tehama, Yolo, and Yuba. These counties form the valley floor of the Sacramento River watershed. The producers were identified through a combination of publicly available pesticide permit lists, county assessor land ownership files, and the state organic farm list. While we do not believe the list identifies every individual agricultural operator in the Sacramento Valley, the sample does include the vast majority of full-time agricultural producers and pesticide users. The sample was further divided into a group of known orchard producers (the "orchard" sample), and a group of other producers for which the specific commodities were not known beforehand (the "non-specific" sample). The orchard sample received additional questions about orchard management practices, which will be reported in future papers. The delivery of the survey followed the standard Dillman procedure of an introductory letter, a survey package, a follow-up reminder postcard, a second survey package to non-respondents, and a second follow-up postcard to non-respondents. Table 2 below reports the total number of respondents and the response rate by county and sample type. Unless otherwise indicated, all results reported here are from the combined sample of 1222 respondents.

The survey population adequately reflects the diversity of land tenure, operation size, commodity types, and operator characteristics in the nine counties. Sacramento Valley producers often adopt a business strategy of owning base land and leasing additional land from other landowners. 65.1% of producers indicated only owning land, 5.4 % only rent land, and 29.5% both rent and own land. The operation sizes show the typical distribution of many small producers balanced with fewer large producers, with an average operation size (rent and own) of 574 acres, 50% of the operations with 94 acres or less, and only 10% of the operations over 1200 acres.

Information on the types of commodity varied depending on the sample. For the non-specific sample, we identified the main commodity produced as the commodity with the most acres devoted towards production: 23.5 % fruit orchards; 16.9% nut orchards, 22.6% rice, 20% row crop/vegetables, and 17% ranching (livestock of some

TABLE 2 Respondents and Response Rates by County

County	Non-Specific Respondents	Non-Specific Response Rates	Orchard Respondents	Orchard Response Rates
Butte	109	16%	130	34%
Colusa	57	19%	24	27%
Glenn	162	24%	47	28%
Shasta	63	39%	--	--
Solano	63	21%	--	--
Sutter	89	25%	54	29%
Tehama	157	20%	54	44%
Yolo	90	25%	41	41%
Yuba	27	16%	11	18%
Other	4	80%	4	24%
Totals	821	22%	411	32%

type). For the orchard sample, each respondent could indicate owning prunes, peaches, walnuts or almonds and thus could report more than one type of orchard. The 398 orchard respondents who answered the question reported a total of 608 orchards. Of the respondents, 65% owned one type of orchard, 24% owned two types, 5% owned three types, and 6% owned 4 types. Of the total 608 orchards, 28% were almonds, 9.5% were peaches, 19% were prunes, and 43% were walnuts. 42% of the producers also reported belonging to some type of agricultural cooperative or commodity group.

Operator characteristics are very similar to those reported in the 2002 Agricultural Census with the exception of gender. Most respondents are experienced, full-time producers who have been in agriculture for an average of 27 years and spend an average of 38 hours per week on agricultural activities, with 50% spending at least 40 hours per week. Reflecting the large number of small producers, 62% report earning less than $10,000 in annual gross agricultural income, while 10% earn over $1,000,000, with 25% somewhere in between. Educational levels easily dispel the myth of uneducated producers—58% have an associate college degree or higher, and only 4% do not have a high school diploma.

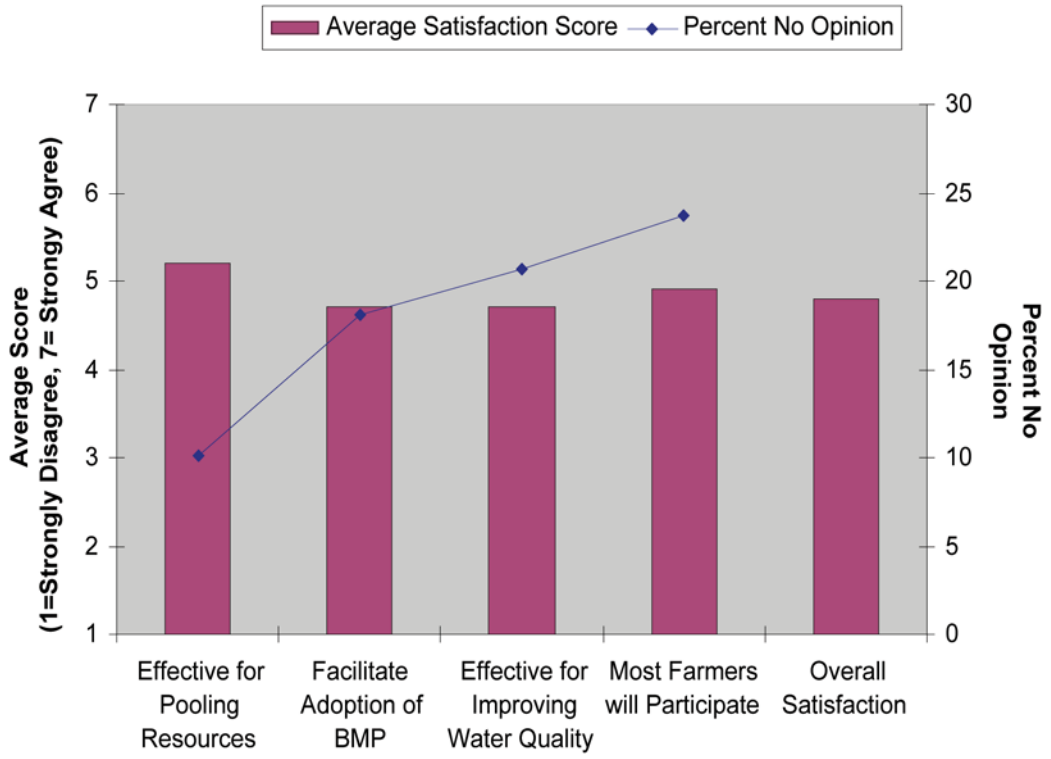
Ethnicity is fairly homogenous, but is nearly identical to the 2002 Agricultural Census—87.4% are white, 2.6% are Latino, .3% are black, 2.2% are East Indian, 2.4% are Asian, and 5.2% are Native American. Finally, 91% of the respondents are male, which is higher than the number of male operators (71%) identified by the Ag Census. This is most likely because the Ag Census counts multiple operators per farm, while the pesticide applications are more likely to be completed by male heads-of-household.

Overall, we believe the sample is adequately representative of the total population of producers in the Sacramento River watershed. The sample may slightly over-represent larger and more economically viable operations, which also reflects the challenges faced by Coalition groups in communicating with smaller and part-time producers. It is safe to say that the sample represents the most economically important group of producers in the Sacramento Valley, and has enough small producers to allow for reliable conclusions.

Survey Indicators of Coalition Effectiveness

This section describes two survey-based measures of Coalition group effectiveness: satisfaction with Coalition

FIGURE 2 Satisfaction with Coalition Groups



Question: **For each statement about Coalition Groups, please indicate whether you strongly agree, or strongly disagree.**

RYAN SALE

Background/General Information

The Sale family has lived in Tehama County since 1915—there is even a road named after their family in Red Bluff and his ranch is on Sale Lane. Their operation has evolved from apricots and grapes to an 80 acre peach and prune orchard with a U-pick business. Ryan Sale sees his family farm being maintained into the foreseeable future with his youngest daughter (a college sophomore) showing the most interest in eventually taking over. In his orchard Sale uses carefully managed dormant season pesticides and in-season applications of herbicides and fertilizers to produce crops that appeal to consumers.

Views on Water Quality

Sale does not feel that agriculture causes any serious water quality problems in the Sacramento River watershed, either in the river water or the groundwater they use for irrigation. A major concern he does have regarding water quality is related to runoff from surrounding housing that is affecting the nitrate levels in his water. "We periodically test our irrigation water to understand its quality and to adjust our inputs." On a broader level, Sale has a related concern having to do with the accuracy of the stream monitoring that the Coalition Groups have chosen in order to comply with the Conditional Waiver. "These streams flow in part through cities but land owners in urban areas are not regulated or forced to monitor their water quality." Sale believes that agriculture could be blamed for water quality problems that have largely urban sources.

Views on Coalition Groups

Sale has taken a pro-active stance on complying with the requirements of the Conditional Waiver. "When the Water Board started looking seriously at monitoring some of us got together and started talking about it because we realized it would impact us. Out of that we formed a watershed steering group of about 20 people that met on a periodic basis to figure out what was happening –to try and get in front of the issue." The group was made of "individuals and Farm Bureau members who met to discuss regulations and gather information from various groups and individuals such as the county Farm Advisor, and the Regional Board." Sale has been on the advisory board of the Shasta-Tehama Water Education Coalition since it was founded and also works with the Resource Conservation District.

Sale is critical of the way the Coalition Groups have been set up by the Central Valley Regional Water Quality Control Board. "This is a self fulfilling prophecy for the Regional Board. They have set it up in terms of working with agriculture to fail. They put it out there but they didn't support the idea of the Coalitions or us, they just promulgated regulations." The main source of his criticism is an overall lack of quality information provided to farmers by the Regional Board. "What we need is credible, timely, and accurate information. This is so critical because we have to make decisions here on a daily basis and they have to be good decisions or we suffer the consequences. I've asked the question 'as a producer what do I have to do and when do I have to do it' and they always respond, 'we don't know.' Without support and reliable information, farmers are then essentially unable to perform the tasks required of them in order to comply."

Sale also thinks that farmer participation in Coalition Groups is hampered by a disconnect between the goals and knowledge of the Regional Board, and the on-the-ground realities of farming. "We're trying to comply with the laws -the constantly changing laws in the state of California." In regards to all the laws affecting agriculture in California Sale believes that government agencies don't always provide reasons. "We understand why some of it's being done and then it's no problem if there's a reason for it, but if it's just being done to be done, we don't want to mess with it. I see this from both sides –as a producer and as someone who works with the RCD. The Regional Board is just one of a litany of organizations that we have to deal with –and most of them have no idea what we do."

STEVE DANNA JR.

Background/General Information

Steve Danna grew up on his family's farm in San Jose. "Our company was started by my great grandfather in 1891 and from there it went to my grandfather and his four brothers. We moved to Yuba City in 1976 although we had been farming in Yuba and Sutter counties since 1942." After college then work as a civil engineer, Danna went back to farming full time with his family in Yuba City. Today, he is President of the company and works with his brother, aunt and four cousins. "My grandfather who is 94 and his youngest brother who is 83 are still involved with the business every day. Hopefully it will be sustained and passed on."

The Danna family operation demonstrates the diversified farms often found in the Central Valley. The 5,100 acre farm consists of melons and squash; prunes, walnuts, and persimmons; wheat and safflower. Because they raise a wide range of crops Danna says they have "a wide range of water demands." Some of their crops are on sprinklers and some receive flood irrigation. "Our water supplies vary from deep wells to district water from the river; our own diversions from the river, and Sutter By-Pass and drainage ditch diversions. In many cases, we are dependent on the runoff from other operations. If growers were to limit their runoff to nothing, several operations would be left dry."

Views on Water Quality

Danna thinks that for the most part water quality in the Sacramento Valley is excellent. He realizes the need to monitor and maintain good water quality but believes that "it must be done on a broad basis and enforced at the local level." He thinks monitoring will help figure out if agriculture really is contributing to water quality problems and to what extent it might be. Doubting that more than a few people out there might be contributing to any problems, he believes the best way to address water quality problems is to "start broad and if anything shows up, work back until you isolate the problem and stop it."

Views on Coalition Groups

Danna is on the board of the Butte-Yuba-Sutter Subwatershed Coalition Group as well as on the board of the Northern California Water Association (NCWA), who he has been working with for eleven years. "Obviously, these new requirements are an expense no matter which way you look at it with all the monitoring and administration. On the other hand, with the Coalition Groups farmers are better-off financially and better-off being with a local group to satisfy the requirements of water quality and the Waiver." Danna believes that the Coalition Groups are "not an easy deal for growers because it's not like you can just write a check and be all taken care of –it takes more involvement and there are a lot of small farms out there that just don't have time to go to the meetings. Small farms and big farms though, we're all interested in making this work."

Danna sees several challenges to making the Coalition Groups work. "I get conflicting information from the Regional Board and their staff. I feel that they are playing two sides of the coin with the environmental lobby on one side and us on the other. They want better water quality but they don't understand how that can get done because in general, they don't understand water delivery systems, the details of agricultural operations, or applying regulations to our operations." Danna believes that over time, the Coalition Groups will have to be better coordinated. He cites the cohesiveness of the air quality districts as being a potential template. "Take the whole water quality issue and put it under one roof. Local water quality management districts with boards that are made up of different types of growers as well as someone from the drainage districts; the counties, and the cities too because they are also liable for water quality. This would make monitoring more broad and uniform and give us a more accurate reading of the problem."

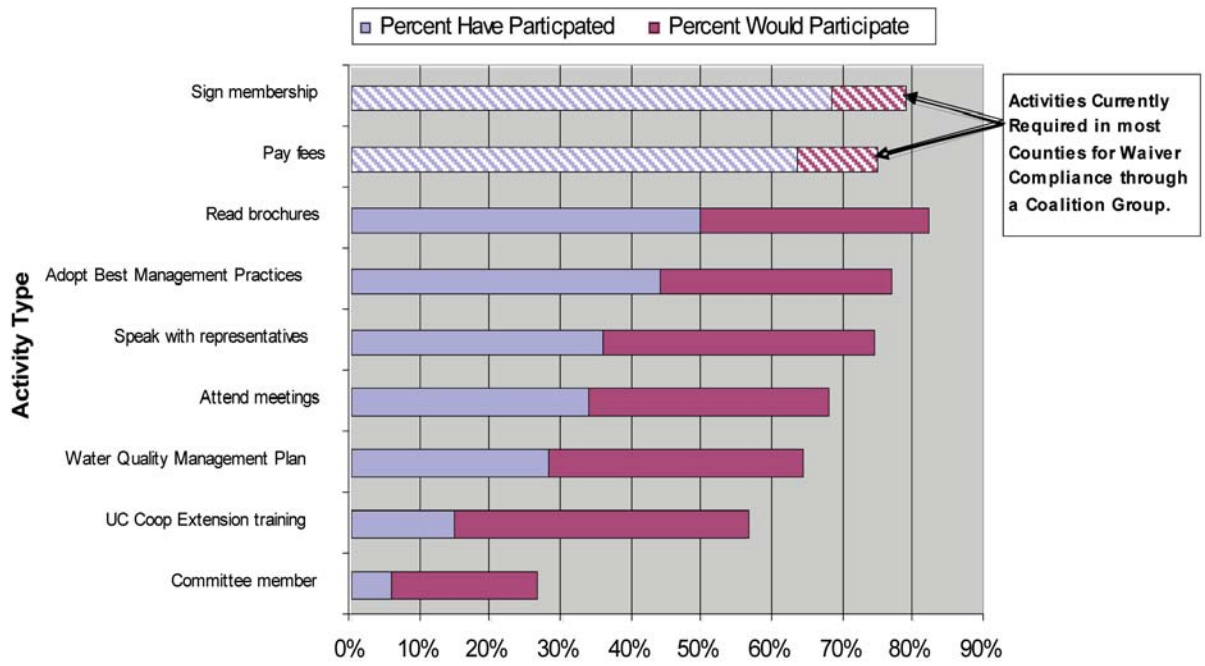
group and participation in Coalition group activities. We believe both of these factors are crucial to the long-term success of Coalition groups, and one of the main goals of this report is to identify factors that influence effectiveness. Note that the survey questions that were used are presented at the bottom of each figure containing survey results.

Figure 2 shows the average level of agreement on four statements about how satisfied producers are with various aspects of Coalition group performance, where a score of one means strongly disagree and seven means strongly agree. The "overall" satisfaction measure is the average of all four of the individual statements. Figure 2 shows that producers rate the Coalition program slightly above the midpoint. While it is hard to say whether this middle level of satisfaction indicates a successful program at the current time, changes in satisfaction over time could be used to monitor effectiveness. What is important at the current time is to understand what factors explain satisfaction.

In addition, the solid line on the graph indicates a substantial amount of no-opinion answers, which reflects a high level of uncertainty within the Coalition group process. For example, nearly 20 percent of the respondents do not have an opinion about whether the Coalition groups will improve water quality. These findings are supported by the personal interviews, which indicated there were many producers who did not hear about (or don't remember hearing about) the Coalition groups, and even if they are aware, they are confused about the requirements of the program. Low levels of awareness combined with high levels of confusion and uncertainty will always be a barrier to implementation. If the Coalition's continuing outreach and enrollment efforts have been successful, the levels of uncertainty expressed at the time of the survey should have decreased at the time of this writing.

Figure 3 shows the percentage of producers who have or would participate in nine different activities offered by the Coalition groups. On average, the producers participated in 3.1 activities. Over sixty percent of the producers surveyed indicated that they participated in the two activities that were required for Waiver compliance at the time of the survey, enrolling in the Coalition by signing membership forms and supporting water quality monitoring by paying membership dues. It is important to note that the survey indicates a higher level of compliance than the acreage counts maintained by the Coalition. This is because people who responded to the survey were also more likely to participate in the Coalitions, so the survey undercounts non-participants. Reaching out to the most reluctant participants will be a continuing issue with the Coalition groups, and it is unlikely they will ever receive full compliance.

FIGURE 3 **Participation in Coalition Group Activities**



Question: **The new coalition groups intend to provide a number of services. Which of the following services have you participated in, would you be interested in participating in, if you have not already.**

Furthermore, the cost of gaining compliance increases very quickly as efforts increase to reach the most reluctant participants. Enforcement efforts will become more important than collaborative efforts to engage this sector of the producer population.

Among the other activities, it is important to note that less than 50 percent of the respondents indicated participating in the most basic activities of the Coalition groups such as reading brochures, attending meetings, and speaking with representatives. This is despite the fact that extensive efforts were made to invite as many producers as possible to educational meetings in each subwatershed and the Regional Board sent out brochures to large numbers of producers. This suggests that the basic message of the Coalition groups had not yet reached a significant number of producers. Part of the explanation for non-participation is the uncertainty that comes from frequent policy changes along with the enormous scope of the task. Again, if the Coalition group outreach and response efforts have been successful, the overall level of participation should have increased since the time of the survey.

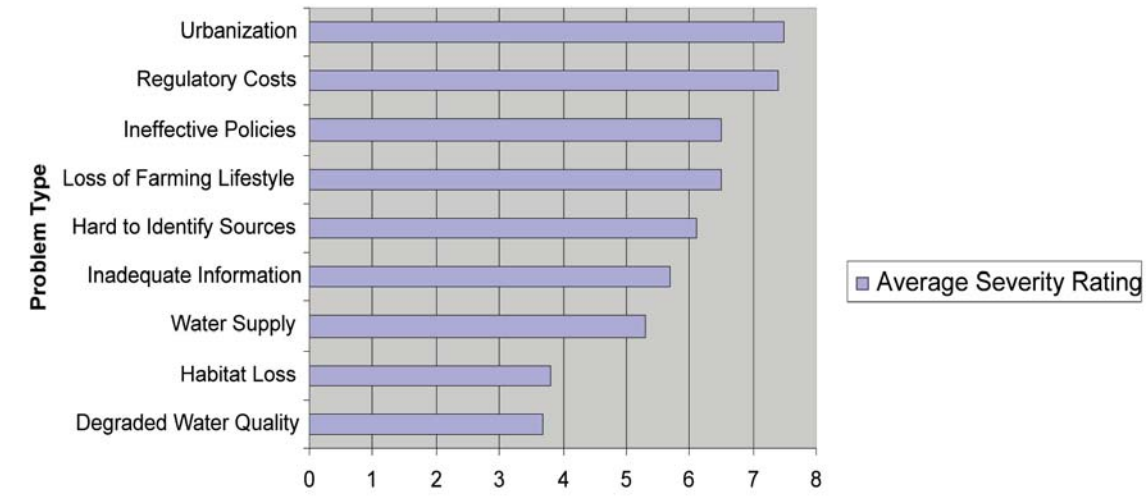
On a more positive note, some of the actions that may be implemented in the future by the Coalition are already happening. Over seventy percent of the producers have or would implement best management practices, and over 60 percent have or would support the development and implementation of some type of water quality management plan specifically for their operation. Furthermore, the results indicate a fairly substantial willingness to participate in the Coalition groups. Thus, it is very likely that participation will increase over time rather than stopping at current levels. Like with most social change, full cooperation takes time and will happen gradually.

A key function of this report is to identify the attributes of individual producers that increase or decrease their satisfaction with or participation in Coalition activities. The next sections describe several different sets of factors that producers take into consideration when forming their opinions or making decisions. As we present these factors, we will identify which of them are the most important influences on indicators of effectiveness. We base our judgments on which factors have statistically significant correlations with Coalition satisfaction and participation. It should be noted that no single factor alone explains satisfaction and participation. Rather, multiple factors must be taken into account. The appendix to this report presents the specific statistical results for the interested reader.

Views on Water Quality

Water quality policies are based on two main assumptions: water quality problems exist and solving water quality problems requires changing the human behaviors that are causing them. These two assumptions are often supported by Regional Board data and scientific studies such as the 305(b) report cited in the introduction, which document the existence and sources of problems. In the case of agricultural water quality management, solving the problem means producers may need to change their

FIGURE 4 Perceived Severity of Water Quality Management Problems



Question: The list below displays several items that have been suggested as current problems related to water quality management in the Sacramento River Watershed. Indicate your assessment of the severity of each problem by choosing a number between 1 (not severe) and 10 (extremely severe).

FRED MANAS

Background/General Information

Fred Manas was raised on a ranch in Winters and says, "Ranching is in my blood." He raises "stone fruit and beef" on his Yolo County operation. The orchard is 50 acres and he runs his cattle on 2,000. Like many other Sacramento Valley farmers and ranchers, he has recently been feeling the pressures of urban development, but is resolved to continue ranching. "I have realtors coming in all the time and I tell them they don't have enough money –I'll never sell." To eliminate the need for pesticides, Manas has used integrated pest management practices in his orchard for 15 years. He uses micro-sprinklers and "hardly gets any run-off." He works with UC Cooperative Extension to manage invasive weeds, and uses fungicides for non-insect plant pests.

Views on Water Quality

Manas says he does not have any water quality issues on his operation and the Conditional Waiver will have no direct effect on his water management practices. He believes the biggest problem with water in the Sacramento Valley right now is the Regional Water Quality Control Board "Unfortunately, there is nobody on the Water Board with any common sense, and no science behind any of their new regulations. In theory they have a good idea, but in practicality—forget it—they aren't even in the real world. They're looking at the world through a piece of pipe and they can't even see what's right in front of them. If there is a problem, we can back track and go up until we find the source. There must be good science guiding it all and we need standards that are relative to what really exists."

Views on Coalition Groups

Manas is on the board of the Yolo County Farm Bureau as well as the board of the Yolo County Farm Bureau Subwatershed Coalition Group. He is a proponent of using the Coalition Groups to pool local knowledge about water quality management. "Coalitions were put together by agriculturalists who understand the issues. We all have basically the same goal just with different ideas of how to get there. When you try to manage something by committee, you never get total consensus, but as long as we come out with the same intention and try to get the same message out, it'll be fine." Manas believes that farmers are good stewards of the land, and can be trusted to solve any water quality problems discovered by the Coalition Groups. "The real environmentalists realize that ranchers and farmers are major environmentalists because if we don't take care of the land and the animals, they're not going to take care of us –and that's just common sense."

GREGG AVILLA

Background/General Information

Gregg Avilla's family has been farming and ranching all his life. He cites the good soils and relatively easy access to water as benefits for agricultural operations in Tehama County. However, he says that "most of the creeks up here don't flow year round; depending on the year and how much precipitation we get the water can stop running around the first of May. In order to get the most out of his water Avilla has a return system that he describes as providing for "a continual process during the irrigation season of irrigating, collecting, irrigating again, re-circulating the water until it's evaporated or all used up." Avilla is currently using a variety of irrigation techniques on his operation: 72 acres are drip-irrigated, he uses micro-sprinklers on 15 acres, and the remainder is flood irrigated

Views on Water Quality

Avilla sees big differences between northern and southern Central Valley agricultural and water use practices. He believes that these differences contribute to great variation in water quality across the state. He also recognizes that while water quality is 'pretty pristine' up in Tehama County, it degrades as you move further downstream. In addition to agriculture, Avilla cites dams, ecological processes, and many other factors contributing to water quality. "If you leave the river natural it continually changes back and forth: trees fall into the river and block things, banks are eroded, and so on and when you add development whether it is agriculture or homes the river changes even more." Avilla has seen water quality changes of the positive sort occurring over time. "There was a time during the 60s and 70s when the water in the Sacramento River was really bad. After some of the big industrial and municipal waste was cleaned up it has generally improved. Can we do better, is it necessary to do better –yeah we can do better and I think that's what this is all about. What farmers are worried about is that this is a government mandate again from people who don't understand at all what we do."

Views on Coalition Groups

Avilla was a member of the group who founded the Shasta-Tehama Education Coalition in order to get out information to the farmers about the new Conditional Waiver requirements and the Coalition option to comply with new regulatory requirements. Avilla cites economic reasons why farmers may generally prefer to join Coalition Groups instead of applying for an individual waste discharge permit. Farmers "are concerned about bearing the brunt of all the costs themselves but are hopeful that they can put the Coalition together and be able to do everything that the Board is requiring us to do without spending an unreasonable amount of money to do so." Coalition Groups "will have to have positive effects on water quality in order to be successful."

Avilla believes that "agriculture has to have a voice at the state and federal level." On a local level he thinks the Coalition Groups may help strengthen relationships because people know one another. He sees a challenge in that "the further the policy making gets away from the people that are affected most by it, the harder it is to have good communication and everyone getting along. An open dialog is critical. There will be groups that don't facilitate the process, as well as other groups and individuals that try to move the process along and help with communication and education." Avilla believes that overall, farmers want to solve justifiable water quality problems in "an economical way that is not detrimental to their operations. It's better to be proactive and meet this thing head-on and try to be part of the solution than to bury our heads in the sand."

irrigated land management practices in some situations.

Like any other person, producers are unlikely to change their practices if they do not believe there is a problem, or if they do not believe they are responsible for the problems. The survey data show that producers have quite different perceptions than the situation portrayed by Regional Board data.

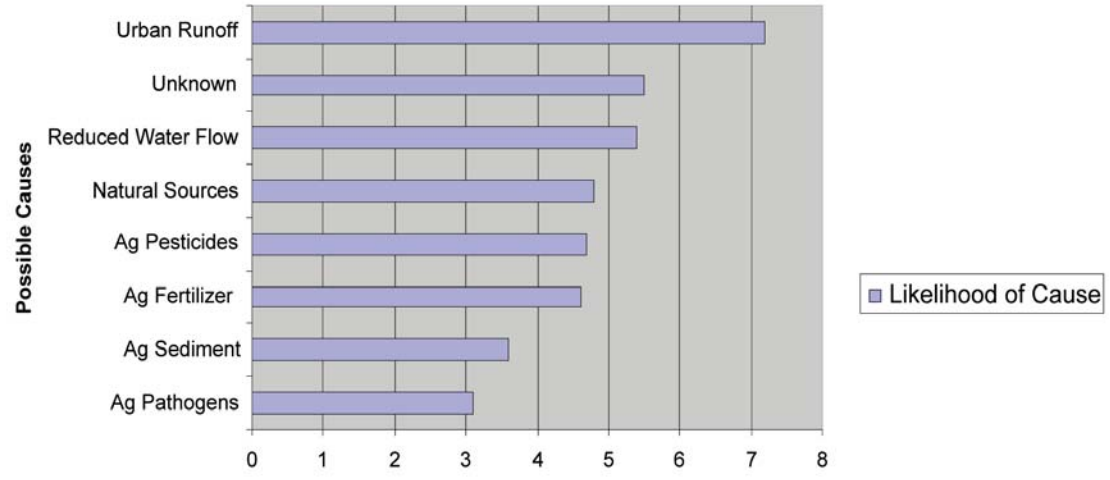
Figure 4 shows the average scores for the perceived severity of several potential water quality problems, where a score of one means not a severe problem and a score of ten means an extremely severe problem. The items are ranked from high to low in terms of what producers are most worried about. Importantly, producers do not perceive the two main issues targeted by the Conditional Waiver and the SVWQC to be very severe—degraded water quality and related habitat quality. Rather, the most severe problems are perceived to be urbanization and costly regulatory policies, followed by ineffective policies, and loss of farming life style.

Figure 5 presents the average scores on a set of statements about possible causes of water quality problems, where a score of one equals not a source and ten equals a major source. Figure 6 tells a similar story with respect to perceived causes of water quality problems. Producers perceive agricultural sources as the least likely causes of water quality problems, and urban runoff as the most probable cause. Among the agricultural sources, pesticides and fertilizers are ranked as the most likely sources. Many of the Coalition group activities do currently target pesticides and fertilizers, which have been subject to other regulatory measures. For example, pesticide purchases and use reporting is required by the Department of Pesticide Regulation and managed through the County Agricultural Commissioners.

The statistically significant correlations in the Appendix (Tables A1 and A2) between Coalition satisfaction/participation and the perceived severity/causes of water quality problems provide interesting insights about producers' motivations for becoming involved in the program. First, producers who think regulatory costs are a problem and policies are ineffective are less likely to be satisfied with the Coalitions yet they are more likely to participate in Coalition activities. Second, producers are significantly more likely to participate in the Coalitions if they think water quality and habitat are not a problem and agriculture is not a source of pollution. At the same time, satisfaction with Coalition groups is lower among producers who believe agriculture is not a source of pollution. These combined results suggest that producers are currently participating in the Coalitions to reduce the costs of what they perceive to be expensive regulations, which they believe could become even more costly, and may be targeting the wrong people for insignificant problems. In other words, producers appear to be participating in Coalitions to forward their own perceptions of the water quality issues and to advance what they believe are more reasonable resolutions.

The personal interviews also show that producers are most concerned about the costs of regulation and lack of attention to urban sources. According to Yuba county orchard grower Sarb Johl, "we (agriculture) pay a lot

FIGURE 5 **Perceived Causes of Water Quality Management Problems**



Question: **There are different opinions about the current possible causes of water quality problems in the Sacramento River. Please indicate your assessment of the possible causes by choosing a number between 1 (not a cause) and 10 (a major cause).**

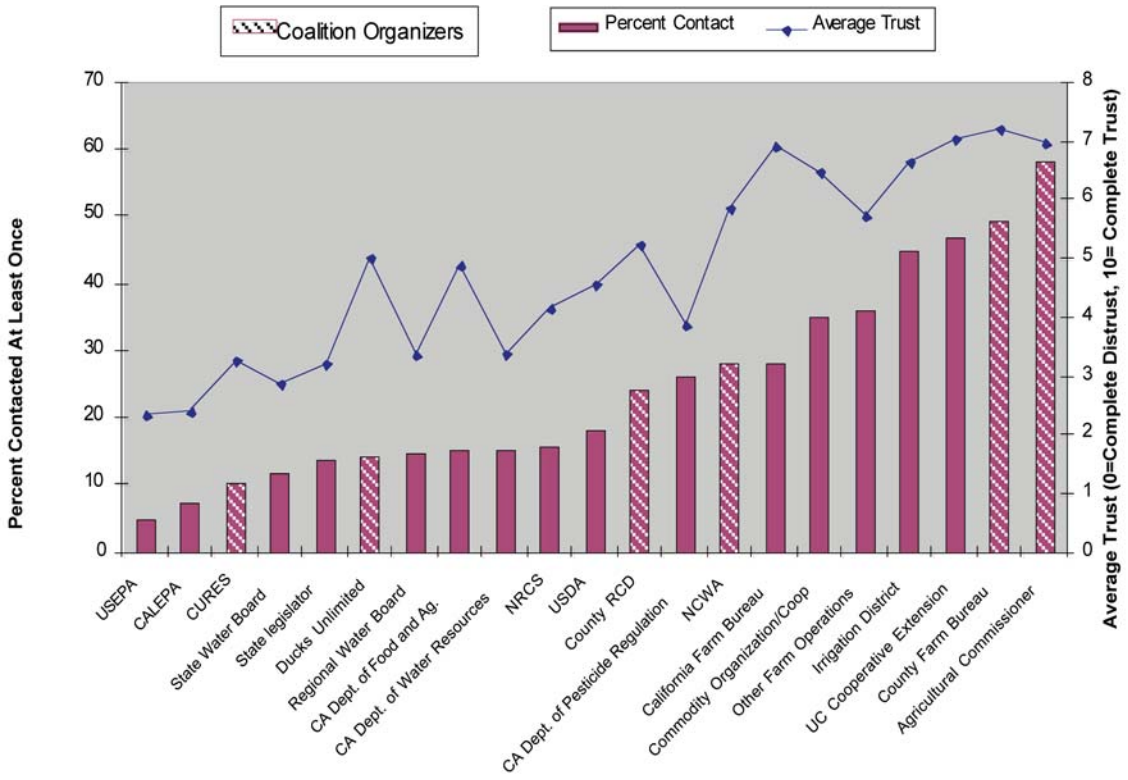
every year just to stay in compliance with all of the regulations, so I want them to achieve some benefit and not be so burdensome that they drive family farms like ours out of business." Shasta County rancher Vieva Swearingen echoes these sentiments and adds that while agriculture is "heavily regulated, private homeowners are not and often do not understand that the chemicals they put on their lawns eventually end up in the creek." However, at the same time, many producers desire to be proactive if a water quality problem is discovered. While this "can do" attitude is not directly captured by the survey, it is summarized by Glenn County producer Mike Vereschagin, who states that "if science shows that agriculture is contributing to the degradation of water quality, agriculture will make changes to address problems directly attributed to farming practices."

The results regarding perceptions of water quality highlight important barriers to Coalition group success. Producers do not place high priority on the same problems and causes that are targeted by the Waiver. Rather, they care more about problems from urbanization, and would like to see urban sources of water pollution receive adequate policy attention. Because they do not feel agriculture is causing a significant problem, they feel the costs of the Coalition groups are currently unjustified and are motivated to participate in the Coalition groups to protect agricultural interests from even more costly regulations. This is an adversarial relationship that to some extent currently serves as a barrier to policy implementation. However, many growers have a proactive stance towards water quality, and are prepared to take action if scientific studies or monitoring results clearly demonstrate a link between water quality problems and irrigated agriculture.

Contact with Policy Organizations

Another important component of policy implementation is the activities of the many government agencies and non-profit organizations involved with agricultural water quality management. Producers are more likely to cooperate if they have high levels of contact with these organizations, and believe these organizations are trustworthy, competent, and honest. Especially in the case of the Coalitions, these organizations deliver important information about program requirements and help encourage participation at the sub-watershed level.

FIGURE 6 **Trust and Contact with Water Quality Management Organizations**



Question: **Below is a list of organizations (or types of organizations) that have been active in the Sacramento River Watershed in water quality management. In the last year, how frequently did you speak with each of the organizations – daily, weekly, monthly, annually, or none? Please indicate your level of trust for each organization by entering a number between 0 (complete distrust) and 10 (complete trust).**

TOM MULLER

Background/General Information

In 1969, suburban expansion brought the Muller family to Yolo County from San Jose. After graduating from college, Tom Muller and two of his brothers joined their first generation Swiss émigré father expanding and diversifying the operation. Today the Muller family farm consists of 8,500 acres broken up into six major sections around Yolo County. Their main crops are wine grapes, processing tomatoes, bell peppers, alfalfa, corn, safflower, and sunflowers. The Mullers employ a wide variety of irrigation techniques depending on the crop and its location. All of their grapes are drip irrigated and the remaining crops are irrigated by a combination of micro-sprinklers, drip, furrow, and flood methods. "Our water comes from two sources: from the ground, which is pumped electrically or pumped with a diesel motor, or it comes from Clear Lake which is managed by to the Yolo County Flood Control Water Conservation District and comes to us by gravity flow ditches."

As someone who has been working with the Yolo County Resource Conservation District for 20 years and is that organization's current president, Tom Muller is committed to on-farm Best Management Practices and would like to see more programs available to agricultural operators in order to encourage them to adopt BMPs without having to sacrifice too much from their bottom line. In order to conserve and get the best use out of their natural resources Muller says, "we've been working with the NRCS for years and have installed filter strips and flash-board risers; we have an EQIP grant for a cost-share on the drip-system, a cost-share for putting in a cover crop in the orchard; we have almost a mile long berm that we're going to revegitate with native grasses and insectiary plants, and we're going to cost-share on dust control to stop the mites from getting into the trees."

Views on Water Quality

"If there is pollution in a river, stream or slough and I'm causing it, I'd like to know because we're the first people who'll say let's fix it." According to Muller, one of the first things that might need fixing is the disconnect he sees between the process of pesticide approval and protocol setting and the sometimes undesirable effects that are the result of operators following application guidelines. "If we get a chemical from a company that has spent years and years and had millions of dollars invested in research and testing, and the EPA approves it to be safe –why should we think otherwise? Most of us are basically just following the rules that have been established." Because Muller believes that most agricultural operators are following the rules and interested in doing what's right, he would like to see a more definitive assessment of the water quality issues potentially facing the Sacramento River Valley.

Views on Coalition Groups

Muller cites the practical, local knowledge of Coalition Group members as being their greatest strength. "We joined the Yolo County Farm Bureau Coalition the first day and there are a bunch of smart, practical Farm Bureau people and farmers working in this Coalition who found the right places to monitor so within the next year there will be a lot more information out there." Muller believes that one of the greatest challenges the Coalition Groups face is to develop relationships with the various resource agency staff members. "There is a lack of knowledge held by the people who are hired in Sacramento –they promulgate mandates without practical knowledge of what will happen. What is even more frustrating is that the people in staff positions with the different agencies are forever changing jobs so there is no way for us to develop relationships with them or see a dedicated commitment to solving long-term problems." However, Muller does believe that the Coalition Groups will have an overall positive effect on water quality and on relationships between farmers. "As long as they give us time to do this and are willing to work with us instead of just shoving regulations down our throats, it will work."

For each of 21 organizations active in water quality management, Figure 6 presents the percentage of producers who contacted that organization at least once in 2004, and the average level of trust in each organization. The bars with diagonal lines indicate organizations that are commonly involved in coordination and lead roles with Coalition activities at the subwatershed or regional level. The results indicate that trust and contact are very tightly linked; producers are more likely to speak with organizations they trust, and vice versa. Local agencies like the County Agricultural Commissioner, County Farm Bureau, UC Cooperative Extension, and water districts have the highest levels of trust and contact, while regulatory agencies like the US Environmental Protection Agency and State Water Board have the lowest levels of trust and contact. Interestingly, the regional Coalition organizers like CURES, Ducks Unlimited, and NWCA do not receive much contact and middle to low levels of trust. The subwatershed organizers like County Agricultural Commissioners, County Farm Bureau, and local support groups like UC Cooperative Extension, water districts, and Resource Conservation Districts, have much higher levels of contact because producers regularly interact with those organizations for a variety of reasons other than the Conditional Waiver.

The correlations (Table A.3) suggest that contact frequency and trust in most agencies have strong relationships to both Coalition satisfaction and participation. The relationships are stronger for satisfaction than for participation, which reinforces the common finding in social science that attitudes are easier to explain than behavior. Also, the influence of trust on satisfaction and participation is much stronger for local Coalition organizers and local support agencies with high levels of contact than for organizations or regulatory agencies with lower levels of contact. For example, trust in NCWA, a regional coordinator of the Coalition, has the strongest influence on satisfaction and trust in local groups has the strongest influence on participation. Conversely, trust in the USEPA has a very low influence on both participation and satisfaction.

The personal interviews also emphasize the importance of trustworthy local organizations with previous experience in water quality management and demonstrated agricultural knowledge. Glenn County grower Larry Domenighini cites the Glenn County Agricultural Commissioner as being at the leading edge of water resources management with a proven track record for successfully working with producers on the Surface Water Stewardship Program. Vieva Swearingen of the Shasta-Tehama Water Education Coalition said, "Through the Coalition group we've had very good success because people know that we're part of the community, that we're not there to control them, but to help them. They trust me better than they do the guy in Sacramento." Swearingen believes the widespread distrust of regulatory agencies could improve over time, but that improvements will begin at the local level.

The survey results and personal interviews demonstrate how interaction between producers and local agencies are the crucible in which cooperation is forged. These relationships can be used to overcome other barriers to policy implementation. The good news is that many of the local agencies that are involved with the sub-watershed groups such as the Agricultural Commissioner, County Farm Bureau, and UC Cooperative Extension, and water districts are highly trusted by producers. Furthermore, despite lower levels of contact and trust, the correlations show that Coalition organizers like NWCA and CURES are more successful in generating satisfaction and encouraging participation. That is, CURES and NWCA are effective for those people they have reached, but they need to either reach many more or capitalize on partnerships with local groups who interact with producers more regularly for a variety of reasons.

The bad news is that the regulatory creators of the Waiver program have the lowest frequency of contact and are highly distrusted by producers. The personal interviews suggest that some of the main reasons for this distrust are a lack of consistent information from regulatory agencies and a perception that regulatory staff does not understand agriculture. Yuba County grower and NCWA board member Steve Danna Jr. said that he gets "conflicting information from the Regional Board and their staff," and that while the Regional Board wants better water quality, "they don't understand how that can get done because in general, they don't understand water delivery systems, the details of agricultural operations, or applying regulations to agricultural operations." Concern over conflicting information from the Regional Board and staff is summarized by Tehama County grower Ryan Sale who said, "What we need is credible, timely and accurate information. This is so critical because we have to make decisions here on a daily basis and they have to be good decisions or we suffer the consequences."

Because local organizations and agencies are critical to producer participation and satisfaction with the Conditional Waiver, policy-makers need to continue to find ways to enable coordinated actions between local sub-watershed organizations and regional organizations that focus on broader water quality management goals. The "nested watershed" approach of the current water

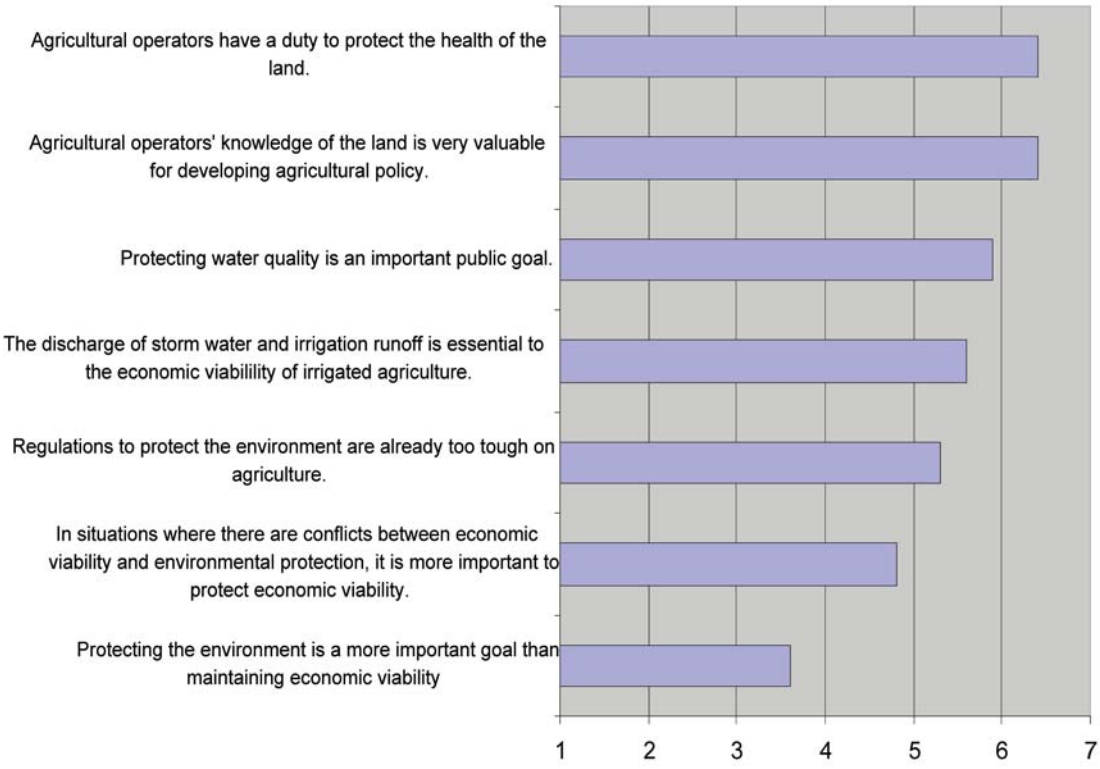
quality management plan is one important mechanism for accomplishing this goal.

The nested watershed approach recognizes that each of the ten subwatersheds in the Coalition may have important differences in hydrologic features, agricultural production systems, climatic conditions, and socioeconomic characteristics. Operating at the local level allows each subwatershed to develop their own leadership and implementation plans that reflect its unique features with respect to water quality management. However, the management efforts of the ten subwatersheds in combination have the potential to influence water quality in the entire Sacramento River watershed, including the Sacramento/San Joaquin Bay Delta. Hence, the regional Coalition organizers need to build connections between the subwatersheds and government agencies at the state and federal levels.

A primary mechanism for regional-local coordination is the networks being built between the locally formed leadership in each sub-watershed and the regional Coalition organizations. The nested watershed approach allows each subwatershed to form a local leadership structure that reflects the local political circumstances. Some subwatersheds have an elected board of directors and have formed non-profit organizations for operation, while others have less formal local advisory committees and work through existing local agencies or organizations such as the Agricultural Commissioner and the county Farm Bureau. The leadership of each of these local organizations meets regularly to discuss and manage the wide range of activities involved with the water quality management plan. Many of these activities involved direct interaction with producers.

Concurrently, leaders and coordinators of local efforts meet nearly monthly with regional coordinators such as NCWA, CURES, and DU to discuss broader agricultural water quality management issues and actions. The regional coordination efforts attempt to achieve timely, consistent, and cost-effective means of implementing water quality management throughout the Sacramento River watershed that is cognizant of regional water quality concerns. This type of local activity can also help facilitate cooperation and trust between producers and organizations that have a regional perspective, including the Regional Board. This assumes that these regional entities exhibit trustworthy behavior, in particular

FIGURE 7 Views on Agriculture and the Environment



Question: **We would like to ask you your general opinions on government, public policy, and agriculture. Please indicate whether you agree, disagree, or somewhere in between. 1 = Strongly Disagree, 7 = Strongly Agree.**

provide reliable information and guidance, stay consistent, and live up to commitments.

Views on Agriculture and the Environment

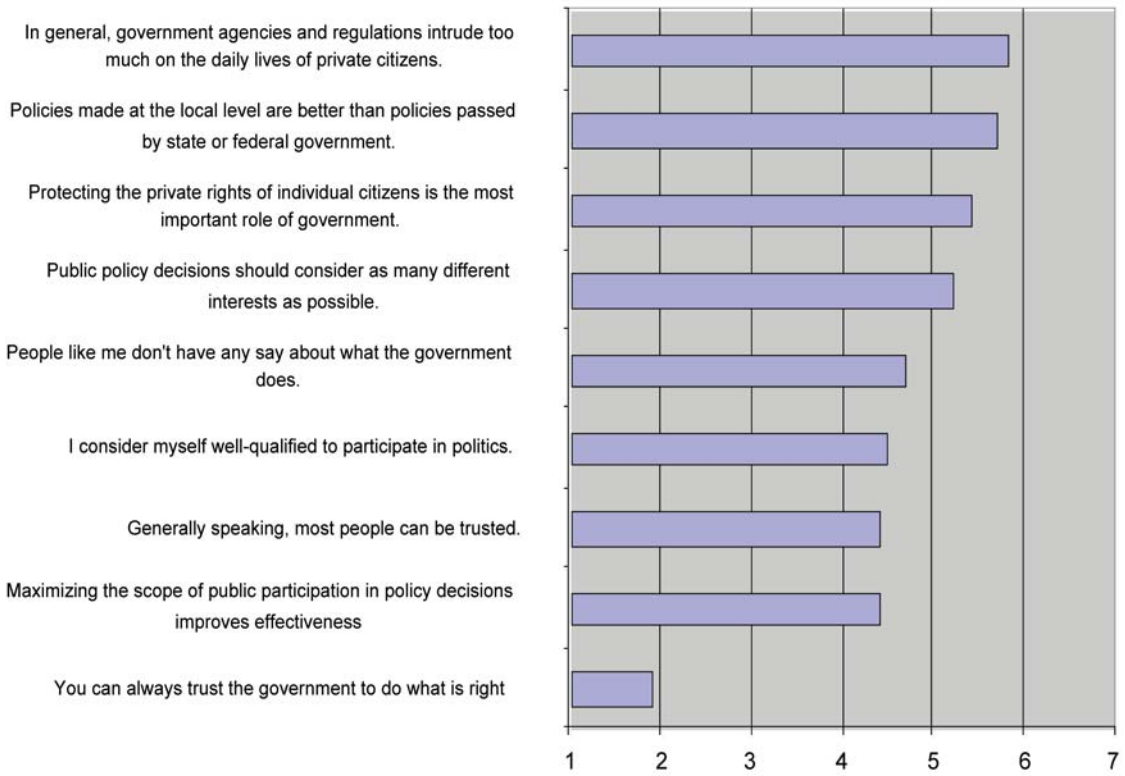
Another important component of water quality management is the social values of producers, which often influence how they perceive different policy choices. Figure 7 below shows the average levels of agreement towards seven statements about agriculture and the environment. Producers' views on agriculture and the environment are relevant because water quality management policies are one way in which society organizes the relationship between irrigated agricultural practices and environmental processes.

The first two statements describe principles of stewardship, which were also very frequently mentioned in the personal interviews. As evidenced by the nearly unanimous level of agreement, most Sacramento Valley producers perceive themselves to be conscientious stewards of the land with a large amount of local knowledge that should be used to pursue the important goal of protecting water quality and that environmental regulations are too tough on agriculture. At the same time, they are less likely to agree that protecting the environment is more important than economic development. Assuming the answers are sincere, the stewardship values serve as an alternative environmental viewpoint to the ideology expressed by traditional environmental groups.

The correlations (Table A.4) suggest that stewardship values are the most important positive contributor to Coalition group satisfaction and participation, with the strongest effect on satisfaction. These values hold the potential to serve as common ground between agricultural interests and environmental goals. Water quality management, including much of the discussion coming from the Regional Boards, is often framed as a pollution problem with agriculture as the bad guy. Reframing water quality management as an exercise in collaborative stewardship with agriculture as an important partner in achieving valued water quality goals is more likely to engage the agricultural community.

The personal interviews also highlight the possibility of reconciling stewardship values and environmental protection. Producers such as Sarb Johl and Fred Manas are frustrated with the negative view of agriculture held by some environmental groups. They believe that farmers and ranchers are "the biggest

FIGURE 8 Views on Government and Society



Question: **We would like to ask you your general opinions on government, public policy, and agriculture. Please indicate whether you agree, disagree, or somewhere in between. 1 = Strongly Disagree, 7 = Strongly Agree.**

stewards of the environment" and "major environmentalists, because if we don't take care of the land and the animals, they're not going to take care of us—that's just common sense." Of course, many of the environmental groups involved with water quality management do not trust the sincerity of these statements, or think stewardship values fail to support strong environmental protections. One possible solution to this conflict is the collaborative philosophy offered by Mike Vereschagin, who says "We must have people on both sides of the issue working together. Let's sit down together and work out our differences to see where there's common ground, don't just throw regulations at us."

Views on Government and Society

Producers' views about government and society are important because the Conditional Waiver policies and the Coalition group water quality management plan in combination represent a government program that is being applied to private agricultural decisions. Political science research suggests that people will like policies with features that are similar to their own views of how government should work. Broader theories of political participation suggest people who think citizens can influence political outcomes are also more likely to participate in policy programs. Figure 8 displays the average level of agreement to several statements about government and society that reflect these concerns.

The results in Figure 8 show producers have generally conservative political viewpoints. They strongly believe that government regulations are intrusive, and prefer policies that are made at the local level and protect individual rights as much as possible. One advantage of Coalition groups is that they do provide opportunities for local input. However, it is no surprise that agricultural interests are averse to water quality management policies that identify individual producers. Not only do the producers fear the possibility of lawsuits, but revealing private information is contrary to fundamental aspects of their political beliefs.

At the same time, the producers have a very low level of trust in government and feel the government is not very responsive to input from ordinary people. Political scientists refer to this as "external political efficacy", which reflects beliefs about the degree to which the government is responsive to citizen preferences. However, many of them do agree that they are well-qualified to participate in politics. Political scientists refer to this as "internal political efficacy", which means an individual has the necessary knowledge and civic skills to effectively participate. Hence, it is important for water quality management to demonstrate to producers that Coalition groups are a good place for exercising their civic skills and responsibilities.

The correlations (Table A.5) support the general importance of internal and external political efficacy as prime motivators for producers to participate in a Coalition. The first and foremost concern is that their particular agricultural interests are taken into account. Producers who feel that government is unresponsive are not as satisfied with the Coalition and participate less frequently. On the other hand, producers who feel they are personally well-qualified to participate in politics are more likely to participate in Coalition activities. At the same time, producers who feel that public policies should have broad public participation also are more satisfied with the Coalition. The results could also be interpreted as support for Coalitions that reach out to broader urban and environmental constituencies in order to form a consensus approach to water quality management. However, careful consideration would have to be given as to how to broaden the constituencies to assure they remain constructive, not overly complex, and remain functional. This includes choosing stakeholders that have a strong commitment to a philosophy of collaboration.

The personal interviews also suggest the potential for Coalition groups to increase political efficacy and the representation of local agricultural interests. "The further the policy making gets away from the people that are affected most by it, the harder it is to have good communication," says Shasta-Tehama Water Education Coalition member Gregg Avilla . The Coalition Groups, according to Mike Vereschagin, "will act as an intermediary between growers and government officials and will improve communication between the two. The groups will speak as one voice to the Regional Board, and through education and outreach the Board can address the growers." The Coalition Groups could help improve relationships between producers and government officials, agrees Larry Domenighini, "if they (the Board) let us do our job, it will make for better trust between the regulatory agencies and the farmers. Of course by trust I don't know if I necessarily mean believing everything they say, but I will have more confidence in their abilities."

Conclusions

This study began with the assumption that producer satisfaction and participation are critical ingredients for the success of the Conditional Waiver, the Coalition groups, and broader water quality management in the Sacramento River Valley. The survey results and interviews reveal several important factors that affect producer satisfaction and participation in the SVWQC. Some of these factors are motivators and some are barriers to success.

In general, producers do not think environmental problems in the Sacramento Valley are very severe or that agricultural sources play a large role in causing them. Therefore, much of the current participation is motivated by a desire to implement reasonable water quality management plans as an alternative to undue regulatory burdens from what producers view as unnecessary policies. They also think that urban sources play an important role in water quality problems, and therefore should be considered as part of the overall water quality management process. However, the personal interviews and survey responses do indicate a "can do" attitude to adopt management practices if a water quality problem associated with irrigated agriculture is discovered. Most producers in the Sacramento Valley are not habitual non-compliers; rather, they believe their scarce resources should only be spent on real problems. At this time, the disjuncture between the problem perceptions of environmental regulators/interest groups and agricultural interests will be a source of ongoing conflict.

There was a large amount of uncertainty at the time of the survey about the extent of water quality problems in the Sacramento Valley, the requirements of the Waiver program, and the overall success of Coalition process. The uncertainty was probably due to the relative newness of the program, the lack of information about water quality conditions and program requirements, frequent policy changes, and also mixed messages coming from the State and Regional Water Quality Control Boards. This uncertainty is akin to people being unaware of the rules of the road because speed limit and stop signs are knocked over or covered up. Producer compliance and participation is always going to be more difficult when such uncertainty exists. Hopefully this level of uncertainty has decreased since the time of the survey.

Producers' connections with and trust in local agencies provide an important source of "social capital" for overcoming these barriers and encouraging participation in water quality management. Social scientists define social capital as the social networks, trust, and reciprocal relationships that increase the level of cooperation in society. Many studies have shown how social capital is important for policy implementation (Putnam 2000; Schneider et al. 1997). Producers indicate the greatest level of social capital with long-established local agencies and organizations like the Agricultural Commissioners, the County Farm Bureau, UC Cooperative Extension, water districts, and resource conservation districts, and these trust-based networks increase participation and satisfaction with the Coalition process. Importantly, while some of the regional Coalition organizers such as NCWA, CURES, and DU have lower levels of trust than the sub-watershed organizations, the regional contact that has occurred appears to have been effective at generating participation. Hence, the constraint is more one of market penetration than product quality. These regional organizations should continue to build their social capital by building on the existing social capital earned by the local organizations. However, the regional and local organizations should not be competing for funding or support from producers. Rather, they should form partnerships for jointly developing and funding programs.

The new partnerships and working relationships that have formed in the past three years among these local and regional entities appear to be enhancing the level of cooperation among producers in the Sacramento River watershed. In general, policy decision-makers need to continue to invest more in coordinating with and increasing the capacity of these local agencies and organizations to implement water quality management policies. They are the main route to demonstrate to producers when, where, and how changes in their management attitudes and practices are needed.

Lastly, social values are also an important motivating factor. While producers generally do not think environmental goals should trump economic goals, they do report a very strong stewardship ethic and value clean water. To the extent these stewardship values are sincerely expressed, they provide a very important common ground between environmental goals and the social values of producers. The SVWQC does face the substantial challenge of operating in a conservative political culture that distrusts top-down governmental programs that place requirements on private decisions. However, like with any political process, the Coalition can overcome some of this challenge by continuing on the course outlined in its water quality management plan, that is, demonstrating they are responsive to input from the producers, and that they provide producers a means and the resources to effectively contribute to water quality policy and its implementation. It is important to note that this does not mean sacrificing water quality goals, but rather having a sufficient understanding of producers'

Recommendations

perspectives to enable their positive contribution.

- We intend these recommendations to make productive contributions to the policy dialogue surrounding Conditional Waivers. Some of these recommendations confirm existing ideas of which there are examples already in place. Other recommendations may suggest new directions or modifications of existing programs.

- Use incremental participation thresholds as compliance points. Instead of full participation as a short-term goal, Coalition groups should be offered incremental participation goals and timelines, building up to a final goal over time. Participation takes time even for willing producers.

- Use a "pragmatic enforcement" philosophy: There will always be some level of non-compliance even given the time needed for participation. Cooperating producers have less incentive to continue participation if they feel their peers are not held accountable to the same standard. However, many of the non-compliant producers are probably willing to cooperate once they understand the policies. Hence, a pragmatic enforcement philosophy should be used that relies primarily on outreach backed with notifications from the Regional Board and appropriate enforcement actions. Limit the strongest enforcement measures to habitual non-compliance cases.

- Reduce uncertainty: To reduce uncertainty, attempt to maintain clear program requirements that change only when essential to respond to new circumstances. Clearly communicate program requirements to local entities that have frequent contact and trust with producers. The early and frequent changes that have occurred to up to this point of implementing the Waiver have caused confusion. Some examples include changes in defining an irrigated agricultural discharger, water quality monitoring and reporting requirements, and enforcement efforts.

- Provide evidence for water quality problems: Data about the extent of water quality problems and agricultural sources needs to be clearly presented. This includes results from the water quality monitoring that is part of the Coalition groups, but also other data collected for programs such as the 305(b) reports. Given the complexity of the existing monitoring plan and data, strategies should be developed to simplify the presentation of the information for a broader audience.

- Demonstrate the role of urban areas: Producers need to be aware of regulations governing urban water pollution, urban expenditures on pollution control, and the extent of urban sources. This will lessen the feeling that agriculture is being singled out as the only cause of water quality problems. It might also point out valid concerns that producers have about shortcomings in water quality regulation in urban areas, which then could be addressed by the Regional Board.

- Invest in the capacity of local organizations: Local and regional organizations that are coordinating and supporting the subwatershed groups are critical to implement water quality management. Grant money, information, and staff support should be given to these organizations to increase their capacity to achieve outreach goals and insure other activities are congruent with Waiver requirements. Interagency collaboration should be facilitated through multi-stakeholder grant opportunities and removing institutional barriers to cooperative efforts.

- Clarify local, regional, and state responsibilities: Effective water quality management requires clarifying the responsibilities of local, regional, and state agencies with respect to BMP development, outreach/education, and enforcement. To the greatest extent possible, BMP development, outreach/education should be done by local groups with congruent missions such as UC Cooperative Extension, RCDs, the NRCS, and Agricultural Commissioners. The subwatershed groups will play an important role in capitalizing on how to utilize these local resources. Enforcement entails bringing state authority to bear on non-compliers, and should be conducted by the Regional Board in coordination with the Department of Pesticide Regulation using a pragmatic approach based on timely and accurate information provided from subwatersheds. The Memorandum of Understanding being piloted in Butte and Glenn counties between the Regional Board, the Department of Pesticide Regulation, and the County Agricultural Commissioners is a creative beginning model for clarifying roles.

- Acknowledge stewardship motivations: Stewardship motivations should be used to encourage participation. Instead of viewing producers as guilty polluters, they should be viewed as collaborators for pursuing the common goals of well-managed land and clean water. A reward program should be created that provides a public acknowledgement of leading environmental stewards. The CARES program of the Suwannee River Watershed Partnership in Florida is a good example (http://mysuwanneeriver.com/resources/cares1.pdf). The reward program should be coordinated by local

subwatershed leadership, but in partnership and cost-share with the Regional Board.

- Maintain institutional responsiveness: Decision-makers should demonstrate responsiveness to reasonable input from producers that is consistent with state law and will contribute to the overall effectiveness of the programs. Acknowledging and documenting when good ideas come from agriculture is an important task to increase the feeling of political efficacy.

- Expand the scope of collaboration: In the long run, successful water quality management will require resolving conflict between environmental, urban, and agricultural interests. Emphasizing stewardship values will play an important role in this resolution. However, environmental and urban interests should be more directly integrated into Coalition decision-making using collaborative processes. This will be difficult at first due to a history of distrust, but will produce long term benefits by creating institutions and relationships to support cooperation.

- Coordinate more with existing programs: There are many existing programs that emphasize best management practices to protect water quality and additional water quality monitoring networks in the Sacramento River Valley. Examples include the USDA's Environmental Quality Incentive Program and USGS monitoring stations. These programs and others like them should be coordinated with the Waiver program to operate more efficiently.

Appendix A: Correlation Analysis

The tables below display correlation coefficients between the two indicators of effectiveness and the different factors that might influence those indicators. Perceived Coalition Satisfaction is the average score on the four effectiveness questions in Figure 2. Number of Participation Activities is a count of the number of Coalition activities the respondent has participated in from the set of nine activities listed in Figure 3. Correlations coefficients are a statistics that measures the strength of a relationship between two variables on a scale ranging from [-1, 1]. Positive coefficients indicate a positive relationship, while negative coefficients indicate an inverse relationship. The closer the coefficient is to -1 or 1, the stronger the negative or positive relationship. Coefficients with an asterisk (*) in the tables indicate a correlation coefficient that is statistically different from zero according to standard statistical criteria. It is important to note that none of these correlation coefficients are large enough to indicate a single factor is

TABLE A1 Correnlations Between Effectiveness Indicators and Perceived Water Quality Problems

Perceived Problems	Coalition Satisfaction	Number of Participation Activities
Urbanization	.05	-.01
Regulatory Costs	-.09*	.12*
Ineffective Policies	-.07*	-.01
Loss of Farming Lifestyle	-.04	-.02
Hard to Identify Sources	.03	-.05
Inadequate Information	-.05	-.12*
Water Supply	.01	.04
Habitat Loss	.03	-.15*
Degraded Water Quality	.08*	-.12*

TABLE A2 Correnlations Between Effectiveness Indicators and Perceived Causes

Perceived Causes	Coalition Satisfaction	Number of Participation Activities
Urban Runoff	.02	.11*
Unknown	.03	.02
Reduced Water Flow	-.02	-.01
Natural Sources	.03	.17*
Agricultural Pesticides	.08*	-.09*
Agricultural Fertilizer	.10*	-.10*
Agricultural Sediment	.11*	-.07*
Agricultural Pathogens	.10*	-.12*

the

TABLE A3 Correnlations Between Effectiveness Indicators and Organization Trust

Organization	Coalition Satisfaction	Number of Participation Activities
USEPA	.14*	-.06
CALEPA	.14*	-.03
CURES	.30*	.17*
State Water Board	.24*	.01
State legislator	.19*	.17*
Ducks Unlimited	.24*	.06
Regional Water Board	.31*	.01
CA Dept. of Food and Ag.	.31*	.11*
CA Dept. of Water Resources	.27*	.06
NRCS	.25*	.19*
USDA	.28*	.05
County RCD	.37*	.25*
CA Dept. of Pesticide Regulation	.22*	.05
NCWA	.44*	.25*
California Farm Bureau	.34*	.13*
Commodity Organization/Coop	.34*	.29*
Other Farm Operations	.27*	.25*
Irrigation District	.33*	.18*
UC Cooperative Extension	.34*	.17*
County Farm Bureau	.32*	.14*
Agricultural Commissioner	.39*	.17*

only explanation for effectiveness. Rather, multiple factors must be considered together.

TABLE A4 Correnlations Between Effectiveness Indicators and Views on Agriculture and the Environment

Question Text	Coalition Satisfaction	Number of Participation Activities
Agricultural operators' knowledge of the land is very valuable for developing agricultural policy.	.13*	.05
Agricultural operators have a duty to protect the health of the land.	.03	.07*
Protecting water quality is an important public goal.	.19*	-.03
The discharge of storm water and irrigation runoff is essential to the economic viability of irrigated agriculture.	.16*	.05
Regulations to protect the environment are already too tough on agriculture.	-.05	.06*
In situations where there are conflicts between economic viability and environmental protection, it is more important to protect economic viability.	-.02	.03
Protecting the environment is a more important goal than maintaining economic viability	.07*	-.07*

TABLE A5 Correnlations Between Effectiveness Indicators and Views on Government and Society

Question Text	Coalition Satisfaction	Number of Participation Activities
In general, government agencies and regulations intrude too much on the daily lives of private citizens.	-.05	.08*
Policies made at the local level are better than policies passed by state or federal government.	.04	.07*
Protecting the private rights of individual citizens is the most important role of government.	-.01	.01
Public policy decisions should consider as many different interests as possible.	.14*	.01
People like me don't have any say about what the government does.	-.12*	-.11*
I consider myself well-qualified to participate in politics	-.05	.22*
Generally speaking, most people can be trusted.	.11*	.03
Maximizing the scope of public participation in policy decisions improves effectiveness	.13*	-.05
You can always trust the government to do what is right	.02	.04

Appendix B: Water Quality Monitoring Program and Results

Appendix B describes progress with implementing the Monitoring and Reporting Program and provides a summary of results through 2005 (based on the SVWQC Annual Monitoring Reports dated April 1, 2005 and December 30, 2005). It also describes changes approved by the Regional Board in the SVWQC Monitoring and Reporting Plan for 2006. More specific information can be downloaded from the following website:

http://www.waterboards.ca.gov/centralvalley/adopted_orders/Waivers/R5-2005-0833.pdf

Site Selection for Water Quality Monitoring

Prior to initiating monitoring in January 2005, the SVWQC proposed a total of 27 water quality monitoring sites throughout the Sacramento River Watershed. In late January, the first water quality monitoring event was completed for 14 of the 27 proposed monitoring sites. The other monitoring sites were pending approval by the Regional Board before monitoring was initiated. By March 2005, 26 SVWQC monitoring sites were slated for water quality monitoring. Nineteen of the sites were new sites established, managed, and paid for solely by the SVWQC and seven of the sites were coordinated with other pre-existing monitoring programs. For the seven shared monitoring sites, SVWQC provides additional funding to expand the scope of the water quality sampling and testing to meet the Regional Board Water Quality Monitoring Order for the Conditional Waiver. The Coalition has paid for the monitoring with its membership dues collected from producers who enrolled for coverage under the Waiver.

The main rationale for site selection was to focus on watershed-level sampling. Geographic coverage was insured by selecting monitoring sites in all ten of the subwatersheds in the SVWQC. Sites were selected on the basis of producer input, previous monitoring results, and drainage areas where irrigated agriculture is more prevalent and where agricultural practices are thought to be of greater risk to water quality. To allow for the cumulative effects of non-point agricultural sources, monitoring sites are located in primary drainage courses down-gradient of the majority of irrigated land. The sites are also located upstream, before they converge with the Sacramento River or any major tributaries to the river.

The monitoring sites managed by the SVWQC to comply with the Conditional Waiver should not be confused with other monitoring programs in the region. Many of the other monitoring programs in the region were created prior to the implementation of the Conditional Waiver, and do not currently meet the monitoring requirements of the Waiver. Future monitoring plans may integrate a broader network of monitoring sites.

Phase I Monitoring from January 1– December 31, 2005

Phase I monitoring commenced in late January, 2005. Storm water samples were taken from 14 monitoring sites. In March 2005, storm water samples were taken at 17 of the 26 sites during a second storm runoff event. Irrigation runoff samples were collected at all 26 sites between May and October, according to different monthly schedules as determined by water flows. In total, 141 water samples were collected (stormwater and irrigation runoff samples) from January 1 through December 31, 2005. An additional 20 sediment samples were collected during two of the monthly irrigation monitoring events.

Each monitoring event incorporates two types of water quality measurements: toxicity tests and basic water quality parameters. Water column toxicity was tested with three aquatic organismis representing low (Selanastrum algae), middle (Ceriodaphnia water flea), and higher (Pimephales flathead minnow larvae) levels of life in the freshwater aquatic ecosystem. A micro-invertebrate species (Hyallela) was used to test sediment samples for toxicity. Water quality from a site is considered toxic if there is a statistically significant reduction in growth rate (algae) or survival (other three species) of these organisms when exposed to water samples from the field in comparison to water from controlled environments with no risk of toxicity. A sample showing more than 50 percent reductions in growth or mortality triggers more intense Phase II monitoring in that drainage area. Similarly, sediment samples showing more than 20 percent mortality of the Hyallela micro-invertebrate test organism triggers more monitoring.

Concurrently with the toxicity testing, Phase I also evaluates a series of basic water quality parameters such as pH, electrical conductivity, dissolved oxygen, dissolved solids, turbidity, color, and pathogen levels. In 2005, 150 water samples were tested for pH from the 26 monitoring sites, 133 samples from 23 of the monitoring sites were tested for dissolved oxygen, 191 samples from the 26 sample sites were tested for E. coli bacteria, 147 samples from the 26 sites were tested for electrical conductivity, and 179 samples from 23 sites were analyzed for total

dissolved solids. Testing of these basic water quality parameters were initiated in Phase I of the monitoring program but are required by the Regional Board to be continued through all phases for the duration of monitoring at each site.

2005 Phase I Results

During the first year of Phase I monitoring, toxicity was observed in nine water samples (6.4 % of all samples) collected from six (23% of all monitoring sites) different monitoring sites in the SVWQC. Of these, two monitoring sites in the Butte/Sutter/Yuba watershed exhibited mortality of 100 percent for the water flea Ceriodaphnia. These findings triggered Phase II monitoring in these two drainage areas, which is described in more detail in the next section of the report. Three other monitoring sites (one in Shasta/Tehama, one in Yolo/Solano, and another in Butte/Sutter/Yuba) also resulted in toxicities and Phase II monitoring, which will not be described in this report for brevity.

There were a total of 20 sediment samples taken in the SVWQC during 2005. Of those 20 sediment samples, 13 (65%) reported statistically significant toxicity, and four of those (20% of all sediment samples) reduced the survival of the Hyallela micro-invertebrate by more than 20 percent. Overall, the sediment tests revealed substantially more toxicity than the water column tests with the algae, water flea, or minnow. One possible reason for this observation is a shift in pesticide use patterns from chemicals that dissolve in water to chemicals that bind to sediments. Phase II monitoring is likely to be implemented at these sites in 2006 if the sediment testing continues to show persistent toxicity.

In total, 800 water samples were analyzed for the basic water quality parameters of pH, dissolved oxygen, E. coli, conductivity, and total dissolved solids. Of this total, 71 of the water samples (9% of the total) exceeded a water quality objective. The highest frequency of exceedences occurred for E.Coli bacteria, which was above the basin plan objective for 37 out 191 samples (19%). Monitoring of these basic water quality parameters will continue at all of the sites in 2006 to better understand the reasons for the exceedences. In the case of the E. coli bacteria monitoring, specific tests may be considered at monitoring sites where exceedences persist to delineate the source. These sample sites may eventually advance into Phase III monitoring if the water quality problems can be attributed to agricultural sources.

Phase II Monitoring 2005

Phase II monitoring serves two functions, depending on the results of Phase I. First, at sites where Phase I monitoring does indicate toxicity, Phase II activates a more intensive series of tests designed to understand the type and general source of contaminant causing the toxicity. If these tests affirm the type and source of contaminant is related to irrigated agricultural practices in that drainage area, then monitoring at that site is advanced to Phase III.

The two monitoring sites located in the Butte/Sutter/Yuba subwatershed that showed highly significant mortality of the *Ceriodaphnia* water flea during Phase I demonstrate how Phase II monitoring is implemented. In Phase II monitoring, additional tests were performed to understand the magnitude, duration, and chemical characteristics of the toxin, including tests for specific pesticides known to be used in the area. The only pesticide identified by the Phase II investigations at both sites was Dichlorvos, which is not registered for use in irrigated agriculture but is registered for use as animal husbandry products to control insect pests around barns, feed lots, and similar facilities. Since the source of the toxicity appears unrelated to irrigated agriculture, steps to correct this specific water quality problem are outside of the scope of the Conditional Waiver and are not the responsibility of SVWQC.

Second, at sites where Phase I testing does not indicate toxicity in the water bodies, the toxicity testing is suspended during Phase II monitoring. The toxicity testing is replaced with testing the water samples for specific pesticides, trace metals, and nutrients used in irrigated agricultural production either in the present or past. The concentrations of the constituents are compared to their respective water quality objectives established by the Regional Board. Each subwatershed can submit a request to omit testing for selected constituents if they can demonstrate those constituents are not used in the subwatershed based on known cropping patterns and pesticide use records.

If Phase II monitoring does not reveal any specific water quality problems, then these monitoring sites may eventually (timeframe is not explicitly defined to provide flexibility) become candidates for removal from the Conditional Waiver monitoring program and substituted with an alternative monitoring site representing a different agricultural drainage in the SVWQC. If Phase II monitoring reveals a specific agricultural constituent that exceeds a water quality objective, monitoring at this site is elevated to Phase III monitoring at the discretion of the Regional Board.

In 2005, Phase II monitoring was implemented at many of the SVWQC monitoring sites. In total, 204 water samples were analyzed for specific pesticides, metals, or nutrients. Specific pesticides were detected in 25 of the 204 samples (12 percent of all samples) and six different

pesticides were identified. These sites may be advanced to Phase III, depending on the results of 2006 monitoring and future monitoring plans as approved by the Regional Board.

SVWQC Monitoring in 2006

The Regional Board approved the second year of the SVWQC Monitoring and Reporting Plan to comply with the Conditional Waiver for Irrigated Lands in February 2006. The number of agricultural drainages and monitoring sites was increased from 26 to 31 sites to provide added coverage throughout the Sacramento River basin. The goal of the 2006 plan is to monitor water quality during two storm water events and to monitor water quality monthly during the irrigation season for each water body to the extent irrigation runoff occurs. Phase I monitoring (basic water quality parameters and aquatic toxicity) has been approved for five of the 31 sites and associated drainages. Phase II monitoring (aquatic toxicity suspended while basic water quality parameters and specific irrigated agricultural constituents are tested) has been approved for 14 of the 31 sites. A combination of Phase I and Phase II monitoring (aquatic toxicity, basic water quality parameters, and specific irrigated agricultural constituents) is approved for the remaining 12 drainages and associated monitoring sites.

Phase III Monitoring 2007 and Beyond.

Monitoring is elevated to Phase III when Phase I and II monitoring identifies a specific irrigated agricultural source to be responsible for toxicity or exceeding Regional Board water quality objectives. None of the SVWQC monitoring sites and corresponding water bodies has been elevated to Phase III water quality monitoring as of March 2006. During Phase III, subwatershed coordinators and leaders will work with local producers and stakeholders implement "Best Management Practices"(BMPs) to mitigate the specific water quality problem. Phase III monitoring assesses whether the adoption of BMPs improves water quality to the point that all water quality objectives are met in the drainage. Phase III monitoring must also document the types and level of adoption of BMPs such as changes in crop type, pesticide and fertilizer use, and other agronomic or horticultural practices.

If implementation of BMPs in Phase III monitoring are not successful in achieving the water quality objectives, other options may be considered such as limiting the use of specific agricultural practices causing a water quality problem. The Regional Board may decide to implement specific agricultural water quality management policy in scenarios where extensive efforts to adopt BMPs do not resolve a water quality problem and are posing significant economic hardships to producers. Depending on the nature of the water quality problem, Phase III monitoring and corrective measures may require multiple years of implementation.

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