

## Cooperative Groundwater Monitoring Program for Irrigated Lands in Southern Region 3

### I. PROGRAM OVERVIEW

#### 1.1 Purpose

The purpose of the Program is to develop an effective groundwater monitoring program in the area of the participating dischargers and minimize costs.

#### 1.2 Geographic Scope

The Program will focus mainly on groundwater aquifers in southern San Luis Obispo and northern to mid Santa Barbara Counties, which is in the southern portion of the Central Coast Water Board's (Region 3) jurisdiction. The area is identified as the "South Coast Range-Coastal Study Unit" by the U.S. Geological Survey (USGS).



**Figure 1. Map of hydrogeologic provinces as defined by USGS.** Source: *South Coast Range-Coastal Study Unit... GAMA Program*, USGS (2010).

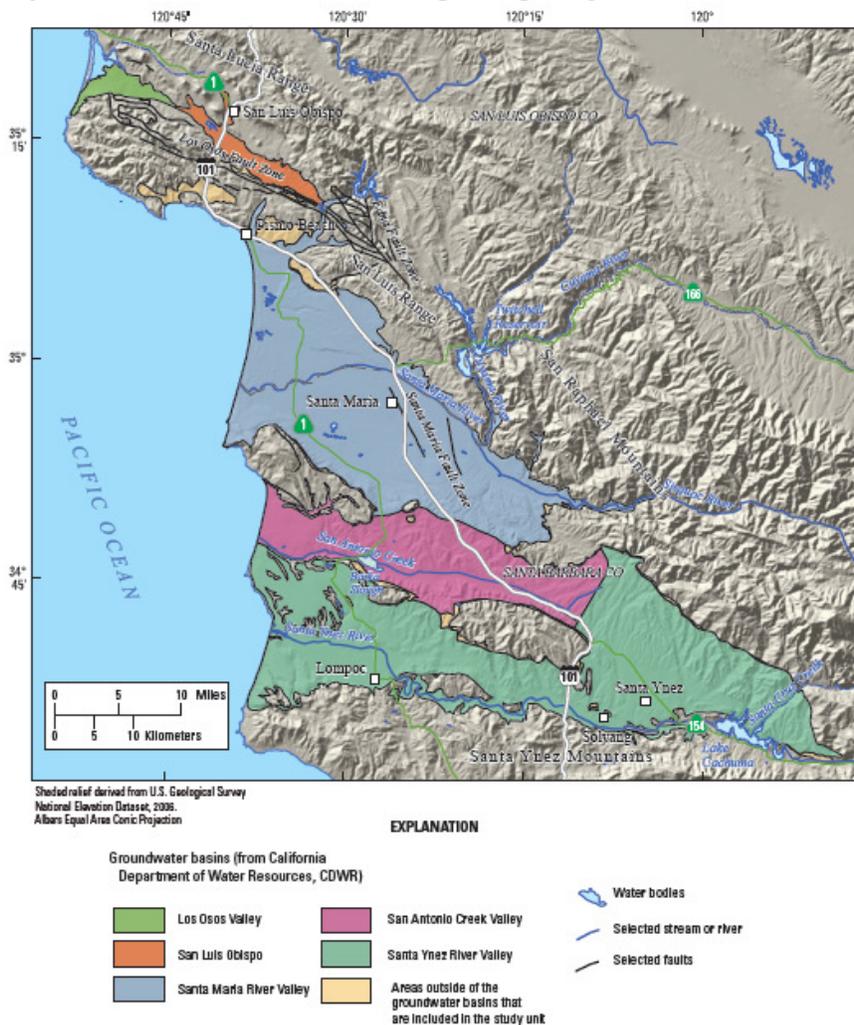
### 1.3 Groundwater Basins

The Program will focus on the local Central Coast Hydrologic Region groundwater basins as defined by DWR and will likely include the following basins:

Program Focus	DWR Basin Number	Basin Name
Primary	3-12	<b>Santa Maria River Valley</b>
	3-14	<b>San Antonio Creek Valley</b>
	3-15	<b>Santa Ynez River Valley</b>
Secondary	3-8	Los Osos Valley
	3-9	San Luis Obispo Valley
	3-41	Morro Valley
	3-42	Chorro Valley
	3-45	Huasna Valley
	Other	Other

**Table 1. Primary and secondary groundwater basins included in Program scope.**

The basin names that appear in bold (Santa Maria, San Antonio, Santa Ynez) will be the primary focus of the Program, given the high concentration of farmers in those regions. The Program’s involvement in the other listed basins will be subject to the interest of farmers in participating in those areas.



**Figure 2. Map of groundwater basins in southern San Luis Obispo County and north-mid Santa Barbara County.** Source: *South Coast Range-Coastal Study Unit... GAMA Program, USGS (2010).*

## 1.4 Program Participants

**Participation in the Program is voluntary.** Other compliance options available to dischargers include individual and other cooperative monitoring programs. The Program will focus primarily on providing Cooperative Groundwater Monitoring services to interested participants in Southern Region 3. The Program will be **open to all interested parties within the defined geographic scope**. The majority of Program participants will likely be farmers who grow row crops such as broccoli, strawberries, cauliflower, celery, and lettuce. There may also be participants who grow other crops such as raspberries, blueberries, grapes, flowers, and tree crops.

## 1.5 Program Context

### Existing Studies

The primary groundwater basins have numerous existing studies and multiple stakeholders. The Santa Barbara County Water Agency has been very active in groundwater basin studies and publishes a tri-annual report on the conditions of the basins. The County contracts with USGS to conduct groundwater quality monitoring at a number of wells in the area of the dischargers. The Santa Maria Basin is an adjudicated basin divided into several management areas; annual reports are due to the Court on the conditions of the basin.

The most significant relevant, recent studies are referenced throughout this proposal and include:

- *Santa Barbara County 2011 Groundwater Report*, Santa Barbara County Public Works Department, Water Resources Division, Water Agency, May 1, 2012.
- *2011 Annual Report of Hydrogeologic Conditions, Water Requirements, Supplies and Disposition, Santa Maria Valley Management Area*, Luhdorff and Scalmanini Consulting Engineers, April 2012.
- *Santa Maria Valley Groundwater Assessment*, GEI Consultants, final draft pending.
- *San Luis Obispo County Master Water Report*, Carollo Engineers, May 2012.
- *2011 Annual Monitoring Report, Northern Cities Management Area [Santa Maria Basin]*, GEI Consultants, May 4, 2012.
- *Groundwater-Quality Data in the South Coast Range-Coastal Study Unit, 2008: Results from the Central Coast GAMA Program: U.S. Geological Survey Data Series 504*, USGS, 2010.
- *Ground-Water Hydrology and Quality in the Lompoc Area, Santa Barbara County, California, 1987-1988*, USGS WRI Report 91-4172, 1992.

The pending *Santa Maria Valley Groundwater Assessment* is being funded through the Santa Barbara County Integrated Regional Water Management Plan (IRWMP) and is the foundation of the Salt and Nutrient Management Plans that local wastewater treatment plants are preparing to comply with the State Water Board's Recycled Water Policy. The Grower-Shipper Association has been actively involved in the development of the assessment and has worked closely with other stakeholders throughout the process.

## Ongoing Association Efforts to Improve Water Quality

- **Salt and Nutrient Management Plan.** As previously mentioned, the Association has been actively engaged with other stakeholders in the development of the Plan and will continue to collaborate in the coming years.
- **Subwatershed Collective Water Treatment.** The Association has also been in discussions with stakeholders such as the Regional Water Board, Cachuma and Coastal San Luis Resource Conservation Districts, City of Santa Maria, and State Parks regarding the installation of Collective Treatment Systems to address water quality impairments. The forms and locations are still being considered and the Association has been an active voice representing agricultural stakeholders in these projects.
- **Farmer and Community Outreach on Ag Order Compliance.** The Association has been actively involved in assisting members in complying with the Ag Order. Numerous farmer outreach meetings have been organized and are well-attended. The Association has conducted countless individual and small group meetings to provide additional assistance to farmers in complying with the Order. The Association has developed many additional resources to assist growers with understanding the requirements that are specifically adapted to local conditions, such as the location of impaired waterbodies and local backflow prevention requirements. The Association has also been a focal point for farmers who are unclear about the Ag Order's requirements. The Association's leadership in assisting farmers comply with the Ag Order has helped to bring many farmers into compliance with the Order. The Association has also been a voice in explaining the Ag Order to civic organizations and the radio, television, and written media.
- **Long-Term Strategy.** The Association formed a Water Committee to provide direction to staff and the Board of Directors on matters related to water. The Committee has been meeting frequently and intends to use the results of the Cooperative Groundwater Monitoring Program and other local, private cooperative research efforts to inform next steps to address water quality.

## 1.6 Drinking Groundwater

### Private Wells

There is currently no reliable information available regarding the use of private wells for drinking water. The Association contacted the Santa Barbara County Water Agency and DWR and neither had reliable information about well registration or use. The Association also attempted to calculate the difference between the self-reported populations served by Water Purveyors in the County and population numbers in the Census, but the Water Purveyor figures exceeded the Census population figures and this method proved to be unreliable.

**It is important to note that not every private household domestic well is used for drinking water. This may be due to a number of factors, such as other water quality parameters affecting taste, cultural preference, and conveyance system.**

### Public and Private Purveyors

The following table shows the populations served as self-reported by water purveyors such as Cities, Community Service Districts, and private companies.

**Santa Barbara County 2011 Water Use**

Agency	Population Served*	M&I** Water (Acre-Feet per year )	Per-Capita Water Use***		Number of Connections by Type				
			(a) Based on Total M & I	(b) Based only on Residential water	Single Family	Multi-Residential	Commercial Institutional	Industrial	Landscape
City of Buellton	4,878	1,193	218	189	1,219	139	172	26	10
Carpinteria Valley WD	15,141	1,979	117	81	3,046	332	276	57	40
Casmalia CSD	150	9	55	48	50	0	3	0	0
Cuvama CSD	820	133	145	87	217	0	15	0	22
Golden State Water Co.	39,353	7,032	160	134	11,304	135	327	7	63
Goleta Water District	87,000	9,736	100	63	13,359	1,581	989	4	213
City of Guadalupe	7,080	910	115	72	1,795	11	102	0	26
La Cumbre Mutual WC	4,900	1,403	256	228	1,435	0	0	0	4
City of Lompoc	39,258	4,288	98	70	7,715	1,096	599	18	126
Los Alamos CSD	1,800	278	138	98	468	29	22	0	13
Mission Hills CSD	3,300	653	177	177	1,220	0	2	0	6
Montecito Water Dist	13,000	4,517	310	264	4,210	73	242	0	0
City of Santa Barbara	91,931	11,588	113	80	16,870	6,177	2,599	56	893
City of Santa Maria	100,062	12,127	108	72	18,300	848	1,956	96	512
Sta Ynez RWCD-ID#1	8,928	2,505	251	242	2,380	0	0	0	0
City of Solvang	5,289	1,286	217	147	1,658	82	241	23	113
Vandenberg AFB****	4,000	1,747	390	188	1,600	0	48	0	5
Vandenberg Village CSD	6,497	1,202	165	127	2,293	50	67	0	15

\* Population as reported by water purveyor

\*\* M&I (Municipal, Commercial & Industrial) refers to all urban use, not including agricultural irrigation or wholesale sales. 1 acre-foot=325,851 gallons.

\*\*\* Per Capita Use is shown as (a) total M&I water divided by population and (b) Single & Multi-Family Residential use divided by pop.

\*\*\*\* VAFB is largely non-metered; and daily employee population is 3 times the resident population.

Compiled by Randy Turner, Santa Barbara County Water Agency, April 2012; contact rturner@cosbpw.net, (805)-568-3541

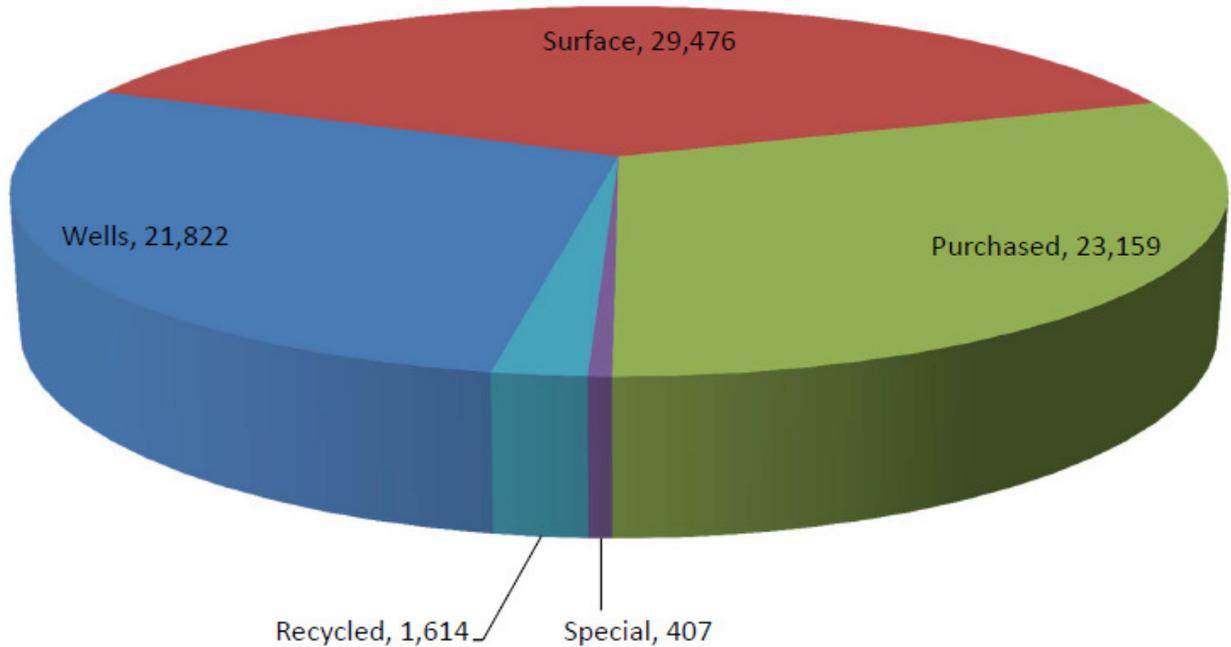
Data is from each water purveyor's form DWR#38: *Public Water System Statistics* for CY2011

**Table 2. Population served and water use as reported by Santa Barbara County water purveyors.**  
Source: *Santa Barbara County 2011 Groundwater Report*.

### *Sources of Water Purveyed*

Many water purveyors utilize a blend of water sources, including surface water, particularly from reservoirs; purchased water, including California State Water Project deliveries; and groundwater.

## **Urban Water Production by Supply Type in Acre Feet for 2011**



**Figure 3. Source of water purveyed in Santa Barbara County.** Source: *Santa Barbara County Water Production and Use Report* (2011).

### *Reservoirs*

Many of the basins in the Program area are impacted by reservoirs that provide either a direct source of drinking water and/or are managed to increase groundwater recharge. Examples include the Cachuma Reservoir in the Santa Ynez River Valley, as well as Twitchell and Lopez Reservoirs in the Santa Maria River Valley.

### *State Water Project*

The Coastal Branch of the State Water Project passes through Santa Barbara and southern San Luis Obispo Counties. State Water Project deliveries began in 1997 and have been a significant development in terms of the quality and quantity of water available to local water users in both counties. Not all cities elected to participate in the Project. The City of Santa Maria by far has the greatest allocation at 16,200 AFY, while other recipients are 5,500 AFY or less (note: allocations do not necessarily equal actual deliveries).

### *Groundwater*

The utilization of groundwater by purveyors varies greatly between purveyors, time of year, and year-to-year. Additional information is available in the *Santa Barbara County 2011 Groundwater Report* and the *San Luis Obispo County Master Water Report* (2012) Volume II.

## II. PROGRAM IMPLEMENTATION

### 2.1 Program Design

#### Number and Distribution of Samples Collected

In general, the Cooperative Groundwater Monitoring Program will utilize an adapted randomized grid-based method employed in the USGS *South Coast Range-Coastal Study Unit... GAMA Program* (2010), which was prepared in cooperation with the California State Water Resources Control Board. As with the USGS GAMA study, the Program expects to sample approximately 1 well per 10 square-miles (mi<sup>2</sup>). Recognizing the limitations of a strict grid-based method's ability to capture each basin's unique characteristics, the "grid" will likely not be rectangular in shape. Instead, the final shape of the "grid" polygons and number of wells sampled will be adjusted for factors such as:

Social	Technical
• Voluntary participation in the Cooperative Groundwater Monitoring Program	• Groundwater direction of flow and quality trends
• Stability of land tenure	• Non-agricultural land use
• Suitability of well access	• Geologic structure of aquifer
• Identifiable spatial reference features, such as roads	• Presence of "shallow" wells to sample
• Use of groundwater wells in the area	• Type and degree of impairment
• Tier of farms in the area	• Presence of a confining layer between the shallow and deep aquifers
• Use of groundwater for drinking	• Depth to groundwater contours
• Current and historical land uses	• Distribution front of discharge

**Table 3. Factors that will influence "grid" polygons' shape and size.**

The Program will coordinate between samples currently being collected and, where needed, collect new samples. Currently a number of groundwater quality samples are collected by the USGS from farms enrolled in the Order. The Program will leverage these sites to avoid duplication of efforts and focus resources on efforts to fill data gaps and improve water quality. Additional sites will likely be identified and sampled to fill data gaps, subject to participation and type of data gaps.

#### Shallow Aquifer

Many of the basins in the Program area consist of Quaternary Alluvium overlaying Careaga Sand. Some of the basins have confined areas while others do not. The Project will attempt to sample a well representing the shallow strata of the aquifer in each polygon. What constitutes shallow strata varies between and within each aquifer. In the event that no shallow wells are present in a polygon, an alternate well will be tested. The depth of agricultural wells is a function of the local hydrology, technology available at the time of well construction, and an individual landowner/operator's business decision and is beyond the control of the Program.

The Program anticipates that the amount of information available on well construction will be variable. At a minimum, the Program will attempt to characterize whether the water quality samples are coming from the shallow or deep strata of the aquifer of each polygon.

**Note: The Program is focusing on sampling wells from the shallow strata of the aquifer to be consistent with the requirements outlined in the MRP. However, the information gathered is not necessarily representative of the quality of water being used for irrigation throughout the Program area. Future analysis of Program results must consider the context of the source data, limited representativeness, and implications of making policy decisions based on a skewed data set.**

## Drinking Groundwater

Participants in the Cooperative Groundwater Monitoring Program will be surveyed to identify the use of groundwater for drinking purposes. Cooperators must agree to take individual steps to evaluate groundwater used for drinking on participating farms for the parameters in Table 3. The steps taken to address this information will depend on the nature of the impairment and desired course of action of the Participant.

## Collection of Samples, QA/QC, and Analysis

Depending on the approved program design, the Program will contract with USGS and/or a private lab(s) to collect and analyze the samples. The samples will be collected by a qualified third party, who will be responsible for following proper quality assurance (QA) and quality control (QC) protocols. The samples will be analyzed for the parameters listed in Table 3 of the MRPs.

**Table 3. Groundwater Sampling Parameters**

Parameter	RL	Analytical Method <sup>3</sup>	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10	EPA Method 310.1 or 310.2	mg/L
Total Alkalinity as CaCO <sub>3</sub>			
Calcium	0.05	General Cations <sup>1</sup> EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO <sub>4</sub> )	1.0	General Anions EPA Method 300 or EPA Method 353.2	
Chloride	0.1		
Nitrate + Nitrite (as N) <sup>2</sup> or Nitrate as NO <sub>3</sub>	0.1		

<sup>1</sup>General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater monitoring and laboratory analysis.

<sup>2</sup>The MRP allows analysis of "nitrate plus nitrite" to represent nitrate concentrations. The "nitrate plus nitrite" analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate. Dischargers may also analyze for Nitrate as NO<sub>3</sub>.

<sup>3</sup>Dischargers may use alternative analytical methods approved by EPA.

RL – Reporting Limit; µS/cm – micro siemens per centimeter

**Table 5. Groundwater Sampling Parameters as specified in Table 3 of the MRPs.**

If the Program contracts with USGS, USGS schedules utilize a reporting limit that is less than or equal to those in Table 3, with the exception of TDS, which has a reporting limit of 20 mg/L. If the Program contracts with a private lab, the lab will be ELAP/NELAP certified.

Additionally, the Cooperative Groundwater Monitoring Program Report will provide information on the well depth when possible, with the intent to include wells to characterize water from the shallow strata of the aquifer as feasible.

### Sample Collection Frequency

Groundwater samples will be collected once every three (3) years. The Santa Barbara County Water Agency prepares a Groundwater Report on a tri-annual basis. The report was formerly prepared annually but in 2006 the County Board of Supervisors followed Staff’s recommendation to change to a tri-annual basis “since groundwater conditions tend to change little on a year-by-year basis” (2011 Groundwater Report Forward). The most recent report was prepared for County Water Year 2011.

The vast majority of farms in the Program area are Tier 1 and Tier 2, which requires a fall sample and a spring sample collected once every 5 years. The tri-annual sampling will be representative of the overwhelming majority of the farms in the discharge area. The few farms that are Tier 3 will also be adequately captured in the Program, since they operate in close proximity to other farms.

### Sample Collection Schedule

Samples will be collected during the months of June through September. The collection schedule has been set to coordinate with the current sampling efforts funded by the Santa Barbara County Water Agency and collected by the USGS. The collection date varies slightly by groundwater basin but generally occurs in July and August. The collection timeframe is based on a variety of factors, including probability that the pump is running at time of collection and Agency experience that samples collected during that time are most representative of the overall water quality of the basin. It is important for the well to be running, since a well should be purged to “turn over” the volume of the casing between 2.5 and 3 times for an accurate sample.

## **2.2 Implementation Timeline**

<b>Date</b>	<b>Task</b>
March 15, 2013	Submit Program to Executive Officer for approval
Plan approval to May 31, 2013*	Open enrollment period in Cooperative Groundwater Monitoring Program and finalization of sample sites
June 1, 2013 through September 30, 2013	Collect first round of samples
October 2013 to February 2014**	Analyze Groundwater Monitoring results and develop Cooperative Groundwater Monitoring Program Report
November 15, 2013 to March 1, 2014**	Submit Cooperative Groundwater Monitoring Program Report to the Water Board
December 2013 on	Disseminate results of groundwater monitoring to participants and work to implement practices to benefit water quality
March to May 2016	Verify current well information for second round of sampling
June 1, 2016 through September 30, 2016	Collect second round of samples
November 15, 2016 to March 1, 2017**	Submit Cooperative Groundwater Monitoring Program Report to the Water Board
March 14, 2017	Order No. R3-2012-0011 expires. Central Coast Water Board will consider renewing or revising the permit.

**Table 6. Cooperative Groundwater Monitoring Program Implementation Timeline.**

\*The end date may be extended depending on Program approval date; in any case the Program expects to complete collection of the first round of samples by September 30, 2013.

\*\*The reporting date range depends on the lab service contracted and reflects variability in sample collection and processing times. For example, USGS samples may require several months of QA/QC to prepare the final approved results.

### **III. COOPERATIVE GROUNDWATER REPORTING**

#### **“Grid” Polygons**

A map(s) of the Program’s polygons will be developed and submitted.

#### **Enrollment Information**

- List of participating operations and AW numbers.
- Number of farms enrolled by polygon
- Number of wells used for drinking by polygon

Note: some farms may span two or more polygons. This information will be addressed if it emerges.

#### **Hydrological Context**

With each Report, the Program will make an effort to identify major hydrological influences that impacted water quality during the previous reporting period. This may include precipitation, changes in the operation of upstream dams, and long-term factors such as changes in recycled water policies. The report may also comment on historical and/or current land use as it pertains to water quality results, such as the presence of dairies, feedlots, waste water treatment plants, oil fields, and landfills.

#### **Agricultural Context**

With each Report, the Program will make an effort to identify major agricultural influences that may have impacted water quality during the previous reporting period. This may include changes in land use and agricultural practices.

#### **Drinking Groundwater**

With the first Report, the Program will report on the results of enrollment regarding the use of groundwater for drinking purposes. The Program will also report on steps taken to address this information, which will depend on the information gathered.

#### **Groundwater Quality Results**

To encourage Program participation, Groundwater Quality Results will be reported by polygon. The exact location of the wells sampled will not be reported. When feasible, the Report will also include information on whether the sample was collected from the shallow or deep strata of the aquifer.

#### **Public Disclosure**

Per the Order (#65, page 26), the Program may assert that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure. If so, the Program will provide an explanation of how those portions of the reports are exempt from public disclosure. The Program will clearly indicate on the cover of the report that the Program asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, and submit separately (in a separate file) unredacted pages (to be maintained separately by staff).

## IV. PROGRAM ADMINISTRATION

### 4.1 Program Management and Administration

Claire Wineman is the President of the Grower-Shipper Association of Santa Barbara and San Luis Obispo Counties and will be the staff contact responsible for the administration of the Cooperative Groundwater Monitoring Program. Ms. Wineman works at the direction of the Board of Directors and may procure additional staff and contract resources as appropriate to successfully implement the Program.

Ms. Wineman has extensive project administration experience, including managing complex, multi-year projects focusing on agriculture and the environment at the Cachuma Resource Conservation District and an international economic development consulting firm. Ms. Wineman earned a degree in Environmental Economics and Policy with an emphasis on Environmental Science at UC Berkeley. Her coursework included the study of quantitative methods and experimental design, including courses related to chemistry, analysis of environmental data, methods and modeling of dynamic resources, and water resource economics.

The Association formed a Water Committee to provide direction to Association Staff and members of the Board. The Water Committee includes members who are on the Board as well as other members. The Committee provides recommendations to the Board of Directors for final review.

The Board of Directors is the Association's governing body and will provide ultimate direction and responsibility for the Program. The Board will consider the recommendations made by the Water Committee and work with Staff to implement the policies of the Board on behalf of the membership.



**Figure 4. Cooperative Groundwater Program Management.** Grower-Shipper staff, Water Committee, and Board of Directors will effectively administer the Program and interact with the Water Board and staff.

## 4.2 Enrollment

**Participation in the Program is voluntary.** In order to participate, farmers must provide the Association with the following:

- Copy of NOI(s), including AW#.
- Permission for Water Board to grant GSA access to current NOI(s) for each operation.
- Well information. Well depth, the use of any wells on the property for drinking water, and other pertinent information may also be required to compile final sites.
- Access agreement signed by the operator and landowner(s) or landowner(s)' designated representative. Every participant must grant the Program the right to sample their well and be willing to provide access and directions, and coordinate with the technician collecting the sample to locate the well and provide a running pump.
- Commitment to evaluate water used for drinking. Cooperators must agree to take individual steps to evaluate groundwater used for drinking on participating farms for the parameters in Table 3. The steps taken to address this information will depend on the presence and nature of the potential impairment and desired course of action of the Participant.

## 4.3 Program Modifications

The Program recognizes that unanticipated variables may emerge as the Program is being implemented. The Program may propose revisions to the Executive Officer for approval when the modifications are justified to accomplish the objectives of the Program. Any proposed revisions will be submitted in writing and subject to approval of the Executive Officer.

## 4.4 Program Funding

The Grower-Shipper Association of Santa Barbara and San Luis Obispo Counties will work with participants to adequately fund Program expenses. Depending on the final cost of the Program, which is a function of the final approved design, the Association may fund the cost of sampling on behalf of its members or may raise additional funds to cover Program expenses. The fundraising aspect, if necessary, may be on a per-acre, farm, or operation basis, as deemed appropriate by the Association's Water Committee and Board of Directors. Farmers who are not Association members will be allowed to participate for a fee determined by the Association's Water Committee and Board of Directors.

## **V. PROGRAM BENEFITS**

There are many aspects of the proposed Cooperative Groundwater Monitoring Program that benefit the Water Board, other local stakeholders, and farmers. These benefits include:

### **Leadership and Cohesiveness**

Perhaps the greatest benefit of the proposed cooperative effort is that it provides leadership and brings participants together to move towards the common goal of understanding and improving water quality. The local agricultural community is built upon close personal relationships. The Grower-Shipper Association has taken a strong leadership role in assisting the agricultural community with water quality issues and has become a focal point in the local community.

### **Scientific Consistency and Context**

There is a tremendous scientific advantage to having a consistent, coherent data set collected as proposed. Advantages include having consistent protocols in the collection and analysis of the samples by the contracted third parties. Furthermore, additional information, such as the relative depth of the well, will provide more insight than what is currently being gathered by individual groundwater reporting.

Sampling and analyzing wells on an individual basis provides glimpses of information but is weakened by the complexities of groundwater dynamics and the context from which the sample was taken. The Program will put the groundwater samples into a greater context.

Also, the Program will attempt to provide consistency in the wells being sampled through time. Although trend analysis is not currently required under the Order, the information may be useful. This consistency is much more feasible through the cooperative than through individual groundwater monitoring, where complex and dynamic land tenure limit long-term trend analysis and consistency of the data set.

### **Focus on Improving Water Quality**

The proposed Cooperative Groundwater Monitoring Program is a way to make efficient use of finite resources to gather information about groundwater quality and allow farmers to focus their attention on implementing practices to improve water quality.