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**VENTURA COUNTY AGRICULTURAL IRRIGATED LANDS GROUP (VCAILG)**

# 2012 Water Quality Management Plan

*submitted to:*

**LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD**

*prepared by:*

**LARRY WALKER ASSOCIATES**

*On behalf of the*

**VENTURA COUNTY AGRICULTURAL IRRIGATED LANDS GROUP (VCAILG)**

LARRY WALKER ASSOCIATES

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# Acronyms

| | |
|---|---|
| AMR | Annual Monitoring Report |
| BMP | Best Management Practice |
| LA | Load Allocation |
| MIL | Mobile Irrigation Lab |
| MRP | Monitoring and Reporting Program Plan |
| NOA | Notice of Applicability |
| NOI | Notice of Intent |
| NRCS | Natural Resources Conservation Service |
| OC | Organochlorine |
| OP | Organophosphorus |
| PCB | Polychlorinated biphenyl |
| QAPP | Quality Assurance Project Plan |
| RCD | Resource Conservation District |
| TMDL | Total Maximum Daily Load |
| UCCE | University of California Cooperative Extension |
| VCAILG | Ventura County Agricultural Irrigated Lands Group |
| WQMP | Water Quality Management Plan |

# Introduction

On October 7, 2010 the Los Angeles Regional Water Quality Control Board (Regional Board) adopted a *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands within the Los Angeles Region* ("Conditional Waiver", Order No. R4-2010-0186). The purpose of the Conditional Waiver is to assess the effects of and control discharges from irrigated agricultural lands in Los Angeles and Ventura Counties, including irrigation return flows, flows from tile drains, and storm water runoff. These discharges can affect water quality by transporting nutrients, pesticides, sediment, salts, and other pollutants from cultivated fields into surface waters, potentially impairing designated beneficial uses. Owners and operators of agricultural lands in Ventura and Los Angeles Counties must comply with provisions contained in the Conditional Waiver or be regulated under other Regional Board programs.

The Conditional Waiver allows individual landowners and growers to comply with its provisions by working collectively as a Discharger Group, or as an individual. A Discharger Group is defined by the Conditional Waiver as "any group of dischargers and/or organizations that forms to comply with this Order. Discharger Groups can be, but are not limited to, organizations formed on a geographic basis or formed with other factors in common such as commodities." The primary purpose of allowing Discharger Groups is to encourage collaboration on monitoring and reporting and to increase the effectiveness of management practices throughout a watershed to attain water quality standards. Those landowners and growers choosing to comply with the Conditional Waiver as a Discharger Group must signify by submitting a Group Notice of Intent and by developing a Discharger Group monitoring program.

To assist agricultural landowners and growers that farm within the boundaries of Ventura County, various agricultural organizations, water districts and individuals joined together to form the Ventura County Agricultural Irrigated Lands Group (VCAILG), which is intended to act as one unified "Discharger Group" for those agricultural landowners and growers that wish to participate. A Notice of Intent (NOI) to comply with the Conditional Waiver was submitted to the Regional Board by the VCAILG on April 7, 2011. The NOI included the VCAILG membership roster, as well as the required Quality Assurance Project Plan (QAPP) and Monitoring and Reporting Program Plan (MRP), which detail the water quality monitoring and reporting procedures being conducted in compliance with the terms of the Conditional Waiver. The Regional Board responded by issuing the Notice of Applicability (NOA) to the VCAILG on September 15, 2011, signifying the Regional Board's approval of the VCAILG and its Monitoring Program.

With receipt of the NOA, VCAILG monitoring commenced and the first Annual Monitoring Report (AMR) under the 2010 Conditional Waiver was submitted February 26, 2013. The AMR provides a detailed summary of activities of the VCAILG during 2011-2012, including administration of the VCAILG, an overview of farming in Ventura County, coursework offered to Group members to fulfill the Conditional Waiver's education requirement, a list of education hours completed to date by each member, and monitoring data collected during the wet and dry monitoring events conducted. Also included is a discussion of monitoring results that exceeded water quality benchmarks.

The Conditional Waiver specifies that if the monitoring results demonstrate an exceedance of water quality benchmarks, then a Water Quality Management Plan (WQMP) must be developed. Per the August 3, 2012 approval letter from the Regional Board Executive Officer, this WQMP

is being submitted on March 15, 2013. Future WQMPs will be submitted May 26th. As specified in Conditional Waiver, "the primary objective of the WQMP is to identify and construct or implement targeted management practices to reduce or eliminate waste discharges from irrigated agriculture lands to the water of the state in order to achieve water quality objectives." To meet this objective, the WQMP is designed to:

1. Assess the impacts of waste discharges from irrigated lands to surface waters;
2. Quantify and identify waste sources;
3. Identify and implement new and/or revised management practices to reduce or eliminate discharges of waste that cause or contribute to exceedances of water quality benchmarks;
4. Document the implementation and maintenance of management practices; and
5. Document attainment of water quality benchmarks.

This document serves as the WQMP for exceedances of water quality benchmarks that occurred during the 2011-2012 monitoring year. All of the water quality benchmark exceedances are addressed by this WQMP. The WQMP also discusses the water quality problems that can be caused by the benchmark exceedance and the degree to which agricultural discharges are contributing to the problem (where feasible and appropriate). By addressing exceedances of all Conditional Waiver water quality benchmarks, applicable total maximum daily load (TMDL) allocations for agriculture, as specified in Appendix 3 of the Conditional Waiver, are included. Additionally, past WQMPs written under the 2005 Conditional Waiver, as well as this one, serve to meet the WQMP development requirement for those TMDLs that compel one.

The WQMP contains five major sections. The first section provides a discussion of the VCAILGMP and TMDL monitoring site locations, crop types that drain to each site, standard water quality benchmarks, TMDL load allocation benchmarks, and a summary of exceedances that occurred during the 2011-2012 monitoring year. To further support this first section, constituent-specific information in Appendix A summarizes the currently available information on sources of the constituents and discusses the water quality problems associated with the benchmark exceedances. Site specific detail regarding benchmark exceedances can be found in Appendix B. The second section is a pesticide use evaluation assessment providing information correlating application dates and amounts within the monitoring drainages with site specific monitoring data. Use trends over time are also described. The third section describes the WQMP process used under the 2005 Conditional Waiver and includes an evaluation of management practice surveys comparing BMP implementation between priority tier groups. This information was used to inform the process proposed for this WQMP. Following a look at past WQMP implementation is a summary of newly implemented BMPs, grower outreach and new research being done related to improving water quality. Finally, the WQMP implementation process proposed for the next year is described.

## Identification of Benchmark Exceedances

This section provides background information regarding the monitoring that took place, such as monitoring objectives and sample locations, and crop types that drain to each monitoring site. Tables with the standard water quality benchmarks and TMDL load allocation benchmarks are provided to place the summarized benchmark exceedances in context. All of this information is also included in the VCAILG 2012 Annual Monitoring Report. Site-specific exceedance information is further detailed in Appendix B.

## MONITORING OBJECTIVES

The objectives of the VCAILGMP required under the Conditional Waiver include the following:

- Monitor the discharge of wastes in irrigation return flows, tile drains, stormwater, and waters of the state and identify waste sources;
- Where discharges of waste cause or contribute to exceedances of water quality benchmarks, or cause pollution or nuisance, submit a Water Quality Management Plan (WQMP) to implement targeted management practices to reduce or eliminate the discharge of waste;
- Report results and other required information on an annual basis; and
- Coordinate monitoring efforts with existing and future monitoring programs so that data generated are complementary and not duplicative (*e.g.*, coordinate monitoring sites and sampling events with the TMDL Monitoring Programs within Ventura County).

## MONITORING SITE SELECTION

The first step toward fulfilling monitoring program objectives was selecting appropriate monitoring sites. Because the focus of the program is on impacts to surface waterbodies from discharges from irrigated agricultural lands, monitoring sites were selected to best characterize agricultural inputs and are generally located at the lower ends of mainstem tributaries or agricultural drainages in areas associated primarily with agricultural activity. In some cases, sites were also located to facilitate distinguishing agricultural inputs from other sources, such as golf courses or landscaped areas – these are referred to herein as "background" ("BKGD") sites. Calleguas Creek Watershed sites supplement monitoring performed under the Calleguas Creek Watershed TMDL Monitoring Program (CCWTMP) and retain consistency with previous VCAILG sampling. Monitoring sites in the Santa Clara River and Ventura River Watersheds were selected to continue building on existing data previously collected by VCAILG and meet TMDL requirements, where applicable.

The specific criteria for selection of monitoring sites are as follows:

- Land use (primarily agricultural drainages);
- Subwatershed representation;
- Acres of agricultural irrigated lands represented;
- Proximity to agricultural operations;
- Previous or existing monitoring locations under the *2005 Conditional Waiver* or TMDL monitoring programs;
- Drainage into waterbodies included on or proposed for the federal Clean Water Act 303(d) list of impaired waterbodies;
- Size and complexity of watershed;
- Size and flow of waterbodies; and,
- Safe access during dry and wet weather.

Table 1 lists monitoring sites selected in each watershed and associated global positioning system (GPS) coordinates for sampling Conditional Waiver Appendix 1, Table 1 constituents. Table 2 lists monitoring sites and GPS coordinates for effective TMDL monitoring locations. Figure 1 through Figure 7 show site locations for all monitoring sites within each watershed. To

further distinguish sites, Table 3 and Table 4 provide acreages of different crop types within each monitoring drainage area.

The format for the monitoring site ID/code is XXXA_YYYY_ZZZZ, where:

- "XXX" is a 2- or 3-character code that identifies the mainstem receiving water reach (where applicable) into which the monitored waterbody drains;
- "A" identifies the monitored waterbody as an agricultural drain (D) or a tributary (T) to the receiving water;
- "YYYY" is a 3-, 4-, or 5-character abbreviation for the site location;
- "ZZZZ" is an optional 3-, 4-, or 5-character abbreviation that provides additional site location information (*e.g.*, "BKGD" indicates a background site).

Examples:

**S03D_BARDS** signifies that the monitoring site is an agricultural drain located in the Santa Clara River Watershed. The site is located along Bardsdale Avenue.

**S04T_TAPO_BKGD** signifies that this a background monitoring site located on Tapo Creek, which is a tributary to the Santa Clara River, Reach 4.

**Table 1. VCAILGMRP Monitoring Locations for Conditional Waiver Constituents**

| Watershed / Subwatershed | Station ID | Reach | Waterbody Type [1] | Station Location | GPS Coordinates [2] | |
|---|---|---|---|---|---|---|
| | | | | | Latitude | Longitude |
| Calleguas Creek / Mugu Lagoon | 01T_ODD3_ARN | 1 | T | Rio de Santa Clara/Oxnard Drain #3 at Arnold Rd. | 34.123564 | -119.156514 |
| Calleguas Creek / Calleguas Creek | 02D_CSUCI | 2 | B | 02D_BROOM background site near CSUCI | 34.159860 | -119.049375 |
| Calleguas Creek / Revolon Slough | 04D_ETTG | 4 | D | Discharge to Revolon Slough at Etting Rd. | 34.161797 | -119.091419 |
| | 04D_LAS | 4 | D | Discharge to Revolon Slough at S. Las Posas Rd. | 34.134208 | -119.079767 |
| Calleguas Creek / Beardsley Channel | 05D_SANT_BKGD | 5 | B | 05D_SANT_VCWPD background site near the golf course | 34.263213 | -119.111314 |
| | 05D_LAVD | 5 | T | La Vista Drain at La Vista Ave. | 34.265950 | -119.093589 |
| | 05T_HONDO | 5 | T | Hondo Barranca at Hwy. 118 | 34.263608 | -119.057431 |
| Calleguas Creek / Arroyo Las Posas | 06T_LONG2 | 6 | T | Long Canyon at Balcom Canyon Rd. crossing | 34.281721 | -118.958565 |
| Oxnard Coastal | OXD_CENTR | -- | D | Central Ditch at Harbor Blvd. | 34.220555 | -119.254983 |
| Santa Clara River | S02T_ELLS | 2 | T | Ellsworth Barranca at Telegraph Rd. | 34.306805 | -119.141275 |
| | S02T_TODD | 2 | T | Todd Barranca at Hwy. 126 | 34.313584 | -119.117095 |
| | S03T_TIMB | 3 | T | Timber Canyon at Hwy. 126 | 34.370172 | -119.020939 |
| | S03T_ BOULD | 3 | T | Boulder Creek at Hwy. 126 | 34.389578 | -118.958738 |
| | S03D_BARDS | 3 | D | Discharge along Bardsdale Ave. upstream of confluence with Santa Clara River | 34.371535 | -118.964470 |
| | S04T_TAPO | 4 | T | Tapo Canyon Creek | 34.401717 | -118.723706 |
| | S04T_TAPO_BKGD | 4 | B | S04T_TAPO background site upstream of agricultural operations | 34.387316 | -118.7204509 |
| Ventura River | VRT_THACH | -- | T | Thacher Creek at Ojai Avenue | 34.446719 | -119.210893 |
| | VRT_SANTO | -- | T | San Antonio Creek at Grand Avenue | 34.454455 | -119.221723 |

1. T = Tributary to receiving water; D = agricultural Drain; B = Background site.
2. All GPS coordinates presented in decimal degrees latitude and longitude in North American Datum 1983 (NAD83).

**Table 2. Monitoring Locations for Effective TMDLs**

| Watershed/ Subwatershed | Site ID | Reach | Waterbody Type [1] | Site Location | GPS Coordinates [2] | |
|---|---|---|---|---|---|---|
| | | | | | Latitude | Longitude |
| Calleguas Creek/ Mugu Lagoon | 01T_ODD2_DCH | 1 | T | Duck Pond/Oxnard Drain #2/Mugu Drain S. of Hueneme Rd. | 34.1395 | -119.1183 |
| Calleguas Creek/ Calleguas Creek | 02D_BROOM | 2 | D | Discharge to Calleguas Creek at Broome Ranch Rd. | 34.1434 | -119.0711 |
| Calleguas Creek/ Revolon Slough | 04D_WOOD | 4 | D | Agricultural drain on E. side of Wood Rd. N of Revolon | 34.1707 | -119.0960 |
| | 05D_SANT_VCWPD | 5 | D | Santa Clara Drain at VCWPD Gage #781 | 34.2425 | -119.1114 |
| Calleguas Creek/ Arroyo Las Posas | 06T_FC_BR | 6 | T | Fox Canyon at Bradley Rd. | 34.2646 | -119.0115 |
| Calleguas Creek/ Arroyo Simi | 07D_HITCH_LEVEE_2 | 7 | D | 2nd corrugated pipe discharging on N. site of Arroyo Simi flood control levee off of Hitch Blvd. | 34.2714 | -118.9205 |
| Calleguas Creek/ Conejo Creek | 9BD_GERRY | 9B | D | Drain crossing Santa Rosa Rd. at Gerry Rd. | 34.2369 | -118.9473 |
| Santa Clara River Estuary | S01D_MONAR | 1 | D | Drain entering SCR Estuary at Monarch Lane between Harbor Blvd. and Victoria Ave. | 34.2333 | -119.2413 |
| Santa Clara River | S02T_ELLS | 2 | T | Ellsworth Barranca at Telegraph Rd. | 34.3068 | -119.1413 |
| Oxnard Coastal | OXD_CENTR | -- | D | Central Ditch at Harbor Blvd. | 34.2206 | -119.2550 |
| Oxnard Coastal/ Channel Islands Harbor | CIHD_VICT | -- | D | Discharge to Doris Drain at S. Victoria Ave. | 34.2099 | -119.2207 |

1. T = Tributary to receiving water; D = agricultural Drain
2. All GPS coordinates presented in decimal degrees latitude and longitude in North American Datum 1983 (NAD83).

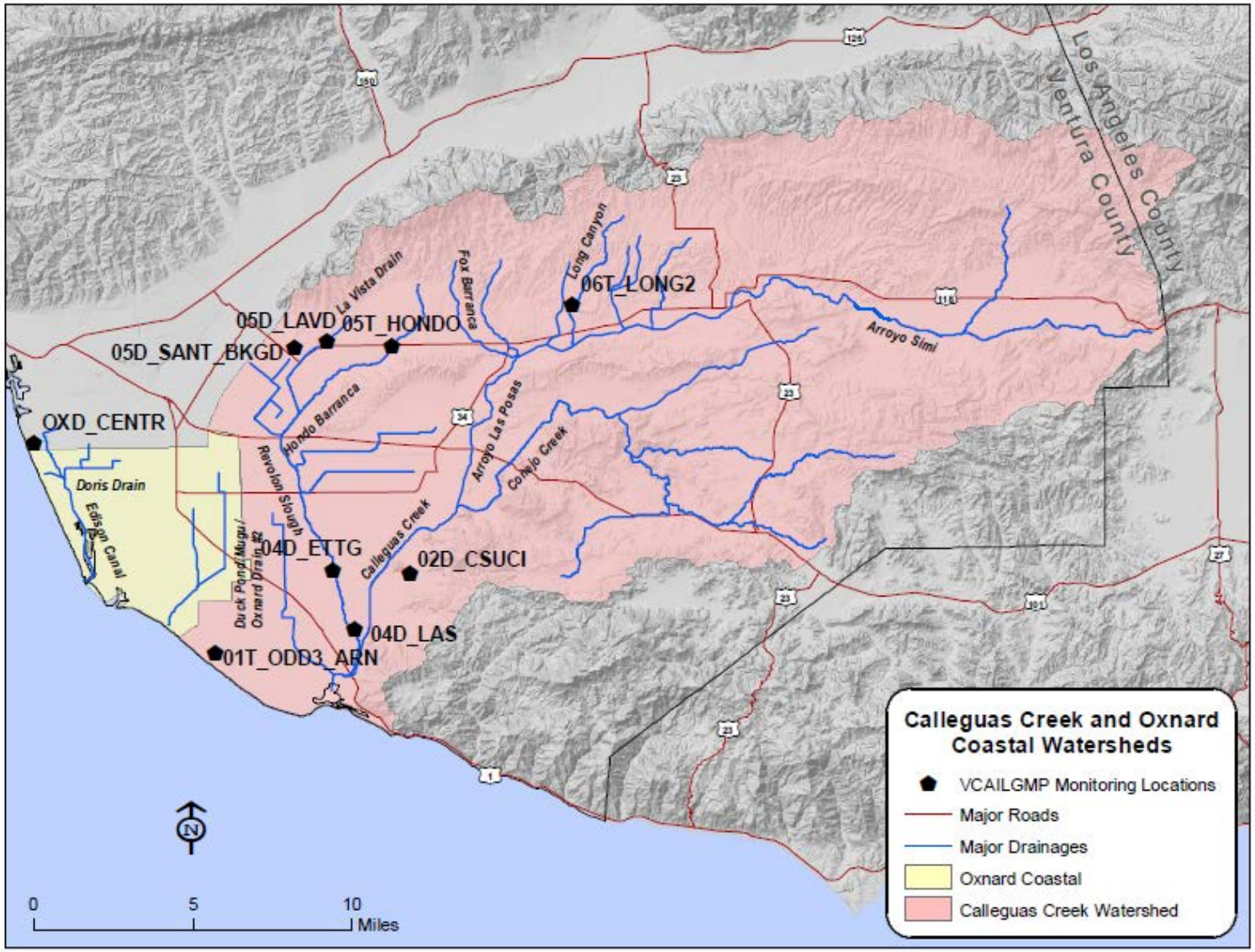



**Figure 1. VCAILG Monitoring Sites in the Calleguas Creek/Oxnard Coastal Watersheds**

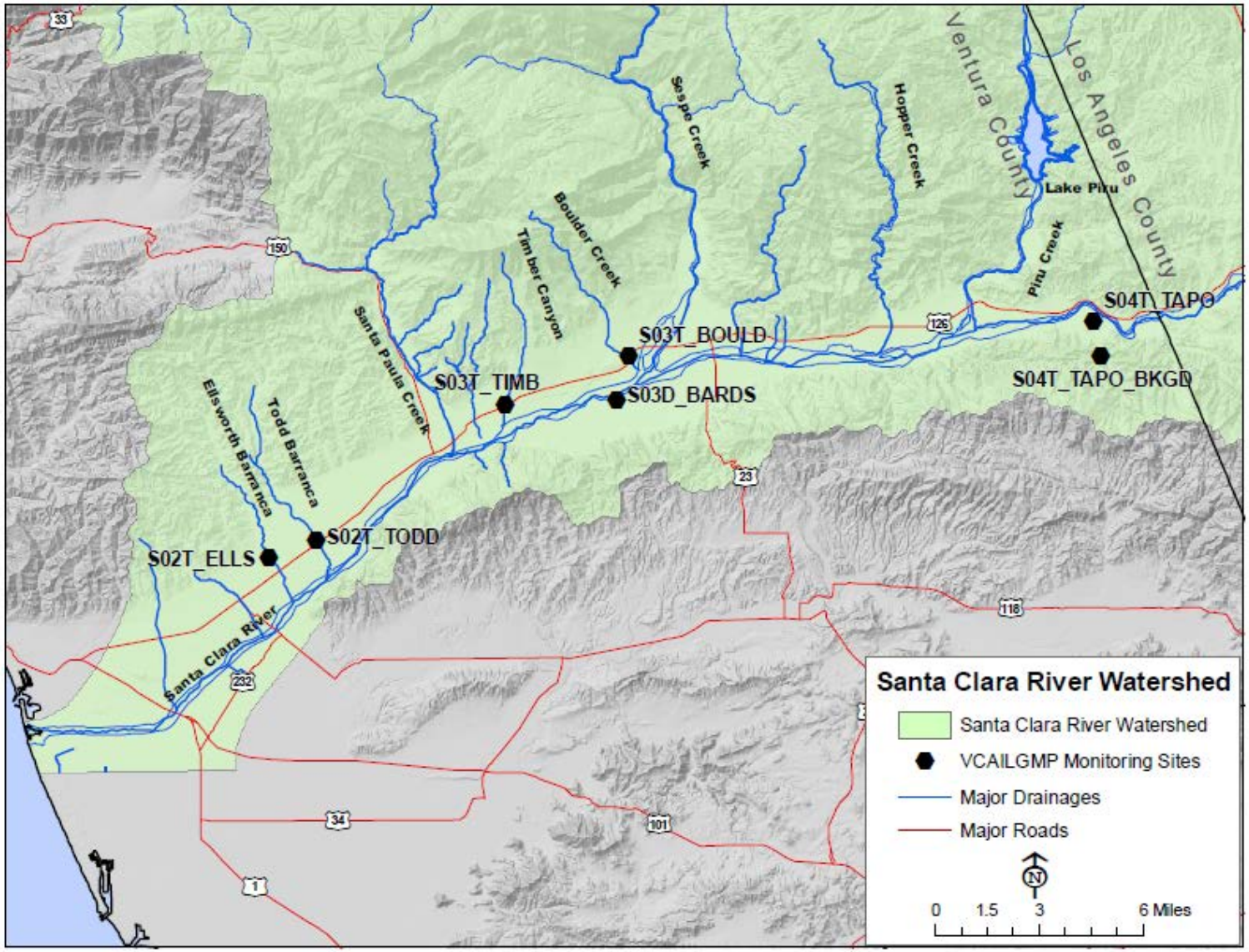



**Figure 2. VCAILG Monitoring Sites Located in the Santa Clara River Watershed**

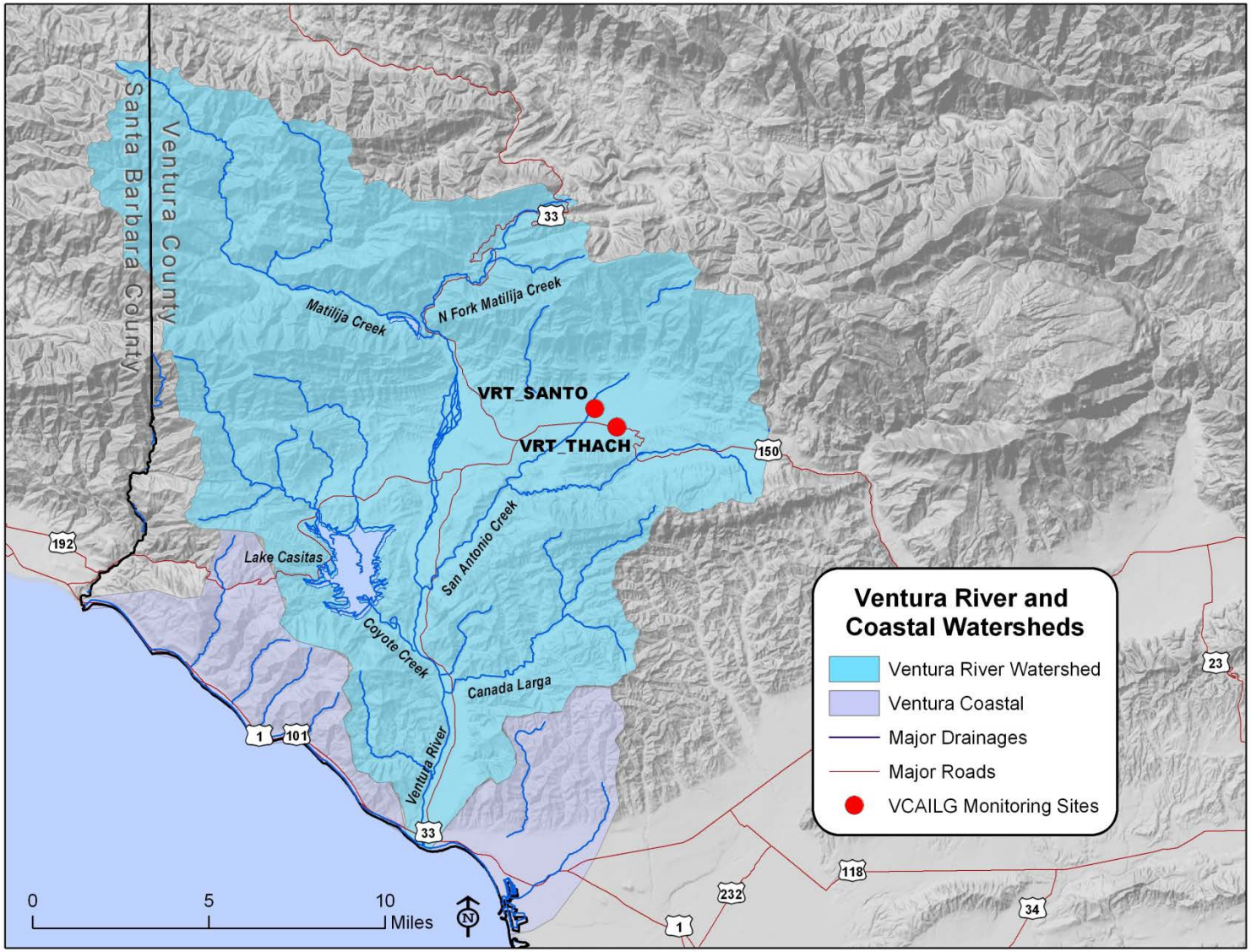



**Figure 3. VCAILG Monitoring Sites Located in the Ventura River Watershed**

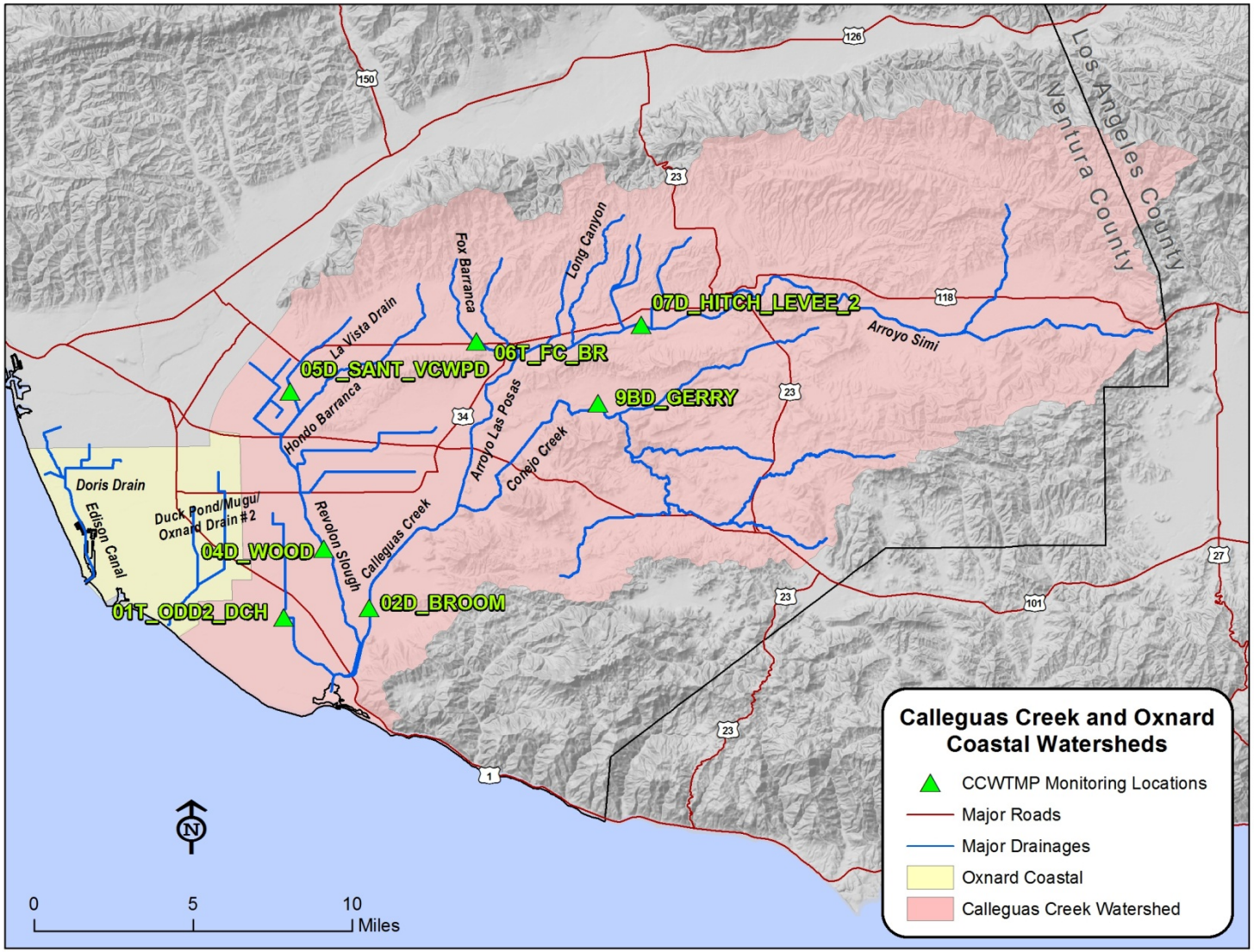



**Figure 4. CCWTMP Monitoring Sites**

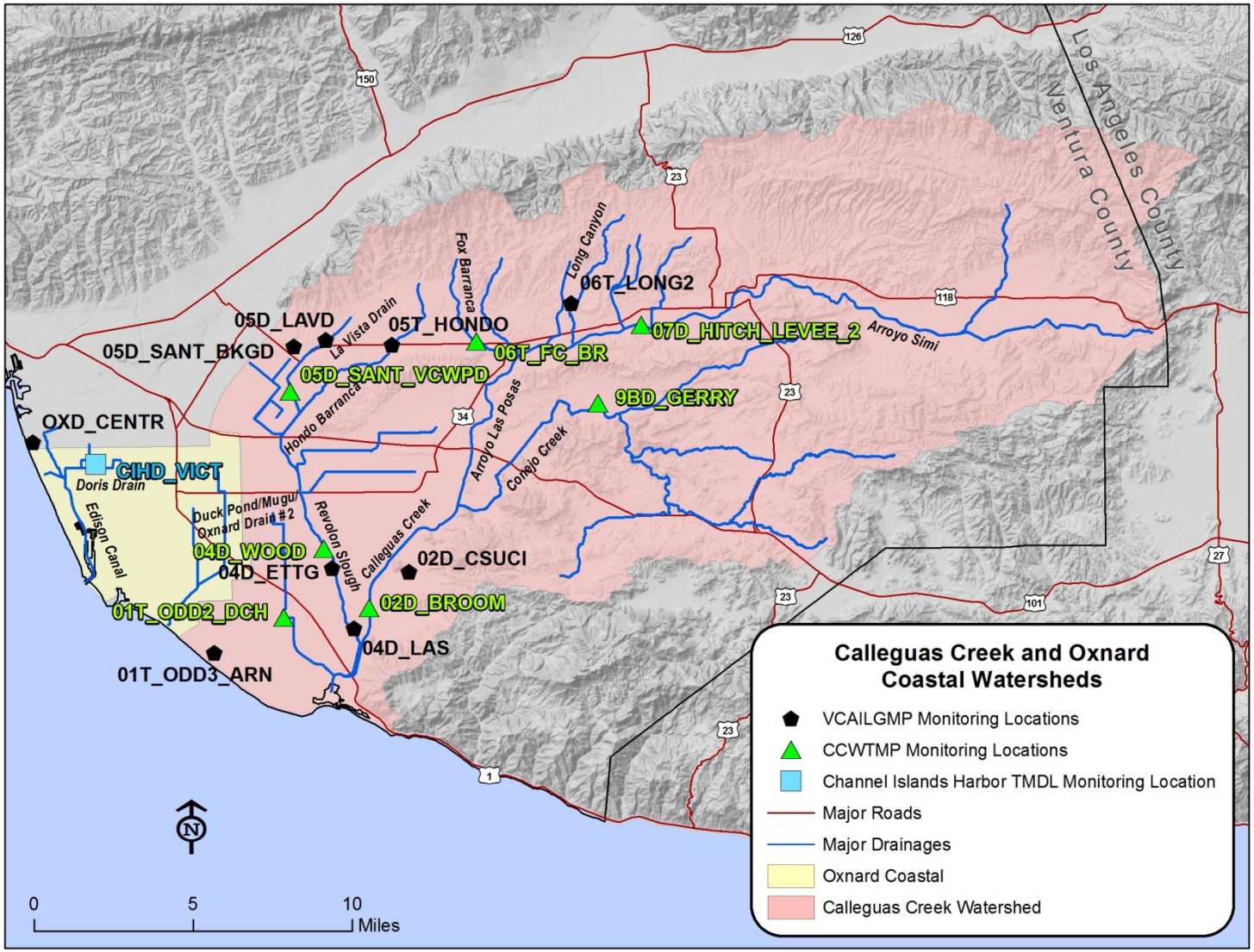



**Figure 5. Calleguas Creek and Oxnard Coastal Watershed Monitoring Sites for All Programs**

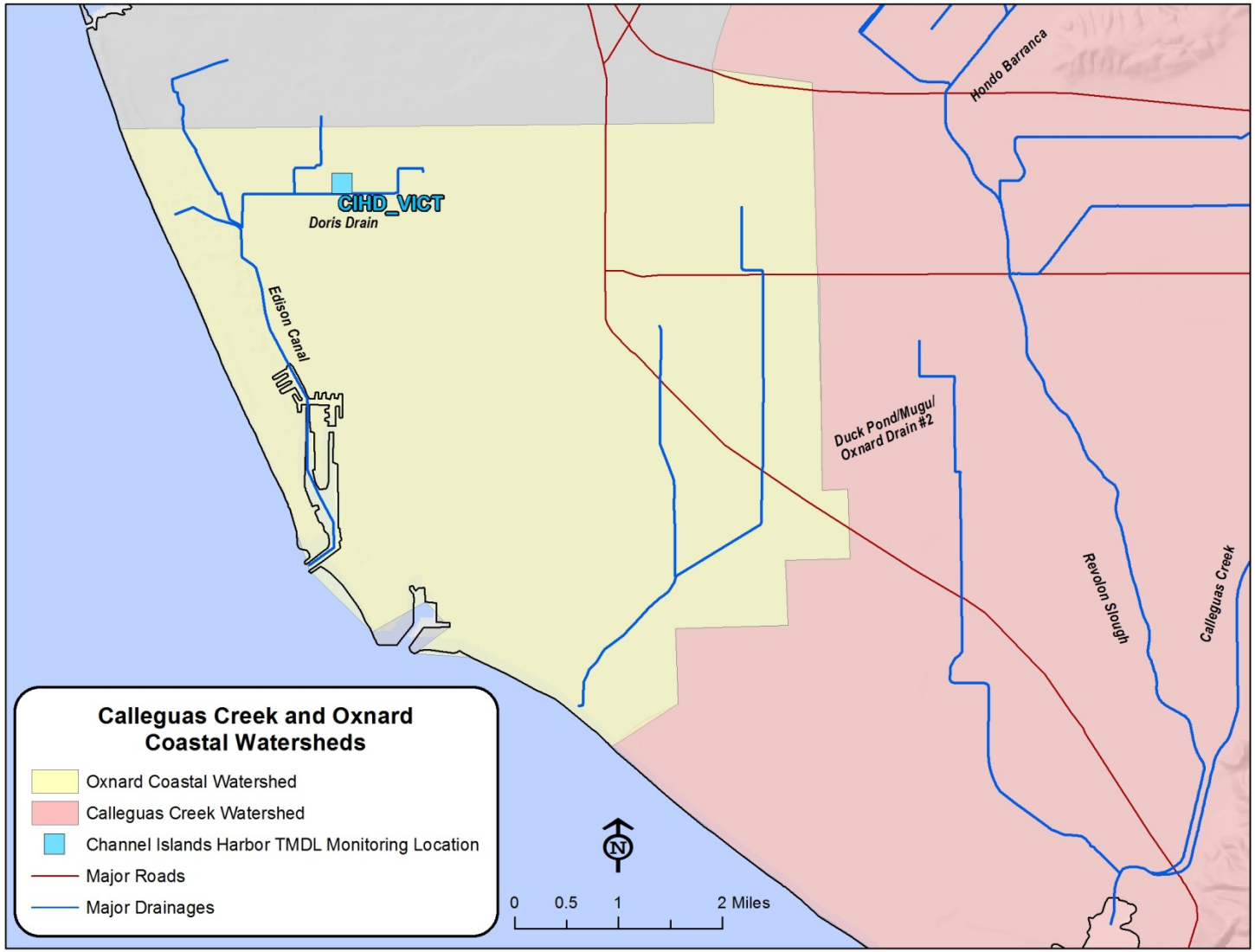



**Figure 6. Channel Islands Harbor Bacteria TMDL Monitoring Site**

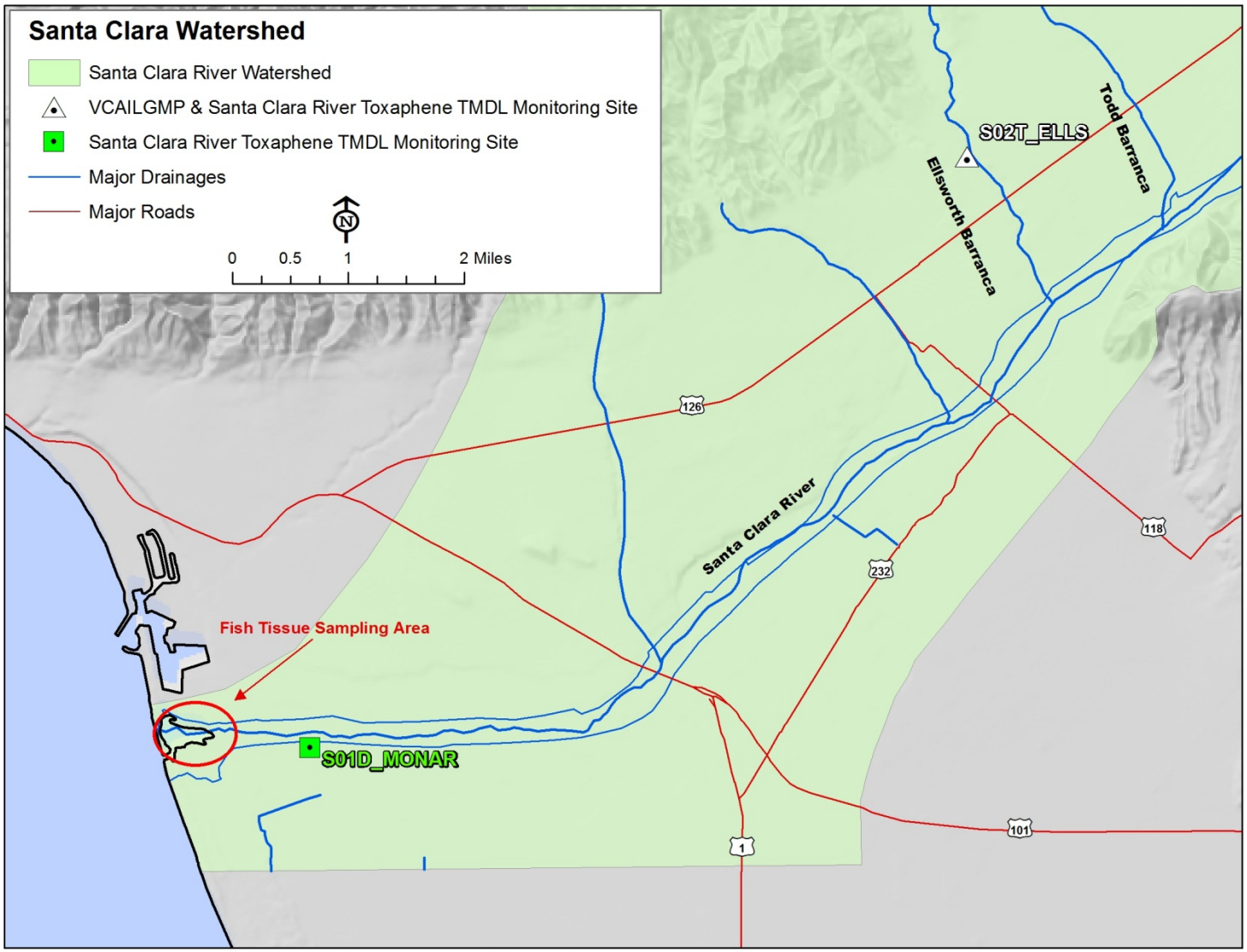



**Figure 7. Santa Clara River Estuary Toxaphene TMDL Monitoring Sites**

**Table 3. Estimated Irrigated Acreage Represented at VCAILG Monitoring Sites**

| Station ID | Irrigated Agricultural Acreage [1, 2] | | | | | | | | | Total Drainage Area Acres |
|---|---|---|---|---|---|---|---|---|---|---|
| | Row Crops | Cut Flowers | Citrus | Avocados | Other Tree Crops | Strawberries | Other Berries | Sod | Nursery | |
| 01T_ODD3_ARN | 867 | | | | | | | 540 | | 800 |
| 04D_ETTG | 2534 | | 116 | | | 322 | 180 | | | 3,779 |
| 04D_LAS | 779 | 17 | | | | 137 | | | 8 | 1,339 |
| 05D_LAVD | 7 | | 202 | 159 | | 51 | 181 | | | 877 |
| 05T_HONDO | 8 | | 1087 | 566 | 1 | | 92 | | 5 | 3,928 |
| 06T_LONG2 | 2 | 10 | 203 | 157 | | 10 | 17 | | 46 | 2,813 |
| OXD_CENTR | 337 | 85 | 13 | | | 273 | | | | 1,243 |
| S02T_ELLS | 99 | | 276 | 529 | 1 | 24 | 21 | | | 9,015 |
| S02T_TODD | 122 | 46 | 222 | 152 | | | | | | 5,748 |
| S03D_BARDS | 39 | | 705 | 92 | | | | | 17 | 2,214 |
| S03T_BOULD | 0 | | 175 | 672 | | | | | 157 | 3,764 |
| S03T_TIMB | 18 | | 104 | 421 | 2 | | | | | 2,183 |
| S04T_TAPO | 29 | | 33 | | | | | | 50 | 3,686 |
| VRT_SANTO | | | 285 | 242 | 13 | | | | | 7,220 |
| VRT_THACH | 6 | | 630 | 158 | 9 | | | | 3 | 6,003 |

1. Data Source Ventura County Agricultural Commissioner's Office
2. Some acreage is double or triple counted due to multi-cropping practices.

**Table 4. Estimated Irrigated Acreage Represented at TMDL Monitoring Sites**

| Station ID [1] | Irrigated Agricultural Acreage [2, 3] | | | | | | | | | Total Drainage Area Acres |
|---|---|---|---|---|---|---|---|---|---|---|
| | Row Crops | Cut Flowers | Citrus | Avocados | Strawberries | Other Berries | Sod | Nursery | Other | |
| 01T_ODD2_DCH | 844 | 3 | 9 | | 470 | | 126 | 1 | 239 | 1,564 |
| 02D_BROOM | 1,154 | 0 | 335 | 328 | | 385 | | 23 | 204 | 8,236 |
| 04D_WOOD | 316 | | | | 43 | 27 | | | 79 | 470 |
| 05D_SANT_VCWPD | 285 | | 404 | 174 | 2 | 71 | | | | 1,154 |
| 06T_FC_BR | 80 | 13 | 791 | 62 | 2 | 55 | | 59 | 1 | 2,602 |
| 07D_HITCH_LEVEE_2 | 85 | | | | | | | 57 | | 142 |
| 9BD_GERRY | | | 32 | 86 | | 120 | | | | 447 |
| S01D_MONAR | 115 | | | | 49 | | | | 11 | 209 |
| CIHD_VICT | 168 | | | | 73 | | | | | 99 |

1. Sites OXD_CENTR and S02T_ELLS are also monitored for specific TMDL constituents; their drainage area and crop type information is listed in the previous table.
2. Data Source Ventura County Agricultural Commissioner's Office
3. Some acreage is double or triple counted due to multi-cropping practices.

## STANDARD WATER QUALITY BENCHMARKS

This section presents the water quality benchmarks as specified in the Conditional Waiver (R4-2010-0186) used to evaluate monitoring data collected at VCAILG monitoring sites in 2012. Benchmarks used for determining exceedances of the standard water quality benchmarks include numeric and narrative water quality objectives contained in Appendix 2 of the Conditional Waiver, which consist of narrative and numeric Basin Plan objectives and water quality standards from the California Toxics Rule (CTR). In instances where the Conditional Waiver references the Basin Plan or CTR, without specifying a benchmark number, the lowest applicable number was selected for each watershed. The Conditional Waiver also includes effective TMDL load allocations (LAs) as water quality benchmarks. A subset of those TMDLs includes the provision to develop WQMPs regardless of whether monitoring data exceed water quality benchmarks. This WQMP has been written to meet any mandatory TMDL requirements compelling WQMP development.

Several of the narrative water quality objectives contained in the Basin Plan specify that discharges of wastes to receiving waters cannot alter "natural" or "ambient" conditions above or below a stated level. Many of the VCAILG monitoring sites are located on agricultural drains that discharge to receiving waters. Because "natural" and "ambient" conditions have not been established in receiving waters or are non-existent on agricultural drains and ephemeral streams, monitoring data from sites located on agricultural drains are evaluated based on the assumption that if benchmarks are not exceeded in the agricultural drain, it is unlikely that the discharge from that drain will cause benchmark exceedances in the receiving water. The following tables specify applicable water quality benchmarks by watershed or stream reach, where appropriate.

**Table 5. Standard Water Quality Benchmarks Derived From Narrative Objectives and Toxicity**

| Constituent | Watershed [1] | Narrative Objective [2] | Applicable Benchmark |
|---|---|---|---|
| pH | CC, OXD, SCR, VR | The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed by more than 0.5 pH units from natural conditions as a result of waste discharges. | $6.5 \leq pH \leq 8.5$<br><br>Changes to ambient receiving water conditions are not assessed; "ambient" or "natural" conditions have not been established |
| Temperature | CC, OXD, SCR, VR | For waters designated WARM, water temperature shall not be altered by more than 5°F above the natural temperature. At no time shall WARM-designated waters be raised above 80°F as a result of waste discharges. | WARM: $\leq 80^{o}F$<br><br>Changes to ambient receiving water conditions are not assessed; "ambient" or "natural" conditions have not been established |
| | SCR, VR | For waters designated COLD, water temperature shall not be altered by more than 5°F above the natural temperature. | COLD: No numeric benchmark. Changes to ambient receiving water conditions are not assessed; "ambient" or "natural" conditions have not been established |
| Dissolved Oxygen | OXD | No single dissolved oxygen determination shall be less than 5 mg/L, except when natural conditions cause lesser concentrations. | $\geq$ 5 mg/L |
| | CC, SCR, VR | The dissolved oxygen content of all surface waters designated as WARM shall not be depressed below 5 mg/L as a result of waste discharges. | WARM: $\geq$ 5 mg/L |
| | SCR, VR | The dissolved oxygen content of all surface waters designated as COLD and SPWN shall not be depressed below 7 mg/L as a result of waste discharges. | COLD, SPWN: $\geq$ 7 mg/L |
| Turbidity | CC, OXD, SCR, VR | Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits:<br>▪ Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%;<br>▪ Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%. | No numeric benchmarks.<br><br>Changes to ambient receiving water conditions are not assessed; "ambient" or "natural" conditions have not been established |
| Biostimulatory Substances | CC, OXD, SCR, VR | Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses. | No numeric benchmarks. Waterbody-specific benchmarks for nutrients are listed in Table 16. |
| Total Suspended Solids (TSS) | CC, OXD, SCR, VR | Wastes shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses. | No numeric benchmarks. |
| Pesticides | CC, OXD, SCR, VR | No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. | No numeric benchmarks. Applicable benchmarks for specific pesticides are listed in Tables 18, 19, and 20. |
| Toxicity | CC, OXD, SCR, VR | All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal or aquatic life. There shall be no chronic toxicity in ambient waters outside mixing zones. | $\leq$ 1.0 TUc [3]<br><br>Benchmarks for specific potentially toxic constituents are listed in Tables 16 through 20. |

1. CC = Calleguas Creek Watershed OXD = Oxnard Coastal Watershed SCR = Santa Clara River Watershed VR = Ventura River Watershed
2. Source: Water Quality Control Plan, Los Angeles Region (Basin Plan), 1994.
3. Source: "Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands," Order No. R4-2010-0186, Los Angeles Regional Water Quality Control Board, adopted October 7, 2010.

**Table 6. Standard Water Quality Benchmarks for Salts and Nutrients (Basin Plan Table 3-8 Numeric Water Quality Objectives)**

| Watershed / Reach | Reach Description | Chloride (mg/L) | Sulfate (mg/L) | TDS (mg/L) | Nitrogen (mg/L) | Ammonia [1] (mg/L) | Phosphate (mg/L) |
|---|---|---|---|---|---|---|---|
| CC below Potrero Rd. | ----- | ----- | ----- | ----- | 10 [2] | pH, temperature dependent | ----- |
| CC above Potrero Rd. | ----- | 150 | 250 | 850 | 10 [3] | pH, temperature dependent | ----- |
| OXD | ----- | ----- | ----- | ----- | 10 [2] | pH, temperature dependent | ----- |
| SCR Reach 1 | Tidally-influenced mouth of Santa Clara River upstream to 101 Bridge | ----- | ----- | ----- | 10 [2] | pH, temperature dependent | ----- |
| SCR Reach 2 | Upstream of Hwy 101 Bridge to Freeman Diversion | 150 | 600 | 1200 | 10 [2] | pH, temperature dependent | ----- |
| SCR Reach 3 | Upstream of Freeman Diversion to A Street Bridge in Fillmore | 100 [4] | 650 | 1300 | 5 [3] | pH, temperature dependent | ----- |
| SCR Reach 4 | Upstream of A Street Bridge in Fillmore to Blue Cut Gaging Station | 100 | 600 | 1300 | 5 [3] | pH, temperature dependent | ----- |
| VR Reach 4 | Between Camino Cielo Rd. and Casitas Vista Rd. | 60 | 300 | 800 | 5 [3] | pH, temperature dependent | ----- |

Watersheds: CC = Calleguas Creek OXD = Oxnard Coastal SCR = Santa Clara River VR = Ventura River

1. Ammonia benchmarks are based on 1) freshwater ammonia objectives as calculated according to LARWQCB Resolutions 2002-011 and 2005-014, and 2) saltwater ammonia objectives as calculated according to LARWQCB Resolution 2004-022. Ammonia objectives are calculated based on the pH and temperature of the receiving water measured at the time of sample collection for ammonia analysis. Ammonia objectives used as benchmarks are chronic, 30-day averages.
2. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L Nitrate-N was used for comparison with VCAILG data collected at monitoring sites in this reach.
3. The Nitrogen benchmark listed is as Nitrate-N plus Nitrite-N.
4. The 100 mg/L benchmark for chloride is the revised water quality objective adopted by the Regional Board in Resolution 2003-015.

**Table 7. Standard Water Quality Benchmarks for Copper**

| Constituent | Freshwater [1] | | Brackish or Saltwater [1] | |
|---|---|---|---|---|
| | Benchmark (µg/L) | Benchmark Source | Benchmark (µg/L) | Benchmark Source |
| Copper [2] | $= 0.96e^{[0.8545(\ln hardness)+(-1.702)]}$ | CTR CCC [3] | 3.1 | CTR CCC [3] |

1. Freshwater benchmark applies to discharges to waters with salinities <1 ppt at least 95% of the time. Saltwater benchmark applies when salinities are ≥10 ppt at least 95% of the time. For discharges between these categories, or tidally influenced freshwater that supports EST beneficial uses, the lower criteria of the two shall be used; which is the saltwater benchmark.
2. As per footnote "m" to the Table in Paragraph (b)(1) of the CTR; "The freshwater and saltwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column." In instances where the measured hardness is >400 mg/L as $CaCO_3$, a hardness of 400 is used to calculate the benchmark. This was done in accordance with CTR §31692, f. Hardness.
3. CTR = California Toxics Rule (USEPA, May 18, 2000).
   CCC = Criteria Continuous Concentration

**Table 8. Standard Water Quality Benchmarks for Organochlorine Pesticides**

| Constituent | CC Watershed | | OXD, SCR Watersheds | | VR Watershed | |
|---|---|---|---|---|---|---|
| | Benchmark (ug/L) | Benchmark Source [1] | Benchmark (ug/L) | Benchmark Source [1] | Benchmark (ug/L) | Benchmark Source [1] |
| Aldrin | 0.00014 | CTR HHO | 0.00014 | CTR HHO | 0.00013 | CTR HHWO |
| Alpha-BHC | 0.013 | CTR HHO | 0.013 | CTR HHO | 0.0039 | CTR HHWO |
| Beta-BHC | 0.046 | CTR HHO | 0.046 | CTR HHO | 0.014 | CTR HHWO |
| Gamma-BHC (Lindane) | 0.063 | CTR HHO | 0.063 | CTR HHO | 0.019 | CTR HHWO |
| Delta-BHC | ----- | ----- | ----- | ----- | ----- | ----- |
| Chlordane-alpha | ----- | ----- | ----- | ----- | ----- | ----- |
| Chlordane-gamma | ----- | ----- | ----- | ----- | ----- | ----- |
| Chlordane, sum | 0.00059 | CTR HHO | 0.00059 | CTR HHO | 0.00059 | CTR HHO |
| 2,4'-DDD | ----- | ----- | ----- | ----- | ----- | ----- |
| 2,4'-DDE | ----- | ----- | ----- | ----- | ----- | ----- |
| 2,4'-DDT | ----- | ----- | ----- | ----- | ----- | ----- |
| 4,4'-DDD | 0.00084 | CTR HHO | 0.00084 | CTR HHO | 0.00084 | CTR HHO |
| 4,4'-DDE | 0.00059 | CTR HHO | 0.00059 | CTR HHO | 0.00059 | CTR HHWO |
| 4,4'-DDT | 0.00059 | CTR HHO | 0.00059 | CTR HHO | 0.00059 | CTR HHWO |
| Dieldrin | 0.00014 | CTR HHO | 0.00014 | CTR HHO | 0.00014 | CTR HHWO |
| Endosulfan I | 0.056 | CTR AFWC | 0.056 | CTR AFWC | 0.056 | CTR AFWC |
| Endosulfan II | 0.056 | CTR AFWC | 0.056 | CTR AFWC | 0.056 | CTR AFWC |
| Endosulfan Sulfate | 240 | CTR HHO | 240 | CTR HHO | 110 | CTR HHWO |
| Endrin | 0.036 | CTR AFWC | 0.036 | CTR AFWC | 0.036 | CTR AFWC |
| Endrin Aldehyde | 0.81 | CTR HHO | 0.81 | CTR HHO | 0.76 | CTR HHWO |
| Endrin Ketone | ----- | ----- | ----- | ----- | ----- | ----- |
| Toxaphene | 0.00075 | CTR HHO | 0.00075 | CTR HHO | 0.00075 | CTR HHO |

Watersheds: CC = Calleguas Creek OXD = Oxnard Coastal SCR = Santa Clara River VR = Ventura River

1. CTR = California Toxics Rule (USEPA, May 18, 2000).
   HHO = Human Health for Consumption of Organisms Only (30-day average)
   HHWO = Human Health for Consumption of Water and Organisms (MUN-designation) (30-day average)
   FWC = Aquatic Life, Freshwater Chronic (4-day average)

**Table 9. Standard Water Quality Benchmarks for Organophosphorus Pesticides**

| Constituent | CC, OXD, SCR, VR Watersheds Benchmark (ug/L) [1] |
|---|---|
| Bolstar | ----- |
| Chlorpyrifos | 0.025 |
| Demeton | ----- |
| Diazinon | 0.10 |
| Dichlorvos | ----- |
| Disulfoton | ----- |
| Ethoprop | ----- |
| Fenchlorophos | ----- |
| Fensulfothion | ----- |
| Fenthion | ----- |
| Malathion | ----- |
| Merphos | ----- |
| Methyl Parathion | ----- |
| Mevinphos | ----- |
| Phorate | ----- |
| Tetrachlorvinphos | ----- |
| Tokuthion | ----- |
| Trichloronate | ----- |

Watersheds: CC = Calleguas Creek OXD = Oxnard Coastal SCR = Santa Clara River VR = Ventura River

1. Benchmarks are from Appendix 2 of the Conditional Waiver

**Table 10. Standard Water Quality Benchmarks for Pyrethroid Pesticides**

| Constituent | CC, OXD, SCR, VR Watersheds Benchmark (ug/L) [1] |
|---|---|
| Allethrin | ----- |
| Bifenthrin | ----- |
| Cyfluthrin | ----- |
| L-Cyhalothrin | ----- |
| Cypermethrin | ----- |
| Danitol | ----- |
| Deltamethrin | ----- |
| Esfenvalerate | ----- |
| Fenvalerate | ----- |
| Permethrin | ----- |
| Prallethrin | ----- |

Watersheds: CC = Calleguas Creek OXD = Oxnard Coastal SCR = Santa Clara River VR = Ventura River

1. There currently are no Conditional Waiver benchmarks in effect for these watersheds.

## SUMMARY OF STANDARD WATER QUALITY BENCHMARK EXCEEDANCES

The following summarizes the exceedances of standard water quality benchmarks as specified in Conditional Waiver Appendix 2 or included by reference to narrative and numeric Basin Plan objectives and water quality standards from the California Toxics Rule. A discussion of the sources of these constituents is provided after the discussion of TMDL benchmarks and exceedances. Site specific information regarding benchmark exceedances and conditions can be found in Appendix B.

Monitoring data from samples collected at 11 of the 15 VCAILG Monitoring Program (VCAILGMP) sites exceeded benchmarks and triggered the requirement to develop WQMPs to address the exceedances. Background sites are not included in the total number of monitoring sites because they are located upstream of irrigated agricultural operations and do not trigger the development of a WQMP. Exceedances of standard water quality benchmarks occurred in all watersheds, except Ventura River Watershed where no samples were collected during the 2012 monitoring year due to lack of flow.

Table 11 lists the exceedances that occurred at each site for each monitoring event. This table also identifies sites that were sampled, but no exceedances occurred, as well as sites that were not sampled due to the absence of flowing water. OC pesticides, primarily DDT compounds, caused the highest number of exceedances overall, followed by nitrogen compounds. OP pesticide exceedances occurred mostly during wet weather and at sites located in the Calleguas Creek and Oxnard Coastal Watersheds. During the Event 12 (January 2012) storm and Event 14 (May 2012) dry weather events, all sites that were sampled had exceedances. During the second storm (Event 13, March 2012) two of the sites sampled did not have any exceedances as did one site during dry event number 15 (July 2012).

Toxicity sampling took place during events 12 and 15. Three-species screening tests were performed during Event 12 and some exceedances of the 1.0 $TU_c$ benchmark were observed. Fish survival or biomass toxicity was not observed at any of the tested sites. Algal cell growth toxicity was only observed at one location, 05D_LAVD (La Vista Drain). In regards to the invertebrate testing, high-conductivity sites tested using *Hyalella azteca* did not have any toxic effects. Results from freshwater sites for *Ceriodaphnia dubia* demonstrated no significant impacts on survival, but all sites did show reproduction toxicity. The sites with reproduction toxicity were split, with three being located in the Santa Clara River Watershed and three in the Calleguas Creek Watershed.

**Table 11. Exceedances of Standard Water Quality Benchmarks in 2012 – by Site and Event [1]**

| Site | Event 12 – Wet January 23, 2012 | Event 13 – Wet March 18, 2012 | Event 14 – Dry May 24, 2012 | Event 15 – Dry July 17, 2012 |
|---|---|---|---|---|
| 01T_ODD3_ARN | Nitrate-N, DDD, DDE, DDT, Chlorpyrifos | Ammonia-N, Nitrate-N, Copper, DDD, DDE, Toxaphene | DO, Nitrate-N, DDD, DDE, DDT, Toxaphene | Ammonia-N, Nitrate-N, Copper, DDD, DDE |
| 04D_ETTG | Nitrate-N, Copper, DDD, DDE, DDT, Toxaphene, Chlorpyrifos, Diazinon | Nitrate-N, Copper, DDD, DDE, Toxaphene, | Nitrate-N, Copper, DDE, Chlorpyrifos | Nitrate-N, Copper, DDE |
| 04D_LAS | Nitrate-N, Copper, DDD, DDE, DDT, Toxaphene, Chlorpyrifos | Nitrate-N, Copper, Toxaphene, Chlorpyrifos | Nitrate-N, DDE | Nitrate-N, DDD, DDE |
| 05D_LAVD | DDD, DDE, DDT, Toxaphene, Chlorpyrifos, Toxicity | TDS, Sulfate, Nitrate-N; DDD, DDE, DDT, Toxaphene, Chlorpyrifos | pH, TDS, Sulfate, DDT | TDS, Chloride, Sulfate, DDT |
| 05T_HONDO | Chlordane, DDD, DDE, DDT, Toxaphene, Toxicity | *NS* | *NS* | *NS* |
| 06T_LONG2 | Chlordane, DDD, DDE, DDT, Toxicity | *NS* | *NS* | *NS* |
| OXD_CENTR | Chlordane, Copper, DDD, DDE, DDT, Toxaphene, Chlorpyrifos | Nitrate-N, DDE, Toxaphene, Chlorpyrifos | Nitrate-N, DDE, | Nitrate-N |
| S02T_ELLS | Chlordane, DDD, DDE, DDT, Toxaphene, Chlorpyrifos, Toxicity | TDS, Chloride, Sulfate | *NS* | *NS* |
| S02T_TODD | Chlordane, DDD, DDE, DDT, Toxaphene, Toxicity | TDS, Sulfate, Nitrate-N | DDE | **None** |
| S03T_TIMB | *NS* | *NS* | DDE | *NS* |
| S03T_BOULD | Nitrate-N, DDE, Toxicity | **None** | *NS* | *NS* |
| S03D_BARDS | *NS* | *NS* | *NS* | *NS* |
| S04T_TAPO | TDS, Chloride, Sulfate, Nitrate-N, Chlordane, DDD, DDE, DDT | **None** | TDS, Chloride, Sulfate, Nitrate-N, DDE | TDS, Chloride, Sulfate, Nitrate-N |
| VRT_SANTO | *NS* | *NS* | *NS* | *NS* |
| VRT_THACH | *NS* | *NS* | *NS* | *NS* |
| Total Number of Sites Sampled | 11 | 9 | 8 | 7 |
| Total Number of Sites with Exceedances | 11 | 7 | 8 | 6 |

NS = Not Sampled; site dry

1. Listed exceedances for DDD, DDE, and DDT are all in the form of 4,4' isomers.

## TMDL WQMP REQUIREMENTS

Appendix 3 of the Conditional Waiver lists water quality benchmarks that come from TMDL load allocations (LAs). Including these LAs as benchmarks means an exceedance triggers the development of a WQMP. Additionally, certain TMDLs require a WQMP regardless of whether monitoring data exceed the LAs; they include the Calleguas Creek Watershed and Mugu Lagoon OC Pesticides and PCBs TMDL, Calleguas Creek Watershed and Mugu Lagoon Toxicity, Chlorpyrifos, and Diazinon TMDL, Calleguas Creek Metals and Selenium TMDL and Calleguas Creek Watershed Boron, Chloride, Sulfate, and TDS (Salts) TMDL. Therefore, this WQMP covers all the previously listed TMDLs regardless of benchmark exceedances. TMDLs that only require a WQMP in the event of a load allocation benchmark exceedance are explained below. The process and BMPs outlined in the WQMP are designed to result in compliance with both the standard water quality and TMDL LA benchmarks. Standard water quality and TMDL LA benchmark exceedances are further detailed in Appendix B.

### Calleguas Creek Watershed Nitrogen Compounds TMDL

The LA for the Calleguas Creek Watershed Nitrogen Compounds TMDL is expressed as the sum of nitrate-nitrogen and nitrite-nitrogen (Table 12).

**Table 12. Load Allocations for Nitrogen Compounds**

| Constituent | Load Allocation (mg/L) |
|---|---|
| Nitrate-N + Nitrite-N | 9 |

### Revolon Slough and Beardsley Wash Trash TMDL

LAs for this TMDL are zero trash. Dischargers may achieve compliance with the LAs by implementing a minimum frequency of assessment and collection/best management practice (MFAC/BMP) program. By March 6, 2010, agricultural dischargers were required to demonstrate full compliance and attainment of the zero trash target's requirement that trash is not accumulating in deleterious amounts between the required trash assessment and collection events.

Non-point source dischargers are complying with the Trash TMDL requirements through a program that includes a combination of a Minimum Frequency Assessment Collection (MFAC) Program and other BMPs. The MFAC program includes regular collection and counting of trash. Various components of the WQMP address the BMP portion of Trash TMDL compliance, including VCAILG education, outreach, and the Management Practice Survey that have all provided information and BMPs related to trash collection and proper disposal.

### Santa Clara River Nitrogen Compounds TMDL

The LA for the Santa Clara River Nitrogen Compounds TMDL applicable to VCAILG monitoring sites is listed in Table 13.

**Table 13. Load Allocations for Nitrogen Compounds**

| Constituent | Load Allocation (mg/L) [1] |
|---|---|
| Ammonia-N + Nitrate-N + Nitrite-N | 10 |

1. The specified load allocation applies to all Santa Clara River reaches within Ventura County.

## Ventura River Estuary Trash TMDL

LAs are zero trash. Dischargers may achieve compliance with the LAs by implementing a minimum frequency of assessment and collection/best management practice (MFAC/BMP) program. By March 6, 2010 agricultural dischargers must demonstrate full compliance and attainment of the zero trash target's requirement that trash is not accumulating in deleterious amounts between the required trash assessment and collection events.

Non-point source dischargers are complying with the Trash TMDL requirements through a program that includes a combination of a MFAC program and other BMPs. Various components of the WQMP address the BMP portion of Trash TMDL compliance, including VCAILG education, outreach, and the Management Practice Survey that have all provided information and BMPs related to trash collection and proper disposal.

## Santa Clara River Estuary Toxaphene TMDL

The Conditional Waiver incorporated toxaphene LAs for suspended sediment and fish tissue as Water Quality Benchmarks (Appendix 3) shown in the table below.

**Table 14. Load Allocations for Toxaphene**

| Reach | Toxaphene in Fish Tissue (µg/kg) | Toxaphene in Suspended Sediment (µg/kg) |
|---|---|---|
| Santa Clara River Estuary | 6.1 | 0.1 |

## SUMMARY OF TMDL LOAD ALLOCATION BENCHMARK EXCEEDANCES

Details regarding the monitoring sites and conditions during which TMDL LA benchmark exceedances occurred can be found in Appendix B. The Calleguas Creek Watershed and Mugu Lagoon Metals and Selenium TMDL interim LAwas exceeded for selenium in Revolon Slough, however, this TMDL already requires a WQMP. Final TMDL LA exceedances occurred for both nitrogen TMDLs (Calleguas Creek Watershed and Santa Clara River Nitrogen Compounds TMDLs). In the Calleguas Creek Watershed, the nitrogen exceedances were geographically contained within the lower watershed, with the exception of one site in Reach 7. In the Santa Clara River Watershed the LA was exceeded three times, each of which occurred at a different site and event from the rest.

# Pesticide Use Evaluation

In 1990, California became the first state to require full reporting of agricultural pesticide use in response to demands for more realistic and comprehensive pesticide use data. Under the program, all agricultural pesticide use must be reported monthly to county agricultural commissioners, who in turn, report the data to DPR.

California has a broad legal definition of "agricultural use" so the reporting requirements include pesticide applications to parks, golf courses, cemeteries, rangeland, pastures, and along roadside and railroad rights-of-way. In addition, all postharvest pesticide treatments of agricultural commodities must be reported along with all pesticide treatments in poultry and fish production as well as some livestock applications. Only agricultural applications, as noted by specific commodity treated, are summarized in this document.

For the purpose of this evaluation, pesticide use records for 2005-2010 from the DPR were reviewed to identify long-term use trends for chlorpyrifos and diazinon. In addition, pesticide use records for 2011-2012 were compared with VCAILG monitoring data for the same year. The evaluation focused on diazinon and chlorpyrifos since those are the only two presently permitted pesticides with water quality benchmarks under the Ag Waiver.

The review of pesticide use data for 2005-2010 focused on Ventura County-wide application of chlorpyrifos and diazinon. For the comparison of the 2011-2012 pesticide use records to VCAILG monitoring data, pesticide application locations had to be linked to the appropriate monitoring site drainage area as not all pesticide applications within Ventura County occurred within a monitoring site drainage area. Additional manipulation of the pesticide use data included converting the percent concentration of active ingredient based on the product name to an amount of active ingredient applied during each application. Depending on the product formulation, the conversion was either into gallons or pounds of active chlorpyrifos or diazinon. The dates and amounts of pesticides applied were then compared to the benchmark exceedances. Table 15 lists chlorpyrifos use by crop type for 2005-2010 and Table 16 lists the diazinon use by crop type for 2005-2010. Table 17 includes 2011-2012 chlorpyrifos application information by crop type as well as a comparison to water quality data from associated VCAILG monitoring sites. Table 18 includes 2011-2012 diazinon application information by crop type as well as a comparison of water quality data from associated VCAILG monitoring sites.

## LONG-TERM PESTICIDE USE DATA

### Chlorpyrifos

For agricultural application, chlorpyrifos is used on a variety of products including row crops, nursery crops, citrus crops, and others. For the years 2005-2010, the highest amount of chlorpyrifos was applied to lemons and second highest applied was to strawberries. Other crops with high amounts of chlorpyrifos application included radishes, broccoli, oranges, cabbage, and tangerines. Total annual chlorpyrifos usage ranged from 27,291.16 pounds in 2007 to 39,227.90 pounds in 2008 with an average annual usage of 33,012.44 pounds (Table 15).

**Table 15. Amount of chlorpyrifos applied (lbs) by crop per year between 2005 and 2010.**

| Crop Type | Chlorpyrifos Application (lbs) | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| Alfalfa | N/A | N/A | N/A | N/A | 2.0 | 0.75 |
| Avocado | 0.5013 | 12.5336 | 12.6869 | N/A | N/A | 2.99 |
| Bean, Unspecified | N/A | N/A | N/A | N/A | 9.39 | N/A |
| Bok Choy | 39.25 | N/A | 44.8617 | N/A | 0.75 | 8.85 |
| Broccoli | 840.8727 | 490.2571 | 120.09 | 495.61 | 141.65 | 6.0 |
| Cabbage | 381.0144 | 688.0724 | 791.7337 | 2,673.0463 | 1,607.61 | 1,621.21 |
| Cauliflower | 31.455 | N/A | N/A | N/A | N/A | N/A |
| Chinese Cabbage | N/A | N/A | N/A | N/A | 0.75 | 2.25 |
| Citrus | N/A | N/A | N/A | N/A | 7.03 | 8.17 |
| Collard | 80.64 | 111.2525 | 14.2375 | 6.8325 | 23.88 | 104.43 |
| Corn, Human Consumption | 330.5807 | 351.4365 | 14.9539 | 39.8771 | 62.97 | 5.4 |
| Cucumber | 148.15 | 1.8391 | 64.2347 | 189.9557 | N/A | 82.05 |
| Daikon | N/A | N/A | N/A | 0.4985 | N/A | N/A |
| Fumigation[1] | N/A | 28.6466 | 29.5422 | N/A | N/A | N/A |
| Grape | N/A | N/A | N/A | 8.0040 | N/A | N/A |
| Grapefruit | 3.75 | 5.2339 | N/A | N/A | N/A | 95.78 |
| Kale | 4.7 | 7.24 | 4.4675 | N/A | 5.8 | 22.72 |
| Landscape Maintenance | 41.6419 | 25.2495 | 47.5688 | 26.7562 | 3.37 | 16.63 |
| Lemon | 24,039.7133 | 25,670.1434 | 18,610.0964 | 27,825.6458 | 23,102.17 | 24,287.61 |
| Lime | N/A | N/A | N/A | 27.0642 | N/A | N/A |
| Mint | 0.7477 | N/A | N/A | N/A | N/A | N/A |
| Mustard | N/A | N/A | N/A | N/A | N/A | 92.06 |
| N-Grnhs[2] Flower | 31.8336 | 11.9375 | 19.2578 | 19.0188 | 24.90 | 44.41 |

| Crop Type | Chlorpyrifos Application (lbs) | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| N-Grnhs Plants in Containers | 6.9375 | 7.9802 | 36.0627 | 31.0183 | 4.49 | 39.60 |
| N-Out[3] Flower | 181.7675 | 130.8751 | 140.3970 | 108.8670 | 113.39 | 109.68 |
| N-Out Plants in Containers | 111.0744 | 119.6101 | 65.4840 | 44.9720 | 16.53 | 79.58 |
| N-Out Transplants | 5.8720 | 1.1250 | 8.6250 | 6.2501 | 9.08 | 1.73 |
| Onion, Dry | 107.25 | N/A | 6.3591 | 156.495 | N/A | N/A |
| Orange | 590.1877 | 999.5621 | 510.8306 | 401.3017 | 188.31 | 294.25 |
| Orchard Floor | N/A | N/A | N/A | N/A | 53.34 | 10.10 |
| Peas | N/A | N/A | N/A | N/A | N/A | 70.42 |
| Pest Control[4] | 172.7232 | 18.5 | 0.0053 | N/A | | |
| Pumpkin | N/A | N/A | N/A | N/A | N/A | 0.19 |
| Radish | 1,132.0647 | 11.8492 | 8.9904 | 43.4555 | 70.12 | 851.54 |
| Rights of Way | 0.15 | 0.3750 | 1.9950 | 1.4954 | 0.45 | N/A |
| Strawberry | 1,838.4823 | 5,149.8470 | 6,489.1843 | 6,576.2225 | 7,219.37 | 6,341.23 |
| Tangelo | N/A | N/A | N/A | 35.0173 | 40.02 | N/A |
| Tangerine | 9.8508 | 56.7835 | 248.0003 | 510.4997 | 511.12 | 65.69 |
| Turf/ Sod | 4.0357 | 15.1199 | N/A | N/A | N/A | 7.68 |
| Uncultivated Ag | N/A | N/A | N/A | N/A | 13.36 | N/A |
| **Annual Total** | 30,103.79 | 33,946.92 | 27,291.16 | 39,227.9 | 33,231.85 | 34,273 |

1. Fumigation includes commodity, soil preparation, and other types of fumigation
2. N-Grnhs = Nursery Greenhouse
3. N-Out = Nursery Outdoor
4. Pest Control includes regulatory and structural pest control

## Diazinon

For agricultural application, diazinon is used on a variety of products including row crops, nursery crops, berries, and others. For the years 2005-2010, the crops with the highest amount of diazinon applied included raspberries, onions, greens, tomatoes, and cabbage. Total annual diazinon usage ranged from 932.76 pounds in 2009 to 3183.43 pounds in 2007 with an average annual usage of 2179.24 pounds (Table 16).

**Table 16. Amount of diazinon applied (lbs) by crop per year between 2005 and 2010.**

| Crop Type | Diazinon Application (lbs) | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| Bean | 124.95 | 9.4962 | 104.4582 | 141.4634 | 149.1 | 199.15 |
| Beet | 24.9833 | 25.6143 | 20.0841 | 56.2892 | 51.48 | 232.86 |
| Blackberry | N/A | N/A | N/A | N/A | N/A | 1.49 |
| Bok Choy | N/A | N/A | 81.0556 | 5 | 0.5 | N/A |
| Cabbage | 10.15 | 56.2544 | 129.8230 | 155.2879 | 140.44 | 300.10 |
| Cauliflower | N/A | 8.7465 | N/A | N/A | N/A | N/A |
| Chinese Cabbage | N/A | 6.7813 | 15.0762 | 3.4727 | N/A | N/A |
| Collard | 81.7418 | 195.7658 | 91.5318 | 94.9642 | 24.02 | 18.36 |
| Corn, Human Consumption | 529.5 | 169.3750 | 319 | 98.5 | 41.0 | 5.0 |
| Daikon | N/A | 5.9532 | N/A | 3.3021 | 11.41 | 0.81 |
| Fumigation, Soil | N/A | N/A | 154.0056 | N/A | N/A | N/A |
| Kale | 0.8807 | 11.6923 | 11.1349 | 19.3818 | 9.23 | 85.33 |
| Landscape Maintenance | N/A | 0.516 | N/A | 1.8604 | 0.2 | 0.04 |
| Lemon | N/A | N/A | N/A | N/A | N/A | 0.03 |
| Lettuce[1] | 74.2108 | 214.4714 | 229.1331 | 322.6415 | 159.17 | 128.13 |
| Melon | 0.75 | 14.4993 | 1 | N/A | N/A | N/A |
| Mushroom | 333.5 | 172.5 | 4.5 | N/A | N/A | N/A |
| Mustard | 80.4984 | 75.2036 | 56.7344 | 12.1487 | 1.49 | N/A |
| N-Grnhs Flower | 5.5 | 1.8125 | N/A | N/A | 1.39 | N/A |
| N-Grnhs Plants in Containers | 8.0605 | 7.7523 | N/A | 1.7813 | 2.93 | 9.41 |
| N-Grnhs Transplants | N/A | 3.9984 | N/A | N/A | N/A | N/A |
| N-Outdr Flower | 35.7836 | 110 | 2.5 | 0.5 | 12.5 | 10.88 |
| N-Outdr Plants in Containers | 52.9315 | 113.7514 | 74.4278 | 30.8698 | 39.26 | 15.64 |
| Onion[2] | 533.0968 | 439.6245 | 2.2497 | 95.4937 | 201.14 | 345.0 |
| Parsley | N/A | N/A | 0.3734 | 39.6330 | N/A | N/A |

| Crop Type | Diazinon Application (lbs) | | | | | |
|---|---|---|---|---|---|---|
| | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** |
| Peas | N/A | N/A | N/A | N/A | N/A | 3.97 |
| Pest Control[3] | 41.559 | 1.8056 | 0.2946 | 0.3775 | N/A | 0.11 |
| Radish | 4.2644 | 74.4904 | 99.114 | 1.9852 | 10.96 | 31.25 |
| Raspberry | 954.1735 | 322.9280 | 1,779.7534 | 369.6895 | 43.17 | 204.24 |
| Spinach | 216.1153 | 14.6994 | N/A | 27.2818 | 10.62 | 94.11 |
| Strawberry | N/A | 32.7446 | N/A | 10.00 | 22.72 | 0.28 |
| Sugar Beet | N/A | N/A | N/A | N/A | 0.03 | N/A |
| Squash | N/A | N/A | 5.0528 | N/A | N/A | N/A |
| Swiss Chard | N/A | 1.0132 | N/A | 2.9874 | N/A | N/A |
| Tomato | N/A | N/A | 2.125 | 331.3958 | N/A | 234.16 |
| Turnip | N/A | 8.4464 | N/A | N/A | N/A | N/A |
| **Annual Total** | 3,112.65 | 2,099.94 | 3,183.43 | 1,826.31 | 932.76 | 1,920.35 |

1. Includes head and leaf crop types
2. Includes dry and green crop types
3. Includes regulatory and structural pest control

## PESTICIDE USE AND VCAILG MONITORING DATA

### Chlorpyrifos

For agricultural application, chlorpyrifos is the active ingredient in several products including Lorsban, Dursban, Nufos, and Warhawk. Use of chlorpyrifos is common on lemons, strawberries, and cabbage in Ventura County. Chlorpyrifos was applied within subwatersheds draining to12 of 15 VCAILG monitoring sites. Of the 12 monitoring sites, 5 had exceedances of the chlorpyrifos water quality benchmark during the monitoring year. All but one of those exceedances occurred either during the January 23, 2012 or the March 12, 2012 storm events. The other occurred during the May 24, 2012 dry weather event. The following factors may contribute to the likelihood that chlorpyrifos is transported off-site: pesticide formulation and application method, date of application in relation to subsequent rain events, and proximity to a drainage channel, stream, or tributary. Table 17 provides chlorpyrifos application details within the VCAILG monitoring site drainage areas and exceedances of the 0.025 µg/L benchmark.

**Table 17. Chlorpyrifos Applications and Exceedances by Monitoring Site for 2011-2012**

| Site | Date | Commodity | Amount of Active Ingredient Applied (gal) | Amount of Active Ingredient Applied (lbs.) | Total Applied per Site (gal) | Total Applied per Site (lbs.) | Date Benchmark Exceeded | Dry or Wet Event? | Exceedance Date Concentration (ug/L) | Total Drainage Area (ac.) |
|---|---|---|---|---|---|---|---|---|---|---|
| 04D_ETTG | 10/21/2011 | Cabbage | | 7.05 | 14.84 | 128.88 | 1/23/2012 | Wet | 0.0958 | 3779 |
| | 11/16/2011 | Strawberry | 4.07 | | | | 5/24/2012 | Dry | 0.0572 | 3779 |
| | 11/16/2011 | Strawberry | 1.69 | | | | | | | |
| | 11/17/2011 | Strawberry | 1.48 | | | | | | | |
| | 11/17/2011 | Strawberry | 1.69 | | | | | | | |
| | 4/18/2012 | Cabbage | | 12.38 | | | | | | |
| | 5/23/2012 | Cabbage | | 4.35 | | | | | | |
| | 6/8/2012 | Cabbage | | 4.50 | | | | | | |
| | 6/20/2012 | Cabbage | | 5.63 | | | | | | |
| | 7/5/2012 | Cabbage | | 7.50 | | | | | | |
| | 7/18/2012 | Cabbage | | 11.25 | | | | | | |
| | 7/25/2012 | Cabbage | | 7.50 | | | | | | |
| | 7/27/2012 | Collard | | 4.65 | | | | | | |
| | 7/29/2012 | Kale | | 3.10 | | | | | | |
| | 8/2/2012 | Cabbage | | 11.25 | | | | | | |
| | 8/8/2012 | Cabbage | | 7.50 | | | | | | |
| | 8/11/2012 | Cabbage | | 7.50 | | | | | | |
| | 8/15/2012 | Mustard | 1.10 | | | | | | | |
| | 8/20/2012 | Kale | | 3.74 | | | | | | |
| | 8/22/2012 | Mustard | 0.61 | | | | | | | |
| | 8/28/2012 | Cabbage | | 7.50 | | | | | | |
| | 9/4/2012 | Cabbage | 0.76 | | | | | | | |
| | 9/12/2012 | Cabbage | 0.72 | | | | | | | |
| | 9/18/2012 | Cabbage | 0.72 | | | | | | | |
| | 9/24/2012 | Cabbage | 1.46 | | | | | | | |
| | 9/24/2012 | Cabbage | | 5.25 | | | | | | |
| | 10/4/2012 | Cabbage | | 4.73 | | | | | | |
| | 10/5/2012 | Cabbage | | 4.50 | | | | | | |

| Site | Date | Commodity | Amount of Active Ingredient Applied (gal) | Amount of Active Ingredient Applied (lbs.) | Total Applied per Site (gal) | Total Applied per Site (lbs.) | Date Benchmark Exceeded | Dry or Wet Event? | Exceedance Date Concentration (ug/L) | Total Drainage Area (ac.) |
|---|---|---|---|---|---|---|---|---|---|---|
| 04D_ETTG | 10/8/2012 | Cabbage | 0.54 | | | | | | | |
| | 10/9/2012 | Cabbage | | 9.0 | | | | | | |
| 04D_LAS | 11/2/2011 | Cabbage | | 27 | 4.5 | 243.52 | 1/23/2012 | Wet | 0.117 | 1339 |
| | 11/19/2011 | Strawberry | 4.5 | | | | 3/12/2012 | Wet | 0.0329 | 1339 |
| | 11/28/2011 | Cabbage | | 43.5 | | | | | | |
| | 12/9/2011 | Cabbage | | 43.5 | | | | | | |
| | 1/7/2012 | Cabbage | | 16.5 | | | | | | |
| | 2/20/2012 | Cabbage | | 3.45 | | | | | | |
| | 3/9/2012 | Cabbage | | 17.25 | | | | | | |
| | 3/20/2012 | Cabbage | | 13.05 | | | | | | |
| | 3/24/2012 | Cabbage | | 6.3 | | | | | | |
| | 5/26/2012 | Cabbage | | 14.47 | | | | | | |
| | 5/30/2012 | Cabbage | | 0.75 | | | | | | |
| | 6/6/2012 | Cabbage | | 7.5 | | | | | | |
| | 6/12/2012 | Cabbage | | 8.25 | | | | | | |
| | 6/20/2012 | Cabbage | | 9.75 | | | | | | |
| | 6/27/2012 | Cabbage | | 7.5 | | | | | | |
| | 7/5/2012 | Cabbage | | 8.25 | | | | | | |
| | 7/11/2012 | Cabbage | | 7.5 | | | | | | |
| | 7/19/2012 | Cabbage | | 9 | | | | | | |
| 05D_LAVD | 10/17/2011 | Strawberry | 0.83 | | 8.53 | | 1/23/2012 | Wet | 0.2818 | 877 |
| | 11/11/2011 | Strawberry | 0.83 | | | | 3/12/2012 | Wet | 0.085 | 877 |
| | 11/15/2011 | Lemon | 5.63 | | | | | | | |
| | 11/17/2011 | Strawberry | 1.25 | | | | | | | |
| 05T_HONDO | 11/7/2011 | Lemon | | 12.57 | 35.86 | 80.82 | N/A | N/A | N/A | 3928 |
| | 6/28/2012 | Lemon | 2.11 | | | | | | | |
| | 8/2/2012 | Lemon | 23.57 | | | | | | | |
| | 8/7/2012 | Lemon | 2.54 | | | | | | | |
| | 8/20/2012 | Lemon | 7.65 | | | | | | | |

| Site | Date | Commodity | Amount of Active Ingredient Applied (gal) | Amount of Active Ingredient Applied (lbs.) | Total Applied per Site (gal) | Total Applied per Site (lbs.) | Date Benchmark Exceeded | Dry or Wet Event? | Exceedance Date Concentration (ug/L) | Total Drainage Area (ac.) |
|---|---|---|---|---|---|---|---|---|---|---|
| 05T_HONDO | 10/9/2012 | Lemon | | 68.25 | | | | | | |
| 06T_LONG2 | 11/18/2011 | Lemon | 1.28 | | 1.28 | | N/A | N/A | N/A | 2813 |
| OXD_CENTR | 10/22/2011 | Strawberry | 0.3 | | 69.35 | 69.9 | 1/23/2012 | Wet | 4.7386 | 1243 |
| | 11/21/2011 | Strawberry | 5.25 | | | | 3/12/2012 | Wet | 0.1118 | 1243 |
| | 11/22/2011 | Strawberry | 3.79 | | | | | | | |
| | 12/7/2011 | N-Outdr Flowers | | 1.5 | | | | | | |
| | 1/16/2012 | Cabbage | | 32.4 | | | | | | |
| | 1/18/2012 | Cabbage | | 36 | | | | | | |
| | 8/15/2012 | Strawberry | 20.9 | | | | | | | |
| | 8/22/2012 | Strawberry | 16.68 | | | | | | | |
| | 8/23/2012 | Strawberry | 16.88 | | | | | | | |
| | 8/23/2012 | Strawberry | 2.93 | | | | | | | |
| | 8/24/2012 | Strawberry | 2.61 | | | | | | | |
| S02T_ELLS | 9/13/2012 | Lemon | 20.5 | | 20.5 | | 1/23/2012 | Wet | 0.0944 | 9015 |
| S02T_TODD | 10/24/2011 | Lemon | 6.75 | | 15.04 | 34.20 | N/A | N/A | N/A | 5748 |
| | 11/11/2011 | Lemon | 0.5 | | | | | | | |
| | 11/11/2011 | Lemon | 3.22 | | | | | | | |
| | 5/24/2012 | Cabbage | | 9 | | | | | | |
| | 5/24/2012 | Cabbage | | 25.2 | | | | | | |
| | 9/19/2012 | Lemon | 4.57 | | | | | | | |
| S03D_BARDS | 10/26/2011 | Orange | 4.54 | | 4.54 | | N/A | N/A | N/A | 2214 |
| S03T_BOULD | 10/20/2011 | Lemon | | 4.77 | 17.69 | 8.54 | N/A | N/A | N/A | 3764 |
| | 11/17/2011 | Lemon | | 3.77 | | | | | | |
| | 8/17/2012 | Lemon | 17.69 | | | | | | | |
| VRT_SANTO | 10/21/2011 | Orange | 0.17 | | 0.17 | | N/A | N/A | N/A | 7220 |
| VRT_THACH | 8/23/2012 | Orange | 0.16 | | 0.49 | | N/A | N/A | N/A | 6003 |
| | 8/30/2012 | Tangerine | 0.11 | | | | | | | |
| | 9/18/2012 | Orange | 0.06 | | | | | | | |
| | 9/18/2012 | Tangerine | 0.16 | | | | | | | |

## Diazinon

Diazinon usage was much less widespread than chlorpyrifos in 2011-2012. The commodities receiving the most diazinon were dry and green onions as well as raspberries. Applications of diazinon occurred within 3 VCAILG monitoring site drainage areas. There was one exceedance of the 0.10 µg/L benchmark during the January 23, 2012 storm event. Table 18 includes diazinon application information for the VCAILG monitoring site drainages and the water quality benchmark exceedance.

**Table 18. Diazinon Applications and Exceedances by Monitoring Site for 2011-2012**

| Site | Date | Commodity | Amount of Active Ingredient Applied (gal) | Amount of Active Ingredient Applied (lbs) | Total Applied per Site (gal) | Total Applied per Site (lbs) | Date Benchmark Exceeded | Dry or Wet Event? | Exceedance Date Concentration (ug/L) | Total Drainage Area (ac.) |
|---|---|---|---|---|---|---|---|---|---|---|
| 04D_ETTG | 10/15/2011 | Raspberry | | 17.0 | | 17.0 | 1/23/2012 | Wet | 0.0958 | 3779 |
| 05T_HONDO | 8/24/2012 | Raspberry | | 4.32 | | 4.32 | N/A | N/A | N/A | 3928 |
| | 10/25/2011 | Onion - Dry | | 12.50 | | | N/A | N/A | N/A | 3686 |
| | 10/27/2011 | Onion – Dry | | 7.50 | | | | | | |
| | 11/5/2011 | Onion – Dry | | 10.00 | | | | | | |
| | 11/11/2011 | Onion – Green | | 7.50 | | | | | | |
| | 11/19/2011 | Onion – Dry | | 7.50 | | | | | | |
| | 12/5/2011 | Onion – Green | | 7.50 | | | | | | |
| S04T_TAPO | 1/30/2012 | Onion – Green | | 12.50 | | 110.0 | | | | |
| | 2/3/2012 | Onion – Green | | 12.50 | | | | | | |
| | 2/11/2012 | Onion – Green | | 12.50 | | | | | | |
| | 2/23/2012 | Beet | | 5.00 | | | | | | |
| | 2/27/2012 | Onion – Green | | 5.00 | | | | | | |
| | 3/21/2012 | Onion – Green | | 5.00 | | | | | | |
| | 3/24/2012 | Beet | | 5.00 | | | | | | |

## PESTICIDE USE SUMMARY

For the 2011-2012 monitoring year, chlorpyrifos was generally applied during the summer and fall, while diazinon was applied during the fall and spring. Out of fifteen sites visited during four events, there were four exceedances of the chlorpyrifos water quality benchmark during the January 23, 2012 storm event, three exceedances during the March 12, 2012 storm event, and one exceedance during the May 24, 2012 dry weather event. From comparing the site-by-site chlorpyrifos application data to the benchmark exceedances data, it appears that areas with high chlorpyrifos applications had more water quality benchmark exceedances. However, this was not always the case as the 05D_LAVD site and the S02T_ELLS site had limited chlorpyrifos applications, yet there were exceedances of the water quality benchmark during wet weather at each site. In addition, the areas where cabbage and strawberries were grown had the majority of the water quality benchmark exceedances.

There was one exceedance of the diazinon water quality benchmark during the January 23, 2012 storm event. For diazinon, there does not appear to be a link between applications and water quality benchmark exceedances. However, as there was only one exceedance, it is difficult to draw any firm conclusions.

Pesticide use is variable and performed in response to a variety of factors such as pest pressures, sudden outbreaks of latent diseases and/or pathogens, cropping patterns, variation in neighboring crops that may have incompatible maximum residue limits, etc. Also, the use of a specific pesticide on a particular crop varies from year to year (Table 15 and Table 16). All pesticide use decisions are based on farmer and pest control advisor (PCA) expertise, and applied under the authority of the local Agricultural Commissioner's office and the Department of Pesticide Regulation (DPR). Outside of compiling the provided pesticide use information and observing any trends, VCAILG does not have the authority to require pest control application modifications. Six questions in the new management practice survey relate to pesticide management (page 84), they include scouting, maintenance, storage, and application timing considerations. The results of these questions will be used in evaluating future pesticide usage records.

# 2005 Conditional Waiver WQMP Progress, Process and Implementation

## PROGRESS TOWARDS IMPROVING WATER QUALITY

As noted in the Monitoring Trends section of the VCAILG 2012 Annual Monitoring Report (AMR)[1], by considering the five years of monitoring data that have been collected, some long-term trends and improvements have been documented. For a complete overview of monitoring trends, refer to the AMR; a subset of the progress in improving water quality is provided below.

### OC Pesticides (general observation)

Many of the OC pesticides are never or only very rarely detected. Considering all 2005 Conditional Waiver events and the first year of 2012 Conditional Waiver monitoring (Events 1-15), the following table lists the number of detections have occurred at VCAILG monitoring sites for OC pesticides that have never been, or are rarely detected.

**Table 19. Rarely Detected OC Pesticides with Water Quality Benchmarks**

| OC Pesticide | # of Detections Considering VCAILG Events 1-15 |
|---|---|
| Aldrin | 0 |
| Alpha-BHC | 0 |
| Beta-BHC | 1 |
| Gamma-BHC | 0 |
| Endosulfan I | 1 |
| Endosulfan II | 0 |
| Endosulfan sulfate | 2 |
| Endrin | 0 |
| Endrin Aldehyde | 0 |

### First-Tier Priority Sites

Five sites were categorized as first-tier priority for BMP implementation and outreach to address water quality benchmark exceedances observed during the 2005 Conditional Waiver. First tier priority sites include:

| | | |
|---|---|---|
| 05D_SANT_VCWPD | 05D_LAVD | OXD_CENTR |
| S02T_TODD | S04T_TAPO | |

#### *OC Pesticides*

During dry weather, the majority of the samples collected for DDT after the 2010 Order did not contain any detectable levels of DDT. Of the samples collected, only three contained detectable

[1] Larry Walker Associates (LWA). 2013. VCAILG 2012 Annual Monitoring Report. February 26, 2013.

levels of DDT. One sample was collected at 05D_SANT_VCWPD and two were collected at 05D_LAVD. The data indicate that DDT levels are decreasing except for at 05D_LAVD (Figure 8). In addition, none of the samples collected for DDD during dry weather after the 2010 Order contained any detectable levels of DDD (Figure 9). For DDE during dry weather, the data indicate concentrations have decreased over time, but are still being detected at most of the sites (Figure 10). Overall, based on the data collected for DDT, DDD, and DDE during dry weather from 2007-2012, it appears that DDT has been breaking down into its metabolites with DDE the most prevalent metabolite.

For DDT during wet weather, concentrations appear to be decreasing as compared to concentrations collected before the 2010 Order (Figure 11).

During dry weather, chlordane has not been detected in any of the first-tier priority sites samples since September 2007. Dieldrin has not been detected in any dry weather samples since May 2008. There have not been any wet weather detections of dieldrin.

Overall, both wet and dry weather samples are showing improvement in regards to toxaphene. During dry weather, there appears to be a decreasing trend in the concentrations of toxaphene at all monitoring sites except for at 05D_SANT_VCWPD (Figure 12). In addition, during wet weather, there appears to be a slight decreasing trend in the concentrations of toxaphene.

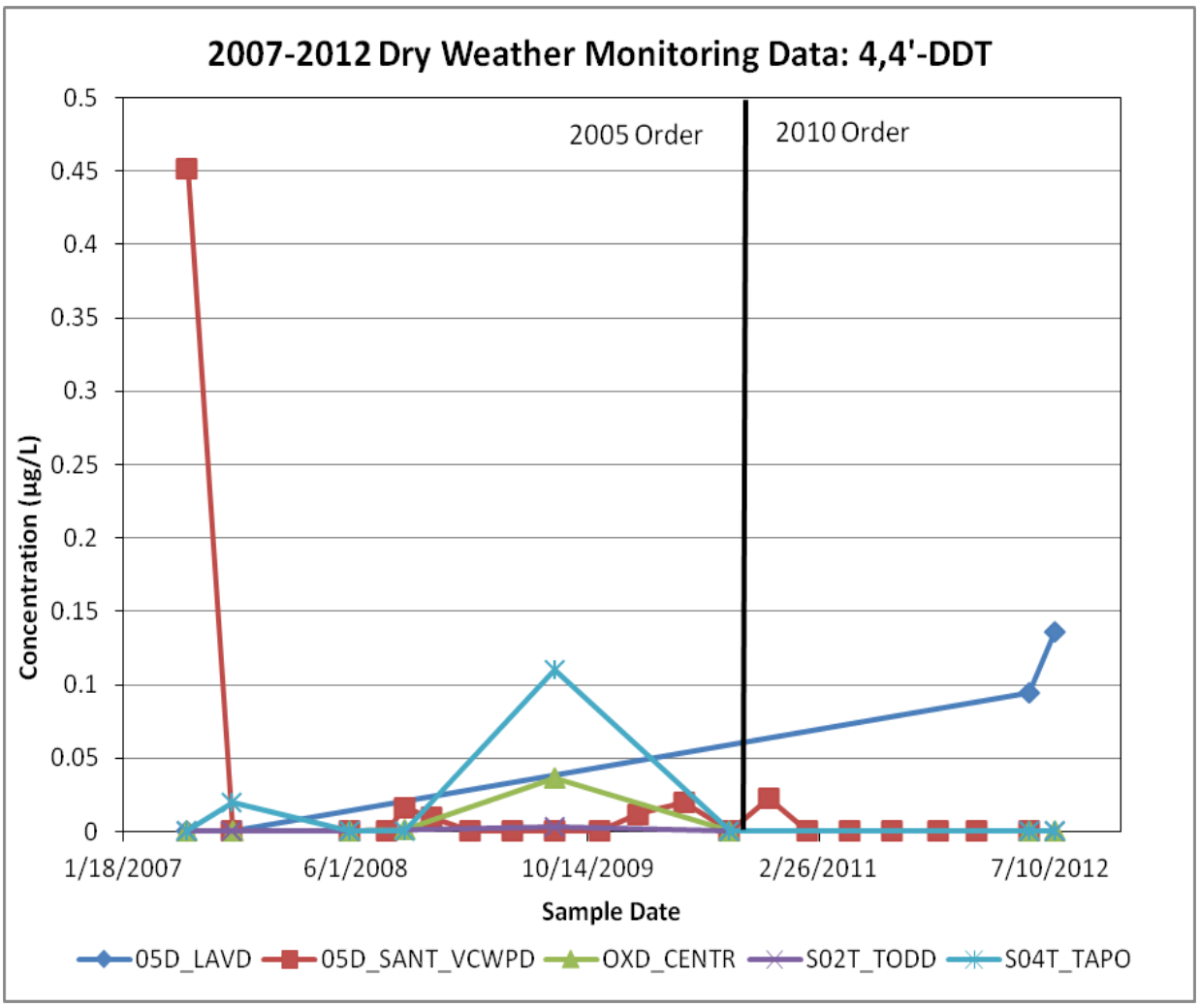



**Figure 8. Dry weather DDT concentrations collected at first priority sites from 2007 to 2012**

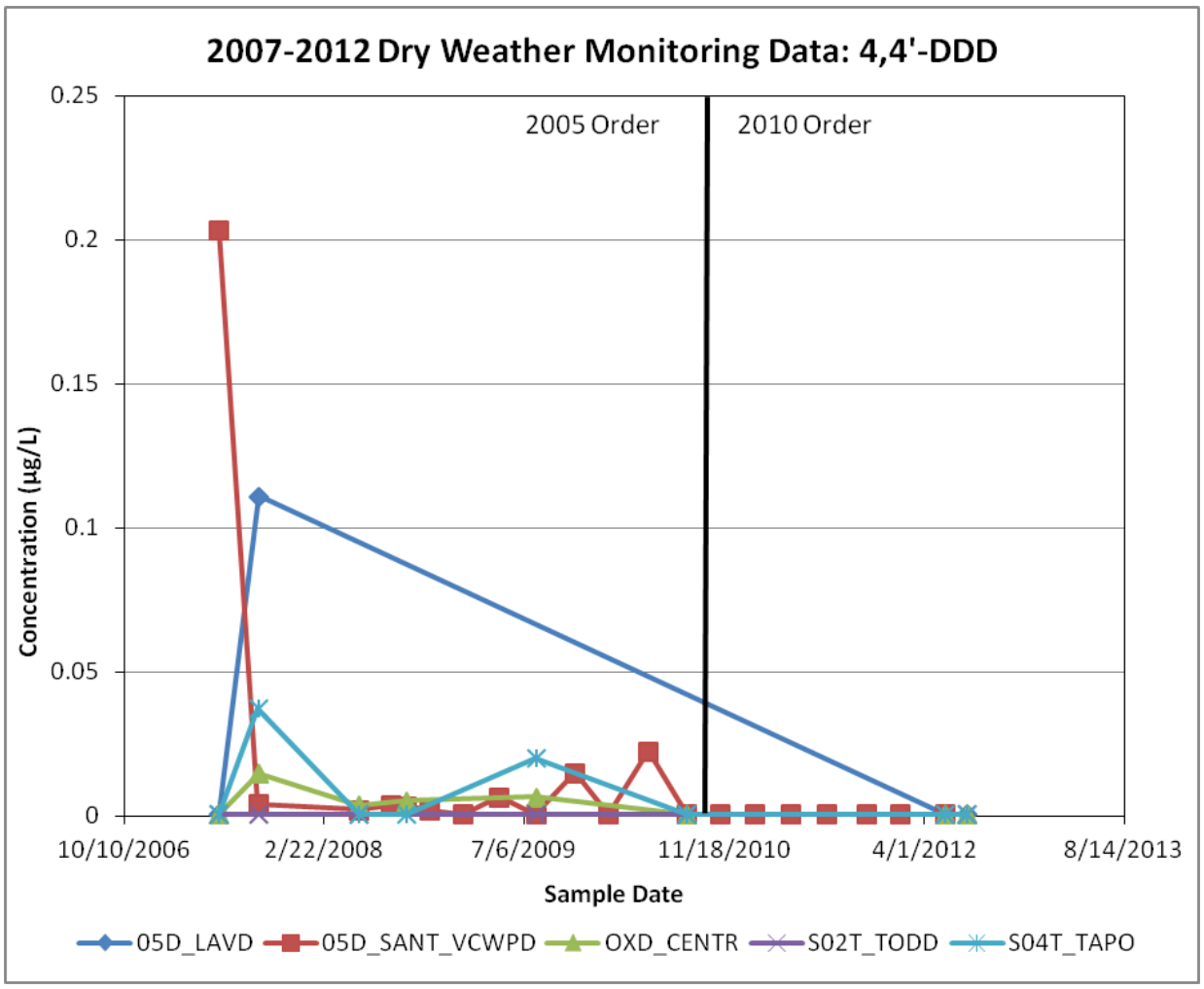



**Figure 9. Dry weather DDD concentrations collected at first priority sites from 2007 to 2012**

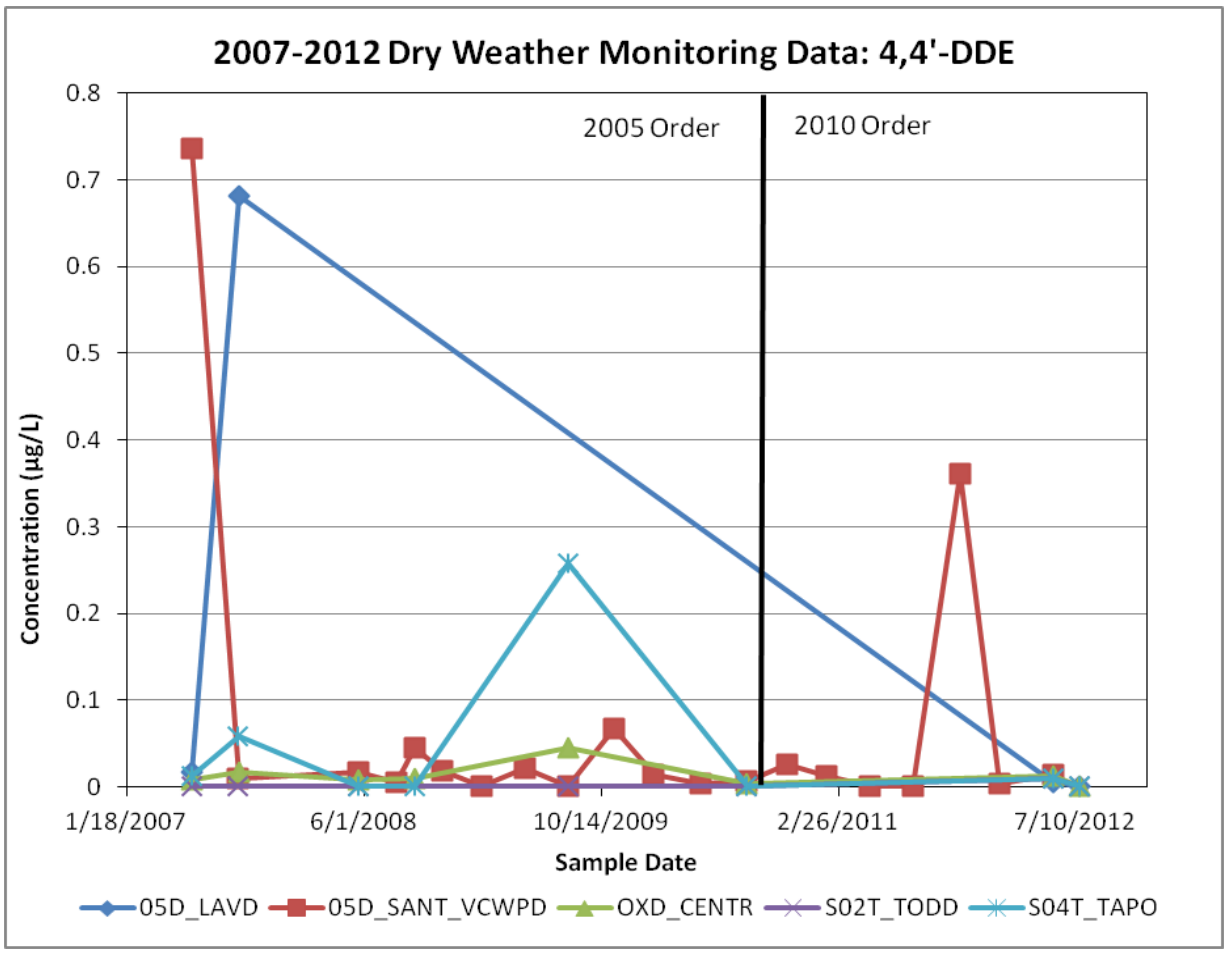



**Figure 10. Dry weather DDE concentrations collected at first priority sites from 2007 to 2012**

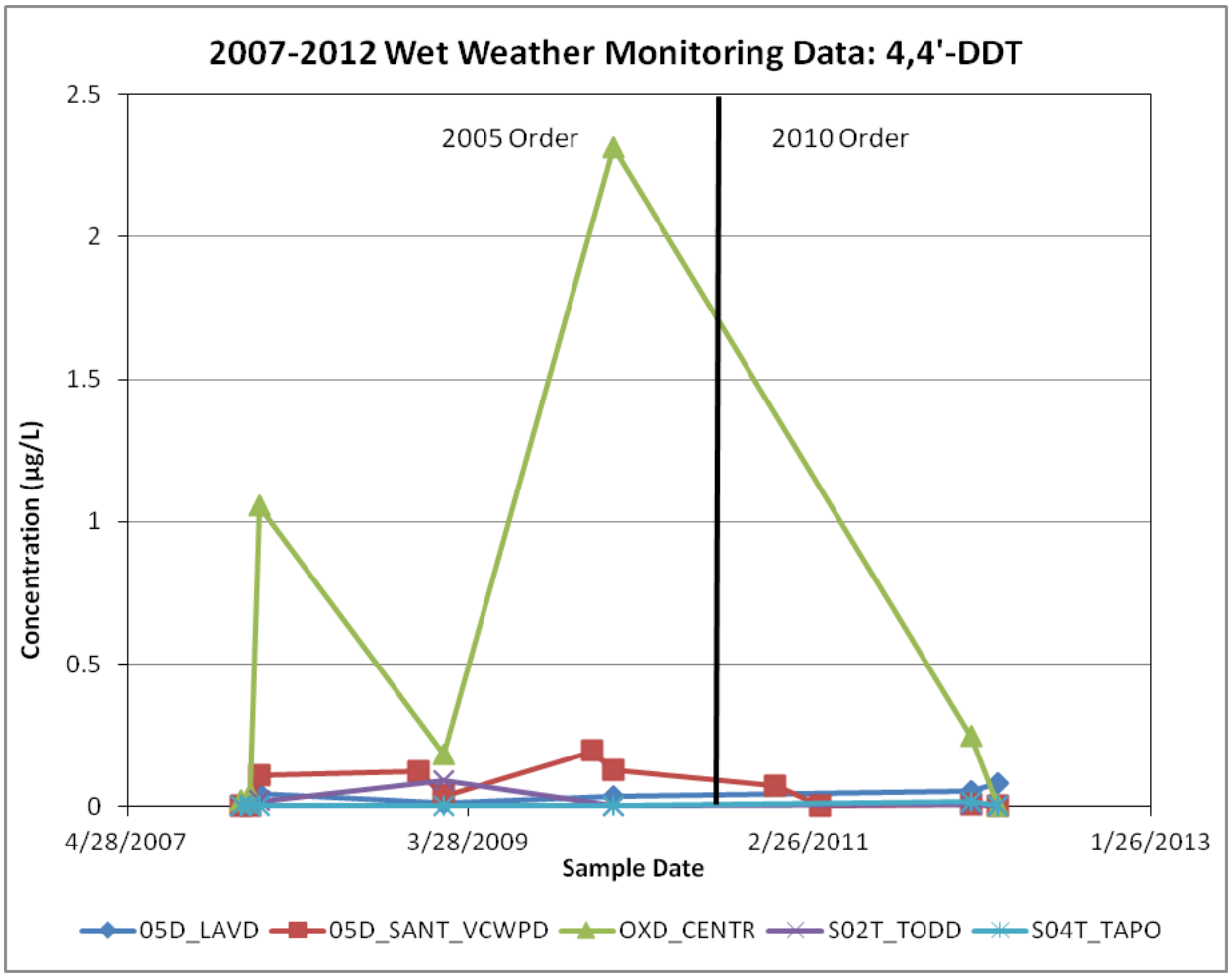



**Figure 11. Wet weather DDT concentrations collected at first priority sites from 2007 to 2012**

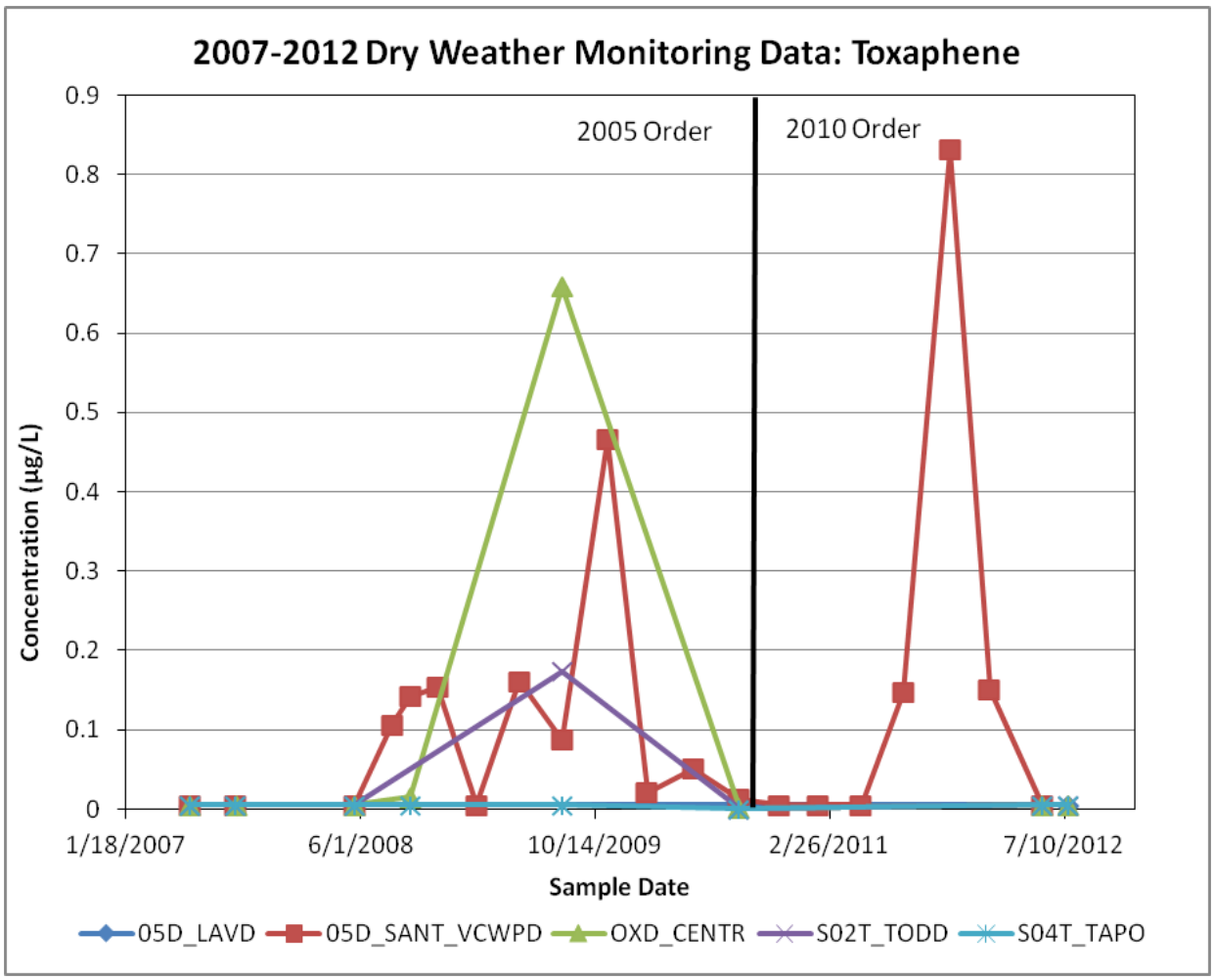



**Figure 12. Dry weather toxaphene concentrations collected at first priority sites from 2007 to 2012**

### *Nitrate-N*

Two first priority monitoring sites have shown significant Nitrate-N improvements during dry weather monitoring, S02T_TODD and S04T_TAPO (Figure 13). The average dry weather Nitrate-N concentration at S02T_TODD between 2007 and 2009 was 9.8 mg/L. Following WQMP implementation and the use of new BMPs by drainage area landowners, since 2010 the average Nitrate-N concentration for this site is now 2.2 mg/L. Regarding the Tapo Canyon site, S04T_TAPO, a large spike in Nitrate-N occurred during the 2009 dry weather event where the concentration was measured at 179.54 mg/L. Following this occurrence, VCAILG scheduled a site visit with the drainage area landowners and included NRCS staff. During the site visit a large potting mix stockpile was observed within close proximity to the waterway, upstream of the monitoring site. Relocating and containing the potting mix as well as other BMPs were discussed during the site visit. The landowners responded by removing the potting mix and vegetating many of the field edge ditches both upstream and also downstream of the Tapo Canyon monitoring site. Nitrate-N concentrations during 2012 dry weather sampling events were 10.16 and 5.19 mg/L.

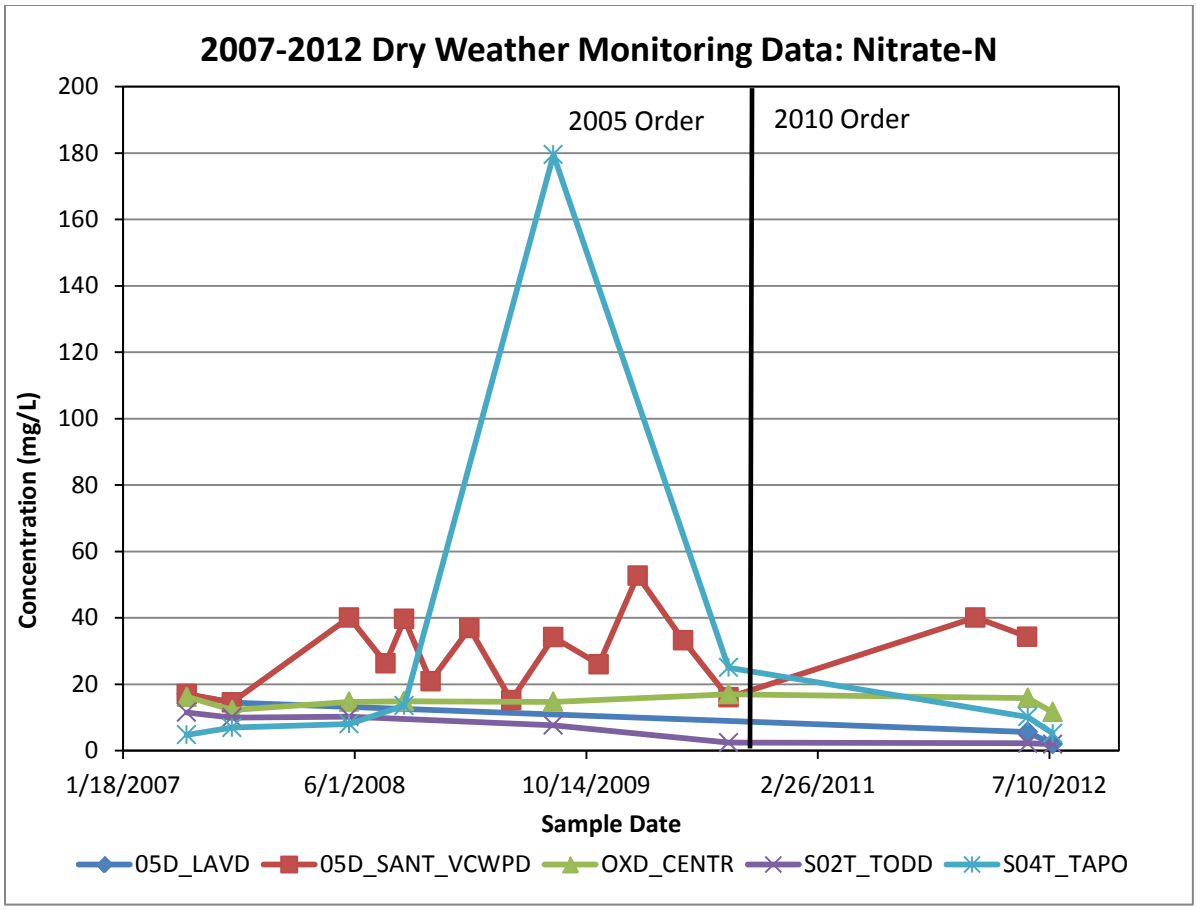



**Figure 13. Dry weather Nitrate-N concentrations collected at first priority sites from 2007 to 2012**

## Third-Tier Priority Sites

### *Boulder Creek (S03T_BOULD)*

Most third-tier priority sites have infrequent dry weather flow. The Boulder Creek site (S03T_BOULD) has shown significant improvement during dry weather. During the first four dry weather events, samples were collected at this site and high levels of nitrate-N were detected (Figure 14). Since 2010, there has been no flowing water during any of the dry weather monitoring events. This is depicted in the figure below as no data points after August 2009.

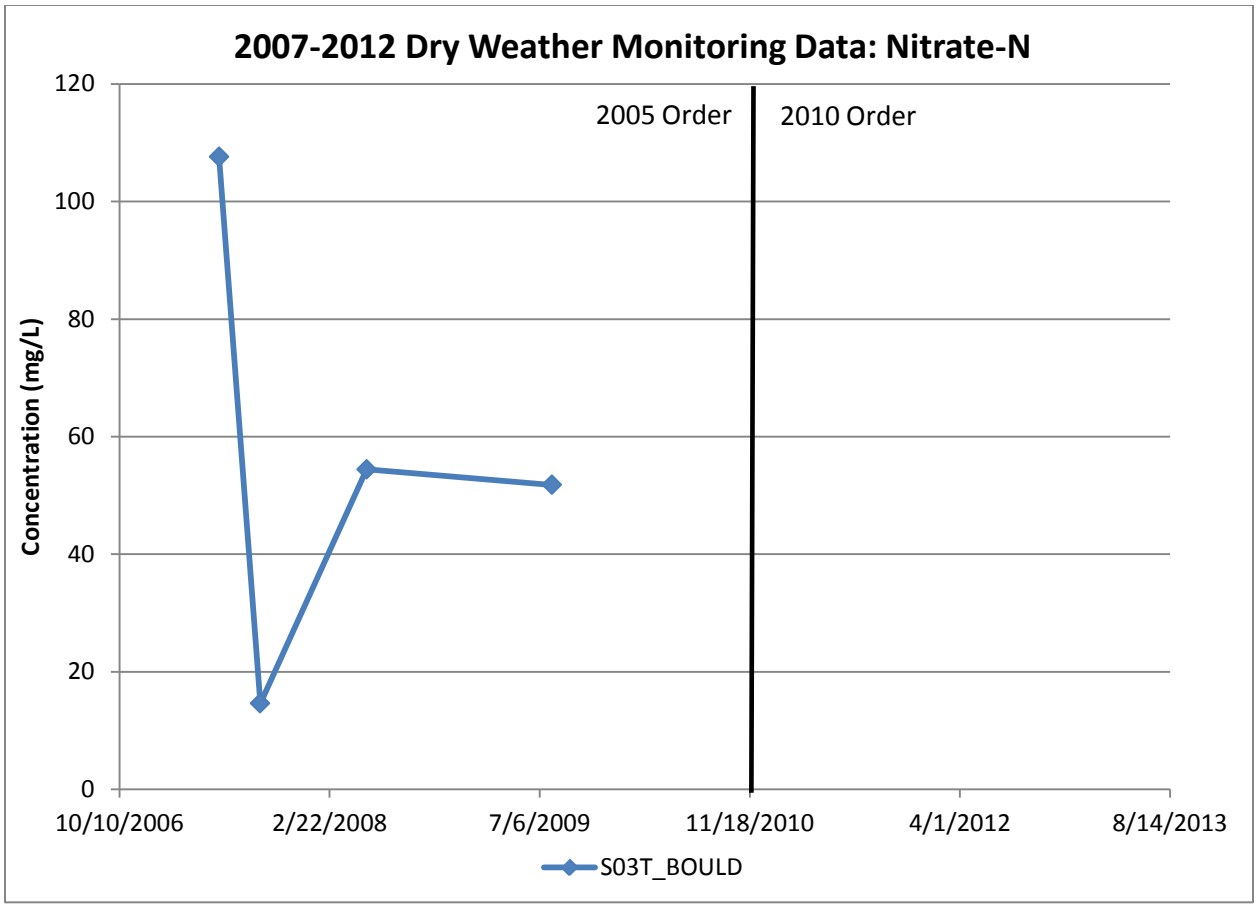



**Figure 14. Dry weather nitrate-N concentrations at S03T_BOULD from 2007 to 2012**

## 2005 CONDITIONAL WAIVER WQMP PROCESS

The 2005 Conditional Waiver included WQMP development and implementation requirements similar to those specified in the 2010 Order. Under the 2005 Conditional Waiver, a process was developed to achieve the goals of the WQMP; these steps included:

- Gathering information regarding management practices;
- Identifying priority areas;
- Providing targeted outreach and BMP guidance for priority areas;
- Implementing and tracking BMPs;
- Evaluating monitoring data for benchmark exceedances; and
- Evaluating BMP implementation to determine next steps.

VCAILG monitoring sites were prioritized as follows:

**Table 20. 2005 Conditional Waiver VCAILGMP Site Prioritization**

| 1st Tier Priority | 2nd Tier Priority | 3rd Tier Priority | Non-Priority |
|---|---|---|---|
| 05D_SANT_VCWPD [2] | 01T_ODD2_DCH [2] | 05T_HONDO | 06T_LONG2 |
| 05D_LAVD | 01T_ODD3_ARN | 06T_FC_BR [2] | 9BD_GERRY [2] |
| OXD_CENTR | 02D_BROOM [2] | S02T_ELLS | S04T_HOPP [1] |
| S02T_TODD | 04D_ETTG | S03T_TIMB | VRT_THACH |
| S04T_TAPO | 04D_LAS | S03T_BOULD | VRT_SANTO |
| | | S03D_BARDS | |

1. This site is no longer part of the VCAILGMP.
2. Site is now only monitored under the Calleguas Creek Watershed TMDL Monitoring Program.

Using the priority categorization for the monitoring sites the VCAILG WQMP was implemented, as detailed in Figure 15.

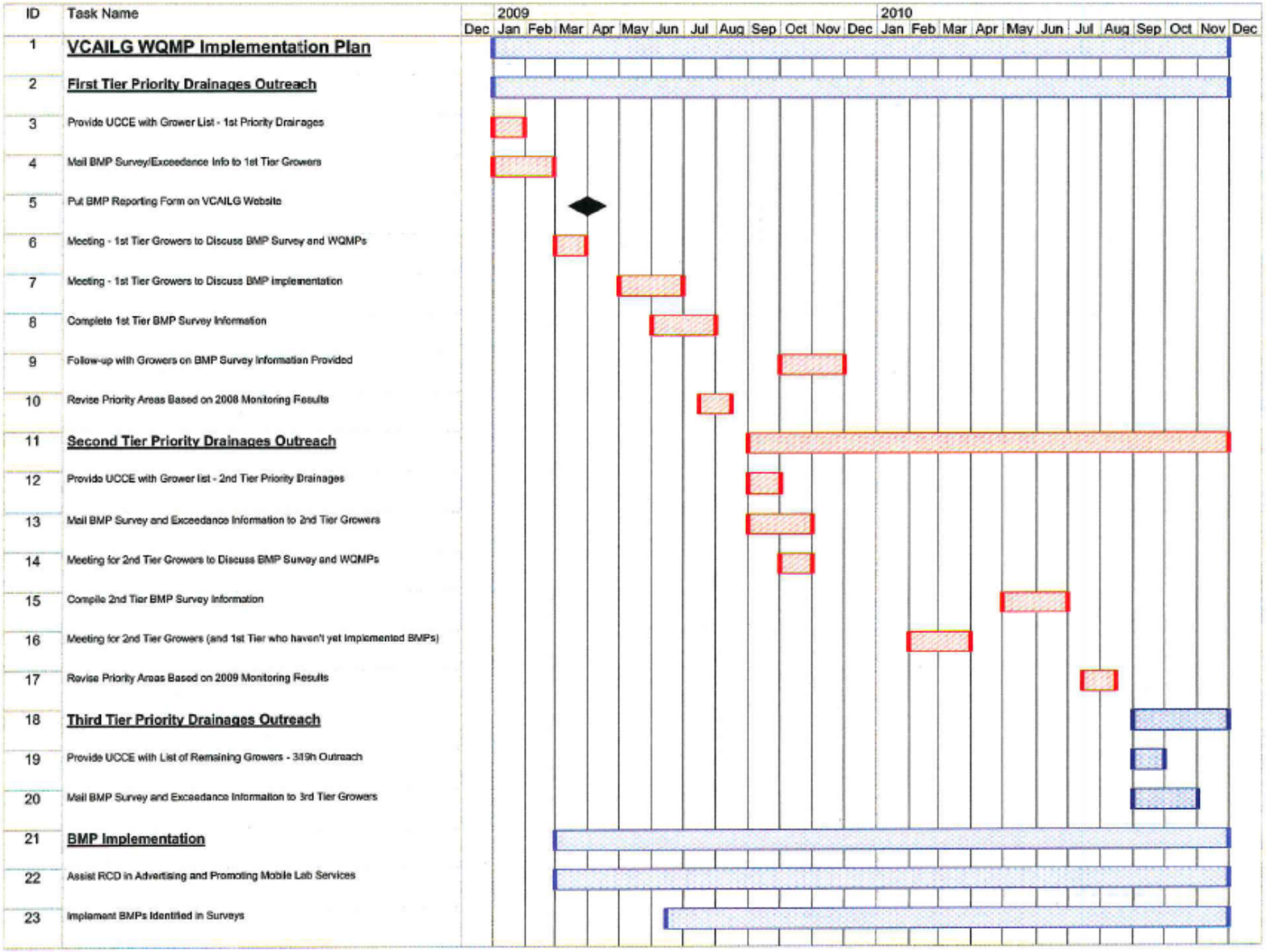



**Figure 15. 2005 Conditional Waiver VCAILG WQMP Implementation Timeline**

## MANAGEMENT PRACTICE SURVEY EVALUATION

### Background

As part of the 2007 WQMP, VCAILG developed a Survey of Management Practices (Survey) for distribution to enrollees. The survey was submitted for Regional Water Board approval in the December 15, 2008, revised WQMP. The Executive Officer of the Regional Board approved the Survey on February, 3, 2009. Distribution of the Survey to VCAILG enrollees has occurred in three phases. The Survey was initially distributed to landowners and growers in first-tier priority drainages shortly after it was approved by the Regional Water Board in early 2009. The returned surveys were evaluated as part of the 2008 VCAILG WQMP. Some of the first-tier enrollees returned their surveys too late (i.e., after June 2009) for the results to be incorporated in the 2008 WQMP. The second phase of Survey distribution targeted landowners and growers in second-tier drainages. VCAILG mailed the Survey to second-tier enrollees on October 1, 2009; surveys were returned between March 2009 and June 2010. In the 2009 WQMP, the survey results for the second-tier drainages were evaluated and the results for the first-tier drainages were updated using the surveys returned after the cutoff for the 2008 WQMP. On September 23, 2010, the Survey was distributed to enrollees in the third-tier drainages:

- 05T_HONDO
- 06T_FC_BR
- S02T_ELLS
- S03D_BARDS
- S03T_BOULD
- S03T_TIMB

In addition, during 2010-2011, VCAILG members who farm irrigated land outside of the Tier 1-3 priority drainages were presented with opportunities to submit surveys at VCAILG education meetings or other events, or by visiting the Farm Bureau website. As a result, a number of surveys were returned that addressed BMP use in several of the non-priority VCAILG site drainages as well as in irrigated areas that do not belong to any of the VCAILG site drainages. Surveys from the third round of distribution were returned through May 2011.

As explained in the 2008 and 2009 WQMPs, the Survey was designed, in part, to gather information about the extent of use of 100 BMPs, each of which was assigned to one of the following management categories:

- Sediment and Erosion Management
- Irrigation Management
- Pest Management
- Nutrient Management
- Salinity Management and Leaching
- Property Management

As part of the Survey, respondents were asked to assign one of the following five descriptors ("scores") to each of the BMPs:

1 - Yes, implemented prior to Jan. 2008

2 - Yes, implemented since Jan. 2008

3 - Planned for Future

4 - No, not currently implemented

5 - Not Applicable

The design of the survey resulted in associations between Ventura County Assessor's Parcel Numbers (APNs) and the scores (1 – 5) for each of the 100 BMPs.

In order to expand options for stratifying and exploring survey data for this report, BMPs were assigned to one of six "Characterization Categories", which were designed to reflect differences in the underlying nature of the activity involved. The Characterization Categories are listed in Table 21 with brief descriptors.

**Table 21. Characterization Categories Used to Stratify Survey Data.**

| Characterization Category | Example Activities |
|---|---|
| Real Time Data | Use of weather data, soil moisture sensors, tensiometers, sources of real time evapotranspiration data |
| Consultation | Use of diagnostic lab services, mobile labs, or irrigation consultants<br>Attendance at UC Cooperative Extension or other industry education events<br>Consultations with local agencies (NRCS, RCD, UCCE, etc.) |
| Testing | Use of pest scouting devices<br>Chemical testing of irrigation water<br>Soil tests<br>Leaf and petiole analysis<br>Irrigation system pressure tests |
| Specialized Knowledge | Acquisition (including web sites) and use of up-to-date, specialized knowledge about soil types, crop rooting depths, pests and disease, nutrient requirements of crops, pesticide effectiveness and recommendations for application, etc. |
| Cropped Area Actions | Actions taken in areas under production, such as field preparation, planting, mulching, irrigation, fertilization |
| Uncropped Area Actions | Actions taken in areas where crops are not growing, such as maintenance of equipment, storage and disposal of chemicals and waste, maintenance and layout of ditches and roads, employee training, treatment of riparian zones and natural vegetation, ground cover in non-cropped areas |

## Level of Response

To date, during implementation of the VCAILG WQMP, respondents have completed and returned 286 surveys. The geographic coverage of survey responses is presented in Table 22, expressed as the percent of total irrigated acreage reported by VCAILG members for an area ("enrolled acres") that is accounted for by all of the pertinent parcels that were listed on one or more survey forms. At this time, the survey process covers 78%, 76%, 72%, and 14%, respectively, of enrolled irrigated acreage in Tier 1, Tier 2, Tier 3, and non-priority VCAILG site drainages. Survey responses have so far addressed less than 75% of enrolled acreage in seven priority drainages (05D_LAVD, S04T_TAPO, 02D_BROOM, 04D_LAS, 06T_FC_BR, S03D_BARDS, S03T_TIMB). Differences in the reported survey coverage in this WQMP as compared to past documents are due to a variety of reasons; as the surveys are a snapshot representing the time of survey completion, since that date various changes may have occurred. Some examples of situations that would result in a difference in survey coverage incude: changes in the farmed acreage within a drainage area, parcels being enrolled in VCAILG that were un-enrolled at the time of survey distribution, or changes in parcel numbers (splitting or combining or parcels).

## Comparison of Survey Results from First-, Second- and Third-Tier Drainages

Survey results were entered into an Access database. The database was queried on the basis of VCAILG site drainage area and Assessor Parcel Number (APN). In many cases, a single set of management practices (single set of scores for the 100 BMPs) applied to an entire parcel. In other cases, where more than one survey was returned that applied to a single parcel (e.g., when an owner and a tenant reported management practices for subsets of the same parcel), each set of BMP scores was assigned to a subset of the parcel, determined by comparing the "evaluated" acres values from the all the response forms listing the parcel in question. When a single survey was submitted for multiple parcels, the total "evaluated acreage" was distributed among parcels according to their proportional contribution to the combined irrigated acreage associated with the group of parcels in the VCAILG membership database ("enrolled" acreage), and the same set of BMP scores was assigned to each parcel. Other adjustments were required when parcels straddled more than one VCAILG site drainage, when parcel numbers had been changed owing to reassessments, or when the "evaluated" acreage listed by respondents on their survey forms was significantly greater - or less - than the "enrolled" or assessed acreage for the same parcels.

Because Survey results are now available for Tier 1, Tier 2, and Tier 3 drainages, it is now possible to evaluate whether there is a correspondence between rates of BMP use and general water quality. In other words, it is now possible to evaluate whether or not particular BMPs are used to a greater extent in drainages where there are fewer benchmark exceedances and where fewer TMDLs apply (and vice versa). Such an evaluation is useful for determining whether there is justification (based on survey results) for prioritizing BMPs for future survey efforts or for outreach and training. Consequently, for this WQMP, priority was given to analyses that facilitated comparisons between BMP use in the three priority Tiers.

In order to simplify such comparisons, BMP's were considered "adopted" whether they were in use prior to January 2008 (corresponding to a score of "1" in the survey) or came into use between January 2008 and the time the survey was submitted (corresponding to a score of "2" in the Survey). "Adoption rates" were calculated for each BMP as the percent of total *applicable*

acres for the BMP (summed across all enrolled parcels in a Tier, or across all enrolled parcels in a drainage area) which were assigned a “1” or a “2”, as follows:

$$\text{Adoption Rate (\%)} = \frac{\text{(Acres with Score “1”)+(Acres with Score “2”)}}{\text{[(Enrolled Acres associated with Surveyed Parcels)-(Acres with Score “5”)]}}$$

**Table 22. Geographic Coverage of Survey Responses. VCAILG Site Drainages for which less than 75% of the Enrolled Acreage has been Addressed by Survey Responses are Highlighted in Beige.**

| Tier | VCAILG Site Drainage | Estimated Irrigated Acreage (a) | Enrolled Acres as of March 2013 | Number of Surveys Returned | Percent of Currently Enrolled Acres Associated with One or More Surveys |
|---|---|---|---|---|---|
| 1 | 05D_LAVD | 877 | 1,067 | 9 | 52% |
| | 05D_SANT_VCWPD | 1,154 | 1,030 | 8 | 83% |
| | OXD_CENTR | 1,243 | 946 | 6 | 100% |
| | S02T_TODD | 5,748 | 1,447 | 12 | 90% |
| | S04T_TAPO | 2,183 | 1,184 | 4 | 64% |
| | **Overall** | | **5,674** | **39** | **78%** |
| 2 | 01T_ODD2_DCH | 1,564 | 1,465 | 18 | 76% |
| | 01T_ODD3_ARN | 800 | 633 | 5 | 98% |
| | 02D_BROOM | 8,236 | 3,283 | 21 | 74% |
| | 04D_ETTG | 3,779 | 3,592 | 32 | 80% |
| | 04D_LAS | 1,339 | 2,469 | 13 | 68% |
| | **Overall** | | **11,442** | **89** | **76%** |
| 3 | 05T_HONDO | 3,928 | 2,047 | 18 | 92% |
| | 06T_FC_BR | 2,602 | 1,808 | 30 | 54% |
| | S02T_ELLS | 9,015 | 1,668 | 18 | 78% |
| | S03D_BARDS | 2,214 | 1,012 | 22 | 54% |
| | S03T_BOULD | 3,764 | 1,455 | 11 | 78% |
| | S03T_TIMB | 2,183 | 844 | 9 | 65% |
| | **Overall** | | **8,834** | **108** | **72%** |
| Non Priority | 05D_SANT_BKGD | | 558 | 1 | 23% |
| | 06T_LONG | 2,813 | 1,805 | 3 | 9% |
| | S04T_TAPO_BKGD | | 591 | 3 | 73% |
| | VRT_SANTO | 7,220 | 650 | 1 | 6% |
| | 9BD_GERRY | 447 | 705 | (b) | |
| | S04T_HOPP | | 137 | (b) | |
| | VRT_THACH | 6,003 | 1,042 | (b) | |
| | **Overall** | | **5,489** | **8** | **14%** |
| **Areas outside of VCAILG site drainages** | | | **57,357** | **42** | **8%** |

(a) Data source: Ventura County Agricultural Commissioner's Office. Values are from Tables 3 and 4.
(b) To date, no surveys have been submitted that list parcels in these Site Drainages.

Average BMP adoption rates for Tiers 1-3 are presented on the basis of BMP Characterization and Management Categories in Table 23. Average adoption rates for categories of BMPs calculated on the basis of drainage area are presented in Table 24. The adoption rates for individual BMPs are presented for Tiers 1-3 in Table 25, with BMPs listed in descending order of their use in the Tier 1 drainages. BMPs with low adoption rates (arbitrarily designated as rates < 50%) in two or three of the Tiers are listed in Table 26. BMPs that were designated as generally not very applicable in surveyed areas (i.e., the BMP was deemed applicable in ≤50% percent of the evaluated acreage by respondents) are listed in Table 27. The survey results are tabulated following the style of the Survey form (i.e., organized by Management Category) in Appendix E.

Included in Table 23 and Table 25 are values for the differences between adoption rates in Tier 1 and Tier 3. Positive values for this parameter for individual BMPs (in Table 25) indicate that the BMP is used on a greater percent of the enrolled irrigated land in Tier 3 drainages (where water quality is relatively higher) than in Tier 1 drainages (where water quality is poorer). This parameter is a potential indicator of the extent to which adoption of particular BMPs, or categories of BMPs, is associated with improved water quality. When considering these survey results, it is important to keep in mind when the tiers were surveyed; Tier 1 properties were surveyed in early 2009, followed by Tier 2 in October, 2009. Tier 3 surveys represent farm practices in September 2010. A significant amount of outreach and education has been completed since this survey effort and many additional and revised BMPs have been implemented. Aside from the differences in water quality amongst the priority tiers, there are also differences in crop type, topography, and other field conditions that may not be captured strictly by comparing tier level. However, the tier comparison provided is a useful tool in looking at the "big picture" of the survey results and gaining an understanding of possible differences in practices that impact water quality, helping to guide future WQMP actions.

**Table 23. Average Adoption Rates, and Overall Differences in Adoption Rate between Tiers, for BMP Categories.**

| | # of Applicable BMPs | Average BMP Adoption Rate | | | Difference in Adoption Rate between Tiers 1 and 3 |
|---|---|---|---|---|---|
| | | Tier 1 | Tier 2 | Tier 3 | |
| **BMP Characterization** | | | | | |
| Use of Real Time Data | 3 | 36.0% | 55.9% | 66.0% | 29.9% |
| Consultation | 4 | 43.5% | 55.2% | 72.7% | 29.2% |
| Testing | 8 | 55.5% | 77.0% | 79.9% | 24.4% |
| Specialized Knowledge | 12 | 54.9% | 78.0% | 87.7% | 32.8% |
| Cropped Area Actions | 52 | 54.7% | 71.5% | 83.6% | 28.9% |
| Uncropped Area Actions | 21 | 57.7% | 80.1% | 90.1% | 32.4% |
| **Management Category** | | | | | |
| Irrigation Management | 23 | 53.5% | 72.6% | 83.5% | 30.0% |
| Nutrient Management | 13 | 56.3% | 78.4% | 86.3% | 30.0% |
| Pest Management | 30 | 58.5% | 80.0% | 89.1% | 30.5% |
| Salinity/Leaching | 4 | 55.2% | 72.1% | 78.3% | 23.0% |
| Sediment & Erosion | 19 | 44.3% | 55.3% | 72.5% | 28.2% |
| Property Management | 11 | 59.9% | 83.2% | 92.2% | 32.3% |

**Table 24. Average Adoption Rates for Categories of BMPs Calculated on the Basis of Drainage Area.**

| BMP Category (Number of Applicable BMPs) | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| **BMP Characterization** | | | | | | | | | | | | | | | | |
| Use of Real Time Data (3) | 58% | 53% | 20% | 37% | 34% | 78% | 89% | 53% | 50% | 43% | 28% | 75% | 57% | 53% | 50% | 88% |
| Consultation (4) | 58% | 49% | 15% | 74% | 47% | 59% | 49% | 52% | 59% | 53% | 53% | 83% | 79% | 58% | 56% | 83% |
| Testing (8) | 69% | 67% | 27% | 91% | 48% | 87% | 93% | 70% | 77% | 77% | 64% | 89% | 86% | 61% | 71% | 86% |
| Specialized Knowledge (12) | 77% | 62% | 28% | 81% | 53% | 84% | 75% | 70% | 82% | 80% | 87% | 99% | 88% | 68% | 79% | 90% |
| Cropped Area Actions (52) | 73% | 65% | 24% | 84% | 48% | 75% | 65% | 64% | 74% | 72% | 75% | 91% | 86% | 65% | 73% | 93% |
| Uncropped Area Actions (21) | 80% | 68% | 27% | 85% | 50% | 83% | 79% | 70% | 86% | 82% | 79% | 96% | 95% | 69% | 78% | 98% |
| **Management Category** | | | | | | | | | | | | | | | | |
| Irrigation Management (23) | 74% | 61% | 23% | 79% | 48% | 79% | 73% | 63% | 75% | 69% | 68% | 88% | 85% | 63% | 70% | 95% |
| Pest Management (13) | 79% | 71% | 30% | 89% | 53% | 84% | 79% | 71% | 85% | 81% | 85% | 96% | 87% | 68% | 81% | 96% |
| Nutrient Management (30) | 73% | 67% | 28% | 88% | 51% | 85% | 86% | 70% | 81% | 81% | 74% | 93% | 93% | 67% | 78% | 92% |
| Salinity/Leaching (4) | 65% | 41% | 20% | 86% | 28% | 72% | 69% | 52% | 81% | 71% | 58% | 91% | 83% | 53% | 58% | 84% |
| Sediment & Erosion (19) | 59% | 53% | 13% | 65% | 39% | 56% | 32% | 54% | 51% | 53% | 59% | 85% | 77% | 58% | 55% | 78% |
| Property Management (11) | 81% | 71% | 31% | 90% | 54% | 87% | 93% | 73% | 89% | 85% | 86% | 98% | 97% | 70% | 84% | 99% |

**Table 25. Comparison of BMP Use in the Priority Drainages. BMPs are listed in Descending Order of Overall Adoption Rate in the Combined Tier 1 Priority Drainages. Low (≤ 50%) and High (≤ 90%) Adoption Rates are Highlighted in Red and Green, Respectively.**

| BMP Category | | Adoption Rate (Percent of Applicable Acreage Where BMP is Employed) | | | Overall Difference in Adoption Rate | BMP Characterization | Description of BMP |
|---|---|---|---|---|---|---|---|
| | BMP # | Tier 1 | Tier 2 | Tier 3 | (Tier 3 –Tier 1) | | |
| Sed/Erosion | 13 | 68% | 60% | 87% | 19% | Cropped Area Action | Erosion management practices such as terracing, water diversions, and critical area plantings are used for non-production areas that are sloped or hilly. |
| Sed/Erosion | 6 | 68% | 83% | 88% | 21% | Cropped Area Action | Avoid bare fields using cover crops, leaving plant debris, or planting subsequent crops. |
| Pest Management | 47 | 67% | 84% | 92% | 24% | Cropped Area Action | All transplants, plugs, or plant material is inspected for pests before planting or introduction in the growing area. |
| Property Management | 97 | 65% | 84% | 96% | 31% | Uncropped Area Action | Vehicles, machinery, and tanks no longer in use are drained of fluids, and those fluids properly disposed. |
| Irrigation Management | 36 | 64% | 86% | 91% | 28% | Cropped Area Action | If irrigation must be based on a set schedule due to water availability, the amount of irrigation is varied according to the weather and plant growth stage. |
| Irrigation Management | 23 | 64% | 80% | 84% | 20% | Cropped Area Action | When drip irrigation is used, the distribution uniformity is 90% or better. |
| Sed/Erosion | 4 | 64% | 75% | 88% | 25% | Cropped Area Action | Long runs of production area are broken up by access roads or buffer strips. |
| Pest Management | 64 | 62% | 84% | 93% | 30% | Uncropped Area Action | Pesticides are stored where they are protected from rain and contained on an impermeable pad with curb to contain spills or leaks. |
| Irrigation Management | 42 | 62% | 84% | 93% | 31% | Cropped Area Action | Irrigation duties are performed only by personnel who understand and practice appropriate irrigation scheduling, application, and crop management practices related to runoff management. |
| Pest Management | 43 | 62% | 84% | 94% | 31% | Testing | Proper scouting methods are used to determine the population densities of insect pests, snails, slugs, and weeds and the incidence of diseases. Methods include use of yellow sticky traps, use of pheromone traps, plant inspection, beating, or net sweeping or other appropriate scouting tools and methods . |
| Pest Management | 59 | 62% | 84% | 94% | 32% | Cropped Area Action | Worn nozzles and screens are replaced to ensure the best coverage of pesticide applications. |
| Pest Management | 61 | 62% | 84% | 93% | 31% | Cropped Area Action | Pesticides are applied only according to the label and environmental hazards are followed. |
| Pest Management | 66 | 62% | 84% | 93% | 31% | Uncropped Area Action | Pesticide disposal methods are environmentally safe and in accordance to label instructions. |
| Pest Management | 67 | 62% | 84% | 93% | 31% | Cropped Area Action | Reduced risk pesticides are used. |
| Pest Management | 69 | 62% | 84% | 93% | 31% | Cropped Area Action | Avoid applying pesticides when wind could move them off-target as drift. |
| Pest Management | 70 | 62% | 84% | 94% | 32% | Cropped Area Action | Avoid applying pesticides when rain or scheduled irrigation will move the pesticides as runoff and ground percolation. |

| BMP Category | | Adoption Rate (Percent of Applicable Acreage Where BMP is Employed) | | | Overall Difference in Adoption Rate | BMP Characterization | Description of BMP |
|---|---|---|---|---|---|---|---|
| | BMP # | Tier 1 | Tier 2 | Tier 3 | (Tier 3 –Tier 1) | | |
| Nutrient Management | 77 | 62% | 84% | 94% | 32% | Cropped Area Action | Crop plants are visually assessed for signs of nutrient deficiency or toxicity. |
| Nutrient Management | 79 | 62% | 84% | 92% | 30% | Cropped Area Action | Fertilizer applications are split into multiple smaller applications rather than applying all that is required for a crop in one large application. |
| Property Management | 92 | 62% | 84% | 94% | 32% | Uncropped Area Action | Employees receive training on the following: wearing protective clothing, understanding fertilizer/pesticide signage, MSDS and label information, personal hygiene and sanitation, trash disposal and recycling, use storage and disposal of fertilizers and pesticides, pest and disease scouting, spill cleanup, and irrigation. |
| Pest Management | 54 | 62% | 84% | 94% | 32% | Specialized Knowledge | The grower or pesticide applicator considers selectivity and effectiveness against the target organism before choosing a pesticide. |
| Pest Management | 60 | 62% | 84% | 94% | 32% | Cropped Area Action | Treatment rate, water volume, and driving speed are optimized to attain the coverage needed for specific pests. |
| Property Management | 96 | 62% | 84% | 94% | 32% | Uncropped Area Action | All vehicles, trucks, and tractors are regularly maintained to detect and prevent fluid leaks. |
| Pest Management | 56 | 62% | 84% | 94% | 32% | Specialized Knowledge | Spray timing is based on economic thresholds of pest incidence. |
| Property Management | 94 | 62% | 84% | 94% | 32% | Uncropped Area Action | Fuel tanks are checked and maintained to prevent leaks. |
| Irrigation Management | 24 | 62% | 81% | 95% | 33% | Cropped Area Action | Irrigation main and lateral lines are regularly inspected for breaks, leaks, or clogs. |
| Irrigation Management | 25 | 62% | 76% | 90% | 28% | Cropped Area Action | Filters are inspected and cleaned regularly. |
| Nutrient Management | 81 | 62% | 84% | 94% | 33% | Cropped Area Action | Fertilizer applications are timed to maximize plant uptake, taking into consideration the life stage of the crop, potential rain events, and irrigation timing. |
| Property Management | 98 | 61% | 84% | 94% | 33% | Uncropped Area Action | The property is kept clean and free of debris. |
| Pest Management | 58 | 61% | 84% | 95% | 33% | Cropped Area Action | Sprayers are routinely calibrated to ensure accurate application rates. |
| Property Management | 93 | 61% | 84% | 94% | 33% | Uncropped Area Action | Training is provided in the employees' native language. |
| Pest Management | 63 | 61% | 84% | 92% | 31% | Cropped Area Action | Pesticide use records are submitted monthly to the county Agricultural Commissioner. |
| Pest Management | 50 | 61% | 84% | 93% | 32% | Specialized Knowledge | Personnel are aware of the causal agents of diseases in the field and their methods of spread. |
| Pest Management | 51 | 61% | 84% | 92% | 31% | Specialized Knowledge | Personnel are familiar with methods and timing of disease control. |
| Irrigation Management | 28 | 61% | 81% | 95% | 34% | Cropped Area Action | Sprinkler heads and drip emitters of the same gallonage are used within each block and replaced with the same heads or emitters when necessary. |

| BMP Category | | Adoption Rate (Percent of Applicable Acreage Where BMP is Employed) | | | Overall Difference in Adoption Rate | BMP Characterization | Description of BMP |
|---|---|---|---|---|---|---|---|
| | BMP # | Tier 1 | Tier 2 | Tier 3 | (Tier 3 –Tier 1) | | |
| Irrigation Management | 39 | 61% | 81% | 87% | 26% | Uncropped Area Action | Harvested or unplanted areas are not irrigated. |
| Pest Management | 48 | 61% | 79% | 91% | 31% | Specialized Knowledge | Natural enemy populations are considered when choosing pesticides, application rates, and timing. |
| Pest Management | 68 | 61% | 84% | 93% | 33% | Cropped Area Action | Choose selective pesticides for the target pest species and avoid using broad-spectrum pesticides. |
| Pest Management | 46 | 61% | 83% | 94% | 33% | Consultation | Diagnostic lab services or other professional assistance is used to identify unknown pathogens, pests, or growth problems before implementing a control measure. |
| Sed/Erosion | 7 | 61% | 85% | 93% | 32% | Cropped Area Action | Minimize compaction by using drive rows, reducing tractor passes, reducing cultivation, and avoiding driving on or tilling wet ground. |
| Nutrient Management | 73 | 61% | 83% | 93% | 33% | Specialized Knowledge | Most recent nutrient recommendations for your particular crops and growing practices are used. |
| Nutrient Management | 83 | 60% | 83% | 92% | 31% | Cropped Area Action | Fertilizer applications are adjusted to account for other nutrient sources, such as: irrigation water, cover crops, and residuals from previous fertilizations. |
| Irrigation Management | 41 | 60% | 88% | 94% | 34% | Cropped Area Action | Well head is protected from surface contamination (located high in the landscape so that surface water drains away from well head; located away from potential contaminants; the space between the casing and sides of hole is grouted; casing regularly inspected for leaks; vermin-proof well cap with screened vent). |
| Property Management | 99 | 60% | 84% | 90% | 30% | Uncropped Area Action | The property has an adequate number of waste containers that are regularly collected to prevent overflow and are kept covered to prevent scattering of trash. |
| Irrigation Management | 27 | 60% | 80% | 90% | 30% | Cropped Area Action | Pressure regulators or pressure compensating emitters are used. |
| Irrigation Management | 38 | 60% | 84% | 88% | 28% | Cropped Area Action | Irrigation is halted if significant runoff occurs. |
| Property Management | 91 | 60% | 83% | 94% | 34% | Specialized Knowledge | Landowner, grower, or other responsible personnel subscribe to and read farming, trade, and industry journals containing articles about water quality, fertilizer, pest and erosion management. |
| Pest Management | 53 | 60% | 84% | 87% | 28% | Specialized Knowledge | Classes of pesticides are rotated to avoid resistance. |
| Sed/Erosion | 11 | 60% | 83% | 91% | 31% | Uncropped Area Action | Berms, culverts, or flow channels are in place to divert water away from roads. |
| Pest Management | 52 | 59% | 84% | 91% | 31% | Cropped Area Action | Disease resistance or disease tolerant crop varieties are used. |
| Property Management | 100 | 59% | 84% | 90% | 31% | Uncropped Area Action | Restrooms or portable toilets are available where needed and regularly maintained. |
| Irrigation Management | 30 | 59% | 86% | 84% | 25% | Uncropped Area Action | Water is diverted from non-crop areas by adjusting sprinkler head arcs or using sprinkler guards. |

| BMP Category | | Adoption Rate (Percent of Applicable Acreage Where BMP is Employed) | | | Overall Difference in Adoption Rate | BMP Characterization | Description of BMP |
|---|---|---|---|---|---|---|---|
| | BMP # | Tier 1 | Tier 2 | Tier 3 | (Tier 3 –Tier 1) | | |
| Sed/Erosion | 15 | 59% | 66% | 93% | 34% | Uncropped Area Action | Non-cropped areas with bare soil are protected from erosion with vegetation, mulch, gravel, or by diverting water. |
| Irrigation Management | 40 | 59% | 76% | 84% | 26% | Testing | Irrigation water quality is tested for parameters of interest including: pH, electrical conductivity (EC), sodium (Na), chloride (Cl), bicarbonate (HCO3), and boron (B). |
| Nutrient Management | 76 | 59% | 76% | 90% | 31% | Cropped Area Action | Fertilization rates are adjusted based on the results of soil fertility measurements. |
| Pest Management | 62 | 59% | 77% | 93% | 34% | Cropped Area Action | Pesticides are applied at the lowest effective labeled rate. |
| Sed/Erosion | 12 | 59% | 80% | 91% | 32% | Uncropped Area Action | Road erosion is minimized by grading, using gravel or mulch on roads, or constructing water bars or drainways. |
| Irrigation Management | 29 | 59% | 81% | 94% | 35% | Cropped Area Action | Consistent riser heights are used. |
| Pest Management | 44 | 58% | 71% | 76% | 18% | Real Time Data | Use weather data or degree days to determine when to control pests. |
| Nutrient Management | 75 | 58% | 75% | 89% | 30% | Testing | Soil fertility is routinely monitored through measurements of nitrogen, phosphorus, potassium, and micronutrients. |
| Salinity/Leaching | 87 | 58% | 82% | 82% | 24% | Cropped Area Action | Leaching is done only when fertilizer injectors are turned off. |
| Nutrient Management | 84 | 58% | 82% | 94% | 36% | Uncropped Area Action | Fertilizers are stored where they are protected from rain and on an impermeable pad with a curb to contain spills. |
| Property Management | 90 | 57% | 78% | 89% | 32% | Consultation | Landowner, grower, or other personnel regularly attend UC Cooperative Extension, Commodity Board, or other industry educational meetings concerning management practices that protect water resources. |
| Nutrient Management | 78 | 57% | 79% | 92% | 35% | Testing | Leaf or petiole analyses are used as a guide for fertilizer application. |
| Salinity/Leaching | 89 | 56% | 66% | 90% | 34% | Cropped Area Action | Saline or high selenium wells are decommissioned and other sources of water are used. |
| Pest Management | 71 | 56% | 77% | 88% | 32% | Cropped Area Action | Copper Sulfate is not applied prior to extensive irrigation or expected rainfall. |
| Irrigation Management | 22 | 56% | 66% | 76% | 20% | Cropped Area Action | Implement appropriate improvements based on your own irrigation system test or the recommendations of the Irrigation Mobile Lab or other appropriate irrigation professionals. |
| Irrigation Management | 26 | 55% | 82% | 86% | 31% | Cropped Area Action | Lines are flushed or cleaned chemically to prevent clogging. |
| Salinity/Leaching | 88 | 54% | 63% | 84% | 31% | Cropped Area Action | Fertilizers and amendments with a low salt index are used. |
| Irrigation Management | 31 | 54% | 72% | 97% | 43% | Cropped Area Action | When irrigating for frost protection, the proper timing and amount of irrigation is used. |
| Sed/Erosion | 10 | 53% | 67% | 88% | 35% | Cropped Area Action | In sloped production areas, management practices to minimize erosion such as contour farming, contoured buffer strips, or terracing are used. |

| BMP Category | | Adoption Rate (Percent of Applicable Acreage Where BMP is Employed) | | | Overall Difference in Adoption Rate | BMP Characterization | Description of BMP |
|---|---|---|---|---|---|---|---|
| | BMP # | Tier 1 | Tier 2 | Tier 3 | (Tier 3 –Tier 1) | | |
| Irrigation Management | 20 | 53% | 74% | 80% | 27% | Testing | At least annually test the irrigation system for distribution uniformity by monitoring water delivery or pressure differences within a block. |
| Salinity/Leaching | 86 | 53% | 77% | 57% | 4% | Testing | Leaching is performed only when necessary, as determined by measuring soil solution electrical conductivity (EC). |
| Pest Management | 65 | 53% | 82% | 88% | 35% | Uncropped Area Action | Pesticide mixing and loading is done on an impermeable surface and more than 100 feet down slope from any wells. |
| Sed/Erosion | 8 | 53% | 57% | 82% | 29% | Cropped Area Action | Apply mulch, compost, or green waste to improve soil characteristics, especially for sandy or clayey soils. |
| Nutrient Management | 80 | 53% | 75% | 62% | 9% | Testing | Fertilizer levels in fertigation water are tested to ensure that injectors are correctly calibrated. |
| Pest Management | 57 | 52% | 68% | 88% | 35% | Cropped Area Action | Hot spots are identified and sprayed rather than treating an entire field. |
| Irrigation Management | 37 | 50% | 68% | 76% | 25% | Cropped Area Action | Flow meters are used to measure actual water use and is coupled with known crop use values or other measurements to conserve water as appropriate. |
| Property Management | 95 | 49% | 82% | 85% | 36% | Uncropped Area Action | Spill cleanup materials are readily accessible and maintained for all potential types and sizes of spills. |
| Nutrient Management | 74 | 49% | 76% | 81% | 33% | Testing | Chemical properties of the soil, including pH and electrical conductivity (EC), are routinely measured. |
| Irrigation Management | 33 | 48% | 77% | 92% | 44% | Specialized Knowledge | The grower knows the infiltration rate of the soil, the available water holding capacity of the soil, and the crop rooting depth. |
| Pest Management | 72 | 48% | 78% | 68% | 20% | Cropped Area Action | Copper containing pesticides are replaced with alternatives. |
| Sed/Erosion | 14 | 48% | 56% | 82% | 35% | Uncropped Area Action | Ditch banks are protected from erosion with vegetation, rock protection, or geotextiles. |
| Nutrient Management | 82 | 46% | 58% | 62% | 16% | Cropped Area Action | Slow-release fertilizers are used. |
| Sed/Erosion | 9 | 46% | 52% | 84% | 38% | Cropped Area Action | Windbreaks or shelterbelts are used in areas prone to wind erosion. |
| Pest Management | 49 | 46% | 58% | 74% | 28% | Cropped Area Action | Beneficial insects or mites are released in the field. |
| Nutrient Management | 85 | 46% | 80% | 86% | 40% | Uncropped Area Action | Mixing and loading of fertilizers occurs in a covered area on an impermeable surface and more than 100 feet down slope from any wells. |
| Sed/Erosion | 5 | 44% | 66% | 79% | 35% | Uncropped Area Action | Riparian areas or other areas of natural vegetation were retained or expanded during site development. |
| Sed/Erosion | 3 | 44% | 64% | 84% | 40% | Cropped Area Action | Consider erosion hazard rating and prevailing winds when choosing row orientation. |
| Pest Management | 45 | 43% | 74% | 83% | 39% | Specialized Knowledge | Use UC IPM guidelines as a resource (www.ipm.ucdavis.edu). |

| BMP Category | | Adoption Rate (Percent of Applicable Acreage Where BMP is Employed) | | | Overall Difference in Adoption Rate | BMP Characterization | Description of BMP |
|---|---|---|---|---|---|---|---|
| | BMP # | Tier 1 | Tier 2 | Tier 3 | (Tier 3 –Tier 1) | | |
| Pest Management | 55 | 43% | 57% | 65% | 22% | Specialized Knowledge | Personnel are familiar with the UC online databases for comparing the risks of different pesticides moving with water and sediment and affecting non-target organisms (WaterTox or Pesticide Wise). |
| Irrigation Management | 32 | 43% | 40% | 81% | 37% | Cropped Area Action | Alternative equipment such as tunnels, air circulation, heaters, or smudge pots are used for frost protection. |
| Sed/Erosion | 2 | 36% | 64% | 75% | 38% | Specialized Knowledge | Know your soil series and its erosion hazard rating. |
| Irrigation Management | 21 | 31% | 30% | 44% | 14% | Consultation | Utilize the services of the Irrigation Mobile Lab or a professional irrigation consultant for evaluating irrigation system performance. |
| Irrigation Management | 34 | 30% | 54% | 70% | 40% | Real Time Data | Soil moisture is measured with equipment such as gypsum block soil moisture sensors (such as Watermarks), tensiometers, soil probe, or neutron probe. |
| Sed/Erosion | 19 | 26% | 9% | 26% | 0% | Cropped Area Action | Devices are in place to treat runoff before it leaves the property, such as grassed waterways, vegetated filter strips, and tailwater recycling systems. |
| Sed/Erosion | 1 | 25% | 29% | 63% | 38% | Consultation | Consult with local agencies (NRCS, RCD, UCCE, or county planning) to develop a soil conservation plan. |
| Irrigation Management | 35 | 20% | 43% | 51% | 32% | Real Time Data | Evapotranspiration (ET) values are used to determine irrigation requirements. Values are obtained from CIMIS, onsite atmometers, or other appropriate devices. |
| Sed/Erosion | 18 | 19% | 23% | 26% | 7% | Cropped Area Action | Sediment traps are used at the end of the field to retain sediments in runoff. |
| Sed/Erosion | 16 | 8% | 21% | 43% | 35% | Cropped Area Action | Irrigation runoff is captured or kept on the property. |
| Sed/Erosion | 17 | 2% | 11% | 14% | 12% | Cropped Area Action | Stormwater runoff is captured or kept on the property. |

**Table 26. BMPs with Low Adoption Rates (< 50%) in Two or Three Tiers. Adoption Rates Less than 50% are Highlighted in Red.**

| BMP# | Adoption Rate | | | BMP Description |
|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | |
| 1 | 25% | 29% | 63% | Consult with local agencies (NRCS, RCD, UCCE, or county planning) to develop a soil conservation plan. |
| 16 | 8% | 21% | 43% | Irrigation runoff is captured or kept on the property. |
| 17 | 2% | 11% | 14% | Stormwater runoff is captured or kept on the property. |
| 18 | 19% | 23% | 26% | Sediment traps are used at the end of the field to retain sediments in runoff. |
| 19 | 26% | 9% | 26% | Devices are in place to treat runoff before it leaves the property, such as grassed waterways, vegetated filter strips, and tailwater recycling systems. |
| 21 | 31% | 30% | 44% | Utilize the services of the Irrigation Mobile Lab or a professional irrigation consultant for evaluating irrigation system performance. |
| 32 | 43% | 40% | 81% | Alternative equipment such as tunnels, air circulation, heaters, or smudge pots are used for frost protection. |
| 35 | 20% | 43% | 51% | Evapotranspiration (ET) values are used to determine irrigation requirements. Values are obtained from CIMIS, onsite atmometers, or other appropriate devices. |

**Table 27. BMPs Designated as Not Very Applicable Within a Tier**

| Priority Tier | BMP# | Percent of Evaluated Acreage where the BMP is Applicable | BMP Description |
|---|---|---|---|
| **Tier 1** | 13 | 43% | Erosion management practices such as terracing, water diversions, and critical area plantings are used for non-production areas that are sloped or hilly. |
| | 31 | 50% | When irrigating for frost protection, the proper timing and amount of irrigation is used. |
| | 89 | 32% | Saline or high selenium wells are decommissioned and other sources of water are used. |
| | | | |
| **Tier 2** | 10 | 33% | In sloped production areas, management practices to minimize erosion such as contour farming, contoured buffer strips, or terracing are used. |
| | 13 | 34% | Erosion management practices such as terracing, water diversions, and critical area plantings are used for non-production areas that are sloped or hilly. |
| | 32 | 46% | Alternative equipment such as tunnels, air circulation, heaters, or smudge pots are used for frost protection. |

Key observations from the survey analysis by tier are summarized below. Survey information by monitoring site drainage has been added to this revised WQMP, however the data compilation by tier provided the most meaningful results.

***Overall use of BMPs correlates well with general water quality.***

BMPs are in greater use where water quality is higher. Twenty-three of the BMPs are used on ≥90% of the combined evaluated acreage in Tier 3 Drainages; none of the BMPs are used to that extent in the combined areas of either Tier 1 or Tier 2 Drainages, at the time surveys were conducted. Significantly more BMPs are *under*-utilized (used on < 50% of evaluated acreage) in Tier 1 (24 BMPs) than in Tier 2 (8 BMPs) or Tier 3 (6 BMPs).

***Almost all of the BMPs potentially contribute to improvements in water quality.***

Except for a single BMP (#19), all of the BMPs in the Survey are used to a greater extent in Tier 3 drainages than in Tier 1 drainages. None of the BMPs are used to a greater extent in Tier 1 than in Tier 3. Additionally, for 92 of the 100 BMPs, adoption rates can be ranked as follows: Tier 1% < Tier 2% < Tier 3%. In these cases, adoption rates *among all three Tiers* are consistent with general trends in water quality in the VCAILG Site Drainages.

***Some BMPs are considered widely inapplicable.***

Widely inapplicable BMPs (those applicable on only ≤50% of evaluated acreage) were only identified in Tiers 1 and 2. Four out of five of the distinct BMPs listed in Table 27 are related to either erosion control in sloped or hilly areas (BMPs #10, #13) or to Frost Protection (BMPs #31, #32). This result can be explained by the local topography, elevation, and/or proximity to the ocean of the majority of land included within Tiers 1 and 2. Tier 2 sites are located in the lower Calleguas Creek Watershed, which is flat; therefore, practices that are useful for farming steep slopes are not relevant in this area. Many BMPs with low adoption rates (Table 26) are classified as such due to the fact that they are impracticable and could just as easily have been categorized as "Not Applicable." For example the capture of stormwater runoff (#16) and the use of sediment traps (#18) are two such BMPs with low adoption rates. These two practices result in the loss of valuable farm land from production. According to the most recent USDA Census of Agriculture, 78% of Ventura County farms are considered "small" at less than 50 acres. While there are areas where these practices are feasible and have been implemented, in many situations the installation of such systems is cost prohibitive and there is not a sufficient benefit to the farmer. Practices that control the source of pollutants and prevent or slow down any runoff are better management options since they reduce the cost of inputs (water, fertilizers, and pesticides) subvert the need for these more costly options that result in land loss. Any future survey efforts will aim to target BMPs that are widely applicable and feasible for most farming situations that exist within Ventura County.

***None of the BMP categories appear to be better correlated than others with trends in water quality.***

Although there are differences in the adoption rates among categories of BMPs (for example, in all Tiers, "Use of Real Time Data" is lower than "Testing" or "Use of Specialized Knowledge"), the overall differences in adoption rates between Tiers 1-3 is surprisingly consistent among categories (ranges 24%-34%). This implies that (based on survey data alone) none of the *categories* of BMPs are more clearly linked to improving water quality than others.

### *Use of Survey Information: Develop Strategies for Prioritizing BMP Training and Outreach*

Because there is evidence from the Survey database that a broad spectrum of currently identified BMPs are potentially contributing to improved water quality, it may be useful to consider the inertial barriers for adoption of BMPs categories, and focus near-term outreach on BMPs that require less effort, less training, or less money than others. For example, intermittent on-farm testing of soil and water involves the participation of fewer staff than would need to participate in the implementation of fundamental changes in every-day activities in cropped areas.

# Grower Outreach and BMP Implementation

## 319H GRANT EDUCATION AND BMP ASSISTANCE

During most of the implementation period of previous VCAILG WQMPs, the University of California, Riverside, Ventura County RCD, and University of California Cooperative Extension (UCCE) received funding to implement a 319h grant, "Implementation of Best Management Practices to Reduce Agricultural TMDL Loads in the Calleguas Creek and Santa Clara River Watersheds." The objective of the grant was to assist Ventura County growers in meeting water quality objectives. Three goals were identified to meet the grant objective:

- Increase understanding of the Ventura County agriculture community in water quality issues and effective management practices to expand the implementation of these practices to protect water quality.
- Identify gaps/deficiencies in current management practices in Ventura County agricultural operations.
- Reduce agriculture's contribution of nutrients, pesticides, and other pollutants to impaired waterbodies in Ventura County leading to compliance with TMDL load reductions, VCAILG benchmarks, and other water quality objectives.

In regards to VCAILG WQMP implementation, the 319h grant team played an important and significant role in the mailing, collection, data input, and follow-up responsibilities related to the Management Practice Survey. The final report for this project details the efforts and accomplishments achieved during the grant period.[2]

The following program highlights were documented in the final report.

- 12 education workshops were held with more than 518 participants.
- Over 95 newly implemented BMPs were documented on more than 8,000 acres.
- 161 growers and landowners were assisted with on-site farm water quality management planning; covering 14,287 acres in Calleguas Creek Watershed and 7,304 acres in Santa Clara River Watershed.

[2] "Implementation of Best Management Practices to Reduce Agricultural TMDL Loads in Calleguas Creek and Santa Clara River Watersheds." Contract # 08-606-554. August 31, 2012.

## VENTURA COUNTY RESOURCE CONSERVATION DISTRICT MOBILE IRRIGATION LAB

### Program Description

The Ventura County Resource Conservation District (VCRCD) Mobile Irrigation Lab (MIL) program was developed to conduct irrigation and energy use audits. MIL staff evaluates irrigation systems, pumps, and energy usage at the field level and provide a report of results, including recommendations on how to improve distribution uniformity, energy savings, seasonal irrigation efficiency, and irrigation scheduling. A certain amount of cost share funding is available to assist farmers in implementing recommended improvements based on MIL evaluations. The MIL program also includes outreach and educational workshops, both independently and in conjunction with VCAILG meetings.

The MIL is equipped to evaluate several types of irrigation systems, including sprinklers, microsprinklers, and drip. Optimizing irrigation systems and their performance can have several benefits. In relation to water quality, potential benefits include: decreased amount of water applied, decreased nutrient leaching, decreased tailwater runoff, decreased fertilizer and/or pesticide applications.

### MIL Program Accomplishments

Since the start of the MIL program in October 2011, 70 irrigation evaluations have been performed on 606 acres. The average distribution uniformity for the farms that have been evaluated was 0.78. The MIL program has a target performance level of 0.85 distribution uniformity. A table specifying the crop types and watershed reach locations for the evaluations to date is provided below, followed by a summary of improvements being made using program cost-share funding. Not every farmer participating in the program wishes to seek cost-share funding, though they may improve their system or install moisture meters to assist with irrigation scheduling as a response to the evaluation results. To capture and document these BMPs, MIL staff plan to begin following-up with program participants and tracking the improvements they make.

**Table 28. MIL Evaluations by Crop Type and Reach – October 2011 through January 2013**

| | Calleguas Creek Watershed | | | | | | Santa Clara River Watershed | | | Ventura River Watershed | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Crop Type | Reach 1 Oxnard Drain | Reach 5 Beardsley Wash | Reach 6 Arroyo Las Posas | Reach 7 Arroyo Simi | Reach 9B Conejo Creek | Reach 11 Arroyo Santa Rosa | Reach 2 | Reach 3 | Reach 4 | Reach 4 | Thacher Creek |
| Orchard | 0 (0) | 53 (4) | 143 (25) | 7 (2) | 9.25 (2) | 7.5 (1) | 30 (2) | 85.8 (10) | 153 (10) | 50 (3) | 30 (6) |
| Row | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| Nursery | 37 (2) | 0 (0) | 0.3 (3) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |

Note: Values are in acres (# of evaluations).

**Table 29. MIL Program BMP Implementation Projects**

| Crop Type | Acres | Stream Reach | Pending Project |
|---|---|---|---|
| Orchard | 14 | SCR Reach 3 | Install drip irrigation and pressure compensating emitters at base of each tree in an irrigation block. |
| Orchard | 15 | CC Reach 6 | Install soil moisture meters to inform irrigation scheduling. Divide existing orchard into more irrigation blocks in order to better regulate pressure and irrigation of trees. |
| Orchard | 24 | SCR Reach 2 | Install pressure regulators and convert from microsprinkler to Netafim™ drip irrigation system. |

## NATURAL RESOURCES CONSERVATION SERVICE PLANNING AND ASSISTANCE

The Natural Resources Conservation Service (NRCS) is a federal agency with local field offices and staff that work with private landowners providing conservation planning and assistance designed to benefit the soil, water, air, plants, and animals. Planning services are available to anyone and cost share funds are distributed through a competitive approval process to aid in the implementation of conservation practices.

NRCS currently has approximately 70 active contracts and an additional 40 applicants in the planning phase. The funded contracts amount to approximately 158,000 acres of land with one or more conservation practices planned to address specific resource concerns. The typical conservation plan is done over two to three years and the practices are completed as funding allows and designs are done. The most common resource concerns of Ventura County farmers seeking NRCS assistance are related to erosion control, flooding and sediment transport, soil condition, and fertilization.

To address the various resource concerns on a property, conservation practices (BMPs) are identified and planned. Some of the practices currently under contract for installation between 2012 and 2014 include the following:

- ~790 acres of Nutrient Management (water quality)
- ~4,000 feet of underground outlet (soil and water quality)
- ~23,000 feet of underground drainage (soil erosion and water quality)
- 1,100 feet of windbreak (wind plant health and soil erosion protection)
- 637 feet of structure for water control (water quality/quantity, soil erosion)
- 12,000 plus feet of pipeline for water conveyance (water quality/quantity/soil erosion)
- 95 acres mulching (organic depletion and soil erosion protection)
- 1,900 feet of lined waterway (soil erosion/water quality)
- 4 irrigation reservoirs and 8 irrigation systems (water quality/quantity/soil erosion)
- ~80 acres of conservation/cover crops (soil health/erosion and water quality)
- 13 acres critical area planting (soil health/erosion and water quality)
- 1 ag chemical handling facility (water quality)
- ~1000 acres of Irrigation Water Management (water quality/quantity)

The map shown in Figure 16 gives the location of sites where BMPs are being implemented within the Ventura County watersheds and hydrologic units.

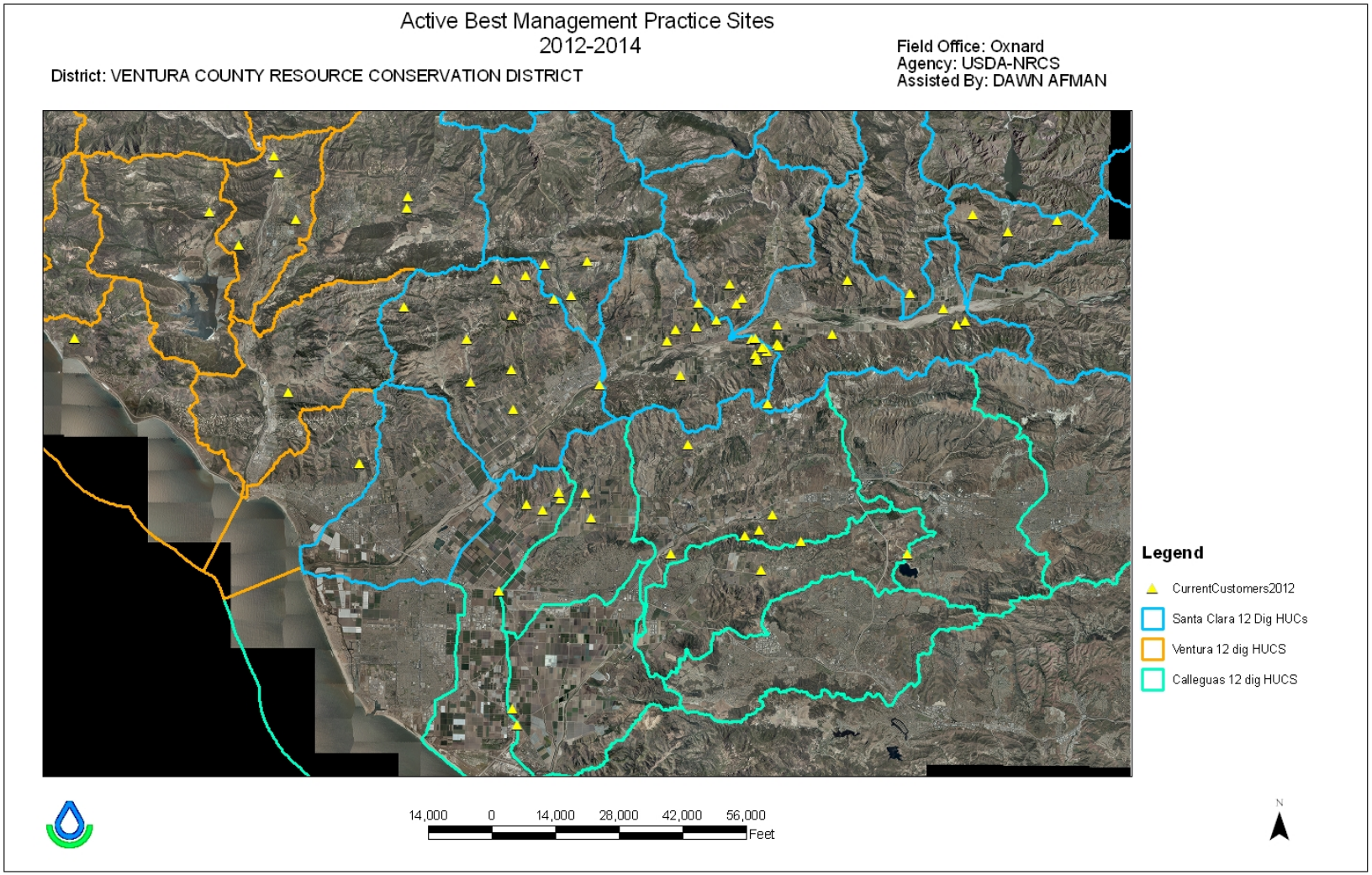



**Figure 16. NRCS BMP Project Locations**

## ADAPTIVE MANAGEMENT PRACTICE IMPLEMENTATION

The available management practices for on-farm implementation are continuing to evolve as new technologies and information becomes available. The necessity of new BMPs can be driven by any, or a combination of the following: cost considerations, need to improve efficiency, market changes, regulatory pressure, problems with current systems, drive to increase yields, desire to improve crop quality, etc. Local agencies and organizations, commodity groups, universities, farmers, and private companies all play a role in expanding on the current knowledge base and providing new BMP research and technologies. Many of these emerging BMPs are developed on farms, creating case-study opportunities that can serve as demonstration sites for other farmers. As the effectiveness of these new BMPs is demonstrated, growers can be expected to adapt their own management strategies to incorporate the latest and most cost-effective options suitable for their crops, locations and cultural practices. The following two tables list some of the current or future BMP implementation and outreach opportunities in Ventura County related to these research and development efforts.

**Table 30. Adaptive BMP Implementation**

| Agency or Organization | Research and BMP Implementation Activities |
|---|---|
| UCCE - Ventura | Farm Advisor, Oleg Daugovish is doing field trials throughout the County for establishing strawberries using drip tape and no overhead irrigation.<br>Local research is also being done regarding the use of cover crops to minimize sediment movement in hoop house fields.<br>Funding was recently approved for two nutrient related grants. One project will evaluate nitrogen and phosphorus leaching from organic fertilizers. The focus of the second grant is to assess the effectiveness of riparian ornamentals as vegetative filters for nitrogen and phosphorus uptake. |
| California Strawberry Commission | Hired a staff person strictly devoted to water education. They are developing an irrigation training program based on irrigation evaluations from 18 strawberry operations in Ventura and other major growing areas (*i.e.* Watsonville and Santa Maria). The farm evaluations include irrigation distribution uniformity, soil analysis and properties, water analysis, etc. |
| California Celery Research Advisory Board | Currently funding nutrient management trials being performed on farms in Ventura County. These trials were demonstrated at a VCAILG field trip for row crops. |
| Fox Canyon Groundwater Management Agency | FCGMA developed and has implemented an irrigation allowance index, which restricts pumping to all GMA pumpers to the calculated value for efficient water use based on crop type, weather, location, leaching, and frost protection. |
| UCCE | Michael Cahn and other UC specialists have been conducting trials relating quick nitrogen testing and weather-based irrigation scheduling to optimize fertilization and water management. The CropManage tool that was developed allows farmers to input various farm specific information (*i.e.* crop type and age, irrigation method, and water delivery per hour, quick nitrogen test results) and the program will make recommendations for how long and when to irrigation and how much nitrogen, if any, should be applied. A limited number of crops are currently in the system, but research is underway to expand. CropManage will be demonstrated at a VCAILG workshop in May, 2013. |
| Irrigation Training and Research Center, Cal Poly San Luis Obispo | ITRC has completed a final report on field trials regarding the effects of sprinkler, partial sprinkler/drip, and drip only irrigation on strawberry transplants. The reduced sprinkler strategy was proven successful locally in Oxnard. |
| Ventura County Resource Conservation District | The RCD has submitted four proposals to the Fertilizer Research and Education Program. Funding decisions will be announced in August 2013. |
| Community Recycling and Local Farmers | Community Recycling and local farmers are collaborating to recycle the agricultural plastic covering strawberry beds and also used in some vegetable fields. Community Recycling estimates that they collect approximately 70% of the agricultural plastic in Ventura County. The used plastic is cleaned, processed, and turned into pellets to be used in new products. Research is being done testing the use of recycled plastic in the fields and determining the percent recycled material that will still stretch and maintain the necessary strength. |

**Table 31. BMP Outreach and Education**

| Agency or Organization | Outreach and Education |
|---|---|
| UCCE – Ventura | A Strawberry BMP Manual has been written in Spanish and English. |
| | A Row Crop BMP Manual is in progress.<br>UCCE hosts various commodity specific education meetings. |
| California Strawberry Commission | Following completion of the farm evaluations mentioned in the table above, a two-tiered education program targeting owners/growers and irrigators will be developed. Owner/growers will learn about proper system design, and education for irrigators will focus on irrigation system maintenance and scheduling. The CSC provides information/education in both English and Spanish.<br>CSC provides education classes and field demonstrations every year. The meetings are a way to inform growers about the latest research and technology related to strawberry production. Meetings are typically presented in English and Spanish. |
| California Avocado Society | CAS holds quarterly meetings in Ventura. All three upcoming meetings are relevant to farm management and water quality; pest management and fertilization are two major focuses. |
| Fox Canyon Groundwater Management Agency | A series of videos have been developed and are accessible to farmers online that detail using the irrigation allowance index as well as crop specific information on irrigation and proper water management. |
| Ventura County Resource Conservation District | The RCD has hosted various education meetings, many focusing on nutrient management and soil moisture monitoring strategies for improved irrigation. A Mobile Irrigation Lab is also being funded with Proposition 84 money. The MIL performs irrigation evaluations including pump tests and distribution uniformity. Evaluation results are provided to the farmers with recommendations for improvement, if needed, and some cost-share funding is available. |
| VCAILG | Since adoption of the 2010 Conditional Waiver, VCAILG and partnering agencies have offered 100 hours of education for its members, with additional meetings planned in 2013. Meetings range in content, but focus on regulation (Conditional Waiver and TMDLs), water quality monitoring data, and BMPs and resources for improving water quality. The Management Practice Survey is another important tool in providing BMP information to VCAILG members. |

# WQMP Implementation Process

The purpose of this section is to outline the process that will be utilized by VCAILG to identify the need for management practices, implement specific management practices and track the implementation and effectiveness of those management practices to mitigate water quality benchmark exceedances and achieve TMDL load allocations. As demonstrated by the survey results, BMP documentation of other organizations, and the progress documenting water quality improvements to date; the implementation of past VCAILG WQMPs has been successful. A substantial amount of information has been gathered and the process for locating issues, gathering information, and determining next steps and BMP implementation remains a legitimate path for achieving compliance. Figure 17 is the same flow chart previously used to demonstration the WQMP implementation process, and it is proposed that this iterative approach continue.

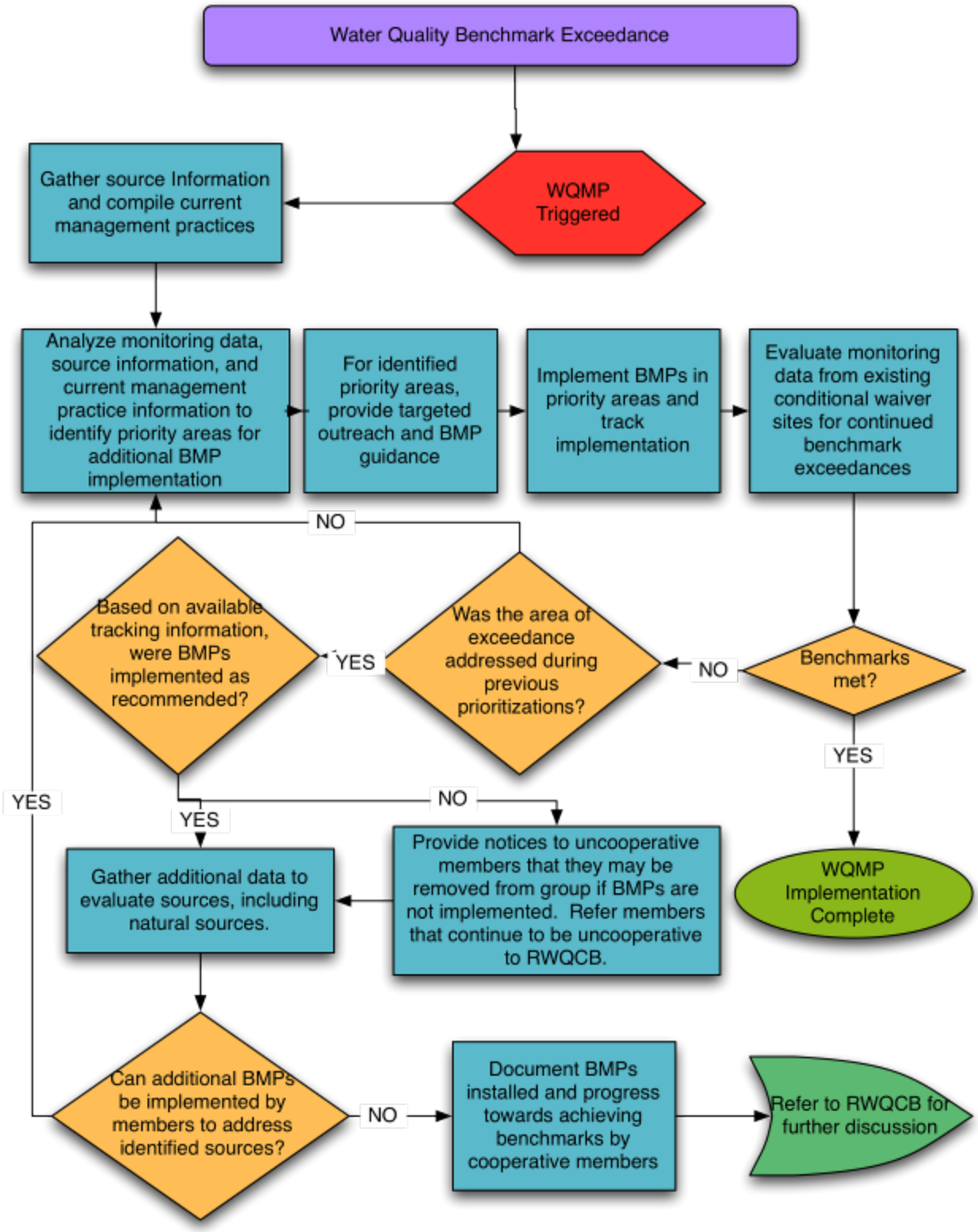



**Figure 17. WQMP Implementation Process**

## IDENTIFICATION OF PRIORITY AREAS

One critical component of implementing the WQMP is prioritizing the monitoring sites. Identifying priority areas is important for focusing outreach efforts and promoting the implementation of BMPs in the areas with water quality benchmark exceedances. The Conditional Waiver specifies that information such as the severity of water quality problems, existence of TMDL load allocations, and availability of other data sources be considered when identifying priority areas. For continuity purposes, the priority tiers will remain the same. TMDL only monitoring sites have been prioritized based on geography, water quality data, and the number of effective TMDLs in that area. Category 1 and 2 columns in the table below list the number of effective TMDLs and priority ranking during the 2005 Conditional Waiver, if applicable. The color each site is shaded represents the priority tier under this WQMP for compliance with the 2010 Conditional Waiver.

**Table 32. Prioritization for VCAILGMP and TMDL Monitoring Sites**

| Site ID | Category 1 # of Effective TMDLs | Category 2 Prioritization During 2005 Conditional Waiver |
|---|---|---|
| **VCAILGMP Monitoring Sites** | | |
| 01T_ODD3_ARN | 4 | 2nd |
| 04D_ETTG | 5 | 2nd |
| 04D_LAS | 5 | 2nd |
| 05D_LAVD | 5 | 1st |
| 05T_HONDO | 5 | 3rd |
| 06T_LONG2 | 4 | None |
| OXD_CENTR | 1 | 1st |
| S02T_ELLS | 2 | 3rd |
| S02T_TODD | 1 | 1st |
| S03T_TIMB | 1 | 3rd |
| S03T_BOULD | 1 | 3rd |
| S03D_BARDS | 1 | 3rd |
| S04T_TAPO | 1 | 1st |
| VRT_THACH | 0 | None |
| VRT_SANTO | 0 | None |
| **TMDL Only Monitoring Sites** | | |
| 01T_ODD2_DCH | 4 | 2nd |
| 02D_BROOM | 4 | 2nd |
| 04D_WOOD | 5 | N/A |
| 05D_SANT_VCWPD | 5 | 1st |
| 06T_FC_BR | 4 | 3rd |
| 07D_HITCH_LEVEE_2 | 4 | N/A |
| 9BD_GERRY | 5 | None |
| S01D_MONAR | 1 | N/A |
| CIHD_VICT | 1 | N/A |

| | | Category 1 | Category 2 |
|---|---|---|---|
| | High Priority | ≥ 4 | 1st Priority |
| | Medium Priority | 2 – 3 | 2nd Priority |
| | Low Priority | ≤ 1 | 3rd Priority or None |

| | |
|---|---|
| | 1st Tier Priority Drainage |
| | 2nd Tier Priority Drainage |
| | 3rd Tier Priority Drainage |

## WQMP APPROACH

A substantial amount of outreach, education, and BMP data gathering has occurred during the 2005 Conditional Waiver period and as part of the 2010 Conditional Waiver, to date. VCAILG has developed a three part approach to addressing water quality priorities during this WQMP period.

1. Develop a comprehensive web-based survey system to better track and evaluate BMP implementation. Feedback VCAILG has received from outreach efforts and past surveys have been used to develop a new focused, web-based survey.

2. Continue to provide outreach and education information to engage VCAILG members regarding education opportunities, water quality monitoring results, and Conditional Waiver requirements.

3. Provide targeted additional follow-up activities focused on documenting occurrences and implementing BMPs to address irrigation runoff. There are a few reasons for this approach:
   - The Survey has demonstrated that to some extent all BMPs are useful; however, they are not all feasible or appropriate for every growing situation. The 2010 Conditional Waiver applies to all farms that are irrigated, and thus proper management of irrigation is a first step in preventing pollutants from leaving a farm property and contributing to exceedances of water quality benchmarks.
   - Proper management of irrigation water protects both surface and groundwater. Excess irrigation leads to surface water runoff and potential leaching to groundwater.
   - The VCAILG Bacteria Study includes a field survey component where instances of irrigation runoff are identified. This is valuable information that can be used to provide targeted outreach to the landowners and operators of the identified farms and document improvements or changes that are made to prevent runoff.

### Web-based Management Practice Survey

The web-based Management Practice Survey was created as a refinement of the previous BMP survey used in past WQMPs. The following input was received and used for survey development:

- Key observations from previous survey years:
  - Greater BMP implementation results in higher water quality, regardless of which BMPs are used.
  - Some BMPs are widely inapplicable, those with very low adoption rates and frequently categorized as "not applicable" have been removed.

- Information available in new BMP manuals:
  - "Best Management Practices to Protect Water Quality – A Guide for California Strawberry Growers"
  - "Handbook of Agricultural Conservation Practices Photos and Descriptions with Food Safety Considerations"
  - UCANR Water Quality Self-Assessment Application for tree crops

- Feedback and recommendations from:
    - VCAILG Steering Committee Members
    - Ventura County Resource Conservation District Staff
    - California Strawberry Commission Staff

Using a web-based survey provides benefits to both VCAILG and its members. Farmers will be able to enter information easily for all parcels that they grow on and answer crop specific questions. VCAILG members will also have the ability to print their completed surveys for their own records and progress tracking. Additionally, development of the online survey took into consideration errors and inaccurate responses received on the paper forms. Error messages and prompts have been incorporated to prevent issues such as the number of reported irrigated acres exceeding the assessed parcel acreage or incorrect parcel number entry. These prompts and backstops will improve the accuracy and ability of VCAILG to compile and assess the survey data.

The online management practice survey compiles the following information related to the ownership and farm operations:

- Identification of person filling out the survey and confirmation of landowner contact information;
- Parcels and irrigated acreage under the management of the person filling out the survey;
- Crops farmed on each parcel within the following categories:
    - Strawberries
    - Raspberries
    - Row Crops
    - Orchard
    - Nursery
    - Cut Flowers
    - Sod
    - Other (must be specified)

Management questions related to overhead cover, surface treatments, and irrigation methods are asked separately for each crop type that is farmed. Some of the options listed below are only applicable to certain crops and within the survey, only the most applicable answers are given as options for a particular crop. To avoid repeating the questions for every crop type, all possible answers are provided below:

1. What type of overhead cover is used in the production area?
    - No Overhead Cover ____ acres
    - Hoop House ____ acres
    - Greenhouse ____ acres
    - Other (specified) ____ acres

2. What type of surface treatments are used in the production area?
    - Raised Beds ____ acres
    - Plastic ____ acres
    - Cover Crop ____ acres
    - Mulch ____ acres
    - Weed Cloth ____ acres
    - Bare Soil ____ acres
    - Other (specified) ____ acres

3. What type of irrigation systems are used?
    - Overhead Sprinkler, Then Drip ____ acres
    - Overhead Sprinkler Only ____ acres
    - Drip Only ____ acres
    - Micro-Sprinkler, Then Drip ____ acres
    - Micro-Sprinkler Only ____ acres
    - Furrow/Flood ____ acres
    - Hand Watering ____ acres
    - Other (specified) ____ acres

The BMP portion of the survey includes thirty-six questions presented in five categories: irrigation and salinity management, nutrient management, sediment management, pesticide management, and trash management. Only one answer can be given for each BMP. Each management practice category also includes a free form field for farmers to describe additional practices they are doing, not captured by the survey questions. This information may be useful to refine the survey questions or learn about new innovative BMPs that could be the topic of future education and outreach. The web-based BMP survey questions and possible answers are provided in the following table. BMPs related to equipment and systems maintenance are noted with a "M". Though it may not be apparent by the website description, the method in which the data is being collected will allow for reporting of the number of BMPs implemented, number of parcels addressed by each BMP, and the area the BMPs cover.

| Irrigation and Salinity Management | | | | | | |
|---|---|---|---|---|---|---|
| # | BMP | Yes, Prior to Oct. 2010 | Yes, New since Oct. 2010 | Planned for Future | No, not currently used | Not applicable |
| 1 | Sprinkler irrigation runoff is captured or kept on the property. | | | | | |
| 2 M | At least every 5 years, the irrigation system is tested for distribution uniformity by monitoring water delivery or pressure differences within a block. | | | | | |
| 3 M | Regular maintenance is performed on the irrigation system to maintain distribution uniformity and prevent runoff caused by leaks or clogged lines. | | | | | |
| 4 | Pressure regulators or pressure compensating emitters are used. | | | | | |
| 5 M | Sprinkler heads and drip emitters of the same flow rate are used within each block and replaced with the same heads or emitters, when necessary. | | | | | |
| 6 | Soil moisture is measured using any of the following:<br>• Sensors<br>• Tensiometers<br>• Probes<br>• Irrigation monitoring service | | | | | |
| 7 | Flow meters are used to measure actual water use and are coupled with known crop use values or other measurements to match irrigation to plant needs. | | | | | |
| 8 | Irrigation water quality is tested for parameters of interest including:<br>• Nitrate<br>• pH<br>• Electrical Conductivity (EC)<br>• Sodium<br>• Chloride<br>• Bicarbonate<br>• Boron | | | | | |
| 9 | Water use for plant establishment has been reduced by adopting more efficient irrigation methods such as:<br>• Early drip use<br>• Intermittent sprinklers<br>• Microsprinklers | | | | | |

| Irrigation and Salinity Management (continued) | | | | | | |
|---|---|---|---|---|---|---|
| # | BMP | Yes, Prior to Oct. 2010 | Yes, New since Oct. 2010 | Planned for Future | No, not currently used | Not applicable |
| 10 | Irrigation decisions are made by trained personnel who understand appropriate irrigation management. | | | | | |
| 11 | Salt leaching is performed only when necessary, as determined by measuring soil solution electrical conductivity (EC). | | | | | |
| Please describe any additional irrigation and/or salinity management practices employed on your farm, or ways you have reduced water use: | | | | | | |

| Nutrient Management | | | | | | |
|---|---|---|---|---|---|---|
| # | BMP | Yes, Prior to Oct. 2010 | Yes, New since Oct. 2010 | Planned for Future | No, not currently used | Not Applicable |
| 12 | Soil or leaf/petiole tests are conducted to determine fertilization needs and the minimum amount necessary is applied based on the results. | | | | | |
| 13 | Fertilizer applications are split into multiple smaller applications to maximize plant uptake. | | | | | |
| 14 M | Fertilizer levels in fertigation water are tested to ensure that injectors are correctly calibrated. | | | | | |
| 15 | Fertilizer applications are timed to consider irrigation and potential rain events. | | | | | |
| 16 | Fertilizer applications are adjusted to account for other nutrient sources, such as: irrigation water, cover crops, and residuals from previous fertilizations. | | | | | |

| Nutrient Management (continued) | | | | | | |
|---|---|---|---|---|---|---|
| # | BMP | Yes, Prior to Oct. 2010 | Yes, New since Oct. 2010 | Planned for Future | No, not currently used | Not Applicable |
| 17 | Fertilizer decisions are made by trained personnel who understand the 4R's of nutrient management:<br>• Right fertilizer source<br>• Right rate<br>• Right time<br>• Right place | | | | | |
| 18 | Fertilizers are stored where they are protected from rain and on an impermeable pad with a curb to contain spills. | | | | | |
| 19 M | Backflow prevention devices are installed and maintained. | | | | | |
| Please describe any additional practices employed on your farm to prevent fertilizers from leaving the property through surface runoff or leaching below the root zone: | | | | | | |

| Sediment Management | | | | | | |
|---|---|---|---|---|---|---|
| # | BMP | Yes, Prior to Oct. 2010 | Yes, New since Oct. 2010 | Planned for Future | No, not currently used | Not Applicable |
| 20 | Long runs of production area are broken up by access roads or buffer strips to reduce sediment movement. | | | | | |
| 21 | In sloped production areas, one or more of the following management practices is used to minimize erosion:<br>• Contour farming<br>• Contoured buffer strips<br>• Terracing | | | | | |

| Sediment Management (continued) | | | | | | |
|---|---|---|---|---|---|---|
| # | BMP | Yes, Prior to Oct. 2010 | Yes, New since Oct. 2010 | Planned for Future | No, not currently used | Not Applicable |
| 22 M | Bare soil is minimized through use of cover crops, mulch, leaving plant debris, or planting subsequent crops, and the soil cover is replenished periodically to maintain effectiveness. | | | | | |
| 23 | Soil amendments, such as polyacrylamide (PAM), are used to reduce sediment movement and retain water. | | | | | |
| 24 M | Berms, culverts, or flow channels are in place to divert water away from roads. These devices or structures are maintained to preserve their functionality. | | | | | |
| 25 | Road erosion is minimized by use of any of the following:<br>• Grading<br>• Gravel<br>• Grass<br>• Mulch<br>• Water bars<br>• Drains | | | | | |
| 26 | Non-cropped areas with bare soil are protected from erosion with any of the following:<br>• Vegetation<br>• Mulch<br>• Gravel<br>• Water diversion | | | | | |
| 27 | Ditch banks are protected from erosion with vegetation, rock placement or geotextiles. | | | | | |
| 28 | One or more of the following is in place to treat runoff before it leaves the property.<br>• Grassed waterways<br>• Vegetated filter strips<br>• Sediment traps<br>• Tailwater recycling systems | | | | | |
| Please describe any additional practices employed on your farm to control sediment transport and minimize erosion: | | | | | | |

| Pesticide Management | | | | | | |
|---|---|---|---|---|---|---|
| # | BMP | Yes, Prior to Oct. 2010 | Yes, New since Oct. 2010 | Planned for Future | No, not currently used | Not Applicable |
| 29 | Before application of pesticides, pest scouting is conducted using one or more of the following methods:<br>• Yellow sticky traps<br>• Pheromone traps<br>• Plant inspection<br>• Beating<br>• Net sweeping | | | | | |
| 30 | Natural enemy populations are considered when choosing pesticides, application rates, and timing. | | | | | |
| 31 M | Sprayers are routinely calibrated to ensure accurate application rates. | | | | | |
| 32 M | Worn nozzles and screens are replaced to ensure the best coverage of pesticide applications. | | | | | |
| 33 | Pesticides are stored and mixed on an impermeable pad and at least 100 feet down slope from water sources (such as wells). | | | | | |
| 34 | Pesticides are not applied when rain or scheduled irrigation events are anticipated. | | | | | |
| Please describe any additional practices employed on your farm to prevent pesticides from leaving the property: | | | | | | |

| Trash Management | | | | | | |
|---|---|---|---|---|---|---|
| # | BMP | Yes, Prior to Oct. 2010 | Yes, New since Oct. 2010 | Planned for Future | No, not currently used | Not Applicable |
| 35 M | The property is kept clean and free of trash. | | | | | |
| 36 M | The property has an adequate number of trash containers that are covered and emptied regularly. | | | | | |

## Runoff Prevention and Member Outreach

The management practice survey serves as both a tracking tool and educational resource, however to fully utilize the tools at VCAILG's disposal additional actions are planned as part of this WQMP. During next year of WQMP implementation, VCAILG will provide outreach related to preventing irrigation runoff and optimizing irrigation efficiency, perform field surveys which will document instances of irrigation tailwater leaving farms throughout the County, and follow-up with farmers that noted plans for, or new BMPs they have implemented as a result of information learned at education meetings. Specific actions to be completed over the next year are as follows:

- Contact members when irrigation runoff was observed on their property during any dry weather Bacteria Study Surveys and provide appropriate assistance. Follow-up priority will be given to those farms within the Tier 1 drainages.
- Provide education and outreach regarding water quality problems and effective BMPs. This will be done through the planned VCAILG education meetings as well as outreach efforts by other agencies and organizations (Table 31).
- Provide targeted outreach and education opportunities to farmers in Tier 1 and 2 priority areas.
- Follow-up with Tier 1 and 2 priority parcels with responses of "Planned for Future" to survey questions listed under the Irrigation Management category (Questions 20 through 42 in Appendix D: Management Practice Survey for 2005 Conditional Waiver WQMPs). Outreach may include any or all of the following: phone call, email, letter, or site visit. Members may be assisted directly by VCAILG or referred to the MIL, NRCS, or other organization providing relevant expertise. This outreach effort will be ongoing throughout the next year.
- Mail an annual newsletter to each VCAILG member with monitoring updates and highlighting areas requiring targeted BMPs. The 2013 newsletter is included as part of Appendix C.

## Implementation Tasks and Timeline

While the WQMP implementation process guides the iterative approach that will be taken to identify and address water quality benchmark exceedances, it does not specify the tasks, timeline, and specific actions that will achieve the WQMP goals. The tasks listed in the following table specify the actions completed since the last VCAILG WQMP and those to be taken over the next year, prior to submittal of the next WQMP. These tasks leverage Management Practice Survey data, VCAILG member feedback from education meetings, BMP documentation performed by collaborating agencies, and information gathered during the VCAILG Bacteria Study.

**Table 33. WQMP Implementation Tasks and Timeline**
(***Bold italic*** text corresponds to tasks that are VCAILG actions that will be completed over the next year.)

| Flow Chart Step | Task | Implementation Actions and Timeline |
|---|---|---|
| Gather source information and compile current management practices | Evaluate existing survey data for Priority Tiers 1, 2, and 3 | Included in this WQMP |
| | Compile BMP information from 319h grant, VCRCD MIL, and NRCS | Included in this WQMP; update annually as available |
| | Complete a pesticide use evaluation | Included in this WQMP; update annually |
| | ***Follow-up with VCAILG members that responded that they have completed or plan to implement BMPs based on information provided at an education meeting*** | ***Contact members who provided new, improved, or planned BMP information and document implementation. This will be done using feedback forms from 2012 and 2013 VCAILG education meetings.*** |
| Analyze monitoring data, source information, and current management practice information to identify priority areas for additional BMP implementation | Identify priority areas | Included in this WQMP; to be updated each subsequent WQMP, if appropriate. |
| Provide targeted outreach and BMP guidance | Distribute Management Practice Survey and site specific water quality problem information to members farming in 3rd Tier Priority areas | Introductory letter, summary of water quality problems, and Management Practice Survey were mailed to 3rd Tier Priority farmers at the end of September 2010 (See Appendix C). |
| | Inform VCAILG members of BMP assistance opportunities | Letters were mailed to members in priority drainages regarding MIL services (See Appendix C) |
| | ***Provide education classes regarding water quality problems and effective BMPs*** | ***Since adoption of the 2010 Conditional Waiver, 100 hours of education have been offered. Four additional courses will be provided by VCAILG this year; including an online irrigation training course which can be done anytime. Other groups and organizations will also be offering crop specific BMP classes and outreach regarding current research. VCAILG will collaborate with these other entities to advertise and encourage participation in these additional education opportunities.*** |
| | ***Dry weather Bacteria Study survey outreach and irrigation runoff prevention assistance*** | ***VCAILG will contact members on whose property irrigation runoff is observed during dry weather Bacteria Study surveys.*** |

| Flow Chart Step | Task | Implementation Actions and Timeline |
|---|---|---|
| | ***Distribute a VCAILG newsletter*** | ***A VCAILG water quality newsletter will be sent to members annually. Refer to Appendix C for the 2013 newsletter.*** |
| Implement BMPs in priority areas and track implementation | BMP implementation by VCAILG members | Ongoing |
| | Tracking of BMPs by collaborating agencies | NRCS and the MIL both provide BMP implementation assistance and funding. NRCS has set application and funding cycles, whereas the MIL accepts cost share requests anytime during the grant period. |
| | ***Tracking of BMPs through the new web-based management practice survey*** | ***VCAILG members will be asked to complete the survey for properties they own or manage.*** |
| | ***Tracking of BMPs by VCAILG through Bacteria Study survey*** | ***VCAILG will follow-up with members contacted due to irrigation runoff observed during the Bacteria Study surveys. Information regarding new BMPs that were implemented or improved system maintenance will be documented.*** |
| | ***Tracking of Improved irrigation management BMPs by VCAILG*** | ***Follow-up on the implementation of irrigation management practices within the Tier 1 and 2 priority areas; this approach complements the use of the Bacteria Study runoff observations noted above.*** |
| Evaluate monitoring data for water quality benchmark exceedances | Compare monitoring results to standard water quality and TMDL LA benchmarks | Submitted in all Annual Monitoring Reports |
| Evaluate BMP implementation to determine next steps | Compare BMP implementation across 2005 Conditional Waiver priority tiers and determine the approach going forward | Included in this WQMP |
| | Update and revise WQMP as appropriate based on an assessment of progress made | Each year monitoring results demonstrate exceedances of water quality benchmarks, a WQMP will be submitted. |

## TRACKING OF BMP IMPLEMENTATION AND EFFECTIVENESS

### Management Practice Survey

Management Practice surveys of the 1st, 2nd, and 3rd tier priority farms during the 2005 Conditional Waiver period served to provide a baseline for the 2010 Conditional Waiver. The compiled information demonstrated that water quality correlates well with overall BMP use. These baseline surveys also aided in the development of the new web-based management practice survey, allowing for a fine-tuning of the list of BMPs to those most relevant to Ventura County farmers and emphasizing on-farm actions. The ability of VCAILG to influence and aid in the compliance of its members with Conditional Waiver provisions related to BMP implementation are as follows:

- Compiling and reporting baseline BMP implementation levels, as done in this WQMP;
- Tracking of management practice implementation and plans for future actions; to be completed through the web-based management practice survey;
- Monitoring water quality to demonstrate improvements from BMP implementation;
- Providing outreach and education opportunities related to water quality benchmark exceedances, Conditional Waiver requirements, and possible BMPs to improve water quality.

Rollout of the web-based management practice survey will be done as described below, utilizing the bulleted capabilities of VCAILG.

**Table 34. Web-based Management Practice Survey Rollout Process**

| Farmers Targeted and Timeframe | VCAILG Outreach Actions |
|---|---|
| Tier 1 and 2 priority drainage farmers (approximately Dec. 2013 through Jan. 2014) | Letter sent with information regarding:<br>• Survey instructions<br>• Reasoning for priority drainages<br>• Exceedances within their drainage area<br>• BMP implementation requirements |
| All remaining VCAILG members (approximately Feb. 2014 through Mar. 2014) | Letter sent with information regarding:<br>• Survey instructions<br>• BMP implementation requirements |

### Preventing Irrigation Runoff

While compiling overall BMP implementation information using the web-based survey, additional efforts will be made to help prevent irrigation runoff and maximizing efficiency. VCAILG will be able to track and demonstrate improvements through direct communications with members and the assistance of cooperating agencies. As described above, data will be gathered based on targeted outreach, as well as through the ongoing water quality monitoring. The four outreach approaches include:

1. All areas where irrigation runoff is observed during any dry weather Bacteria Study Surveys;
2. Direct contact and follow-up with Tier 1 and 2 priority parcels that marked “Planned for Future” on any BMPs in the Irrigation Management category;

3. Farmers that planned to implement BMPs based on information they received during a VCAILG education meeting;
4. All members will receive an annual water quality newsletter.

Depending on the success of the new management practice survey results and targeted irrigation runoff prevention efforts, the process will be evaluated and an approach proposed for future WQMPs.

# Appendix A

# Constituent-Specific Water Quality Problems and Sources

Appendix 1 of the Conditional Waiver details the required elements of a WQMP. One of the elements is the "Identification of likely waste sources, review of possible correlations between sampling conditions (e.g., time and weather), seasonal growing activities, and water quality results." To identify likely waste sources, pollutants or measured parameters were divided into constituent groups. For each group the characteristics of the pollutants and a summary of potential sources are discussed. Water quality benchmark exceedance information by site and for each applicable TMDL is provided in Appendix B.

## POLYCHLORINATED BIPHENYLS AND ORGANOCHLORINE PESTICIDES

This constituent group includes polychlorinated biphenyls (PCBs) and organochlorine (OC) pesticides such as chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, and toxaphene. PCBs are organochlorides that were widely used as dielectric and coolant fluids in transformers, capacitors, and electric motors as well as flame retardants, inks, adhesives, paints, pesticide extenders, plasticizers, polyolefin catalyst carriers, surface coatings, wire insulators, metal coatings. Commercial production of PCBs in the United States began in 1929. By 1974, most domestic uses of PCBs were restricted to nominally closed applications and by 1977, manufacture of PCBs was stopped in the United States because of evidence of negative environmental and human health effects. Chlordane is a pesticide that was first used in 1948 and was banned in 1988. DDT is an insecticide that was first used in 1939 and was banned in the United States in 1972. Dieldrin is an insecticide that came into use in the 1950s and was banned in 1970. Toxaphene is an insecticide containing over 670 chemicals that was first used in the 1940s. The EPA canceled the registrations of toxaphene for most uses as a pesticide or pesticide ingredient in 1982.

PCBs are considered persistent organic pollutants due to their resistance to environmental degradation. Although banned for most uses, PCBs still persist in the environment. PCBs are referred to as legacy pesticides due to the fact that although most uses have been banned for many years, they continue to persist in the environment. OC pesticides are also referred to as legacy pollutants because they have been banned for agricultural use for many years yet continue to persist in the environment. As a result, these pesticides have long-term environmental impacts as they remain present in sediments and bioaccumulate in the food chain.

PCBs and OC pesticides are similar in their tendency to strongly sorb to sediment, silt, and organic matter. Therefore, the primary sources of these constituents are sediment discharges from areas of historic pesticide applications or PCB release sites. PCBs were not used for agricultural applications and are not expected to be discharged significantly from agricultural fields.

## ORGANOPHOSPHORUS PESTICIDES

Organophosphorus (OP) pesticides are the class of pesticides that replaced the use of organochlorine pesticides in many cases. Although they do not persist as long in the environment, current applications of the pesticides may cause aquatic toxicity when present in waterbodies above threshold levels. The OP pesticides covered by this WQMP are chlorpyrifos and diazinon.

Chlorpyrifos was introduced in 1965 and was primarily used as a home and garden insecticide until the phase-out of residential uses began in 2000. Chlorpyrifos is still widely applied for agricultural uses. Diazinon is an insecticide that was heavily used in the 1970s and 1980s for

indoor insect control in residential, non-food buildings. Residential use of diazinon was outlawed in 2004, but diazinon is still approved for agricultural uses.

Between 2011 and 2012, chlorpyrifos application occurred in 12 of the 15 VCAILGMP monitoring site drainage areas while diazinon application occurred in 3 of the 15. There were 575 pounds of chlorpyrifos and 184 gallons of chlorpyrifos applied within the 12 monitoring site drainage areas. There were 131 pounds of diazinon applied within the 3 monitoring site drainage areas. Chlorpyrifos was most heavily applied to lemons, strawberries, and cabbage. Diazinon was applied to beets, onions, and raspberries.

## SALTS

Salts are dissolved ions that are transported in water. The salts covered by this WQMP include chloride, sulfate, total dissolved solids (TDS), and boron, though only the first three constituents are being monitored by VCAILG. The primary source of all salts in agricultural discharges is the water supply. The water supply for irrigation is comprised mostly of local ground and surface water, as well as some imported water in certain parts of the county. Some supplies are relatively high in salts and their use for irrigation water concentrates the salts in the soils as plants take up the water and leave the salts on the fields. Other sources of salts, particularly sulfate, include pesticides and fertilizers. Sulfate may be applied directly to crops as the pesticide copper sulfate, and/or as a fertilizer as calcium sulfate.

During dry weather, salts are discharged from agricultural fields as irrigation runoff. Salts are also discharged during wet weather as stormwater runoff; however salt loadings in stormwater runoff tend to be diluted. Other non-agricultural salts sources include: imported water, water softeners that discharge to publicly owned treatment works, wastewater treatment chemicals, atmospheric deposition, urban pesticides and fertilizers, and indoor water use.

## CHRONIC TOXICITY

Chronic toxicity is a measure of how suitable sample water would be in supporting aquatic life. This is determined by exposing aquatic organisms to sample water and comparing the effects on the organisms to the effects on similar organisms exposed to a control sample comprised of laboratory control water (modified according EPA to the appropriate test method). A decline in growth, reproduction, or biomass of the organisms in the sample water relative to the organisms in the control sample indicates a toxic effect. Toxicity is a water quality problem that can be caused by numerous pollutants including pesticides, metals, salts, nutrients, pH-related effects, and other pollutants.

## NITROGEN

This WQMP covers nitrate-nitrogen, nitrite-nitrogen, ammonia-nitrogen, and the sums of all of these constituents. Nitrogen is an important macronutrient necessary for plant growth and is widely applied to agricultural lands as both organic and inorganic fertilizers. When excessive nitrogen is applied to crops and discharges off the field with irrigation runoff and/or stormwater runoff, or leaches to groundwater it poses a threat to water quality.

## METALS AND SELENIUM

Copper, nickel, mercury, and selenium are all naturally occurring trace elements. Depending on their form and concentration, they can cause toxic effects in aquatic life. These constituents are naturally present in agricultural soils and may also be present in these sources: (1) groundwater used for irrigation, (2) imported irrigation water, and (3) local surface water irrigation sources. An additional input pathway for these elements is atmospheric deposition. Currently, copper is the only metal identified as being applied as a pesticide, though mercury was used historically. Trace levels of these constituents may also be present in other pesticides and fertilizers. Losses of these constituents from agricultural areas can occur through plant uptake and crop removal, leaching, and volatilization. However, of concern in regards to water quality is trace element transport to surface waters from erosion and runoff, which can carry sediment-bound and soluble forms of these constituents.

## DISSOLVED OXYGEN, TEMPERATURE, AND PH

Dissolved oxygen, temperature, and pH are not pollutants, but rather water quality indicators. Each of these measurements can be influenced by pollutants or physical characteristics of the water body being measured. Factors influencing dissolved oxygen concentrations include volume and velocity of flowing water, water temperature, weather (sunny versus cloudy), time of day (daytime of nighttime), type and number of organisms in a water body, dissolved or suspended solids, nutrients, organic wastes, riparian vegetation, and groundwater inflow. Temperature may vary due to human-induced thermal pollution, the amount of shade on the water body, turbidity, and the confluence of water bodies with differing temperatures. Additionally, water temperature is influenced by the ambient air temperature at the time of sample collection independent of any discharge contributions. To meet the water quality benchmark for pH, the measurement must remain between 6.5 and 8.5. Normal acidity or alkalinity of waterbodies will vary based on natural influences, such as type of soil or bedrock, groundwater influence, etc. However, discharges from anthropogenic sources can alter pH and harm aquatic life, depending on the duration and magnitude of the change.

## TRASH

Trash in agricultural areas generally consists of materials used during agricultural production including plastic sheeting, fertilizer/ pesticide containers, tubing, binding materials, metal scraps, and other materials. Trash in agricultural areas also consists of materials related to the activities of farm workers including plastic bottles, plastic bags, cigarette butts, food containers, clothing, and other materials. There are three main pathways for trash entering water bodies: (1) wind or runoff transporting the materials from the fields directly to the water bodies; (2) dumping of materials directly to the water bodies; and (3) trash entering conveyances such as pipes or channels through wind, runoff, or direct dumping and then discharged to the water bodies. Two effective TMDLs address trash and have load allocations included in Appendix 3 of the Conditional Waiver: (1) Ventura River Estuary Trash TMDL and (2) Revolon Slough/ Beardsley Wash Trash TMDL.

# Appendix B

# Standard Water Quality and TMDL LA Benchmark Exceedances Data by Site

This appendix provides specific data complementary to the information presented in the Constituent-Specific Water Quality Problems and Sources Section and elaborates upon the summaries of benchmark exceedances that followed the listing of applicable benchmarks. Specifically, this appendix provides information regarding the possible correlation between sampling conditions, seasonal growing activities, and water quality results by presenting the standard water quality and TMDL load allocation benchmark exceedances at each site by watershed. A summary regarding the possible correlation between sampling conditions, seasonal growing activities, and water quality results is provided at the end of the Benchmark Exceedances Section.

## BENCHMARK EXCEEDANCES

## Calleguas Creek Watershed

### *01T_ODD3_ARN*

Rio de Santa Clara / Oxnard Drain No. 3. The monitoring site is located on an agricultural drain just upstream from the Arnold Road Bridge. Flow from this drain eventually discharges into the western arm of Mugu Lagoon (Calleguas Creek Reach 1). Because the site is tidally influenced, an attempt is made to conduct monitoring at this site approximately one-half hour after low tide. Row crops and sod are the primary crop types in the vicinity of this site.

**Table 35. 01T_ODD3_ARN Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 | Event 13 Wet 3/18/2012 | Event 14 Dry 5/24/2012 | Event 15 Dry 7/17/2012 |
|---|---|---|---|---|---|---|
| **Field Measurements** | | | | | | |
| Dissolved Oxygen | mg/L | ≥ 5 | NE | NE | ***4.07*** | NE |
| **Nutrients** | | | | | | |
| Ammonia-N | mg/L | 2.36/ 1.11/ 1.66/ 0.85 [1] | NE | ***1.59*** | NE | ***19.45*** |
| Nitrate-N | mg/L | 10 [2] | ***36.56*** | ***36.47*** | ***31.27*** | ***44.41*** |
| **Metals** | | | | | | |
| Dissolved Copper | µg/L | 3.1 [3] | NE | ***5.05*** | NE | ***3.67*** |
| **Organochlorine Pesticides** | | | | | | |
| 4,4'-DDD | µg/L | 0.00084 | ***0.0112*** | ***0.0155*** | ***0.0186*** | ***0.011*** |
| 4,4'-DDE | µg/L | 0.00059 | ***0.0342*** | ***0.0441*** | ***0.0706*** | ***0.0385*** |
| 4,4'-DDT | µg/L | 0.00059 | ***0.0091*** | NE | ***0.0079*** | NE |
| Toxaphene | µg/L | 0.00075 | NE | ***0.07085*** | ***0.057*** | NE |
| **Organophosphorus Pesticides** | | | | | | |
| Chlorpyrifos | µg/L | 0.025 | ***0.0326*** | NE | NE | NE |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
NE = No Exceedance

1. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the Basin Plan Amendment to Update Saltwater Ammonia Objectives (LARWQCB Resolution No. 2004-022). The benchmarks are based on the chronic saltwater equation and are dependent upon the pH, temperature, and salinity of the water at the time of sample collection.
2. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L nitrate-N was used for comparison with VCAILG data for this site.
3. Copper benchmark for saltwater applies at this site.

### *04D_ETTG*

This monitoring site is located on an agricultural drain just upstream from its confluence with Revolon Slough, just east of the intersection of Wood Road and Etting Road. Flow from this drain eventually discharges into Calleguas Creek Reach 4 (Revolon Slough). Row crops are the most common crops grown within this site drainage area. Additional crop types include strawberries, other berries (such as raspberries or blueberries), and citrus.

**Table 36. 04D_ETTG Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 | Event 13 Wet 3/18/2012 | Event 14 Dry 5/24/2012 | Event 15 Dry 7/17/2012 |
|---|---|---|---|---|---|---|
| **Nutrients** | | | | | | |
| Nitrate-N | mg/L | 10 [1] | ***53.11*** | ***91.68*** | ***54.78*** | ***32.83*** |
| **Metals** | | | | | | |
| Dissolved Copper | µg/L | 3.1 [2] | ***4.24*** | ***5.71*** | ***4.5*** | ***4.18*** |
| **Organochlorine Pesticides** | | | | | | |
| 4,4'-DDD | µg/L | 0.00084 | ***0.0584*** | ***0.0088*** | NE | NE |
| 4,4'-DDE | µg/L | 0.00059 | ***0.3284*** | ***0.0489*** | ***0.0157*** | ***0.0139*** |
| 4,4'-DDT | µg/L | 0.00059 | ***0.0769*** | NE | NE | NE |
| Toxaphene | µg/L | 0.00075 | ***1.01368*** | ***0.13961*** | NE | NE |
| **Organophosphorus Pesticides** | | | | | | |
| Chlorpyrifos | µg/L | 0.025 | ***0.0958*** | NE | ***0.0572*** | NE |
| Diazinon | µg/L | 0.1 | ***0.1385*** | NE | NE | NE |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
NE = No Exceedance
1. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L nitrate-N was used for comparison with VCAILG data for this site.
2. The copper benchmark for saltwater applies at this site.

### *04D_LAS*

This monitoring site is located on an agricultural drain just upstream of its confluence with Revolon Slough just upstream of South Las Posas Road. A tile drain discharge is intermittently pumped into this ag drain upstream of the monitoring site. Flow from this drain eventually flows into Calleguas Creek Reach 4 (Revolon Slough). Row crops are the primary crop type along with significant acreage of strawberries being grown in the vicinity of this site.

**Table 37. 04D_LAS Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 | Event 13 Wet 3/18/2012 | Event 14 Dry 5/24/2012 | Event 15 Dry 7/17/2012 |
|---|---|---|---|---|---|---|
| **Nutrients** | | | | | | |
| Nitrate-N | mg/L | 10 [1] | ***53.51*** | ***56.79*** | ***47.8*** | ***28.07*** |
| **Metals** | | | | | | |
| Dissolved Copper | µg/L | 3.1 [2] | ***4.03*** | ***4.2*** | NE | NE |
| **Organochlorine Pesticides** | | | | | | |
| 4,4'-DDD | µg/L | 0.00084 | ***0.012*** | NE | NE | ***0.0095*** |
| 4,4'-DDE | µg/L | 0.00059 | ***0.0585*** | NE | ***0.0172*** | ***0.0311*** |
| 4,4'-DDT | µg/L | 0.00059 | ***0.0097*** | NE | NE | NE |
| Toxaphene | µg/L | 0.00075 | ***0.19705*** | ***0.05938*** | NE | NE |
| **Organophosphorus Pesticides** | | | | | | |
| Chlorpyrifos | µg/L | 0.025 | ***0.117*** | ***0.0329*** | NE | NE |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
NE = No Exceedances
1. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L nitrate-N was used for comparison with VCAILG data for this site.
2. The copper benchmark for saltwater applies at this site.

### *05D_LAVD*

This monitoring site is located on the La Vista Drain just east of La Vista Avenue, north of Hwy 118. Flow from this drain eventually discharges into Calleguas Creek Reach 5 (Beardsley Channel). The Ventura County Watershed Protection District maintains a stormwater monitoring station just downstream of the VCAILG monitoring site. Citrus, avocados, and berries (other than strawberries) are the major crop types that drain to this monitoring location.

**Table 38. 05D_LAVD Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 | Event 13 Wet 3/18/2012 | Event 14 Dry 5/24/2012 | Event 15 Dry 7/17/2012 |
|---|---|---|---|---|---|---|
| **Field Measurements/ General Water Quality** | | | | | | |
| pH | pH Units | 6.5≤ pH ≤8.5 | NE | NE | ***8.84*** | NE |
| TDS | mg/L | 850 | NE | ***970*** | ***1510*** | ***1680*** |
| Chloride | mg/L | 150 | NE | NE | NE | ***166*** |
| Sulfate | mg/L | 250 | NE | ***470*** | ***840*** | ***973*** |
| **Nutrients** | | | | | | |
| Nitrate-N | mg/L | 10 | NE | ***10.52*** | NE | NE |
| **Organochlorine Pesticides** | | | | | | |
| 4,4'-DDD | µg/L | 0.00084 | ***0.0078*** | ***0.0202*** | NE | NE |
| 4,4'-DDE | µg/L | 0.00059 | ***0.1439*** | ***0.1727*** | NE | NE |
| 4,4'-DDT | µg/L | 0.00059 | ***0.0543*** | ***0.079*** | ***0.0946*** | ***0.1363*** |
| Toxaphene | µg/L | 0.00075 | ***0.09874*** | ***0.13343*** | NE | NE |
| **Organophosphorus Pesticides** | | | | | | |
| Chlorpyrifos | µg/L | 0.025 | ***0.2818*** | ***0.085*** | NE | NE |
| **Toxicity** | | | | | | |
| Chronic Toxicity | | 1 $TU_c$ | ***Toxicity Exhibited*** | NS | NS | NE |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
NE = No Exceedance
NS = No Sample

### *05T_HONDO*

This monitoring site is located on Hondo Barranca just downstream of the Hwy 118 Bridge. Hondo Barranca is a tributary to Calleguas Creek Reach 5 (Beardsley Channel). Hondo Barranca drains land planted primarily with citrus and avocado orchards.

**Table 39. 05D_HONDO Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 |
|---|---|---|---|
| **Organochlorine Pesticides** | | | |
| Total Chlordane | µg/L | 0.00059 | ***0.0486*** |
| 4,4'-DDD | µg/L | 0.00084 | ***0.2157*** |
| 4,4'-DDE | µg/L | 0.00059 | ***1.7998*** |
| 4,4'-DDT | µg/L | 0.00059 | ***0.6316*** |
| Toxaphene | µg/L | 0.00075 | ***1.44445*** |
| **Toxicity** | | | |
| Chronic Toxicity | | 1 $TU_c$ | ***Toxicity Exhibited*** |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.

### *06T_LONG2*

This monitoring site is located on Long Canyon where it crosses Balcom Canyon Road north of Highway 118. Long Canyon is a tributary to Calleguas Creek Reach 6 (Arroyo Las Posas). The drainage area for this monitoring site consists mostly of citrus and avocado orchards, with small portions used for growing nursery stock, berries, and cut flowers.

**Table 40. 06T_LONG2 Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 |
|---|---|---|---|
| **Organochlorine Pesticides** | | | |
| Total Chlordane | µg/L | 0.00059 | ***0.0131*** |
| 4,4'-DDD | µg/L | 0.00084 | ***0.0533*** |
| 4,4'-DDE | µg/L | 0.00059 | ***0.3574*** |
| 4,4'-DDT | µg/L | 0.00059 | ***0.1479*** |
| **Toxicity** | | | |
| Chronic Toxicity | | 1 $TU_c$ | ***Toxicity Exhibited*** |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.

## Oxnard Coastal Watershed

### *OXD_CENTR*

This is the only VCAILG monitoring site in the Oxnard Coastal Watershed. The site is located on the Central Ditch, which flows under Harbor Boulevard and into McGrath Lake. Water from McGrath Lake is pumped periodically into the ocean to prevent the Central Ditch from backing up and flooding Harbor Boulevard. Strawberries and row crops are the predominant crop types that drain to this site.

**Table 41. OXD_CENTR Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 | Event 13 Wet 3/18/2012 | Event 14 Dry 5/24/2012 | Event 15 Dry 7/17/2012 |
|---|---|---|---|---|---|---|
| **Nutrients** | | | | | | |
| Nitrate-N | mg/L | 10 [1] | NE | ***27.2*** | ***15.81*** | ***11.58*** |
| **Metals** | | | | | | |
| Dissolved Copper | µg/L | 3.1 [2] | ***3.91*** | NE | NE | NE |
| **Organochlorine Pesticides** | | | | | | |
| Total Chlordane | µg/L | 0.00059 | ***0.0219*** | NE | NE | NE |
| 4,4'-DDD | µg/L | 0.00084 | ***0.1504*** | NE | NE | NE |
| 4,4'-DDE | µg/L | 0.00059 | ***0.5308*** | ***0.0195*** | ***0.0135*** | NE |
| 4,4'-DDT | µg/L | 0.00059 | ***0.2445*** | NE | NE | NE |
| Toxaphene | µg/L | 0.00075 | ***0.05981*** | ***0.07832*** | NE | NE |
| **Organophosporus Pesticides** | | | | | | |
| Chlorpyrifos | µg/L | 0.025 | ***4.7386*** | ***0.1118*** | NE | NE |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
NE = No Exceedance
1. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L nitrate-N was used for comparison with VCAILG data for this site.
2. The copper benchmark for saltwater applies at this site.

## Santa Clara River Watershed

### *S02T_ELLS*

This monitoring site is located on Ellsworth Barranca just downstream of the Telegraph Road Bridge. Ellsworth Barranca drains the Aliso Canyon area and is a tributary to Santa Clara River Reach 2. Citrus and avocados are the primary crop types associated with this site.

**Table 42. S02T_ELLS Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 | Event 13 Wet 3/18/2012 |
|---|---|---|---|---|
| **General Water Quality** | | | | |
| TDS | mg/L | 1200 | NE | ***1690*** |
| Chloride | mg/L | 150 | NE | ***320*** |
| Sulfate | mg/L | 600 | NE | ***680*** |
| **Organochlorine Pesticides** | | | | |
| Total Chlordane | µg/L | 0.00059 | ***0.0321*** | NE |
| 4,4'-DDD | µg/L | 0.00084 | ***0.0308*** | NE |
| 4,4'-DDE | µg/L | 0.00059 | ***0.2362*** | NE |
| 4,4'-DDT | µg/L | 0.00059 | ***0.1431*** | NE |
| Toxaphene | µg/L | 0.00075 | ***0.23274*** | NE |
| **Organophosphorus Pesticides** | | | | |
| Chlorpyrifos | µg/L | 0.025 | ***0.0944*** | NE |
| **Toxicity** | | | | |
| Chronic Toxicity | | 1 $TU_c$ | ***Toxicity Exhibited*** | NS |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
NE = No Exceedance
NS = No Sample

### *S02T_TODD*

This monitoring site is located on Todd Barranca upstream of Hwy 126. Todd Barranca drains the Wheeler Canyon area and is a tributary to Santa Clara River Reach 2. Citrus and avocados are the primary crop types associated with this site.

**Table 43. S02T_TODD Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 | Event 13 Wet 3/18/2012 | Event 14 Dry 5/24/2012 | Event 15 Dry 7/17/2012 |
|---|---|---|---|---|---|---|
| **General Water Quality** | | | | | | |
| TDS | mg/L | 1200 | NE | ***2010*** | NE | NE |
| Sulfate | mg/L | 600 | NE | ***1020*** | NE | NE |
| **Nutrients** | | | | | | |
| Nitrate-N | mg/L | 10 | NE | ***12.41*** | NE | NE |
| **Organochlorine Pesticides** | | | | | | |
| Total Chlordane | µg/L | 0.00059 | ***0.0166*** | NE | NE | NE |
| 4,4'-DDD | µg/L | 0.00084 | ***0.0603*** | NE | NE | NE |
| 4,4'-DDE | µg/L | 0.00059 | ***0.0533*** | NE | ***0.0095*** | NE |
| 4,4'-DDT | µg/L | 0.00059 | ***0.0076*** | NE | NE | NE |
| Toxaphene | µg/L | 0.00075 | ***0.18036*** | NE | NE | NE |
| **Toxicity** | | | | | | |
| Chronic Toxicity | | 1 $TU_c$ | ***Toxicity Exhibited*** | NS | NS | NE |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
NE = No Exceedance
NS = No Sample

### *S03T_TIMB*

This monitoring site is located on Timber Canyon Creek just upstream of Hwy 126, east of Santa Paula. Timber Canyon Creek is a tributary to Santa Clara River Reach 3. Drainage from this site is mostly from avocado and citrus orchards.

**Table 44. S03T_TIMB Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 14 Dry 5/24/2012 |
|---|---|---|---|
| **Organochlorine Pesticides** | | | |
| 4,4'-DDE | µg/L | 0.00059 | ***0.0117*** |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.

### *S03T_BOULD*

This monitoring site is located on Boulder Creek just upstream of Hwy 126, west of Fillmore. Boulder Creek is a tributary to Santa Clara River Reach 3. Citrus, avocados, and nurseries are the primary crop types associated with this site.

**Table 45. S03T_BOULD Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 |
|---|---|---|---|
| **Nutrients** | | | |
| Nitrate-N | mg/L | 5 | ***12.66*** |
| **Organochlorine Pesticides** | | | |
| 4,4'-DDE | µg/L | 0.00059 | ***0.007*** |
| **Toxicity** | | | |
| Chronic Toxicity | | 1 $TU_c$ | ***Toxicity Exhibited*** |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.

### *S03D_BARDS*

This monitoring site is located near the end of the agricultural drain that runs parallel to Bardsdale Avenue in Bardsdale. The drain is located on the south side of the Santa Clara River and eventually discharges into Santa Clara River Reach 3. Drainage to this site is mostly from citrus orchards with small proportions of the area used for avocados and row crops.

Water was not present for sampling at this site during any of the 2012 monitoring events. Therefore, no water quality benchmark exceedances occurred.

### *S04T_TAPO*

This monitoring site is located on Tapo Creek near the Ventura / Los Angeles County line, south of Hwy 126 and the Santa Clara River. Tapo Creek is a tributary to Santa Clara River Reach 4. Citrus, row crops, and nursery stock are grown in the vicinity of this monitoring site.

**Table 46. S04T_TAPO Benchmark Exceedances for 2012**

| Constituent | Units | Benchmark | Event 12 Wet 1/23/2012 | Event 14 Dry 5/24/2012 | Event 15 Dry 7/17/2012 |
|---|---|---|---|---|---|
| **General Water Quality** | | | | | |
| TDS | mg/L | 1300 | ***2400*** | ***2710*** | ***1370*** |
| Chloride | mg/L | 100 | ***164*** | ***190*** | ***123*** |
| Sulfate | mg/L | 600 | ***1150*** | ***1300*** | ***601*** |
| **Nutrients** | | | | | |
| Nitrate-N | mg/L | 5 | ***9.22*** | ***10.16*** | ***5.19*** |
| **Organochlorine Pesticides** | | | | | |
| Total Chlordane | µg/L | 0.00059 | ***0.0117*** | NE | NE |
| 4,4'-DDD | µg/L | 0.00084 | ***0.1134*** | NE | NE |
| 4,4'-DDE | µg/L | 0.00059 | ***0.3399*** | ***0.0097*** | NE |
| 4,4'-DDT | µg/L | 0.00059 | ***0.0157*** | NE | NE |

Concentrations in ***bold italics*** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
NE = No Exceedance

## Ventura River Watershed

### *VRT_THACH*

This monitoring site is located on Thacher Creek just upstream of Ojai Avenue in Ojai. Thacher Creek is a tributary of San Antonio Creek, which is a tributary of the Ventura River. Avocados and citrus are the predominant crop types associated with this site.

Water was not present for sampling at this site during any of the 2012 monitoring events.

### *VRT_SANTO*

This monitoring site is located on San Antonio Creek just upstream of Grand Avenue in Ojai. San Antonio Creek is a tributary of the Ventura River. Citrus and avocados are the predominant crop types associated with this site.

Water was not present for sampling at this site during any of the 2012 monitoring events.

## POSSIBLE CORRELATIONS BETWEEN SAMPLING CONDITIONS, SEASONAL GROWING ACTIVITIES, AND WATER QUALITY RESULTS

For the Calleguas Creek Watershed, there appears to be a correlation between wet weather and organochlorine pesticide concentrations greater than the applicable water quality benchmark including 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, toxaphene, total chlordane. In particular, 4,4'-DDE was found at most sites during wet weather at concentrations above the water quality benchmark. Other constituents with concentrations greater than the applicable water quality benchmarks during wet weather include nitrate-N and chlorpyrifos. However, these two constituents had much fewer exceedances than the organochlorine pesticides. During dry weather, the same constituents identified as an issue during wet weather were found to have concentrations higher than the applicable water quality benchmarks; however, there were many fewer instances where the concentrations were higher than the applicable water quality benchmarks. There does not appear to be a correlation between season and growing activities, as a variety of crops are grown in the various drainage areas with differing growing activities and practices.

For the Oxnard Coastal Watershed, it is difficult to identify any correlations as there is only one monitoring site in the watershed. However, there appears to be a correlation between wet weather and organochlorine pesticide concentrations greater than the applicable water quality benchmark including 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, toxaphene, total chlordane. In particular, 4,4'-DDE and toxaphene were found during both wet weather events at concentrations above the applicable water quality benchmarks. Other constituents with concentrations greater than the applicable water quality benchmarks during wet weather include nitrate-N and chlorpyrifos. However, these two constituents have much fewer exceedances than the organochlorine pesticides. During dry weather, nitrate-N and 4,4'-DDE had concentrations greater than the applicable water quality benchmarks. There does not appear to be a correlation between seasonal growing activities as the types of crops in the drainage area do not vary highly between seasons.

For the Santa Clara River Watershed, there appears to be a correlation between wet weather and organochlorine pesticide concentrations greater than the applicable water quality benchmark including 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, toxaphene, total chlordane. In particular, during the first storm event sampled in 2012, the organochlorine pesticides listed above had concentrations greater than the applicable water quality benchmarks. Many of these same constituents did not have concentrations greater than the applicable water quality benchmarks during the second storm sampled in 2012. This seems to indicate that a first-flush effect occurred during the first storm sampled in 2012. Other constituents with concentrations greater than applicable water quality benchmarks during wet weather include total dissolved solids, chloride, sulfate, and nitrate-N. However, these constituents did not exhibit a first-flush effect. During dry weather, most of the sites were dry. However, the sites that were not dry had concentrations of nitrate-N, total dissolved solids, chloride, sulfate, or 4,4'-DDE greater than the applicable water quality benchmarks, but with many fewer exceedances than during wet weather. There does not appear to be a correlation between season and growing activities as a variety of crops are grown in the various drainage areas with differing growing activities and practices.

For the Ventura River Watershed, water was not present for sampling at the two sites during any of the 2012 monitoring events so a correlation cannot be made.

## TMDL BENCHMARK EXCEEDANCES

### Calleguas Creek Watershed and Mugu Lagoon Metals and Selenium TMDL

As shown in Table 47, the interim load allocations are being met in the receiving waters for all metals constituents except for selenium in Revolon Slough (04_WOOD site). It has been noted in the current and previous CCW TMDL annual reports that rising groundwater is a large background source of selenium in the Revolon Slough subwatershed. There are two agricultural land use sites located in this subwatershed: (1) 04D_WOOD and (2) 05D_SANT_VCWPD. The selenium monitoring results from the receiving water site and the two agricultural land use sites are provided below (Table 47). Of the two agricultural land use sites, 05D_SANT_VCWPD is located the furthest upstream in the subwatershed and has significantly higher selenium concentrations than 04D_WOOD.

**Table 47. Revolon Slough Receiving Water and Agricultural Land Use Monitoring Sites Selenium Data**

| Site ID [1] | Selenium Interim LA | Event 28 Dry Aug-11 | Event 29 Dry Nov-11 | Event 31 Dry Feb-12 | Event 33 Dry May-12 |
|---|---|---|---|---|---|
| 04_WOOD | 6 | ***23.06*** | ***30.4*** | ***25.71*** | ***22.13*** |
| 04D_WOOD | 6 | NS | ***8.4*** | ***6.88*** | NS |
| 05D_SANT_VCWPD | 6 | ***62.11*** | ***72.1*** | ***53.25*** | ***63.34*** |

Concentrations in ***bold italics*** indicate the concentration was greater than the load allocation applicable to this TMDL.
NS = No Sample

1. 04_WOOD is the receiving water site; 04D_WOOD and 05D_SANT_VCWPD are agricultural land use sites upstream of the receiving water monitoring location.

### Calleguas Creek Watershed Nitrogen Compounds TMDL

Table 48 shows the monitoring data from CCWTMP agricultural land use monitoring sites that exceeded the applicable load allocation. Monitoring sites located in the lower part of the watershed consistently exceed the nitrogen LAs, whereas sites in the upper reaches are typically below the allocation. The exception to this is the Reach 7 site, 07D_HITCH_LEVEE2, which had the highest concentration detected during this monitoring year as compared to all the agricultural sites. Table 49 shows a comparison of Calleguas Creek Watershed VCAILGMP sites exceedance data. The two CCWTMP and two VCAILGMP monitoring sites without load allocation exceedances are not included in the tables below.

**Table 48. CCWTMP Agricultural Land Use Monitoring Sites Nitrate-N + Nitrite-N Data**

| Site | Constituent | Load Allocation (mg/L) [1] | Event 31 Dry 2/1/2012 | Event 32 Wet 3/17/2012 | Event 33 Dry 5/23/2012 |
|---|---|---|---|---|---|
| 01T_ODD2_DCH | Nitrate-N + Nitrite-N | 9 | ***68.22*** | ***30.92*** | ***47.87*** |
| 02D_BROOM | Nitrate-N + Nitrite-N | 9 | ***67.8*** | ***78.69*** | ***59.95*** |
| 04D_WOOD | Nitrate-N + Nitrite-N | 9 | ***63.88*** | ***45.46*** | Site Dry |
| 05D_SANT_VCWPD | Nitrate-N + Nitrite-N | 9 | ***40.26*** | ***35.76*** | ***34.39*** |
| 07D_HITCH_LEVEE_2 | Nitrate-N + Nitrite-N | 9 | Site Dry | ***16.16*** | ***93.39*** |

Concentrations in ***bold italics*** indicate the concentration was greater than the load allocation applicable to this TMDL.
NE = No Exceedance

1. The load allocation is the sum of nitrate-nitrogen + nitrite-nitrogen.

**Table 49. Nitrogen Load Allocation Compared to CCW VCAILGMP Site Data**

| Site | Constituent | Load Allocation (mg/L) | Event 12 Wet 1/23/2012 | Event 13 Wet 3/18/2012 | Event 14 Dry 5/24/2012 | Event 15 Dry 7/17/2012 |
|---|---|---|---|---|---|---|
| 01T_ODD3_ARN | Nitrate-N | 9 | ***36.56*** | ***36.47*** | ***31.27*** | ***44.41*** |
| 04D_ETTG | Nitrate-N | 9 | ***53.11*** | ***91.68*** | ***54.78*** | ***32.83*** |
| 04D_LAS | Nitrate-N | 9 | ***53.51*** | ***56.79*** | ***47.8*** | ***28.07*** |
| 05D_LAVD | Nitrate-N | 9 | NE | ***10.52*** | NE | NE |

Concentrations in ***bold italics*** indicate the concentration was greater than the load allocation applicable to this TMDL.
NE = No Exceedance

## Santa Clara River Nitrogen Compounds TMDL

Table 50 lists the VCAILGMP monitoring sites located within the Santa Clara River Watershed that exceeded the nitrogen load allocation. The allocation was exceeded three separate times, each time at a different monitoring location. Three Santa Clara River Watershed sites did not exceed the load allocation and are not included in the table.

**Table 50. Nitrogen Load Allocations Compared to SCR VCAILGMP Site Data**

| Site | Constituent | Load Allocation [1] (mg/L) | Event 12 Wet 1/23/12 | Event 13 Wet 3/18/12 | Event 14 Dry 5/24/12 | Event 15 Dry 7/17/12 |
|---|---|---|---|---|---|---|
| S02T_TODD | Ammonia-N + Nitrate-N | 10 | NE | ***12.41*** | NE | NE |
| S03T_BOULD | Ammonia-N + Nitrate-N | 10 | ***13.13*** | NE | Site Dry | Site Dry |
| S04T_TAPO | Ammonia-N + Nitrate-N | 10 | NE | NE | ***10.28*** | NE |

Concentrations in ***bold italics*** indicate the concentration was greater than the load allocation applicable to this TMDL.
NE = No Exceedance

1. Nitrite-N concentrations are not monitored as part of the VCAILGMP, however, levels of nitrite are typically insignificant compared to the other nitrogen compounds that are measured.

# Appendix C

## Outreach Materials

VENTURA COUNTY
Agricultural Irrigated Lands Group

PO Box 3160, Ventura, CA 93006
805-289-0155 / Fax 805-658-0295



September 23, 2010

Dear VCAILG member,

After five years of successful effort to establish and conduct a comprehensive program of water-quality monitoring, the Ventura County Agricultural Irrigated Lands Group is embarking on a new phase in its activities. Your participation will be crucial if these legally mandated activities are to succeed.

As required by the Conditional Waiver adopted in 2005 by the Regional Water Quality Control Board, VCAILG tested samples of water draining from agricultural lands starting in 2007 and continuing through this year, for the presence of contaminants. That testing detected levels of pollutants that exceed the state's legal limits. Those findings triggered the need to develop a Water Quality Management Plan, which describes how VCAILG members will implement Best Management Practices to reduce or eliminate that contamination.

You are receiving this information and the enclosed survey because runoff from the area in which your property is located exceeded state pollutant limits multiple times. You are being asked to provide VCAILG with information on the practices you employ or plan to adopt to improve the water quality in your area. On the following pages you will find information on the monitoring site your property drains to and the water-quality issues associated with it.

**Upon completing the survey, please return it to the:**

**Ventura County Resource Conservation District**
**Attn: Emmanuel González,**
**P.O. Box 147**
**Somis, CA 93066-0147**

Filling out a survey and implementing additional management practices is a requirement for compliance with the Conditional Waiver. Failure to participate in these activities may lead to termination of your VCAILG membership, which would require you to comply with the waiver as an individual. As I am sure you are aware, that is a very costly and time-consuming process. I encourage you to continue to enjoy the substantial benefits of VCAILG membership by completing the enclosed survey and participating in implementation of the Water Quality Management Plan.

The Water Quality Management Plan is available on the Water Quality page of the Farm Bureau website, www.farmbureauvc.com. If you have additional questions, contact Emmanuel González at (805) 386-4489 x 114 (office) or (760) 200-7413 (cell).

Sincerely,

Edgar Terry
VCAILG Steering Committee chairman

## Management Practice Survey:
## Supplemental Information for Hondo Barranca (05T_HONDO)

The VCAILG developed a Water Quality Management Plan to address exceedances in water quality objectives found during water sampling conducted from 2007 to 2009. Because your property drains to a priority area, the VCAILG is asking that you comply with the Water Quality Management Plan by doing the following:

- Review the information on this sheet to become familiar with the water quality issues in your area.
- Complete the Management Practice Survey.
- Pay particular attention to management practices you are not currently implementing and start using new practices to address the water quality exceedances listed below.

***Your property drains to the Hondo Barranca monitoring site***


***These are the water quality benchmark exceedances found at 05T_HONDO:***

*Wet Weather*

- OC Pesticides (i.e. DDT)
- OP Pesticides (i.e. chlorpyrifos/lorsban)
- Chronic Toxicity
- Salts

## Management Practice Survey:
## Supplemental Information for Fox Barranca (06T_FC_BR)

The VCAILG developed a Water Quality Management Plan to address exceedances in water quality objectives found during water sampling conducted from 2007 to 2009. Because your property drains to a priority area, the VCAILG is asking that you comply with the Water Quality Management Plan by doing the following:

- Review the information on this sheet to become familiar with the water quality issues in your area.
- Complete the Management Practice Survey.
- Pay particular attention to management practices you are not currently implementing and start using new practices to address the water quality exceedances listed below.

***Your property drains to the Fox Barranca monitoring site***


***These are the water quality benchmark exceedances found at 06T_FC_BR:***

*Wet Weather*

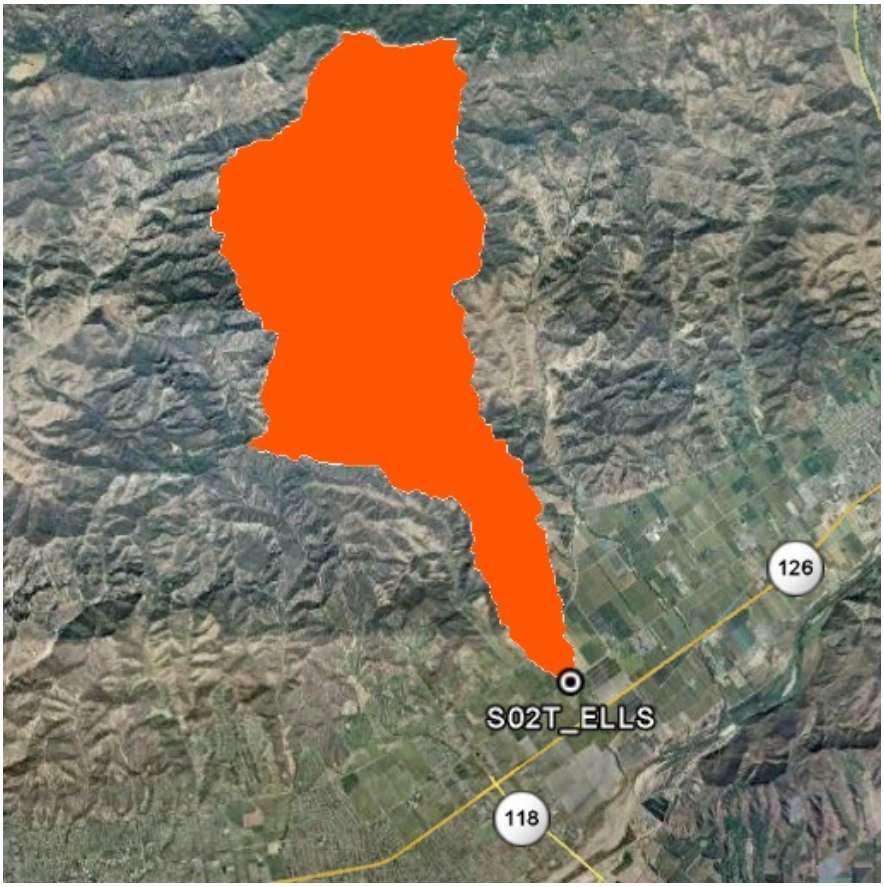
- Nitrogen
- OC Pesticides (i.e. DDT)
- OP Pesticides (i.e. chloryprifos/lorsban)
- Chronic Toxicity
- Salts

## Management Practice Survey:
## Supplemental Information for the Ellsworth Barranca (S02T_ELLS)

The VCAILG developed a Water Quality Management Plan to address exceedances in water quality objectives found during water sampling conducted from 2007 to 2009. Because your property drains to a priority area, the VCAILG is asking that you comply with the Water Quality Management Plan by doing the following:

- Review the information on this sheet to become familiar with the water quality issues in your area.
- Complete the Management Practice Survey.
- Pay particular attention to management practices you are not currently implementing and start using new practices to address the water quality exceedances listed below.

***Your property drains to the Ellsworth Barranca monitoring site***




***These are the water quality benchmark exceedances found at S02T_ELLS:***

*Dry Weather*

- pH
- OP Pesticides (i.e. chlorpyrifos/lorsban)

*Wet Weather*

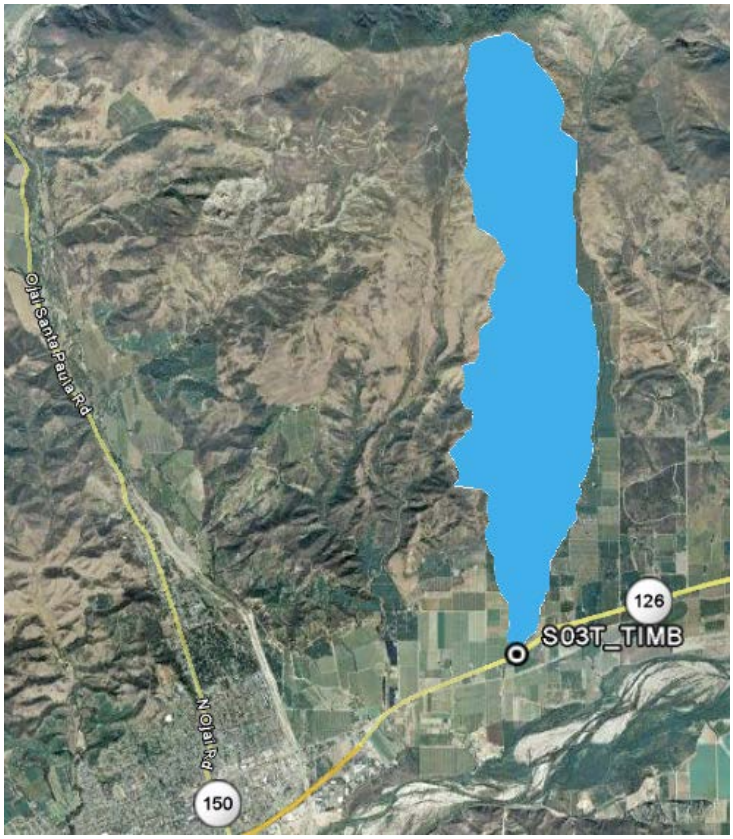
- OP Pesticides (i.e. chlorpyrifos/lorsban)
- OC Pesticides (i.e. DDT)
- Chronic Toxicity
- Salts

## Management Practice Survey:
## Supplemental Information for Timber Canyon Creek (S03T_TIMB)

The VCAILG developed a Water Quality Management Plan to address exceedances in water quality objectives found during water sampling conducted from 2007 to 2009. Because your property drains to a priority area, the VCAILG is asking that you comply with the Water Quality Management Plan by doing the following:

- Review the information on this sheet to become familiar with the water quality issues in your area.
- Complete the Management Practice Survey.
- Pay particular attention to management practices you are not currently implementing and start using new practices to address the water quality exceedances listed below.

***Your property drains to the Timber Canyon Creek monitoring site***




***These are the water quality benchmark exceedances found at S03T_TIMB:***

*Wet Weather*

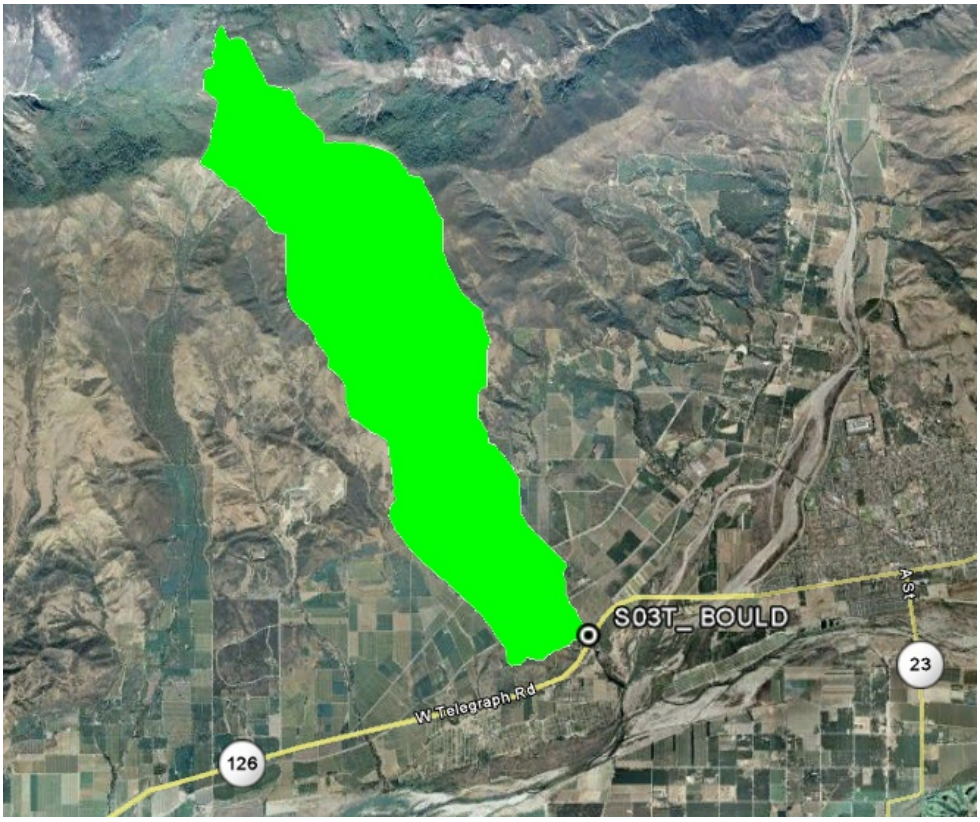
- Nitrogen
- OC Pesticides (i.e. DDT)
- OP Pesticides (i.e. chlorpyrifos/lorsban)
- Chronic Toxicity
- Salts

## Management Practice Survey:
## Supplemental Information for Boulder Creek (S03T_BOULD)

The VCAILG developed a Water Quality Management Plan to address exceedances in water quality objectives found during water sampling conducted from 2007 to 2009. Because your property drains to a priority area, the VCAILG is asking that you comply with the Water Quality Management Plan by doing the following:

- Review the information on this sheet to become familiar with the water quality issues in your area.
- Complete the Management Practice Survey.
- Pay particular attention to management practices you are not currently implementing and start using new practices to address the water quality exceedances listed below.

***Your property drains to Boulder Creek***




***These are the water quality benchmark exceedances found at S03T_BOULD:***

*Dry Weather*

- Nitrogen
- Chronic Toxicity
- Salts

*Wet Weather*

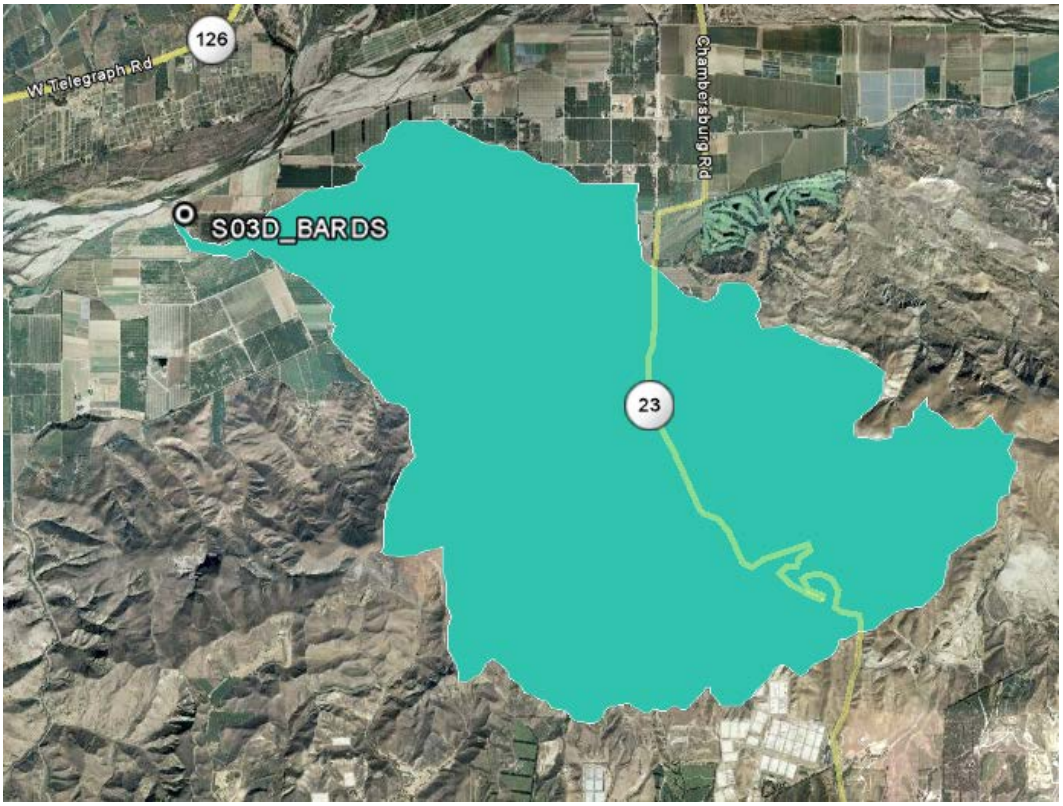
- Nitrogen
- OC Pesticides (i.e. DDT)
- OP Pesticides (i.e. chlorpyrifos/lorsban)
- Chronic Toxicity

## Management Practice Survey:
## Supplemental Information for the Bardsdale Avenue ag drain (S03D_BARDS)

The VCAILG developed a Water Quality Management Plan to address exceedances in water quality objectives found during water sampling conducted from 2007 to 2009. Because your property drains to a priority area, the VCAILG is asking that you comply with the Water Quality Management Plan by doing the following:

- Review the information on this sheet to become familiar with the water quality issues in your area.
- Complete the Management Practice Survey.
- Pay particular attention to management practices you are not currently implementing and start using new practices to address the water quality exceedances listed below.

### *Your property drains to the Bardsdale Avenue ag drain*




***These are the water quality benchmark exceedances found at S03D_BARDS:***

*Wet Weather*

- OC Pesticides (i.e. DDT)
- OP Pesticides (i.e. chlorpyrifos/lorsban)

VENTURA COUNTY
Agricultural Irrigated Lands Group

PO Box 3160, Ventura, CA 93006
805-289-0155 / Fax 805-658-0295



June 20, 2012

Dear VCAILG member,

Your property drains to a waterway where the VCAILG monitoring program has detected levels of nutrients or pesticides that exceed state water-quality standards. When this happens, state regulations for runoff from irrigated agricultural lands require that landowners implement changes in their management practices to address the issue.

Improving irrigation efficiency is one such management strategy. To help landowners take this important step toward addressing water-quality problems in Ventura County, the Resource Conservation District (RCD) is offering free, confidential evaluations of agricultural irrigation systems. The evaluations are being performed under a state grant program, which is described in the enclosed flier.

Although participation is voluntary, VCAILG encourages you to sign up for a free analysis. Not only will your participation in this grant program help improve water quality in our region, it will demonstrate to state and federal agencies that Ventura County farmers and ranchers take their regulatory obligations seriously. This will help immeasurably when VCAILG's program comes up for renewal in three years.

Please complete and return the enclosed form to schedule an irrigation evaluation. If you have already made arrangements with the RCD to do an irrigation evaluation, then simply return the form and indicate you have already been in contact. If you have previously tested the uniformity of your irrigation system, please return the form with your contact information so that we can forward the information to the RCD for follow-up.

Thank you for your willingness to make our program a success. If you have questions, contact Dale Zurawski, the Farm Bureau's water quality program manager, at (805) 289-0155 or dale@farmbureauvc.com.

Sincerely,

Edgar Terry, chairman
VCAILG Steering Committee

VENTURA COUNTY
Agricultural Irrigated Lands Group

PO Box 3160, Ventura, CA 93006
805-289-0155 / Fax 805-658-0295



October 1, 2012

Dear VCAILG member,

Three months ago, we contacted you concerning your property, which drains to a waterway where our monitoring program detected levels of nutrients or pesticides that exceed state water-quality standards. When this happens, state regulations for runoff from irrigated agricultural lands require that landowners implement changes in their management practices to address the issue.

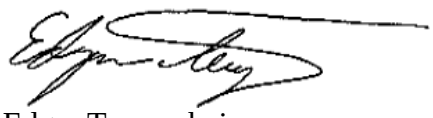
Improving irrigation efficiency is one such management strategy. To help landowners take this important step toward addressing water-quality problems in Ventura County, the Resource Conservation District (RCD) is offering free, confidential evaluations of agricultural irrigation systems. The evaluations are being performed under a state grant program, which is described in the enclosed flier.

Although participation is voluntary, VCAILG encourages you to take advantage of this **free** analysis. Not only will your participation in this grant program help improve water quality in our region, it will demonstrate to state and federal agencies that Ventura County farmers and ranchers take their regulatory obligations seriously. This will help immeasurably when VCAILG's program comes up for renewal in three years.

Unless we hear otherwise from you, VCAILG plans to forward your information to the RCD staff so they can contact you to schedule an evaluation. If you do not wish to be contacted by the RCD staff, please call or email Dale Zurawski, the Farm Bureau's water quality program manager, at (805) 289-0155 or dale@farmbureauvc.com before Oct. 19, 2012.

Thank you for your willingness to make our program a success.

Sincerely,



Edgar Terry, chairman
VCAILG Steering Committee

# VCAILG Field Tour Handout

## Are there water quality problems in the area I farm?

**We have detected some sort of water quality problem in every watershed; the differences between locations are:**

Magnitude of the problem – how much above the limits are the concentrations we have measured.

Number of constituents – how many different pollutants have been detected.

Some sites only have runoff during storms, others have runoff during both irrigation and storms.

## What can I do to make improvements?

**1. Prevent irrigation runoff.**

By eliminating irrigation runoff we can show an overall improvement in water quality. Without irrigation runoff, there is no drainage water to sample during dry weather, and therefore no exceedances of water quality benchmarks.

**2. Practice the 4Rs of fertilizer usage.**

Use the **Right Source**, applied at the **Right Rate**, at the **Right Time** and in the **Right Place** for uptake. This minimizes nutrient transport to both surface and groundwater. Nitrogen is one of the constituents that is most frequently detected above the water quality benchmark and by very significant margins at some monitoring sites.

**3. Minimize the transport of pesticides by controlling erosion.**

Critically evaluate your farm for areas of potential erosion and consider not just the cropped areas but also roads, ditches, equipment storage, and staging areas. Even pesticides no longer used, such as DDT, are still showing up in our water samples. These pesticides tend to attach to soil particles; therefore, controlling sediment and allowing them to breakdown naturally is how we can prevent these legacy pesticides from continuing to be washed into local waterways.

**4. Use alternatives to Diazinon and chlorpyrifos (Lorsban, Dursban, Omni, Nufos), if possible.**

Diazinon and chlorpyrifos usage and detections in water samples have gone down in recent years. Demonstrating that these pesticides are being used less and not detecting them in future water samples would be a great improvement to document. Be knowledgeable about pesticides and work with a PCA to find the least persistent pesticides available as alternatives.

**5. No matter where or how you farm it is important to be conscientious of your impact to water quality. Everything runs downstream and anyone can be a contributor to water quality problems.**

VENTURA COUNTY
Agricultural Irrigated Lands Group

Newsletter Volume 5, No. 1
July 2013

# Understanding your 2013-2014 billing invoice

Welcome to this edition of the Ventura County Agricultural Irrigated Lands Group newsletter. We hope the information in these pages will help you better understand how the program works, and keep you up to date on program activities.

This newsletter accompanies your member invoice for the 2013-2014 fiscal year. If you were enrolled in the program last year, the formatting of this year's invoice will look familiar.

As was the case last year, all Total Maximum Daily Load compliance costs are included in the VCAILG billing. In previous years, the Calleguas Creek TMDL charges were billed separately and payment was considered voluntary, as they were not a component of the Conditional Waiver program. The Regional Board, however, has made the waiver the legal compliance mechanism for all TMDLs addressing agricultural runoff in Ventura County. Payment of those TMDL assessments now is mandated by the VCAILG participation agreement.



The total VCAILG program budget for 2013-2014 is $1,313,657. Last year's total was $1,616,404. The decrease is 19 percent. The invoiced amount will be $1,162,988, reflecting application of $150,669 in carryover funds as a credit against projected 2013-2014 expenditures. Effective this year, the FBVC administrative fee is set at a flat $250,000 instead of a percentage of total program costs.

As before, the VCAILG assessments will be based exclusively on the costs of monitoring, reporting, mitigation, state board fees and Farm Bureau's administrative fee. Farm Bureau will absorb all direct and indirect costs associated with program administration and management, including employee salaries and benefits, printing and postage, meetings, accounting fees, travel and bank charges, and office overhead.

The number of billing sub-watersheds remains unchanged from last year. Although program costs are down overall, some assessment rates will increase while others will decrease.

Per-acre assessment history

| Watershed | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|
| Calleguas | $29.28 | $17.53 | $23.59 | $19.68 |
| Santa Clara | $12.06 | $7.07 | $7.40 | $10.35 |
| Ventura | $23.73 | $10.03 | $8.84 | $10.93 |
| Revolon | $30.39 | $18.25 | $24.64 | $20.54 |
| McGrath | $21.70 | $4.92 | $8.02 | $11.81 |
| Cl Harbor | $13.42 | $4.92 | $6.99 | $9.75 |
| Coastal | $8.93 | $4.92 | $6.99 | $9.75 |

Here is a brief description of the charges on your invoice:

*VCAILG management and reporting:* This represents the cost of services provided by our primary consulting firm, Larry Walker Associates, to manage the data collection and analysis, and to file all required reports and other documents with the state. This cost is shared equally across all seven watersheds.

*Ag Waiver monitoring:* This is the cost of collecting and analyzing water-quality samples as required by the Conditional Waiver. It varies by watershed, depending on what kinds of pollutants have been found there and the number of monitoring sites.

*State fee:* The Water Resources Control Board imposes this fee to help recover the cost of administering regulatory programs. The amount does not vary by watershed.

*Farm Bureau Administrative Fee:* Farm Bureau of Ventura County manages the VCAILG program, and the Board of Directors sets this fee each year at a level intended to recover the full direct and indirect costs of program management and to generate funds for other programs benefitting the agricultural community.

*TMDL Monitoring and Implementation:* TMDLs are additional water-quality regulations that require additional monitoring. These costs vary by watershed, depending on what kinds of pollutants have been found there and the number of monitoring sites.

# Water-quality progress and problems: Looking toward 2015

VCAILG was established in 2006 to enable growers to comply with new regulations aimed at improving water quality. We are halfway through the second five-year term of the Conditional Waiver, which will come up for renewal in 2015.

As a reminder, what is being "waived" is a discharge permit that would require edge-of-field monitoring. The "conditions" of the waiver are fairly straightforward: achieve improvements in water quality, adopt new Best Management Practices to address problems, and attend eight hours of educational classes. We also are required to document BMPs that have been recently implemented and conduct a study to determine whether farms are a source of bacteria in local waterways.

We have been collecting water-quality monitoring data since 2007. It reveals a wide range of conditions, from very good to problematic.

On the positive side, at most monitoring sites in areas planted mainly in avocados and citrus, we are not seeing any irrigation runoff, which means we meet dry-weather standards there. We also are meeting the water quality target of 10 parts per million for nitrate in storm runoff.

(Continued from preceding page)

VCAILG has categorized the various watersheds and subwatersheds in the county based on the frequency and severity of contamination detected through our monitoring program, and prioritized those with the worst record. Our top five priority sites are those having the most problems with nitrogen and pesticide exceedances. The five sites in the second tier also have high nitrogen levels and some pesticides problems.

As for improvement, we have seen reduced nitrate levels in irrigation runoff at two out of these 10 monitoring sites. At the sites where we have seen reduced nitrogen levels, we have also seen BMPs implemented that addressed nutrient loading.

The remaining 11 monitoring locations throughout the county fall into the third priority tier, or are not regarded as a priority at all. We are seeing few nitrogen exceedances in these areas. These sites are all characterized by orchard crops and a high level of implemented BMPs.

We continue to see low levels of pesticides at all of our monitoring sites. Although the majority of the legacy pesticides are rarely or never detected, others like DDT and toxaphene are still showing up. Likewise, we still see some detections of currently used pesticides.

**Implementing new BMPs**

BMP implementation should focus on irrigation and nutrient management. Why? Because we see the most consistent problems with nitrate and this is a contaminant that farmers have the most control over. It also makes economic sense to be more efficient in irrigation and nutrient management. Since legacy pesticides persisting in the soil are still showing up in runoff, we must address them through sediment control.

**Educational program**

VCAILG members have shown their commitment to the educational process with 70 percent of our members completing the eight-hour requirement and 39 percent taking more than the eight required hours of classes. To date, VCAILG has provided 35 educational opportunities, offering over 100 hours of workshops. There will be more opportunities in the coming months for our members to gain educational hours through courses approved for VCAILG credit and offered by our partner organizations, such as the California Strawberry Commission and UC Cooperative Extension. Announcements of future meetings will be distributed through email. VCAILG members may also call the Farm Bureau office for a list of upcoming classes.

**Documenting BMP implementation**

The Conditional Waiver requires that we document BMPs that are being implemented. To meet this requirement, VCAILG is developing a web-based survey of recently implemented BMPs. We expect to have the survey ready in early 2014. We plan to start surveying those farms that drain to our monitoring sites with the most water quality problems and then eventually survey our entire membership.

**Bacteria Study**

The Conditional Waiver also requires that we conduct a bacteria study to determine whether farmland is contributing to bacteria exceedances at local beaches. This study began last year and will continue this year with sampling at a few VCAILG monitoring sites and tile drains. We will also continue our driving surveys to collect edge-of-field samples during wet and dry weather. In areas where irrigation runoff is observed, we will be contacting farmers to help locate potential problems and provide assistance.

**The bottom line**

So how are we doing? We have a successful program so far. However, since our monitoring data do not reflect strong reductions in the pollutants, our challenge is to show that we are continuing to implement BMPs. By developing a web-based survey system, we hope to drive the process and create meaningful, less onerous methods to comply with the laws created to protect human health and the environment. For more information, go to the Farm Bureau website under Water Issues and download VCAILG documents.




VCAILG is administered by the Farm Bureau of Ventura County.

5156 McGrath St.
Ventura, CA 93003

805-289-0155

*vcailg@farmbureauvc.com*

Newsletter compiled by John Krist and Dale Zurawski.

# Appendix D

# Management Practice Survey for 2005 Conditional Waiver WQMPs

| Management Practices | | Practice Tracking | | | | | Pollutants Being Targeted/Controlled | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Fertilization, Irrigation, & Runoff Control | | Sediment Transport & Runoff Control [1] | | |
| ***Sediment and Erosion Management*** | | **Yes, Prior to Jan. 2008** | **Yes, New since Jan. 2008** | **Planned for future** | **No, Not currently used** | **N/A** | ***Nitrogen*** | ***Salts*** | ***OC Pesticides*** | ***OP Pesticides*** | ***Metals*** |
| 1 | Consult with local agencies (NRCS, RCD, UCCE, or county planning) to develop a soil conservation plan. | | | | | | | | x | x | x |
| 2 | Know your soil series and its erosion hazard rating. | | | | | | | | x | x | x |
| 3 | Consider erosion hazard rating and prevailing winds when choosing row orientation. | | | | | | | | x | x | x |
| 4 | Long runs of production area are broken up by access roads or buffer strips. | | | | | | | | x | x | x |
| 5 | Riparian areas or other areas of natural vegetation were retained or expanded during site development. | | | | | | x | x | x | x | x |
| 6 | Avoid bare fields using cover crops, leaving plant debris, or planting subsequent crops. | | | | | | x | x | x | x | x |
| 7 | Minimize compaction by using drive rows, reducing tractor passes, reducing cultivation, and avoiding driving on or tilling wet ground. | | | | | | | | x | x | x |
| 8 | Apply mulch, compost, or green waste to improve soil characteristics, especially for sandy or clayey soils. | | | | | | x | x | x | x | x |
| 9 | Windbreaks or shelterbelts are used in areas prone to wind erosion. | | | | | | | | x | x | x |

| | ***Sediment and Erosion Management continued*** | **Yes, Prior to Jan. 2008** | **Yes, New since Jan. 2008** | **Planned for future** | **No, Not currently used** | **N/A** | ***Nitrogen*** | ***Salts*** | ***OC Pesticides*** | ***OP Pesticides*** | ***Metals*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | In sloped production areas, management practices to minimize erosion such as contour farming, contoured buffer strips, or terracing are used. | | | | | | x | x | x | x | x |
| 11 | Berms, culverts, or flow channels are in place to divert water away from roads. | | | | | | x | x | x | x | x |
| 12 | Road erosion is minimized by grading, using gravel or mulch on roads, or constructing water bars or drainways. | | | | | | | | x | x | x |
| 13 | Erosion management practices such as terracing, water diversions, and critical area plantings are used for non-production areas that are sloped or hilly. | | | | | | x | x | x | x | x |
| 14 | Ditch banks are protected from erosion with vegetation, rock protection, or geotextiles. | | | | | | x | x | x | x | x |
| 15 | Non-cropped areas with bare soil are protected from erosion with vegetation, mulch, gravel, or by diverting water. | | | | | | x | x | x | x | x |
| 16 | Irrigation runoff is captured or kept on the property. | | | | | | x | x | x | x | x |
| 17 | Stormwater runoff is captured or kept on the property. | | | | | | x | x | x | x | x |
| 18 | Sediment traps are used at the end of the field to retain sediments in runoff. | | | | | | x | x | x | x | x |
| 19 | Devices are in place to treat runoff before it leaves the property, such as grassed waterways, vegetated filter strips, and tailwater recycling systems. | | | | | | x | x | x | x | x |

| | *Irrigation Management* | Yes, Prior to Jan. 2008 | Yes, New since Jan. 2008 | Planned for future | No, Not currently used | N/A | *Nitrogen* | *Salts* | *OC Pesticides* | *OP Pesticides* | *Metals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | At least annually test the irrigation system for distribution uniformity by monitoring water delivery or pressure differences within a block. | | | | | | x | x | x | x | x |
| 21 | Utilize the services of the Irrigation Mobile Lab or a professional irrigation consultant for evaluating irrigation system performance. | | | | | | x | x | x | x | x |
| 22 | Implement appropriate improvements based on your own irrigation system test or the recommendations of the Irrigation Mobile Lab or other appropriate irrigation professionals. | | | | | | x | x | x | x | x |
| 23 | When drip irrigation is used, the distribution uniformity is 90% or better. | | | | | | x | x | x | x | x |
| 24 | Irrigation main and lateral lines are regularly inspected for breaks, leaks, or clogs. | | | | | | x | x | x | x | x |
| 25 | Filters are inspected and cleaned regularly. | | | | | | x | x | x | x | x |
| 26 | Lines are flushed or cleaned chemically to prevent clogging. | | | | | | x | x | x | x | x |
| 27 | Pressure regulators or pressure compensating emitters are used. | | | | | | x | x | x | x | x |
| 28 | Sprinkler heads and drip emitters of the same gallonage are used within each block and replaced with the same heads or emitters when necessary. | | | | | | x | x | x | x | x |
| 29 | Consistent riser heights are used. | | | | | | x | x | x | x | x |

| | *Irrigation Management continued* | Yes, Prior to Jan. 2008 | Yes, New since Jan. 2008 | Planned for future | No, Not currently used | N/A | *Nitrogen* | *Salts* | *OC Pesticides* | *OP Pesticides* | *Metals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | Water is diverted from non-crop areas by adjusting sprinkler head arcs or using sprinkler guards. | | | | | | x | x | x | x | x |
| 31 | When irrigating for frost protection, the proper timing and amount of irrigation is used. | | | | | | x | x | x | x | x |
| 32 | Alternative equipment such as tunnels, air circulation, heaters, or smudge pots are used for frost protection. | | | | | | x | x | x | x | x |
| 33 | The grower knows the infiltration rate of the soil, the available water holding capacity of the soil, and the crop rooting depth. | | | | | | x | x | x | x | x |
| 34 | Soil moisture is measured with equipment such as gypsum block soil moisture sensors (such as Watermarks), tensiometers, soil probe, or neutron probe. | | | | | | x | x | x | x | x |
| 35 | Evapotranspiration (ET) values are used to determine irrigation requirements. Values are obtained from CIMIS, onsite atmometers, or other appropriate devices. | | | | | | x | x | x | x | x |
| 36 | If irrigation must be based on a set schedule due to water availability, the amount of irrigation is varied according to the weather and plant growth stage. | | | | | | x | x | x | x | x |
| 37 | Flow meters are used to measure actual water use and is coupled with known crop use values or other measurements to conserve water as appropriate. | | | | | | x | x | x | x | x |

| | *Irrigation Management continued* | Yes, Prior to Jan. 2008 | Yes, New since Jan. 2008 | Planned for future | No, Not currently used | N/A | *Nitrogen* | *Salts* | *OC Pesticides* | *OP Pesticides* | *Metals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 38 | Irrigation is halted if significant runoff occurs. | | | | | | x | x | x | x | x |
| 39 | Harvested or unplanted areas are not irrigated. | | | | | | x | x | x | x | x |
| 40 | Irrigation water quality is tested for parameters of interest including: pH, electrical conductivity (EC), sodium (Na), chloride (Cl), bicarbonate (HCO3), and boron (B). | | | | | | x | x | | | |
| 41 | Well head is protected from surface contamination (located high in the landscape so that surface water drains away from well head; located away from potential contaminants; the space between the casing and sides of hole is grouted; casing regularly inspected for leaks; vermin-proof well cap with screened vent). | | | | | | x | x | x | x | x |
| 42 | Irrigation duties are performed only by personnel who understand and practice appropriate irrigation scheduling, application, and crop management practices related to runoff management. | | | | | | x | x | x | x | x |

| | *Pest Management* | Yes, Prior to Jan. 2008 | Yes, New since Jan. 2008 | Planned for future | No, Not currently used | N/A | *Nitrogen* | *Salts* | *OC Pesticides* | *OP Pesticides* | *Metals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 43 | Proper scouting methods are used to determine the population densities of insect pests, snails, slugs, and weeds and the incidence of diseases. Methods include use of yellow sticky traps, use of pheromone traps, plant inspection, beating, or net sweeping or other appropriate scouting tools and methods . | | | | | | | | | x | x |
| 44 | Use weather data or degree days to determine when to control pests. | | | | | | | | | x | x |
| 45 | Use UC IPM guidelines as a resource (www.ipm.ucdavis.edu). | | | | | | | | | x | |
| 46 | Diagnostic lab services or other professional assistance is used to identify unknown pathogens, pests, or growth problems before implementing a control measure. | | | | | | | | | x | x |
| 47 | All transplants, plugs, or plant material is inspected for pests before planting or introduction in the growing area. | | | | | | | | | x | x |
| 48 | Natural enemy populations are considered when choosing pesticides, application rates, and timing. | | | | | | | | | x | x |
| 49 | Beneficial insects or mites are released in the field. | | | | | | | | | x | x |
| 50 | Personnel are aware of the causal agents of diseases in the field and their methods of spread. | | | | | | | | | x | x |
| 51 | Personnel are familiar with methods and timing of disease control. | | | | | | | | | x | x |

| | *Pest Management continued* | Yes, Prior to Jan. 2008 | Yes, New since Jan. 2008 | Planned for future | No, Not currently used | N/A | *Nitrogen* | *Salts* | *OC Pesticides* | *OP Pesticides* | *Metals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | Disease resistance or disease tolerant crop varieties are used. | | | | | | | | | x | x |
| 53 | Classes of pesticides are rotated to avoid resistance. | | | | | | | | | x | |
| 54 | The grower or pesticide applicator considers selectivity and effectiveness against the target organism before choosing a pesticide. | | | | | | | | | x | |
| 55 | Personnel are familiar with the UC online databases for comparing the risks of different pesticides moving with water and sediment and affecting non-target organisms (WaterTox or Pesticide Wise). | | | | | | | | | x | |
| 56 | Spray timing is based on economic thresholds of pest incidence. | | | | | | | | | x | x |
| 57 | Hot spots are identified and sprayed rather than treating an entire field. | | | | | | | | | x | x |
| 58 | Sprayers are routinely calibrated to ensure accurate application rates. | | | | | | | | | x | x |
| 59 | Worn nozzles and screens are replaced to ensure the best coverage of pesticide applications. | | | | | | | | | x | x |
| 60 | Treatment rate, water volume, and driving speed are optimized to attain the coverage needed for specific pests. | | | | | | | | | x | x |
| 61 | Pesticides are applied only according to the label and environmental hazards are followed. | | | | | | | | | x | x |
| 62 | Pesticides are applied at the lowest effective labeled rate. | | | | | | | | | x | x |

| | *Pest Management continued* | Yes, Prior to Jan. 2008 | Yes, New since Jan. 2008 | Planned for future | No, Not currently used | N/A | *Nitrogen* | *Salts* | *OC Pesticides* | *OP Pesticides* | *Metals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | Pesticide use records are submitted monthly to the county Agricultural Commissioner. | | | | | | | | | x | x |
| 64 | Pesticides are stored where they are protected from rain and contained on an impermeable pad with curb to contain spills or leaks. | | | | | | | | | x | x |
| 65 | Pesticide mixing and loading is done on an impermeable surface and more than 100 feet down slope from any wells. | | | | | | | | | x | x |
| 66 | Pesticide disposal methods are environmentally safe and in accordance to label instructions. | | | | | | | | | x | x |
| 67 | Reduced risk pesticides are used. | | | | | | | | | x | |
| 68 | Choose selective pesticides for the target pest species and avoid using broad-spectrum pesticides. | | | | | | | | | x | |
| 69 | Avoid applying pesticides when wind could move them off-target as drift. | | | | | | | | | x | x |
| 70 | Avoid applying pesticides when rain or scheduled irrigation will move the pesticides as runoff and ground percolation. | | | | | | | | | x | x |
| 71 | Copper sulfate is not applied prior to extensive irrigation or expected rainfall. | | | | | | | x | | | x |
| 72 | Copper containing pesticides are replaced with alternatives. | | | | | | | | | | x |

| | *Nutrient Management* | Yes, Prior to Jan. 2008 | Yes, New since Jan. 2008 | Planned for future | No, Not currently used | N/A | *Nitrogen* | *Salts* | *OC Pesticides* | *OP Pesticides* | *Metals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 73 | Most recent nutrient recommendations for your particular crops and growing practices are used. | | | | | | x | x | | | |
| 74 | Chemical properties of the soil, including pH and electrical conductivity (EC), are routinely measured. | | | | | | x | x | | | |
| 75 | Soil fertility is routinely monitored through measurements of nitrogen, phosphorus, potassium, and micronutrients. | | | | | | x | x | | | |
| 76 | Fertilization rates are adjusted based on the results of soil fertility measurements. | | | | | | x | x | | | |
| 77 | Crop plants are visually assessed for signs of nutrient deficiency or toxicity. | | | | | | x | x | | | |
| 78 | Leaf or petiole analyses are used as a guide for fertilizer application. | | | | | | x | x | | | |
| 79 | Fertilizer applications are split into multiple smaller applications rather than applying all that is required for a crop in one large application. | | | | | | x | x | | | |
| 80 | Fertilizer levels in fertigation water are tested to ensure that injectors are correctly calibrated. | | | | | | x | x | | | |
| 81 | Fertilizer applications are timed to maximize plant uptake, taking into consideration the life stage of the crop, potential rain events, and irrigation timing. | | | | | | x | x | | | |
| 82 | Slow-release fertilizers are used. | | | | | | x | x | | | |

| | ***Nutrient Management continued*** | **Yes, Prior to Jan. 2008** | **Yes, New since Jan. 2008** | **Planned for future** | **No, Not currently used** | **N/A** | ***Nitrogen*** | ***Salts*** | ***OC Pesticides*** | ***OP Pesticides*** | ***Metals*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 83 | Fertilizer applications are adjusted to account for other nutrient sources, such as: irrigation water, cover crops, and residuals from previous fertilizations. | | | | | | x | x | | | |
| 84 | Fertilizers are stored where they are protected from rain and on an impermeable pad with a curb to contain spills. | | | | | | x | x | | | |
| 85 | Mixing and loading of fertilizers occurs in a covered area on an impermeable surface and more than 100 feet down slope from any wells. | | | | | | x | x | | | |
| | ***Salinity Management and Leaching*** | | | | | | | | | | |
| 86 | Leaching is performed only when necessary, as determined by measuring soil solution electrical conductivity (EC). | | | | | | x | x | | | |
| 87 | Leaching is done only when fertilizer injectors are turned off. | | | | | | x | x | | | |
| 88 | Fertilizers and amendments with a low salt index are used. | | | | | | | x | | | |
| 89 | Saline or high selenium wells are decommissioned and other sources of water are used. | | | | | | | x | | | |

| | *Property Management* | Yes, Prior to Jan. 2008 | Yes, New since Jan. 2008 | Planned for future | No, Not currently used | N/A | *Nitrogen* | *Salts* | *OC Pesticides* | *OP Pesticides* | *Metals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 | Landowner, grower, or other personnel regularly attend UC Cooperative Extension, Commodity Board, or other industry educational meetings concerning management practices that protect water resources. | | | | | | x | x | x | x | x |
| 91 | Landowner, grower, or other responsible personnel subscribe to and read farming, trade, and industry journals containing articles about water quality, fertilizer, pest and erosion management. | | | | | | x | x | x | x | x |
| 92 | Employees receive training on the following: wearing protective clothing, understanding fertilizer/pesticide signage, MSDS and label information, personal hygiene and sanitation, trash disposal and recycling, use storage and disposal of fertilizers and pesticides, pest and disease scouting, spill cleanup, and irrigation. | | | | | | x | x | x | x | x |
| 93 | Training is provided in the employees' native language. | | | | | | x | x | x | x | x |
| 94 | Fuel tanks are checked and maintained to prevent leaks. | | | | | | | | | | x |
| 95 | Spill cleanup materials are readily accessible and maintained for all potential types and sizes of spills. | | | | | | x | x | | x | x |
| 96 | All vehicles, trucks, and tractors are regularly maintained to detect and prevent fluid leaks. | | | | | | | | | | x |
| 97 | Vehicles, machinery, and tanks no longer in use are drained of fluids, and those fluids properly disposed. | | | | | | | | | | x |

| | *Property Management continued* | Yes, Prior to Jan. 2008 | Yes, New since Jan. 2008 | Planned for future | No, Not currently used | N/A | *Nitrogen* | *Salts* | *OC Pesticides* | *OP Pesticides* | *Metals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 98 | The property is kept clean and free of debris. | | | | | | | | | | |
| 99 | The property has an adequate number of waste containers that are regularly collected to prevent overflow and are kept covered to prevent scattering of trash. | | | | | | | | | | |
| 100 | Restrooms or portable toilets are available where needed and regularly maintained. | | | | | | | | | | |

[1] Previous samplings have shown pesticides and metals to have caused toxicity. Therefore, BMPs that address these classes of constituents will also mitigate toxicity exceedances.

# Appendix E

# BMP Adoption Rates by Priority Drainage Tier

**Appendix E. BMP Adoption Rates in the Priority Drainages. BMPs are Listed in Order According to Management Category, as they Appear in the Survey Form. Low (< 50%) and High (≤ 90%) Adoption Rates are Highlighted in Red and Green, Respectively.**

| BMP # | Adoption Rate (Percent of Applicable Surveyed Acres Where BMP is Employed) | | | Difference in Adoption Rate between Tier 1 and Tier 3 | BMP Characterization | BMP Description |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | | | |
| **Sediment/Erosion** | | | | | | |
| 1 | 25% | 29% | 63% | 38% | Consultation | Consult with local agencies (NRCS, RCD, UCCE, or county planning) to develop a soil conservation plan. |
| 2 | 36% | 64% | 75% | 38% | Specialized Knowledge | Know your soil series and its erosion hazard rating. |
| 3 | 44% | 64% | 84% | 40% | Cropped Area Action | Consider erosion hazard rating and prevailing winds when choosing row orientation. |
| 4 | 64% | 75% | 88% | 25% | Cropped Area Action | Long runs of production area are broken up by access roads or buffer strips. |
| 5 | 44% | 66% | 79% | 35% | Uncropped Area Action | Riparian areas or other areas of natural vegetation were retained or expanded during site development. |
| 6 | 68% | 83% | 88% | 21% | Cropped Area Action | Avoid bare fields using cover crops, leaving plant debris, or planting subsequent crops. |
| 7 | 61% | 85% | 93% | 32% | Cropped Area Action | Minimize compaction by using drive rows, reducing tractor passes, reducing cultivation, and avoiding driving on or tilling wet ground. |
| 8 | 53% | 57% | 82% | 29% | Cropped Area Action | Apply mulch, compost, or green waste to improve soil characteristics, especially for sandy or clayey soils. |
| 9 | 46% | 52% | 84% | 38% | Cropped Area Action | Windbreaks or shelterbelts are used in areas prone to wind erosion. |
| 10 | 53% | 67% | 88% | 35% | Cropped Area Action | In sloped production areas, management practices to minimize erosion such as contour farming, contoured buffer strips, or terracing are used. |
| 11 | 60% | 83% | 91% | 31% | Uncropped Area Action | Berms, culverts, or flow channels are in place to divert water away from roads. |
| 12 | 59% | 80% | 91% | 32% | Uncropped Area Action | Road erosion is minimized by grading, using gravel or mulch on roads, or constructing water bars or drainways. |
| 13 | 68% | 60% | 87% | 19% | Cropped Area Action | Erosion management practices such as terracing, water diversions, and critical area plantings are used for non-production areas that are sloped or hilly. |
| 14 | 48% | 56% | 82% | 35% | Uncropped Area Action | Ditch banks are protected from erosion with vegetation, rock protection, or geotextiles. |
| 15 | 59% | 66% | 93% | 34% | Uncropped Area Action | Non-cropped areas with bare soil are protected from erosion with vegetation, mulch, gravel, or by diverting water. |

| BMP # | Adoption Rate (Percent of Applicable Surveyed Acres Where BMP is Employed) | | | Difference in Adoption Rate between Tier 1 and Tier 3 | BMP Characterization | BMP Description |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | | | |
| 16 | 8% | 21% | 43% | 35% | Cropped Area Action | Irrigation runoff is captured or kept on the property. |
| 17 | 2% | 11% | 14% | 12% | Cropped Area Action | Stormwater runoff is captured or kept on the property. |
| 18 | 19% | 23% | 26% | 7% | Cropped Area Action | Sediment traps are used at the end of the field to retain sediments in runoff. |
| 19 | 26% | 9% | 26% | 0% | Cropped Area Action | Devices are in place to treat runoff before it leaves the property, such as grassed waterways, vegetated filter strips, and tailwater recycling systems. |
| **Irrigation Management** | | | | | | |
| 20 | 53% | 74% | 80% | 27% | Testing | At least annually test the irrigation system for distribution uniformity by monitoring water delivery or pressure differences within a block. |
| 21 | 31% | 30% | 44% | 14% | Consultation | Utilize the services of the Irrigation Mobile Lab or a professional irrigation consultant for evaluating irrigation system performance. |
| 22 | 56% | 66% | 76% | 20% | Cropped Area Action | Implement appropriate improvements based on your own irrigation system test or the recommendations of the Irrigation Mobile Lab or other appropriate irrigation professionals. |
| 23 | 64% | 80% | 84% | 20% | Cropped Area Action | When drip irrigation is used, the distribution uniformity is 90% or better. |
| 24 | 62% | 81% | 95% | 33% | Cropped Area Action | Irrigation main and lateral lines are regularly inspected for breaks, leaks, or clogs. |
| 25 | 62% | 76% | 90% | 28% | Cropped Area Action | Filters are inspected and cleaned regularly. |
| 26 | 55% | 82% | 86% | 31% | Cropped Area Action | Lines are flushed or cleaned chemically to prevent clogging. |
| 27 | 60% | 80% | 90% | 30% | Cropped Area Action | Pressure regulators or pressure compensating emitters are used. |
| 28 | 61% | 81% | 95% | 34% | Cropped Area Action | Sprinkler heads and drip emitters of the same gallonage are used within each block and replaced with the same heads or emitters when necessary. |
| 29 | 59% | 81% | 94% | 35% | Cropped Area Action | Consistent riser heights are used. |
| 30 | 59% | 86% | 84% | 25% | Uncropped Area Action | Water is diverted from non-crop areas by adjusting sprinkler head arcs or using sprinkler guards. |
| 31 | 54% | 72% | 97% | 43% | Cropped Area Action | When irrigating for frost protection, the proper timing and amount of irrigation is used. |
| 32 | 43% | 40% | 81% | 37% | Cropped Area Action | Alternative equipment such as tunnels, air circulation, heaters, or smudge pots are used for frost protection. |

| BMP # | Adoption Rate (Percent of Applicable Surveyed Acres Where BMP is Employed) | | | Difference in Adoption Rate between Tier 1 and Tier 3 | BMP Characterization | BMP Description |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | | | |
| 33 | 48% | 77% | 92% | 44% | Specialized Knowledge | The grower knows the infiltration rate of the soil, the available water holding capacity of the soil, and the crop rooting depth. |
| 34 | 30% | 54% | 70% | 40% | Real Time Data | Soil moisture is measured with equipment such as gypsum block soil moisture sensors (such as Watermarks), tensiometers, soil probe, or neutron probe. |
| 35 | 20% | 43% | 51% | 32% | Real Time Data | Evapotranspiration (ET) values are used to determine irrigation requirements. Values are obtained from CIMIS, onsite atmometers, or other appropriate devices. |
| 36 | 64% | 86% | 91% | 28% | Cropped Area Action | If irrigation must be based on a set schedule due to water availability, the amount of irrigation is varied according to the weather and plant growth stage. |
| 37 | 50% | 68% | 76% | 25% | Cropped Area Action | Flow meters are used to measure actual water use and is coupled with known crop use values or other measurements to conserve water as appropriate. |
| 38 | 60% | 84% | 88% | 28% | Cropped Area Action | Irrigation is halted if significant runoff occurs. |
| 39 | 61% | 81% | 87% | 26% | Uncropped Area Action | Harvested or unplanted areas are not irrigated. |
| 40 | 59% | 76% | 84% | 26% | Testing | Irrigation water quality is tested for parameters of interest including: pH, electrical conductivity (EC), sodium (Na), chloride (Cl), bicarbonate (HCO3), and boron (B). |
| 41 | 60% | 88% | 94% | 34% | Cropped Area Action | Well head is protected from surface contamination (located high in the landscape so that surface water drains away from well head; located away from potential contaminants; the space between the casing and sides of hole is grouted; casing regularly inspected for leaks; vermin-proof well cap with screened vent). |
| 42 | 62% | 84% | 93% | 31% | Cropped Area Action | Irrigation duties are performed only by personnel who understand and practice appropriate irrigation scheduling, application, and crop management practices related to runoff management. |
| **Pest Management** | | | | | | |
| 43 | 62% | 84% | 94% | 31% | Testing | Proper scouting methods are used to determine the population densities of insect pests, snails, slugs, and weeds and the incidence of diseases. Methods include use of yellow sticky traps, use of pheromone traps, plant inspection, beating, or net sweeping or other appropriate scouting tools and methods . |
| 44 | 58% | 71% | 76% | 18% | Real Time Data | Use weather data or degree days to determine when to control pests. |
| 45 | 43% | 74% | 83% | 39% | Specialized Knowledge | Use UC IPM guidelines as a resource (www.ipm.ucdavis.edu). |

| BMP # | Adoption Rate (Percent of Applicable Surveyed Acres Where BMP is Employed) | | | Difference in Adoption Rate between Tier 1 and Tier 3 | BMP Characterization | BMP Description |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | | | |
| 46 | 61% | 83% | 94% | 33% | Consultation | Diagnostic lab services or other professional assistance is used to identify unknown pathogens, pests, or growth problems before implementing a control measure. |
| 47 | 67% | 84% | 92% | 24% | Cropped Area Action | All transplants, plugs, or plant material is inspected for pests before planting or introduction in the growing area. |
| 48 | 61% | 79% | 91% | 31% | Specialized Knowledge | Natural enemy populations are considered when choosing pesticides, application rates, and timing. |
| 49 | 46% | 58% | 74% | 28% | Cropped Area Action | Beneficial insects or mites are released in the field. |
| 50 | 61% | 84% | 93% | 32% | Specialized Knowledge | Personnel are aware of the causal agents of diseases in the field and their methods of spread. |
| 51 | 61% | 84% | 92% | 31% | Specialized Knowledge | Personnel are familiar with methods and timing of disease control. |
| 52 | 59% | 84% | 91% | 31% | Cropped Area Action | Disease resistance or disease tolerant crop varieties are used. |
| 53 | 60% | 84% | 87% | 28% | Specialized Knowledge | Classes of pesticides are rotated to avoid resistance. |
| 54 | 62% | 84% | 94% | 32% | Specialized Knowledge | The grower or pesticide applicator considers selectivity and effectiveness against the target organism before choosing a pesticide. |
| 55 | 43% | 57% | 65% | 22% | Specialized Knowledge | Personnel are familiar with the UC online databases for comparing the risks of different pesticides moving with water and sediment and affecting non-target organisms (WaterTox or Pesticide Wise). |
| 56 | 62% | 84% | 94% | 32% | Specialized Knowledge | Spray timing is based on economic thresholds of pest incidence. |
| 57 | 52% | 68% | 88% | 35% | Cropped Area Action | Hot spots are identified and sprayed rather than treating an entire field. |
| 58 | 61% | 84% | 95% | 33% | Cropped Area Action | Sprayers are routinely calibrated to ensure accurate application rates. |
| 59 | 62% | 84% | 94% | 32% | Cropped Area Action | Worn nozzles and screens are replaced to ensure the best coverage of pesticide applications. |
| 60 | 62% | 84% | 94% | 32% | Cropped Area Action | Treatment rate, water volume, and driving speed are optimized to attain the coverage needed for specific pests. |
| 61 | 62% | 84% | 93% | 31% | Cropped Area Action | Pesticides are applied only according to the label and environmental hazards are followed. |
| 62 | 59% | 77% | 93% | 34% | Cropped Area Action | Pesticides are applied at the lowest effective labeled rate. |
| 63 | 61% | 84% | 92% | 31% | Cropped Area Action | Pesticide use records are submitted monthly to the county Agricultural Commissioner. |

| BMP # | Adoption Rate (Percent of Applicable Surveyed Acres Where BMP is Employed) | | | Difference in Adoption Rate between Tier 1 and Tier 3 | BMP Characterization | BMP Description |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | | | |
| 64 | 62% | 84% | 93% | 30% | Uncropped Area Action | Pesticides are stored where they are protected from rain and contained on an impermeable pad with curb to contain spills or leaks. |
| 65 | 53% | 82% | 88% | 35% | Uncropped Area Action | Pesticide mixing and loading is done on an impermeable surface and more than 100 feet down slope from any wells. |
| 66 | 62% | 84% | 93% | 31% | Uncropped Area Action | Pesticide disposal methods are environmentally safe and in accordance to label instructions. |
| 67 | 62% | 84% | 93% | 31% | Cropped Area Action | Reduced risk pesticides are used. |
| 68 | 61% | 84% | 93% | 33% | Cropped Area Action | Choose selective pesticides for the target pest species and avoid using broad-spectrum pesticides. |
| 69 | 62% | 84% | 93% | 31% | Cropped Area Action | Avoid applying pesticides when wind could move them off-target as drift. |
| 70 | 62% | 84% | 94% | 32% | Cropped Area Action | Avoid applying pesticides when rain or scheduled irrigation will move the pesticides as runoff and ground percolation. |
| 71 | 56% | 77% | 88% | 32% | Cropped Area Action | Copper Sulfate is not applied prior to extensive irrigation or expected rainfall. |
| 72 | 48% | 78% | 68% | 20% | Cropped Area Action | Copper containing pesticides are replaced with alternatives. |
| **Nutrient Management** | | | | | | |
| 73 | 61% | 83% | 93% | 33% | Specialized Knowledge | Most recent nutrient recommendations for your particular crops and growing practices are used. |
| 74 | 49% | 76% | 81% | 33% | Testing | Chemical properties of the soil, including pH and electrical conductivity (EC), are routinely measured. |
| 75 | 58% | 75% | 89% | 30% | Testing | Soil fertility is routinely monitored through measurements of nitrogen, phosphorus, potassium, and micronutrients. |
| 76 | 59% | 76% | 90% | 31% | Cropped Area Action | Fertilization rates are adjusted based on the results of soil fertility measurements. |
| 77 | 62% | 84% | 94% | 32% | Cropped Area Action | Crop plants are visually assessed for signs of nutrient deficiency or toxicity. |
| 78 | 57% | 79% | 92% | 35% | Testing | Leaf or petiole analyses are used as a guide for fertilizer application. |
| 79 | 62% | 84% | 92% | 30% | Cropped Area Action | Fertilizer applications are split into multiple smaller applications rather than applying all that is required for a crop in one large application. |

| BMP # | Adoption Rate (Percent of Applicable Surveyed Acres Where BMP is Employed) | | | Difference in Adoption Rate between Tier 1 and Tier 3 | BMP Characterization | BMP Description |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | | | |
| 80 | 53% | 75% | 62% | 9% | Testing | Fertilizer levels in fertigation water are tested to ensure that injectors are correctly calibrated. |
| 81 | 62% | 84% | 94% | 33% | Cropped Area Action | Fertilizer applications are timed to maximize plant uptake, taking into consideration the life stage of the crop, potential rain events, and irrigation timing. |
| 82 | 46% | 58% | 62% | 16% | Cropped Area Action | Slow-release fertilizers are used. |
| 83 | 60% | 83% | 92% | 31% | Cropped Area Action | Fertilizer applications are adjusted to account for other nutrient sources, such as: irrigation water, cover crops, and residuals from previous fertilizations. |
| 84 | 58% | 82% | 94% | 36% | Uncropped Area Action | Fertilizers are stored where they are protected from rain and on an impermeable pad with a curb to contain spills. |
| 85 | 46% | 80% | 86% | 40% | Uncropped Area Action | Mixing and loading of fertilizers occurs in a covered area on an impermeable surface and more than 100 feet down slope from any wells. |
| **Salinity/Leaching** | | | | | | |
| 86 | 53% | 77% | 57% | 4% | Testing | Leaching is performed only when necessary, as determined by measuring soil solution electrical conductivity (EC). |
| 87 | 58% | 82% | 82% | 24% | Cropped Area Action | Leaching is done only when fertilizer injectors are turned off. |
| 88 | 54% | 63% | 84% | 31% | Cropped Area Action | Fertilizers and amendments with a low salt index are used. |
| 89 | 56% | 66% | 90% | 34% | Cropped Area Action | Saline or high selenium wells are decommissioned and other sources of water are used. |
| **Property Management** | | | | | | |
| 90 | 57% | 78% | 89% | 32% | Consultation | Landowner, grower, or other personnel regularly attend UC Cooperative Extension, Commodity Board, or other industry educational meetings concerning management practices that protect water resources. |
| 91 | 60% | 83% | 94% | 34% | Specialized Knowledge | Landowner, grower, or other responsible personnel subscribe to and read farming, trade, and industry journals containing articles about water quality, fertilizer, pest and erosion management. |
| 92 | 62% | 84% | 94% | 32% | Uncropped Area Action | Employees receive training on the following: wearing protective clothing, understanding fertilizer/pesticide signage, MSDS and label information, personal hygiene and sanitation, trash disposal and recycling, use storage and disposal of fertilizers and pesticides, pest and disease scouting, spill cleanup, and irrigation. |

| BMP # | Adoption Rate (Percent of Applicable Surveyed Acres Where BMP is Employed) | | | Difference in Adoption Rate between Tier 1 and Tier 3 | BMP Characterization | BMP Description |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | | | |
| 93 | 61% | 84% | 94% | 33% | Uncropped Area Action | Training is provided in the employees' native language. |
| 94 | 62% | 84% | 94% | 32% | Uncropped Area Action | Fuel tanks are checked and maintained to prevent leaks. |
| 95 | 49% | 82% | 85% | 36% | Uncropped Area Action | Spill cleanup materials are readily accessible and maintained for all potential types and sizes of spills. |
| 96 | 62% | 84% | 94% | 32% | Uncropped Area Action | All vehicles, trucks, and tractors are regularly maintained to detect and prevent fluid leaks. |
| 97 | 65% | 84% | 96% | 31% | Uncropped Area Action | Vehicles, machinery, and tanks no longer in use are drained of fluids, and those fluids properly disposed. |
| 98 | 61% | 84% | 94% | 33% | Uncropped Area Action | The property is kept clean and free of debris. |
| 99 | 60% | 84% | 90% | 30% | Uncropped Area Action | The property has an adequate number of waste containers that are regularly collected to prevent overflow and are kept covered to prevent scattering of trash. |
| 100 | 59% | 84% | 90% | 31% | Uncropped Area Action | Restrooms or portable toilets are available where needed and regularly maintained. |

# Appendix F

# Adoption Rates for Individual BMPs Calculated on the Basis of Drainage Area

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| **Sediment/Erosion BMPs** | | | | | | | | | | | | | | | | | | |
| 1 | Consultation | Consult with local agencies (NRCS, RCD, UCCE, or county planning) to develop a soil conservation plan. | 40% | 25% | 0% | 40% | 34% | 28% | 0% | 33% | 33% | 24% | 25% | 70% | 75% | 47% | 51% | 81% |
| 2 | Specialized Knowledge | Know your soil series and its erosion hazard rating. | 67% | 58% | 3% | 35% | 45% | 86% | 93% | 46% | 68% | 56% | 73% | 99% | 84% | 63% | 49% | 73% |
| 3 | Cropped Area Action | Consider erosion hazard rating and prevailing winds when choosing row orientation. | 60% | 67% | 0% | 87% | 46% | 72% | 58% | 51% | 70% | 71% | 53% | 100% | 91% | 65% | 63% | 100% |
| 4 | Cropped Area Action | Long runs of production area are broken up by access roads or buffer strips. | 74% | 67% | 28% | 93% | 53% | 79% | 93% | 70% | 72% | 81% | 81% | 100% | 100 % | 66% | 75% | 98% |
| 5 | Uncropped Area Action | Riparian areas or other areas of natural vegetation were retained or expanded during site development. | 60% | 54% | 26% | 30% | 40% | 72% | 0% | 63% | 42% | 69% | 47% | 84% | 87% | 64% | 35% | 89% |
| 6 | Cropped Area Action | Avoid bare fields using cover crops, leaving plant debris, or planting subsequent crops. | 81% | 75% | 15% | 93% | 53% | 88% | 93% | 66% | 89% | 81% | 79% | 100% | 80% | 66% | 77% | 100% |

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 7 | Cropped Area Action | Minimize compaction by using drive rows, reducing tractor passes, reducing cultivation, and avoiding driving on or tilling wet ground. | 87% | 76% | 26% | 93% | 56% | 88% | 93% | 73% | 90% | 86% | 94% | 100% | 96% | 69% | 86% | 100% |
| 8 | Cropped Area Action | Apply mulch, compost, or green waste to improve soil characteristics, especially for sandy or clayey soils. | 59% | 76% | 26% | 90% | 45% | 48% | 0% | 69% | 52% | 73% | 67% | 93% | 76% | 65% | 67% | 93% |
| 9 | Cropped Area Action | Windbreaks or shelterbelts are used in areas prone to wind erosion. | 67% | 71% | 8% | 36% | 54% | 52% | 10% | 64% | 43% | 46% | 80% | 71% | 78% | 68% | 66% | 99% |
| 10 | Cropped Area Action | In sloped production areas, management practices to minimize erosion such as contour farming, contoured buffer strips, or terracing are used. | 52% | 70% | 18% | 88% | 48% | 72% | 0% | 47% | 38% | 41% | 81% | 95% | 93% | 69% | 64% | 95% |
| 11 | Uncropped Area Action | Berms, culverts, or flow channels are in place to divert water away from roads. | 87% | 76% | 26% | 90% | 54% | 88% | 93% | 73% | 86% | 86% | 75% | 100% | 99% | 70% | 82% | 97% |
| 12 | Uncropped Area Action | Road erosion is minimized by grading, using gravel or mulch on roads, or constructing water bars or drainways. | 87% | 67% | 24% | 90% | 57% | 79% | 58% | 69% | 86% | 86% | 86% | 100% | 97% | 70% | 75% | 99% |

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 13 | Cropped Area Action | Erosion management practices such as terracing, water diversions, and critical area plantings are used for non-production areas that are sloped or hilly. | 65% | 66% | 7% | 88% | 41% | 54% | 0% | 56% | 19% | 41% | 41% | 100% | 85% | 68% | 56% | 100% |
| 14 | Uncropped Area Action | Ditch banks are protected from erosion with vegetation, rock protection, or geotextiles. | 72% | 67% | 6% | 75% | 54% | 65% | 10% | 50% | 68% | 48% | 69% | 82% | 92% | 69% | 71% | 91% |
| 15 | Uncropped Area Action | Non-cropped areas with bare soil are protected from erosion with vegetation, mulch, gravel, or by diverting water. | 67% | 75% | 28% | 90% | 13% | 55% | 10% | 67% | 84% | 64% | 95% | 100% | 98% | 61% | 59% | 100% |
| 16 | Cropped Area Action | Irrigation runoff is captured or kept on the property. | 21% | 0% | 7% | 5% | 9% | 20% | 0% | 41% | 14% | 0% | 43% | 75% | 46% | 32% | 12% | 48% |
| 17 | Cropped Area Action | Stormwater runoff is captured or kept on the property. | 5% | 0% | 0% | 5% | 0% | 0% | 0% | 34% | 0% | 0% | 0% | 30% | 5% | 24% | 15% | 2% |
| 18 | Cropped Area Action | Sediment traps are used at the end of the field to retain sediments in runoff. | 49% | 12% | 7% | 38% | 8% | 8% | 0% | 37% | 15% | 23% | 20% | 50% | 21% | 28% | 22% | 16% |

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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 19 | Cropped Area Action | Devices are in place to treat runoff before it leaves the property, such as grassed waterways, vegetated filter strips, and tailwater recycling systems. | 19% | 9% | 0% | 72% | 33% | 11% | 0% | 12% | 0% | 23% | 16% | 58% | 53% | 38% | 23% | 3% |
| **Irrigation Management** | | | | | | | | | | | | | | | | | | |
| 20 | Testing | At least annually test the irrigation system for distribution uniformity by monitoring water delivery or pressure differences within a block. | 72% | 73% | 28% | 87% | 41% | 86% | 93% | 55% | 85% | 73% | 73% | 84% | 84% | 53% | 62% | 100% |
| 21 | Consultation | Utilize the services of the Irrigation Mobile Lab or a professional irrigation consultant for evaluating irrigation system performance. | 38% | 34% | 0% | 74% | 44% | 30% | 10% | 34% | 31% | 26% | 14% | 62% | 51% | 46% | 5% | 54% |
| 22 | Cropped Area Action | Implement appropriate improvements based on your own irrigation system test or the recommendations of the Irrigation Mobile Lab or other appropriate irrigation professionals. | 67% | 73% | 28% | 90% | 50% | 72% | 93% | 68% | 69% | 42% | 42% | 69% | 59% | 59% | 68% | 100% |

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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 23 | Cropped Area Action | When drip irrigation is used, the distribution uniformity is 90% or better. | 86% | 67% | 28% | 90% | 48% | 80% | 58% | 66% | 90% | 86% | 34% | 86% | 100 % | 64% | 80% | 96% |
| 24 | Cropped Area Action | Irrigation main and lateral lines are regularly inspected for breaks, leaks, or clogs. | 87% | 76% | 31% | 90% | 57% | 88% | 93% | 65% | 90% | 86% | 96% | 100% | 100 % | 71% | 87% | 100% |
| 25 | Cropped Area Action | Filters are inspected and cleaned regularly. | 87% | 76% | 31% | 90% | 57% | 67% | 10% | 71% | 90% | 86% | 84% | 99% | 89% | 71% | 83% | 93% |
| 26 | Cropped Area Action | Lines are flushed or cleaned chemically to prevent clogging. | 69% | 56% | 28% | 89% | 53% | 84% | 58% | 73% | 87% | 86% | 94% | 96% | 86% | 66% | 62% | 95% |
| 27 | Cropped Area Action | Pressure regulators or pressure compensating emitters are used. | 86% | 76% | 28% | 93% | 53% | 84% | 58% | 70% | 88% | 82% | 96% | 96% | 87% | 69% | 72% | 100% |
| 28 | Cropped Area Action | Sprinkler heads and drip emitters of the same gallonage are used within each block and replaced with the same heads or emitters when necessary. | 87% | 67% | 31% | 93% | 57% | 87% | 93% | 65% | 90% | 86% | 96% | 100% | 100 % | 71% | 87% | 100% |
| 29 | Cropped Area Action | Consistent riser heights are used. | 87% | 46% | 31% | 93% | 55% | 87% | 93% | 69% | 90% | 69% | 95% | 96% | 97% | 71% | 86% | 95% |
| 30 | Uncropped Area Action | Water is diverted from non-crop areas by adjusting sprinkler head arcs or using sprinkler guards. | 75% | 62% | 23% | 90% | 46% | 87% | 93% | 69% | 90% | 86% | 77% | 80% | 88% | 68% | 79% | 100% |

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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 31 | Cropped Area Action | When irrigating for frost protection, the proper timing and amount of irrigation is used. | 75% | 22% | 27% | 75% | 26% | 75% | 0% | 66% | 60% | 36% | 81% | 86% | 100 % | 59% | 67% | 100% |
| 32 | Cropped Area Action | Alternative equipment such as tunnels, air circulation, heaters, or smudge pots are used for frost protection. | 79% | 50% | 4% | 15% | 43% | 39% | 0% | 41% | 16% | 31% | 83% | 67% | 78% | 63% | 71% | 90% |
| 33 | Specialized Knowledge | The grower knows the infiltration rate of the soil, the available water holding capacity of the soil, and the crop rooting depth. | 61% | 57% | 24% | 82% | 53% | 88% | 93% | 73% | 75% | 73% | 96% | 100% | 86% | 67% | 82% | 100% |
| 34 | Real Time Data | Soil moisture is measured with equipment such as gypsum block soil moisture sensors (such as Watermarks), tensiometers, soil probe, or neutron probe. | 67% | 59% | 26% | 19% | 13% | 77% | 83% | 57% | 40% | 49% | 9% | 63% | 84% | 50% | 64% | 96% |
| 35 | Real Time Data | Evapotranspiration (ET) values are used to determine irrigation requirements. Values are obtained from CIMIS, onsite atmometers, or other appropriate devices. | 35% | 27% | 3% | 0% | 36% | 67% | 93% | 35% | 35% | 30% | 11% | 85% | 11% | 41% | 33% | 79% |

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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 36 | Cropped Area Action | If irrigation must be based on a set schedule due to water availability, the amount of irrigation is varied according to the weather and plant growth stage. | 82% | 64% | 4% | 92% | 54% | 87% | 93% | 62% | 90% | 83% | 94% | 100% | 98% | 65% | 69% | 100% |
| 37 | Cropped Area Action | Flow meters are used to measure actual water use and is coupled with known crop use values or other measurements to conserve water as appropriate. | 52% | 76% | 9% | 90% | 55% | 87% | 93% | 53% | 71% | 71% | 53% | 72% | 64% | 56% | 65% | 100% |
| 38 | Cropped Area Action | Irrigation is halted if significant runoff occurs. | 87% | 67% | 31% | 90% | 53% | 88% | 93% | 72% | 90% | 86% | 49% | 89% | 100 % | 70% | 81% | 100% |
| 39 | Uncropped Area Action | Harvested or unplanted areas are not irrigated. | 79% | 50% | 28% | 90% | 51% | 87% | 93% | 71% | 89% | 72% | 77% | 100% | 100 % | 66% | 71% | 94% |
| 40 | Testing | Irrigation water quality is tested for parameters of interest including: pH, electrical conductivity (EC), sodium (Na), chloride (Cl), bicarbonate (HCO3), and boron (B). | 72% | 76% | 31% | 93% | 53% | 88% | 93% | 73% | 72% | 73% | 54% | 96% | 84% | 66% | 74% | 96% |

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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 41 | Cropped Area Action | Well head is protected from surface contamination (located high in the landscape so that surface water drains away from well head; located away from potential contaminants; the space between the casing and sides of hole is grouted; casing regularly inspected for leaks; vermin-proof well cap with screened vent). | 84% | 71% | 31% | 93% | 56% | 88% | 93% | 69% | 90% | 86% | 81% | 100% | 100 % | 69% | 73% | 100% |
| 42 | Cropped Area Action | Irrigation duties are performed only by personnel who understand and practice appropriate irrigation scheduling, application, and crop management practices related to runoff management. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 89% | 86% | 85% | 100% | 100 % | 70% | 83% | 100% |

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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| **Pest Management** | | | | | | | | | | | | | | | | | | |
| 43 | Testing | Proper scouting methods are used to determine the population densities of insect pests, snails, slugs, and weeds and the incidence of diseases. Methods include use of yellow sticky traps, use of pheromone traps, plant inspection, beating, or net sweeping or other appropriate scouting tools and methods. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 85% | 100% | 99% | 70% | 86% | 100% |
| 44 | Real Time Data | Use weather data or degree days to determine when to control pests. | 71% | 73% | 31% | 93% | 53% | 88% | 93% | 67% | 75% | 49% | 63% | 78% | 77% | 68% | 54% | 88% |
| 45 | Specialized Knowledge | Use UC IPM guidelines as a resource (www.ipm.ucdavis.edu). | 76% | 33% | 31% | 37% | 47% | 65% | 10% | 71% | 85% | 85% | 74% | 96% | 73% | 62% | 68% | 93% |
| 46 | Consultation | Diagnostic lab services or other professional assistance is used to identify unknown pathogens, pests, or growth problems before implementing a control measure. | 87% | 76% | 31% | 87% | 55% | 88% | 93% | 73% | 88% | 86% | 96% | 100% | 95% | 69% | 86% | 100% |

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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 47 | Cropped Area Action | All transplants, plugs, or plant material is inspected for pests before planting or introduction in the growing area. | 86% | 76% | 28% | 93% | 54% | 85% | 58% | 73% | 90% | 86% | 94% | 95% | 97% | 66% | 84% | 100% |
| 48 | Specialized Knowledge | Natural enemy populations are considered when choosing pesticides, application rates, and timing. | 87% | 76% | 31% | 93% | 52% | 85% | 58% | 73% | 78% | 86% | 96% | 100% | 98% | 71% | 86% | 91% |
| 49 | Cropped Area Action | Beneficial insects or mites are released in the field. | 38% | 59% | 22% | 90% | 41% | 49% | 0% | 57% | 70% | 54% | 74% | 59% | 65% | 64% | 67% | 89% |
| 50 | Specialized Knowledge | Personnel are aware of the causal agents of diseases in the field and their methods of spread. | 87% | 76% | 31% | 87% | 57% | 88% | 93% | 73% | 89% | 86% | 85% | 100% | 100 % | 70% | 87% | 98% |
| 51 | Specialized Knowledge | Personnel are familiar with methods and timing of disease control. | 87% | 76% | 31% | 87% | 57% | 88% | 93% | 73% | 89% | 86% | 85% | 100% | 96% | 71% | 84% | 97% |
| 52 | Cropped Area Action | Disease resistance or disease tolerant crop varieties are used. | 87% | 76% | 31% | 91% | 49% | 88% | 93% | 73% | 90% | 86% | 88% | 91% | 92% | 71% | 87% | 98% |
| 53 | Specialized Knowledge | Classes of pesticides are rotated to avoid resistance. | 87% | 55% | 31% | 93% | 56% | 88% | 93% | 73% | 90% | 86% | 66% | 96% | 64% | 69% | 83% | 100% |

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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 54 | Specialized Knowledge | The grower or pesticide applicator considers selectivity and effectiveness against the target organism before choosing a pesticide. | 87% | 76% | 31% | 93% | 56% | 88% | 93% | 73% | 90% | 86% | 95% | 100% | 94% | 71% | 87% | 100% |
| 55 | Specialized Knowledge | Personnel are familiar with the UC online databases for comparing the risks of different pesticides moving with water and sediment and affecting non-target organisms (WaterTox or Pesticide Wise). | 40% | 13% | 26% | 86% | 48% | 60% | 0% | 67% | 59% | 54% | 85% | 96% | 74% | 59% | 69% | 34% |
| 56 | Specialized Knowledge | Spray timing is based on economic thresholds of pest incidence. | 87% | 76% | 31% | 91% | 57% | 88% | 93% | 73% | 90% | 86% | 95% | 100% | 92% | 71% | 87% | 100% |
| 57 | Cropped Area Action | Hot spots are identified and sprayed rather than treating an entire field. | 38% | 64% | 31% | 93% | 52% | 66% | 83% | 70% | 61% | 73% | 51% | 100% | 92% | 60% | 86% | 98% |
| 58 | Cropped Area Action | Sprayers are routinely calibrated to ensure accurate application rates. | 87% | 68% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 94% | 100% | 91% | 70% | 87% | 100% |
| 59 | Cropped Area Action | Worn nozzles and screens are replaced to ensure the best coverage of pesticide applications. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 94% | 100% | 93% | 70% | 87% | 100% |

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 60 | Cropped Area Action | Treatment rate, water volume, and driving speed are optimized to attain the coverage needed for specific pests. | 87% | 76% | 31% | 93% | 56% | 88% | 93% | 73% | 90% | 86% | 94% | 100% | 93% | 70% | 87% | 100% |
| 61 | Cropped Area Action | Pesticides are applied only according to the label and environmental hazards are followed. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 95% | 100% | 88% | 71% | 86% | 100% |
| 62 | Cropped Area Action | Pesticides are applied at the lowest effective labeled rate. | 82% | 67% | 31% | 89% | 53% | 88% | 93% | 73% | 75% | 73% | 95% | 100% | 88% | 69% | 86% | 100% |
| 63 | Cropped Area Action | Pesticide use records are submitted monthly to the county Agricultural Commissioner. | 87% | 68% | 31% | 93% | 56% | 88% | 93% | 73% | 90% | 86% | 95% | 100% | 89% | 71% | 86% | 100% |
| 64 | Uncropped Area Action | Pesticides are stored where they are protected from rain and contained on an impermeable pad with curb to contain spills or leaks. | 87% | 74% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 70% | 100% | 89% | 71% | 86% | 100% |
| 65 | Uncropped Area Action | Pesticide mixing and loading is done on an impermeable surface and more than 100 feet down slope from any wells. | 76% | 50% | 24% | 90% | 48% | 84% | 93% | 72% | 89% | 81% | 75% | 95% | 86% | 68% | 77% | 98% |

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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 66 | Uncropped Area Action | Pesticide disposal methods are environmentally safe and in accordance to label instructions. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 95% | 100% | 89% | 71% | 87% | 100% |
| 67 | Cropped Area Action | Reduced risk pesticides are used. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 93% | 100% | 89% | 70% | 87% | 100% |
| 68 | Cropped Area Action | Choose selective pesticides for the target pest species and avoid using broad-spectrum pesticides. | 87% | 76% | 31% | 93% | 52% | 88% | 93% | 73% | 90% | 86% | 95% | 100% | 89% | 70% | 85% | 100% |
| 69 | Cropped Area Action | Avoid applying pesticides when wind could move them off-target as drift. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 96% | 100% | 89% | 71% | 87% | 100% |
| 70 | Cropped Area Action | Avoid applying pesticides when rain or scheduled irrigation will move the pesticides as runoff and ground percolation. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 96% | 100% | 89% | 70% | 87% | 100% |
| 71 | Cropped Area Action | Copper Sulfate is not applied prior to extensive irrigation or expected rainfall. | 74% | 43% | 31% | 88% | 53% | 84% | 58% | 63% | 88% | 79% | 92% | 79% | 85% | 59% | 77% | 100% |
| 72 | Cropped Area Action | Copper containing pesticides are replaced with alternatives. | 69% | 73% | 16% | 86% | 34% | 84% | 58% | 58% | 87% | 79% | 38% | 82% | 55% | 52% | 44% | 84% |
| **Nutrient Management** | | | | | | | | | | | | | | | | | | |

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
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| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 73 | Specialized Knowledge | Most recent nutrient recommendations for your particular crops and growing practices are used. | 82% | 76% | 31% | 93% | 54% | 88% | 93% | 73% | 86% | 86% | 96% | 96% | 100 % | 71% | 85% | 100% |
| 74 | Testing | Chemical properties of the soil, including pH and electrical conductivity (EC), are routinely measured. | 40% | 60% | 26% | 90% | 47% | 88% | 93% | 73% | 72% | 73% | 41% | 79% | 81% | 63% | 76% | 100% |
| 75 | Testing | Soil fertility is routinely monitored through measurements of nitrogen, phosphorus, potassium, and micronutrients. | 67% | 76% | 31% | 93% | 54% | 88% | 93% | 70% | 72% | 73% | 74% | 96% | 86% | 66% | 80% | 100% |
| 76 | Cropped Area Action | Fertilization rates are adjusted based on the results of soil fertility measurements. | 67% | 76% | 31% | 93% | 55% | 88% | 93% | 70% | 74% | 73% | 74% | 96% | 93% | 68% | 80% | 100% |
| 77 | Cropped Area Action | Crop plants are visually assessed for signs of nutrient deficiency or toxicity. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 89% | 86% | 96% | 100% | 97% | 71% | 86% | 100% |
| 78 | Testing | Leaf or petiole analyses are used as a guide for fertilizer application. | 67% | 76% | 24% | 90% | 57% | 88% | 93% | 73% | 74% | 86% | 96% | 96% | 92% | 70% | 80% | 100% |

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 79 | Cropped Area Action | Fertilizer applications are split into multiple smaller applications rather than applying all that is required for a crop in one large application. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 96% | 96% | 100 % | 71% | 77% | 100% |
| 80 | Testing | Fertilizer levels in fertigation water are tested to ensure that injectors are correctly calibrated. | 72% | 47% | 22% | 93% | 50% | 86% | 93% | 70% | 74% | 73% | 50% | 79% | 89% | 52% | 59% | 47% |
| 81 | Cropped Area Action | Fertilizer applications are timed to maximize plant uptake, taking into consideration the life stage of the crop, potential rain events, and irrigation timing. | 87% | 76% | 31% | 90% | 57% | 88% | 93% | 73% | 90% | 86% | 96% | 100% | 100 % | 71% | 87% | 100% |
| 82 | Cropped Area Action | Slow-release fertilizers are used. | 40% | 30% | 27% | 89% | 36% | 63% | 10% | 55% | 63% | 67% | 25% | 69% | 82% | 62% | 70% | 52% |
| 83 | Cropped Area Action | Fertilizer applications are adjusted to account for other nutrient sources, such as: irrigation water, cover crops, and residuals from previous fertilizations. | 87% | 76% | 31% | 89% | 53% | 88% | 93% | 73% | 87% | 86% | 89% | 100% | 99% | 65% | 80% | 100% |
| 84 | Uncropped Area Action | Fertilizers are stored where they are protected from rain and on an impermeable pad with a curb to contain spills. | 87% | 76% | 31% | 90% | 42% | 88% | 93% | 68% | 90% | 86% | 80% | 100% | 100 % | 68% | 84% | 100% |

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 85 | Uncropped Area Action | Mixing and loading of fertilizers occurs in a covered area on an impermeable surface and more than 100 feet down slope from any wells. | 76% | 50% | 21% | 53% | 49% | 80% | 93% | 64% | 89% | 81% | 51% | 100% | 94% | 67% | 67% | 97% |
| **Salinity/Leaching** | | | | | | | | | | | | | | | | | | |
| 86 | Testing | Leaching is performed only when necessary, as determined by measuring soil solution electrical conductivity (EC). | 77% | 49% | 24% | 89% | 23% | 82% | 92% | 70% | 75% | 73% | 39% | 79% | 77% | 46% | 53% | 46% |
| 87 | Cropped Area Action | Leaching is done only when fertilizer injectors are turned off. | 62% | 43% | 24% | 86% | 23% | 73% | 92% | 73% | 82% | 86% | 52% | 85% | 83% | 41% | 73% | 100% |
| 88 | Cropped Area Action | Fertilizers and amendments with a low salt index are used. | 71% | 73% | 15% | 86% | 56% | 53% | 0% | 53% | 87% | 71% | 88% | 100% | 95% | 67% | 56% | 89% |
| 89 | Cropped Area Action | Saline or high selenium wells are decommissioned and other sources of water are used. | 48% | 0% | 15% | 84% | 10% | 79% | 92% | 14% | 81% | 54% | 52% | 100% | 79% | 57% | 50% | 100% |
| **Property Management** | | | | | | | | | | | | | | | | | | |

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 90 | Consultation | Landowner, grower, or other personnel regularly attend UC Cooperative Extension, Commodity Board, or other industry educational meetings concerning management practices that protect water resources. | 66% | 59% | 31% | 93% | 56% | 88% | 93% | 69% | 83% | 73% | 78% | 100% | 94% | 68% | 80% | 95% |
| 91 | Specialized Knowledge | Landowner, grower, or other responsible personnel subscribe to and read farming, trade, and industry journals containing articles about water quality, fertilizer, pest and erosion management. | 72% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 88% | 86% | 96% | 99% | 97% | 71% | 85% | 100% |
| 92 | Uncropped Area Action | Employees receive training on the following: wearing protective clothing, understanding fertilizer/pesticide signage, MSDS and label information, personal hygiene and sanitation, trash disposal and recycling, use storage and disposal of fertilizers and pesticides, pest and disease scouting, spill cleanup, and irrigation. | 87% | 76% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 96% | 100% | 96% | 71% | 86% | 100% |

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 93 | Uncropped Area Action | Training is provided in the employees' native language. | 87% | 68% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 96% | 100% | 98% | 70% | 86% | 100% |
| 94 | Uncropped Area Action | Fuel tanks are checked and maintained to prevent leaks. | 87% | 72% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 94% | 100% | 100 % | 70% | 86% | 100% |
| 95 | Uncropped Area Action | Spill cleanup materials are readily accessible and maintained for all potential types and sizes of spills. | 71% | 53% | 31% | 74% | 38% | 73% | 93% | 73% | 89% | 86% | 40% | 96% | 87% | 65% | 81% | 97% |
| 96 | Uncropped Area Action | All vehicles, trucks, and tractors are regularly maintained to detect and prevent fluid leaks. | 87% | 73% | 31% | 93% | 57% | 88% | 93% | 73% | 90% | 86% | 95% | 96% | 100 % | 71% | 86% | 100% |
| 97 | Uncropped Area Action | Vehicles, machinery, and tanks no longer in use are drained of fluids, and those fluids properly disposed. | 87% | 76% | 31% | 90% | 50% | 88% | 93% | 73% | 90% | 86% | 95% | 100% | 99% | 69% | 85% | 99% |
| 98 | Uncropped Area Action | The property is kept clean and free of debris. | 87% | 73% | 31% | 90% | 57% | 88% | 93% | 73% | 90% | 86% | 96% | 100% | 100 % | 70% | 86% | 100% |
| 99 | Uncropped Area Action | The property has an adequate number of waste containers that are regularly collected to prevent overflow and are kept covered to prevent scattering of trash. | 87% | 76% | 31% | 90% | 52% | 88% | 93% | 73% | 90% | 86% | 84% | 91% | 100 % | 70% | 78% | 100% |

| BMP | Character-ization Category | BMP Description | Tier 1 | | | | | Tier 2 | | | | | Tier 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 05D_SANT_VCWPD | 05D_LAVD | S04T_TAPO | OXD_CENTR | S02T_TODD | 01T_ODD2_DCH | 01T_ODD3_ARN | 02D_BROOM | 04D_ETTG | 04D_LAS | S03T_TIMB | S03T_BOULD | S03D_BARDS | S02T_ELLS | 06T_FC_BR | 05T_HONDO |
| 100 | Uncropped Area Action | Restrooms or portable toilets are available where needed and regularly maintained. | 71% | 75% | 31% | 93% | 55% | 88% | 93% | 73% | 90% | 86% | 73% | 94% | 100 % | 70% | 80% | 100% |