CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

Attachment A to Order R5-2013-XXXX
INFORMATION SHEET

WASTE DISCHARGE REQUIREMENTS GENERAL ORDER
FOR
MEMBERS OF A THIRD-PARTY GROUP WITHIN THE TULARE LAKE BASIN, EXCLUDING THE AREA OF THE WESTLANDS STORMWATER COALITION

This attachment to Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin, excluding the area of Westlands Stormwater Coalition (hereafter "Tulare Lake Basin Area"), that are Members of the Third-Party group, Order R5-2013-XXXX (referred to as the "Order") is intended to provide information regarding the rationale for the Order, general information on surface and groundwater monitoring that has been conducted, and a discussion of this Order's elements that meet required state policy.

DESCRIPTION OF THE TULARE LAKE BASIN AREA

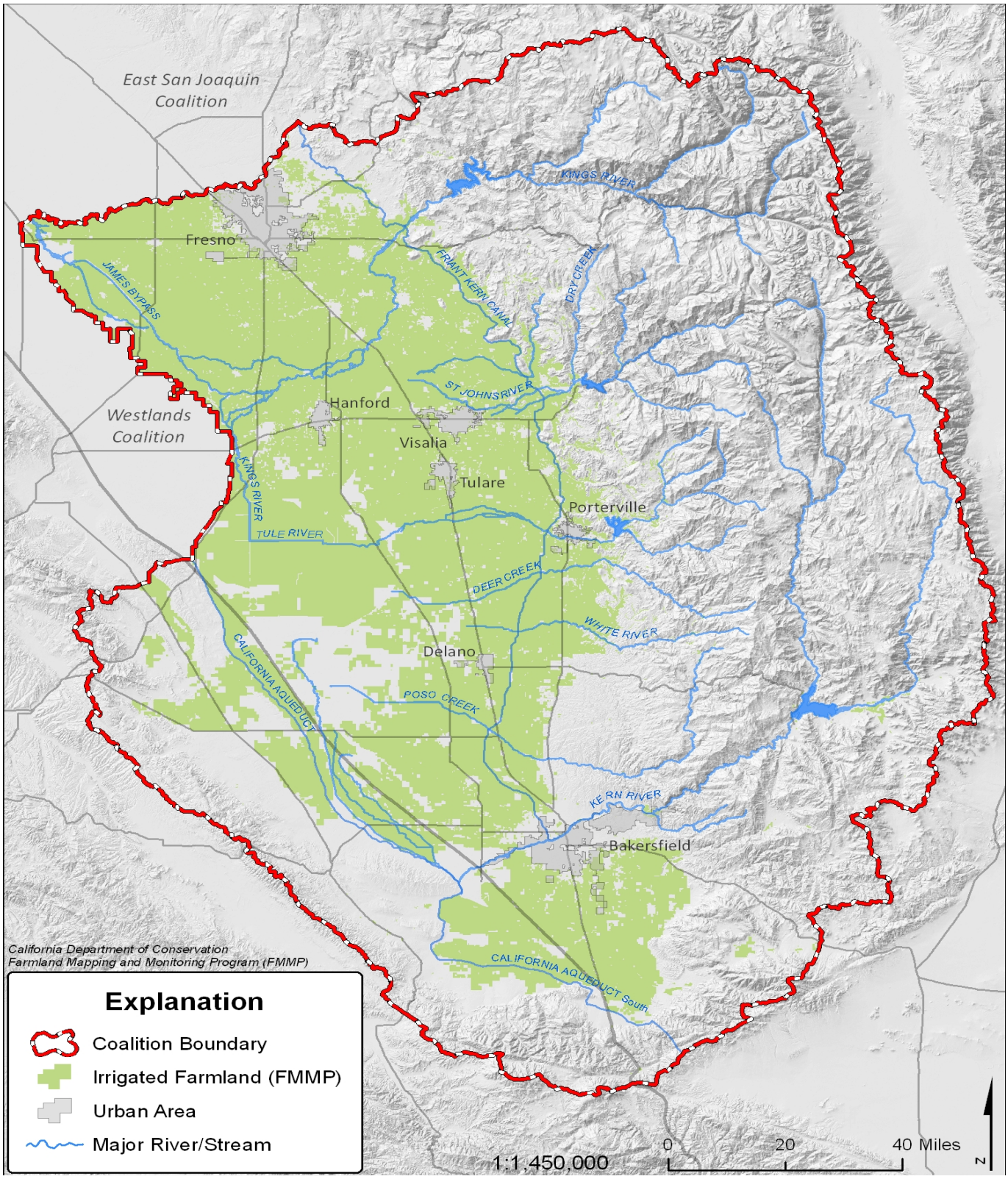
The Tulare Lake Basin Area encompasses approximately 2.9 million acres of irrigated agricultural lands which are distributed across portions of Fresno and Kern Counties, and the entirety of Tulare and Kings County's (see Figure 1). Approximately 350,000 of these acres are regulated under the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board or board) General Order for Existing Milk Cow Dairies. The Tulare Lake Basin Area comprises one of the most important agricultural centers in the United States, containing the top three counties in the state for agricultural sales, totaling over $15 billion in revenue (California Department of Food and Agriculture, 2011-2012). The Tulare Lake Basin Area also includes the top three counties in the state for pesticide applications, totaling 69 million pounds of active pesticide ingredients applied during 2010 (California Department of Pesticide Regulation, 2010 summary data).

Geographically, the Tulare Lake Basin Area is bounded by the Sierra Nevada on the east, the Tehachapi Mountains on the south, the Coast Ranges (and the Westlands Stormwater Coalition) on the west and the San Joaquin River on the north. The basin is normally a hydrologically closed basin except during periods of above average surface water flows, when flood control waters are diverted out of the basin through Fresno Slough and James Bypass into the San Joaquin River. Additional diversions both within the basin and out of the basin occur as water transfers and exchanges via the Cross Valley Canal to the California Aqueduct (U.S. Bureau of Reclamation, 2008)

The San Joaquin, Kings, Kaweah, Tule, and Kern rivers drain the west face of the Sierra Nevada mountains and provide the bulk of the surface water supply native to the basin. These rivers have over thousands of years produced a broad, extensive network of alluvial fans which drained into topographically closed sinks, such as Tulare Lake, Kern Lake, and Buena Vista Lake. In addition to the native supply, imported surface water enters into the Tulare Lake Basin through the San Luis Canal/California Aqueduct System, Friant-Kern Canal, and Delta-Mendota Canal.

The natural hydrology of the Tulare Lake Basin Area has been extensively modified over the last 150 years. Channelization of the area's rivers and streams coupled with development of a vast system of irrigation canals and ditches allow for the transfer and mixing of surface waters from a variety of different sources (e.g., the water contained in Cross Creek [west of Visalia] may be from the Kings River, the Kaweah River, the Friant-Kern Canal [San Joaquin River water], Cottonwood Creek or a mixture of these waters).

Figure 1 – Tulare Lake Basin Area



The Tulare Lake Basin Area includes all or portions of 11 groundwater basins/sub-basins (see Figure 2) that are composed of sediments that reflect their source area and manner of deposition. In the eastern part of the valley, sediments derived primarily from the crystalline granitic rocks of the Sierra Nevada are

highly permeable, medium- to coarse-grained sands with low total organic carbon, forming broad alluvial fans where the streams enter the valley. These deposits generally are coarsest near the upper parts of the alluvial fans and finest near the valley trough (Page, 1986). The alluvial deposits of the western part of the valley are derived from the marine sedimentary deposits that comprise the Coast Ranges and tend to be of finer texture relative to those of the eastern part of the valley and have higher clay content. Lacustrine and marsh deposits exist beneath the Buena Vista, Kern and Tulare Lake beds and along the western flank of the valley (Figure 3). These deposits are composed primarily of silts and clays with sand interbeds. The most laterally continuous of these units have been designated from the youngest to oldest by the letters A through F. The most prominent of these clay units is the modified E Clay or Corcoran Clay Member of the Tulare Formation (Corcoran Clay) which extends throughout the majority of western and southern Tulare Lake Basin (absent along the eastern boundary and in the Bakersfield area). The Corcoran Clay generally separates unconfined groundwater conditions above the clay to confined conditions below the clay. This results in two zones with distinctly different groundwater chemistries (Page, 1968).

Areas of high total dissolved solids (TDS) content are primarily along the west side of the San Joaquin Valley and in the trough of the valley (Figure 4). High TDS content of west-side water is due to recharge of stream flow originating from marine sediments in the Coast Range, and percolation from irrigation and rainfall events passing through soils of marine origin. High TDS content in the trough of the valley is the result of concentration of salts because of evaporation and poor drainage (DWR, California's Groundwater Update, 2003). In the central and west-side portions of the valley, where the Corcoran Clay confining layer exists, water quality is generally better beneath the clay than above it.

Primary sources of groundwater recharge in the Tulare Lake Basin Area are percolation of irrigation water past crop roots; seepage from rivers, streams, and irrigations canals; rainfall infiltration; and in the area near Fresno, Visalia, and Bakersfield, engineered recharge primarily from runoff from the nearby Sierra Nevada (California Department of Water Resources, Bulletin 118, 2003 update; Wright and others, 2004). Discharge from the aquifer is primarily from ground-water pumping for irrigation and public water supply. Until recently, Fresno and Visalia were entirely dependent on groundwater for their supply, and Fresno was the second largest city in the U.S. reliant solely on groundwater (California Department of Water Resources, Bulletin 118, update 2003). Many public water supply systems within the Tulare Lake Basin Area remain totally dependent on groundwater for drinking water.

The top ten crops based on 2010 total harvested acreage in the Tulare Lake Basin Area are (listed in decreasing order): hay, grains (includes barley, wheat, rice and corn), grapes (table and wine), almonds, cotton, citrus, tomatoes, pasture, stone fruit (includes peaches, apricots, cherries, nectarines, plums, and pluots), and pistachios. This list includes the acreage in the Westlands, Stormwater Coalition, so does not necessarily represent the top ten crops for the Tulare Lake Basin Area covered by this Order. There were over 100 crops grown in the Tulare Lake Basin Area watershed in 2010.

SOUTHERN SAN JOAQUIN VALLEY WATER QUALITY COALITION (SSJVWQC) ORGANIZATION

The SSJVWQC submitted a Notice of Intent in October 2003 and received a Notice of Applicability (NOA) from the Executive Officer in 2004. The NOA approved the SSJVWQC's request to operate as a lead entity under the previous Irrigated Lands Regulatory Program Conditional Waiver Orders (Order's R5-2003-0105 and R5-2006-0053) within its boundaries. Due to a substantial number of new requirements, this Order requires that the third-party submit a new Application to Serve as a Third-Party Representing Growers under this Order. It is anticipated that the SSJVWQC will continue to operate as the third-party lead entity under this Order.

Figure 2 - Groundwater Basins/sub-basins within the Tulare Lake Basin – adapted from DWR

Groundwater Basins covered by this Order

5-22 .08	Kings
5-22 .11	Kaweah
5-22 .12	Tulare Lake
5-22 .13	Tule
5-22 .14	Kern County
5-25	Kern River Valley
5-26	Walker Basin
5-27	Cummings Valley
5-28	Tehachapi Valley West
5-29	Castaic Lake Valley
5-82	Cuddy Canyon Valley

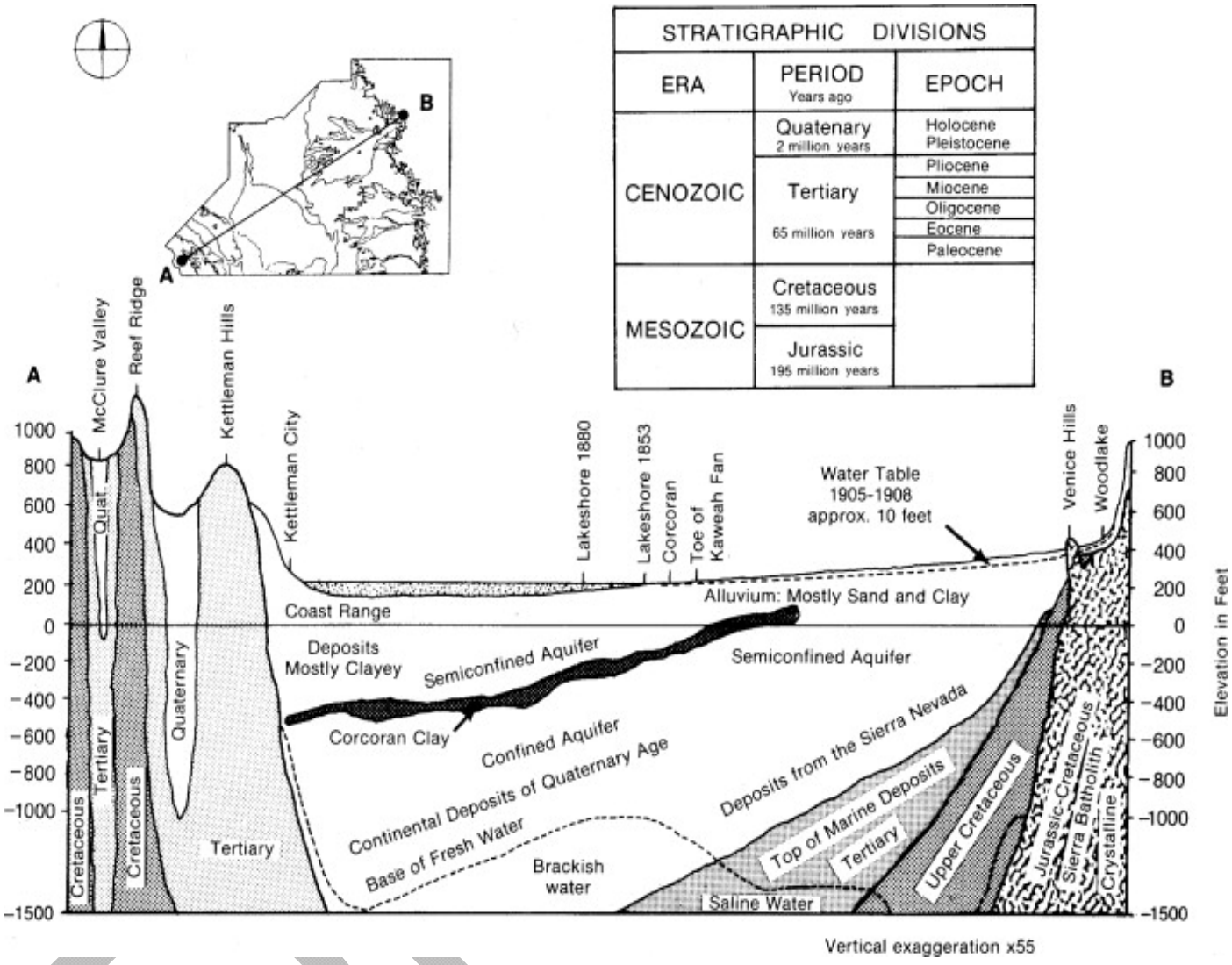


Figure 3 - Generalized Diagram for the Central Valley – Gao, et al., 2007

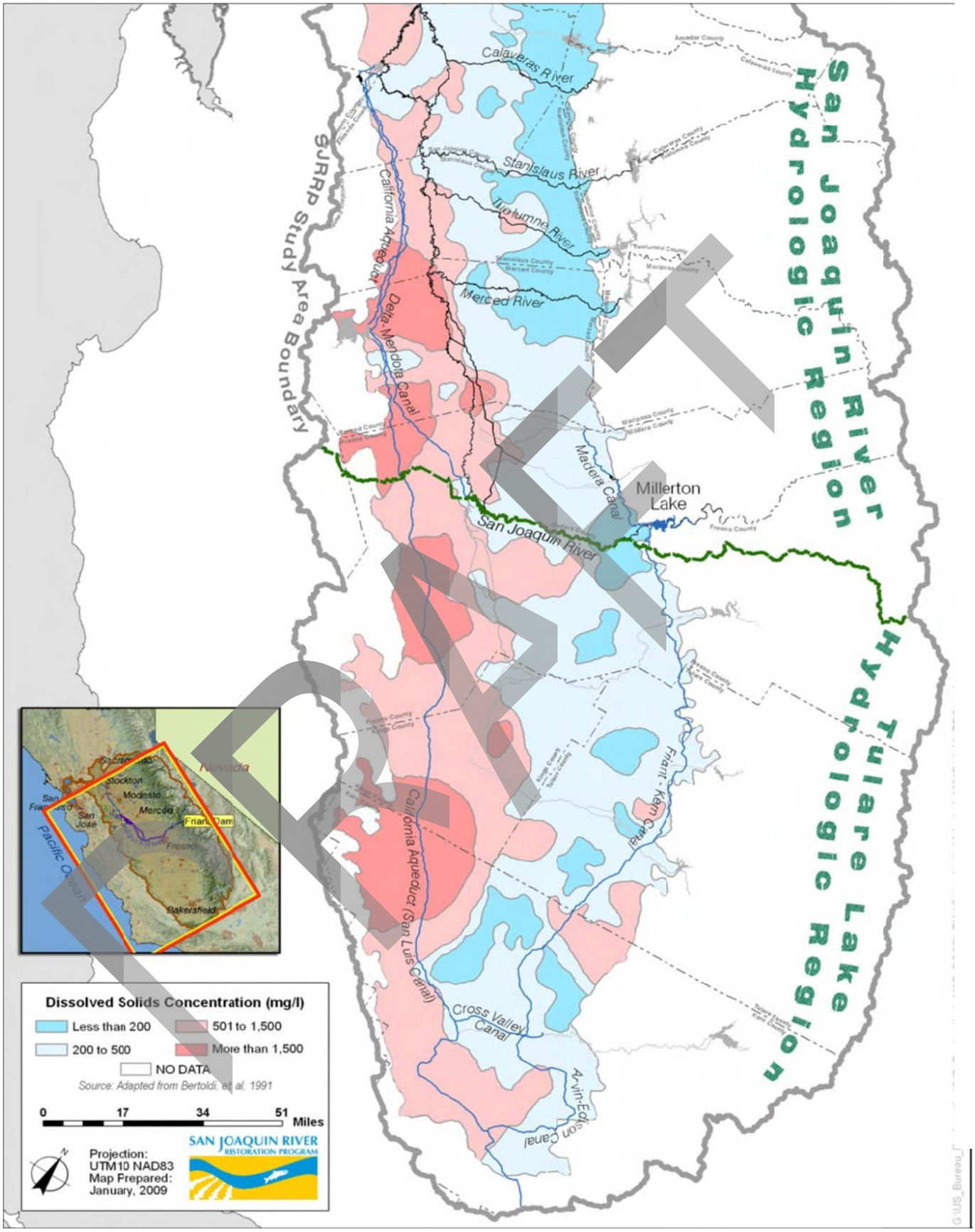


Figure 4 - Generalized Diagram for the Central Valley, Showing Total Dissolved Solids (TDS) Concentrations – U.S. Bureau of Reclamations, San Joaquin River Restoration *Draft* EIS/EIR, 2011

GROWER ENROLLMENT PROCESS

The enrollment process whereby growers obtain membership in the third-party group under this Order is designed to incentivize speedy enrollment by increasing both submittal requirements and fees due for those that wait to obtain regulatory coverage. Members in good standing when the Order is adopted, as well as growers needing membership, will have a 120-day period (after the NOA is issued by the Executive Officer for the third-party) to complete enrollment before additional requirements are initiated. Members in good standing will submit a one-page Notice of Confirmation (NOC) to the third-party, confirming that they would like to continue membership in the third-party and that they are familiar with the new Order's requirements. Other growers will submit a membership application to the third-party and will be notified by the third-party when their membership is approved. This will streamline the initial enrollment process for the bulk of the irrigated agricultural operations within the Tulare Lake Basin Area.

Growers that do not enroll within the 120-day enrollment period, or are prompted to apply due to Central Valley Water Board enforcement or inspection, will be required to submit (1) a Notice of Intent (NOI) to comply with the terms and conditions of the Order to the Central Valley Water Board, (2) an administrative processing fee for the increased workload associated with the grower outreach (as applicable), and (3) a Membership application to the third-party group. These additional steps of submitting an NOI and fee directly to the board after the initial enrollment deadline are intended to provide an incentive for growers to enroll promptly.

The third-party will provide an annual Membership List to the Central Valley Water Board that will include everyone who enrolled. The Membership List will specify Members in good standing as well as revoked memberships or pending revocations. Board staff will conduct enforcement activities as needed using the list of revoked/pending revocations.

VULNERABILITY

The concept of higher and lower vulnerability areas was integrated into the Irrigated Lands Regulatory Program (ILRP) to allow the board to tailor requirements to applicable waste discharge conditions. Resources can be focused on areas that need enhanced water quality protection. The third-party has the option to identify low vulnerability areas where reduced program requirements would apply.

Vulnerability may be based on, but is not limited to, the physical conditions of the area (soil type, depth to groundwater, beneficial uses, etc.), water quality monitoring data, and the practices used in irrigated agriculture (pesticide permit and use conditions, label requirements, application method, etc.). Additional information such as models, studies, and information collected may also be considered in designating vulnerability areas.

High vulnerability areas for groundwater are those areas that meet the requirements for preparing a Groundwater Quality Management Plan or areas identified in the Groundwater Assessment Report (GAR), where available information indicates irrigated lands could cause or contribute to an exceedance of water quality objectives or to degradation of groundwater quality that may threaten applicable beneficial uses. The Groundwater Assessment Report may rely on water quality data to identify high vulnerability areas or may rely on assessments of hydrogeological conditions and other factors (e.g., areas with coarse-grained sediments) to identify high vulnerability areas. The Department of Pesticide Regulation Ground Water Protection Areas and the State Water Resources Control Board vulnerability areas will generally be considered high vulnerability areas. The third-party is also expected to review readily available studies and assessments of groundwater quality to identify those areas that may be impacted by irrigated agricultural operations. However, the third-party can provide data and information in the Groundwater Assessment Report to demonstrate that portions of the Ground Water Protection Areas or the State Water Board vulnerability areas should be considered low vulnerability areas.

In general, low vulnerability areas for groundwater are areas that do not exhibit characteristics of high vulnerability groundwater areas (as defined in the MRP).

Vulnerability designations will be proposed by the third-party, and refined and updated periodically per the Groundwater Assessment Report and Monitoring Report processes (described in Attachment B, Monitoring and Reporting Program [MRP] Order R5-2013-XXXX). The Executive Officer will make the final determination regarding the irrigated lands waste discharge vulnerability areas.

SURFACE WATER AND GROUNDWATER MONITORING

Irrigated Lands Regulatory Program (ILRP) – Surface Water Quality Monitoring

The SSJVWQC has been operating under a Monitoring and Reporting Program Plan (MRP Plan) prepared according to the Monitoring and Reporting Program Order R5-2008-0005 (MRP) for Coalition Groups under the amended Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands Order R5-2006-0053. The MRP Plan, together with the SSJVWQCs proposed Management Plans (described below), is the work plan for the monitoring and reporting program, including environmental monitoring, quality assurance and quality control, outreach, and tracking and reporting on progress.

Under previous MRP Order R5-2008-0005, the SSJVWQC conducted three types of water quality monitoring: Core, Assessment, and Special Project. Core Monitoring was designed to evaluate general water quality trends over time at the Core sites and included general physical parameters, nutrients, and pathogens. Assessment Monitoring rotated through Assessment sites and included analyses for a large suite of constituents. Core Monitoring sites underwent Assessment Monitoring every three years. Special Project Monitoring occurred when the requirement for a management plan was triggered and additional data were needed to identify sources of the exceedances, as well as to assess water quality improvement due to implementation of management practices.

The basic questions to be answered by the updated surface water quality monitoring program are similar to those established under the previous MRP Order (R5-2008-005):

1. Are receiving waters to which irrigated lands discharge meeting applicable water quality objectives and Basin Plan provisions?
2. Are irrigated agricultural operations causing or contributing to identified water quality problems?[1] If so, what are the specific factors or practices causing or contributing to the identified problems?
3. Are water quality conditions changing over time (e.g., degrading or improving as new management practices are implemented)?
4. Are irrigated agricultural operations in compliance with the provisions of the WDR?
5. Are implemented management practices effective in meeting applicable discharge limitations?
6. Are the applicable surface water quality management plans effective in addressing identified water quality problems?

The questions are addressed through the following monitoring and information gathering approaches:

1. The “Core”, “Assessment”, and “Ephemeral”, monitoring sites comprehensively cover the sections of the Tulare Lake Basin Area with irrigated agricultural operations. The requirement to evaluate materials applied to crops or constituents mobilized by irrigated agricultural operations will result in monitoring of those constituents in receiving waters.
2. The monitoring and evaluation approach required as part of the surface water quality monitoring and management plan development and implementation will address this question (see below and the requirements associated with surface water quality management plans).

[1] “Water quality problem” is defined in Attachment E.

3. Both “special project” monitoring associated with management plans and the monitoring conducted at “Core” monitoring sites should be sufficient to allow for the evaluation of trends. The requirements to gather information on management practices will provide additional information to help estimate whether any changes in trends may be associated with the implementation of practices.
4. The surface water monitoring required should allow for a determination as to whether discharges from irrigated lands are protective of beneficial uses and meeting water quality objectives. Other provisions in the MRP should result in the gathering of information that will allow the board to evaluate overall compliance with the WDR.
5. The monitoring conducted as part of the implementation of a management plan, in addition to any special project monitoring required by the Executive Officer, should allow the board to determine whether management practices representative of those implemented by irrigated agriculture are effective. In addition, information developed through studies outside of these requirements can be used to evaluate effectiveness.
6. The “special project” monitoring associated with management plans will be tailored to the specific constituents of concern and the time period when they are impacting water quality. Therefore, the water quality data gathered, together with management practice information, should be sufficient to determine whether the management plans are effective.

The primary changes from the previous monitoring and reporting program include: 1) elimination of the set frequency for monitoring metals and pesticides; 2) elimination of the set parameter list for metals and pesticides; 3) removal of monitoring of prescribed “core” parameters for trend monitoring purposes; and 4) modification of the monitoring approach to better conform to the unique surface water conditions that exist in the Tulare Lake Basin Area.

The rationales for the above changes are as follows:

1) The previous requirement to monitor monthly resulted in monitoring during months in which no problems would be expected and infrequent monitoring during peak periods when potential problems could occur. The third-party will be required to evaluate pesticide use patterns and peak times when pesticides/metals from irrigated agriculture operations may cause problems in surface water. Based on that evaluation, they will propose a frequency and time period to conduct monitoring that will adequately characterize surface waters receiving irrigated agricultural waste discharges.
2) The set list of parameters resulted in monitoring of some pesticides and metals that are unlikely to result in water quality problems. Also, in some cases pesticides that could cause or contribute to a water quality problem were not monitored. The third-party will be required to evaluate use patterns and properties (e.g., physical-chemical characteristics) and propose a list of metals to monitor. Board staff will work with DPR to develop a list of pesticides for monitoring by the third-party.
3) The general parameters that were monitored as part of “Core” monitoring have been of limited value for monitoring trends related to irrigated agricultural waste discharge. Rather than requiring monitoring of general parameters to try to determine trends, trend monitoring will occur as part of management plan monitoring and through more frequent monitoring at “Core” sites.
4) The previous requirement included monitoring a broad suite of parameters once every three years. The “trigger” for requiring preparation of a management plan is more than one exceedance every three years. The previous approach reduces the likelihood of identifying and addressing a problem, especially if a problem is primarily prevalent in a single month – a management plan could never be triggered. The new MRP requires two consecutive years of assessment monitoring parameters (broad suite of parameters) followed by three years of core monitoring parameters (smaller list of indicator parameters and constituents that exceeded a water quality objective during assessment monitoring) at “Core” monitoring sites (any monitoring triggered by management plans would continue even if a site had switched from assessment to core monitoring).

This Order's MRP requires the development of a Surface Water Monitoring Plan which will utilize five different but interrelated types of surface water monitoring sites: 1) fixed, long-term core sites (as in previous program), 2) assessment sites (previous program), 3) ephemeral sites (new), 4) special project sites (previous program), and 5) representative sites (previous program). The addition of ephemeral monitoring and the continuation of the requirement to develop new assessment sites are based upon unique differences that exist between the various types of surface waterways present in the Tulare Lake Basin Area.

Types of waterways include:

1. Perennial streams (flows continuously throughout the year) which include the major river systems or portion of these rivers (Kings, Kaweah, Tule, and Kern).
2. Intermittent streams (streams that flow only certain times of the year) such as Packwood Creek or Deer Creek or the lower portions of the Kaweah and Tule River systems (these natural or modified natural waterways are typically used during a portion of each year as conveyance structures for irrigation flows [primarily derived from the Friant-Kern Canal] or storm water flows/groundwater recharge flows).
3. Ephemeral streams (a stream which carries water only during and immediately after periods of rainfall or snow melt).
4. Constructed conveyance structures (e.g., Friant-Kern Canal, Homeland Canal, Lakeside Ditch, and Westside Canal) which are used to move waters of the state throughout the region (not intended to apply to on farm conveyance structures) for irrigation purposes and have the potential to be impacted by agricultural operations (spray drift, tailwater, tile drainage, or storm water flows).

Core Monitoring

Core monitoring sites will continue to be used to track trends in water quality over time. The period of monitoring for Core sites has been changed to address the management plan trigger requirements discussed in rationale 4 above. Each Core site will now be sampled on a rotating basis consisting of two years of Assessment monitoring parameters (broad suite of parameters that will now be proposed by the third-party) followed by three years of Core monitoring parameters (reduced suite of parameters to be proposed by the third-party) with the cycle then repeated. The frequency of monitoring (monthly, irrigation season/storm season or other) will now be proposed by the third-party for each Core site (for both Core and Assessment parameters). The proposed frequency is to be based upon site conditions (presence or absence of surface water or change in the source of water [natural stream flow verses irrigation waters introduced into the channel from off stream reservoirs or canals], crop types [permanent crops, row crops, etc.] and crop requirements [timing of irrigation, timing of nutrient and pesticide applications]). This approach will ensure that each Core site will undergo periodic comprehensive Assessment monitoring necessary to allow the board to track and identify any significant changes, while still gathering trend information and not imposing an undue cost burden.

Assessment Monitoring

Assessment monitoring will be conducted on a revolving basis (period of two consecutive years at all newly established sites and then repeated on a regular basis; the period of rotation to be proposed by the third-party). Rotation will be continuous so that any given water body will be reassessed on a regular basis. This strategy will allow for the characterization of a large number of water bodies throughout the third-party area over time and is necessary in the Tulare Lake Basin Area due to the large number of surface water bodies that have yet to be monitored under the existing program. Alternatively, the third-party may utilize representative monitoring to characterize a group of similar surface water bodies (similarities in hydrology, crop types, pesticide use, and other factors that affect the discharge of wastes from irrigated lands to surface waters).

Ephemeral Monitoring

A large number of ephemeral streams that may be impacted by agricultural operations (e.g., spray drift, tailwater flows, and/or storm water runoff) are present in the eastern and southern portions of the Tulare

Lake Basin Area. Because ephemeral waterways do not typically have a municipal and/or domestic water supply beneficial use (to be determined on an individual waterway basis), and they are typically dry for extended periods of time (in some cases for multiple years), ephemeral monitoring will be conducted. This may be most effectively accomplished using representative monitoring sites on ephemeral waterways. The number and locations of sites chosen for representative ephemeral monitoring will be proposed by the third-party group.

Special Project Monitoring

Special Project Monitoring sites will be established as needed to implement a Surface Water Quality Management Plan (SQMP), to evaluate commodity or management practice-specific effects on identified water quality problems,[2] or to evaluate sources of identified water quality problems.

Surface Water Quality Management Plans

Since 2004, the SSJVWQC has collected water quality monitoring data at 41 monitoring sites. Under Conditional Waiver Order R5-2006-0053, Twenty four SQMPs were required for waterways where there was an exceedance of a water quality objective or trigger limit[3] more than one time in a three year period. There are currently surface water management plans required for the following constituents: pH, electrical conductivity, dissolved solids, dissolved oxygen, E. coli, fecal coliform, boron, molybdenum, chlorpyrifos, DDE, toxaphene, Ceriodaphnia dubia, Pimephales promelas, Selenastrum capricornutum, and Hyalella azteca. The SSJVWQC's proposed Management Plans, which cover these constituents, are under staff review at the time this Order is being proposed, and once approved will be updated annually. This Order requires (should the SSJVWQC be approved as the third-party) that the Management Plans be implemented and updated once approved.

Similar to the previous Order (Coalition Group Conditional Waiver), this Order requires the third-party to develop SQMPs for watersheds where there is an exceedance of a water quality objective or trigger limit more than one time in a three-year period. SQMPs may also be required where there is a trend of degradation that threatens a beneficial use. SQMPs will only be required for wastes that may be discharged by some or all of irrigated lands in the identified area. SQMPs are the key mechanism under this Order to help ensure that waste discharges from irrigated lands are meeting Surface Water Discharge Limitation III.A.1.

The main elements of SQMPs are to A) investigate potential irrigated agriculture sources of waste discharge to surface water; B) review physical setting information for the plan area such as existing water quality data; C) considering elements A and B, develop a strategy with schedule and milestones to implement practices to ensure waste discharges from irrigated agriculture are meeting Surface Water Limitation III.A.1; D) develop a monitoring strategy to provide feedback on SQMP progress; E) develop methods to evaluate data collected under the SQMP; and F) provide annual reports to the Central Valley Water Board on progress.

Elements A – F are necessary to establish a process by which the third-party and Central Valley Water Board are able to investigate waste sources and the important physical factors in the plan area that may impact management decisions (elements A and B), implement a process to ensure effective practices are adopted by Members (element C), ensure that adequate feedback monitoring is conducted to allow for evaluation of SQMP effectiveness (elements D and E), and facilitate efficient board review of data collected on the progress of the SQMP (element F).

The SQMPs required by this Order require the third-party to include the above elements. SQMPs will be reviewed and approved by the Executive Officer. Also, because SQMPs may cover broad areas potentially impacting multiple surface water users in the plan area, these plans will be circulated for public review. Prior to plan approval, the Executive Officer will consider public comments on proposed SQMPs.

[2] "Water quality problem" is defined in Attachment E.
[3] Trigger limits are discussed below under "Water Quality Objectives."

The burden of the SQMP, including costs, is reasonable. The Central Valley Water Board must be informed of the efforts being undertaken by irrigated agricultural operations to address identified surface water quality problems. In addition, a regional SQMP is a reasonable first step to address identified surface water quality problems, since the monitoring and planning costs are significantly lower, when undertaken regionally by the third-party, than requiring individuals to undertake similar monitoring and planning efforts. However, if the regional SQMP does not result in the necessary improvements to water quality, the burden, including costs, of requiring individuals in the impacted area to conduct monitoring, describe their plans for addressing the identified problems, and evaluate their practices is a reasonable subsequent step. The benefits and necessity of such individual reporting, when regional efforts fail, include, but are not limited to: 1) the need of the board to evaluate the compliance of regulated growers with applicable orders; 2) the need of the board to understand the effectiveness of practices being implemented by regulated growers; and 3) the benefits to all users of that surface water of improved water quality.

Groundwater Quality Monitoring

A Groundwater Monitoring Advisory Workgroup (GMAW) consisting of groundwater experts representing state agencies, the United States Environmental Protection Agency (USEPA), the United States Geological Survey (USGS), academia, and private consultants were queried by Central Valley Water Board staff regarding development of a groundwater monitoring approach for irrigated agricultural operations. The following questions were identified by the GMAW and Central Valley Water Board staff as critical questions to be answered by groundwater monitoring conducted to comply with the ILRP.

1. What are irrigated agriculture's impacts to the beneficial uses of groundwater and where has groundwater been degraded or polluted by irrigated agricultural operations (areal and vertical extent)?
2. Which irrigated agricultural management practices are protective of groundwater quality and to what extent is that determination affected by site conditions (e.g., depth to groundwater, soil type, and recharge)?
3. To what extent can irrigated agriculture's impact on groundwater quality be differentiated from other potential sources of impact (e.g., nutrients from septic tanks or dairies)?
4. What are the trends in groundwater quality beneath irrigated agricultural areas (getting better or worse) and how can we differentiate between ongoing impact, residual impact (vadose zone) or legacy contamination?
5. What properties (soil type, depth to groundwater, infiltration/recharge rate, denitrification/ nitrification, fertilizer and pesticide application rates, preferential pathways through the vadose zone [including well seals, abandoned or standby wells], contaminant partitioning and mobility [solubility constants]) are the most important factors resulting in degradation of groundwater quality due to irrigated agricultural operations?
6. What are the transport mechanisms by which irrigated agricultural operations impact deeper groundwater systems? At what rate is this impact occurring and are there measures that can be taken to limit or prevent further degradation of deeper groundwater while we're identifying management practices that are protective of groundwater?
7. How can we confirm that management practices implemented to improve groundwater quality are effective?

The workgroup members reached consensus that the most important constituents of concern related to agriculture's impacts to the beneficial uses of groundwater are nitrate (NO_3-N) and salinity. In addition to addressing the widespread nitrate problems, the presence of nitrates in groundwater at elevated levels would serve as an indicator of other potential problems associated with irrigated agricultural practices. Central Valley Water Board staff utilized the recommended salinity and nitrate parameters and added

general water quality parameters contained within a majority of the groundwater monitoring programs administered by the board (commonly measured in the field) and some general minerals that may be mobilized by agricultural operations (general minerals to be analyzed once every five years in Trend wells). The general water quality parameters will help in the interpretation of results and ensure that representative samples are collected. The board considered the above questions in developing the SSJVWQC Order's groundwater monitoring requirements.

Groundwater Monitoring Strategy Rationale
Groundwater monitoring needs to provide sufficient data to describe irrigated agricultural impacts on groundwater quality and to determine whether existing or newly implemented management practices are complying with the groundwater limitations of the Order. It should also provide sufficient data to answer the critical questions developed by the Groundwater Monitoring Advisory Workgroup (listed above). In order to accomplish these goals, the Order requires the third-party to prepare a Groundwater Assessment Report which will analyze existing monitoring data and provide the foundation for implementing the Groundwater Monitoring Strategy.

The Groundwater Monitoring Strategy consists of two parallel tracks: 1) a Trend Monitoring Program and 2) a Representative Monitoring Program. The Trend Groundwater Monitoring Program is designed to determine baseline quality of groundwater in the third-party area, and to develop long-term groundwater quality information that can be used to evaluate the regional effects (i.e., not site-specific effects) of irrigated agriculture and its practices. Trend monitoring has been developed to answer GMAW questions 1 and 4. At a minimum, trend monitoring must include annual monitoring for electrical conductivity, pH, dissolved oxygen, temperature, nitrate+nitrite as nitrogen (N), total kjeldahl nitrogen, and once every five year monitoring for total dissolved solids, carbonate, bicarbonate, chloride, sulfate, boron, calcium, sodium, magnesium, and potassium. Existing shallow wells, such as domestic supply wells, can be used for the trend groundwater monitoring program. The use of existing wells is less costly than installing wells specifically designed for groundwater monitoring, while still yielding data which can be compared with historical and future data to evaluate long-term groundwater trends.

A Representative Groundwater Monitoring Program (RGMP) is to be developed where known groundwater quality impacts exist for which irrigated agricultural operations are a potential contributor or where conditions make groundwater more vulnerable to impacts from irrigated agricultural activities (high vulnerability areas). The objective of the RGMP is to identify whether site and/or commodity-specific existing agricultural management practices are protective of groundwater quality in the high vulnerability areas and to assess the effectiveness of any newly implemented management practices instituted to improve groundwater quality. Given the wide range of management practices/commodities within the third-party's boundaries, it is anticipated that the third-party will rank or prioritize their high vulnerability areas and commodities, and present a phased approach to implement the RGMP. Representative monitoring has been designed to answer GMAW questions 2, 5, 6, and 7. Existing monitoring wells can be utilized where available for representative monitoring.

The third party may also look to and explore using existing monitoring networks such as those being conducted in accordance with local groundwater management plans (e.g., AB 3030, SB 1938, Integrated Regional Water Management Plans). Alternative approaches for evaluating discharge to groundwater, such as modeling or vadose zone monitoring, may be utilized, if those approaches include sufficient groundwater quality monitoring to validate the results of the alternative approach.

GMAW question 3, which seeks to differentiate sources of existing impact, cannot be easily answered by traditional groundwater monitoring. Representative and trend monitoring will help to answer this question, but other methods such as isotope tracing and groundwater age determination may also be necessary to fully differentiate sources. The MRP does not require these advanced source methods because they are not necessary to determine compliance with the Order.

Alternatives to groundwater monitoring will be considered provided the proposed methods can predict whether the groundwater limitations of the order can be met with the combination of management

practices and site conditions. Some amount of groundwater monitoring will be required to demonstrate that the selected alternative(s) can accurately predict the impacts to groundwater quality.

Data Summary, Pesticides

Monitoring data collected for two studies conducted by the State Water Resources Control Board and the United States Geological Survey (USGS) in 2006 showed detections of pesticides used by agriculture in groundwater within the Tulare Lake Basin Area (Burton, C.A., and Belitz, K., 2006, and Shelton, J.L, et al., 2006). Pesticides and pesticide degradates were detected in greater than 50 percent of wells (46 wells of 83 wells sampled) in the southeastern San Joaquin Valley (study area entirely contained within the Tulare Lake Basin Area) in 2006, and 60 percent of wells (30 wells of 50 wells samples) in the Kern County Subbasin Study Unit in 2006. Most frequently detected pesticides in the studies include deethylatrazine (degradate of triazine herbicides, e.g., atrazine), simazine, atrazine, 3,4-Dichloroaniline (degradate of Diuron herbicide), DBCP, and prometron (triazine herbicide). Most pesticide detections were below health-based thresholds and applicable water quality objectives. Analyses were not run for all pesticides used in the study areas.

The California Department of Pesticide Regulation (DPR), as part of its regulatory requirements under the Pesticide Contamination Prevention Act (PCPA) enacted in 1985, is required to maintain a statewide database of wells sampled for pesticide active ingredients and, in consultation with the California Department of Public Health (DPH) and the State Water Board, provide an annual report of the data contained in the database and the actions taken to prevent pesticides contamination to the Legislature and other state agencies. DPR also initiated the Ground Water Protection Program that focuses on evaluating the potential for pesticides to move through soil to groundwater, improving contaminant transport modeling tools, and outreach/training programs for pesticide users. There are approximately 981,775 acres of land classified as DPR Groundwater Protection Areas within the third-party area. See Figure 5 for a map of the Groundwater Protection Areas within the Tulare Lake Basin Area.

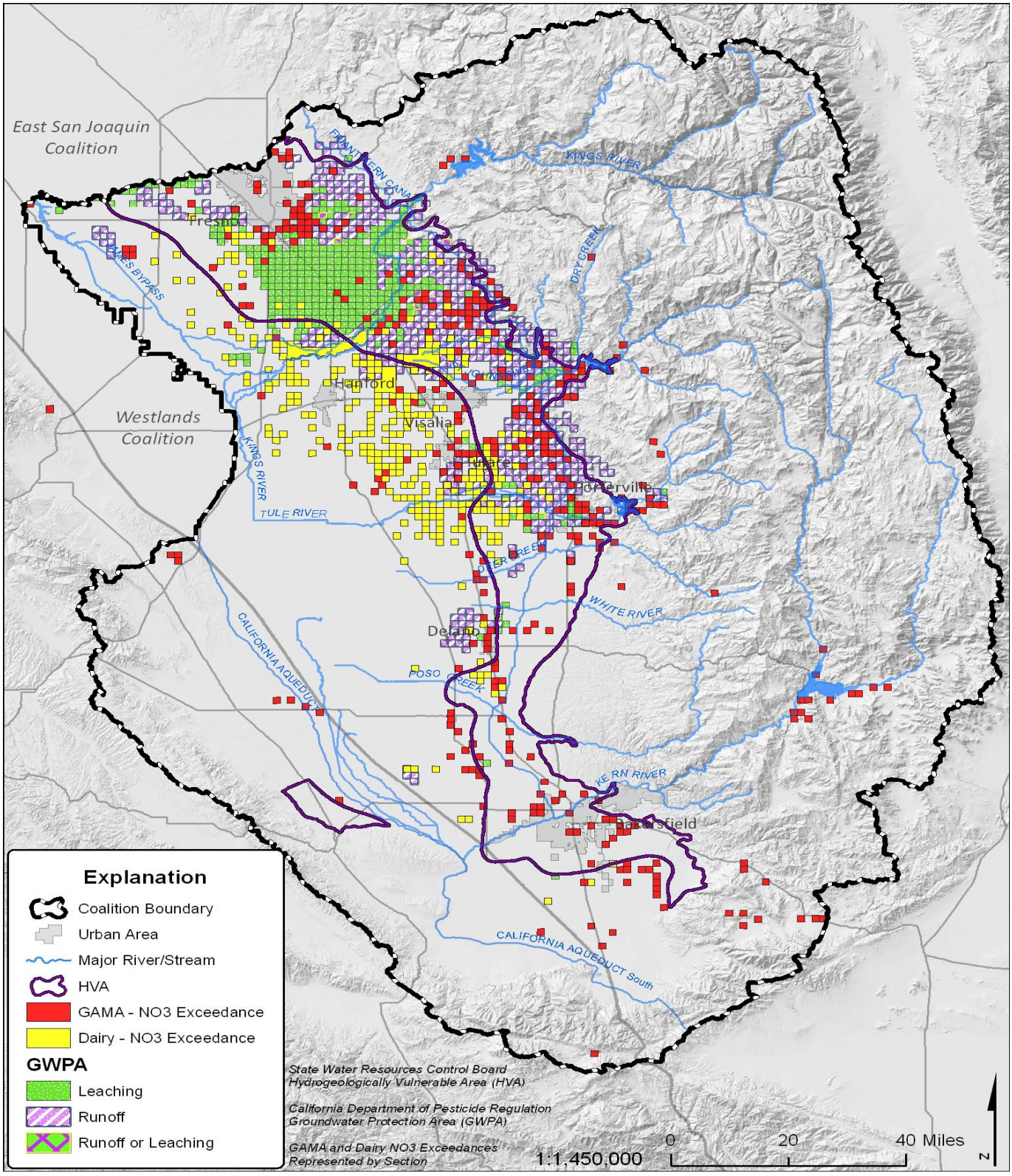


Figure 5 – DPR Groundwater Protection Areas (GWPA) by section, State Water Board's Hydrogeologically Vulnerable Area (HVA), Nitrate Exceedances from the GAMA Database by section (section contains a well that exceeds the nitrate MCL concentration), and Nitrate Exceedances Associated with the Dairy General Order by section (section contains a well that exceeds the nitrate MCL concentration).

DPR developed a groundwater monitoring system consisting of 75 domestic water wells located in Tulare and Fresno counties in areas that have been identified as being susceptible to the movement of pesticides to groundwater (based on soil type and average depth to groundwater). The wells are divided between coarse-grained sections (leaching areas) and hardpan sections (runoff areas) and are allotted in the following manner: 33 wells in Fresno County coarse soil sections, 18 wells in Fresno County hardpan soil sections, 3 wells in Tulare County coarse soil sections, and 21 wells in Tulare County hardpan soil sections. All or a portion of these wells have been sampled once to twice yearly since 1999. The most recent sampling for which results are available (68 wells sampled in March and April of 2011) detected simazine in 70% of wells sampled and its degradation products, ACET and DACT, in nearly all the wells. All concentrations were at low levels (less than one part per billion) and did not exceed California Department of Public Health maximum contaminant levels. Diuron was found in 22% of the wells sampled at concentrations less than one part per billion and bromacil was present in 21% of wells with two wells exceeding one part per billion (DPR, 2012). Like simazine, diuron and bromacil are pre-emergence herbicides.

DPR's current groundwater quality monitoring program should be sufficient to identify any emerging pesticides of concern and to track water quality trends of identified pesticides of concern. However, the presence of pesticides in groundwater indicates a discharge of waste subject to Central Valley Water Board regulation. Therefore, should the board or DPR identify groundwater quality information needs related to pesticides in groundwater, the board may require the third-party to conduct studies or implement a monitoring plan to address those information needs. Where additional information collected indicates a groundwater quality problem, a coordinated effort with DPR to address the identified problem will be initiated and the board may require the third party to develop a groundwater quality management plan (GQMP).

Data Summary Nitrates

Nitrate derived from both agricultural and non-agricultural sources has resulted in degradation of groundwater beneath large areas within California's Central Valley. In attempting to evaluate this issue, the State Water Board, Division of Clean Water Program, Groundwater Special Studies Unit, produced a *"Draft Groundwater Information Sheet, Nitrate/Nitrite"* in October 2002. The draft information sheet was produced to provide general information regarding nitrate in groundwater and it used the California Department of Health Services (DHS) data for public supply wells to identify wells that exceeded the MCL for nitrate. Approximately 16,000 public supply wells were sampled; of these, 616 wells were identified as having nitrate concentrations above the MCL (Figure 6). Nitrate impacts in the Tulare Lake Basin Area (from south to north) appear as a discontinuous band of high nitrate groundwater extending northwestward from southern Kern County along the eastern side of the valley to the southern end of Madera County.

A Revised Groundwater Information Sheet for Nitrate/Nitrite was issued by the State Water Board in February 2008. The revised information sheet utilized California Department of Public Health data from 1994 forward to evaluate nitrate impacts in approximately 15,000 active and standby public drinking water wells throughout California. Eight hundred and fifty two (852) wells were identified as having nitrate concentrations above the MCL value (Figure 7). The band of impacted groundwater observed in the 2002 study is shown to have broadened and forms a more continuous arc from Bakersfield northward into southern Madera County.

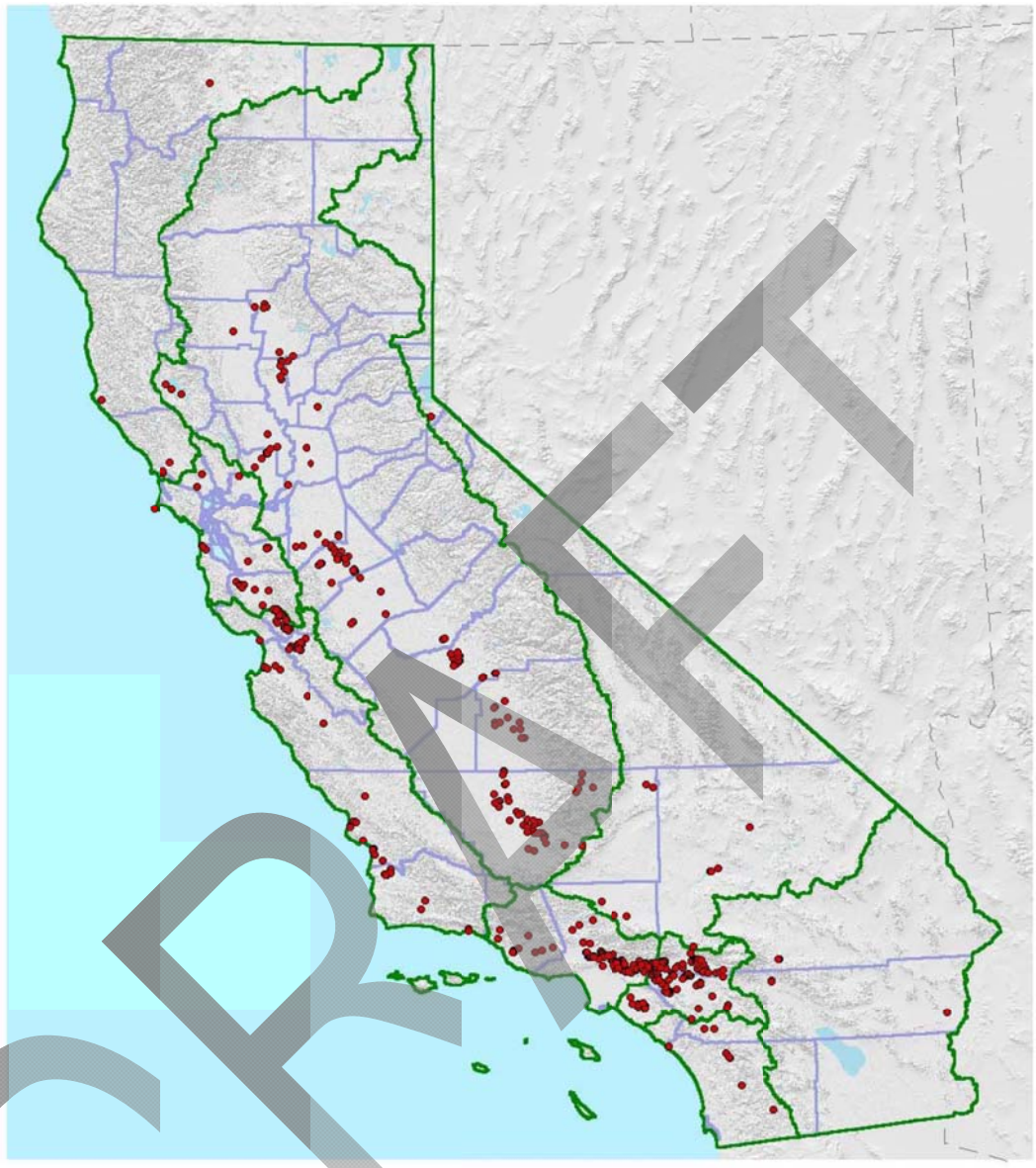


Figure 6 – State Water Resources Control Board, 2002.

Figure 7 – State Water Resources Control Board, 2008

In 2003, the United States Geological Survey (USGS) prepared a report entitled *Framework for a Ground-Water Quality Monitoring and Assessment Program for California* (GAMA). The report cites Assembly Bill 599, ("Ground-Water Quality Monitoring Act of 2001") as identifying the need for developing and maintaining a monitoring program to assess the quality of California's groundwater. The major groundwater supply basins are a specific focus of the GAMA program.

The GAMA program was divided into four projects: Priority Basin Project, Domestic Well Project, Specia Studies Project, and GeoTracker GAMA Project. The Priority Basin Project was designed to provide a spatially unbiased assessment of raw groundwater quality within specific groundwater basins/sub-basins, as well as to provide a statistically consistent basis for comparing water quality between basins throughout California. Samples were collected from water supply wells in each basin/sub-basin using a randomized grid-based method to provide statistical representation of the study unit (grid wells). Additional wells were selected to evaluate changes in water chemistry along selected lateral or vertical groundwater flow paths in the aquifer (flow-path wells).

The results of the chemical analyses for nitrate in groundwater collected by the Priority Basin Project for the Tulare Lake Basin Area are as follows:

1. Kern County Sub-basin - 2 out of 17 samples had a nitrate concentration that exceeded the nitrate MCL value (sample set included 14 wells and 3 flow-path wells);

2. Southeast San Joaquin Valley - 6 out of 44 samples had a nitrate concentration that exceeded the nitrate MCL value (28 wells and 16 flow-path wells). All six detections that exceeded the nitrate MCL value occurred in flow-path wells;

Figure 8 shows the nitrate concentrations obtained from the GAMA domestic well sampling program conducted in Tulare County. One hundred and eighty one (181) domestic wells were sampled; seventy five (75) of which exceeded the nitrate MCL value (41%).

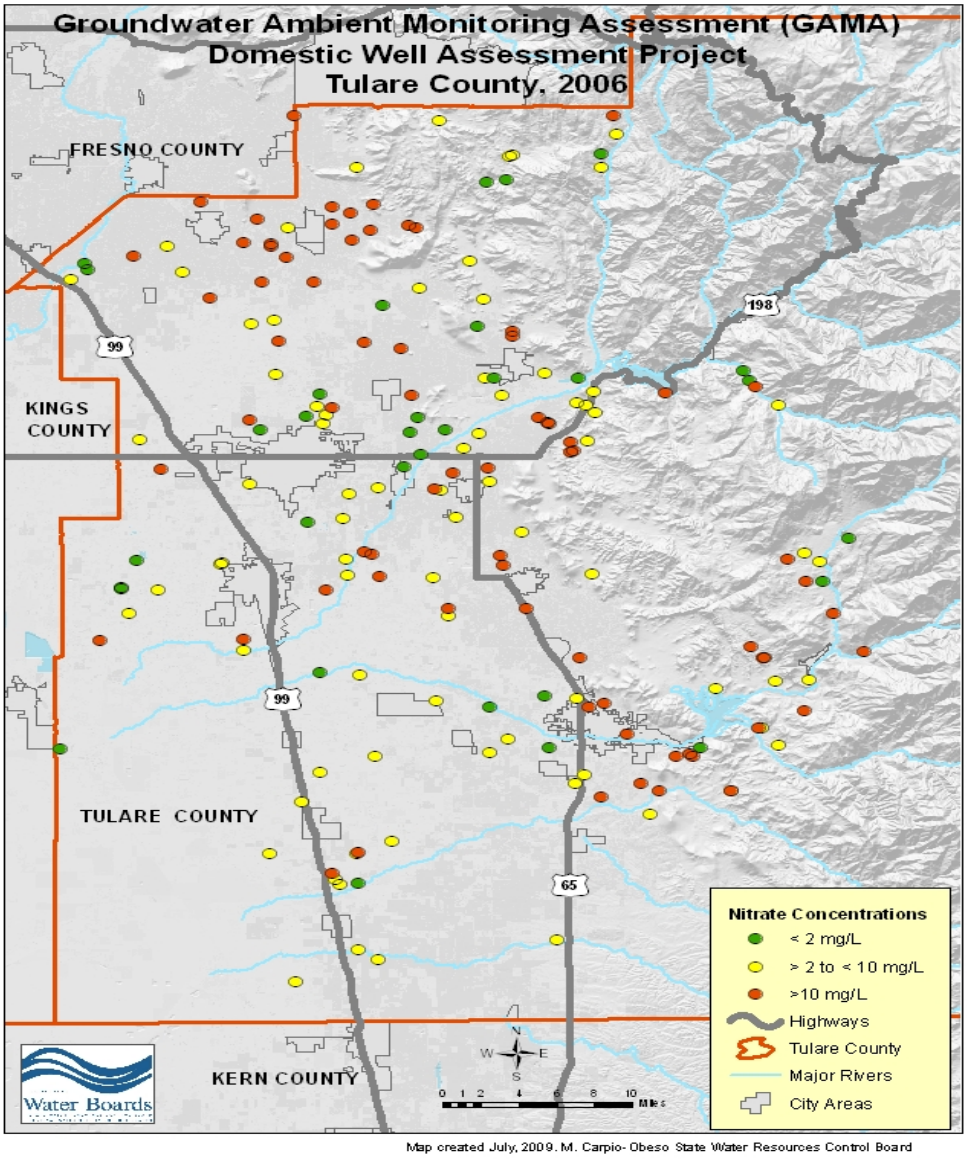


Figure 8 - GAMA Voluntary Domestic Well Project – Tulare County (2006)

The results of the National Water-Quality Assessment Program (NAWQA) and GAMA domestic well programs were combined by Bartholomay and others (2007) to produce a map of California depicting nitrate concentrations in groundwater within the Central Valley Aquifer system (Figure 9). The map distinguishes between the sources of the groundwater data by using circles NAWQA and squares (GAMA).

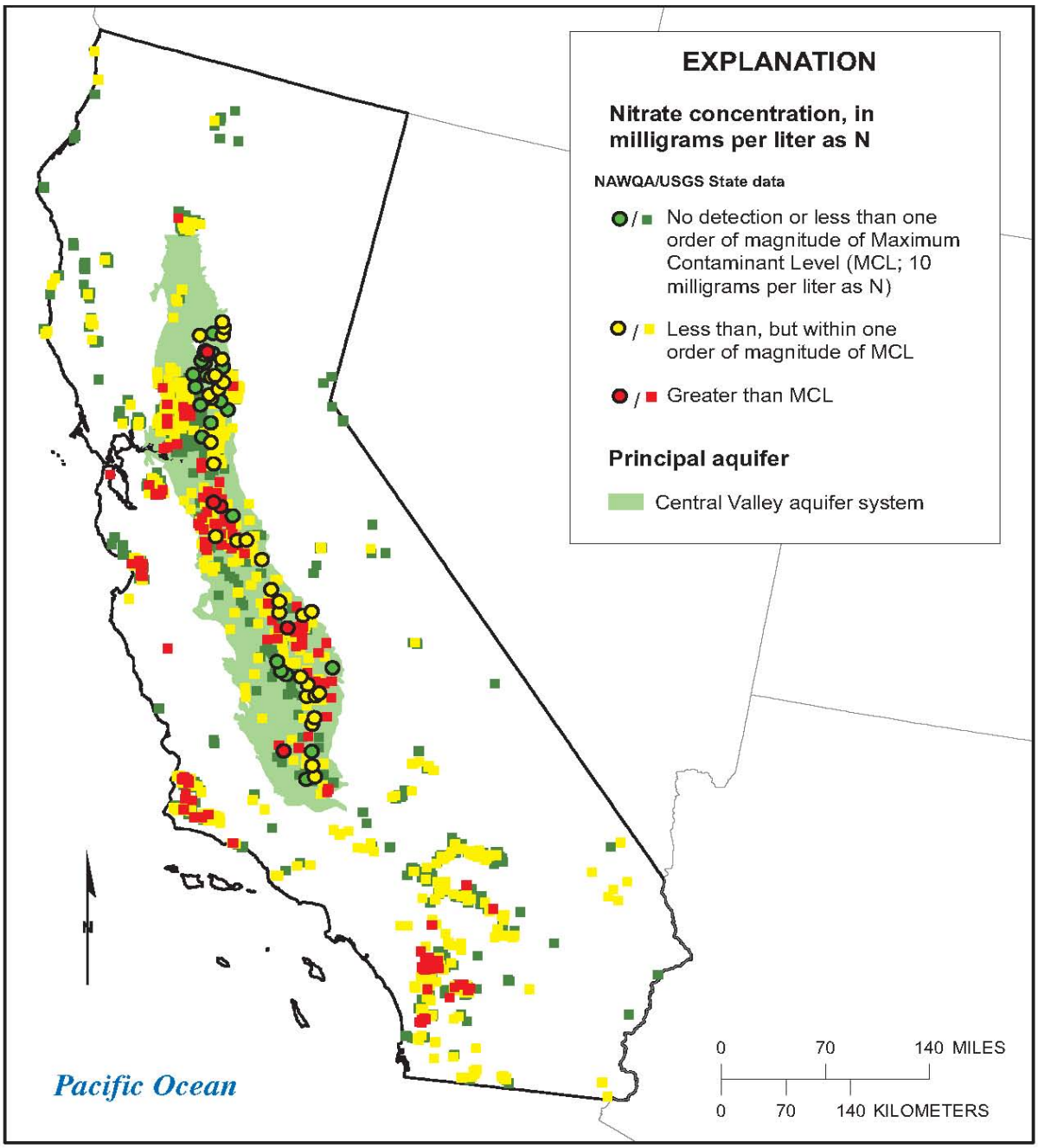


Figure 9 – Concentration of nitrate in groundwater in California *from* Bartholomay and Others, 2007, U.S. Geological Survey Scientific Investigations Report 2007-5213.

In 2009, Ekdahl and others used GeoTracker GAMA to Investigate Nitrate Concentrations in California (Figure 10). The GeoTracker GAMA system is an online database that uses Google Maps and data bases generated by State and Regional Water Boards (SWRCB/RWQCB), California Department of Public Health (CDPH), Department of Pesticide Regulation (DPR), Department of Water Resources

(DWR), United States Geological Survey (USGS), and Lawrence Livermore National Laboratory (LLNL) The GeoTracker GAMA system provides data for over 100,000 sampling locations and analytical results for a variety of constituents including nitrate.

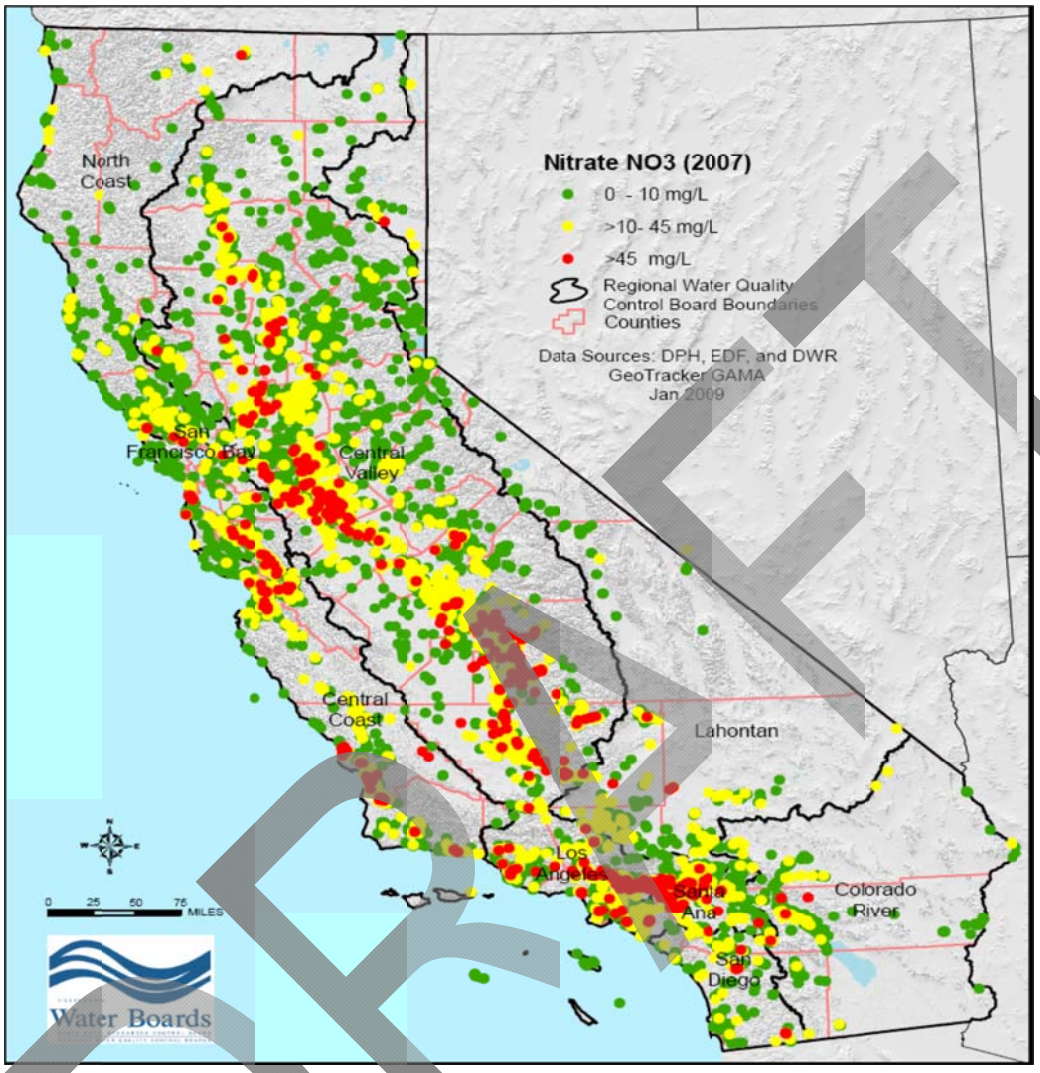


Figure 10 – Nitrate in Groundwater *From:* Erik J. Ekdahl, Maria de la Paz Carpio-Obeso, and John Borkovich, California State Water Resources Control Board, 2009; in: Harter, T., 2009. Agricultural impacts on groundwater nitrate, Southwest Hydrology, July/August 2009, p.23-25.

A variety of investigators have looked at the San Joaquin Valley groundwater nitrate concentrations ove time (Burow et al, 1998, 2007, and 2008; Rupert, 2008; and Rosen and Lapham, 2008). In 1995, NAWQA (Burow, et al 1998) resampled 30 domestic supply wells in the eastern San Joaquin Valley tha had previously been sampled by the U.S. Geological Survey between 1986 and 1987 (Figure 11). The median nitrate concentration for 23 of the 30 wells in 1986–87 was 2.4 mg/L, (seven wells had no nitrat sample data) and in 1995 the median concentration for the full 30 wells was 4.6 mg/L. Nitrate exceeded the MCL value in two wells in 1986-87 and in five wells in 1995.

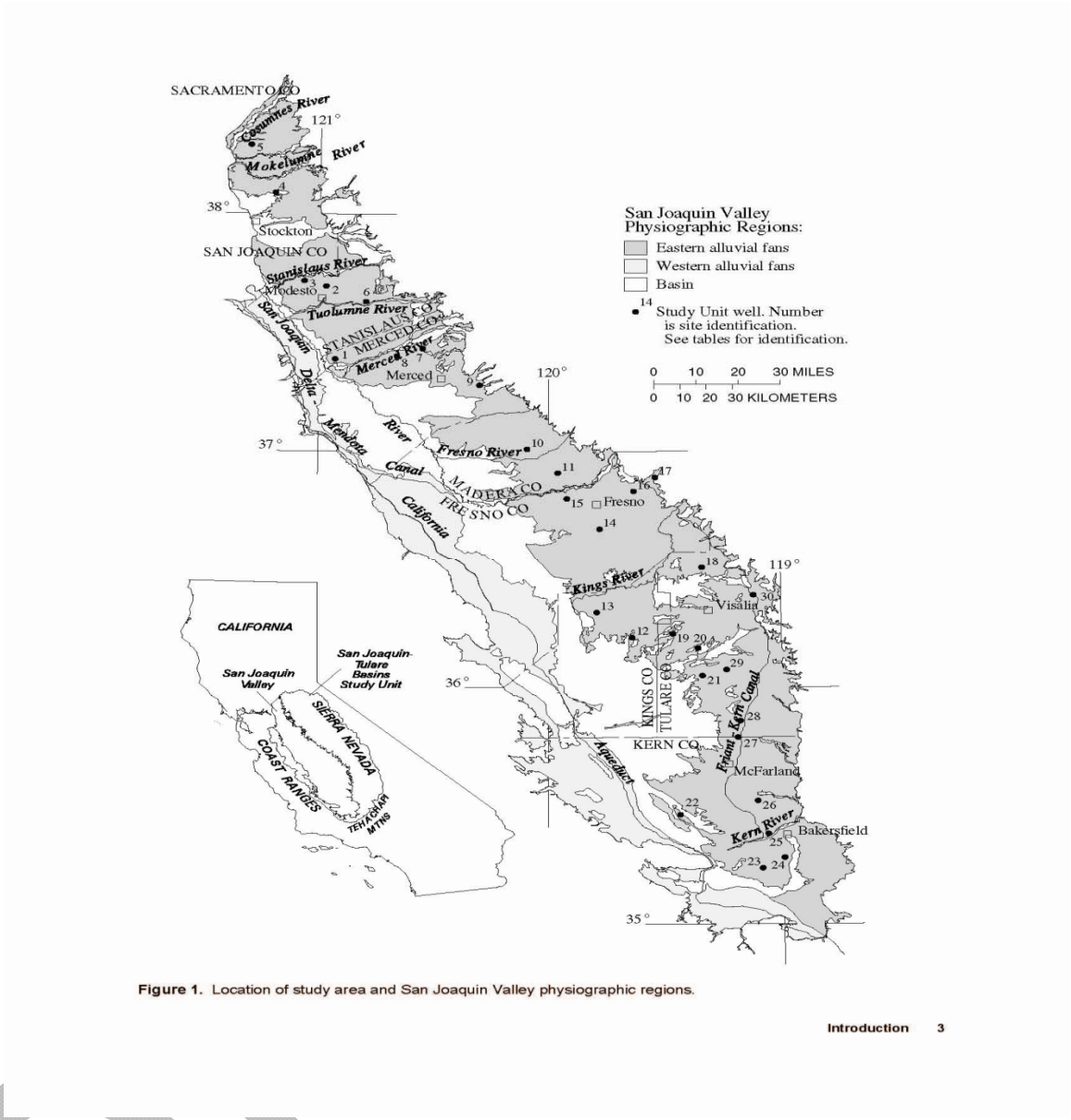


Figure 1. Location of study area and San Joaquin Valley physiographic regions.

Introduction 3

Figure 11 – Eastern San Joaquin Study Area; *from* Burow, et al, 1998.

In 2002, twenty nine of the original 30 domestic wells within the regional aquifer were resampled for the third time (Burow, et al, 2008). The median nitrate concentration for the resampled wells had risen from 2.3 mg/L in 1986-87 to 5.4 mg/L in 2003. Burow and others (2008) concluded that, *"The results of the analysis of regional- and local-scale nitrate concentration data indicate that widespread high concentrations of nitrate in the shallow part of the San Joaquin Aquifer system are likely to move to deeper parts of the ground-water flow system."*

The trend of nitrate concentrations in the shallow groundwater portion of the Eastern San Joaquin Study Area has also been investigated by means of focused studies utilizing monitoring wells in three geographical areas: near Fresno, near Modesto, and near the Merced River (Burow and Green, 2008). Nitrogen fertilizer data were coupled with the results of groundwater sampling to show that nitrate concentrations increased over time; corresponded to fertilizer application rates in all three focus study areas. Burow and Green (2008) reported that, *"Analysis using county-level nitrogen applications and a wide range of chemical data from sampling vertical monitoring well transects showed that reconstructed nitrate concentrations are consistent with 50% of the applied nitrogen reaching the water table."*

Burow and others (2007) produced a report that expanded upon the data evaluation for the focused study areas of the Eastern San Joaquin Study Area. This study reported that the nitrate concentrations in monitoring wells completed in the shallowest part of the aquifer increased in concentration from 8 to 23 mg/L as NO_3 during the period of time from 1994-1995 to 2003. Nitrate concentrations varied considerably with groundwater depth ranging from 2mg/L in the deepest monitoring wells to 30 to 40 mg/L in the shallow wells. This change in concentration verses depth is due in part to the age of the groundwater. Based upon chlorinated fluorocarbons concentrations (CFC), groundwater less than 10 meters (m) below the water table is approximately 15 years old. The mean age of groundwater deeper than 60m below the water table is approximately 45 years old (Burow et al, 2007). Burow and others concluded that,

> "Nitrate concentrations were highest and most variable in the shallow monitoring wells in the regional areal monitoring networks; the variability in nitrate concentrations and median values decreased with depth. Because of intensive pumping and irrigation recharge, the dominant groundwater flow paths in the aquifer system are vertically downward. High concentrations in the shallow part of the aquifer could be expected to move downward over time, which would result in increasing concentrations in the deeper domestic and public-supply wells in the future as water with high nitrate concentrations moves deeper in the groundwater system."

In March of 2012, Harter and others released a report entitled *Addressing Nitrate in California's Drinking Water* which was prepared for the State Water Board. The document focused on the Tulare Lake Basin and the Salinas Valley evaluating the nitrate concentrations for 100,000 groundwater samples from nearly 20,000 wells across the two regions (Figure 12). The report concluded that, "*Of the 20,000 wells, 2,500 are frequently sampled public water supply wells (over 60,000 samples). In these public supply wells, about 1 in 10 raw water samples exceed the nitrate MCL"*. The predominant source of the nitrate in groundwater was deemed to be agricultural fertilizers and animal waste applied to croplands.

The Harter and others (2012) report also provided an evaluation of household self-supplied and local small water supply systems in the Tulare Lake Basin and the Salinas Valley that are impacted by nitrate concentrations. The report found that,

> "Severely disadvantaged communities (SDACs) are particularly vulnerable to financial costs. Of 51 community public water systems (serving about 714,000 people) in the study area with a raw source exceeding the nitrate MCL, most systems (40, serving about 379,000 people) are in a DAC. Thirteen of the 40 exceeding systems are in unincorporated areas (serving about 167,000 people), and 27 are in incorporated communities (serving about 212,000 people)."

Figure 13 provides a representation of Household self-supplied and local small water systems located near wells having a maximum nitrate concentration value greater than the MCL as contained within the Harter and Others report.

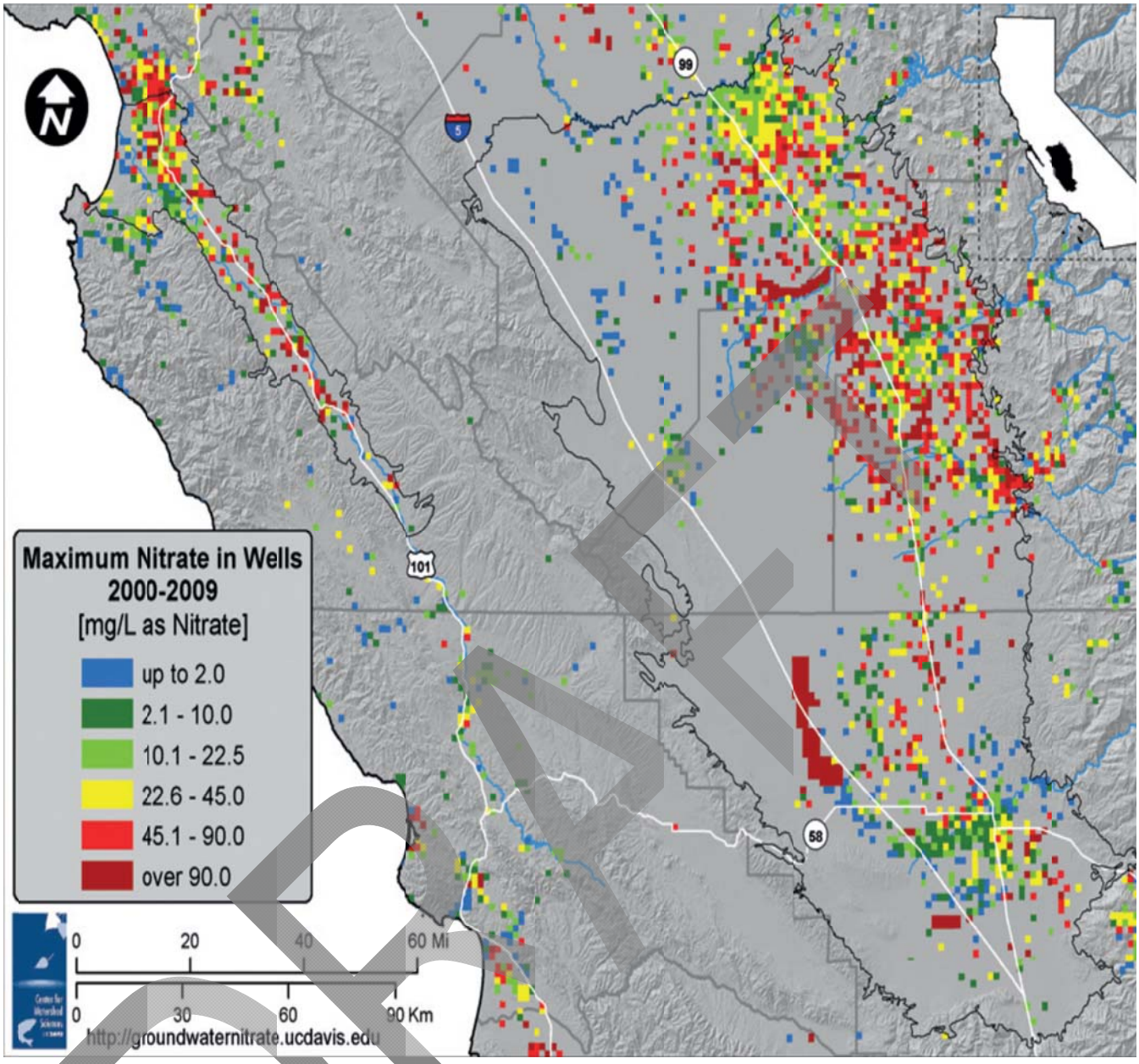


Figure 12 - Maximum nitrate concentration (mg/L) measured at any time during 2000–2009 within a 1-square-mile land section. Source: Boyle et al. 2012, In Harter and others, 2012.

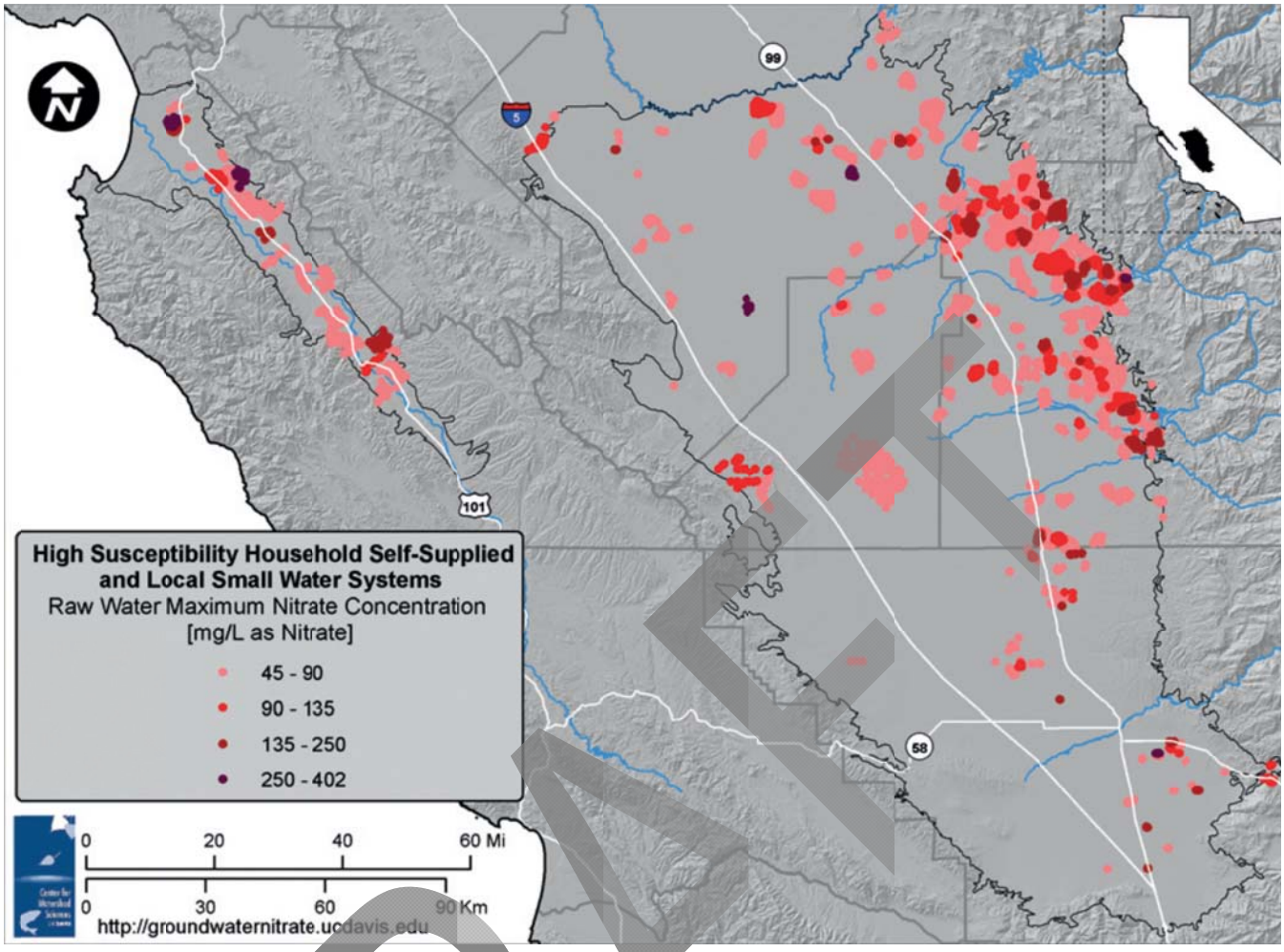


Figure 13 - Household self-supplied and local small water systems located near wells having a maximum nitrate concentration value greater than the MCL *in* Harter and Others, 2012.

In February 2012, the State Water Board issued a draft report to the legislature: *Communities That Rely on Contaminated Groundwater*. This document reported that in Tulare County there are 41 communities that rely on contaminated groundwater, serving approximately 205,000 people, of which 99 percent are solely reliant on groundwater.

Hydrogeologically Vulnerable Areas
In 2000, the State Water Resources Control Board created a map showing locations where published hydrogeologic information indicated conditions that may be more vulnerable to groundwater contamination. They termed these areas "Hydrogeologically Vulnerable Areas". The map identifies areas where geologic conditions allow recharge to underlying water supply aquifers at rates or volumes substantially higher than in lower permeability or confined areas of the same groundwater basin. The map does not include hydrogeologically vulnerable areas (HVAs) where local groundwater supplies occur mainly in the fractured igneous and metamorphic rocks which underlie the widespread mountain and foothill regions of the Sierra Nevada, or in permeable lava flows which may provide primary recharg for extensive but sparsely populated groundwater basins. See Figure 5 for a map of the HVA areas within the third-party region.

Groundwater Quality Management Plans (GQMPs)
Under this Order, groundwater management plans will be required where there are exceedances of water quality objectives, where there is a trend of degradation that threatens a beneficial use, as well as for "high vulnerability groundwater areas" (as defined by the third-party in the Groundwater Assessment Report). GQMPs will only be required if irrigated lands may cause or contribute to the groundwater

quality problem. GQMPs are the key mechanism under this Order to help ensure that waste discharges from irrigated lands are meeting Groundwater Discharge Limitation III.B.

The main elements of GQMPs are to A) investigate potential irrigated agricultural sources of waste discharge to groundwater, B) review physical setting information for the plan area such as geologic factors and existing water quality data, C) considering elements A and B, develop a strategy with schedules and milestones to implement practices to ensure discharge from irrigated lands are meeting Groundwater Limitation III.B, D) develop a monitoring strategy to provide feedback on GQMP progress, E) develop methods to evaluate data collected under the GQMP, and F) provide reports to the Central Valley Water Board on progress.

Elements A – F are necessary to establish a process by which the third-party and Central Valley Water Board are able to investigate waste sources and the important physical factors in the plan area that may impact management decisions (elements A and B), implement a process to ensure effective practices are adopted by Members (element C), ensure that adequate feedback monitoring is conducted to allow for evaluation of GQMP effectiveness (elements D and E), and facilitate efficient board review of data collected on the progress of the GQMP (element F).

This Order requires the third-party to develop GQMPs that include the above elements. GQMPs will be reviewed and approved by the Executive Officer. Also, because GQMPs may cover broad areas potentially impacting multiple groundwater users in the plan area, these plans will be circulated for public review. Prior to plan approval, the Executive Officer will consider public comments on proposed GQMPs.

The burden of the GQMP, including costs, is reasonable. The Central Valley Water Board must be informed of the efforts being undertaken by Members to address identified groundwater quality problems. In addition, a regional GQMP is a reasonable first step to address identified groundwater quality problems, since the monitoring and planning costs are significantly lower when undertaken regionally by the third-party than requiring individual Members to undertake similar monitoring and planning efforts. However, if the regional GQMP does not result in the necessary improvements to water quality, the burden, including costs, of requiring individual Members in the impacted area to conduct monitoring, describe their plans for addressing the identified problems, and evaluate their practices is a reasonable subsequent step. The benefits and necessity of such individual reporting, when regional efforts fail, include, but are not limited to: 1) the need of the board to evaluate the compliance of regulated Members with applicable orders; 2) the need of the board to understand the effectiveness of practices being implemented by Members; and 3) the benefits of improved groundwater quality to all users.

Farm Evaluations

The Order requires that all Members complete a Farm Evaluation describing management practices implemented to protect surface and groundwater quality. The evaluation will also include information such as location of the farm, surface water discharge points, location of in service wells and abandoned wells and whether wellhead protection practices have been implemented.

Central Valley Water Board staff will work with third-parties, technical service providers, commodity groups, and other interested stakeholders to develop a Farm Evaluation Template to assist Members in completing the evaluation. Once the Executive Officer approves the template, all Members will be required to complete a Farm Evaluation. The Order establishes prioritization for Member completion and updating of the evaluations based on whether the operation is within a high or low vulnerability area. Farm Evaluations must be maintained at the Member's farming operations headquarters or primary place of business and submitted to the third-party for summary reporting to the Central Valley Water Board.

The Farm Evaluation is intended to provide the third-party and the Central Valley Water Board with information regarding individual Member implementation of the Order's requirements. Without this information, the board would rely solely on regional surface and groundwater monitoring to determine compliance with water quality objectives. The regional monitoring cannot determine whether all Members are implementing protective practices, such as wellhead protection measures for groundwater.

Regional monitoring also does not allow identification of which practices are protective in areas where impacts are observed and multiple practices are employed. For groundwater protection practices, it may take years in many areas (even decades in some areas) before broad trends in groundwater may be measured and associated with implementation of this Order. Farm evaluations will provide assurance that Members are implementing management practices to protect groundwater quality while trend data are collected.

The reporting of practices identified in the Farm Evaluation will allow the third-party and board to effectively implement the representative monitoring program. Representative monitoring (in lieu of farm specific monitoring) only works if the results of the monitored sites can be extrapolated to non-monitored sites. One of the key ways to extrapolate those results will be to have an understanding of which farming operations have practices similar to the site that is monitored. In addition, reporting of practices will allow the third-party and board to evaluate changes in surface water quality relative to changes in practices. Absent such information, it will be difficult to determine how effective practices are in protecting surface water and groundwater quality.

Sediment and Erosion Control Plans

The Order requires that Members with the potential to discharge surface water develop a Sediment and Erosion Control Plan. Control of sediment discharge will work to achieve water quality objectives associated with sediment and also water quality objectives associated with sediment-bound materials such as pesticides. To ensure that water quality is being protected in high vulnerability areas for discharge of sediment and sediment-bound materials (identified as areas under SQMPs for sediment/sediment bound materials or those areas identified by the Executive Officer as being high vulnerability for sediment discharge), this Order requires that Sediment and Erosion Control Plans for Members within these areas be written, amended, and certified by a Qualified Sediment and Erosion Control Plan Developer. A qualified developer must possess one of the six certifications and or registrations specified in the Order and shown in Table 1 below. Requiring that qualified personnel develop these plans is consistent with the State Water Board's Construction Stormwater Program. In addition, the third-party can request that other service providers (such as the Natural Resources Conservation Service or the University of California Cooperative Extension) assist Members in preparing the plans. If NRCS or the Cooperative Extension provide such assistance, the Member will need to retain written documentation of the recommendation provided by NRCS or the Cooperative Extentsion.

Table 1. Qualified Sediment and Erosion Control Plan Developers

Title/Certification	Certifier
Professional Civil Engineer	State of California
Professional Geologist or Engineering Geologist	State of California
Landscape Architect	State of California
Professional Hydrologist	American Institute of Hydrology
Certified Professional in Erosion and Sediment Control™ (CPESC)	Enviro Cert International Inc.
Certified Professional in Storm Water Quality™ (CPSWQ)	Enviro Cert International Inc.

The Sediment and Erosion Control Plan has two major objectives: (1) to help identify the sources of sediment that affect the quality of storm water and irrigation water discharges; and (2) to describe and ensure the implementation of water quality management practices to reduce or eliminate sediment and other pollutants bound to sediment in storm water and irrigation water discharges. The plan must be appropriate for the Member's operations and will be developed and implemented to address site specific conditions. Each farming operation is unique and requires specific description and selection of water quality management practices needed to address waste discharges of sediment. The plan must be maintained at the farming operations headquarters or primary place of business.

Central Valley Water Board staff will work with third-parties, technical service providers, commodity groups, and other interested stakeholders to develop a Sediment and Erosion Control Plan Template to assist Members and qualified developers in completing the plan. Once the Executive Officer approves the template, all Members that discharge surface water will be required to complete the plan. The Order establishes prioritization for Member completion of the plan based on whether the operation is within a high or low vulnerability area. Members within low vulnerability areas will have additional time to complete the plan. In addition, the Executive Officer may identify areas requiring such plans based on evidence of ongoing erosion or sediment control problems.

Nitrogen Budgets

Nitrate derived from both agricultural and non-agricultural sources has resulted in degradation and/or pollution of groundwater beneath agricultural areas in California's Central Valley (ICF International. 2011).[4] As shown in Figures 10 and 12, there are a number of wells within the Tulare Lake Basin Area with nitrate concentrations that higher than drinking water quality objectives. To address these concerns, the Order requires Members implement practices that minimize excess nutrient application relative to predicted crop need. Proper nutrient management will work to reduce excess plant nutrients, such as nitrogen, from reaching state waters. Nutrient management must take site-specific conditions into consideration in identifying steps that will be taken and practices that will be implemented to minimize nitrate movement through surface runoff and leaching past the root zone.

To assist Members with nutrient management, Central Valley Water Board staff will work with the California Department of Food and Agriculture (CDFA), the University of California Cooperative Extension, Natural Resource Conservation Services (NRCS), third-parties, technical service providers, commodity groups, and other interested stakeholders to develop an Annual Nitrogen Budget Worksheet template. The template should incorporate, to the extent appropriate, the major criteria established in Code 590 of the NRCS Nutrient Management document, including soil and plant tissue testing, nitrogen application rates, nitrogen application timing, consideration of organic nitrogen fertilizer, consideration of irrigation water nitrogen levels to minimize surface and groundwater pollution and meet crop nitrogen requirements and crop yield potential.

Once the Executive Officer approves the Annual Nitrogen Budget Worksheet template, all Members will be required to complete a Proposed Annual Nitrogen Budget for the upcoming crop year and Final Annual Nitrogen Budget for the previous crop year using the template. Proposed and Final Annual Nitrogen Budget(s) must be maintained at the Member's farming operations headquarters or primary place of business.

For Members located within a high vulnerability groundwater area, for which nitrate is identified as a constituent of concern, the Proposed Annual Nitrogen Budget Worksheet(s) must be prepared or approved by a certified nutrient management plan specialist. Certified nutrient management plan

[4] ICF International. 2011. *Irrigated Lands Regulatory Program - Program Environmental Impact Report*. Final and Draft. March. (ICF 05508.05.) Sacramento, CA. Prepared for Central Valley Regional Water Quality Control Board, Sacramento, CA. Appendix A, page 46.

specialists include Professional Soil Scientists, Professional Agronomists, Crop Advisors[5] certified by the American Society of Agronomy, or Technical Service Providers certified in nutrient management in California by the National Resource Conservation Service (NRCS). Alternatively, the Member may attend a California Department of Food and Agriculture or other Executive Officer approved training program for nutrient management certification in order to self-certify the worksheets. Beginning the year after the Central Valley Water Board Executive Officer approves the third-party's Groundwater Assessment Report and provides the Annual Nitrogen Budget Worksheet template, Members subject to this requirement must provide Final Annual Nitrogen Budget(s) for the previous crop year, and the Proposed Annual Nitrogen Budget(s) for the upcoming crop year to the third-party. The third-party will summarize Nitrogen Budges for this subset of Members and report the information to the Central Valley Water Board.

Nitrogen Budget reporting for Members in high vulnerability groundwater areas will provide the third-party and the Central Valley Water Board with information regarding individual Member implementation of the Order's requirements. Without this information, the board would rely on groundwater monitoring to determine compliance with water quality objectives. The groundwater monitoring cannot determine whether all Members are managing nutrients to protect groundwater. In the scenario of groundwater protection practices, it may take many years before broad trends in groundwater may be measured showing reduced nitrates. Nitrogen Budget reporting will provide assurance that Members are managing nutrients to protect groundwater quality while trend data is collected.

Spatial Resolution of Nitrogen Budget and Farm Evaluation Information

The Order requires reporting to the Central Valley Water Board of nitrogen budget information and management practices identified through the farm evaluation. These data are required to be associated with the township, range, and section (TRS) where the farm is located (resolution is to the square mile or 640 acres). This spatial resolution is identical to the spatial resolution for pesticide use reporting required by the Department of Pesticide Regulation. The TRS is already identified by growers when they report their pesticide use to their local county agricultural commissioner (see http://www.cdpr.ca.gov/docs/enforce/prenffrm/enf025.pdf). The grower can, therefore, easily provide the TRS information for their farm(s) to the third-party.

Using a reporting scale consistent with the Department of Pesticide Regulation's will facilitate the analysis of any pesticide related issues. For example, the farm practices being used in an area with a pesticide water quality problem can be easily compared to the pesticide use patterns, since the spatial resolution of the reporting is similar. The spatial resolution of a square mile provides a common unit that should facilitate analysis of data and comparisons between different areas. Where appropriate, areas with common cropping patterns and soil types can be aggregated (i.e., combining sections) to allow for comparisons and provide summary information. In addition, if water quality problems are identified and the practices reported in a particular section appear problematic, the board will be able to easily identify the Members that require potential compliance and enforcement activities.

If data are aggregated at a grosser scale (e.g., summarized at the watershed-level), the board and the public may not be able to effectively use the information to help determine whether Members are implementing practices and managing nitrogen to protect water quality. Also, summarizing the data to a larger scale may make it difficult for the board or any other interested group to check the analysis of the third-party or conduct additional analysis. If the information at the smaller spatial scale is not available, it is not possible to check the analysis of the aggregated information and it is not possible to conduct other analysis using different scales or boundaries. Because the management practice information and nitrogen budgets serve as a surrogate for water quality data, it is reasonable to require reporting at a spatial resolution that would allow the board and other interested parties to conduct their own independent analysis.

[5] Should the California Department of Food and Agriculture and the California Certified Crop Adviser's establish a specific nutrient management certification, any Certified Crop Adviser who prepares a nutrient management plan must have a nutrient management certification.

Technical Reports

The surface water and trend groundwater quality monitoring under the Order is regional in nature instead of individual field discharge monitoring. The benefits of regional monitoring include the ability to determine whether water bodies accepting discharges from numerous irrigated lands are meeting water quality objectives. Regional monitoring also allows the Central Valley Water Board to determine, at the regional level, whether practices are protective of water quality. There are limitations to regional monitoring when trying to determine possible sources of water quality problems and individual compliance with the Order's requirements.

An effective method of determining compliance with water quality objectives is water quality monitoring at the individual level. Individual monitoring may also be used to help determine sources of water quality problems. Individual monitoring of waste discharges is required under many other board programs. Examples of such programs include regulation of wastewater treatment plants and the Central Valley Water Board's Dairy Program.[6] The costs of individual monitoring would be much higher than regional surface and groundwater quality monitoring required under the Order. Regional monitoring provides a general measure of compliance over a large area, reducing the number of samples collected.

This Order requires the third-party to provide technical reports. These reports may include field-specific special studies at the direction of the Executive Officer. The Executive Officer may require special studies where regional monitoring is ineffective in determining potential sources of water quality problems or to identify whether management practices are effective. Special studies help ensure that the potential information gaps described above under the Order's regional monitoring requirements may be filled through targeted technical reports, instead of more costly individual monitoring programs.

WATER QUALITY OBJECTIVES

Surface water and groundwater discharge limitations in section III of the Order specify that waste discharge from irrigated lands may not cause or contribute to an excedance of water quality objectives in surface water or underlying groundwater, unreasonably affect beneficial uses, or cause a condition of pollution or nuisance.

Water quality objectives that apply to surface water are described in the *Water Quality Control Plan for the Tulare Lake Basin* (Basin Plan). Applicable water quality objectives include, but are not limited to, (1) the numeric objectives, including the bacteria objective, the chemical constituents objective (includes listed chemicals and state drinking water standards, i.e., maximum contaminant levels (MCLs) promulgated in Title 22 California Code of Regulations (CCR) Division 4, Chapter 15 sections 64431 and 64444 that are applicable through the Basin Plan to waters designated as municipal and domestic supply), dissolved oxygen objectives, pH objectives, the salinity objectives, and the turbidity objectives; and (2) the narrative objectives, including the biostimulatory substances objective, the chemical constituents objective, and the toxicity objective. The Basin Plan also contains numeric water quality objectives that apply to specifically identified water bodies, such as specific temperature objectives. Federal water quality criteria that apply to surface water are contained in federal regulations referred to as the California Toxics Rule and the National Toxics Rule. See 40 CFR sections 131.36 and 131.38.

Water quality objectives that apply to groundwater include, but are not limited to, (1) numeric objectives, including the bacteria objective and the chemical constituents objective (includes state MCLs promulgated in Title 22 CCR Division 4, Chapter 15 section 64431 and 64444 and are applicable through the Basin Plan to municipal and domestic supply), and (2) narrative objectives including the chemical constituents, taste and odor, and toxicity objectives.

The requirements that waste discharge not unreasonably affect beneficial uses or cause a condition of pollution or nuisance are prescribed pursuant to sections 13263 and 13241 of the California Water Code.

[6] The dairy program requires individual monitoring of surface water discharges and allows for a "representative" groundwater monitoring in lieu of individual groundwater monitoring.

Section 13263 of the California Water Code requires Regional Water Boards, when establishing waste discharge requirements, to consider the need to prevent nuisance and the provisions in section 13241 of the California Water Code. Section 13241 requires Regional Water Boards to consider several factors when establishing water quality objectives including prevention of nuisance and reasonable protection of beneficial uses.

Implementation of Water Quality Objectives

The Basin Plan includes numeric and narrative water quality objectives. The narrative toxicity objective states: "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life." The Basin Plan states that material and relevant information, including numeric criteria, and recommendations from other agencies and scientific literature will be utilized in evaluating compliance with the narrative toxicity objective. The narrative chemical constituent objective states that waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At a minimum, "…water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs)" in Title 22 of the California Code of Regulations (CCR). The Basin Plan further states that, to protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs. The narrative tastes and odors objective states: The narrative tastes and odors objective states: "Water shall not contain taste- or odor-producing substances in concentrations that cause nuisance, adversely affect beneficial uses, or impart undesirable tastes or odors to fish or other edible products of aquatic origin or to domestic or municipal water supplies."

The Basin Plan at page IV-21, contains an implementation policy, "Application of Water Quality Objectives", that specifies that the Central Valley Water Board "will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives." With respect to narrative objectives, the Regional Water Board must establish limitations using one or more of three specified sources, including: (1) USEPA's published water quality criteria, (2) a proposed state criterion (i.e., water quality objective) or an explicit state policy interpreting its narrative water quality criteria (i.e., the Regional Water Board's "Policy for Application of Water Quality Objectives"), (40 CFR 122.44(d)(1)(vi)(A), (B) or (C)), or (3) an indicator parameter. For purposes of this Order, all three sources will be used as part of the process described below.

Implementation of numeric and narrative water quality objectives under the Order involves an iterative process. The Order's MRP establishes management plan trigger limits that are equivalent to the applicable Basin Plan numeric water quality objectives. For constituents that are not assigned Basin Plan numeric water quality objectives, board staff will develop trigger limits in consultation with the Department of Pesticide Regulation (for pesticides) and other agencies as appropriate. Board staff will provide interested parties, including the third-party representing Members, with an opportunity to review and comment upon the trigger limits. The Executive Officer will then provide the trigger limits to the third-party. Those trigger limits will be considered the numeric interpretation of the applicable narrative objectives. In locations where trigger limits are exceeded, water quality management plans must be developed that will form the basis for reporting which steps have been taken by growers to achieve compliance with numeric and narrative water quality objectives.

NON-POINT SOURCE (NPS) PROGRAM

This Order regulates waste discharges from irrigated agricultural lands to state waters as an NPS program. Accordingly, the waste discharge requirements must implement the provisions of the State Water Board's *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (NPS Policy). Under the NPS Policy, the Central Valley Water Board must find that the program will promote attainment of water quality objectives. The nonpoint-source program also must meet the requirements of five key structural elements. These elements include (1) the purpose of the program must be stated and the program must address NPS pollution in a manner that achieves and maintains water quality objectives and beneficial uses, including any applicable antidegradation requirements; (2) describe the practices to be implemented and processes to be used to select and verify proper implementation of practices; (3) where it is necessary to allow time to achieve water quality

requirements, include a specific time schedule, and corresponding quantifiable milestones designed to measure progress toward reaching specified requirements; (4) feedback mechanisms to determine whether the program is achieving its purpose; and (5) the consequences of failure to achieve the stated purpose.

This Order addresses each of the five key elements, as described below.

(1) The purpose of the long-term irrigated lands regulatory program, of which this Order is an implementing mechanism, is stated below under the section titled "Goals and Objectives of the Irrigated Lands Regulatory Program."[7] The program goals and objectives include meeting water quality objectives. The requirements of this Order include requirements to meet applicable water quality objectives and the requirements of State Water Board Resolution 68-16 (antidegradation requirements). Further discussion of this Order's implementation of antidegradation requirements is given below under the section titled "State Water Board Resolution 68-16."

(2) The board is prevented by Water Code section 13360 from prescribing specific management practices to be implemented. However, it may set forth performance standards and require dischargers to report on what practices they have or will implement to meet those standards. Examples of the types of practices that irrigated agricultural operations may implement to meet program goals and objectives have been described in the Economics Report[8] and evaluated in the Program Environmental Impact Report (PEIR)[9] for the long-term ILRP. This Order requires each individual operation to develop a Farm Evaluation that will describe and evaluate their management practices in place to protect surface water and groundwater quality. This Order also requires the development of Surface/Groundwater Quality Management Plans (SQMPs/GQMPs) in areas where there are exceedances of water quality objectives. The requirements for SQMPs and GQMPs include that the third-party identify management practices and develop a process for evaluating the effectiveness of such practices. The requirements of this Order are consistent with Key Element 2.

(3) This Order requires the development of SQMPs/GQMPs in areas where water quality objectives are not met. SQMPs/GQMPs must include time schedules for implementing the plans and meeting the surface and groundwater discharge limitations (section III of the Order) as soon as practicable, but within a maximum of 10 years for surface and groundwater. The time schedules must be consistent with the requirements for time schedules set forth in this Order. The time schedules must include quantifiable milestones that will be reviewed by the Executive Officer and the public prior to approval. The time schedule requirements in this Order are consistent with Key Element 3.

(4) To provide feedback on whether program goals are being achieved, this Order requires surface and groundwater quality monitoring, tracking of management practices, and evaluation of effectiveness of implemented practices. This feedback will allow iterative implementation of practices to ensure that program goals are achieved. This feedback mechanisms required by this Order are consistent with Key Element 4.

(5) This Order establishes the following consequences where requirements are not met:

[7] The goals and objectives were developed as part of the ILRP Program Environmental Impact Report, ICF International. 2011. *Irrigated Lands Regulatory Program - Program Environmental Impact Report*. Final and Draft, March 2011. (ICF 05508.05.) Sacramento, CA. Prepared for Central Valley Regional Water Quality Control Board, Sacramento, CA.

[8] ICF International. 2010. *Draft Technical Memorandum Concerning the Economic Analysis of the Irrigated Lands Regulatory Program.* July 2010 (ICF 05508.05.) Sacramento, CA. Prepared for: Central Valley Regional Water Quality Control Board, Sacramento, CA.

[9] ICF International. 2011. *Irrigated Lands Regulatory Program - Program Environmental Impact Report*. Final and Draft, March 2011. (ICF 05508.05.) Sacramento, CA. Prepared for Central Valley Regional Water Quality Control Board, Sacramento, CA.

(a) The third-party or Members will be required, in an iterative process, to conduct additional monitoring and/or implement management practices where water quality objectives are not being met;
(b) Appropriate Central Valley Water Board enforcement action where the iterative management practices process is unsuccessful, program requirements are not met, or time schedules are not met;
(c) Require noncompliant Members, or all Members where the third-party fails to meet the requirements of this Order, to submit a report of waste discharge to obtain individual waste discharge requirements from the Central Valley Water Board (i.e., revoke coverage under this Order).

This Order describes consequences for failure to meet requirements and is consistent with Key Element 5.

GOALS AND OBJECTIVES OF THE IRRIGATED LANDS REGULATORY PROGRAM

The goals and objectives of this Order, which implements the long term ILRP, are described below. These are the same goals described in the PEIR for the ILRP.

Understanding that irrigated agriculture in the Central Valley provides valuable food and fiber products to communities worldwide, the overall goals of the this Order are to (1) restore and/or maintain the highest reasonable quality of state waters considering all the demands being placed on the water; (2) minimize waste discharge from irrigated agricultural lands that could degrade the quality of state waters; (3) maintain the economic viability of agriculture in California's Central Valley; and (4) ensure that irrigated agricultural discharges do not impair access by Central Valley communities and residents to safe and reliable drinking water. In accordance with these goals, the objectives of this Order are to:

- *Restore and/or maintain appropriate beneficial uses established in Central Valley Water Board water quality control plans by ensuring that all state waters meet applicable water quality objectives.*
- *Encourage implementation of management practices that improve water quality in keeping with the first objective without jeopardizing the economic viability for all sizes of irrigated agricultural operations in the Central Valley or placing an undue burden on rural communities to provide safe drinking water.*
- *Provide incentives (i.e., financial assistance, monitoring reductions, certification, or technical help) for agricultural operations to minimize waste discharge to state waters from their operations.*
- *Coordinate with other Central Valley Water Board programs (e.g., the Grasslands Bypass Project WDRs for agricultural lands, efforts by the Westlands Water District to develop WDRs for agricultural lands, development of total maximum daily loads [TMDLs] for Central Valley Salinity Alternatives for Long-Term Sustainability [CV-SALTS], and WDRs for dairies).*
- *Promote coordination with other regulatory and non-regulatory programs associated with agricultural operations to minimize duplicative regulatory oversight while ensuring program effectiveness (e.g., U.S. Department of Agriculture [USDA] National Organic Program, State Water Board Groundwater Ambient Monitoring and Assessment Program)."*

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

For the purposes of adoption of this Order, the Central Valley Water Board is the lead agency pursuant to CEQA (Public Resources Code sections 21100 et seq.). The Central Valley Water Board has prepared a Final Program Environmental Impact Report (PEIR)[10] that analyzes the potential environmental impacts of six program alternatives for a long term ILRP. As described more fully in Attachment D, this Order relies upon the PEIR for CEQA compliance. The requirements of the Order

[10] ICF International. 2011. *Irrigated Lands Regulatory Program Final Program Environmental Impact Report.* Final and Draft, March 2011. (ICF 05508.05.) Sacramento, CA. Prepared for: Central Valley Regional Water Quality Control Board, Sacramento, CA

include regulatory elements that are described within the six alternatives or are within the range of actions and related impacts encompassed by the six alternatives. Furthermore, the actions by Members to protect water quality in response to the requirements of this Order are expected to be similar to those described for Alternatives 2-6 of the PEIR (Alternative 1 does not include groundwater protection).

The PEIR describes that potential environmental impacts of all six alternatives are associated with implementation of water quality management practices, construction of monitoring wells, and impacts to agriculture resources (e.g., loss of production of prime farmland) due to increased regulatory costs. Under this Order, Members will be required to implement water quality management practices to address water quality concerns. The PEIR also describes and evaluates potential impacts of practices likely to be implemented to meet water quality and other management goals on irrigated lands. These water quality management practices include:

- Nutrient management;
- Improved water management;
- Tailwater recovery system;
- Pressurized irrigation;
- Sediment trap, hedgerow, or buffer;
- Cover cropping or conservation tillage; and
- Wellhead protection

These practices are examples of the types of practices that would be broadly applied by irrigated agricultural operations throughout the Central Valley and are considered representative of the types of practices that would have potential environmental impacts. It is important to note that the evaluated practices are not required; operators will have the flexibility to select practices to meet water quality goals. This Order represents one order in a series of orders that will be developed, based on the alternatives evaluated in the PEIR for all irrigated agriculture within the Central Valley. The requirements of this Order would lead to implementation of the above practices within the Tulare Lake Basin Area to a similar degree as is described for Alternatives 2-6 analyzed in the PEIR. Also, the requirements of this Order will require installation of monitoring wells (with the extent depending on the adequacy of existing wells for water quality monitoring). As described in the PEIR for Alternatives 2-6, the combination of an operator's choice of management practice and where that practice is implemented (i.e., located within a sensitive resource area) may result in significant environmental impacts for the following resource areas:

- Cultural resources: Potential loss of resources from construction and operation of management practices and monitoring wells.
- Noise and vibration: Exposure of sensitive land uses to noise from construction and operation of management practices (e.g., construction of tailwater return system, pump noise) and monitoring wells.
- Air quality: Generation of construction and operational emissions from management practices and monitoring wells (e.g., equipment and pump emissions generated during construction and continued operation of practices).
- Climate change: Cumulative, from a potential increase in greenhouse gas emissions.
- Vegetation and wildlife: Loss of habitat, wildlife, and wetland communities from reduced surface water discharge and construction and operation of practices and monitoring wells (e.g., loss of habitat if a practice is sited in a previously undisturbed area). Cumulative loss of habitat.
- Fisheries: Loss of habitat from construction of management practices, monitoring wells, and toxicity attributable to coagulant additives.
- Agriculture resources: Loss of farmland from increased regulatory cost. Cumulative loss of agriculture resources.

The above is a generalized summary of affected resource areas. The reader is directed to the Attachment D, Findings of Fact and Statement of Overriding Considerations, of this Order for specific impacts and discussion. Attachment D provides a listing of the above impacts, the written findings

regarding those impacts consistent with section 15091 of the CEQA Guidelines, and the explanation for each finding.

Mitigation Measures

The impacts described above, except for agriculture resources, cumulative climate change, and cumulative vegetation and wildlife can be reduced to a less than significant level through the employment of alternate practices or by choosing a location that avoids sensitive areas (e.g., installing a sedimentation basin in a portion of the property that is already developed rather than in an area that provides riparian habitat). Where no alternate practice or less sensitive location for a practice exists, this Order requires that the third-party and Members choosing to employ these practices to avoid impacts to sensitive resources by implementing the mitigation measures described in Attachment C. A CEQA Mitigation Monitoring and Reporting Program is included in Attachment B of this Order, Monitoring and Reporting Program R5-2013-XXXX.

STATEMENT OF POLICY WITH RESPECT TO MAINTAINING HIGH QUALITY WATERS IN CALIFORNIA (STATE WATER BOARD RESOLUTION 68-16)

This section of the Information Sheet first provides background on State Water Board Resolution 68-16 *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (Resolution 68-16). Following the background discussion, the Information Sheet describes how the various provisions in the WDR and MRP collectively implement Resolution 68-16. In summary, the requirements of Resolution 68-16 are met through a combination of upfront planning and implementation at the farm level; regional monitoring to determine whether trends in degradation are occurring; and regional planning and on-farm implementation when trends in degradation are identified.

Initially, all Members will need to conduct an on-farm evaluation to determine whether their practices are protective of water quality and whether they are meeting the established farm management performance standards. All Members must also prepare and implement a farm-specific nitrogen budget. In addition, each Member whose farming operations have the potential to discharge surface water must prepare and implement a farm-specific sediment and erosion control plan. Implementation of the sediment/erosion control plan should result in achieving best practicable treatment or control (BPTC) for sediment associated pollutants. Implementation of the nitrogen budget should result in achieving BPTC for nitrates discharged to groundwater.

Regional trend monitoring of surface water and groundwater is required to determine compliance with water quality objectives and determine whether any trends in degradation are occurring. If trends in such degradation are identified that could result in impacts to beneficial uses, a surface (or groundwater) quality management plan must be prepared by the third party. The plan must include the identification of practices that will be implemented to address the trend in degradation and an evaluation of the effectiveness of those practices in addressing the degradation. The third party must report on the implementation of practices by their Members. Failure to implement practices or address the degradation by individual Members will result in further direct regulation by the board, including, but not limited to, requiring individual farm water quality management plans; regulating the individual grower directly through WDR's for individual farmers; or taking other enforcement action.

As discussed further below, the combination of these requirements fulfill the requirements of Resolution 68-16 for any degradation of high quality waters authorized by this Order.

Background

Basin Plan water quality objectives are developed to ensure that ground and surface water beneficial uses are protected. The quality of some state ground and surface waters is higher than established Basin Plan water quality objectives. For example, nutrient levels in good, or "high quality" waters may be very low, or not detectable, while existing water quality standards for nutrients may be much higher. In

such waters, some degradation of water quality may occur without compromising protection of beneficial uses. State Water Board Resolution 68-16 *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (Resolution 68-16) was adopted in October of 1968 to address high quality waters in the state. Title 40 of the Code of Federal Regulations, Section 131.12—Antidegradation Policy (40 CFR 131.12) was developed in 1975 to ensure water quality necessary to protect existing uses in waters of the United States. Resolution 68-16 applies to discharges to all high quality waters of the state, including groundwater and surface water (Water Code section 13050[e]); 40 CFR 131.12 applies only to surface waters.

The requirement to implement the Antidegradation Policy is contained in Resolution 68-16 (provision 2 presented below) and in the Basin Plan. The Basin Plan states that the Central Valley Water Board actions must conform with State Water Board plans and policies and among these policies is Resolution 68-16, which requires that:

1. *"Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies."*
2. *"Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."*

For discharges to surface waters only, the Federal Antidegradation Policy (Section 131.12, Title 40, CFR) requires:

1. *"Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.*
2. *Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.*
3. *When high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.*
4. *In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act."*

The State Water Board has interpreted Resolution 68-16 to incorporate the Federal Antidegradation Policy in situations where the policy is applicable. (SWRCB Order WQ 86-17). The application of the Federal Antidegradation Policy to nonpoint source discharges (including discharges from irrigated agriculture) is limited.[11]

[11] 40 CFR 131.12(a)(2) requires that the "State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and *all cost-effective and reasonable best*

Administrative Procedures Update (APU) 90-004, Antidegradation Policy Implementation for NPDES Permitting, provides guidance for the Regional Water Boards in implementing Resolution 68-16 and 40 CFR 131.12, as these provisions apply to NPDES permitting. APU 90-004 is not applicable in the context of this Order because nonpoint discharges from agriculture are exempt from NPDES permitting.

A number of key terms are relevant to application of Resolution 68-16 and 40 CFR 131.12 to this Order. These terms are described below.

High Quality Waters: Resolution 68-16 applies whenever "existing quality of water is better than quality established in policies as of the date such policies become effective,"[12] and 40 CFR 131.12 refers to "quality of waters [that] exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation." Such waters are "high quality waters" under the state and federal antidegradation policies. In other words, high quality waters are waters with a background quality of better quality than that necessary to protect beneficial uses.[13] The Water Code directs the State Water Board and the Regional Water Boards to establish water quality objectives for the reasonable protection of beneficial uses. Therefore, where water bodies contain levels of water quality constituents or characteristics that are better than the established water quality objectives, such waters are considered high quality waters.

Both state and federal guidance indicates that the definition of high quality waters is established by constituent or parameter [State Water Board Order WQ 91-10; USEPA Water Quality Handbook, Chapter 4 Antidegradation (40 CFR 131.12) ("EPA Handbook")]. Waters can be of high quality for some constituents or beneficial uses but not for others. With respect to degraded groundwater, a portion of the aquifer may be degraded with waste while another portion of the same aquifer may not be degraded with waste. The portion not degraded is high quality water within the meaning of Resolution 68-16. See State Water Board Order WQ 91-10.

In order to determine whether a water body is a high quality water with regard to a given constituent, the background quality of the water body unaffected by the discharge must be compared to the water quality objectives. That background is generally determined based on current conditions of the water body. See SWRCB Order WQ-2000-07, WQ-86-8. If the quality of a water body has declined since the adoption of the relevant policies and that subsequent lowering was not a result of regulatory action consistent with the state antidegradation policy, a baseline representing the historically higher water quality may be an appropriate representation of background.[14] However, if the decline in water quality was permitted consistent with state and federal antidegradation policies, the most recent water quality resulting from permitted action still constitutes the relevant baseline for determination of whether the water body is high quality. See, e.g., SWRCB Order WQ 2009-0007 at 12. Additionally, if water

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management practices for nonpoint source control." The EPA Handbook, Chapter 4, clarifies this as follows: "Section 131.12(a)(2) does not mandate that States establish controls on nonpoint sources. The Act leaves it to the States to determine what, if any, controls on nonpoint sources are needed to provide attainment of State water quality standards (See CWA Section 319). States may adopt enforceable requirements, or voluntary programs to address nonpoint source pollution. Section 40 CFR 131.12(a)(2) does not require that States adopt or implement best management practices for nonpoint sources prior to allowing point source degradation of a high quality water. However, States that have adopted nonpoint source controls must assure that such controls are properly implemented before authorization is granted to allow point source degradation of water quality." Accordingly, in the context of nonpoint discharges, the BPTC standard established by state law controls.

[12] Such policies would include policies such as State Water Board Resolution 88-63, Sources of Drinking Water Policy, establishing beneficial uses, and water quality control plans.

[13] USEPA Water Quality Handbook, Chapter 4 Antidegradation (40 CFR 131.12) , defines "high quality waters" as "those whose quality exceeds that necessary to protect the section 101(a)(2) goals of the Act [Clean Water Act], regardless of use designation."

[14] The state antidegradation policy was adopted in 1968, therefore water quality as far back as 1968 may be relevant to an antidegradation analysis. For purposes of application of the federal antidegration policy only, the relevant year would be 1975.

quality conditions have improved historically, the current higher water quality would again be the point of comparison for determining the status of the water body as a high quality water.

Best Practicable Treatment or Control: Resolution 68-16 requires that, where degradation of high quality waters is permitted, best practicable treatment and control (BPTC) limits the amount of degradation that may occur. Neither the Water Code nor Resolution 68-16 defines the term "best practicable treatment or control."

Despite the lack of a BPTC definition, certain State Water Board water quality orders and other documents provide direction on the interpretation of BPTC. The State Water Board has stated: "one factor to be considered in determining BPTC would be the water quality achieved by other similarly situated dischargers, and the methods used to achieve that water quality." (See Order WQ 2000-07, at pp. 10-11). In a "Questions and Answers" document for Resolution 68-16 (the Questions and Answers Document), BPTC is interpreted to additionally include a comparison of the proposed method to existing proven technology; evaluation of performance data (through treatability studies); comparison of alternative methods of treatment or control, and consideration of methods currently used by the discharger or similarly situated dischargers.[15] The costs of the treatment or control should also be considered. Many of the above considerations are made under the "best efforts" approach described later in this section. In fact, the State Water Board has not distinguished between the level of treatment and control required under BPTC and what can be achieved through "best efforts."

The Regional Water Board may not "specify the design, location, type of construction, or particular manner in which compliance may be had with [a] requirement, order, or decree" (Water Code 13360). However, the Regional Water Board still must require the discharger to demonstrate that the proposed manner of compliance constitutes BPTC (SWRCB Order WQ 2000-7). The requirement of BPTC is discussed in greater detail below.

Maximum Benefit to People of the State: Resolution 68-16 requires that where degradation of water quality is permitted, such degradation must be consistent with the "maximum benefit to people of the state." Only after "intergovernmental coordination and public participation" and a determination that "allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located" does 40 CFR 131.12 allow for degradation.

As described in the Question and Answers Document, factors considered in determining whether degradation of water quality is consistent with maximum benefit to people of the State include economic and social costs, tangible and intangible, of the proposed discharge, as well as the environmental aspects of the proposed discharge, including benefits to be achieved by enhanced pollution controls. Closely related to the BPTC requirement, consideration must be given to alternative treatment and control methods and whether lower water quality can be abated or avoided through reasonable means, and the implementation of feasible alternative treatment or control methods should be considered.

USEPA guidance clarifies that the federal antidegradation provision "is not a 'no growth' rule and was never designed or intended to be such. It is a policy that allows public decisions to be made on important environmental actions. Where the state intends to provide for development, it may decide under this section, after satisfying the requirements for intergovernmental coordination and public participation, that some lowering of water quality in "high quality waters" is necessary to accommodate important economic or social development" (EPA Handbook for Developing Watershed Plans to Restore and Protect Our Waters, Chapter 4). Similarly, under Resolution 68-16, degradation is permitted where maximum benefit to the people of the state is demonstrated.

Water Quality Objectives and Beneficial Uses: As described above, Resolution 68-16 and Section 40 CFR 131.12 are both site-specific evaluations that are not easily employed to address large areas or broad implementation for classes of discharges. However, as a floor, any degradation permitted

[15] See *Questions and Answers, State Water Resources Control Board, Resolution 68-16* (February 16, 1995).

under the antidegradation policies must not cause an exceedance of water quality objectives or a pollution or nuisance. Furthermore, the NPS Policy establishes a floor for all water bodies in that implementation programs must address NPS pollution in a manner that achieves and maintains water quality objectives and beneficial uses.

Waters that are Not High Quality: The "Best Efforts" Approach: Where a water body is at or exceeding water quality objectives already, it is not a high quality water and is not subject to the requirements of the antidegradation policy. As stated previously, data collected by the Central Valley Water Board, dischargers, educational institutions, and others demonstrate that many water bodies in the Central Valley Region are already impaired for various constituents associated with irrigated agricultural activities.

Where a water body is not high quality and the antidegradation policies are accordingly not triggered, the Central Valley Water Board should under State Water Board precedent to set limitations more stringent than the objectives set forth in the Basin Plan. The State Water Board has directed that, "where the constituent in a groundwater basin is already at or exceeding the water quality objective, . . . the Regional Water Board should set limitations more stringent than the Basin Plan objectives if it can be shown that those limitations can be met using 'best efforts.'" SWRCB Order WQ 81-5; *see also* SWRCB Orders Nos. WQ 79-14, WQ 82-5, WQ 2000-07. Finally, the NPS Policy establishes standards for management practices.

The "best efforts" approach involves the Regional Water Board establishing limitations expected to be achieved using reasonable control measures. Factors which should be analyzed under the "best efforts" approach include the effluent quality achieved by other similarly situated dischargers, the good faith efforts of the discharger to limit the discharge of the constituent, and the measures necessary to achieve compliance. SWRCB Order WQ 81-5, at p. 7. The State Water Board has applied the "best efforts" factors in interpreting BPTC. (See SWRCB Order Nos. WQ 79-14, and WQ 2000-07).

In summary, the board may set discharge limitations more stringent than water quality objectives even outside the context of the antidegradation policies. The "best efforts" approach must be taken where a water body is not "high quality" and the antidegradation policies are accordingly not triggered.

APPLICATION OF RESOLUTION 68-16 REQUIREMENTS TO THIS ORDER

The determination of a high quality water within the meaning of the antidegradation policies is water body and constituent-specific. Very little guidance has been provided in state or federal law with respect to applying the antidegradation policy to a program or general permit where multiple water bodies are affected by various discharges, some of which may be high quality waters and some of which may, by contrast, have constituents at levels that already exceed water quality objectives. Given these limitations, the board has used readily available information regarding the water quality status of surface and ground waters in the Tulare Lake Basin Area to construct provisions in this Order to meet the substantive requirements of Resolution 68-16.

This Order regulates discharges from thousands of individual fields to a very large number of water bodies within the Tulare Lake Basin Area. There is no comprehensive, waste constituent–specific information available for all surface waters and groundwater aquifers accepting irrigated agricultural wastes that would allow site-specific assessment of current conditions. Likewise, there is no comprehensive historical dataset.[16]

However, data collected by the Central Valley Water Board, dischargers, educational institutions, and others demonstrate that many water bodies within the Tulare Lake Basin Area are already impaired for various constituents that are or could be associated with irrigated agricultural activities. As described above, there are surface water quality management plan requirements for the following constituents and

[16]Irrigated lands discharges have been regulated under a conditional waiver since 1982, but comprehensive data as to trends under the waiver are not available.

indicators: pH, electrical conductivity, dissolved solids, dissolved oxygen, E. coli, fecal coliform, boron, molybdenum, chlorpyrifos, DDE, toxaphene, Ceriodaphnia dubia, Pimephales promelas, Selenastrum capricornutum, and Hyalella azteca. These surface water bodies within the watershed not meeting water quality objectives would not be considered "high quality waters" with respect to these constituents. Those same data collection efforts also indicate that surface water bodies within the watershed meet objectives for particular constituents and would be considered "high quality waters" with respect to those constituents.

Similarly, as described above in the "Groundwater Quality Monitoring" section, large areas within the Tulare Lake Basin Area contain groundwater wells which contain maximum nitrate levels above applicable water quality objectives. The groundwater represented by these wells may not be considered "high quality" with respect to nitrates. However, available data show that currently existing quality of certain water bodies is better than the water quality objectives; for example, deeper groundwaters, represented by municipal supply wells, are generally high quality with respect to pesticides and nitrates. Degradation of such waters can be permitted only consistent with the state and federal antidegradation policies.

Given the significant variation in conditions over the broad areas covered by this Order, any application of the antidegradation requirements must account for the fact that at least some of the waters into which agricultural discharges will occur are high quality waters (for some constituents). Further, the Order provisions should also account for the fact that even where a water body is not high quality (such that discharge into that water body is not subject to the antidegradation policy), the board should, under State Water Board precedent, impose limitations more stringent than the objectives set forth in the Basin Plan, if those limits can be met by "best efforts."

Consistency with BPTC and the "Best Efforts" Approach

Due to the numerous commodities being grown on irrigated agricultural lands and varying hydrogeologic conditions within the Tulare Lake Basin Area, identification of a specific technology or treatment device as BPTC or "best efforts" has not been accomplished. By contrast, there are a variety of technologies that have been shown to be effective in protecting water quality. For example, Chapter 5 of the Irrigated Lands Program Existing Conditions Report[17] (ECR) describes that there are numerous management practices that Members could implement to achieve water quality protection goals. The Central Valley Water Board recognizes that there is often site-specific, crop-specific, and regional variability that affects the selection of appropriate management practices, as well as design constraints and pollution-control effectiveness of various practices.

Growers need the flexibility to choose management practices that best achieve a management measure's performance expectations given their own unique circumstances. Management practices developed for agriculture are to be used as an overall system of measures to address nonpoint-source pollution sources on any given site. In most cases, not all of the practices will be needed to address the nonpoint sources at a specific site. Operations may have more than one constituent of concern to address and may need to employ two or more of the practices to address the multiple sources. Where more than one source exists, the application of the practices should be coordinated to produce an overall system that adequately addresses all sources for the site in a cost-effective manner.

There is no specific set of technologies, practices, or treatment devices that can be said to achieve BPTC/best efforts universally in the Tulare Lake Basin Area. This Order, therefore, establishes a set of performance standards that must be achieved and an iterative planning approach that will lead to implementation of BPTC/best efforts. The iterative planning approach will be implemented as two distinct processes, 1) establishment of baseline set of universal farm water quality management goals combined with upfront evaluation, planning and implementation of management practices to attain those goals, and 2) additional planning and implementation measures where degradation trends in high quality

[17] California Regional Water Quality Control Board, Central Valley Region, and Jones and Stokes. 2008. *Irrigated Lands Regulatory Program Existing Conditions Report.* Sacramento, CA.

waters are observed that threaten to impair a beneficial use or where beneficial uses are impaired (i.e., water quality objectives are not being met). Taken together, these processes are considered BPTC/best efforts. The planning and implementation processes that growers must follow on their farms should lead to the on-the-ground implementation of the optimal practices and control measures to address waste discharge from irrigated agriculture.

1. Farm Management Performance Standards

This Order establishes on-farm standards for implementation of management practices that all Members must achieve. The selection of appropriate management practices must include analysis of site-specific conditions, waste types, discharge mechanisms, and crop types. Considering this, as well as the Water Code 13360 mandate that the Regional Water Board not specify the manner of compliance with its requirements, selection must be done at the farm level. Following are the performance standards that all Members must achieve:

a. minimize waste discharge offsite in surface water,
b. minimize or eliminate the discharge of sediment above natural background levels,
c. minimize percolation of waste to groundwater,
d. minimize excess nutrient application relative to predicted crop need,
e. prevent pollution and nuisance,
f. achieve and maintain water quality objectives and beneficial uses, and
g. protect wellheads from surface water intrusion.

BPTC is not defined in Resolution 68-16. However, the State Water Board describes in their 1995 Questions and Answers, Resolution 68-16: "To evaluate the best practicable treatment or control method, the discharger should compare the proposed method to existing proven technology; evaluate performance data, e.g., through treatability studies; compare alternative methods of treatment or control; and/or consider the method currently used by the discharger or similarly situated dischargers." Available state and federal guidance on management practices may serve as a measure of the types of water quality management goals for irrigated agriculture recommended throughout the state and country (e.g., water quality management goals for similarly situated dischargers). This will provide a measure of whether implementation of the above goals will lead to implementation of BPTC/best efforts.

- As part of California's Nonpoint Source Pollution Control Program, the State Water Board, California Coastal Commission, and other state agencies have identified seven management measures to address agricultural nonpoint sources of pollution that affect state waters (*California's Management Measures for Polluted Runoff*, referred to below as "Agriculture Management Measures").[18] The agricultural management measures include practices and plans installed under various NPS programs in California, including systems of practices commonly used and recommended by the USDA as components of resource management systems, water quality management plans, and agricultural waste management systems.

- USEPA's National Management Measures to Control Nonpoint Source Pollution from Agriculture (EPA 841-B-03-004, July 2003;),[19] "*is a technical guidance and reference document for use by State, local, and tribal managers in the implementation of nonpoint source pollution*

[18] *California's Management Measures for Polluted Runoff* (<http://www.waterboards.ca.gov/water_issues/programs/nps/docs/cammpr/info.pdf>)
[19] (<http://water.epa.gov/polwaste/nps/agriculture/agmm_index.cfm>)

management programs. It contains information on the best available, economically achievable means of reducing pollution of surface and ground water from agriculture."

Both of the above guidance documents describe a series of management measures, similar to the farm management performance standards required by the Order. The agricultural management measures described in the state and USEPA reference documents generally include: 1) erosion and sediment control, 2) facility wastewater and runoff from confined animal facilities, 3) nutrient management, 4) pesticide management, 5) grazing management, 6) irrigation water management, and 7) education and outreach. A comparison of the recommendations with the Order's requirements is provided below.

Management measure 1, erosion and sediment control. Practices implemented to minimize waste discharge offsite and erosion (performance standards a and b) are consistent with this management measure to achieve erosion and sediment control. The Order requires that all Members implement sediment discharge and erosion prevention practices to minimize or eliminate the discharge of sediment above natural background levels. Those Members that have the potential to discharge surface water must develop a farm-specific sediment and erosion control plan.

Management measure 2 is not applicable, as this Order does not address waste discharges from confined animal facilities

Management measure 3, nutrient management. As described in the State's Agricultural Management Measures document, "this measure addresses the development and implementation of comprehensive nutrient management plans for areas where nutrient runoff is a problem affecting coastal waters and/or water bodies listed as impaired by nutrients." Nutrient management practices implemented to meet performance standard d is consistent with this measure. The Order also requires nitrogen budgets be developed by all Members. Where nutrients are causing exceedances of water quality objectives in surface waters, this Order would require development of a detailed SQMP which would address sources of nutrients and require implementation of practices to manage nutrients.

Management measure 4, pesticide management. As described in the State's Agricultural Management Measures document, this measure "is intended to reduce contamination of surface water and groundwater from pesticides." Performance standards a, c, e, f, and g are consistent with this management measure, requiring Members to implement practices that minimize waste discharge to surface and groundwater (such as pesticides), prevent pollution and nuisance, achieve and maintain water quality objectives, and implement wellhead protection measures.

Management measure 5, grazing management. As described in the state Agriculture Management Measures document, this measure is "intended to protect sensitive areas (including streambanks, lakes, wetlands, estuaries, and riparian zones) by reducing direct loadings of animal wastes and sediment." While none of the Order's farm management goals directly address grazing management, performance standards a, b, e and f, when considered by an irrigated pasture operation would lead to the same management practices, e.g., preventing erosion, discharge of sediment, and ensuring that animal waste loadings do not cause pollution or nuisance, and achieve water quality objectives. The Order also requires that all Members implement sediment discharge and erosion prevention practices to minimize or eliminate the discharge of sediment above natural background levels.

Management measure 6, irrigation water management. As described in the state Agricultural Management Measures document, this measure "promotes effective irrigation while reducing pollutant delivery to surface and ground waters." Performance standards a and c, requiring Members

to minimize waste discharge to surface and groundwater will lead to practices that will also achieve this management measure. For example, a Member may choose to implement efficient irrigation management programs (e.g., timing, uniformity testing), technologies (e.g., spray, drip irrigation, tailwater return), or other methods to minimize discharge of waste to surface water and percolation to groundwater.

Management measure 7, education and outreach. The Order requires that third-party groups conduct education and outreach activities to inform Members of program requirements and water quality problems.

Implementation of practices to achieve the Order's water quality requirements described above is consistent with the state and federal guidance for management measures. Because these measures are recommended for similarly situated dischargers (e.g., agriculture), it is expected that effectively meeting the requirements of the Order will lead to implementation of BPTC/best efforts by all Members.

2. Additional Planning and Implementation Measures (SQMP/GQMPs)

This Order requires development of water quality management plans (surface or groundwater) where degradation trends are observed that threaten to impair a beneficial use or where beneficial uses are impaired (i.e., water quality objectives are not being met). In the absence of such specific monitoring trends, the Central Valley Water Board does not have sufficient evidence to conclude that waste discharges authorized by the Order are causing degradation. Further, Resolution 68-16 does not require Members to use technology that is better than necessary to prevent degradation. As such, the board presumes that the performance standards required by this Order are sufficiently achieving BPTC where water quality conditions and management practice implementation are already preventing degradation. Further, since BPTC determinations are informed by the consideration of costs, it is important that discharges in these areas not be subject to the more stringent and expensive requirements associated with SQMPs/GQMPs. Such additional costs could have adverse economic effects on the industry.

SQMPs/GQMPs include requirements to investigate sources, develop strategies to implement practices to ensure waste discharges are meeting the Orders surface and groundwater discharge limitations, and develop a monitoring strategy to provide feedback on the effectiveness of the management plan. Under these plans, additional management practices will be implemented in an iterative manner, to ensure that the management practices represent BPTC/best efforts and that degradation does not threaten beneficial uses. The SQMPs/GQMPs need to meet the performance standards set forth in this Order.

It is also important to note that in some cases, other agencies may establish performance standards that are equivalent to BPTC and may be relied upon as part of a SQMP or GQMP. For example, the Department of Pesticide Regulation (DPR) has established Groundwater Protection Areas within the Tulare Lake Basin Area that require growers to implement specific groundwater quality protection requirements for certain pesticides. The practices required under DPR's Groundwater Protection Program are considered BPTC for those pesticides requiring permits in groundwater protection areas, since the practices are designed to prevent those pesticides from reaching groundwater and they apply uniformly to similarly situated dischargers in the area.

The State Water Board indicates in its Questions and Answers, Resolution 68-16: "To evaluate the best practicable treatment or control method, the discharger should…evaluate performance data, e.g., through treatability studies..." Water quality management plans, referred to as SQMPs/GQMPs above, institute an iterative process whereby the effectiveness of any set of practices in minimizing degradation will be periodically reevaluated as necessary and/or as more recent and detailed water

quality data become available. This process of reviewing data and instituting additional practices where necessary will continue to assure that BPTC/best efforts are implemented and will facilitate the collection of information necessary to demonstrate the performance of the practices. This iterative process will also ensure that the highest water quality consistent with maximum benefit to the people of the state will be maintained.

SUMMARY

Members are required to implement practices to meet the above goals and periodically review the effectiveness of implemented practices and make improvements where necessary. Members will identify the practices they are implementing to achieve water quality protection goals as part of Farm Evaluations and SQMPs/GQMPs. Also, the Order requires water quality monitoring aimed to identify trends and evaluate effectiveness of management practices.

Requirements for individual Farm Evaluations, management practices tracking, and water quality monitoring will work to ensure that degradation is minimized. These requirements are aimed to ensure that all irrigated lands are implementing management practices that minimize degradation, the effectiveness of such practices is evaluated, and feedback monitoring is conducted to ensure that degradation is limited. The Order will work to achieve site-specific antidegradation and antidegradation-related requirements through implementation of BPTC/best efforts as appropriate and representative monitoring to confirm the effectiveness of the BPTC/best efforts measures in achieving their goals. The Order relies on implementation of practices and treatment technologies that constitute BPTC/best efforts, based to the extent possible on existing data, and requires monitoring of water quality to ensure that the selected practices in fact constitute BPTC where degradation of high quality waters is or may be occurring, and best efforts where waters are already degraded. Because the State Board has not distinguished between the level of treatment and control required under BPTC and what can be achieved through best efforts, the requirements of this Order for BPTC/best efforts apply equally to high quality waters and already degraded waters.

This Order allows limited degradation of existing high quality waters. This limited degradation is consistent with maximum benefit to the people of the state for the following reasons:

- at a minimum, this Order requires that irrigated agriculture achieve and maintain compliance with water quality objectives and beneficial uses;
- the requirements implementing the Order will result in use of BPTC where irrigated agricultural waste discharges may cause degradation of high quality waters; where waters are already degraded, the requirements will result in the pollution controls that reflect the “best efforts” approach;
- Central Valley communities depend on irrigated agriculture for employment (PEIR, Appendix A);
- the State and nation depend on Central Valley agriculture for food (PEIR, Appendix A); and
- the long-term ILRP would work to prevent further degradation of surface and groundwater;

The requirements of the Order are consistent with State Water Board Resolution 68-16 and the limited degradation that would be allowed is consistent with the maximum benefit to the people of the state.

CALIFORNIA WATER CODE SECTIONS 13141 AND 13241

The total estimated annual cost of compliance with this Order, e.g., summation of costs for administration, monitoring, reporting, tracking, implementation of management practices, is expected to be approximately $6 per acre greater than the cost associated with the protection of surface water only under the Coalition Group Conditional Waiver. The total estimated cost of compliance associated with continuation of the previous Coalition Group Conditional Waiver within the Tulare Lake Basin Area is expected to be approximately XX million dollars per year ($XXX per acre annually). The total estimated

cost of this Order is 100 million dollars per year ($120 per acre annually). Approximately $115 of the estimated $120 per acre annual cost of the Order is associated with implementation of water quality management practices (see discussion below for a breakdown of estimated costs). This estimate is based on evaluation of practices that growers may implement to meet the Order's requirements. Some of these practices will also help to achieve other farm related goals, such as water conservation. It must also be noted that there are a number of funding programs that may be available to assist growers in the implementation of water quality management practices through grants and loans (e.g., Environmental Quality Incentives Program, State Water Board Agricultural Drainage Management Loan Program). Following is a discussion regarding derivation of the cost estimate for the Order.

This Order, which implements the Long-term ILRP within the Tulare Lake Basin Area, is based mainly on Alternatives 2 and 4 of the PEIR. The Order contains the third-party lead entity structure, regional surface and groundwater management plans, and regional surface water quality monitoring approach similar to Alternative 2 of the PEIR; farm planning, management practices tracking, nutrient tracking, and regional groundwater monitoring similar to Alternative 4 of the PEIR; prioritized installation of groundwater monitoring wells similar to Alternative 5; and a prioritization system based on systems described by Alternatives 2 and 4. Therefore, potential costs of the Order are estimated using the costs for these components of Alternatives 2, 4, and 5 given in Tables 2-19, 2-21, and 2-22 of the *Draft Technical Memorandum Concerning the Economic Analysis of the Irrigated Lands Regulatory Program* (ICF International. 2010, Economics Report). Estimated costs of management practices are based on costs for Alternatives 2 and 4. Table 4 summarizes the major regulatory elements of the Order and provides reference to the PEIR alternative basis.

Table 2. Summary of regulatory elements

Order elements	Equivalent element from Alternatives 2 and 4
Third-party administration	Alternative 2
Farm evaluation Sediment and erosion control plan Nitrogen budgets	Alternative 4: "farm water quality management plan and certified nutrient management plan"
Surface and groundwater management plans	Alternative 2 "surface and groundwater management plans"
Regional surface water monitoring	Alternative 2 "regional surface water monitoring"
Regional trend groundwater monitoring	Alternative 4 "regional groundwater monitoring"
Representative groundwater monitoring	Alternative 4 regional groundwater monitoring, targeted site-specific studies to evaluate the effects of changes in management practices on groundwater quality and Alternative 5 installation of groundwater monitoring wells at prioritized sites
Management practice reporting	Alternative 4 "tracking of practices"
Nitrogen budget reporting	Alternative 4 "nutrient tracking"
Management practices implementation	Alternative 2 or 4 "costs of management practice implementation"

The administrative costs of the Order are estimated to be similar to the costs shown for Alternative 2 in Table 2-19 of the Economics Report. Farm evaluation, sediment and erosion control plan and nitrogen budgeting (farm plans) costs are estimated to be similar to the costs shown for Alternative 4 for farm planning (Table 2-21, Economics Report). Total surface water monitoring and reporting costs are estimated to be similar to the costs shown for Alternative 2 –essentially a continuation of the current regional surface water monitoring approach. Total regional groundwater monitoring and reporting costs are estimated to be similar to the costs shown for Alternative 4 in Table 2-21 of the Economics Report minus the "Tier 3 individual monitoring." Costs for installation of groundwater monitoring wells are estimated to be similar to the costs shown for Alternative 5 in Table 2-22 of the Economics Report. Tracking costs of management practices and nutrients applied are estimated to be similar to the costs shown for Alternative 4 in Table 2-21 of the economics report –under "tracking." Estimated management

practices costs are equal under Alternatives 2 and 4.[20] Estimated average annualized costs per acre of the Order relative to full implementation of the current waiver program in the Tulare Lake Basin Area (per acre costs are applicable to the Tulare Lake Basin Area) are summarized below in Table 3.

Table 3. Estimated annual average per acre cost of the Order relative to full implementation of the current program (PEIR Alternative 1) in the Tulare Lake Basin Area (applicable to the Tulare Lake Basin Area)

	Order	Current program	Change
Administration	0.80	0.80	--
Farm plans	0.70	--	0.70
Monitoring/reporting/tracking	3.00	1.20	1.90
Management practices	115	113	2.40
Total	119	114	4.90

* Totals may not sum due to rounding. Estimated cost figures are from Tables 2-18, 2-19, and 2-21 of the Economics Report for the Tulare Lake Basin Area. Per acre costs have been developed using the acres in the Tulare Lake Basin Area (est. 2,126,028, Table 3-3, Economics Report).

On DATE, the Water Quality Control Plan for the Tulare Lake Basin was amended to estimate potential costs and sources of financing for the long-term irrigated lands program. The estimated costs were derived by analyzing the alternatives evaluated in the PEIR using the cost figures provided in the Economics Report. The Basin Plan cost estimate is provided as a range applicable to implementation of the program throughout the Central Valley. The Basin Plan's estimated total annualized cost of the irrigated lands program is $216 million to $1.3 billion, or $27 to $168 per acre. The estimated total annual cost of this Order of $100 million dollars ($119 per acre) falls within the estimated cost range for the irrigated lands program as described in the Basin Plan when considering per acre costs ($27-$168 per acre).

The estimated total annual cost per acre of Alternative 4 in the Tulare Lake Basin Area is $XXX. The Order, based significantly on Alternative 4, has a similar cost and is expected to have similar overall economic impacts, as described in the Economics Report.

CALIFORNIA WATER CODE SECTION 13263

California Water Code section 13263 requires that the Central Valley Water Board consider the following factors, found in section 13241, when considering adoption of waste discharge requirements.

(a) Past, present, and probable future beneficial uses of water

The Central Valley Water Board's Water Quality Control Plan for the Tulare Lake Basin (Basin Plan) identifies applicable beneficial uses of surface and groundwater within the Tulare Lake Basin. The Order protects the beneficial uses identified in the Basin Plan. Applicable past, present, and probable future beneficial uses of Tulare Lake Basin waters were considered by the Central Valley Water Board as part of the Basin Planning process and are reflected in the Basin Plans themselves. The Order is a general order applicable to a wide geographic area. Therefore, it is appropriate to consider beneficial uses as identified in the Basin Plan and applicable policies, rather than a site specific evaluation that might be appropriate for WDRs applicable to a single discharger.

(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto

[20] The estimated management practice implementation costs for this Order are based on the costs estimated for Alternatives 2/4 (Tables 2-19 and 2-21, Economics Report), with an additional cost for potential engineering and design associated with tailwater design ponds.

Environmental characteristics of the Tulare Lake Basin Area have been considered in the development of irrigated lands program requirements as part of the Central Valley Water Board's 2008 *Irrigated Lands Regulatory Program Existing Conditions Report* and the PEIR. In these reports, existing water quality and other environmental conditions throughout the Central Valley have been considered in the evaluation of six program alternatives for regulating waste discharge from irrigated lands. This Order's requirements are based on the alternatives evaluated in the PEIR.

(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area

This Order provides a process to review these factors during implementation of water quality management plans (SQMPs/GQMPs). The Order requires that discharges of waste from irrigated lands to surface water and groundwater do not cause or contribute to an exceedance applicable water quality objectives. SQMPs and GQMPs are required in areas where water quality objectives are not being met –where irrigated lands are a potential source of the concern, and in areas where irrigated agriculture may be causing or contributing to a trend of degradation that may lead to an exceedance of a water quality objective. GQMPs are also required in high vulnerability groundwater areas. Under these plans, sources of waste must be estimated along with background water quality to determine what options exist for reducing waste discharge to ensure that irrigated lands are not causing or contributing to the water quality problem. The SQMPs and GQMPs must be designed to ensure that waste discharges from irrigated lands do not cause or contribute to an exceedance of a water quality objective and meet other applicable requirements of the Order, including, but limited to, section III.

(d) Economic considerations

The PEIR was supported by the *Draft Technical Memorandum Concerning the Economic Analysis of the Irrigated Lands Regulatory Program* (Economics Report). An extensive economic analysis was presented in this report to estimate the cost and broader economic impact on irrigated agricultural operations associated with the five alternatives for the irrigated lands program, including the lands regulated by this Order. Staff was also able to use that analysis to estimate costs of a sixth alternative, since the sixth alternative fell within the range of the five alternatives. This cost estimate is found in Appendix A of the PEIR. This Order is based on the alternatives evaluated in the PEIR, which is part of the administrative record. Therefore, potential economic considerations related to the Order have been considered as part of the overall economic analysis for implementation of the long-term irrigated lands program. This Order is a single action in a series of actions to implement the ILRP in the Central Valley region. Because the Order has been developed from the alternatives evaluated in the PEIR, economic effects will be within the range of those described for the alternatives.

One measure considered in the PEIR is the potential loss of Important Farmland[21] due to increased regulatory costs. This information has been used in the context of this Order to estimate potential loss of Important Farmland within the Tulare Lake Basin Area. It is estimated that approximately 23 thousand acres of Important Farmland within the Tulare Lake Basin Area potentially would be removed from production under full implementation of this Order. As described in the Economics Report, most of the estimated losses would be to lower value crop land, such as irrigated pasture and forage crops.

(e) The need for developing housing within the region

This Order establishes waste discharge requirements for irrigated lands in the Tulare Lake Basin Area. The Order is not intended to establish requirements for any facilities that accept wastewater from residences or stormwater runoff from residential areas. This Order will not affect the development of housing within the region.

[21] *Important Farmland* is defined in the PEIR as farmland identified as prime, unique, or of statewide importance by the California Department of Conservation, Farmland Mapping and Monitoring Program.

(f) The need to develop and use recycled water

This Order does not establish any requirements for the use or purveyance of recycled wastewater. Where an agricultural operation may have access to recycled wastewater of appropriate quality for application to fields, the operation would need to obtain appropriate waste discharge requirements from the Central Valley Water Board prior to initiating use. This need to obtain additional waste discharge requirements in order to recycle wastewater on agricultural fields instead of providing requirements under this Order may complicate potential use of recycled wastewater on agricultural fields. However, the location of agricultural fields in rural areas generally limits access to large volumes of appropriately treated recycled wastewater. As such, it is not anticipated that there is a need to develop general waste discharge requirements for application of recycled wastewater on agricultural fields in the Tulare Lake Basin Area.

SELECTED REFERENCES

Bartholomay, R.C., Carter, J.M., Qi, S.L., Squillace, P.J., and Rowe, G.L., 2007, Summary of Selected U.S. Geological Survey Data on Domestic Well Water Quality for the Centers for Disease Control's National Environmental Public Health Tracking Program: U.S. Geological Survey, Scientific Investigations Report 2007-5213, 57 p.

Burow, K.R., Stork, S.V., and Dubrovsky, N.M, 1998, Nitrate and Pesticides in Ground Water in the Eastern San Joaquin Valley, California: Occurrence and Trends: USGS Water-Resources Investigations Rep. 98-4040A.

Burow, K.R., Shelton, J.L., and Dubrovsky, N.M., 1998, Occurrence of nitrate and pesticides in ground water beneath three agricultural land-use settings in the eastern San Joaquin Valley, California: USGS Water-Resources Investigations Rep. 97-4284. USGS, Sacramento, CA

Burow, K.R., and Green, C.T., 2008, Spatial and Temporal Trends in Nitrate Concentrations in the Eastern San Joaquin Valley Regional Aquifer and Implications for Nitrogen Fertilizer Management, California Plant and Soil Conference: Conservation of Agricultural Resources, February 5 & 6, 2008, Visalia, California, p. 47-52.

Burow, K.R., Shelton, J.L., Dubrovsky, N.M., 2008, Regional Nitrate and Pesticide Trends in Ground Water in the Eastern San Joaquin Valley, California: Journal of Environmental Quality, Vol. 37:p. 249-263.

Burton, C.A., and Belitz, K., 2008, Ground-water quality data in the southeast San Joaquin Valley, 2005–2006—Results from the California GAMA Program: U.S. Geological Survey Data Series 351, 103 p.

California Department of Food and Agriculture, California Agricultural Statistics Review 2011-2012.

California Department of Pesticide Regulation, Pesticide Use Reporting – 2010 Summary Data by County.

California Department of Pesticide Regulations, 2012, *Study 182/228-Preliminary Summary of Results for Well Sampling Program from 1999 through 2011*.

California Department of Water Resources, 2003, California's groundwater*: California Department of Water Resources Bulletin 118, update 2003*, 246 p,

California State Water Resources Control Board, Groundwater Information Sheet – Nitrate / Nitrite 2002.

California State Water Resources Control Board, Division of Water Quality, GAMA Program, Groundwater Information Sheet – Nitrate / Nitrite Revised: February 2008.

California State Water Resources Control Board, 2012, Communities that Rely on Contaminated Groundwater, State Water Resources Control Board, Report to the Legislature, DRAFT, February 2012.

California Regional Water Quality Control Board, Central Valley Region, and Jones and Stokes. 2008. *Irrigated Lands Regulatory Program Existing Conditions Report.* Sacramento, CA.

Dubrovsky, N.M., Kratzer, C.R., Brown, L.R., Gronberg, J.M., and Burow, K.R., 1998, Water quality in the San Joaquin-Tulare Basins, California, 1992–95: USGS Circ. 1159.

Erik J. Ekdahl, Maria de la Paz Carpio-Obeso, and John Borkovich, California State Water Resources Control Board, 2009; in: Harter, T., 2009. Agricultural impacts on groundwater nitrate, Southwest Hydrology, July/August 2009, p.23-25.

Gao, S., Tanji, K.K., Banuelos, G.S. 2007. Processes and conditions affecting elevated arsenic concentrations in groundwaters of tulare basin, california, usa. Book Chapter. Trace Metals and other Contaminants in the Environment, Volume 9, pgs 383-410, 2007.

Harter, T., J. R. Lund, J. Darby, G. E. Fogg, R. Howitt, K. K. Jessoe, G. S. Pettygrove, J. F. Quinn, J. H. Viers, D. B. Boyle, H. E. Canada, N. DeLaMora, K. N. Dzurella, A. Fryjoff-Hung, A. D. Hollander, K. L. Honeycutt, M. W. Jenkins, V. B. Jensen, A. M. King, G. Kourakos, D. Liptzin, E. M. Lopez, M. M. Mayzelle, A. McNally, J. Medellin-Azuara, and T. S. Rosenstock. 2012. Addressing Nitrate in California's Drinking Water with a Focus on Tulare Lake Basin and Salinas Valley Groundwater. Report for the State Water Resources Control Board Report to the Legislature. Center for Watershed Sciences, University of California, Davis. 78 p.

ICF International. 2011. *Irrigated Lands Regulatory Program - Program Environmental Impact Report*. Final and Draft. March. (ICF 05508.05.) Sacramento, CA. Prepared for Central Valley Regional Water Quality Control Board, Sacramento, CA. Appendix A, page 46.

ICF International. 2010. *Draft Technical Memorandum Concerning the Economic Analysis of the Irrigated Lands Regulatory Program.* July 2010 (ICF 05508.05.) Sacramento, CA. Prepared for: Central Valley Regional Water Quality Control Board, Sacramento, CA.

ICF International. 2011. *Irrigated Lands Regulatory Program - Program Environmental Impact Report*. Final and Draft, March 2011. (ICF 05508.05.) Sacramento, CA. Prepared for Central Valley Regional Water Quality Control Board, Sacramento, CA.

Page, R.W., 1986, *Geology of the fresh ground-water basin of the Central Valley, California, with texture maps and sections*: U.S. Geological Survey Professional Paper 1401-C, 54 p., 5 plates in pocket.

Shelton, J.L., Pimentel, I., Fram, M.S., and Belitz, K., 2006, Groundwater-quality data in the Kern County Subbasin Study Unit, 2006: Results from the California GAMA program: U.S. Geological Survey Data Series 337.

Thiros, S.A., 2010. Section 13. *Conceptual Understanding and Groundwater Quality of the Basin-Fill Aquifer in the Central Valley, California* in *Conceptual Understanding and Groundwater Quality of Selected Basin-Fill Aquifers in the Southwestern United States*. United States Geological Survey Professional Paper 1781.

U.S. Bureau of Reclamation, *2008 Conditional One Year Pre-approval of Transfers and Exchanges Between Friant and Cross Valley Long-Term CVP Contractors and NCVP Contractors.* U.S. Department of the Interior, Bureau of Reclamations, Mid Pacific Region, South Central California Area Office, Fresno, California, EA-07-120.

U.S. Bureau of Reclamations, *Draft* Program Environmental Impact Statement / Environmental Impact Report, San Joaquin River Restoration, April 2011, SCH#2007081125.

Wright, M.T., Belitz, Kenneth, and Johnson, T., 2004, *Assessing susceptibility to contamination of two aquifer systems, Modesto and Fresno, California, 2001 and 2002*: U.S. Geological Survey Scientific Investigations Report 2004–5149, 35 p.