

**PROPOSED ORDER NO. R3-2017-0002
SUMMARY OF REQUIREMENTS AND INFORMATION/DATA
GATHERED DURING AG ORDER 2.0**

Proposed Ag Order 3.0 has essentially the same requirements as Ag Order 2.0, but expands some monitoring and reporting requirements. Staff posted a draft of Ag Order 3.0 for public comment beginning November 1, 2016 ("draft Ag Order 3.0"). Each of the following sections describes any changes between draft Ag Order 3.0 and the proposed order included in the agenda package ("proposed Ag Order 3.0"), compares the relevant provisions of proposed Ag Order 3.0 to Ag Order 2.0, and explains the reasons for the proposed changes.

Term of Ag Order 3.0

Staff is proposing a term of three years for Ag Order 3.0. This is consistent with the Board's discussion and direction at the September 2016 Board meeting. Ag Order 2.0 had a term of five years, which is the maximum term for a waiver of waste discharge requirements. A three-year term provides some time for the State Water Board to finalize its order on the East San Joaquin (ESJ) WDRs, and for the Court of Appeal to issue its decision on Ag Order 2.0. Even before those orders are issued, however, staff will begin the process of developing new compliance requirements based on the need to address the critical water quality problems associated with irrigated agriculture.

Requirements for All Tiers

eNOI

Proposed Ag Order 3.0 eNOI reporting requirements are largely consistent with those of draft Ag Order 3.0; however, staff revised the time to notify succeeding owners/operators from 30 days to 60 days, which is consistent with requests made in public comment.

See conditions 55.c-e in proposed Ag Order 3.0 for the changes below.

All growers must enroll all operations and ranches using the electronic notice of intent (eNOI). In Ag Order 2.0, growers updated the eNOI annually by October 1st of each year. Proposed Ag Order 3.0 only requires updates when a change affecting an answer to a question in the eNOI occurs; required updates must be completed within 60 days. Draft Ag Order 3.0 required updating within 30 days. This change is in response to growers' requests.

Proposed Ag Order 3.0 requires that within 60 days of a change in control or ownership of a ranch or operation, the former responsible party must notify the succeeding owner and operator about the requirement to enroll in the order. Draft Ag Order 3.0 required notification within 30 days. This change is in response to comments.

Proposed Ag Order 3.0 requires all growers to submit an eNOI within 60 days of acquiring control or ownership of the operation or ranch. Draft Ag Order 3.0 required submittal within 30 days. This change is in response to comments.

The eNOI section requiring growers to name surface waters adjacent to the enrolled ranch has been removed from the form. This information is used by staff for ranch tier assignments. In many cases, growers do not know the names of the waterbodies adjacent to the ranch. Staff assesses the waterbodies adjacent to the enrolled ranch using GIS software; growers will no longer need to provide this information on the form.

Monitoring and Reporting Programs (MRPs)

Surface Receiving Water Monitoring:

Proposed Ag Order 3.0 requires surface receiving water monitoring consistent with draft Ag Order 3.0.

Proposed changes to the MRPs for surface receiving water for all tiers relative to the Revised MRPs issued by the Executive Officer on August 22, 2016, includes the addition of a sixth water-column neonicotinoid, clothianidin, which was discussed as part of [agenda item 12](#) of the December 2016 Central Coast Water Board meeting.

The surface receiving water MRPs also include requirements for toxicity testing using *Chironomus spp.*, which is sensitive to neonicotinoid pesticides; pyrethroid pesticide chemistry in sediment; toxicity testing using the indicator species *Hyalella azteca*, which is sensitive to pyrethroid pesticides; and other parameters and sampling frequencies described in the November 1, 2016 draft MRPs for tier 1, 2 and 3 ranches.

Groundwater Monitoring:

Growers must sample all private domestic wells and the primary irrigation well on each ranch twice during calendar year 2017, once between March and June and again between September and December.

Growers can comply with groundwater monitoring requirements individually or through a third-party coalition. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in the Order unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Staff has received concept proposals from two groundwater coalitions. The Santa Rosa Creek Valley Watershed coalition and the Central Coast Groundwater Coalition have submitted draft proposals to conduct groundwater monitoring on behalf of coalition members. The Executive Officer will provide an opportunity for public comment on any approved proposals. Staff will notify interested parties once the proposals are accepted or rejected by the Executive Officer.

Farm Plans

Proposed Ag Order 3.0 requires Farm Plan development consistent with draft Ag Order 3.0.

Ag Order 2.0 required all growers, by a specified date, to develop a farm water quality management plan, install backflow prevention devices if using any sort of chemigation, and properly destroy abandoned wells. Proposed Ag Order 3.0 has no deadlines associated with these requirements because Ag Order 2.0 already required full compliance. However, these are ongoing requirements so they have been retained.

See Condition 44 of proposed Ag Order 3.0 for Farm Plan requirements. See Conditions 31 and 32 of proposed Ag Order 3.0 for backflow prevention and well abandonment requirements, respectively.

Enrollment Terminations

Staff is proposing revisions to Condition 61 of draft Ag Order 3.0.

Ag Order 2.0 did not clearly state when required information must be submitted in the event a ranch terminates coverage under the Ag Order. Consequently, a grower might terminate enrollment and vacate a ranch months before required information was due. Proposed Ag Order 3.0 requires growers to submit required data and information within 60 days of terminating enrollment of a ranch, unless otherwise approved by the Executive Officer. For example, if a grower terminates enrollment of a ranch and was required to track and report total nitrogen applied by March 1st, the total nitrogen applied report must be submitted within 60 days of the termination date. Consistent with public comment, staff revised the number of days stated in Condition 61 from 30 days to 60 days.

Requirements for Tier 2 and Tier 3 Ranches

Annual Compliance Form

Proposed Ag Order 3.0 requires Annual Compliance Form reporting consistent with draft Ag Order 3.0.

Proposed Ag Order 3.0 requires tier 2 and tier 3 ranches to electronically submit an Annual Compliance Form and update the form annually. Ag Order 2.0 had the same requirement.

Growers have requested that the required update be scheduled for March of each year, rather than October of each year as was required in Ag Order 2.0. Proposed Ag Order 3.0 incorporates that request and requires that the Annual Compliance Form be updated each March 1st, beginning in 2018.

Proposed Ag Order 3.0 removes three portions of the Annual Compliance Form:

- Section B, irrigation water concentration information. Proposed Ag Order 3.0 expands the total nitrogen applied reporting requirement to more tier 2 and tier 3 ranches, as described below. The total nitrogen applied form includes reporting of irrigation water nitrate concentration. Requiring this information on the Annual Compliance Form is redundant.
- Section C, risk assessment of loading nitrogen to groundwater. In Ag Order 2.0, this section was used to assess whether a ranch was required to report total nitrogen applied and develop an irrigation and nutrient management plan (INMP). In proposed Ag Order 3.0, total nitrogen applied and INMP requirements are assigned based on a different set of criteria (discussed below). Section C, therefore, is no longer necessary.
- Photo monitoring requirement. Proposed Ag Order 3.0 does not require photo monitoring, except in conjunction with the Water Quality Buffer Plan requirements. This section in the Annual Compliance Form is therefore not necessary.

See Condition 67 of proposed Ag Order 3.0 and Part 3 of the MRP for tier 2 and MRP for tier 3 ranches for Annual Compliance Form requirements.

Total Nitrogen Applied

Proposed Ag Order 3.0 requires total nitrogen applied reporting consistent with draft Ag Order 3.0.

Proposed Ag Order 3.0 requires that tier 2 and tier 3 ranches growing any high-risk crop annually submit a total nitrogen applied report for all crops grown on the ranch. This requirement is consistent with the Board's direction from the September 2016 Board meeting and staff's public discussion at the September and December 2016 Board meetings.

Proposed Ag Order 3.0 expands the nitrogen applied requirement to all tier 2 and tier 3 ranches growing any high-risk crop. All ranches growing any high-risk crop must report total nitrogen applied to all crops grown on the ranch, including crops that are not on the high-risk list.

Ag Order 2.0 allowed growers to break up the ranches into risk units and then report only on the risk units that received a “high” risk determination in Section C of the Annual Compliance Form. Most growers did not use the risk unit option; instead they reported total nitrogen applied on all crops grown on the ranch. Consequently, staff received nitrogen application rates for non-high-risk crops, some of which had far greater application rates than high-risk crops. Potential nitrogen loading from non-high risk crops could be a significant contributor to the nitrate pollution in surface water and groundwater; therefore, it is important for staff to collect this information. Additionally, the Expert Panel recommendations included a recommendation for uniform regulation amongst growers, rather than applying regulation via a vulnerability or risk-based approach. Applying the total nitrogen applied requirement across more growers is a step toward a universal requirement for nitrogen reporting. Hence, proposed Ag Order 3.0 includes the requirement to report nitrogen applied to all crops including those not deemed to be high-risk.

Section C, risk assessment, of the Annual Compliance Form required growers to predict what they would grow in the year ahead, as well as predict field conditions that they would encounter during the coming year, and use this information to complete Section C. Growers and consultants have informed staff that these predictions are difficult and often not accurate, thereby requiring them to adjust the Annual Compliance Form during the year, if they remembered to do so. Growers and consultants have requested that staff devise a method of minimizing the need to update enrollment documents, including the Annual Compliance Form. Requiring growers who are subject to the total nitrogen applied reporting requirement to submit nitrogen application information for all crops grown on the ranch does away with the need for growers to predict the year ahead, helps minimize the number of times growers need to review and edit their Annual Compliance Form, and helps provide staff the information they need to understand the sources of nitrate contamination prevalent in surface water and groundwater.

Proposed Ag Order 3.0 expands the total nitrogen applied reporting requirement to all tier 2 and tier 3 ranches growing a high-risk crop. Staff estimates that the expansion will result in an increase of required ranches reporting from the current 700 ranches to about 1,700 ranches, representing a reporting acreage increase from about 97,000 acres currently required to 230,000 acres, which is about 87% of the acreage of all enrolled tier 2 and tier 3 ranches.

Consistent with many grower and technical service providers’ comments during the public outreach efforts, proposed Ag Order 3.0 moves the total nitrogen applied report date from October 1st to March 1st of each year. The total nitrogen applied reporting period coincides with a calendar year; any crops that are harvested during the reporting period are reported on the March 1st following the calendar year of harvest. The total nitrogen applied to each reported crop includes nitrogen applied at any time during its life cycle. Special rules apply to long-term crops, as explained in the total nitrogen applied instructions posted on the ILRP program page of the Central Coast Water Boards website.

Requirements for Tier 3 Ranches

Individual Surface Water Discharge Monitoring and Reporting

Proposed Ag Order 3.0 requires individual surface water discharge monitoring and reporting consistent with draft Ag Order 3.0.

Ag Order 2.0 required tier 3 ranches with either storm water or irrigation water discharges to surface water to conduct monitoring and reporting of the discharge. The ranches were required to develop and submit a Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) to the Executive Officer for approval, prior to conducting monitoring by December 1, 2013. Monitoring and reporting results were due each October 1st, beginning in 2014. Proposed Ag Order 3.0 continues the required monitoring and reporting of individual surface water discharges from tier 3 ranches. Any newly enrolled tier 3 ranch must submit a SAP and QAPP by March 1, 2018. For tier 3 ranches newly enrolled after March 1, 2018, a SAP and QAPP must be submitted on a schedule directed by the Executive Officer.

See conditions 70 and 71 of Proposed Ag Order 3.0 and Part 5 of the MRP for tier 3 ranches.

Irrigation and Nutrient Management Plan

Staff proposes revisions to the irrigation and nutrient management plan reporting requirements from draft Ag Order 3.0; staff revised the reporting frequency from annually to once during the term of Ag Order 3.0.

Ag Order 2.0 required tier 3 ranches with a high-risk of loading nitrate to groundwater to develop and implement an irrigation and nutrient management plan (INMP). The high-risk determination was assessed using Section C of the Annual Compliance Form. These ranches were not required to submit the INMP; rather, they were required to submit an INMP Effectiveness Report by October 1, 2016.

Proposed Ag Order 3.0 requires these same growers to update their INMPs as necessary, implement their INMPs, and submit an updated Effectiveness Report by March 1, 2019. The required information is the same as that required in Ag Order 2.0, and is described in the MRP for tier 3 ranches.

Ag Order 3.0 requires newly enrolled tier 3 ranches to develop and implement an INMP, as directed by the Executive Officer. For newly enrolled tier 3 ranches, the Executive Officer will use the risk assessment established in Ag Order 2.0 and outlined in Section C of the Annual Compliance Form to make this determination. Required tier 3 ranches must develop and implement an INMP within 18 months of enrolling the ranch, then submit an INMP Effectiveness Report by March 1, 2019.

See Condition 72-74 of draft Ag Order 3.0 and Part 6 of the MRP for tier 3 ranches.

Water Quality Buffer Plan

Staff proposes to revise the water quality buffer plan reporting requirements from draft Ag Order 3.0; staff revised the reporting frequency from annually to once during the term of Ag Order 3.0.

Ag Order 2.0 required tier 3 ranches adjacent to a surface water listed on the 2010 Clean Water Act section 303(d) list for sediment, turbidity, or temperature to draft, submit, and implement a water quality buffer plan or alternative plan demonstrating water quality protection. The 2010 Clean Water Act section 303(d) list is still the most current 303(d) list of impaired waters. Proposed Ag Order 3.0 requires these same growers to submit a water quality buffer plan status report (WQBP Status Report) or an Alternative to WQBP Status Report. The status report is due once during the term of Ag Order 3.0, on March 1, 2019. Growers must use the form developed and distributed during Ag Order 2.0, or submit an alternative status report in a format approved by the Executive Officer. The required information is the same as that required in Ag Order 2.0 and is described in the MRP for tier 3 ranches.

Proposed Ag Order 3.0 requires newly enrolled tier 3 ranches that are adjacent to a 303(d) listed water for sediment, turbidity or temperature to comply with the water quality buffer plan requirement. Newly enrolled tier 3 ranches must submit a plan, or alternative, within 18 months of enrolling the ranch, and then submit a status report by March 1, 2019.

See Conditions 75-77 of the draft Ag Order 3.0, and Part 7 of the MRP for tier 3 ranches.

Effective Control of Discharges

Proposed Ag Order 3.0 requires effective control of discharges consistent with draft Ag Order 3.0.

Ag Order 2.0 required tier 3 ranches to effectively control discharges of pesticides, toxic substances, sediment, turbidity, nutrients, and nitrate to groundwater by specified dates outlined in Conditions 80-83 of the order. The specified dates have now passed. Proposed Ag Order 3.0 does not contain new dates in these conditions.

See Conditions 80-83 of Proposed Ag Order 3.0.

RESEARCH AND DATA GATHERED DURING AG ORDER 2.0

California Nitrogen Assessment Report

The California Nitrogen Assessment Report (published June 2016) was developed by the Agricultural Sustainability Institute at UC Davis. The report assesses sources, uses, fate, benefits, effects, and management of nitrogen in the State of California¹. The authors sought to provide an objective, scientific perspective to help guide management and policy decisions aimed at resolving the negative effect associated with excessive nitrogen loading and the associated pollution this caused.

The report contained the following findings:

- The authors assessed nitrogen imports into California as of 2005. California annually imports about 1.8 million tons of new nitrogen. Imports include fertilizer, animal feed, fossil fuels and nitrogen fixation. Synthetic fertilizer nitrogen was the greatest amount imported at 514,000 tons. Crops grown in California take up less than half of this nitrogen, leaving the remainder applied available for leaching to groundwater or discharging to surface water.
- To reverse the trend of nitrogen accumulation in groundwater, leaching must be reduced by about 283,000 tons, representing a 67% decrease from current levels; this exceeds the reduction capacity of current management practice technology. However, research suggests that the average nitrogen reduction realized from proven practices, on average, exceeds the reduction being realized from practices currently implemented. In other words, there is opportunity for improvement.
- Although there is opportunity for improvement using currently known practices, development of new improved practices is necessary to meet the objective of a 67% decrease in leached nitrogen to groundwater. Growers will continue to play a role in the development of new improved practices. To accomplish this, continued agricultural profitability is needed to foster this technological development. Regulatory compliance plays a role by allowing regulatory flexibility to develop improved controls.

¹ <http://asi.ucdavis.edu/programs/sarep/research-initiatives/are/nutrient-mgmt/california-nitrogen-assessment>

- Regulating the emission of nitrogen (e.g., loading), rather than nitrogen input (i.e., nitrogen application) allows growers more flexibility in developing cost-effective means of regulatory compliance while still producing a marketable crop. However, to accomplish this will require development of methods to assess nitrogen emissions that are accurate and economically feasible. Therefore, policy that allows continual feedback between agricultural profitability, nitrogen management development, environmental outcome, and regulation is necessary to achieve our goals.
- Reversing the trend of nitrate loading to groundwater will take time. Depending on site conditions, it could take years, decades, even centuries until nitrogen already leached into the soil will discharge to groundwater. Therefore, treatment or other short-term solutions (such as replacement water), are necessary where drinking water wells are contaminated by nitrate.

UC Davis Nitrate Report

The State Water Board was required by Water Code section 83002.5 to prepare a report to the California Legislature to increase the understanding of the causes of nitrate contamination in groundwater, identify potential solutions, ensure safe drinking water to the people of the State, and identify funding opportunities to do so. The University of California, Davis under the principal direction of Dr. Thomas Harter and Dr. Jay R. Lund, prepared the report *Addressing Nitrate in California's Drinking Water: With a Focus on Tulare Lake Basin and Salinas Valley Groundwater* (UC Davis Nitrate Report).²

The study area included the Tulare Lake Basin and the Salinas Valley in Monterey County. These two areas include four of the five counties with the largest agricultural production in the country, representing 40% of the agricultural land area in the state.

The UC Davis Nitrate Report found that cropland accounted for 96% of the total nitrate sources to groundwater in the study area, with synthetic fertilizer making up 54% and animal manure making up 33%. The figure below is taken directly from the UC Davis Nitrate Report.

² Harter, T. and Lund, Jay R. January 2012. *Addressing Nitrate in California's Drinking Water: With a Focus on Tulare Lake Basin and Salinas Valley Groundwater*. Center for Watershed Sciences, University of California, Davis Groundwater Nitrate Project, Implementation of Senate Bill X2 1. http://www.waterboards.ca.gov/water_issues/programs/nitrate_project/

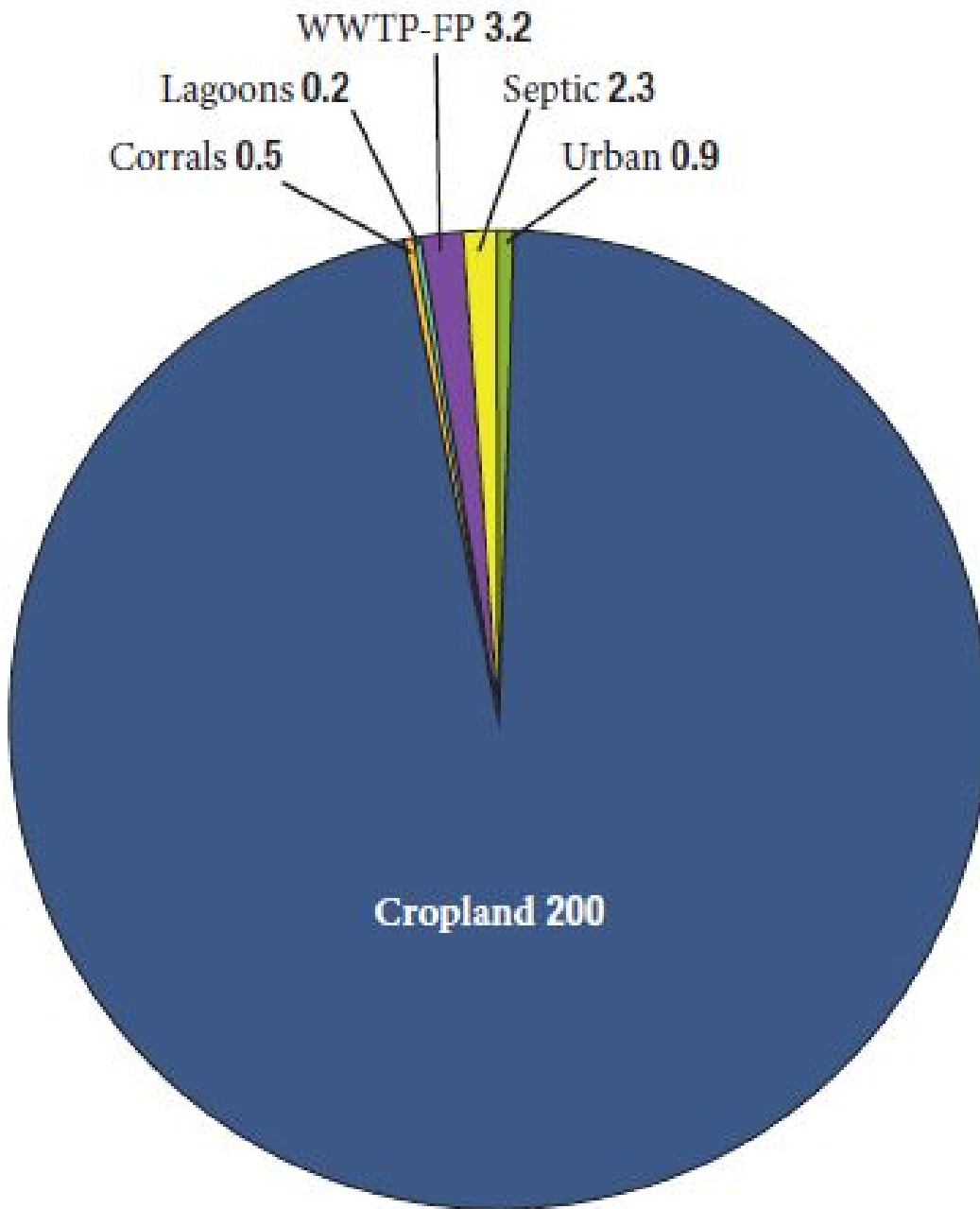
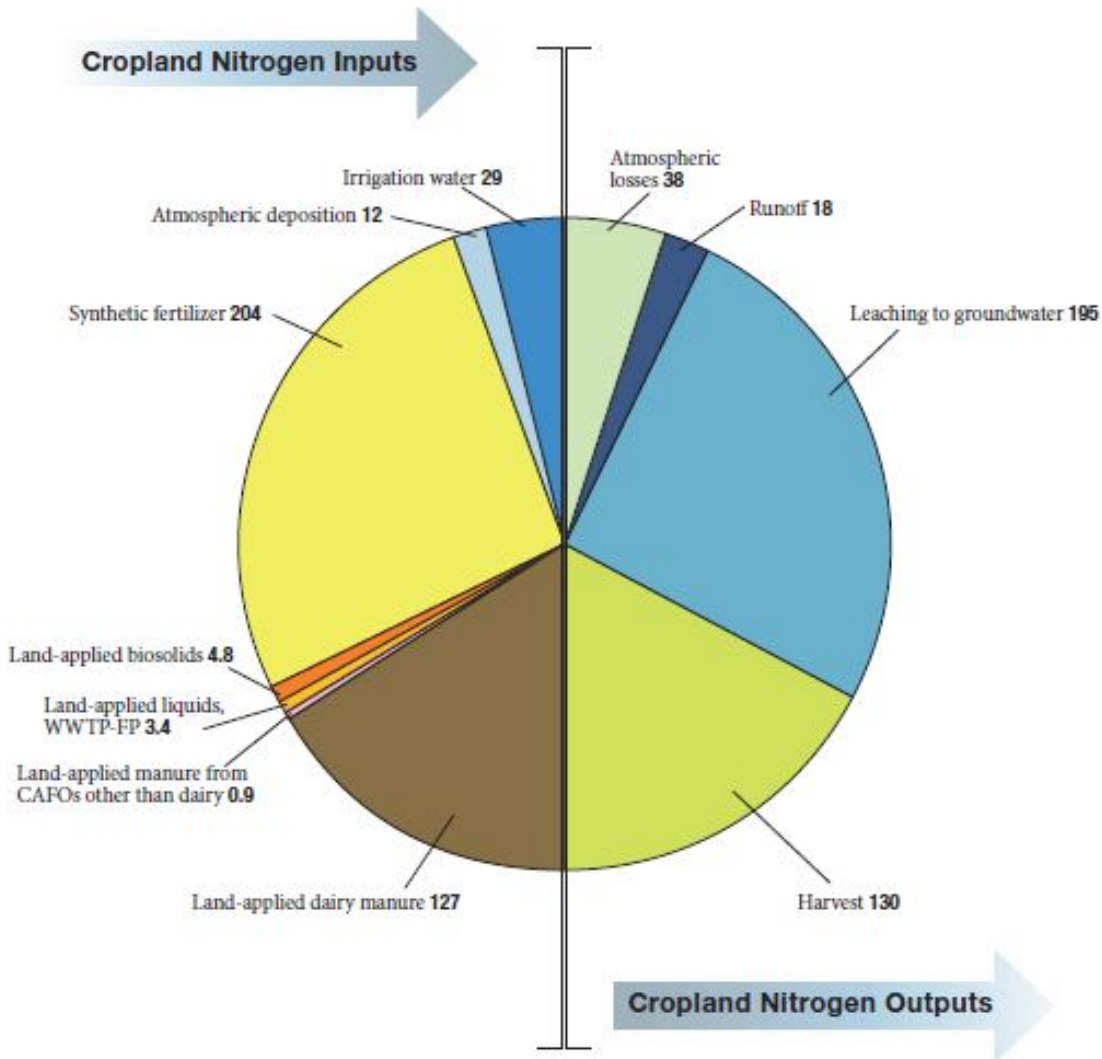


Figure ES-1. Estimated groundwater nitrate loading from major sources within the Tulare Lake Basin and Salinas Valley, in Gg nitrogen per year (1 Gg = 1,100 t).

Figure 1: Estimated groundwater nitrate loading in Tulare Lake Basin and Salinas Valley (Gg N year⁻¹): figure from UC Davis Nitrate Report.

Figure 2 below illustrates the inputs and outputs of nitrogen from croplands in the study area. Note the relatively large proportion on nitrogen output leaching to groundwater.



Note: No mass balance was performed on 0.17 million ha (0.4 million ac) of nitrogen-fixing alfalfa, which is estimated to contribute an additional 5 Gg N/yr to groundwater. Groundwater nitrate loading from all non-cropland sources is about 8 Gg N/yr.

Figure ES-2. Overview of cropland input and output (Gg N/yr) in the study area (Tulare Lake Basin and Salinas Valley) in 2005. The left half of the pie chart represents total nitrogen inputs to 1.27 million ha (3.12 million ac) of cropland, not including alfalfa. The right half of the pie chart represents total nitrogen outputs with leaching to groundwater estimated by difference between the known inputs and the known outputs. Source: Viers et al. 2012.

Figure 2: Estimated nitrate inputs and outputs of nitrogen in Tulare Lake Basin and Salinas Valley (Gg N year⁻¹): figure from UC Davis Nitrate Report.

The UC Davis Nitrate Report found that the travel time of nitrogen applied at the surface to load underlying aquifers that impact wells can take decades for domestic well screened interval

aquifer zones or even centuries for deeper agricultural production well screened interval aquifer zones. Therefore, nitrate reduction efforts could take decades to manifest themselves in drinking water wells. Consequently, simultaneous, dual strategy of 1) providing safe drinking water solutions for small water systems of 2-4 connections in contaminated drinking water wells will necessarily include point-of-use, point-of-entry, or other options, now, and in the foreseeable future, combined with 2) a long-term pollutant source reduction component to reduce nitrate concentrations in drinking water sources/aquifers.

It is the users of these small systems that are faced with the greatest financial and public health problems associated with nitrate contamination in their drinking water supply. Mechanisms to help fund such efforts could include Cleanup and Abatement funding (e.g., UCLA's pilot treatment project), the Central Coast Water Board's safe drinking water funding efforts (e.g., Johnson Road replacement water efforts in northern Monterey County), and Regional Water Boards' designation of "at risk" areas where cleanup and abatement orders could require overlying areas to help support safe drinking water solutions.

Consistent with the California Nitrogen Assessment Report, the UC Davis Nitrate Report found that nitrate source-reduction efforts through agricultural practices will take decades to improve drinking water supply wells. Solutions include: a) reducing nitrate sources that are contaminating groundwater (e.g., synthetic fertilizers) and b) monitoring and assessing groundwater to evaluate trends and monitor effectiveness of efforts.

With respect to reducing nitrate sources, the UC Davis Nitrate Report suggests an education and research effort led by the University of California and others to develop and implement educational programs aimed at providing technical assistance to growers to help them improve nitrogen use efficiency, including the pump-and-fertilize approach. Of specific note is the California Department of Food and Agriculture's Fertilizer Research and Education Program (CDFA FREP). A nitrogen mass accounting task force could assess nitrogen mass balance methods, which would include farm-level nutrient management plans. Previously discussed options also include a fertilizer excise fee that would raise the cost of fertilizer to incentivize reduction practices, with a higher fee assessed in the identified "at risk" areas.

In a February 2013 Report to the Legislature, the State Water Board considered input and findings from various sources to make specific recommendations for addressing nitrate contaminated groundwater. In developing their Report to the Legislature, the State Water Board relied on the UC Davis Report as a foundation.

Other Research

Staff frequently reviews the literature and research papers related to irrigated agriculture, including nutrients, pesticides, irrigation, and management practices, to stay current and to improve the Water Board's regulatory program.

Agricultural Expert Panel

As a response to the UC Davis Nitrate report, the State Water Board recommended that a panel of experts be convened to assess agricultural nitrate regulatory controls and provide recommendations on appropriate regulatory approach. The Agricultural Expert Panel (Expert Panel) resulted. The Expert Panel provided recommendations in September 2014. The Expert Panel recommended that regulatory programs recognize and incorporate the following:

- Regulatory programs should focus efforts on minimizing loading of nitrogen to groundwater

- Coalitions should be established to act as intermediary between growers and regulatory agencies
- Creation and implementation of nitrogen and water management plans should be developed, customized and implemented in all agricultural areas, not just in high vulnerability areas.
- Use of A/R ratios, where “A” is the amount of nitrogen applied “from any source” and “R” is nitrogen removed, should be tracked and reported (page iii). Assessment of A/R ratios should be done over multiple years, since seasonal variations are likely.
- If more nitrogen is applied to a field than is removed, the excess will be leached to groundwater.

Total Nitrogen Applied

In Ag Order 2.0, a subset of growers were required to measure and report the total nitrogen applied to crops grown on tier 2 and tier 3 ranches. Growers with tier 2 and tier 3 ranches were required to complete Section C of the Annual Compliance Form, which assessed the risk of loading nitrogen to groundwater. The risk assessment included crop type, irrigation type, nitrate concentration in groundwater, and other factors. The crop-type variable of the risk assessment considered whether high-risk crops are grown. High-risk crops are crops that have a higher risk of loading nitrogen to groundwater and are defined in Part C, Definitions in Attachment A, Additional Findings, to the staff report. Note that in proposed Ag Order 3.0, the total nitrogen applied reporting requirement is not triggered by the risk assessment in Section C of the Annual Compliance Form; Section C is removed in Ag Order 3.0, and the total nitrogen applied requirement is applied to tier 2 and tier 3 ranches growing high-risk crops.

In Ag Order 2.0, growers had an option to divide a ranch into risk units, and then apply the Section C risk assessment to each of the risk units to determine if the total nitrogen applied requirement was required for each risk unit. A grower might implement this option if the ranch contained a low-risk crop, thereby potentially removing the need to submit nitrogen application information for that low-risk crop. The majority of ranches did not choose this option, but rather reported total nitrogen applied for all crops grown on the ranch. Consequently, staff received total nitrogen applied information for crops that are not high risk crops.

The total nitrogen applied reports, or TNA reports, were due annually on October 1st, beginning in 2014. The number of ranches annually required to submit TNA reports ranged from about 500-600 between 2014 and 2015.

TNA data received show that nitrogen application rates vary widely for the same crop. For the 2014-2015 reporting period, total nitrogen applied to lettuce ranged from about 40 to over 500 pounds per acre (maximum nitrogen uptake is 170 lb/ac); total nitrogen applied to broccoli ranged from about 20 to over 600 pounds per acre (maximum nitrogen uptake is 337 lb/ac); and total nitrogen applied to spinach ranged from about 20 to over 600 pounds per acre (maximum nitrogen uptake is 130 lb/ac).

Lettuce is the most prevalent crop reported. Nitrogen uptake by lettuce varies depending on field conditions. Research conducted in the Salinas River watershed found that nitrogen uptake by lettuce did not exceed about 170 pounds per acre³. Note that the nitrogen application to lettuce reported ranges from 40-500 pounds per acre. Nitrogen application above the crop’s

³ Bottoms, T., Smith, R, and Cahn, M. 2012. Nitrogen Requirements and N Status Determinations of Lettuce. HortScience 47(12):1768-1774.

uptake is potentially available for loading to surface water and groundwater. Nitrogen application rates above the uptake ability of the crop were observed for several crops reported in TNA reports.

Some of the highest nitrogen application rates were reported on crops that are not high-risk crops. The following are examples:

- Carrots, over 580 pounds per acre
- Parsley, over 900 pounds per acre
- Chives, over 700 pounds per acre
- Kale, over 600 pounds per acre

Nitrogen uptake rates for all crops grown in the Central Coast Region are not yet available; however, the nitrogen applications reported on these non-high risk crops well exceed the uptake ranges of several high risk crops. These reported values could be an indicator of high application rates across many crops, including those not historically deemed as high-risk for loading nitrogen to groundwater.

About 70% of the ranches that report growing crops that have a high risk of loading to groundwater (high-risk crops) were not required to report total nitrogen applied in Ag Order 2.0; the TNA reports received is a relatively small sample of the larger population of ranches growing high risk crops.

Please see findings 60-64 of Attachment A, Additional Findings (Attachment 2 to the staff report) pertaining to total nitrogen applied in the proposed order.

Surface Receiving Water Monitoring

Ag Order 2.0 required water quality sampling and assessment of surface receiving waters in agricultural watersheds. Central Coast Water Quality Preservation, Inc.'s Cooperative Monitoring Program (CMP) has fulfilled the surface receiving water monitoring requirement on behalf of all growers enrolled in the Ag Order. CMP collects samples from 50 monitoring sites in areas where agriculture is the predominant land use. CMP has provided annual reports and presentations to the Water Board on monitoring activities and results.

Nitrate concentrations in surface waters have been trending lower, particularly in the southern portion of the region, until 2014. In 2015, the median nitrate concentration at many monitoring sites in the major agricultural watersheds of Pajaro River, Salinas River, and the Santa Maria River exceeded the drinking water standard of 10 mg/L-N. In the Pajaro River watershed, the highest median nitrate concentration of 35 mg/L-N was observed in San Juan Creek. In the Salinas River watershed, the highest median nitrate concentration of 73 mg/L-N was observed in Blanco Drain, followed by 52 mg/L-N in Alisal Slough. In the Salinas River watershed, Chualar Creek had a maximum concentration of 109 mg/L-N. In the Santa Maria River watershed, Orcutt-Solomon Creek had a median nitrate concentration of 65 mg/L-N, and a maximum nitrate concentration was observed in Bradley Canal of 128 mg/L-N.

The CMP also monitors pesticides in surface receiving waters. Organophosphate pesticides, including chlorpyrifos and diazinon, were monitored in the water column four times concurrent with water toxicity monitoring during Ag Order 2.0. The indicator species *Ceriodaphnia dubia*, which is sensitive to organophosphate pesticides, was used to indicate water column toxicity. Pyrethroid pesticides in sediment were monitored once concurrent with sediment toxicity

monitoring during Ag Order 2.0. The indicator species *Hyalella azteca*, which is sensitive to pyrethroid pesticides, was used to indicate sediment toxicity.

Agricultural use of the organophosphate pesticides chlorpyrifos and diazinon has declined during the term of Ag Order 2.0. In contrast, agricultural use of pyrethroid and neonicotinoid pesticides has increased during the term of Ag Order 2.0. Table 1 below illustrates the trend in pesticide use from 2010 to 2014 in Monterey and Santa Barbara counties.

Table 1: Pesticide Application in Monterey and Santa Barbara Counties from 2010 to 2014

MONTEREY AND SANTA BARBARA COUNTIES (POUNDS ACTIVE INGREDIENT APPLIED)		
	2010	2014
Chlorpyrifos/Diazinon/Malathion	362,507	137,147
Pyrethroid Pesticides	46,638	70,378
Neonicotinoid Pesticides	43,251	70,824

Cooperative Monitoring Program (CMP) data indicated a trend of decreasing water column toxicity when comparing 2014 data results to 2005-2009 data results. In contrast, sediment toxicity increased during the same time period. Note that this time period coincides with increased pyrethroid applications (see Table 1), and recall that pyrethroid pesticides adsorb to sediment.

Neonicotinoid pesticides are readily soluble in water. The CMP water toxicity analysis utilized the toxicity indicator species *Ceriodaphnia dubia* to indicate water column toxicity, as required by approved monitoring and reporting programs (MRPs) for the Ag Order. Data and information suggest that *C. dubia* is not sensitive to neonicotinoid pesticides⁴; this could explain apparent decreasing toxicity trend in the water column, when observed.

In September 2014, a collaborative study between Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP), the Department of Pesticide Regulation, and the Granite Canyon Marine Pollution Studies Laboratory evaluated nine sites in the Santa Maria and Salinas watersheds for a broad suite of pesticides and two different toxicity test organisms. These sites are also sampled by the Cooperative Monitoring Program for agriculture. The study data showed frequent detections of imidicloprid and pyrethroid pesticides, with toxicity commonly found to *Hyalella* (an amphipod sensitive to pyrethroids) and *Chironomus* (a fly larvae sensitive to neonicotinoids). All but one site (89%) were toxic to one or both test species. The CMP sampled the same sites one month earlier in August 2014 using the traditional toxicity test species required by the 2012 Ag Order MRPs: *Ceriodaphnia dubia* (waterflea), *Selenastrum* (algae), and *Pimephales* (fat-head minnow). No toxicity was found at any of the sites using these traditional test species. These findings demonstrate the importance of selecting test organisms that are sensitive to the chemicals found at the site and a need to adjust test organisms in response to changes in pesticide use patterns.

The California Department of Pesticide Regulation's *Surface Water Monitoring for Pesticides in Agricultural Areas of California, 2015* found that two of the four pesticides with the highest detection frequencies included imidacloprid (a neonicotinoid pesticide) and bifenthrin (a pyrethroid pesticide). Of the 30 bifenthrin samples taken, 47% exceeded an aquatic life

⁴ See [Executive Officer's Report](#) for May 2015 Central Coast Water Board meeting.

benchmark; 21% of the 77 Imidacloprid samples exceeded an aquatic life benchmark. The areas studied included agricultural areas in Monterey, San Luis Obispo, and Santa Barbara counties of the Central Coast Region.

The CMP conducted a special study of water and sediment toxicity in 2013-2014. In its analysis, CMP added toxicity units (TUs) across pesticide classes that could combine to create an additive toxic effect. A TU of 0.5 indicates that the effect will be toxic, and should be indicated by the test organism. In many cases, the observed toxicity could not be explained by the TU (i.e., the TU was less than 0.5). With respect to water column toxicity, the report stated "...a substantial portion of the observed mortality could not be readily explained by the pesticides measured in the study (i.e. the measured pesticides were not detected, or were below toxic thresholds)."⁵

On August 22, 2016, the Executive Officer issued revised monitoring and reporting programs for Ag Order 2.0 (Revised MRPs). The Revised MRPs included the addition of the indicator species *Chironomus spp.* for water column toxicity analysis; *Chironomus spp.* is sensitive to neonicotinoid pesticides. The Revised MRPs also included the addition of five neonicotinoid pesticides in water column chemistry sampling. The Revised MRPs required an increase in the frequency of pyrethroid pesticide chemistry analysis in sediment along with sediment toxicity testing using the indicator species *Hyalella azteca*, which is sensitive to pyrethroids. Before issuing the Revised MRPs, staff discussed future monitoring; at the July 2016 board meeting, the board suggested that any future monitoring and reporting programs include currently used pesticides. Staff then held two outreach events via webcast in August 2016, where components of the draft Revised MRPs were shared. Staff informed stakeholders of neonicotinoid pesticide, pyrethroid pesticide, *Chironomus*, and *Hyalella* testing requirements in the draft Revised MRPs. In December 2016, staff presented a discussion on the Revised MRPs at a public board meeting after providing public notice and another opportunity to comment on the Revised MRPs. The board considered the Revised MRPs and did not direct the Executive Officer to make any changes to them.⁶

Please see findings 83-86 of Attachment A, Additional Findings (Attachment 2 of the staff report) in the proposed order related to neonicotinoid and pyrethroid pesticide use.

Groundwater Monitoring

Ag Order 2.0 required testing of all domestic wells located on ranches enrolled in the agricultural order; resulting data indicate that 25% of 1,733 domestic wells sampled exceed the nitrate drinking water standard in agricultural areas in the Central Coast Region.

Ag Order 2.0 also required testing of the primary irrigation well located on ranches enrolled in the agricultural order. Resulting data indicate that 26% of 2,266 primary irrigation wells sampled also exceed the nitrate drinking water standard.

Growers had the choice of complying individually with groundwater monitoring requirements or through a coalition. The Central Coast Groundwater Coalition (CCGC) conducted groundwater monitoring on behalf of nearly 50% of the enrolled ranches, per an approved workplan.

⁵ Central Coast Region Conditional Waiver Cooperative Monitoring Program. 2013-2014. Supplemental Monitoring Report: Aquatic Toxicity and Potential Toxicants in Sediment and Water.

⁶ See agenda item 11 for December 2016 board meeting.

http://www.waterboards.ca.gov/centralcoast/board_info/agendas/2016/december/item11/index.shtml

Collectively, staff and CCGC sent over 500 drinking-water notification letters to require notification to well users of unsafe drinking water and associated public health risks.

Staff implemented groundwater monitoring requirements for domestic wells of Ag Order 2.0 consistent with descriptions used by the State Water Board Division of Drinking Water, Department of Water Resources, and local county environmental health agencies. The language in the Revised MRPs from August 2016 is consistent with this approach and with Water Code section 106.3 (human right to water) and with State Water Board Resolution 2016-0010, Adopting the Human Right to Water as A Core Value and Directing Its Implementation in Water Board Programs and Activities. The Revised MRPs clarify that a domestic well is any groundwater well that is connected to a residence, workshop, or place of business that is used or may be used for human consumption, cooking, or sanitary purposes. Staff has consistently interpreted Ag Order 2.0's requirements in this manner, so the clarification added no new monitoring requirements but will assist growers to comply with the MRPs. The Central Coast Water Board adopted resolution No. R3-2017-0004 on January 9, 2017, establishing the human right to water as a core value and directing that it be implemented in the Central Coast Region.

Please see Finding 12 of Attachment A, Additional Findings (Attachment 2 of the staff report) in the proposed order related to Water Code section 106.3 regarding human right to water.