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Fertilizers and Nitrates in Drinking Water: State Water Board Tackles the Public Health Threat of Contaminated Groundwater

*By Emel G. Wadhvani**

Introduction and Background

California's agricultural industry produces more than 400 commodities at over 75,000 farms and ranches. Agriculture is a crucial part of the state's economy, with the state's farms receiving around \$50 billion annually for commodity sales, and provides a large percentage of fruits and vegetables for the nation.¹ While the benefits of California's agricultural industry to the state's economy and to its food are self-evident, agriculture also has potential adverse impacts on environmental quality and public health. These impacts are particularly difficult to address because the same activities that are essential to reliably producing crops also underlie many of the critical impacts of agriculture. For example, pesticides used to control pests and fertilizers used to provide nutrients to crops may also cause harm to the surrounding environment. One persistent, unresolved problem in parts of the state has been the contamination of drinking water with nitrates, a product of nitrogen found in fertilizer.²

In an order adopted on February 7, 2018, the State Water Resources Control Board ("State Water Board"), California's state agency responsible for protecting water quality, took a significant step toward tackling the issue of nitrates in

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1. CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE CALIFORNIA AGRICULTURAL STATISTICS REVIEW, 2015-2016, 1-3 <https://www.cdffa.ca.gov/Statistics/PDFs/2016Report.pdf> [<https://perma.cc/DF8F-CDLJ>].

2. UC DAVIS CENTER FOR WATERSHED SCIENCES, ADDRESSING NITRATE IN CALIFORNIA'S DRINKING WATER (March 2012) <http://groundwaternitrate.ucdavis.edu/> [<https://perma.cc/5B6S-YXUD>] (hereinafter "2012 UC Davis Nitrate Report").

drinking water.³ (This article refers to the February 7, 2018, order as the “State Water Board Agricultural Order” or “Agricultural Order.”) The State Water Board Agricultural Order sets up a system for growers statewide to report data for the amount of nitrogen applied to a field in fertilizers and in irrigation water and for the amount of nitrogen removed from the field through harvest. Generally, nitrogen that is not removed through harvest of the crop and is not used and stored by permanent crops such as trees, remains in the soil. Bacterial action converts nitrogen remaining in the soil to nitrate. Over time, that nitrate has the potential to percolate down through the soil to groundwater, transported through irrigation and rainfall that push past the root zone.⁴

Nitrate is one of the most frequently detected contaminants in groundwater in California and elsewhere, particularly in the aquifers in the Central and Salinas Valleys, both of which are centers of agricultural activity.⁵ High levels of nitrate in drinking water may affect human health.⁶ Infants who ingest water containing high levels of nitrate may become seriously ill and, if untreated, may die from a condition that impedes oxygen transportation in their blood stream.⁷ This condition is often referred to as “blue baby syndrome.”⁸ High nitrate levels may also sicken pregnant women and other adults with certain hereditary conditions.⁹

Consumers who drink from regulated public water systems are generally protected from the health effects of nitrates because the water is treated prior to consumption. However, a significant part of the population in impacted areas obtains drinking water directly from wells or relies on systems smaller than the threshold for regulation.¹⁰ The problem disproportionately impacts socio-economically disadvantaged populations, including farm workers,¹¹ and has been

3. CAL. STATE WATER RESOURCES CONT. BOARD, Order WQ 2018-0002 https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2018/wqo_2018_0002_with_data_fig1_2_appendix_a.pdf [<https://perma.cc/T48C-JR3Q>] (hereinafter “State Water Board Agricultural Order”).

4. 2012 UC Davis Nitrate Report, *supra* note 2, at 15.

5. *Id.* at 9, *see also*, OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT, DRAFT PUBLIC HEALTH GOALS: NITRATE/NITRITE IN DRINKING WATER (Dec. 2016.), <https://oehha.ca.gov/media/downloads/cnr/nitratephg121616.pdf> [<https://perma.cc/6T38-FSDR>].

6. 2012 UC Davis Nitrate Report, *supra* note 2, at 9.

7. *Id.*

8. *Id.*

9. *Id.*

10. The 2012 UC Davis Nitrate Report found that in California’s Tulare Lake Basin and Salinas Valley, roughly 254,000 people were at risk for nitrate contamination of their drinking water. Of these, 220,000 were connected to community public (>14 connections) or state small water systems (5-14 connections), which are regulated and subject to monitoring by either the State Water Board or the county. Another 34,000 were served by private domestic wells or other systems smaller than the threshold for state or county regulation. 2012 UC Davis Nitrate Report, *supra* note 2, at 3.

11. *See* Carolina Balasz, et al., Social Disparities in Nitrate Contaminated Drinking Water in California’s San Joaquin Valley, Environmental Health Perspectives (June 2011),

a priority issue of advocacy for environmental justice organizations in the Central Valley.

The challenge of addressing nitrates in groundwater is multifaceted. There is an immediate public health issue—ensuring that drinkers of private well water in the state are notified of any nitrate contamination and are provided with a source of replacement drinking water where needed. There is also a longer-term undertaking of ensuring that ongoing farming does not continue to add to the problem, i.e., that existing contamination does not worsen, and that groundwater that currently meets the drinking water standards does not become contaminated in the future. Finally, there are significant policy and technical challenges as to how, and whether, to clean up existing nitrate contamination, much of which is due to decades of historic agricultural practices as well as sources other than agriculture, such as septic systems.¹²

The State Water Board Agricultural Order, which concerns regulation of ongoing agricultural discharges, does not directly take on the last of these issues, leaving the question of short-term cleanup to other regulatory efforts, such as the cleanup and abatement authority of the State Water Board and regional water boards.¹³ The Agricultural Order partially addresses the first issue, the immediate public health concern, by requiring the sampling of on-farm wells for nitrates and notification to drinkers when the levels exceed public health thresholds and setting an expectation that the Central Valley Water Board will make provisions for replacement water.¹⁴ There are also ongoing regulatory and legislative efforts outside of the Agricultural Order that may bear fruit over the next few years to address these facets of the problem. These efforts include the Central Valley Salinity Alternatives for Long-term Sustainability Initiative (“CV-SALTS”),¹⁵ a collaborative, stakeholder-driven process which would establish a Central Valley-wide salt and nitrate control program, and Senate Bill 623,¹⁶ a legislative proposal to create a fund based in part on fertilizer fees to help pay for replacement drinking water in contaminated aquifers.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3230390/> [https://perma.cc/P5HD-DRHC]; see also Environmental Justice Coalition for Water, *Thirsty for Justice: A People’s Blueprint for California Water* (Aug. 2005) <https://www.issuelab.org/resource/thirsty-for-justice-a-people-s-blueprint-for-california-water.html> [https://perma.cc/ES8C-RTQ4] (follow link; then select “Download via IssueLab”).

12. 2012 UC Davis Nitrate Report, *supra* note 2, at 34. Other sources of nitrate contamination include wastewater from treatment plants or food processors and discharges from animal corrals or manure lagoons. *Id.*

13. State Water Board Agricultural Order, *supra* note 3, at 14, n.33.

14. *Id.* at 60–63.

15. CV-SALTS, <https://www.cvsalinity.org/> [https://perma.cc/SF4D-JQEJ] (last visited Feb. 8, 2018).

16. Governor Brown has included components of SB 623 in his budget proposal for fiscal year 2018-2019. Safe and Affordable Drinking Water Act, Proposed trailer bill language, (Feb. 2018) http://dof.ca.gov/Budget/Trailer_Bill_Language/documents/SafeandAffordableDrinkingWater.pdf [https://perma.cc/8FUR-9BG8].

The primary focus of the State Water Board Agricultural Order is on ongoing farming practices and ensuring that programmatic improvements going forward minimize nitrates reaching groundwater. Toward this purpose, the Agricultural Order establishes a reporting system to collect data that is essential for evaluating how effectively management practices protect groundwater, and how those practices may be improved. The objective of the new reporting is to enable collection of the data necessary for growers, regulatory agencies, researchers, and the public, to begin to develop benchmarks for reasonable ranges of nitrogen application that will help protect the groundwater underlying agricultural areas. This article presents this pivotal new reporting system and how it will move the ball forward on the significant issue of nitrates in groundwater. By ensuring that growers, regulatory agencies, research institutions, and the public have a complete, reliable set of data to evaluate trends and changes in nitrogen application and removal from agricultural fields, the Agricultural Order sets the stage for increased knowledge and expertise on how to improve the efficiency of nitrogen usage, minimize ongoing impacts, and potentially begin to reverse decades of nitrate pollution caused by historic agricultural practices.

Procedural Framework

The State Water Board adopted the Agricultural Order in response to a set of petitions that challenged a permit issued by the Central Valley Regional Water Quality Control Board (“Central Valley Water Board”). The Central Valley Water Board is one of nine regional water quality control boards (“regional water boards”) under the umbrella of the State Water Board. Among other responsibilities, the regional water boards issue water quality permits to dischargers in their regions.¹⁷ The Central Valley of California, the flat valley at the state’s geographical center, has over seven million acres of irrigated agricultural operations.¹⁸ The Central Valley Water Board issued the permit to growers who own or operate irrigated agricultural land in several counties in the Central Valley east of the San Joaquin River. (This article will refer to the permit as the “Eastern San Joaquin Agricultural Permit.”¹⁹) The Eastern San Joaquin Agricultural Permit is one of eight area or commodity-wide permits issued to growers in the Central Valley. The permits rely on third party groups (termed “coalitions”), such as commodity groups, nongovernmental organizations, or watershed groups, that act as intermediaries between the Central Valley Water

17. Cal. Water Code § 13263. (2018).

18. NASA LANDSAT SCIENCE, FEDERAL AGENCIES RELEASE DATA SHOWING CALIFORNIA CENTRAL VALLEY IDLE FARMLAND DOUBLING DURING DROUGHT (Oct. 21, 2015), <https://landsat.gsfc.nasa.gov/federal-agencies-release-data-showing-california-central-valley-idle-farmland-doubling-during-drought/> [<https://perma.cc/8AFW-5DP6>].

19. CALIFORNIA WATER BOARDS, EASTERN SAN JOAQUIN AGRICULTURAL PERMIT INFORMATION, https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/regulatory_information/eastern_sanjoaquin_watershed_wdrs/index.html [<https://perma.cc/GEX5-NK4L>] (last visited Feb. 8, 2018).

Board and the growers and have a number of obligations under the permit. In this case, the relevant coalition is the East San Joaquin Water Quality Coalition.

Shortly after the permit was adopted by the Central Valley Water Board in December 2012, several stakeholders representing agricultural, environmental, and environmental justice interests challenged aspects of the permit to the State Water Board in a petition process.²⁰ When the State Water Board receives a petition on a permit adopted by a regional water board, the State Water Board may review the action of the regional water board. In doing so, the State Water Board “is vested with all the powers of the regional boards.”²¹ The State Water Board has broad discretion as to the scope of its review and may decline to review all or some claims and may take up issues not raised in the petitions on its own motion.²² The State Water Board also has broad discretion as to the remedy and may, among other actions, revise a permit itself or remand all or parts of the permit to the regional water board.²³ A petition order issued by the State Water Board may set precedent for its regulatory programs statewide.²⁴

The State Water Board delayed commencement of its review of the petitions to allow certain related proceedings to conclude first. These included the proceedings of a Nitrogen Tracking Task Force (“Task Force”) and an Agricultural Expert Panel (“Expert Panel”), both of which grew out of a legislative effort to address nitrate in groundwater.²⁵ The Task Force was convened by the California Department of Food and Agriculture (“CDFA”) in coordination with the water boards and other stakeholders, and made recommendations on the appropriate components of an effective nitrogen tracking and reporting system, including data

20. Cal. Water Code § 13320 (2018); Cal. Code Regs. tit. 23, §§ 2050 et seq. (2018). The petitions and other documents in the proceedings to review the petitions are available at the State Water Board website. Eastern San Joaquin River Watershed, STATE WATER RESOURCES CONTROL BOARD, https://www.waterboards.ca.gov/public_notices/petitions/water_quality/a2239_sanjoaquin_ag.shtml [<https://perma.cc/AQ4H-6GP4>] (last visited Feb. 7, 2018).

21. Cal. Water Code § 13320(c.) (2018).

22. *Id.*; *see also* Cal. Code Regs. tit. 23, §§ 2050.5(c), 2052(a) (2018).

23. Cal. Water Code § 13320 (2018); Cal. Code Regs., tit 23, §2052(a) (2018).

24. Generally, State Water Board petition orders are precedential unless otherwise designated. Order Denying Petitions for Reconsideration, Cal. State Water Resources Cont. Board Order WR 96-1, Lagunitas Creek 17 n.11.

25. In 2008, the Legislature added section 83002.5 (added by Stats. 2007-2008, 2nd Ex.Sess., ch. 1 (S.B.1), § 6, eff. March 1, 2009) to the Water Code requiring the State Water Board to develop pilot projects focusing on nitrate in groundwater in the Tulare Lake Basin and the Salinas Valley, and to submit a report to the Legislature. Cal. Water Code § 83002.5 (2018). The 2012 UC Davis Nitrate Report presented the technical findings of the pilot projects and was followed by a State Water Board report to the legislature in which the Board made a number of recommendations for moving forward on nitrate control STATE WATER RESOURCES CONTROL BOARD, RECOMMENDATIONS ADDRESSING NITRATE IN GROUNDWATER (Feb. 20, 2013), https://www.waterboards.ca.gov/water_issues/programs/nitrate_project/docs/nitrate_rpt.pdf [<https://perma.cc/9UD8-JVRR>].

elements that should be tracked and reported.²⁶ The Expert Panel was convened by the State Water Board, in coordination with CDFA, and considered all existing studies, programs, and efforts for agricultural nitrate control, including the recommendations of the Nitrogen Tracking Task Force.²⁷ The Task Force and the Expert Panel issued final reports in December 2013 and September 2014 respectively.

The State Water Board circulated a first draft order reviewing the Eastern San Joaquin Agricultural Permit in February 2016, followed by a written public comment period and two Board workshops to allow oral comment.²⁸ The State Water Board indicated that aspects of the order were intended to implement recommendations of the Task Force and Expert Panel and set statewide precedent for agricultural regulatory programs. The State Water Board thus encouraged stakeholders throughout the state to comment. In response to comments, the State Water Board circulated a second draft order in October 2017, again with an opportunity to submit written comments and present oral comments to the Board at a workshop.²⁹ This second draft additionally incorporated elements of a proposal prepared by a group of agricultural coalition representatives and environmental justice representatives to reach compromise on certain aspects of the permit, as discussed in the next sections.³⁰ The State Water Board adopted the Agricultural Order, with additional revisions, on February 7, 2018.

26. CAL. DEPT. OF FOOD AND AGRICULTURE, THE NITROGEN TRACKING AND REPORTING TASK FORCE FINAL REPORT (Dec. 5, 2013), <https://www.cdfa.ca.gov/environmentalstewardship/PDFs/NTRSTFFinalReport122013.pdf> [<https://perma.cc/82AW-NEKP>].

27. The Agricultural Expert Panel proceedings are detailed at http://www.swrcb.ca.gov/water_issues/programs/agriculture/ (as of Feb. 7, 2018). 7, 2018) [<https://perma.cc/Y85T-B62B>]. See also IRRIGATION TRAINING AND RESEARCH CENTER CAL POLY, CONCLUSIONS OF THE AGRICULTURAL EXPERT PANEL (Sept. 9, 2014), https://www.waterboards.ca.gov/water_issues/programs/agriculture/docs/ILRP_expert_panel_final_report.pdf [<https://perma.cc/G7L5-EV3W>] (hereinafter “Agricultural Expert Panel Report.”). On September 24, 2013, the State Water Board adopted Order WQ 2013-0101, reviewing the Central Coast Regional Water Board’s (Central Coast Water Board) permit for agricultural discharges. In that order, the State Water Board referred a number of questions regarding the development of an appropriate agricultural regulatory program to the Agricultural Expert Panel for consideration. Order WQ 2013-0101 is the subject of ongoing litigation. *Monterey Coastkeeper v. State Water Resources Control Bd.* Super Ct. Sacramento County, No. 34-2012-80001324 (2015) (app. pending, Cal. Ct. App.3d D., No.C080530.).

28. Draft orders released by the State Water Board, written comments on those draft orders, and the workshop and meeting notices, agendas, and presentations are available at https://www.waterboards.ca.gov/public_notices/petitions/water_quality/a2239_sanjoaquin_ag.shtml [<https://perma.cc/B4XZ-TD7E>].

29. *Id.*

30. See State Water Board Agricultural Order, *supra* note 3, at 23, 66. https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2018/wqo2018_0002_with_data_fig1_2_appendix_a.pdf [<https://perma.cc/T48C-JR3Q>].

Legal Framework

Under applicable law, agricultural discharges are categorized as “nonpoint source discharges,” and are distinguished from “point source discharges” that enter water bodies from a discernable point source, such as a pipe.³¹ While point source discharges are subject to the federal Clean Water Act, nonpoint source discharges are primarily regulated under state law. In California, the applicable law is the Porter-Cologne Water Quality Control Act (“Porter-Cologne Act”).³² The Porter-Cologne Act, codified as part of the California Water Code, directs regional water boards to issue permits for the discharge of waste,³³ a term that is defined broadly and includes discharges of irrigation and storm water from agricultural fields to surface water bodies and groundwater.³⁴ Among other mandates, the relevant water code sections require the water boards to set waste discharge requirements, in other words, issue permits, that protect water quality by implementing applicable “basin plans.”³⁵ The basin plans establish the uses (e.g., recreation, freshwater habitat, municipal, and domestic supply) of the surface water bodies and groundwater in the region and set water quality objectives (i.e., maximum levels of pollutants that are still protective of the beneficial uses) for the water bodies. For example, the basin plans specify a water quality objective for nitrate in groundwater that is used as a drinking water source. Immediate compliance with the water quality objectives is not always required and the permits may allow a time schedule for meeting the water quality objectives.³⁶ Permits may be issued to individual dischargers or a single permit may be issued to a category of dischargers, such as to all growers in a certain region or growing a certain crop.³⁷ The Water Code further grants the regional water board authority to require monitoring and reporting as a component of the permit.

Water board permits must also comply with applicable State Water Board policies. Two policies are particularly relevant for agricultural discharges. The first, the antidegradation policy,³⁸ expresses a strong policy preference for maintaining the level of water quality of “high quality waters,” i.e., waters with

31. See 33 U.S.C. § 1362 (2014). Agricultural stormwater discharges and return flows are specifically exempted from the definition of a point source under the Clean Water Act. *Id.*

32. Cal. Water Code §§ 13000 et seq. (2018).

33. Cal. Water Code §§ 13260, 13263 (2018).

34. Cal. Water Code § 13050(d) (2018).

35. Cal. Water Code § 13263(a) (2018). Basin plans are formally referred to as “water quality control plans.”

36. Cal. Water Code § 13263(c) (2018).

37. Cal. Water Code § 13263(i) (2018). The water boards may also choose instead to issue a “waiver” of waste discharge requirements under Water Code § 13269. The terminology of a “waiver” can be misleading. The code provisions have been amended over the years so that now, in most respects, waivers of waste discharge requirements have the same legal and regulatory effect as waste discharge requirements.

38. Statement of Policy with Respect to Maintaining High Quality Waters, State Water Board Res. No. 68-16 (Cal. 1968) [hereinafter Antidegradation Policy].

quality better than the objectives required in the Basin Plans, and requires certain findings to be made prior to allowing any degradation of such waters to occur.³⁹ The second is the Nonpoint Source Policy.⁴⁰ The Nonpoint Source Policy guides the water boards' interpretation and implementation of Water Code requirements in the context of nonpoint source discharges, since nonpoint source discharges pose unique challenges that are not easily addressed by strategies designed to address point source pollution. The Nonpoint Source Policy acknowledges that, because of their diffuse nature, nonpoint source discharges, such as agricultural discharges, are most effectively addressed by control of the sources of pollution; typically with implementation of management practices, rather than by attempts to treat the discharge at multiple, and often indeterminate, number of discharge points.⁴¹ Thus, a schedule of management practice implementation, assessment, and adaptive management may act as a proxy for assessing nonpoint source regulatory program progress.⁴² However, instituting effective management practices requires sufficient monitoring and reporting to determine if existing management practices are leading to compliance with water quality requirements (including any anti-degradation requirements for high quality waters) and implementation of improved water quality practices where they are not.

This feedback mechanism—designed to link a nonpoint source program's implementation requirements, with some level of confidence, to expected water quality outcomes—is a fundamental tenet of the Nonpoint Source Policy,⁴³ and the focus of the State Water Board Agricultural Order.

The State Water Board Agricultural Order

A. The New Metric

With its review of the Eastern San Joaquin Agricultural Permit, the State Water Board seized an opportunity to ask and try to answer a fundamental question in addressing nitrate contamination of drinking water statewide: What is an appropriate feedback mechanism for determining whether management practices related to the application of nitrogen to agricultural fields are effective at minimizing the amount of nitrates that may reach groundwater? This question is crucial to the achievement of the water quality objective for nitrate in groundwater and thus for the protection of drinking water supplies.

Unfortunately, the question does not lend itself to easy answers because of the nonpoint nature of the discharges from agricultural fields, and because the

39. The State Water Board Agricultural Order reviewed the permit's compliance with the Antidegradation Policy and concluded that the Central Valley Water Board made the appropriate findings.

40. Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program, State Water Resources Control Board & Cal. Env'tl. Prot. Agency (2004) [hereinafter Nonpoint Source Policy].

41. *Id.* at 7–9.

42. *Id.* at 12.

43. *Id.* at 13–14.

impacts on the fields do not immediately translate into impacts to underlying groundwater. In a permit for a traditional point-source facility, the water board permits set a limitation at the discharge point and require monitoring of the discharge to verify that the limitation is being met.⁴⁴ In a landscape-based, nonpoint source program such as an agricultural regulatory program, sampling of the numerous and sometimes indeterminate set of farm discharge points to surface water and groundwater is an impractical, prohibitively costly, and often ineffective method for compliance determination. Water quality monitoring programs for agricultural discharges thus often rely on regional or representative monitoring.⁴⁵ With groundwater in particular, the issue is even more complicated, because how quickly a practice on the field shows impacts in the underlying groundwater is dependent on a number of factors, including soil type and depth to the groundwater aquifer. Nitrogen applied to a field may not show up as nitrates in the groundwater for decades.⁴⁶ Groundwater sampling is thus of limited value in providing feedback on management practice effectiveness, except for very shallow groundwater.

The Task Force and the Expert Panel established the scientific and technical groundwork for the State Water Board to tackle the above question. In particular, the Expert Panel, after considering the findings of the Task Force and other studies and testimony, concluded that the most effective tool for evaluating whether nitrogen is applied to a field at appropriate levels is not groundwater quality monitoring, but a multiyear comparison of the total nitrogen applied to and total nitrogen removed from the field.⁴⁷ The total nitrogen applied is the sum of nitrogen applied in fertilizers and nitrogen applied through amounts already present in the irrigation water, a common additional source of nitrogen where groundwater is used for irrigation. The total nitrogen removed is the sum of nitrogen removed when the crop is harvested, which is determined by multiplying the yield with a coefficient value specific to the crop, and the nitrogen used by permanent plantings, such as the woody parts of fruit or nut trees. A comparison of the nitrogen-applied with the nitrogen-removed for each field provides a reasonable estimate, even if not precise indicator, of the nitrogen left in the soil that has the potential to percolate to groundwater in the form of nitrates.⁴⁸ Minimizing that difference—which can be measured as a ratio (nitrogen applied over nitrogen removed or A/R) or a subtraction (nitrogen applied minus nitrogen removed or A-R)—also minimizes the nitrogen left in the soil and consequently the nitrate that may reach drinking water. This article refers to the A/R and A-R metrics collectively as the “AR metric” and the underlying data as the “AR data.”

44. See 33 U.S.C. §§ 1311, 1342.

45. Agricultural Expert Panel Report, *supra* note 27, at 40–41.

46. *Id.* at 9–12.

47. *Id.* at ii–iv.

48. *Id.* at 27–28. Some of this nitrogen might be used by the next crop planting, but when averaged over several years, the carryover from nitrogen left in soil becomes insignificant for purposes of tracking and reporting.

The State Water Board's endorsement of the AR metric grew directly out of the expert proceedings of the Task Force and the Expert Panel and was generally supported by stakeholders. Growers regulated under the Eastern San Joaquin Agricultural Permit and under many similar permits in the Central Valley and elsewhere in the state are already required to prepare a plan for nitrogen management and have been reporting annual nitrogen applied to the fields as recorded in that plan. Some have additionally been reporting data similar to the nitrogen removed component of the AR metric.⁴⁹ The AR metric was viewed as a refinement of those reporting requirements and not a significant departure from existing requirements.

B. Controversy over Anonymity

While the AR metric itself was generally well-received, whether the AR data should be publicly available information became a central issue of controversy in the proceedings. The Expert Panel found that the AR metric needed to be tracked at the field level, rather than at a larger geographic scale, to provide meaningful data on potential nitrate impacts,⁵⁰ but did not specifically address whether the field-level AR data should be reported to the regional water board. Under the Eastern San Joaquin Agricultural Permit (and other permits issued in the Central Valley), the growers submitted the nitrogen application and removal data to the coalition which in turn aggregated that data for fields growing the same crop type within the township. The coalition submitted the data to the Central Valley Water Board at the township level with additional graphs that indicated the distribution of data within each crop category.⁵¹ Thus, while the Central Valley Water Board could review the aggregated data to view ranges and to observe trends over annual submissions, the reports did not tie the nitrogen data to individual fields or growers or indicate if there were any "hotspots" within the township for over-application.

The State Water Board's February 2016 draft order required submission of the field-level data to the Central Valley Water Board with the name of the grower and the field location identified. The draft proposed to have this form of AR data reporting precedential for all agricultural regulatory programs in the state. Once in the possession of a regional water board, the grower names and field locations

49. See, e.g., requirement for "nitrogen applied" in the agricultural permit for the Central Coast region Order R3-2017-0002, at 27, available at https://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/ag_order3/ag_order3.0_approved.pdf [<https://perma.cc/539F-R97U>] and requirement for "nitrogen consumption ratio" in the Eastern San Joaquin Agricultural Permit, as originally adopted (Order R5-2012-0116, Att. B, at 23, https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2012-0116.pdf [<https://perma.cc/6WWR-TAGC>]).

50. Agricultural Expert Panel Report, *supra* note 27, at 37–38. The Expert Panel allowed that multiple fields growing the same crop may be grouped together for purposes of reporting and the State Water Board Agricultural Order makes a similar allowance. State Water Board Agricultural Order, *supra* note 3, at 31, n.88.

51. Submissions by the coalitions, including the East San Joaquin Water Quality Coalition, to the Central Valley Water Board are available at https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/water_quality/coalitions/.

are public information subject to a Public Records Act request.⁵² The State Water Board's proposal met with immediate and significant opposition from the grower community.

There are legitimate, but competing, positions on each side of the transparency debate that erupted around the State Water Board proceedings. On the one hand, environmental and environmental justice stakeholders argued forcefully for the value of transparency.⁵³ Where a coalition acts as an intermediary between the growers and the regional water board, the program's success depends on whether the third party is reporting that data to the regional water board with sufficient detail to allow for appropriate regulatory oversight in implementation of the program to reach the water-quality results. In particular, concerns with privacy and protection of proprietary information create strong incentives toward less granularity in reporting. Aggregated data can mask the role of a particular field in impacting underlying groundwater or the ineffectiveness of the management practices implemented by a particular individual or set of growers in preventing loss of nitrogen.

On the other hand, growers and the coalition representatives made a compelling case to the State Water Board that the continuation of a coalition framework in agricultural regulatory programs depends in part on an expectation of privacy and confidentiality for growers who prefer to interface with a coalition rather than the regulatory agency. Coalitions build on relationships already in place with growers and are often more effective at outreach to increase understanding of the permit provisions and to facilitate management practice development and implementation. In contrast, the regional water boards have limited staff available for follow-up and education and may not have the same expertise in agricultural practices as the coalition representatives. Compared to other regulatory programs, the regulation of agriculture is relatively new, and growers have a reluctance to disclose data that they have never before disclosed to the public, especially because control of the pollutant in question—nitrogen—directly interferes with the underlying activity of applying fertilizer to grow crops.

52. Cal. Gov't Code, §§ 6250 et seq. (2018).

53. Data transparency in agricultural regulatory programs has been the subject of recent litigation in the Central Coast region and is likely to be a continuing issue of controversy. See *Zamora v. Cent. Coast Regional Water Quality Control Bd.*, No. 15CV-0247 (Cal. Super. Oct. 28, 2016) (requiring public disclosure of notifications provided when a drinking water well exceeds the nitrate drinking water standards). Three petitions for writ of mandate have been filed challenging the State Water Board Agricultural Order and the underlying East San Joaquin Agricultural Permit, raising, among other issues, the appropriateness of anonymous identifiers. See *Environmental Law Foundation v. State Water Resources Control Bd.*, Cal. Super. Ct. Sacramento County, *petition for writ of mandate filed*, (Cal. Mar. 28, 2018) (No. 34-2018-80002851); *Monterey Coastkeeper et al. v. Central Valley Regional Water Quality Control Bd. and State Water Resources Control Bd.*, Cal. Super. Ct. Sacramento County, *petition for writ of mandate filed*, (Cal. Mar. 28, 2018) (No. 34-2018-80002853); *Protectores Del Agua Subterranea v. State Water Resources Control Bd.*, Cal. Super. Ct. Sacramento County, *petition for writ of mandate filed*, (Cal. Mar. 28, 2018) (No. 34-2018-80002852) (on file with editor).

The State Water Board ultimately concluded that obtaining field-level AR data is essential for the regulatory program's progress in minimizing nitrogen impacts from agricultural discharges, but that—at least at this early stage in the development of the program—the field-level AR data need not be submitted with name and location identifiers.⁵⁴ In devising this compromise, the State Water Board relied in part on a proposal presented by a group of coalition representatives and environmental justice representatives for the submission of field-level data with anonymous identifiers.⁵⁵ The reporting framework adopted by the State Water Board associates each grower with an anonymous grower identification number and each field with an anonymous location-based identification number.⁵⁶ All of the field-level AR data is submitted to the regional water board, but the coalition retains the key that allows for the identification of grower names and locations.⁵⁷ The State Water Board explained its rationale for allowing anonymous identifiers as follows:

. . . [W]e will proceed cautiously at this time and not require more information than we find is necessary to effectively manage the [agricultural] regulatory program and provide the public with the essential assurance that we are doing so. As a regulatory entity, we are cognizant that we should be judicious in exercising our regulatory authority only as necessary by only collecting that information that we believe is necessary to fulfill our mandates. We will periodically evaluate whether the framework we set out here is, in fact, sufficient to enable the oversight and transparency necessary to ensure measurable progress toward achieving water quality requirements while balancing the privacy concerns expressed by growers. We may require disclosure of name and location data in the future if we find that the framework we adopt here is not functioning properly. . . . For now, however, we expect that the value of a fully-functioning third party will more than offset the limitations that are associated with receiving data that is largely anonymous.⁵⁸

54. State Water Board Agricultural Order, *supra* note 3, at 47–48.

55. *Id.* at 23, n.66. Another significant component of the proposal presented by the group was the development of “groundwater protection targets” which were conceived as township-level nitrogen loading targets designed to reach the water quality objectives for nitrates. The State Water Board incorporated a process for development of these targets into the order. *Id.* at 66–67.

56. *Id.* at 48–49.

57. *Id.*

58. *Id.* at 48. Although concerns regarding protection of trade secrets and proprietary business information were raised during the proceedings, the State Water Board did not base its determination on those legal grounds. The State Water Board stated that it would not add to the protections for sensitive business information created by the Legislature in the Water Code and the Public Records Act, pointing out that the Eastern San Joaquin Agricultural Permit already established a process whereby a Member may assert that all or

The State Water Board emphasized, however, that the regional water boards would retain the crucial authority to request the underlying grower names and locations for any field or set of fields from the coalition where they determined that their oversight function required a more proactive effort. The coalitions, the State Water Board stated, are the appropriate entities to take the lead in outreach to growers whose AR data indicate potential nitrogen over-application because of their existing, established relationships with growers and because of their expertise in management practice development and deployment. However, the regional water boards could and should request the identity of growers and locations of fields when outreach efforts by the coalitions fail to yield water quality results.⁵⁹

C. Significance of Field-Level Data

The fundamental shift in policy instituted by the State Water Board Agricultural Order is the requirement for AR Data to be reported to the regional water boards for each grower and for each field without aggregation. With some specified exceptions, this direction is precedential for all agricultural regulatory programs in the state, so that each agricultural regulatory program will be gathering owner- and field-specific AR data in the near future, albeit with anonymous identifiers.⁶⁰

There are several significant regulatory purposes that underlie the State Water Board's insistence that field-level data be reported to the regional water boards. The first is that the availability of the AR data sets the stage for development of acceptable ranges for AR metric values. The AR metric is an indicator of the amount of nitrogen in the soil that could potentially reach groundwater as nitrate. Over the next several years, as the regional water boards gather the field-level AR data, the data will be analyzed to determine ranges of the AR metric for each crop that represent acceptable values to support crop growth, but minimize nitrogen left in the soil. The AR metric ranges will be crop-specific and measured over multiple crop cycles and may be further refined over time for different conditions such as irrigation methods and soil types.⁶¹ Given the challenges of groundwater quality monitoring for evaluating the effectiveness of nitrogen application practices, development of the AR metric ranges currently represents the most promising methodology for fair and even-handed evaluation of efforts to minimize the potential for nitrates to reach groundwater. Significantly, development of the AR metric ranges requires access to the database of field-level

a portion of a report is exempt from public disclosure. See Cal. Water Code § 13267(b)(2) (2018), Cal. Gov't Code § 6254(k) (2018), and Cal. Evid. Code § 1060 (2018).

59. State Water Board Agricultural Order, *supra* note 3, at 50 and 53.

60. The growers in the Central Coast region report nitrogen application data directly to the Central Coast Water Board because that program has no intermediary third party. Information on the Central Coast Water Board program is available at https://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/ [<https://perma.cc/8NGR-2ZTZ>] (as of Feb. 8, 2018).

61. State Water Board Agricultural Order, *supra* note 3, at 52–53, 73–74.

data, including field-level values for nitrogen applied, nitrogen removed, and crop type, but not the names and locations associated with that data.

A second significant regulatory purpose is follow-up. While AR metric ranges must be based on several years of data, the field-level AR data also supports immediate efforts to reduce the potential for nitrates to reach groundwater. Each grower will have information on how his/her nitrogen application compares to other growers planting the same crops. For any given year, the regional water boards will be able to work with the coalition to identify a set of outliers for each crop and require the coalition (which will have identifying grower name and location information for each field) to follow up with those growers. Where the over-application persists over multiple crop cycles, the regional water boards may require additional outreach by the coalition and action by the growers. The regional water boards may ultimately require that the coalition identify the grower of a field with persistent over-application and directly follow up with that grower or proceed to an enforcement action.⁶²

Finally, the State Water Board Agricultural Order also requires management practice implementation data to be submitted to the regional water boards at a field level with an anonymous grower ID.⁶³ Because the anonymous ID for each grower is identical for the management practice implementation data set and the AR data set, the regional water board has the capability to correlate management practice implementation on a particular field with the AR metric. This correlation will provide significant insight into field-level practices that lead to reductions in nitrogen over-application and facilitate management practice evaluation and implementation.⁶⁴

In addition to the field-level AR data, the State Water Board Agricultural Order continues the requirement for the coalition to summarize the data at a township-level. This data set will serve additional regulatory and nonregulatory purposes. Researchers may use the data to conduct studies on area-specific nitrogen loading and studies advancing the science of agricultural practices, environmental justice groups may use the data to assist in planning for areas that may need drinking water assistance, and local agencies may use the data in groundwater quality management efforts, among other purposes.⁶⁵ Significantly, the agricultural coalition and environmental justice representatives who presented the compromise proposal on anonymous reporting also proposed the development of township-level nitrogen loading targets and the State Water Board incorporated a process for development of these targets into the Agricultural Order.⁶⁶ With the requirement for submission of field-level AR data, the Agricultural Order also ensures that these types of township-level analyses will be fortified by the ability of the more granular field-level data to identify and address over-application of

62. *Id.* at 52–53.

63. *Id.* at 30–32.

64. *Id.* at 73.

65. State Water Board Agricultural Order, *supra* note 3, at 73.

66. *Id.* at 66–67.

nitrogen in “hot spots” that might otherwise be obfuscated by the averaging effect of township-level data.

Ultimately, the availability of field-level AR data means that the regulatory agencies, research institutions, growers, and public can begin to evaluate what levels of nitrogen application are compatible with safe drinking water and translate that knowledge into improved management practices for particular growers or categories of growers.

Conclusion

In regulating agricultural discharges, the State Water Board must ensure that there is a robust feedback mechanism that ties management practices implemented on the surface with the water quality results required by law for the underlying groundwater. The law does not specify a particular level of granularity in monitoring and reporting and therefore leaves significant discretion to the State Water Board to determine the appropriate level of data gathering and reporting for different programs. The State Water Board Agricultural Order struck a balance that, on the one hand, requires sufficient data collection and reporting to allow for meaningful feedback on grower practices. On the other hand, it acknowledges and accommodates grower discomfort with direct regulation and concern with maintaining privacy of field-level information. The precedential Agricultural Order requires the collection of crucial data that will force short-term follow up to curtail over-application of nitrogen and support long-term studies, analyses, and regulatory programs to minimize the amount of nitrate that reaches groundwater. With the adoption of the Agricultural Order, California has taken a crucial step toward protecting and restoring drinking water supplies for its disadvantaged communities.
