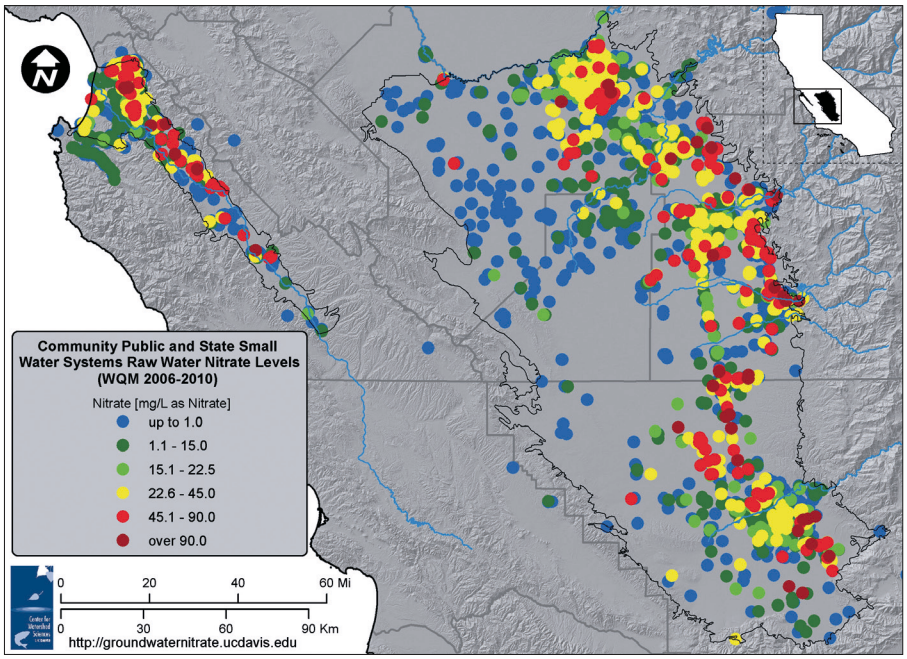
Nitrate in California's Groundwater

In 2008, Senate Bill SBX2 1 (Perata) required that the State Water Resources Control Board (State Water Board) prepare a Report to the Legislature to "improve understanding of the causes of [nitrate] groundwater contamination, identify potential remediation solutions and funding sources to recover costs expended by the State … to clean up or treat groundwater, and ensure the provision of safe drinking water." The University of California prepared a set of reports under contract with the State Water Board for this purpose. This summary focuses on some major findings and promising actions, with details in the Main Report *Addressing Nitrate in California's Drinking Water* and accompanying Technical Reports.



Maximum reported raw-level nitrate concentration in community public water systems and state-documented state small water systems, 2006–2010. *Source:* CDPH PICME WQM Database.

Nitrate is one of the state's most widespread groundwater contaminants. It is principally a byproduct of nitrogen in fertilizer used to grow crops. Nitrate concentrations in public drinking water that exceed the **California Department of Public Health (CDPH) maximum contaminant level (MCL) for nitrate in drinking water of 45 milligrams per liter (as nitrate)** require often-costly water system actions to provide safe drinking water. This study focuses on the four-county **Tulare Lake Basin and the Monterey County portion of the Salinas Valley.** About 2.6 million people in these regions rely on groundwater for drinking water, including some of the poorest communities in California. The study area includes four of the nation's five counties with the largest agricultural production, representing about 40% of California's irrigated cropland and over half of the state's confined animal farming industry.

Nitrate in groundwater poses public health concerns for about 254,000 people in California's Tulare Lake Basin and Salinas Valley who are currently at risk for nitrate contamination of their drinking water. Of these, 220,000 are connected to community public (more than 14 connections) or state small water systems (5 to 14 connections), and 34,000 are served by private domestic wells or other systems that are smaller than the threshold for State regulation and which are largely unmonitored.

Summary of Key Findings

1. **Nitrate problems will likely worsen for several decades. For more than half a century, nitrate from fertilizer and animal waste has infiltrated into Tulare Lake Basin and Salinas Valley aquifers. Most nitrate in drinking water wells today was applied to the surface decades ago.**
2. **Agricultural fertilizers and animal wastes applied to cropland are by far the largest regional sources of nitrate in groundwater. Other sources can be locally relevant.**
3. **Nitrate loading reductions are possible, some at modest cost. Large reductions of nitrate loads to groundwater can have substantial economic cost.**
4. **Direct remediation to remove nitrate from large groundwater basins is extremely costly and not technically feasible. Instead, "pump-and-fertilize" and improved groundwater recharge management are less costly long-term alternatives.**
5. **Drinking water supply actions such as blending, treatment, and alternative water supplies are most cost-effective. Blending will become less available in many cases as nitrate pollution continues to spread.**
6. **Many small communities cannot afford safe drinking water treatment and supply actions. High fixed costs affect small systems disproportionately.**
7. **The most promising revenue source is a fee on nitrogen fertilizer use in these basins. A nitrogen fertilizer use fee could compensate affected small communities for mitigation expenses and effects of nitrate pollution.**
8. **Inconsistency and inaccessibility of data prevent effective and continuous assessment. A statewide effort is needed to integrate diverse water-related data collection activities by many state and local agencies.**

Table. Likely performance of promising state and agency actions for nitrate groundwater contamination.

Action	Safe Drinking Water	Groundwater Degradation	Economic Cost
No Legislation Required			
Safe Drinking Water Actions			
D1: Point-of-Use Treatment Option for Small Systems +	◆◆		low
D2: Small Water Systems Task Force +	◆		low
D3: Regionalization and Consolidation of Small Systems +	◆◆		low
Source Reduction Actions			
S1: Nitrogen/Nitrate Education and Research +		◆◆◆	low–moderate
S2: Nitrogen Accounting Task Force +		◆◆	low
Monitoring and Assessment			
M1: Regional Boards Define Areas at Risk +	◆◆◆	◆◆◆	low
M2: CDPH Monitors At-Risk Population +	◆	◆	low
M3: Consider Nitrogen Use Reporting +		◆◆	low
M4: Groundwater Data Task Force +	◆	◆	low
M5: Groundwater Task Force +	◆	◆	low
Funding			
F1: Nitrogen Fertilizer Mill Fee		◆◆◆	low
F2: Local Compensation Agreements for At-Risk Areas +	◆◆	◆	moderate
New Legislation Required			
D4: Domestic Well Testing in At-Risk Areas *	◆◆		low
D5: Stable Small System Funds	◆		moderate
Non-tax legislation could also strengthen and augment existing authority.			
Fiscal Legislation Required			
Source Reduction			
S3: Fertilizer Excise Fee	◆◆	◆	moderate
S4: Higher Fertilizer Fee in Areas at Risk	◆	◆	moderate
Funding Options			
F3: Fertilizer Excise Fee	◆◆	◆◆	moderate
F4: Water Use Fee	◆◆	◆◆	moderate

◆ Helpful

◆◆ Effective

◆◆◆ Essential

+ Legislation would strengthen.

* County health departments may have authority; CDPH requires legislation.