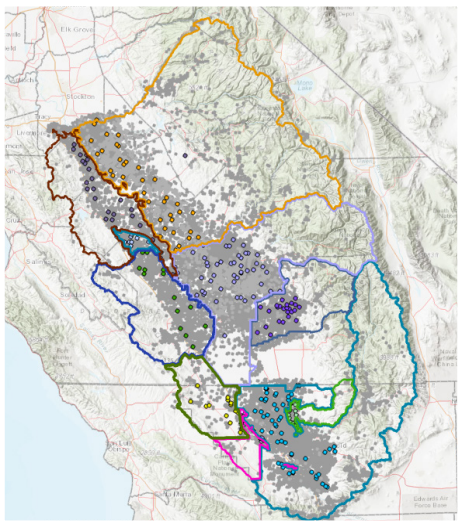
CENTRAL VALLEY
GROUNDWATER
MONITORING
COLLABORATIVE

Five-Year Assessment Report
Executive Summary

November 30, 2021



ACKNOWLEDGMENTS

Special thanks to all of the individual coalitions that collaborated and funded this report. Great appreciation is also expressed for the technical consultants who worked together to produce this landmark document.

Buena Vista Coalition and Provost & Pritchard Consulting Group

Cawelo Water District Coalition and Provost & Pritchard Consulting Group

East San Joaquin Water Quality Coalition and MLJ Environmental and Luhdorff & Scalmanini Consulting Engineers

Grassland Drainage Area Coalition and Luhdorff & Scalmanini Consulting Engineers

Kaweah Basin Water Quality Association and Provost and Pritchard Consulting Group

Kern River Watershed Coalition Authority and Provost and Pritchard Consulting Group

Kings River Water Quality Coalition and Kings River Conservation District and Luhdorff & Scalmanini Consulting Engineers

Westlands Water Quality Coalition and MLJ Environmental and Luhdorff & Scalmanini Consulting Engineers

Westside San Joaquin River Watershed Coalition and Luhdorff & Scalmanini Consulting Engineers

Westside Water Quality Coalition and Geosyntec Consultants

EXECUTIVE SUMMARY

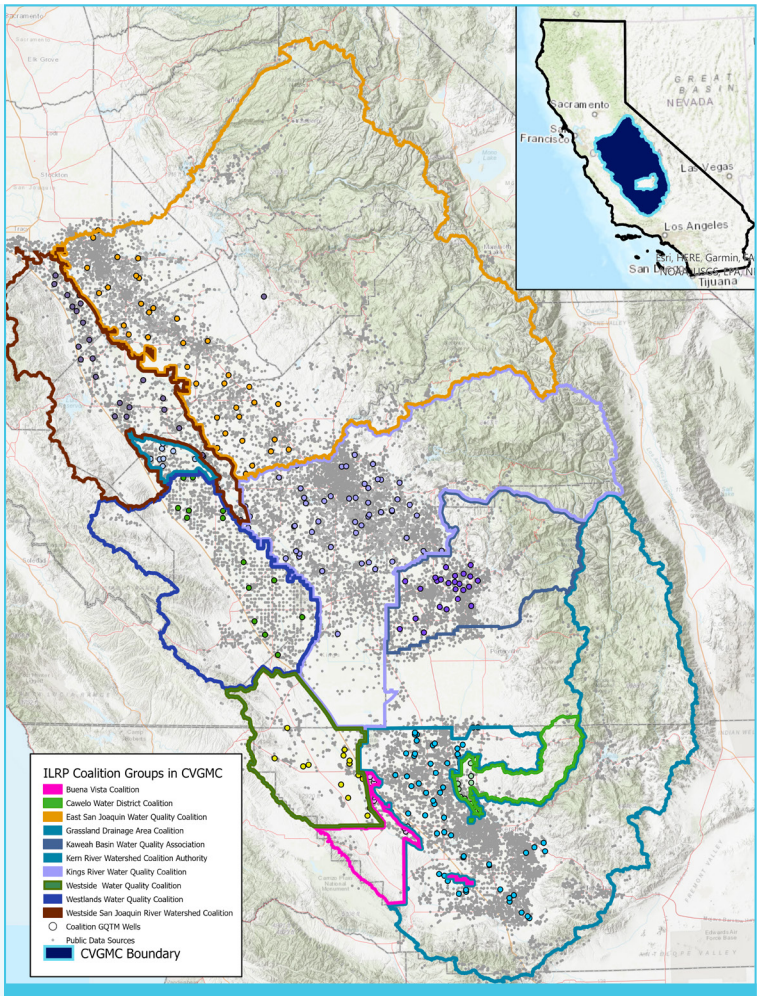
The Central Valley Groundwater Monitoring Collaborative (CVGMC) is a group of irrigated agricultural lands coalitions across the Central Valley working collaboratively under a Memorandum of Agreement (MOA) to protect groundwater quality (https://cvgmc.org/). The CVGMC was created to comply with the various Waste Discharge Requirement General Orders of the participating Central Valley Irrigated Lands Regulatory Program (ILRP) Coalitions. The collaboration of these ten agricultural coalitions includes monitoring and characterizing regional groundwater quality conditions and trends. The CVGMC has worked collaboratively to prepare the ILRP Groundwater Quality Trend Monitoring Program Workplan (2018) and a Workplan Update (2020), and each individual agricultural coalition has also submitted separate regulatory documents such as Groundwater Quality Trend Monitoring Network Workplans and groundwater quality trend monitoring reports.

This CVGMC Five-Year Assessment Report marks the first time these ten coalitions have worked together to analyze nitrate concentrations and other groundwater quality data for most of the southern part of the Central Valley..

This report focuses on recent groundwater conditions of nutrients and salinity (e.g., nitrate and total dissolved solids, or TDS).

The ten coalitions that founded the CVGMC and have worked collaboratively since 2017 are listed below. Their boundaries correspond to the colors on the map to the right.

- **Buena Vista Coalition**
- **Cawelo Water District Coalition**
- **East San Joaquin Water Quality Coalition**
- **Grassland Drainage Area Coalition**
- **Kaweah Basin Water Quality Association**
- **Kern River Watershed Coalition Authority**
- **Kings River Water Quality Coalition**
- **Westlands Water Quality Coalition**
- **Westside San Joaquin River Watershed Coalition**
- **Westside Water Quality Coalition**
- Coalition GQTM Wells
- Public Data Sources
- CVGMC Boundary

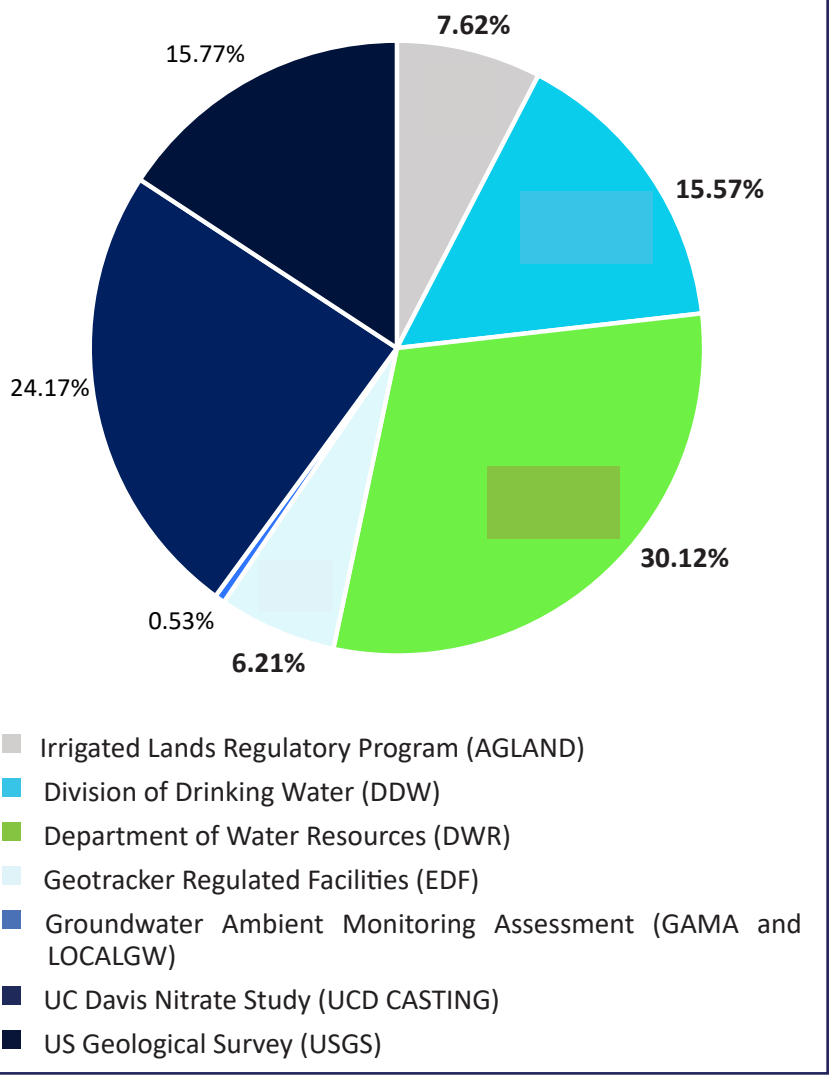


GQTM Wells and Publicly Available Nitrate, TDS, and Pesticide Well Locations

Each individual coalition maintains their own Groundwater Quality Trend Monitoring (GQTM) network, consisting of existing wells selected to characterize and track groundwater quality conditions in both high and low vulnerability areas on irrigated agricultural lands within each coalition's boundary. Wells in the GQTM network are largely completed in the upper part of the groundwater system, and the network of wells meets the General Order regulatory requirements.

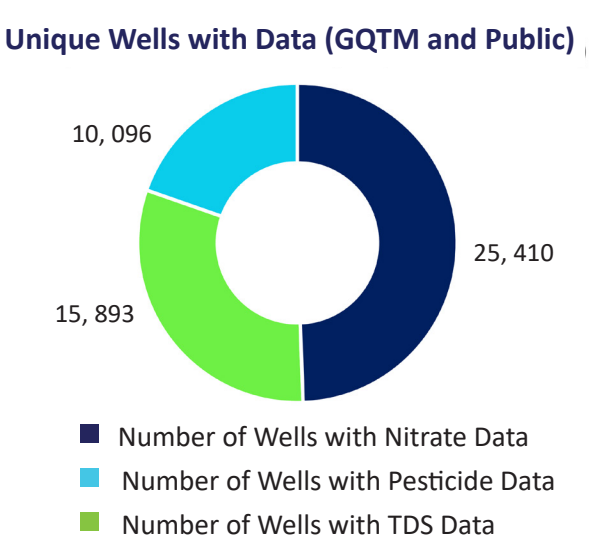
CVGMC has initiated the development and maintenance of one central data repository (their Data Management System, or DMS) to house all of the GQTM groundwater quality sample results over time. The coalitions' data that are uploaded to the CVGMC DMS are rigorously reviewed to meet the requirements of the Comprehensive Quality Assurance Plan (CVGMC QAP), resulting in a highly curated GQTM groundwater quality dataset. Publicly available groundwater quality data (for nitrate, TDS, and pesticides) supplement the GQTM monitoring data from many different sources including the ILRP Drinking Water Well Sampling Program (AGLAND), State Water Resources Control Board (State Board) Division of Drinking Water (DDW), California Department of Pesticide Regulation (DPR), California Department of Water Resources (DWR), State Board GeoTracker Regulated Facilities (EDF), State Board Groundwater Ambient Monitoring Assessment (GAMA and LOCALGW), University of California Davis Nitrate Study (UCD CASTING), and the U.S. Geological Survey. The nitrate and TDS public data underwent a cursory QA/QC process prior to their inclusion in the DMS and subsequent assessment.

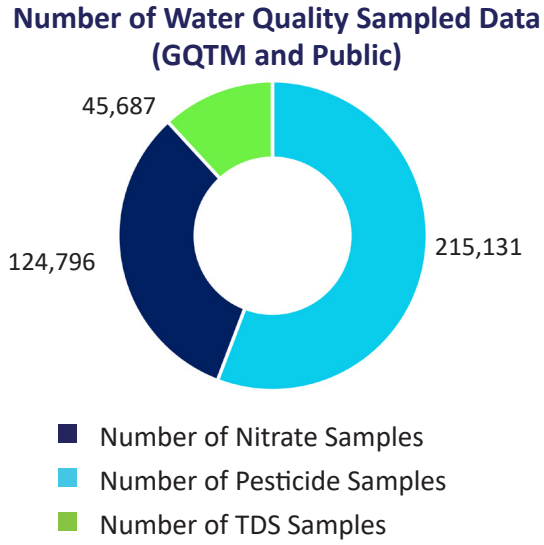
Number of Wells With Nitrate Data Within a 3-mile Buffer around the CVGMC Boundary that Fall Within the Central Valley Floor Footprint (Total 22,422 Wells)



The combination of GQTM and publicly available nitrate, TDS, and pesticide datasets result in hundreds of thousands of data points used for the ambient conditions and trends assessments in this report.

Table of Public and GQTM Data Used for Conditions Assessment						
CVGMC Dataset	Number of Wells with Nitrate Data	Number of Nitrate Samples	Number of Wells with TDS Data	Number of TDS Samples	Number of Wells with Pesticide Data	Number of Pesticide Samples
Entire Dataset	25,410	124,796	15,893	45,687	10,096	215,131
Within Central Valley Floor	22,673	107,628	13,983	38,401	8,502	215,131

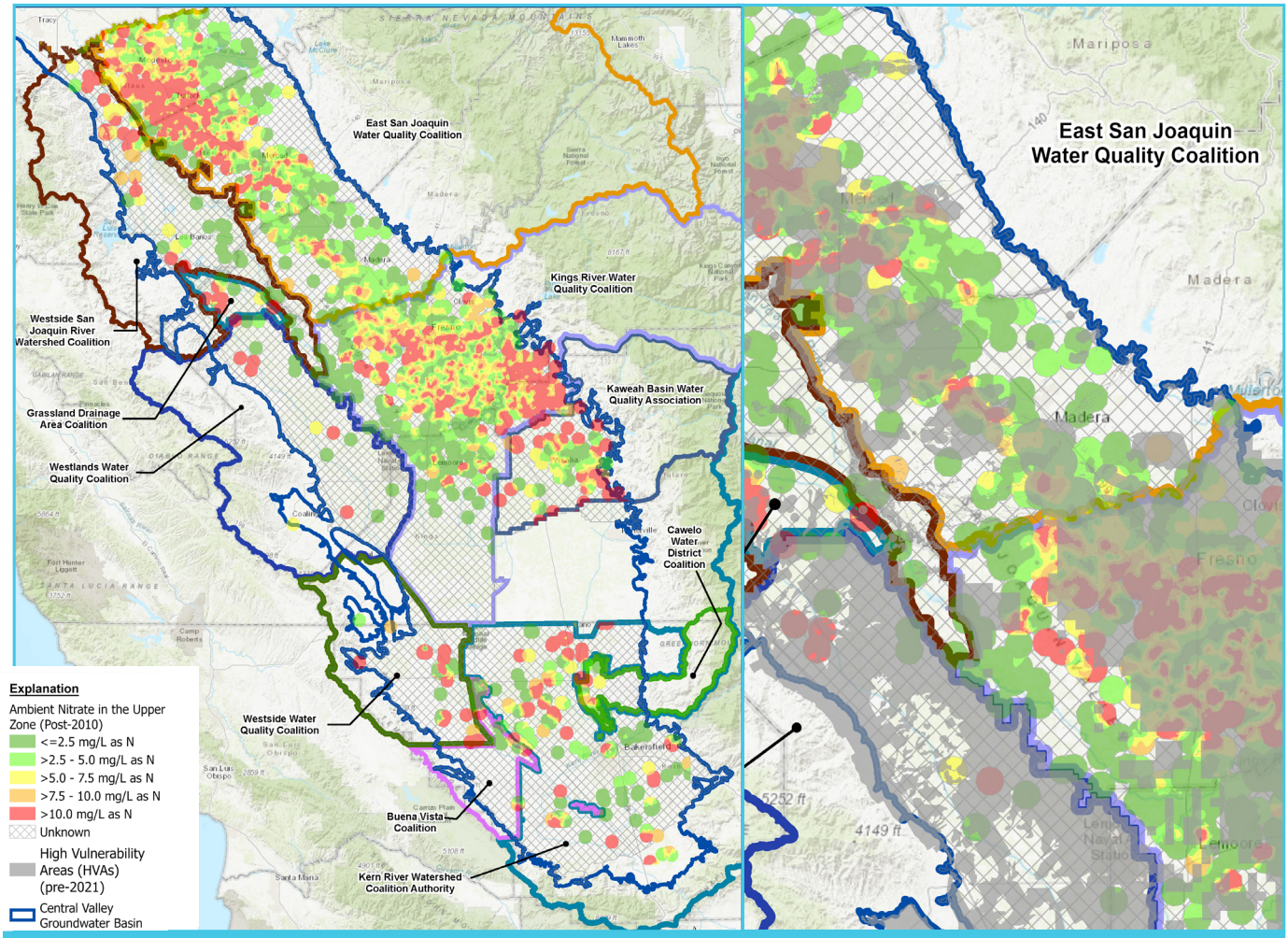




The purpose of this Five-Year Assessment Report is to focus on nitrate occurrence, distribution, and trends in groundwater. Nitrate conditions are presented in this report, spatially, and in time series and tabular form. The spatial distribution of nitrate is presented for GQTM wells as well as in a spatially interpolated recent snapshot of ambient nitrate conditions for the Upper Zone of the groundwater system. Nitrate and TDS trends are also analyzed and provided in tabular and map form. Salinity is a secondary focus of this Five-Year Assessment Report, and spatial and trend conditions are also provided similarly.

Although not the main focus of this assessment, pesticide data from non-GQTM wells for a subset of parameters (seven constituents associated with active irrigated agriculture and two constituents that are banned and no longer associated with irrigated agriculture) are compared to current water standards such as Maximum Contaminant Levels (MCLs), drinking water health advisory levels, or health-based screening levels and summarized tabularly and spatially. Similarly, general mineral data, although not a primary focus of this assessment, are also summarized tabularly for GQTM wells.

Nitrate and TDS conditions are compared to the most recent 2018 land use coverage of irrigated agriculture (from DWR's most recent dataset). All quality controlled publicly available nitrate data (including coalitions' GQTM data) are also compared to the originally designated High Vulnerability Areas (HVAs), which were developed by each coalition and approved by the Regional Water Quality Control Board, to determine whether HVA modifications and updates are warranted.



Ambient Nitrate in the Upper Zone (Post-2010) (Left Image) Zoomed in with HVA Overlays (Right Image).

Each individual coalition provides their own chapter specific to addressing: 1) their local GQTM network and 2020 sampling results, 2) their sampling quality assurance evaluation, 3) their local five-year assessment results, and 4) any edits or updates to their HVA, as needed.

The CVGMC has been working on enhancing their education and outreach activities, as well as coordination with other programs and projects. CVGMC launched its own website (www.cvgmc.org), which contains information about the coalitions and activities, participants, and describes how interested parties can become involved.

Snapshot of CVGMC Website

CVGMC also collaboratively maintains their DMS, which now houses hundreds of thousands of data points pertinent to the groundwater quality conditions in the San Joaquin Valley. Many of the monitoring results and analyses provided in this Five-Year Assessment Report satisfy similar objectives as other projects such as the Basin Plan Amendment, the CV-SALTS Nitrate Control Program, and Sustainable Groundwater Management Act (SGMA) Implementation.

A summary of the findings from this Five-Year Assessment are provided below:

1. Nitrate conditions are highly variable in the subsurface, as shown by GQTM well data and publicly available groundwater data.

2. The availability of GQTM and publicly available recent (post-2010) nitrate data in the Upper Zone is densest in the northeast and central-eastern portions of the CVGMC area, with much sparser Upper Zone recent (post-2010) nitrate data on the western side and southern portion of CVGMC.

3. Recent (post-2010) nitrate data for wells completed in the Upper Zone show two large areas of elevated nitrate occurring in the north central and central-eastern areas of the CVGMC. Other smaller pockets of elevated nitrate concentrations occur throughout each of the ten CVGMC coalitions.

4. Nitrate conditions in the Upper Zone of the CVGMC area are generally of better quality on the eastern edges of the Central Valley Floor, and in areas adjacent to parts of the San Joaquin River and the Fresno Slough.

5. Regional trend analyses exhibit increasing trends in many coalitions; however, recent trends in nitrate concentrations are more often stable or decreasing compared to long-term trends, and nitrate concentrations are decreasing in all land use areas within the entire CVGMC.

6. TDS concentrations on a well-by-well basis also exhibit variability, but general patterns suggest TDS conditions in the Upper Zone on the west side of the CVGMC area are higher and tend to exceed the secondary drinking water standard of 1,000 mg/L compared to the eastern areas of the CVGMC. Pockets of elevated TDS exist in the southern and southeastern CVGMC areas as well as some areas on the eastern side of the Central Valley Floor.

7. TDS trends for GQTM and publicly available groundwater wells vary but generally show more increasing patterns compared to trends in nitrate conditions, regardless of overlying land use.

8. Based on publicly available pesticide data for nine constituents of interest, pesticides associated with current agricultural practices are rarely found above health-based or screening levels.