

2. GROUND WATER DATA

2.1 List of Major Databases for Groundwater Quality Data

1. U.S. Environmental Protection Agency

Database: Storage and Retrieval database (STORET) LDC and Modernized

2. U.S. Geological Survey

Database: National Water Information System (NWIS)
National Water Quality Assessment Program (NAWQA)
Ground-Water Ambient Monitoring and Assessment (GAMA)

3. California Department of Water Resources

Database: Water Data Library

2.2 Metadata Summary Table (Table 2-1, next page)

Table 2.1 Databases containing ground water quality data for the California Central Valley

Database	Contact Person	Contact number	E-mail	Geographic Coverage	Temporal Coverage	Salinity data
Environmental Protection Agency STORET (LDC)	Eric Wilson	(415) 972-3454	wilson.eric@epa.gov	Central Valley counties	1901-1999	conductance, alkalinity, TDS, nutrients (e.g., phosphate, nitrate, nitrite) major inorganics (chloride, bicarbonate, carbonate, sulfate, calcium, sodium)
Environmental Protection Agency STORET (Modernized)	Eric Wilson	(415) 972-3454	wilson.eric@epa.gov	Central Valley counties	1999-2008	conductance, alkalinity, TDS, nutrients (e.g., phosphate, nitrate, nitrite) major inorganics (chloride, bicarbonate, carbonate, sulfate, calcium, sodium)
U.S. Geological Survey NWIS	Michael V. Shulters	(916) 278-3000 1-888-275-8747		Central Valley counties	1899-2008	salinity, conductance, alkalinity, nutrients (e.g., phosphate, nitrate, nitrite) major inorganics (chloride, bicarbonate, carbonate, sulfate, calcium, sodium)
U.S. Geological Survey NAWQA	Sandy (Alex) K. Williamson (Database Team Leader) Nate Booth (Database developer)	(253) 428-3600x2683 Kelly McPherson (916) 278-3169 GAMA Project Chief (619) 222-2243	akwill@usgs.gov niboath@usgs.gov	51 U.S. Basins California Basins: Sacramento Basin, San Joaquin-Tulare Basin, Santa Ana Basin	1991-2006	conductance, nutrients (e.g., phosphate, nitrate, nitrite) major inorganics (chloride, bicarbonate, carbonate, sulfate, calcium, sodium), and land use
U.S. Geological Survey GAMA	Kelly McPherson (Geographer) or GAMA Project Chief	Eric Senter (916) 651-9648 Greg Smith (916) 653-6410 Brian Niski (916) 651-9289	krmcpher@usgs.gov	California Basins	2004-2010	Nutrients (nitrates, phosphates), major ions
Department of Water Resources Water Data Library	Eric Senter Greg Smith Brian Niski	esenter@water.ca.gov gregs@water.ca.gov bniski@water.ca.gov		Central Valley counties	1963-2008	Alkalinity, nitrate, nitrite, conductance, sulfate, phosphate, TDS, and chloride

2.3 Summary Tables for Ground Water Coverage

Table 2.2 Department of Water Resources Water Data Library Water quality temporal coverage for the California Central Valley* Surface water and Ground water	
County	Temporal Coverage
Alameda	1989-2008
Alpine	No data**
Amador	No data**
Butte	1963-2008
Calaveras	No data**
Colusa	1998-2008
Contra Costa	1983-2008
El Dorado	No data**
Fresno	1998-2001
Glenn	1998-2008
Kern	1998-2008
Kings	1998-2008
Lake	1998-2008
Lassen	2000-2008
Madera	No data**
Mariposa	No data**
Merced	1988-2008
Modoc	2000-2008
Napa	No data**
Nevada	1998-2006
Placer	1998-2006
Plumas	1998-2007
Sacramento	1983-2008
San Benito	No data**
San Joaquin	1983-2008
Shasta	1998-2008
Sierra	1999-2007
Siskiyou	1999-2008
Solano	1983-2008
Stanislaus	1988-1999
Sutter	1963-2008
Tehama	1998-2008
Tulare	No data**
Tuolumne	No data**
Yolo	1991-2008
Yuba	1967-2007

*Earliest data recorded-1963

*Latest data recorded-2008

**No data-No data available for these counties

Table 2.3 Salinity data available for the Central Valley counties in the NAWQA database*
Ground Water

County	Specific conductance, conductivity	Alkalinity	Nitrate, Nitrogen, ammonia	Chloride	Sulfate	Phosphate	TDS	Salinity
Alameda								
Alpine								
Amador								
Butte	X	X	X	X	X	X		
Calaveras								
Colusa	X	X	X	X	X	X		
Contra Costa								
El Dorado								
Fresno	X	X	X	X	X	X		
Glenn	X	X	X	X	X	X		
Kern	X	X	X	X	X	X		
Kings	X	X	X	X	X	X		
Lake								
Lassen								
Madera	X	X	X	X	X	X		
Mariposa	No data**							
Merced	X	X	X	X	X	X		
Modoc								
Napa								
Nevada								
Placer	X	X	X	X	X	X		
Plumas								
Sacramento	X	X	X	X	X	X		
San Benito								
San Joaquin	X	X	X	X	X	X		
Shasta	No data**							
Sierra								
Siskiyou								
Solano	No data**							
Stanislaus	X	X	X	X	X	X		
Sutter	X	X	X	X	X	X		
Tehama	No data**							
Tulare	X	X	X	X	X	X		
Tuolumne								
Yolo	X	X	X	X	X	X		
Yuba	X	X	X	X	X	X		

*Total dissolved solids and salinity are listed as parameters in the database but no data is available for the Central Valley counties.

*Counties with missing data are not in the California basins studied by NAWQA

**No Data- no data available for the selected parameters in ground water and surface water; however, data for other parameters might have been recorded for the county

Table 2.4 Salinity related data available for the Central Valley counties in the STORET Legacy database Ground Water								
County	Specific conductance, conductivity	Alkalinity	Nitrate, Nitrogen, ammonia	Chloride	Sulfate	Phosphate	TDS	Salinity
Alameda	X	X		X	X			
Alpine				X	X			
Amador	X	X		X	X			
Butte	X	X		X	X	X		
Calaveras	X	X		X	X			
Colusa	X	X		X	X	X		
Contra Costa	X							
El Dorado	X	X		X	X			
Fresno	X	X	X	X	X			
Glenn	X	X	X	X	X	X		
Kern	X	X		X	X	X		
Kings	X	X	X	X	X	X		
Lake	No data*							
Lassen	X	X		X	X			
Madera	X	X		X	X			
Mariposa	X	X	X	X	X	X		
Merced	X	X	X					
Modoc	X	X	X		X			
Napa	No data*							
Nevada	X	X		X	X			
Placer	X	X		X	X			
Plumas	X	X		X	X			
Sacramento	No data*							
San Benito	X	X		X				
San Joaquin						X		
Shasta				X	X		X	
Sierra	X	X		X	X			
Siskiyou	X	X		X	X	X		
Solano								
Stanislaus	X	X		X	X			
Sutter	X	X		X	X			
Tehama	X	X		X	X			
Tulare	No data*							
Tuolumne	X	X		X	X			
Yolo	X	X						
Yuba	X	X		X	X	X		

*No Data- no data available for the selected parameters; however, data for other parameters might have been recorded for the county

Table 2.5 Salinity related data available for the Central Valley counties in the STORET Modern database Ground Water								
County	Specific conductance, conductivity	Alkalinity	Nitrate, Nitrogen, ammonia	Chloride	Sulfate	Phosphate	TDS	Salinity
Alameda								
Alpine								
Amador	No data*							
Butte								
Calaveras								
Colusa								
Contra Costa								
El Dorado								
Fresno								
Glenn								
Kern	No data*							
Kings	No data*							
Lake								
Lassen	X	X		X				
Madera								
Mariposa								
Merced								
Modoc								
Napa								
Nevada								
Placer								
Plumas								
Sacramento								
San Benito	No data*							
San Joaquin								
Shasta								
Sierra								
Siskiyou								
Solano								
Stanislaus								
Sutter								
Tehama	X	X		X				
Tulare								
Tuolumne								
Yolo								
Yuba								

*No Data- no data available for the selected parameters in ground water and surface water; however, data for other parameters might have been recorded for the county

2.4 Groundwater Coverage Notes

- The earliest surface-water quality data included in the NWIS database are from 1901.
- STORET LDC, NWIS, and DWR databases have both historic and modern data for download.
- NAWQA and STORET Modern databases provide modern data only (from 1990 to 2008).
- NAWQA and NWIS databases overlap. The difference is that NWIS has historic data for California, and NAWQA has modern data for the California basins.

2.5 Metadata of Groundwater Databases

2.5.1 NWIS (USGS)

U.S. Geological Survey NWIS Metadata Surface Water and Ground Water

Content Citation

Title of Content: National Water Information System
NWIS and NWISWeb

Type of Content: Downloadable data

Content Publisher: U.S. Geological Survey

Content Description

Content Summary: The USGS collects and analyzes chemical, physical, and biological properties of water, sediment and tissue samples from across the Nation. The NWIS is a system for storage and retrieval of water data for the nation. The system is composed of four subsystems: the Ground-Water Site-Inventory System, the Water-Quality System, the Automated Data-Processing System, and the Water-Use Data System. Many types of data are stored in the NWIS data base, including Site information, Time-series (flow, stage, precipitation, chemical), peak flow, ground water, water quality, water use. The NWIS Web discrete sample data base is a compilation of over 4.4 million historical water quality analyses in the USGS district data bases through September 2005. The discrete sample data is a large and complex set of data that has been collected by a variety of projects ranging from national programs to studies in small watersheds. Users should review the help notes and particularly the data retrieval precautions before beginning any retrieval or analysis of data from this data set. At selected surface-water and groundwater sites, the USGS

maintains instruments that continuously record physical and chemical characteristics of the water including pH, specific conductance, temperature, dissolved oxygen, and percent dissolved-oxygen saturation. Supporting data such as air temperature and barometric pressure are also available at some sites.

Content Purpose: The USGS investigates the occurrence, quantity, quality, distribution, and movement of surface and underground waters and disseminates the data to the public, State and local governments, public and private utilities, and other Federal agencies involved with managing the water resources.

Time Period of Content

Date: 1899-2008

Content Status

Update Frequency: Data provided by NWISWeb are updated from NWIS on a regularly scheduled basis, and real-time data are generally updated upon receipt at local Water Science Centers. At sites where the information is transmitted automatically, data are available from the real-time data system. Once a complete day of readings are received from a site, daily summary data are generated and made available online. Annually, the USGS finalizes and publishes the daily data in a series of water-data reports.

Spatial Domain

State: States in the United States and territories
County: U.S. Counties
California: All California counties
California
Central Valley: All Central Valley counties

Spatial Data Information

Data Type: Many types of data are stored in NWIS, including comprehensive information for site characteristics, well-construction details, time-series data for gage height, stream flow, groundwater level, precipitation, and physical and chemical properties of water. Additionally, peak flows, chemical analyses for discrete samples of water, sediment, and biological media are accessible within NWIS.

Salinity Data:

Surface Water: Parameters measured: stream flow, conductivity, alkalinity, salinity dissolved salts, nutrients (nitrate, phosphate, nitrite), major inorganics (sulfate, chloride, bicarbonate, carbonate, calcium, sodium)

Ground Water: conductivity, alkalinity, salinity dissolved salts, nutrients (nitrate, phosphate, nitrite), major inorganics (sulfate, chloride, bicarbonate, carbonate, calcium, sodium)

Data Format: NWISWeb provides several output options including: graphs of real-time stream flow, maps of real time sites water levels, and water quality; tabular output in HTML and ASCII tab-delimited files; and summary lists for selected sites that can be used as a basis for reselection to acquire refined details.

Access and Usage Information

Access: Online query at <http://waterdata.usgs.gov/nwis>

Query Structure: Query by data category of interest, by state, by county, by hydrologic unit or specific site, by latitude and longitude

Download requirements: file decompression software and spreadsheet creating programs

Data Owner and Data quality

Owner: USGS

Quality: Quality Assurance/Quality Control (QA/QC) documentation available in NWIS:

- Field and laboratory protocols, and changes in those protocols, are documented in numerous reports and technical memoranda. These range from project-specific reports to national protocols. Current protocols are published in the USGS National Field Manual and other publications (<http://water.usgs.gov/owq/Fieldprocedures.html>).
- Summary of National QA/QC documentation through 1995. (Or see USGS Open-File Report 96-337).
- Technical memoranda, which document protocols.
- Information on national QC programs run by the Branch of Quality Systems.
- USGS Water Science Center offices may be contacted for project-specific QA/QC reports; and QC data.
- Sample information is defined by Fixed value codes
- Agency codes. The collecting agency code and analyzing agency (00028) are provided with each data retrieval.
- Sampling method information.
- Sampling method (82398)
- Sampler type (84164)

- Sample purpose code (71999) (samples collected for NAWQA and NASQAN, for example, are identified using this code. These National programs typically have nationally consistent protocols).
- Analytical method information
- Parameter code definition
- Method code

2.5.2 NAWQA (USGS)

U.S. Geological Survey NAWQA Metadata Surface Water and Ground Water

Content Citation

Title of Content: National Water Quality Assessment (NAWQA) Program
Type of Content: Downloadable data
Content Publisher: U.S. Geological Survey

Content Description

Content Summary: From 1991-2001, the NAWQA Program conducted interdisciplinary assessments, including water chemistry, hydrology, land use, stream habitat, and aquatic life, and established a baseline understanding of water-quality conditions in 51 of the Nation's river basins and aquifers, referred to as Study Units. Summary reports are available for the individual Study Units assessed from 1991-2001. The Study-Unit design uses a rotational sampling scheme; therefore, sampling intensity varies year to year at the different sites. In general, about one-third of the Study Units are intensively investigated at any given time for 3-4 years, followed by low-intensity monitoring. Trends are assessed about every 10 years. During the first decade, 20 investigations began in 1991; 16 in 1994; and 15 in 1997. During the second decade (2001-2012), monitoring continues in 42 of the 51 Study Units completed in the first decade, following a rotational scheme of 14 investigations beginning in 2001, 2004, and 2007. Findings will help to establish trends at selected surface-water and ground-water sites that have been consistently monitored for more than a decade, and fill in gaps characterizing water-quality conditions. Because each Study-Unit assessment adheres to a nationally consistent sampling and analytical methodology, water-quality conditions in a specific locality or watershed can be compared to those in other geographic regions. Collectively, the assessments advance an understanding of the quality of water across regions and the Nation. Information at different scales helps to bridge local, State, regional and national efforts to manage the Nation's water resources.

Content Purpose: The National Water-Quality Assessment (NAWQA) Program was established in 1991 to develop long-term consistent and comparable information on streams, rivers, ground water, and aquatic systems in support of national, regional, State, and local information needs and decisions related to water-quality management and policy.

Time Period of Content

Date: 1991-2006

Content Status

Update Frequency: Data provided by NWISWeb are updated from NWIS on a regularly scheduled basis

Spatial Domain

State:	51 river basins in the U.S. (includes Alaska and Hawaii). Study Unit boundaries frequently cross State boundaries and usually encompasses more than 10,000 square kilometers (about 3,900 square miles).
County:	Counties within the study units
California:	California study units available include: San Joaquin-Tulare Basin, Sacramento River Basin, and Santa Ana Basin.
California Central Valley:	San Joaquin-Tulare Basin, Sacramento River Basin

Spatial Data Information

Data Type:	a-Chemical concentrations in water, sediment, and aquatic-organism tissues and related quality-control data from the USGS National Water Information System (NWIS) b-Biological data for stream-habitat and ecological-community data on fish, algae, and benthic invertebrates (Future version will contain linked Biological data for stream habitat) c-Site, well, and basin information associated with thousands of descriptive variables derived from spatial analysis, like land use, soil, and population density d-Daily streamflow and temperature information from NWIS for selected sampling sites. e-Groundwater levels for sampled wells f-7,600 surface-water sites (including 2,500 reach segments for biological studies) and 8,100 wells g-49,000 nutrient samples and 31,000 pesticide samples as well as 9,000 VOC samples h-2,500 samples of bed sediment and aquatic organism tissues h-Biological community data for 16,000 fish, algae and invertebrate samples i-Some characteristics of sites developed by GIS overlays are available
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Salinity Data:

Surface water: Parameters measured for salinity include alkalinity, sulfate, nitrate, phosphate, chloride, conductivity, and salinity. Most downloaded data comes with land use information. Total dissolved solids and salinity are listed as parameters in the database but no data is available for the Central Valley counties.

Ground water: Parameters measured for salinity include: nitrate, phosphate, chloride, and conductivity. Most downloaded data comes with land use information. Total dissolved solids and salinity are listed as parameters in the database but no data is available for the Central Valley counties counts, serial, crosstab-basic, crosstab-extended

Data Format:

Access and Usage Information

Access: Online query at <http://water.usgs.gov/nawqa>
Query Structure: Site information, Constituent finder, Ground water, Surface water and bed sediment, Mixed (surface- and ground water), Animal tissue contaminants, Daily discharge, Biological community samples, water year, parameter group, specific parameter

Download requirements: file decompression software and spreadsheet creating programs

Data Owner and Data Quality

Owner: USGS
Quality: Most of the water quality, streamflow, and well water-level data contained in the NAWQA data warehouse (DWH) are also contained in the NWISWeb database. Therefore, the QA/QC data follow those described by NWIS.

2.5.3 STORET (US EPA)

**U.S. Environmental Protection Agency STORET Metadata
Surface Water and Ground Water**

Content Citation

Title of Content: STOrage and RETrieval database
STORET Legacy Data (LDC) and STORET Modernized
Type of Content: Downloadable data
Content Publisher: U.S. Environmental Protection Agency

Content Description

Content Summary: The LDC contains historical water quality data dating back to the early part of the 20th century and collected up to the end of 1998. STORET Modernized contains data collected beginning in 1999, along with older data that has been properly documented and migrated from the LDC. Both systems contain raw biological, chemical, and physical data on surface and ground water collected by federal, state and local agencies, Indian Tribes, volunteer groups, academics,

and others. All 50 States, territories, and jurisdictions of the U.S. are represented in these systems.

Content Purpose: STORET (short for STORage and RETrieval) is a repository for water quality, biological, and physical data and is used by state environmental agencies, EPA and other federal agencies, universities, private citizens, and many others.

Time Period of Content

Date: 1901-2008

Content Status

Update Frequency: Modernized STORET is currently receiving new data on a regular basis, and will continue to do so for the foreseeable future. Downloads performed for the same sites may differ over time as a result of the addition of new data by their owners. LDC database does not permit updates.

Spatial Domain

State: All 50 States in the United States and U.S. Territories

County: U.S. Counties

California: All California counties

California

Central Valley: All Central Valley Counties

Spatial Data Information

Data Type: Water quality data for rivers, streams, reservoirs, lakes, wells, canals and aqueducts. Data include physical water quality parameters (e.g., pH, temperature, conductivity, stage, storage, and stream flow), chemical water quality parameters (e.g., nutrients, disinfection byproducts, pesticides, and isotopes), site identification, sampling methods, sample latitude and longitude as well as correspondent state, county and hydrologic unit code.

Salinity Data:

Surface water: Parameters measured: stream flow, conductivity, dissolved solids, nitrate, nitrogen, phosphate, sulfate, alkalinity, chloride, carbonate, sodium, calcium, and salinity. Salinity measurements are based on conductivity and in part per thousand. Total dissolved solids measurements are reported as sum of constituents, tons per day, electric conductivity and lb/day/cfs.

Ground water: Parameters measured: conductivity, dissolved solids, nitrate, nitrogen, phosphate, sulfate, alkalinity, chloride, carbonate, sodium and calcium, salinity. Salinity measurements are based on conductivity

and in part per thousand. Total dissolved solids measurements are reported as sum of constituents, tons per day, electric conductivity and lb/day/cfs.

Data Format: .tar.gz, .txt, pdf, .jpeg, .gif, and html

Access and Usage Information

Access: Online query at www.epa.gov/storet/dbtop.html.

Query Structure: All STORET legacy data for each state can be downloaded via compressed self-extracting flat files delimited by <tabs>. Advance Query format for LDC and modern include data selection by state, by county, by hydrologic unit, station, sampling beginning date/ending date and water quality parameters

Download

requirements: file decompression software and spreadsheet creating programs

Data Owner and Data Quality

Owner: Multiple agencies.

Note:

All data owned by STORET Agency "112WRD" (the United States Geological Survey) have been removed from the STORET Legacy Data Center (LDC). In the future, STORET will no longer maintain the "112WRD" USGS data on the STORET Legacy Data Center (LDC).

Quality: Quality assurance data must be obtained directly with the data provider. LDC database contains data of undocumented quality.

2.5.4 DWR database

California Department of Water Resources Water Data Library (WDL) Surface water and Ground water

Content Citation

Title of Content: Water Data Library (water quality data, groundwater data, surface-water data)

Type of Content: Downloadable data

Content Publisher: California Department of Water Resources

Content Description

Content Summary: DWR provides a central focal point for the collection and dissemination of water quality information for the Department and stakeholders through comprehensive water quality monitoring, analysis, and assessment;

applied research; implementation of a rigorous quality assurance and control program; and, data management and dissemination. DWR collects water quality data throughout the state of California with a main focus on the Sacramento-San Joaquin Delta and the State Water Project. WDL provides on-line access to hydrologic data (water-quality data, groundwater level data, and surface-water data) collected by the Division of Planning and Local Assistance and other organizations inside and outside the Department.

Content Purpose: To document the environmental water quality conditions effected by operation of the SWP and the federal Central Valley Project through constituents throughout the Delta.

Time Period of Content

Date: 1963-2008

Content Status

Update Frequency:

Spatial Domain

State: California

County: All California counties

California

Central Valley: All Central Valley counties

Latitude and longitude not available for all sites

Spatial Data Information

Data Type: Water quality data for ground water and surface water

Salinity Data:

Surface water: Alkalinity, nitrate, nitrite, conductance, sulfate, phosphate, TDS, and chloride.

Ground water: Alkalinity, nitrate, nitrite, conductance, sulfate, phosphate, TDS, and chloride

Data Format: HTML, HTML Crosstab, MS excel, MS Crosstab, Text, Text Crosstab

Access and Usage Information

Access: Water-quality data at wdl.water.ca.gov

Query Structure: Search for stations using either partial or complete station name, and partial or complete station number, by selecting a county, or using a combination of any of the three options. For each county selection data can be retrieved by selecting date range and analytes. A limit of 15 stations can be selected for data retrieval in each county.

Note: not all counties listed have water quality data.

Download

requirements: spreadsheet creating programs

Data Owner and Data Quality

Owner: DWR

Quality: DWR follows established procedures for documenting the quality of the data. All analyses performed by DWR follow EPA or Standard methods specifications. DWR does not keep printed QA/QC documents but has QC data from 1998 onward available upon request. An analytical method code is provided with the data retrieval as a guide for users to determine whether results for a given analyte done by different methods are similar enough to be lumped together. In most cases they are, but in some cases, the data are incompatible because they represent different things. Examples include analytes such as Chloroform or Bromoform. Sometimes these are measured directly in the water, and sometimes they are created by the addition of chlorine and measured as a formation potential. The method comparability code will indicate whether the results can be used together. Other common differences may be found with nutrients and organic carbon.

2.5.5 GAMA (USGS)

U.S. Geological Survey GAMA Metadata Ground water

Content Citation

Title of Content: Ground-Water Ambient Monitoring and Assessment Program (GAMA)

Type of Content: Downloadable data

Content Publisher: U.S. Geological Survey

Content Description

Content Summary: The GAMA program is a comprehensive assessment of statewide ground-water quality. The program is designed to help better understand and identify risks to ground-water resources. Ground water will be sampled at many locations across California in order to characterize its constituents and identify trends in ground-water quality. The results of these tests will provide information for water agencies to address a variety of issues ranging in scale from local water supply to statewide resource management.

Content Purpose: The GAMA program was developed in response to the Ground-Water Quality Monitoring Act of 2001 (Sections 10780-10782.3 of the Water Code): a public mandate to assess and monitor the quality of ground water used as public supply for municipalities in California. The goal of the act was to improve statewide ground-water monitoring and facilitate the availability of information about ground-water quality to the public. The State Water Resources

Control Board is implementing the GAMA Program in coordination with the U.S. Geological Survey and Lawrence Livermore National Laboratory.

Time Period of Content

Date: 2004-2010

Content Status

Update Frequency:

Spatial Domain

State: 116 identified priority basins in the state of California, which collectively include more than 75 percent of the public-supply wells in the state. For the GAMA program, the priority basins were combined into 35 study units. These study units will be sampled 2004 through 2010. In each study unit, 60 to 120 public-supply wells will be sampled.

Spatial Data Information

Data Type: Samples will be analyzed for chemical constituents that include major ions, trace elements, nutrients, volatile organic compounds, pesticides, and pharmaceuticals, to define the quality of water in the ground-water basins. Naturally occurring isotopes (tritium, carbon-14, and helium-4) also will be measured in these samples to help identify the source and age of the sampled ground water. A tiered analytical approach will be used to balance spatial coverage and analytical intensity (number of constituents analyzed).

Salinity Data: Nutrients (nitrates, phosphates), major ions

Data Format:

Access and Usage Information

Access: Online query will be available at <http://www.ca.water.usgs.gov/gama>

Query Structure: Not available at the time of this report

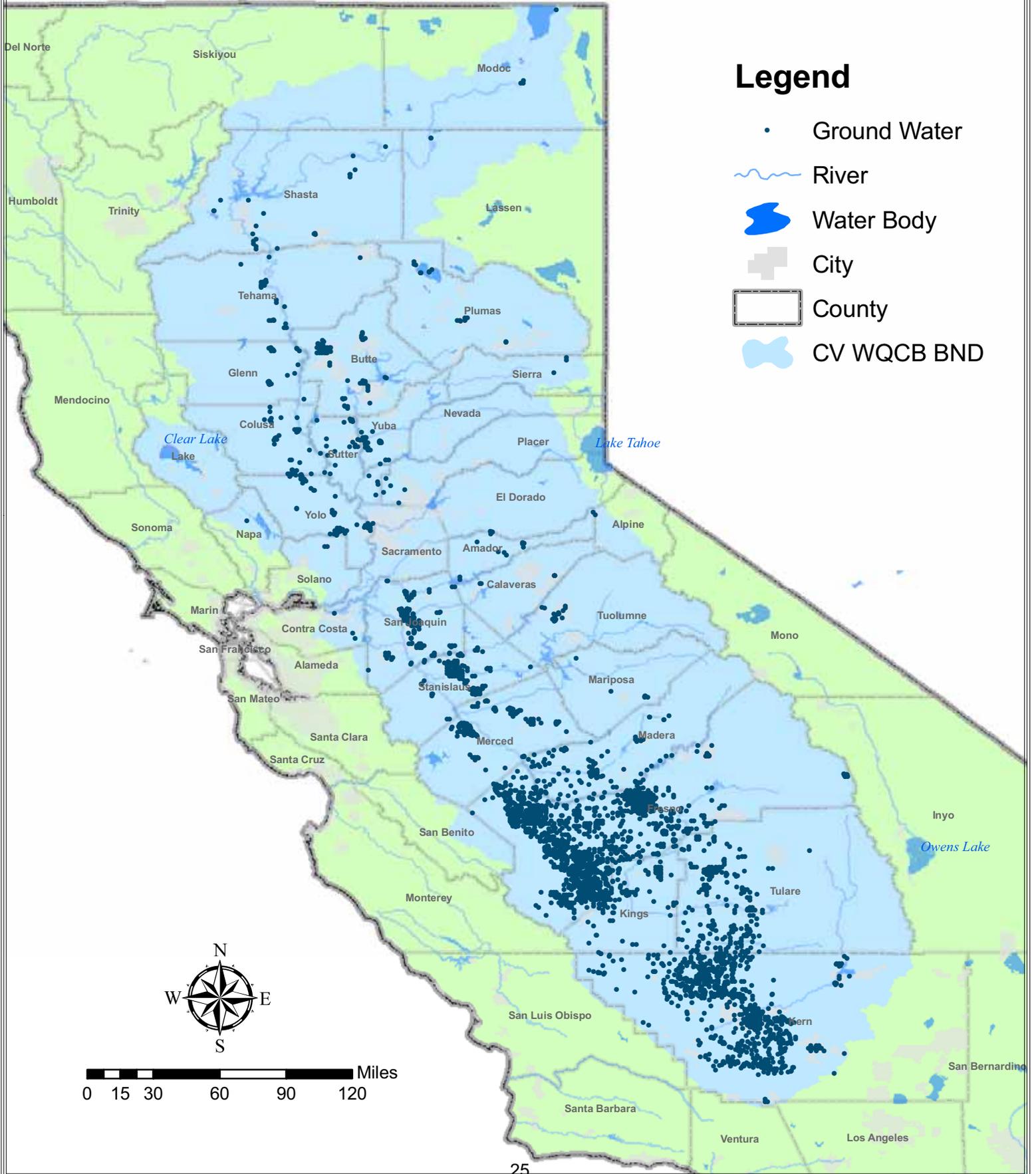
Download requirements:

Data Owner and Data Quality

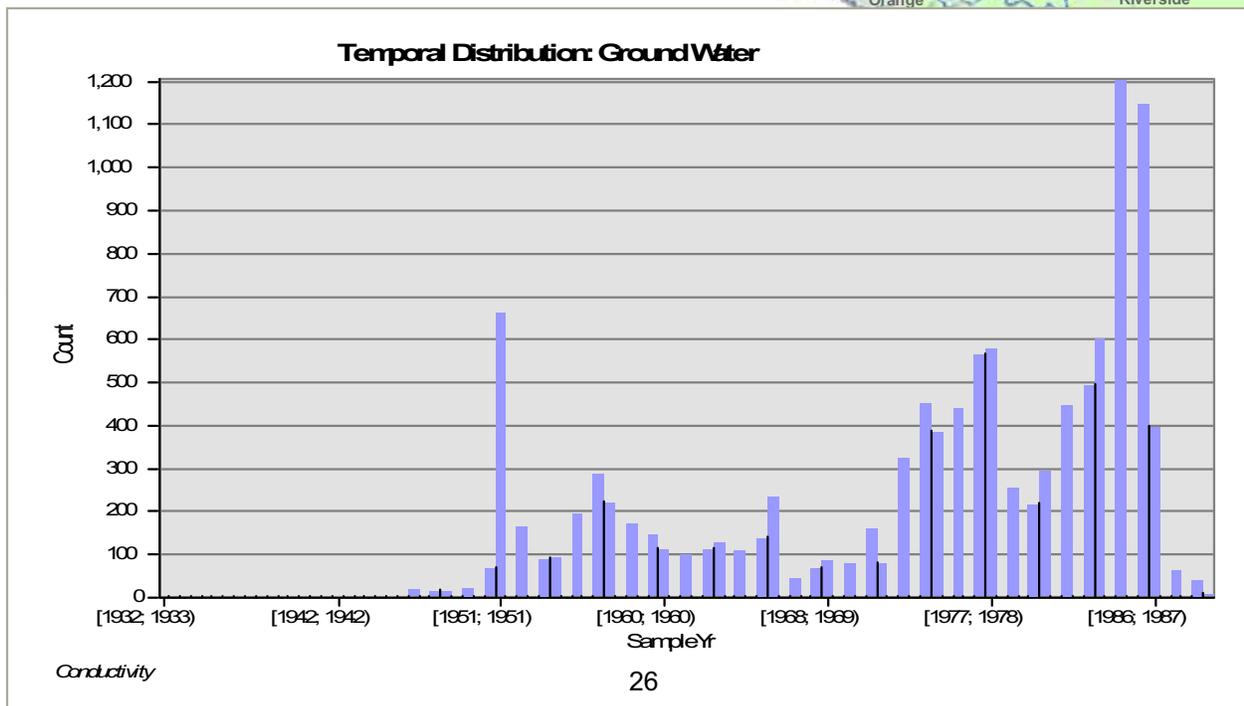
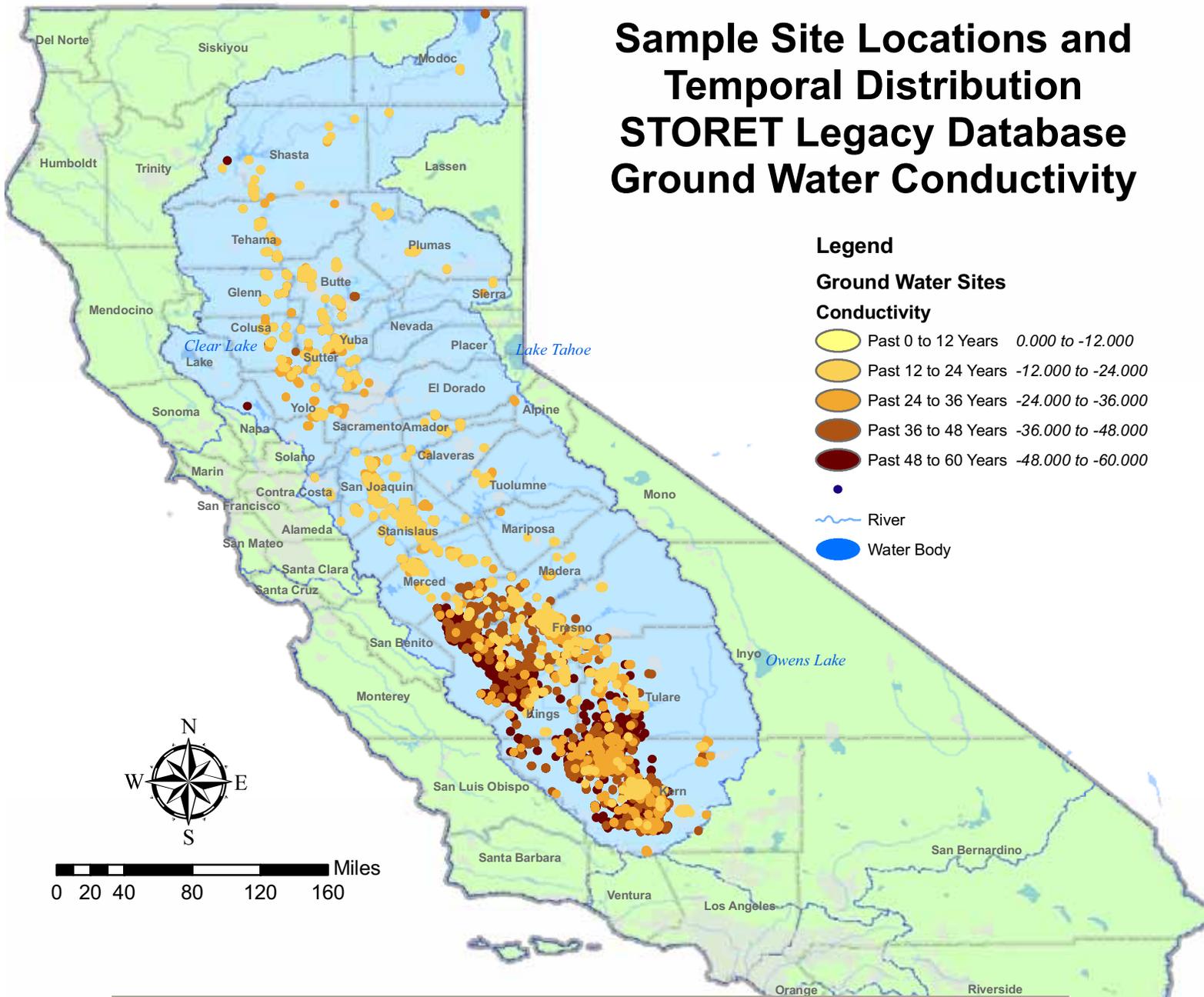
Owner: USGS, State Water Resources agencies, and STORET

Quality: Database not available at the time of this report

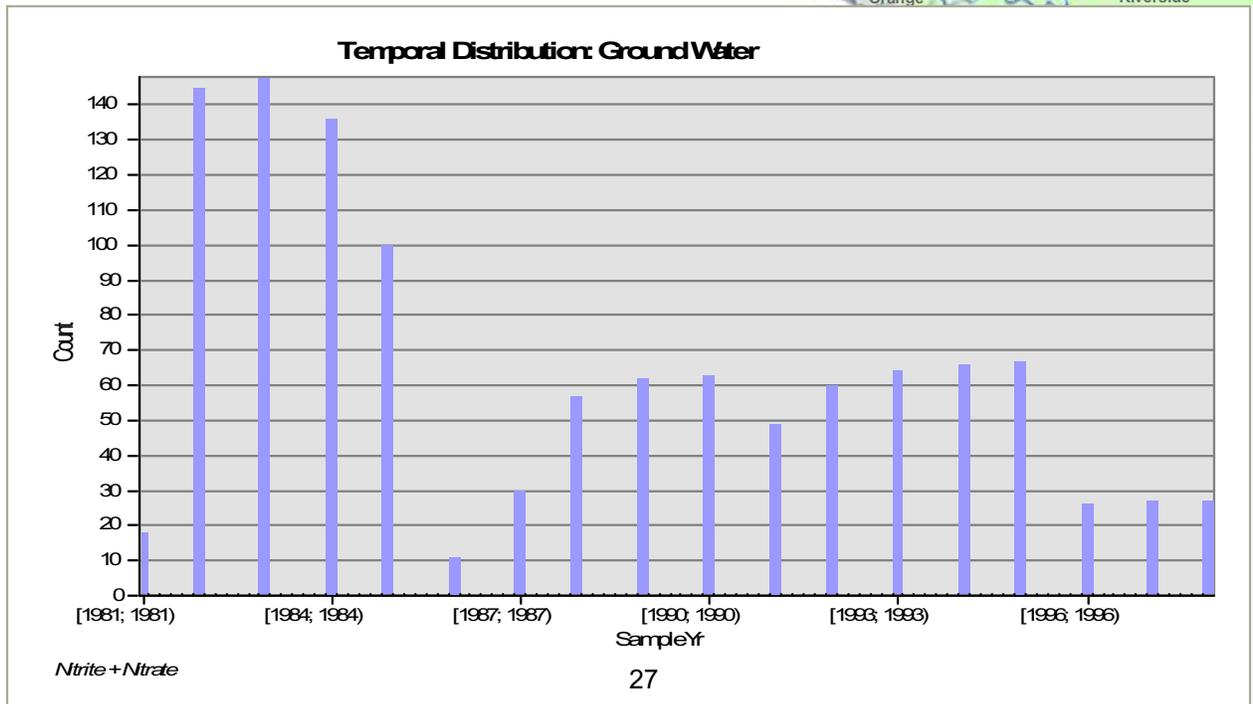
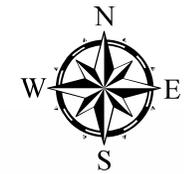
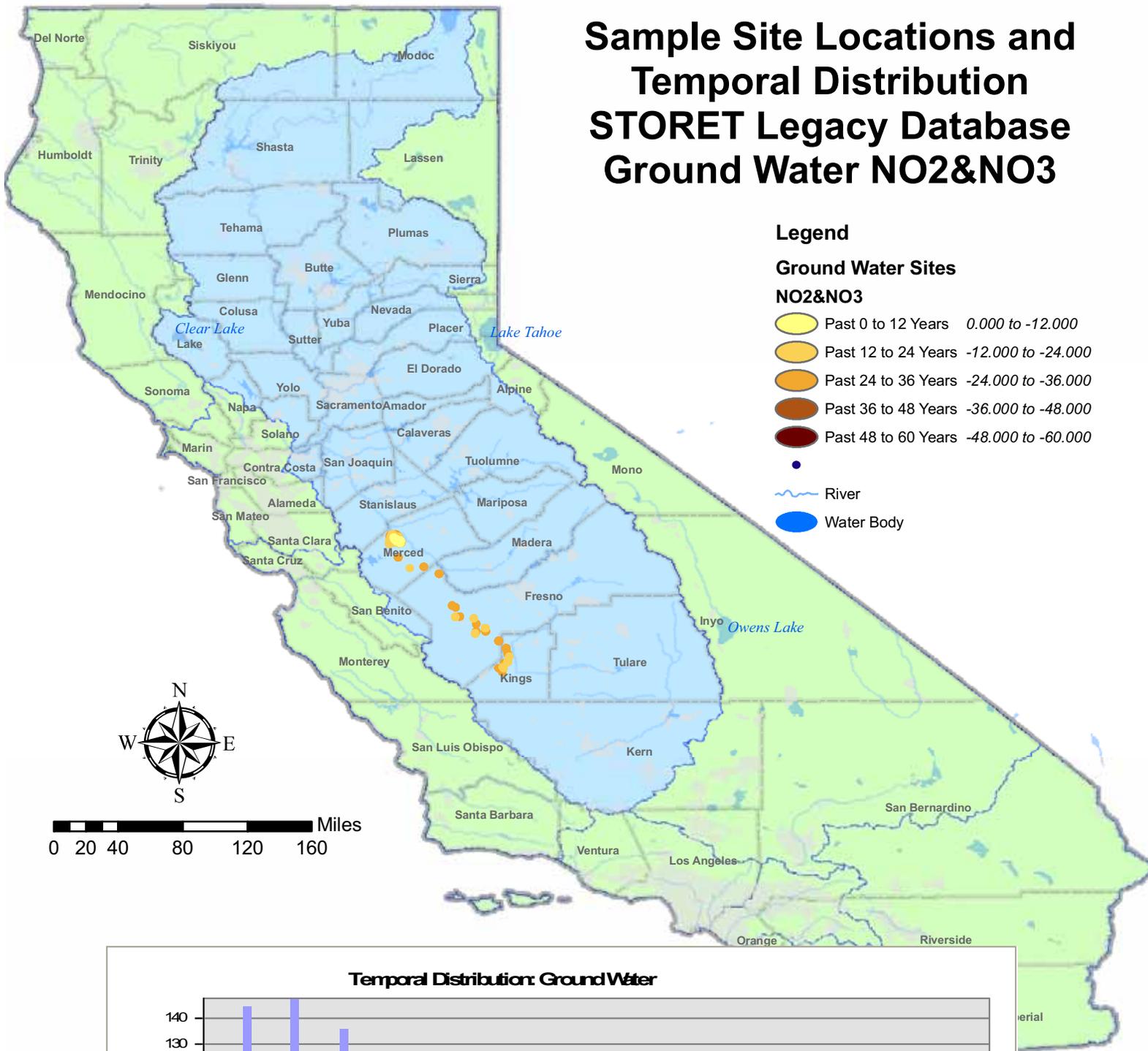
Ground Water Sample Site Locations STORET Legacy Database



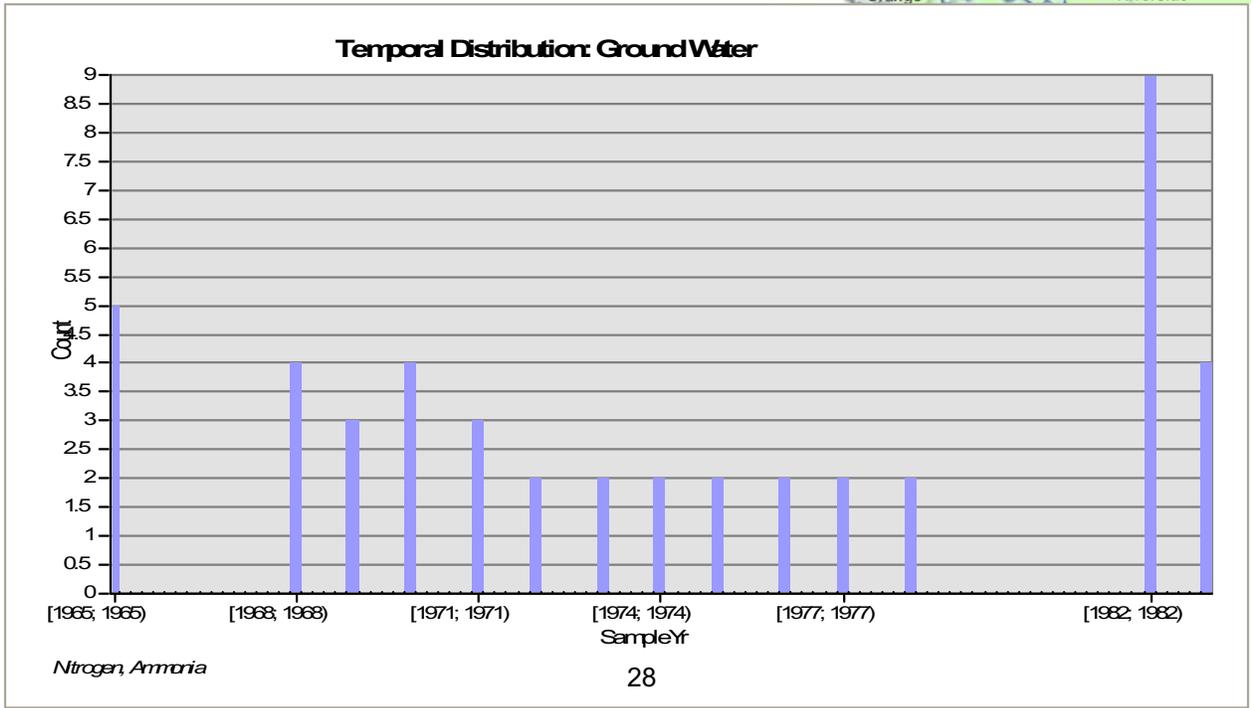
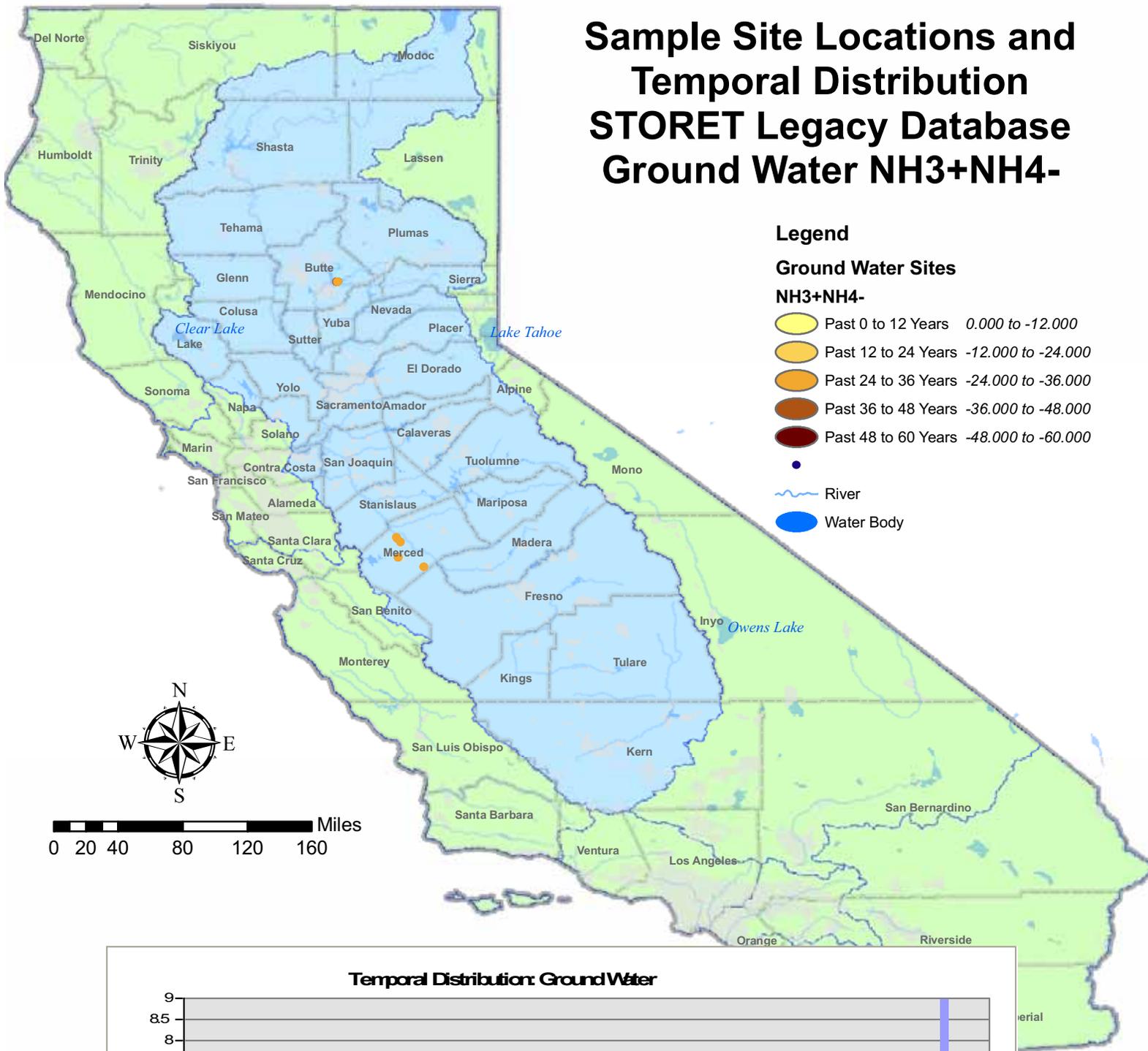
Sample Site Locations and Temporal Distribution STORET Legacy Database Ground Water Conductivity



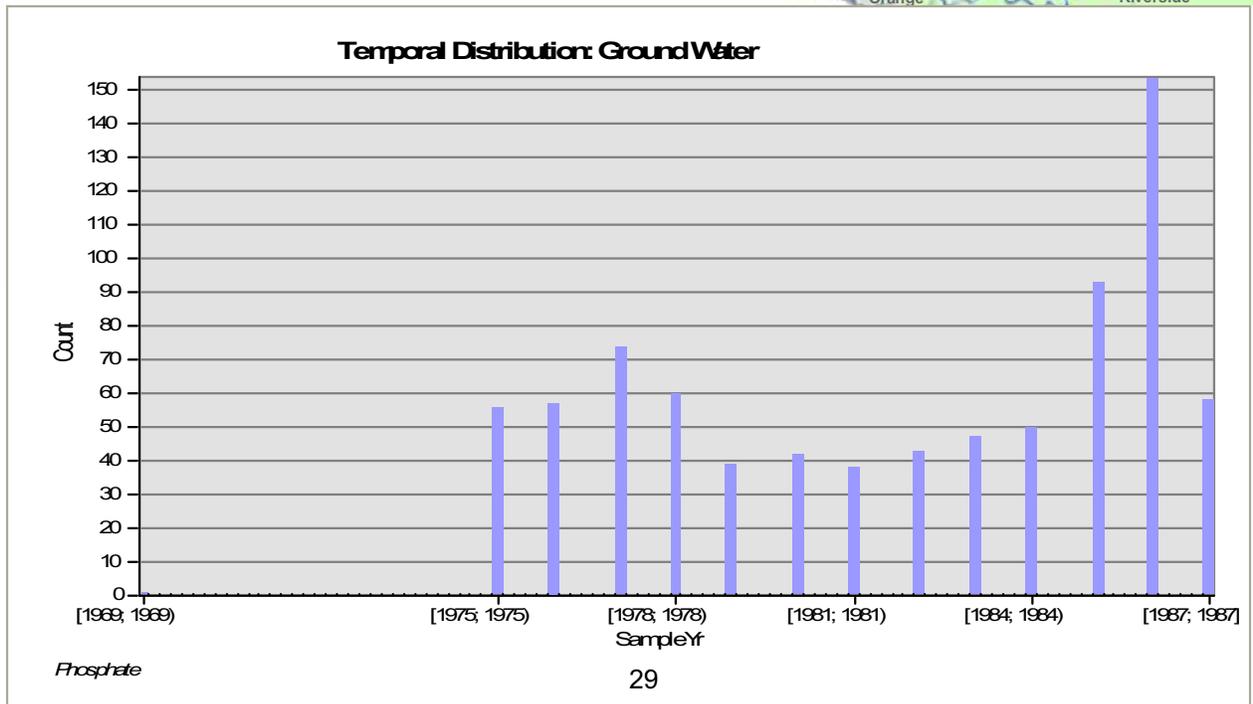
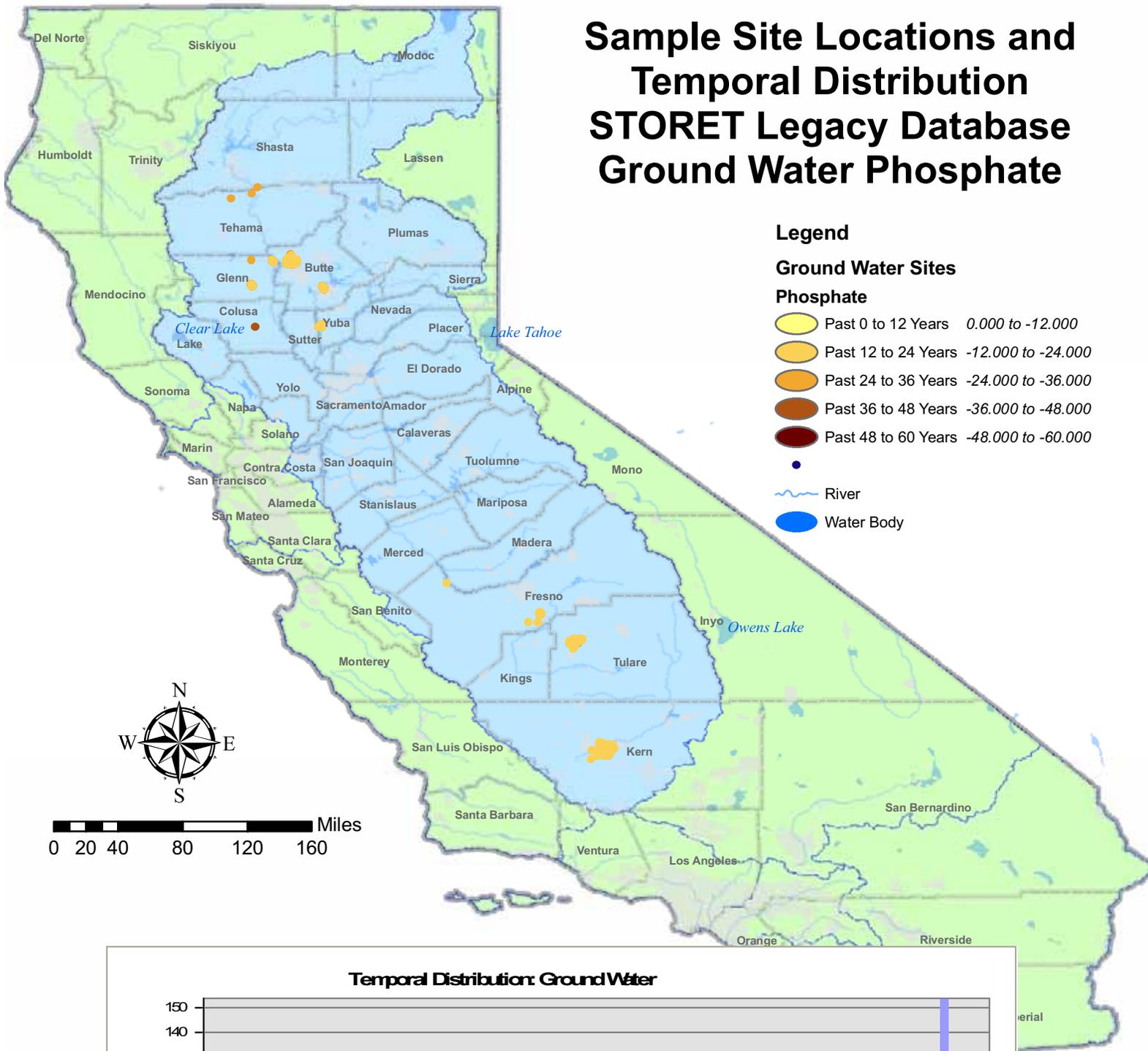
Sample Site Locations and Temporal Distribution STORET Legacy Database Ground Water NO₂&NO₃



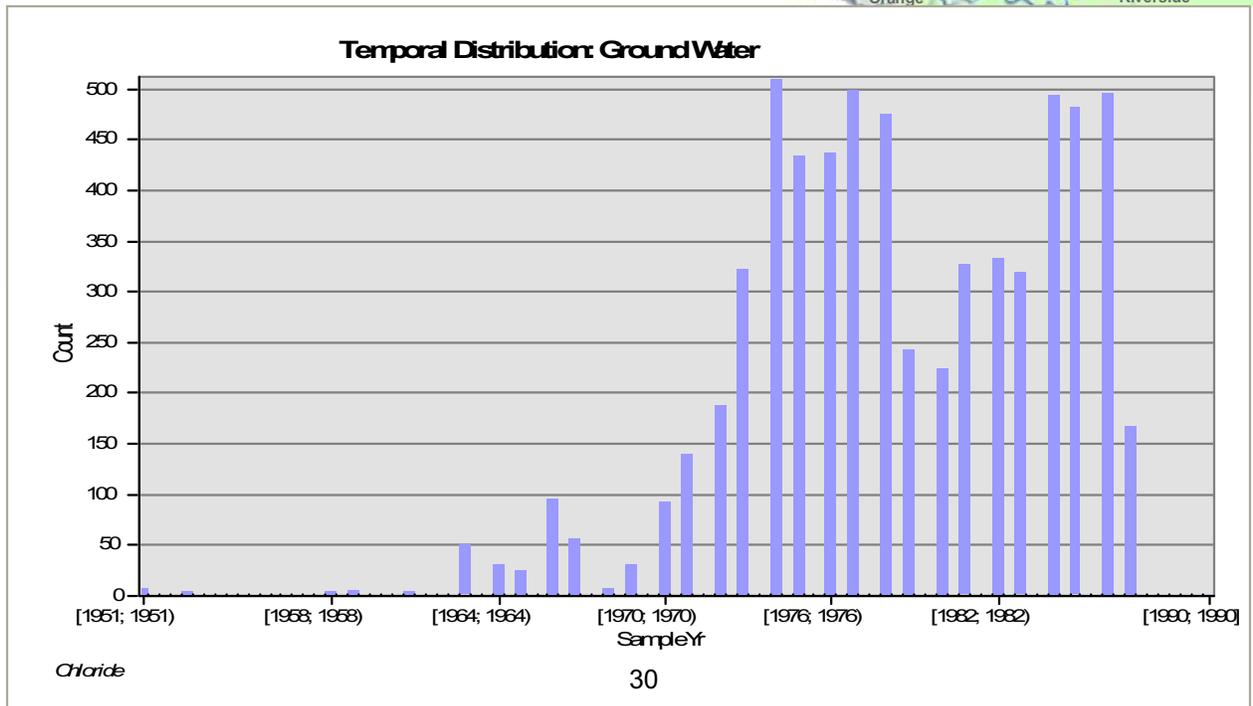
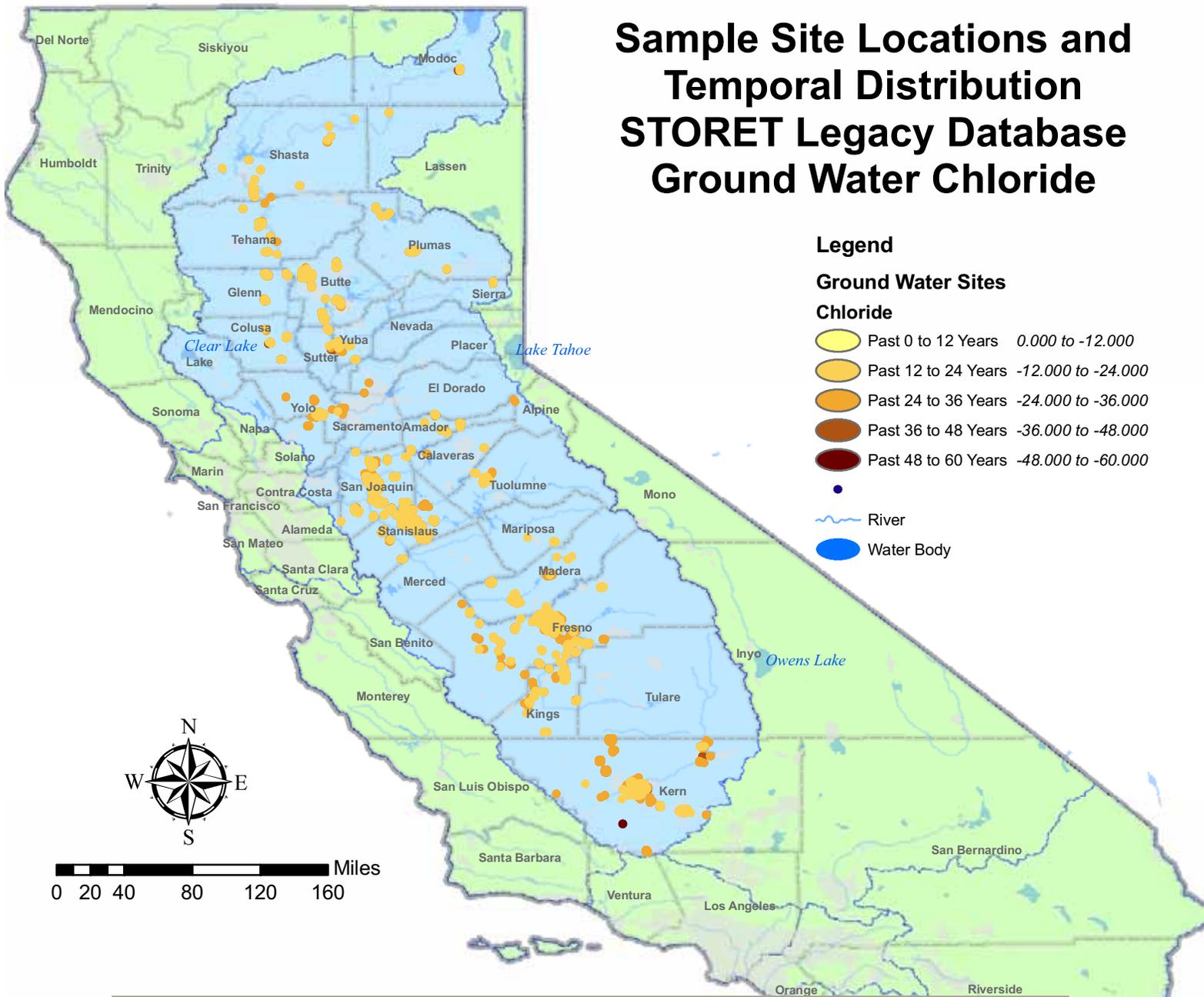
Sample Site Locations and Temporal Distribution STORET Legacy Database Ground Water NH₃+NH₄-



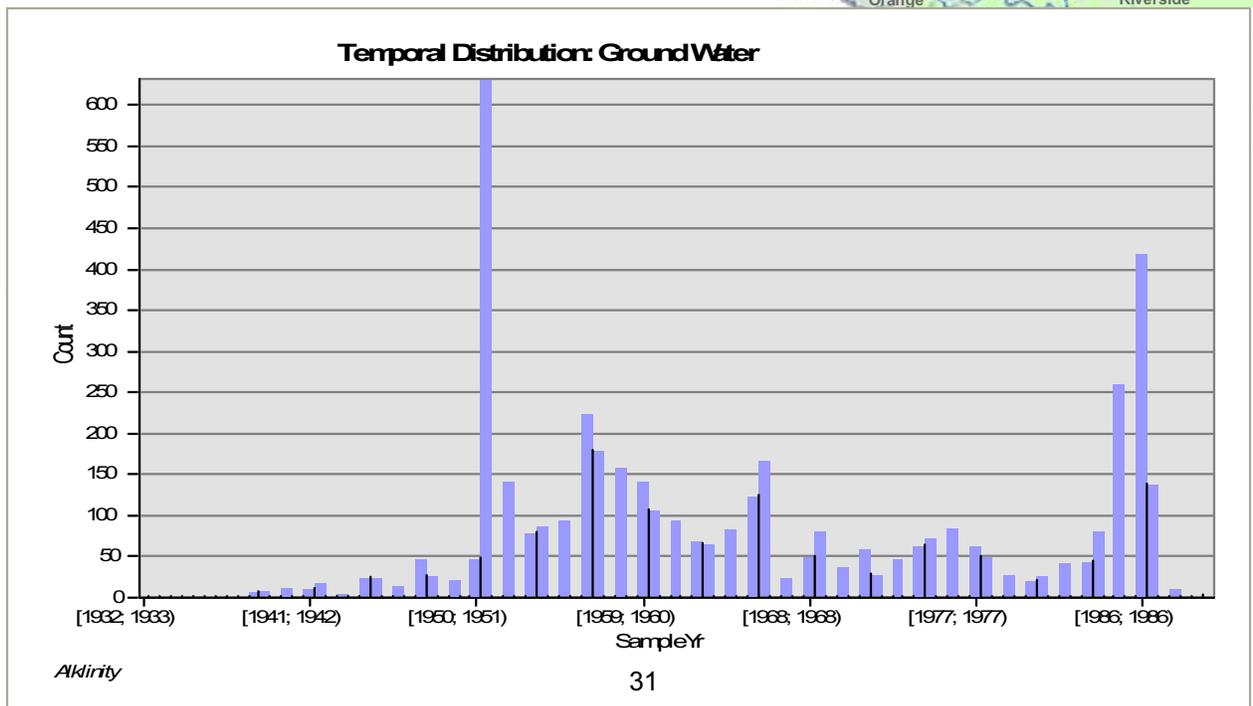
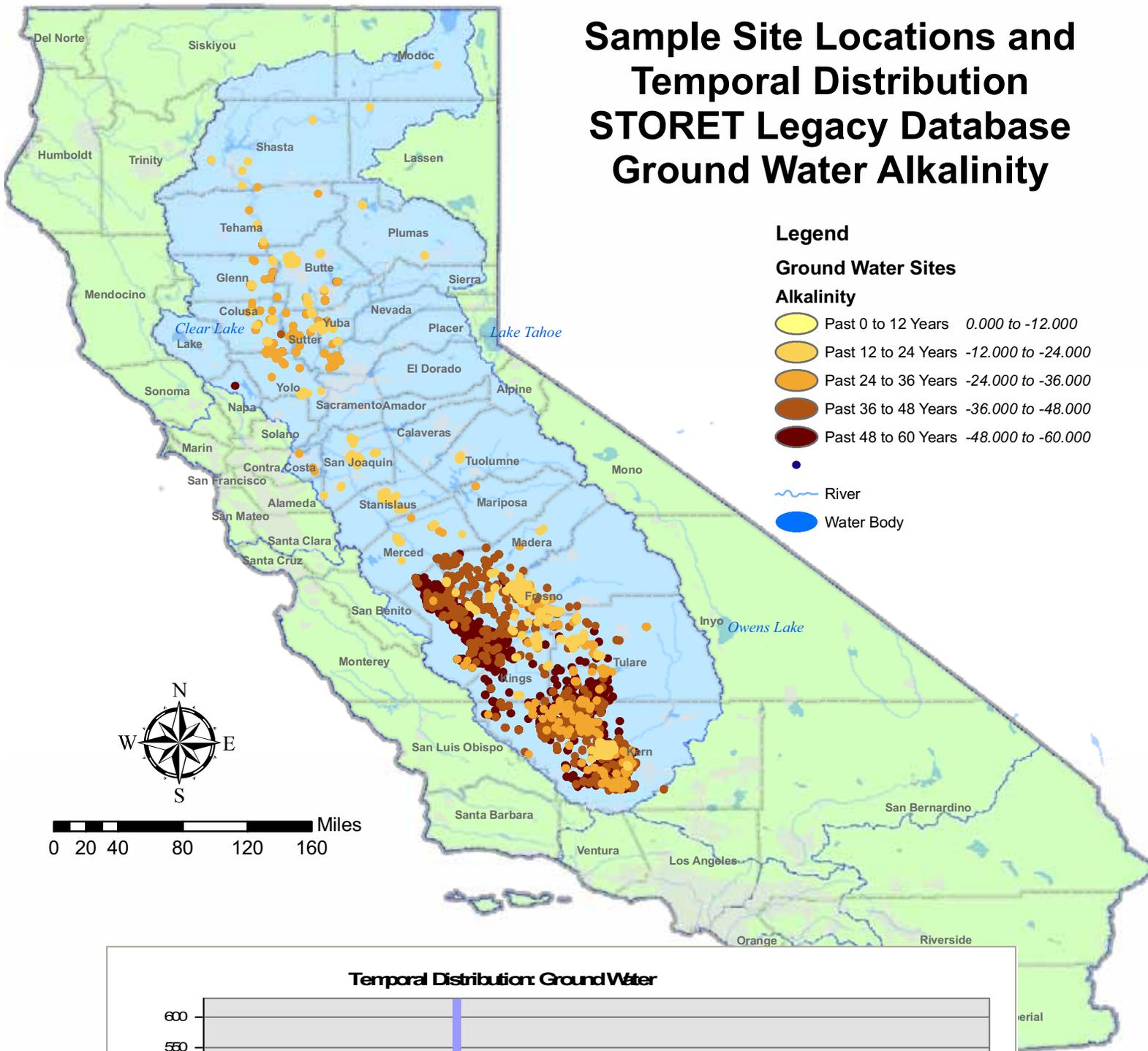
Sample Site Locations and Temporal Distribution STORET Legacy Database Ground Water Phosphate



Sample Site Locations and Temporal Distribution STORET Legacy Database Ground Water Chloride



Sample Site Locations and Temporal Distribution STORET Legacy Database Ground Water Alkalinity



Sample Site Locations and Temporal Distribution STORET Legacy Database Ground Water Sulfate

