Prepared For

Coachella Valley Regional Water Resilience Plan

Domestic and Small Water System Well Inventory and Vulnerability Assessment Report

Coachella Valley Regional Water Resilience Plan Consultants

RINCON CONSULTANTS

TODD GROUNDWATER

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List of Acronyms

Acronym:	Definition:
AFY	Acre-Feet per Year
APN	Assessor's Parcel Number
CVRWRP	Coachella Valley Regional Water Resilience Plan
CVWD	Coachella Valley Water District
CWA	Coachella Water Authority
DBCP	Dibromochloropropane
DWA	Desert Water Agency
DWR	California Department of Water Resources
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GSA	Groundwater Sustainability Agency
IWA	Indio Water Authority
LCJA	Leadership Counsel for Justice and Accountability
MCL	Maximum Contaminant Level
MO	Measurable Objective
MSWD	Mission Springs Water District
MT	Minimum Threshold
OSWCR	Online System for Well Completion Reports
PFAS	Per- and Polyfluoroalkyl Substances
PLSS	Public Land Survey System
POE	Point-of-Entry
POU	Point-of-Use
PUCDC	Pueblo Unido Community Development Corporation
PWS	Public Water System
RAC	Replenishment Assessment Charge program
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
SNMP	Salt and Nutrient Management Plan
SWRCB	California State Water Resources Control Board
SWN	State Well Number
TDS	Total Dissolved Solids
TMDCI	Torres Martinez Desert Cahuilla Indians
VSD	Valley Sanitary District

1. INTRODUCTION

The Coachella Valley Regional Water Resilience Plan (CVRWRP) Domestic and Small Water System Well Inventory and Vulnerability Analysis (Well Inventory) addresses a critical data gap in understanding the reliance on groundwater among rural communities in the Coachella Valley, focusing on domestic and small water system wells. While previous inventories included municipal, industrial, commercial, and agricultural wells, information on domestic and small systems—often the sole drinking water source for mobile home parks, Polanco parks [1], and rural residences—was lacking.

To close this data gap, Todd Groundwater conducted a comprehensive desktop study to identify both known domestic and small water system well locations across the Coachella Valley. Known wells were identified using permitting and registry records, while potential well locations, including mobile home parks and rural residences not connected to municipal water systems, were identified using data from the Leadership Counsel for Justice and Accountability (LCJA), the U.S. Environmental Protection Agency (EPA), and Riverside County, supplemented by a systematic review of aerial imagery. This analysis informed a targeted field survey to verify well locations and conditions.

The Well Inventory was used to identify threats to groundwater quality and quantity due to the changing climate. Areas with domestic wells that may experience decreasing water levels or changes in water quality are documented here so that projects and management actions can be focused on these geographic locations.

The study was commissioned by the Coachella Valley Water District (CVWD) in partnership with Pueblo Unido Community Development Corporation (PUCDC) and Torres Martinez Desert Cahuilla Indians (TMDCI). The study was funded by a grant from the Governor's Office of Land Use and Climate Innovation (LCI). Additional support was provided by Coachella Water Authority (CWA), Desert Water Agency (DWA), Indio Water Authority (IWA), Mission Springs Water District (MSWD), Valley Sanitary District (VSD), and LCJA. These organizations have various roles, responsibilities and resources. The study area encompasses the Coachella Valley Integrated Regional Water Management Plan region (Coachella Valley Regional Water Management Group, 2018). Todd Groundwater and Rincon Consultants served as the consulting team.

The Well Inventory is a foundational study to inform the current understanding of groundwater reliance in the region, as well as identify critical data gaps. By identifying and understanding the most vulnerable groundwater users in the region and ensuring adequate protective measures are in place, this will strengthen the governing sustainability documents including the Indio Subbasin Alternative Plan Update. The need for a comprehensive subbasin well inventory was first identified in the Indio Subbasin Alternative Plan (Indio GSAs, 2022). This study provides the information necessary to address that need,

[1] Polanco parks are mobile home communities housing predominantly farmworkers and their families in the Coachella Valley. The term Polanco parks is named for Richard Polanco, a state representative who sponsored 1992 legislation to spur the creation of affordable housing for farmworkers (PUCDC, 2025)

including compiling well construction and use data and conducting field visits to verify well locations and conditions. The study area also includes the Mission Creek Subbasin, with groundwater management in this area guided by the Mission Creek Subbasin Alternative Plan (Mission Creek GSAs, 2021). The Well Inventory also supports a broader climate vulnerability assessment for water systems across Coachella Valley.

2. WELL INVENTORY

The Well Inventory was developed to provide a comprehensive inventory of domestic and small water system wells within the study area. Historically, local agencies have identified larger production wells (over 10 acre-feet per year (AFY) in DWA's RAC program, and over 25 AFY in CVWD's RAC program) through the Replenishment Assessment Charge (RAC) program, which monitors pumping and funds groundwater replenishment. These efforts have focused on high-production wells, including municipal, agricultural, industrial, and commercial users. Self-supplied domestic wells serving mobile home parks, Polanco parks, and rural residences have not been comprehensively cataloged. This gap provided the impetus for the current analysis.

Domestic and small water systems are of particular concern because they:

- Lack redundancy – Most rely on a single water source, leaving them vulnerable to disruptions from groundwater declines, water quality issues, or power outages.
- Have limited financial resources – These users often lack the means to respond to emergency or urgent water system failures, address infrastructure breakdowns, or implement long-term resilience measures.
- Have technical and managerial capacity limitations – Many small systems lack trained operators, and operators are often managing operations in addition to other employment.
- Face higher risk of equipment failure – With no backup supply and limited resources, a single failure can result in complete loss of water supply.
- Are vulnerable to climate impacts – Extreme weather, shifting groundwater levels, and other climate-related changes compound these risks.

To address this gap, the Well Inventory was developed. The Well Inventory combines a desktop analysis of existing data sources with field verification to confirm and supplement findings. The desktop study first assessed known information and identified gaps requiring on-site validation. Two primary categories were considered: *known well locations* and *potential well locations* (areas where wells are likely).

2.1. KNOWN WELL LOCATIONS

Known well locations are derived from primary data sources that provide specific information on well sites. The primary data sources are:

- Riverside County well location records
- CVWD well registry
- TMDCI
- Indian Health Services

Further details of these data sources are provided in **Section 3** of this report. In addition to location data, these sources may include:

- Construction details (e.g., depth, perforation intervals, construction date)
- Ownership and intended use
- Permit information
- Installed equipment specifications (e.g., pump manufacturer)

Known well location datasets were categorized as follows:

- Domestic and community wells
- Destroyed/abandoned
- Other well types

2.1.1. Domestic and Community Wells

Domestic and community wells in rural areas are the primary focus of this inventory. Data from:

- Riverside County
- CVWD well registry
- CVWD RAC program

were filtered using well type categories to isolate these wells.

Next, wells located within municipal service areas were identified and separated from the primary inventory but were retained in a secondary subset. Service areas were determined using coverage data provided by agency partners, including meter locations, serviced parcels, and pipe networks. Representative municipal water district coverages are shown in **Figure 1**. Note that Figure 1 presents illustrative jurisdictional boundaries for some providers, which may extend beyond their actual service areas (e.g., DWA, IWA, MSWD, and CVWD). Refined information was provided by many of the municipal districts, including pipe networks and meter locations. Where detailed data were unavailable, agency representatives provided input on actual service boundaries.

Domestic and community wells within municipal service areas were classified as secondary. Some of these may be active as drinking water sources; however, they are not considered primary sources because of the general availability of municipal supply and jurisdiction of the municipality. The subset of wells in municipal area can be provided to the municipal purveyors. This information could be pertinent to verification of appropriate permitting, ordinance requiring connection of households to nearby municipal pipelines, and municipal concern about backflow issues associated with private wells.

2.1.2. Destroyed/Abandoned Wells

Wells identified in primary sources as abandoned or destroyed, based on use type or notes, were extracted as a separate subset. Where destruction records could be linked to specific well locations, those wells were removed from the inventory.

2.1.3. Other Well Types

All remaining wells, including municipal, industrial, agricultural, monitoring, and unknown types, were grouped into a separate category. These wells fall outside the scope of this study. While some may serve domestic uses due to inconsistencies in well-use categorization, it is assumed that these represent a small number of wells in the subbasins.

2.1.4. Data Processing Approach for Well Location Datasets

Known well location data was processed and merged into a single dataset that includes the following fields:

- Source ID - unique identifier field to link back to primary source data
- Latitude
- Longitude
- Number of connections – number of households using water from the well, either known or estimated
- Well depth – depth of completed well in feet below ground surface
- Screen Interval – depth to well top and bottom perforation
- County well permit number
- State well number
- Local name – alias for well
- Location accuracy – e.g., parcel, measured, estimated
- Status – e.g., active, backup/secondary
- Use type - individual or community
- Well completion report – weblink to Riverside County data portal
- Construction year
- Notes
- Location in Tribal lands – identifies whether a well is located on Tribal Trust land or Tribal fee land. Community water systems located on Tribal fee land are regulated by the EPA and are typically identified by a Public Water System (PWS) identification number.

2.2. POTENTIAL WELL LOCATIONS

The desktop study also assessed areas where there are likely to be wells serving domestic users, even if none were indicated in the existing datasets. These *potential well locations* include mobile home parks, Polanco parks, rural residences, mobile homes, and other sites where self-supplied well water is likely used for domestic purposes.

Primary data sources for potential well locations include:

- Eastern Coachella Valley mobile home park and Polanco Park mapping (LCJA, 2021)
- Small Water Systems (Riverside County, 2025b)

- Regulated Small Water Systems (EPA, 2025)
- Aerial photo analysis

Further details of these datasets are provided in **Section 3**.

2.2.1. Known Mobile Home Park and Polanco Park Locations

Data from LCJA (2021), Riverside County (2025b), and EPA (2025) were combined to identify known mobile home park and Polanco park locations (collectively referred to as **Parks**). Duplicate records were removed. These sources may also include:

- Address information
- Number of service connections
- Basic site infrastructure details
- State Public Water System number

The completeness and consistency of this information vary by source, but all available data were retained and utilized where possible.

2.2.2. Aerial Photo Analysis

An aerial photo analysis was conducted using Google Earth (Google, 2025) to identify rural residential structures where existing well data are limited, and presence of self-supplied water source is possible. Potential locations were identified by visually locating rural residential structures outside urban water district service areas. Structures appearing to be a home were flagged as *Potential Well Locations*. The analysis was systematically organized using the Public Land Survey System (PLSS) grid.

This approach has inherent limitations. The presence of an apparent residential structure does not confirm the existence of an onsite well. Parcels may be undeveloped, abandoned, or no longer actively using water despite the presence of a structure. In addition, aerial imagery alone cannot determine whether a structure is occupied.

2.2.3. Combined Potential Well Location Dataset

Data from LCJA, Riverside County, EPA, and aerial photo analysis were merged into a single dataset. After removal of duplicates, the combined dataset included:

- 662 mobile home parks and Polanco parks
- 226 rural residential locations

2.3. IDENTIFICATION OF WELL INVENTORY DATA GAPS

After developing the *Known Well Locations* and *Potential Well Locations* datasets, an analysis was conducted to identify gaps in known well coverage. These gaps represent

locations that may rely on self-supplied water but lack confirmed well data, making them candidates for field verification.

A parcel-level analysis was performed to attribute water supply sources to *Potential Well Locations*:

1. Municipal system coverage was assessed first, using service area boundaries, pipe networks, and meter locations. Verification was supplemented by municipal agency representatives to confirm whether parcels were serviced.
2. *Known Well Locations* were then matched to *Potential Well Locations* at the parcel level. If a known domestic or community well was located on the same parcel as a *Potential Well Location*, the supply was considered confirmed.

Any *Potential Well Location* not linked to a municipal system or a *Known Well Location* was classified as a data gap requiring field verification.

Following this analysis, 312 park locations and 118 rural residential locations remained without an assigned well. These sites represent the data gaps identified during the desktop phase of the Well Inventory.

2.4. FIELD VERIFICATION OF DOMESTIC WELL LOCATIONS

After identifying data gaps, a field survey was conducted to confirm actual well locations and collect additional details such as construction characteristics, known issues, and anecdotal information. The majority of the 312 park locations identified in the data gap analysis were concentrated in the East Valley, where municipal system coverage is limited and populations are more dependent on self-supplied wells. These locations were prioritized for field verification.

Field surveys were carried out between July and September 2025. An intern hired by CVWD conducted the surveys, with support from project partners PUCDC and TMDCI. In total, 128 locations were visited during this period. Results from the field survey include:

- 65 locations were verified as having a domestic well
- 2 locations receive water from a well on an adjacent property
- 30 locations had a non-potable well type or abandoned well
- 31 locations were unable to be verified (e.g., no one home or refused entry)

2.4.1. Well Characteristics from Field Survey Results

Survey respondents were asked for information about their wells, including the construction (depth and/or screening interval) of the well, year of construction, and number of households served. The respondents were not always the person managing or operating the well, so the information collected was to the best of their knowledge. A summary of information collected during the field survey is shown in **Table 1**.

Table 1. Well Information Collected in CVRWRP Field Survey

	Count	Minimum	Average	Maximum
Well Depth (feet below ground surface)	17	100	504	850
Construction Year	30	1949	1989	2019
Number of Households	51	1	5	15

2.4.2. Anecdotal Evidence from Field Survey Respondents

Field survey respondents were asked about issues affecting their wells, including known water quality concerns, electrical supply reliability, and flooding impacts from the major 2023 storm. Based on anecdotal information, outreach, and past interviews with community members, it is understood that many wells in the study area were originally constructed for agricultural purposes and were not designed or permitted for use as domestic drinking water sources. Over time, and in the context of limited affordable farmworker housing, these wells have increasingly become the sole source of water for households, particularly for farmworker families with few alternatives for accessing reliable drinking water.

Six properties reported flooding during the Tropical Storm Hilary event in 2023. Of these locations, four were in FEMA 100-year flood plains, and two were outside of FEMA zones. Three of the locations within the 100-year flood plain are near Thermal, and the other location is near the intersection of Pierce and Harrison Streets. The two locations outside of FEMA floodplains are on the east side of Highway 86 near Thermal. Beyond these cases, most respondents were unaware of specific operational issues affecting their wells.

Notably, many respondents expressed distrust in their well water quality for drinking purposes and only used well water for bathing and cleaning purposes. This was particularly prevalent in Polanco parks where the owner did not live onsite. Many of these residents stated that they purchase drinking water from water stores.

There may also be cultural elements to purchasing water from stores. Most residents surveyed came from Latin American countries where it is commonplace to refrain from drinking tap water and rely on purchased water.

2.4.3. Incorporation of Field Survey Data into Well Inventory and Remaining Data Gap

Field survey data were formatted and integrated into the Well Inventory developed during the desktop study. Locations visited during the survey were removed from the data gap list, except where no contact was made; these sites remain classified as data gaps.

The remaining data gap consists of rural residential locations identified through aerial photo analysis and parks where field verification was unsuccessful. As of this report, 333 locations

remain as likely well locations. To characterize the extent of domestic and small water system users, these locations are assumed to have a well for spatial analysis purposes.

Analyses of well characteristics (e.g., depth, year of construction) are based exclusively on recorded data points from primary sources.

2.5. RESULTS OF WELL INVENTORY

The Well Inventory combines results from the desktop analysis (**Section 2.1**) and field survey (**Section 2.4**). After merging these sources, the inventory includes 1,184 domestic and small water system wells.

For vulnerability assessment purposes, the 333 remaining data gap locations are conservatively assumed to contain wells and are maintained as a separate dataset. *Potential Well Locations* within municipal service areas were screened and excluded, as these wells are unlikely to serve as a primary water source.

Including both confirmed wells and estimated data gap locations, approximately 1,500 sites in the study area are believed to rely on self-supplied groundwater.

All spatial results are presented as density maps, summarized by the count of wells per Public Land Survey System (PLSS) section. The combined distribution of known domestic wells and remaining potential well locations is shown in **Figure 2**. As noted in **Section 2.1.1**, areas served by municipal districts are excluded from this analysis.

Summary characteristics of known domestic wells, including depth, year of construction, and estimated households served, are provided in **Table 2**. These characteristics were selected because they are key indicators of vulnerability to both water supply and potential water quality risks. Well depth provides insight into susceptibility to declining groundwater levels and shallow contamination. Construction year serves as a proxy for infrastructure age and potential exposure to outdated well construction standards. Estimated number of households served reflects the scale of potential human impact should a well fail or experience degradation.

Of the 1,184 known domestic well sites, only 288 wells (24 percent) had a known well depth and 101 (less than 10 percent) had a known construction year. It is likely that other domestic wells are shallow and drilled decades ago. This information could help identify specific areas that may be at risk due to declining water levels or aging infrastructure.

Table 2. CVRWRP Well Inventory Data on Well Construction and Households Served

	Count	Minimum	Average	Maximum
Well Depth (feet below ground surface)	288	100	448	920
Construction Year	101	1955	2000	2023
Estimated Number of Households	174	1	11	79

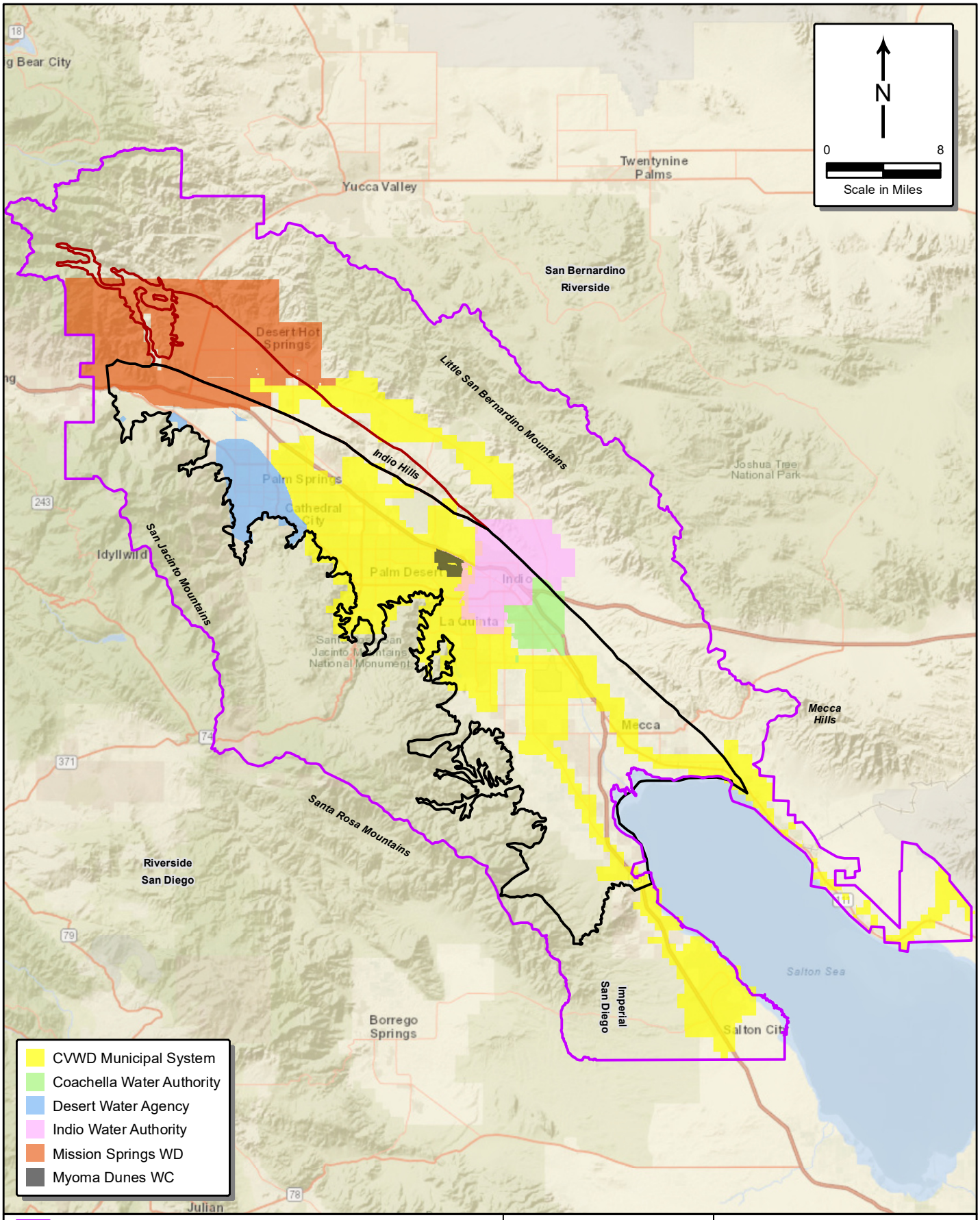
The distribution of wells with a known depth is shown in **Figure 3**; the distribution of wells with known year of construction is shown in **Figure 4**. **Figure 3** shows that 88 percent (N=253) of domestic and small water system wells that reported depth information in the Well Inventory have a depth between 200 and 600 feet. **Figure 4** shows that nearly three quarters of wells that reported age information were drilled over 20 years ago.

2.5.1. Data Consolidation and Quality Control

To ensure accuracy, duplicate records were reconciled based on attribute fields and spatial proximity. Wells located within 100 feet of each other were reviewed for potential duplication.

Additional quality control steps included:

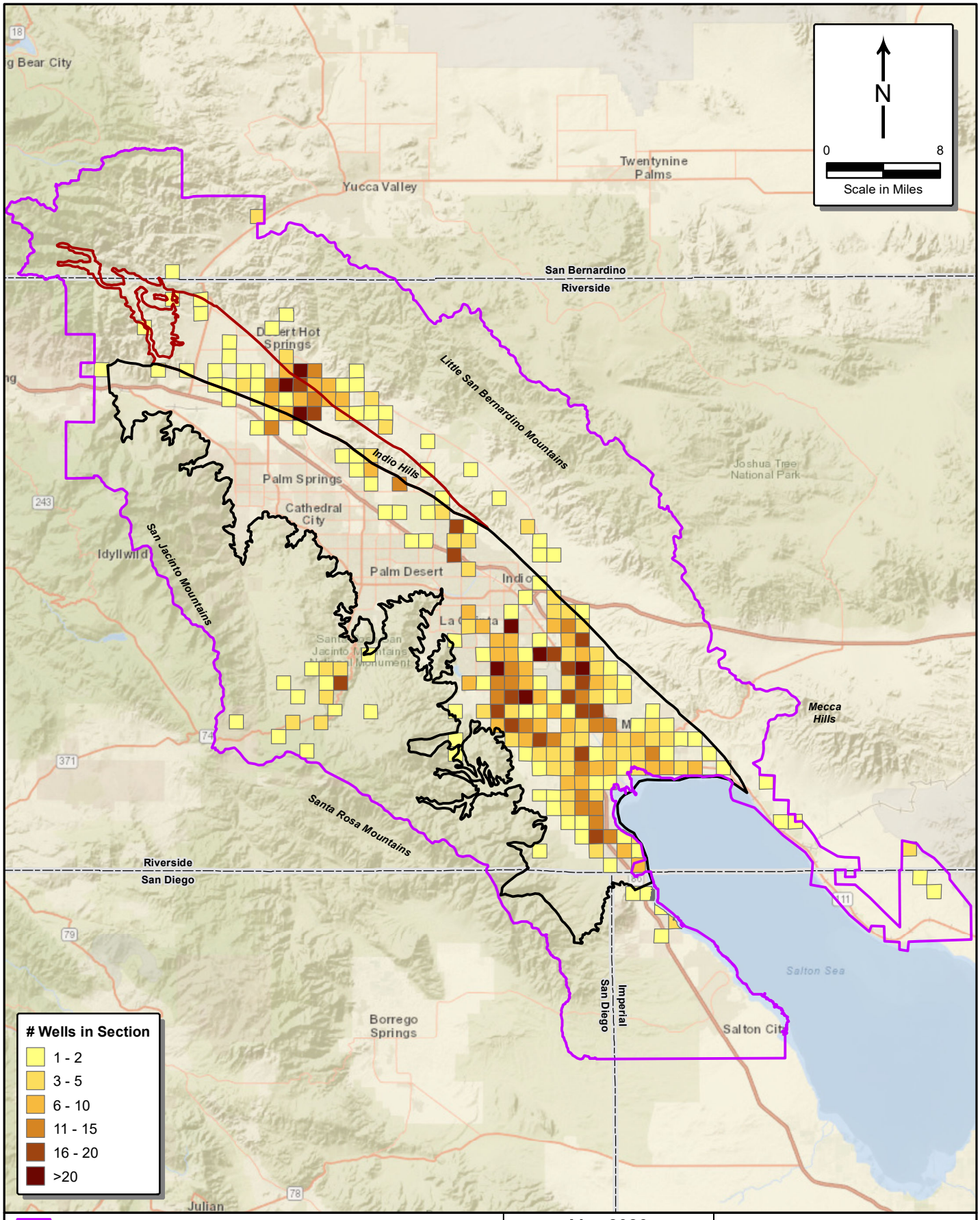
- Appending missing depth data from well completion reports when available.
- Reviewing wells under 200 feet depth; several entries under 100 feet were corrected due to source data errors.
- Reviewing wells over 800 feet depth; some were identified as municipal wells and removed from the inventory.



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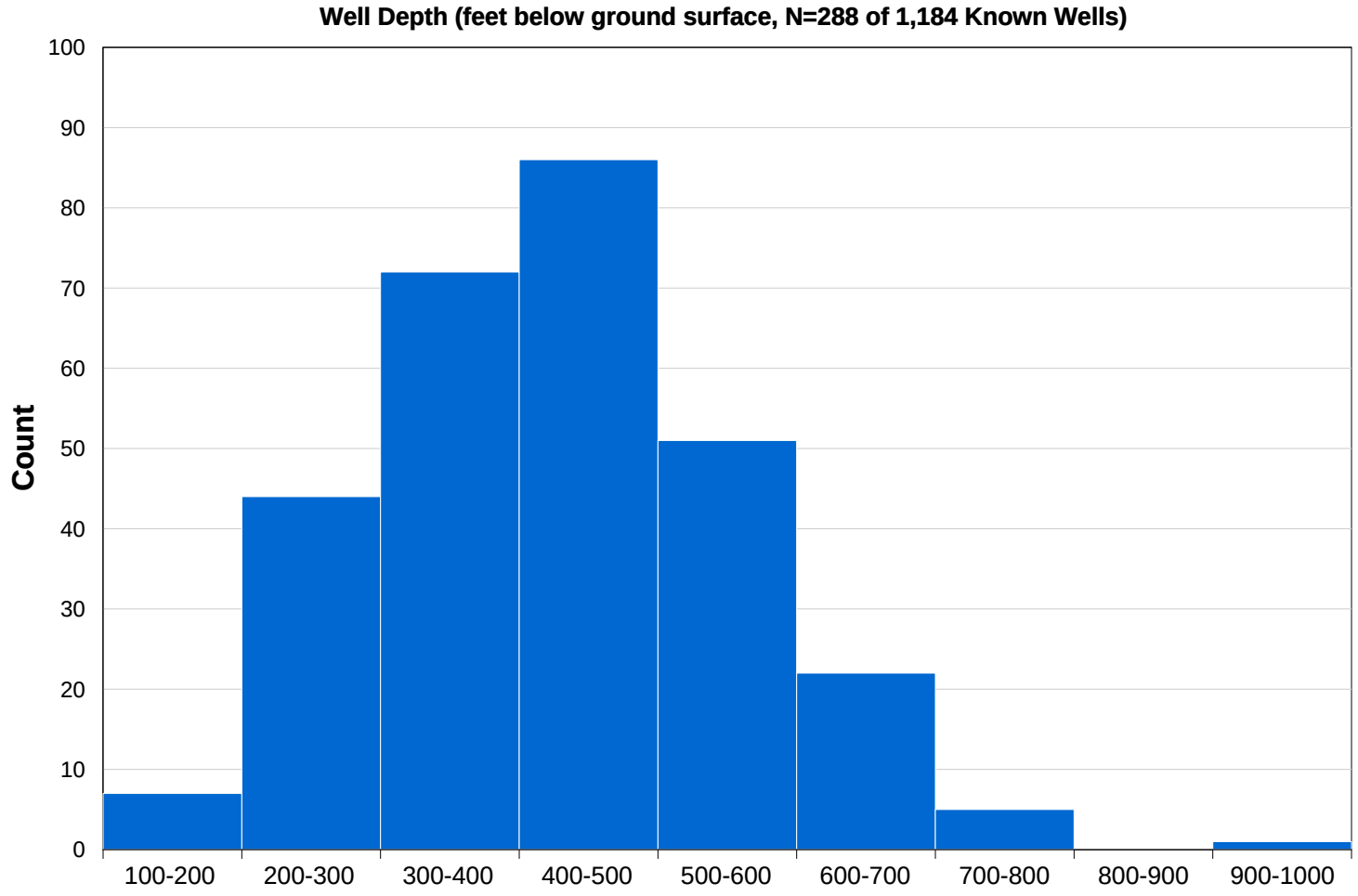
Figure 1
Municipal System Service Areas



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Figure 2
CVRWRP Well Inventory
Known And Potential
Well Locations

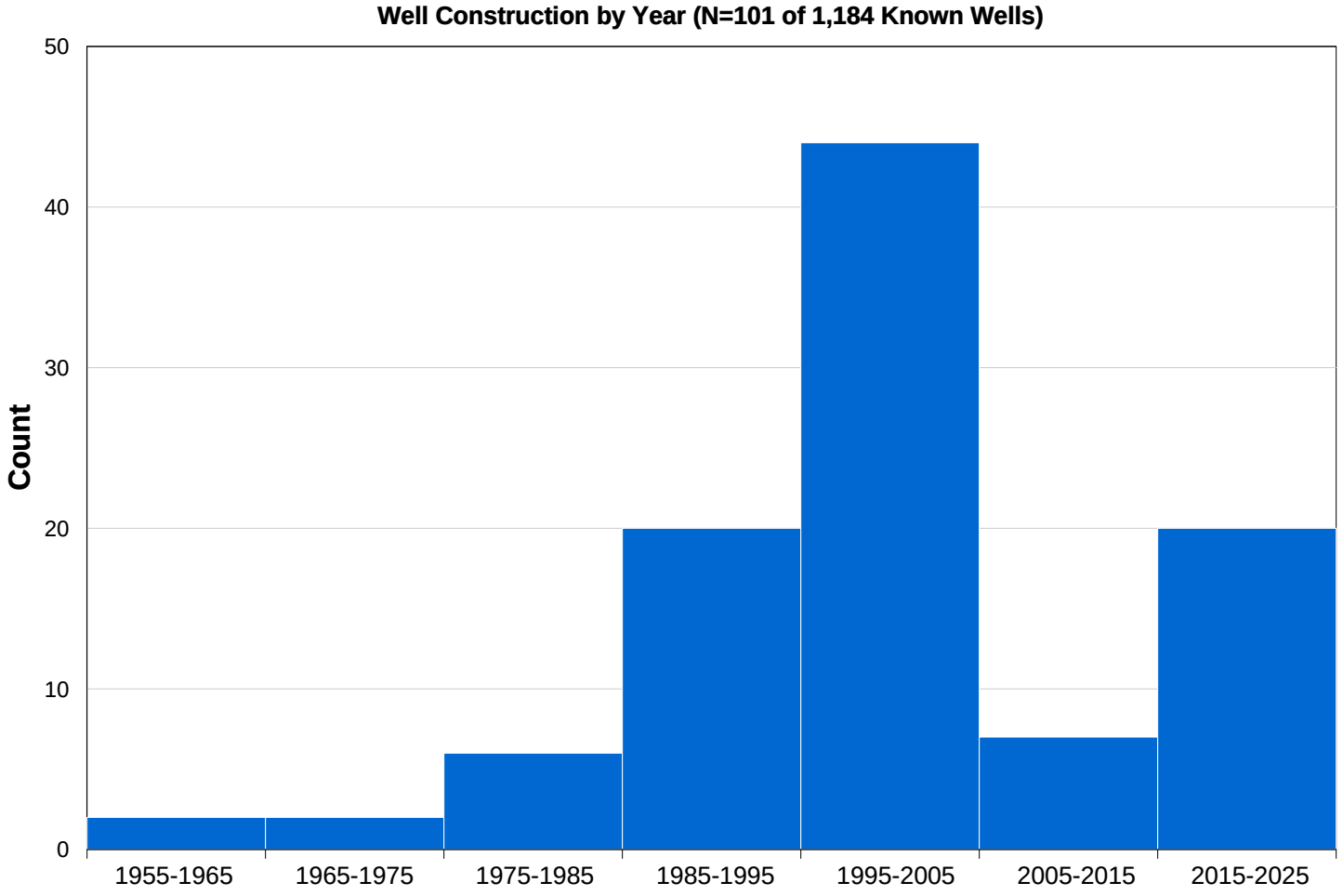


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Figure 3
Distribution Of Well Inventory Known Well Depths

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Figure 4
Distribution Of Year Of Construction For Well Inventory

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3. DATA DOCUMENTATION

This section describes the data sources used in the Well Inventory and how they were utilized.

3.1. KNOWN WELL LOCATIONS

Known well location data sources provide information on well sites and, in some cases, additional details such as use type (e.g., domestic, municipal, agricultural), construction characteristics, and equipment specifications (e.g., pump details).

3.1.1. Coachella Valley Water District

CVWD monitors wells within its jurisdiction and has provided data from its internal investigations and the RAC program. With the RAC program, CVWD levies and collects fees from groundwater producers that extract more than 25 acre-feet per year. These fees support groundwater replenishment programs in the Indio subbasin.

Attributes in this dataset include:

- State Well Number (SWN)
- Well type and construction details
- Infrastructure information (e.g., pump manufacturer, meter type and serial number)
- Surveyed locations
- RAC program data on well location, water meters, and water use type

3.1.2. Riverside County

Well location data were obtained from the Riverside County Department of Environmental Health. These records are primarily based on permitting applications and include some destruction records. Attributes in this dataset include:

- Well location and accuracy
- Use type
- PLSS section and parcel number (APN)
- Construction details
- Links to permits and well completion reports

3.1.3. Indian Health Service

The Indian Health Service provided well records for the TMDCI Reservation, including:

- Well locations and construction details
- Estimated number of households served
- Well logs with capacity and construction information

Identifying information of tribal members was redacted prior to submission.

3.1.4. Torres Martinez Desert Cahuilla Indians

TMDCI supplied maps from prior studies, well logs, and tables of well locations.

3.1.5. Other Well Location Data

The California Department of Water Resources (DWR) manages the Online System for Well Completion Reports (OSWCR), which includes well location data. Although OSWCR was initially considered as a primary source, it was excluded due to concerns about location accuracy. Local sources were deemed more reliable.

However, OSWCR domestic well locations were used for regional-scale comparison to verify that the Well Inventory captured expected spatial patterns.

3.2. POTENTIAL WELL LOCATIONS

To identify potential well locations in the study area, data were compiled from multiple sources, including LCJA, EPA Region 9, and the Riverside County Department of Environmental Health. These sources provided information on mobile home parks, Polanco parks, and small water systems.

A consolidated dataset was created by merging these sources and removing duplicates to ensure accuracy. This dataset serves as the foundation for identifying domestic users likely reliant on groundwater wells. In general, if a community water system is not connected to a municipal supply, it is assumed that its primary water source is a well.

3.2.1. Eastern Coachella Valley Mobile Home Parks

LCJA collected detailed data on mobile home parks and Polanco parks in the eastern Coachella Valley. Attributes include:

- Geographic coordinates
- Number of service connections
- Available water infrastructure

This information was used to identify park locations that may depend on private wells.

3.2.2. Riverside County

Riverside County Department of Environmental Health provided data on state-registered small water systems in the study area. Attributes include:

- System names
- Service areas

- Regulatory status

This dataset also includes non-residential community water systems, such as those serving gas stations, truck stops, casinos, hotels, and other commercial businesses.

3.2.3. Environmental Protection Agency

The United States EPA provided information on federally regulated small water systems located on tribal lands within the study area. These systems are subject to federal oversight and include locations on tribal fee and trust lands.

3.2.4. Aerial Photo Analysis

To supplement primary datasets, an aerial photo analysis was conducted to identify locations likely dependent on wells as a water source. The analysis focused on areas outside municipal service boundaries and conservation lands. Features appearing to be houses or mobile homes were marked as potential well locations.

This analysis primarily targeted rural residential areas not served by municipal systems.

4. VULNERABILITY ASSESSMENT OF DOMESTIC AND SMALL WATER SYSTEM WELLS

This section evaluates the vulnerability of domestic and small water system wells using data from the Well Inventory. As detailed in **Section 2**, approximately 1,500 locations in the study area are estimated to rely on self-supplied groundwater. These users face heightened vulnerability to changes in groundwater conditions due to limited management capacity and potential climate change impacts. Unlike larger municipal systems, these wells typically lack redundancy features such as backup wells or storage reservoirs. Example photographs of wells observed in the field survey are shown in **Figure 5**.

4.1. DISTRIBUTION OF DOMESTIC WELLS IN COACHELLA VALLEY

Domestic wells are widely distributed across the study area (**Figure 2**), with several notable clusters:

- North of Palm Springs / Southeast of Desert Hot Springs
    - Approximately 300 known wells, averaging 320 feet deep, primarily serving rural residential properties. This area has partial municipal coverage from CVWD and MSWD.
- East of Palm Desert / North of Indio
    - About 100 known domestic wells, averaging 400 feet deep and serving a mix of rural residences and mobile home parks. Many clusters are located just outside CVWD's domestic service area.
- Pinyon Pines / Mountain Center
    - Small unincorporated communities to the west of Coachella Valley with roughly 40 known wells, averaging 540 feet deep, primarily for rural residential use. No major municipal water systems serve this area; there are five small water systems. It is unclear if domestic wells in this area are for primary water supply as most fall within the service area of a small water system.
- Eastern Coachella Valley
    - Over 700 known wells, averaging 490 feet deep and primarily serving Polanco parks and mobile home parks, with some rural residences.

The eastern Coachella Valley has the highest concentration of domestic and small water system wells. The area overall lacks essential infrastructure, including:

- Limited municipal water system coverage, with most locations relying on domestic wells
- Limited sewer system coverage, with most locations relying on septic systems
- Regional flood control infrastructure, areas within the FEMA 100-year flood zone may experience sheet flow up to 1-3 feet (CVWD, 2024b).

Agriculture is the predominant land use in this region, with many residents in this area being farm workers. These communities are typically lower income and lack sufficient resources to holistically address issues with their water supplies.

4.2. WATER LEVELS

This section addresses vulnerabilities of domestic and small water system wells related to groundwater levels.

4.2.1. Current Conditions

As documented in the Indio Subbasin Alternative Plan (Indio GSAs, 2022) and the most recent Annual Report (Indio GSAs, 2025), groundwater levels in the Indio Subbasin have generally increased since 2008. Some wells in the eastern Coachella Valley, particularly northwest of the Salton Sea, exhibit artesian conditions[2] due to high groundwater levels. Water year (WY 2023–2024) groundwater levels, overlaid with the Well Inventory, are shown in **Figure 6**.

A more useful metric for assessing vulnerability is depth to groundwater, which indicates where wells may risk going dry. **Figure 7** shows depth-to-groundwater conditions for 2019 from the Indio Subbasin Alternative Plan (Indio GSAs, 2022):

- Western Coachella Valley: Average depth to groundwater ≈ 200 feet
- Eastern Coachella Valley: Depth typically within 200 feet of ground surface, trending toward artesian conditions

Since 2019, groundwater levels across most of the Indio Subbasin have remained stable or increased, suggesting that wells in this basin are not generally at risk of groundwater levels falling below well depth.

As documented in the Mission Creek Subbasin Alternative Plan (Mission Creek GSAs, 2021), groundwater levels have generally increased since 2002 after an imported water recharge program began at the Mission Creek Groundwater Replenishment Facility. Domestic and small water system wells in the subbasin are clustered in the southeastern area of the basin, near the Indio Hills, where depth to groundwater is typically shallower, ranging from <50-feet to approximately 200-feet below ground surface.

The Well Inventory initially included 65 wells with reported depths less than 200 feet. A review of available well completion reports revealed that several records contained incorrect depth information or represented older wells (pre-1990) that may no longer be active. Because depth data are based on primary sources, some uncertainty exists. It is likely

[2] Artesian conditions occur when groundwater is held under pressure and rises up a well without pumping, sometimes flowing to the ground surface.

that most wells reported as <200 feet are either inactive or located in areas with shallow groundwater.

4.2.2. Projected Conditions with Climate Change

The Indio Subbasin Alternative Plan includes an analysis of potential groundwater level impacts under climate change scenarios (see Section 7.5.1 of the plan for assumptions used in the simulation). This vulnerability assessment compares a baseline scenario to a climate change scenario without implementation of projects or management actions—a conservative approach intended to represent a potential worst-case condition for domestic wells.

Projected changes in groundwater levels due to climate change in the Indio Subbasin, overlaid with the Well Inventory, are shown in **Figure 8**.

Key Findings:

- The highest risk for groundwater level decline occurs in the mid-valley area near Coachella and Bermuda Dunes.
- In this area, groundwater levels could decrease by as much as 50 feet below current conditions under the climate change scenario.
- More than 60 known domestic wells are located within this zone, indicating potential vulnerability if these declines occur.

In the Mission Creek Subbasin, projected conditions with climate change show decreasing water levels at key wells in the southeastern areas of the basin as much as 30-feet below baseline conditions. Referring to section 7.5.1 of the Mission Creek Alternative Plan (Mission Creek GSAs, 2021), the Key Well hydrographs around the cluster of domestic and small water system wells show that under baseline conditions with climate change, all wells fall below their Measurable Objective (MO)[3]. Key Wells in the vicinity of the main cluster of domestic and small water system wells also fall below their Minimum Threshold (MT)[4].

These projections underscore the importance of continued basin management, including monitoring and mitigation measures, to prevent undesirable results and protect vulnerable groundwater users.

The Indio Subbasin Alternative Plan also considered how projects and management actions may counteract undesirable results such as groundwater level declines. The projected change in groundwater levels with climate change and implementation of projects and

[3] A Measurable Objective is the groundwater level that managers are trying to maintain over time to keep the groundwater basin sustainable.

[4] A Minimum Threshold is the groundwater level or condition that must not be crossed to avoid causing undesirable results, such as wells going dry or water quality degradation.

management actions is shown overlain with the well inventory in **Figure 9**. As shown in **Figure 9**, the mid-valley area previously showing groundwater level declines now shows slight increases in water levels.

When Near Term Projects with Climate Change are simulated in the Mission Creek Subbasin, most of the Key Wells stabilize to be near to the MT, with two showing as slightly below their MT. Under the Future Projects with climate change scenario, Key Wells in the southeastern area stay above their MT, with some showing periods slightly below MOs, though recovering later in the planning horizon.

4.2.3. Regional and Local Monitoring

The current water level network developed for the Indio Subbasin Alternative Plan has been designed to track groundwater conditions. The network consists of over 350 wells that are monitored triennially by the Indio and Mission Creek Groundwater Sustainability Agencies (GSAs). Key Wells were identified in Indio and Mission Creek Subbasins to support compliance with established Sustainable Management Criteria (SMCs). These Key Wells are representative of local groundwater elevation conditions and are appropriate for inclusion in the Key Well groundwater elevation monitoring network (a subset of the overall monitoring program). Each Key Well was assigned a MT for groundwater levels, recognizing that chronic lowering of groundwater levels can indicate significant and unreasonable depletion of supply, causing undesirable results to domestic, agricultural, municipal, and other beneficial uses of groundwater.

Figure 10 shows the 57 Key Wells in the Indio Subbasin as green dots, the 3 Key Wells in Mission Creek Subbasin as pink dots, and the additional monitored groundwater levels as orange dots.

A 2027 update to the Indio Subbasin Alternative Plan is currently in development and will review the MTs for the Key Wells. While domestic and small water system well depths were considered in the Alternative Plan MTs, this Well Inventory will inform future SMCs. MTs may be revised to be more protective of domestic wells and prevent dewatering of local wells.

Groundwater levels are compiled and published in the Annual Report (Indio GSAs, 2025), submitted to DWR every April 1. In addition to reporting on MTs of Key Wells, the Annual Report also includes change in groundwater elevation figures. These analyses can help identify if areas of the basin are experiencing groundwater declines and help identify potential solutions.

4.3. WATER QUALITY

Water quality is a major concern for domestic users in California. Threats to water quality include a variety of constituents of concern with different sources and mechanisms for affecting domestic supplies, varying distributions and with different mitigation or treatment responses.

4.3.1. Regional Groundwater Quality

As documented in the Indio Subbasin Alternative Plan (Indio GSAs, 2022), there are several constituents that may exceed health standards in some areas of the basin. Constituents of concern include total dissolved solids (TDS), nitrate, arsenic, chromium-6, uranium, fluoride, perchlorate, and DBCP. Elevated TDS and nitrate concentrations are linked to current and historic water and wastewater management, agricultural activity, urban land use, septic systems, and natural conditions. In the Indio Subbasin, arsenic, chromium-6, uranium, and fluoride are naturally occurring and geologically derived. DBCP is a soil fumigant historically used in agriculture. Perchlorate can be found in some fertilizers and was first detected in Colorado River water in 1997. In areas with significant numbers of domestic wells, the main constituents of concern include nitrate, arsenic, and chromium-6. **Figures 11, 12, and 13** show the water quality concentration maps from the Indio Subbasin Alternative Plan for nitrate, arsenic, and chromium, respectively.

In the Mission Creek Subbasin Alternative Plan (Mission Creek GSAs, 2021), arsenic, fluoride, uranium, and chromium-6 were assessed as potential constituents of concern based on their natural occurrence. Of these naturally occurring constituents, only uranium was found to have levels exceeding California maximum contaminant levels (MCLs) in water supply wells. Nitrate is also considered a constituent of concern, and TDS was identified as requiring additional evaluation. The Mission Creek Subbasin Alternative Plan includes MTs for uranium and nitrate. Other constituents of concern will continue to be monitored as part of the Mission Creek Subbasin annual reports.

Nitrate is an anthropogenic constituent, introduced by man-made activities in the basin. Domestic wells near agricultural areas or golf courses may have higher nitrate concentrations due to the land application of fertilizers. **Figure 11** shows elevated concentrations on nitrate in the southeastern portion of the Coachella Valley in the area of some domestic wells. While the local source of nitrate is unknown, it is likely from nearby agricultural uses.

Figure 12 shows arsenic concentrations in the Indio Subbasin. Arsenic naturally occurs in groundwater, generally derived from basin sediments, and often dissolved in groundwater with anoxic or high-pH conditions. Higher concentrations are found in the portion of the basin near the Salton Sea, an area with significant domestic wells.

Chromium-6 is the oxidized form of the metal chromium and occurs in oxygen-rich groundwater near chromium-bearing rocks. In the Indio Subbasin, there are higher concentrations around Thermal and the mid-Valley, **Figure 13.**

Ongoing monitoring show stable concentrations for these constituents but changes to groundwater management may impact the fate and transport. Climate change is expected to increase the variability of imported water, with more recharge occurring in wet years and more pumping during longer dry times. The result may be a larger range of groundwater levels, with levels increasing in wet years and declining in dry years. Potentially, the change in groundwater levels may change regional water quality. However, these changes are

expected to be slow and small. Additional water quality monitoring is critical and can help identify issues before they occur.

4.3.2. Individual Well and Water System Water Quality

Domestic wells are more at risk from water quality concerns due to local water quality issues, poor well construction, or poor water system maintenance. Many households that are served by a domestic well also rely on a septic system. Septic systems may increase nitrate concentrations or viral contamination in the local groundwater, and a wider range of groundwater levels could exacerbate the problem.

Well construction will also impact the local water quality of a well. Surface contamination from fertilizer, pesticides, storm water, or other discharges can potentially affect wells and, to reduce that risk, new domestic wells are required to have an annular seal to a minimum depth of 50 feet and a concrete pad around the well head at the surface. During the field verification process, some of the wells visited did not have a concrete pad. This would leave the well vulnerable to surface contamination under baseline conditions and especially if flooding occurs in the area. In addition, there are specific ordinances that require setbacks from animal enclosures, septic systems, and other types of facilities. Proper well siting and well construction would reduce water quality concerns.

Inadequate well construction is not the only contributor to potential local water quality concerns. Water quality issues could occur in the entire water system (well, pipes, tanks). Water could corrode water heaters and pipes, introducing heavy metals such as lead, copper, cadmium, and zinc into the water supply. While these constituents are not found at elevated concentrations in the natural groundwater aquifer, the metals could leach from pipes, fittings, and solder joints. Water treatment is available, but the cost and maintenance depend on the type of local issues and volume of water to be treated.

4.3.3. Regional and Local Monitoring

The current water quality network developed for the Coachella Valley Salt Nutrient Management Plan (CV-SNMP) has been designed to account for regional water quality conditions. As shown in **Figure 14**, the CV-SNMP includes monitoring wells in the shallow, perched, and deep zones to fully characterize the Subbasin. These wells are sampled for Total Dissolved Solids (TDS), nitrate, chromium-6, and arsenic. Additional monitoring for PFAS is being considered, especially considering changing Maximum Contaminant Levels (MCLs). The regional network is essential to understand potential water quality changes from climate change.

Local water quality issues may impact an individual well and not be detected through regional water quality monitoring. It is essential that households periodically test the water quality of their wells. DWR publishes “A Guide for Private Domestic Well Owners” (https://www.waterboards.ca.gov/gama/docs/wellowner_guide.pdf) that provides detailed information on how to test a domestic well.

4.4. FLOODING

Domestic and small water system wells are particularly vulnerable to flooding events, which can cause physical damage and water quality degradation. Floodwaters can submerge wellheads and other water distribution system infrastructure, allowing contaminants (including sediments and pathogens) to enter the well system. This can pose a direct risk to drinking water safety and result in costly repairs. Limited consideration of flood risks at time of construction has resulted in wellhead casings and associated equipment (e.g. bladder tanks and pumps) being installed at low-lying locations in the Valley. As a result, these water systems are more susceptible to flood damage.

Climate change is expected to increase the frequency and intensity of extreme precipitation weather events and to shift seasonal runoff patterns. These changes heighten the potential likelihood of localized flooding, especially in lower lying areas with poor drainage or insufficient flood control infrastructure. Aging wells often lack sufficient sanitary seals, whether due to design deficiencies at time of construction or degradation. Floods may also cause loss of power supply for domestic wells.

The Well Inventory was mapped with FEMA 100-year and 500-year flood plains, shown in **Figure 15**. Several regions of the study area have both domestic wells and flood risks, including:

- North of Palm Springs and south of Desert Hot Springs. Wells in this area are primarily rural residential. Those with information on year of construction tend to be more recently drilled.
- Mid-valley, north of Palm Desert. These are predominantly rural residential properties with limited well age information.
- Eastern Coachella Valley, on the northwest side of the Salton Sea and in the lower reach of the Whitewater River before discharge into the Salton Sea. These areas contain wells that are for both rural residential, mobile home parks, and Polanco parks. Available information on well age in this area shows that wells are on average older in this region. This can be seen by comparing the average age of wells in **Table 2**, for the entire study area with the field survey data represented in **Table 1.**

As discussed in **Section 2.4.2**, six locations visited during the field survey confirmed flooding during the large 2023 storm. Two of these locations were identified as being outside of the identified FEMA flood plains.

4.5. WELL CONDITION VULNERABILITY

The physical condition of wells is important for maintaining reliability and protecting water quality. Many of the wells in the Well Inventory are decades old. With increased age there are often more vulnerabilities to contamination, mechanical failure, and well failure. Vulnerabilities to well condition include:

- Age of wells – Older wells are more likely to experience system failures due to aging infrastructure and wear. Many do not utilize modern construction methods and may have structural deficiencies, such as absence of a concrete pad or sanitary seal, lack of annular grout, or deteriorated or improperly sized casings.
- Unpermitted wells or repurposed agricultural wells– Many of these wells were originally constructed for agricultural use and not designed for long-term domestic supply. Over time, casings may corrode or rust, resulting in sand production, reduced performance, and increased risk of system failure.
- Changing construction methods – Modern wells typically use steel or PVC casing with grout seals. Older wells may have thin or corroded steel casing or deteriorating concrete seals. These deficiencies can allow for surface runoff, septic effluent, or shallow groundwater to enter the well.
- Old pressure tanks – Older tanks may have corrosion and sediment buildup. This may introduce particulates into the system or leach metals into water supply.
- Location and setback – Older and unpermitted wells may not meet setback requirements from septic systems, livestock areas, or other pollution sources.
- Unknown condition of infrastructure– The condition of well infrastructure, such as casing, is often unknown unless assessed by a qualified professional. Well owners may lack the financial resources to conduct inspections, and there is limited availability of professionals willing to take on small-scale projects in the eastern Coachella Valley. As a result, wear and tear may go undetected, increasing the risk of system failure.
- Power reliability – Wells depend on electricity to operate pumps and are vulnerable to frequent outages in the eastern Coachella Valley. Most systems lack backup power, resulting in loss of water supply during outages.
- Shallow well water quality – Shallower wells have a higher risk of contamination from surface activities, e.g., from septic systems or nearby livestock.

4.6. WELL INVENTORY DATA LIMITATIONS

Despite substantial efforts to consolidate and confirm the Well Inventory data, some uncertainties and gaps remain. Potential errors and limitations include:

- Miscategorized wells in primary data – Some wells may be incorrectly classified as domestic or community wells when their actual use is municipal, irrigation, or industrial. A comprehensive review of well completion reports could help address these discrepancies.
- Changes in well use over time – The intended use recorded at the time of drilling may have changed, making historical data less reliable.
- Retired wells included as active – Wells lacking destruction records may still appear as known locations even though they are no longer in service.
- Unknown or unpermitted wells – Some wells may exist without permitting and remain unidentified yet serve as a primary domestic water source.

4.7. ADDITIONAL CONCERNS FROM COMMUNITY SURVEYS

As part of the CVRWRP, surveys were conducted at community events, including local festivals, tribal fiestas, and other community events. Surveys were conducted in English and Spanish. Respondents were asked questions about their domestic water supply source; issues and concerns they have with water quality and aesthetics; priorities for actions to address concerns; impacts due to flooding; and priorities for addressing potential climate change impacts.

Survey questions varied by event, with changing information needs as the Study evolved. Key themes that were recorded from survey respondents include:

- Drinking water supply source:
    - Over half of survey respondents indicated they receive their water from a non-municipal supply source.
    - Approximately one of eight respondents indicated their primary source of drinking water is bottled water.
    - The estimated average cost of bottled water was over $50 per month.
- Aesthetic and water quality concerns:
    - Over half of survey respondents indicated concerns with water quality and aesthetics, including:
        - Arsenic contamination
        - Odor and smell issues
        - Discoloration
        - Skin irritation.
- Flooding:
    - About half of survey respondents indicated that they have experienced impacts from flooding.
    - The most common impacts were flood damage to homes and buildings in their communities, issues with access and commuting due to flooded roads, and impacts on septic systems.
- Climate impacts:
    - The most frequently expressed concern of survey respondents with climate impacts was unsafe drinking water.
    - A significant number of respondents were also concerned with water shortages, damage to pipes or wells, and power line damage.
- Priority actions:
    - The highest priority action identified by survey respondents was water infrastructure upgrades.
    - Respondents also supported protecting supply sources and having emergency drinking water programs.





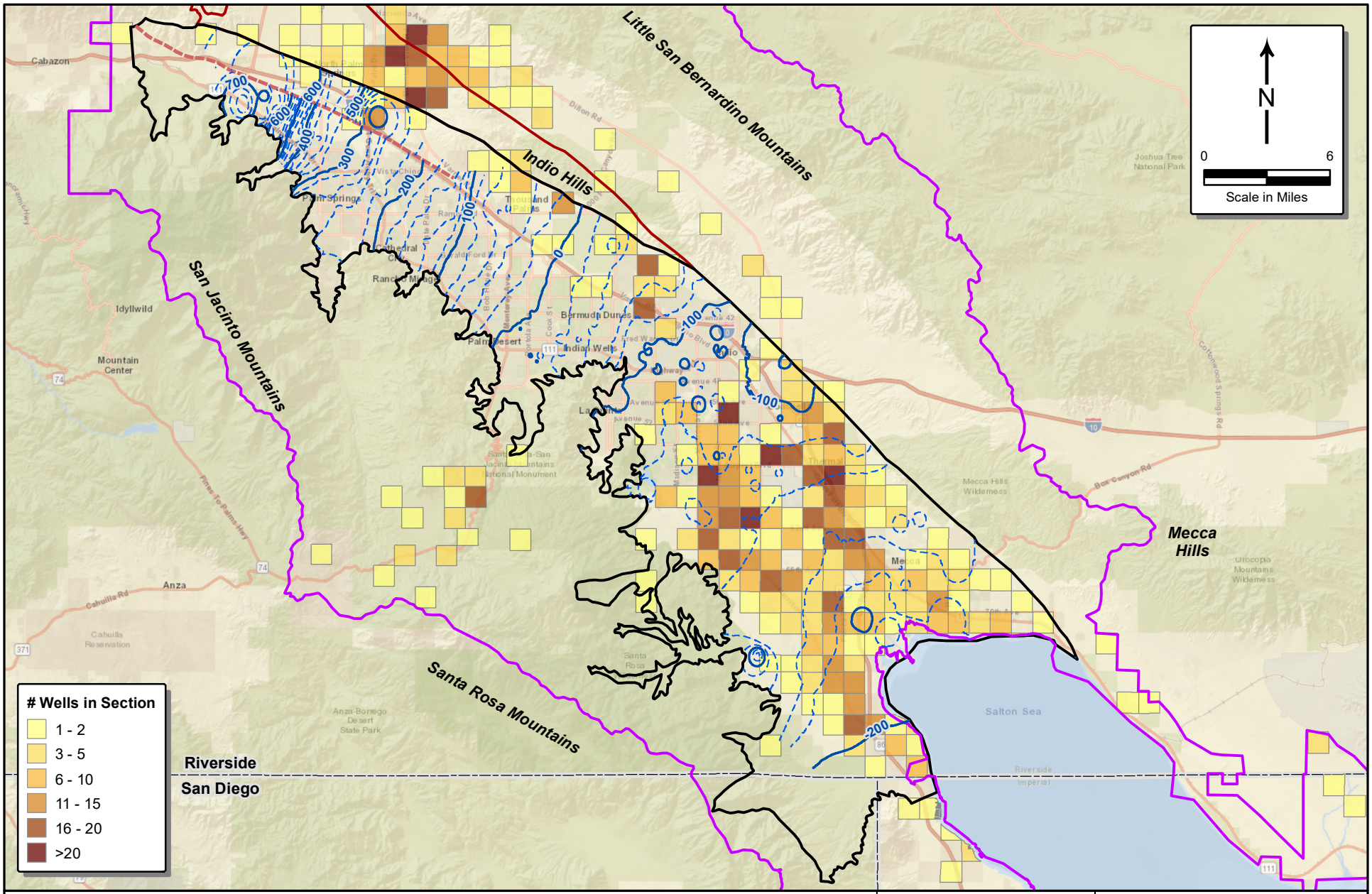


Note:
Examples of typical small domestic water supply wells in the eastern Coachella Valley. Center and right include pressurized storage tanks. All wells show electrical equipment near the ground surface, which could cause loss of power or damage to electrical components during flooding events.

May 2026

TODD GROUNDWATER

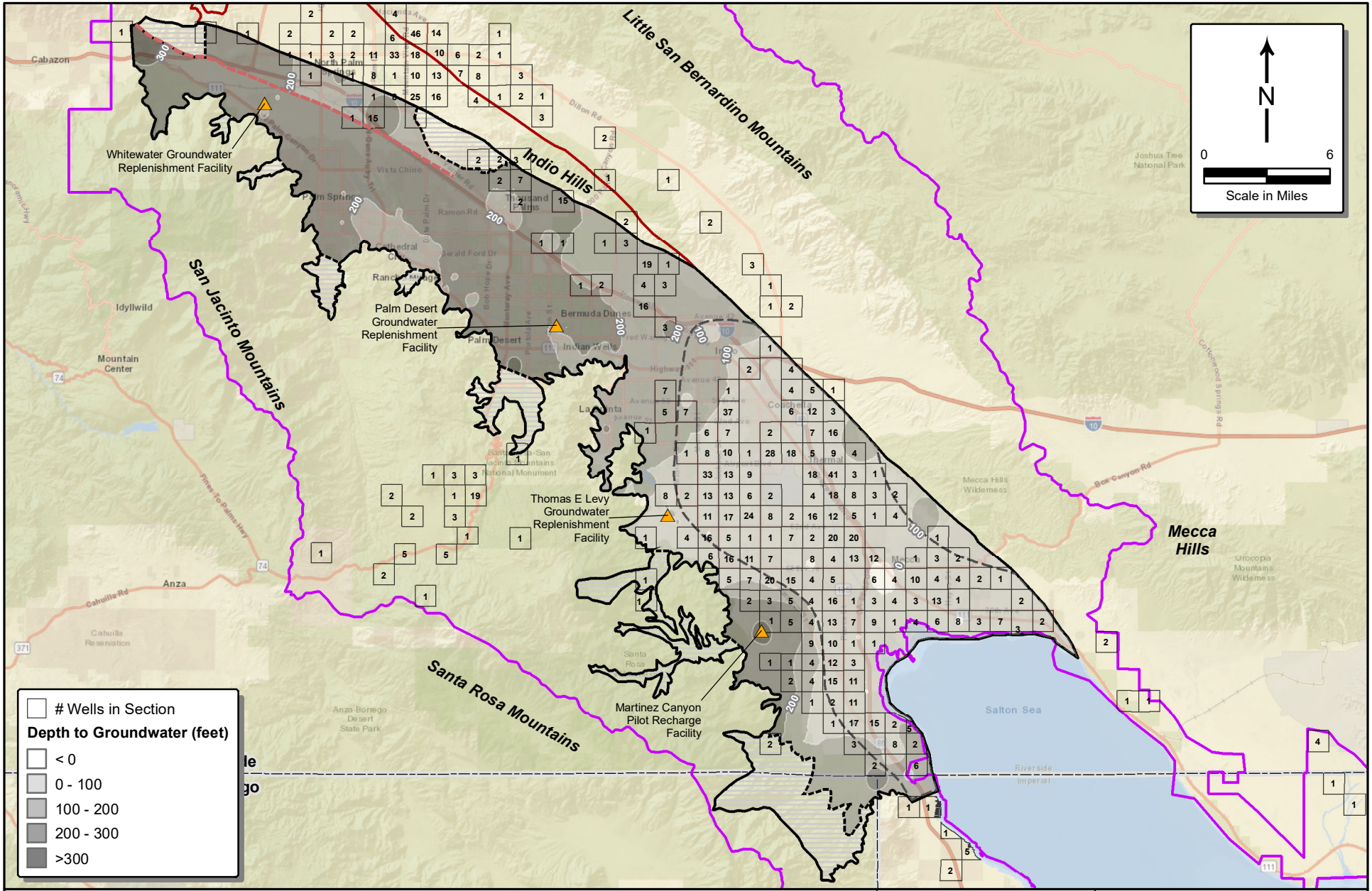
Figure 5
Example Domestic And Small Water Systems Wells In The Coachella Valley



May 2026

TODD GROUNDWATER

Figure 6
Well Inventory with Current (WY2023-2024) Groundwater Elevations



May 2026

TODD GROUNDWATER

Figure 7
CVRWRP Well Inventory with Depth to Groundwater (2019)

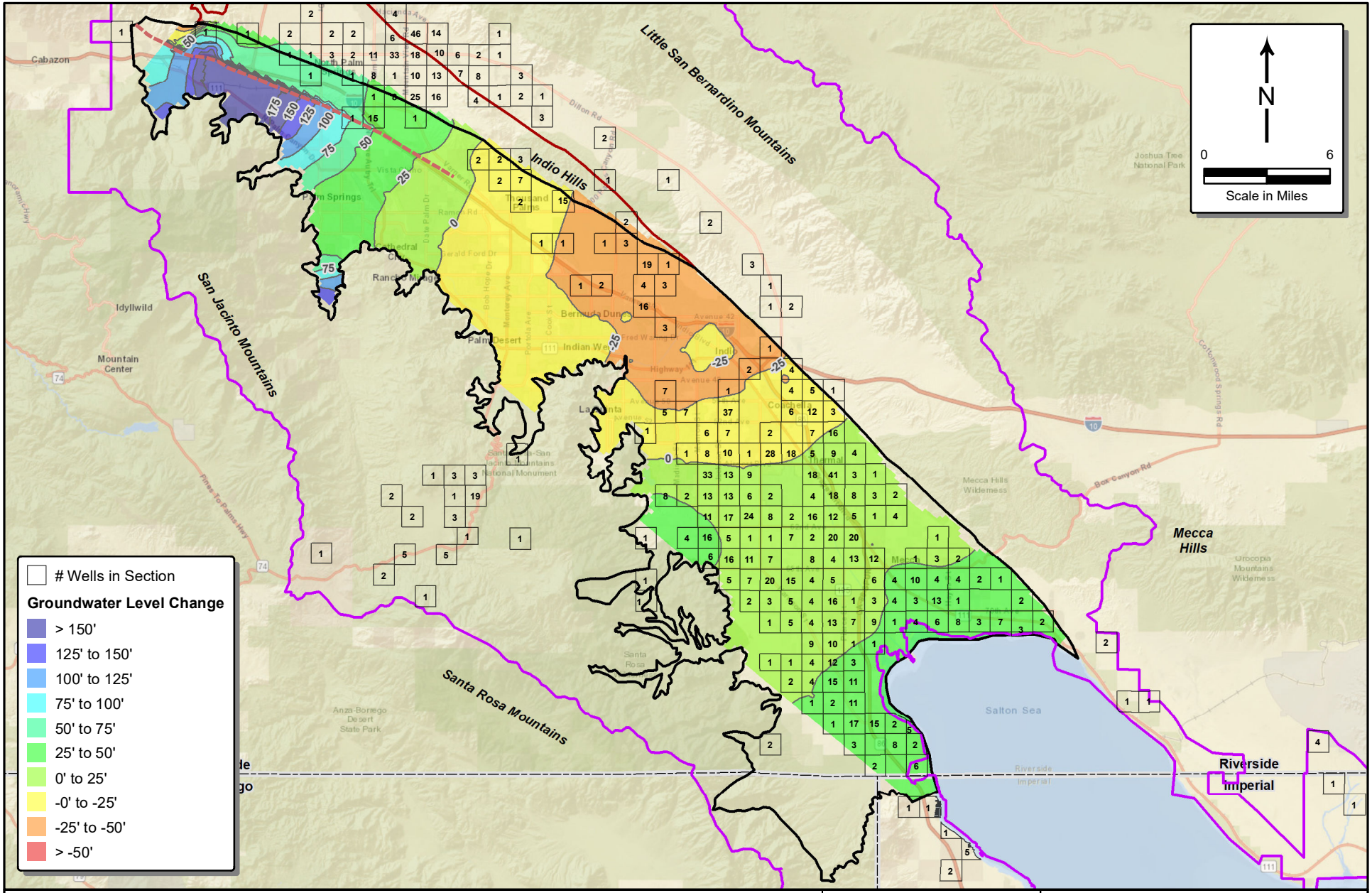
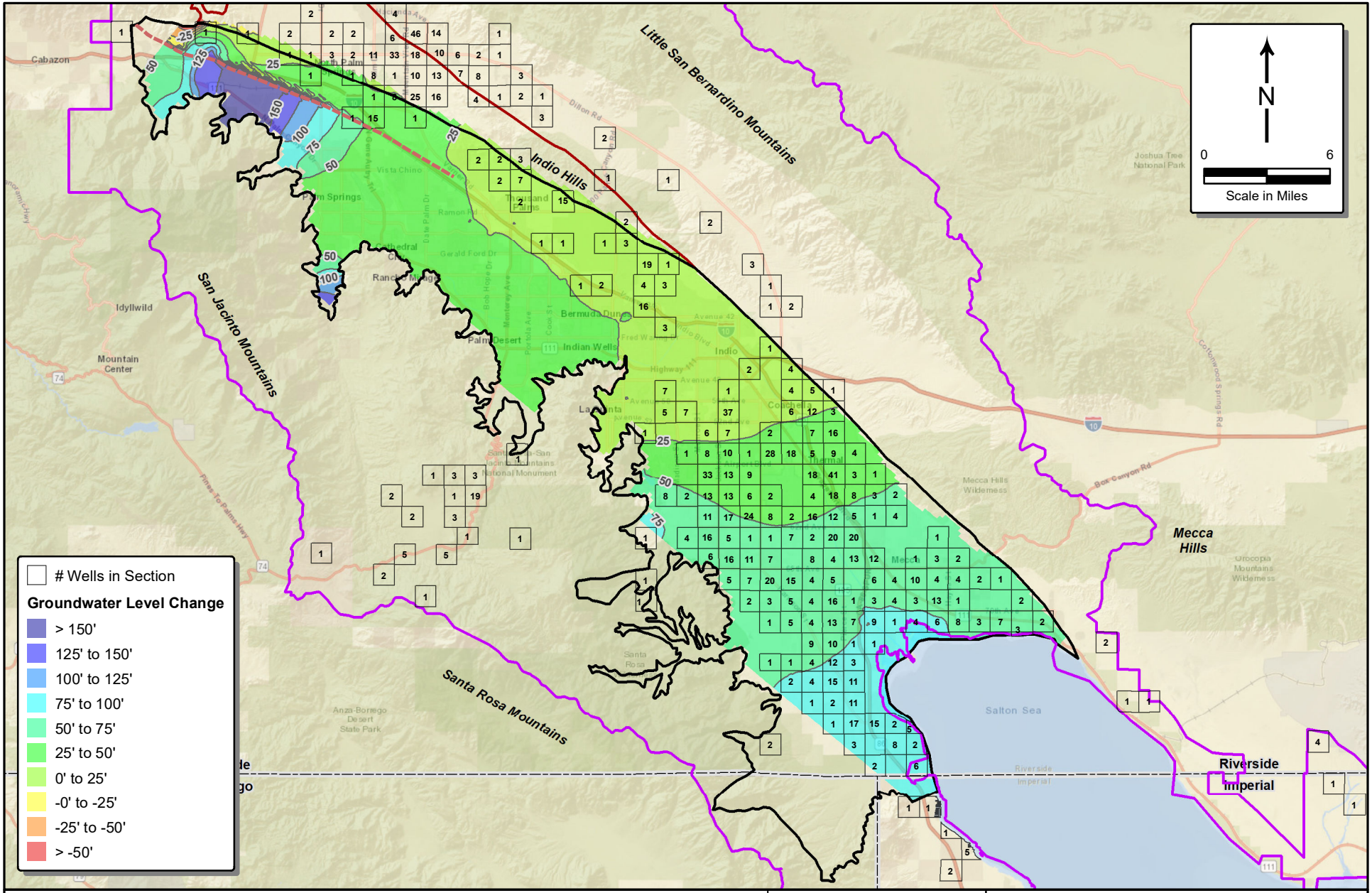


Figure 8
Well Inventory with Projected Change in Groundwater Levels Due To Climate Change



May 2026

TODD GROUNDWATER

Figure 9
Well Inventory with Projected Change in Groundwater Levels Including Projects and Management Actions

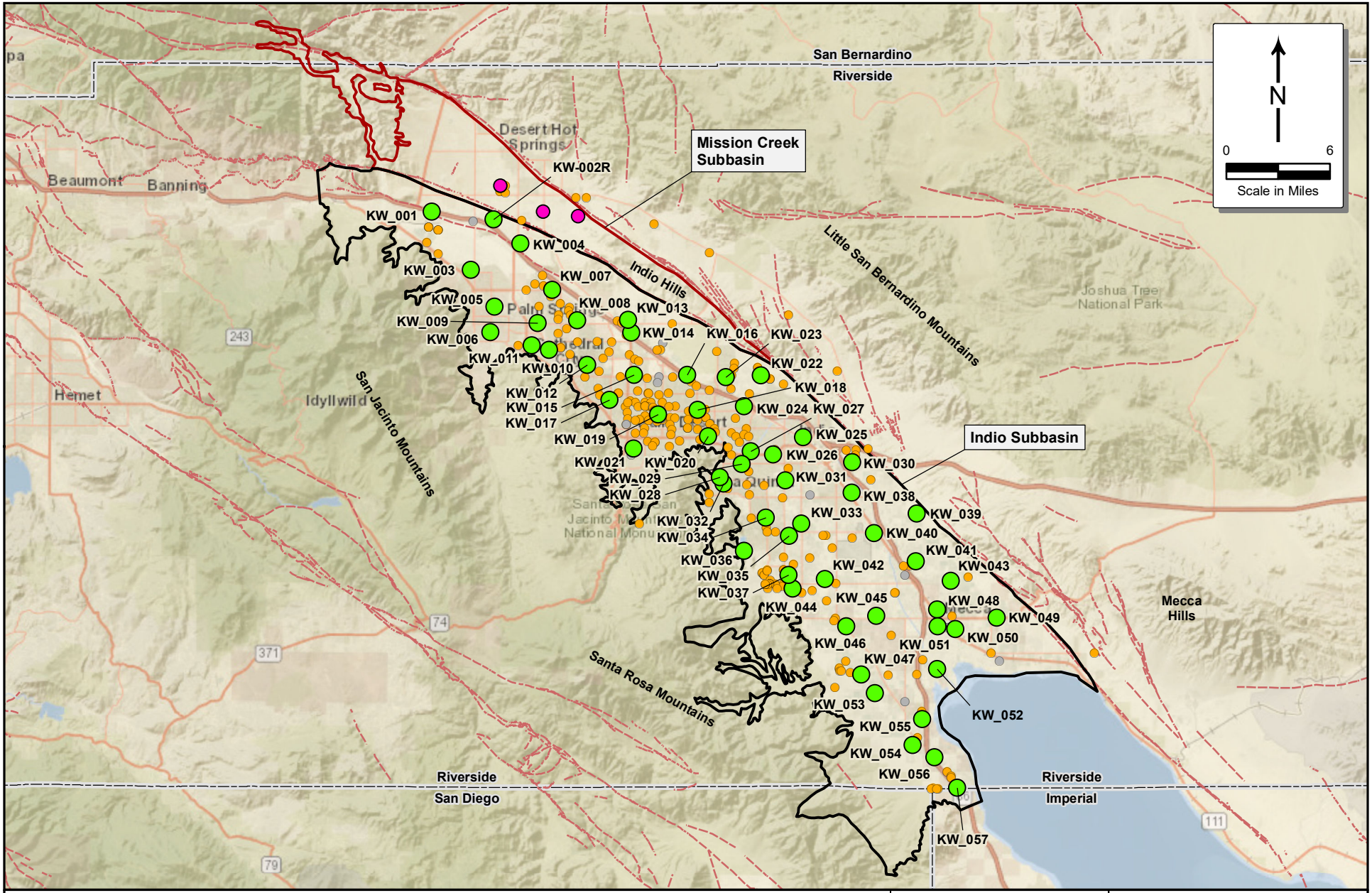
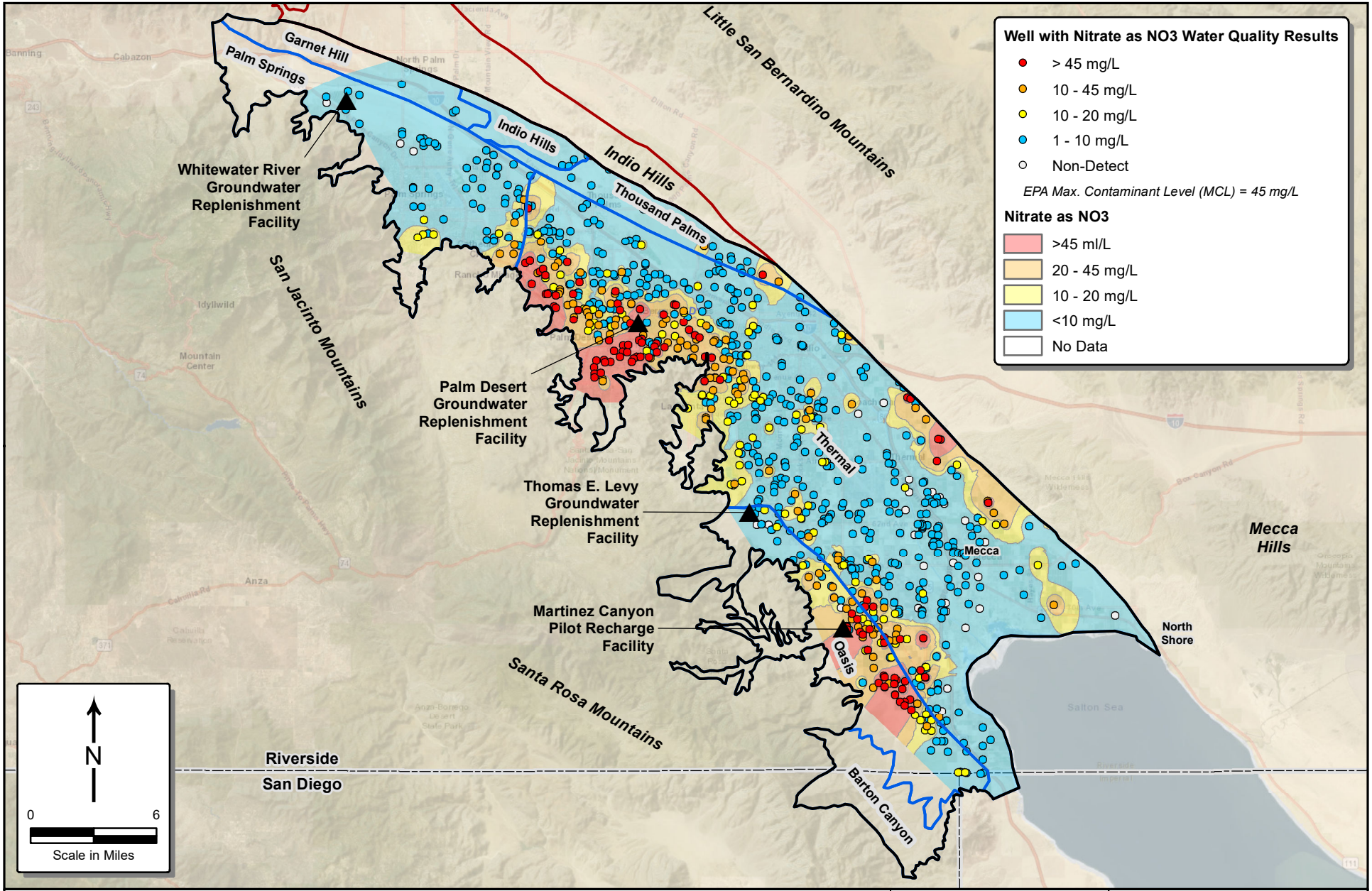


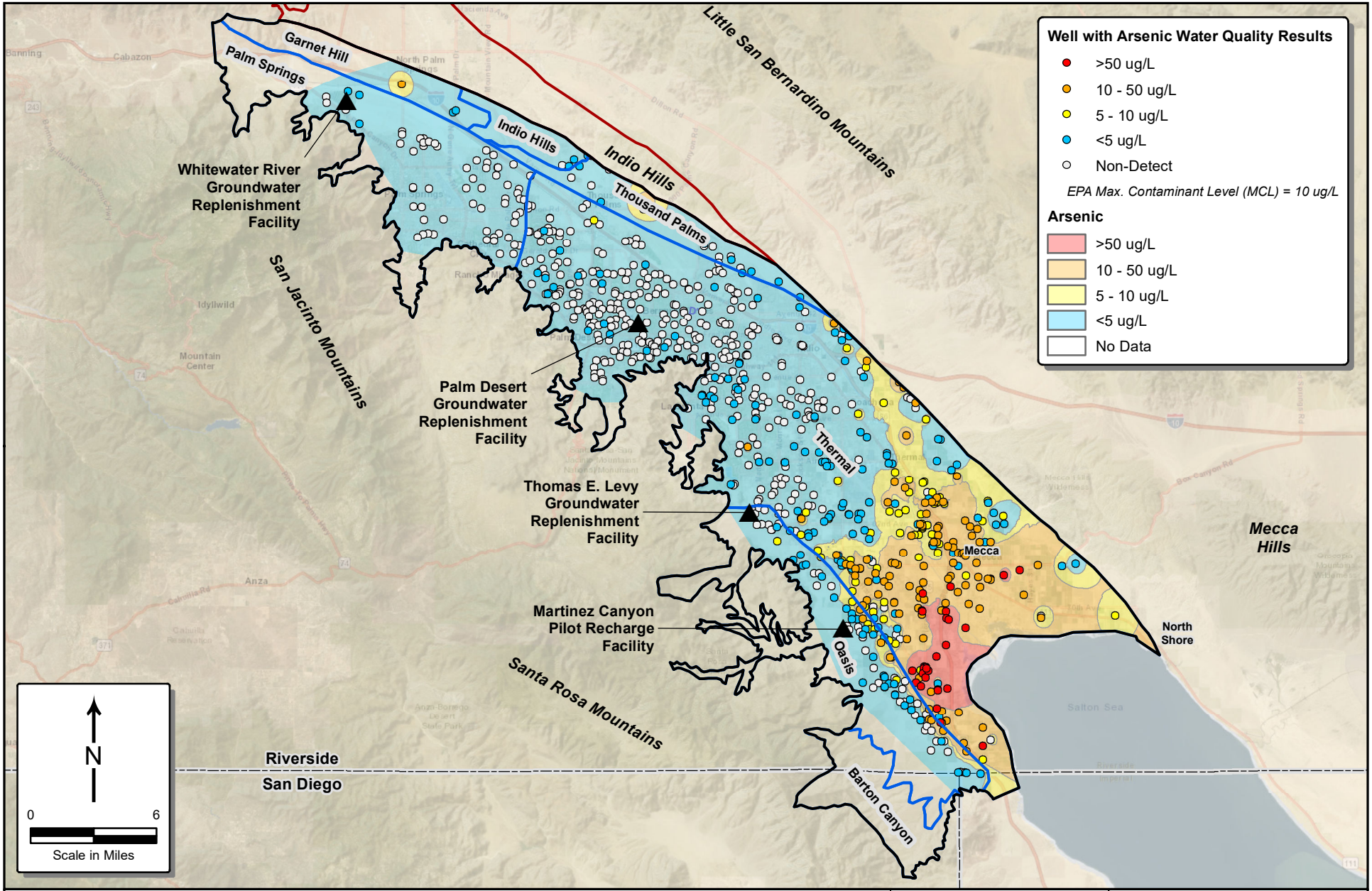
Figure 10
Groundwater Level Monitoring Network



May 2026

TODD GROUNDWATER

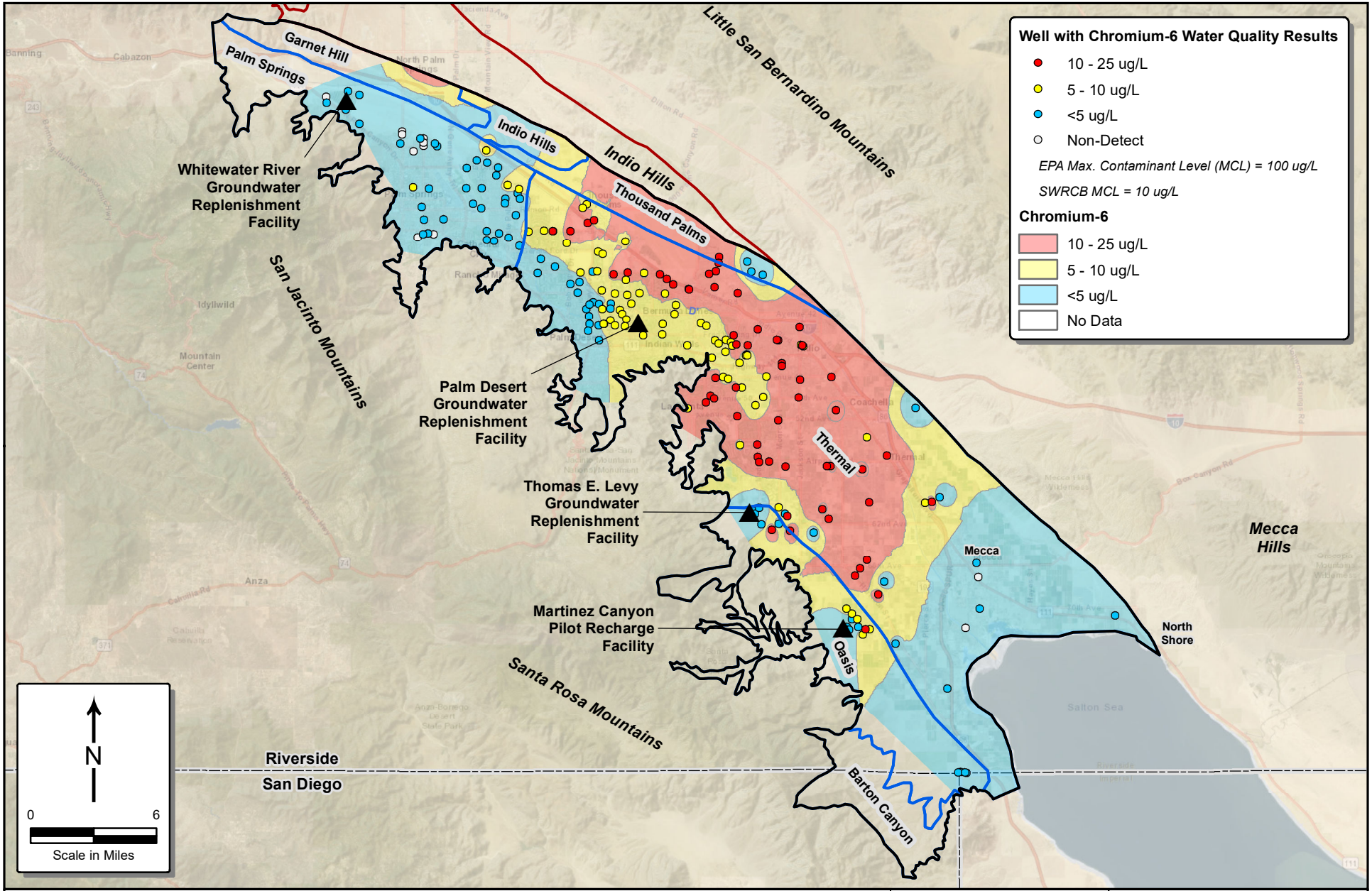
Figure 11
Nitrates
Concentration Map



May 2026

TODD GROUNDWATER

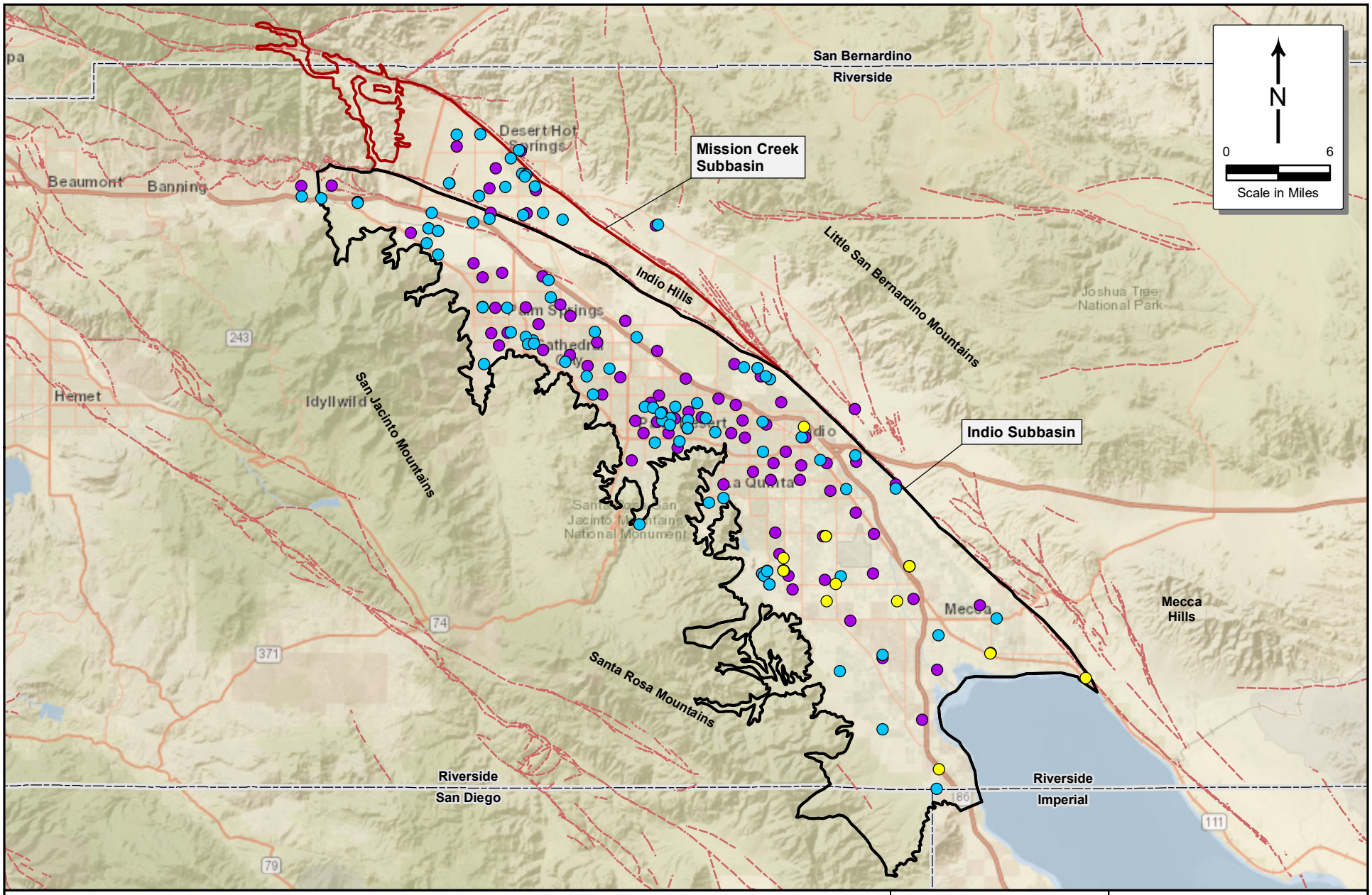
Figure 12
Arsenic Concentration Map



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Figure 13
Chromium Concentration Map

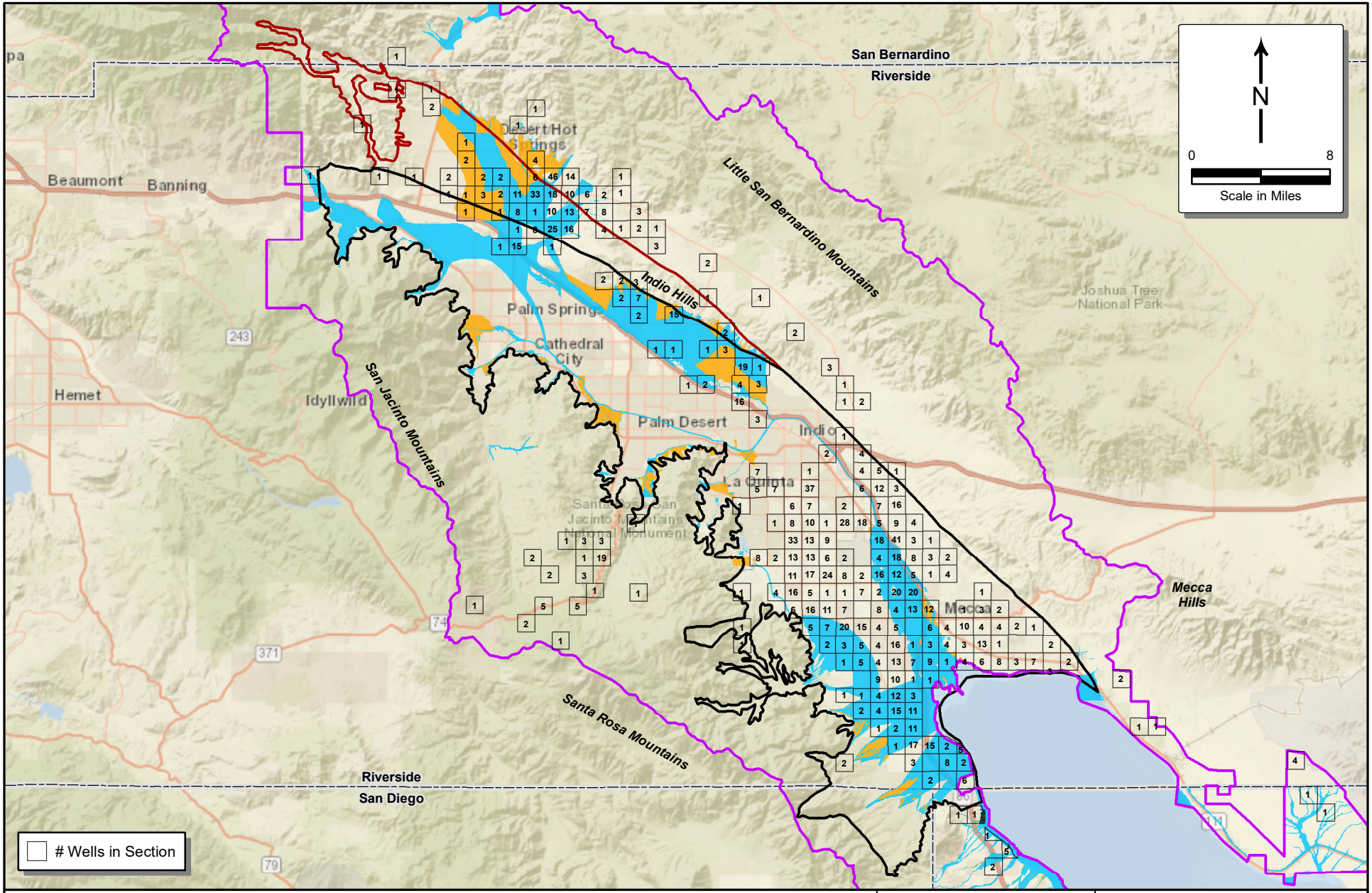


Monitoring Wells (Perched)
Monitoring Wells (Shallow)
Monitoring Wells (Deep)
Indio Subbasin
Mission Creek Subbasin

May 2026

TODD GROUNDWATER

Figure 14
Water Quality
Monitoring Network



May 2026

TODD GROUNDWATER

Figure 15
CVRWRP Well Inventory with FEMA Flood Plains

5. KEY FINDINGS

Key findings from the CVRWRP Domestic and Small Water System Well Inventory and Vulnerability Analysis include:

- The Well Inventory addresses a major data gap in the study area; domestic and small water system wells were identified in rural areas of the Coachella Valley. These wells are concentrated in the eastern Coachella Valley where municipal coverage is limited. Due to a lack of redundancy and financial resources, many of these wells have vulnerabilities, some of which may be exacerbated by climate change.
- Approximately 24 percent of known wells have construction information, and the average depth is 448 feet below ground surface. Less than 10 percent of known wells have a year of construction, and the average construction year is 2000, indicating that the average domestic and small water system well is over 20 years old. It should be noted that these data gaps may reflect administrative limitations in recordkeeping or data availability among regulatory agencies, rather than the absence of information.
- Vulnerabilities are increased by a lack of information on wells, including the age of wells, construction information, possible poor maintenance, and lack of water quality sampling.
- Water levels could decline due to changes in groundwater replenishment or increased pumping that could result from climate change. Domestic and small water system wells are particularly vulnerable because they are often shallower and lack equipment redundancy and the financial resources needed to adapt to changing conditions. The highest risk for groundwater level decline occurs in the mid-valley area near Coachella and Bermuda Dunes.
- Limited financial resources and management capacity can increase the vulnerability of domestic and small water system wells. Risks may stem from aging infrastructure, unpermitted wells not constructed to current regulatory standards, outdated construction methods, inadequate maintenance, and proximity to agricultural operations or septic systems.
- The Coachella Valley is susceptible to a range of water quality issues, including naturally occurring constituents such as arsenic and chromium-6, as well as anthropogenic contaminants like nitrates. Although water quality is monitored at the regional level, many concerns arise locally. Domestic wells and small water systems are often more vulnerable to water quality problems and may lack comprehensive testing programs to adequately track and address these issues.
- Climate change is expected to increase the variability of imported water, with more recharge occurring in wet years and more pumping during longer dry times. The result may be a larger range of groundwater levels, with levels increasing in wet years and declining in dry years. Change in groundwater levels may potentially affect regional and local water quality.

- Many domestic wells and small water system wells are located within FEMA-designated floodplains. Flooding can lead to a range of issues, such as submerged wellheads, the introduction of pathogens or sediments, equipment damage, and power loss. Field surveys also identified several locations outside FEMA floodplains that nonetheless may be vulnerable to flooding. These risks are expected to increase as climate change intensifies storm events and alters precipitation patterns.
- Community concerns include unsafe drinking water, flooding impacts and water shortages. Community priorities for actions to address concerns include water infrastructure upgrades, emergency drinking water programs, and source protection.

6. RECOMMENDATIONS

Many of the issues identified in the Well Inventory, particularly those discussed in the Vulnerability Assessment section of this report, are managed by the GSAs of the Indio and Mission Creek Subbasins as part of their respective Alternative Plans. Continued proactive regional management of groundwater resources is essential to protecting the most vulnerable groundwater users. The focus of this Well Inventory is to understand the distribution, characteristics, and potential vulnerabilities that may arise for these users at the local level. Additional mitigation measures will be developed as part of the Coachella Valley Regional Water Resilience Plan.

Both Alternative Plans include Projects and Management Actions to improve conservation of water resources; increase use of recycled water supplies; pursue new sources of imported water supplies for groundwater replenishment; protect groundwater quality; and improve data collection. These efforts are critical in protecting the users dependent on domestic and small water system wells in the Coachella Valley.

To address vulnerabilities of domestic and small water system owners, the following recommendations are made:

1. Support consolidation or conversion of small water systems and private wells where appropriate and locally supported - Continue programs that improve reliability and drought resilience, and reduce vulnerability to climate related disruptions such as extreme heat and power outages through consolidation or connection to State small water or municipal systems, while respecting Tribal sovereignty and supporting Tribal-led decision making regarding water system governance and management
2. Investigate opportunities for establishing community systems that service multiple Polanco parks. Areas with higher concentrations of Polanco parks could establish shared systems to improve resilience to drought, water quality impacts, and system failures, and emergency disruptions during extreme events.
3. Alternative drinking water solutions where consolidation is not feasible – In areas where connection to municipal or State small water systems is not feasible, support implementation of alternative solutions such as Point-of-Use (POU) and Point-of-Entry (POE) treatment systems. Programs such as PUCDC's Drinking Water Program have installed over four hundred reverse osmosis units, an effective near-term approach to improve drinking water quality and resilience for households relying on self-supplied wells.
4. Integrate Well Inventory data into climate planning – Utilize data developed in the Well Inventory to inform regional planning efforts, including Alternative Plan updates, with a focus on addressing vulnerabilities related to groundwater decline, water quality degradation, and climate driven risks such as drought, flooding, and extreme weather.

5. Identify funding opportunities for community and climate resilience projects, which could establish well equipment inspection programs, perform water quality monitoring, and provide upgrades to well infrastructure.
6. Promote education and outreach for climate preparedness – Promote education, outreach, and owner/operator training to support routine maintenance, water testing, and preparedness for climate-related disruptions such as drought, flooding, and power outages.
7. Establish low cost or free water quality testing for small water system and domestic wells, prioritizing older wells and those in areas with known water quality issues.
8. Pursue grants and other funding for replacement and rehabilitation of high risk wells and associated infrastructure – Prioritize wells that cannot meet current construction standards, lack sanitary seals, are located within FEMA floodplains, or are near contamination sources. Improvements should incorporate climate resilience measures, such as elevating wellheads and onsite electrical distribution equipment above expected flood levels and integrating standby or backup power to maintain operation during power outages. State programs, including those supported by the State Water Resources Control Board (SWRCB), can provide technical assistance and funding to support well rehabilitation, new well development, and replacement of water distribution equipment.

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