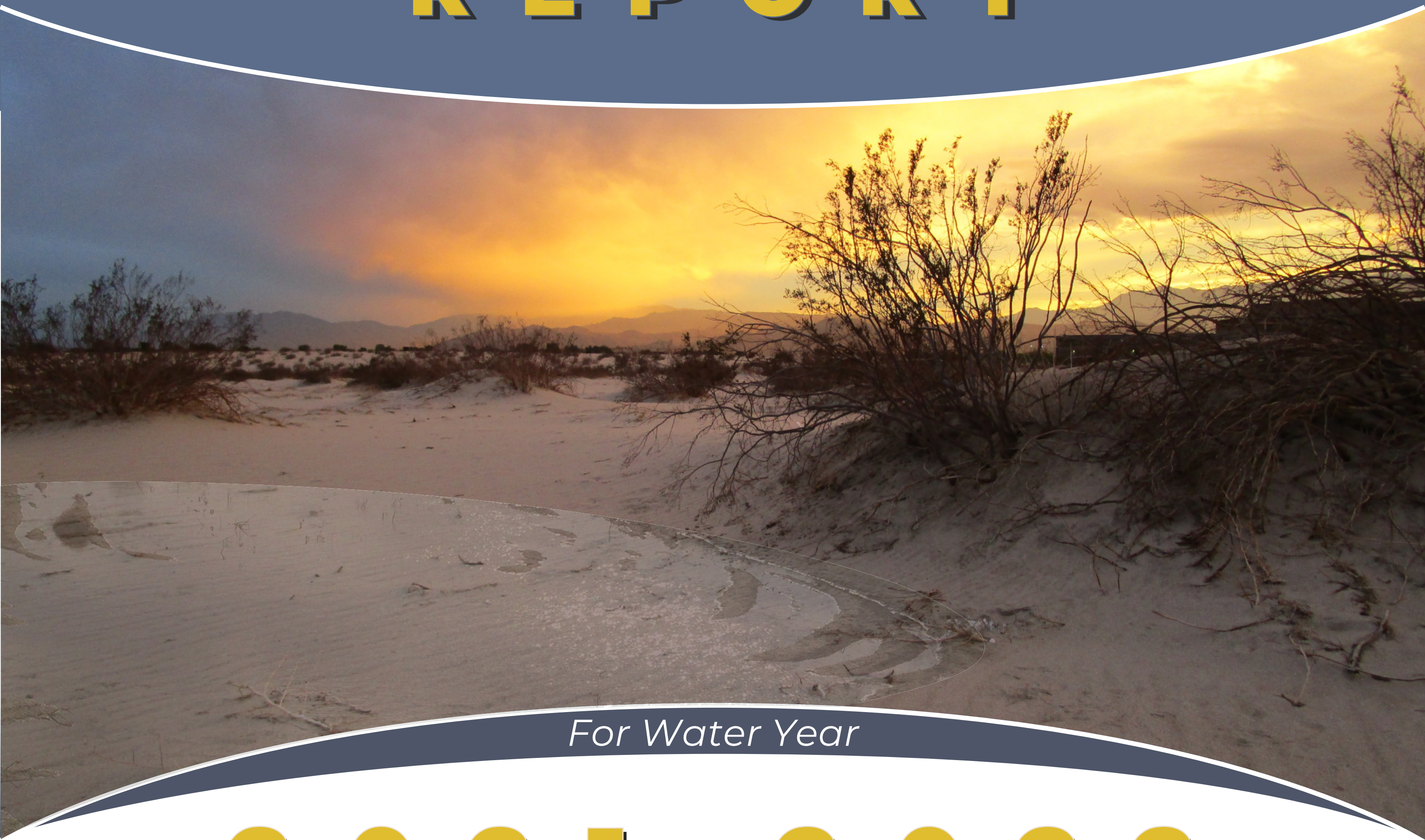
INDIO SUBBASIN

ANNUAL REPORT



For Water Year

2021-2022

FINAL | MARCH 2023

Prepared for: Indio Subbasin Groundwater Sustainability Agencies

FINAL

INDIO SUBBASIN ANNUAL REPORT FOR WATER YEAR 2021-2022

COACHELLA VALLEY WATER DISTRICT
COACHELLA WATER AUTHORITY
DESERT WATER AGENCY
INDIO WATER AUTHORITY

March 2023

TODD GROUNDWATER

2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
www.toddgroundwater.com

Alternative Annual Report Elements Guide - Indio Subbasin Annual Report for Water Year 2021-2022

California Code of Regulations - GSP Regulation Sections	**Alternative Elements**	**Document which *attachment(s) contains the applicable alternative element.***	***Document which section(s), page number(s), or briefly describe why that Alternative element does not apply to the entity.***
Article 7	**Annual Reports and Periodic Evaluations by the Agency**		
§ 356.2	**Annual Reports**		
	Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:		
	(a) General information, including an executive summary and a location map depicting the basin covered by the report.	Annual Report	An executive summary is provided as the first section of the Annual Report. Maps depicting the Indio Subbasin are shown on Figures 1-1 and 1-2.
	(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:		
	(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:		
	(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.	Annual Report	A groundwater contour map is provided on Figure 3-2 for WY 2021 -2022. Seasonal changes are generally not significant in this large Subbasin, as shown in hydrographs provided on Figure 3-2.
	(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.	Annual Report	Representative hydrographs are provided on Figure 3-2. Water year type is not provided because the Subbasin is not directly affected by runoff conditions in Sacramento and San Joaquin River, but instead receives water from the Colorado River.
	(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.	Annual Report	Groundwater extraction by water use section is described in Section 4 of the Annual Report. Extractions, methods of measurement, and accuracy of measurements are summarized in Table 4-1. A map of groundwater extractions is provided on Figure 4-1.
	(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.	Annual Report	Surface water supply and use is described in Section 5. Direct use of surface water is summarized in Table 5-3.
	(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.	Annual Report	Total water use is described in Section 6. Table 6-1 summarizes water sources for each water use sector and provides the method of measurement and accuracy of measurements.
	(5) Change in groundwater in storage shall include the following:		
	(A) Change in groundwater in storage maps for each principal aquifer in the basin.	Annual Report	There is one principal aquifer for the Indio Subbasin. Change in storage is described in Section 7 and summarized on Figure 7-1.
	(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.	Annual Report	Historical annual change in groundwater storage since 1970 is depicted in graphical form on Figure 7-2. Cumulative change in storage since 1970 is presented depicted in graphical form on Figure 7-3.
	(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.	Annual Report	A description of progress toward implementing the plan is provided in Section 8. A detailed status for WY 2021-2022 is provided in Table 8-2.

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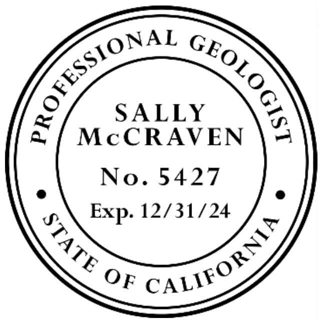

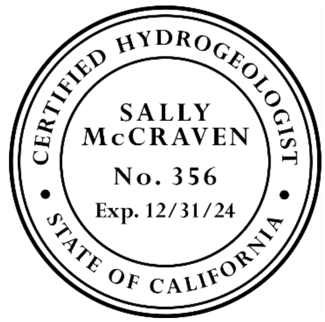

Sally McCraven, PG, CHG, CEG

Consulting Hydrogeologist

Todd Groundwater

Maureen Reilly, PE

Professional Engineer

Todd Groundwater

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LIST OF ACRONYMS AND ABBREVIATIONS

˚F	degrees Fahrenheit
AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
AMI	Advanced Metering Infrastructure
AOB	Area of Benefit
AWAG	Agricultural Water Advisory Group
Basin	Coachella Valley Groundwater Basin
CASGEM Program	California Statewide Groundwater Elevation Monitoring Program
CRA	Colorado River Aqueduct
CVRWMG	Coachella Valley Regional Water Management Group
CV-SNMP	Coachella Valley Salt and Nutrient Management Plan
CVSC	Coachella Valley Stormwater Channel
CVWD	Coachella Valley Water District
CVWMP	Coachella Valley Water Management Plan
CWA	Coachella Water Authority
CWC	California Water Code
CWSRF	Clean Water State Revolving Fund
CY	Calendar Year
DAC	Disadvantaged Community
DCF	Delta Conveyance Facility
DWA	Desert Water Agency
DWR	California Department of Water Resources
ECVWSP	East Coachella Valley Water Supply Project
EIR	Environmental Impact Report
ET	evapotranspiration
EVRA	East Valley Reclamation Authority
feet ags	feet above ground surface
feet bgs	feet below ground surface
feet msl	feet above mean sea level
GPS	Global Positioning System
GIPSY-OASIS	GNSS-Inferred Positioning System and Orbit Analysis Simulation Software
GRF	Groundwater Replenishment Facility
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan

ID	Improvement District
IID	Imperial Irrigation District
InSAR	Interferometric Synthetic Aperture Radar
IPR	indirect potable reuse
IWA	Indio Water Authority
MCL	maximum contaminant level
MC-GRF	Mission Creek Groundwater Replenishment Facility
mgd	million gallons per day
mi^2	square miles
MNM	Monitoring Network Module
MP	Mile Post
msl	mean sea level
MSWD	Mission Springs Water District
MT	Minimum Threshold
MWD	Metropolitan Water District of Southern California
MVP	Mid-Valley Pipeline
NAVD88	North American Vertical Datum 1988
NGVD29	National Geodetic Vertical Datum 1929
NPDES	National Pollutant Discharge Elimination System
NPW	non-potable reuse
PD-GRF	Palm Desert Groundwater Replenishment Facility
PMAs	project and management actions
QWELL	Qualified Water Efficient Landscaper
QSA	Quantification Settlement Agreement
RCFCWD	Riverside County Flood Control and Water Conservation District
SB	Senate Bill
SDCWA	San Diego County Water Authority
SGMA	Sustainable Groundwater Management Act
SNMP	Salt and Nutrient Management Plan
sq ft	square feet
SWRCB	State Water Resources Control Board
SWP	State Water Project
TEL-GRF	Thomas E. Levy Groundwater Replenishment Facility
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey
UWMP	Urban Water Management Plan

VSD	Valley Sanitary District
WBIC	weather-based irrigation controller
WRP	Water Reclamation Plant
WSCP	Water Shortage Contingency Plan
WWR-GRF	Whitewater River Groundwater Replenishment Facility
WY	Water Year

EXECUTIVE SUMMARY

The Coachella Valley Water District (CVWD), Coachella Water Authority (CWA), Desert Water Agency (DWA), and Indio Water Authority (IWA) represent the Groundwater Sustainability Agencies (GSAs) responsible for sustainably managing the Indio Subbasin in compliance with the Sustainable Groundwater Management Act (SGMA).

On behalf of the Indio Subbasin GSAs, Todd Groundwater has prepared this *Indio Subbasin Annual Report for Water Year (WY) 2021-2022 (Annual Report)* in accordance with annual reporting requirements of SGMA. The Annual Report summarizes groundwater conditions and the implementation status of projects and management actions in the Indio Subbasin for WY 2021-2022 (October 1, 2021 to September 30, 2022). This report is the sixth annual report prepared for the Indio Subbasin, which is designated as Basin No. 7-21.01 by the California Department of Water Resources (DWR).

ES-1 BACKGROUND

The Coachella Valley Groundwater Basin (Basin) has been divided into four Subbasins by DWR as documented in California Bulletin 108 (1964) and Bulletin 118 (2016). The four Subbasins include the Indio[1], Mission Creek, San Gorgonio Pass, and Desert Hot Springs Subbasins (**Figure 1-1**). The Indio, Mission Creek, and San Gorgonio Pass Subbasins have been designated as medium-priority Subbasins under SGMA, and the Desert Hot Springs Subbasin has been designated as a very low-priority Subbasin.

On December 29, 2016, the Indio Subbasin GSAs submitted to DWR the *2010 Coachella Valley Water Management Plan (CVWMP)* (CVWD, 2012a), accompanied by a Bridge Document (Indio Subbasin GSAs, 2016) that describes how the 2010 CVWMP and supporting documents satisfied the requirements of SGMA and should be considered as an acceptable Alternative to a Groundwater Sustainability Plan (GSP) for the Indio Subbasin (Alternative Plan).

On July 17, 2019, DWR approved the Alternative Plan with specific recommendations presented in its *Indio Subbasin Alternative Assessment Staff Report* and a requirement to submit an Alternative Plan Update by January 1, 2022. Consistent with SGMA, objectives of the Alternative Plan Update were to assess and report progress toward sustainability of the Indio Subbasin, respond to DWR recommendations and, consistent with the goals of the 2010 CVWMP, make needed updates to ensure that future water demands in the Indio Subbasin are reliably met in a cost-effective and sustainable manner. The Indio Subbasin GSAs published the update to the Alternative Plan, the *2022 Indio Subbasin Water Management Plan Update: SGMA Alternative Plan* (*2022 Alternative Plan Update*), which was submitted to DWR in December 2021. The *2022 Alternative Plan Update* includes the Indio Subbasin and the areas served by or expected to be served by groundwater from the subbasin (Plan Area).

[1] The Indio Subbasin is also identified as the Whitewater River Subbasin by the United States Geological Survey, 1980. However, the Whitewater River Subbasin is identified as the Indio Subbasin in DWR Bulletin 108 (1964) and Bulletin 118 (2016). For consistency with SGMA, this Annual Report will identify the Whitewater River Subbasin as the Indio Subbasin.

ES-2 WY 2021-2022 OVERVIEW

While sixth in the series of Annual Reports, this WY 2021-2022 Annual Report is the second since submittal of the comprehensive *2022 Alternative Plan Update* and incorporates its priorities, findings, and implementation planning. The *2022 Alternative Plan Update* is available on the program website (www.IndioSubbasinSGMA.org).

The *2022 Alternative Plan Update* addressed groundwater sustainability criteria, as defined in SGMA, including the undesirable results of chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, land subsidence, degraded water quality, and depletion of interconnected surface water. SGMA also defines quantitative measures to demonstrate sustainability, which include the Minimum Threshold (MT), a numeric value used to define each undesirable result, and the Measurable Objective (MO), a quantifiable goal to track the performance of sustainable management. The *2022 Alternative Plan Update* provided MTs for groundwater levels, defined by historical groundwater low levels (which occurred in the years around 2009). These levels also serve as effective proxy MTs for the potential undesirable results of groundwater storage depletion and subsidence given the direct relationships between groundwater levels and these indicators. Establishment of the MTs also involved identification of 57 Key Wells across the Subbasin to represent local groundwater levels with each Key Well assigned a specific MT.

In WY 2021-2022, water levels in all 57 wells remained above their respective MTs, confirming that significant undesirable results of chronic lowering of groundwater levels, depletion of groundwater storage, and potential subsidence are not occurring across the basin. Responsive to drought conditions and diminished State Water Project (SWP) deliveries, managed aquifer recharge in the Whitewater River Groundwater Replenishment Facility (WWR-GRF) was greatly reduced in WY 2021-2022. Approximately 19,000 AF was recharged at this facility, amounting to about 87,000 AF less than in WY 2020-2021. While groundwater replenishment was reduced at this facility, the long history of consistent recharge at WWR-GRF has resulted in increased long term water levels and has helped maintain basin groundwater levels in critical dry years such as WY 2021-2022. Replenishment at Thomas E. Levy Groundwater Replenishment Facility (TEL-GRF) and Palm Desert Groundwater Replenishment Facility (PD-GRF) continued without reductions in WY 2021-2022.

Overall, the Indio Subbasin lost 76,786 AF in storage during WY 2021-2022. The GSAs continued to implement the Projects and Management Actions (PMAs) detailed in the *2022 Alternative Plan Update*; their progress is documented in Section 8.

ES-3 INDIO SUBBASIN SETTING

The Indio Subbasin is part of the Coachella Valley Groundwater Basin, which extends approximately 50 miles southeast from the San Bernardino Mountains to the northern shore of the Salton Sea (**Figure 1-1**). The Coachella Valley Groundwater Basin lies within the northwesterly portion of California's Colorado Desert. The San Bernardino, San Jacinto, and Santa Rosa Mountains impede the eastward movement of storms and create a rain shadow, which results in an arid climate and greatly reduces the contribution of direct precipitation as a source of recharge to groundwater.

The Coachella Valley Groundwater Basin has been divided into four subbasins as described by DWR in Bulletin 108 (1964) and Bulletin 118 (2016). The boundaries between the subbasins are generally defined by faults that impede the lateral movement of groundwater flow.

The Indio Subbasin underlies the major portion of the Coachella Valley floor and encompasses approximately 525 square miles (mi^2). As shown on **Figure 1-1**, it shares a border with the San Gorgonio Pass Subbasin; this boundary represents a bedrock constriction and flow divide. On the southwest, the Indio Subbasin is bordered by the Santa Rosa and San Jacinto Mountains. The Indio Subbasin is separated from the Mission Creek Subbasin by the Banning Fault, and from the Desert Hot Springs Subbasin by the San Andreas Fault; both faults represent effective barriers to groundwater flow (DWR, 1964) (**Figure 1-1**). Within the Indio Subbasin, the Garnet Hill Fault also partially impedes groundwater flow from the Garnet Hill Subarea to the south.

Sediments in the northwestern Indio Subbasin are predominantly coarse-grained. From about the City of Indio southeasterly to the Salton Sea, the Indio Subbasin is characterized by increasingly thick layers of silt and clay, especially in the shallower portions. These silt and clay layers are remnants of ancient lakebed deposits and impede the percolation of water applied for irrigation (DWR 1964). In 1964, DWR estimated that the Indio Subbasin contained approximately 29,800,000 acre-feet (AF) of water in the first 1,000 feet below the ground surface (feet bgs), or approximately 76 percent of the total groundwater in the Coachella Valley Groundwater Basin.

The Indio Subbasin was divided by DWR (1964) into five subareas: Garnet Hill, Palm Springs, Thermal, Thousand Palms, and Oasis (**Figure 2-1**). Subareas have been delineated based on one or more of the following geologic or hydrogeologic characteristics: type(s) of water-bearing formations, water quality, areas of confined groundwater, and groundwater or surface drainage divides. The largest of these are the Palm Springs and Thermal subareas. The Palm Springs Subarea in the northwest is characterized by a thick sequence of coarse sediments and by substantial natural recharge along the Whitewater River and artificial recharge (replenishment). Groundwater from the Palm Springs Subarea moves southeastward through the Thermal Subarea. The Garnet Hill Subarea is located between the Banning and Garnet Hill Faults, which act as barriers to groundwater movement below a depth of about 100 feet bgs. The Garnet Hill Subarea is recharged by subsurface flow from the Mission Creek Subbasin and runoff from the Whitewater River watershed. Relative to the Palm Springs Subarea, the hydrostratigraphy of the Thermal Subarea is generally characterized by greater frequency and extent of fine-grained sediments that define an Upper Aquifer and Lower Aquifer (separated by a semi-confining aquitard) and a shallow fine-grained zone in which semi-perched groundwater occurs. Semi-perched groundwater has been maintained by irrigation water applied to agricultural lands, necessitating the construction of an extensive subsurface tile drain system (DWR, 1964). The Thousand Palms Subarea on the east margin is characterized by distinct water quality and recharge that apparently occurs mostly from the Indio Hills. Similarly, the Oasis Subarea on the southwest margin is characterized by unconfined groundwater that is different in chemical characteristics from water in the major aquifers of the Indio Subbasin.

ES-4 GROUNDWATER ELEVATION DATA

As summarized in **Table ES-1**, groundwater levels were measured in 374 wells in WY 2021-2022. Of these 374 wells, 57 were monitored by the Indio Subbasin GSAs to serve as Key Wells (see **Figure 3-1**) for assessing sustainability in terms of groundwater levels, storage, and potential subsidence.

As documented in the *2022 Alternative Plan Update*, the 57 Key Wells were selected through a quantitative approach that considered wells in terms of long records characteristic of an area and distribution across the Indio Subbasin, **Figure 3-1**. Each Key Well was assigned a groundwater level MT, based on historical low groundwater levels. Information on these Key Wells and the associated water level data is uploaded to the SGMA portal on an on-going basis. Groundwater elevations in all 57 of the Key Wells were above the MTs set in the *2022 Alternative Plan Update*, showing no indication of chronic lowering of groundwater levels, storage depletion, or potential subsidence.

Table ES-1. WY 2021-2022 Wells in the Indio Subbasin Water Level Monitoring Program

Monitoring Agency	Key Wells Monitored	Additional Wells Monitored	Total Wells Monitored
Coachella Valley Water District	51	255	306
Coachella Water Authority	1	3	4
Desert Water Agency	4	32	36
Indio Water Authority	1	25	26
Mission Springs Water District	0	2	2
Total	**57**	**317**	**374**

Notes:
Mission Springs Water District has SGMA key wells in the Mission Creek Subbasin

Figure 3-2 shows the WY 2021-2022 groundwater elevation contour map for the Indio Subbasin. Groundwater elevations presented in this report are representative of the principal aquifer zone. Groundwater levels do not exhibit strong seasonal variations, so average groundwater elevations of the principal aquifer for the water year are used for contouring. Regional groundwater flows are in a northwest-to-southeast direction through the Subbasin. The hydraulic gradients across the Indio Subbasin in WY 2021-2022 were typically steeper in the northwest, flattening downgradient to the southeast. Groundwater elevations and gradients are strongly influenced by groundwater replenishment activities near the WWR-GRF and TEL-GRF. PD-GRF was constructed adjacent to CVWD's administrative offices in 2019; replenishment activities there do not yet influence hydraulic gradients significantly. Geological faults, constrictions, and pumping also affect localized hydraulic gradients. Collectively, the hydrographs in **Figure 3-2** illustrate the effectiveness at reversing historical overdraft of continued groundwater replenishment, source substitution, and conservation programs under varying historical climatic and water use conditions. Groundwater levels throughout the Indio Subbasin have either increased or stabilized since historical lows in the mid to late 2000s.

Historically, the eastern portion of the Indio Subbasin experienced artesian conditions with sufficient pressure to cause groundwater levels in deep wells to rise above the ground surface. Beginning in the late 1980s, groundwater use increased, resulting in declining water levels and the loss of these artesian conditions. Groundwater management programs (including groundwater replenishment, source substitution and water conservation) have restored groundwater levels and artesian conditions in the eastern portion of the Indio Subbasin. The area of artesian conditions increased slightly from WY 2020-2021 to WY 2021-2022 (**Figure 3-3**).

Land subsidence in the Coachella Valley has been investigated since 1995 through an on-going cooperative program between CVWD and the United States Geological Survey (USGS). Analysis of Interferometric Synthetic Aperture Radar (InSAR) data collected from 1995 to 2017 by the USGS indicates that as much as 2.0 feet of subsidence occurred in the Indio Subbasin from 1995 to 2010 near Palm Desert, Indian Wells, and La Quinta (Sneed and Brandt, 2020). Since 2010, groundwater levels have stabilized or partially recovered in that area in response to the implementation of source substitution, conservation, and groundwater replenishment programs included in the 2010 CVWMP resulting in much smaller subsidence magnitudes. Elsewhere, up to 1 inch of uplift has been measured since 2011 in the Palm Springs area, corresponding to higher groundwater levels in response to WWR-GRF recharge. In the Thermal area, the ground surface has also rebounded about 2 inches over the past 10 years, returning to elevations observed in 2001. This rebound coincides with commencement of recharge operations at the TEL-GRF in 2009.

The Indio Subbasin GSAs plan to continue monitoring water levels and subsidence to track the effects of management actions on land subsidence. The GSAs and the USGS have established a partnership and a continuing subsidence monitoring program to collect and evaluate data between 2015 and 2023 with a report to be published by the USGS by June 30, 2025.

ES-5 GROUNDWATER EXTRACTIONS

A total of 282,079 AF of groundwater was extracted from the Indio Subbasin in WY 2021-2022 (**Table ES-2**). The total groundwater extracted represents a decrease of 4,771 AF (2 percent) compared to the volume extracted in WY 2020-2021 (285,351 AF). The agricultural sector (including fish farms) was similar to WY 2020-2021, with a 67 AF or 0.1 percent decrease. The industrial sector experienced a volumetric increase in groundwater use of 210 AF compared to WY 2020-2021, or 16 percent. The urban usage experienced a volumetric decrease in water use of 3,415 AF compared to WY 2020-2021, or 1.4 percent. The groundwater use by golf courses and other recreational users is included in the urban sector.

Table ES-2. WY 2021-2022 Groundwater Extractions in the Indio Subbasin by Water Use Sector

Water Use Sector	Groundwater Extractions (AF)	Method of Measurement	Accuracy of Measurement
Agriculture[1]	46,494	100% metered	±2%
Industrial[2]	1,498	15% metered	±2%
		85% estimated	±50%
Urban[3]	232,587	99% metered	±2%
		1% estimated	±50%
Undetermined[4]	1,500	100% estimated	±50%
Total Production	**282,079**		

Notes:
1 – Includes crop irrigation and fish farms.
2 – Includes 1,100 AF of estimated unreported extractions for industrial tribal water use.

3 – Total includes municipal, golf courses and other uses. Total also includes 1,200 AF of estimated unreported extractions for recreational tribal water use. Of the total urban use, 2,385 AF is exported for use outside the Indio Subbasin.

4 – Estimated unreported extraction by minimal pumpers (including small water systems, domestic wells, and other private wells) who do not have to report production to CVWD (<25 AFY) or DWA (<10 AFY) and estimated additional unclassified tribal water use.

ES-6 SURFACE WATER

Surface water supplies consist of local surface water, imported Colorado River water from the Coachella Canal, SWP and other imported supplies exchanged for water from the Colorado River Aqueduct (CRA), and recycled water produced by public wastewater treatment/reclamation plants.

Natural surface water flow in the Coachella Valley occurs as a result of precipitation and concentrated stream runoff originating from the San Bernardino and San Jacinto Mountains, with lesser amounts originating from the Santa Rosa Mountains. Precipitation data for WY 2021-2022 collected at 12 precipitation monitoring stations in the Coachella Valley are provided in **Table 6-1.** Station locations are shown on **Figure 5-1**. The annual precipitation for these stations during WY 2021-2022 averaged 3.87 inches, or approximately 80 percent relative to the long-term average.

ES-6.1 Local Surface Water

DWA operates stream diversion facilities on Snow, Falls, and Chino Canyon creeks, and captures subsurface flow from the Whitewater River Canyon. During WY 2021-2022, 611 AF of local surface water was directly used for urban and agricultural water supply in DWA's service area as shown in **Table 5-3**.

Streamflow is measured by the USGS at 19 locations within the Indio Subbasin (**Figure 5-1**). **Table 5-2** shows the station name and number and the recorded streamflow volumes for WY 2021-2022.

ES-6.2 Colorado River Water

Colorado River water has been a major water supply source for the Indio Subbasin area since the completion of the Coachella Canal in 1949. CVWD is the only agency in the Indio Subbasin that has Colorado River water allocations quantified in the 2003 Quantification Settlement Agreement. In Calendar Year (CY) 2022, CVWD's total entitlement of Colorado River water was 404,000 AF, an increase of 5,000 AF as compared to the CY 2021 entitlement. In WY 2021-2022, approximately 70 percent of the Colorado River water delivered through the Coachella Canal was used for agriculture, about 15 percent was for urban uses (e.g., golf courses and homeowners' associations), and about 15 percent was replenished at the TEL-GRF and PD-GRF.

ES-6.3 State Water Project Water

DWR manages the SWP and determines the available amount of SWP water for delivery based on hydrologic, storage, water rights, water quality, and environmental factors, including requirements for the Sacramento-San Joaquin Delta. While CVWD and DWA have contracts for Table A SWP water, there are no physical facilities to deliver this water to the Coachella Valley. SWP water is exchanged for Colorado River water from the Metropolitan Water District of Southern California's (MWD's) CRA. Since 1973, this exchange water has been delivered for groundwater replenishment to the Indio Subbasin at the WWR-

GRF and to the Mission Creek Subbasin at the Mission Creek Groundwater Replenishment Facility (MC-GRF). The Advance Delivery Agreement allows MWD to pre-deliver SWP water to CVWD and DWA, exchanged for Colorado River water, at the WWR-GRF or MC-GRF. As such, CVWD and DWA account for annual deliveries of SWP Exchange water from the CRA and water previously delivered to the Coachella Valley and credited to the Advance Delivery Account.

In WY 2021-2022, MWD received 42,137 AF of CVWD and DWA SWP and other exchange water. From this total, 19,103 AF were delivered for replenishment at WWR-GRF and 23,034 AF was subtracted from the Advance Delivery Account. At the end of WY 2021-2022, the balance in MWD's Advance Delivery Account was 281,347 AF.

ES-6.4 Recycled Water

Figure 5-2 shows the locations of water reclamation plants (WRPs) and other wastewater treatment facilities in the Indio Subbasin. Currently, three WRPs provide recycled water for irrigation in the Indio Subbasin (City of Palm Springs WWTP/DWA WRP, CVWD WRP-7, and CVWD WRP-10).

Four additional WRPs in the Indio Subbasin treat wastewater, but do not deliver recycled water for direct use at this time (CVWD WRP-2, CVWD WRP-4, Coachella WRP, and Valley Sanitary District (VSD) WWTP). For these wastewater treatment facilities, treated effluent is discharged either to onsite percolation/evaporation ponds or to the Coachella Valley Storm Channel (CVSC). In WY 2021-2022, a total of 41,017 AF of wastewater was treated, of which 13,875 AF was recycled and reused, 4,893 AF was discharged through percolation/evaporation, and 22,249 AF was discharged to the CVSC.

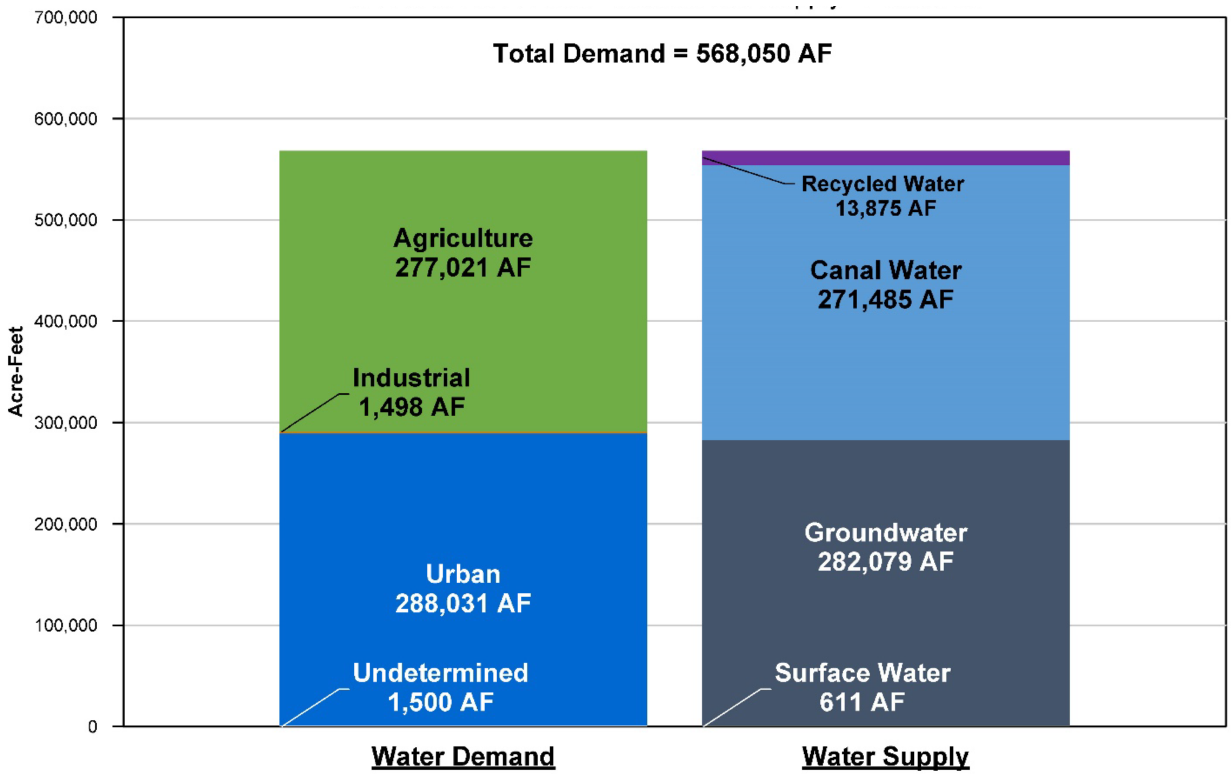
ES-7 TOTAL WATER USE

A total of 568,050 AF of water was delivered for direct use within the Plan Area during WY 2021-2022. This represents a decrease of 19,582 AF, or 3 percent, compared to WY 2020-2021. This includes water used in the Subbasin and exported for use outside of the Subbasin within the Plan Area or in adjacent subbasins. Over the past three years, water use has been generally consistent.

As summarized in **Figure ES-1**, total direct use is calculated by summing groundwater production, local surface water diversions, Coachella Canal water deliveries, and recycled water use for agricultural, industrial, urban, and other undetermined uses.

Total direct use volumes include 4,288 AF of water exported for use outside of the Indio Subbasin. This includes Colorado River water delivered outside the Indio Subbasin for agricultural use (837 AF) and urban use (1,067 AF), and groundwater pumped from the Indio Subbasin and delivered outside of the Indio Subbasin (2,384 AF), including groundwater delivered to CVWD customers in Imperial and Riverside counties on the east and west sides of the Salton Sea (East and West Salton Sea Basins) and groundwater pumped by MSWD in the Garnet Hill Subarea and delivered to its customers in the Mission Creek Subbasin.

Figure ES-1. Comparison of Supply and Demand for Direct Use for the Plan Area- WY 2021-2022



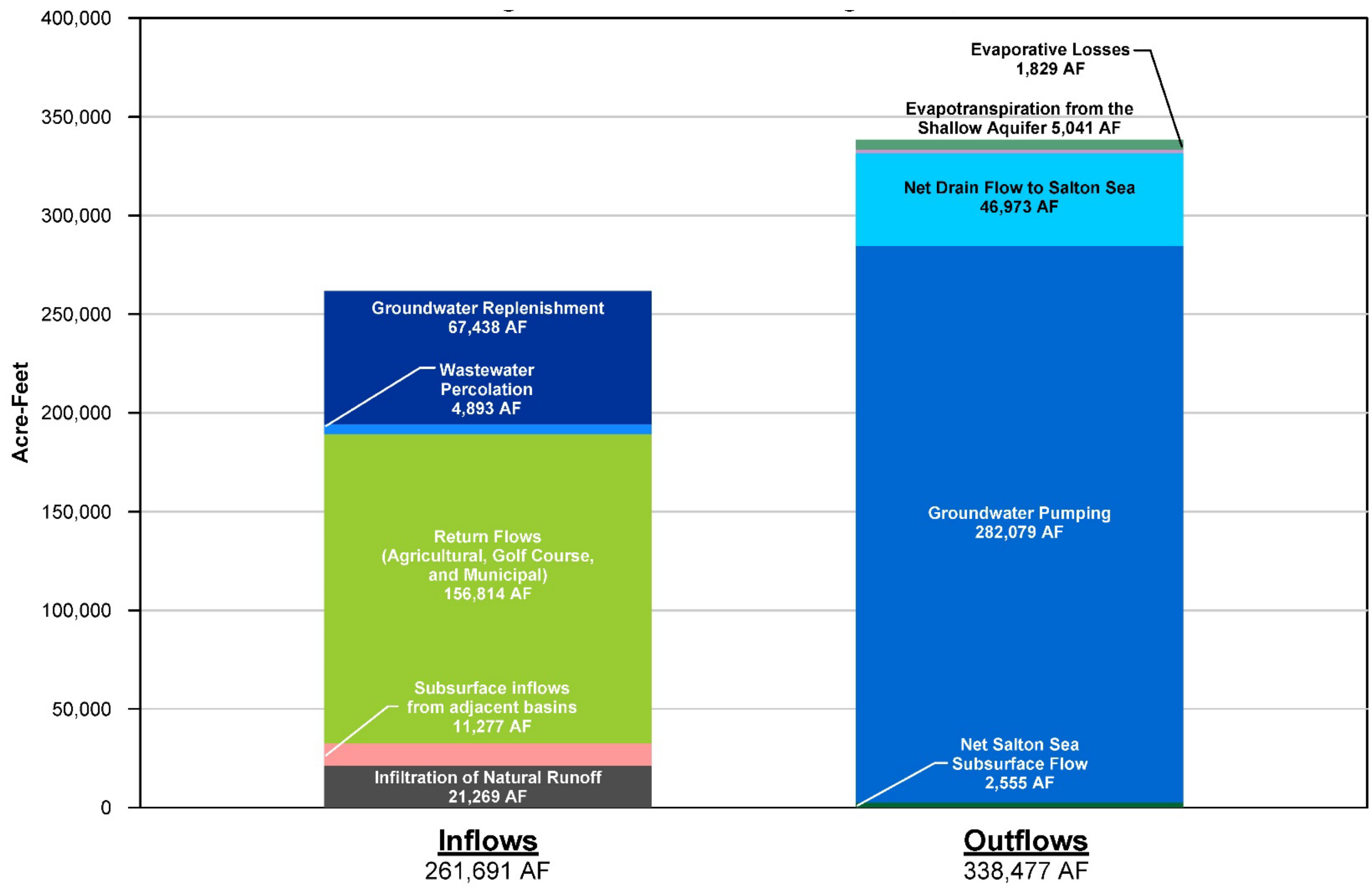
ES-8 GROUNDWATER BALANCE AND CHANGE IN GROUNDWATER STORAGE

A groundwater balance is helpful in assessing the condition of the groundwater of the Indio Subbasin. The groundwater balance compares the inflows to and outflows from the Indio Subbasin for a specific time period. The difference between inflows and outflows at a given time is defined as the change in storage for that time period. The Indio Subbasin groundwater balance for WY 2021-2022, including estimated inflow and outflow quantities, is summarized on **Figure ES-2**. The *2022 Alternative Plan Update* numerical model was updated through September 2022.

Inflows contributing to the groundwater balance of the Indio Subbasin consist of infiltration of natural runoff, return flows from urban and agricultural uses, artificial replenishment, and Salton Sea intrusion (if any). Inflows from outside the Indio Subbasin consist of subsurface inflow from the San Gorgonio Pass Subbasin and from the Mission Creek and Desert Hot Springs Subbasins. Groundwater outflows from the Indio Subbasin consist of groundwater pumping, flow from the semi-perched aquifer through agricultural drains into the Salton Sea, evapotranspiration (ET) from the shallow unconfined aquifer, evaporation losses, and subsurface flow out of the Indio Subbasin into the aquifers beneath the Salton Sea.

The annual change in groundwater storage represents the annual difference between inflows and outflows in the Indio Subbasin. During wet years or periods of high artificial recharge, the change in storage is positive (water in storage increases). In dry years, periods of low artificial recharge, or periods of high pumping, the change in storage is often negative (storage decreases). Managed artificial recharge continued to replenish the Subbasin. The Indio Subbasin lost 76,786 AF in storage during WY 2021-2022.

Figure ES-2. Groundwater Balance for the Indio Subbasin – WY 2021-2022



Long-term sustainability is typically assessed based on changes in groundwater storage over a historical period on the order of 10 to 20 years that includes wet and dry periods. In the Indio Subbasin, after an extended period of decline, the twenty-year running average change in storage has shown upward trends since 2009, and the ten-year running average has been positive since 2017 **(Figure 7-2)**. This indicates that groundwater levels have continued to recover from historical lows, and the basin is being sustainably managed. While the goal of the Alternative Plan is to eliminate groundwater overdraft, not to restore the Indio Subbasin to historical conditions, it is worth noting that since 2009 the Subbasin has recovered approximately 750,000 AF of groundwater in storage, or about 40 percent of the cumulative depletion observed from 1970 to 2009. **Figure 7-3** shows the cumulative change in storage since 1970. The Indio Subbasin was at its minimum storage in 2009 (with a calculated storage loss of 1,890,000 AF from 1970 to 2009, which represents 6 percent of the estimated storage capacity of the Indio Subbasin). Since 2009, groundwater pumping has decreased by about 20 percent, and replenishment activities have increased, leading to the observed recovery of groundwater in storage. The recovery of groundwater storage demonstrates the progress being made through implementation of the Alternative Plan. Water levels in the Indio Subbasin have generally increased over the past ten years (**Figure 7-5**), reflecting storage benefits from replenishment operations at all GRFs within the Indio Subbasin and from decreased pumping.

Figure 7-4 shows the one-year change in average groundwater elevations from WY 2020-2021 to WY 2021-2022 for the Indio Subbasin. Groundwater levels in the Indio Subbasin generally increased from WY 2020-2021 to WY 2021-2022 in most of the Subbasin. However, in the northwestern area of the Subbasin in the immediate vicinity of the WWR-GRF, groundwater levels declined compared with WY 2020-2021, due to reduced managed recharge (lower SWP deliveries) in WY 2021-2022, for the second year in a row. In the central portion of the Indio Subbasin from Palm Desert to La Quinta, groundwater levels generally remained stable.

Figure 7-5 shows the long-term change in average groundwater elevations from WY 2008-2009, a period of recent historic lows, to WY 2021-2022 for the Indio Subbasin. Groundwater levels in most of the Indio Subbasin have increased over the past 13 years. The largest groundwater increases are observed downgradient of the WWR-GRF in the Palm Springs area and in the vicinity of the TEL-GRF and PD-GRF, with water level increases of up to about 90 feet downgradient of the WWR-GRF, about 100 feet near the TEL-GRF, and about 25 feet near the PD-GRF. In the greater mid-valley area near Palm Desert, Indian Wells, and La Quinta, groundwater levels have risen on the order of 20 feet, reflecting the benefits of source substitution, conservation programs, and managed recharge operations. Groundwater levels in the southeastern portion of the Indio Subbasin have generally increased, typically between 10 and 40 feet, reflecting storage benefits from replenishment operations at the TEL-GRF and decreased pumping. It is important to note that groundwater levels remain significantly above the recent historic lows because of continued groundwater recharge and other management activities.

ES-9 DESCRIPTION OF PROGRESS

The *2022 Alternative Plan Update* identified the following water management strategies to achieve water reliability and resilience:

- Fully use available Colorado River water supplies
- Support improvement of the long-term reliability of SWP supplies, including participation in the Delta Conveyance Facility (DCF)
- Continue developing recycled water as a reliable local water supply
- Implement source substitution and replenishment for resilience in response to changing conditions and for maintenance of long-term groundwater supply reliability
- Increase water-use efficiency across all sectors
- Participate in development of the Coachella Valley Salt and Nutrient Management Plan (CV-SNMP) to address salt and nutrient management in the Indio Subbasin.

The Indio Subbasin GSAs are working collaboratively to implement the goals and programs of the *2022 Alternative Plan Update*. A variety of projects and management actions (PMAs) are planned for implementation over the planning horizon (to 2045) to achieve sustainability in the Subbasin, summarized in **Table 8-1**. Thirty PMAs were identified based on priorities identified by the GSAs and stakeholders; these represent a wide variety of activities by the four GSAs. Projects are classified into four categories based on project benefits: water conservation, water supply development, source substitution and replenishment, and water quality protection.

Water conservation is a major component of overall water management in the Indio Subbasin. As a desert community reliant upon imported water supplies, the Coachella Valley has and will continue to use its water resources efficiently. The Indio Subbasin GSAs are collaborating with urban (including golf courses) and agricultural water users to increase efficiency and reduce future water demands.

CVWD and DWA continue their efforts to increase reliability and obtain additional water supplies, as opportunities become available through SWP-related projects (e.g., Delta Conveyance Facility, Sites Reservoir, Lake Perris Seepage and other exchanges, entitlements, and transfers).

Source substitution and replenishment is the delivery of an alternate source of water to users that currently pump groundwater, reducing groundwater extraction and allowing the management of groundwater in storage. CVWD is working to expand direct delivery of Colorado River water for agriculture, golf courses, and homeowners' associations. The Indio Subbasin GSAs are also working to maximize the use of recycled water and expand their non-potable water systems (some CVWD customers receive a blend of recycled water and Canal water). The *2022 Alternative Plan Update* includes non-potable water expansions at multiple WRPs in order to reduce the volume of recycled water that is disposed of through onsite percolation basins or discharged to the CVSC. CVWD and DWA also intend to continue and expand groundwater replenishment operations with SWP and Canal water in the Indio Subbasin.

PMAs related to water quality that will help protect the groundwater basin for beneficial uses and users and avoid undesirable results include continued implementation of water quality programs and policies in the Subbasin, as well as implementation of the Development Workplan to update the CV-SNMP.

1. INTRODUCTION

The Coachella Valley Water District (CVWD), Coachella Water Authority (CWA), Desert Water Agency (DWA), and Indio Water Authority (IWA), represent the Groundwater Sustainability Agencies (GSAs) responsible for managing the Indio Subbasin in compliance with the Sustainable Groundwater Management Act (SGMA). On behalf of the Indio Subbasin GSAs, Todd Groundwater has prepared this *Indio Subbasin Annual Report for Water Year (WY) 2021-2022 (Annual Report)* in accordance with annual reporting requirements of SGMA. The Annual Report summarizes groundwater conditions and the implementation status of projects and management actions in the Indio Subbasin for WY 2021-2022 (October 1, 2021 to September 30, 2022).

1.1 REPORT ORGANIZATION

This Annual Report is divided into the following nine sections:

Section 1 – Introduction summarizes the report organization, background as related to SGMA, and the approach used by the four Indio Subbasin GSAs to comply with the SGMA.

Section 2 – Groundwater Basin Setting provides an overview of the Coachella Valley Groundwater Basin, its component Subbasins and Subareas, and the physiography, climate, and regional geology of the Indio Subbasin.

Section 3 – Groundwater Elevation Data describes the sources of groundwater level data and provides a groundwater elevation contour map and hydrographs of groundwater levels over time.

Section 4 – Groundwater Extraction summarizes groundwater extraction by volume, area, and water use sectors.

Section 5 – Surface Water summarizes the various surface water sources and surface water-related components in the Indio Subbasin including precipitation, streamflow, imported water deliveries for direct use and groundwater replenishment, and wastewater treatment, disposal, and reuse.

Section 6 – Total Water Use provides a summary of the total water use by source and water use sector.

Section 7 – Groundwater Balance and Change in Groundwater Storage provides the groundwater balance and change in storage for the Indio Subbasin.

Section 8 – Description of Progress provides a summary of progress toward achieving the water management objectives outlined in the *2022 Indio Subbasin Water Management Plan Update: SGMA Alternative Plan* (*2022 Alternative Plan Update*).

Section 9 – References provides references for this report.

1.2 IMPLEMENTATION OF THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT

In 2014, faced with declining groundwater levels (most notably in California's Central Valley), the California Legislature enacted SGMA to provide a framework for the sustainable management of groundwater resources throughout California, primarily by local authorities. SGMA consisted of three bills, Assembly Bill (AB) 1739 (Dickinson), Senate Bill (SB) 1168 (Pavley), and SB 1319 (Pavley) that were signed into law by Governor Brown on September 16, 2014.

For groundwater basins designated by DWR as medium or high-priority, SGMA required local authorities to form GSAs by June 30, 2017, to evaluate conditions in the groundwater basins, and to prepare and adopt Groundwater Sustainability Plan (GSPs) or Alternative Plans consistent with GSP regulations. The option of an Alternative Plan was provided by SGMA for local water agencies with existing groundwater management plans that could be documented as functionally equivalent to a GSP; the deadline for submittal of Alternative Plans was January 1, 2017. The Indio Subbasin GSAs chose to submit an Alternative Plan, based on decades of local Coachella Valley Groundwater Basin (Basin) management. SGMA allows a 20-year time frame for GSAs to implement their GSPs or Alternative Plans and achieve long-term groundwater sustainability. While protecting existing water rights, SGMA provides GSAs with the tools and authority to:

- Monitor and manage groundwater levels and quality
- Monitor and manage land subsidence and changes in surface water flow and quality affecting groundwater levels or quality or caused by groundwater extraction
- Require registration of groundwater wells
- Require reporting of annual extractions
- Require reporting of surface water diversions to underground storage
- Impose limits on extractions from individual wells, if needed
- Assess fees to implement GSPs and Alternative Plans, and
- Request revisions of basin boundaries, including establishing new boundaries.

DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) Program to track seasonal and long-term trends in groundwater elevations in California's groundwater basins. Through its CASGEM program, DWR ranked all groundwater basins and subbasins in California as either very low, low, medium, or high priority. In addition, DWR, as required by SGMA, identified 21 basins and subbasins in California as critically overdrafted. None of the subbasins in the Coachella Valley Groundwater Basin were listed as high priority or critically overdrafted.

The Coachella Valley Groundwater Basin has been divided into four subbasins by DWR in California Bulletin 108 (1964) and Bulletin 118 (2016): the Indio,[2] Mission Creek, San Gorgonio Pass, and Desert Hot Springs Subbasins (**Figure 1-1**). The Indio, Mission Creek, and San Gorgonio Pass Subbasins were designated medium-priority under the SGMA, and the Desert Hot Springs Subbasin was designated a very low-priority Subbasin.

[2] The Indio Subbasin is also identified as the Whitewater River Subbasin by the United States Geological Survey (1980). However, the Whitewater River Subbasin is identified as the Indio Subbasin in DWR Bulletin 108 (1964) and Bulletin 118 (2003). For consistency with SGMA, this Annual Report will identify the Whitewater River Subbasin as the Indio Subbasin.

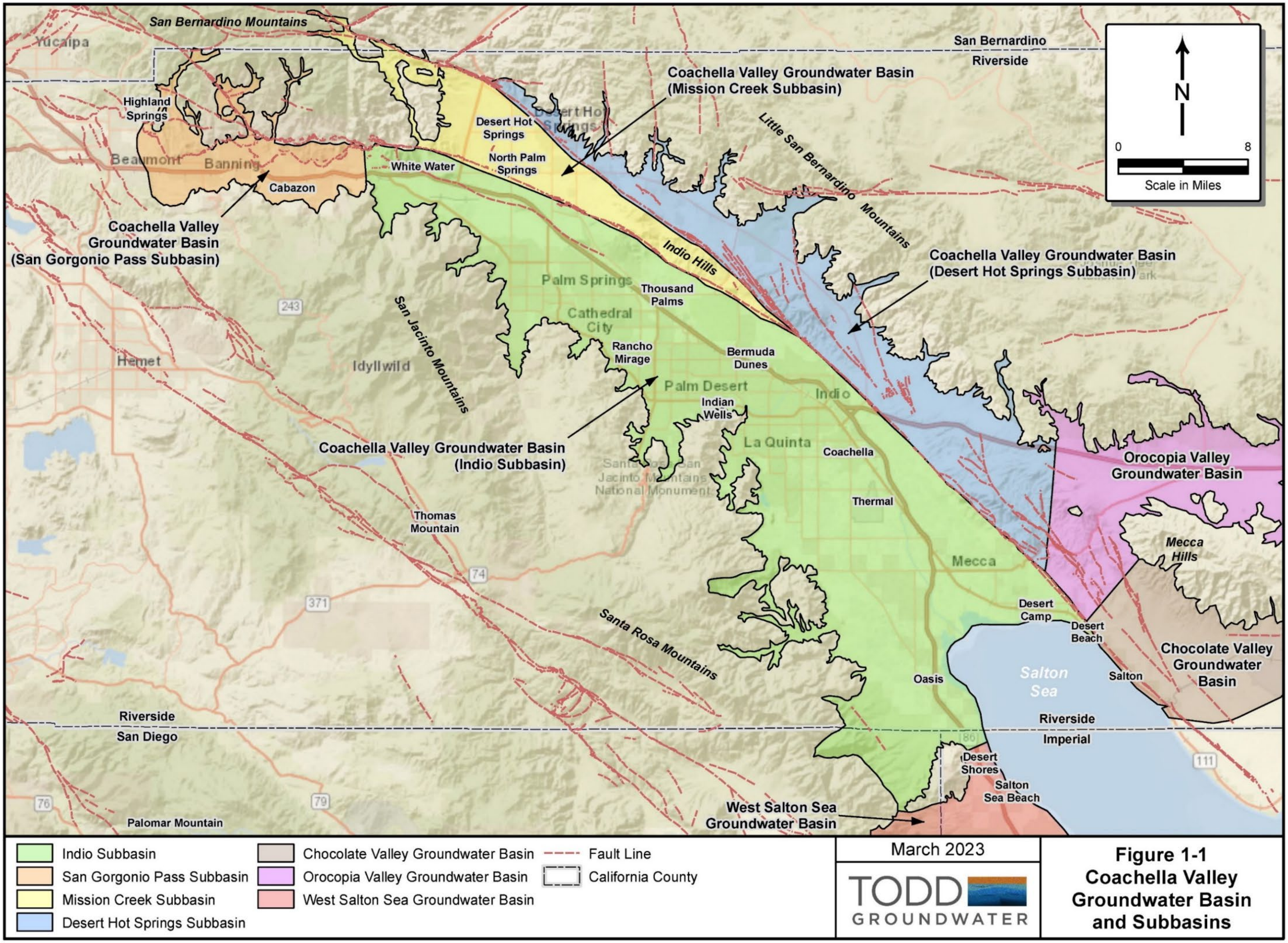


Figure 1-1 Coachella Valley Groundwater Basin and Subbasins

1.2.1 Formation of GSAs by Local Agencies in the Indio Subbasin

Four separate entities filed Notices of Election with DWR to become GSAs to manage the Indio Subbasin within their respective services areas in compliance with the SGMA:

- Coachella Valley Water District (CVWD)
- Coachella Water Authority (CWA)
- Desert Water Agency (DWA)
- Indio Water Authority (IWA)

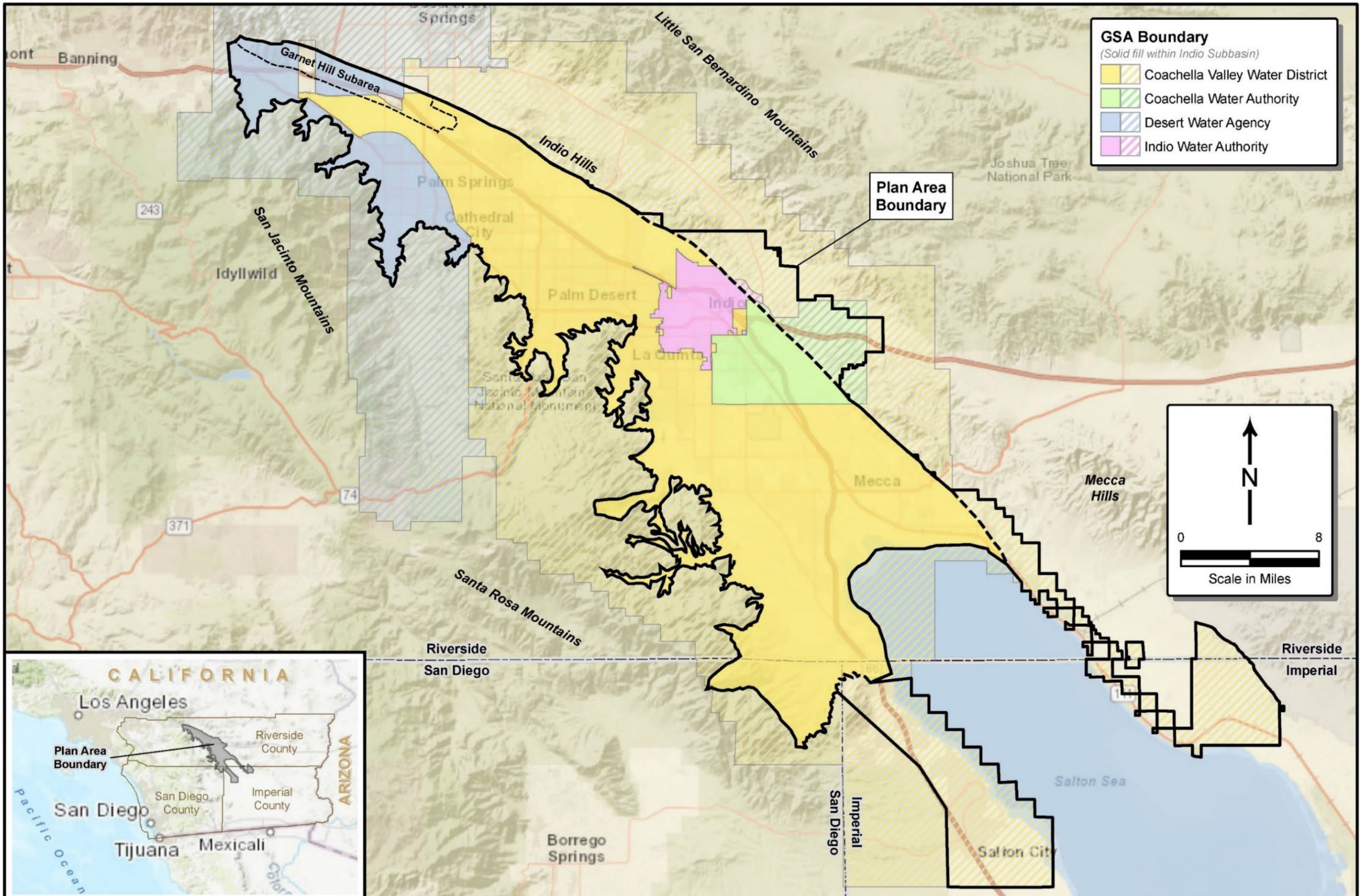
These agencies have been designated by DWR as Exclusive GSAs within their respective service areas in the Indio Subbasin and are referred to herein collectively as the Indio Subbasin GSAs. **Figure 1-2** shows the jurisdictional areas of the Indio Subbasin GSAs with reference to the Indio Subbasin.

1.2.2 Submission of the Alternative Plan and 2022 Alternative Plan Update

SGMA recognized that some groundwater basins, such as the Indio Subbasin, have been managed for years and allowed existing groundwater management plans to be submitted as an Alternative Plan. Twenty years before the adoption of SGMA, CVWD began development of its initial water management plan to manage available surface water and local groundwater resources in the Indio Subbasin and adjacent areas that depend on these water resources. The 2002 Coachella Valley Water Management Plan (CVWMP) and 2010 CVWMP Update were developed to eliminate long-term overdraft and satisfy the goals and intent of the then-Groundwater Management Planning Act (now superseded by SGMA).

On December 29, 2016, the Indio Subbasin GSAs collaboratively submitted to DWR the 2010 CVWMP Update (CVWD, 2012a), accompanied by a Bridge Document (Indio Subbasin GSAs, 2016) that describes how the 2010 CVWMP Update and supporting documents satisfy the requirements of SGMA and thus should be considered as an acceptable Alternative Plan for the Indio Subbasin.

The Indio Subbasin Alternative Plan was one of fifteen submitted to DWR by the January 1, 2017 deadline and was one of nine approved by DWR. On July 17, 2019, DWR approved the Indio Subbasin Alternative Plan with specific recommendations presented in its Alternative Assessment Staff Report and a requirement to submit an Alternative Plan Update by January 1, 2022.



Plan Area Boundary
Indio Subbasin

March 2023

TODD GROUNDWATER

Figure 1-2
Plan Area

The *2022 Alternative Plan Update* was submitted to DWR on December 29, 2021. Consistent with SGMA, objectives of the *2022 Alternative Plan Update* are to assess and report progress toward sustainability of the Indio Subbasin, as well as respond to DWR recommendations. Consistent with the goals of both the 2010 CVWMP Update and the *2022 Alternative Plan Update*, the GSAs' overarching water management goal is to ensure that future water demands in the Indio Subbasin are reliably met in a cost-effective and sustainable manner.

Additionally, in accordance with SGMA GSP Emergency Regulations (DWR, 2016), DWR requires that the Indio Subbasin GSAs submit annual reports following submission of the Alternative Plan. Annual Reports were therefore submitted in 2018, 2019, 2020, 2021, and 2022. This WY 2021-2022 Annual Report is required to be submitted to DWR by April 1, 2023.

1.2.3 Annual Reporting

CVWD and DWA have reported on groundwater conditions in the Indio Subbasin annually since 1978. CVWD has published an annual Engineer's Report on Water Supply and Replenishment Assessment for its West Whitewater River Subbasin Area of Benefit (AOB) since 1980 and for the East Whitewater River Subbasin AOB since 2004. Similarly, DWA has published an Annual Engineer's Report for the Groundwater Replenishment and Assessment Program in its Whitewater River Subbasin AOB since 1978. The Engineer's Reports describe groundwater levels, annual water budgets, artificial and natural recharge, and groundwater pumping, as well as the replenishment assessment charged for production within each management area for the following fiscal year.

In accordance with SGMA (Water Code 10728), on April 1 following the year of adoption of a GSP or submission of an Alternative Plan and annually thereafter, the annual report must document the following Basin conditions for the preceding water year:

- Groundwater elevation data
- Aggregated data identifying groundwater extraction
- Surface water supply used or available for groundwater recharge or in-lieu use
- Total water use
- Change in groundwater storage
- Progress toward implementing the GSP or Alternative Plan

This Indio Subbasin Annual Report for WY 2021-2022 is the sixth annual report prepared for the Indio Subbasin in response to SGMA requirements and the second prepared following submittal of the *2022 Alternative Plan Update*. This Annual Report contains a discussion of the Indio Subbasin followed by sections describing each of the above-listed elements required by SGMA. Data used to support the development of this Annual Report have been uploaded to DWR's SGMA Portal. Groundwater elevations of the Key Wells and water use information were uploaded in the format required and included here as Appendix A and Appendix B, respectively.

2. INDIO SUBBASIN SETTING

Figure 1-1 shows the extent of the Coachella Valley Groundwater Basin, which encompasses more than 800 square miles and extends from the San Gorgonio Pass area in the San Bernardino Mountains to the northern shore of the Salton Sea. The Basin is bordered by the San Bernardino Mountains on the north, the San Jacinto and Santa Rosa Mountains on the west, the Little San Bernardino Mountains on the east and Salton Sea on the south. The Coachella Valley lies within the northwesterly portion of California's Colorado Desert, an extension of the Sonoran Desert. The San Bernardino, San Jacinto, and Santa Rosa Mountains impede the eastward movement of storms and create a rain shadow, which results in an arid climate and greatly reduces the contribution of direct precipitation as a source of recharge to the Basin.

The Basin is composed of the San Gorgonio Pass, Mission Creek, Desert Hot Springs, and Indio Subbasins (**Figure 1-1**). The boundary between the San Gorgonio Pass and Indio Subbasins is a bedrock constriction and divide; otherwise, the boundaries between subbasins within the Basin are generally defined by faults that represent barriers to the lateral movement of groundwater.

The western portion of the Indio Subbasin is characterized by an urban resort/recreation-based economy and includes the cities of Palm Springs, Cathedral City, Thousand Palms, Rancho Mirage, Palm Desert, and Indian Wells. The eastern portion has a predominantly agricultural-based economy and includes the cities of Indio, Coachella, and La Quinta, along with the unincorporated communities of Mecca, Thermal, and Oasis.

2.1 CLIMATE

The bulk of natural groundwater replenishment comes in the form of runoff from the adjacent mountains. Climate in the Indio Subbasin is characterized by low humidity, high summer temperatures, and mild dry winters. Average annual precipitation ranges from 3 to 6 inches on the Valley floor. Most of the precipitation occurs between December and February. Additional discussion of precipitation is provided in Section 5.

Mid-summer high temperatures commonly exceed 100 degrees Fahrenheit (°F), frequently exceed 110°F, and periodically reach 120°F. Winter high temperatures typically range from about 45°F to 80°F.

2.2 COACHELLA VALLEY GROUNDWATER BASIN

The Coachella Valley Groundwater Basin is bounded by crystalline (non-water bearing) rocks of the San Bernardino Mountains and Little San Bernardino Mountains to the north/northwest and of the San Jacinto Mountains and Santa Rosa Mountains to the west/southwest. At the west end of the San Gorgonio Pass Subbasin between Beaumont and Banning, a surface drainage divide separates the Coachella Valley Groundwater Basin from the Beaumont Groundwater Basin of the Upper Santa Ana Drainage Area.

The southern boundary is formed primarily by the watershed of the Mecca Hills and by the northwest shoreline of the Salton Sea. At the base of the Santa Rosa Mountains, the southern boundary crosses the Riverside County Line into Imperial and San Diego counties. Although there is subsurface groundwater flow throughout the Basin, fault barriers, constrictions in the groundwater Basin profile, and areas of low permeability limit and control movement of groundwater. Based on the occurrence of these features, the

Coachella Valley Groundwater Basin has been divided into subbasins and subareas as described by the Department of Water Resources (DWR) in Bulletin 108 (1964) and Bulletin 118 (2016).

Sedimentary infill in the Indio Subbasin consists of thick sand and gravel sedimentary sequences eroded from the surrounding mountains. From about the City of Indio southeasterly to the Salton Sea, the Indio Subbasin is characterized by increasingly thick layers of silt and clay, especially in the shallower portions of the Indio Subbasin. These silt and clay layers are remnants of ancient lakebed deposits and impede the percolation of water applied for irrigation (DWR, 1964).

2.2.1 Subbasins and Subareas of the Coachella Valley Groundwater Basin

As shown on **Figure 1-1**, the Basin is divided into four Subbasins – Indio, San Gorgonio Pass, Mission Creek, and Desert Hot Springs. The subbasins encompass areas underlain by formations that readily yield stored groundwater through water wells and offer natural reservoirs for the management of water supplies. The boundaries between the subbasins are generally defined by faults that impede the lateral movement of groundwater.

Of the four subbasins, the Indio Subbasin is the focus of this Annual Report. The Indio Subbasin has been subdivided into subareas based on one or more of the following geologic or hydrogeologic characteristics: type(s) of water-bearing formations, water quality, areas of confined groundwater, and groundwater or surface drainage divides. Boundaries for the Indio Subbasin subareas are shown on **Figure 2-1**.

The following is a list of the subbasins and associated subareas in the Coachella Valley Groundwater Basin as identified by DWR in Bulletin 108 (1964) and Bulletin 118 (2016), with the subbasin numbers designated by DWR (2016):

- Indio Subbasin (7-21.01)
    - Garnet Hill Subarea
    - Palm Springs Subarea
    - Thermal Subarea
    - Thousand Palms Subarea
    - Oasis Subarea
- Mission Creek Subbasin (7-21.02)
- Desert Hot Springs Subbasin (7-21.03)
    - Miracle Hill Subarea
    - Sky Valley Subarea
    - Fargo Canyon Subarea
- San Gorgonio Pass Subbasin (7-21.04)

Section 2.3 provides additional descriptions of Indio Subbasin subareas and boundaries including geology, hydrogeology, water supply, and groundwater storage.

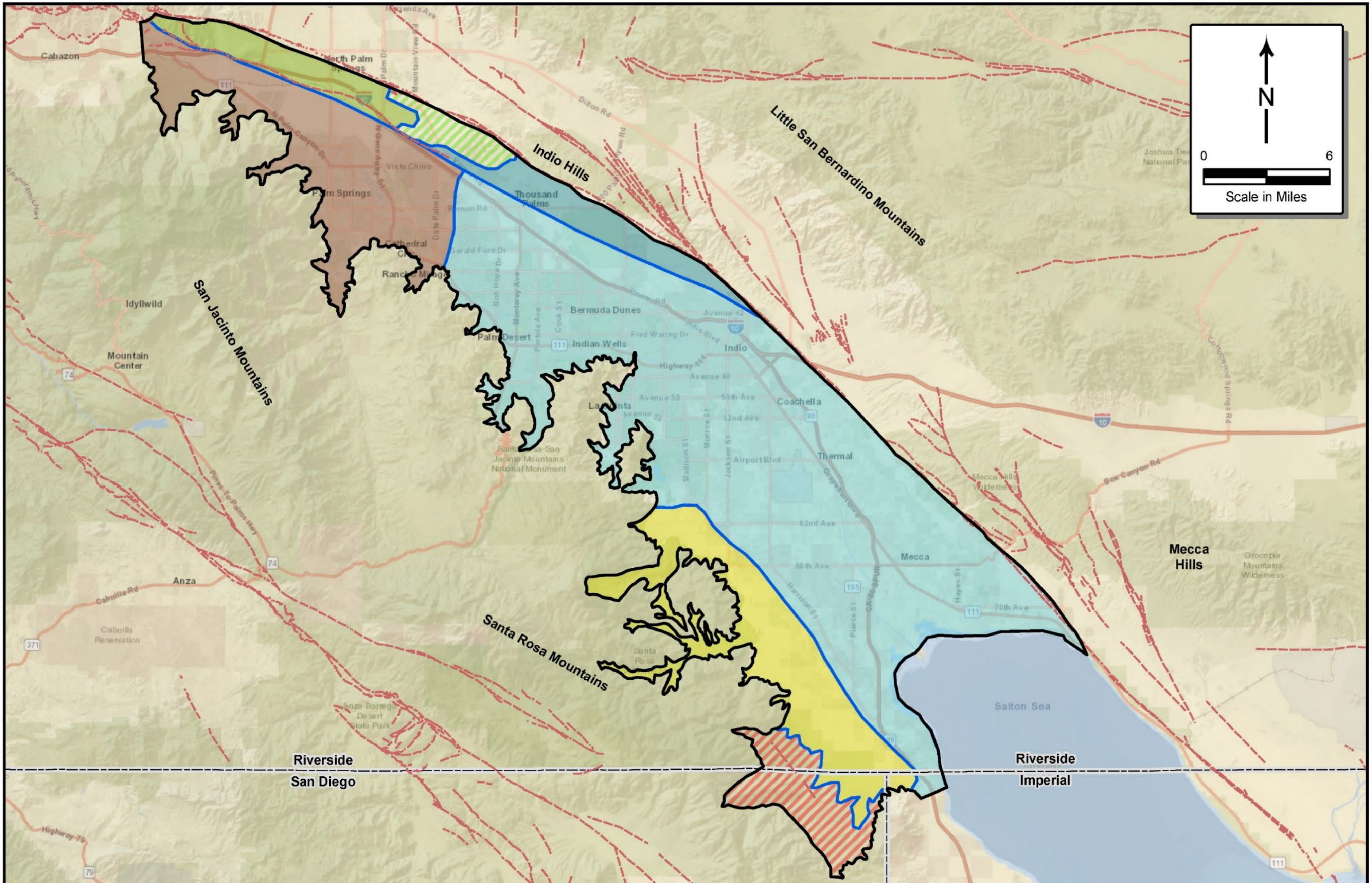


Figure 2-1 Groundwater Subareas of the Indio Subbasin

2.2.2 Geology

The Indio Subbasin is bounded on its northern, northwestern, southwestern, and southern margins by uplifted bedrock; Indio Subbasin sedimentary fill consists of thick sand and gravel sedimentary sequences eroded from the surrounding mountains. Sedimentary infill within the Indio Subbasin thickens from north to south, and depending on location within the Basin, is at least several thousand and as much as 12,000 feet thick. The upper approximately 2,000 feet constitute the aquifer system that is the primary source of groundwater supply (DWR, 1979). **Figure 2-2** is a geologic map encompassing the Indio Subbasin.

From about the City of Indio southeasterly to the Salton Sea, the Indio Subbasin is characterized by increasingly thick layers of silt and clay, especially in the shallower portions of the Indio Subbasin. These silt and clay layers are remnants of ancient lakebed deposits and impede the percolation of water applied for irrigation (DWR, 1964).

2.2.3 Basin Storage Capacity

In 1964, DWR estimated that the Subbasins in the Coachella Valley Groundwater Basin contained approximately 39,200,000 AF of water in the first 1,000 feet bgs, of which 29,800,000 AF is in the Indio Subbasin. The capacities of the Indio Subbasin subareas are shown in **Table 2-1**.

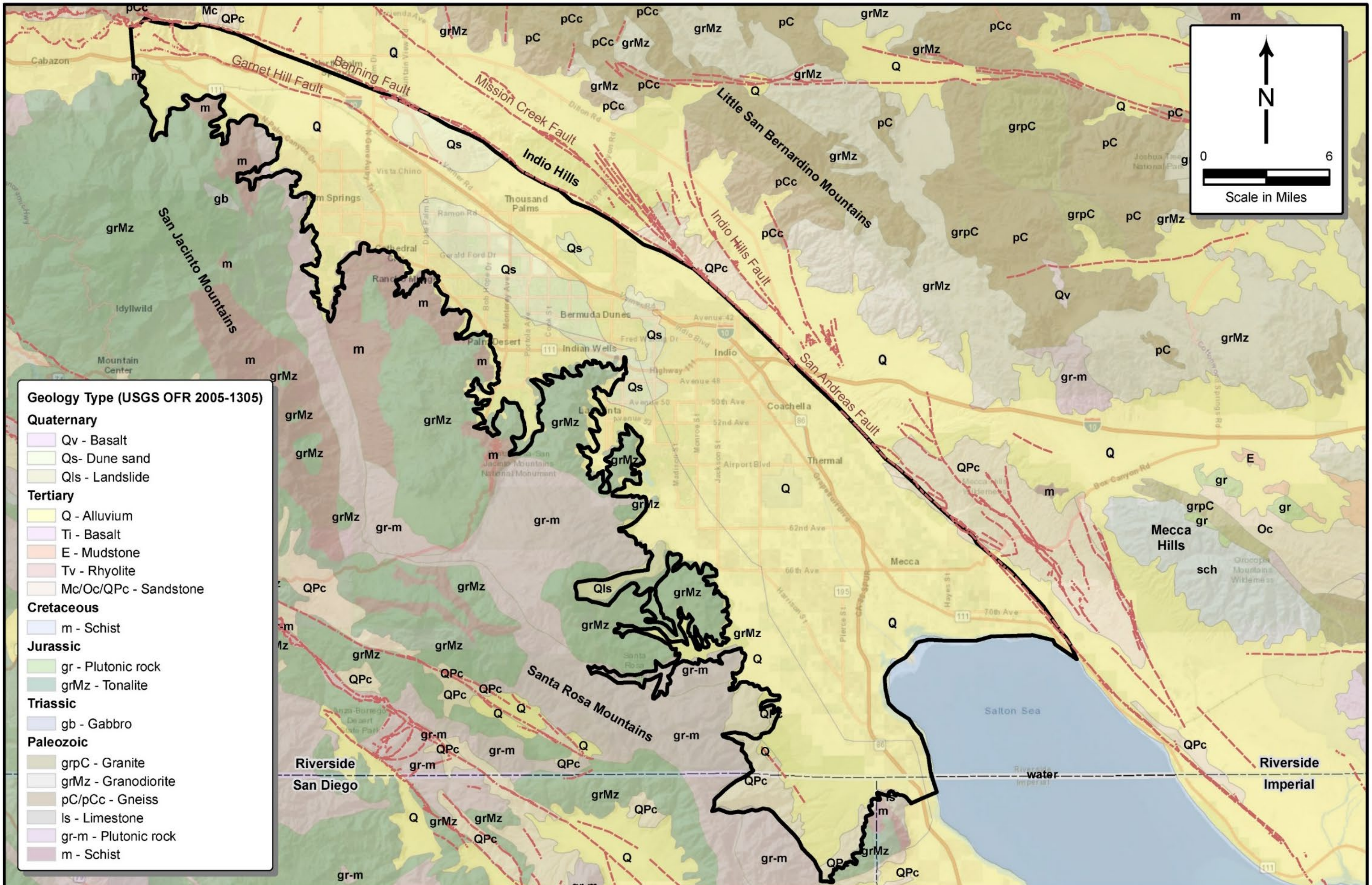
Table 2-1. Indio Subbasin Groundwater Storage Capacity

Subarea	Groundwater Storage (AF)[1]
Garnet Hill Subarea	1,000,000
Oasis Subarea	3,000,000
Palm Springs Subarea	4,600,000
Thermal Subarea	19,400,000
Thousand Palms Subarea	1,800,000
Indio Subbasin Total	**29,800,000**

Notes:
1 – Storage volume in first 1,000 feet below the ground surface (DWR, 1964).

2.3 INDIO SUBBASIN DESCRIPTION

The Indio Subbasin underlies the major portion of the Coachella Valley floor and encompasses approximately 525 square miles (mi^2). The Indio Subbasin extends from the Whitewater area in the northwest approximately 50 miles to the southeast, terminating along the northern shoreline of the Salton Sea.



March 2023

TODD GROUNDWATER

Figure 2-2
Indio Subbasin Area Geologic Map

The Indio Subbasin is bordered on the southwest by the Santa Rosa and San Jacinto Mountains and is separated from the Mission Creek Subbasin by the Banning Fault, and from the Desert Hot Springs Subbasin by the San Andreas Fault; both faults represent effective barriers to groundwater flow (DWR, 1964) (**Figure 2-2**). The San Andreas Fault extends southeasterly from the junction of the Mission Creek and Banning Faults in the Indio Hills and continuing out of the Basin on the east flank of the Salton Sea. The boundaries between subbasins within the Basin are generally defined by other faults that serve as effective barriers to the lateral movement of groundwater.

Within the Indio Subbasin, the Garnet Hill Fault extends southeasterly from the north side of the San Gorgonio Pass to the Indio Hills. The Garnet Hill Subarea lies between the Garnet Hill and Banning faults, which act as partially effective barriers to lateral groundwater movement. The Garnet Hill Fault partially impedes groundwater flow from the Garnet Hill Subarea toward the south. This effect is revealed by close inspection of groundwater level information on either side of the Garnet Hill Fault; for example, the groundwater level contour map in the *Indio Subbasin Annual Report for Water Year 2021-2022* shows differences of as much as 220 feet across the Garnet Hill Fault. The Garnet Hill Fault does not reach the surface and is probably effective as a barrier to lateral groundwater movement only below a depth of about 100 feet (CVWD, DWA, and MSWD, 2013).

Figure 2-1 shows the five Indio Subbasin subareas: Garnet Hill, Palm Springs, Thermal, Thousand Palms, and Oasis. The Palm Springs Subarea is the forebay or main area of replenishment to the Indio Subbasin, and the Thermal Subarea includes the pressure, or confined area, within the Indio Subbasin. The other three subareas are characterized by unconfined groundwater conditions.

2.3.1 Garnet Hill Subarea

The Garnet Hill Subarea, located between the Garnet Hill Fault and the Banning Fault, is considered part of the Indio Subbasin as defined in DWR's *California's Groundwater: Bulletin 118—Update 2003* (Bulletin 118) (DWR, 2003) as shown in **Figure 2-1**. The relative scarcity of wells in the subarea limits the available geologic information and understanding of groundwater interactions between this subarea and the adjoining Mission Creek Subbasin and Indio Subbasin. Groundwater production is relatively low in the Garnet Hill Subarea and is not expected to increase significantly in the future due to relatively low well yields compared to those in the Mission Creek Subbasin. Groundwater levels in the western and central portions of the Garnet Hill Subarea show response to large replenishment quantities from the WWR-GRF, while levels are relatively flat in the eastern portion of the subarea.

While the Garnet Hill Subarea receives subsurface inflow from the Mission Creek Subbasin and some natural recharge from occasional high flows of Mission Creek and other streams, the chemical character of the groundwater and its direction of movement indicate that the main source of inflow to the subarea comes from percolation associated with the Whitewater River (CVWD, DWA, and MSWD, 2013).

2.3.2 Palm Springs Subarea

Located in the northwestern portion of the Indio Subbasin, the Palm Springs Subarea is bounded by the Garnet Hill Fault to the north and the eastern slopes of the San Jacinto Mountains to the south and extends southeast to Cathedral City. Alluvial fan deposits consist of heterogeneous, coarse-grained sediments with a total thickness in excess of 1,000 feet. Although no lithologic distinction is apparent from water well driller's logs, the total thickness of recent deposits suggests that Ocotillo Conglomerate underlies recent Fanglomerate deposits at a depth ranging from 300 to 400 feet (DWR, 1964). Substantial natural and artificial recharge (i.e., replenishment) occurs through the thick sequence of coarse sediments in this subarea.

2.3.3 Thermal Subarea

Groundwater in the Palm Springs Subarea moves southeastward into the Thermal Subarea. As shown in **Figure 2-1**, the division between the Palm Springs Subarea and the Thermal Subarea is near the City of Cathedral City.

Figure 2-3 presents a generalized stratigraphic column of the Thermal Subarea showing local geologic units and groundwater zones. As illustrated, the hydrostratigraphy is characterized by the following:

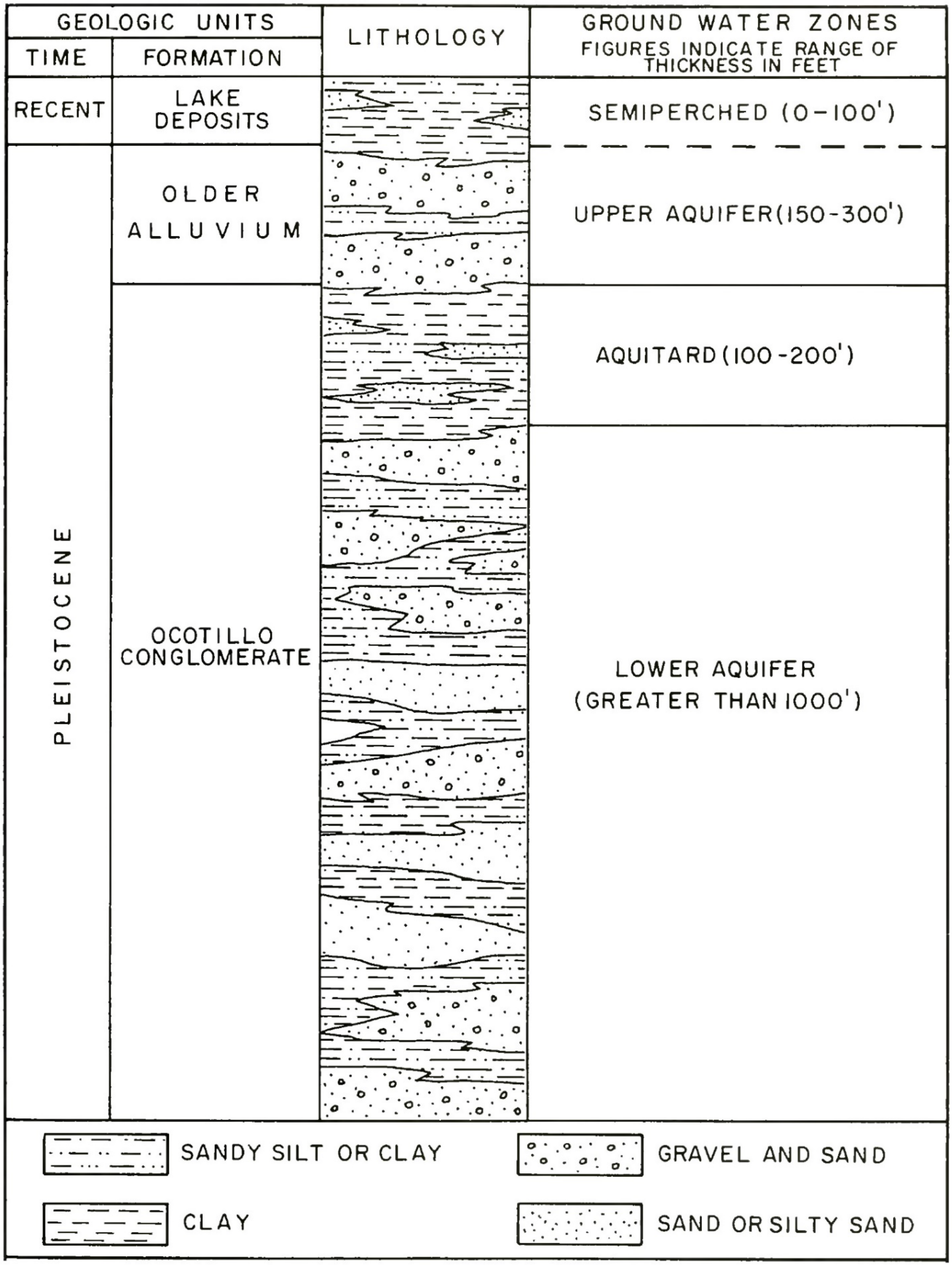
- A shallow semi-perched and confining zone consisting of recent silts, clays, and fine sands
- An upper aquifer with unconfined (water table) conditions
- A semi-confining aquitard of fine-grained materials
- A lower aquifer with confined and artesian conditions

As shown on **Figure 2-3**, fine-grained (clay) deposits of the upper Ocotillo Conglomerate Formation separate the upper and lower aquifers. The clay deposits are not regionally extensive or thick enough to completely restrict vertical groundwater flow between the upper and lower aquifer zones and are thus referred to as an aquitard.

The aquitard is absent (and no distinction between the upper and lower aquifer zones occurs) along the southwestern margins of the Thermal Subarea at the base of the Santa Rosa Mountains, such as the alluvial fans at the mouth of Deep Canyon and near the City of La Quinta.

The lower aquifer, composed of Ocotillo Conglomerate Formation, consists of silty sands and gravels with interbeds of silt and clay. The lower aquifer contains the greatest quantity of stored groundwater in the Indio Subbasin. The top of the lower aquifer occurs at a depth ranging from 300 to 600 feet bgs. The thickness of the zone is undetermined, as the deepest wells in the Coachella Valley do not fully penetrate the formation. Available data indicate the zone is at least 500 feet thick and can be in excess of 1,000 feet thick. The thickness of the aquitard overlying the lower aquifer zone ranges from 100 to 200 feet, although in some areas near the Salton Sea it may be in excess of 500 feet.

Capping the upper aquifer zone in the Thermal Subarea is a shallow fine-grained zone in which semi-perched groundwater occurs (**Figure 2-4**). This zone consists of recent silts, clays, and fine sands and is relatively persistent southeast of the City of Indio. It ranges from 0 to 100 feet thick and is an effective barrier to deep percolation. The low permeability of the materials southeast of the City of Indio has contributed to irrigation drainage challenges in the area. Semi-perched groundwater has been maintained by irrigation water applied to agricultural lands, necessitating the construction of an extensive subsurface tile drain system (DWR, 1964). North and west of the City of Indio, the zone is composed mainly of clayey sands and silts, and its effect in retarding deep percolation is limited.

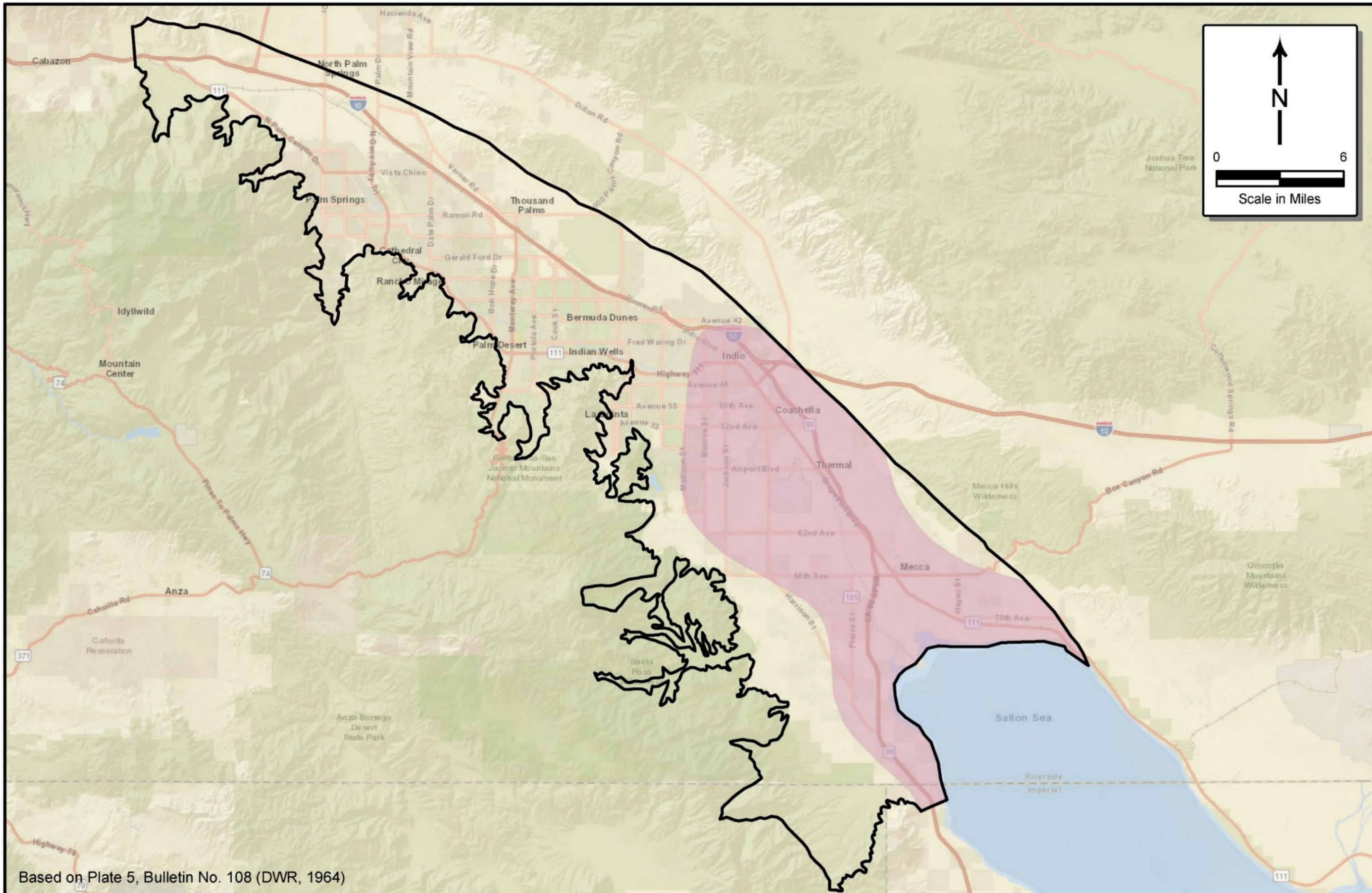


Source: Bulletin No. 108 (DWR 1964)

March 2023

TODD GROUNDWATER

Figure 2-3
Generalized Stratigraphic Column Thermal Subbarea



March 2023

TODD GROUNDWATER

Figure 2-4
Approximate Extent of Shallow Semi-Perched Aquifer in Thermal Subarea

2.3.4 Thousand Palms Subarea

The Thousand Palms Subarea (**Figure 2-1**) is located along the southwest flank of the Indio Hills and is differentiated from the Thermal Subarea by groundwater quality differences (DWR, 1964). In brief, groundwater in the Thousand Palms Subarea is characterized by sodium sulfate chemistry that is distinct from the calcium bicarbonate water of the Thermal Subarea. The differences in water quality indicate that replenishment to the Thousand Palms Subarea comes primarily from the Indio Hills and is limited in supply. The relatively sharp boundary between chemical characteristics of water derived from the Indio Hills in the Thousand Palms Subarea and groundwater in the Thermal Subarea suggests there is little intermixing between the two subareas.

The configuration of the water table north of the community of Thousand Palms is such that the generally uniform, southeasterly gradient in the Palm Springs Subarea diverges and steepens to the east along the base of Edom Hill. This steepened gradient suggests the presence of a barrier to groundwater flow in the form of a reduction in sediment permeability or a southeast extension of the Garnet Hill Fault. Gravity surveys by DWR (1964) do not indicate a subsurface fault. Accordingly, the sharp increase in gradient is attributed to lower sediment permeability to the east.

2.3.5 Oasis Subarea

Another peripheral zone of unconfined groundwater, with different chemical characteristics from water in the major Indio Subbasin areas, is found underlying the Oasis Subarea that extends along the base of the Santa Rosa Mountains. Water-bearing materials underlying the subarea consist of highly permeable alluvial fan deposits. Although groundwater data suggest that the boundary between the Oasis and Thermal subareas may be a buried fault extending from Travertine Rock to the community of Oasis, the remainder of the boundary is a lithologic change from the coarse fan deposits of the Oasis Subarea to the interbedded sands, gravel, and silts of the Thermal Subarea. Little information is available as to the thickness of the water-bearing materials, but it is estimated to exceed 1,000 feet.

3. GROUNDWATER ELEVATION DATA

This section summarizes groundwater conditions in terms of elevations, flow, trends over time, and artesian conditions.

3.1 MONITORING WELLS

Groundwater level monitoring data are available for selected wells in the Indio Subbasin dating back to 1910. As summarized in **Table 3-1**, Indio Subbasin groundwater levels were measured in 374 wells in Water Year (WY) 2021-2022, including wells monitored by the Indio Subbasin Groundwater Sustainability Agencies (GSAs) and Mission Springs Water District (MSWD). Of the 374 wells monitored by the GSAs and MSWD, 57 Key Wells were monitored as part of the Sustainable Groundwater Management Act (SGMA) monitoring program and their data were uploaded to Monitoring Network Module (MNM) on the Department of Water Resources' (DWR) SGMA Portal.

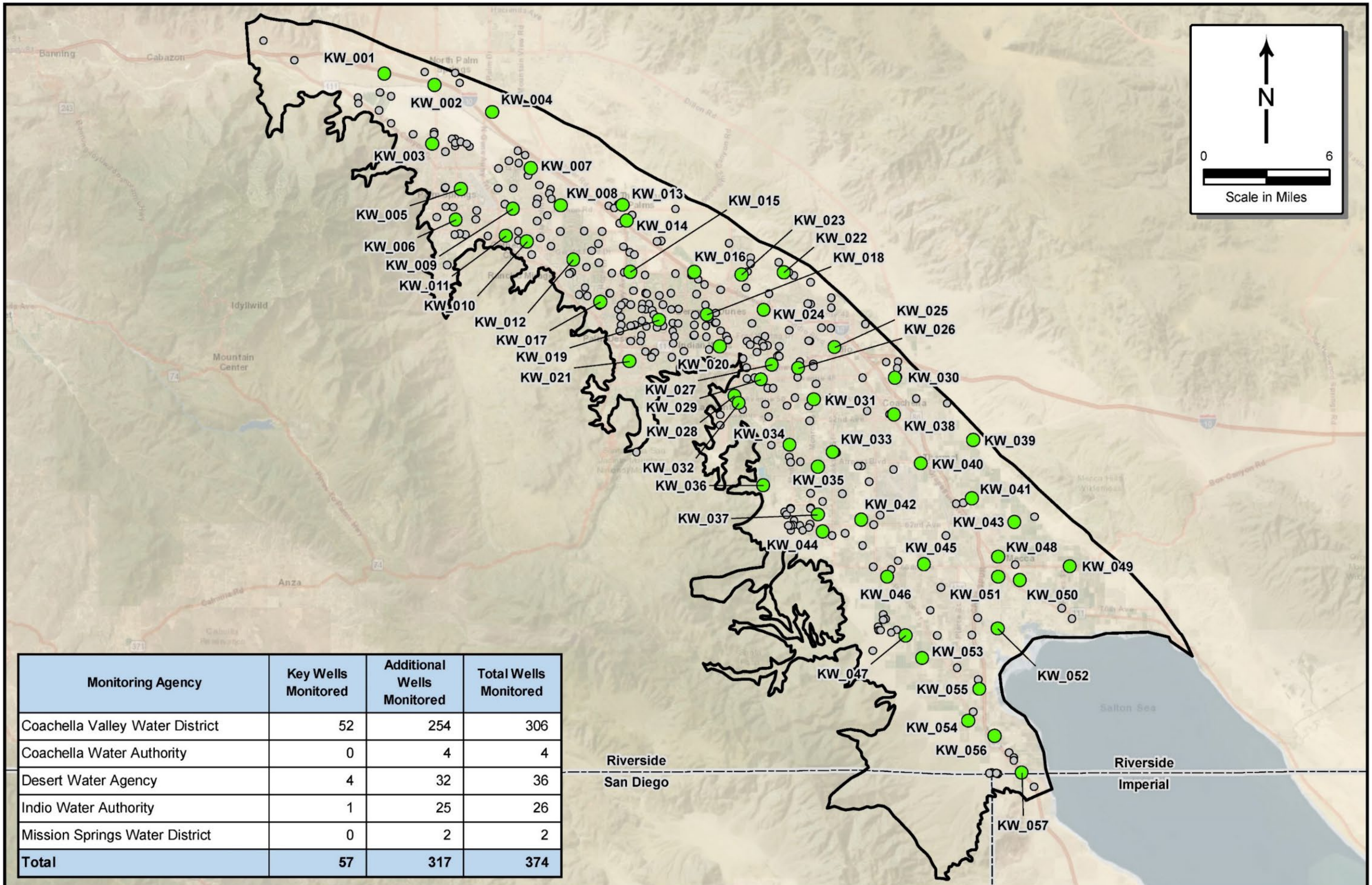
Table 3-1. WY 2021-2022 Wells in the Indio Subbasin Water Level Monitoring Program

Monitoring Agency	Key Wells Monitored	Additional Wells Monitored	Total Wells Monitored
Coachella Valley Water District	51	255	306
Coachella Water Authority	1	3	4
Desert Water Agency	4	32	36
Indio Water Authority	1	25	26
Mission Springs Water District	0	2	2
Total	**57**	**317**	**374**

Notes:
Mission Springs Water District has SGMA key wells in the Mission Creek Subbasin

Previously, water agencies uploaded data for select wells to the California Statewide Groundwater Elevation Monitoring (CASGEM) program. As Indio Subbasin has an approved Alternative Plan, GSAs now meet the monitoring requirements using the MNM on the SGMA Portal. Indio Subbasin GSAs submitted monitoring data for the SGMA Key Wells to MNM for the Alternative Plan and will continue to update it with seasonal monitoring data. The GSAs will no longer upload data to CASGEM for basins covered by Alternative Plans.

The groundwater elevation monitoring data are used to characterize Subbasin conditions, evaluate pumping and recharge operations, assess minimum thresholds for SGMA indicators, and support groundwater modeling and model calibration. **Figure 3-1** illustrates the distribution of groundwater elevation monitoring wells in the Indio Subbasin monitored by agencies. The 57 Key Wells selected to track SGMA progress are highlighted in green on **Figure 3-1**.



Monitoring Agency	Key Wells Monitored	Additional Wells Monitored	Total Wells Monitored
Coachella Valley Water District	52	254	306
Coachella Water Authority	0	4	4
Desert Water Agency	4	32	36
Indio Water Authority	1	25	26
Mission Springs Water District	0	2	2
Total	**57**	**317**	**374**

Key Well
Other Monitored Wells
Indio Subbasin
California County

March 2023

TODD GROUNDWATER

Figure 3-1
Elevation Monitoring Well Locations in the Indio Subbasin

3.2 KEY WELLS

As part of the *2022 Alternative Plan Update*, the GSAs took the general approach to defining sustainability criteria based on recognition of the following: 1) historical low groundwater levels have occurred relatively recently in the Indio Subbasin and 2) there has been an absence of reported problems associated with those historical lows. Accordingly, it is reasonable to assume that maintaining groundwater elevations at or above minimum historical values should not cause undesirable results. This has been substantiated by a review of available information on the location and depths of wells serving both municipal and small water systems, which indicated that historical low groundwater levels were above the shallowest well depths.

The *2022 Alternative Plan Update* identified a network of 57 Key Wells, shown on **Figure 3-1**. These Key Wells were selected through a quantitative approach that considered the wells with long records characteristic of an area and distribution of wells across the Indio Subbasin. These 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 Minimum Threshold (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.

The MT for chronic lowering of groundwater levels is defined at each Key Well by historical low groundwater levels. Undesirable results are indicated when groundwater levels are below the MT for five consecutive same season monitoring events, in 25 percent or more of the Key Wells in the Indio Subbasin. Consistent with SGMA, Measurable Objectives (MOs) are specific, quantifiable goals to track management performance relative to sustainability indicators. In the 2022 Alternative Plan Update, the GSAs define the MOs as maintaining groundwater levels within an operating range above the groundwater level MTs; this represents a sustainable groundwater system. In addition, the 2022 Alternative Plan Update demonstrated that the groundwater level MTs are appropriate proxy criteria for other sustainability indicators including groundwater storage and subsidence, given that groundwater levels are linked to these indicators.

Key Wells, their MTs, and WY 2021-2022 minimum groundwater levels are listed in **Table 3-2.** These wells and associated level data were uploaded to the MNM of the SGMA Portal prior to submittal of this Annual Report. For elevations, Coachella Valley Water District (CVWD) uses the National Geodetic Vertical Datum (NGVD) NGVD29 and MTs for each well were determined in this datum for the *2022 Alternative Plan Update*. DWR requires that all elevation data be submitted in the MNM using the NAVD88 datum and requires that datum is used throughout the Annual Report. During the quality review of SGMA data, an error in ground surface elevation was identified for Key Well 15. As a result, the MT is updated here to reflect the correct ground surface. It should be noted that the relative difference between observed data and the MT remains the same but the MT is now reported relative to the corrected ground surface elevation. **Appendix A** includes a map showing Key Well locations and numbers (**Figure A-1**) and hydrographs with the respective MTs for each Key Well in the NAVD88 datum.

Table 3-2. SGMA Key Wells and Minimum Observed Elevation of in WY 2021-2022

Key Well Number	SWN	Well Name/Owner	First Year Monitored	MT NAVD88	Minimum GW Elevation WY 21-22	Season Minimum GW Elevation Occurred[1]	Above MT?	Elevation Above MT (ft)
KW_001	03S04E17K01S	Private Well	1954	617.8	642.7	Fall	Yes	24.9
KW_002	03S04E22A01S	Private Well	1953	587.2	611.5	Spring	Yes	24.3
KW_003	03S04E34R01S	DWA WELL 21	1973	243.3	320.2	Fall	Yes	76.8
KW_004	03S05E30G01S	Private Well	1965	380.6	387.9	Fall	Yes	7.3
KW_005	04S04E13C01S	DWA WELL 23	1975	184.9	249.3	Fall	Yes	64.4
KW_006	04S04E24D01S	DWA WELL 24	1978	165.0	224.0	Fall	Yes	58.9
KW_007	04S05E09B01S	CVWD Well 4562-1	1962	152.2	206.1	Fall	Yes	53.9
KW_008	04S05E15R02S	Private Well	1960	99.7	142.2	Fall	Yes	42.5
KW_009	04S05E17Q02S	DWA WELL 31	1987	135.3	186.4	Fall	Yes	51.2
KW_010	04S05E28F02S	CVWD Well 4519-1	1974	106.2	141.2	Fall	Yes	35.0
KW_011	04S05E29F01S	Private Well	1958	130.1	176.6	Fall	Yes	46.5
KW_012	04S05E35G03S	CVWD Well 4503-1	1953	55.9	83.3	Fall	Yes	27.4
KW_013	04S06E18R01S	CVWD Well 4623-1	1953	34.4	57.7	Fall	Yes	23.3
KW_014	04S06E20M02S	CVWD Well 4628-2	2003	16.1	43.4	Fall	Yes	27.3
KW_015	04S06E32N02S	CVWD Well 4611-1	2000	-2.49	19.71	Fall	Yes	22.2
KW_016	04S06E35P01S	Private Well	1985	-44.7	-27.8	Fall	Yes	16.9
KW_017	05S05E12H02S	CVWD Well 5507-1	1956	5.4	27.6	Fall	Yes	22.2
KW_018	05S06E12N01S	CVWD Well 5626-1	1980	-64.4	-41.9	Fall	Yes	22.5
KW_019	05S06E16A02S	CVWD Well 5620-1	1976	-41.3	-11.9	Fall	Yes	29.4
KW_020	05S06E24G01S	CVWD Well 5636-1	1965	-86.0	-60.5	Fall	Yes	25.5
KW_021	05S06E29C01S	CVWD Well 5643-1	1956	-36.2	-13.2	Fall	Yes	23.0
KW_022	05S07E04A01S	CVWD Well WRP7 MW-1	1955	-61.9	-56.8	Fall	Yes	5.1
KW_023	05S07E06B04S	CVWD Well 5720-1	1993	-76.3	-59.7	Fall	Yes	16.6
KW_024	05S07E08Q01S	Private Well	1967	-78.7	-66.8	Spring	Yes	11.9
KW_025	05S07E24M04S	IWA WELL 1C	1985	-91.4	-87.8	Spring	Yes	3.6

Key Well Number	SWN	Well Name/Owner	First Year Monitored	MT NAVD88	Minimum GW Elevation WY 21-22	Season Min GW Elevation Occurred[1]	Above MT?	Elevation Above MT (ft)
KW_026	05S07E27L01S	Private Well	1965	-141.3	-122.7	Fall	Yes	18.6
KW_027	05S07E28E01S	CVWD Well 5701-1	1948	-94.8	-86.4	Fall	Yes	8.4
KW_028	05S07E31P01S	CVWD Well 5706-1	1978	-106.9	-95.4	Spring	Yes	11.5
KW_029	05S07E32B01S	CVWD Well 5725-1	2005	-154.5	-116.7	Fall	Yes	37.8
KW_030	05S08E33D01S	CWA 10	1979	-160.0	-88.7	Fall	Yes	71.3
KW_031	06S07E02D02S	Private Well	1985	-156.5	-79.5	Fall	Yes	77.0
KW_032	06S07E06B01S	CVWD Well 6701-1	1981	-144.7	-106.3	Fall	Yes	38.4
KW_033	06S07E13M02S	CVWD Well 6781-1	1963	-90.7	-85.7	Spring	Yes	5.0
KW_034	06S07E16A02S	CVWD Well 6723-1	1987	-172.0	-133.5	Fall	Yes	38.5
KW_035	06S07E23F01S	Private Well	1965	-162.5	-129.8	Fall	Yes	32.7
KW_036	06S07E29B01S	Private Well	1995	-170.2	-88.7	Fall	Yes	81.5
KW_037	06S07E35L02S	Private Well	1988	-175.9	-79.6	Fall	Yes	96.3
KW_038	06S08E05R02S	CVWD Well 6858-1	1957	-102.7	-98.7	Fall	Yes	4.0
KW_039	06S08E12Q01S	Private Well	1991	-132.0	-109.4	Fall	Yes	22.6
KW_040	06S08E22D02S	CVWD Well 6803-1	1966	-176.4	-142.4	Fall	Yes	34.0
KW_041	06S08E25Q01S	Private Well	1979	-187.7	-152.9	Fall	Yes	34.8
KW_042	06S08E31P01S	Private Well	1989	-184.1	-142.0	Fall	Yes	42.1
KW_043	06S09E32Q01S	Private Well	1966	-175.3	-133.5	Fall	Yes	41.8
KW_044	07S07E02G02S	Private Well	1996	-177.5	-94.0	Spring	Yes	83.5
KW_045	07S08E10P01S	Private Well	1988	-203.5	-153.1	Fall	Yes	50.4
KW_046	07S08E17G01S	CVWD Well 7801-1	1972	-196.6	-147.9	Fall	Yes	48.7
KW_047	07S08E33B01S	Private Well	1965	-210.7	-166.6	Fall	Yes	44.1
KW_048	07S09E07J01S	CVWD Well 7993-1	1970	-245.2	-173.5	Fall	Yes	71.7
KW_049	07S09E14C01S	Private Well	1992	-179.9	-153.6	Fall	Yes	26.3
KW_050	07S09E16M03S	Private Well	1989	-260.8	-188.3	Fall	Yes	72.5
KW_051	07S09E18H01S	Private Well	1994	-262.4	-187.9	Fall	Yes	74.5
KW_052	07S09E30R01S	CVWD Bernadine	1996	-208.4	-171.6	Fall	Yes	36.8

Key Well Number	SWN	Well Name/Owner	First Year Monitored	MT NAVD88	Minimum GW Elevation WY 21-22	Season Min GW Elevation Occurred[1]	Above MT?	Elevation Above MT (ft)
KW_053	08S08E03L01S	Private Well	1965	-219.5	-172.5	Fall	Yes	47.0
KW_054	08S08E24L01S	Private Well	1939	-256.4	-141.6	Fall	Yes	51.0
KW_055	08S09E07N03S	CVWD Gracie	2003	-248.9	-196.9	Spring	Yes	52.0
KW_056	08S09E30A01S	Private Well	1965	-265.8	-211.0	Fall	Yes	54.8
KW_057	08S09E33N01S	Private Well	1952	-262.2	-211.0	Spring	Yes	51.2

Notes:

NAVD88 - North American Vertical Datum 1988

1- Spring is defined Jan - Jun and Fall is defined July - Dec

3.3 GROUNDWATER ELEVATIONS, FLOW, AND TRENDS

Figure 3-2 shows the WY 2021-2022 groundwater elevation contour map for the Indio Subbasin. Groundwater levels do not exhibit strong seasonal variations, so average groundwater elevations of the principal aquifer for the water year are used for contouring. Regional groundwater flows are in a northwest-to-southeast direction through the Indio Subbasin. Groundwater elevations range from greater than 1,200 feet above mean sea level (feet msl) near the San Gorgonio Pass Subbasin in the northwest to approximately -200 feet msl in the southeast along the northern shoreline of the Salton Sea. The hydraulic gradients across the Indio Subbasin in WY 2021-2022 were typically steeper in the northwest with the gradient flattening to the southeast, similar to last water year. Groundwater elevations and gradients in WY 2021-2022 were less influenced by groundwater replenishment activities than in previous years but water levels remain high near the WWR-GRF and TEL-GRF. Geological faults, constrictions, and pumping also affect local hydraulic gradients.

Long-term water level hydrographs for 16 selected Key Wells distributed across the Indio Subbasin are presented on **Figure 3-2** to illustrate groundwater elevation trends over time. Water level measurements for the 16 wells are included on five hydrographs labeled 1 through 5 on **Figure 3-2** and depict the groundwater level response to historical pumping and water management activities in the Indio Subbasin.

Even as this water year's groundwater replenishment was less than average, groundwater levels still show positive responses from the replenishment in previous years. The hydrographs show that groundwater levels in the northwestern portion of the Indio Subbasin have responded directly and positively to historical replenishment activities at the WWR-GRF (Hydrograph 2). Groundwater elevations in the Palm Springs/Cathedral City area have remained relatively stable over time with more moderate positive responses to upgradient WWR-GRF replenishment activities. Groundwater levels in the Palm Desert area have stabilized since 2005 and increased slightly since 2010 with recent increases coinciding with reduced groundwater pumping and initiation of recharge at the PD-GRF in February 2019 (Hydrograph 3). Groundwater elevations in Bermuda Dunes, La Quinta, Indio, and Coachella have stabilized since 2005 and increased slightly in the La Quinta area since 2010 (Hydrograph 3). Groundwater elevations in the southeastern portion of the Indio Subbasin near Thermal, Mecca, and Oasis have responded positively to replenishment activities at the TEL-GRF since recharge commenced in 2009 (Hydrographs 4 and 5). Full-scale hydrographs for all Key Wells are provided in **Appendix A**. The full-scale hydrographs in **Appendix A** show the surface elevation of each well as a horizontal line.

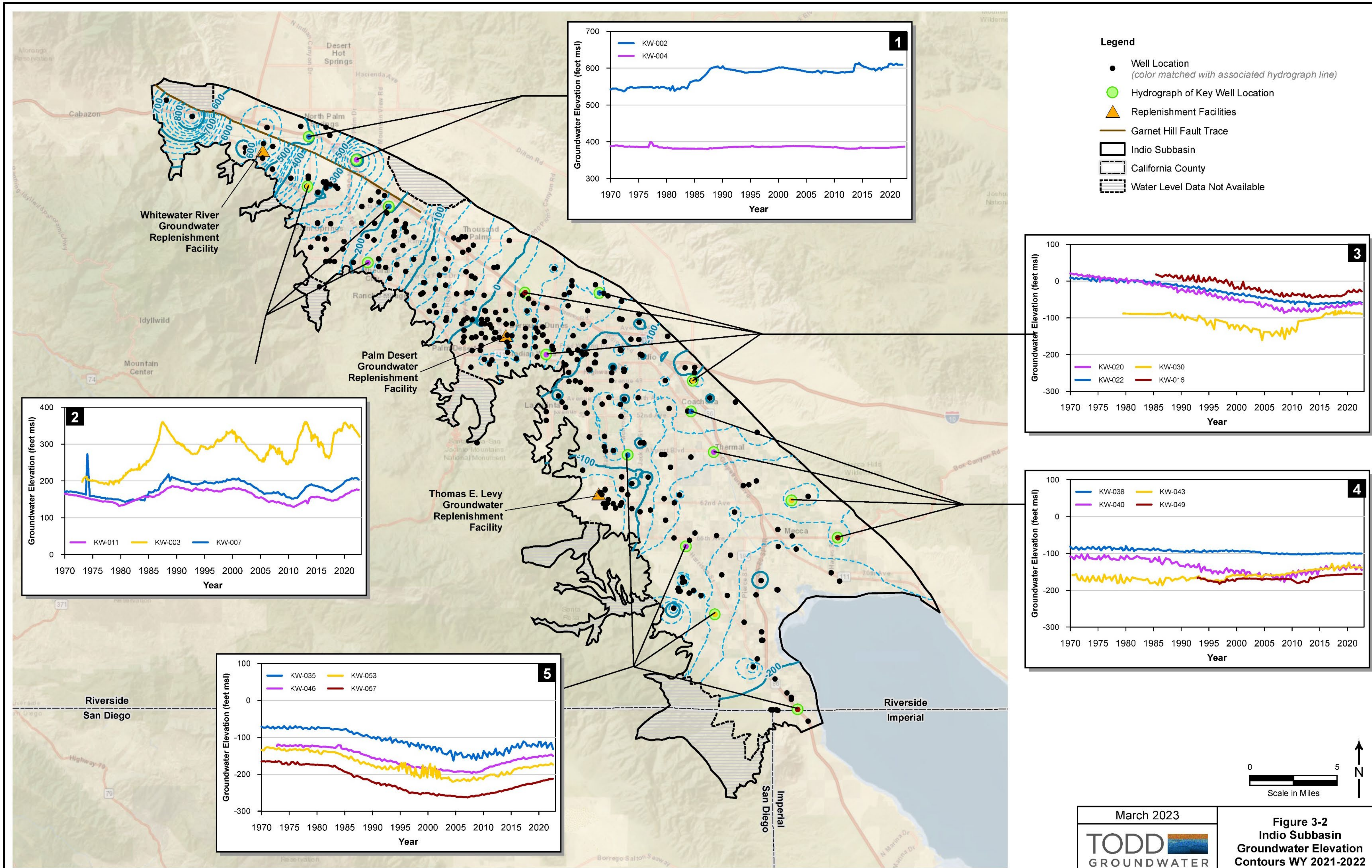
Collectively, the selected hydrographs illustrate the effectiveness of long-term groundwater replenishment, source substitution, and conservation programs in the Indio Subbasin in maintaining and, in some areas, increasing groundwater levels under varying historical climatic and water use conditions.

3.3.1 Artesian Conditions

Historically, the eastern portion of the Indio Subbasin experienced artesian conditions with sufficient pressure to cause groundwater levels in wells to rise above the ground surface. Artesian flowing wells attracted early settlers to farm in this area, but artesian conditions subsequently declined in the late 1930s due to increased local groundwater pumping. The completion of the Coachella Canal by the United States Bureau of Reclamation (USBR) in 1949 brought Colorado River water to the eastern Coachella Valley for agricultural irrigation purposes. Artesian conditions returned in the early 1960s through the 1980s, as imported Colorado River water was substituted for groundwater production. Beginning in the late 1980s, groundwater use increased again, resulting in declining water levels and the loss of artesian conditions.

The GSAs' water management programs (including groundwater replenishment, source substitution and water conservation) are restoring local groundwater levels, and artesian conditions have returned in the eastern Indio Subbasin. Benefits associated with artesian conditions include reduced groundwater pumping costs and water quality protection of the deeper, confined production zone aquifers.

Figure 3-3 shows the location of 19 wells under artesian pressure in WY 2021-2022 and their respective water pressure equivalent elevation (measured in feet above ground surface [feet-ags]). The area of artesian conditions expanded slightly in comparison to WY 2020-2021; two more wells were measured with artesian conditions. The table on the figure compares groundwater elevations between WY 2020-2021 and WY 2021-2022 for 17 wells that consistently show artesian conditions and the two wells that were artesian in WY 2021-2022 but not the previous water year. Increases in artesian water levels (ranging from +0.63 to +4.68 feet) are noted in 16 of the 19 artesian wells. The other three wells showed decreases of up to 1.3 feet.



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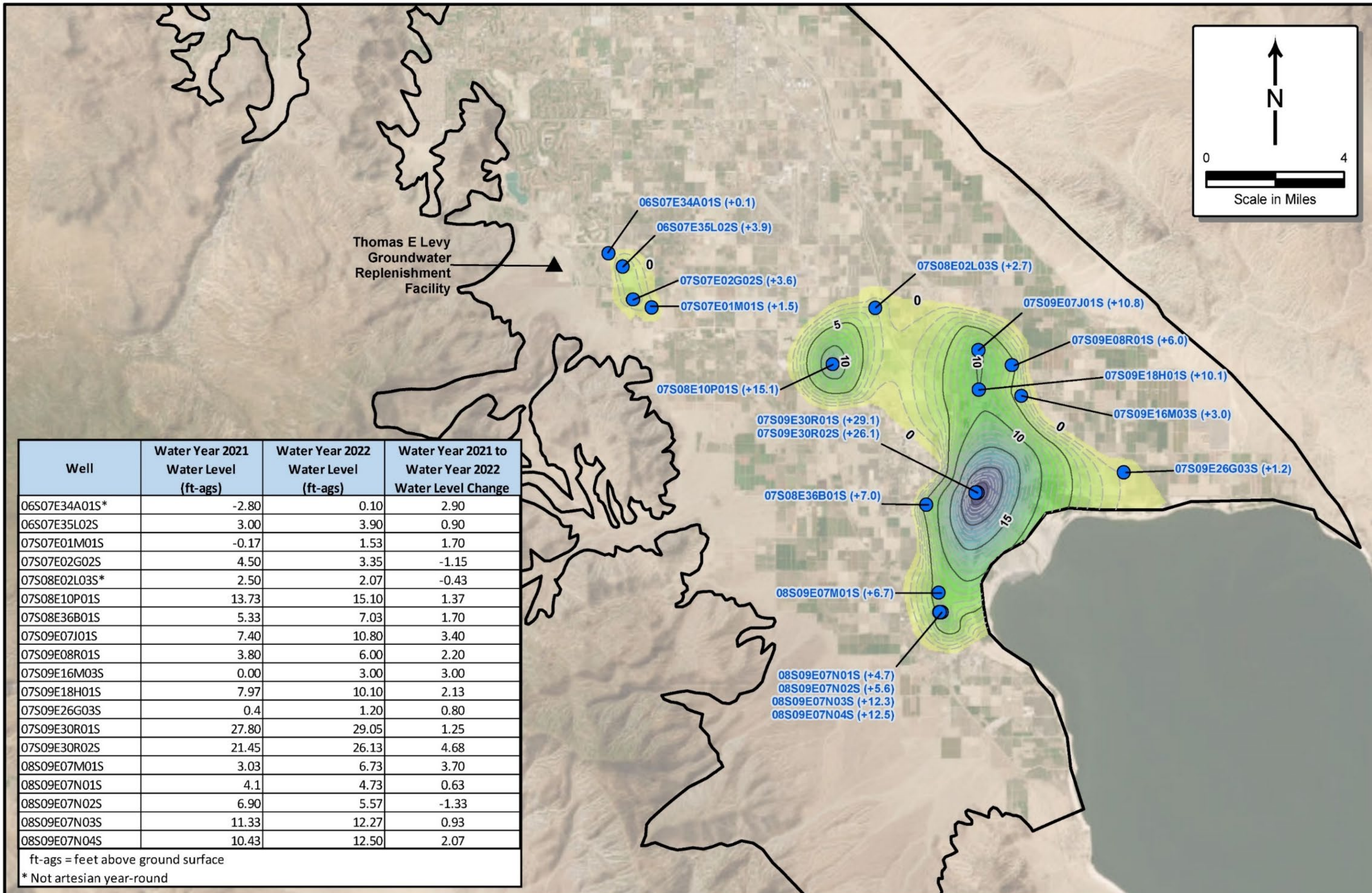
TODD GROUNDWATER

Figure 3-2
Indio Subbasin
Groundwater Elevation
Contours WY 2021-2022



Well	Water Year 2021 Water Level (ft-ags)	Water Year 2022 Water Level (ft-ags)	Water Year 2021 to Water Year 2022 Water Level Change
06S07E34A01S*	-2.80	0.10	2.90
06S07E35L02S	3.00	3.90	0.90
07S07E01M01S	-0.17	1.53	1.70
07S07E02G02S	4.50	3.35	-1.15
07S08E02L03S*	2.50	2.07	-0.43
07S08E10P01S	13.73	15.10	1.37
07S08E36B01S	5.33	7.03	1.70
07S09E07J01S	7.40	10.80	3.40
07S09E08R01S	3.80	6.00	2.20
07S09E16M03S	0.00	3.00	3.00
07S09E18H01S	7.97	10.10	2.13
07S09E26G03S	0.4	1.20	0.80
07S09E30R01S	27.80	29.05	1.25
07S09E30R02S	21.45	26.13	4.68
08S09E07M01S	3.03	6.73	3.70
08S09E07N01S	4.1	4.73	0.63
08S09E07N02S	6.90	5.57	-1.33
08S09E07N03S	11.33	12.27	0.93
08S09E07N04S	10.43	12.50	2.07

ft-ags = feet above ground surface

* Not artesian year-round

Artesian Well (WY 2021-2022 groundwater level in feet above ground surface)

Replenishment Facility

Indio Subbasin

Artesian Conditions

High : 25

Low : 0

March 2023

TODD GROUNDWATER

Figure 3-3
WY 2021-2022
Artesian Wells in the Indio Subbasin

3.4 LAND SUBSIDENCE

Land subsidence is the differential lowering of the ground surface, which can damage structures and facilities. This may be caused by regional tectonism or by declines in groundwater elevations due to pumping. Land subsidence, resulting from aquifer system compaction and groundwater level declines, has been a concern in the Coachella Valley since the mid-1990s and has been investigated since 1996 through an on-going cooperative program between CVWD and the USGS (Sneed and Brandt, 2020). Global Positioning System (GPS) surveying, using GNSS-Inferred Positioning System and Orbit Analysis Simulation Software (GIPSY-OASIS) and interferometric synthetic aperture radar (InSAR) methods, have been used to determine the location, extent, and magnitude of the vertical land-surface changes in the Coachella Valley.

The GPS measurements have been used to determine elevation changes at specific locations, while InSAR measurements have documented the geographic extent of elevation changes for the Indio Subbasin. Analysis of InSAR data collected from 1995 to 2017 by the USGS indicates that as much as 2.0 feet of subsidence occurred in the Indio Subbasin from 1995 to 2010 near Palm Desert, Indian Wells, and La Quinta (Sneed and Brandt, 2020).

Since 2010, groundwater levels have stabilized or have partially recovered in response to the implementation of source substitution, conservation, and groundwater replenishment programs. Up to one inch of uplift has been measured since 2011 in the Palm Springs area, corresponding to higher groundwater levels in response to upgradient WWR-GRF recharge. In the Thermal area, the ground surface has also rebounded about two inches over the past 10 years, returning to elevations observed in 2001. This rebound roughly coincides with commencement of recharge operations at the TEL-GRF in 2009.

The Indio Subbasin GSAs plan to continue monitoring water levels and subsidence to track the effects of management actions on land subsidence. The GSAs and the USGS have established a partnership and a continuing subsidence monitoring program to collect and evaluate data between 2015 and 2023 with a report to be published by the USGS before June 30, 2025 (CVWD, et al., 2021b).

Groundwater level MTs are used as a proxy to monitor subsidence. **Table 3-2** indicates that all Key Wells are above their MTs.

4. GROUNDWATER EXTRACTIONS

This section presents groundwater extraction volumes for the Indio Subbasin for WY 2021-2022. Because Coachella Valley Water District (CVWD) and Desert Water Agency (DWA) are authorized to collect a replenishment assessment fee from groundwater producers, their respective governing policies mandate the installation of water meters on all wells owned by entities producing more than 25 acre-feet per year (AFY) in CVWD's service area and more than 10 AFY in DWA's service area. Accordingly, the CVWD and DWA groundwater extraction monitoring programs provide relatively accurate extraction information for the Indio Subbasin.

Table 4-1 summarizes the groundwater extraction volumes in the Indio Subbasin in Water Year (WY) 2021-2022 by water use sector. The methods of measurement and corresponding measurement accuracy are also provided. The table shows that in WY 2021-2022, a total of 282,079 AF of groundwater was extracted from the Indio Subbasin. Of the total volume extracted, groundwater production of 278,279 AF was extracted from 551 metered wells in the Indio Subbasin. The remaining 3,800 AF of groundwater extraction is estimated for uses that are not required to report extraction amounts to any of the agencies: 1) industrial tribal water use (1,100 AF), 2) recreational tribal water use (1,200 AF), and 3) minimal pumpers (entities extracting less than 25 AFY in CVWD's service area and less than 10 AFY in DWA's service area) combined with unclassified tribal water use (1,500 AF).

Table 4-1. WY 2021-2022 Groundwater Extractions by Water Use Sector in the Indio Subbasin

Water Use Sector	Groundwater Extractions (AF)	Method of Measurement	Accuracy of Measurement
Agriculture[1]	46,494	100% metered	±2%
Industrial[2]	1,498	15% metered	±2%
		85% estimated	±50%
Urban[3]	232,587	99% metered	±2%
		1% estimated	±50%
Undetermined[4]	1,500	100% estimated	±50%
Total Production	**282,079**		

Notes:

1 – Includes crop irrigation and fish farms.

2 – Includes 1,100 AF of estimated unreported extractions for industrial tribal water use.

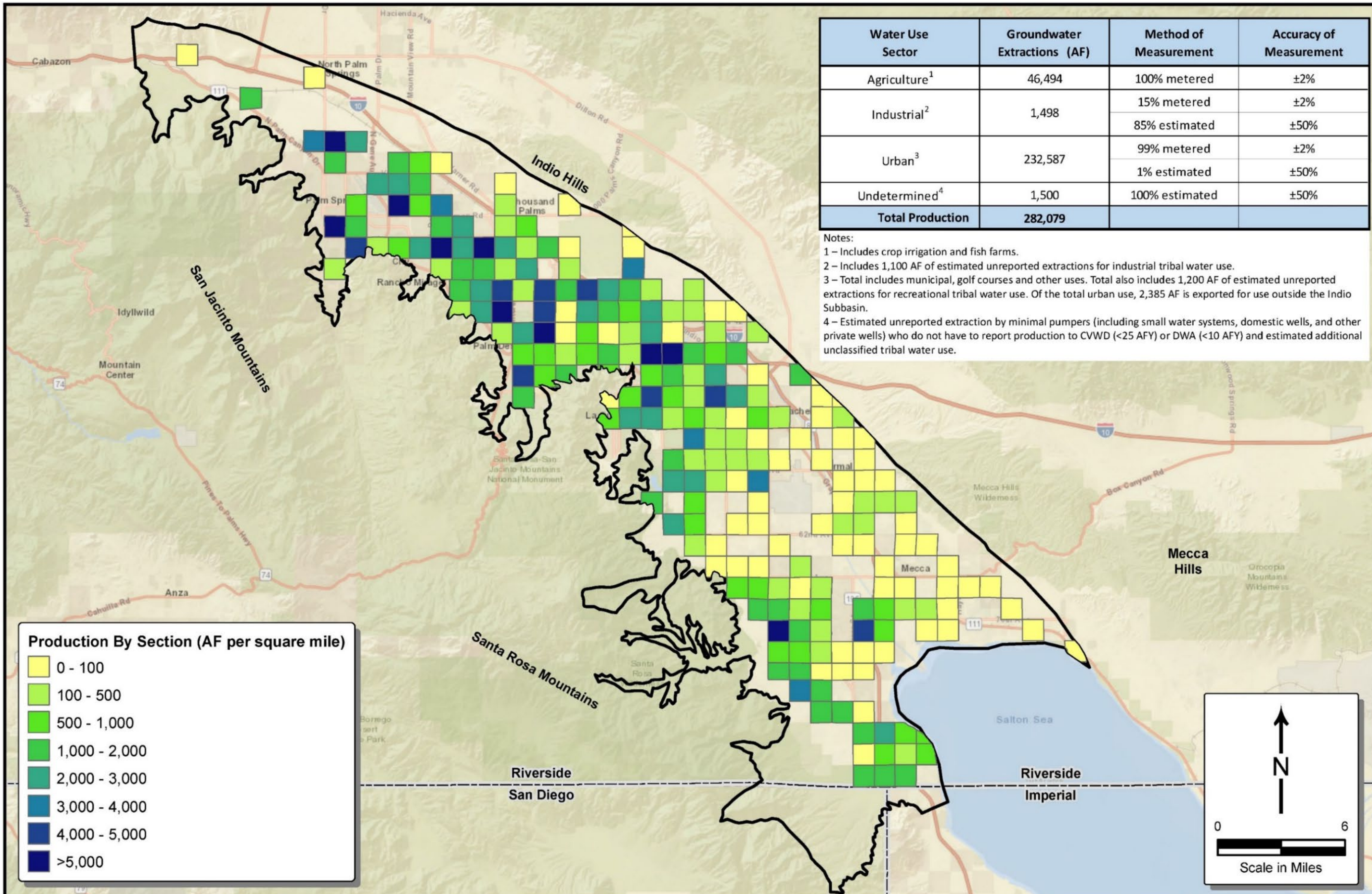
3 – Total includes municipal, golf courses and other uses. Total also includes 1,200 AF of estimated unreported extractions for recreational tribal water use. Of the total urban use, 2,385 AF is exported for use outside the Indio Subbasin.

4 – Estimated unreported extraction by minimal pumpers (including small water systems, domestic wells, and other private wells) who do not have to report production to CVWD (<25 AFY) or DWA (<10 AFY) and estimated additional unclassified tribal water use.

The total groundwater extracted in WY 2021-2022 represents a decrease of 3,272 AF (1 percent) compared to the volume extracted in WY 2020-2021 (285,351 AF). The agricultural water use sector (including fish farms) experienced a small volumetric decrease in water use (67 AF) compared to WY 2020-2021, or 0.14 percent. The industrial sector experienced a small volumetric increase in water use of 210 AF compared to WY 2020-2021, or 16 percent. Urban usage experienced a volumetric decrease in water use of 3,415 AF compared to WY 2020-2021, or 1.4 percent. The water use by golf courses and other users was included in the urban sector.

Note that **Table 4-1** includes a portion of groundwater extracted from the Indio Subbasin that is exported for use in adjacent areas outside the Indio Subbasin. Groundwater volumes exported for use outside the Indio Subbasin in WY 2021-2022 are described in further detail in Section 6.

Figure 4-1 shows the location of groundwater extraction in the Indio Subbasin based on public land survey sections. The volume of groundwater extraction is indicated by color with dark blue sections corresponding to groundwater extraction greater than 5,000 AF per square mile. Such areas are generally located near urban centers, including the cities of Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, and Indio.



Water Use Sector	Groundwater Extractions (AF)	Method of Measurement	Accuracy of Measurement
Agriculture[1]	46,494	100% metered	±2%
Industrial[2]	1,498	15% metered	±2%
		85% estimated	±50%
Urban[3]	232,587	99% metered	±2%
		1% estimated	±50%
Undetermined[4]	1,500	100% estimated	±50%
Total Production	**282,079**		

Notes:

1 – Includes crop irrigation and fish farms.

2 – Includes 1,100 AF of estimated unreported extractions for industrial tribal water use.

3 – Total includes municipal, golf courses and other uses. Total also includes 1,200 AF of estimated unreported extractions for recreational tribal water use. Of the total urban use, 2,385 AF is exported for use outside the Indio Subbasin.

4 – Estimated unreported extraction by minimal pumpers (including small water systems, domestic wells, and other private wells) who do not have to report production to CVWD (<25 AFY) or DWA (<10 AFY) and estimated additional unclassified tribal water use.

Indio Subbasin

California County

March 2023

TODD GROUNDWATER

Figure 4-1
WY 2021-2022
Groundwater Production

5. SURFACE WATER

This section presents the surface water supplies and use for the Indio Subbasin for Water Year (WY) 2021-2022. Surface water supplies consist of local surface water, imported Colorado River water from the Coachella Canal, State Water Project (SWP) and other exchange water from the Colorado River Aqueduct (CRA), and recycled water produced by publicly owned wastewater reclamation plants.

5.1 LOCAL PRECIPITATION

Natural surface water flow in the Coachella Valley occurs as a result of precipitation, precipitation runoff, and stream flow originating from the San Bernardino and San Jacinto Mountains, with lesser amounts originating from the Santa Rosa Mountains. Most precipitation occurs from December through February, though intense precipitation events from subtropical thunderstorms can occur during the summer months. The precipitation that occurs within the tributary watersheds either evaporates, is consumed by native vegetation, percolates into underlying alluvium and fractured rock, or becomes runoff, which can be captured by mountain-front debris basins and percolated into the aquifer. A portion of the flow percolating into the mountain watersheds eventually becomes subsurface inflow to the Subbasins.

Precipitation data for WY 2021-2022 collected for 12 precipitation monitoring stations are provided in **Table 5-1.** Station locations are shown on **Figure 5-1**. The annual precipitation for these stations during WY 2021-2022 averaged 3.87 inches, or approximately 80 percent relative to the long-term average.

5.2 LOCAL STREAMFLOW

Streamflow is measured by the U.S. Geological Survey (USGS) at 15 stations in the Indio Subbasin. **Table 5-2** shows the station names and numbers, and the recorded streamflow volumes for WY 2021-2022. Stream gauge locations are shown on **Figure 5-1**.

Note that some streams (e.g., Whitewater River, Snow Creek, and Falls Creek) are gauged at multiple locations. For example, the Whitewater River is gauged at six locations. USGS gauges 10257548 and 10257549 are downstream from where imported water is released at the Whitewater River Groundwater Replenishment Facility (WWR-GRF). USGS gauge 10259540 measures the flow in the Coachella Valley Storm Channel (CVSC) before it enters the Salton Sea. Snow Creek and Falls Creek are each gauged at one location but diversions and downgradient flows are calculated and reported for each. This Annual Report does not include these flow values.

5.2.1 Direct Use of Local Surface Water

DWA operates stream diversion facilities on Snow, Falls, and Chino Creeks, and captures subsurface flow from the Whitewater River Canyon. During WY 2021-2022, 611 AF of local surface water was directly used as shown in **Table 5-3,** all of which was used for urban and agricultural water supply in DWA's service area.

Table 5-1. WY 2021-2022 Coachella Valley Precipitation Data (Inches)

Station Name[1]	Whitewater North	Snow Creek	Desert Hot Springs	Tachevah Dam	Tram Valley	Cathedral City	Thousand Palms	Palm Springs Sunrise	Edom Hill	Oasis	Mecca Landfill III	Thermal Airport
Subbasin	Indio	Indio	Mission Creek	Indio	Indio	Indio	Indio	Indio	Mission Creek	Indio	Indio	Indio
Station Number	233	207	57	216	224	34	222	442	436	431	432	443
Latitude	33°59'23.06"	33°53'32.64"	33°58'2.85"	33°49'51.26"	33°50'11.56"	33°46'51.49"	33°49'1.66"	33°48'35.94"	33°53'7.52"	33°26'21.64"	33°34'20.19"	33°37'53.90"
Longitude	116°39'21.39"	116°41'41.06"	116°29'39.93"	116°33'31.53"	116°36'49.72"	116°27'29.69"	116°23'46.30"	116°31'37.94"	116°26'18.48"	116° 4'44.83"	116° 0'15.33"	116° 9'50.81"
Elevation (ft-msl)	2,220	1,658	1,223	570	2,675	283	230	397	1,038	-108	13	-122
October	0.57	0.72	0.17	0.14	0.65	0.06	0.03	0.1	0.13	0.02	0.01	0
November	0	0	0	0	0	0	0	0	0	0	0	0
December	6.12	3.32	2.04	4.87	6.74	0.97	0.53	1.79	1.04	0.31	0.09	0.11
January	0.02	0	0	0	0.01	0.01	0	0	0	0	0	0
February	0.93	0.97	0.12	0.1	0.54	0.08	0.04	0.11	0.06	0.01	0	0.02
March	0.97	1.02	0.03	0	0.2	0	0	0.03	0	0.02	0.21	0.02
April	0.24	0.55	0.05	0	0.26	0.02	0	0.04	0.03	0	0	0
May	0	0	0	0	0	0	0	0	0	0	0	0
June	0.32	1.4	0.01	0.06	0.55	0.22	0	0.22	0	0	0	0
July	0	0	0.01	0	0	0	0	0	0	0	0	0
August	0	0.17	0	0	0.66	0	0	0	0	0.74	0.04	0.01
September	NA	0.72	NA	0.66	1.19	NA	0.62	NA	0.62	0	0	0.95
Total	**9.17**	**8.87**	**2.43**	**5.83**	**10.8**	**1.36**	**1.22**	**2.29**	**1.88**	**1.1**	**0.35**	**1.11**
Average	**3.87**											

Notes:

1 – Two precipitation monitoring stations located in the Mission Creek Subbasin (Desert Hot Springs and Edom Hill) are included here primarily to fully characterize water year precipitation in the Coachella Valley region. However, data from these stations are not used in any Indio Subbasin-specific calculations.

NA - Data from stations were not available for September 2022.

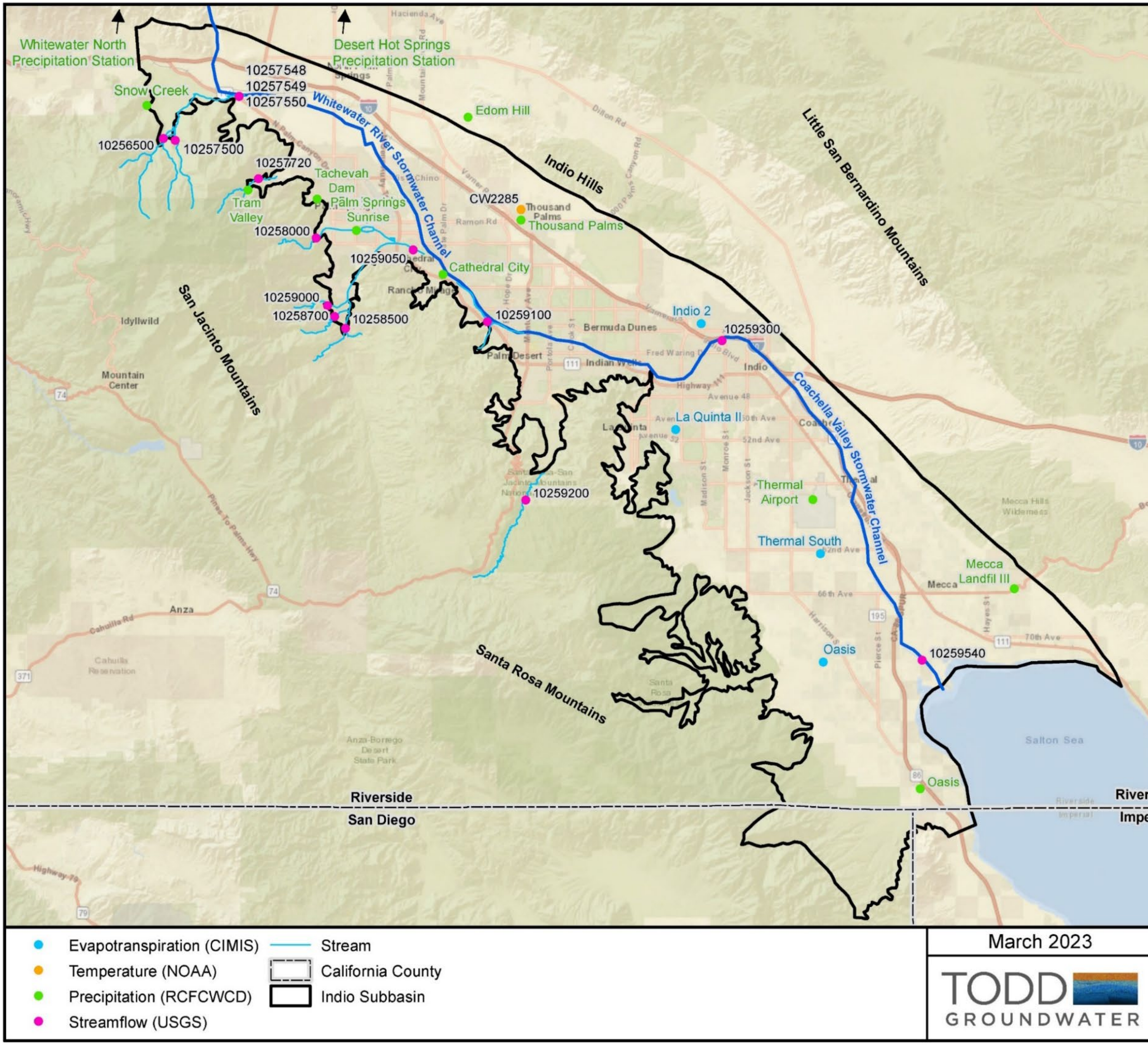


Figure 5-1
Climate and Streamflow Monitoring Stations

Table 5-2. WY 2021-2022 Local Streamflow Measurements for the Indio Subbasin

Station Number	Station Name	WY 2021-2022 Flows (AF)
10256500	SNOW CREEK NEAR WHITE WATER CA	1,463
10257500	FALLS CREEK NEAR WHITEWATER CA	495
10257548	WHITEWATER RIVER AT WINDY POINT MAIN CHANNEL CA	18,604
10257549	WHITEWATER RIVER AT WINDY POINT OVERFLOW CHANNEL CA	1,494
10257550	WHITEWATER RIVER AT WINDY POINT NEAR WHITEWATER CA	20,099
10257720	CHINO CANYON CREEK BELOW TRAMWAY NEAR PALM SPRINGS CA	172
10258000	TAHQUITZ CREEK NEAR PALM SPRINGS CA	527
10258500	PALM CANYON CREEK NEAR PALM SPRINGS CA	100
10258700	MURRAY CANYON CREEK NEAR PALM SPRINGS CA	288
10259000	ANDREAS CREEK NR PALM SPRINGS CA	1,194
10259050	PALM CANYON WASH NEAR CATHEDRAL CITY CA	7
10259100	WHITEWATER RIVER AT RANCHO MIRAGE CA	86
10259200	DEEP CREEK NEAR PALM DESERT CA	1
10259300	WHITEWATER RIVER AT INDIO CA	30
10259540	WHITEWATER RIVER NEAR MECCA CA	45,116

Table 5-3. WY 2021-2022 Direct Use of Local Surface Water in the Indio Subbasin

Water Use Sector	Surface Water Use (AF)	Method of Measurement	Accuracy of Measurement
Agriculture[1]	300	100% metered	±2%
Industrial	0	Not applicable	--
Urban[1]	311	100% metered	±2%
Total Surface Water Use	**611**		

Notes:
1 – Use by sector is apportioned according to the 5-year average agricultural and urban use of DWA surface water.

5.3 IMPORTED WATER DELIVERIES

The Indio Subbasin has water allocations from two imported surface water sources: the Colorado River and the SWP. Colorado River water is delivered to the eastern portion of the Indio Subbasin via the Coachella Canal and to the western portion through the Colorado River Aqueduct (CRA). There is currently no infrastructure to physically deliver SWP water to the Coachella Valley. To exercise SWP deliveries, Coachella Valley Water District (CVWD) and Desert Water Agency (DWA) exchange the deliveries with Metropolitan Water District (MWD) for Colorado River water, which is delivered to the western portion of the Subbasin via the CRA. Imported surface water is used to replenish groundwater and as an alternative source to groundwater pumping in the Indio Subbasin. CVWD and DWA augment natural recharge of the Indio Subbasin through their respective groundwater replenishment programs. There are two types of groundwater replenishment programs in the Indio Subbasin: 1) direct replenishment, in which imported surface water is percolated directly into the aquifer, and 2) in-lieu replenishment, in which imported surface water or recycled water is provided directly to irrigation customers, thus reducing or eliminating the use of pumped groundwater.

5.3.1 Colorado River Water

Colorado River water has been a significant water supply source for the Indio Subbasin area since the Coachella Canal was completed in 1949. CVWD is the only agency in the Indio Subbasin that receives Colorado River water deliveries.

California's Colorado River water rights are defined by the 1922 *Colorado River Compact* and the 1928 *Boulder Canyon Project Act*. CVWD's portion of California's rights were set by the 1931 *Seven Party Agreement (USBR, 1931)*.[3] Under the *Seven Party Agreement*, CVWD receives 330,000 acre-feet (AF) of Priority 3A Colorado River water and has water rights as part of the first 3.85 million acre-feet per year (AFY) of Colorado River water allocated to California. The Coachella Canal originates at Drop 1 on the All-American Canal and extends approximately 123 miles, terminating in CVWD's Lake Cahuilla. This water is then delivered to the CVWD's Improvement District No. 1 (ID-1) service area, which encompasses 136,400 acres covering most of the East Valley and a portion of the West Valley north of Interstate 10.

In 2003, CVWD, MWD, and Imperial Irrigation District (IID) successfully negotiated the *Quantification Settlement Agreement (QSA),* which quantifies the Colorado River water allocations through 2077 and supports the transfer of water between agencies. The QSA defines CVWD's Colorado River water supply entitlement on a calendar year basis. Under the QSA, CVWD has a base allotment of 330,000 AFY. CVWD negotiated water transfer agreements with MWD and IID that increased CVWD supplies by an additional 123,000 AFY. From CVWD's QSA entitlement, 26,000 AFY is transferred to San Diego County Water Authority (SDCWA) as part of the Coachella Canal Lining Project and 3,000 AFY is transferred to Indian Present Perfected Rights. As a result, CVWD's net QSA supply will increase to 424,000 AFY by 2026 and remain at that level until 2047, decreasing to 421,000 AFY until 2077, when the agreement expires (Secretary of the Interior, 2003). CVWD's Colorado River entitlement under the QSA for Calendar Year (CY) 2022 is summarized in **Table 5-4**. CVWD's total Colorado River water entitlements for CY 2022 under the

[3] The seven parties include CVWD, MWD, Imperial Irrigation District, Palo Verde Irrigation District, City of Los Angeles, City of San Diego, and County of San Diego.

QSA are 404,000 AFY, an increase of 5,000 AF as compared to CY 2021 reflecting the change in Second IID/CVWD Transfer water from 28,000 AF in calendar year CY 2021 to 33,000 AF in CY 2022.

Additionally, under the 2003 QSA, MWD transferred 35,000 AFY of its SWP Table A Amount to CVWD. This SWP water is exchanged for Colorado River water and can be delivered at Imperial Dam for delivery via the Coachella Canal to the eastern portion of the Indio Subbasin or at Lake Havasu for delivery via the Colorado River Aqueduct to the western portion of the Indio Subbasin at the WWR-GRF. The 2019 Second Amendment (CVWD, 2019b) guaranteed delivery of the 35,000 AFY from 2019 to 2026, for a total of 280,000 AFY of water to the WWR-GRF during that timeframe. MWD can deliver the water through CVWD's Whitewater Service Connections (for recharge at WWR-GRF) or via the Advance Delivery account.

The MWD/IID Transfer originated in a 1989 agreement with MWD to receive 20,000 AF of its Colorado River supply. The 2019 Amended and Restated Agreement for Exchange and Advance Delivery of Water (CVWD, 2019a) defined the exchange and delivery terms between MWD, CVWD, and DWA. The 2019 Second Amendment to Delivery and Exchange Agreement (CVWD, 2019b) reduced CVWD's annual delivery of the MWD/IID Transfer to 15,000 AFY, for a total of 105,000 AF, if taken at the Whitewater Service Connections (for recharge at WWR-GRF) between 2020 and 2026. For those seven years, MWD keeps the remaining 5,000 AFY.

Colorado River water is delivered extensively throughout the East Valley to agricultural users, golf courses, and homeowner's associations for irrigation, in addition to being used in CVWD's groundwater replenishment programs at WWR-GRF, TEL-GRF, and PD-GRF. Colorado River Water is also delivered to the Mid-Valley area via the Mid-Valley Pipeline (MVP) where it is delivered directly or blended with CVWD's recycled water for golf course and open space irrigation.

Table 5-4. CY 2022 CVWD Colorado River Water Entitlements under the QSA

Budget Component	Amount (AF)
Base Entitlement	330,000
Less Coachella Canal Lining (to SDCWA)	-26,000
Less Miscellaneous/Indian PPRs[1]	-3,000
1988 MWD/IID Approval Agreement	20,000
First IID/CVWD Transfer	50,000
Second IID/CVWD Transfer	33,000
MWD/CVWD Replacement Water[2]	0
Total Colorado River Entitlements	**404,000**
MWD SWP Transfer	35,000
Total Available Deliveries	**439,000**

Notes:
SDCWA - San Diego County Water Authority
PPRs - Present Perfected Rights
1 - Indian Present Perfected Rights
2 - MWD assumes the obligation to provide 50,000 acre-feet per year (AFY) of replacement water after 2048.

5.3.2 State Water Project (Exchange Water)

Department of Water Resources (DWR) manages the SWP and determines the amount of SWP water available for delivery based on hydrologic, storage, water rights, water quality, and environmental factors, including requirements for the Sacramento-San Joaquin Delta (Delta). The available water is then allocated to the SWP contractors according to Table A amounts (CVWD, 2012a). During CY 2021, DWR allocated 5 percent, plus health and safety allowances, of the Table A amounts to contractors. This is less than the 58 percent long-term average SWP deliveries across all water years through 2015 due to below average precipitation during winter of WY 2021-2022. DWR allocated 5 percent of CVWD's and DWA's Table A amounts in CY 2022. DWR increased the initial 2023 allocation of 5 percent to 35 percent in February 2023.

While CVWD and DWA have contracts for Table A water (**Table 5-5**), there are no physical facilities to deliver SWP water to the Coachella Valley. CVWD's and DWA's SWP water is exchanged with MWD for an equal amount of Colorado River water from MWD's CRA. This exchange water is delivered to the Indio Subbasin at the WWR-GRF or the MC-GRF turnout. As summarized in **Table 5-5**, CVWD and DWA SWP allocations include their original Table A allocations and the following transfer agreements:

- **MWD Transfer (2003):** CVWD and DWA executed a Delivery and Exchange Agreement with MWD for a combined total of 100,000 AFY as a permanent transfer to be delivered to the WWR-GRF or the MC-GRF.
- **Tulare Lake Basin Transfer #1 (2004):** CVWD purchased an additional 9,900 AFY of Table A water from Tulare Lake Basin Water Storage District in Kings County.
- **Tulare Lake Basin Transfer #2 (2007):** CVWD and DWA executed transfer agreements with Tulare Lake Basin Water Storage District for 5,250 AFY and 1,750 AFY, respectively, totaling 7,000 AFY.
- **Berrenda Transfer (2007):** CVWD and DWA executed transfer agreements with Berrenda Mesa Water District in Kern County for 12,000 AFY and 4,000 AFY, respectively, totaling 16,000 AFY.

Table 5-5. State Water Project Table A Amounts

Agency	Original SWP Table A (AFY)	MWD Transfer (AFY)	Tulare Lake Basin Transfer #1 (AFY)	Tulare Lake Basin Transfer #2 (AFY)	Berrenda Transfer (AFY)	Total (AFY)
CVWD	23,100	88,100	9,900	5,250	12,000	138,350
DWA	38,100	11,900	-	1,750	4,000	55,750
Total	**61,200**	**100,000**	**9,900**	**7,000**	**16,000**	**194,100**

Along with the transfer agreements described above, CVWD also acquired an additional 35,000 AFY of SWP transfer water from the QSA. The SWP QSA water is exchanged for Colorado River water and can be delivered at Imperial Dam for delivery via the Coachella Canal to the eastern portion of the Indio Subbasin or at Lake Havasu for delivery via the CRA to the western portion of the Indio Subbasin at the WWR-GRF.

The *1984 Advance Delivery Agreement* between CVWD, DWA, and MWD, signed in 1985 and amended in 2019 by the *Amended and Restated Agreement for Exchange and Advance Delivery of Water* (CVWD, 2019a), allows MWD to deliver up to 800,000 AFY of Colorado River water to be credited against its future SWP exchange obligations. Advance deliveries of exchange water are highly variable and concentrated in wet years, with the Indio Subbasin providing storage of the pre-delivered supplies. Along with transfers listed in **Table 5-5**, CVWD and DWA have explored additional water transfers, for example water purchases from programs such as SWP Article 21 and Turnback Water Pool, Governor's Drought Water Bank, Yuba Accord, and Rosedale-Rio Bravo Water Storage District. **Table 5-6** summarizes the WY 2021-2022 deliveries to MWD of SWP water, which MWD then exchanges for Colorado River water and delivers to CVWD and DWA at their respective facilities or from the Advance Delivery Account. Advance deliveries received by CVWD and DWA are credited to the Advance Delivery Account.

As part of the SWP Exchange Agreement, MWD received a total of 23,040 AF of SWP water allocated to CVWD and DWA in WY 2021-2022. Of this amount, 16,756 AF was Table A water, 1,528 AF was Dry Year (Yuba) water, and 4,750 AF was Rosedale-Rio Bravo transfer water. MWD also received 6 AF of SWP water transferred to CVWD under the QSA. As part of CVWD's annual delivery of the 1988 MWD/IID Transfer, 19,097 AF were also delivered at the WWR-GRF.

As shown in **Table 5-6**, CVWD and DWA received 19,103 AF of water at the WWR-GRF and no water was delivered to the MC-GRF (in the Mission Creek Subbasin). This was 87,505 AF less than the 106,608 AF delivered in WY 2020-2021. The remaining 23,034 AF was subtracted from the Advance Delivery Account. At the end of WY 2021-2022, the balance in MWD's Advance Delivery Account was 281,347 AF.
In WY 2021-2022, water delivered to WWR-GRF totaled 19,103 AF, which was used entirely for groundwater replenishment at WWR-GRF.

Table 5-6. Accounting of CVWD and DWA SWP Water Exchanges and Delivery Agreements with MWD in WY 2021-2022

Description	CVWD (AF)	DWA (AF)	Total (AF)
Table A	11,935	4,821	16,756
Article 21 "Interruptible"	0	0	0
Turnback Pool A and B	0	0	0
Multi-Year Pool	0	0	0
Dry Year (Yuba)	1,089	439	1,528
Flex Storage Payback	0	0	0
Article 56 (c) "Carryover" from 2019 delivered in 2020	0	0	0
Rosedale-Rio Bravo	4,750	0	4,750
CVWD QSA Transfer[1]	6	0	6
Total SWP Delivered to MWD	**17,780**	**5,260**	**23,040**
1988 MWD/IID Approval Agreement Exchange[2]			19,097
Total Exchanged			**42,137**
Water Delivered to CVWD and DWA at Whitewater River GRF (WWR-GRF)	--	--	19,103
Water Delivered to CVWD and DWA at Mission Creek GRF (MC-GRF)	--	--	0
Total Delivered to Coachella Valley			**19,103**
Credit to/from Advance Delivery Account[3]	--	--	-23,034
Advance Delivery Account Balance as of September 30, 2022	--	--	281,347

Notes:
1 – The 35,000 AFY of SWP water available through the QSA may be delivered at either Imperial Dam or Whitewater River and is not subject to SWP or Colorado River reliability.
2 - Accounts for -5,000 AFY reduction in MWD/IID Approval Agreement deliveries from 2020–2026. The 2019 Amended and Restated Agreement for Exchange and Advance Delivery of Water with MWD allows for delivery of 1988 MWD/IID Approval Agreement Exchange water through the Whitewater turnout of the CRA from 2020-2026.
3 – Credit to/from Advance Delivery Account is the difference between Total Exchanged and Total Water Delivered to the Indio and Mission Creek Subbasins to CVWD and DWA.

5.3.3 Total Imported Deliveries

Table 5-7 summarizes the total imported water in the Indio Plan Area by water use sector and source during WY 2021-2022. **Table 5-7** is split by the total imported deliveries for direct use by local customers in the Plan Area (271,485 AF) and the total imported deliveries for groundwater replenishment (67,438 AF). Total water imported to the Indio Plan Area was 338,923 AF. This includes 1,904 AF of imported water deliveries used outside the Indio Subbasin.

Table 5-7. WY 2021-2022 Imported Water for Direct Use and Replenishment in Plan Area

Water Use Sector	Water Source	Imported Water Use (AF)	Method of Measurement	Accuracy of Measurement
Agriculture[1]	Coachella Canal	230,227	100% metered	±2%
Urban[2]	Coachella Canal	41,258	100% metered	±2%
Industrial	Coachella Canal	0	100% metered	±2%
Environmental[3]	Coachella Canal	0	Not applicable	--
Total Imported Water for Direct Use[4]		**271,485**		
Exported for Use Outside of Indio Subbasin[5]		*1,904*		
Total Imported Water for Direct Use in Indio Subbasin		269,581		
Groundwater Replenishment	Coachella Canal[6]	48,335	100% metered	±2%
Groundwater Replenishment	SWP Exchange/CRA	19,103	100% metered	±2%
Total Imported Water for Groundwater Replenishment		**67,438**		
Total Imported Water Use in the Indio Plan Area		**338,923**		

Notes:

1 - Includes crop irrigation and fish farms. Includes 837 AF for agricultural use outside the Indio Subbasin.

2 - Includes municipal and recreational uses. Includes 1,067 AF for urban use outside Indio Subbasin.

3 - A small amount of Coachella Canal water is used for wildlife habitat enhancement and mitigation in the East Salton Sea Groundwater Basin.

4 - Excludes regulatory water (6,754 AF) and other conveyance losses.

5 - Water delivered to agricultural and urban users outside Indio Subbasin.

6 - Includes 37,673 AF to Thomas E. Levy Groundwater Replenishment Facility (TEL-GRF) and 10,662 AF to Palm Desert Groundwater Replenishment Facility (PD-GRF).

5.4 RECYCLED WATER

Figure 5-2 shows the locations of water reclamation plants (WRPs) and other wastewater treatment and discharge facilities in the Indio Subbasin. Currently, three WRPs provide recycled water for irrigation in the Indio Subbasin. Of these, two recycled water facilities are operated by CVWD (WRP-7 and WRP-10) and one recycled water facility is operated by DWA using secondary effluent from the City of Palm Springs Wastewater Treatment Plant (CPS WWTP/DWA WRP).

CVWD WRP-7, located north of Indio, has a tertiary treatment capacity of 2.5 million gallons per day (mgd). Recycled water from WRP-7 is used for irrigation of golf courses at Sun City in north Palm Desert and Shadow Hills in north Indio. Recycled water not used for irrigation is either used on site or percolated at onsite and offsite percolation ponds. WRP-7 delivered 2,488 AF of recycled water in WY 2021-2022, including onsite use.

CVWD WRP-10, located in Palm Desert, has a tertiary treatment capacity of 15 mgd and delivers recycled water for irrigation of golf courses and homeowner's associations landscaping within the mid-valley area. WRP-10 recycled water is blended with Canal water particularly in summer months when recycled water supply alone cannot meet non-potable irrigation demands. WRP-10 delivered 8,042 AF of recycled water in WY 2021-2022, including onsite use.

The DWA WRP is located in the City of Palm Springs and has a tertiary treatment capacity of 10 mgd. DWA provides tertiary treatment of secondary treated supply from the City of Palm Springs's WWTP for irrigation of parks and other greenscapes in the Palm Springs area. DWA WRP supplied 3,345 AF of recycled water in WY 2021-2022, including onsite use. **Table 5-8** shows that a total of 13,875 AF of recycled water was used in WY 2021-2022 to offset groundwater pumping.

Four additional WRPs in the Indio Subbasin treat wastewater, but do not generate recycled water. These wastewater treatment facilities are operated by the Valley Sanitary District (VSD), the City of Coachella, and CVWD (WRP-2 and WRP-4); locations of each facility are shown on **Figure 5-2**. For these wastewater treatment facilities, treated effluent is discharged either to on-site percolation/evaporation ponds or to the CVSC. Additionally, the Kent SeaTech Fish Farm has a National Pollution Discharge Elimination System (NPDES) permit to discharge water to the CVSC. **Table 5-9** summarizes the volumes of wastewater treated, recycled, and disposed in the Indio Subbasin by facility (listed from northwest to southeast).

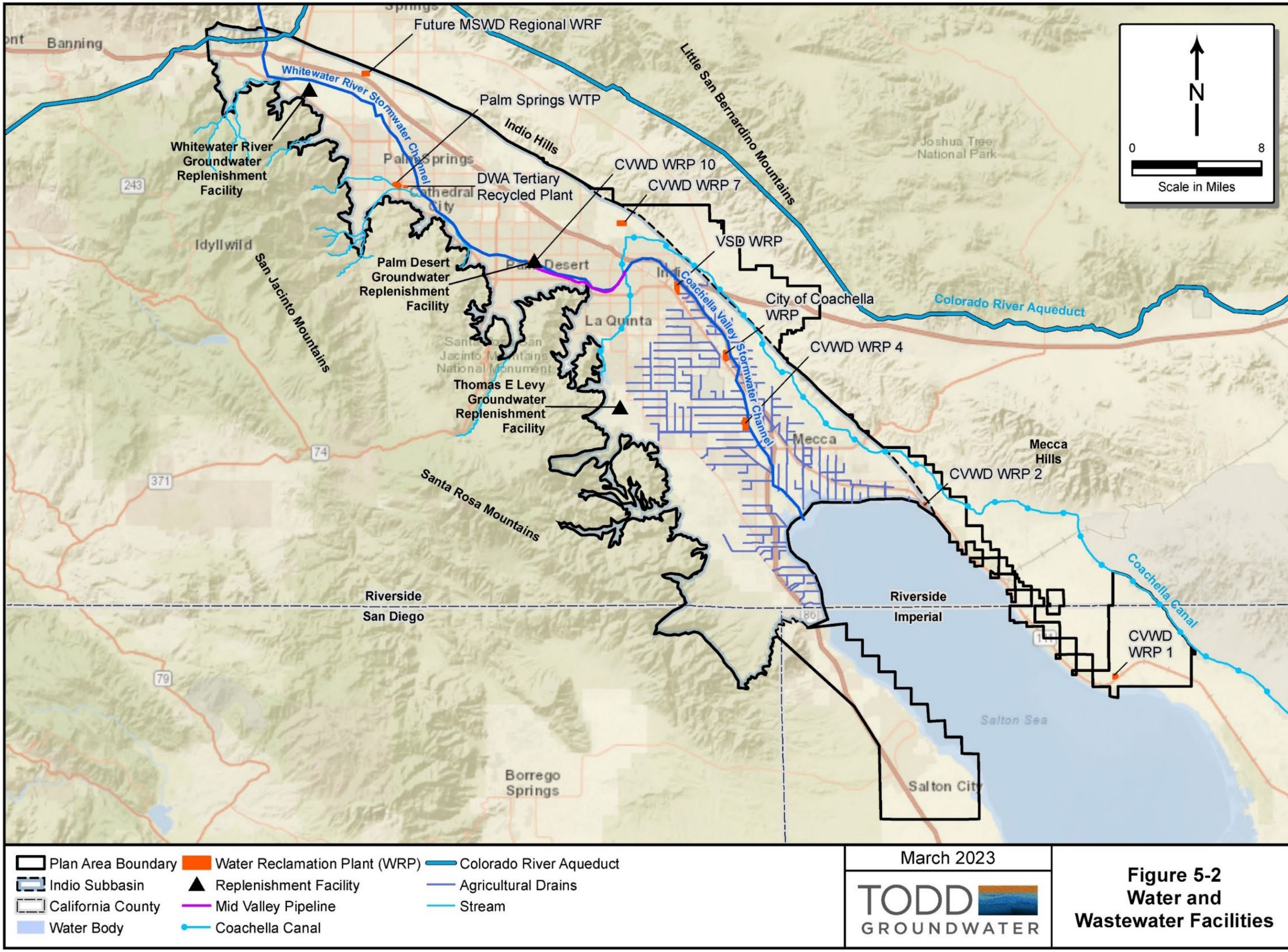


Figure 5-2 Water and Wastewater Facilities

Table 5-8. WY 2021-2022 Recycled Water Use in the Indio Subbasin

Water Use Sector	Water Source	Recycled Water Use (AF)	Method of Measurement	Accuracy of Measurement
Urban[1]	DWA WRP	3,345	100% metered	±2%
Urban[1]	CVWD WRP-7	2,488	100% metered	±2%
Urban[1]	CVWD WRP-10	8,042	100% metered	±2%
Total Recycled Water Use		**13,875**		

Notes:

1 - Includes municipal, recreational, and reclamation plant (including onsite) water uses.

Table 5-9. WY 2021-2022 Wastewater Treatment, Reuse, and Disposal in the Indio Subbasin

Facility	Wastewater Treated (AF)	Recycled Water Use[1] (AF)	Recycled Onsite WRP Use[2] (AF)	Disposal Percolation/ Evaporation (AF)	Disposal to CVSC (AF)
CPS WWTP/DWA WRP	6,036	3,342	3	2,691	N/A
CVWD WRP 7	3,366	2,100	388	878	N/A
CVWD WRP 10	9,349	7,580	462	1,307	N/A
Valley SD WRP[3]	8,460	0	0	0	8,460
City of Coachella WRP[3]	3,886	0	0	0	3,886
CVWD WRP 4	5,889	0	0	0	5,889
Kent SeaTech	6,432	0	0	0	6,432
CVWD WRP 2[4]	17	0	0	17	0
Total	**43,435**	**13,022**	**853**	**4,893**	**24,667**

Notes:

1 - Recycled water sold to customers.

2 - Recycled water for WRP onsite uses.

3 - Data downloaded from the SWRCB.

4 - Includes 14 AF of percolation and 3 AF of evaporation.

6. TOTAL WATER USE

This section presents the total water use for the Plan Area for Water Year (WY) 2021-2022. **Table 6-1** presents a summary of water use by water use sector and water source. As shown in **Table 6-1**, a total of 568,050 acre-feet (AF) of water was used within the Plan Area, and of that, 4,289 acre-feet (AF) was exported for use outside of the Indio Subbasin. **Figure 6-1** shows a comparison of supply and demand for direct use within the Plan Area for WY 2021-2022.

The total water use in the Plan Area was 568,050 AFY. This represents a decrease of 19,582 AF or 3 percent compared to WY 2020-2021 (587,632 AF). Uses outside the Indio Subbasin include (a) Colorado River water exported to areas adjacent to the Indio Subbasin for agricultural use (837 AF) and urban use (1,067 AF) and (b) groundwater pumped from the Indio Subbasin and delivered to Coachella Valley Water District (CVWD) customers in Imperial and Riverside counties on the east and west sides of the Salton Sea (East and West Salton Sea Basins) (2,160 AFY) and pumped by MSWD and delivered to its customers in the Mission Creek Subbasin (225 AFY).

As summarized on **Figure 6-1**, total Plan Area water use is calculated by summing groundwater production, local surface water diversions, Coachella Canal water, and recycled water for agricultural, industrial, urban, and other undetermined uses, and including water exports for use outside the Indio Subbasin.

The 2022 Alternative Plan Update forecasted demand in the Indio Subbasin from 2020 to 2045 based on average current uses, because water demand varies from year to year due in part to local weather conditions (wet and dry year types). The 2022 Alternative Plan Update estimated total water use in 2020 to average 573,408 AF. **Figure 6-2** compares the forecasted demand to the actual water use in WYs 2017-2018 through 2021-2022 and the five-year average (573,408 AFY, shown as a dashed line on **Figure 6-2**). The five-year average actual water use is lower than projected 2022 demands by approximately 20,000 AF.

DWR requires that SGMA Annual Reports be accompanied by tables summarizing water use by type and source. The following required tables are included as **Appendix B**.

A – Groundwater Extractions
B – Groundwater Extraction Methods
C – Surface Water Supply
D – Total Water Use

Table 6-1. WY 2021-2022 Total Direct Water Use by Sector and Source in the Plan Area and Indio Subbasin

Water Use Sector	Water Source (AF)						Method of Measurement	Accuracy of Measurement
	Groundwater Production	Local Surface Water	Imported Water: Colorado River[4]	Imported Water: SWP Exchange	Recycled Water	Total Direct Water Use		
Agriculture[1]	46,494	300	230,227	-	-	**277,021**	99% metered 1% estimated	±2% ±50%
Industrial	1,498	-	-	-	-	**1,498**	16% metered 84% estimated	±2% ±50%
Urban[2]	232,587	311	41,258	-	13,875	**288,031**	99% metered 1% estimated	±2% ±50%
Undetermined[3]	1,500	-	-	-	-	**1,500**	100% estimated	±50%
Total Water Use in the Plan Area	**282,079**	**611**	**271,485**	**0**	**13,875**	**568,050**		
Water Exported for Use Outside Indio Subbasin	**2,385**	**0**	**1,904**	**0**	**0**	**4,289**		
Total Direct Water Use in Indio Subbasin	**279,695**	**611**	**269,581**	**0**	**13,875**	**563,761**		

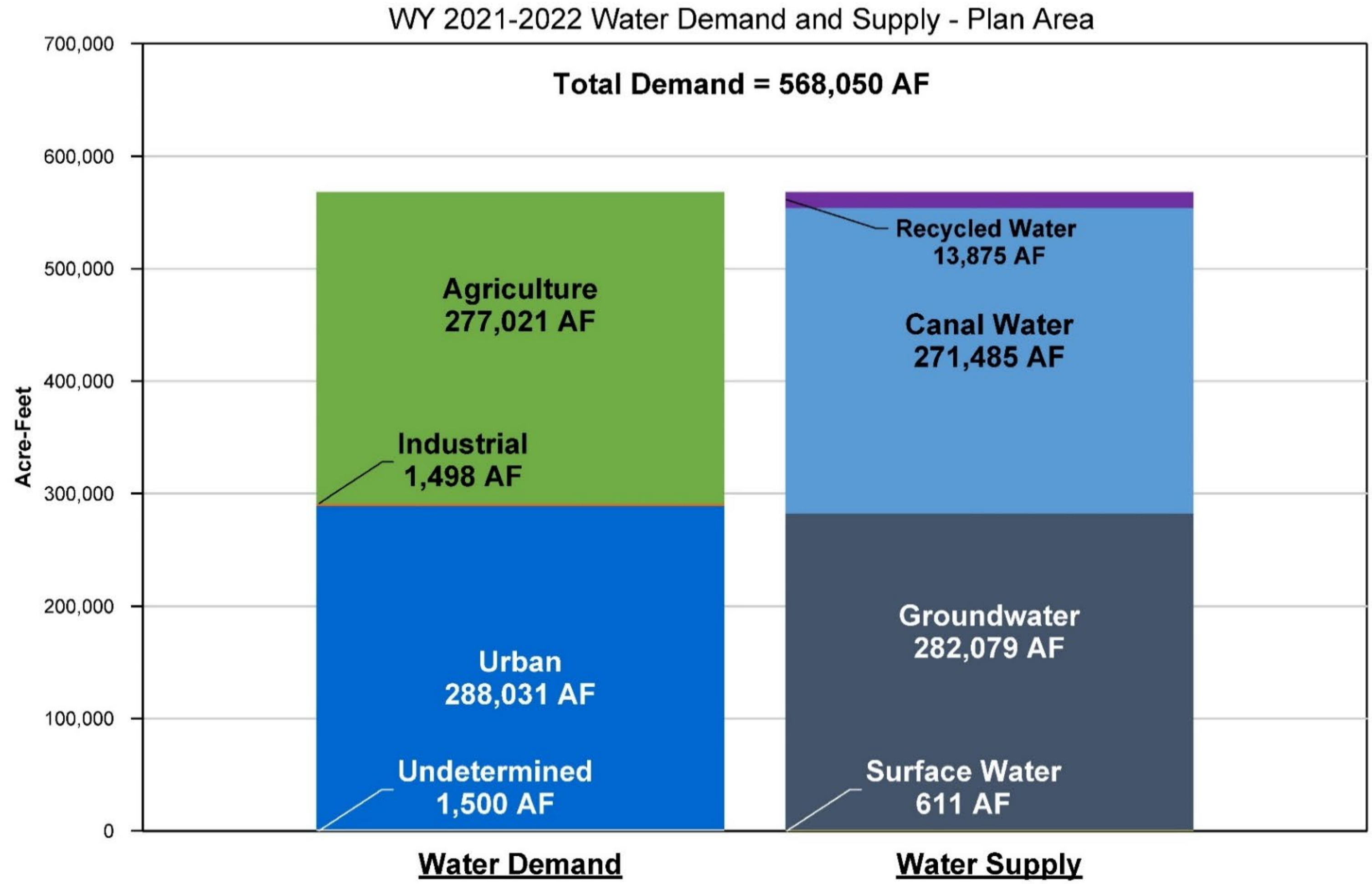
Notes:

1 – Includes crop irrigation and fish farms; includes 837 AF of imported Colorado River water exported for agricultural use in the Desert Hot Springs Subbasin outside the Indio Subbasin.

2 – Includes municipal and recreational uses; includes 1,067 AF of Canal water and 2,385 AF of groundwater exported for use outside the Indio Subbasin for urban use in the Mission Creek Subbasin, Desert Hot Springs Subbasin, and West Salton Sea and East Salton Sea subbasins.

3 – Estimated production by minimal pumpers who do not report production to CVWD (<25 AFY) or DWA (<10 AFY) and estimated additional unreported tribal water use.

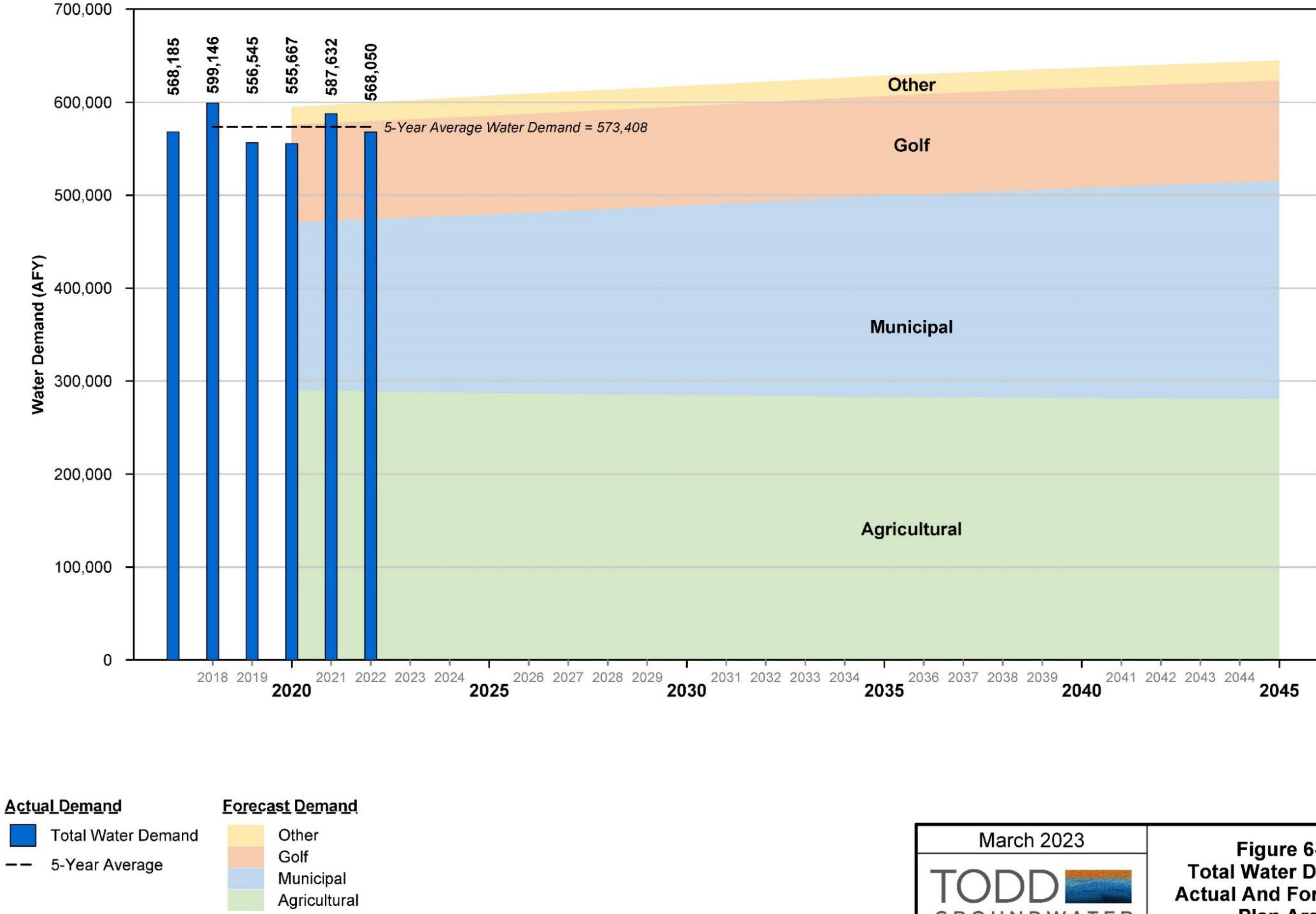
4 - Excludes regulatory water (6,754 AF) and conveyance losses.



March 2023

TODD GROUNDWATER

Figure 6-1
Comparison of Supply and Demand for Direct Use for the Plan Area
WY 2021-2022



March 2023

TODD GROUNDWATER

Figure 6-2
Total Water Demand
Actual And Forecasted
Plan Area

7. CHANGE IN GROUNDWATER STORAGE

This section presents the groundwater balance and change in storage for the Indio Subbasin for Water Year (WY) 2021-2022.

7.1 GROUNDWATER BALANCE

The water budget compares the inflows to and outflows from the Indio Subbasin. The difference between inflows and outflows defines the change in storage over a specific time period, in this case, WY 2021-2022. The annual water balance for the Indio Subbasin in WY 2021-2022 shows a decrease in groundwater storage of 66,547 acre-feet (AF), largely due to the reduction in groundwater replenishment at WWR-GRF. A discussion of major inflows and outflows from the Indio Subbasin is presented below and a stacked bar chart of total groundwater inflows and outflows is presented on **Figure 7-1**. Some elements of the methodology used in calculating the water balance change in storage were modified in WY 2021-2022, including use of the numerical model to be more consistent with the *2022 Alternative Plan Update*, as explained below. The numerical model was updated from December 2019 through September 2022.

7.1.1 Groundwater Inflows

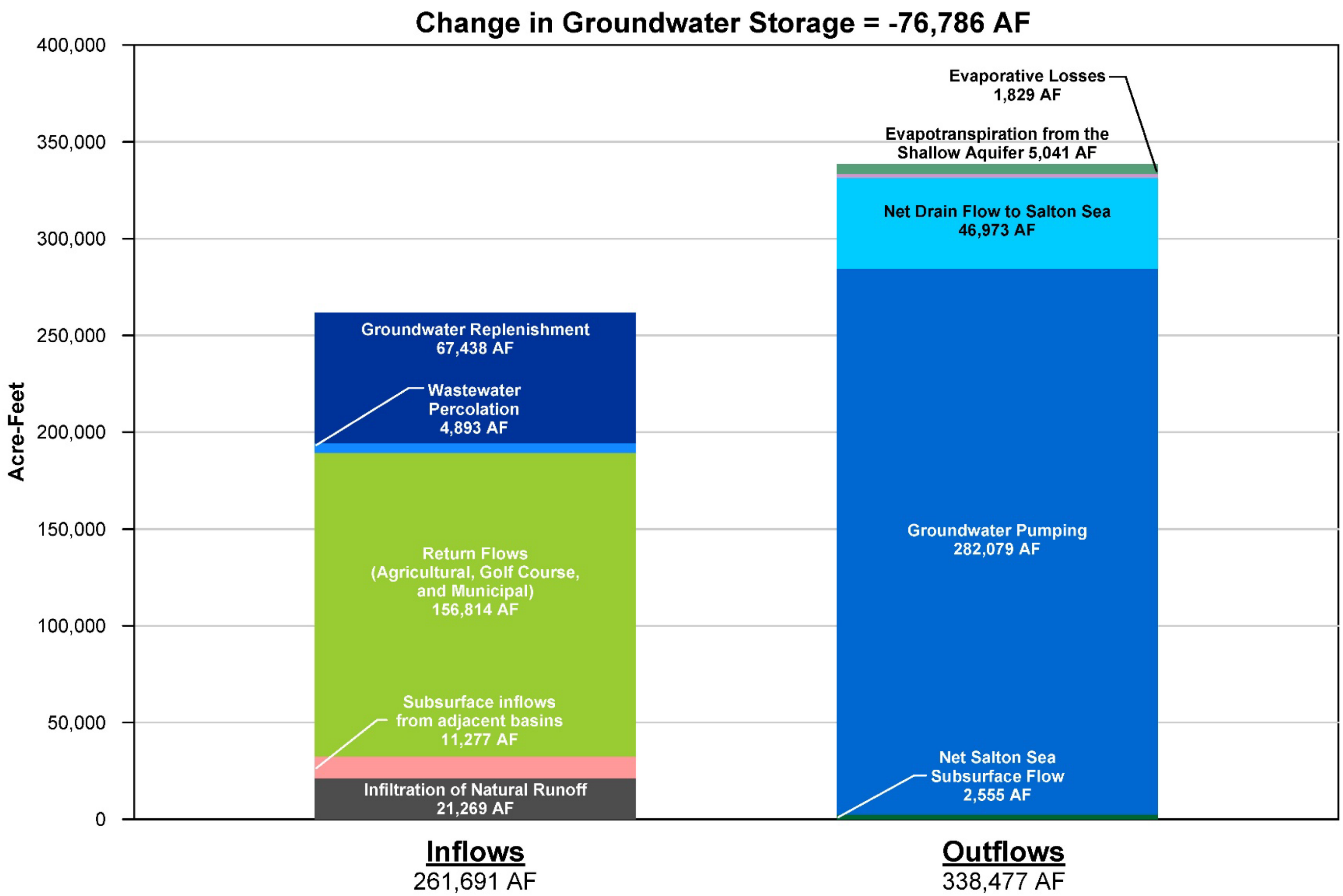
Major inflows to the Indio Subbasin include natural recharge, subsurface inflow (from adjacent subbasins and potentially from the Salton Sea), return flows from use and wastewater percolation, and groundwater replenishment (or artificial recharge).

Natural Recharge

Precipitation that falls in the San Jacinto, Santa Rosa, and Little San Bernardino mountains is the primary source of natural recharge in the Indio Subbasin. A portion of the surface runoff produced by precipitation percolates directly into the subsurface or infiltrates through streambeds. The annual volume of natural recharge varies significantly as the annual volume of precipitation varies widely.

Natural recharge was estimated using the same methodology that was developed for the *2022 Alternative Plan Update* numerical model. The *2022 Alternative Plan Update* groundwater flow model and data were updated to reflect hydrologic conditions through WY 2021-2022. Recharge from mountain front inflow and from percolation of stream flows into the Indio Subbasin was estimated for 24 watersheds and stream channels along the southwest edge of the model, where the Indio Subbasin interfaces with the consolidated rocks of the San Jacinto and Santa Rosa Mountains.

In past annual reports, the long-term average value (45,953 AF) was used in the water budget to represent natural recharge. However, more recent years have experienced less than the long-term average natural recharge and an annual volume is more indicative of natural water year variations. Natural infiltration for WY 2021-2022 was calculated as 21,269 AF, 46 percent of the long-term average (1930-2009).



March 2023

TODD GROUNDWATER

Figure 7-1
Groundwater Balance for the Indio Subbasin WY 2021-2022

Subsurface Inflow

Natural inflow to the Indio Subbasin includes subsurface inflows from the San Gorgonio Pass Subbasin, Mission Creek Subbasin, and Desert Hot Springs Subbasin (**Table 7-1**). Subsurface flow between the Indio Subbasin and adjacent basins in the southeast area of the model (Orocopia Valley, Chocolate Valley and West Salton Sea Basins) is assumed to be negligible due to faulting, semi-permeable bedrock units comprising adjacent basins, short contact boundaries and relatively flat hydraulic gradients compared with other subbasin/basin contact areas. It is assumed that there is no subsurface flow between the Indio Subbasin and the Orocopia and Chocolate Valleys or the West Salton Sea Groundwater Basin. Inflow amounts from upstream basins were simulated in the *2022 Alternative Plan Update* modeling. Historically, these inflows were estimated to range from 7,000 acre-feet per year (AFY) to 13,000 AFY. The model update for this report simulated the annual subsurface inflows to be approximately 11,277 AFY, as shown in **Table 7-1**. Collectively, the calculated natural recharge (21,269 AF) and subsurface inflows (11,277 AF) applied to WY 2021-2022 total 32,546 AF, an eight percent reduction from WY 2020-2021.

Table 7-1. WY 2021-2022 Estimated Average Subsurface Inflows into Indio Subbasin

Subbasin Boundary Transfer	Estimated Average Annual Underflow (AF) [1]
San Gorgonio Pass Subbasin to the Indio Subbasin	7,976
Mission Creek Subbasin to the Indio Subbasin	3,301
Desert Hot Springs Subbasin (Fargo Canyon) to the Indio Subbasin	0.2
Total Subsurface Inflow from Neighboring Subbasins	**11,277**

Notes:

1 - Based on *2022 Alternative Plan Update* numerical model

Infiltration of Applied Irrigation Water

Deep percolation of water applied to agricultural fields, golf courses, and urban landscapes represents a major inflow to the groundwater system and is referred to as irrigation return flow. Irrigation return flows can be calculated based on evapotranspiration (ET), leaching requirements of existing crops and landscaped areas, and assumptions on irrigation methods and their respective efficiencies.

The method of estimating return flows is described in the *2022 Alternative Plan Update*. For WY 2021-2022, irrigation return flow (agricultural, municipal, and golf uses) in the Indio Subbasin was estimated to be 156,814 AF. The geographic distribution of these return flows was developed to update the *2022 Alternative Plan Update* model and the volumes were increased proportionally to the increased direct water use in these sectors. The municipal return flows include septic system percolation.

Wastewater Percolation

The urban portions of the Indio Subbasin are served primarily by municipal sewer systems that convey wastewater to municipal wastewater treatment/reclamation plants. A portion of the treated wastewater that is not reused is conveyed to percolation/evaporation ponds as described in Section 5. Wastewater disposal to percolation/evaporation ponds was 4,893 AF for WY 2021-2022. For groundwater balance purposes, a two percent evaporation loss is applied to wastewater evaporation as an outflow.

Groundwater Replenishment

Artificial recharge is accomplished in the western portion of the Indio Subbasin at the WWR-GRF, in the mid-valley at the PD-GRF, and in the eastern portion of the Indio Subbasin at the TEL-GRF.

The source of replenishment water for the WWR-GRF is SWP exchange water (exchanged for Colorado River water via the Colorado River Aqueduct (CRA) and QSA water, while the source of replenishment water for the PD-GRF and TEL-GRF is Colorado River water imported through the Coachella Canal. Canal water is delivered to the PD-GRF via the MVP.

In WY 2021-2022, 67,438 AF of imported water was used for groundwater replenishment in the Indio Subbasin. Of this volume, 19,103 AF were replenished at the Whitewater River Groundwater Replenishment Facility (WWR-GRF) (see **Table 5-7**). Of the 48,335 AF of Colorado River (Coachella Canal) water delivered for replenishment, 37,673 AF were replenished at the Thomas E. Levy Groundwater Replenishment Facility (TEL-GRF), and 10,662 AF were replenished at the Palm Desert Groundwater Replenishment Facility (PD-GRF) (**Table 5-7**). Replenishment in WY 2021-2022 represents a 56 percent decrease from last water year's replenishment (154,848 AF). Colorado River supplies to TEL-GRF and PD-GRF remained about the same as the previous year, however imported water to WWR-GRF decreased by more than 87,000 AF. For groundwater balance purposes, a four percent evaporation loss is applied to WWR-GRF and a two percent evaporation loss is applied to all other replenishment water deliveries.

7.1.2 Groundwater Outflows

Indio Subbasin groundwater outflows consist of:

- Groundwater pumping to meet water demands,
- Flow from the semi-perched aquifer through the agricultural drains into the Salton Sea,
- ET from groundwater replenishment, wastewater percolation and semi-perched aquifer, and
- Subsurface flow out of the Indio Subbasin, into the aquifers beneath the Salton Sea.

Groundwater Pumping

Groundwater pumping is the largest component of outflow from the Indio Subbasin. During WY 2021-2022, 282,079 AF of groundwater was pumped for beneficial uses within the Plan Area as shown in **Table 4-1**.

Flow to Drains

In the eastern portion of the Indio Subbasin, the confining unit of the Upper Aquifer impedes deep percolation of applied water at the surface, resulting in saturated soil conditions that can reduce agricultural productivity. In the 1930s, a network of drains was constructed to alleviate this condition. The CVSC and 27 drains that flow to the Salton Sea receive intercepted shallow groundwater from agricultural fields. Following the delivery of Coachella Canal water to the Coachella Valley in 1949, subsurface (tile) drainage systems were soon installed to control the high-water table conditions and to intercept poor quality shallow groundwater. Coachella Valley Water District (CVWD) currently maintains 21 miles of open drains and 166 miles of subsurface pipe drains serving 37,425 acres of agricultural lands in the Coachella Valley (CVWD, 2018a).

Provision of shallow drainage reduces the percolation of poor-quality return flows into the deeper potable aquifers. Flow in the drains increased steadily as additional tile drains were installed, until the early 1970s. Agricultural drainage flow remained relatively stable through the 1970s and steadily declined through 2009. Drain flow (excluding wastewater discharges and fish farm effluent) has decreased steadily from a high of approximately 158,000 AF in 1976, to 58,800 AF in 1999, and about 40,000 AF in 2009. Since 2009, drain flows have increased in part because of higher groundwater levels in the eastern Indio Subbasin.

CVWD monitors drain flows to the Salton Sea on a monthly basis. Drain flows are either metered or measured once per month using current meter and cross-sectional areas. The USGS also operates a continuous flow gauge near the terminus of the Coachella Valley Storm Channel (CVSC) (USGS Gauge Number 10256540 on **Figure 5-1**). As shown in **Table 7-2**, the total measured drain flow to the Salton Sea in WY 2021-2022 was approximately 77,827 AF; this is a 3.5 percent decrease from WY 2020-2021 (80,720 AF). It is noted here that the drain flows from the Grant St. drain were previously underestimated for WY 2019-2020 and WY 2020-2021 as two meters began to be used to measure flows in this drain but have been corrected for WY 2021-2022.

The CVSC and drain system also receive flows of Coachella Canal water that exceed requested deliveries (regulatory water), treated wastewater, and fish farm effluent. These flows must be deducted from the total flow to calculate the amount of groundwater leaving the Indio Subbasin through the drain system. **Table 7-3** indicates that 46,973 AF of drain water flowed from the shallow groundwater system to the Salton Sea in WY 2021-2022.

<u>Subsurface Flow to the Salton Sea</u>

Historically, when groundwater levels were relatively high, groundwater naturally flowed toward the Salton Sea. Shallow semi-perched groundwater discharged into the Salton Sea and deeper groundwater left the Indio Subbasin as subsurface outflow. As groundwater levels in the southeastern portion of the Indio Subbasin declined, the rate of outflow to the Salton Sea decreased.

The Salton Sea is simulated in the *2022 Alternative Plan Update* model as a general head boundary (GHB) with time-varying elevations. The model was updated to reflect actual Salton Sea elevations. Both groundwater outflow to the Sea and inflow from the Sea are simulated, depending on location, time period, and hydraulic gradients between the shallow aquifer and the Sea. Simulated net flow between the Sea and groundwater system is relatively small and has become a net outflow in recent years. In WY 2021-2022, the net subsurface outflow to the Salton Sea was simulated as 2,555 AFY.

Table 7-2. WY 2021-2022 Measured Drain Flows from the Indio Subbasin to the Salton Sea

Drain	Measured Drain Flows (AF)[1]
A Channel	935
Arthur 0.5	1,554
Arthur St.	1,646
Ave 74	651
Ave 76	1,831
Ave 78	157
Ave 79	1,118
Ave 83	458
C Channel	1,176
Caleb Channel	759
Cleveland 0.5	952
Cleveland East	124
Cleveland West	479
Coachella Valley Storm Water Channel	44,941
D Channel	1,109
E Channel	987
F Channel	0
Garfield 0.5	2,290
Garfield St.	1,733
Grant 0.5	1,777
Grant St.[2]	2,801
Hayes	870
Hayes 0.5	368
Johnson St.	3,504
Lincoln-Oasis	4,163
McKinley	719
McKinley 0.5	416
Oasis-Grant	309
Total Drain Flows	**77,827**

Notes:
1 – Drain flows are either metered or measured once per month using current meter and cross-sectional areas. If conditions are unsafe for metering, flows are estimated based on the average for the three previous years. Total shown reflects rounding.

Table 7-3. WY 2021-2022 Net Subsurface Drain Flow from the Indio Subbasin to the Salton Sea

Component	Net Drain Flow (AF)
Total Measured Drain Flow	77,827
Storm Flow[1]	-42
Adjusted Regulatory Water[2]	-6,145
Valley Sanitary District	-8,460
Coachella Water Authority	-3,886
WRP-4	-5,889
Kent SeaTech	-6,432
Net Drain Flow to Salton Sea	**46,973**

Notes:
1 – Storm flow is the volume of Coachella Valley Stormwater Channel flow attributed to storm events and is calculated using a base flow separation methodology.

2 – Regulatory Water is Canal water in excess of water orders that must be discharged to the drain system (6,754 AF). Regulatory water is adjusted for amounts not captured by monthly drains measurements because discharges are not occurring at time of handheld current measurements or are measured through a separate meter than a drain's dedicated tile drainage meter.

Evapotranspiration (ET)

Prior to agricultural development, water loss through ET was significant above the semi-perched aquifer in the southeastern portion of the Indio Subbasin. As native landscapes were converted to agriculture, groundwater loss to ET decreased. The installation of the drain system in the 1950s and 1960s lowered groundwater levels in the semi-perched aquifer, further reducing ET losses. Increased pumping in the 1980s and 1990s may have resulted in further declines in groundwater elevations and ET. The *2022 Alternative Plan Update* model was updated for WY 2021-2022 and ET from the shallow aquifer was simulated as 5,041 AF.

Additionally, a portion of the imported water used for groundwater replenishment and/or disposed as wastewater is assumed to be lost to evaporation. It is estimated that 1,829 AF of water was lost to evaporation from the wastewater disposal ponds and groundwater replenishment spreading basins, assuming a factor of two percent of total volume for groundwater replenishment and wastewater disposal ponds, with the exception of WWR-GRF where it is assumed a factor of four percent. Because of the decrease in replenishment at WWR-GRF, the evaporation from replenishment was also greatly reduced.

7.1.3 Annual Change in Groundwater Storage

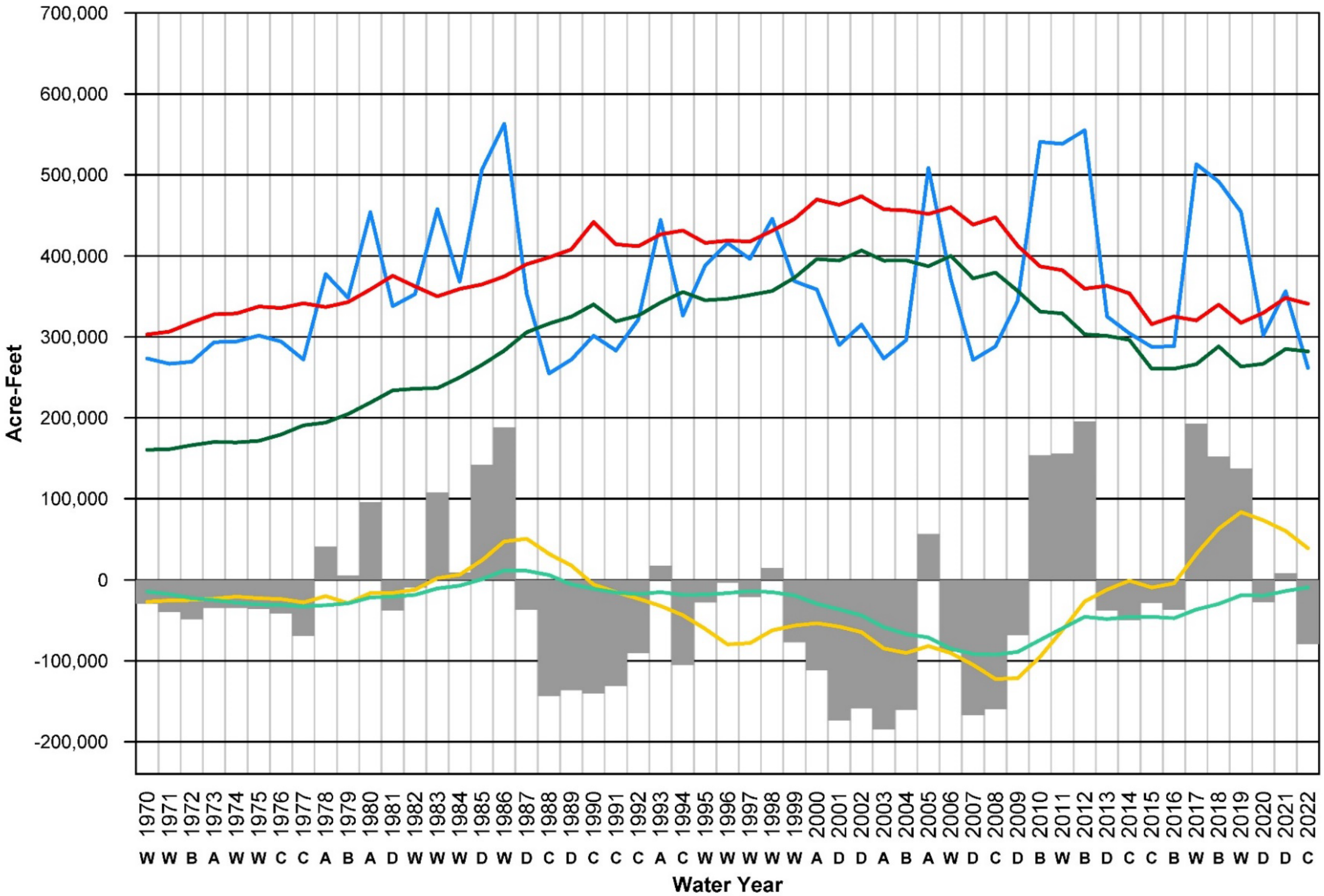
Table 7-4 and **Figure 7-1** shows inflows to and outflows from the Indio Subbasin and the estimated annual change in groundwater storage for WY 2021-2022. During periods of high artificial recharge, the change in storage tends to be positive (water in storage increases). In dry years, periods of low artificial recharge, or periods of high pumping, the change in storage is often negative (storage decreases). WY 2021-2022 was a dry year, and managed artificial recharge was decreased. The Indio Subbasin had a net decrease of 76,786 AF in storage. However, water levels remained above the minimum thresholds (MTs) in all key wells and previous years of groundwater replenishment continue to keep the basin sustainable despite short-term dry years like WY 2021-2022.

Long-term sustainability is typically assessed based on changes in groundwater storage over a historical period on the order of 10 to 20 years that includes wet and dry periods. **Figure 7-2** shows the annual change in groundwater storage from 1970 through WY 2021-2022 (gray columns). The starting year of 1970 was selected as it is three years before imported water replenishment commenced in the Indio Subbasin. The data used to prepare this figure are based on calendar year until WY 2016-2017, when data sources were compiled for the water year for the first Annual Report. WY 2021-2022 is the second year that the numerical model was used to simulate the change in storage. The model from the 2022 Alternative Plan was updated to reflect conditions through September 2022. Previous years relied on analytical solutions developed to estimate natural processes and long-term averages.

Figure 7-2 also shows the annual inflows, outflows, groundwater production, and ten-year and twenty-year running-average change in groundwater storage. As shown on the chart, annual inflows to the Indio Subbasin (blue line) are highly variable with years of high inflows corresponding to wet years when SWP delivery volumes were greater. Higher inflows in the mid-1980s occurred when Metropolitan Water District (MWD) commenced large-scale advanced water deliveries to the Indio Subbasin. The chart shows that after an extended period of decline, the twenty-year running average change in storage showed a positive trend since 2009, and the ten-year running average has been positive since 2017.

Table 7-4. WY 2021-2022 Groundwater Balance in the Indio Subbasin

Groundwater Balance Component	WY 2021-2022 Flows (AF)
Inflows	
Infiltration of natural runoff[1]	21,269
Subsurface inflows from adjacent basins	11,277
Return Flows (Agricultural, Golf Course, and Municipal[2])	156,814
Wastewater percolation	4,893
Groundwater replenishment	67,438
Total Inflow	**261,691**
Outflows	
Subsurface outflow to adjacent basins[5]	0
Groundwater pumping	282,079
Net drain flow to Salton Sea[3]	46,973
Net Salton Sea subsurface flow[5]	2,555
Evaporative losses[4]	1,829
Evapotranspiration from the shallow aquifer[5]	5,041
Total Outflow	**338,477**
Change in Groundwater Storage	**-76,786**



Note:
Values shown prior to 2017 are on a calendar year basis.
Letters below the years indicate Sacramento Valley Water Year Type:
W = Wet
A = Above Normal
B = Below Normal
D = Dry
C = Critically Dry

Annual Inflows
Annual Ouflows
Groundwater Production
10-year Average Change in Storage
20-year Average Change in Storage
Annual Change in Storage

March 2023

TODD GROUNDWATER

Figure 7-2
Historical Annual Change in Groundwater Storage in the Indio Subbasin

While the goal of the CVWMP was to eliminate groundwater overdraft, not to restore the Indio Subbasin to historical conditions, it is worth noting that since 2009 the Indio Subbasin has recovered approximately 750,000 AF of groundwater in storage, or about 40 percent of the cumulative depletion observed from 1970 to 2009. **Figure 7-3** shows the cumulative change in storage since 1970. The Indio Subbasin was at its minimum storage in 2009 (with a calculated storage loss of 1,890,000 AF from 1970 to 2009, which represents 6 percent of the estimated storage capacity of the Indio Subbasin). Since 2009, groundwater pumping has decreased by about 20 percent and replenishment activities have increased leading to the observed recovery of groundwater in storage.

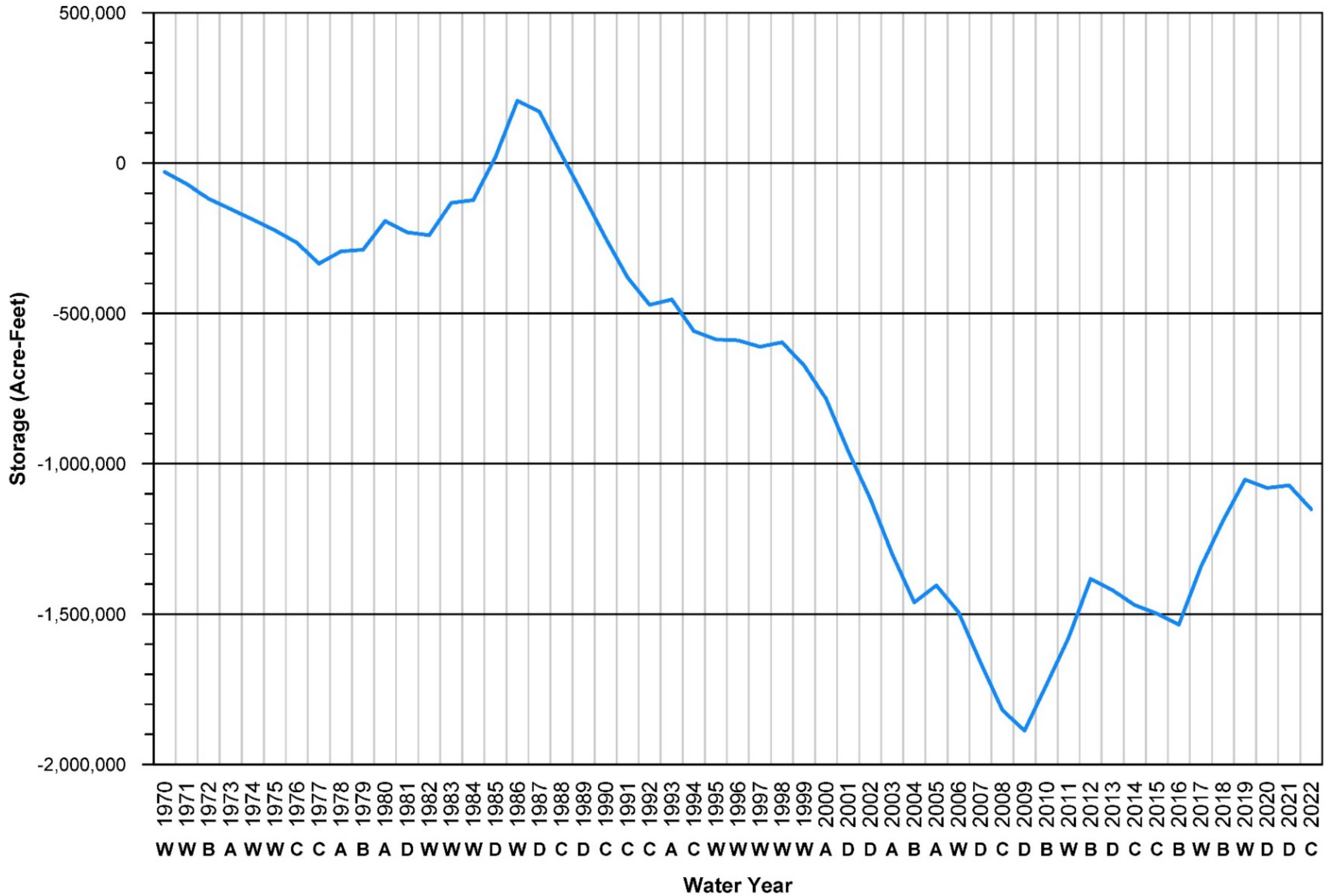
The recovery of groundwater storage and the positive trends in the water balance demonstrate the progress being made through implementation of the Alternative Plan.

7.2 CHANGE IN GROUNDWATER ELEVATION MAPS

Figure 7-4 and **Figure 7-5** show one-year and long-term groundwater elevation change maps, respectively. In addition to the main map frame, two separate zoomed-in frames are included on each figure to show calculated water level changes for the numerous wells in the mid-valley area and TEL-GRF vicinity. The change in groundwater elevation is based on the difference between the average groundwater elevations for wells monitored in the Indio Subbasin during WY 2020-2021 and WY 2021-2022 (one-year) and WY 2008-2009 and WY 2021-2022 (long-term). Current groundwater elevations were compared to WY 2008-2009 because that water year represented recent historical lows for much of the basin. **Figure 7-3** shows the volume of recovery since those historical lows. Careful consideration was taken to ensure that average water level measurements for each well for the respective water years were comparable.

7.2.1 One-Year Change (WY 2020-2021 to WY 2021-2022)

Figure 7-4 shows the one-year change in average groundwater elevations from WY 2020-2021 to WY 2021-2022 for the Indio Subbasin. Groundwater levels in most of the Indio Subbasin were generally stable from WY 2020-2021 to WY 2021-2022. However, in the northwestern area of the Subbasin in the immediate vicinity of the WWR-GRF, groundwater levels declined compared with WY 2020-2021, due to reduced replenishment in WY 2021-2022. This represents the second year of less than average groundwater replenishment in WWR-GRF resulting in lower groundwater levels in the vicinity of the facility. Groundwater levels at all Key Wells remain above the minimum thresholds (MTs). In the central portion of the Indio Subbasin from Palm Desert to La Quinta, groundwater levels remained stable including around the PD-GRF and TEL-GRF.



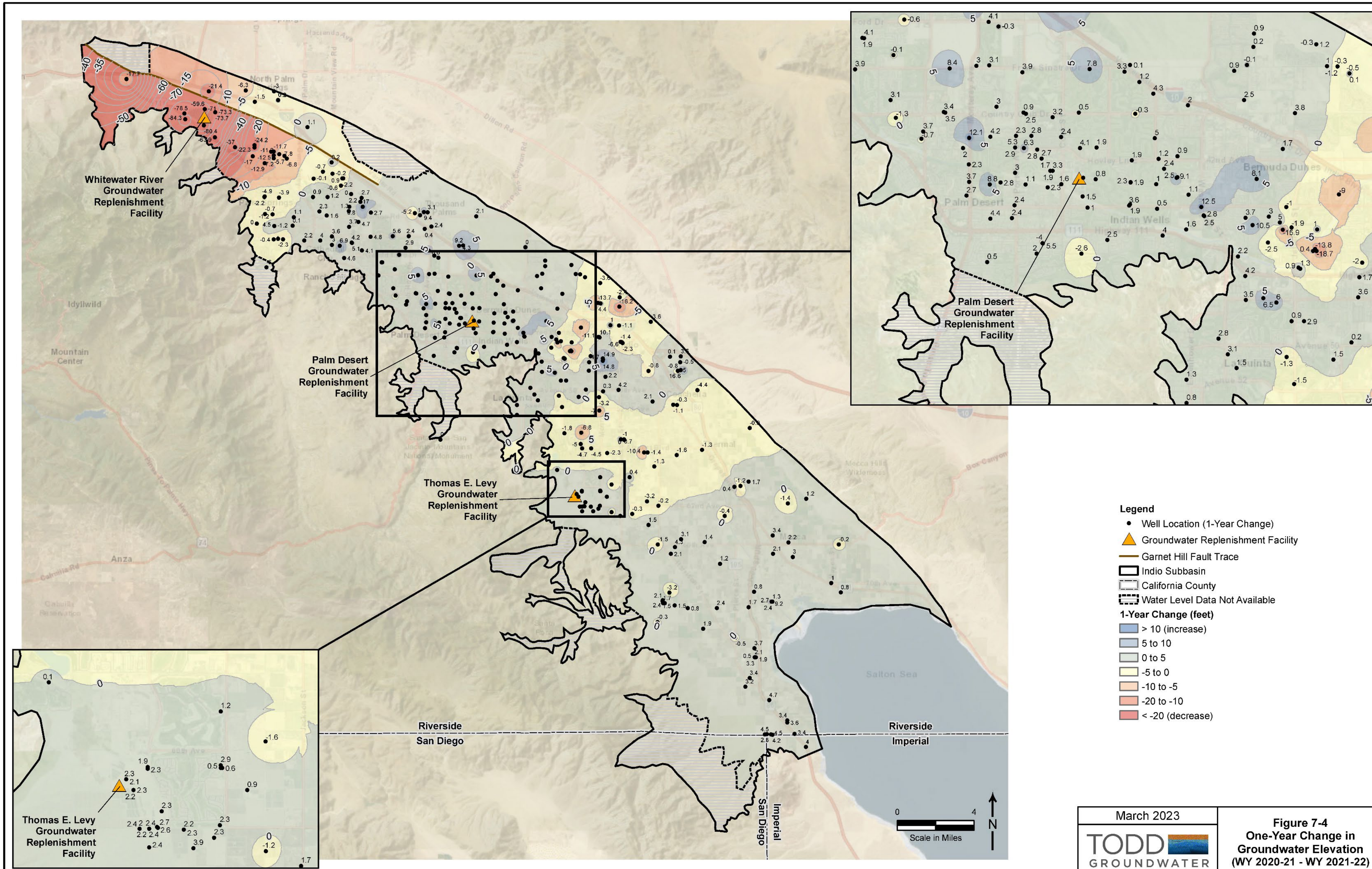
Note:
Values shown prior to 2017 are on a calendar year basis.
Letters below the years indicate Sacramento Valley Water Year Type:
W=Wet, A=Above Normal, B=Below Normal, D=Dry, C=Critically Dry

Cumulative Change in Storage since 1970

March 2023

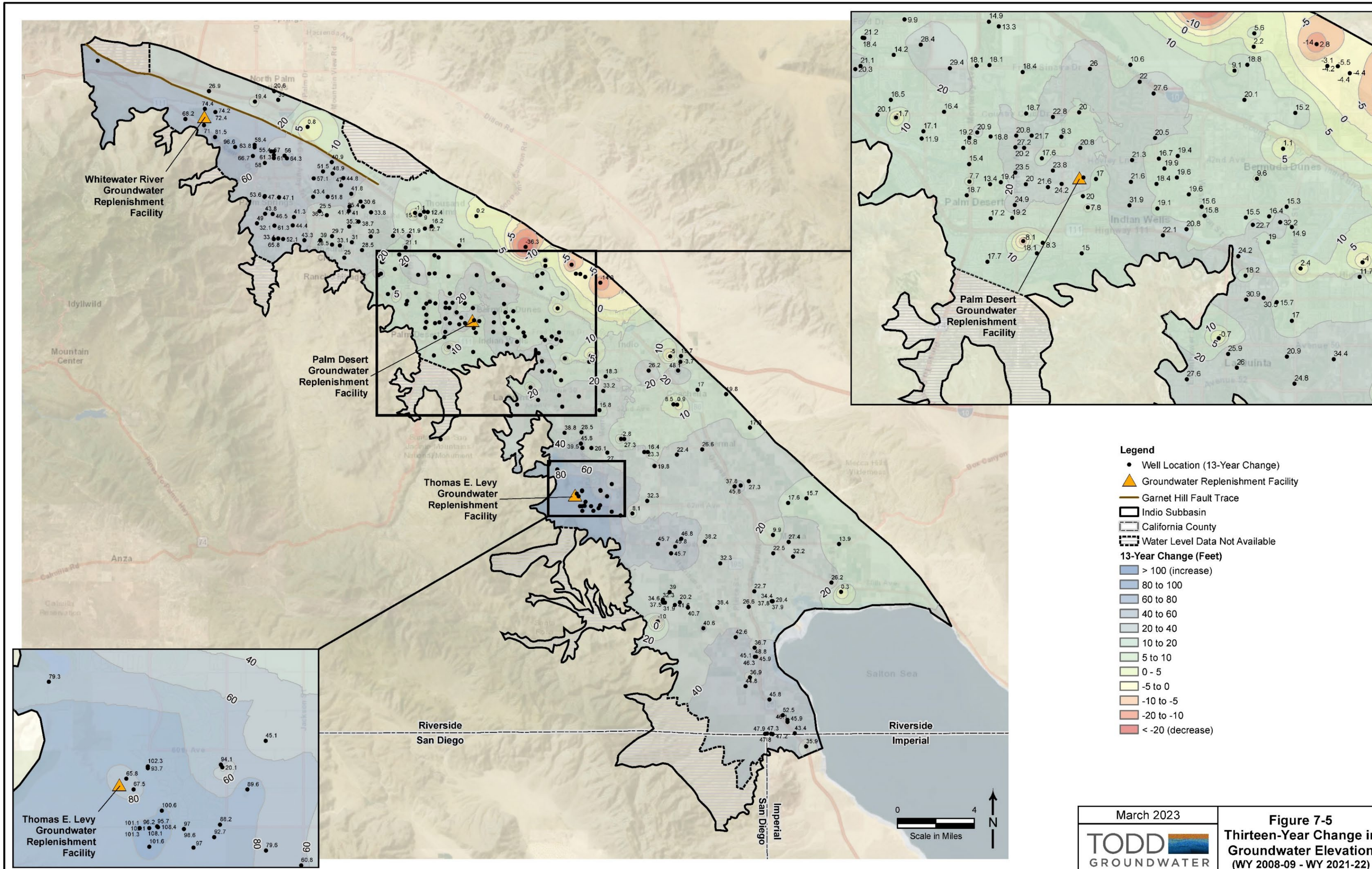
TODD GROUNDWATER

Figure 7-3
Cumulative Change in Groundwater Storage Since 1970


Whitewater River Groundwater Replenishment Facility
Palm Desert Groundwater Replenishment Facility
Thomas E. Levy Groundwater Replenishment Facility
North Palm Springs
Thousand Palms
Palm Desert
Indian Wells
La Quinta
Bermuda Dunes
Idyllwild
Mountain Center
Anza
Salton Sea
Riverside
San Diego
Riverside
Imperial
San Diego
Imperial
Legend
Well Location (1-Year Change)
Groundwater Replenishment Facility
Garnet Hill Fault Trace
Indio Subbasin
California County
Water Level Data Not Available
1-Year Change (feet)
> 10 (increase)
5 to 10
0 to 5
-5 to 0
-10 to -5
-20 to -10
< -20 (decrease)
0
4
Scale in Miles
N
March 2023
TODD GROUNDWATER
Figure 7-4
One-Year Change in Groundwater Elevation
(WY 2020-21 - WY 2021-22)

7.2.2 Thirteen-Year Change (WY 2008-2009 to WY 2021-2022)

Figure 7-5 shows the long-term change in average groundwater elevations from WY 2008-2009, a period of historical lows, to WY 2021-2022 for the Indio Subbasin. While groundwater replenishment was reduced in WWR-GRF, the long history of consistent recharge at this facility has resulted in increased long term water levels and has helped maintain the basin in critical dry years such as WY 2021-2022. Replenishment at TEL-GRF and PD-GRF continued in WY 2021-2022 without reduction. Groundwater levels in most of the Indio Subbasin have increased over the past 13 years. The largest groundwater level increases are observed downgradient of the WWR-GRF in the Palm Springs area and in the vicinity of the TEL-GRF and PD-GRF, with water level increases of up to about 90 feet directly downgradient of the WWR-GRF, about 100 feet near the TEL-GRF, and about 25 feet near the PD-GRF. In the greater mid-valley area near Palm Desert, Indian Wells, and La Quinta, groundwater level increases have risen about 20 feet, reflecting the benefits of source substitution, conservation programs, and recharge operations. Some localized declines have occurred northeast of Bermuda Dunes. Groundwater levels in the southeastern portion of the Indio Subbasin have generally increased, typically between 10 and 50 feet, reflecting storage benefits from replenishment operations at the TEL-GRF and decreased pumping.



Whitewater River Groundwater Replenishment Facility
Palm Desert Groundwater Replenishment Facility
Thomas E. Levy Groundwater Replenishment Facility
Riverside
San Diego
Riverside
Imperial
Legend
Well Location (13-Year Change)
Groundwater Replenishment Facility
Garnet Hill Fault Trace
Indio Subbasin
California County
Water Level Data Not Available
13-Year Change (Feet)
> 100 (increase)
80 to 100
60 to 80
40 to 60
20 to 40
10 to 20
5 to 10
0 - 5
-5 to 0
-10 to -5
-20 to -10
< -20 (decrease)
0 4
Scale in Miles
N
March 2023
TODD GROUNDWATER
Figure 7-5
Thirteen-Year Change in Groundwater Elevation
(WY 2008-09 - WY 2021-22)

8. DESCRIPTION OF PROGRESS

Building on the original 2002 Coachella Valley Water Management Plan (CVWMP), the 2010 CVWMP Update was adopted in January 2012 with the goal "to reliably meet current and future water demands in a cost-effective and sustainable manner" and meet the following objectives:

1. Meet current and future water demands with a 10 percent supply buffer.
1. Eliminate long-term groundwater overdraft.
2. Manage and protect water quality.
3. Comply with state and federal laws and regulations.
4. Manage future costs.
5. Minimize adverse environmental impacts.

In response to adoption of the Sustainable Groundwater Management Act (SGMA) in 2014, the Indio Subbasin Groundwater Sustainability Agencies (GSAs) collaboratively submitted to DWR the *2010 CVWMP*, accompanied by a Bridge Document, as an Alternative to a Groundwater Sustainability Plan (GSP) for the Indio Subbasin that describes how the existing *2010 CVWMP* met the requirements of the SGMA. DWR approved the *2010 CVWMP Update* as an Alternative Plan in July 2019. SGMA requires plan updates every 5 years. In compliance with SGMA, the GSAs updated and adopted the 2022 Indio Subbasin Water Management Plan Update (*2022 Alternative Plan Update*) to fulfill that requirement.

This section provides an update of the status of *2022 Alternative Plan Update* implementation activities during WY 2021-2022. The GSAs have made significant progress in moving forward many of these PMAs.

8.1 IMPLEMENTATION OF PROJECTS AND MANAGEMENT ACTIONS

The *2022 Alternative Plan Update* identified the following water management strategies to achieve water reliability and resilience through the planning horizon:

- Fully use available Colorado River water supplies
- Support improvement of the long-term reliability of SWP supplies, including participation in the Delta Conveyance Facility (DCF)
- Continue developing recycled water as a reliable local water supply
- Implement source substitution and replenishment for resilience in response to changing conditions and for maintenance of long-term groundwater supply reliability
- Increase water-use efficiency across all sectors
- Participate in development of the Coachella Valley Salt and Nutrient Management Plan (CV-SNMP) to address salt and nutrient management in the Indio Subbasin.

To accomplish this, the GSAs updated and expanded the list of PMAs that support water management within the Subbasin. Thirty PMAs were identified based on priorities set by the GSAs and stakeholders; these represent a wide variety of activities by the four GSAs. Projects are classified into four categories based on project benefits: water conservation, water supply development, source substitution and replenishment, and water quality protection.

The following sections provide a summary of the PMAs included in the *2022 Alternative Plan Update* grouped by category. Please refer to the *2022 Alternative Plan Update* for more detailed information on the PMAs and to **Table 8-1** below for the current status of the PMAs.

8.2 WATER CONSERVATION

Water conservation is a major component of overall water management in the Indio Subbasin. As a desert community reliant upon imported water supplies, the Coachella Valley has and will continue to use its water resources efficiently. The *2022 Alternative Plan Update* included water conservation efforts for agriculture, urban, and landscaping water demands, and the GSAs continue to expand and strengthen water conservation programs not only through the *2022 Alternative Plan Update*, but also through other efforts, such as the Coachella Valley Regional Water Management Group (CVRWMG). This section summarizes existing and proposed urban, agricultural, and golf course water conservation activities in the Coachella Valley.

PMA 1: Urban Water Conservation

For the past three decades, water purveyors have placed a significant focus on urban water conservation as a way of life to address the increasing water demands due to population growth and economic development in the Coachella Valley. Local urban water conservation programs began as early as 1988. The Indio Subbasin GSAs manage a suite of conservation programs and activities designed to increase efficiency, reduce future water demand, and support fulfillment of the statewide Water Conservation Act.

The Regional Water Conservation Program (Regional Program) has been a cornerstone of water conservation in the Coachella Valley. Implemented in 2013 by the CVRWMG, this multifaceted Regional Program has achieved a significant level of conservation through programs and activities designed to increase efficiency, reduce future water demand, and assist the Coachella Valley in meeting regulatory requirements. The Regional Program funds many of the conservation programs as well as the CV Water Counts (www.cvwatercounts.com) conservation website.

The demand management programs highlighted in the *2020 Coachella Valley Regional Urban Water Management Plan* (*2020 RUWMP*) (CVWD, et al., 2021c) and refined by the GSAs include but are not limited to landscape plan checks, residential and large landscape smart controller rebates, residential turf conversions, water waste investigations, toilet and clothing washer rebates, commercial and residential plumbing retrofits, and efficient rotating nozzles. The GSAs will continue to seek grant funding to support ongoing delivery and expansion of their conservation programs.

In WY 2021-2022, the Indio Subbasin GSAs have continued implementation of water conservation programs for both large landscape customers and residential customers in the Subbasin. For example, the design was completed for an expanded demonstration garden for drought tolerant plants, and landscape workshops were held in the spring and fall. GSAs continue to develop water use efficient landscape standards, pursue grant funding for expanded turf removal and conservation studies, update and implement rates, monitor leaks and losses, prevent water waste, and increase rebates for water-efficient appliances and for turf removal.

As part of the *2020 RUWMP,* the GSAs have also each developed and adopted a Water Shortage Contingency Plan (WSCP) (CVWD et al., 2021c). Each WSCP included six shortage response levels and associated voluntary and mandatory actions for conservation, depending on the causes, severity, and anticipated duration of the water supply shortage. These response actions have been used effectively in the past and could be implemented as needed, as part of the GSAs' adaptive management strategy. During WY 2021-2022 the GSAs were in Shortage Level 2 of their respective WSCPs and implemented selected actions from higher levels, based on a state-wide emergency drought mandate. Coachella Valley Water District (CVWD) also imposed drought penalties for customers not reducing outdoor consumption by 10 percent.

PMA 2: Golf Water Conservation

Golf water conservation has been implemented by CVWD since development of the 2002 CVWMP and recognition that demand management was essential to balancing the Indio Subbasin. The CVWD Landscape Ordinance (Ordinance No. 1302.5, last updated July 2020) establishes uniform landscaping standards throughout the Coachella Valley and is one of the few ordinances in the State to establish turf limitations for new and renovated golf courses. CVWD is committed to working with new and existing golf courses to reduce water demands through programs such as irrigation system audits, scheduling irrigation with the best available science, plan checking, inspecting new golf courses for plan check compliance, and monitoring maximum water allowance compliance.

In December 2013, CVWD collaborated with the local chapter of the Golf Course Superintendents Association to create a Golf and Water Task Force. In collaboration with the golf course representatives on the Task Force, CVWD launched the golf course rebate program in 2015, after securing a State grant. In WY 2022, CVWD held regular meetings with the Golf and Water Task Force and offered mapping and water budget modeling to golf courses. CVWD and Desert Water Agency (DWA) applied for grant funds for golf course turf conversion.

CVWD's non-potable water program currently has 54 golf courses connected to the Mid-Valley Pipeline (MVP), the Coachella Canal, or the blended delivery systems from WRP-7 and WRP-10. The conversion of golf courses from private production wells to non-potable water reduces groundwater use and maximizes delivery of the region's imported supplies. CVWD is committed to its ongoing non-potable water expansion. DWA serves recycled water to golf courses within its service area where it has been deemed cost effective to connect. Additional courses may be connected when recycled water pipelines are extended to closer proximity. DWA offers incentives to convert grass areas to desert landscape.

PMA 3: Agricultural Water Conservation

Following the 2010 CVWMP Update, CVWD began implementing a variety of agricultural conservation programs, including grower education and training, scientific irrigation scheduling, irrigation upgrades/retrofits, and engineering evaluations. Programs with voluntary grower participation, such as the Extraordinary Conservation Measures programs, have been effective in increasing water use efficiency. CVWD is committed to ongoing implementation of agricultural conservation programs.

CVWD established the Agricultural Water Advisory Group (AWAG) in December 2015 to collaborate with other organizations and educate Valley residents about the agricultural industry's stewardship of water in the Coachella Valley. CVWD is committed to continued participation in the AWAG.

In WY 2022, CVWD held a workshop on citrus irrigation and developed the Colorado River Water Conservation Program to incentivize agricultural customers to reduce water usage.

8.3 WATER SUPPLY DEVELOPMENT

CVWD and DWA continue their efforts to increase reliability and obtain additional water supplies, as they become available through SWP-related projects (e.g., Delta Conveyance Facility, Sites Reservoir, Lake Perris Seepage) and other exchanges, entitlements, and transfers.

8.3.1 Surface Water

PMA 4: Increased Surface Water Diversion

DWA's surface water rights for Chino, Snow, Falls Creek, and Whitewater canyon flows total 13,309 acre-feet per year (AFY). However, DWA has not always captured all the surface water it has had the right to divert from those sources. DWA plans to divert as much water from those sources as may be available and deliver that diverted surface water to the Whitewater River Groundwater Replenishment Facility (WWR-GRF) for replenishment into the Indio Subbasin and subsequent extraction for use in DWA's domestic water supply system. Some of that diverted water is and will continue to be filtered for use in the Snow Creek Village west of Palm Springs.

8.3.2 SWP Water

CVWD and DWA are working with Metropolitan Water District (MWD) and the Department of Water Resources (DWR) to both improve the reliability of State Water Project (SWP) water and acquire additional supplies. Future SWP projects are outlined below.

PMA 5: Delta Conveyance Facility

The Delta Conveyance Facility (DCF) is a project led by DWR to improve SWP reliability by modernizing SWP conveyance facilities in the Delta. The DCF will construct and operate a new tunnel to bypass the existing natural channels that are currently used for SWP conveyance, which are vulnerable to earthquakes, sea level rise, and pumping restrictions. In 2022, CVWD's and DWA's Board of Directors authorized funding for planning and design costs for 2023 and 2024.

PMA 6: Lake Perris Dam Seepage Recovery Project

The Lake Perris Dam Seepage Recovery Project is a project led by DWR to collect and distribute SWP water seeping under Lake Perris Dam and deliver the water to MWD in addition to its current allocated Table A water. The proposed project consists of installing an integrated recovery well system that would include up to six new seepage recovery wells and a conveyance pipeline connecting the wells to the CRA. CVWD and DWA both continue to support planning activities for this project.

PMA 7: Sites Reservoir Project

The Sites Reservoir Project is a reservoir in the Sacramento Valley that will capture and store excess water from snowmelt and winter runoff from the Sacramento River for use during dry periods. Water supply and storage capacity will be made available to water purveyors throughout California.

In 2022, CVWD's and DWA's Board of Directors authorized funding for Phase 2 Amendment 3 to the 2019 Sites Reservoir Project Agreement for 2022, 2023, and 2024.

PMA 8: Future Supplemental Water Acquisitions

CVWD has entered into various agreements with Rosedale Rio-Bravo, Glorious Lands Company, and MWD to deliver supplemental water to the Indio Subbasin. As opportunities arise, CVWD and DWA will continue to make water transfers and purchases.

8.3.3 Potable Reuse

PMA 9: East Valley Reclamation Authority Potable Reuse

In 2013, IWA and VSD formed a Joint Powers Agreement for the East Valley Reclamation Authority (EVRA), with the main objective to augment local water resources through beneficial water reuse. This project involves injection of highly treated wastewater from the existing VSD WRF for indirect potable reuse. In WY 2022, IWA kicked off groundwater modeling and Recycled Water Master Planning to support this project.

8.4 Source Substitution and Replenishment

Source substitution is the delivery of an alternate source of water to users that currently pump groundwater, reducing groundwater extraction and allowing the management of groundwater in storage. The source substitution projects are presented by water source and location within the Coachella Valley.

8.4.1 Colorado River Water – Non-Potable Water (NPW) Deliveries

Historically, Colorado River water (Canal water) was used almost exclusively for agricultural irrigation, with golf course irrigation beginning in 1986. Direct use of Colorado River water now includes agriculture, duck clubs and fish farms, golf courses, and construction water. CVWD is working to expand direct delivery of Colorado River water for agriculture, golf courses, and homeowner's associations.

PMA 10: Mid-Valley Pipeline (Canal Only Customers)

The Mid-Valley Pipeline (MVP) is a pipeline distribution system to deliver Canal water to the Mid-Valley area. Canal water from the MVP is either delivered directly or used to supplement CVWD's recycled water for golf course and open space irrigation. CVWD continues to pursue the direct connection of golf courses and open spaces that primarily use groundwater for irrigation to the MVP.

PMA 11: Mid-Canal Storage Project

The Mid-Canal Storage Project will increase storage along the Coachella Canal by removing the existing embankment between the current lined canal with the original earthen canal section to form a single wide trapezoidal reservoir section. This additional storage will allow CVWD to manage common, but unpredictable, events by providing for capture during excess water events for use during deficit water events. During drought periods, this added backup supply will improve efficient use of water and limit waste. In WY 2022, CVWD completed design and environmental documentation and applied for grant funding for this project.

PMA 12: East Golf Expansion

The East Golf NPW Program currently serves 30.5 golf courses with Canal water. CVWD continues to pursue the East Golf Expansion project to connect additional golf courses in the East Valley to the Coachella Canal.

PMA 13: Oasis Distribution System

The Oasis Distribution System will expand the Canal water delivery system to the Oasis Area to utilize additional Colorado River water and offset groundwater production for agricultural irrigation primarily. Phase 2 of the project is currently under construction, and CVWD continues to move forward with agricultural connections.

8.4.2 Recycled Water Deliveries

Currently, recycled water production exceeds existing demand during the winter months, and the remaining recycled water is disposed of through onsite percolation basins. The following is a summary of projects to maximize recycled water use by continuing to expand the NPW system and to eliminate land disposal.

PMA 14: WRP-10 Recycled Water Delivery

The WRP-10 distribution system delivers NPW to existing customers throughout Indian Wells, Palm Desert, and portions of Rancho Mirage. There are currently 18 customers served by a blend of Canal water and recycled water. Construction contracts have been awarded for a group of additional golf course connections, and projects to design and construct additional connections were advertised for bid and received CWSRF financing.

PMA 15: WRP-7 Tertiary Expansion

CVWD plans to expand its WRP-7 recycled water production tertiary treatment capacity by 3 million gallons per day (mgd) to a total capacity of 5.5 mgd (6,150 AFY) to meet anticipated regulatory changes and utilize increases in future wastewater flows. CVWD has completed 90 percent of the design, begun environmental documentation, and submitted grant funding applications.

PMA 16: Canal Water Pump Station Upgrade

The Canal Water Pump Station Upgrade would upgrade the Mile Post (MP) 113.2 Canal water pump station capacity to convey Colorado River supply for blending with WRP-7 recycled water. CVWD has completed 90 percent of the design, begun environmental documentation, and submitted grant funding applications.

PMA 17: WRP-7 Recycled Water Delivery

WRP-7 delivers NPW to golf courses in the Sun City area. CVWD continues to pursue new WRP-7 NPW connections. CVWD has completed design plans for one new customer and has included the project in grant requests for the WRP-7 Tertiary Expansion.

PMA 18: WRP-4 Tertiary Expansion & Delivery

CVWD's tertiary treatment expansion at WRP-4 will construct tertiary capacity in four phases, establish a recycled water distribution system, and reduce discharges to the CVSC. CVWD has completed 60 percent design and initiated environmental documentation.

PMA 19: DWA WRP Recycled Water Delivery

DWA will increase deliveries of recycled water consistent with existing customer demands, wastewater flow growth and new cost-effective connections. DWA has applied for grant funding for its Recycled Water Feasibility Study and reduced its recycled water rate to encourage additional customers. In 2022, DWA applied for and was awarded funding to extend its recycled water distribution system to a large public park and baseball field with more than 1,000,000 square feet of grass.

8.4.3 Groundwater Replenishment

Since 1973, CVWD and DWA have replenished the western portion of the Subbasin at the WWR-GRF with nearly 4 million AF and at the PD-GRF with a total of 14,836 AF since starting operations in 2019. CVWD has replenished the eastern portion of the Subbasin at TEL-GRF with about 400,000 AF since full-scale operations commenced in 2009. The following is a brief summary of projects to continue groundwater replenishment in the Indio Subbasin.

PMA 20: PD-GRF Expansion

The PD-GRF Expansion will expand direct replenishment capacity at the PD-GRF by constructing Phase II of the project, which will provide for additional recharge capacity up to 15,000 AFY. CVWD continues to operate the PD-GRF with expanded replenishment volumes as feasible given supply availability and hydraulic capacity. CVWD is obtaining the needed permits to move forward with the PD-GRF expansion including the RWQCB 401 Water Quality Certification. CVWD is developing a mitigation project to satisfy the requirements of the USACE 404 permit.

PMA 21: TEL-GRF Expansion

The TEL-GRF Expansion would expand recharge capacity at the TEL-GRF incrementally through 2025. CVWD continues to evaluate the need to expand the recharge capacity at TEL-GRF.

PMA 22: WWR-GRF Operation

The WWR-GRF has a recharge capacity of more than 400,000 AFY. CVWD and DWA continue to replenish as much SWP Table A water or other imported water at WWR-GRF as is available annually. CVWD is working with BLM to obtain the needed Right of Way lease for the facility.

8.5 WATER QUALITY PROTECTION

The Indio Subbasin has variable concentrations of water quality constituents as documented in the *2022 Alternative Plan Update*. Below are the PMAs related to water quality that will help protect the groundwater basin for beneficial uses and users and avoid undesirable results.

8.5.1 Water Quality Programs and Policies

The following is a list of water quality policies and programs to help protect the Indio Subbasin.

PMA 23: Eliminate Wastewater Percolation

Currently, CVWD's Water Reclamation Plant (WRP)-7, WRP-10, and Palm Springs' WWTP/DWA's WRP all discharge to percolation ponds within the Indio Subbasin. The GSAs continue to pursue expansion of recycled water to reduce and eventually eliminate percolation of wastewater into the Indio Subbasin.

PMA 24: Wellhead Treatment

The Wellhead Treatment program assesses the need to expand groundwater treatment facilities to treat additional drinking water wells for arsenic, nitrate, or other constituents of concern. The GSAs continue to monitor the development of new maximum contaminant levels (MCLs) (e.g., hexavalent chromium) to ensure delivered drinking water meets state and federal MCLs established to protect public health. As of WY 2022, IWA is evaluating potential treatment options for hexavalent chromium in the event that the MCL is lowered.

PMA 25: Small Water System Consolidations

Small water systems, often serving disadvantaged communities (DACs), may face challenges in providing safe, accessible, and affordable water because they may not have adequate resources to support maintenance, operation, and treatment costs. CVWD continues to pursue grant funding and design for several top-ranked small water system consolidations that were identified in the East Coachella Valley Water Supply Project.

Coachella Water Authority (CWA) also continues to seek grant funding to consolidate multiple mobile home parks within its service area to address water quality deficiencies identified by the Riverside County Department of Health (DEH).

Indio Water Authority (IWA) continues to work in partnership with Division of Drinking Water on small water system consolidations as identified and adjacent to IWA's water service area.

PMA 26: Septic to Sewer Conversions

Septic systems are a documented source of nitrate to the groundwater basin. CVWD continues to pursue grant funding and design for several septic-to-sewer conversions to improve groundwater quality and sanitation within small communities in the East Valley. DWA converted one commercial and five residential properties from septic to sewer during calendar year 2022. CVWD received notification that USDA will fund the Monroe Trunk Sewer Project and applied for additional grant funds for other projects.

8.5.2 Coachella Valley Salt and Nutrient Management Plan (CV-SNMP)

In 2020 and 2021, the CV-SNMP Agencies – which include CVWD, Coachella Sanitary District, City of Palm Springs, CWA, DWA, IWA, MSWD, Myoma Dunes Mutual Water Company, and VSD – prepared a CV-SNMP Groundwater Monitoring Program Workplan and a CV-SNMP Development Workplan to guide the monitoring and update of the 2015 CV-SNMP.

PMA 27: Implement CV-SNMP Groundwater Monitoring Program Workplan

The GSAs, along with the other CV-SNMP Agencies, began implementing the *CV-SNMP Groundwater Monitoring Program Workplan* approved by the RWQCB in February 2021 and outlining an expanded groundwater monitoring program. In WY 2022, the agencies submitted their first annual progress report, continued to monitor wells, drilled nine new wells to fill data gaps, and applied for DWR technical support services to construct additional wells.

PMA 28: Implement CV-SNMP Development Workplan

The GSAs, along with the other CV-SNMP Agencies, began implementing the *CV-SNMP Development Workplan* which outlined a scope of work for updating the CV-SNMP in accordance with the *Recycled Water Policy* and was approved by the RWQCB in October 2021. In WY 2022, a consultant was selected to update the CV-SNMP and implementation of the Development Workplan began. In addition, USBR WaterSMART grant funding was received to develop the Mission Creek Subbasin fate and transport model.

PMA 29: Colorado River Basin Salinity Control Forum

The Salinity Forum, which is a cooperative effort involving federal, state, and local agencies, includes projects that remove salt tonnage. This will be accomplished principally by reducing the salt contributions to the Colorado River from existing sources and minimizing future increases in salt load caused by human activities. CVWD will continue to support and participate in Salinity Forum efforts.

PMA 30: Source Water Protection

Well management programs are required to ensure that existing and future wells do not impact the usability of the groundwater resource. CVWD continues to implement the Leaking Artesian Well Rebate Program to educate and work with well owners to properly control artesian wells.

8.6 CURRENT IMPLEMENTATION STATUS

The PMAs are identified and described in Table 11-3 of the *2022 Alternative Plan Update*. The GSAs have continued efforts to advance the PMAs to maintain the Indio Subbasin in sustainable conditions, able to meet Plan Area water demands, and groundwater levels and quality that avoid undesirable results. With continued implementation of these PMAs, the GSAs are anticipated to meet their water management goals and comply effectively with SGMA. A revised version of Table 11-3, with the current updated status of each PMA, is presented as **Table 8-1**.

Table 8-1. WY 2021-2022 CVWMP Implementation Status Update

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
Water Conservation					
PMA 1: Urban Water Conservation	CVWD, DWA, IWA, CWA	Outreach/ Education and CV Water Counts	Continue to implement public information programs, including CV Water Counts. Educate the public on conservation programs being planned and/or implemented, as well as educational tips that customers can use to lower their water usage. Includes publications, demonstration gardens, workshops, community events, website, social media, and a school education program.	Increased messaging regarding drought and water conservation. Design completed for expansion of a demonstration garden. Continued outreach workshops and community events.	Complete demonstration garden construction Request for Proposals (RFP) and begin construction. Conduct additional public outreach. 2023 Water Academy, a free public forum for customers to learn about water as a resource and conservation, began in February.
	CVWD, DWA, IWA, CWA	Water Shortage Contingency Plan (WSCP)	Implement WSCP as needed in response to drought conditions and mandates. Implement supply augmentation, demand reduction, and operational changes as needed to meet declared shortage level.	Implemented all Shortage Level 2 demand reduction actions (based on state-wide drought), and selected actions from higher levels. CVWD imposed drought penalties for customers not reducing outdoor consumption by 10%.	Continue to monitor water supplies and operational changes and declare elevated shortage levels if appropriate or mandated.
	CVWD, DWA, IWA, CWA	Grant Funding	Pursue grant funding to fund urban water conservation programs at a higher level, as needed.	Awarded grant funding for enhanced turf removal rebates and expanded demonstration garden.	Continue to pursue grant funding opportunities for conservation programs including the 2022 Urban Community Drought Relief Grant.
	CVWD, DWA, IWA, CWA	Conservation Study	Conduct a Conservation Study, including a detailed analysis of market saturation. Quantify potential savings from implementing current programs, relative cost on an AF basis, and potential for future savings.	Submitted a request for and was awarded grant funding to complete the study through Proposition 1 Round 2.	Complete scope of work and initiate study. Project will move forward with Prop 1 Round 2 grant funding.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 1: Urban Water Conservation (cont.)	CVWD, DWA, IWA, CWA	Update and Implement Water Rates	Update Replenishment Assessment Charge and all water and sewer rates as necessary per cost of service studies. Consider tiered rates. Implement updated rates.	CVWD completed sanitation cost of service study and implemented updated rates for Fiscal Year (FY) 2023. DWA implemented updated rates for domestic water service in January 2022, for sewer service in June 2022, and for recycled water service in July 2022. IWA currently has budget based rate structure in place that encourages conservation.	CVWD will evaluate RAC rates for Groundwater Replenishment Reuse Projects. DWA plans to complete a cost of service study for its potable water rate in calendar year 2023.
	CVWD, DWA, IWA, CWA	Leak Detection/Water Loss	Continue to implement water loss reduction programs and practices.	CVWD continued monitoring of water loss, improved water loss tracking and improved proactive meter replacement. DWA commenced source meter calibration study in November 2022 by consultant. IWA continues to leverage AMI infrastructure to address leak detection. Planning efforts are underway for a meter replacement project. IWA also completed its annual water loss audit; the water loss is within acceptable industry standard.	Continue on-going efforts. DWA to conduct leak detection survey / pipe condition assessment for domestic water system. DWA is designing its fixed network system to support its transition to AMI. DWA is also conducting a source meter calibration study to reduce apparent water losses and improve data validity. IWA will continue to leverage AMI technology to address leak detection and complete its annual water loss audit.
	CVWD, DWA, IWA, CWA	Implement Landscape Ordinance	Continue to implement MWELO, including plan checks.	Continued to comply with State requirements and to implement each GSA's Landscape Ordinance.	Continue to comply with State requirements and to implement Landscape Ordinances.
	CVWD, DWA	Water Audits	Continue to implement Large Landscape Irrigation Audit Program to assist users in maximizing the efficient operation of their irrigation system by measuring performance, generating irrigation schedules and recommending improvement actions.	CVWD has conducted over 2,300 field investigations, site visits and landscape audits, all aimed at assisting customers. DWA conducted 24 water audits and numerous site visits during 2022 calendar year.	Continue to offer audits and commit to increasing outreach.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 1: Urban Water Conservation (cont.)	CVWD	Professional Landscaper Training	Continue to host a LCP for professional landscapers that focuses on water use efficiency.	Hosted landscape workshops in spring and fall and continued online course available through local community college partnership.	Consider hosting another Qualified Water Efficient Landscaper training and other in-house workshops.
	CVWD, DWA, IWA	Water Waste Program/Patrols	Actively patrol the service area for water waste violations. Unresolved issues result in increasing fines to customers.	Increased patrol efforts. Worked with communities with known water waste issues. CVWD began enforcing ban on non-functional turf and providing site assessments.	Continue efforts and increase in response to the drought as necessary or mandated.
	CVWD, DWA, IWA, CWA	Indoor Rebates	Implement indoor rebate programs, designed to assist homeowners and commercial customers who want to reduce their water usage by upgrading or replacing devices, or installing new technology to improve efficiency.	CVWD increased outreach regarding rebate programs and worked on partnership with CalWEP/Flume for water use monitoring device incentive. DWA continued washing machine incentives for residential customers, and commercial toilet incentives. IWA, with other agencies in the Coachella Valley, continued to promote and offer rebate programs. IWA is offering rebates for toilets and washers to its customers.	Research potential for new programs and continue to promote participation in existing programs. DWA is evaluating a residential ultra-low flow toilet rebate program. IWA intends to continue offering indoor rebate programs to promote water efficiency.
	CVWD, DWA, IWA, CWA	Landscape/Outdoor Rebates	Implement landscape/outdoors rebates, designed to assist homeowners, HOA, and commercial customers who want to reduce their outdoor water usage by converting their lawn to desert-friendly landscaping, installing smart irrigation controllers, or improving the efficiency of their systems. Reducing outdoor usage is the best way to meet a monthly water budget.	CVWD increased turf conversion rebate to $3/sq ft. and converted over 1.1 million square feet of turf to desert landscape. CVWD issued over 150 smart controller rebates for residential and commercial customers and partnered with 3 local cities to provide additional funding. IWA continues to receive a steady stream of rebate applications for turf removal, washers and toilets (with majority of applications for turf removal). Planning efforts are underway to develop a program to further support DACs.	Continue to promote participation in landscape and outdoor rebate programs. CVWD will begin offering rebate program for additional smart controllers.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 1: Urban Water Conservation (cont.)	CVWD, DWA, IWA, CWA	Landscape/Outdoor Rebates (cont.)		DWA increased its rebate to $3 per square foot and converted 343,603 square feet of turf to low water use landscaping; 73 smart controllers issued to customers; replaced 6,608 irrigation nozzles. DWA launched turf rebate program specific to DAC communities; continue to offer turf rebate pending grant funding awards. DWA partnered with the City of Palm Springs to get matching funds for City residents and HOAs.	
	CVWD	Golf & Water Task Force Meetings	Continue to meet bi-monthly, or as needed, with Golf & Water Task Force to discuss conservation programs that support golf courses.	Held regular task force meetings.	Continue to meet regularly.
PMA 2: Golf Water Conservation	CVWD	Model Golf Course Water Budgets	Continue to create model water budgets for area golf courses and provide that information to the courses. While the courses are not billed according to those budgets (see water budget based tiered rates below), they can use the budget as a tool to determine their efficiency rates.	CVWD offered service to map courses and provided model water budgets upon request. Updated GIS software to provide improved mapping.	Continue to offer this service upon request.
	CVWD	Golf Course Education Programs	Develop golf course incentive programs that provide education for golf course managers on water use efficiency.	CVWD discussed potential programs at the Golf & Water Task Force meetings. Promoted University of California, Riverside Turfgrass & Landscape Research Field Day.	Continue to identify potential golf course incentive programs and implement as needed. Identify potential revenue streams that could provide incentives for golf course conservation efforts.
	CVWD, DWA	Grant Funding	Secure grant funding as available to create incentive programs for water use efficiency such as lake liner programs, irrigation efficiency programs, or turf removal rebates.	Applied for a USBR WaterSMART grant for golf course turf conversion and irrigation system upgrades.	Continue to seek grant funding.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 2: Golf Water Conservation (cont.)	CVWD	Conservation Study	Complete a Conservation Study to better quantify potential savings from implementing current or proposed golf conservation programs, relative cost on an AF basis, and potential for future savings as needed.	No action.	Consider timing and scope of work to conduct evaluation.
	CVWD	AWAG Meetings	Continue to meet bi-annually with AWAG to discuss any updates that impact the agricultural community and receive input from local farmers.	Meetings postponed. Held a citrus workshop and promoted a USBR Growers Meeting.	Continue to meet bi-annually.
PMA 3: Agricultural Water Conservation	CVWD	Agricultural Efficiency	Work with other agencies and organizations through AWAG to identify projects and programs that could assist farmers, including small farmers, on improving water use efficiency.	CVWD promoted programs and events that would be beneficial to farmers. Developed the Colorado River Water Conservation Program to incentivize agricultural customers to reduce water usage.	Continue to promote programs and events to assist farmers in water use efficiency improvements.
	CVWD	Agricultural Resource Page	Maintain agriculture page on CVWD website with links to resources such as agricultural articles, grants and rebates, meetings and groups, education, and trainings.	Updated website as necessary.	Continue to share relevant information on website.
	CVWD	Grant Funding	Secure grant funding to create incentive programs for water use efficiency such as flood-to-drip rebates, soil sensor programs, or irrigation fixture upgrades.	Researched potential grant funding opportunities.	Continue to seek grant funding including funding available for Colorado River basin states.
	CVWD	Conservation Study	Complete a Conservation Study to better quantify potential savings from implementing current or AWAG identified programs, relative cost on an AF basis, and potential for future savings as needed.	No action.	Consider timing and scope of work to conduct evaluation.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
Water Supply Development					
PMA 4: Increased Surface Water Diversion	DWA	Surface Water Diversions	Increase surface water diversions for replenishment at WWR-GRF for use in its domestic water supply system.	Diverted approximately 1,800 AF of surface water for replenishment at WWR-GRF to date in Calendar Year 2022.	Continue diverting surface water for replenishment at WWR-GRF for use in its domestic water supply system.
PMA 5: Delta Conveyance Facility	CVWD, DWA	DCF Deliveries	Continue participation in DCF, anticipated to increase Table A deliveries from 45% to ~58% starting in 2041; 60% Table A and 40% Article 21	DWR/Delta Conveyance Design and Construction Authority (DCA) released the Draft Environmental Impact Report (EIR) for public review and comments; completed Biological Assessment and Incidental Take Permit application; identified preliminary design and engineering objectives; performed soil investigations, including data collection, soil samples and surveys, in the Delta; conducted public engagements such as educational workshops and tribal outreach. In 2022, CVWD's and DWA's Board of Directors authorized funding for planning and design costs for 2023 and 2024.	DWR/DCA plan to finalize the EIR; perform other environmental processes such as water rights, Delta plan consistency, other environmental permits; conduct additional public engagement opportunities.
PMA 6: Lake Perris Seepage	CVWD, DWA	Lake Perris Seepage	Continue participation in Lake Perris Seepage, which installs a series of five pumps placed down-gradient from the face of the Lake Perris Dam that will pump seepage from the lake into a collection pipeline that discharges directly into MWD's Colorado River Aqueduct. Anticipated 2025-2045 per 2019 Terms Sheet, 2,753 AFY.	DWR performed geotechnical modeling.	DWR may perform additional geotechnical modeling prior to final design.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 7: Sites Reservoir	CVWD, DWA	Sites Reservoir	Continue participation in Sites Reservoir, which captures and stores stormwater flows from the Sacramento River for release in dry years. Deliveries at 11,550 AFY (participation amount with assumed 30% conveyance loss) beginning in 2035.	Sites Project Authority released the draft EIR for public review and comments, submitted water rights application, determined overall project schedule and delivery strategy, and developed Mitigation Acquisition Master Plan. DWA Board approved the third amendment to the 2019 Sites Reservoir Project Agreement on February 15, 2022.	Sites Project Authority plans to finalize the EIR; begin securing funding; advance engineering of project feature encroachments to 65% design level to support permitting; initiate application for permit to construct; develop Land Acquisition Master Plan and Right-of Way Manual; execute water supply and storage services contracts; receive water right order and permit
PMA 8: Future Supplemental Water Acquisitions	CVWD, DWA	Supplemental Water	Enter into new agreements for Supplemental water, as available from SWP or Colorado River.	No activity.	No activity.
PMA 9: EVRA Potable Reuse	IWA	Implement Groundwater Model and PDR	Implement groundwater model and begin regulatory and stakeholder engagement. FY 2021-2023. Preliminary Design FY 2023-2024.	IWA kicked-off the groundwater modeling project and Recycled Water Master Plan for the EVRA project. Currently working with consultants to implement the groundwater model and complete a master plan that studies purple pipe system and groundwater replenishment options.	Efforts will continue during 2023 on the groundwater modeling and the recycled water master plan for the EVRA project.
Source Substitution and Replenishment					
PMA 10: Mid-Valley Pipeline (Canal Only Customers)	CVWD	FY 32-40 Mid-Valley Pipeline Golf Course Connections/ Design & Construction	Seek Clean Water State Revolving Fund (CWSRF) and Water Infrastructure Improvements for the Nation Act (WIIN) grant funding support to design and construct mid-valley pipeline canal connections to Indian Wells CC, El Dorado CC, La Rocca, Marrakesh CC, Shadow Mountain, Vintage CC, Morningside CC, Chaparral CC, Date Palm CC, Rancho Las Palmas, Monterrey CC, Thunderbird CC, and Porcupine Ridge. The projects will expand canal delivery for landscape irrigation to area golf courses.	No activity.	No activity planned. These connections are planned for Fiscal Years 2032 to 2040.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 11: Mid-Canal Storage Project	CVWD	Design and Environmental	Develop plans, specifications, and engineering (PS&E), along with environmental permitting support, for the project.	Completed design and environmental documentation.	Bid the project and commence construction in summer 2023.
	CVWD	Mid-Canal Storage Construction	Construct a wide trapezoidal reservoir section within the Coachella Canal to store peak flows, improve water efficiency, and limit water waste	Applied for WaterSMART Drought and Water and Energy Efficiency grants. Also received Bipartisan Infrastructure Law loan funding from USBR. Did not receive funding from Water and Energy Efficiency Grant.	Receive funding decision from USBR WaterSMART grant application. Begin construction in summer 2023.
PMA 12: East Golf Expansion	CVWD	East Golf Expansion	Deliver Canal water to 5 additional golf courses in East Valley.	Hired consultant to prepare a feasibility study for providing the Quarry Development canal water (non-potable water) connection.	Complete the feasibility study for the Quarry Development.
PMA 13: Oasis Distribution System	CVWD	Oasis Distribution System	Expand the Canal water delivery system to the Oasis area. Substitute groundwater production with Canal water for agricultural irrigation and other non-potable landscape irrigation.	Oasis In-Lieu Recharge, Phase 2 under construction.	Complete Phase 2 construction.
PMA 14: WRP-10 Recycled Water Delivery	CVWD	FY 18 Non-Potable Water Golf Course Connections/ Construction	Seek CWSRF and WIIN grant funding support to construct non-potable water connections to Oasis Country Club, Woodhaven Country Club, Palm Desert Resort Country Club, Bermuda Dunes Country Club, Marriott Desert Springs, Marriott Shadow Ridge, Emerald Desert, and T1 Pump Station. The project will expand non-potable water landscape irrigation to area golf courses.	Construction contracts awarded for these golf course connections.	Complete construction.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 14: WRP-10 Recycled Water Delivery (cont.)	CVWD	FY 21 Non-Potable Water Golf Course Connections/ Design & Construction	Seek CWSRF and WIIN grant funding support to design and construct non-potable water connections to Suncrest Country Club (CC), Rancho Mirage CC, Annenberg, Tamarisk CC, Tri-Palm CC, Jack Ivey Ranch, Palm Royale CC, Southwest Community Church, and Indian Wells Tennis Garden. The project will expand non-potable water landscape irrigation to area golf courses.	Projects advertised for bid and received CWSRF financing.	Begin construction.
	CVWD	FY 22 Non-Potable Water Golf Course Connections/ Design & Construction	Seek CWSRF and WIIN grant funding support to design and construct upsizing improvements to the existing NPW pipelines, converting Indian Ridge CC to lake delivery, and non-potable water connections to Desert Island and Springs Country Club. The project will expand non-potable water landscape irrigation to area golf courses.	Prepare a Request for Proposals (RFP) to initiate design of these non-potable water connections.	Complete 90% design, initiate environmental documentation and submit application for CWSRF funding.
	CVWD	FY 25 Non-Potable Water Golf Course Connections/ Design & Construction	Seek CWSRF and WIIN grant funding support to design and construct non-potable water connections to Mission Hills CC, Westin Hills, Outdoor Resort, and Forest Lawn. The project will expand non-potable water landscape irrigation to area golf courses.	No activity.	No activity planned. These are future non-potable water connections.
	CVWD	Future Non-Potable Water Golf Course Connections/ Design & Construction	These projects are planned for FY26 and beyond depending on new golf courses and residential tracts.	No activity.	No activity planned. These are future non-potable water connections.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 15: WRP-7 Tertiary Expansion	CVWD	FY 21 - WRP 7 Tertiary Treatment Expansion and MP113.2 Pump Station Upgrade/Construction.	Seek CWSRF and WIIN grant funding support to construct an expansion of the tertiary system by 2.5 mgd for a total capacity of 5.0 mgd, add a 5-million-gallon tertiary water storage bladder, repurpose a land disposal pond to accept secondary effluent for pretreatment, and upgrade the capacity of the MP 113.2 canal water pump station. The project will expand non-potable water landscape irrigation	Completed 90% design, initiated environmental documentation, and submitted funding applications.	Complete design plans and specifications by summer 2023.
PMA 16: Canal Water Pump Station Upgrade	CVWD	Canal Water Pump Station Upgrade	Construct pump station to convey Canal water. Complete design of MP 113.2 Canal Water Pump Station upgrade in 2022. Complete construction in 2026.	Completed 90% design, initiated environmental documentation, and submitted funding applications.	Complete design plans and specifications by summer 2023.
	CVWD	FY21 - WRP 7 Tertiary Treatment Expansion and MP113.2 Pump Station Upgrade/Construction	Seek CWSRF and WIIN grant funding support to construct a capacity upgrade to the existing pump Station at MP 113.2 canal water pump station. The additional pump station capacity will expand non-potable water landscape irrigation to area golf courses.	Submitted applications for CWSRF funding and prepared feasibility study for WIIN grant funding application.	Complete feasibility study and submit with WIIN grant application in March 2023. Receive funding decisions from CWSRF and WIIN applications.
PMA 17: WRP-7 Recycled Water Delivery	CVWD	FY 22 Non-Potable Water Golf Course Connections/ Design & Construction	Seek CWSRF and WIIN grant funding support to design and construct non-potable water connections to Talavera Residential Community, Young's Family Farms, and Shadow Hills High School, and Shadow Hills North Golf Course. The project will expand non-potable water landscape irrigation to area golf courses.	Completed design plans for Young's Family Farms and included it with the funding applications for the WRP 7 Tertiary Expansion Project. Preparing Request for Proposal for the design of the other non-potable water connections.	Complete 90% design for the other non-potable water connections, initiate environmental documentation and submit application for CWSRF funding.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 18: WRP-4 Tertiary Expansion & Delivery	CVWD	FY 22 WRP 4 – Phase 1A Tertiary Expansion and New Customer Connections/ Construction	This project includes seeking CWSRF and WIIN grant funding support to construct an expansion of the tertiary system by 2.5 mgd and connect three new irrigation farm customers including Grimmway Farms, West Coast Turf, and Ocean Mist. The project will expand non-potable water to area irrigation customers.	Completed 60% design and initiated environmental documentation.	Complete environmental documentation.
	CVWD	FY 26 WRP 4 – Phase 1B Tertiary Expansion and New Customer Connections/ Design & Construction	This project includes seeking CWSRF and WIIN grant funding support to construct an expansion of the tertiary system to a total capacity of 10 mgd and connect new irrigation farm customers. The project will expand non-potable water to area irrigation customers.	No activity.	No activity planned. This is a future expansion project.
PMA 19: DWA WRP Recycled Water Delivery	DWA	DWA WRP Recycled Water	Increase deliveries of recycled water in DWA's service area consistent with existing customer demands, wastewater flow growth and new cost-effective connections.	Applied for grant funding through Proposition 1, Round 2 for the Sunrise Park Recycled Water Connection project. Applied for grant funding through SGM Implementation Round 2 for a recycled water feasibility study. Board approved reduction in recycled water rate effective July 1, 2022; Board approved Amendment No. 1 to the original agreement with one of DWA's largest recycled water users to utilize a minimum 95% recycled water for golf course and landscape irrigation needs effective July 1, 2022.	Begin planning/design/engineering phase of Sunrise Park Recycled Water Connection project pending award of grant funding. Begin recycled water feasibility study pending award of grant funding.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 20: PD-GRF Expansion	CVWD	FY 22 - Palm Desert Groundwater Facility - Phase II	Construct three groundwater replenishment basins to receive Colorado River water within the WWR Stormwater Channel. A groundwater replenishment facility will serve to help mitigate historical groundwater level declines within the West Whitewater River Sub-basin Area. Approximately an additional 15,000 AFY of Colorado River water will be delivered via the adjacent Mid-Valley Pipeline, for a total replenishment in the near vicinity of 25,000 AFY.	RWQCB 401 Water Quality Certification received. The Environmental Science Associate consultant is developing a new mitigation project alternative and the development of a revised mitigation plan for review and approval by the USACE staff for 404 permit issuance.	Receive approved USACE 404 permit. Initiate a Request for Proposal for construction.
PMA 21: TEL-GRF Expansion	CVWD	TEL-GRF Expansion	Expand recharge capacity at the TEL-GRF from 37,000 to 40,000 AF.	No activity.	None planned in 2023.
PMA 22: WWR-GRF Operation	CVWD, DWA	Maximize WWR-GRF Replenishment	Continued operation of WWR-GRF at maximum available replenishment water. If additional SWP exchange water can be acquired, increase replenishment.	BLM Right of Way lease for the facility is in progress. BLM prepared a draft EIS, received public comments, and published a Final EIS. CVWD prepared a Draft EIR, received public comments, and began preparing a Final EIR.	BLM is anticipated to file a Record of Decision for the Final EIS and determine to grant CVWD a Right-of-Way lease. Pending BLM's Record of Decision, CVWD will take the Final EIR to the CVWD Board for certification.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
Water Quality Protection					
PMA 23: Eliminate Wastewater Percolation	CVWD, CWA, DWA	Eliminate Wastewater Percolation	Eliminate wastewater percolation. Recycle water that would have been percolated to be protective of water quality.	Design in progress for CVWD WRP 4 Phase I Improvements NPW Project, WRP 7 Recycled Water Expansion Project, and WRP 10 Tertiary Filter Upgrade Project. Construction in progress for CVWD WRP 10 T1 Pump Station Replacement, as well as Oasis Country Club, Woodhaven Country Club, Palm Desert Resort Country Club, and Bermuda Dunes Country Club NPW Connection Projects. Completed CVWD WRP 10 Secondary Effluent Pump Station and Storage Ponds. DWA applied for grant funding through Proposition 1, Round 2 for the Sunrise Park Recycled Water Connection project. DWA applied for grant funding through SGM Implementation Round 2 for a recycled water feasibility study.	CVWD will begin/continue design for WRP 4 Phase I Improvements NPW Project, WRP 7 Recycled Water Expansion, WRP 10 Tertiary Filter Upgrade, as well as Indian Wells Tennis and Garden, Marriott Desert Springs North Course, Marriott Shadow Ridge, Desert Island CC, Emerald Desert, Young's Farmland, Springs CC, and Talavera NPW Connection Projects. CVWD will begin/continue construction for WRP 10 T1 Pump Station Replacement, as well as Jack Ivey Ranch, Tri-Palms CC, Palm Royale CC, Southwest Community Church, Suncrest CC, Annenberg Golf Club, Rancho Mirage CC, and Tamarisk CC NPW Connection Projects. CVWD will complete construction for Oasis CC, Woodhaven CC, Palm Desert Resort CC, and Bermuda Dunes CC NPW Connection Projects. DWA to begin planning/design/ engineering for the Sunrise Park Recycled Water Connection project pending award of grant funding. DWA to begin recycled water feasibility study pending award of grant funding.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 24: Wellhead Treatment	CVWD, DWA, IWA, CWA	Wellhead Treatment	Assess the need to expand groundwater treatment facilities to treat additional wells in the future for arsenic, nitrate, or other constituents.	Ongoing.	Continue to assess needs.
	IWA	Hexavalent Chromium (Cr-6) Wellhead Treatment	Pending Cr-6 MCL, upgrade resin at existing IX treatment plants (FY 2021-22). Begin design and construction of new wellhead treatment facilities (FY 2022-26).	Pending official MCL determination for Cr-6, IWA has been evaluating Cr-6 treatment options and planning efforts are underway based on feasibility, cost, and operational impacts.	Efforts will continue in 2023 with planning and design efforts based on final MCL determination and selected Cr-6 treatment option.
PMA 25: Small Water System Consolidations	CVWD, DWA, IWA, CWA	Small Water System Consolidations	Extend urban water service to small water systems (e.g., mobile home/RV park communities) with deficient infrastructure and poor water quality. Implement consolidations as grant funding becomes available.	CVWD continued to participate in Disadvantaged Community Infrastructure Task Force meetings and identify grant funding opportunities and projects. IWA consolidated properties located on Monroe and Avenue 50 to be part of the larger IWA water system in partnership with Division of Drinking Water.	Continue to participate in Disadvantaged Community Infrastructure Task Force meetings and identify grant funding opportunities and projects.
	CVWD	Saint Anthony Water Consolidation Project	Seek grant funding to design and construct a new domestic water pipeline along Avenue 66 and adjacent roadways to serve the Saint Anthony area with clean, safe drinking water.	Continued to prepare the grant funding applications and finishing the design plans for portions of this project.	Receive the Grant Funding Agreement from the State Water Board and initiate construction on a portion of this project.
	CVWD	Valley View Water Consolidation Project	Seek grant funding to design and construct a new domestic water pipeline along Airport Blvd and adjacent roadways to serve the Valley View area with clean, safe drinking water.	Continued to prepare the grant funding applications and finishing the environmental documentation for a portion of this project.	Complete the environmental documentation for a portion of this project and initiate design pending receipt of grant funds.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 26: Septic to Sewer Conversions	CVWD, DWA, VSD, CWA	Septic to Sewer Conversions	Seek USDA, CWSRF, and WIIN grant funding support to design and construct septic-to-centralized sewer systems and expand service to DACs. Implement conversions as grant funding becomes available.	CVWD continued to participate in Disadvantaged Community Infrastructure Task Force meetings and identify grant funding opportunities and projects. DWA converted one commercial and five residential properties from septic to sewer during calendar year 2022.	CVWD staff will continue to participate in Disadvantaged Community Infrastructure Task Force meetings and identify grant funding opportunities and projects.
	CVWD	Monroe Trunk Sewer	Seek grant funding to design and construct a new sewer pipeline along Monroe Street from Avenue 62 to Avenue 64 to expand CVWD's service area to the tribal residential neighborhood at the intersection of Avenue 64 and Monroe.	CVWD received notice from USDA that they will fund this project pending CVWD compliance with letter of conditions.	Bid the project for construction upon approval that CVWD has met the letter of conditions from USDA and received a funding agreement.
	CVWD	Avenue 66 Trunk Sewer	Seek grant funding to design and construct a new sewer pipeline along Avenue 66 and Harrison to expand CVWD's service area to the Torres-Martinez Coachella center, Sunbird Mobile Home Park, and residential neighborhood within Middleton Road.	Design and environmental documentation completed. Grant funding application currently in process with CWSRF.	Receive grant funding agreement and bid the project for construction.
	CVWD	Airport Blvd Sewer Consolidation Project	Seek grant funding to design and construct a new sewer collection system (gravity sewer pipelines and lift stations), along Desert Cactus Dr, Ave 57th, Fillmore St and Airport Blvd.	Worked with funding agencies to determine available funding. CVWD Board of Directors certified the environmental document.	Finalize funding application with the State Water Board and receive a funding agreement for design.
PMA 27: Implement CV-SNMP Groundwater Monitoring Program Workplan	CVWD, DWA, IWA, CWA	Implement CV-SNMP Workplans	Implement the CV-SNMP Groundwater Monitoring Program Workplan approved by the RWQCB to expand and improve the region's groundwater monitoring system for water quality.	Submitted first annual progress report to Regional Board. Continued monitoring network wells. Constructed nine monitoring wells to fill network gaps. Submitted DWR Technical Support Services Phase 2 application to fill additional network gaps.	Submit second annual progress report to Regional Board. Complete initial monitoring of network wells by December 31, 2023. Continue construction of monitoring wells to fill network gaps.

PMA Name	Project Proponent(s)	Activity Name	Activity Description	2022 Status	2023 Planned Activities
PMA 28: Implement CV-SNMP Development Workplan	CVWD, DWA, IWA, CWA	Implement CV-SNMP Workplans	Develop a compliant CV-SNMP per the SNMP Development Workplan submitted to the RWQCB.	Selected consultant to prepare CV-SNMP Update. Initiated workplan tasks to establish the CV-SNMP stakeholder group and Technical Advisory Committee. Initiated work to characterize nitrate/TDS loading to the groundwater basin. Applied for and received a $200,000 USBR WaterSMART Applied Science grant to help develop Mission Creek Subbasin fate and transport model.	Continue workplan implementation to prepare the CV-SNMP Update. Initiate tasks to characterize current groundwater quality and delineate draft management zones. Submit grant request to DWR Sustainable Groundwater Management SGMA Implementation Round 2 grant for workplan implementation.
PMA 29: Colorado River Basin Salinity Control Forum	CVWD, DWA	Colorado River Salinity Forum	Support implementation of Colorado River Salinity Forum projects through participation and comments on Forum activities.	Continued to track Salinity Forum activities for opportunities to engage and provide comments.	Continue to support Salinity Forum through participation and comments as opportunities arise.
PMA 30: Source Water Protection	CVWD, DWA	Abandoned well management program	Continue cooperating with Riverside County DEH to identify and cap/destroy unused wells.	Ongoing.	Continue to cooperate and coordinate with Riverside County DEH as opportunities arise.
	CVWD	Leaking artesian well rebate program	Continue implementing CVWD's leaking artesian well rebate program.	Processed one application to repair a small domestic well with uncontrolled artesian flows. Included $50,000 in Fiscal Year 2023 budget for leaking artesian well repairs and destructions.	Continue to implement CVWD's leaking artesian well rebate program.
	CVWD	Well management rebate programs	Continue to secure grant funding when available to supplement leaking artesian well rebate program and fund proper abandonment/destruction of unused wells.	No activity.	Pursue grant funding when eligible opportunities are identified.

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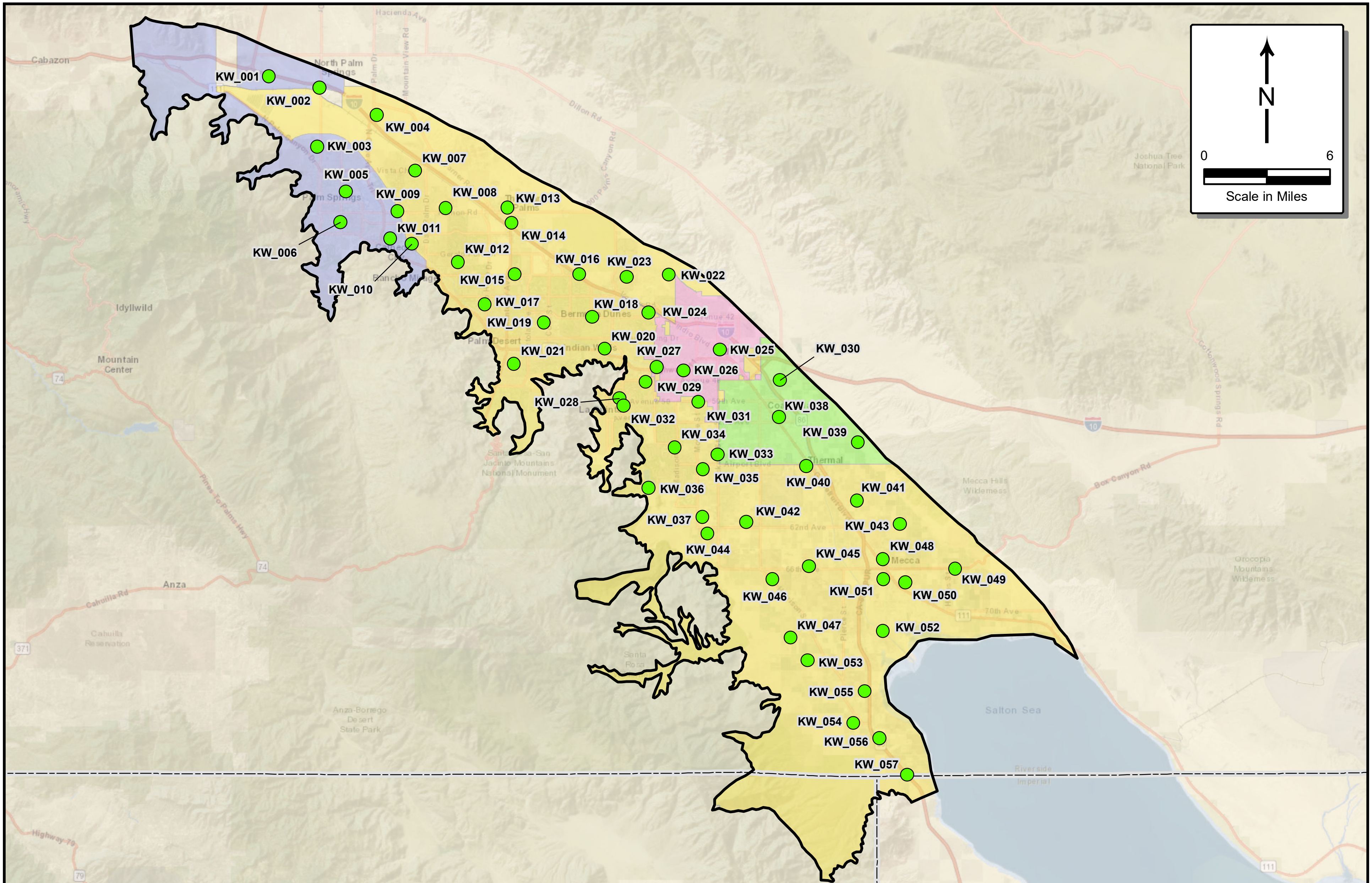
APPENDIX A

Representative Groundwater Elevation Hydrographs



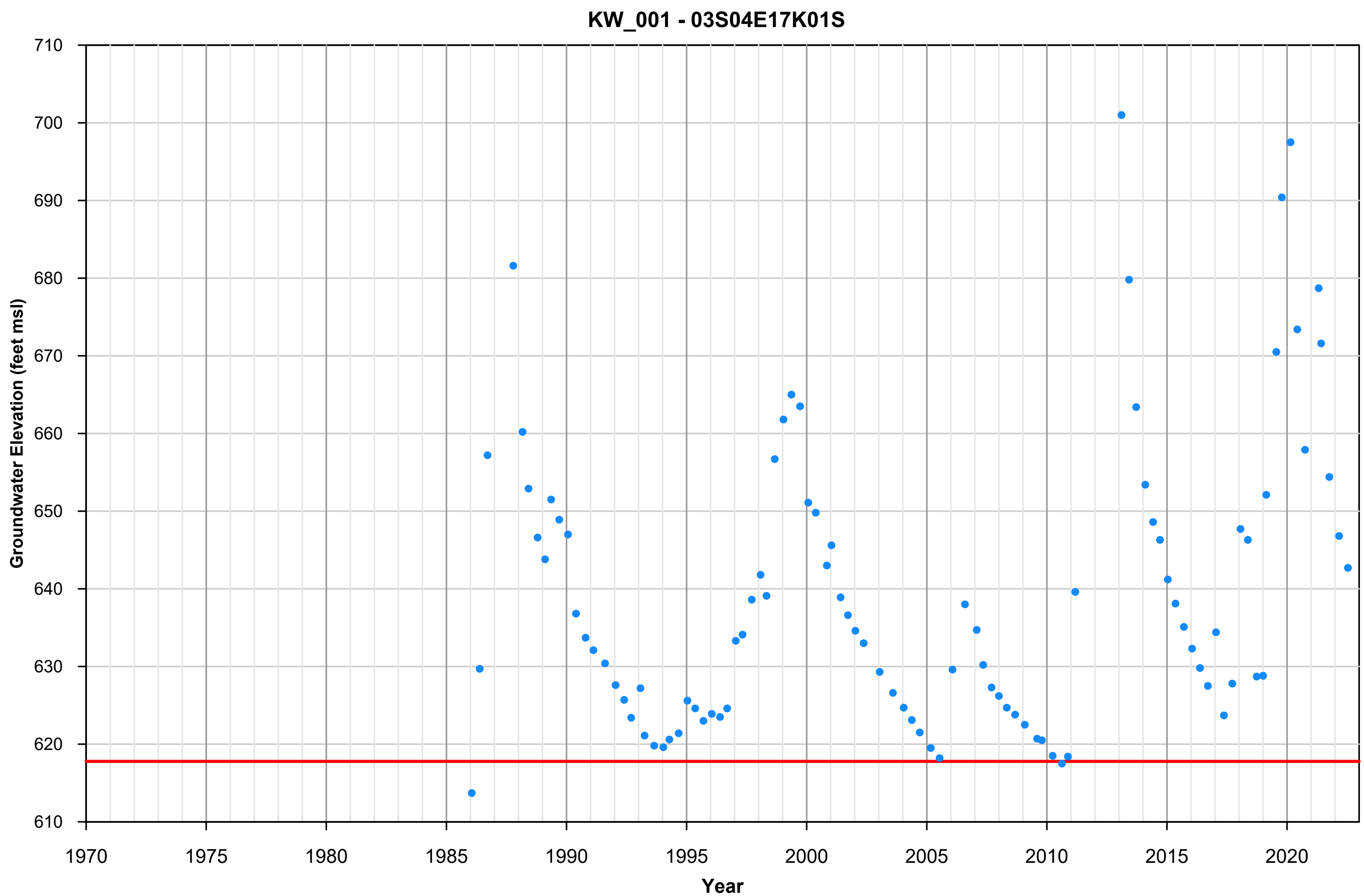
Key Well (57)
California County
Coachella Valley Water District
Coachella Water Authority
Desert Water Agency
Indio Water Authority

WOODARD & CURRAN

March 2023

TODD GROUNDWATER

Figure A-1
Selected Key Wells for Groundwater Level Monitoring



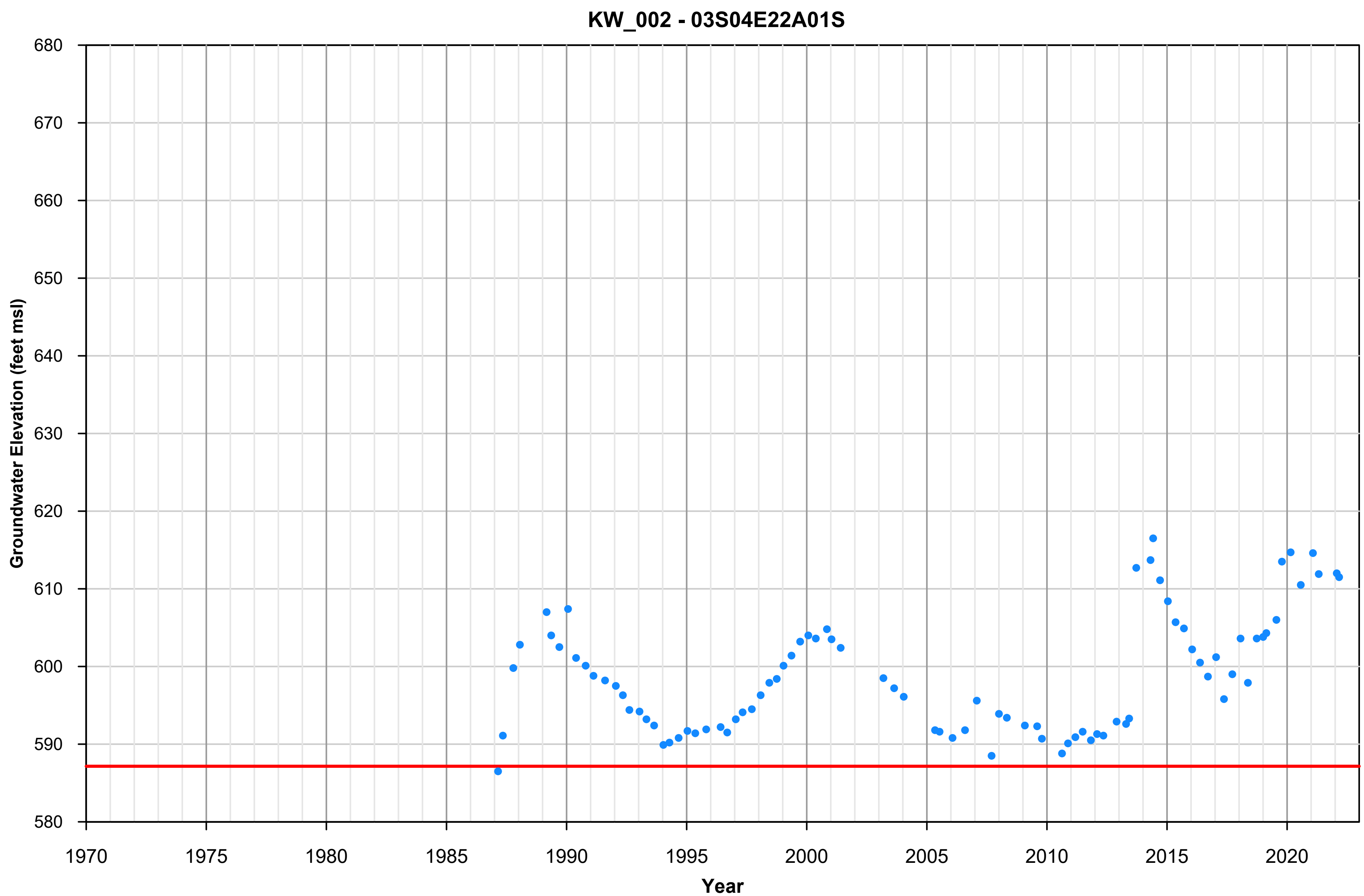
Note:
Minimum groundwater elevation occured in 1968.

Groundwater Elevation (feet msl)
Minimum Threshold (feet msl)

March 2023

TODD GROUNDWATER

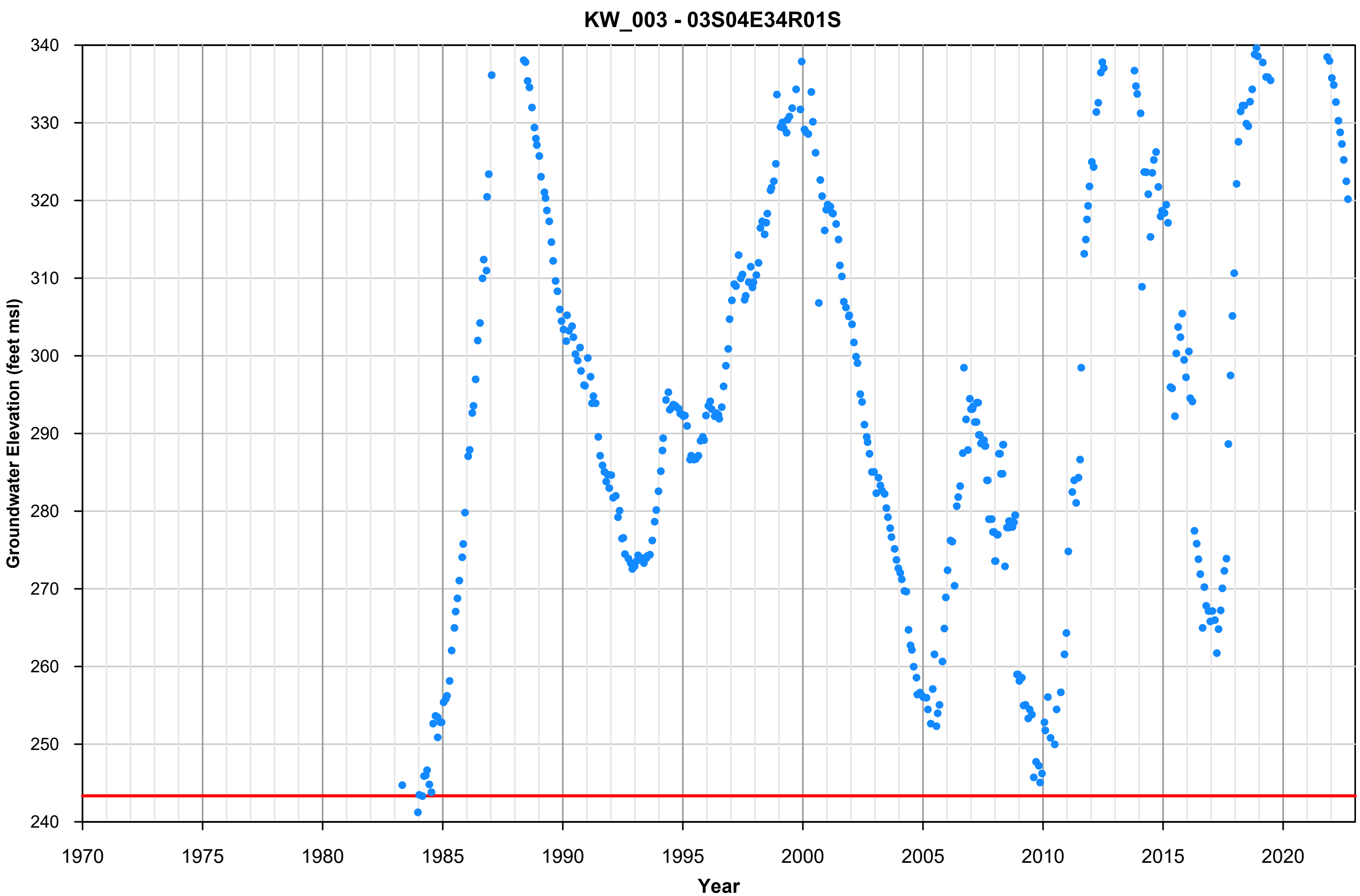
Appendix A-2
Groundwater Elevation Hydrograph
KW_001 - 03S04E17K01S



March 2023

TODD GROUNDWATER

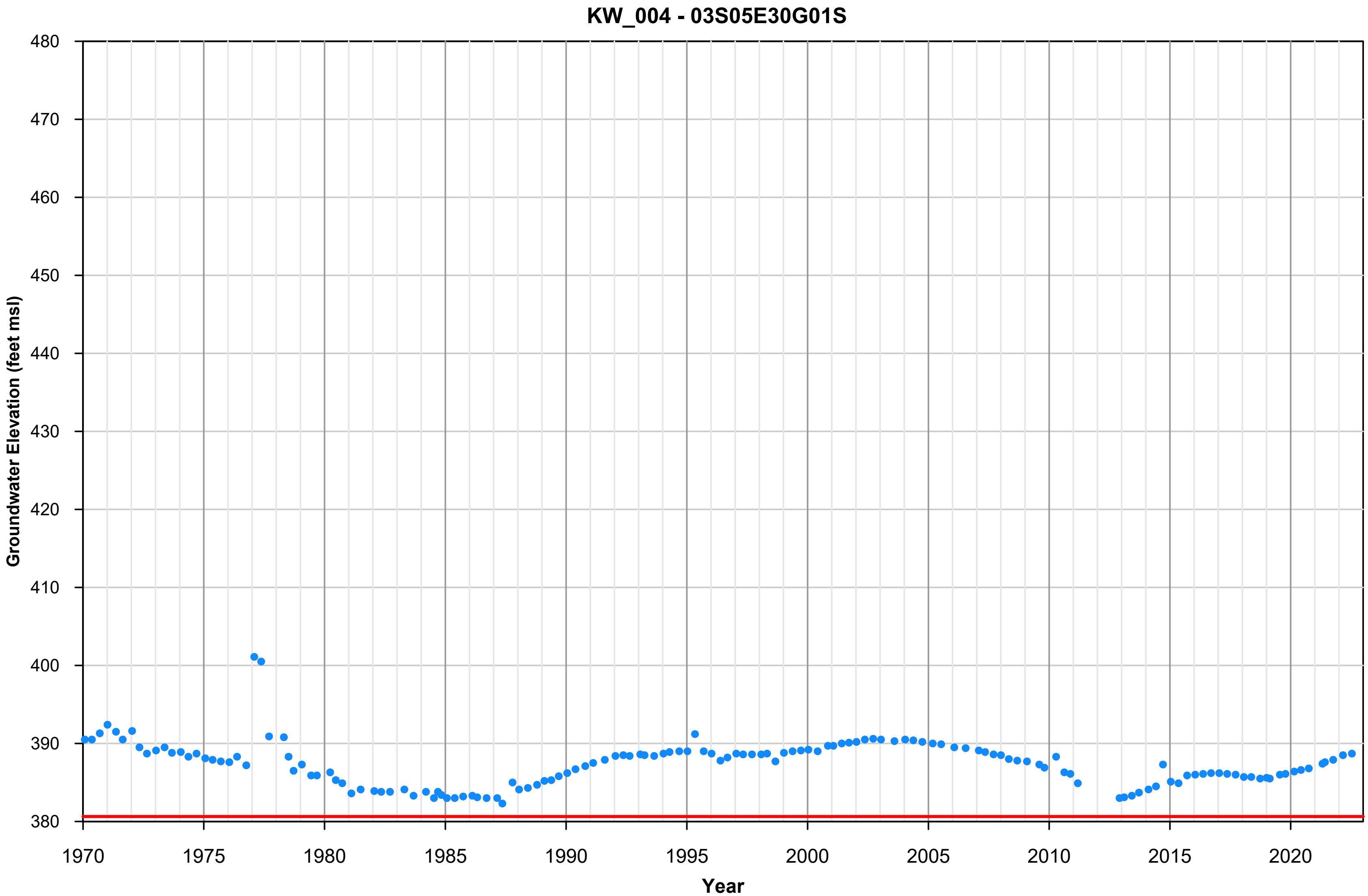
Appendix A-3
Groundwater Elevation Hydrograph
KW_002 - 03S04E22A01S



March 2023

TODD GROUNDWATER

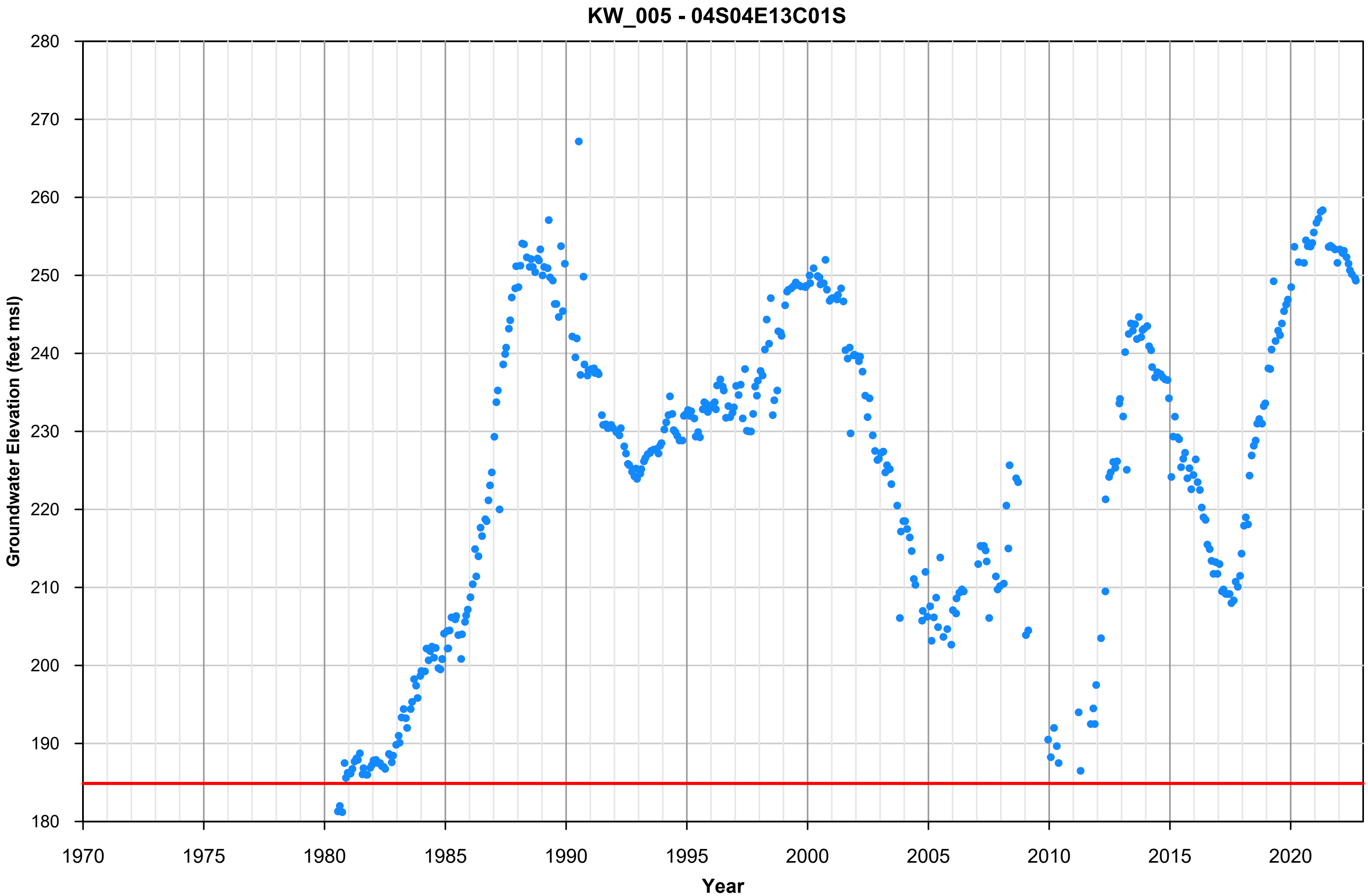
Appendix A-4
Groundwater Elevation Hydrograph
KW_003 - 03S04E34R01S



March 2023

TODD GROUNDWATER

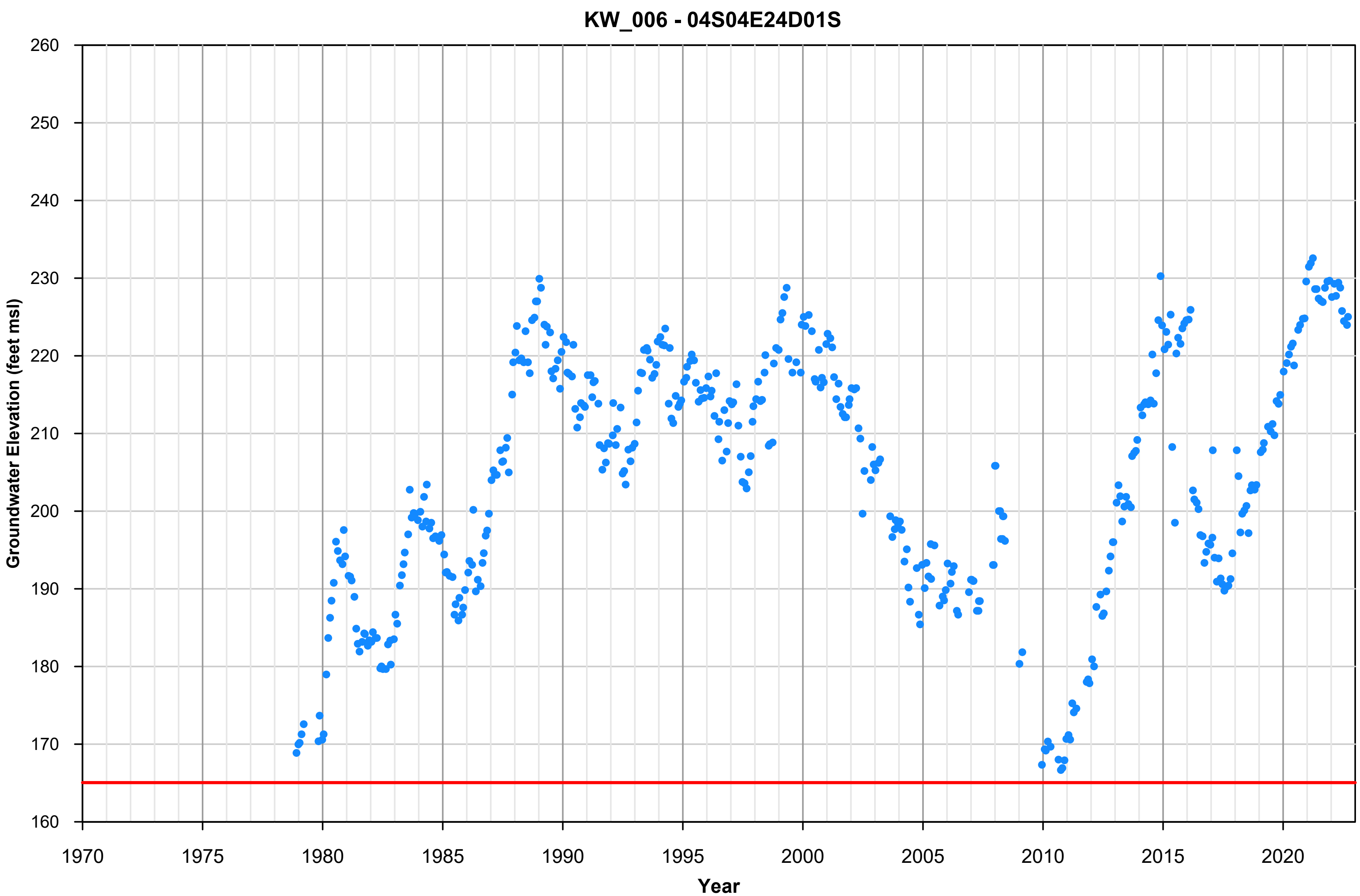
Appendix A-5
Groundwater Elevation Hydrograph
KW_004 - 03S05E30G01S



March 2023

TODD GROUNDWATER

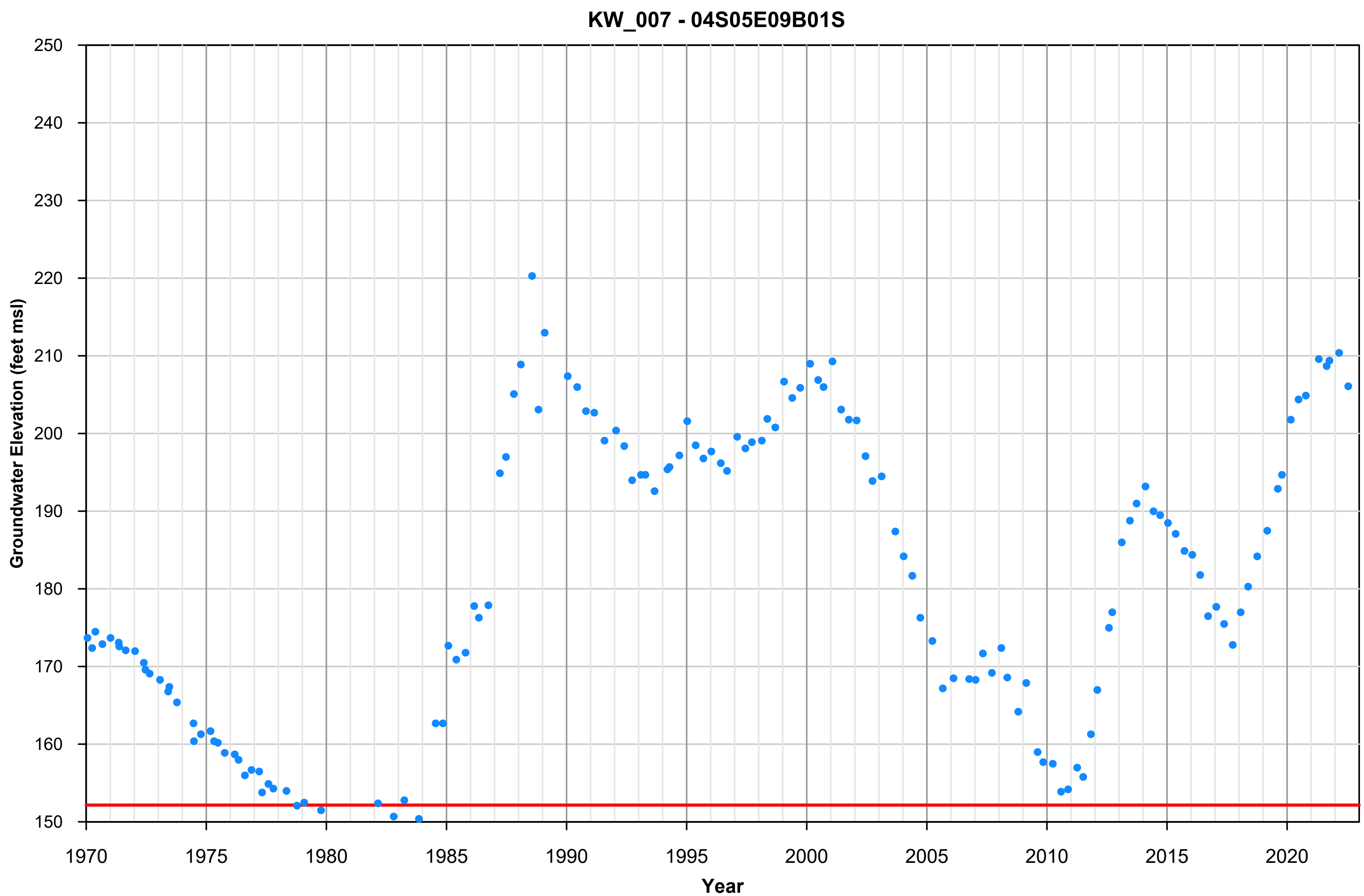
Appendix A-6
Groundwater Elevation Hydrograph
KW_005 - 04S04E13C01S



March 2023

TODD GROUNDWATER

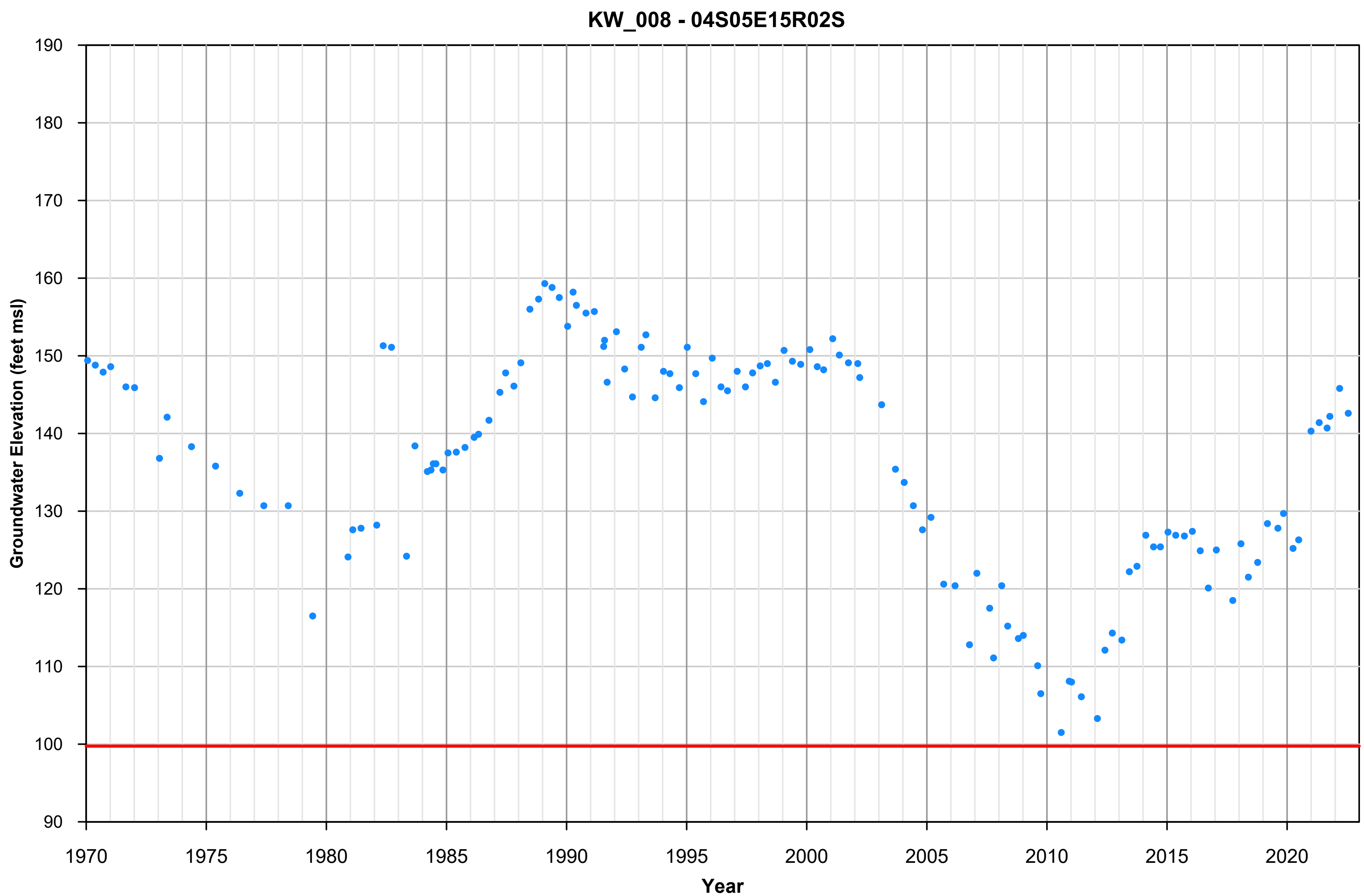
Appendix A-7
Groundwater Elevation Hydrograph
KW_006 - 04S04E24D01S



March 2023

TODD GROUNDWATER

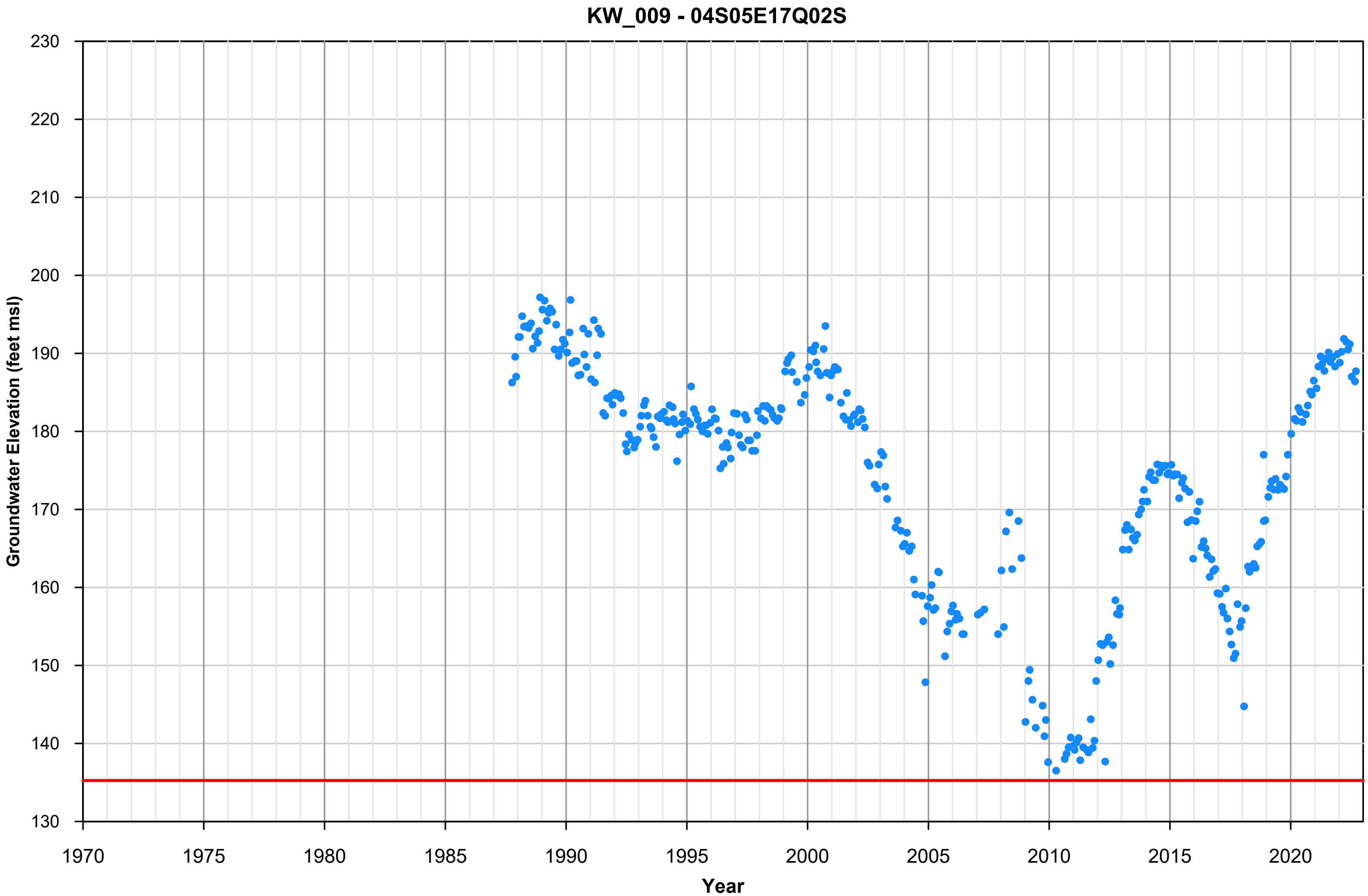
Appendix A-8
Groundwater Elevation Hydrograph
KW_007 - 04S05E09B01S



March 2023

TODD GROUNDWATER

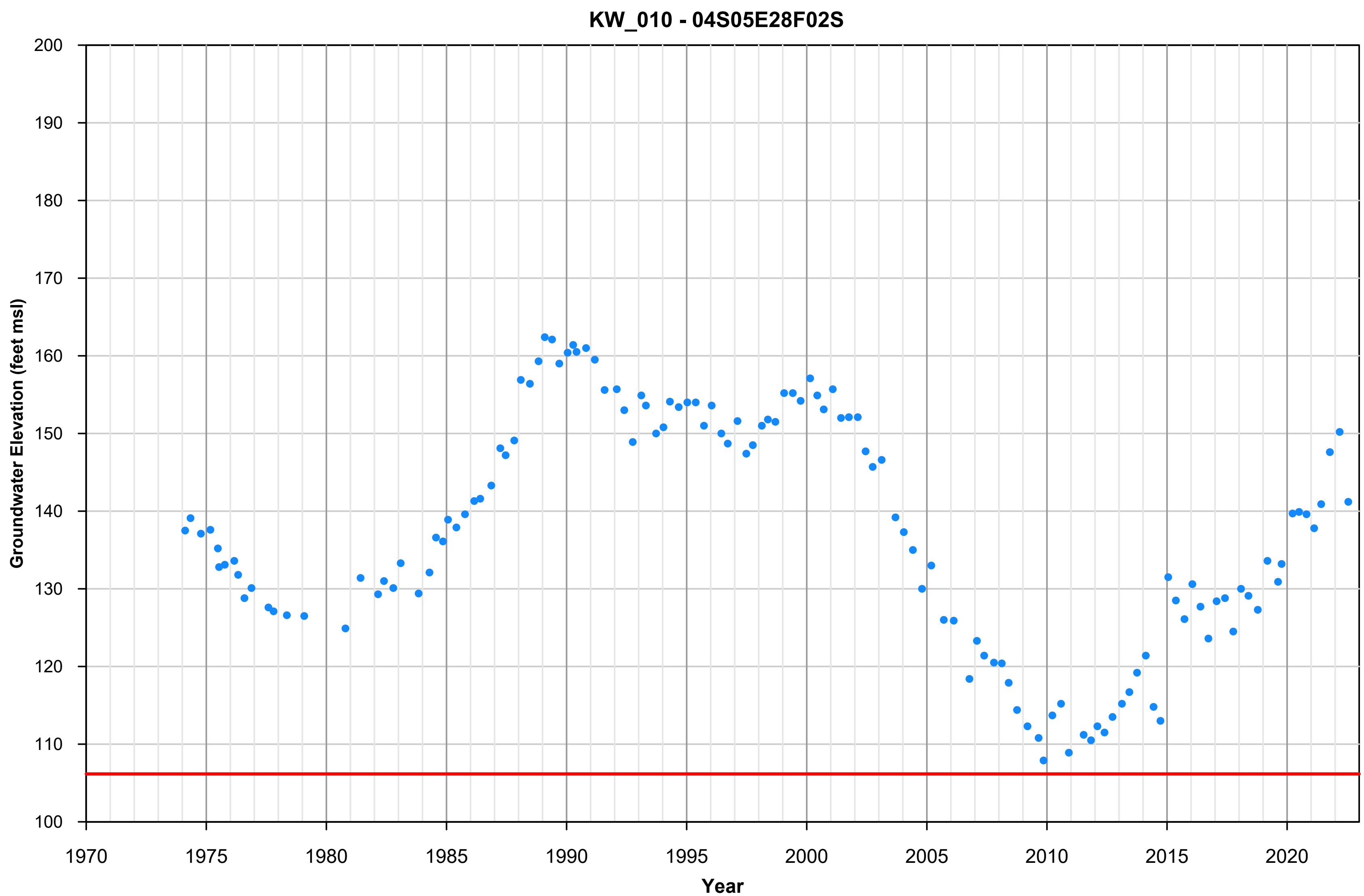
Appendix A-9
Groundwater Elevation Hydrograph
KW_008 - 04S05E15R02S



March 2023

TODD GROUNDWATER

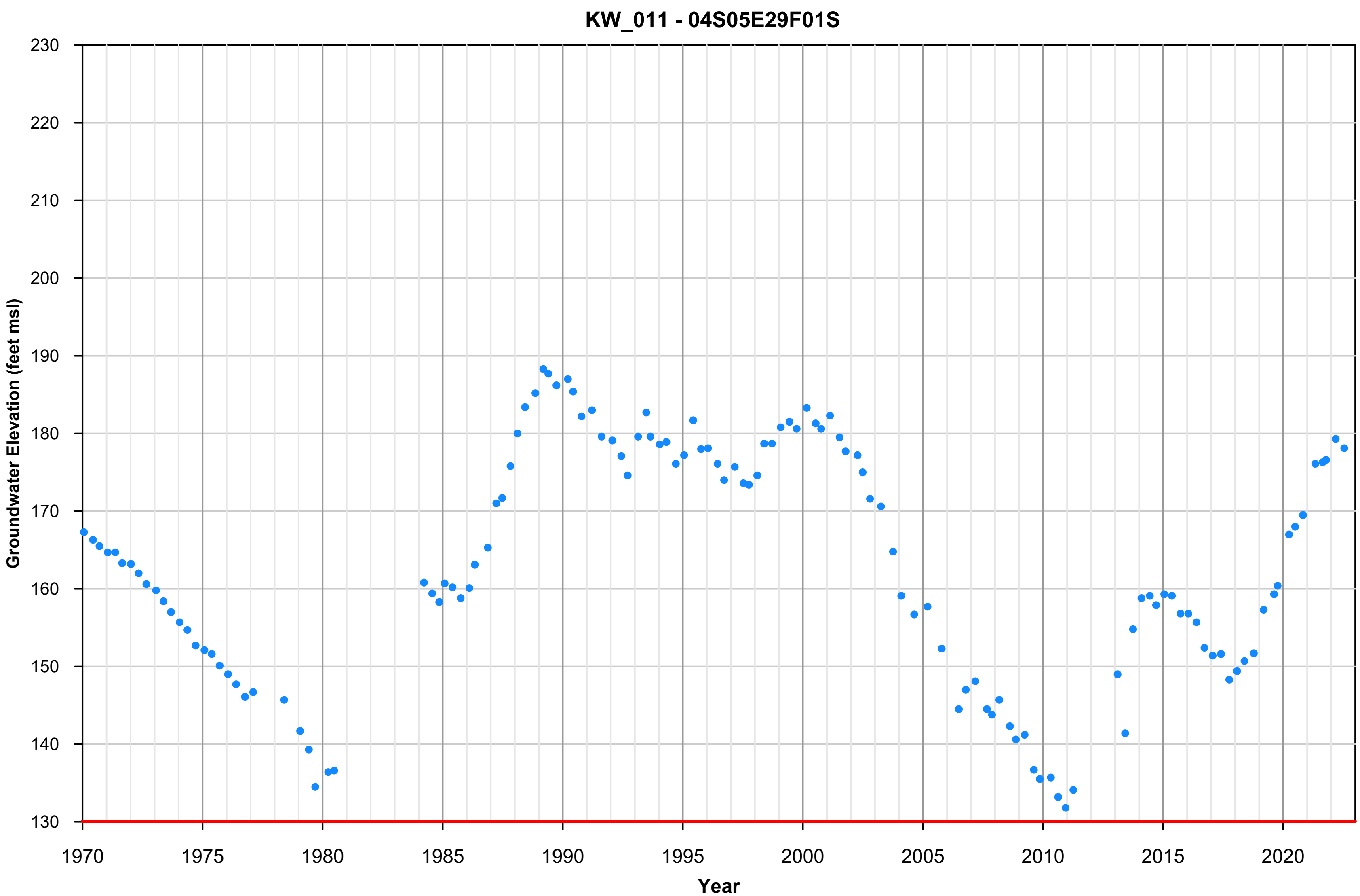
Appendix A-10
Groundwater Elevation Hydrograph
KW_009 - 04S05E17Q02S



March 2023

TODD GROUNDWATER

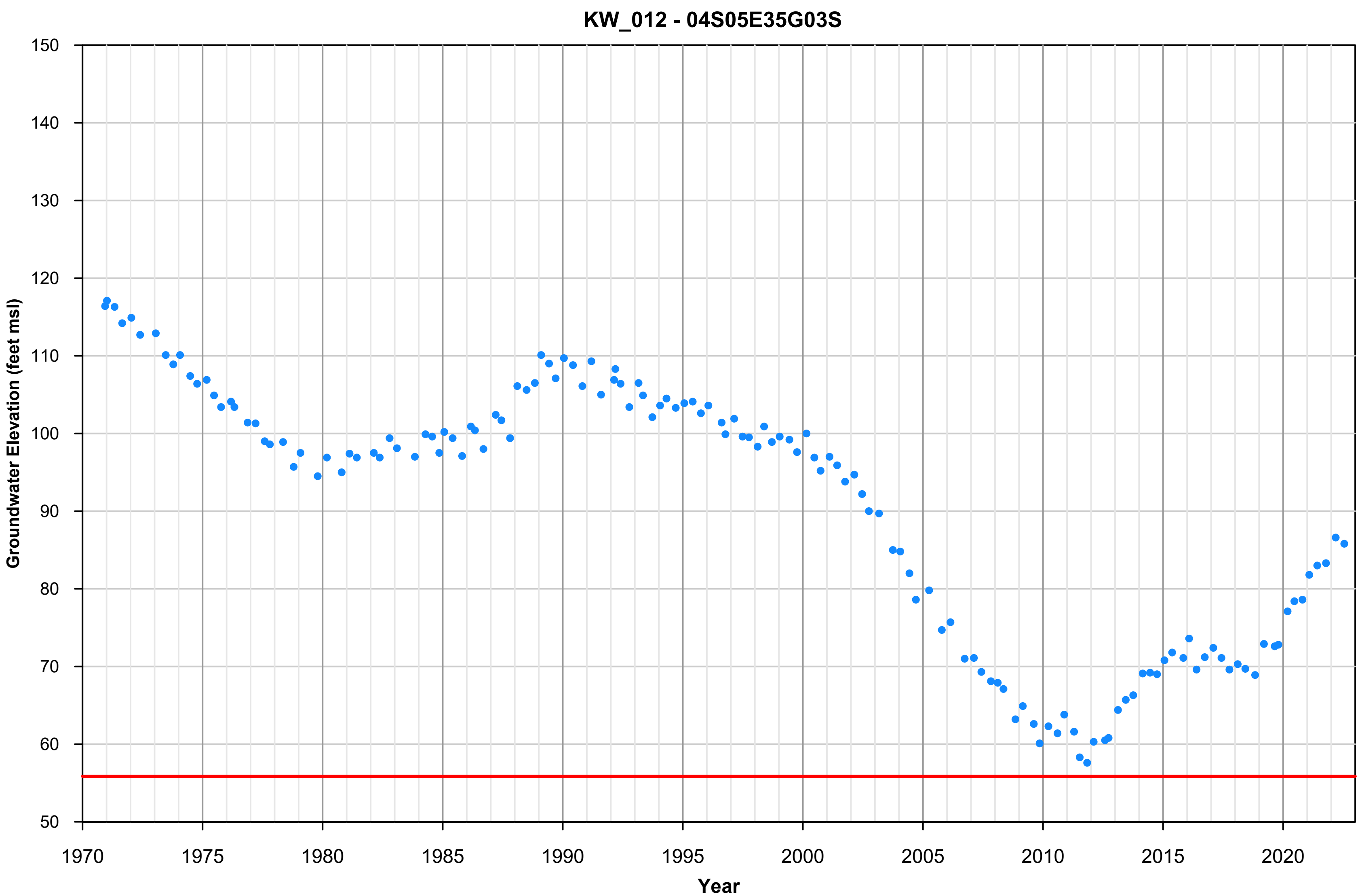
Appendix A-11
Groundwater Elevation Hydrograph
KW_010 - 04S05E28F02S



March 2023

TODD GROUNDWATER

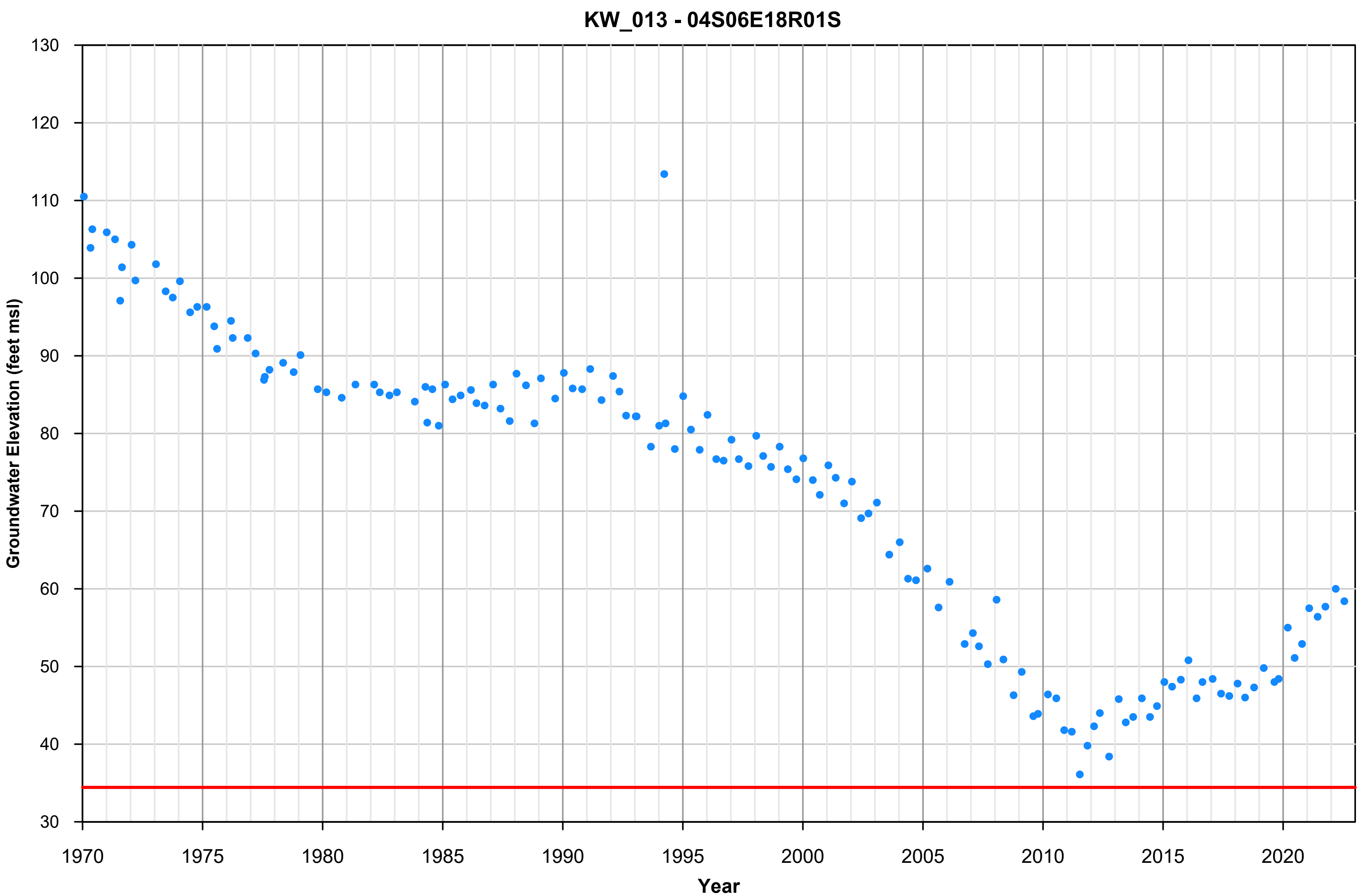
Appendix A-12
Groundwater Elevation Hydrograph
KW_011 - 04S05E29F01S



March 2023

TODD GROUNDWATER

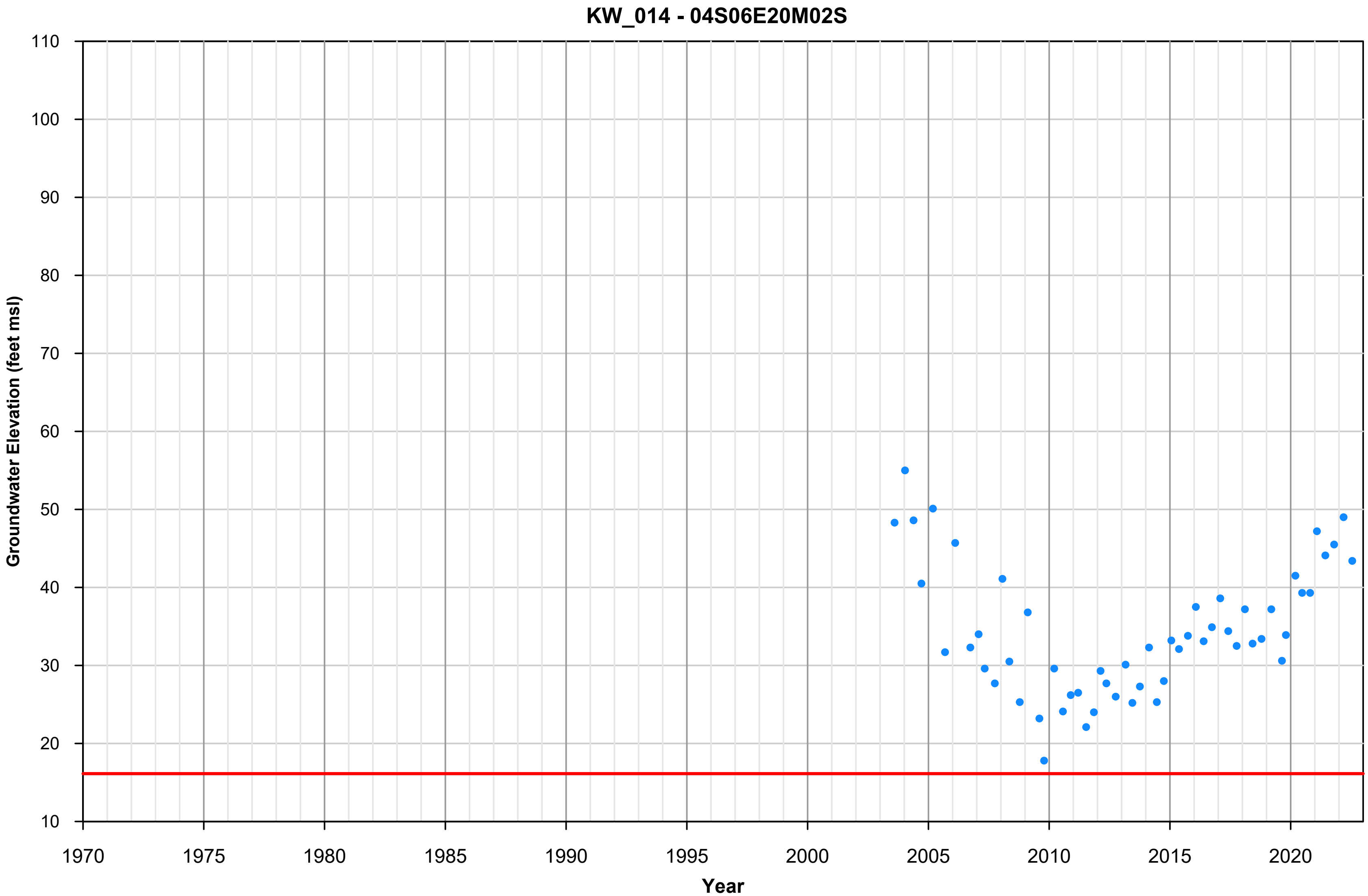
Appendix A-13
Groundwater Elevation Hydrograph
KW_012 - 04S05E35G03S



March 2023

TODD GROUNDWATER

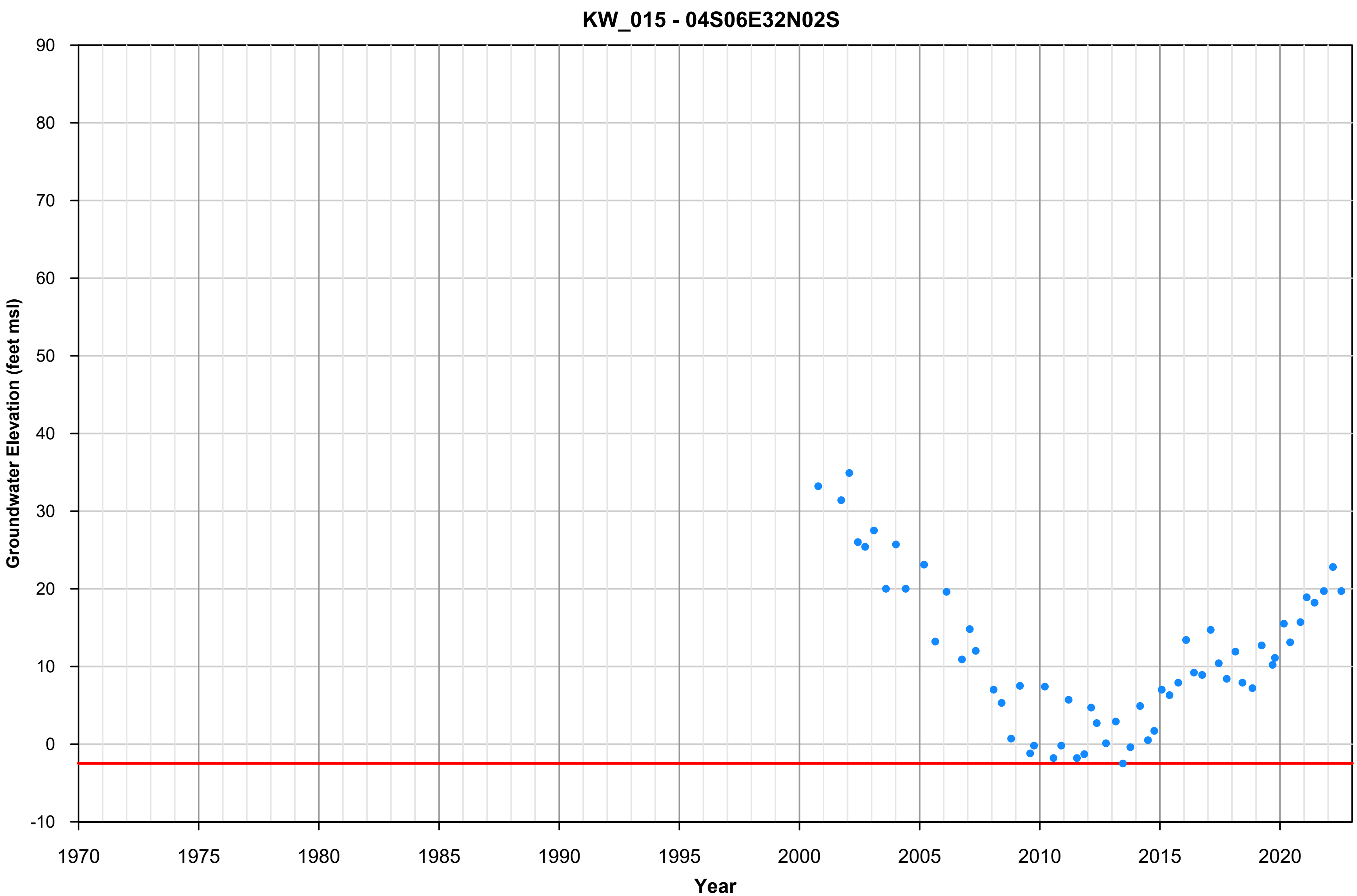
Appendix A-14
Groundwater Elevation Hydrograph
KW_013 - 04S06E18R01S



March 2023

TODD GROUNDWATER

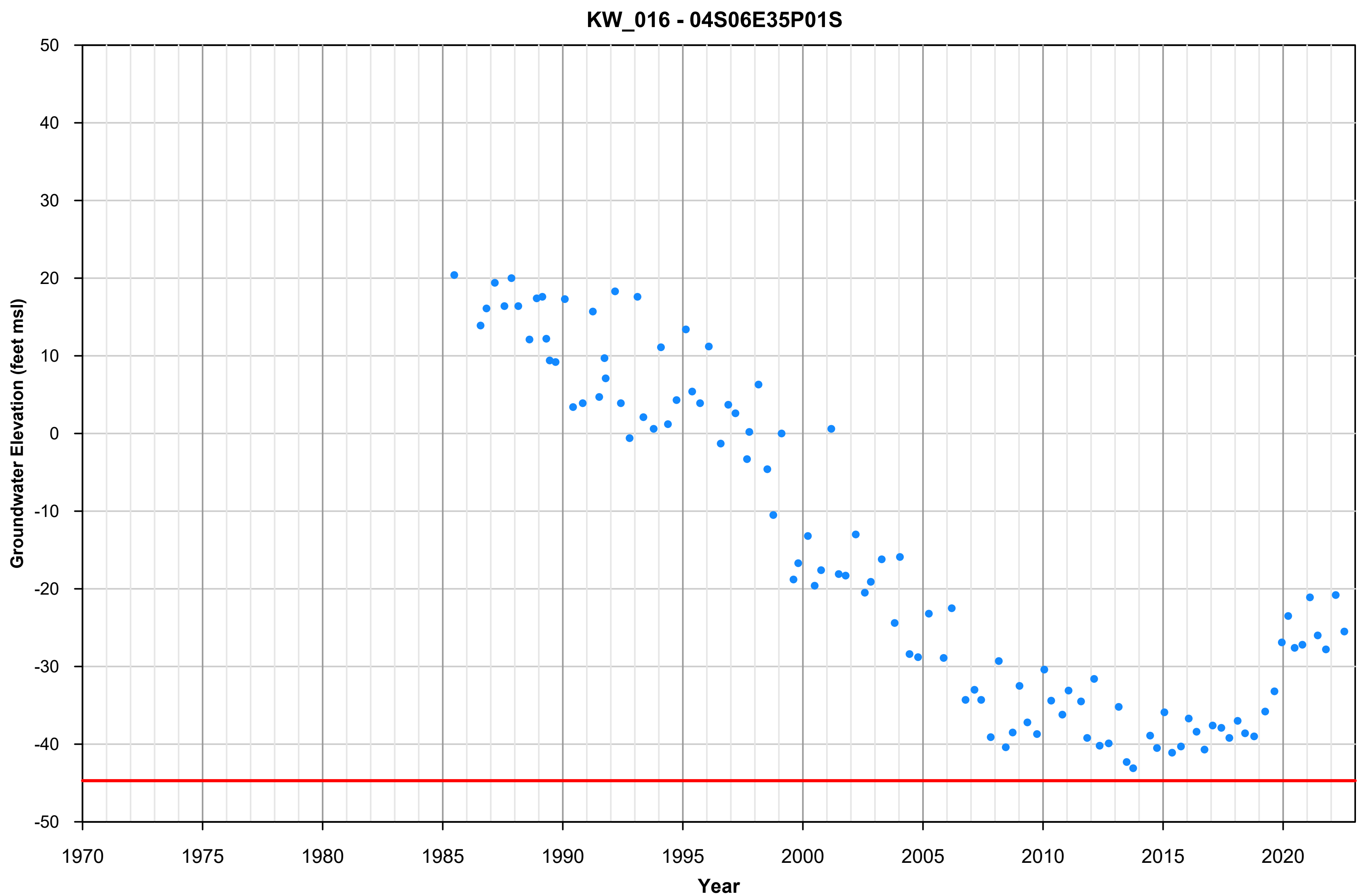
Appendix A-15
Groundwater Elevation Hydrograph
KW_014 - 04S06E20M02S



March 2023

TODD GROUNDWATER

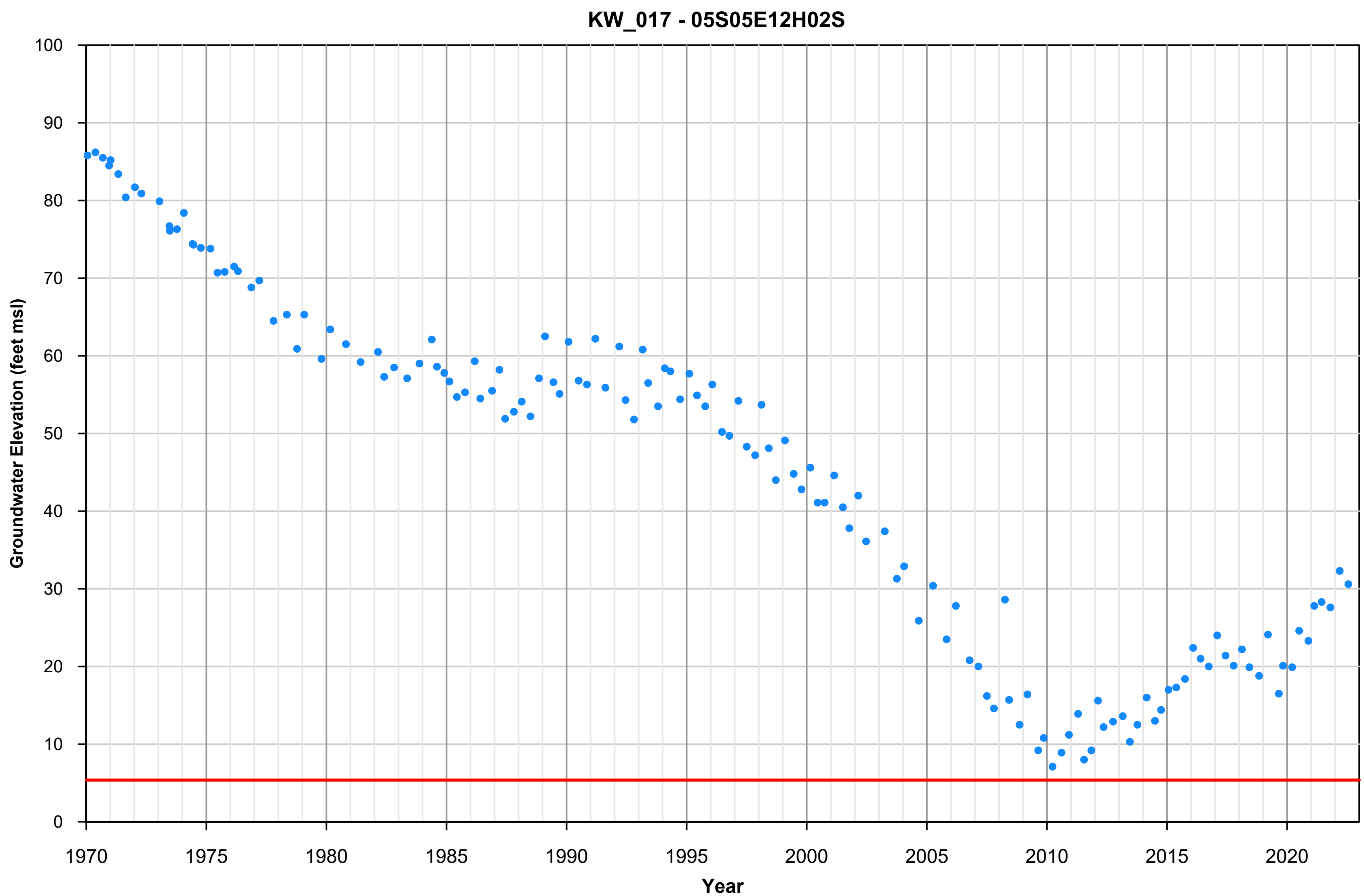
Appendix A-16
Groundwater Elevation Hydrograph
KW_015 - 04S06E32N02S



March 2023

TODD GROUNDWATER

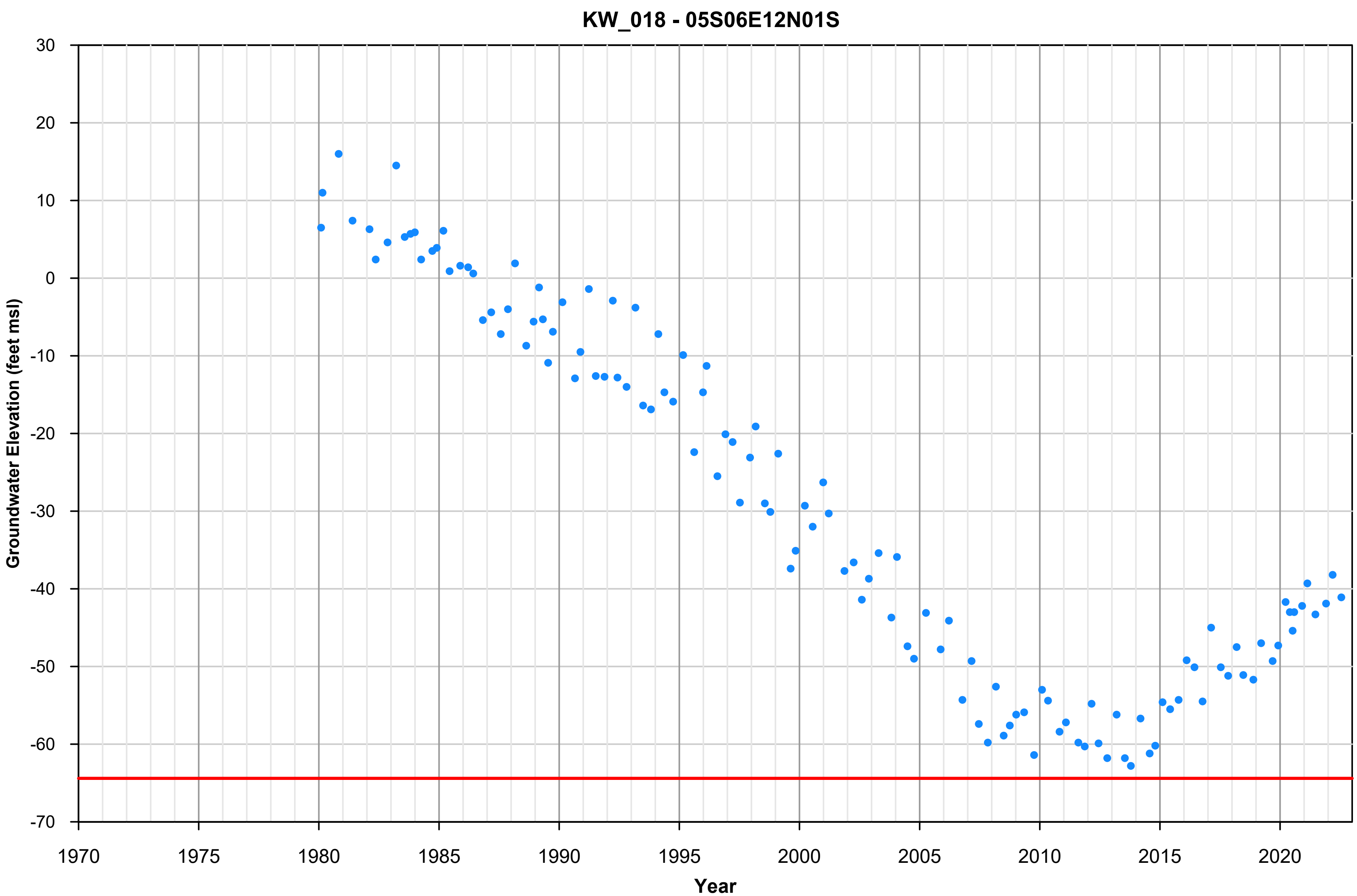
Appendix A-17
Groundwater Elevation Hydrograph
KW_016 - 04S06E35P01S



March 2023

TODD GROUNDWATER

Appendix A-18
Groundwater Elevation Hydrograph
KW_017 - 05S05E12H02S



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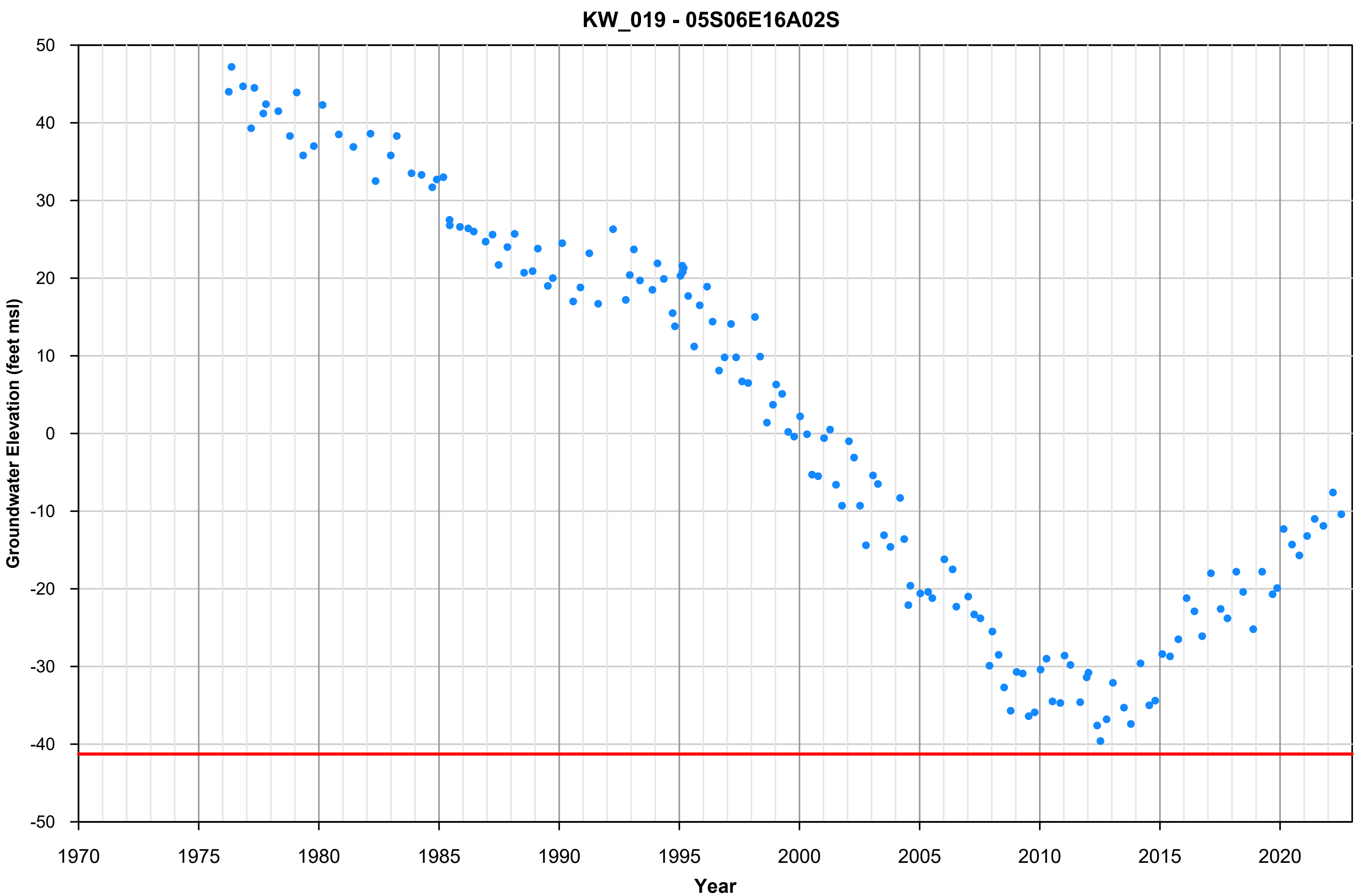
March 2023

TODD GROUNDWATER

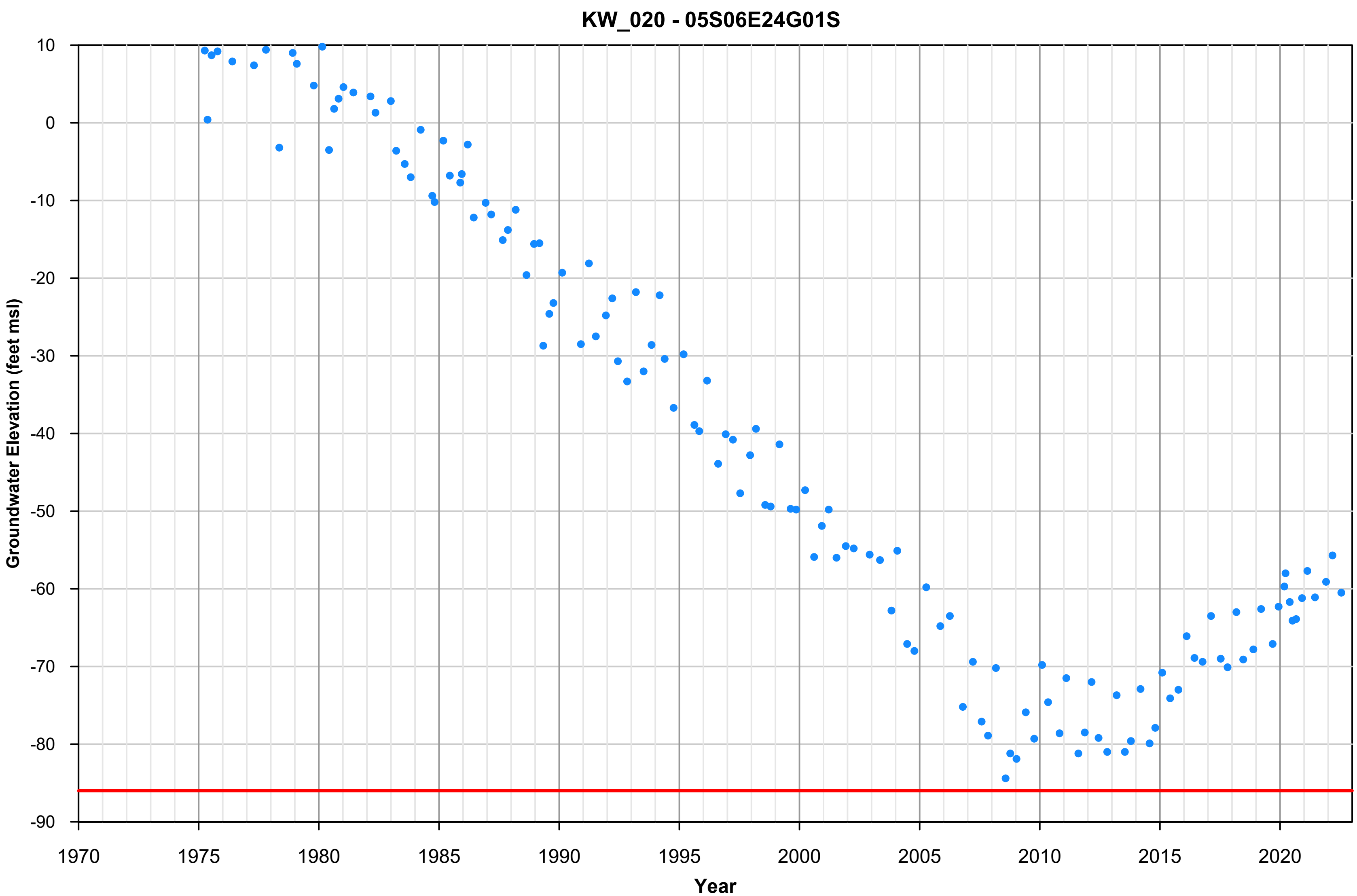
Appendix A-19
Groundwater Elevation Hydrograph
KW_018 - 05S06E12N01S



March 2023

TODD GROUNDWATER

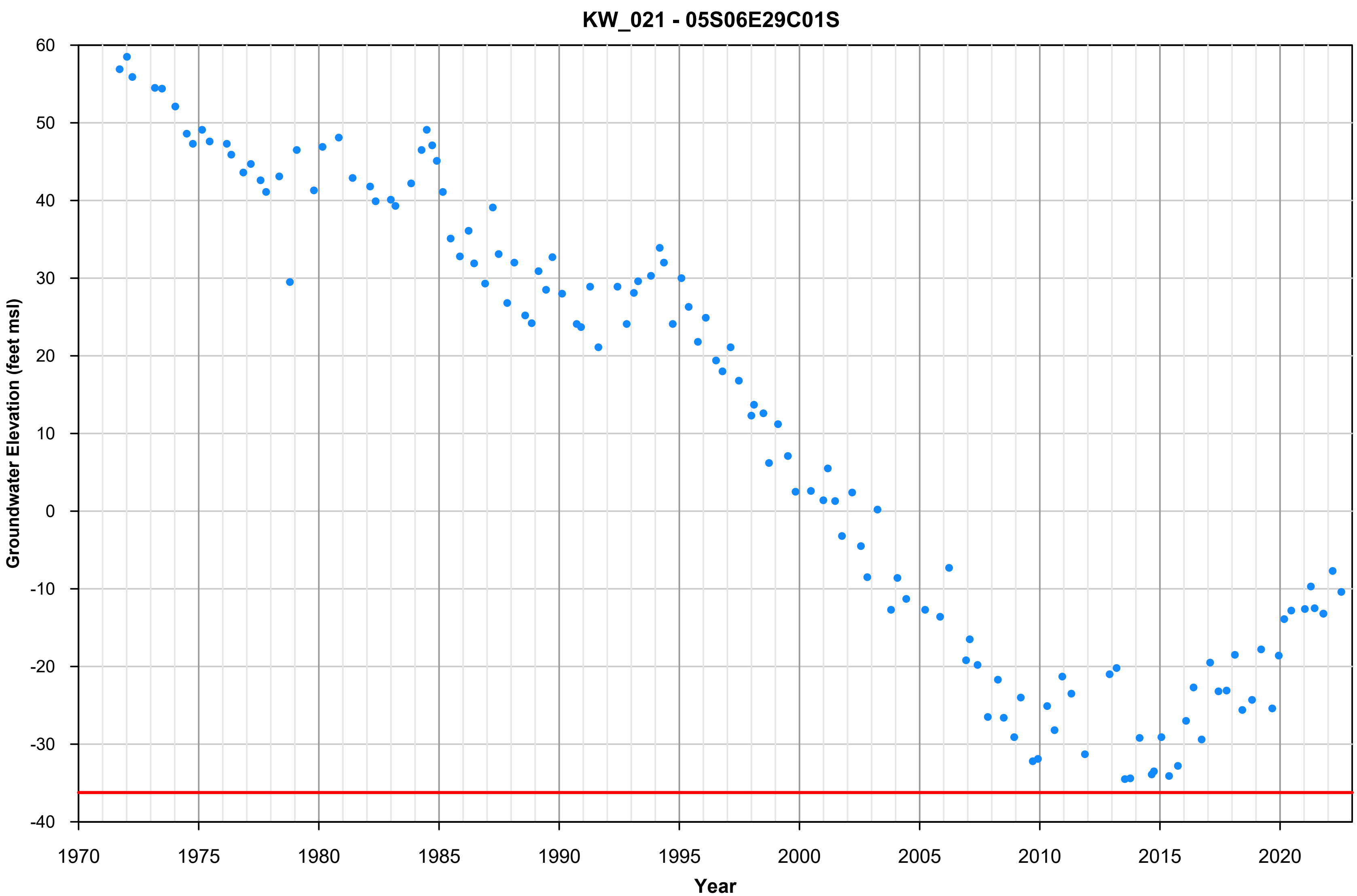
Appendix A-20
Groundwater Elevation Hydrograph
KW_019 - 05S06E16A02S



March 2023

TODD GROUNDWATER

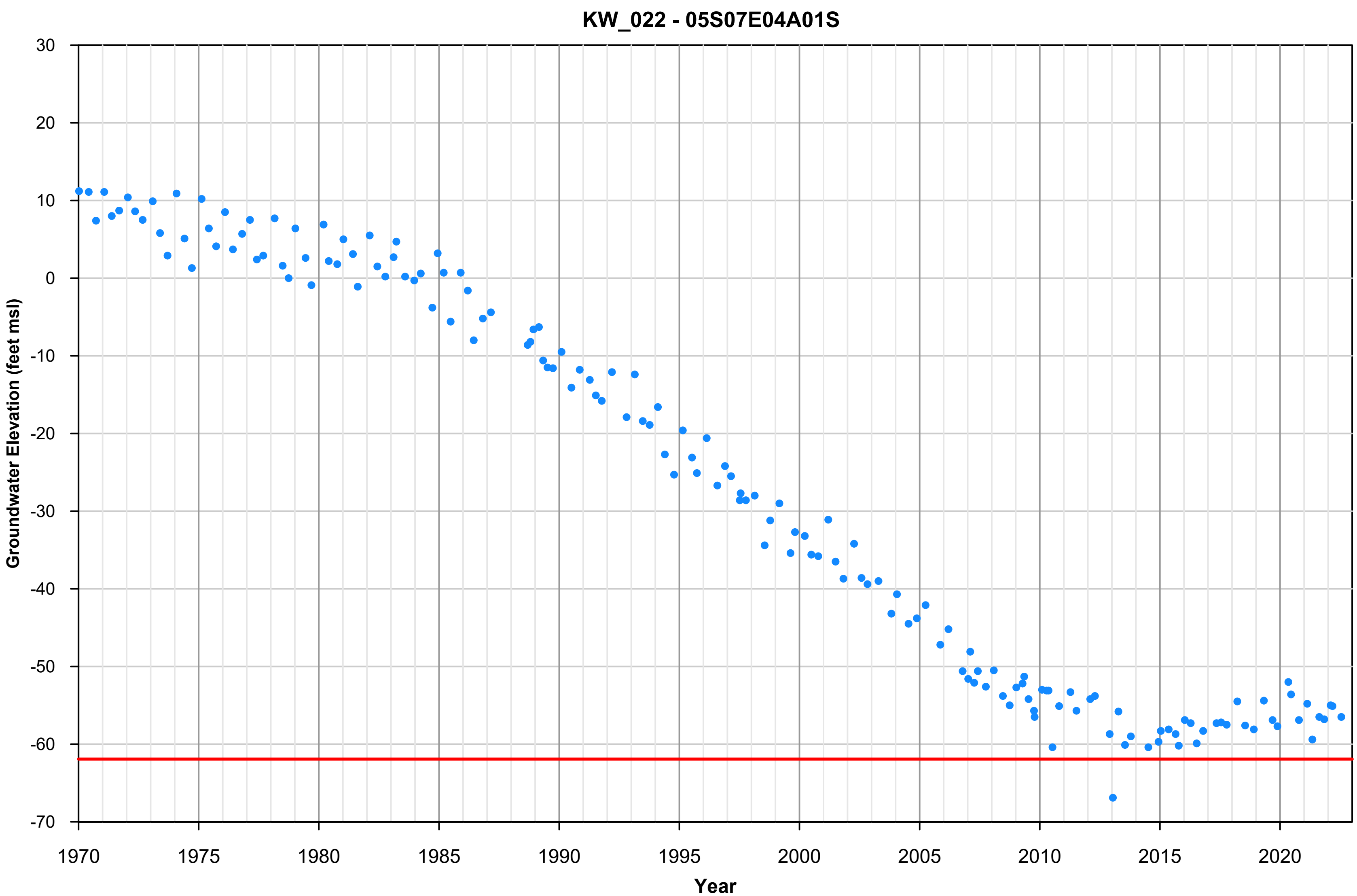
Appendix A-21
Groundwater Elevation Hydrograph
KW_020 - 05S06E24G01S



March 2023

TODD GROUNDWATER

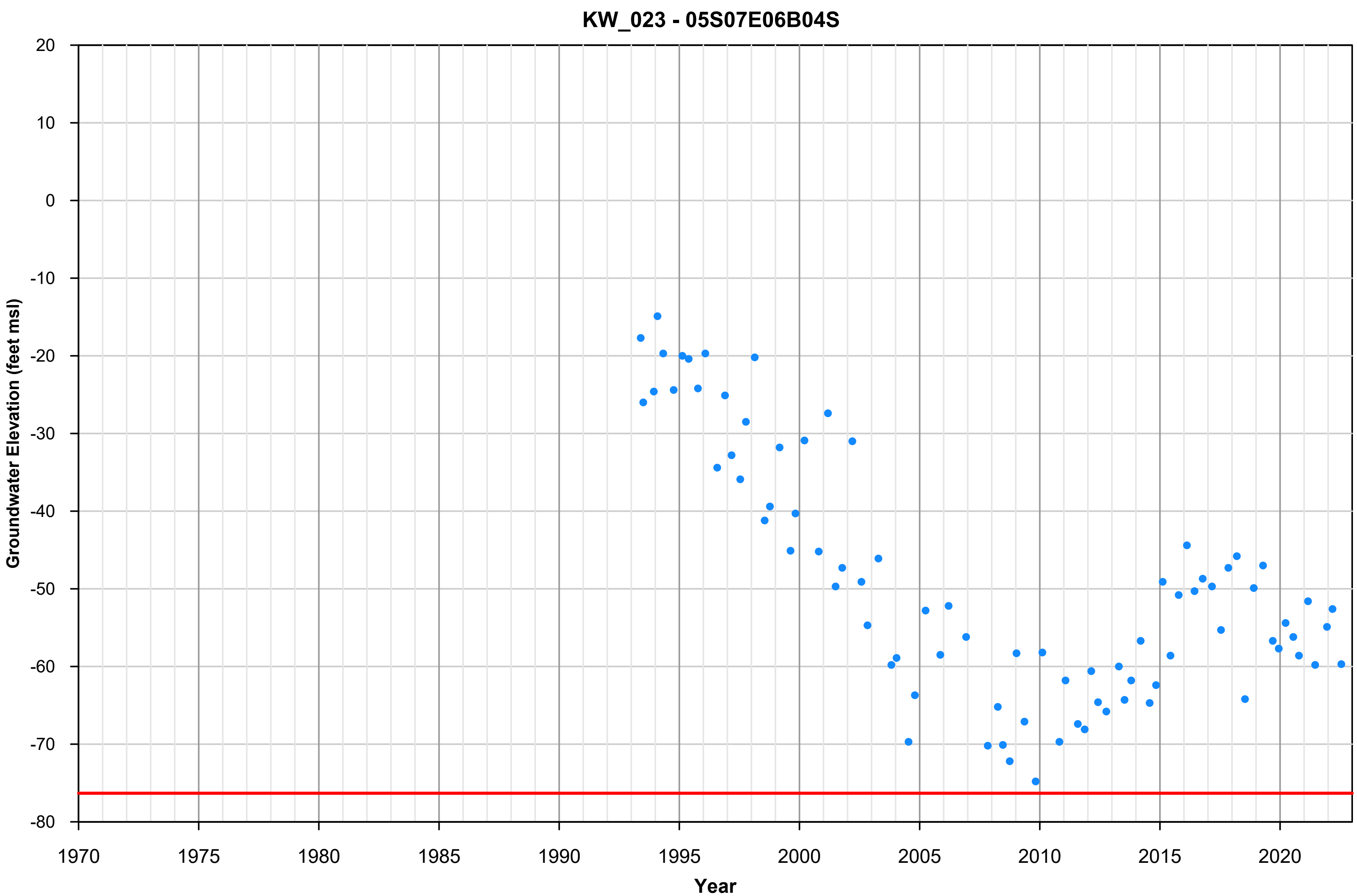
Appendix A-22
Groundwater Elevation Hydrograph
KW_021 - 05S06E29C01S



March 2023

TODD GROUNDWATER

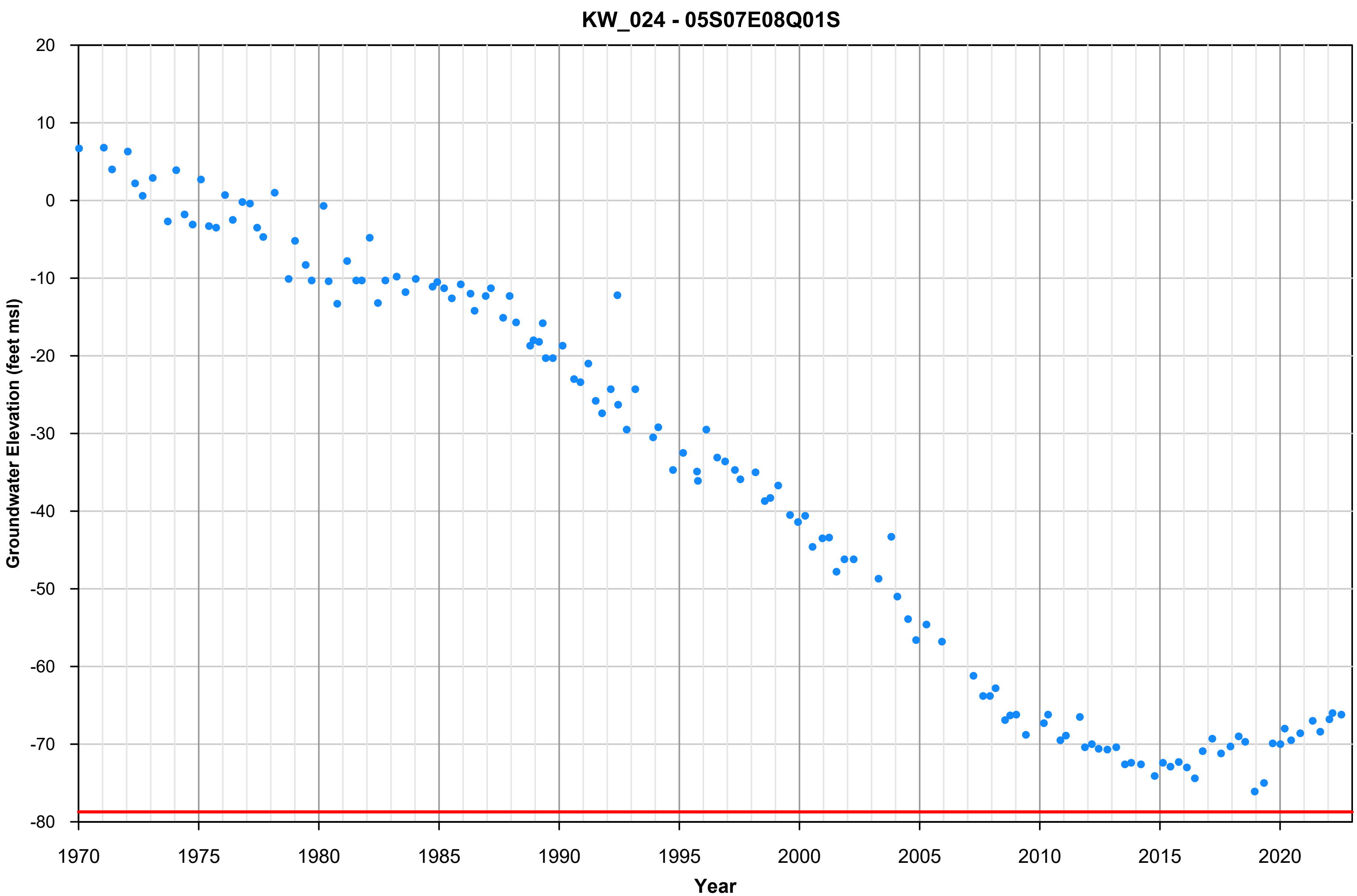
Appendix A-23
Groundwater Elevation Hydrograph
KW_022 - 05S07E04A01S



March 2023

TODD GROUNDWATER

Appendix A-24
Groundwater Elevation Hydrograph
KW_023 - 05S07E06B04S



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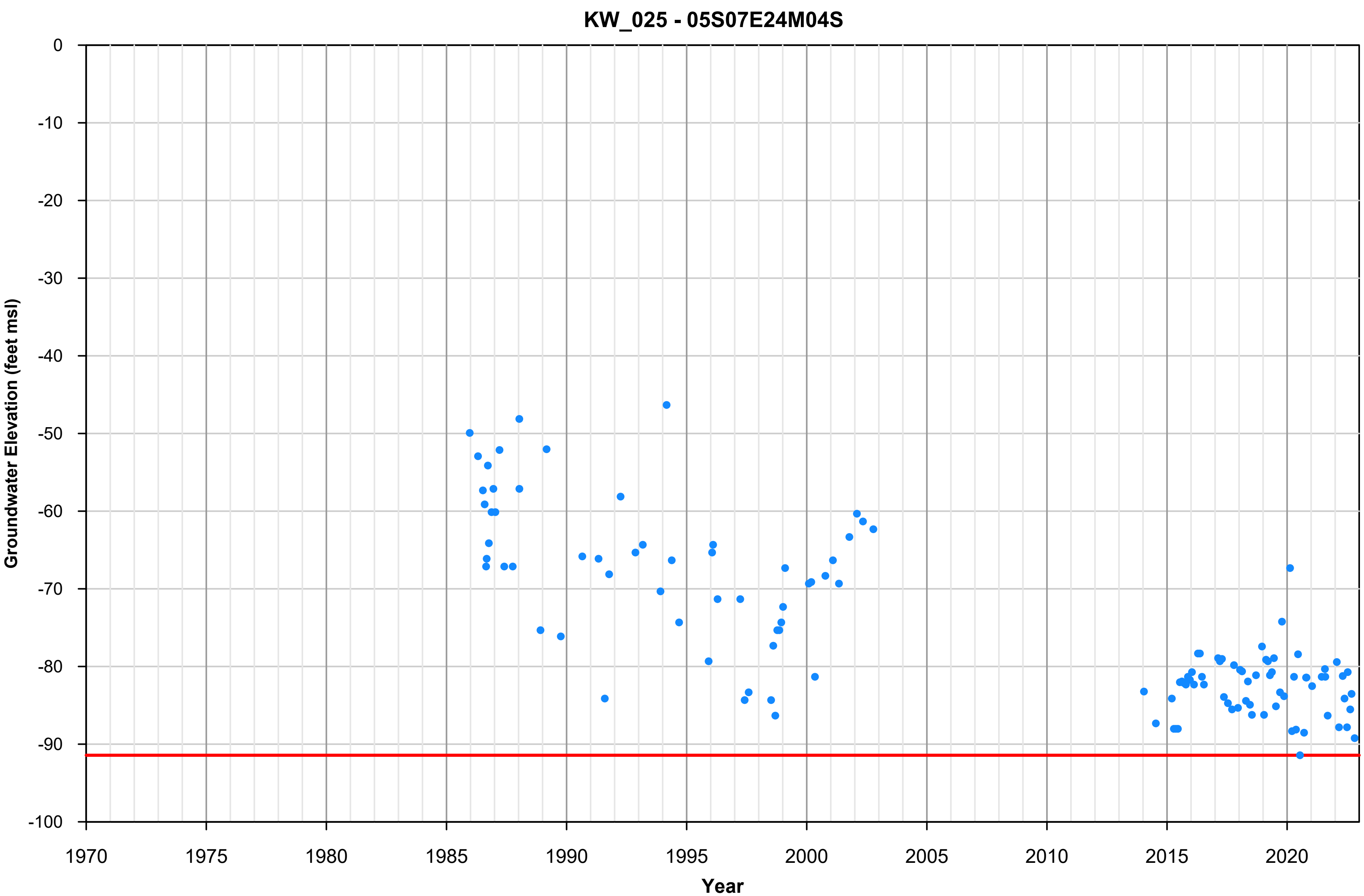
TODD GROUNDWATER

Appendix A-25
Groundwater Elevation Hydrograph
KW_024 - 05S07E08Q01S



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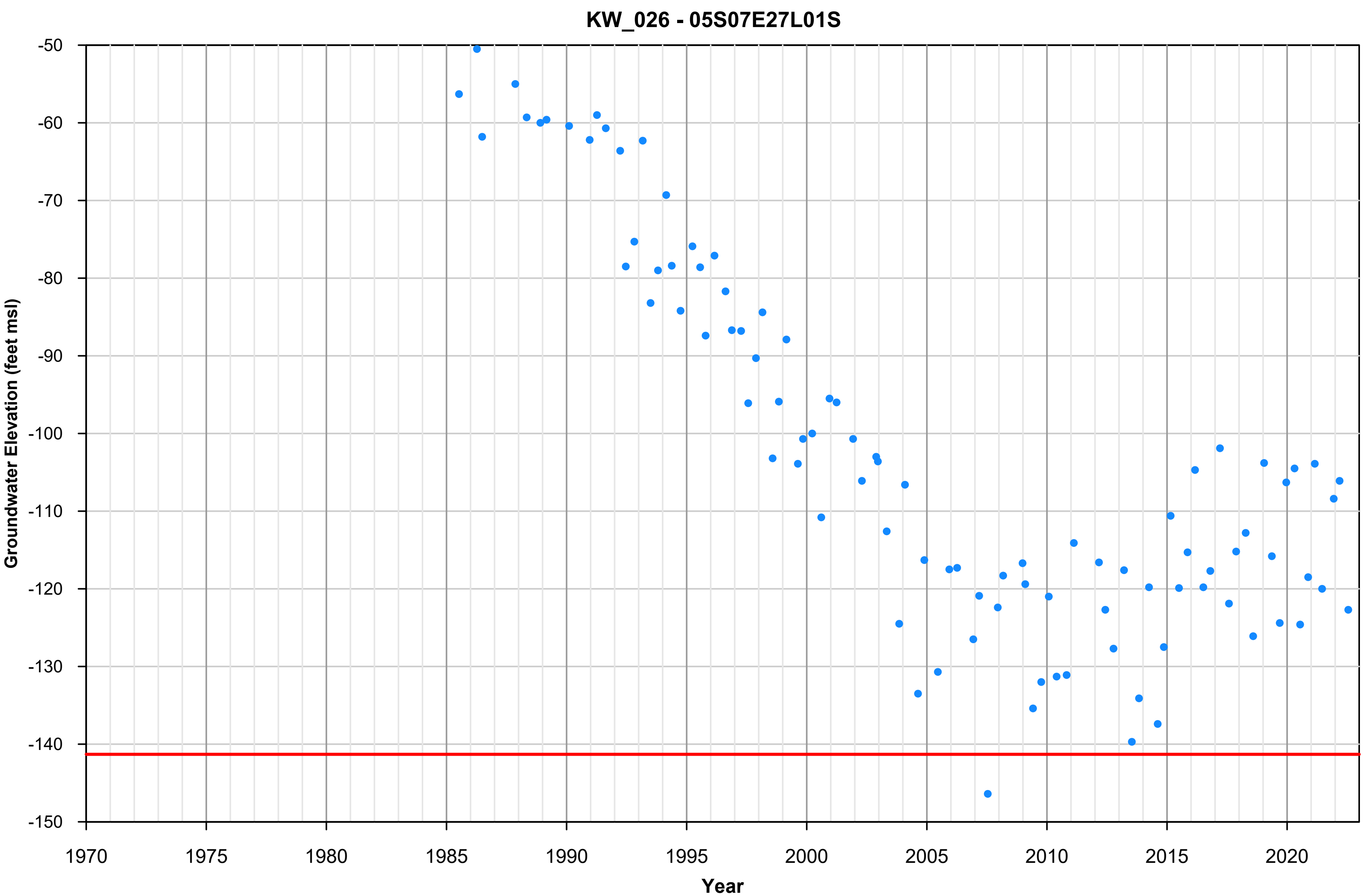
TODD GROUNDWATER

Appendix A-26
Groundwater Elevation Hydrograph
KW_025 - 05S07E24M04S



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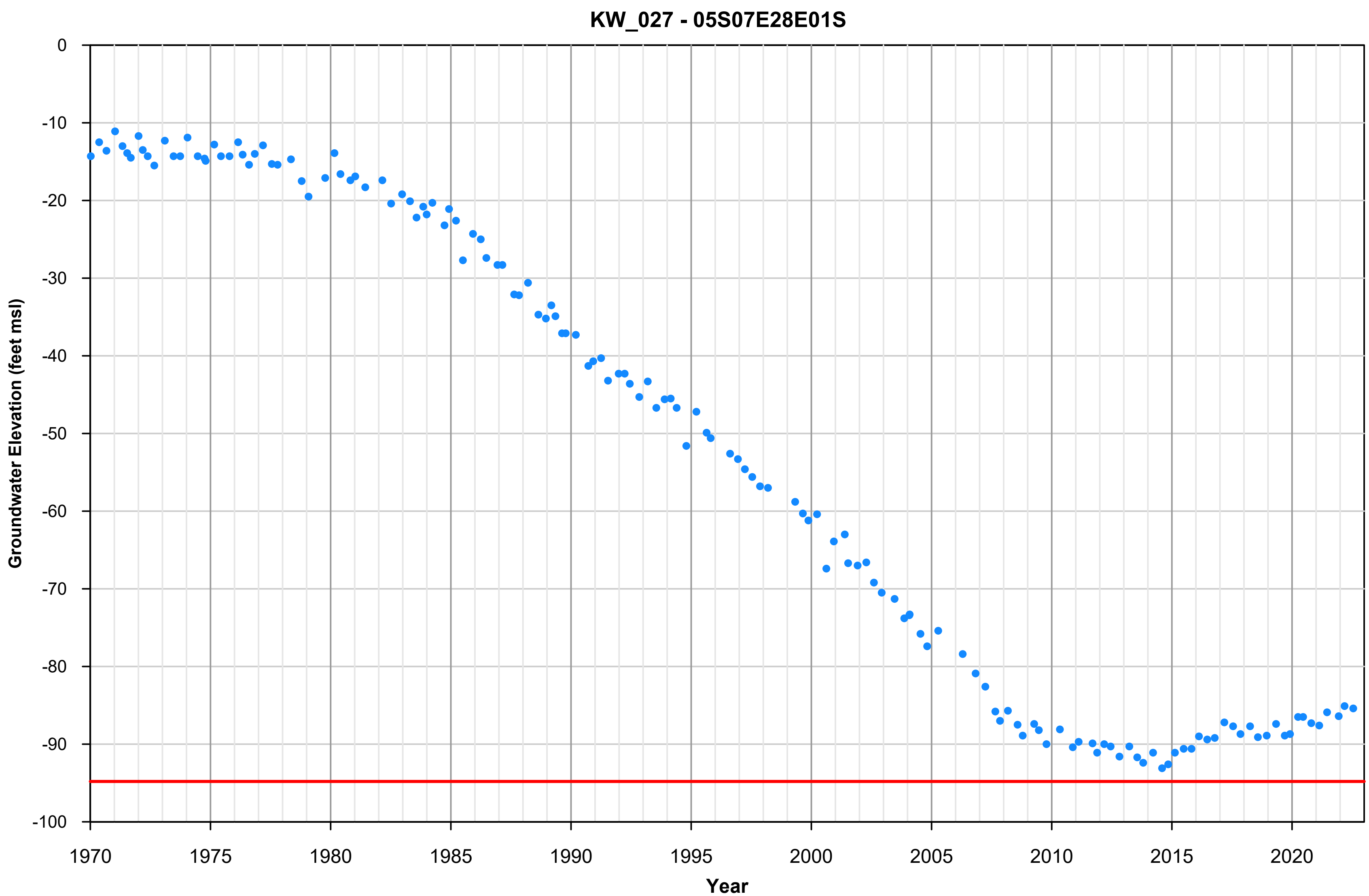
TODD GROUNDWATER

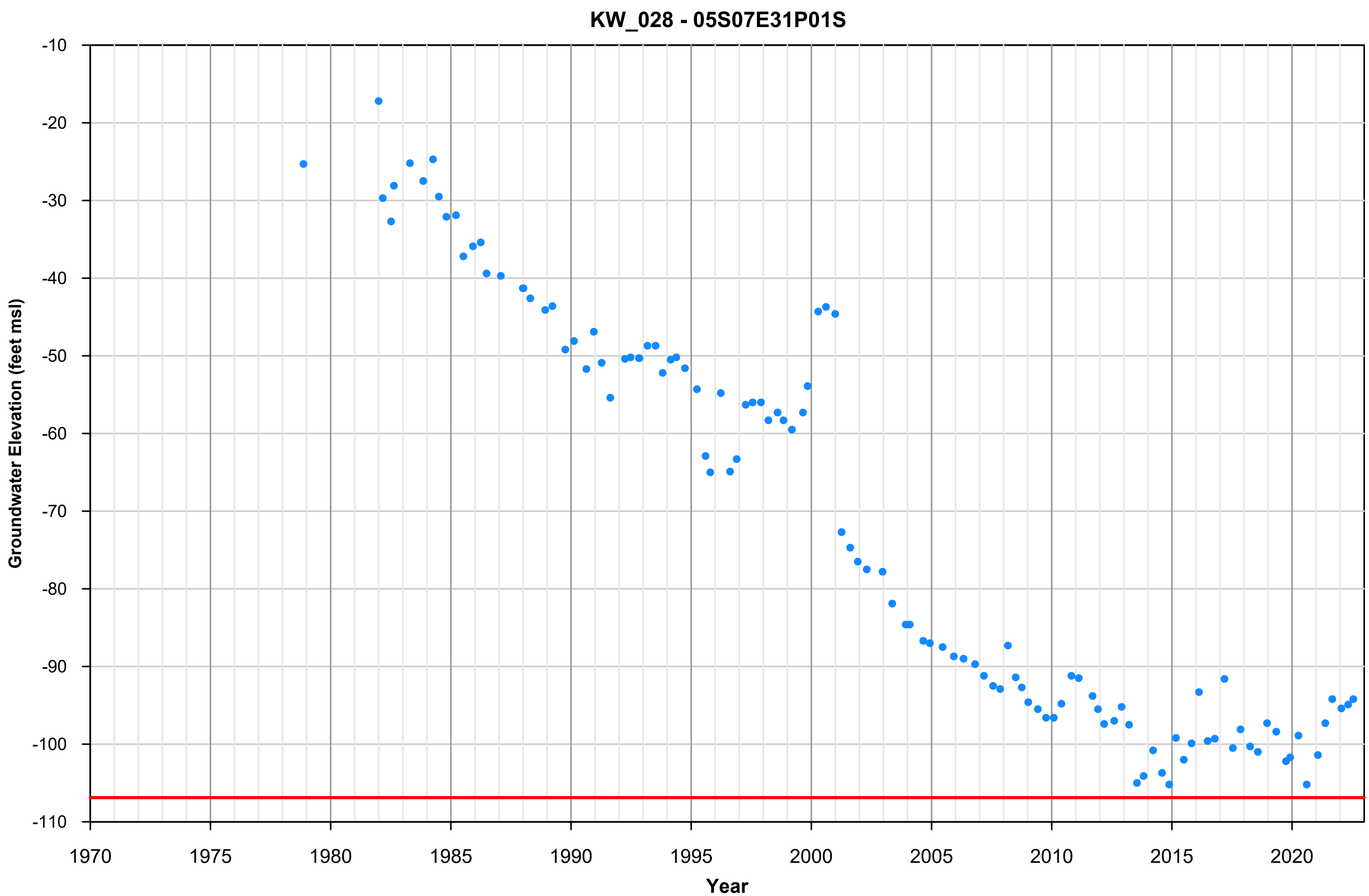
Appendix A-27
Groundwater Elevation Hydrograph
KW_026 - 05S07E27L01S



March 2023

TODD GROUNDWATER

Appendix A-28
Groundwater Elevation Hydrograph
KW_027 - 05S07E28E01S



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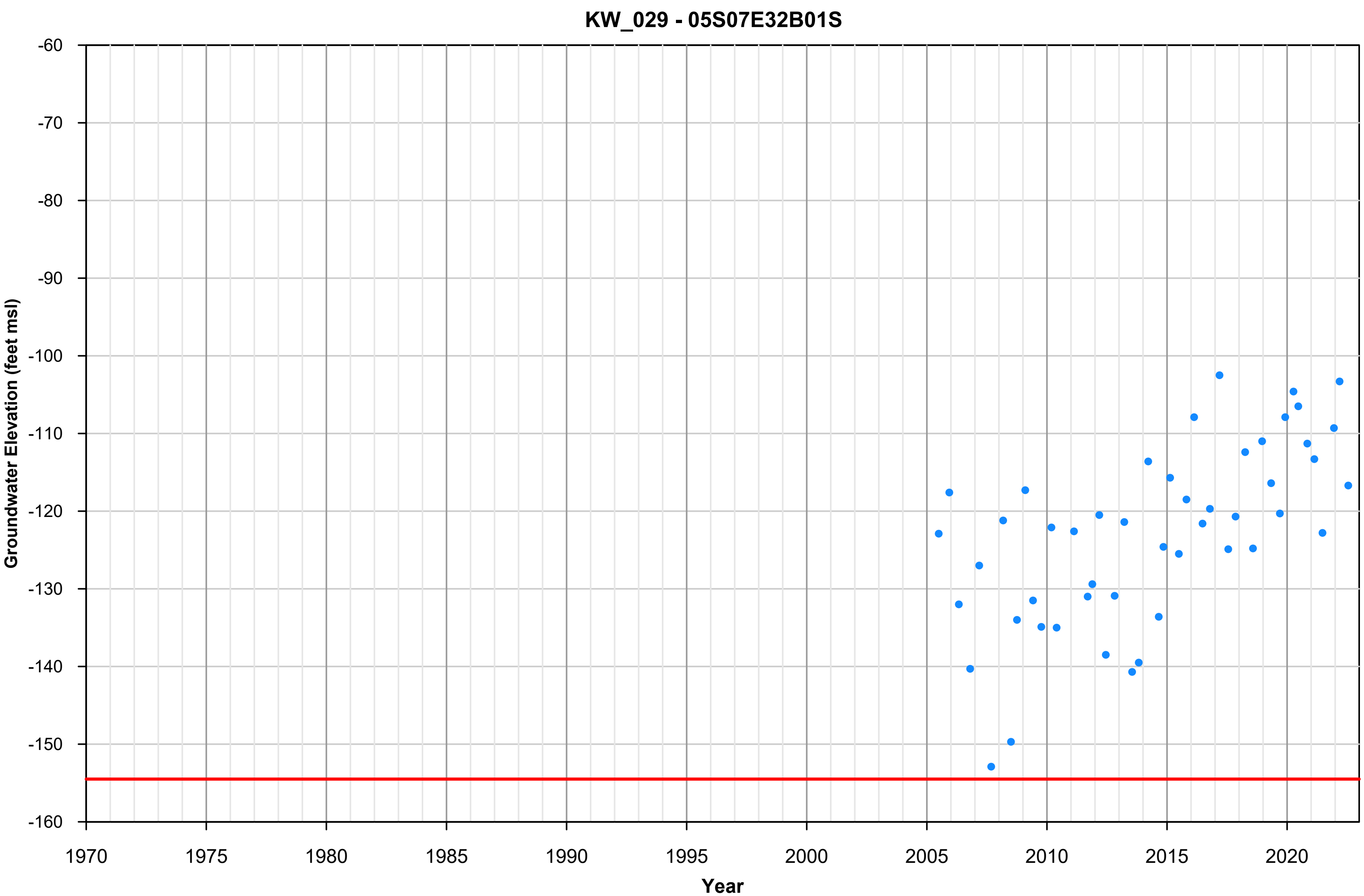
TODD GROUNDWATER

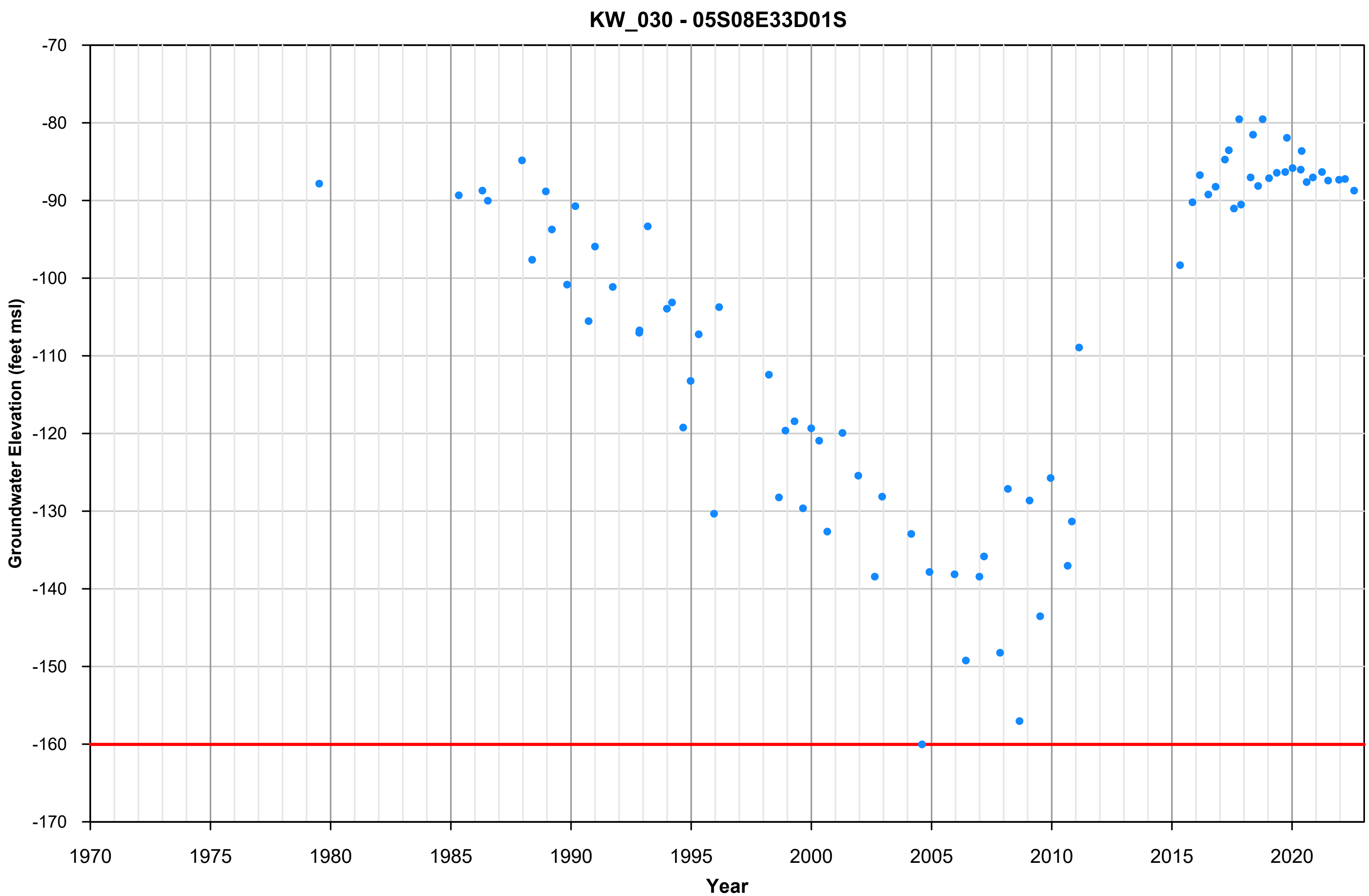
Appendix A-29
Groundwater Elevation Hydrograph
KW_028 - 05S07E31P01S



March 2023

TODD GROUNDWATER

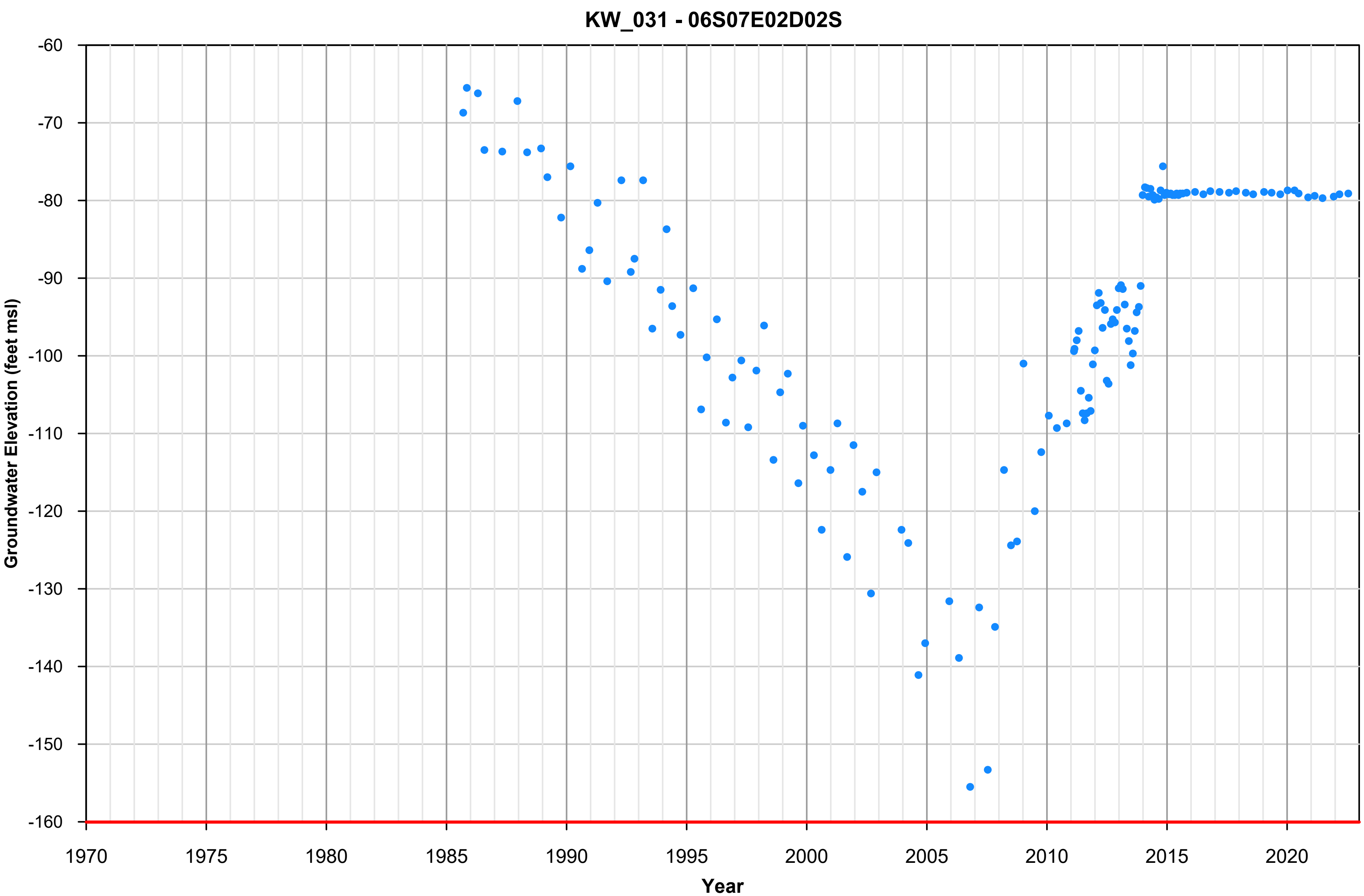
Appendix A-30
Groundwater Elevation Hydrograph
KW_029 - 05S07E32B01S



March 2023

TODD GROUNDWATER

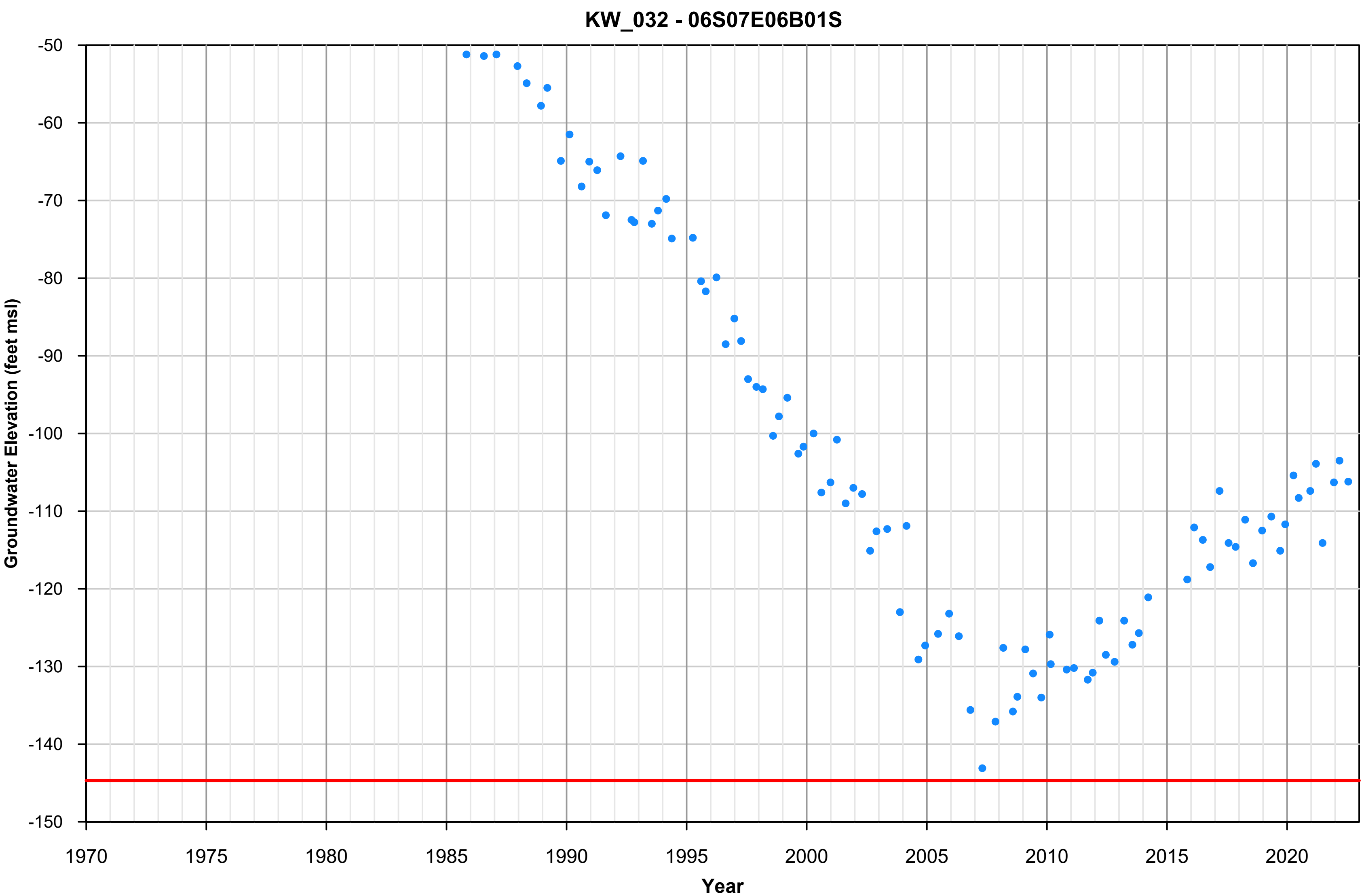
Appendix A-31
Groundwater Elevation Hydrograph
KW_030 - 05S08E33D01S



March 2023

TODD GROUNDWATER

Appendix A-32
Groundwater Elevation Hydrograph
KW_031 - 06S07E02D02S



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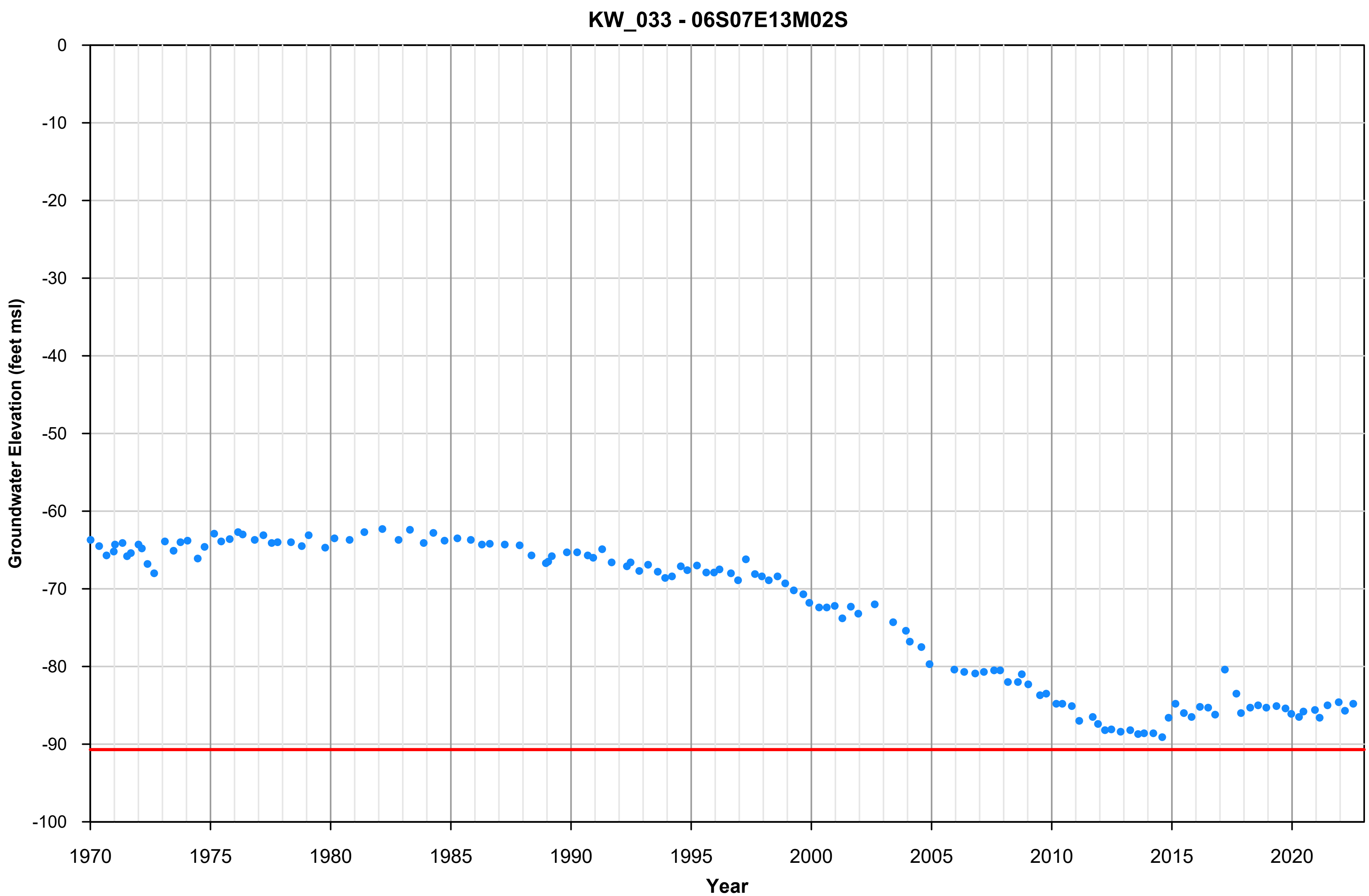
TODD GROUNDWATER

Appendix A-33
Groundwater Elevation Hydrograph
KW_032 - 06S07E06B01S



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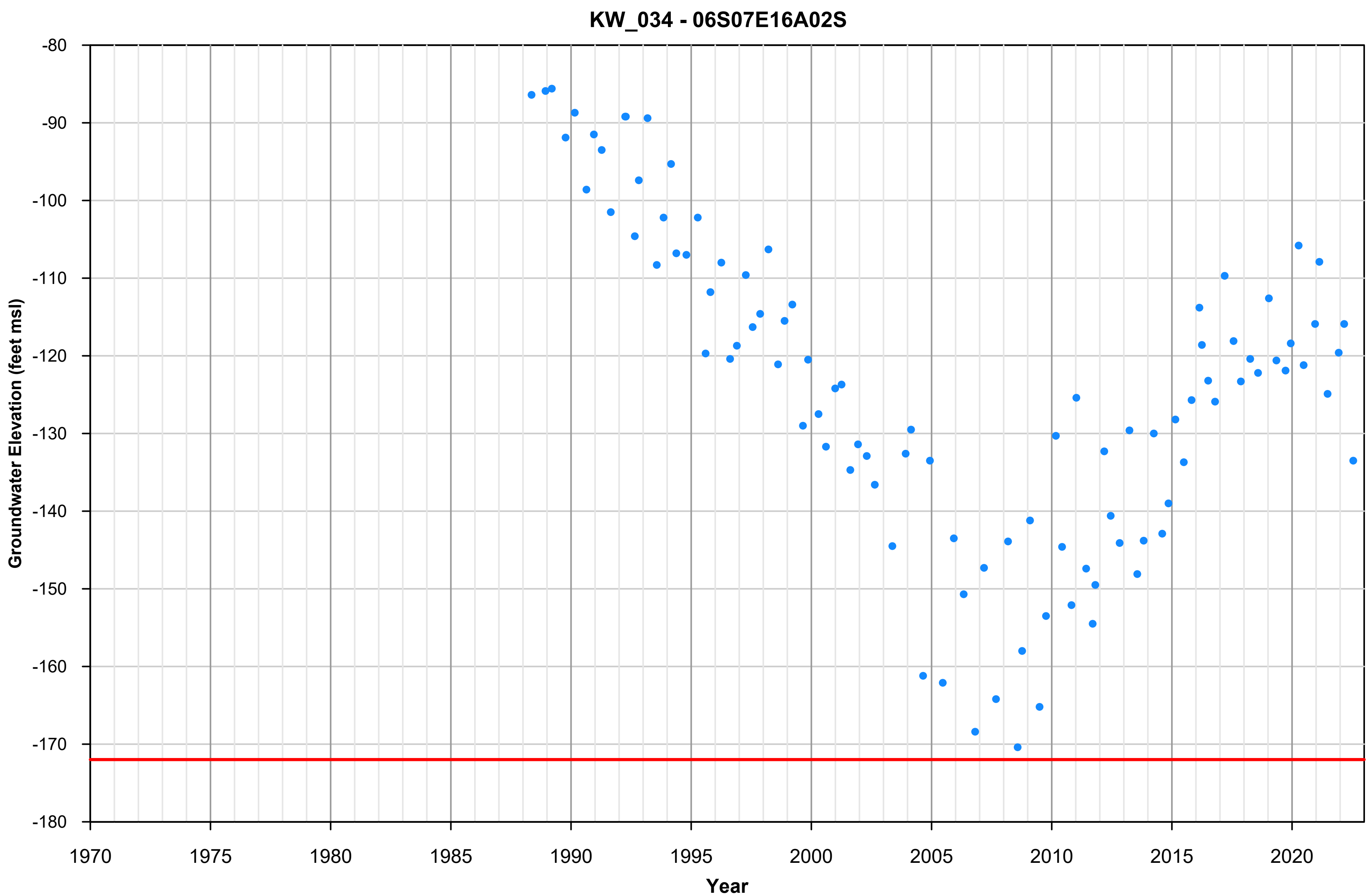
TODD GROUNDWATER

Appendix A-34
Groundwater Elevation Hydrograph
KW_033 - 06S07E13M02S



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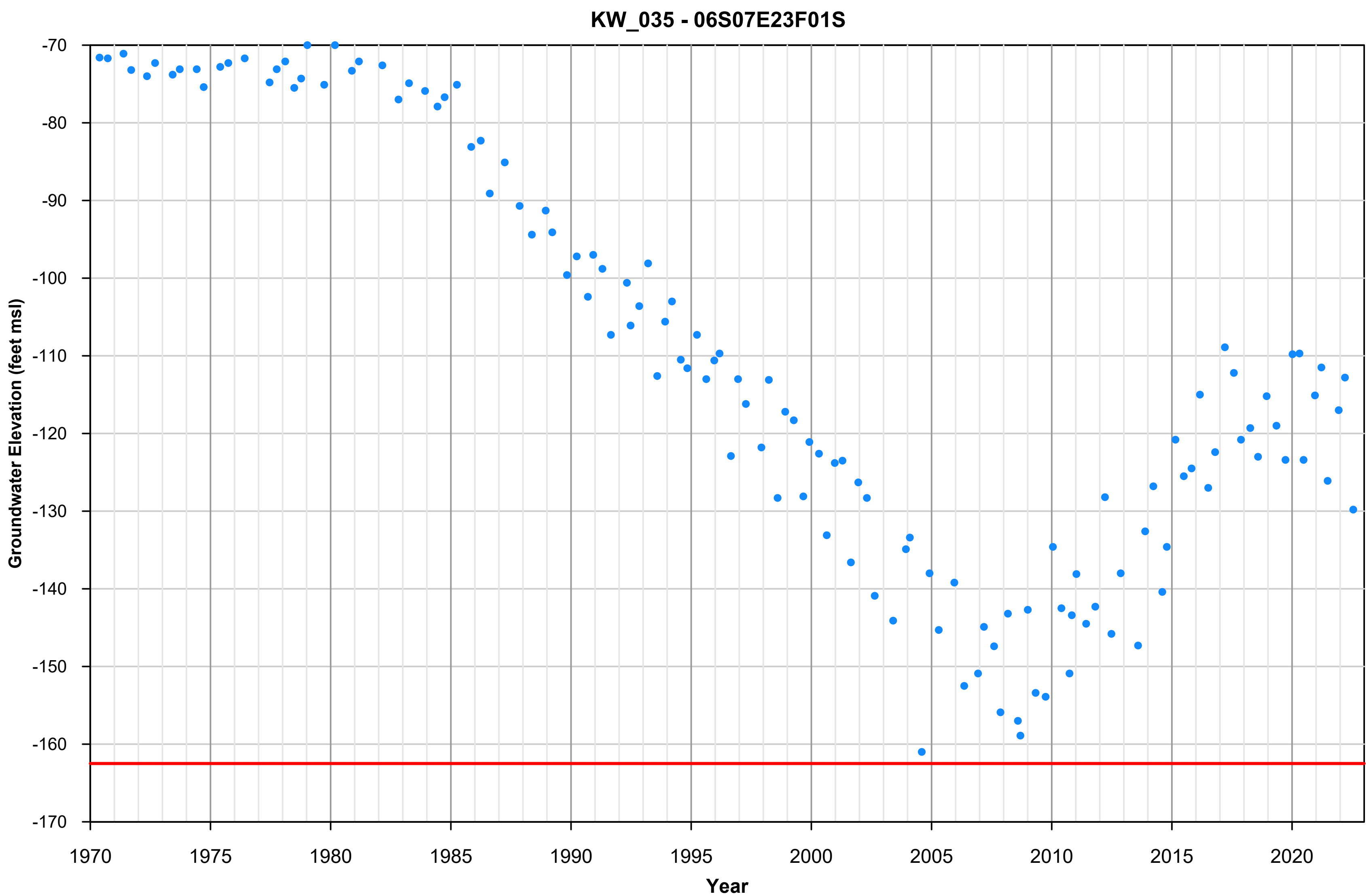
TODD GROUNDWATER

Appendix A-35
Groundwater Elevation Hydrograph
KW_034 - 06S07E16A02S



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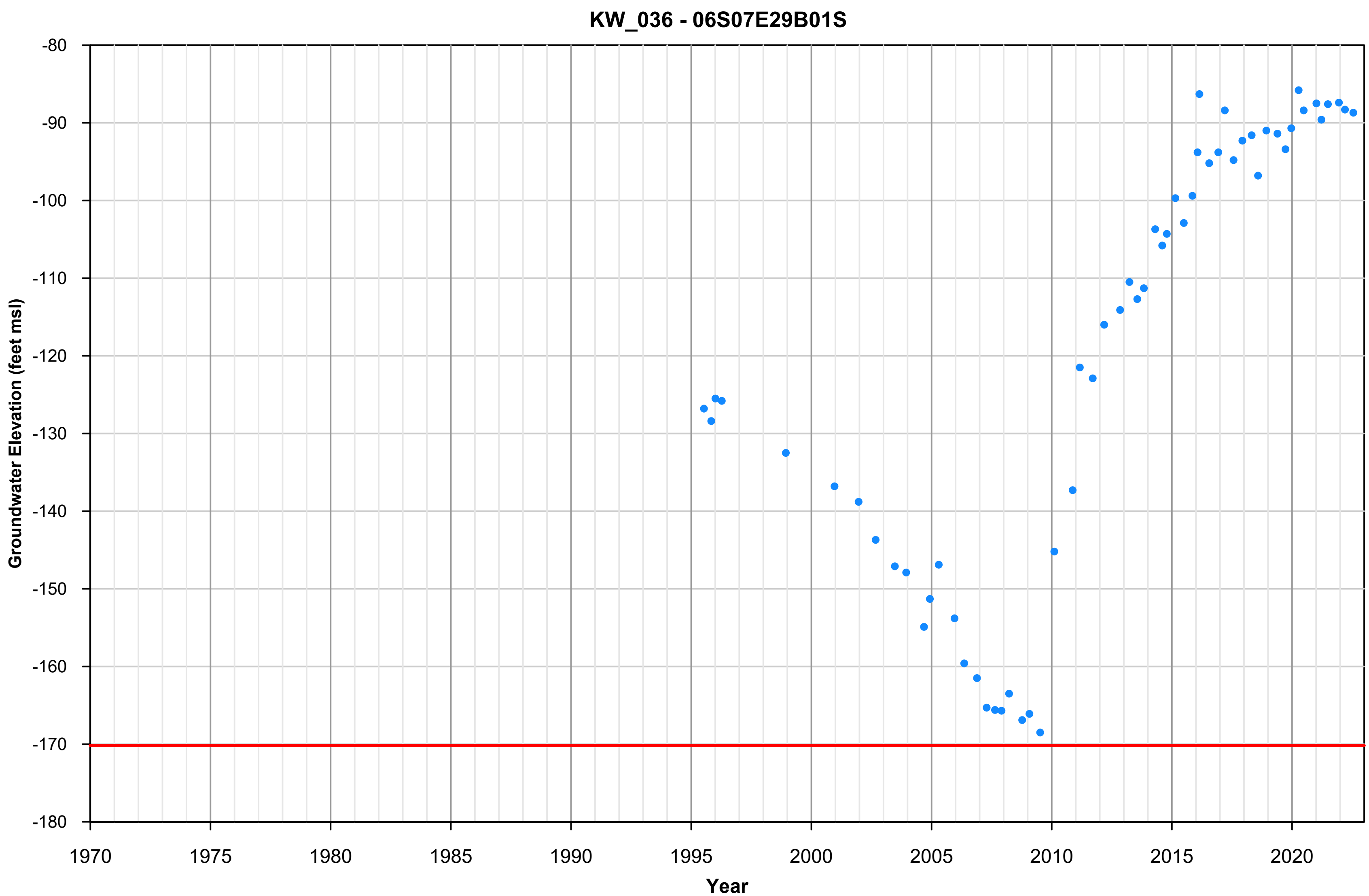
TODD GROUNDWATER

Appendix A-36
Groundwater Elevation Hydrograph
KW_035 - 06S07E23F01S



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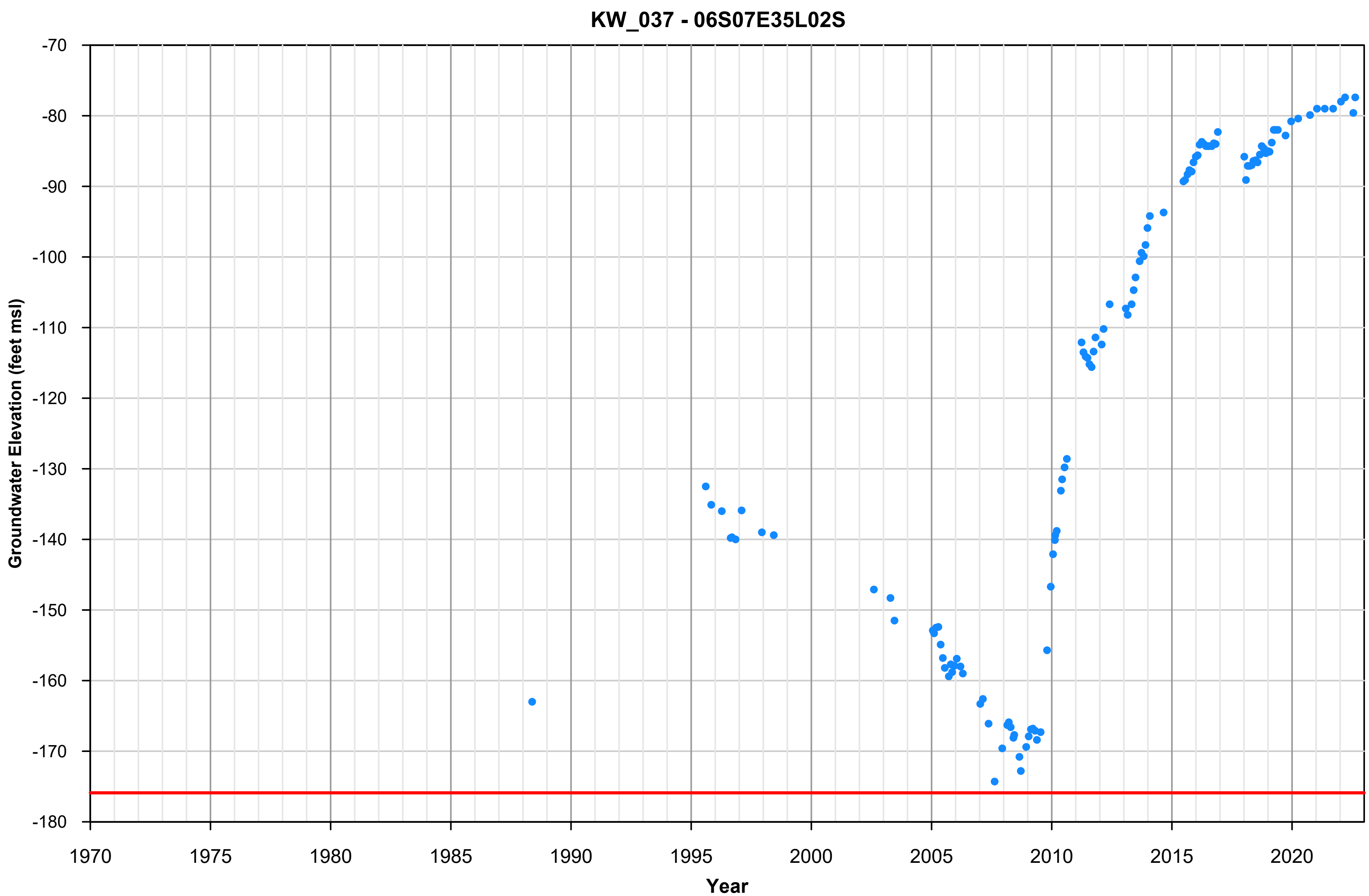
TODD GROUNDWATER

Appendix A-37
Groundwater Elevation Hydrograph
KW_036 - 06S07E29B01S



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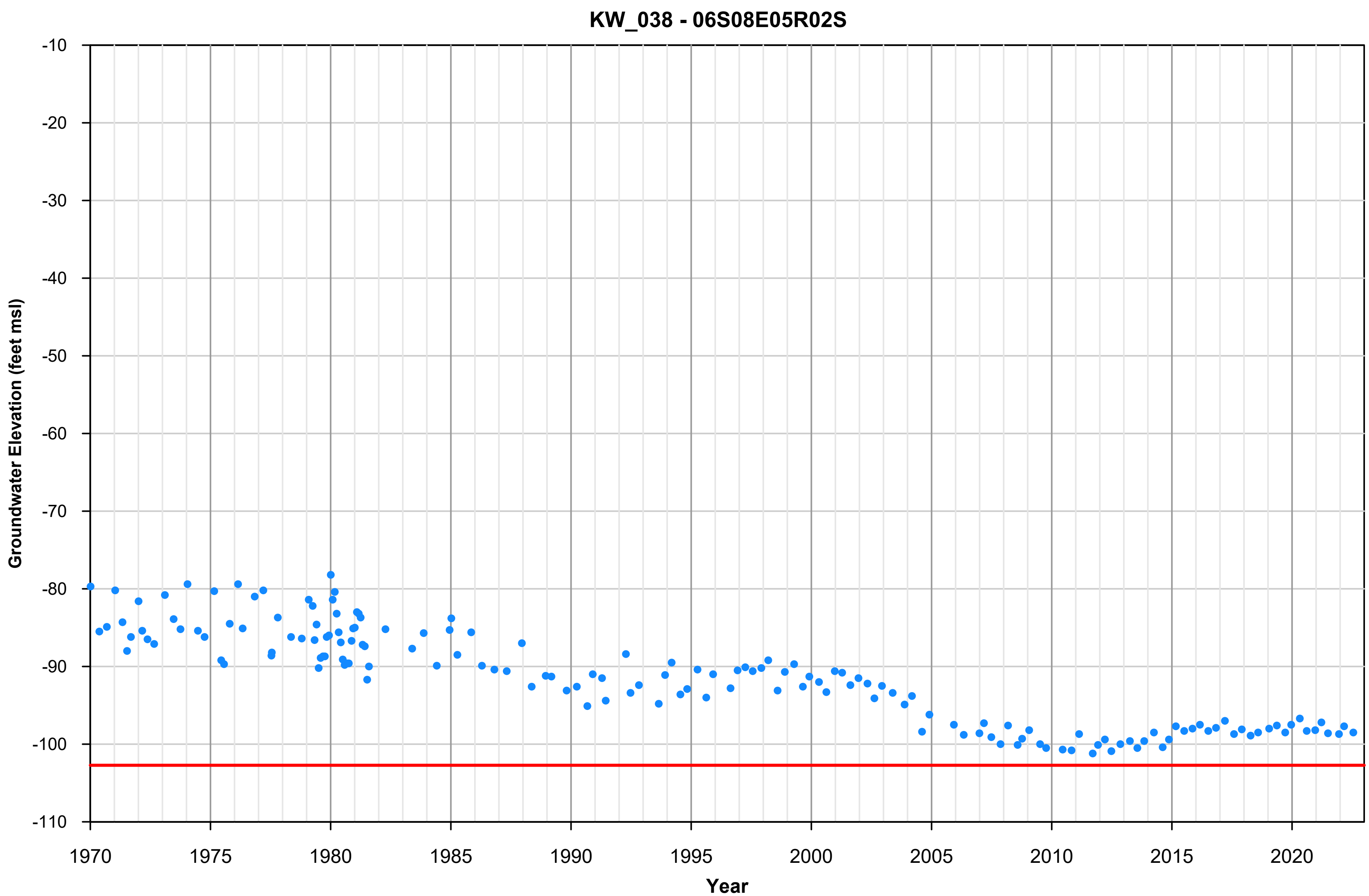
TODD GROUNDWATER

Appendix A-38
Groundwater Elevation Hydrograph
KW_037 - 06S07E35L02S



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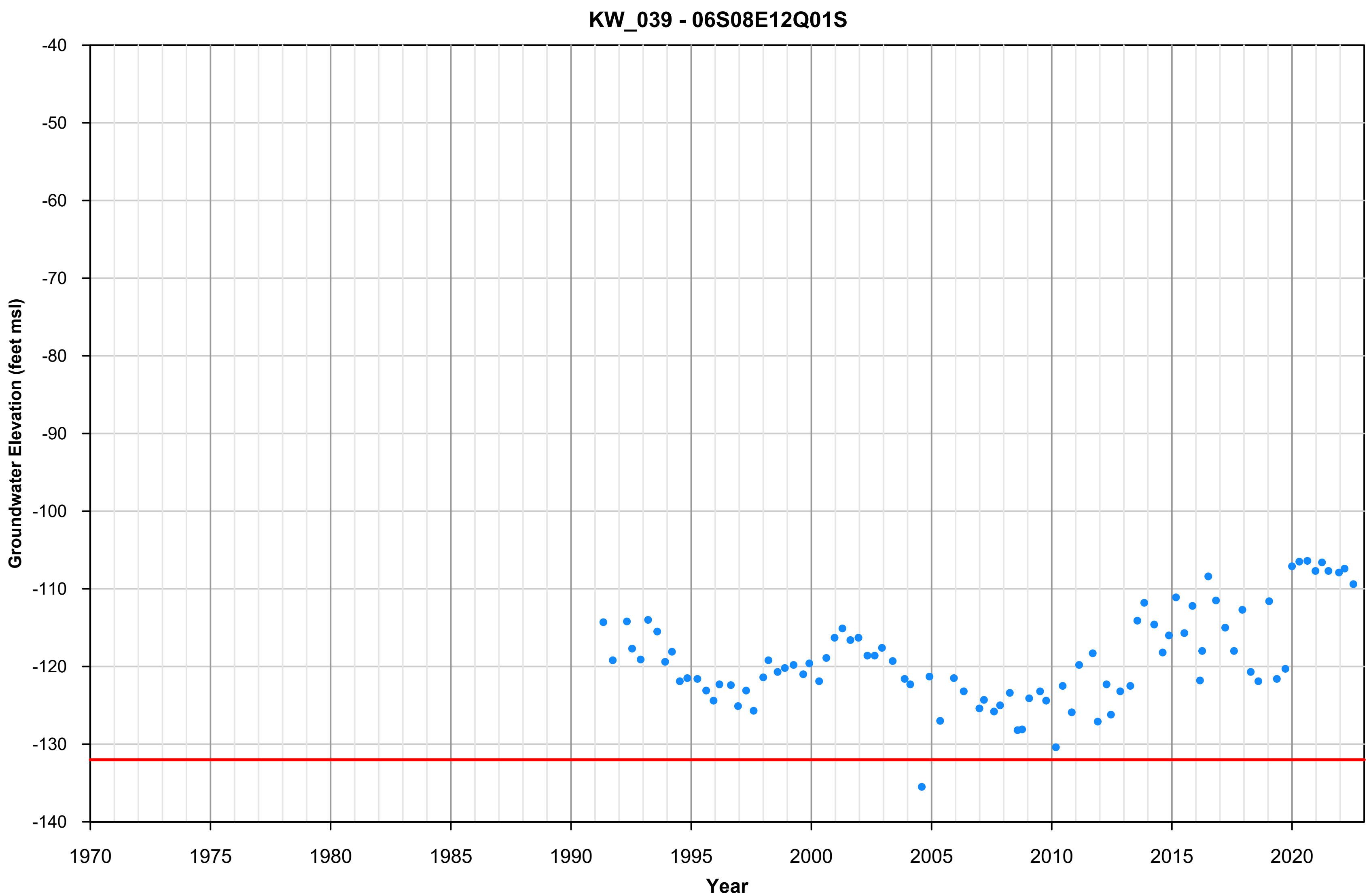
TODD GROUNDWATER

Appendix A-39
Groundwater Elevation Hydrograph
KW_038 - 06S08E05R02S



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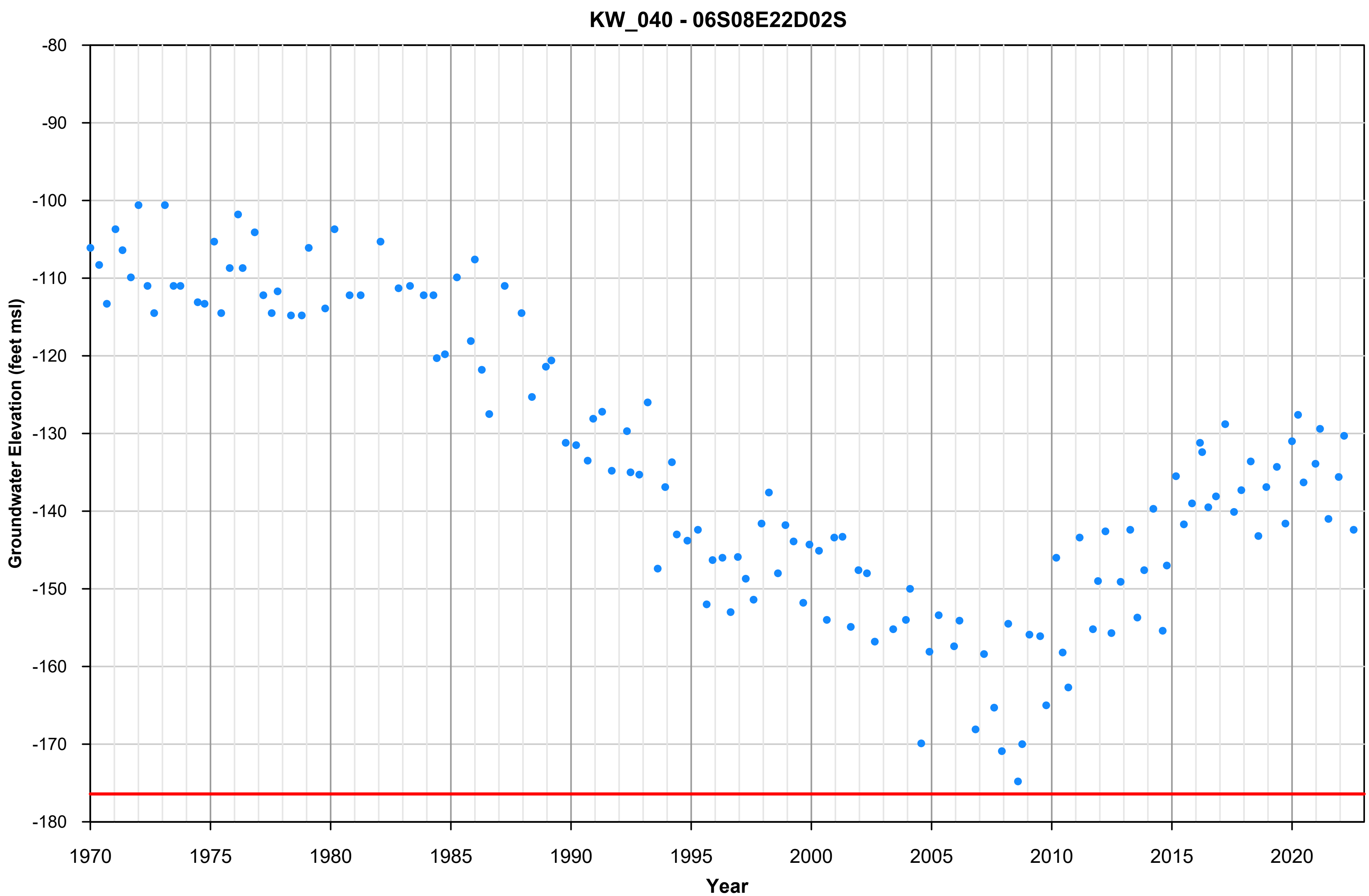
TODD GROUNDWATER

Appendix A-40
Groundwater Elevation Hydrograph
KW_039 - 06S08E12Q01S



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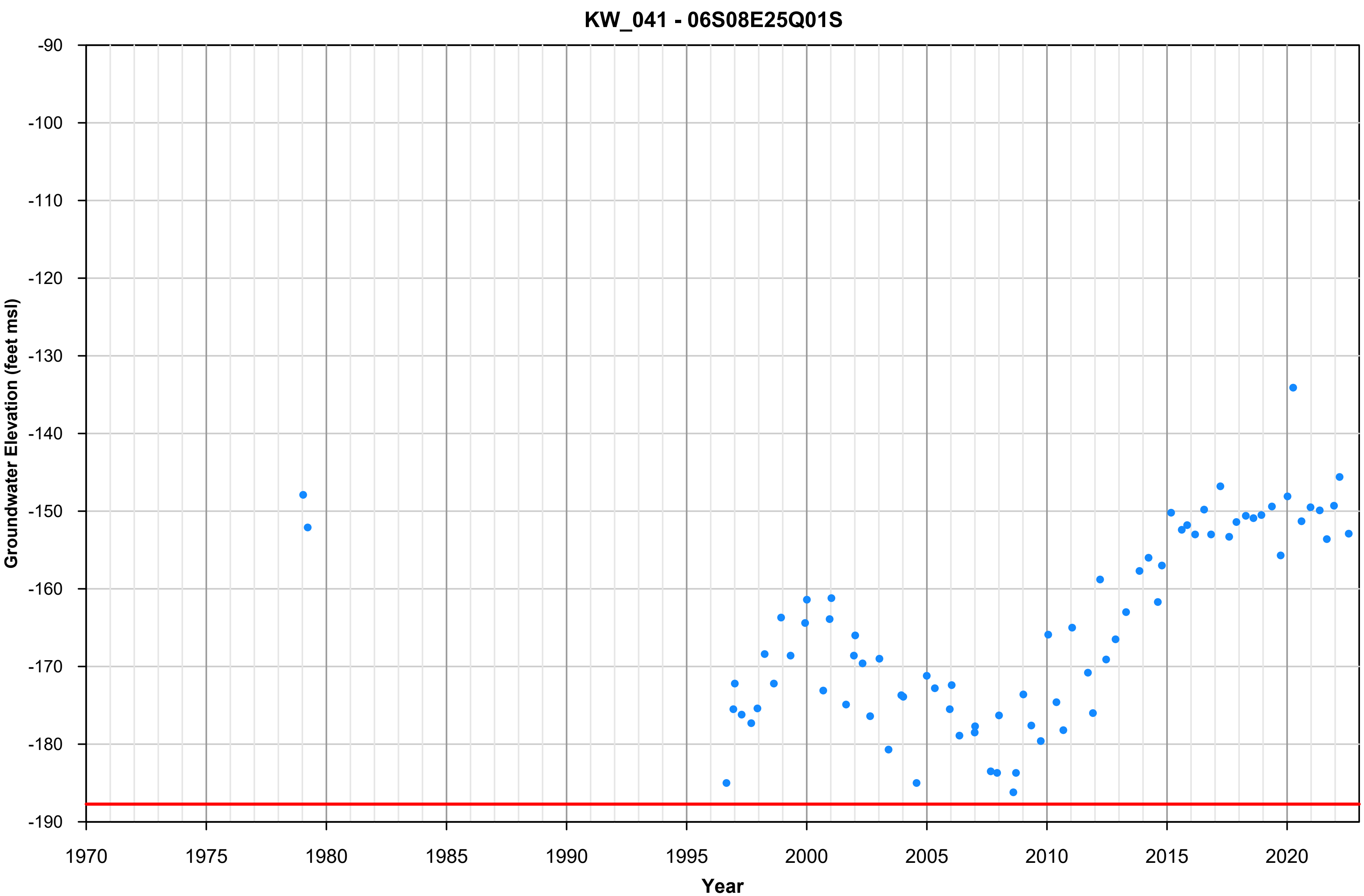
TODD GROUNDWATER

Appendix A-41
Groundwater Elevation Hydrograph
KW_040 - 06S08E22D02S



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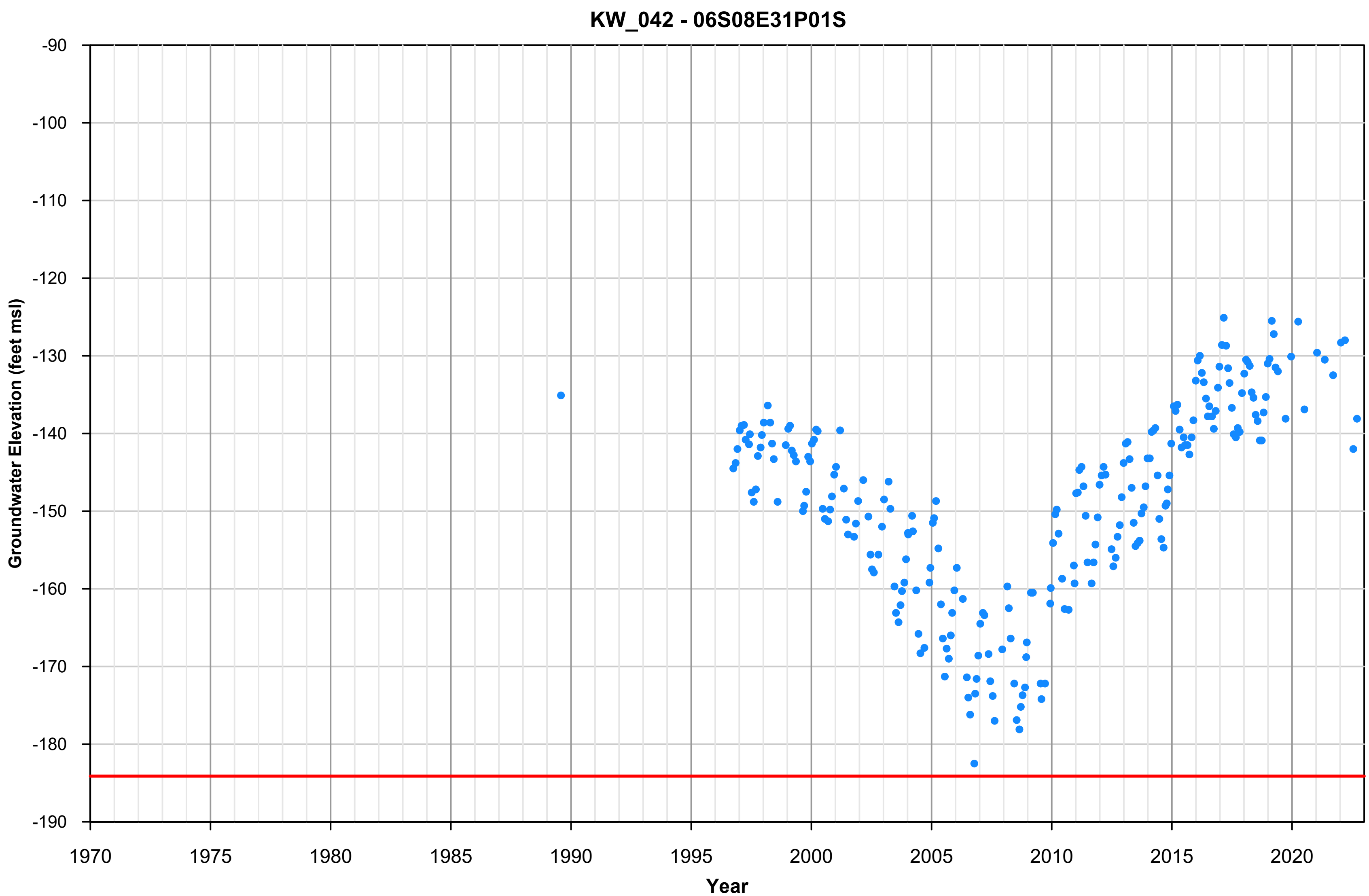
TODD GROUNDWATER

Appendix A-42
Groundwater Elevation Hydrograph
KW_041 - 06S08E25Q01S



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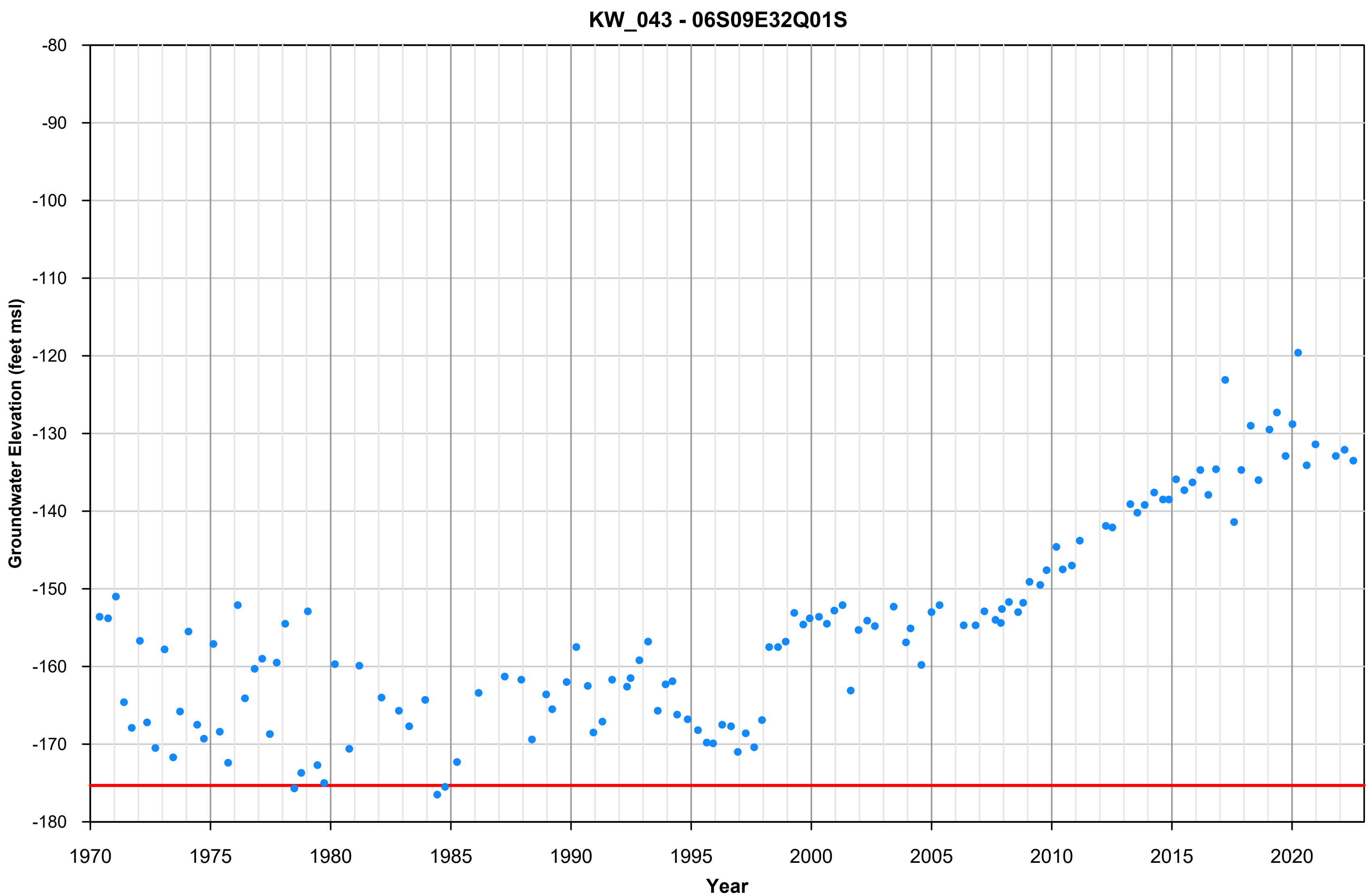
TODD GROUNDWATER

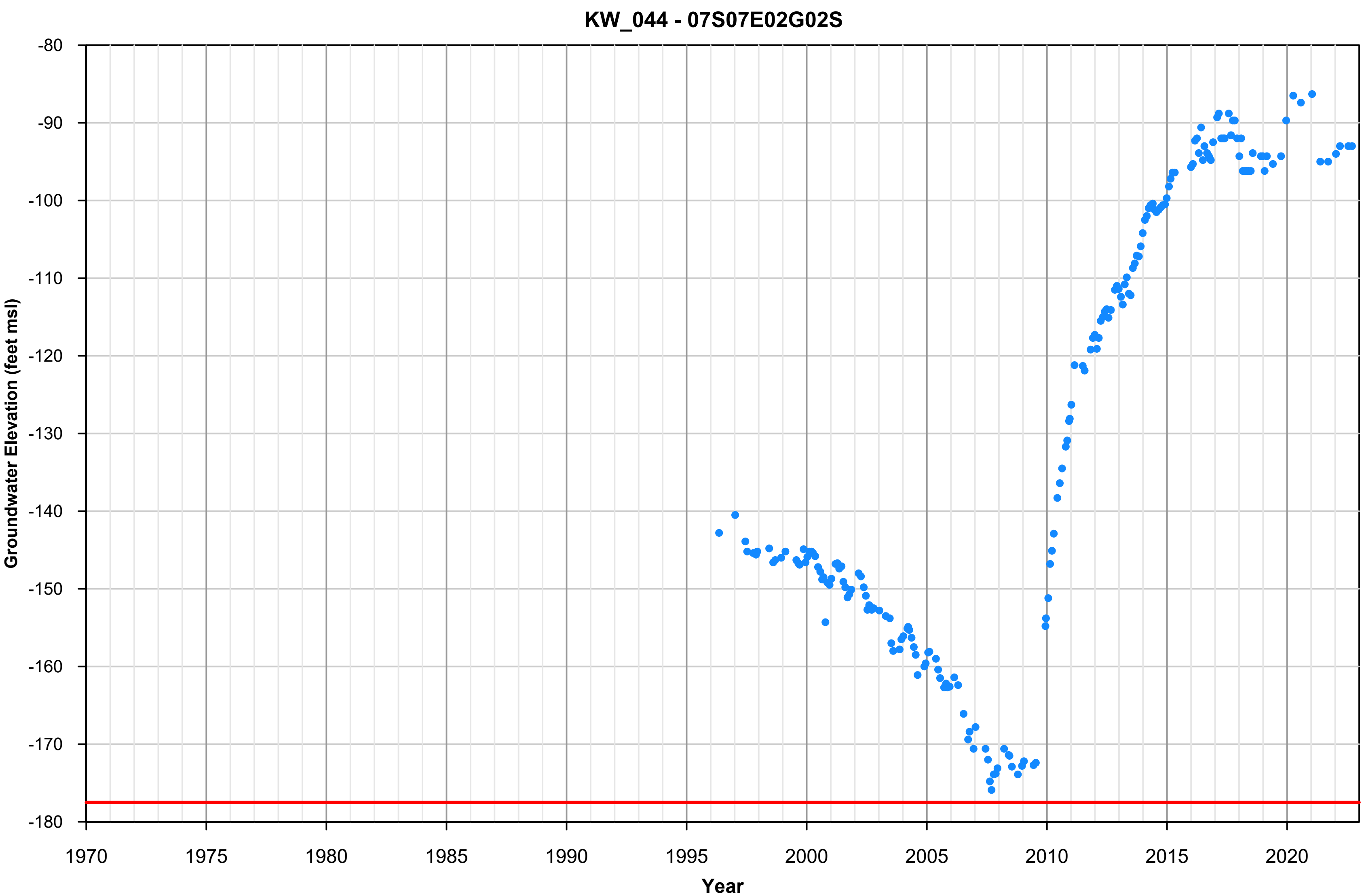
Appendix A-43
Groundwater Elevation Hydrograph
KW_042 - 06S08E31P01S



March 2023

TODD GROUNDWATER

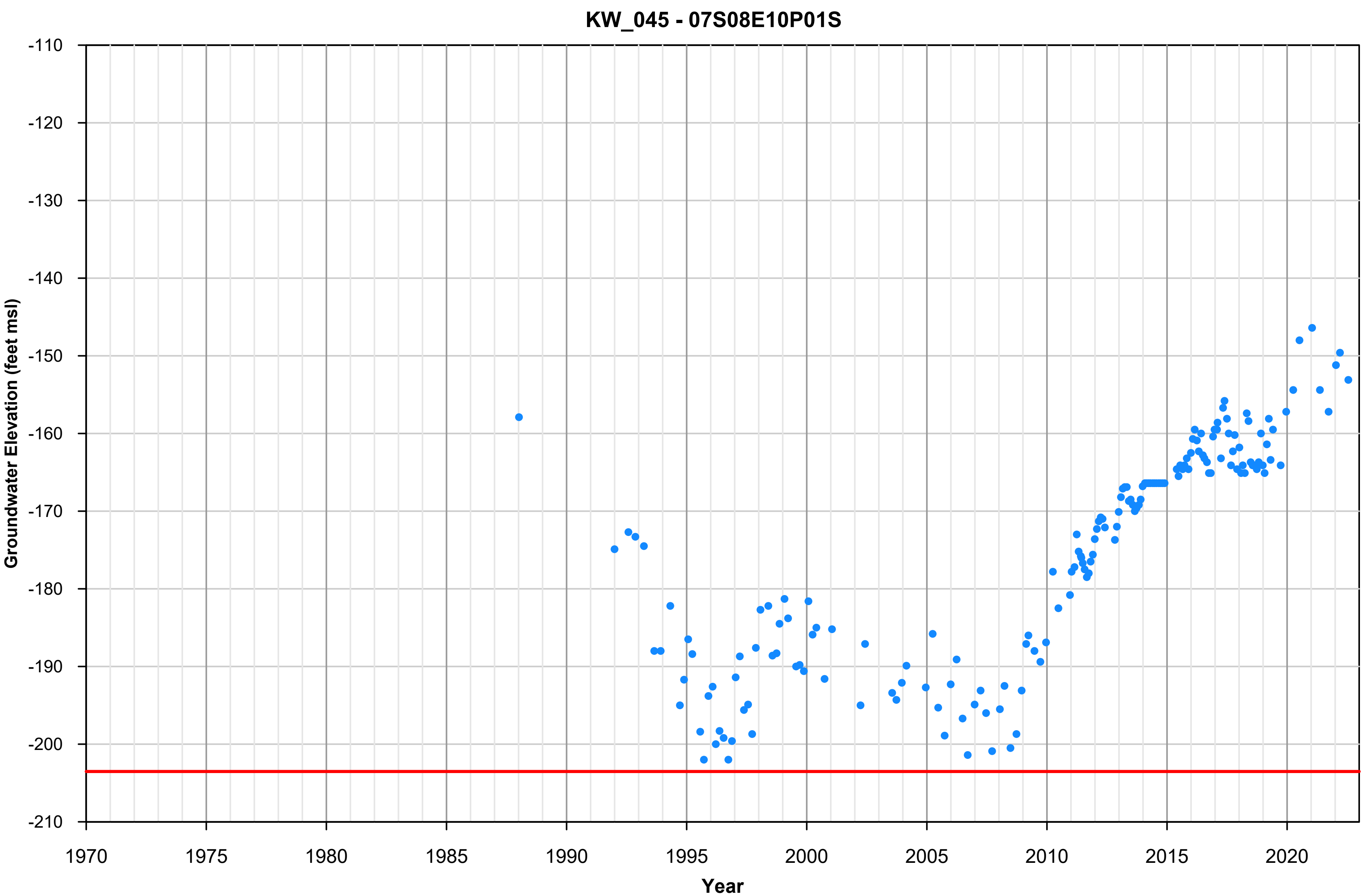
Appendix A-44
Groundwater Elevation Hydrograph
KW_043 - 06S09E32Q01S



March 2023

TODD GROUNDWATER

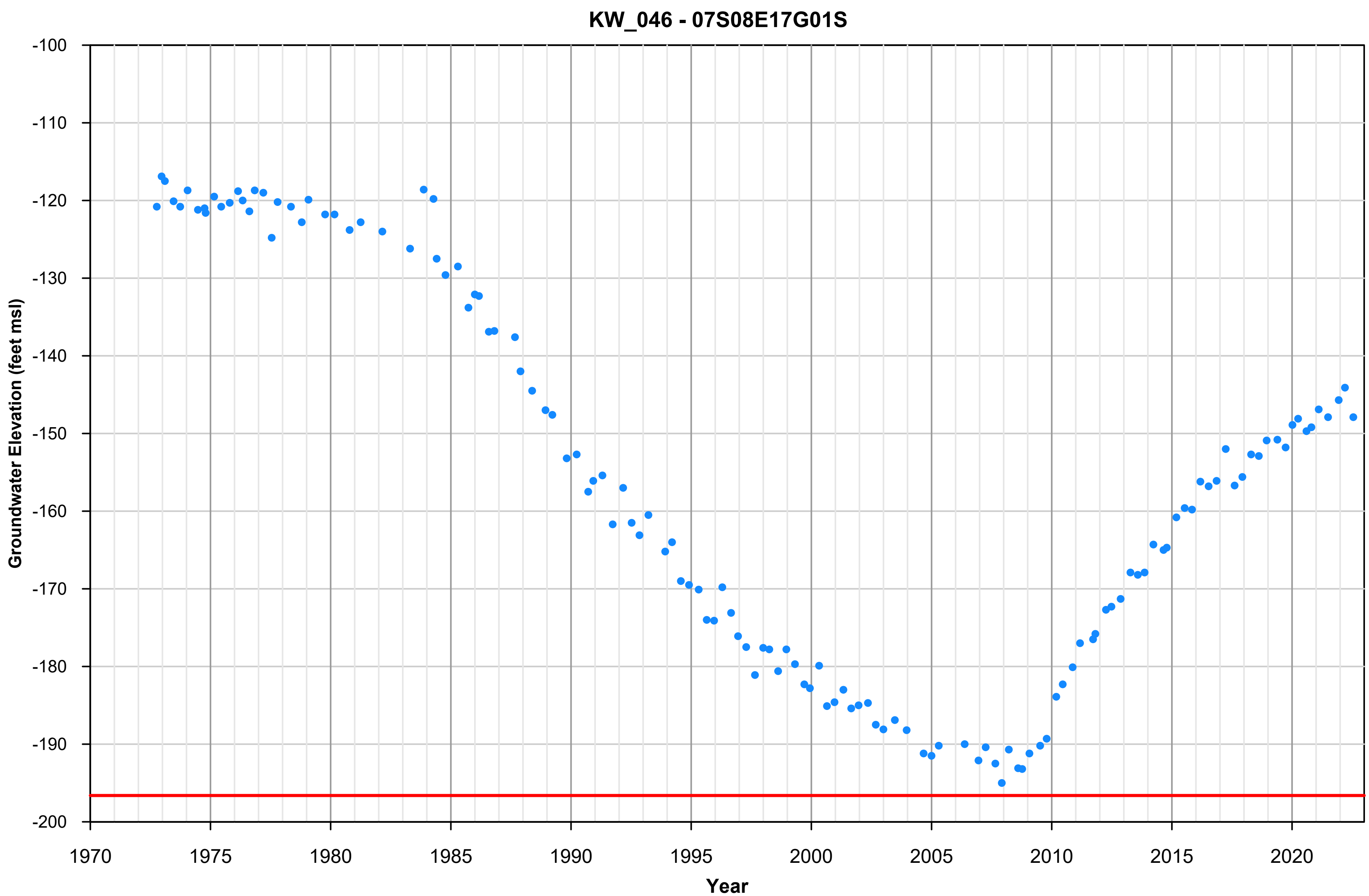
Appendix A-45
Groundwater Elevation Hydrograph
KW_044 - 07S07E02G02S



March 2023

TODD GROUNDWATER

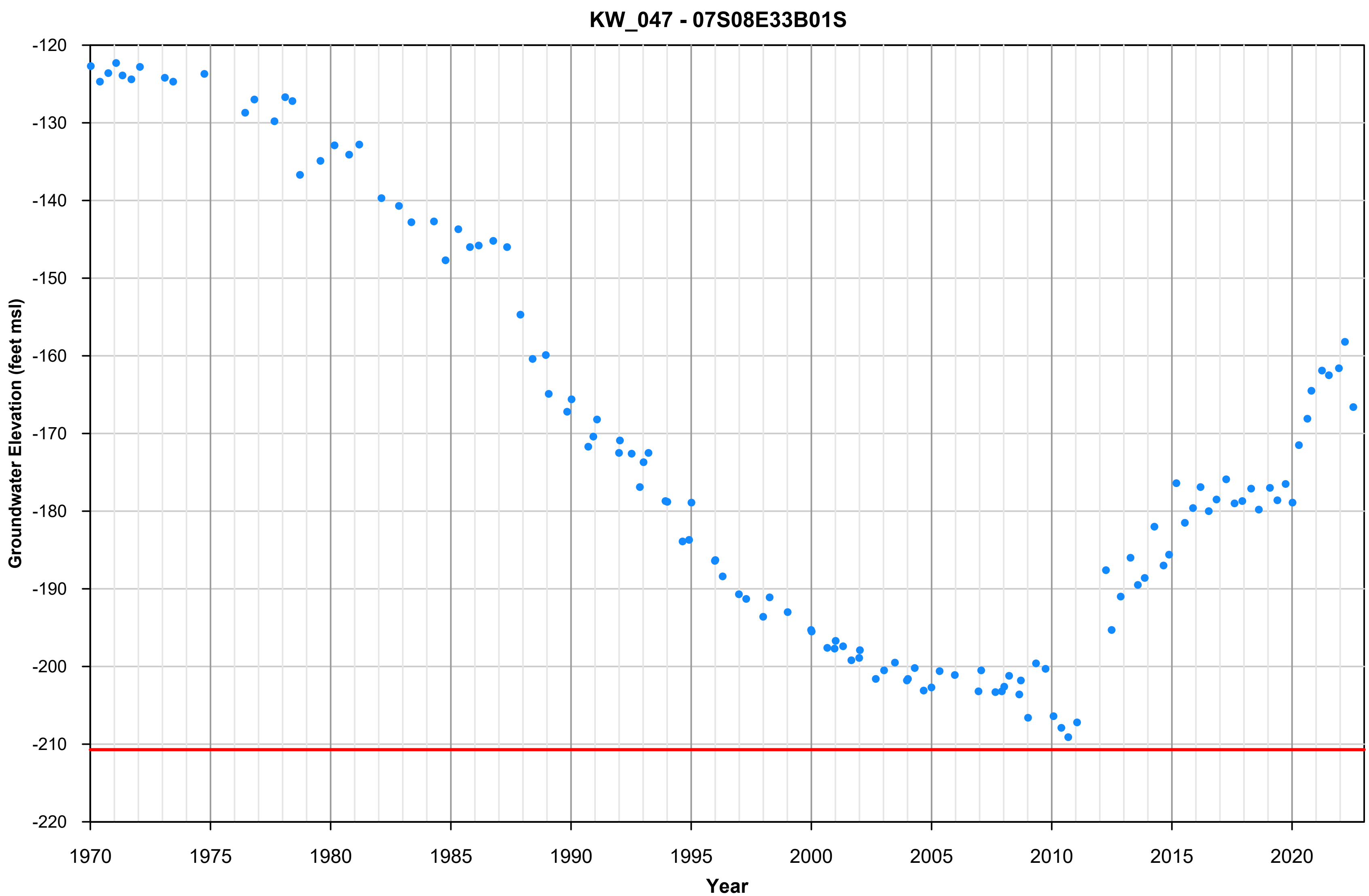
Appendix A-46
Groundwater Elevation Hydrograph
KW_045 - 07S08E10P01S



March 2023

TODD GROUNDWATER

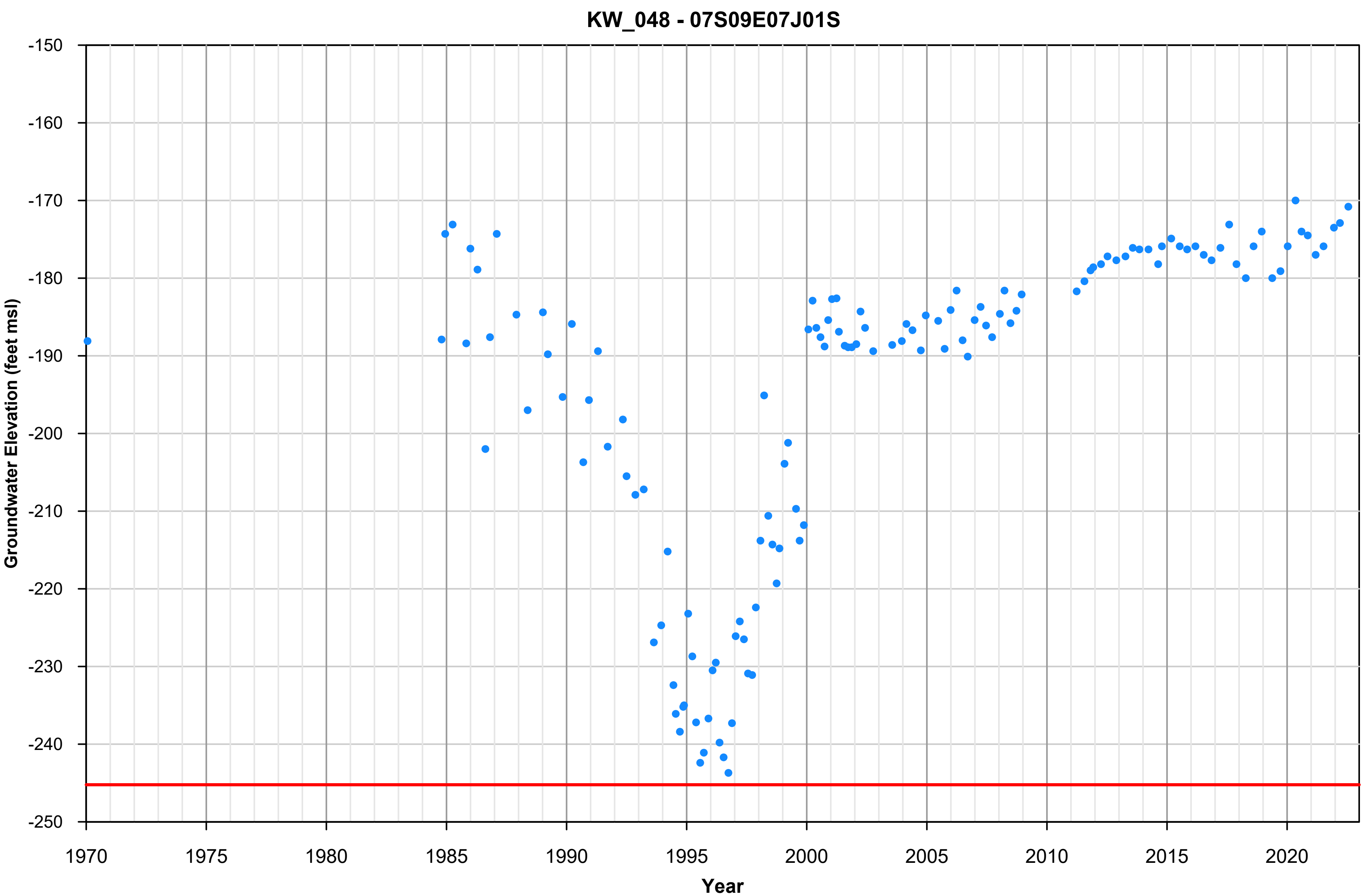
Appendix A-47
Groundwater Elevation Hydrograph
KW_046 - 07S08E17G01S



March 2023

TODD GROUNDWATER

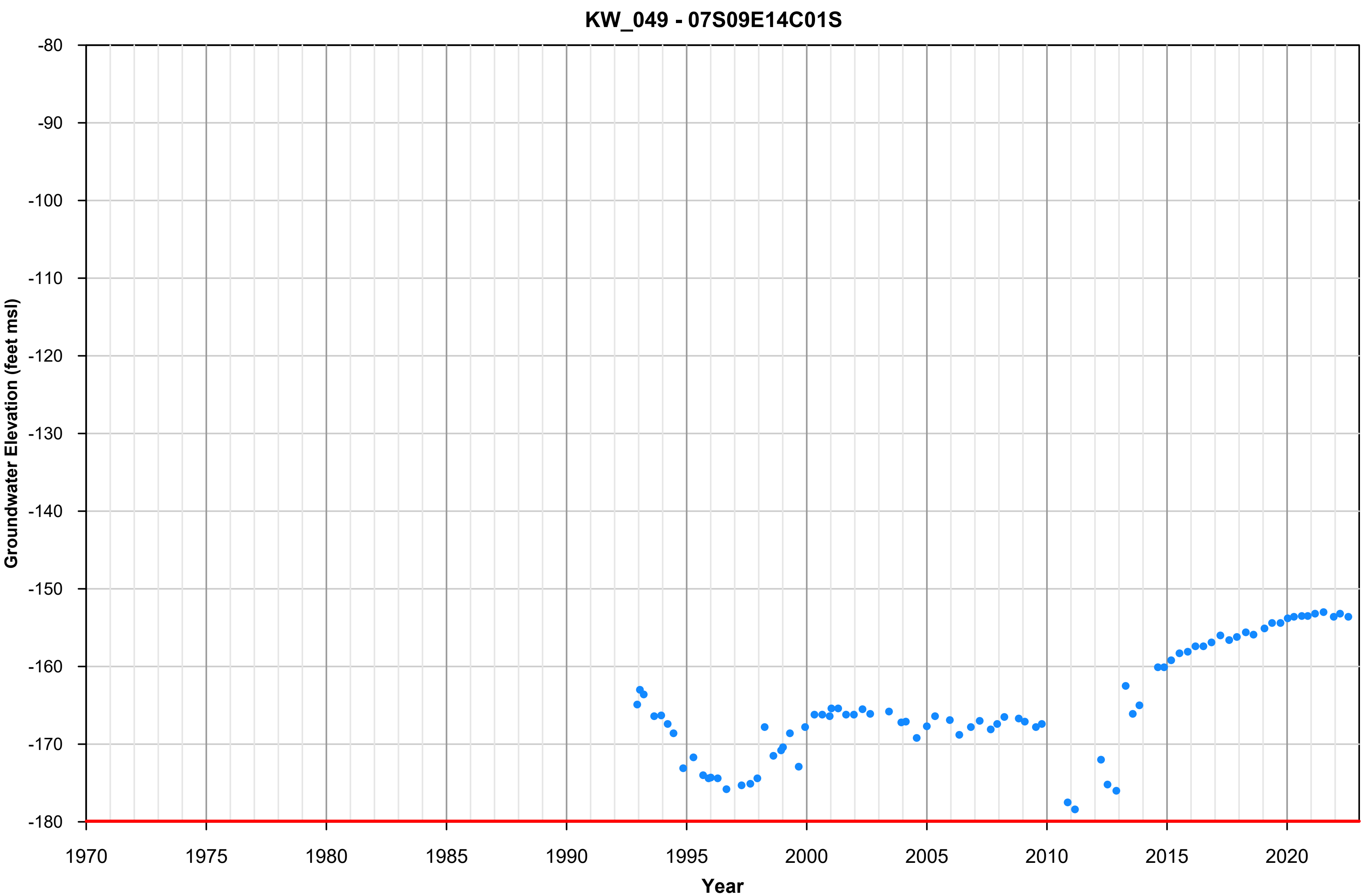
Appendix A-48
Groundwater Elevation Hydrograph
KW_047 - 07S08E33B01S



March 2023

TODD GROUNDWATER

Appendix A-49
Groundwater Elevation Hydrograph
KW_048 - 07S09E07J01S



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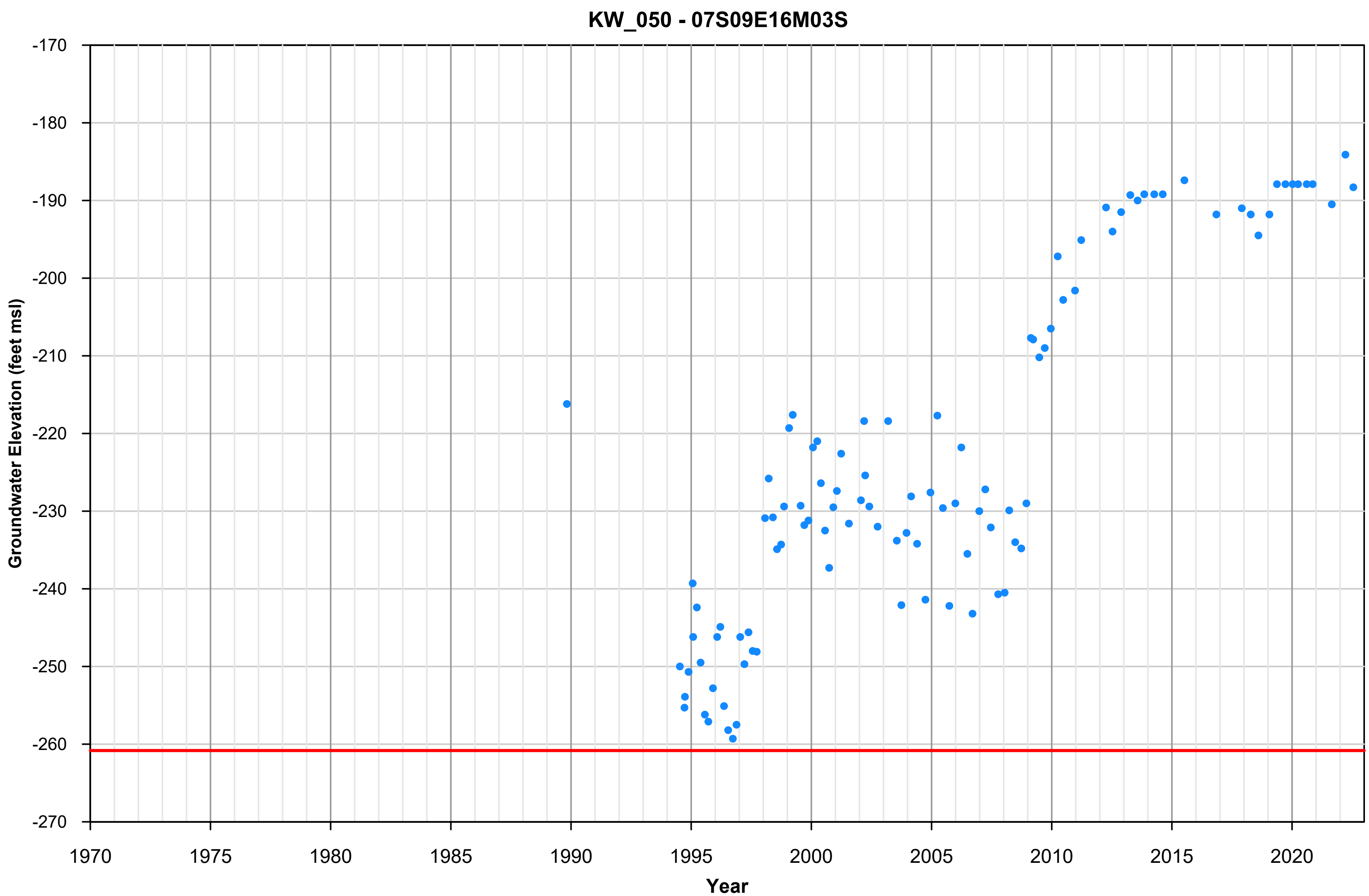
TODD GROUNDWATER

Appendix A-50
Groundwater Elevation Hydrograph
KW_049 - 07S09E14C01S



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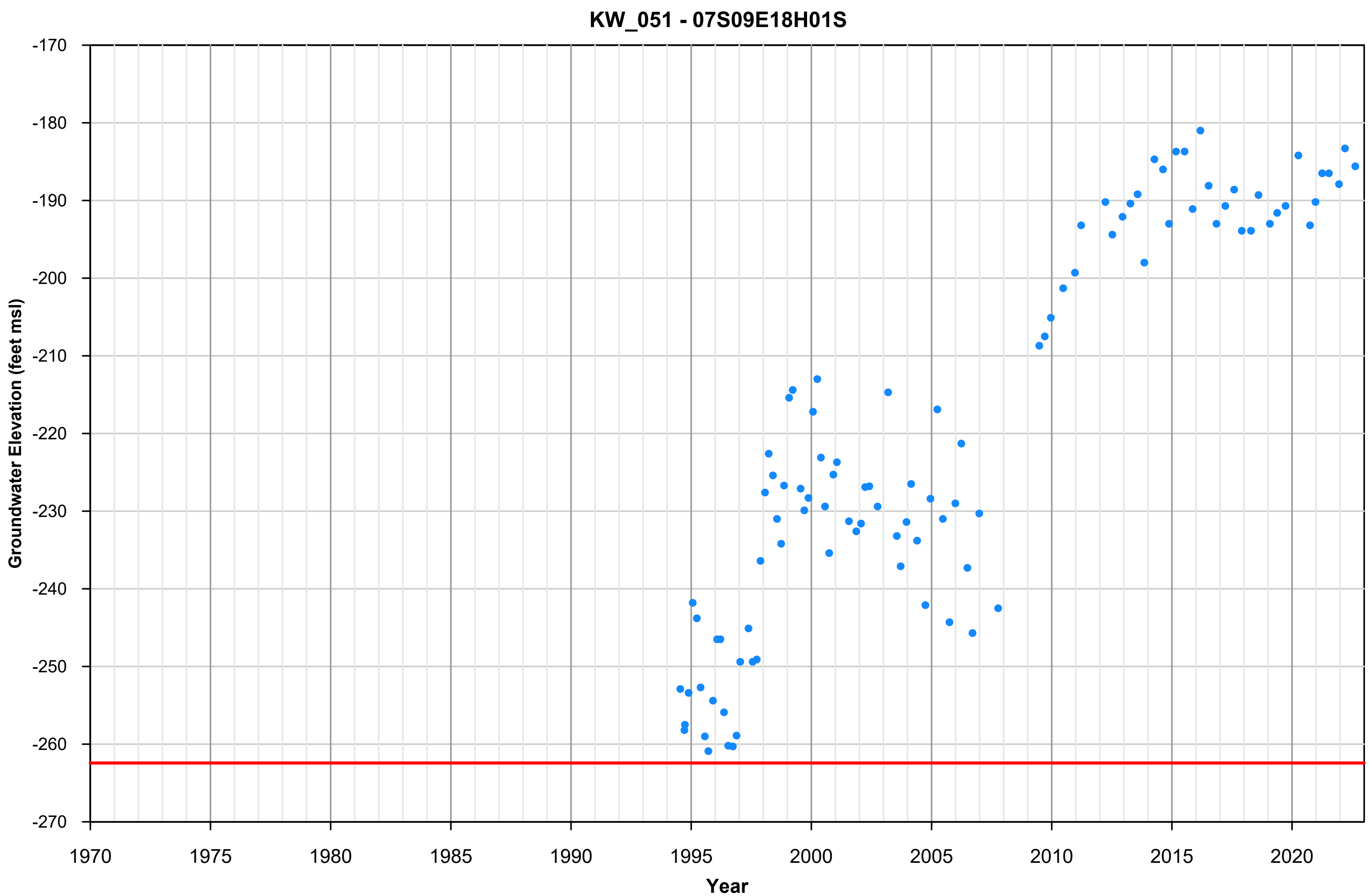
TODD GROUNDWATER

Appendix A-51
Groundwater Elevation Hydrograph
KW_050 - 07S09E16M03S



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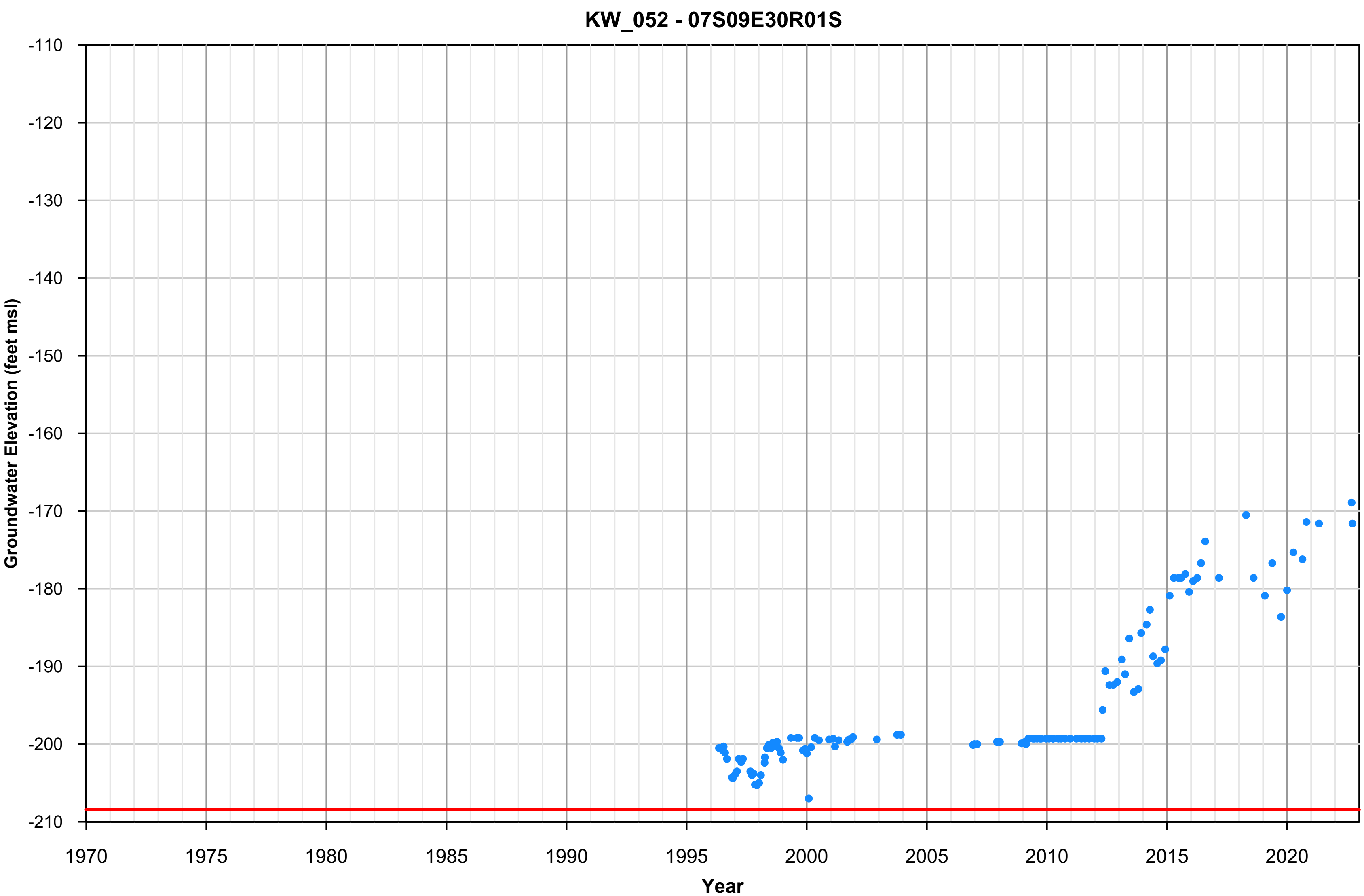
TODD GROUNDWATER

Appendix A-52
Groundwater Elevation Hydrograph
KW_051 - 07S09E18H01S



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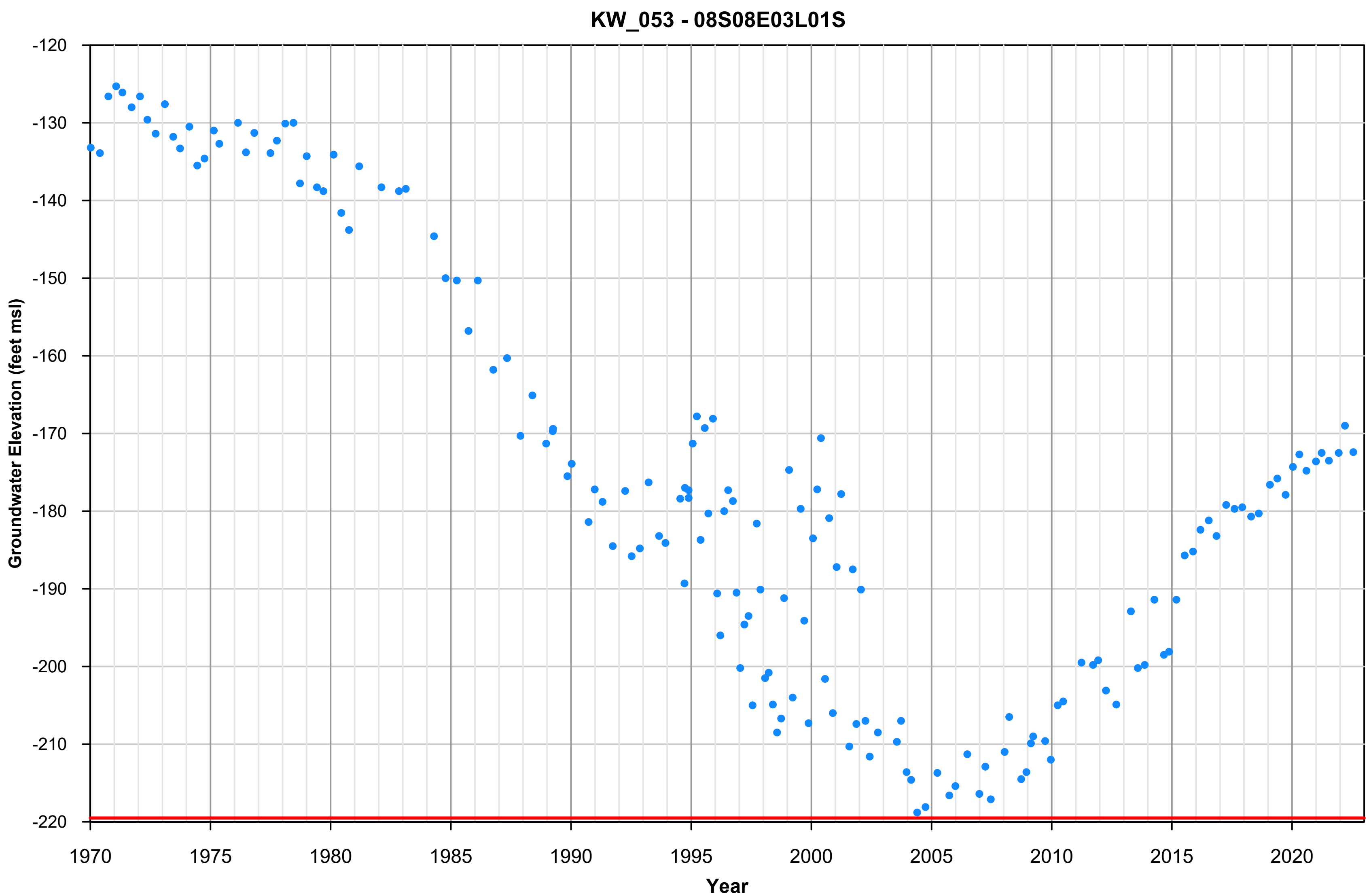
TODD GROUNDWATER

Appendix A-53
Groundwater Elevation Hydrograph
KW_052 - 07S09E30R01S



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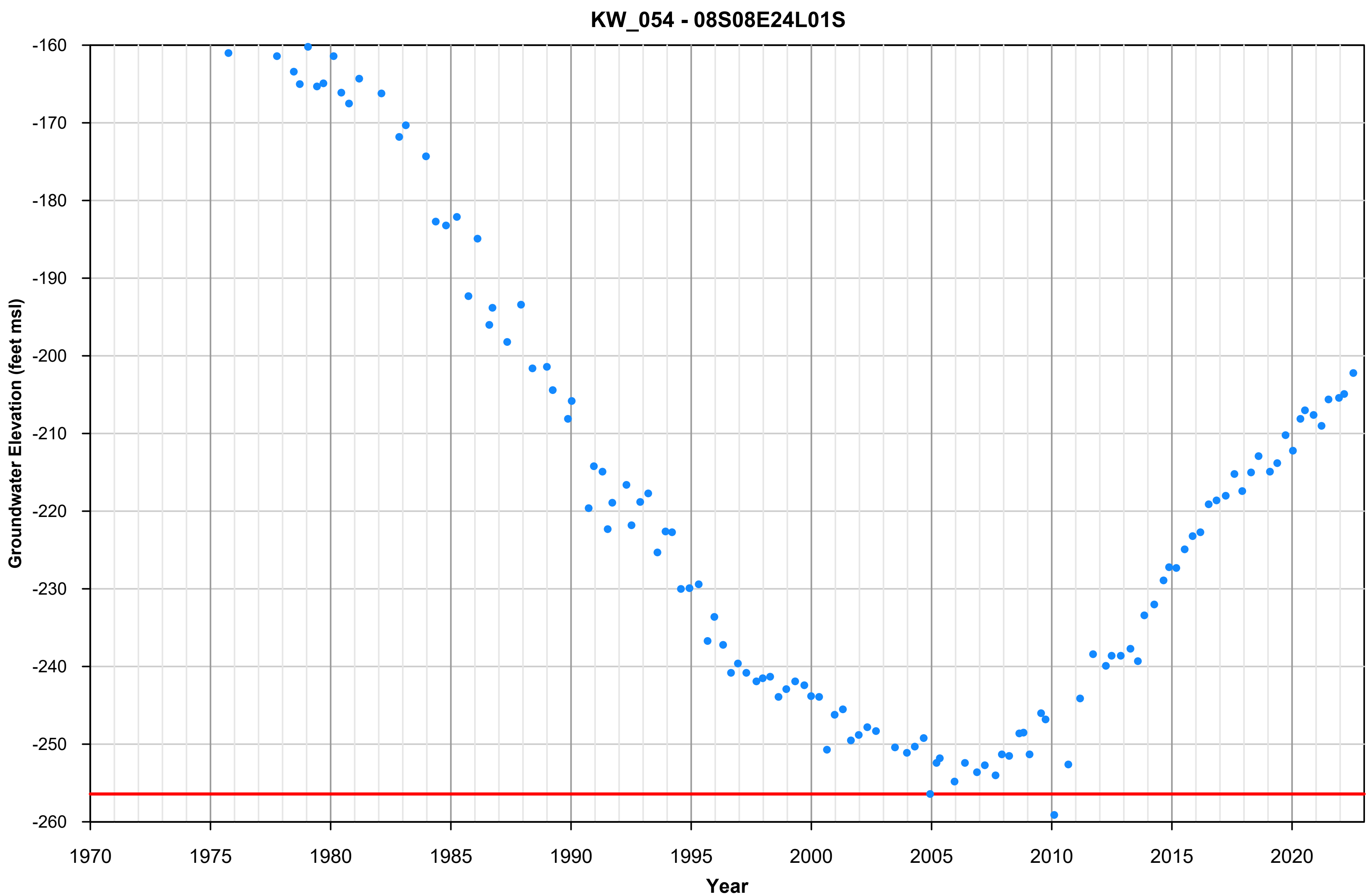
TODD GROUNDWATER

Appendix A-54
Groundwater Elevation Hydrograph
KW_053 - 08S08E03L01S



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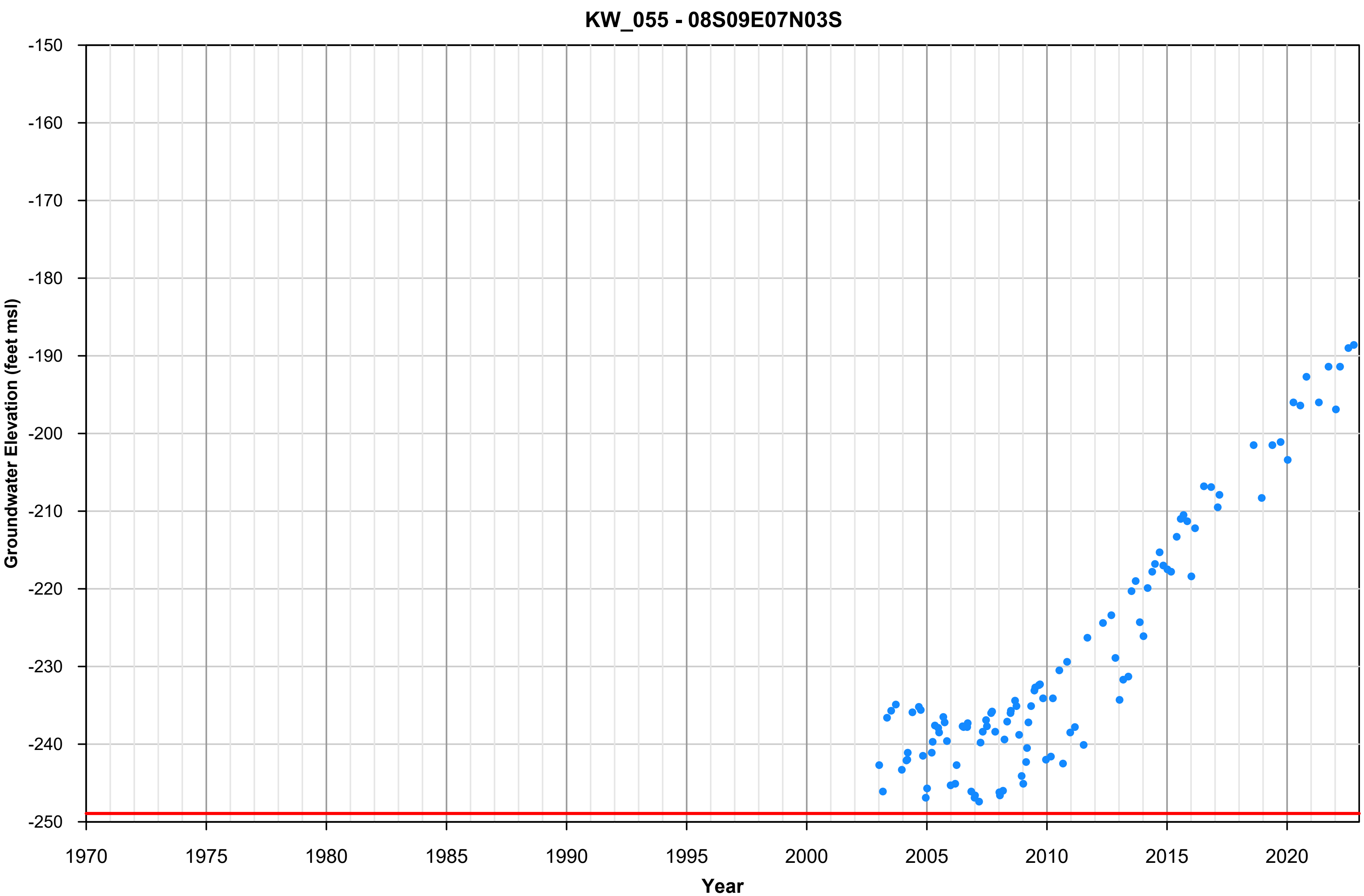
TODD GROUNDWATER

Appendix A-55
Groundwater Elevation Hydrograph
KW_054 - 08S08E24L01S



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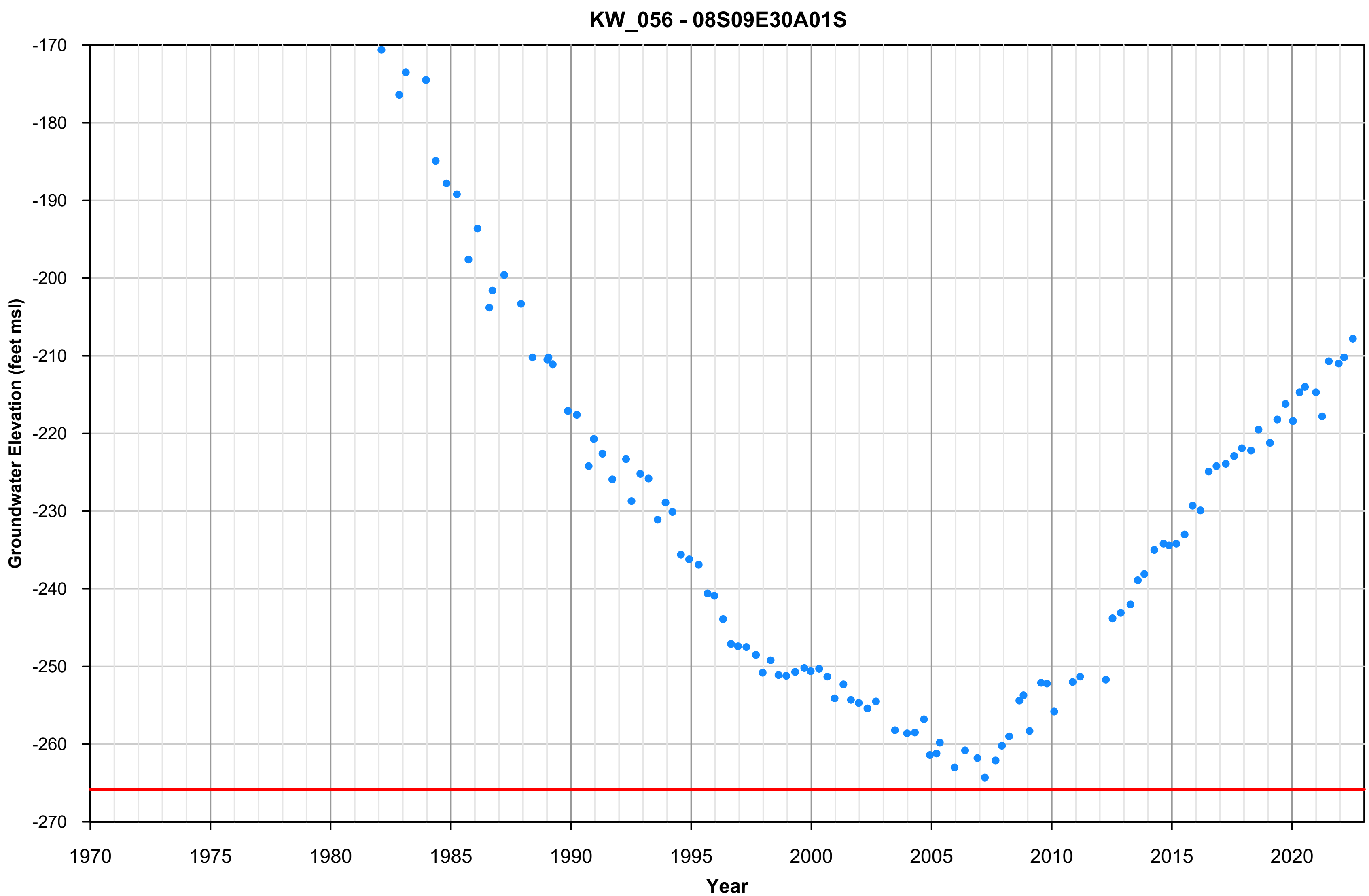
TODD GROUNDWATER

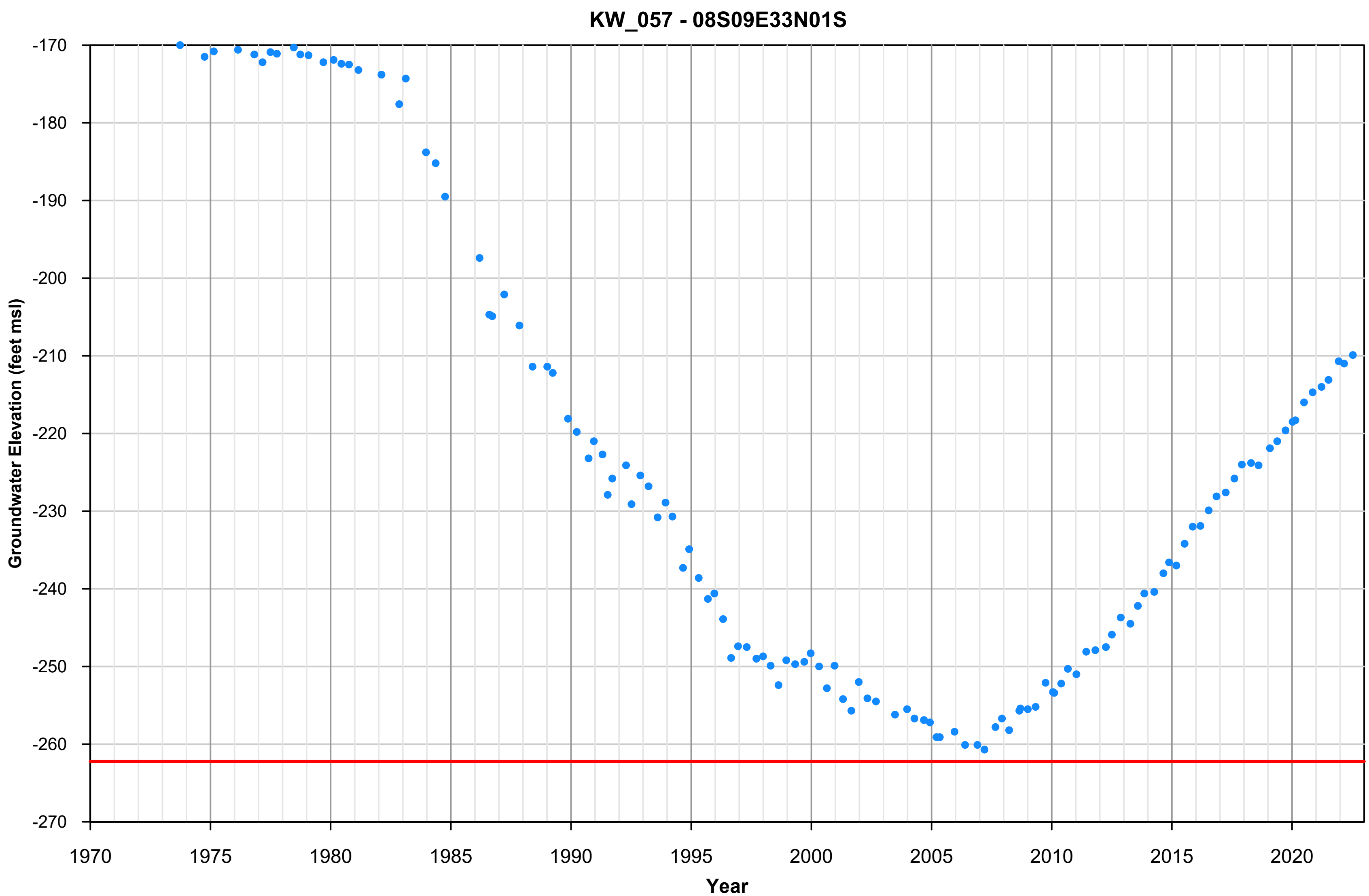
Appendix A-56
Groundwater Elevation Hydrograph
KW_055 - 08S09E07N03S



March 2023

TODD GROUNDWATER

Appendix A-57
Groundwater Elevation Hydrograph
KW_056 - 08S09E30A01S



March 2023

TODD GROUNDWATER

Appendix A-58
Groundwater Elevation Hydrograph
KW_057 - 08S09E33N01S

APPENDIX B

WY 2021-2022 Water Use Information for SGMA Portal

Basin Number	7-021.01
Water Year	2022 (Oct. 2021 - Sept. 2022)
Total Groundwater Extractions (AF)	282,079
Water Use Sector Urban (AF)	232,587
Water Use Sector Industrial (AF)	1,498
Water Use Sector Agricultural (AF)	46,494
Water Use Sector Managed Wetlands (AF)	
Water Use Sector Managed Recharge (AF)	-
Water Use Sector Native Vegetation (AF)	-
Water Use Sector Other (AF)	1,500
Water Use Sector Other Description	Groundwater extractions are mostly metered. Unmetered usesd include other water use for domestic use (1,000 AFY in the East, 500 AFY in the West).

Basin Number	7-021.01
Water Year	2022 (Oct. 2021 - Sept. 2022)
Meters Volume (AF)	278,279
Meters Description	
Meters Type	
Meters Accuracy (%)	0-5 %
Meters Accuracy Description	
Electrical Records Volume (AF)	0
Electrical Records Description	
Electrical Records Type	
Electrical Records Accuracy (%)	
Electrical Records Accuracy Description	
Land Use Volume (AF)	0
Land Use Description	
Land Use Type	
Land Use Accuracy (%)	
Land Use Accuracy Description	
Groundwater Model Volume (AF)	-
Groundwater Model Description	
Groundwater Model Type	
Groundwater Model Accuracy (%)	
Groundwater Model Accuracy Description	
Other Method(s) Volume (AF)	3,800
Other Method(s) Description	Other groundwater extraction method volume includes unmetered domestic use (1,000 AFY in the East, 500 AFY in the West) and estimated use on Tribal Trust land (Eagle Creek Golf Course 1,200 AFY and Greenleaf Power Station 1,100 AFY)
Other Method(s) Type	Estimate
Other Method(s) Accuracy (%)	40-50 %
Other Method(s) Accuracy Description	Estimates are based on population not served directly by the available water suppliers and estimates for the Tribal Trust land is estimated base on use type.

Basin Number	7-021.01
Water Year	2022 (Oct. 2021 - Sept. 2022)
Methods Used To Determine	Meters
Water Source Type Central Valley Project (AF)	-
Water Source Type State Water Project (AF)	-
Water Source Type Colorado River Project (AF)	269,581
Water Source Type Local Supplies (AF)	611
Water Source Type Local Imported Supplies (AF)	-
Water Source Type Recycled Water (AF)	13,875
Water Source Type Desalination (AF)	-
Water Source Type Other (AF)	-
Water Source Type Other Description	

Basin Number	7-021.01
Water Year	2022 (Oct. 2021 - Sept. 2022)
Total Water Use (AF)	563,761
Methods Used To Determine	99% metered, 1% estimated
Water Source Type Groundwater (AF)	279,694
Water Source Type Surface Water (AF)	611
Water Source Type Recycled Water (AF)	13,875
Water Source Type Reused Water (AF)	-
Water Source Type Other (AF)	269,581
Water Source Type Other Description	Colorado River Water
Water Use Sector Urban (AF)	283,742
Water Use Sector Industrial (AF)	1,498
Water Use Sector Agricultural (AF)	277,021
Water Use Sector Managed Wetlands (AF)	-
Water Use Sector Managed Recharge (AF)	-
Water Use Sector Native Vegetation (AF)	-
Water Use Sector Other (AF)	1,500
Water Use Sector Other Description	Other category refers to the unmetered groundwater pumping for domestic uses. Includes only water use in the Subbasin