# US Gypsum Annual Report
# Spring 2017 to Spring 2018

**Prepared for**

## US Gypsum

**September 2018**

TODD GROUNDWATER

# ANNUAL REPORT

# SPRING 2017 - SPRING 2018

## US GYPSUM, IMPERIAL COUNTY

September 2018

TODD GROUNDWATER

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# 1. INTRODUCTION

In 1999, US Gypsum (USG) began an expansion and modernization project for the Plaster City Plant. This included construction of a new high-speed gypsum wallboard manufacturing facility to replace the unreliable, slow production line built in 1956. An environmental impact report and study (EIR/EIS) was approved in 2008 for the expansion of the Plaster City Plant. The EIR/EIS showed that groundwater levels in the basin used for supply (the Coyote Wells Valley Basin, **Figure 1**) had been declining prior to the expansion of the Plaster City Plant and predicted that groundwater levels would decline at a greater rate after the expansion was complete. The mitigation plan from the EIR/EIS included implementation of a Groundwater Monitoring Program, which was developed for USG in 2015 (Todd, 2015).

This Annual Report documents conditions and changes that occurred from Spring 2017 through Spring 2018. Water levels are monitored by the United States Geological Survey (USGS) each spring. The Annual Report is submitted to the County by the first business day of October.

New groundwater level and quality data are documented and discussed below. Overall, the conditions in the Coyote Wells Valley Basin have remained similar to conditions reported in 2017, although some wells show a slight decline in groundwater elevation. Water level elevations were measured at 27 wells and water quality was sampled at 14 wells across the basin.

# 2. PHYSICAL SETTING

## 2.1. Description of Groundwater Basin

Groundwater for the Plaster City Plant, community of Ocotillo, and local domestic wells is pumped from the Coyote Wells Valley Groundwater Basin (No. 7-29), as defined by the California Department of Water Resources (DWR, 2003)[1]. DWR generally defines groundwater basins based on the extent of alluvial deposits. As depicted in **Figure 1,** the Basin encompasses 64,000 acres (100 square miles) in the Yuha desert west of Imperial Valley, California. It is located mostly in Imperial County, with the western edge extending into San Diego County. The Basin is bounded by the Coyote Mountains to the north and the Jacumba Mountains to the west and southwest. These boundaries correspond to the geologic contacts between alluvium and less permeable geologic formations as mapped by DWR. The southern basin boundary is the United States-Mexico border and the eastern boundary is a roughly north-south line from Superstition Mountain on the north to the international border. Part of the northeastern boundary is a surface drainage divide connecting the Coyote Mountains with Superstition Mountain.

[1] The EIR/EIS refers to the area as the Ocotillo/Coyote Wells Groundwater Basin as defined by USGS.

## 2.2. HYDROGEOLOGY

**Figure 2** shows the surficial geology within the Coyote Wells Valley Groundwater Basin, as mapped by the USGS (Loeltz, 1975). The groundwater basin boundaries on the north, west, and southwest generally coincide with the low-permeability formations of the mountain ranges; some discrepancies reflect the scale and interpretation of geologic mapping. The main water-bearing units of the basin are the Quaternary alluvial deposits forming the basin floor. In many areas, alluvium and lake deposits overlie older Quaternary/Tertiary formations including the Palm Springs and Imperial formations. As shown in **Figure 2**, these crop out to the west and east.

**Figure 3** is a general cross-section illustrating the major formations in the basin (see **Figure 1** for location). This cross-section is reproduced from the Final EIR/EIS and shows two layers defined for groundwater flow modeling. The upper layer (Layer 1) consists of alluvial deposits (Qa/Qof) and the lower layer (Layer 2) is composed of the Palm Springs and Imperial formations (QTp/QTi), which have been uplifted in the area east of Ocotillo and are relatively near the ground surface. The water-bearing alluvial deposits (Layer 1) are primarily restricted to the center of the basin, with thickness of 550 feet or greater in the Ocotillo area. As shown, the alluvium was previously indicated to be 650 feet thick; however, monitoring wells recently drilled near the US Gypsum pumping encountered alluvium to a depth of 800 feet. The alluvial deposits thin toward the margins of the basin where they become unsaturated. Along the basin margins, the saturated zones occur in the Palm Springs and Imperial formations.

In brief, the alluvial Layer 1 aquifer near Ocotillo is generally characterized by relatively high permeability, good water quality, and rapid recovery from pumping. The less permeable Layer 2 (Palm Springs/Imperial formations) east of Ocotillo and in the Yuha Estates area is characterized by relatively poor water quality and greater, more persistent impacts from pumping. In the Ocotillo area, groundwater levels in Layer 1 have been indicated to be higher than those in Layer 2. However, continued groundwater level declines in Layer 1—at more rapid rates than those in Layer 2—present the potential for significant change in that vertical gradient. In that case, relatively poor groundwater from Layer 2 could migrate into Layer 1, resulting in water quality deterioration in Layer 1.

Geologic units in the Ocotillo/Coyote Wells Groundwater Basin can be grouped as follows:

- Quaternary Alluvium (Layer 1), composed of poorly consolidated older alluvial fan deposits and sand, underlies much of the basin floor and extends locally into large canyons of the surrounding mountains. Lake deposits also are mapped by USGS. Most wells drilled in the Ocotillo area are completed within the alluvium. The alluvial wells are noted for high yields and relatively good water quality.
- The Palm Springs Formation (in Layer 2) is composed of fluvial and deltaic sand, silt, and clay deposits deposited by the ancestral Colorado River during the early Pleistocene. Thicknesses can range up to several thousand feet. No pumping test data were found for the Palm Springs Formation, but the aquifer properties (e.g., transmissivity and specific yield) are likely similar to those of the Imperial Formation.
- The Late Miocene to Pliocene Imperial Formation (in Layer 2) is generally described as interbedded claystone and sandstone of dominantly marine origin. The Imperial

Formation has an exposed thickness of over 1,500 feet in the Yuha area. Wells drilled into the Imperial Formation typically have low yields and produce poor quality water.

Significant differences have been noted in the hydrogeologic properties, water levels, and water quality between the area around the community of Ocotillo and areas to the east. Near Ocotillo, transmissivities (aquifer properties describing the ease with which groundwater flows through the aquifer) have been noted as significantly higher than those to the east. Transmissivities have been measured in the range of 5,800 to 6,700 $ft^2$/day near Ocotillo, whereas transmissivities of 34 to 957 $ft^2$/day have been noted in the eastern areas. These variations are reflected in groundwater gradients: shallower (flatter) hydraulic gradients have been mapped in the Ocotillo area and steeper hydrologic gradients have been mapped in the area east of Ocotillo.

While there is an occurrence of unconfined groundwater in other parts of the basin, water quality these areas are generally poor, with existing wells drilled in confined groundwater showing improved water quality. Groundwater generally flows southeast through the basin, with the principal recharge derived from percolation from precipitation and ephemeral runoff from the surrounding mountains (Skrivan, 1977).

## 2.3. HYDROLOGY

The Coyote Wells Valley Basin receives very limited precipitation and natural recharge. The closest active precipitation station is in El Centro (Western Regional Climate Center, 2018). Over the period of record 1934-2018, the average annual rainfall for a Spring to Spring water year is 2.56 inches. From March 2017 to March 2018, annual precipitation was 0.35 inches, much below average. Rainfall has ranged from 0.07 inches in 2006 to 7.3 inches in 1982. **Figure 4** shows the annual spring to spring precipitation for the El Centro station.

## 2.4. GROUNDWATER PUMPING

The main use of groundwater pumping within the basin is industrial usage by the Plaster City plant. This groundwater is pumped from three US Gypsum production wells (USG- 4, 5, and 6) located in the center of the Basin as shown on **Figure 5**. **Figure 5** also shows wells in the monitoring program. **Figure 6** provides a close-up view of well locations around Ocotillo.

As documented in **Table 1**, groundwater pumping by USG in calendar year 2017 amounted to 362 AFY, the highest since 2008, and was as much as 575 AFY in 2005. **Figure 7** depicts the long-term pumping amounts with annual pumping data from 1970 to the present.

As this Annual Report covers the period Spring 2017 through Spring 2018, the pumping over this time was 376 AFY. **Table 2** shows the pumping on a quarterly basis. Pumping volumes have been consistent in each quarter reflecting steady pumping throughout the year.

Other groundwater pumping from the basin occurs for residential and industrial uses. Wells of two mutual water companies and individual domestic wells have been estimated to produce 127 AFY as of 2004 (Todd, 2007).

# 3. MONITORING PROGRAM

**Table 3** identifies all actively monitored wells within and just east of the groundwater basin. Water levels are monitored by the US Geological Survey (USGS) and US Gypsum, and water quality is monitored by USGS. In 2018, the USGS monitored 27 wells for water levels and 18 wells for water quality. The USGS provides water level and water quality data on a semi-annual basis. Water levels and quality uploaded to the USGS portal after this annual report will be included in next year's annual report.

USG has probes in 5 wells monitoring both water levels and water quality. USG data collection includes data loggers in USG-4, USG- 5, and USG-6 that measure water levels in these wells daily. However, three of these wells are pumping wells and water levels fluctuate based on pumping level within the well and may not reflect regional water levels. When a well is pumped, groundwater levels decline in the well, and the resultant drawdown varies based on type of pump, efficiency of well, and other variables. Water levels are expected to return to static water levels shortly after the pump is turned off.

**Table 3** also lists that wells that were recently monitored, along with the monitoring entity (USGS or USG) and reason for interruption of monitoring.

Locations of monitored wells across and beyond the basin are shown on **Figure 5** and the wells in the Ocotillo area are shown on **Figure 6;** blue indicates wells that have both level and quality data from 2018, yellow indicates wells with water level data only and green indicates water quality data only. Currently inactive wells also are shown.

# 4. GROUNDWATER ELEVATIONS

## 4.1. WATER LEVELS

All hydrographs are provided in **Appendix A.** Hydrographs are presented in two sets: one set contains hydrographs with the same scale for all active wells and the other set shows the water levels on a focused scale with a range of 20 feet to highlight small changes. Overall, the hydrographs show that groundwater levels have small changes over time.

**Figure 8** shows the location of key wells that have hydrographs of groundwater levels. Key wells were selected on the basis of relatively complete water level histories and representative locations that show trends within the groundwater basin.

Monitoring wells 31B1 and 36D2, located near the USG production wells, show similar trends (decrease from 1990s to 2008, slight increase from 2008 to 2015 and a slight decrease from 2015 to 2018). This pattern mirrors the pumping at the USG plant, with decreased water levels in times of greater pumping and relative recovery during lower pumping. These short-term changes are not visible in wells located farther from the plant, for example, wells 24D1 or 16J1. These wells continue a steady trend (decreasing and increasing respectively) although USG pumping was reduced to half from 2009 to 2015. Wells along the eastern edge of the basin, 42L1 and to a lesser extent 32R1, reflect a seasonal variation, showing sharp increases shortly after peak precipitation events (1993 and 1997).

Of the 27 wells monitored, nine showed increasing water levels, five showed stable water levels, and 13 showed decreasing water levels. USG-5 showed the largest increase in water level (5.9 ft over the past year) and USG-4 showed a 3.5-foot decrease; however, these wells do not reflect static conditions. From Spring 2017 to Spring 2018, USG-4 pumping increased from 12.3 AF during the second quarter of 2017 to 36.5 AF during the first quarter of 2018, which likely accounts for the lowered water level in this well. Meanwhile, USG-5 pumping decreased from 48.9 AF in the second quarter of 2017 to 32.8 AF in the first quarter of 2018, which likely accounts for the increase in water level by Spring 2018. The decreasing water levels ranged from 0.01 feet to 3.8 feet over the last year.

## 4.2. CURRENT WATER LEVELS

From Spring 2017 to Spring 2018, water levels in the basin showed steady or slightly decreasing groundwater levels. The increase in wells with a slightly decreasing groundwater level may reflect the increase in pumping from 339 AF in 2016 to 362 AF (March 2017-March 2018). Groundwater levels typically range from about 200 feet above mean sea level in the southeast part of the groundwater basin to about 290 feet in the western portion of the basin. No substantial changes have been seen in the current water levels from 2017-2018 as compared to previous data presented in the monitoring plan.

**Figure 9** shows groundwater contours and flow direction in the vicinity of Ocotillo. Groundwater generally flows from west to east. A pumping depression is shown around one well on the west; this depression is most likely due to recent pumping in one or more private, non-USG wells.

## 4.3. ASSESSMENT OF GROUNDWATER LEVEL DECLINES

Groundwater level declines in the Coyote Wells Valley Basin can reflect two basic causes. First, groundwater levels in a well can be affected by the drawdown effects of nearby pumping, for example, from USG wells. This is a localized and short-term phenomenon. Second, groundwater levels in the Coyote Wells Valley Basin are characterized by long-term regional decline; additional pumping could cause a declining trend that is more widespread or greater than the predicted rate.

Operation of production wells involves alternating periods when well pumps are off and on. When well pumps are operating, groundwater levels decline in and around the pumped well; when this short-term, localized drawdown affects a nearby well, such well interference can have adverse effects on well yield. To increase the effectiveness of the monitoring program, a performance standard was created to assess such potential impacts:

> *Well interference is defined as the combined pumping from all USG pumping wells so as* ***not to exceed 5 feet of drawdown at the nearest water-supply well.***

No private wells have reported well interference issues due to USG pumping. As shown in the hydrographs for USG-4, USG-5, and USG-6, water levels vary greatly when the well is pumping but water levels recover quickly when wells are not pumping.

To assess potential impacts of USG pumping on long-term regional decline in groundwater levels, the performance standard is designed to act as an early warning system; it is stated as follows:

> *Water level decline is defined as four consecutive **annual** groundwater measurements (**spring only**) declining at a rate that is greater **than 0.1875 feet per year**, occurring at more than **10 percent of wells** in the regional monitoring program. As of 2016, there were 27 wells and therefore a significant decline would involve at least three (3) wells.*

In the 25 wells where water levels have been being monitored in 2018, none have showed a declining trend greater than the predicted rate for four consecutive sampling events. This indicates no additional steady groundwater decline attributable to USG pumping. **Table 4** summarizes the calculated rate of decline by well for the previous eight years (2010-2018). To reduce any seasonal effects, only spring measurements are used to calculate the rate of decline.

However, 6 of the 25 wells did show a slight decline from 2017. Of those, two wells (23B1 and 22E2) showed abnormally higher water levels in 2017, and the water level change from 2016 to 2018 was steady or increasing. USG-4 shows a downward trend from 2017 to 2018, but as discussed, water levels in this well are highly affected by USG pumping. If USG wells are pumping nearby, water levels drop considerably but recover quickly.

The remaining three wells (31B1, USG-5, and 42L1) show no correlation with each other as they are distributed over the basin, have variable depths, and are near other wells that do not show a decline.

# 5. WATER QUALITY

## 5.1. GROUNDWATER QUALITY

The EIR/EIS indicated that the primary causes of potential groundwater quality degradation from increased groundwater production would include:

- lateral migration of saline water from Tertiary marine sediments that crop out in the Ocotillo and No Mirage area and areas to the east of Coyote Wells, or
- vertical migration of saline water from the Tertiary marine sediments present at depth below the alluvial aquifer.

The monitoring program is designed to detect changes in TDS concentrations due to increased pumping by USG. Use of TDS as an indicator for general mineral groundwater quality is a simplified, but widely accepted method to detect changes in general water quality.

## 5.2. POTENTIAL WATER QUALITY DEGRADATION

Water quality data generally show stable trends for the key constituents. Because of reduced pumping by USG, it is unlikely that high TDS concentrations in the east are migrating west.

The following performance standard is used as an early warning of changing conditions from USG pumping and its potential effect on water quality:

> *A significant increasing trend in **total dissolved solids** (TDS) concentrations is defined as TDS concentrations in groundwater from any well in the groundwater basin whereby **four consecutive annual samples (collected each spring)** show a cumulative increase greater than **20 percent of the long-term average** for that well.*

TDS concentrations for the active USGS monitoring wells are shown in **Table 6**, and other constituents are presented in **Appendix B**. TDS concentrations are steady, as defined by the updated 2018 USG performance standard. Eight of the eleven active monitoring wells with both 2017 and 2018 measurements showed a slight decrease in TDS concentrations. The three wells with any increase in TDS concentration (34B1, 36C2, and USG-6) showed a two, ten, and nine percent increase respectively. While 34B1 is located on the western edge of the alluvium, an area that may indicate poor water quality migration from other formations, the water levels at that well have declined only 0.05 ft over three years (2015-2018).

**Figures 10a** and **10b** shows TDS concentrations by well for each spring monitoring event. **Figure 10a** shows all of the wells with a scale of 0 to 1,600 mg/L and **Figure 10b** shows all but two wells with a more focused scale from 0 to 600 mg/L. Most wells are relatively stable over time. One well (30R1) showed an increase in TDS from 2012-2017 but has since shown a decrease in concentration.

**Figure 11** shows maximum TDS concentrations within the groundwater basin for Spring 2017 to Spring 2018; data are provided in Appendix B. As documented in Appendix B, well with previously high TDS concentrations (42A8) showed a decline from a high of 1,240 mg/L in April 2011 to 564 mg/L in March 2018. Twelve of the fifteen wells in which TDS were measured in 2017 and/or 2018 have maximum TDS levels of <500 mg/L. All wells in the monitoring network met the performance standard for TDS.

As shown in **Figure 11**, one well has high TDS; this is well 24B1 with a TDS value of 1,310 mg/L in March 2018. While this is a decrease from 1,350 mg/L in April 2017, it still exceeds the recommended California Secondary Maximum Contaminant Level of 1,000 mg/L. Note that this standard is based on aesthetics not health issues. Historical concentrations of TDS in Well 24B1 are plotted with annual USG pumping in **Figure 11**. While USG pumping is unlikely the cause of these elevated TDS concentrations, the semi-annual groundwater quality monitoring will continue with annual reporting to detect water quality changes in the groundwater basin and individual wells.

# 6. SUSTAINABLE GROUNDWATER MANAGEMENT ACT (SGMA)

Pursuant to California Water Code Section 10723.8 of the Sustainable Groundwater Management Act (SGMA), which became effective on January 1, 2015, Imperial County gave notice to DWR of its election to assume the role of Groundwater Sustainability Agency (GSA) and to undertake sustainable groundwater management within County boundaries for all groundwater basins and sub-basins within the county. The County has since been deemed the exclusive GSA for the Coyote Wells Valley Basin.

We understand that the County will continue to work cooperatively with local agencies, water providers and other interested stakeholders within the basin. Should the County choose to prepare a Groundwater Sustainability Plan (GSP) for the Basin, the County will consider the interests of all beneficial uses and users of groundwater, as directed by California Water Code section 10723.2. The GSP process should continue to be followed by USG. Groundwater management may change how groundwater is monitored, reported, or allocated in the basin.

## 7.CONCLUSIONS

The current monitoring program meets the objectives set forth in EIR/EIS, noting the importance of continued USGS data collection. The water level data collected are sufficient to identify increases in the rate of water-level decline and the water quality data provide an early warning of potential degradation.

US Gypsum will prepare the next Annual Report due to the County of Imperial for the period including Spring 2018 to Spring 2019.

## 8. REFERENCES

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# TABLES

**Table 1. Annual USG Pumping by Well (AFY)**

| Calendar Year Pumping | Well #4 | Well #5 | Well #6 | Total |
|---|---|---|---|---|
| **2005** | 226 | 199 | 149 | 575 |
| **2006** | 199 | 188 | 162 | 549 |
| **2007** | 192 | 174 | 135 | 501 |
| **2008** | 140 | 136 | 125 | 400 |
| **2009** | 75 | 84 | 78 | 237 |
| **2010** | 78 | 82 | 79 | 239 |
| **2011** | 81 | 83 | 82 | 247 |
| **2012** | 69 | 109 | 70 | 248 |
| **2013** | 106 | 66 | 78 | 250 |
| **2014** | 98 | 59 | 82 | 239 |
| **2015** | 87 | 93 | 91 | 271 |
| **2016** | 115 | 118 | 106 | 339 |
| **2017** | 93 | 148 | 121 | 362 |

**Table 2. Quarterly USG Pumping by Well (AF per quarter)**

| Year | Quarter | #4 | #5 | #6 | TOTAL | Annual Distribution |
|---|---|---|---|---|---|---|
| 2017 | Q1 | 16 | 32.2 | 31.9 | 80 | -- |
| 2017 | Q2 | 12.3 | 48.9 | 32.5 | 94 | 25% |
| 2017 | Q3 | 30.8 | 35.5 | 28.6 | 95 | 25% |
| 2017 | Q4 | 35.9 | 31.6 | 28.4 | 96 | 26% |
| 2018 | Q1 | 36.5 | 32.8 | 21.4 | 91 | 24% |

## Table 3. List of Actively Monitored Wells and Available Data for 2018

| Well Name | Short Name | Active WL Network | Active WQ Network | First WL Measurement | First WQ Measurement | Agency |
|---|---|---|---|---|---|---|
| 17S10E11H3 | 11H3 | Y | Y | 1987 | 1987 | USGS |
| 16S09E24B1 | 24B1 | Y | Y | 1976 | 1977 | USGS |
| 16S09E24D1 | 24D1 | Y | Y | 1976 | 1977 | USGS |
| 16S09E25K2 | 25K2 | Y | Y | 1972 | 1972 | USGS |
| 16S10E31B1 | 31B1 | Y | Y | 1993 | 2013 | USGS |
| 16S09E34B1 | 34B1 | Y | Y | 1998 | 1997 | USGS |
| 16S09E36A1 | 36A1 /MW-2B | Y | Y | 2012 | 2013 | US Gypsum |
| 16S09E36A2 | 36A2 /MW-2A | Y | Y | 2012 | 2013 | US Gypsum |
| 16S09E36H2 | 36H2 / USG-5 | Y | Y | 2015 | 2015 | USGS / USG |
| 17S10E11B1 | 11B1 | Y | | 1975 | * | USGS |
| 17S10E11G4 | 11G4 | Y | | 1978 | * | USGS |
| 17S11E16J1 | 16J1 | Y | | 1970 | 1972 | USGS |
| 17S11E22E2 | 22E2 | Y | | 1975 | 1975 | USGS |
| 16S11E23B1 | 23B1 | Y | | 1974 | 1964 | USGS |
| 16S11E27F1 | 27F1 | Y | | 1975 | * | USGS |
| 16S10E27R1 | 27R1 | Y | | 1975 | 1975 | USGS |
| 16S10E28D1 | 28D1 | Y | | 1974 | 1948 | USGS |
| 16S10E29H1 | 29H1 | Y | | 1975 | 1975 | USGS |
| 16S10E32P1 | 32P1 | Y | | 1992 | * | USGS |
| 15S11E32R1 | 32R1 | Y | | 1974 | 1964 | USGS |
| 16S09E35M1 | 35M1 | Y | | 1962 | 1962 | USGS |
| 16S09E36D2 | 36D2 | Y | | 1975 | 1975 | USGS |
| 16S09E36G3 | 36G3 / USG-4 | Y | | 2011 | 1963 | US Gypsum |
| 16S11E42L1 | 42L1 | Y | | 1975 | 1975 | USGS |
| 16S09E25M2 | 25M2 | | Y | 1991 | 1971 | USGS |
| 16S09E26F1 | 26F1 | | Y | 1998 | 2013 | USGS |
| 16S10E30R1 | 30R1 | | Y | * | 1959 | USGS |
| 16S09E36C2 | 36C2 | | Y | 1975 | 1961 | USGS |
| 16S10E42A8 | 42A8 | | Y | * | 1994 | USGS |

Wells Not Monitored in 2018 that were recently active

| Well Name | Short Name | Agency | Reason |
|---|---|---|---|
| 16S09E25M2 | 25M2 | USGS | No reason given by USGS, WQ was monitored |
| 16S09E26F1 | 26F1 | USGS | No reason given by USGS, levels previously not measured due to active pumping, WQ was monitored |
| 16S09E36B1 | 36B1 /USG-6 | US Gypsum | Down for maintnance |
| 17S10E11G1 | 11G1 | USGS | No reason given by USGS, levels previously not measured due to active pumping |

**Table 4: Water Level Trends**

| Well Name | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Maximum consecutive years of declines greater than 0.1875 ft/year |
|---|---|---|---|---|---|---|---|---|---|---|
| 11B1 | 0.60 | 0.52 | 0.56 | 0.44 | 0.37 | 0.60 | 0.62 | 0.43 | 0.42 | |
| 11G1 | | 0.83 | -0.18 | 0.84 | 0.64 | -0.39 | 1.46 | -0.89 | | 1 |
| 11G4 | 0.62 | 0.29 | 0.30 | 0.60 | 0.55 | 0.42 | 0.62 | -0.48 | 1.70 | |
| 11H3 | | 2.19 | -1.09 | 2.05 | 0.29 | 0.84 | 0.66 | -0.05 | 0.79 | |
| 16J1 | 0.38 | 0.46 | 0.12 | 0.27 | 0.13 | 0.03 | 0.20 | 0.08 | 0.27 | |
| 22E2 | 0.38 | 0.41 | 0.16 | 0.24 | 0.46 | -0.27 | 0.20 | 0.71 | -0.34 | 1 |
| 23B1 | -0.30 | 0.26 | -0.45 | -0.06 | -0.63 | 0.55 | -0.10 | 3.74 | -3.80 | 1 |
| 24B1 | -0.07 | -0.23 | -0.16 | -0.09 | -0.21 | -0.14 | -0.09 | -0.10 | -0.13 | |
| 24D1 | -0.08 | -0.18 | -0.11 | -0.14 | -0.19 | -0.51 | 0.30 | -0.04 | -0.13 | |
| 25K2 | | | | | | | | -0.20 | -0.12 | |
| 25M2 | | -0.88 | 1.17 | -0.33 | 0.29 | -0.80 | 0.69 | -0.94 | | 1 |
| 26F1 | -0.07 | -0.05 | -0.11 | -0.07 | -0.10 | -0.06 | -0.09 | -1.21 | | 1 |
| 27F1 | -0.10 | -0.25 | -0.28 | 0.13 | -0.10 | -0.15 | 0.05 | -0.08 | 0.13 | |
| 27R1 | -0.12 | 0.01 | -0.09 | 0.01 | 0.41 | 0.05 | 0.21 | -0.22 | 0.22 | |
| 28D1 | -0.38 | -0.20 | -0.28 | -0.15 | -0.18 | -0.20 | -0.15 | | 1.66 | |
| 29H1 | 0.35 | -0.31 | -0.09 | -0.01 | 0.01 | | -0.02 | -0.08 | 0.08 | |
| 31B1 | 0.35 | 0.27 | 0.18 | 0.03 | -0.02 | -1.04 | -2.11 | 2.73 | -0.35 | 1 |
| 32P1 | -0.08 | -0.35 | -0.18 | -0.43 | -0.38 | -0.10 | -0.33 | -0.10 | -0.17 | |
| 32R1 | 0.01 | 0.02 | -0.09 | 0.22 | 0.12 | -0.07 | -0.01 | | -0.03 | |
| 34B1 | | | | | | -0.16 | | | -0.02 | |
| 35M1 | | 4.30 | | 2.83 | 1.10 | -0.07 | -0.26 | -0.10 | -0.05 | |
| 36D2 | 0.48 | 0.36 | 0.17 | 0.11 | -0.03 | 0.03 | -0.17 | -0.25 | -0.15 | |
| 36H2 | | | | | | | -0.08 | | -1.29 | 1 |
| 42L1 | -0.97 | -1.01 | -0.29 | 3.03 | 0.19 | -0.05 | 0.01 | -0.43 | -0.4 | 2 |

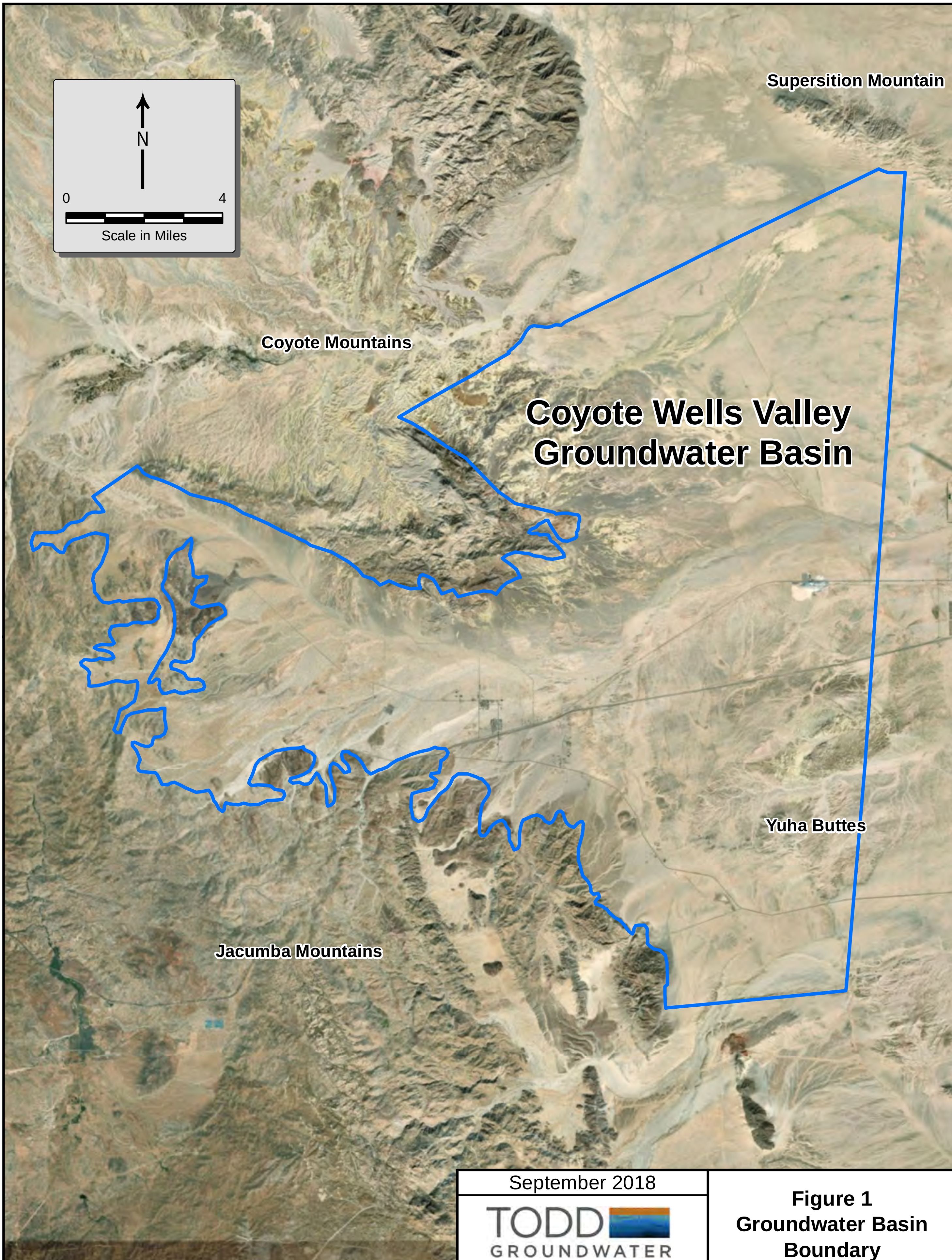
**Table 5: Well Depths**

| USGS Site Code | Well Name | Depth (ft) | Aquifer Units |
|---|---|---|---|
| 324138115552901 | 11B1 | 301 | Basin and Range |
| 324119115553201 | 11G4 | 199 | Basin and Range |
| 324117115552001 | 11H3 | 348 | Basin and Range |
| 324013115511101 | 16J1 | 366 | Basin and Range |
| 323934115504701 | 22E2 | 120 | Basin and Range |
| 324603115480501 | 23B1 | 115 | Basin and Range |
| 324608115593501 | 24B1 | 128 | Basin and Range |
| 324558115595201 | 24D1 | 149 | Basin and Range |
| 324439115593401 | 25K2 | 372 | Basin and Range |
| 324446115595901 | 25M2 | 336 | Basin and Range |
| 324455116003801 | 26F1 | 300 | Basin and Range |
| 324500115492101 | 27F1 | 135 | Basin and Range |
| 324430115555501 | 27R1 | 104 | Basin and Range |
| 324510115565601 | 28D1 | 53 | Basin and Range |
| 324458115570301 | 29H1 | 36 | Basin and Range |
| 324428115581601 | 30R1 | 75 | Basin and Range |
| 324417115582401 | 31B1 | 255 | Basin and Range |
| 324342115574301 | 32P1 | | Basin and Range |
| 324851115505901 | 32R1 | 146 | Basin and Range |
| 324424116012301 | 34B1 | 410 | Basin and Range |
| 324345116010001 | 35M1 | 495 | Basin and Range |
| 324414115591901 | 36A1 | 800 | Basin and Range |
| 324414115591902 | 36A2 | 200 | Basin and Range |
| 324416115594101 | 36C2 | 303 | Basin and Range |
| 324422116000301 | 36D2 | 200 | Basin and Range |
| 324405115592101 | 36G3 / USG-4 | 450 | Basin and Range |
| 324407115590902 | 36H1 / USG-5 | 410 | Basin and Range |
| | 36B1 / USG-6 | | |
| 324323115580001 | 42A8 | 112 | Basin and Range |
| 324251115522201 | 42L1 | 130 | Basin and Range |
| **Average** | | **252** | |

**Table 6: Total Dissolved Solids Concentrations (mg/L)**

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1 (MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Total Dissolved Soilds | 287 | 1210 | | 335 | | 517 | | 302 | | | 359 | 365 | 305 | 910 | | | |
| Mar-10 | Total Dissolved Soilds | 307 | 1200 | | 306 | | 498 | | 300 | | | 349 | 346 | 304 | 1100 | | | |
| Apr-11 | Total Dissolved Soilds | 280 | 1220 | | 325 | | 525 | | 298 | | | 485 | 359 | 306 | 1220 | | | |
| Mar-12 | Total Dissolved Soilds | 315 | 1210 | 486 | | | 511 | | 303 | | | 359 | | 320 | 886 | | | |
| Feb-13 | Total Dissolved Soilds | 284 | 1220 | 497 | 302 | | 530 | 299 | 306 | | | | | | 739 | | | |
| Apr-14 | Total Dissolved Soilds | 292 | 1290 | 499 | 309 | | 543 | 284 | 314 | | | 360 | | 327 | 728 | | | |
| Mar-15 | Total Dissolved Soilds | 297 | 1350 | 492 | | | | 298 | 315 | | | | | | | | | |
| Mar-16 | Total Dissolved Soilds | 280 | 1350 | 484 | 291 | 356 | 559 | 271 | 303 | 298 | 399 | 362 | | | 654 | 362 | 334 | 309 |
| May-17 | Total Dissolved Soilds | 298 | 1350 | 495 | 323 | 353 | 567 | 283 | 300 | 303 | 412 | 357 | | | 594 | | 328 | 314 |
| Mar-18 | Total Dissolved Soilds | 288 | 1310 | 439 | 304 | | 565 | 274 | 305 | 291 | | 396 | 350 | | 323 | 564 | | 343 |
| | Average | 293 | 1,271 | 485 | 312 | 355 | 535 | 285 | 305 | 297 | 406 | 378 | 355 | 312 | 795 | 463 | 331 | 322 |
| | Change from 2017-2018 | (10) | (40) | (56) | (19) | -- | (2) | (9) | 5 | (12) | -- | 39 | -- | -- | (271) | -- | -- | 29 |
| | 20 percent of average | 59 | 254 | 97 | 62 | 71 | 107 | 57 | 61 | 59 | 81 | 76 | 71 | 62 | 159 | 93 | 66 | 64 |

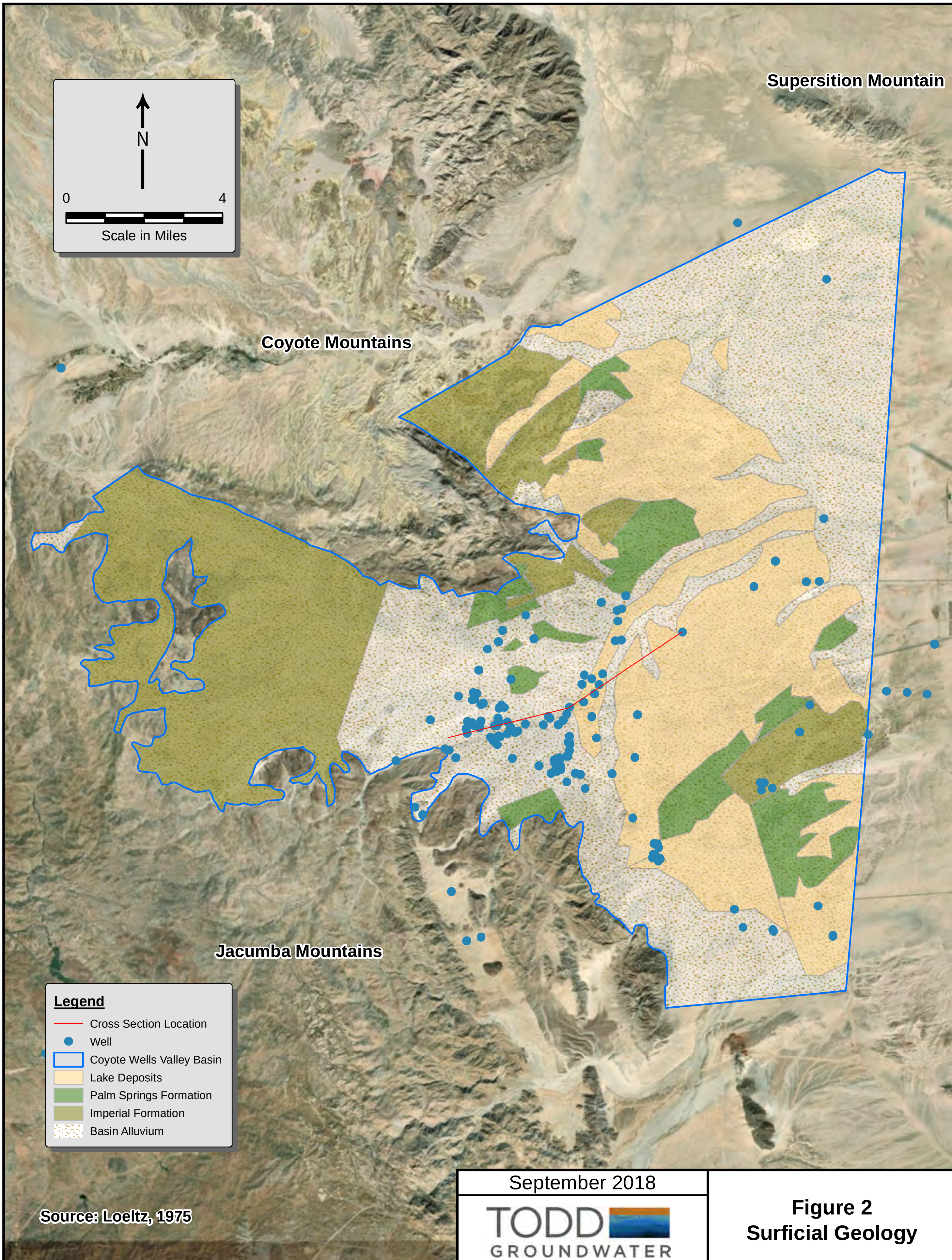
# FIGURES




September 2018

TODD GROUNDWATER

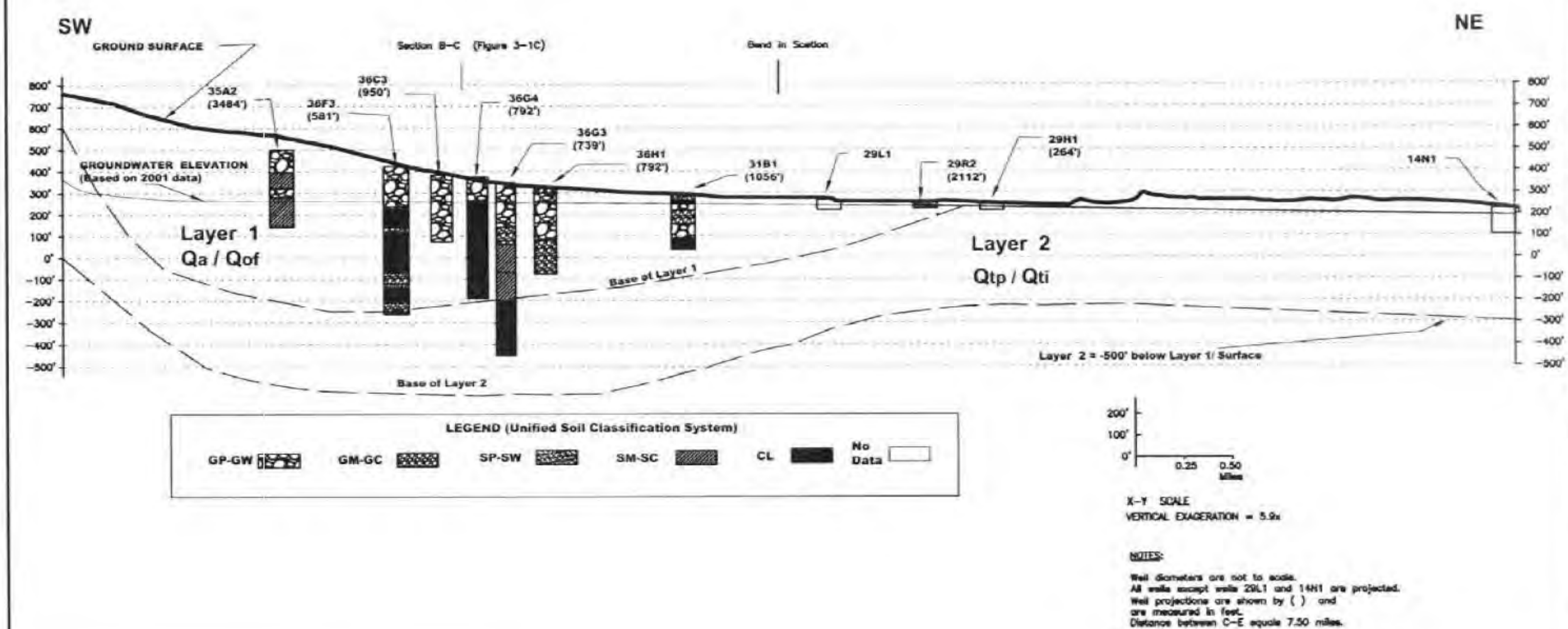
**Figure 1**
**Groundwater Basin Boundary**




September 2018

TODD GROUNDWATER

**Figure 2**
**Surficial Geology**




Bookman-Edmonston
A Division of GEI Consultants, Inc.

Ocotillo/Coyote Wells Groundwater Study
Geologic Cross-Section (Ocotillo-Transverse)
U.S. Gypsum Company

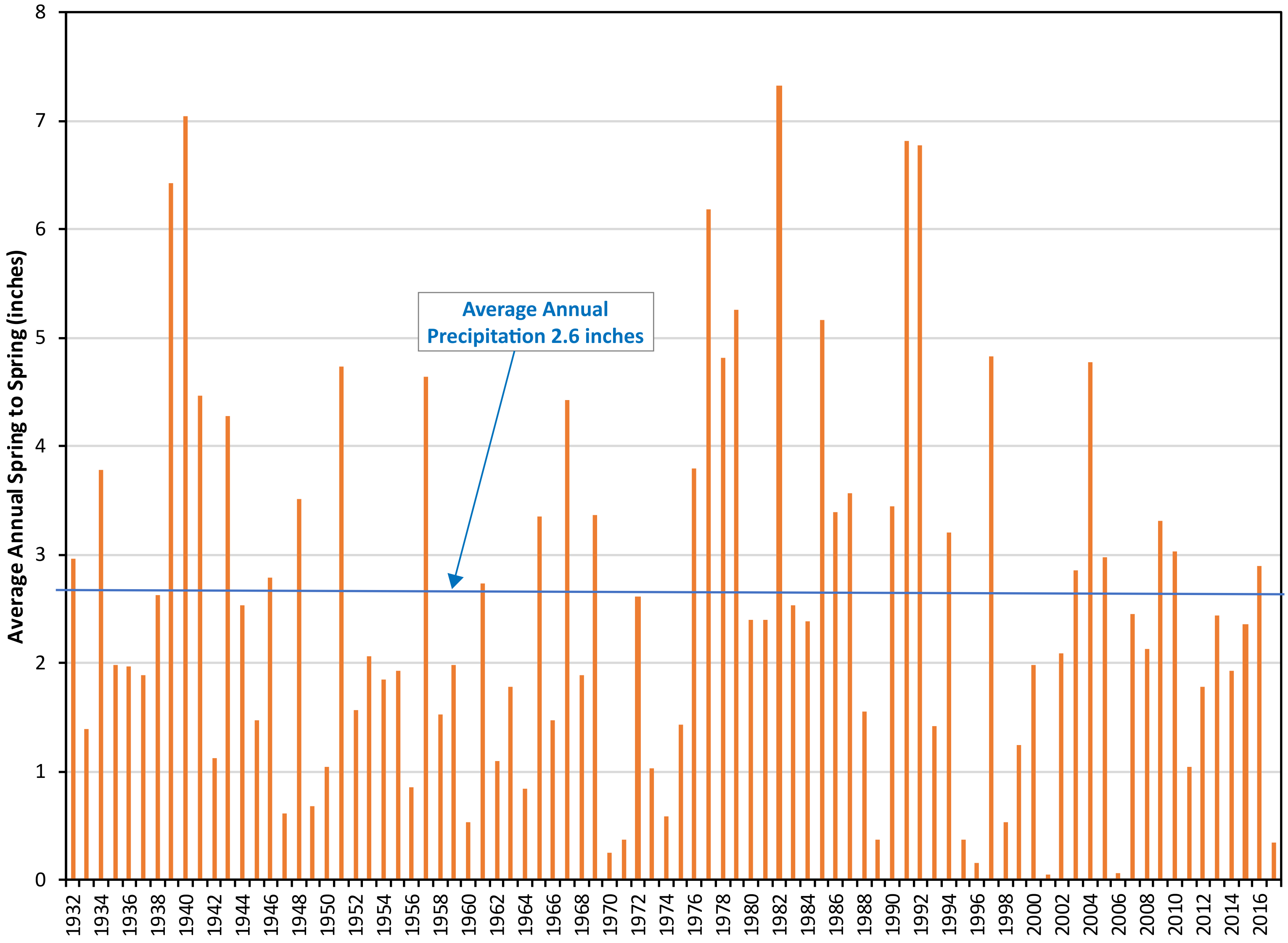
9/24/03

FIGURE 3-1E

September 2018

TODD GROUNDWATER

**Figure 3**
**Geologic Cross Section**




September 2018

TODD GROUNDWATER

**Figure 4**
**Annual Precipitation**
**El Centro Station**

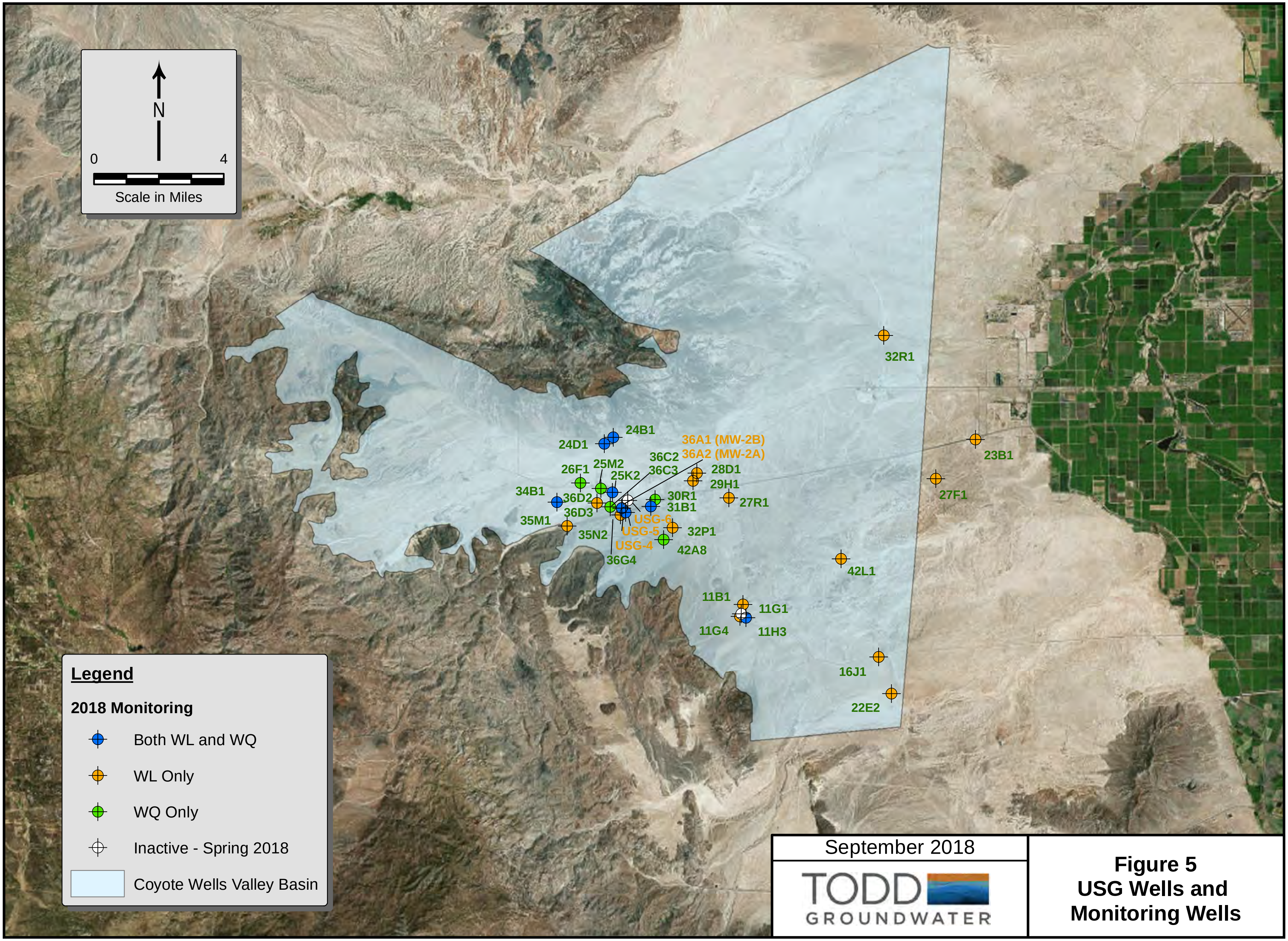
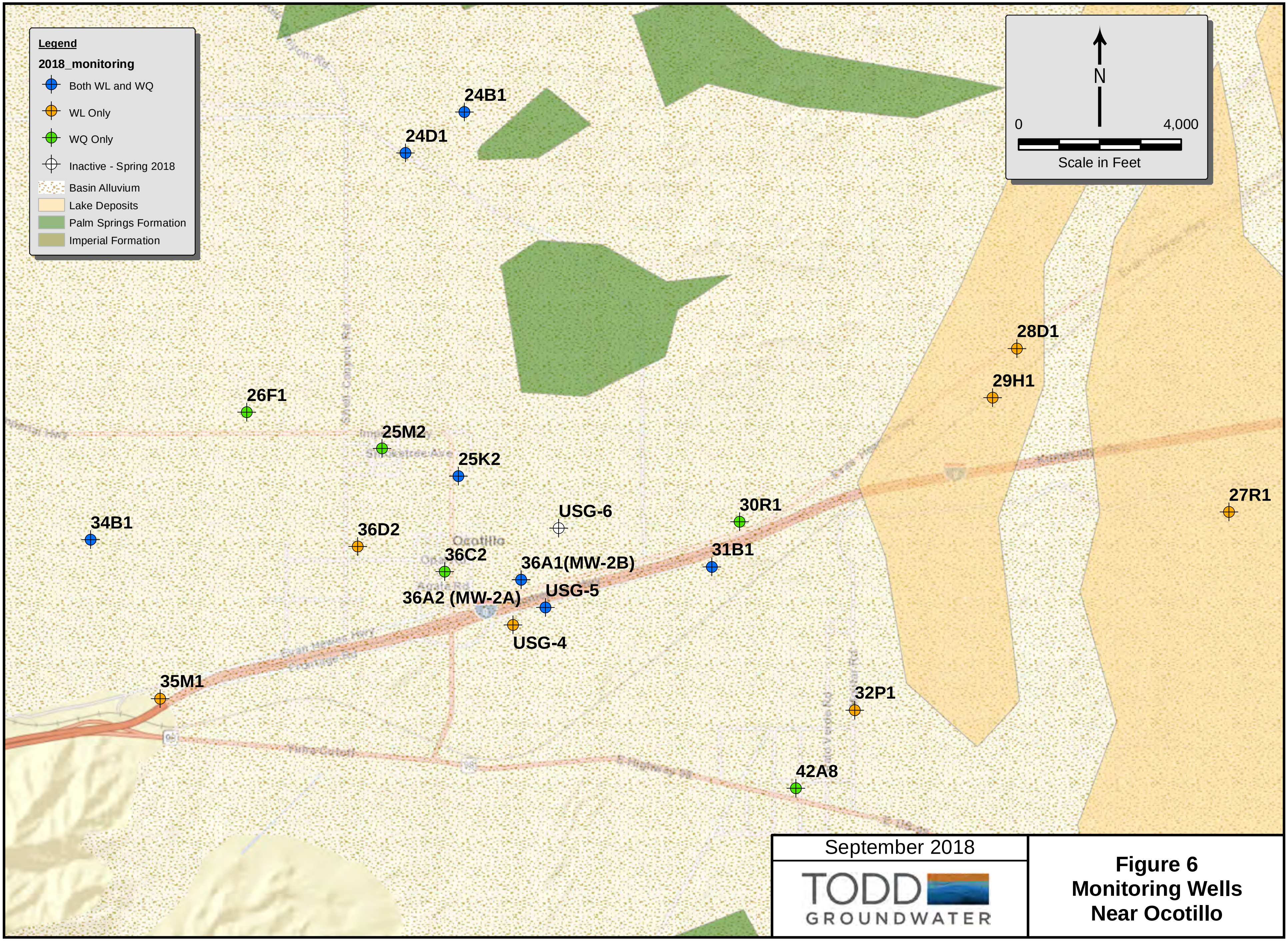
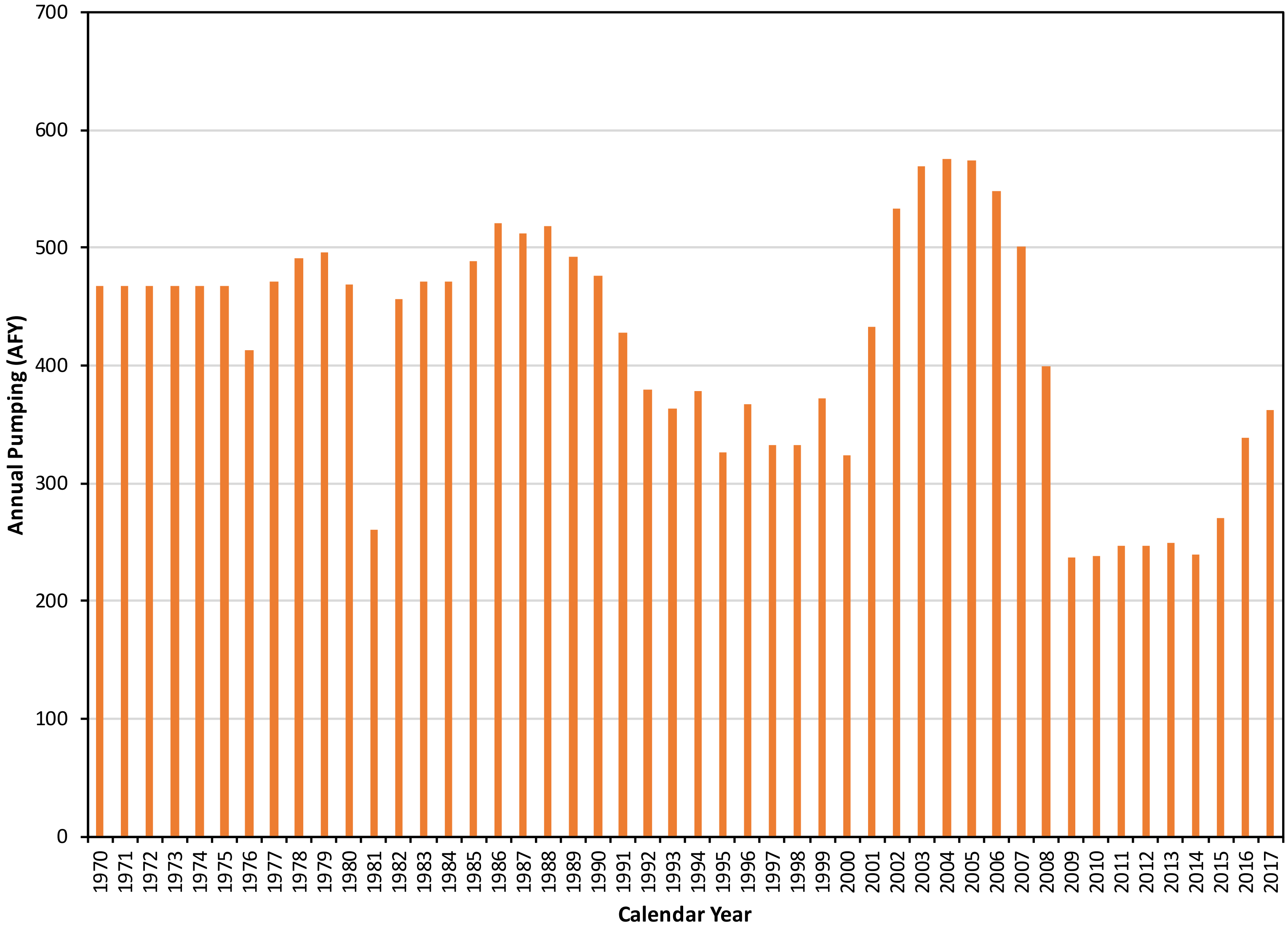



**Figure 5**
**USG Wells and Monitoring Wells**




September 2018

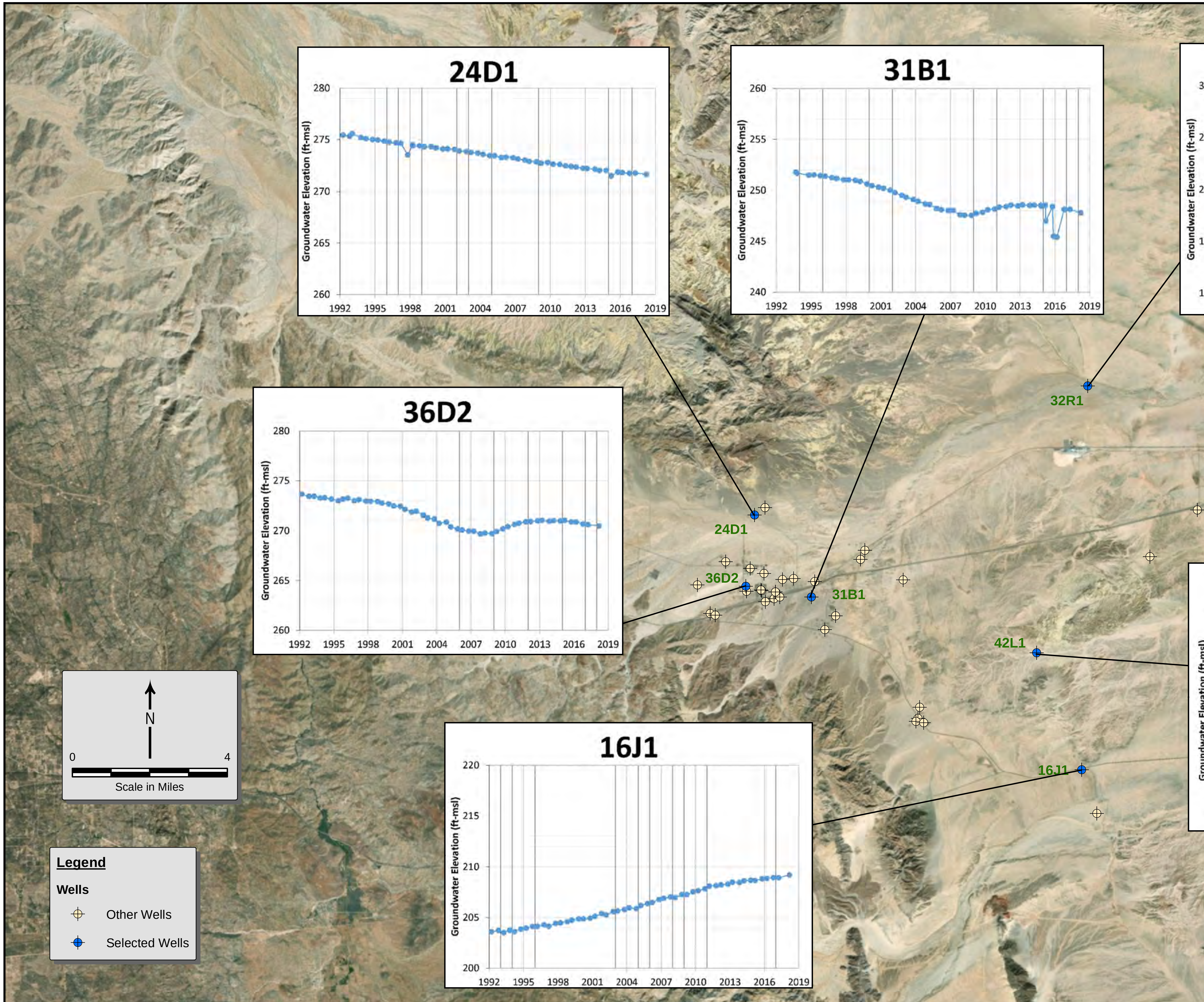
**Figure 6**
**Monitoring Wells**
**Near Ocotillo**




September 2018

TODD GROUNDWATER

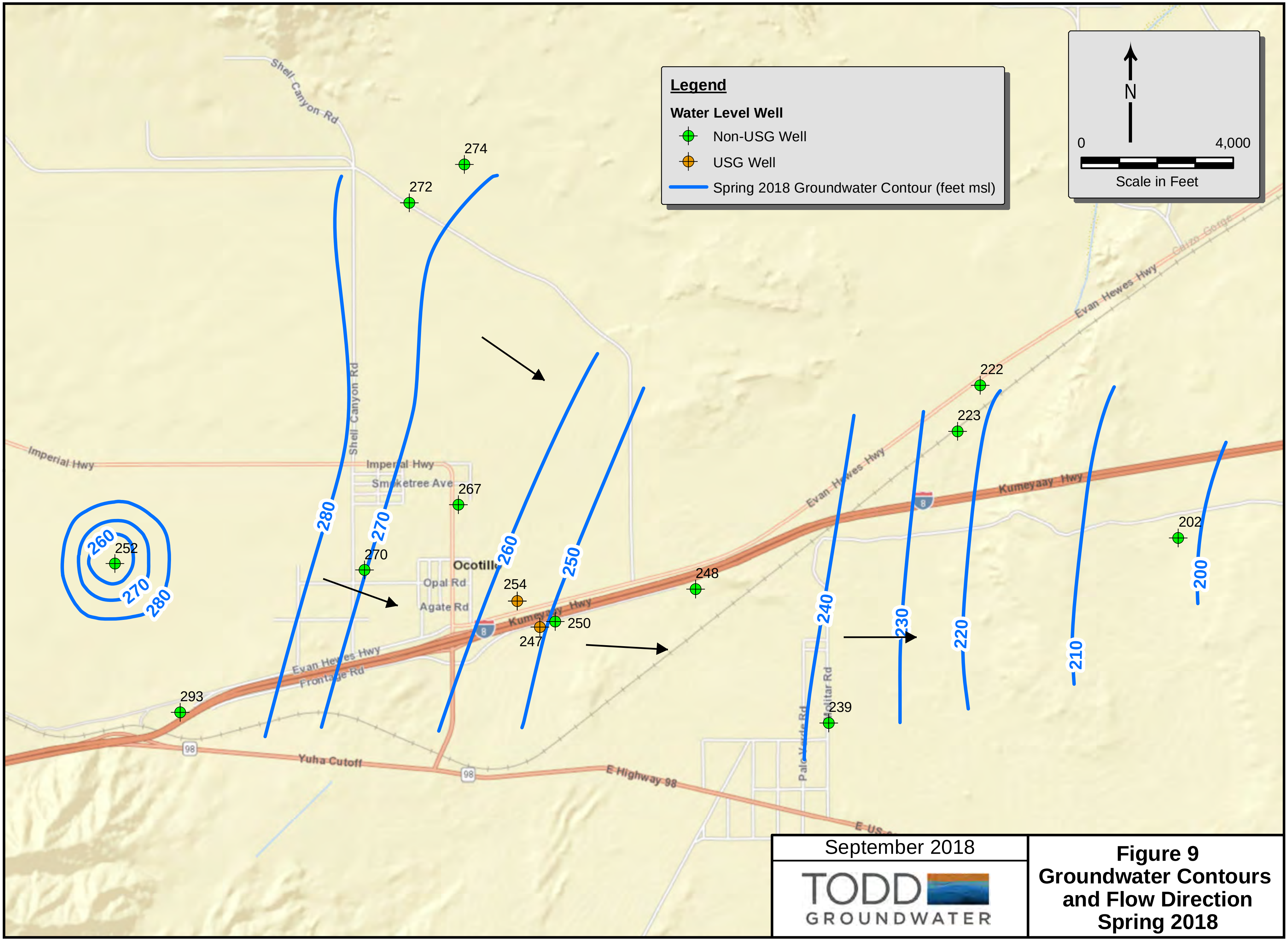
**Figure 7**
**USG**
**Annual Pumping**

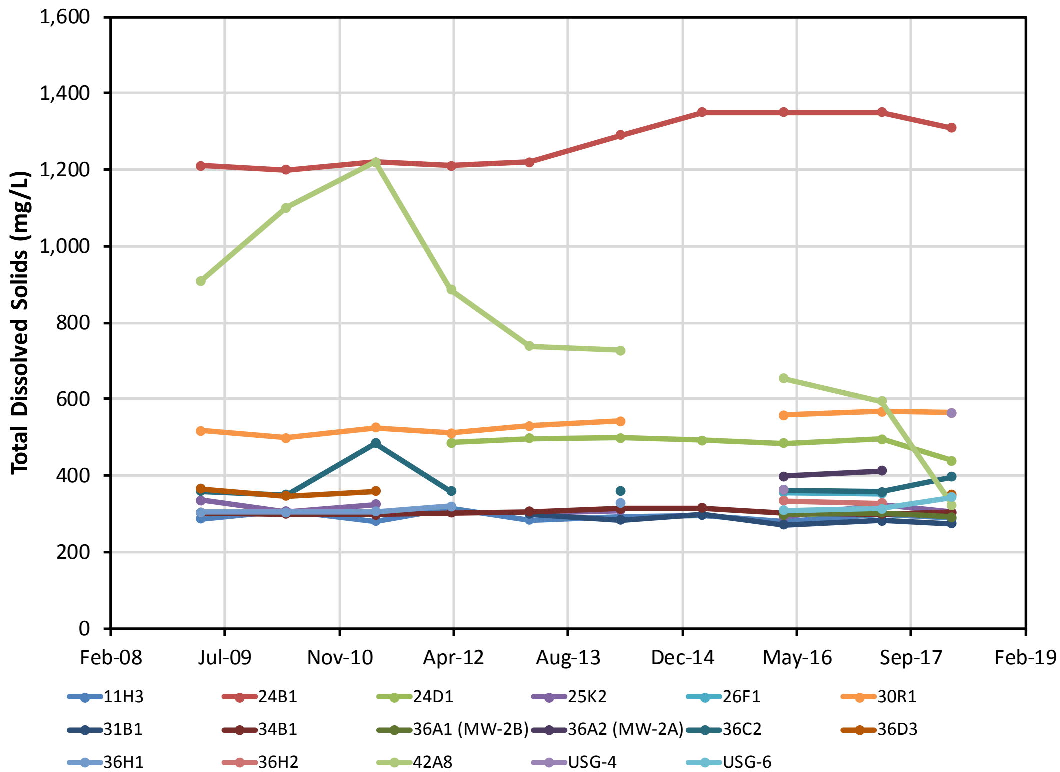


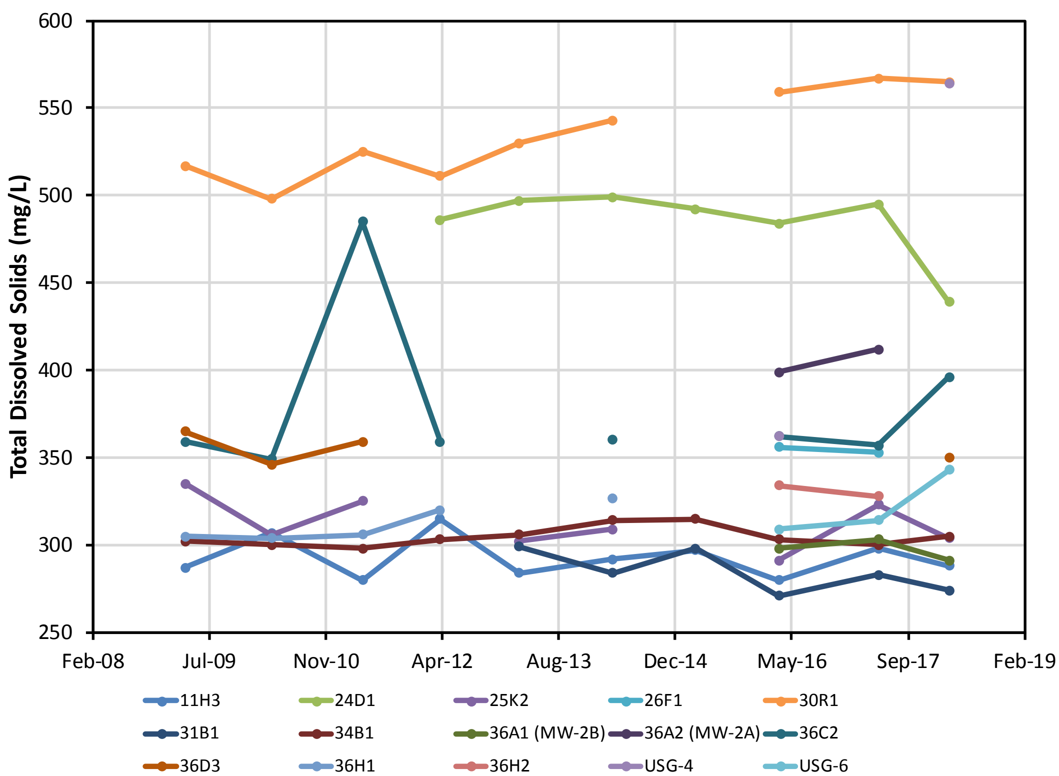

September 2018

TODD GROUNDWATER

**Figure 8**
**Key Groundwater Elevation Hydrographs**


Legend
Water Level Well
Non-USG Well
USG Well
Spring 2018 Groundwater Contour (feet msl)
N
0
4,000
Scale in Feet
Shell Canyon Rd
Imperial Hwy
Smoketree Ave
Ocotillo
Opal Rd
Agate Rd
Kumeyaay Hwy
Evan Hewes Hwy
Frontage Rd
Yuha Cutoff
E Highway 98
Palo Verde Rd
Militar Rd
274
272
267
270
252
254
250
247
248
293
239
222
223
202
280
270
260
250
240
230
220
210
200
September 2018
TODD GROUNDWATER
Figure 9
Groundwater Contours
and Flow Direction
Spring 2018

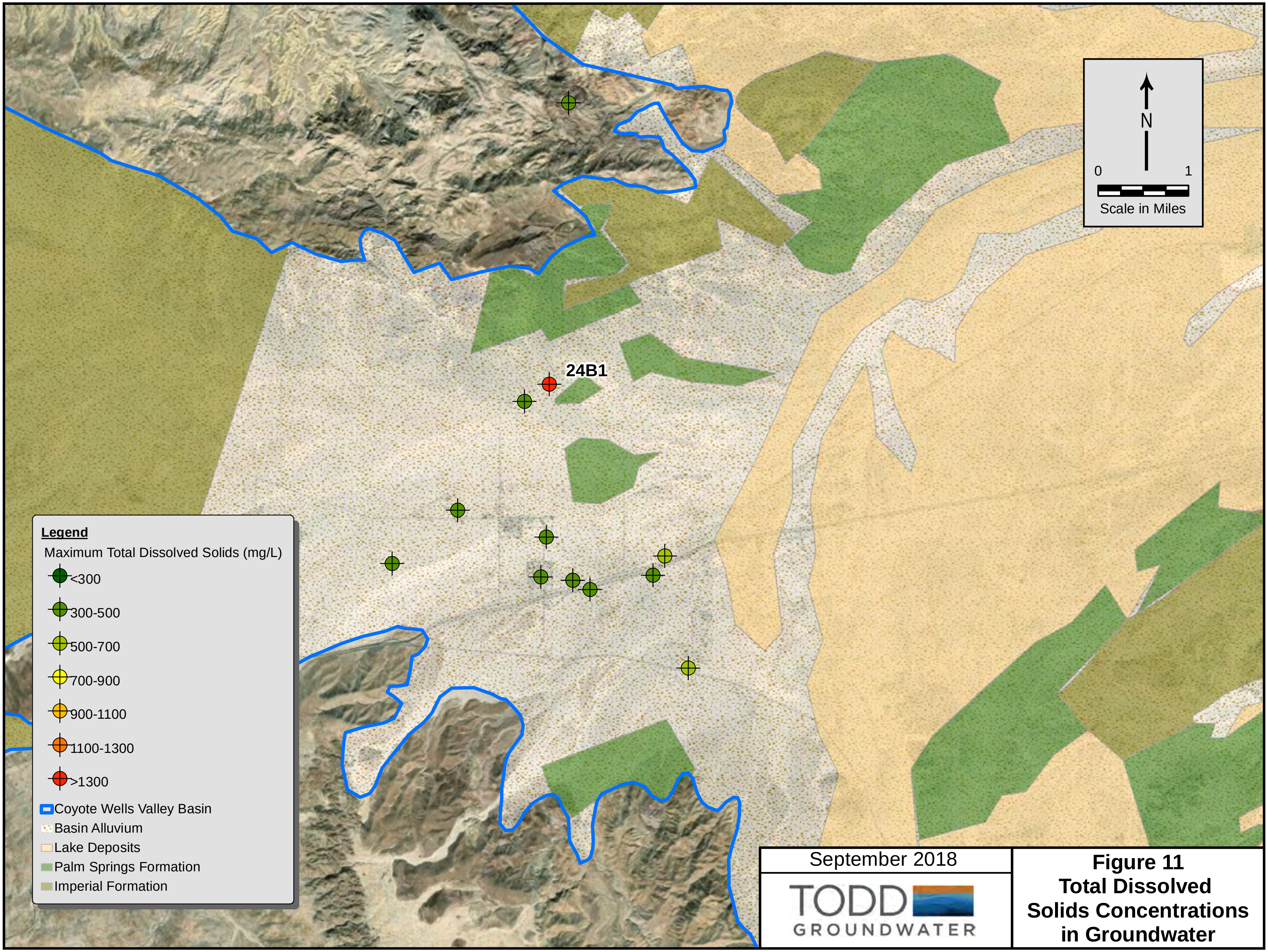



September 2018

TODD GROUNDWATER

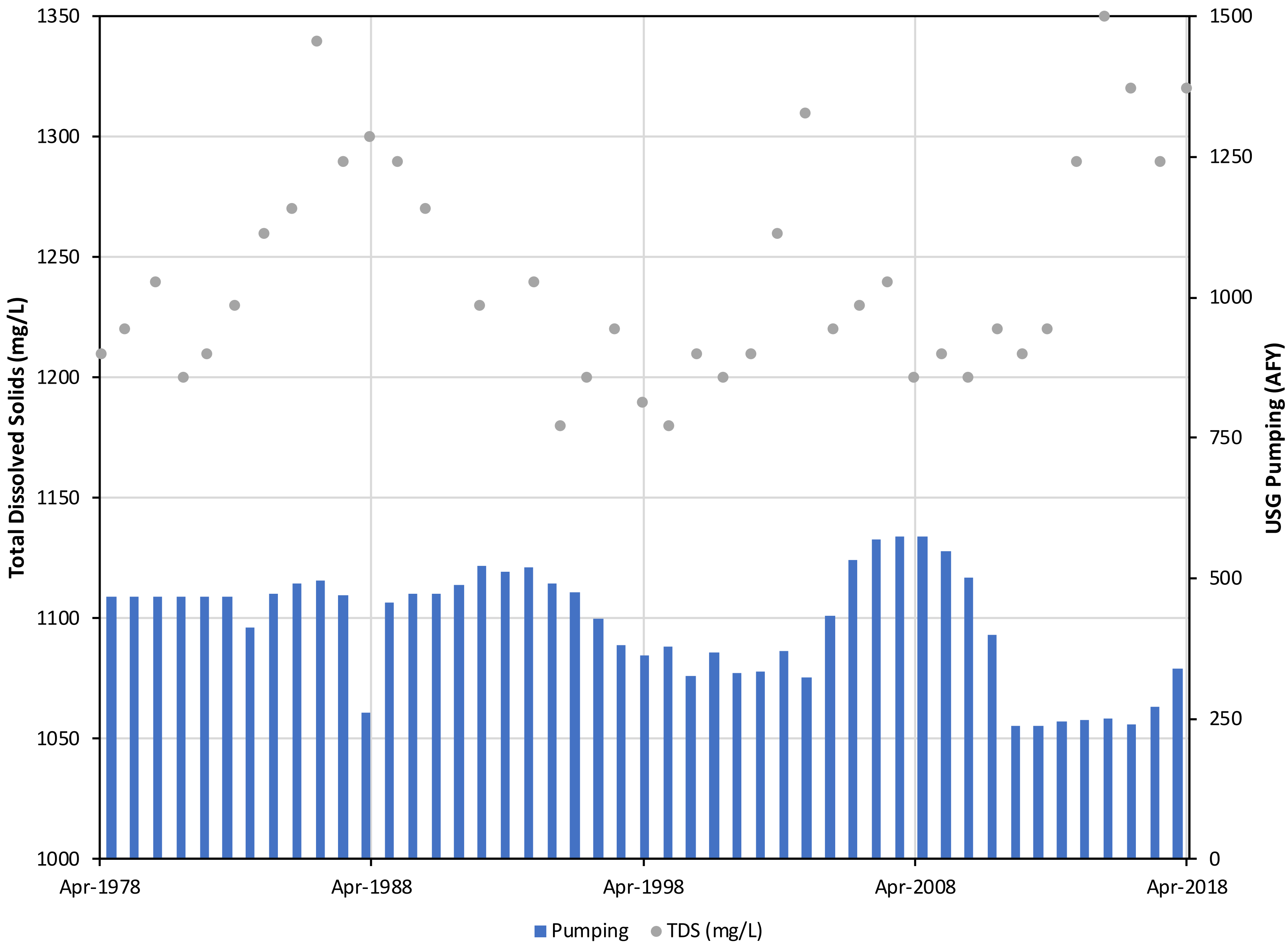
**Figure 10**
**TDS Concentrations Over Time**




September 2018

TODD GROUNDWATER

**Figure 11**
**Total Dissolved Solids Concentrations in Groundwater**

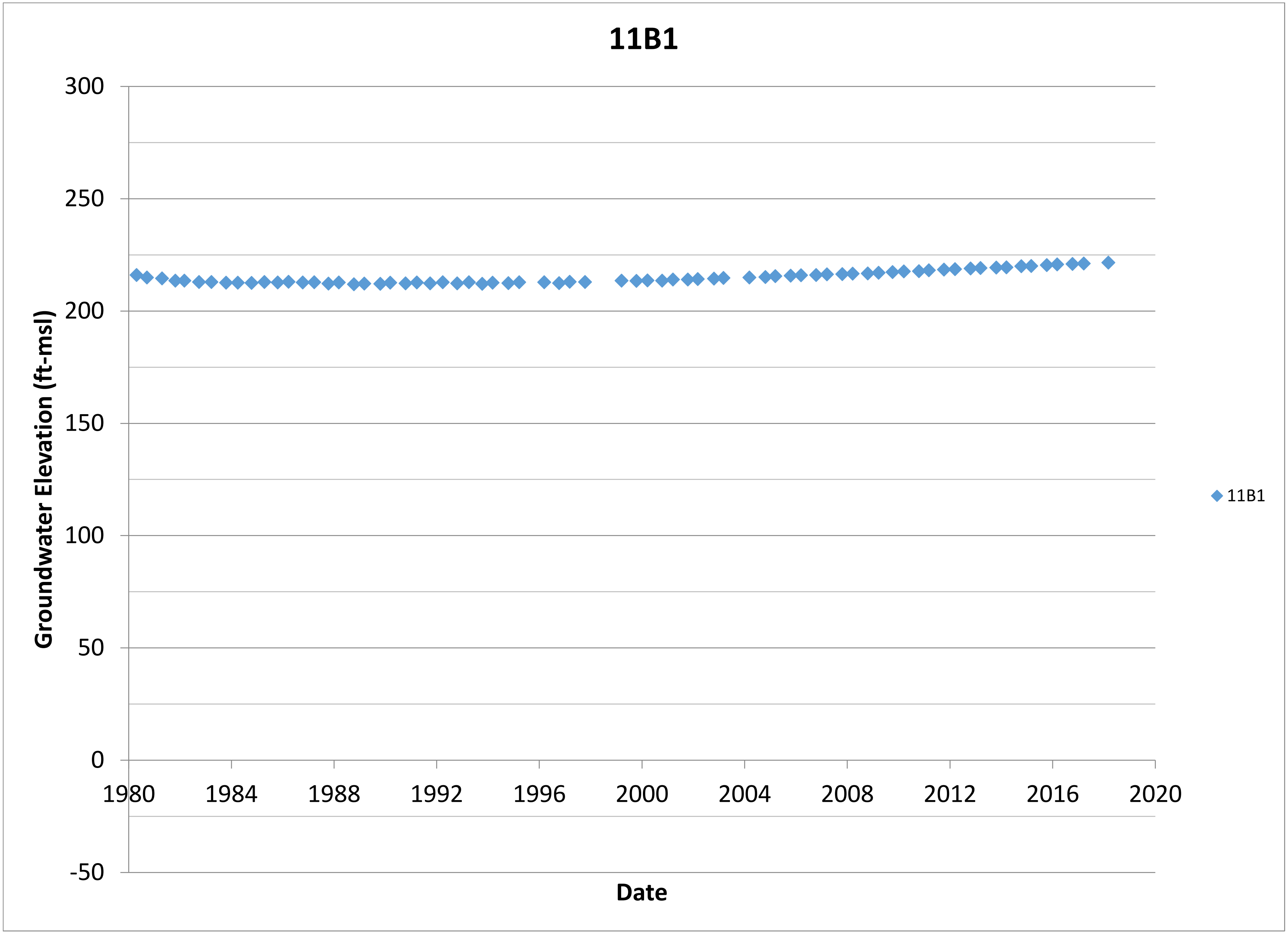



September 2018

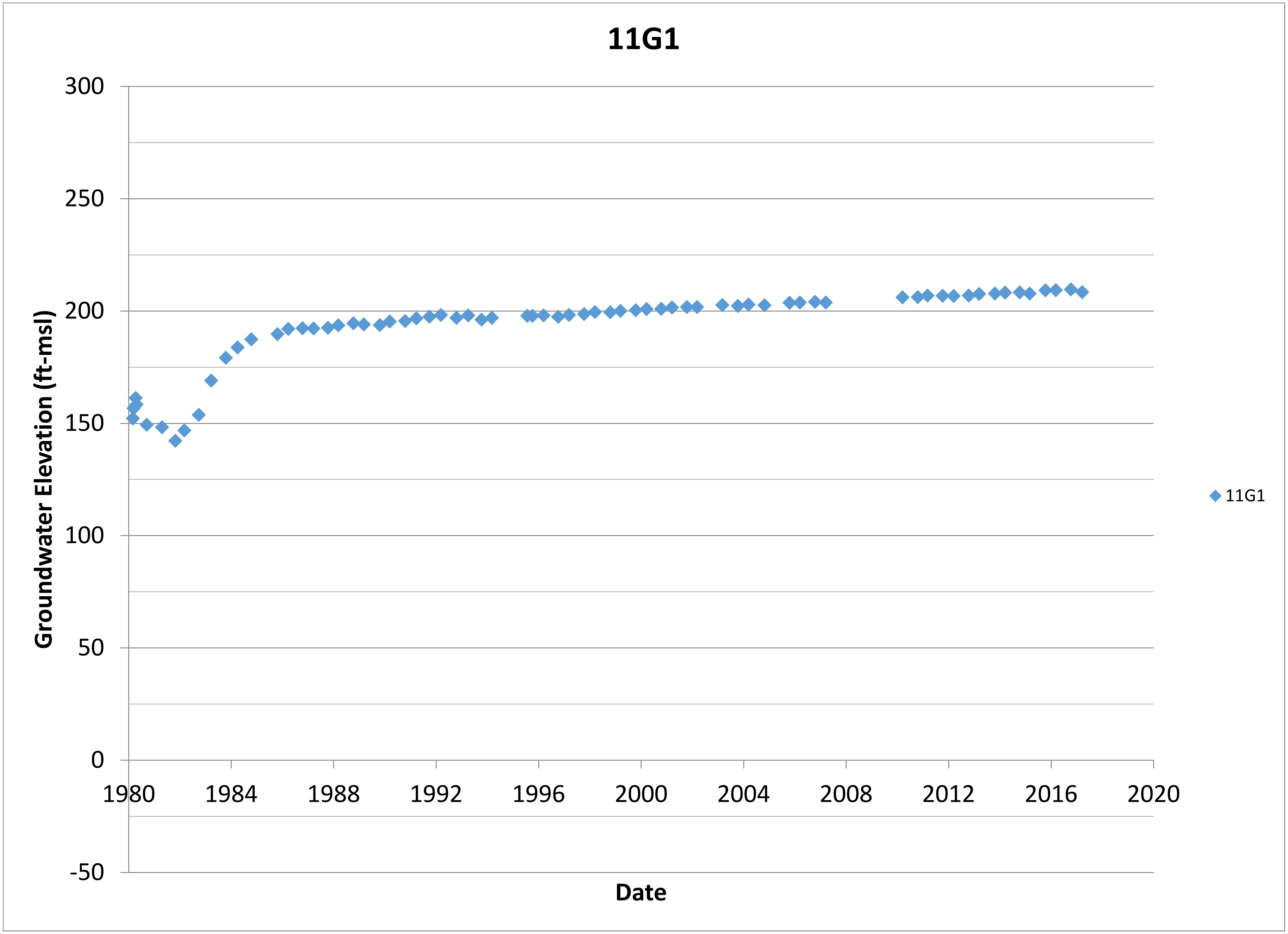
TODD GROUNDWATER

**Figure 12**
**TDS Concentrations in Well 24B1**

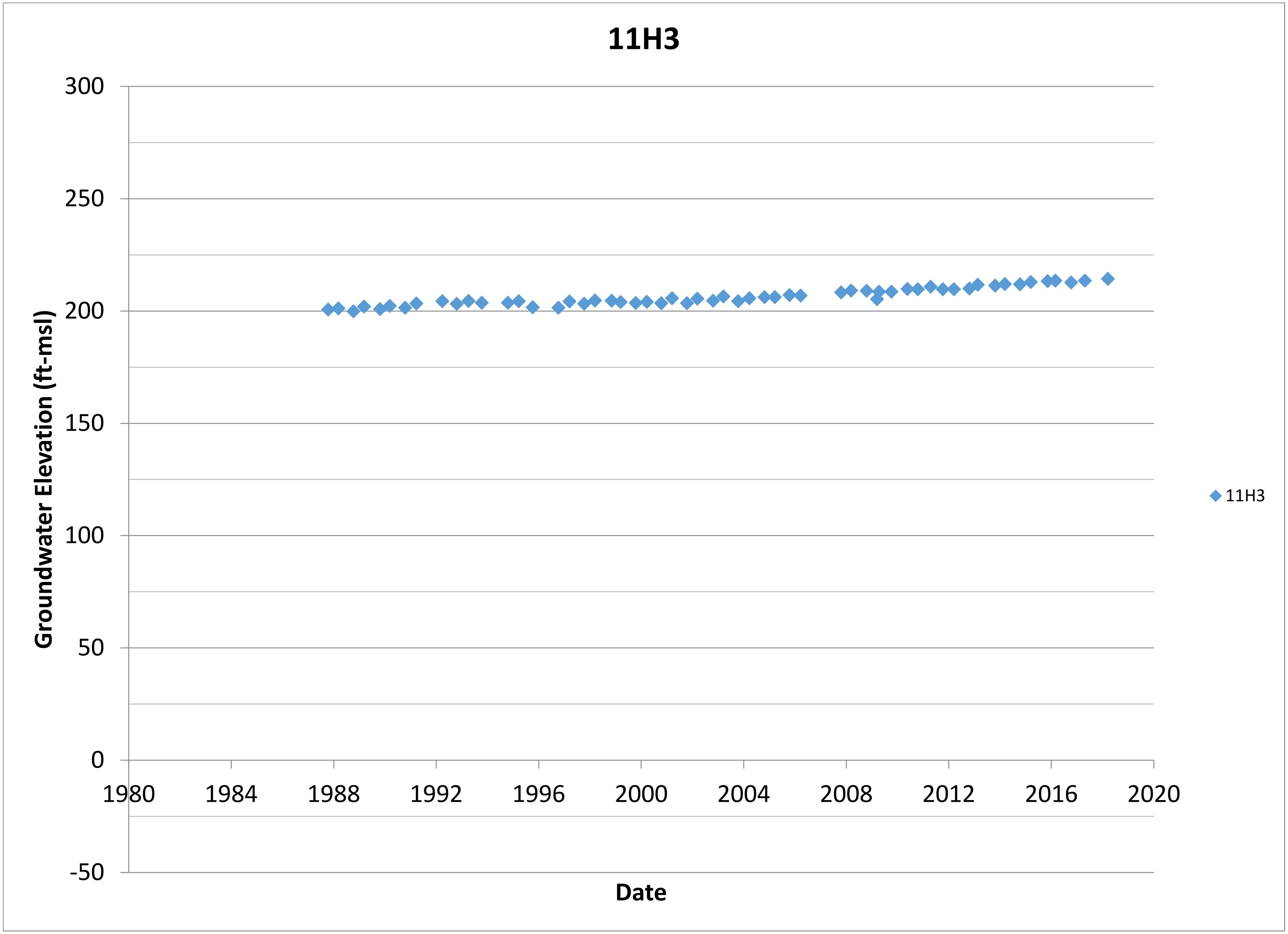
# APPENDIX A:
# Groundwater Elevation Hydrographs Same Scale

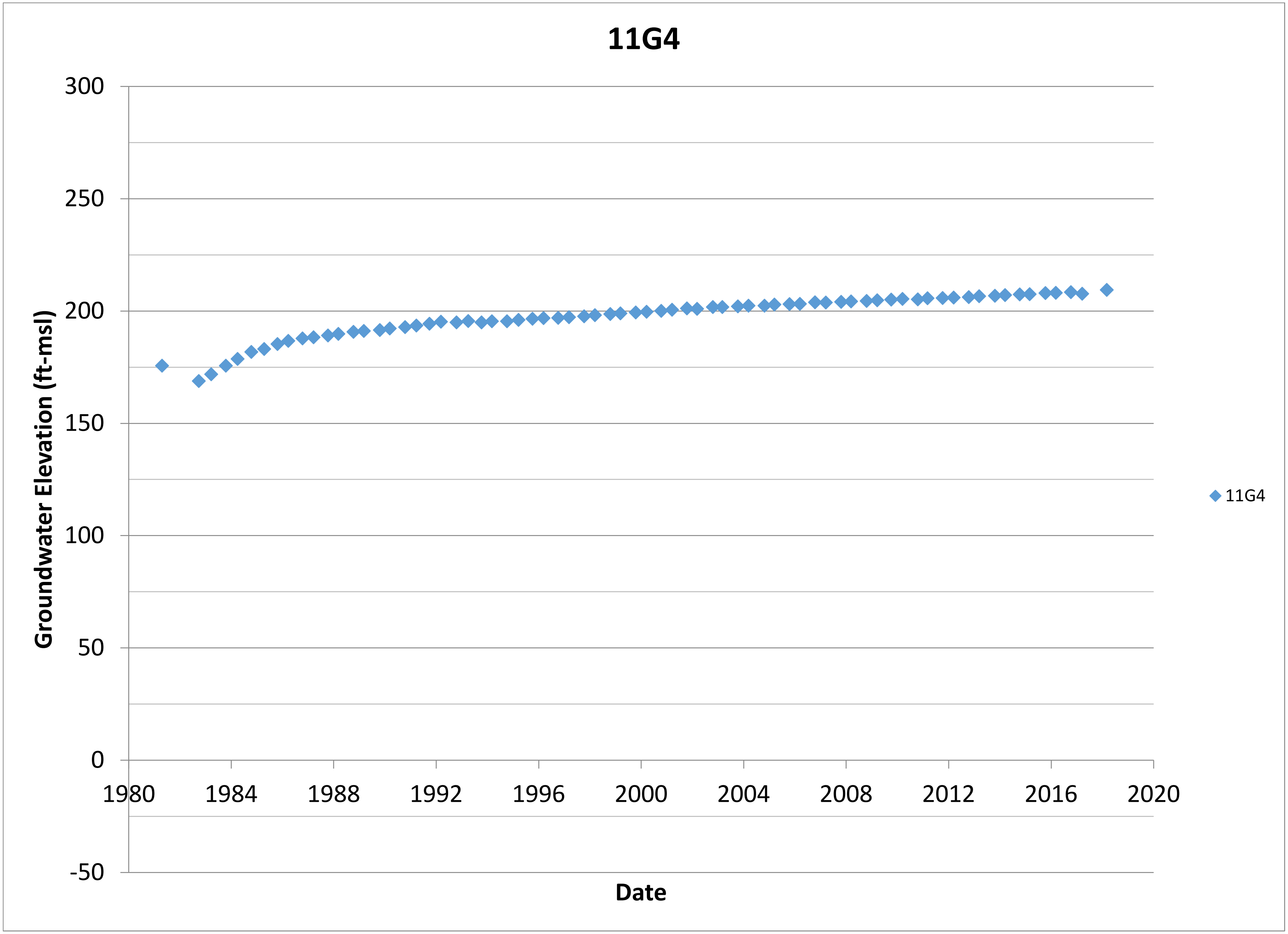


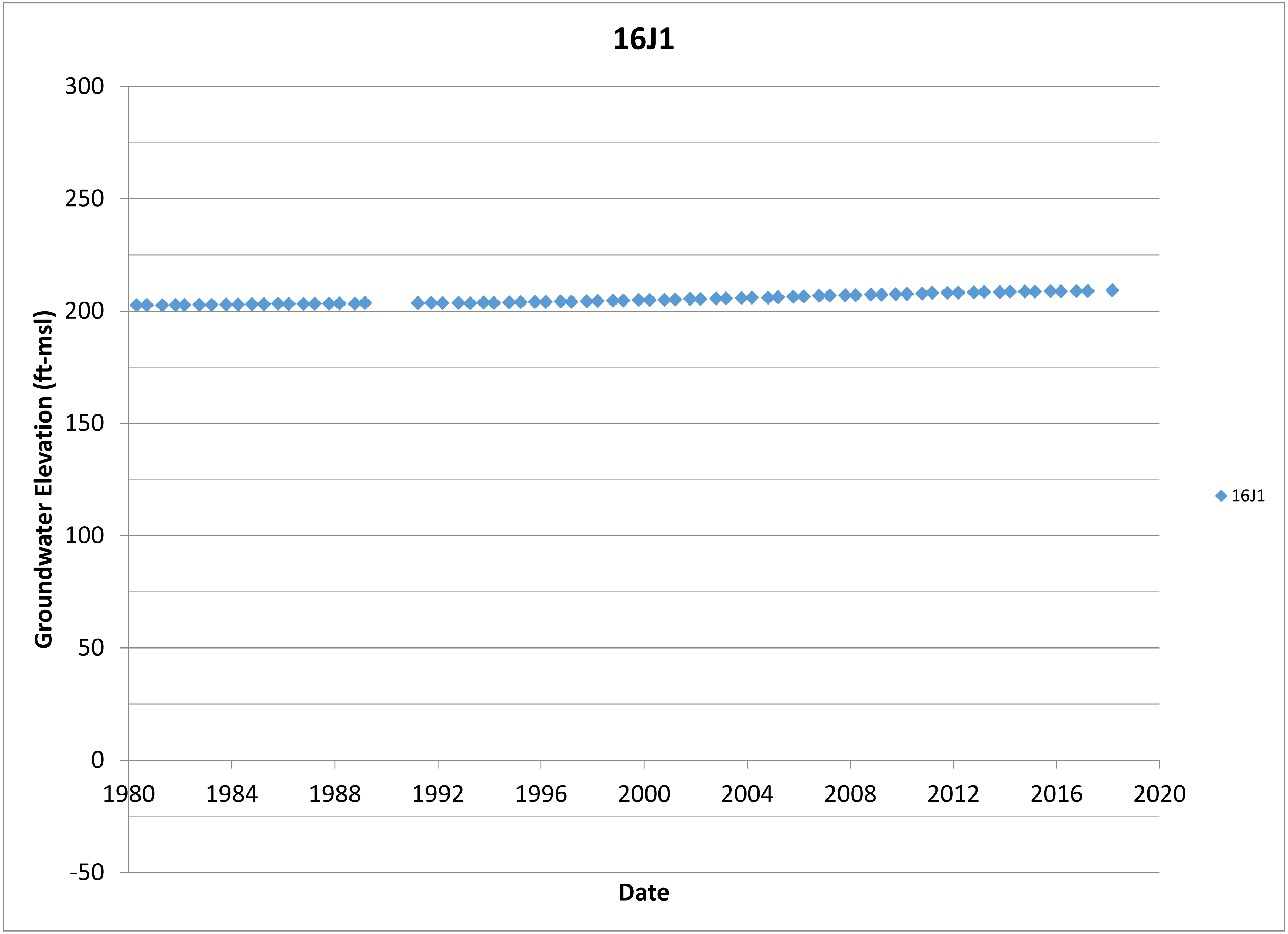
11B1
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
11B1



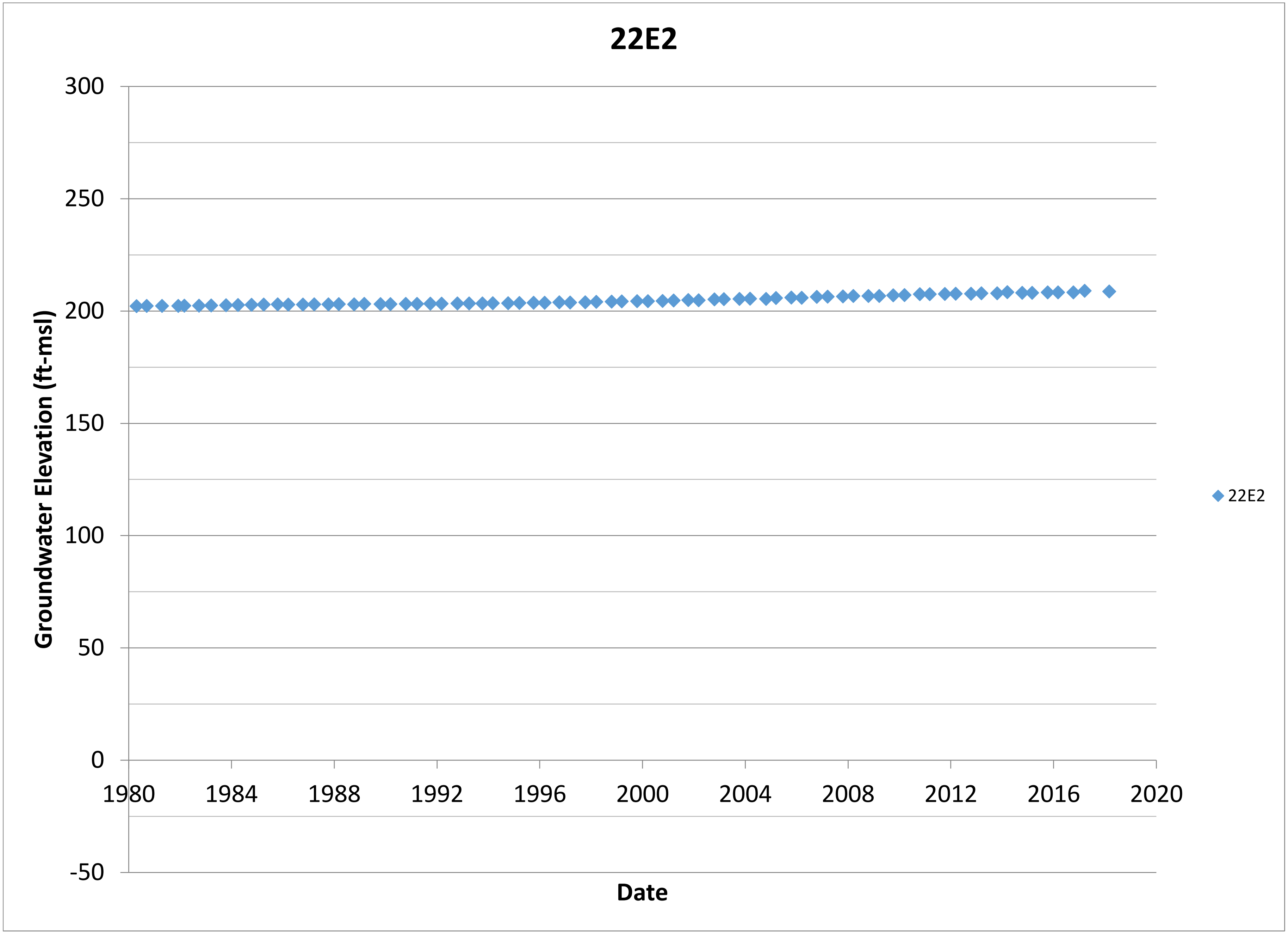
11G1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
11G1

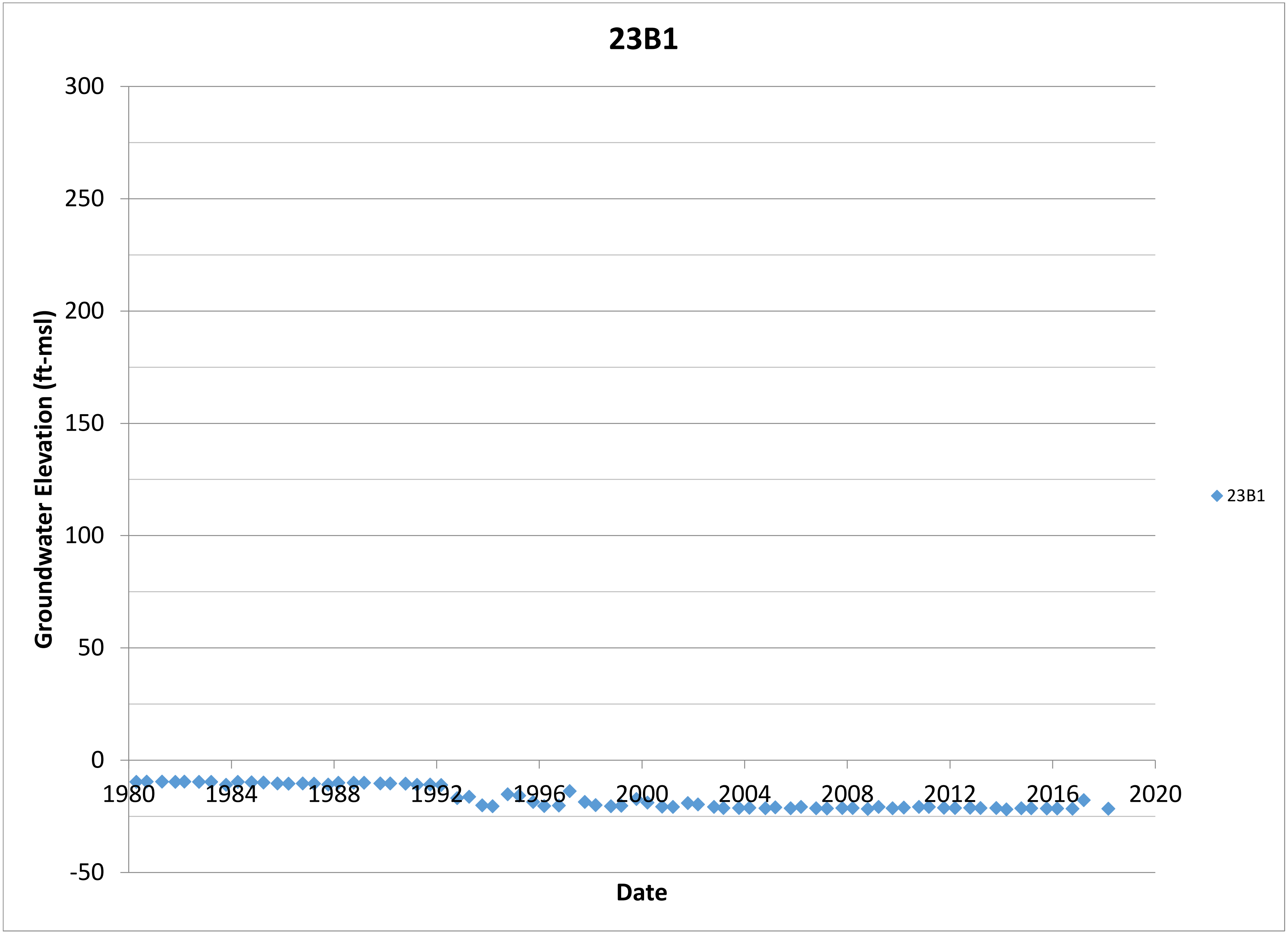

11H3
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
11H3


11G4
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
11G4

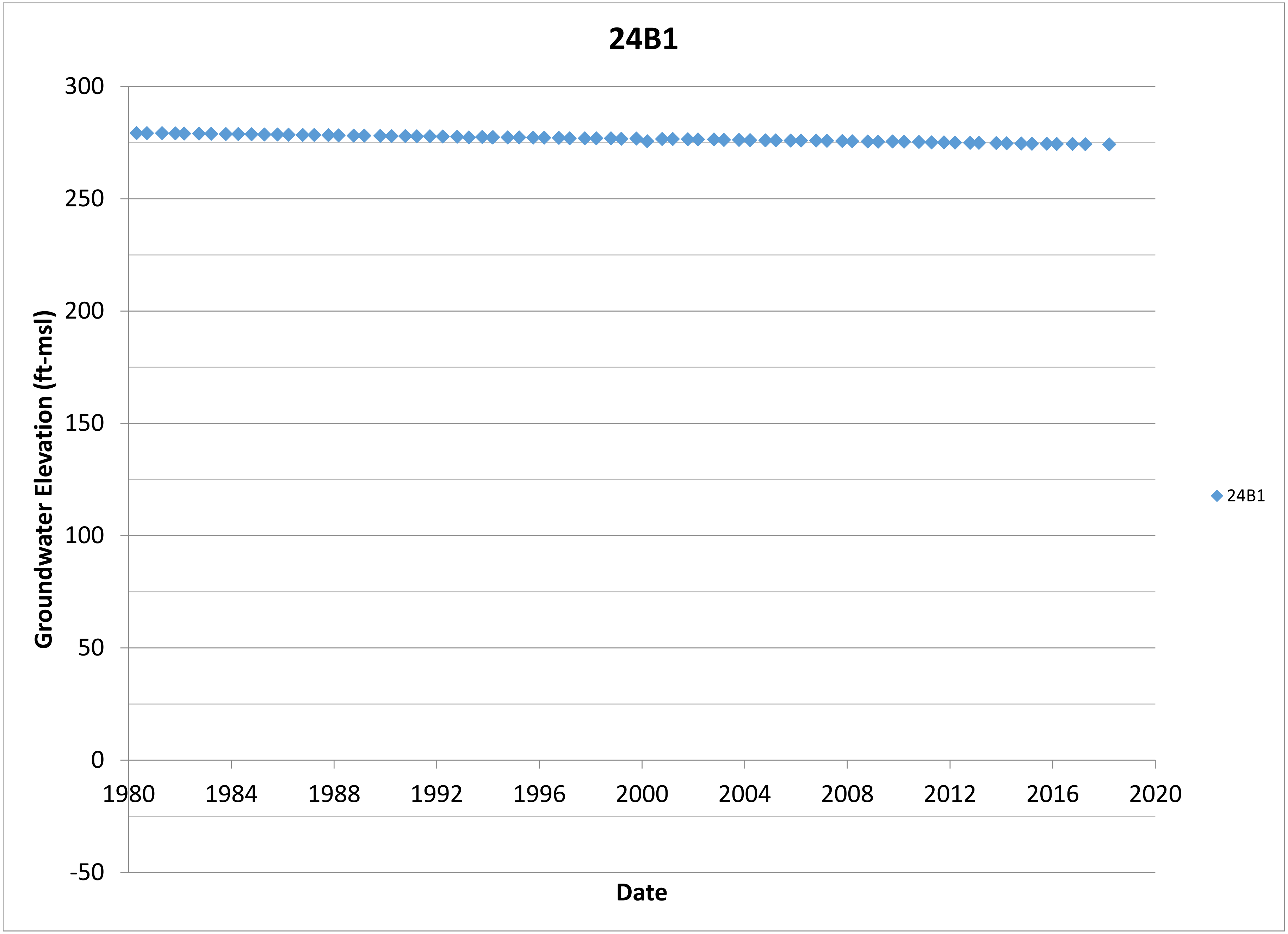


16J1
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
16J1

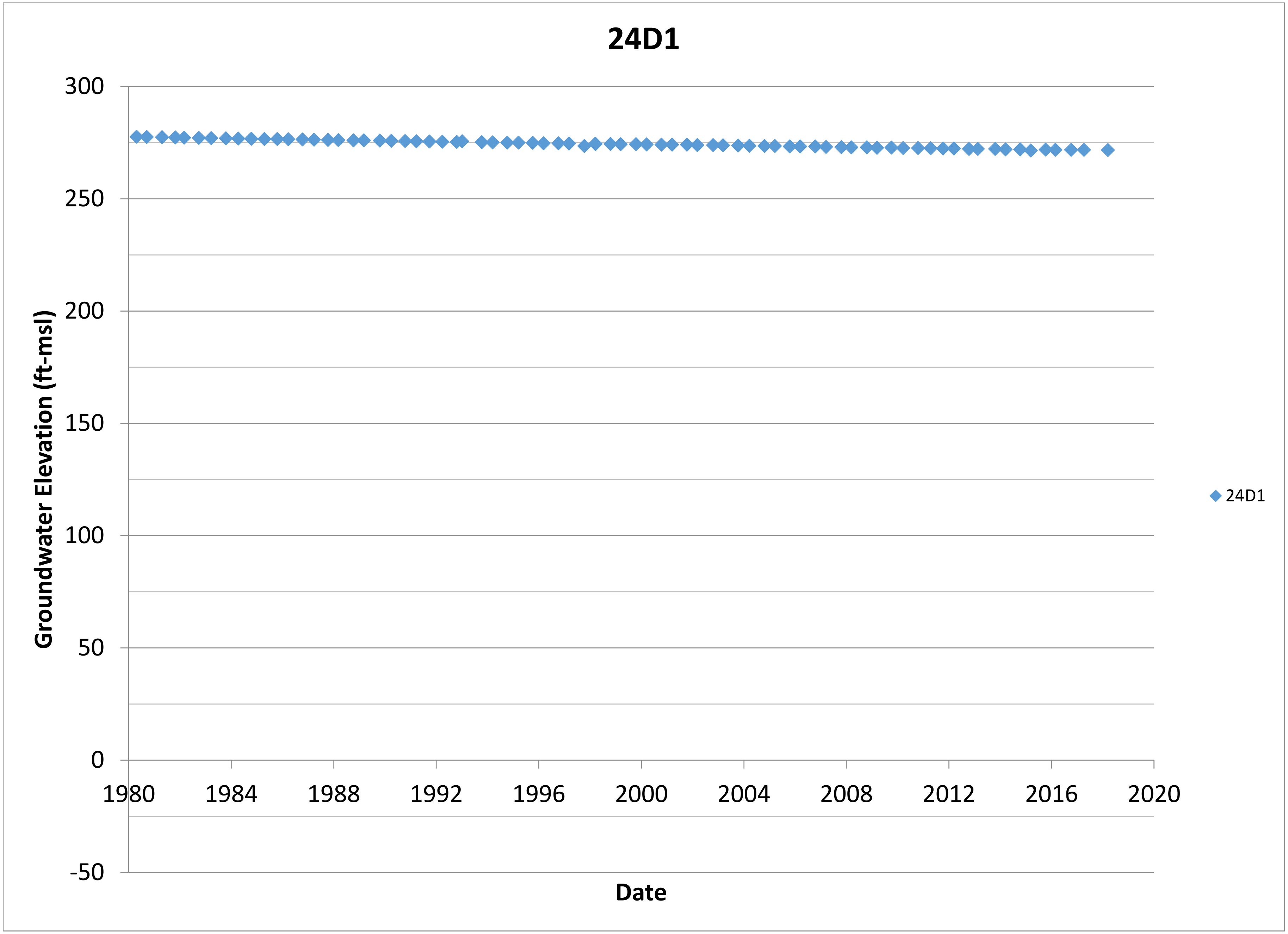

22E2
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
22E2



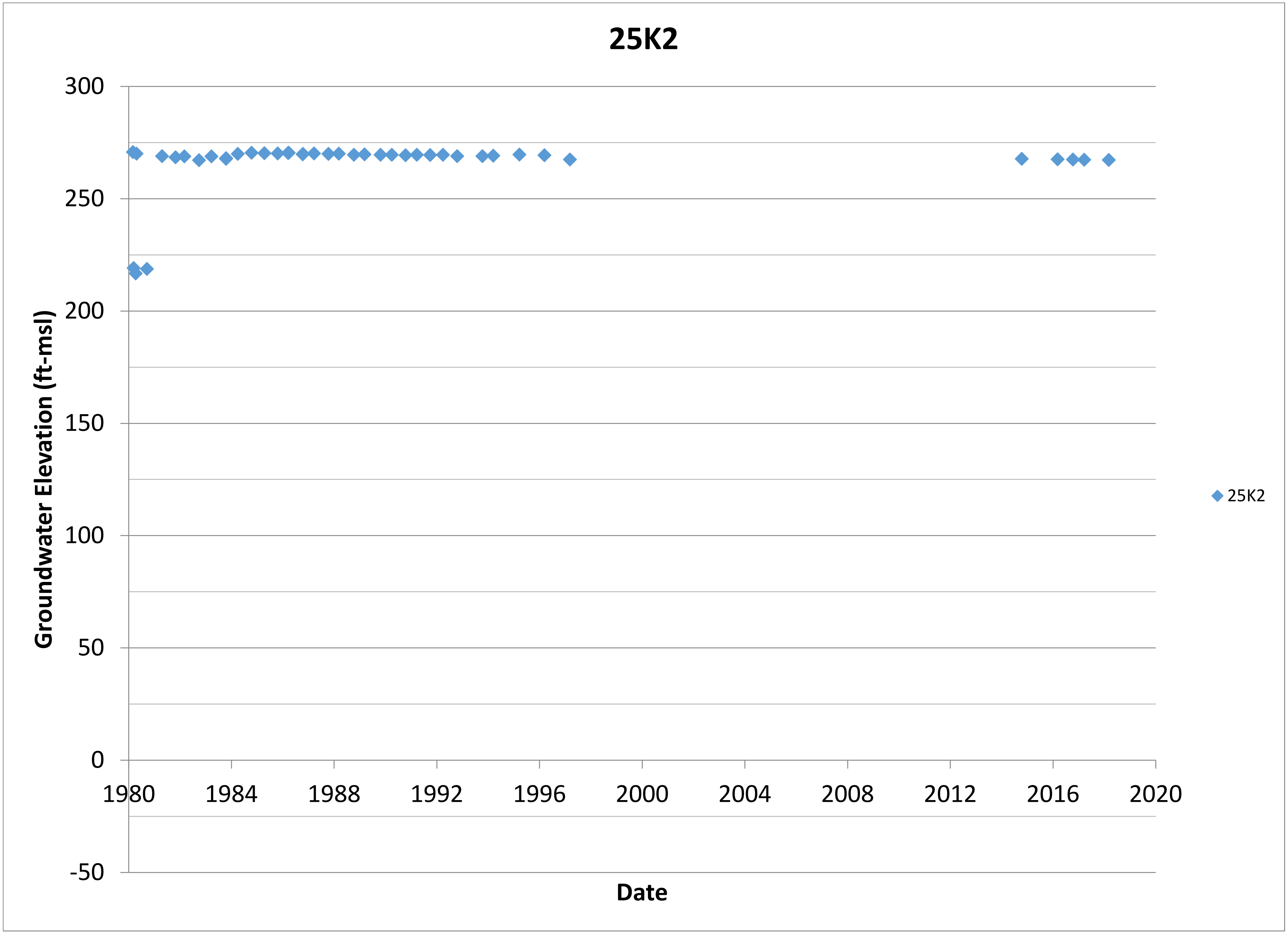
23B1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
23B1

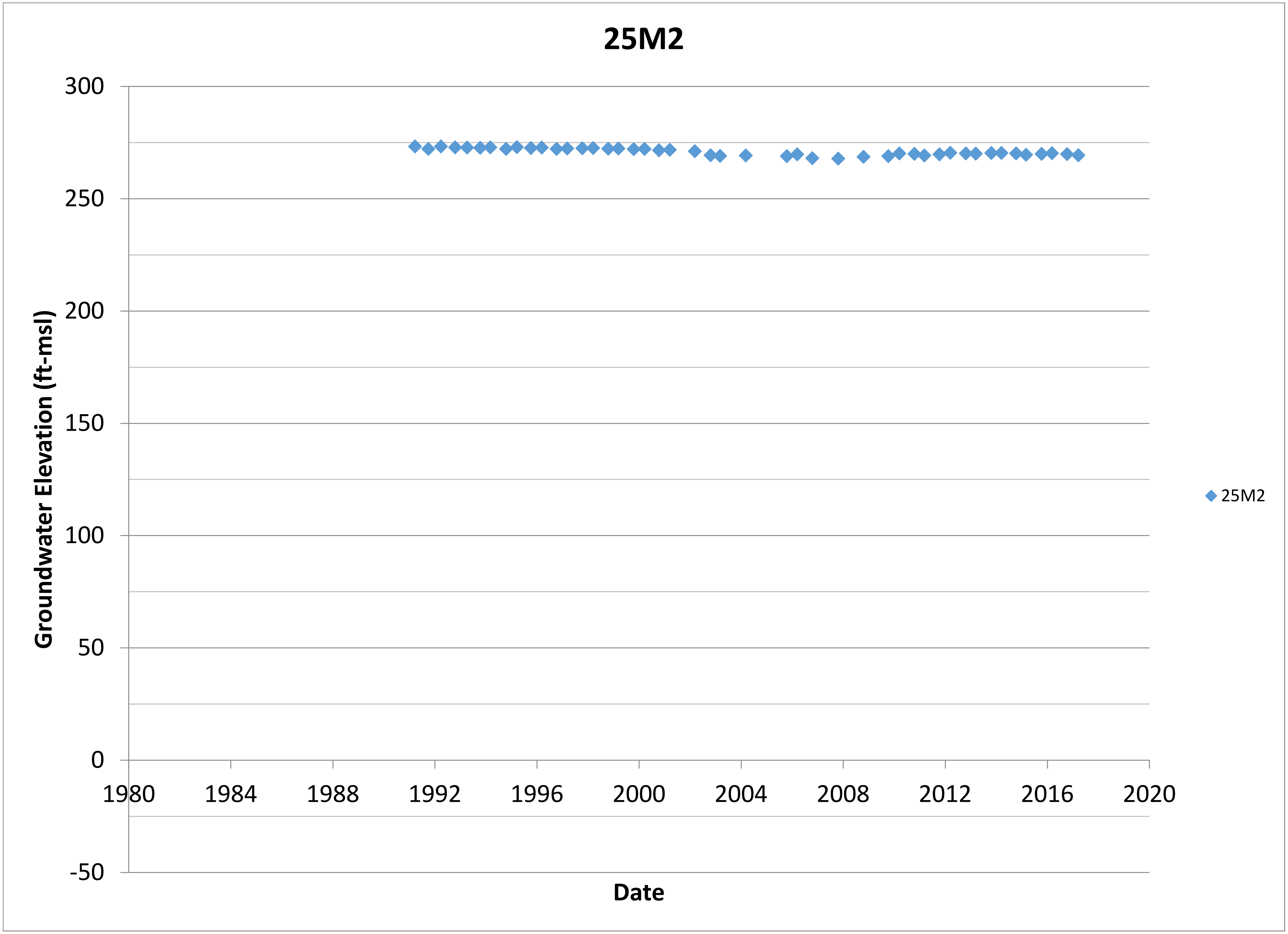


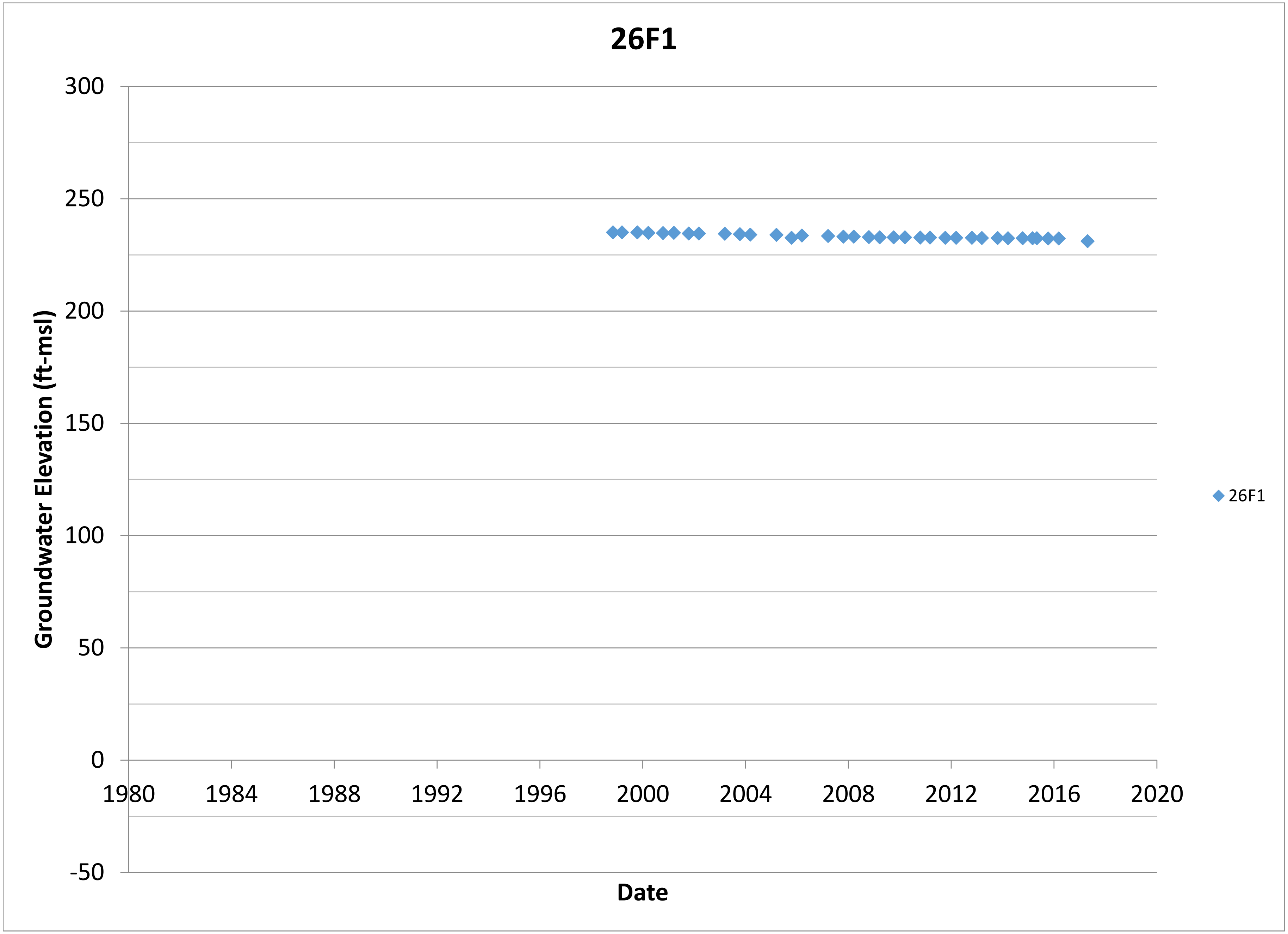
24B1
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
24B1



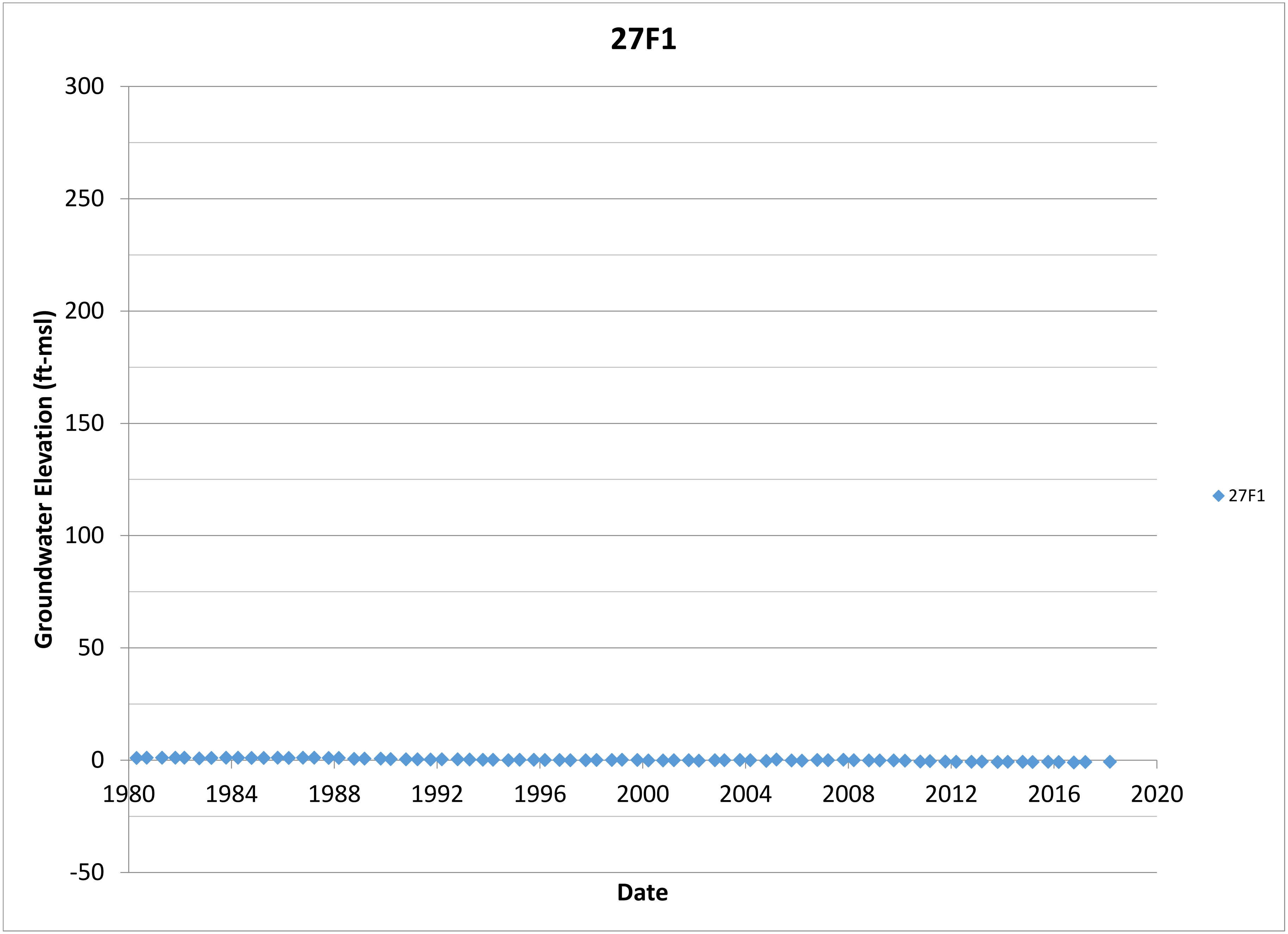
24D1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
24D1

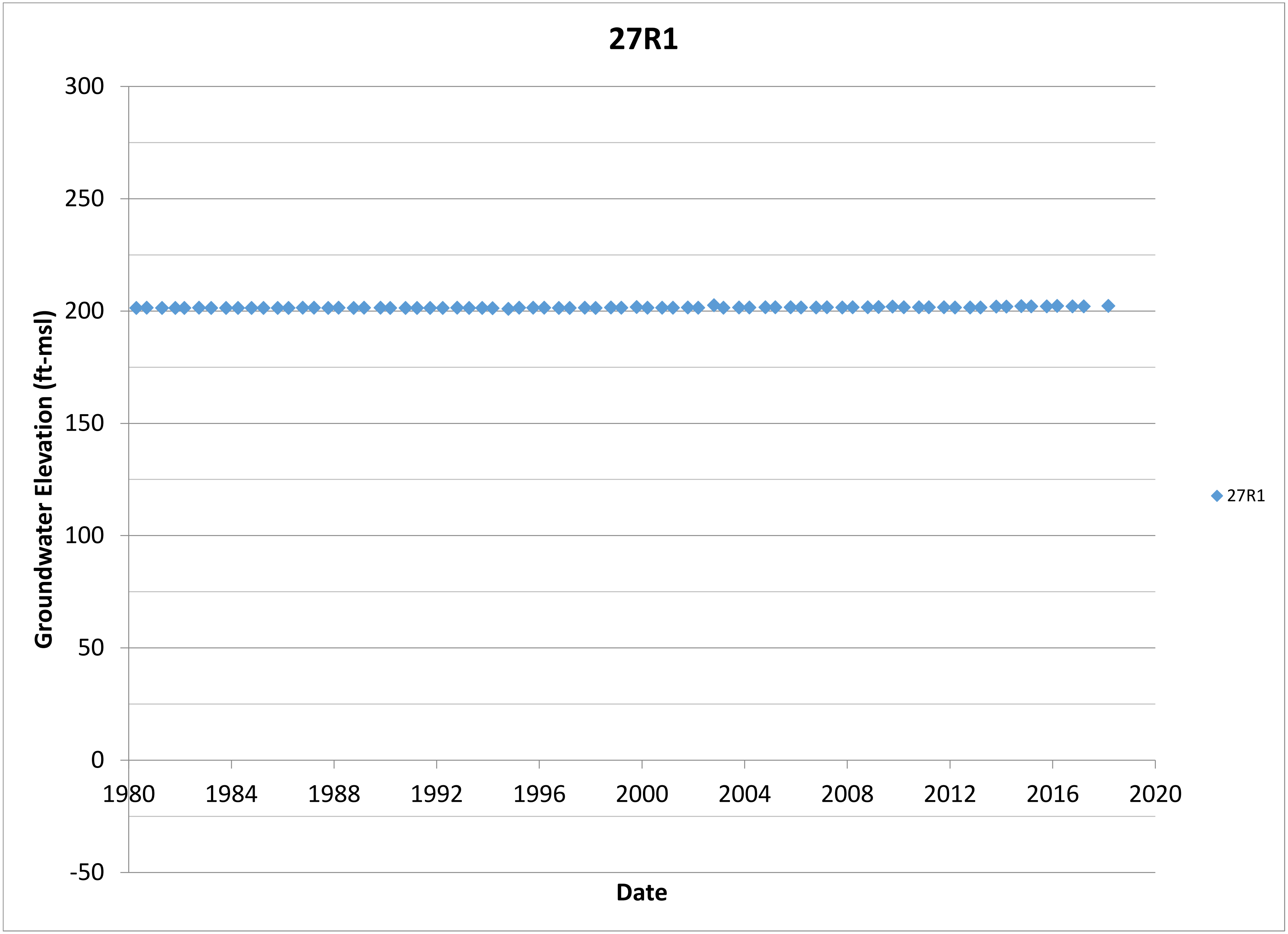

25K2
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
25K2

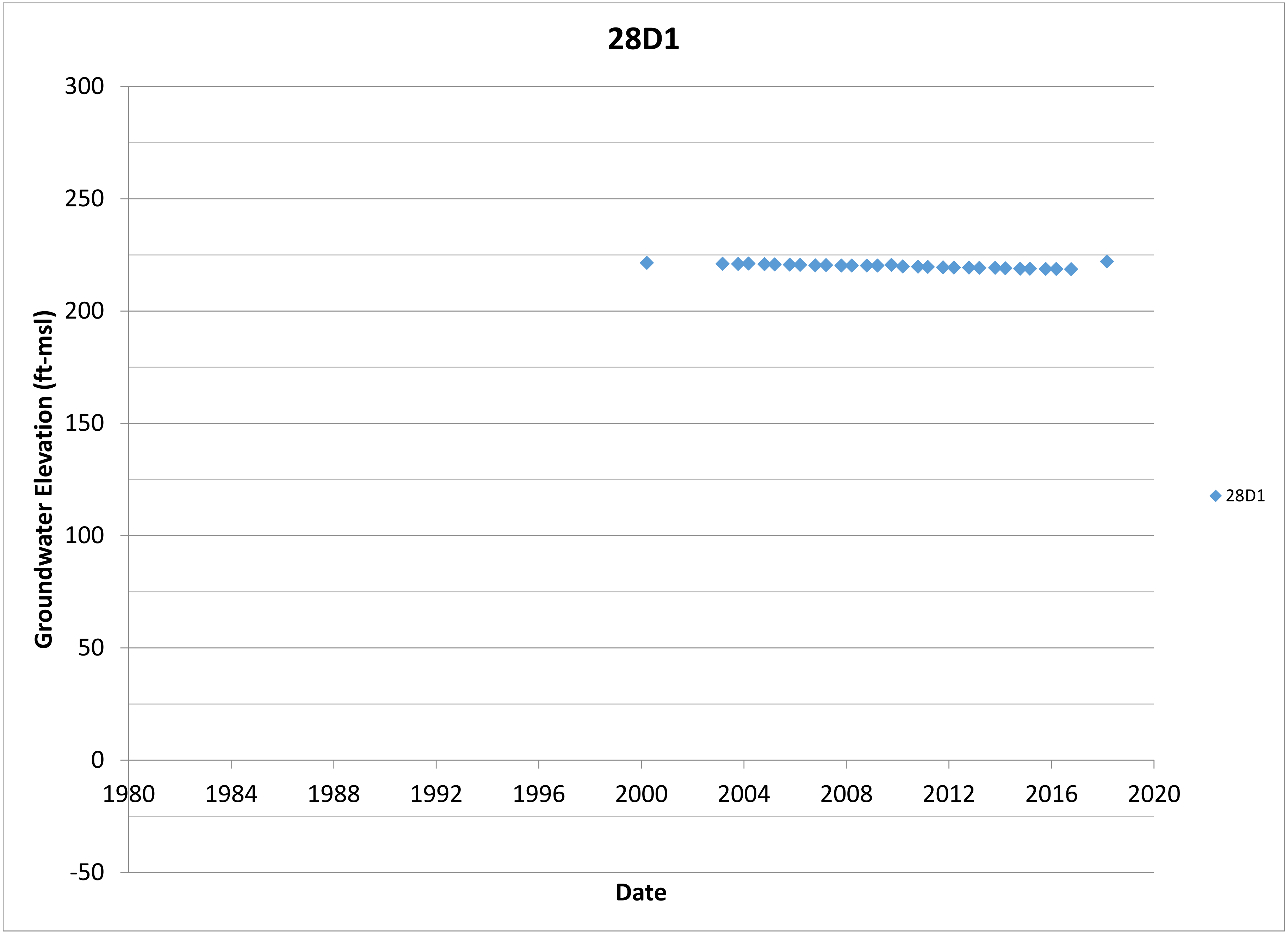

25M2
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Groundwater Elevation (ft-msl)
Date
25M2

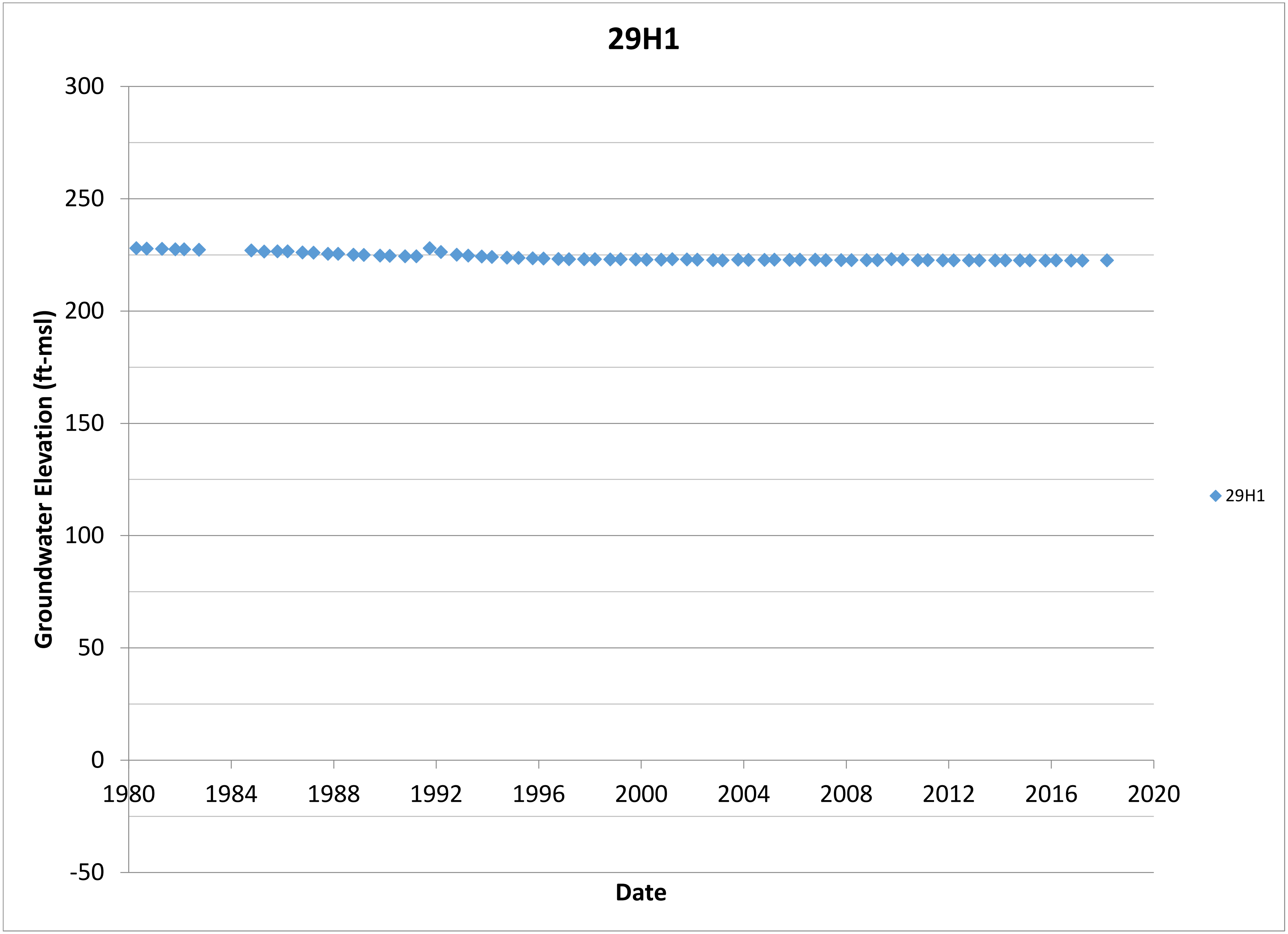


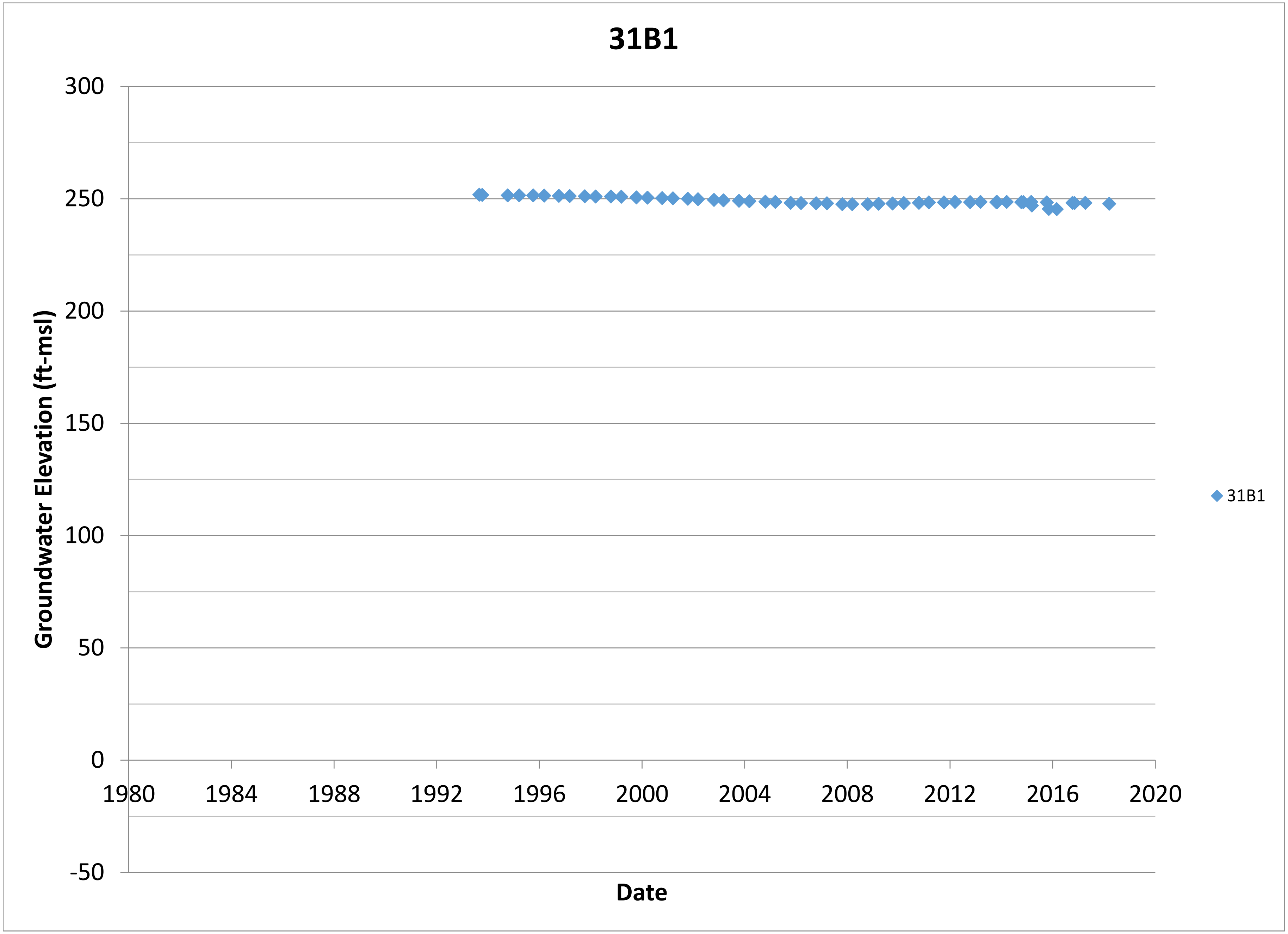
26F1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
26F1

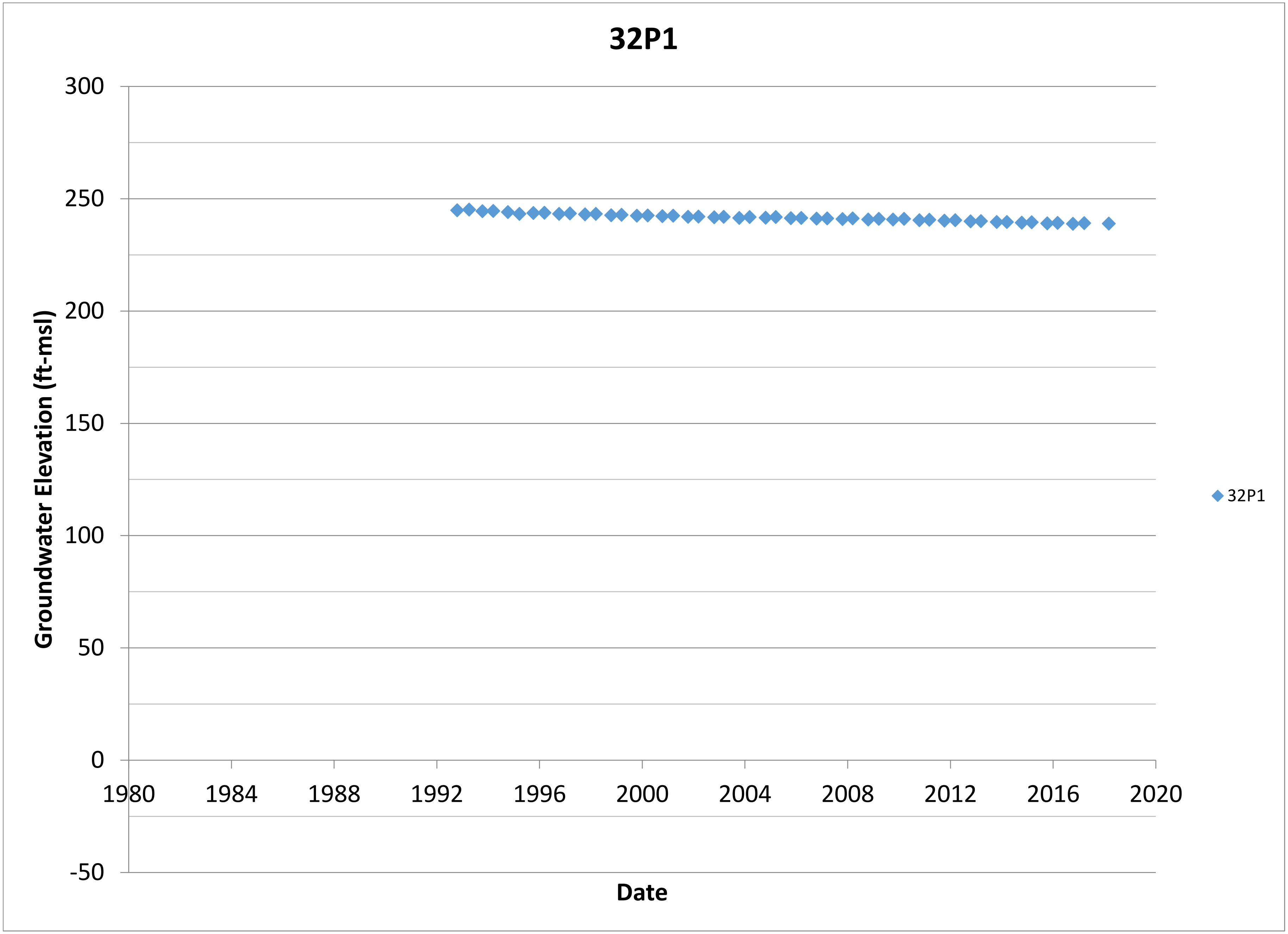

27F1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
27F1

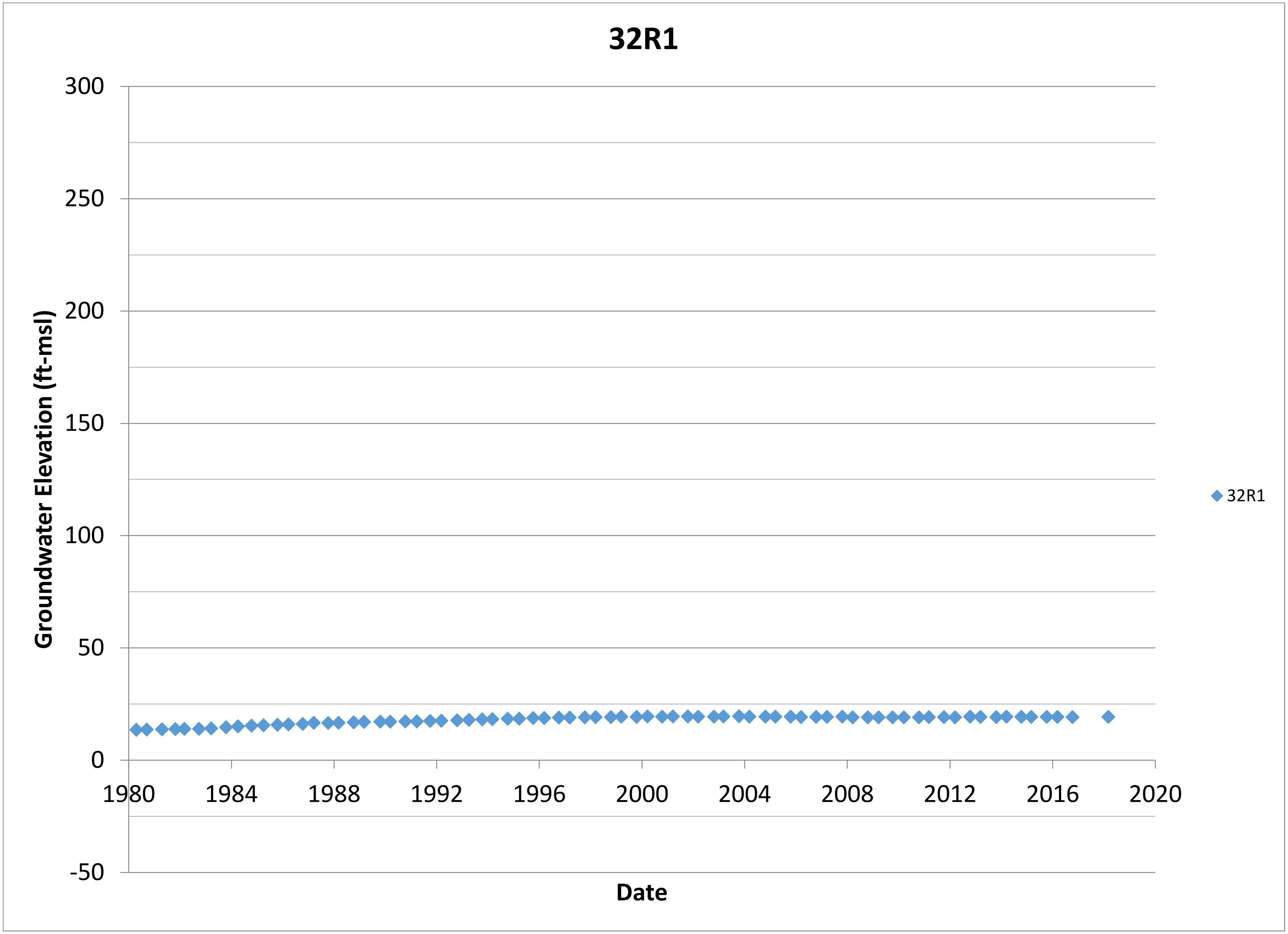

27R1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
27R1

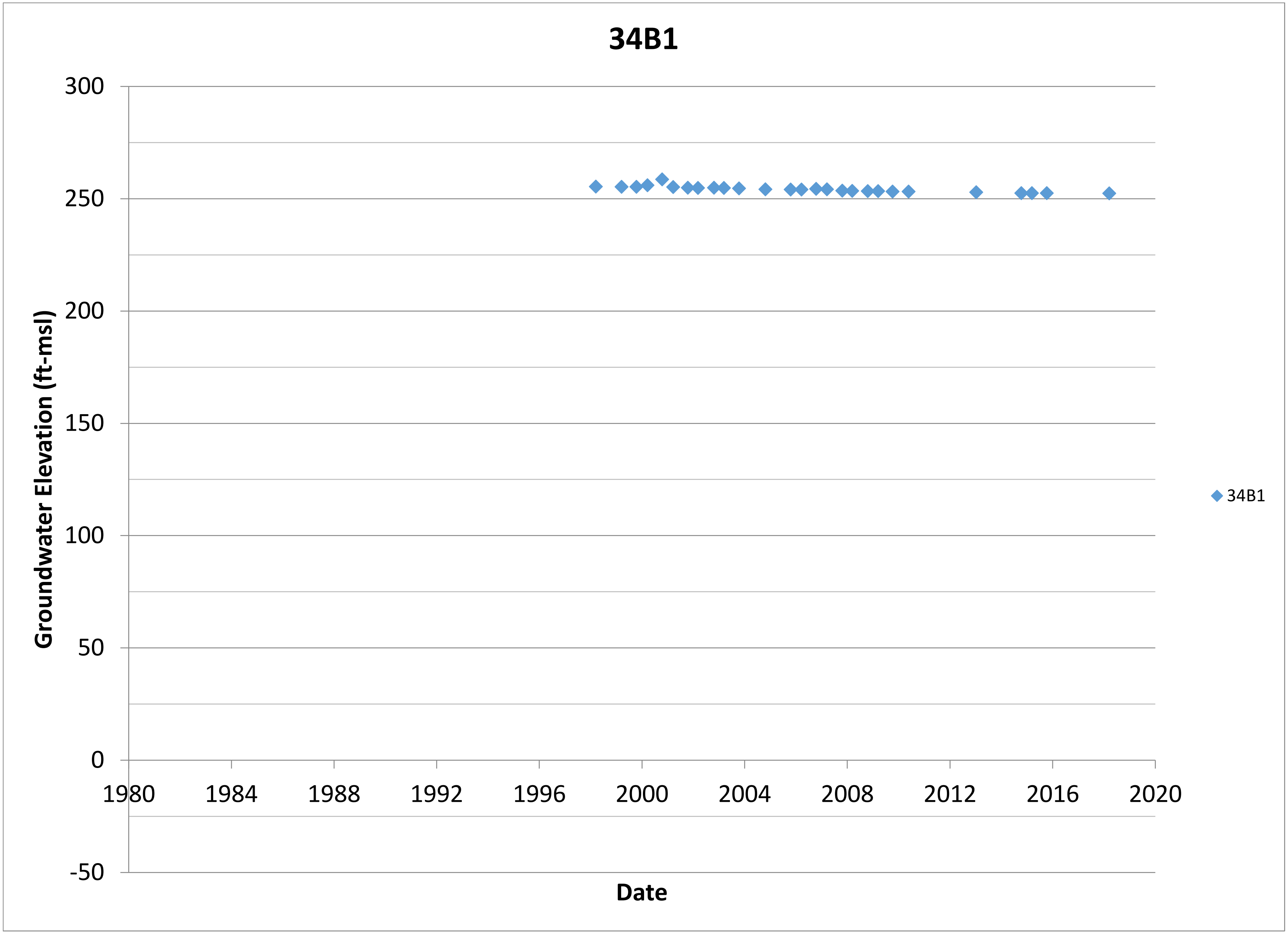

28D1
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
28D1


29H1
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Groundwater Elevation (ft-msl)
Date
29H1

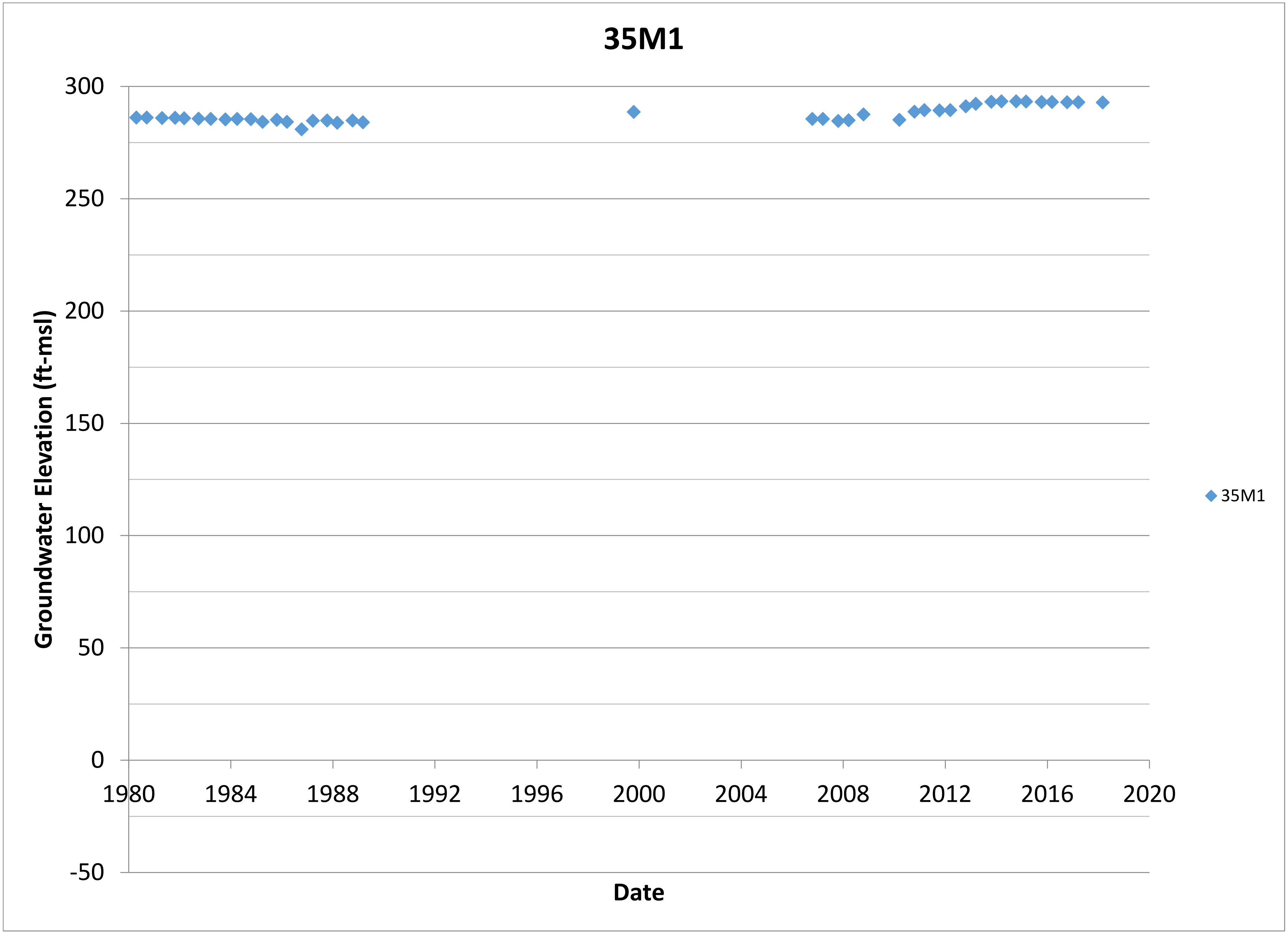

31B1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
31B1

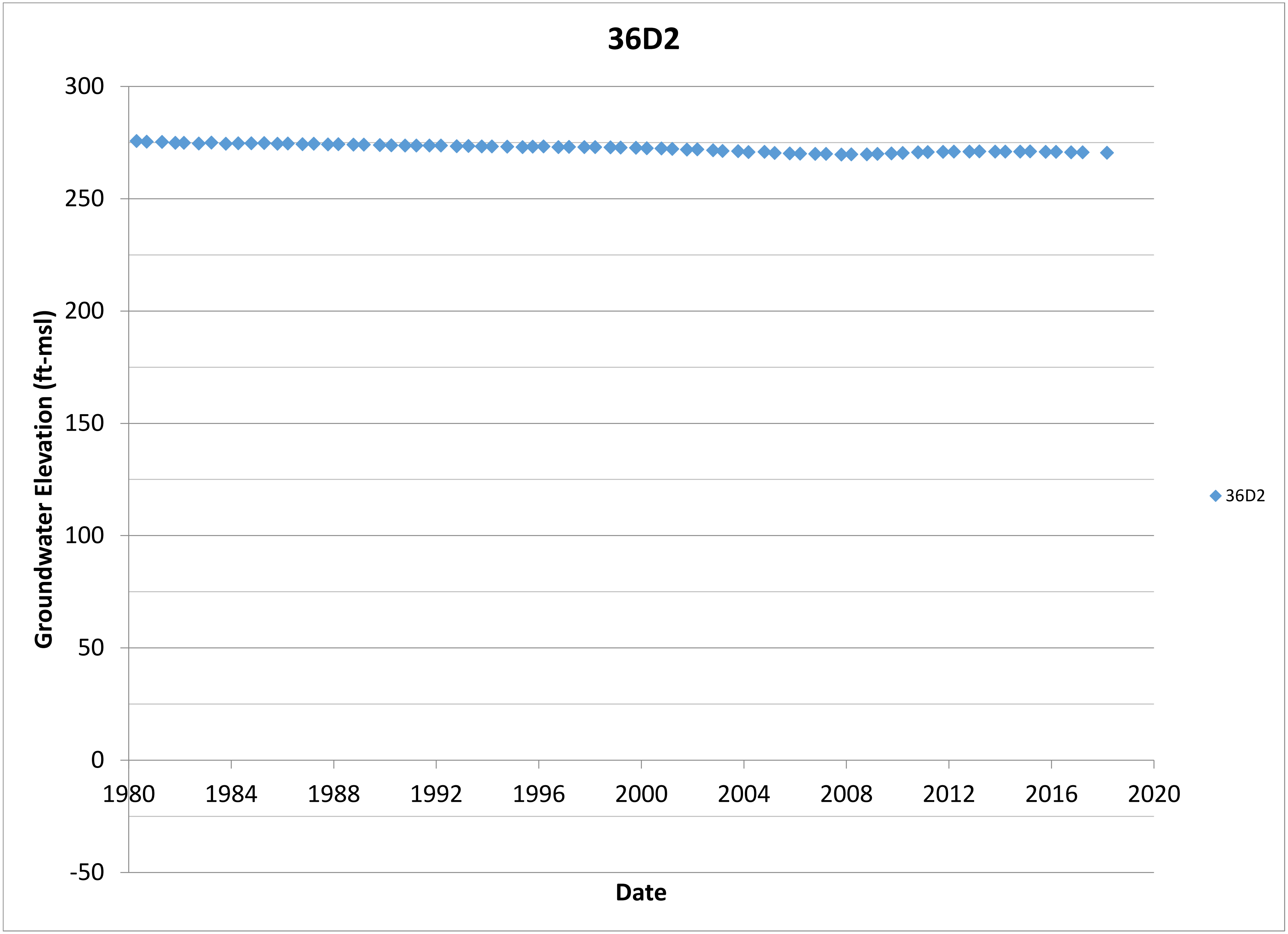

32P1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
32P1

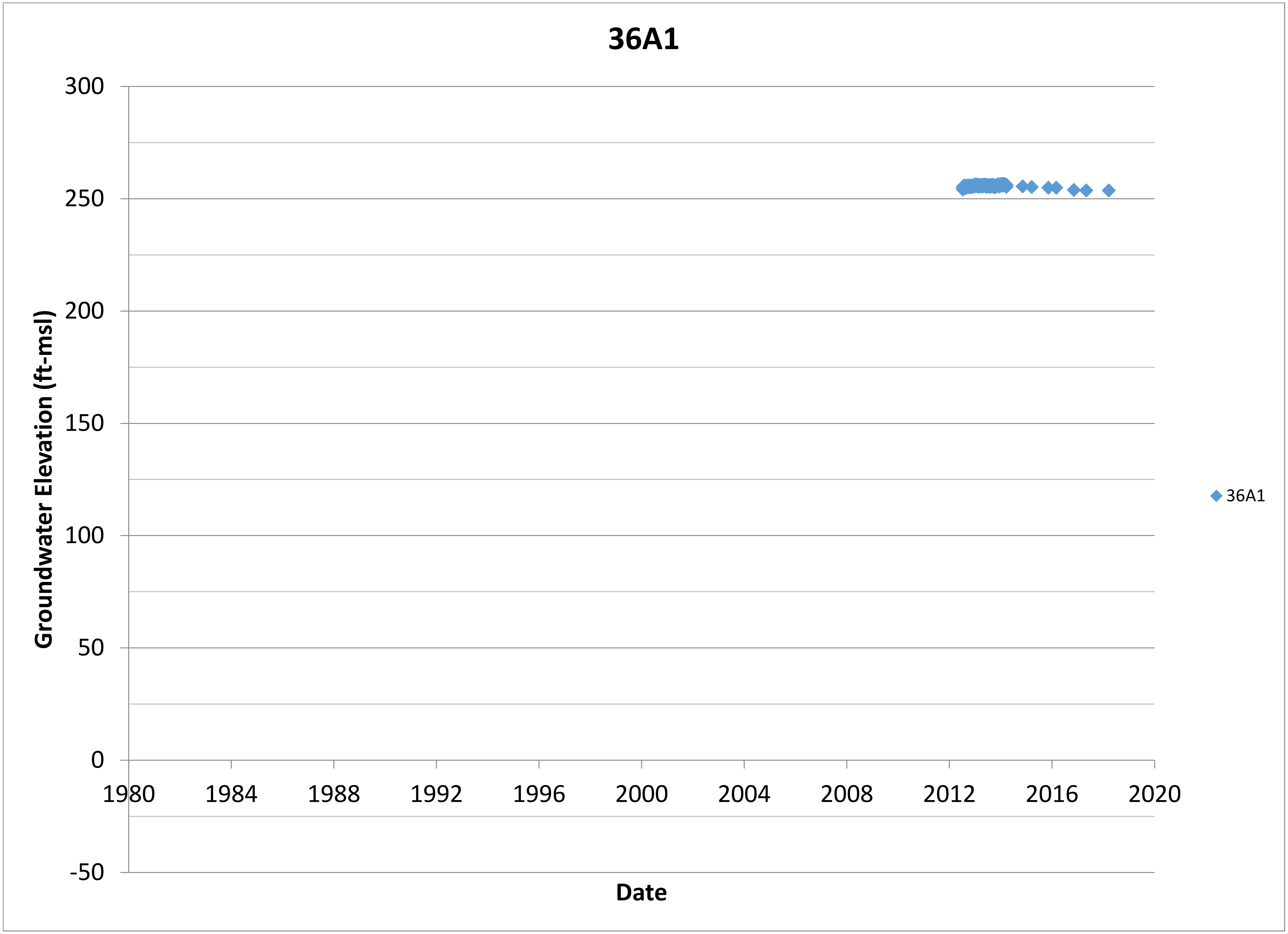

32R1
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
32R1

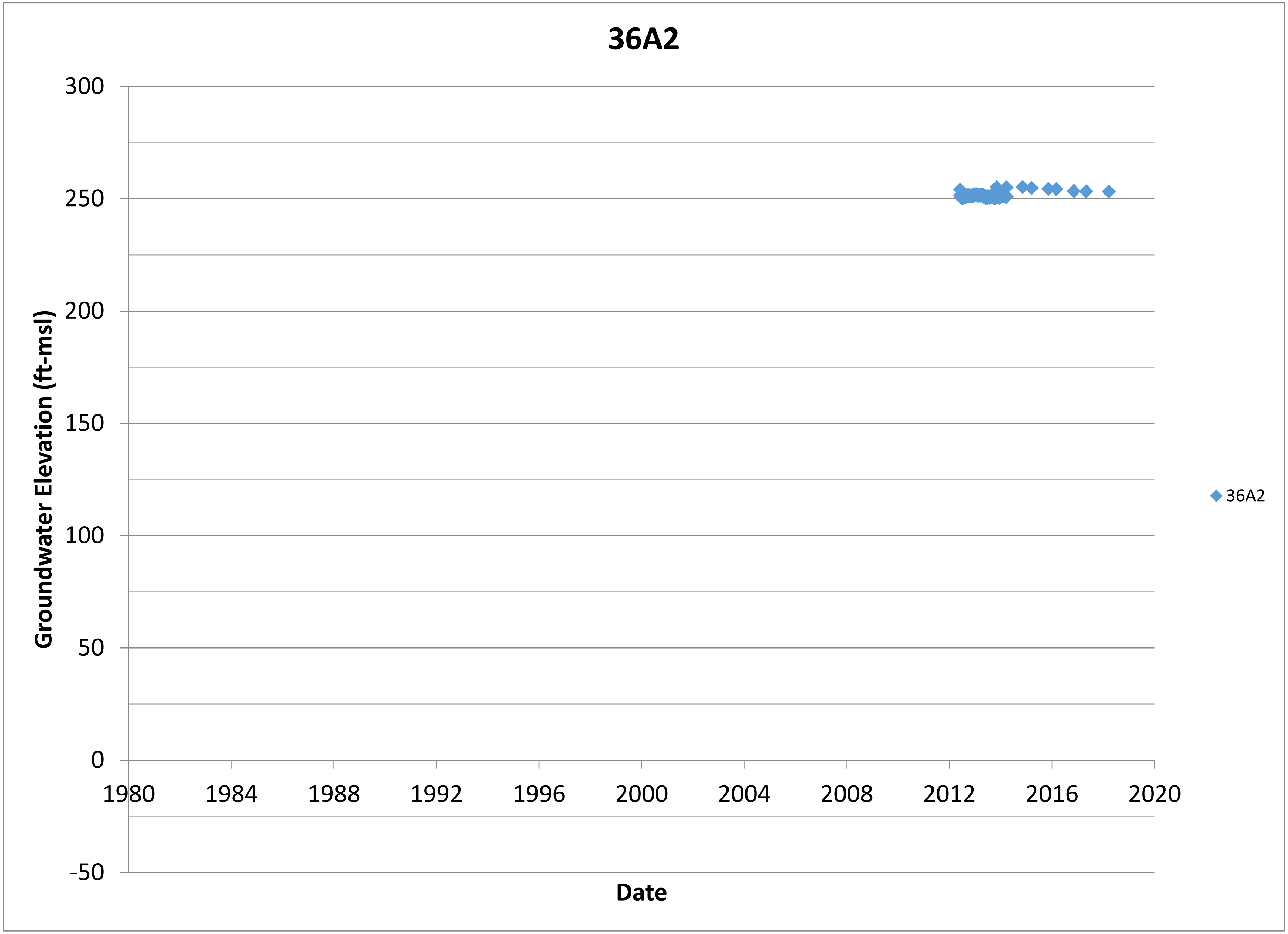


34B1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
34B1

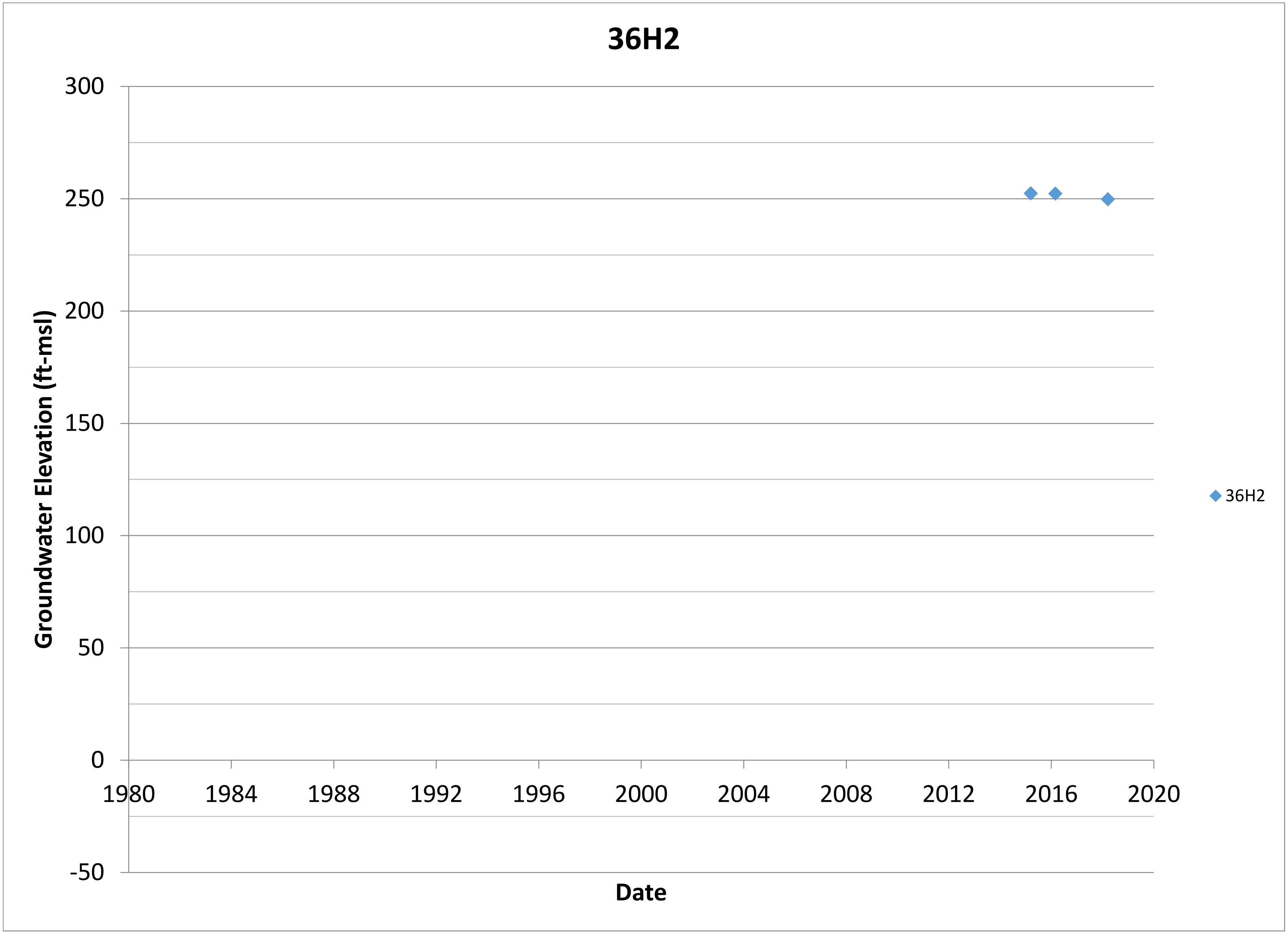

35M1
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
35M1

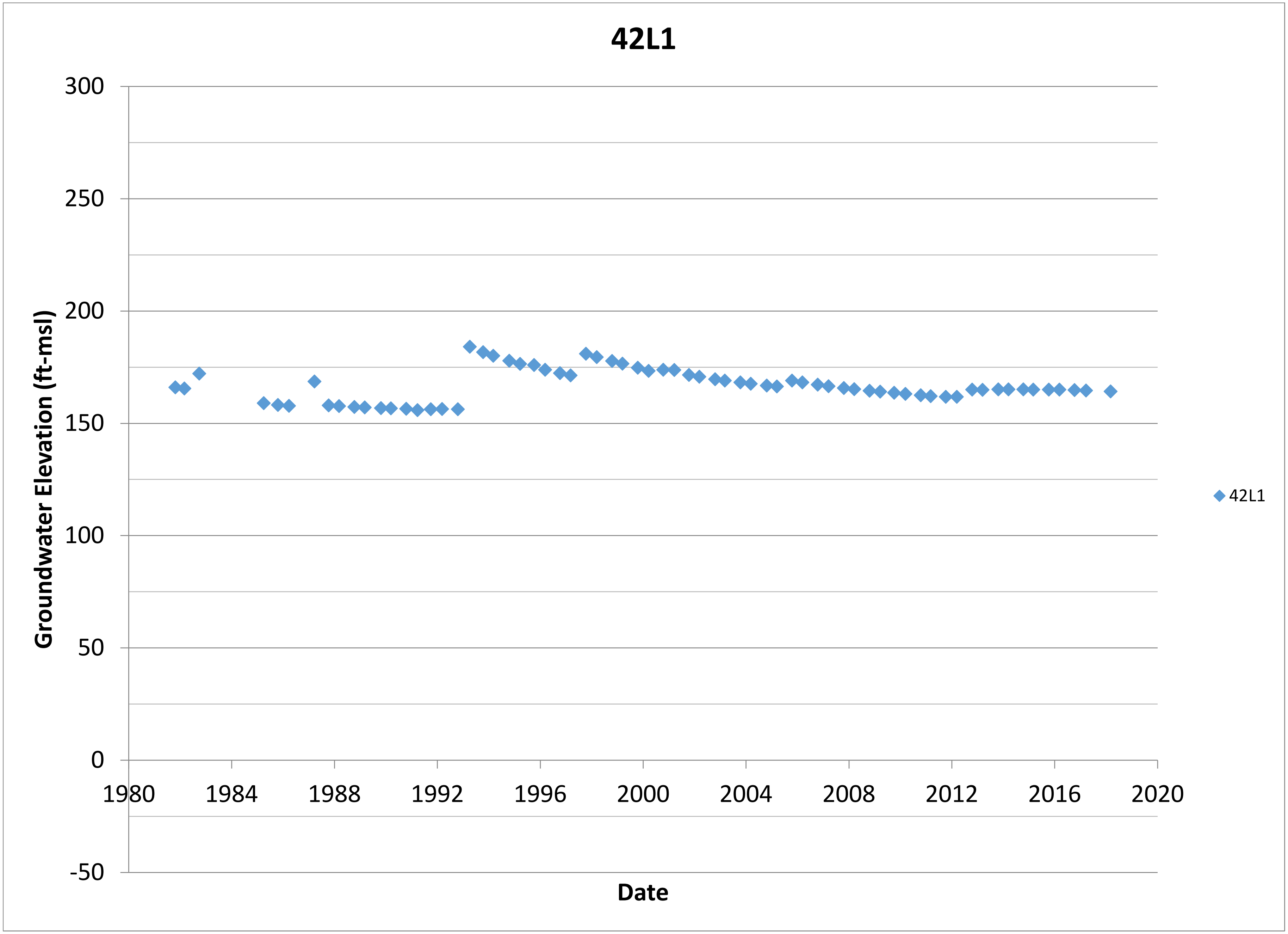

36D2
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
36D2

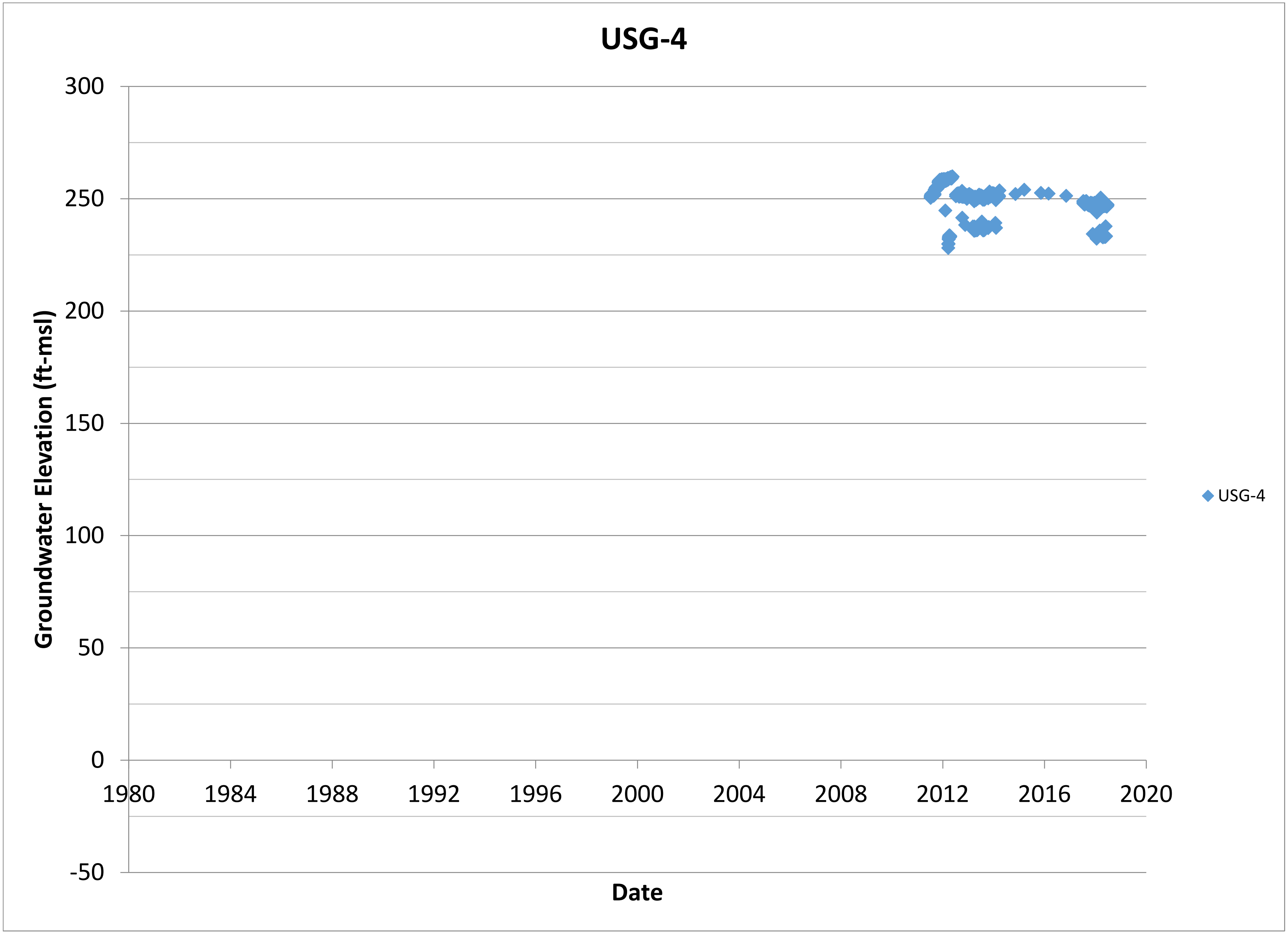

36A1
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
36A1



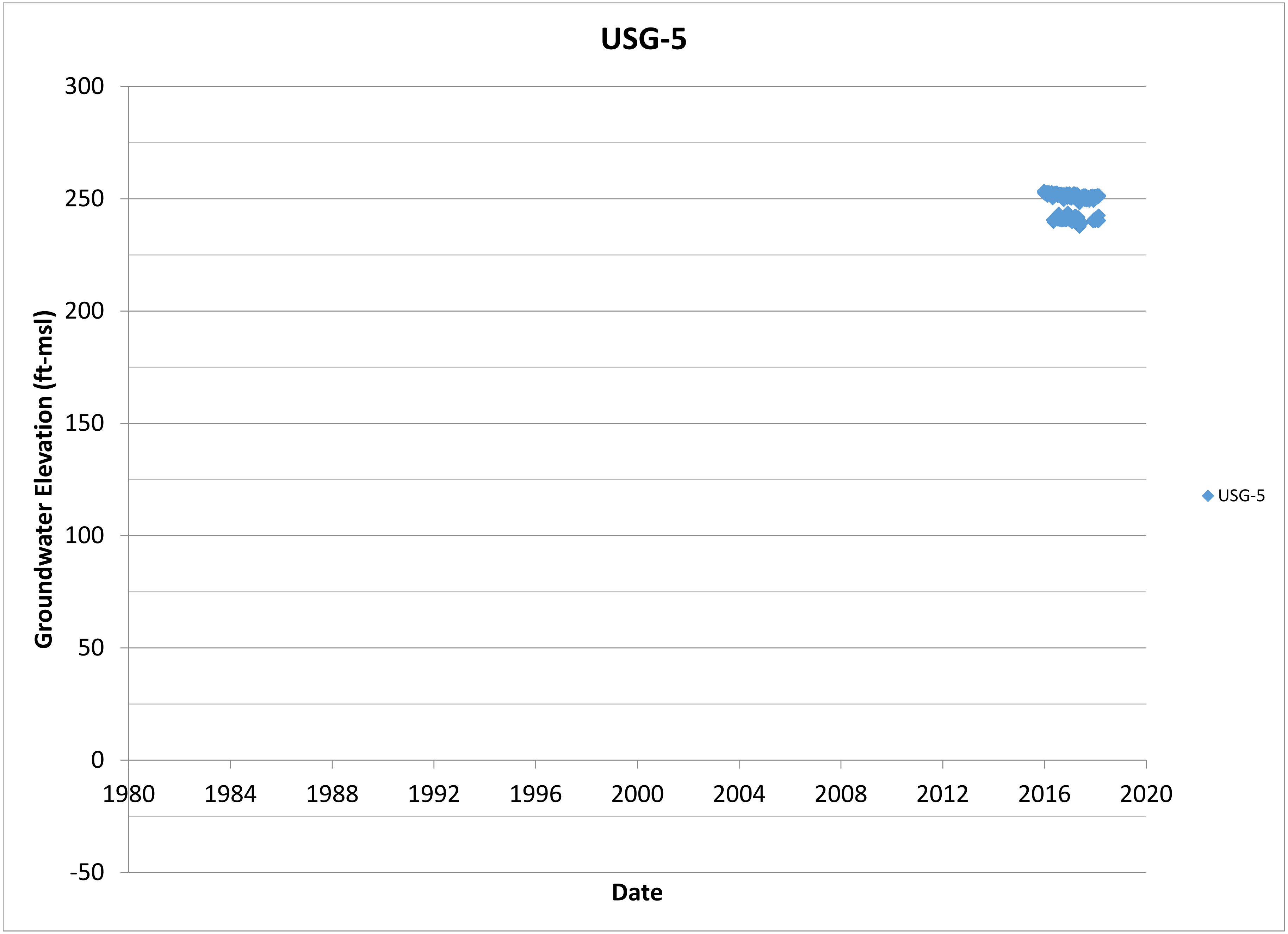
36A2
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
36A2


36H2
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
36H2

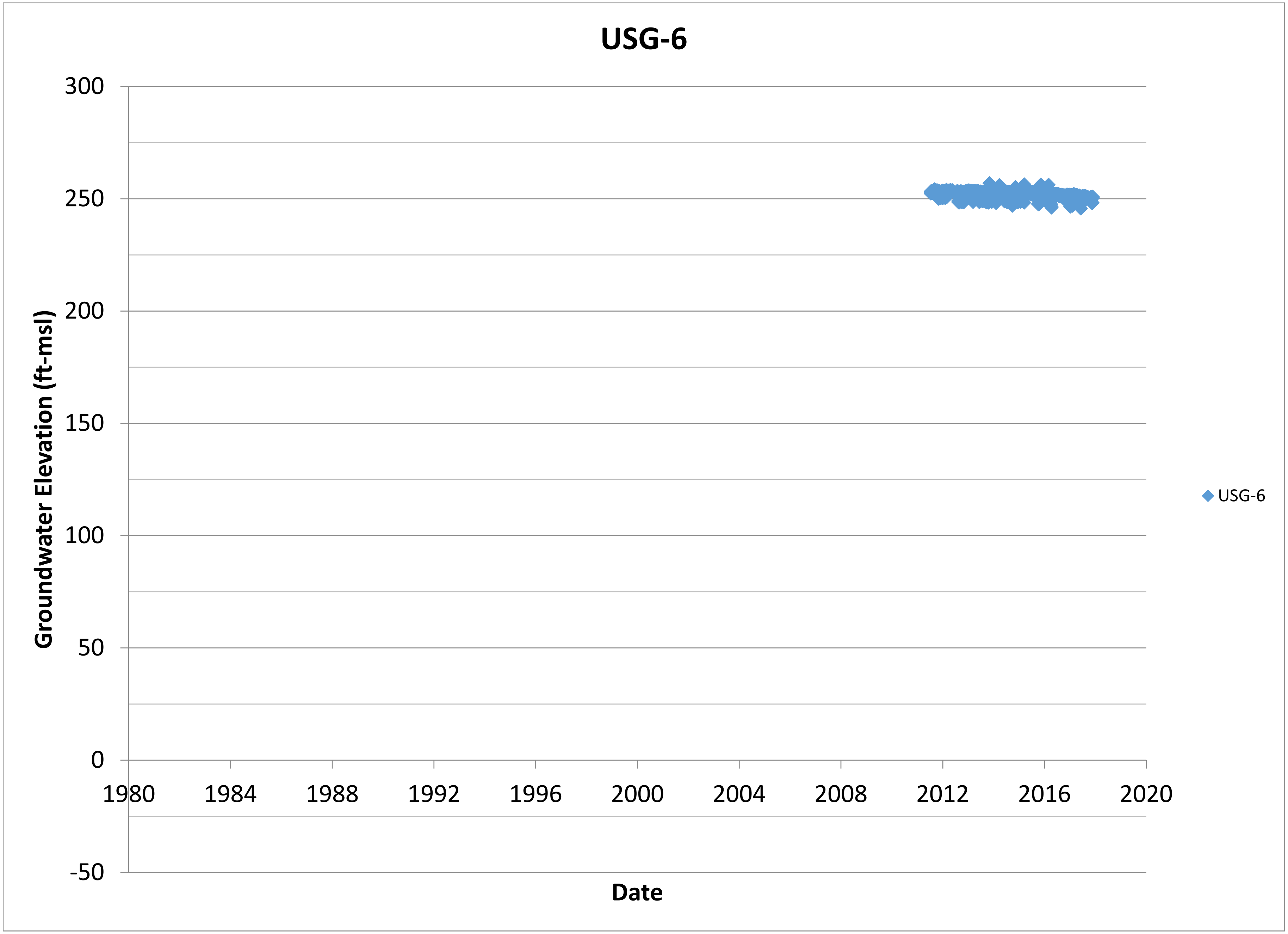

42L1
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
42L1



USG-4
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
USG-4

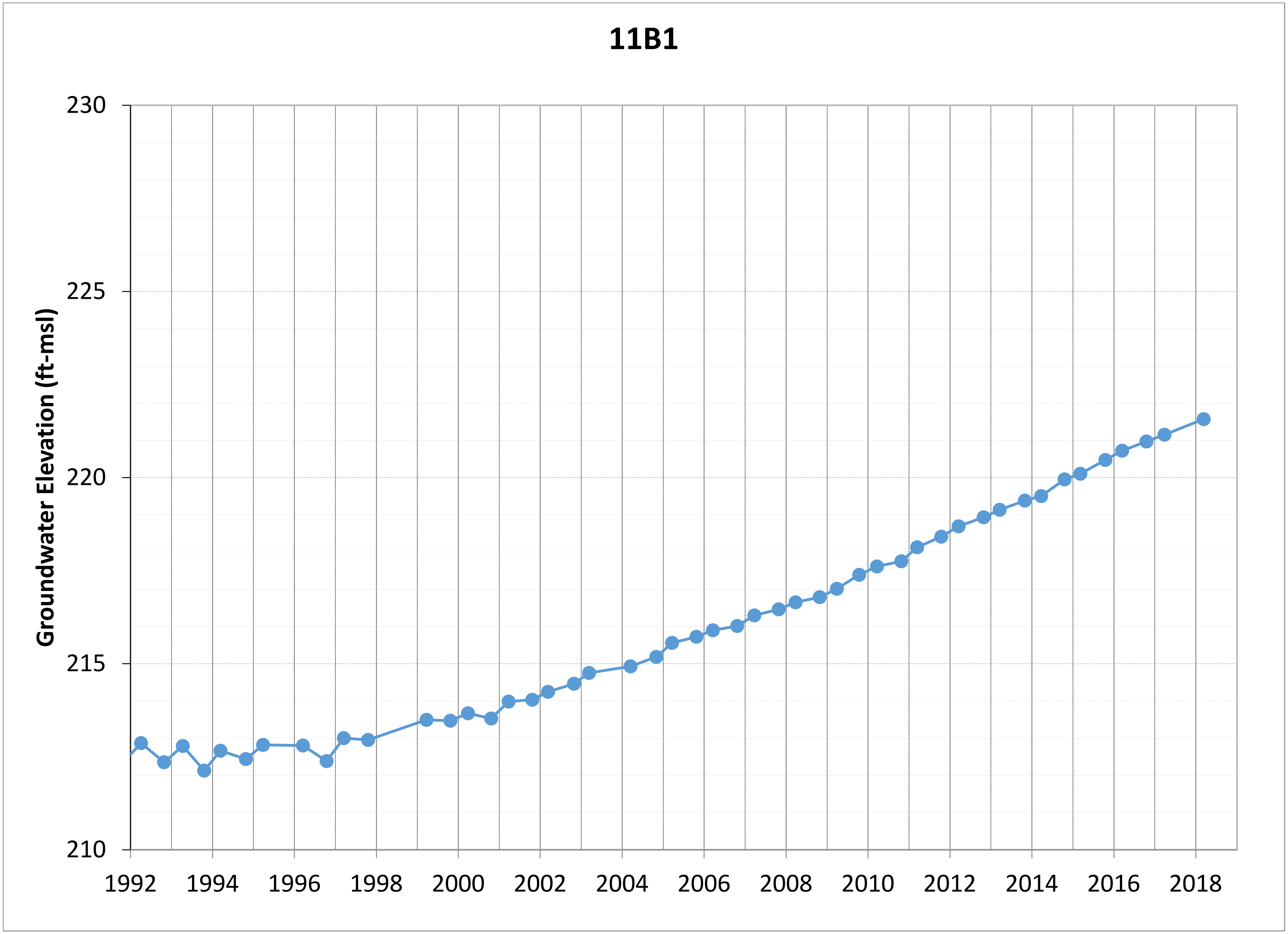


USG-5
300
250
200
150
100
50
0
-50
Groundwater Elevation (ft-msl)
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
USG-5

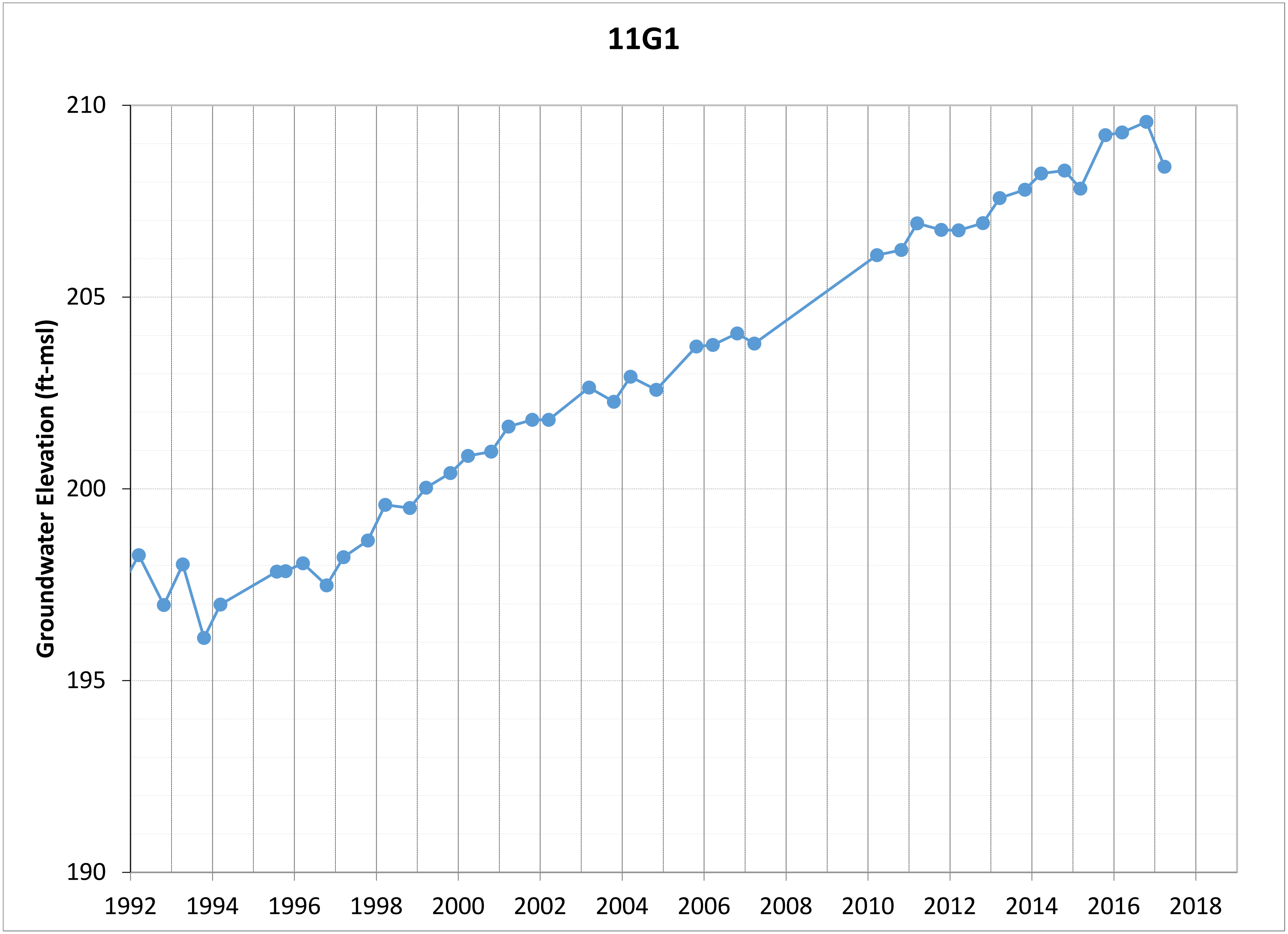


USG-6
Groundwater Elevation (ft-msl)
300
250
200
150
100
50
0
-50
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Date
USG-6

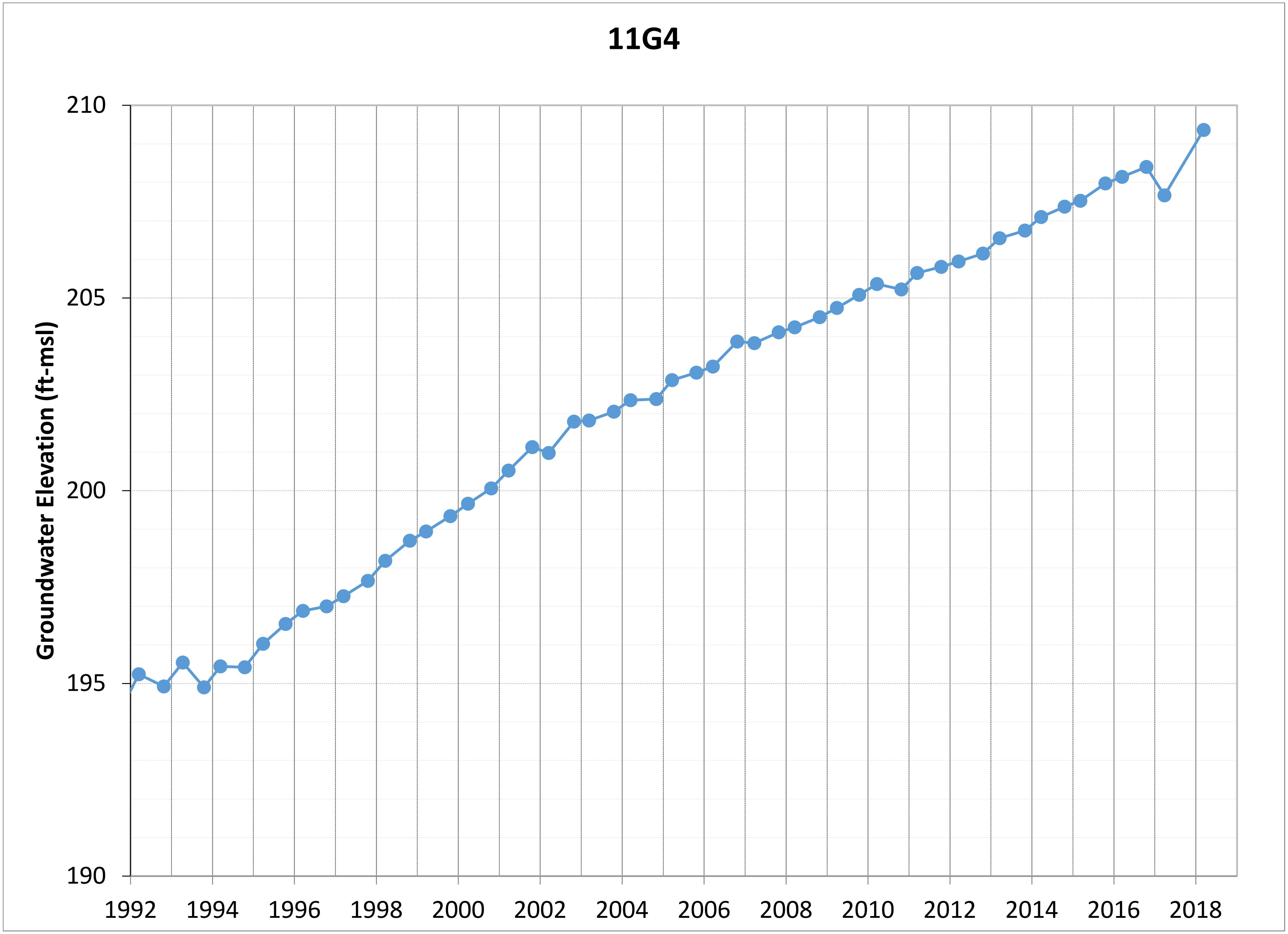
# APPENDIX A: Groundwater Elevation Hydrographs Focused Interval



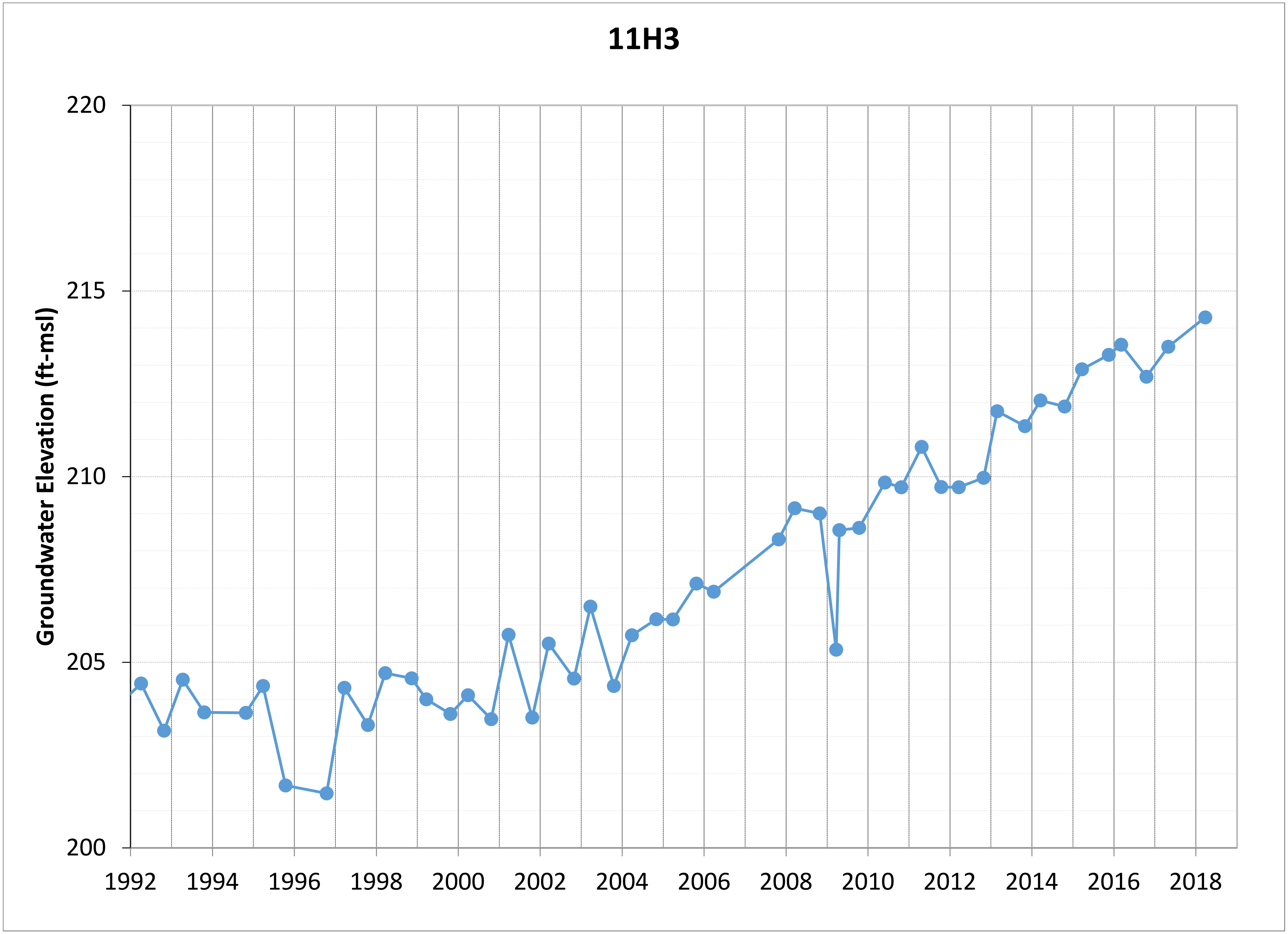
11B1
Groundwater Elevation (ft-msl)
230
225
220
215
210
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018



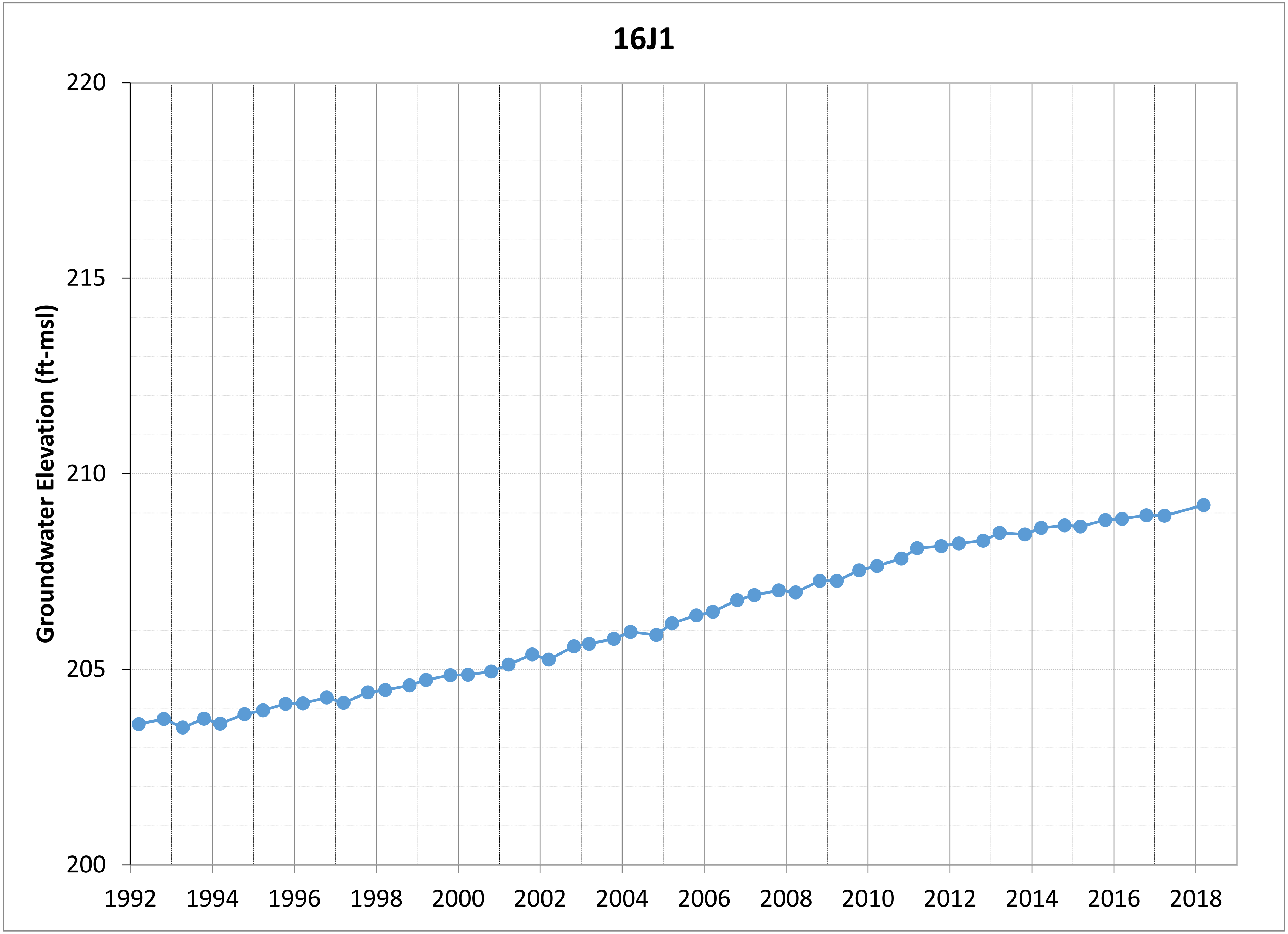
11G1
Groundwater Elevation (ft-msl)
210
205
200
195
190
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018



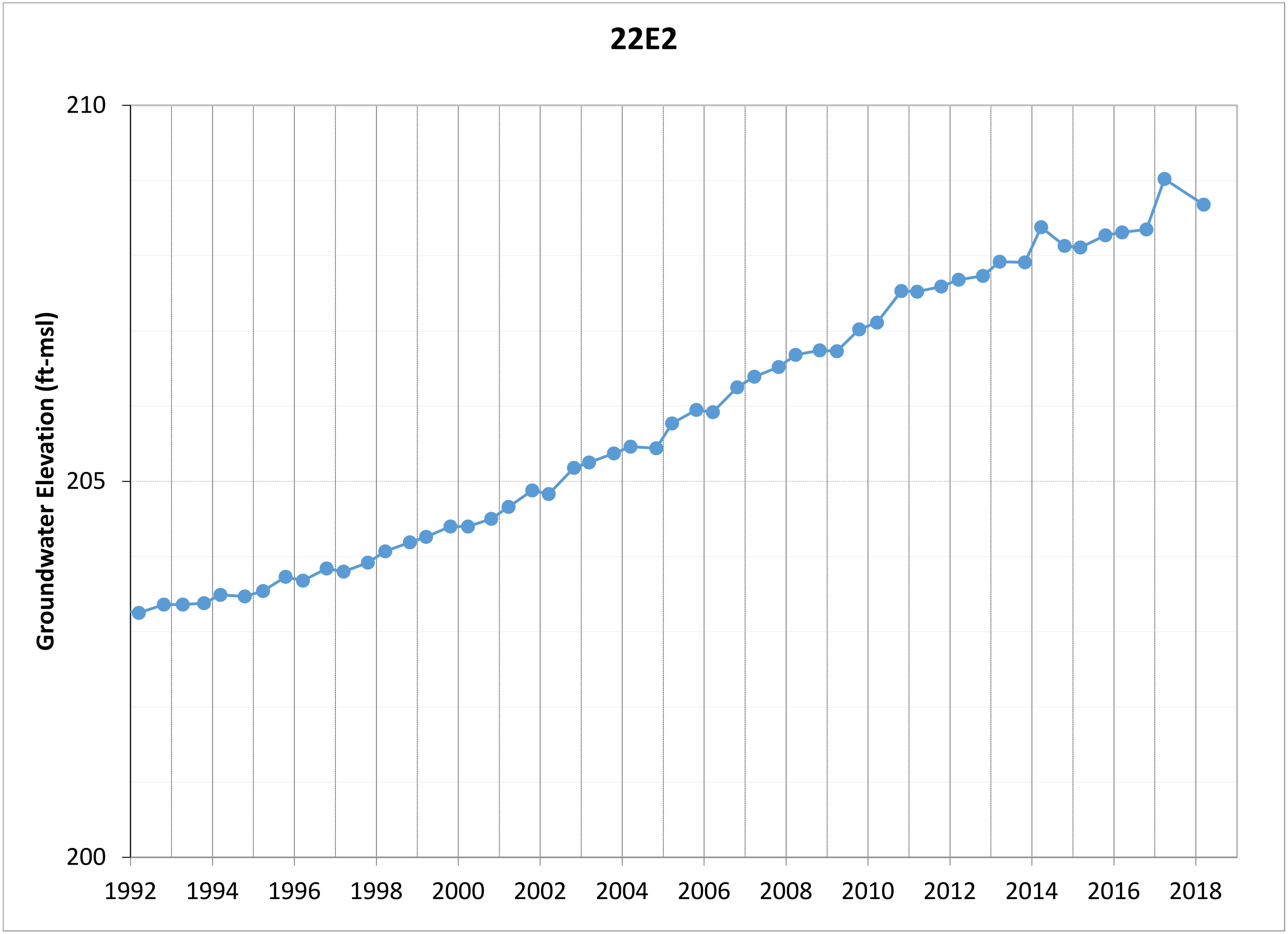
11G4
Groundwater Elevation (ft-msl)
210
205
200
195
190
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

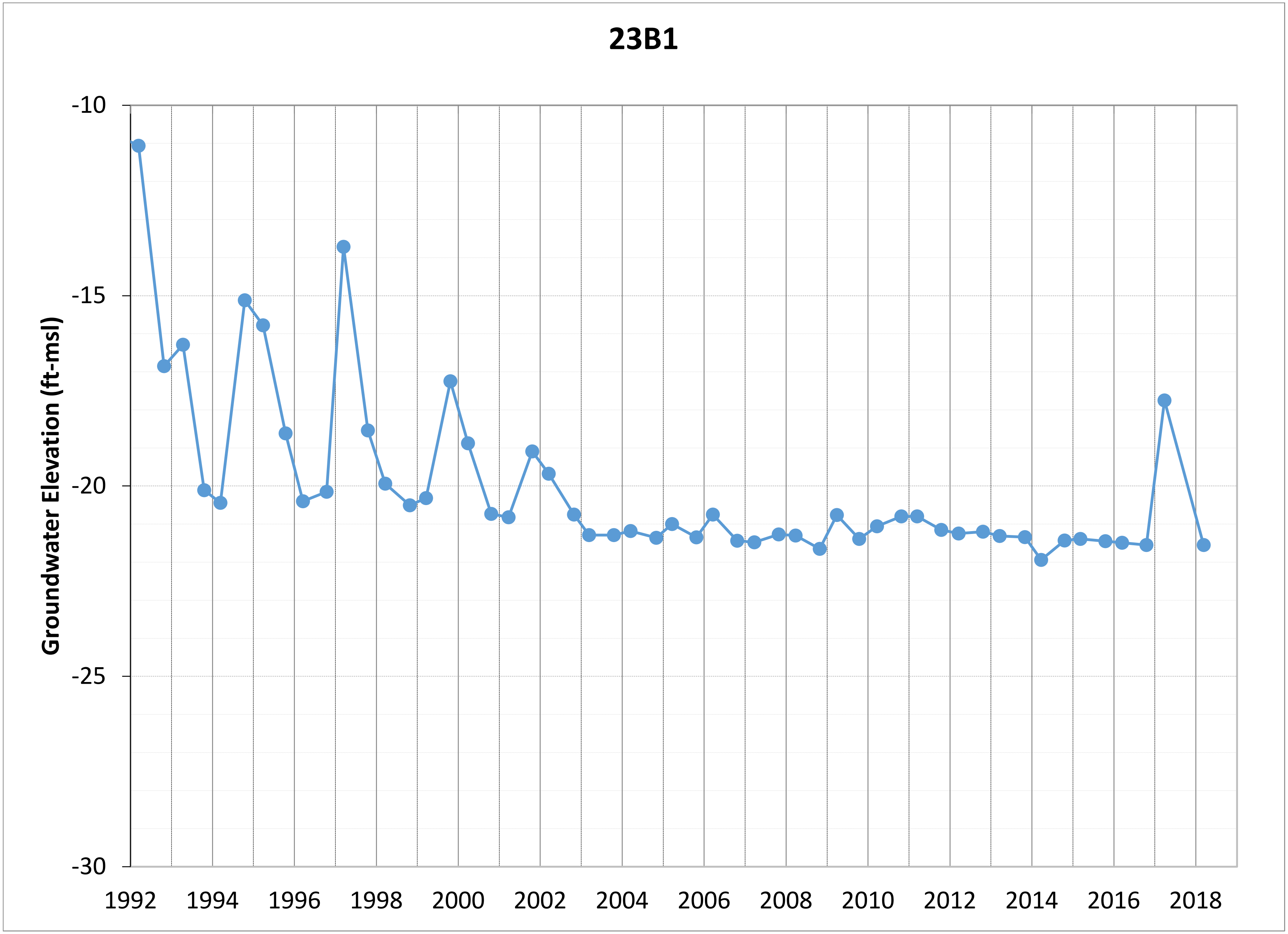


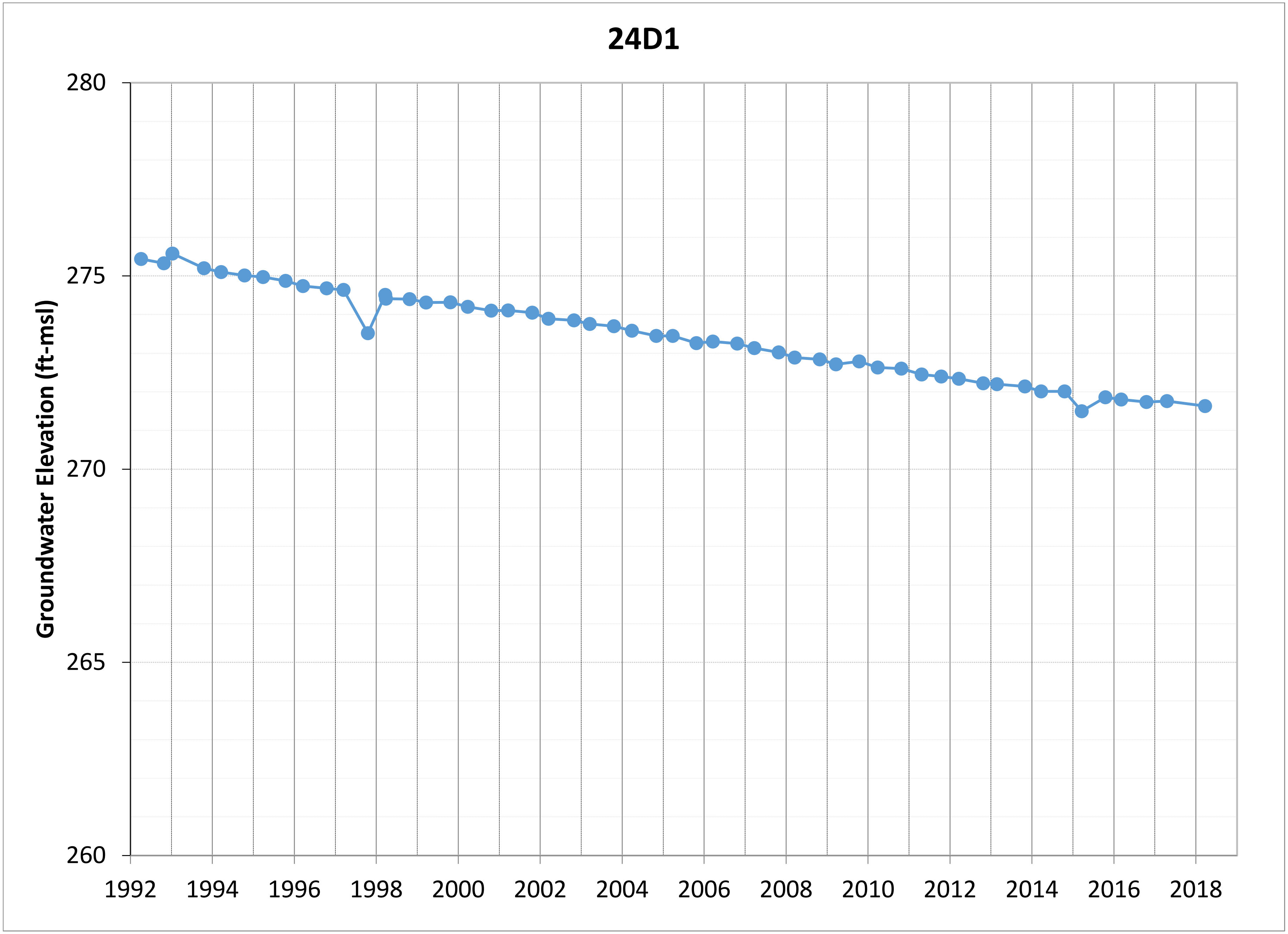
11H3
Groundwater Elevation (ft-msl)
220
215
210
205
200
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018



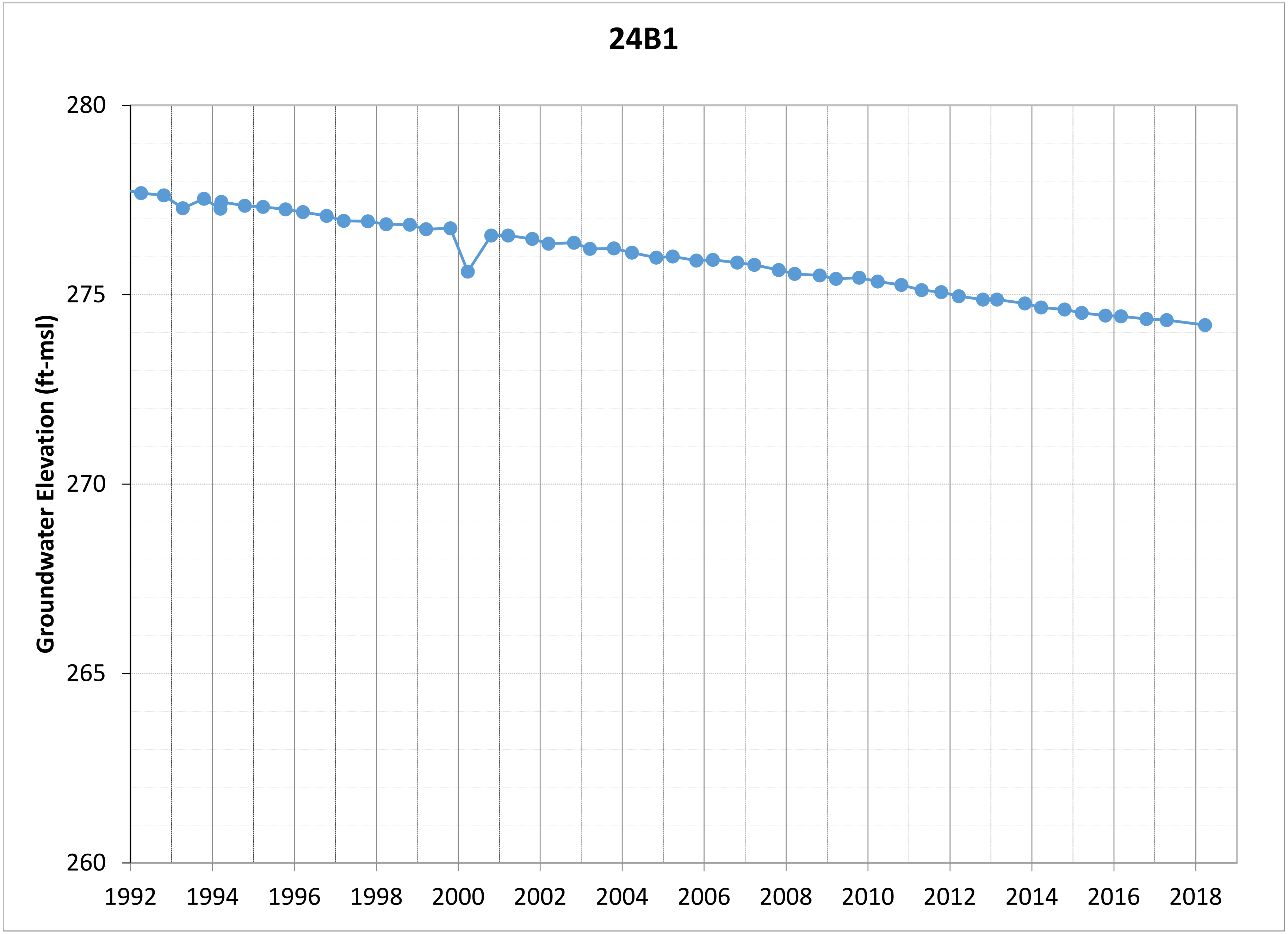
16J1
Groundwater Elevation (ft-msl)
220
215
210
205
200
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

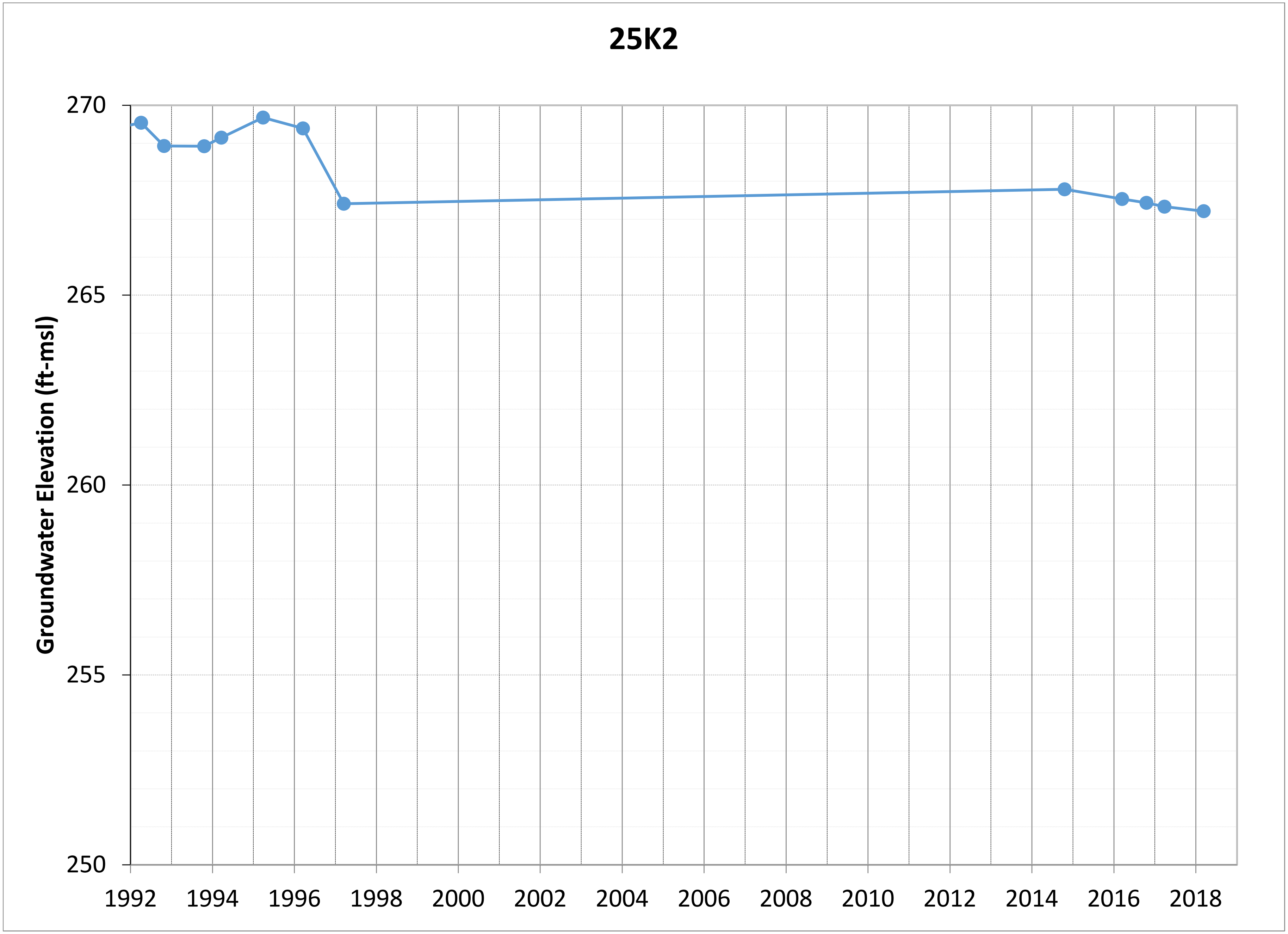

22E2
Groundwater Elevation (ft-msl)
210
205
200
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

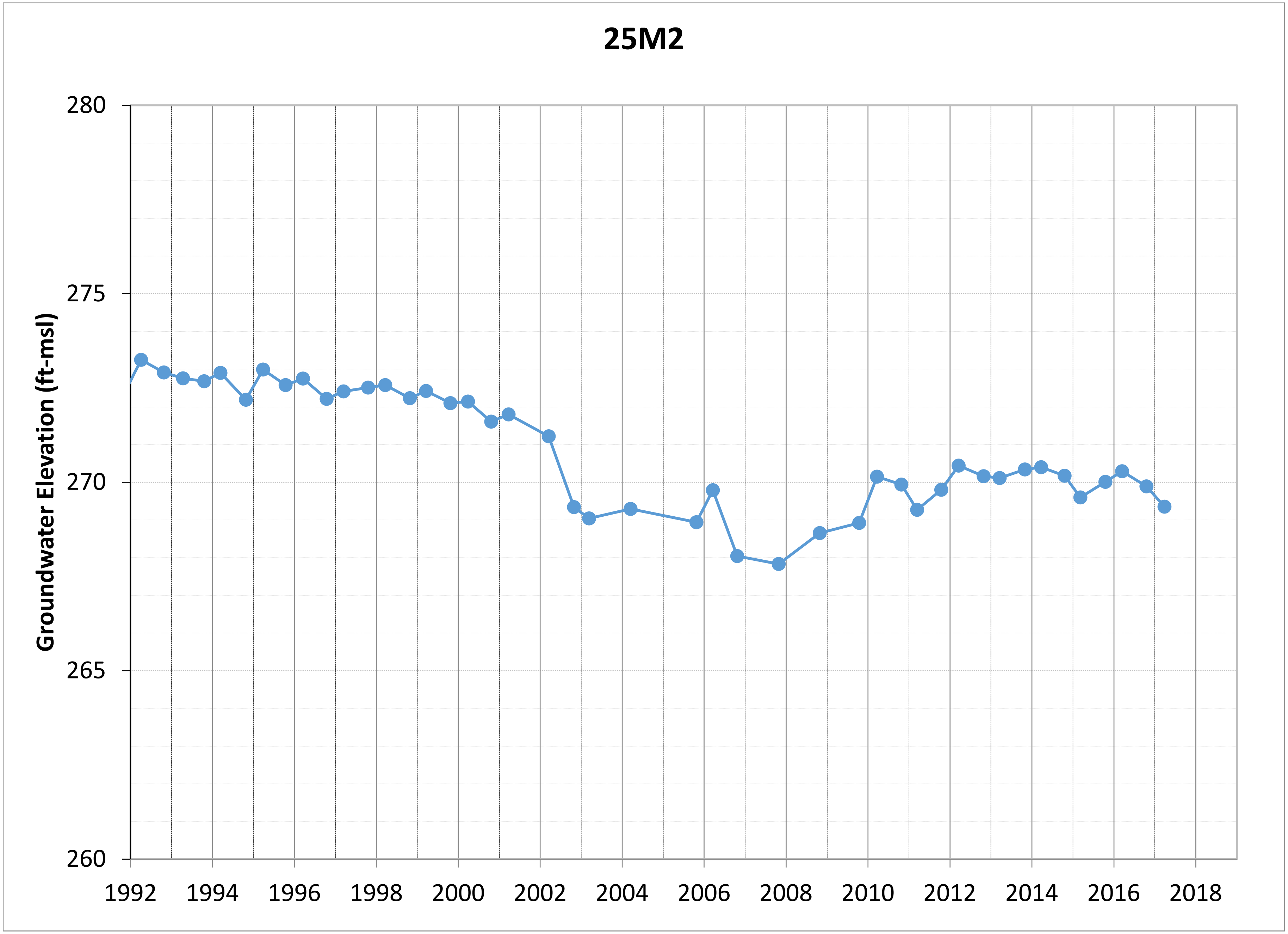

23B1
Groundwater Elevation (ft-msl)
-10
-15
-20
-25
-30
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018



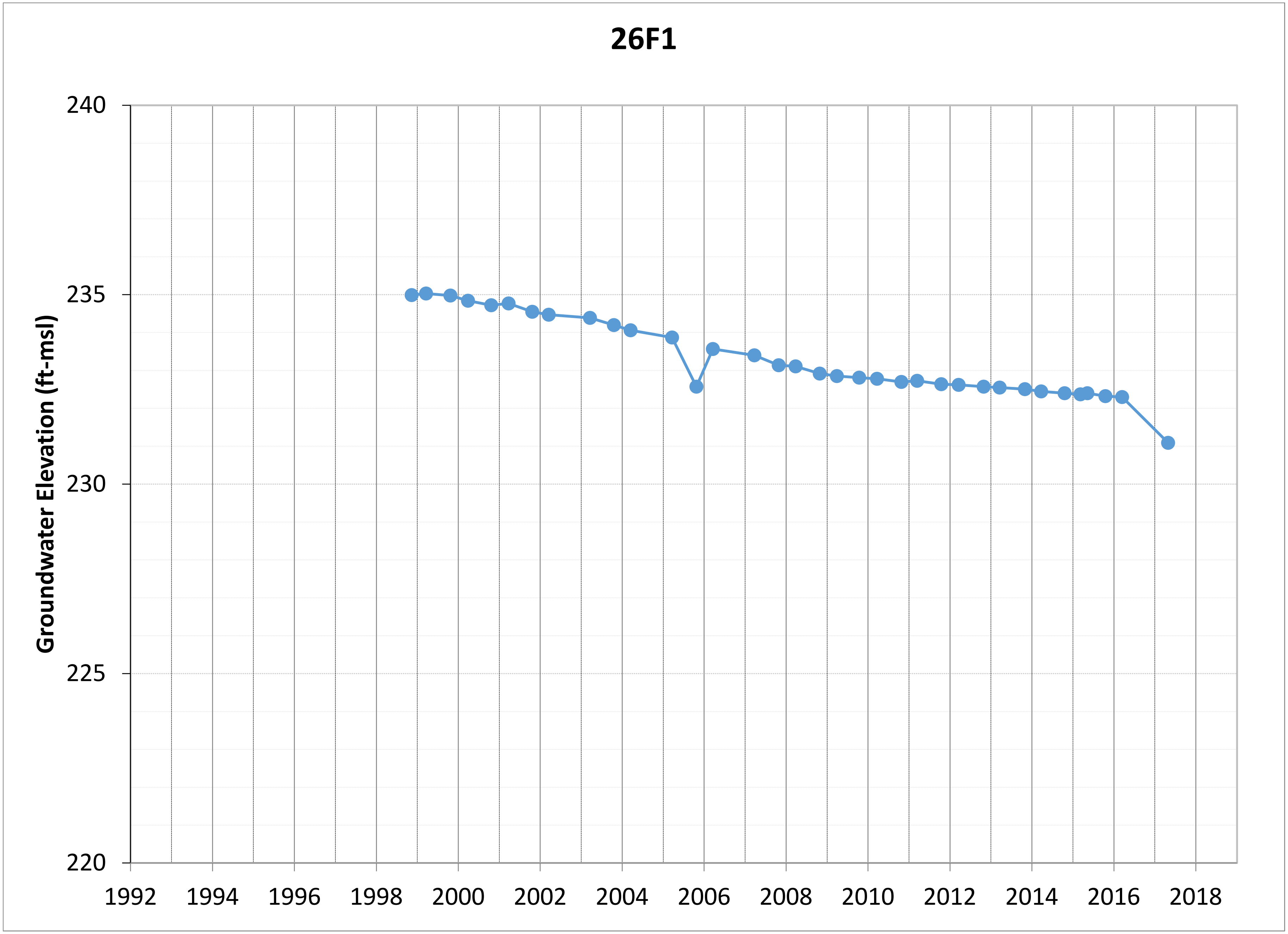
24D1
Groundwater Elevation (ft-msl)
280
275
270
265
260
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018


24B1
Groundwater Elevation (ft-msl)
280
275
270
265
260
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

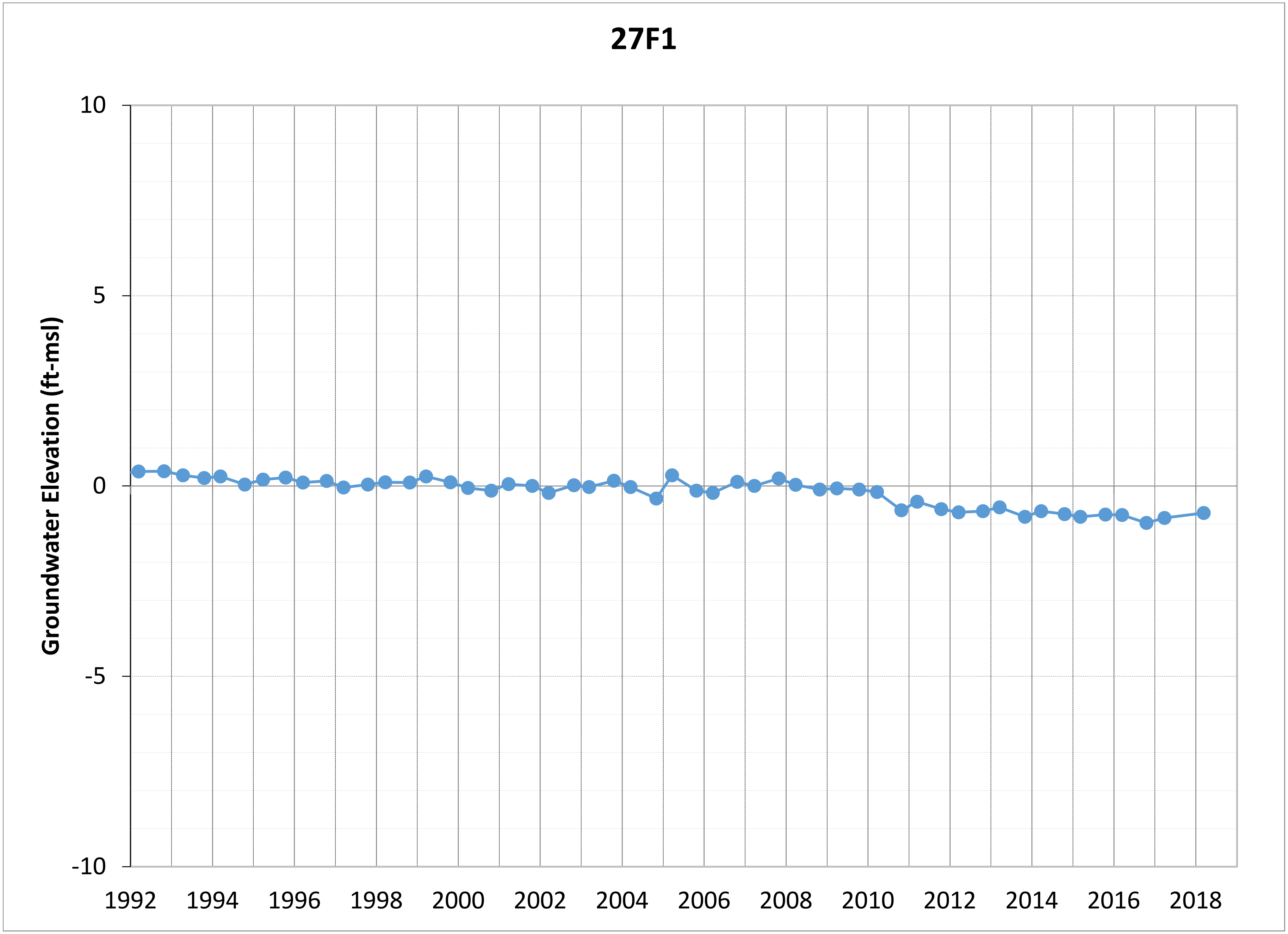

25K2
Groundwater Elevation (ft-msl)
270
265
260
255
250
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

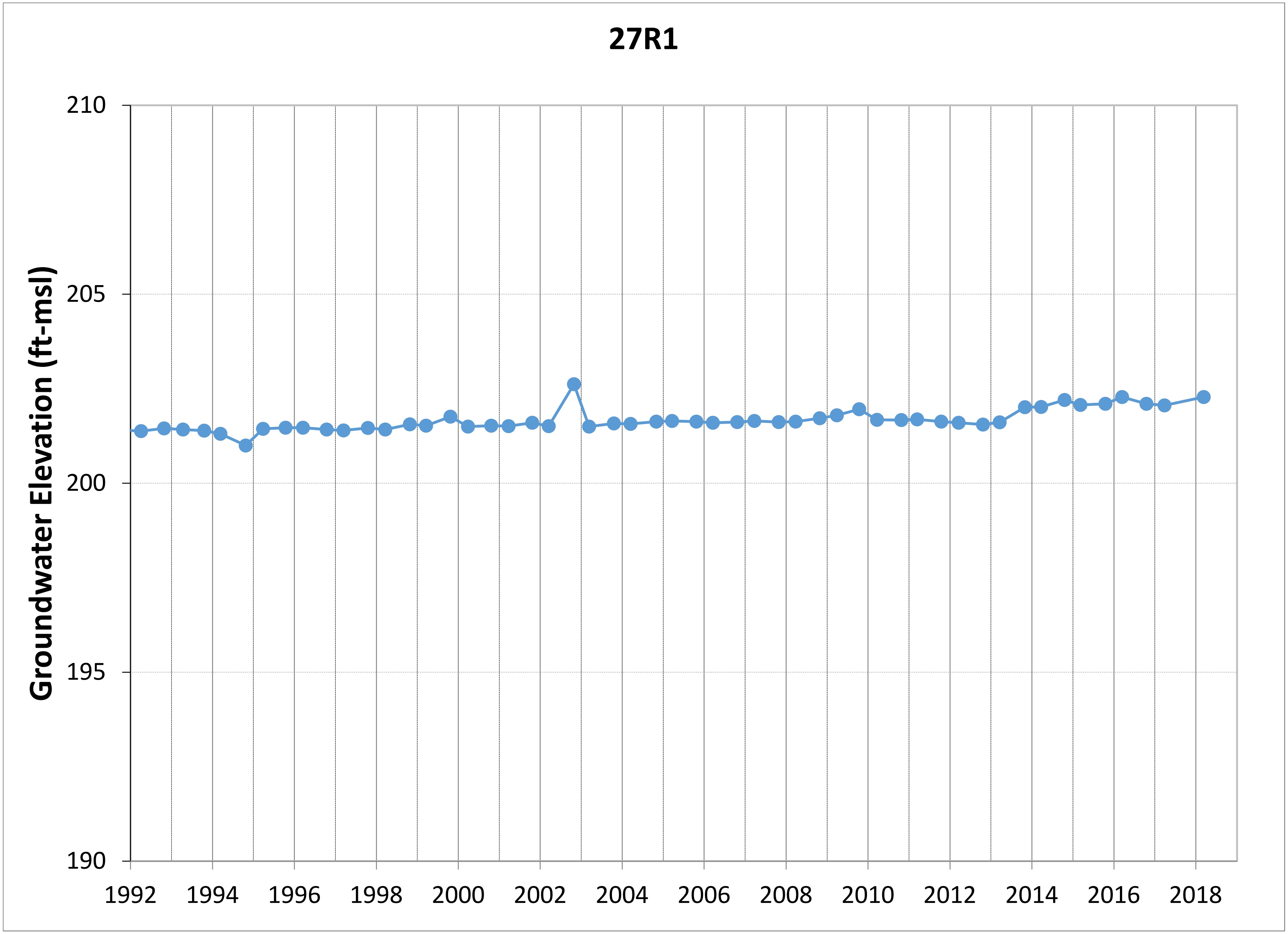


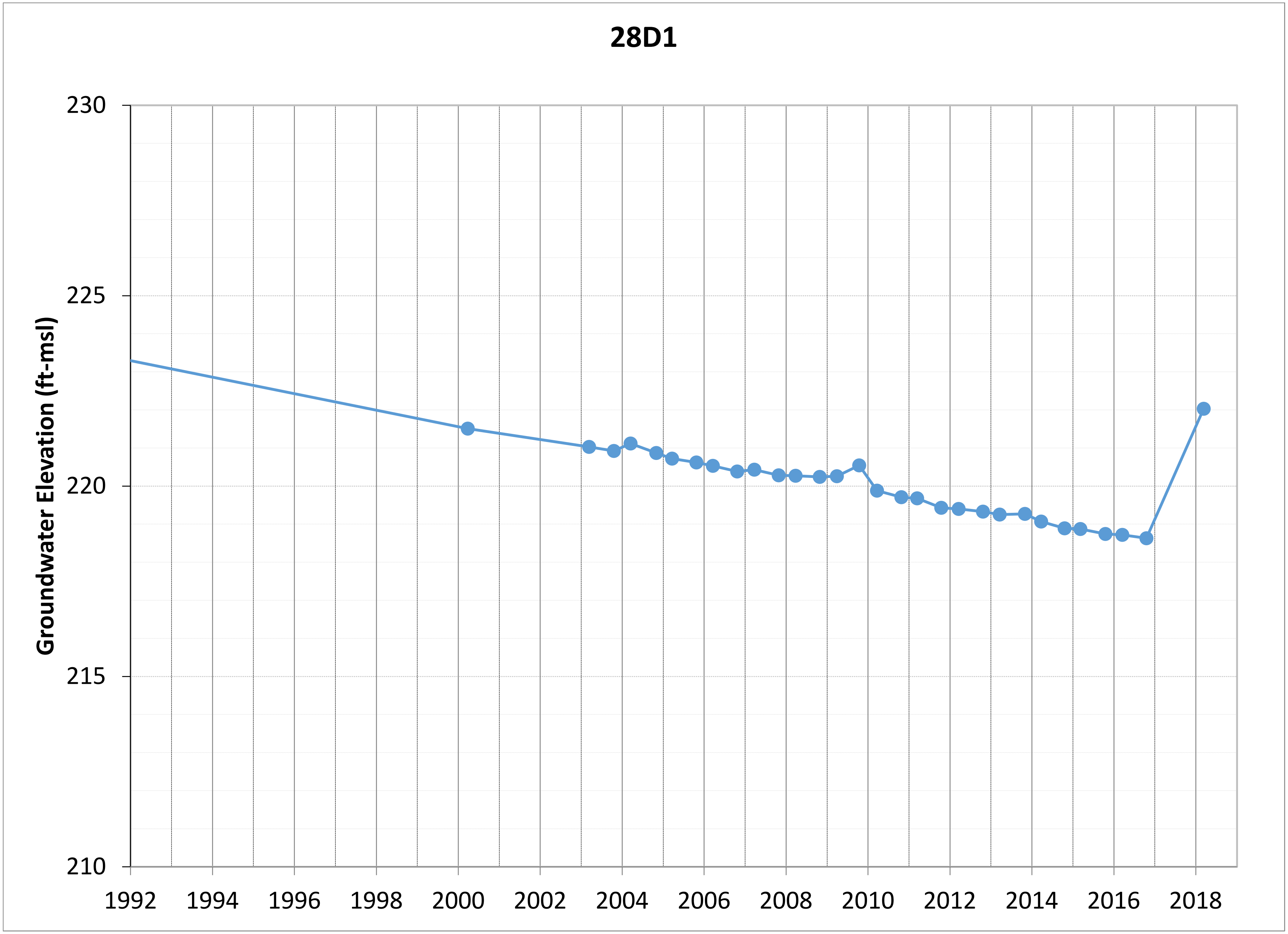
25M2
Groundwater Elevation (ft-msl)
280
275
270
265
260
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

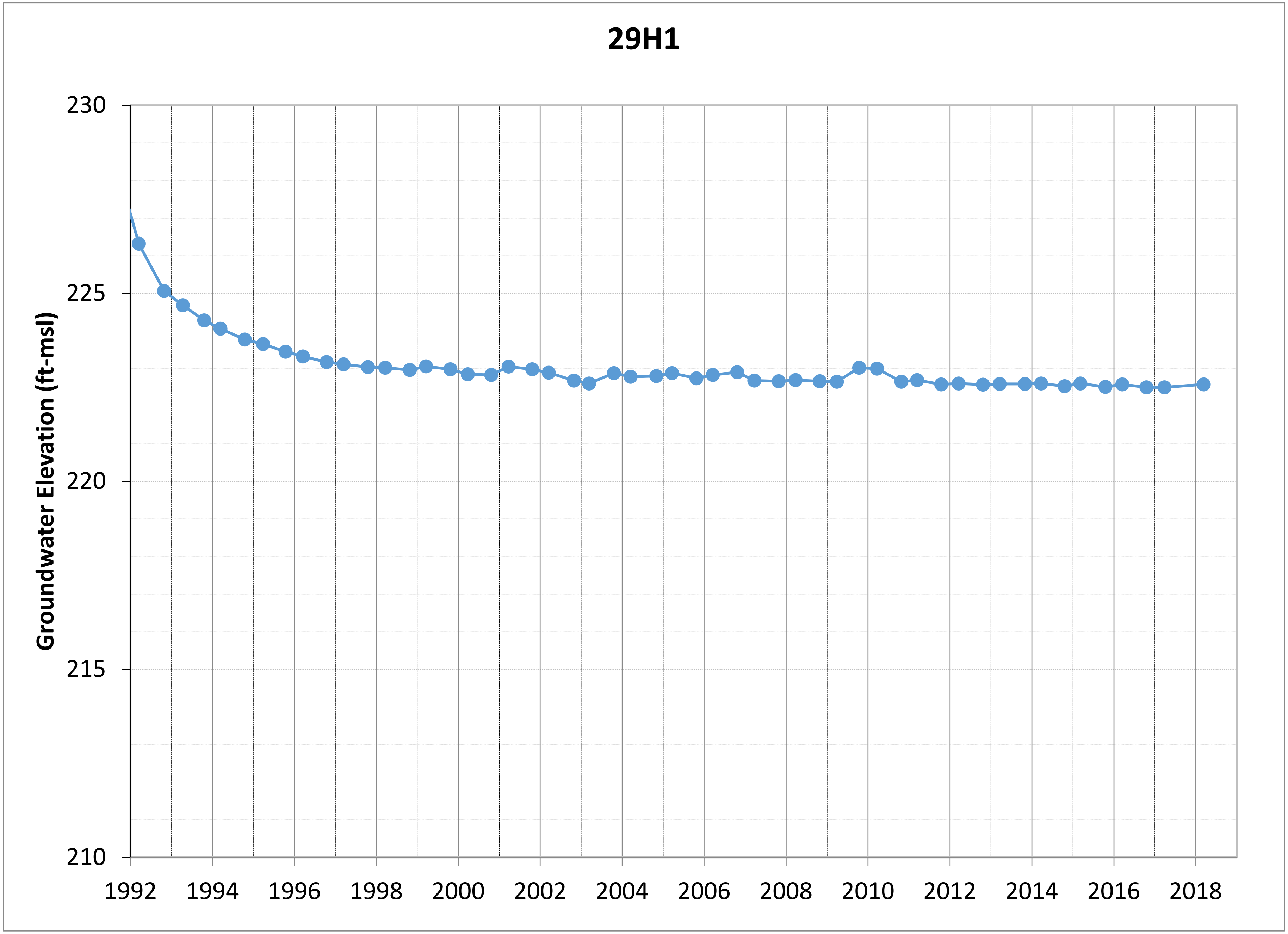


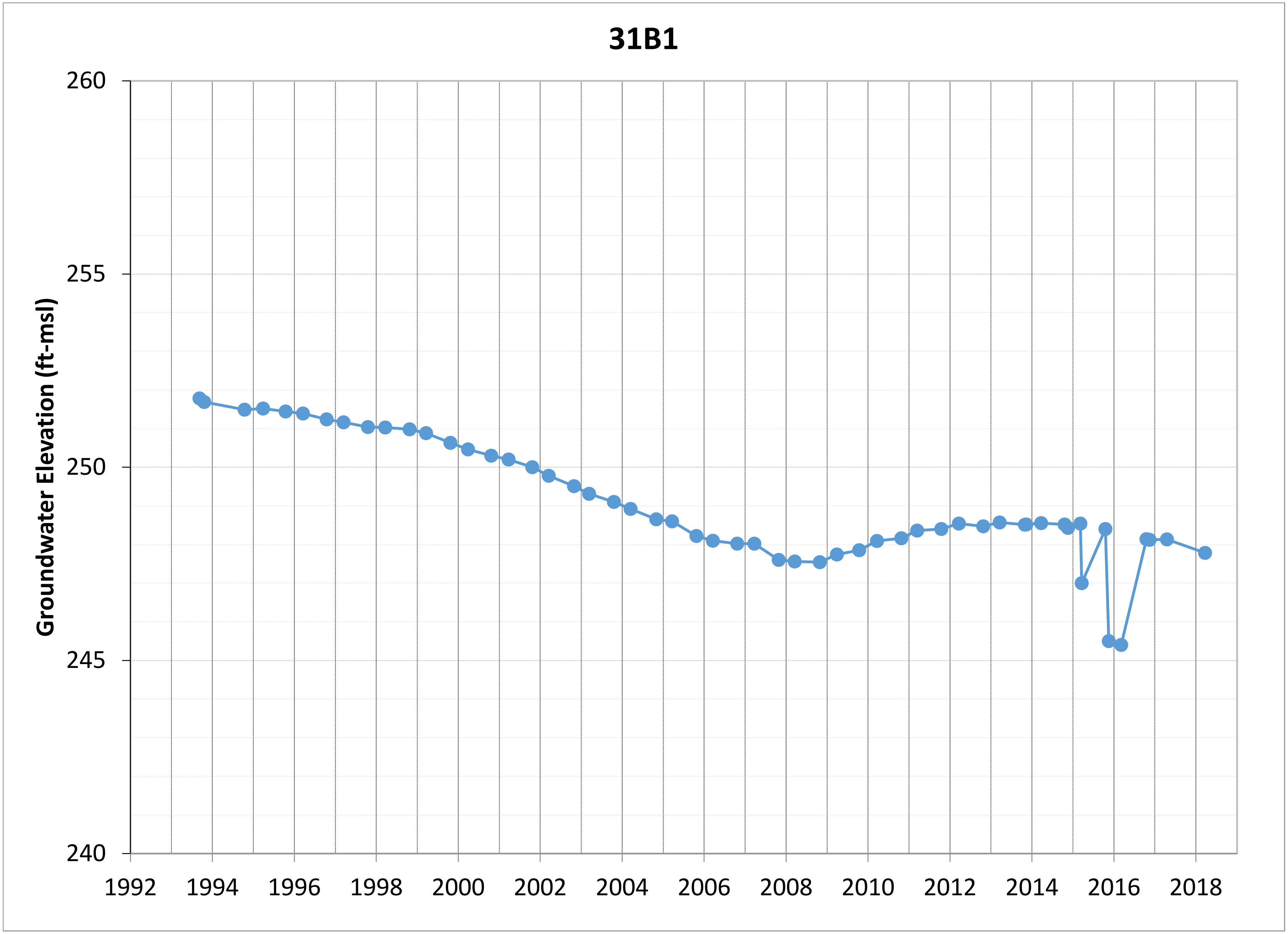
26F1
Groundwater Elevation (ft-msl)
240
235
230
225
220
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018


27F1
Groundwater Elevation (ft-msl)
10
5
0
-5
-10
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

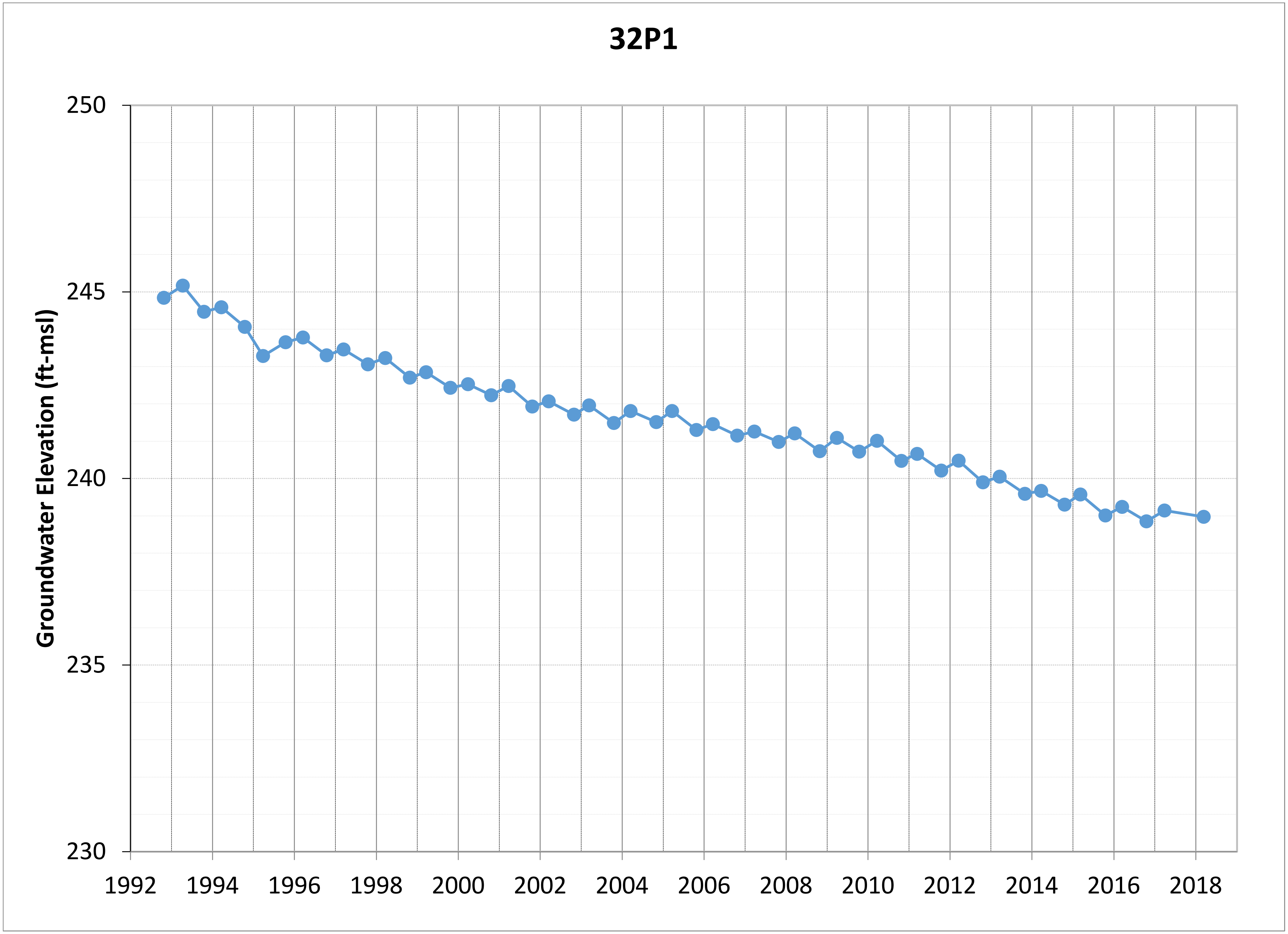

27R1
Groundwater Elevation (ft-msl)
210
205
200
195
190
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

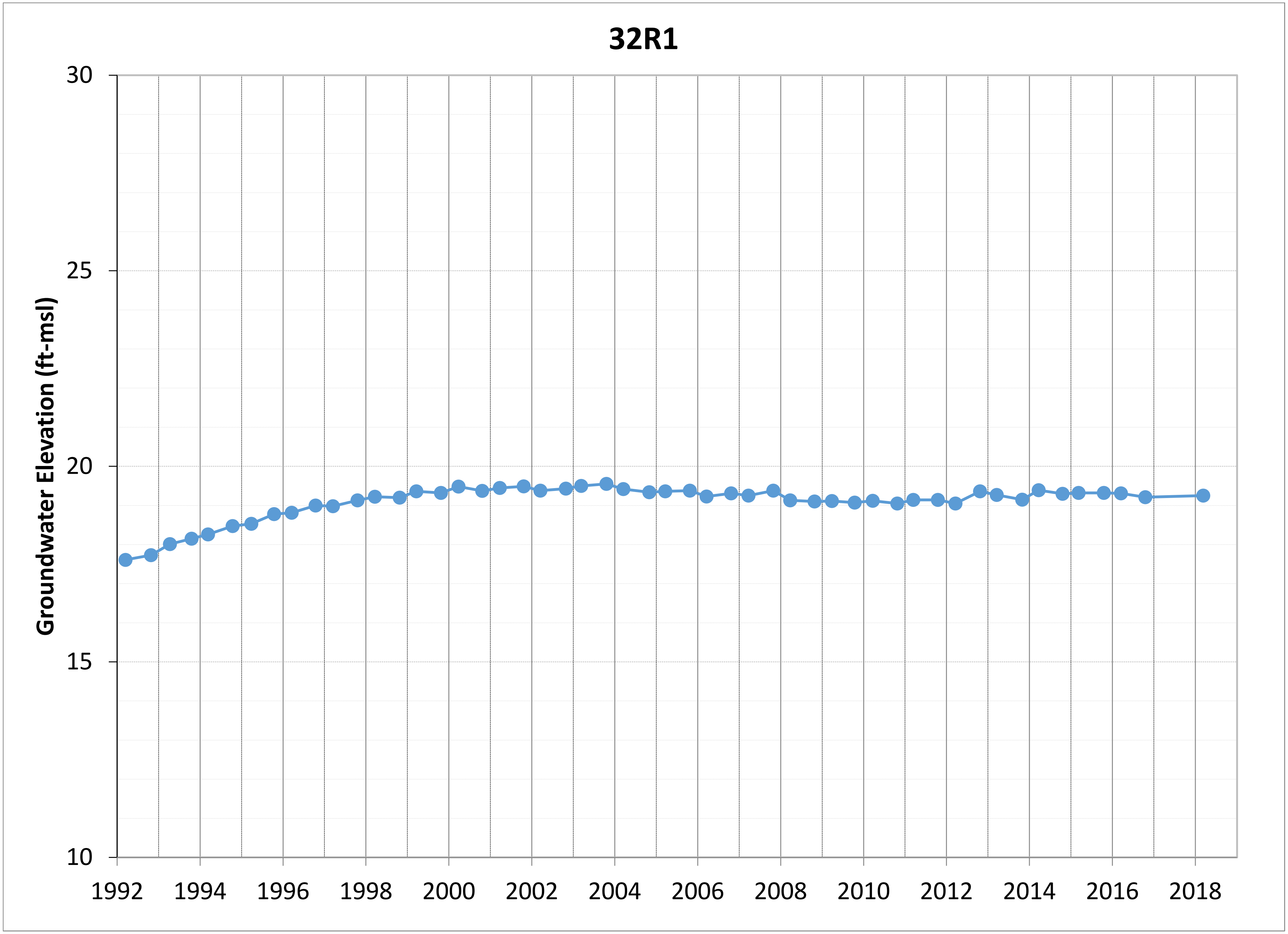

28D1
Groundwater Elevation (ft-msl)
230
225
220
215
210
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

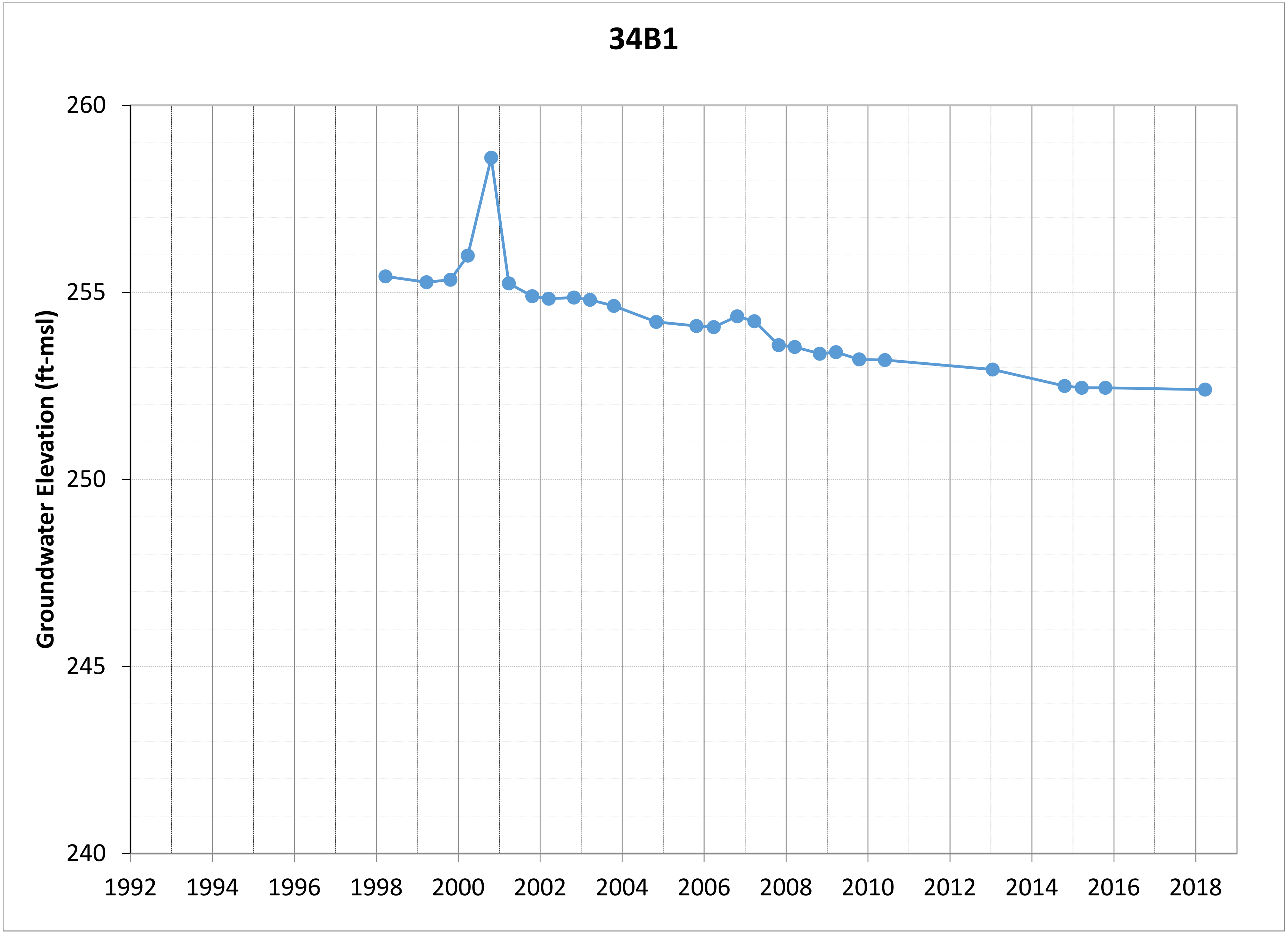

29H1
Groundwater Elevation (ft-msl)
230
225
220
215
210
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018



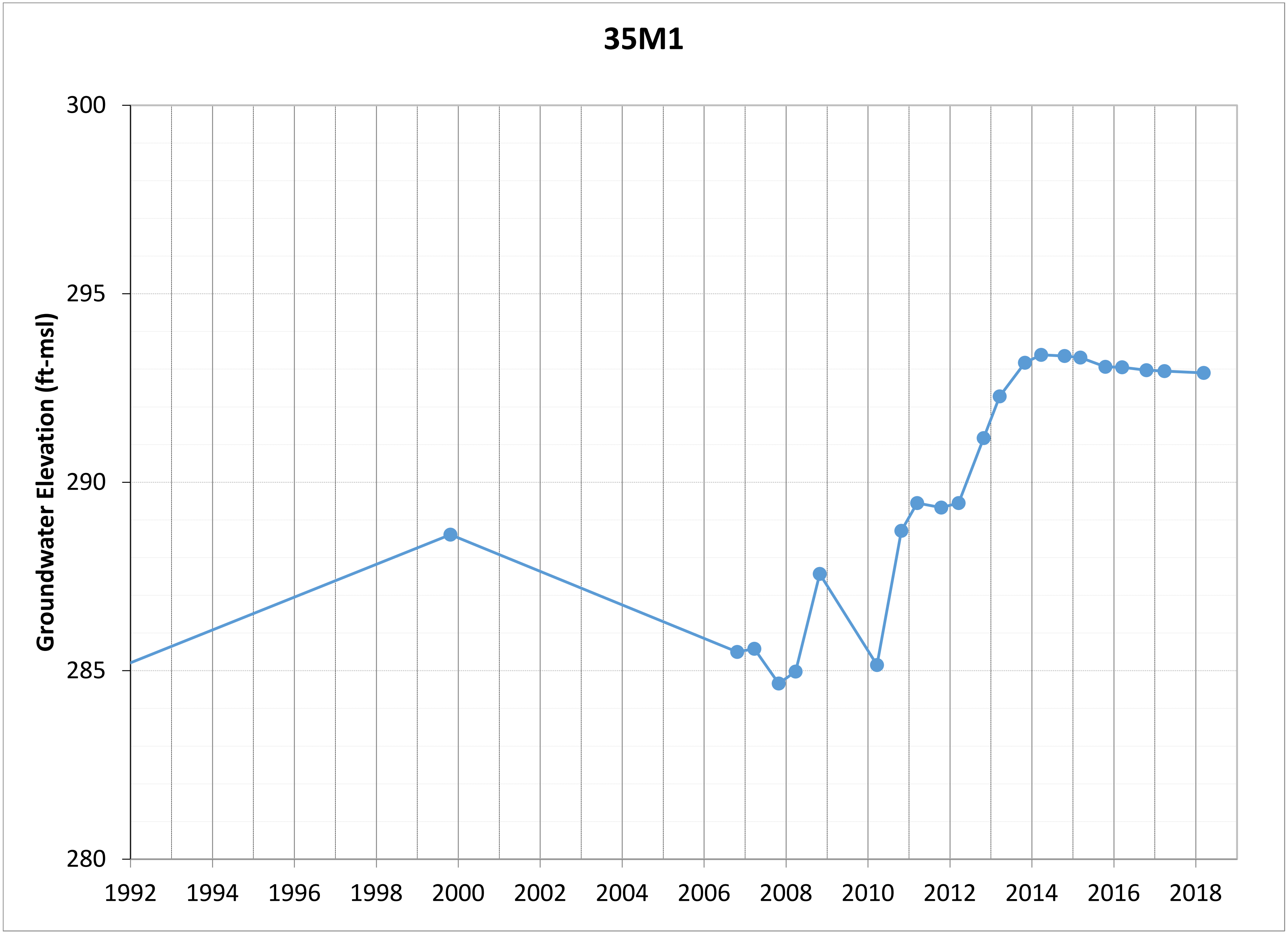
31B1
Groundwater Elevation (ft-msl)
260
255
250
245
240
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018


32P1
Groundwater Elevation (ft-msl)
250
245
240
235
230
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

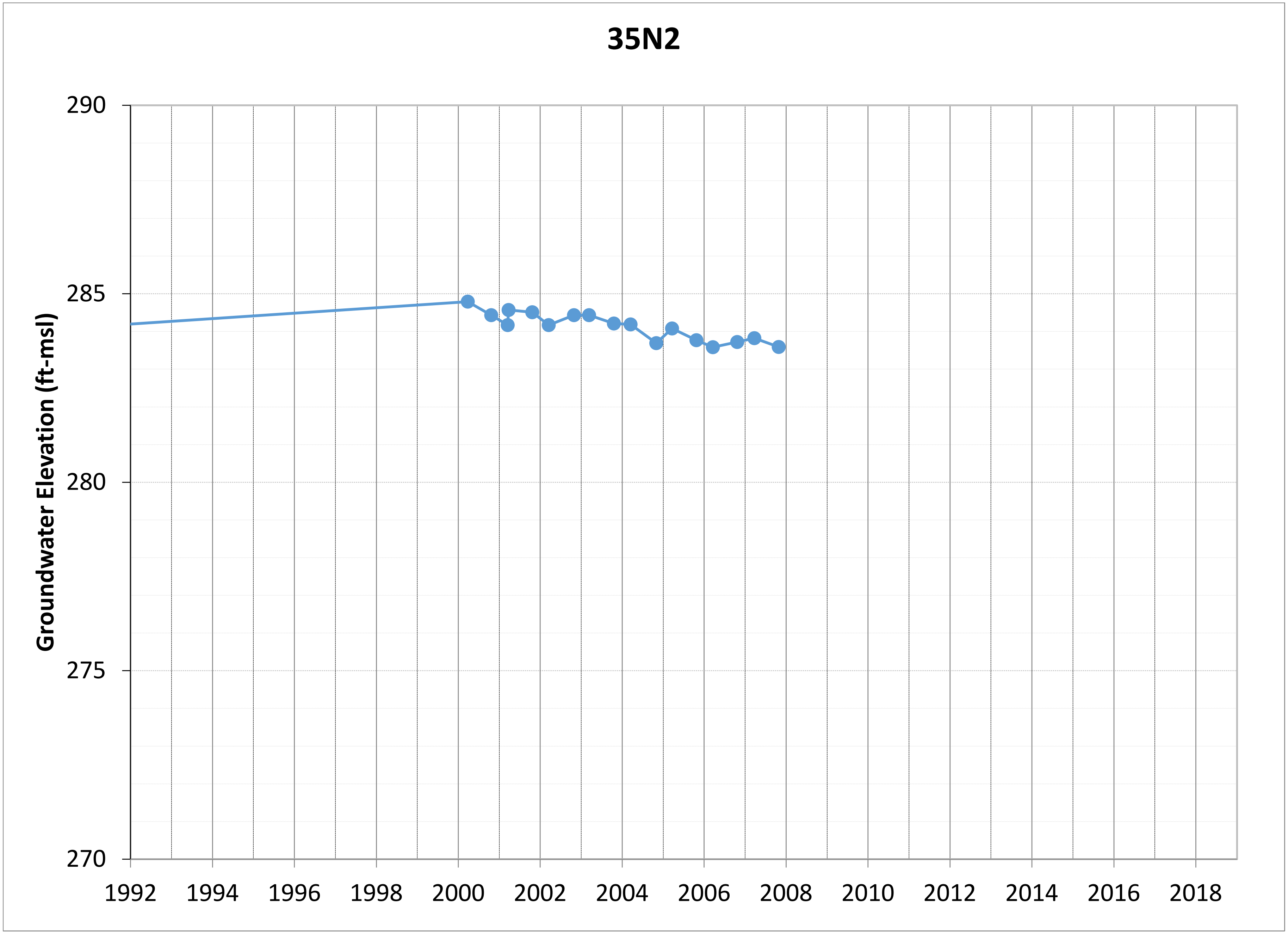

32R1
Groundwater Elevation (ft-msl)
30
25
20
15
10
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018



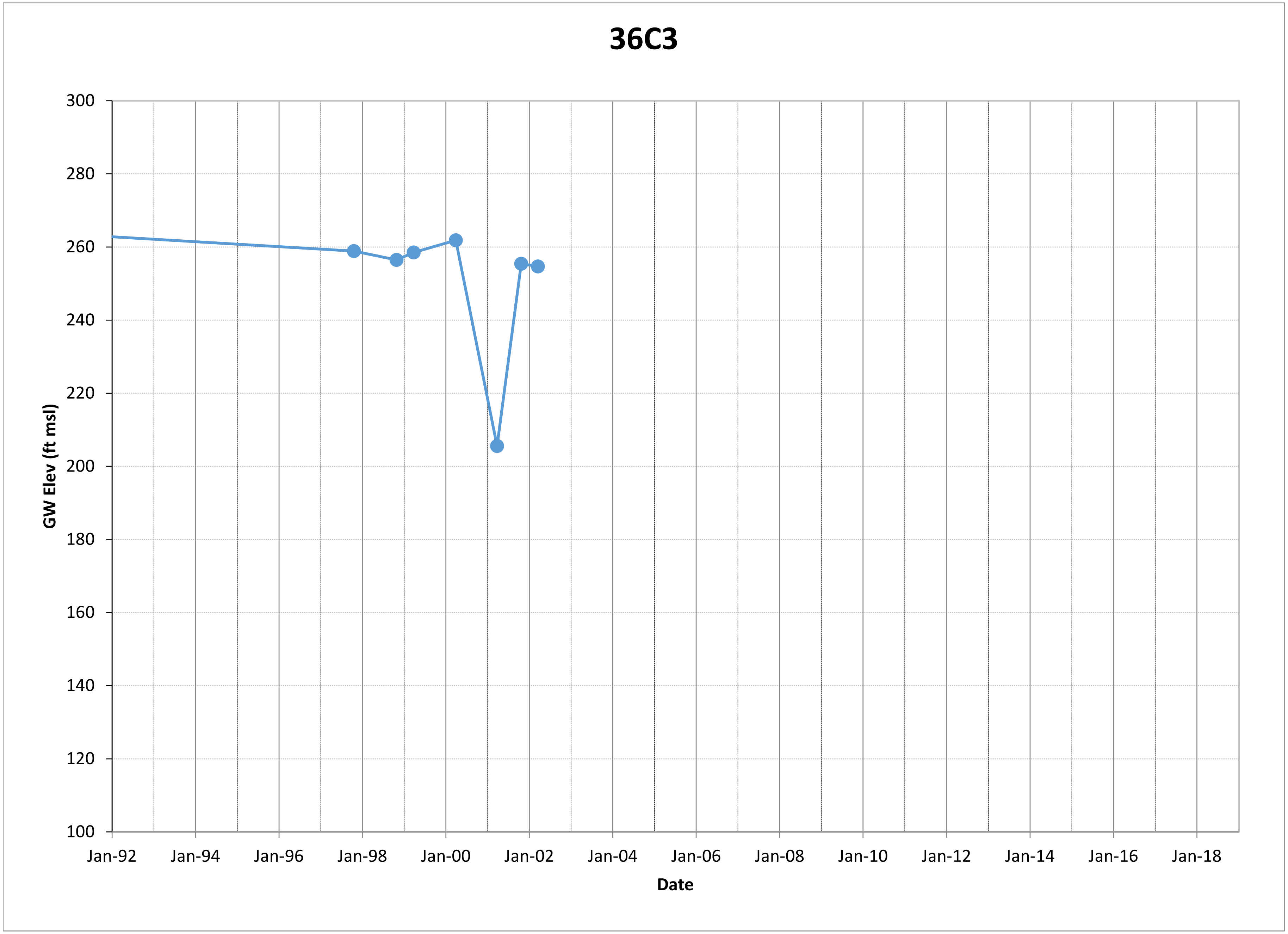
34B1
Groundwater Elevation (ft-msl)
260
255
250
245
240
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

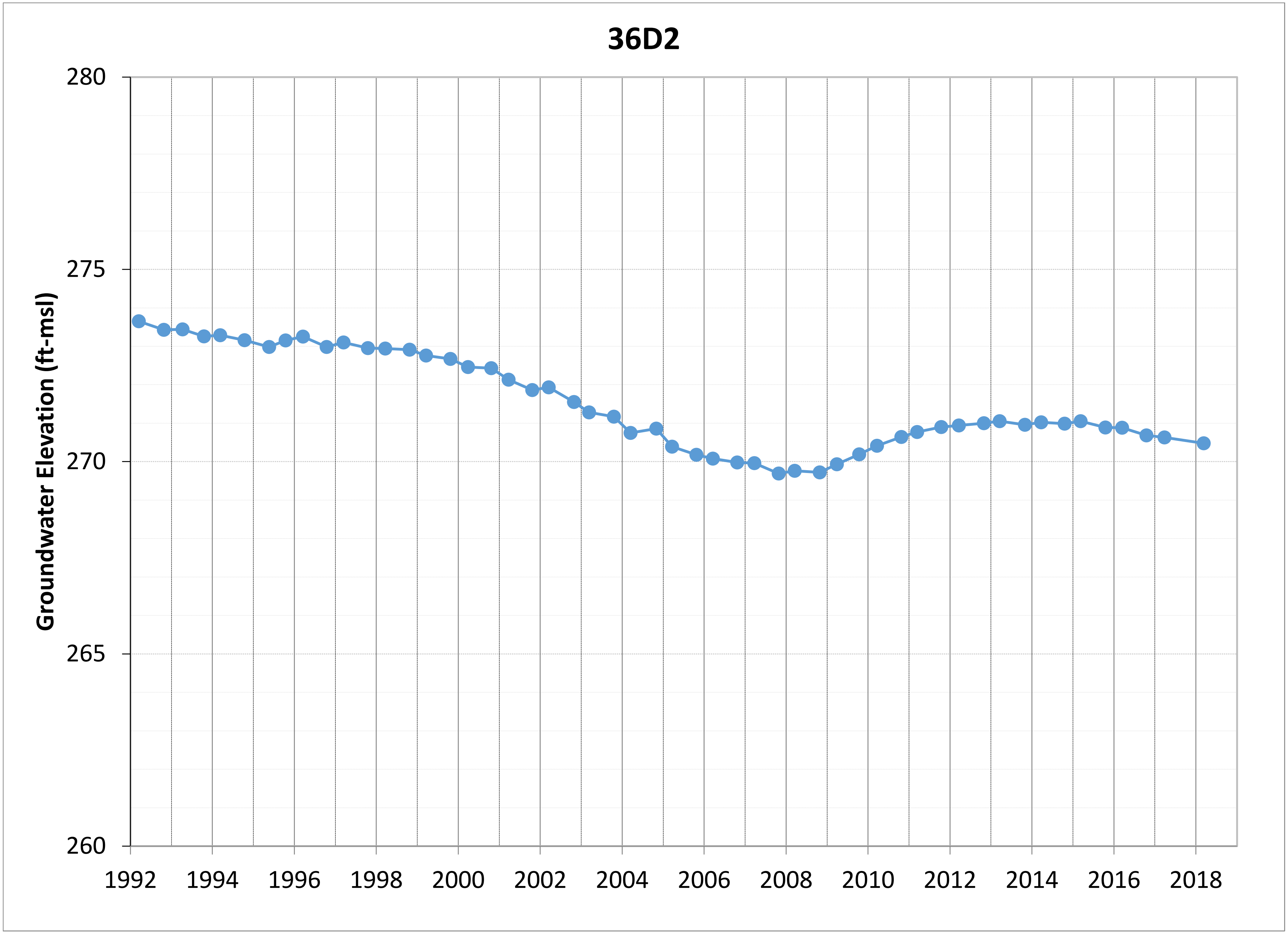


35M1
Groundwater Elevation (ft-msl)
300
295
290
285
280
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

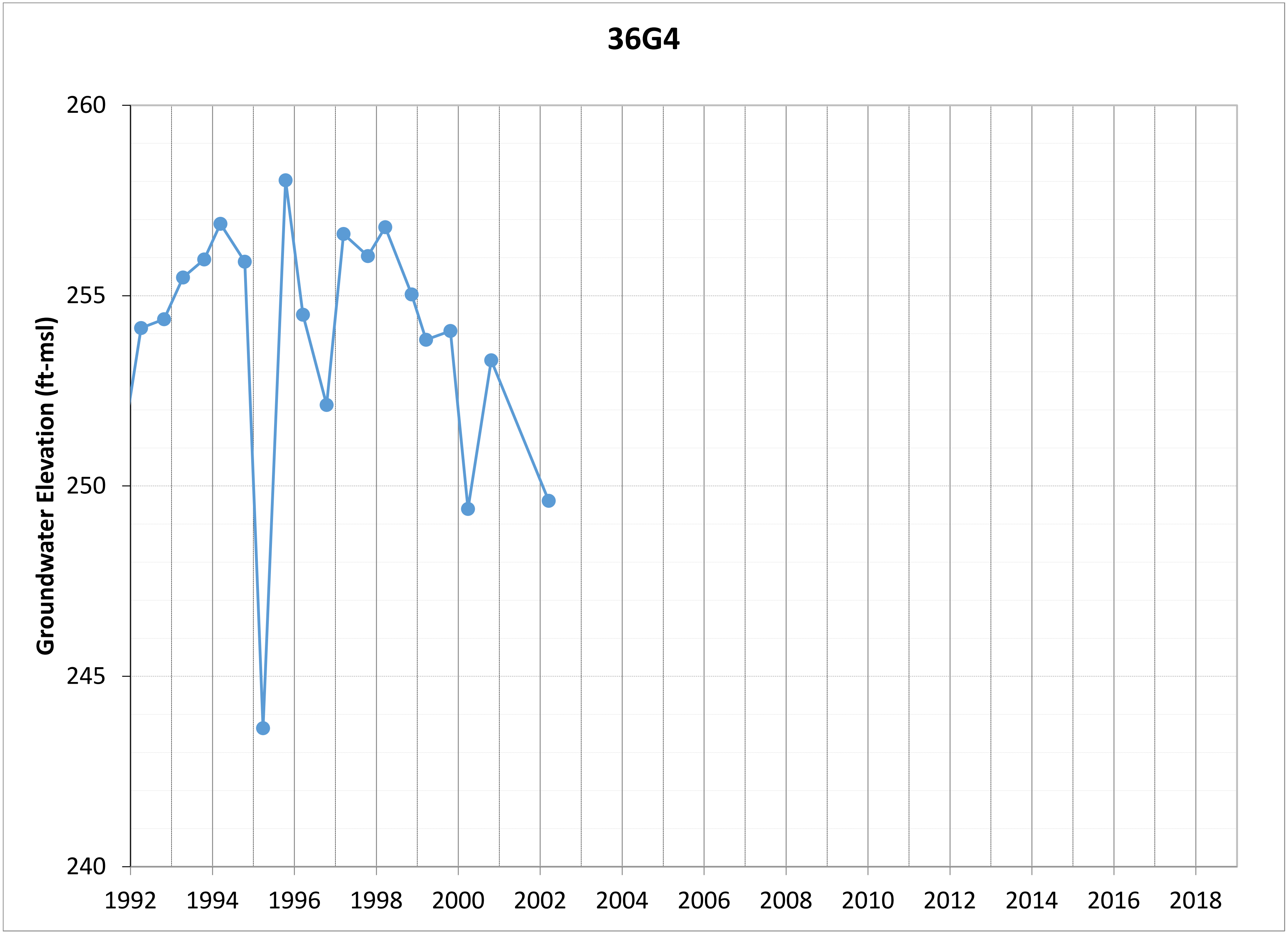


35N2
Groundwater Elevation (ft-msl)
290
285
280
275
270
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

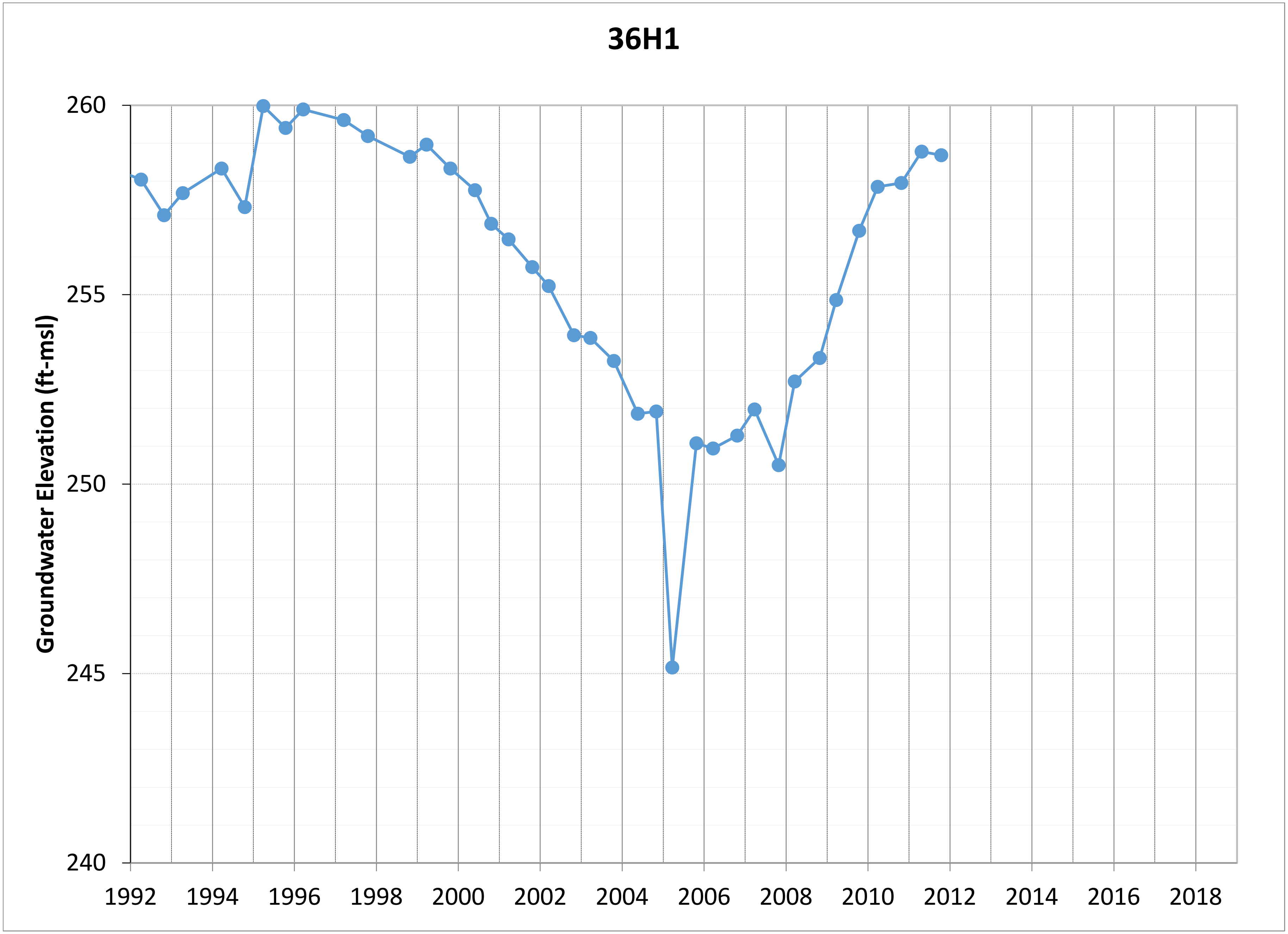

36C3
GW Elev (ft msl)
300
280
260
240
220
200
180
160
140
120
100
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Date

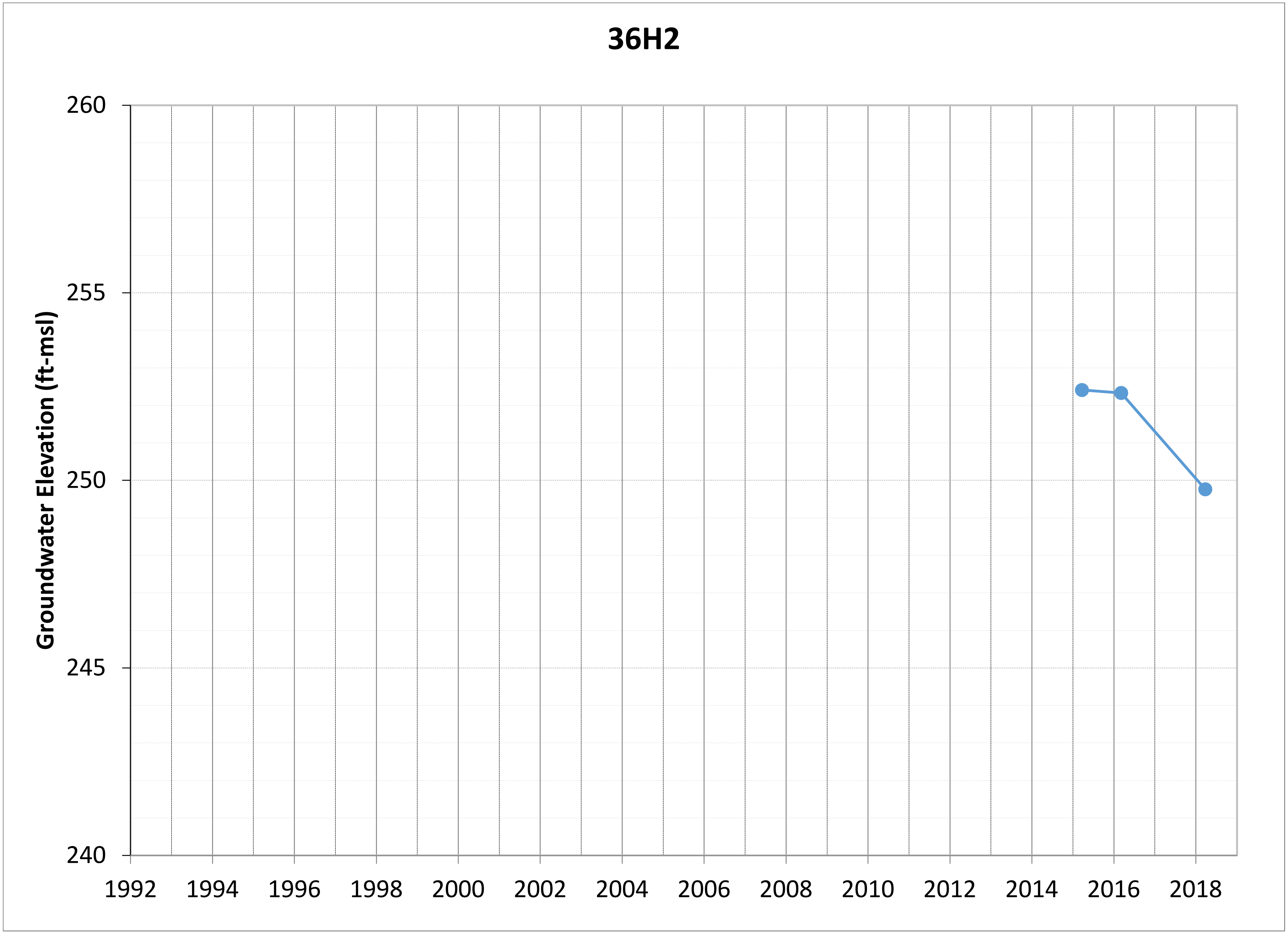


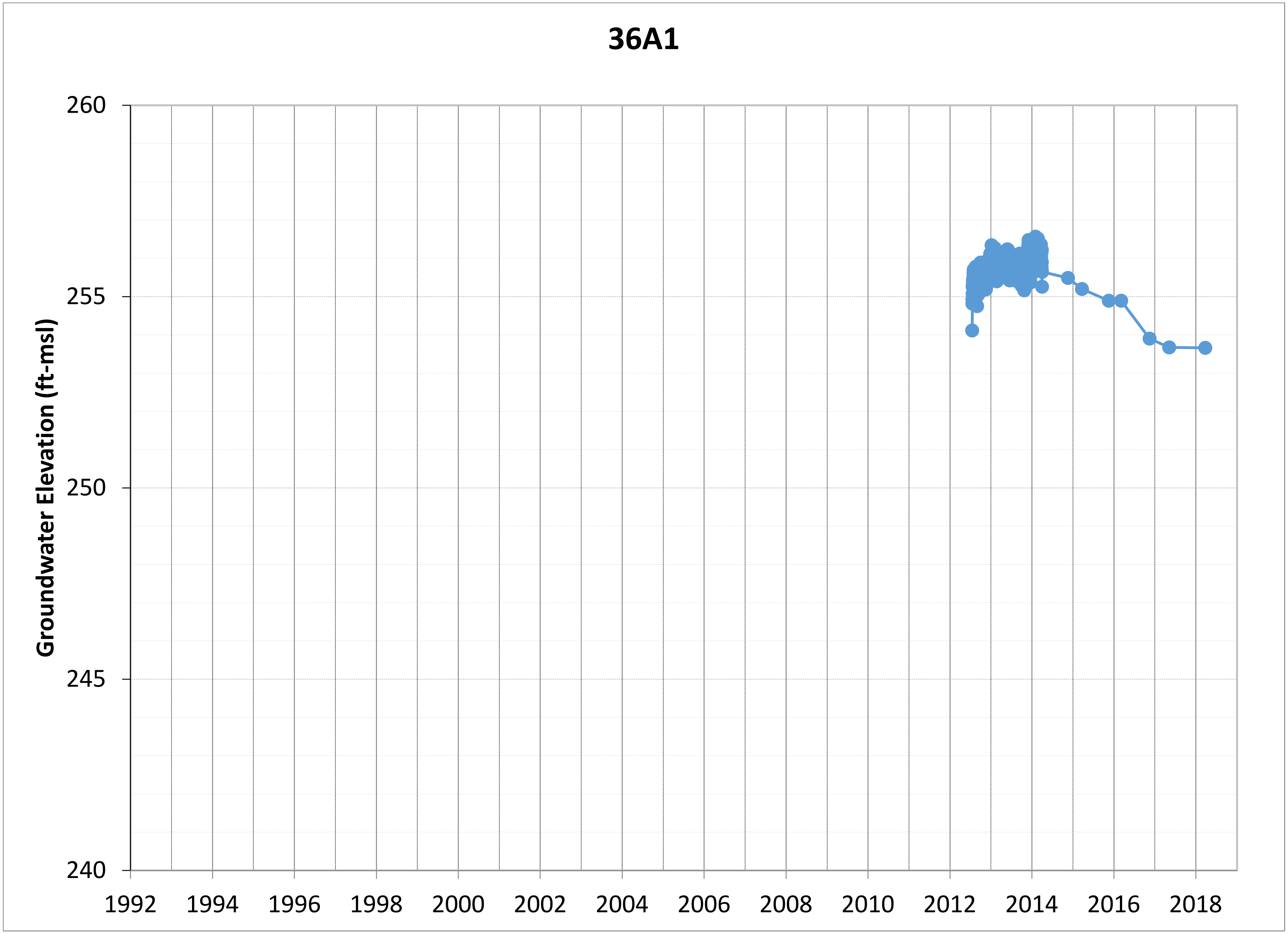
36D2
Groundwater Elevation (ft-msl)
280
275
270
265
260
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018



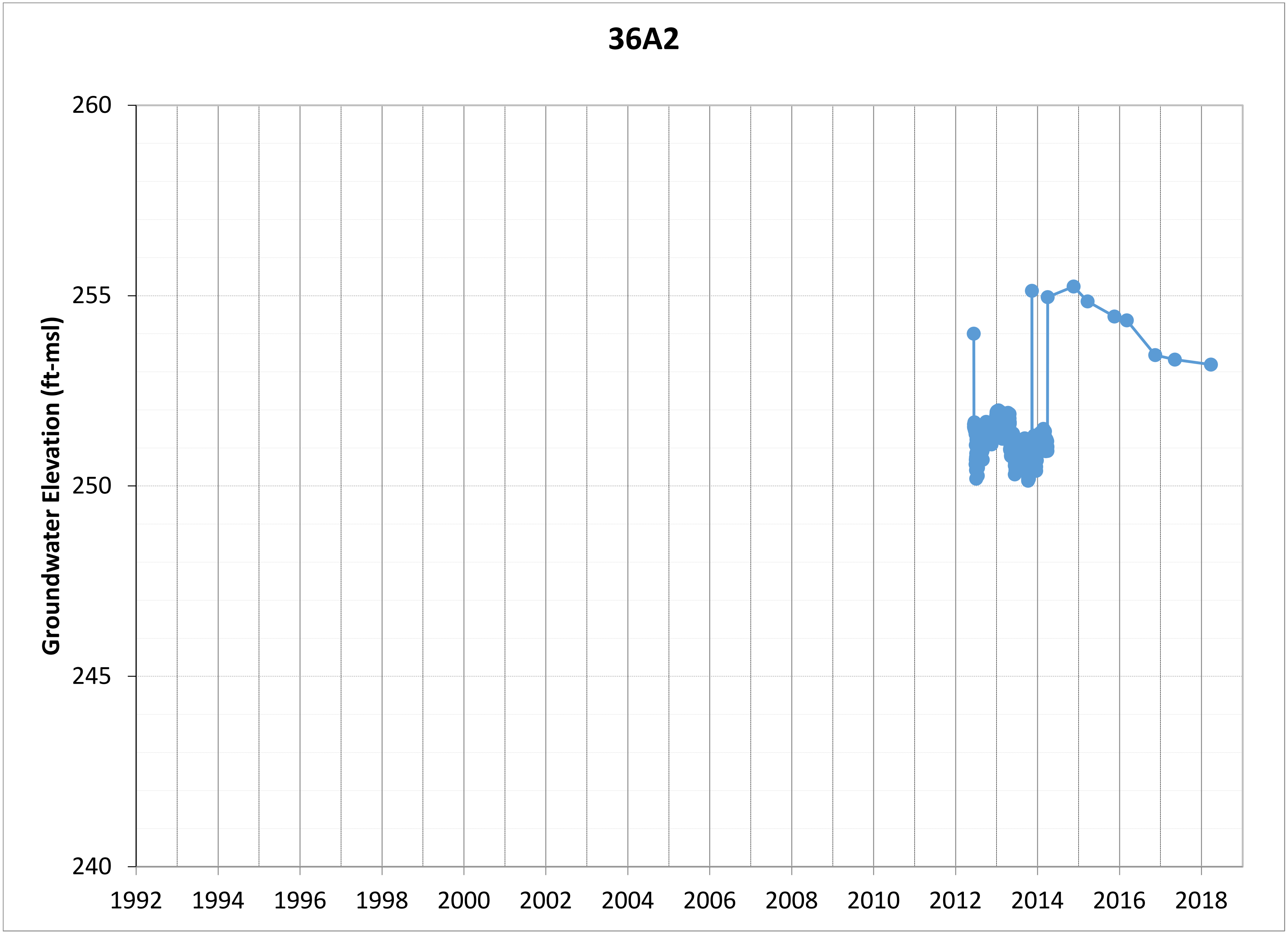
36G4
Groundwater Elevation (ft-msl)
260
255
250
245
240
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018


36H1
Groundwater Elevation (ft-msl)
260
255
250
245
240
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

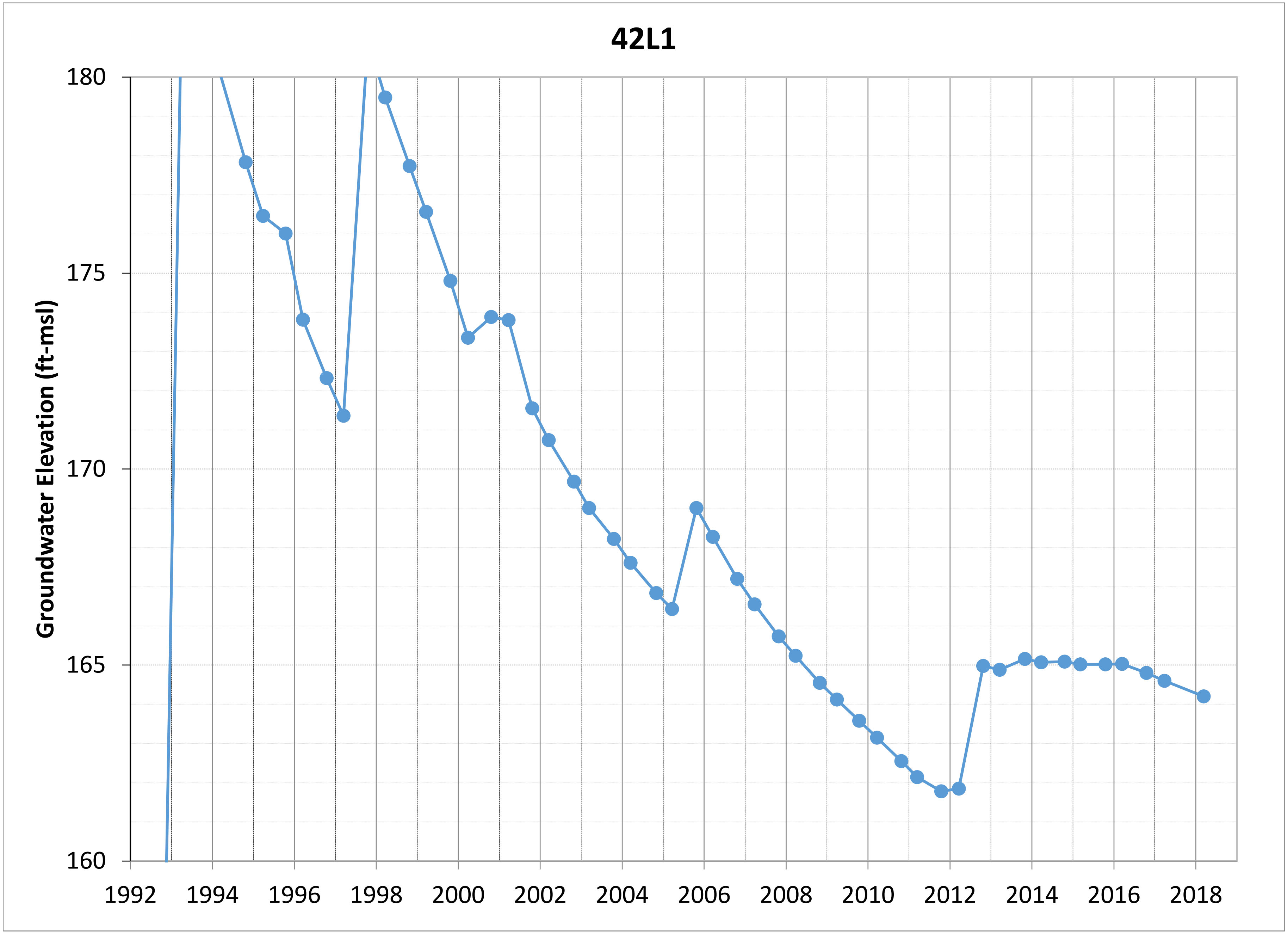

36H2
Groundwater Elevation (ft-msl)
260
255
250
245
240
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

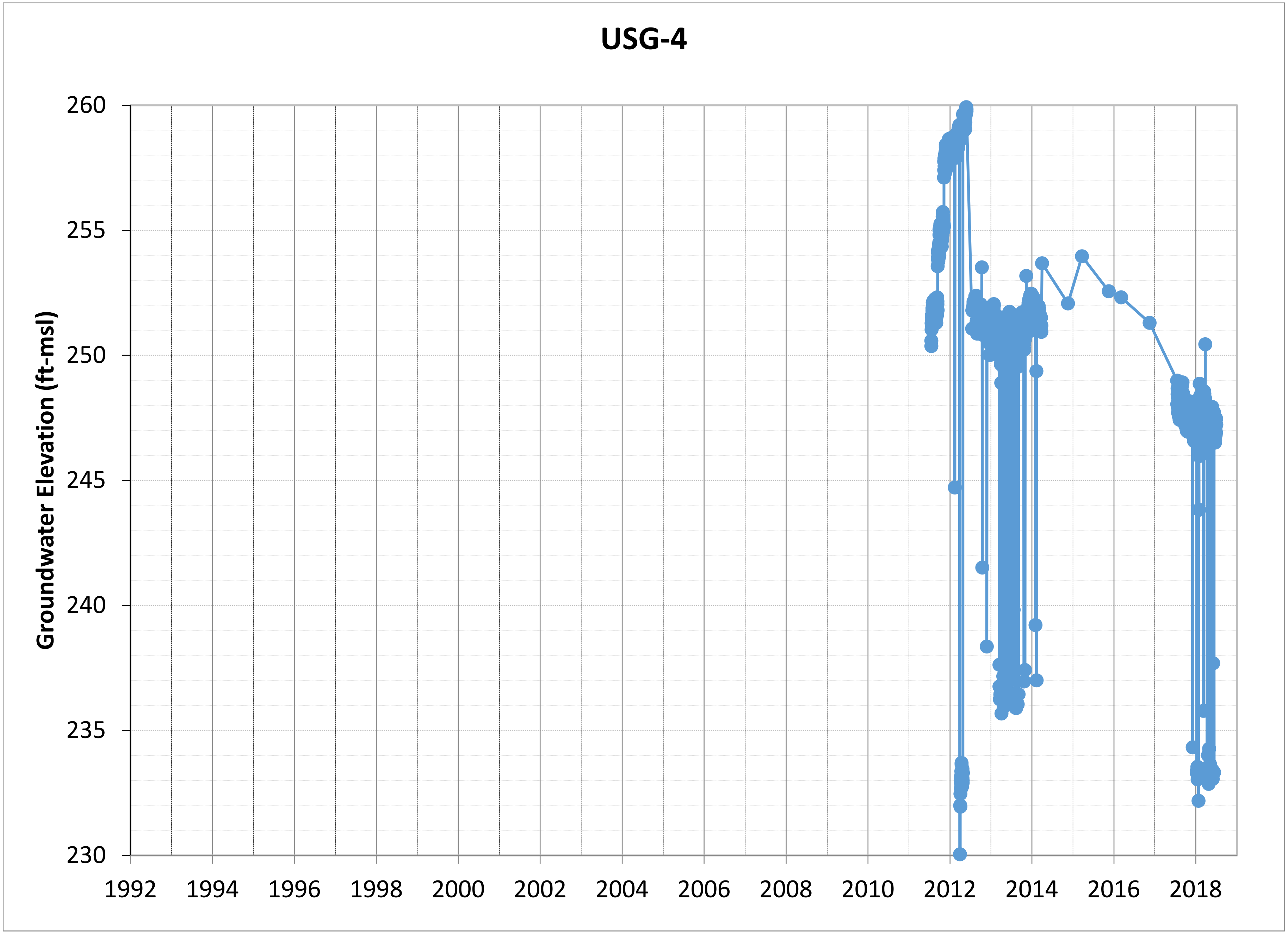


36A1
Groundwater Elevation (ft-msl)
260
255
250
245
240
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

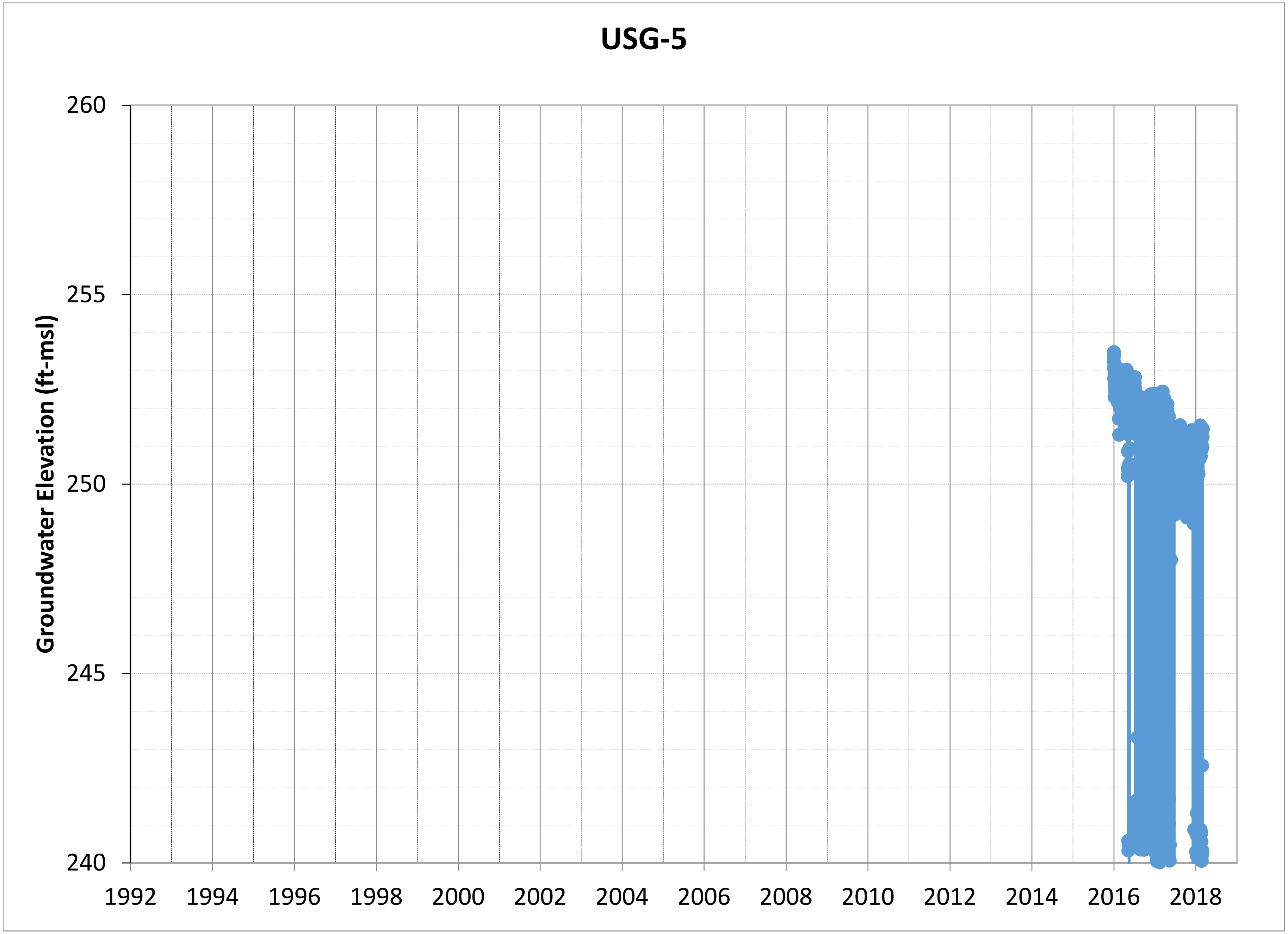


36A2
Groundwater Elevation (ft-msl)
260
255
250
245
240
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

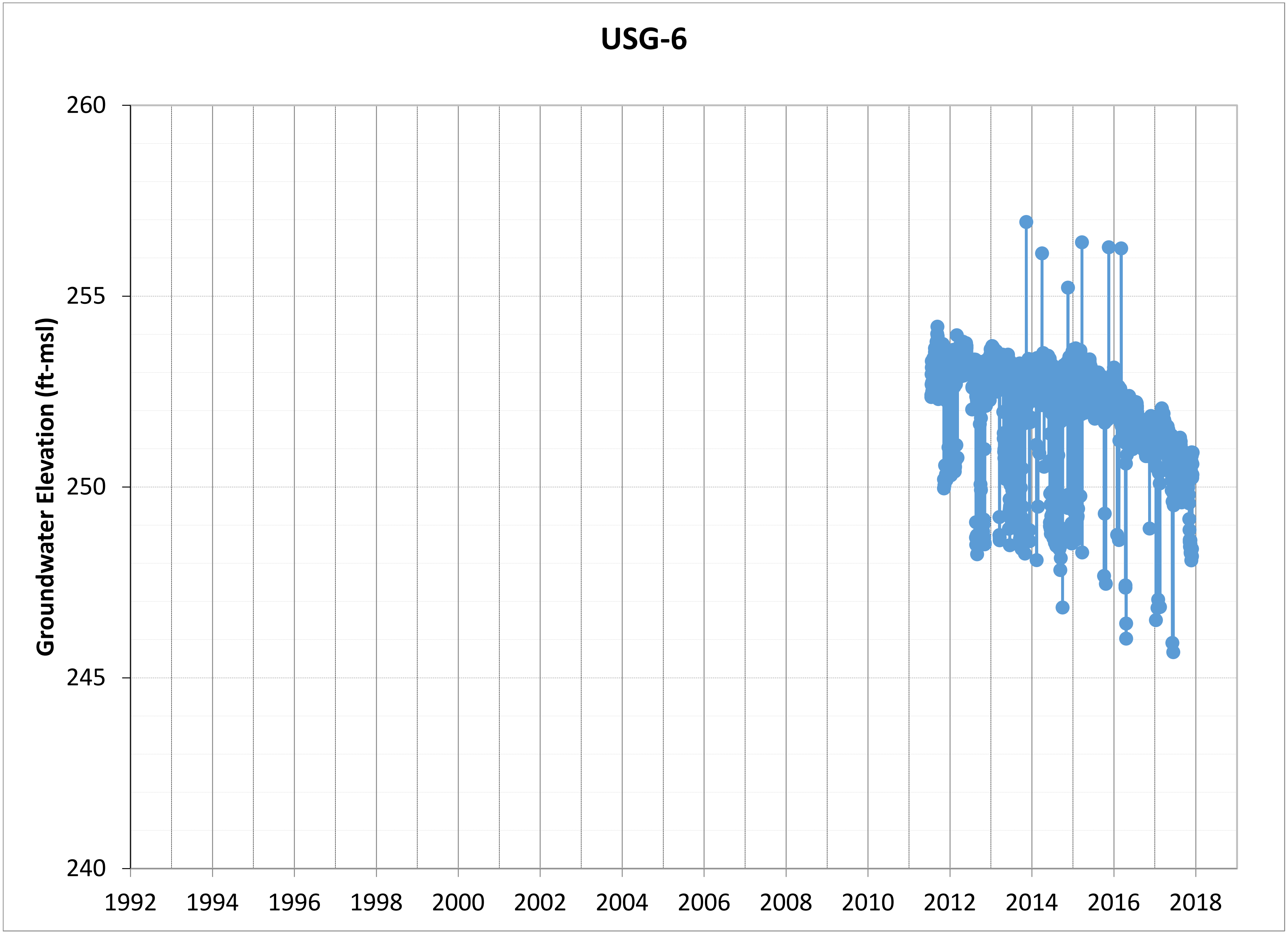

42L1
Groundwater Elevation (ft-msl)
180
175
170
165
160
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018



USG-4
Groundwater Elevation (ft-msl)
260
255
250
245
240
235
230
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018



USG-5
Groundwater Elevation (ft-msl)
260
255
250
245
240
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018


USG-6
Groundwater Elevation (ft-msl)
260
255
250
245
240
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

# APPENDIX B: Water Quality Results and Statistical Analyses

Table C-1. Alkalinity results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Alkalinity | 122 | 173 | | 126 | | | 131 | | 109 | | | 131 | 157 | 107 | 218 | | | |
| Mar-10 | Alkalinity | 112 | 177 | | 118 | | | 114 | | 108 | | | 128 | 148 | 102 | 217 | | | |
| Apr-11 | Alkalinity | 124 | 177 | | 121 | | | 114 | | 107 | | | 128 | 150 | 102 | 234 | | | |
| Mar-12 | Alkalinity | 113 | 184 | 97.7 | | | | 113 | | 106 | | | 128 | | 103 | 219 | | | |
| Feb-13 | Alkalinity | 126 | 169 | 99.2 | 122 | | | 113 | 108 | 107 | | | | | | 208 | | | |
| Apr-14 | Alkalinity | 124 | 180 | 98.6 | 121 | | | 113 | 108 | 105 | | | 128 | | 99.6 | 210 | | | |
| Mar-15 | Alkalinity | 122 | 203 | 98 | | | | | 108 | 103 | | | | | | | | | |
| Mar-16 | Alkalinity | 124 | 201 | 99 | 120 | | 126 | 112 | 109 | 105 | 98.6 | 120 | 128 | | | 205 | 123 | 102 | 112 |
| May-17 | Alkalinity | 121 | 193 | 97 | 117 | | 130 | 115 | 115 | 103 | 98.4 | 121 | 127 | | | 194 | | 103 | 110 |
| Mar-18 | Alkalinity | | | | | | | | | | | | | | | | | | |
| | Mean | 120.9 | 184.1 | 98.3 | 120.7 | | 128.0 | 115.6 | 109.6 | 105.9 | 98.5 | 120.5 | 128.3 | 151.7 | 102.7 | 213.1 | 123.0 | 102.5 | 111.0 |

Table C-2. Bicarbonate results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Bicarbonate | 146 | 178 | | 147 | | | 142 | | 127 | | | 152 | 174 | 120 | 254 | | | |
| Mar-10 | Bicarbonate | 128 | 188 | | 139 | | | 136 | | 127 | | | 152 | 170 | 120 | 262 | | | |
| Apr-11 | Bicarbonate | 141 | 181 | | 144 | | | 128 | | 122 | | | 144 | 172 | 115 | 270 | | | |
| Mar-12 | Bicarbonate | 132 | 192 | 113 | | | | 132 | | 123 | | | 150 | | 121 | 262 | | | |
| Feb-13 | Bicarbonate | 148 | 150 | 114 | 140 | | | 132 | 128 | 123 | | | | | | 241 | | | |
| Apr-14 | Bicarbonate | 145 | 180 | 110 | 142 | | | 127 | 126 | 120 | | | 147 | | 116 | 243 | | | |
| Mar-15 | Bicarbonate | 136 | 226 | 108 | | | | | 124 | 120 | | | | | | | | | |
| Mar-16 | Bicarbonate | 145 | 214 | 113 | 136 | | 144 | 129 | 123 | 121 | 107 | 140 | 151 | | | 232 | 140 | 118 | 131 |
| May-17 | Bicarbonate | 144 | 206 | 107 | 127 | | 148 | 129 | 115 | 122 | 104 | 139 | 149 | | | 230 | | 121 | 128 |
| Mar-18 | Bicarbonate | | | | | | | | | | | | | | | | | | |
| | Mean | 140.6 | 190.6 | 110.8 | 139.3 | | 146.0 | 131.9 | 123.2 | 122.8 | 105.5 | 139.5 | 149.3 | 172.0 | 118.4 | 249.3 | 140.0 | 119.5 | 129.5 |

Table C-3. Boron results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Boron | 158 | 727 | | 202 | | | 372 | | 238 | | | 485 | 764 | 204 | 1360 | | | |
| Mar-10 | Boron | 176 | 766 | | 208 | | | 374 | | 256 | | | 358 | 475 | 191 | 1500 | | | |
| Apr-11 | Boron | 167 | 718 | | 203 | | | 362 | | 247 | | | 504 | 729 | 197 | 1610 | | | |
| Mar-12 | Boron | 166 | 761 | 421 | | | | 347 | | 262 | | | 499 | | 192 | 1270 | | | |
| Feb-13 | Boron | 146 | 754 | 396 | 184 | | | 342 | 235 | 254 | | | | | | 1010 | | | |
| Apr-14 | Boron | 166 | 763 | 423 | 204 | | | 378 | 231 | 266 | | | 501 | | 200 | 1030 | | | |
| Mar-15 | Boron | 176 | 818 | 402 | | | | | 229 | 258 | | | | | | | | | |
| Mar-16 | Boron | 172 | 840 | 420 | 200 | | 279 | 373 | 236 | 257 | 195 | 243 | 508 | | | 938 | 470 | 209 | 220 |
| May-17 | Boron | 176 | 865 | 428 | 211 | | 284 | 396 | 231 | 279 | 200 | 261 | 519 | | | 864 | | 219 | 236 |
| Mar-18 | Boron | 179 | 834 | 381 | 219 | 253 | 287 | 405 | 233 | 284 | 198 | 254 | | 517 | | 221 | 843 | | 459 |
| | Mean | 168.2 | 784.6 | 410.1 | 203.9 | 253.0 | 283.3 | 372.1 | 232.5 | 260.1 | 197.7 | 252.7 | 482.0 | 621.3 | 196.8 | 1089.2 | 656.5 | 214.0 | 305.0 |

Table C-4. Calcium results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Calcium | 18.7 | 3.62 | 12 | 23.3 | | | 36.1 | | 8 | | | 18 | 7.36 | 18.4 | 36.3 | | | |
| Mar-10 | Calcium | 18.9 | 2.96 | 11.5 | 21.3 | | | 34.7 | | 7.91 | | | 16.9 | 6.66 | 18.2 | 55.8 | | | |
| Apr-11 | Calcium | 19.4 | 2.87 | 11.6 | 22.1 | | | 37 | | 7.2 | | | 17.7 | 7.12 | 19.4 | 60.7 | | | |
| Mar-12 | Calcium | 19.7 | 3.73 | 11.6 | 0 | | | 36.3 | | 8.15 | | | 17.9 | | 20.6 | 34.1 | | | |
| Feb-13 | Calcium | 18.7 | 2.17 | 11.8 | 20.2 | | | 37.8 | 21.3 | 8.97 | | | | | | 22.7 | | | |
| Apr-14 | Calcium | 19.5 | 3.01 | 11.2 | 20.7 | | | 39.9 | 18.1 | 8.39 | | | 17.4 | | 21.1 | 21.2 | | | |
| Mar-15 | Calcium | 20.7 | 5.27 | 12.2 | | | | | 21.6 | 8.56 | | | | | | | | | |
| Mar-16 | Calcium | 21.4 | | 12.1 | | | | | | | 6.76 | 34.5 | | | | 18.6 | 19.4 | 24.5 | 22.4 |
| May-17 | Calcium | 20.4 | 3.66 | 11.9 | 20.9 | | 20.5 | 43.2 | 12.4 | 8.39 | 6.25 | 33.5 | 18 | | | 14.7 | | 23.1 | 22.1 |
| Mar-18 | Calcium | 18.6 | 3.36 | 10.1 | 19.6 | 26.1 | 19.9 | 42.7 | 16.9 | 8.62 | 5.99 | 30.9 | | 17.5 | | 21.6 | 13.1 | | 17.2 |
| | Mean | 19.6 | 3.4 | 11.6 | 18.5 | 26.1 | 20.2 | 38.5 | 18.1 | 8.2 | 6.3 | 33.0 | 17.7 | 9.7 | 19.5 | 31.7 | 16.3 | 23.8 | 20.6 |

Table C-5. Carbonate results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Carbonate | | 11 | | | | | | | | | | | | | | | | |
| Mar-10 | Carbonate | 1.2 | 8.9 | | 0.9 | | | 0.6 | | 0.8 | | | 1.3 | 2.1 | 1.2 | 0.8 | | | |
| Apr-11 | Carbonate | 0.7 | 7.6 | | 0.7 | | | 0.6 | | 1.1 | | | 0.9 | 0.7 | 0.7 | 0.9 | | | |
| Mar-12 | Carbonate | 0.9 | 10.7 | 1.8 | | | | | | 0.8 | | | 1 | | 0.8 | 0.8 | | | |
| Feb-13 | Carbonate | 1 | 25.7 | 2 | 1.1 | | | 0.6 | 1.1 | 0.8 | | | | | | 1.4 | | | |
| Apr-14 | Carbonate | 1 | 13.9 | 2.5 | 1 | | | 0.6 | 1.3 | 1.3 | | | 1.1 | | 0.9 | 1.2 | | | |
| Mar-15 | Carbonate | 0.9 | 7.2 | 1.7 | | | | | 0.6 | 0.9 | | | | | | | | | |
| Mar-16 | Carbonate | 0.9 | 10.9 | 1.4 | 0.7 | | 0.8 | 0.6 | 0.8 | 1 | 4 | 0.5 | 1.2 | | | 1.6 | 0.9 | 0.6 | 0.7 |
| May-17 | Carbonate | 0.8 | 7 | 1.6 | 0.5 | | 0.6 | 0.5 | 4 | 0.7 | 5.1 | 0.6 | 0.9 | | | 1.4 | | 0.7 | 0.8 |
| Mar-18 | Carbonate | | | | | | | | | | | | | | | | | | |
| | Mean | 0.9 | 11.4 | 1.8 | 0.8 | | 0.7 | 0.6 | 1.6 | 0.9 | 4.6 | 0.6 | 1.1 | 1.4 | 0.9 | 1.2 | 0.9 | 0.7 | 0.8 |

Table C-6. Chloride results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Chloride | 42.8 | 382 | | 69.2 | | | 170 | | 66.3 | | | 83.8 | 79.2 | 64.2 | 268 | | | |
| Mar-10 | Chloride | 60.9 | 393 | | 62.5 | | | 179 | | 68.5 | | | 84.6 | 82.9 | 66.9 | 393 | | | |
| Apr-11 | Chloride | 41.7 | 388 | | 67 | | | 188 | | 69.3 | | | 96.3 | 81.1 | 67.7 | 417 | | | |
| Mar-12 | Chloride | 60.6 | 392 | 95.9 | | | | 181 | | 69.1 | | | 85.4 | | 71.8 | 262 | | | |
| Feb-13 | Chloride | 41.7 | 394 | 95.4 | 58.8 | | | 189 | 62.2 | 70.4 | | | | | | 196 | | | |
| Apr-14 | Chloride | 43.7 | 403 | 93.6 | 58.2 | | | 191 | 56.2 | 70.8 | | | 82 | | 76.6 | 183 | | | |
| Mar-15 | Chloride | 46.9 | 398 | 92 | | | | | 63.6 | 72.2 | | | | | | | | | |
| Mar-16 | Chloride | 44.1 | 394 | 92.7 | 58.3 | | 71.7 | 198 | 58.2 | 71.5 | 59.5 | 108 | 82.5 | | | 152 | 83 | 82.3 | 68.2 |
| May-17 | Chloride | 47.8 | 408 | 94.8 | 56.9 | | 70.7 | 206 | 57.4 | 70.7 | 58.5 | 118 | 81.7 | | | 130 | | 76.9 | 67.3 |
| Mar-18 | Chloride | 44.7 | 410 | 84 | 57.2 | 81.3 | 71.1 | 202 | 56.4 | 71.9 | 58.4 | 115 | | 82.1 | | 74.7 | 116 | | 78.8 |
| | Mean | 47.5 | 396.2 | 92.6 | 61.0 | 81.3 | 71.2 | 189.3 | 59.0 | 70.1 | 58.8 | 113.7 | 85.2 | 81.3 | 69.4 | 230.6 | 99.5 | 79.6 | 71.4 |

Table C-7. Conductivity results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Conductivity | 497 | 2070 | | 640 | | | 915 | | 515 | | | 610 | 610 | 498 | 1540 | | | |
| Mar-10 | Conductivity | 540 | 2100 | | 528 | | | 883 | | 513 | | | 600 | 600 | 500 | 1910 | | | |
| Apr-11 | Conductivity | 484 | 2100 | | 545 | | | 880 | | 507 | | | 610 | 602 | 490 | 2100 | | | |
| Mar-12 | Conductivity | 545 | 2140 | 835 | | | | 915 | | 511 | | | 612 | | 530 | 1480 | | | |
| Feb-13 | Conductivity | 540 | 2350 | 903 | | | | 1000 | 480 | 550 | | | | | | 1360 | | | |
| Apr-14 | Conductivity | 485 | 2240 | 830 | 510 | | | 960 | 468 | 513 | | | 610 | | 530 | 1230 | | | |
| Mar-15 | Conductivity | 496 | 2340 | 841 | | | | | 490 | | | | | | | | | | |
| Mar-16 | Conductivity | 483.5 | 2330 | 836.5 | 508 | | 593.5 | 979.5 | 472.5 | 510 | 488 | 710.5 | 604.5 | | | 1105 | 603 | 569 | 521 |
| May-17 | Conductivity | 542.5 | 2275 | 828.5 | 508 | | 594.5 | 999.5 | 470 | 519.5 | 488.5 | 717.5 | 602.5 | | | 979 | | 560.5 | 524.5 |
| Mar-18 | Conductivity | 514 | 2160 | 708 | 488 | 600 | 602 | 1010 | 469 | 522 | 487 | 702 | | 606 | | 542 | 942 | | 588 |
| | Mean | 512.7 | 2210.5 | 826.0 | 532.4 | 600.0 | 596.7 | 949.1 | 474.9 | 517.8 | 487.8 | 710.0 | 607.0 | 604.5 | 509.6 | 1360.7 | 772.5 | 564.8 | 544.5 |

Table C-8. Fluoride results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Fluoride | 0.48 | 1.56 | | 0.75 | | | 0.87 | | 1.72 | | | 1.61 | 2.77 | 0.63 | 1.52 | | | |
| Mar-10 | Fluoride | 0.56 | 1.69 | | 0.81 | | | 0.85 | | 1.77 | | | 1.69 | 2.93 | 0.67 | 1.53 | | | |
| Apr-11 | Fluoride | 0.52 | 1.59 | | 0.79 | | | 0.83 | | 1.69 | | | 1.61 | 2.81 | 0.67 | 1.43 | | | |
| Mar-12 | Fluoride | 0.52 | 1.59 | 0.98 | 0 | | | 0.81 | | 1.71 | | | 1.61 | | 0.65 | 1.67 | | | |
| Feb-13 | Fluoride | 0.45 | 1.63 | 0.96 | 0.74 | | | 0.8 | 0.75 | 1.79 | | | | | | 1.8 | | | |
| Apr-14 | Fluoride | 0.53 | 1.61 | 1.02 | 0.78 | | | 0.87 | 0.77 | 1.89 | | | 1.7 | | 0.64 | 2.28 | | | |
| Mar-15 | Fluoride | 0.48 | 1.48 | 0.94 | | | | | 0.73 | 2 | | | | | | | | | |
| Mar-16 | Fluoride | 0.52 | 1.48 | 0.97 | 0.74 | | 0.89 | 0.78 | 0.76 | 1.88 | 0.73 | 0.6 | 1.79 | | | 2.25 | 1.29 | 0.66 | 0.74 |
| May-17 | Fluoride | 0.47 | 1.51 | 0.97 | 0.72 | | 0.85 | 0.77 | 0.67 | 1.8 | 0.69 | 0.61 | 1.71 | | | 2.36 | | 0.62 | 0.71 |
| Mar-18 | Fluoride | 0.46 | 1.54 | 0.87 | 0.71 | 0.69 | 0.83 | 0.72 | 0.7 | 1.78 | 0.72 | 0.6 | | 1.7 | | 0.6 | 2.34 | | 1.23 |
| | Mean | 0.5 | 1.6 | 1.0 | 0.7 | 0.7 | 0.9 | 0.8 | 0.7 | 1.8 | 0.7 | 0.6 | 1.7 | 2.6 | 0.7 | 1.7 | 1.8 | 0.6 | 0.9 |

Table C-9. Iron results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Iron | 3 | 130 | | 13 | | | 26.6 | | 14 | | | 34 | 3.4 | 7.7 | 27.3 | | | |
| Mar-10 | Iron | 6 | 6 | | 17 | | | 79.1 | | 28 | | | 4 | 6 | 4 | 73.9 | | | |
| Apr-11 | Iron | 3 | 15 | | 3 | | | 49 | | 101 | | | 8 | 3.2 | | 119 | | | |
| Mar-12 | Iron | 3.2 | 6.4 | 3.2 | 0 | | | 61.1 | | 16.4 | | | 5.7 | | 13.5 | 57.7 | | | |
| Feb-13 | Iron | 6.9 | 13.8 | 4 | 13.4 | | | 65.6 | 13.4 | 108 | | | | | | 96.6 | | | |
| Apr-14 | Iron | | 8 | 4 | 9.8 | | | 57.8 | 31.1 | 24.4 | | | 8.5 | | 6.6 | 83.1 | | | |
| Mar-15 | Iron | 42.3 | 9 | | | | | | 10.3 | 12.9 | | | | | | | | | |
| Mar-16 | Iron | 6.2 | | | 15.9 | | | 66.5 | 12.3 | 53.7 | | 190 | | | | 22 | | 5 | |
| May-17 | Iron | 6.6 | 12.2 | | 17 | | | 42.2 | 71.7 | 11.6 | | | | | | 65 | | | |
| Mar-18 | Iron | | | | 21.5 | | | 73 | 75 | 23.4 | | | | | | 12.4 | 87.1 | | |
| | Mean | 9.7 | 25.1 | 3.7 | 12.3 | | | 57.9 | 35.6 | 39.3 | | 190.0 | 12.0 | 4.2 | 8.0 | 61.9 | 87.1 | 5.0 | |

Table C-10. Magnesium results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Magnesium | 4.16 | 1.59 | 3.84 | 5.58 | | | 11 | | 1.51 | | | 3.17 | 4.41 | 3.98 | 13.4 | | | |
| Mar-10 | Magnesium | 3.67 | 1.31 | 3.36 | 4.56 | | | 11.2 | | 1.51 | | | 2.76 | 1.24 | 3.5 | 21 | | | |
| Apr-11 | Magnesium | 4.2 | 1.28 | 3.7 | 5 | | | 12 | | 1.46 | | | 3.07 | 1.39 | 3.98 | 22.8 | | | |
| Mar-12 | Magnesium | 4.27 | 1.57 | 3.72 | | | | 11.7 | | 1.65 | | | 3.16 | | 4.27 | 12.3 | | | |
| Feb-13 | Magnesium | 4.27 | 0.897 | 3.82 | 4.71 | | | 12.2 | 5.38 | 1.79 | | | | | | 8.63 | | | |
| Apr-14 | Magnesium | 4.31 | 1.38 | 3.69 | 4.7 | | | 12.8 | 4.84 | 1.66 | | | 3.12 | | 4.39 | 7.6 | | | |
| Mar-15 | Magnesium | 4.55 | 2.04 | 3.8 | | | | | 5.25 | 1.68 | | | | | | | | | |
| Mar-16 | Magnesium | 4.38 | | 3.65 | | | | | | | 0.575 | 8.01 | | | | 6.26 | 3.28 | 4.57 | 4.17 |
| May-17 | Magnesium | 4.2 | 1.7 | 3.53 | 4.66 | | 4.05 | 13.2 | 3.55 | 1.64 | 0.506 | 7.79 | 2.97 | | | 5.01 | | 4.28 | 3.91 |
| Mar-18 | Magnesium | 4.05 | 1.77 | 3.13 | 4.54 | 5.17 | 3.81 | 14.6 | 4.55 | 1.66 | 0.46 | 7.9 | | 2.98 | | 4.3 | 4.82 | | 3.07 |
| | Mean | 4.2 | 1.5 | 3.6 | 4.8 | 5.2 | 3.9 | 12.3 | 4.7 | 1.6 | 0.5 | 7.9 | 3.0 | 2.5 | 4.0 | 11.3 | 4.1 | 4.4 | 3.7 |

Table C-11. pH results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | pH | 8 | 8.8 | | 7.8 | | | 7.7 | | 8.1 | | | 8 | 8.1 | 8 | 7.7 | | | |
| Mar-10 | pH | 8.1 | 8.8 | | 8 | | | 7.8 | | 8 | | | 8.1 | 8.2 | 8.2 | 7.6 | | | |
| Apr-11 | pH | 7.9 | 8.8 | | 7.9 | | | 7.8 | | 8.2 | | | 8 | 8.1 | 8 | 7.6 | | | |
| Mar-12 | pH | 8 | 8.8 | 8.4 | | | | 7.9 | | 8 | | | 8 | | 8 | 7.6 | | | |
| Feb-13 | pH | 8 | 9.3 | 8.4 | 8.1 | | | 7.8 | 8.2 | 8 | | | | | | 7.9 | | | |
| Apr-14 | pH | 8.1 | 9 | 8.6 | 8.1 | | | 7.9 | 8.3 | 8.2 | | | 8.1 | | 8.1 | 7.9 | | | |
| Mar-15 | pH | 8.2 | 8.6 | 8.4 | | | | | 8.3 | 8.2 | | | | | | | | | |
| Mar-16 | pH | 8.1 | 8.8 | 8.5 | 8.2 | | 7.8 | 7.8 | 8.2 | 8.3 | 8.7 | 7.8 | 8 | | | 7.9 | 8 | 8 | 8 |
| May-17 | pH | 8 | 8.6 | 8.4 | 7.8 | | 7.8 | 7.8 | 8.7 | 8 | 9 | 7.9 | 8 | | | 8 | | 8.1 | 8.1 |
| Mar-18 | pH | 7.9 | 8.8 | 8.4 | 8 | 8 | 7.8 | 7.8 | 8.3 | 7.9 | 8.8 | 8 | | 8.1 | | 8 | 8.1 | | 8.1 |
| | Mean | 8.0 | 8.8 | 8.4 | 8.0 | 8.0 | 7.8 | 7.8 | 8.3 | 8.1 | 8.8 | 7.9 | 8.0 | 8.1 | 8.1 | 7.8 | 8.1 | 8.1 | 8.1 |

Table C-12. Potassium results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Potassium | 3.97 | 2.7 | 4.02 | 4.87 | | | 4.87 | | 3.27 | | | 4.18 | 2.53 | 4.44 | 4.58 | | | |
| Mar-10 | Potassium | 3.98 | 2.63 | 3.85 | 4.67 | | | 4.77 | | 3.38 | | | 3.98 | 2.36 | 4.21 | 5.28 | | | |
| Apr-11 | Potassium | 3.74 | 2.74 | 3.68 | 4.48 | | | 5.07 | | 3.22 | | | 3.92 | 2.42 | 4.17 | 5.49 | | | |
| Mar-12 | Potassium | 3.96 | 2.44 | 3.59 | | | | 4.89 | | 3.16 | | | 3.97 | | 4.35 | 4.2 | | | |
| Feb-13 | Potassium | 3.9 | 2.52 | 3.58 | 4.47 | | | 4.96 | 4.04 | 3.35 | | | | | | 3.47 | | | |
| Apr-14 | Potassium | 3.96 | 2.68 | 3.76 | 4.51 | | | 5.06 | 4.06 | 3.29 | | | 3.91 | | 4.46 | 3.46 | | | |
| Mar-15 | Potassium | 4.08 | 3.11 | 3.81 | | | | | 4.27 | 3.62 | | | | | | | | | |
| Mar-16 | Potassium | 4.22 | 3.19 | 3.89 | 4.82 | | 5.07 | 5.52 | 4.25 | 3.58 | 1.89 | 6.06 | 4.19 | | | 3.51 | 4.01 | 4.72 | 4.81 |
| May-17 | Potassium | 3.92 | 2.87 | 3.72 | 4.48 | | 4.82 | 5.27 | 3.85 | 3.41 | | | 3.97 | | | 3.12 | | | |
| Mar-18 | Potassium | 4.03 | 3.5 | 3.39 | 4.57 | 5.26 | 4.62 | 5.53 | 4.19 | 3.61 | 1.69 | 5.94 | | 4.08 | | 4.46 | 3.24 | | 4.09 |
| | Mean | 4.0 | 2.8 | 3.7 | 4.6 | 5.3 | 4.8 | 5.1 | 4.1 | 3.4 | 1.8 | 6.0 | 4.0 | 2.8 | 4.3 | 4.2 | 3.6 | 4.7 | 4.5 |

Table C-13. Sodium results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Sodium | 75 | 434 | 153 | 80.5 | | | 122 | | 88.5 | | | 99.5 | 119 | 75.7 | 265 | | | |
| Mar-10 | Sodium | 77 | 408 | 136 | 68.4 | | | 106 | | 83.9 | | | 90.4 | 104 | 73.2 | 276 | | | |
| Apr-11 | Sodium | 72.3 | 438 | 151 | 80.4 | | | 124 | | 90 | | | 99.8 | 118 | 73.9 | 335 | | | |
| Mar-12 | Sodium | 84.9 | 426 | 142 | | | | 118 | | 89.5 | | | 99.5 | | 79.7 | 247 | | | |
| Feb-13 | Sodium | 71.3 | 415 | 147 | 70.1 | | | 121 | 71.2 | 90.9 | | | | | | 218 | | | |
| Apr-14 | Sodium | 75.5 | 448 | 152 | 77.2 | | | 130 | 67.5 | 97 | | | 102 | | 78.1 | 221 | | | |
| Mar-16 | Sodium | 83.4 | | 156 | | | | | | | 96.2 | 98.1 | | | | 210 | 102 | 88 | 78.9 |
| May-17 | Sodium | 73.8 | 444 | 144 | 71.1 | | 94.4 | 130 | 74.9 | 93.6 | 91.7 | 94.4 | 98.6 | | | 183 | | 79.1 | 74.2 |
| Mar-18 | Sodium | 76.2 | 470 | 135 | 74.9 | 87.3 | 94.2 | 133 | 72.6 | 96.6 | 95.3 | 94 | | 104 | | 81.8 | 182 | | 97.7 |
| | Mean | 76.6 | 435.4 | 146.2 | 74.7 | 87.3 | 94.3 | 123.0 | 71.6 | 91.3 | 94.4 | 95.5 | 98.3 | 111.3 | 76.1 | 226.3 | 142.0 | 83.6 | 83.6 |

Table C-14. Sulfate results and upper confidence interval test (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Sulfate | 49.8 | 261 | | 40.5 | | | 47.4 | | 21.9 | | | 32.9 | 20.8 | 34.3 | 144 | | | |
| Mar-10 | Sulfate | 58.5 | 273 | | 38.7 | | | 44.8 | | 21.4 | | | 33.3 | 20.4 | 34.3 | 171 | | | |
| Apr-11 | Sulfate | 48.6 | 266 | | 37.6 | | | 44.2 | | 20.5 | | | 151 | 19.8 | 34 | 189 | | | |
| Mar-12 | Sulfate | 55.4 | 260 | 147 | | | | 42.8 | | 20.3 | | | 31.6 | | 33.5 | 146 | | | |
| Feb-13 | Sulfate | 49.5 | 281 | 152 | 35.5 | | | 46.6 | 30.7 | 21.6 | | | | | | 120 | | | |
| Apr-14 | Sulfate | 51.5 | 306 | 154 | 35.1 | | | 46.9 | 30.4 | 21.7 | | | 34.5 | | 36.3 | 119 | | | |
| Mar-15 | Sulfate | 52.5 | 306 | 146 | | | | | 31.8 | 21.4 | | | | | | | | | |
| Mar-16 | Sulfate | 52 | 300 | 147 | 39.4 | | 50.1 | 47.2 | 30.2 | 21 | 36.5 | 40.3 | 34.6 | | | 108 | 38 | 37.1 | 29.8 |
| May-17 | Sulfate | 52.6 | 301 | 150 | 39.6 | | 48.7 | 48.1 | 24.6 | 20.9 | 35.5 | 44.6 | 33.8 | | | 96.7 | | 37.1 | 29.5 |
| Mar-18 | Sulfate | 51.8 | 297 | 133 | 37.5 | 33.8 | 49.1 | 46.2 | 28.4 | 21.1 | 35.8 | 44.1 | | 34.2 | | 37 | 89.5 | | 36.3 |
| | Mean | 52.2 | 285.1 | 147.0 | 38.0 | 33.8 | 49.3 | 46.0 | 29.4 | 21.2 | 35.9 | 43.0 | 50.2 | 23.8 | 34.5 | 125.6 | 63.8 | 37.1 | 31.9 |

Table C-15. Total Dissolved Solids (mg/L)

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Total Dissolved Solids | 287 | 1210 | | 335 | | | 517 | | 302 | | | 359 | 365 | 305 | 910 | | | |
| Mar-10 | Total Dissolved Solids | 307 | 1200 | | 306 | | | 498 | | 300 | | | 349 | 346 | 304 | 1100 | | | |
| Apr-11 | Total Dissolved Solids | 280 | 1220 | | 325 | | | 525 | | 298 | | | 485 | 359 | 306 | 1220 | | | |
| Mar-12 | Total Dissolved Solids | 315 | 1210 | 486 | | | | 511 | | 303 | | | 359 | | 320 | 886 | | | |
| Feb-13 | Total Dissolved Solids | 284 | 1220 | 497 | 302 | | | 530 | 299 | 306 | | | | | | 739 | | | |
| Apr-14 | Total Dissolved Solids | 292 | 1290 | 499 | 309 | | | 543 | 284 | 314 | | | 360 | | 327 | 728 | | | |
| Mar-15 | Total Dissolved Solids | 297 | 1350 | 492 | | | | | 298 | 315 | | | | | | | | | |
| Mar-16 | Total Dissolved Solids | 280 | 1350 | 484 | 291 | | 356 | 559 | 271 | 303 | 298 | 399 | 362 | | | 654 | 362 | 334 | 309 |
| May-17 | Total Dissolved Solids | 298 | 1350 | 495 | 323 | | 353 | 567 | 283 | 300 | 303 | 412 | 357 | | | 594 | | 328 | 314 |
| Mar-18 | Total Dissolved Solids | 288 | 1310 | 439 | 304 | | | 565 | 274 | 305 | 291 | | 396 | 350 | | 323 | 564 | | 343 |
| | Mean | 292.8 | 1271.0 | 484.6 | 311.9 | | 354.5 | 535.0 | 284.8 | 304.6 | 297.3 | 405.5 | 378.4 | 355.0 | 312.4 | 794.9 | 463.0 | 331.0 | 322.0 |

Total

| Date | Chem | 11H3 | 24B1 | 24D1 | 25K2 | 25M2 | 26F1 | 30R1 | 31B1 | 34B1 | 36A1(MW-2B) | 36A2 (MW-2A) | 36C2 | 36D3 | 36H1 | 42A8 | USG-4 | USG-5 | USG-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-09 | Sample Value as a Percent Greater than Long Term Average | -2.0 | -4.8 | | 7.4 | | | -3.4 | | -0.9 | | | -5.1 | 2.8 | -2.4 | 14.5 | | | |
| Mar-10 | | 4.8 | -5.6 | | -1.9 | | | -6.9 | | -1.5 | | | -7.8 | -2.5 | -2.7 | 38.4 | | | |
| Apr-11 | | -4.4 | -4.0 | | 4.2 | | | -1.9 | | -2.2 | | | 28.2 | 1.1 | -2.0 | 53.5 | | | |
| Mar-12 | | 7.6 | -4.8 | 0.3 | | | | -4.5 | | -0.5 | | | -5.1 | | 2.4 | 11.5 | | | |
| Feb-13 | | -3.0 | -4.0 | 2.6 | -3.2 | | | -0.9 | 5.0 | 0.5 | | | | | | -7.0 | | | |
| Apr-14 | | -0.3 | 1.5 | 3.0 | -0.9 | | | 1.5 | -0.3 | 3.1 | | | -4.9 | | 4.7 | -8.4 | | | |
| Mar-15 | | 1.4 | 6.2 | 1.5 | | | | | 4.6 | 3.4 | | | | | | | | | |
| Mar-16 | | -4.4 | 6.2 | -0.1 | -6.7 | | 0.4 | 4.5 | -4.9 | -0.5 | 0.2 | -1.6 | -4.3 | | | -17.7 | -21.8 | 0.9 | -4.0 |
| May-17 | | 1.8 | 6.2 | 2.2 | 3.6 | | -0.4 | 6.0 | -0.6 | -1.5 | 1.9 | 1.6 | -5.6 | | | -25.3 | | -0.9 | -2.5 |
| Mar-18 | | -1.6 | 3.1 | -9.4 | -2.5 | | | 5.6 | -3.8 | 0.1 | -2.1 | -100.0 | 4.7 | -1.4 | | -59.4 | 21.8 | | 6.5 |
| | Number of Years with 20% increase | 0 | 0 | 0 | 0 | -- | 0 | 0 | 0 | 0 | 0 | 0 | **1** | **0** | **0** | **2** | 1 | **0** | 0 |

# APPENDIX C: Pumping Data 2017-2018

| Pumping per week by Well | | | | |
|---|---|---|---|---|
| | Total Pumping (AF) | Pumping (Gallons) | | |
| | | USG-4 | USG-5 | USG-6 |
| 1/2/2017 | | 27012968 | 28997132.0 | 98234745 |
| Acreft/wk | **6** | 2.0 | 1.8 | 1.8 |
| 1/9/2017 | | 27095048 | 29926199.0 | 99162360 |
| Acreft/wk | **6** | 0.3 | 2.9 | 2.8 |
| 1/16/2017 | | 27095048 | 30889868 | 100052481 |
| Acreft/wk | **6** | 0.0 | 3.0 | 2.7 |
| 1/23/2017 | | 27095048 | 31976148 | 101045842 |
| Acreft/wk | **6** | 0.0 | 3.3 | 3.0 |
| 1/30/2017 | | 27095048 | 33118094 | 102104544 |
| Acreft/wk | **7** | 0.0 | 3.5 | 3.2 |
| 2/6/2017 | | 27095048 | 34314973 | 103225103 |
| Acreft/wk | **7** | 0.0 | 3.7 | 3.4 |
| 2/13/2017 | | 27228149 | 35056637 | 103920298 |
| Acreft/wk | **5** | 0.4 | 2.3 | 2.1 |
| 2/20/2017 | | 28011933 | 35729320 | 104638128 |
| Acreft/wk | **7** | 2.4 | 2.1 | 2.2 |
| 2/27/2017 | | 28275369 | 35986851 | 104933143 |
| Acreft/wk | **3** | 0.8 | 0.8 | 0.9 |
| 3/6/2017 | | 28957694 | 36622355 | 105600320 |
| Acreft/wk | **6** | 2.1 | 2.0 | 2.0 |
| 3/13/2017 | | 29730799 | 37341710 | 106323775 |
| Acreft/wk | **7** | 2.4 | 2.2 | 2.2 |
| 3/20/2017 | | 30585128 | 38059251 | 107112349 |
| Acreft/wk | **7** | 2.6 | 2.2 | 2.4 |
| 3/27/2017 | | 31402370 | 38808047 | 107894790 |
| Acreft/wk | **7** | 2.5 | 2.3 | 2.4 |
| 4/3/2017 | | 32228597 | 39504569 | 108638596 |
| Acreft/wk | **7** | 2.5 | 2.1 | 2.3 |
| 4/10/2017 | | 33029604 | 40278972 | 109387930 |
| Acreft/wk | **7** | 2.5 | 2.4 | 2.3 |
| 4/17/2017 | | 33877532 | 41068289 | 110192100 |
| Acreft/wk | **7** | 2.6 | 2.4 | 2.5 |
| 4/24/2017 | | 34584871 | 41738590 | 110817519 |
| Acreft/wk | **6** | 2.2 | 2.1 | 1.9 |
| 5/1/2017 | | 35351882 | 42508161 | 111573053 |
| Acreft/wk | **7** | 2.4 | 2.4 | 2.3 |
| 5/8/2017 | | 35351882 | 43647562 | 112625124 |
| Acreft/wk | **7** | 0.0 | 3.5 | 3.2 |
| 5/15/2017 | | 35351882 | 46231117 | 112649881 |
| Acreft/wk | **8** | 0.0 | 7.9 | 0.1 |
| 5/22/2017 | | 35351882 | 48810729 | 112670851 |
| Acreft/wk | **8** | 0.0 | 7.9 | 0.1 |
| 5/29/2017 | | 35351882 | 49976217 | 113780841 |
| Acreft/wk | **7** | 0.0 | 3.6 | 3.4 |
| 6/5/2017 | | 35351882 | 49976217 | 115126321 |
| Acreft/wk | **4** | 0.0 | 0.0 | 4.1 |
| 6/12/2017 | | 35351882 | 52414163 | 116268847 |
| Acreft/wk | **11** | 0.0 | 7.5 | 3.5 |
| 6/19/2017 | | 35385100 | 53736231 | 117563011 |
| Acreft/wk | **8** | 0.1 | 4.1 | 4.0 |

| Pumping per week by Well | | | | |
|---|---|---|---|---|
| | Total Pumping (AF) | Pumping (Gallons) | | |
| 6/26/2017 | | 35405570 | 54727564 | 118495377 |
| Acreft/wk | **6** | 0.1 | 3.0 | 2.9 |
| 7/3/2017 | | 35427203 | 55425914 | 119137000 |
| Acreft/wk | **4** | 0.1 | 2.1 | 2.0 |
| 7/10/2017 | | 502952 | 56256869 | 119899873 |
| Acreft/wk | **6** | 1.5 | 2.6 | 2.3 |
| 7/17/2017 | | 1374653 | 57044367 | 120664775 |
| Acreft/wk | **7** | 2.7 | 2.4 | 2.3 |
| 7/24/2017 | | 2281247.0 | 57844953.0 | 121434113.0 |
| Acreft/wk | **8** | 2.8 | 2.5 | 2.4 |
| 7/31/2017 | | 3211956.0 | 58686835.0 | 121723015.0 |
| Acreft/wk | **6** | 2.9 | 2.6 | 0.9 |
| 8/7/2017 | | 4235836.0 | 59676016.0 | 121746310.0 |
| Acreft/wk | **6** | 3.1 | 3.0 | 0.1 |
| 8/14/2017 | | 5116317.0 | 60424439.0 | 122313674.0 |
| Acreft/wk | **7** | 2.7 | 2.3 | 1.7 |
| 8/21/2017 | | 5587596.0 | 61506942.0 | 123383805.0 |
| Acreft/wk | **8** | 1.4 | 3.3 | 3.3 |
| 8/28/2017 | | 5994840.0 | 62595111.0 | 124531909.0 |
| Acreft/wk | **8** | 1.2 | 3.3 | 3.5 |
| 9/4/2017 | | 6795063.0 | 63342158.0 | 125205223.0 |
| Acreft/wk | **7** | 2.5 | 2.3 | 2.1 |
| 9/11/2017 | | 7842237 | 64317358.0 | 126077614 |
| Acreft/wk | **9** | 3.2 | 3.0 | 2.7 |
| 9/18/2017 | | 8855391 | 65367329.0 | 126937029 |
| Acreft/wk | **9** | 3.1 | 3.2 | 2.6 |
| 9/25/2017 | | 10010876 | 66291632 | 127823808 |
| Acreft/wk | **9** | 3.5 | 2.8 | 2.7 |
| 10/2/2017 | | 11019447 | 67327339.0 | 128684716 |
| Acreft/wk | **9** | 3.1 | 3.2 | 2.6 |
| 10/9/2017 | | 12135908 | 68425195.0 | 129565285 |
| Acreft/wk | **9** | 3.4 | 3.4 | 2.7 |
| 10/16/2017 | | 13096376 | 69283255.0 | 130334512 |
| Acreft/wk | **8** | 2.9 | 2.6 | 2.4 |
| 10/23/2017 | | 13910253 | 70005836.0 | 130959190 |
| Acreft/wk | **7** | 2.5 | 2.2 | 1.9 |
| 10/30/2017 | | 14385805 | 70436272.0 | 131377656 |
| Acreft/wk | **4** | 1.5 | 1.3 | 1.3 |
| 11/6/2017 | | 15369452 | 71321355.0 | 132135781 |
| Acreft/wk | **8** | 3.0 | 2.7 | 2.3 |
| 11/13/2017 | | 16413481 | 72184119.0 | 132860445 |
| Acreft/wk | **8** | 3.2 | 2.6 | 2.2 |
| 11/20/2017 | | 16923283 | 72641613.0 | 133281266 |
| Acreft/wk | **4** | 1.6 | 1.4 | 1.3 |
| 11/27/2017 | | 17882094 | 73465115.0 | 134119789.0 |
| Acreft/wk | **8** | 2.9 | 2.5 | 2.6 |
| 12/4/2017 | | 18930807 | 74334661.0 | 134958250 |
| Acreft/wk | **8** | 3.2 | 2.7 | 2.6 |
| 12/11/2017 | | 19950227 | 75198725.0 | 135744833 |
| Acreft/wk | **8** | 3.1 | 2.7 | 2.4 |

| Pumping per week by Well | | | | |
|---|---|---|---|---|
| | **Total Pumping (AF)** | **Pumping (Gallons)** | | |
| 12/18/2017 | | 20866267 | 75888955.0 | 136437966 |
| Acreft/wk | **7** | 2.8 | 2.1 | 2.1 |
| 12/26/2017 | | 21697248 | 76601091.0 | 137081997 |
| Acreft/wk | **7** | 2.6 | 2.2 | 2.0 |
| 1/2/2018 | | 22377469 | 77242211.0 | 137703043 |
| Acreft/wk | **6** | 2.1 | 2.0 | 1.9 |
| 1/8/2018 | | 23347406 | 78068858.0 | 138420897 |
| Acreft/wk | **8** | 3.0 | 2.5 | 2.2 |
| 1/15/2018 | | 24205329 | 78698507 | 139139550 |
| Acreft/wk | **7** | 2.6 | 1.9 | 2.2 |
| 1/22/2018 | | 25015470 | 79287820 | 139796393 |
| Acreft/wk | **6** | 2.5 | 1.8 | 2.0 |
| 1/29/2018 | | 25447526 | 79945109 | 140380261 |
| Acreft/wk | **5** | 1.3 | 2.0 | 1.8 |
| 2/5/2018 | | 26399977 | 80549843 | 140938087 |
| Acreft/wk | **6** | 2.9 | 1.9 | 1.7 |
| 2/12/2018 | | 27156032 | 81227242 | 141596405 |
| Acreft/wk | **6** | 2.3 | 2.1 | 2.0 |
| 2/19/2018 | | 27946279 | 81908657 | 142146331 |
| Acreft/wk | **6** | 2.4 | 2.1 | 1.7 |
| 2/26/2018 | | 28707126 | 82607455 | 142812391 |
| Acreft/wk | **7** | 2.3 | 2.1 | 2.0 |
| 3/5/2018 | | 29342629 | 83234382 | 143389531 |
| Acreft/wk | **6** | 2.0 | 1.9 | 1.8 |
| 3/12/2018 | | 30101268 | 83973021 | 144052886 |
| Acreft/wk | **7** | 2.3 | 2.3 | 2.0 |
| 3/19/2018 | | 31206420 | 85034127 | 144052886 |
| Acreft/wk | **7** | 3.4 | 3.3 | 0.0 |
| 3/26/2018 | | 32437144 | 86218470 | 144052886 |
| Acreft/wk | **7** | 3.8 | 3.6 | 0.0 |
| 4/2/2018 | | 33586000 | 87292806 | 144052886 |
| Acreft/wk | **7** | 3.5 | 3.3 | 0.0 |
| 4/9/2018 | | 34945246 | 88661695 | 144052886 |
| Acreft/wk | **8** | 4.2 | 4.2 | 0.0 |
| 4/16/2018 | | 36428094 | 90163824 | 144052886 |
| Acreft/wk | **9** | 4.6 | 4.6 | 0.0 |
| 4/23/2018 | | 37669100 | 91392778 | 144052886 |
| Acreft/wk | **8** | 3.8 | 3.8 | 0.0 |
| 4/30/2018 | | 38927089 | 92523504 | 144052886 |
| Acreft/wk | **7** | 3.9 | 3.5 | 0.0 |
| 5/7/2018 | | 40050089 | 93684320 | 144052886 |
| Acreft/wk | **7** | 3.4 | 3.6 | 0.0 |
| 5/14/2018 | | 41315442 | 94866166 | 144052886 |
| Acreft/wk | **8** | 3.9 | 3.6 | 0.0 |
| 5/21/2018 | | 42528819 | 96022301 | 144052886 |
| Acreft/wk | **7** | 3.7 | 3.5 | 0.0 |
| 5/28/2018 | | 43751786 | 97234568 | 144052886 |
| Acreft/wk | **7** | 3.8 | 3.7 | 0.0 |
| 6/4/2018 | | 44952980 | 98381310 | 144052886 |
| Acreft/wk | **7** | 3.7 | 3.5 | 0.0 |

| Pumping per week by Well | | | | |
|---|---|---|---|---|
| | Total Pumping (AF) | Pumping (Gallons) | | |
| 6/11/2018 | | 46392811 | 99669330 | 144216789 |
| Acreft/wk | **9** | 4.4 | 4.0 | 0.5 |
| 6/18/2018 | | 47626910 | 100738232 | 144582056 |
| Acreft/wk | **8** | 3.8 | 3.3 | 1.1 |
| 6/25/2018 | | 48758935 | 101869369 | 145215242 |
| Acreft/wk | **9** | 3.5 | 3.5 | 1.9 |
| 7/2/2018 | | 49776028 | 102790148 | 146164292 |
| Acreft/wk | **9** | 3.1 | 2.8 | 2.9 |
| 7/9/2018 | | 50546878 | 103592215 | 146939949 |
| Acreft/wk | **7** | 2.4 | 2.5 | 2.4 |
| 7/16/2018 | | 51448270 | 104421746 | 147837528 |
| Acreft/wk | **8** | 2.8 | 2.5 | 2.8 |
| 7/23/2018 | | 52326642.0 | 105198024.0 | 148683803.0 |
| Acreft/wk | **8** | 2.7 | 2.4 | 2.6 |
| 7/30/2018 | | 53233201.0 | 106081315.0 | 149609558.0 |
| Acreft/wk | **8** | 2.8 | 2.7 | 2.8 |
| 8/6/2018 | | 54094658.0 | 106919215.0 | 150424927.0 |
| Acreft/wk | **8** | 2.6 | 2.6 | 2.5 |
| 8/13/2018 | | 54764294.0 | 107543094.0 | 151144220.0 |
| Acreft/wk | **6** | 2.1 | 1.9 | 2.2 |
| 8/20/2018 | | 55826100.0 | 108510810.0 | 152195361.0 |
| Acreft/wk | **9** | 3.3 | 3.0 | 3.2 |
| 8/27/2018 | | 56812583.0 | 109507082.0 | 153250719.0 |
| Acreft/wk | **9** | 3.0 | 3.1 | 3.2 |
| 9/3/2018 | | 57666962.0 | 110348224.0 | 154090944.0 |
| Acreft/wk | **8** | 2.6 | 2.6 | 2.6 |