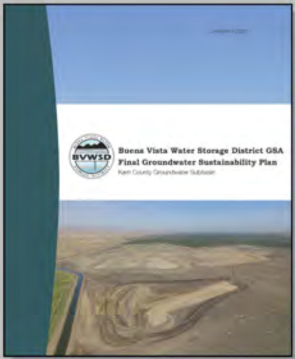
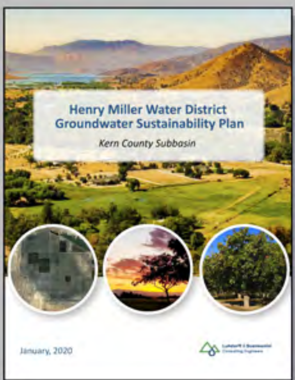
Final

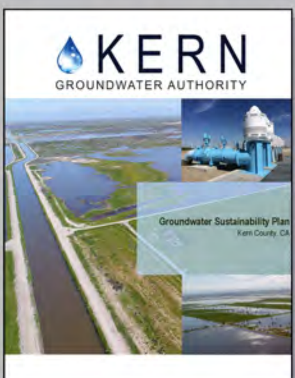
# Kern County Subbasin Groundwater Sustainability Plans

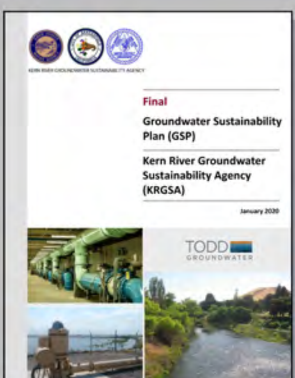
## First Annual Report Water Year 2019

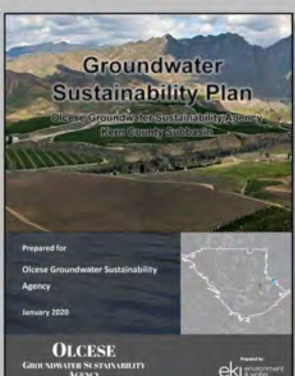
**April 1, 2020**




TODD GROUNDWATER

KERN COUNTY SUBBASIN

GROUNDWATER SUSTAINABILITY AGENCIES

# Kern County Subbasin

# Groundwater Sustainability Plans (GSPs)

## First Annual Report
## Water Year 2019

**April 1, 2020**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## List of Acronyms

| | |
|---|---|
| AEWSD | Arvin-Edison Water Storage District |
| AF | acre feet |
| AFY | acre feet per year |
| bgs | below ground surface |
| BMP | Best Management Practices |
| BVWSD | Buena Vista Water Storage District |
| CASGEM | California Statewide Groundwater Elevation Monitoring |
| C2VSim | California Central Valley Groundwater-Surface Water Simulation |
| C2VSimFG-Kern | California Central Valley Groundwater-Surface Water Simulation Model, Fine-Grid, Kern County Update for the Kern County and White Wolf Subbasin |
| CCR | California Code of Regulations |
| CEQA | California Environmental Quality Act |
| cfs | cubic feet per second |
| CIMIS | California Irrigation Management Information System |
| COB 2800 | City of Bakersfield 2800 Acre Groundwater Banking Area |
| CVC | Cross Valley Canal |
| CVP | Central Valley Project |
| CWD | Cawelo Water District |
| DMS | Data Management System |
| DWR | Department of Water Resources |
| ENCSD | East Niles Community Services District |
| ET | Evapotranspiration |
| ETo | Reference evapotranspiration |
| EWMA | Eastside Water Management Area |
| ft | feet |
| Greenfield CWD | Greenfield County Water District |
| GSA | Groundwater Sustainability Agency |
| GSE | Ground Surface Elevation |
| GSP | Groundwater Sustainability Plan |

| | |
|---|---|
| HMWD | Henry Miller Water District |
| IDC | Independent Demand Calculator |
| ILRP | Irrigated Lands Regulatory Program |
| InSAR | Interferometric Synthetic Aperture Radar |
| ITRC | Irrigation Training and Research Center |
| IWFM | Integrated Water Flow Model |
| KCWA | Kern County Water Agency |
| KDWD | Kern Delta Water District |
| KFMC | Kern Fan Monitoring Committee |
| KGA | Kern Groundwater Authority |
| KRGSA | Kern River Groundwater Sustainability Agency |
| KTWD | Kern-Tulare Water District |
| KWB | Kern Water Bank |
| MA | Management Area |
| METRIC | Mapping EvapoTranspiration at high Resolution with Internalized Calibration |
| MO | Measurable Objective |
| MT | Minimum Threshold |
| msl | mean sea level |
| NKWSD | North Kern Water Storage District |
| NORMWD | North of the River Municipal Water District |
| OMWC | Oildale Mutual Water Company |
| OWD | Olcese Water District |
| PRISM | Parameter-elevation Relationships on Independent Slopes Model |
| RPE | Reference Point Elevation |
| RRBWSD | Rosedale-Rio Bravo Water Storage District |
| SGMA | Sustainable Groundwater Management Act |
| SSJMUD | South San Joaquin Municipal Utilities District |
| Subbasin | Kern County Subbasin, when capitalized |
| SWID | Shafter-Wasco Irrigation District |
| SWP | State Water Project |
| SWSD | Semitropic Water Storage District |

| | |
|---|---|
| TCWD | Tejon-Castac Water District |
| WDWA | Westside District Water Authority |
| WKWD | West Kern Water District |
| WRMWSD | Wheeler Ridge-Maricopa Water Storage District |
| WY | Water Year, October 1 through September 30 |

# EXECUTIVE SUMMARY

Covering about 2,834 square miles, the Kern County Subbasin is the largest Subbasin in California with a complex water management structure, a large portfolio of local and imported water sources, access to flood waters throughout the State, and numerous large groundwater banking projects, collectively providing both local and State-wide water supply and water quality benefits. To comply with the Sustainable Groundwater Management Act (SGMA), local agencies have organized into 11 groundwater sustainability agencies (GSAs); five lead GSAs coordinated on the submittal of five groundwater sustainability plans (GSPs) by the January 31, 2020 deadline. **Figure 1** shows the Kern County Subbasin and adjacent subbasins. **Figures 2** and **3** show the 11 Subbasin GSAs and the areas covered by the five GSPs prepared for the Subbasin, respectively.

Since January 2020, Kern County Subbasin GSAs have been working cooperatively to implement respective GSPs including a coordinated preparation of this First GSP Annual Report. This report covers the Reporting Period of Water Year (WY) 2019 and represents one comprehensive document for the entire Subbasin. The purpose of this First GSP Annual Report for WY 2019 is to provide the required data and analyses to demonstrate that the Kern County Subbasin GSPs are being implemented in a manner that will achieve the sustainability goals that have been developed for the Subbasin and individual GSPs.

## Approach

More than 40 agencies have contributed data and information for support of this 2019 Annual Report. Data have been combined and analyzed for use in hydrographs, water level contour maps, and an update of the local C2VSimFG-Kern model. In particular, the C2VSimFG-Kern model provides a basin-wide technically credible tool to analyze groundwater extractions and changes in groundwater in storage on a basin-wide basis. Various model results are presented from WY 1995 through WY 2019; water year types for that 25-year period are presented on **Figure 6**.

Templates provided by the Department of Water Resources (DWR) are employed for consistent reporting of information and data. A narrative progress report on GSP implementation has also been provided by the GSAs and member agencies; those reports are compiled in **Section 7**.

The timing of this First GSP Annual Report presents inherent limitations. The Reporting Period covers WY 2019, a time period that occurred prior to completion and adoption of the Subbasin GSPs. In addition, in some areas of the Subbasin, historical data are either non-existent or insufficient to develop consistent hydrographs or water level contour maps for all four Principal Aquifers.

Nonetheless, the Kern County Subbasin GSAs are collectively committed to successful GSP implementation and attainment of Subbasin Sustainability Goals. Substantial compliance with requirements of the Annual Report is demonstrated throughout this report, and additional data are currently being collected to address data gaps.

## Groundwater Elevations

Groundwater elevations were compiled from wells in the Subbasin SGMA monitoring network for the preparation of hydrographs across the Subbasin. Available data, including sustainable management criteria, are presented on more than 200 SGMA well hydrographs in **Appendix A**.

Data from the SGMA monitoring network were combined with supplemental water level data from the Kern Fan Monitoring Committee and other local sources by Kern County Water Agency (KCWA) to prepare groundwater elevation contour maps. Specifically, KCWA developed water level contour maps for Fall 2018 and Spring 2019 for the *Primary* Principal Aquifer in the Subbasin (**Figures 7** and **8**). Three additional Principal Aquifers have been identified in four localized areas within the Subbasin as shown on **Figure 9**; however, based on limited available data, groundwater elevation contour maps were not prepared for these three non-primary local Principal Aquifers. Nonetheless, these local Principal Aquifers are represented in the C2VSimFG-Kern local model and included in the groundwater extraction data and the change in groundwater in storage analyses.

## Groundwater Extractions

Groundwater extraction data for the Kern County Subbasin were compiled using two methods:

- Directly measured groundwater extraction data collected by local water agencies.
- Estimated groundwater extractions using the IWFM Demand Calculator (IDC) tool developed by DWR (Dogrul, Kadir and Brush, 2017), which is dynamically linked to C2VSimFG-Kern.

IDC employs user-specified evapotranspiration (ET) data that are based on monthly satellite data processed by the Irrigation Training & Research Center (ITRC) at California Polytechnic State University, San Luis Obispo (Howes, 2020). Surface water supplies are incorporated based on measured data and regional precipitation (PRISM); using these collective data sets, IDC calculates the groundwater extraction necessary to meet the crop demand. Urban demands in C2VSimFG-Kern are based on agency-supplied extraction data and/or population and per-capita water demands.

**Table ES-1** summarizes the Kern County Subbasin groundwater extractions by water use type and measurement method for WY 2019.

**Table ES-1. Groundwater Extractions in the Kern County Subbasin for Water Year 2019**

| Groundwater Extraction | Total Groundwater Extractions | Meters Volume | Electrical Records Volume | Land Use Volume | Groundwater Model Volume | Other Methods Volume |
|---|---|---|---|---|---|---|
| **Water Use Type** | **Acre-ft** | **Acre-ft** | **Acre-ft** | **Acre-ft** | **Acre-ft** | **Acre-ft** |
| Urban | 150,892 | 128,115 | 0 | 22,777 | 0 | 0 |
| Industrial | 0 | 0 | 0 | 0 | 0 | 0 |
| Agricultural | 1,096,779 | 19,945 | 0 | 1,076,834 | 0 | 0 |
| Managed Wetlands | 0 | 0 | 0 | 0 | 0 | 0 |
| Managed Recharge | 0 | 0 | 0 | 0 | 0 | 0 |
| Native Vegetation | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 36,512 | 21,531 | 0 | 14,981 | 0 | 0 |
| Total | 1,284,183 | 169,591 | 0 | 1,114,592 | 0 | 0 |

**Figure 11 s**hows the distribution and volumes of total groundwater extractions over the Kern County Subbasin during the Reporting Period.

## Surface Water Supply

For the Kern County Subbasin, surface water supplies are measured directly by local water agencies at the point of diversion from a river, stream or canal using measurement devices and monitoring protocols. Surface water data were collected by measurement devices with a high level of accuracy consistent with relevant standards. Measured surface water data were provided by local agricultural water districts, urban water purveyors and city water departments for this Annual Report (see **Table 1**, Section 1.3.2).

**Table ES-2. Surface Water Supplies in the Kern County Subbasin for Water Year 2019**

| Surface Water Supply | Surface Water Supply Volume |
|---|---|
| **Surface Water Supply Source** | **Acre-ft** |
| Central Valley Project | 505,061 |
| State Water Project | 1,121,965 |
| Colorado River Project | 0 |
| Local Supplies | 1,065,772 |
| Local Imported Supplies | 75,469 |
| Recycled Water | 35,609 |
| Desalination | 0 |
| Other Water Source | 1,524 |
| Total Surface Water Supply | 2,805,400 |

A map showing surface water supply infrastructure and features in the Kern County Subbasin is provided on **Figure 12.**

## Total Water Use

Based on data and tables in preceding sections, the total water use in the Subbasin is provided by Water Source Type and Water Use Sector, as shown on **Tables ES-3** and **ES-4** below.

**Table ES-3. Total Water Use by Source Type, Kern County Subbasin, Water Year 2019**

| Total Water Use | Total Water Supply by Volume |
|---|---|
| **Water Source Type** | **Acre-ft** |
| Groundwater | 1,284,183 |
| Surface Water | 2,768,267 |
| Recycled Water | 35,609 |
| Reused Water | 1,524 |
| Other Water Source Type | 0 |
| Total Water Supply | 4,089,583 |

**Table ES-4. Total Water Use by Water Use Sector, Kern County Subbasin, Water Year 2019**

| Total Water Use | Total Water Use Volume |
|---|---|
| **Water Use Sector** | **Acre-ft** |
| Urban | 199,977 |
| Industrial | 0 |
| Agricultural | 2,445,679 |
| Managed Wetland | 23,074 |
| Managed Recharge | 1,173,060 |
| Native Vegetation | 0 |
| Other Water Source Type | 36,512 |
| Total Water Use | 3,878,302 |

## Change in Groundwater in Storage

As required by the GSP regulations, the following figures included in the 2019 Annual Report illustrate the changes in groundwater in storage over the Subbasin:

- Graph depicting water year type, groundwater use, the annual and cumulative change in groundwater in storage based on historical data to the greatest extent available, including from January 1, 2015 to the current reporting year.

- Change in groundwater in storage maps for Subbasin Principal Aquifers.

The coordinating agencies supported updating the C2VSimFG-Kern local model to assist with the change in groundwater in storage analyses.

**Figure 13** shows the simulated change in groundwater in storage graph for the Kern County Subbasin over the 25-year period from WY 1995 to WY 2019. The graph includes the annual and cumulative change along with the water year type based on the San Joaquin River Index (CDEC, 2020; Friant Water Authority, 2019). Results for the changes in groundwater in storage for updated WY 2016 through WY 2019 are summarized below:

- WY 2016, a dry water year type, had a decline of 1,229,970 acre-feet
- WY 2017, a wet water year type, had an increase of 1,722,971 acre-feet
- WY 2018, a below normal water year type, had a decline of 636,030 acre-feet
- WY 2019, a wet water year type, had an increase of 851,260 acre-feet.

The total change in groundwater in storage over the four-year period from WY 2016 through WY 2019 was an increase of 708,231 acre-feet, which represents an average increase of 177,058 acre-feet per year. This compares to an average annual decline in groundwater in storage of -277,114 AFY over the 20-year base period from WY 1995 to WY 2014 (a period representative of average hydrologic conditions).

**Figure 15** presents series of four maps of the change in groundwater in storage, one for each of the last four water years WY 2016 through WY 2019, using the C2VSimFG-Kern model results. The change in groundwater in storage represents the sum of the total inflow components plus the total outflow components. A positive value represents an increase in the volume of groundwater stored in the aquifer that was typified by a rise in groundwater levels whereas a negative represents a decrease in groundwater in storage typified by a decline in groundwater levels. A description of the change in groundwater in storage for each water year is as follows:

- **WY 2016** (a dry water year type) indicates widespread declines in groundwater in storage with the largest declines concentrated in the vicinity of the large groundwater banking operations in the central Subbasin. Widespread but lower declines are observed over most of the Subbasin. Some limited areas of increases are noted along and south of the Kern River, along the eastern margin of the Subbasin.
- **WY 2017** (a wet water year type) indicates concentrated areas of increases in groundwater in storage, especially in areas of local managed aquifer recharge facilities and central banking areas. Over the remainder of the basin, the change in groundwater in storage varies with area from increases to decreases. Decreases are overall less than those noted in WY 2016. Areas of significant recharge also occur along the Kern River, Poso Creek and southeastern margin of the Subbasin.

- **WY 2018** (below normal water year type) indicates overall decreases in groundwater in storage, especially in the vicinity of the large banking operations where groundwater recovery pumping occurred. However, there is also a halo of increased groundwater in storage representing migration of the groundwater mound developed in WY 2017. Other areas of concentrated groundwater recovery (and associated declines in groundwater in storage) are noted to the north and southeast near large managed recharge operations. Similar widespread storage declines are observed over most of the Subbasin with limited areas of increase noted along the Kern River and southeastern margin of the Subbasin.
- **WY 2019** (a wet water year type) indicates a similar pattern to that observed for WY 2017 but with lower magnitudes. Areas of storage increases occur in the center, north and southeast parts of the Subbasin representing large managed aquifer recharge operations. Over the remainder of the basin, the change in groundwater storage varies from slight increases to slight decreases. Areas of significant recharge occur along the Kern River, Poso Creek and southeastern margin of the Subbasin.

## Progress on GSP Implementation

The lead agencies associated with the five GSPs have all submitted a progress report on their respective GSP implementation activities (**Table 1**). These progress reports are organized by the five GSPs, in alphabetical order for the lead GSA. KGA agencies that have prepared Management Area Plans are listed in alphabetical order in Section 7.3 (see **Figure 4**).

To facilitate DWR review, a consistent reporting format was established, based on the components listed in the GSP regulations (*§356.2(b)(5)(C)*), as follows:

1) Compliance with Sustainable Management Criteria
    a) Implementation of GSP Monitoring Network
    b) Progress in Achieving Interim Milestones
    c) Compliance with Additional Sustainable Management Criteria (including minimum thresholds (MTs) and measurable objectives (MOs))
2) Implementation of Projects
3) Implementation of Management Actions

In brief, all agencies have implemented portions of the GSP and are committed to coordination for sustainable groundwater management. Many GSP monitoring networks have been fully implemented; others are planning for new monitoring sites. Some networks represent areas where local groundwater conditions have been monitored for the first time and, therefore, will provide valuable future information for Subbasin sustainable management.

# 1 INTRODUCTION

With the successful submission of five Groundwater Sustainability Plans (GSPs) by January 31, 2020, the five Groundwater Sustainability Agencies (GSAs) that submitted the GSPs in the Kern County Subbasin have now collaborated to prepare this First GSP Annual Report. The Kern County Subbasin is the largest Subbasin in the State, has been designated as critically-overdrafted, and is governed by a myriad of water districts, water storage districts, irrigation districts, and municipalities. Kern County Subbasin agencies have organized into five GSAs that submitted the GSPs that cover the entire Subbasin as required by the Sustainable Groundwater Management Act (SMGA). By submitting one Annual Report that covers the entire Kern County Subbasin, the GSAs demonstrate the collective implementation of the GSPs across the Subbasin. The Kern County Subbasin and adjacent subbasins are shown on **Figure 1**.

The Kern County Subbasin is covered by 11 GSAs and five GSPs as shown on **Figures 2** and **3**, respectively. A comparison of **Figures 2** and **3** shows the variety of coordination for GSP preparation and implementation in the Subbasin. The GSPs for Buena Vista GSA, Henry Miller GSA, and Olcese GSA each represent one GSP prepared by one GSA. The GSP for the Kern River GSA represents two GSAs (Kern River GSA and Greenfield County Water District). The Kern Groundwater Authority (KGA) GSA covers the remainder of the Subbasin and represents six GSAs coordinating on one GSP. The agencies forming Management Areas within the KGA are shown on **Figure 4**.

This First GSP Annual Report (also referred to as the 2019 GSP Annual Report) is being prepared under the guidance of Water Code Section 10728 and GSP regulations (in particular, Article 7, §356). The report combines data and information for the entire Kern County Subbasin, as provided by the agencies that submitted the GSPs and have coordinated in the preparation of this report. As such, this First GSP Annual Report is submitted as one comprehensive and coordinated Annual Report that covers the entire Kern County Subbasin.

## 1.1 PURPOSE OF THE 2019 GSP ANNUAL REPORT

The purpose of this First GSP Annual Report for Water Year (WY) 2019 is to demonstrate that the individual GSPs in the Kern County Subbasin are being implemented in a manner that will achieve the sustainability goals that have been developed for the Subbasin. The 2019 GSP Annual Report provides an update on the groundwater conditions for WY 2019 (Reporting Period), and documents progress on GSP implementation.

Data and analyses cover the Reporting Period (October 1, 2018 through September 30, 2019); groundwater elevation hydrographs and the change in groundwater in storage analysis also covers a historical period as required by the regulations. Specifically, these two components are required to use "historical data to the greatest extent available including from January 1, 2015 to the current reporting year." (§356.2 (b)(1)(B) and §356.2 (b)(5)(B)).

For this First Annual Report, historical analyses from WY 1995 to WY 2015 are being incorporated as a coordinated study period to comply with the requirement of using "historical data to the greatest extent available." Some additional analyses have been required to cover the time period from October 1, 2015 through September 30, 2019 (WY 2016 through WY 2019). Inclusion of data from this four-year period provides a "bridge" between the end of the current study period (WY 2015) used for the Subbasin GSPs and the Reporting Period for this 2019 Annual Report (i.e., WY 2019).

## 1.2 COORDINATED SUBMITTAL

Even before the GSPs were finalized, the Kern County Subbasin agencies decided to coordinate on one combined submittal for its First GSP Annual Report. The Plan Manager for the Kern County Subbasin GSPs secured a technical team to support the process and coordinated scoping meetings beginning in December 2019 to discuss how best to develop the required technical data sets and analyses. During preparation, GSAs convened three in-person and webinar meetings to discuss the requirements and approach for this 2019 GSP Annual Report. Templates were provided to agencies by the technical team to develop consistent data sets and information for the 2019 GSP Annual Report. These templates were supplemented by DWR templates as they became available.

### 1.2.1 Coordinated Historical Data

For the two analyses requiring historical data (hydrographs and change in groundwater in storage), the Subbasin agencies employed the 20-year historical study period (WY 1995 through WY 2014) and the one-year current study period (WY 2015) that had been used in the GSP basin-wide water budget analyses. Specifically, a basin-wide local model, C2VSimFG-Kern[1], was revised with local data to analyze historical and current water budgets over that 21-year period for the entire Kern County Subbasin. This period represents a consistent basin-wide data set with historical data "to the greatest extent available." These historical data sets and analyses were updated in the C2VSimFG-Kern model from WY 2015 through WY 2019 to bridge the intervening years and develop a model tool capable of supporting the analyses required for the Annual Report.

### 1.2.2 Coordinated Monitoring Networks

During the GSP process, the Kern County Subbasin GSAs compiled individual GSP monitoring networks on a basin-wide scale to coordinate a GSP monitoring network across the Subbasin. Although developed and implemented locally, the basin-wide monitoring network allowed for evaluation of locally-designated sustainable management criteria, especially across GSP and/or management area boundaries.

In addition to these combined local monitoring networks, the Kern County Subbasin also agreed to develop a regional subsidence monitoring program for the Subbasin, with all GSAs providing cost share funds. While the GSAs or management area agencies would continue to monitor local subsidence as part of the individual GSPs, the basin-wide subsidence monitoring program would focus on critical infrastructure with basin-wide importance for water supply, such as the State Water Project (SWP) California Aqueduct and Central Valley Project (CVP) Friant-Kern Canal. A scope of work and budget were approved by Subbasin agencies for coordinated implementation of the basin-wide subsidence monitoring program; that program has been incorporated into Subbasin GSPs and made a part of the executed Coordination Agreement for the Subbasin.

### 1.2.3 Coordinated Data Management System (DMS)

Pursuant to §352.6, GSAs are required to develop and maintain a data management system (DMS) for storing and reporting relevant information for development or implementation of the GSP. Monitoring

[1] Documentation of the local model, along with water budget results, was included as Appendix 2 in the Subbasin Coordination Agreement.

data from the DMS are required for inclusion in the GSP Annual Report and are also required to be submitted electronically on forms provided by DWR (§354.40).

For this First GSP Annual Report, a DWR-provided form for electronic submittal of water level data is used for compilation of data from the GSAs. Much of the well data were submitted on a DWR-developed form as supporting information at the time of GSP submittal. Additional water level data associated with these wells are being included as electronic submittals for this First GSP Annual Report. This includes water level data used to develop the hydrographs described in Section 2.

At this time, most of the monitoring data are maintained separately by the responsible GSA or associated member agencies. Although Subbasin water budget data are maintained in the C2VSimFG-Kern local model files, an official basin-wide DMS has not yet been established. However, Subbasin GSAs have committed to developing such a DMS and have applied for financial assistance for the project through the DWR Sustainable Groundwater Management Grant Program, Round 3. In March 2020, the development of a Kern County Subbasin DMS was recommended for funding with a $500,000 grant (Final Award List). As indicated in the grant application, the Subbasin GSAs intend to cooperatively identify goals and objectives for the DMS and secure technical support for DMS development. That project is expected to be initiated in late Spring 2020 and is considered part of SGMA implementation for all GSAs in the Kern County Subbasin and is a component of the executed Coordination Agreement.

## 1.3 APPROACH

Data and analyses for the GSP Annual Report include compilation of water level data; development of hydrographs and groundwater elevation contour maps; tabulation of groundwater extraction, surface water supply, and total water use data; and changes in groundwater in storage. Data and analyses cover the Reporting Period of WY 2019 except for hydrographs and changes in groundwater in storage, which are presented from WY 1995 through WY 2019.

### 1.3.1 Data Compilation

Following guidance from Article 7 of the GSP regulations, data were compiled from GSAs, member agencies, and other entities throughout the Subbasin. **Table 1** provides a list of the over 40 agencies who contributed data in support this Annual Report. Although a significant data collection effort has been conducted, some information is either unavailable or incomplete due to the timing of this First GSP Annual Report, due only two months after GSP submittal.

### 1.3.2 C2VSimFG-Kern Model Update

The Kern County Subbasin Coordination Agreement refers to the local groundwater-surface water model (C2VSimFG-Kern) as the agreed upon method for generating coordinated water budgets for the Kern County Subbasin. Appendices 2 and 4 of the Kern County Subbasin Coordination Agreement include a technical report (Maley and Brush, 2020) on the development and application of C2VSimFG-Kern for these purposes.

**Table 1. List of Agencies Contributing Data**

| Agency | Groundwater Extractions | Surface Water Supply | Total Water Use | Groundwater Elevations |
|---|---|---|---|---|
| **Agricultural Water Agencies** | | | | |
| Arvin-Edison WSD | X | X | X | X |
| Belridge WSD | | X | | X |
| Berrenda Mesa WD | | X | | X |
| Buena Vista WSD | X | X | X | X |
| Cawelo WD | X | X | X | X |
| Eastside WMA | | X | | X |
| Henry Miller WD | X | X | X | X |
| Kern Delta WD | X | X | X | X |
| Kern-Tulare WD | X | X | X | X |
| Lost Hills WD | | X | | X |
| North Kern WSD | X | X | X | X |
| Olcese WD | X | X | X | X |
| Rosedale-Rio Bravo WSD | X | X | X | X |
| Semitropic WSD | X | X | X | X |
| Shafter-Wasco ID | | X | X | X |
| 7th Standard Annex WMA | | X | | X |
| Southern San Joaquin MUD | | X | X | X |
| Tejon-Castac WD | X | | | X |
| Wheeler Ridge-Maricopa WSD | X | X | X | X |
| **Urban Water Agencies** | | | | |
| Arvin Community Services District | X | | X | |
| Cal Water - Bakersfield | X | X | X | X |
| City of Bakersfield | X | X | X | X |
| City of Delano | X | | X | |
| City of McFarland | X | | X | |
| City of Shafter | X | | X | X |
| City of Wasco | X | | X | |
| East Niles CSD | X | X | X | X |
| Greenfield CWD | X | | X | X |
| Kern County Water Agency ID4 | X | X | X | X |
| Lamont PUD | X | | X | X |
| North of the River Sanitation District | X | | X | |
| North of the River MWD/Oildale MWC | X | X | X | |
| Vaughn Water Company | X | | X | |
| West Kern WD | X | X | X | X |
| **Other Agencies** | | | | |
| Berrenda Mesa Banking Project | X | X | X | X |
| Pioneer Banking Project | X | X | X | X |
| Kern Water Bank Authority | X | X | X | X |
| Kern National Wildlife Refuge | | X | | |

To meet the requirements for the 2019 Annual Report, C2VSimFG-Kern was updated with new input data for WYs 2016 through 2019. C2VSimFG-Kern is based on the C2VSim Fine Grid Public Beta model (C2VSimFG-Beta) that was released by DWR for SGMA support in May 2018. C2VSimFG-Beta input files were revised to incorporate locally derived managed water supply and demand data to better represent the local water budgets for the Kern County Subbasin (Maley and Brush, 2020).

For the 2019 Annual Report model update, new data for WYs 2016 through 2019 were added to the existing data structure and model input files. In addition, new recovery wells and recharge operations that became operational during the update period were added to the model input. Monthly data were requested and provided by the local agencies through their respective GSA. The monthly data for Kern County Subbasin includes:

- Surface water imports and diversions for various uses including agricultural, urban, seasonal refuge, and managed aquifer recharge/groundwater banking.
- Recharge volumes for managed aquifer recharge/groundwater banking operations.
- Measured pumping volumes for managed aquifer recharge/groundwater banking recovery operations for local use and pump-ins to regional aqueducts.
- Urban water supply, both surface water and groundwater, for the larger cities in Kern County Subbasin with emphasis on the Metropolitan Bakersfield Area.
- Stream inflows to the Subbasin for the Kern River and Poso Creek.
- Other locally important water supply or demand data provided by local agencies.

In addition, regional data sets were also updated to provide climatic data sets for the C2VSimFG-Kern update. These data sets include the following:

- Precipitation data were updated using publicly available rainfall data for WYs 2016 through 2019. These data were downloaded from the PRISM Climate Group (PRISM, 2020) web site in January 2020.
- ET rates for Kern County were determined using satellite-based data following the same process used for the original C2VSimFG-Kern development (Maley and Brush, 2020). The ET data were developed by the Irrigation Training & Research Center (ITRC) at California Polytechnic State University, San Luis Obispo (Howes, 2020). ITRC uses a modified Mapping of EvapoTranspiration with Internal Calibration (METRIC) procedure to compute actual evapotranspiration using LandSAT Thematic Mapper data.

Due to time limitations in producing this Annual Report, the agricultural, urban and native vegetation land use areas used the same assumptions as used in the projected-future Baseline scenarios for the Kern County Subbasin GSPs (Maley and Brush, 2020). Future updates will incorporate available land use and crop type data produced by the Kern County Agricultural Commission, individual agencies, and other best available information.

Updates to areas outside of the Kern County Subbasin were developed by repeating data from an analogous water year type. This is the same approach that was used for the projected-future Baseline scenarios for the Kern County Subbasin GSPs (Maley and Brush, 2020).

Using WY 1995 to WY 2014 as the base period, C2VSimFG-Kern results show declining groundwater levels and long-term reduction of groundwater in storage. During this period, C2VSimFG-Kern results show an average-annual decline in groundwater in storage of -277,114 acre-feet per year (AFY). Based on these historical C2VSimFG-Kern results, an estimated level of uncertainty of the overall water budget was determined to be on the order of 10% to 20% (Maley and Brush, 2020). Notwithstanding some limitations, C2VSimFG-Kern is considered to be the best available information and well-suited as a planning tool to estimate the impacts of the proposed SGMA projects and management actions on groundwater conditions in the Kern County Subbasin.

The C2VSimFG-Kern water budgets and sustainable yield estimates are based on available data and the current level of model calibration and are considered appropriate to support SGMA planning efforts. C2VSimFG-Kern water budgets are not intended for determination of individual landowner allocations or groundwater rights. Additional technical and legal analysis, along with stakeholder involvement, is necessary to fully quantify the sustainable and native yields in the Kern County Subbasin.

### 1.3.3 DWR Templates

DWR has provided Microsoft Excel data upload templates for agencies to report their basin-wide groundwater extraction and measurement methods, surface water supplies, and total water use; GSAs are required to use these templates so that consistent data is reported statewide. A description of the data provided for these templates is included in the following sections. These include:

- **Part A. Groundwater Extractions** – Description of groundwater extractions by water use sector data (23 CCR §356.2(b)(2)) is presented in Section 3.
- **Part B. Groundwater Extraction Methods** – Description of groundwater extraction measurement methods (23 CCR §356.2(b)(2)) is presented in Section 3
- **Part C. Surface Water Supply** – Description of surface water supply by water source type (23 CCR §356.2(b)(3)) is presented in Section 4.
- **Part D. Total Water Use** – Description of total water supply and use (23 CCR §356.2(b)(4)) is presented in Section 5.

As part of the submission of this Annual Report, the data templates will be uploaded to the Monitoring Network Module on the SGMA Portal, the same system used to load monitoring data for GSP submission.

## 1.4 Report Organization

This 2019 GSP Annual Report is organized by components presented in Article 7 of the GSP regulations. These components include groundwater elevations (Section 2), groundwater extractions (Section 3), surface water supply (Section 4), total water use (Section 5), change in groundwater in storage (Section 6), and a narrative description of progress towards GSP implementation (Section 7). Also included are an Executive Summary and general information summarized in this first section.

With more than 20 member agencies associated with the five GSPs of the Kern County Subbasin, an order for data presentation has been developed. For purposes of this first GSP Annual Report, the GSAs responsible for the five GSPs are listed in alphabetical order for the lead GSA. Specifically, the order of the information and data provided in this Annual Report is presented as follows:

1. Buena Vista Water Storage District GSA GSP
2. Henry Miller Water District GSA GSP
3. Kern Groundwater Authority (KGA) GSP, with Management Area-specific Plans as follows:
    a. Arvin-Edison Water Storage District (AEWSD)
    b. Cawelo Water District (CWD)
    c. Eastside Water Management Area (EWMA)
    d. Kern County Water Agency (KCWA) – Pioneer GSA
    e. Kern-Tulare Water District (KTWD)
    f. Kern Water Bank (KWB)
    g. North Kern Water Storage District & Shafter-Wasco Irrigation District (NKWSD & SWID)
    h. Rosedale-Rio Bravo Water Storage District (RRBWSD)
    i. Semitropic Water Storage District (SWSD)
    j. Shafter-Wasco Irrigation District 7th Standard Annexation Management Area (SWID MA-2)
    k. Southern San Joaquin Municipal Utility District (SSJMUD) (including McFarland GSA)
    l. Tejon-Castac Water District (TCWD)
    m. West Kern Water District (WKWD)
    n. Westside District Water Authority (WDWA)
    o. Wheeler Ridge-Maricopa Water Storage District (WRMWSD)
4. Kern River GSA (KRGSA) GSP (including Greenfield County Water District (GCWD) GSA)
5. Olcese Water District (OWD) GSP.

## 1.5 LIMITATIONS

The timing of this First GSP Annual Report presents inherent limitations because the Reporting Period covers WY 2019, a time period that occurred prior to completion and adoption of the Subbasin GSPs. In some areas of the Subbasin, the GSP monitoring network represents the first coordinated monitoring program for local groundwater conditions. Accordingly, while most monitoring wells have a historical record, historical data in some areas are either non-existent or insufficient to develop consistent hydrographs or water level contour maps for all Principal Aquifers. Even if GSP implementation had begun on the day the final GSPs were each adopted, the Reporting Period for the First Annual Report would already have passed, making it impossible to collect sufficient data during that time period.

Although GSP implementation is already occurring throughout the Subbasin, it is not reasonable to assume that all GSPs should have started implementation prior to GSP completion. Yet, in order to meet the timing of the First GSP Annual Report requirements, the monitoring networks would have to have been finalized and implemented before the GSPs were completed, adopted, and submitted. Many monitoring networks in the Subbasin contain historical data during the Reporting Period, but some networks were not yet available.

Nonetheless, the Kern County Subbasin GSAs are collectively committed to successful GSP implementation and attainment of Subbasin Sustainability Goals. Substantial compliance with requirements of the Annual Report is demonstrated throughout the report. Data are currently being collected to address data gaps identified in the GSPs.

## 1.6 ANNUAL REPORT SUBMITTAL

As required in §353.4, this First GSP Annual Report for the Kern County Subbasin is being submitted electronically to DWR through its online reporting system (SGMA Portal) at https://sgma.water.ca.gov/portal/, using forms and submittal instructions provided by DWR (§353.2).

This First GSP Annual Report has been prepared by Todd Groundwater on behalf of and in cooperation with Plan Manager Patty Poire and the Subbasin GSAs. KCWA Geologist Michelle Anderson prepared the water level contour maps for the Primary Principal Aquifer. Kern-Tulare Water District provided data for the local Santa Margarita Principal Aquifer. Extensive contributions were also made by Subbasin GSAs, member agencies, and their technical consultants to develop a coherent, coordinated Annual Report that meets regulatory requirements and documents ongoing GSP implementation across the entire Kern County Subbasin.

# 2 GROUNDWATER ELEVATIONS

Historical groundwater elevations for GSP monitoring wells in the Kern County Subbasin have been compiled for this First GSP Annual Report for the following purposes:

- Preparation of water level hydrographs to illustrate long-term trends and fluctuations and to demonstrate compliance relative to sustainable management criteria (see **Appendix A**).
- Development of water level contour maps for Kern County Subbasin Principal Aquifers illustrating the seasonal high and seasonal low levels during the Reporting Period (i.e., Fall 2018 and Spring 2019).
- Provision of data in DWR-provided templates for upload on the Annual Report SGMA portal.

## 2.1 COORDINATED BASIN-WIDE MONITORING NETWORK

The Kern County Subbasin GSAs have combined the five GSP water level monitoring networks into a basin-wide network as shown on **Figure 5**. Although developed locally, networks were combined to facilitate coordination and evaluation of sustainable management criteria across GSP boundaries and throughout the Subbasin. Wells on **Figure 5** show the SGMA water level representative monitoring wells (RMWs) that are also being used to evaluate Minimum Thresholds (MTs) and Measurable Objectives (MOs). Hydrographs for these wells are provided in **Appendix A**.

During the GSP development process, then-current wells in the GSP representative monitoring networks were compiled into a Subbasin GSP monitoring network and designated with a local identifier code *RMW-xxx*. These RMW codes were uploaded with the GSP as the Local Identifier code for some, but not all, GSP monitoring network wells. Because these numbers represent the only common well identifier system that has been assigned to GSP RMW sites, those numbers are maintained in this First GSP Annual Report (**Figure 5**). Note that the RMW numbers, although assigned sequentially, do not represent a complete chronological record because some wells were added, eliminated, and/or replaced during the final development of the GSP monitoring networks.

For wells without RMW designations, local well identifiers are used. For linkage back to the well data uploaded on the SGMA portal during the GSP submission process, the DWR Site Code is also included in the hydrograph label.

The Kern County Subbasin GSAs have also coordinated on monitoring protocols for water levels, as documented in each of the Subbasin GSPs and in the executed Coordination Agreement. Monitoring protocols considered Best Management Practices (BMPs), CASGEM[2] monitoring protocols, and protocols from other long-established Kern County Subbasin monitoring programs (e.g., the Kern Fan Monitoring Committee). In consideration of the variable monitoring schedules already developed for existing Subbasin programs, the following time frames were included in the protocols to allow monitoring flexibility for collection of seasonal high and low levels as experienced across this large and complex Subbasin.

- *Collection of water level data between the two approved time frames only:*
    - *January 15th to March 30th representing the seasonal high water levels.*
    - *September 15th to November 15th representing the seasonal low water levels.*

[2] California Statewide Groundwater Elevation Monitoring (CASGEM) program.

Some GSP monitoring network wells are measured more frequently, either as part of a separate monitoring program or in compliance with GSP-specific requirements.

## 2.2 Groundwater Elevation Data

Available water level data from each GSP water level monitoring network have been compiled into the DWR water level template and are being uploaded onto the SGMA portal as supporting information for this Annual Report. As summarized in Section 1.5, GSP monitoring data for many network monitoring wells are incomplete for WY 2019. GSP monitoring networks and protocols were finalized and adopted *after the end of the Reporting Period* (i.e., WY 2019). Many GSP monitoring sites have been identified and incorporated into a monitoring program for the first time. In addition, DWR templates were only recently made available (after completion of the Reporting Period) and some of the required fields had not yet been incorporated into the GSP monitoring program protocols.

For example, some wells have been recently installed and do not have historical data. Other wells represent newly-available wells that may be associated with either an incomplete water level record, water level data with key attributes missing regarding historical monitoring protocols, and/or confidential historical water level records. Nonetheless, Subbasin GSAs have committed to a significant level of effort for the basin-wide GSP monitoring network and are now producing consistent basin-wide water level data sets.

Extensive historical water level monitoring data are available in portions of the Subbasin (e.g. the Kern Fan area) to supplement data from the GSP water level monitoring network. KCWA typically compiles data from the Kern Fan Monitoring Committee, along with other Subbasin data, on an annual basis. To provide additional accuracy for water level contour mapping, KCWA incorporated these additional datasets with the GSP monitoring network data to prepare water level contour maps for the Primary Principal Aquifer, as described Section 2.4 below.

## 2.3 Hydrographs from WY 1995 through WY 2019

Water level data described above were used to generate water level hydrographs for GSP monitoring network wells where Minimum Thresholds (MTs) and Measurable Objectives (MOs) have been established (**Appendix A**). Hydrograph development and observations on trends and fluctuations – along with information on compliance with sustainable management criteria – are described in the following sections.

### 2.3.1 Hydrograph Development

GSP regulations require that hydrographs use "historical data to the greatest extent available, including from January 1, 2015, to current reporting year" (§356.2(b)(1)(B)). For this First GSP Annual Report for the Kern County Subbasin, the time period from WY 1995 through WY 2019 (Reporting Period) was chosen to meet GSP requirements and allow for consistent hydrograph development. This time period includes the 20-year historical study period (WY 1995 – WY 2014) that was used in the basin-wide analysis of water budgets to represent average hydrologic conditions. The hydrograph time period also includes WY 2015, which was used as the current study period for basin-wide water budgets. Data are presented through the Reporting Period of WY 2019 where available. Accordingly, all hydrographs cover a 25-year period from WY 1995 through WY 2019 (**Appendix A**).

Regulations also require the identification of water year type for each of the water years included on the hydrographs. The water year type for this time period uses the San Joaquin River Index as illustrated by the bottom graph on **Figure 6**. The Annual Index for the Kern River is also shown on **Figure 6** for comparison to local Subbasin conditions. As illustrated by the colors on the San Joaquin River Index, water year types include Wet, Above Normal, Below Normal, Dry, and Critically Dry. A comparison of the San Joaquin and Kern rivers indices indicates relatively good agreement for wet and dry cycles over the 25-year period. In particular, the recent drought years from 2013 through 2015 represent the three most critically dry years in the period for both the Kern River and the San Joaquin River. For the San Joaquin River and Kern River, WY 2015 was the driest on record. The last four years of the period represent two wet years (WY 2017 and WY 2019) with intervening drier years (WY 2016 and WY 2018).

In compliance with GSP regulations Article 4, the hydrographs are submitted electronically and labeled with a unique site identification number (Site Code and Local Identifier/RMW#), monitoring agency, and the ground surface elevation (GSE). In addition, hydrographs have incorporated the same datum and scaling to the greatest extent practical (§352.4(e)). Some vertical scales are adjusted to allow the GSE, MT, and MO to be displayed.

Some hydrographs are presented without groundwater elevation data but are provided as a placeholder to illustrate the GSP monitoring network and locally-designated MT and MO. Blank hydrographs generally represent a local monitoring site that does not contain historical data and is expected to be implemented after the end of the Reporting Period.

Over 200 hydrographs, including those without groundwater elevation data during the Reporting Period, have been developed for this 2019 Annual Report and are presented in a consistent format in **Appendix A**. For each hydrograph, a solid black horizontal line shows the GSE and the MT and MO are represented by orange and gray lines, respectively. Groundwater elevation data are shown in blue.

Most of the hydrographs represent the Primary Principal Aquifer, composed of the alluvial continental deposits in the Subbasin. However, three local Principal Aquifers in addition to the Primary Principal Aquifer are represented by the following hydrographs in **Appendix A**:

- 7 hydrographs prepared by Kern-Tulare Water District (KTWD) for the Santa Margarita Formation.
- 9 hydrographs prepared by Eastside Water Management Area (EWMA) for the Santa Margarita Formation and the Olcese Sand.
- 2 hydrographs prepared by Olcese Water District (OWD) for the Olcese Sand.

### 2.3.2 Water Level Trends and Fluctuations

In general, hydrographs for the Primary Principal Aquifer generally mimic the water year types illustrated by the hydrology of the San Joaquin River and Kern River indices on **Figure 6**. Water levels generally rose during the wet periods of WY 1995 through WY 1998, WYs 2005-2006, WYs 2010-2011 and the recent wet years of WY 2017 and WY 2019. Water level declines were observed in the intervening drought years with the drought of record (WYs 2015-2016) producing the historic low water levels over much of the Subbasin.

The fluctuations associated with wet and dry cycles are more significant in the Kern Fan banking areas where large volumes of water are recharged and recovered with operations primarily controlled by hydrology. Fluctuations of more than 200 feet are observed from wet years to drought years. Fluctuations are muted away from the banking areas and represent factors affected more by local recharge and pumping conditions. Notwithstanding the large fluctuations, it is important to note that the Kern Fan banking projects have been developed with mitigation requirements on the lowering of water levels with limitations on how low the water levels are allowed to decline.

### 2.3.3 Compliance with Sustainable Management Criteria

As demonstrated by the hydrographs in **Appendix A**, almost all wells in the Subbasin are above the designated MT measurements during the Reporting Period at each monitoring site. Although water levels in some wells declined to levels close to or below MTs during the continued dry conditions of WY 2018, water levels generally rose toward the end of WY 2019 (the end of the Reporting Period) and have remained above the MTs since that time. Note that the water level declines below MTs occurred prior to the submission of the GSPs and prior to GSP implementation.

## 2.4 Groundwater Elevation Contours for Subbasin Principal Aquifers

Groundwater elevation data were used to develop water level contours maps for the *Primary* Principal Aquifer in the Subbasin. As mentioned previously, GSP monitoring network data were supplemented with additional groundwater elevation data to construct the maps for the Primary Principal Aquifer. Water level contour maps could not be generated for the remaining three local Principal Aquifers that have a much more limited extent in the Subbasin, as explained in subsequent sections below.

### 2.4.1 Primary Principal Aquifer

KCWA provided water elevation contour maps for the Primary Principal Aquifer, which consists primarily of continental alluvial deposits that extend throughout most of the Subbasin. KCWA has been responsible for implementation of the Kern Fan Monitoring Committee program and has constructed similar basin-wide groundwater elevation contour maps for decades. Although KCWA has prepared contour maps for both seasonal highs (Spring) and lows (Fall) previously, more data are typically collected in Spring when water levels are less affected by a long irrigation season and more accurately reflect the natural hydrologic conditions in the Subbasin. For this First GSP Annual Report, data were compiled and contours for both Fall 2018 and Spring 2019, as shown on **Figures 7** and **8**, respectively, to comply with GSP regulations.

As shown on **Figure 7**, groundwater elevations are highest in the eastern Subbasin along the Kern River (above 350 feet mean sea level (msl)), where Kern River water infiltrates the channel and unlined canals and recharges the groundwater basin. In general, water levels remain at approximately 200 feet msl along the Kern River to the Kern Fan banking projects where water was being recharged for storage and subsequent recovery. Water levels indicate that groundwater flows radially away from the Kern Fan recharge area. Within several miles of the banking areas, water levels are about 50 feet or more lower than in the banking areas. Water levels are below sea level beneath much of the northern Subbasin. The lowest water levels (more than 100 feet below msl) occur long the northern boundary of **Figure 7** near the Subbasin subsurface outflow to the adjacent northern subbasins. Water levels are higher south of the Kern River and are generally above 50 feet to 100 feet msl.

Similar patterns of water levels and groundwater flow directions are indicated for Spring 2019 conditions as shown on **Figure 8**. For this time period, additional data are available from other monitoring programs and more detailed contouring can be supported by the data. During this time period, water levels have risen in the Kern Fan banking areas, resulting from recharge operations. As groundwater flows north and south from the Kern River, water levels are maintained at higher levels further from the Kern River than observed in Fall 2018. The lowest water levels in the Subbasin are about 40 feet below msl close to the Subbasin subsurface outflow to the northern subbasins. As in Fall 2018, water levels are generally higher south of the Kern River, with most of the area above 120 feet msl.

### 2.4.2 Local Principal Aquifers

Although most of the Subbasin production occurs within the Primary Principal Aquifer, three additional Principal Aquifers have been identified as having local significance. Although the exact extents of these three local Principal Aquifers are not well known, the aquifers have been identified in four areas of the Subbasin as listed in **Table 2**.

**Table 2. Local Principal Aquifers in the Kern County Subbasin**

| Principal Aquifer | Responsible Agency | Subbasin Area |
|---|---|---|
| **Santa Margarita Formation** | Kern-Tulare Water District (KTWD) | Northeast |
| **Santa Margarita Formation Olcese Sand** | Eastside Water Management Area (EWMA) | East-Northeast |
| **Olcese Sand** | Olcese Water District (OWD) | East, near the Subbasin boundary adjacent to the Kern River |
| **Upper Aquifer** | Semitropic Water Storage District (SWSD) | Northwest |

The general extents of these local Principal Aquifers are approximated on **Figure 9**. As shown on the map, aquifers consist of deeper consolidated units in the east-northeastern Subbasin including the Santa Margarita Formation and the Olcese Sand. In those areas, groundwater is produced primarily from the Santa Margarita Formation in KTWD, both the Santa Margarita and Olcese Sand in EWMA, and the Olcese Sand in OWD.

In the north central Subbasin, a local Principal Aquifer associated with limited production is created by the occurrence of shallow clays that create a shallow upper alluvial aquifer that is generally separated from the Primary Principal Aquifer locally. Although the upper aquifer is not heavily relied on for water supply, the presence of an upper and lower aquifer system is evidenced by differences in water levels. Cross sections and maps presented in the Semitropic Water Storage District (SWSD) MA Plan (in the KGA GSP) show the water level differences and limited extent of the upper Aquifer as a local Principal Aquifer. The estimated extent is shown on **Figure 9**.

Portions of the upper aquifer have been mapped previously as part of the Semitropic Groundwater Banking Project Monitoring Committee. Those maps will continue to be available; however, publicly-available water level data for WY 2019 were not sufficient for creating new maps in the First GSP Annual Report. Almost all of the groundwater production beneath SWSD occurs in the lower Principal Aquifer (hydraulically connected to the Primary Principal Aquifer); as such, no significant change in groundwater in storage for the upper aquifer was identified in the Management Area analysis. Any local change in groundwater in storage will be documented from the C2VSimFG-Kern modeling as part of this 2019 Annual Report.

Similarly, insufficient data were available for water level contour mapping in the Eastside Water Management Area where the first ever groundwater elevation monitoring program has just been implemented. In Olcese Water District, the use of the local Principal Aquifer occurs from a small number of wells located in a limited area. Those data for WY 2019 also were insufficient for water level contour maps.

For the Santa Margarita Formation beneath Kern Tulare Water District (KTWD), additional data are available from both the previously-implemented CASGEM program as well as the ongoing monitoring by KTWD as part of its GSP network. For this GSP Annual Report, groundwater elevations from Fall 2018 and Spring 2019 were provided by KTWD and shown on **Figure 10**.

As evidenced by the data on **Figure 10**, water levels are variable and not readily conducive to water level contouring. The production zone represents a narrow band of Santa Margarita sandstone that is structurally complex. Nonetheless, it provides an important local resource that is continually being investigated and monitored by KTWD.

# 3 GROUNDWATER EXTRACTIONS

The volume of groundwater extraction in the Kern County Subbasin is provided for the preceding water year (WY 2019) per SGMA Annual Report requirements in 23 CCR §356.2(b)(2). Data are summarized in a table (**Table 2**) that follows DWR reporting requirements for groundwater extractions by water use sector and identifies the method of measurement and accuracy of measurements. A map of groundwater extractions (**Figure 11**) is provided to illustrate the general location and volume of groundwater extractions in the Kern County Subbasin.

## 3.1 GROUNDWATER EXTRACTION DATA METHODS

Total groundwater extractions for the Subbasin for the preceding water year (WY 2019) were compiled and are summarized in this section. The data were collected using the "best available measurement methods." For the Kern County Subbasin the groundwater extraction data were compiled using two methods:

- Directly measured groundwater extraction data collected by local water agencies.
- Estimated groundwater extractions using the IWFM Demand Calculator (IDC) tool developed by DWR (Dogrul, Kadir and Brush, 2017).

Directly measured groundwater extractions were collected using meters and other appropriate comparable measuring devices by local water agencies (**Table 1**) in accordance with the monitoring protocols of the respective local water agency. These data were compiled and provided to support this Annual Report by the local water agency. These directly measured data were obtained using a "high-accuracy" measuring devices and methodologies (see **Section 3.4**).

The remaining estimated groundwater extractions are based on DWR's IDC tool (Dogrul, Kadir and Brush, 2017) to estimate agricultural, urban and other pumping. IDC is a stand-alone root zone modeling tool that solves the soil moisture balance in the root zone using local soil properties to compute the monthly agricultural and urban water demand for each model element. If water demand is not satisfied with precipitation and applied surface water, the IDC tool calculates the groundwater pumping needed to eliminate any assumed deficit (Maley and Brush, 2020). The groundwater extraction calculated by IDC is dynamically linked to the C2VSimFG-Kern to provide the overall pumping data for the groundwater model component.

IDC calculates agricultural demand based on annual crop type distribution mapping from the Kern County Agricultural Commissioner, member agency data and evapotranspiration (ET) rates for 20 irrigated crop types, the urban areas, and the managed seasonal wetlands at the Kern National Wildlife Refuge. Monthly ET rates are based on satellite-based data developed by the Irrigation Training & Research Center (ITRC) at California Polytechnic State University, San Luis Obispo (Howes, 2020). Surface water supplies are based on measured data and precipitation is based on regional data; therefore, IDC is required to calculate only the groundwater extraction necessary to meet the crop and soil moisture demand.

Similarly, urban demands in C2VSimFG-Kern are based on agency supplied information and/or population and per-capita water demands. Population information was from projected-future baseline population used for the GSPs (Maley and Brush, 2020). The per-capita water demand was recalculated for the metropolitan Bakersfield area based on water supply data provided by the local water purveyors.

IDC calculates urban water demands for specified urban delivery zones, allocates specified surface water and groundwater supplies to meet these demands, and can optionally pump additional groundwater to satisfy unmet urban (indoor and outdoor) demands in each zone (Maley and Brush, 2020).

## 3.2 SUMMARY EXTRACTIONS BY SUBBASIN FOR WY 2019

Using the methods described above, the total groundwater extractions in the Kern County Subbasin for WY 2019 were tabulated. **Table 3** summarizes the Kern County Subbasin groundwater extractions by water use type and measurement method for WY 2019.

**Table 3. Groundwater Extractions in the Kern County Subbasin for Water Year 2019**

| Groundwater Extraction | Total Groundwater Extractions | Meters Volume | Electrical Records Volume | Land Use Volume | Groundwater Model Volume | Other Methods Volume |
|---|---|---|---|---|---|---|
| **Water Use Type** | **Acre-ft** | **Acre-ft** | **Acre-ft** | **Acre-ft** | **Acre-ft** | **Acre-ft** |
| Urban | 150,892 | 128,115 | 0 | 22,777 | 0 | 0 |
| Industrial | 0 | 0 | 0 | 0 | 0 | 0 |
| Agricultural | 1,096,779 | 19,945 | 0 | 1,076,834 | 0 | 0 |
| Managed Wetlands | 0 | 0 | 0 | 0 | 0 | 0 |
| Managed Recharge | 0 | 0 | 0 | 0 | 0 | 0 |
| Native Vegetation | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 36,512 | 21,531 | 0 | 14,981 | 0 | 0 |
| Total | 1,284,183 | 169,591 | 0 | 1,114,592 | 0 | 0 |

The data show that 1,284,183 acre-feet of groundwater extractions occurred in WY 2019. Following the DWR templates, the groundwater extractions are presented by water use sector. For the Kern County Subbasin, the water use sectors are described as follows:

- **Urban** – groundwater extractions for all urban uses including residential, commercial, municipal, industrial, oilfield use, landscaping and other uses. Reported data are provided by urban water purveyors with metered data. Non-reported data are derived from land use assumptions in the IDC tool within the C2VSimFG-Kern groundwater model. The total urban groundwater extraction in the Kern County Subbasin is 150,892 acre-feet which accounts for about 12% of the total pumping in the Kern County Subbasin.
- **Industrial** – current data do not allow for tabulation of groundwater extraction of industrial water use on a consistent basin-wide basis; therefore, industrial water use is included in the urban water use sector for WY 2019.
- **Agricultural** – groundwater extractions for irrigated crops and pasture (including non-district lands). Also included in this category is groundwater used for process water for food processing, dairy and other agricultural uses, which is then applied to nearby crops for disposal. Reported data are pumping by local water agencies for agricultural use within the Kern County Subbasin. Private agricultural pumping is determined using the IDC tool within C2VSimFG-Kern based on the ITRC-METRIC satellite data to determine monthly ET rates. The WY 2019 total agricultural

groundwater extraction in the Kern County Subbasin is 1,096,779 acre-feet which accounts for about 85% of the total pumping.

- **Managed Wetlands** – currently, no known groundwater extraction is used for maintaining managed wetlands in the Kern County Subbasin. The Kern National Wildlife Refuge has historic groundwater use, but currently relies on surface water supplies. No managed wetland groundwater extractions were reported for WY 2019.
- **Managed Recharge** – currently, no known groundwater extractions are used to supply managed recharge operations in the Kern County Subbasin. Groundwater recovery pumping of managed recharge operations is distributed to the appropriate water use sector based on the destination land use.
- **Native Vegetation** – currently, no groundwater extractions are used for maintaining native vegetation in the Kern County Subbasin.
- **Other Sector** – groundwater extractions for water use sectors that do not fit within the categories listed above or where the water use is not specified by water use sector. Groundwater extractions by managed recharge operations that are returned to either the California Aqueduct or Friant-Kern Canal as a "Pump-In" for water exchanges or for unspecified end use are included here. The total groundwater extraction for other uses in the Kern County Subbasin is 36,512 acre-feet which accounts for about 3% of the total pumping.

In accordance with 23 CCR §356.2 (b)(2), the user must define the method of measurement (direct or indirect) and the accuracy of measurements. The other criteria required for presenting the groundwater extraction data is by method of measurement. As shown on **Table 3**, the groundwater extractions are categorized into two of the methods listed by DWR. These include:

- **Meters** – direct measurement of groundwater extraction collected by local water agencies using meters and other appropriate measurement device. The total groundwater extraction from metered data in the Kern County Subbasin is 169,591 acre-feet which accounts for about 13% of the total pumping.
- **Land Use Calculation** – indirect estimate of groundwater extractions based on land use methods using the IDC tool (Dogrul, Kadir and Brush, 2017), a component of the C2VSimFG-Kern model for the Kern County Subbasin. The total groundwater extraction based on land use calculations in the Kern County Subbasin is 1,114,592 acre-feet which accounts for about 87% of the total pumping in the basin.

Groundwater extractions presented here represent the current best estimate of groundwater pumping in the Kern County Subbasin. The use of C2VSimFG-Kern, including the IDC tool, provide a consistent, basin-wide method for estimating the unmeasured pumping in accordance with the Kern County Subbasin Coordination Agreement.

## 3.3 GROUNDWATER EXTRACTIONS MAP

In accordance with 23 CCR §356.2 (b)(2), a map (**Figure 11**) illustrating the general location and volume of groundwater extractions is included in the Annual Report. For WY 2019, a total groundwater extractions map was derived from the simulation results of C2VSimFG-Kern. The specified metered pumping is directly input into C2VSimFG-Kern and the IDC tool estimates the unmeasured portion of agricultural and urban pumping based on land use calculations (Maley and Brush, 2020).

Developing a map showing the distribution of groundwater extraction is not a function readily available with the existing DWR tools. The development of this map required accessing the groundwater extraction for each element from the binary data of model results. The model output is the total volume of groundwater extracted within a model element. Since model elements vary in size, the simulated groundwater extraction rate from C2VSIMFG-Kern was normalized to the rate of acre-feet per square mile. These groundwater extraction rates were then interpolated onto a uniform one-square mile grid superimposed over the Kern County Subbasin. Therefore, the model represents the total pumping per square mile over the groundwater basin included in C2VSimFG-Kern.

**Figure 11** shows the distribution of total groundwater extractions over the Kern County Subbasin. Since agricultural pumping accounts for 85% of the total groundwater extractions, the pumping distribution generally corresponds to the distribution of irrigated agriculture. The exception is in the northwestern Subbasin where irrigated agriculture depends solely upon imported surface water supplies due to poor groundwater quality in this area that makes the groundwater unsuitable for irrigation. In general, groundwater extraction in the irrigated areas ranges between 250 to 2,000 acre-feet per square mile. Isolated areas above 2,000 acre-feet per square mile are typically associated with concentrated areas of pumping for groundwater banking recovery operations. Because of this, concentrated pumping is primarily located in the vicinity of managed aquifer recharge operations where the pumping is recovering previously "banked" surface water for use.

## 3.4 PART A AND B DWR TEMPLATES

As part of the Annual Report submittal, DWR requires that a series of Excel spreadsheets be completed to summarize key water supply and use volumes for WY 2019 for the entire Subbasin. For groundwater extraction, DWR requires two spreadsheets be submitted along with the Annual Report in accordance with 23 CCR §356.2 (b)(2):

- **Part A. Groundwater Extractions** - groundwater extractions for WY 2019 by water use sector (23 CCR §356.2(b)(2))
- **Part B. Groundwater Extraction Methods** - the volume of groundwater extractions for WY 2019 by different measurement methods (23 CCR §356.2(b)(2)).

Data summarized in **Table 3** follow the Part A and B DWR Template reporting requirements for groundwater extractions and were collected using the best available measurement methods.

The accuracy of measurement is required on the DWR templates. For the Kern County Subbasin, the groundwater extractions are based on either reported metered pumping data or from the simulation results of the C2VSimFG-Kern model. These data were collected by experienced agency staff from agricultural, urban and county water agencies (**Table 1**) in accordance with their monitoring protocols. The measuring devices used by these agencies are considered to be well maintained and consistently monitored; therefore, reported data meet high accuracy levels in compliance with AWWA (2006, 2012) and other relevant standards. In accordance with these standards, meter accuracy is considered high, ranging between 0% and 5%.

Estimated groundwater extractions are based on simulation results of the IDC tool within C2VSimFG-Kern model. The water balance accuracy of the groundwater model is considered medium, approximately ranging between 10% and 20%. Input data based on metering, as noted above, are assumed to have an accuracy of 0% to 5%. The agricultural pumping, which is the largest component of groundwater extraction, is estimated using the ITRC-METRIC based ET Rates. ITRC (Howes, 2020) lists the accuracy of the ET measurements as ranging from 7% to 10%. Land use is based on Kern County Agricultural Commissioner annual land use data including crop type. Soil properties are based on local soil survey data, which have a higher level of uncertainty. Applying a weighted average of these inputs to the overall water budget produces a relative accuracy between 10% and 20% for the land use calculation for agricultural groundwater extractions.

# 4 SURFACE WATER SUPPLY

The volume of surface water supplies delivered to the Kern County Subbasin is provided for WY 2019 per GSP Regulations (23 CCR §356.2(b)(3). Data are summarized in a table that follows DWR reporting requirements for surface water supplies by source water supply source and identifies the method used to determine the reported volume.

## 4.1 SURFACE WATER DATA METHODS

Surface water supplies for the Subbasin for WY 2019 were compiled from data collected using the "best available measurement methods." For the Kern County Subbasin, surface water supplies are directly measured by local water agencies at the point of diversion from a river, stream or canal. Water supply from natural sources, (e.g., precipitation and natural runoff) are not included in Section 4. The contribution of these sources to the basin is included in the calculation of the change in groundwater in storage based on the C2VSimFG-Kern model provided in **Section 6**.

The measured surface water supplies were provided by local agricultural water districts, urban water purveyors and city water departments (**Table 1**) for this Annual Report. These data were collected using meters that are compiled by local water agencies following their monitoring protocols. Therefore, these data were obtained using a "high accuracy" method consistent with typical accuracy ranges of surface water diversions.

## 4.2 SURFACE WATER BY SOURCE TYPE

Using the methods described above, the surface water supply by source in the Kern County Subbasin for WY 2019 were tabulated and are summarized in **Table 4**. The water source types are defined in 23 CCR §351 (a-k). The user can identify a different water source type than those predefined by selecting 'other source type' in the template and providing a description of the source type with the data. A map showing the primary surface water supply infrastructure and features in the Kern County Subbasin is provided on **Figure 12**.

**Table 4. Surface Water Supplies in the Kern County Subbasin for Water Year 2019**

| Surface Water Supply | Surface Water Supply Volume |
|---|---|
| **Surface Water Supply Source** | **Acre-ft** |
| Central Valley Project | 505,061 |
| State Water Project | 1,121,965 |
| Colorado River Project | 0 |
| Local Supplies | 1,065,772 |
| Local Imported Supplies | 75,469 |
| Recycled Water | 35,609 |
| Desalination | 0 |
| Other Water Source | 1,524 |
| Total Surface Water Supply | 2,805,400 |

- **Central Valley Project (CVP)**: surface water deliveries from the CVP diverted from the Friant-Kern Canal and/or California Aqueduct (westside CVP – Cross Valley Contractors). In WY 2019, 505,061 acre-feet of CVP water was delivered to the Kern County Subbasin, representing about 18% of total surface water supplies.
- **State Water Project (SWP)**: surface water deliveries from the SWP diverted from the California Aqueduct. In WY 2019, 1,121,965 acre-feet of SWP water was delivered to the Kern County Subbasin, representing about 40% of total surface water supplies.
- **Colorado River Project**: Currently, no surface water from the Colorado River is delivered to the Kern County Subbasin.
- **Local Supplies**: surface water diversions from local surface water sources. The primary local supply is from the Kern River, but other local surface water diversions are taken from other local sources such as Poso Creek. In WY 2019, 1,065,772 acre-feet of local surface water was delivered to the Kern County Subbasin, representing about 38% of total surface water supplies.
- **Local Imported Supplies:** surface water from local sources imported from areas outside of the Kern County Subbasin. The primary source of local imported water is from treated oilfield produced water. In WY 2019, 75,469 acre-feet of local imported water supplies were delivered to the Kern County Subbasin, representing about 3% of total surface water supplies.
- **Recycled Water:** wastewater and recovered stormwater that is treated and used for either agriculture or groundwater recharge. In WY 2019, 35,609 acre-feet of recycled water were used in the Kern County Subbasin, representing about 1% of total surface water supplies.
- **Desalination Water:** poor-quality surface water or groundwater that is treated to levels where it can be used for irrigated agriculture, urban water supply or groundwater recharge. Currently, no desalination water is available in the Kern County Subbasin; however, proposed SGMA projects include this source as a future water supply.
- **Other Water Source**: surface water obtained from sources other than those listed above or from unspecified sources. In WY 2019, 1,524 acre-feet of local surface water was delivered to the Kern County Subbasin, primarily from reuse of tailwater or irrigation return flow that re-enters local surface water system that is then diverted back for irrigated agriculture water supply representing less than 1% of total surface water supplies.

The surface water supplies in the Kern County Subbasin can vary from year-to-year due to water year type, statewide water demand and operational considerations. WY 2019 was a wet year according to the San Joaquin River Index; flows on the Kern River were 175% of the long-term average, also consistent with a wet year.

## 4.3 PART C DWR TEMPLATE

As part of the Annual Report submittal, DWR requires that a series of Excel spreadsheets be completed to summarize key water supply and use volumes for WY 2019 for the Subbasin. The volume of surface water reported in the template is by water source type. For the surface water supply, DWR requires one spreadsheet be submitted along with the Annual Report in accordance with 23 CCR §356.2 (b)(3):

- **Part C. Surface Water Supply** – the surface water supply for WY 2019 based on quantitative data and listed by water source type (23 CCR §356.2(b)(3)).

Data summarized in **Table 4** follow the Part C DWR Template reporting requirements for surface water supply and were collected using the best available measurement methods.

Measurement of surface water supplies for the Kern County Subbasin consist of a variety of measurement methods, but all are considered reliable and accurate. Water agencies typically measure surface water deliveries with a combination of weirs and meters that are read and reported by agency staff. Senate Bill x7-7 (SBx7-7) requires flow measurement devices to be maintained within an acceptable range of accuracy that is defined as a volumetric flow measurement within +/- 12% (§597.3(a)(1))). Weirs and meters used in the Kern County Subbasin have been documented to conform to the SBx7-7 volumetric accounting standards (ITRC, 2012, USBR, 2001, AWWA 2006, 2012) in local water district agricultural water management plans. Procedures employed by water agencies have been standardized to further reduce potential sources of error to range between 1% to 10% depending on the measurement device. In the Part C template, an error range of 5% to 10% is listed as a conservative assumption for this Annual Report.

## 5 TOTAL WATER USE

The total water supply and use for the Kern County Subbasin is provided for WY 2019 per GSP Regulations 23 CCR §356.2(b)(4).

### 5.1 TOTAL WATER USE BY SOURCE

The total water supply utilizes the same data compiled for WY 2019 groundwater extractions and surface water supplies as presented in Section 3 and 4. The data show a total water use for the Kern County Subbasin was 4,089,445 acre-feet in WY 2019. The total water supply is summarized in **Table 5.** The water supply types shown on **Table 5** are described as follows:

- **Groundwater** includes groundwater extractions for all uses. In WY 2019, the groundwater supply totaled 1,284,183 acre-feet representing about 31% of total supplies in WY 2019.
- **Surface water** includes surface water deliveries for all uses. In WY 2019, the surface water supply totaled 2,768,267 acre-feet representing about 68% of total water supplies in WY 2019.
- **Recycled water** includes treated wastewater and stormwater for all use. In WY 2019, recycled water supply totaled 35,609 acre-feet representing about 1% of total water supplies in WY 2019.
- **Reused water** includes reuse of tailwater, or irrigation return flow that re-enters local surface water system that is then diverted back for irrigated agriculture water supply. In WY 2019, reused water supply totaled 1,524 acre-feet representing less than 1% of total water supplies in WY 2019.
- **Other Water Source Type** - No *other* water source type is noted for the Kern County Subbasin.

**Table 5. Total Water Use by Source Type in the Kern County Subbasin for Water Year 2019**

| Total Water Use | Total Water Supply by Volume |
|---|---|
| **Water Source Type** | **Acre-ft** |
| Groundwater | 1,284,183 |
| Surface Water | 2,768,267 |
| Recycled Water | 35,609 |
| Reused Water | 1,524 |
| Other Water Source Type | 0 |
| Total Water Supply | 4,089,583 |

In this case, the total surface water supply from Section 4 that is shown distributed by water source in **Table 4** is presented in **Table 5** distributed by water supply type. The total surface water supply shown on **Table 4** is distributed among surface water, recycled water and reused water on **Table 5**.

## 5.2 Total Water Use By Water Use Sector

The data show a total water use for the Kern County Subbasin was 3,878,302 acre-feet in WY 2019. The total water supply is summarized in **Table 6**, and the water use sectors shown on **Table 6** are described as follows:

- **Urban** includes total water use for all urban water uses including residential, commercial, municipal, industrial, oilfield use, landscaping and other uses. In WY 2019, urban water use totaled 199,977 acre-feet, representing about 5% of the total water use in the Kern County Subbasin.
- **Industrial** includes total water use for industrial use. Current data does not allow for tabulation of industrial water use on a consistent basin-wide basis; therefore, industrial water use is included in the urban water use sector for WY 2019.
- **Agricultural** includes total water use for all agricultural water uses. In WY 2019, agricultural water use totaled 2,445,679 acre-feet, representing about 63% of the total water use in the Kern County Subbasin.
- **Managed Wetlands** includes total water use for maintaining managed wetlands at the Kern National Wildlife Refuge. In WY 2019, managed wetlands water use totaled 23,074 acre-feet, representing about 1% of the total water use in the Kern County Subbasin.
- **Managed Recharge** includes total water use for all managed recharge and groundwater banking operations. In WY 2019, managed recharge use totaled 1,173,060 acre-feet, representing 30% of the total water use in the Kern County Subbasin.
- **Native Vegetation** includes total water use for maintaining native vegetation. In WY 2019, no groundwater extractions or surface water deliveries were used on native vegetation in the Kern County Subbasin.
- **Other Water Use** includes total water use for uses other than those listed above or from unspecified uses. In WY 2019, Other Water Uses totaled 36,512 acre-feet, representing 1% of the total water use in the Kern County Subbasin.

**Table 6. Total Water Use by Sector in the Kern County Subbasin for Water Year 2019**

| Total Water Use | Total Water Use Volume |
|---|---|
| **Water Use Sector** | **Acre-ft** |
| Urban | 199,977 |
| Industrial | 0 |
| Agricultural | 2,445,679 |
| Managed Wetland | 23,074 |
| Managed Recharge | 1,173,060 |
| Native Vegetation | 0 |
| Other Water Use | 36,512 |
| Total Water Use | 3,878,302 |

The total water use also utilizes the same data that was compiled for WY 2019 groundwater extractions and surface water supplies presented in Sections 3 and 4. In this case, the total urban and agricultural water use is taken from the IDC tool within the C2VSimFG-Kern model. The difference in total water supply and total water use is 211,281 acre-feet representing about 5% of the total water supply, or 8% of the total surface water supply. These volumes and percentages are consistent with estimated conveyance losses for the Kern County Subbasin. Therefore, this difference is considered to represent losses primarily due to canal seepage that contribute to groundwater recharge.

## 5.3 Part D DWR Template

As part of the Annual Report submittal, DWR requires that a series of Excel spreadsheets be completed to summarize key water supply and use volumes for WY 2019 for the Subbasin. For the total water use, DWR requires one spreadsheet be submitted along with the Annual Report in accordance with 23 CCR §356.2 (b)(3):

- **Part D. Total Water Use** – the total water supply by water use type and total water use by water use sector for the preceding water year (WY 2019) for the entire Kern County Subbasin (23 CCR §356.2(b)(4)).

Data summarized in **Tables 5** and **6** follow the Part D DWR Template reporting requirements for total water supply and use and were collected using the best available measurement methods.

# 6 CHANGE IN GROUNDWATER IN STORAGE

GSP regulation §356.2(b)(5) requires inclusion of the following maps and graphs in the Annual Report for the entire Kern County Subbasin:

(A) Change in groundwater in storage maps for each principal aquifer in the basin.

(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.

This section provides a description of the methodology used to develop the required annual change in groundwater in storage maps and graphs.

## 6.1 METHODOLOGY

The Kern County Subbasin GSAs coordinated on an approach for the change in groundwater in storage maps and graphs that covered the entire Subbasin; these were based on the updated C2VSimFG-Kern model results. The Kern County Subbasin Coordination Agreement refers to the local groundwater-surface water model (C2VSimFG-Kern) as the agreed upon method for generating coordinated water budgets for the Kern County Subbasin. C2VSimFG-Kern uses comparable data sets and methodologies over the entire Subbasin that meets numerous technical requirements for basin-wide coordination in §357.4.

This current approach for continued update and use of the primary DWR modeling tool (with our local Kern County updates for evaluating basin conditions) will maintain consistency of method for presenting the basin-wide change in groundwater in storage. A summary of C2VSimFG-Kern development is provided in Section 1.3, and additional documentation is available as Appendix 2 and 4 of the Kern County Subbasin Coordination Agreement (Maley and Brush, 2020).

## 6.2 GRAPHS OF CHANGE IN GROUNDWATER IN STORAGE

GSP Regulation §356.2(b)(5)(B) requires that the Annual Report include graphs of the following basin-wide information. The graphs are to include historical data, to the greatest extent available, including from January 1, 2015 to the current reporting year. These graphs are to include the following information:

- Water Year Type (Wet, Above Normal, Below Normal, Dry, Critically Dry)
- Groundwater Use
- Annual Change in groundwater in storage
- Cumulative change in groundwater in storage

### 6.2.1 Change in Groundwater in Storage Graph

**Figure 13** shows the simulated change in groundwater in storage graph for the Kern County Subbasin from over the 25-year period from WY 1995 to WY 2019. The updated C2VSimFG-Kern results for change in groundwater in storage for the Kern County Subbasin and the water year type based on the San Joaquin River Index (CDEC, 2020, Friant Water Authority, 2019) are summarized as follows:

- WY 2016, a dry water year type, had a **decline** of 1,229,970 acre-feet
- WY 2017, a wet water year type, had an **increase** of 1,722,971 acre-feet
- WY 2018, a below normal water year type, had a **decline** of 636,030 acre-feet
- WY 2019, a wet water year type, had an **increase** of 851,260 acre-feet

The total change in groundwater in storage over the four-year period from WY 2016 through WY 2019 was an increase of 708,231 acre-feet, which is average increase of 177,058 acre-feet per year. This compares to the simulated historical average over the 20-year base period from WY 1995 to WY 2014 that was a decline in groundwater in storage of 277,114 AFY.

The simulated change in groundwater storage varies over the historical period that is closely related to climatic conditions and surface water supply availability (**Figure 13**). During the periods WY 1995 to WY 1999, WY 2005 to WY 2006 and WY 2011, the groundwater storage volume was stable to increasing and correlates to the above average rainfall and surface water availability during these times. During the periods WY 2000 to WY 2004, WY 2007 to WY 2010 and WY 2012 to WY 2015, groundwater storage volume decreased, correlated to periods of drought and low surface water availability.

### 6.2.2 Groundwater Use Graph

**Figure 14** shows the simulated groundwater use based on C2VSimFG-Kern model results. The updated C2VSimFG-Kern simulation results for groundwater use in the Kern County Subbasin and the water year type based on the San Joaquin River Index (CDEC, 2020, Friant Water Authority, 2019) are summarized as follows:

- **WY 2016**, a dry water year type, had a total groundwater use of 1,933,203 acre-feet, of which 74% was for agricultural use, 8% for urban use, and 19% for other uses. A higher percentage of other uses in WY 2016 included higher than average groundwater banking recovery for local use and aqueduct “pump-ins”.
- **WY 2017**, a wet water year type, had a total groundwater use of 1,348,048 acre-feet, of which 83% was for agricultural use, 12% for urban use, and 5% for other uses.
- **WY 2018**, a below normal water year type, had a total groundwater use of 1,861,878 acre-feet, of which 84% was for agricultural use, 8% for urban use, and 7% for other uses.
- **WY 2019**, a wet water year type, had a total groundwater use of 1,284,183 acre-feet, of which 85% was for agricultural use, 12% for urban use, and 3% for other uses.

Total groundwater pumping was about 20% to 30% lower during wet years than during the dry and below normal water year types. This was primarily driven by the availability of surface water for irrigated agriculture during the wet years which led to a decrease to groundwater pumping. Groundwater pumping for other uses was 4 to 5 times greater during WY 2016 and WY 2018 due to increases in groundwater banking recovery during the drier years. Urban pumping was relatively stable from WY 2016 to WY 2019.

## 6.3 MAP OF CHANGE IN GROUNDWATER IN STORAGE FOR THE SUBBASIN

GSP regulation §356.2(b)(5)(A) requires an annual change in groundwater in storage map for the entire Kern County Subbasin be included in the Annual Report. In the Kern County Subbasin, four principal aquifers were defined; however, three of these principal aquifers are small, localized aquifers which currently have limited data. Therefore, the WY 2019 Annual Report presents the change in groundwater in storage for the entire Subbasin rather than separate estimates for each principal aquifer.

### 6.3.1 WY 2016 through WY 2019 Maps

The change in groundwater in storage maps were developed following a similar process as used for the groundwater extraction map. The C2VSimFG-Kern binary output files were accessed to extract the change in groundwater in storage for each element and model layer. C2VSimFG-Kern output provides the total volume of storage change within a model element for all four model layers. To compensate for the fact that model elements vary in size, the data were normalized to the rate of acre-feet per square mile. The normalized rates were then interpolated onto a uniform one-square mile grid superimposed over the Kern County Subbasin. The maps on **Figure 15** show the C2VSimFG-Kern model results as the total change in groundwater in storage per square mile over the entire Kern County Subbasin.

**Figure 15** presents the annual basin-wide change in groundwater in storage map for WY 2016 through WY 2019. The change in groundwater in storage represents the sum of the total inflow components plus the total outflow components. A positive value represents an increase in the volume of groundwater stored in the aquifer that is physically represented as a rise in groundwater levels whereas a negative represents a decrease in groundwater in storage typified by a decline in groundwater levels. A description of the change in groundwater in storage for each water year is described as follows:

- **WY 2016** was rated a dry water year under the San Joaquin River Index (CDEC, 2020), and the Kern River Index was 48% of average Kern River flows (COB, 2017). The change in groundwater in storage is concentrated in the center of the Kern County Subbasin in the vicinity of the large groundwater banking operations. Widespread, but lower level, declines are observed over most of the Subbasin. Some limited areas of increases are noted along and to the south of the Kern River and along the eastern margin of the Subbasin.
- **WY 2017** was rated a wet water year under the San Joaquin River Index (CDEC, 2020), and the Kern River Index was 261% of average Kern River flows (COB, 2018). The highest magnitude change in groundwater in storage is again concentrated in the center of the Kern County Subbasin in the vicinity of the large groundwater banking operations. In WY 2017, this area experienced a significant storage increase due to the high volume of managed aquifer recharge operations in the Kern Fan area. Other areas of large-scale managed aquifer recharge are noted to the north and southeast parts of the basin as areas of high storage change. Over the remainder of the basin, the change in groundwater storage varies from areas with increases to areas with decreases; however, these areas of decreases are less than those noted in the WY 2016 maps. Areas of significant recharge also occur along the Kern River, Poso Creek and along southeastern margin of the Subbasin.
- **WY 2018** was rated a below normal water year under the San Joaquin River Index (CDEC, 2020), and the Kern River Index was 48% of average Kern River flows (COB, 2019). The change in groundwater in storage in the center of the Subbasin shows areas of concentrated decreases representing groundwater recovery pumping. Surrounding this area is a halo of increases

representing a migration of the groundwater mound developed during recharge activities in WY 2017. Other areas of concentrated groundwater recovery are noted to the north and southeast near those large managed recharge operations. Elsewhere, widespread storage declines are observed with limited areas of increases are noted along the Kern River and southeastern margin of the Subbasin.

- **WY 2019** was rated a wet year under the San Joaquin River Index (Friant Water Authority, 2019), and the Kern River Index was 175% of average Kern River flows (COB, 2020). The change in groundwater in storage shows a similar pattern to that observed for WY 2017 but with lower magnitudes. Areas of storage increases occur in the center, north and southeast parts of the Subbasin representing large managed aquifer recharge operations in the vicinity of the large groundwater banking operations. Over the remainder of the Subbasin, the change in groundwater storage varies from slight increases to slight decreases. Areas of significant recharge also occur along the Kern River, Poso Creek and along southeastern margin of the Subbasin.

A review of the four maps on **Figure 15** indicate that the managed recharge and groundwater banking operations produce the most significant localized changes in groundwater in storage due the magnitude and concentration of such activities. Agricultural and urban areas show lower magnitude annual changes, but these are more widespread over the Subbasin. Localized recharge along the major streams and from runoff from the surrounding watersheds is significant in wet years but is diminished during the dry years. Overall these maps reflect how the distribution of the basin-wide change in groundwater in storage maps are distributed across the Subbasin.

### 6.3.2 Accuracy of Change in Groundwater in Storage Maps

Using WY 1995 to WY 2014 as the base period, C2VSimFG-Kern results show declining groundwater levels and long-term reduction of groundwater storage. During this period, C2VSimFG-Kern results show an average-annual decline in groundwater in storage of 277,114 AFY. An estimated level of uncertainty of the overall water budget was determined to be on the order of 10% to 20% for the historical C2VSimFG-Kern results used in the Kern County Subbasin GSPs (Maley and Brush, 2020). This range is based on a weighted average of the simulation results compared to the relative accuracy of the input values (see Section 3.4).

# 7 PROGRESS IN GSP IMPLEMENTATION

GSP regulations (*§356.2(b)(5)(C)*) require GSAs to include a description of progress towards implementing a GSP in the Annual Report, "including achieving interim milestones, and implementation of projects or management actions." To comply with this requirement, GSAs and/or member agencies have provided brief progress reports regarding GSP implementation.

To provide consistent information and a reasonable level of effort for the numerous agencies coordinating on this First GSP Annual Report, the outline below has been used as a guide for the progress report summaries. Responses by each agency are organized around the following topics:

1) Compliance with Sustainable Management Criteria
    a) Implementation of GSP Monitoring Network
    b) Progress in Achieving Interim Milestones
    c) Compliance with Additional Sustainable Management Criteria (including minimum thresholds (MTs) and measurable objectives (MOs))
2) Implementation of Projects
3) Implementation of Management Actions

Some of the information under item 1 has already been addressed with regards to the hydrographs, which also show MTs and MOs and compliance with these criteria based on recent water level data, where available. That compliance is summarized herein; as noted in Section 2, the compliance hydrographs are provided in **Appendix A**.

For some GSPs/Management Area Plans, implementation of projects and management actions (items 2 and 3 above) are closely linked and, as such, are combined for reporting purposes. The narrative for Projects and Management Actions does not repeat project/action details described in each recently submitted GSP, and the reviewer is referred to a more complete description of each project/management action in the respective GSP, as needed.

Although the Annual Report requests activities associated with the Reporting Period (WY 2019), implementation activities since the submittal of the final GSPs are also included. Because of the timing of this First GSP Annual Report, the Reporting Period occurs prior to the completion and adoption of each GSP. As such, implementation activities were generally not yet underway. GSP implementation activities have been prioritized since the January 2020 submittals, and those activities are included in the progress reports where appropriate.

In addition to the details on local GSP implementation described in this section, it is recognized that GSAs and associated member agencies in the Subbasin have collaborated and contributed to this First GSP Annual Report including provision of water resources data for an update of the C2VSimFG-Kern local model. Accordingly, this submittal of the First GSP Annual Report represents completion of an important GSP implementation measure.

The GSP progress reports are presented in alphabetical order by the lead agency of each of the five GSPs (Sections 7.1 through 7.5 below). For the KGA GSP, material is presented in alphabetical order for each of the 15 KGA member agencies that provided a separate Management Area Plan for its service area (see Sections 7.3.1 through 7.3.15 below). Some, but not all, of the KGA member agencies are also separate GSAs.

## 7.1 BUENA VISTA GSA GSP

### 1) Compliance with Sustainable Management Criteria

#### *a) Implementation of GSP Monitoring Network*

The network of monitoring wells includes all existing District owned monitoring wells which have been in use for many years and several wells that are part of the Kern Fan Monitoring Committee's monthly hydrographs. The installation of the network is 100% complete.

#### *b) Progress in Achieving Interim Milestones*

No interim milestones were required or set. The 2019 water levels improved in the south as expected due to recharge and less pumping by others. No water levels fell below MTs during the Reporting Period.

#### *c) Compliance with Additional Sustainable Management Criteria*

In addition to local subsidence monitoring for BVWSD, the GSA is also participating with the other Subbasin GSPs in a basin-wide subsidence monitoring program, which focuses on infrastructure affecting the entire Subbasin including identified areas along the California Aqueduct and CVP canal, among other areas.

### 2) Implementation of Projects

- In 2019 the BVWSD has moved 3,000,000 cubic yards of impervious clay overburden to create 357 acres of additional in-District recharge ponds.
- In 2020 the BVWSD/GSA has 71 acres in escrow to combine with an existing 20-acre piece to create another District recharge pond.
- The BVWSD/GSA is negotiating terms on the long-term lease (30 years) of 85 acres to create an in-District recharge pond.
- The BVWSD/GSA continues to work through regulatory hurdles in the development of a 2,072-acre water bank. BVWSD is an 85% owner of this project. This project is not in-District.

### 3) Implementation of Management Actions:

In 2020, the BVWSD (similar to BVGSA) induced 3,400 acres to be fallowed. The District paid landowners $500/acre to fallow. This is approximately 10% of the irrigated acreage in the BVWSD/GSA. It is taking this action despite already being in balance.

## 7.2 HENRY MILLER WATER DISTRICT GSP

### 4) Compliance with Sustainable Management Criteria

#### *a) Implementation of GSP Monitoring Network*

Water level data for all five monitoring wells was successfully collected in the fall and spring of each year in the annual report to represent the seasonal high and low groundwater levels, in accordance with the recommended protocols for the Subbasin. The HMWD GSA is planning on implementing the monitoring of the other sustainability indicators as set forth in the GSP, in 2020. The GSA continues to monitor land subsidence by monitoring California Aqueduct Pools 29 and 30.

#### *b) Progress in Achieving Interim Milestones*

Groundwater levels: reporting data indicate that the GSA is complying with the interim milestones as set forth in its GSP and 2019 seasonal high groundwater levels were above measurable objectives in all five GSP monitoring network wells. The most recently collected groundwater quality: indicate that interim milestones are being met. There was an increase in groundwater storage: from Spring 2018 to Spring 2019 which indicates that the GSA is complying with the interim milestones and measurable objectives as set forth in its GSP. Land subsidence: reporting data indicate that the GSA is complying with the interim milestones as set forth in its GSP.

#### *c) Compliance with Additional Sustainable Management Criteria*

Data from monitoring well hydrographs for the GSA indicate that the GSA is complying with the Measurable Objective and Minimum Threshold criteria for groundwater levels as set forth in its GSP.

### 5) Implementation of Projects and Management Actions

The GSA's sole project is to optimize the recovery of Pioneer Project banked supplies in dry years. While the GSA has not recovered banked water in the Pioneer Project in recent years, it has delivered significant quantities of surface water to the Pioneer Project for banking and overdraft correction in recent years. Therefore, the GSA has made considerable strides towards the future implementation of its Project by shoring up supplies that could be used to avoid groundwater overdraft and combat declining groundwater levels in the GSA in future years.

## 7.3 Kern Groundwater Authority (KGA) GSP

As provided in the KGA GSP Umbrella Document, the KGA prepared the GSP representing its member agencies. In addition, 15 agencies prepared their own Plan as a separate chapter of the umbrella document, each relating to its own Management Area. Accordingly, the KGA member agencies provided separate information regarding GSP implementation. That information is arranged in alphabetical order below by member agency.

### 7.3.1 Arvin-Edison Water Storage District

### 1) Compliance with Sustainable Management Criteria

#### *a) Implementation of GSP Monitoring Network*

Arvin-Edison Water Storage District (AEWSD) has implemented its portion of the Arvin-Edison Management Area GSP Monitoring Network through the following actions:

- Securing access agreements with all well owners under its jurisdiction in the groundwater level Representative Monitoring Network.

- Monitoring for groundwater levels in Fall 2019 in all 15 wells under its jurisdiction in the groundwater level Representative Monitoring Network. (Note, one well gave erratic readings when measured and therefore no usable data point from that well was collected).

- Collection of survey data in June 2019 from all five benchmark sites in the land subsidence Representative Monitoring Network in the Arvin-Edison Management Area.

In addition, Arvin Community Services District (ACSD) has implemented its portion of the Arvin-Edison Management Area GSP Monitoring Network through the following actions:

- Collection of groundwater level data in late summer (August) 2019 from the one well under its jurisdiction in the groundwater level Representative Monitoring Network.

- Collection of groundwater quality samples three times in 2019 from the one well under its jurisdiction in the groundwater quality Representative Monitoring Network.

In addition to the above activities related to the groundwater level, groundwater quality, and land subsidence Representative Monitoring Networks, both AEWSD and ACSD have also collected monitoring data from additional locations in 2019 which will be evaluated as part of local SGMA implementation, as well as information collected by others (e.g., other public water systems, environmental compliance sites, etc.).

### *b) Progress in Achieving Interim Milestones*

Groundwater level data collected from wells in the groundwater level Representative Monitoring Network in the Arvin-Edison Management Area in Fall 2019 indicate the following:

- Groundwater levels in all Representative Monitoring Wells are greater than their respective Minimum Thresholds.
- Groundwater levels in four Representative Monitoring Wells are between their Minimum Thresholds and Measurable Objectives.
- Groundwater levels in ten Representative Monitoring Wells are greater than their respective Measurable Objectives.
- Groundwater levels could not be measured in one well due to erratic readings.

### *c) Compliance with Additional Sustainable Management Criteria*

Compliance with additional (non-groundwater level) Sustainable Management Criteria (SMCs) is as follows:

- Groundwater quality data from the one groundwater quality Representative Monitoring Well in the Arvin-Edison Management Area in 2019 indicate that concentrations of arsenic (the water quality parameter for which SMCs have been established) are below the Minimum Threshold.

- Survey data from the five land subsidence Representative Monitoring Sites in the Arvin-Edison Management Area collected in June 2019 indicates that four sites had 2018-2019 subsidence rates less than the Minimum Threshold rate and one site had a 2018-2019 subsidence rate greater than the Minimum Threshold rate.

## 2) Implementation of Projects

AEWSD has made progress towards implementing several of its planned Projects. This progress has included the following:

- Purchase Sunset Spreading Works Property, in support of AEWSD's planned P/MA #1 AEWSD Sunset Spreading Works.

- The AEWSD Board of Directors approved a new Landowner Recharge Program, in support of AEWSD's planned P/MA #6, that increases recharge potential on private lands.

- Working with County of Kern on potential solutions regarding Caliente Creek, in support of AEWSD planned P/MA #7.

- Authorization of approximately $300,000 in Task Orders for consultants to complete preliminary and 30% design documents for AEWSD's planned P/MA #17 DiGiorgio In-Lieu Project and P/MA #11 Forrest Frick Pipeline / KDWD Eastside Canal Intertie, and environmental documentation for P/MA #11 and all potential in-lieu projects and interconnection facilities (i.e., P/MA #16 Frick Unit In-Lieu Project, P/MA #17 DiGiorgio In-Lieu Project, and P/MA #18 General In-Lieu Banking Program.

- Continue coordination with Tejon-Castac Water District regarding conversion of the Granite Quarry into a potential recharge site, in support of AEWSD planned P/MA #14.

- AEWSD and WRMWSD has begun discussions regarding multiple potential sites for interconnections to increase transfer and exchange opportunities, P/MA #TBD.

ACSD has made progress towards implementing its planned Projects, including the following:

- ACSD's P/MA #28 Emergency 1,2,3-TCP Treatment at Well No. 13 was completed in April of 2019. That project included installation of two GAC treatment vessels in parallel (which would require the well to go offline once the 1,2,3-TCP broke though the carbon). ACSD recently reached a settlement with Dow Chemical and Shell Oil that will allow for construction of a four vessel lead-lag system which will maximize continuous use of wells with very low arsenic levels.

- ACSD's PMA #29 Arsenic Mitigation Project – Phase II is fully underway with the anticipated completion in June 2020. This project will bring in three new wells, a one-million-gallon storage tank with booster station and backup generators, 15,000 ft of new conveyance lines, and the implementation of a full SCADA automation system. The District will also be abandoning all old wells which contained high arsenic and 1,2,3-TCP levels.

- ACSD is also drilling a new well to replace a well that is considered at risk of contamination due to its proximity to the Brown and Bryant Superfund Site. The new well (No. 12) is being drilled concurrently with the Arsenic Mitigation Project Phase II and will allow ACSD to bring four new wells online in addition to Well No. 13 and 14 brought online in July of 2016.

### 3) Implementation of Management Actions

AEWSD has made progress towards implementing several of its planned Management Actions. This progress has included the following:

- Preparation of a DRAFT White Paper summarizing the history and purpose of AEWSD's General Administration and General Project (GA/GP) service charges covering both the surface water and groundwater service areas, in support of investigating AEWSD's P/MA #23 Groundwater Fee Increase, if applicable.

- Consultant Task Order for GSP Implementation including basin-scale and local coordination activities, prioritization of data gap filling activities and P/MA development, and other related efforts.

- Consultant Task Order related to water quality and subsidence support services which support continuing to protect AEWSD's surface water quality and quantity from the Friant-Kern Canal.

## 7.3.2 Cawelo GSA Management Area

### 1) Compliance with Sustainable Management Criteria

Progress towards compliance with sustainable management criteria in the Cawelo GSA Management Area during WY 2019 is summarized as follows:

#### *a) Implementation of GSP Monitoring Network*

Implementation of the GSP Monitoring Network in the Cawelo GSA Management Area during W Y2019 consists of the following actions:

- The monitoring network is a subset of a preexisting groundwater monitoring network and a continuation of the groundwater monitoring efforts in the Cawelo area.
- Spring 2019 groundwater levels were obtained at 6 of the 7 established monitoring wells. Well T27R26-4R was secured and access was not available. Fall 2019 groundwater levels were measured at 5 of the 7 monitoring wells. Again, well T27R26-4R was secured and access was not available. Well T28R27-6C was operating and static groundwater level measurement was not possible. Both wells of these wells are privately owned well.
- Owner of well T27R26-4R has been contacted regarding access for water level measurements. Accommodations have been provided by the owner and Cawelo GSA staff currently has full access to the well.
- All private well owners have agreed to make their wells available for the monitoring network. The Cawelo GSA is preparing landowner access agreements to help ensure long-term well access.
- Cawelo GSA continues to examine available and appropriate wells for the proposed 8$^{th}$ monitoring well.

### *b) Progress in Achieving Interim Milestones*

Groundwater level data collected from wells in the groundwater level Representative Monitoring Network in the Cawelo GSA Management Area during WY 2019 consists indicate the following:

- The updated hydrographs indicate that groundwater elevations generally continue fluctuate at or near the Measurable Objectives for each of the respective monitoring wells.
- In Fall 2018, T27R26-12H (RMW-167) did report a groundwater elevation below the minimum threshold; however, subsequent measurements show groundwater elevation returned to near the measurable objective. Therefore, this single instance does not meet the definition of an undesirable result.

### *c) Compliance with Additional Sustainable Management Criteria*

Compliance with additional (non-groundwater level) Sustainable Management Criteria in the Cawelo GSA Management Area during WY 2019 is as follows:

- Water quality samples were collected from all 7 monitoring wells had TDS concentrations below the Measurable Objectives for each of the respective monitoring wells.
- For Land Subsidence, groundwater levels were at or above the Measurable Objectives for each of the respective monitoring wells.

## 2) Implementation of Projects

Progress towards implementing the planned Projects in the Cawelo GSA Management Area includes the following:

- <u>P1- New Water Supplies Purchases</u>
    - Negotiations have begun with new program partner to purchase new water supplies from outside of the Kern Subbasin area
    - Schedule is, in part, reliant of the progress of the Bay Delta Plan Update and Voluntary Agreements, including potential impacts from the recent lawsuit filed by the State of California against the Federal government

- P3 – New Cawelo GSA Banking Partners
    - Negotiations have begun with a new potential groundwater banking partner.
    - The Cawelo Water District Board of Directors approved a new Landowner Banking and Recharge Agreement that will allow private landowners to import privately owned surface water for banking purpose within district boundaries and provides for a shared beneficial use of the imported water.

- <u>P5 - Friant Pipeline Project</u>
    - Construction began December 9, 2019
    - Progress to date includes:
        - Excavation of the Inlet Structure at Reservoir D, inlet subsurface preparation, and placement of the reinforced bottom of the Inlet Structure has been completed

- Installation of 8,860 feet of 48” PVC Pipe has been completed
- Underground horizontal boring under local railroad and Freeway 99 has begun
- Total of $1,326,516 has been paid to the project contractor

### 3) Implementation of Management Actions

Progress towards implementing the planned Management Actions in the Cawelo GSA Management Area includes the following:

- Management Actions are scheduled to be implemented, if needed, approximately around the year 2030.

### 7.3.3 Eastside Water Management Area

The following provides a brief progress update by the Eastside Water Management Area on implementation of its Management Area Plan (MAP) developed as part of the KGA GSP.

### 1) Compliance with Sustainable Management Criteria

EWMA continues to make progress toward sustainable management, including compliance with Sustainable Management Criteria (SMCs), as discussed below.

#### *a) Implementation of GSP Monitoring Network*

The EWMA Board of Directors has begun efforts to establish groundwater level and water quality monitoring in the EWMA monitoring network proposed in the MAP. The nine wells proposed as Representative Monitoring Wells (RMWs) are supply wells, rather than monitoring wells and none of them up until this point have been subjected to a regular program of water level measurements. Ad-hoc existing data have been assembled and negotiations are underway to allow future access for monitoring going forward. The current status of water level data for the nine RMWs are shown in the attached hydrographs. Additional data collection is planned for Spring and Fall 2020, and will be conducted in a coordinated manner, using a common datum.

Additionally, preliminary work has begun to address data gaps in well construction, stratigraphy, and principal aquifer boundary locations and chemical characteristics, as identified in the MAP. This effort is being undertaken in collaboration with the adjoining Kern-Tulare Water District, and Cawelo Water District. It is expected that collaborative data collection and standardization will result in a more consistent and accurate hydrogeological conceptual model and better groundwater management practices.

#### *b) Progress in Achieving Interim Milestones*

EWMA is a recently-formed non-profit organization without significant or consistent historical records. Based on very limited data, EWMA proposed measurable objectives (MOs) and minimum thresholds (MTs) for the nine preliminary RMWs identified in the MAP. As a number of the wells had not been gauged for several years and the consistency of measurements across the EWMA have not yet been established, evaluation of the current status of each RMW in relation to its MO and MT has not been completed.

Thus, although a schematic glide path identifying the relationship of expected water levels to MOs, MTs, and interim milestones (IMs) was presented in the MAP, no management actions such as specific pumping restrictions have been proposed until a clearer picture of groundwater conditions relative to MOs and MTs in the EWMA can be determined. This process is underway by addressing water level and hydrostratigraphic data gaps identified in the MAP, and once consistently measured water level and water quality data have been collected, an evaluation of progress toward IMs and MOs will be performed.

### *c) Compliance with Additional Sustainable Management Criteria*

EWMA's available data for RMWs is summarized in the attached hydrographs, one for each of the wells. Although data are very limited, the hydrographs indicate that water levels in all wells are above MTs, and in many cases are above MOs. As discussed above, implementation of the monitoring program will shed light on seasonal and extraction-related water level fluctuations, allowing a much more rigorous evaluation of compliance with SMCs, both for water levels and water quality.

## 2) Implementation of Projects

The EWMA MAP proposed six potential projects for consideration, once sufficient data are collected, and analyses performed to evaluate their feasibility and potential benefits. The potential projects from the MAP are listed below.

1. Development of oilfield produced-water supplies to potentially reduce groundwater demand;
2. Investigation of groundwater quality by compilation and analysis of (a) available water quality data, and (b) borehole geophysical data;
3. Improved estimation of local (EWMA) native yield by use of additional field- collected data and analysis;
4. Construction of aquifer-specific monitoring wells in locations with data gaps, to better understand hydraulic heads and gradients;
5. Installation of pressure transducers in selected wells of the monitoring network, to collect high-resolution cost-effective data; and
6. Surface runoff capture and enhanced infiltration in impoundments.

Preliminary work has been performed toward assembling data for Project #2, Investigation of Groundwater Quality, in collaboration with Kern-Tulare Water District. Additional preliminary planning also is underway for several of the other identified projects. These efforts will be continued and expanded in 2020.

### 3) Implementation of Management Actions

The EWMA MAP proposed four potential management actions (MAs) for consideration, once sufficient data and analyses were in place to evaluate their necessity. The potential MAs are listed below.

1. Reduction of irrigated acreage, or modification of irrigation techniques or crop types to reduce water usage;
2. Assessment of fees for groundwater use to encourage reduced pumping or curtailment;
3. Establishment of a system of transferrable water credits; and
4. Legal and administrative review regarding effects of CEQA and water law on joint management of native yield.

Currently, no decisions have been made regarding implementation of management actions, as the basic underlying data are insufficient to judge their necessity and usefulness. As a more complete picture of groundwater conditions is constructed through collection of consistent and uniform data for water levels and quality in the EWMA, a practical evaluation of these and potentially other management actions will become possible, and the EWMA Board of Directors will at that time undertake any necessary management actions to bring the EWMA into compliance with the GSP's goal of sustainable groundwater management.

## 7.3.4 Kern County Water Agency – Pioneer GSA

### 1) Compliance with Sustainable Management Criteria

#### *a) Implementation of GSP Monitoring Network*

***Water Level Monitoring***
The Pioneer Project records water level data for 42 wells (monitoring and production wells) in the GSA Area. While most of the wells have associated water level data, production well data can be misleading, since measurements can be taken during or after groundwater pumping, which can artificially lower levels below ambient conditions.

***Water Quality Monitoring***
The Pioneer Project collects water quality data from both production and monitoring wells. As part of Pioneer Project operations, water quality is sampled regularly in production wells. Each well is sampled every nine years on a rotational schedule for Title 22 analysis. The data are added to a blending model that forecasts expected water quality results of the blended water that is entering the SWP from the Pioneer and surrounding projects. Further quarterly water quality sampling is undertaken during extraction/recovery operations on blended water in the CVC and Kern Water Bank Canal to determine efficacy of the model. Additional water quality sampling occurs on all operating wells of specific constituents during recovery operations. Water quality analyses are also performed annually on monitoring wells in the Pioneer Project, if accessible. The monitoring wells are sampled for a specified list of constituents. Analyses results are shown in the Kern Fan Area Operations and Monitoring Report.

***Subsidence Monitoring***
Subsidence monitoring for the Pioneer GSA Area includes an extensometer and InSAR. While there are no extensometers in the Pioneer GSA Area, data collected from a DWR-maintained station in the Kern Water Bank will be used in the future, given the extensometer's proximity to the Pioneer GSA Area.

***Surface Water Monitoring***
Surface water can fall into two categories: natural stream channels and water conveyance infrastructure. The Pioneer GSA Area is bordered to the north by the CVC and is bisected by the Kern River Canal in the south. Both canals are monitored as part of regular banking activities. Although the Kern River runs through the middle of two Pioneer GSA Area portions, it is not part of the GSA Area. Therefore, there are no surface water features in the Pioneer GSA Area, and no surface water monitoring is needed.

#### *b) Progress in Achieving Interim Milestones*

Interim Milestones were not developed for the Pioneer GSA. The Pioneer Project is a banking program which continues to operate sustainably within the Kern Subbasin.

#### *c) Compliance with Additional Sustainable Management Criteria*

Due to recent managed recharge in the Pioneer GSA area, all monitoring well hydrographs demonstrate that the Pioneer Project is operating above its MTs and MOs as identified in its Chapter GSP.

### 2) Implementation of Projects

***Project 1 (Completed): Install Monitoring Well in North Pioneer***
A data gap for groundwater monitoring north of the Kern River was identified during the development of the Pioneer GSP, and a monitoring well cluster was installed in the northwest triangle-shaped parcel of the Pioneer Project. The monitoring well cluster will allow groundwater monitoring at multiple depths using three separate boreholes. The monitoring well in each borehole has screened sections that will allow water to enter the well from different depths in the Subbasin. Each monitoring well is hydraulically isolated from the other and from the aquifer at different depths in the Subbasin. The shallowest monitoring well will monitor water quality and water levels at a depth of 330 feet bgs. The middle monitoring well will monitor water quality and water levels at a depth of 560 feet bgs. The deepest monitoring well will monitor water quality and water levels at a depth of 715 feet bgs.

### 3) Implementation of Management Actions

***Management Action 1***
Continued balanced pumping and recharge is the standard operating procedure for the Pioneer GSA. Under this management action, long-term pumping would be balanced by long-term recharge activities in the Pioneer GSA Area. Pioneer GSA would continue to closely monitor water that is pumped from the Subbasin and water that recharges the Subbasin with the goal of a balanced groundwater budget over the long term. The Pioneer Project uses a mix of SWP, Kern River and other imported water supplies for groundwater recharge. In the Pioneer GSA Area, the Pioneer Project has a recharge capacity of 302,000 AFY, and a recovery capacity of 68,415 AFY. Recovery capacity is limited by recovery well capacity. KCWA is responsible for management of the Pioneer Project and is the only agency operating groundwater banking and pumping within the Pioneer GSA Area on behalf of the Participants.

All water that is recharged and recovered in the Pioneer GSA Area is accounted for and metered, with recovery less than recharge to accommodate losses, as well as recovery from the Pioneer Project that occurs outside the Pioneer GSA Area boundary. This management action maintains the balance between recharge and pumping.

#### 7.3.5 Kern-Tulare Water District (KTWD)

### 1) Compliance with Sustainable Management Criteria

#### *a) Implementation of GSP Monitoring Network*

- KTWD continues to monitor groundwater levels for three aquifers in 20 groundwater wells in the Kern Groundwater Authority GSA and Eastern Tule GSA. Existing monitoring wells are active or inactive production agricultural wells – most of which are perforated through multiple aquifers. One of KTWD's planned network improvements is to drill dedicated monitoring wells that separately measure the distinct aquifers. Construction is scheduled to begin in March 2020 on two adjacent monitoring wells within KTWD; one will be completed exclusively in the shallower Continental Deposits and the other in the Santa Margarita formation. These wells will help fill spatial data gaps and better characterize the groundwater conditions in these primary aquifers.

#### *b) Progress in Achieving Interim Milestones*

- Fall of 2019 groundwater levels in the Santa Margarita formation were all above the Interim Milestone. Three of the monitoring wells were at or above the measurable objective for fall levels and none of the wells reached the minimum threshold.

#### *c) Compliance with Additional Sustainable Management Criteria*

- KTWD will collect groundwater quality samples in the future to determine if the measurable objective for TDS in the Santa Margarita formation has been met. KTWD and the Eastside Water Management Area have begun working together to define the saltwater interface in the Santa Margarita and Olcese aquifers and develop a water quality monitoring program.

### 2) Implementation of Projects/Management Actions

- **Action 1: Modify District Pricing Structure** – KTWD has authority to implement a groundwater charge but, due to the current water supply outlook, does not plan on invoking a groundwater charge in 2020.
- **Action 2: CRC Pipeline Project** – KTWD has continued to pursue the CRC Pipeline Project which would provide an additional produced water supply of about 3,000 AFY. Construction of a 595 AF storage reservoir that would be the pipeline terminus began in January 2020 and is projected to be complete in June 2020. The pipeline design is 90% complete and all environmental permits for the pipeline alignment have been obtained. KTWD and CRC continue to work on the reports needed to apply for Waste Discharge Requirements (WDR) from the Central Valley Regional Water Quality Control Board.

- **Action 3: In-District Surface Storage** – KTWD is evaluating the feasibility of constructing two surface reservoirs with a total storage capacity of 8,000 AF. If found feasible, the construction of these facilities is not anticipated until 2025-2030.

### 7.3.6 Kern Water Bank

## 1) Compliance with Sustainable Management Criteria

### *a) Implementation of GSP Monitoring Network*

- **Groundwater level monitoring** is conducted in 53 nested monitoring wells at 16 locations. The wells are nested at various depth intervals so that water level information is also available vertically within the aquifer. This very detailed information is used in the development of the maps provided in this report. For more information on monitoring well construction and historical monitoring, see *Kern Water Bank Storage Project Within the Kern Groundwater Authority*, Sections 2.2.2.2 and 2.2.2.3 (https://sgma.water.ca.gov/portal/gsp/preview/36).

- **Groundwater quality** is monitored by: 1) the sampling of 38 dedicated monitoring wells twice a year for several potential constituents of concern, and 2) the sampling of all recovery wells pursuant to Title 22. This information will be available as needed for future reporting. For more information on historical monitoring, see *Kern Water Bank Storage Project Within the Kern Groundwater Authority*, Sections 2.2.2.4 and 2.2.2.9 (https://sgma.water.ca.gov/portal/gsp/preview/36).

- **Subsidence** has been continuously monitored by DWR since June 1994 with an extensometer located near the center of the KWB in Section 16, T30S/R25E. The extensometer is anchored at a depth of approximately 800 feet and continuously monitors changes on a chart recorder. This information will be available as needed for future reporting. For more information on historical monitoring, see *Kern Water Bank Storage Project Within the Kern Groundwater Authority*, Section 2.2.2.6 and 2.2.2.11 (https://sgma.water.ca.gov/portal/gsp/preview/36).

### *b) Progress in Achieving Interim Milestones*

The KWB fully implements mitigation measures developed by DWR for the KWB. The data collected in the monitoring network is incorporated into a MODFLOW model to determine the potential for banking operations to impact nearby domestic and agricultural wells as described in an Operations Plan developed by area banking projects. Should certain triggers occur, mitigation measures are employed to reduce impacts to less than significant. For more information see *Kern Water Bank Storage Project Within the Kern Groundwater Authority*, Section 2.1.2.8 and 4.2.1 (https://sgma.water.ca.gov/portal/gsp/preview/36).

### *c) Compliance with Additional Sustainable Management Criteria*

See discussion in item b) above.

## 2) Implementation of Projects/ Management Actions

Although not in response to SGMA, the KWBA is constructing 1,025 acres of recharge basins, in addition to the existing basins. These additional basins will allow the KWBA to capture more water in the future, furthering the conservation goals of SGMA.

### 7.3.7 North Kern Water Storage District & Shafter-Wasco Irrigation District

## 1) Compliance with Sustainable Management Criteria

Based on the data provided by North Kern Water Storage District (NKWSD), Shafter-Wasco Irrigation District (SWID) and the cities of Shafter and Wasco for the 2020 Annual SGMA Report, the plan area covered by the joint Management Area Plan for NKWSD and SWID is meeting the Sustainable Management Criteria (SMCs) set in the 2020 GSP.

### *a) Implementation of GSP Monitoring Network*

- Both NKWSD and SWID have begun to implement the GSP Monitoring Network in their respective districts. NKWSD already participated in the CASGEM program, collecting groundwater level data in the spring and fall of each year.

- In addition to the water level data provided by the cities of Shafter and Wasco, SWID has engaged a consultant for the development of two SGMA-compliant monitoring wells, which will be used for both groundwater level measurements and water quality sampling. The design, drilling, and completion of these wells is anticipated to be completed in time for measurements in fall 2020.

- Both NKWSD and SWID will continue to coordinate with the cities for the collection of groundwater level and groundwater quality data as prescribed in the 2020 KGA GSP.

### *b) Progress in Achieving Interim Milestones*

According to the representative monitoring site hydrographs, updated through 2019, the groundwater levels within the plan are above the Measurable Objectives set in the 2020 GSP. Therefore, the districts and cities are meeting the interim milestones for the management of groundwater levels.

### *c) Compliance with Additional Sustainable Management Criteria*

Per the NKWSD and SWID management area plan submitted as a part of the KGA GSP, groundwater levels are being used as a proxy for both groundwater quality and land subsidence. By proxy, the plan area is meeting its groundwater quality and land subsidence interim milestones. North Kern samples all District wells (101 currently) every pumping year to test for general irrigation water quality constituents and Arsenic.

There were publicly available water quality data for two of the municipal wells used as representative monitoring sites in the plan area. One well did not have a sufficient record of groundwater level data to analyze any trends in concentrations for TCP, nitrate, or salinity. One well, RMW-256 (Wasco 12) shows an overall trend of increasing groundwater levels and decreasing concentrations of the constituents of concern for the data available at this time.

Per the districts' joint Management Area Plan, the districts will continue to monitor groundwater levels, groundwater quality, and land surface elevations (as an indicator of land subsidence). This continued and ongoing monitoring and data collection will address the data gaps identified in the management area plan.

## 2) Implementation of Projects

The following two tables summarize progress on GSP projects described in the Management Area Plan for NKWSD and SWID, respectively. Project numbers follow the numbering in Tables 5-1 and 5-2 in the 2020 joint Management Area Plan.

**NKWSD GSP Project Implementation**

| NKWSD Project Number/Name | Status | Timetable for Completion | Timetable for Expected Benefits | Comments on NKWSD Implementation |
|---|---|---|---|---|
| 1. Calloway Canal Improvements: Lining Snow Rd. to 7th Standard Rd. | Ongoing | 2021 | Through 2040 | Received initial award decision for a USBR grant to fund the next phase. Design/construction documents to be developed after finalization of the grant agreement. |
| 2. Expanded Water Banking Program | Ongoing | TBD | Through 2040 | Ongoing work with banking partners to optimize available water and capacity. Ongoing planning and design for additional facilities. |
| 3. NKWSD Groundwater Banking Conveyance Improvements | Initiated | 2021 | Through 2040 | NKWSD is working with adjacent districts/ banking partners to design and develop return capacity. NKWSD. |
| 4. Beneficial Reuse of Oilfield Produced Water | Ongoing | TBD | Through 2040 | Prior to the implementation of SGMA, NKWSD used oilfield produced water as a source of water for recharge. The district continues to utilize this source of water as it is available. |
| 5. SCADA Automation and ET Measurement Improvements | Initiated | 2021 | Through 2040 | Began working with Land IQ for the development of remote data acquisition for ET measurements. |
| 6. Poso Creek Weir | Conceptual | TBD | 2022 | This project is in the conceptual phase of design and anticipated to progress through 2020. |
| 7. Expanded Recharge (RRID) | Conceptual | 2022 | Through 2040 | Continue working with landowners in RRID to identify potential sites for expanded recharge. |

**SWID GSP Project Implementation**

| SWID Project Number/Name | Status | Timetable for Completion | Timetable for Expected Benefits | Comments on SWID Implementation |
|---|---|---|---|---|
| 1. Diltz Intertie Lateral Piping and WMI | Ongoing | 2021 | Through 2040 | This project is currently under construction. |
| 2. Bell Recharge Project | Initiated | 2022 | Through 2040 | This project has been funded by a USBR grant. Design and construction documents will follow the finalization of the grant agreement. |

| SWID Project Number/Name | Status | Timetable for Completion | Timetable for Expected Benefits | Comments on SWID Implementation |
|---|---|---|---|---|
| 3. Kimberlina Recharge Project | Ongoing | 2022 | Through 2040 | This ongoing project has been receiving water for groundwater recharge since 2017. |
| 4. Leonard Avenue Conveyance Improvement Project | Ongoing | 2021 | Through 2040 | Design and required CEQA documentation is underway. |
| 5. Improved Water Level Measurement of District Recharge Facility | Conceptual | 2022 | Through 2040 | Engaged Land IQ to begin development of in-district measurement of ET versus applied water. Also engaged a consultant to site two new SGMA compliant monitoring wells for groundwater level and water quality measurements. |

## 3) Implementation of Management Actions

The following tables summarize progress made on management actions described in the Management Area Plan for NKWSD and SWID, respectively. The Management Action numbers shown follow the sequencing in Tables 5-1 and 5-2 in the 2020 joint Management Area Plan.

**NKWSD and SWID GSP Management Action Implementation**

| NKWSD / SWID Management Action NKWSD No. / (SWID No.) | Status | Timetable for Completion | Timetable for Expected Benefits | Comments on NKWSD/SWID Implementation |
|---|---|---|---|---|
| 8. Allocation of Available NKWSD Supplies (RRID) | Ongoing | TBD | Through 2040 | District/ Landowners |
| 9. In-Lieu Recharge Program (SWID #6) | Conceptual | 2020 | Through 2040 | Develop a formal in-lieu recharge program to incentivize available surface water use. |
| 10. On-Farm Irrigation Practices Incentive Program (SWID #7) | Ongoing | 2025 | Through 2040 | Continue to work with growers on methods and policies for on-farm efficiency improvements. |
| 11. Subsurface Recharge Feasibility Study (SWID #9) | Conceptual | 2022 | Through 2040 | Engage with growers on potential development of a subsurface recharge program. |
| 12. Refinement of Water Budget Components (SWID #10) | Ongoing | TBD | Through 2040 | Work with adjacent districts to coordinate datasets to refine water budget components. |
| 13. Conversion of Agricultural Land to Urban Use (SWID #11) | Ongoing | TBD | Through 2030 | As the cities continue to grow, conversion of agricultural lands to urban use is anticipated. |
| 14. Urban Water Conservation Program (SWID #12) | Ongoing | 2030 | Through 2030 | Cities are currently working on methods to estimate indoor usage and enforce the limits required by SB 606 and AB 1668. |
| 15. Mitigation for Potential Impacts to Domestic Wells (SWID #13) | Conceptual | TBD | TBD | Work with other districts in the KGA on the development of a well mitigation program. |
| 16. In-District Allocation Structure (SWID #14) | Conceptual | TBD | TBD | At this time, an in-district allocation structure is conceptual and has not been developed. |

| NKWSD / SWID Management Action NKWSD No. / (SWID No.) | Status | Timetable for Completion | Timetable for Expected Benefits | Comments on NKWSD/SWID Implementation |
|---|---|---|---|---|
| 17. Voluntary Land Fallowing (SWID #15) | Conceptual | TBD | TBD | At this time, a voluntary land fallowing program is conceptual and has not been developed. |
| 18. Pumping Restrictions (SWID #16) | Conceptual | TBD | TBD | At this time, in-district pumping restrictions are conceptual and have not been developed. |
| (SWID #8) On-Farm Recharge Activities Incentive Program | Conceptual | 2025 | Through 2040 | Conceptual project not yet developed but closely related to MA #8. |

### 7.3.8 Rosedale-Rio Bravo Water Storage District

As a member of the KGA, Rosedale-Rio Bravo Water Storage District prepared a GSP chapter for the KGA GSP covering the Rosedale-Rio Bravo Management Area (RRBMA).

#### 1) Compliance with Sustainable Management Criteria

##### *a) Implementation of GSP Monitoring Network*

RRBWSD has implemented a robust water level monitoring network to measure groundwater sustainability in the RRBMA. Groundwater levels are monitored monthly in 20 locations; six of these locations are multi-completion monitoring wells at various depth intervals so that water level information is also available vertically within the Principal Aquifer. The wells are a combination of agricultural, domestic and dedicated monitor wells of known well construction and offer reliable long-term data.

Long-term groundwater hydrograph plots of potentiometric surfaces for the Kern County Subbasin Principal Aquifer are provided in **Appendix A** for each of five District zones (North, Central, South, East and South of River). To the extent that two of the North, Central, and South of River zones exceed the established MT criterion, the RRBMA will consider it an undesirable result. To the extent that either the South or East zones exceed the MT criterion, the RRBMA will consider it an undesirable result.

##### *b) Progress in Achieving Interim Milestones*

It is noteworthy that the North and Central Zones show a muted impact from recharge and recovery operations on the banking projects to the south and indicate a steady decline but have leveled out in the 2017-2019 period. Levels in the North Zone are below the GSP established Minimum Thresholds and levels in the Central Zone are above; therefore, this is not considered an undesirable result according to the RRBMA plan criteria.

The South and East Zones however depict large fluctuations consistent with large recharge and recovery cycles on the Kern River Fan. Levels were at the GSP established Minimum Thresholds in 2016-17 but are now rising and approaching the Measurable Objectives.

The South of River Zone also depicts large fluctuations consistent with large recharge and recovery cycles on the Kern River Fan. Levels were at the GSP established Minimum Thresholds in 2016-17 but are now rising and approaching the Measurable Objectives.

Additional progress in achieving interim milestones is documented in the summary table for projects and management actions in items 2) and 3) below.

### c) Compliance with Additional Sustainable Management Criteria

In addition to the water level monitoring program, the RRBMA has also implemented a robust water quality monitoring network. Groundwater quality is monitored annually in 35 locations, six of these locations are multi completion monitor wells at various depth intervals so that water level information is also available vertically within the aquifer. The wells are a combination of agricultural, domestic and dedicated monitor wells of known well construction. The current wells offer reliable long-term data. Data collection has commenced but results have not yet been analyzed; a detailed discussion of water quality conditions will be included in the next annual report.

RRBWSD is also participating in the basin-wide subsidence monitoring program, with a focus on critical infrastructure important to the entire Subbasin such as the California Aqueduct and the Friant-Kern canal, among others.

## 2) Implementation of Projects

RRBWSD is developing several projects in order to meet its measurable objectives and achieve sustainability as summarized below.

- The **West Basins Improvement Project** is the improvement of existing recharge ponds and acquisition and development of an additional 50-acre project west of Bakersfield. Project construction was completed in 2016. The favorable hydrology during 2017-2019 provide surface water deliveries for the following estimates for direct recharge:
    - 2017: 11 months of operation @ 0.5 ft/day = 8,250 AF
    - 2018: 3 months of operation @ 0.5 ft/day = 2,250 AF
    - 2019: 9 months of operation @ 0.5 ft/day = 6,750 AF

- The **Superior Basins Improvement Project** consists of property purchased in 2019 as an adaptive management action to improve existing recharge ponds (net increase of 50 acres) and development of an additional 40-acre project to recharge up to 18,500 AF in wet years (possible average of 1,500 AFY). Construction was completed in 2019 at a total capital cost of approximately $2.7M; annual O&M costs are estimated to be $30,000 Total annualized cost is $168,000, or $111/AF (plus water cost).

- The **Enns Basins Improvement Project** consists of property purchased in 2019 as an adaptive management action to add an additional 275-acre direct recharge project west of Bakersfield. Project construction is slated for 2021 at a total capital cost of approximately $9.5M; annual O&M costs are estimated to be $30,000 Total annualized cost is $515,000, or $147/AF (plus water cost).

- The **Stockdale East Groundwater Storage and Recovery Project** is a 200-acre direct recharge project that was completed in 2019. Estimated total capital cost is $12.2M and annual O&M costs of $366,000. Total annualized cost is $1.26M or $330/AF (plus water cost). In 1.5 months of operation in 2019, about 3,500 AF were recharged.

- The RRBWSD owns several parcels of land associated with water rights for the **Onyx Ranch and Smith Ranch**. RRBWSD is currently conducting an analysis of a proposed change in the point of diversion and place of use of the water rights associated with these parcels so that the water can be delivered in the RRBWSD service area on the San Joaquin Valley floor and used for irrigation and groundwater recharge. The project is currently undergoing an environmental analysis; an administrative Draft EIR was completed at the end of 2019 and a DEIR should be circulated in 2020.

- Additional activities are proceeding on two additional recharge, storage, and recovery projects – **James Groundwater Storage and Recovery Project** and **Kern Fan Groundwater Storage Project**. Environmental analysis was re-initiated in 2019 for the James project with its completion anticipated in 2021. A feasibility and environmental analysis for the Kern Fan project is scheduled for 2020-2021.

- The **Western Rosedale In-Lieu Service Area** project includes construction and operation of up to ten miles of water conveyance pipelines and a service agreement with BVWSD to provide surface water to agricultural water users in the RRBWSDs service area west of Interstate 5 and in close proximity to Buena Vista Water Storage Districts East Side Canal. Feasibility and environmental analyses are now complete.

- The **Ten Section Water Recharge** project involves an ongoing feasibility study for recharge, storage, and recovery on an area with more than 200 acres of land for project development.

The RRBMA had planned to develop projects capable of 5,000 AFY by 2020, but due to its adaptive management actions, it has already developed approximately 6,500 AFY of additional supply; those adaptive management actions included the West Basins and Superior Basins Improvements and Stockdale East projects. Total capital costs are approximately $15.9M and annual O&M costs are approximately $416,000. Total annualized cost is $1,509,000 or $232/AF (plus water cost). The recharge benefit from these projects is documented in the table provided in item 3) below.

### 3) Implementation of Management Actions

RRBWSD is moving several management actions forward in order to meet its measurable objectives and achieve sustainability, including analyses for potential water demand reductions, including white lands within the RRBMA. It is estimated that the demand reductions will result in approximately 217 AFY of demand reduction starting in 2020. This approach would result in an imbalance reduction of 2,167 AFY by 2030 and a total of 4,335 AFY by the 2040 sustainability planning period.

RRBWSD is also assisting 3rd parties with recharge of additional water supplies. This program is estimated to result in approximately 1,250 AFY of new supplies for the RRBMA starting in 2020. Progress towards implementation of GSP projects and Management Actions and the contribution towards achieving interim milestones are summarized in the table below.

**RRBWSD GSP Management Action Implementation**

| | PROJECTS | | MANAGEMENT ACTIONS | | TOTAL | |
|---|---|---|---|---|---|---|
| | Actual | Milestone | Actual | Milestone | Actual | Milestone |
| **2020** | 6,500 AFY | 5,000 AFY | 1,250 AFY | 1,250 AFY | 7,750 AFY | 6,250 AFY |
| **2025** | | 11,500 AFY | | 5,300 AFY | | 16,800 AFY |
| **2030** | | 10,000 AFY | | 1,300 AFY | | 11,300 AFY |
| **2035** | | 1,000 AFY | | 1,300 AFY | | 2,300 AFY |
| **2040** | | 0 AFY | | 1,300 AFY | | 1,300 AFY |

### 7.3.9 Semitropic Water Storage District

Since the submittal of the KGA GSP, under which the Semitropic Water Storage District (SWSD) submitted a management area plan, SWSD has advanced the following sustainability activities, consistent with the KGA GSP.

**1) Compliance with Sustainable Management Criteria**

***a) Implementation of GSP Monitoring Network***

- Initiated GSP monitoring network and provided historical and current (Reporting Period) water level data for 12 wells in the current GSP monitoring network for inclusion in this First GSP Annual Report (see SWSD hydrographs in **Appendix A**).

- See also, Monitoring Improvement Network Plan (Management Action 5) below.

- SWSD continues to participate in basin-wide coordination activities with the KGA and other Kern Subbasin GSAs. In particular, SWSD is currently engaged in discussions with DWR regarding subsidence management associated with the California Aqueduct.

***b) Progress in Achieving Interim Milestones***

- For all 112 hydrographs provided in Appendix A, all water levels during the Reporting Period (and all historical data) are above the established MTs and MOs for each well.

***c) Compliance with Additional Sustainable Management Criteria***

- As indicated in item a) above, SWSD is participating in the basin-wide subsidence monitoring efforts and is also working directly with DWR regarding subsidence management along the California Aqueduct.

**2) Implementation of Projects/Management Actions**

- **Landowner Water Budgets (Management Action 1).** This management action is a continuation of water budget planning activities begun in 2019. SWSD anticipates initiating a stakeholder outreach effort for this management action in mid-2020. SWSD is also assessing the need for establishing a Proposition 215 process and regulatory coverage under CEQA. This management action is estimated to be approved and in place in 2021.

- **Tiered Pricing for Groundwater Pumping (Management Action 2).** This management action was initiated March 2020. SWSD anticipates initiating a stakeholder outreach effort for this management action in mid-2020. SWSD is also assessing the need for establishing a Proposition 215 process and regulatory coverage under CEQA. This management action is estimated to be approved and in place in 2021.

- **Enhanced Groundwater Recharge (Management Action 4).** SWSD is continuing efforts to enhance groundwater recharge through the investigation of subsurface recharge activities driven by district landowners. During 2020, SWSD anticipated developing criteria for evaluation of proposed subsurface groundwater recharge projects and will be engaging with local landowners to determine interest.

- **Monitoring Improvement Network Plan (Management Action 5).** As collection and preparation of data for this First GSP Annual Report is being undertaken, SWSD is assessing the adequacy of its initial monitoring network. This ongoing effort will identify data gaps and recommendations for filling those data gaps, assessing the adequacy of monitoring locations, and developing a program for converting all representative monitoring sites to SGMA compliant standards, as appropriate. This program is expected to be ongoing.

#### 7.3.10 Shafter-Wasco Irrigation District 7th Standard Annexation MA

This new management area, also referred to as SWID MA-2, consisted of former "white lands" in the Kern County Subbasin that have been annexed into Shafter-Wasco Irrigation District (SWID). SWID and the local landowners have made considerable progress toward GSP implementation and SGMA compliance as summarized below.

**1) Compliance with Sustainable Management Criteria**

***a) Implementation of GSP Monitoring Network***

- Expanded and integrated monitoring network into existing District monitoring program.

- Initiated water level measurements Fall 2019.

***b) Progress in Achieving Interim Milestones***

- A goal for 10% reduction of the 17,000 AF overdraft is planned in the first five years. During this reporting period, a reduction of 770 AF – about 4.5% of the targeted reduction – has already been achieved.

#### *c) Compliance with Additional Sustainable Management Criteria*

As demonstrated by the hydrographs provided for the SWID MA-2 Plan Area (Appendix A), water levels have remained above the designated MOs and MTs, demonstrating ongoing compliance with these sustainable management criteria.

### 2) Implementation of Projects/Management Actions

Key initial steps to support the GSP implementation have included:

- Annexed 10,000 acres of white lands into SWID.
- Organized and held a successful election under Proposition 218 to fund GSP administration and reporting and GSP Projects/Management Actions.

## 7.3.11 Southern San Joaquin Municipal Utility District

### 1) Compliance with Sustainable Management Criteria

Based on the data provided by Southern San Joaquin Municipal Utility District and the cities of Delano and McFarland for the 2020 Annual SGMA Report, the plan area covered by the joint Management Area Plan for SSJMUD is meeting the Sustainable Management Criteria (SMCs) set in the 2020 GSP.

#### *a) Implementation of GSP Monitoring Network*

- SSJMUD has begun to implement the GSP Monitoring Network in its district's area. SSJMUD already participates in the CASGEM program, collecting groundwater level data in the spring and fall of each year. Some of the CASGEM wells in SSJMUD were selected as representative monitoring sites for SGMA.

- In addition to the selected CASGEM wells, the cities of Delano and McFarland have provided available data for their respective wells that are part of SSJMUD's representative monitoring sites.

- SSJMUD has engaged a consultant for the development of two SGMA-compliant monitoring wells, which will be used for both groundwater level measurements and water quality sampling. The design, drilling, and completion of these wells is anticipated to be completed in time for measurements in fall 2020.

- SSJMUD will continue to coordinate with the cities for the collection of groundwater level and groundwater quality data as prescribed in the 2020 KGA GSP.

#### *b) Progress in Achieving Interim Milestones*

According to the representative monitoring site hydrographs, updated through 2019, the groundwater levels within the plan area are above the Measurable Objectives set in the 2020 GSP. Therefore, the district and cities are meeting the interim milestones for the management of groundwater levels.

### *c) Compliance with Additional Sustainable Management Criteria*

Per the KGA's 2020 GSP, groundwater levels are being used as a proxy for both groundwater quality and land subsidence. By proxy, the plan area is meeting its groundwater quality and land subsidence interim milestones. There was no publicly groundwater quality data for the representative monitoring sites in the plan area available in time for the annual report. Per the district's Management Area Plan, the district will continue to monitor groundwater levels, groundwater quality, and land surface elevations (as an indicator of land subsidence). This continued and ongoing monitoring and data collection will address the data gaps identified in the management area plan.

## 2) Implementation of Projects

SSJMUD GSP project implementation activities are summarized in the following table.

| SSJMUD Project Number/Name | Status | Timetable for Completion | Timetable for Expected Benefits | Comments on SSJMUD Implementation |
|---|---|---|---|---|
| 1. City of Delano Spreading Grounds | Initiated | 2021 | Through 2040 | Site cleared by Kern County staff via a pre-disturbance biological survey. Ongoing pilot recharge project and piezometer readings. |
| 2. In-District Spreading and Recovery Facility | Initiated | 2022 | Through 2040 | Ongoing negotiations for land purchase to construct one 40-acre spreading pond and 1 recovery well. USBR Grant funding secured. Preliminary design/environmental work underway. |
| 3. Schuster Intertie | Conceptual | 2022 | Through 2040 | Future work on preliminary design with Semitropic. |
| 4. SSJMUD & Cawelo WD Intertie | Conceptual | 2025 | Through 2040 | Future work on preliminary design with Cawelo. |
| 5. SSJMUD & NKWSD 9-28 Intertie | Initiated | 2025 | Through 2040 | Preliminary design/environmental work underway. |
| 6. Southeast Delano Spreading Grounds | Initiated | 2022 | Through 2040 | Initiated discussion on potential sites for a joint recharge project - in addition to the existing stormwater retention basin repurposing project. |
| 7. Pond Road Spreading Grounds | Conceptual | 2025 | Through 2040 | Focus on development of the first 80 acres of spreading grounds. Continued evaluation of additional locations for recharge facilities. |
| 8. In-District Spreading Grounds | Conceptual | 2030 | Through 2040 | Focus on development of the first 80 acres of spreading grounds. Continued evaluation of additional locations for recharge facilities. |
| 9. Conversion of Dairy to Recharge Facility | Conceptual | 2030 | Through 2040 | Ongoing search for and evaluation of potential properties. |

### 3) Implementation of Management Actions

Implementation activities for SSJMUD Management Actions are summarized in the following table.

| Management Action Number/Name | Status | Timetable for Completion | Timetable for Expected Benefits | Comments on Implementation |
|---|---|---|---|---|
| 10. In-Lieu Recharge Program | Conceptual | 2020 | Through 2040 | Begin to work on the development of a formal in-lieu recharge program to incentivize its customers to use available surface water first. |
| 11. On-Farm Irrigation Practices Incentive Program | Conceptual | 2025 | Through 2040 | Continue to work with growers and discuss methods and policies that would encourage on-farm efficiency improvements. |
| 12. Refinement of Water Budget Components | Ongoing | TBD | Through 2040 | Consultant has been retained to assist with an in-district ET and applied water measurement system. Work with adjacent districts on datasets needed to refine water budget components. |
| 13. Conversion of Agricultural to Urban Use | Ongoing | TBD | Through 2030 | As the cities continue to grow, the conversion of agricultural land use to urban use is anticipated. |
| 14. Urban Water Conservation Program | Ongoing | 2030 | Through 2030 | Cities are currently working to estimate indoor usage methods and enforce the limits required by SB 606 and AB 1668. |
| 15. Mitigation for Potential Impacts to Domestic Wells | Conceptual | TBD | TBD | Begin to work with other districts in the KGA on the development of a mitigation program. |
| 16. In-District Allocation Structure | Conceptual | TBD | TBD | At this time, an in-district allocation structure is conceptual and has not been developed. |
| 17. Voluntary Land Fallowing | Conceptual | TBD | TBD | At this time, an in-district land buyback/fallowing program is in the conceptual stage only. |
| 18. Pumping Restrictions | Conceptual | TBD | TBD | At this time, an in-district pumping restriction program is in the conceptual stage only. |

## 7.3.12 Tejon-Castac Water District

### 1) Compliance with Sustainable Management Criteria

#### *a) Implementation of GSP Monitoring Network*

Tejon-Castac Water District (TCWD) has implemented the GSP Monitoring Network for the Tejon-Castac Water District Management Area through the following actions:

- Collection of groundwater level data in Fall 2019 (11/11/2019) in the one well in the groundwater level Representative Monitoring Network.

### b) Progress in Achieving Interim Milestones

Groundwater level data collected from the one well in the groundwater level Representative Monitoring Network in the Tejon-Castac Water District Management Area in Fall 2019 indicate the following:

- The groundwater level is greater than the established Minimum Threshold and slightly below the established Measurable Objective.

### c) Compliance with Additional Sustainable Management Criteria

There are no additional sustainable management criteria identified in the Tejon-Castac Water District Management Area.

## 2) Implementation of Projects/Management Actions

With respect to its planned Projects and Management Actions (P/MAs), TCWD has taken the following steps in 2019:

- P/MA #1 Conversion of Granite Quarry to Sycamore Reservoir – Coordination with AEWSD was taken on this P/MA in 2019, as this P/MA action will increase when operations at the Granite Quarry facility cease, which is anticipated in one to four years.
- P/MA #2 Recharge of Carrot Wash Water – This P/MA is underway and ongoing. In 2019, approximately 527 acre-feet of carrot wash water were recharged to the groundwater basin under this P/MA.

## 7.3.13 West Kern Water District GSA

## 1) Compliance with Sustainable Management Criteria

### a) Implementation of GSP Monitoring Network

The Kern Subbasin Coordination Agreement Monitoring Protocols require its member agencies measure groundwater levels semi-annually during the period of January 15 through March 30, and again from September 15 to November 15. WKWD measures groundwater levels in its monitoring and production wells semi-monthly. Those groundwater level measurements collected during the coordinated monitoring period will be reported to the KGA for use in the Annual Report for the Kern Subbasin.

### b) Progress in Achieving Interim Milestones

All groundwater levels, reported in WKWD's Management Area Plan (MAP) and this Annual Report, are above the Minimum Thresholds established for the individual wells in the monitoring network. For this reason, Interim Milestones were not needed or developed for Representative Wells.

### c) Compliance with Additional Sustainable Management Criteria

The following subsections provide brief updates and compliance status of the remaining sustainable management criteria.

***Reduction of Groundwater Storage***
WKWD GSA uses groundwater levels as a proxy for determining changes in groundwater storage. Therefore, the WKWD MAP uses data collected from its groundwater level monitoring network to identify any change in storage. From 2015 to 2019, groundwater levels rose approximately 20-25 feet and about 10-50ft in WKWD's North and South Management Areas, respectively.

***Seawater Intrusion***
The WKWD GSA area is geographically and geologically isolated from the Pacific Ocean, and any other large source of saline water. As a result, the Subbasin is not at risk for seawater intrusion.

***Degraded Groundwater Quality***
WKWD reports groundwater quality data to the Division of Drinking Water on a routine basis. Based on laboratory analytical results from routine monitoring, groundwater quality in the WKWD GSA North and South Management Areas has not degraded throughout the monitoring period of this Annual Report (2016-2019). This includes portions of the drought period from 2015 to 2017 when groundwater levels were at historic lows. This suggests that groundwater quality is not impacted when groundwater levels are managed sustainably in WKWD's North and South Management Areas. Therefore, additional groundwater quality monitoring is not necessary.

***Land Subsidence***
Currently there are no subsidence monitoring stations in the WKWD GSA North and South Management Areas where groundwater recovery occurs. DWR operates and maintains an extensometer located approximately one mile north of the North Project Management Area. InSAR spatial imagery provided by NASA's Jet Propulsion Laboratory is available for the majority of the Subbasin. Information from the extensometer and InSAR spatial imagery provide representative data relative to the magnitude of land subsidence, if any, occurring in the WKWD GSA area.

Land Subsidence Monitoring was identified as a data gap in the Kern County Subbasin Umbrella GSP and will be coordinated between all Kern County GSAs. WKWD GSA will continue to participate in that coordinated effort.

***Depletions of Interconnected Surface Waters***
There is little naturally occurring surface water in the WKWD GSA area. All streams are ephemeral, and there are currently no stream or river gages in the WKWD GSA area. The far western reach of the Kern River flows through a small part of the WKWD GSA area, however, the Kern River channel is dry except during high flow events. Due to the lack of naturally occurring surface waters, management of interconnected surface water is not necessary in the WKWD GSA area.

### 2) Implementation of Projects

Several projects were identified in the WKWD Chapter GSP that will help achieve sustainability goals for the portion of the Subbasin that lies within the WKWD GSA's Boundaries. The following subsection briefly describe those projects and their implementation status.

***Automatic Meter Reading (AMR) Project***
From 2016 through 2019, WKWD installed 2,127 AMR systems on residential and industrial service connections. This, along with the AMR systems installed prior to 2016, account for about 32 percent of WKWD's customers. AMR installation will continue until all connections have been converted.

***Participation in Delta Conveyance Facility***
WKWD will participate in Delta Conveyance Facility to increase water supply reliability for its customers. The exact increase in water supply from the Delta Conveyance Facility remains uncertain until final design, approvals, and agreements are in place.

The timing and circumstance of implementation of this project is beyond the control of the WKWD GSA. This project has not yet been implemented due to the Delta Conveyance Facility's State controlled timeline.

***Buena Vista Aquatic Recreation Area (BVARA) Water Supply Management Coordination***
BVARA is located within and adjacent to the WKWD GSA area (i.e., Lake Management Area). The County of Kern pumps groundwater from wells located within the GSA area to supplement losses at BVARA. Coordination between the WKWD GSA and the County of Kern to identify water supplies, other than groundwater, to augment losses at BVARA has begun and is anticipated to continue after submittal of this Annual Report.

### 3) Implementation of Management Actions

Management actions are those decisions that could be made to affect groundwater conditions without the need for additional capital projects or approval beyond the appropriate governing boards. Management Actions discussed in the WKWD Chapter GSP are provided in the following subsections.

***Continued Balanced Pumping and Recharge***
Continued balanced pumping and recharge of imported supplies has and will continue to be the operational norm for WKWD. Under this management action, recharge and recovery activity will continue to be monitored closely by WKWD to maintain balanced conditions.

***Implement Water Shortage Response Plan (WSRP)***
The WSRP is incorporated into the 2015 UWMP and includes triggers for when the WSRP would be implemented. The WSRP describes management actions and use restrictions that would be implemented if water shortages were declared. At this time, implementation of the WSRP has not been triggered and is not warranted.

***Continued Participation in Basin-Wide Coordination***
The WKWD GSA is one of eleven GSAs in the Subbasin. Coordination among these GSAs is necessary for sustainable management of the Subbasin as a whole and has been ongoing during development of the respective GSPs. The WKWD GSA will continue to participate in the Subbasin coordination efforts.

***Implementation of Adaptive Management Strategies***
Adaptive management strategies would only be considered for implementation if designated trigger events for that strategy occur. Triggering events would be based on monitoring results and data and are set in relation to undesirable results as described in the WKWD GSA Management Area Plan, Section 7.0.

At this time, no triggering events have occurred, and Adaptive Management Strategies have not been initiated.

### 7.3.14 Westside District Water Authority

#### 1) Compliance with Sustainable Management Criteria

##### *a) Implementation of GSP Monitoring Network*

WDWA staff has been actively preparing for the collection and analysis of groundwater monitoring and testing data pursuant to the WDWA Chapter Groundwater Sustainability Plan (GSP) Monitoring Network Plan (MNP). As the MAP indicates, there has been a deficiency in groundwater data, due to the poor groundwater quality. As such, there is data lacking on the hydrographs for the MT/MO wells related to water level. This is a data gap that the WDWA seeks to fill with future monitoring.

To facilitate the MNP sampling schedule and ensure representative data, WDWA staff is currently finalizing access agreements and preparing to ground-truth selected monitoring locations to confirm well construction details, well casing access and overall well condition. Wells determined to be deficient for the purpose of the MNP will be replaced with the next closest well that meets MNP criteria for representativeness and well condition. Any replacement well location will be detailed in the relevant Annual Report along with the technical rationale for the change.

##### *b) Progress in Achieving Interim Milestones*

Beginning in Spring 2020, the WDWA will test its current MT/MO network of wells for water levels twice a year (spring and fall). In addition, the MNP identifies 21 wells that will be monitored annually in summer and winter for groundwater quality and levels. These wells will be sampled beginning in summer 2020.

##### *c) Compliance with Additional Sustainable Management Criteria*

See b) above.

#### 2) Implementation of Projects/Management Actions

The Westside District Water Authority (WDWA) Management Area Plan (MAP) outlined three management actions to be completed over the course of SGMA implementation. All the management actions identified in the WDWA chapter GSP are now in progress and additional management actions may be identified as new data becomes available. Any new management actions will be detailed and discussed in the relevant Annual Report. The three current management actions are:

- Collection and analysis of representative hydrogeologic data to remedy a documented lack of groundwater data in the Westside.
- Water resource coordination – due to poor groundwater quality, Westside landowners rely primarily on surface water. As such to further reduce groundwater use and increase drought resiliency, WDWA Districts and their landowners will continue to work cooperatively in pursuing supplemental surface water opportunities, including trades and purchases both between themselves and with parties outside of the WDWA.

- Conjunctive reuse of brackish water as a new source of water supply is in the feasibility study and economic assessment phase. Sources of brackish water under study for treatment and beneficial reuse include groundwater with TDS above 2,000 mg/L and oilfield produced water.

Water resource coordination is a well-established and successful practice of water resource management in the WDWA. Because of near ubiquitous poor groundwater quality, due to Westside geology, the WDWA meets current demand almost exclusively through California Aqueduct water, although not all surface water is from the State Water Project. The WDWA and its landowners work cooperatively to facilitate inter- and intra- WDWA supplemental water purchases and trades. In addition, individual landowners work amongst themselves to determine arrangements for supplemental water. These ongoing practices have been assimilated into the Chapter GSP and will be expanded as part of GSP implementation to include cooperation with adjacent Groundwater Management Areas, with regard to groundwater quality, supply and elevation data through regular meetings, and the exchange of pertinent groundwater monitoring data, irrigation technology developments and supplemental water demand/supply information. For example, the WDWA and its landowners are currently assessing a possible 2020 Dry Year Transfer Program and will work to coordinate MNP groundwater monitoring activities to ensure representative data. Resource coordination meetings and milestones will be described in forth coming Annual Reports.

Conjunctive reuse of non-conventional water resources such as brackish groundwater and oilfield produced water has been identified as an important and innovative management action in the WDWA Chapter GSP for continued sustainability and drought resilience. To assess the technical and economic viability of advanced treatment of water with elevated concentrations of total dissolved solids (TDS), the WDWA has initiated a Phase I Feasibility Study (FS). As currently planned, the Phase I FS will be completed in the second Quarter of 2020. The goal of the project is to ultimately treat up to 50,000 AFY of brackish water for multiple beneficial reuses. If determined to be promising, a Phase II FS and Engineering Report will be initiated in late 2020. As proposed in the Chapter GSP, a first phase treatment system would be online in 2030, with full production anticipated between 2035 and 2040. Project status will be updated in various future Annual Reports as data become available.

#### 7.3.15 Wheeler Ridge-Maricopa Water Storage District

##### 1) Compliance with Sustainable Management Criteria

##### *a) Implementation of GSP Monitoring Network*

Wheeler Ridge-Maricopa Water Storage District (WRMWSD) has implemented GSP Monitoring Network for the Wheeler Ridge-Maricopa Management Area through the following actions:

- Securing access agreements with all well owners in the groundwater level Representative Monitoring Network.

- Collection of groundwater level data in Fall 2019 in all 14 wells in the groundwater level Representative Monitoring Network.

- Compilation of benchmark survey data collected by the Department of Water Resources in June 2019 from all 40 benchmark sites in the land subsidence Representative Monitoring Network in the Wheeler Ridge-Maricopa Management Area.

In addition to the above activities related to the groundwater level and land subsidence Representative Monitoring Networks, WMRWSD has also collected groundwater level and groundwater quality monitoring data from additional locations in 2019 which will be evaluated as part of local SGMA implementation, as well as information collected by others (e.g., other public water systems, environmental compliance sites, etc.).

#### *b) Progress in Achieving Interim Milestones*

Groundwater level data collected from wells in the groundwater level Representative Monitoring Network in the Wheeler Ridge-Maricopa Management Area in Fall 2019 indicate the following:

- Groundwater levels in all Representative Monitoring Wells are greater than their respective Minimum Thresholds and also greater than their respective Measurable Objectives.

#### *c) Compliance with Additional Sustainable Management Criteria*

Compliance with additional (non-groundwater level) Sustainable Management Criteria is as follows:

- Survey data from the 40 land subsidence Representative Monitoring Sites in the Wheeler Ridge-Maricopa Management Area collected in 2019 indicates that 15 sites had 2018-2019 subsidence rates less than the Minimum Threshold rate and 25 sites had 2018-2019 subsidence rates greater than the Minimum Threshold rate.

### 2) Implementation of Projects

WRMWSD has made progress towards implementing several of its planned Projects. This progress has included the following:

- P/MA #3 Increase Out-of-District Banking Operations. WRMWSD, as a participant in the Kern Water Bank, is involved in a project to increase the water banking capabilities of the Kern Water Bank by approximately 1000 acres. This project is in construction at this time. This project, although not directly within the Wheeler Ridge-Maricopa Management Area, will allow WRMWSD more capacity to bank excess supplies when available. During a wet year, this would allow WRMWSD to capture an additional 15,000 acre-feet per year (AFY; 120 days of recharge). The Kern Water Bank is an essential tool in WRMWSD's portfolio in managing surface supplies for delivery into the District.

- P/MA #5 Purchase Additional Supplies. As has historically been done, WRMWSD is continually investigating, pursuing, and purchasing supplies for delivery into its service area, and into WRMWSD's banking projects. WRMWSD has purchased supplies above its normal State Water Project entitlement in the following amounts in the following years:
    - 2015 – 4,481 acre-feet (AF)
    - 2016 – 16,794 AF
    - 2017 – 90,866 AF
    - 2018 – 43,734 AF
    - 2019 – 57,819 AF

- P/MA #6 Desalination Facilities. WRMWSD is currently in discussions with various vendors on possible desalination opportunities.

- P/MA #7 "Thru Delta" Facility. WRMWSD is currently in discussions and negotiations regarding a “Thru Delta” facility.

  P/MA #TBD Facility Interconnections with AEWSD. WRMWSD has begun discussions with AEWSD on multiple potential sites for interconnections to increase transfer and exchange opportunities.

### 3) Implementation of Management Actions

WRMWSD has made progress towards implementing several of its planned Management Actions. This progress has included the following:

- P/MA #8 Acreage Assessment. This is currently being discussed at a WRMWSD Board Committee level.

## 7.4 KERN RIVER GSA (KRGSA) GSP

GSP implementation activities for the KRGSA include actions by member agencies (City of Bakersfield, Kern Delta Water District, Kern County Water Agency Improvement District No. 4, East Niles Community Services District, and North of the River MWD/Oildale Mutual Water District) and also by Greenfield County Water District, who is a separate GSA and coordinated with the KRGSA on its GSP. In order to improve coordination among the agencies as the GSA, the KRGSA Managers are convening a managers’ workshop scheduled for April 3, 2020. At that workshop, KRGSA Managers will discuss roles, responsibilities, and protocols for coordinated GSP implementation going forward.

### 1) Compliance with Sustainable Management Criteria

#### *a) Implementation of GSP Monitoring Network*

- Although the KRGSA GSP monitoring network was finalized and adopted after the completion of the Reporting Period, some data were collected during WY 2019 for 22 of the 39 KRGSA water level monitoring wells (see KRGSA Hydrographs in **Appendix A**).

- Some network wells without WY 2019 data are inactive production wells that became available in late 2019 to improve our ability to replace active production wells in the KRGSA GSP monitoring network. Those wells were added to our network after the end of the Reporting Period but are currently being monitored.

- After adoption of the monitoring program and submission of the GSP in January 2020, the KRGSA initiated the GSP monitoring network including the following activities:

- Initiate monthly monitoring and reporting in the Urban MA including inactive municipal wells included in the GSP monitoring network (including coordination with member agencies that own the wells).
- Initiate semi-annual monitoring in the Agricultural MA.
- Continue monitoring and reporting in the Banking MA including Berrenda Mesa monitoring well, and City piezometers in the 2800 Recharge Facility.

- Coordinate with other agencies in the KRGSA Plan Area for monitoring and reporting of agency wells incorporated into the GSP monitoring network, including Cal Water, ENCSD, and Greenfield CWD.

- Details on monitoring protocols and access agreements are currently being established for the entire GSP Monitoring Network.

### *b) Progress in Achieving Interim Milestones*

- Although the KRGSA GSP monitoring network had not yet been finalized and adopted during the Reporting Period, available WY 2019 data provided from 22 of the 39 GSP monitoring wells indicated an overall rise in KRGSA water levels.

- During the Reporting Period, none of the measured water levels fell below the MTs. One well had a measurement fall below the MT at the end of the Reporting Period (RMW-216 on 10/1/2019), but, as an active production well, the data were likely impacted from recent pumping. No undesirable results occurred. A management action in the KRGSA GSP provides for improvements to the monitoring network including consideration of removing active production wells over time.

- Data were within or had already exceeded the defined interim milestone level that was targeted for 2025. About one-half of the wells with WY 2019 data had water levels that exceeded the MOs during the Reporting Period.

### *c) Compliance with Additional Sustainable Management Criteria*

At the KRGSA Managers workshop, scheduled for April 2, procedures for compiling and analyzing existing water quality data and publicly-available InSAR land subsidence data will be developed as described in the KRGSA GSP. Also as described in the KRGSA GSP, the KRGSA will continue to participate in the basin-wide subsidence monitoring program, with initial activities currently under development.

## 2) Implementation of Projects

- The implementation of Phase One Project Water Allocation Plan by Kern Delta Water District (KDWD) resulted in the capture and use of 34,604 AF of water for in-lieu and/or direct groundwater recharge within the KRGSA. Nearly all of this water would have been unavailable to the KRGSA in prior years without the Water Allocation Plan project.

- The implementation of Phase One Project Optimization of Conjunctive Use by the City has resulted in additional Kern River recharge of 75,317 AF during WY 2019 as compared to the historical average. The City's first priority for available Kern River water was delivery to surface water treatment plants for direct use in meeting meet municipal demands. The second priority was to recharge surface water into the multiple City water amenities, canals, the Kern River channel, and the 2800 Acre Recharge Facility. Such operations allowed for recharge and storage of 75,317 AF to balance demands met from local groundwater pumping, including storage for future drought conditions when surface water is not available.

- For the Phase One Project North Weedpatch Highway Water System Consolidation, the following items document progress since the project was described in the GSP:
    - Consolidation agreements for Victory MWC and Del Oro WC are in preparation.
    - CEQA documents have been prepared and submitted to the State Water Board for review.
    - Land negotiations are underway with Fairfax School District.
    - Construction plans (about 90% complete) are under review by the State.

- As part of the KDWD conjunctive use and water banking program with Metropolitan Water District, KDWD was able to recharge and store more than 55,000 AF of water from outside the KRGSA in 2019, which will have a net positive impact of 6,140 AF on the KRGSA water budget.

- Although not an identified project in the KRGSA GSP, KDWD is coordinating with AEWSD on the implementation of the Sunset Spreading Project, which will provide water from the KDWD Eastside Canal for direct recharge on 157 acres located in AEWSD/KDWD (purchased jointly).

### 3) Implementation of Management Actions

- KRGSA Managers are working in a collaborative manner to develop and adapt water management practices within the KRGSA to mitigate overdraft attributable to the KRGSA.

- The KRGSA is developing GSA-wide policies and procedures to be used in GSP implementation. These include measures to improve data collection throughout the KRGSA. (Managers' Workshop currently scheduled for April 2, 2020 to develop priorities and actions).

- The KRGSA has cooperated and contributed significantly on provision of water resources data to bridge WY 2015 to WY 2019 for this First GSP Annual Report. These data include revisions to the Kern County Subbasin C2VSIM-FG Kern local model to support analyses in this First GSP Annual Report.

## 7.5 Olcese GSA GSP

### 1) Compliance with Sustainable Management Criteria

#### *a) Implementation of GSP Monitoring Network*

Olcese Groundwater Sustainability Agency (Olcese GSA) has implemented the GSP (Representative) Monitoring Network for the Olcese GSA Area through the following actions:

- Collection of groundwater level data in Fall 2019 from the two wells in the groundwater level Representative Monitoring Network.

In addition, Olcese GSA has also collected groundwater level and groundwater quality monitoring data from additional locations (not part of the Representative Monitoring Network) in 2019 which will be evaluated as part of local SGMA implementation, as well as information collected by others (e.g., other public water systems, environmental compliance sites, etc.).

### *b) Progress in Achieving Interim Milestones*

Groundwater level data collected from wells in the groundwater level Representative Monitoring Network in the Olcese GSA Area in Fall 2019 indicate the following:

- Groundwater levels in both Representative Monitoring Wells are greater than their respective Minimum Thresholds.

- The groundwater level in one Representative Monitoring Well is greater than its respective Measurable Objective, and the groundwater level in the other Representative Monitoring Well is slightly below (by 1 foot) its respective Measurable Objective.

### *c) Compliance with Additional Sustainable Management Criteria*

No other sustainability indicators besides Chronic Lowering of Groundwater Levels (and Groundwater Storage, by proxy) have established Minimum Thresholds within the Olcese GSA Area.

## 2) Implementation of Projects

Olcese GSA has made progress in 2019 towards implementing one of the Projects included in the Olcese GSP:

- Non-contingent P/MA #1 – Installation of a shallow monitoring well in the vicinity of Olcese Water District well #2 for purposes of evaluating potential hydraulic connection between the Olcese Sand Aquifer Unit and the Shallow Alluvium. Olcese GSA installed this well in Summer 2019 and has collected groundwater level monitoring data in Fall 2019.

Olcese GSA has not yet initiated the non-contingent Project #3 to develop a network of subsidence monitoring locations.

## 3) Implementation of Management Actions

Olcese GSA has not yet initiated the non-contingent Management Action #2 to conduct a study of the potential hydraulic connection between the Olcese Sand Aquifer Unit and the Shallow Alluvium. This study will be initiated in 2020.

# 8 REFERENCES


American Water Works Association (AWWA), 2006, Flowmeters in Water Supply, Manual of Water Supply Practices Manual M33, Second Edition.

American Water Works Association (AWWA), 2012, Water Meters – Selection, Installation, Testing and Maintenance, Manual of Water Supply Practices Manual M6, Fifth Edition.

California Data Exchange Center (CDEC), 2020, Chronological Reconstructed Sacramento and San Joaquin Valley Water Year Hydrologic Classification Indices, download of public data from California Department of Water Resources (DWR), accessed in March 2020 at weblink: http://cdec.water.ca.gov/reportapp/javareports?name=WSIHIST

City of Bakersfield (COB), 2020, DRAFT Kern River 2019 Hydrographic Annual Report, draft report tables provided by City of Bakersfield – Water Resources.

City of Bakersfield (COB), 2019, Kern River 2018 Hydrographic Annual Report, report published by City of Bakersfield – Water Resources.

City of Bakersfield (COB), 2018, Kern River 2017 Hydrographic Annual Report, report published by City of Bakersfield – Water Resources.

City of Bakersfield (COB), 2017, Kern River 2016 Hydrographic Annual Report, report published by City of Bakersfield – Water Resources.

Dogrul, E.C. and T.N. Kadir and C.F. Brush, 2017, Theoretical Documentation and User's Manual for IWFM Demand Calculator (IDC-2015), Revision 63, DWR Technical Memorandum on methods and files used in IDC-2015 Revision 63, released in August 2017, available https://water.ca.gov/Library/Modeling-and-Analysis/Modeling-Platforms/Integrated-Water-Flow-Model-Demand-Calculator

Friant Water Authority, 2019, Friant Water Update September 11, 2019, report by Friant Water Authority, accessed in March 2020 at weblink: https://static1.squarespace.com/static/58c2eccc15d5db46200ea426/t/5d79621b3e6ff65a64d6fb14/1568236059697/2019.0911+-+Friant+Water+Update.pdf.

Howes, D.J., 2020, Kern Subbasin1993-2019 ITRC-METRIC ETc for Kern County, technical report and accompanying GIS files provided by Irrigation Training & Research Center (ITRC) at California Polytechnic State University, San Luis Obispo to the Kern Groundwater Authority, Feb 18, 2020.

Irrigation Training & Research Center (ITRC), 2012, SBx7 Flow Rate Measurement Compliance for Agricultural Irrigation Districts, ITRC Report No. R12-002, Irrigation Training & Research Center (ITRC) at California Polytechnic State University, San Luis Obispo, August 26, 2012, http://www.itrc.org/reports/sbx7.htm.

Maley, M. and C. Brush, 2020, SGMA Water Budget Development using C2VSimFG-Kern in support of the Kern County Subbasin Groundwater Sustainability Plans (GSPs), included as Appendix 2 and 4 in the Kern County Subbasin Coordination Agreement: available at weblink: https://sgma.water.ca.gov/portal/gsp/coordagreement/preview/11

PRISM, 2020, PRISM Climate Data download of monthly precipitation data for October 2015 through September 2019, data developed by PRISM Climate Group, Northwest Alliance for Computational Science & Engineering (NACSE) based at Oregon State University, data downloaded in January 2020 from weblink: http://www.prism.oregonstate.edu/

United States Bureau of Reclamation (USBR), 2001, Water Measurement Manual, A Water Resources Technical Publication, U.S Bureau of Reclamation, Revised Reprint Third Edition, 2001. https://www.usbr.gov/tsc/techreferences/mands/wmm/

# FIGURES

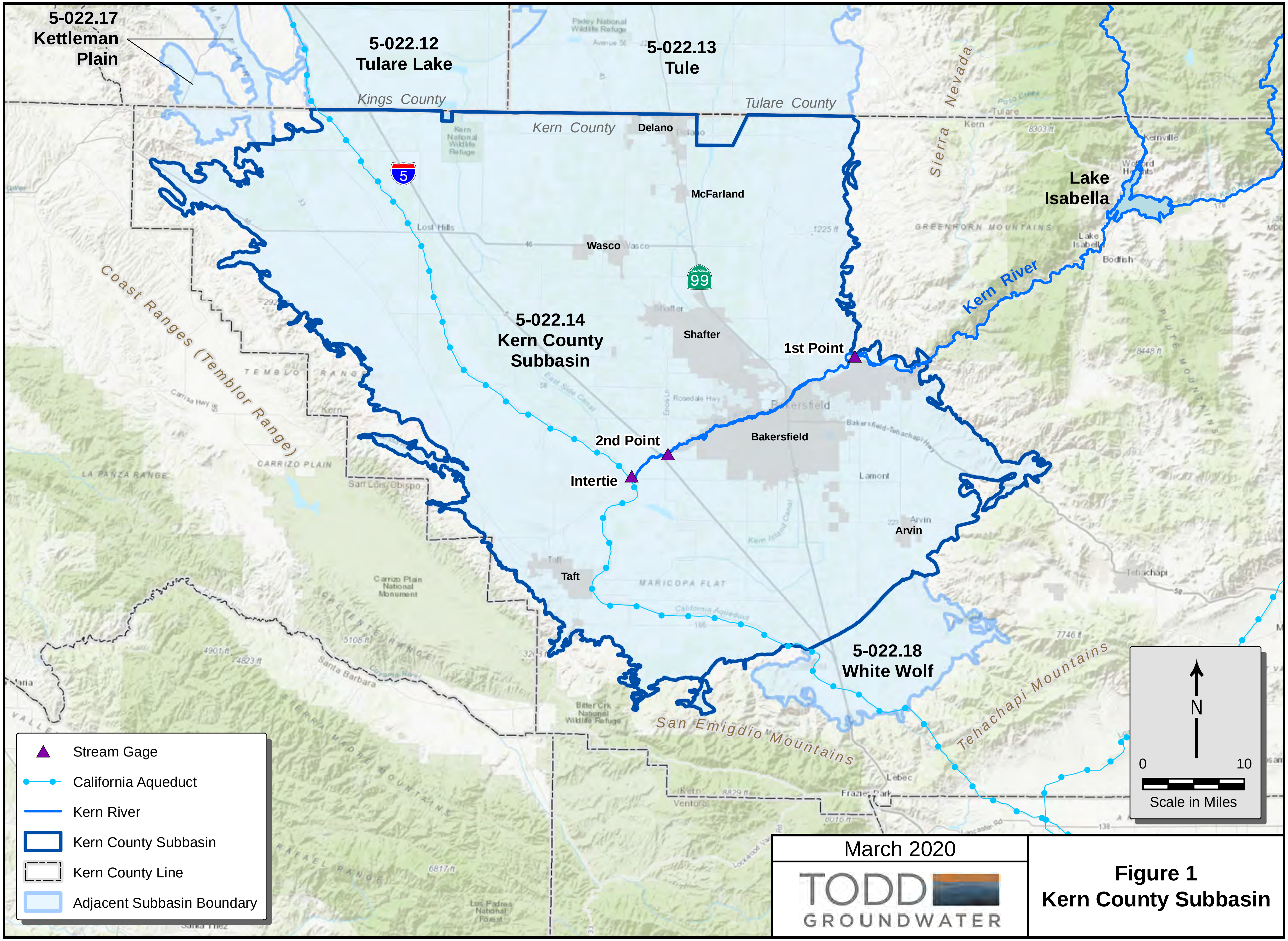
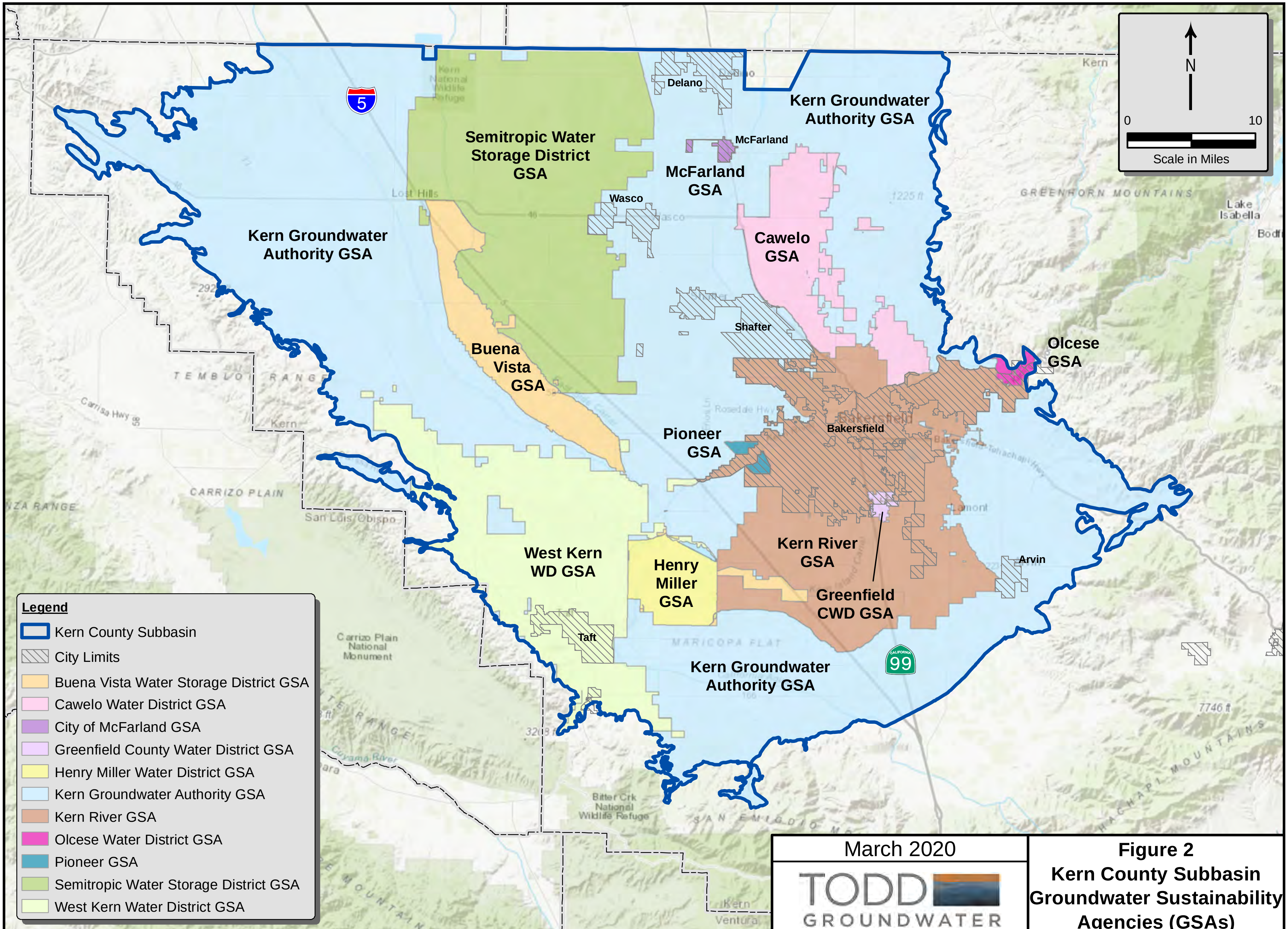



**Figure 1**
**Kern County Subbasin**




March 2020

TODD GROUNDWATER

**Figure 2**
**Kern County Subbasin Groundwater Sustainability Agencies (GSAs)**

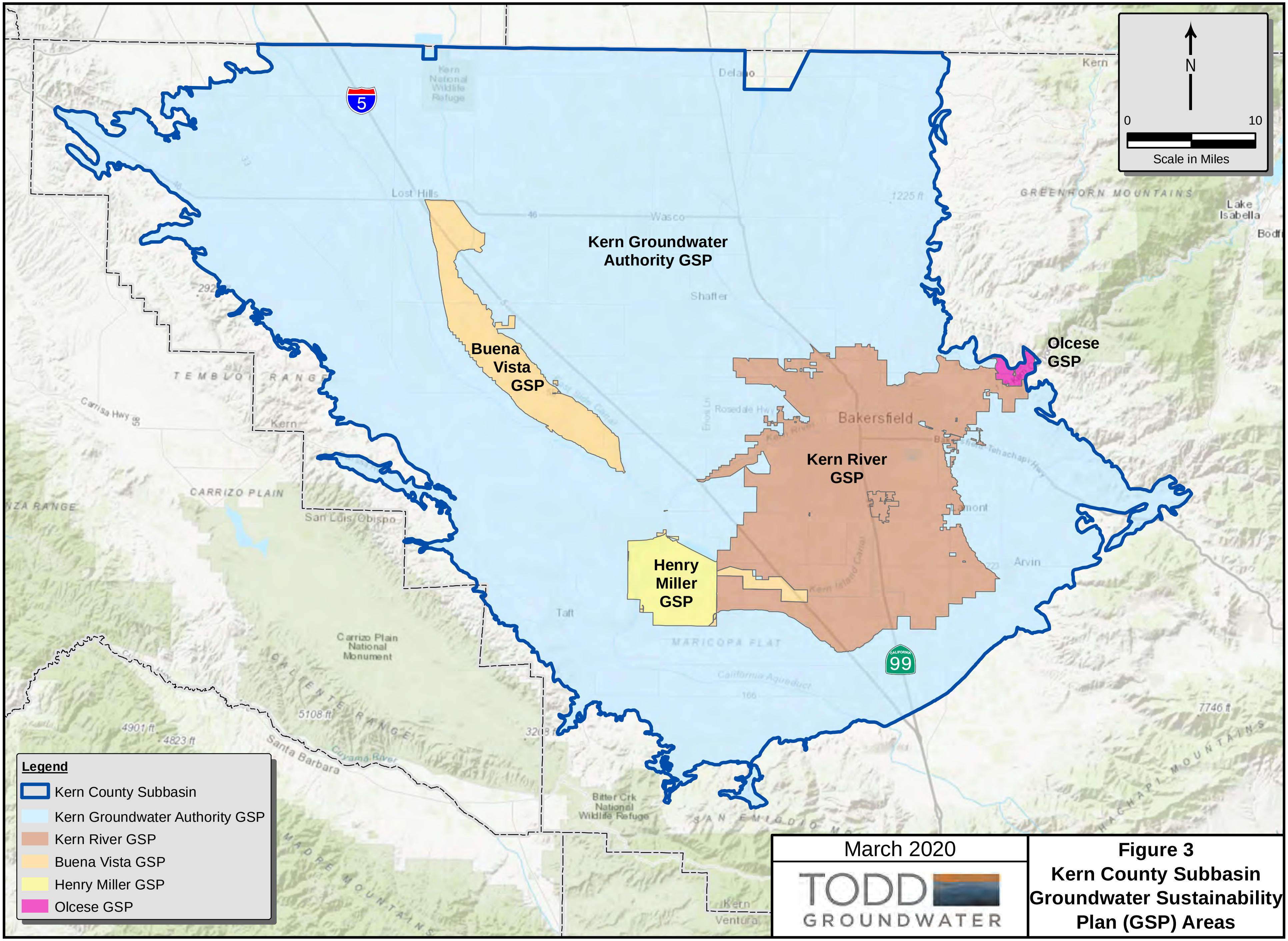
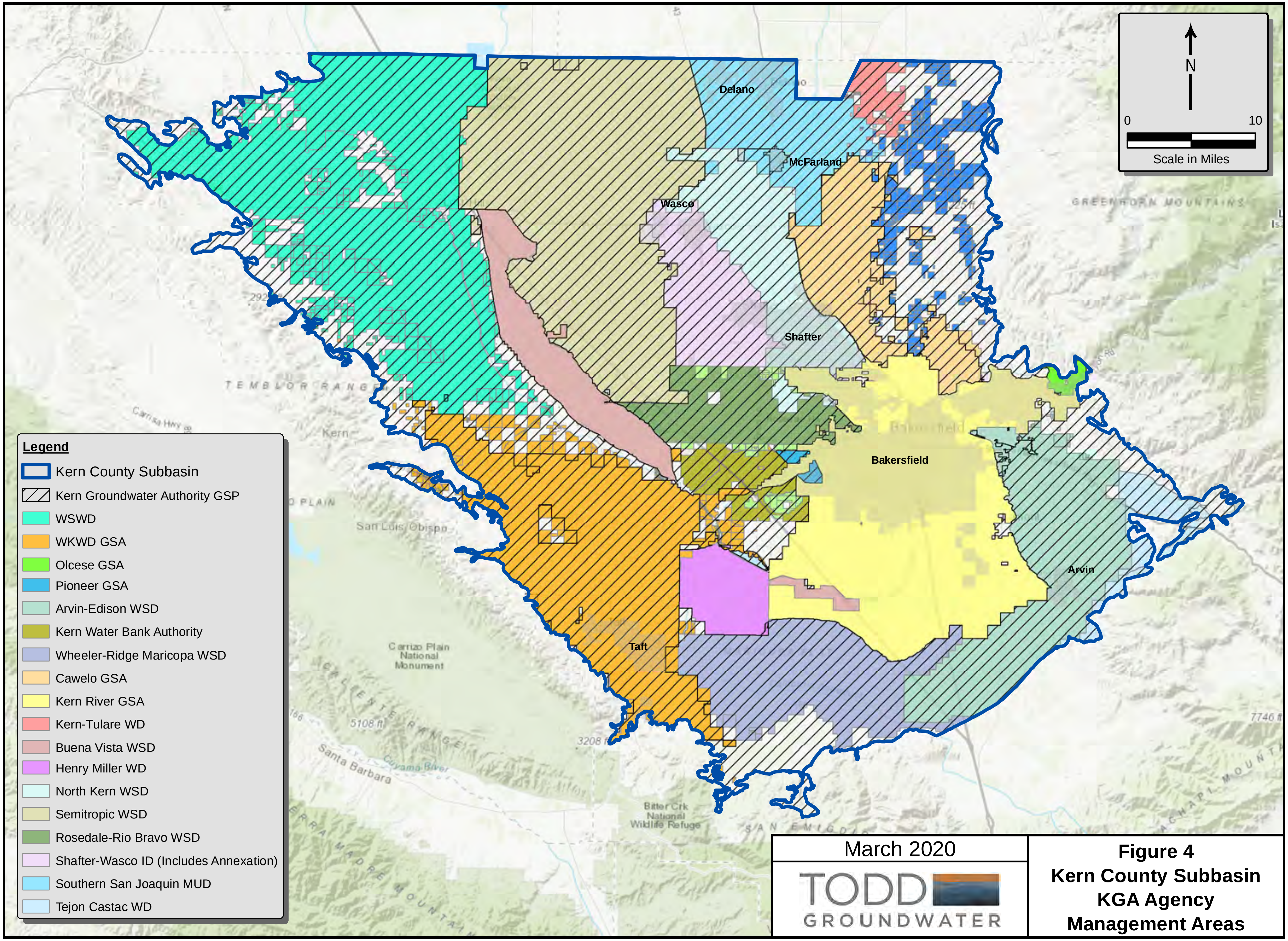



**Figure 3**
**Kern County Subbasin Groundwater Sustainability Plan (GSP) Areas**

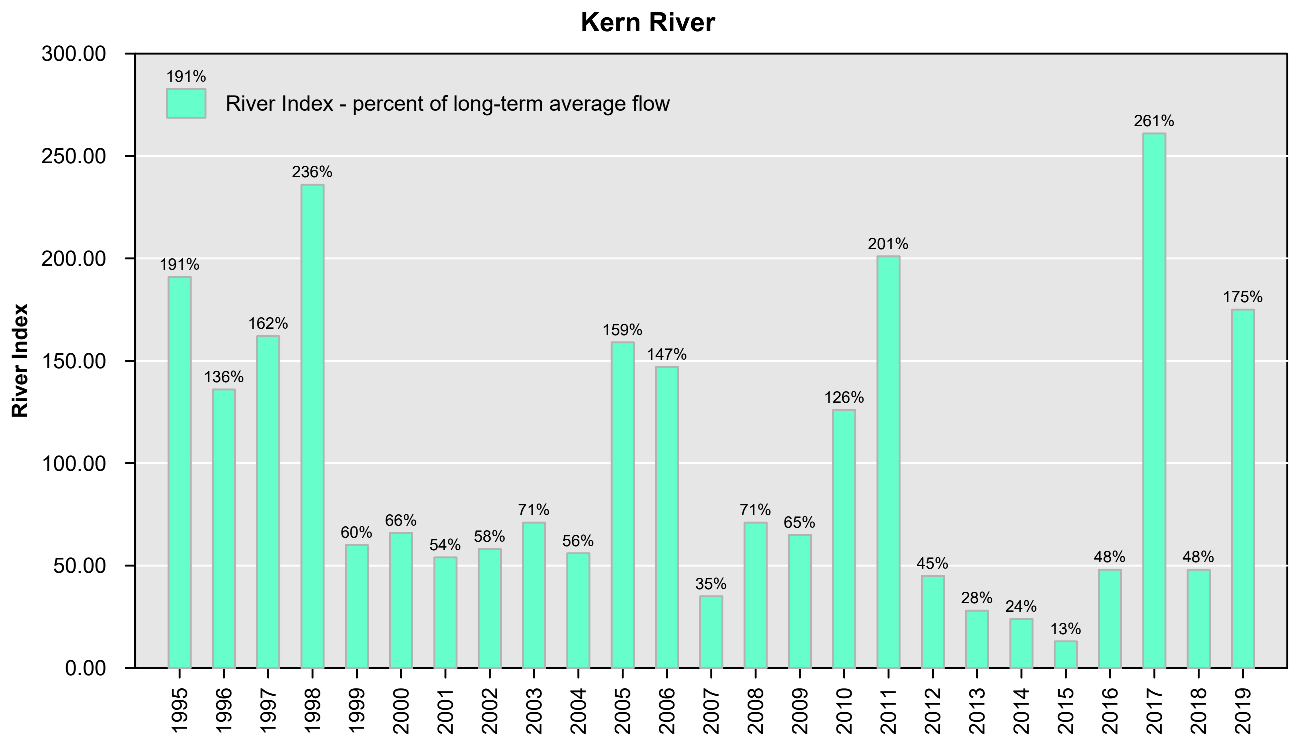


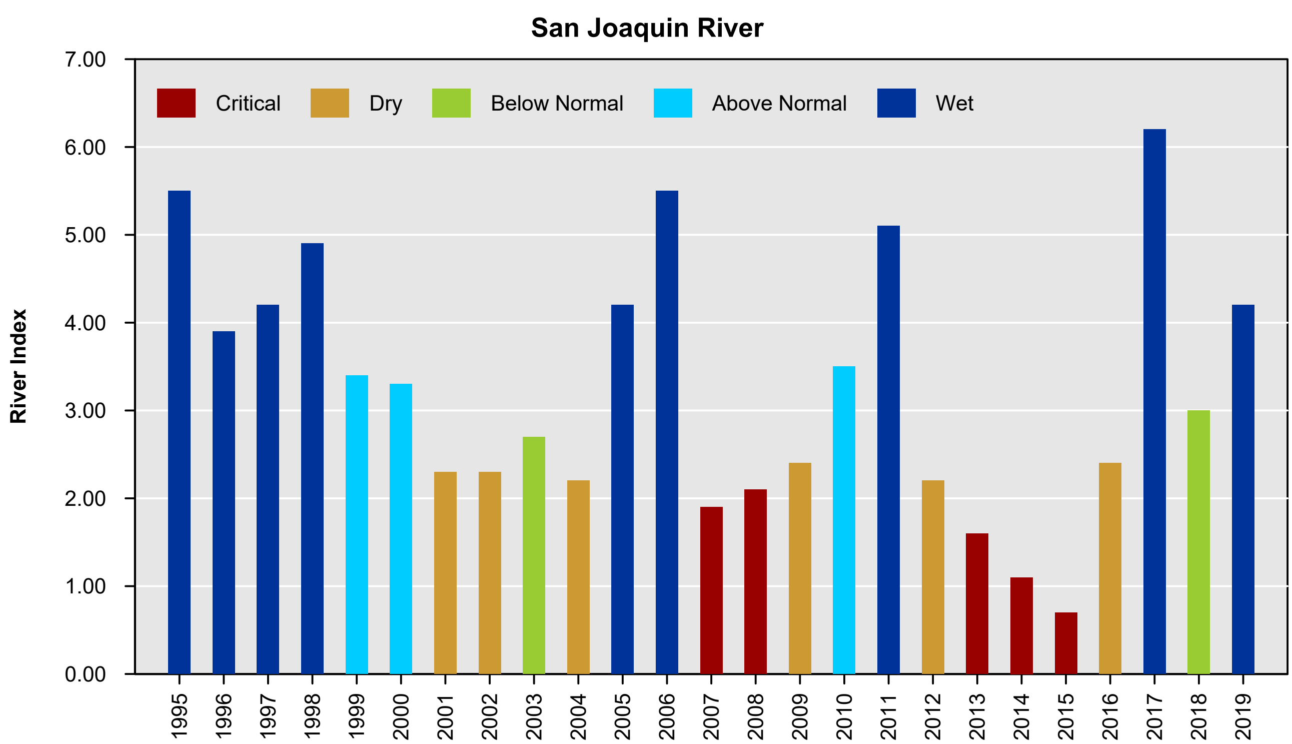

March 2020

TODD GROUNDWATER

**Figure 4**
**Kern County Subbasin**
**KGA Agency**
**Management Areas**


**Figure 5**
**Basin-Wide Groundwater Level Monitoring Network (Hydrograph wells)**




**Data Sources:**
California Data Exchange Center (CDEC, 2020)
Friant Water Update (Friant Water Authority, 2019)
Kern River Hydrographic Reports (COB 2019, 2020)

March 2020

TODD GROUNDWATER

**Figure 6**
**Water Year Types**
**Kern and San Joaquin River Indices**
**WY 1995-2019**

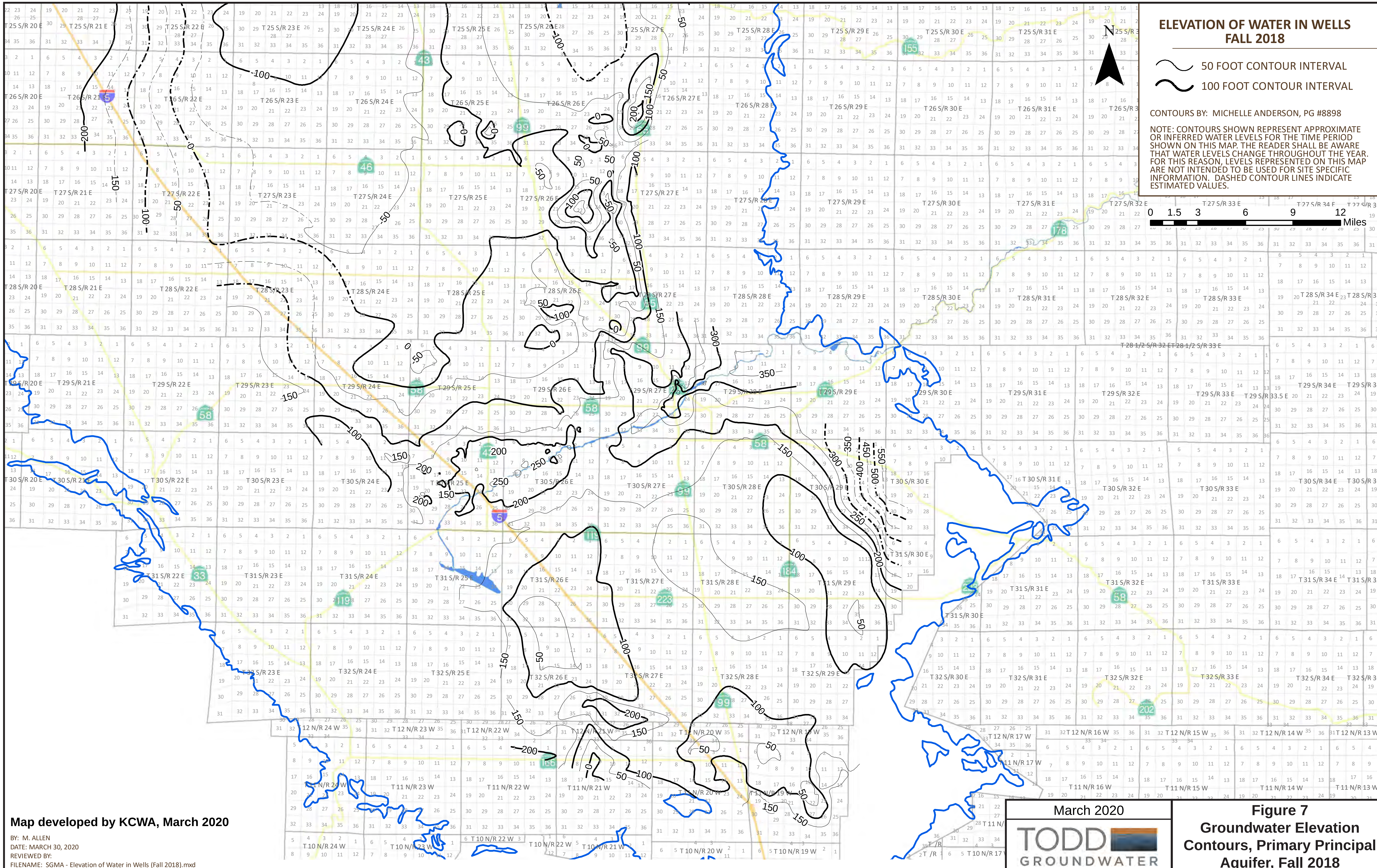



Figure 7
Groundwater Elevation Contours, Primary Principal Aquifer, Fall 2018

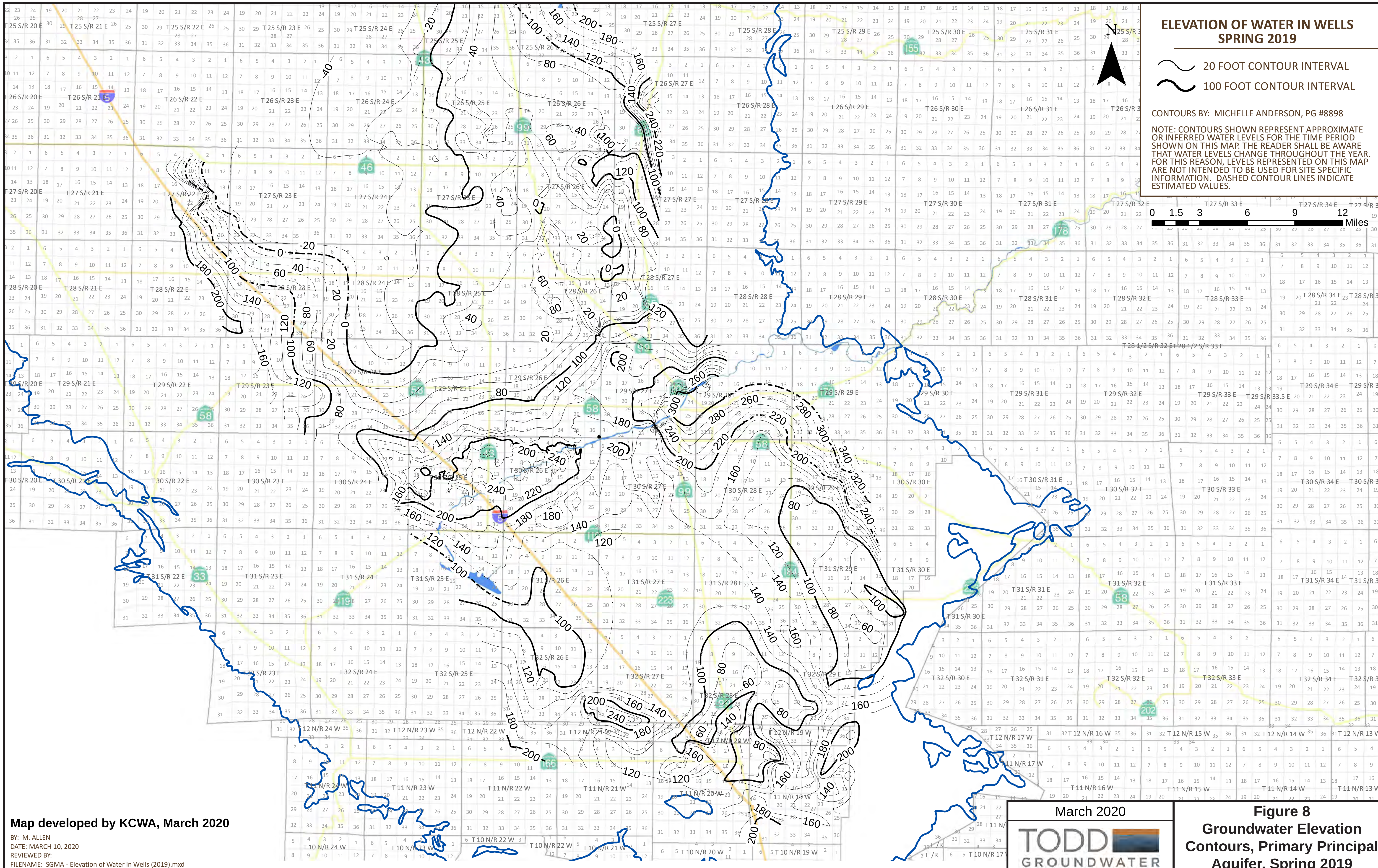


Figure 8
Groundwater Elevation Contours, Primary Principal Aquifer, Spring 2019

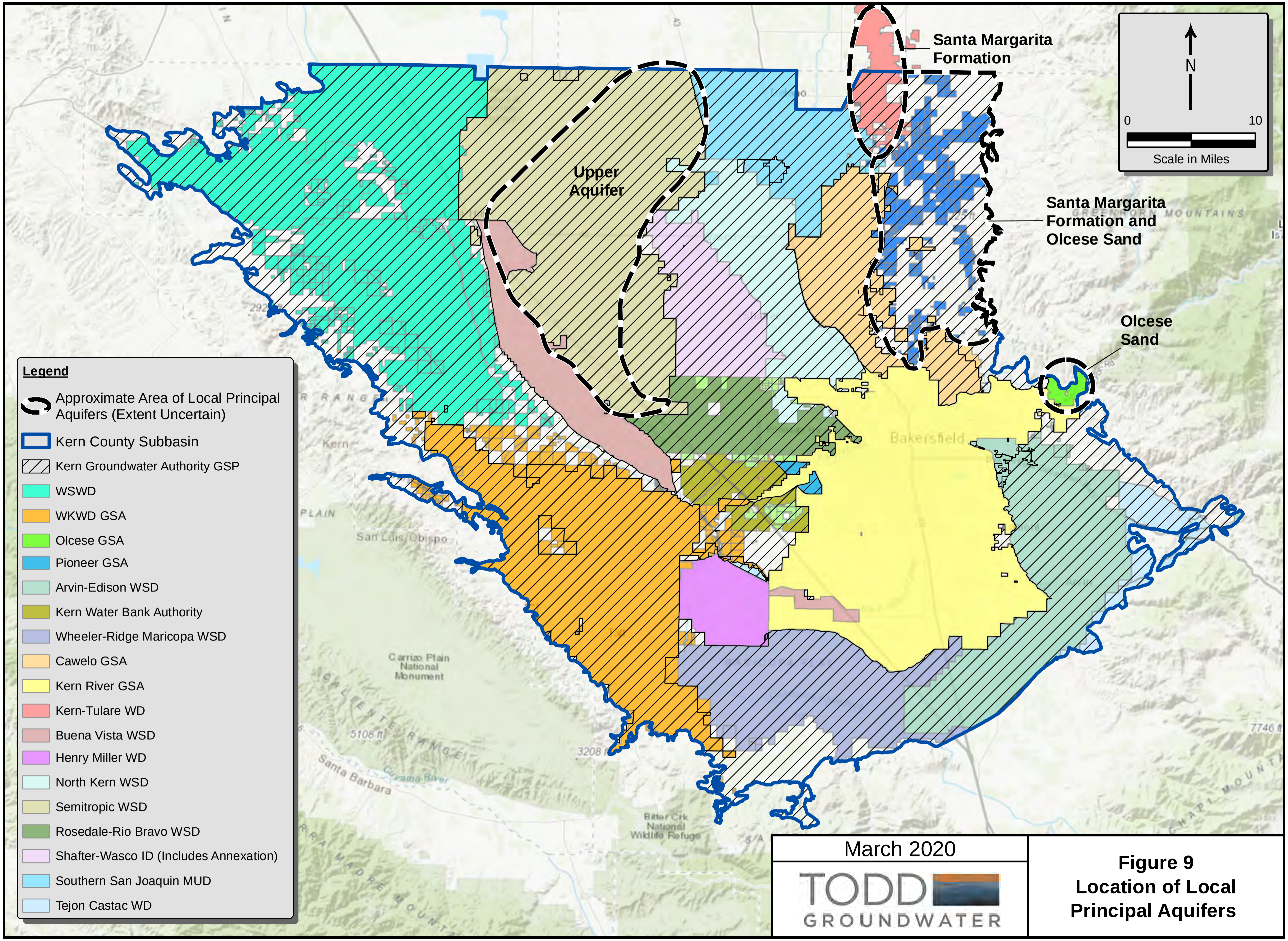
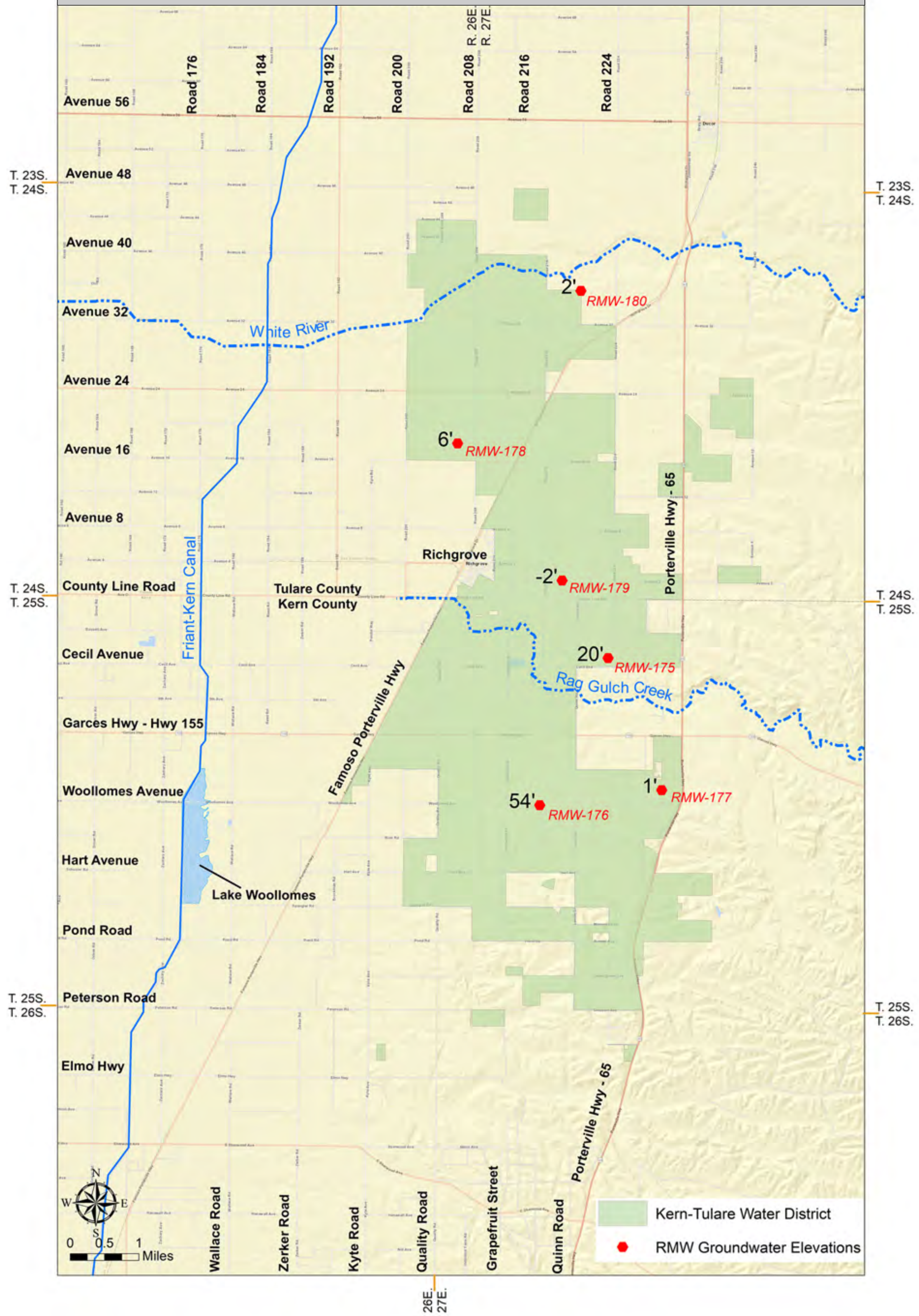
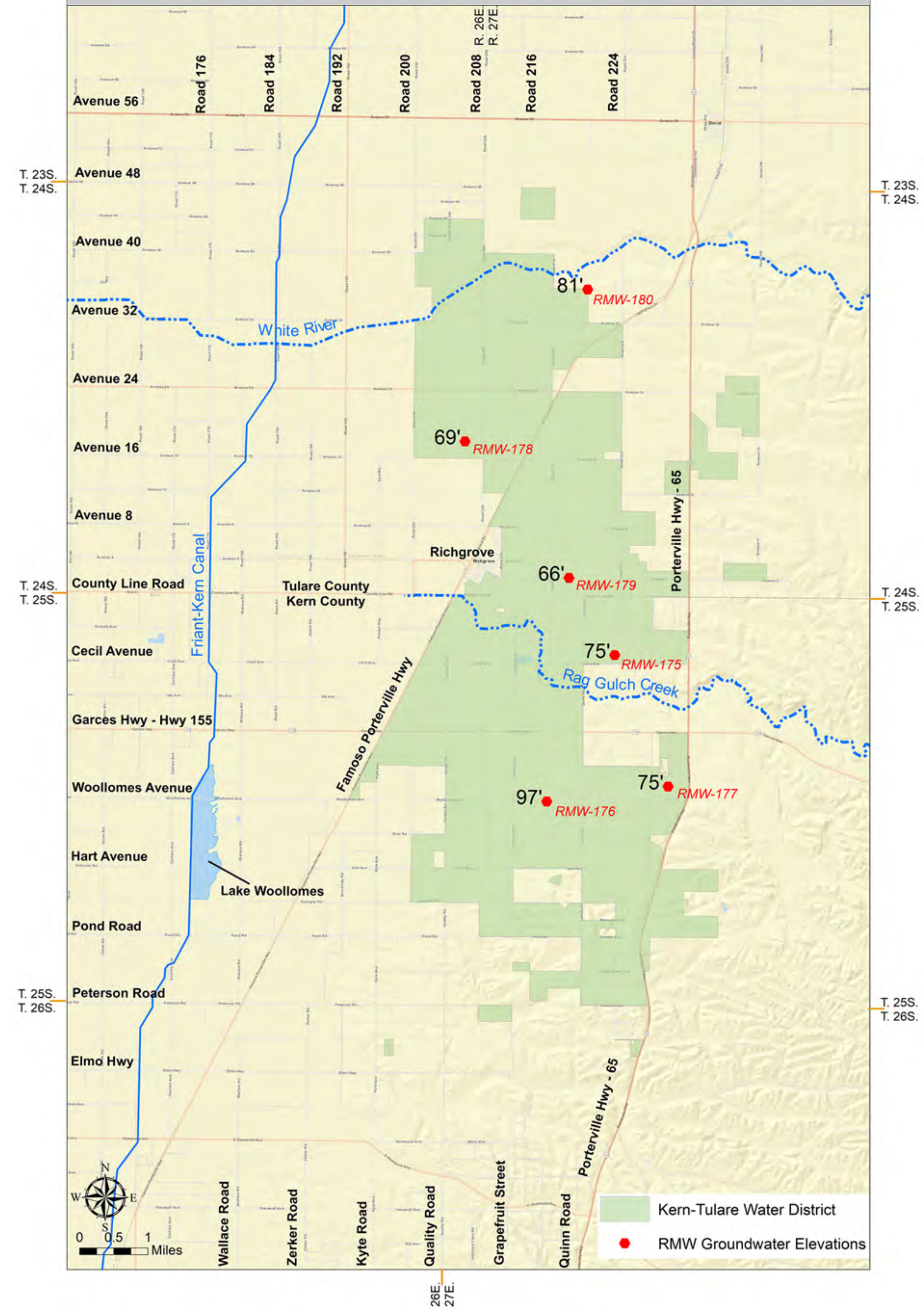



**Figure 9**
**Location of Local Principal Aquifers**

## Fall 2018 Santa Margarita Groundwater Elevations




## Spring 2019 Santa Margarita Groundwater Elevations

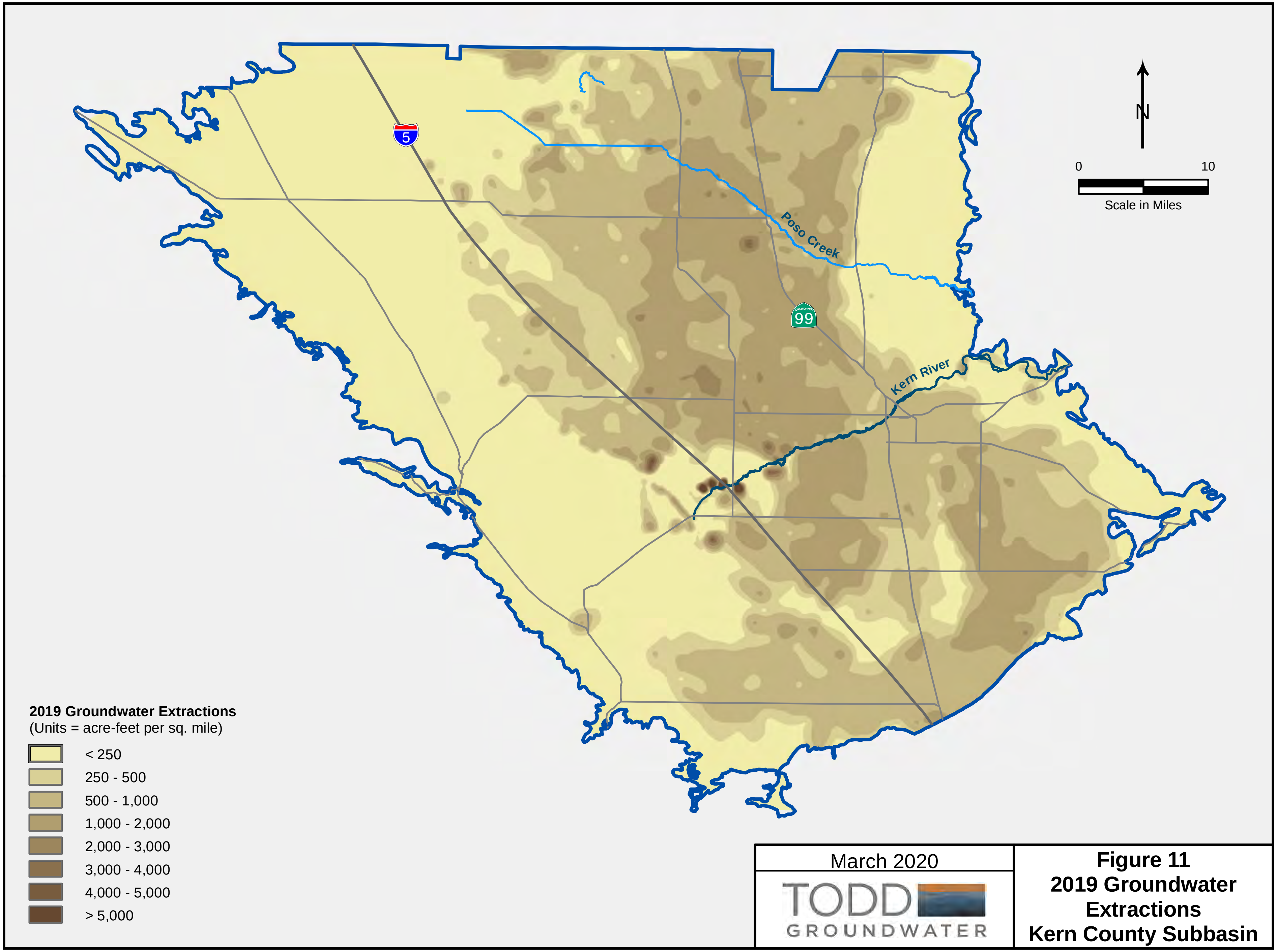



Source:
Kern-Tulare Water District (KTWD),
March 2020.

**Figure 10**
**Groundwater Elevations**
**Local Principal Aquifer**
**Santa Margarita Formation**

March 2020

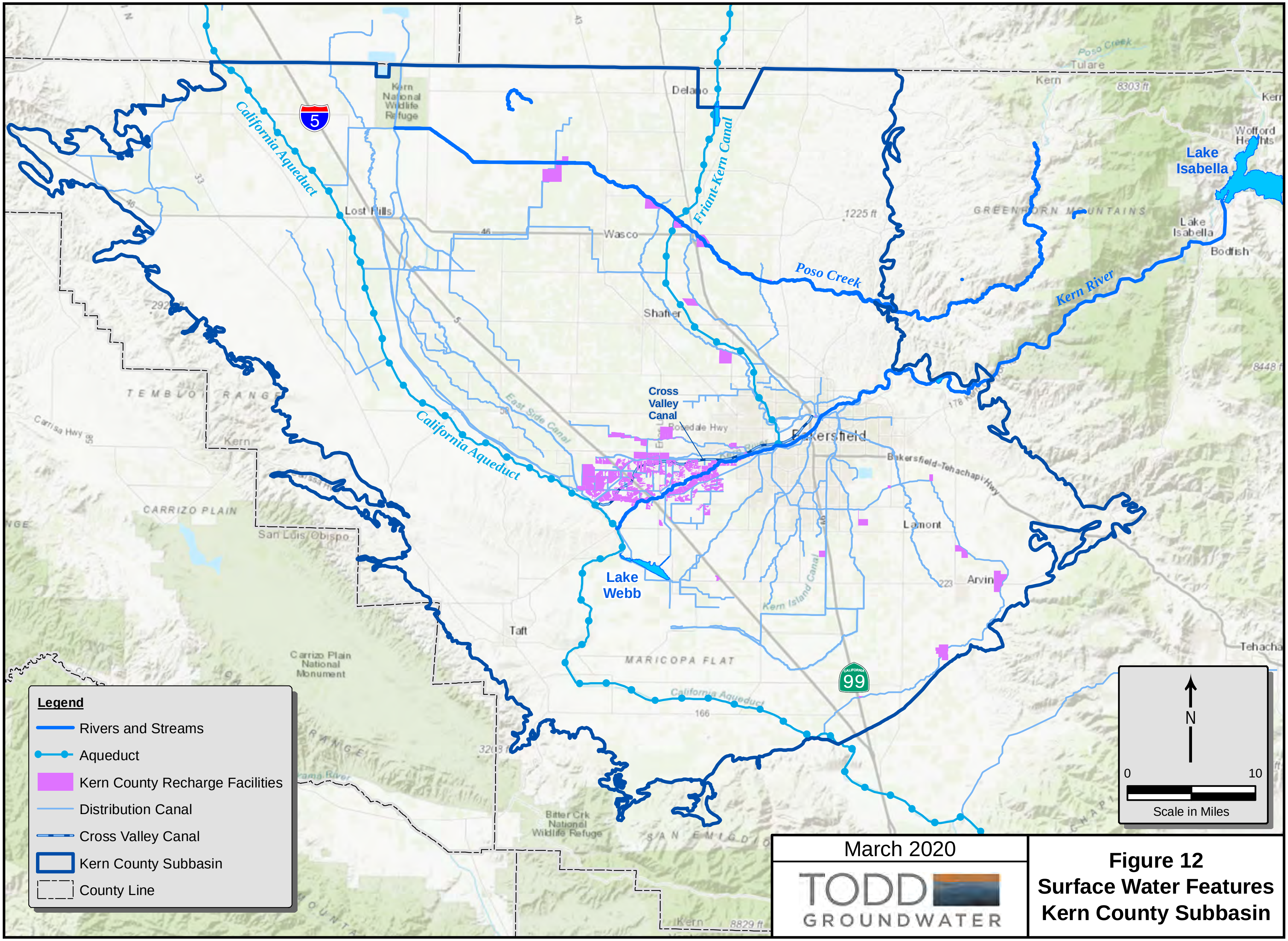
TODD GROUNDWATER




March 2020

TODD GROUNDWATER

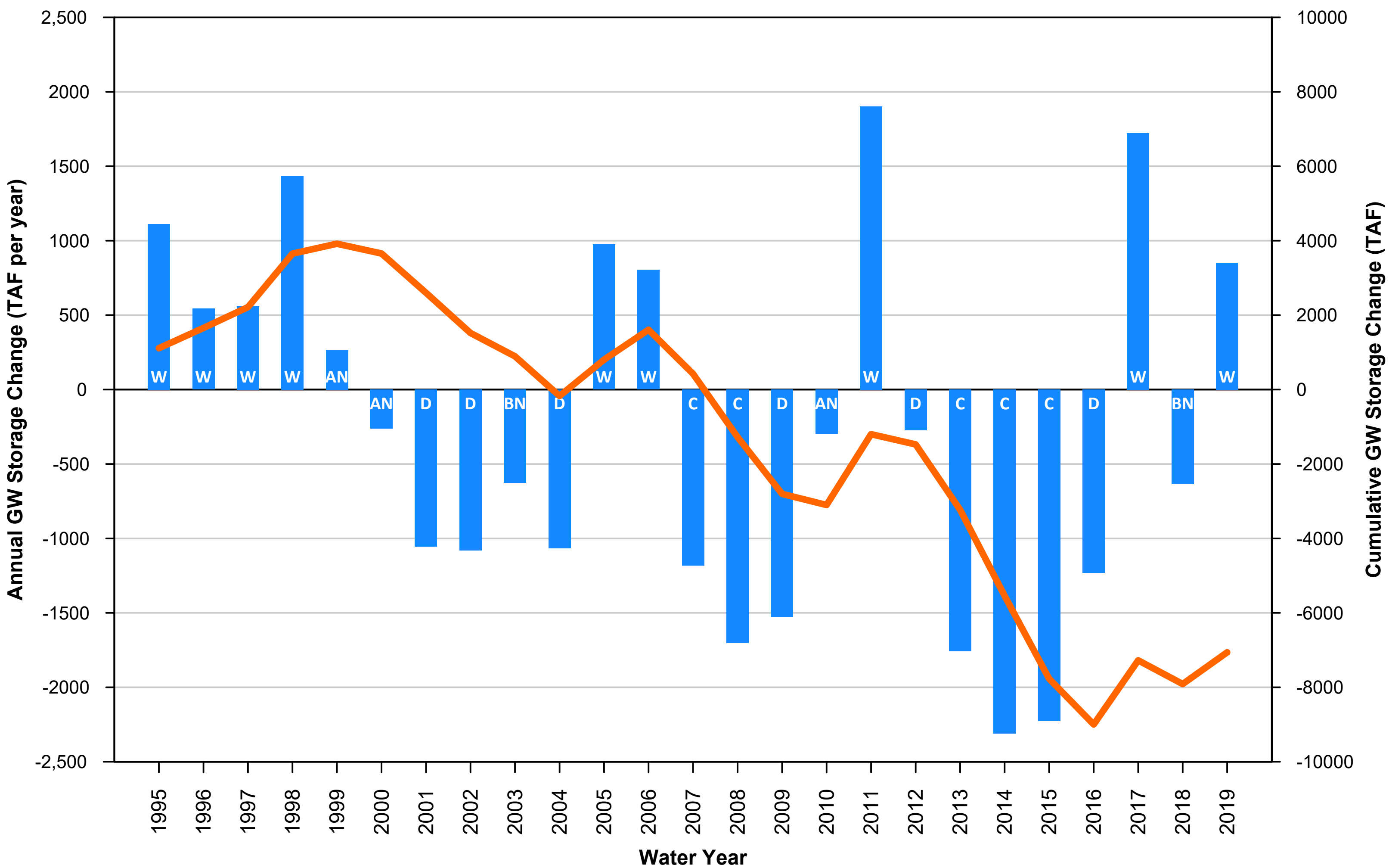
**Figure 11**
**2019 Groundwater Extractions**
**Kern County Subbasin**




March 2020

TODD GROUNDWATER

**Figure 12**
**Surface Water Features**
**Kern County Subbasin**




Annual Change in Groundwater Storage (TAF)

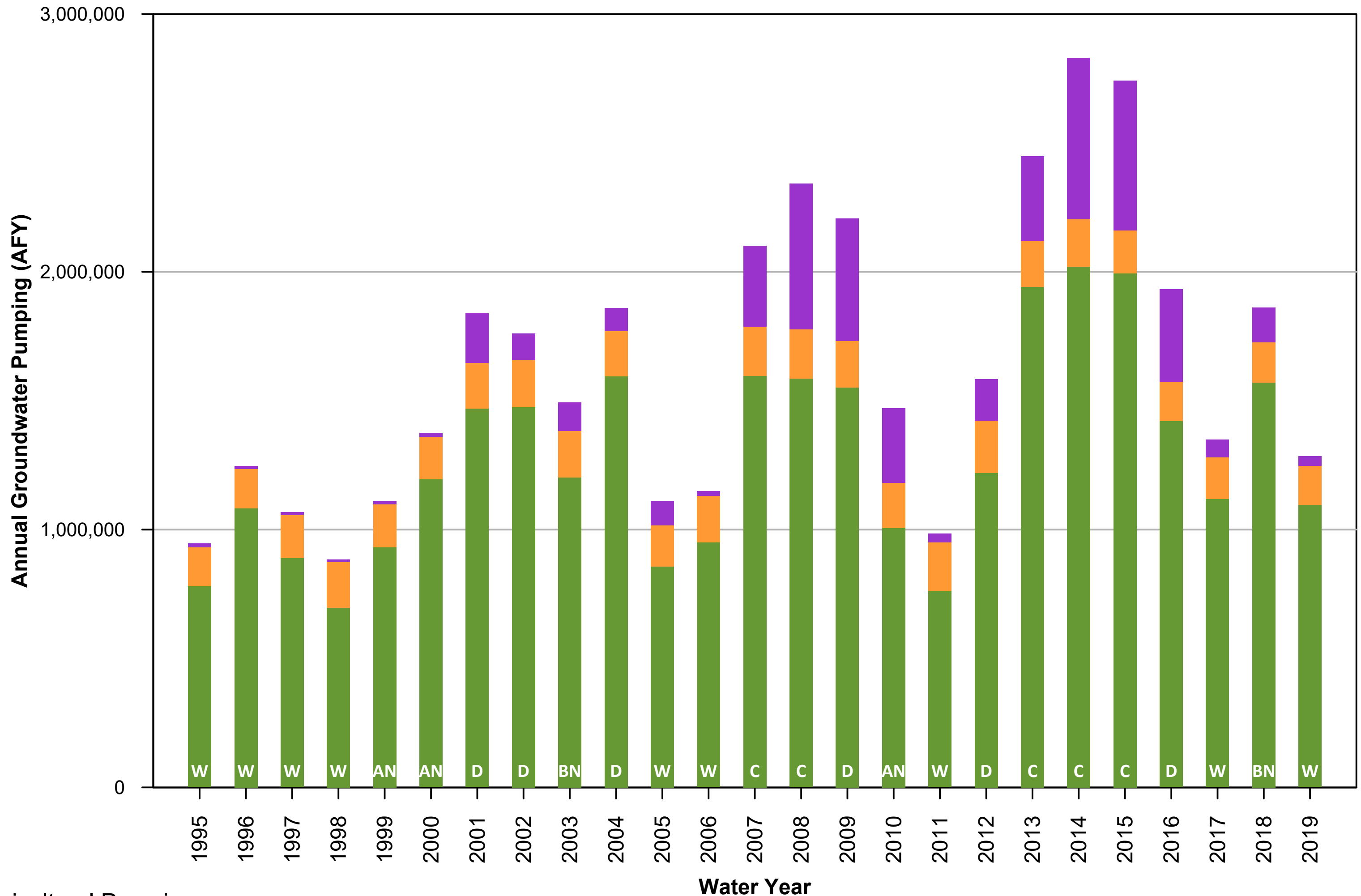
Cumulative Change in Groundwater Storage (TAF)

W Wet
AN Above Normal
BN Below Normal
D Dry
C Critically Dry

March 2020

TODD GROUNDWATER

**Figure 13**
**Change in Groundwater in Storage**
**Kern County Subbasin**
**WY 1995 – WY 2019**




Agricultural Pumping
Urban Pumping
GW Banking, Exchanges, and "Pump-ins"

W Wet
AN Above Normal
BN Below Normal
D Dry
C Critically Dry

March 2020

TODD GROUNDWATER

**Figure 14**
**Groundwater Extractions**
WY 1995 – WY 2019

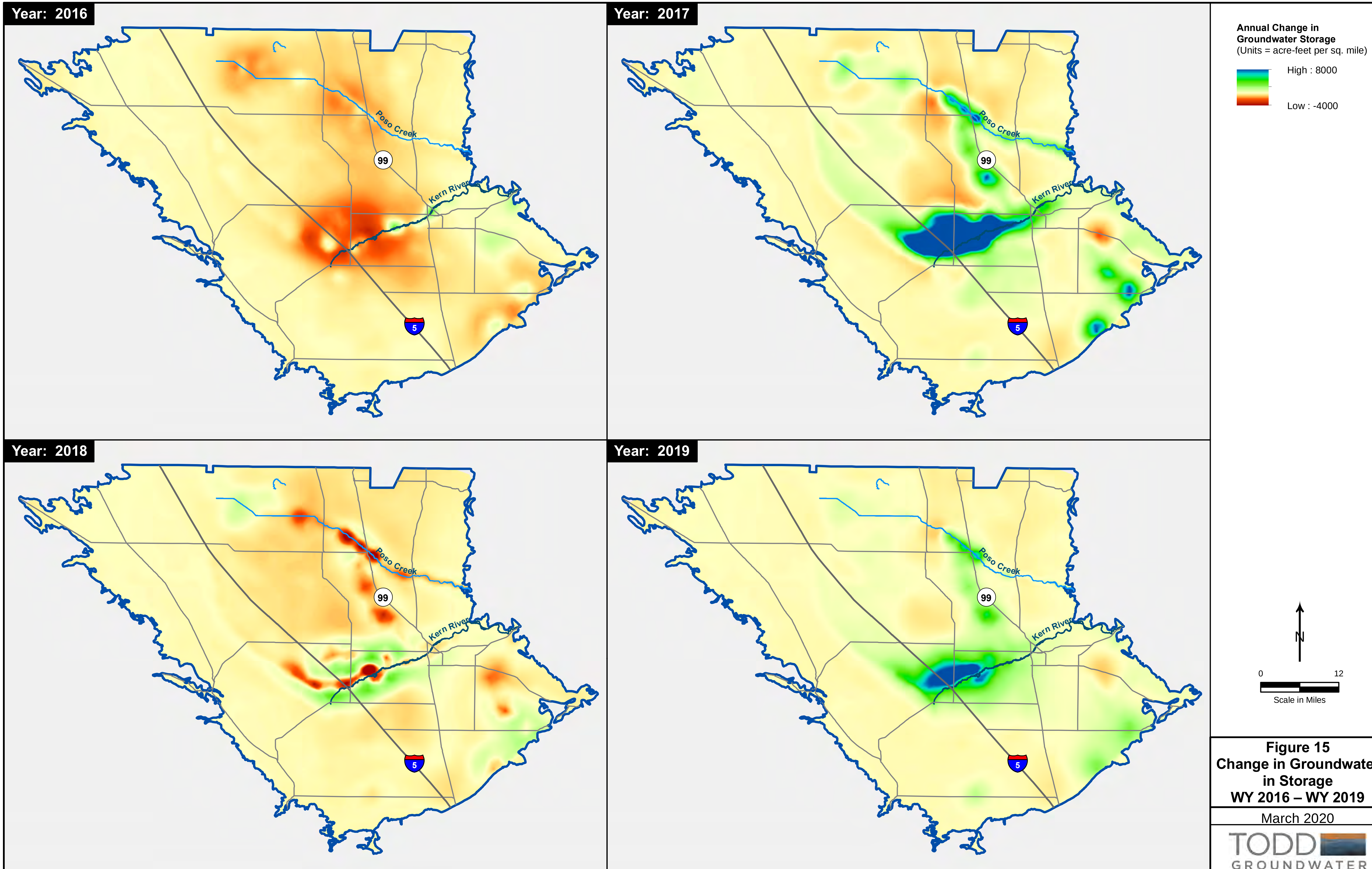



**Figure 15**
**Change in Groundwater in Storage**
**WY 2016 – WY 2019**

March 2020

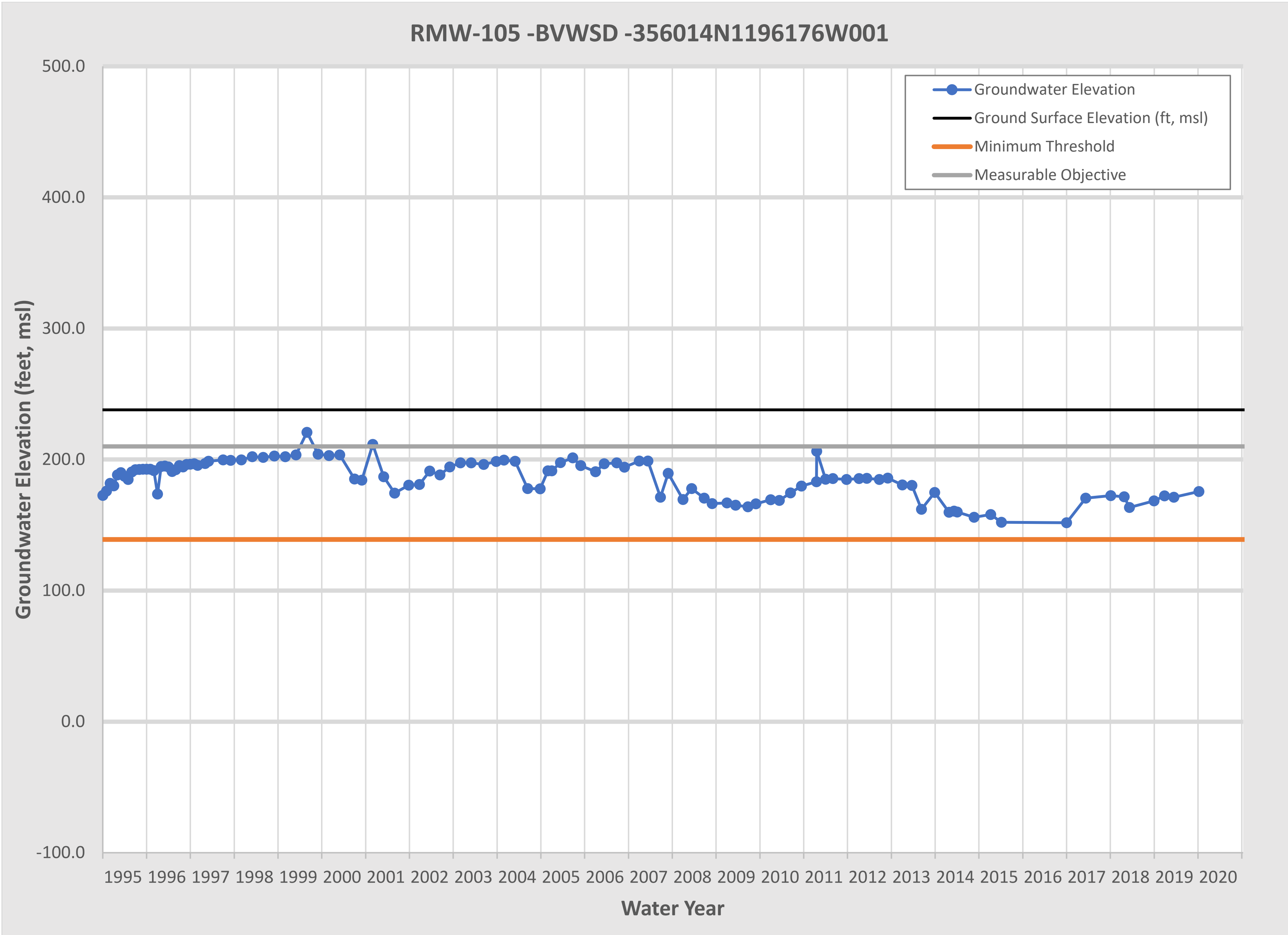
TODD GROUNDWATER

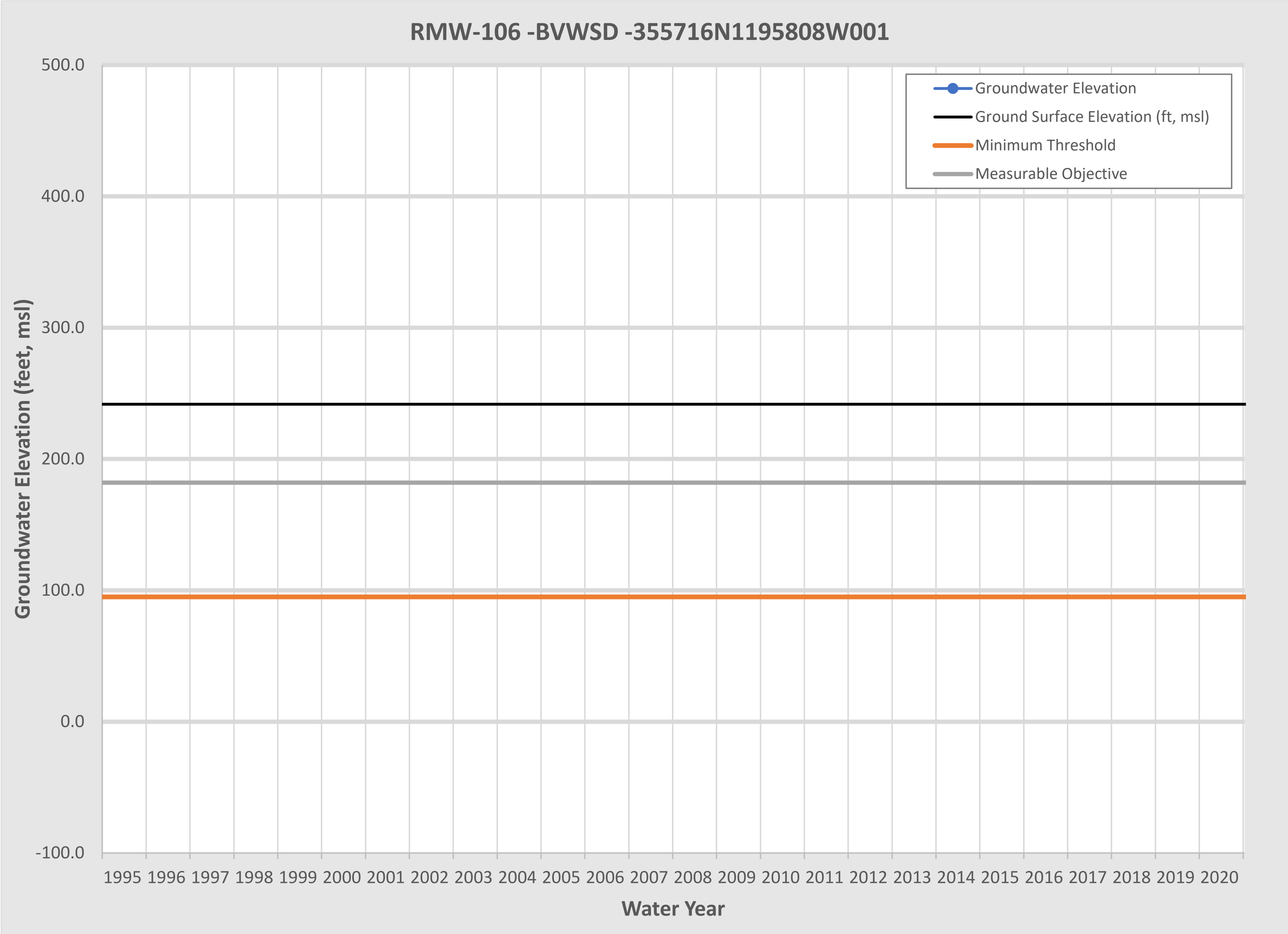
# APPENDIX A

## Hydrographs of Groundwater Elevations

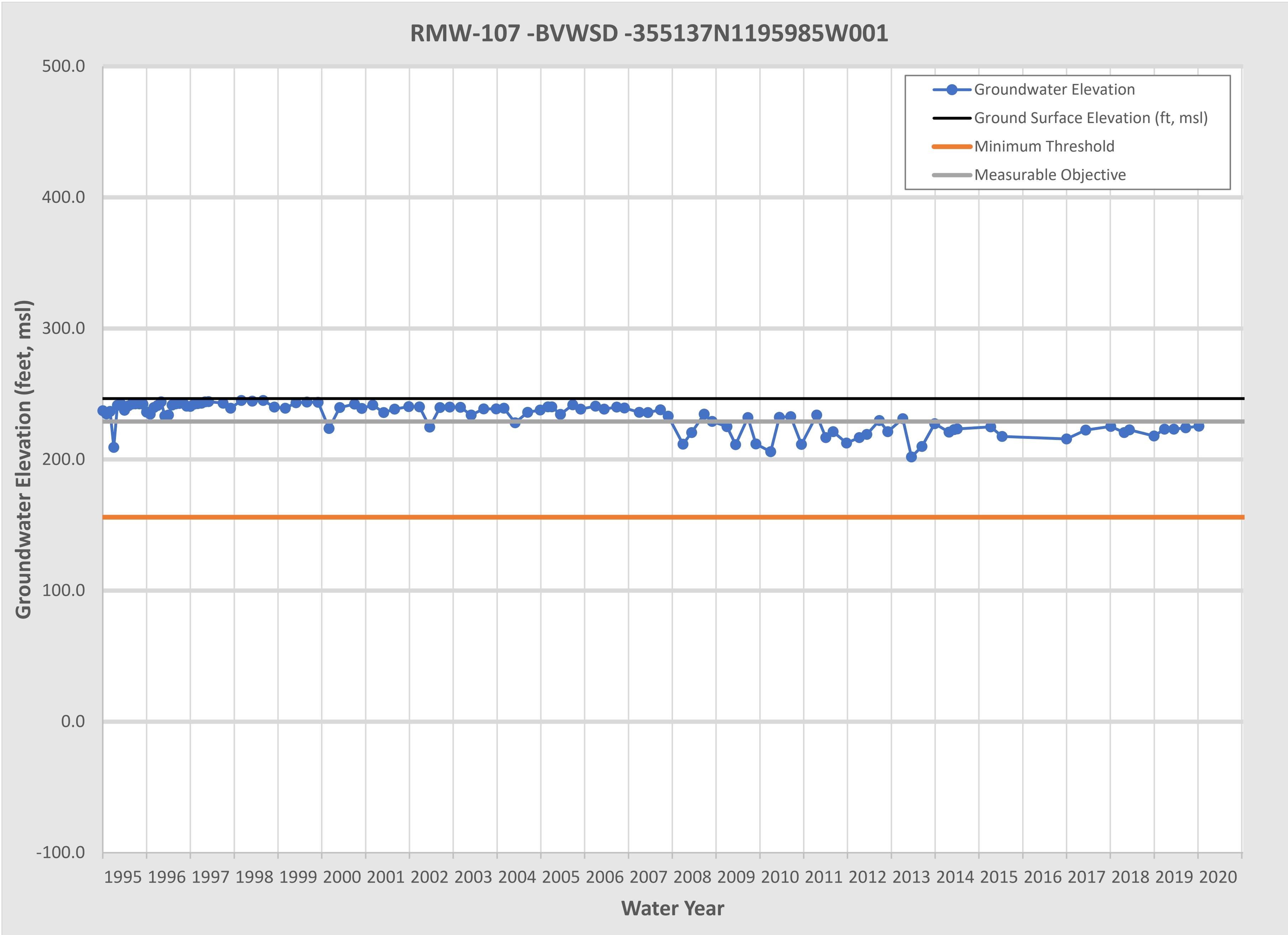
## GSP Monitoring Network Wells

## Kern County Subbasin

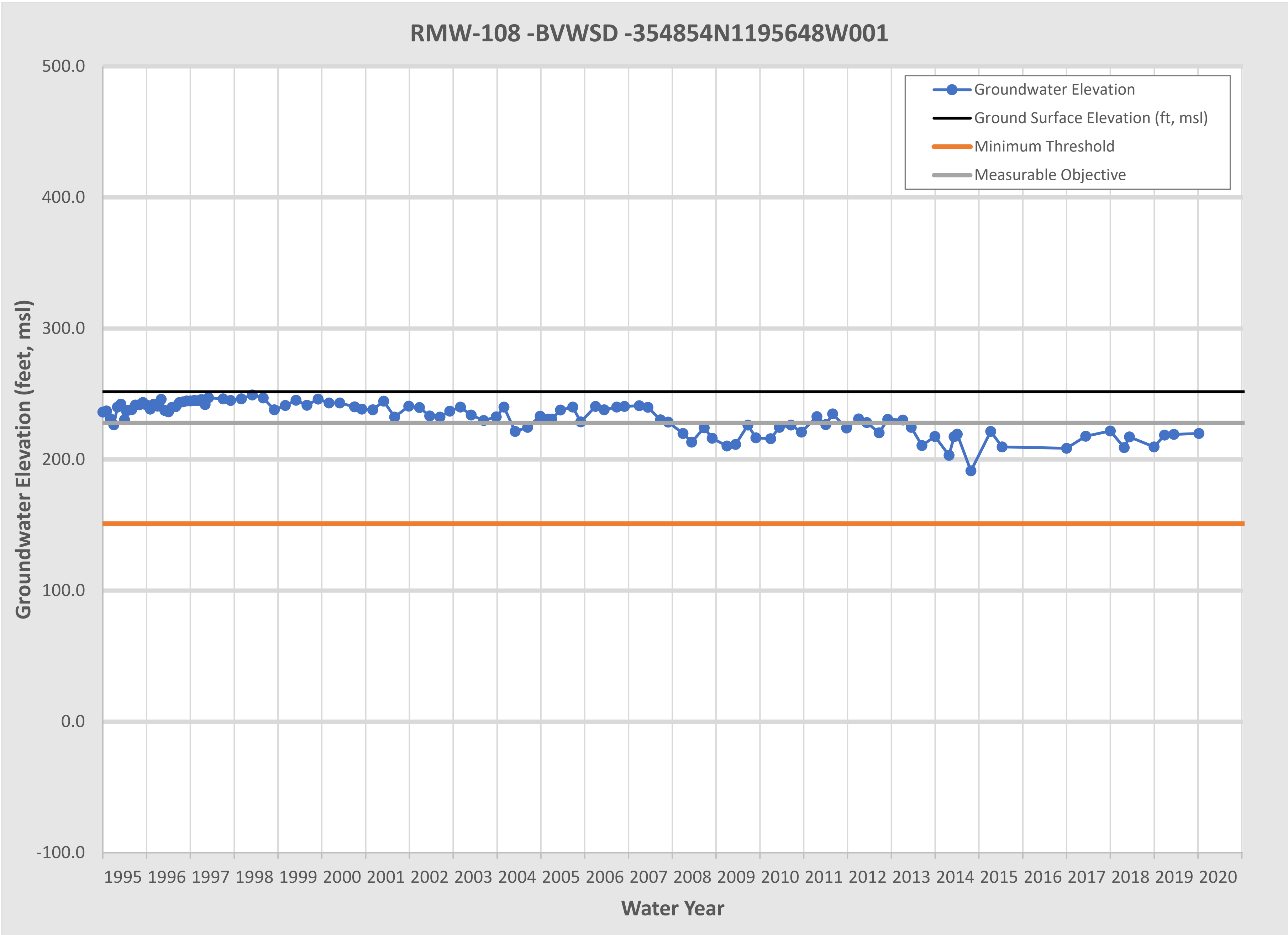

RMW-105 -BVWSD -356014N1196176W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

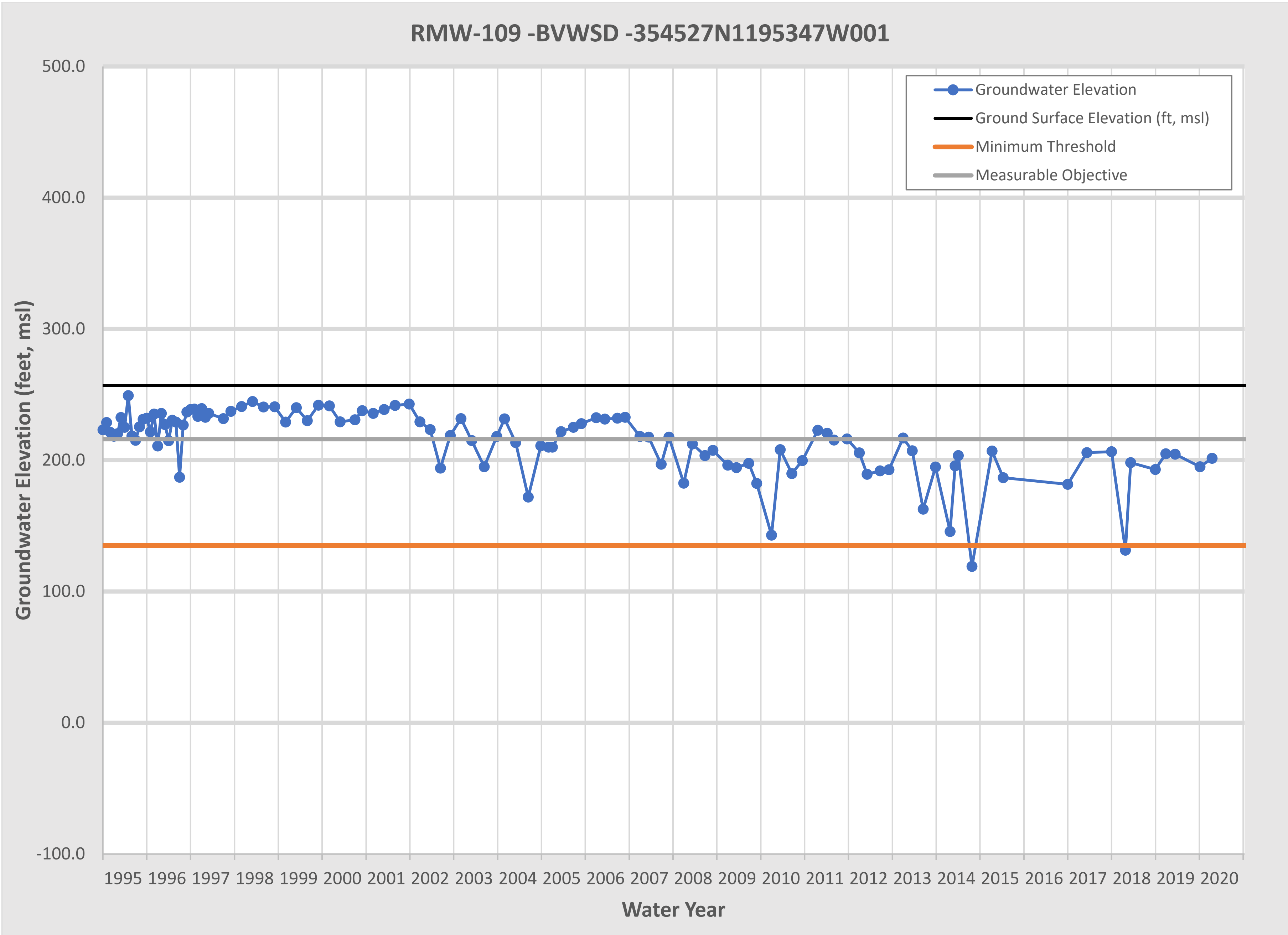


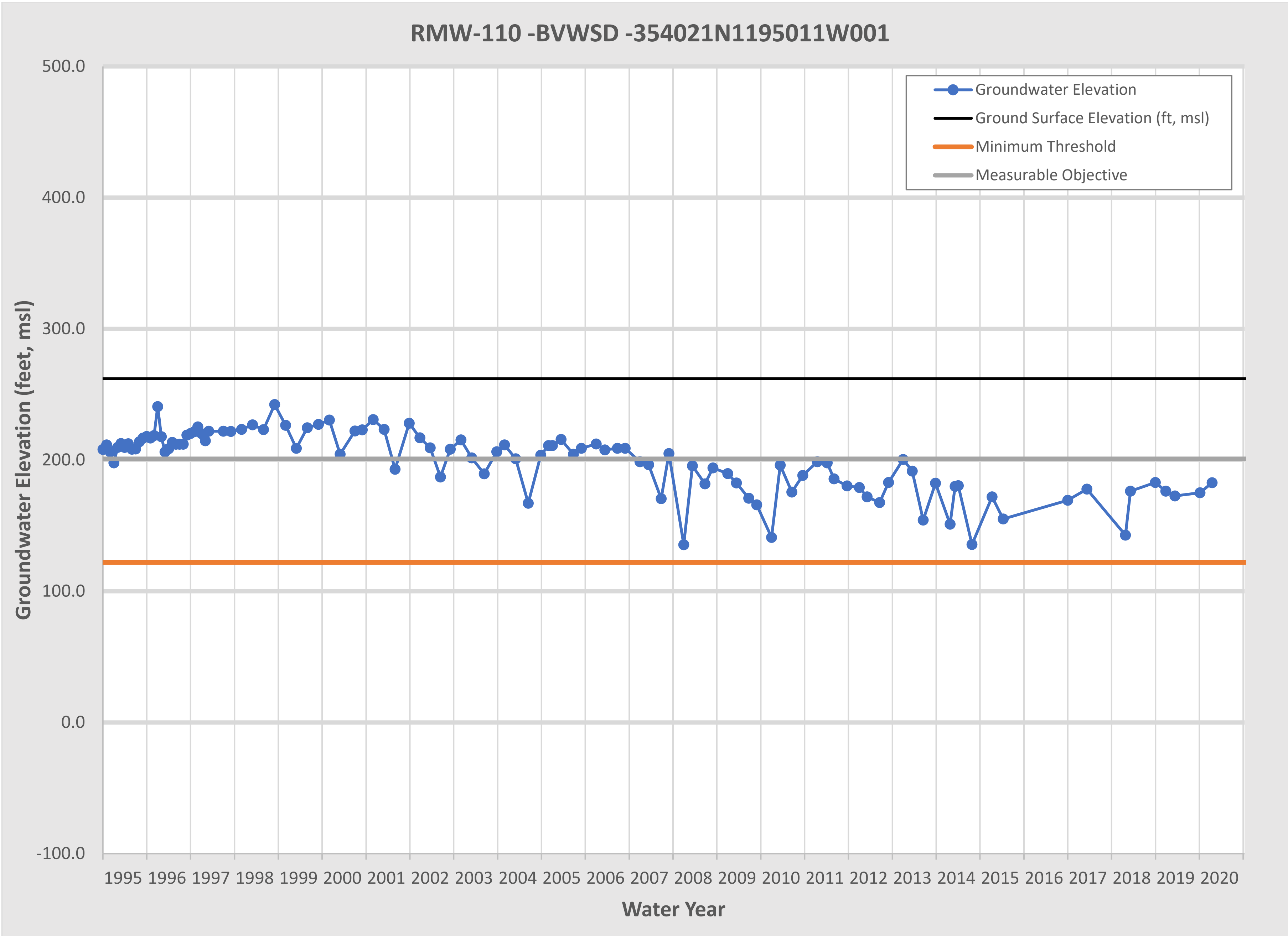
RMW-106 -BVWSD -355716N1195808W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



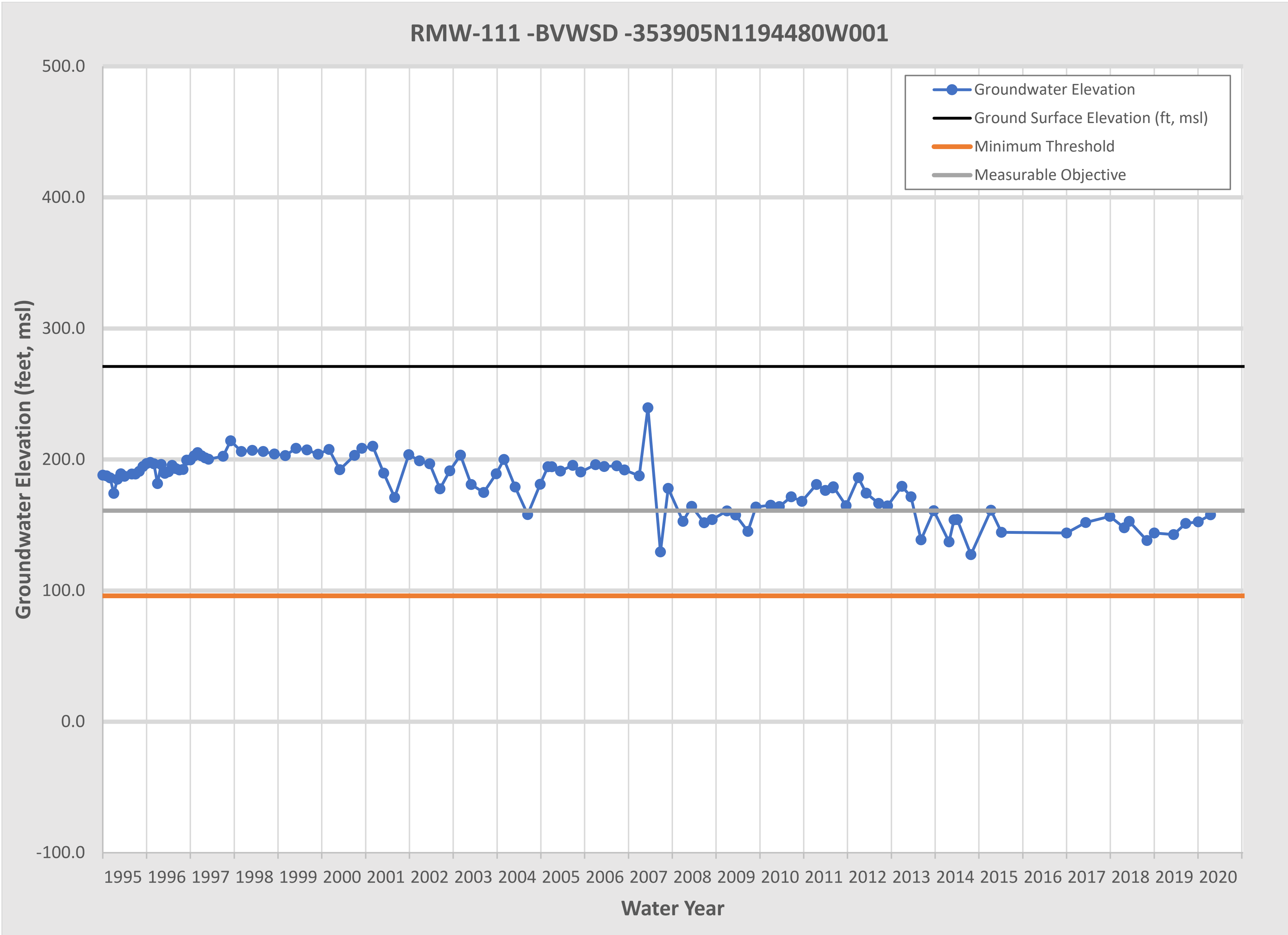
RMW-107 -BVWSD -355137N1195985W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-108 -BVWSD -354854N1195648W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

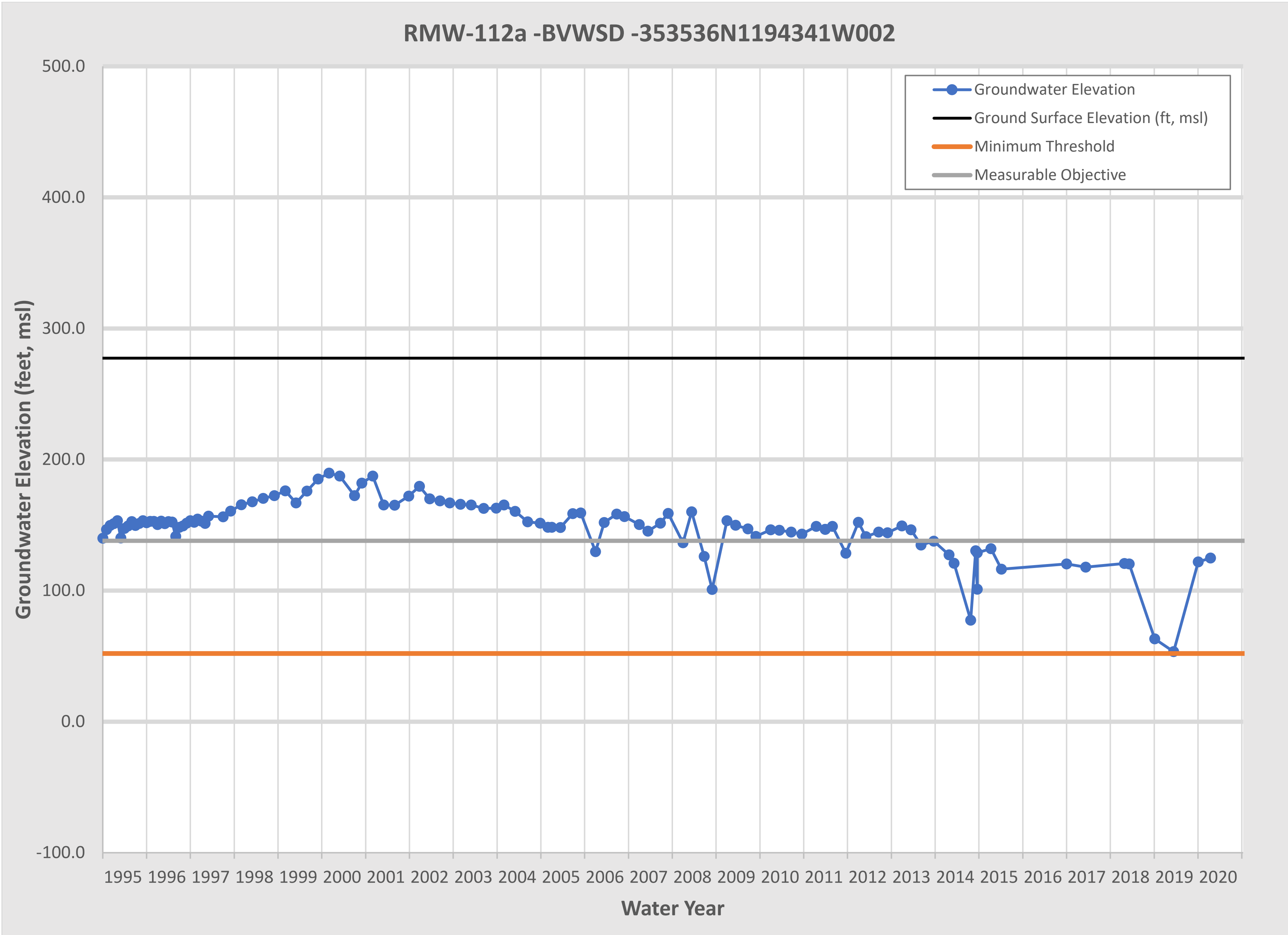

RMW-109 -BVWSD -354527N1195347W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



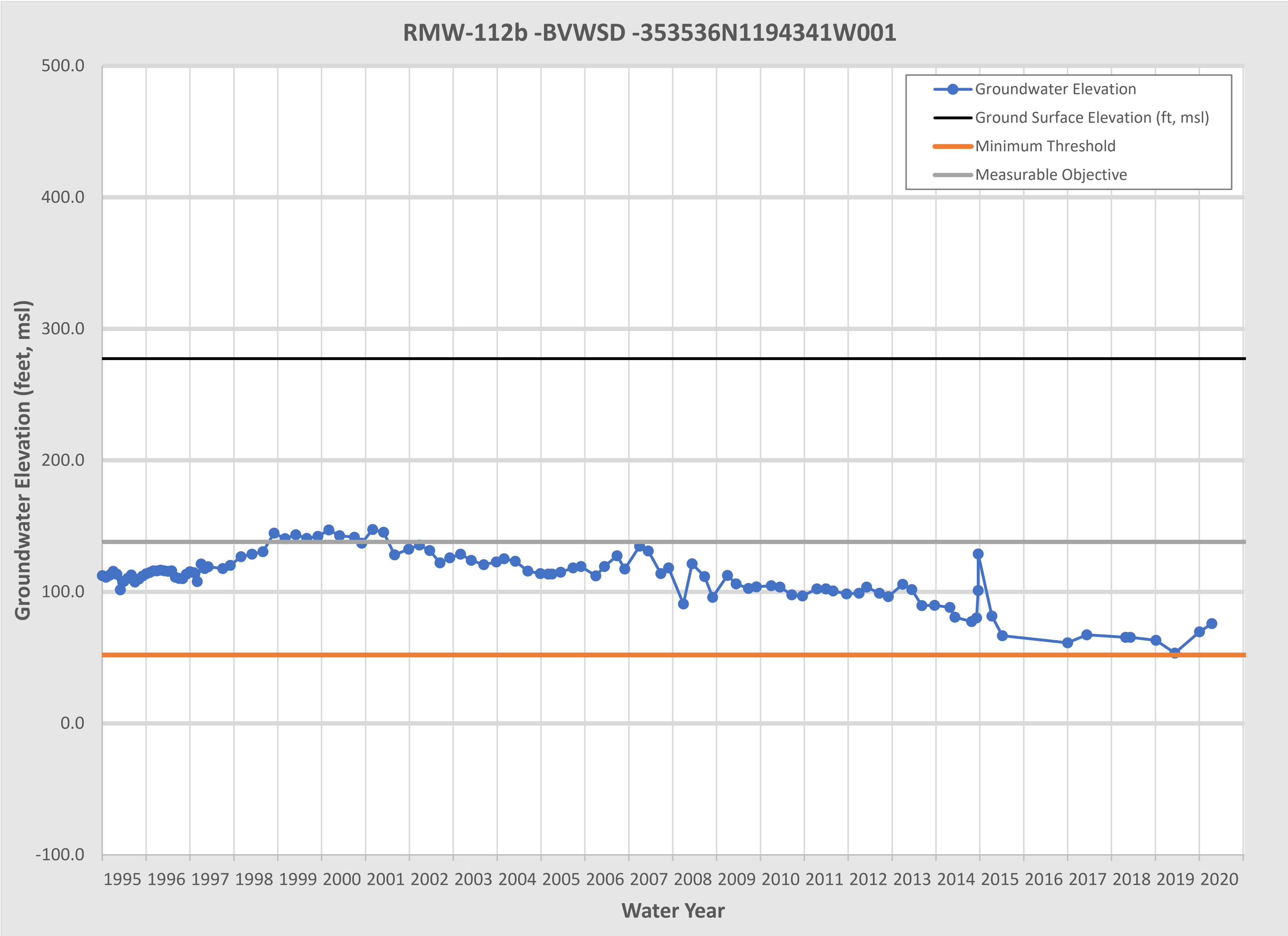
RMW-110 -BVWSD -354021N1195011W001
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

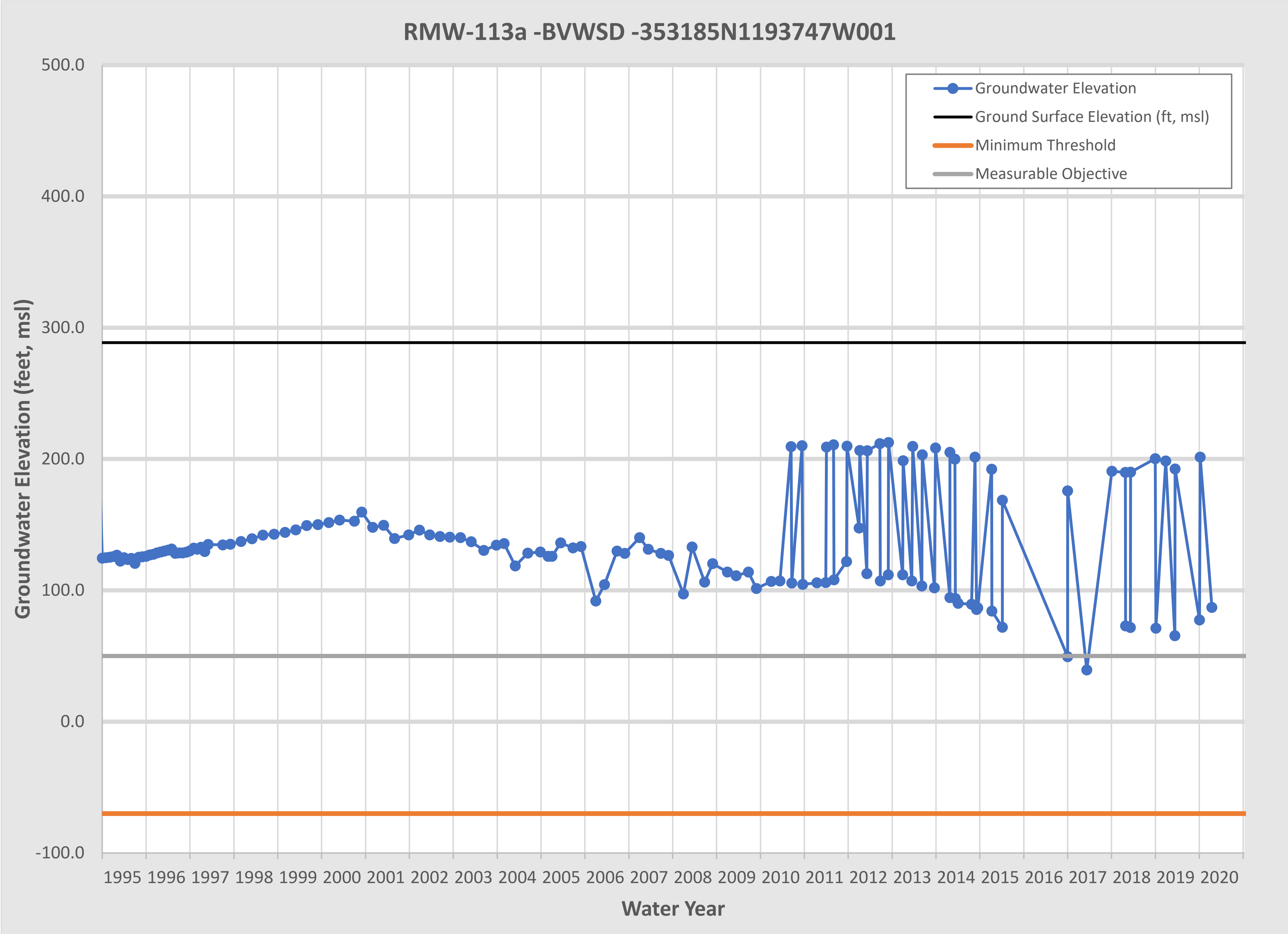


RMW-111 -BVWSD -353905N1194480W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

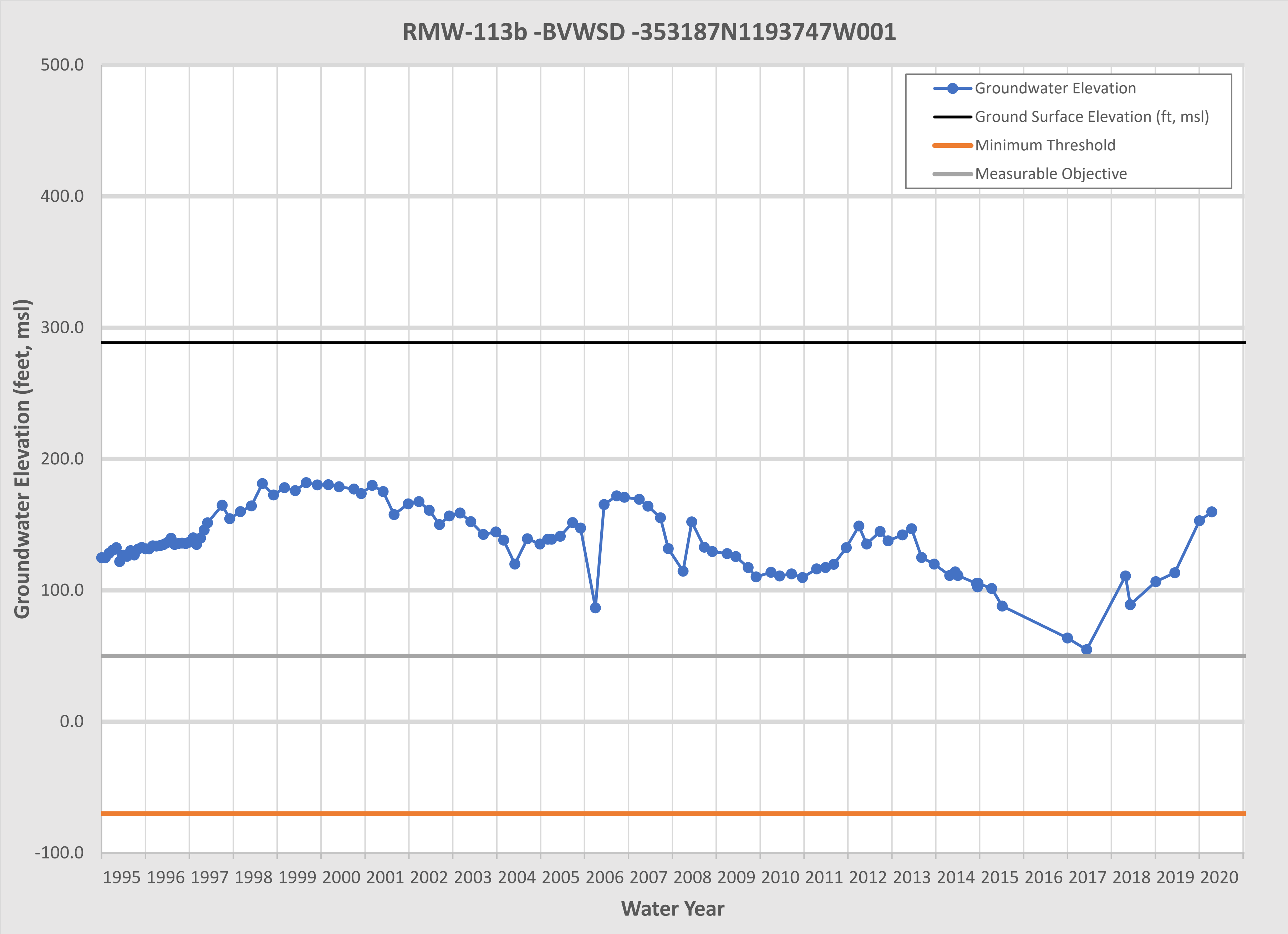


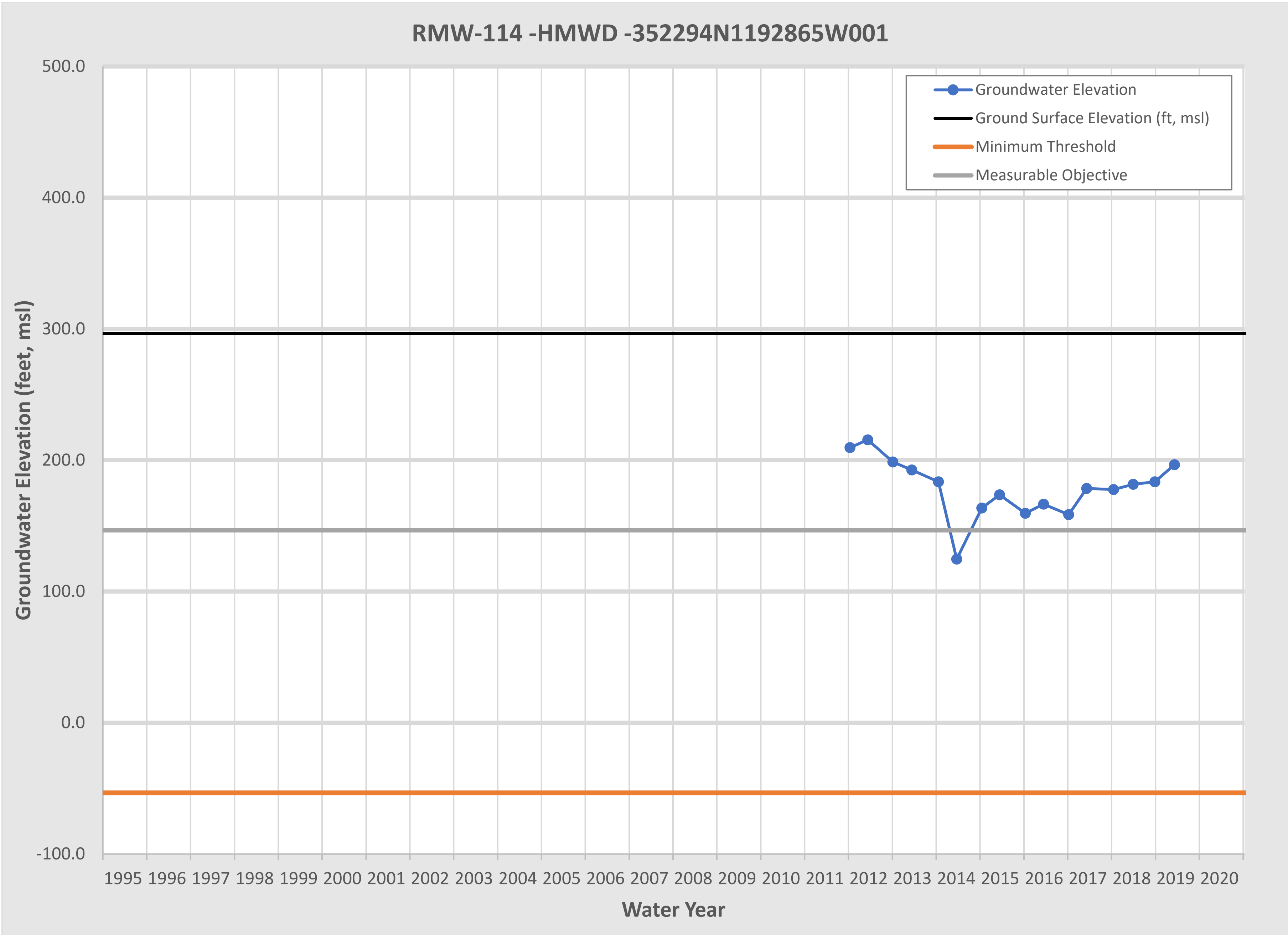
RMW-112a -BVWSD -353536N1194341W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-112b -BVWSD -353536N1194341W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

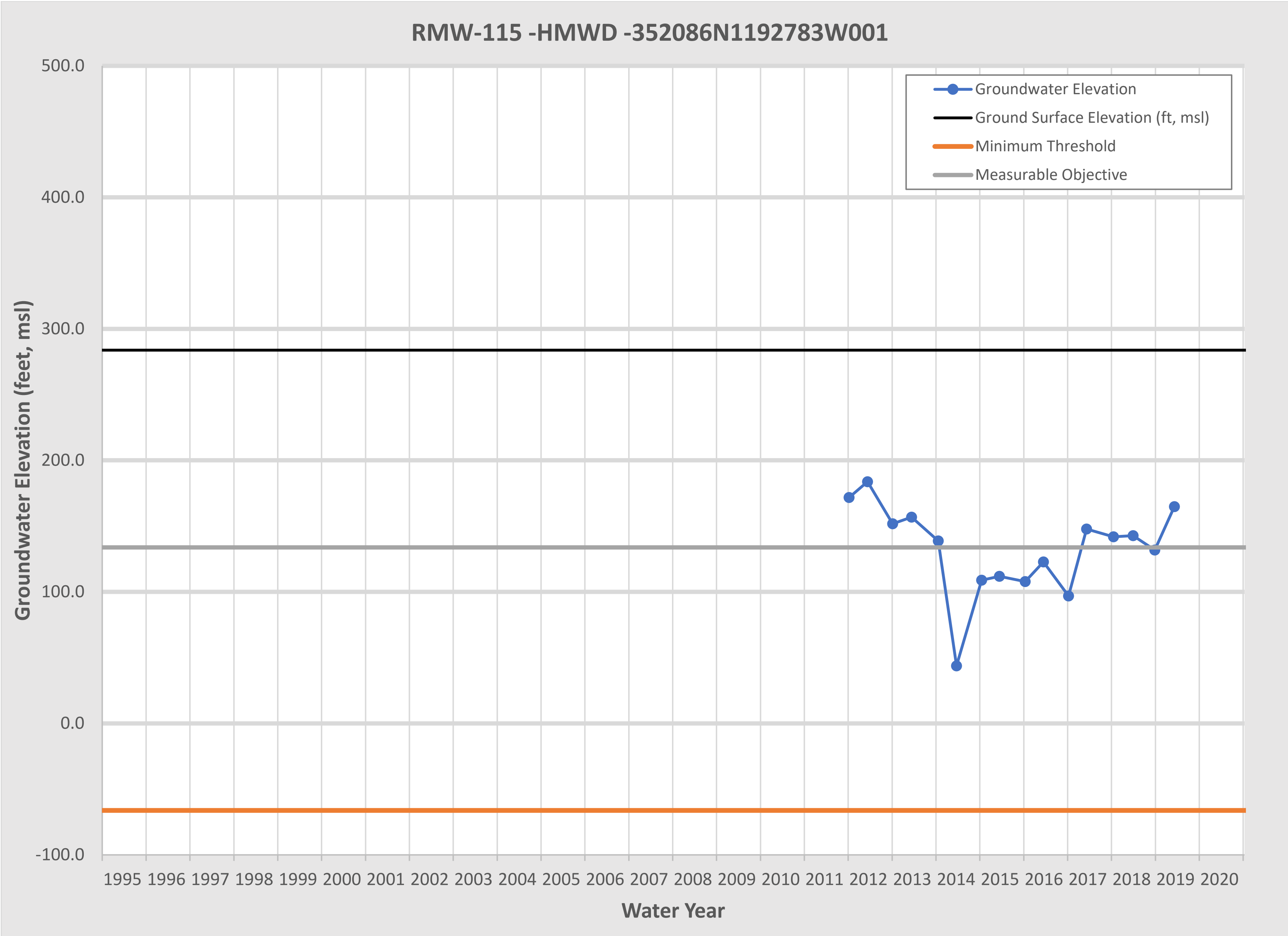


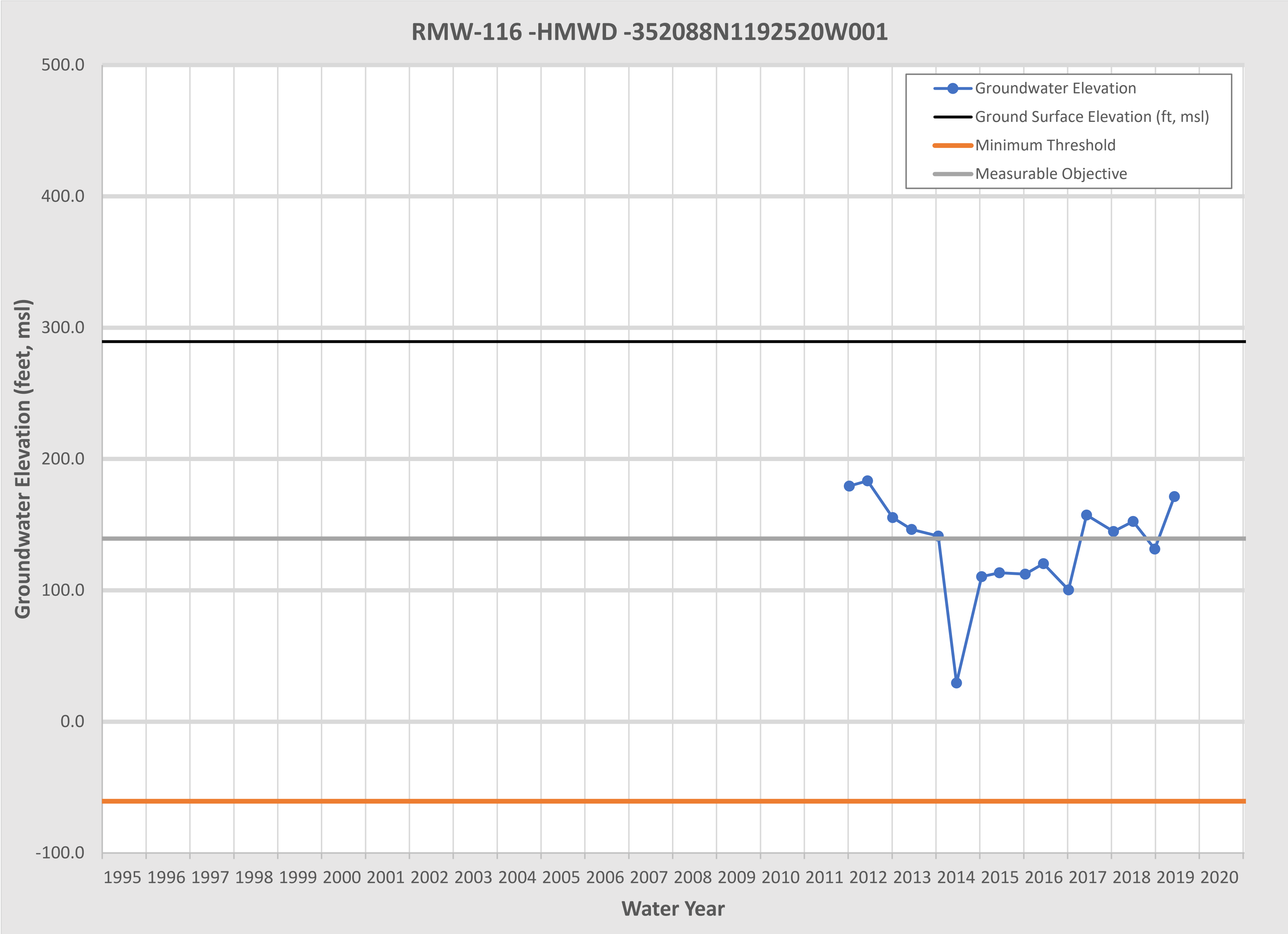
RMW-113a -BVWSD -353185N1193747W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

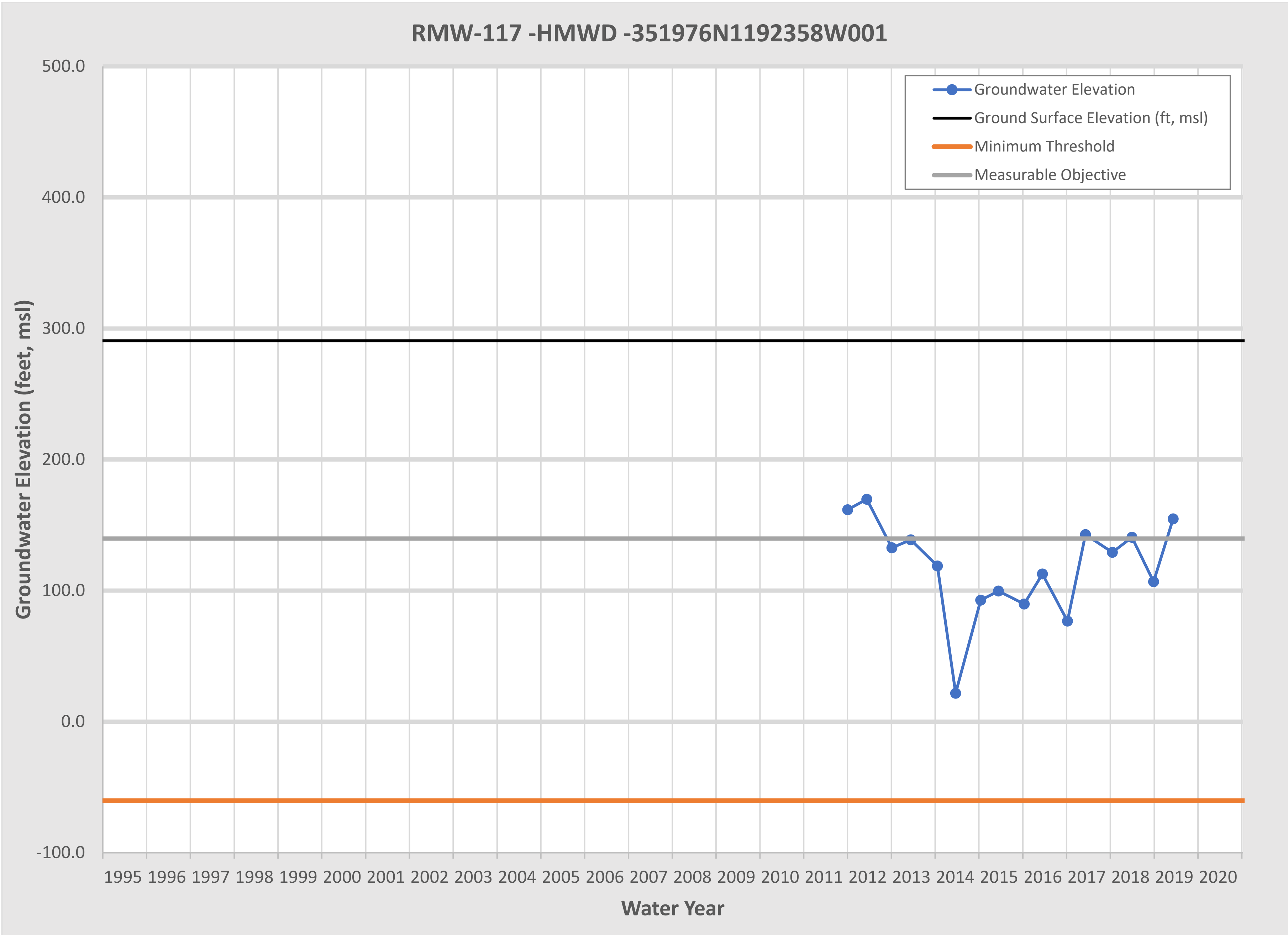

RMW-113b -BVWSD -353187N1193747W001
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

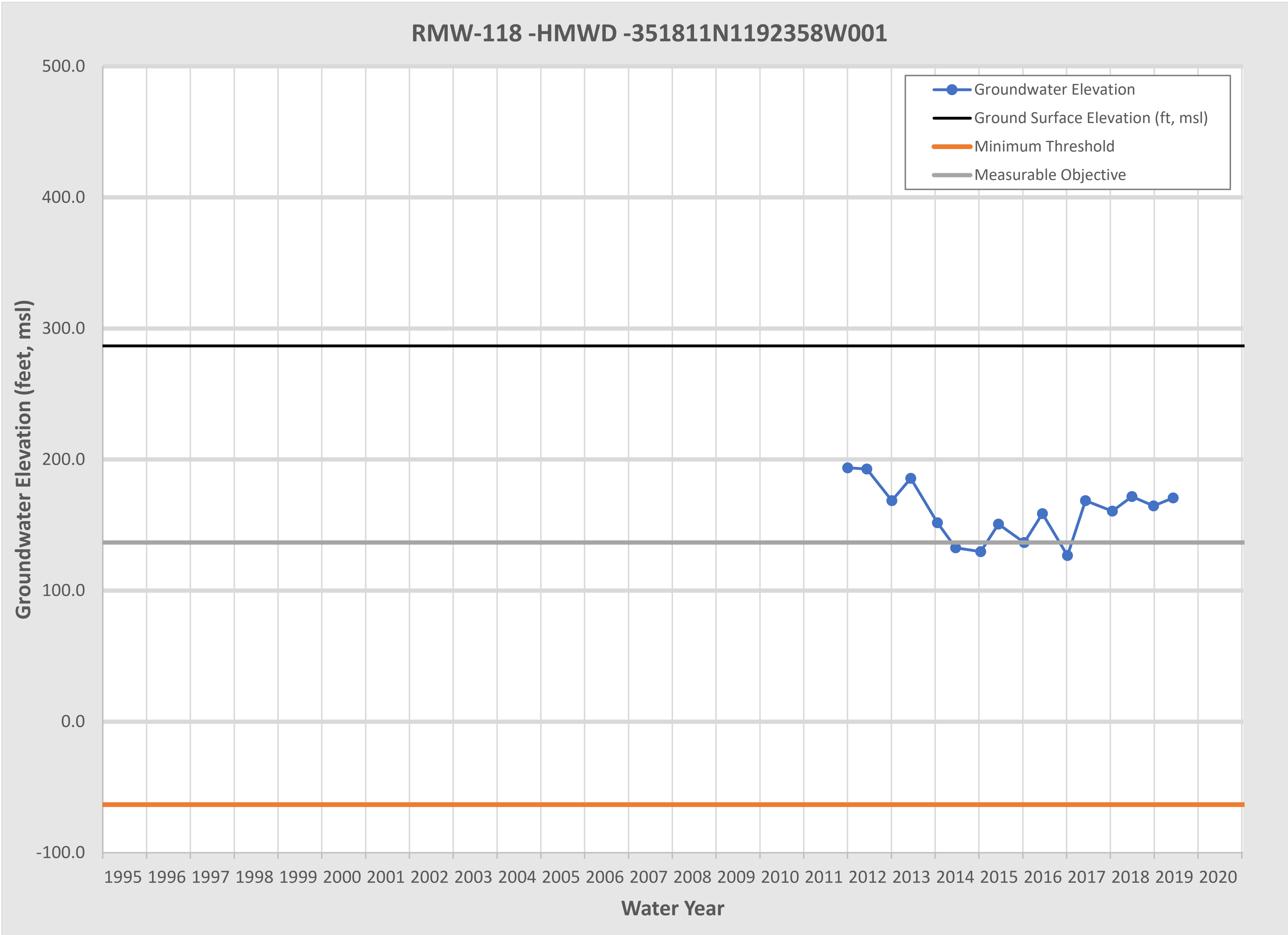


RMW-114 -HMWD -352294N1192865W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

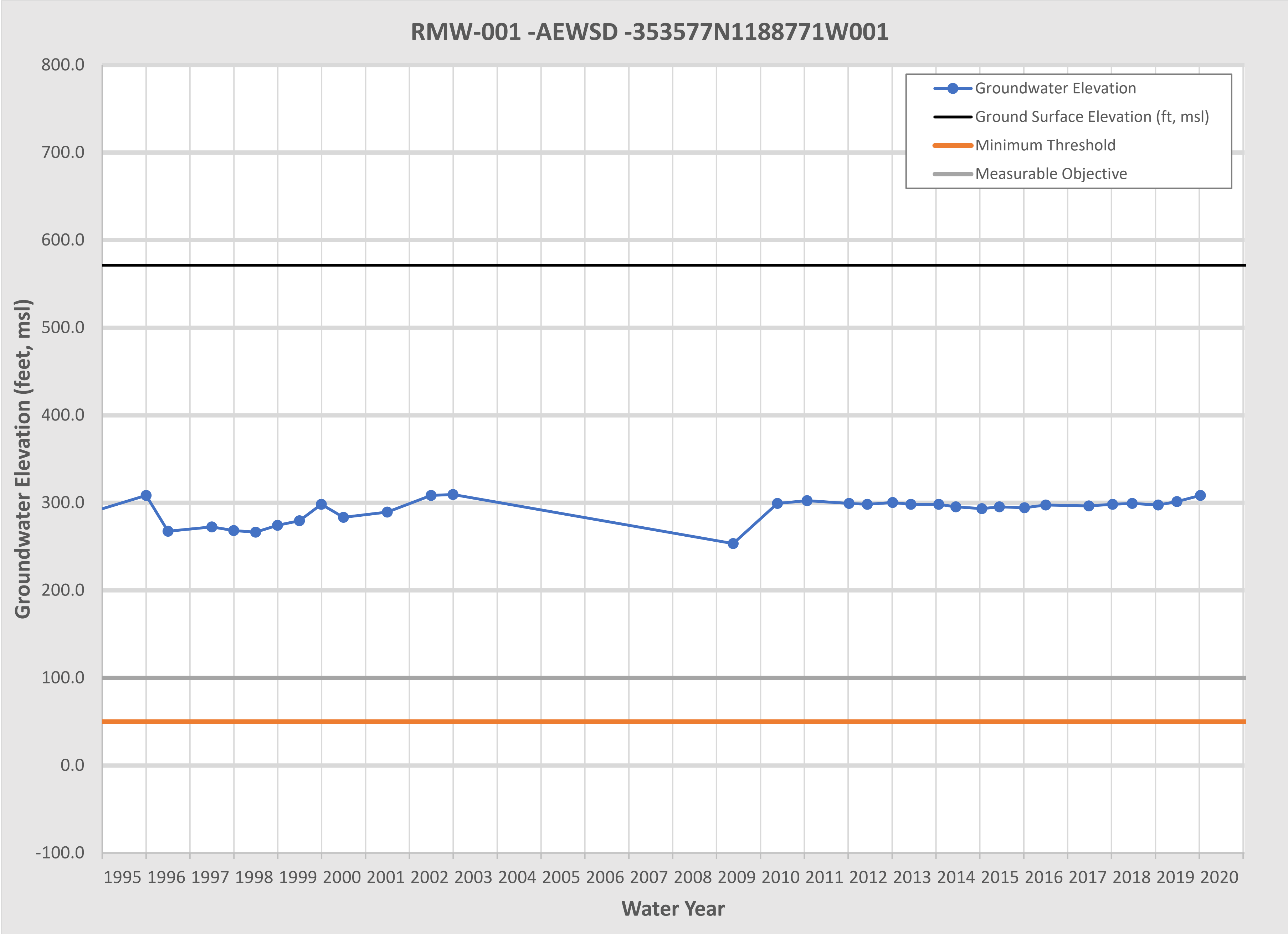

RMW-115 -HMWD -352086N1192783W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-116 -HMWD -352088N1192520W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

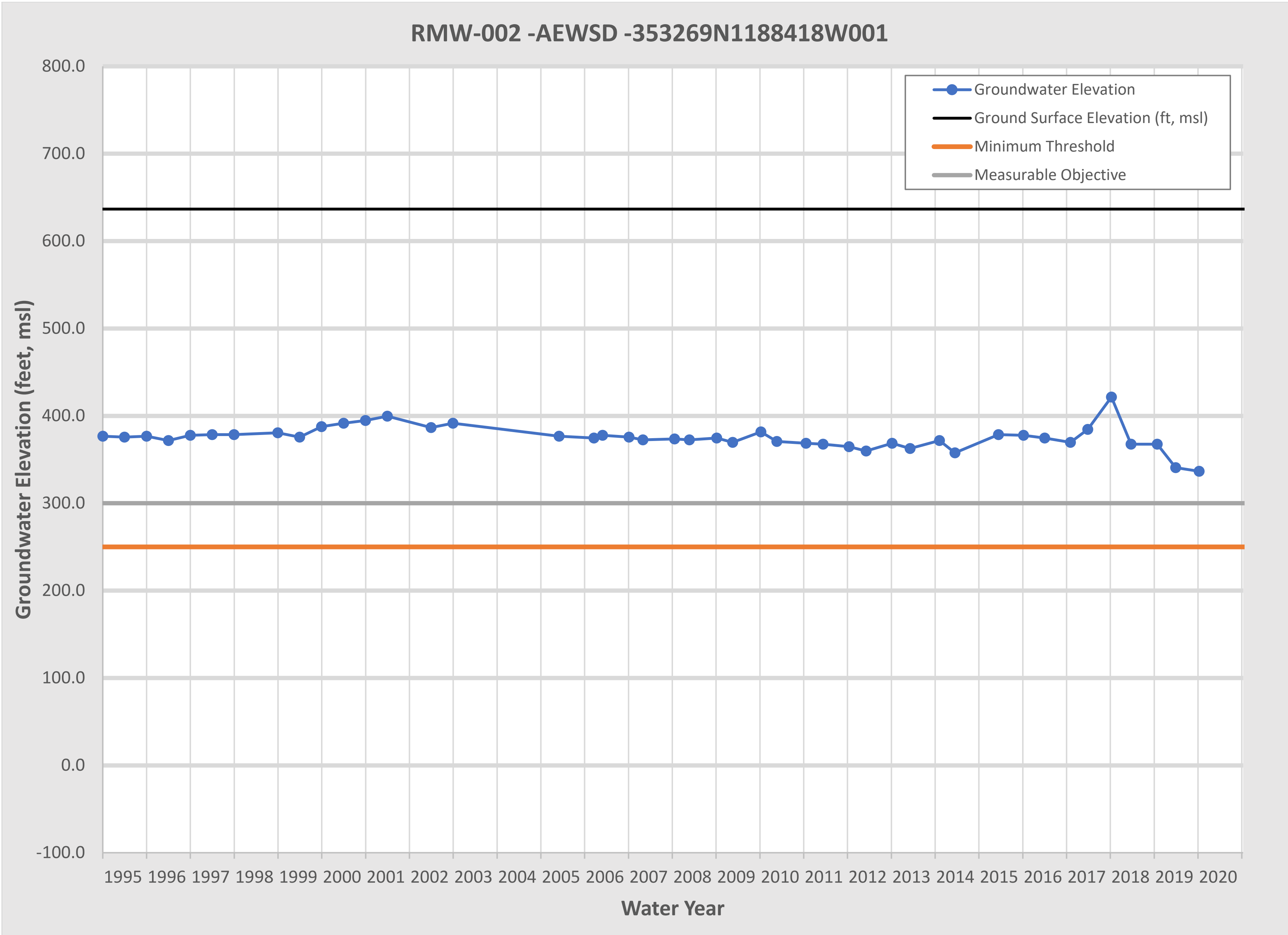

RMW-117 -HMWD -351976N1192358W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

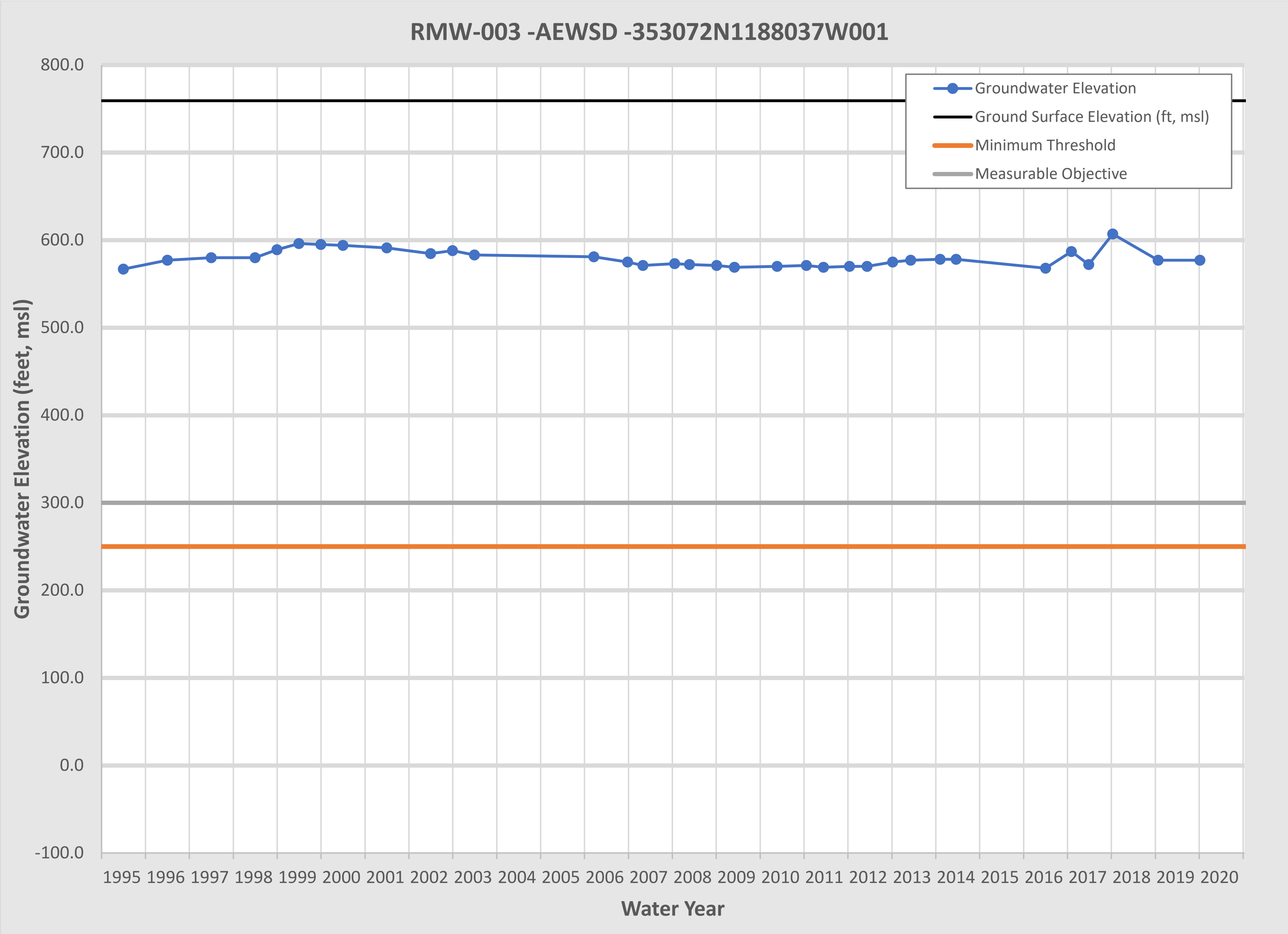


RMW-118 -HMWD -351811N1192358W001
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

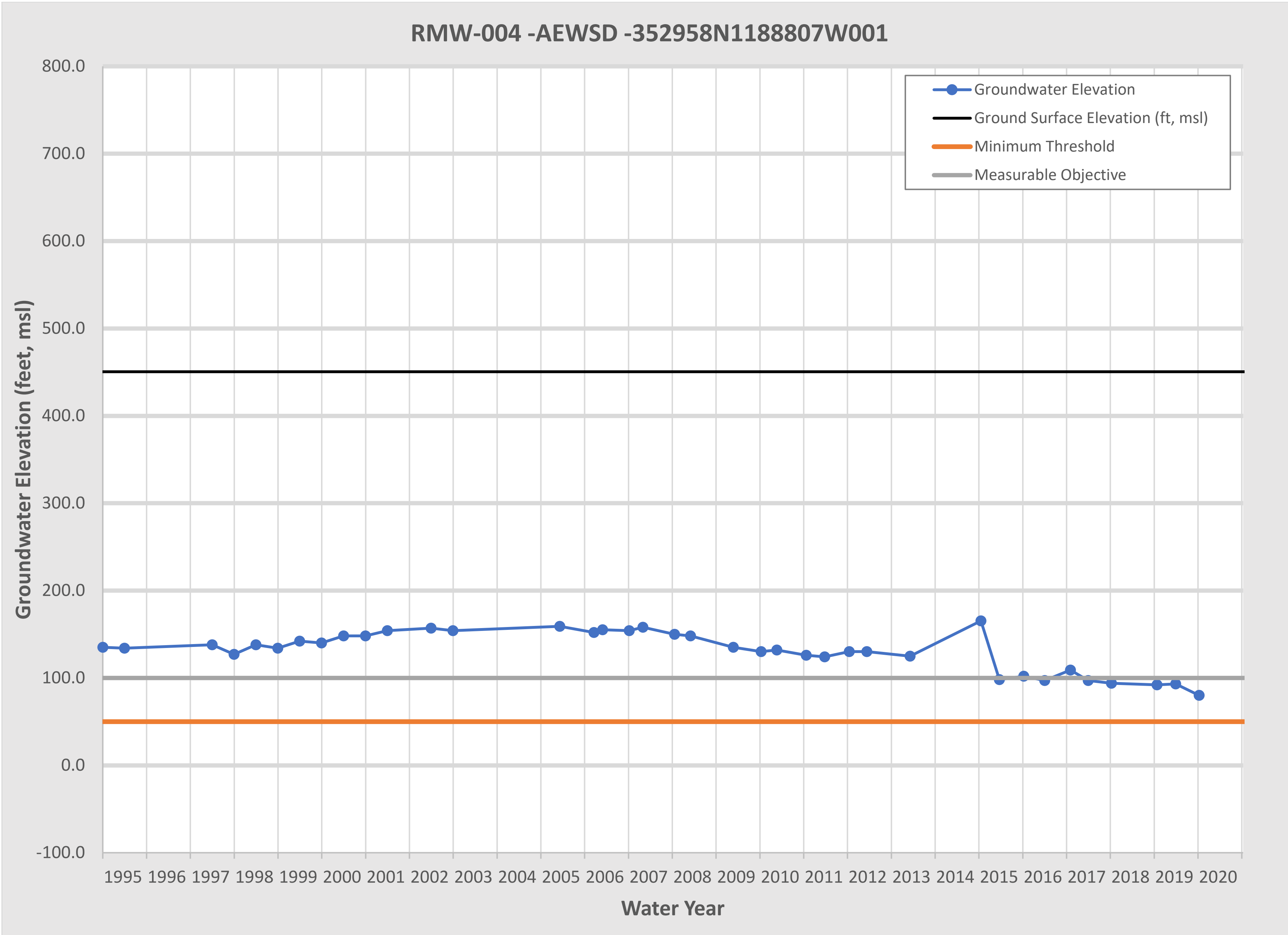


RMW-001 -AEWSD -353577N1188771W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

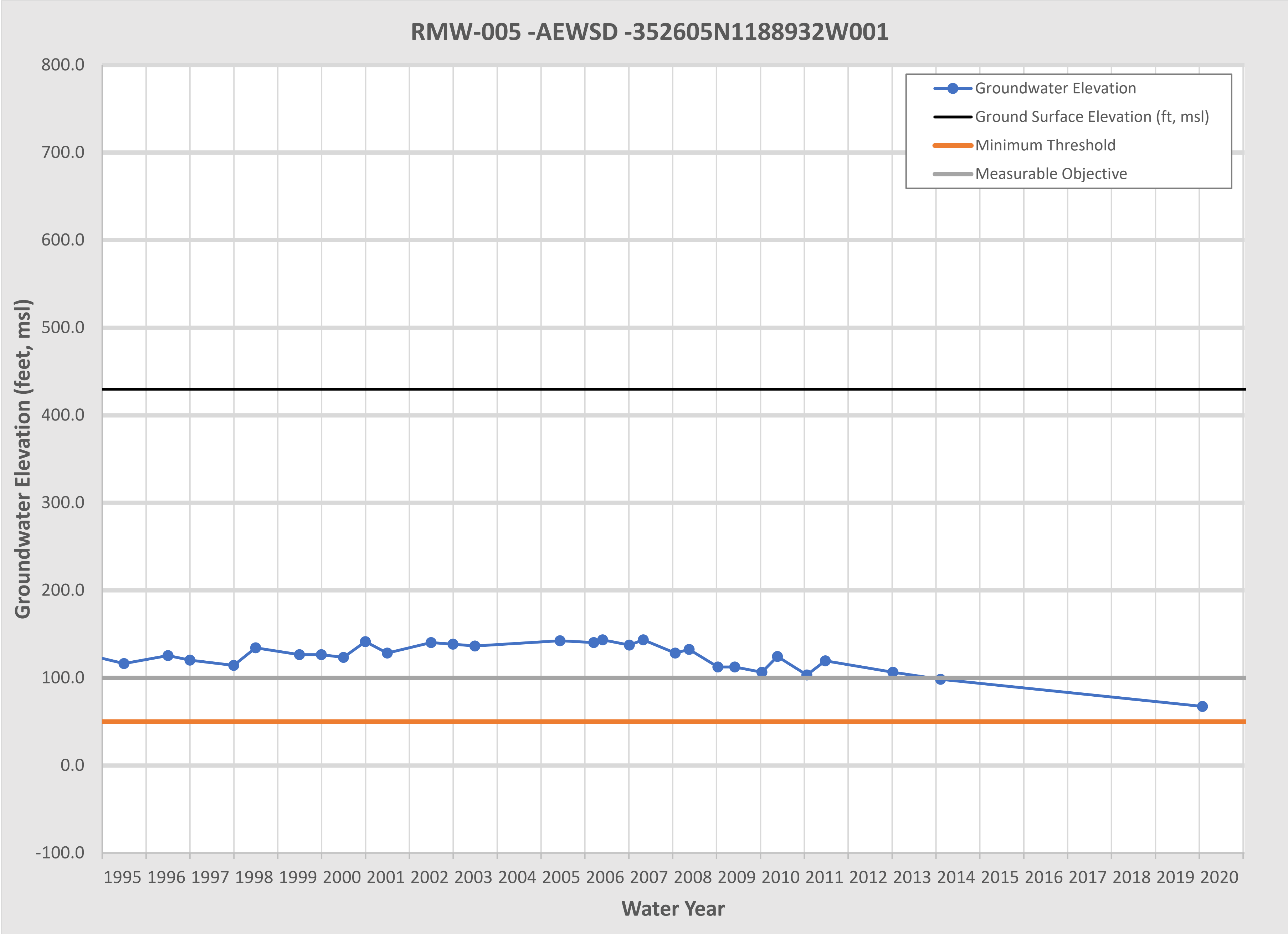

RMW-002 -AEWSD -353269N1188418W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



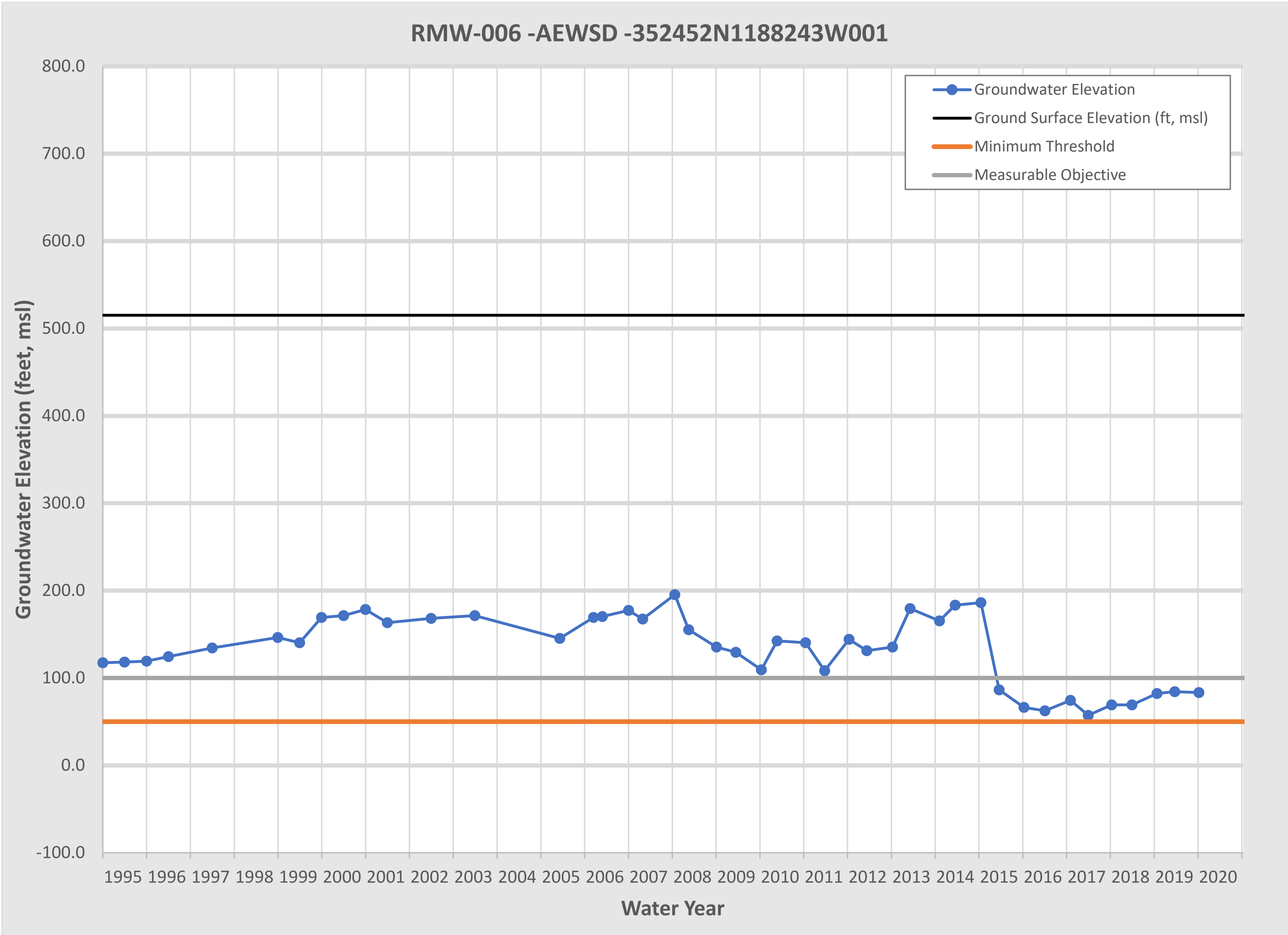
RMW-003 -AEWSD -353072N1188037W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

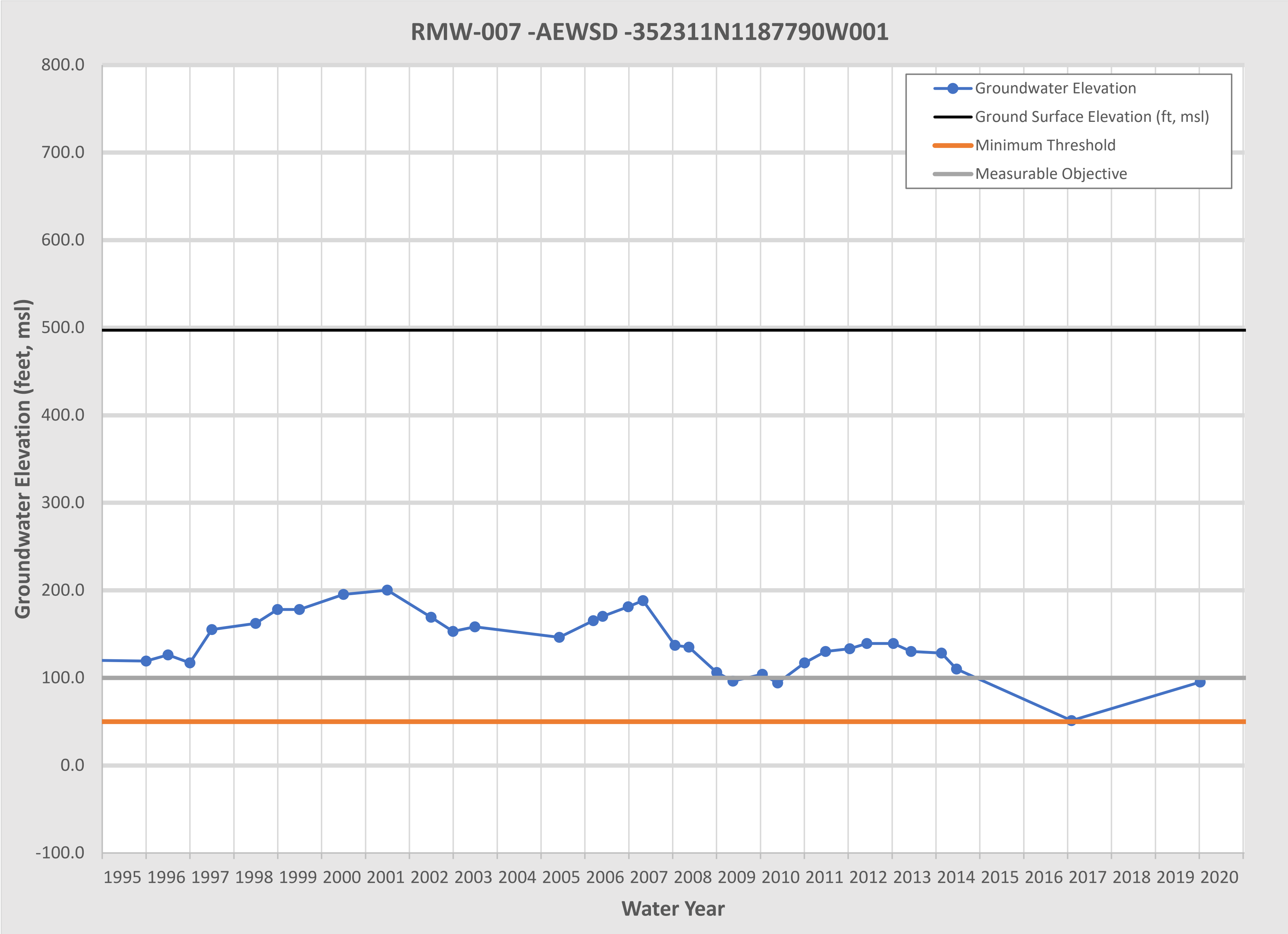


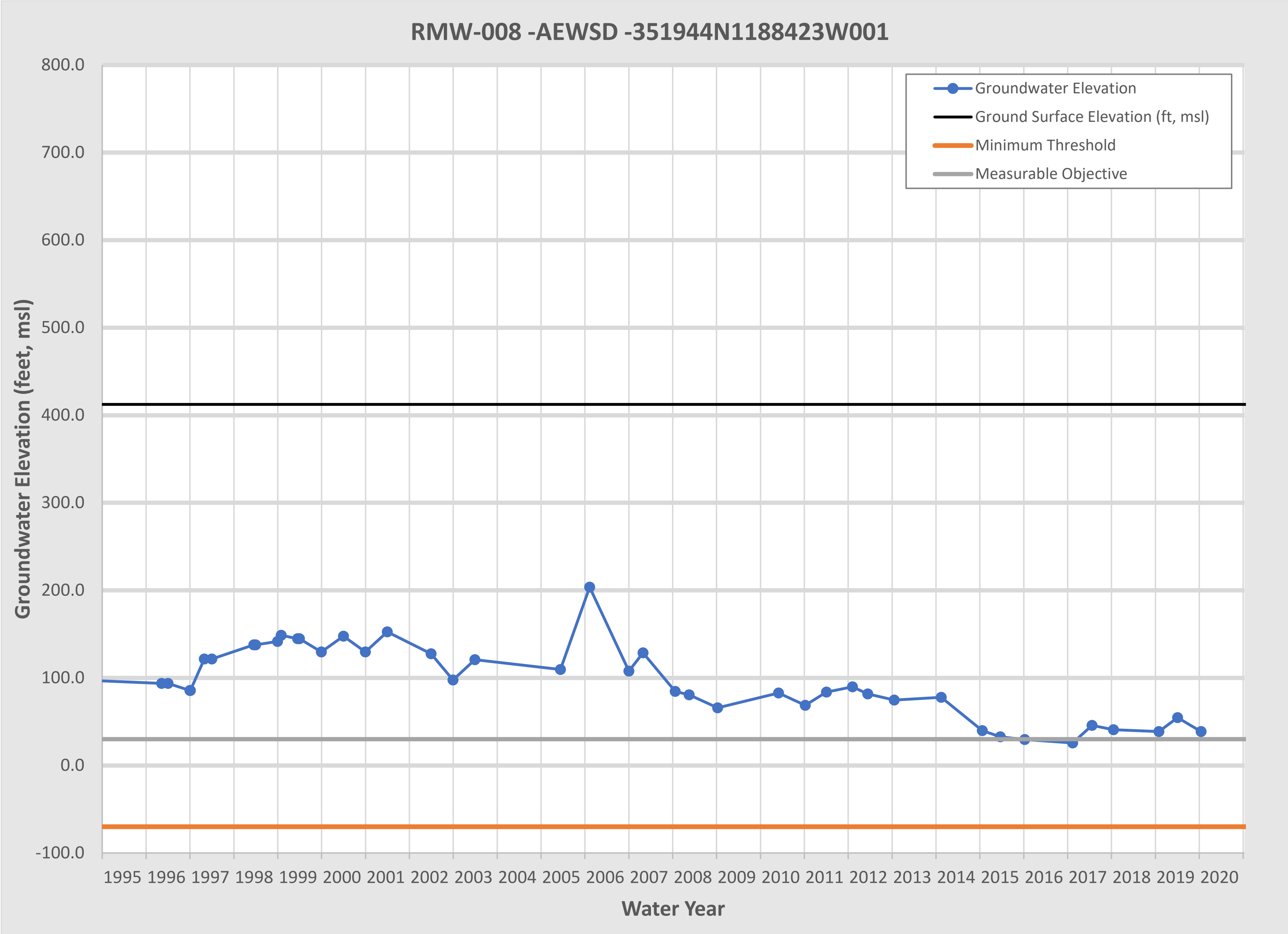
RMW-004 -AEWSD -352958N1188807W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

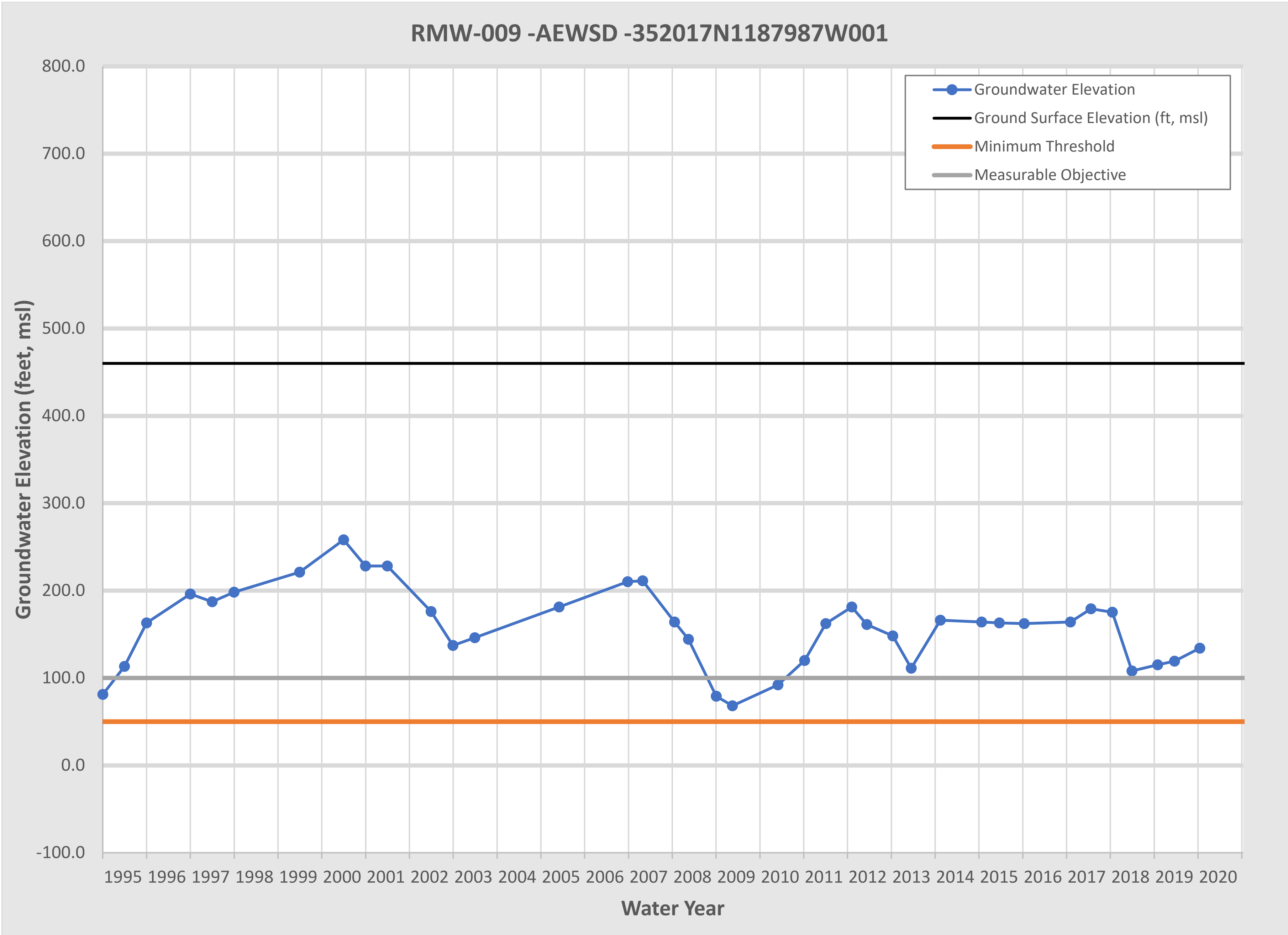


RMW-005 -AEWSD -352605N1188932W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

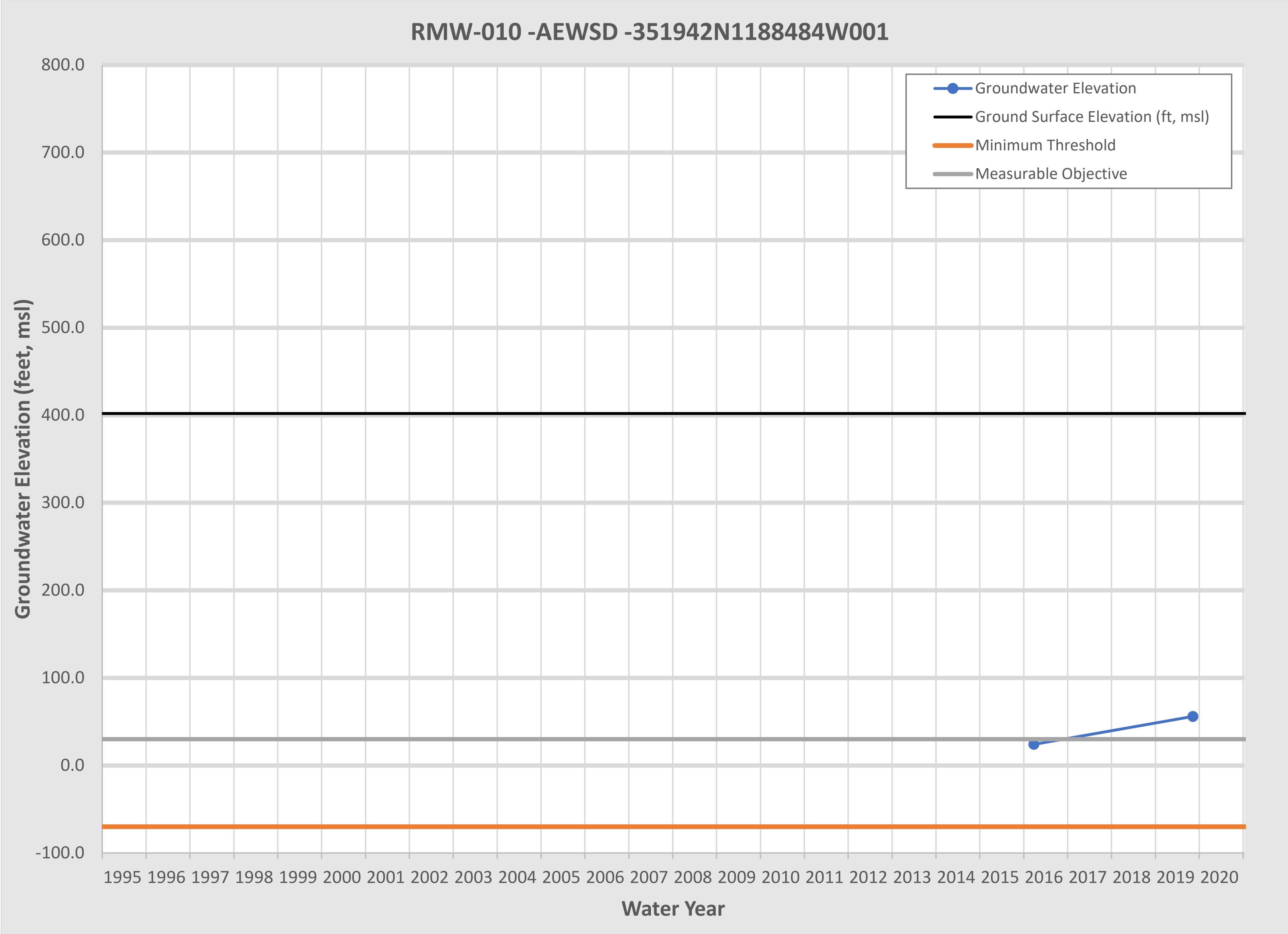

RMW-006 -AEWSD -352452N1188243W001
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

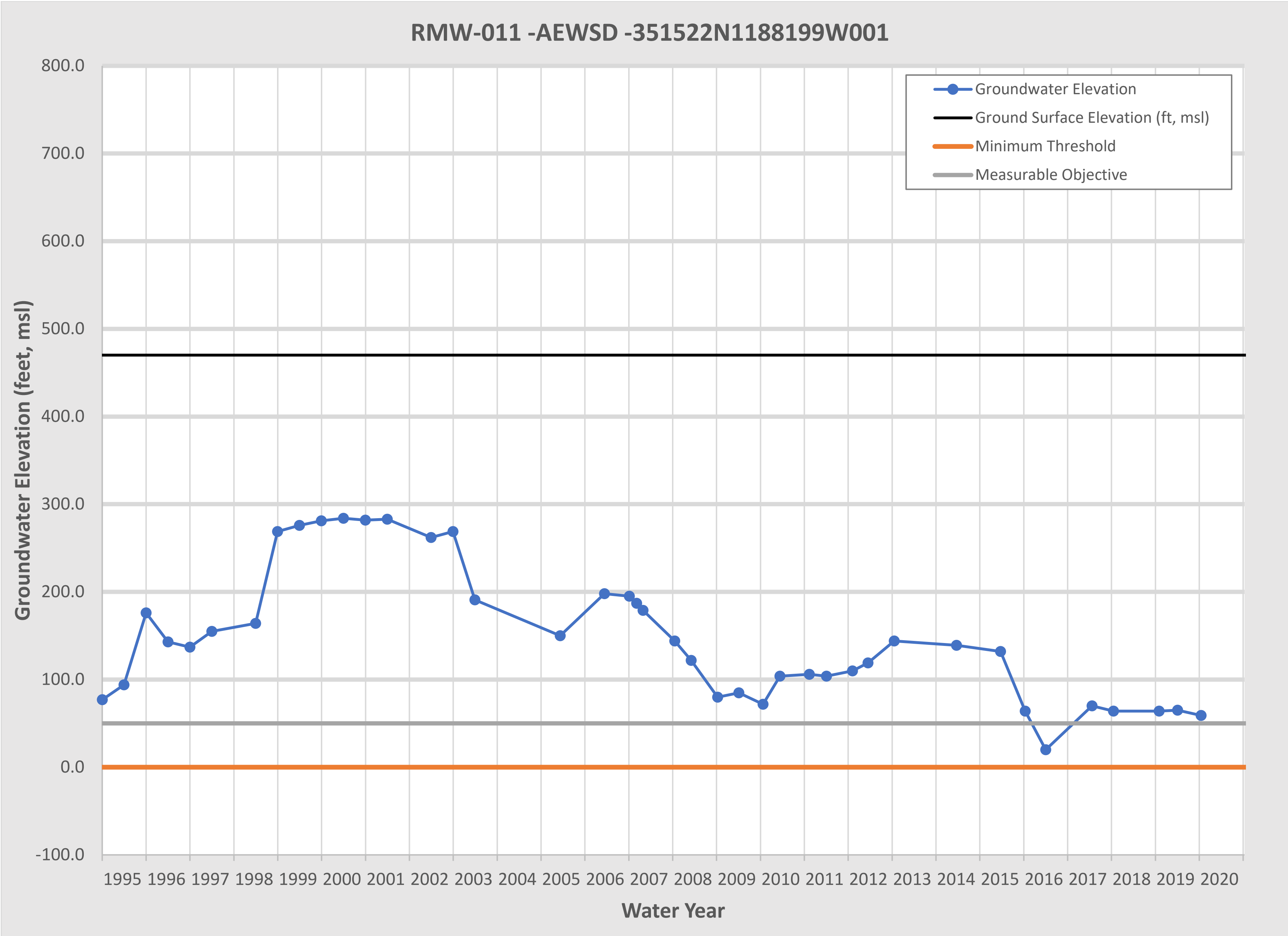

RMW-007 -AEWSD -352311N1187790W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-008 -AEWSD -351944N1188423W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

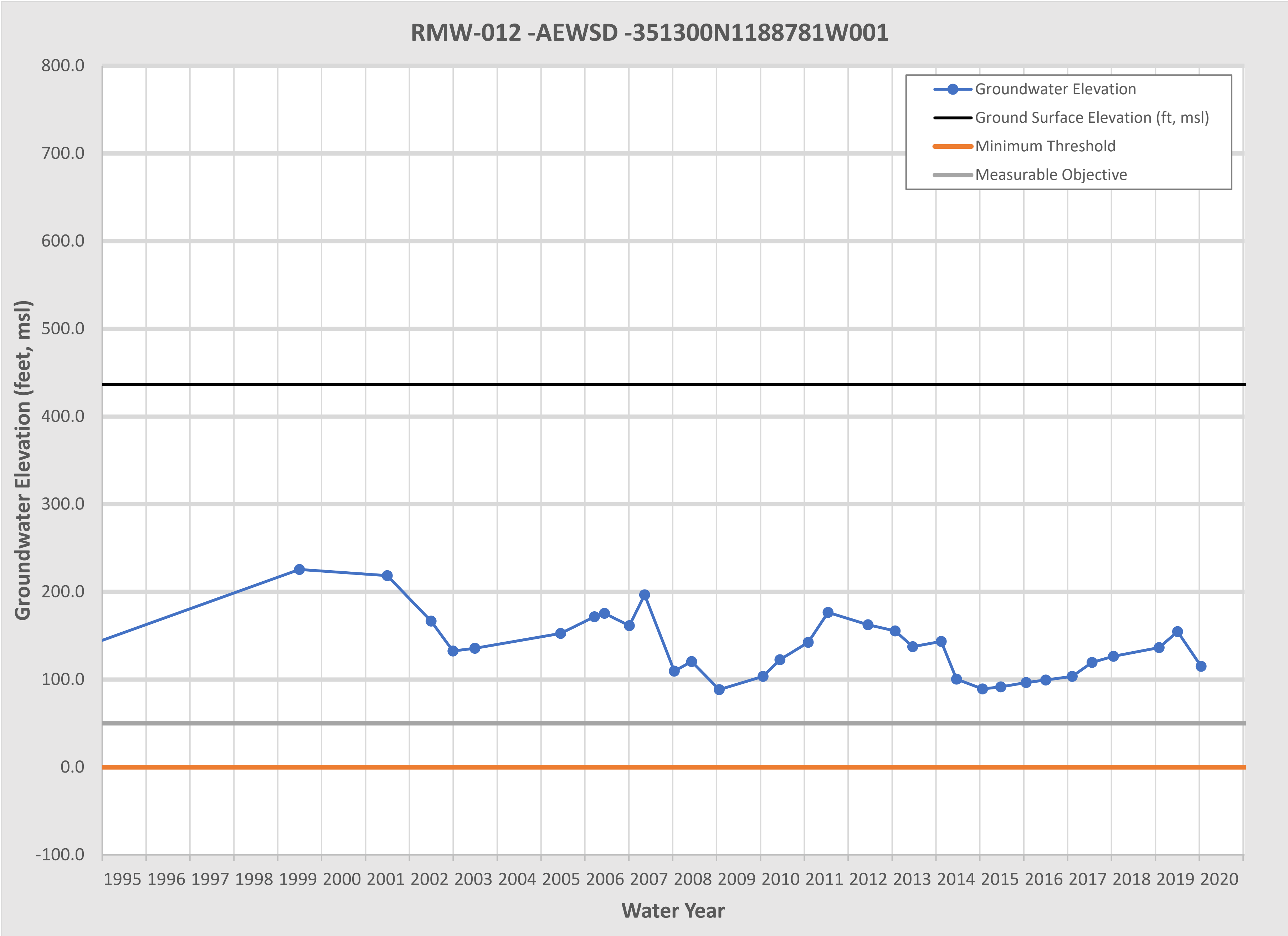


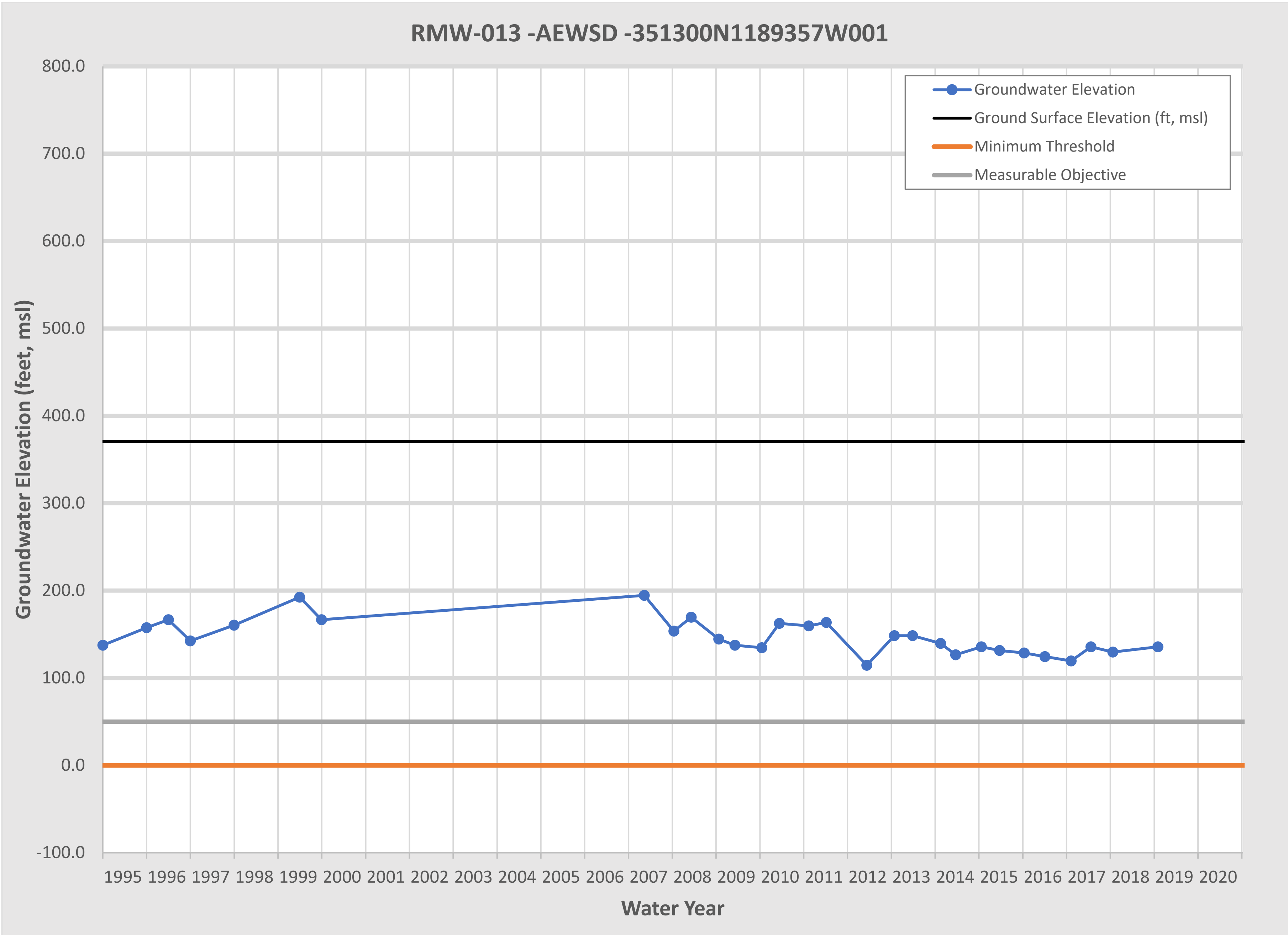
RMW-009 -AEWSD -352017N1187987W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-010 -AEWSD -351942N1188484W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

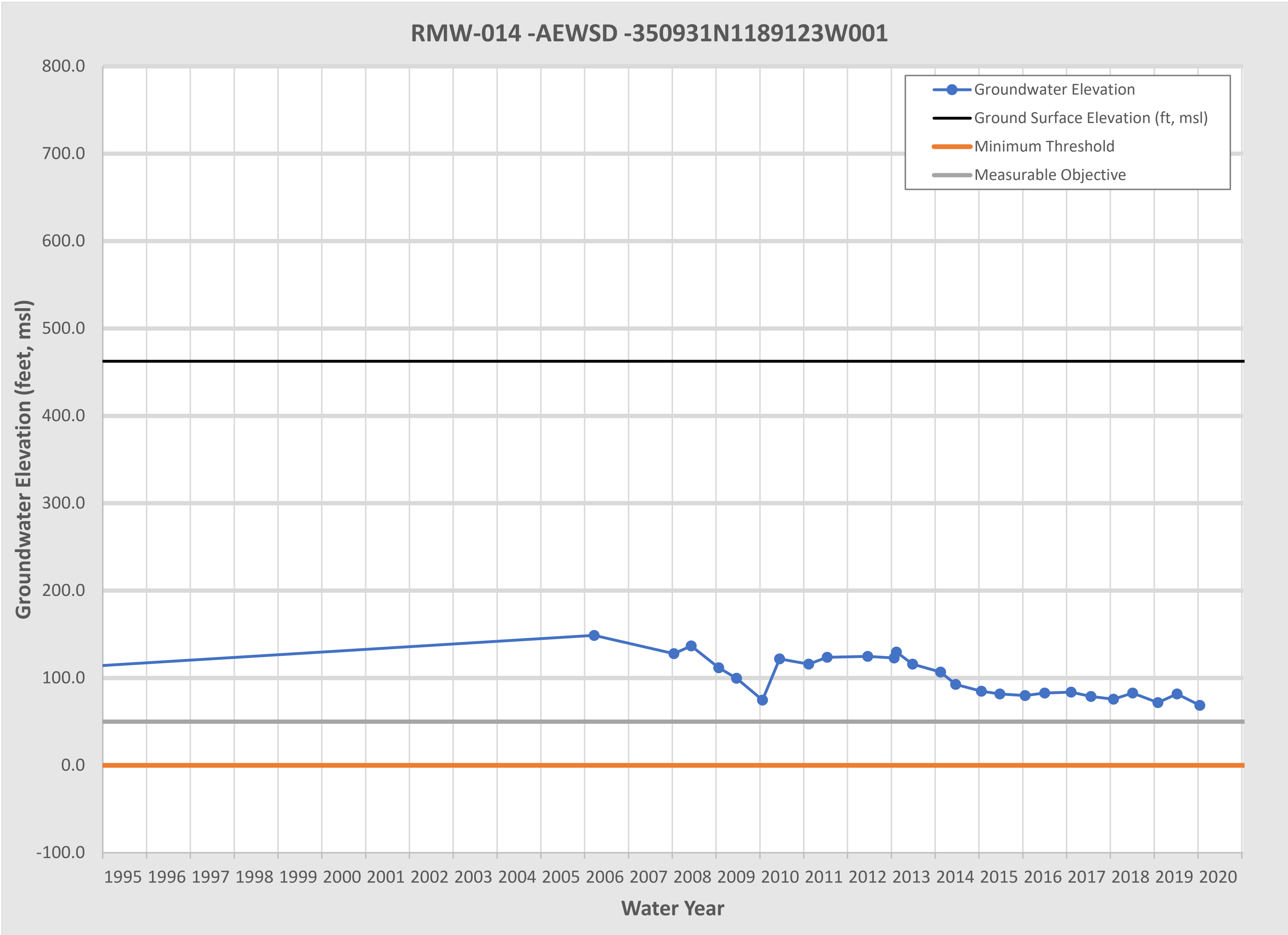


RMW-011 -AEWSD -351522N1188199W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

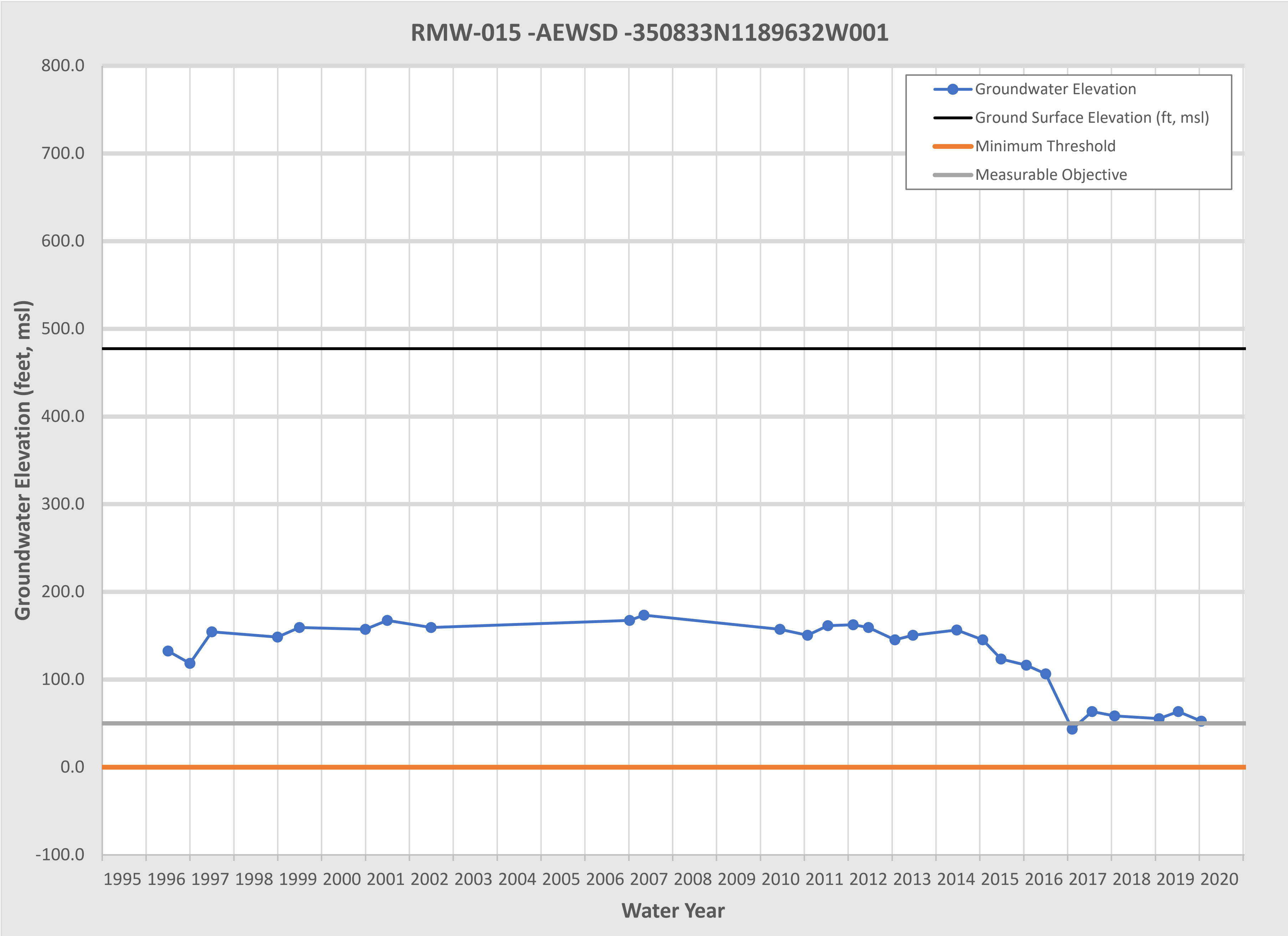

RMW-012 -AEWSD -351300N1188781W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



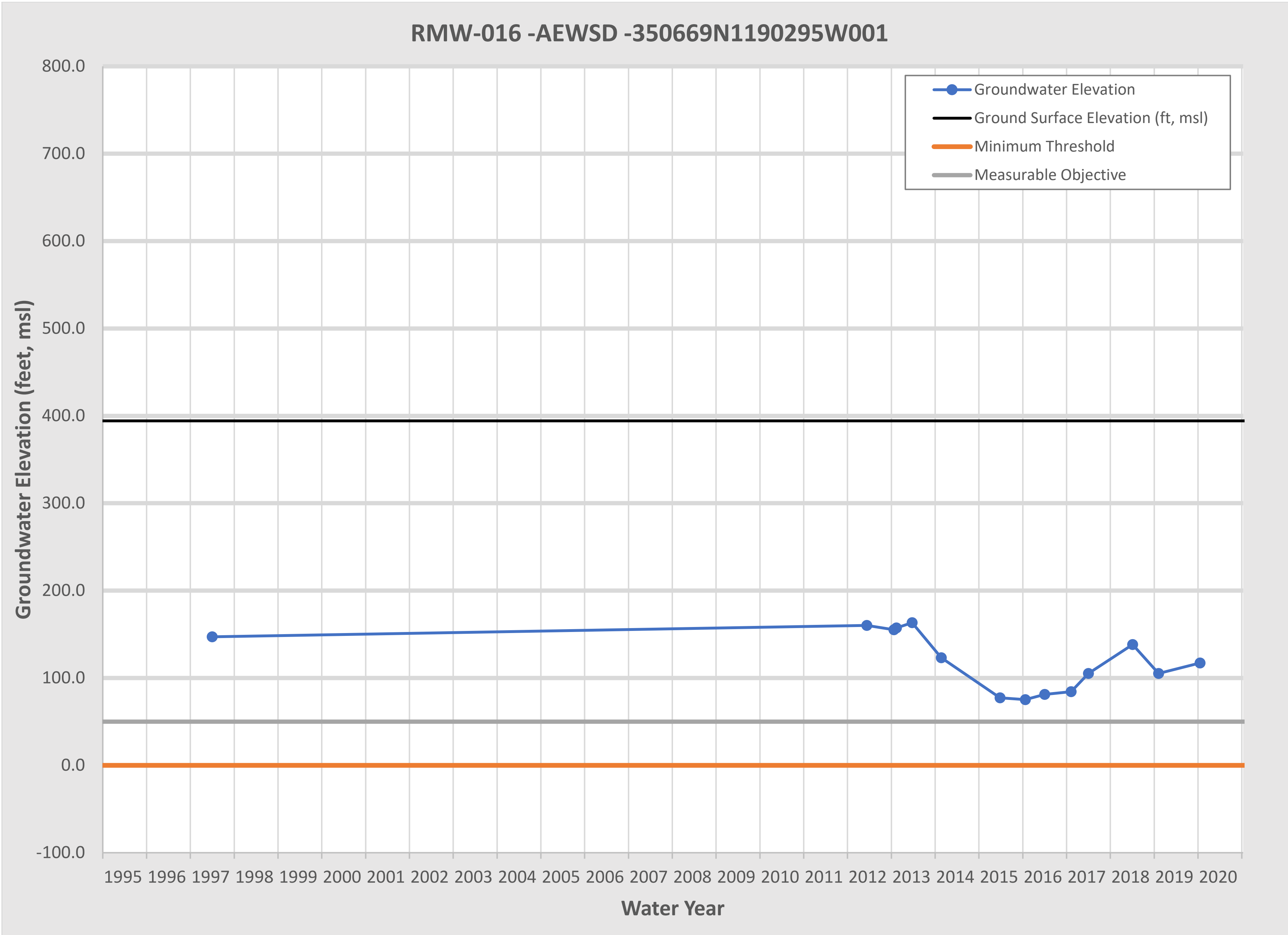
RMW-013 -AEWSD -351300N1189357W001
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

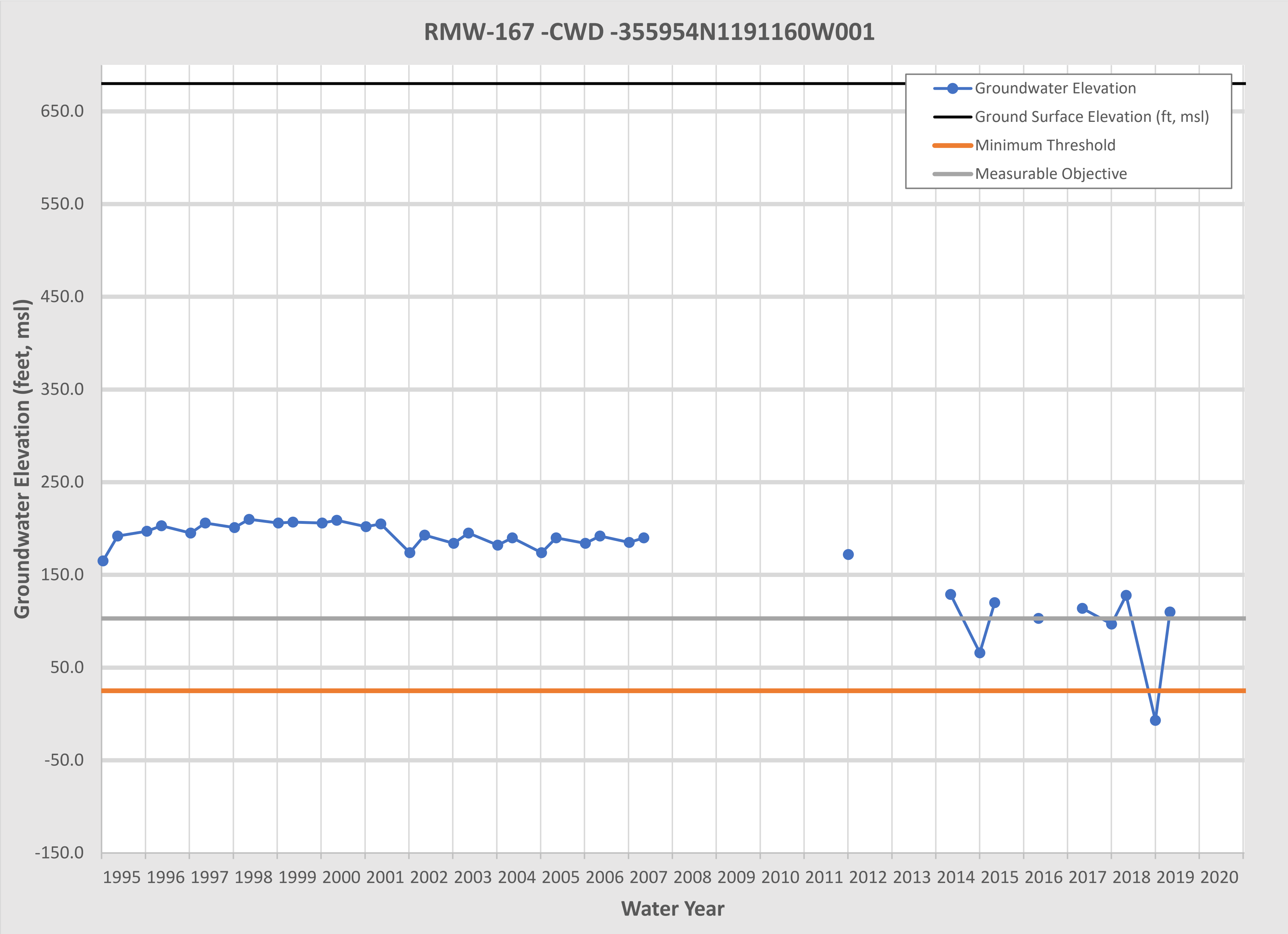


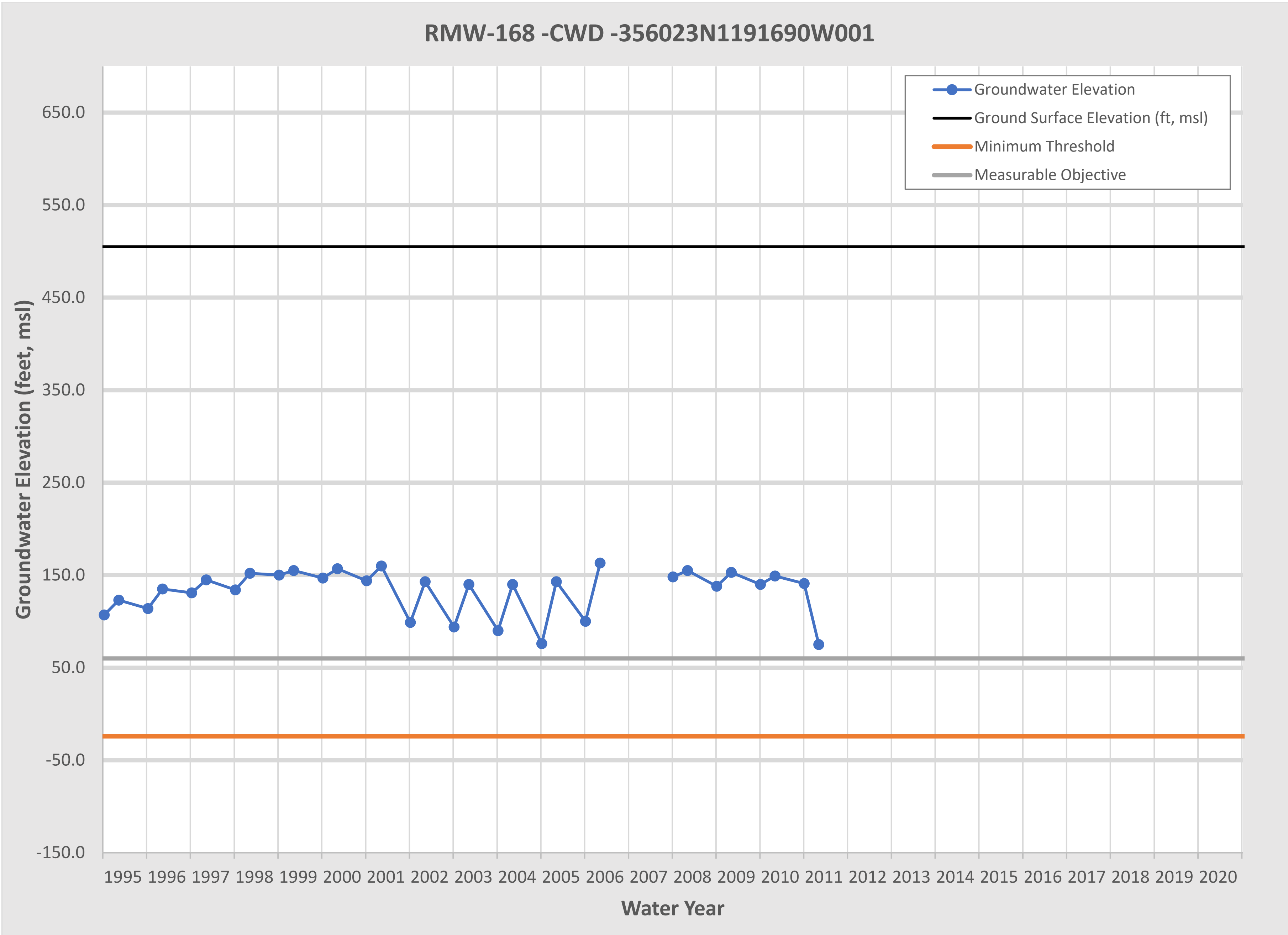
RMW-014 -AEWSD -350931N1189123W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

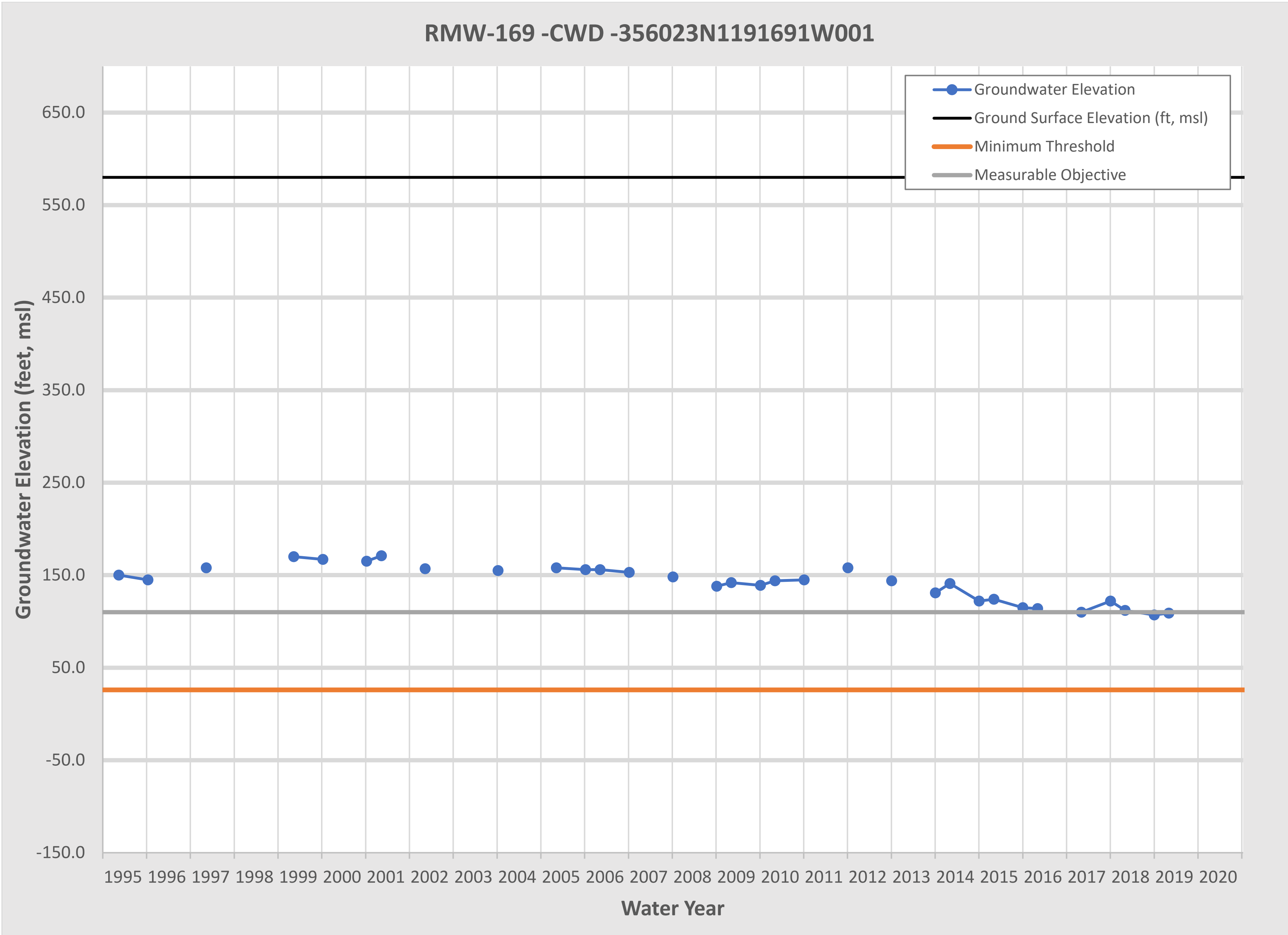


RMW-015 -AEWSD -350833N1189632W001
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

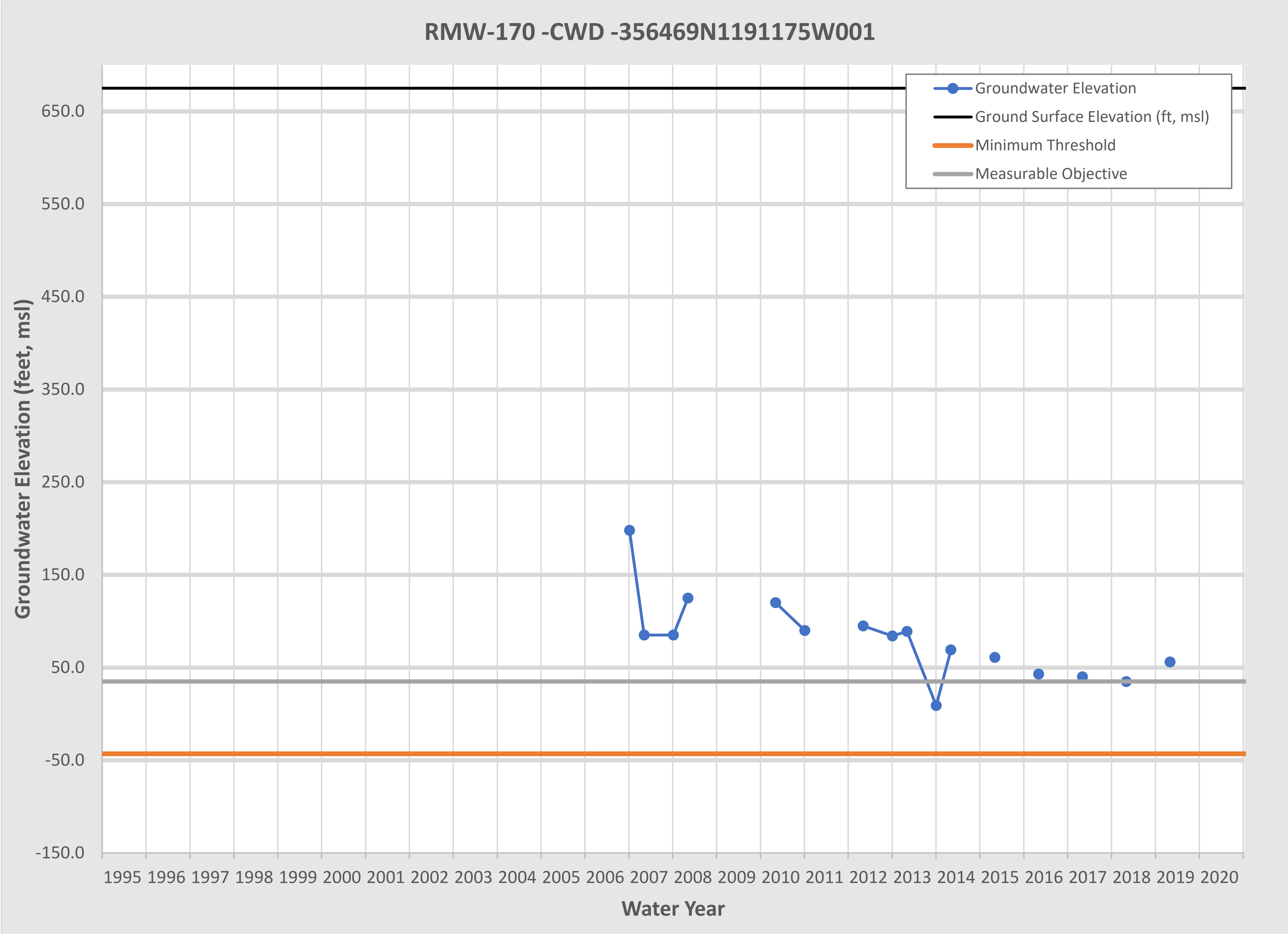

RMW-016 -AEWSD -350669N1190295W001
Groundwater Elevation (feet, msl)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

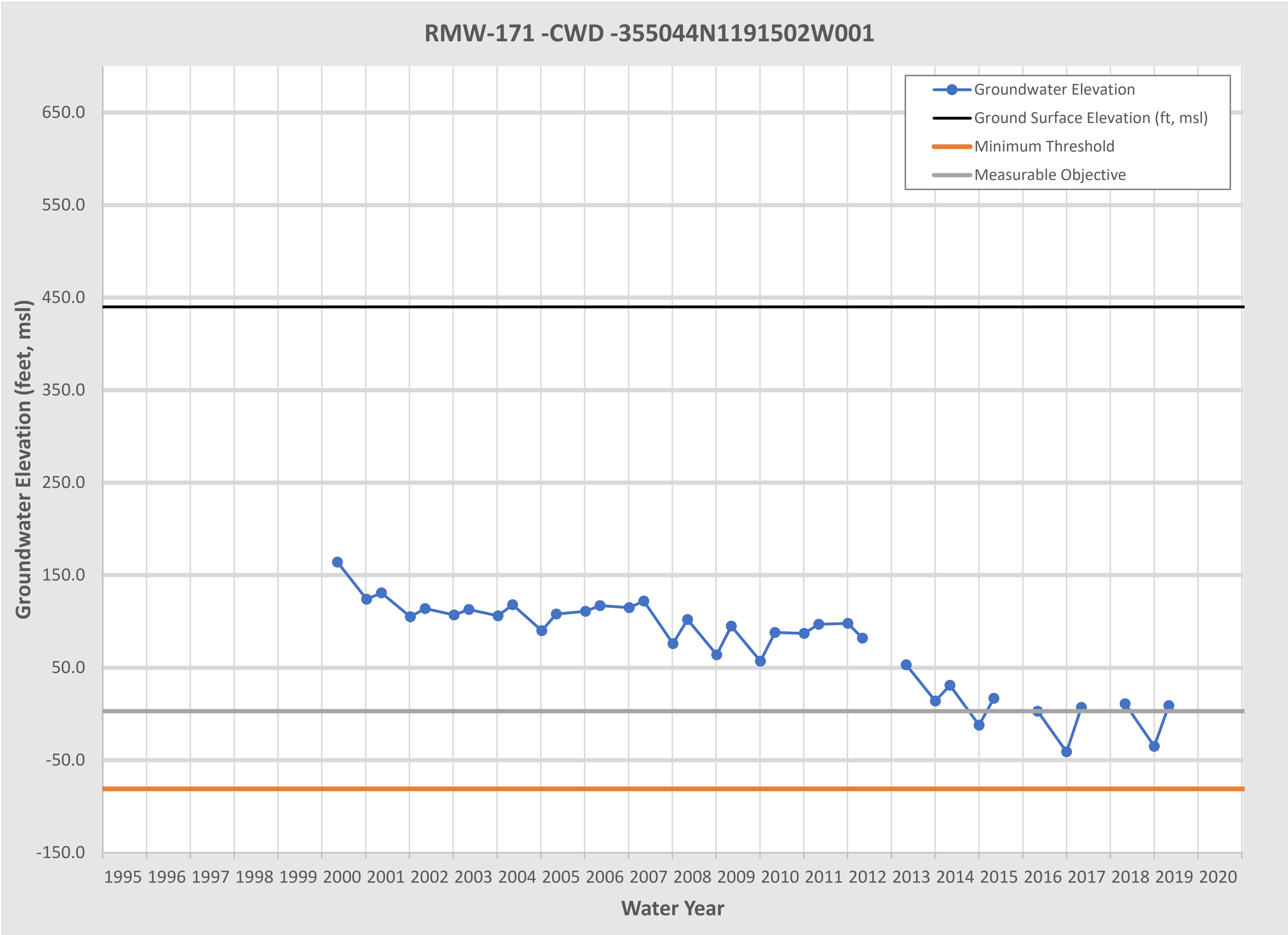

RMW-167 -CWD -355954N1191160W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

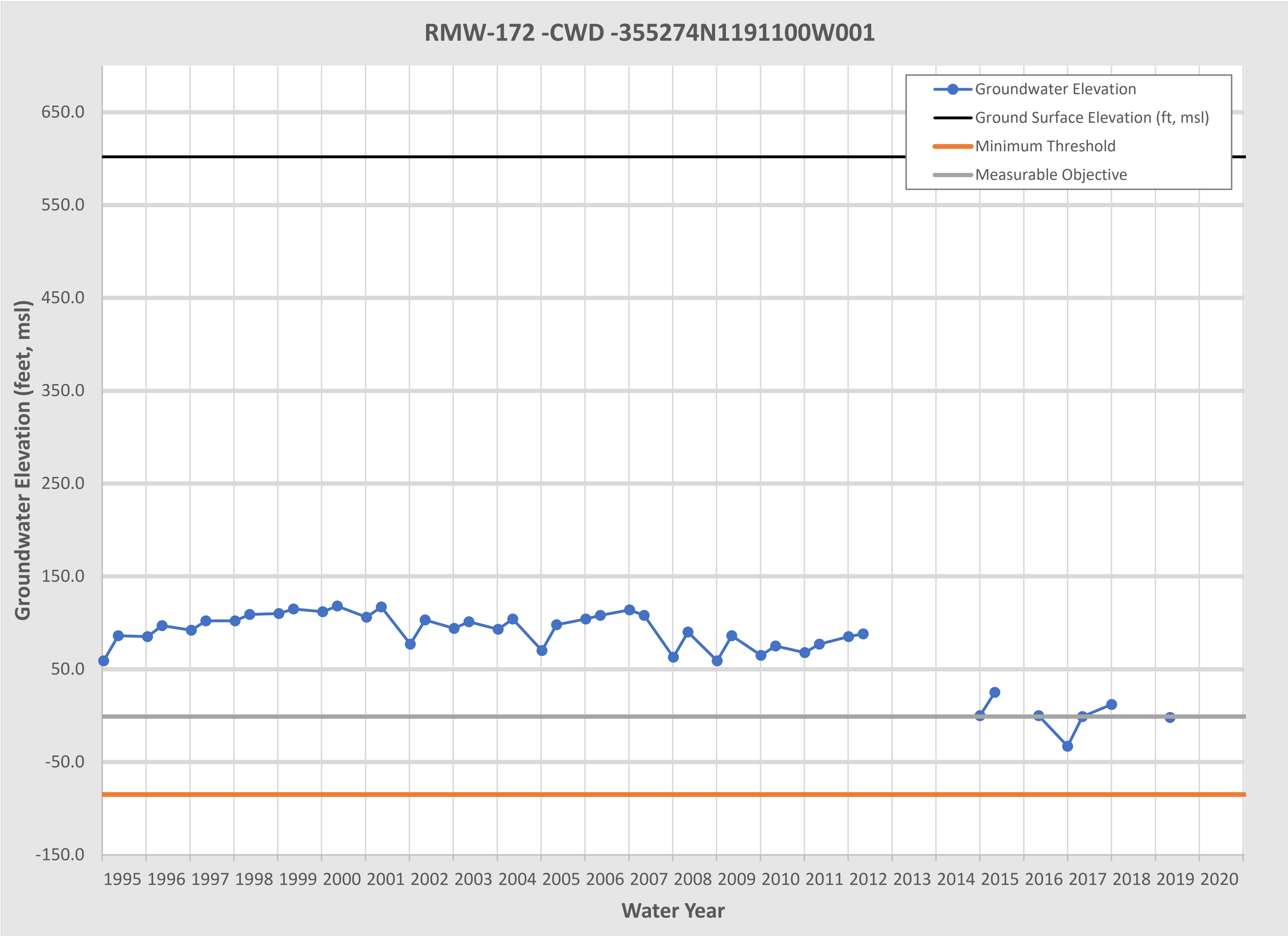

RMW-168 -CWD -356023N1191690W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

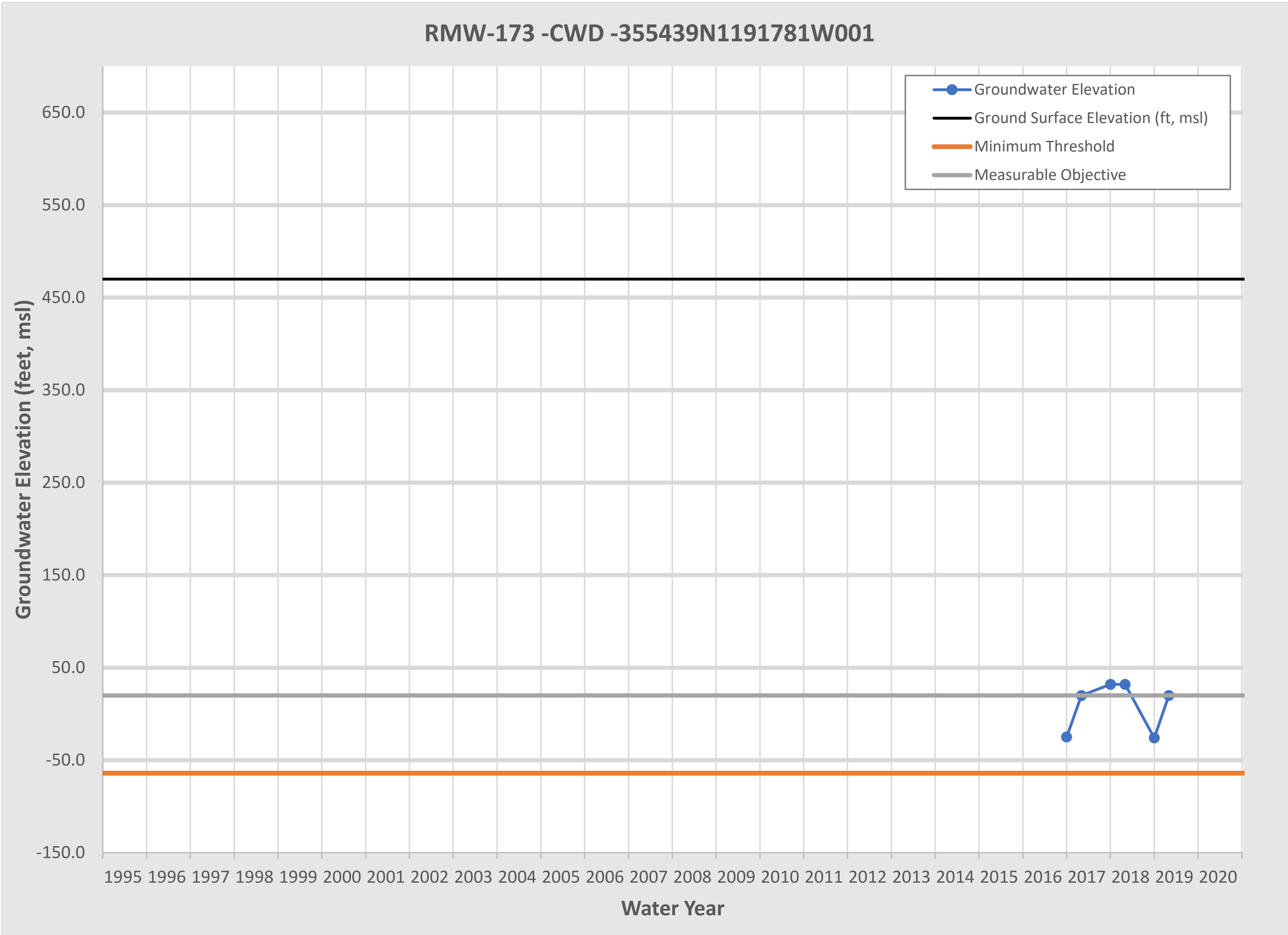


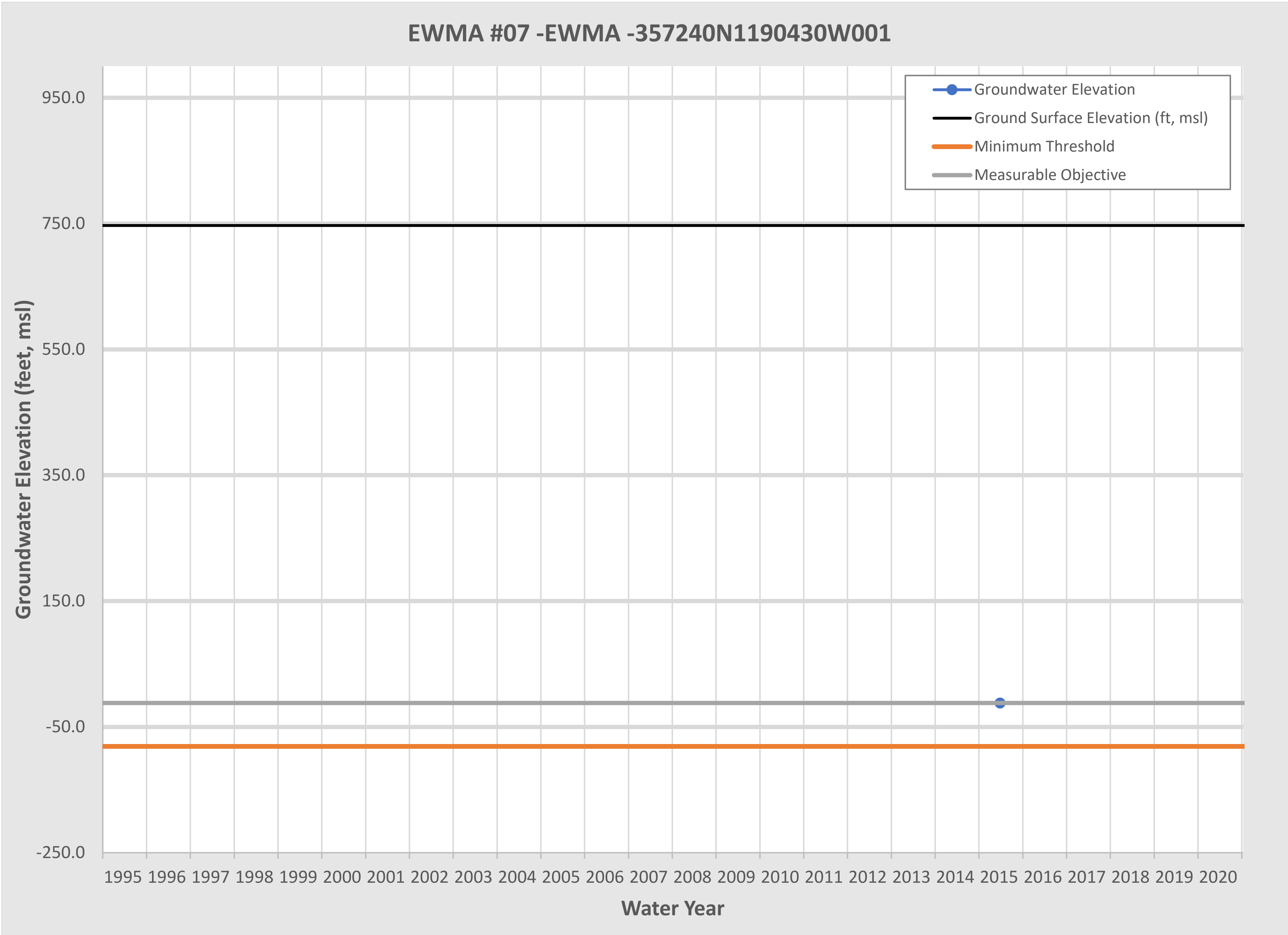
RMW-169 -CWD -356023N1191691W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

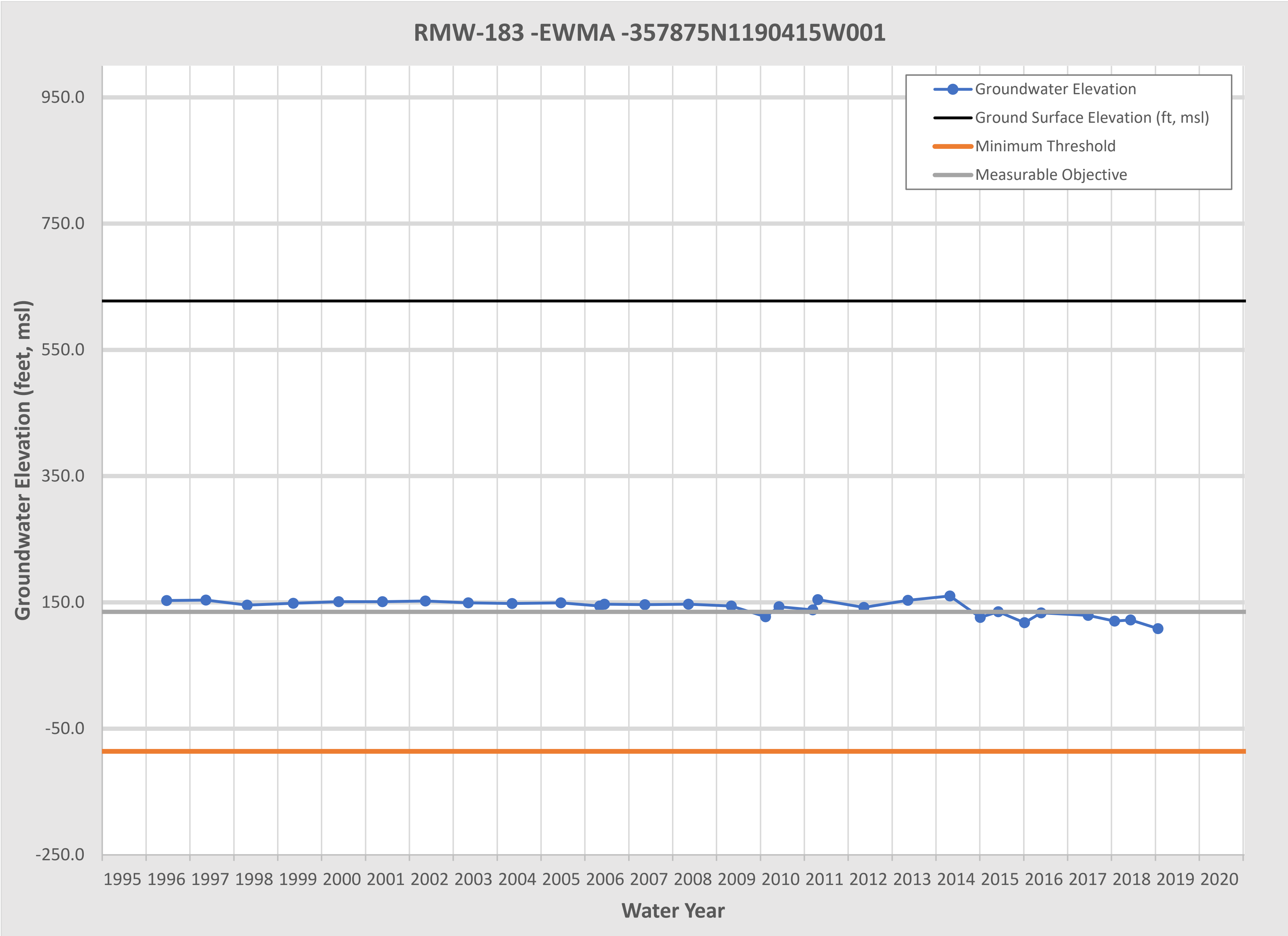

RMW-170 -CWD -356469N1191175W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-171 -CWD -355044N1191502W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

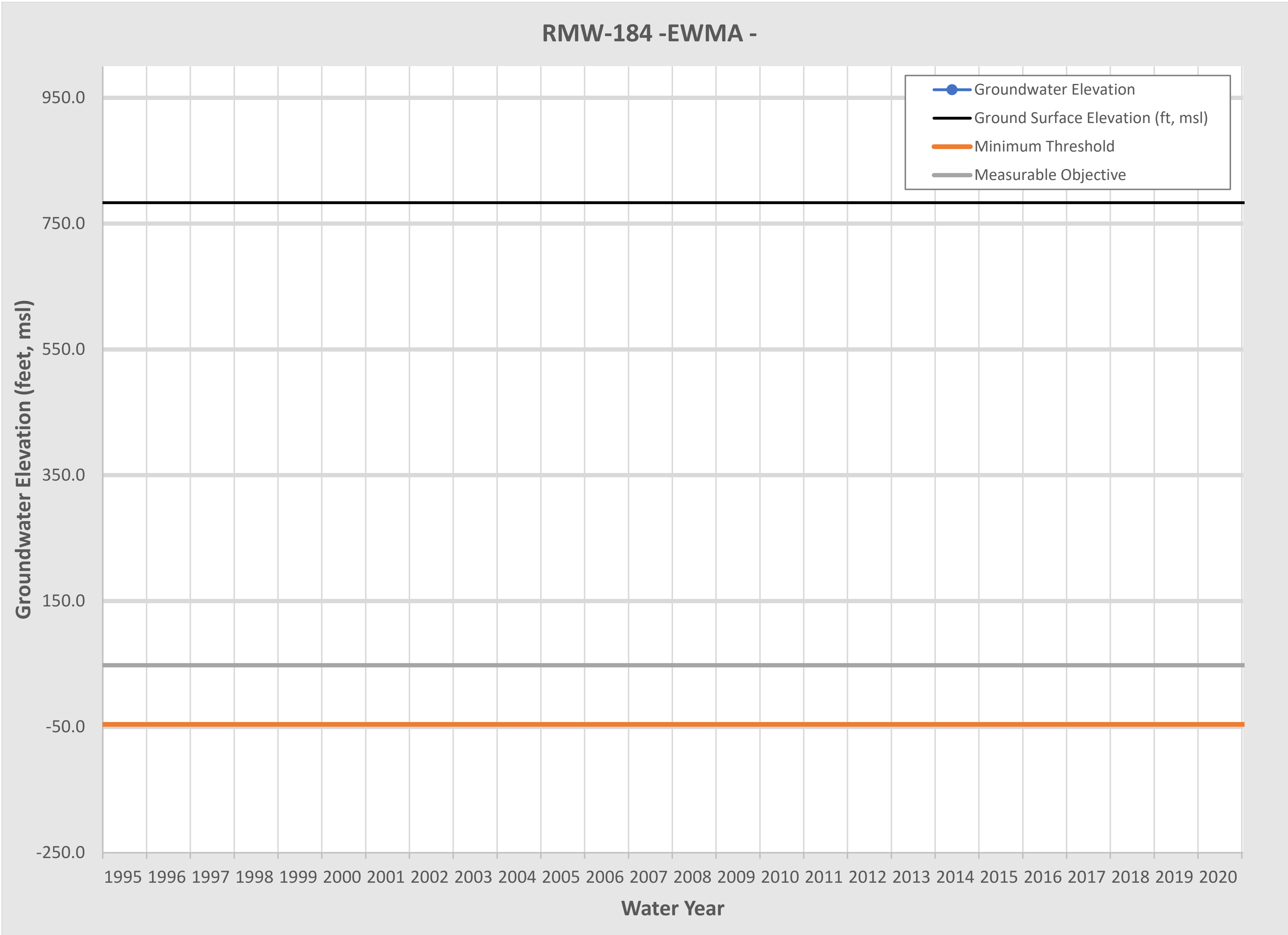

RMW-172 -CWD -355274N1191100W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

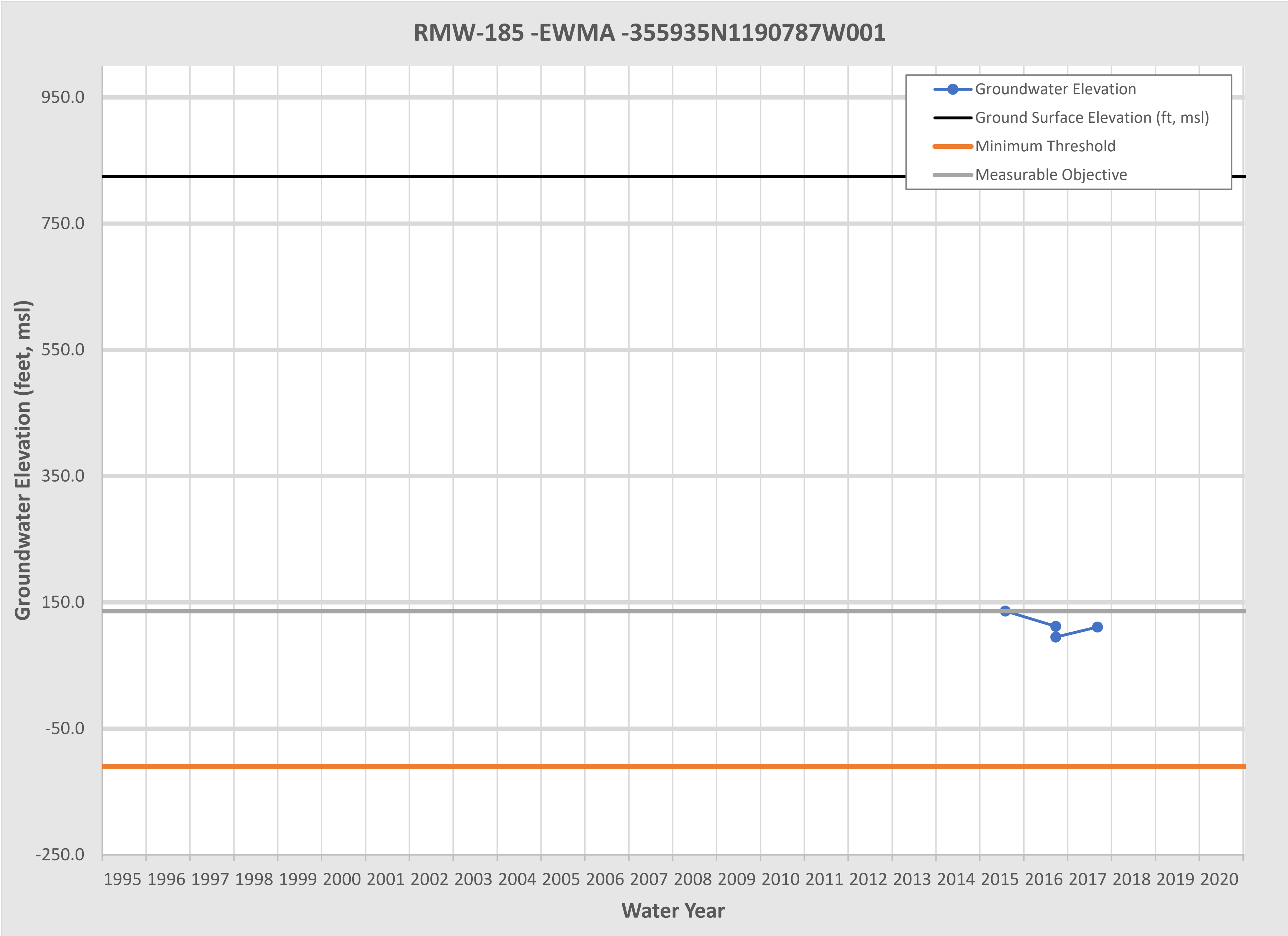

RMW-173 -CWD -355439N1191781W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

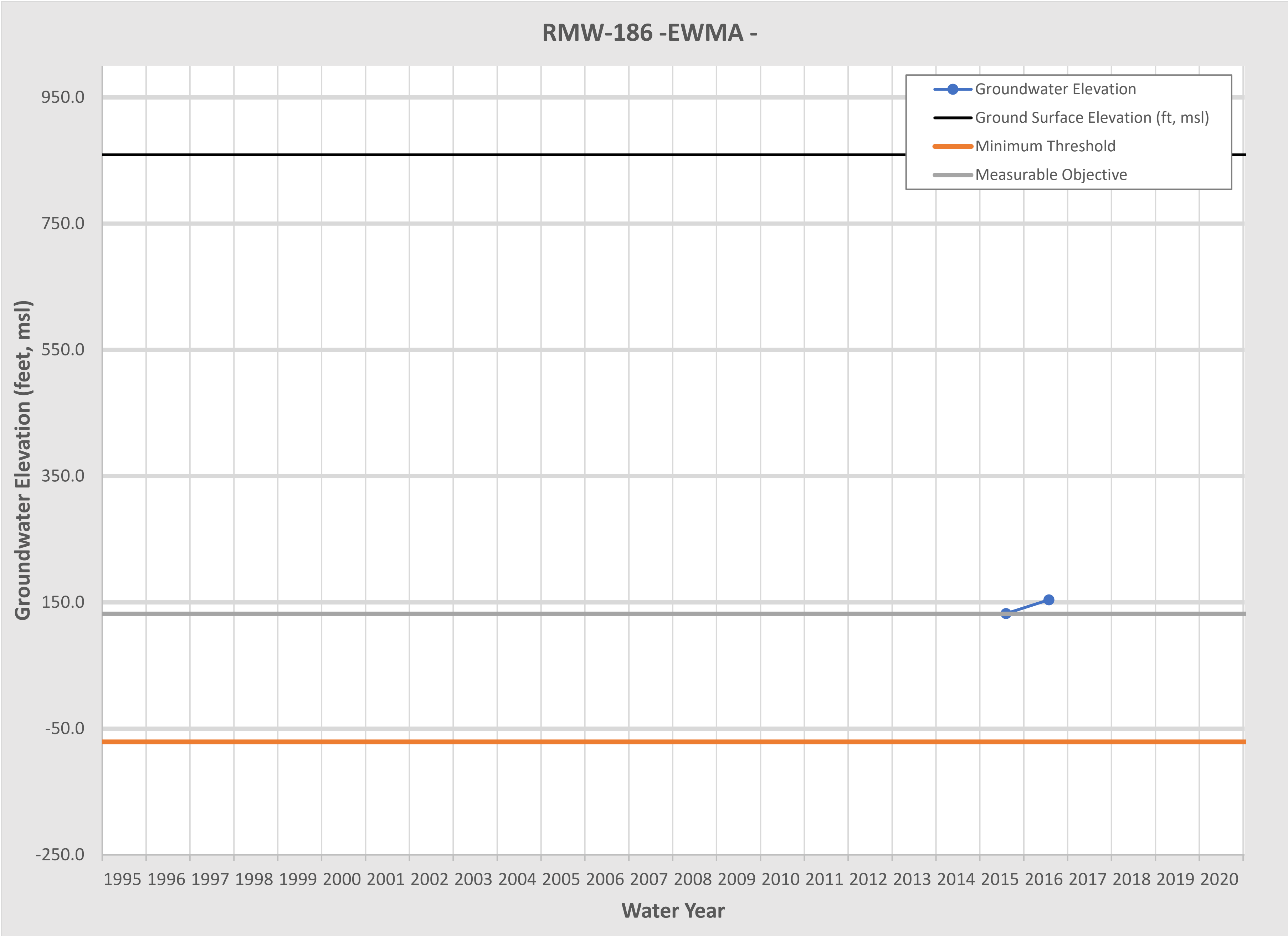

EWMA #07 -EWMA -357240N1190430W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
950.0
750.0
550.0
350.0
150.0
-50.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

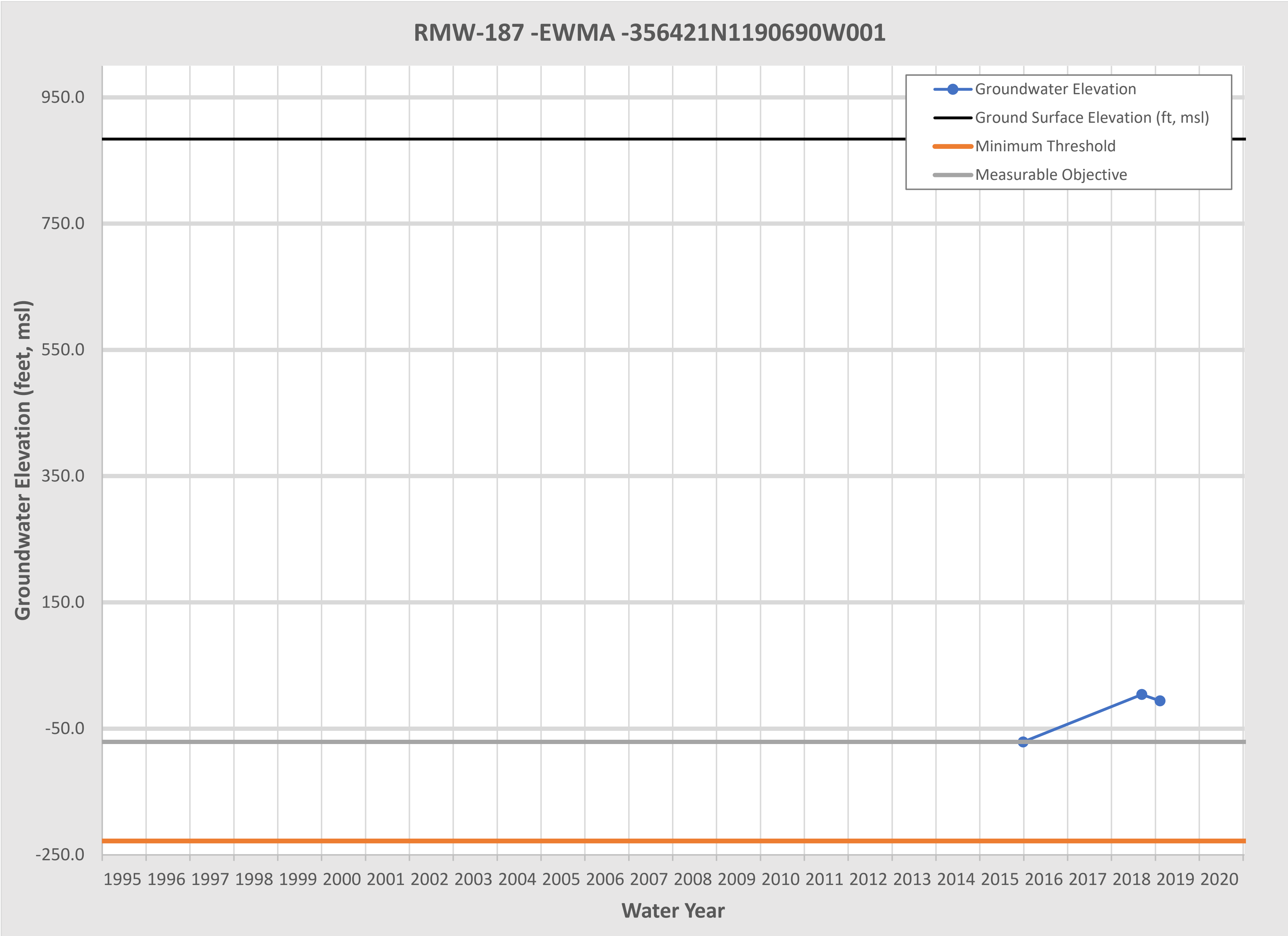


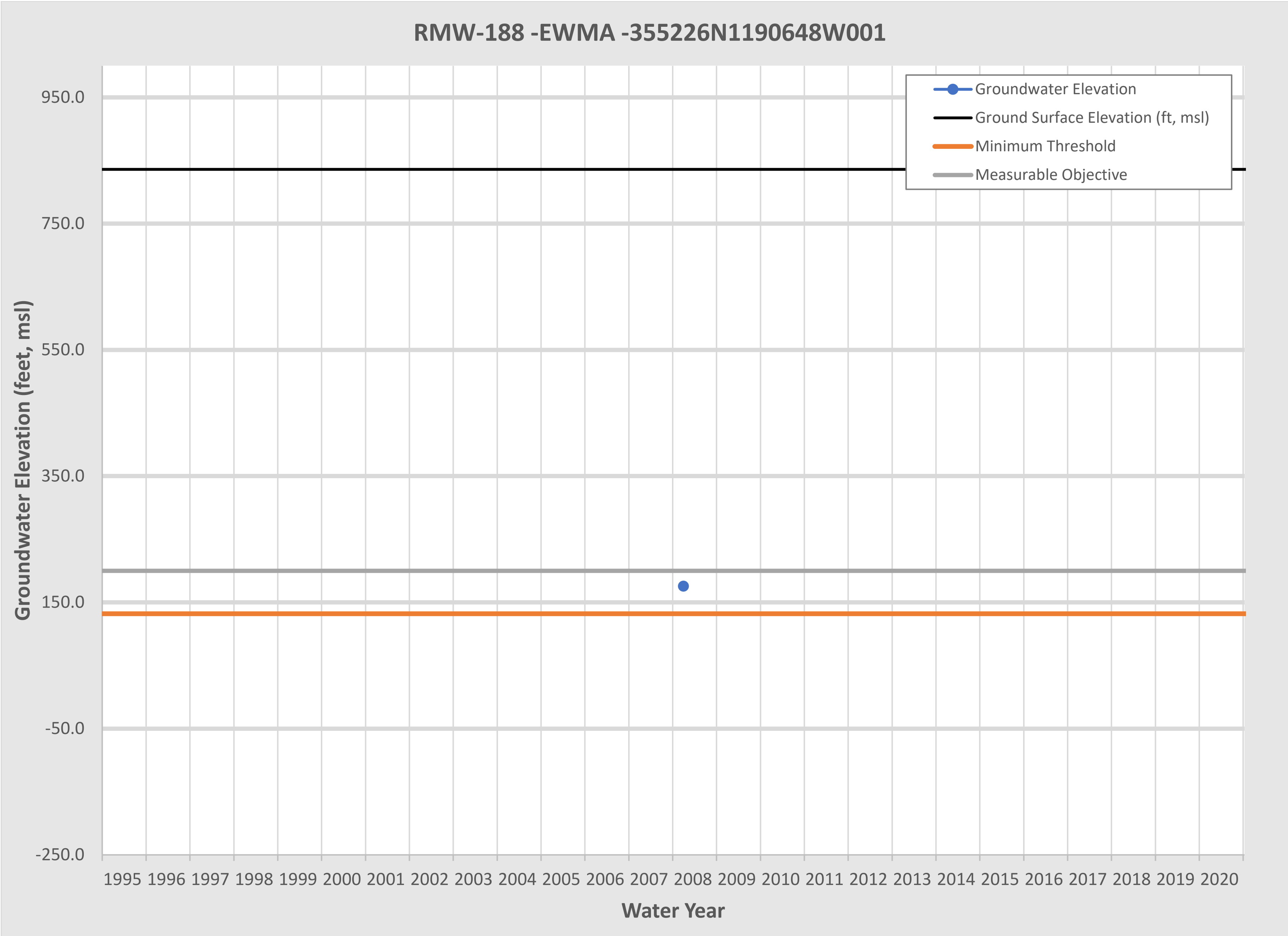
RMW-183 -EWMA -357875N1190415W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
950.0
750.0
550.0
350.0
150.0
-50.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

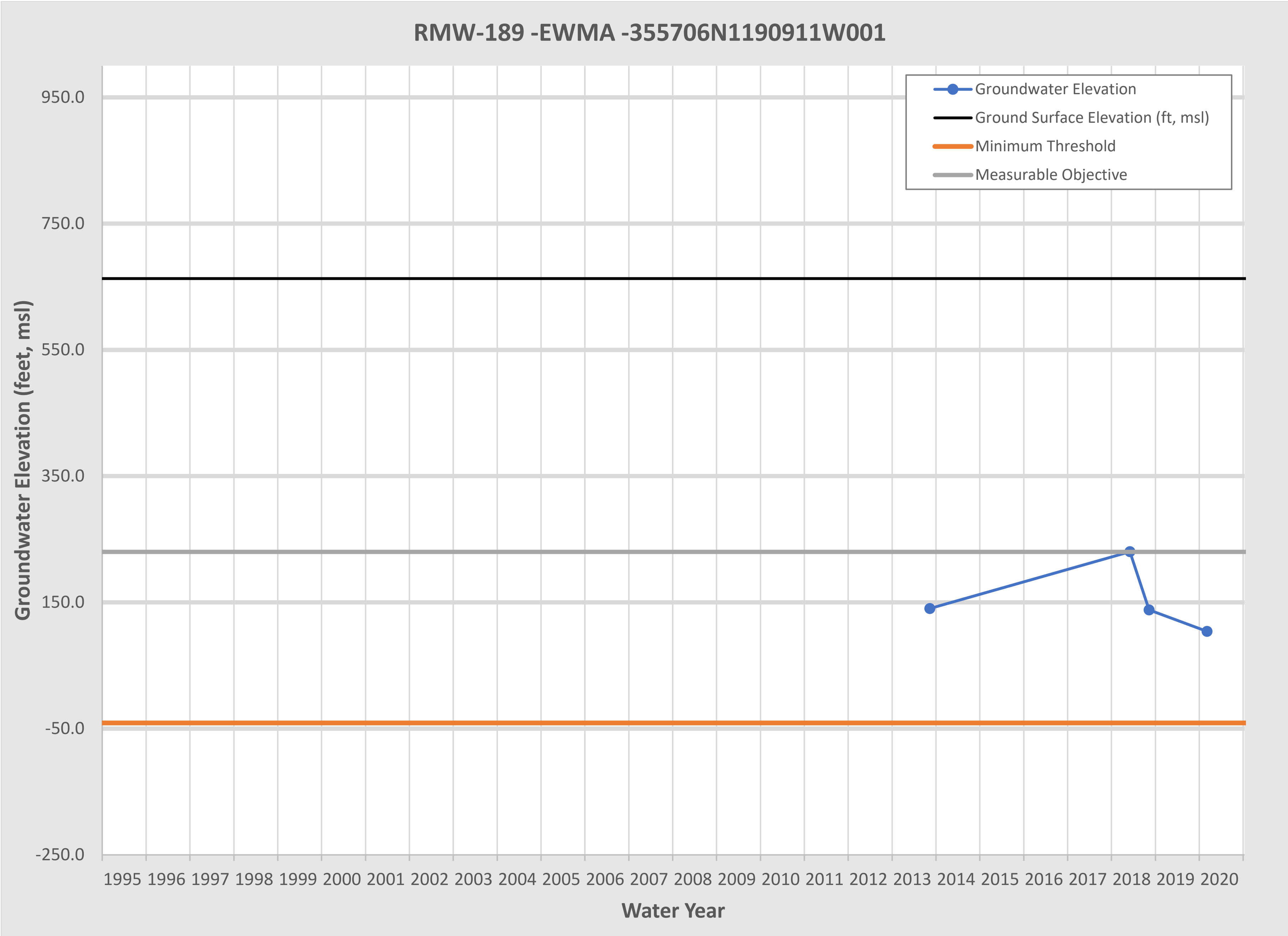

RMW-184 -EWMA -
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
950.0
750.0
550.0
350.0
150.0
-50.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-185 -EWMA -355935N1190787W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
950.0
750.0
550.0
350.0
150.0
-50.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

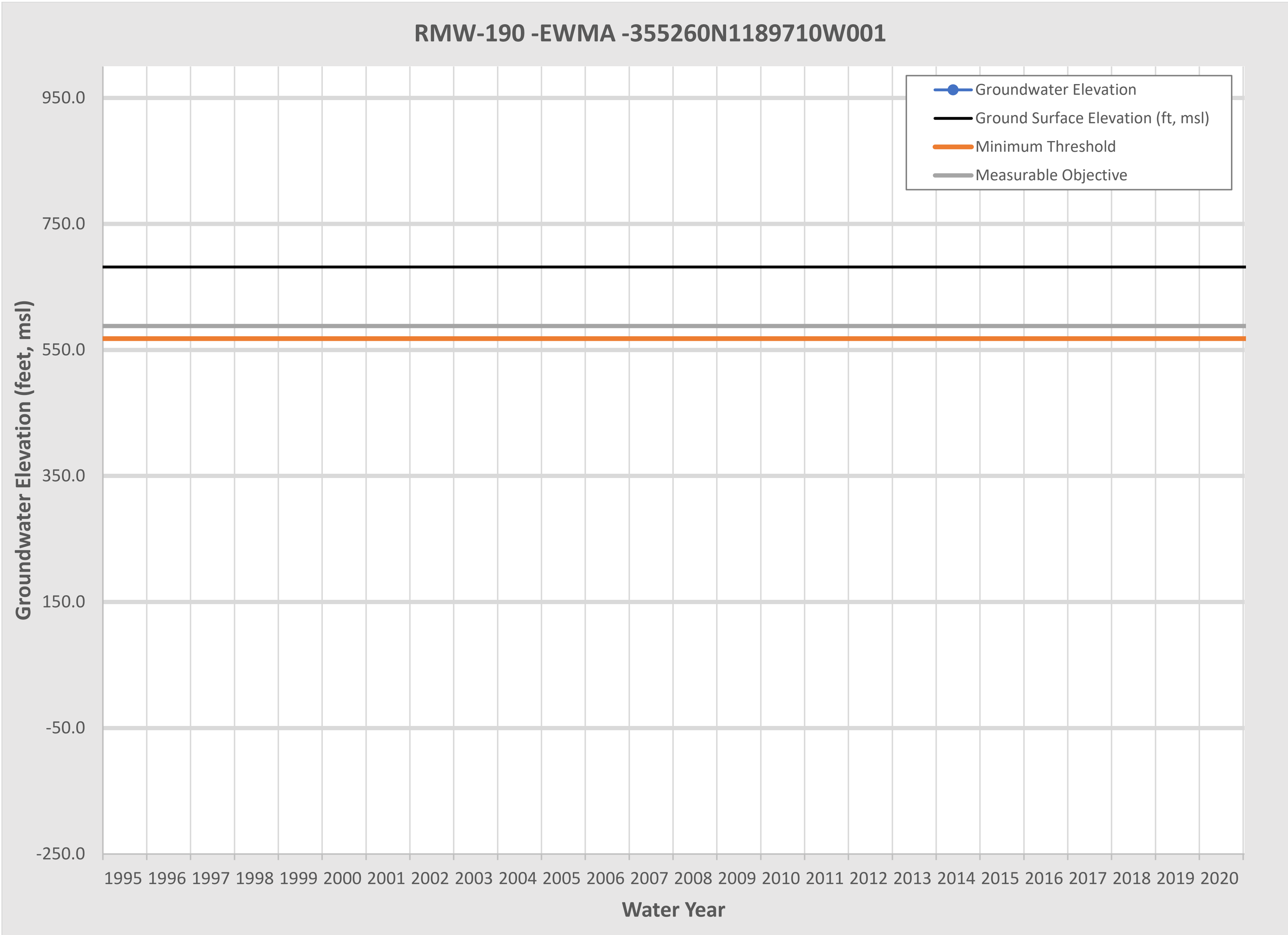

RMW-186 -EWMA -
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
950.0
750.0
550.0
350.0
150.0
-50.0
-250.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

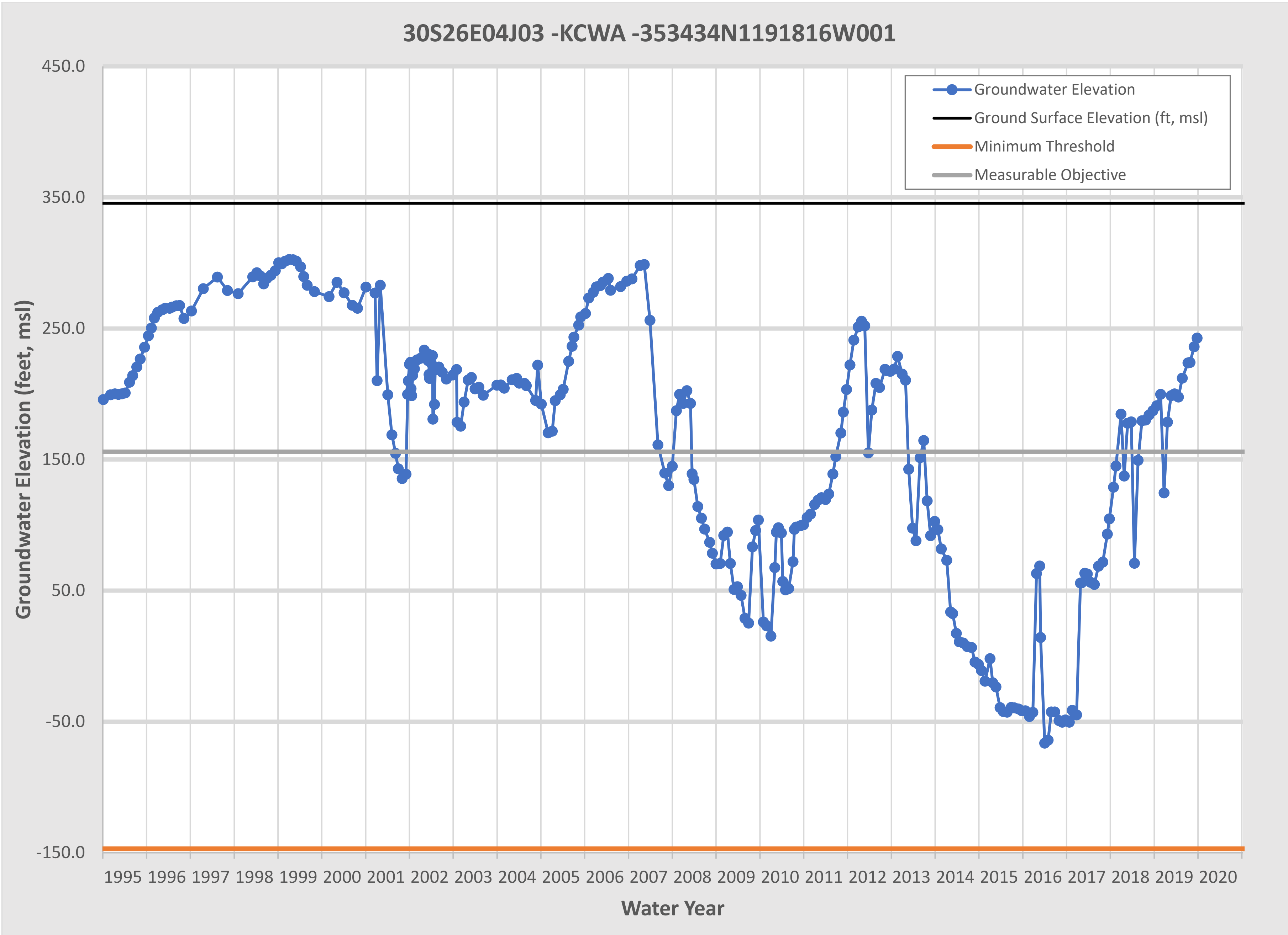

RMW-187 -EWMA -356421N1190690W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
950.0
750.0
550.0
350.0
150.0
-50.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-188 -EWMA -355226N1190648W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
950.0
750.0
550.0
350.0
150.0
-50.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

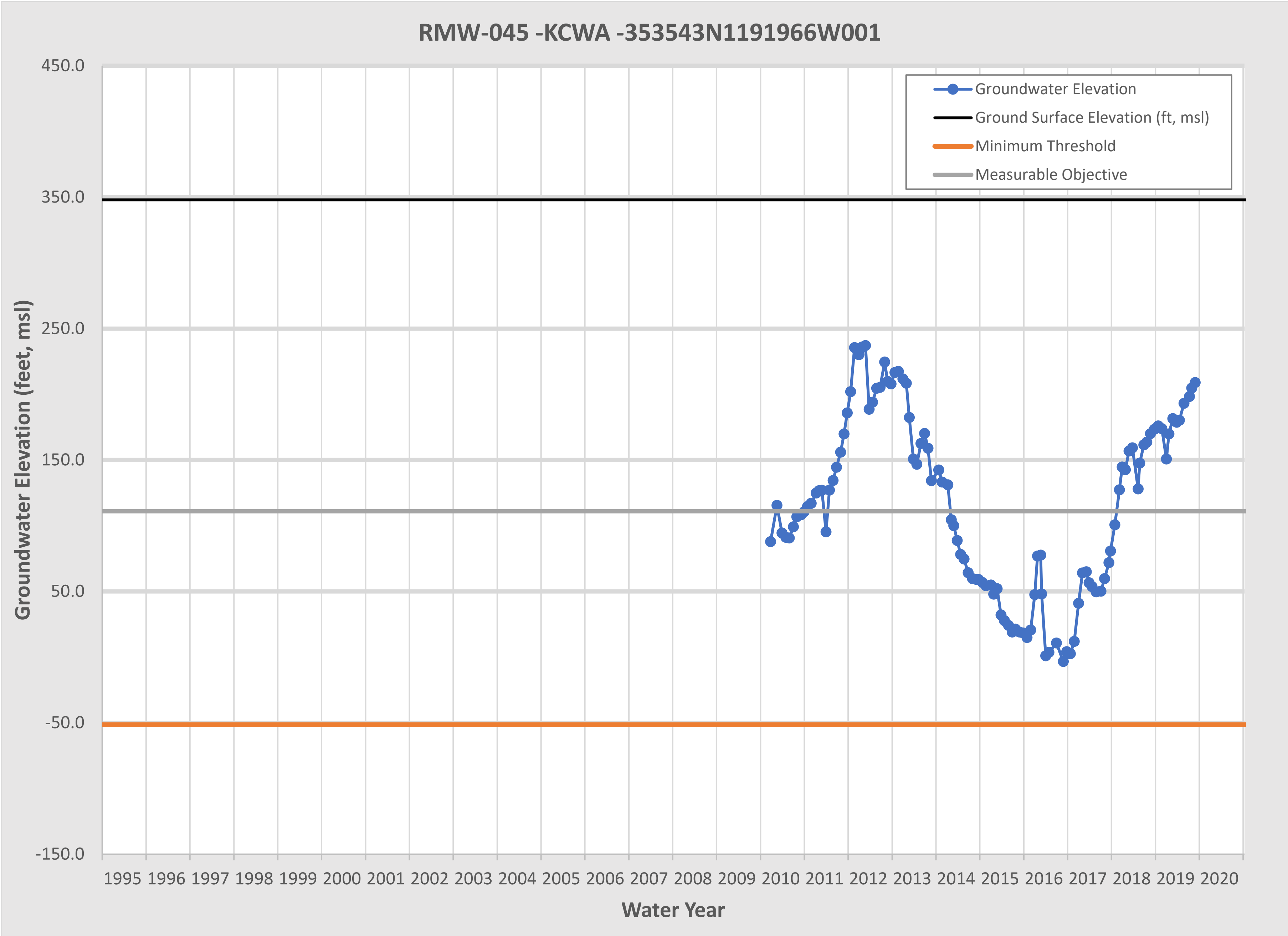


RMW-189 -EWMA -355706N1190911W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
950.0
750.0
550.0
350.0
150.0
-50.0
-250.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

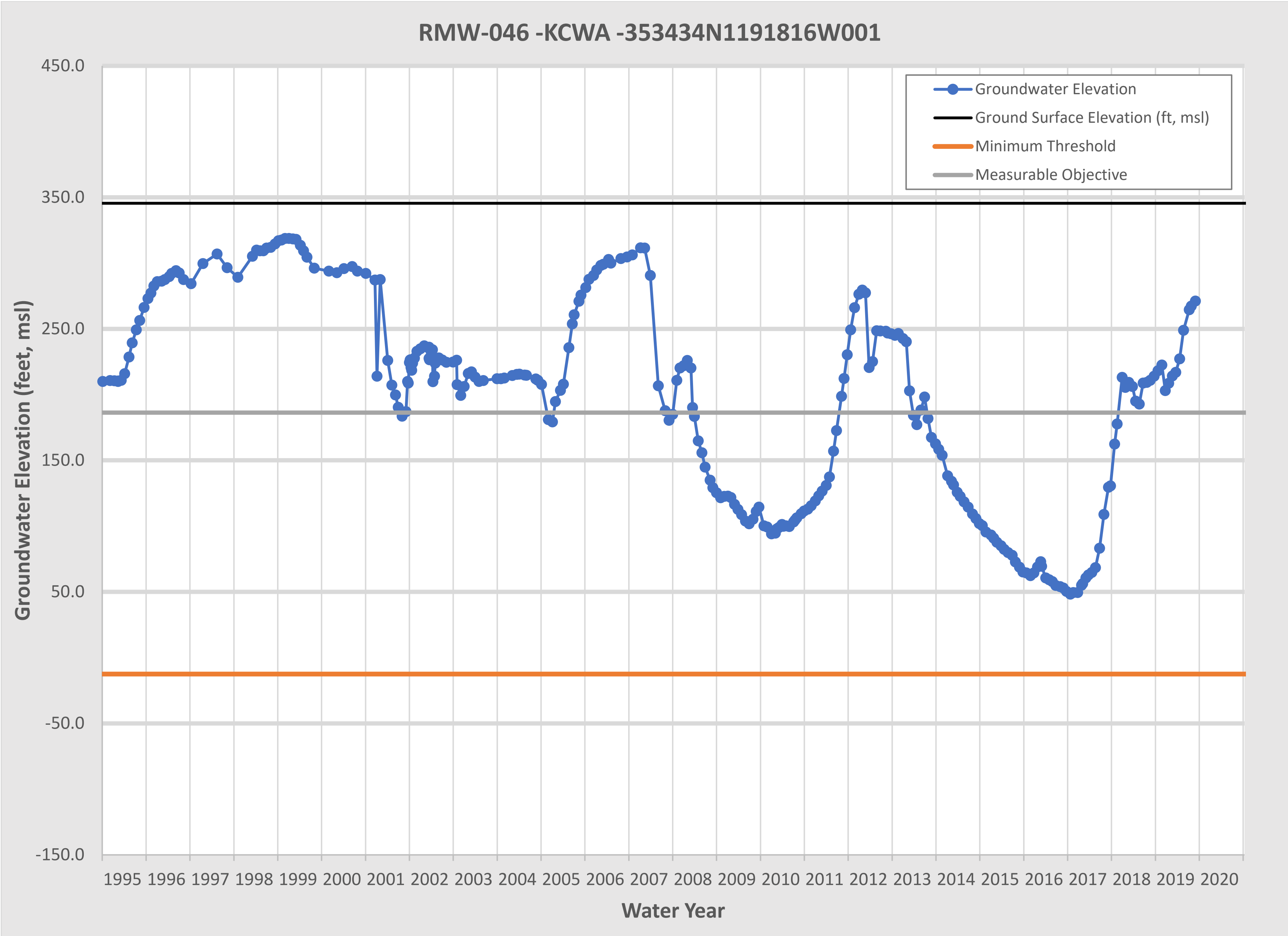

RMW-190 -EWMA -355260N1189710W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
950.0
750.0
550.0
350.0
150.0
-50.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

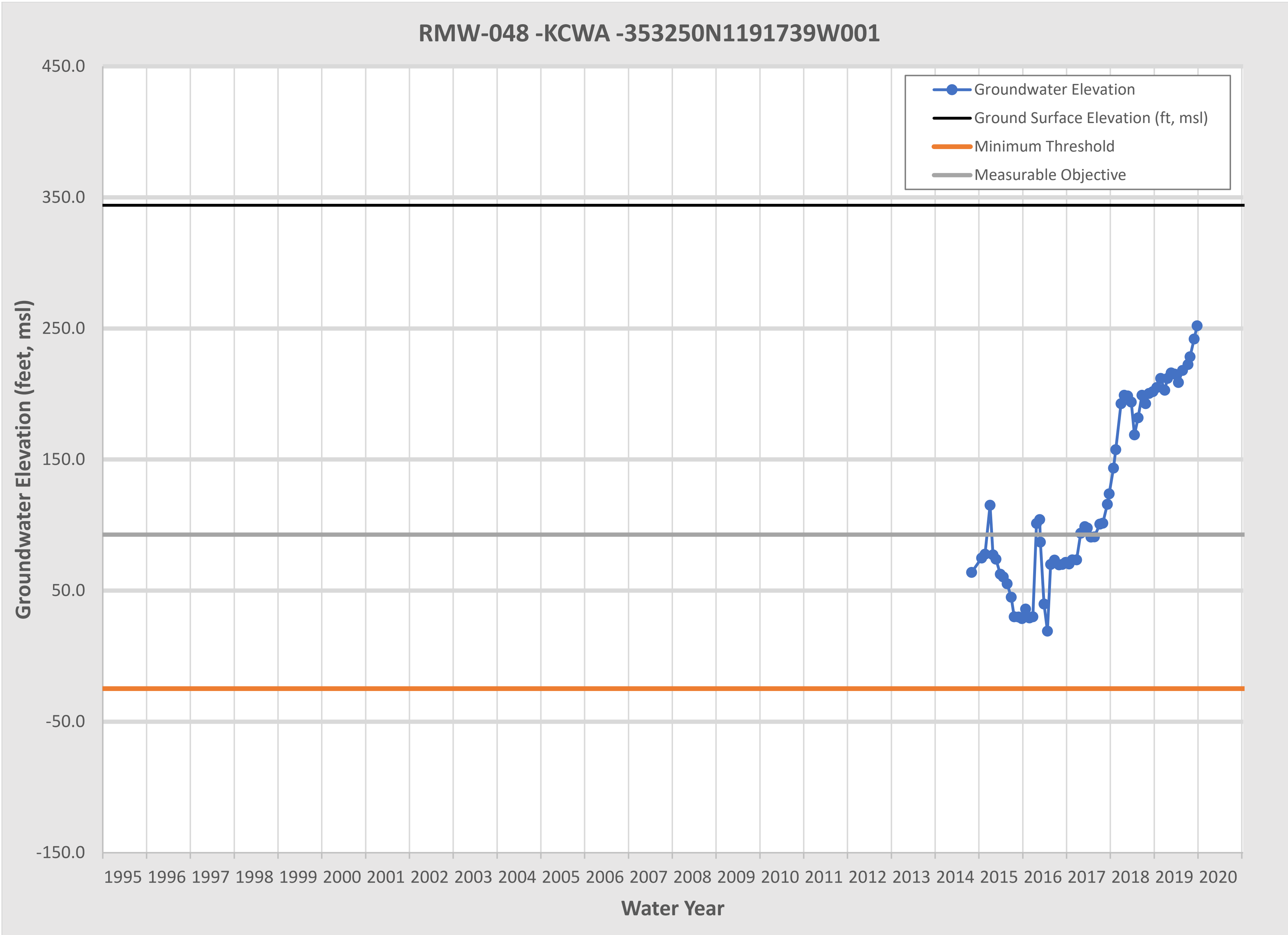


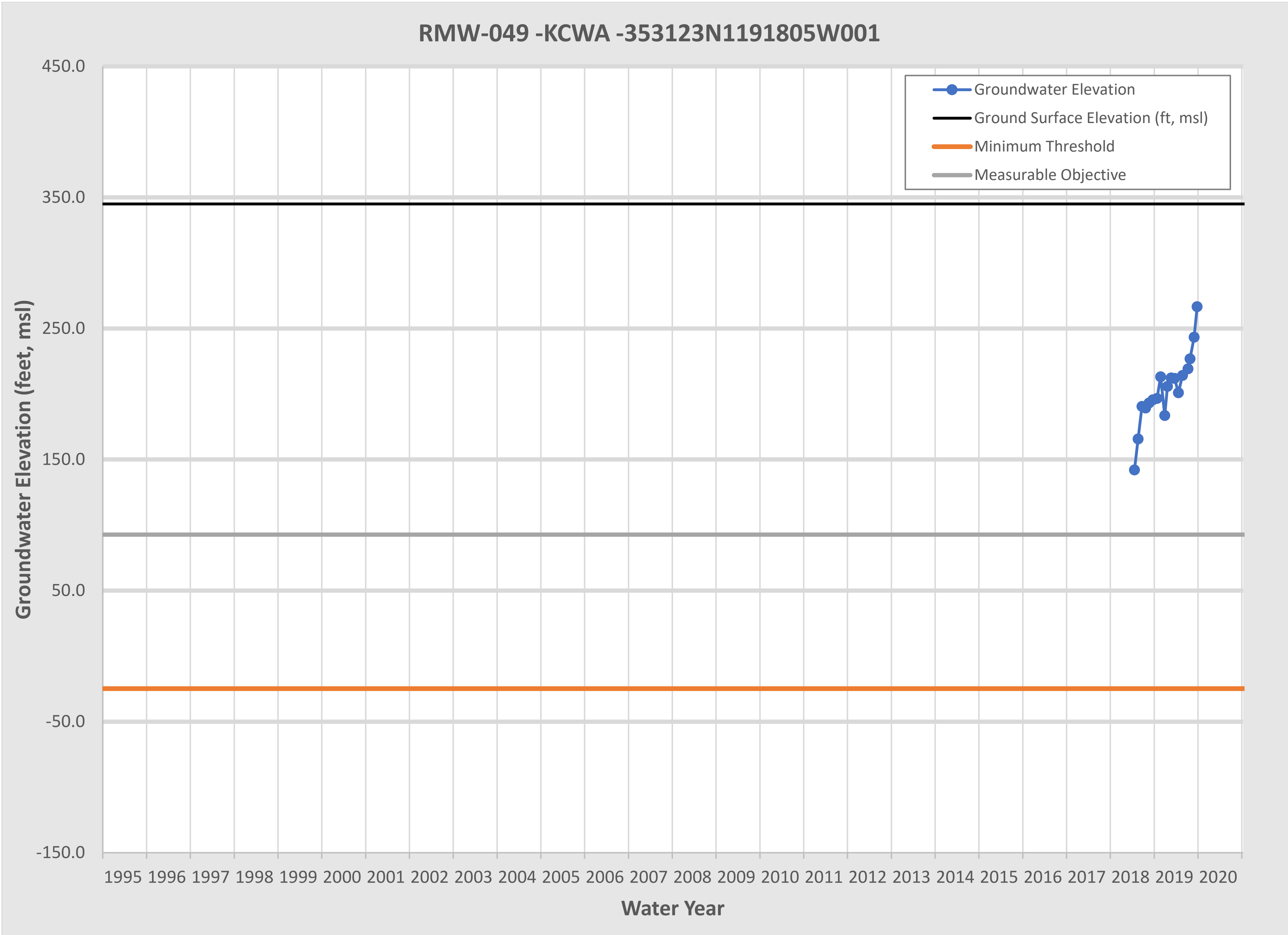
30S26E04J03 -KCWA -353434N1191816W001
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective



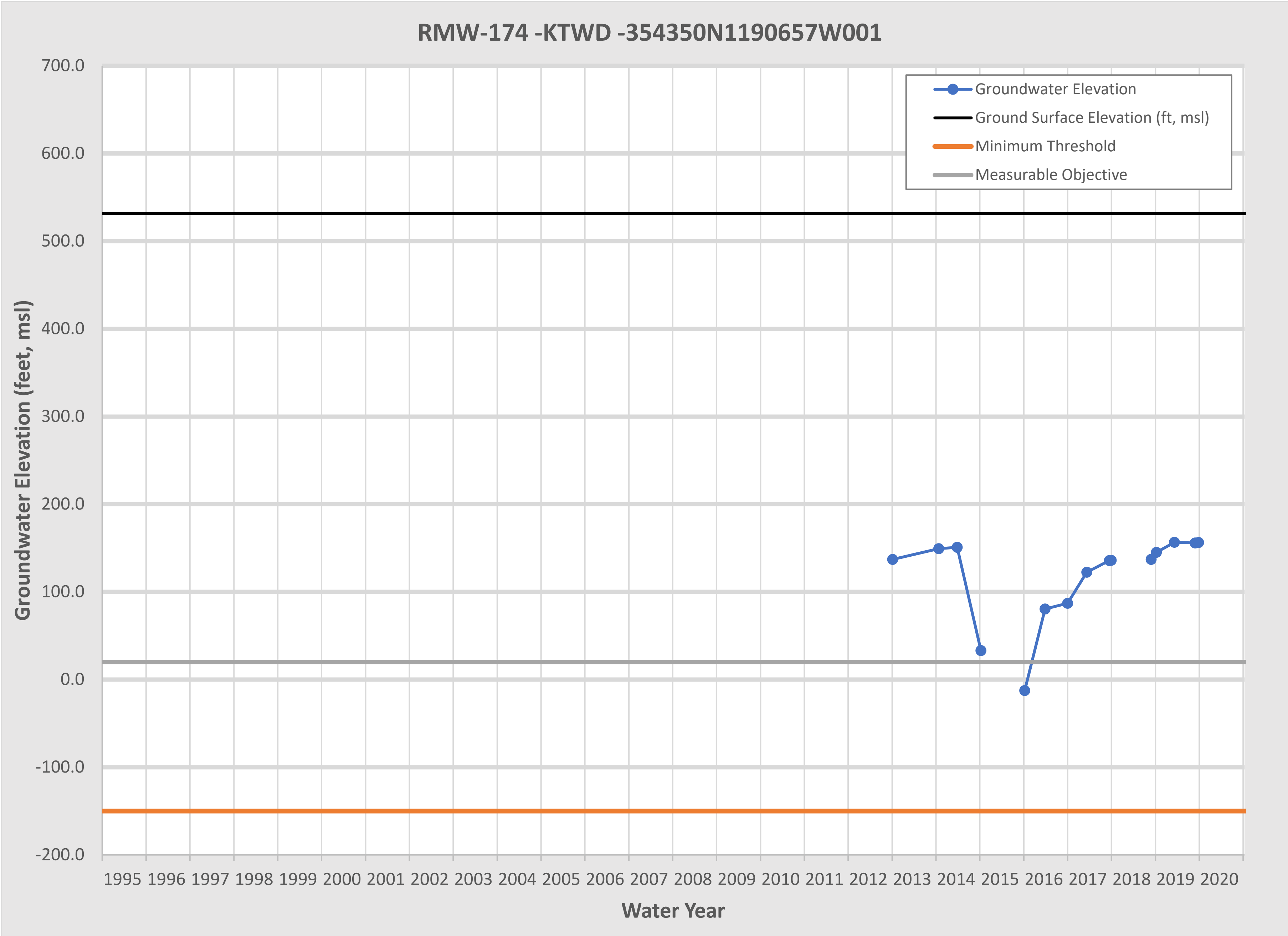
RMW-045 -KCWA -353543N1191966W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-046 -KCWA -353434N1191816W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

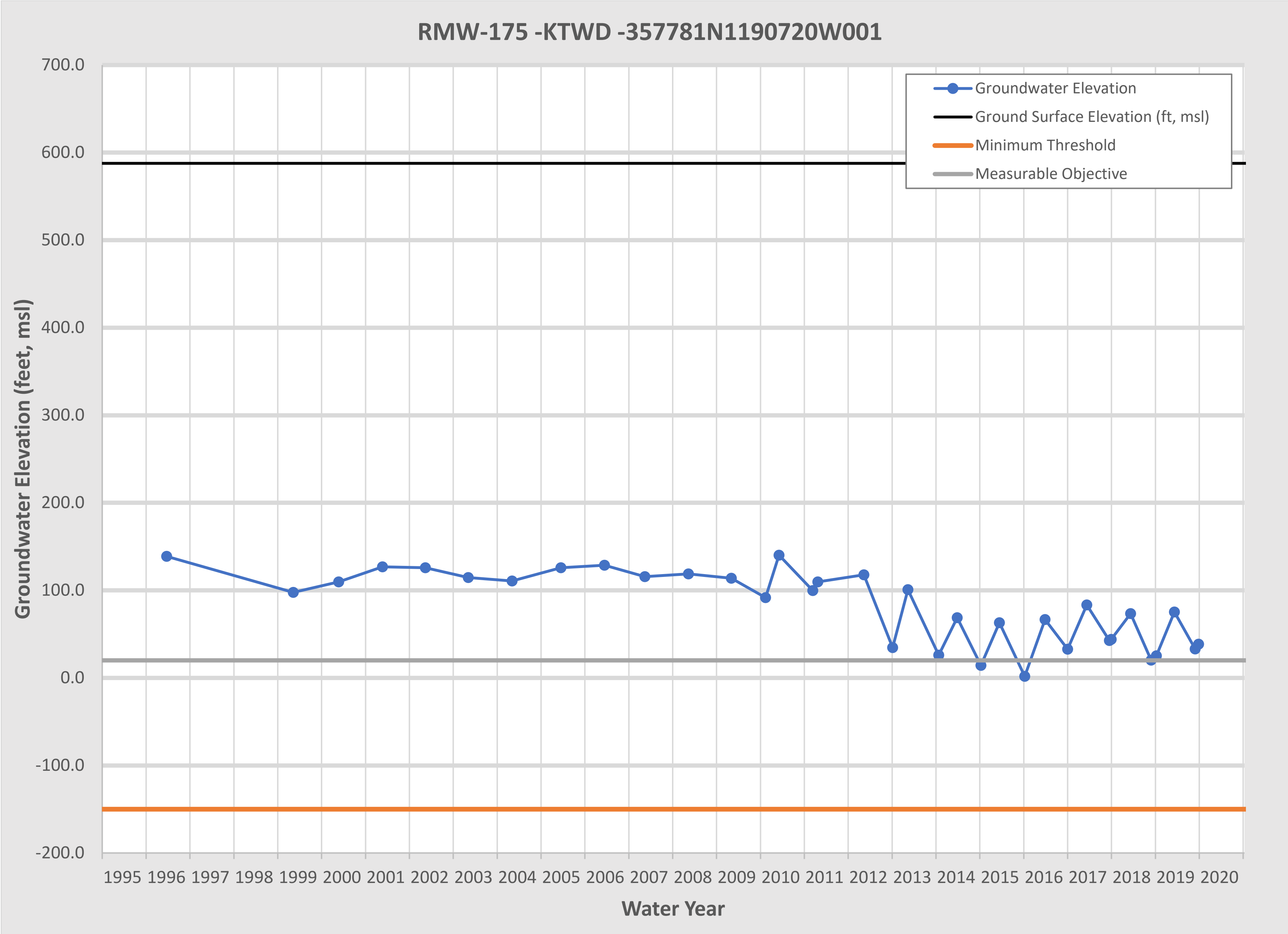

RMW-048 -KCWA -353250N1191739W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

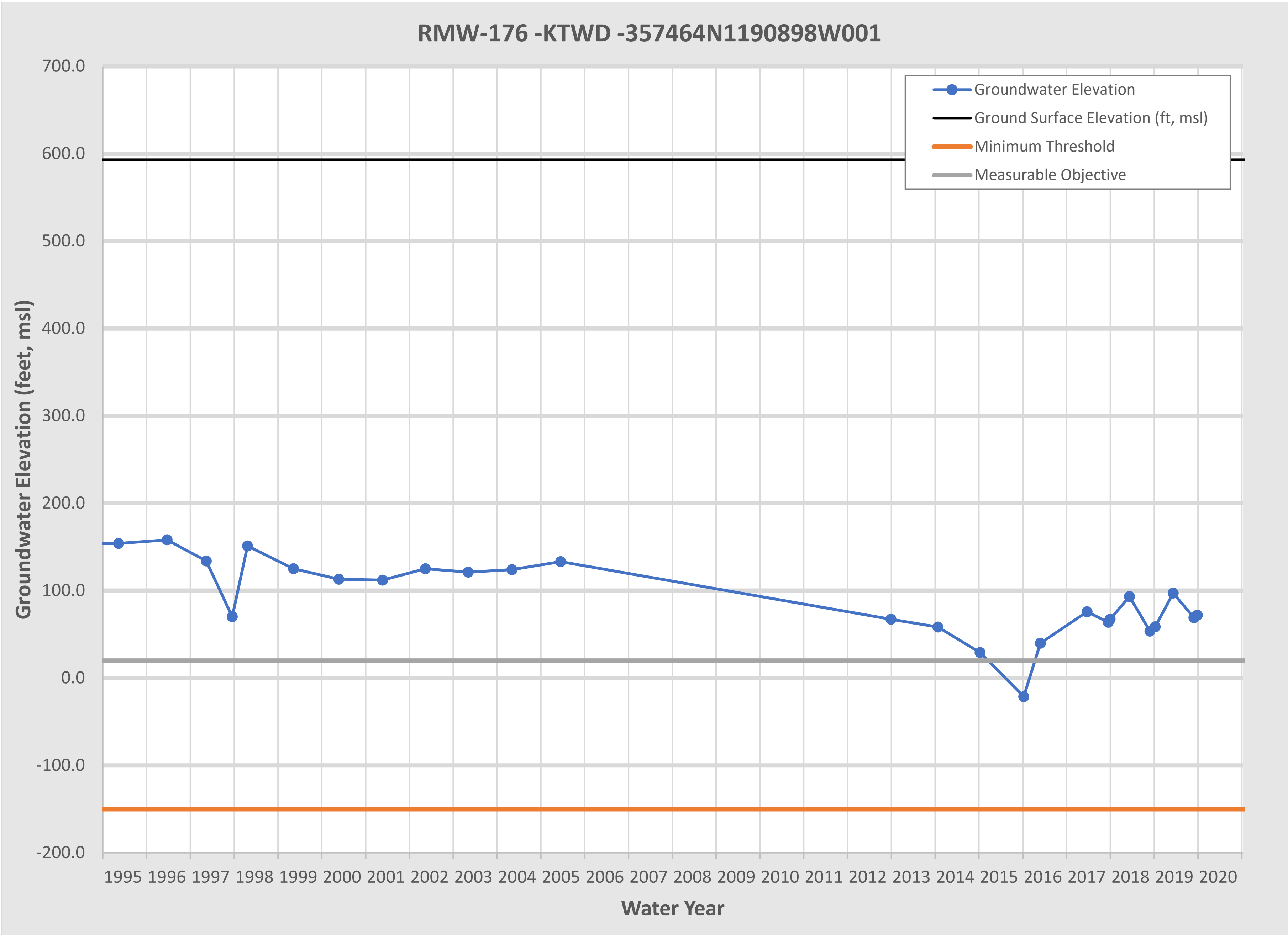


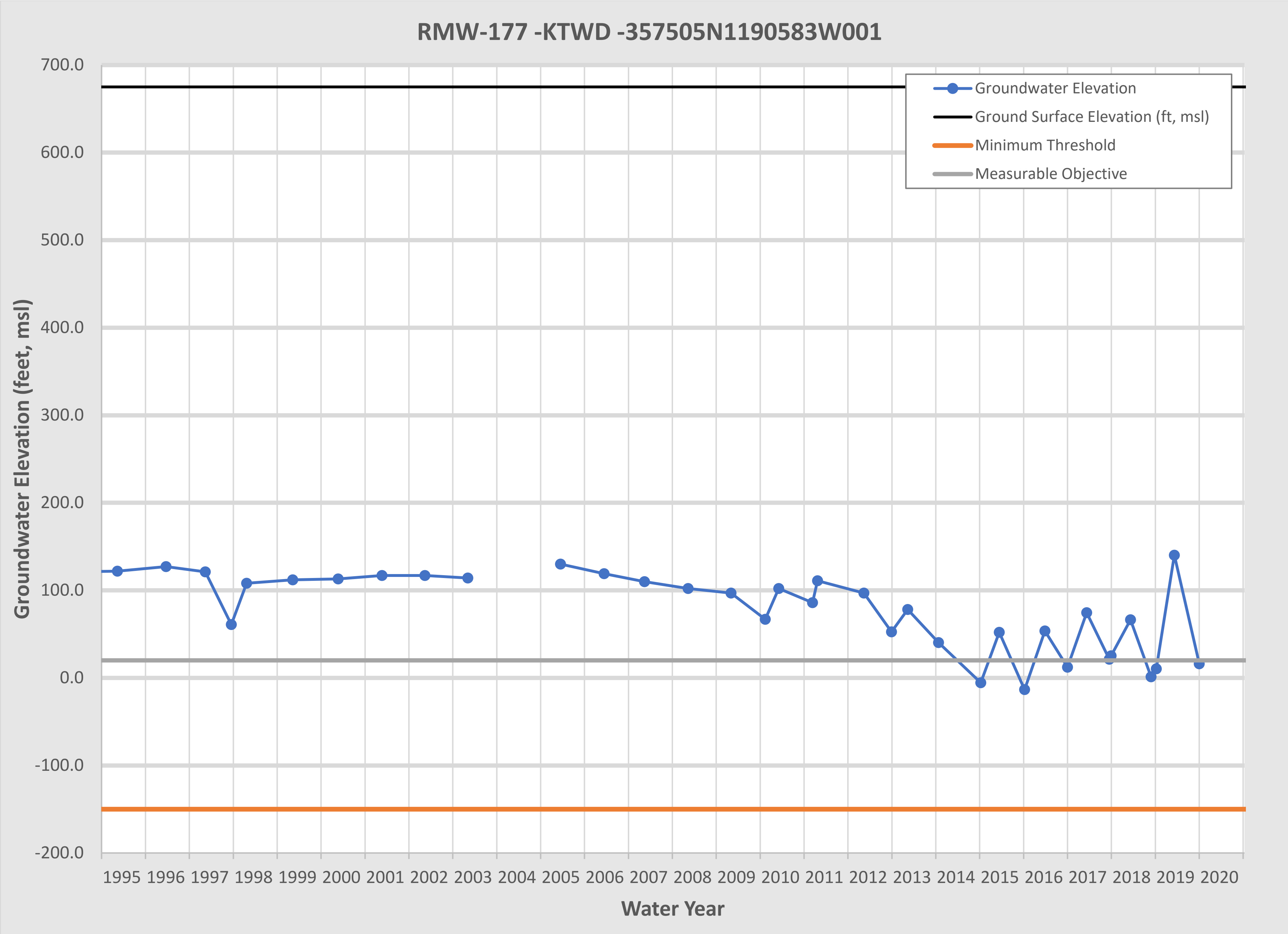
RMW-049 -KCWA -353123N1191805W001
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

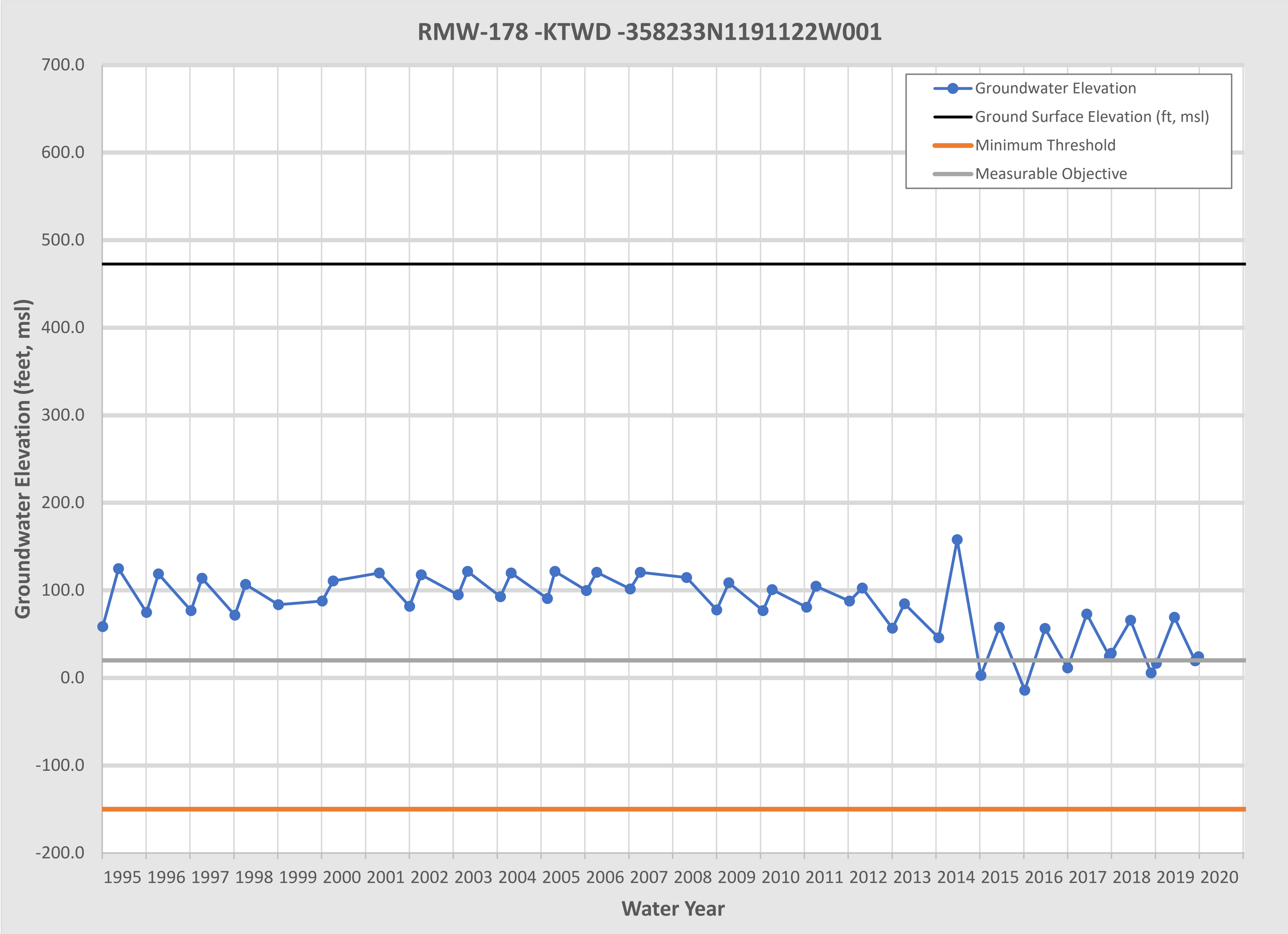


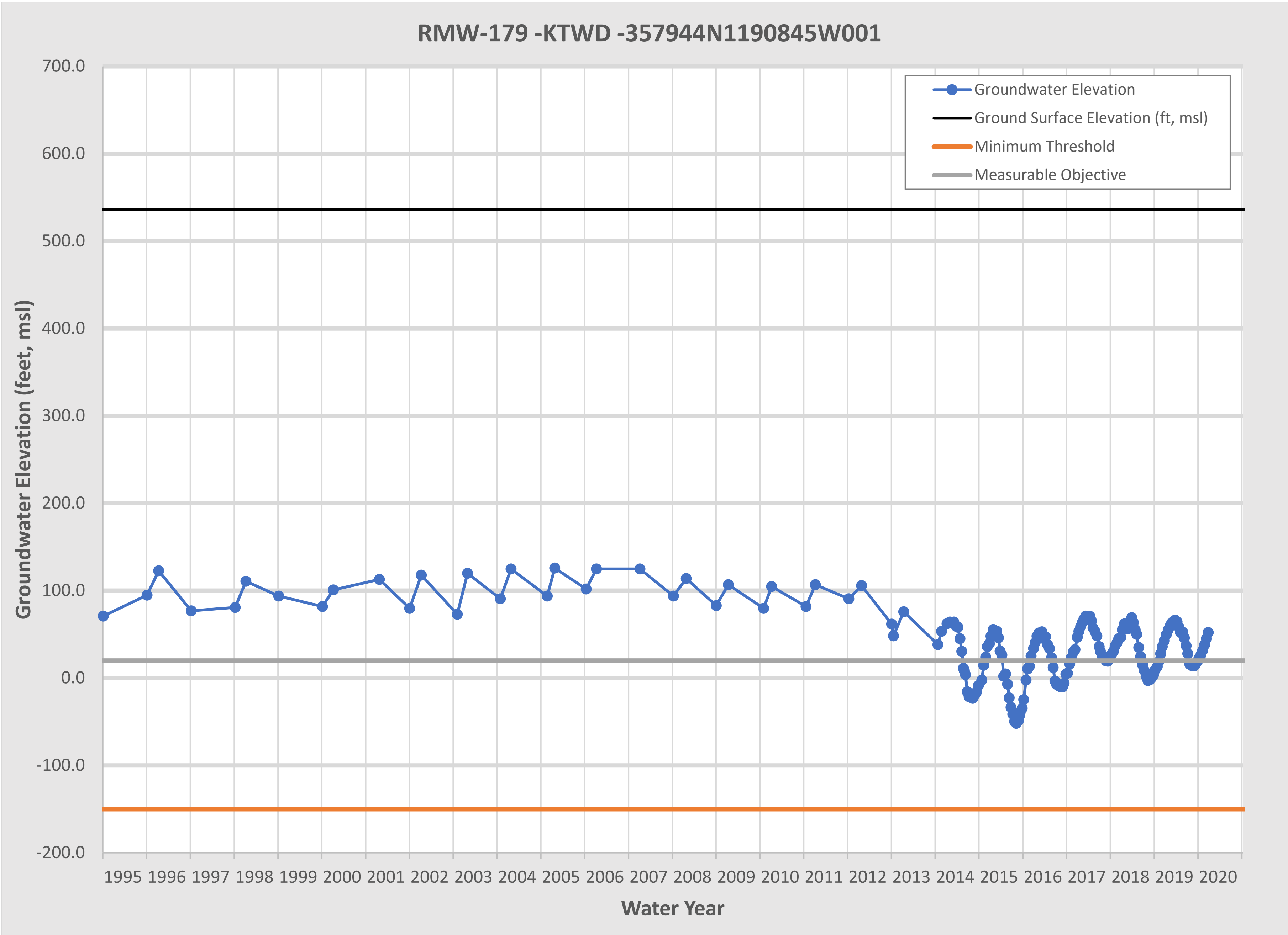
RMW-174 -KTWD -354350N1190657W001
Groundwater Elevation (feet, msl)
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective


RMW-175 -KTWD -357781N1190720W001
Groundwater Elevation (feet, msl)
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

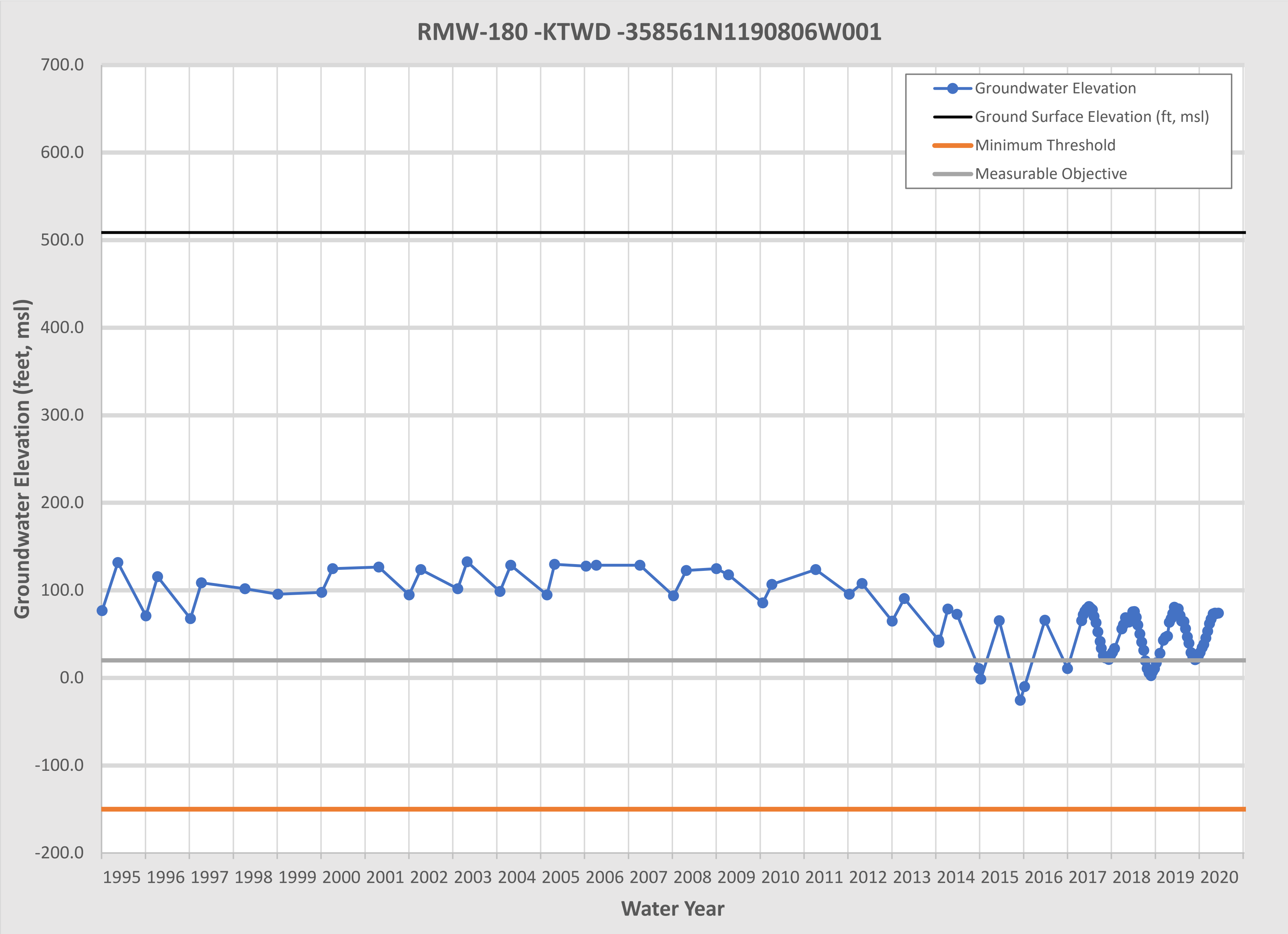

RMW-176 -KTWD -357464N1190898W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-177 -KTWD -357505N1190583W001
Groundwater Elevation (feet, msl)
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

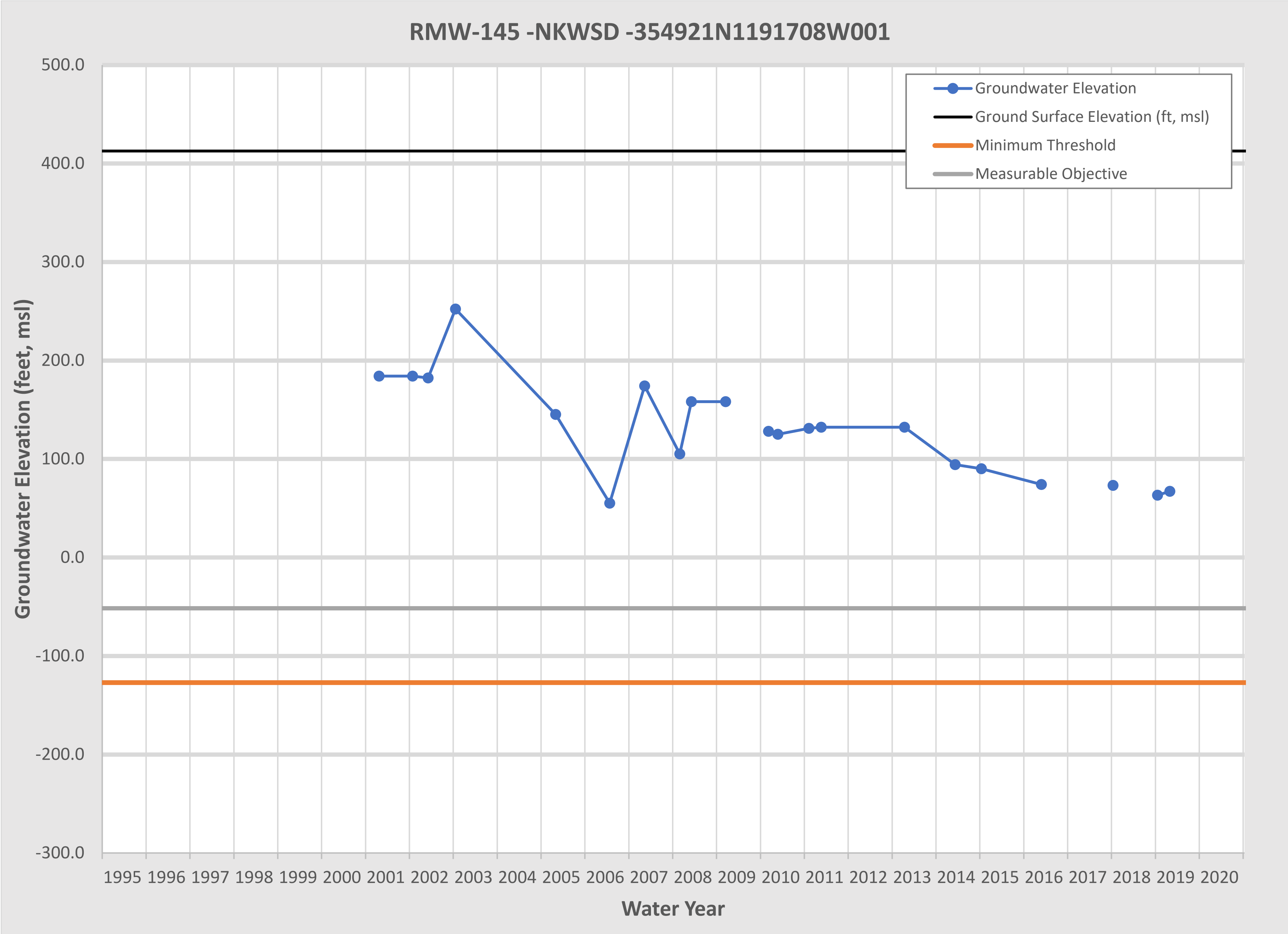

RMW-178 -KTWD -358233N1191122W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

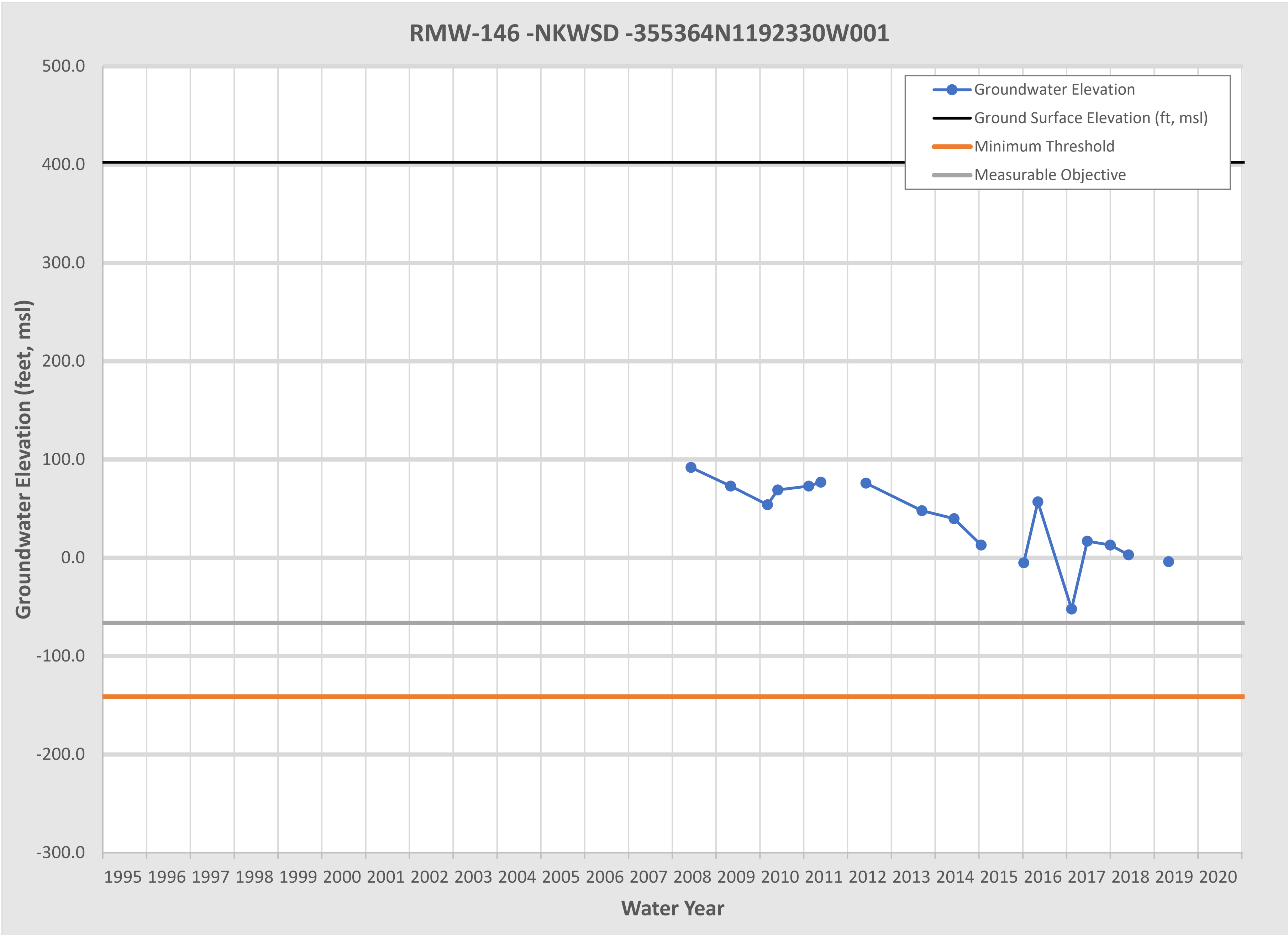


RMW-179 -KTWD -357944N1190845W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

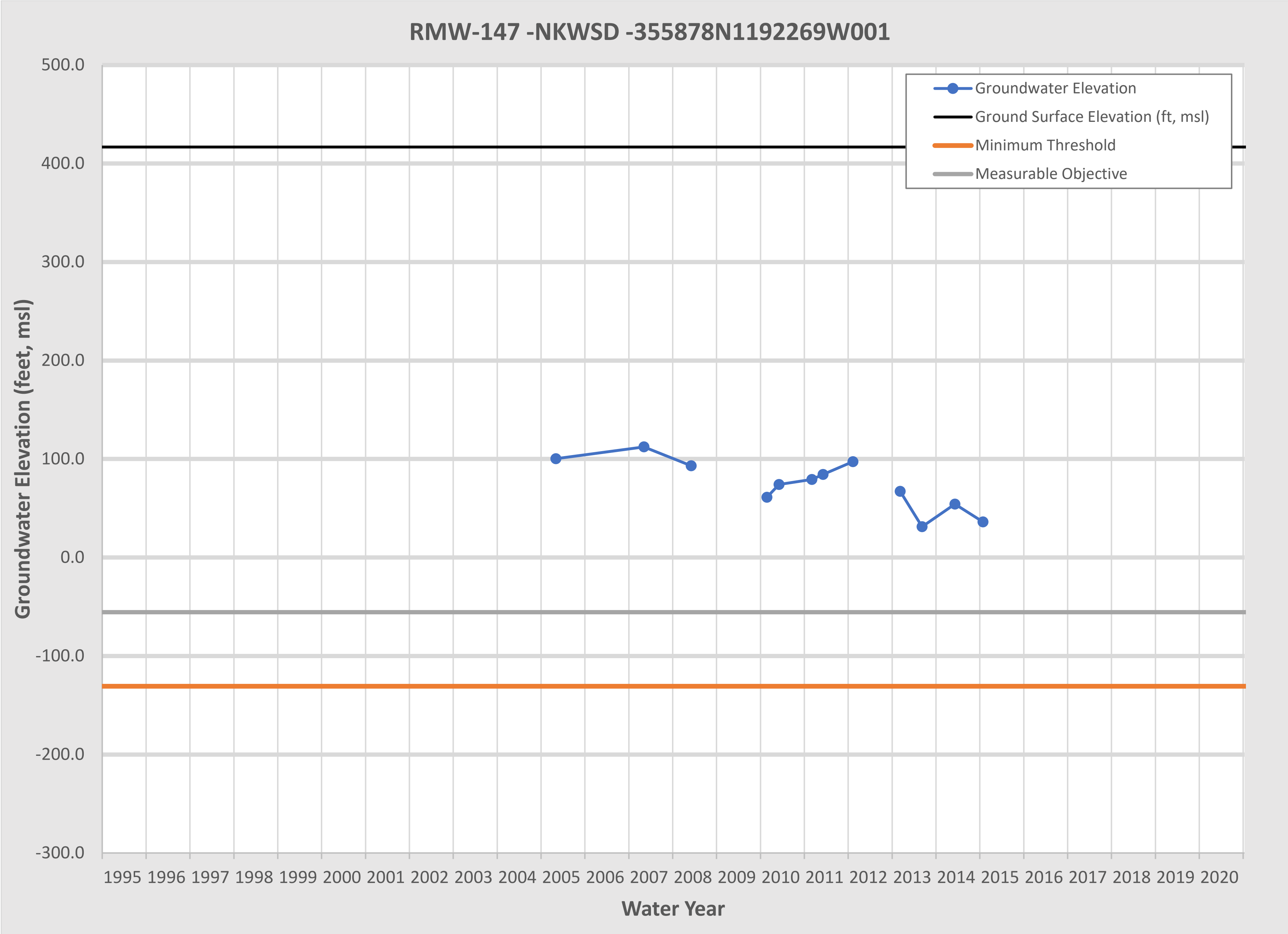


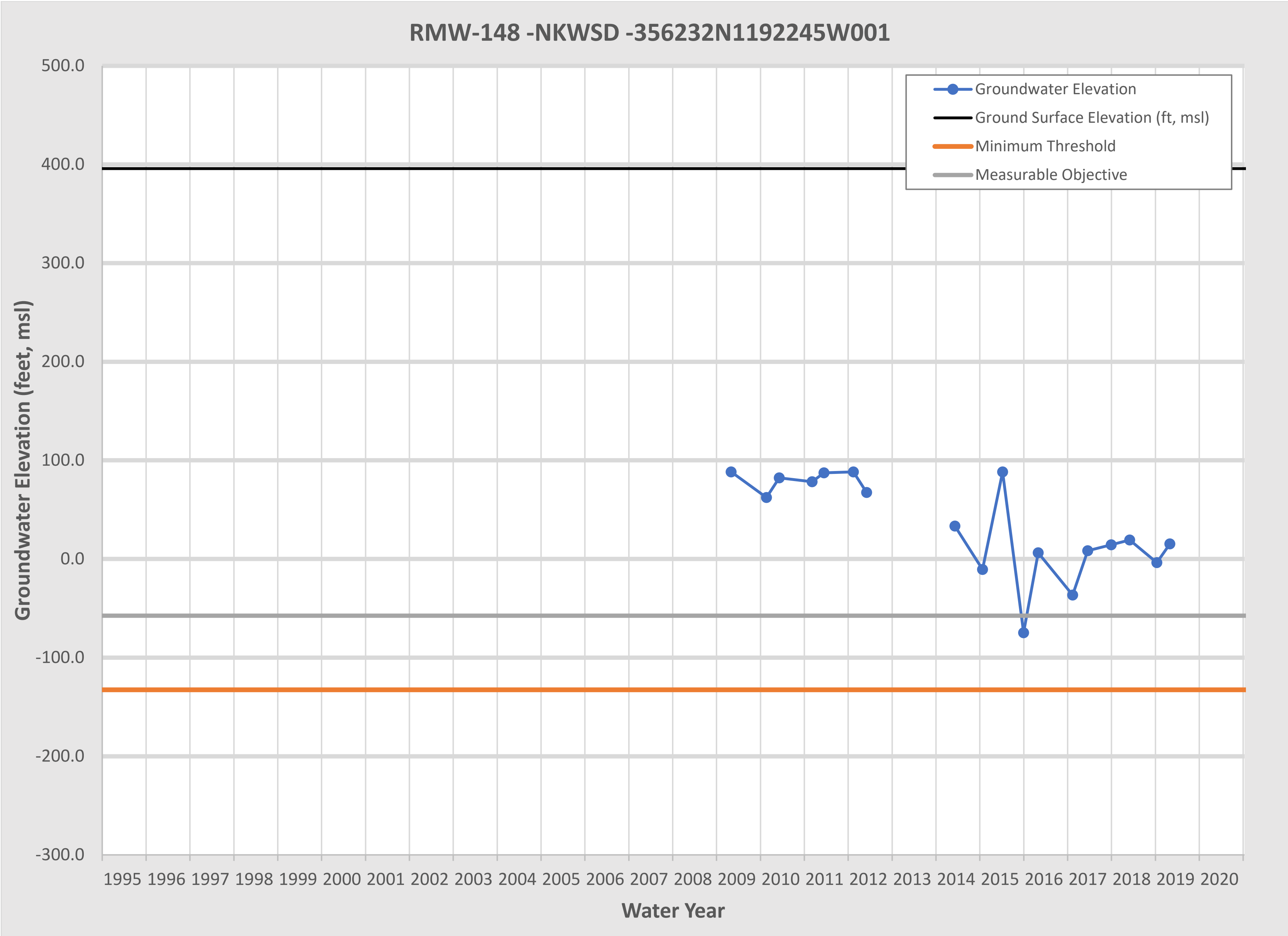
RMW-180 -KTWD -358561N1190806W001
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective


RMW-145 -NKWSD -354921N1191708W001
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

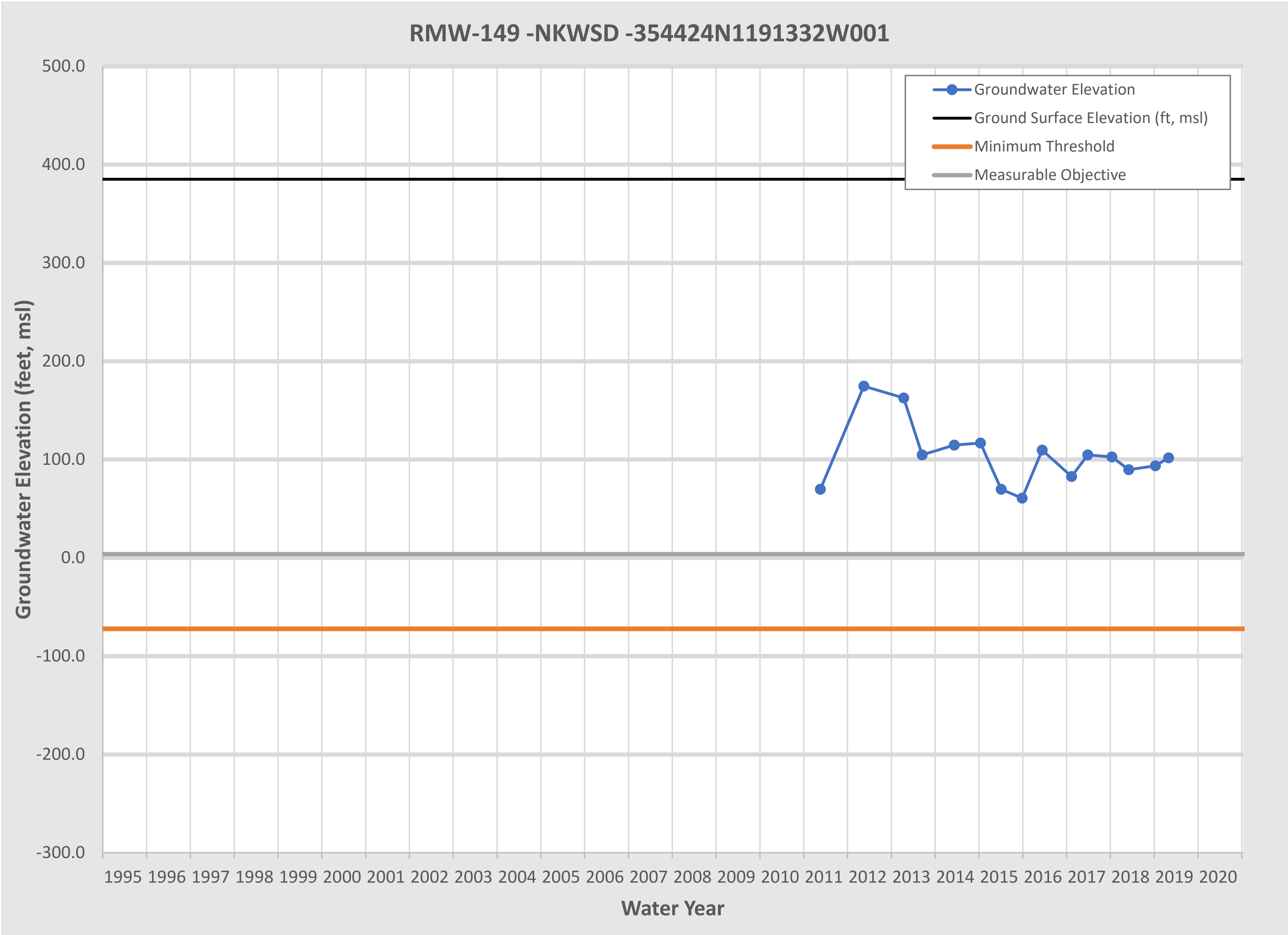


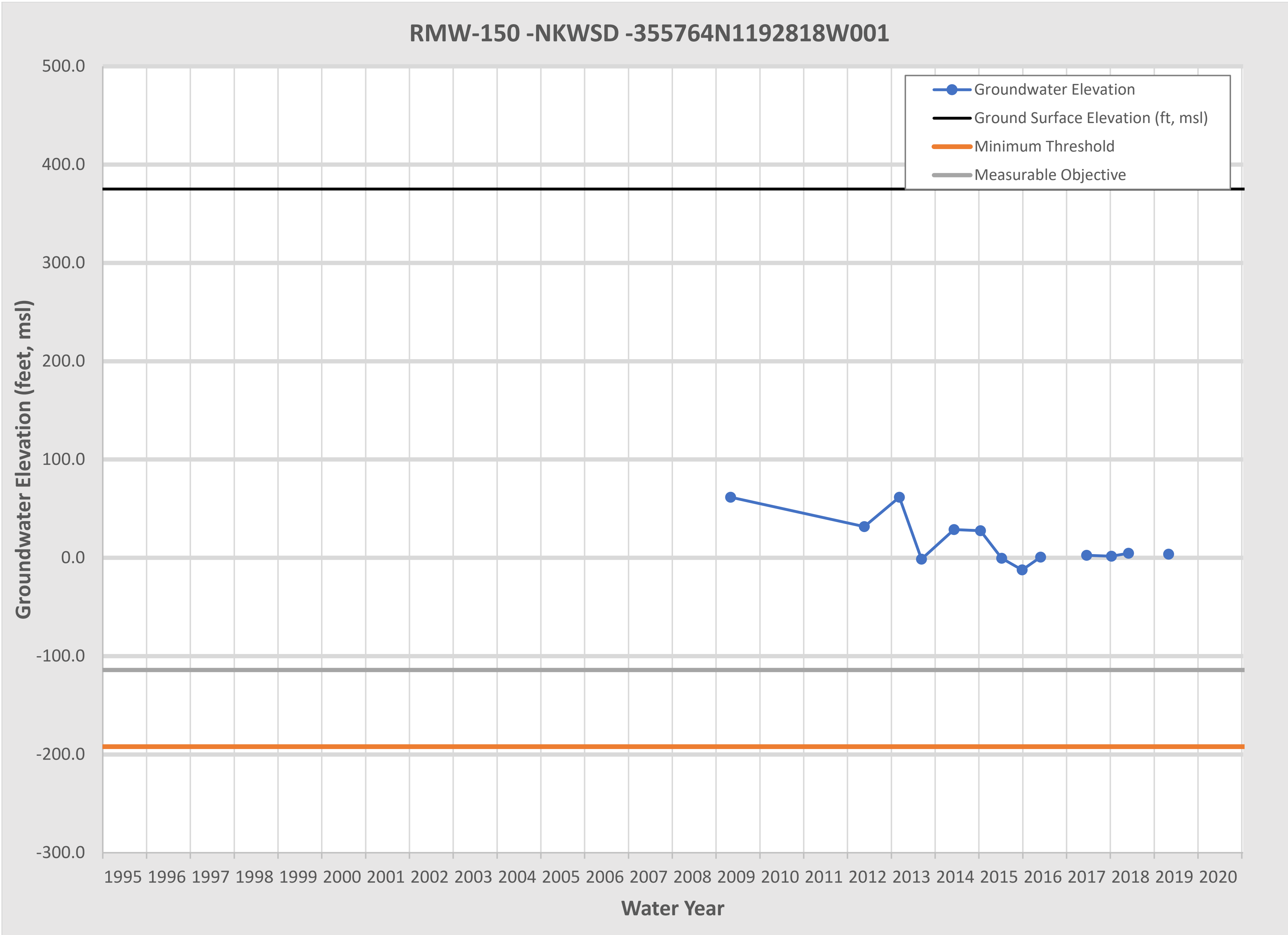
RMW-146 -NKWSD -355364N1192330W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

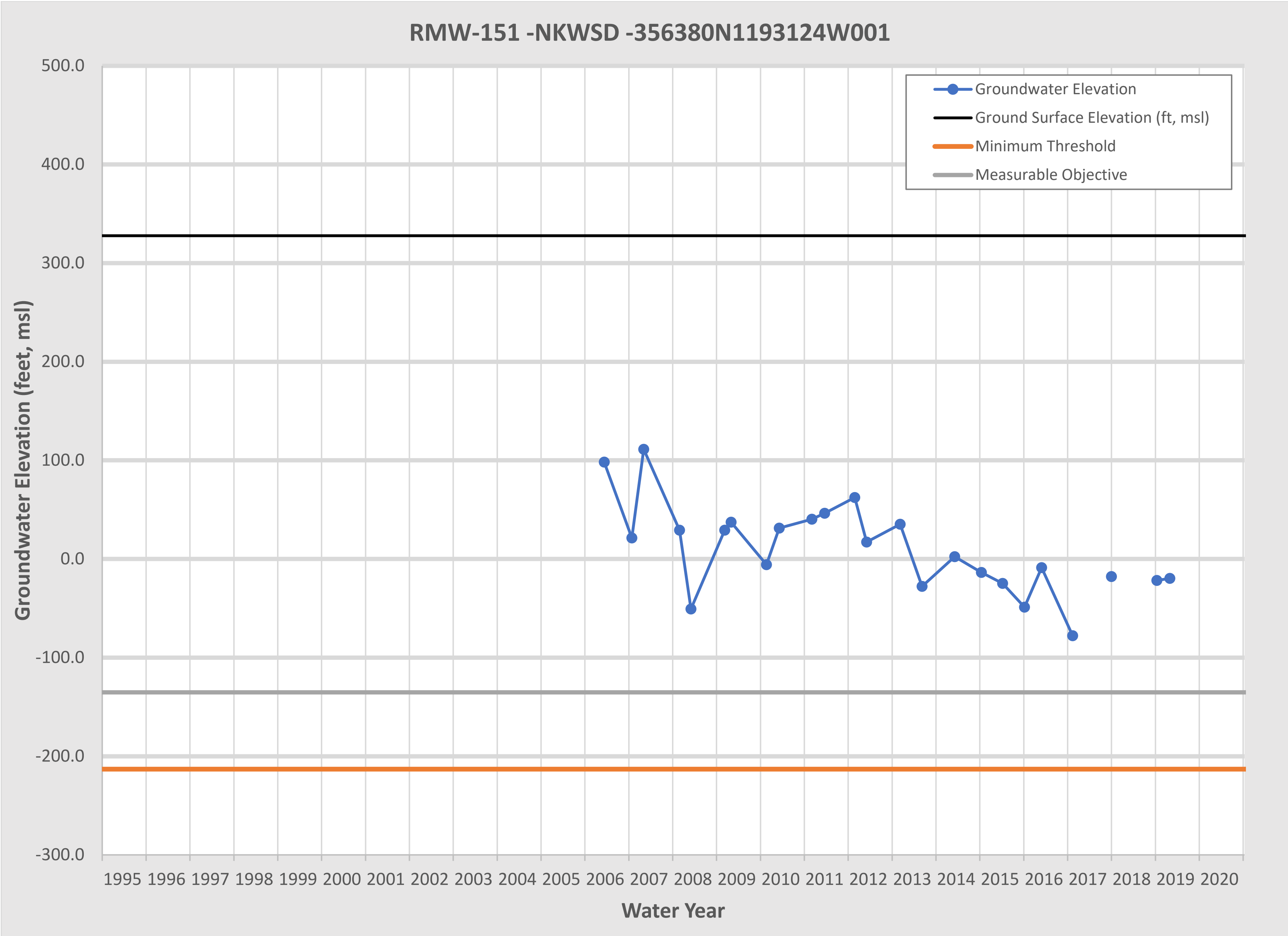

RMW-147 -NKWSD -355878N1192269W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

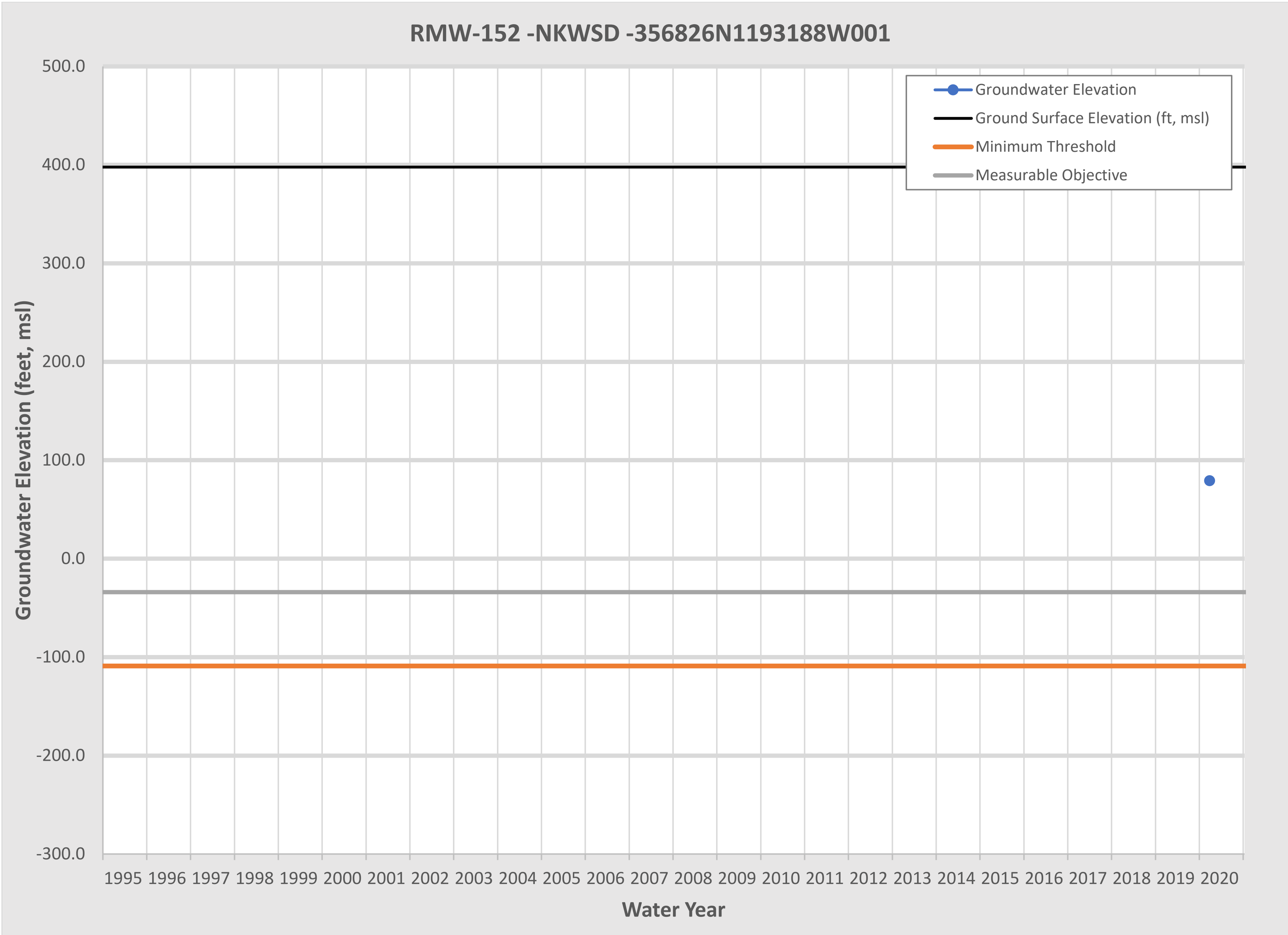


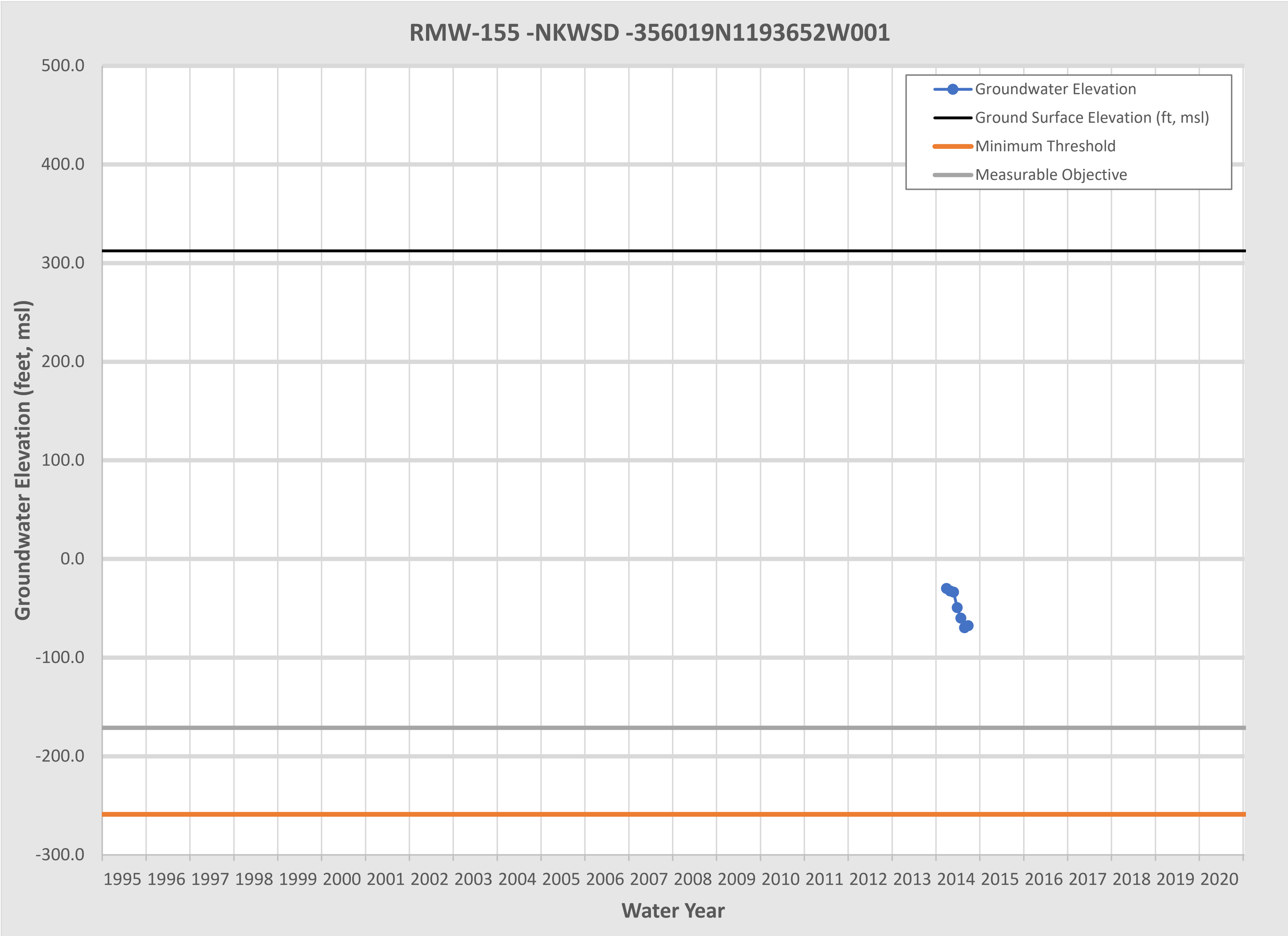
RMW-148 -NKWSD -356232N1192245W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-149 -NKWSD -354424N1191332W001
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

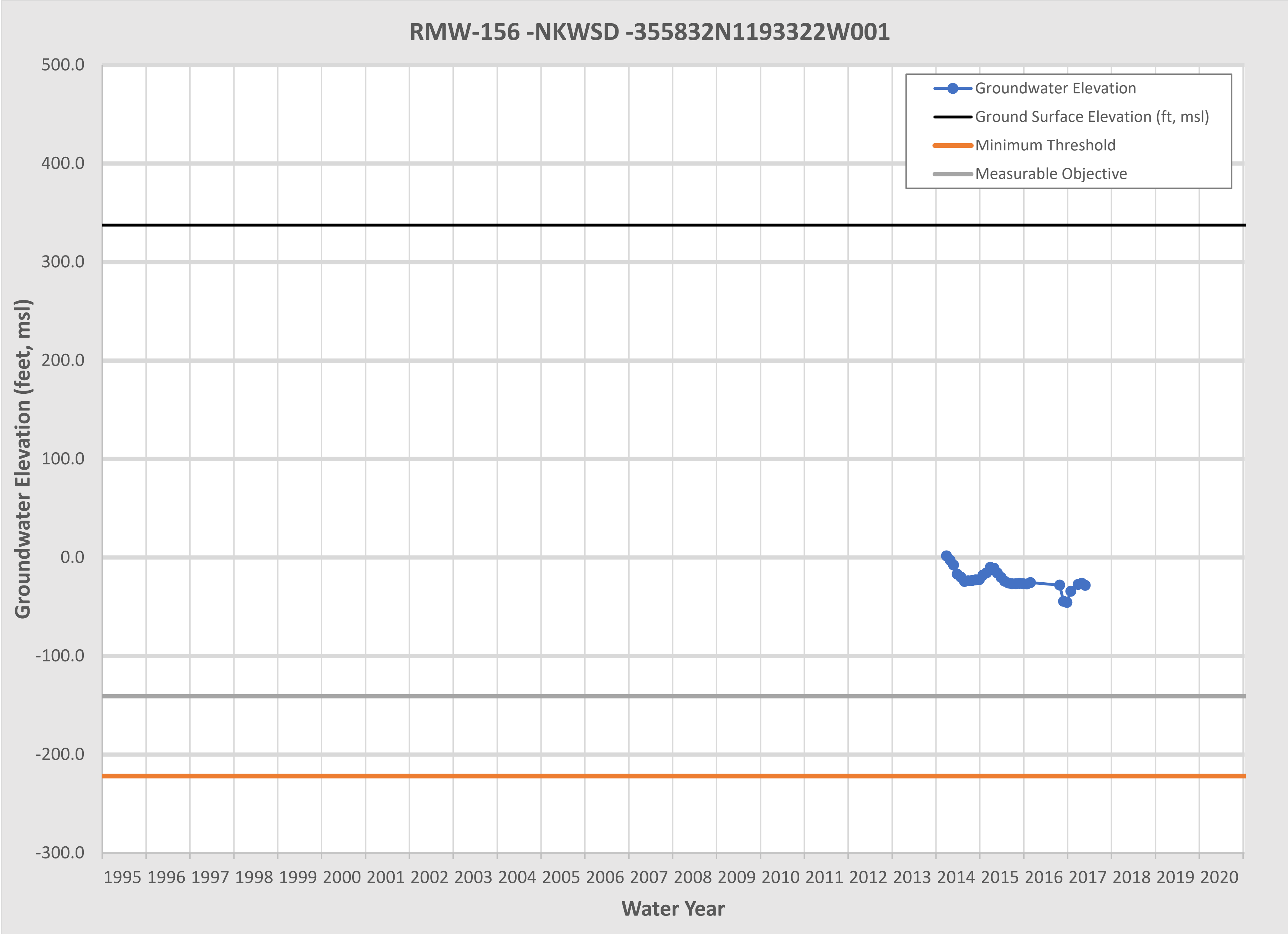

RMW-150 -NKWSD -355764N1192818W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

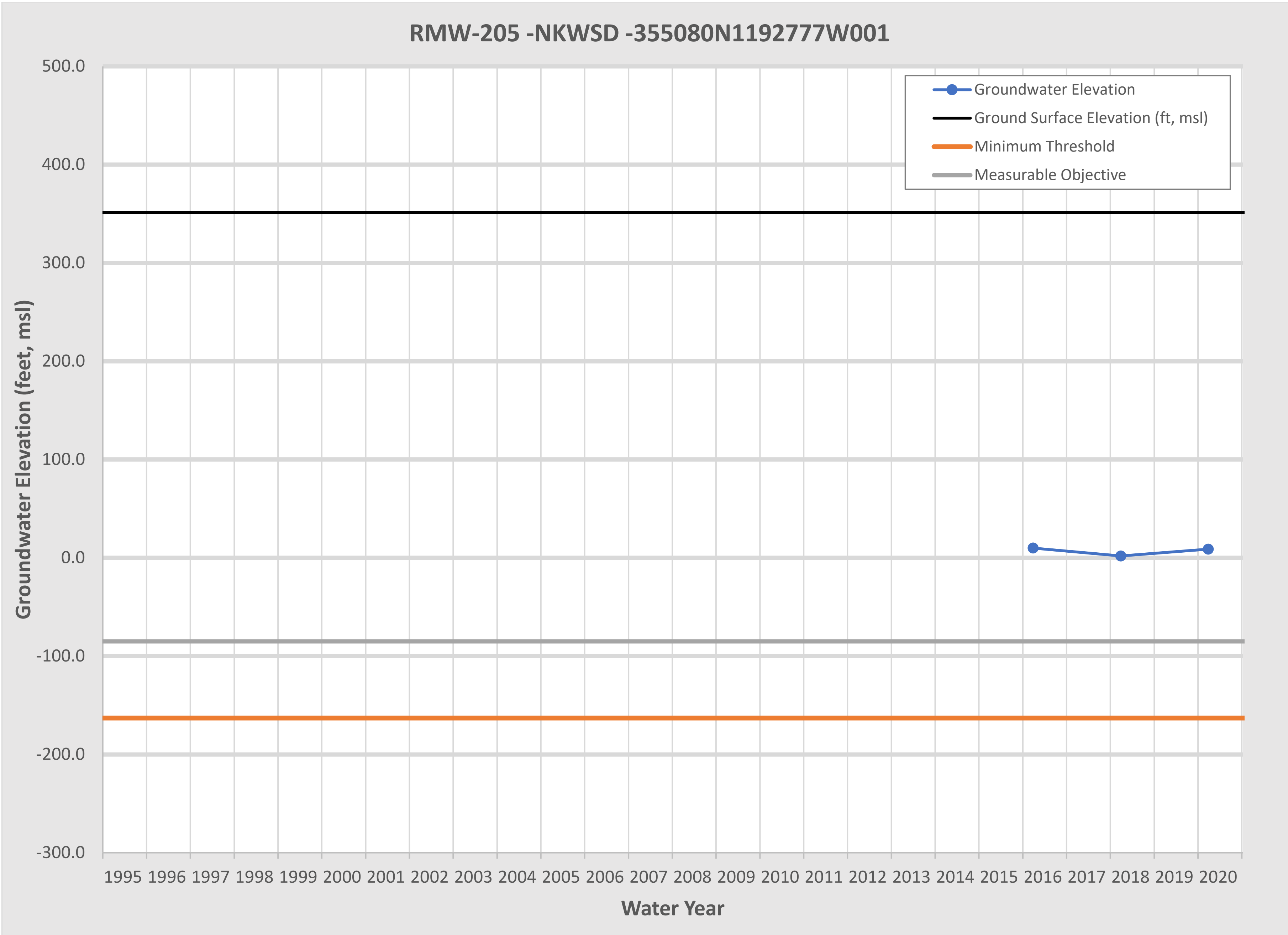

RMW-151 -NKWSD -356380N1193124W001
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

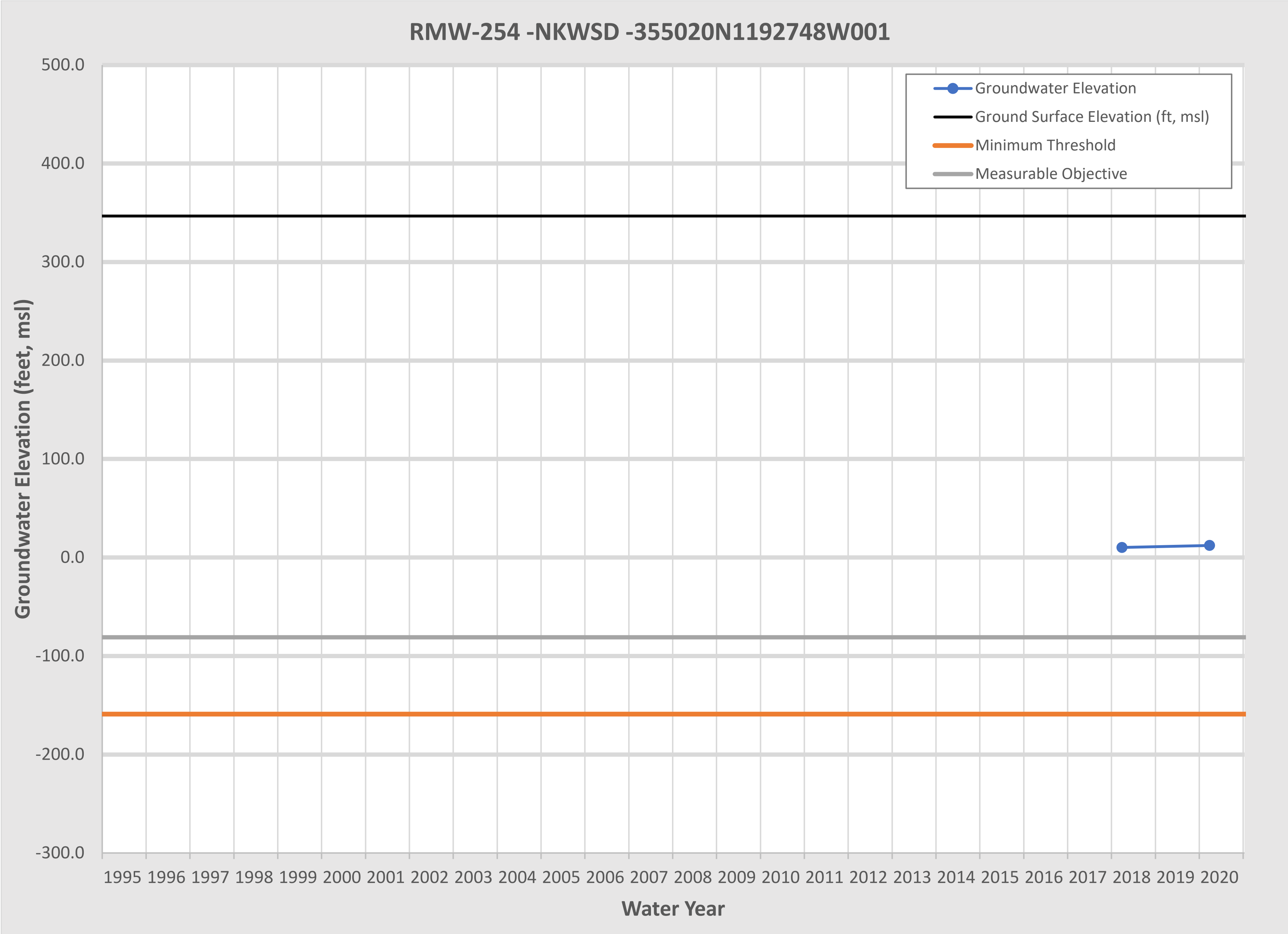

RMW-152 -NKWSD -356826N1193188W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

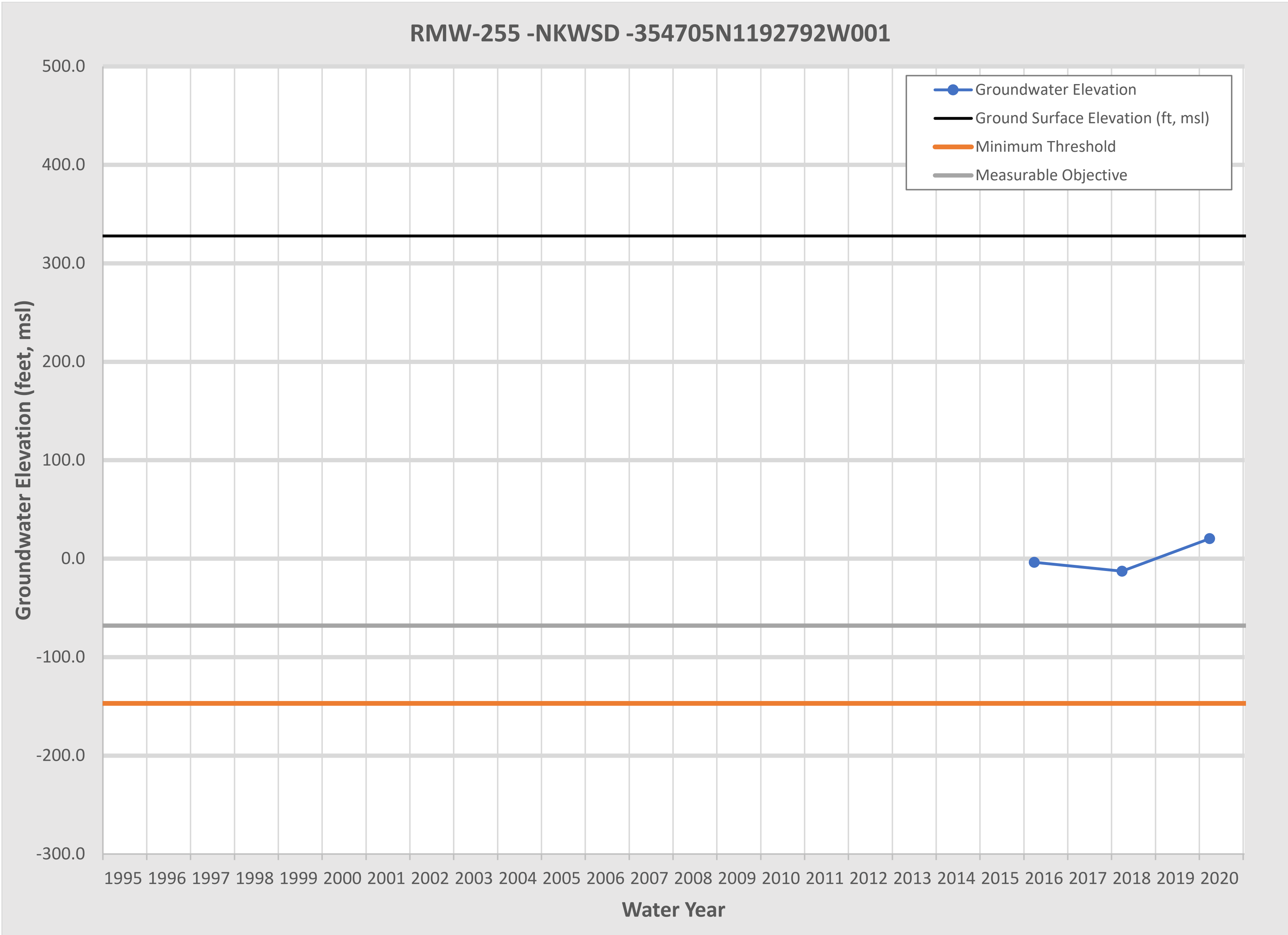


RMW-155 -NKWSD -356019N1193652W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

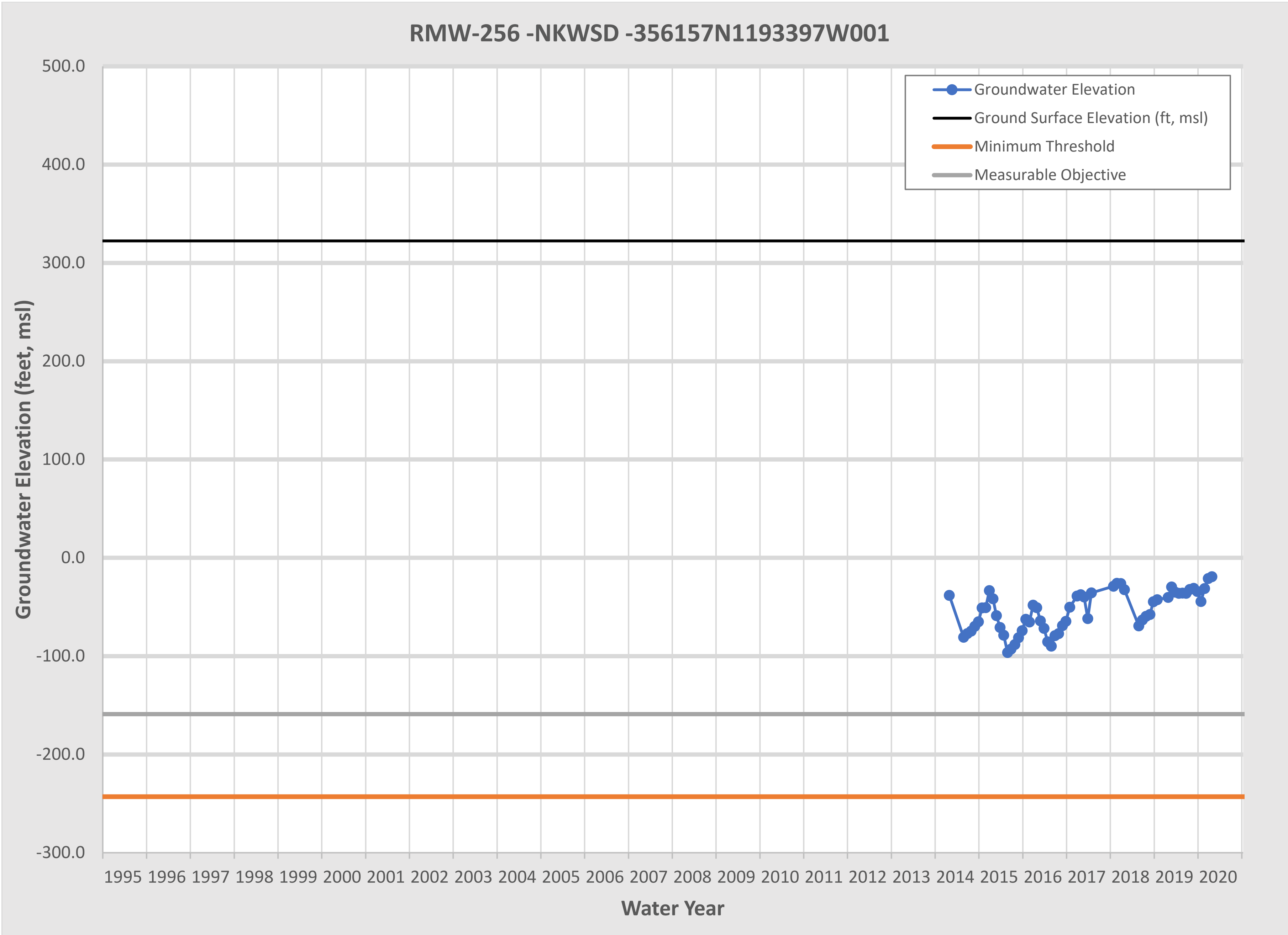

RMW-156 -NKWSD -355832N1193322W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

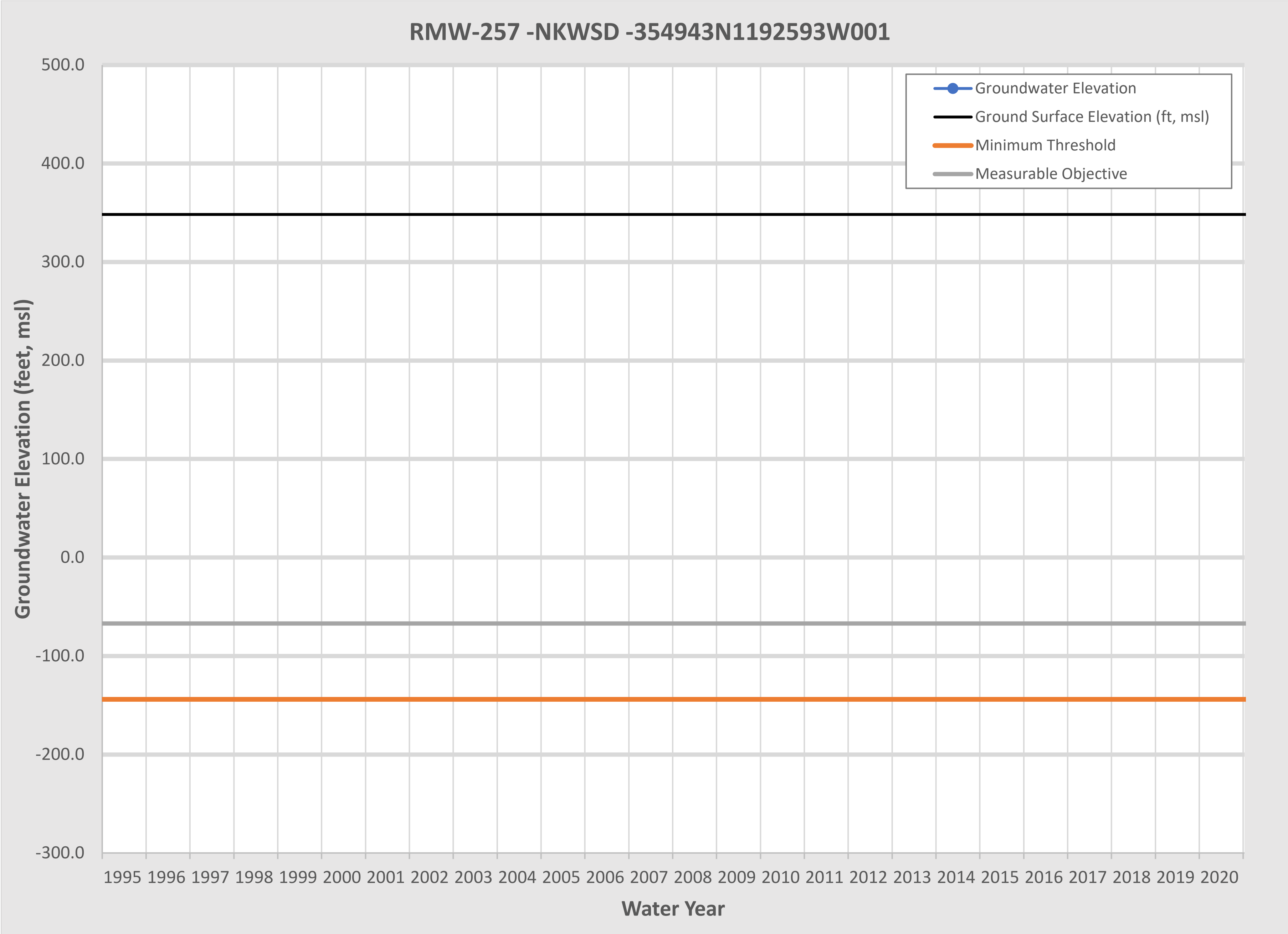

RMW-205 -NKWSD -355080N1192777W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

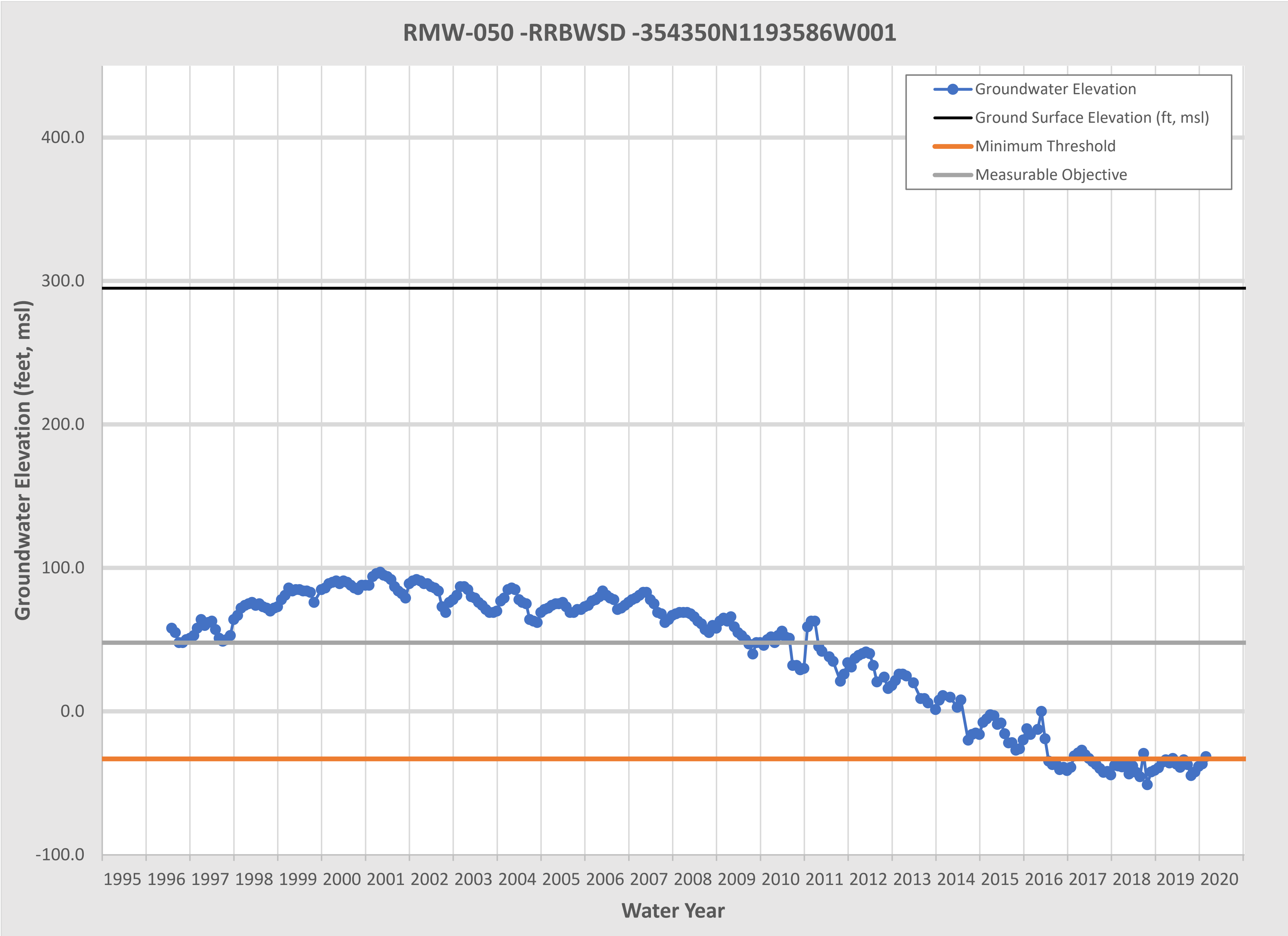

RMW-254 -NKWSD -355020N1192748W001
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

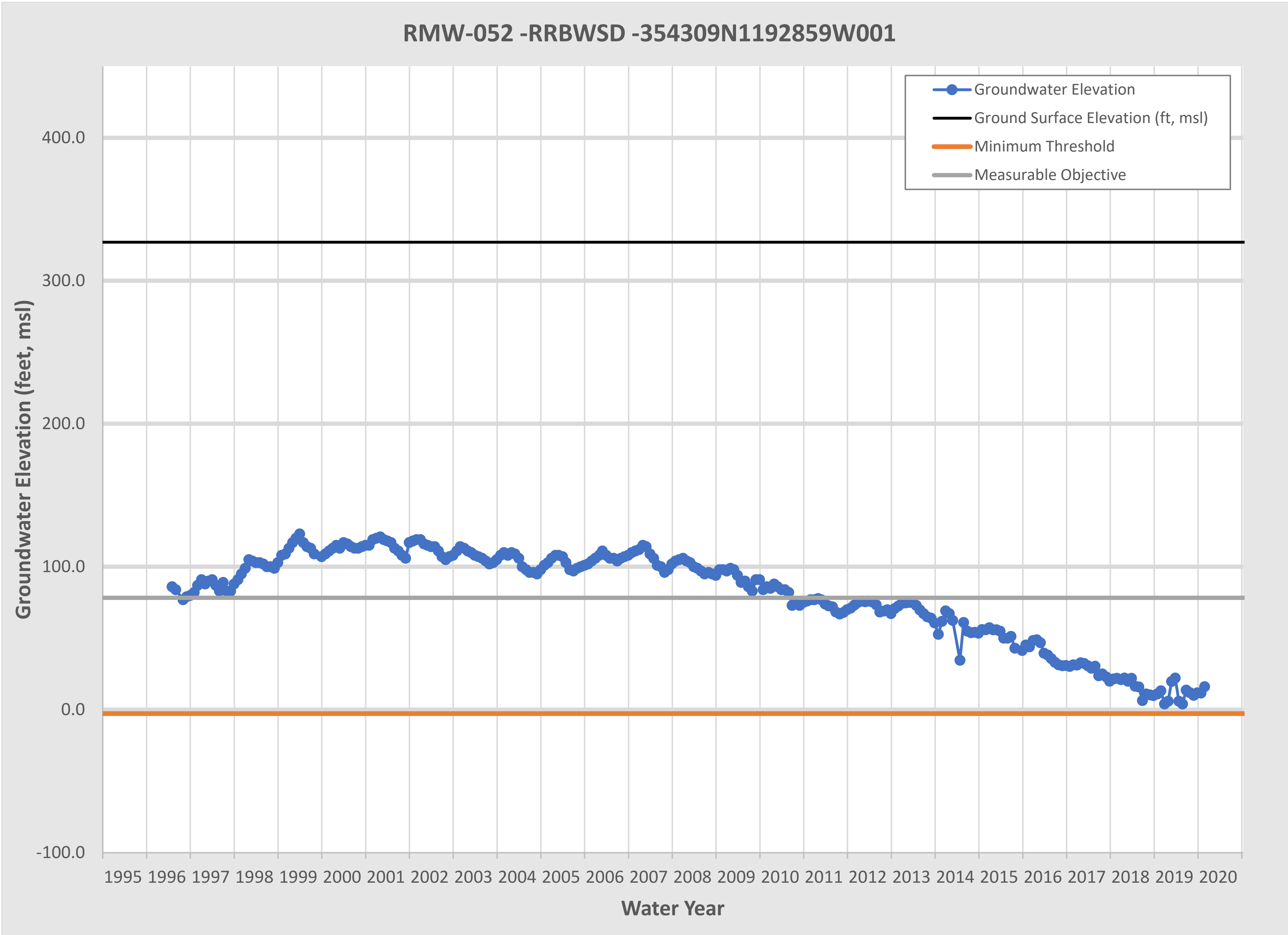


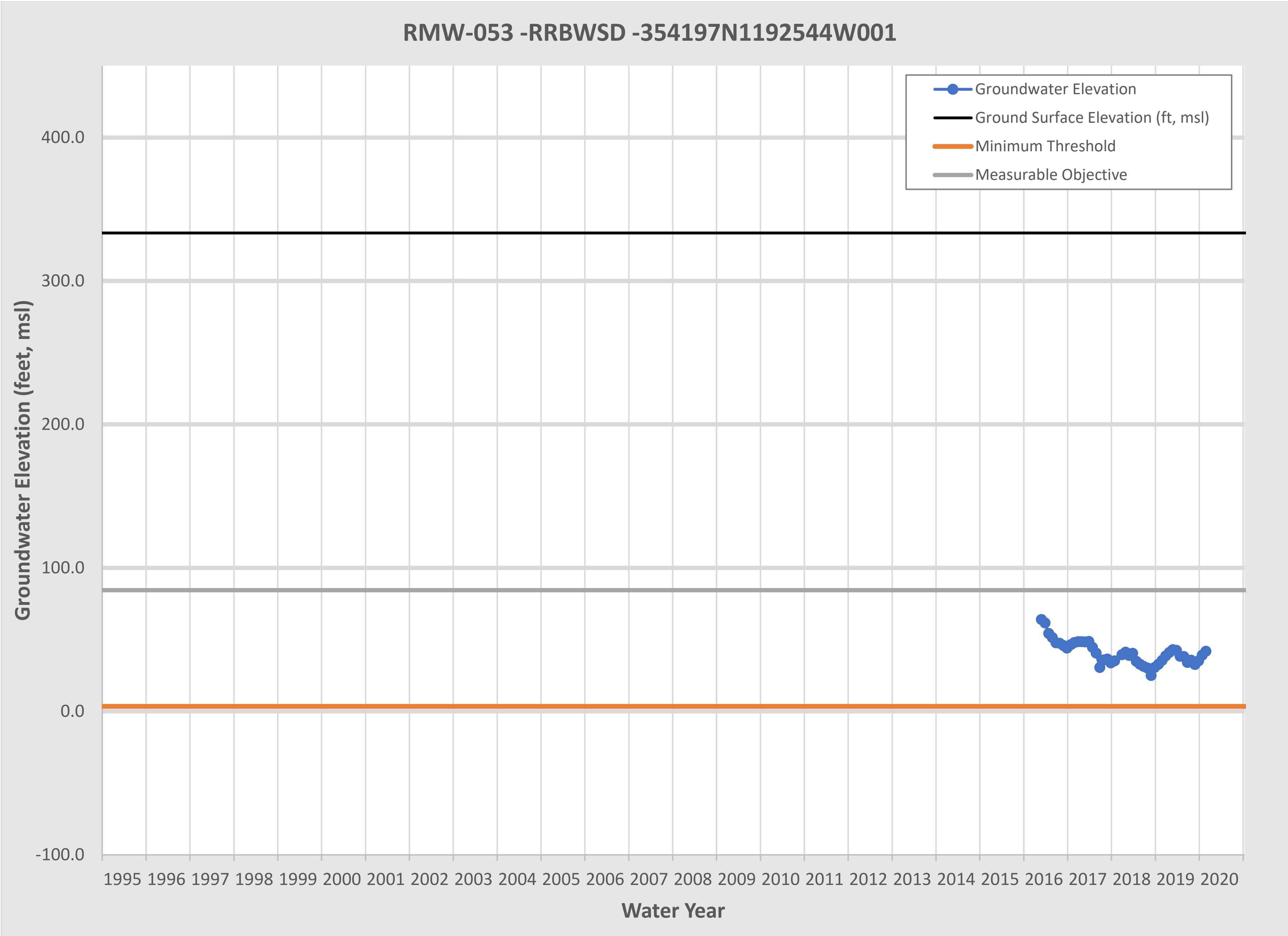
RMW-255 -NKWSD -354705N1192792W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

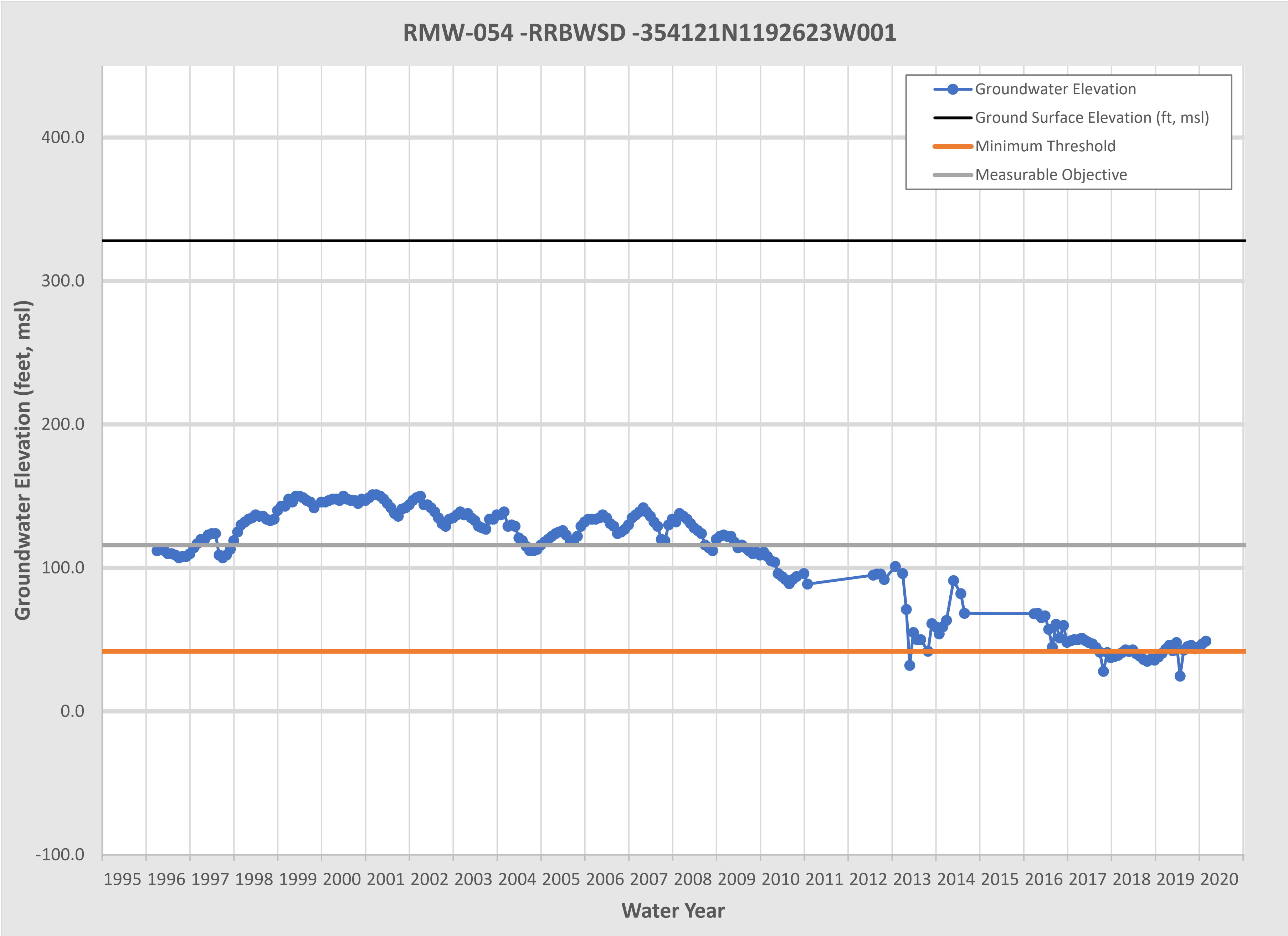

RMW-256 -NKWSD -356157N1193397W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-257 -NKWSD -354943N1192593W001
Groundwater Elevation (feet, msl)
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

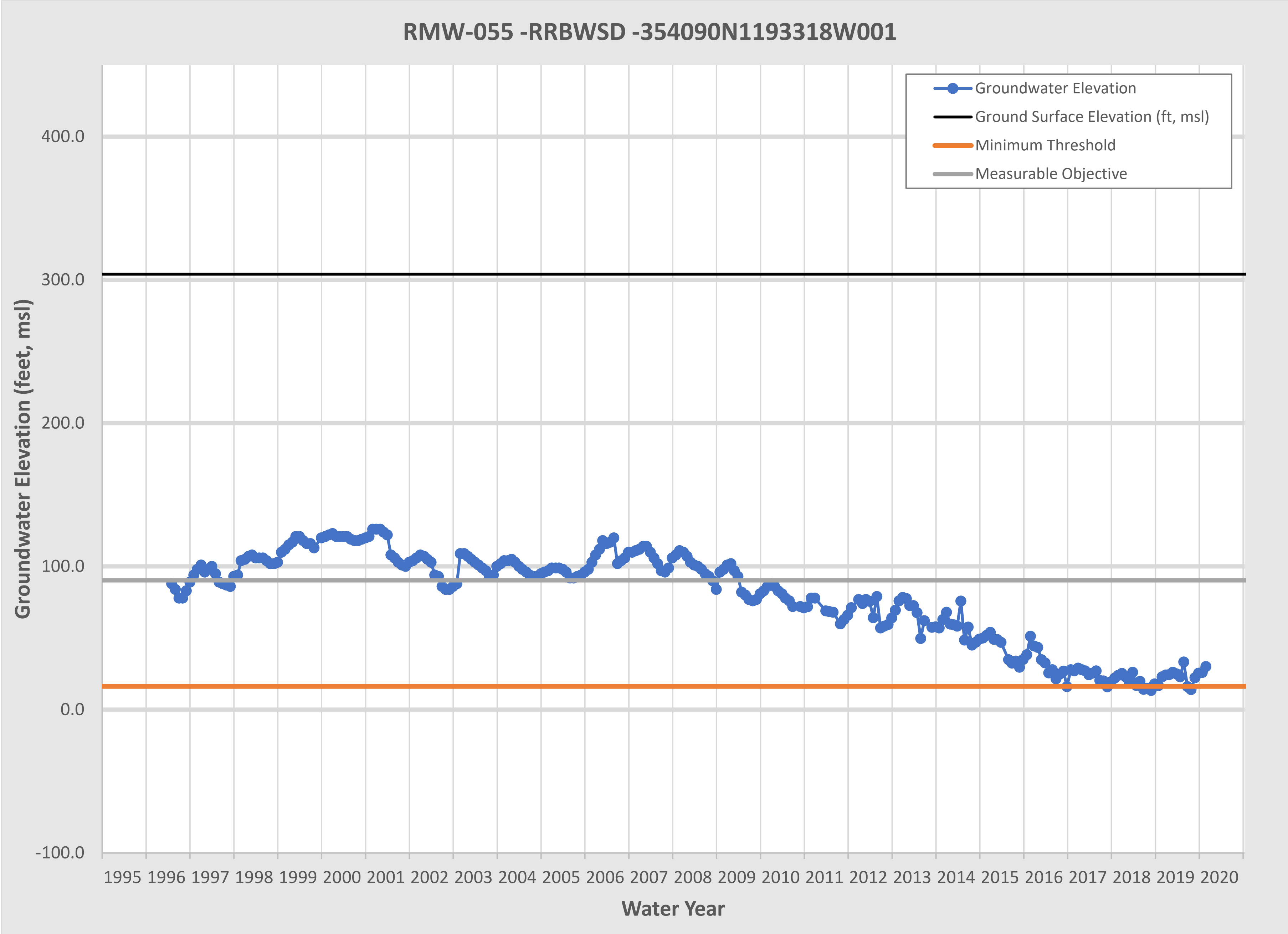

RMW-050 -RRBWSD -354350N1193586W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

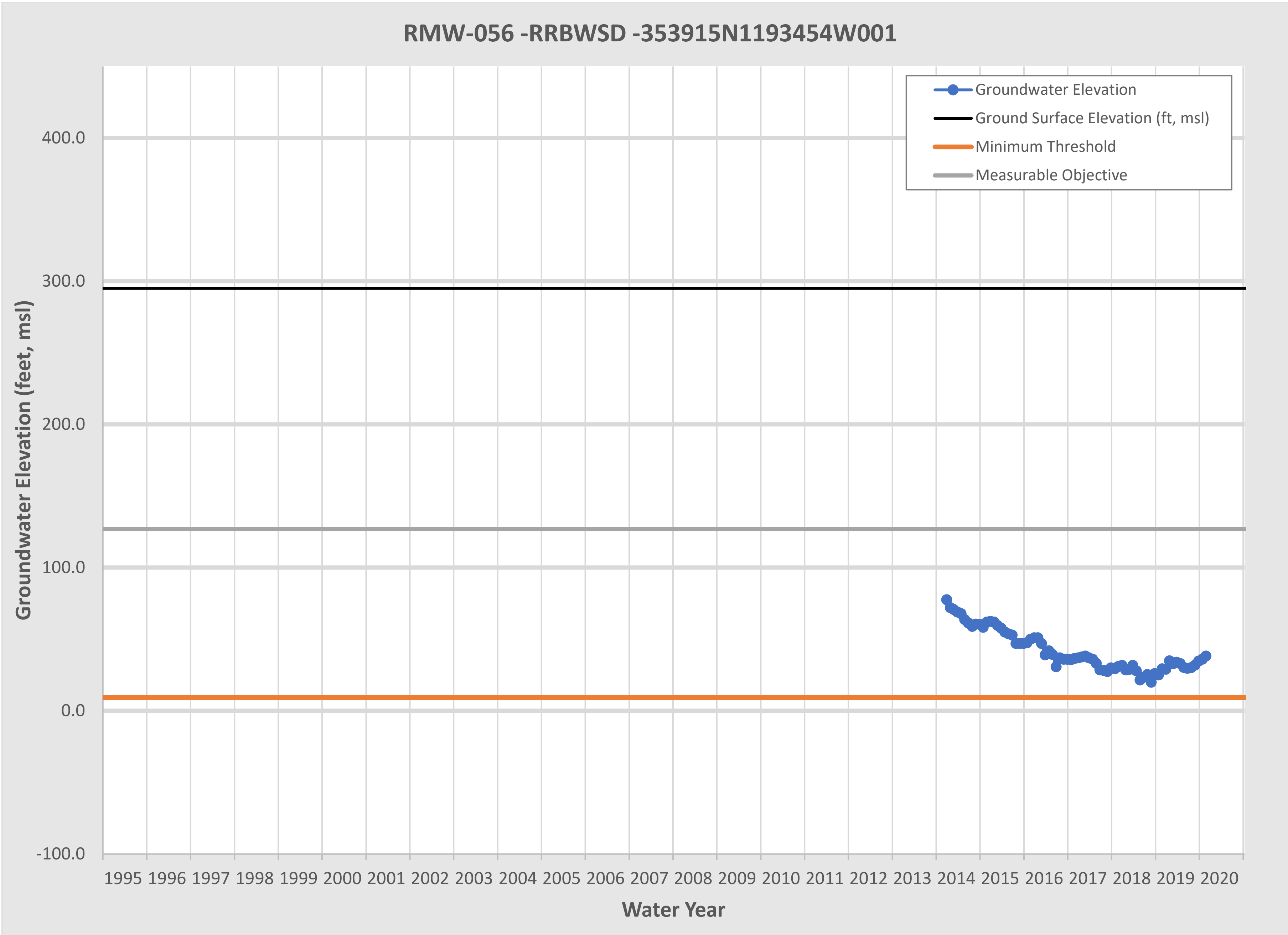

RMW-052 -RRBWSD -354309N1192859W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

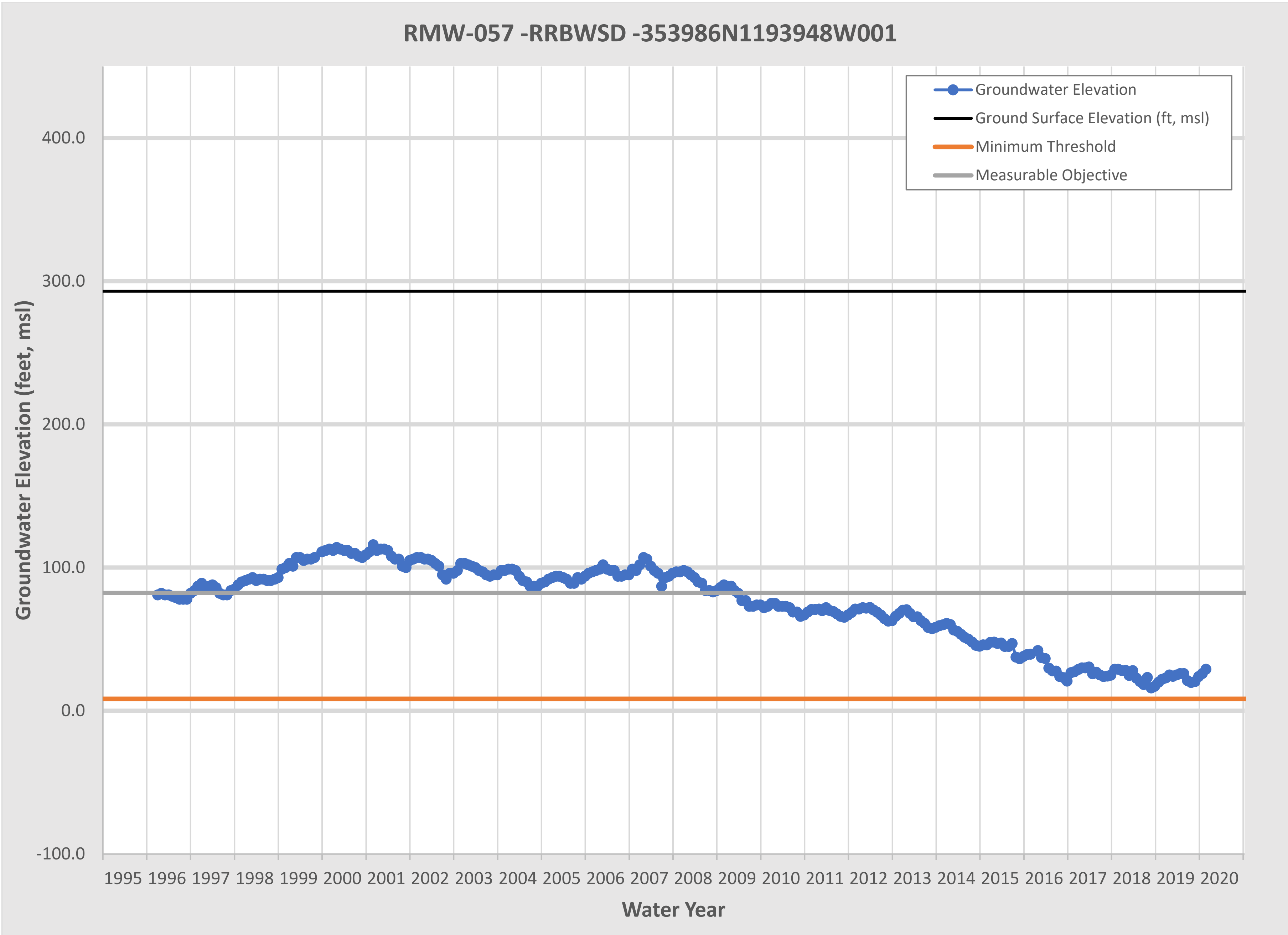

RMW-053 -RRBWSD -354197N1192544W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

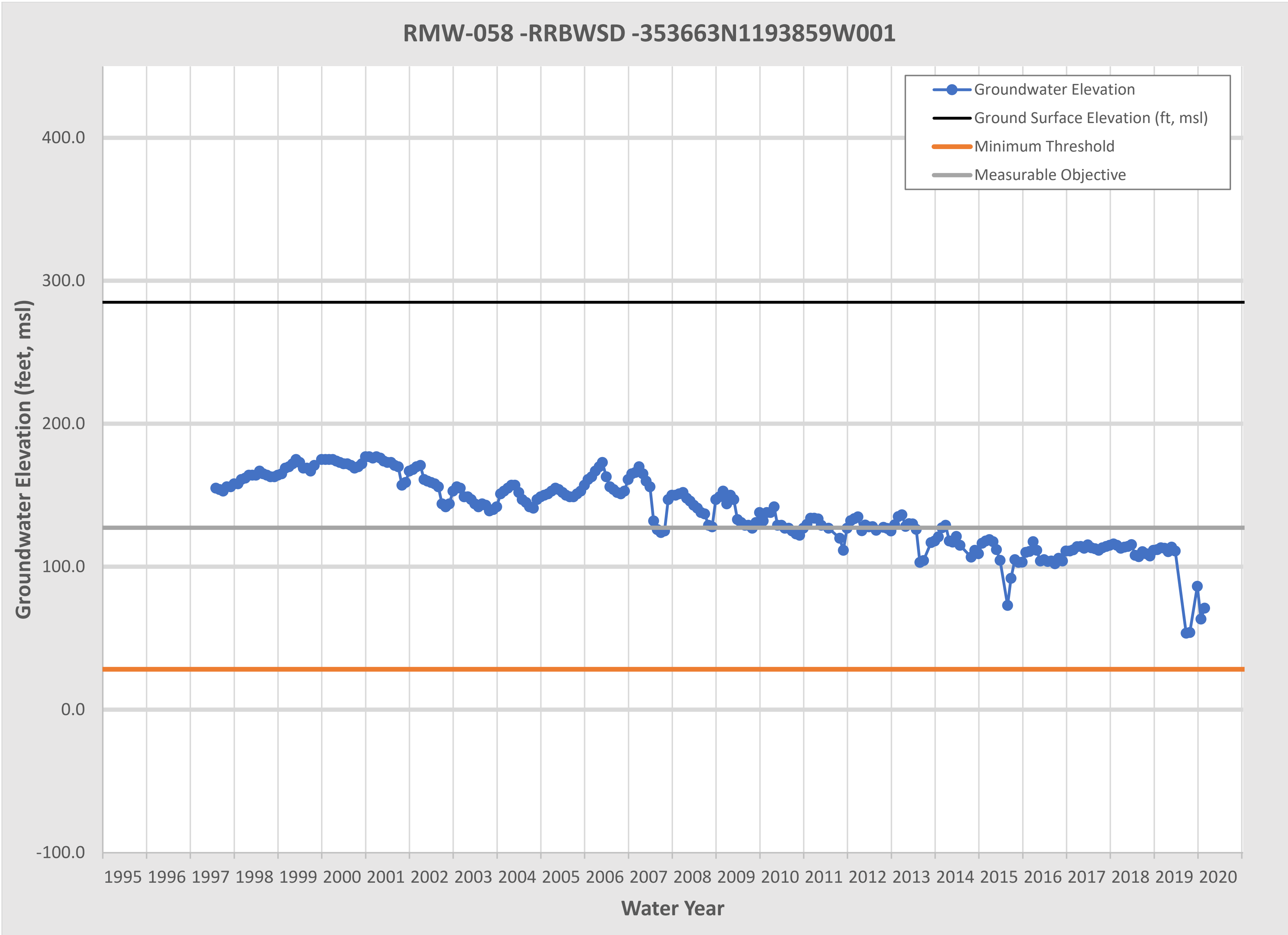


RMW-054 -RRBWSD -354121N1192623W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

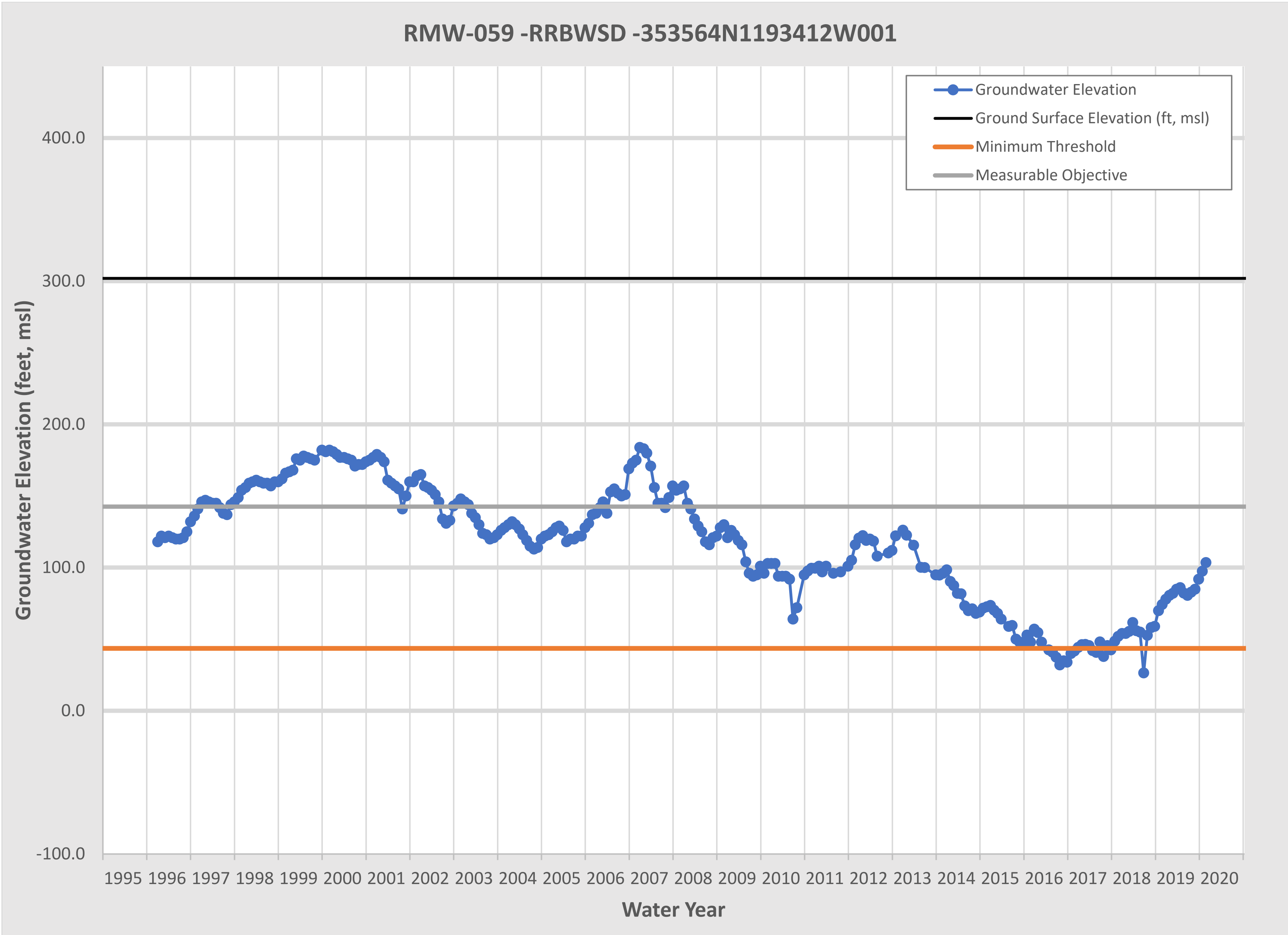

RMW-055 -RRBWSD -354090N1193318W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

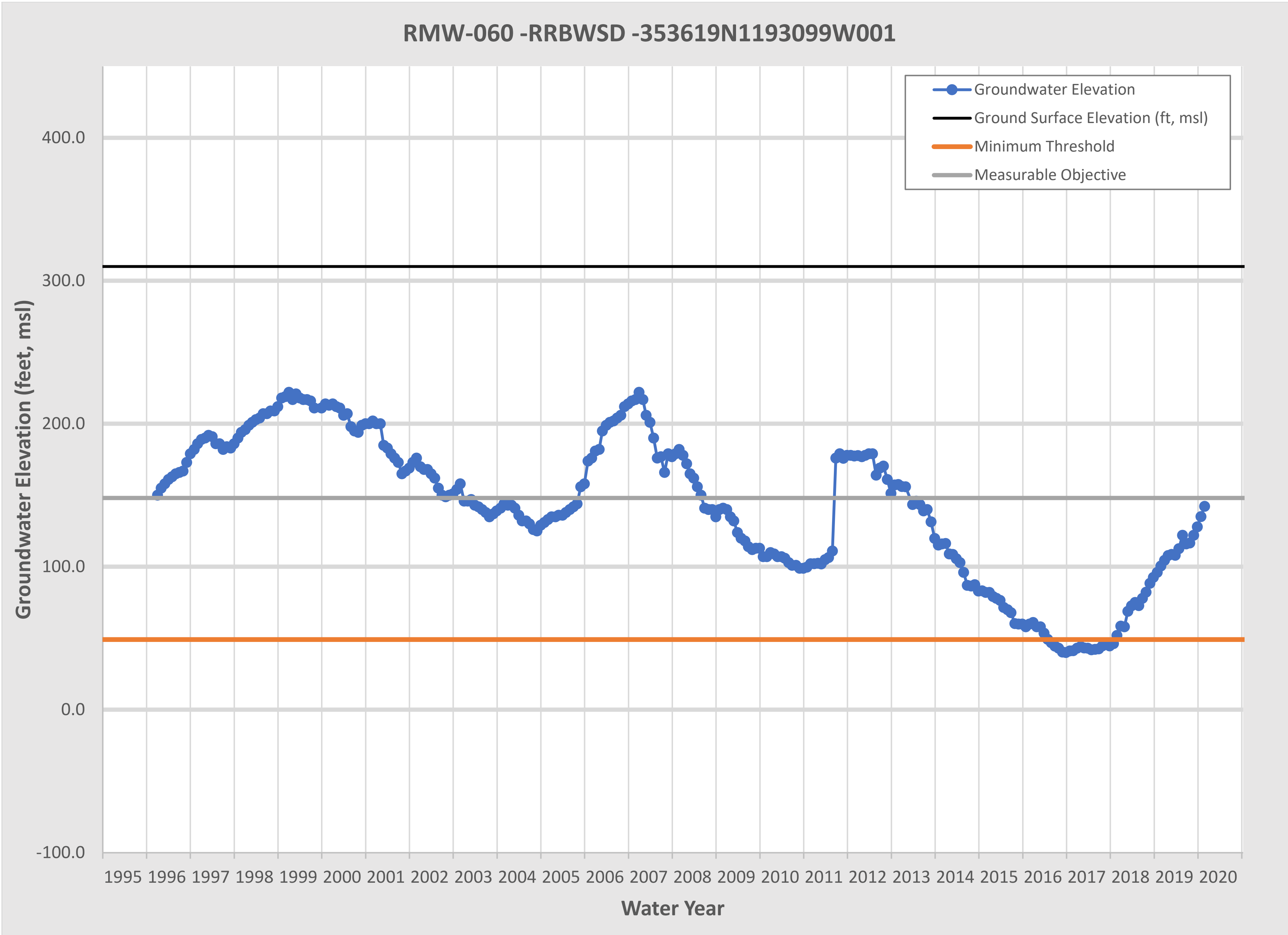

RMW-056 -RRBWSD -353915N1193454W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

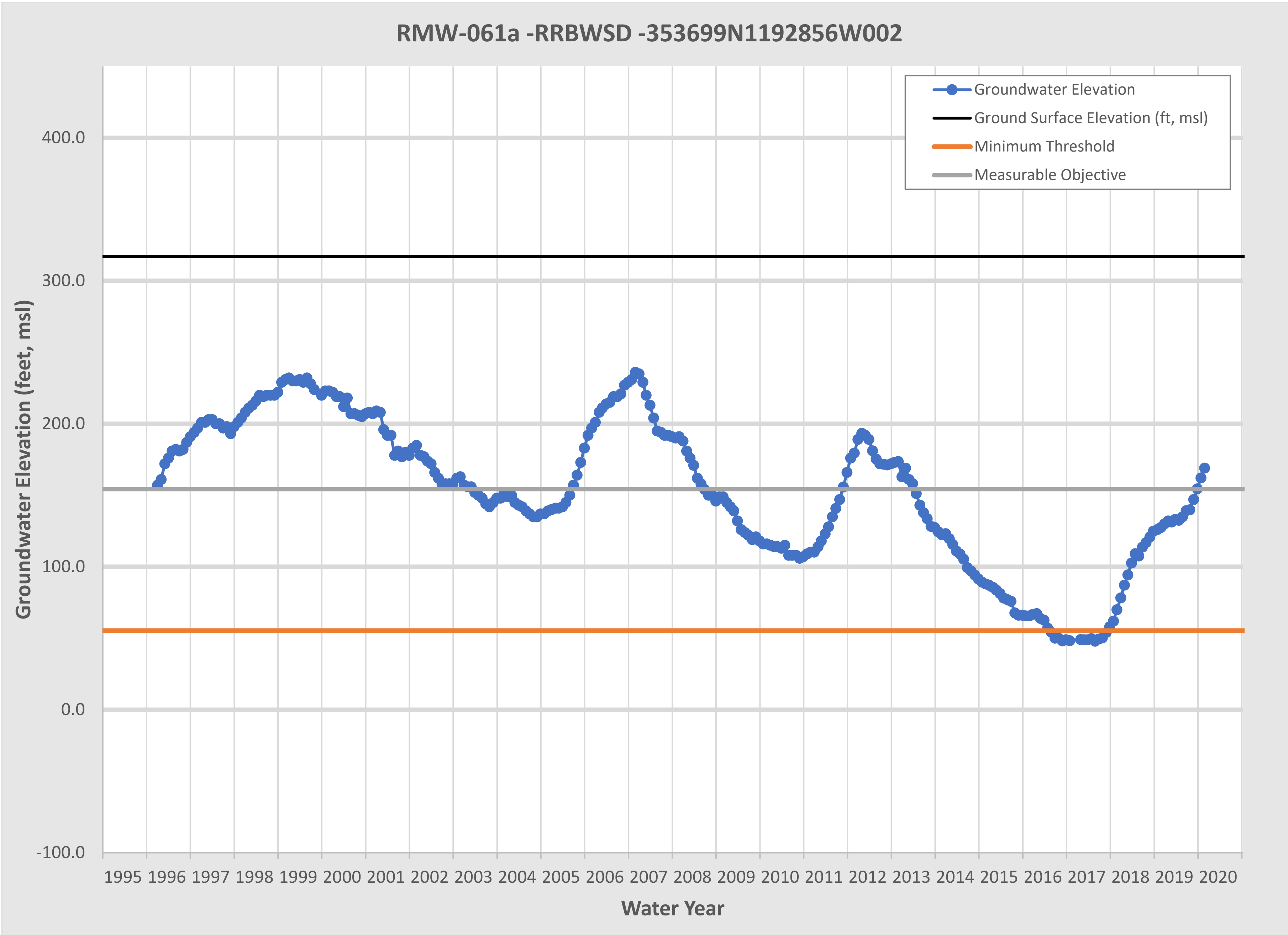

RMW-057 -RRBWSD -353986N1193948W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



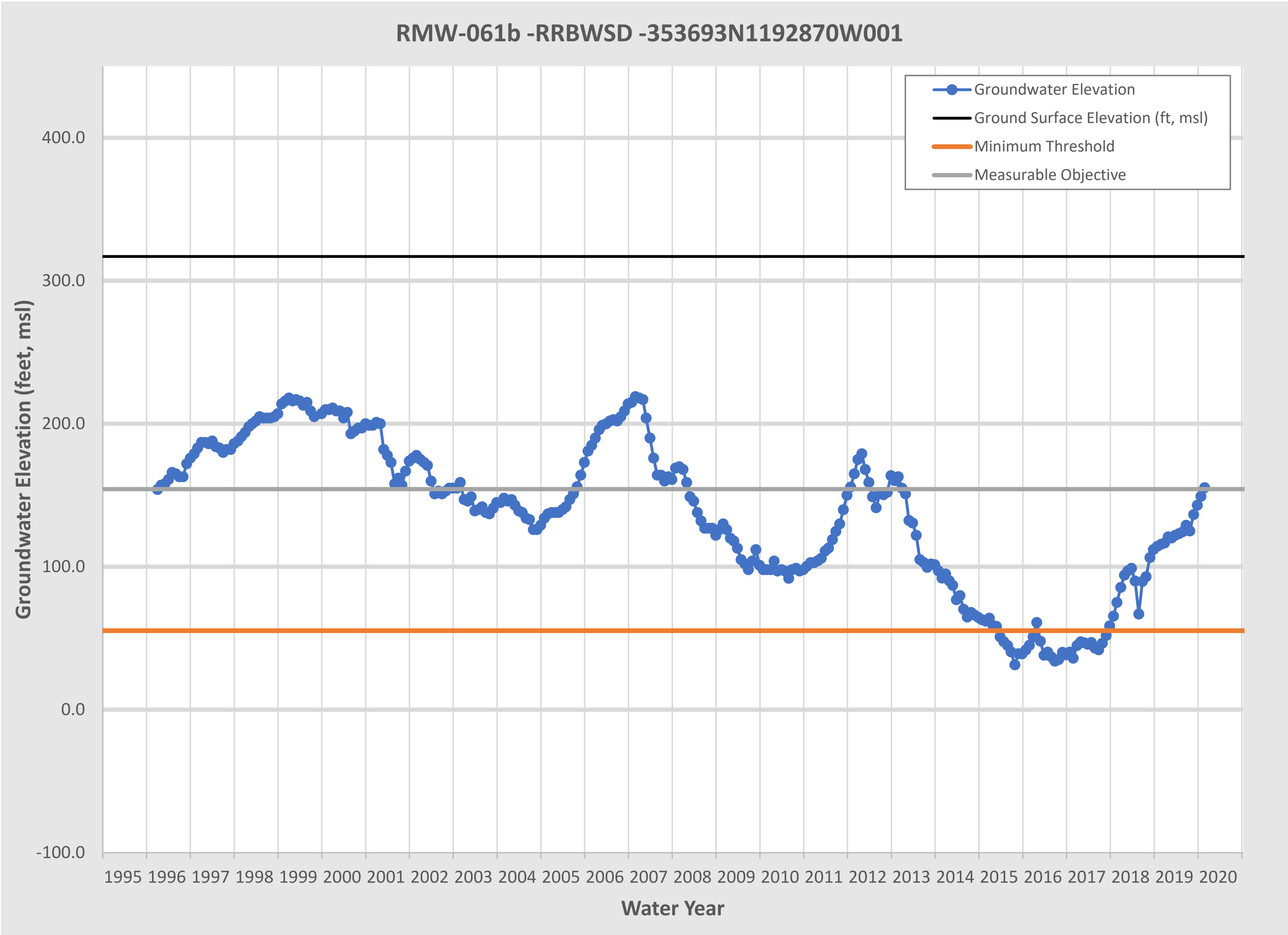
RMW-058 -RRBWSD -353663N1193859W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-059 -RRBWSD -353564N1193412W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

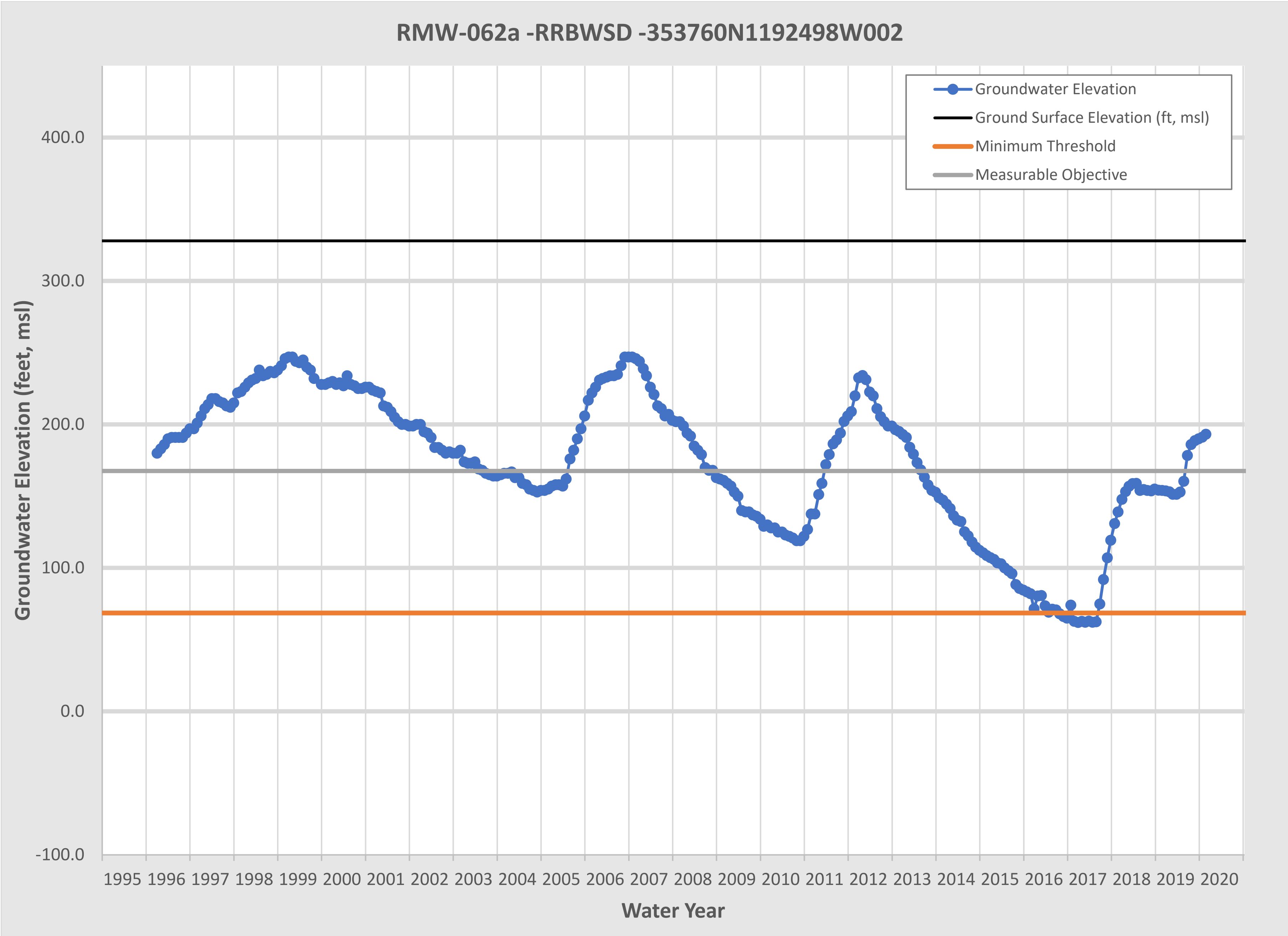

RMW-060 -RRBWSD -353619N1193099W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



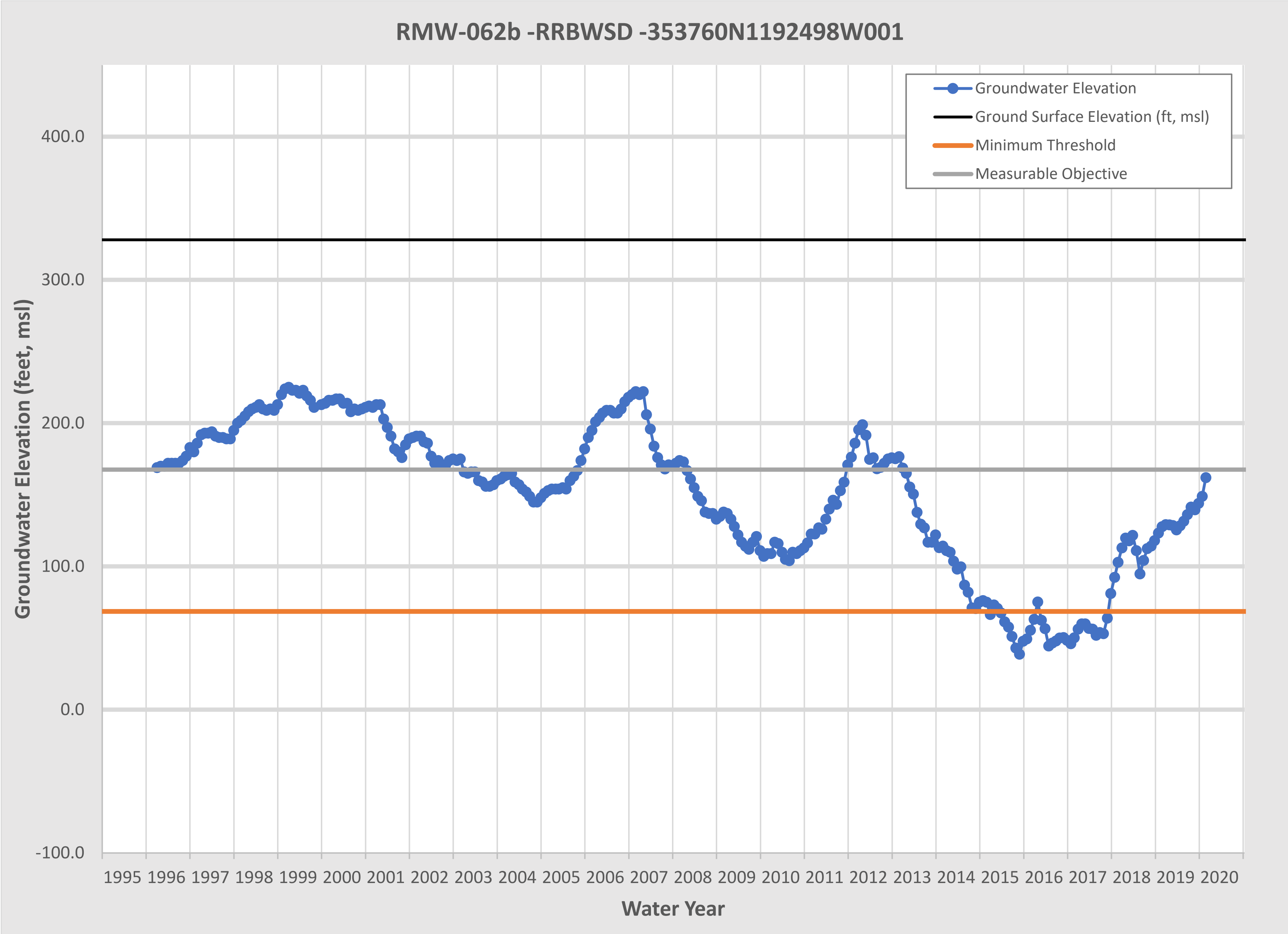
RMW-061a -RRBWSD -353699N1192856W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



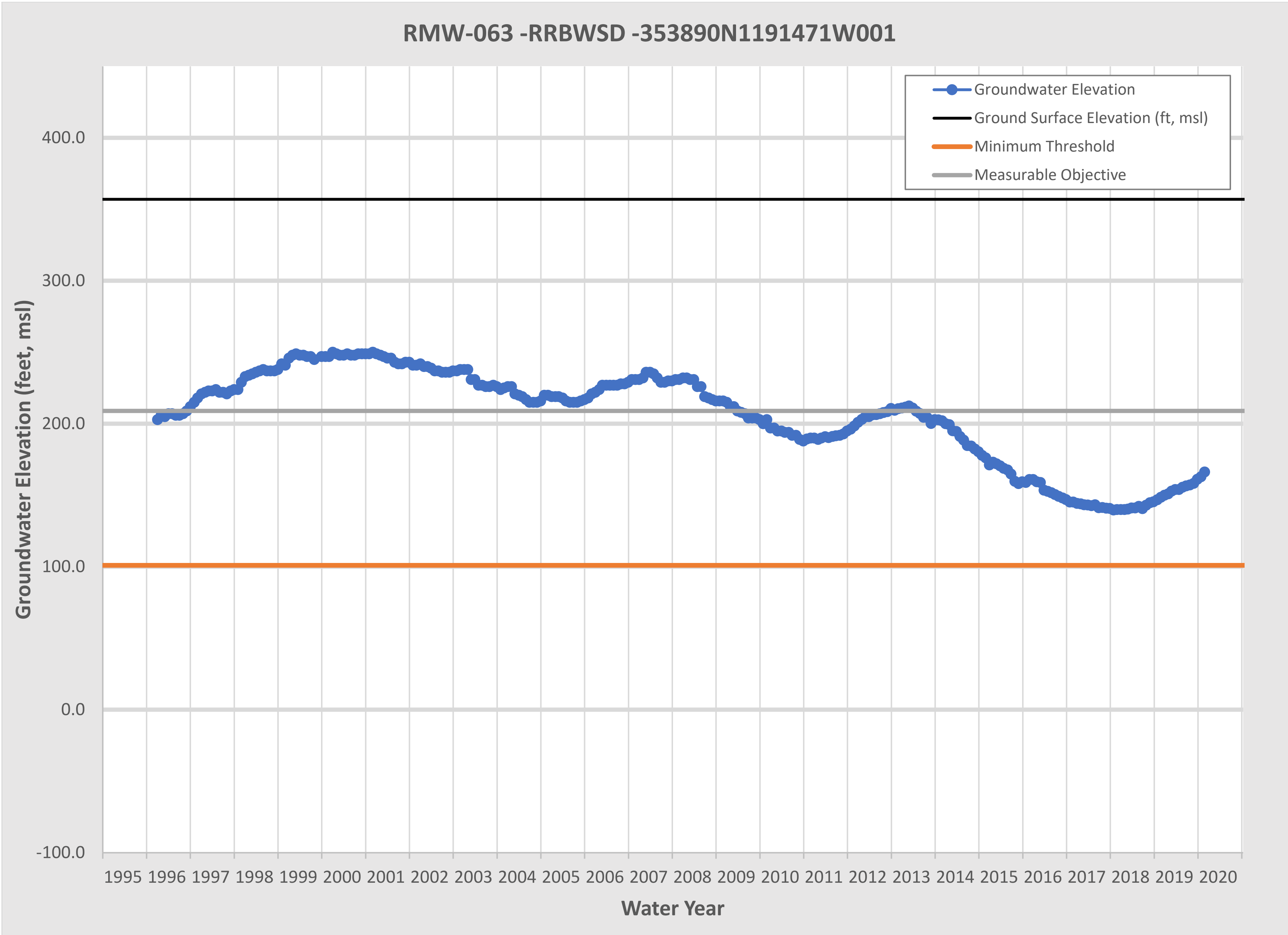
RMW-061b -RRBWSD -353693N1192870W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



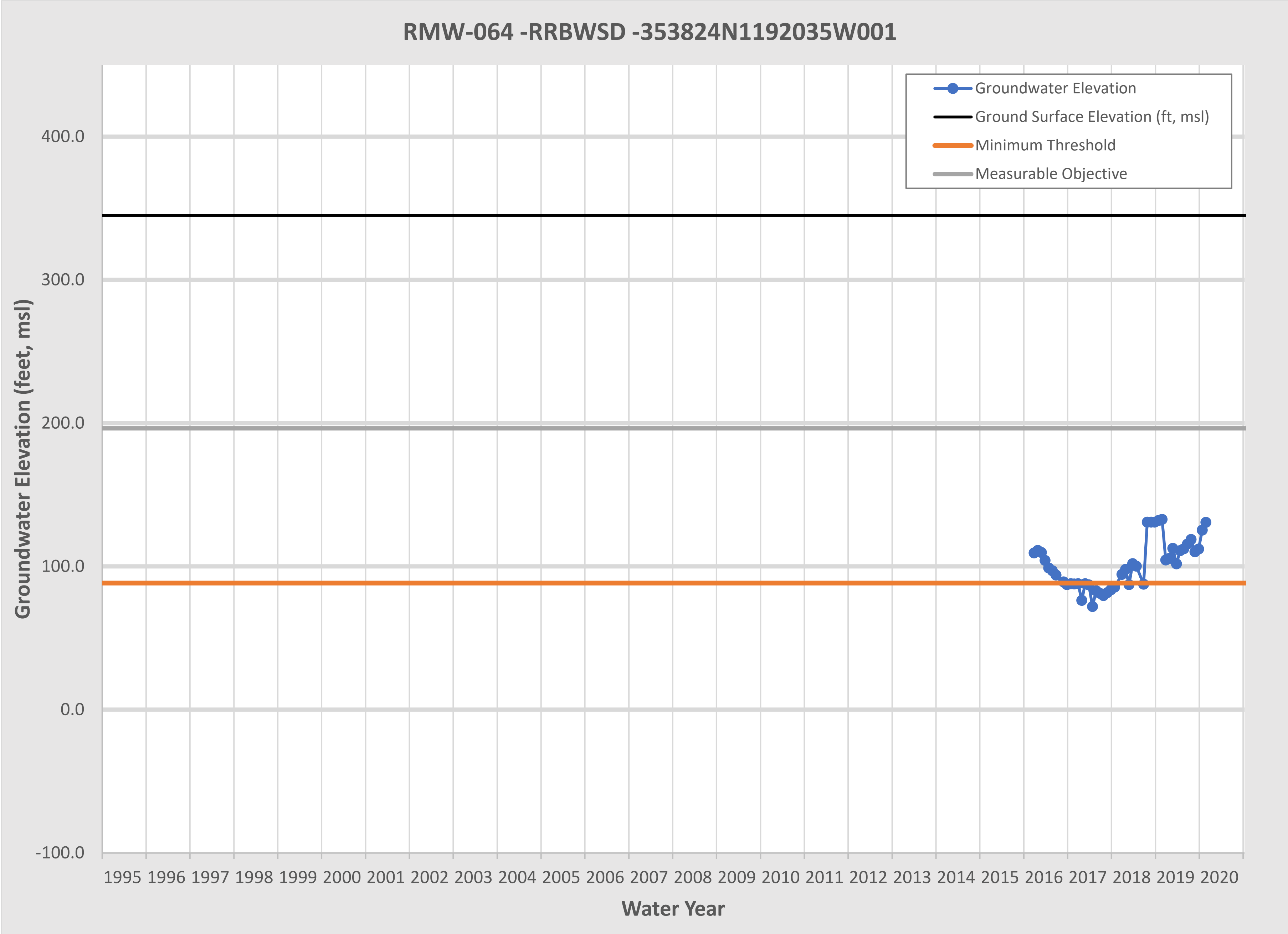
RMW-062a -RRBWSD -353760N1192498W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



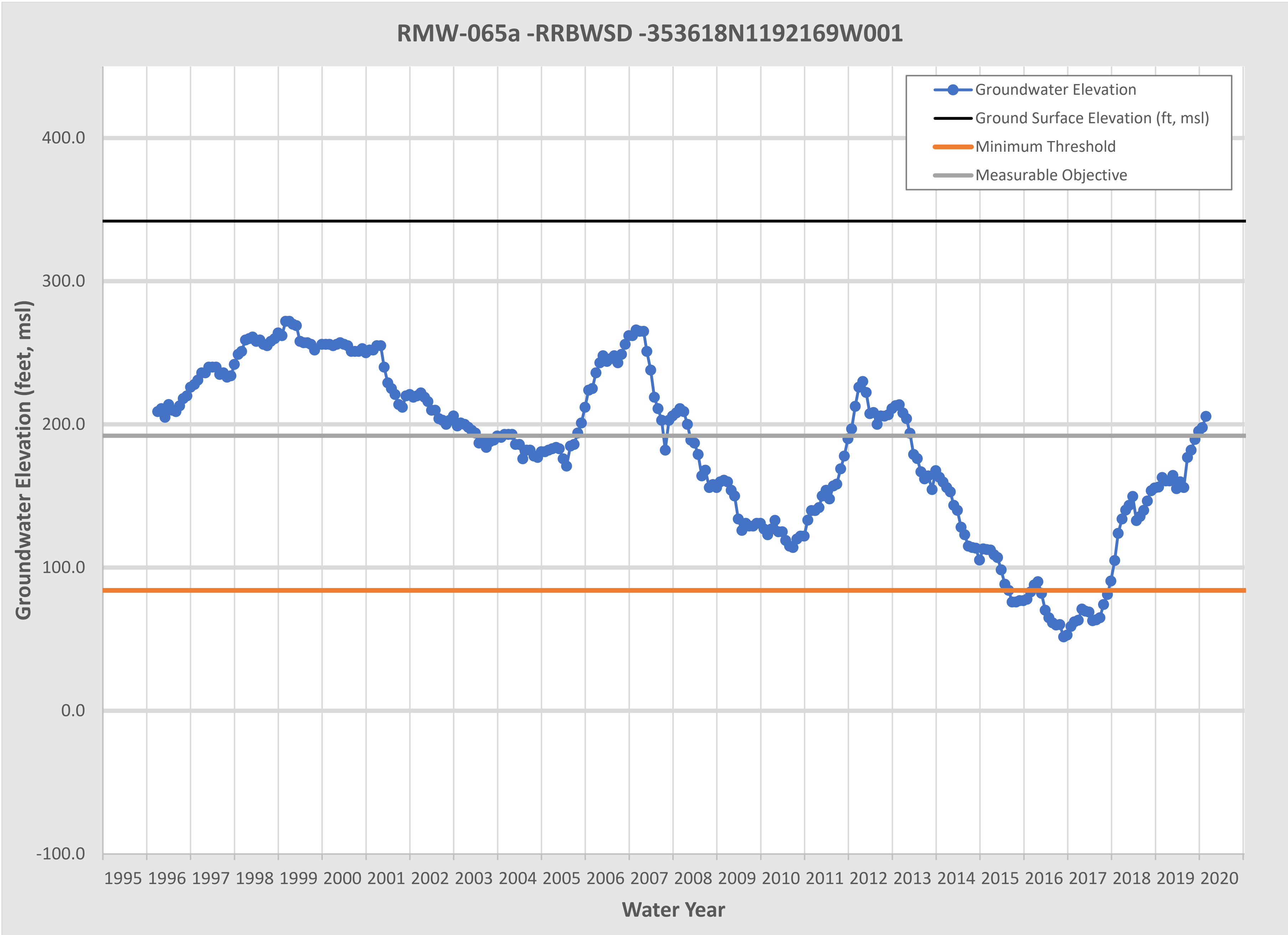
RMW-062b -RRBWSD -353760N1192498W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



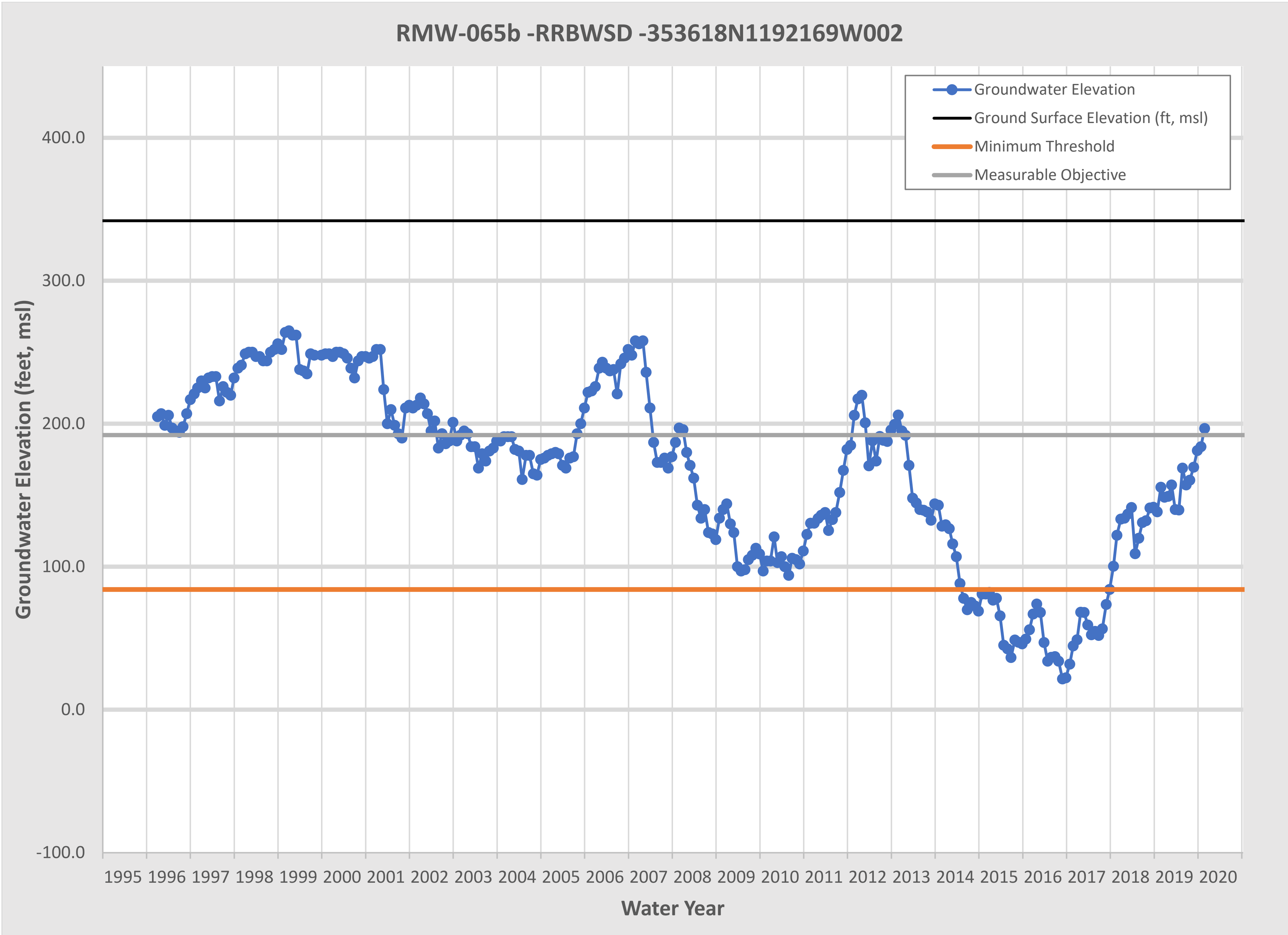
RMW-063 -RRBWSD -353890N1191471W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

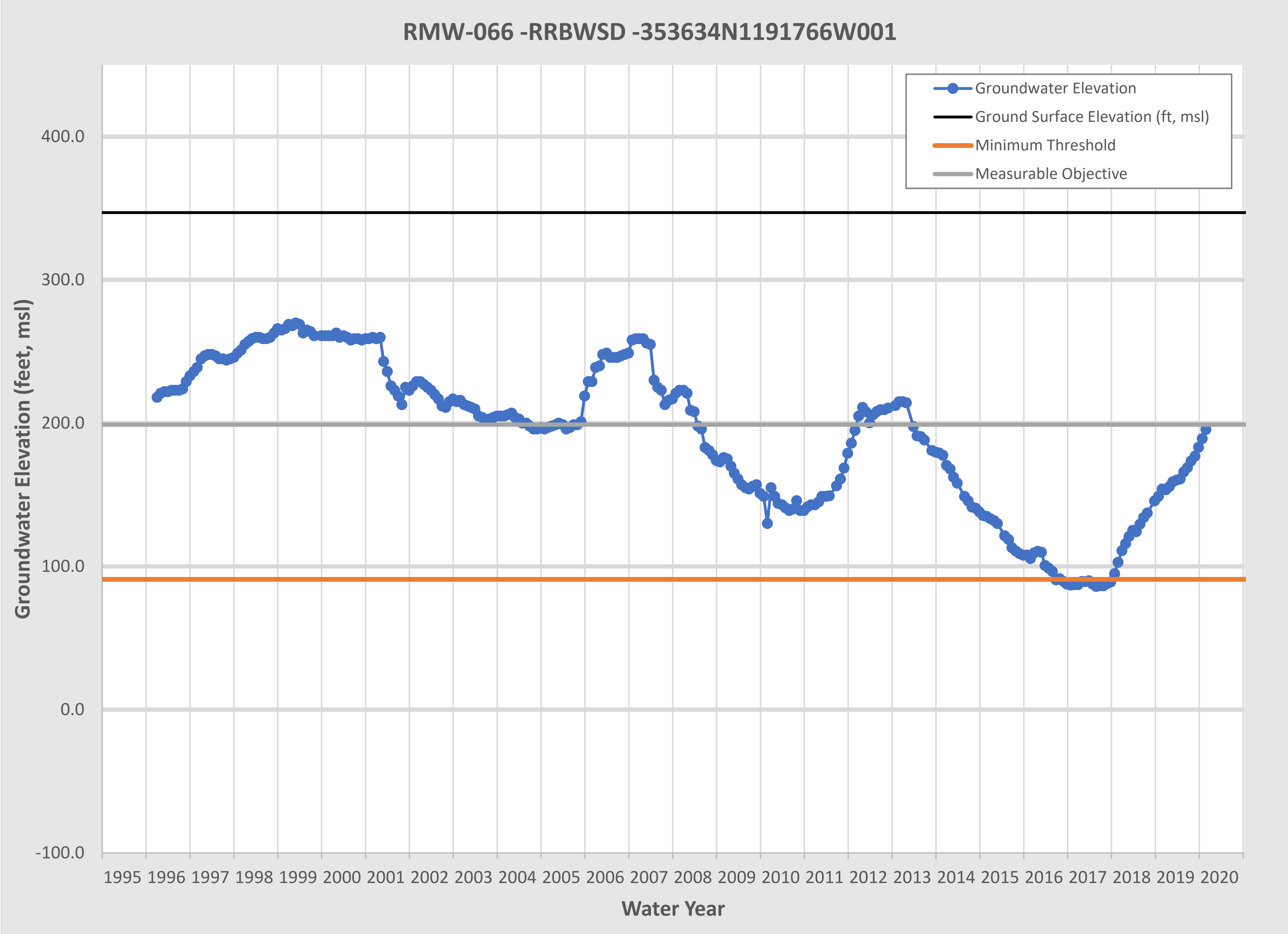


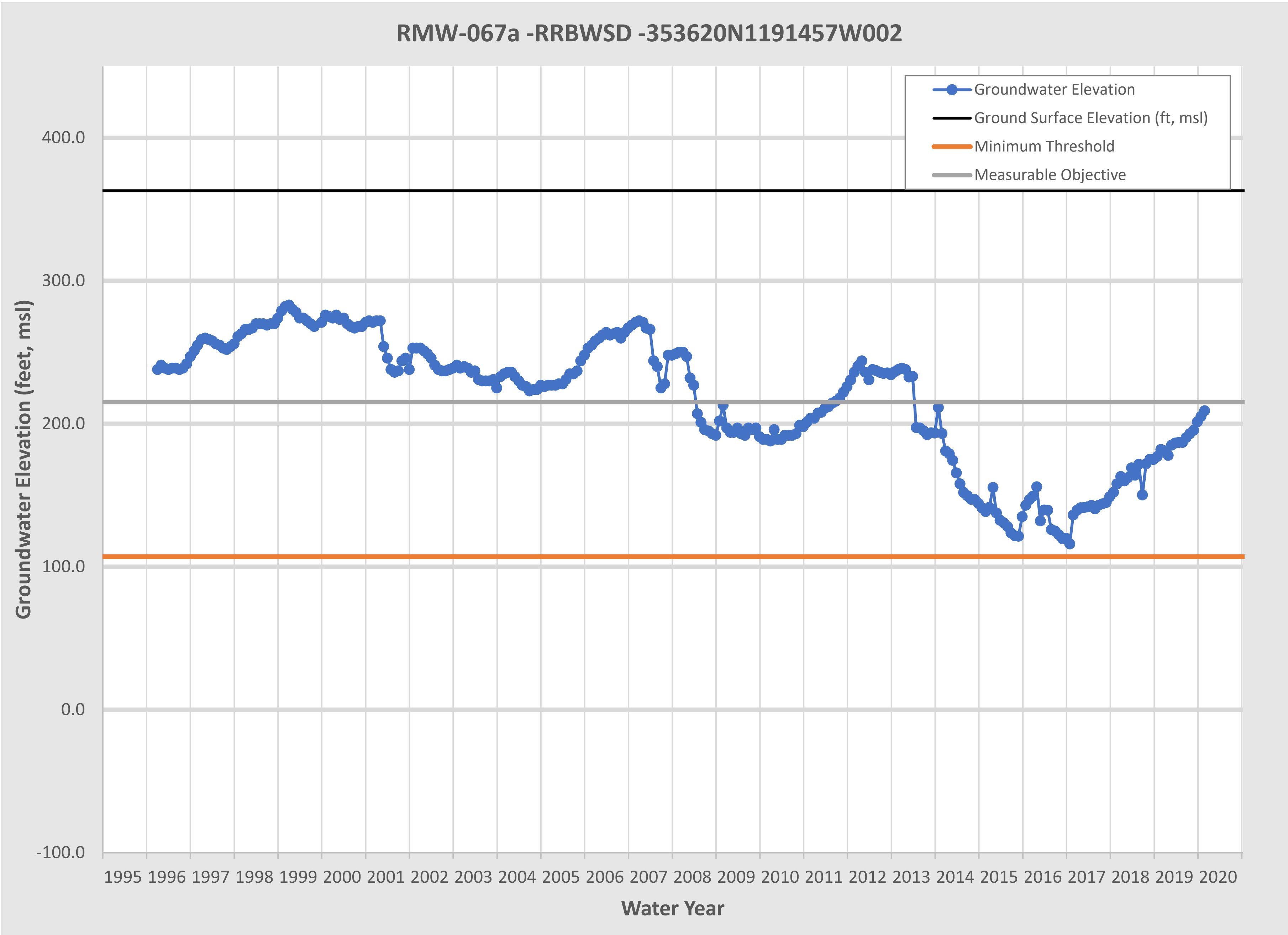
RMW-064 -RRBWSD -353824N1192035W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



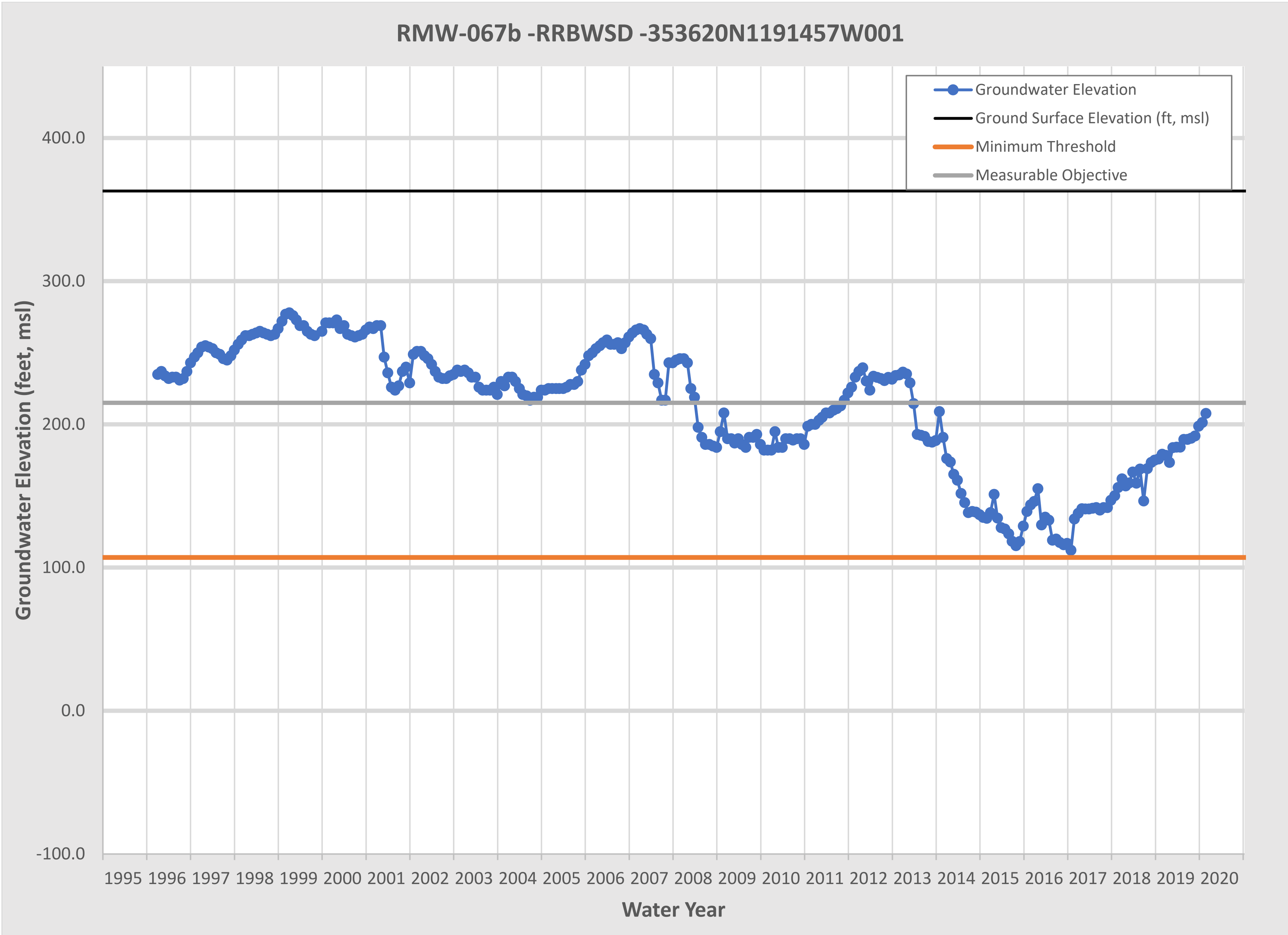
RMW-065a -RRBWSD -353618N1192169W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-065b -RRBWSD -353618N1192169W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

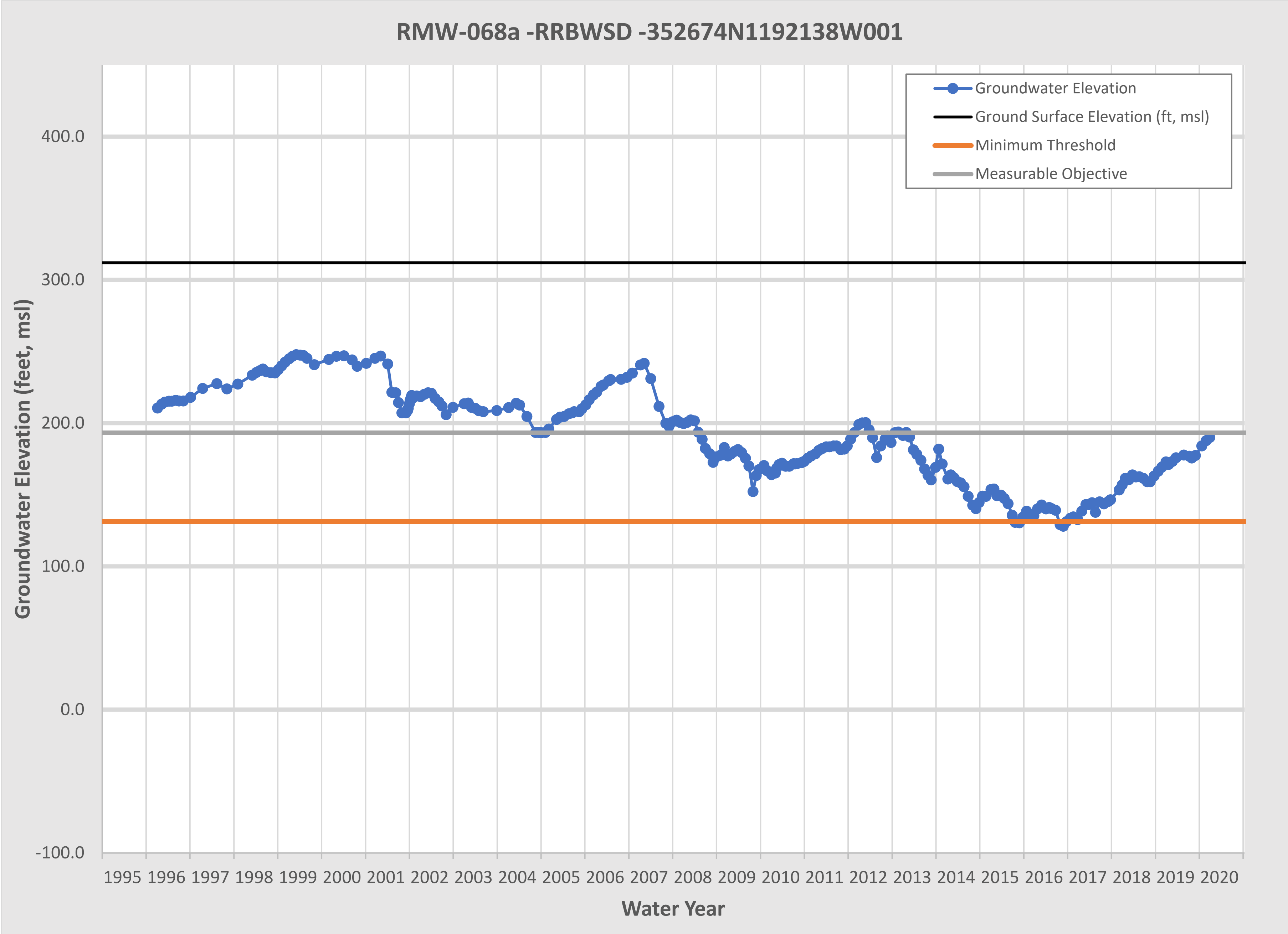

RMW-066 -RRBWSD -353634N1191766W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



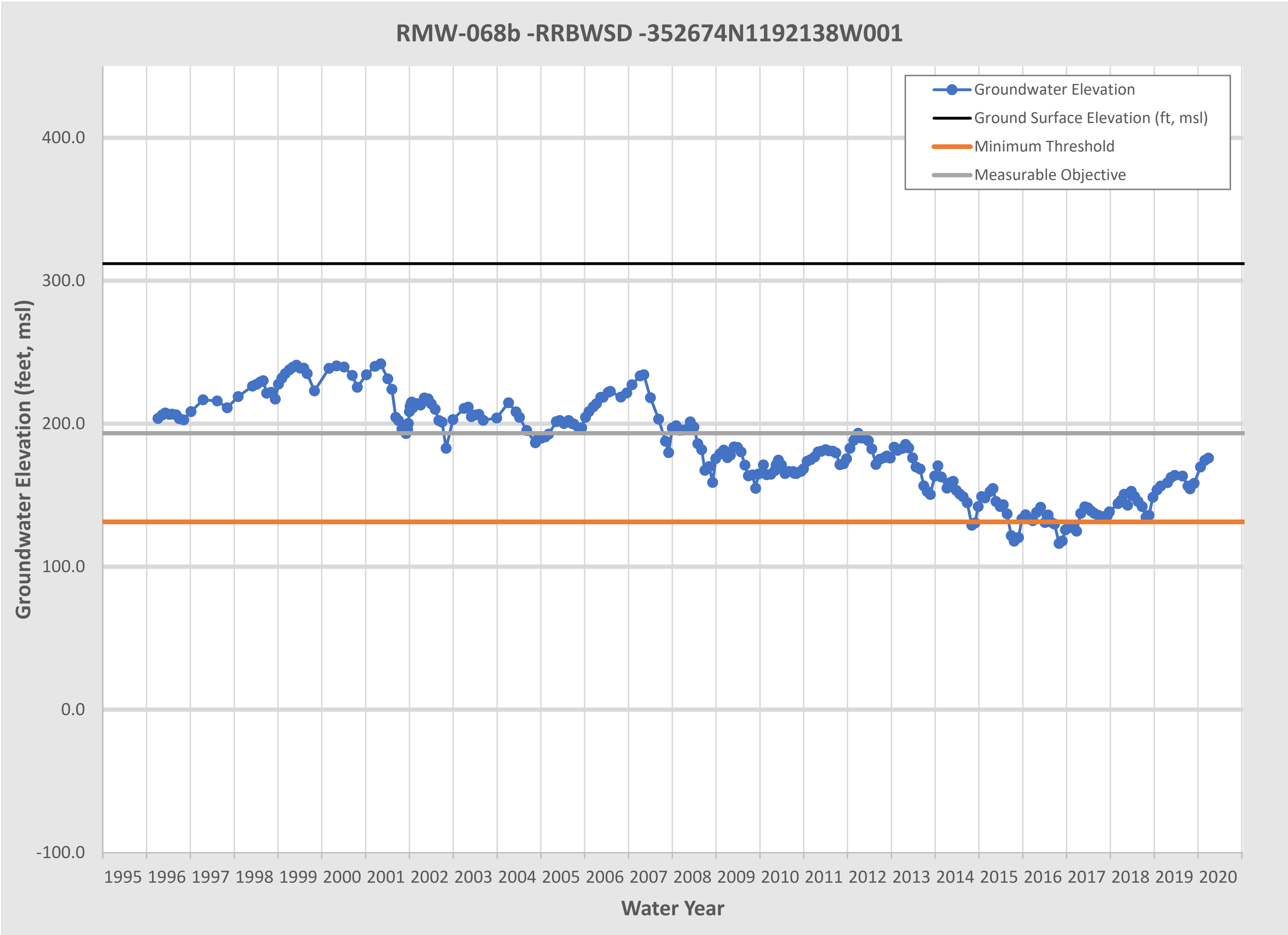
RMW-067a -RRBWSD -353620N1191457W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



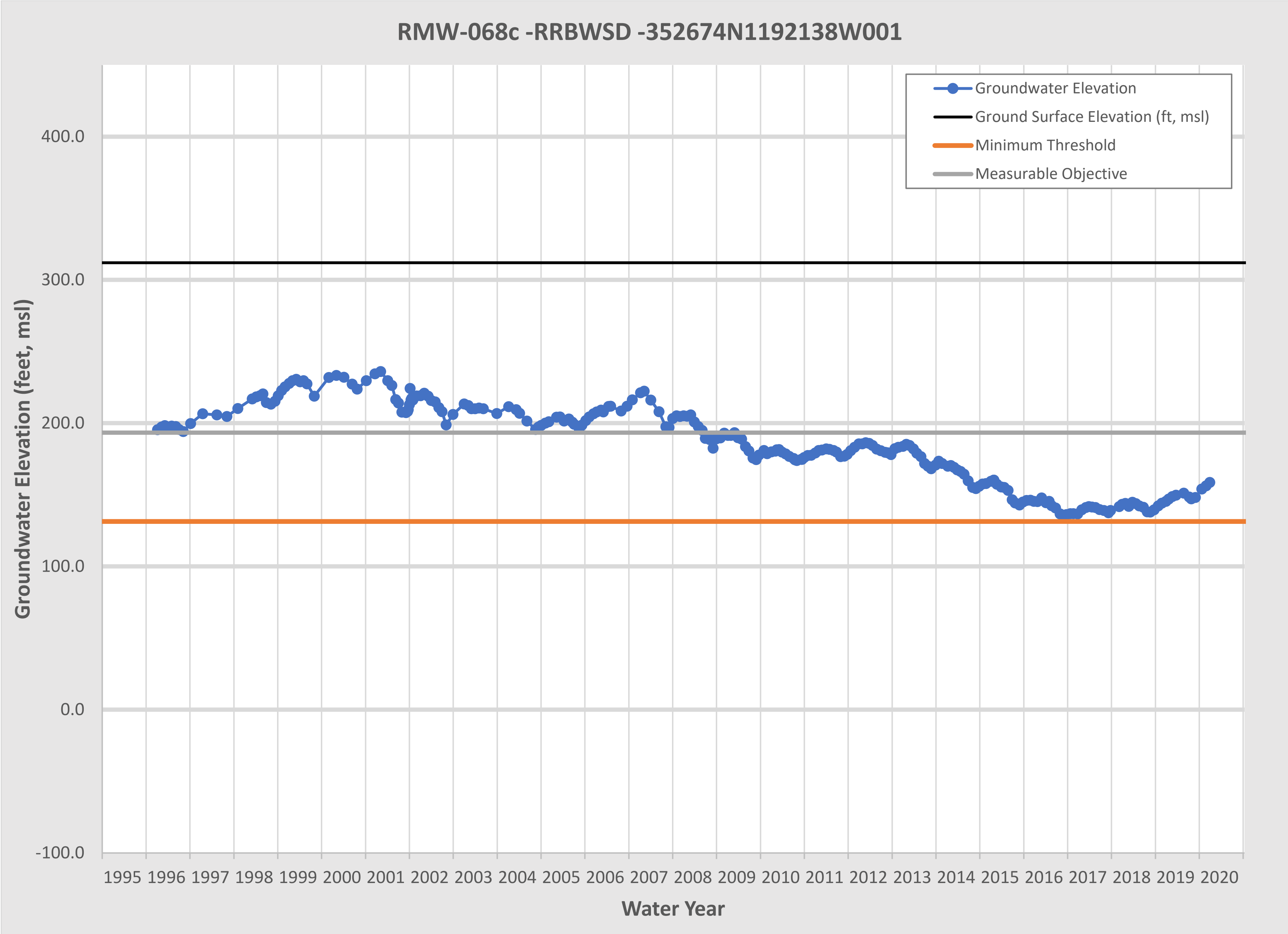
RMW-067b -RRBWSD -353620N1191457W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



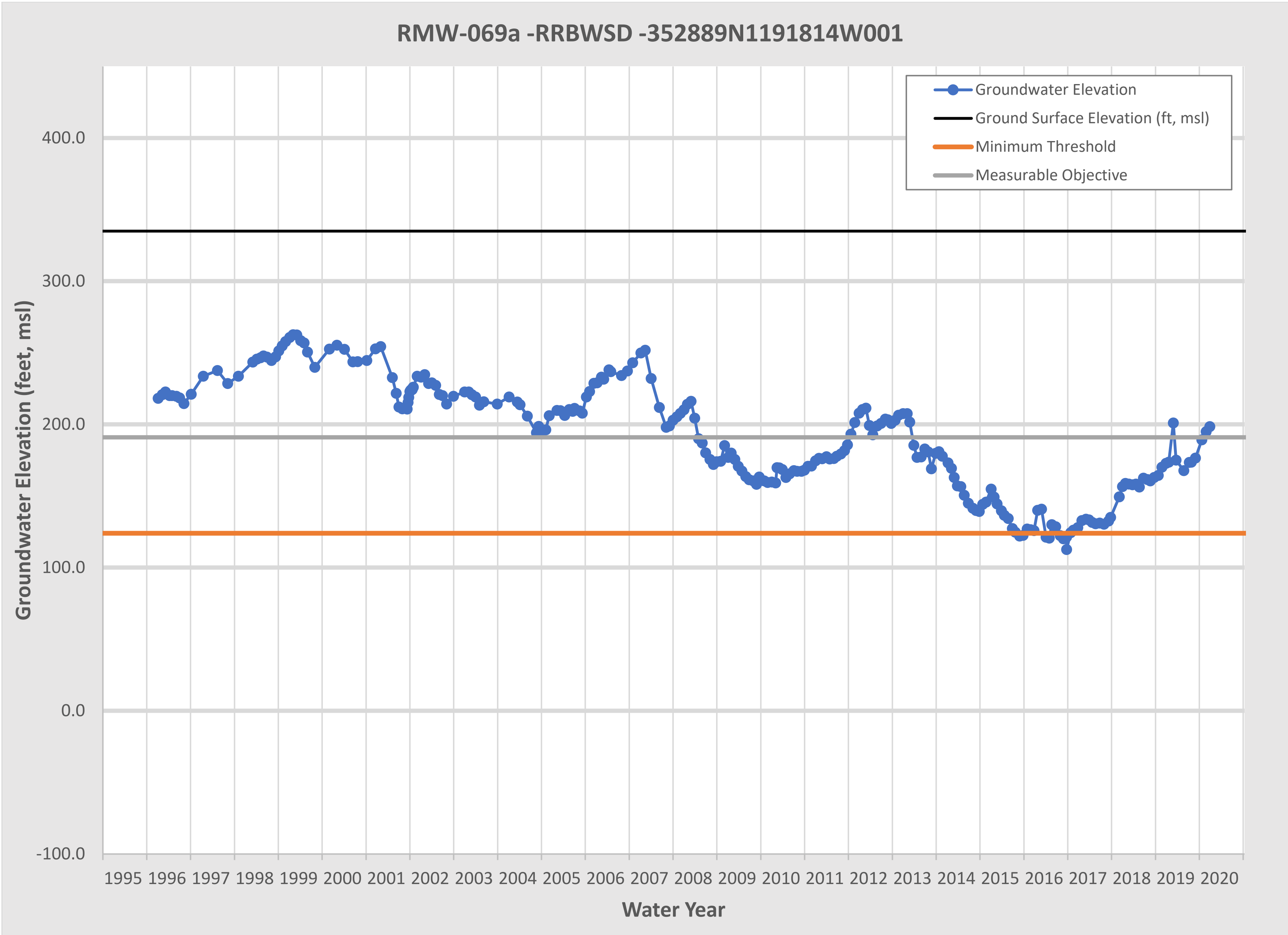
RMW-068a -RRBWSD -352674N1192138W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



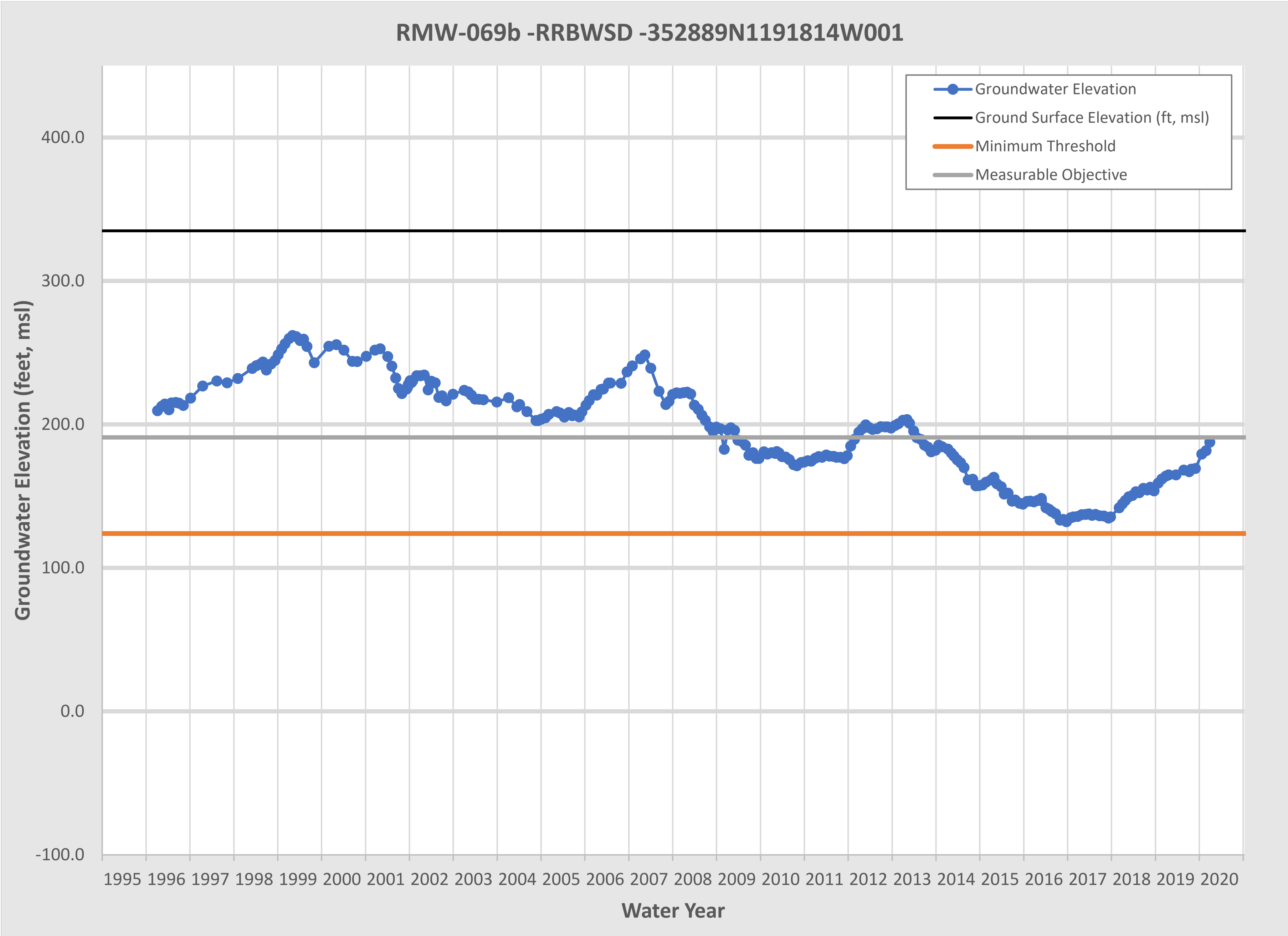
RMW-068b -RRBWSD -352674N1192138W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

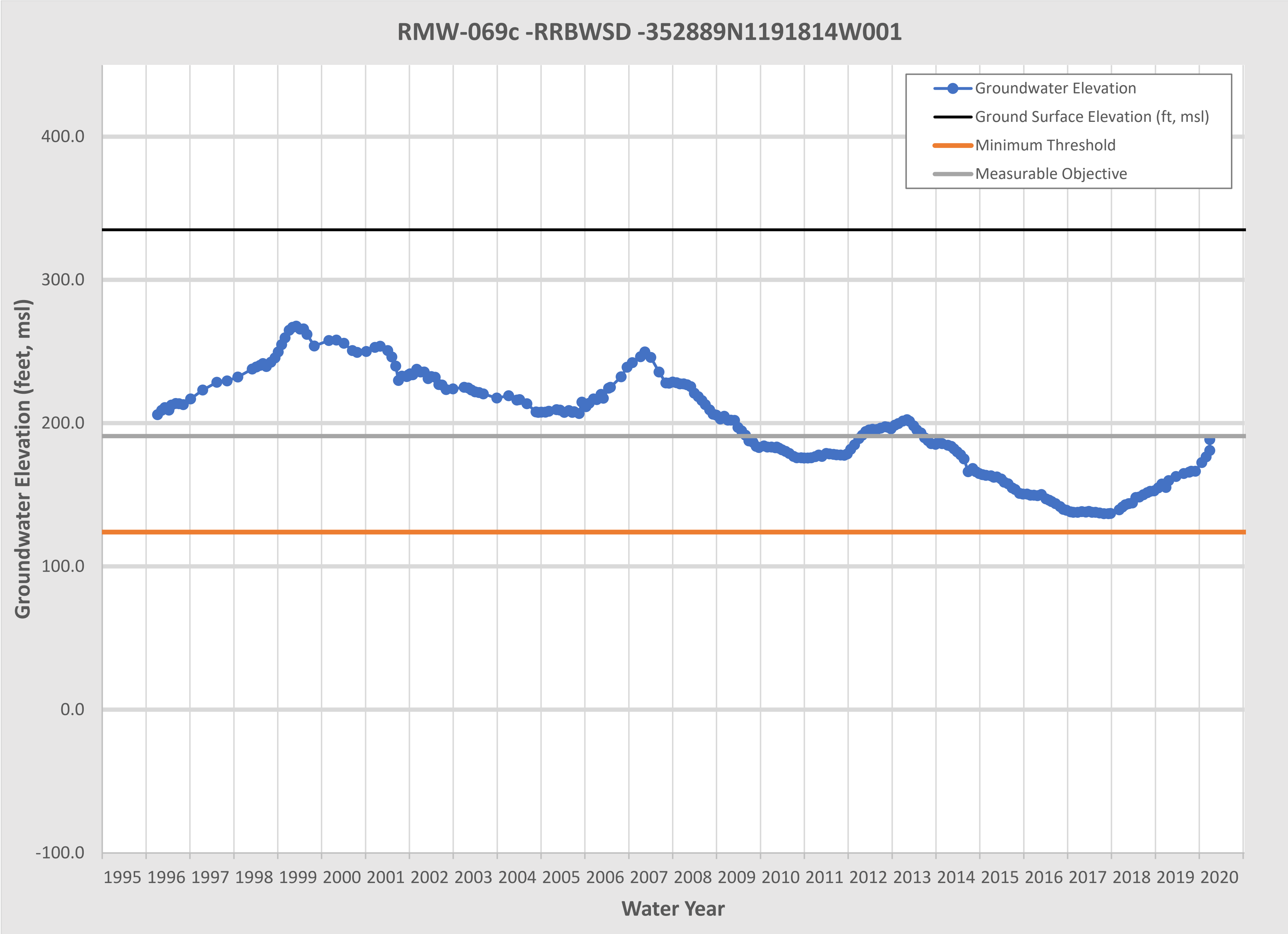


RMW-068c -RRBWSD -352674N1192138W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

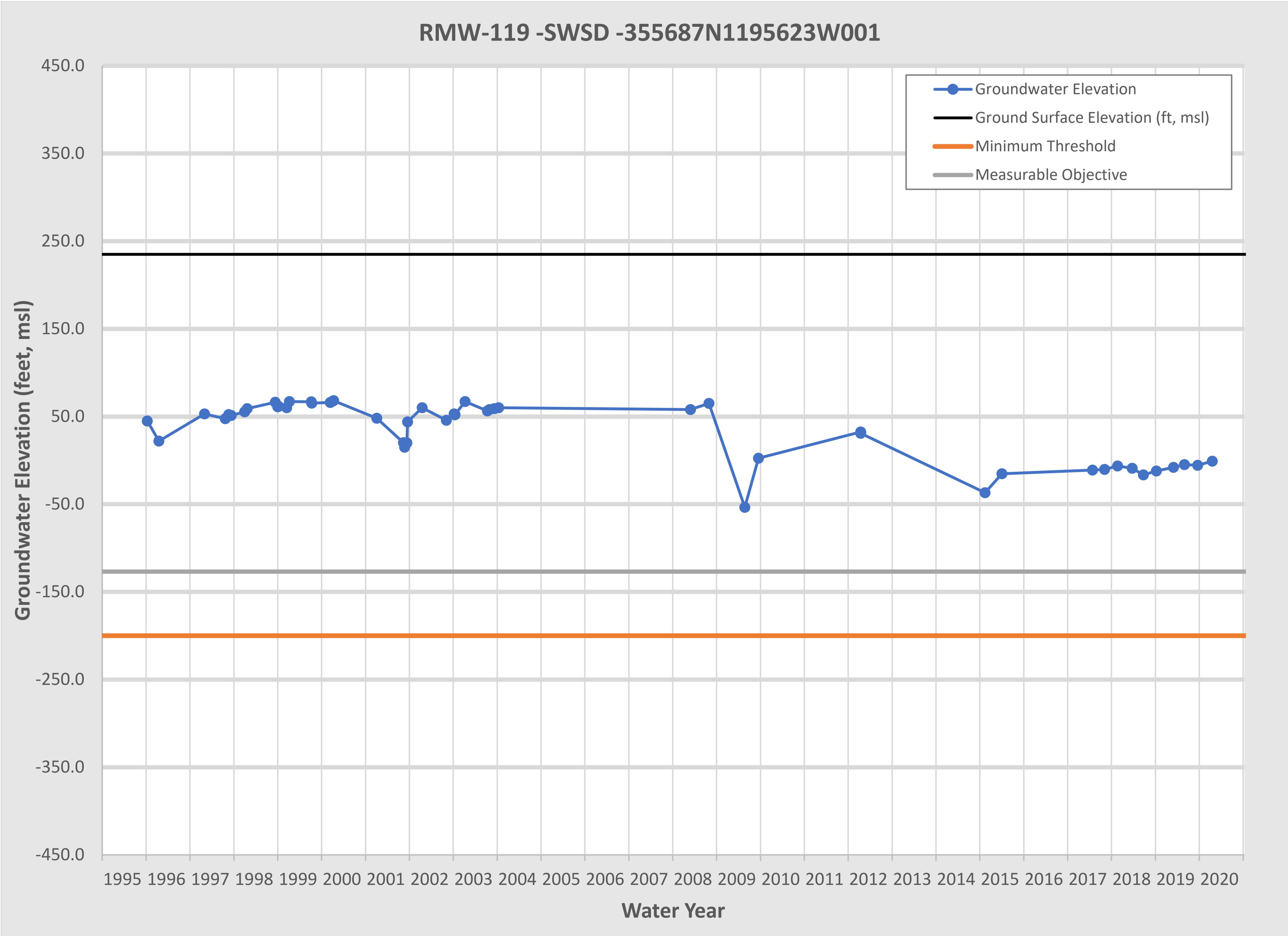


RMW-069a -RRBWSD -352889N1191814W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
400.0
300.0
200.0
100.0
0.0
-100.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

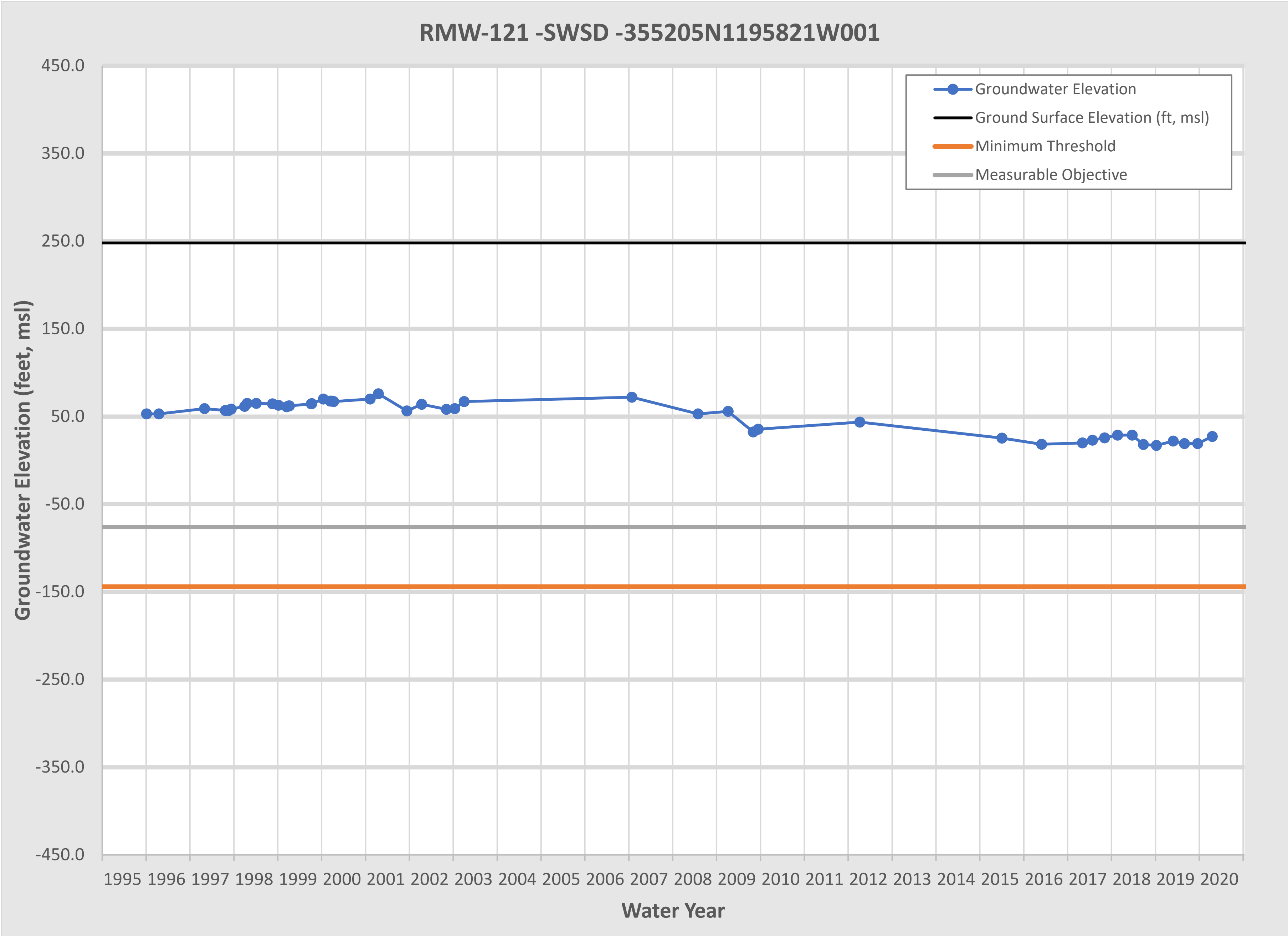

RMW-069b -RRBWSD -352889N1191814W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

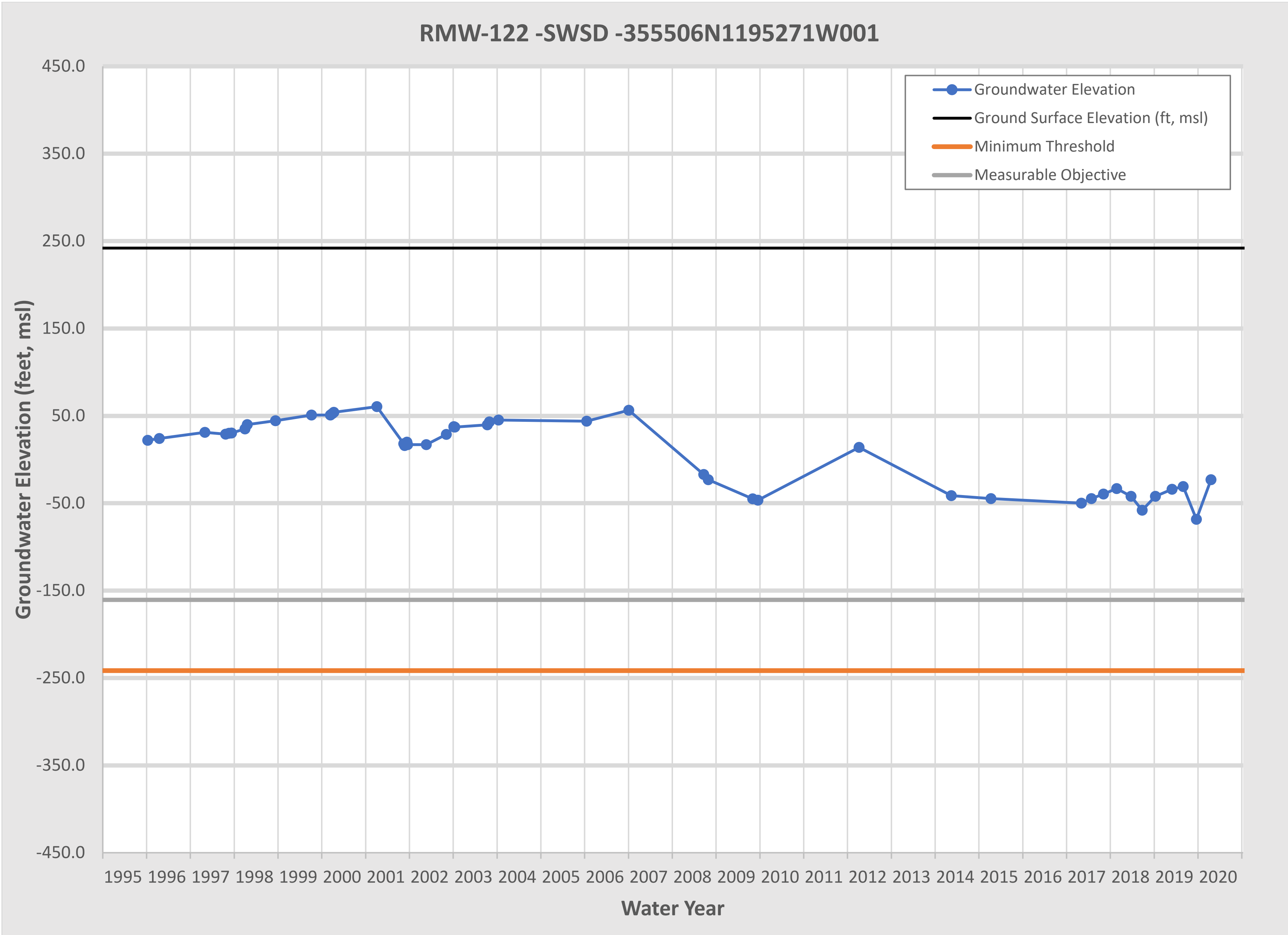


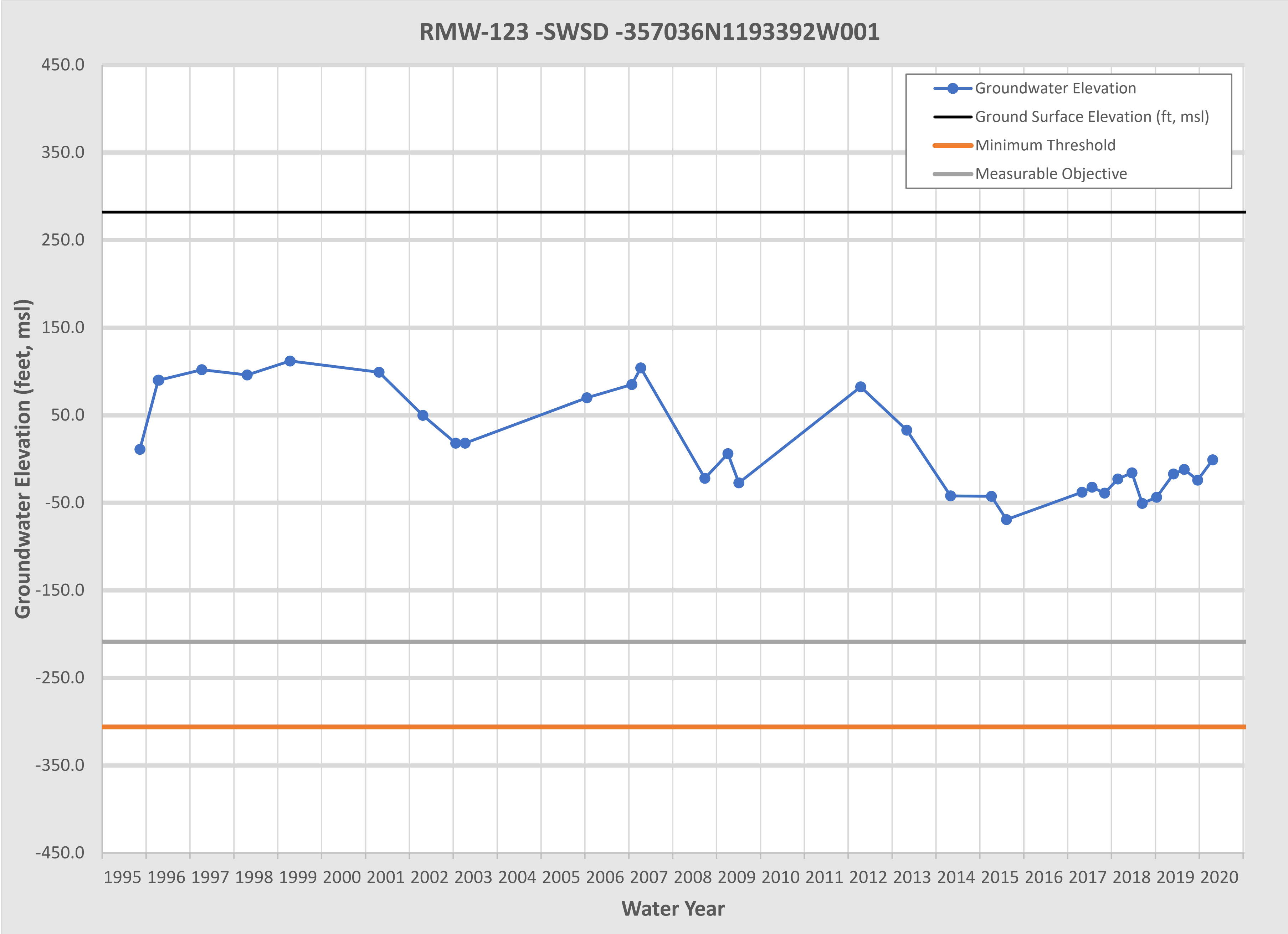
RMW-069c -RRBWSD -352889N1191814W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
400.0
300.0
200.0
100.0
0.0
-100.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



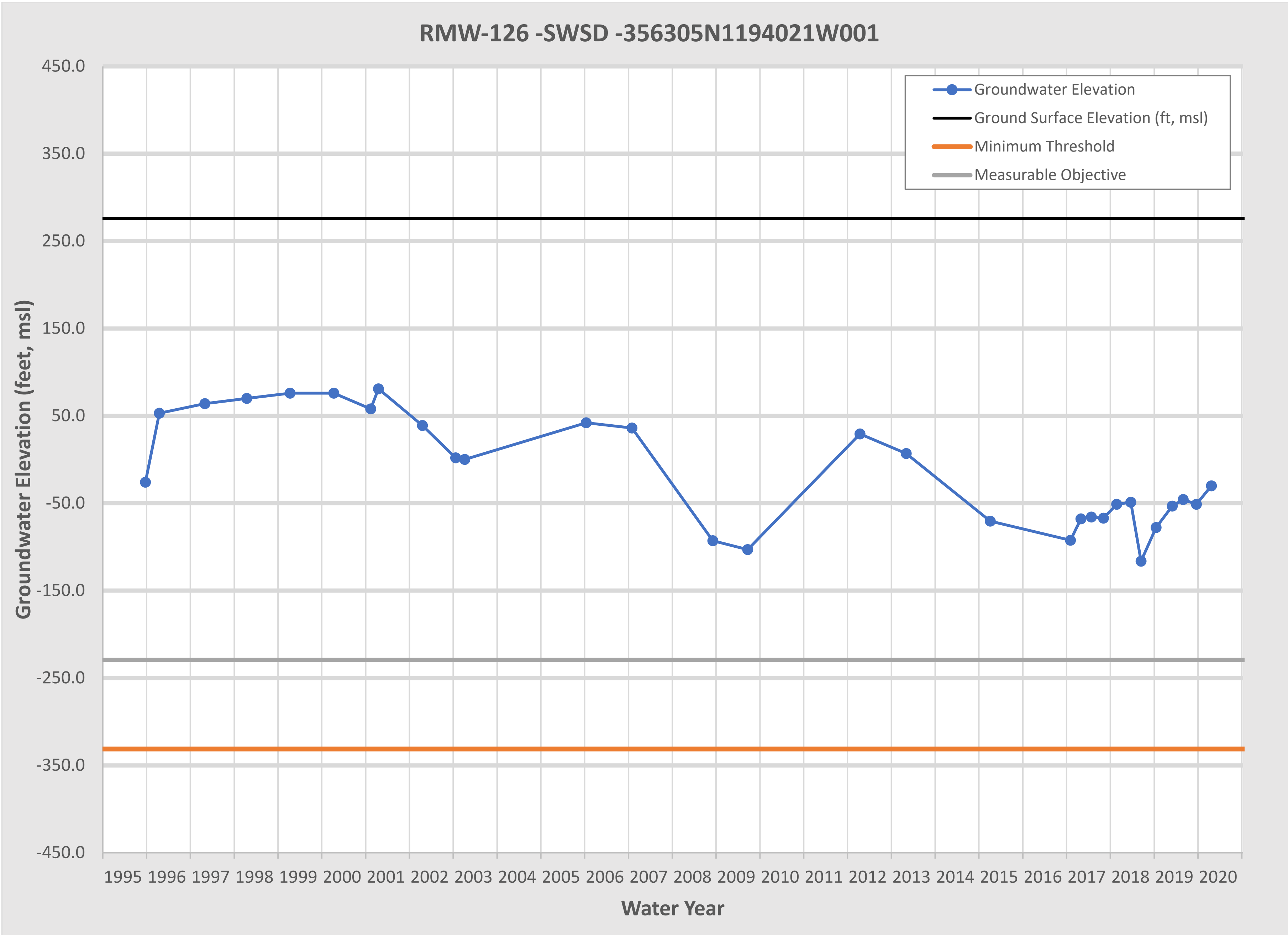
RMW-119 -SWSD -355687N1195623W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-121 -SWSD -355205N1195821W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

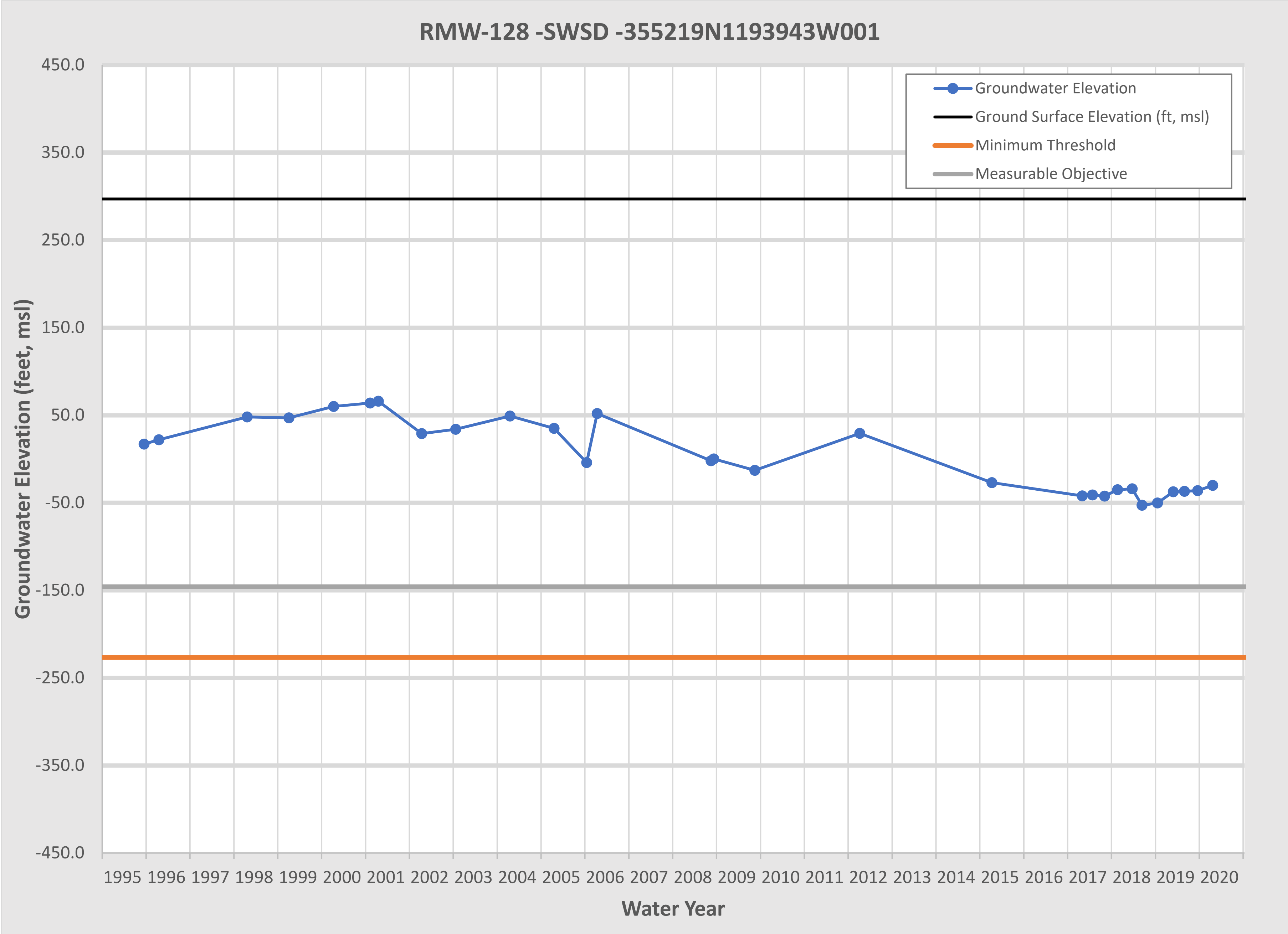

RMW-122 -SWSD -355506N1195271W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

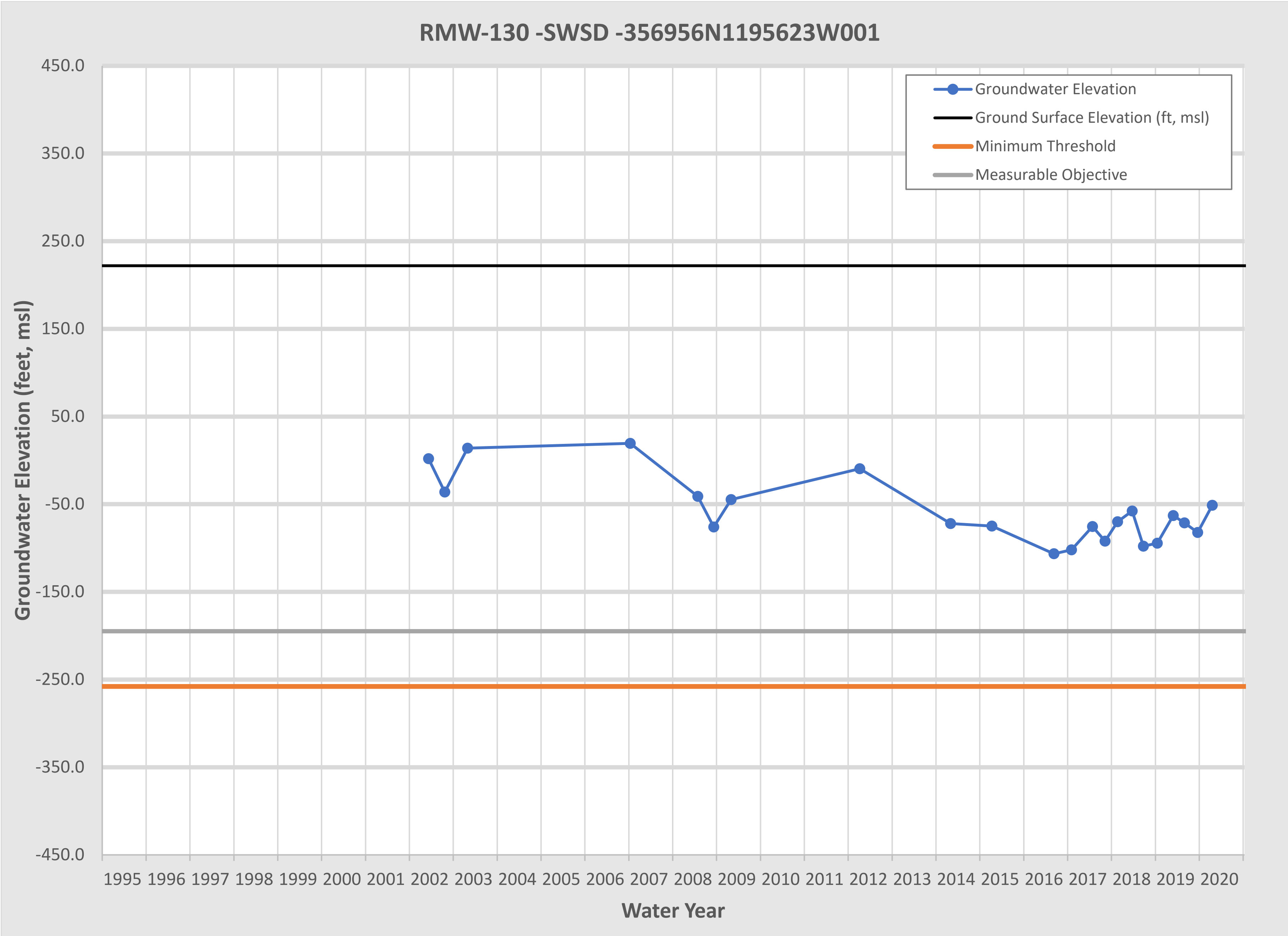


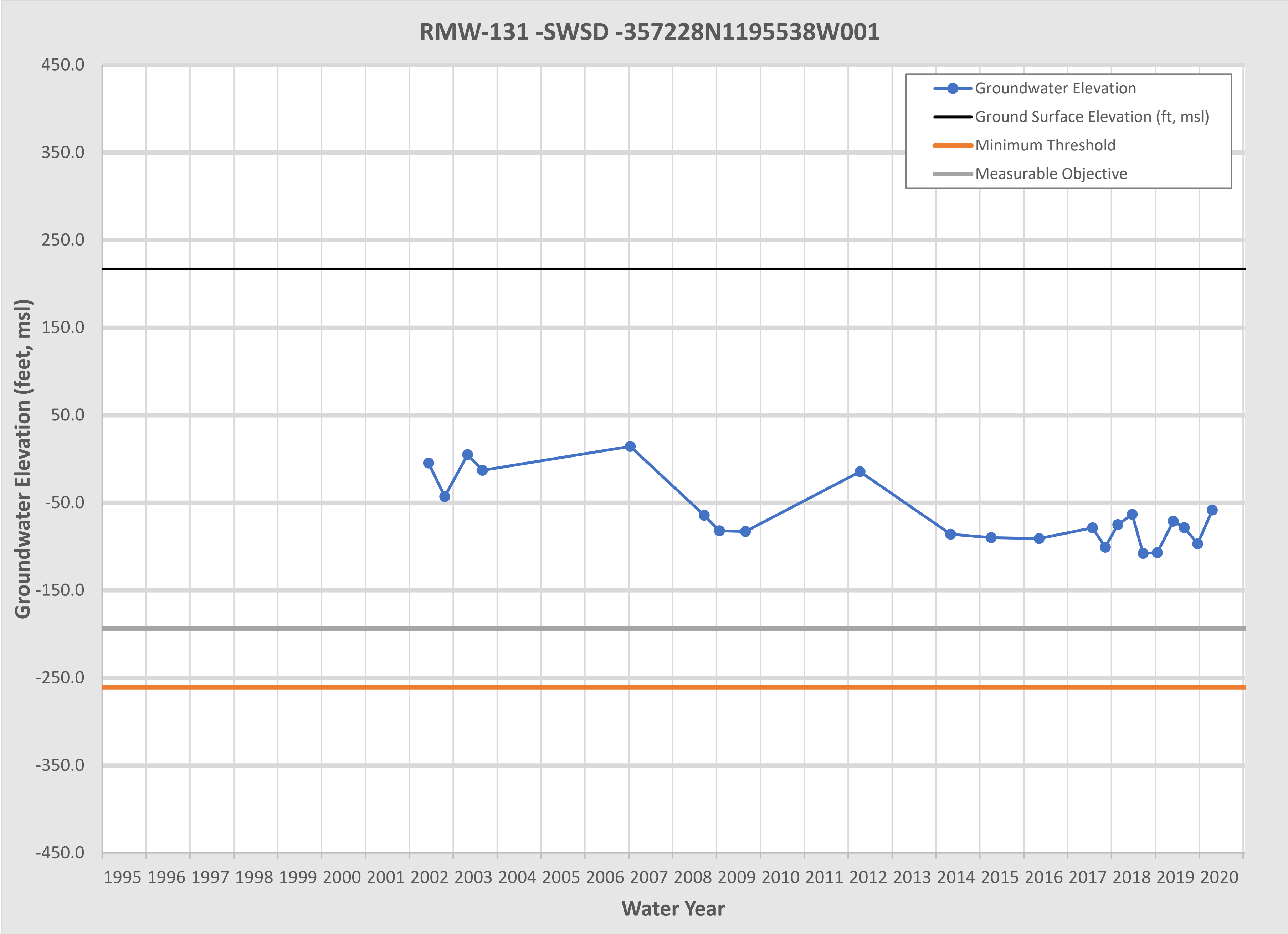
RMW-123 -SWSD -357036N1193392W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



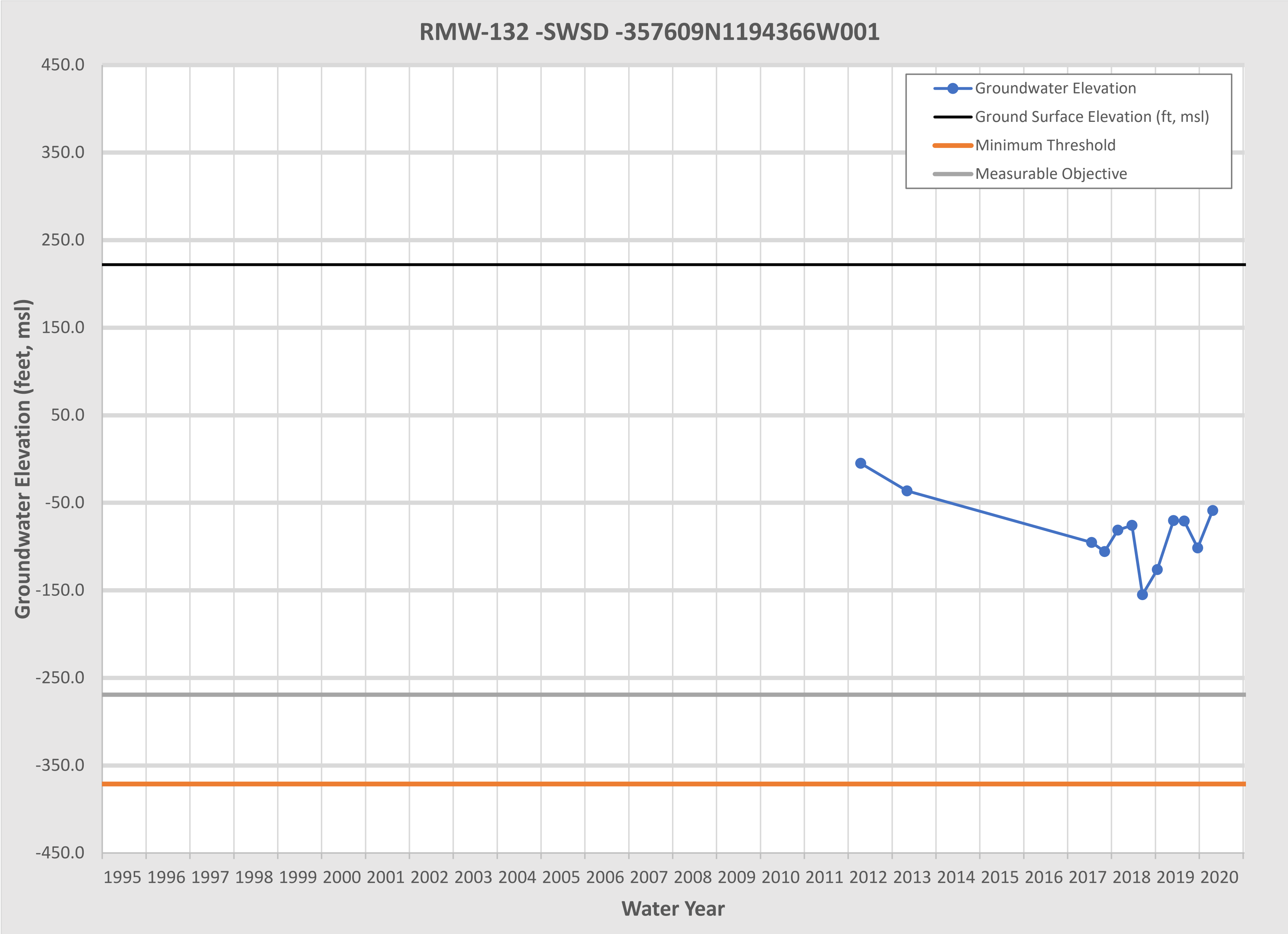
RMW-126 -SWSD -356305N1194021W001
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective


RMW-128 -SWSD -355219N1193943W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

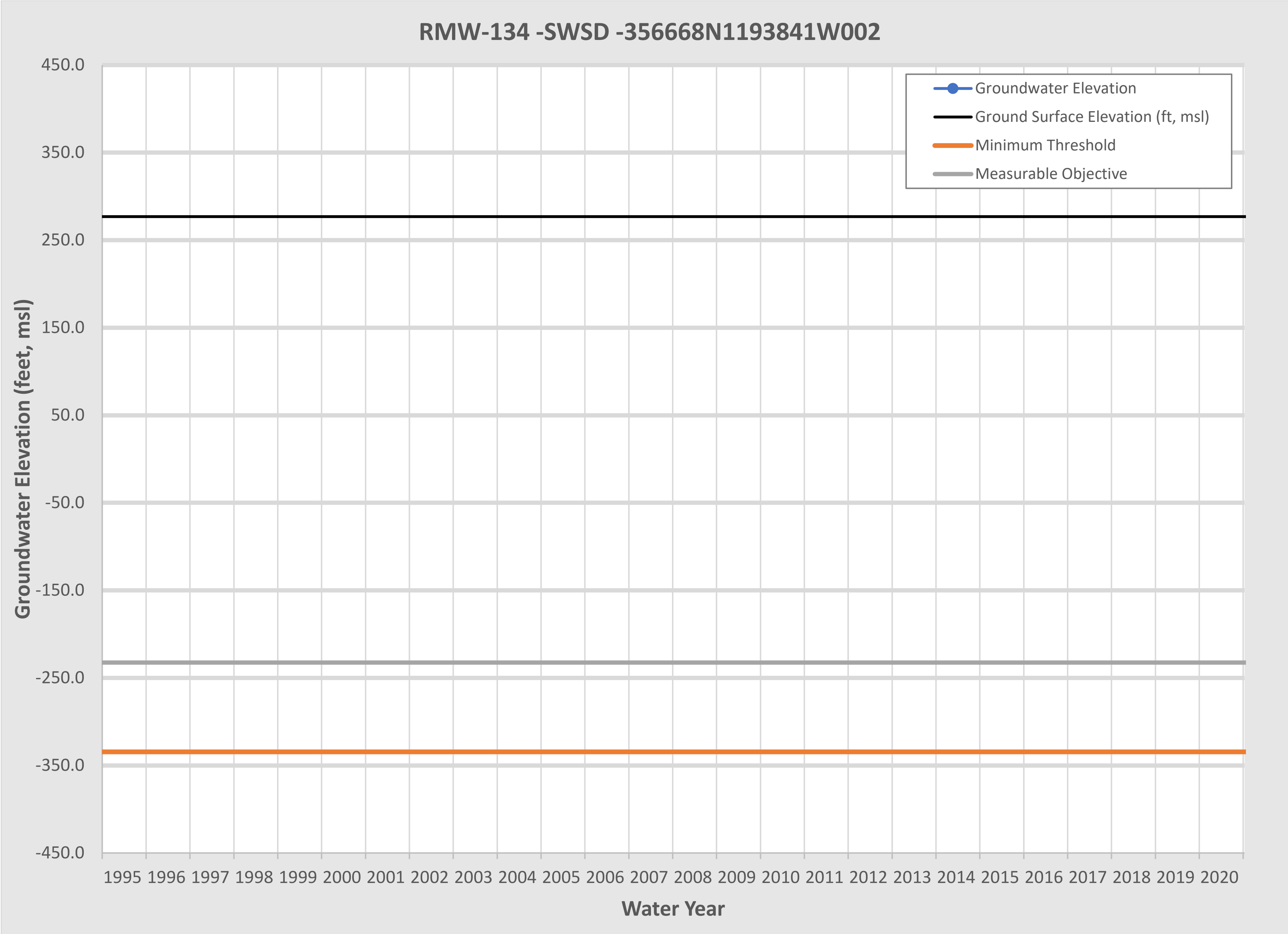

RMW-130 -SWSD -356956N1195623W001
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

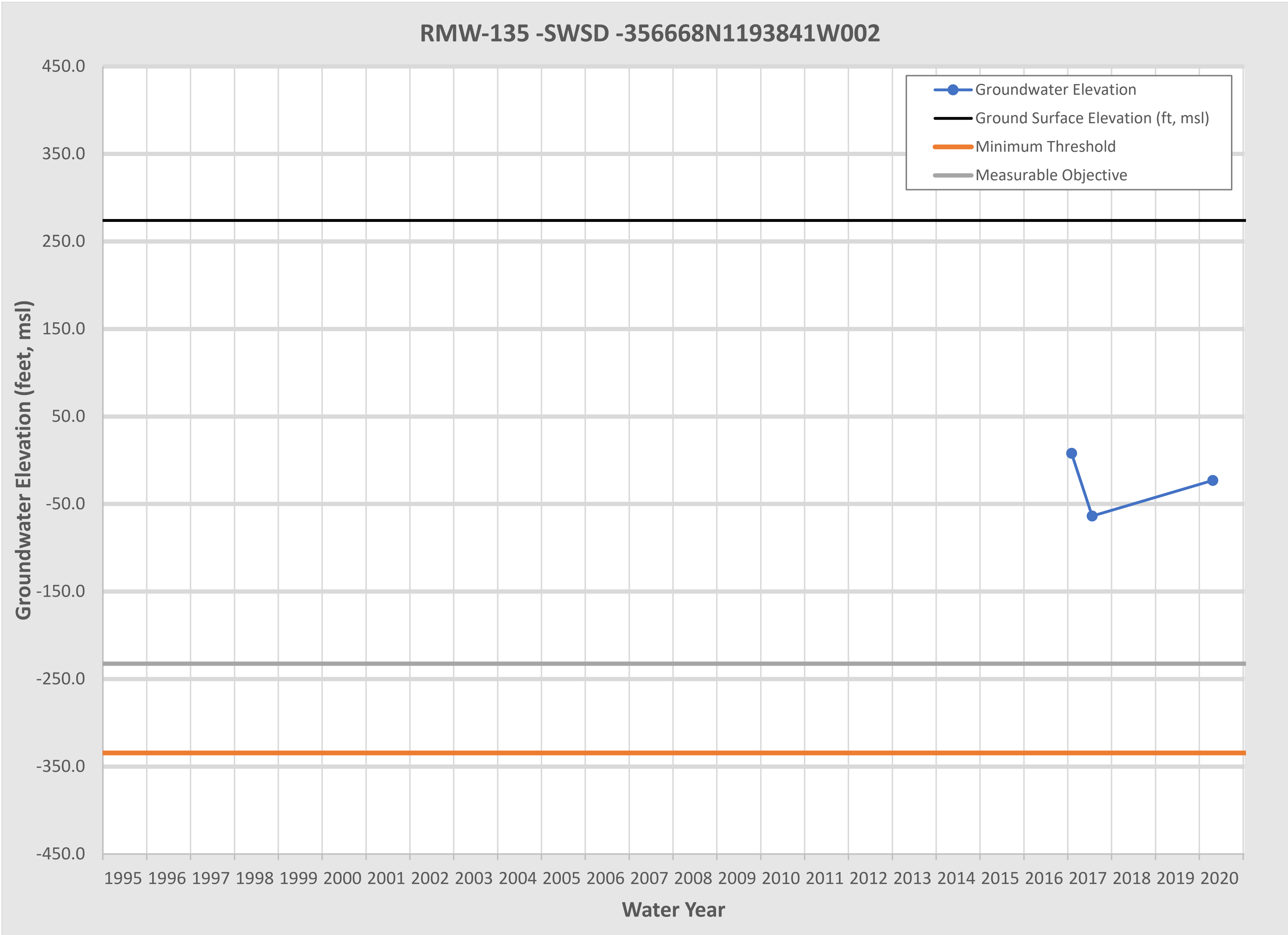


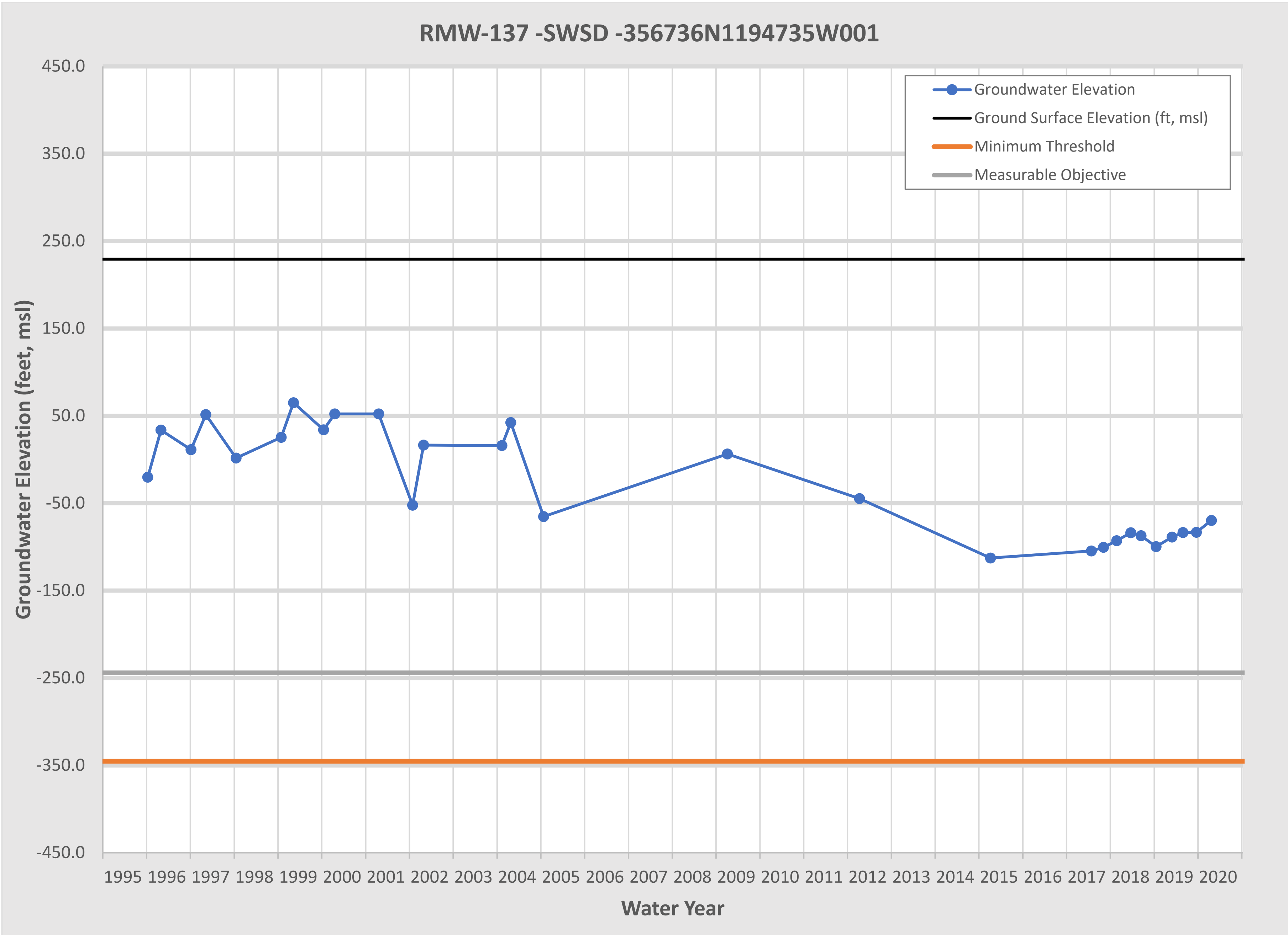
RMW-131 -SWSD -357228N1195538W001
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective



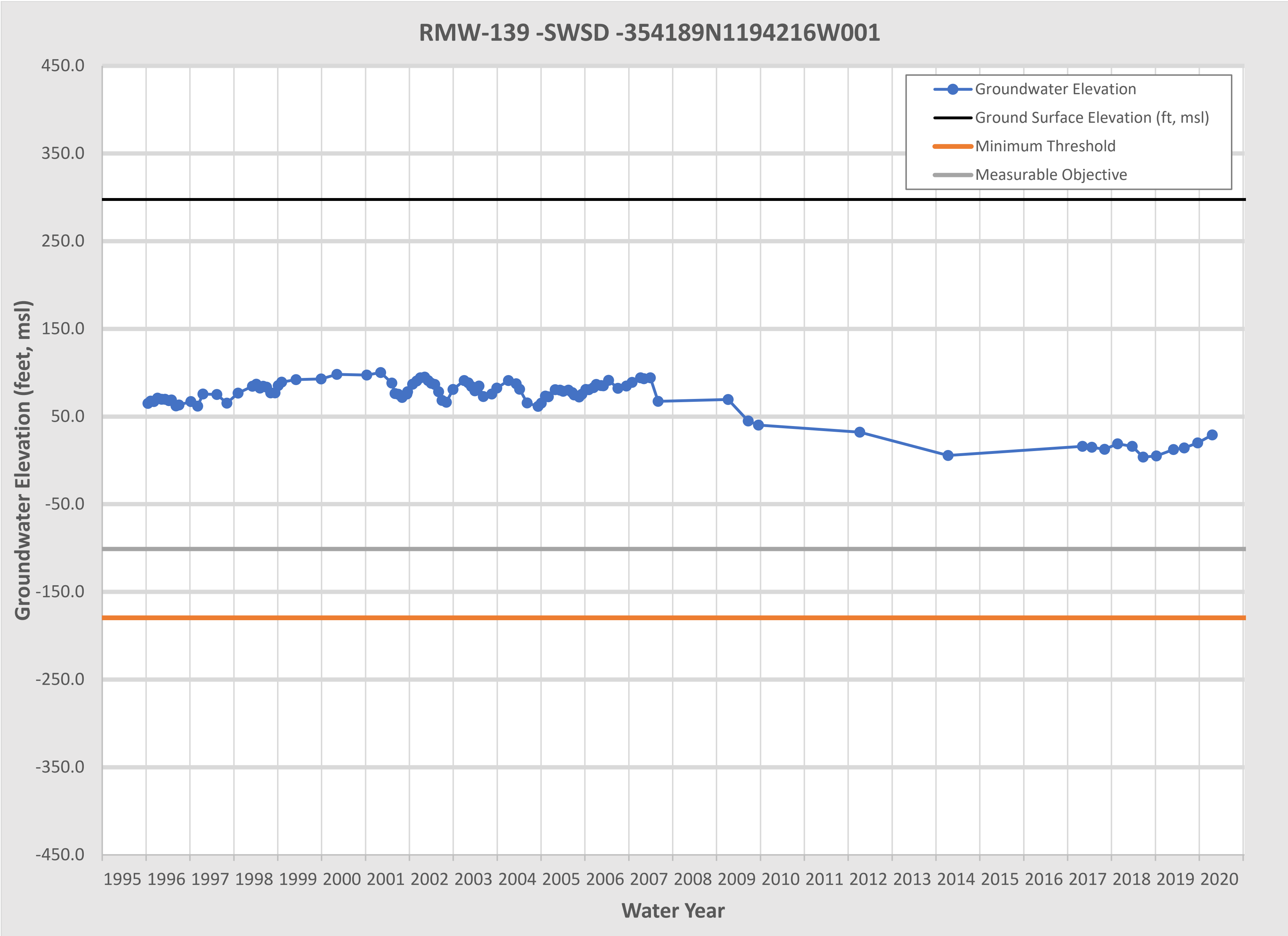
RMW-132 -SWSD -357609N1194366W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-134 -SWSD -356668N1193841W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

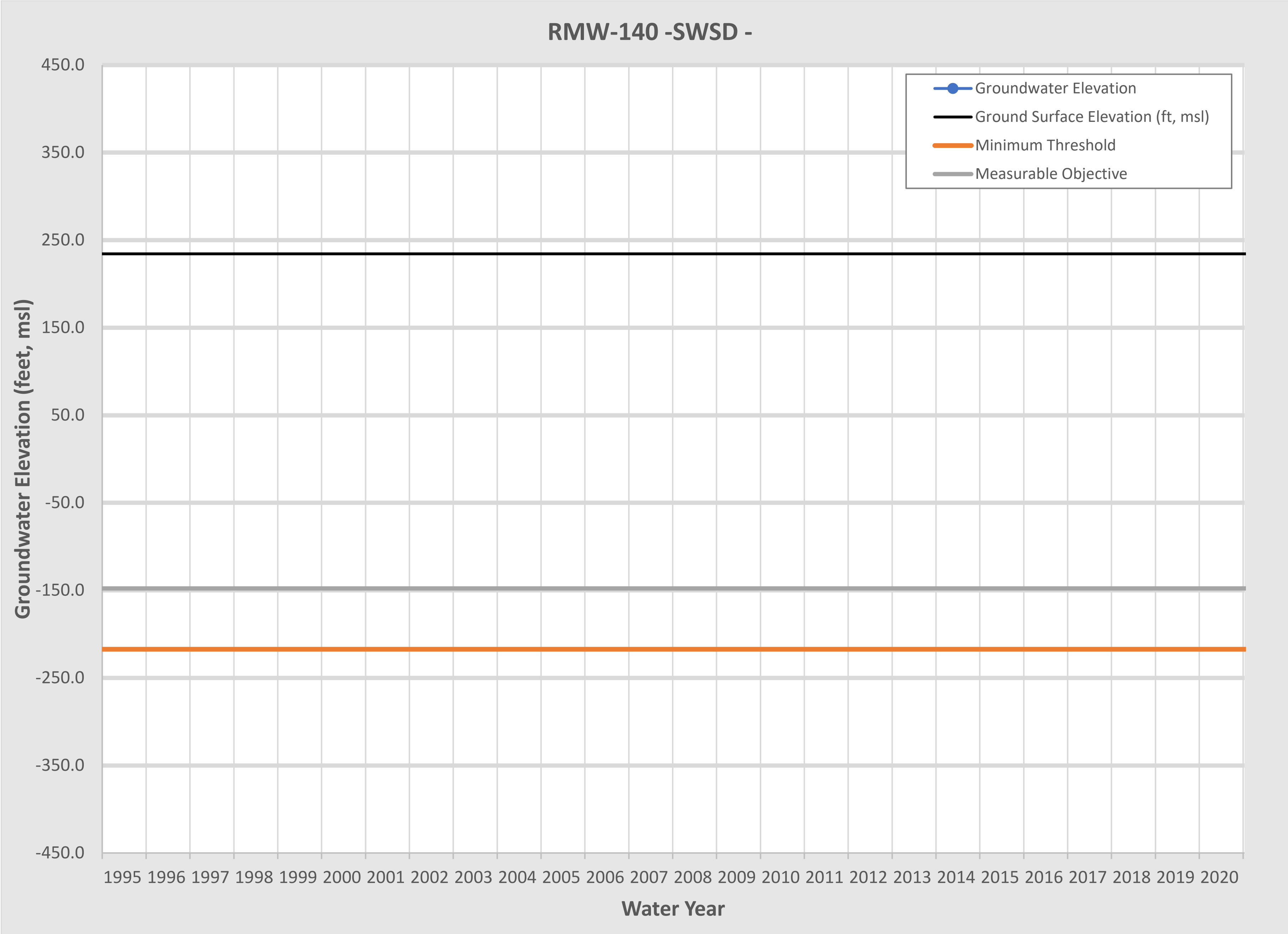

RMW-135 -SWSD -356668N1193841W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

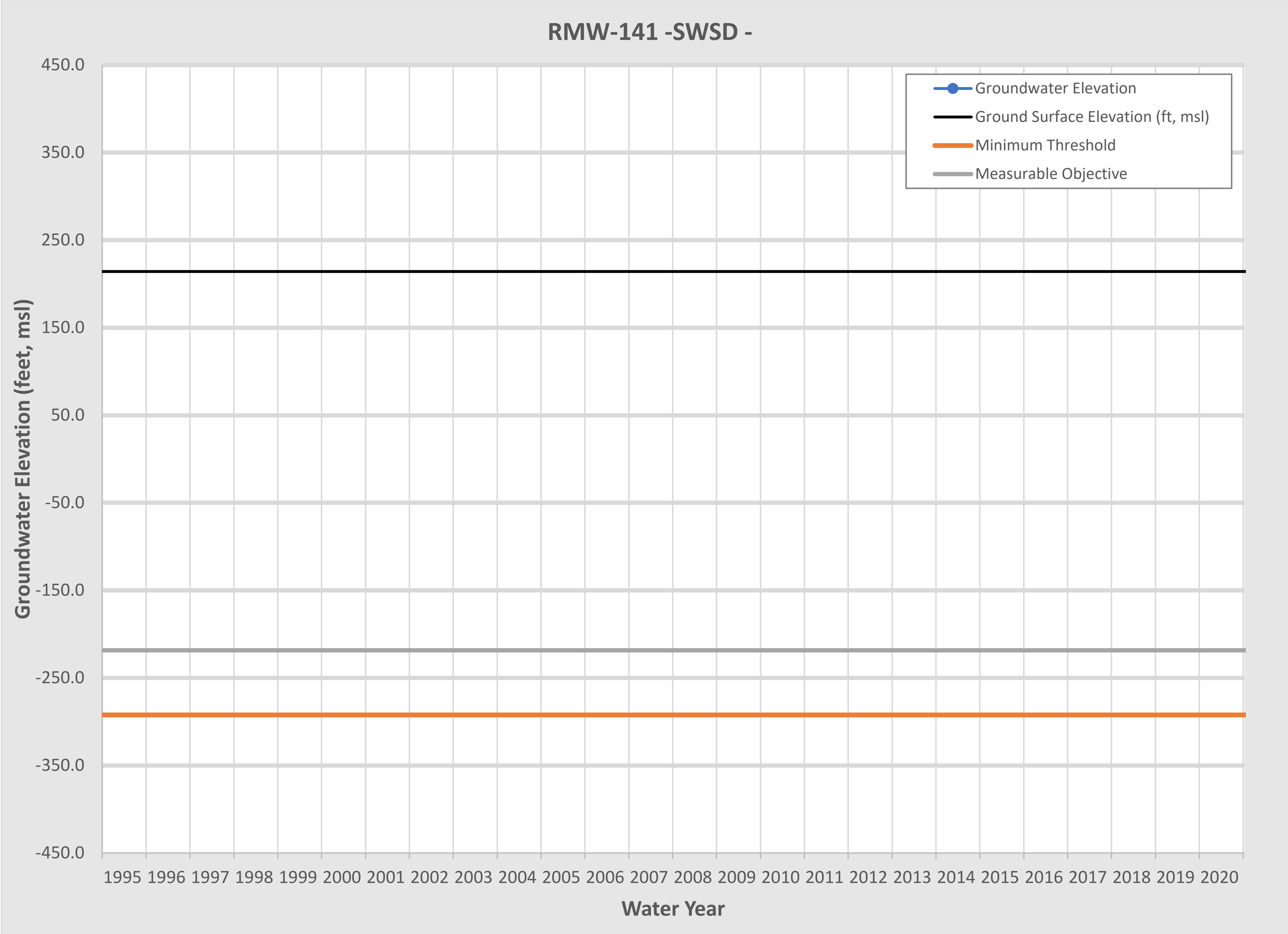


RMW-137 -SWSD -356736N1194735W001
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

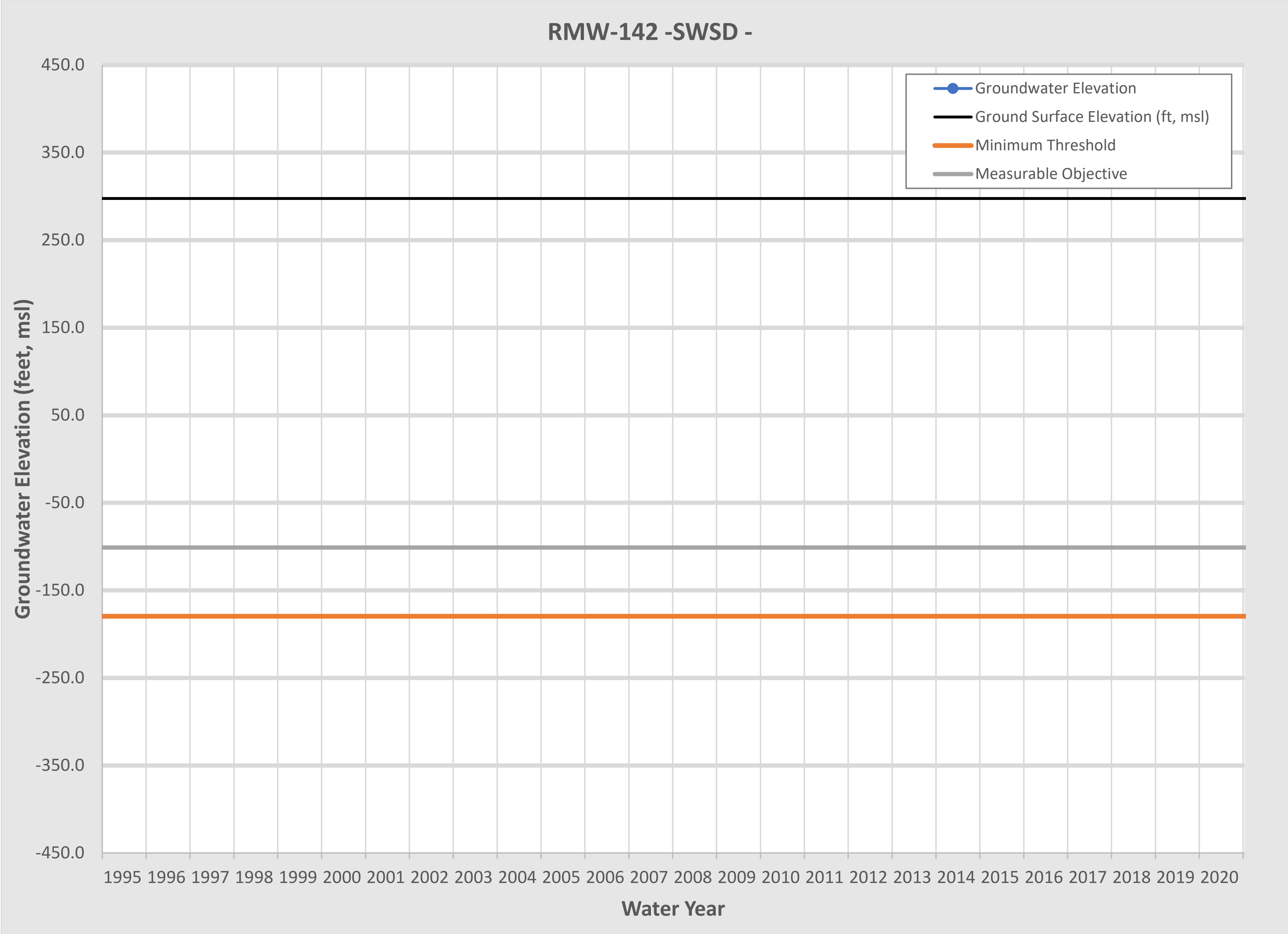


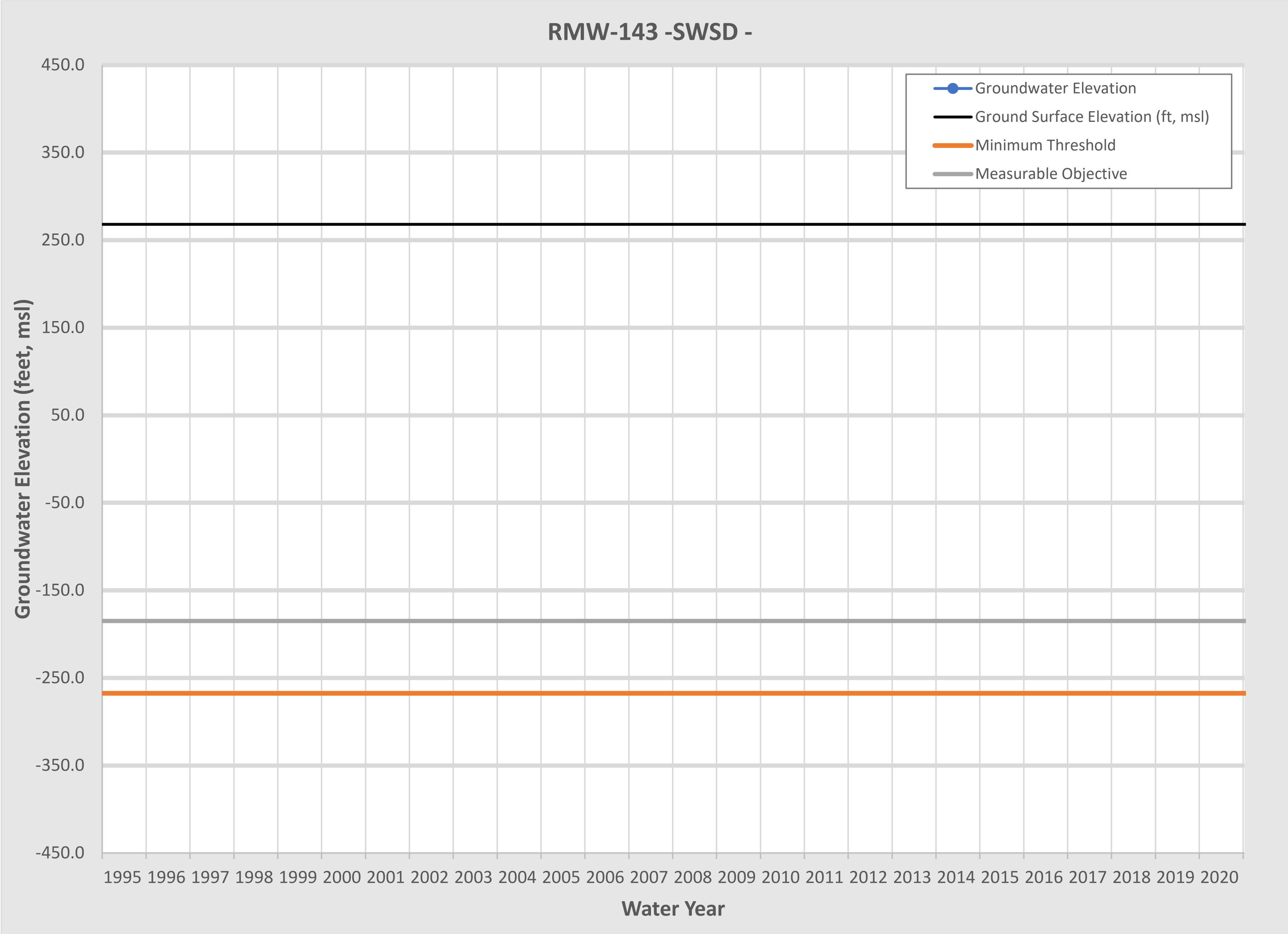
RMW-139 -SWSD -354189N1194216W001
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

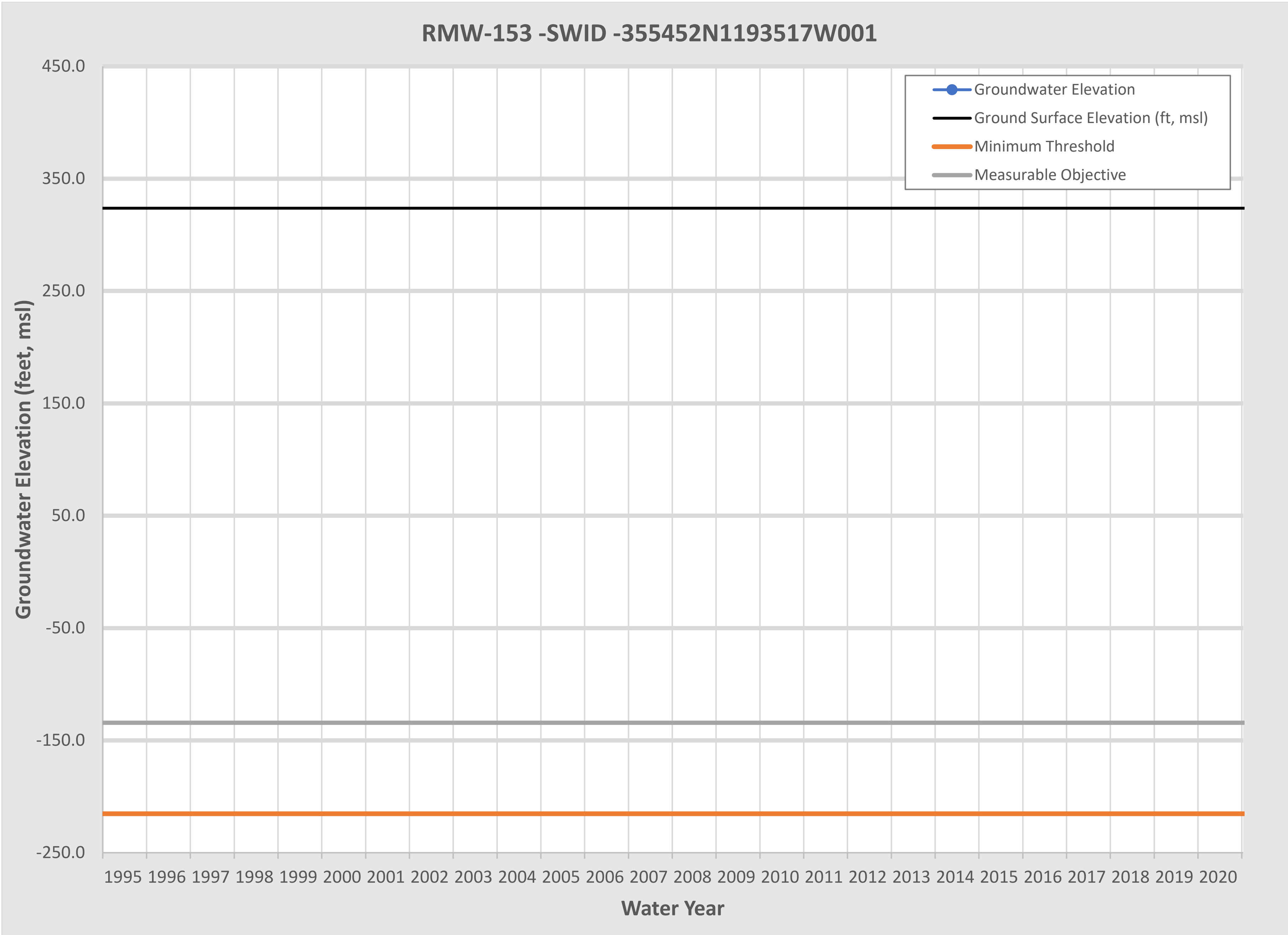

RMW-140 -SWSD -
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

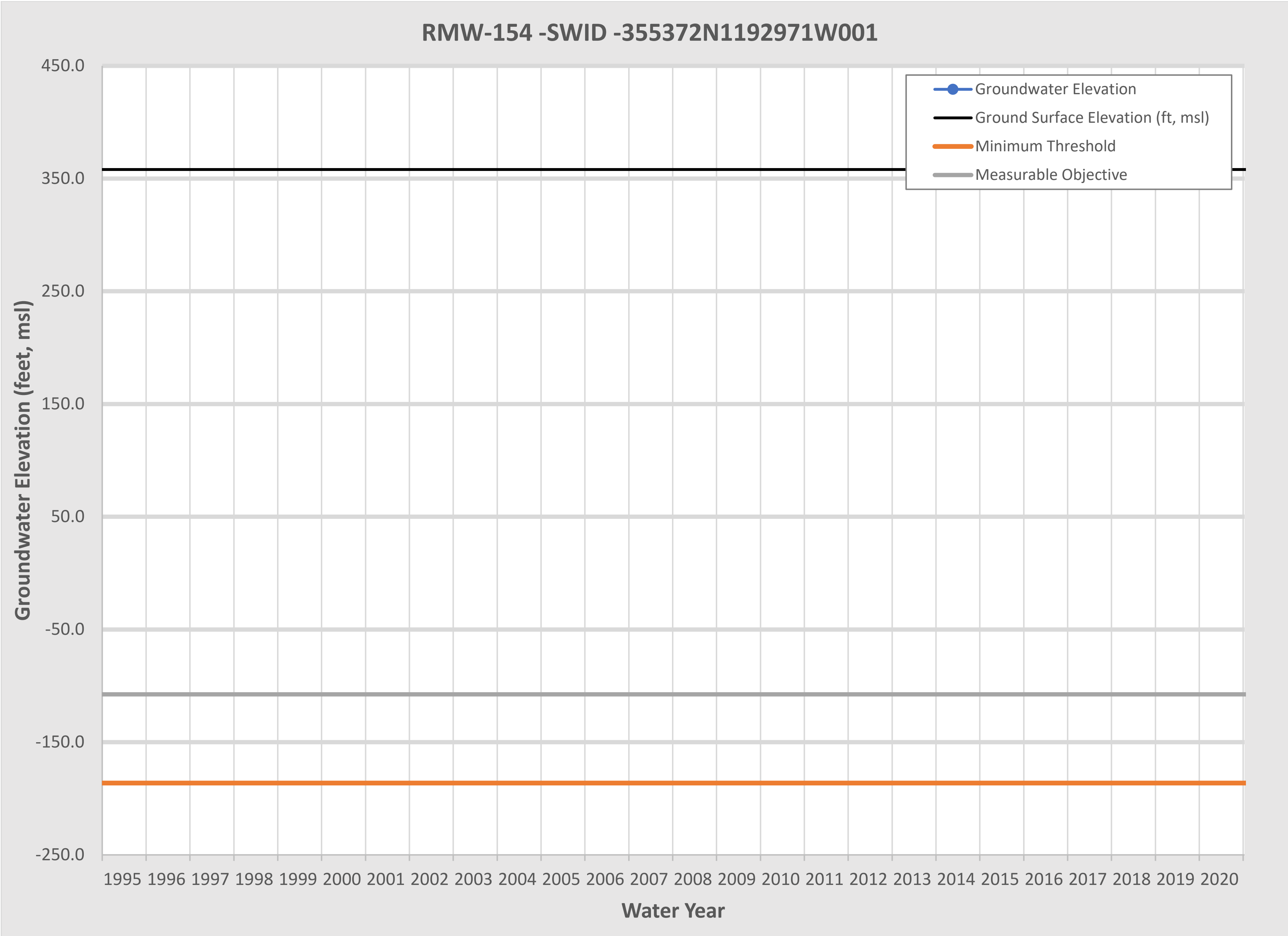


RMW-141 -SWSD -
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

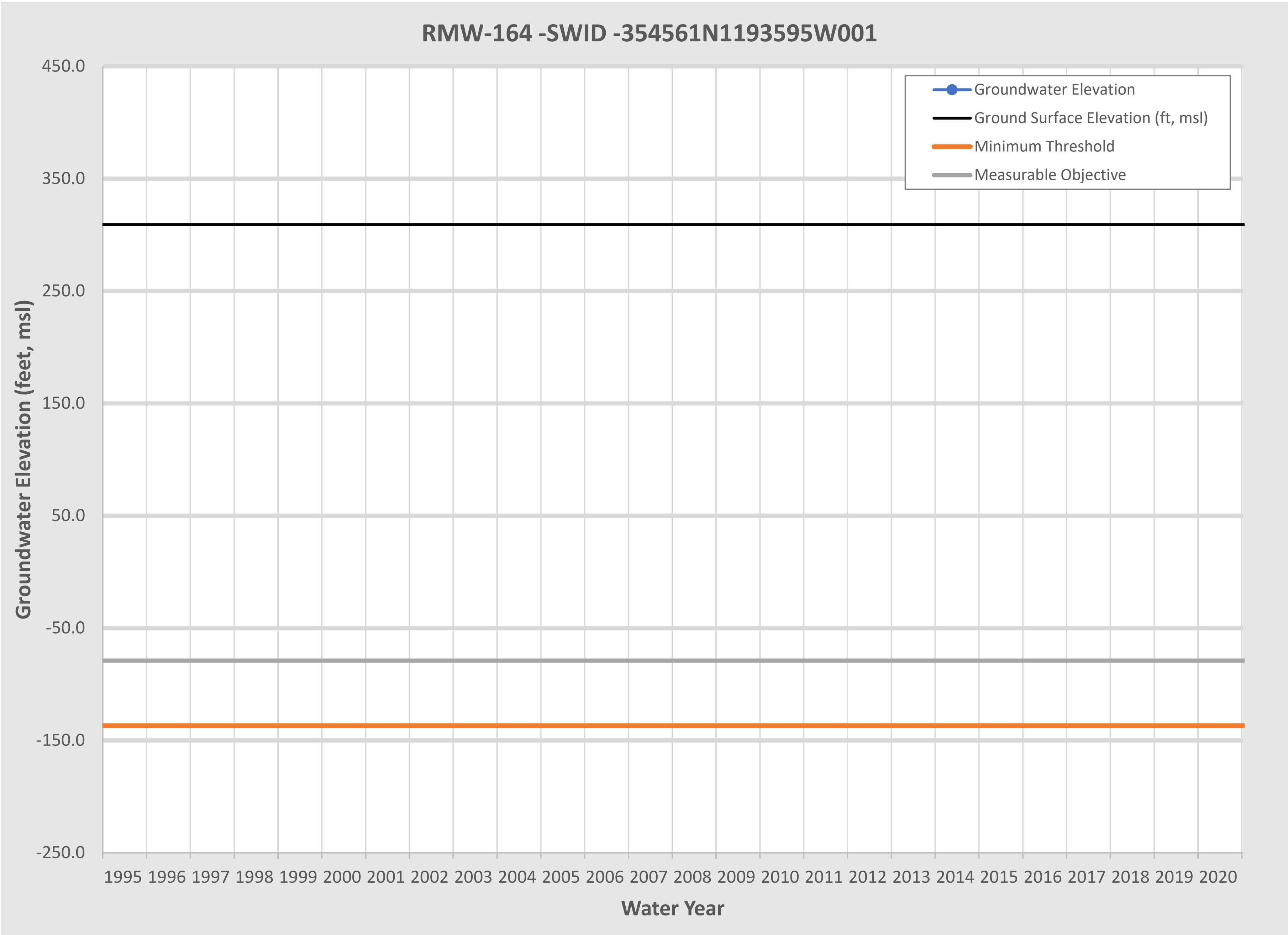

RMW-142 -SWSD -
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

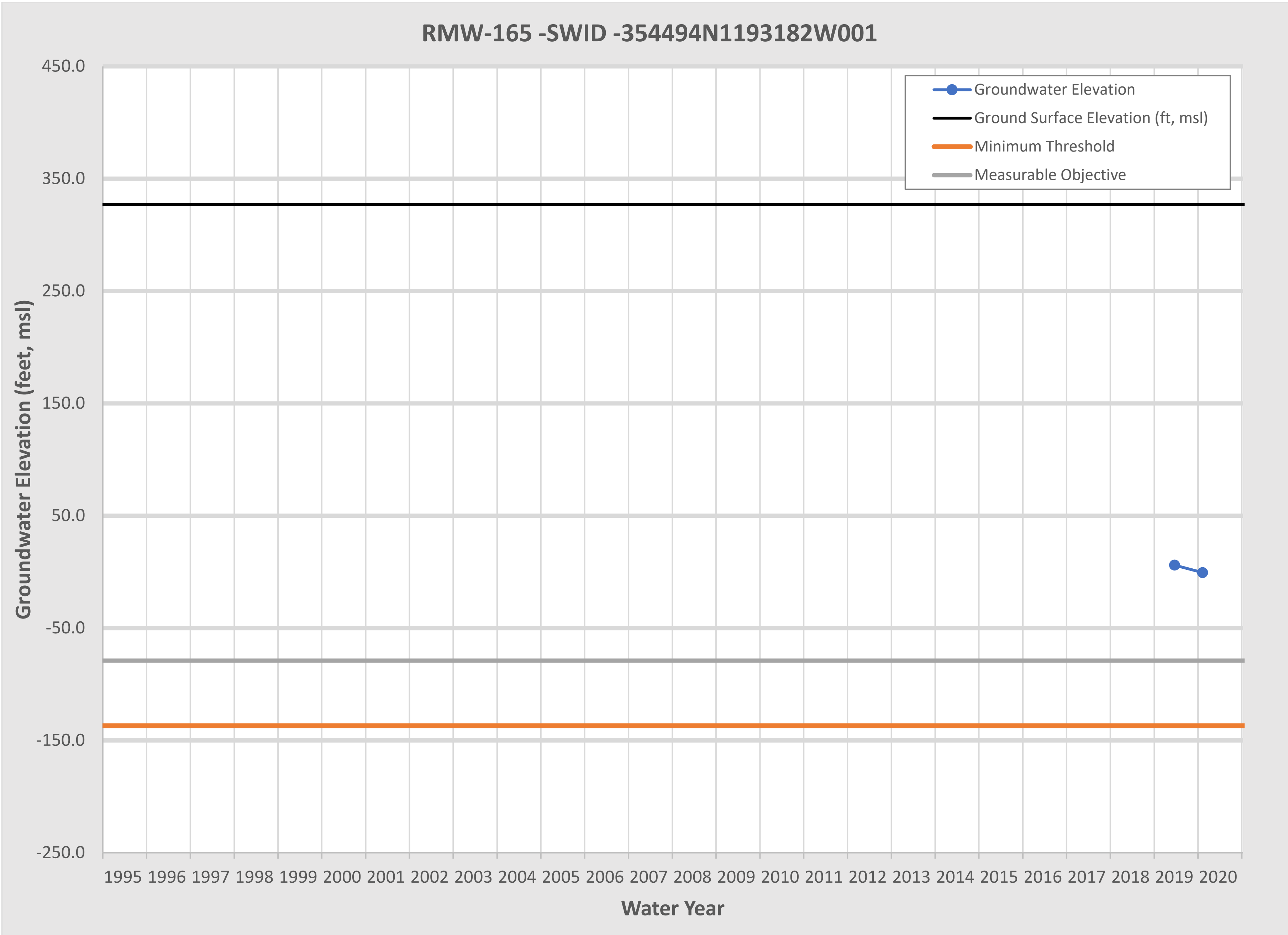

RMW-143 -SWSD -
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
-450.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-153 -SWID -355452N1193517W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

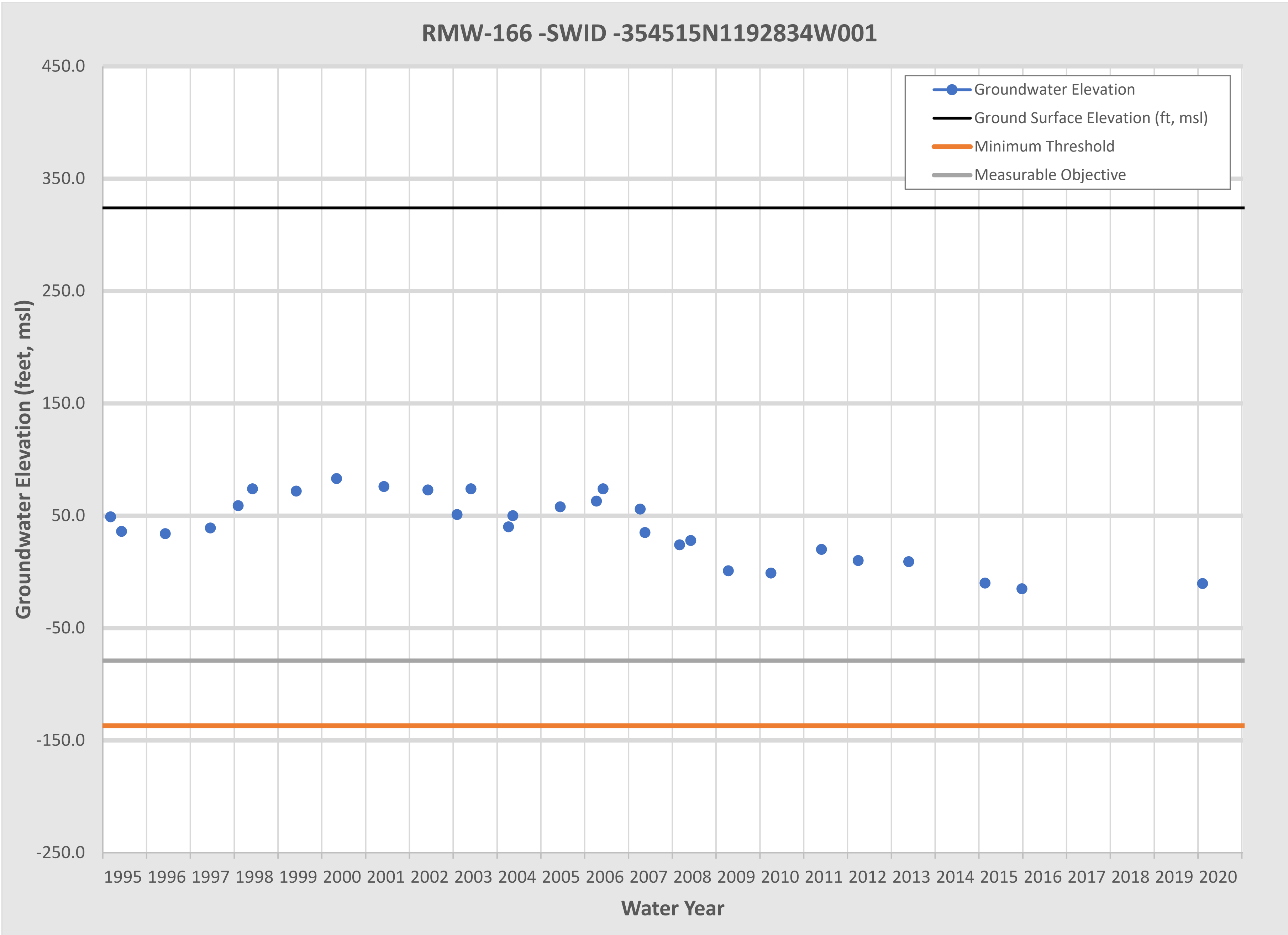


RMW-154 -SWID -355372N1192971W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

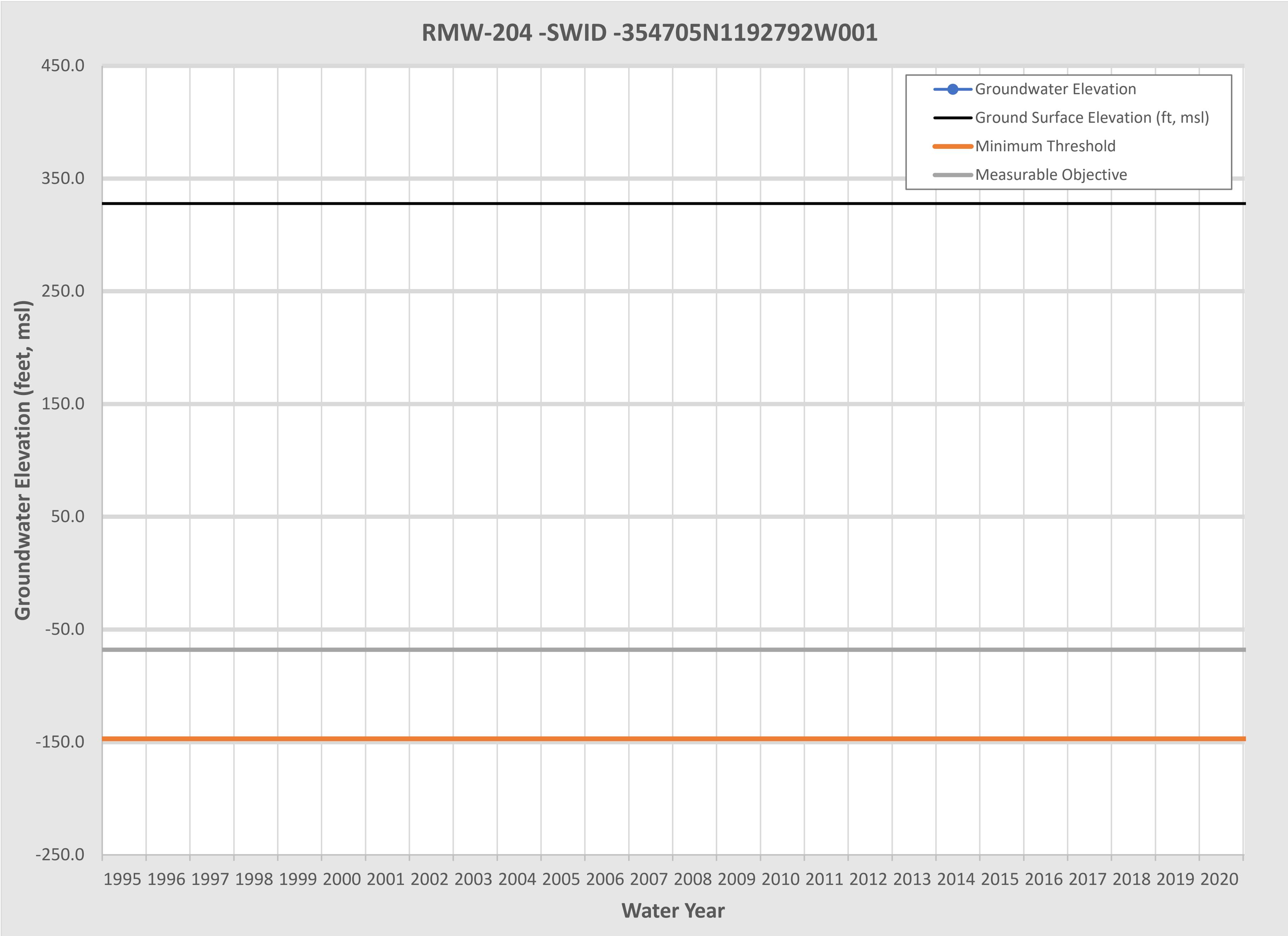

RMW-164 -SWID -354561N1193595W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

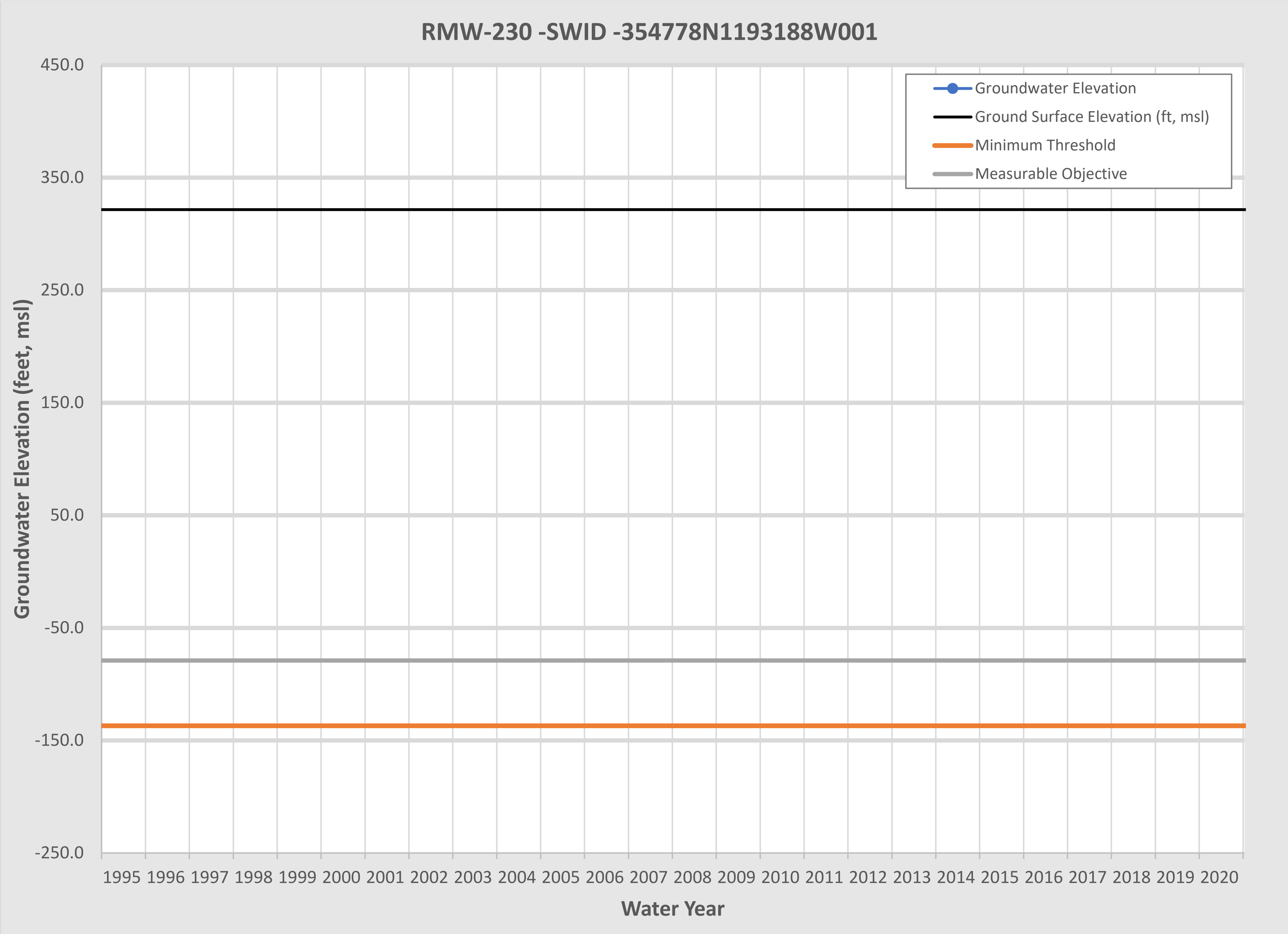


RMW-165 -SWID -354494N1193182W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

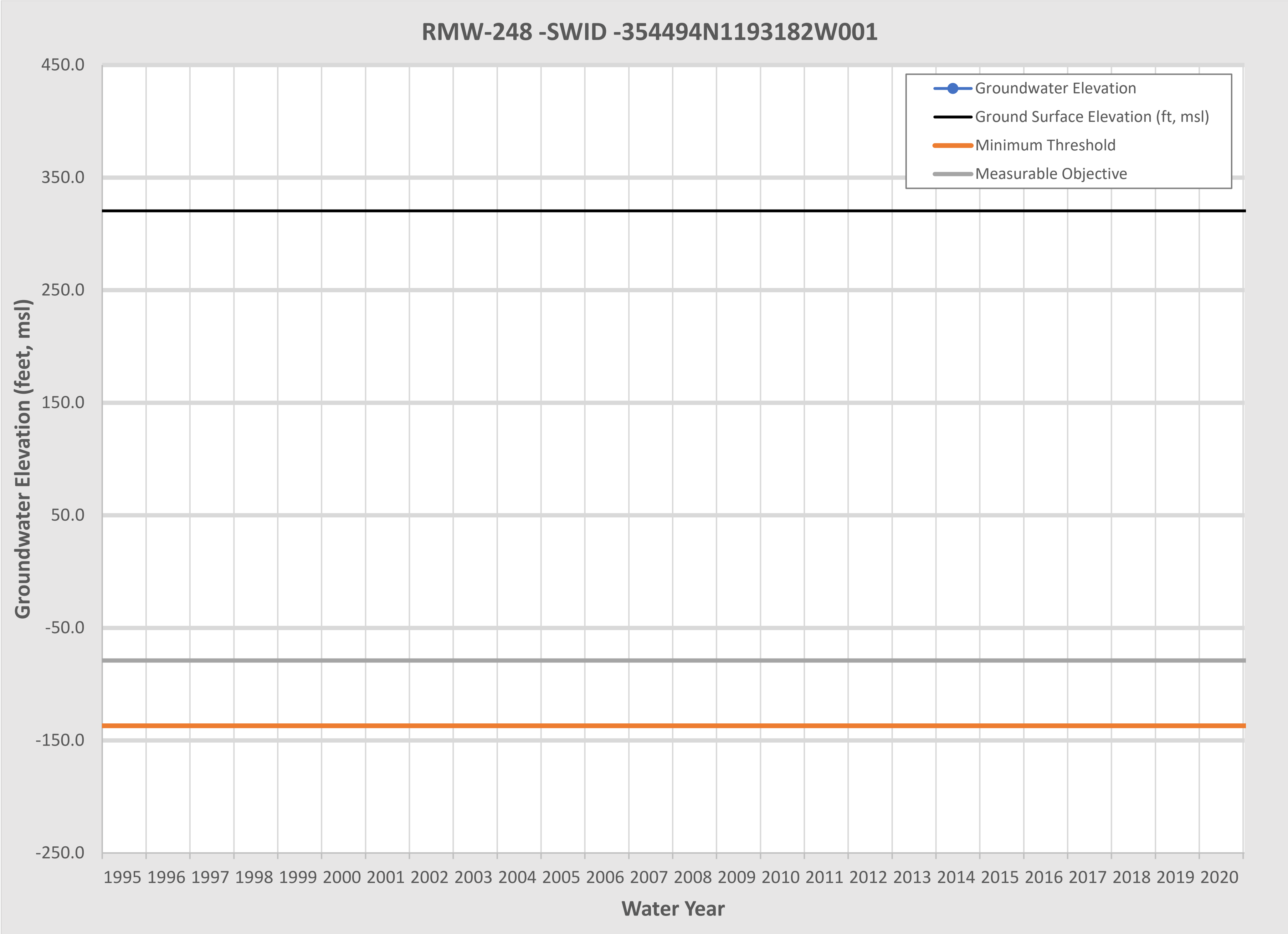


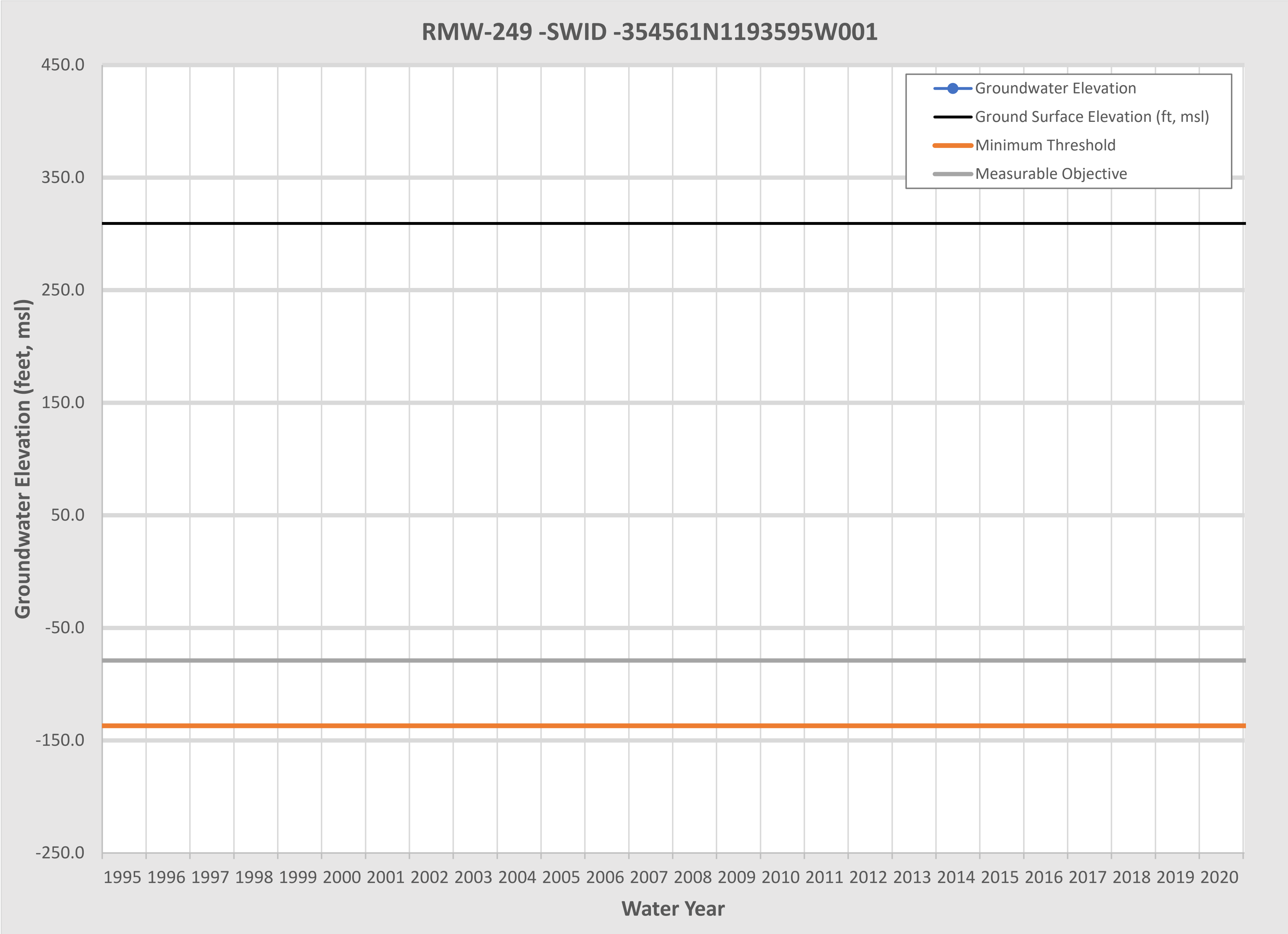
RMW-166 -SWID -354515N1192834W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

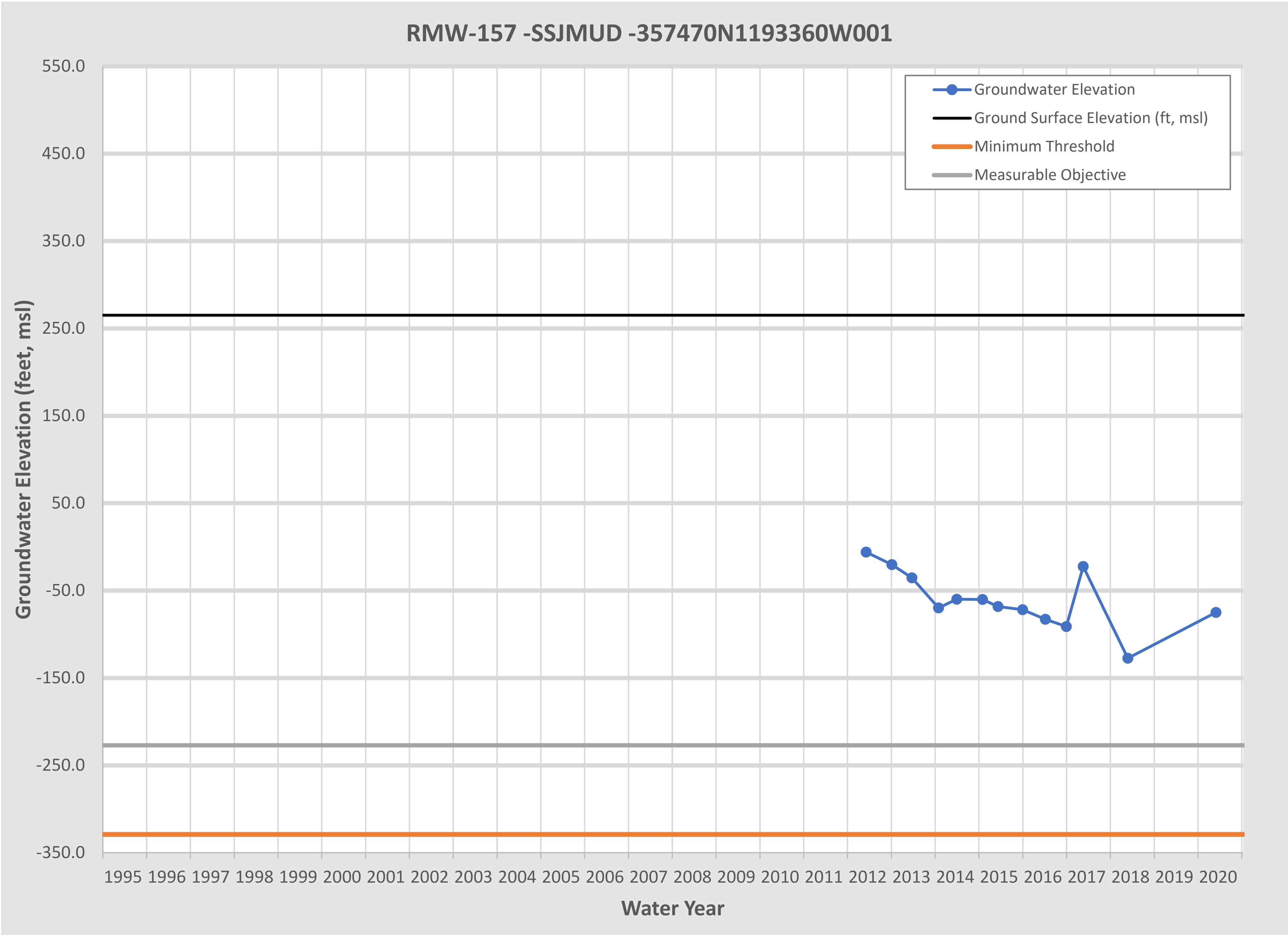

RMW-204 -SWID -354705N1192792W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



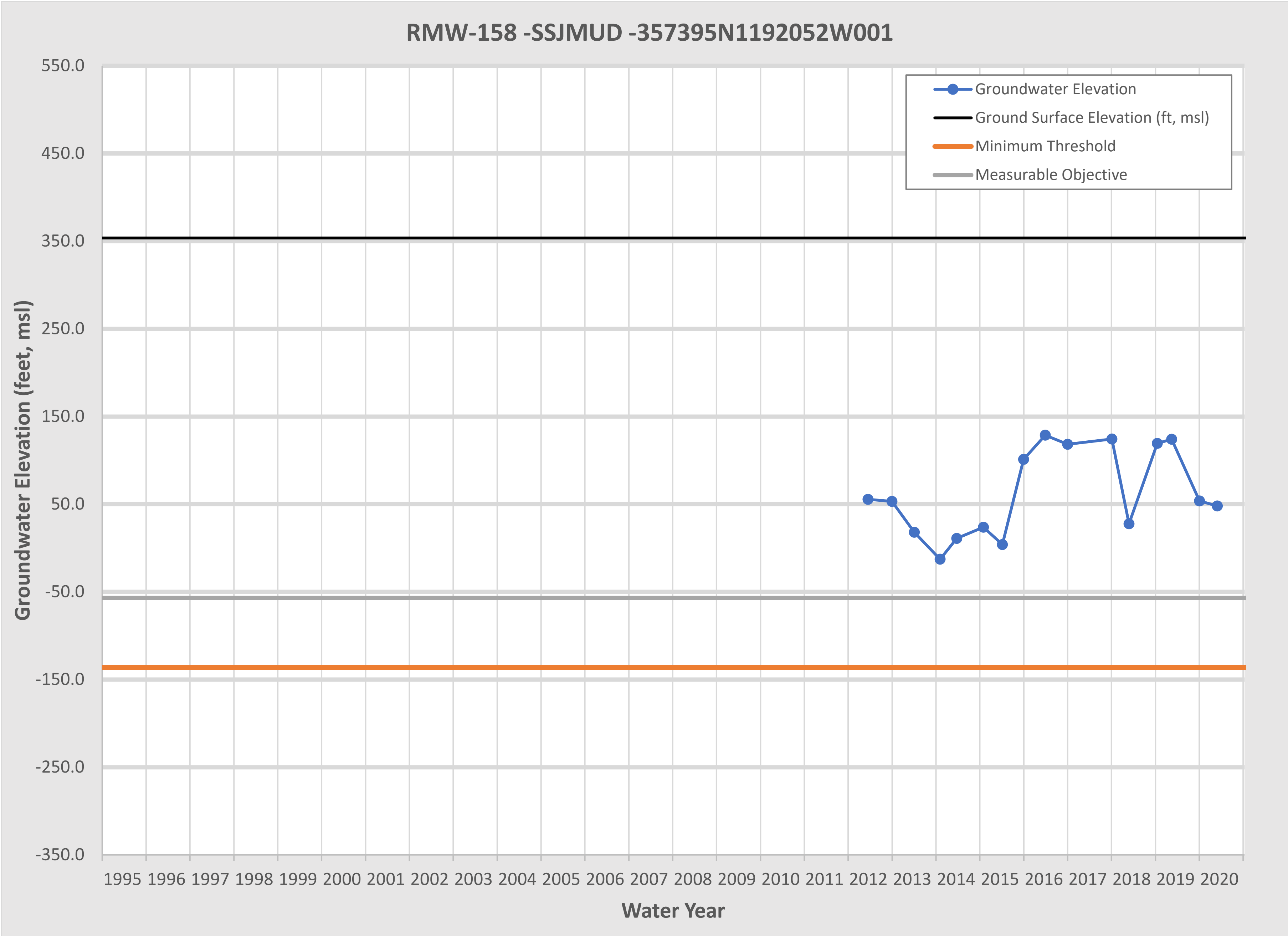
RMW-230 -SWID -354778N1193188W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

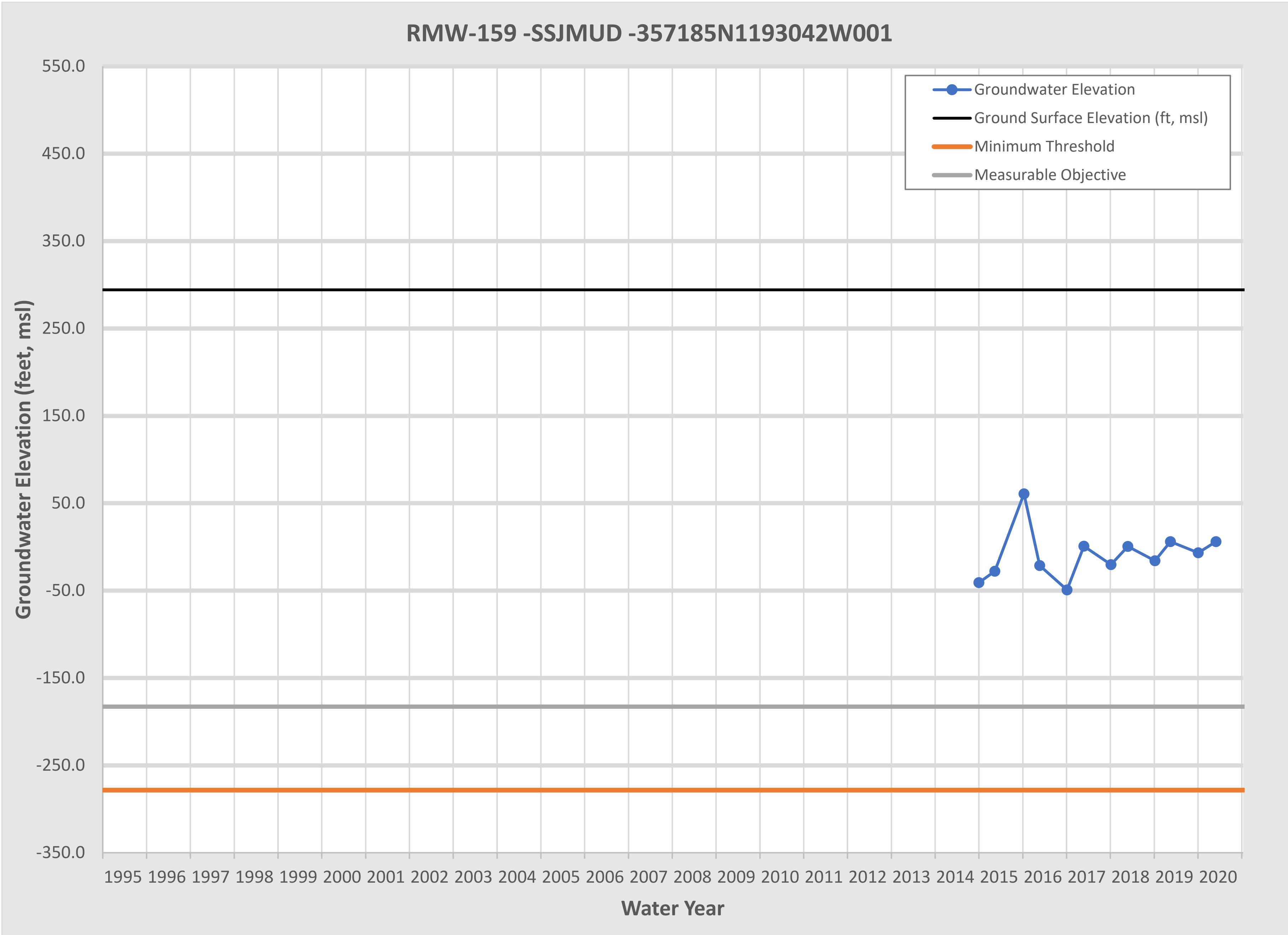

RMW-248 -SWID -354494N1193182W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

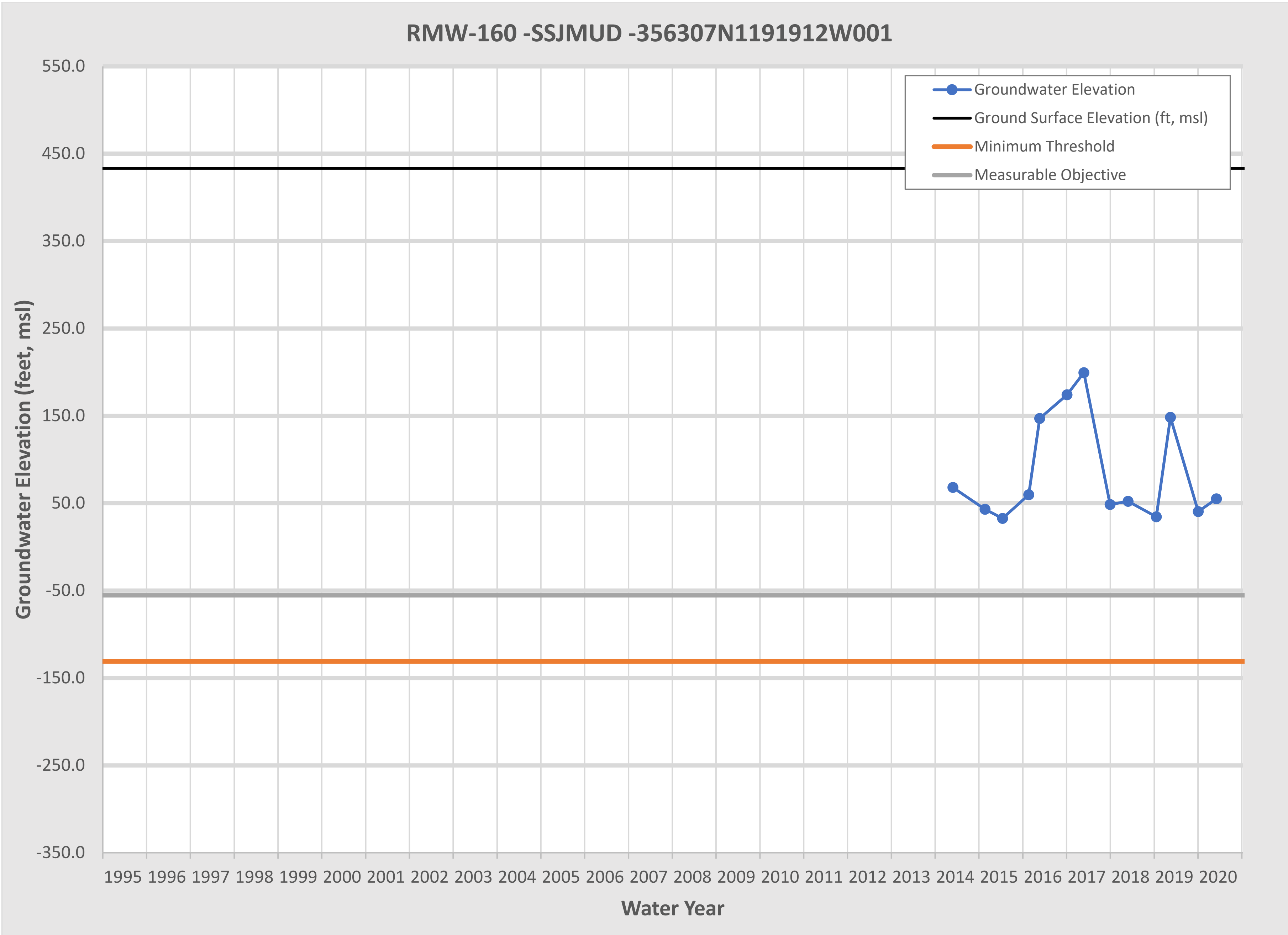

RMW-249 -SWID -354561N1193595W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



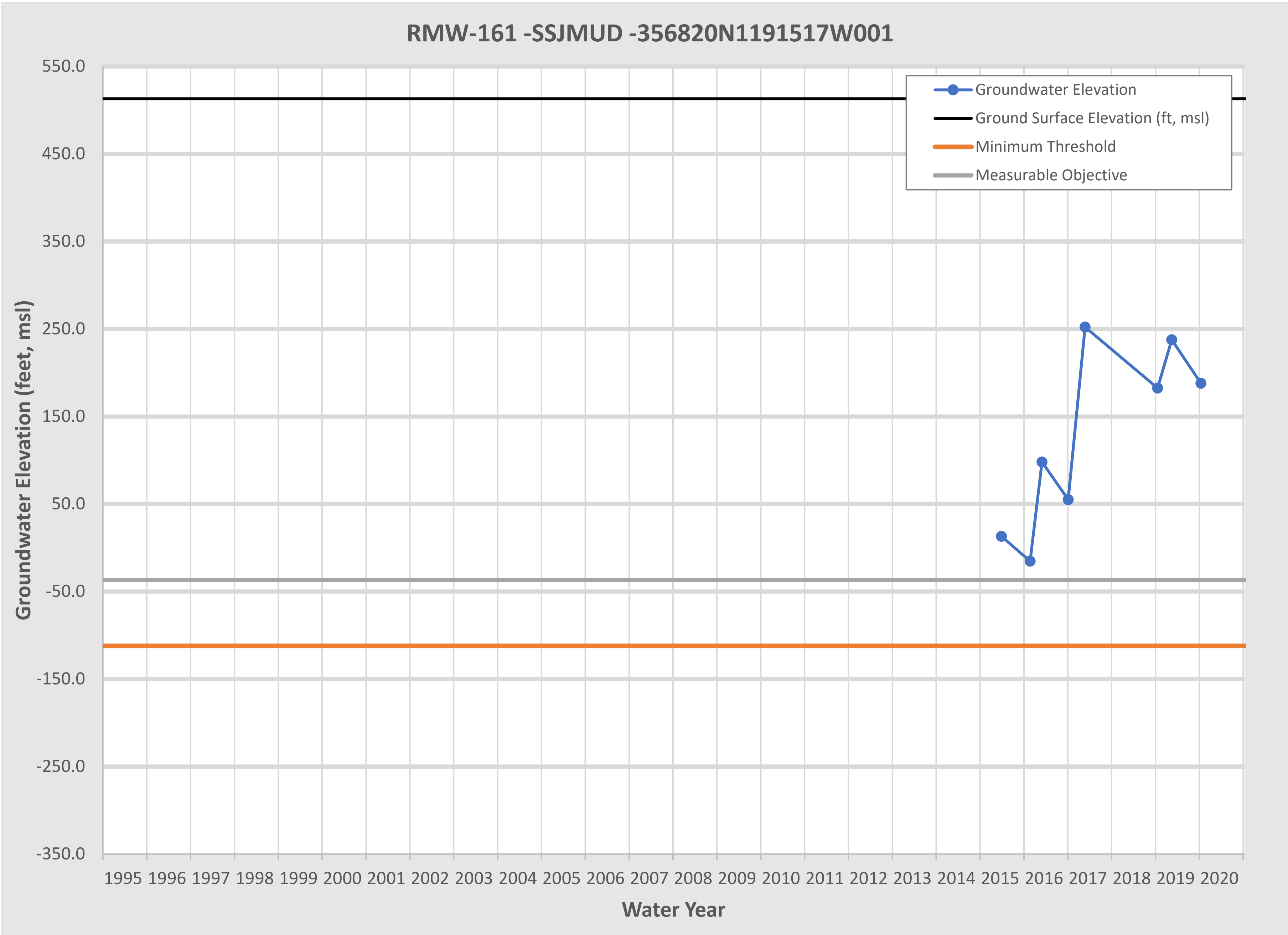
RMW-157 -SSJMUD -357470N1193360W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

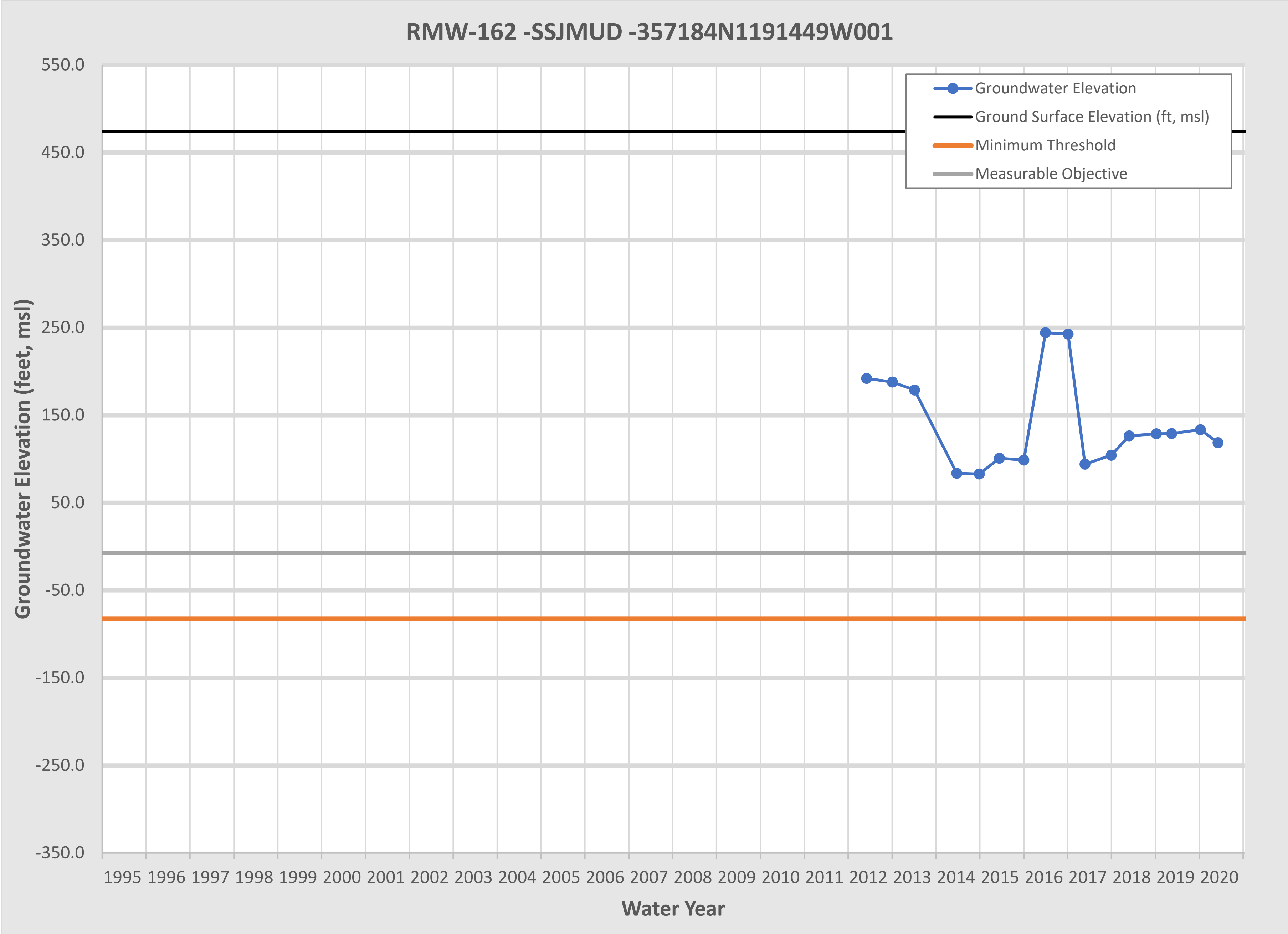

RMW-158 -SSJMUD -357395N1192052W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

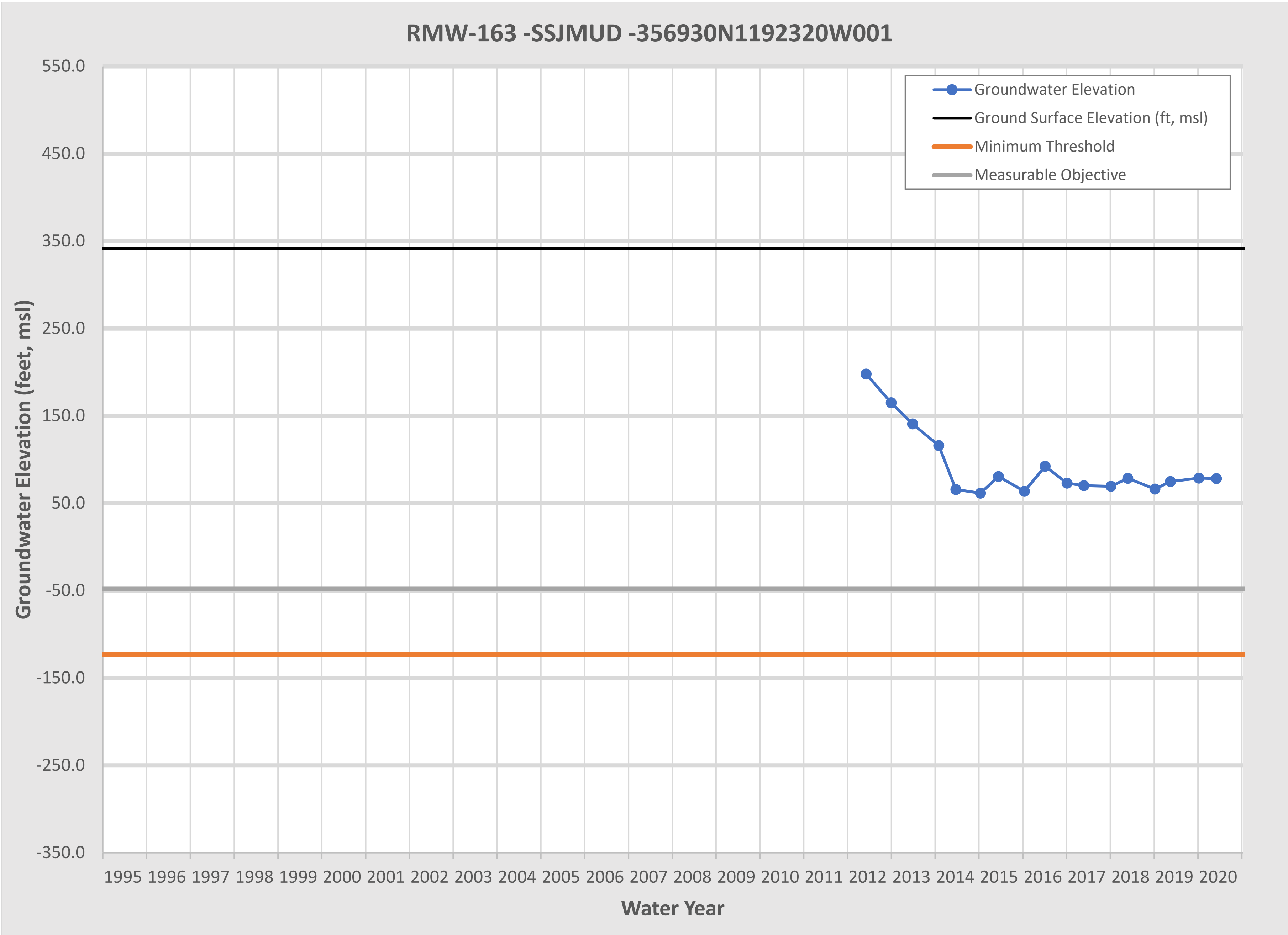

RMW-159 -SSJMUD -357185N1193042W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

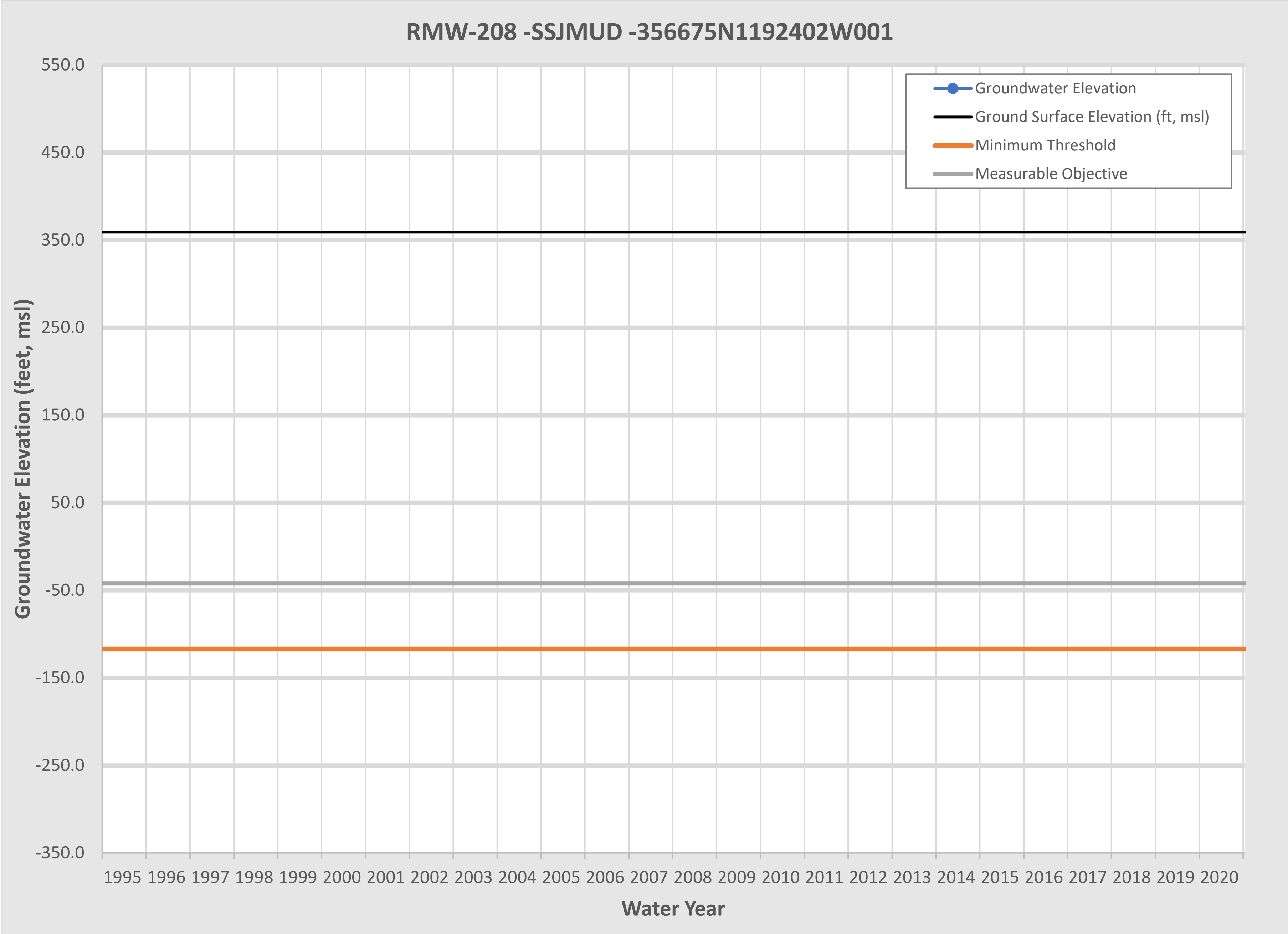


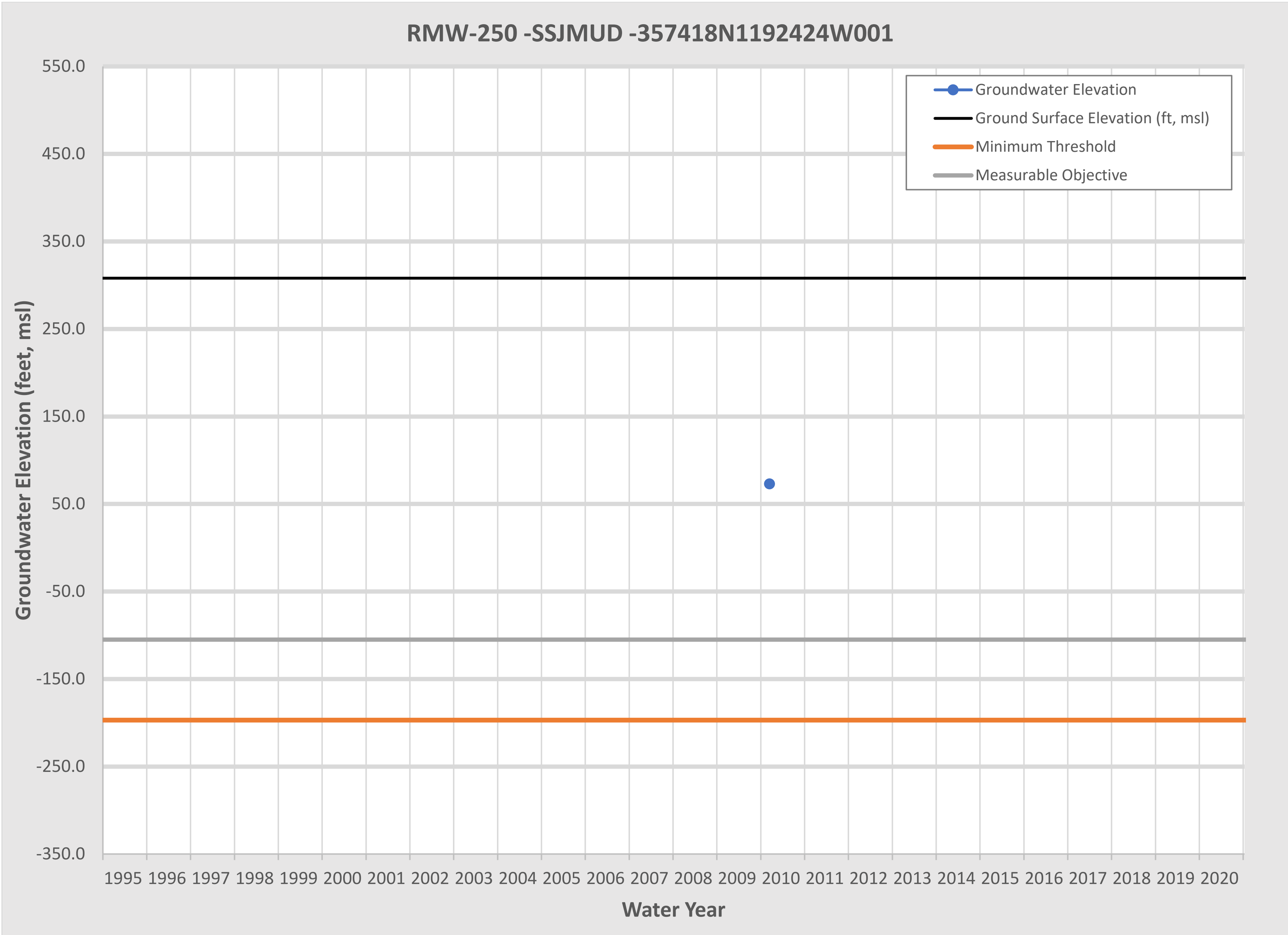
RMW-160 -SSJMUD -356307N1191912W001
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

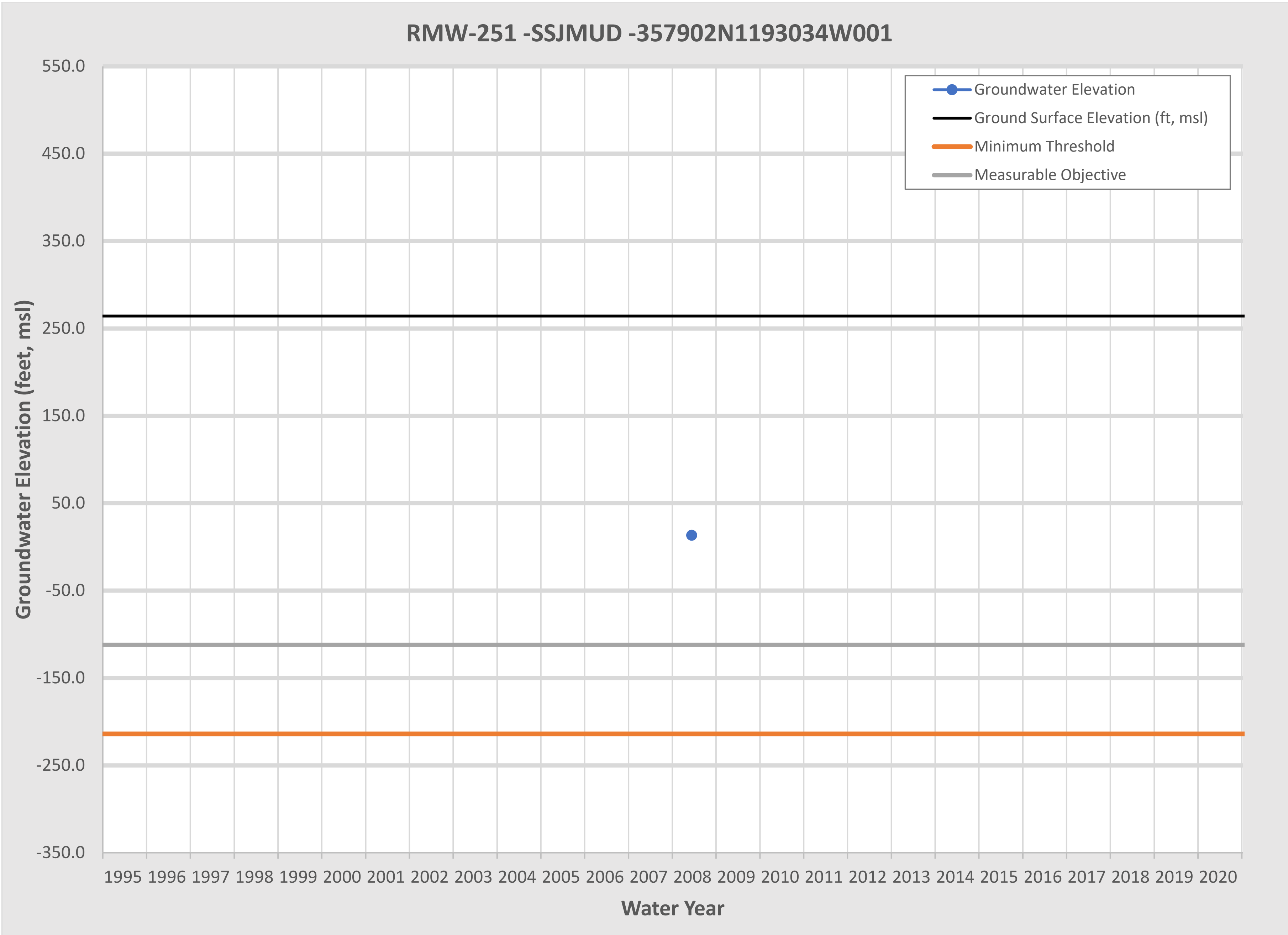

RMW-161 -SSJMUD -356820N1191517W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-162 -SSJMUD -357184N1191449W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

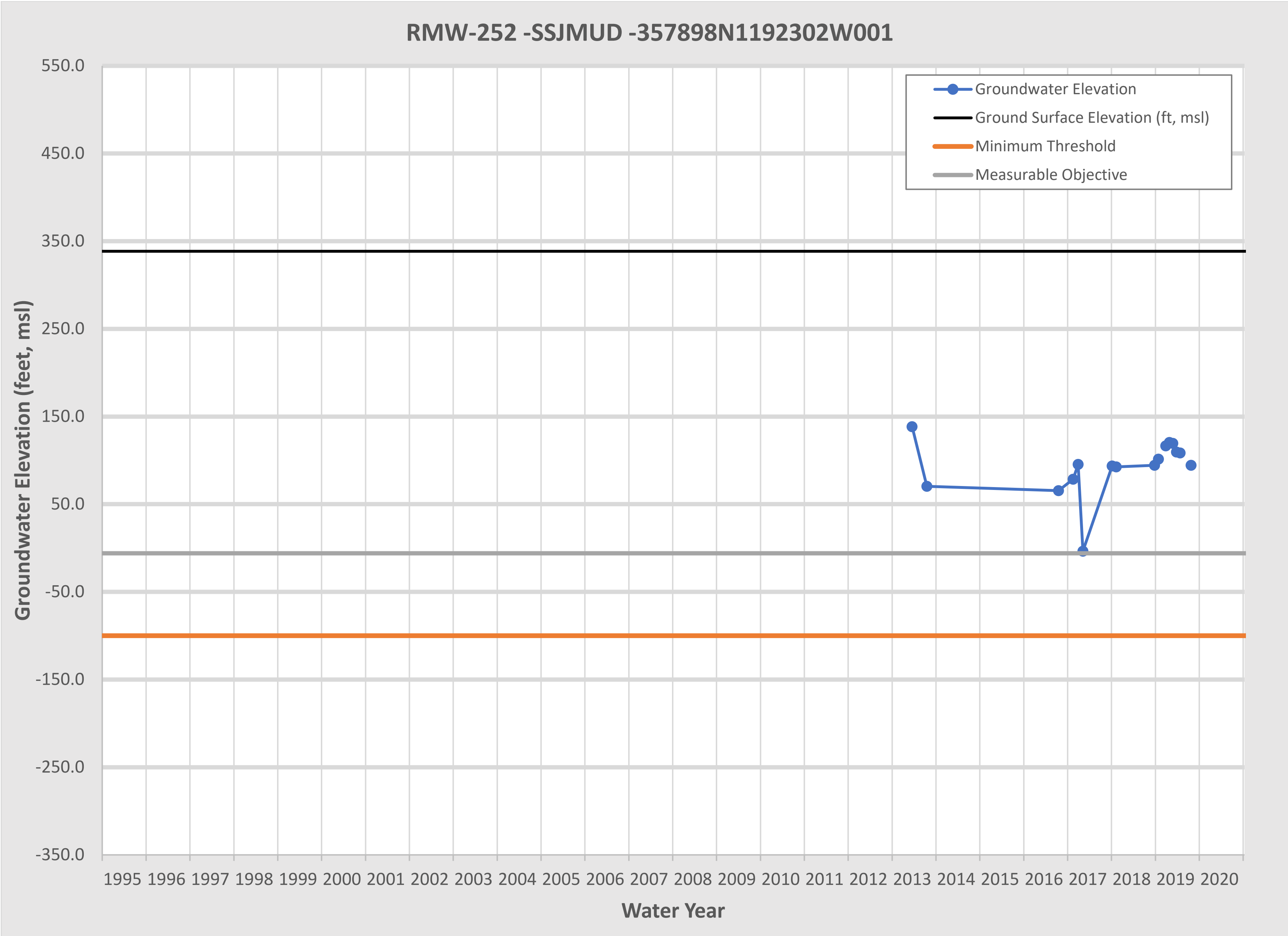

RMW-163 -SSJMUD -356930N1192320W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-208 -SSJMUD -356675N1192402W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

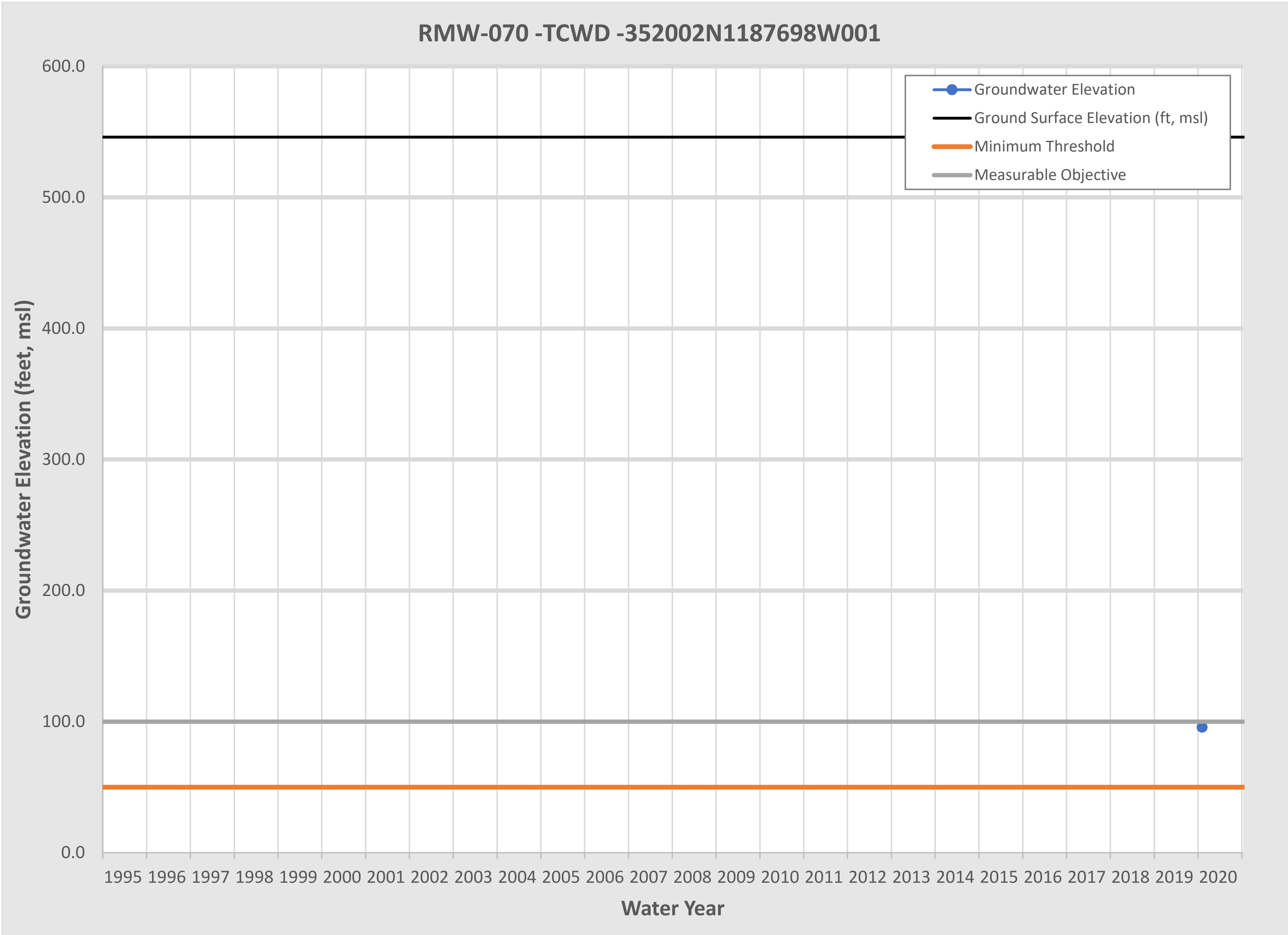

RMW-250 -SSJMUD -357418N1192424W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



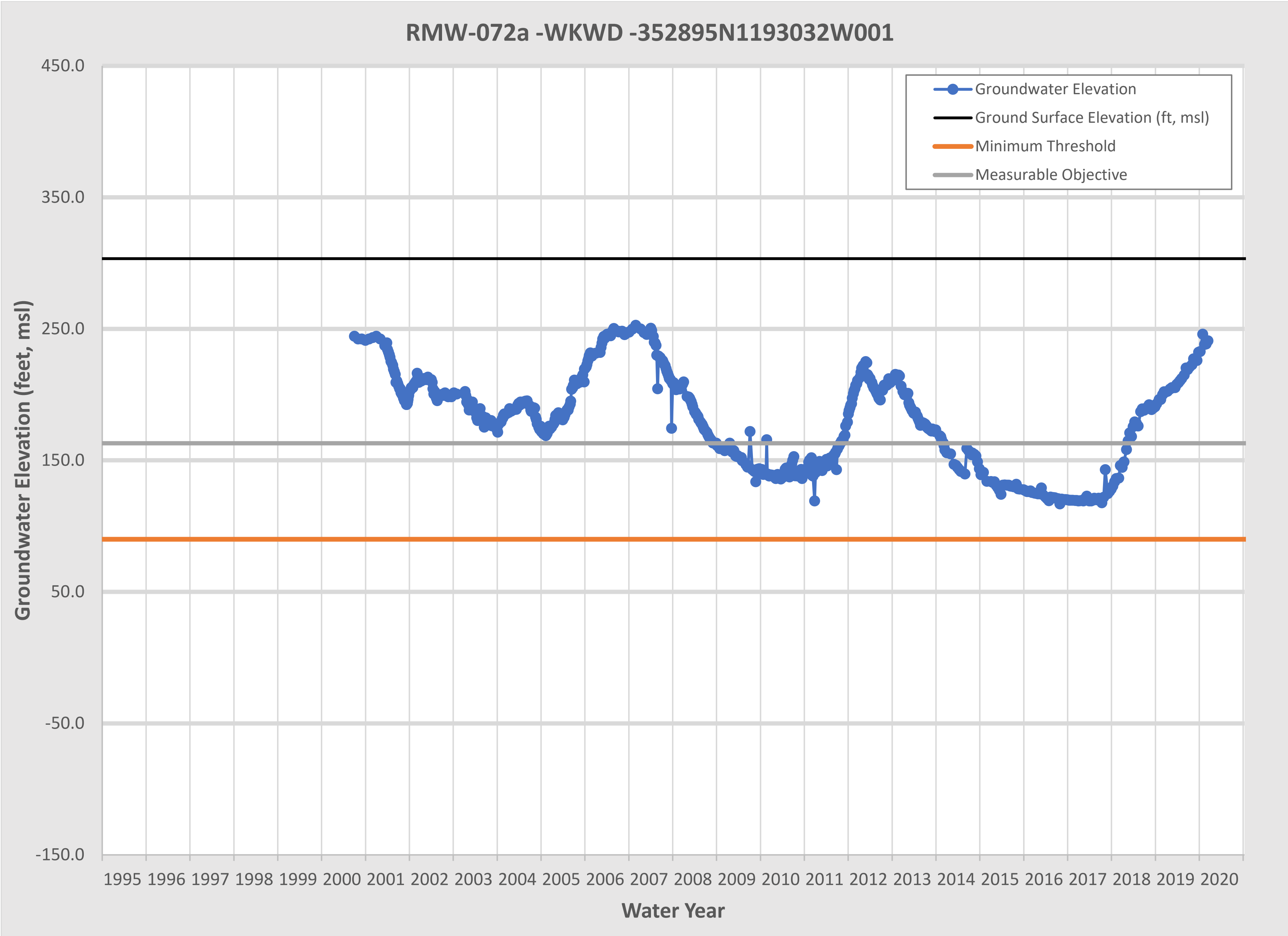
RMW-251 -SSJMUD -357902N1193034W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



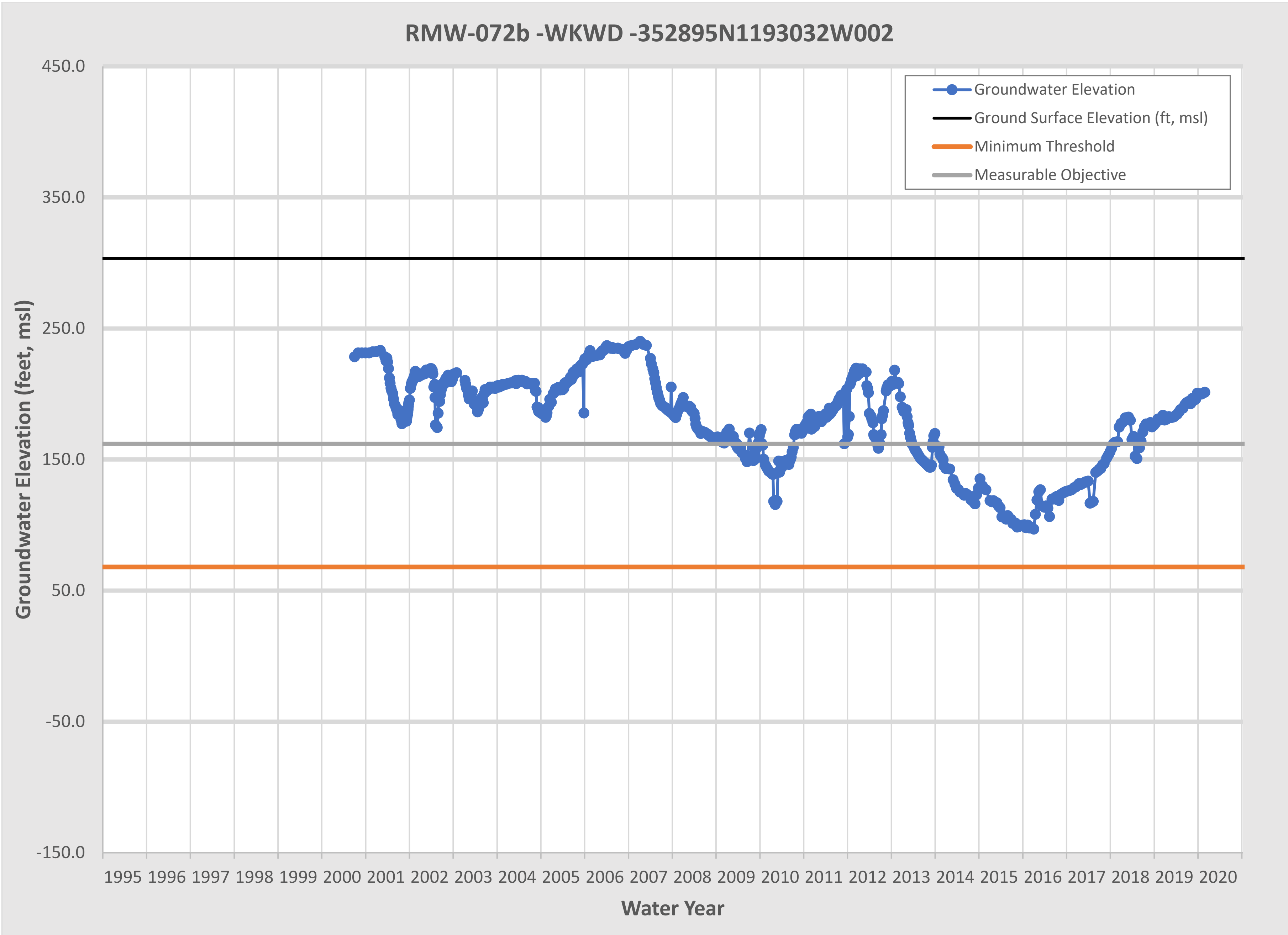
RMW-252 -SSJMUD -357898N1192302W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
-250.0
-350.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



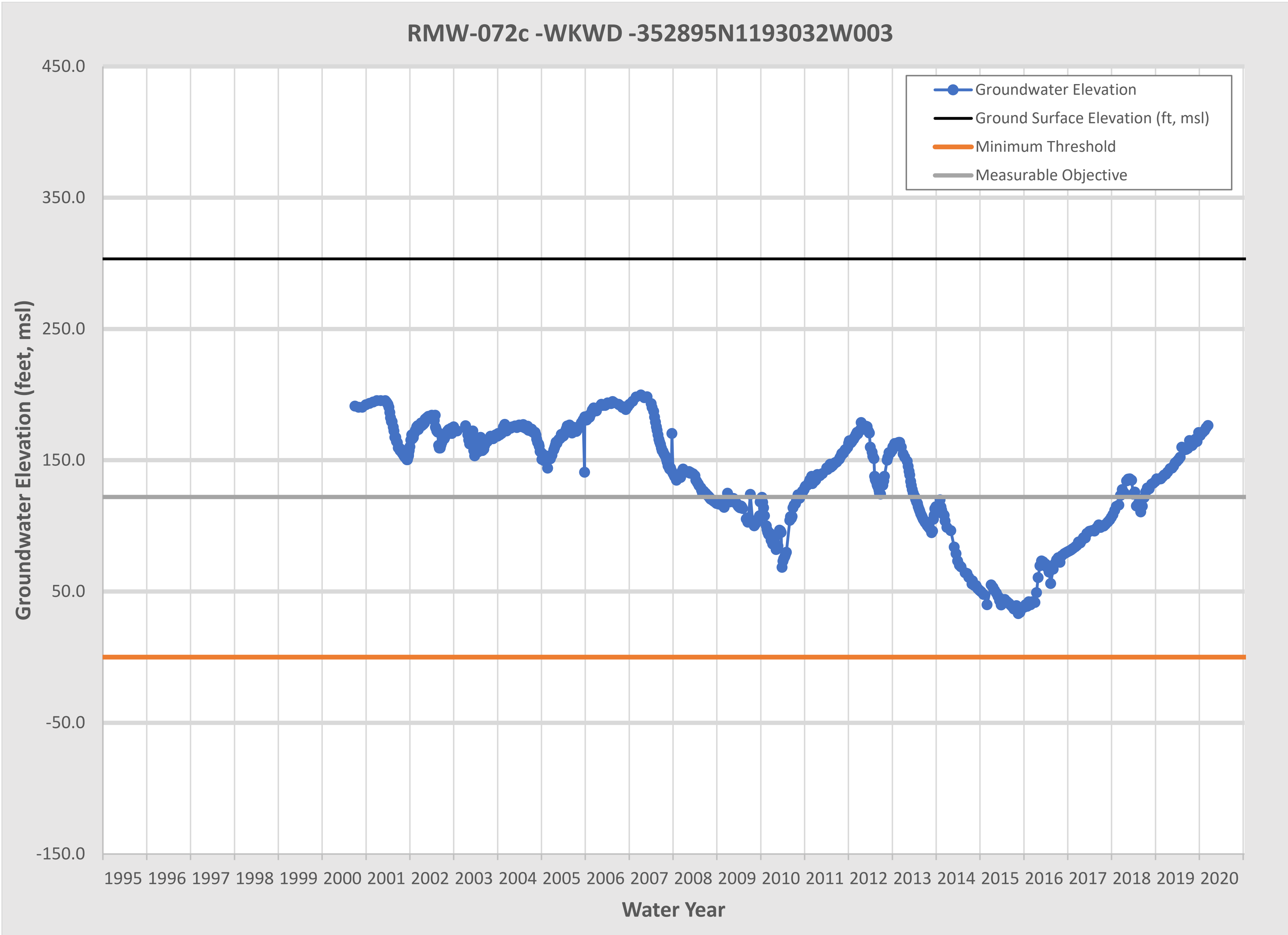
RMW-070 -TCWD -352002N1187698W001
600.0
500.0
400.0
300.0
200.0
100.0
0.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective



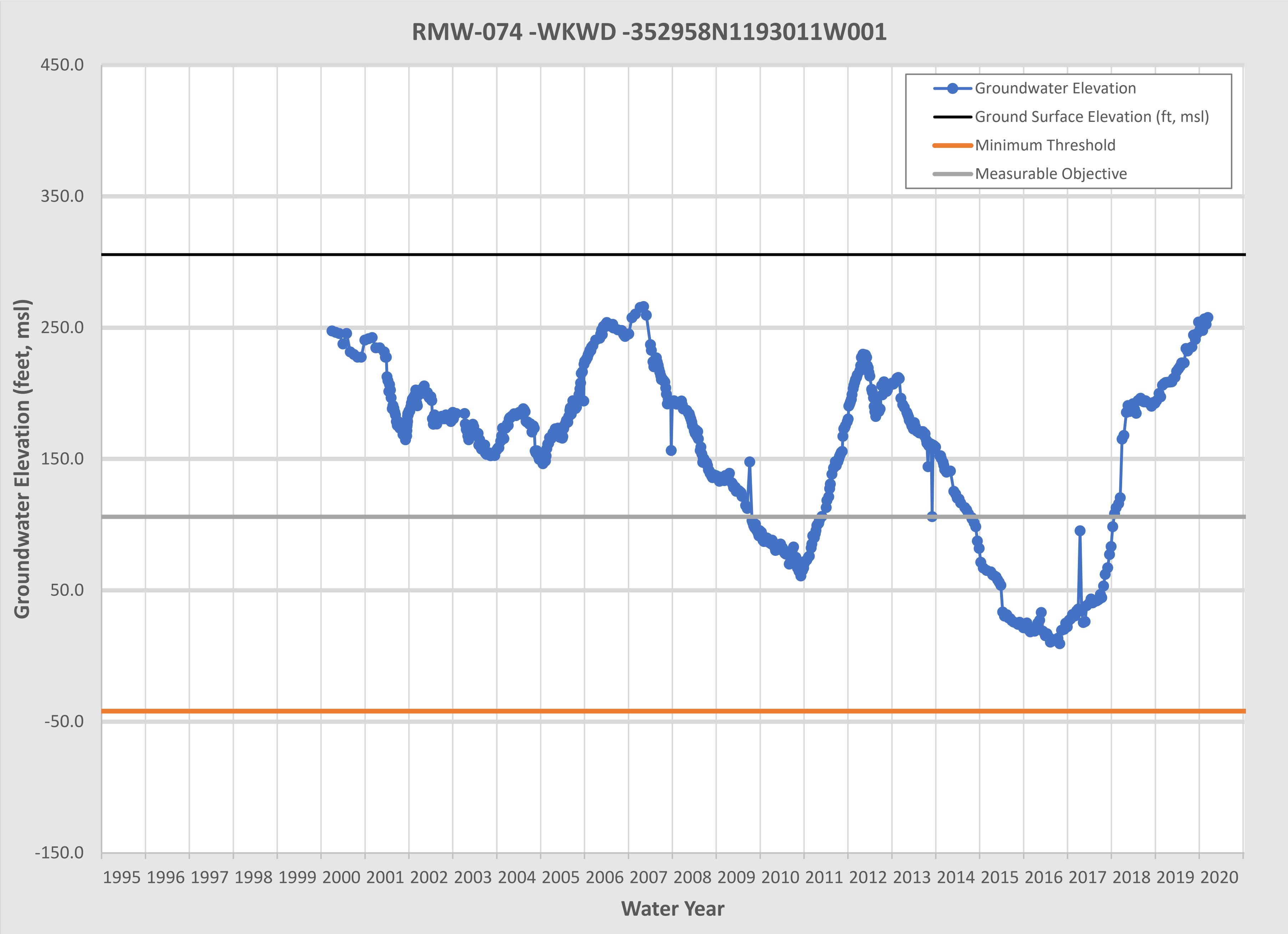
RMW-072a -WKWD -352895N1193032W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



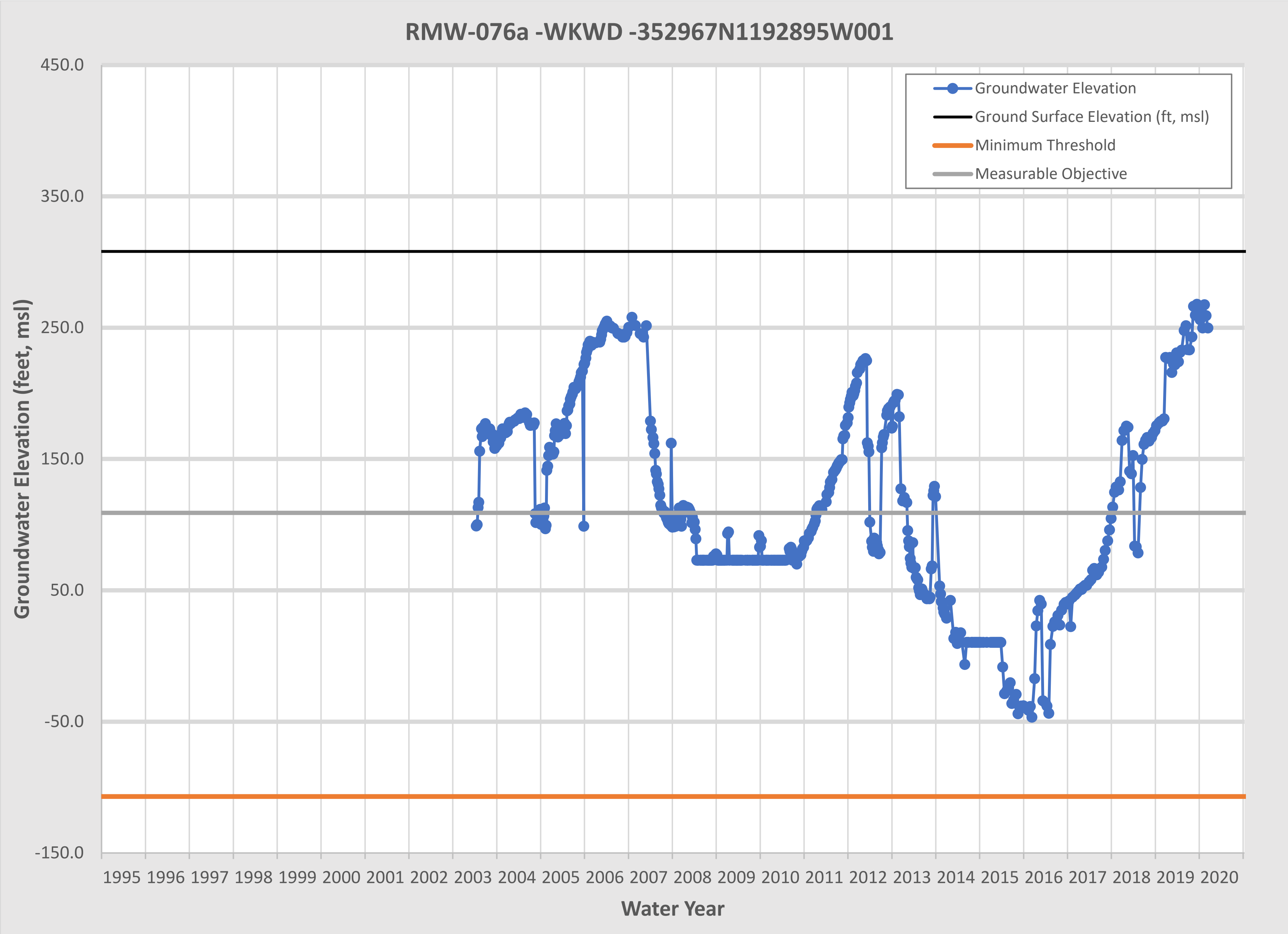
RMW-072b -WKWD -352895N1193032W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

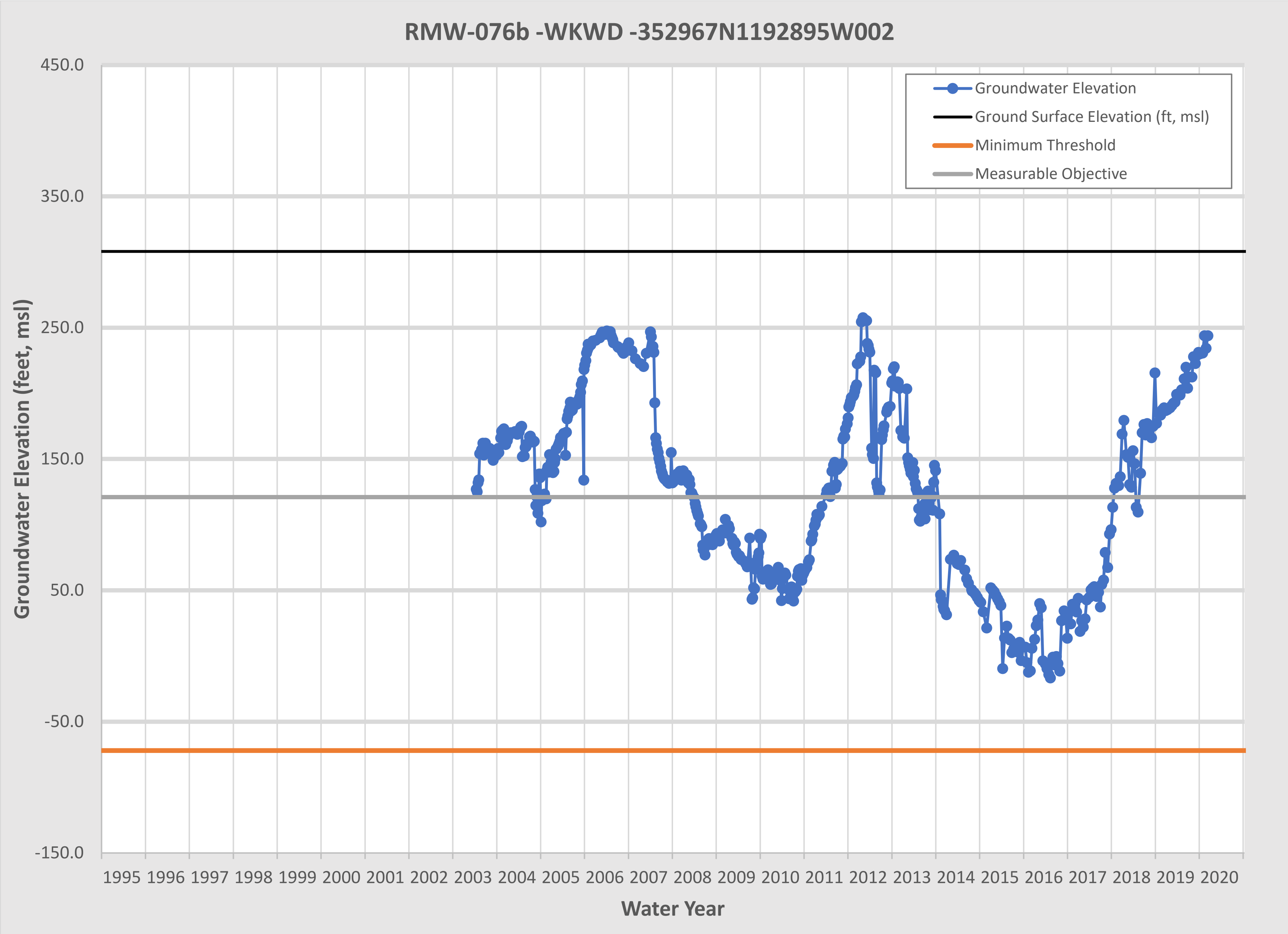


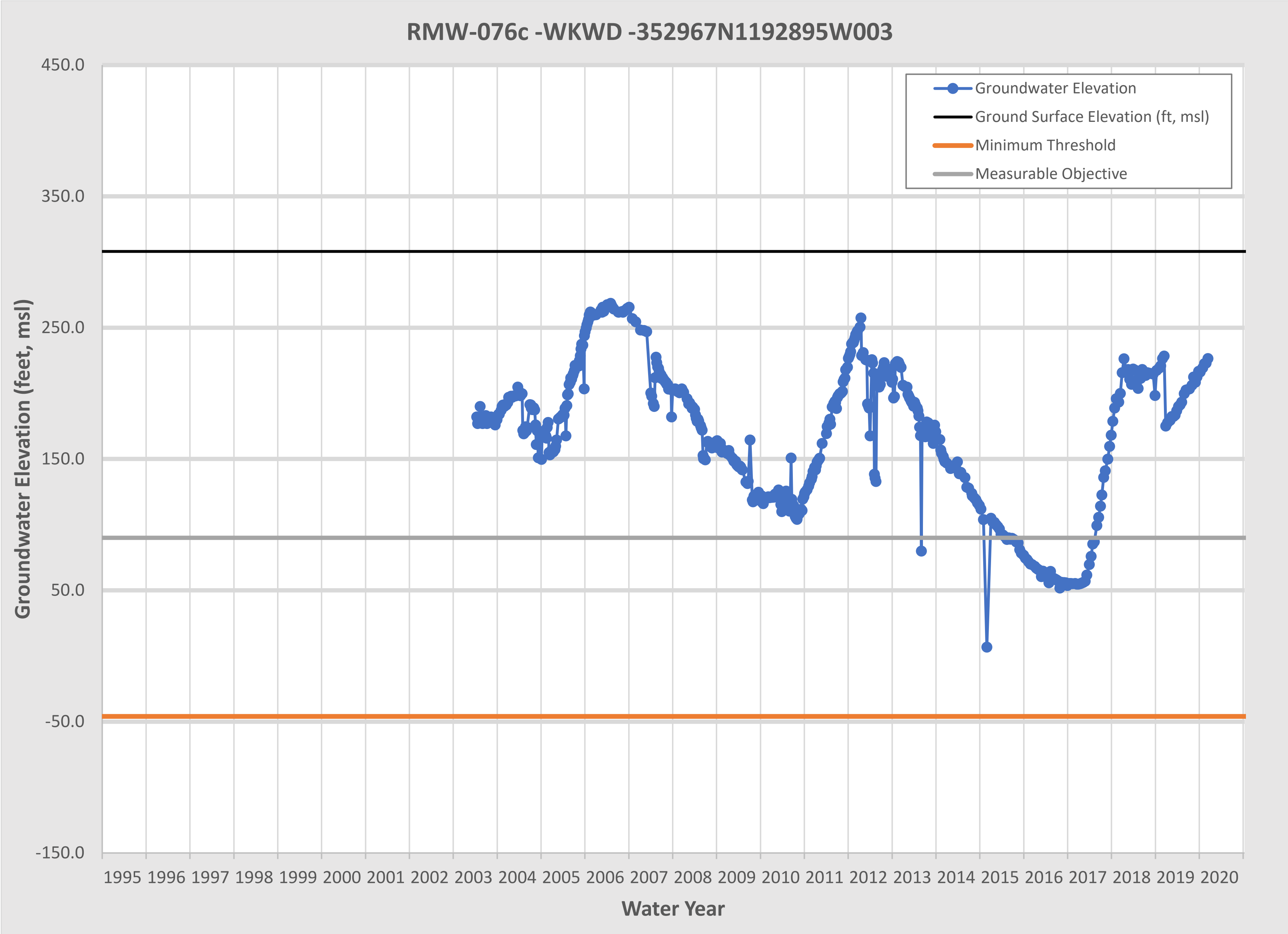
RMW-072c -WKWD -352895N1193032W003
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

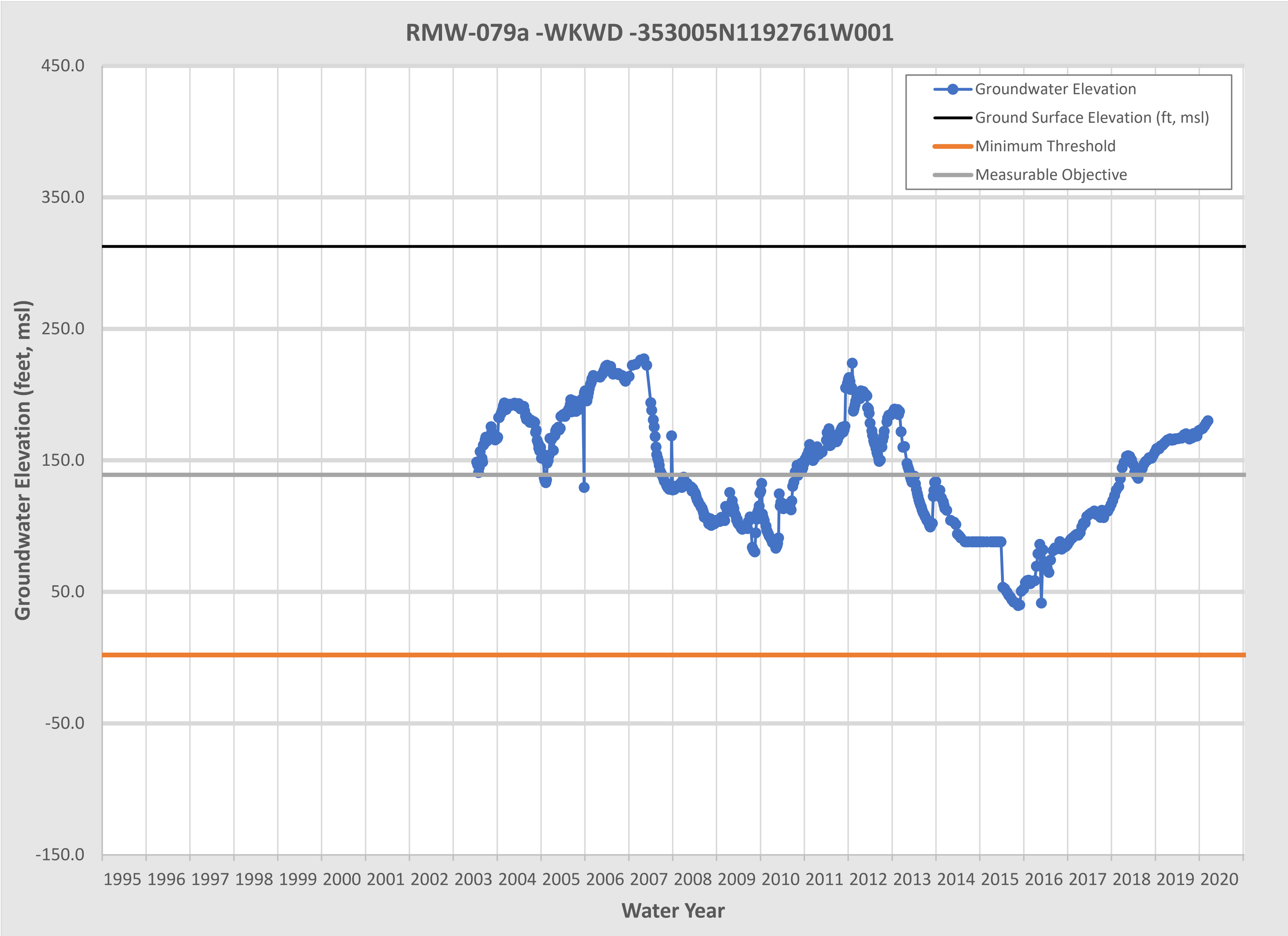


RMW-074 -WKWD -352958N1193011W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

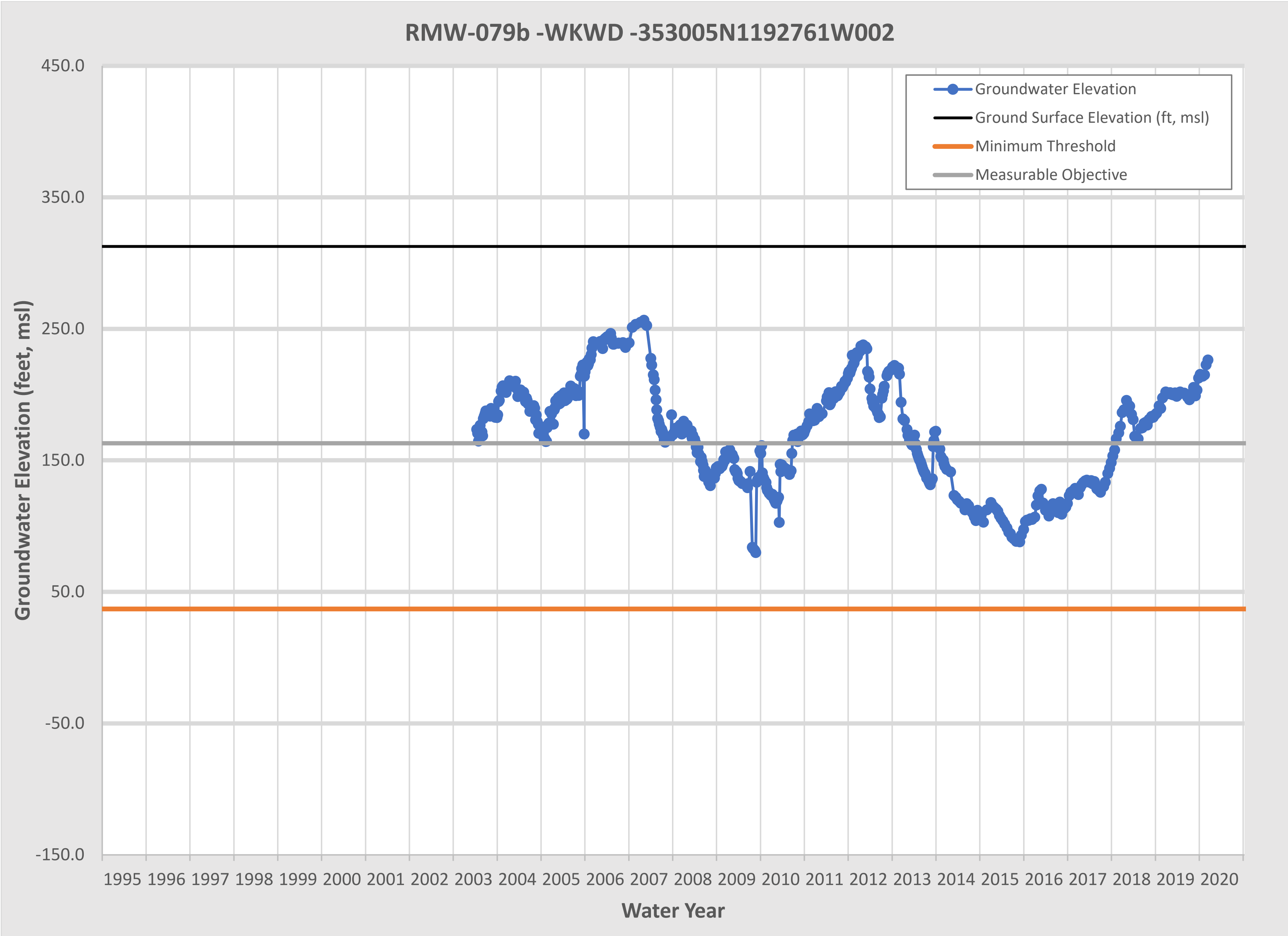

RMW-076a -WKWD -352967N1192895W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

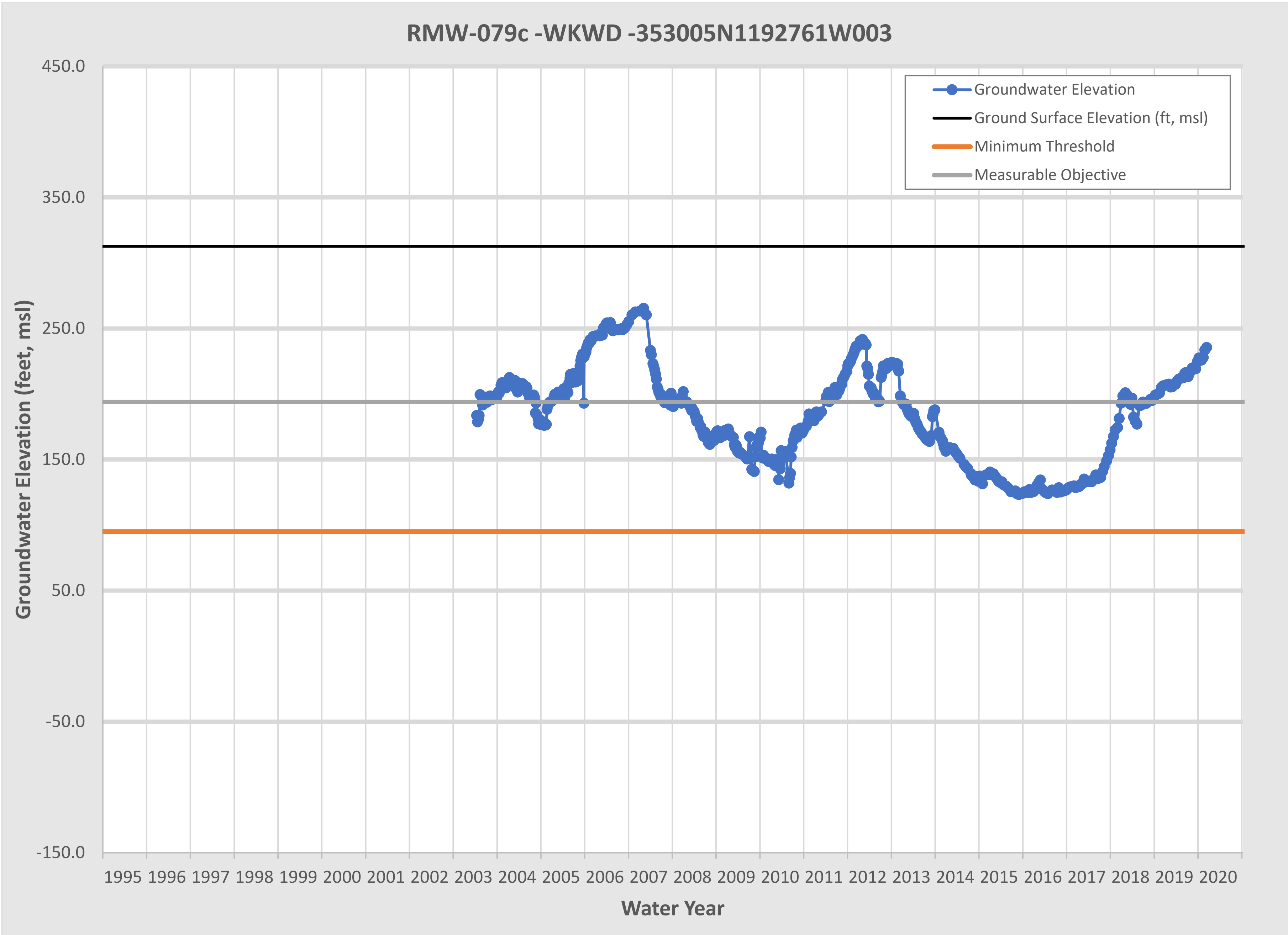

RMW-076b -WKWD -352967N1192895W002
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective


RMW-076c -WKWD -352967N1192895W003
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

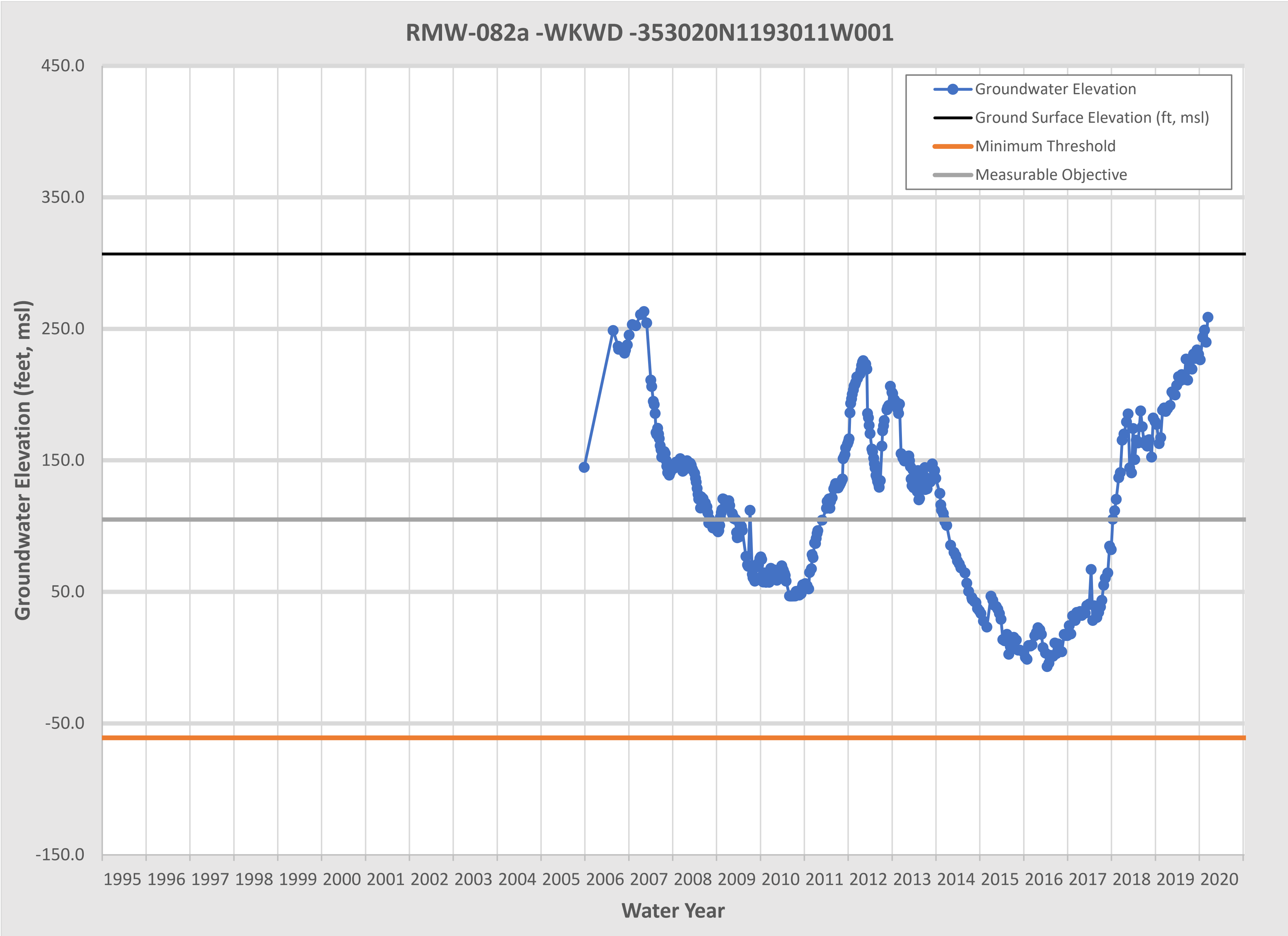


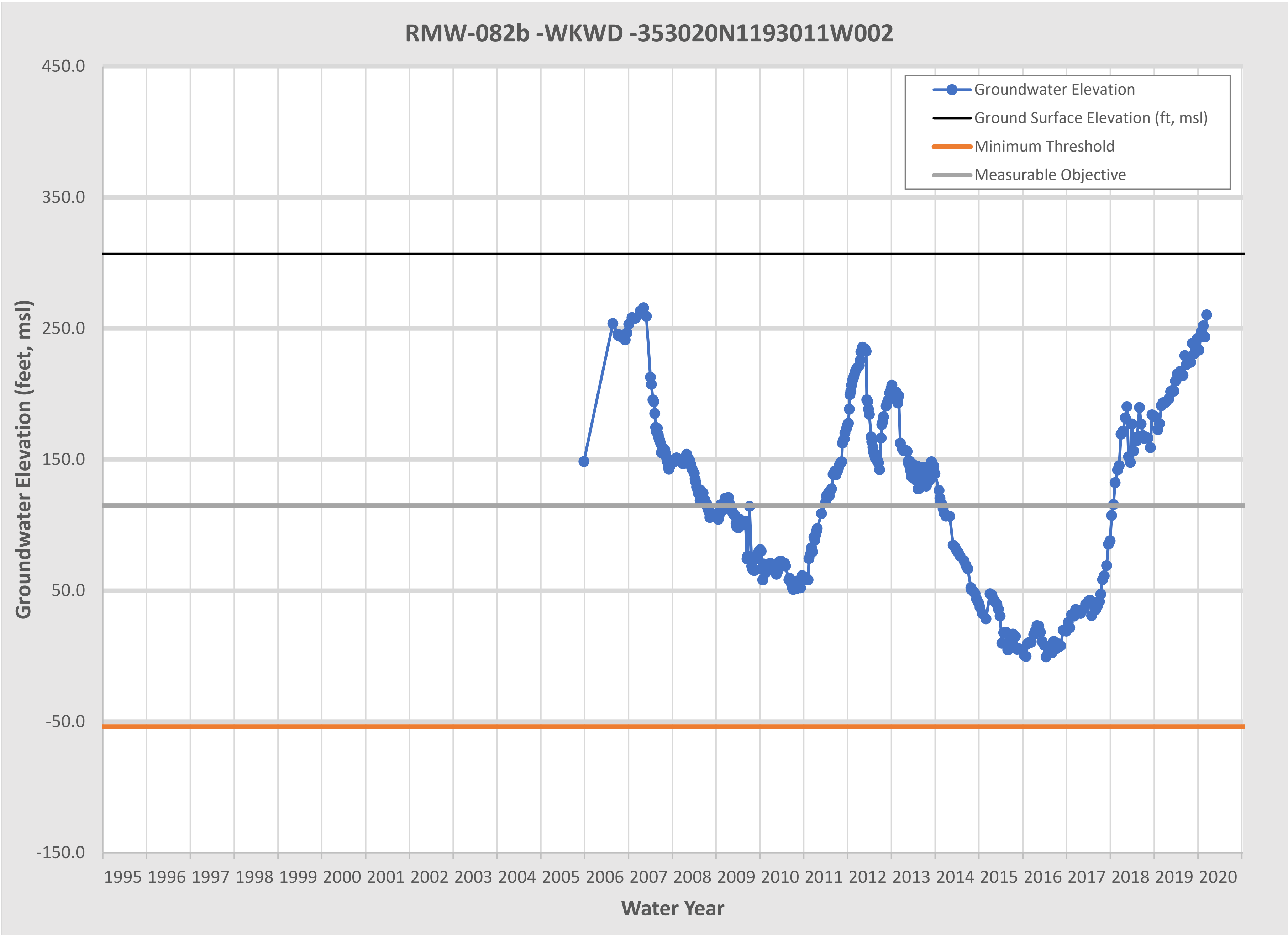
RMW-079a -WKWD -353005N1192761W001
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

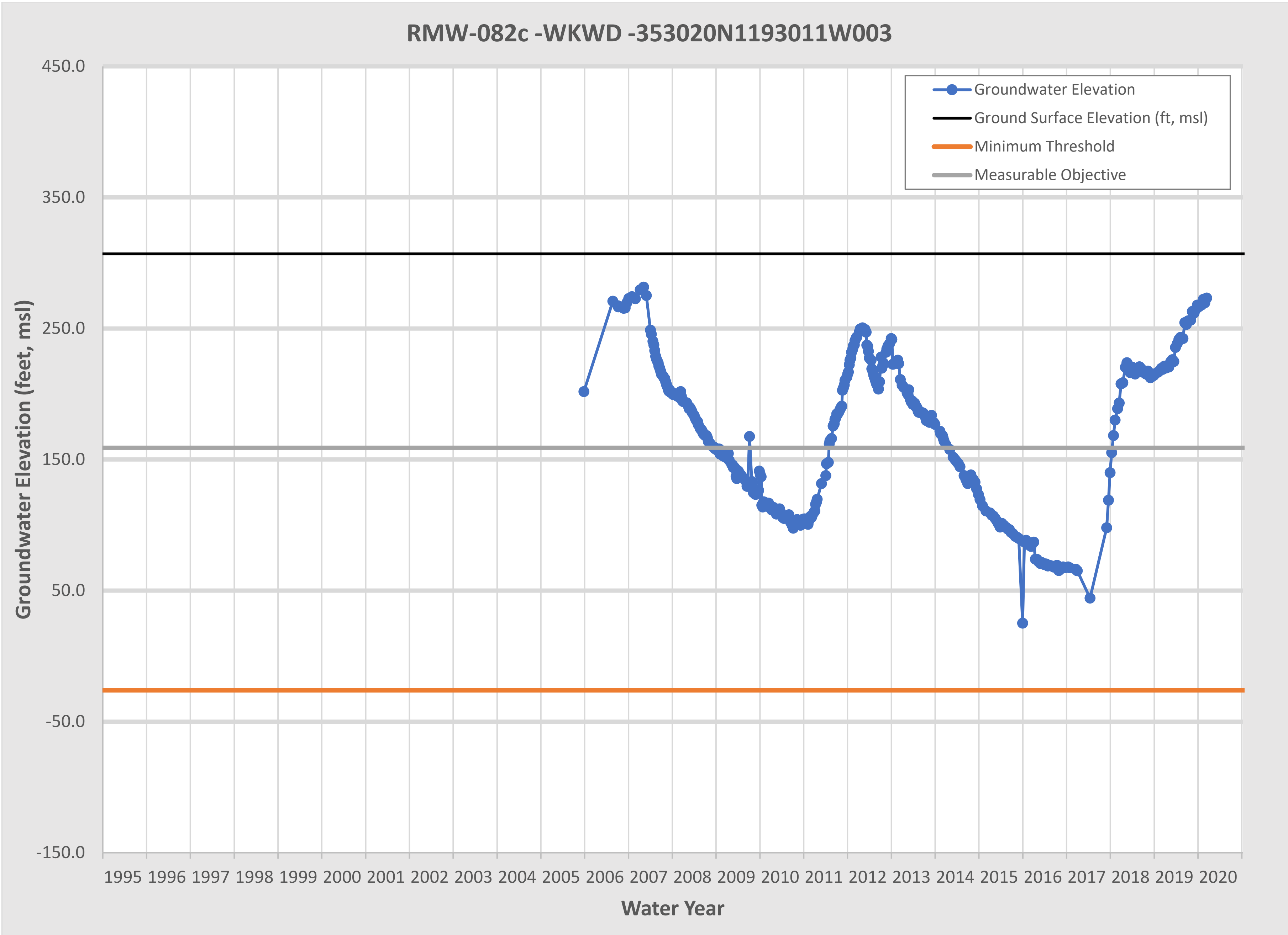

RMW-079b -WKWD -353005N1192761W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

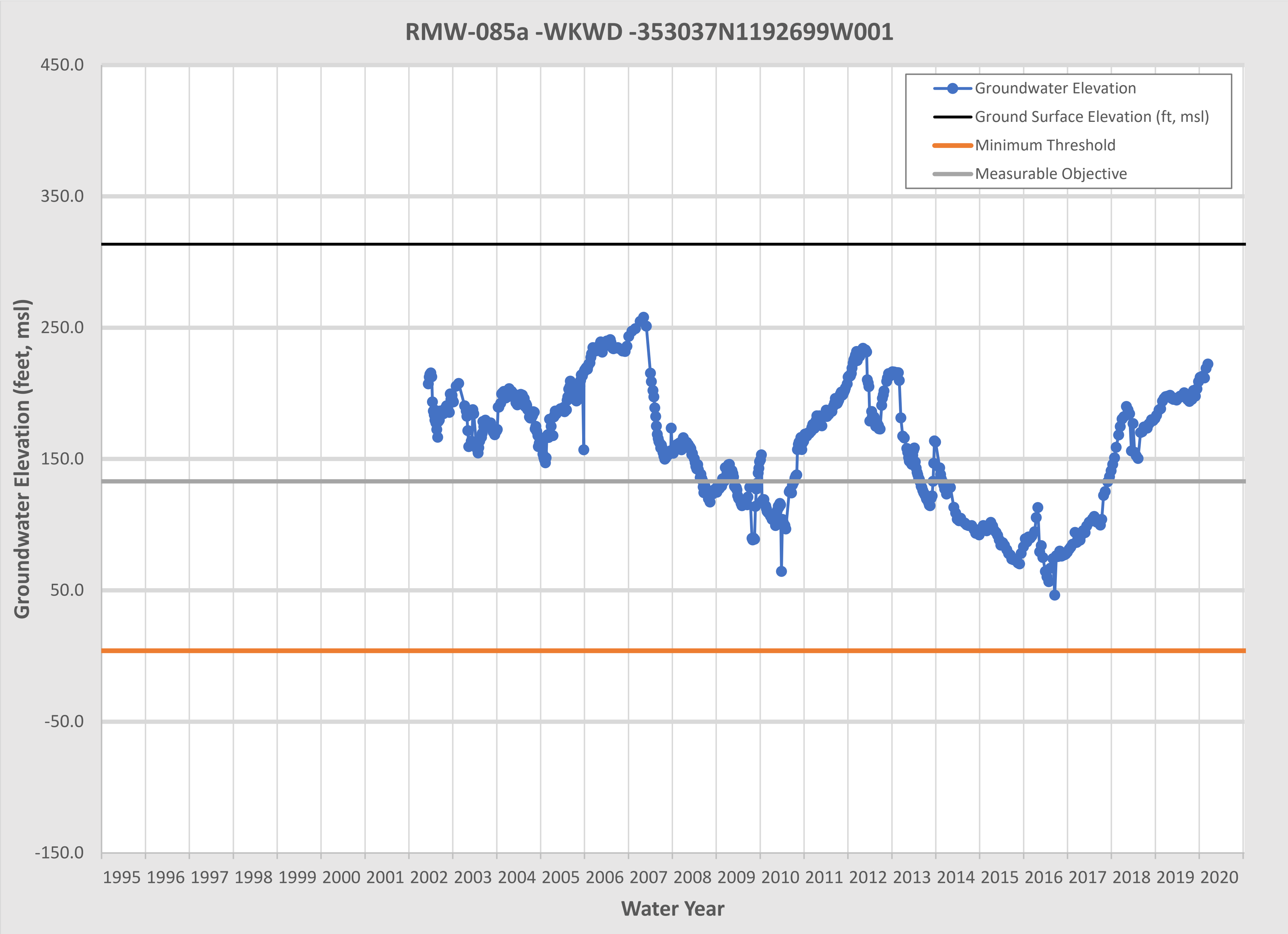


RMW-079c -WKWD -353005N1192761W003
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

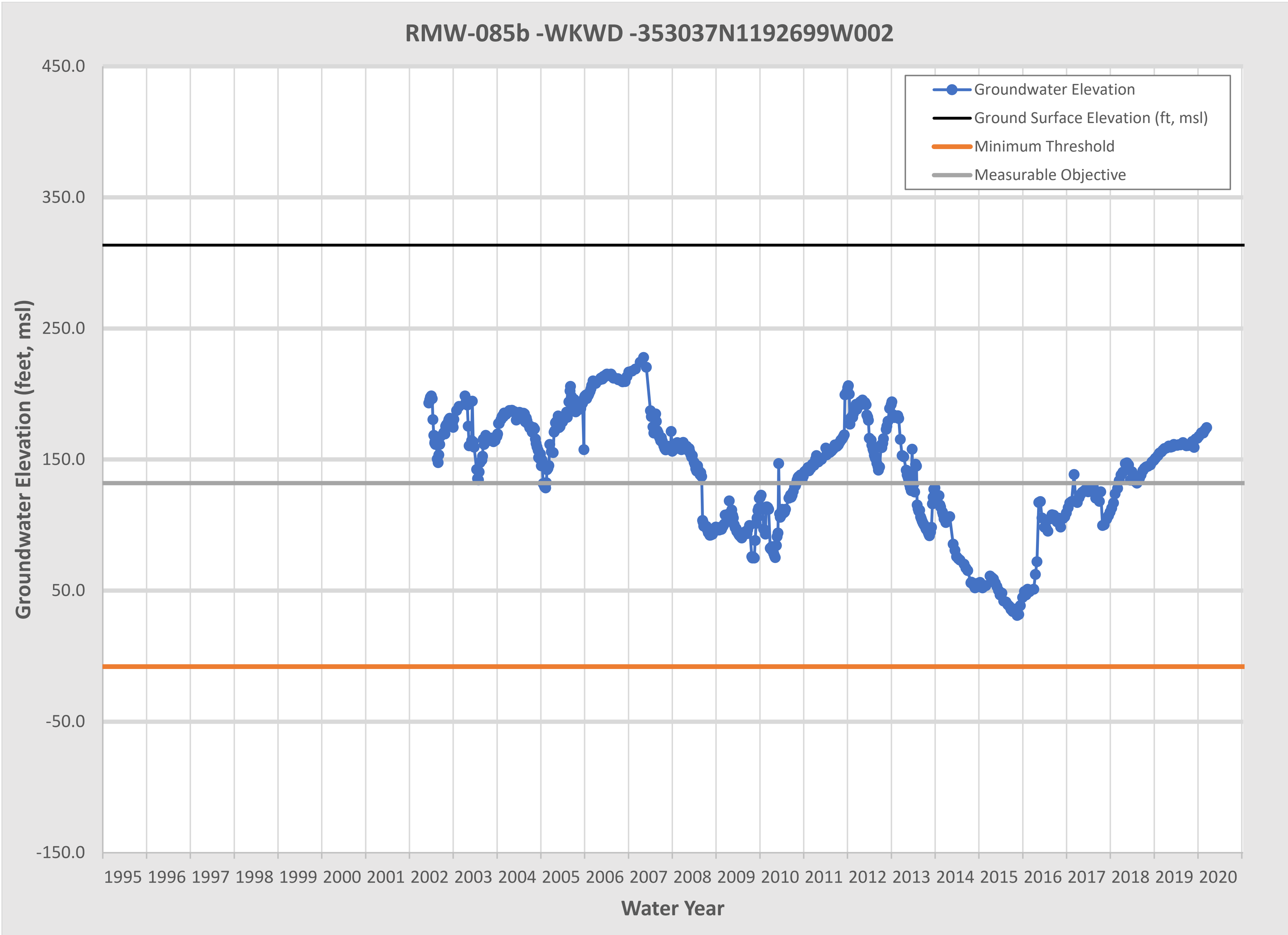

RMW-082a -WKWD -353020N1193011W001
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective


RMW-082b -WKWD -353020N1193011W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

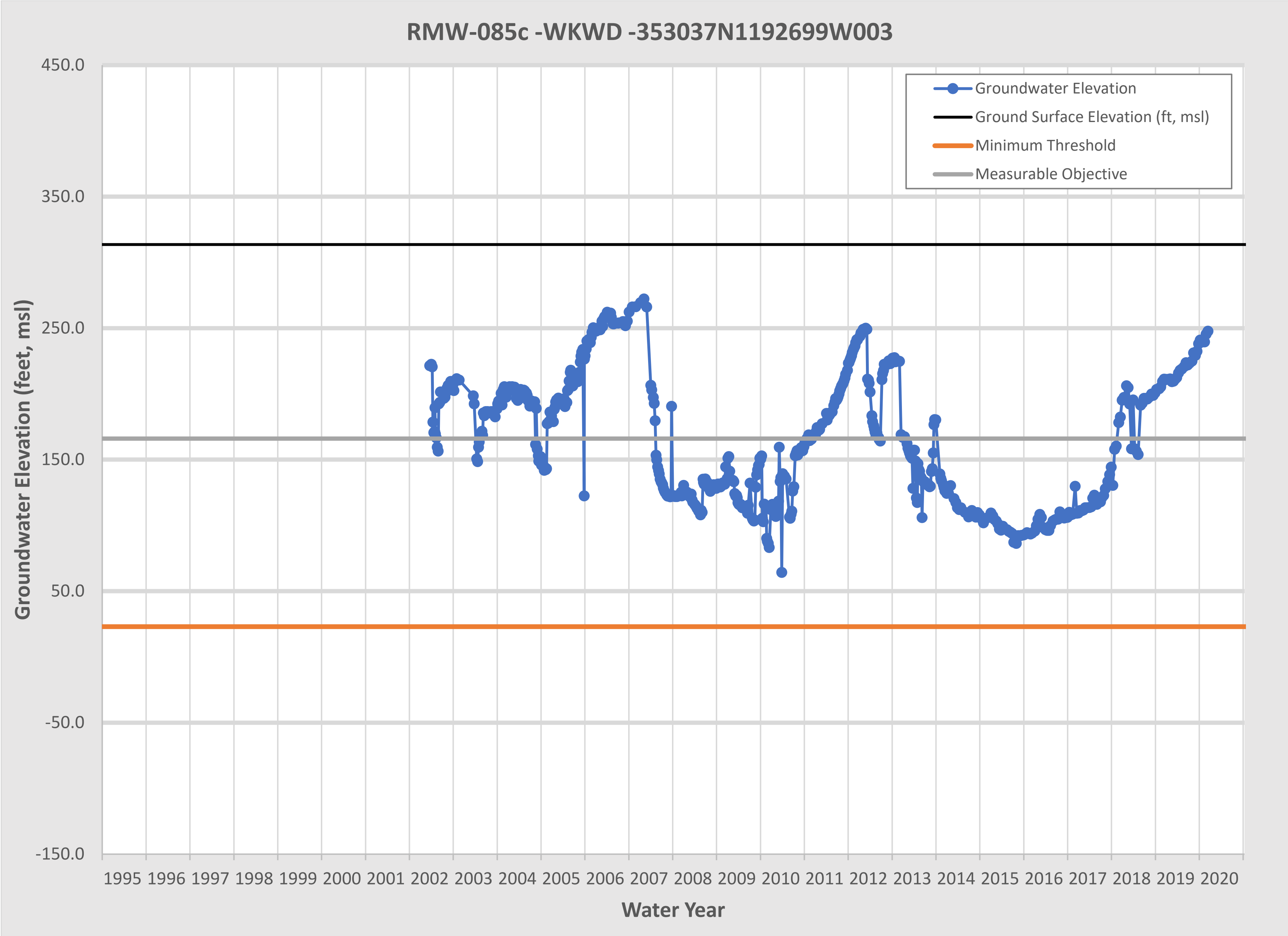

RMW-082c -WKWD -353020N1193011W003
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

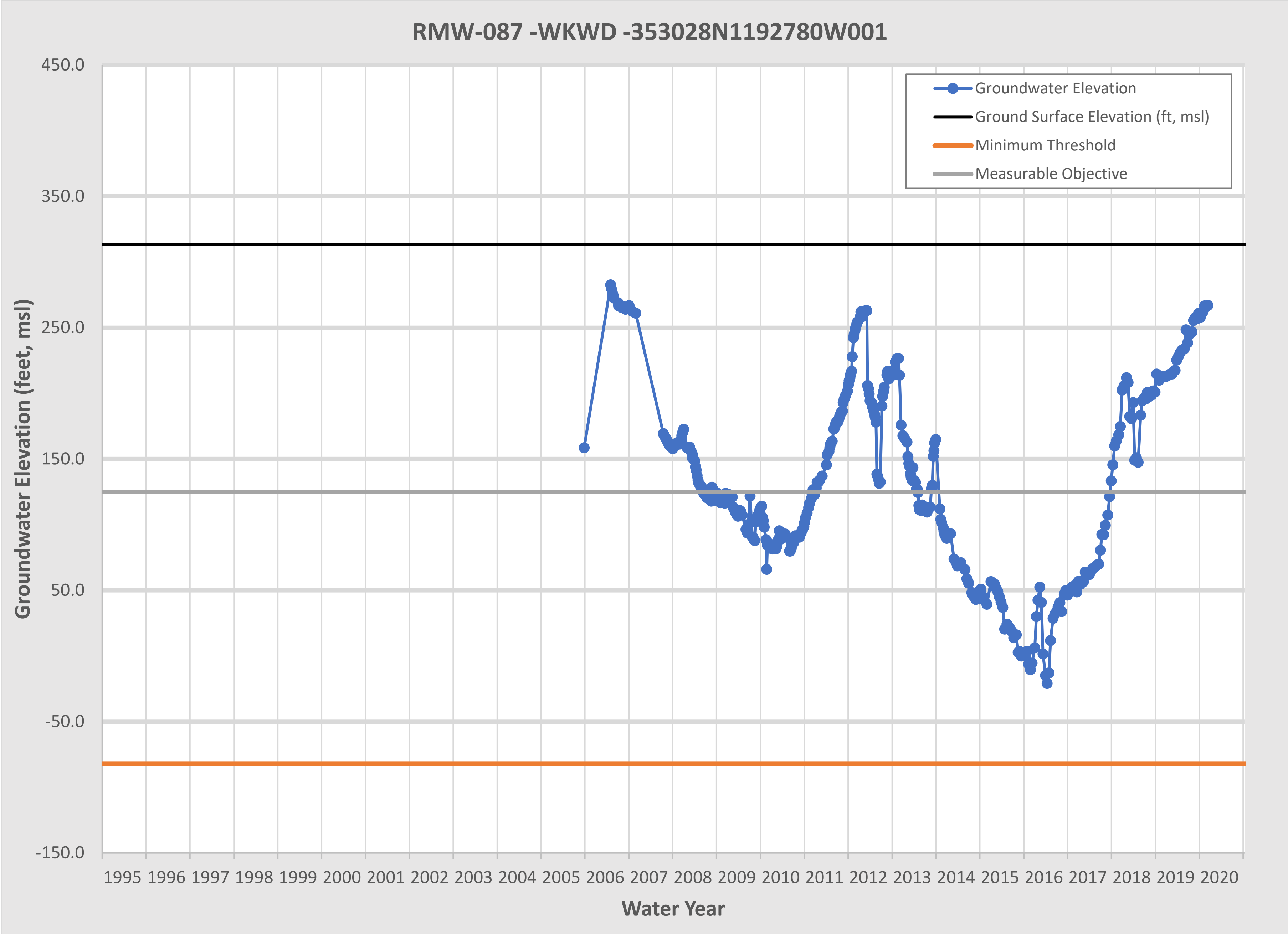


RMW-085a -WKWD -353037N1192699W001
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

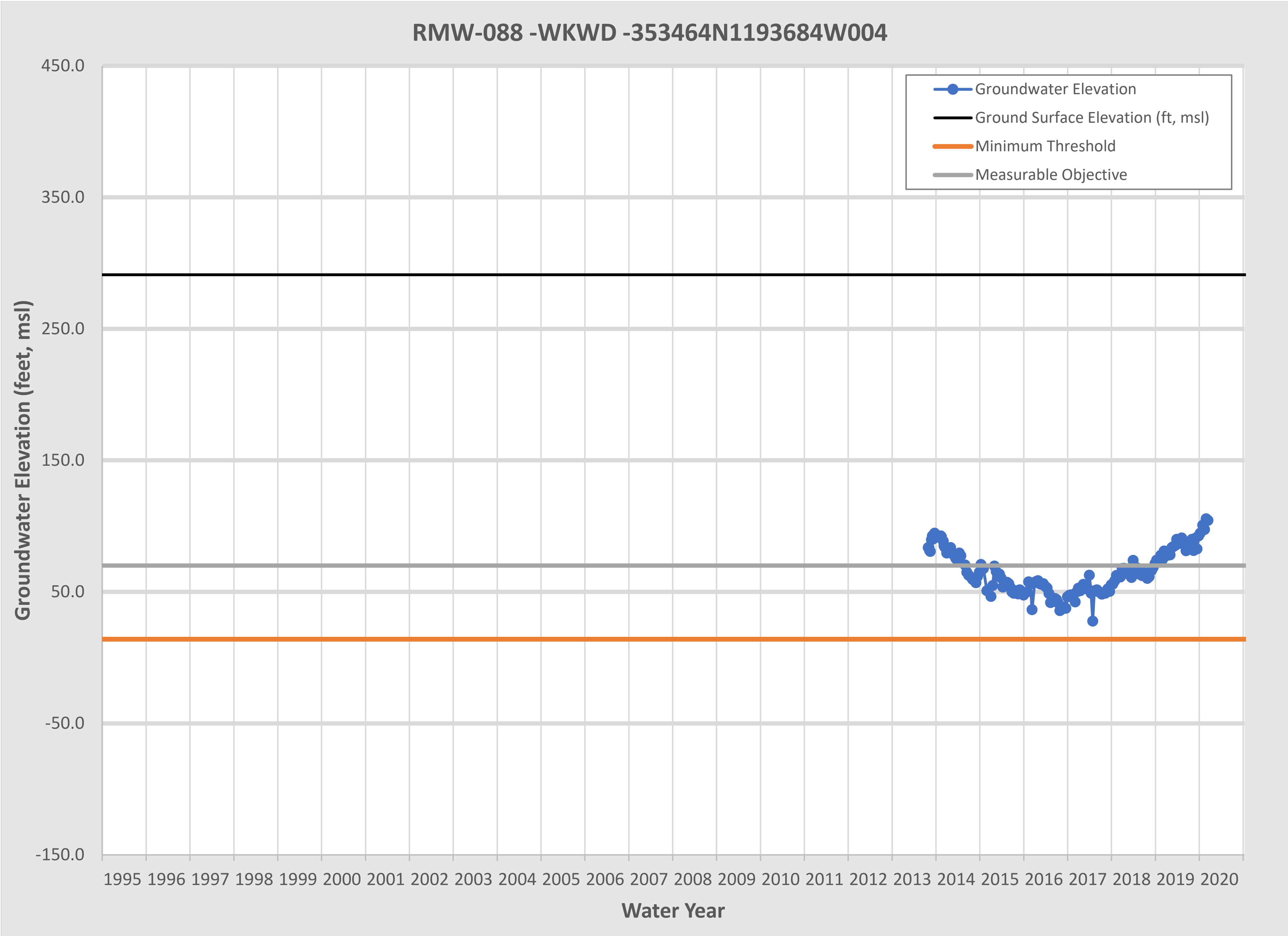


RMW-085b -WKWD -353037N1192699W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

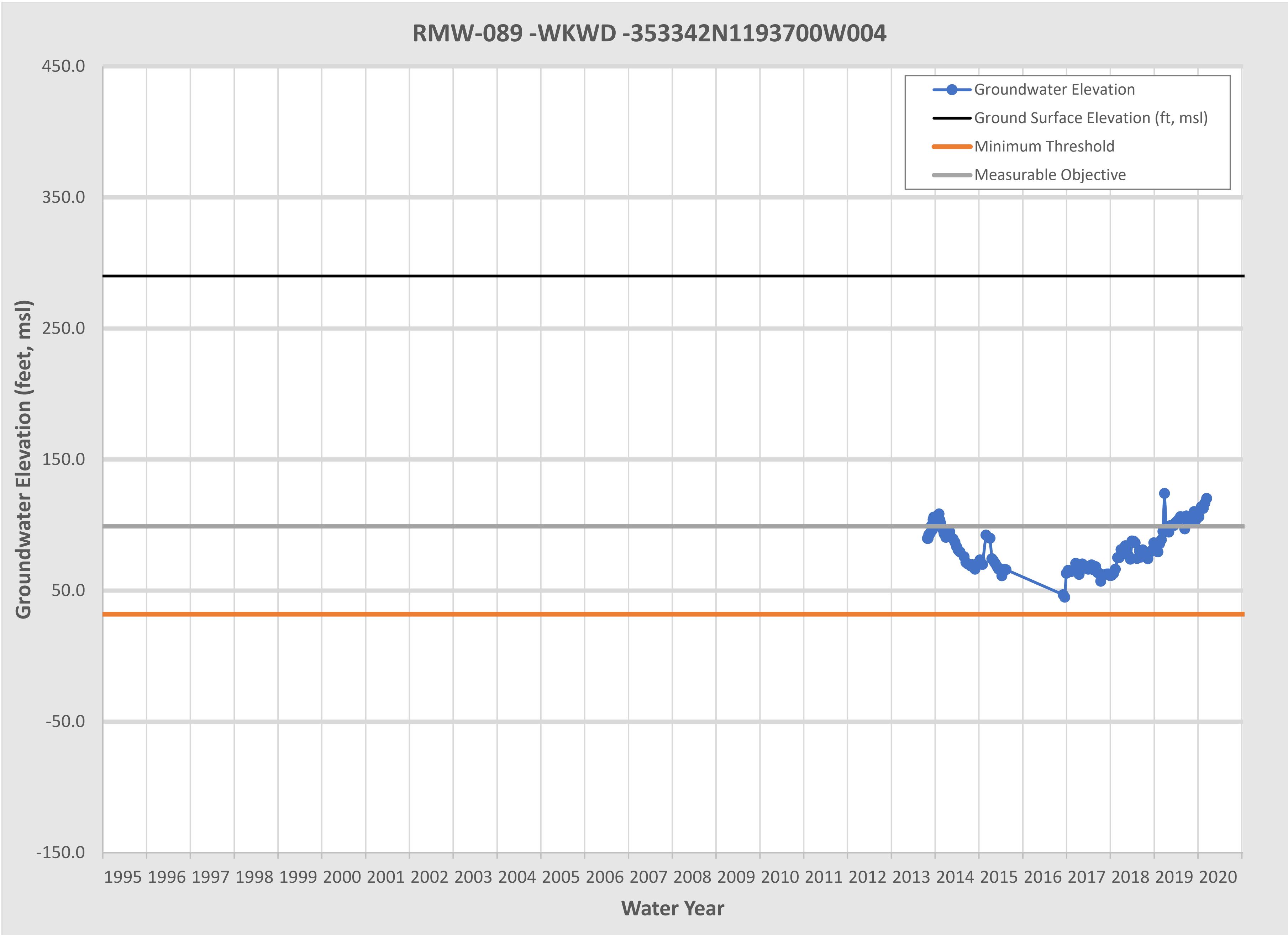

RMW-085c -WKWD -353037N1192699W003
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective

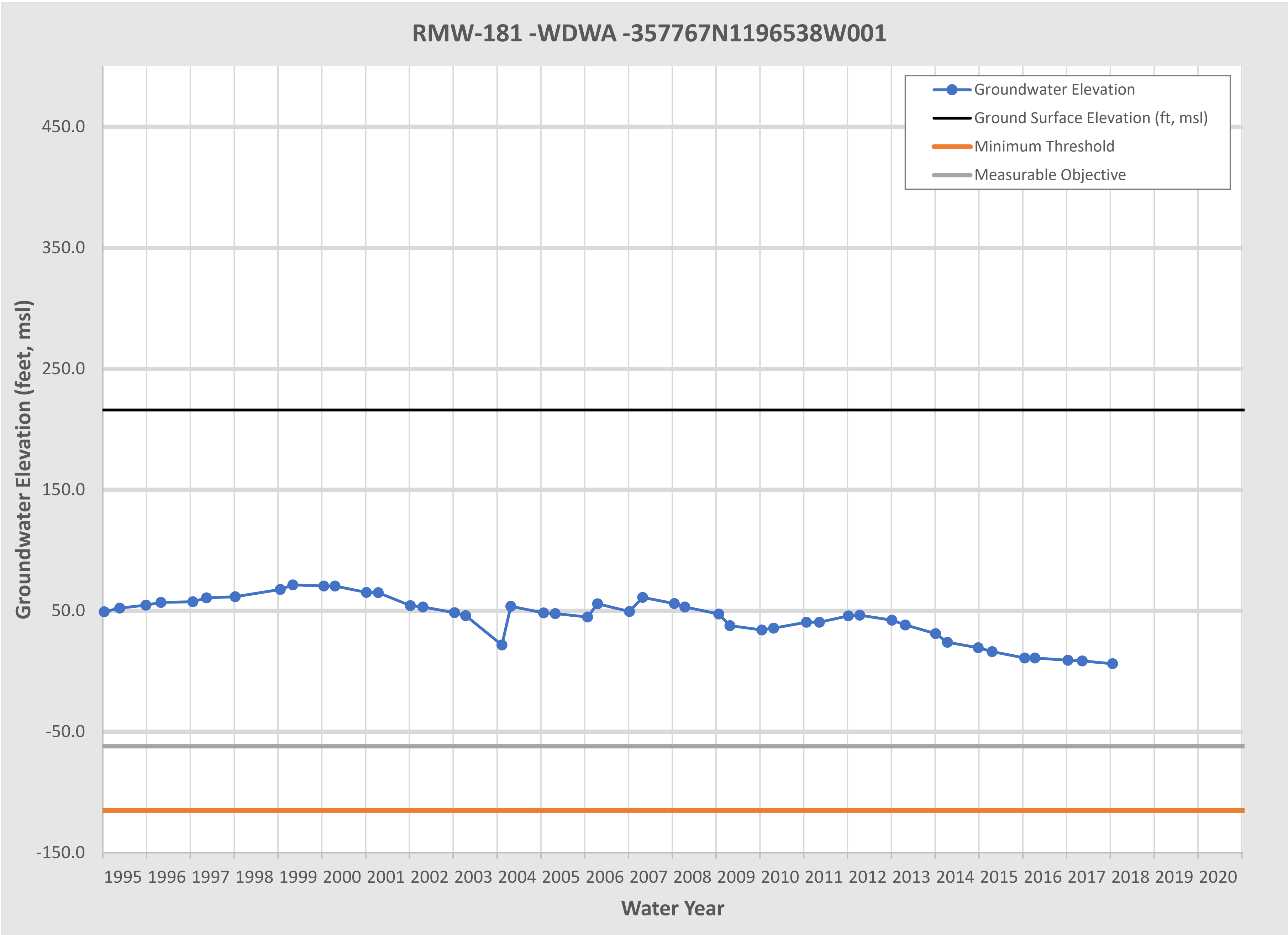


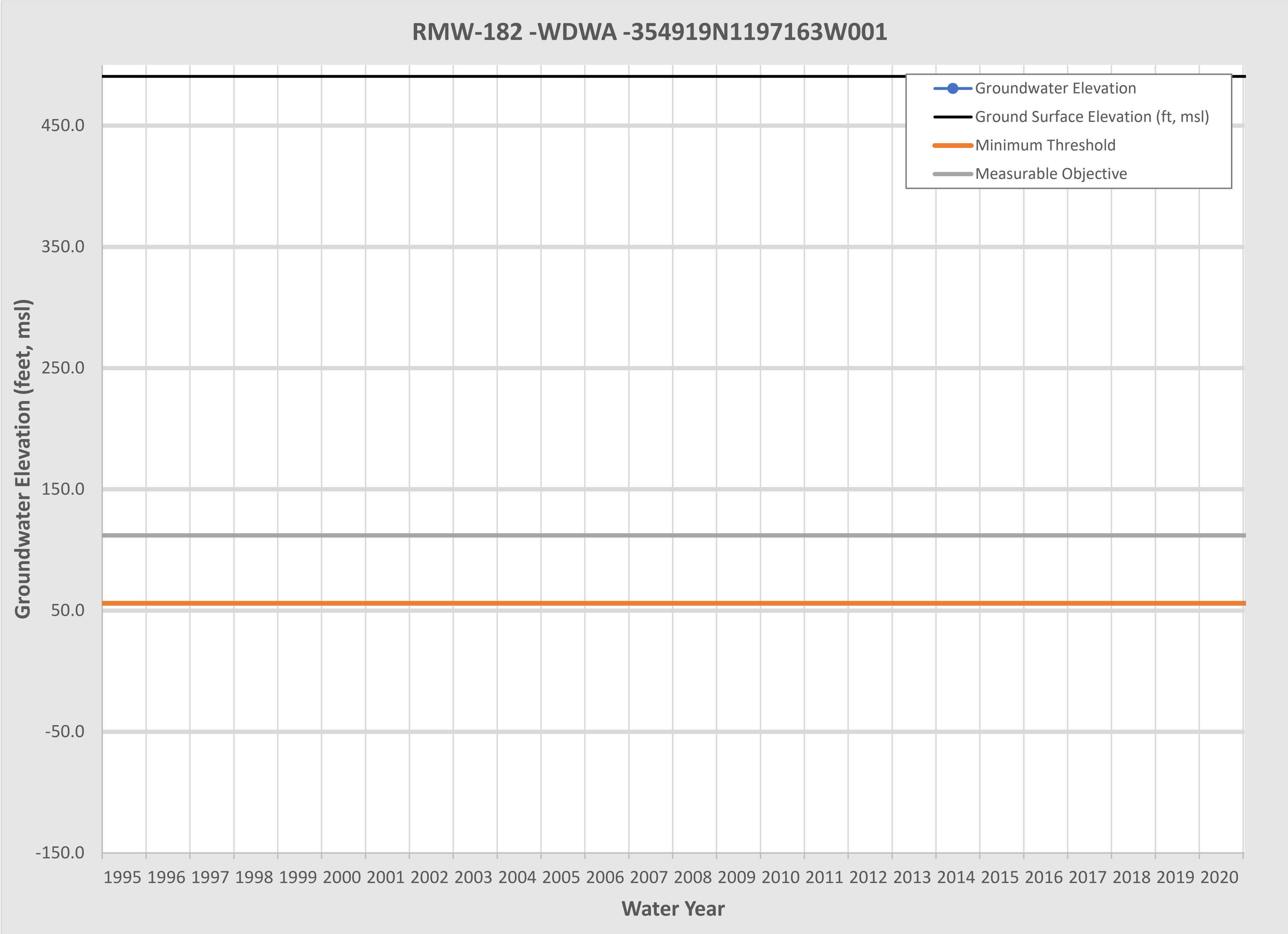
RMW-087 -WKWD -353028N1192780W001
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective



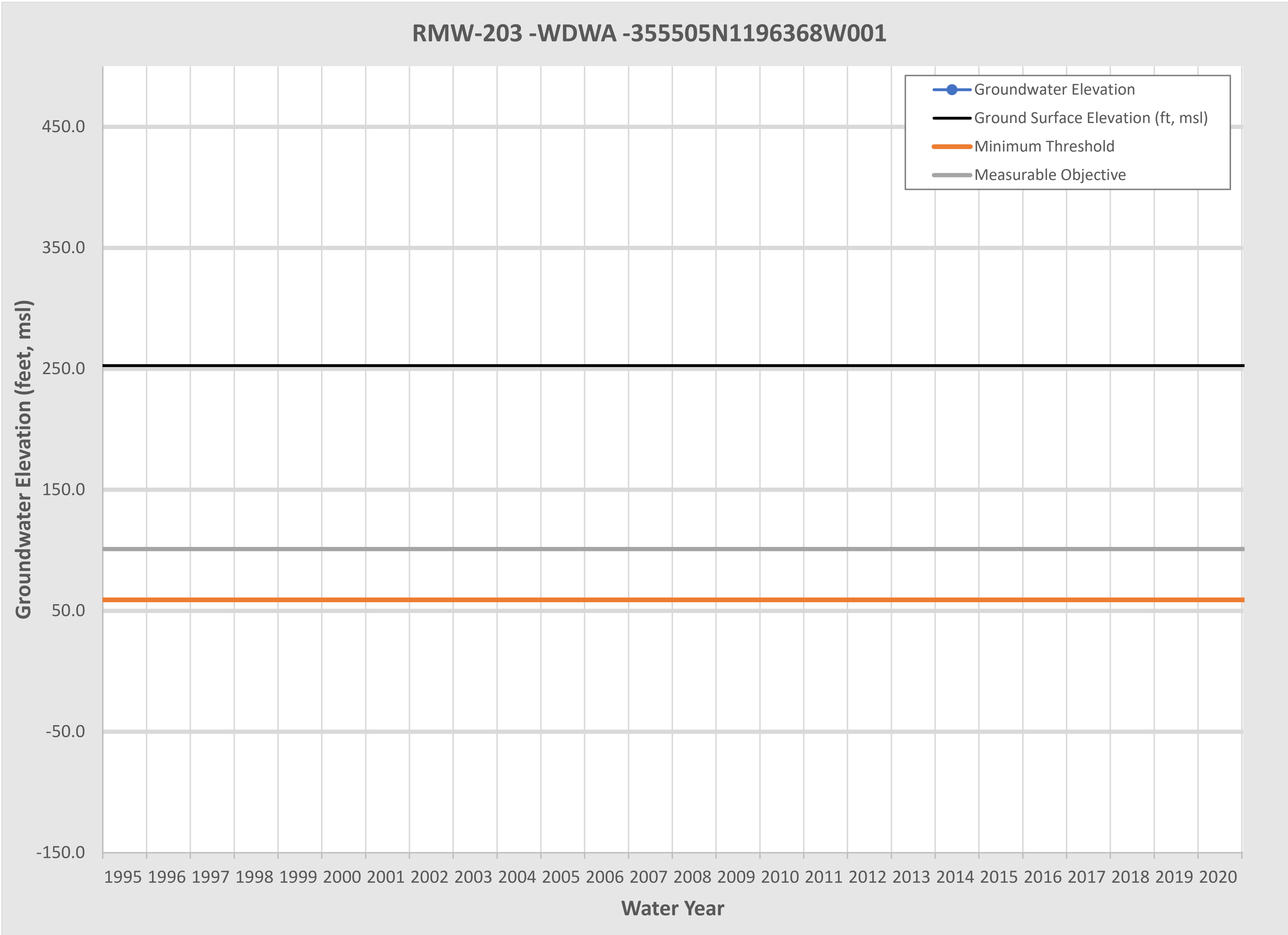
RMW-088 -WKWD -353464N1193684W004
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective


RMW-089 -WKWD -353342N1193700W004
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

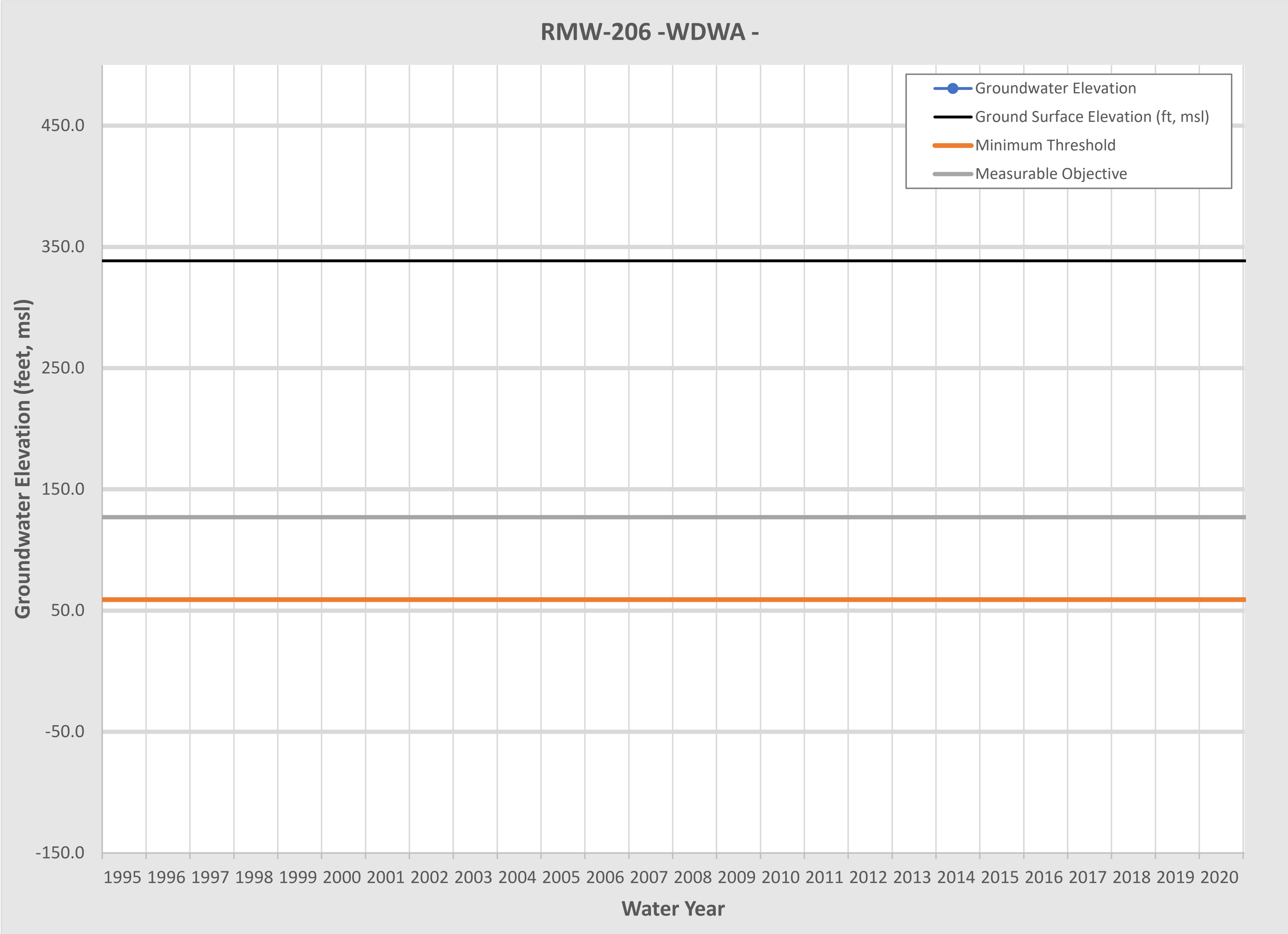

RMW-181 -WDWA -357767N1196538W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



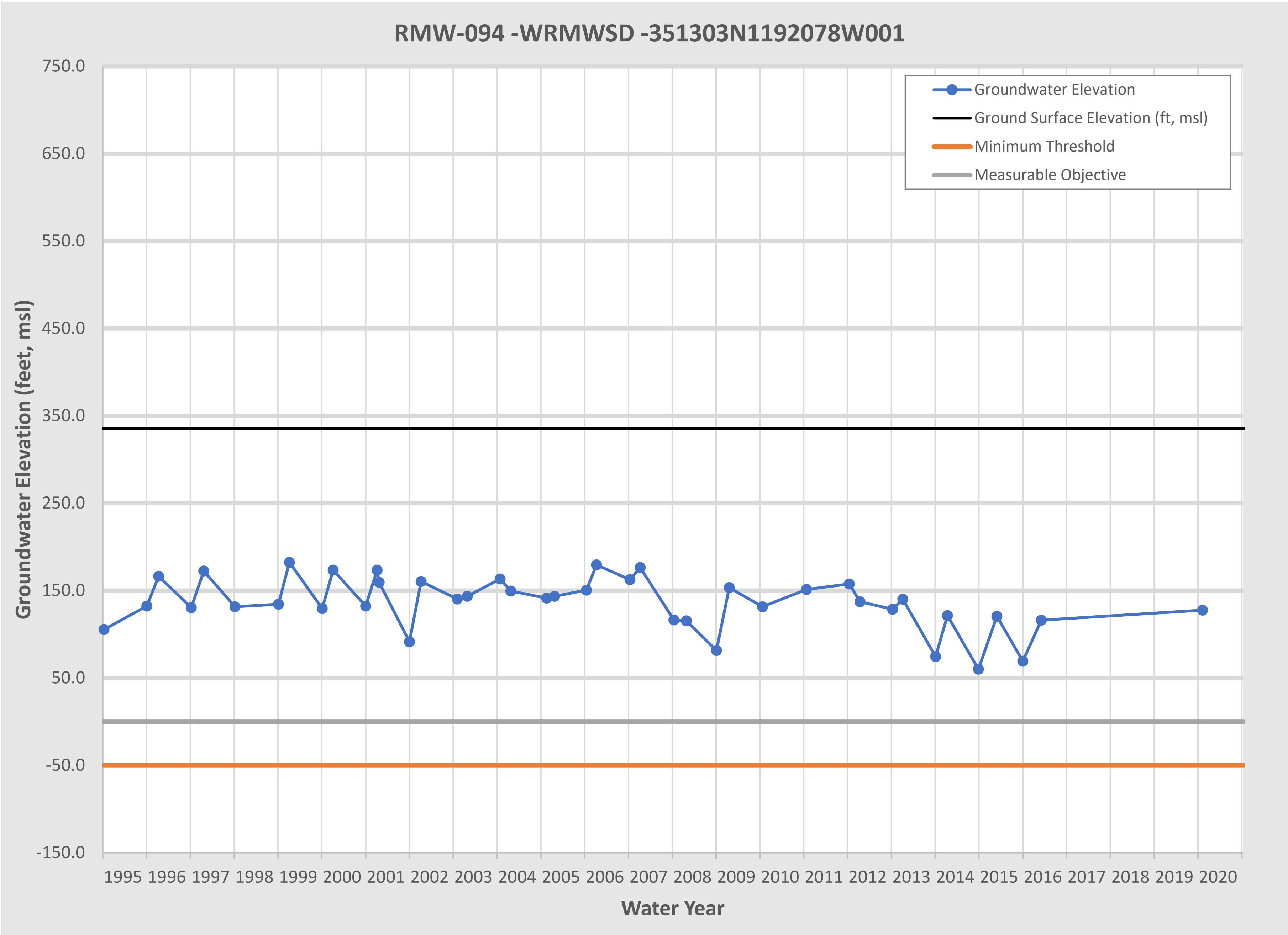
RMW-182 -WDWA -354919N1197163W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

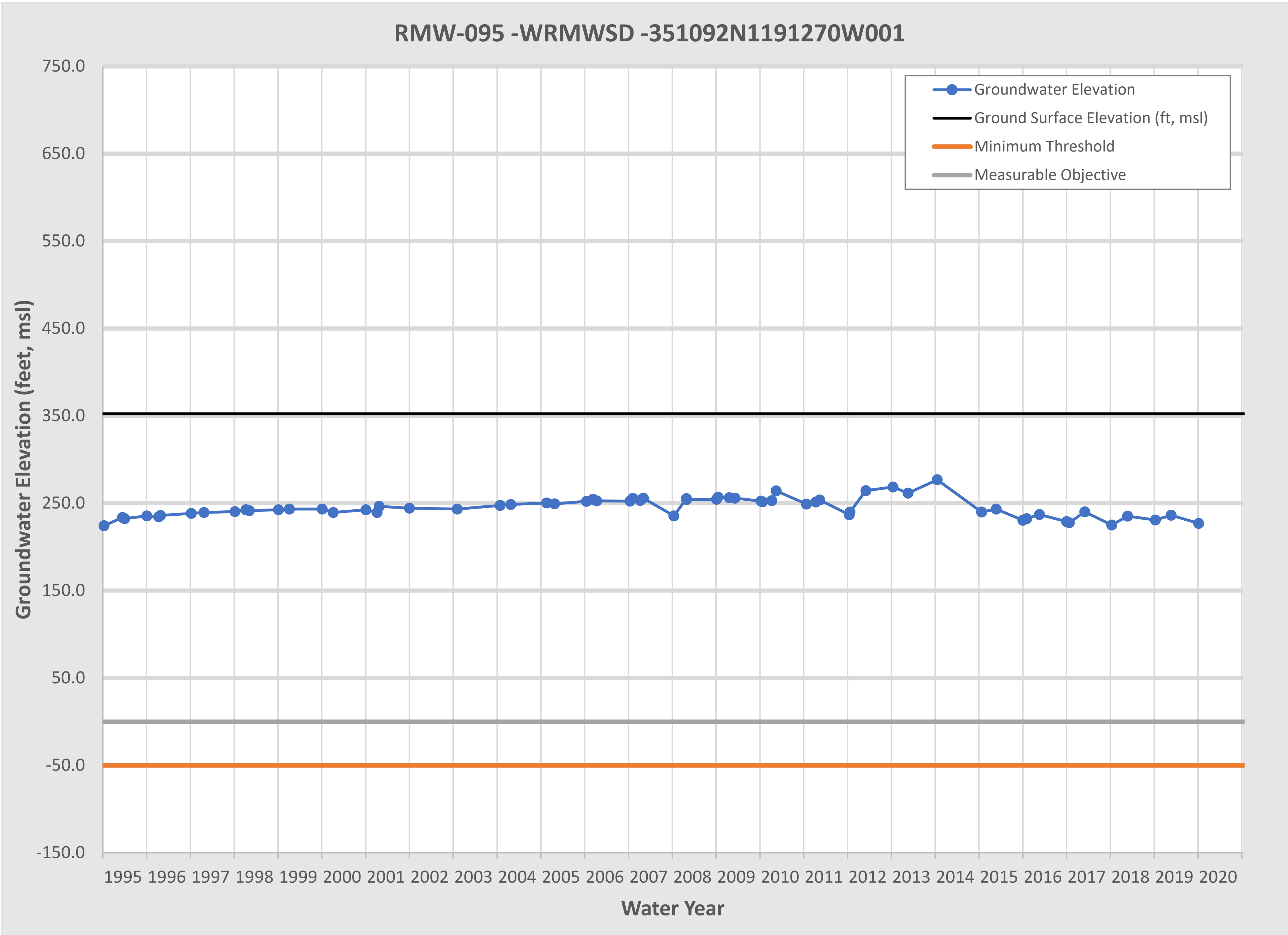


RMW-203 -WDWA -355505N1196368W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

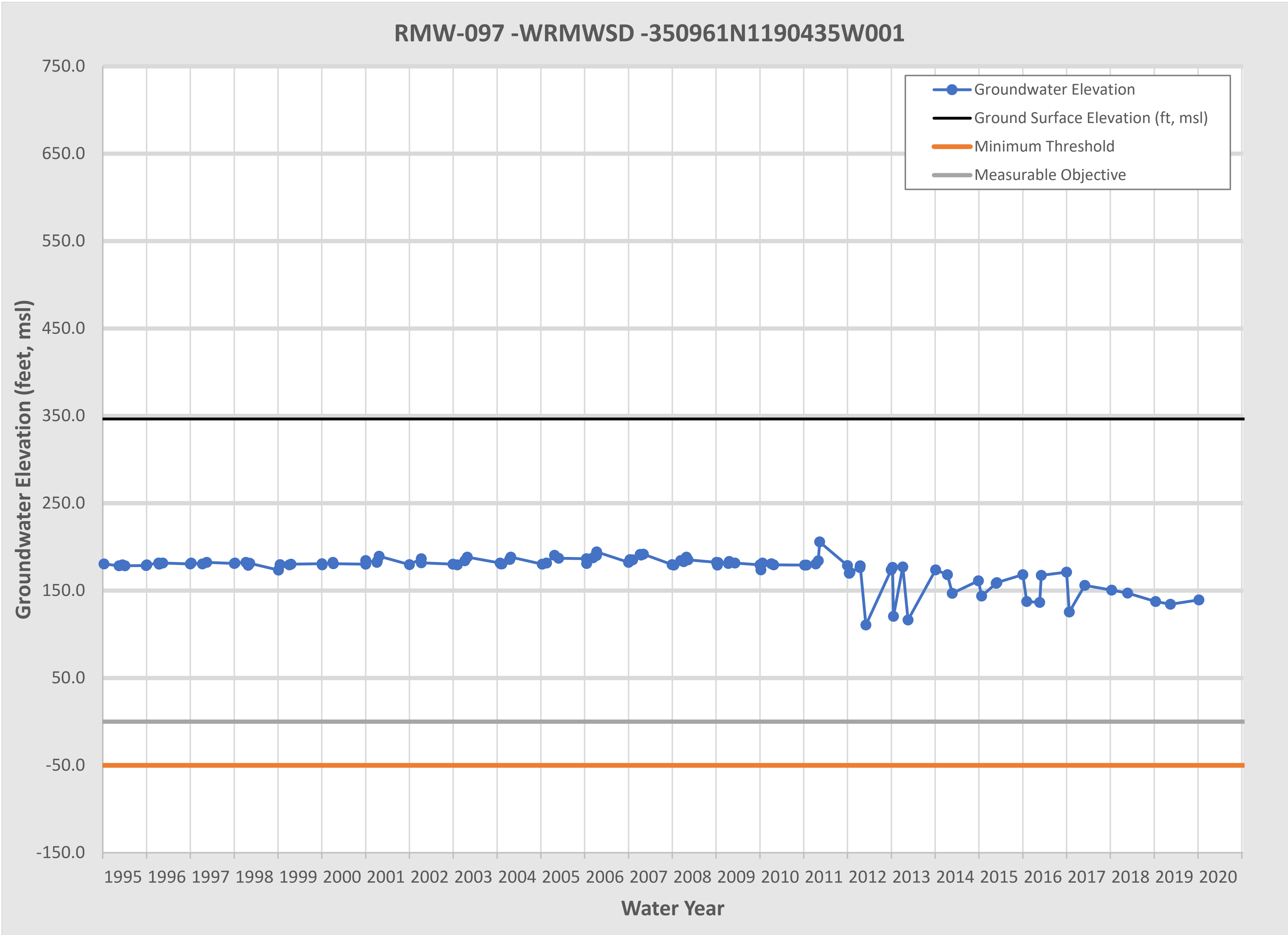


RMW-206 -WDWA -
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

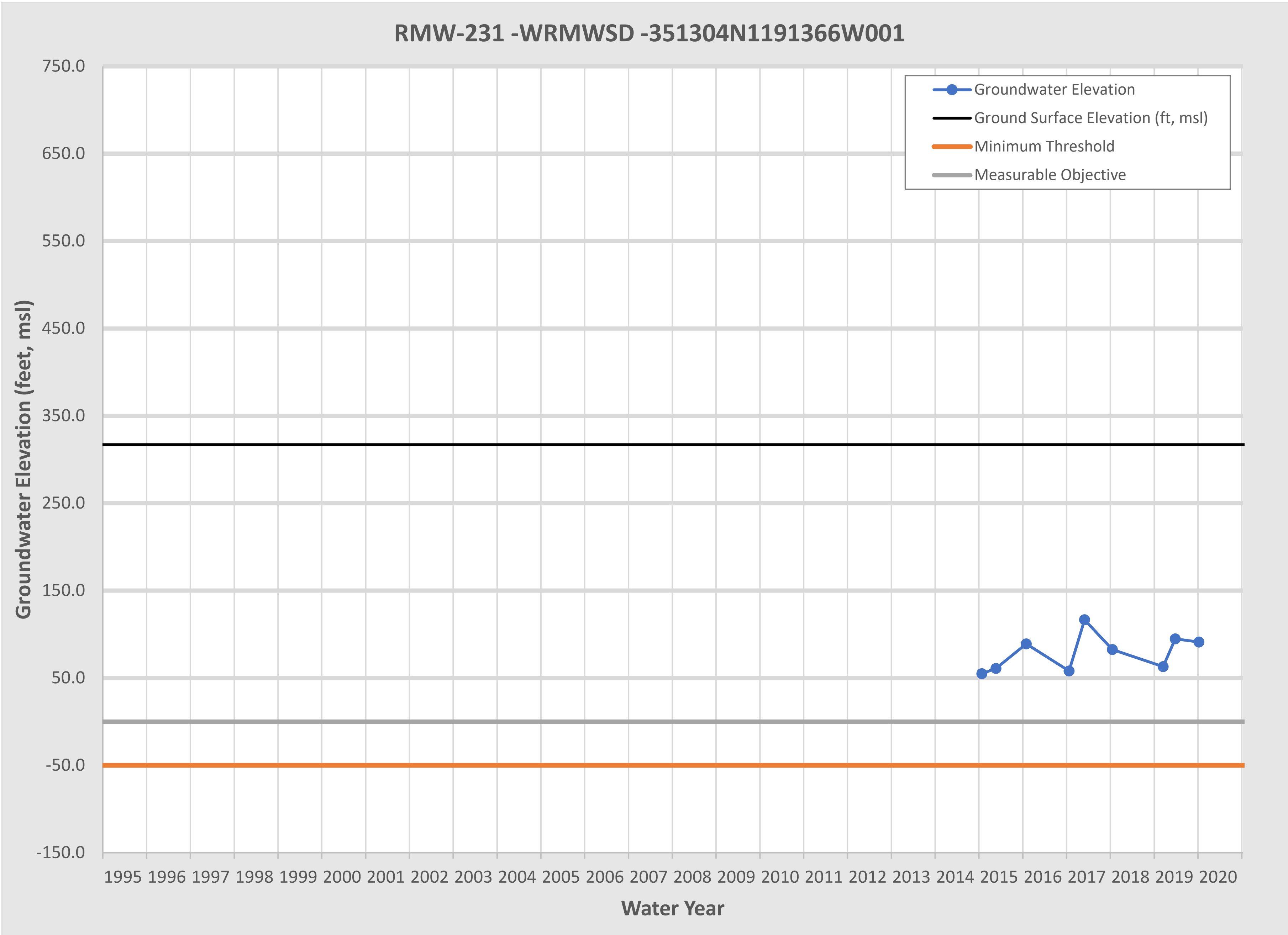

RMW-094 -WRMWSD -351303N1192078W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



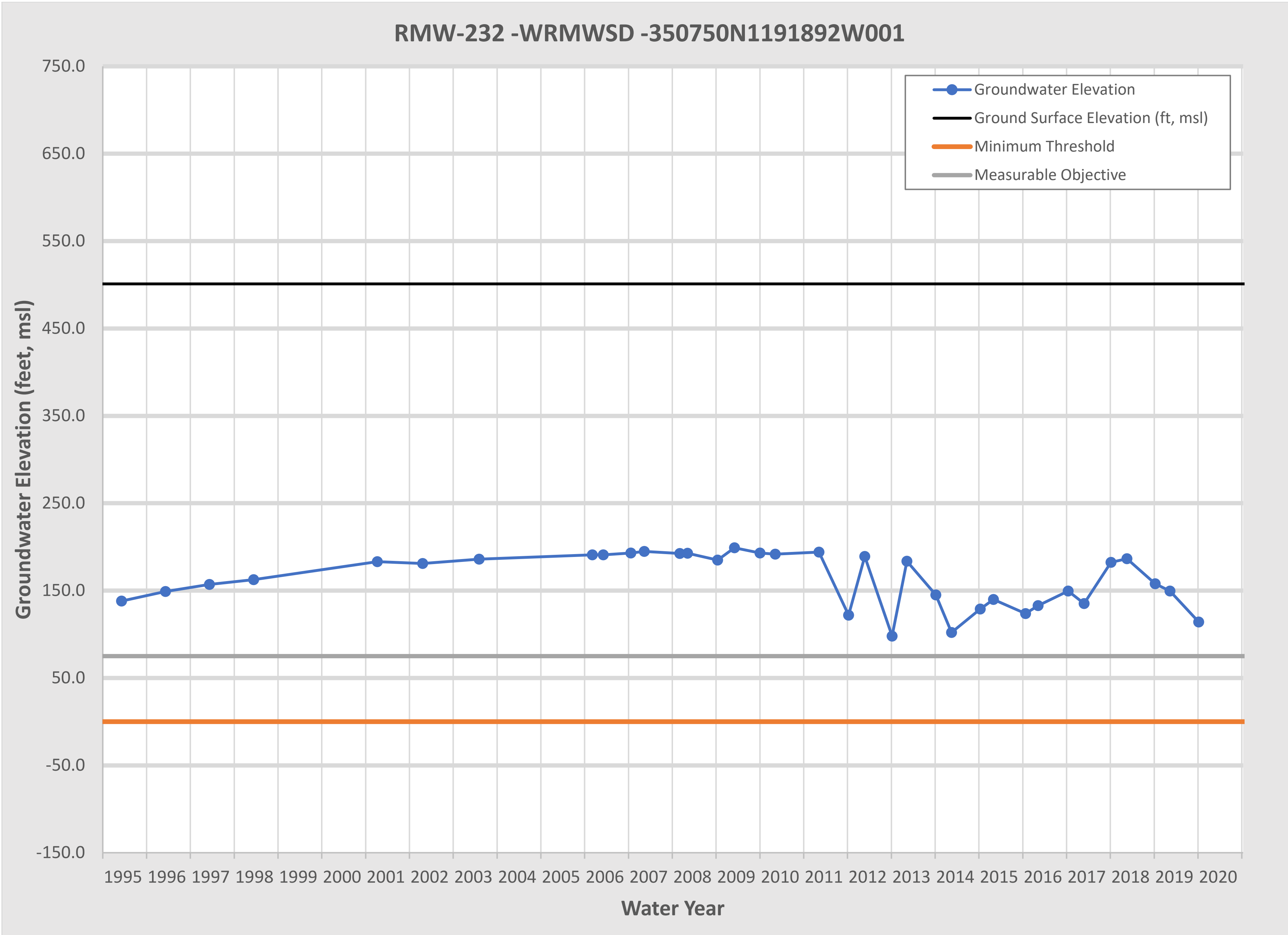
RMW-095 -WRMWSD -351092N1191270W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

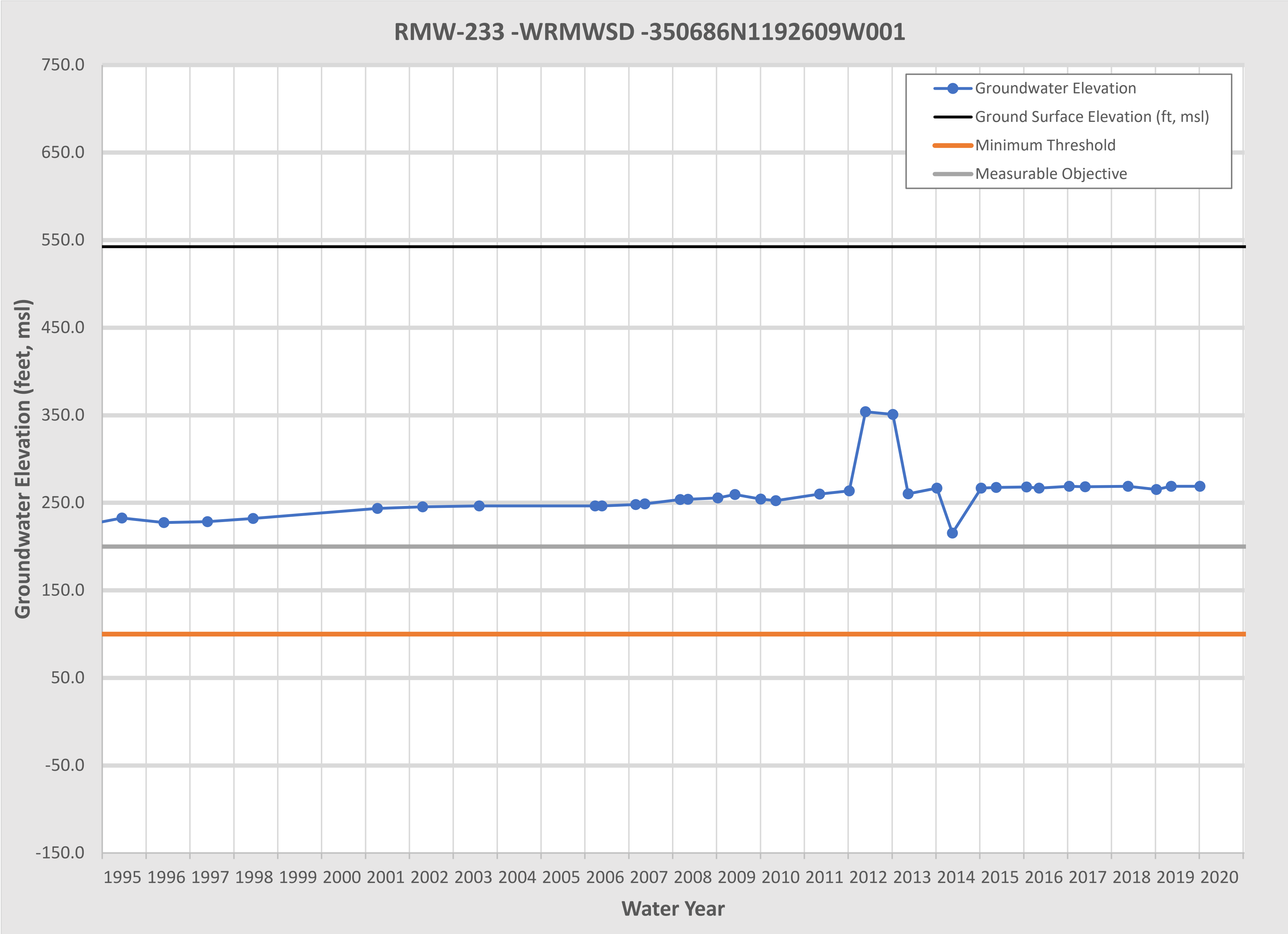


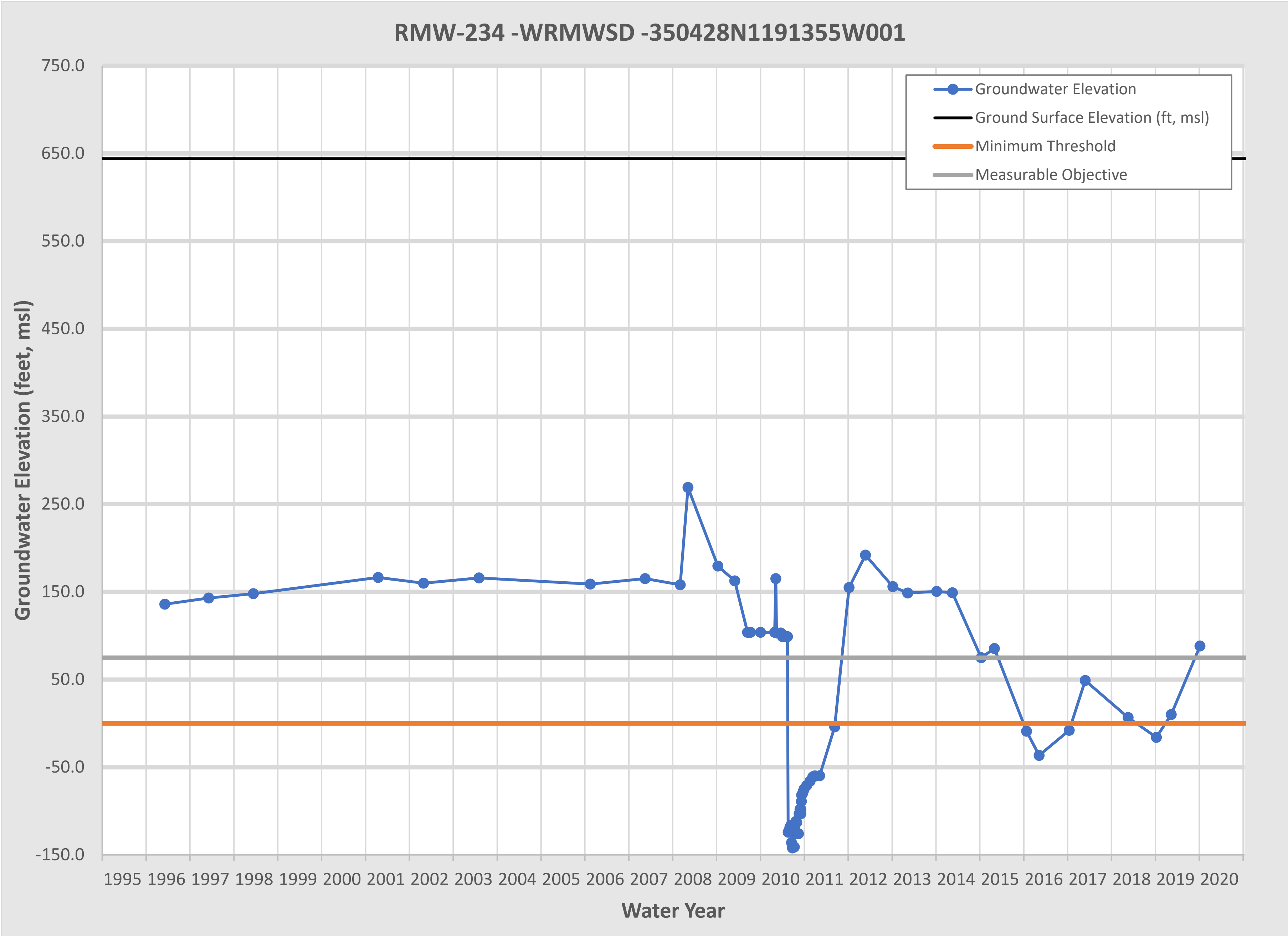
RMW-097 -WRMWSD -350961N1190435W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

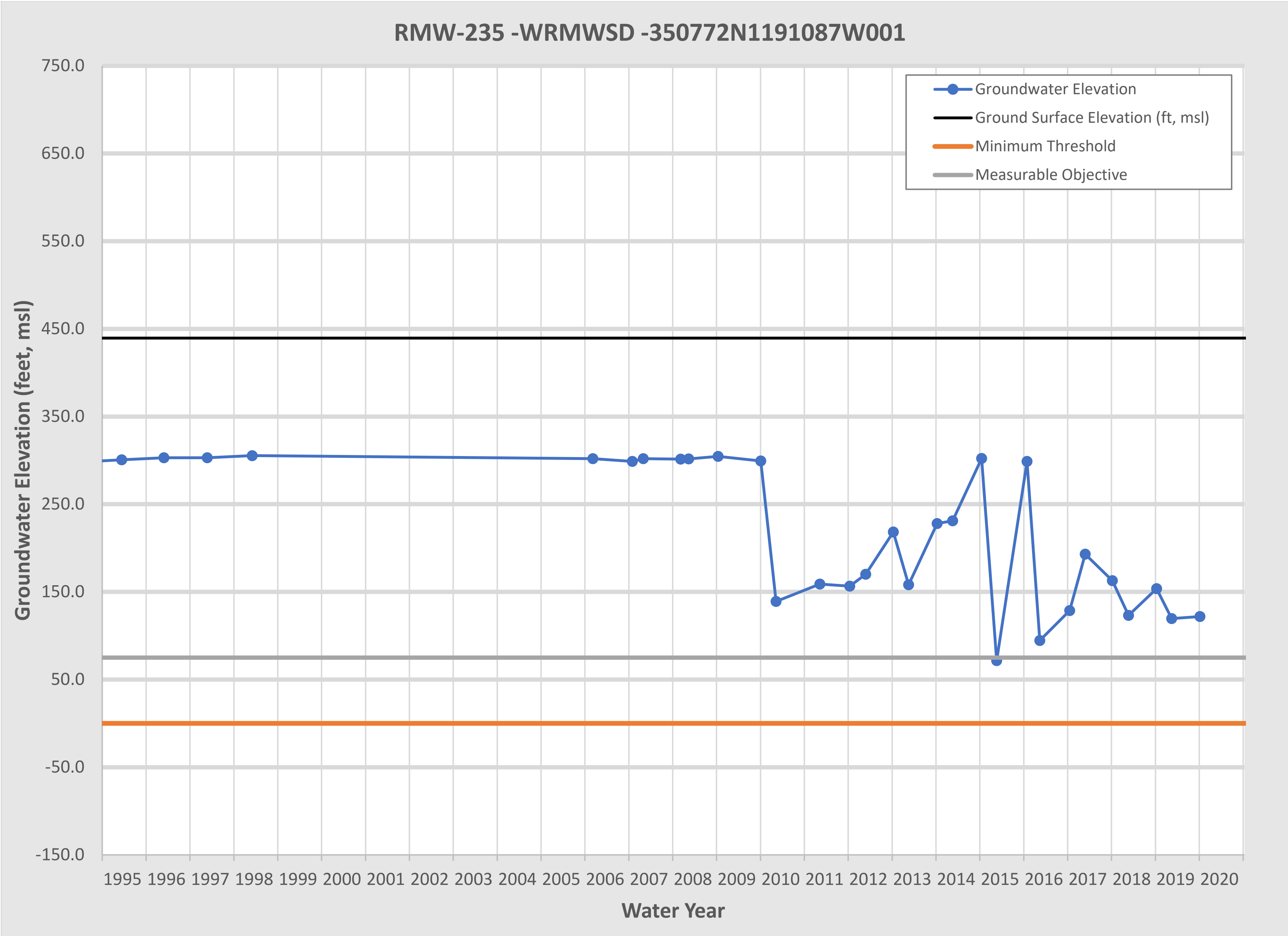


RMW-231 -WRMWSD -351304N1191366W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

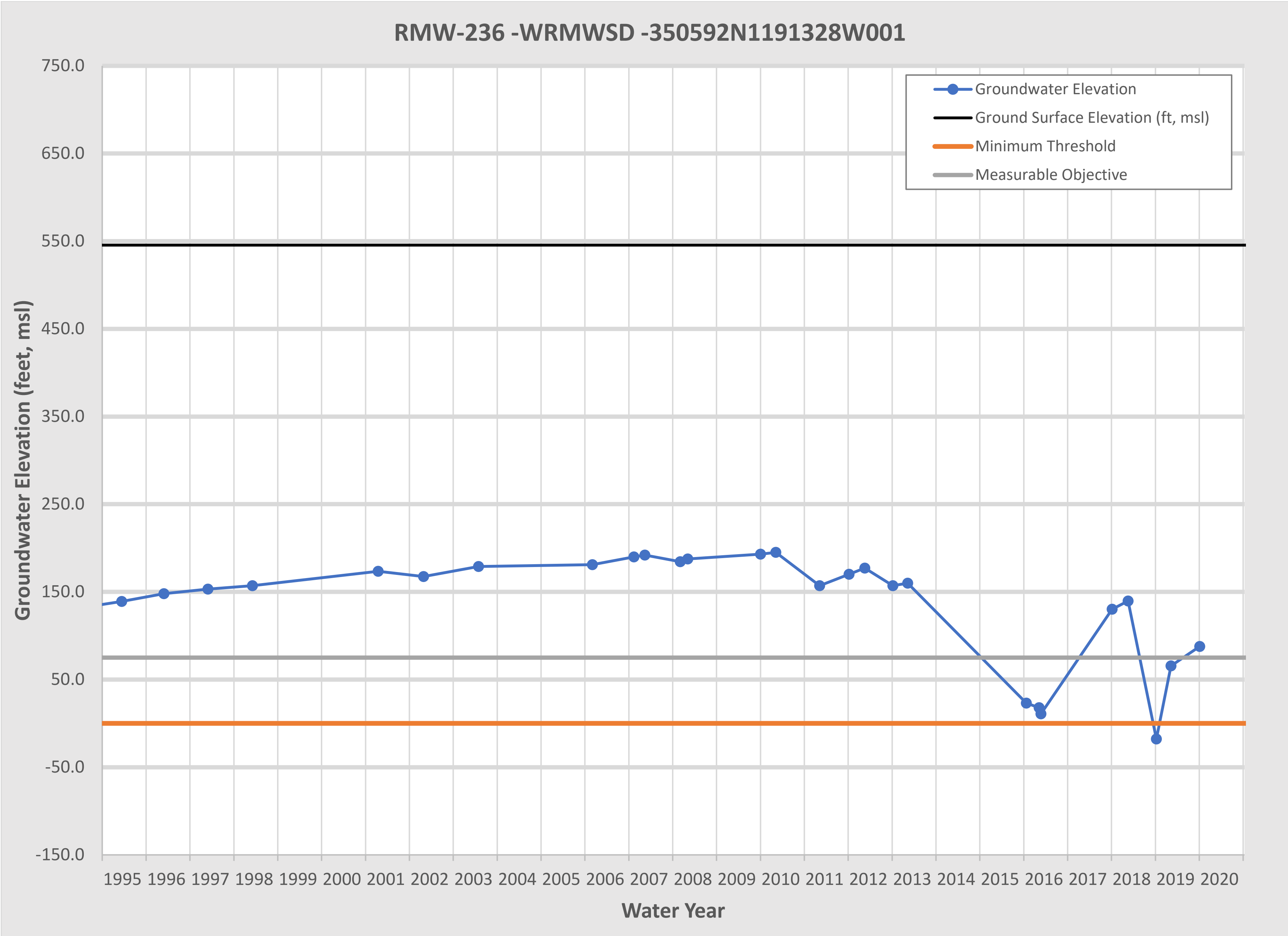

RMW-232 -WRMWSD -350750N1191892W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-233 -WRMWSD -350686N1192609W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

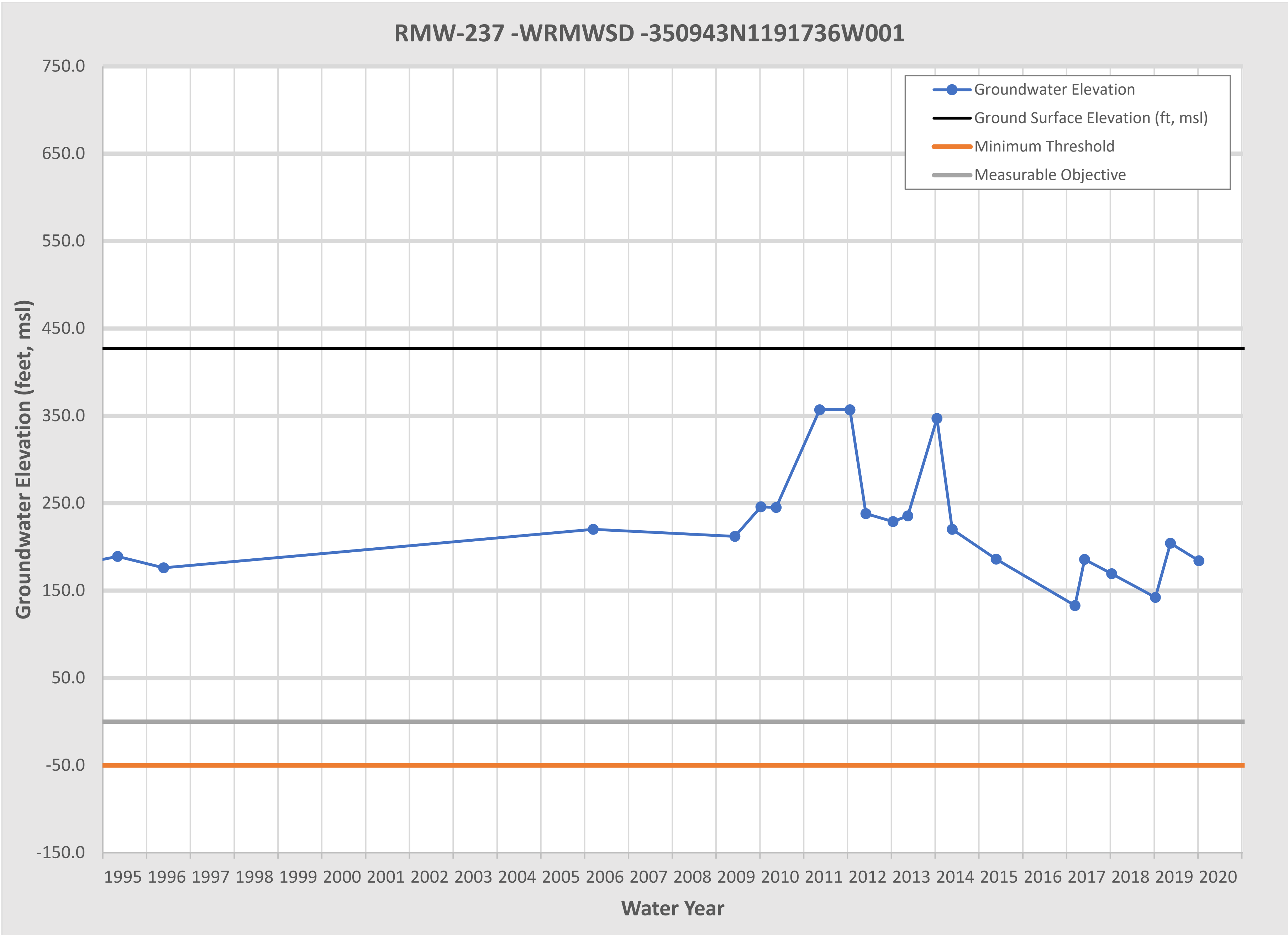

RMW-234 -WRMWSD -350428N1191355W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

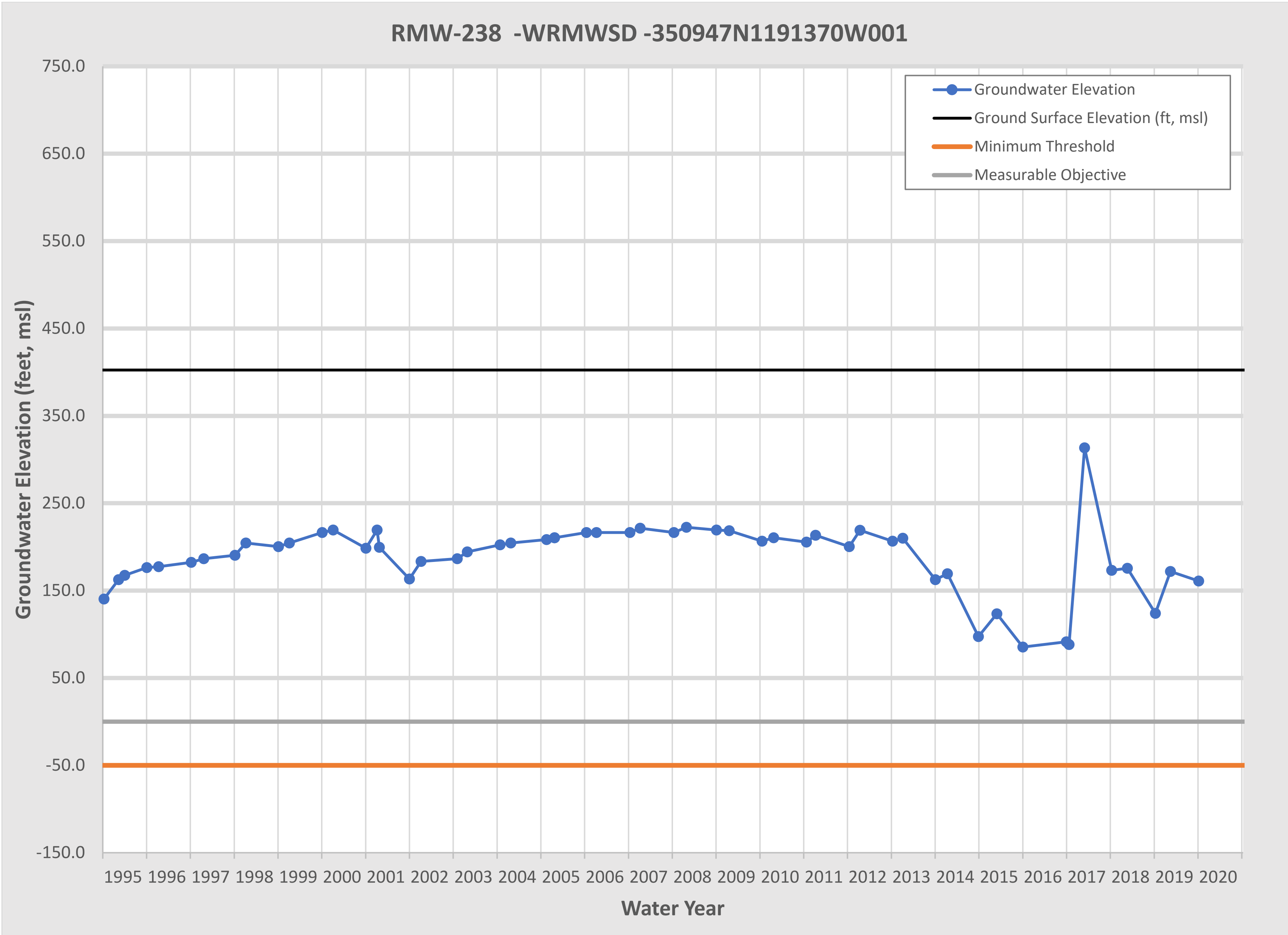


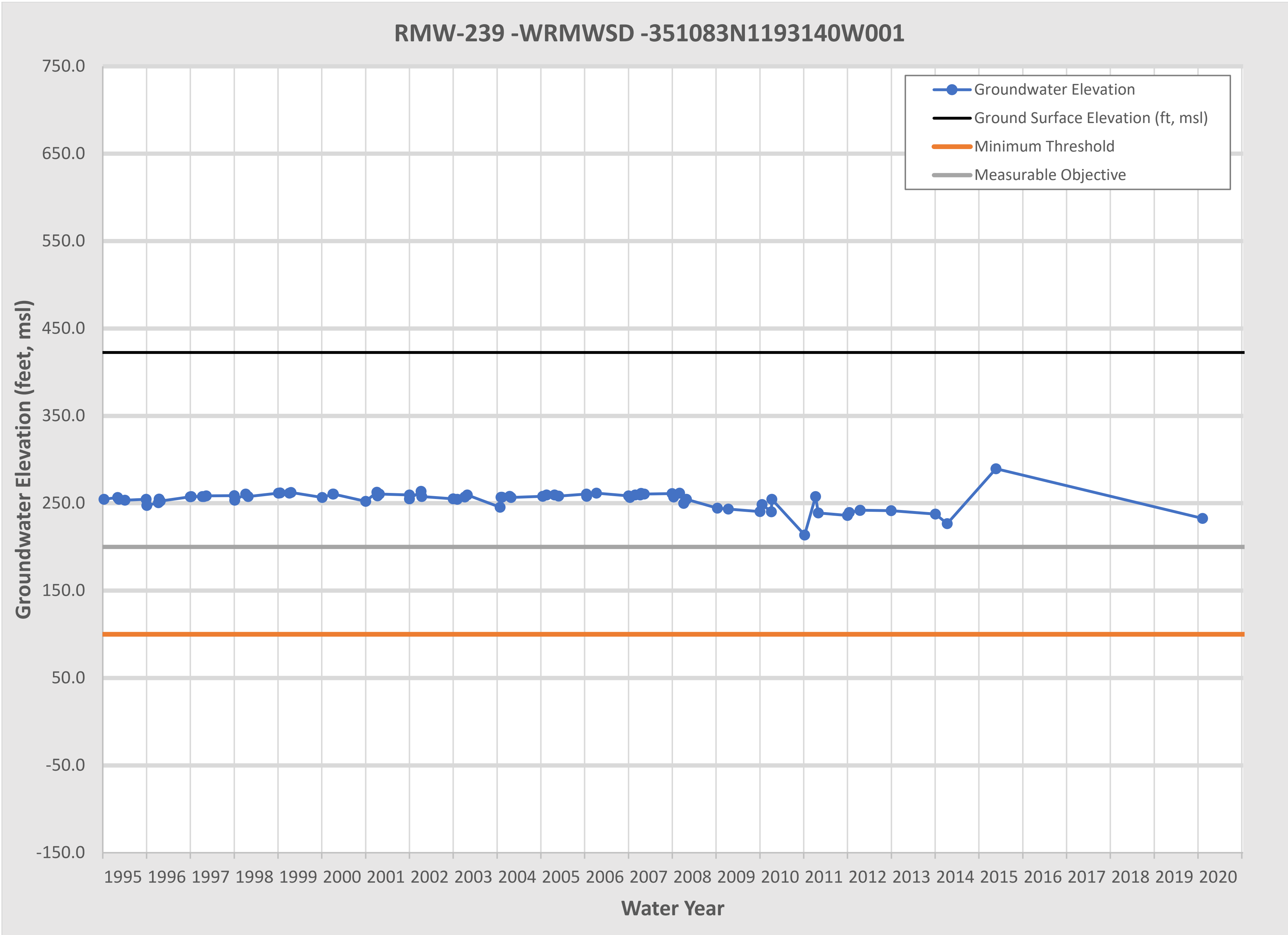
RMW-235 -WRMWSD -350772N1191087W001
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective



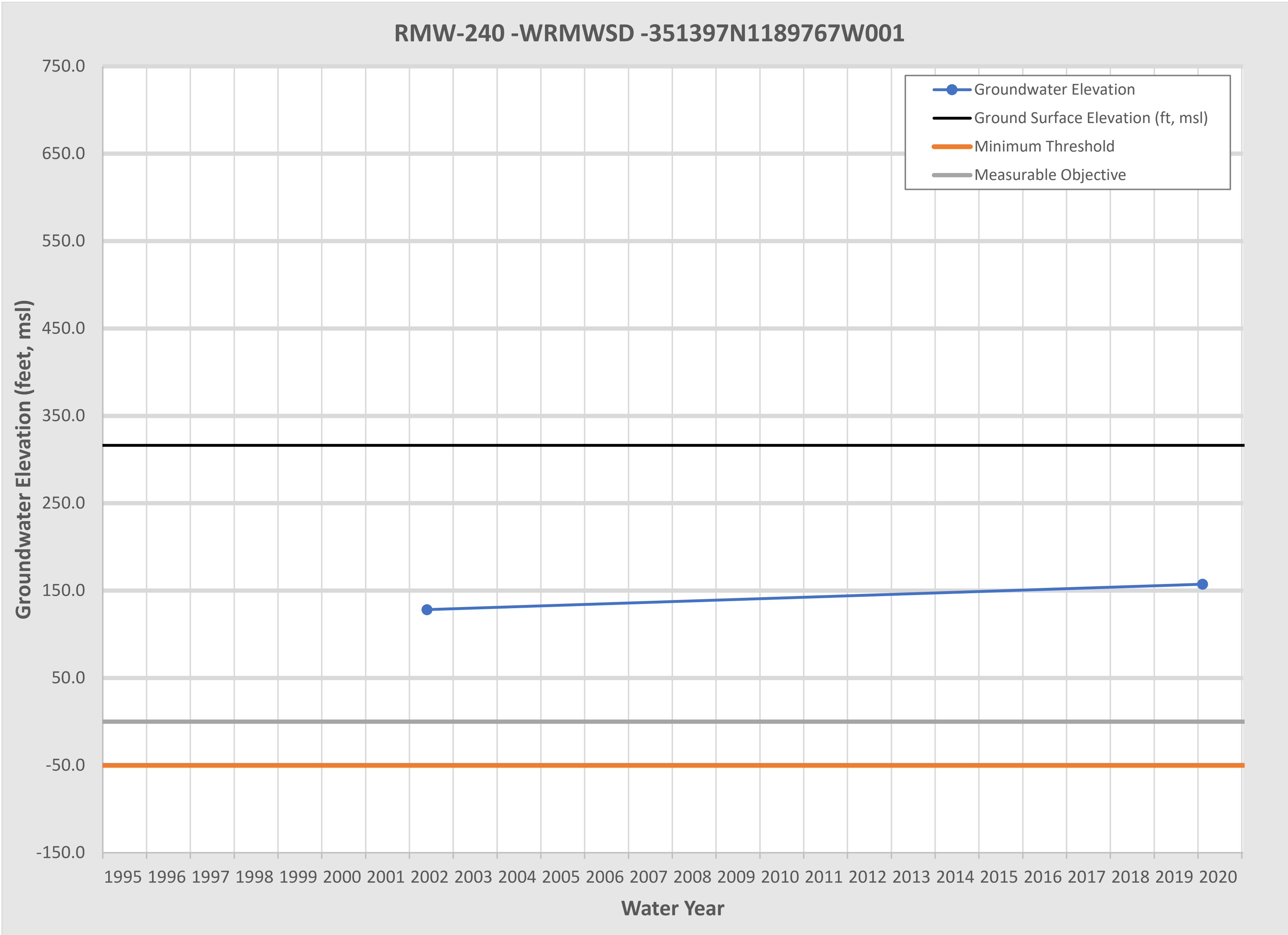
RMW-236 -WRMWSD -350592N1191328W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-237 -WRMWSD -350943N1191736W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

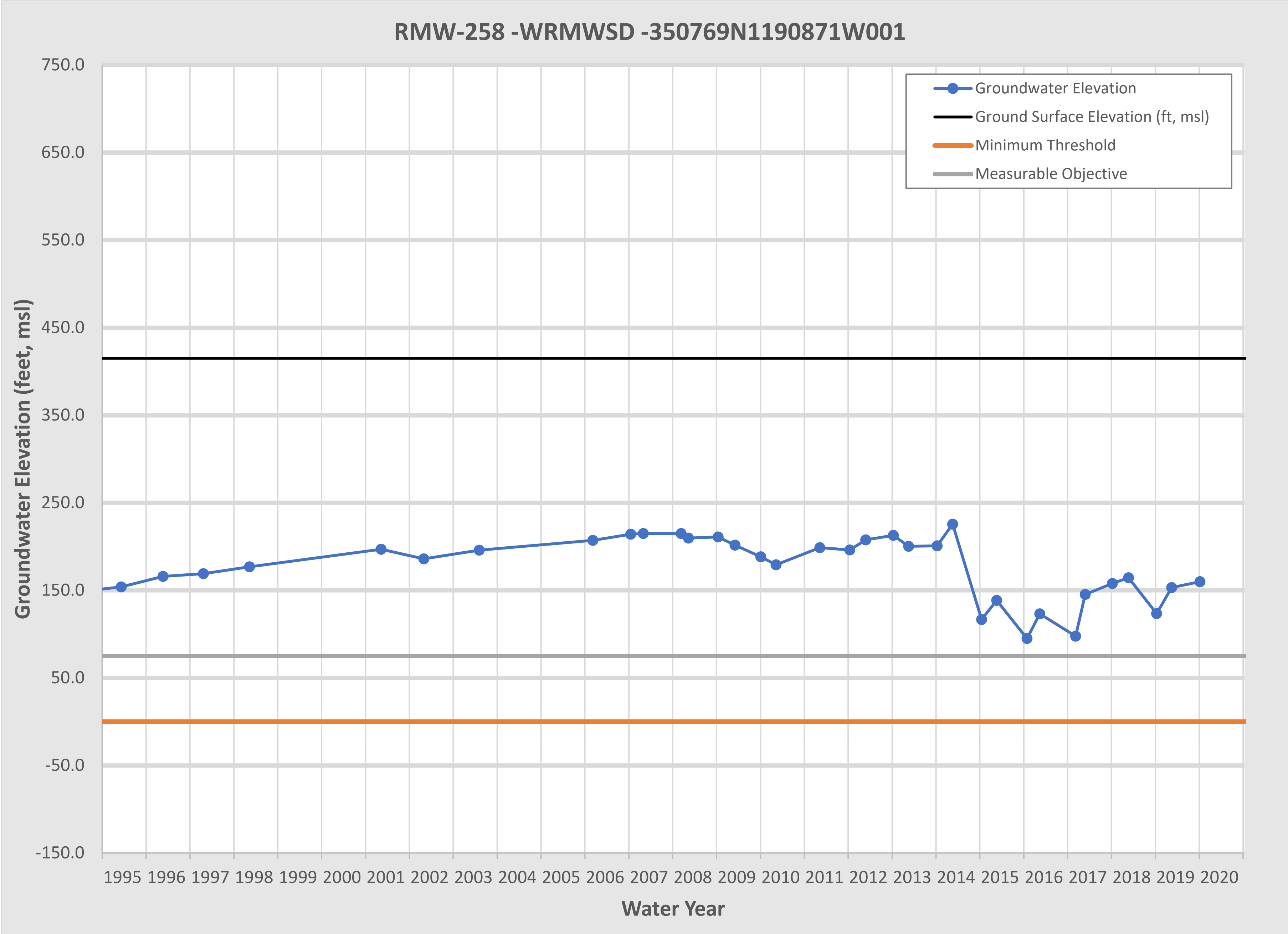

RMW-238 -WRMWSD -350947N1191370W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



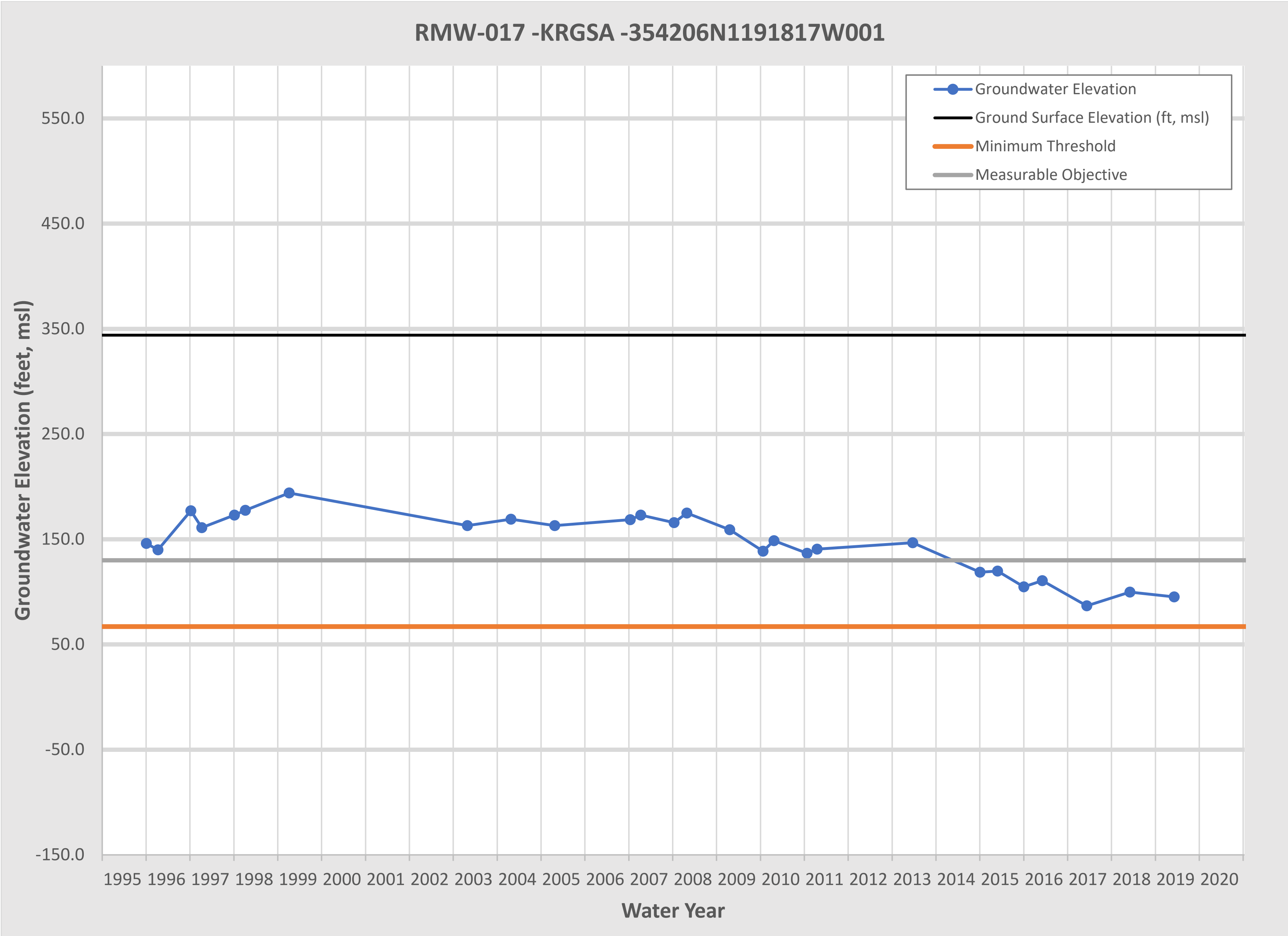
RMW-239 -WRMWSD -351083N1193140W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

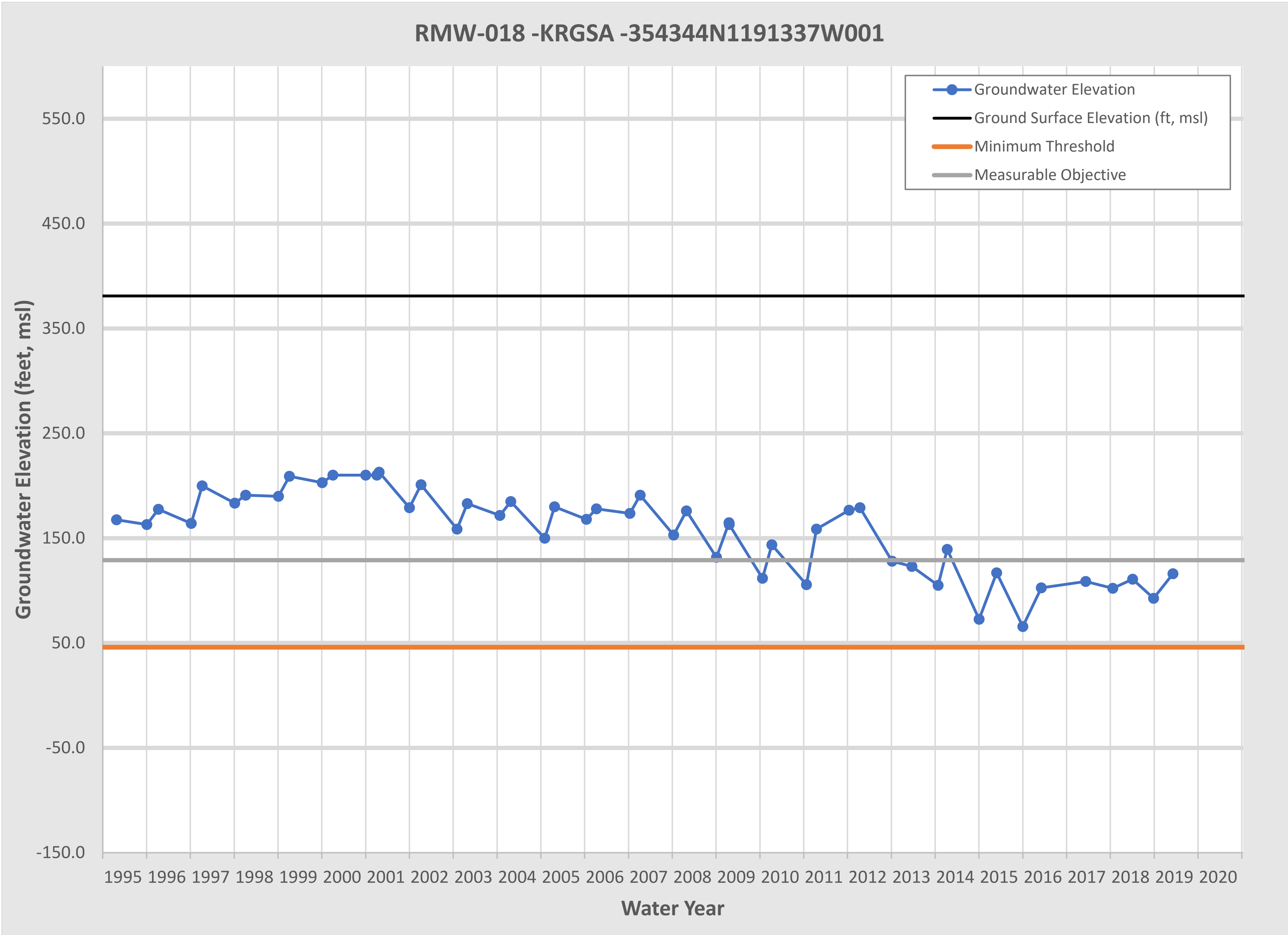


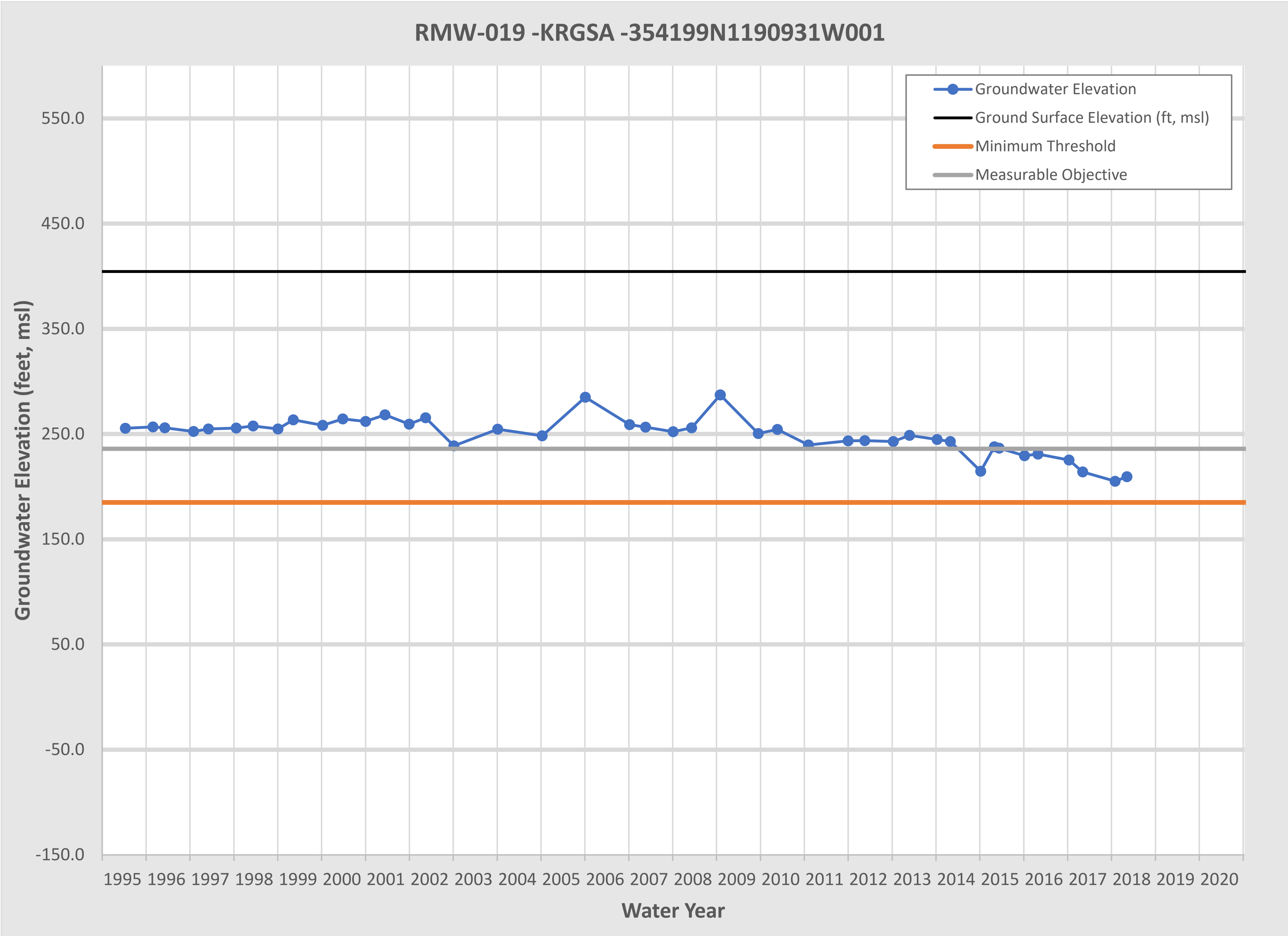
RMW-240 -WRMWSD -351397N1189767W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

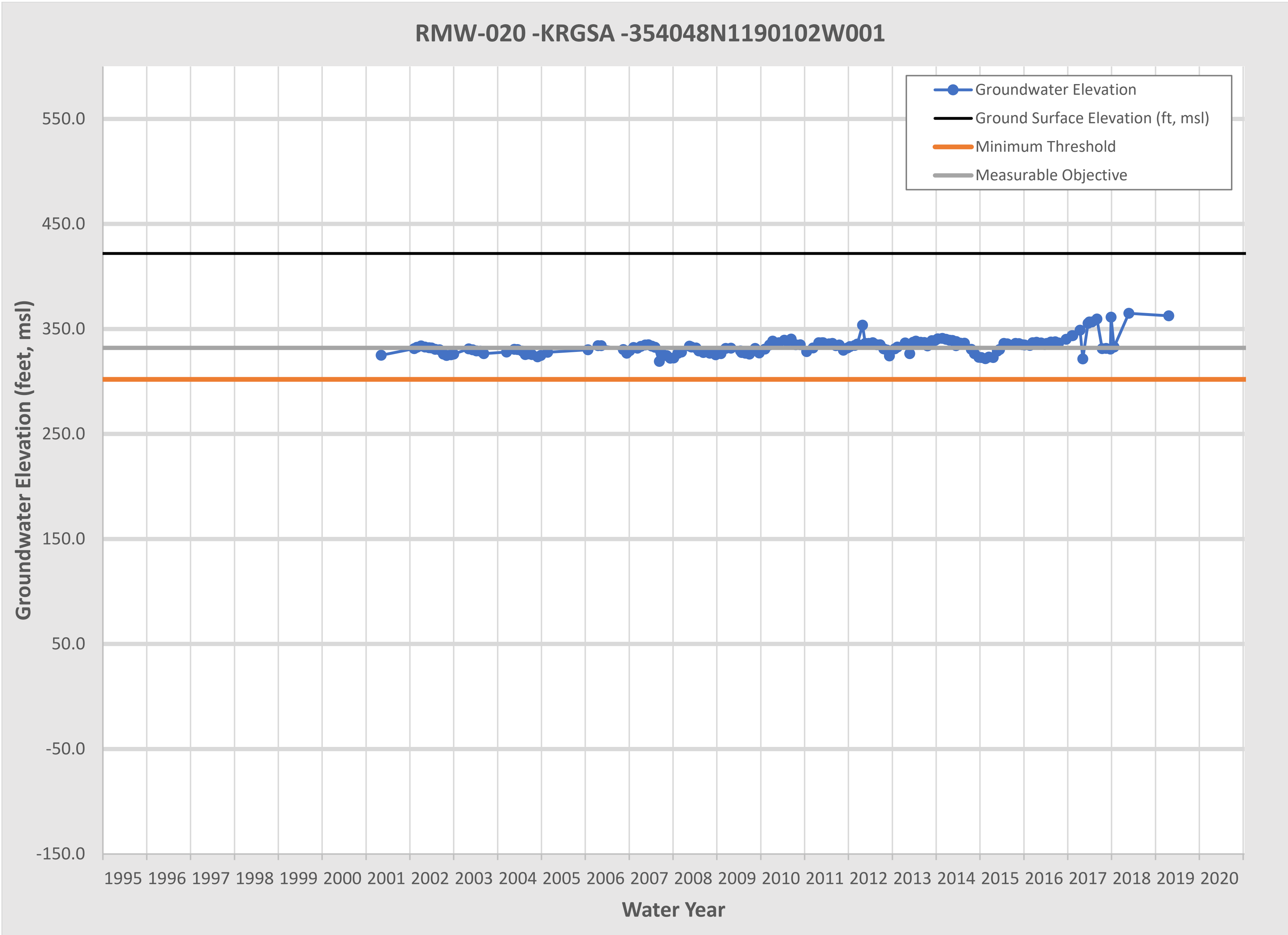


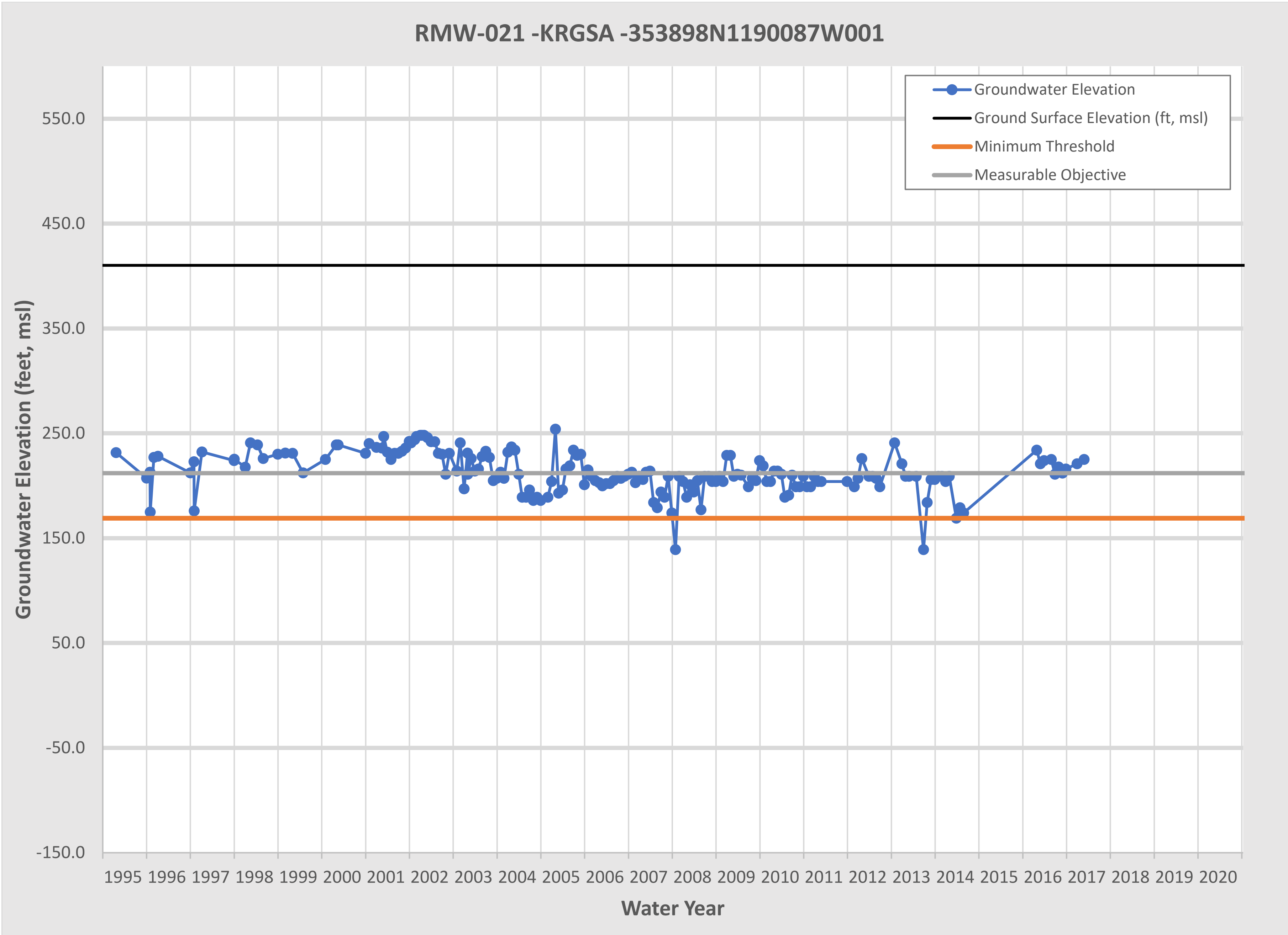
RMW-258 -WRMWSD -350769N1190871W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-017 -KRGSA -354206N1191817W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

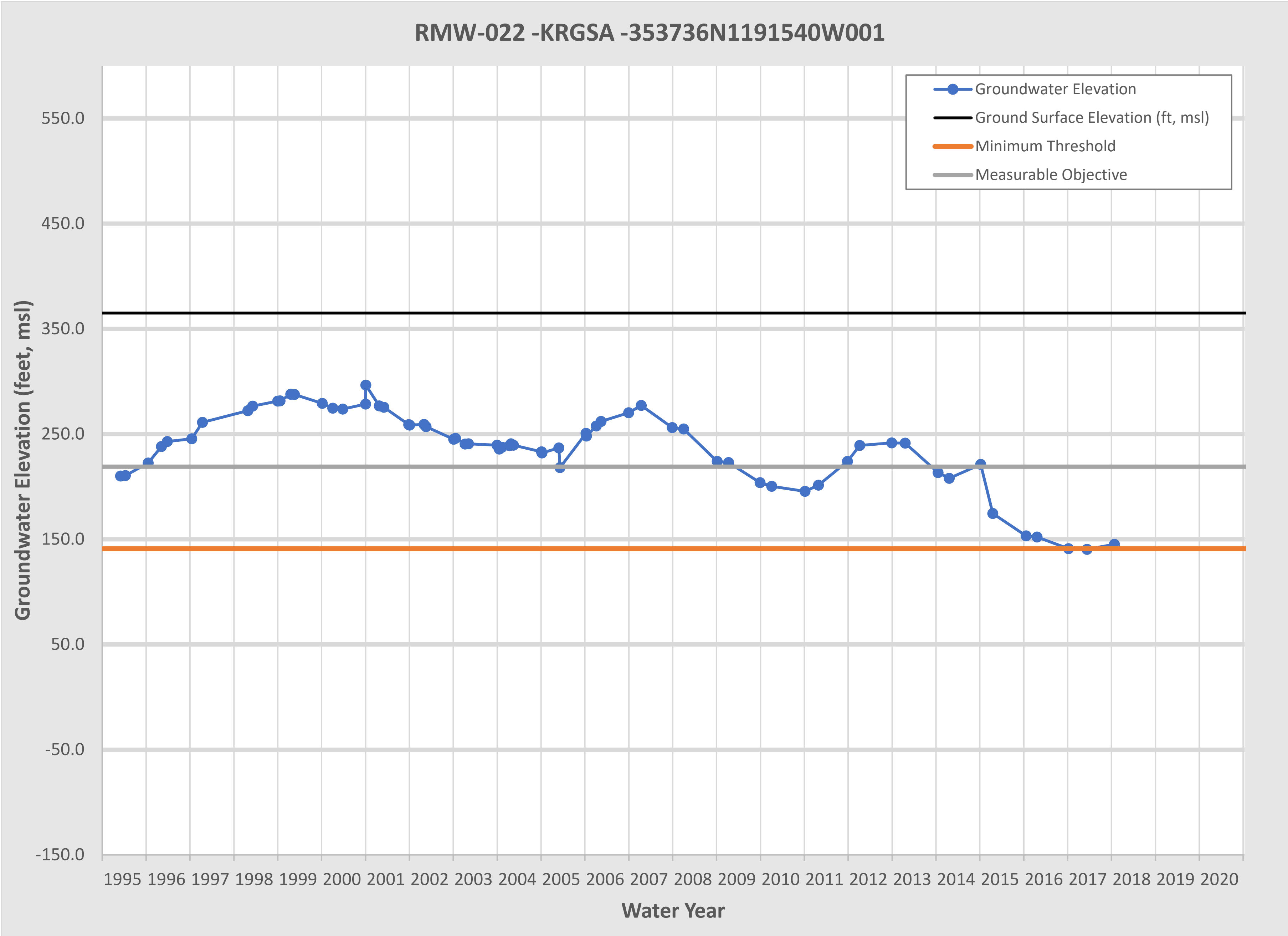

RMW-018 -KRGSA -354344N1191337W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

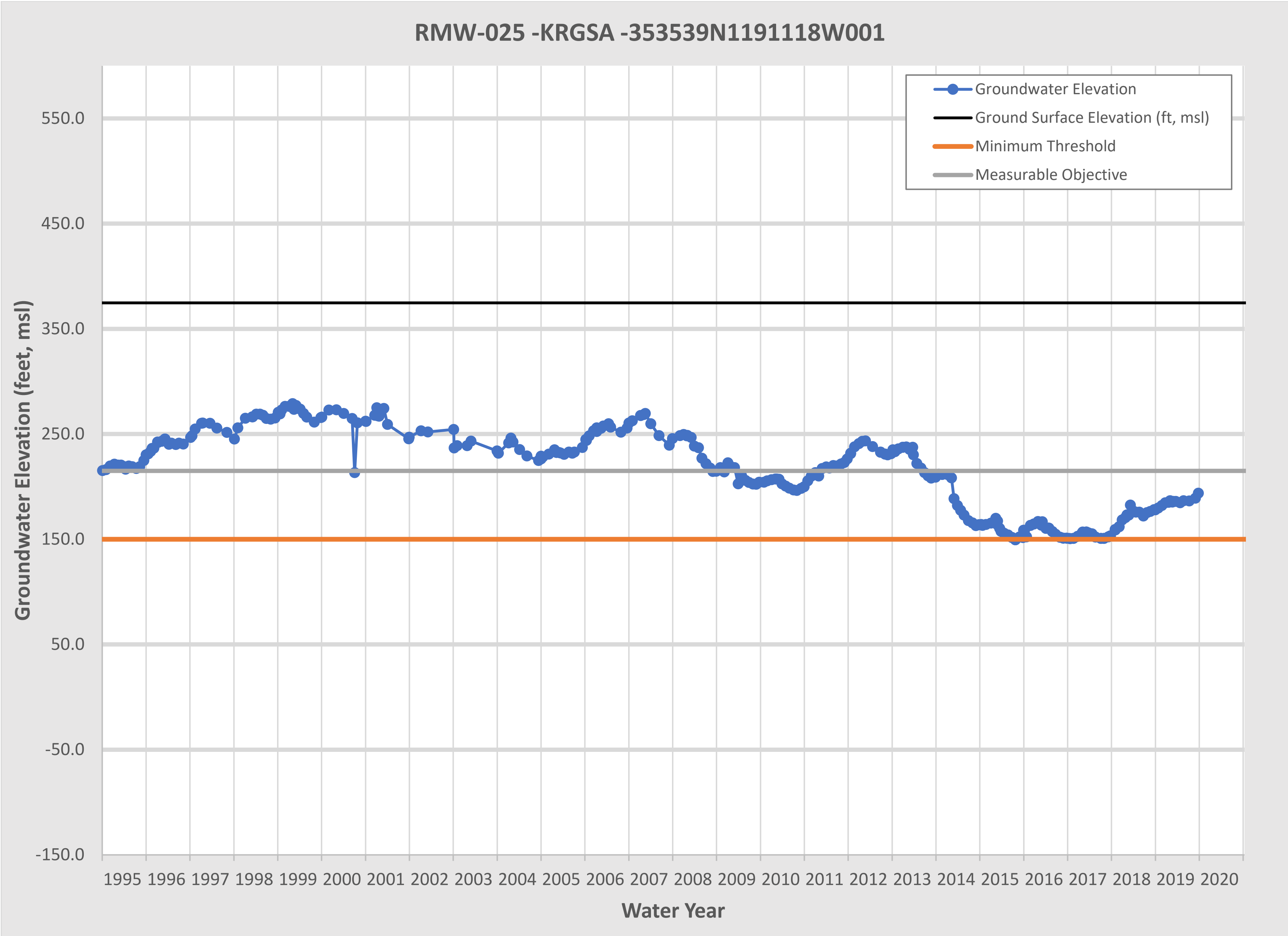

RMW-019 -KRGSA -354199N1190931W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

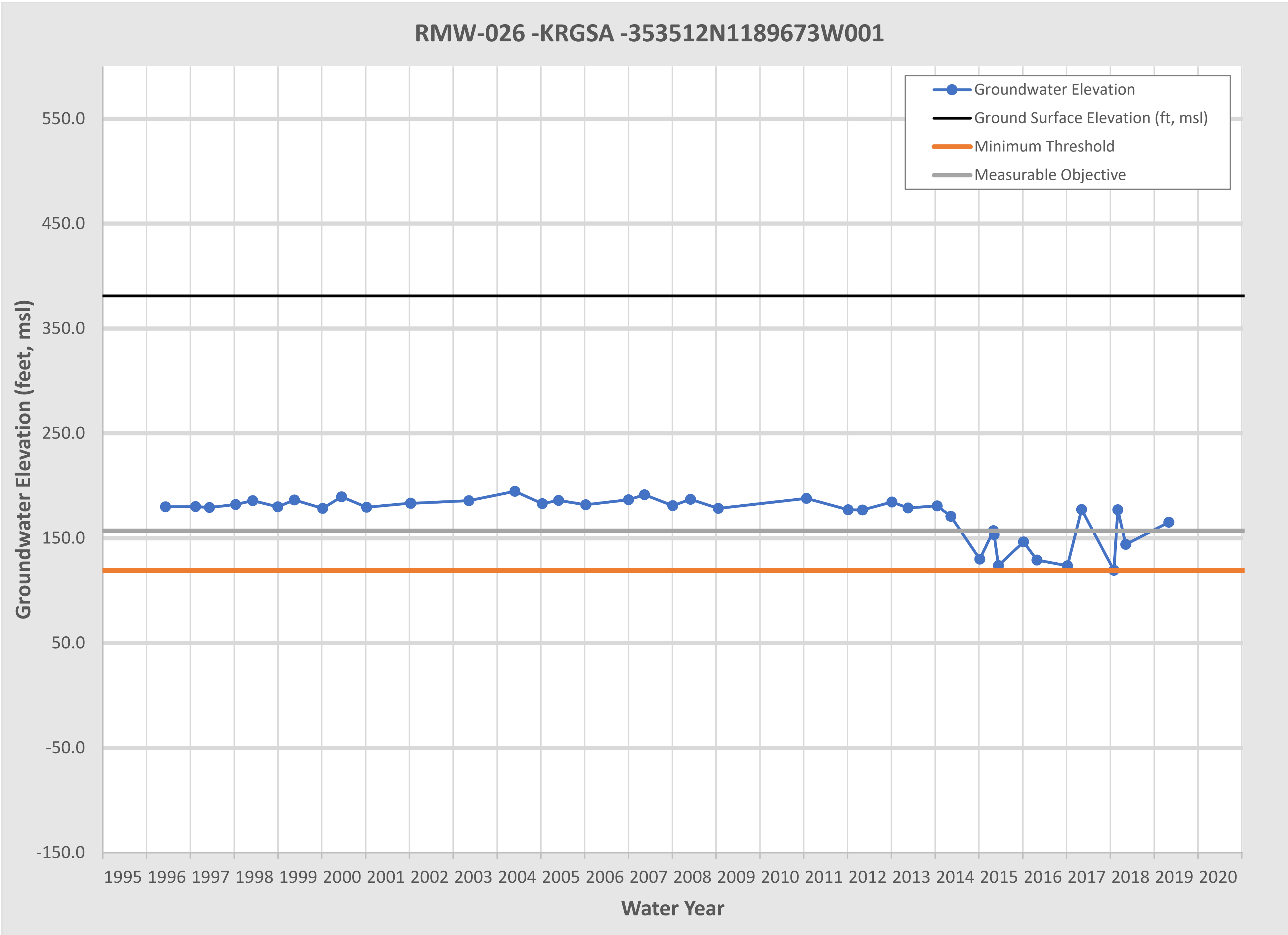

RMW-020 -KRGSA -354048N1190102W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

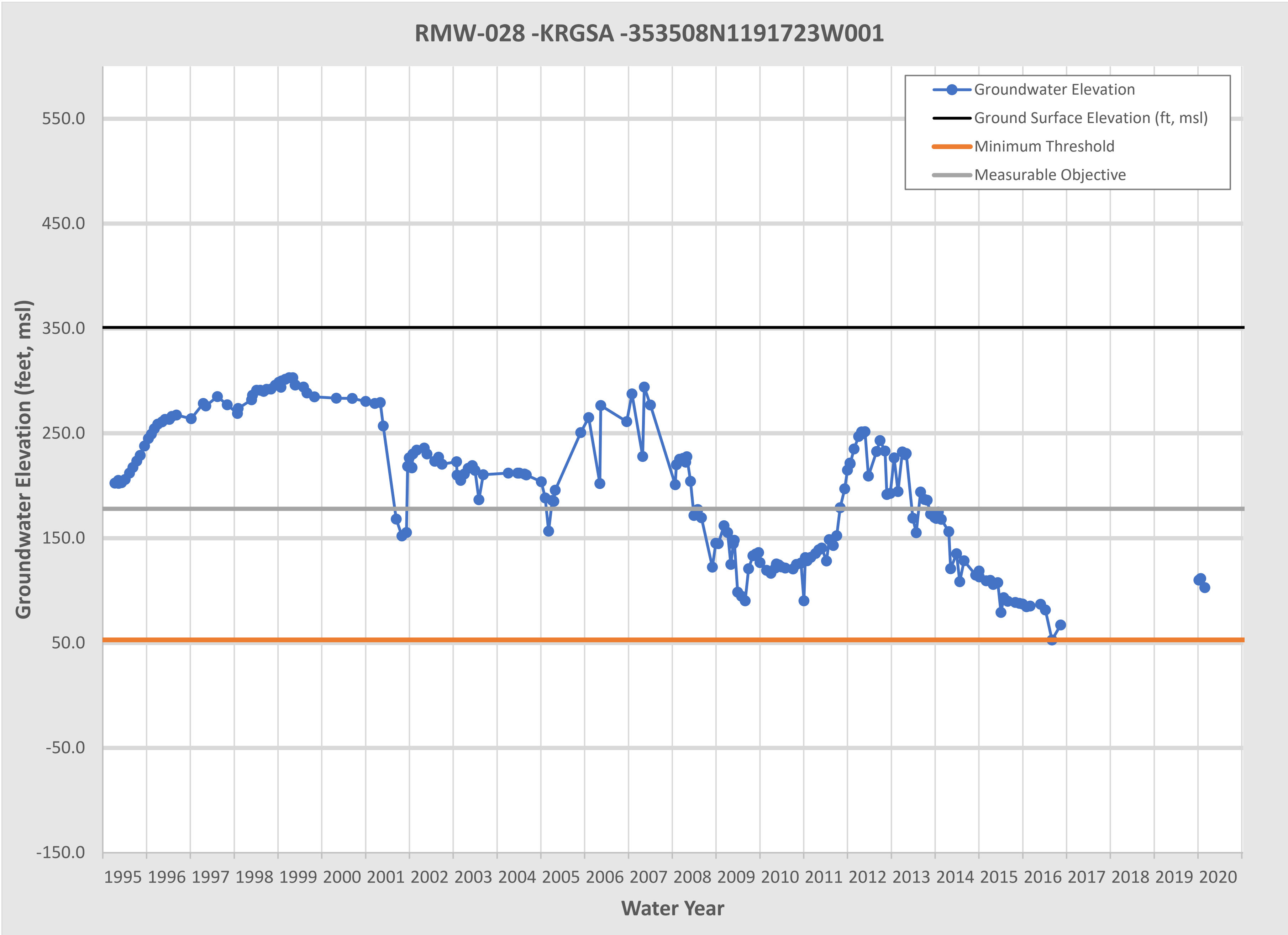


RMW-021 -KRGSA -353898N1190087W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

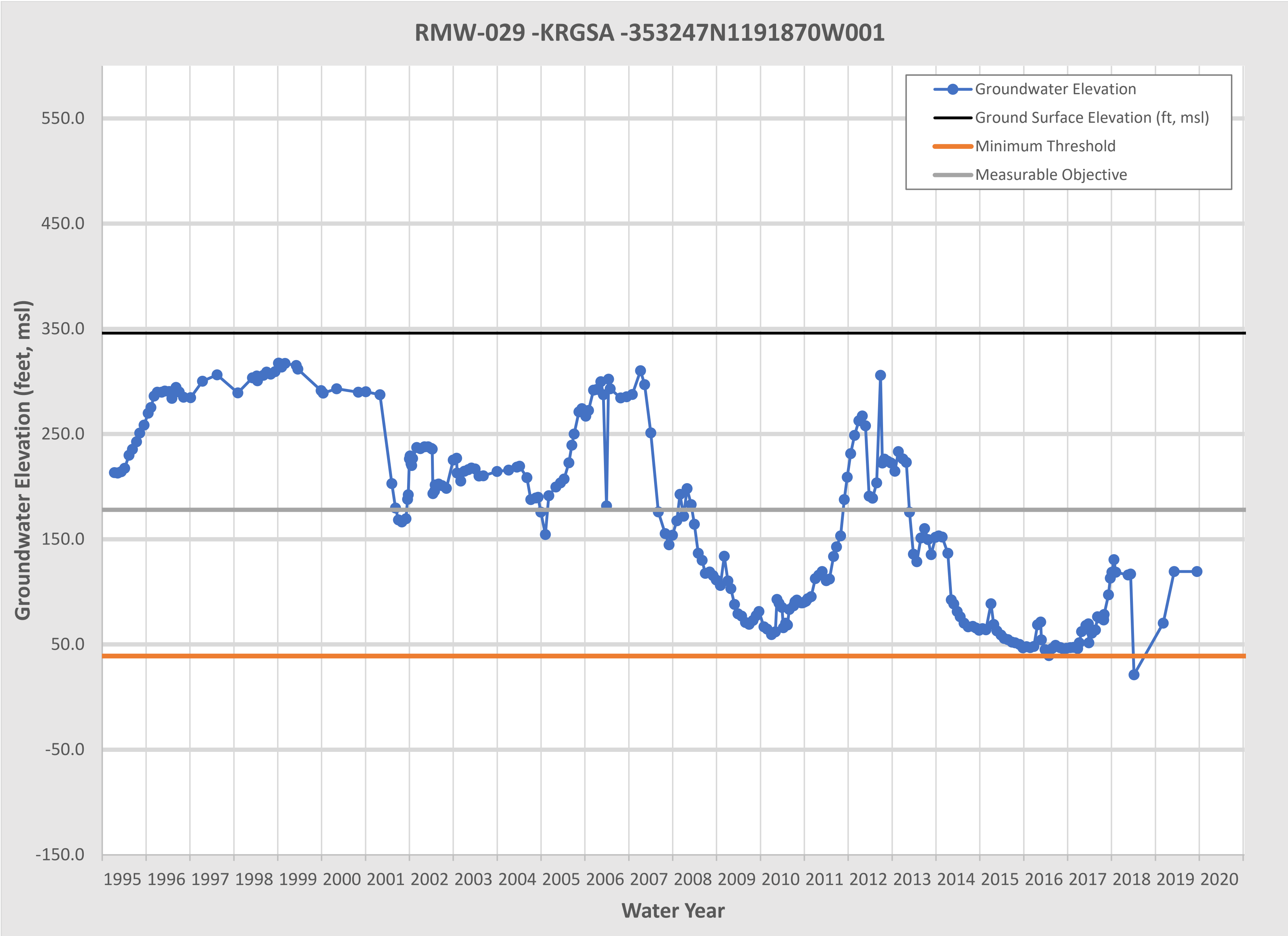

RMW-022 -KRGSA -353736N1191540W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

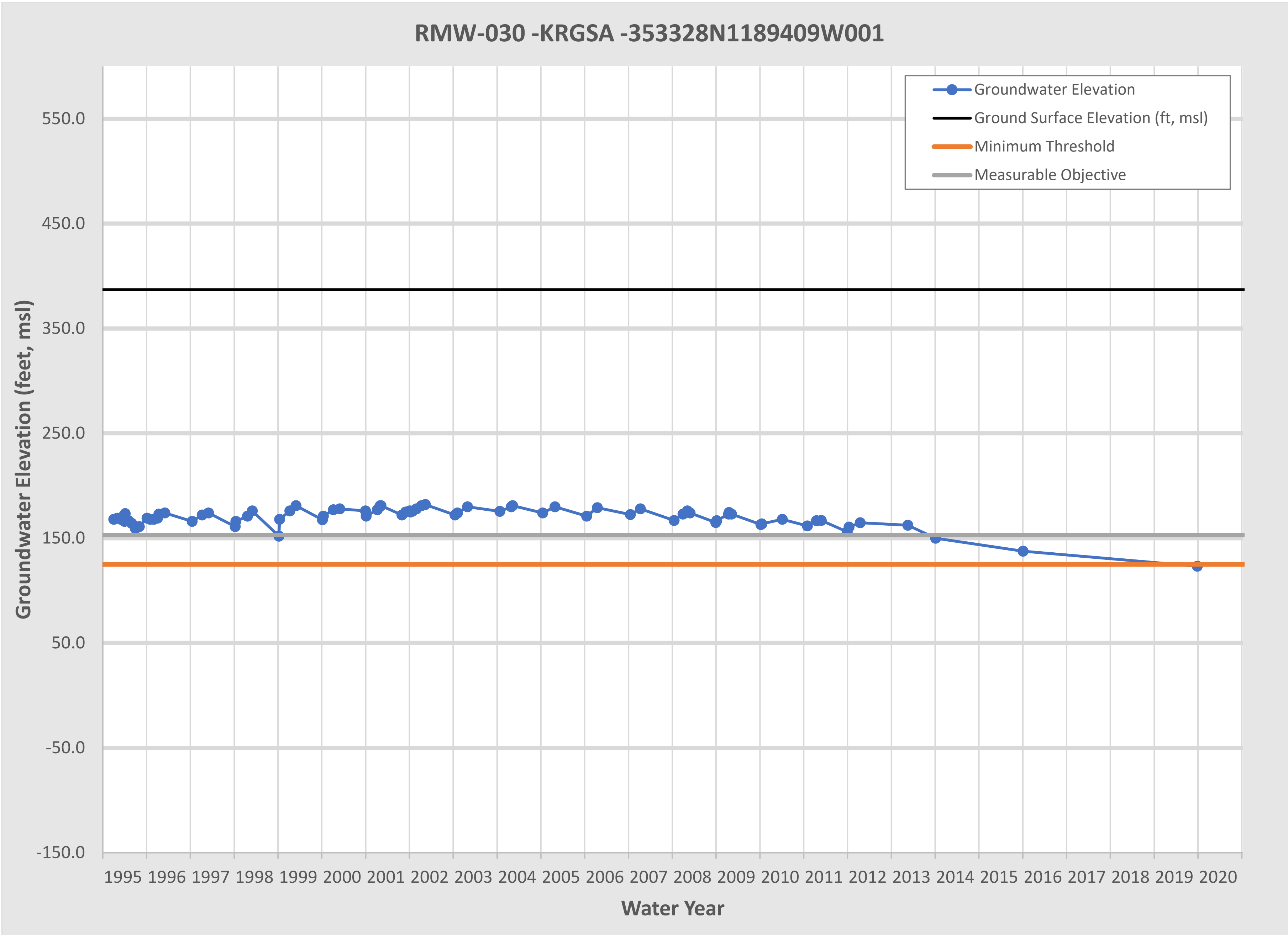

RMW-025 -KRGSA -353539N1191118W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

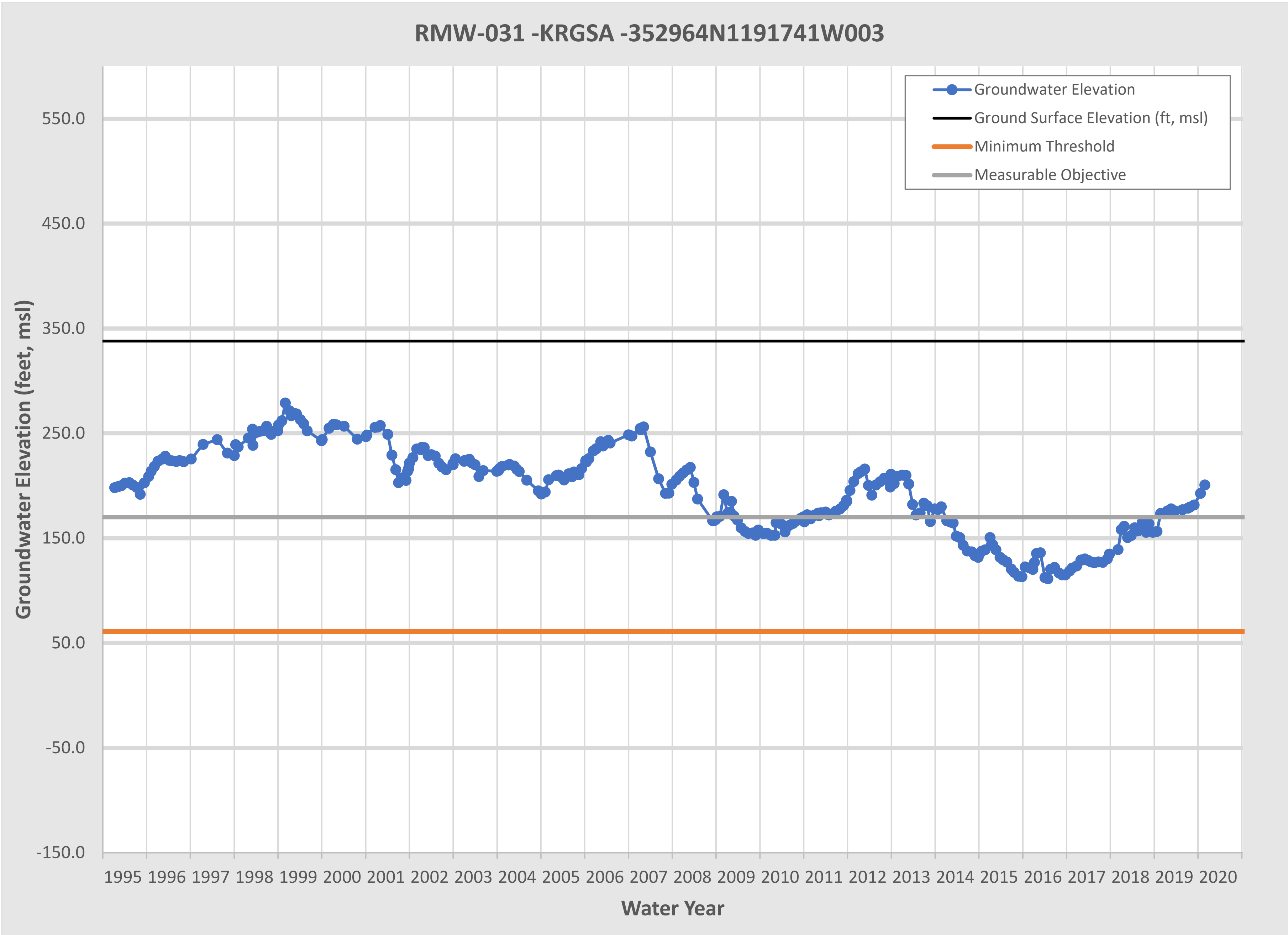

RMW-026 -KRGSA -353512N1189673W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



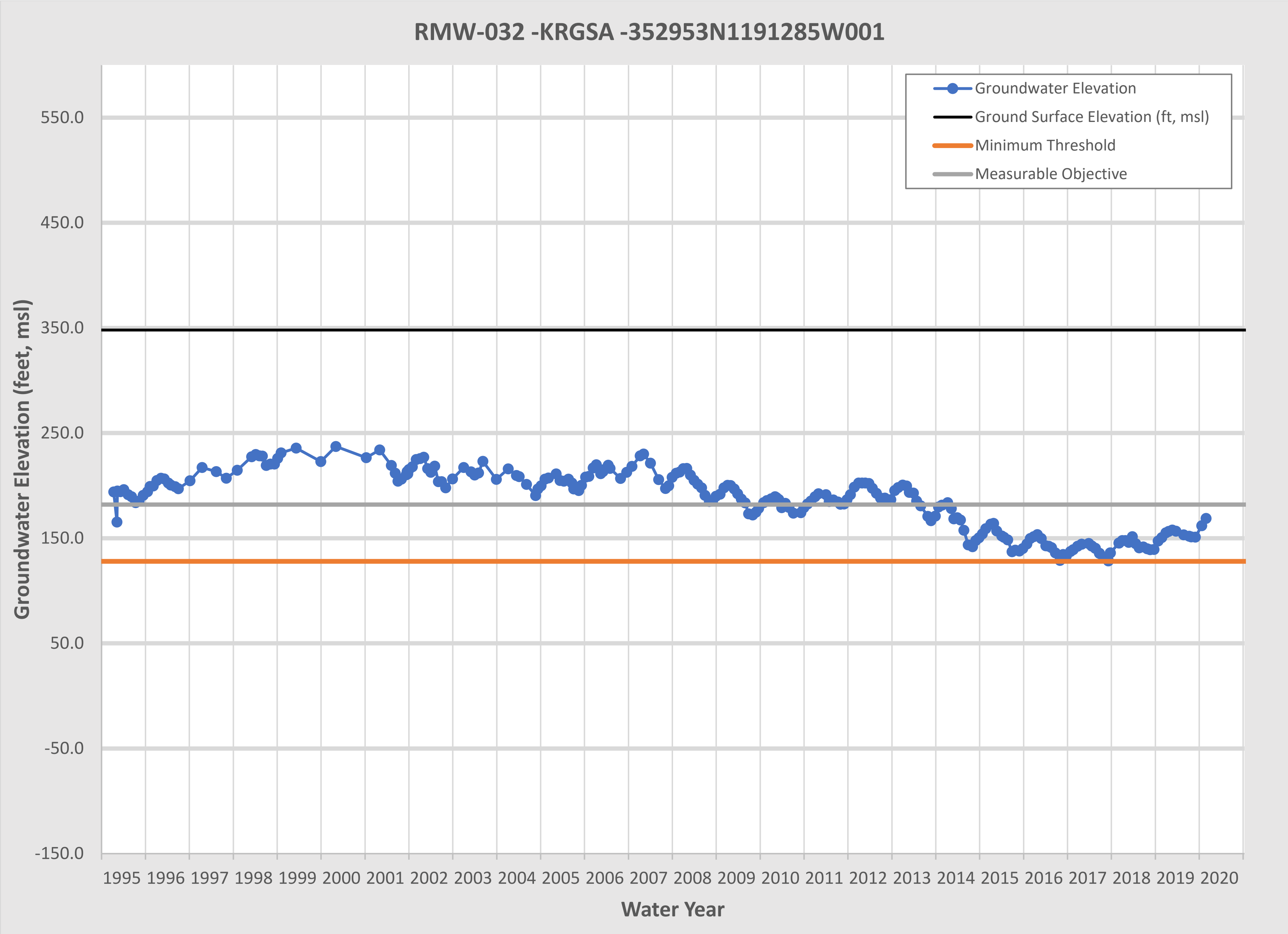
RMW-028 -KRGSA -353508N1191723W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-029 -KRGSA -353247N1191870W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

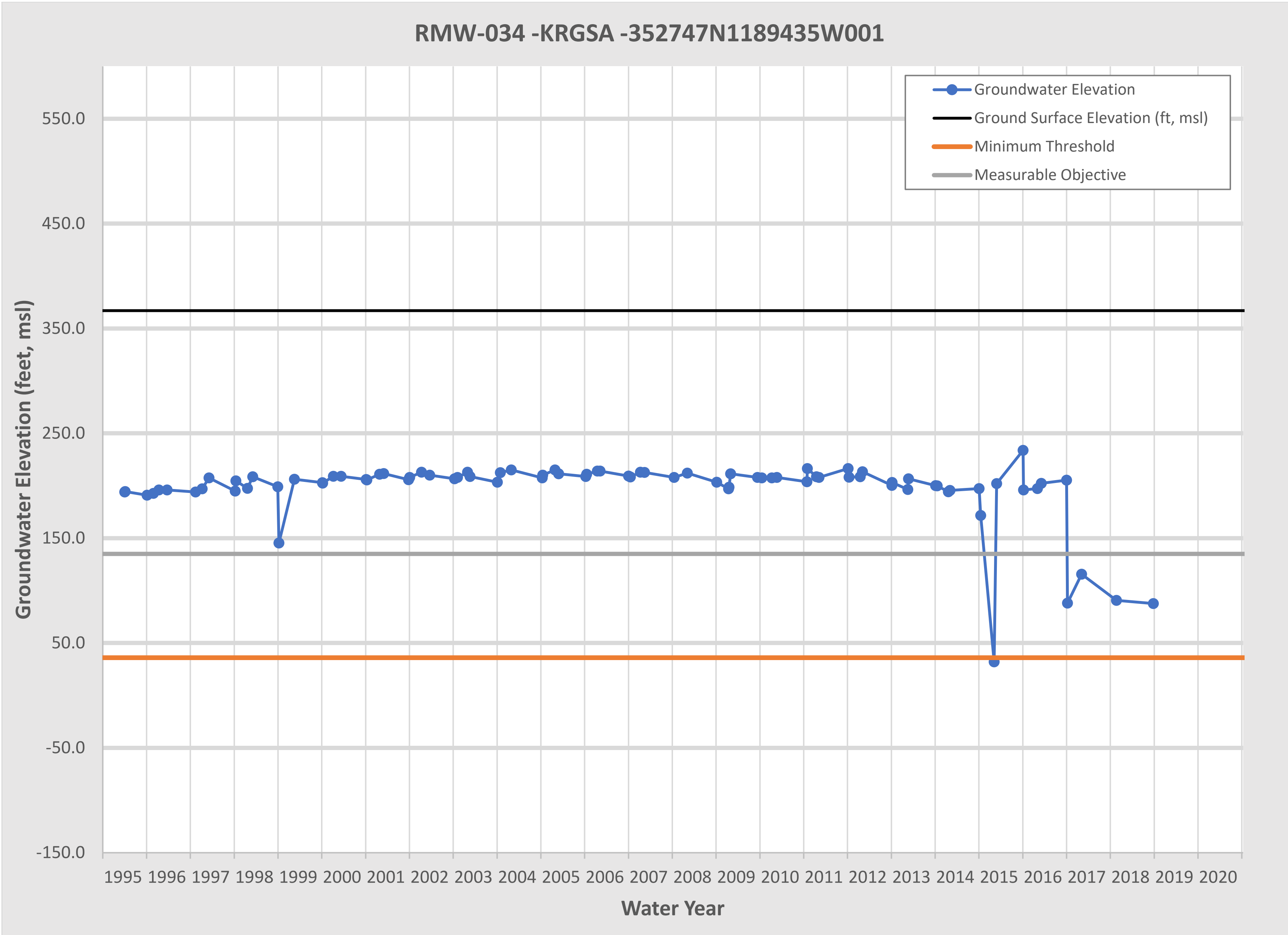

RMW-030 -KRGSA -353328N1189409W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



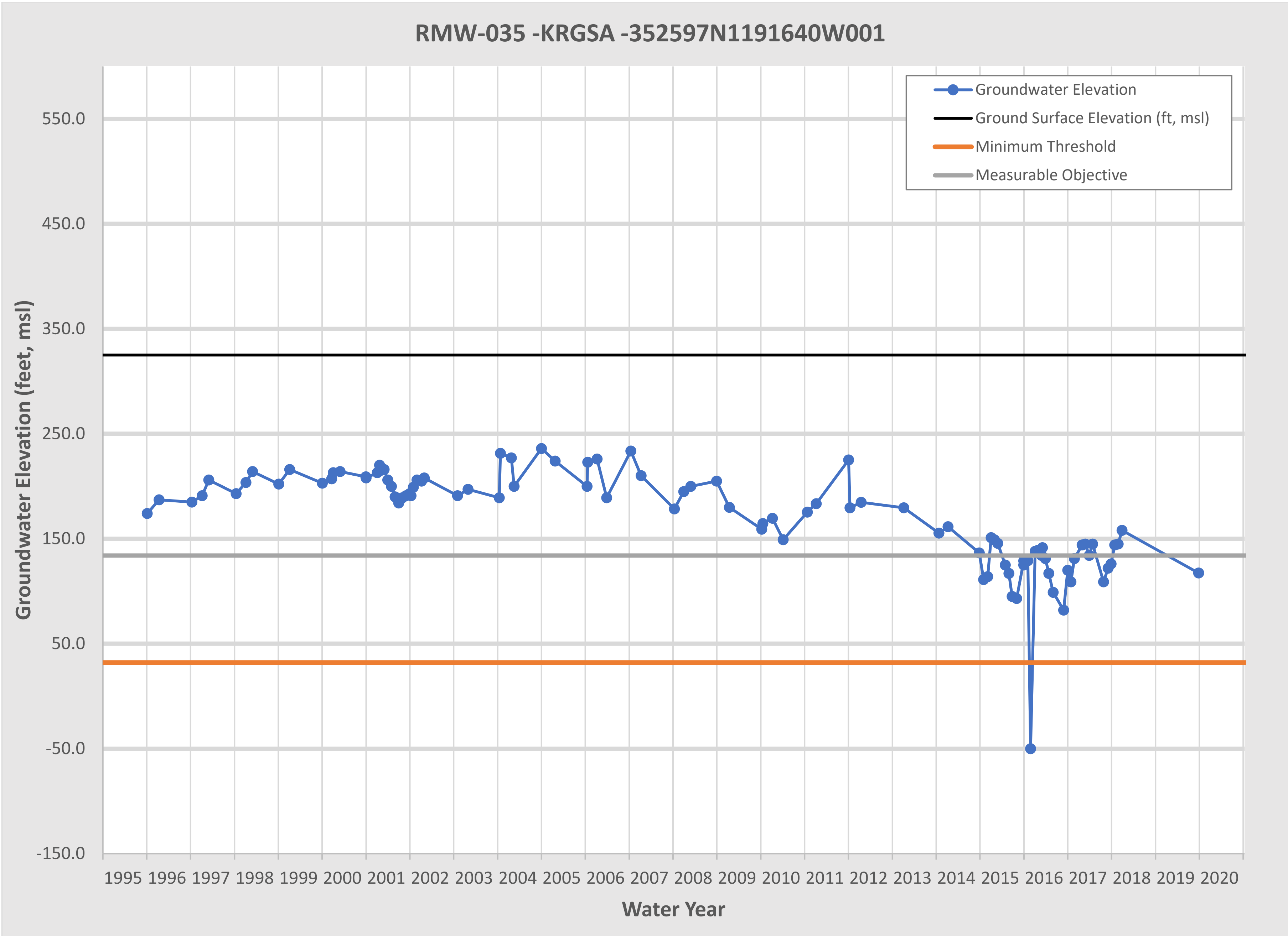
RMW-031 -KRGSA -352964N1191741W003
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



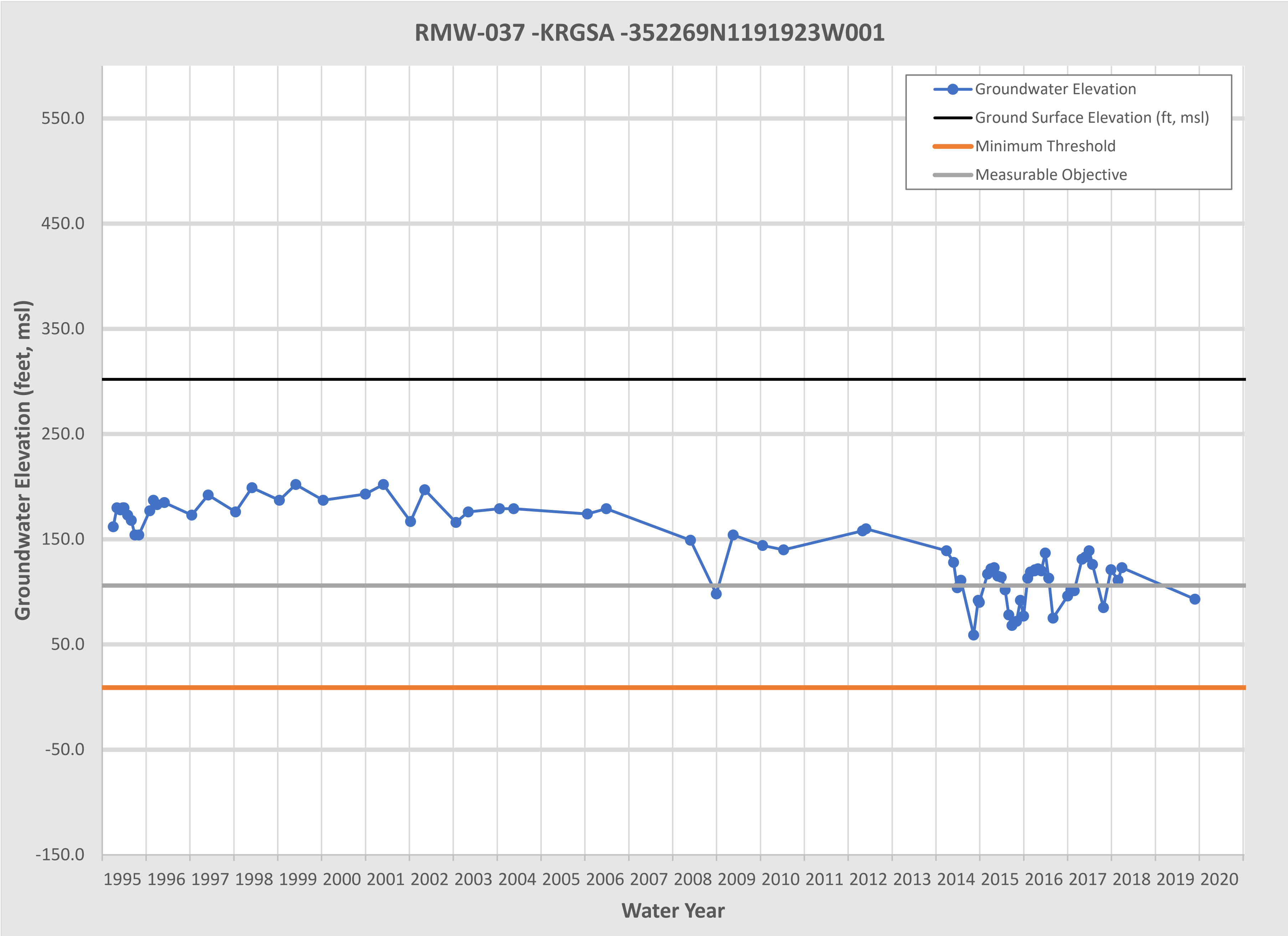
RMW-032 -KRGSA -352953N1191285W001
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective



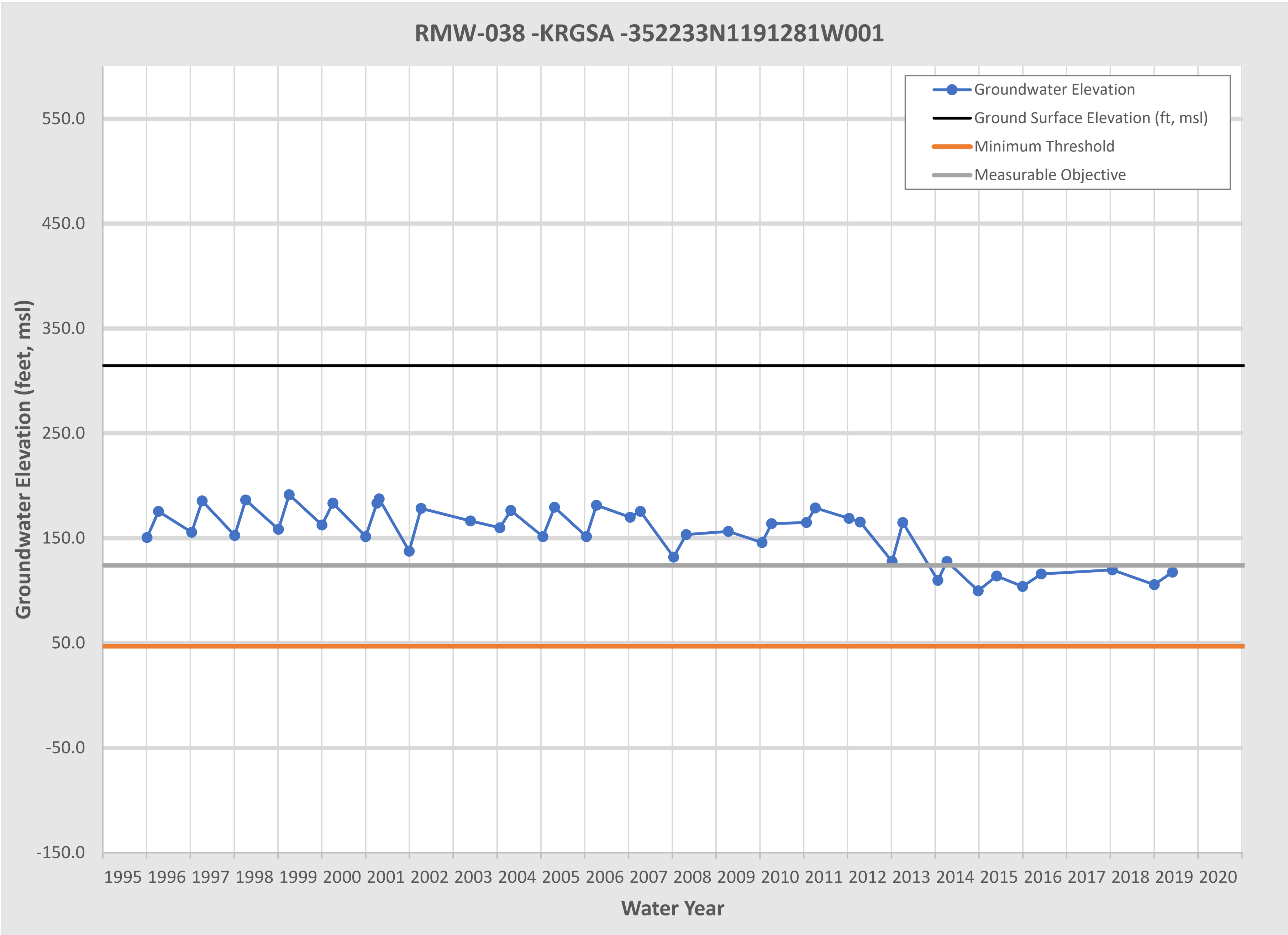
RMW-034 -KRGSA -352747N1189435W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

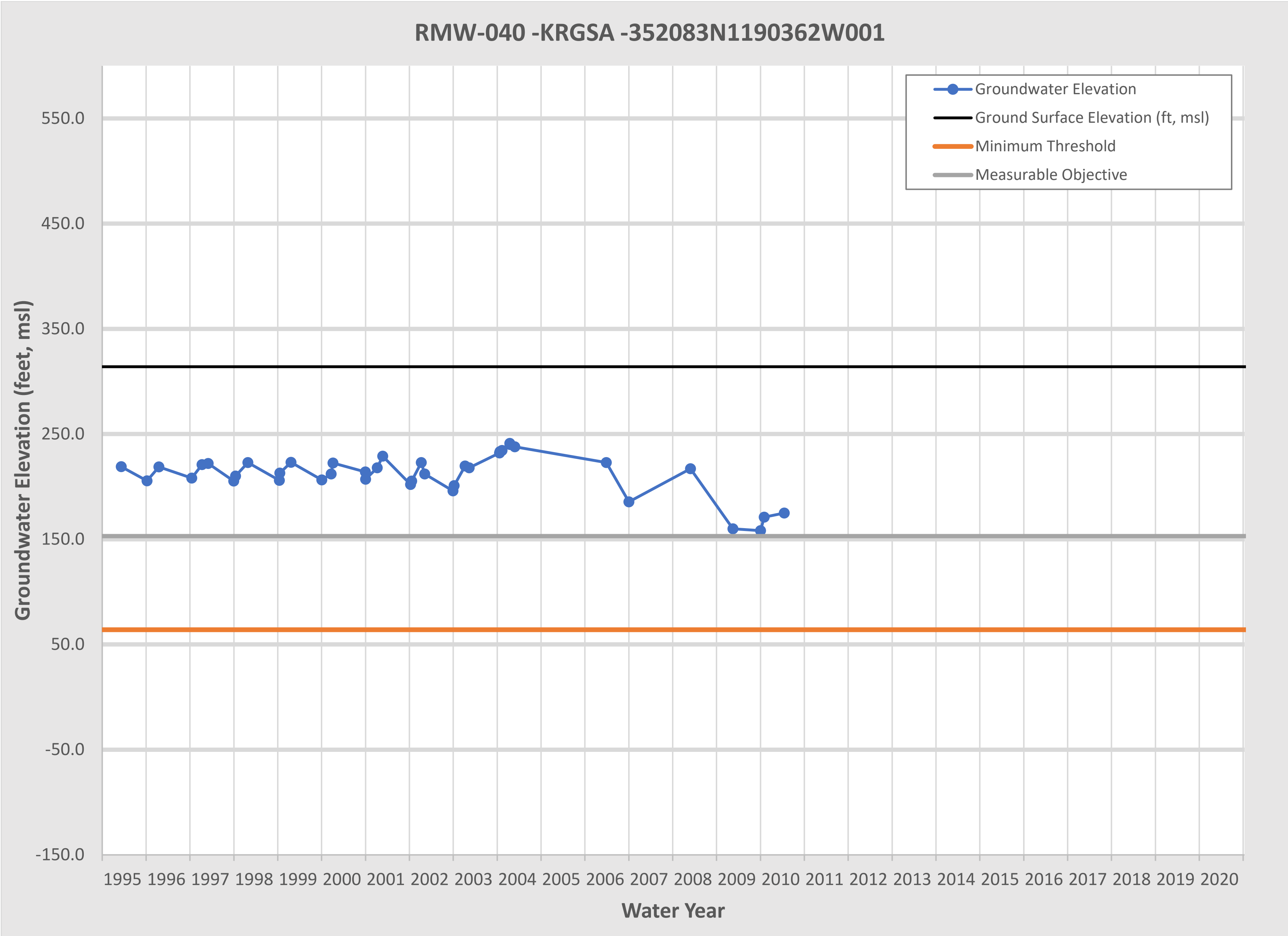


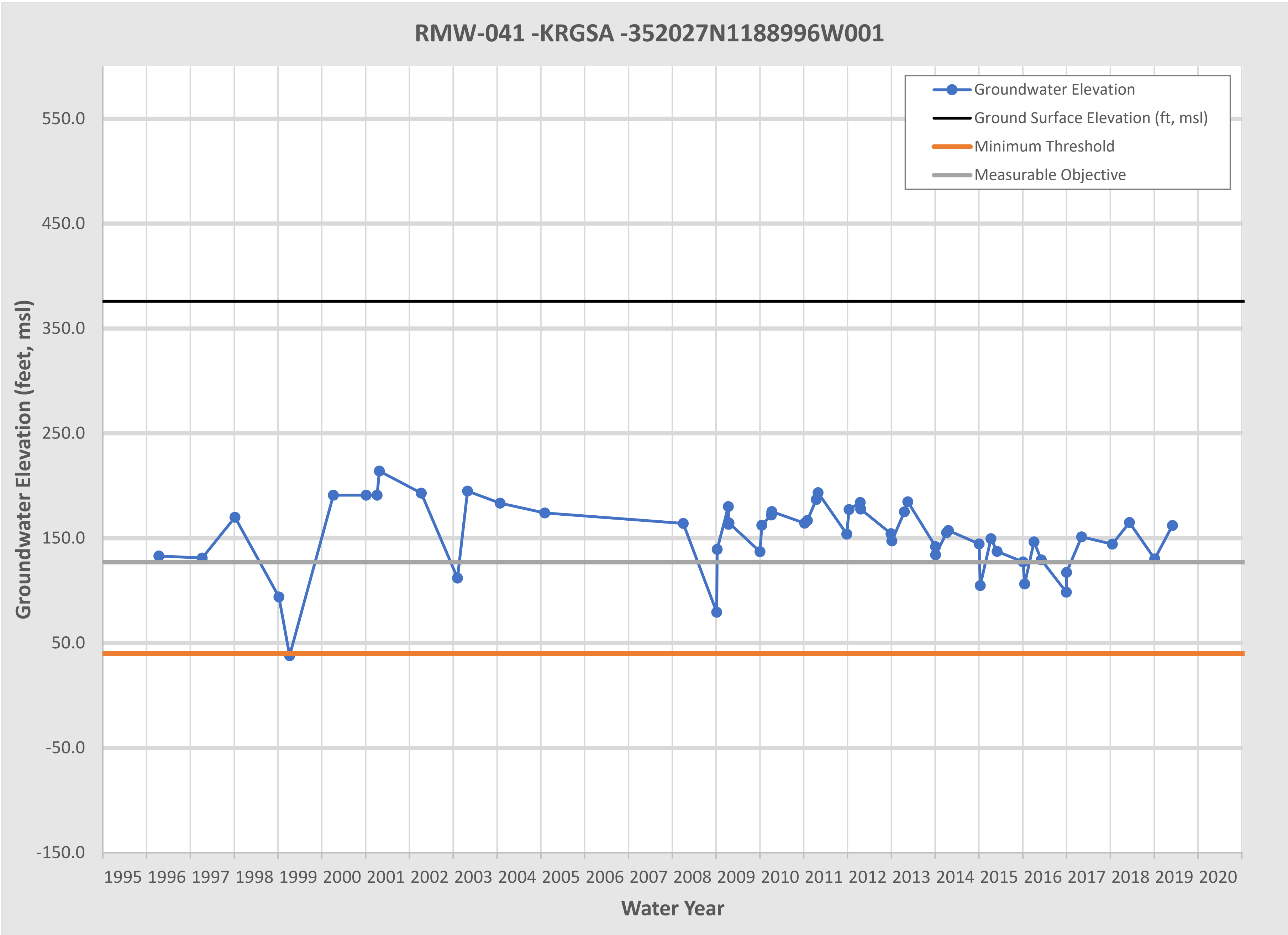
RMW-035 -KRGSA -352597N1191640W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

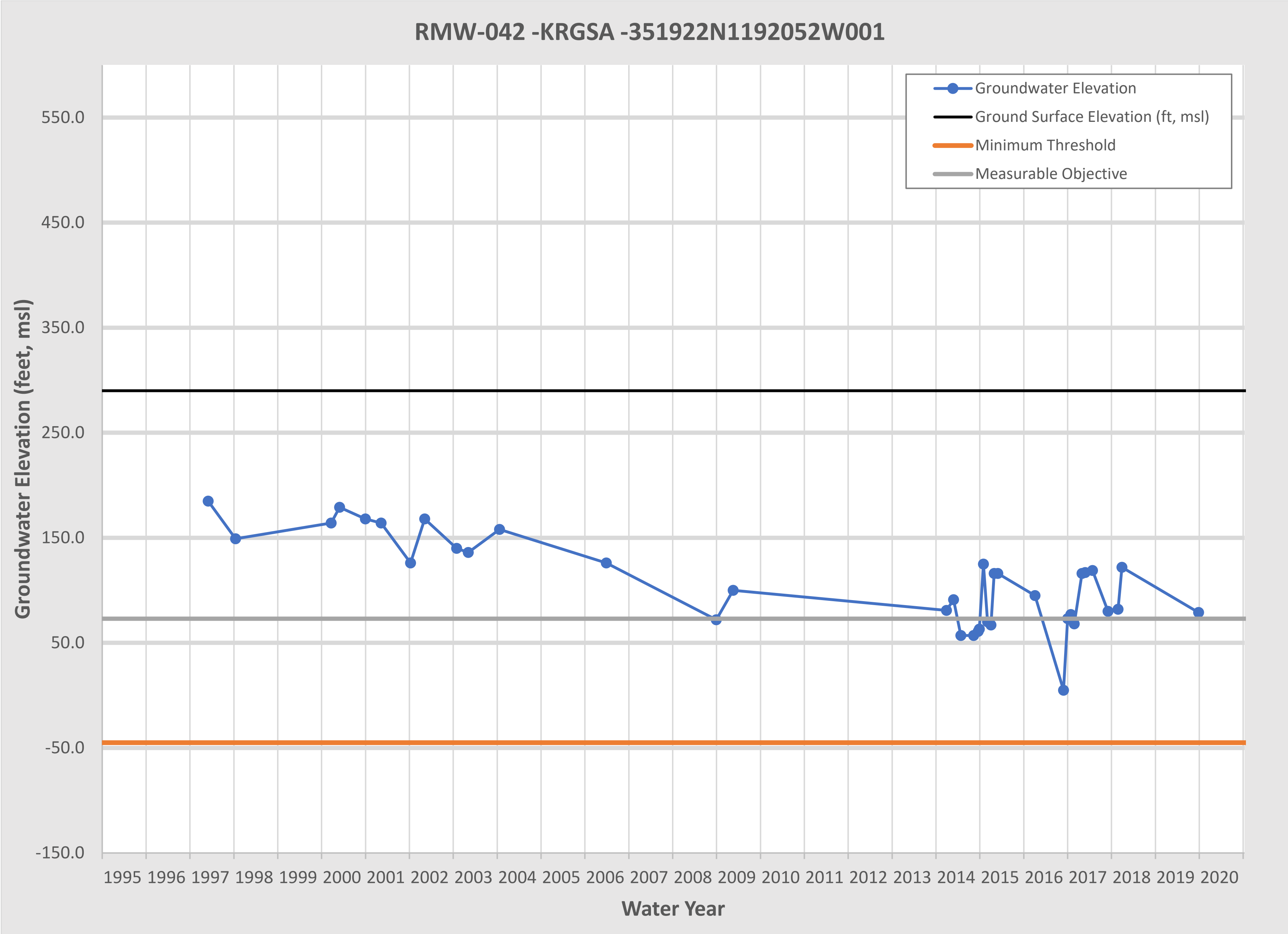


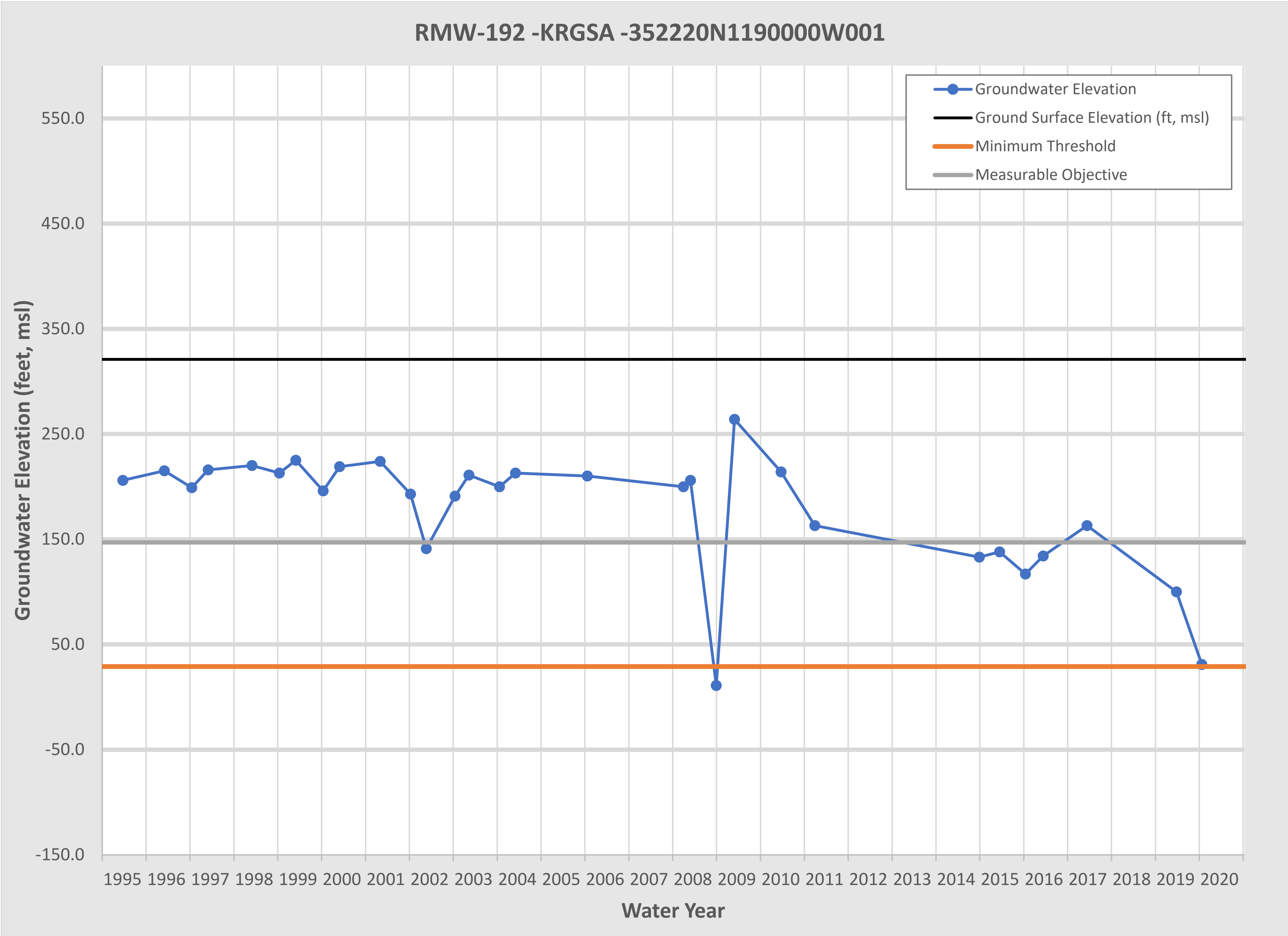
RMW-037 -KRGSA -352269N1191923W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

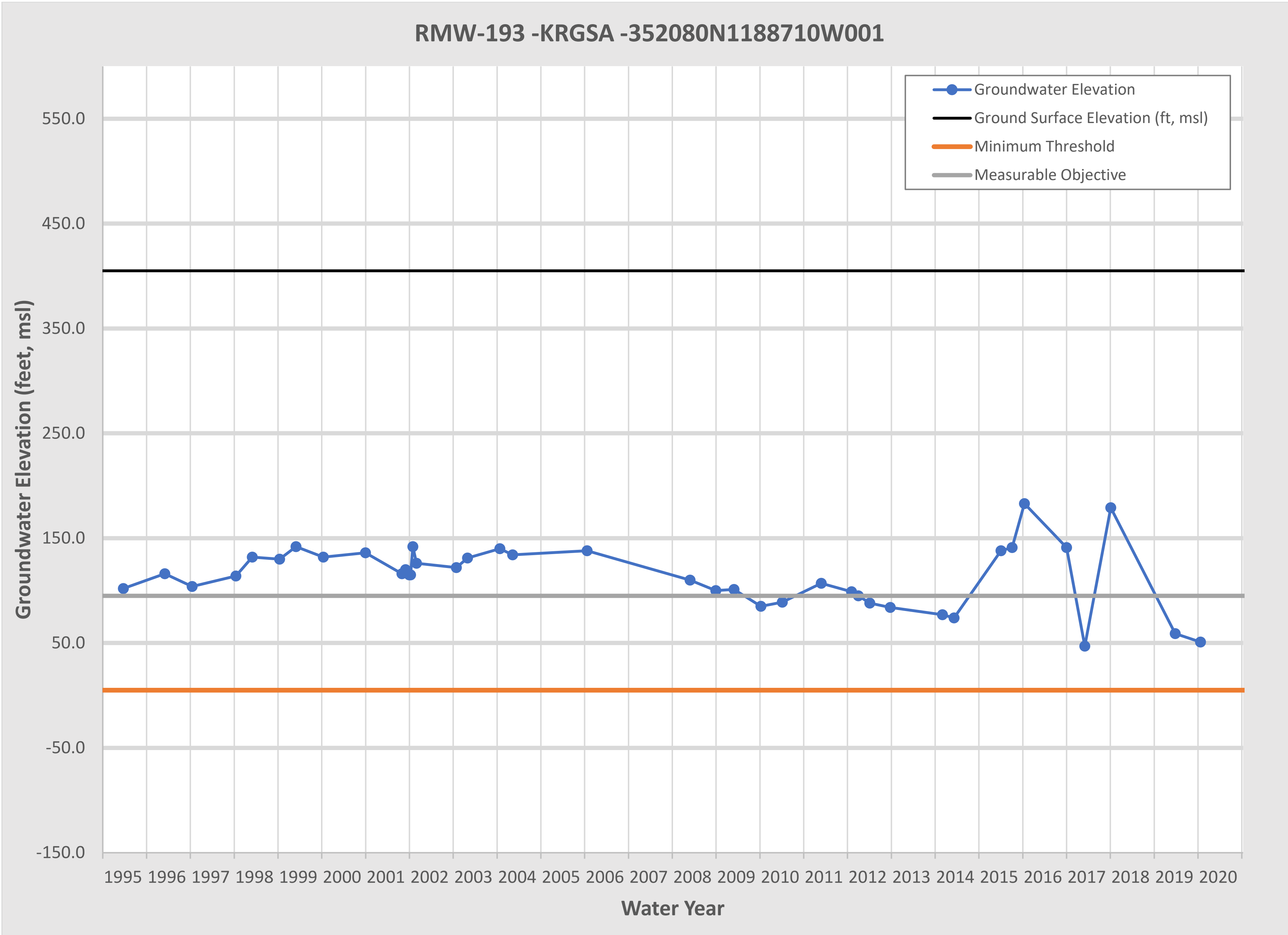

RMW-038 -KRGSA -352233N1191281W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

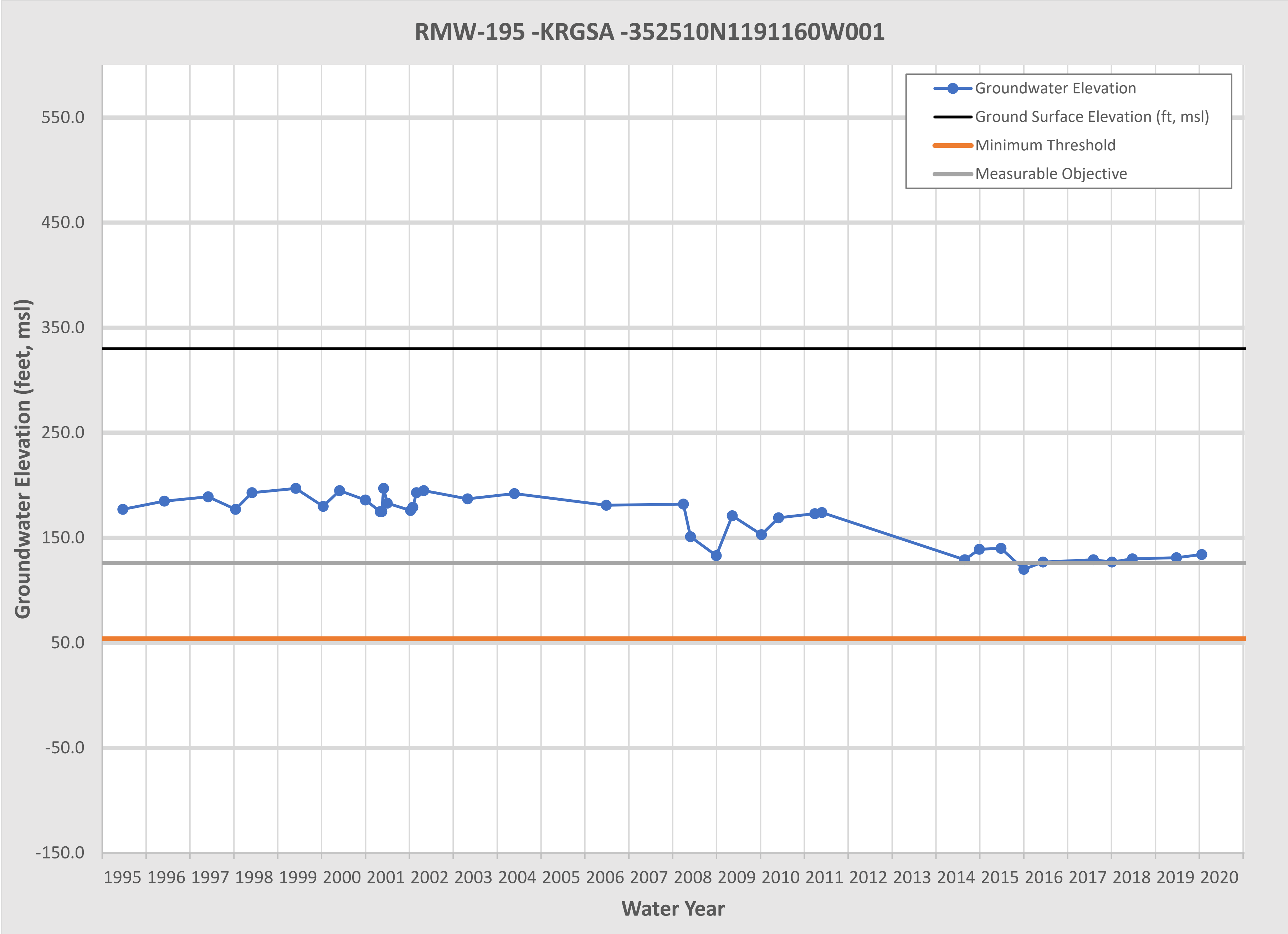

RMW-040 -KRGSA -352083N1190362W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

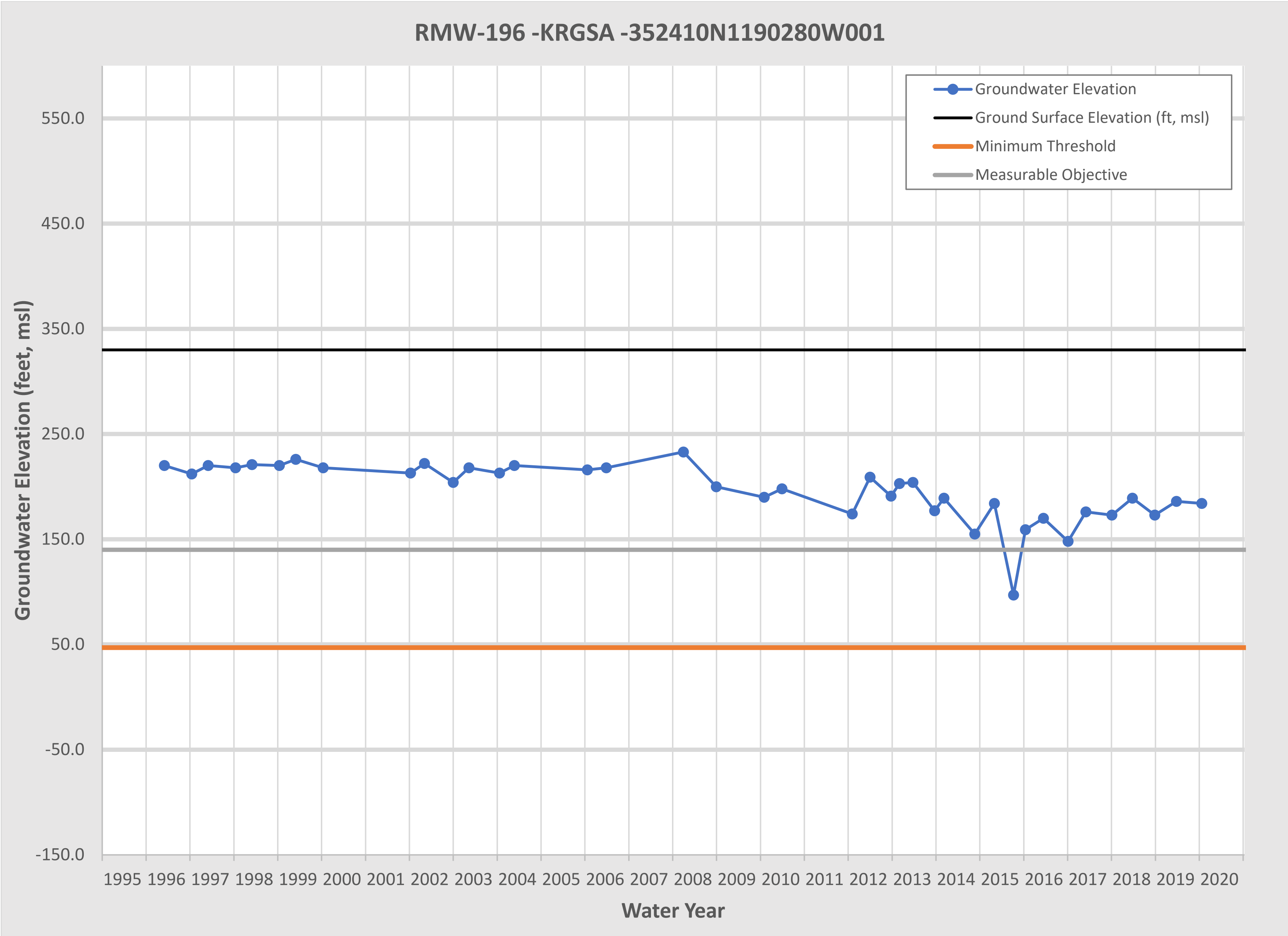

RMW-041 -KRGSA -352027N1188996W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-042 -KRGSA -351922N1192052W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

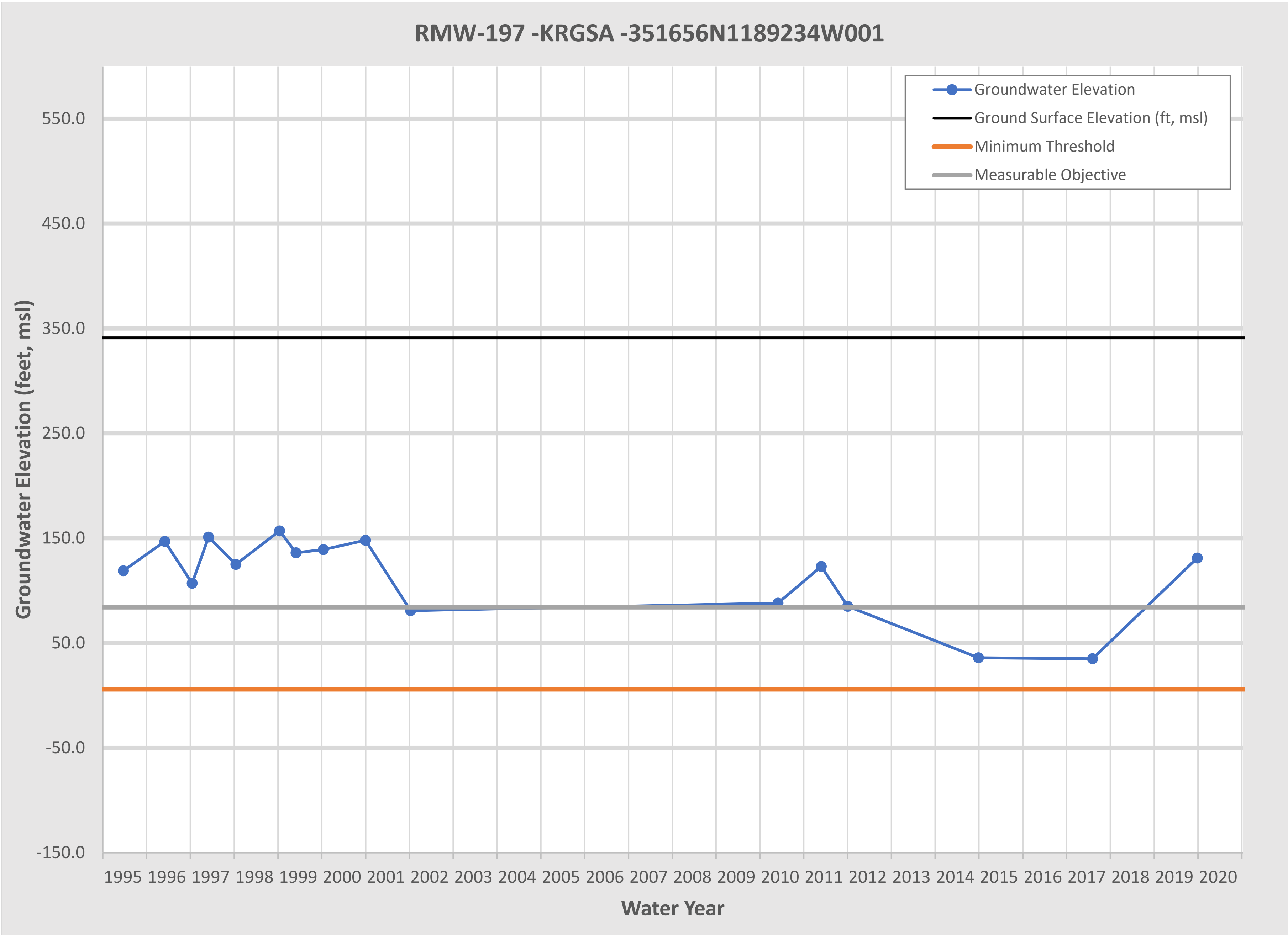

RMW-192 -KRGSA -352220N1190000W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-193 -KRGSA -352080N1188710W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

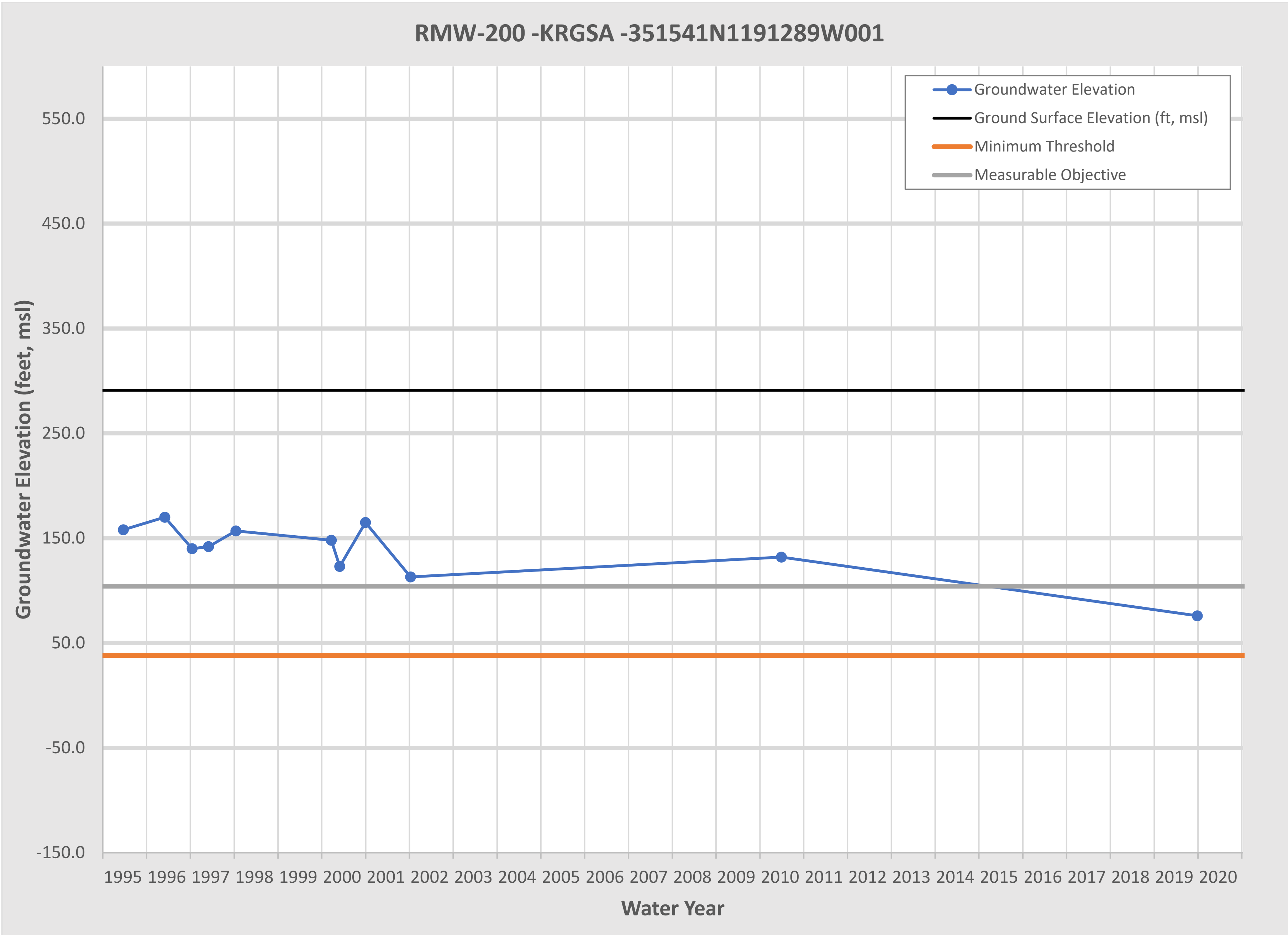

RMW-195 -KRGSA -352510N1191160W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

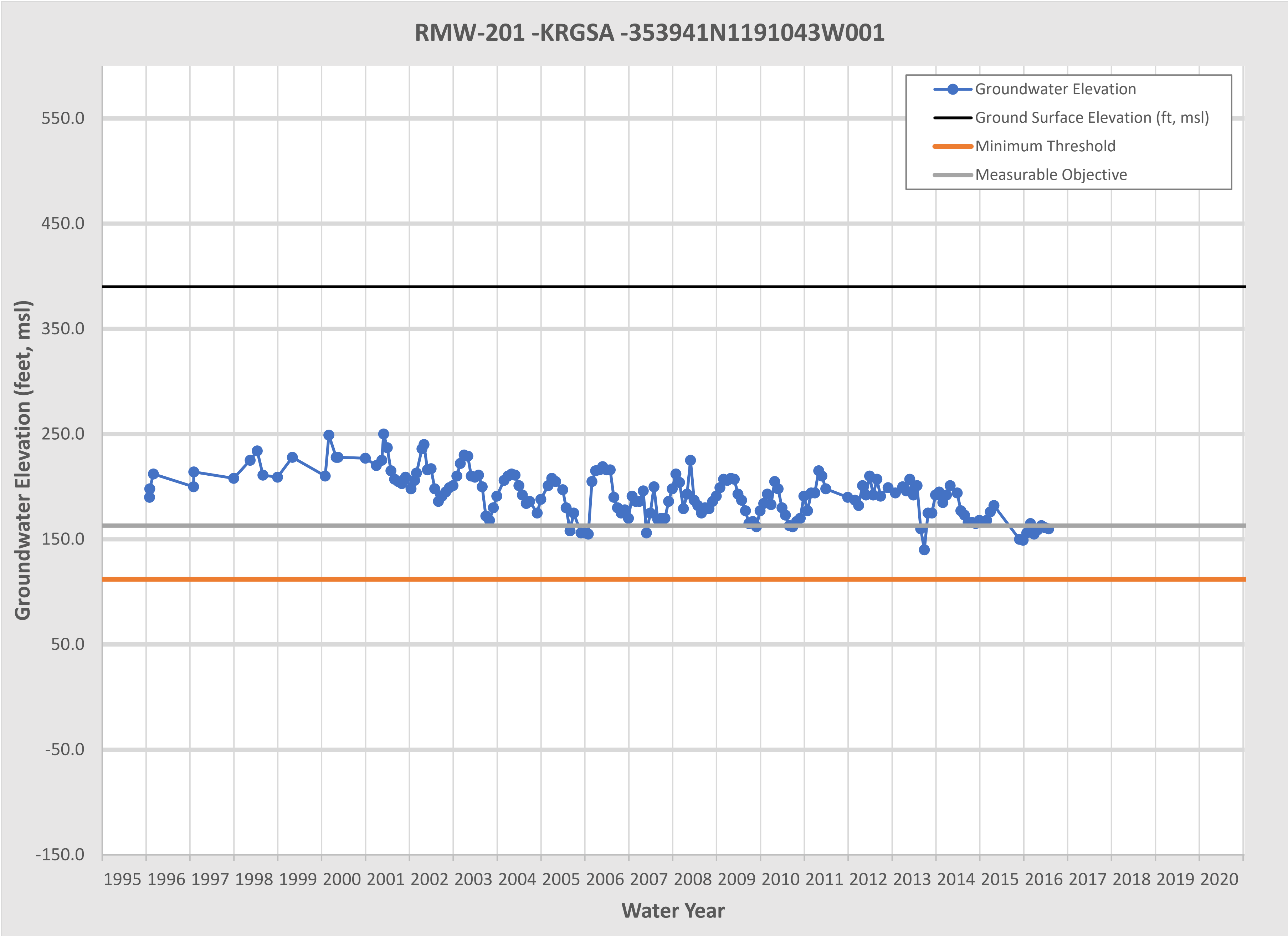


RMW-196 -KRGSA -352410N1190280W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

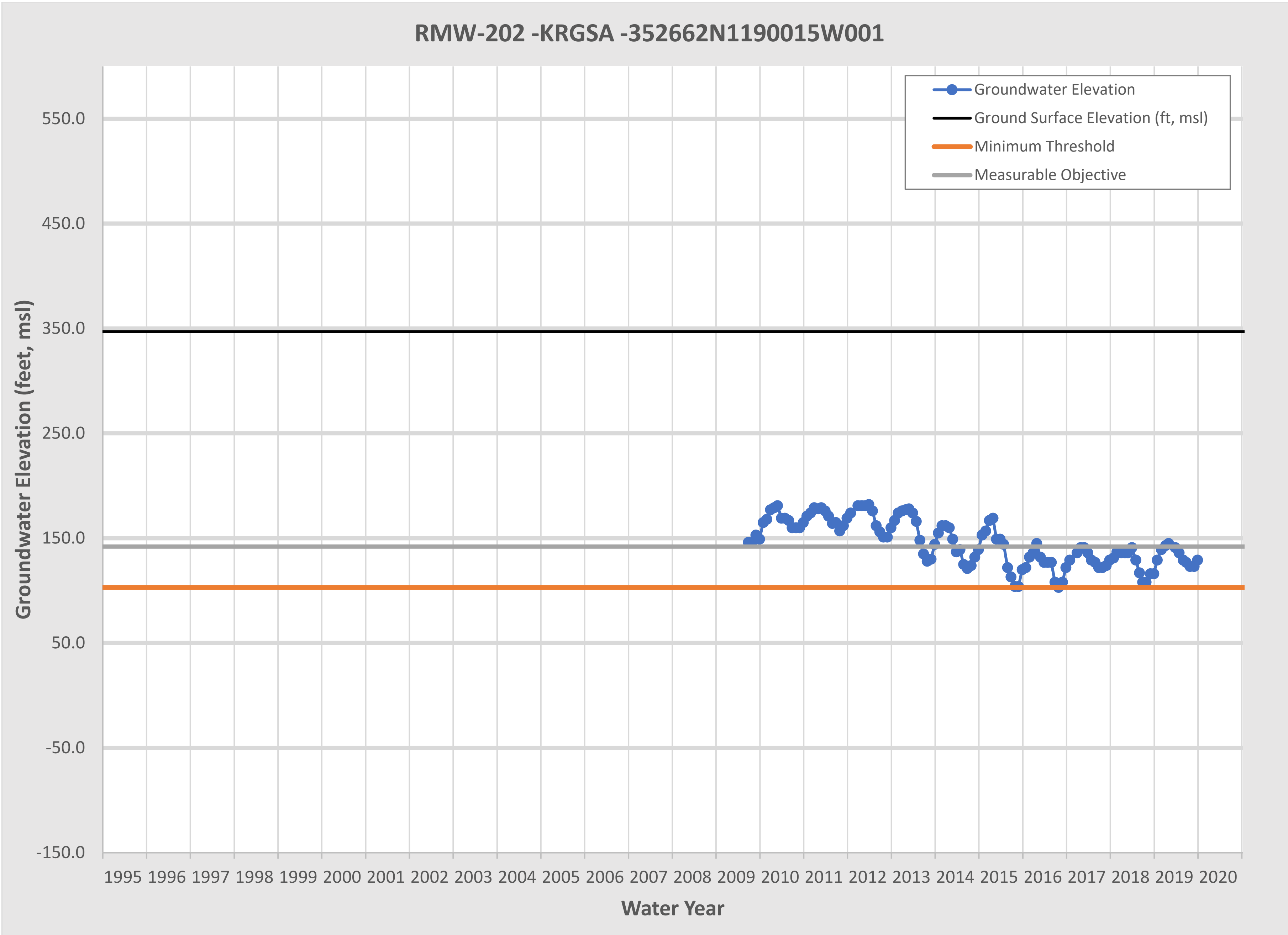


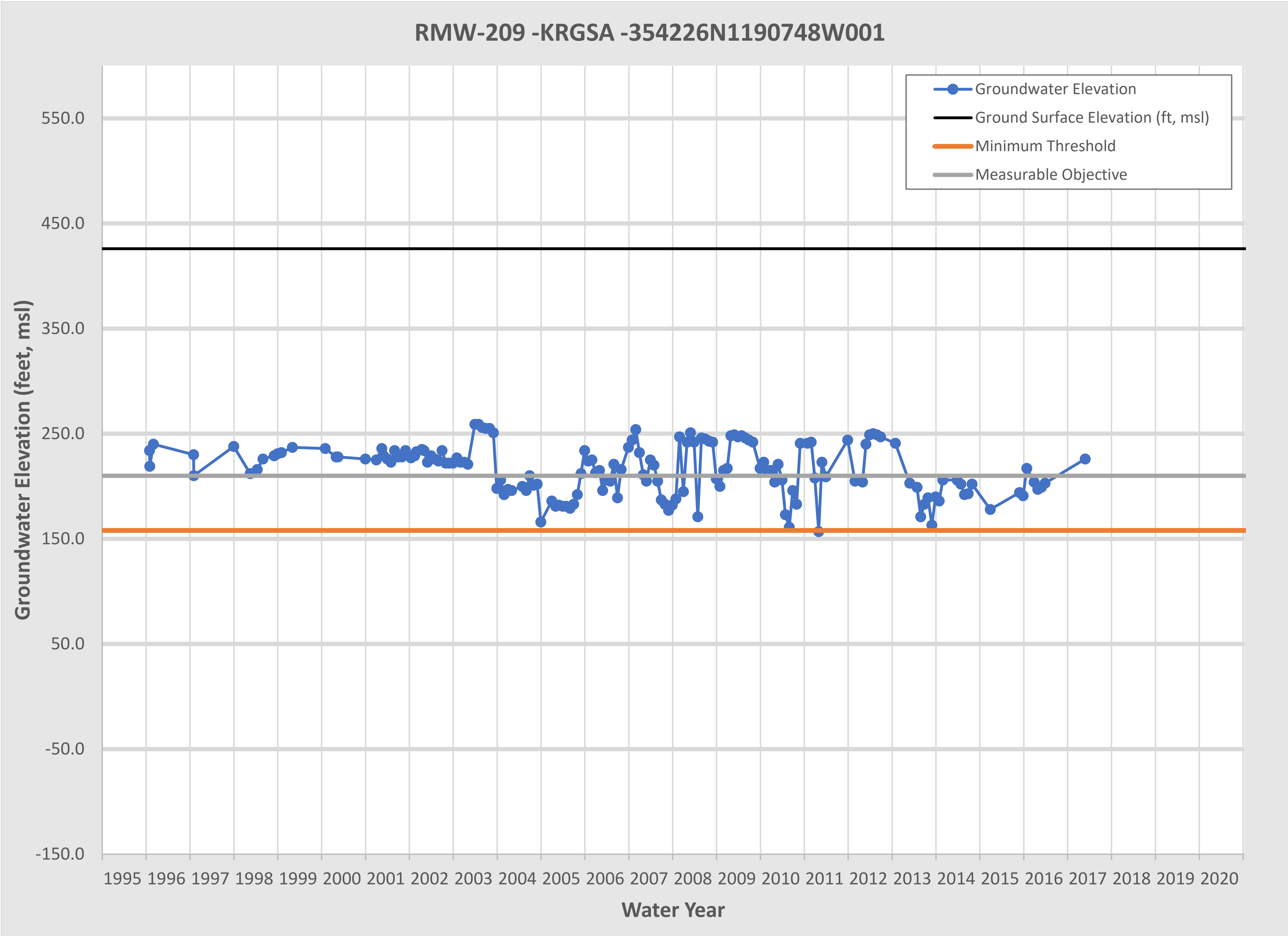
RMW-197 -KRGSA -351656N1189234W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-200 -KRGSA -351541N1191289W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

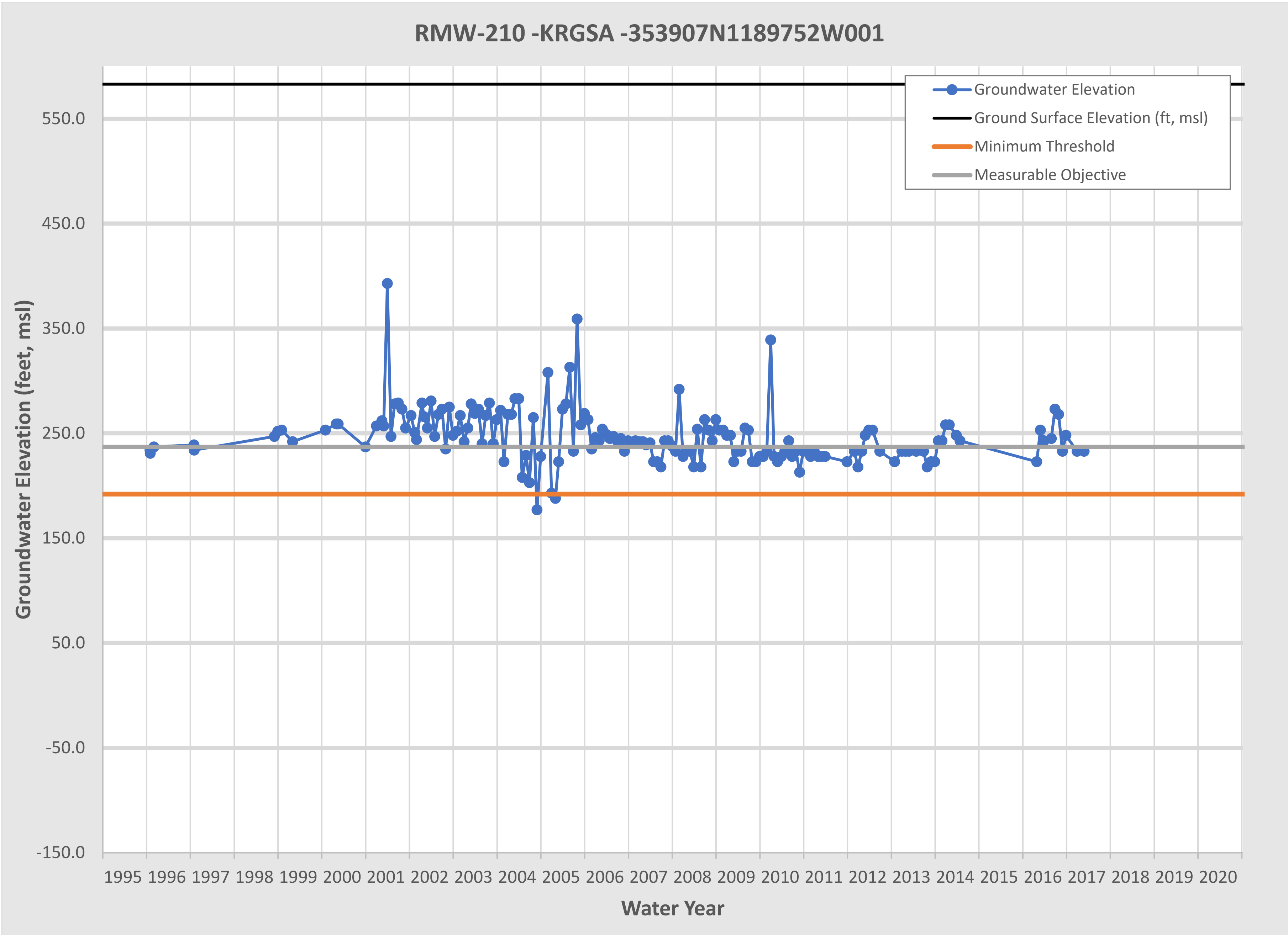


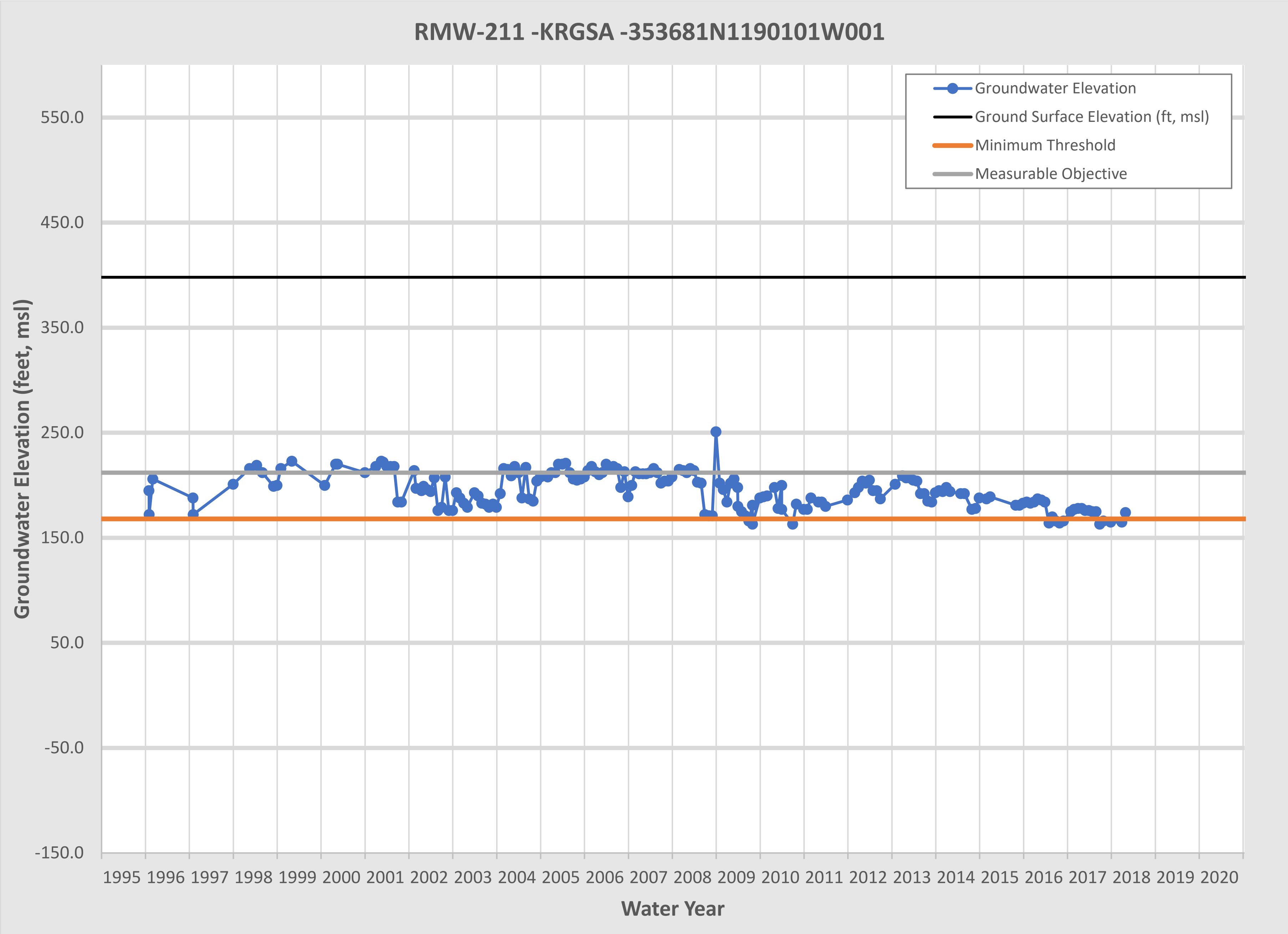
RMW-201 -KRGSA -353941N1191043W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

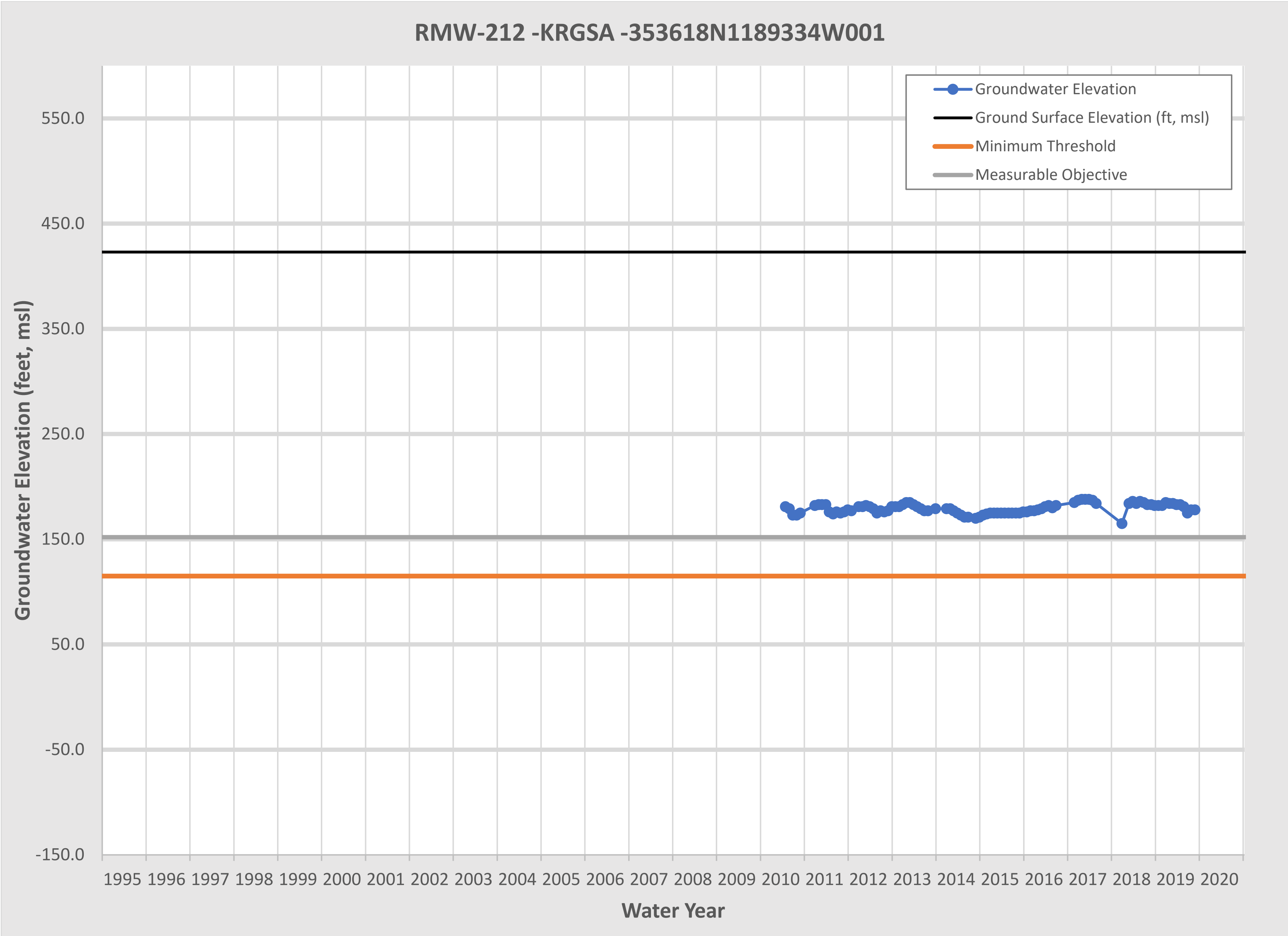

RMW-202 -KRGSA -352662N1190015W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



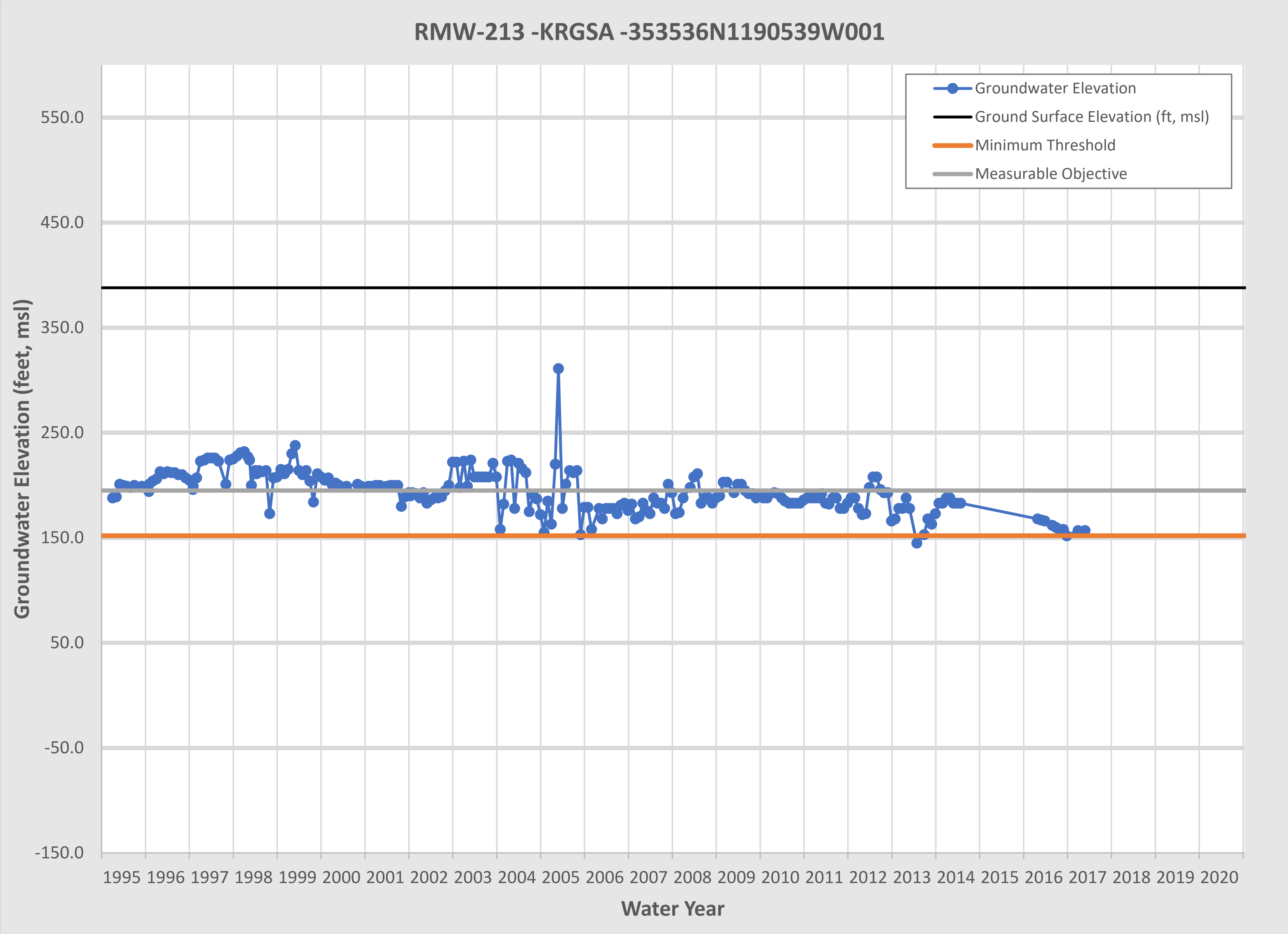
RMW-209 -KRGSA -354226N1190748W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

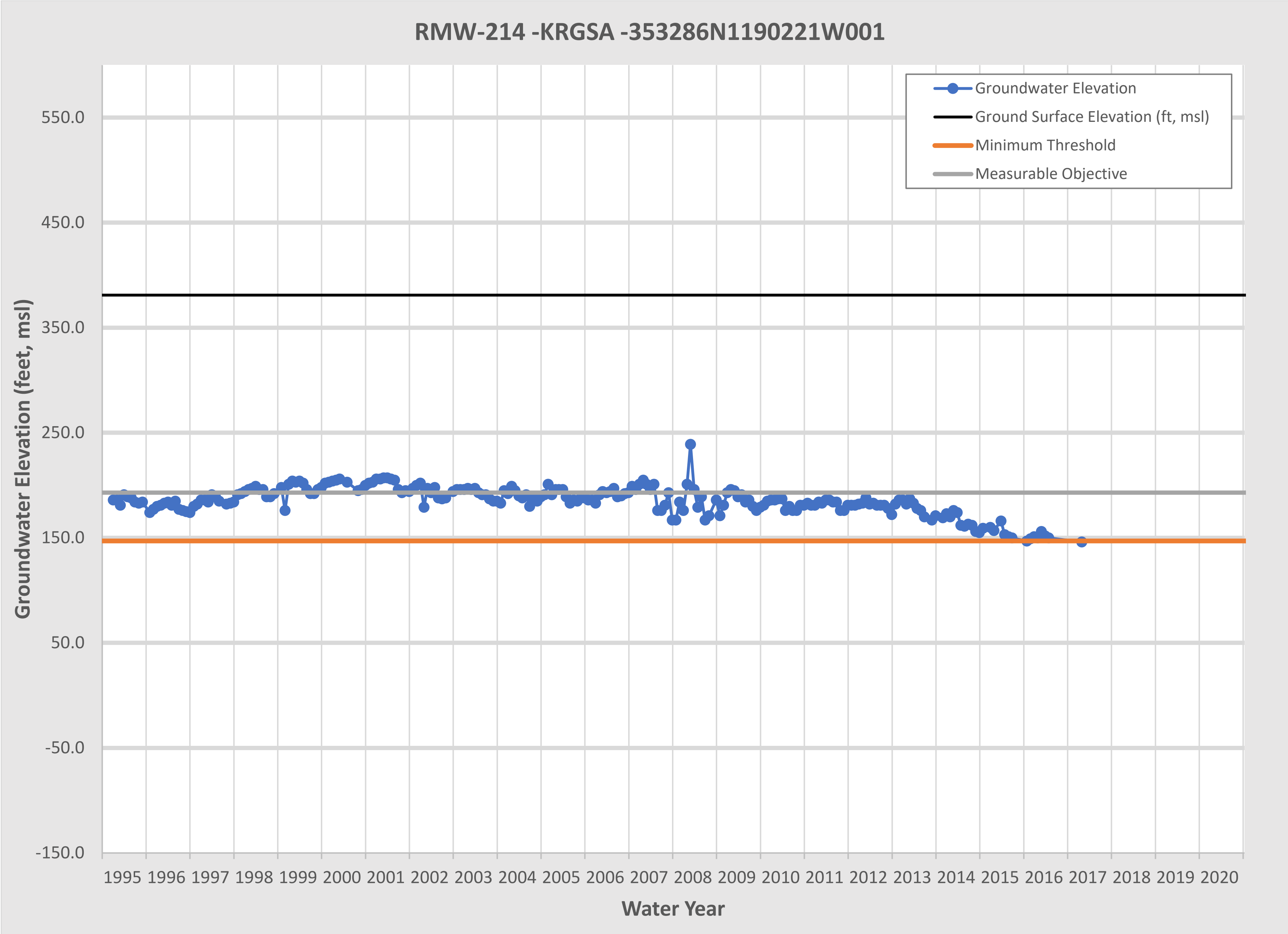

RMW-210 -KRGSA -353907N1189752W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

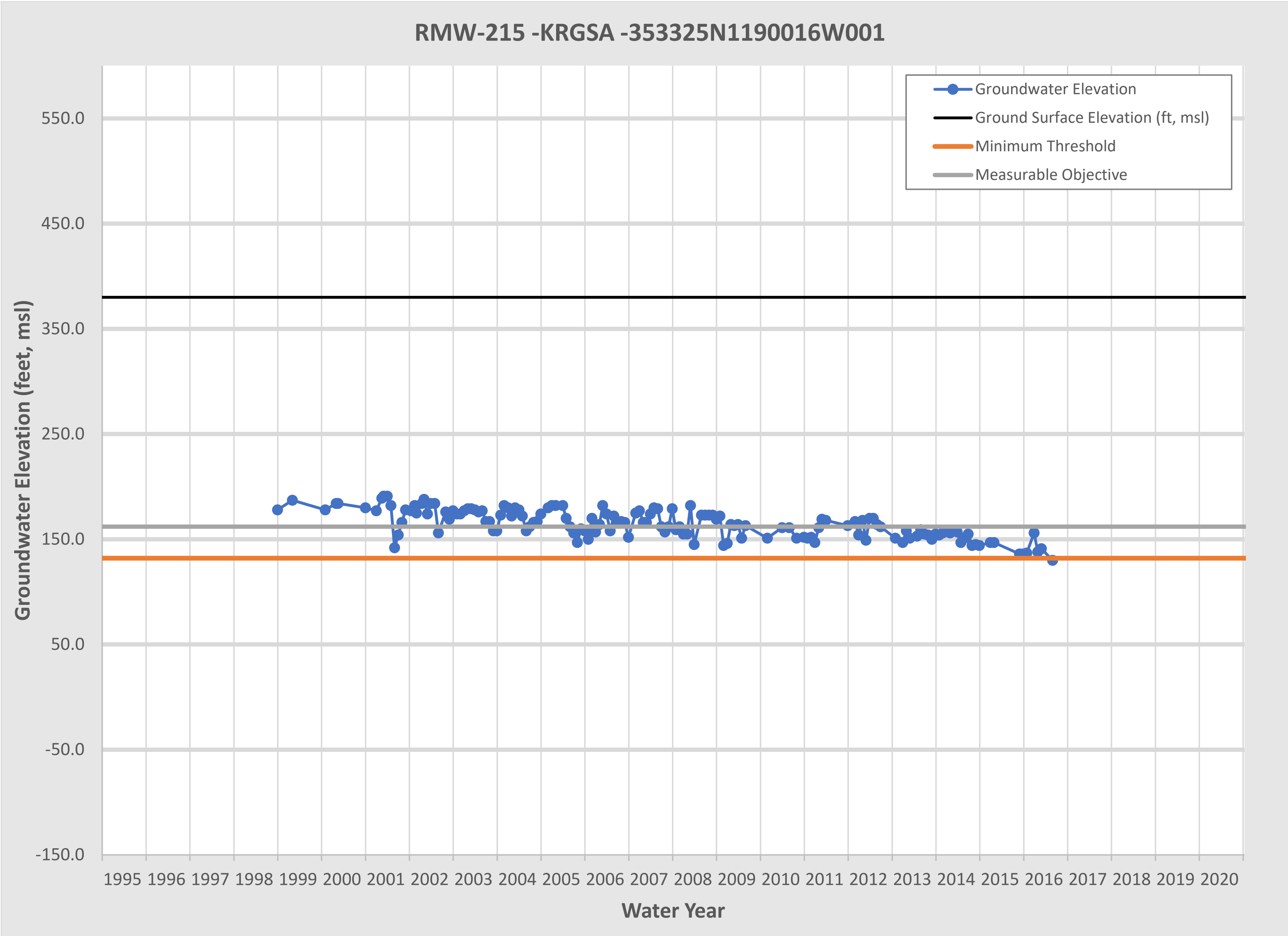

RMW-211 -KRGSA -353681N1190101W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

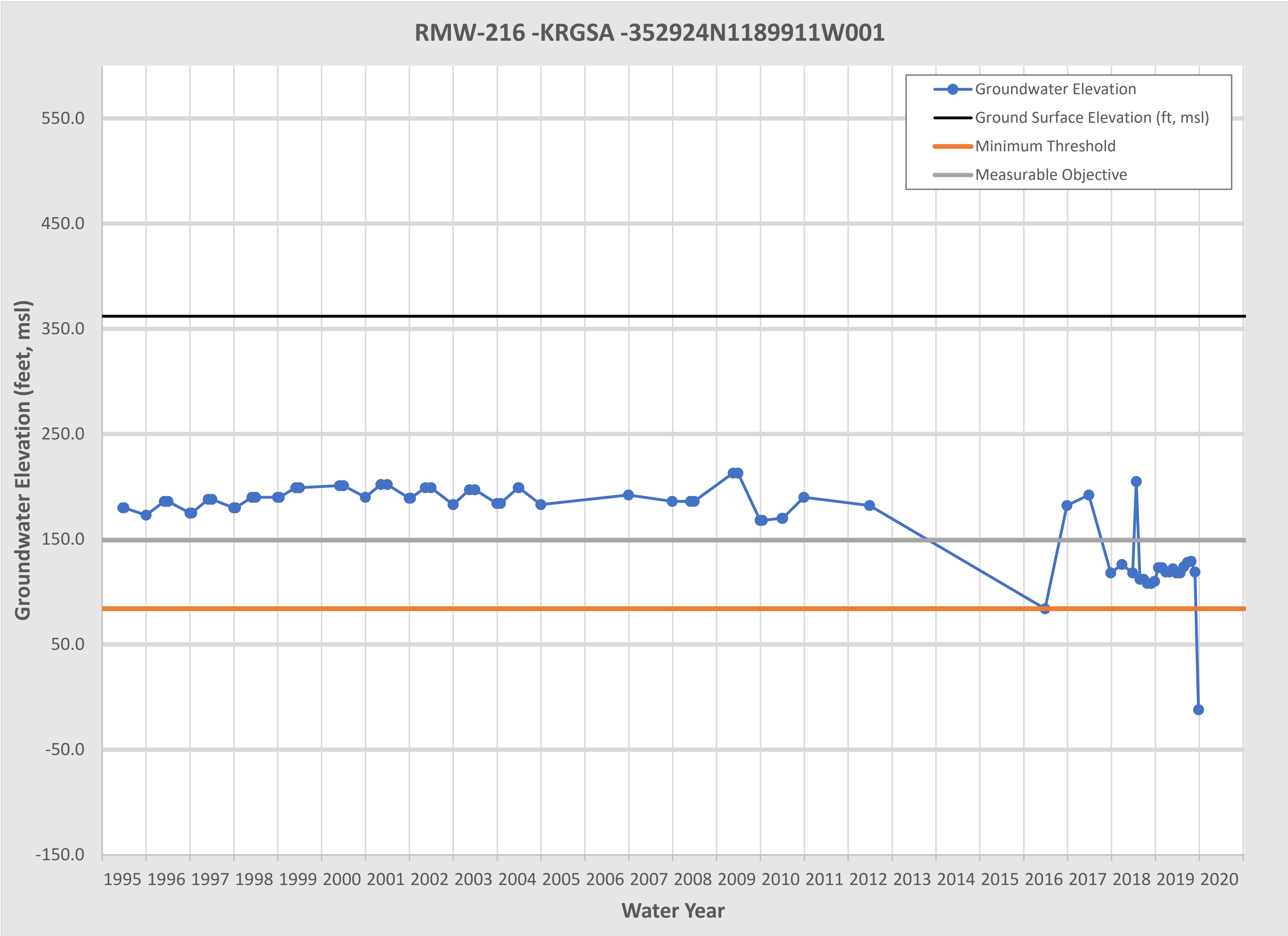


RMW-212 -KRGSA -353618N1189334W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

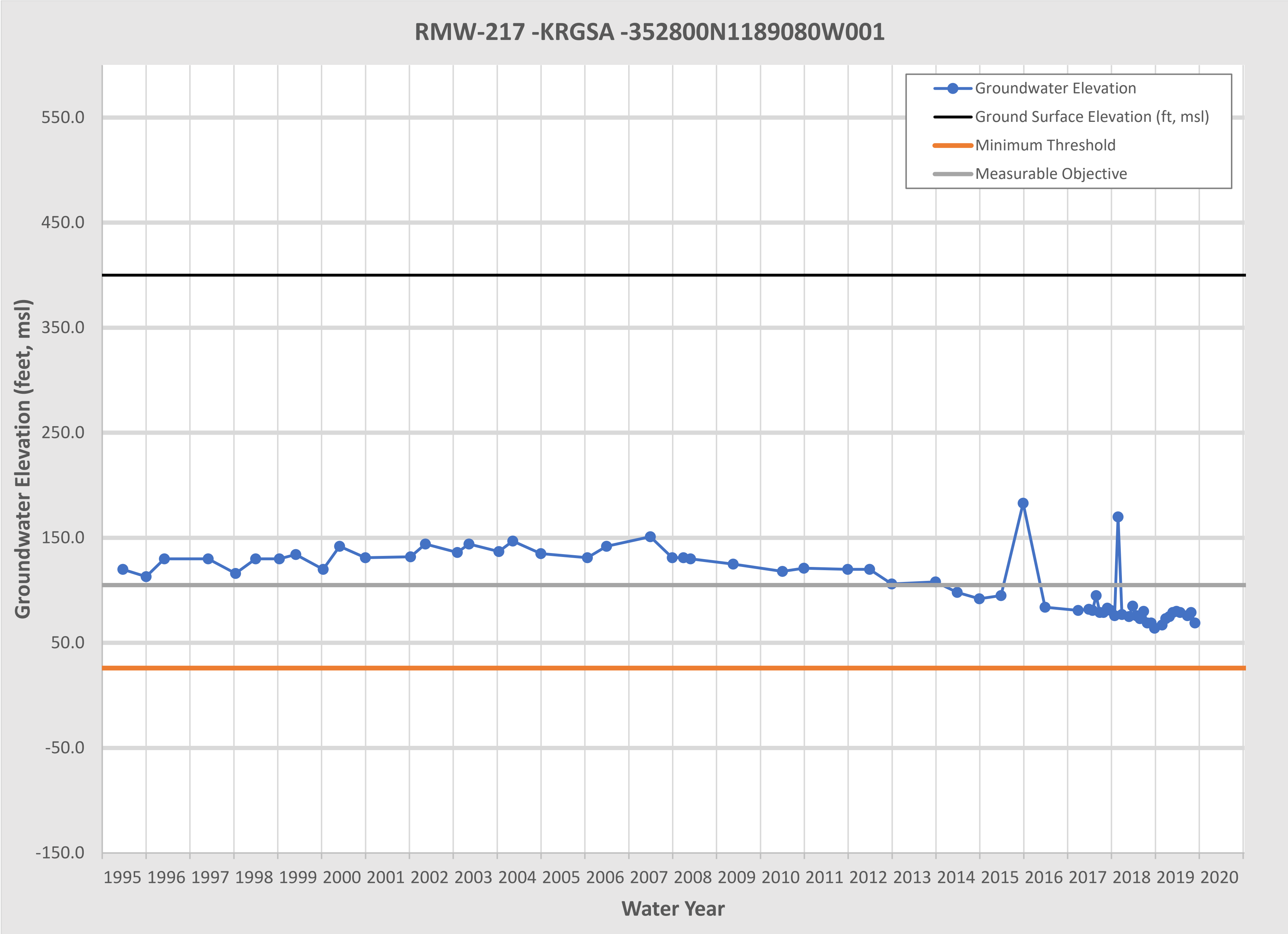

RMW-213 -KRGSA -353536N1190539W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

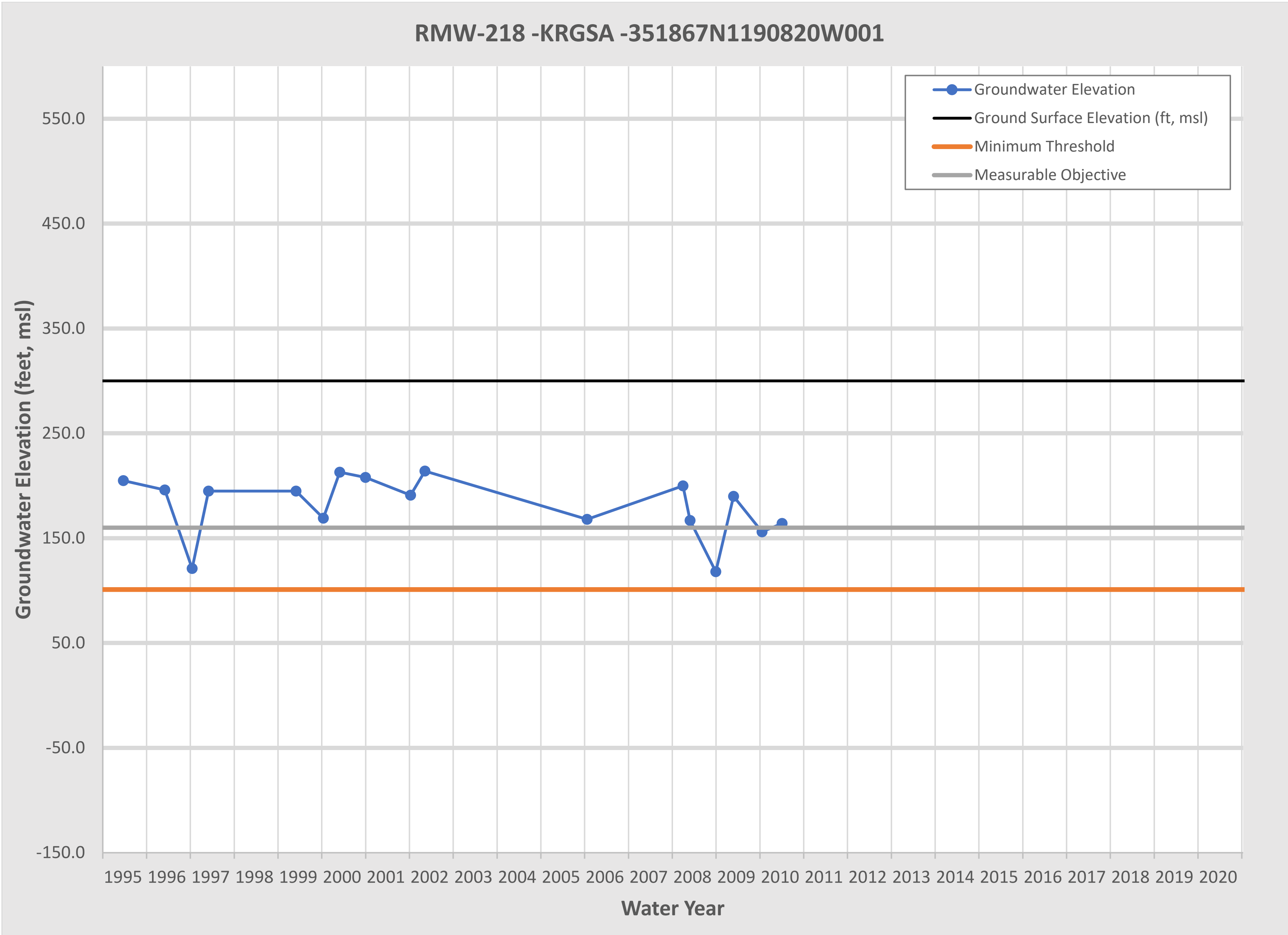

RMW-214 -KRGSA -353286N1190221W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

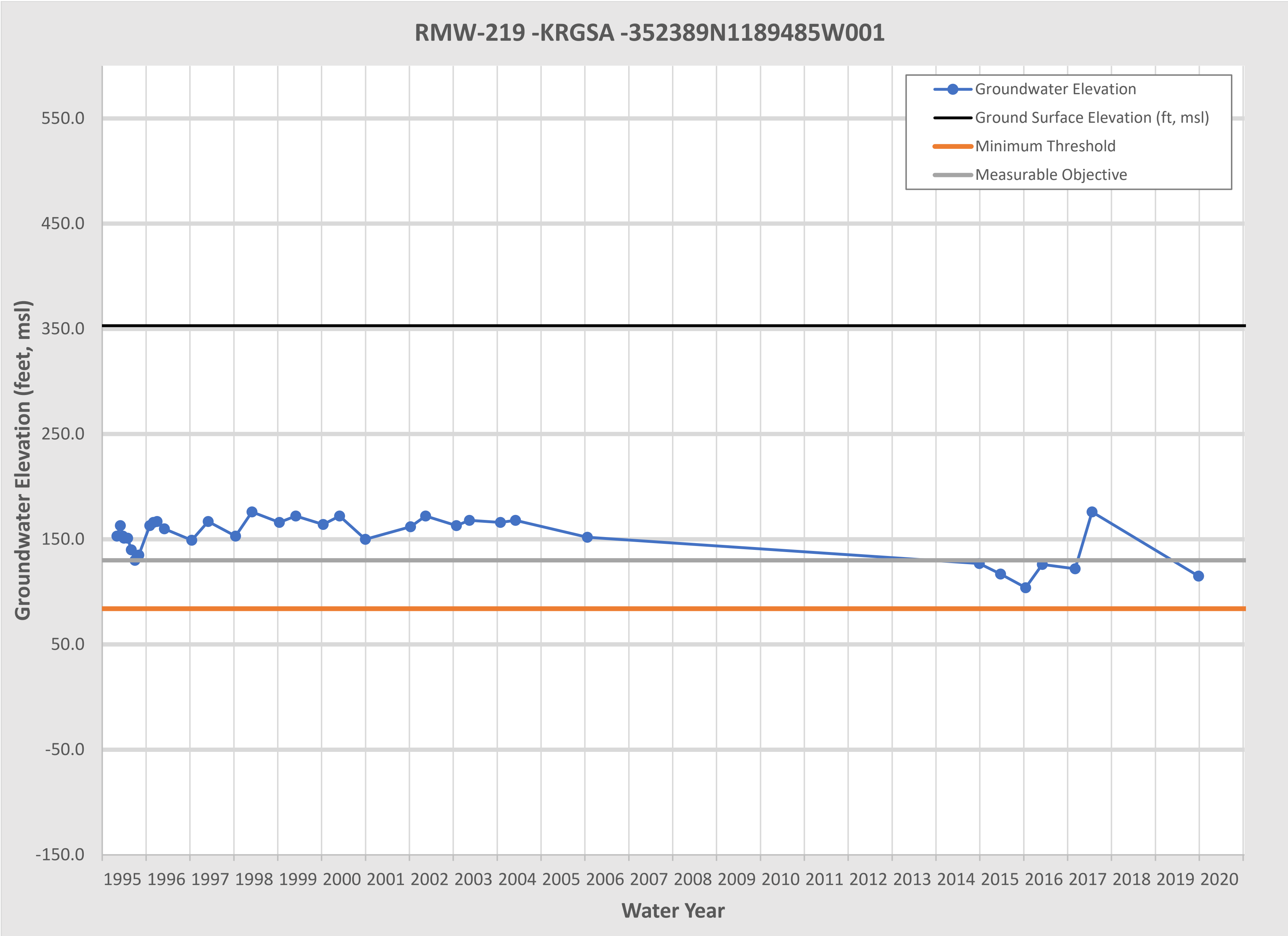

RMW-215 -KRGSA -353325N1190016W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



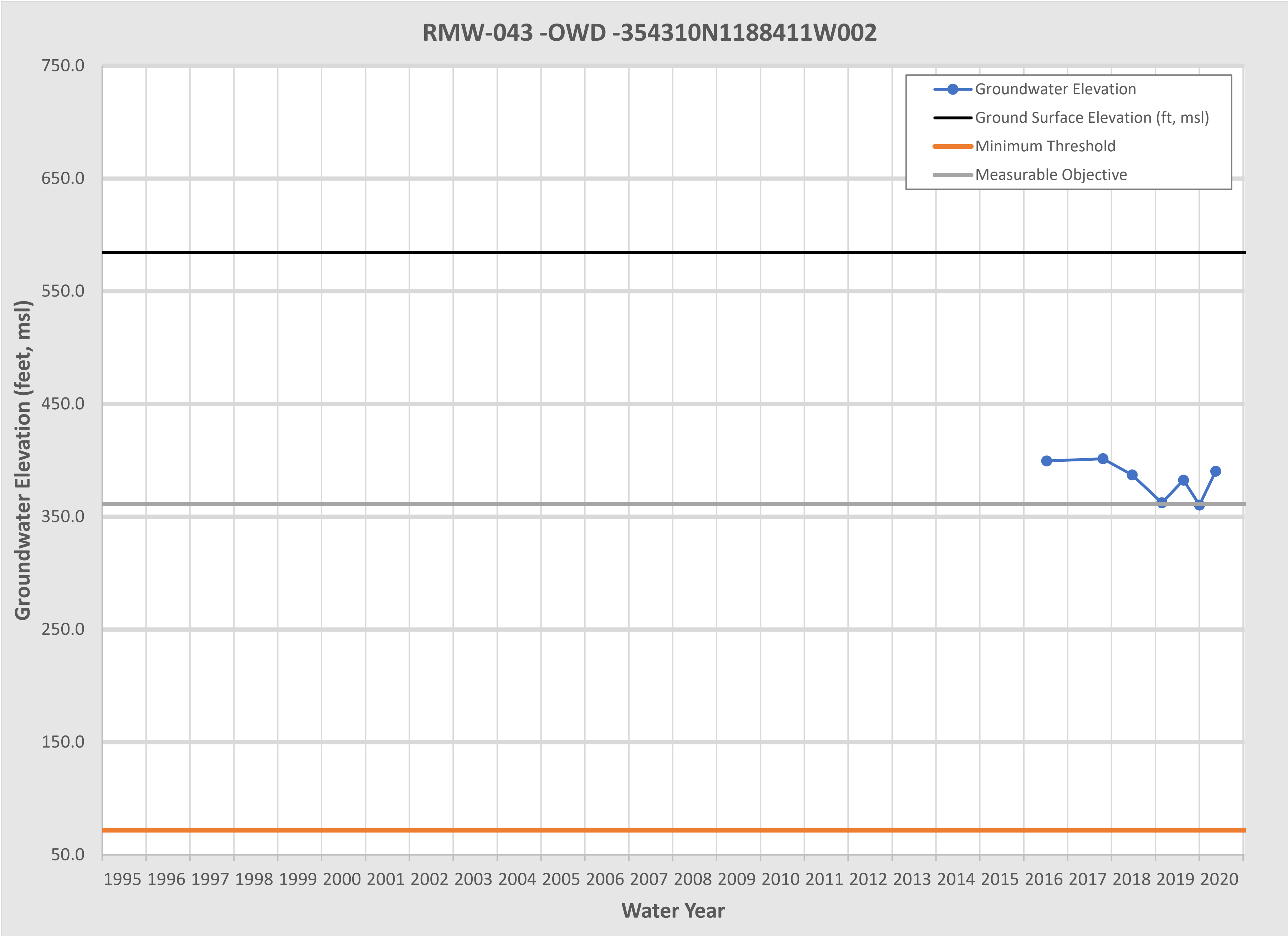
RMW-216 -KRGSA -352924N1189911W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

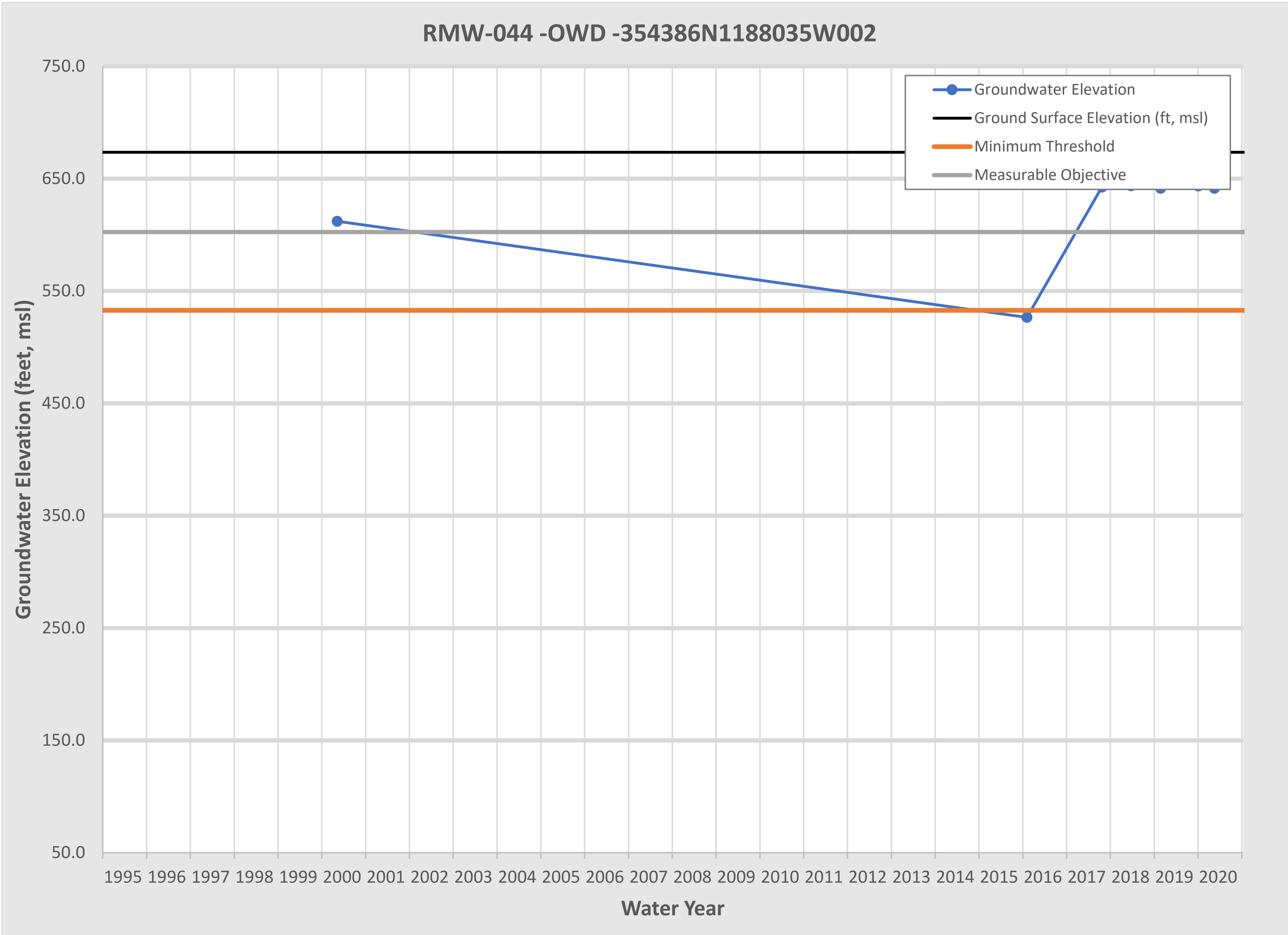

RMW-217 -KRGSA -352800N1189080W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year


RMW-218 -KRGSA -351867N1190820W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



RMW-219 -KRGSA -352389N1189485W001
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
Groundwater Elevation (feet, msl)
550.0
450.0
350.0
250.0
150.0
50.0
-50.0
-150.0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year

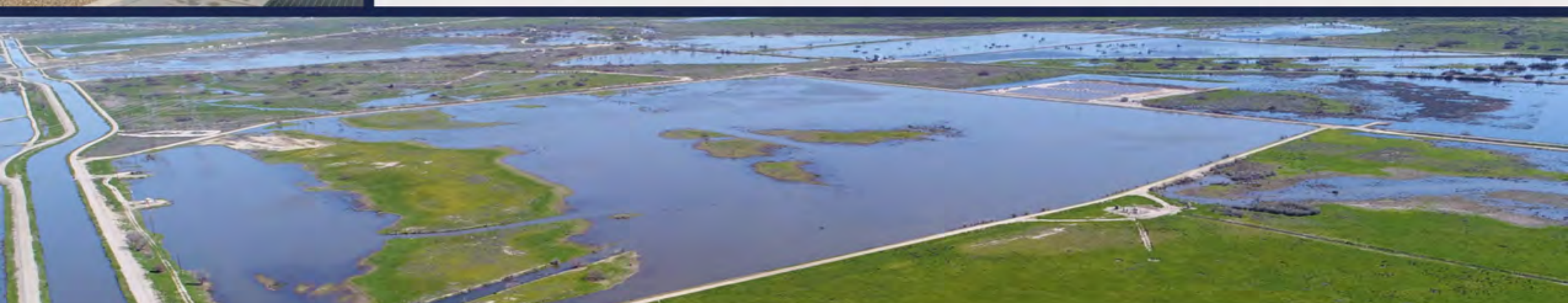

RMW-043 -OWD -354310N1188411W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year



RMW-044 -OWD -354386N1188035W002
Groundwater Elevation
Ground Surface Elevation (ft, msl)
Minimum Threshold
Measurable Objective
750.0
650.0
550.0
450.0
350.0
250.0
150.0
50.0
Groundwater Elevation (feet, msl)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Water Year





TODD GROUNDWATER