APRIL 2025

SISKIYOU COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

Shasta Valley Groundwater Sustainability Plan – WY 2024 Annual Report

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Abbreviation	Explanation
AF	Acre-feet
AFY	Acre-feet per year
amsl	above mean sea level
AT	Action Trigger
bgs	Below ground surface
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CCR	California Code of Regulations
CDEC	California Data Exchange Center
DTW	Depth to Water
DWR	California Department of Water Resources
ET	Evapotranspiration
ft	Foot/feet
GAMA	Groundwater Ambient Monitoring and Assessment Program
gpm	Gallons per minute
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HCM	Hydrogeologic conceptual model
in	Inch/inches
IND	Industrial Service Supply (acronym used to describe beneficial use)
InSAR	Interferometric Synthetic Aperture Radar
km	Kilometer/kilometers
LLNL	Lawrence Livermore National Laboratory
m	Meter/meters
MCL	Maximum contaminant level
mg/L	Milligrams per liter
mi	Mile/miles
mm	Millimeter
MO	Measurable Objective
MT	Minimum Threshold
MW	Monitoring well
NOAA	United States National Oceanic and Atmospheric Administration
OSWCR	Online Systems for Well Completion Reports
PMA	Projects and Management Actions
ppb	Parts per billion

(continued)

Abbreviation	Explanation
ppm	Parts per million
RMP	Representative Monitoring Point
SGMA	Sustainable Groundwater Management Act
SI	Sustainability Indicator
sq	Square
SSWD	Scott Valley and Shasta Valley Watermaster District
SWGM	Shasta Watershed Groundwater Model
SWRCB	California State Water Resources Control Board
TAF	Thousand acre-feet
TMDL	Total Maximum Daily Load
U.S.	United States
UCD	University of California, Davis
ug/L	Micrograms per liter
UL	Upper level
umhos/cm	Micromhos per centimeter
USGS	United States Geological Survey
WQO	Water quality objective

Executive Summary

California Water Code (CWC) §356.2 requires the submission of an annual report to DWR by April 1 of each year following the adoption of the Groundwater Sustainability Plan (GSP). This report is the fourth annual report submitted to DWR and it provides an update on Basin conditions and plan implementation progress within the Shasta Valley Basin for Water Year 2024 (October 1, 2023 – September 30, 2024). This report is prepared on behalf of the Groundwater Sustainability Agency (GSA)—Siskiyou County Flood Control & Water Conservation District.

The Shasta Valley GSP provides a path towards sustainable, long-term groundwater management that achieves the Basin's Sustainability Goal:

The Sustainability Goal of the Basin is to maintain groundwater resources in ways that best support the continued and long-term health of the people, the environment, and the economy in Shasta Valley for generations to come.

To evaluate progress towards the goal, groundwater conditions are assessed for each applicable sustainability indicator (SI) in Water Year 2024. Table 1 lists the SIs and defines the Measurable Objective (MO) and the Minimum/Maximum Threshold (MT), which are Sustainable Management Criteria (SMCs) included in Chapter 3 of the GSP; Table 1 also defines the occurrence of undesirable results and provides an evaluation of compliance with the criteria for Water Year 2024.

Importantly, measured data in Water Year 2024 do not indicate the occurrence of undesirable results in the Shasta Valley.

The remainder of the Executive Summary presents key metrics for Water Year 2024, including groundwater level data, groundwater quality data, land subsidence data, estimated water use, estimated groundwater use, estimated groundwater storage change, and progress on Plan Implementation regarding projects and management actions. In the sections and appendices that follow the Executive Summary, each key metric is discussed in detail.

It is noted that Water Year 2024 experienced reduced precipitation compared to Water Year 2023. Preliminary water year type calculations define Water Years 2020-2022 as the Critical water year type, however Water Year 2023 and Water Year 2024 both improved to the Below Normal water year type. These results indicate persisting, though improving, drought conditions.

In May 2021, Governor Gavin Newsom declared a drought emergency for 41 counties in California, including Siskiyou County. In August 2021, the State Water Resources Control Board (SWRCB) adopted drought Emergency Regulations, regarding the Scott and Shasta Rivers which were readopted, with amendments, in July 20221. These Emergency Regulations authorized curtailments of surface water diversions when flows did not meet SWRCB approved drought emergency minimum monthly flow targets. The impact of surface water diversion curtailment on the underlying aquifer is unknown at this time, and impacts to rural residential and groundwater dependent ecosystem (GDE) water use are still being evaluated. This Emergency Regulation was in effect until July 31,

2023. In December 2023, a new Emergency Regulation was adopted for the Scott and Shasta River Watersheds. The State Water Board readopted an emergency regulation in January 2025 and it is in effect for one year[1].

Table 1: Summary of Sustainable Management Criteria.

Sustainability Indicator	Minimum/Maximum Threshold (MT)	Measurable Objective (MO)	Occurrence of Undesirable Results	WY 2024 Annual Report Status
Groundwater Levels	Set to the historic low minus a buffer, which is either 10% of the historic maximum depth to water measured, or 10 feet, whichever is less.	75th percentile of the fall measurement range (i.e., water levels > 25% of historic record).	The fall low water level observation in any of the representative monitoring sites in the Basin falls below the respective minimum threshold for 2 consecutive years.	No occurrence of undesirable results.
Groundwater Storage	Groundwater levels used as a proxy for this sustainability indicator.		Groundwater levels used as a proxy for this sustainability indicator.	No occurrence of undesirable results.
Seawater Intrusion	This sustainability indicator is not applicable in the Subbasin.	-	-	-

[1] https://www.waterboards.ca.gov/drought/scott_shasta_rivers/

Table 1: Summary of Sustainable Management Criteria. *(continued)*

Sustainability Indicator	Minimum/Maximum Threshold (MT)	Measurable Objective (MO)	Occurrence of Undesirable Results	WY 2024 Annual Report Status
Degraded Water Quality	Nitrate = 10 mg/L, Specific Conductivity = 900 umhos/cm	More than 90% of wells monitored for water quality maintain their range of water quality measurements measured during 1990 to 2020.	More than 25% of groundwater quality wells exceed the maximum threshold for concentration and/or concentrations in over 25% of groundwater quality wells increase by more than 15% per year, on average over ten years.	No occurrence of undesirable results.
Land Subsidence	<0.1 ft of subsidence in any one year.	Maintain current ground surface elevations.	Groundwater pumping induced subsidence is greater than the minimum threshold of 0.1 ft (0.03 m) in any single year.	No occurrence of undesirable results.
Depletions of Interconnected Surface Waters	Baseflow = 100 cfs to maintain recent conditions	Baseflow = 145 cfs	Greater than the depletion under which a minimum threshold of 100 CFS +/- 20% average monthly groundwater contributions occurs, for two consecutive years.	Not completed for 2024, awaiting model update

Groundwater Levels

Measured groundwater levels in Water Year 2024 do not indicate the occurrence of undesirable results. Fall 2024 groundwater levels were compared to the MO, MT, Action Trigger (AT), and the Interim Milestones (IM). The minimum groundwater level measurement taken in September – November 2024 was used for each well ("fall low"). Three out of thirteen RMP wells fell below the MT during the fall 2024 period. However, these three wells did not fall below the MT in the fall 2023 period and hence there is no occurrence of undesirable results. The occurrence of undesirable results requires that the fall low water level observation in any of the RMPs fall below the respective minimum threshold for 2 consecutive years.

Contour maps of groundwater elevation are shown in Section 2.1 and hydrographs are included in Appendix A.

Groundwater Storage

The groundwater storage SI uses groundwater levels measured at RMPs as a proxy to assess compliance with the SMCs. Since no RMP wells recorded a fall low measurement below the MT for two consecutive years, no undesirable results occurred for the Groundwater Storage SI.

Water Use and Groundwater Budget

To assess change in storage and the groundwater budget, the Shasta Watershed Groundwater Model (SWGM) was used to develop a water budget for the basin during Water Year 2024. The total change in storage in Water Year 2024 was estimated to be 58,700 AF. Section 2.5 includes a spatial map of change in storage between the current and previous WY and a time series plot of change in groundwater storage by water year.

Total groundwater extractions estimated by the SWGM for Water Year 2024 are estimated to be 41,800 AF (Section 2.2), while surface water diversions are estimated to be 71,200 AF (Section 2.3). Total water use is estimated to be 113,000 AF (Section 2.4).

Groundwater Quality

Groundwater quality SMCs are defined for nitrate and specific conductance. Measured groundwater concentrations during Water Year 2024 are presented in Section 4.5 and do not indicate the occurrence of undesirable results. No RMPs exceeded the MT for nitrate. Specific conductivity was not measured in any of the RMPS in Water Year 2024, as the monitoring frequency is not annual.

Land Subsidence

Land subsidence was measured by satellite data (i.e., InSAR). Estimated land subsidence was less than 0.1 ft of subsidence, which avoids the occurrence of undesirable results. A map of land subsidence in Water Year 2024 can be found in Section 4.6.

Plan Implementation Progress

In Water Year 2024, the GSA continued activities to implement the GSP, including efforts to close data gaps, conduct a well inventory of wells in the Basin, and update the Shasta Watershed Groundwater Model. The GSA has also made progress addressing the recommended corrective actions included in the GSP approval letter from DWR, which was received in April 2023. Progress on these actions includes work to fill data gaps related to the SWGM and groundwater conditions, as well as expansion of the water quality network and physical monitoring.

Recent years have seen the introduction of additional regulations that were not considered in the approved Groundwater Sustainability Plan (GSP), submitted in 2022. These regulations influence the assumptions made within the GSP regarding water usage and the implementation of the GSP itself. Notably, the State Water Resource Control Board's (SWRCB) Scott and Shasta River Watersheds Emergency Regulations authorize water use curtailments when measured flows fall below the established emergency minimum flows, as outlined in the regulation. This functions as a management action, not implemented by the GSA, that influences the Basin's path to sustainability, as measured with the defined sustainable management criteria.

Additionally, the SWRCB is working to establish permanent instream flow requirements for the Scott and Shasta Rivers. The GSA will continue to track and engage with these regulations and evaluate the consequences for the GSP implementation. The GSA is already implementing projects to achieve the interim milestones and measurable objective set for the interconnected surface water sustainability indicator.

Chapter 1

Introduction

1.1 Purpose

California Water Code (CWC) §356.2 requires the submission of an annual report to DWR by April 1 of each year following the adoption of the GSP. This report is the fourth annual report submitted to DWR and provides an update on basin conditions and initial plan implementation progress within the Shasta Valley Basin for Water Year 2024. The purpose of annual reports is to provide periodic updates on the progress towards Basin sustainability, groundwater elevation data (contour maps and hydrographs), groundwater extraction, surface water supply, changes in groundwater storage, and a description of progress towards implementation of the GSP.

The production schedule for the annual report is as follows:

- October 1: day after end of water year for preceding reporting period.
- November 1: all data for preceding water year is input into the DMS.
- November to January (3 months): produce draft report.
- February 1: produce annual report draft.
- February to March (2 months): review report and gain GSA approval.
- April 1: submit finalized report to DWR.

1.2 Shasta Valley GSA

The Siskiyou County Flood Control and Water Conservation District is the sole GSA for the Shasta Valley Basin (Basin). The Siskiyou County Flood Control and Water Conservation District Act (Cal Uncod. Water Deer, Act 1240 §§ 1-38) was adopted by the State Legislature in 1959. This Act established a special district of the same name, and of limited powers that could provide flood protection, water conservation, recreation and aesthetic enhancement within its boundaries. At the time of its creation, the jurisdictional boundaries of the Flood District were smaller than those of the County. In 1983, following the County of Siskiyou Local Agency Formation Commission (LAFCO) action, the balance of the County was annexed into the District, making its jurisdictional boundaries coincide with the County. The District is governed by a Board of Directors that is composed of the Board of Supervisors; however, the District is a separate legal entity from the County, with independent rights and limited powers set forth in its originating act. The District's purpose is the conservation and control of storm, flood, and other waters and ensuring beneficial use thereof.

The Siskiyou County Flood Control and Water Conservation District approved the GSP for the Shasta Valley Groundwater Basin in December 2021 and submitted the GSP to the DWR in January 2022.

1.3 Basin Description

The Shasta Valley Watershed (watershed) is located in central Siskiyou County in north-central California and is bounded by Mount Shasta to the south, the Klamath Mountains to the west, and the Cascade Range to the east. The Basin covers approximately 800 square miles (sq mi; about 2,000 square kilometers [sq km]) and consists of a north dipping and topographically rough valley floor surrounded by mountain terrain (Figure 1). The topography of the Basin ranges in elevation from just over 2,000 feet (ft; ~610 meters [m]) above mean sea level (amsl) near the confluence of the Shasta River with the Klamath River (the hydrologic terminus for the Watershed) to over 14,100 ft (~4,300 m) amsl near the volcanic peak of Mount Shasta. The valley floor transitions sharply to the mountains bordering the valley, all of which are either part of the Klamath or Cascade Mountain Ranges.

The Basin contains one principal aquifer with various water-bearing geologic formations consisting of a mixture of alluvial and volcanic formations. The volcanic formations consist of water-laden lava tubes to water-sediment-filled pockets found within the cracks and crevices in the volcanic deposits. The connection of structurally different water-bearing formations results in numerous springs or diffuse wetlands where groundwater more easily discharges to the surface than into less-conductive water-bearing units. This discharge also occurs in areas where groundwater levels are close to or above the ground surface. The discharge levels of the springs can vary over many orders of magnitude from one spring to the next and can also significantly vary seasonally as well as year-to-year.

Vegetation on the mountains to the east, south, and west of the Basin mainly consists of evergreen tree species, with lower flank elevations containing shrub and scrub vegetation (MRLC 2019). The remaining lower-lying areas in the Basin core are vegetated by shrub and scrub, grasslands, wetland, pasture, small forested pockets, and cultivated crops (mainly alfalfa).

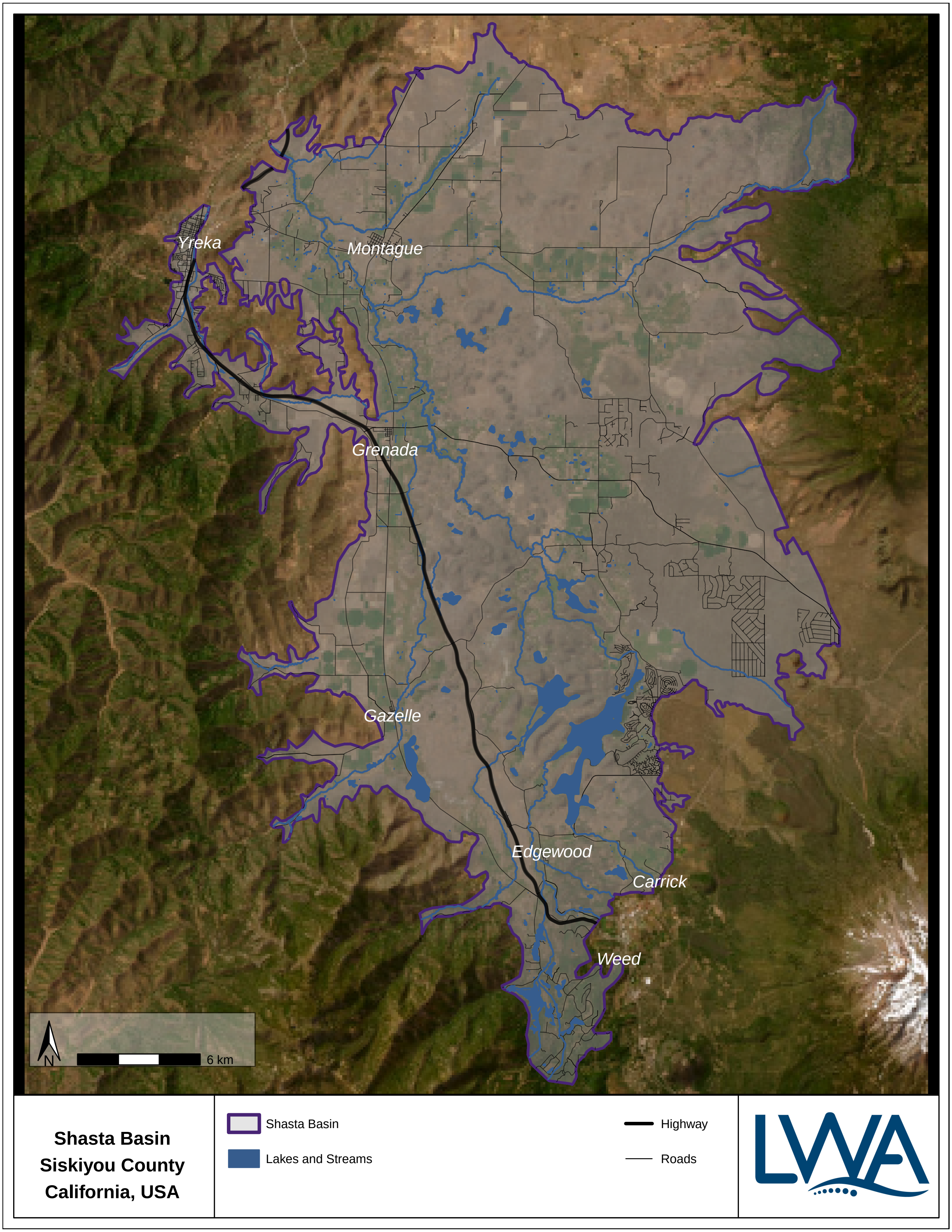


Figure 1: Topography of the Basin and surrounding Watershed.

1.3.1 Climate

Annual precipitation for the City of Yreka is presented in Figure 2, where annual precipitation values range from 9 to 31 inches (23–79 cm) during water years 1983 to 2024. Water Year 2024 had less total rainfall compared to Water Year 2023. The rainy season, which generally begins in October and lasts through April, accounts for about 80 percent of total annual rainfall.

To illustrate the variation in precipitation throughout the basin, annual precipitation is shown for four stations in Figure 3. **YRK** and **SBG** are CDEC stations located near the City of Yreka and Grenada, respectively; **USW00024259** and **US1CASK0003** are NOAA stations located in the northern part of the basin near Montague Siskiyou County Airport and in the southern part of the basin near the City of Weed, respectively. The mean annual precipitation over the total period of available data shown in Figure 3 is 18.0 (YRK), 15.0 (US1CASK0003), 11.1 (USW00024259), and 8.97 (SBG) inches.

All stations except SBG measured decreased precipitation in WY 2024 compared to WY 2023. Annual precipitation at SBG increased by 0.7 inches.

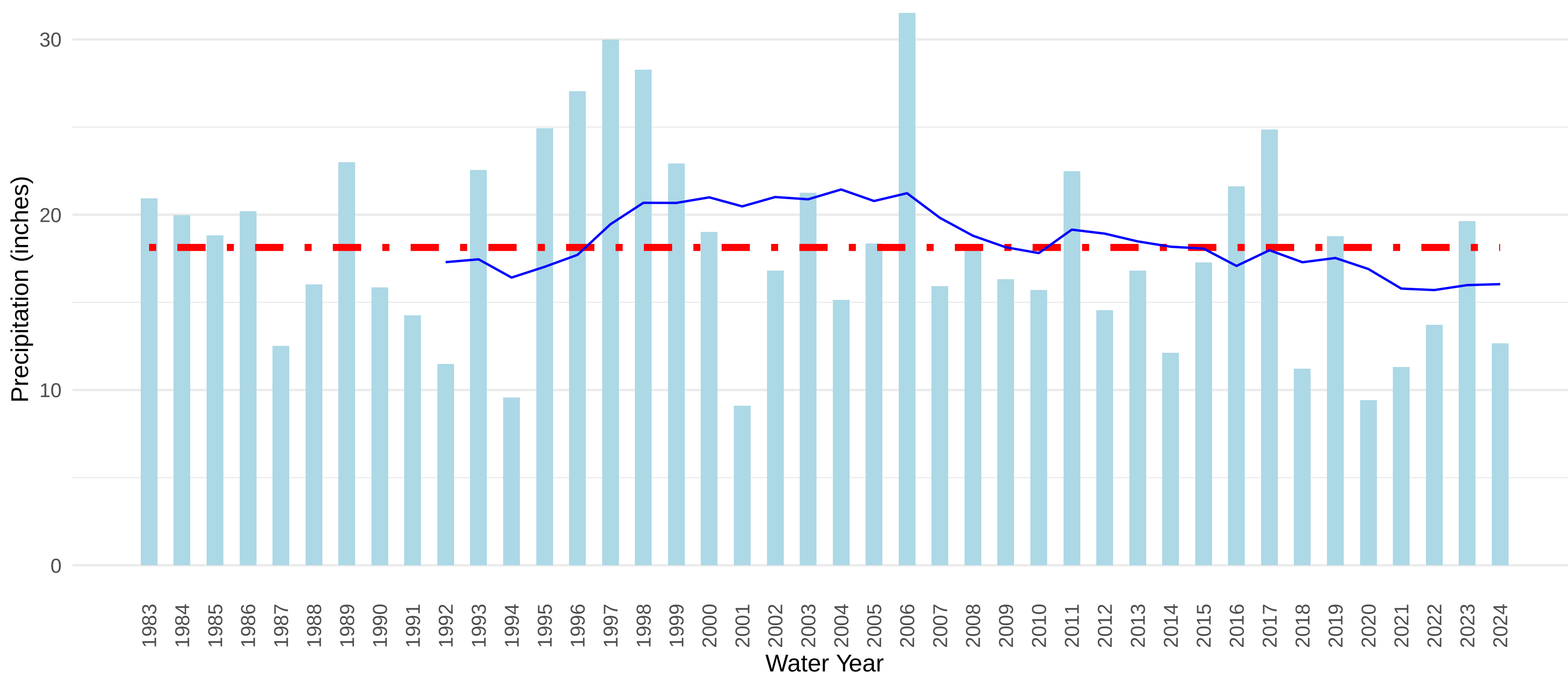


Figure 2: Yreka annual precipitation from 1983 to 2024, measured by CDEC. The long-term mean (18 in) is shown as the red dashed line, and the ten-year rolling mean is shown as the blue trendline.

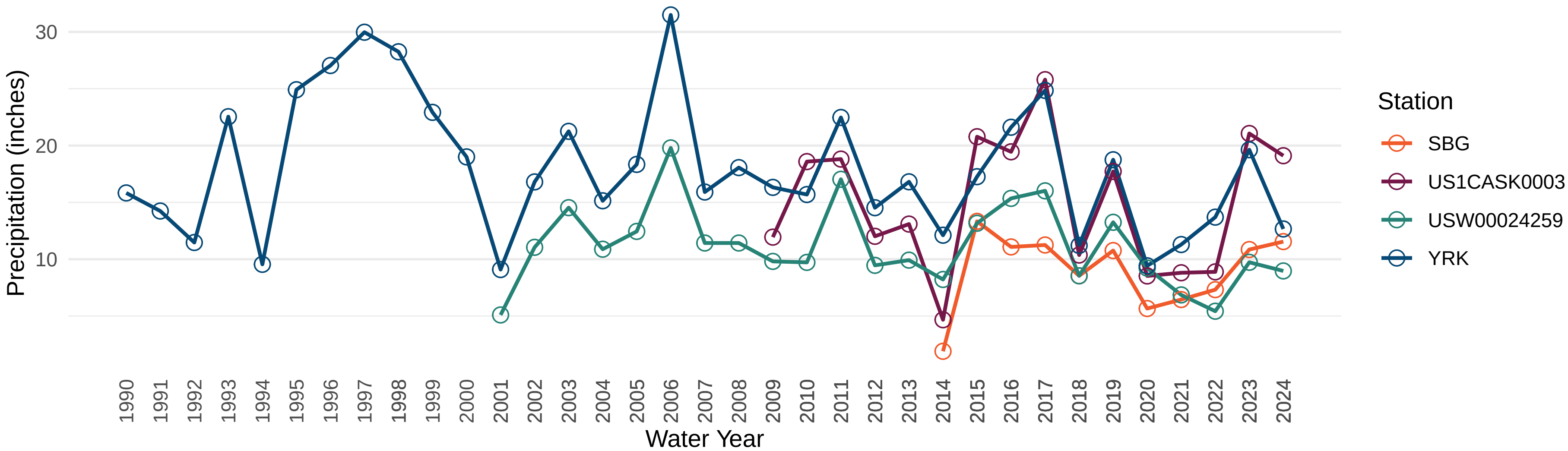


Figure 3: Annual precipitation time series from WY 1990 to WY 2024 from CDEC (YRK and SBG) and NOAA (US1CASK0003 and USW00024259) stations.

Chapter 2

Groundwater Basin Conditions

2.1 Groundwater Elevations

This section evaluates the groundwater elevations in Water Year 2024 as measured by the representative monitoring points (RMPs) as well as the broader GSP monitoring network. The groundwater level *RMP network* consists of the wells that were used to define the SMC criteria, and are thus used to determine the basin status, compare to SMCs, and determine the occurrence of undesirable results. The broader *GSP monitoring network* includes additional wells to help provide further insight into the basin conditions. The RMP network is a subset of the GSP monitoring network. The groundwater level monitoring network is discussed in Chapter 3, including any changes to the network and additions or removal of monitoring wells.

Groundwater elevation contours for the seasonal high and low groundwater conditions (i.e., spring and fall) are shown in Figure 4 and 5. Spatial data gaps prevent the contour map from covering the entire Basin. Both Figure 4 and 5 show characteristically lower groundwater elevations in the northwest portion of the basin (near the City of Montague) that increase towards the southern edge near the City of Edgewood as well as the north and northeastern portion of the Basin.

Appendix A provides hydrographs of groundwater elevations for both the RMP network (Appendix A.1) and the larger GSP monitoring network (Appendix A.2). These hydrographs include the water year type to the extent available, including from January 1, 2015 to the current reporting year. Water year types from WY 2019-2024 are preliminary results calculated based on the SGMA Water Year Type Dataset Development Report [1]. Results will be finalized once DWR updates the water year type dataset for these years.

Figure 6 shows groundwater elevation time series for select wells to illustrate the historical record and long-term trends throughout Shasta Valley.

[1]https://data.cnra.ca.gov/dataset/sgma-water-year-type-dataset/resource/79c7b9c1-1203-4203-b956-844554fcec79

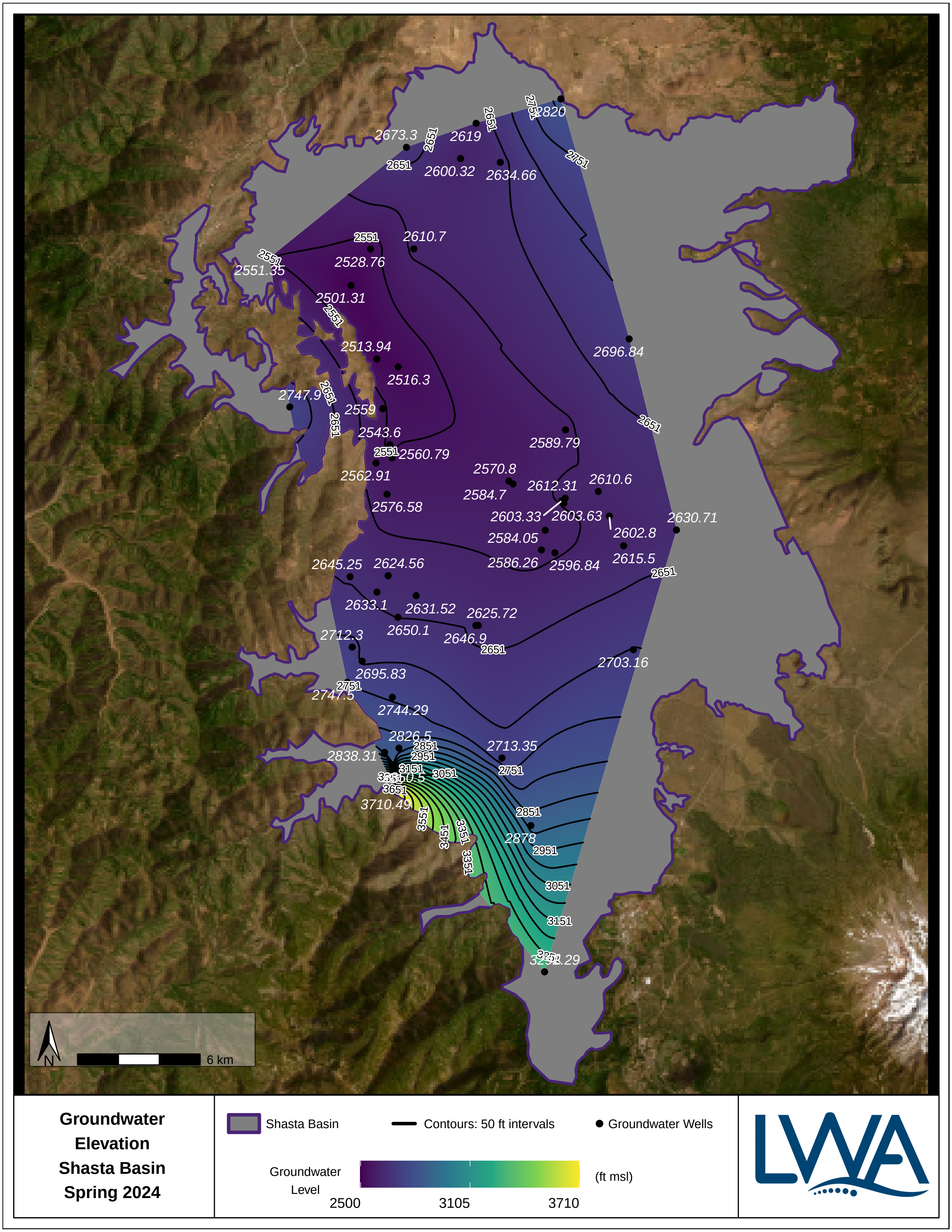


Figure 4: Interpolated representation of Spring 2024 Shasta Valley Groundwater Elevations

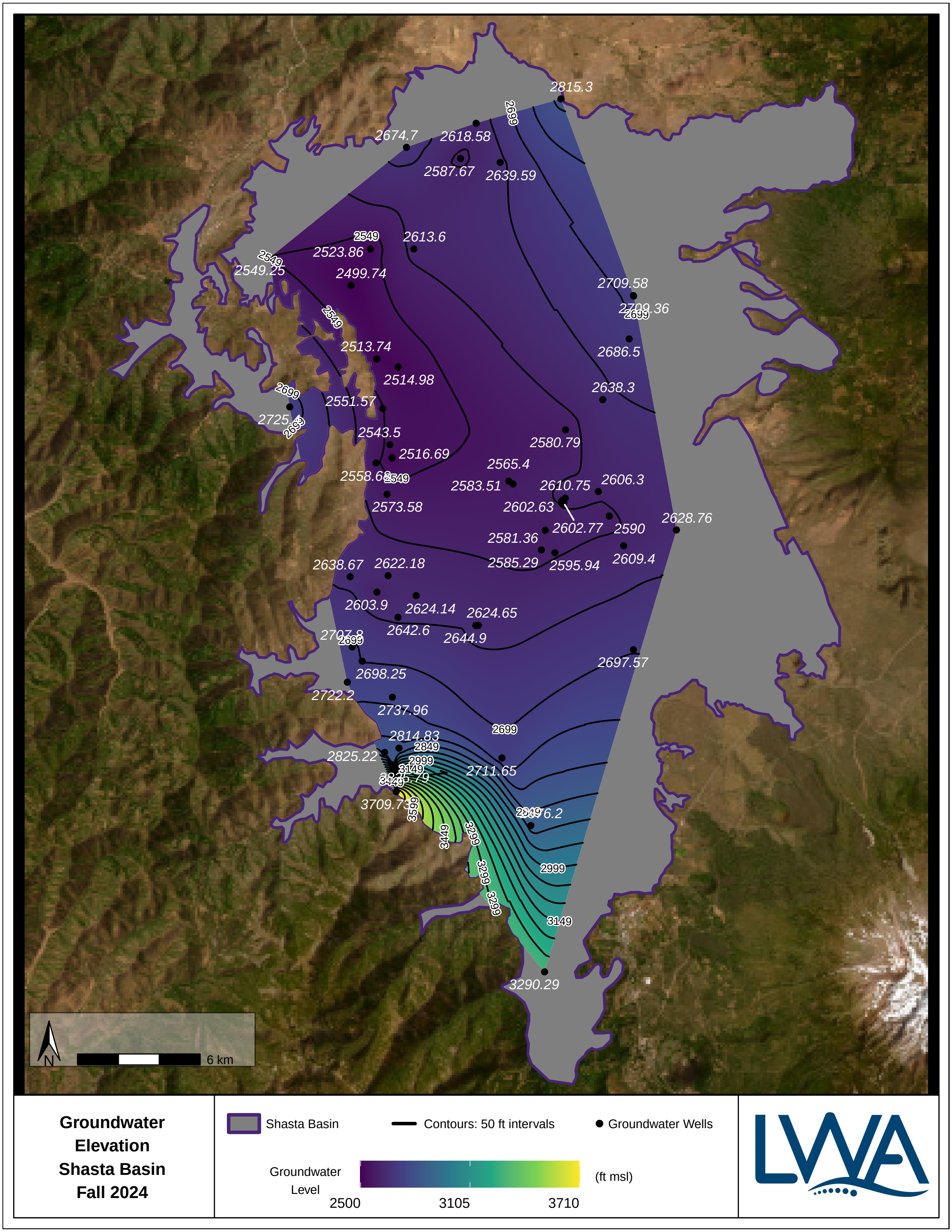


Figure 5: Interpolated representation of Fall 2024 Shasta Valley Groundwater Elevations

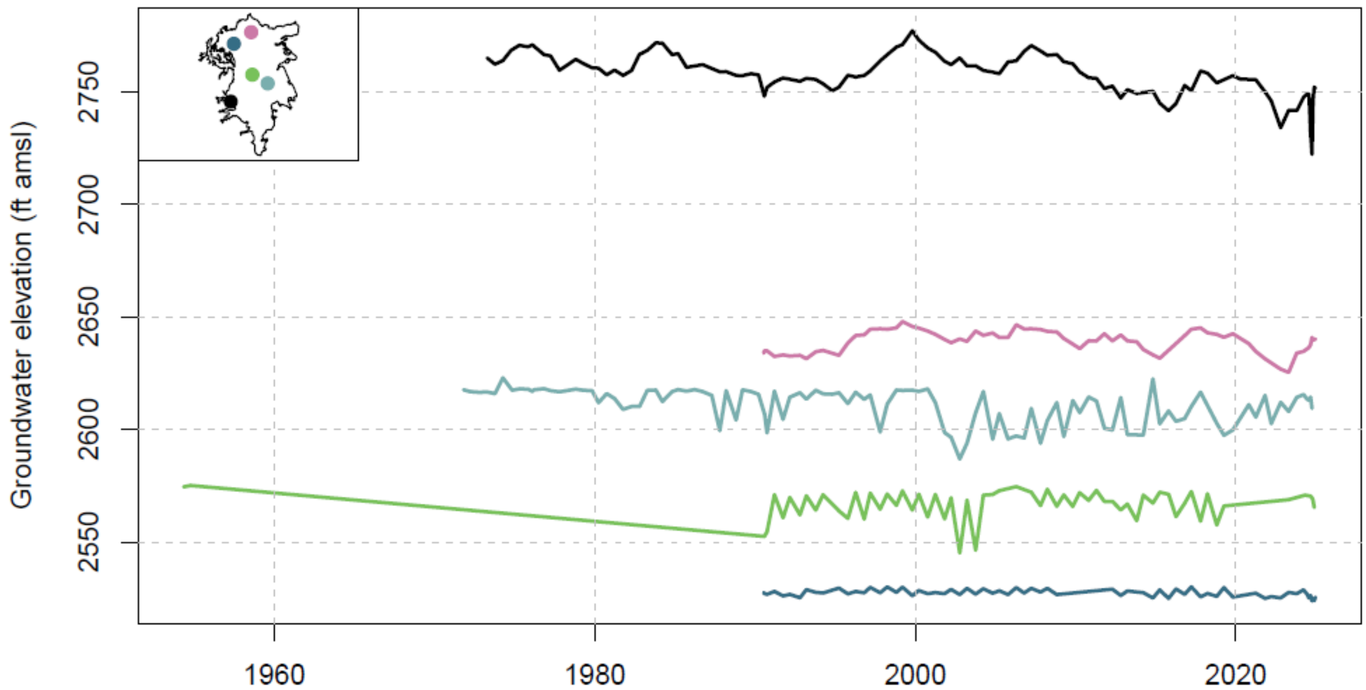


Figure 6: Groundwater level measurements over time in five wells located throughout Shasta Valley, representing long-term groundwater level trends.

2.2 Groundwater Extractions

This section summarizes monthly groundwater extractions for WY 2024 from the data available and defines the method of measurement by water use sector (Table 2). The best method available to estimate groundwater extraction in Shasta Valley is land-use, which is applied in the SWGM. The previous SWGM spanned WY1990-WY2018 and is currently being updated. The model has been preliminarily extended to WY 2024 and is used to estimate the WY 2024 groundwater extraction in this report. Figure 7 shows the spatial distribution of estimated total pumping in WY 2024 in AF/year, with an estimated 20% reduction due to the curtailment regulation implemented by the State Water Resources Control Board. Note that high-magnitude values, which may result from non-distributed pumping estimates or other factors, have been omitted from the colorbar to enhance the readability and visual clarity of the groundwater pumping map.

The total estimated groundwater extraction for WY 2024 is 41.8 TAF. This is estimated from an initial estimate of 46 TAF, and subtracting the estimated 20% curtailment, which results in 37 TAF[2]. There is an additional 3.5[3] TAF of urban groundwater extraction based on population[4]. The amount of groundwater sold by Big Springs Irrigation District (BSID) was 1.478 TAF in WY 2022, a substantial drop compared to historical groundwater extraction due to curtailments. The same value is used to estimate the groundwater sold by BSID in WY 2024. This gives a total groundwater extraction of 41.8 TAF for WY 2024.

[2]Rounded to 37 TAF for spreadsheet rules

[3]Rounded to 4 TAF for spreadsheet rules

[4]Population data from (https://gis.water.ca.gov/app/bp-dashboard/final/), groundwater extraction assumes 1 AF per 3.5 persons/year.

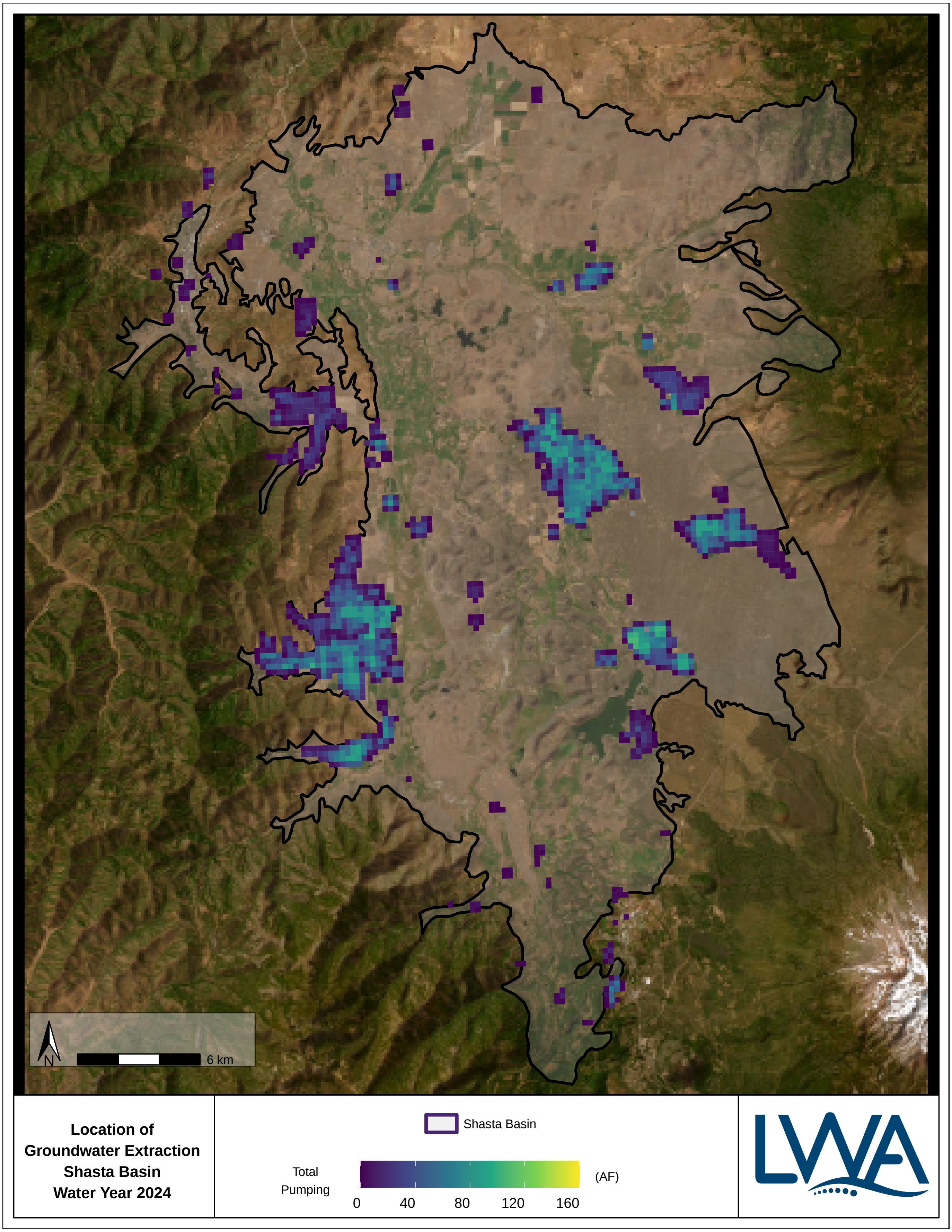


Figure 7: Estimated spatial distribution of total groundwater extraction for WY 2024 using the Shasta Watershed Groundwater Model (SWGM).

Table 2: Groundwater Extraction in WY 2024 by water use sector

Water Use Sector	Applied Groundwater (AF)	Method	Accuracy
Urban / Domestic	3,500	Estimate	70-80%
Industrial	0	Estimate	80-90%
Agricultural	38,300	Estimate	60-70%
Managed Wetlands	0	Estimate	90-100%
Managed Recharge	0	Estimate	80-90%
Native Vegetation	Data Gap		

2.3 Surface Water Supply Used for Groundwater Recharge or In-Lieu Use

SGMA requires that the annual report tabulate "Surface water supply used or available for use" (CCR §356.2 [b] [3]). For WY 2024 the surface water supply data was provided by the Scott Valley and Shasta Valley Watermaster District (SSWD) and is 71.207 TAF. This amount is comparable to the amount reported in WY 2023 (71.4 TAF).

2.4 Total Water Use

This section summarizes groundwater use and surface water available for use for the reporting period (Table 3). For WY 2024 the total water use combines the surface water supply data provided by the Scott Valley and Shasta Valley Watermaster District, and estimated groundwater extraction. This results in 113.2 TAF.

Table 3: Total Water Use in WY 2024 by water use sector

Category	Water Use Type/Sector	Applied Water (AF)	Method	Accuracy
WY 2024 Total	Total Water Use	113,000	Estimate	60-70%
Water Source Type	Groundwater	41,800	Estimate	60-70%
	Surface Water	71,200	Direct	90-100%
	Recycled Water	0	Estimate	90-100%
	Reused Water	0	Estimate	90-100%
	Other	0	Estimate	90-100%
Water Use Sector	Urban / Domestic	3,500	Estimate	80-90%
	Industrial	0	Estimate	90-100%
	Agricultural	109,500	Estimate	60-70%
	Managed Wetlands	0	Estimate	90-100%
	Managed Recharge	0	Estimate	90-100%
	Native Vegetation	Data Gap		

Table 3: Total Water Use in WY 2024 by water use sector *(continued)*

Category	Water Use Type/Sector	Applied Water (AF)	Method	Accuracy
	Other	0	Estimate	60-70%

2.5 Change in Groundwater Storage

The change in groundwater storage for the Basin is calculated using the SWGM.

Figure 9 shows the spatial change in storage in AF in WY 2024 as calculated by the SWGM. Change in storage values across the Basin range from approximately -10 to +10 AF over the model grid cells. Values outside this range are capped at the minimum or maximum limit for clarity. Note that extreme high or low values, which may be outliers due to the model calibration not yet being updated, have been omitted from the colorbar to improve readability of the storage change map.

Larger values of positive change in storage are seen along the eastern side of the Basin. This spatial pattern of change in storage may be attributed to a combination of factors, such as the spatial distribution and heterogeneity of the geology, recharge and pumping. Variations in geologic properties influence how water is stored and transmitted. In particular, the areas on the east side consist largely of the Hornbrook Formation and the Western Cascade Volcanics. A preliminary review suggests that the storage coefficients of these formations may be contributing to the observed storage change pattern. The change in storage patterns also roughly reflect the spatial distribution of simulated recharge, and areas with higher recharge may experience a larger gain in storage, though other factors such as geology and pumping will influence this effect. Pumping on the west side may reflect the reduced storage gain in that area. Though the interplay of these factors likely contributes to the observed pattern, it is important to note that further model refinement and calibration are needed to fully quantify these relationships.

Figure 8 depicts the water budget from the SWGM within the Bulletin 118 boundary. It includes the water year type, the annual change in groundwater storage, and the cumulative change in groundwater storage from WY 1991 to WY 2024. As estimated from the model, groundwater storage gained 58,700 AF in WY 2024. In comparison, a storage gain of 69,300 AF was reported in the previous Annual Report for WY 2023[5].

[5] Note that the WY 2023 change in storage value of 69,300 AF was estimated from changes in groundwater levels and *not* from the SWGM.

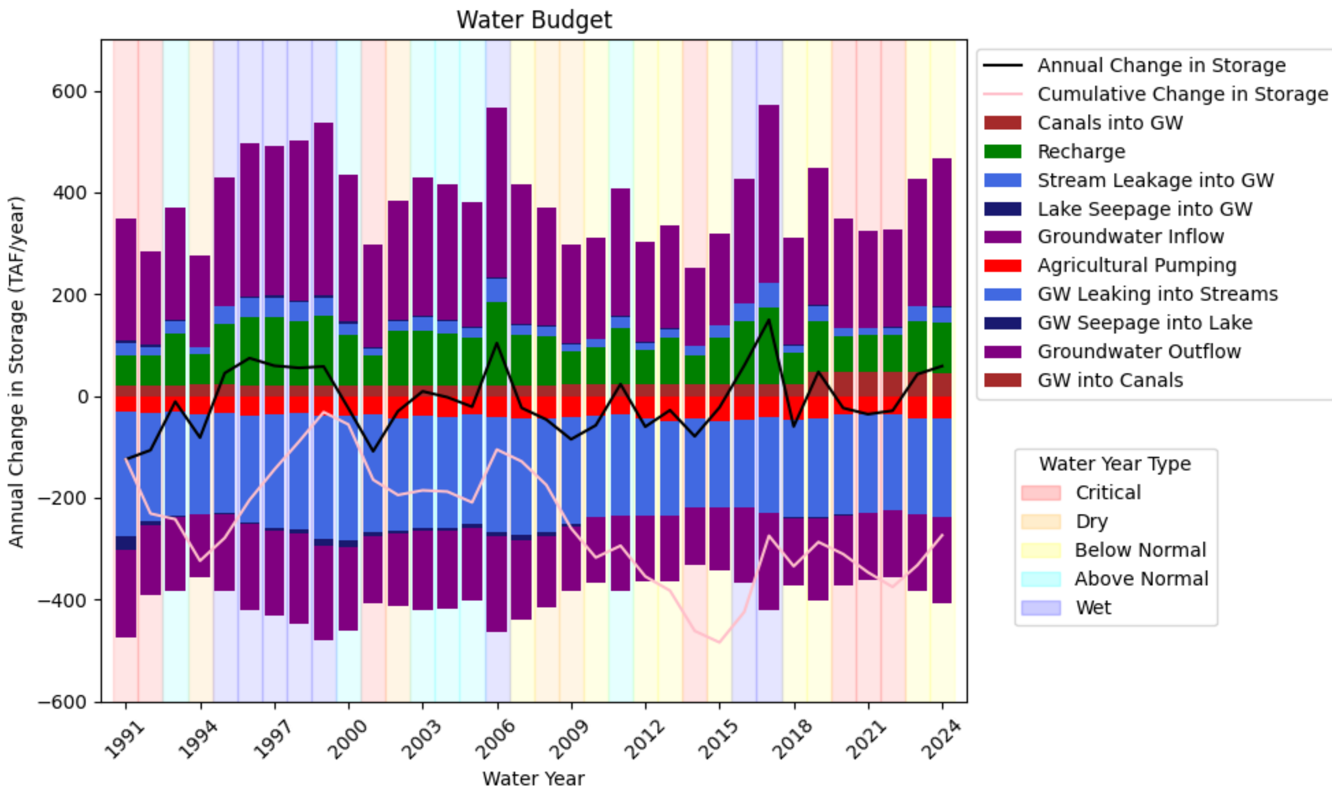


Figure 8: Timeseries showing change in storage and cumulative change in storage from the SWGM.

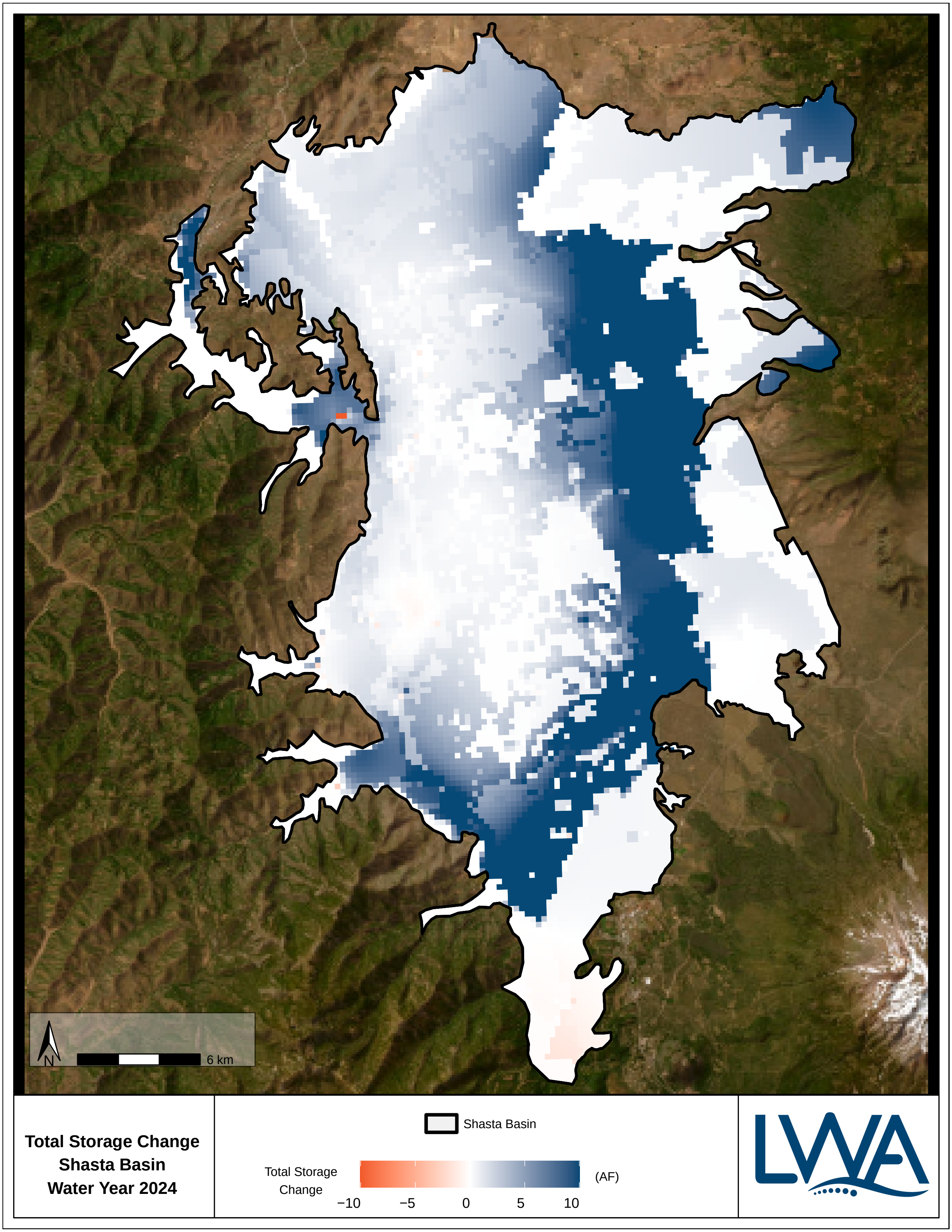


Figure 9: Estimated spatial distribution of change in storage (AF) in WY 2024 using the SWGM.

Chapter 3

Monitoring Network

As described in Chapter 2, the groundwater level RMP network is a subset of the GSP monitoring network. The groundwater level RMP network is used to evaluate SMCs for individual sustainability indices for the Basin and will continue be used to demonstrate the sustainability of the Basin through 2042. The full GSP monitoring network provides further insight into Basin conditions.

A subset of the monitoring wells are instrumented with continuous dataloggers (temperature and water level measured collected every 15 minutes) with telemetry, while for the rest of the California Statewide Groundwater Elevation Monitoring (CASGEM) Program wells, bi-annual measurements are collected. Continuous monitoring offers the best data coverage while periodic monitoring is generally completed twice a year (spring and fall). During 2024, 31 continuous groundwater monitoring stations were active in the Shasta Valley basin. None of these wells have sufficient history for use as RMPs; however, they may be added to the RMP network during a future GSP update.

The water quality network used to evaluate SMCs consists of public water supply wells and monitoring wells. Stream flow and stream depletion due to groundwater pumping are measured using flow gages, and subsidence is measured with Interferometric Synthetic Aperture Radar (InSAR) satellite data provided by DWR.

3.1 Groundwater Level Monitoring Network

The groundwater level RMP network consists of thirteen CASGEM wells in the Basin. Three wells are located within the fractured basalt formation, seven in the alluvial formation, and three in various other geologic material. The distribution of monitoring wells is shown in Figure 10. The current network satisfies DWR requirements with respect to spatial distribution and may be expanded using wells recently equipped with monitoring instrumentation that will be evaluated over the first five years of implementation.

Water level monitoring network status update

RMP well *416595N1223971W001* (well name *44N05W14M002M*) had been temporarily inaccessible since October 2019, due to challenges during COVID-19, gate access, and well owner contact. Access to this site was regained in fall 2024, and the fall low measurement was taken. Similarly, RMP well *416237N1224524W001* (well name *44N05W32C002M*) is a CASGEM well that has not been consistently measured since 2019. This well was measured in spring and fall of 2024. The

GSA will continue to work to ensure consistent measurements are taken at these wells. The GSA is also considering installing a sensor for continuous measurements at these wells.

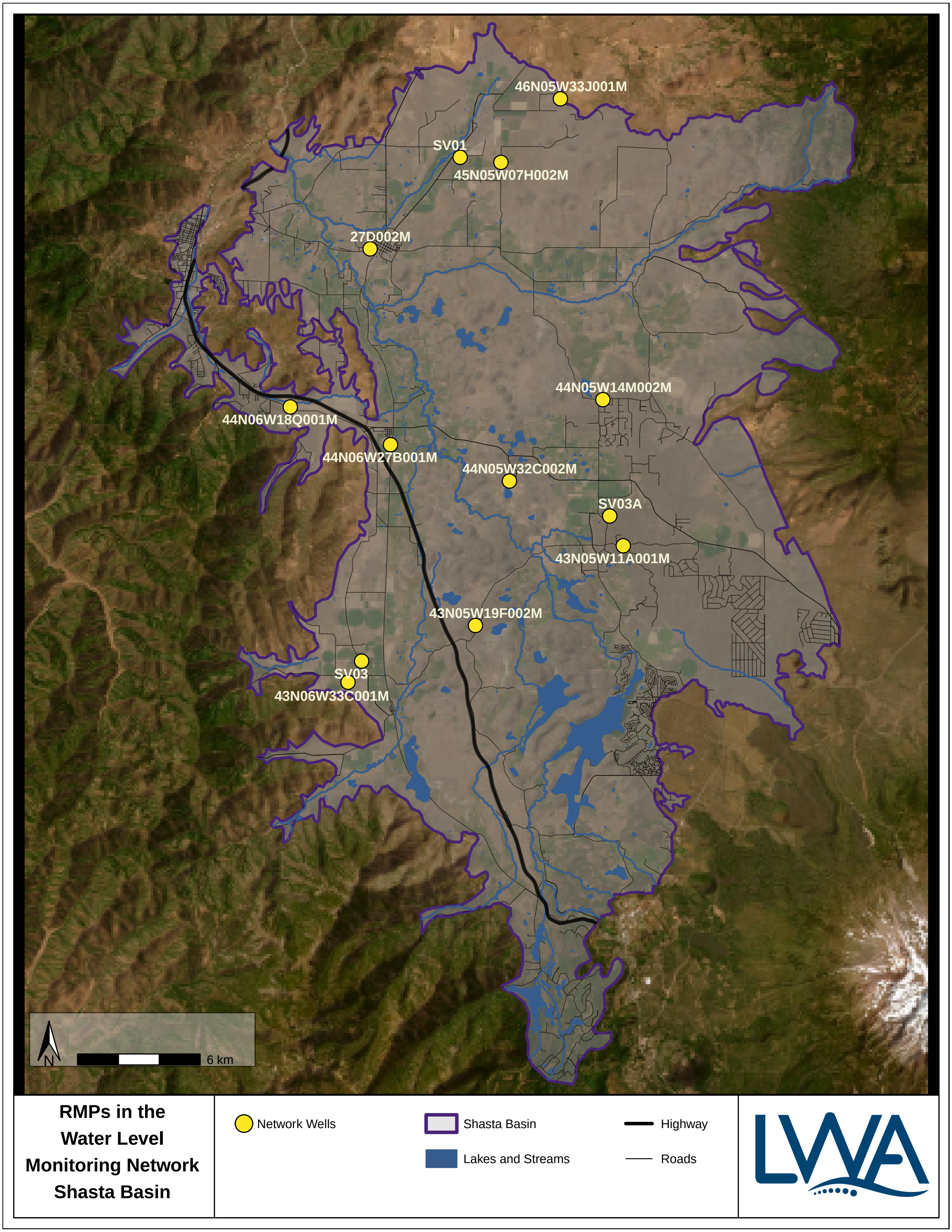


Figure 10: RMP Wells in the Water Level Monitoring Network.

3.2 Groundwater Quality Monitoring Network

Existing wells used to monitor groundwater quality in the Basin and evaluate water quality SMCs include public water supply wells and monitoring wells, which are shown in Figure 11. The groundwater quality monitoring network uses wells that are regularly sampled as part of existing monitoring programs for the constituents for which SMCs are set: nitrate and specific conductivity. Efforts are currently underway to identify additional wells for inclusion in the water quality network.

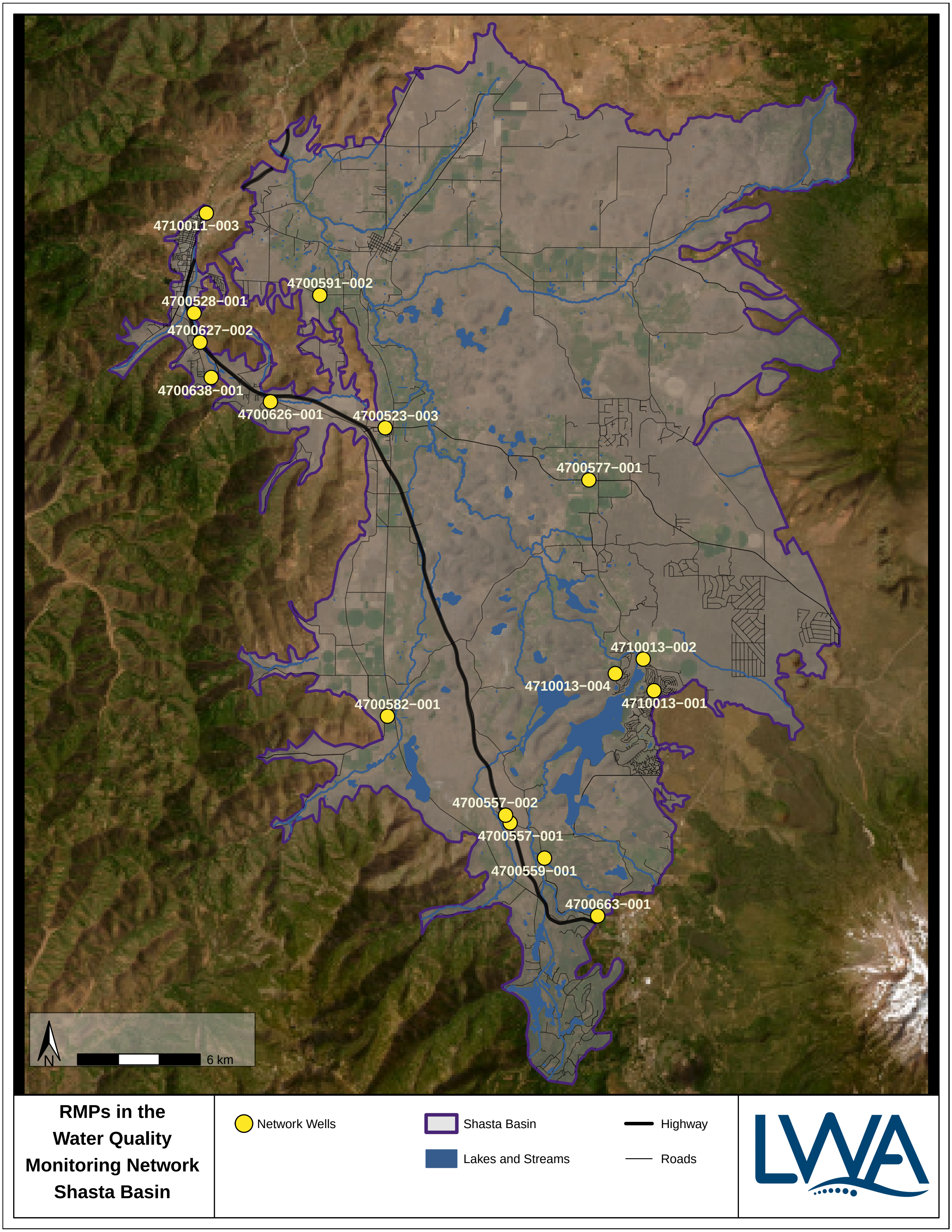


Figure 11: RMP wells in the Water Quality Monitoring Network.

Chapter 4

Sustainable Management Criteria

The GSP defines SMC with respect to quantifiable impacts to beneficial users of groundwater that if exceeded, would lead to the identification of undesirable results. This chapter evaluates the six sustainability indicators: groundwater levels, groundwater storage, seawater intrusion, degraded water quality, land subsidence, and depletions of interconnected surface water, by comparing measured data collected during Water Year 2024 to defined SMC. The SMCs include minimum and maximum thresholds, measurable objectives, and interim milestones.

4.1 Groundwater Elevations

Groundwater level Interim Milestones (IM) are identified in Chapter 3 of the GSP. These IM are anticipated to be achieved over the course of GSP implementation in increments of five years, pursuant to the CCR definition "Target values representing measurable groundwater conditions, in increments of five years, set by Agency as part of a Plan" [CCR Title 23, Division 2 §351(q)]. Currently, IM are set to the measurable objective (MO) of each RMP well. Progress toward stabilizing groundwater levels above minimum thresholds and towards the MO is also progress towards achieving IMs. In Fall 2024, three RMP wells exceeded the MT. In WY 2023, one well (**415444N1225387W001**) led to the occurrence of undesirable results for basin water levels because it exceeded the MT for two consecutive years. In Fall 2024 this well was above the MT and also above the MO, reflecting improved conditions at this well and the removal of undesirable results for water levels.

Table 4 compares the fall low water level measurement to the SMCs for Fall 2024. The values shown in Table 4 represent depth to groundwater. The fall low is the maximum depth to groundwater during the period of September 15 - November 15, 2023. The column "Status" notes whether the maximum depth to groundwater for this period exceeded the minimum threshold ("Below MT"), exceeded the measurable objective and not the minimum threshold ("Above MT"), did *not* exceed both the measurable objective and the minimum threshold ("Above MO"), or whether a measurement was not recorded. The IM is the same as the MO for each RMP well. Detailed hydrographs for each RMP with their SMCs can be found in Appendix A.1

The Fall 2024 status of the RMP wells in relation to their SMCs is also shown in Figure 12. Measurements are sorted into the following categories: Near or Above Measurable Objective, Within Central Operational Range, Near Minimum Threshold, or At or Below Minimum Threshold. These ranges are defined below and are based on the MO, MT, and a provisional metric NMT (near measurable objective). The NMT is defined as the Action Trigger (AT).

Near or Above Measurable Objective: measurement > MO

Within Central Operational Range: MO > measurement > NMT

Near Minimum Threshold: NMT > measurement > MT

At or Below Minimum Threshold: MT > measurement

Access has been regained to RMP wells *416595N1223971W001* and *416237N1224524W001*, which did not have Fall 2023 measurements taken. Measurements were obtained for this Fall 2024 period.

In Fall 2024, three RMP wells exceeded the MT: **415351N1225474W001**, **417258N1225337W001**, and **416083N1223932W001**. The fall low for these wells did not exceed the MT in Fall 2023; hence there is no occurrence of undesirable results as these wells have not crossed the MT for two consecutive years. All three wells show groundwater recovery during the spring months. Spring 2024 measurements are above the MT, there is an upward trend in groundwater levels approaching Spring 2025. The GSA will closely monitor these wells.

RMP well *415444N1225387W001* exceeded the minimum threshold in Fall 2023, however it increased above the MT in fall 2024, indicating an improvement in groundwater levels and the removal of undesirable results. This RMP well is an irrigation well in the Gazelle area, and the impacts of pumping may explain the previous excursions below the MT in Fall 2022 and Fall 2023. Both Spring 2022 and Spring 2023 levels were above the MT, indicating groundwater level recovery during the spring months.

Section 5.1 and 5.2 discuss PMA activities conducted that may improve water levels and storage in the Basin. The ongoing and anticipated PMA activities are expected to continue to improve groundwater conditions, and the GSA will continue to closely monitor conditions, particularly, wells **415351N1225474W001**, **417258N1225337W001**, and **416083N1223932W001** moving forward.

Table 4: Comparison of Fall 2024 groundwater measurements to SMC values. Measurements represent depth to groundwater and fall low is defined as the maximum depth to groundwater during the period September 15 - November 15, 2024.

Well Code	Well Name	Station ID	MT (ft bgs)	AT (ft bgs)	MO (ft bgs)	IM (ft bgs)	2024 Fall Low (ft bgs)	Status
415952N1223848W001	43N05W11A001M	22370	166.5	156.5	144.1	144.1	134.00	Above MO
415351N1225474W001	43N06W33C001M	22373	79.1	71.9	61.0	61.0	91.20	Below MT
416595N1223971W001	44N05W14M002M	22375	65.8	59.8	56.5	56.5	55.40	Above MO
417638N1224574W001	45N05W07H002M	24045	30.7	27.9	22.3	22.3	21.21	Above MO
417258N1225337W001	27D002M	24067	8.7	7.9	6.8	6.8	9.00	Below MT
416237N1224524W001	44N05W32C002M	36753	73.0	66.4	51.3	51.3	43.10	Above MO
417916N1224217W001	46N05W33J001M	36892	45.2	41.1	34.4	34.4	42.50	Above MT
416397N1225224W001	44N06W27B001M	36999	22.2	20.2	17.4	17.4	19.60	Above MT
417660N1224811W001	SV01	37001	53.4	48.5	24.2	24.2	22.90	Above MO
415444N1225387W001	SV03	49002	88.1	80.1	76.0	76.0	72.67	Above MO
415601N1224718W001	43N05W19F002M	49294	13.3	12.1	10.0	10.0	10.70	Above MT
416563N1225813W001	44N06W18Q001M	49295	33.3	30.3	27.1	27.1	25.60	Above MO
416083N1223932W001	SV03A	50631	69.0	62.7	47.3	47.3	70.80	Below MT

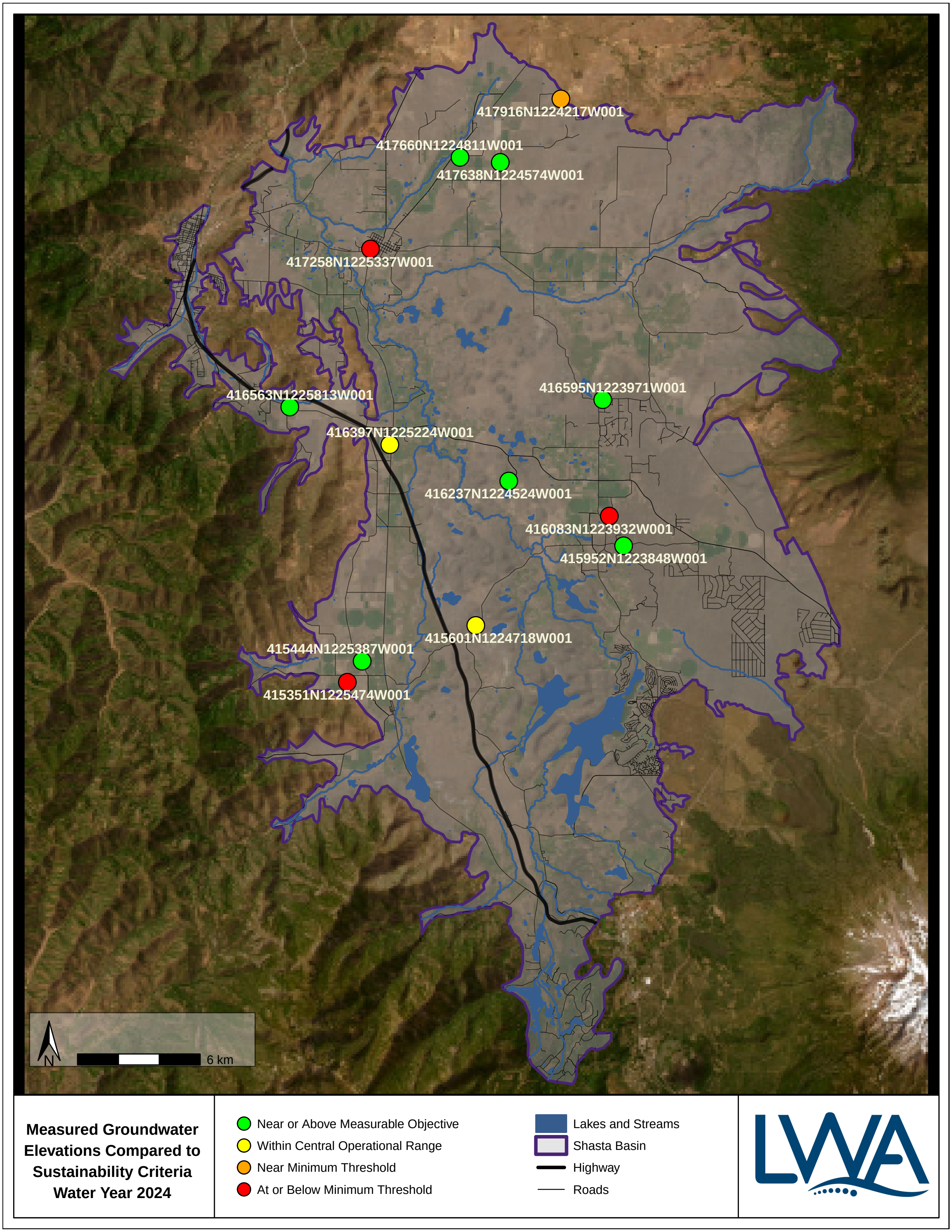


Figure 12: Status of the groundwater level RMP networks for Fall 2024.

4.2 Reduction of Groundwater Storage

Groundwater levels are the proxy for groundwater storage and the sustainability management criteria are identical. According to the United States Geologic Survey, estimates of groundwater storage rely on groundwater level data and sufficiently accurate knowledge of hydrogeologic properties of the aquifer. Direct measurements of groundwater levels can be used to estimate changes in groundwater storage. As groundwater levels fall or rise, the volume of groundwater storage changes accordingly. Unacceptable groundwater decline indicates unacceptable storage loss. The hydrogeologic model outlined in Chapter 2 of the GSP provides the needed hydrogeologic properties of the aquifer. As with the groundwater level sustainability indicator, there is no occurrence of undesirable results for the groundwater storage sustainability indicator in WY 2024, as the wells that fell below the MT in Fall 2024 have not fallen below the MT for two consecutive years.

4.3 Seawater Intrusion

This sustainability indicator is not applicable in this Basin.

4.4 Groundwater Quality

This section compares groundwater quality monitoring results to the GSP's sustainable management criteria and provides a summary of ongoing water quality coordination activities conducted by the GSAs. Groundwater quality data for the evaluation is obtained from the Groundwater Ambient Monitoring and Assessment (GAMA) Groundwater Information System. The maximum concentration of nitrate as N and specific conductivity sampled from the groundwater quality RMP network in WY 2024 is shown in Table 5. The results are compared to the MT and MO for each of the 16 groundwater quality RMPs in the network. The MT for nitrate as N is 10 mg/L (the Title 22 Primary Maximum Contaminant Level, or MCL), and the MT for specific conductivity is 900 micromhos/cm (Title 22 Recommended Secondary Maximum Contaminant Level, or SMCL). The MO is achieved when more than 90% of wells monitored for water quality maintain their range of water quality measurements measured during 1990 to 2020.

For nitrate, 8 RMPs had measurements below the MO, 1 RMP had a measured concentration greater than the MO, no RMPs had a measured concentration greater than the MT, and 7 RMPs were not monitored during WY 2024. For specific conductivity, all 16 RMPs were not monitored during WY 2024. Based on this evaluation, the MO for nitrate was not met as eight of the nine wells with measurements were below the MO (i.e., 88% of RMPs measured maintained their historic concentration, while the MO is set to 90%). The status of specific conductivity in regards to the MO was not evaluated in WY 2024, as the monitoring frequency for this constituent is not annual. The monitoring frequency ranges from 3 to 9 years, with most RMP wells having a monitoring frequency of 9 years, as specified in the GSP. Efforts are underway to evaluate potential approaches to increasing the sampling frequency of specific conductivity.

To ensure that current water quality data is available for future annual reports, efforts will be made to contact the monitoring entities of the wells with missing measurements to facilitate continued data collection. If this communication is not successful, a process to plan for the continued collection of representative water quality data will be developed. Options may include planning alternate monitoring entities for the wells or inclusion of different wells in the network.

As per the GSP, there are currently no SMCs defined for benzene, arsenic, manganese, and iron. Data for these constituents is presented in Table 6 and is provided to track potential mobilization, or exceedances of the primary MCLs or secondary MCLs. As presented, no measured concentrations during WY 2024 result in an exceedance of the MCL or SMCL.

Table 5: Water quality data from WY2024 in the RMP network (Nitrate MT is 10 mg/L; Specific Conductivity MT is 900 micromhos/cm).

Well ID	GSP ID	Nitrate MO (mg/L)	Nitrate WY 2024 Max Measurement (mg/L)	Nitrate Status	SC MO (micromhos/cm)	SC WY 2024 Max Measurement (micromhos/cm)	SC Status
CA4700523_003_003	4700523-003	6.80	8.28	Above MO	540	NA	No measurement
CA4700528_001_001	4700528-001	2.04	NA	No measurement	513	NA	No measurement
CA4700557_001_001	4700557-001	2.42	1.52	Below MO	NA	NA	No measurement
CA4700557_002_002	4700557-002	2.75	2.6	Below MO	NA	NA	No measurement
CA4700559_001_001	4700559-001	9.57	6.04	Below MO	297	NA	No measurement
CA4700577_001_001	4700577-001	6.79	4.29	Below MO	NA	NA	No measurement
CA4700582_001_001	4700582-001	9.77	8.7	Below MO	672	NA	No measurement
CA4700591_002_002	4700591-002	2.90	<0.4	Below MO	1.92	NA	No measurement
CA4700626_001_001	4700626-001	5.05	NA	No measurement	453	NA	No measurement
CA4700627_002_002	4700627-002	3.39	2.8	Below MO	464	NA	No measurement
CA4700638_001_001	4700638-001	1.66	1.26	Below MO	533	NA	No measurement
CA4700663_001_001	4700663-001	0.68	NA	No measurement	NA	NA	No measurement
CA4710011_003_003	4710011-003	5.34	NA	No measurement	627	NA	No measurement
CA4710013_001_001	4710013-001	0.45	NA	No measurement	360	NA	No measurement

Table 5: Water quality data from WY2024 in the RMP network (Nitrate MT is 10 mg/L; Specific Conductivity MT is 900 micromhos/cm). *(continued)*

Well ID	GSP ID	Nitrate MO (mg/L)	Nitrate WY 2024 Max Measurement (mg/L)	Nitrate Status	SC MO (micromhos/cm)	SC WY 2024 Max Measurement (micromhos/cm)	SC Status
CA4710013_002_002	4710013-002	0.40	NA	No measurement	310	NA	No measurement
CA4710013_004_004	4710013-004	1.12	NA	No measurement	310	NA	No measurement

Table 6: Water quality data from WY2024 for benzene, arsenic, manganese, and iron.

Well ID	Result	Analyte	Date	Units	MCL or SMCL	Source
CA4700523_003_003	2	Arsenic	2024-05-02	ug/L	10	Title 22 Table 64431-A
CA4700523_003_003	0.5	Benzene	2024-05-02	ug/L	1	Title 22 Table 64444-A

4.5 Subsidence

To monitor subsidence, the Basin relies on data provided by DWR based on Interferometric Synthetic Aperture Radar (InSAR), a satellite-based remote sensing technique that measures vertical ground surface displacement changes at high degrees of measurement resolution and spatial detail. This data is made available through the DWR SGMA Data Viewer [1] and shows overall subsidence less than 0.1 feet for the entire Basin during the Water Year 2024 (Figure 13), which avoids the occurrence of undesirable results.

[1] https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions

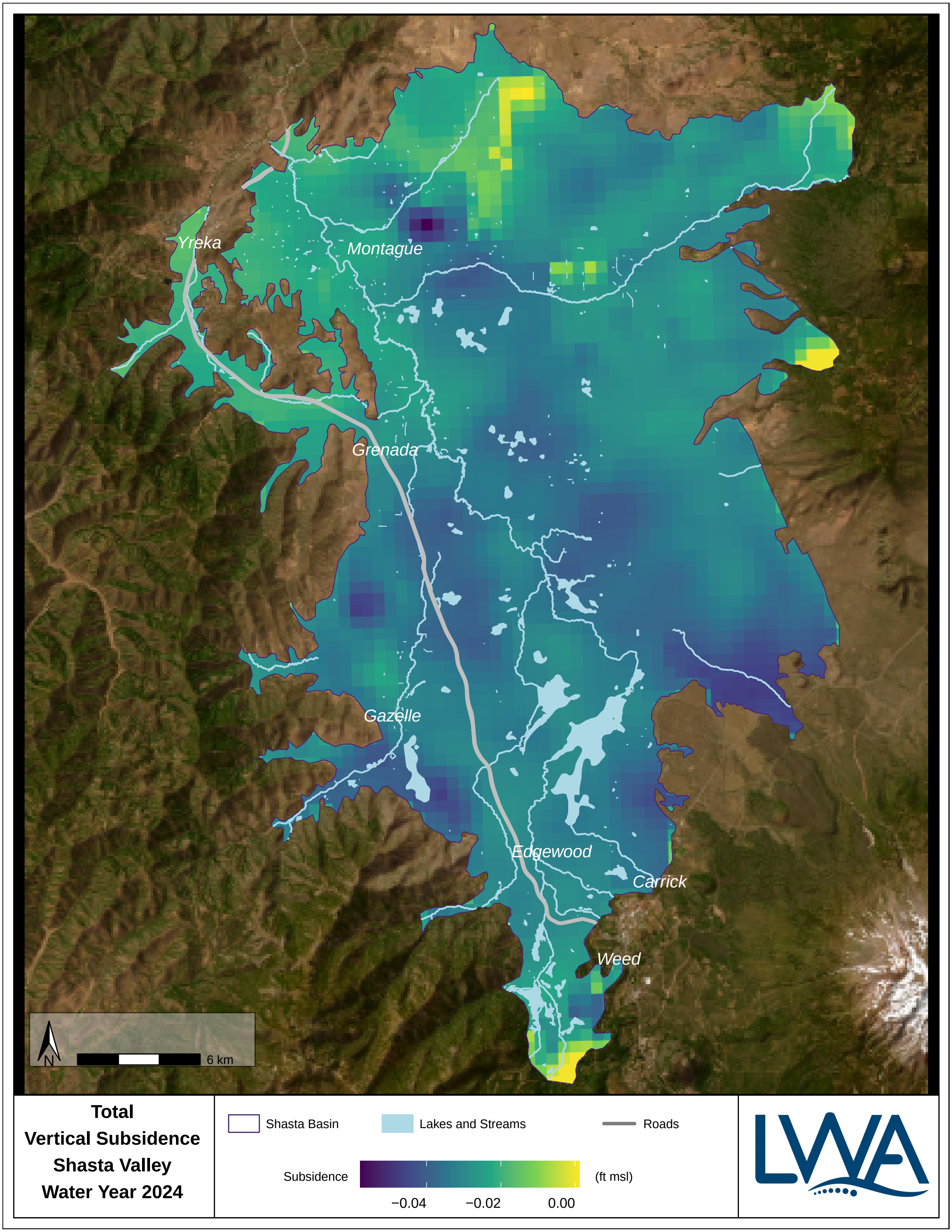


Figure 13: InSAR satellite measured total vertical subsidence (feet) in WY 2024. Note that the processed InSAR instrument and GIS conversion error is roughly +/-0.1 feet (https://gis.water.ca.gov/arcgisimg/rest/services/SAR).

4.6 Interconnected Surface Water

Interconnected surface waters in the Basin are not evaluated for WY 2024 because the updated method using the SWGM to assess SMCs will be ready following additional model calibration in 2025. A component of the grant proposal submitted to DWR's SGM Implementation Grant Program for Shasta Valley is conducting a groundwater-surface water study to better characterize groundwater-surface water interaction in the Basin. From WY 2025 and on the annual report will use the SWGM to determine the location, timing and rate of interconnected surface waters in the Basin.

Chapter 5

Project Implementation and Management Actions

This section provides updates and progress towards implementing the GSP, including implementation of projects and management actions since adoption of the GSP and the most recent annual report. The project and management actions that are described in the GSP are summarized in Table 7, which provides the status of the project, the project's management category (i.e., demand management), and targeted sustainability indicator. Section 5.1 describes the progress on implementing projects and management actions focusing on water year 2024, Section 5.2 describes the activities planned for water year 2025, and Section 5.3 describes additional coordinated activities or management actions that the GSA is conducting with other agencies.

5.1 Implementation of Projects and Management Actions

5.1.1 Progress Made on Addressing Recommended Corrective Actions in the Department's GSP Determination

On April 27, 2023, DWR sent a letter to the GSA, approving the Shasta Valley GSP, with eight recommended corrective actions to be considered and addressed by the Plan's first Periodic Evaluation due in late January 2027. Below is the progress on implementing those actions:

RECOMMENDED CORRECTIVE ACTION 1 - *Coordinate with the Department through the appropriate channels to clearly show what portions of the Basin the GSA has jurisdiction over and intends to manage under the Plan. This should include updating the GSA information on the SGMA Portal and associated geospatial files.*

Corrective Action 1 Progress - Complete. The GSA information has been updated on the SGMA Portal.

RECOMMENDED CORRECTIVE ACTION 2 - *Investigate and work to fill data gaps related to the hydrogeologic conceptual model as follows:* a) The GSA should investigate and improve its understanding of the locations and extent of the bottom of the Basin. b) The GSA should investigate the three water-bearing formations and identify the appropriate principal aquifer(s) for the Basin.

Corrective Action 2 Progress - The results of the AEM survey have been analyzed by the technical team and used to update the geologic model and groundwater model. Additional and ongoing efforts have been taken to fill additional data gaps within the groundwater basin, including expanding the monitoring networks and targeted studies regarding Lake Shastina.

RECOMMENDED CORRECTIVE ACTION 3 – *Investigate and work to fill data gaps related to understanding groundwater conditions as follows:* a) Describe groundwater storage conditions in the Basin including a chart depicting estimates of the change in groundwater in storage, demonstrating the annual and cumulative change in the volume of groundwater in storage, including the annual groundwater use and water year type. b) Provide an estimate of the location, volume, and timing of depletions of surface water due to groundwater extraction.

Corrective Action 3 Progress - The groundwater storage conditions currently estimated by the groundwater model are shown in Figure 8, with all requested data. The depletions of surface water will be determined by the groundwater model in the next annual report.

RECOMMENDED CORRECTIVE ACTION 4 – *Provide a current water budget as required by the GSP Regulations.*

Corrective Action 4 Progress - The current water budget estimated by the SWGM is provided in the current report in Figure 8.

RECOMMENDED CORRECTIVE ACTION 5 - *Provide a description of the relationship between established minimum thresholds for the chronic lowering of groundwater levels and how they avoid undesirable results for each of the other sustainability indicators.*

Corrective Action 5 Progress - The current minimum thresholds are based on the lowest historical groundwater level measure- ments, with a buffer that is either 10% of the historic maximum depth to water measurement, or 10 feet, whichever is smaller. This gives a buffer for operational flexibility under causes such as climate change while the GSA works toward groundwater sustainability. The GSA has initiated the necessary work to address this corrective action in the GSP Periodic Evaluation.

RECOMMENDED CORRECTIVE ACTION 6 – *Water Quality. Page 39 of the Department's April 27, 2023 letter include four recommended actions for water quality.*

Corrective Action 6 Progress - The GSA is working with local agencies to expand the water quality network, which currently relies on public supply wells. The GSA has initiated the necessary work to address this corrective action in the GSP Periodic Evaluation, and the requested changes to the definition of undesirable results and minimum thresholds for water quality will be considered during the five-year update.

RECOMMENDED CORRECTIVE ACTION 7 – *Stream Depletion. Page 39 and 40 of the Department's April 27, 2023 letter include four recommended actions for stream depletion.*

Corrective Action 7 Progress - SWGM is in the process of being updated so interconnected surface water and stream depletion can be determined for future water years. Section 5 of this Annual Report includes additional work by the GSA regarding interconnected surface water, the GSA has initiated additional work to address this corrective action in the GSP Periodic Evaluation.

RECOMMENDED CORRECTIVE ACTION 8 - *The GSA should provide identification of the physical monitoring that will be used to support the SWGM's estimates of depletions of surface water for the interconnected surface water monitoring network*

Corrective Action 8 Progress - Section 5 of this Annual Report lists PMAs that expand physical monitoring for depletions of surface water, including stream gages. The GSA has initiated the necessary work to address this corrective action in the GSP Periodic Evaluation.

5.1.2 Project Activities for WY 2024

During water year 2024 the GSA continued activities necessary to implement the GSP and manage the Basin on a path toward sustainable management. The progress of specific PMAs identified in Table 7 are described below:

Irrigation Efficiency Improvements – Workshops were held in 2024 on efficient water management for forage crops will be held in coordination with the University of California Cooperative Extension (UCCE) and the Tehama Resource Conservation District. The Workshop provided information on a Mobile Irrigation Lab that can provide on-site evaluations of irrigation systems and provide comprehensive reports to producers that detail how their irrigation system is performing, including tips, suggestions, and recommendations based on data collected during the inspection. After the workshop, UCCE visited a few farms in Scott and Shasta Valley and started planning for future farm assessment.

Well Inventory – During water year 2024, significant progress was made to inventory the wells within the Shasta Basin. The well inventory was initiated with the Department's existing Well Completion Report (WCR) dataset. Each well in the WCR dataset was reviewed in satellite imagery for spatial accuracy, and the well's location was corrected to the extent possible. Categories within the well's feature attributes in the WCR were also reviewed and corrected for completeness and accuracy. Outreach on progress and methodology was shared at multiple Advisory Committee meetings. An approach to identify parcels that likely have wells, but do not have wells identified in the WCR dataset, was developed. Development and refinement of the well risk assessment with use of groundwater flow model and updated understanding of the basin's geology continued. This included preparation for scenarios and the evaluation of water level drawdown due to pumping.

Well Permitting - The GSA continued to work with the Siskiyou County Environmental Health Department's well permitting staff to develop a new "Well Permitting Guidance Document" that will update the County well permitting policies and comply with the Governors Executive Order (EO N-3-24). The methodology in the draft "Well Permitting Guidance Document" was used on several test cases to further refine the guidance and criteria used to permit future wells.

Data Gaps and Data Collection – Steps were taken to reduce data gaps in the Basin including the installation of continuous groundwater level and surface water monitoring sites to monitor and support the implementation of planned projects and management actions. Monitoring, evaluation, and/or quality assurance and quality control of data from groundwater level, precipitation, and flow stations (17 continuous groundwater level sites managed by the GSA, as well as data collected from wells monitored by other agencies) continued. These sites will also be used to improve representation and understanding of the Basin's different hydrogeologic units. Geophysical data collected during airborne electromagnetic (AEM) surveys was collected and analysis was conducted by the technical team. The AEM data partially covered the Basin, but will increase confidence in the model. This work included the use of Leapfrog Works (3D Geologic Modeling software) to revise and edit the MODFLOW numeric flow model, and also to improve the conceptual understanding of the Shasta Valley geologic history. Additionally, the surface water-groundwater transect monitoring was continued by the Shasta Valley Resource Conservation District.

With respect to water quality, additional wells for potential inclusion in the RMP network were scouted and sampled for nitrate and specific conductivity. The intent is to include additional RMP wells in the GSP's RMP network. Additional sampling occurred to evaluate the impact of pesticides associated with cannabis cultivation on groundwater and surface water.

Data collected and used to support GSP efforts was largely made accessible through the Data

Management System (DMS). The DMS provides access to well location and construction details, historical water level data, telemetered water level data (collected by the GSA and DWR), and lithology data.

Shasta Watershed Groundwater Model (SWGM) Model Update – Sensitivity analysis and calibration of the current groundwater-surface water model were conducted. The dataset of groundwater elevation and streamflow observations was extended to include water year 2024 and new monitoring stations. Geophysical data collected during the airborne electromagnetic (AEM) surveys, along with a new digital elevation model, were incorporated into the geological model. The streamflow and recharge components of the Shasta Valley Precipitation Runoff Modeling System (PRMS) model were updated. The PRMS model was updated with data from local monitoring stations (precipitation, temperature, and snowpack) and was extended to water year 2024.

Upland Management – In June 2024, the GSA and technical team met with the Ad Hoc group that was formed during an Advisory Committee meeting to discuss existing and planned upland management projects with the potential to be monitored for their impact on water resources. No specific projects were identified; however, it was recommended to utilize existing spatial datasets on prescribed burns, wildfires, and past upland management projects to assess their impacts on water resources. During water year 2024, these spatial datasets were acquired, and the locations of fires or management activities were correlated with existing data on streamflow, groundwater levels, precipitation, and snowfall. A methodology was then developed to evaluate their impact on water resources. Model scenarios for upland management were developed with the Shasta Valley PRMS model. This includes coordination with the US Department of Agriculture (USDA) Lost Meadow Model, which predicts potential meadow restoration projects. The effectiveness of the USDA Lost Meadow Model was tested within the neighboring Scott Valley, with plans to apply to Shasta Valley.

Public Outreach - The GSA has continued public outreach by visiting local well owners who report concerns about groundwater levels in their wells and also worked to develop opportunities to improve monitoring and data collection to aid the GSA in characterizing and improving groundwater reliability. Quarterly Advisory Committee meetings, open to the public, were also conducted.

5.2 Activities Anticipated for the Coming Year

Data Gaps and Data Collection - The GSA plans to continue the installation of continuous groundwater level and surface water monitoring sites to support the implementation of planned projects and management actions. These new monitoring sites will improve the representation of groundwater levels throughout the Basin and improve the representation of the different hydrogeologic units. Current areas identified for installation of additional monitoring wells include the Big Springs area, Gazelle, and the central portion of the Basin. Expansion of the water quality monitoring network is planned to occur, with the addition of representative monitoring points. Sampling of pesticides will continue to evaluate the impact of pesticides associated with cannabis cultivation on groundwater and surface water. Groundwater-surface water connectivity will continue to be evaluated in the Basin. The installation of temporary and permanent stream gages to measure surface flows will occur at multiple sites including the inflow to Lake Shastina as well as the outflow to various canal systems. Additionally, sites will be identified and prioritized for pumping tests to be conducted to evaluate the impact of pumping on the water table and nearby surface waters. These studies will eventually be paired with geophysical surveys as well as geochemical sampling to estimate and refine water mass balances. The DMS will continue to be developed. Improvements to the DMS include the addition of water quality data, stream gage data, and GSP specific data including RMPs and associated SMC.

Irrigation Efficiency Improvements – The GSA will continue to coordinate with the State Water Board on measuring evapotranspiration (ET), and funding options to install additional measurement stations in the Basin. The stations would collect soil moisture and ET data and would be used to determine suggestions on best practices for irrigation to improve efficiency. The GSA would like to install stations in fields with different crop types and irrigation methods, and is looking for willing landowners okay with having a station on their property for three years. Additionally, on-site evaluations of irrigation systems will continue to be conducted by the Mobile Irrigation lab to provide reports to producers on their irrigation system performance, including tips, suggestions, and recommendations based on data collected during the inspection.

Well Inventory – During the upcoming water year the GSA is identifying parcels that likely have wells, but do not have wells identified in the WCR dataset. The parcels with likely wells will be included in the well inventory. A potential next step is to conduct outreach to owners of the parcels to confirm if a well exists on the property. Information from the Well Inventory will continue to be incorporated into the model and also be used to inform the Fee Study conducted to identify options to fund groundwater management in the Basin.

Well Permitting – The GSA will continue to work with the Siskiyou County Environmental Health Department's well permitting staff to develop an updated "Well Permitting Guidance Document" that will comply with the Governors Executive Order (EO N-3-24).

Recharge Project - Siskiyou County Flood Control and Water Conservation District received State Water Resources Control Board Temporary Permit 21469 (TP21469) on January 31, 2025, enabling the Shasta Westside Recharge Project designed to augment groundwater supply to prevent domestic wells in the Grenada area from running dry. TP21469 is based on the conditions submitted in Application T033460 and reflects comments and requested conditions from the California Department of Fish and Wildlife consultation, and protests by the Friends of the Shasta River. The Shasta Westside Recharge Project diverts Shasta River during high flows for recharge via flood irrigation of pasturelands within the Grenada Irrigation District (GID). Diversion and conveyance of river water to the targeted fields is through the existing GID infrastructure. Prior to diversion, TP21469 requires updating the Lake and Streambed Alteration (LSA) Agreement for the GID diversion to include the December through March window and obtaining a North Coast Regional Board Low-Threat Conditional Waiver. Conditions for diversion include: limited to within December 1 to March 31; daily flowrate at Yreka USGS gage must exceed the 90th percentile for that day (table of daily flows specified in the permit); four 90th percentile days must occur; diversion rate is the limited to the lesser of 40 cfs, difference between the actual flow and the 90th percentile flow at the GID diversion, and 20 percent of the river flow; and diversion season is limited to a total of 4,800 ac-ft.

Shasta Watershed Groundwater Model (SWGM) Model Update – A new soil water budget (SWB) component will be incorporated into the groundwater model to estimate groundwater pumping, surface water diversion, and deep percolation at irrigated fields. Observations of streamflow and groundwater elevations will be extended to include water year 2024, and new monitoring stations will be incorporated into the model. Additionally, the groundwater model will continue to be refined and calibrated.

Upland Management – Data from existing spatial datasets of prescribed burns, wildfires, and past upland management projects will continue to be evaluated to assess their effects on water resources. Streamflow data, and other hydrologic data including precipitation and snowfall, will be used during the evaluation. The model scenarios developed in the previous year will be analyzed using the PRMS model, which will include: juniper removal, the impact of wildfire, and the impact of wildfire.

Public Outreach – The GSA will continue public outreach by working with the public to develop opportunities to improve monitoring and data collection. Quarterly Advisory Committee Meetings, open to the public, will also be conducted.

5.3 Coordination

State Water Resources Control Board – GSA staff meets biweekly with SWRCB staff to discuss updates and activities related to SWRCB's Emergency Regulation Curtailments. The two parties discuss updates to curtailment actions in place, including Local Cooperative Extensions (LCS) and activities that may have impacts on groundwater management.

The GSA will continue to track the SWRCB emergency regulations and permanent flow setting process and the resulting impacts to water use, ability to achieve interim milestones set for sustainable management criteria, and any changes to project and management actions. The GSA anticipates participating in the permanent flow setting process through public comments, coordination on relevant GSP implementation efforts, and sharing data collected through the GSA's monitoring networks.

Other new regulations that the GSA will be tracking, and engaging with, in the coming water year include the Waste Discharge Requirements (WDR) for Agricultural Operations in the Scott and Shasta Watersheds, which is under development by the North Coast Regional Water Quality Control Board.

Karuk Tribe – During water year 2023 the GSA worked to finalize the Memorandum of Understanding (MOU) with the Karuk Tribe regarding coordinating on aspects of the GSP implementation in the Scott and Shasta basins, and the Final MOU was signed on May 3, 2023. The Shasta groundwater committee has a Karuk staff member as a representative. GSA staff continually works with DWR provided facilitation support services staff to engage with the Karuk Tribe to discuss pertinent updates regarding GSP implementation and project development.

Table 7: Project and Management Actions Summary.

Project Title	**Status**	**Project Category - Targeted Sustainability Indicator(s)/Benefits**	**Project Description**
Well Drilling Permits and County of Siskiyou Groundwater Use Restrictions	Existing/ Ongoing	Demand Management - Groundwater levels	Siskiyou County Well Drilling Permits (Standards for Wells, Title 5, Chapter 8 of Siskiyou County Code of Ordinances).

Table 7: Project and Management Actions Summary. *(continued)*

Project Title	Status	Project Category - Targeted Sustainability Indicator(s)/Benefits	Project Description
Scott and Shasta Valley Watermaster District	Existing/ Ongoing	Demand Management - Interconnected Surface Water	Implements Shasta River Decree. Among other things, a watermaster assists in managing water leases under the authority of Shasta River Water Trust and 1707 dedications and transfers.
Shasta Watershed Groundwater Model (SWGM) Model Update and Isotope Results	Active	GSP Implementation	Update the Shasta Watershed Groundwater Model and conduct a groundwater isotope study.
Novy Rice Zenkus Fish Passage Improvement Project	Active	Habitat Improvement	Improve fish habitat on the Shasta River.
Montague- Grenada Weir Modification Project	Active	Habitat Improvement - Interconnected surface water	Improve fish passage on the Shasta River.
Piezometer Transect Study Project	Active	Demand Management – Groundwater levels	Conduct piezometer transects at key reaches of primary surface water bodies in the Basin.
City of Yreka Water Demand	Active	Demand Management – Groundwater levels	City water shortage contingency ordinance.
Shasta River Safe Harbor Agreement	Active	Habitat Improvement	Improve fish habitat on the Shasta River.
Enhancement of Survival Permits Authorizing Shasta River Template Safe Harbor Agreement and Associated Site Plans/ Recovery of Southern Oregon/Northern California Coast (SONCC) Coho Salmon	Active	Habitat Improvement - Interconnected Surface Water	Habitat enhancement on private land.
Shasta River Tailwater Reduction Plan	Active	Conjunctive Use -Groundwater quality	Reduce tailwater's negative impacts to water quality.
Upland Management	Active	Supply Enhancement – (1) Improved groundwater recharge, (2) groundwater levels, (3) habitat	Upland management includes removal of excess vegetation. This can occur on US Forest Service, Bureau of Land Management, or private land.

Table 7: Project and Management Actions Summary. *(continued)*

Project Title	Status	Project Category - Targeted Sustainability Indicator(s)/Benefits	Project Description
Data Gaps and Data Collection	Active	GSP Implementation	Prioritization and actions to address data gaps during GSP implementation.
Aquifer Characterization Analysis	Active	Demand Management – (1) Groundwater levels, (2) Interconnected Surface Water	Conduct aquifer characterization studies with large capacity wells.
Avoiding Significant Increase of Total Net Groundwater Use from the Basin	Active	Demand Management – (1) Groundwater levels, (2) Interconnected Surface Water	Avoid significant future increase of total net groundwater use above the most recent 20 year period (2000-2020) within the Basin through planning and coordination with land use zoning and well permitting agencies.
Conservation Easements	Planning Phase	Supply Augmentation – Interconnected Surface Water	Conservation easements in Shasta Valley that enhance stream flow during the critical low flow period.
Upslope Water Yield Projects	Planning Phase	Supply Augmentation – Interconnected Surface Water	Building green infrastructure in the upper watershed to increase water yield. Green infrastructure includes fuel reduction, road improvements, canopy opening to manage snow shade and accumulation, and other large landscape projects that increase water storage within the upper watershed during wet periods and baseflow from the upper watershed during dry periods.
Habitat Improvement in Shasta Watershed	Planning Phase	Habitat Improvement - Interconnected Surface Water	Improve wildlife habitat conditions in the Shasta watershed
Instream Flow Leases	Planning Phase	Supply Augmentation – Interconnected Surface Water	Temporary transfer of a water rights to protect instream flows.

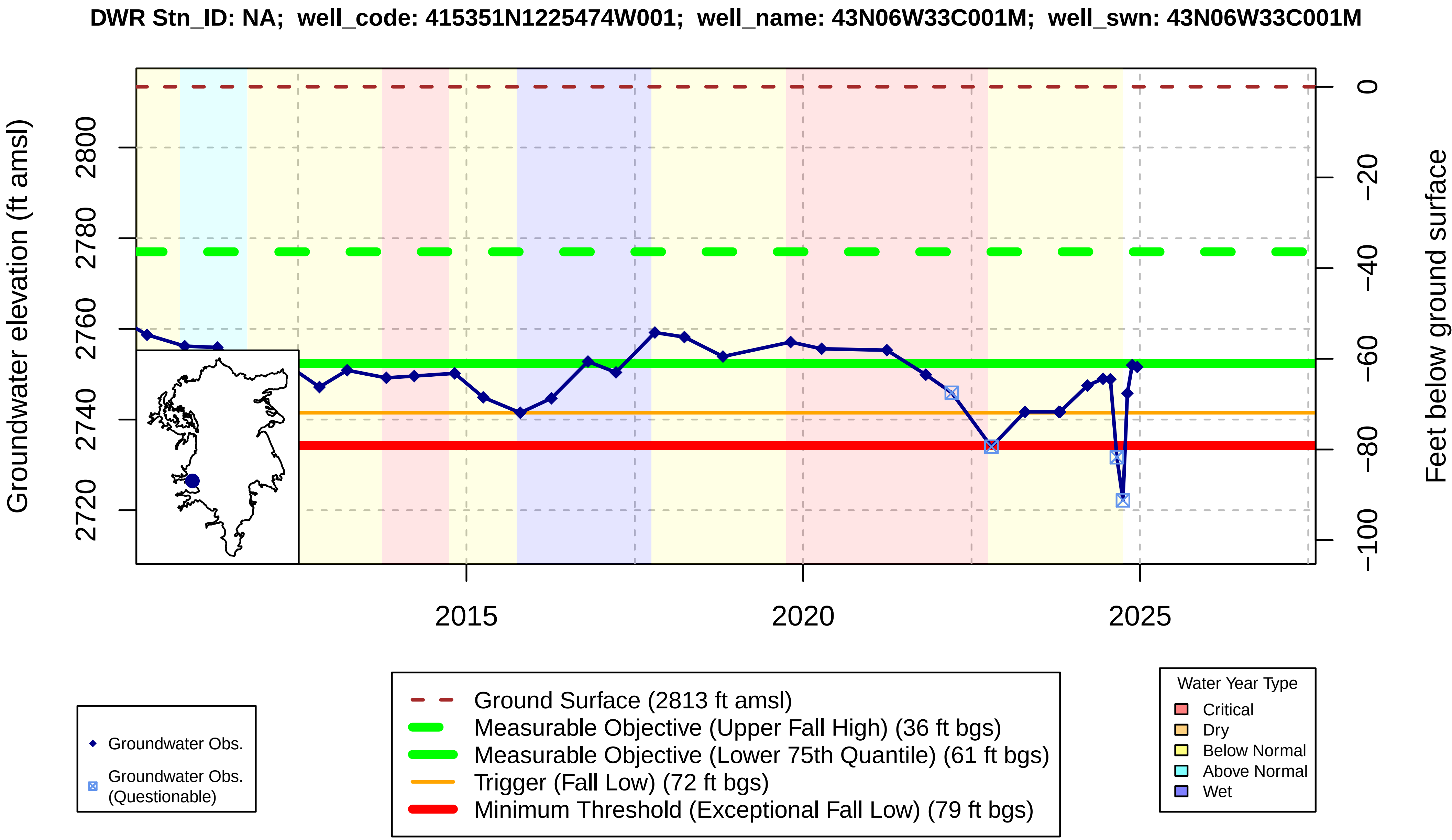
Table 7: Project and Management Actions Summary. *(continued)*

Project Title	Status	Project Category - Targeted Sustainability Indicator(s)/Benefits	Project Description
Irrigation Efficiency Improvements	Active	Demand Management – (1) Groundwater levels, (2) Interconnected Surface Water	Increase irrigation efficiency (and in some cases, yields) through assessing infrastructure or equipment improvements. Consider funding incentives through the NRCS EQIP program.
Juniper Removal	Conceptual Phase	Habitat Improvement - (1) Groundwater levels, (2) Interconnected Surface Water	Juniper removal
Public Outreach	Active	GSP Implementation	Public outreach and education for GSA stakeholders.
Reporting of Pump Volumes	Conceptual Phase	Demand Management – Groundwater levels	Reporting of pump volumes for pumps above 500 gpm and commercial purposes.
Voluntary Managed Land Repurposing	Conceptual Phase	Demand Management – Groundwater levels	Reduce water use through voluntary managed land repurposing activities including term contracts, crop rotation, irrigated margin reduction, conservation easements, and other uses
Well Inventory Program	Active	GSP Implementation	Improve the GSA database of wells within the Basin

Appendix A - Water Level Hydrographs

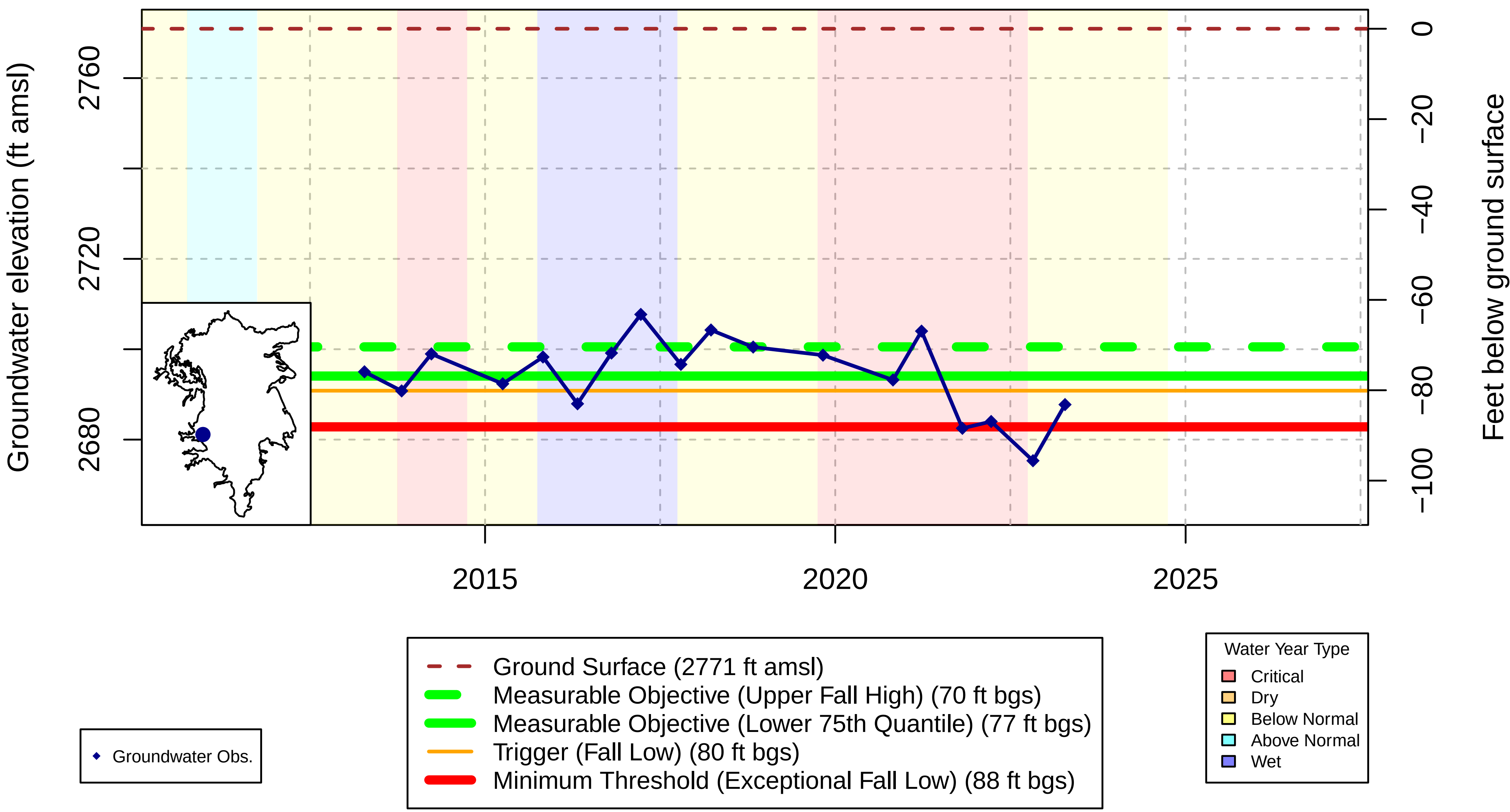
This appendix contains groundwater level hydrographs to document the Groundwater Elevation and Storage Sustainability Management Criteria. Appendix A.1 shows hydrographs for each RMP. The historical hydrographs for these RMPs were used to set the minimum thresholds and measurable objectives in the GSP. The designated SMCs are shown on each hydrograph in Appendix A.1. Appendix A.2 shows general hydrographs for the larger GSP monitoring network, including wells for which SMCs were not defined.

Appendix A.1 - Water Level Representative Monitoring Network (RMP) Hydrographs



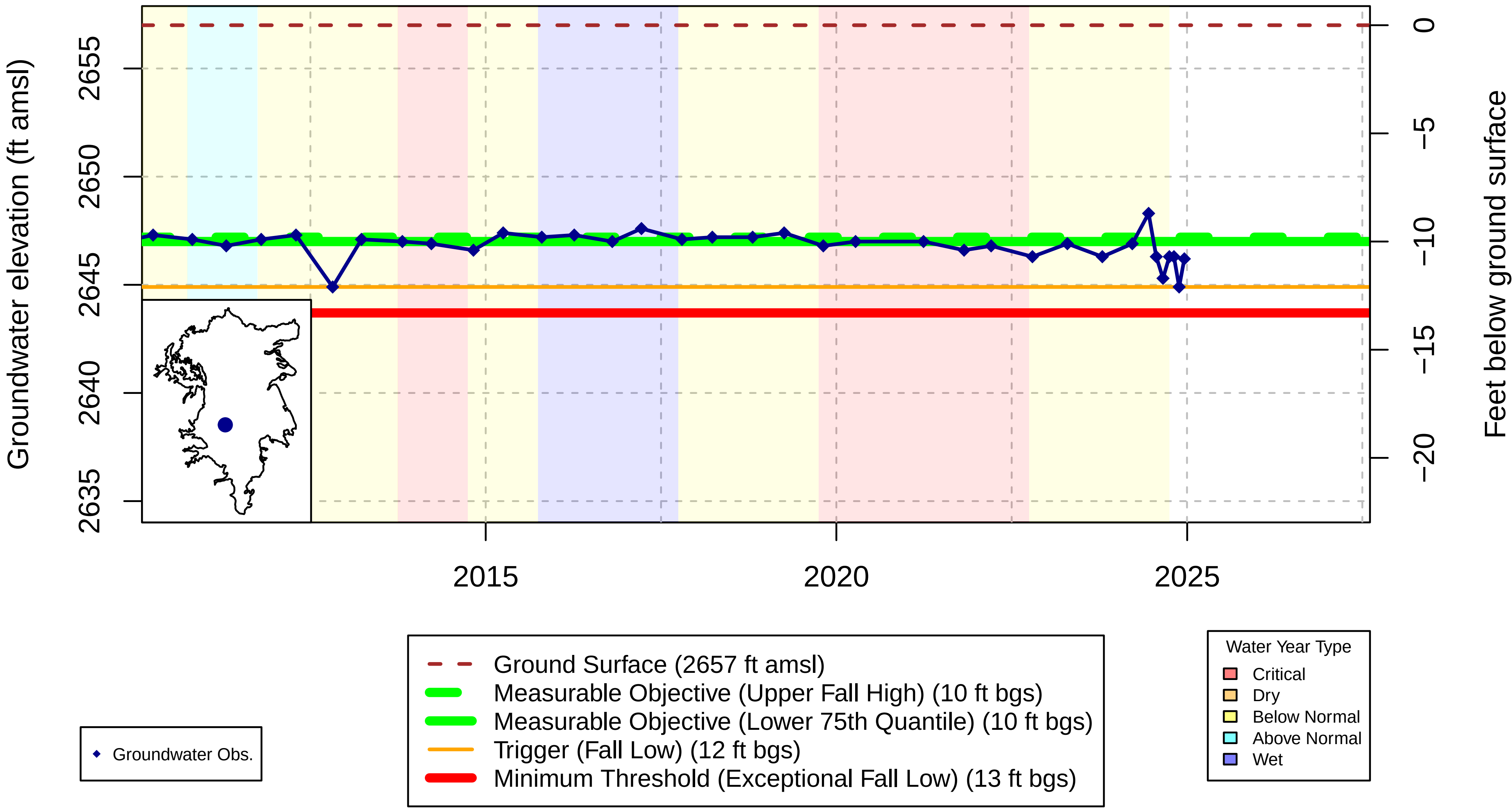
Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.

DWR Stn_ID: NA; well_code: 415444N1225387W001; well_name: SV03; well_swn: NA

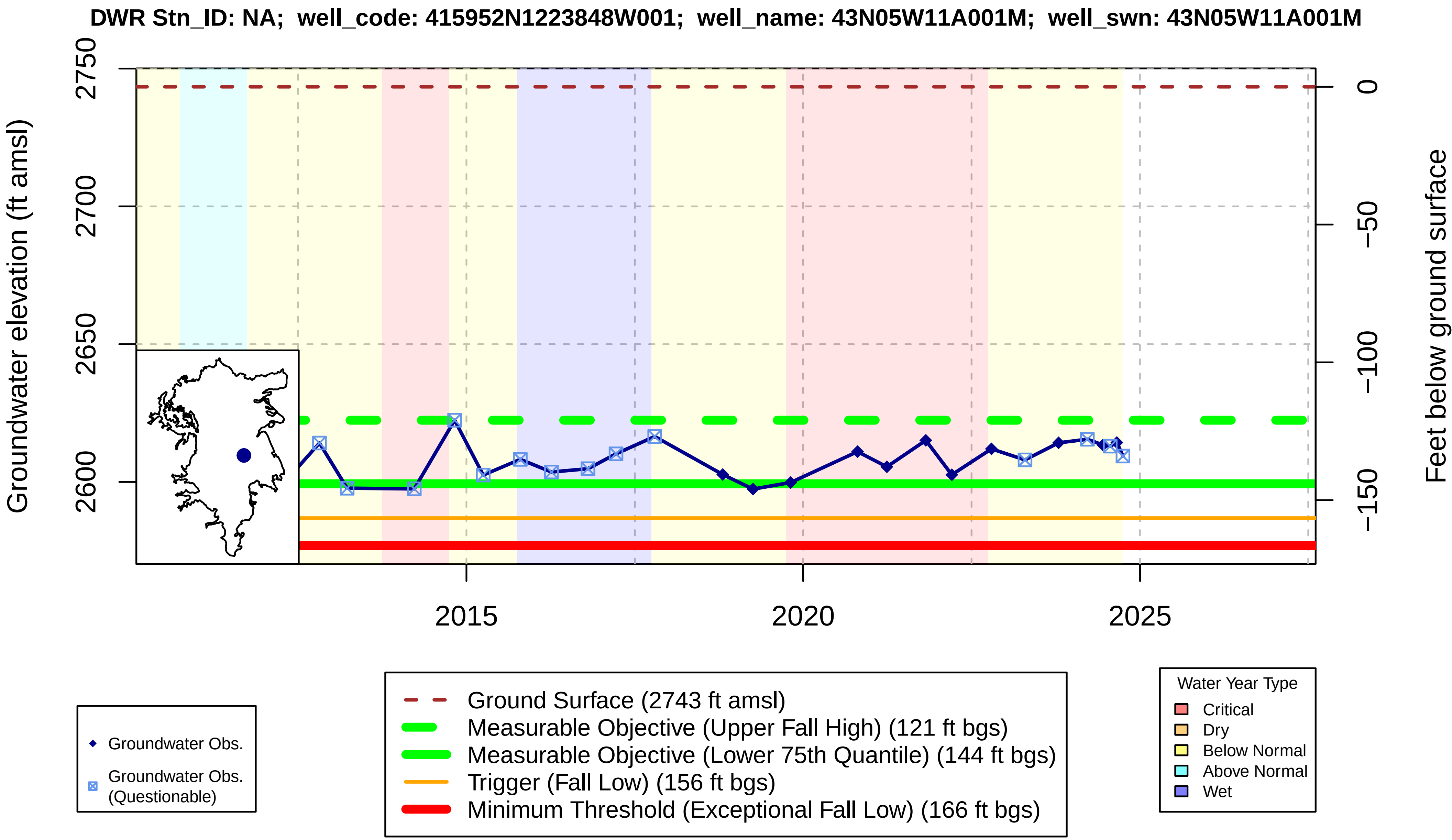


Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.

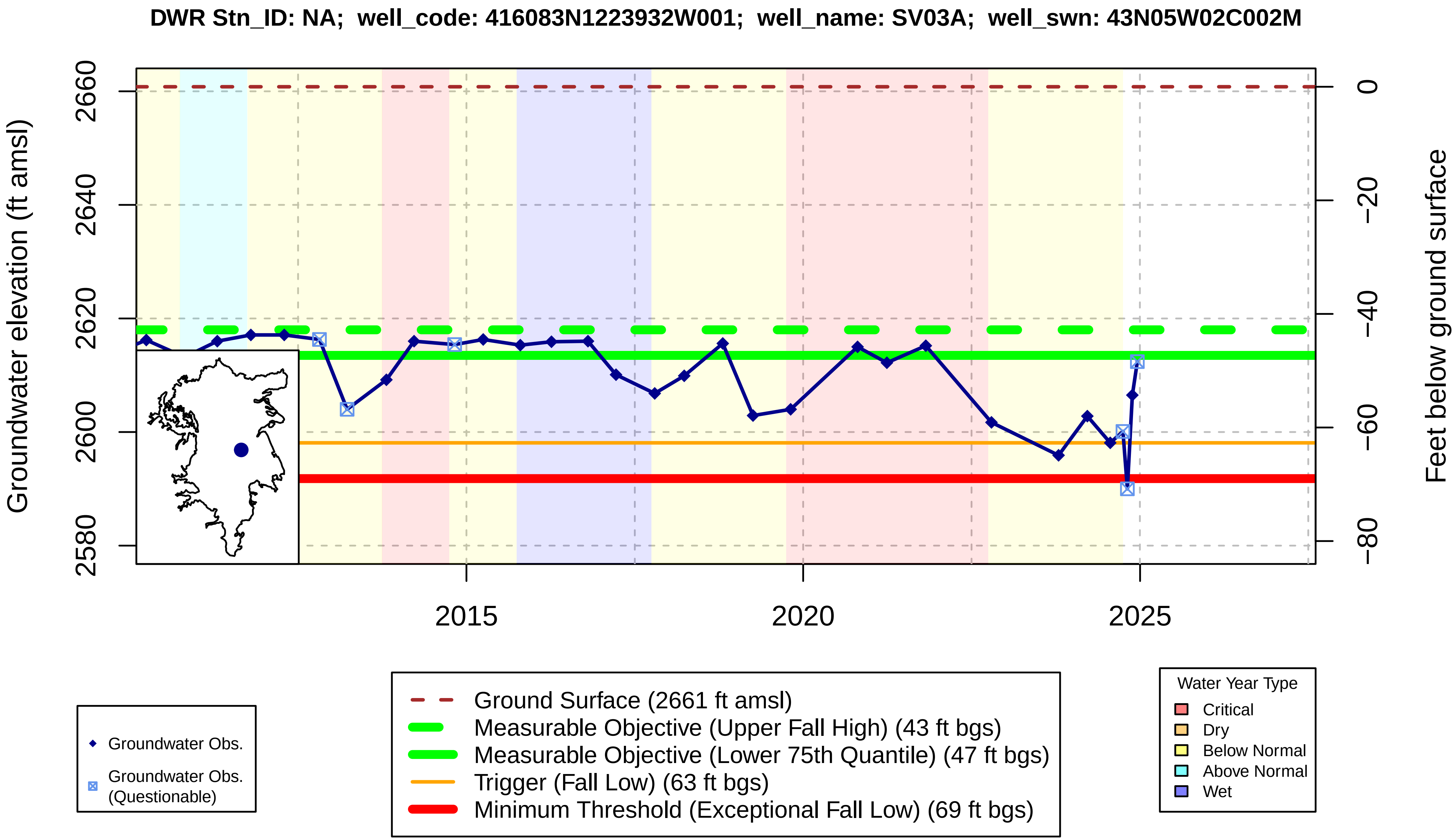
DWR Stn_ID: NA; well_code: 415601N1224718W001; well_name: 43N05W19F002M; well_swn: 43N05W19F002M



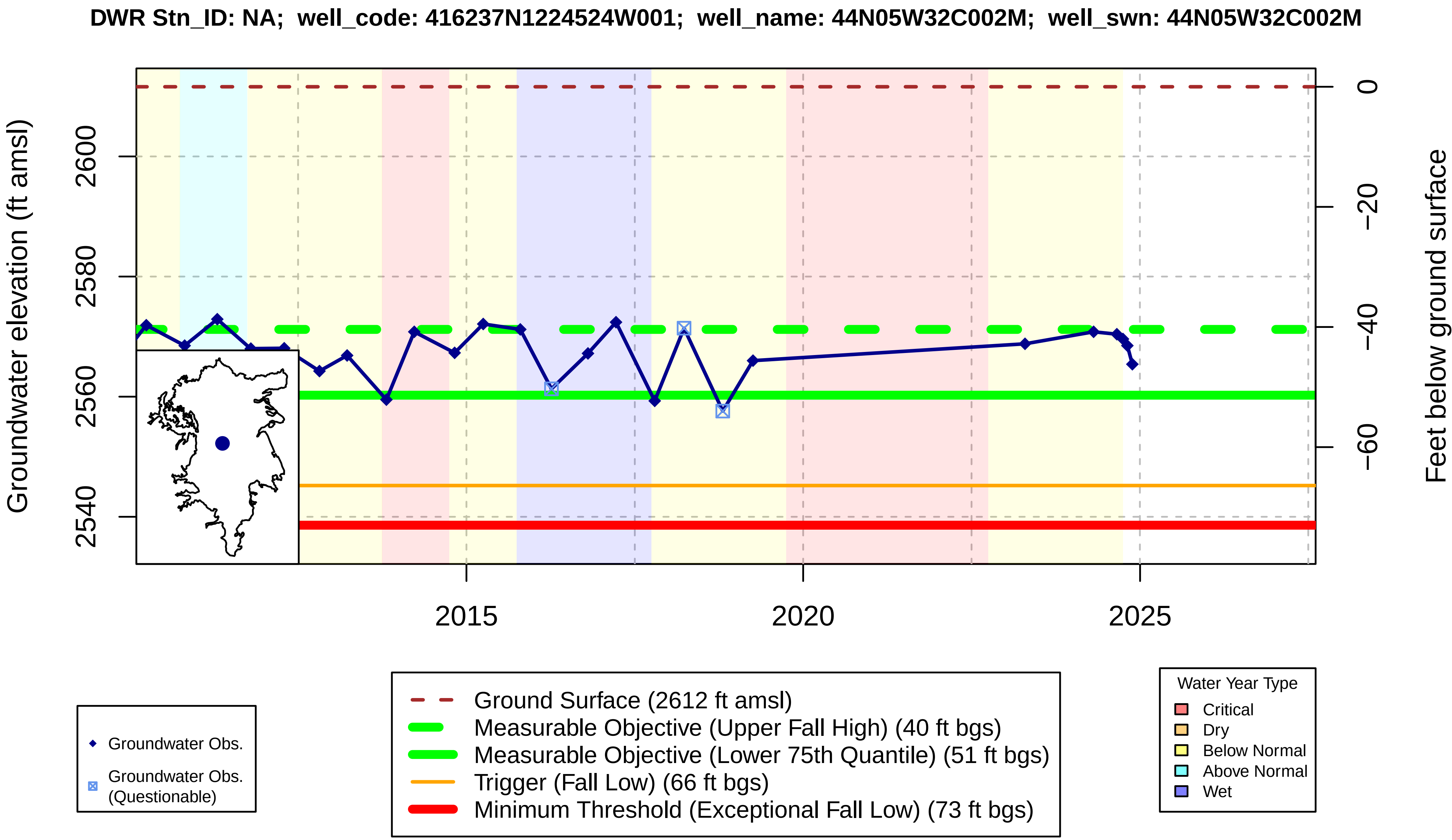
Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.



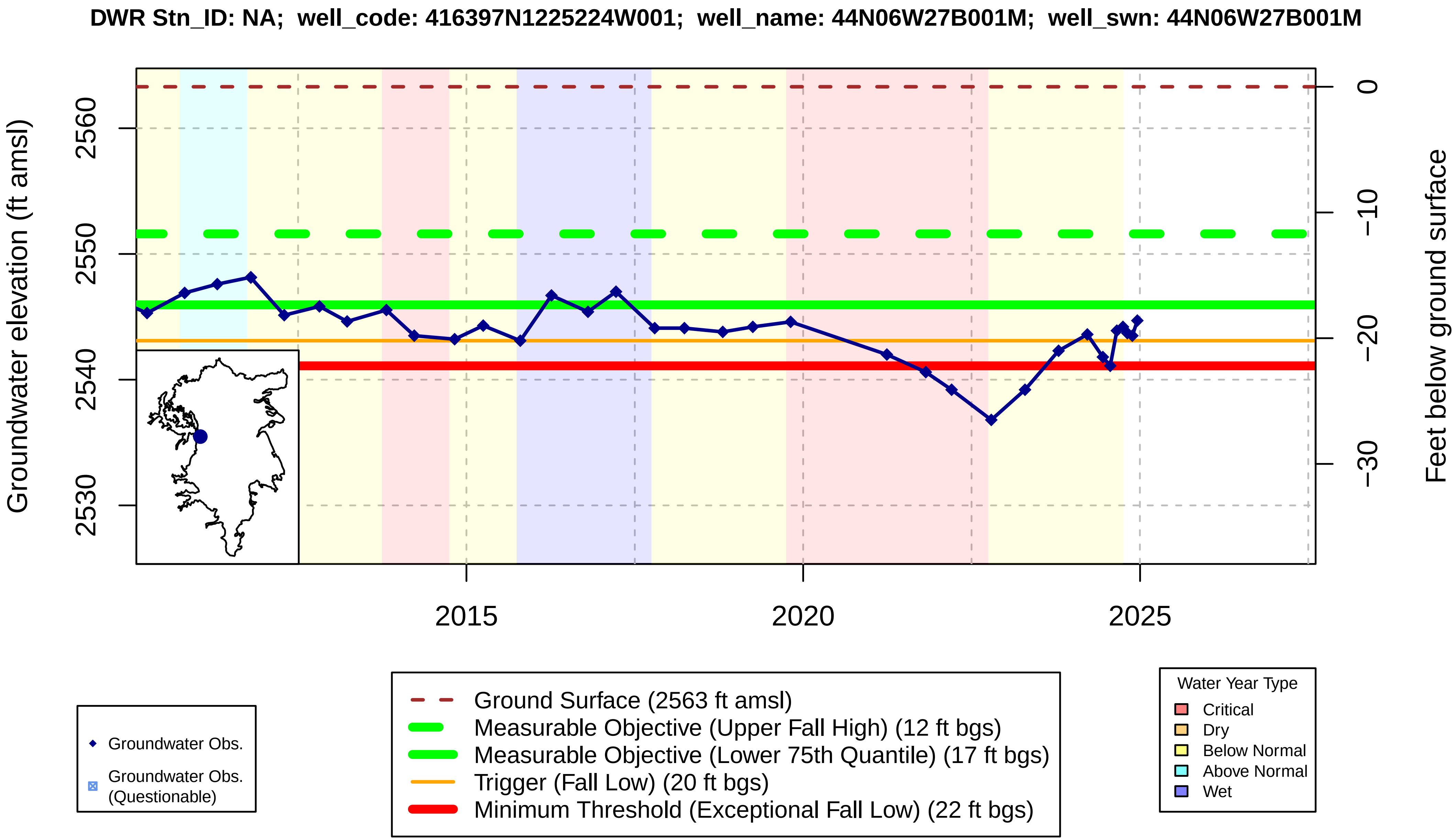
Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.



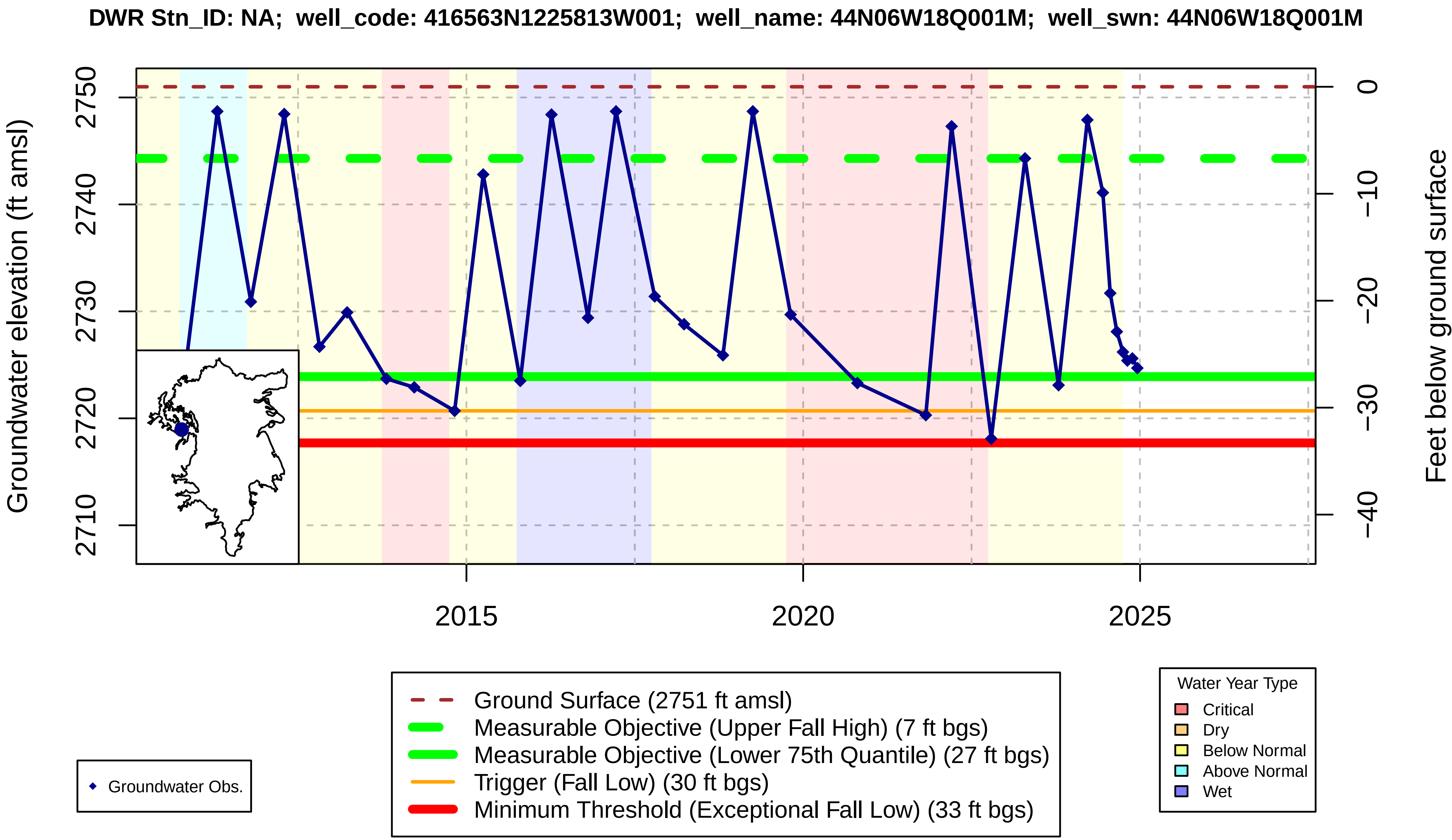
Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report. The results will be finalized once DWR updates the water year type dataset for these years.



Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.

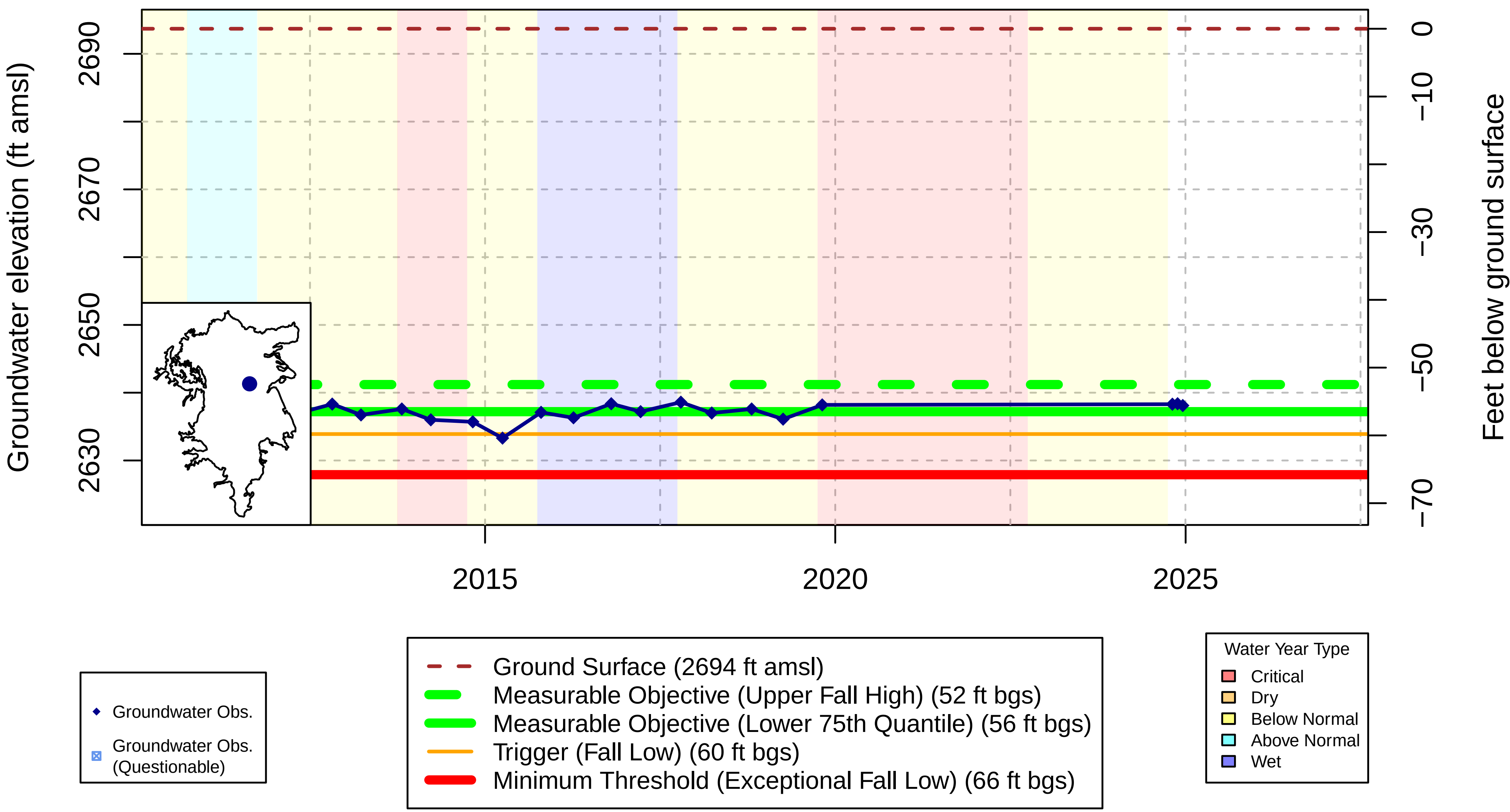


Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.

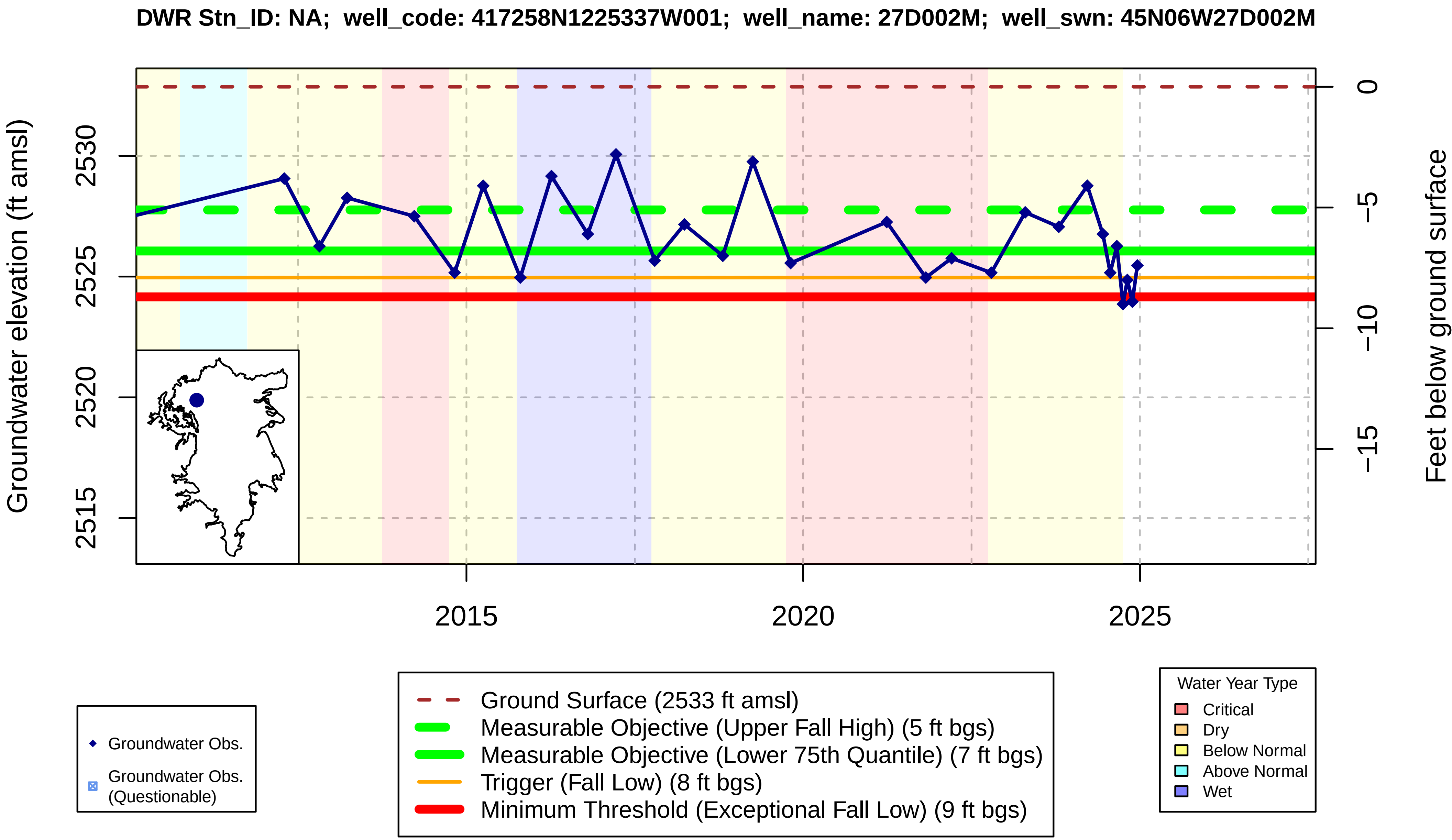


Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.

DWR Stn_ID: NA; well_code: 416595N1223971W001; well_name: 44N05W14M002M; well_swn: 44N05W14M002M

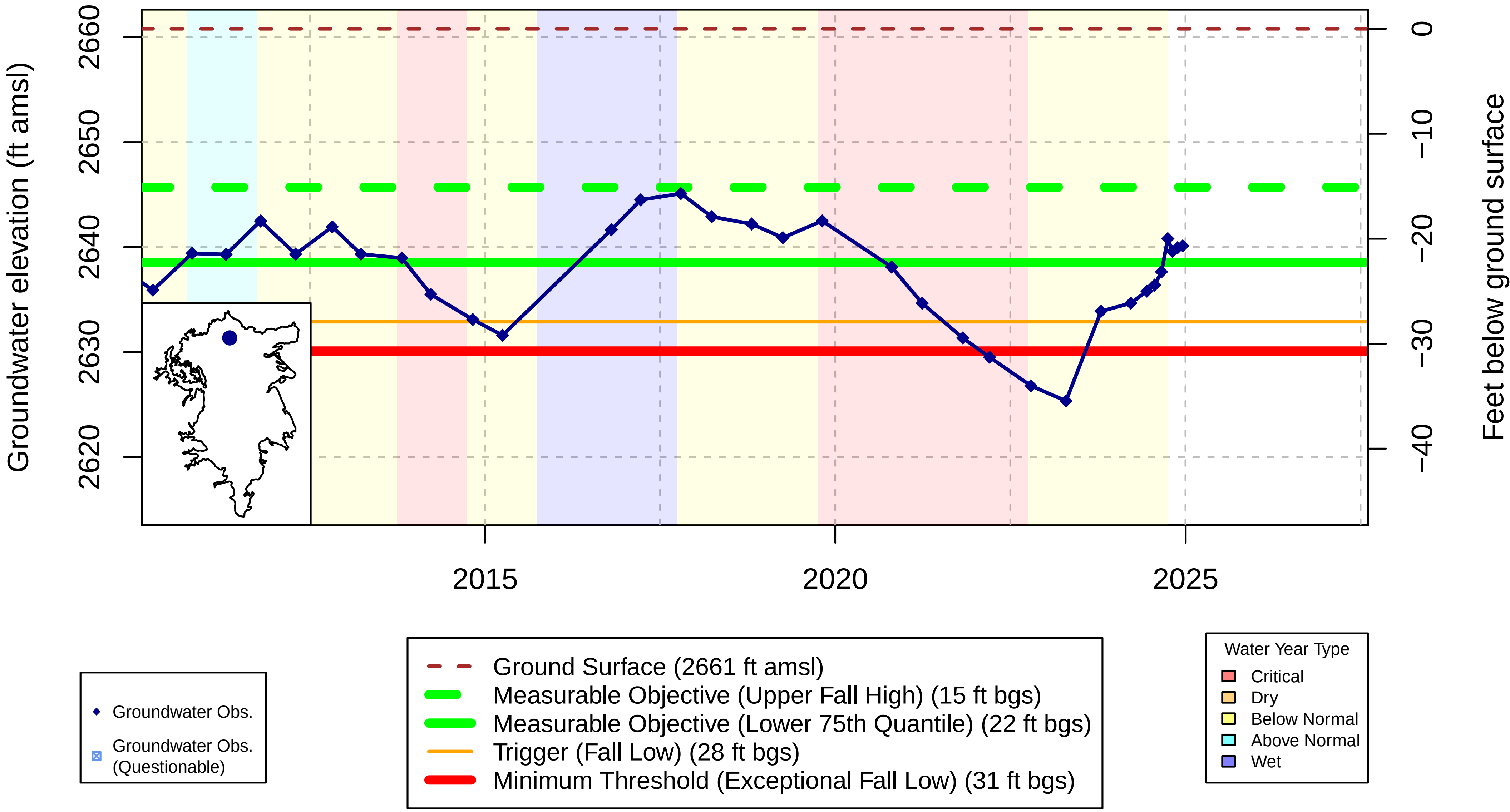


Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.

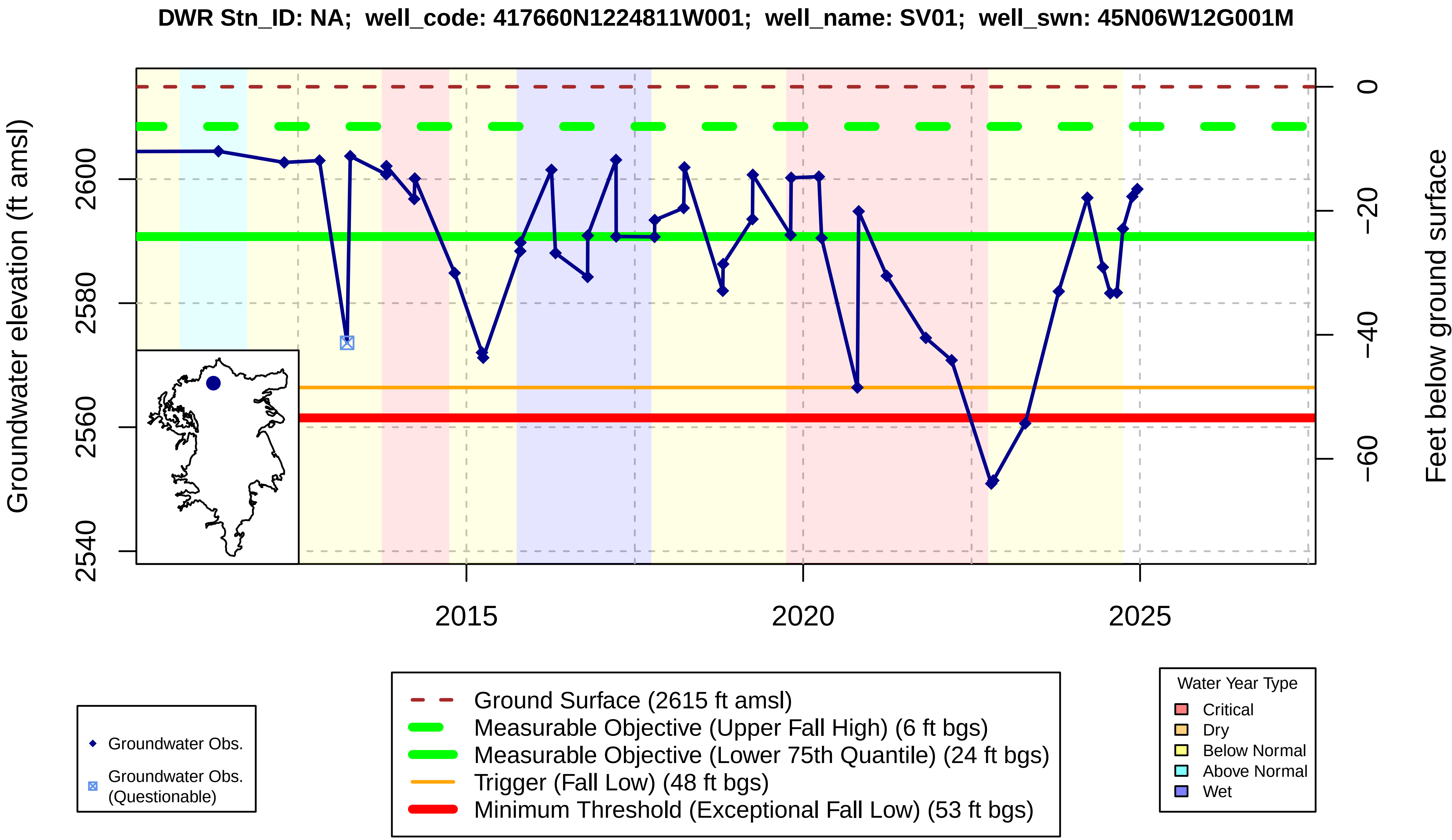


Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report. The results will be finalized once DWR updates the water year type dataset for these years.

DWR Stn_ID: NA; well_code: 417638N1224574W001; well_name: 45N05W07H002M; well_swn: 45N05W07H002M

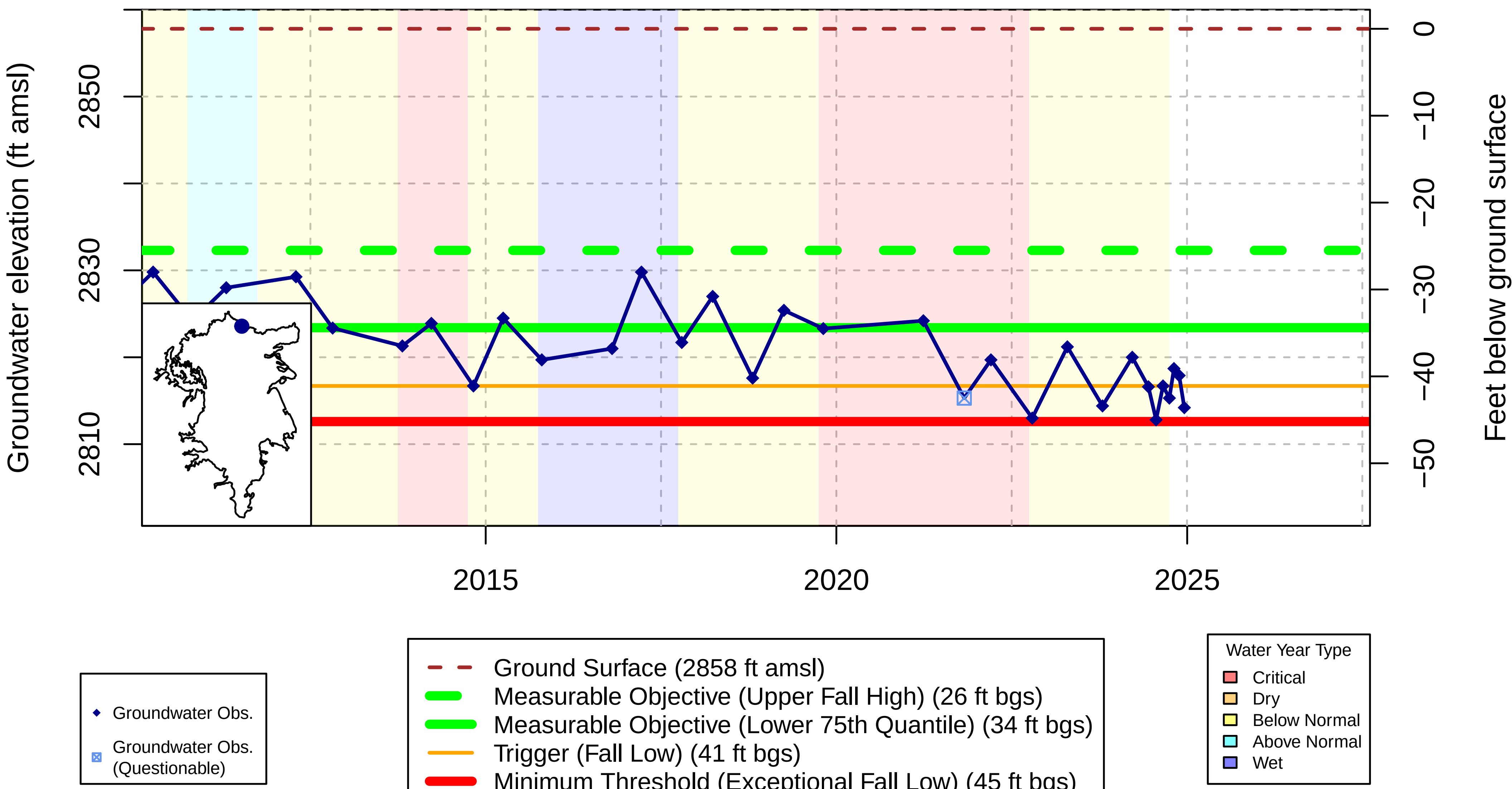


Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.



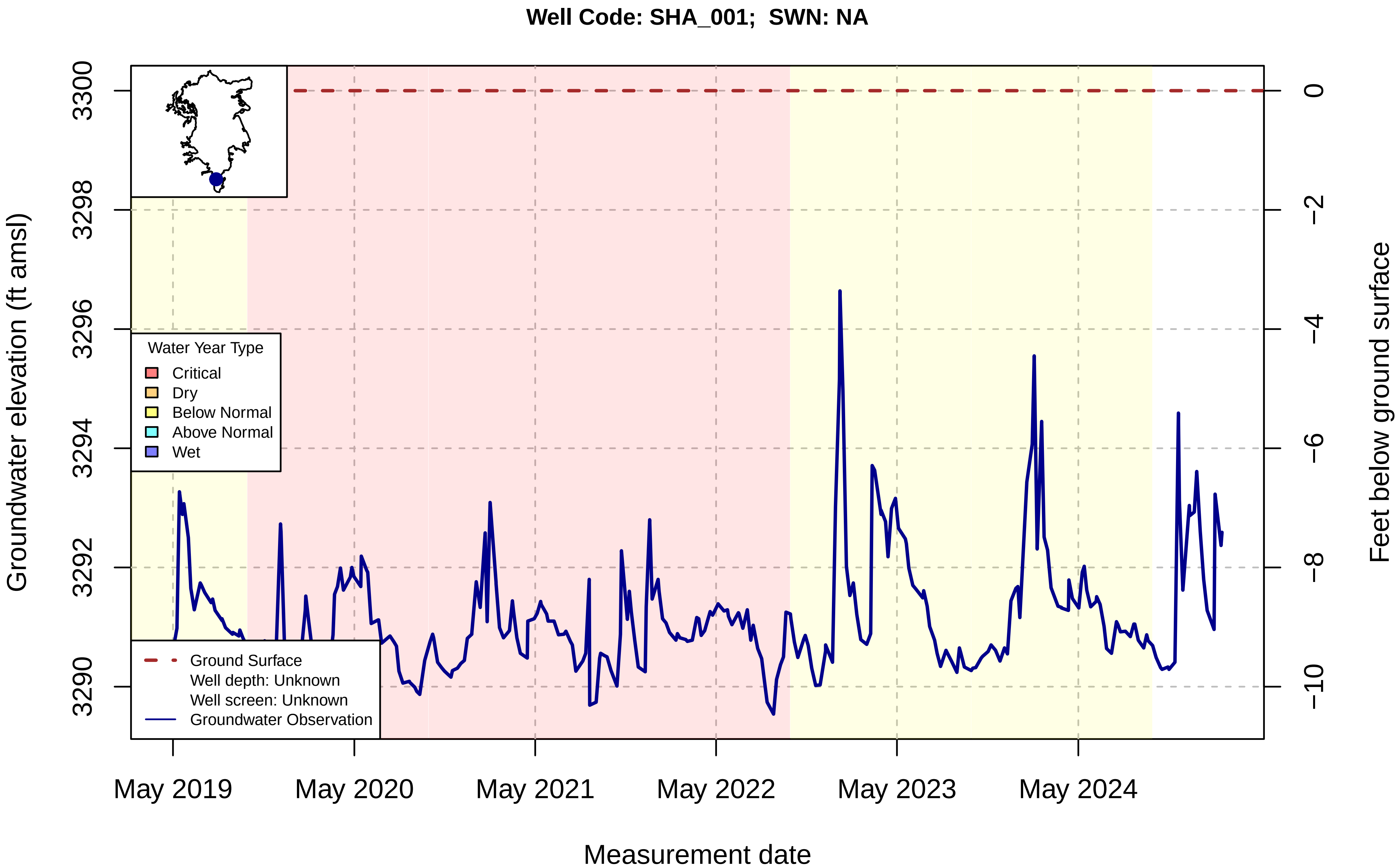
Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report.
The results will be finalized once DWR updates the water year type dataset for these years.

DWR Stn_ID: NA; well_code: 417916N1224217W001; well_name: 46N05W33J001M; well_swn: 46N05W33J001M

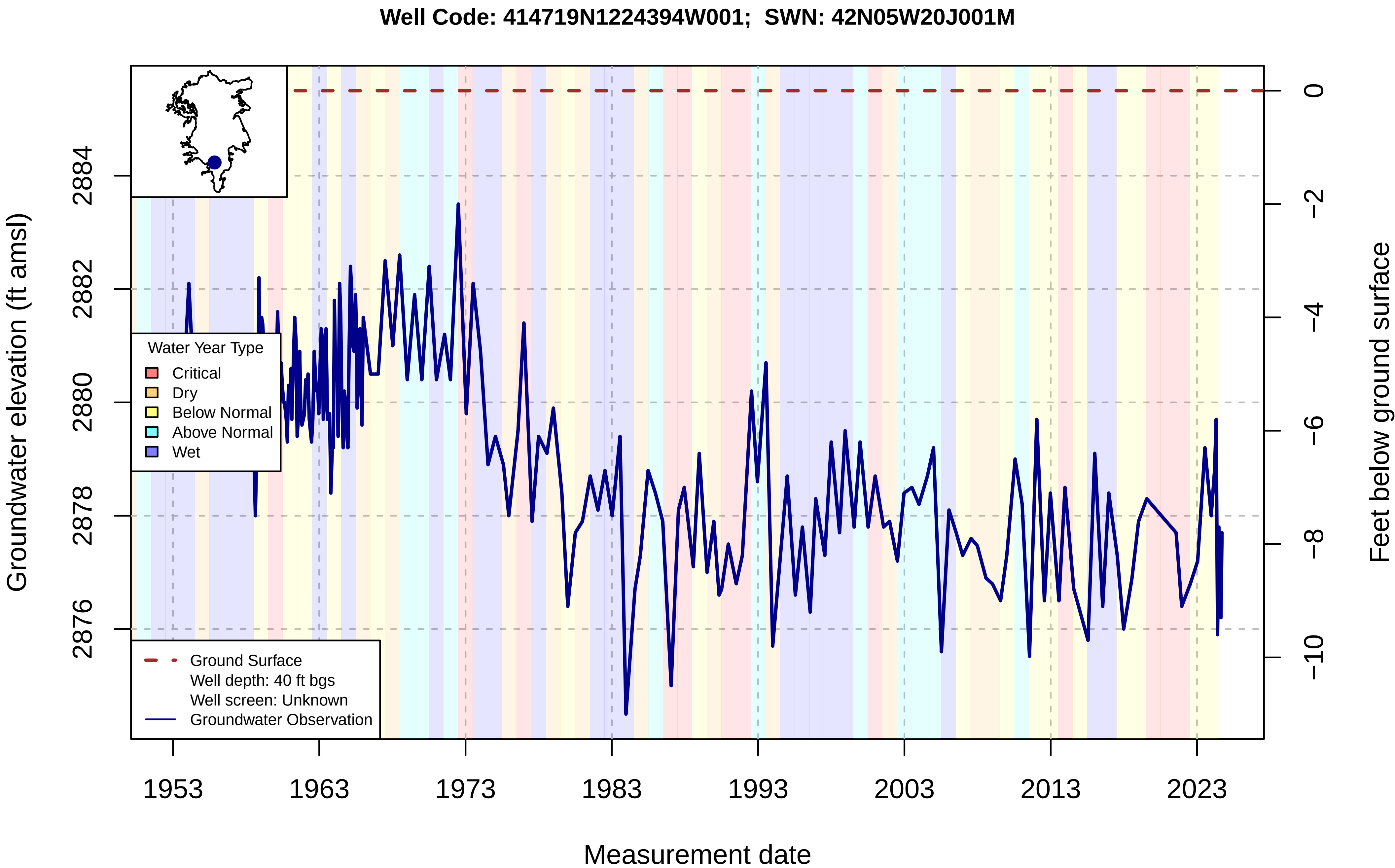


Water Year Types from WY 2019−2024 are preliminary results calculated based on SGMA Water Year Type Dataset Development Report. The results will be finalized once DWR updates the water year type dataset for these years.

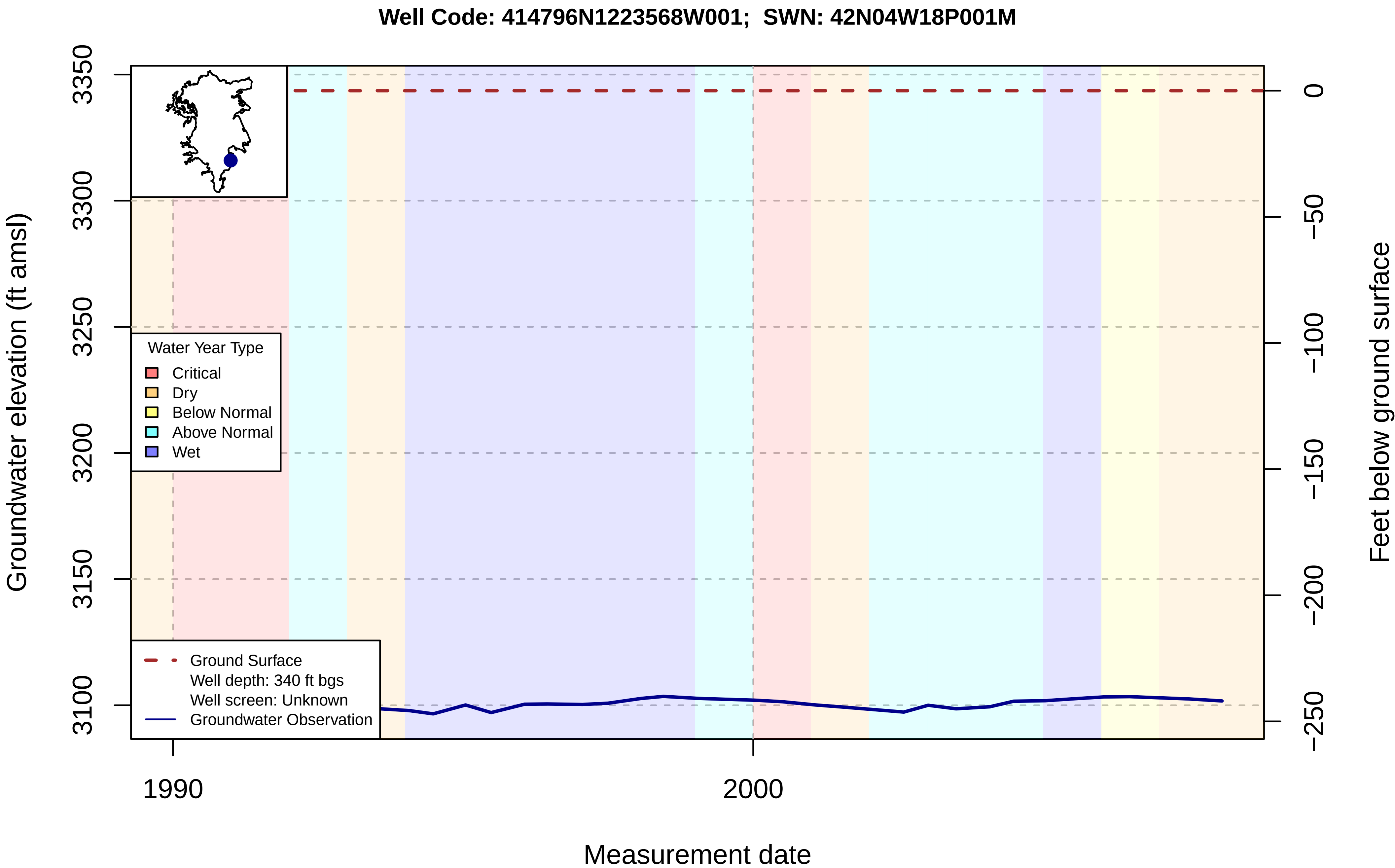
Appendix A.2 - Water Level GSP Monitoring Network Hydrographs



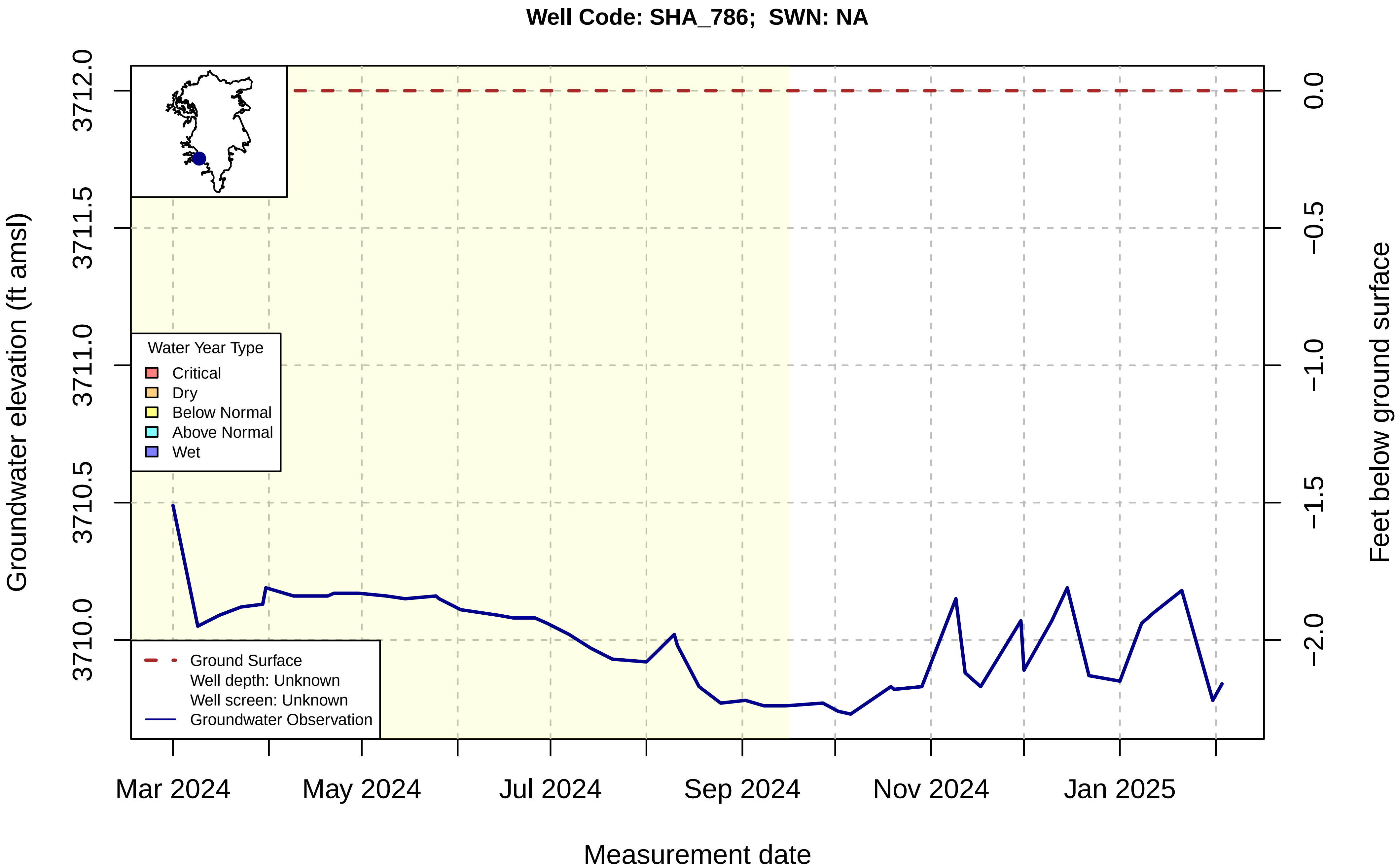
Well Code: SHA_001; SWN: NA
Groundwater elevation (ft amsl)
Feet below ground surface
3290
3292
3294
3296
3298
3300
0
−2
−4
−6
−8
−10
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation
May 2019
May 2020
May 2021
May 2022
May 2023
May 2024
Measurement date

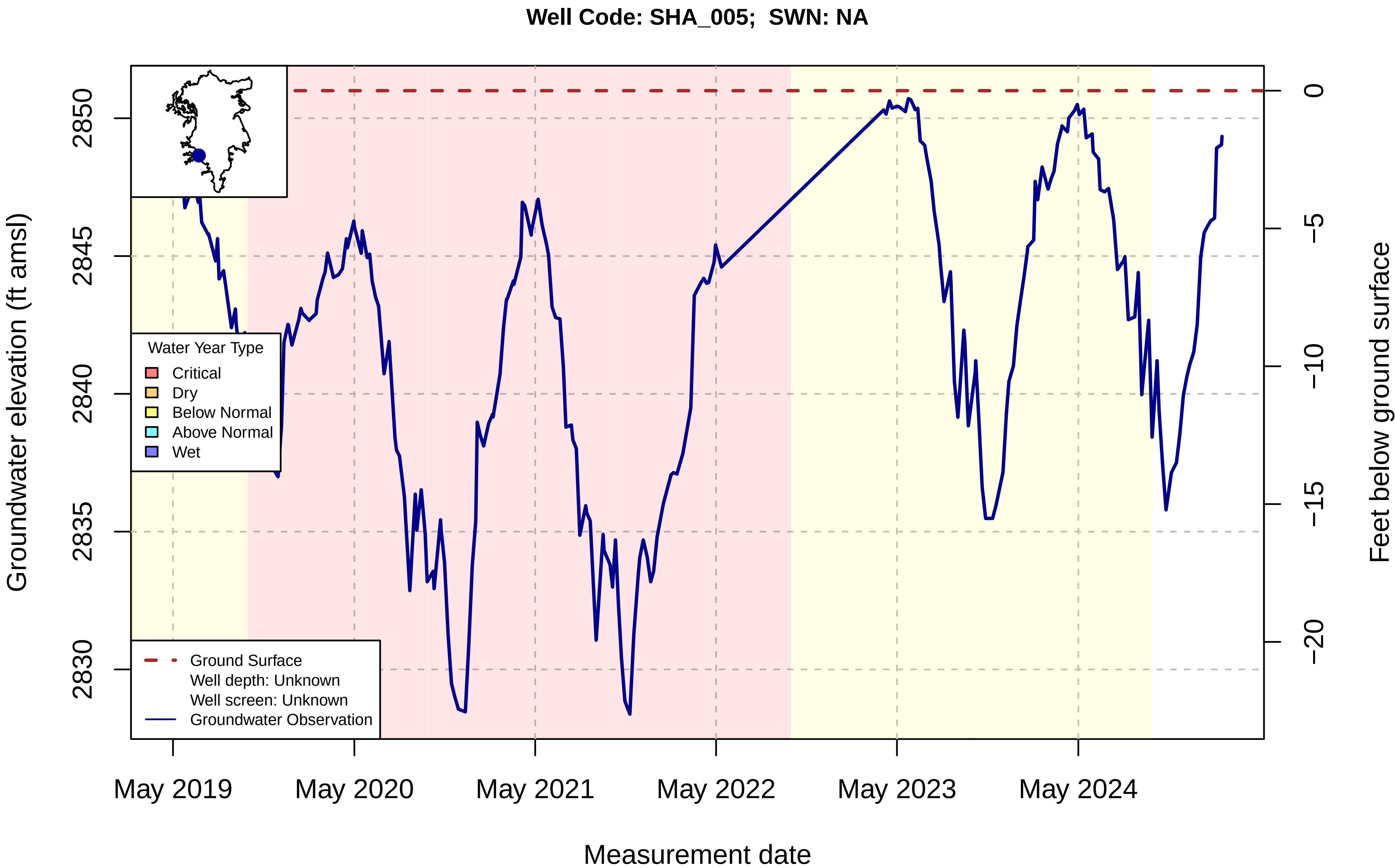


Well Code: 414719N1224394W001; SWN: 42N05W20J001M
Groundwater elevation (ft amsl)
2876
2878
2880
2882
2884
Feet below ground surface
0
−2
−4
−6
−8
−10
1953
1963
1973
1983
1993
2003
2013
2023
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 40 ft bgs
Well screen: Unknown
Groundwater Observation

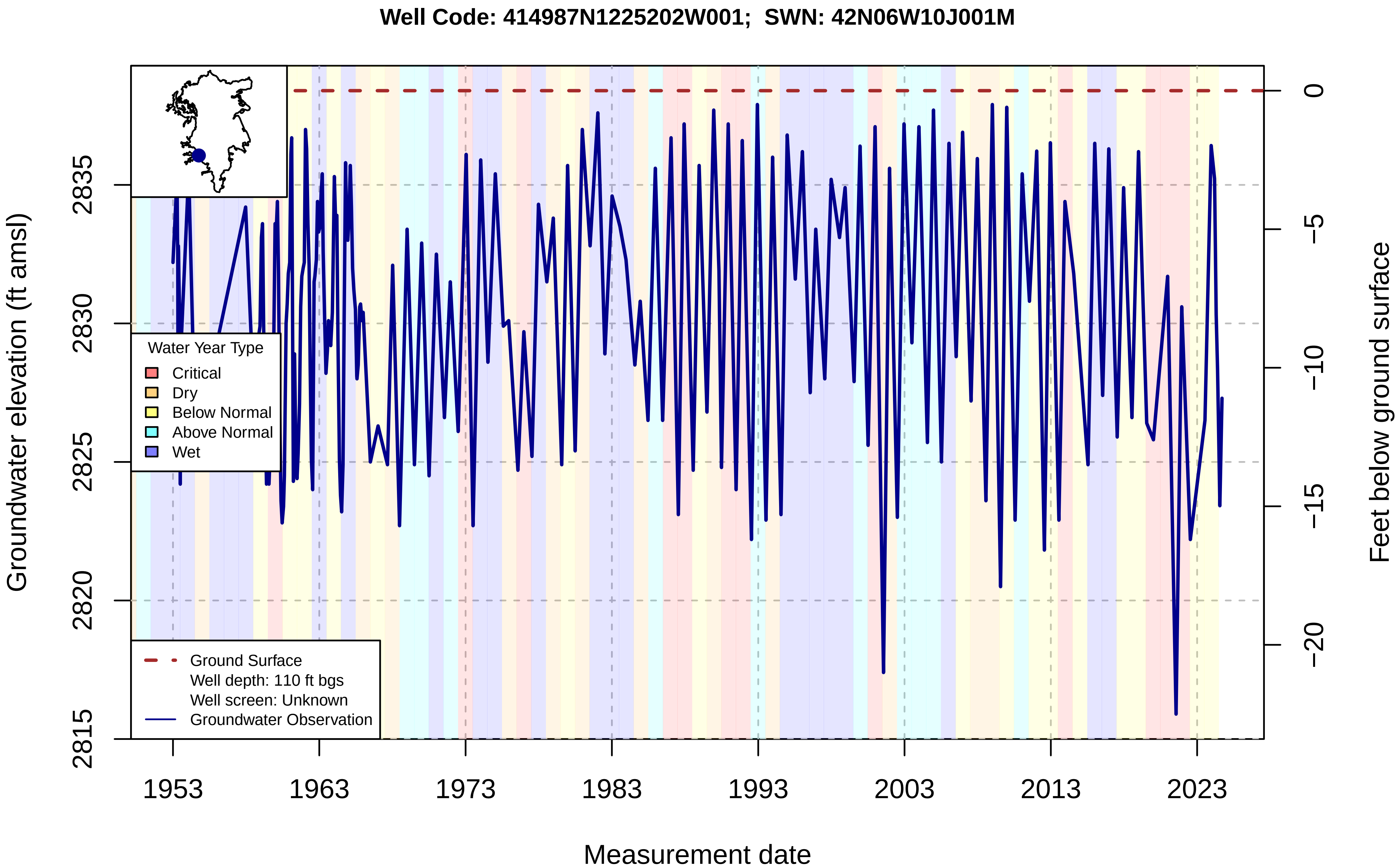


Well Code: 414796N1223568W001; SWN: 42N04W18P001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
3350
3300
3250
3200
3150
3100
0
−50
−100
−150
−200
−250
1990
2000
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 340 ft bgs
Well screen: Unknown
Groundwater Observation


Well Code: SHA_786; SWN: NA
Groundwater elevation (ft amsl)
3712.0
3711.5
3711.0
3710.5
3710.0
Feet below ground surface
0.0
−0.5
−1.0
−1.5
−2.0
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation
Mar 2024
May 2024
Jul 2024
Sep 2024
Nov 2024
Jan 2025
Measurement date

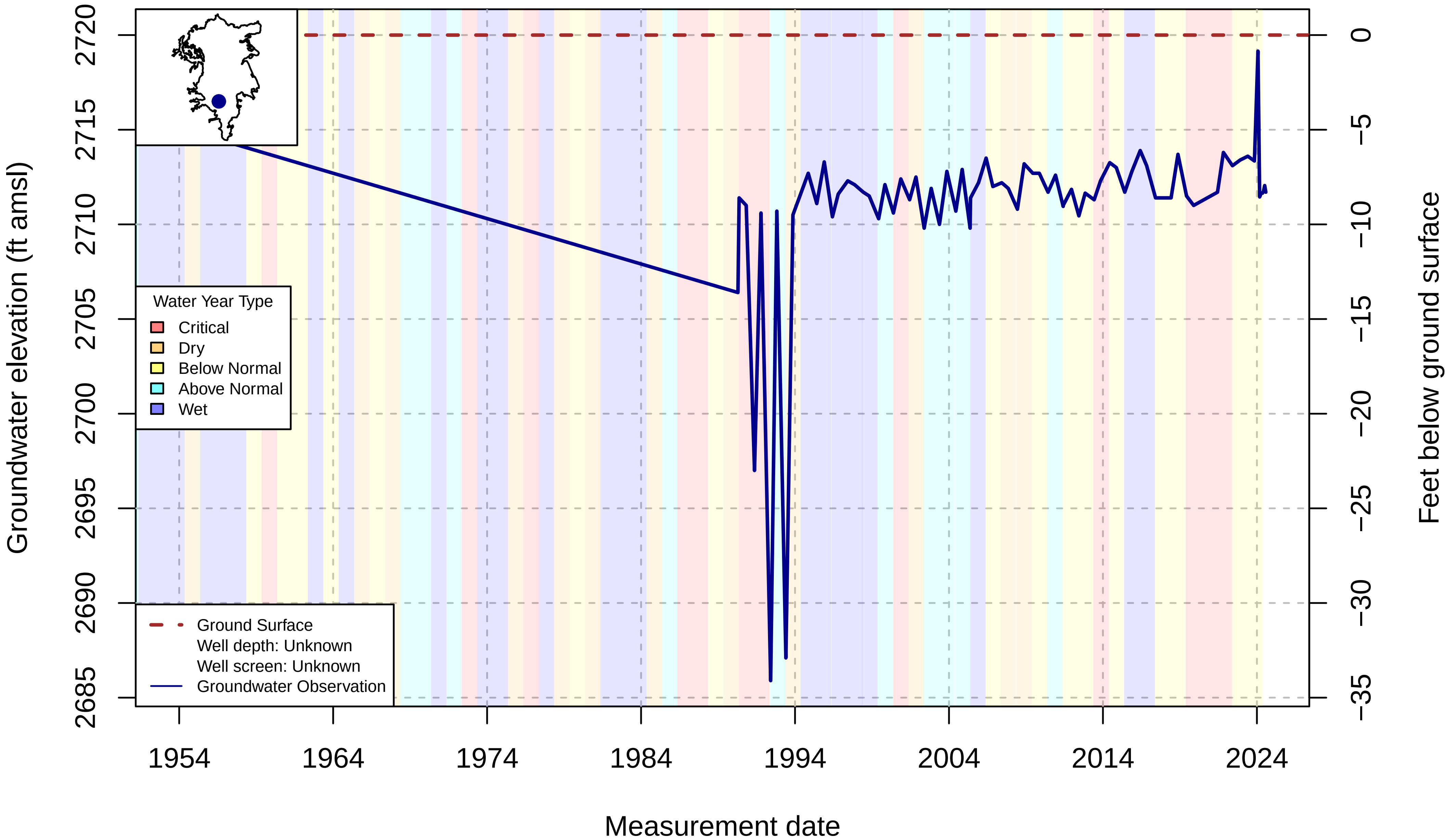


Well Code: SHA_005; SWN: NA
Groundwater elevation (ft amsl)
2830
2835
2840
2845
2850
Feet below ground surface
0
−5
−10
−15
−20
May 2019
May 2020
May 2021
May 2022
May 2023
May 2024
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation

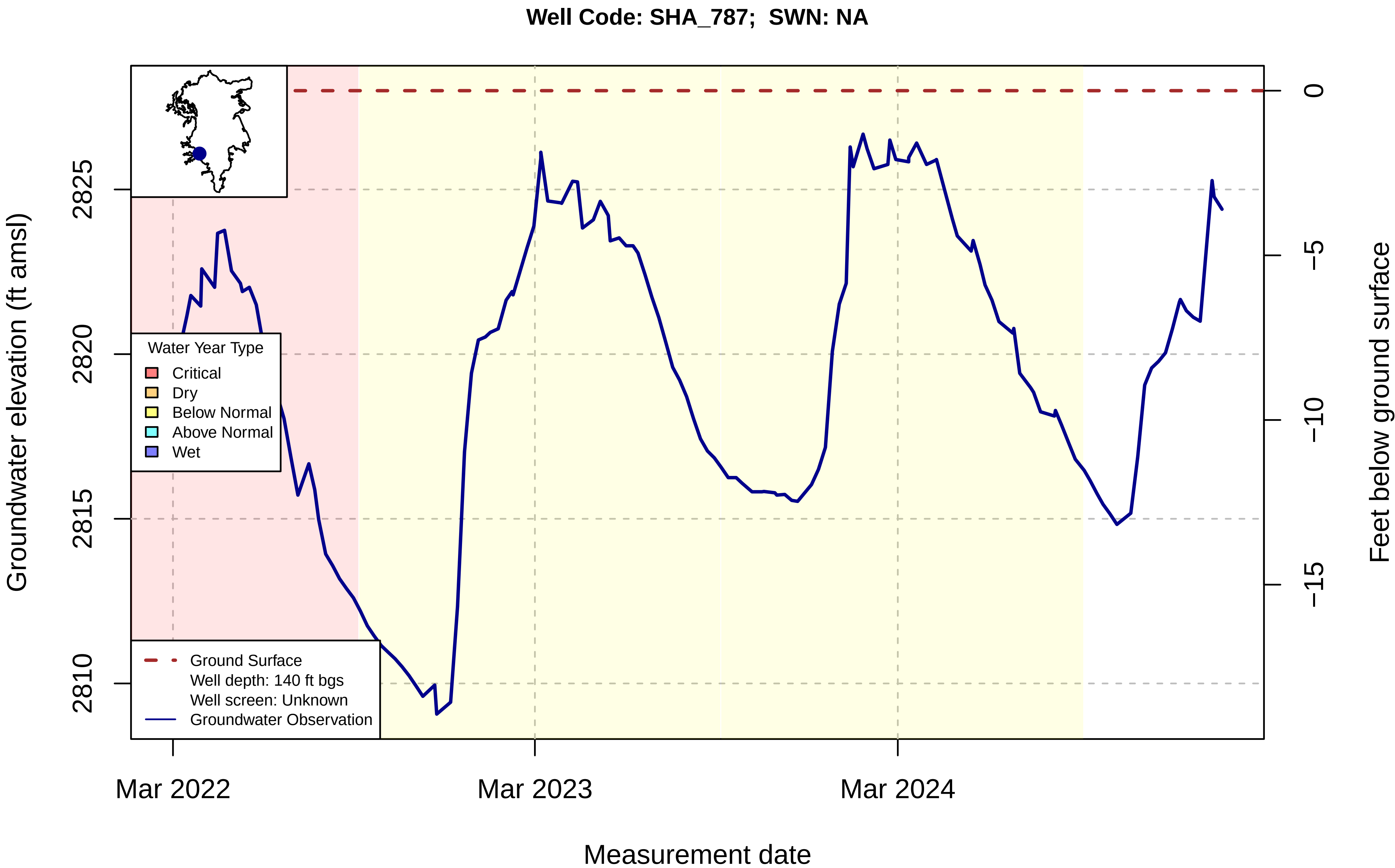


Well Code: 414987N1225202W001; SWN: 42N06W10J001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2815
2820
2825
2830
2835
0
−5
−10
−15
−20
1953
1963
1973
1983
1993
2003
2013
2023
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 110 ft bgs
Well screen: Unknown
Groundwater Observation

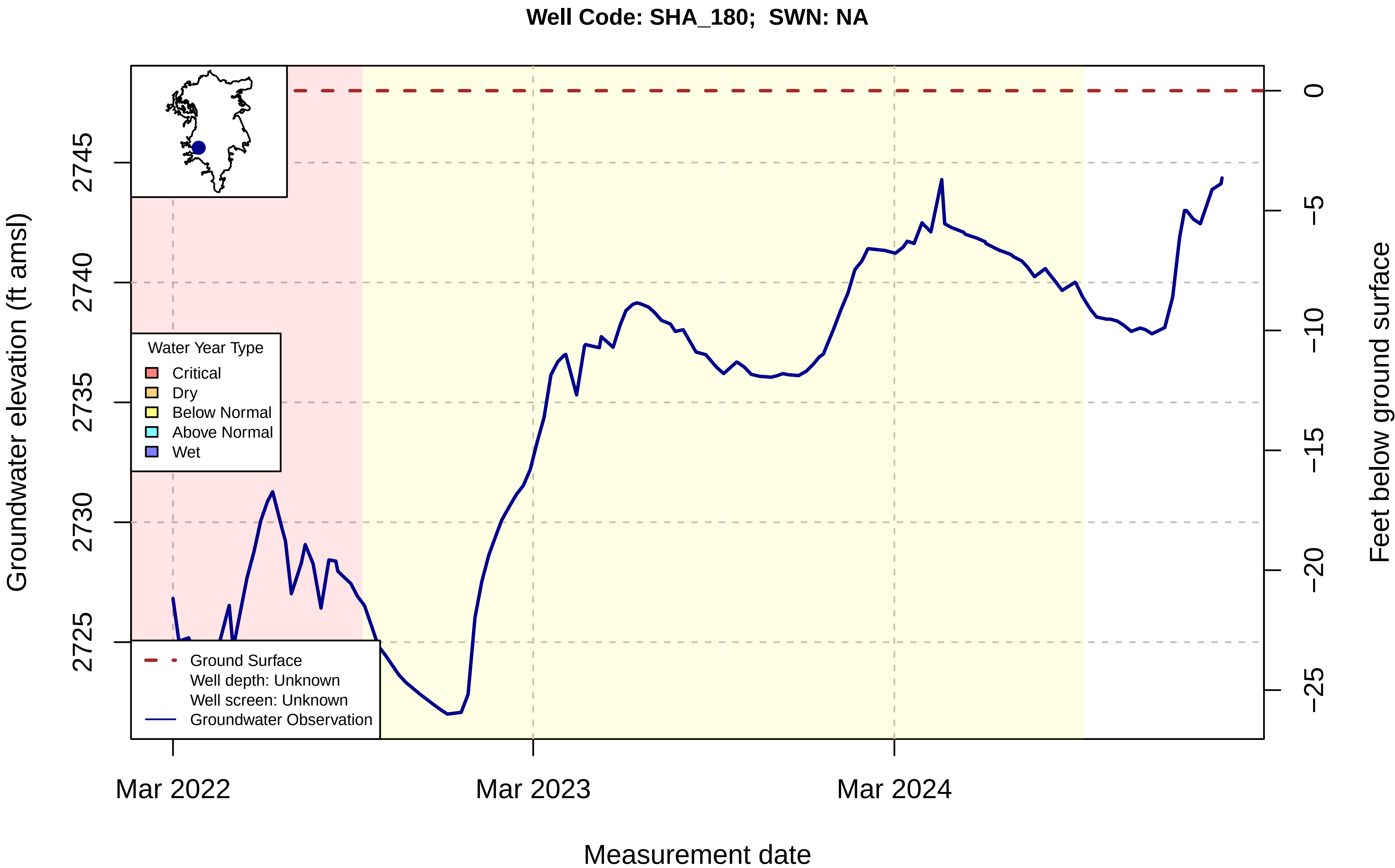
Well Code: 415017N1224564W001; SWN: 42N05W08E001M



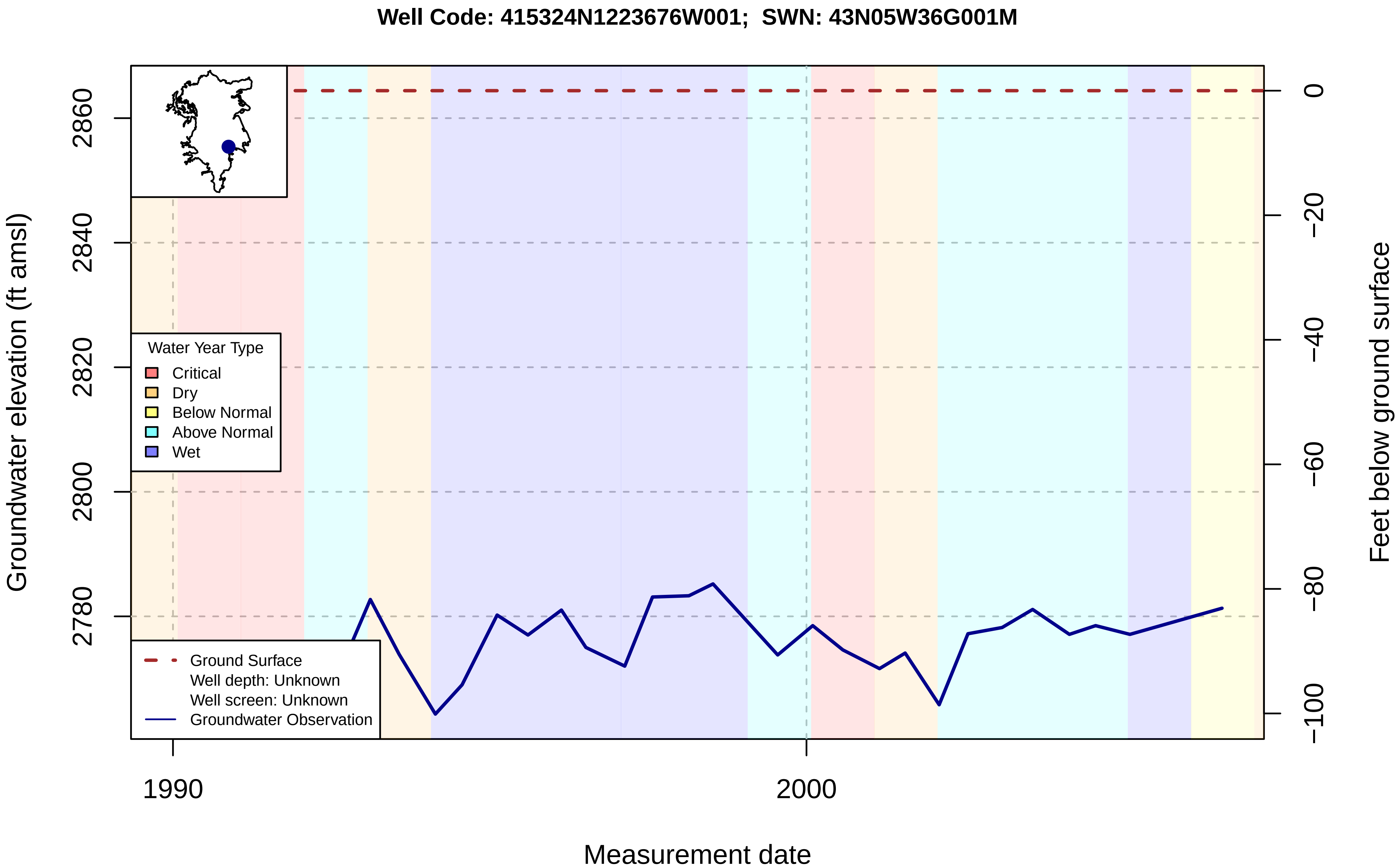
Well Code: SHA_887; SWN: NA



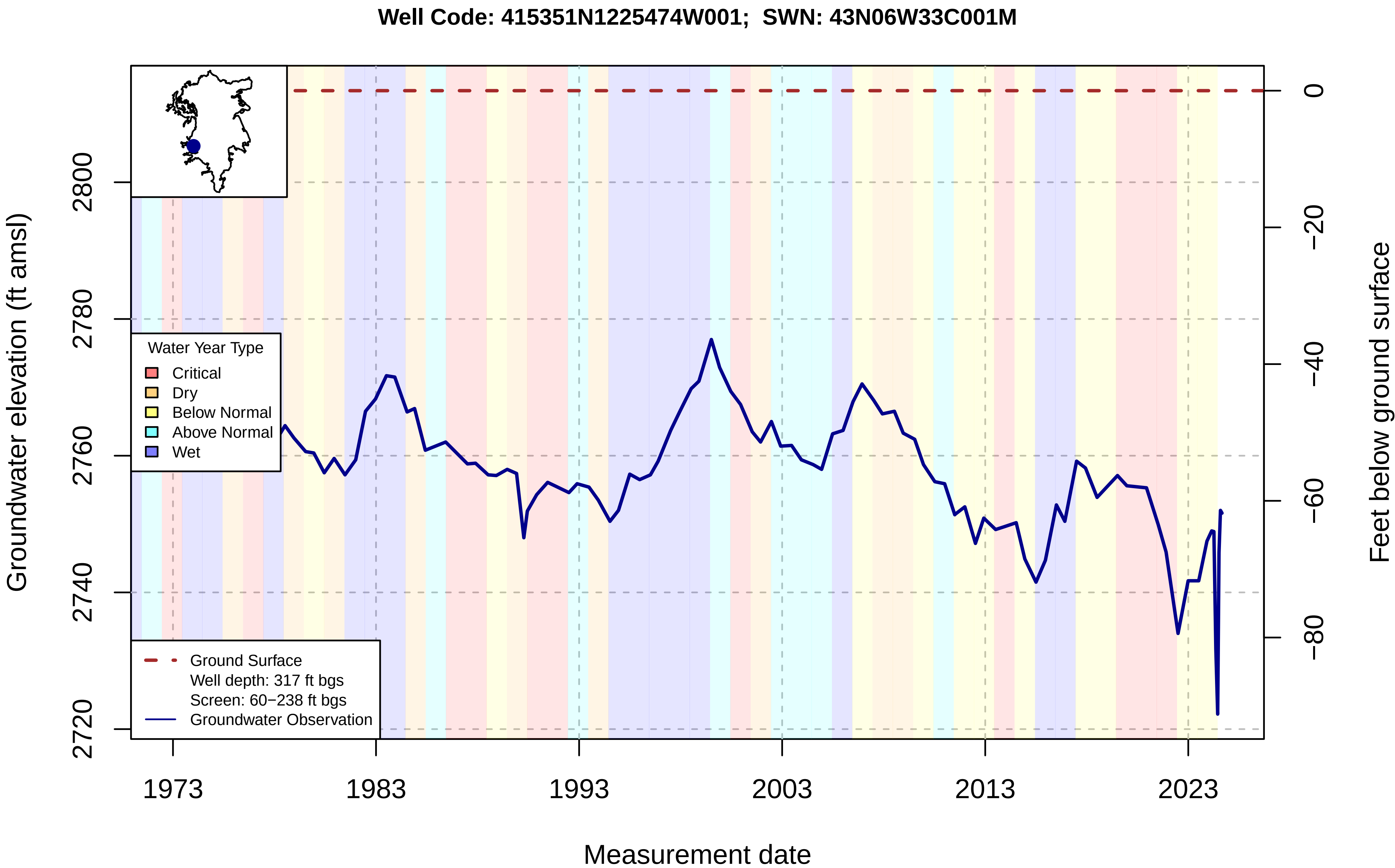
Well Code: SHA_787; SWN: NA
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2810
2815
2820
2825
0
−5
−10
−15
Mar 2022
Mar 2023
Mar 2024
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 140 ft bgs
Well screen: Unknown
Groundwater Observation



Well Code: SHA_180; SWN: NA
Groundwater elevation (ft amsl)
2725
2730
2735
2740
2745
Feet below ground surface
0
−5
−10
−15
−20
−25
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation
Mar 2022
Mar 2023
Mar 2024
Measurement date

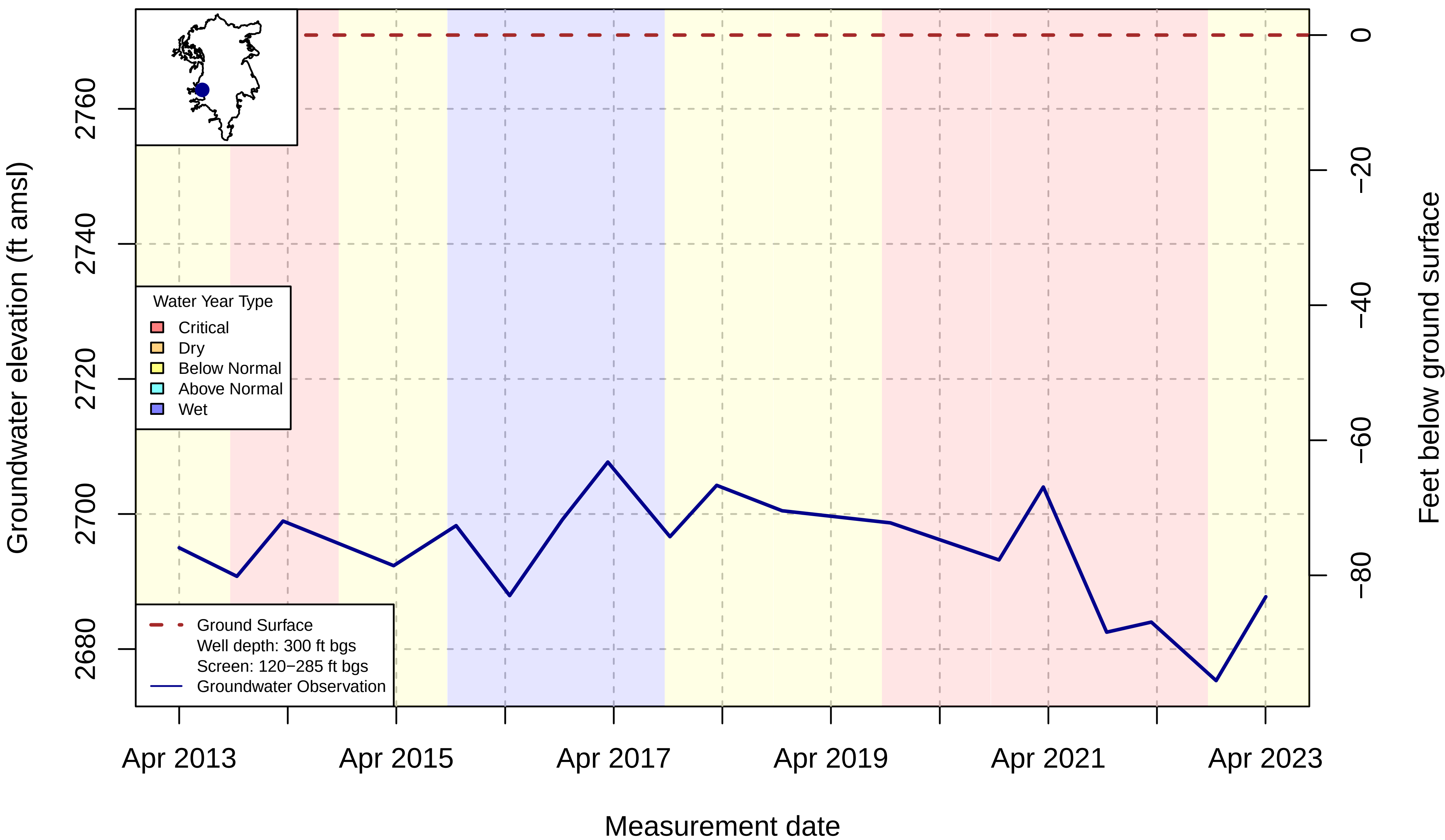


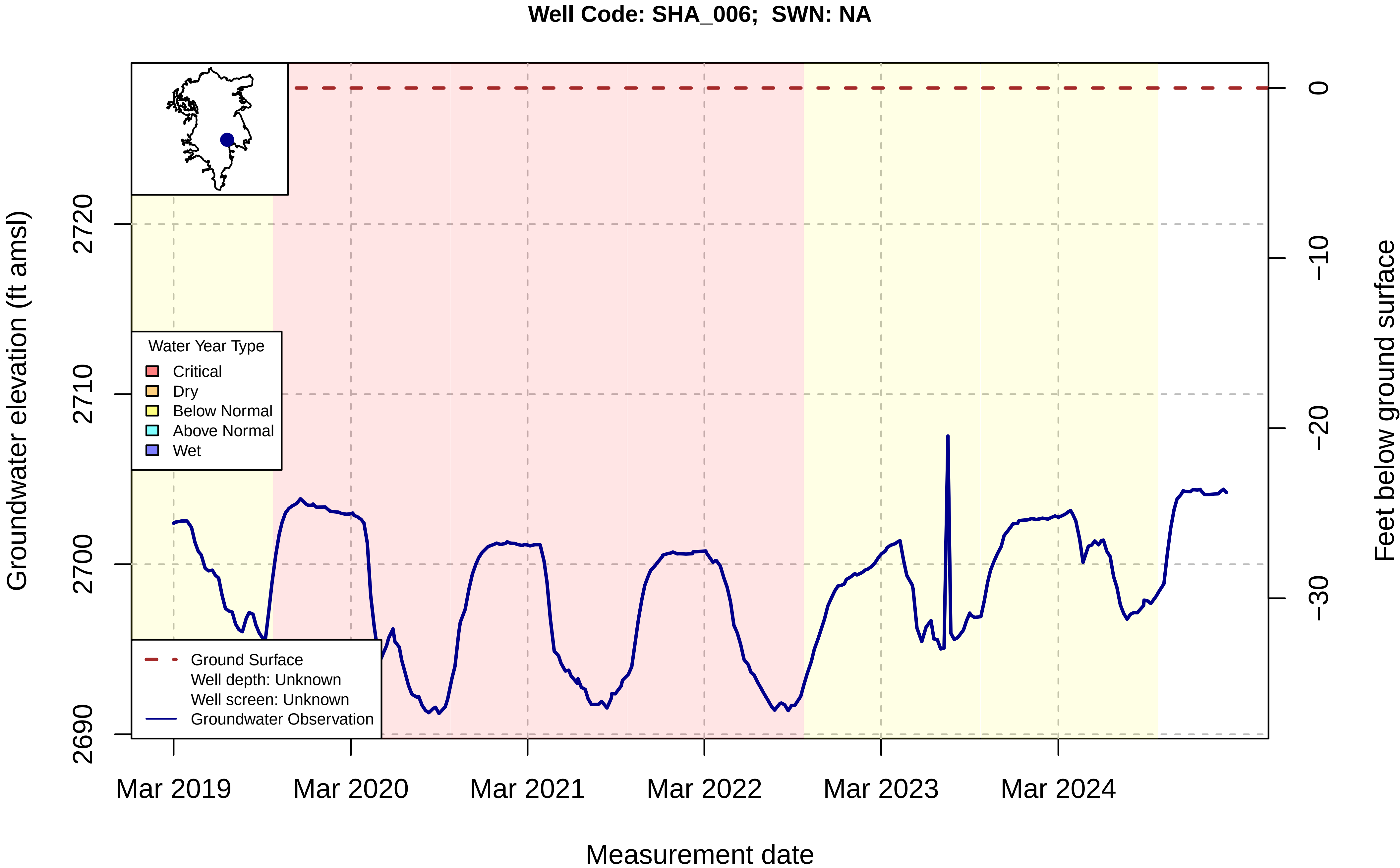
Well Code: 415324N1223676W001; SWN: 43N05W36G001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2780
2800
2820
2840
2860
0
−20
−40
−60
−80
−100
1990
2000
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation



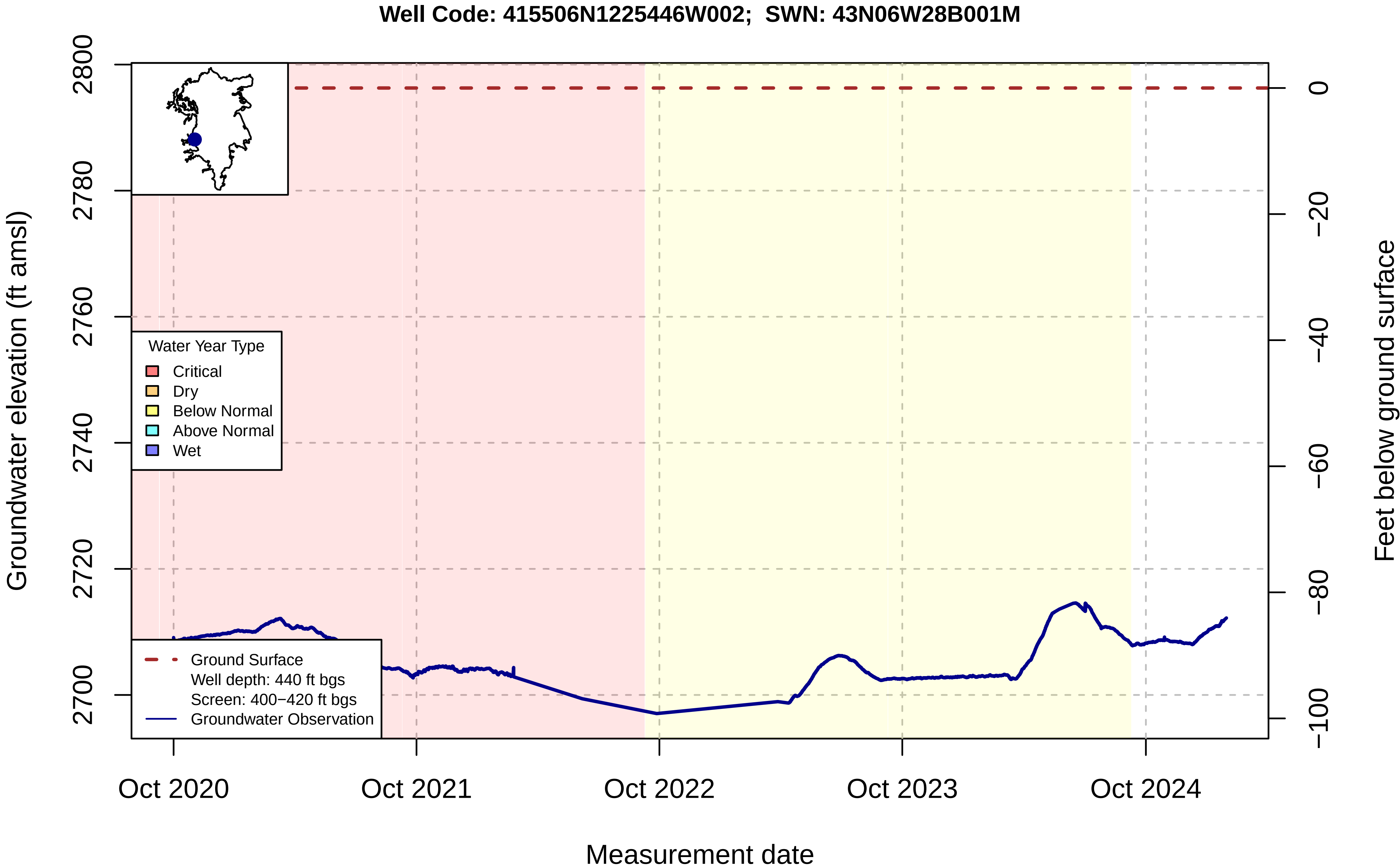
Well Code: 415351N1225474W001; SWN: 43N06W33C001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2720
2740
2760
2780
2800
0
−20
−40
−60
−80
1973
1983
1993
2003
2013
2023
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 317 ft bgs
Screen: 60−238 ft bgs
Groundwater Observation

Well Code: 415444N1225387W001; SWN: NA

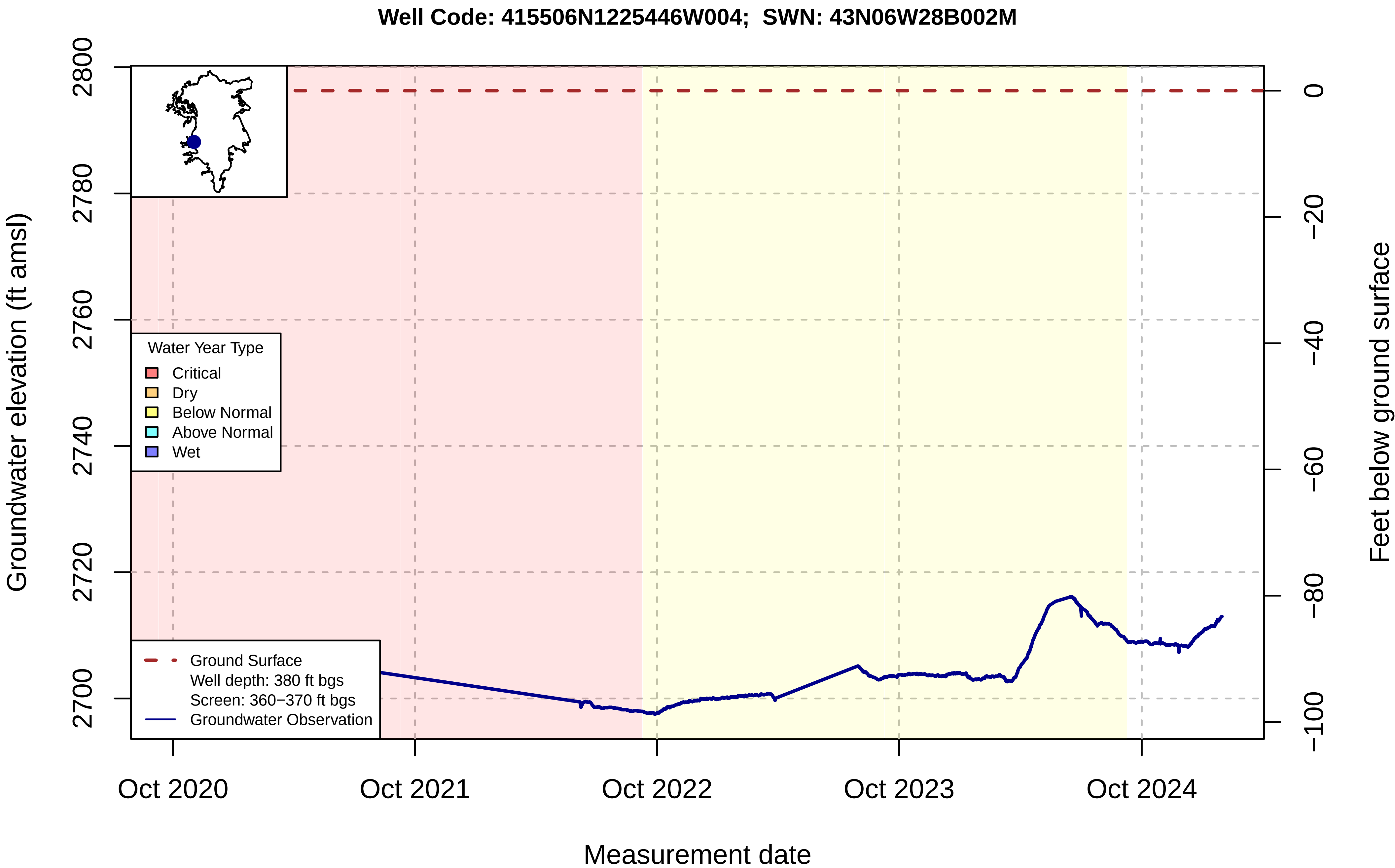




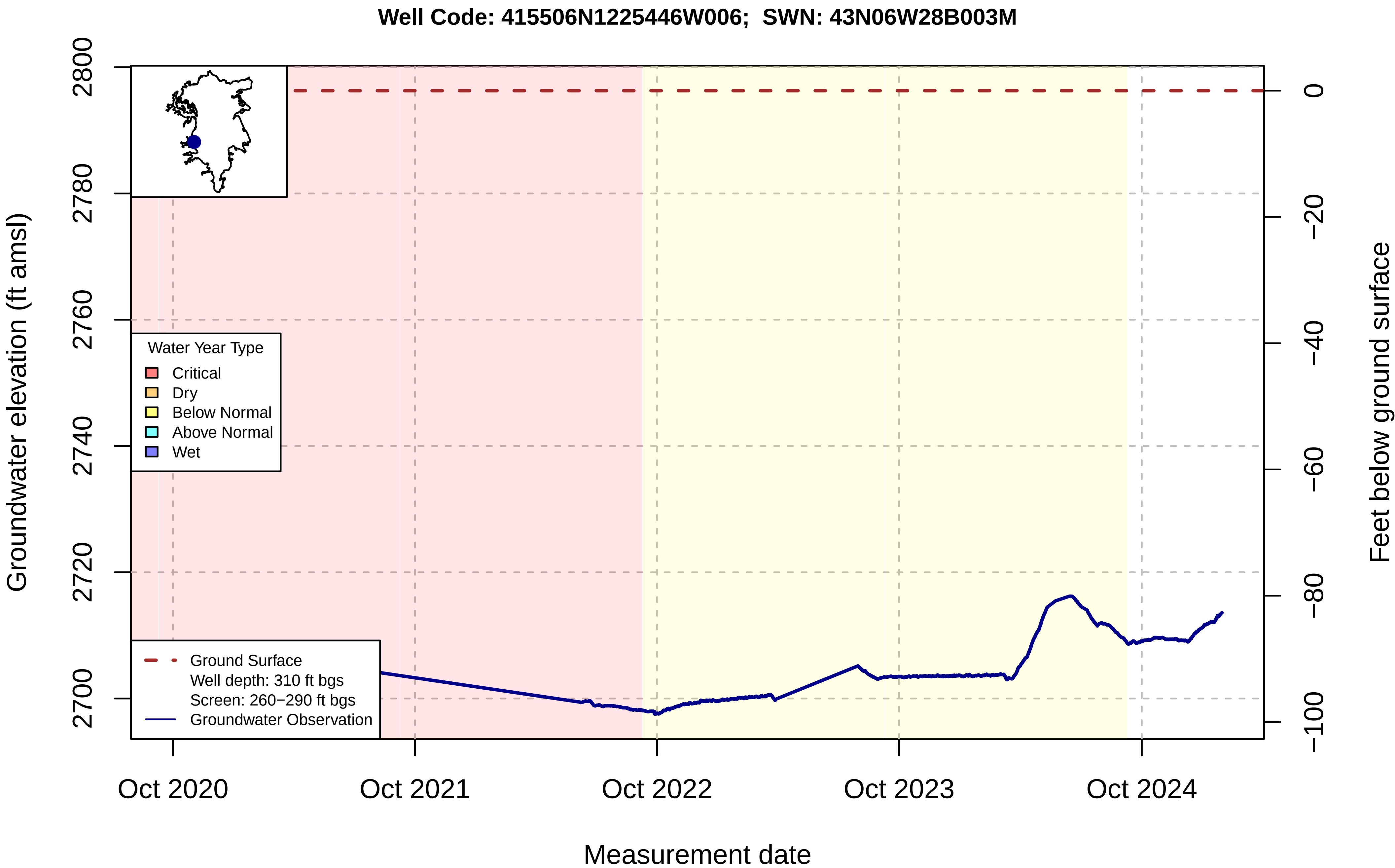
Well Code: SHA_006; SWN: NA
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2690
2700
2710
2720
0
−10
−20
−30
Mar 2019
Mar 2020
Mar 2021
Mar 2022
Mar 2023
Mar 2024
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation



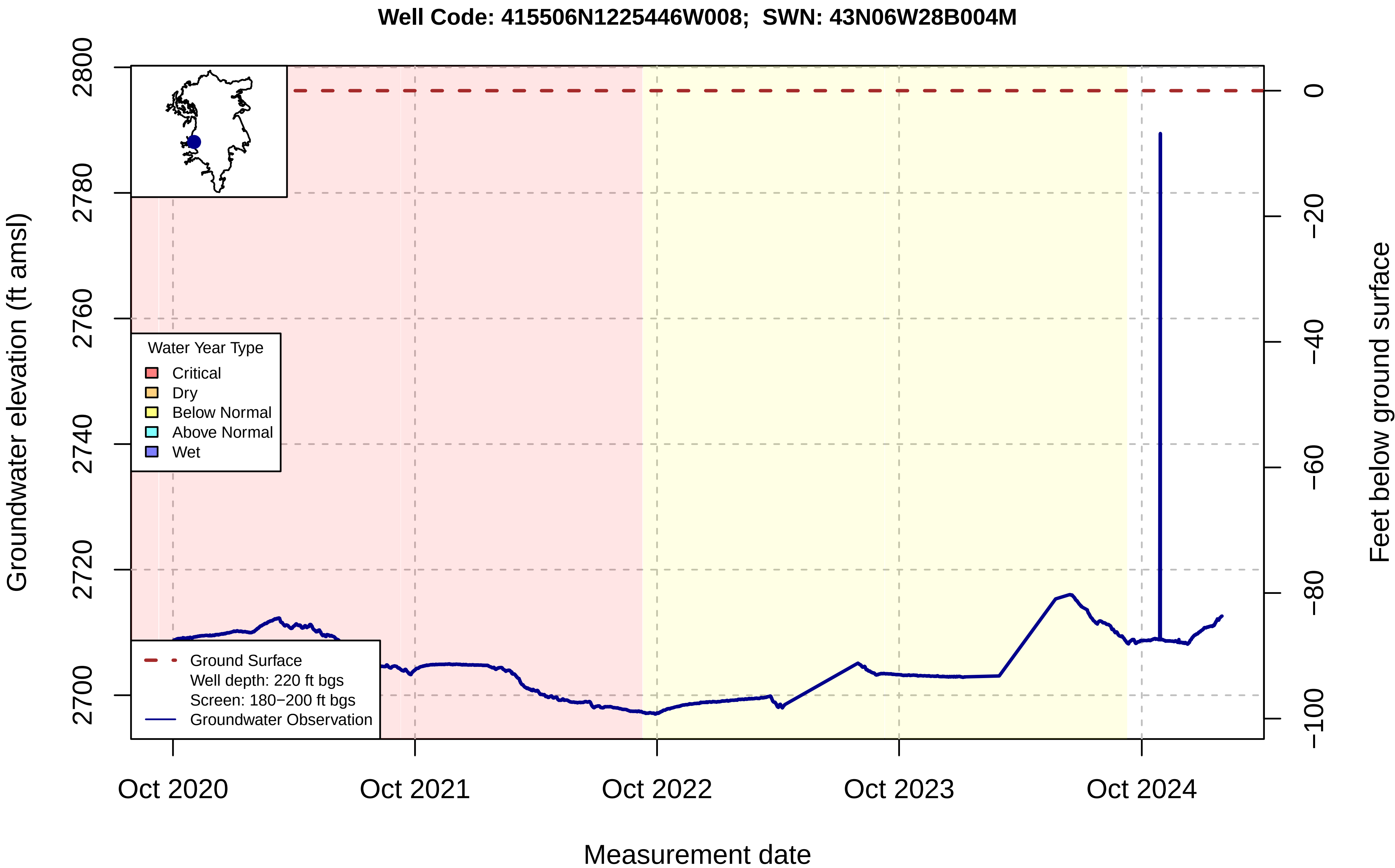
Well Code: 415506N1225446W002; SWN: 43N06W28B001M
Groundwater elevation (ft amsl)
2700
2720
2740
2760
2780
2800
Feet below ground surface
0
−20
−40
−60
−80
−100
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 440 ft bgs
Screen: 400−420 ft bgs
Groundwater Observation
Oct 2020
Oct 2021
Oct 2022
Oct 2023
Oct 2024
Measurement date



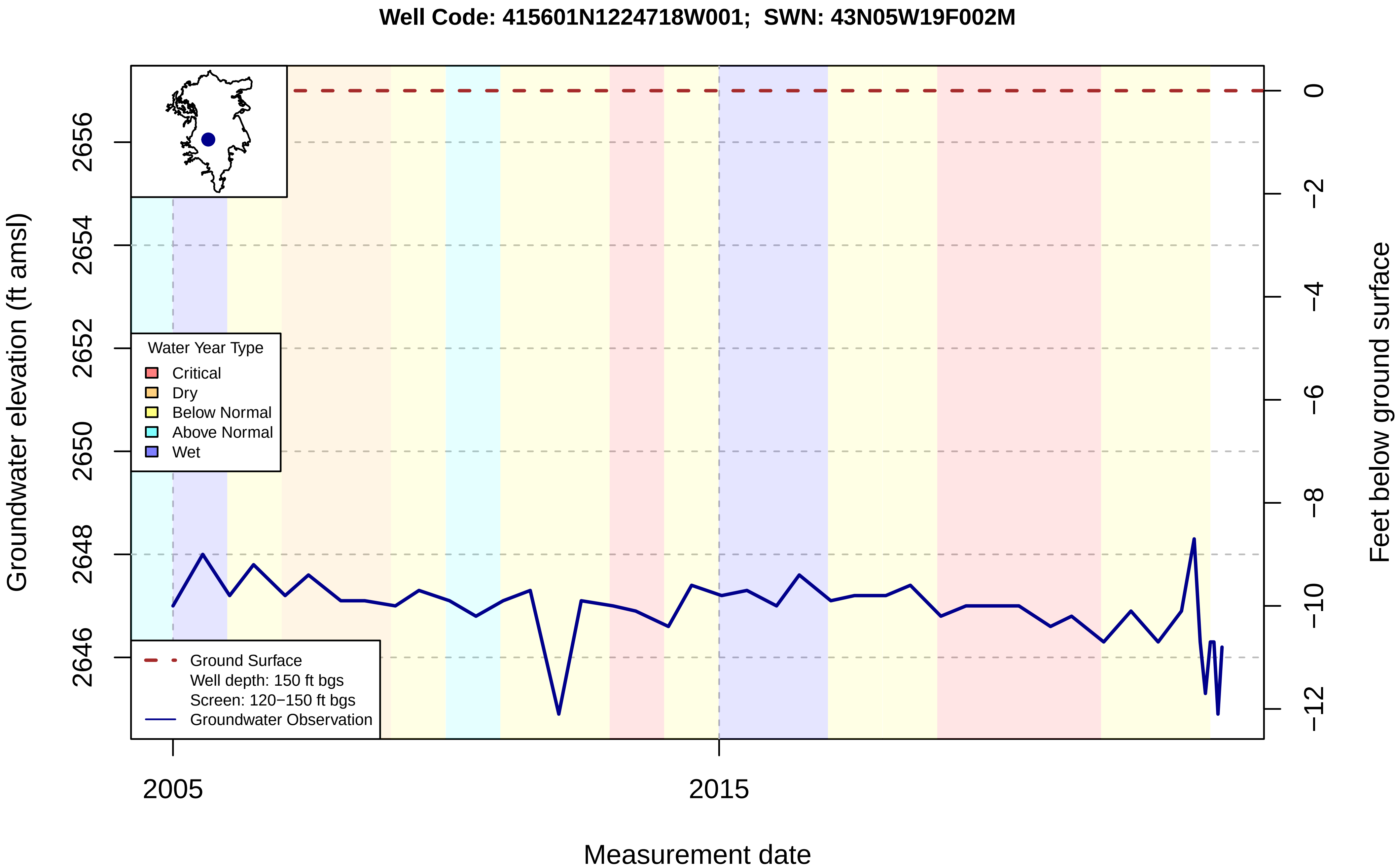
Well Code: 415506N1225446W004; SWN: 43N06W28B002M
Groundwater elevation (ft amsl)
2700
2720
2740
2760
2780
2800
Feet below ground surface
0
−20
−40
−60
−80
−100
Oct 2020
Oct 2021
Oct 2022
Oct 2023
Oct 2024
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 380 ft bgs
Screen: 360−370 ft bgs
Groundwater Observation



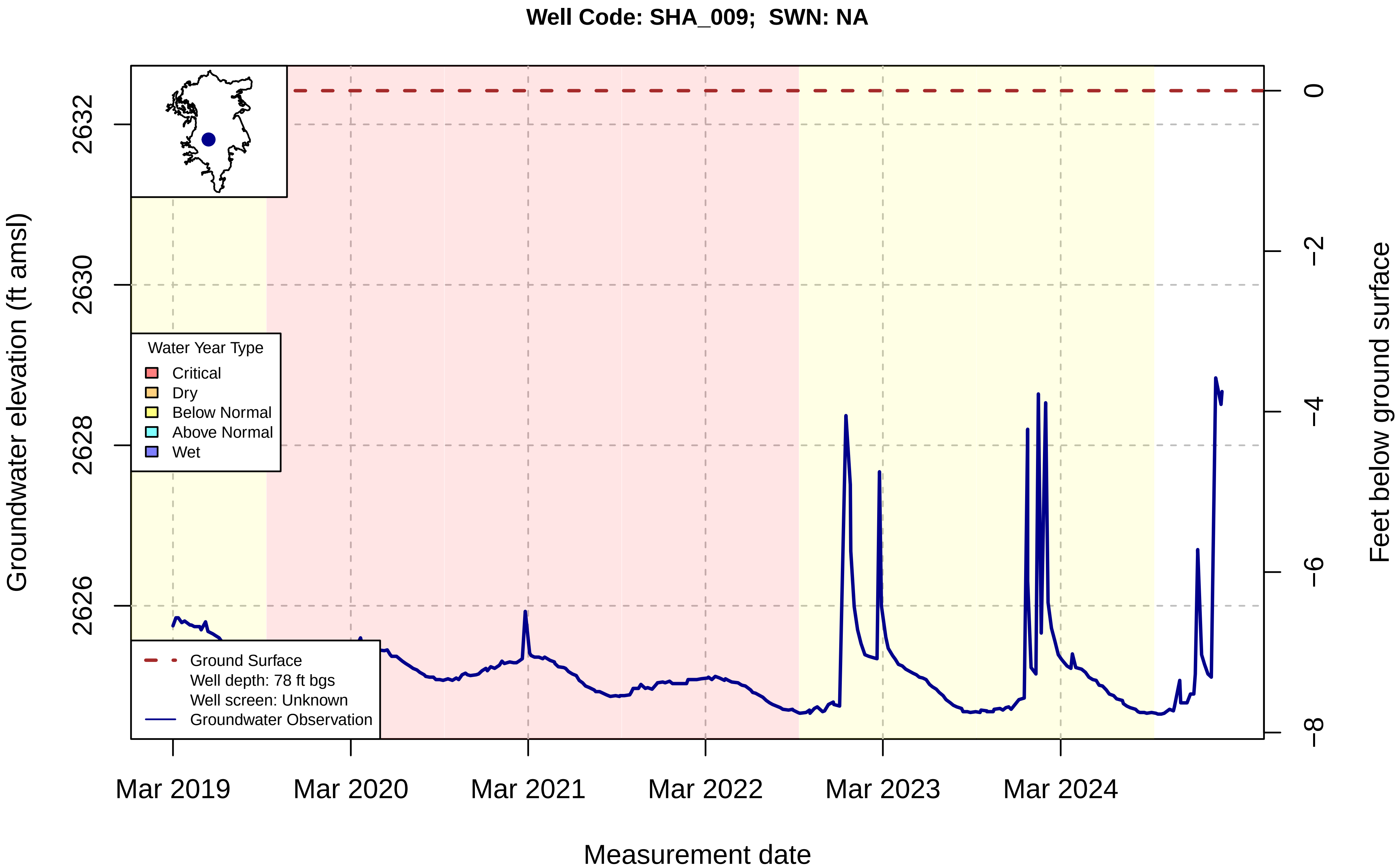
Well Code: 415506N1225446W006; SWN: 43N06W28B003M
Groundwater elevation (ft amsl)
2700
2720
2740
2760
2780
2800
Feet below ground surface
0
−20
−40
−60
−80
−100
Measurement date
Oct 2020
Oct 2021
Oct 2022
Oct 2023
Oct 2024
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 310 ft bgs
Screen: 260−290 ft bgs
Groundwater Observation



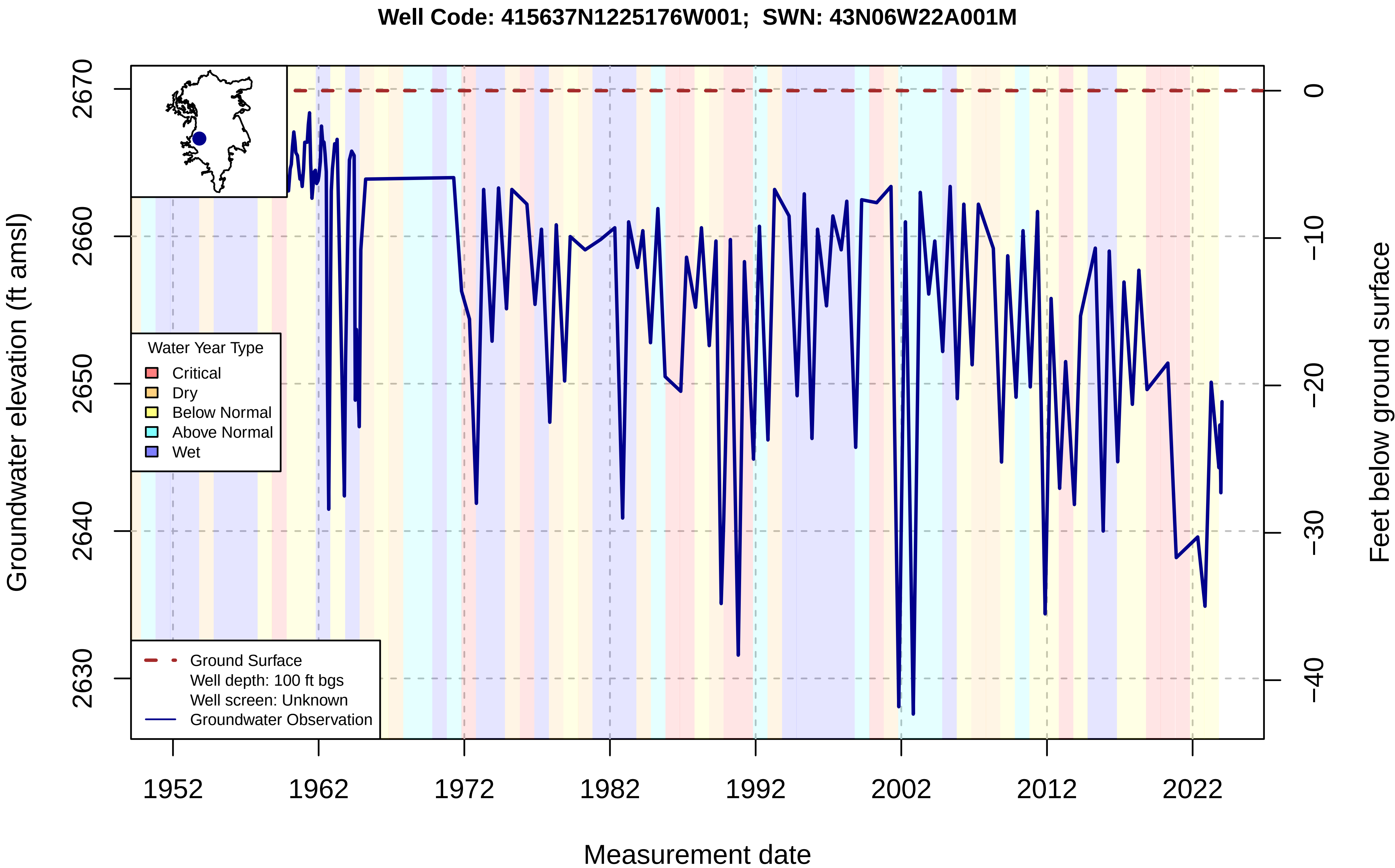
Well Code: 415506N1225446W008; SWN: 43N06W28B004M
Groundwater elevation (ft amsl)
2700
2720
2740
2760
2780
2800
Feet below ground surface
0
−20
−40
−60
−80
−100
Oct 2020
Oct 2021
Oct 2022
Oct 2023
Oct 2024
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 220 ft bgs
Screen: 180−200 ft bgs
Groundwater Observation



Well Code: 415601N1224718W001; SWN: 43N05W19F002M
Groundwater elevation (ft amsl)
2646
2648
2650
2652
2654
2656
Feet below ground surface
0
−2
−4
−6
−8
−10
−12
2005
2015
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 150 ft bgs
Screen: 120−150 ft bgs
Groundwater Observation

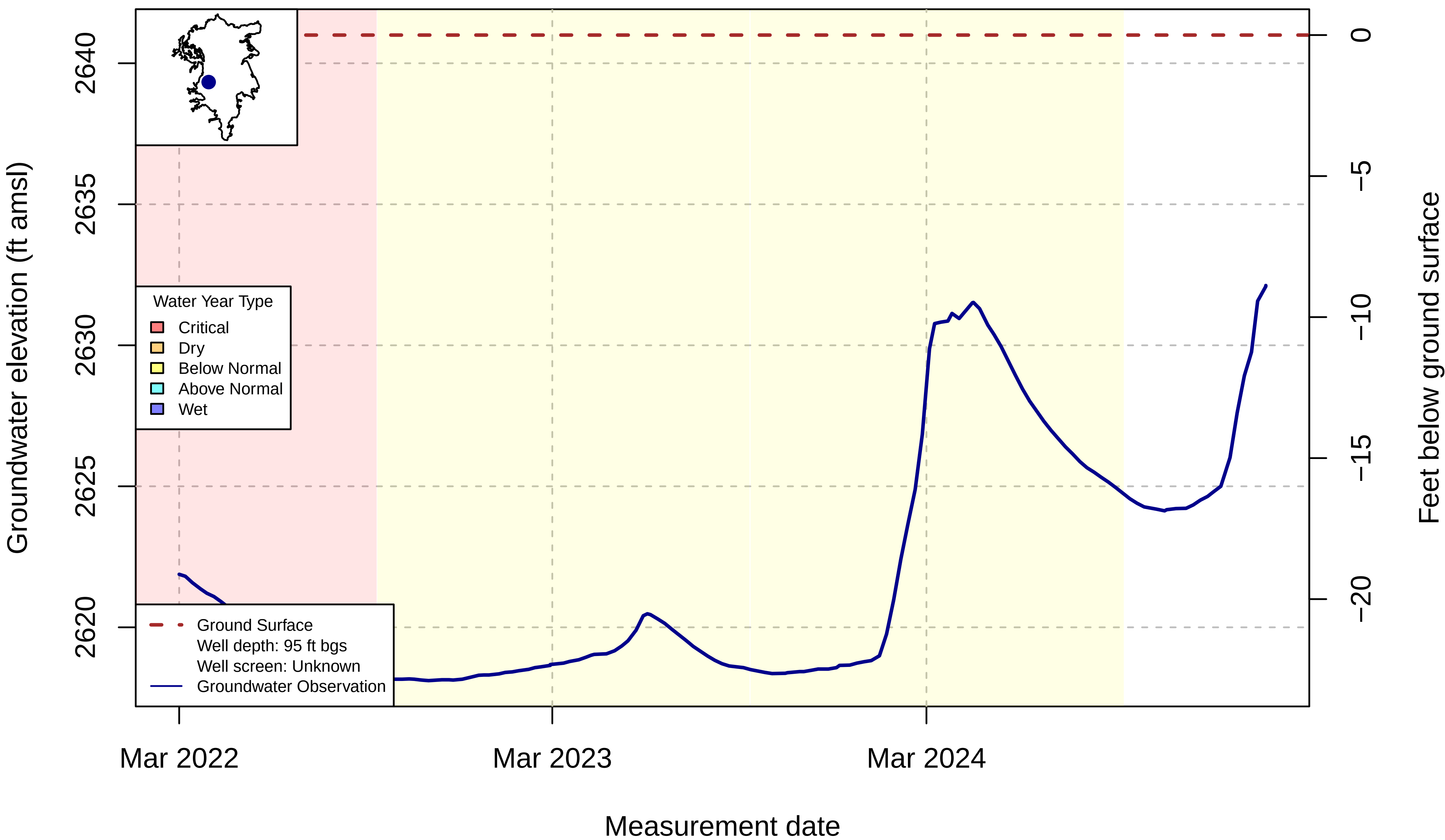


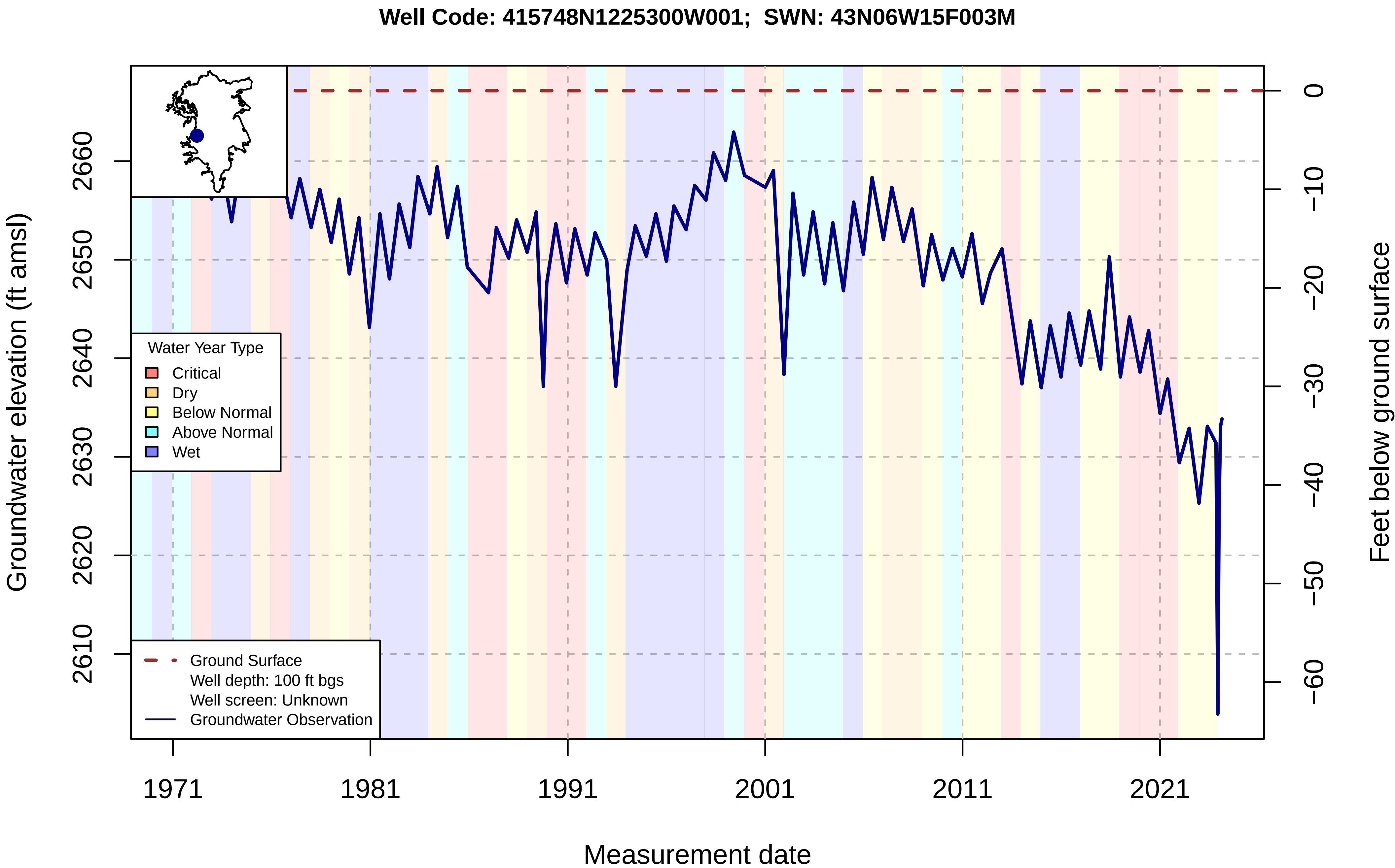
Well Code: SHA_009; SWN: NA
Groundwater elevation (ft amsl)
2626
2628
2630
2632
Feet below ground surface
0
−2
−4
−6
−8
Mar 2019
Mar 2020
Mar 2021
Mar 2022
Mar 2023
Mar 2024
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 78 ft bgs
Well screen: Unknown
Groundwater Observation



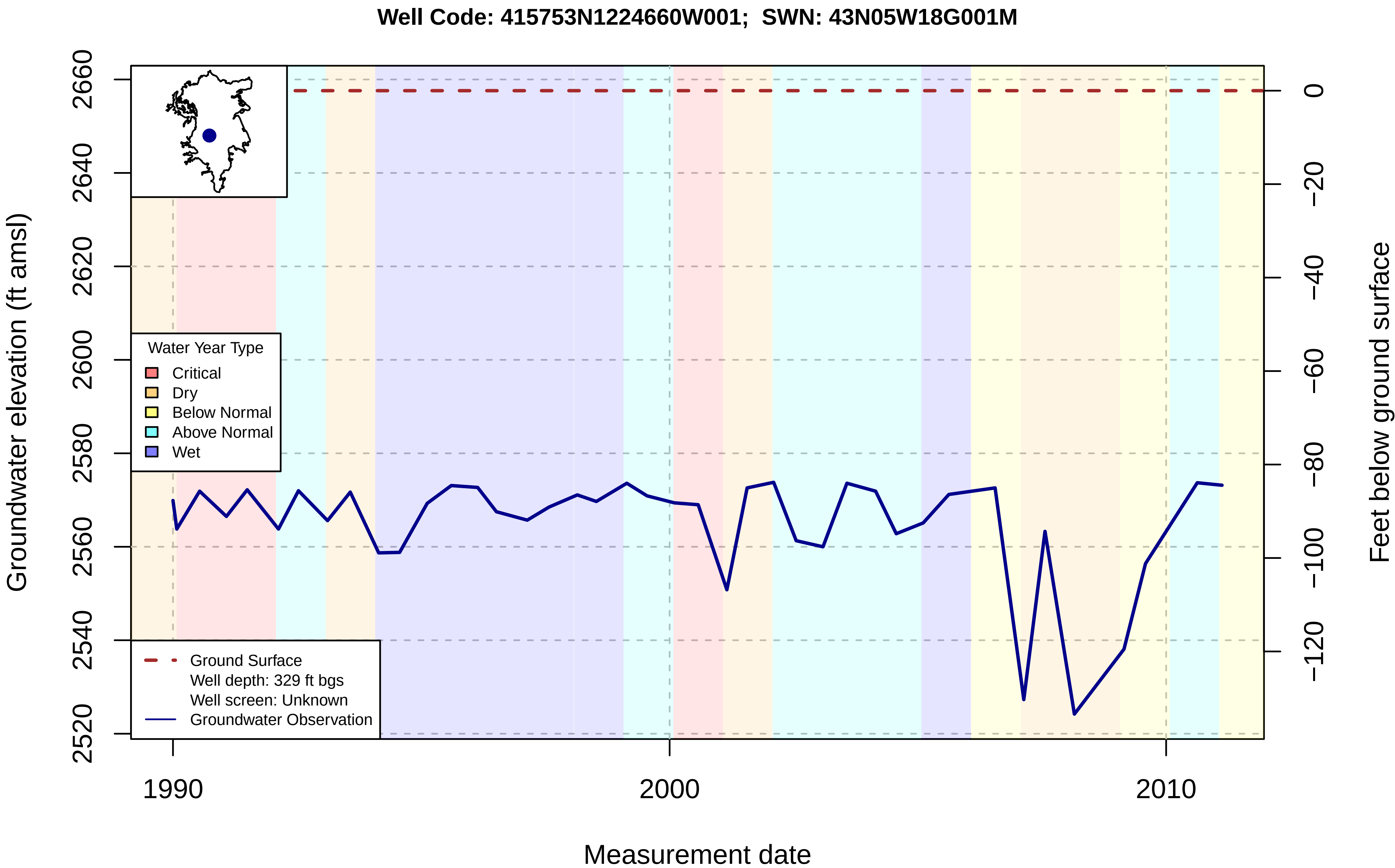
Well Code: 415637N1225176W001; SWN: 43N06W22A001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2630
2640
2650
2660
2670
0
−10
−20
−30
−40
1952
1962
1972
1982
1992
2002
2012
2022
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 100 ft bgs
Well screen: Unknown
Groundwater Observation

Well Code: SHA_193; SWN: NA

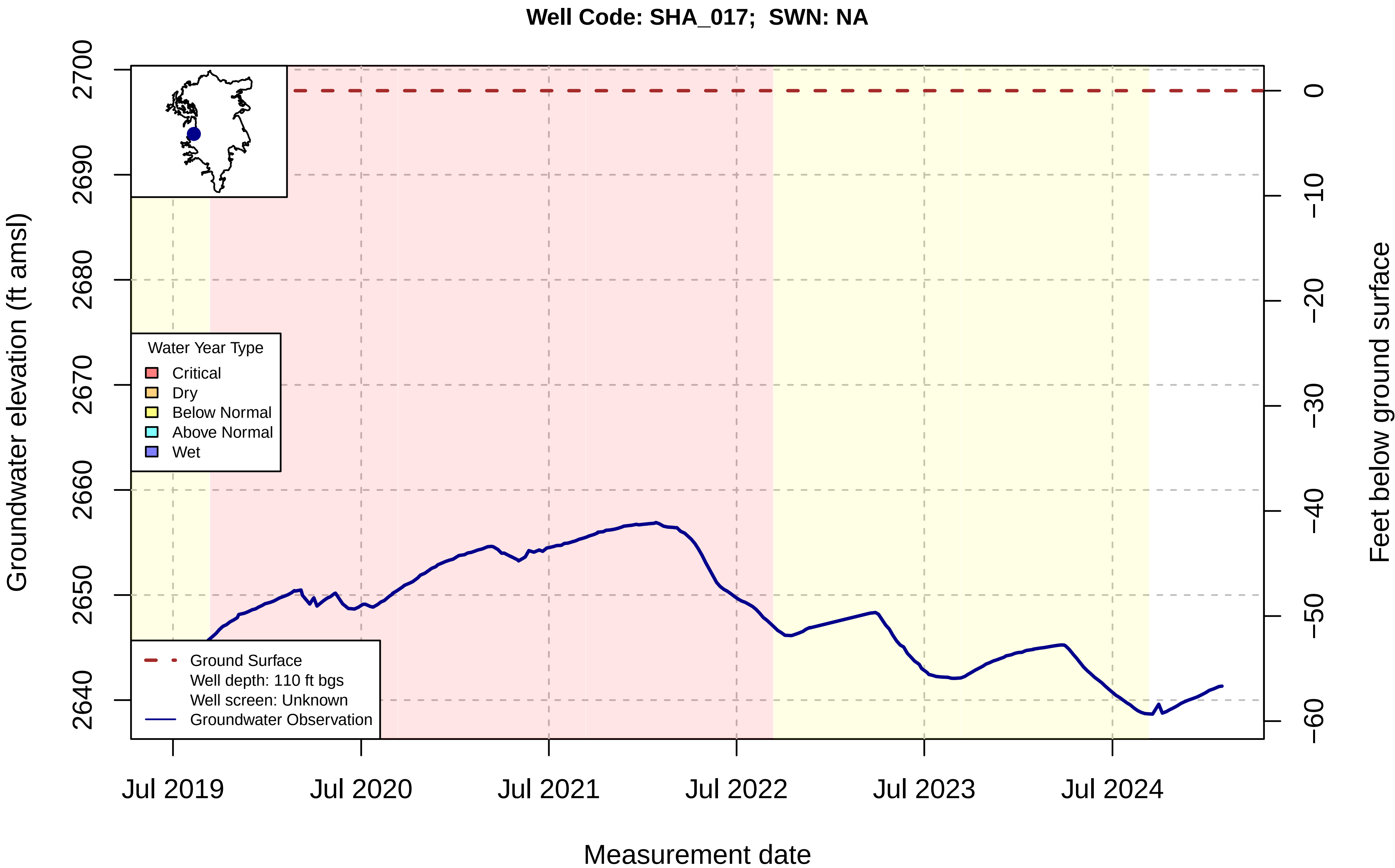




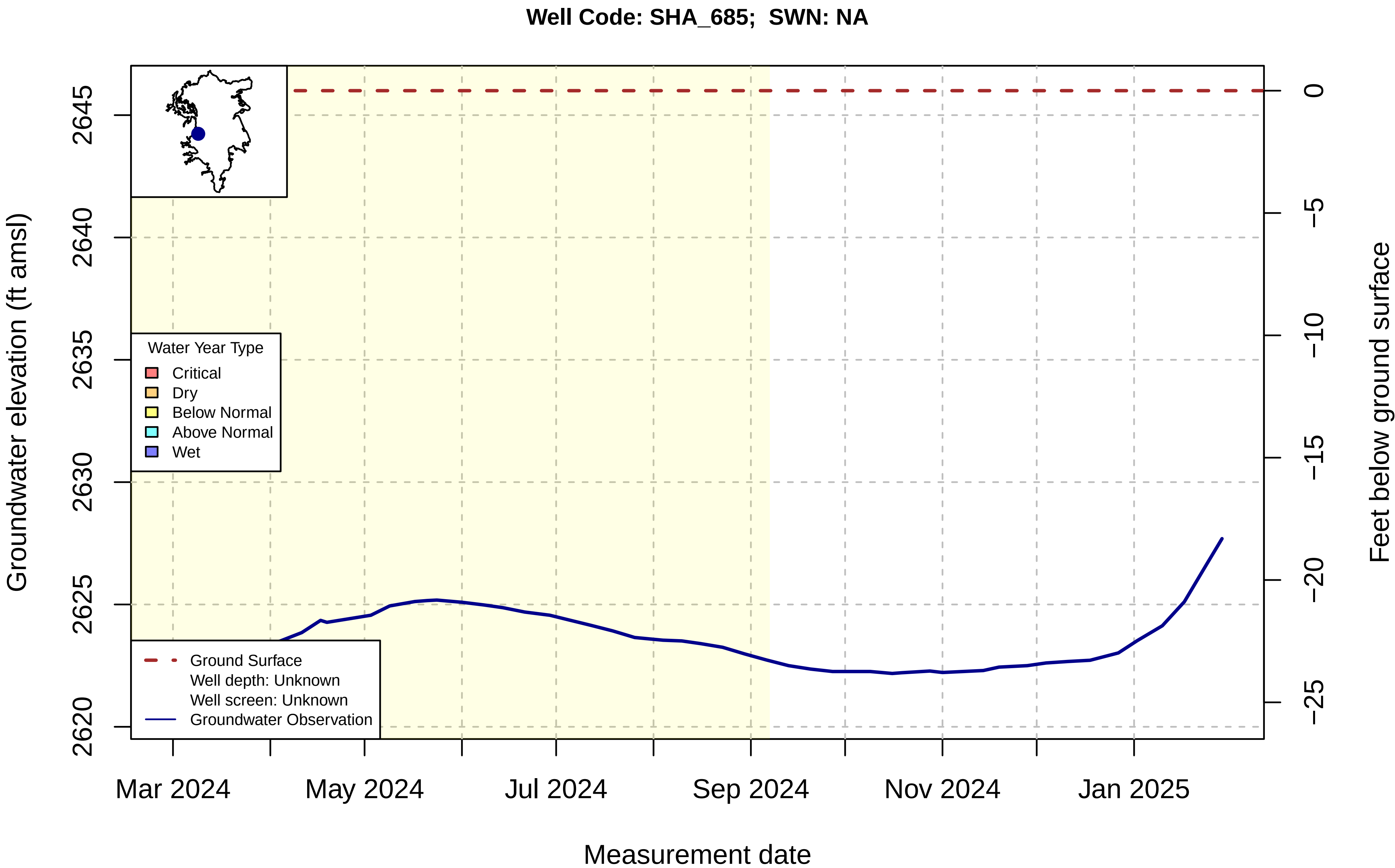
Well Code: 415748N1225300W001; SWN: 43N06W15F003M
Groundwater elevation (ft amsl)
2610
2620
2630
2640
2650
2660
Feet below ground surface
0
−10
−20
−30
−40
−50
−60
1971
1981
1991
2001
2011
2021
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 100 ft bgs
Well screen: Unknown
Groundwater Observation



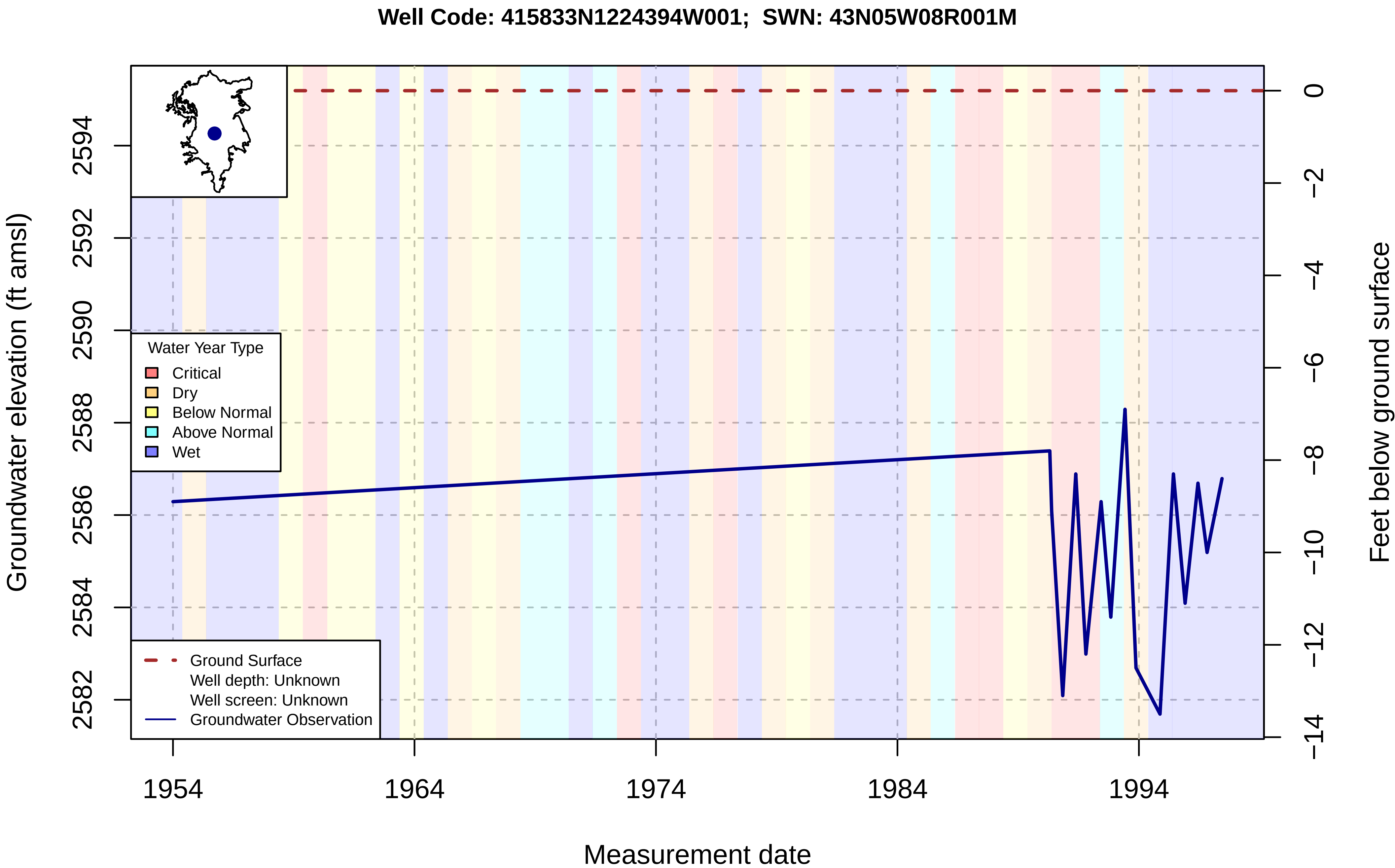
Well Code: 415753N1224660W001; SWN: 43N05W18G001M
Groundwater elevation (ft amsl)
2520
2540
2560
2580
2600
2620
2640
2660
Feet below ground surface
0
−20
−40
−60
−80
−100
−120
1990
2000
2010
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 329 ft bgs
Well screen: Unknown
Groundwater Observation



Well Code: SHA_017; SWN: NA
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2640
2650
2660
2670
2680
2690
2700
0
−10
−20
−30
−40
−50
−60
Jul 2019
Jul 2020
Jul 2021
Jul 2022
Jul 2023
Jul 2024
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 110 ft bgs
Well screen: Unknown
Groundwater Observation

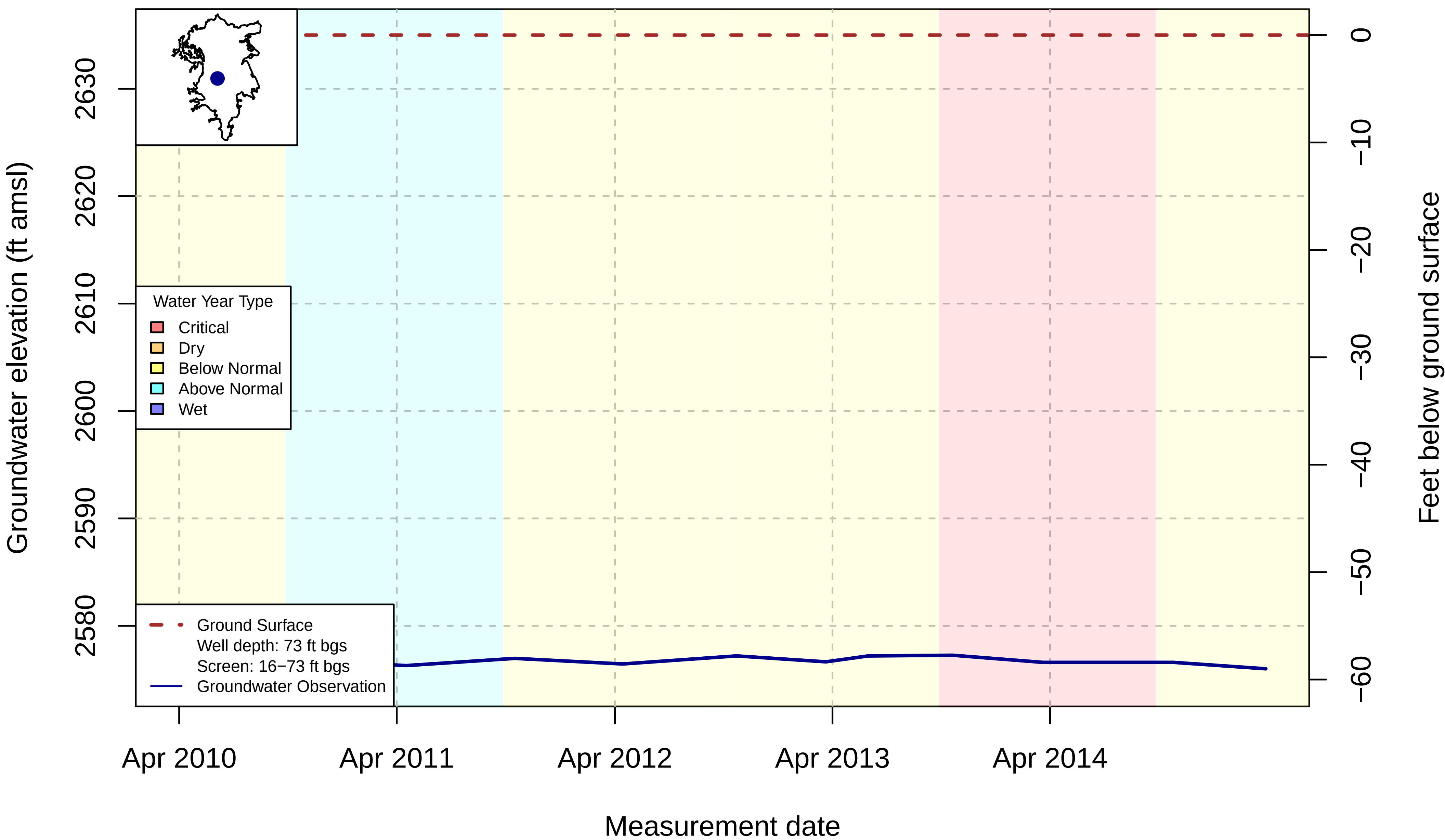


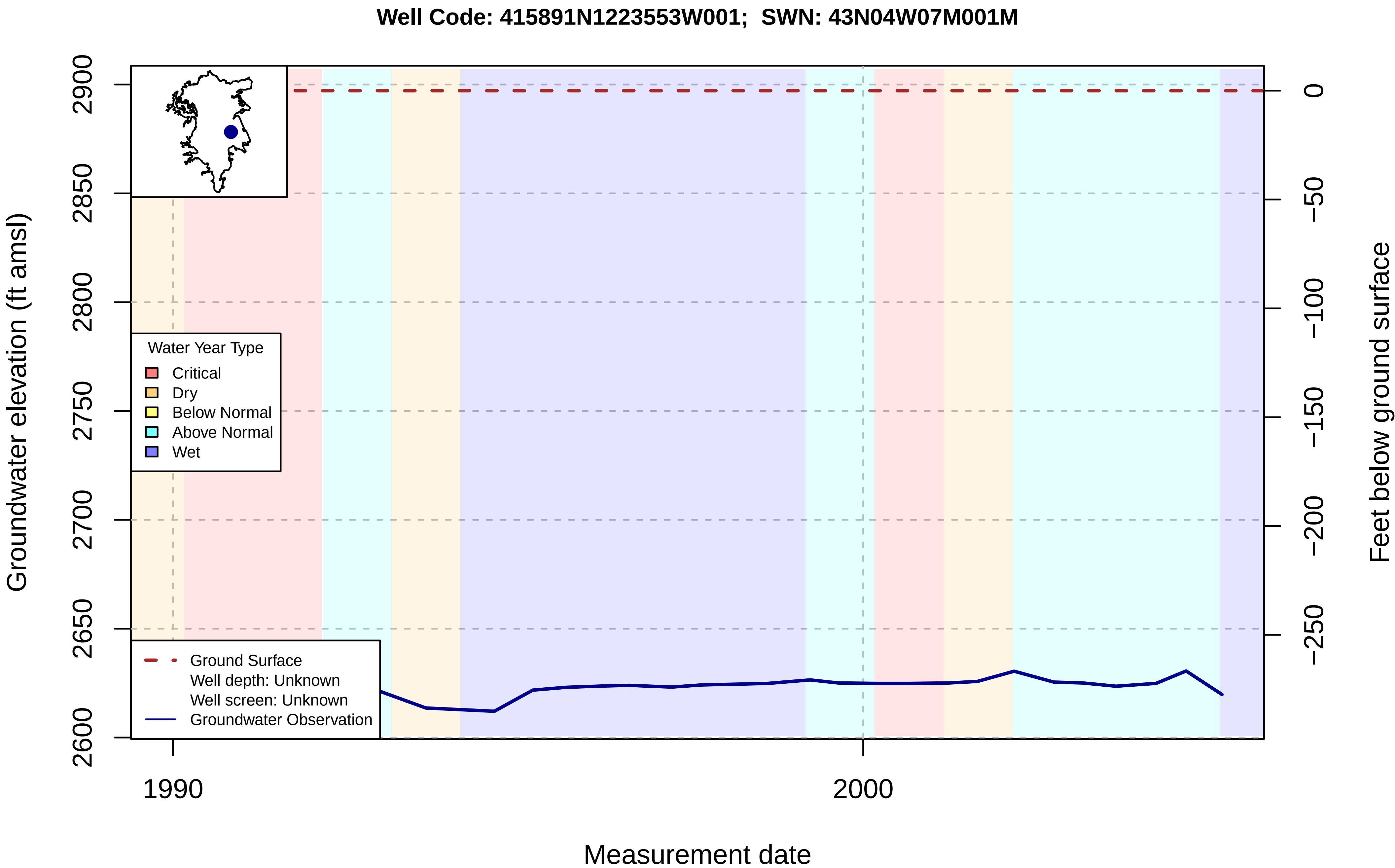
Well Code: SHA_685; SWN: NA
Groundwater elevation (ft amsl)
2620
2625
2630
2635
2640
2645
Feet below ground surface
0
−5
−10
−15
−20
−25
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation
Mar 2024
May 2024
Jul 2024
Sep 2024
Nov 2024
Jan 2025
Measurement date

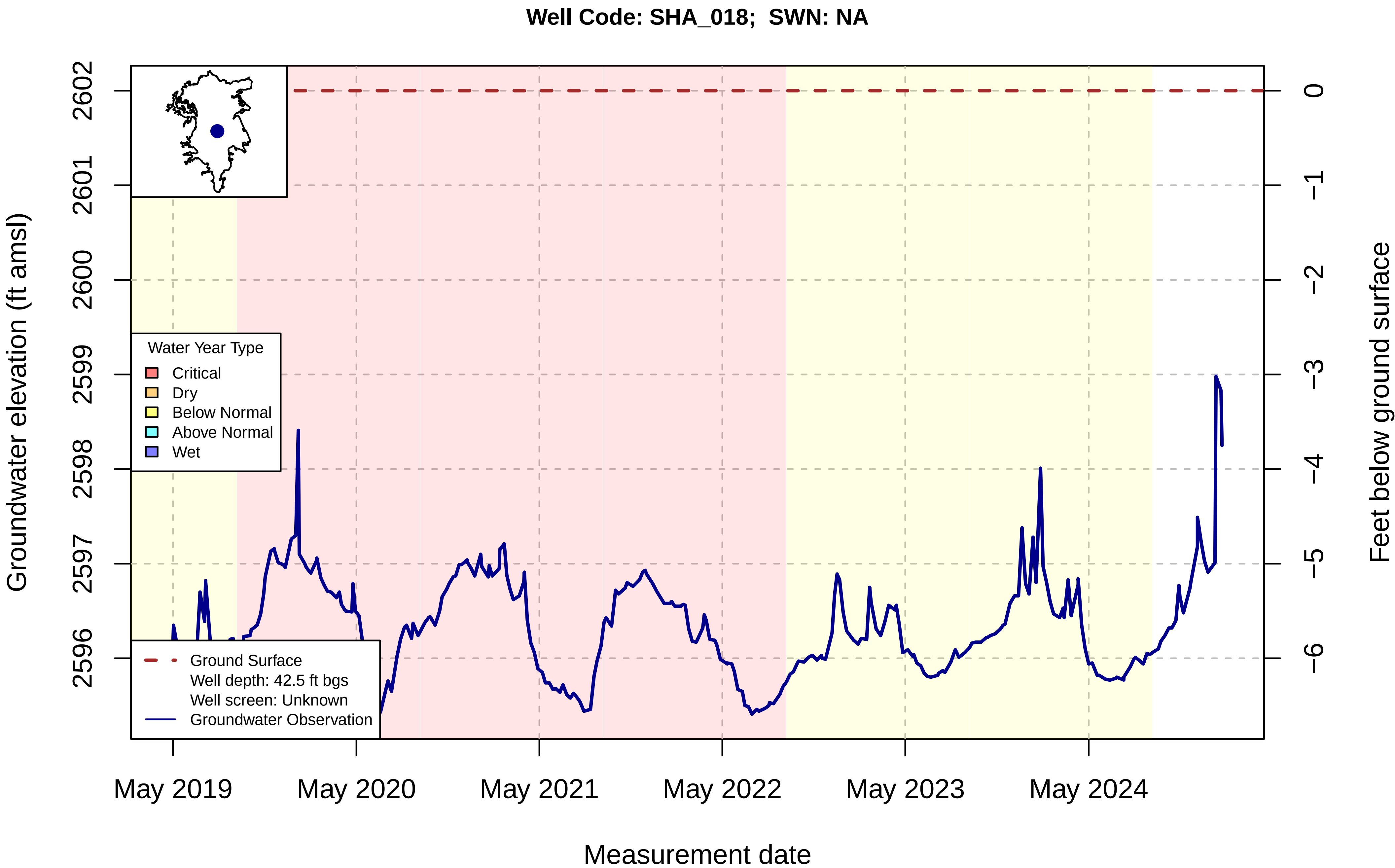


Well Code: 415833N1224394W001; SWN: 43N05W08R001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2582
2584
2586
2588
2590
2592
2594
0
−2
−4
−6
−8
−10
−12
−14
1954
1964
1974
1984
1994
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation

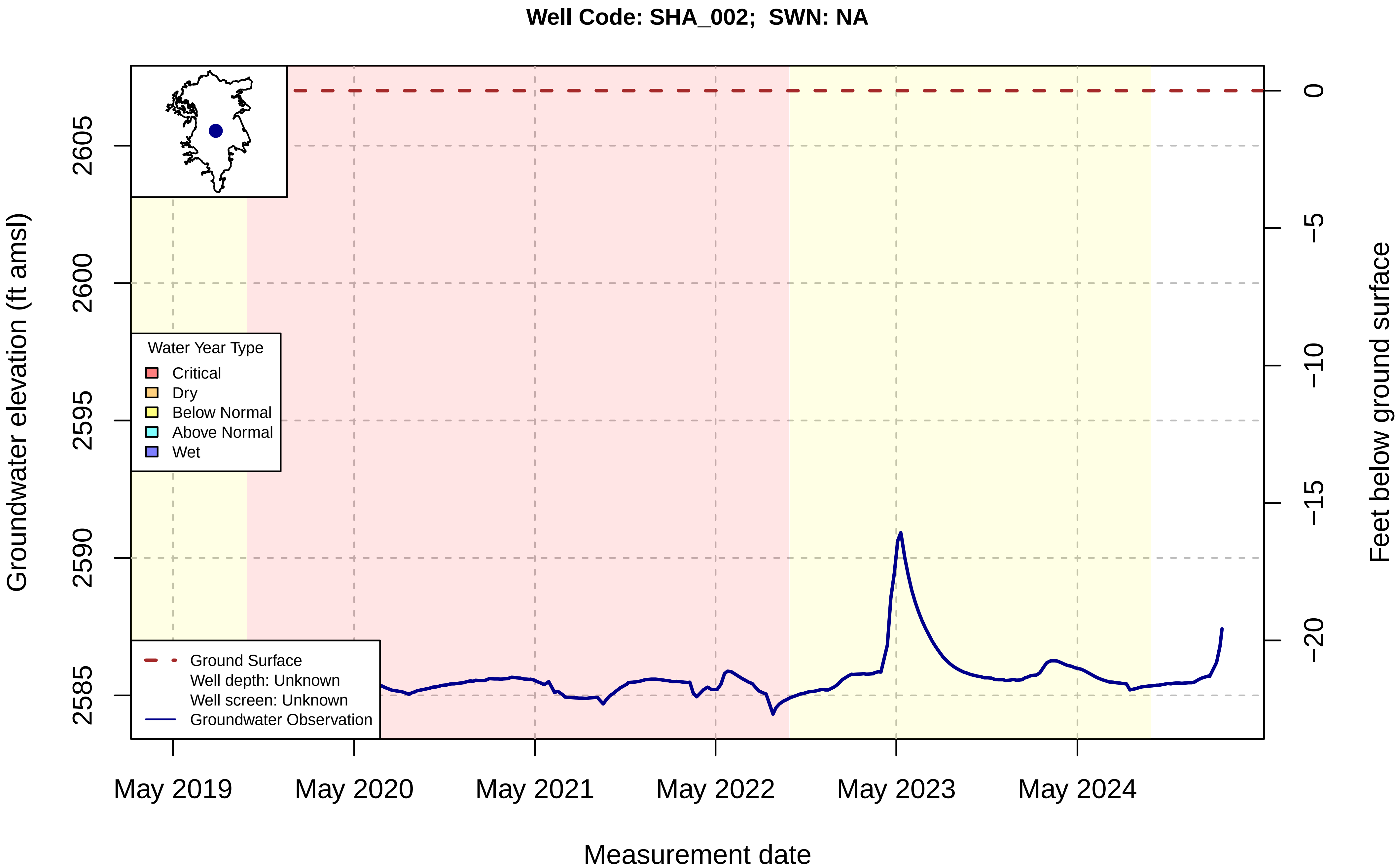
Well Code: 415867N1224630W001; SWN: 43N05W07K001M




Well Code: 415891N1223553W001; SWN: 43N04W07M001M
Groundwater elevation (ft amsl)
2600
2650
2700
2750
2800
2850
2900
Feet below ground surface
0
−50
−100
−150
−200
−250
1990
2000
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation

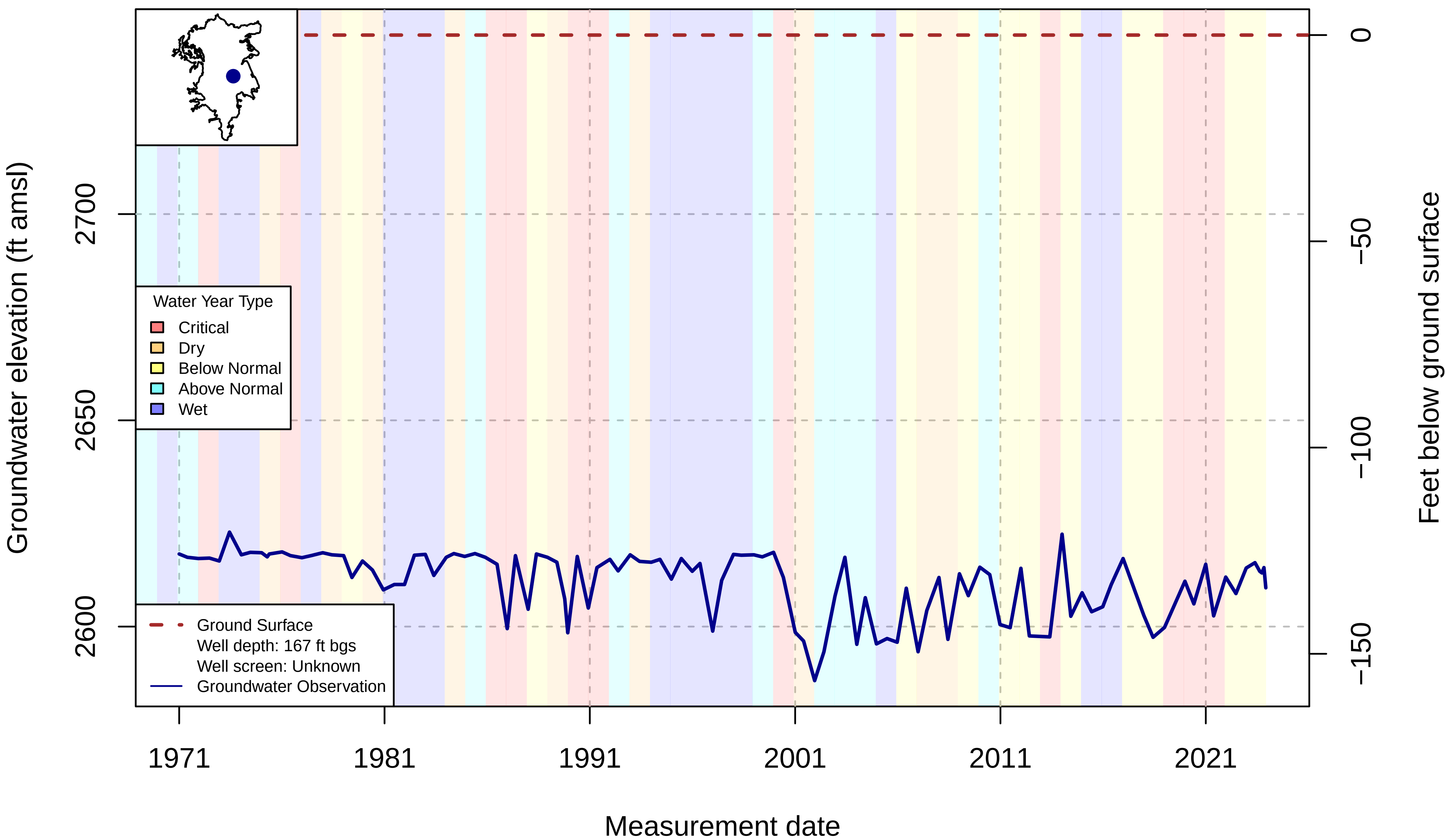


Well Code: SHA_018; SWN: NA
Groundwater elevation (ft amsl)
Feet below ground surface
2596
2597
2598
2599
2600
2601
2602
0
−1
−2
−3
−4
−5
−6
May 2019
May 2020
May 2021
May 2022
May 2023
May 2024
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 42.5 ft bgs
Well screen: Unknown
Groundwater Observation

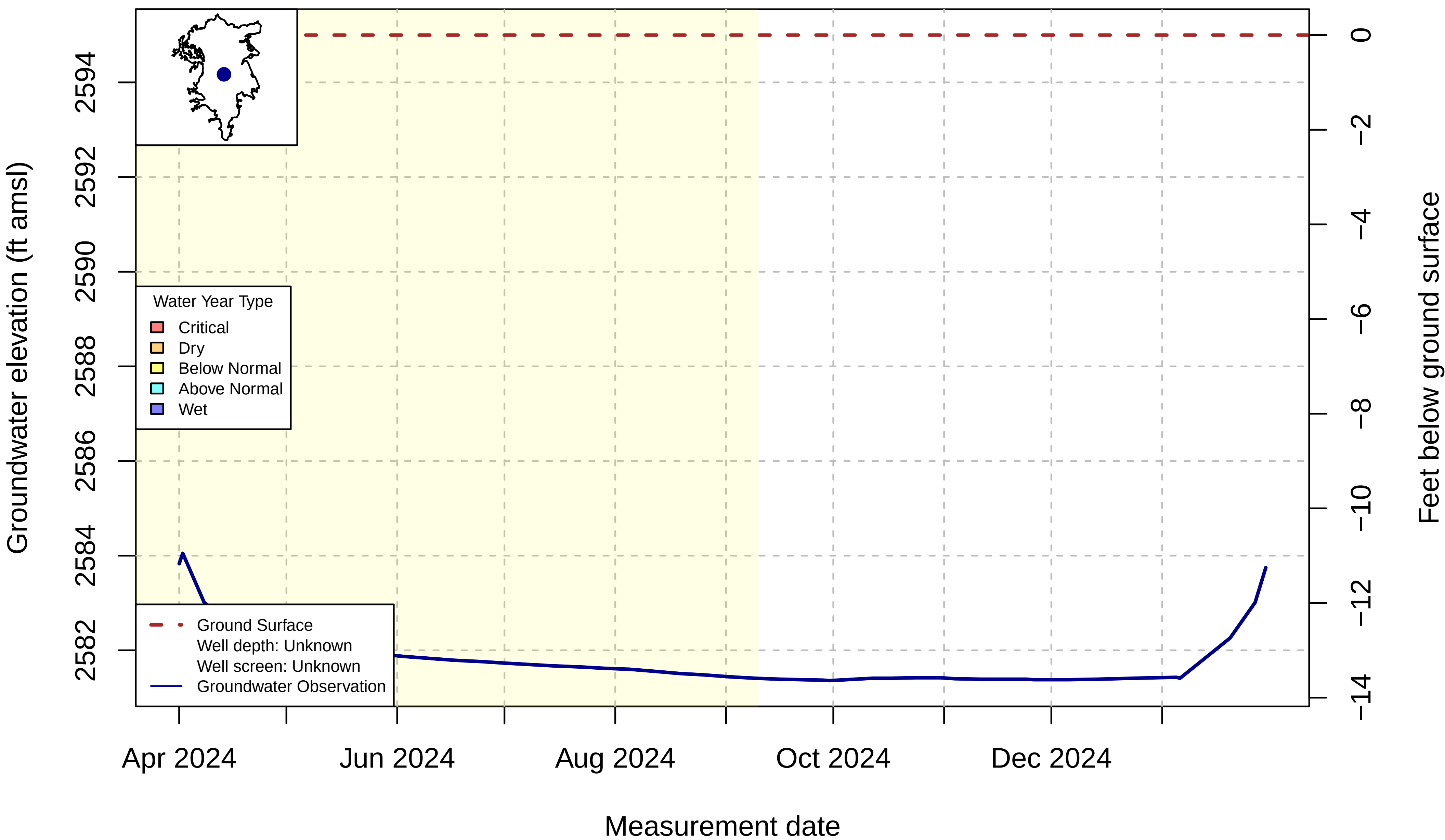


Well Code: SHA_002; SWN: NA
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2585
2590
2595
2600
2605
0
−5
−10
−15
−20
May 2019
May 2020
May 2021
May 2022
May 2023
May 2024

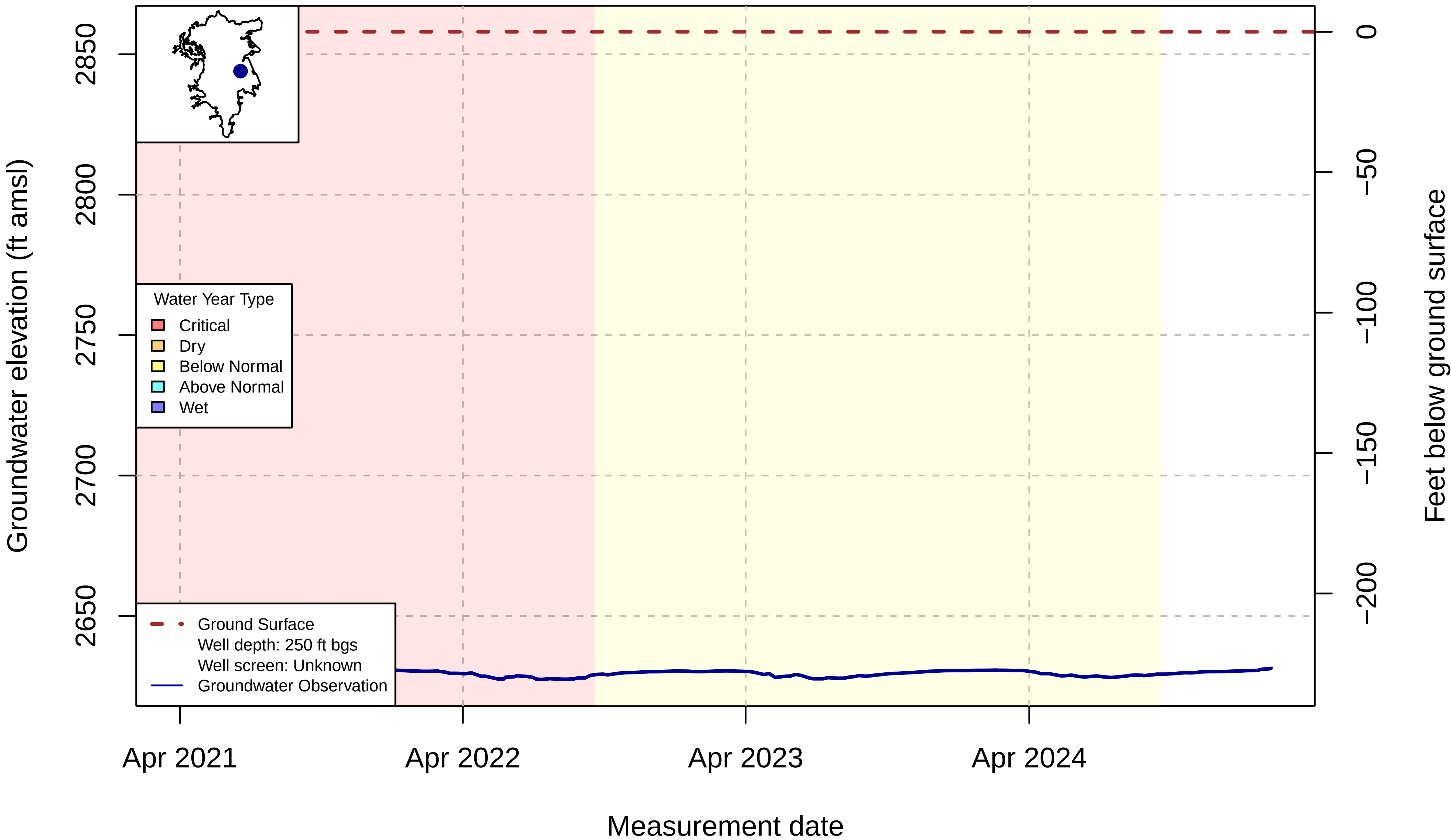
Well Code: 415952N1223848W001; SWN: 43N05W11A001M

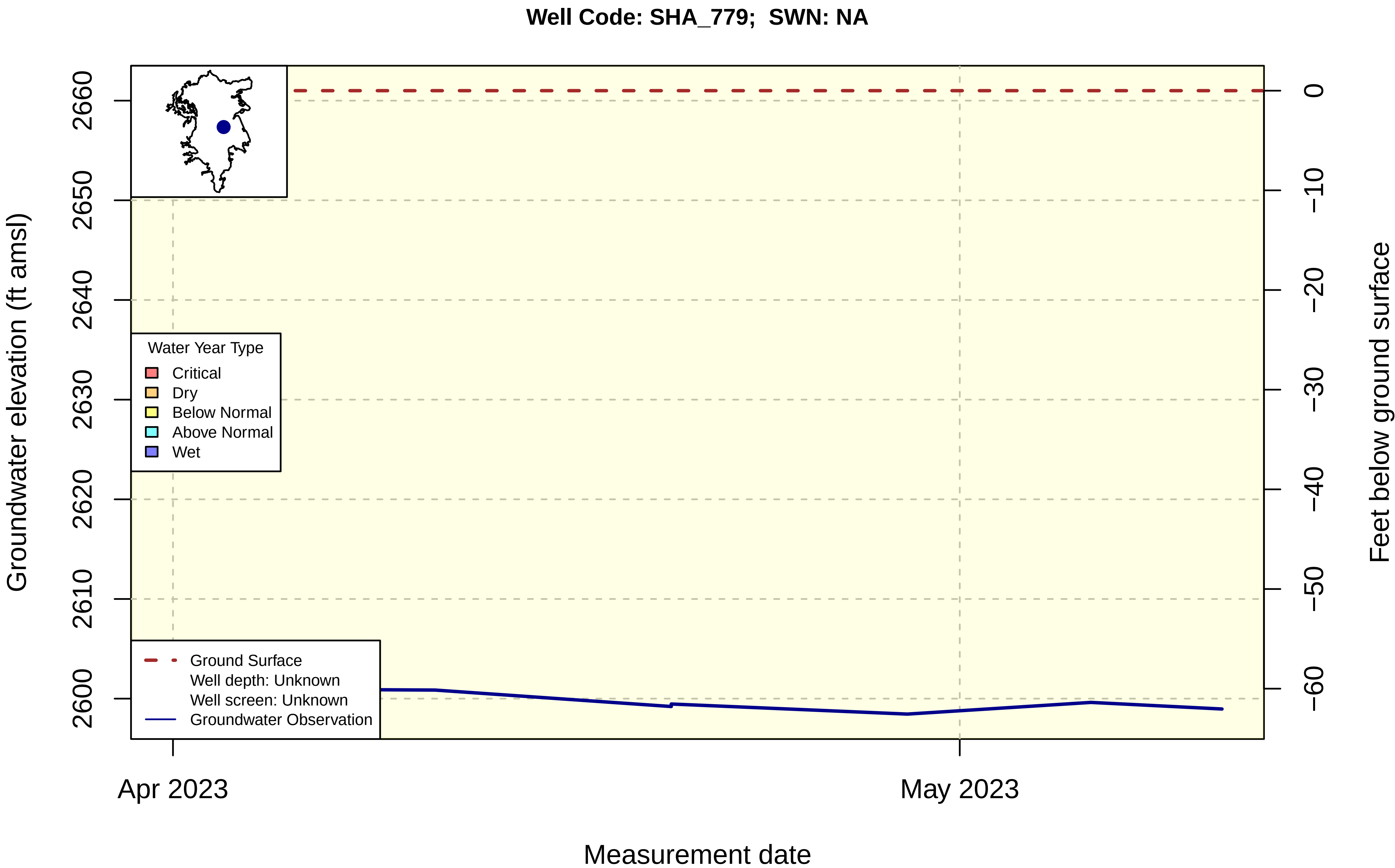


Well Code: SHA_031; SWN: NA



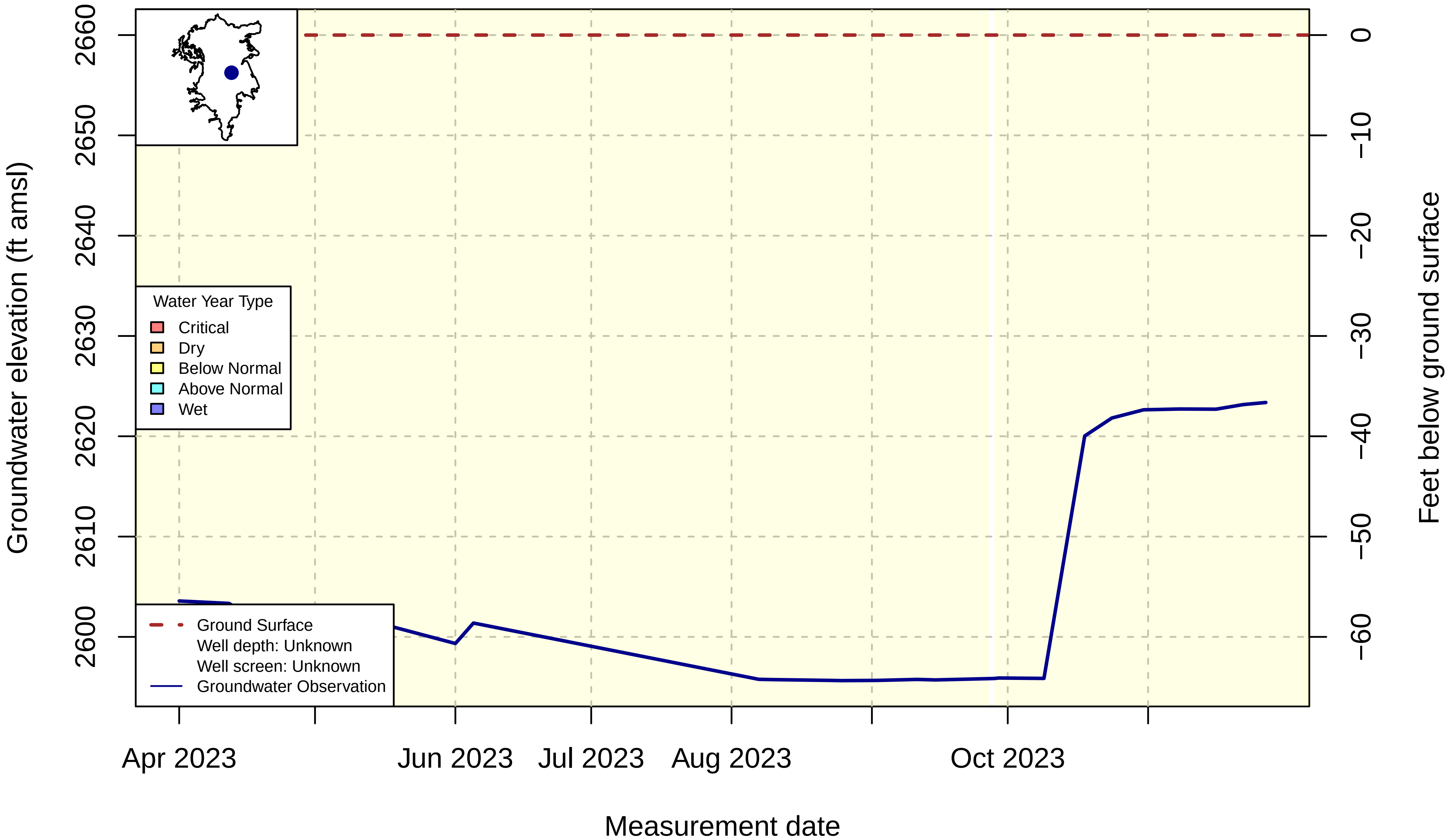
Well Code: SHA_174; SWN: NA

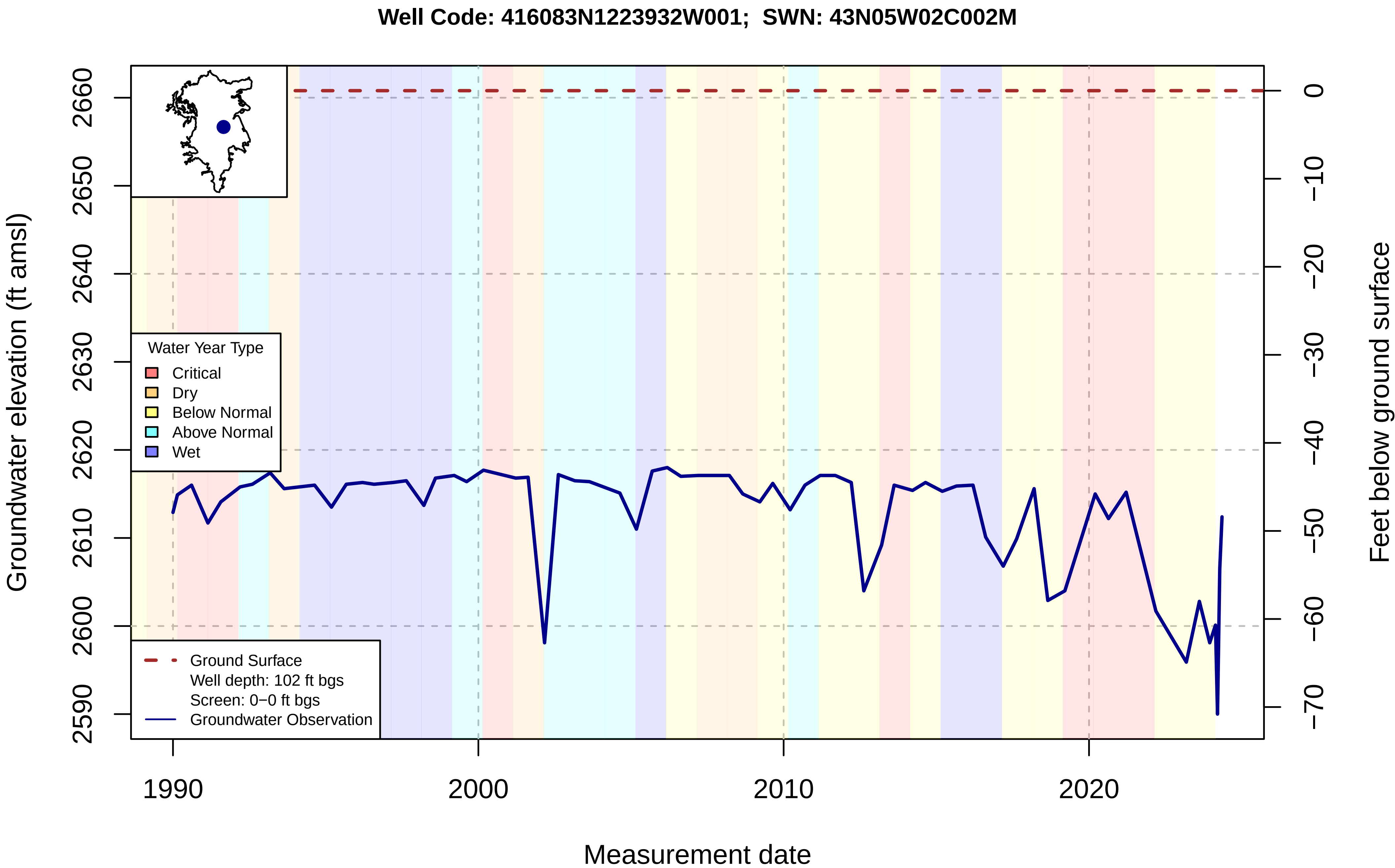




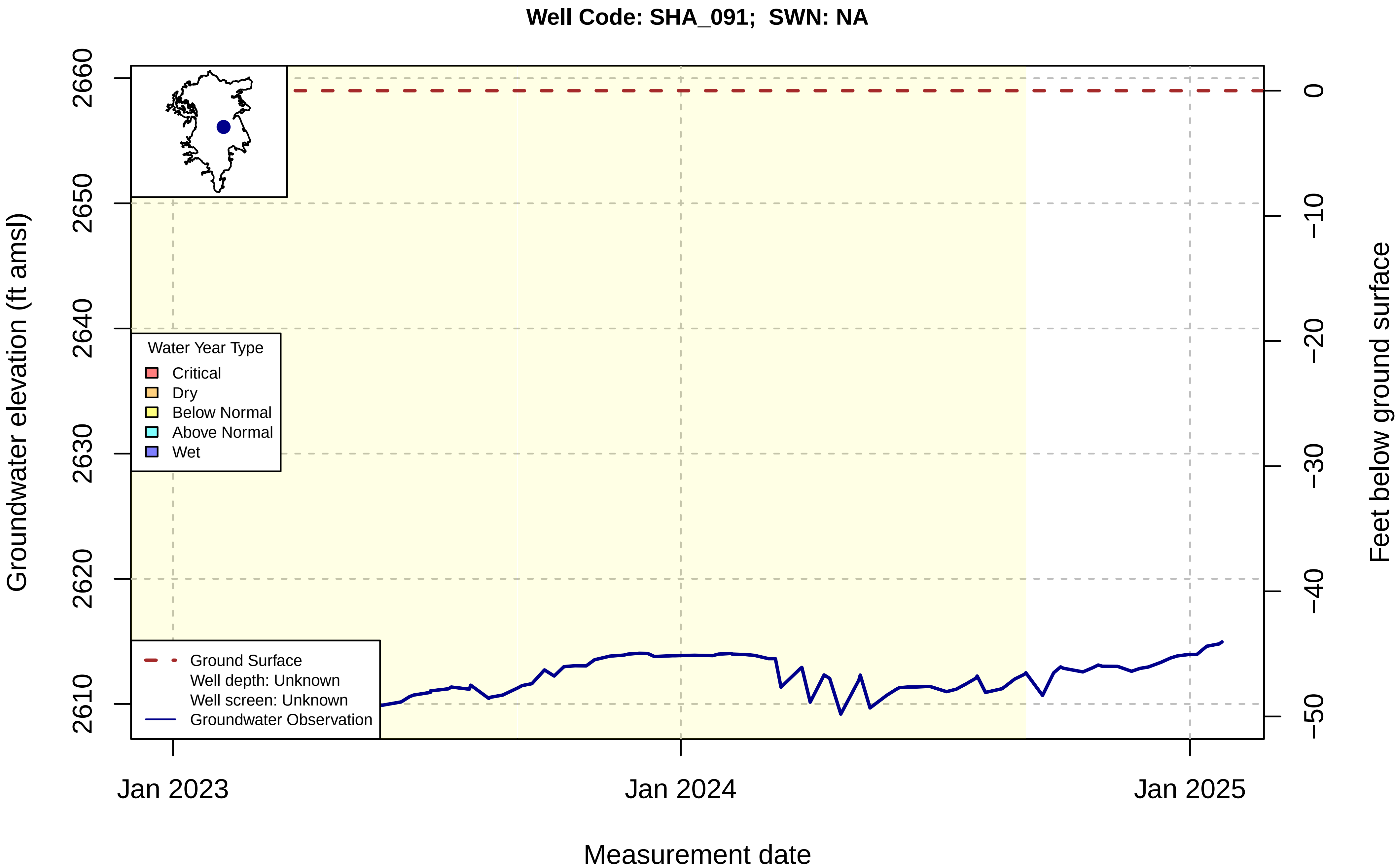
Well Code: SHA_779; SWN: NA
Groundwater elevation (ft amsl)
2660
2650
2640
2630
2620
2610
2600
Feet below ground surface
0
−10
−20
−30
−40
−50
−60
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation
Apr 2023
May 2023
Measurement date

Well Code: SHA_789; SWN: NA

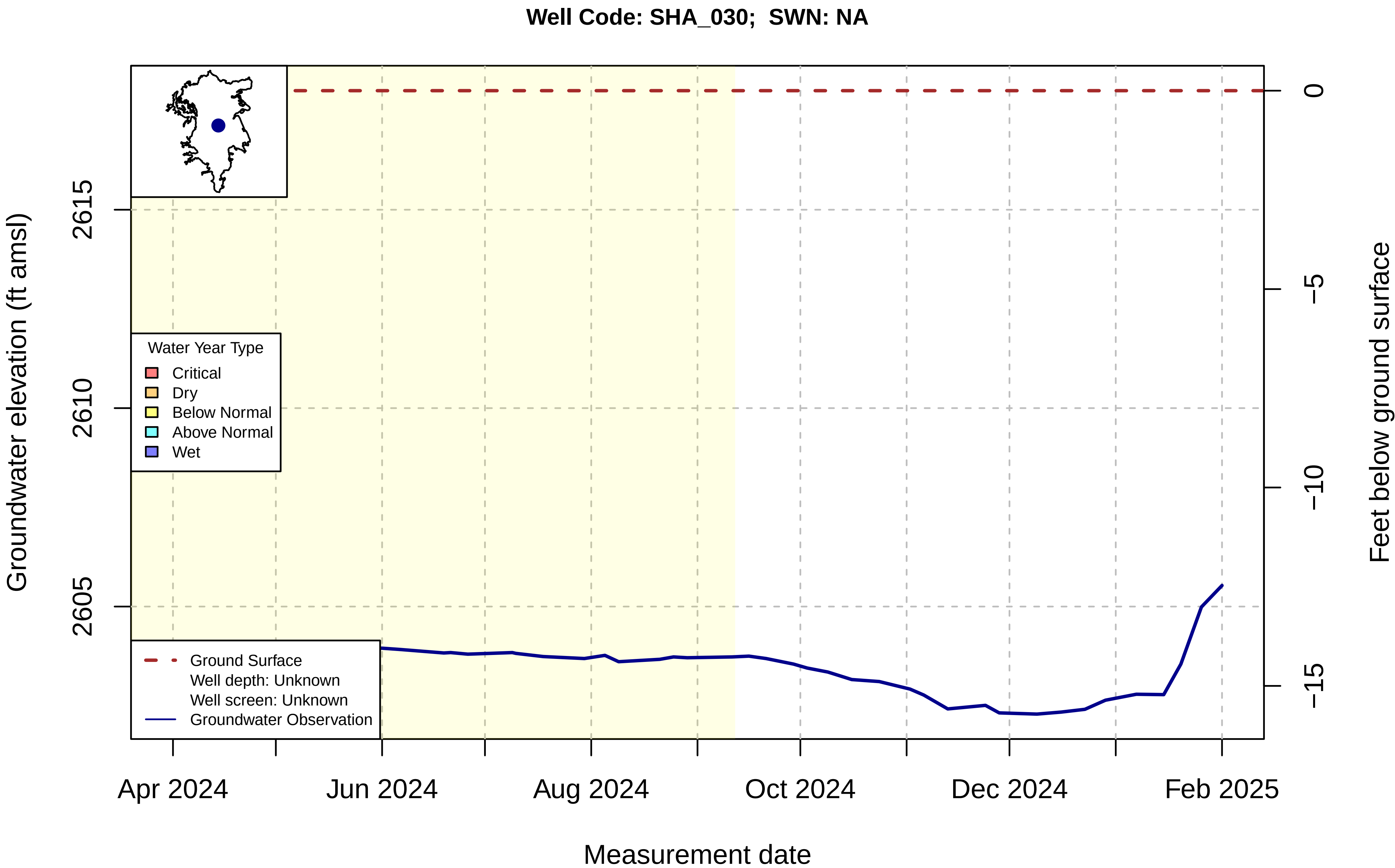




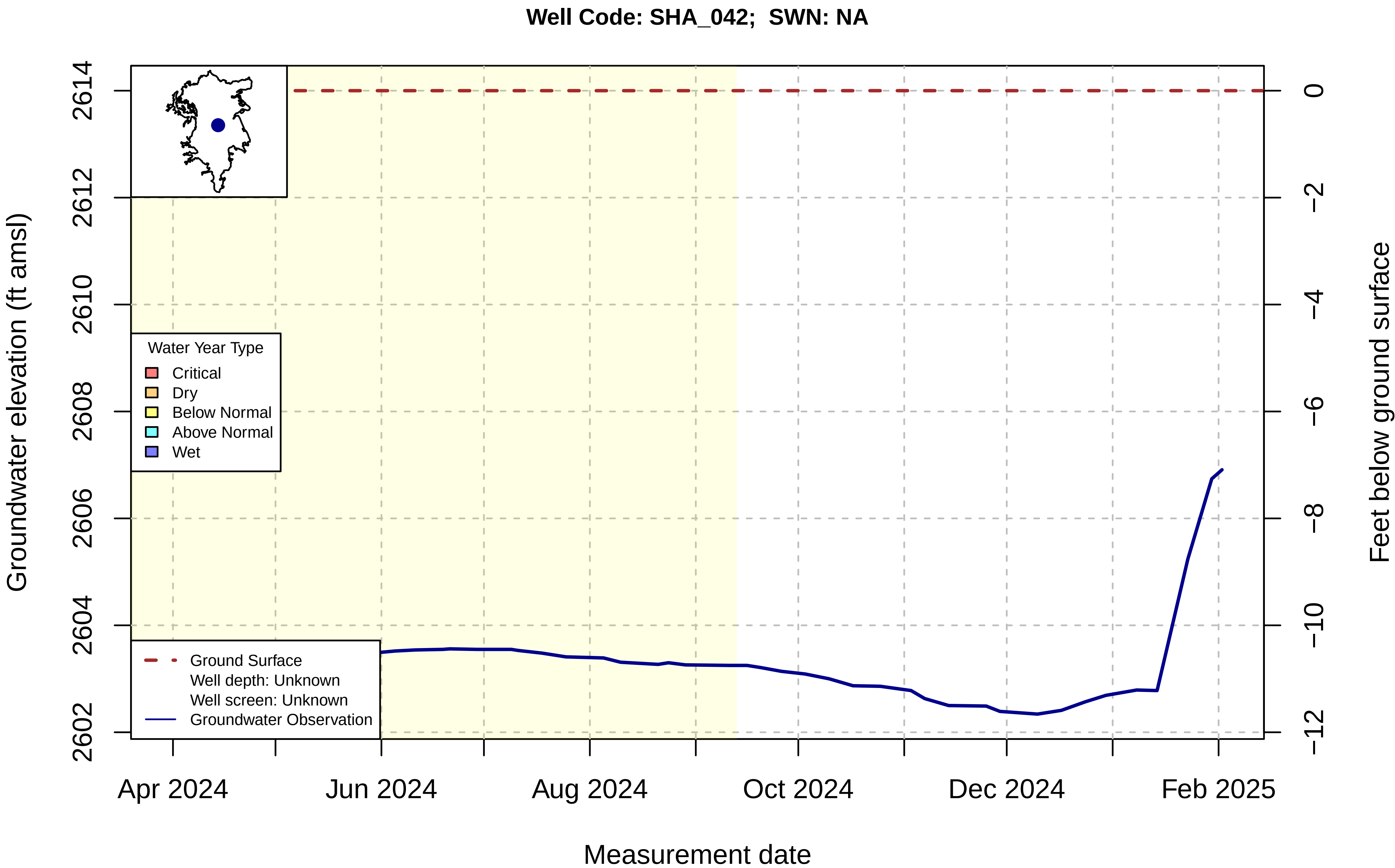
Well Code: 416083N1223932W001; SWN: 43N05W02C002M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2590
2600
2610
2620
2630
2640
2650
2660
0
−10
−20
−30
−40
−50
−60
−70
1990
2000
2010
2020
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 102 ft bgs
Screen: 0−0 ft bgs
Groundwater Observation



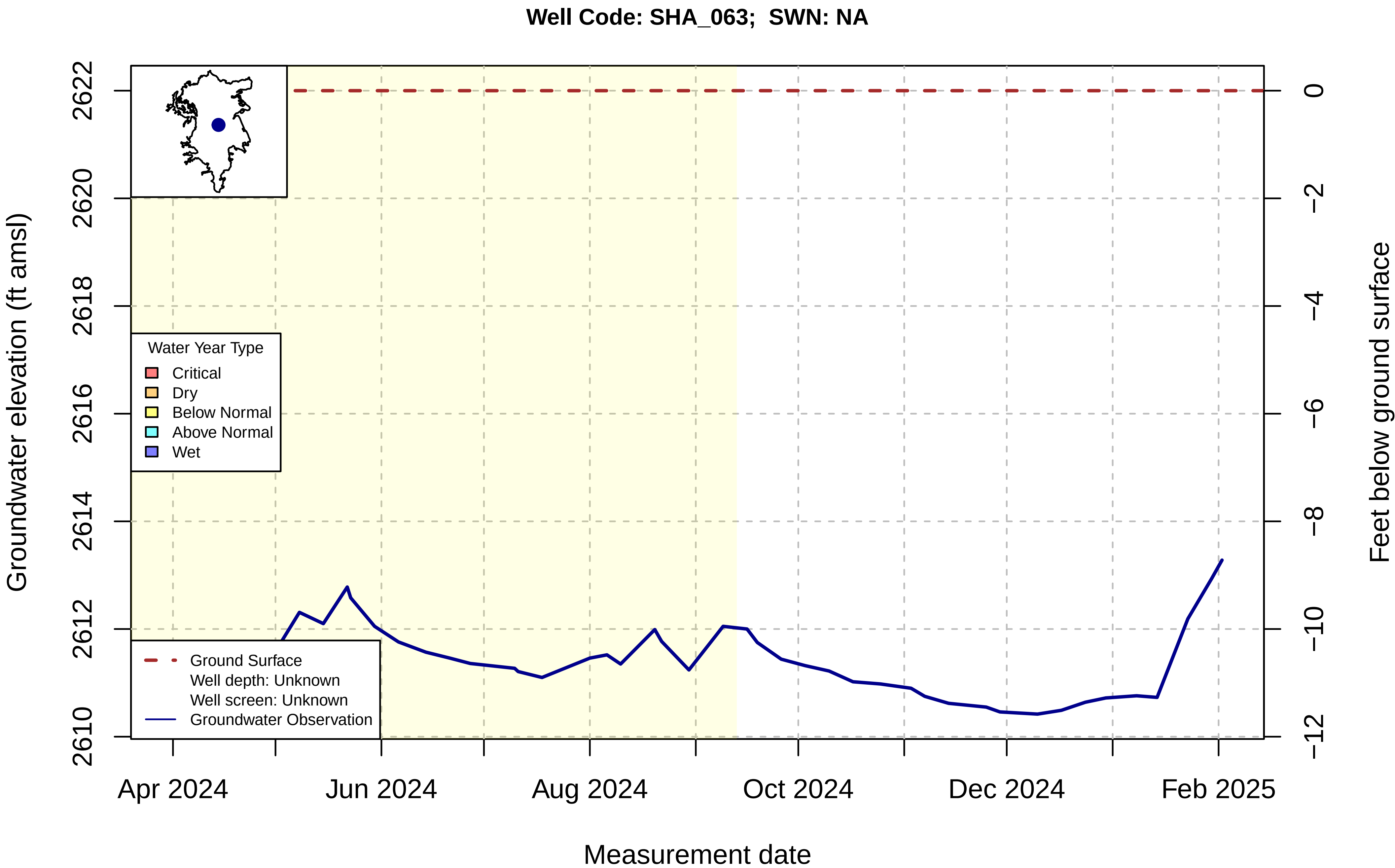
Well Code: SHA_091; SWN: NA
Groundwater elevation (ft amsl)
2660
2650
2640
2630
2620
2610
Feet below ground surface
0
−10
−20
−30
−40
−50
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation
Jan 2023
Jan 2024
Jan 2025
Measurement date



Well Code: SHA_030; SWN: NA
Groundwater elevation (ft amsl)
2615
2610
2605
Feet below ground surface
0
−5
−10
−15
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation
Apr 2024
Jun 2024
Aug 2024
Oct 2024
Dec 2024
Feb 2025
Measurement date

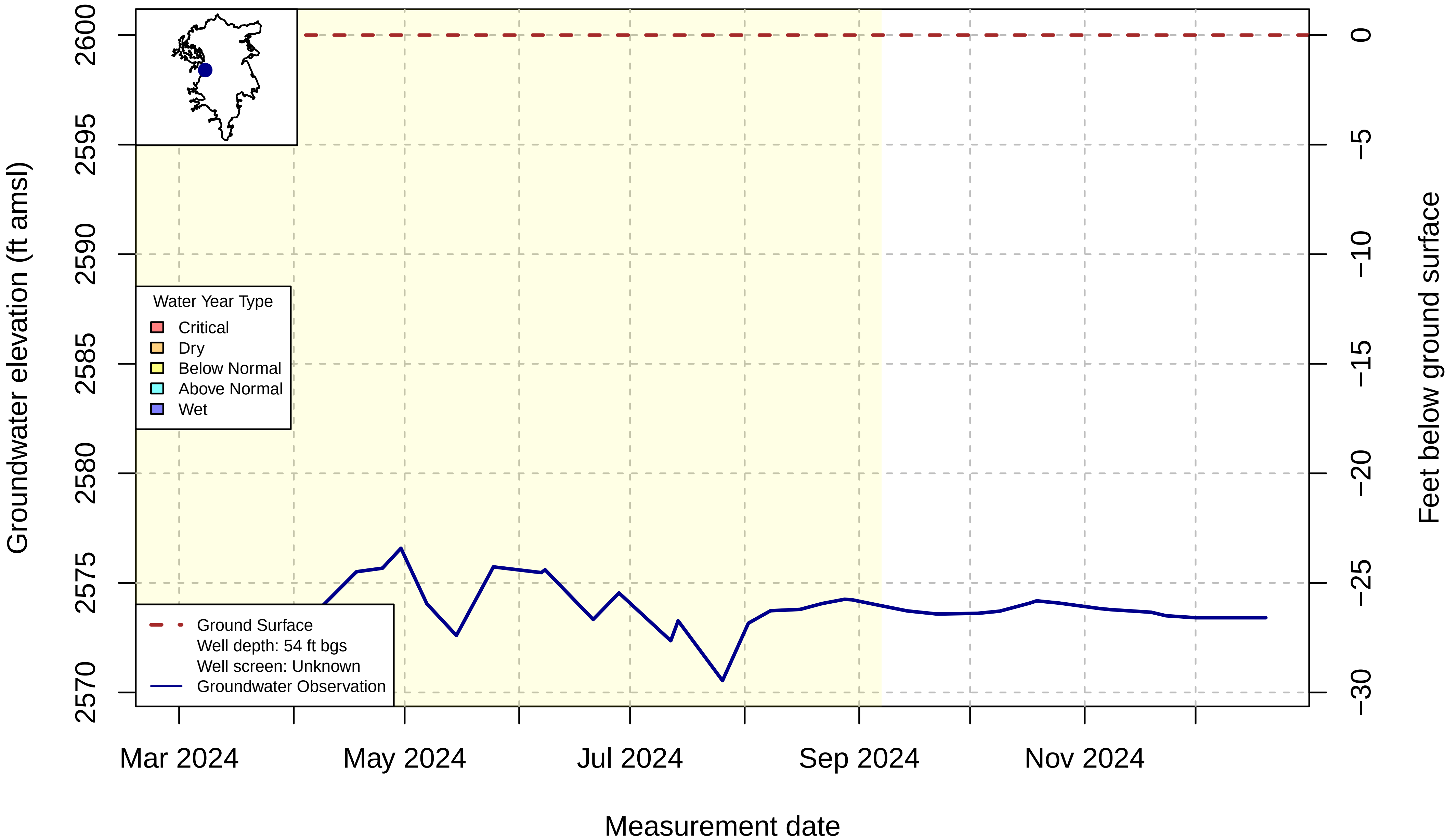


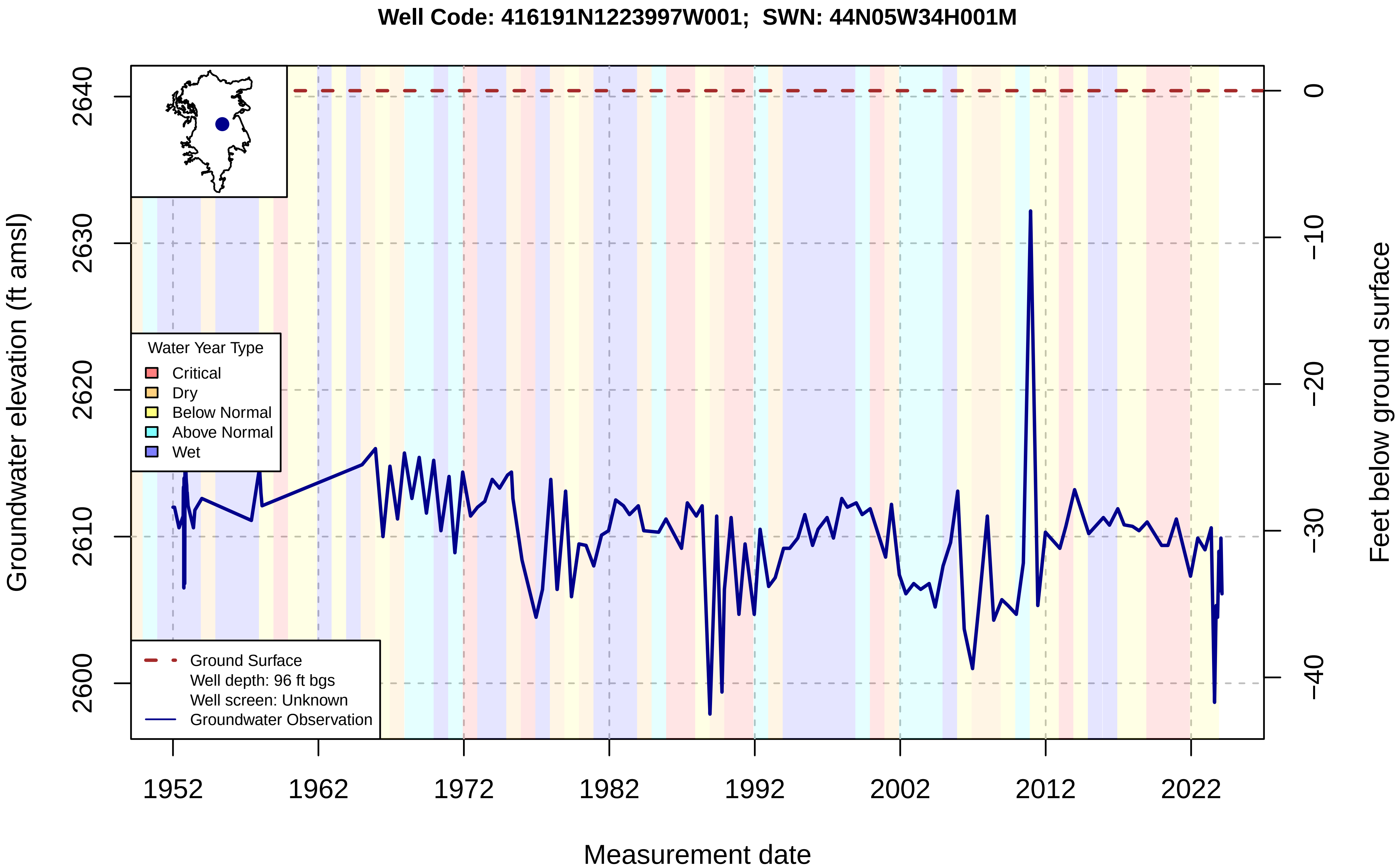
Well Code: SHA_042; SWN: NA
Groundwater elevation (ft amsl)
2602
2604
2606
2608
2610
2612
2614
Feet below ground surface
0
−2
−4
−6
−8
−10
−12
Apr 2024
Jun 2024
Aug 2024
Oct 2024
Dec 2024
Feb 2025
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation



Well Code: SHA_063; SWN: NA
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2622
2620
2618
2616
2614
2612
2610
0
−2
−4
−6
−8
−10
−12
Apr 2024
Jun 2024
Aug 2024
Oct 2024
Dec 2024
Feb 2025
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation

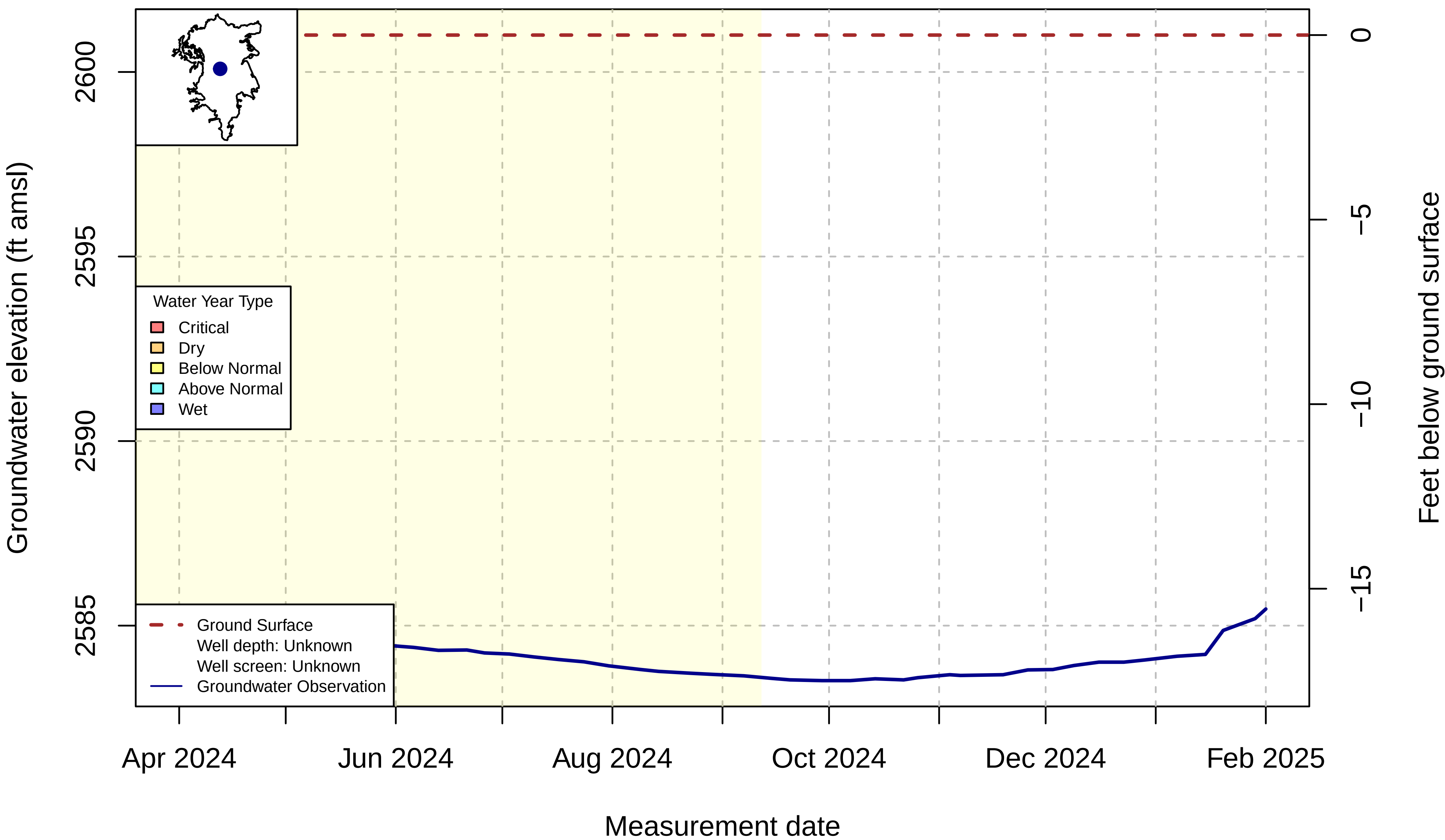
Well Code: SHA_612; SWN: NA

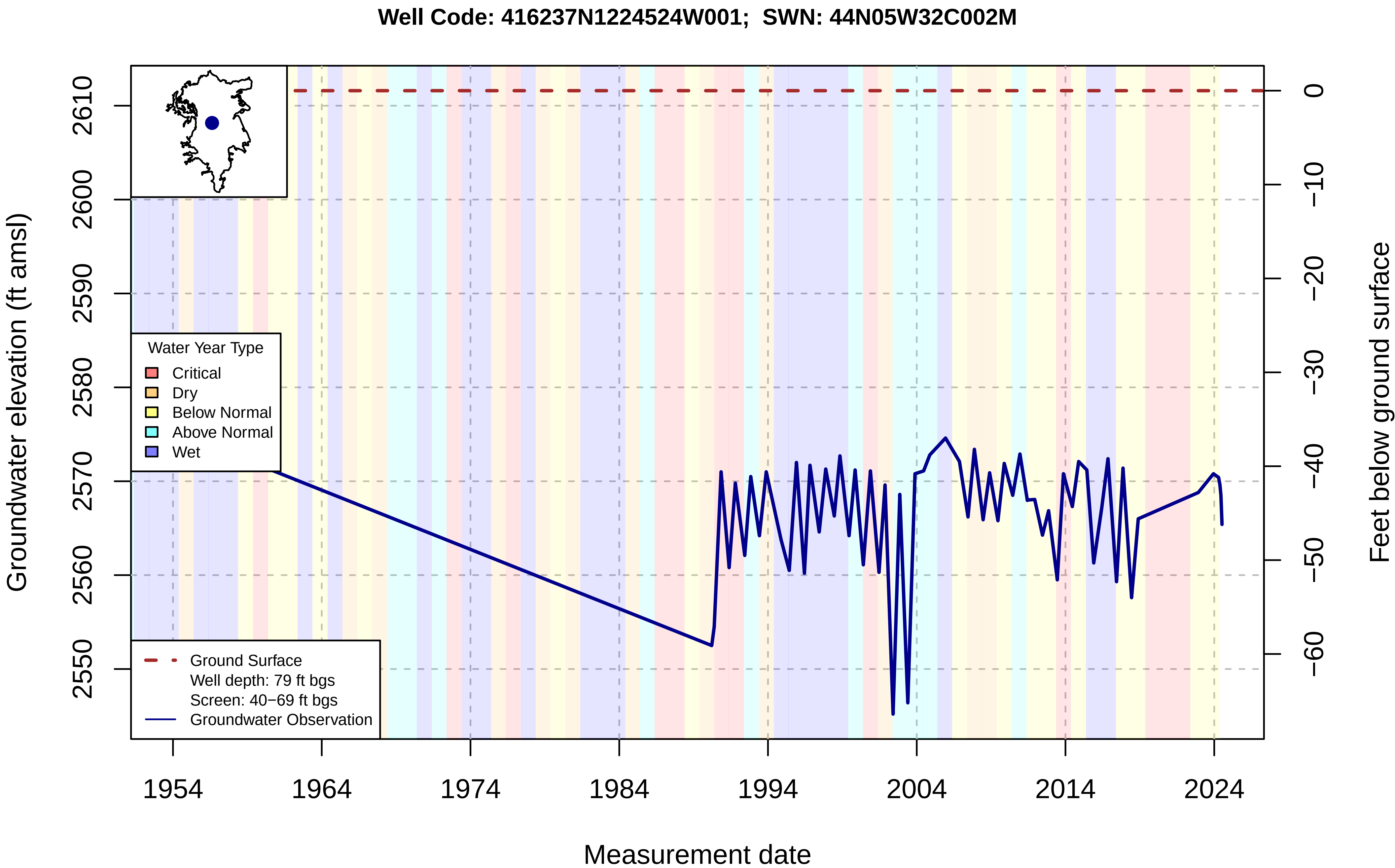




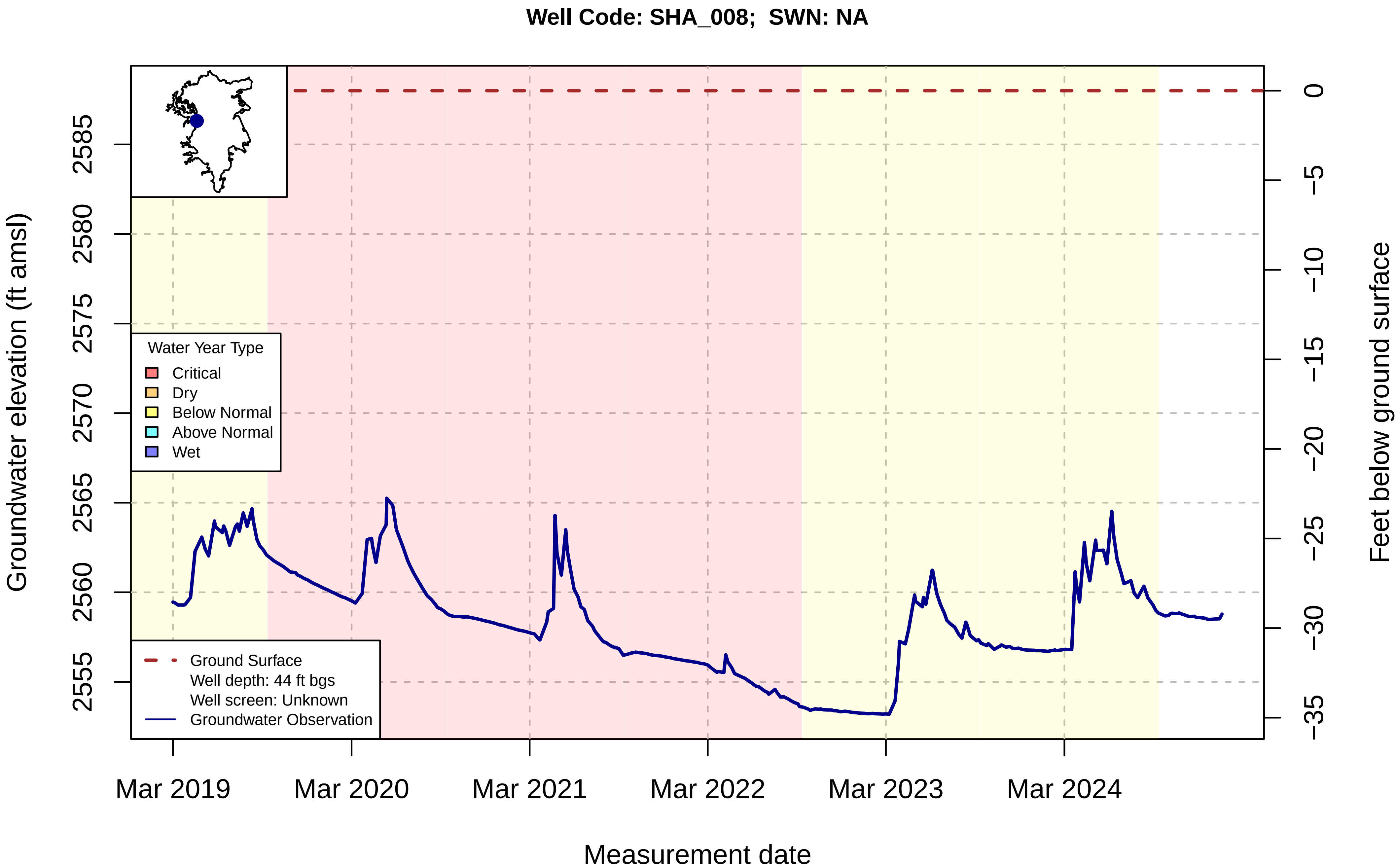
Well Code: 416191N1223997W001; SWN: 44N05W34H001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2600
2610
2620
2630
2640
0
−10
−20
−30
−40
1952
1962
1972
1982
1992
2002
2012
2022
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 96 ft bgs
Well screen: Unknown
Groundwater Observation

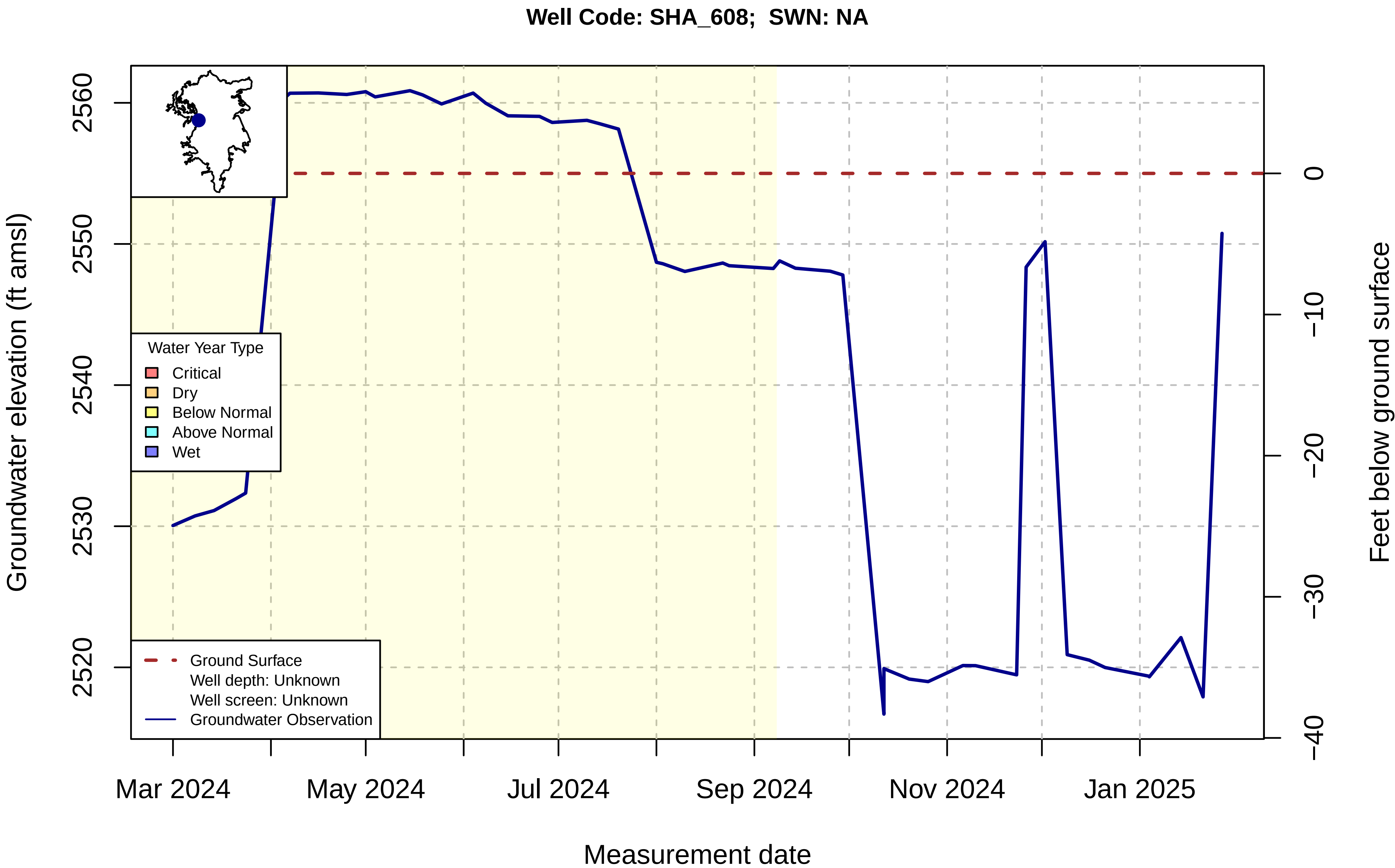
Well Code: SHA_037; SWN: NA



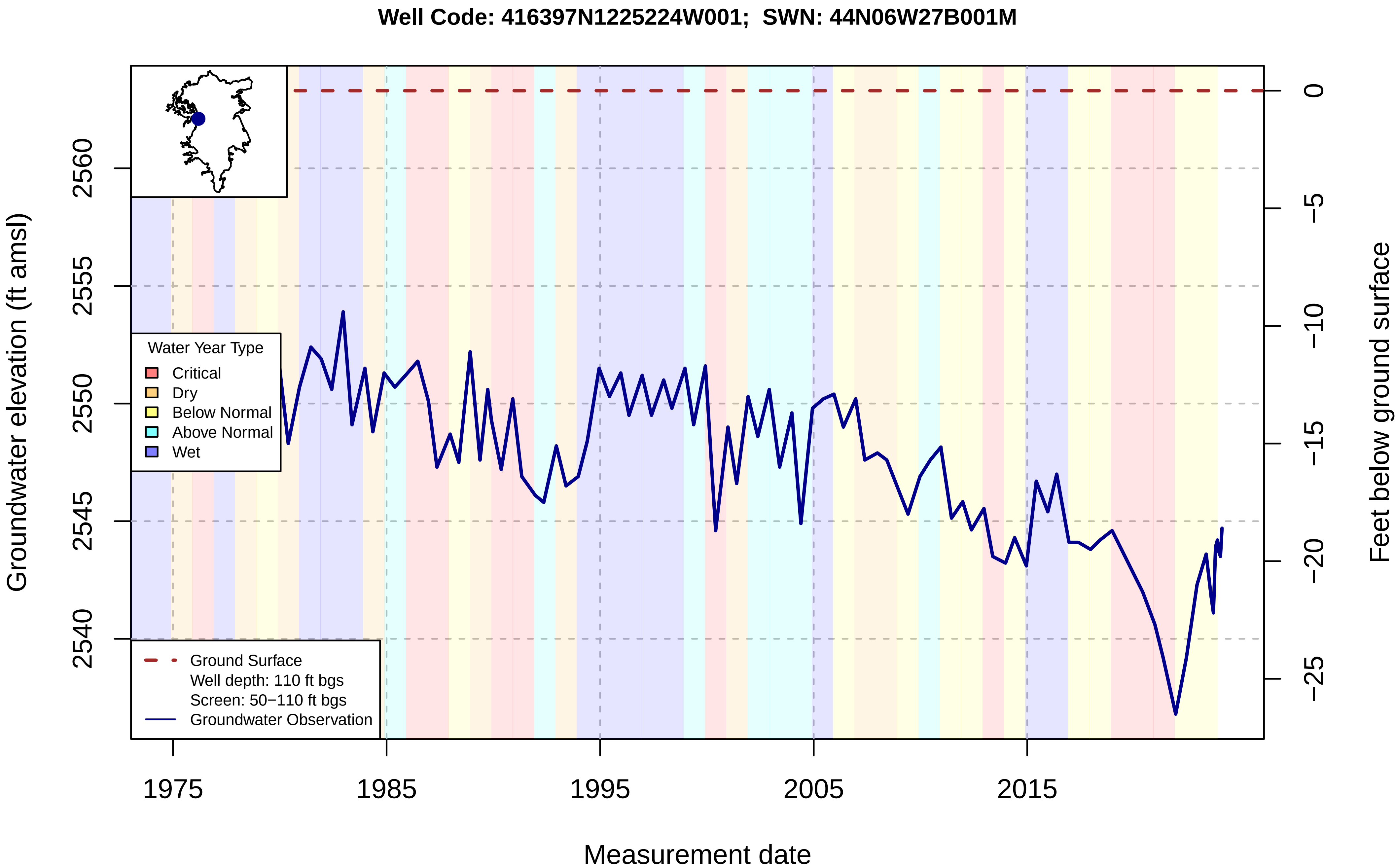


Well Code: 416237N1224524W001; SWN: 44N05W32C002M
Groundwater elevation (ft amsl)
2550
2560
2570
2580
2590
2600
2610
Feet below ground surface
0
−10
−20
−30
−40
−50
−60
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 79 ft bgs
Screen: 40−69 ft bgs
Groundwater Observation
1954
1964
1974
1984
1994
2004
2014
2024
Measurement date

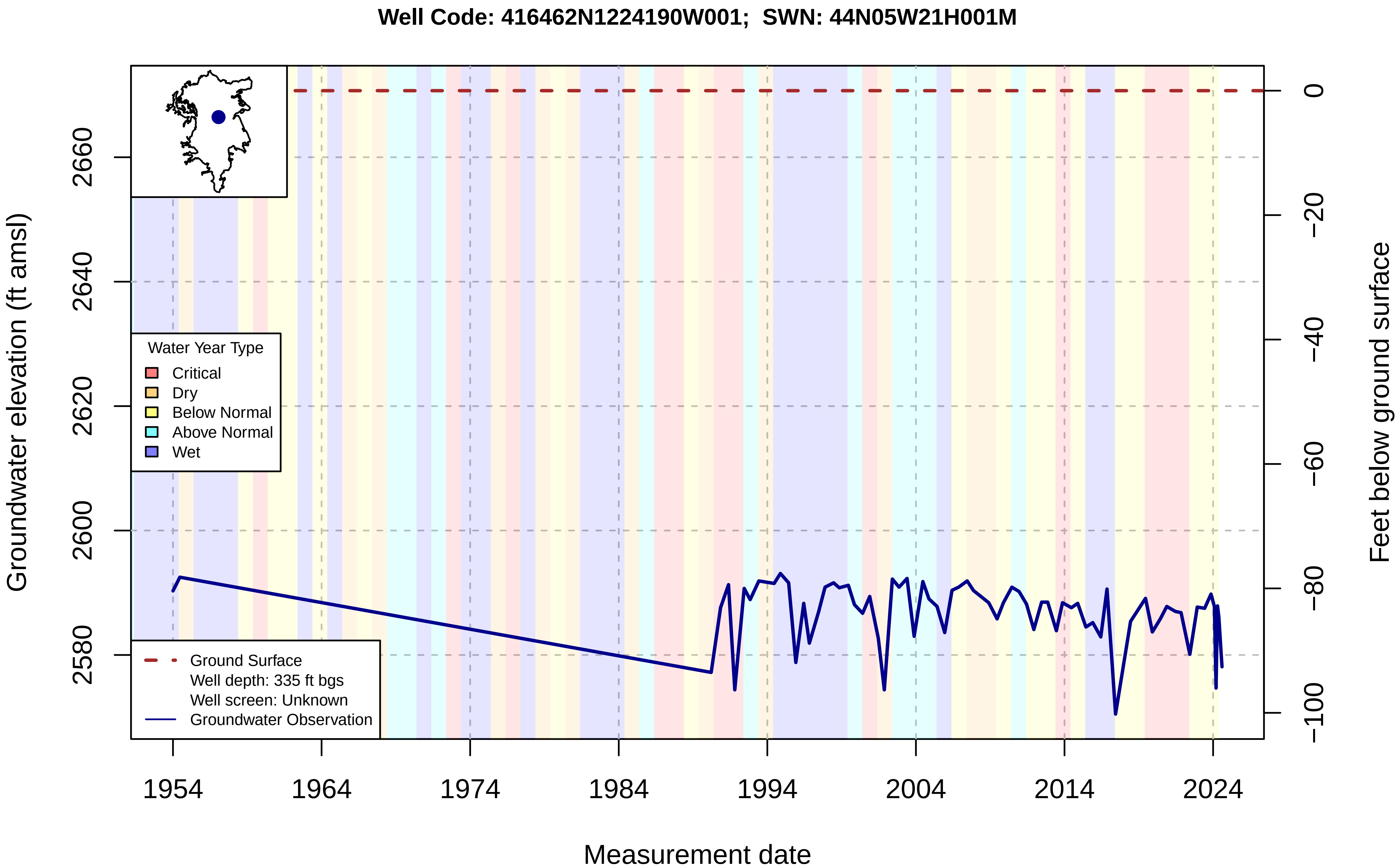

Well Code: SHA_008; SWN: NA
Groundwater elevation (ft amsl)
2555
2560
2565
2570
2575
2580
2585
Feet below ground surface
0
−5
−10
−15
−20
−25
−30
−35
Mar 2019
Mar 2020
Mar 2021
Mar 2022
Mar 2023
Mar 2024
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 44 ft bgs
Well screen: Unknown
Groundwater Observation



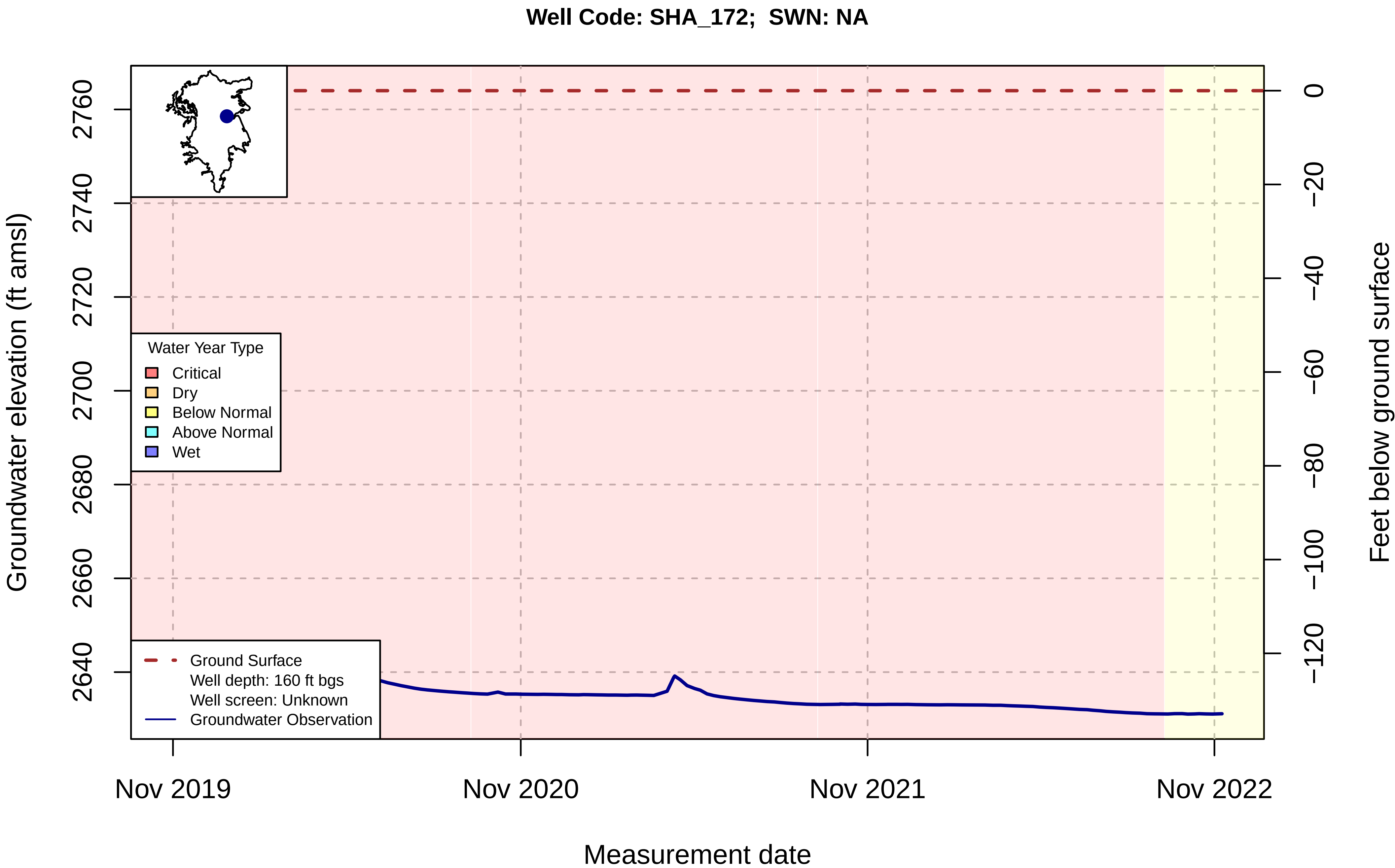
Well Code: SHA_608; SWN: NA
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2560
2550
2540
2530
2520
0
−10
−20
−30
−40
Mar 2024
May 2024
Jul 2024
Sep 2024
Nov 2024
Jan 2025
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation



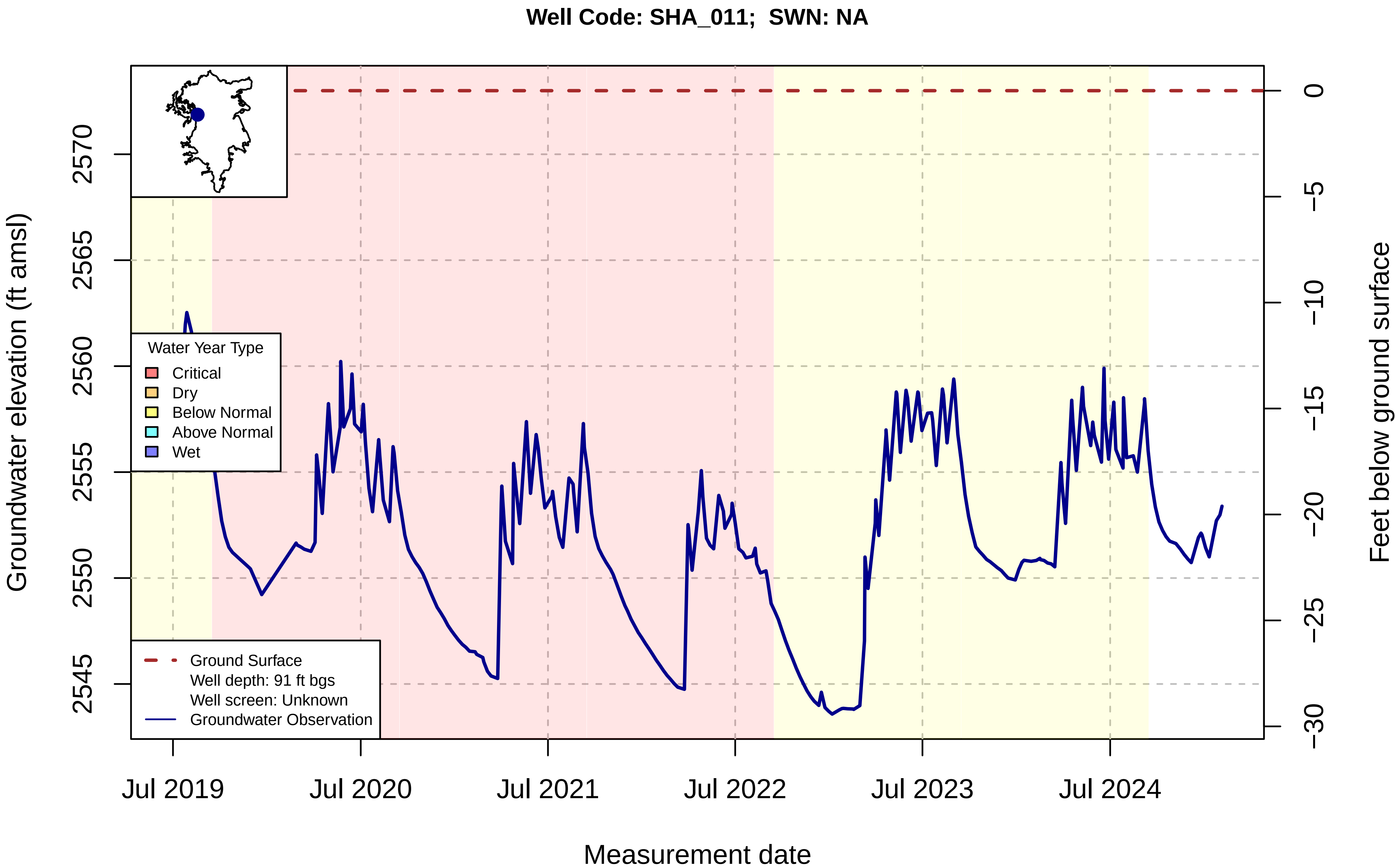
Well Code: 416397N1225224W001; SWN: 44N06W27B001M
Groundwater elevation (ft amsl)
2540
2545
2550
2555
2560
Feet below ground surface
0
−5
−10
−15
−20
−25
1975
1985
1995
2005
2015
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 110 ft bgs
Screen: 50−110 ft bgs
Groundwater Observation



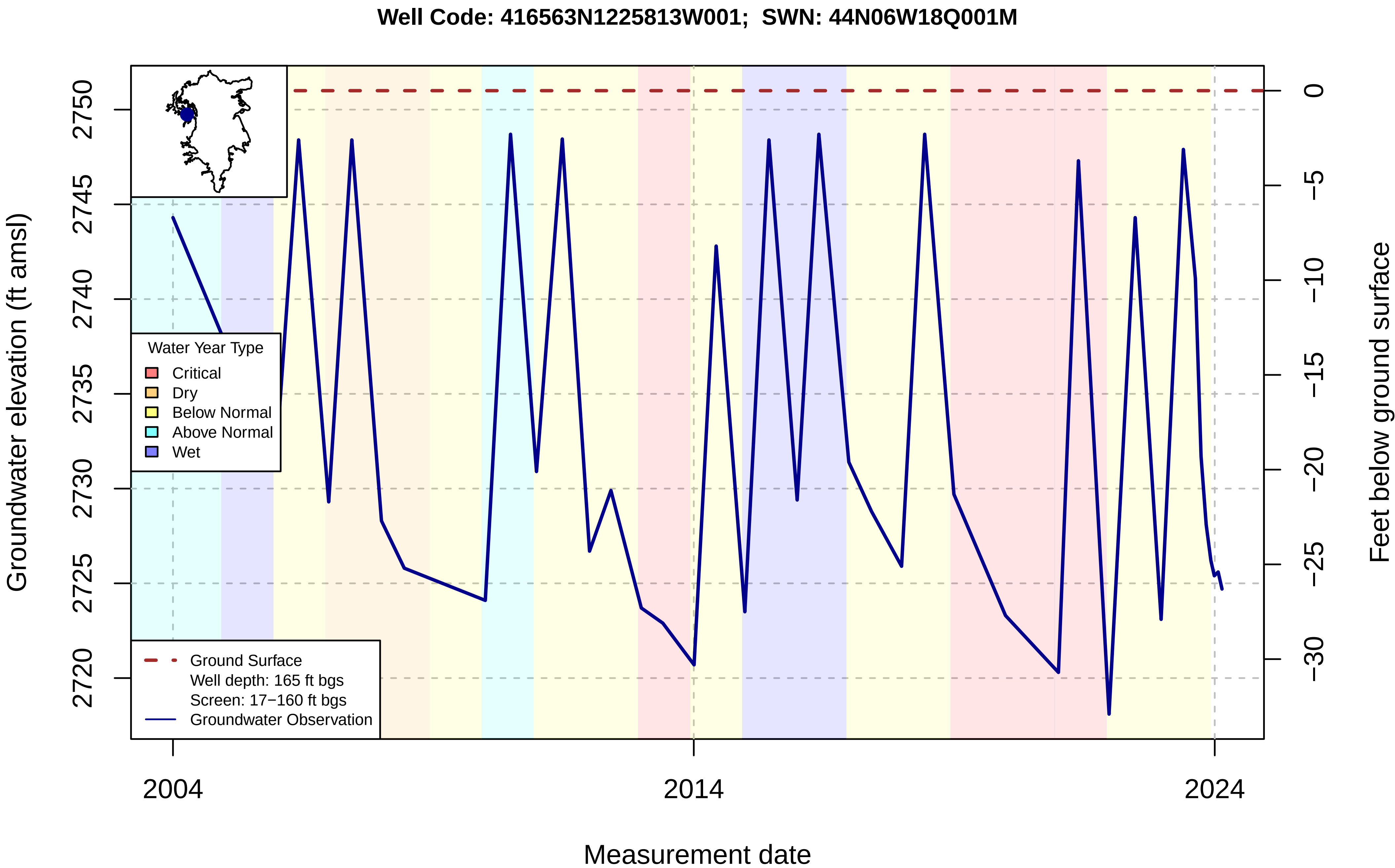
Well Code: 416462N1224190W001; SWN: 44N05W21H001M
Groundwater elevation (ft amsl)
2580
2600
2620
2640
2660
Feet below ground surface
0
−20
−40
−60
−80
−100
Measurement date
1954
1964
1974
1984
1994
2004
2014
2024
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 335 ft bgs
Well screen: Unknown
Groundwater Observation

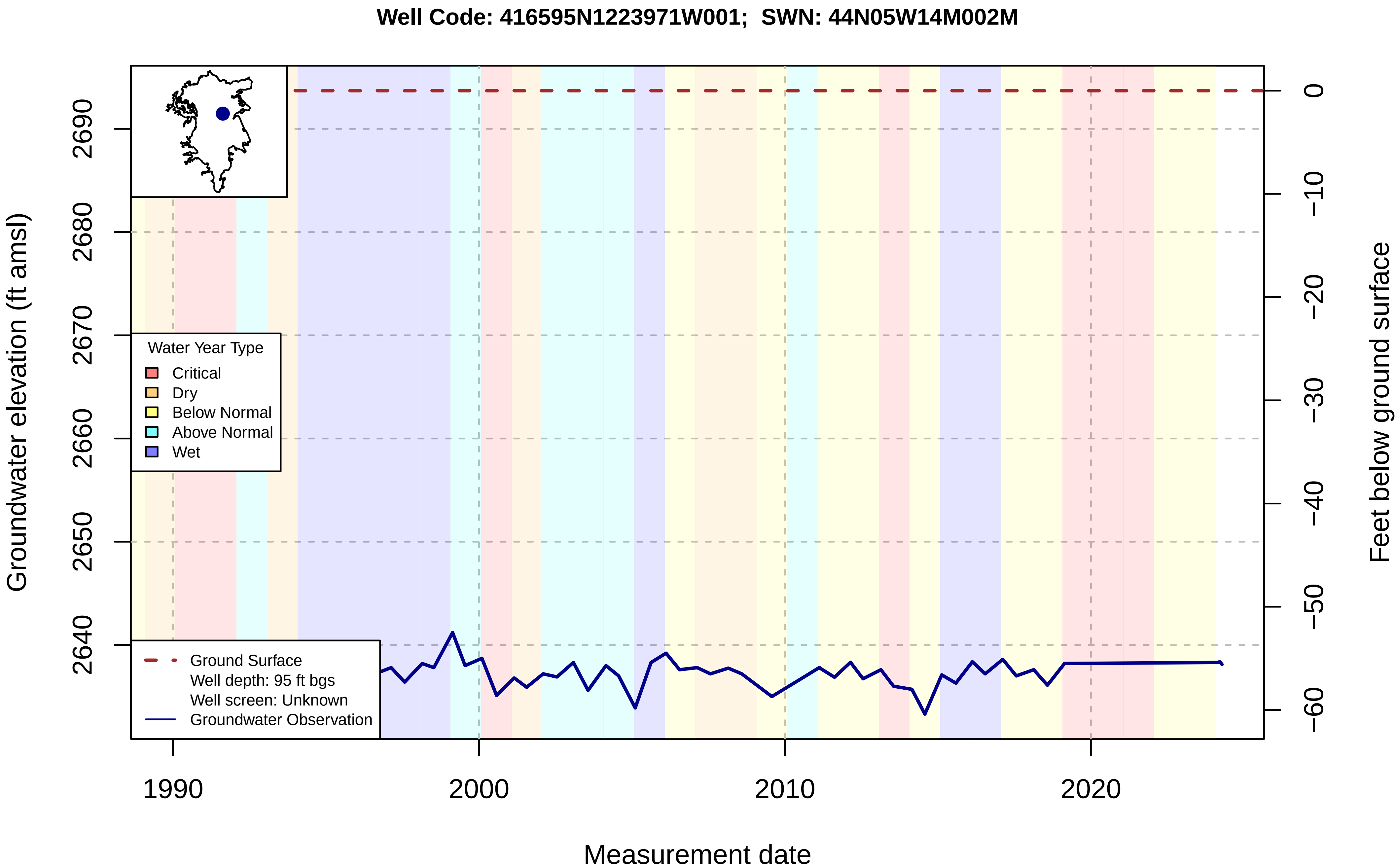


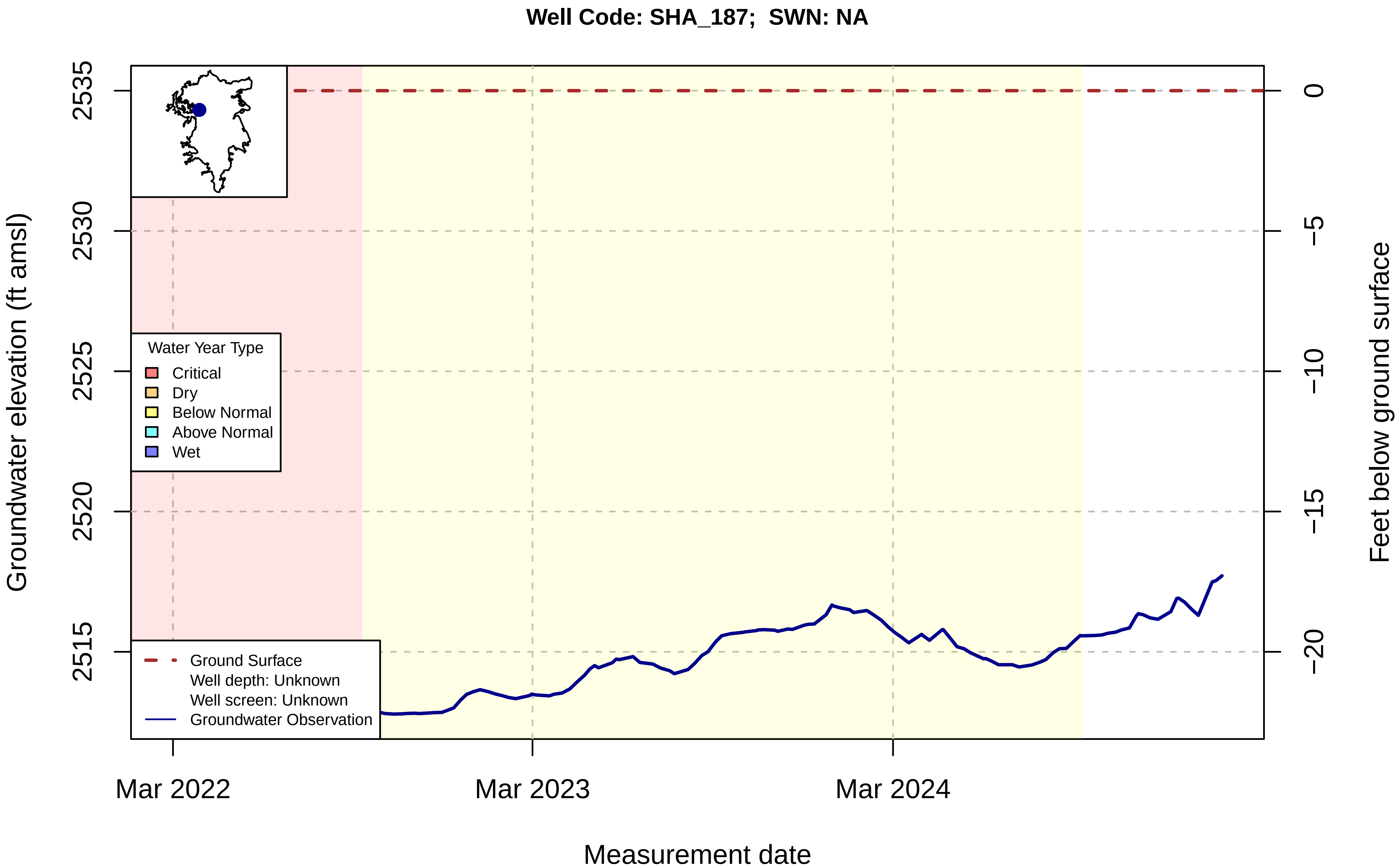
Well Code: SHA_172; SWN: NA
Groundwater elevation (ft amsl)
2760
2740
2720
2700
2680
2660
2640
Feet below ground surface
0
−20
−40
−60
−80
−100
−120
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 160 ft bgs
Well screen: Unknown
Groundwater Observation
Nov 2019
Nov 2020
Nov 2021
Nov 2022
Measurement date



Well Code: SHA_011; SWN: NA
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 91 ft bgs
Well screen: Unknown
Groundwater Observation
Groundwater elevation (ft amsl)
2545
2550
2555
2560
2565
2570
Feet below ground surface
0
−5
−10
−15
−20
−25
−30
Jul 2019
Jul 2020
Jul 2021
Jul 2022
Jul 2023
Jul 2024
Measurement date

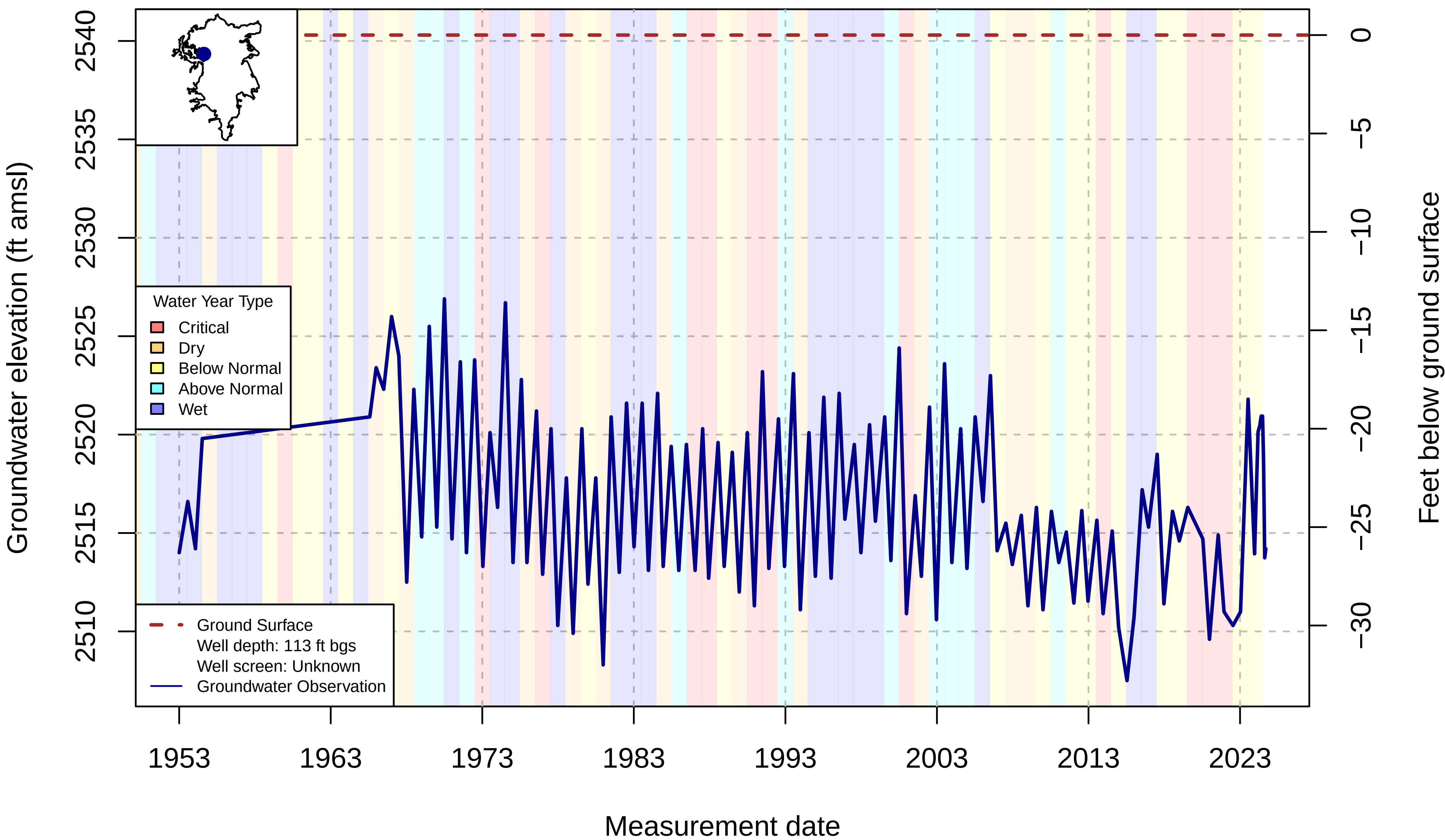

Well Code: 416563N1225813W001; SWN: 44N06W18Q001M
Groundwater elevation (ft amsl)
2720
2725
2730
2735
2740
2745
2750
Feet below ground surface
0
−5
−10
−15
−20
−25
−30
2004
2014
2024
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 165 ft bgs
Screen: 17−160 ft bgs
Groundwater Observation

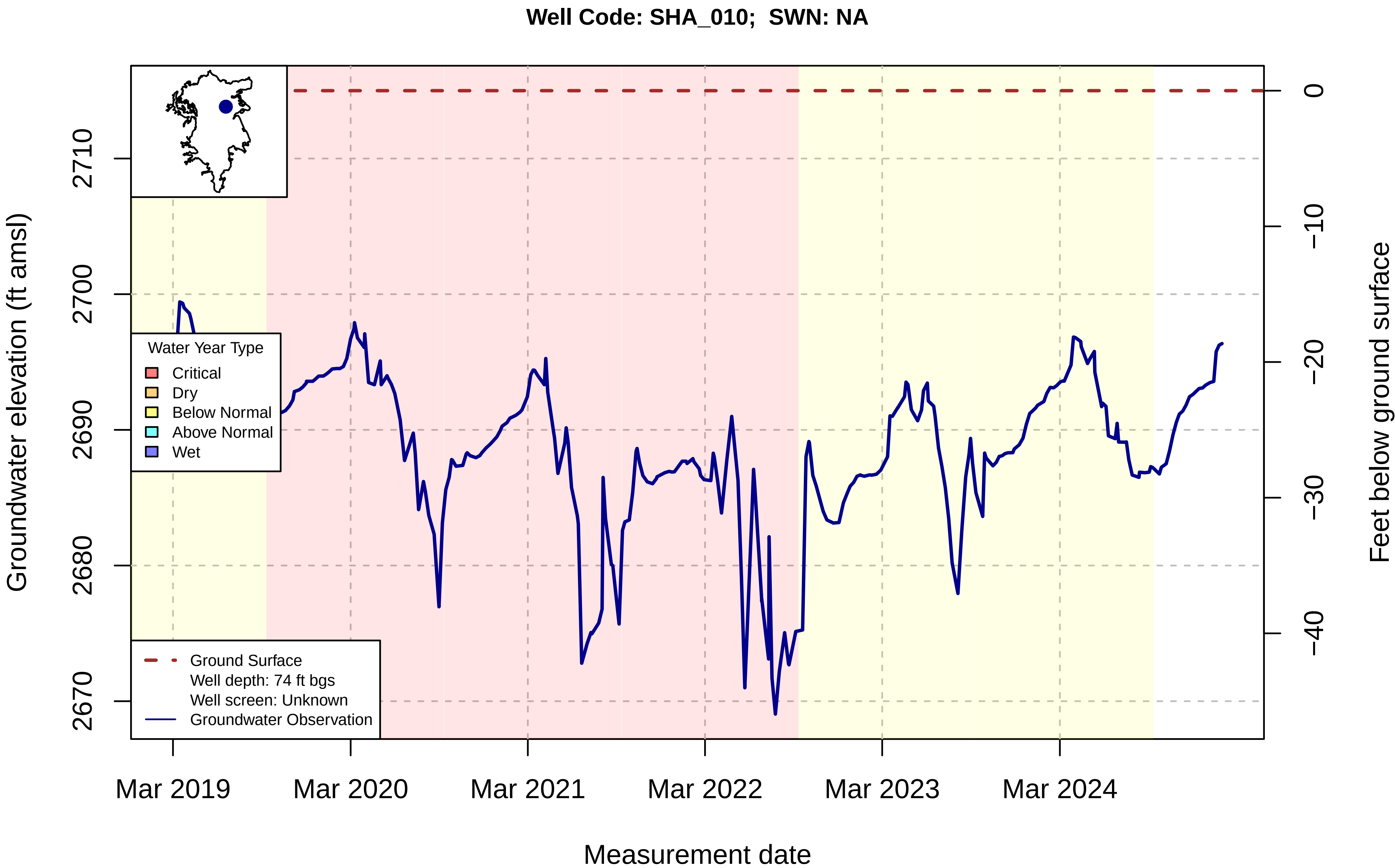

Well Code: 416595N1223971W001; SWN: 44N05W14M002M
Groundwater elevation (ft amsl)
2640
2650
2660
2670
2680
2690
Feet below ground surface
0
−10
−20
−30
−40
−50
−60
1990
2000
2010
2020
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 95 ft bgs
Well screen: Unknown
Groundwater Observation



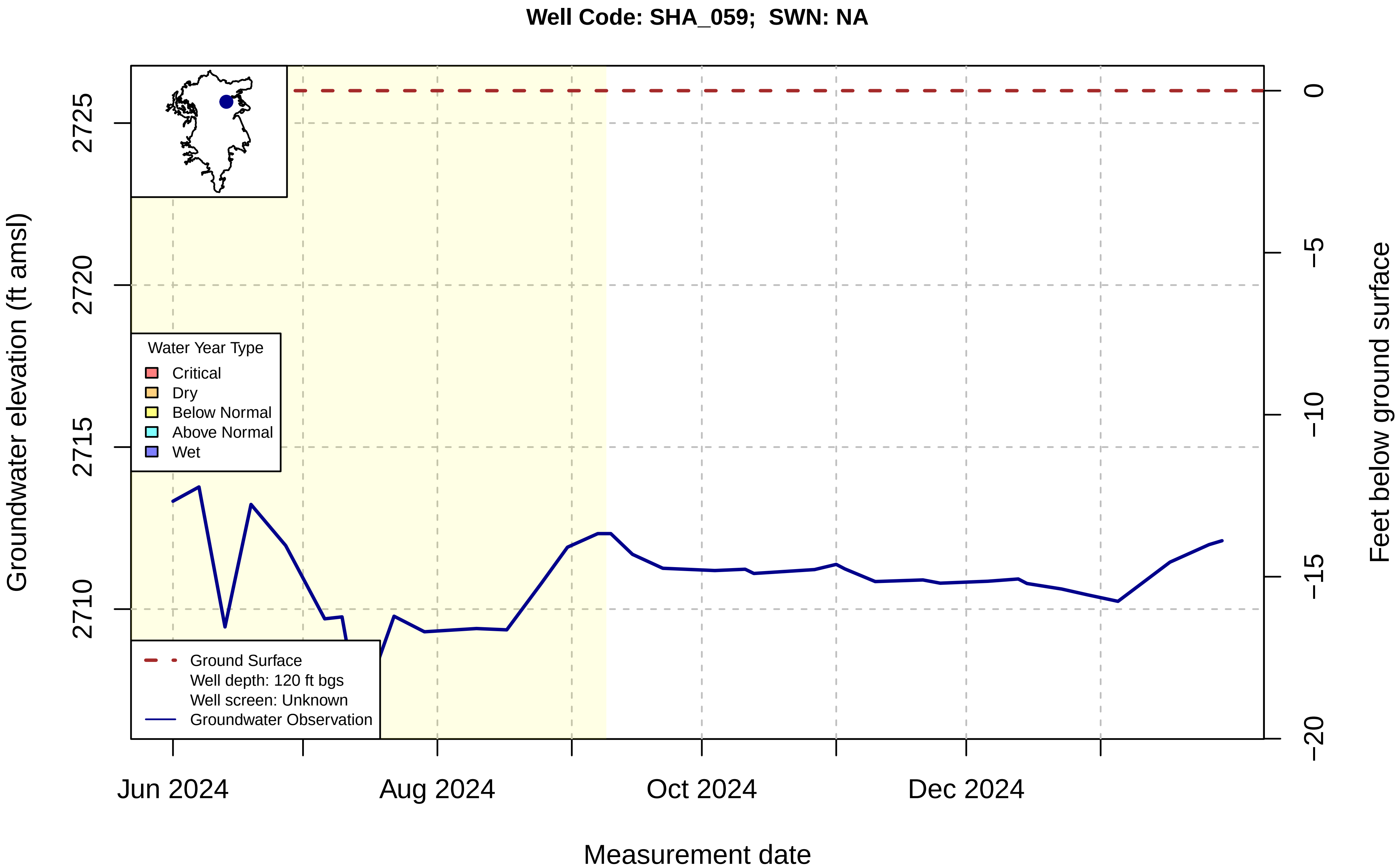
Well Code: SHA_187; SWN: NA
Groundwater elevation (ft amsl)
2535
2530
2525
2520
2515
Feet below ground surface
0
−5
−10
−15
−20
Mar 2022
Mar 2023
Mar 2024
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation

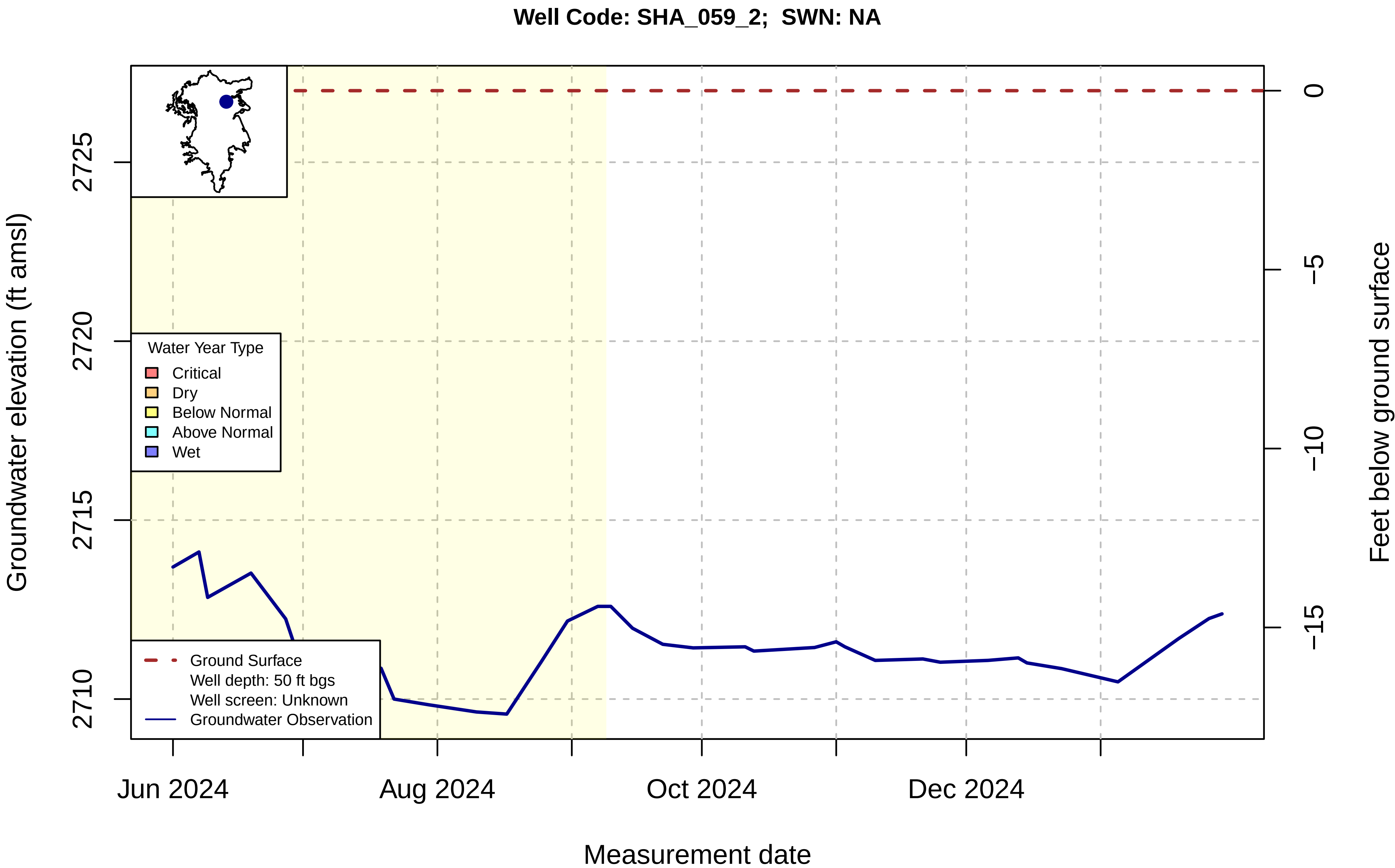
Well Code: 416774N1225301W001; SWN: 44N06W10F001M



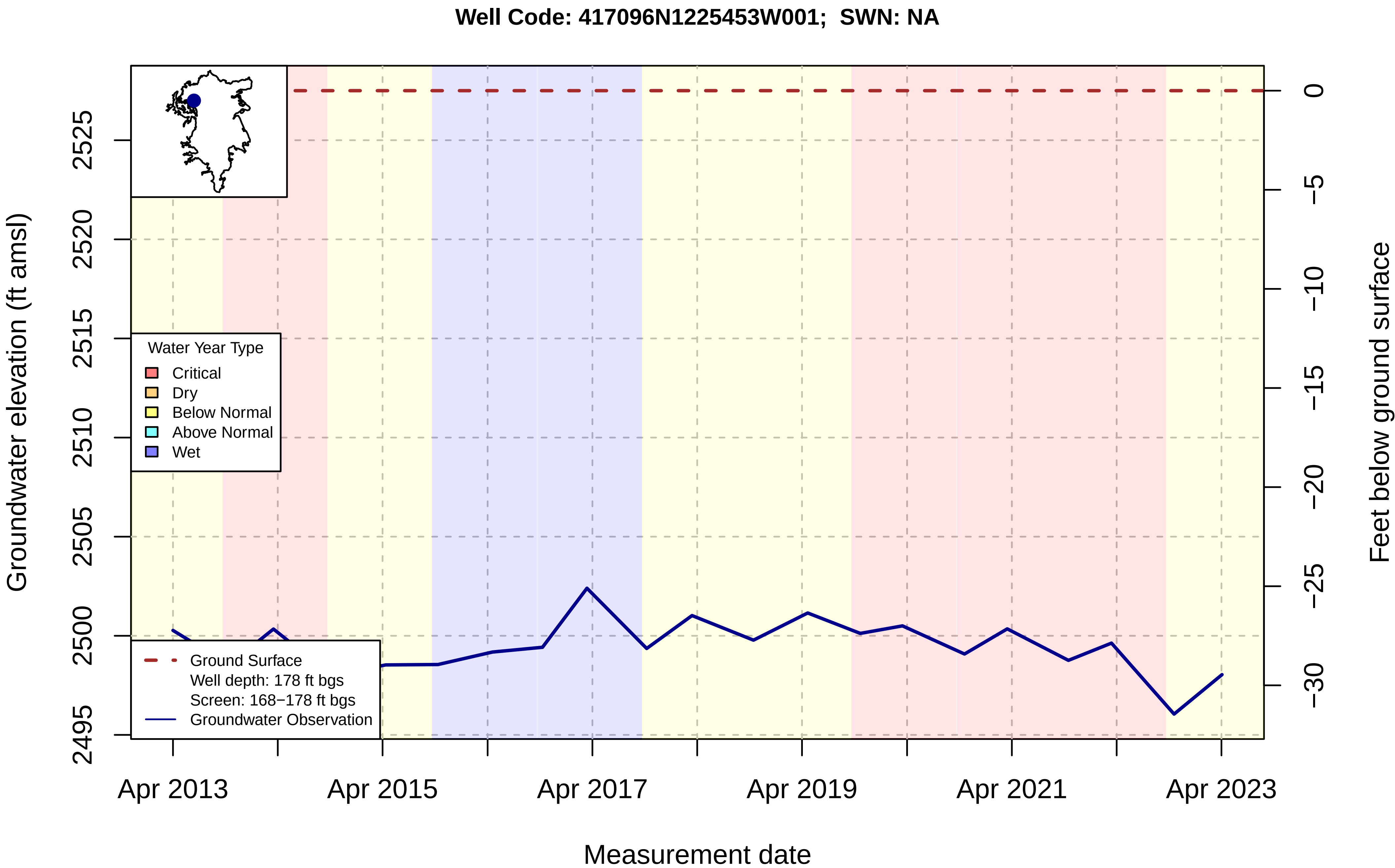


Well Code: SHA_010; SWN: NA
Groundwater elevation (ft amsl)
2670
2680
2690
2700
2710
Feet below ground surface
0
−10
−20
−30
−40
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 74 ft bgs
Well screen: Unknown
Groundwater Observation
Mar 2019
Mar 2020
Mar 2021
Mar 2022
Mar 2023
Mar 2024
Measurement date

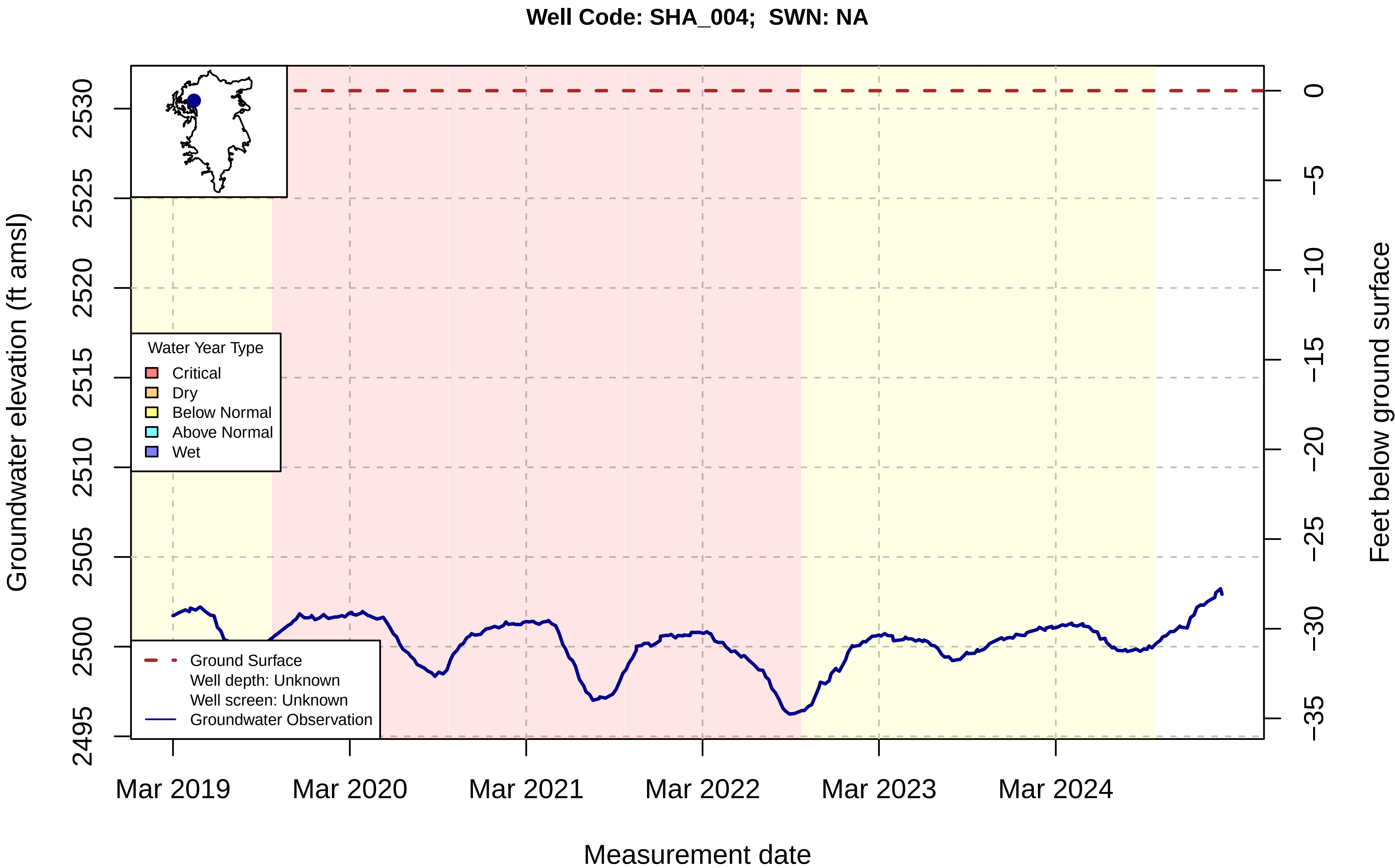

Well Code: SHA_059; SWN: NA
Groundwater elevation (ft amsl)
2725
2720
2715
2710
Feet below ground surface
0
−5
−10
−15
−20
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 120 ft bgs
Well screen: Unknown
Groundwater Observation
Jun 2024
Aug 2024
Oct 2024
Dec 2024
Measurement date

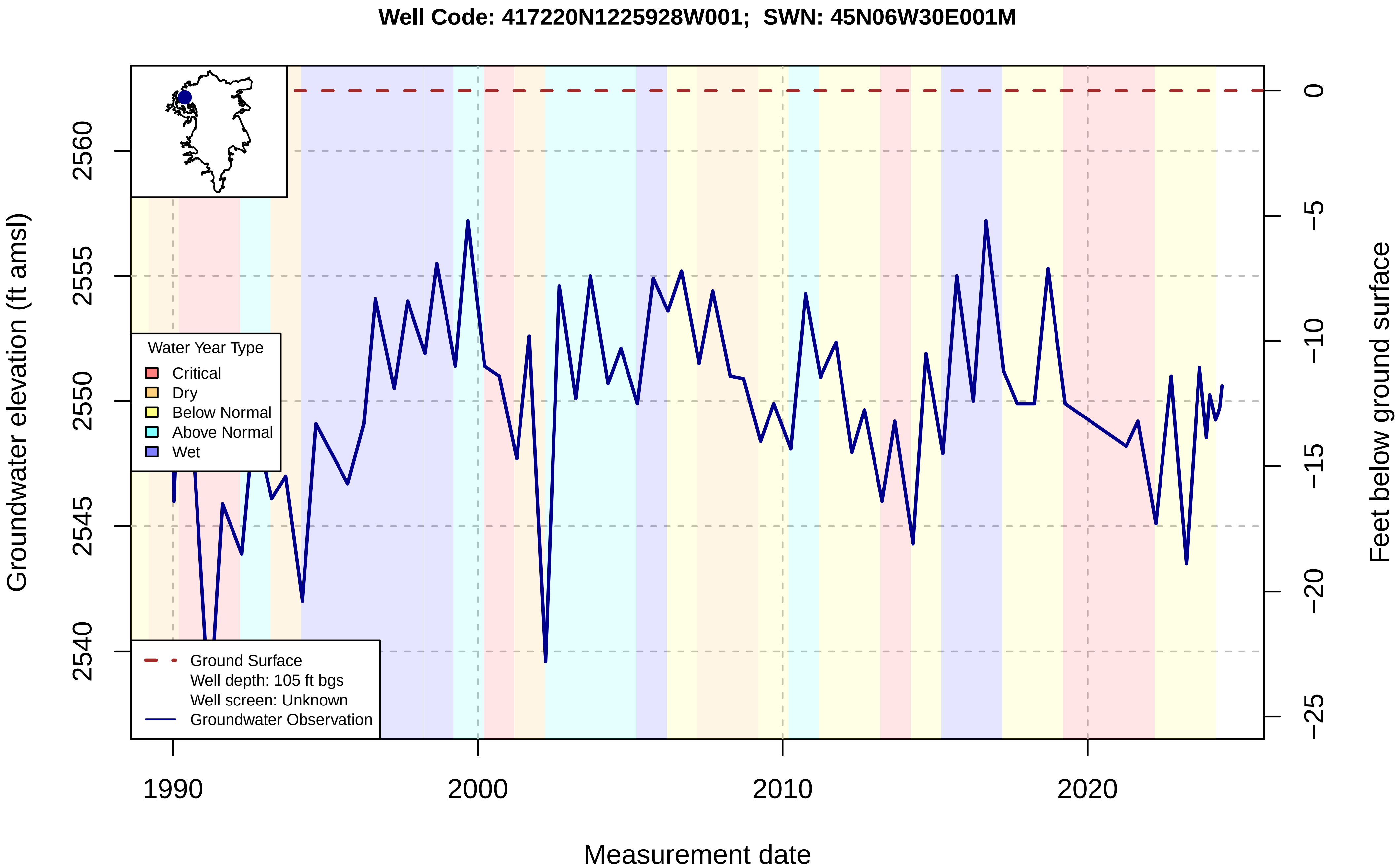


Well Code: SHA_059_2; SWN: NA
Groundwater elevation (ft amsl)
2710
2715
2720
2725
Feet below ground surface
0
−5
−10
−15
Measurement date
Jun 2024
Aug 2024
Oct 2024
Dec 2024
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 50 ft bgs
Well screen: Unknown
Groundwater Observation



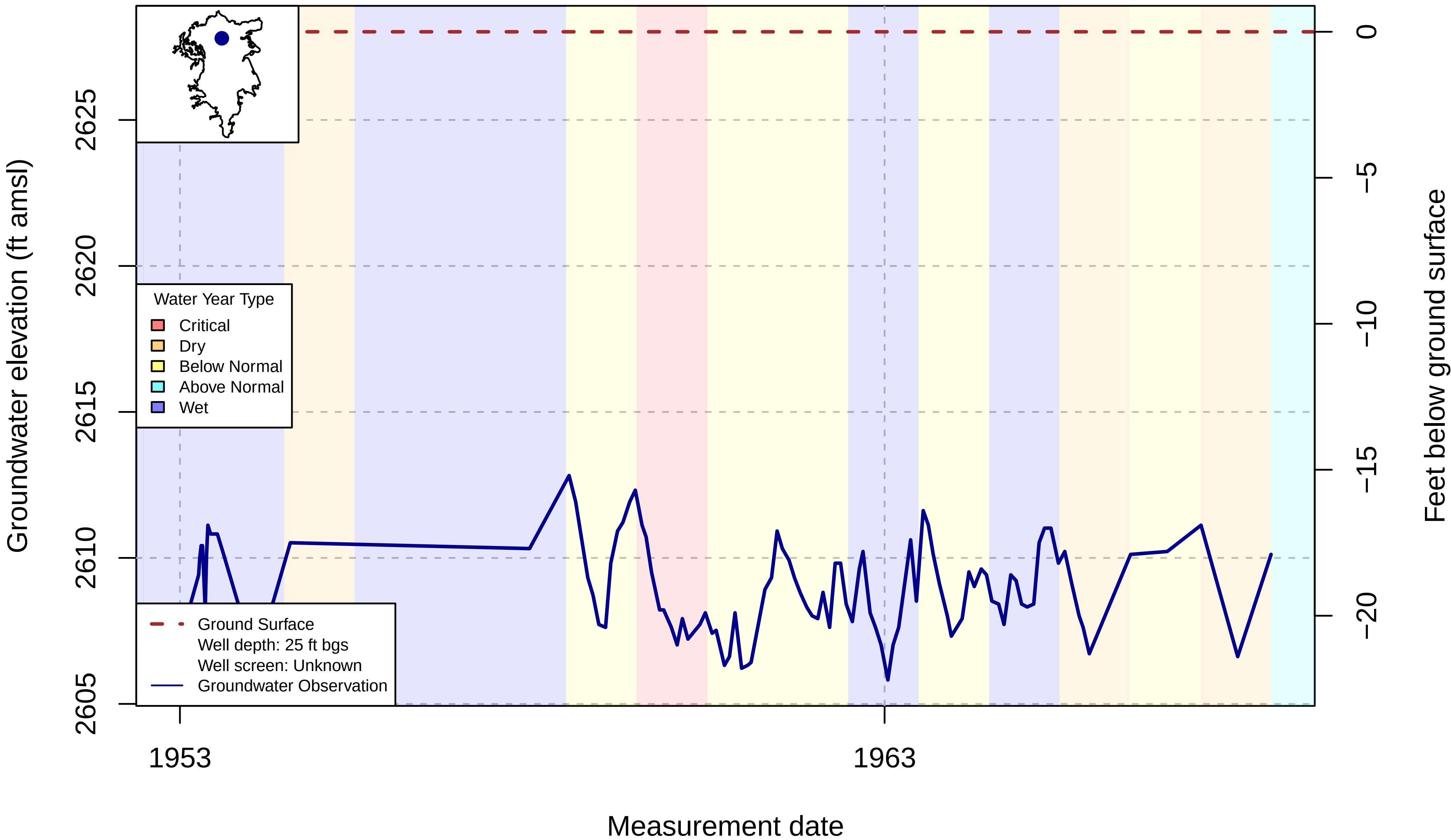
Well Code: 417096N1225453W001; SWN: NA
Groundwater elevation (ft amsl)
2495
2500
2505
2510
2515
2520
2525
Feet below ground surface
0
−5
−10
−15
−20
−25
−30
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 178 ft bgs
Screen: 168−178 ft bgs
Groundwater Observation
Apr 2013
Apr 2015
Apr 2017
Apr 2019
Apr 2021
Apr 2023
Measurement date

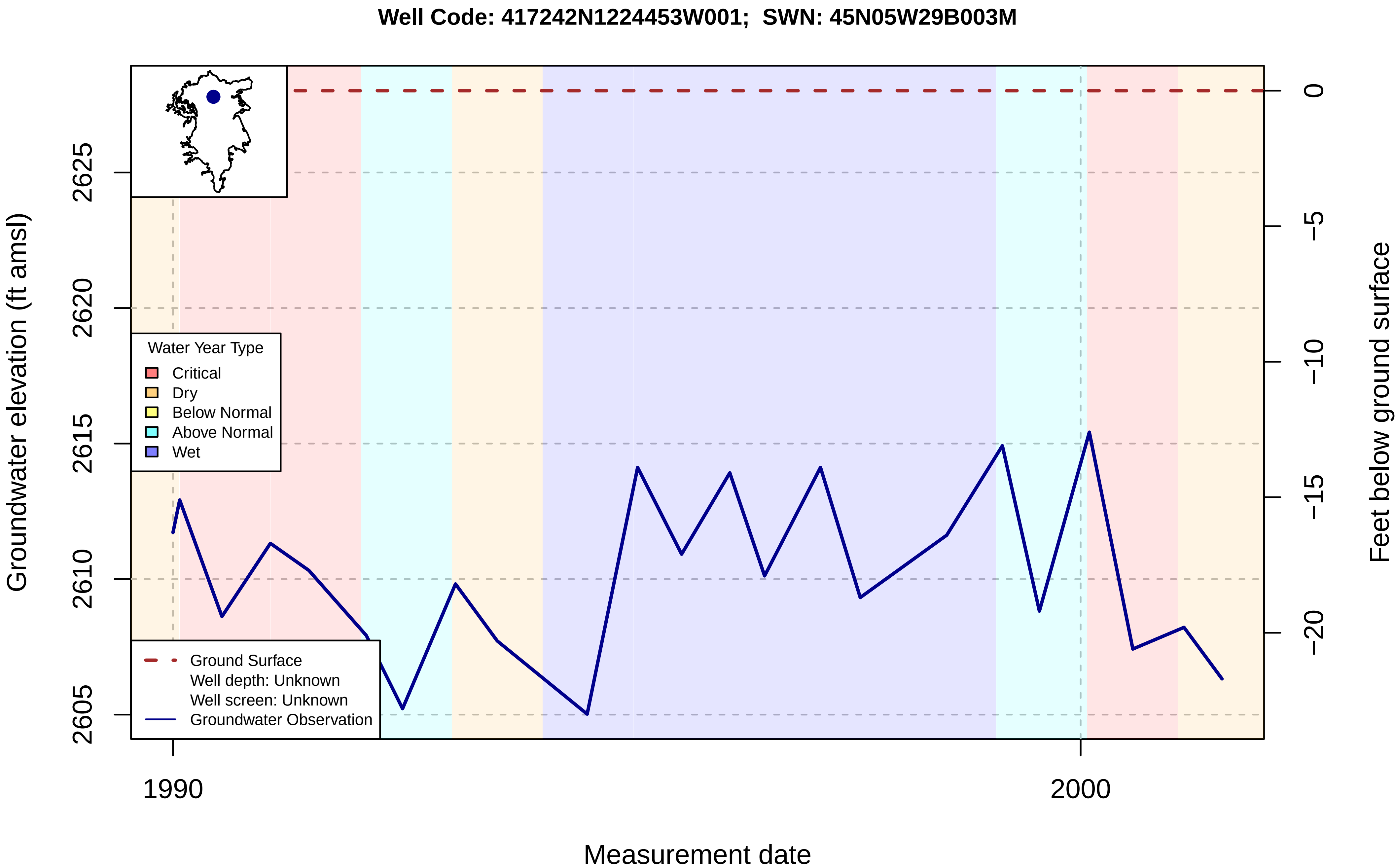

Well Code: SHA_004; SWN: NA
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2495
2500
2505
2510
2515
2520
2525
2530
0
−5
−10
−15
−20
−25
−30
−35
Mar 2019
Mar 2020
Mar 2021
Mar 2022
Mar 2023
Mar 2024
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation

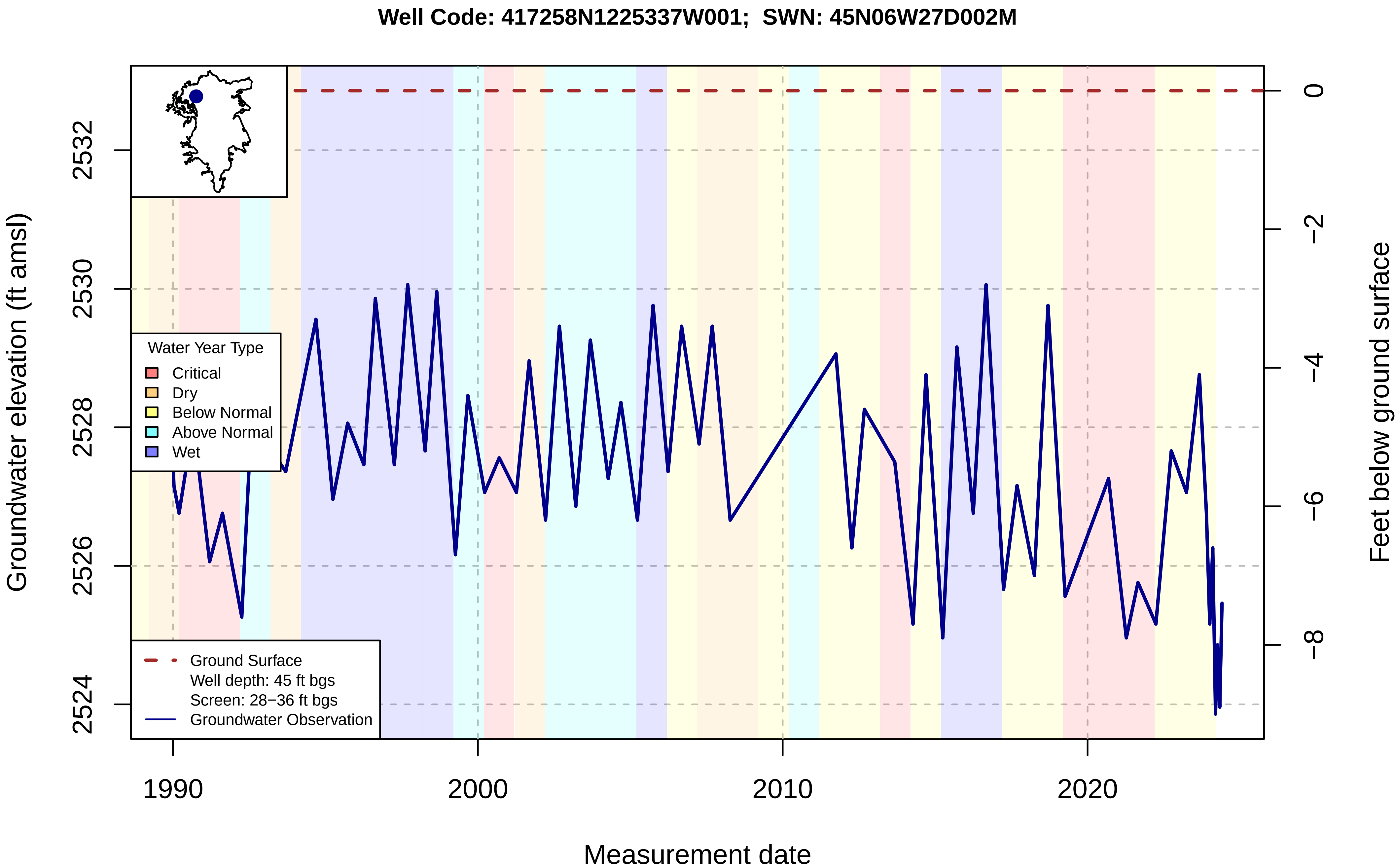


Well Code: 417220N1225928W001; SWN: 45N06W30E001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 105 ft bgs
Well screen: Unknown
Groundwater Observation
2540
2545
2550
2555
2560
0
−5
−10
−15
−20
−25
1990
2000
2010
2020

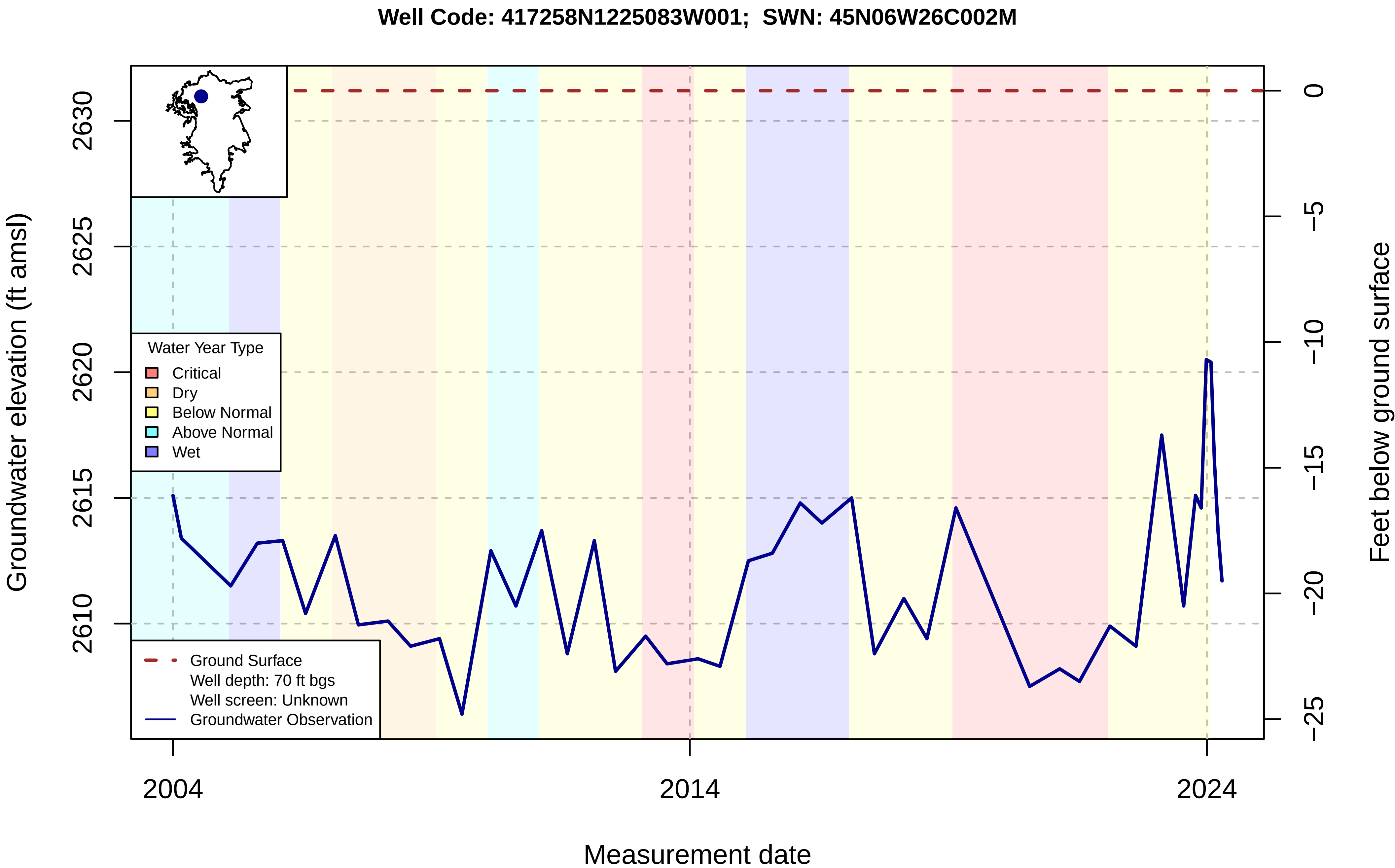
Well Code: 417236N1224461W001; SWN: 45N05W29B001M



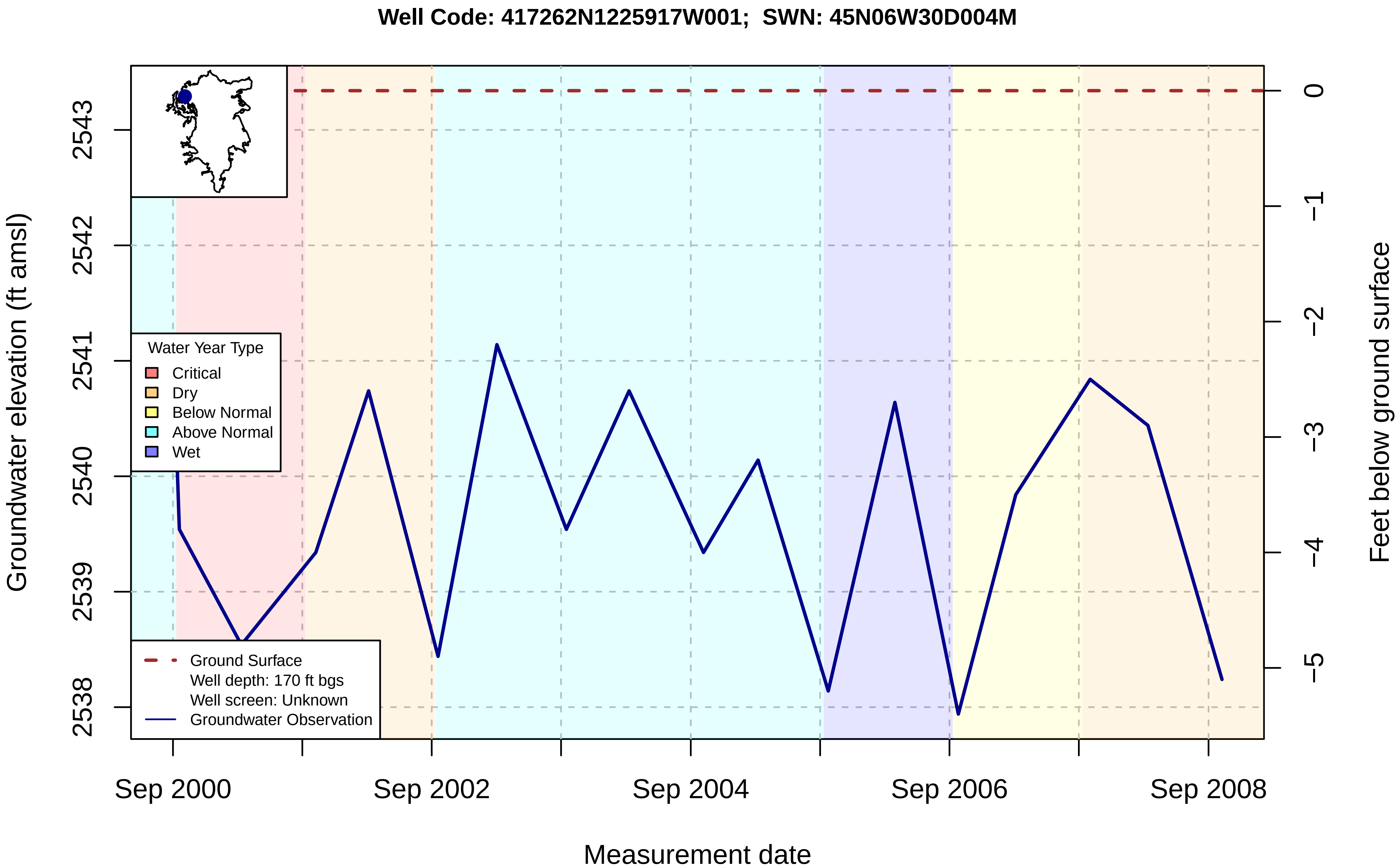

Well Code: 417242N1224453W001; SWN: 45N05W29B003M
Groundwater elevation (ft amsl)
2605
2610
2615
2620
2625
Feet below ground surface
0
−5
−10
−15
−20
1990
2000
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation

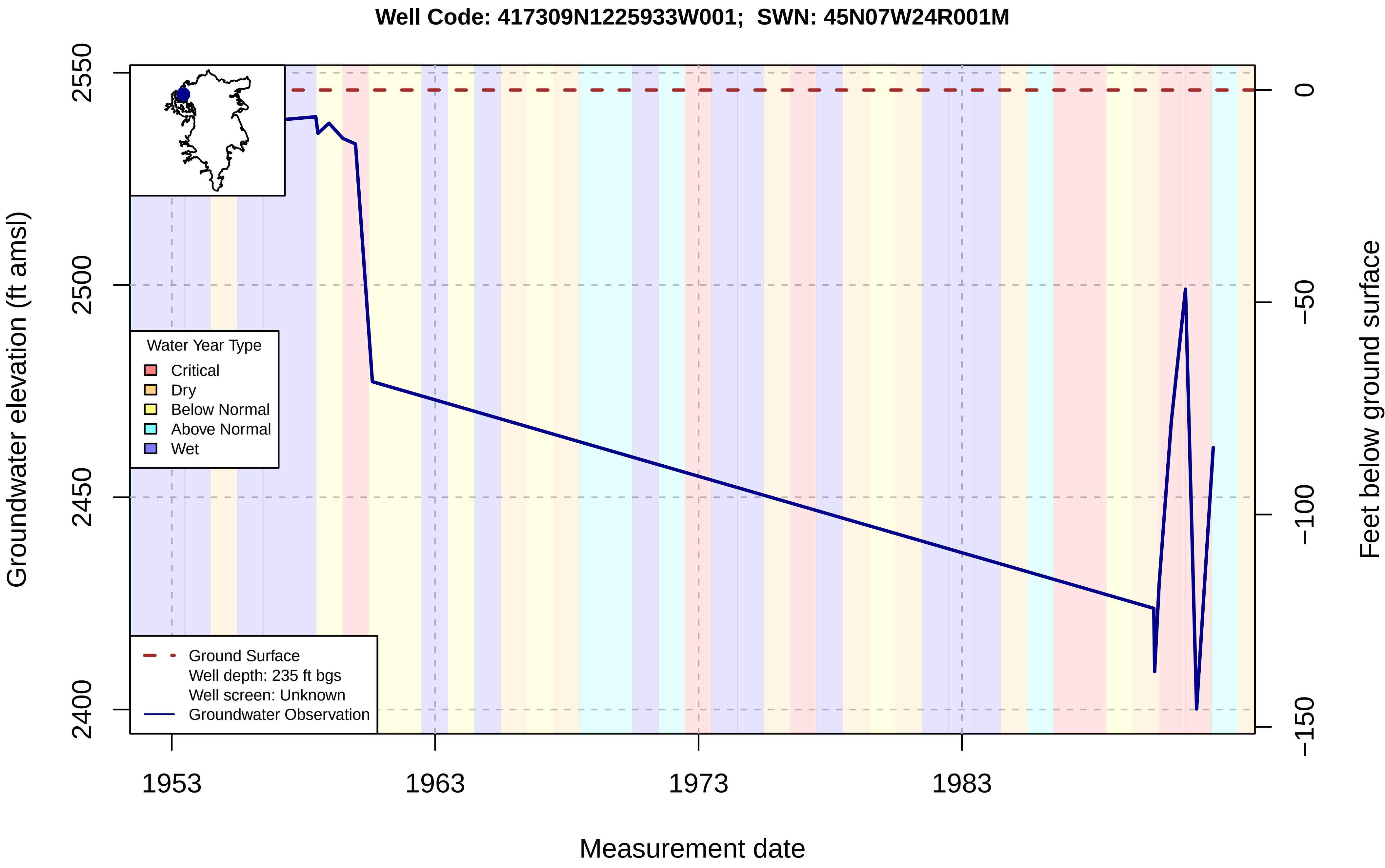


Well Code: 417258N1225337W001; SWN: 45N06W27D002M
Groundwater elevation (ft amsl)
2524
2526
2528
2530
2532
Feet below ground surface
0
−2
−4
−6
−8
Measurement date
1990
2000
2010
2020
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 45 ft bgs
Screen: 28−36 ft bgs
Groundwater Observation

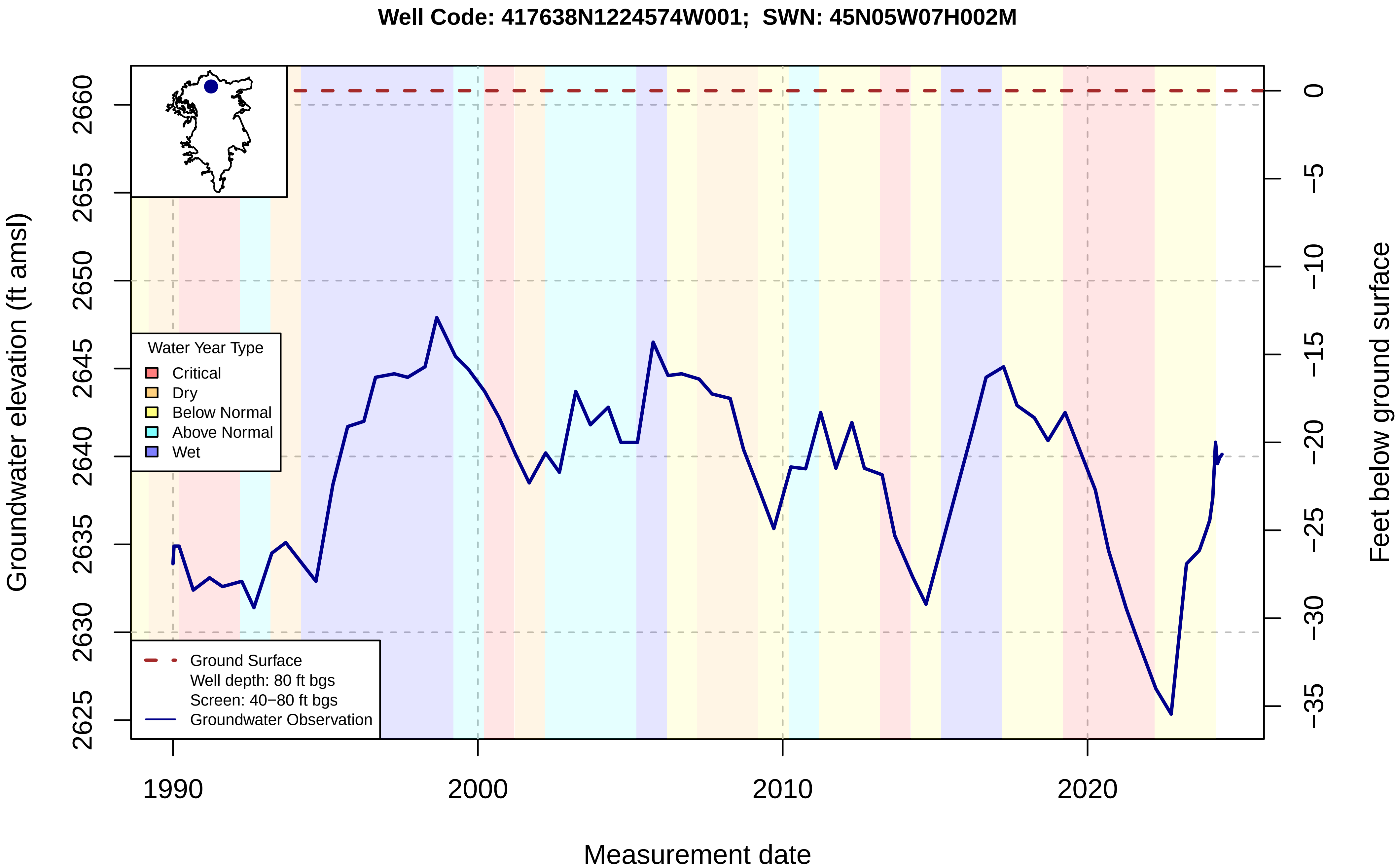


Well Code: 417258N1225083W001; SWN: 45N06W26C002M
Groundwater elevation (ft amsl)
2630
2625
2620
2615
2610
Feet below ground surface
0
−5
−10
−15
−20
−25
2004
2014
2024
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 70 ft bgs
Well screen: Unknown
Groundwater Observation

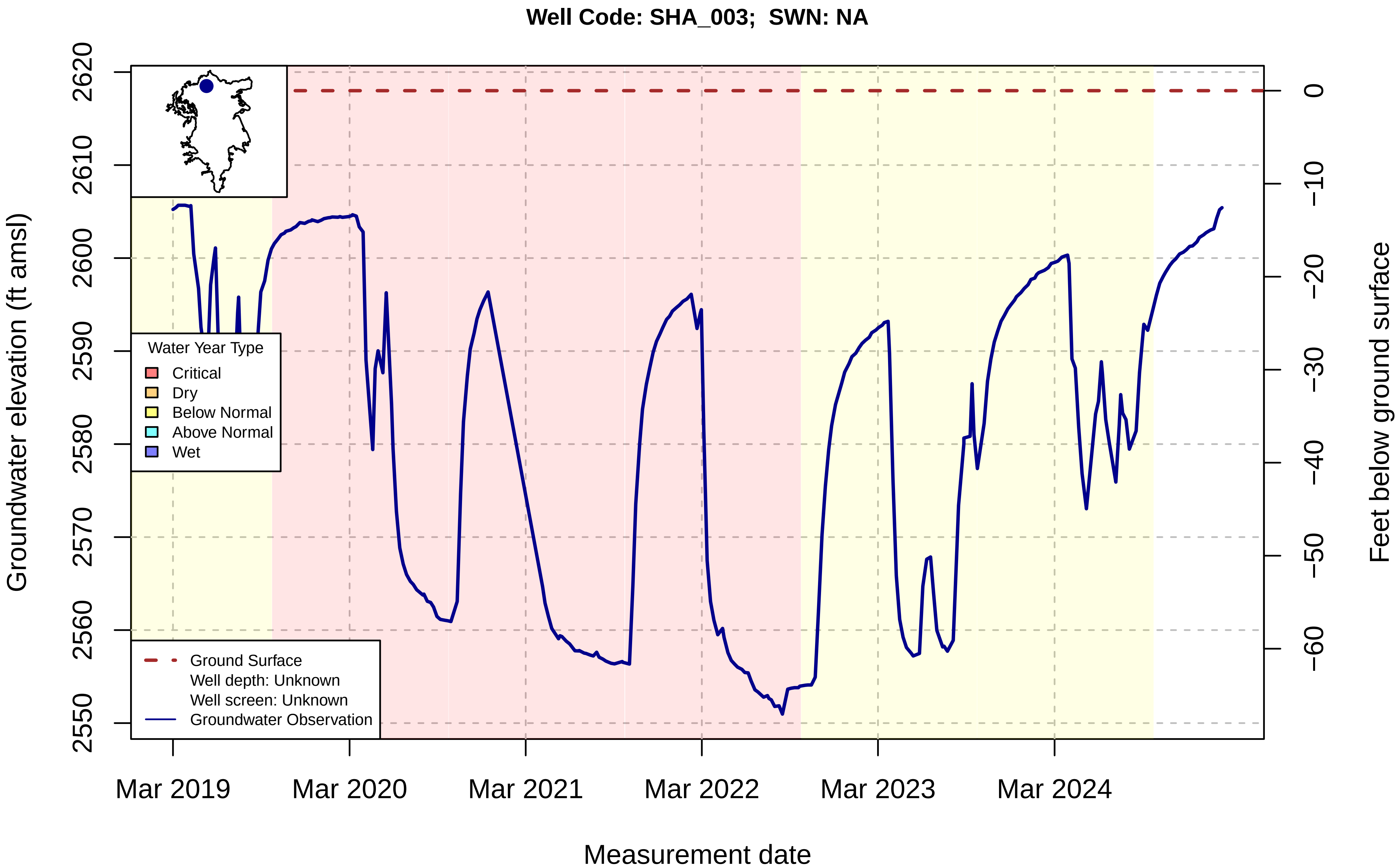

Well Code: 417262N1225917W001; SWN: 45N06W30D004M
Groundwater elevation (ft amsl)
2538
2539
2540
2541
2542
2543
Feet below ground surface
0
−1
−2
−3
−4
−5
Sep 2000
Sep 2002
Sep 2004
Sep 2006
Sep 2008
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 170 ft bgs
Well screen: Unknown
Groundwater Observation



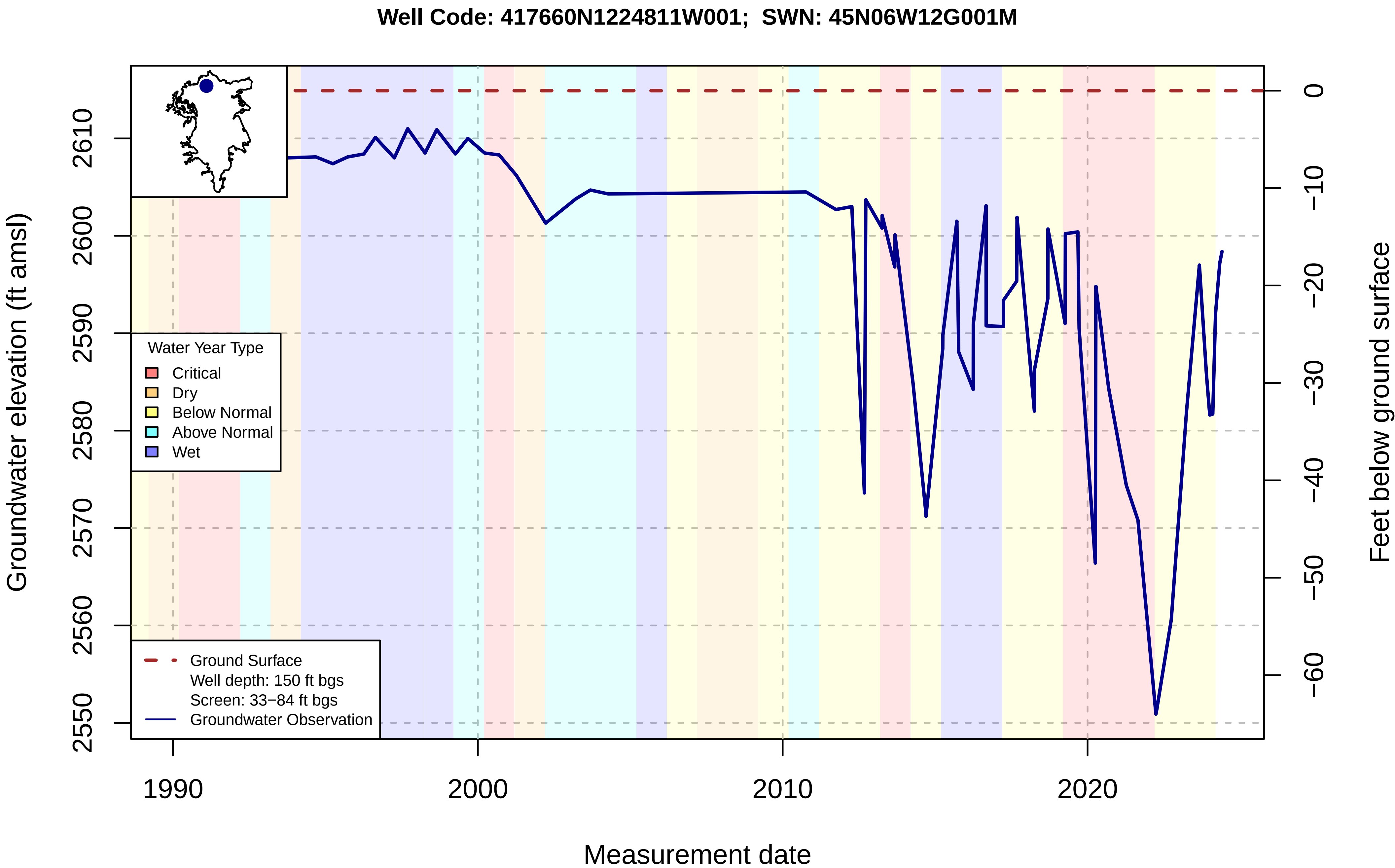
Well Code: 417309N1225933W001; SWN: 45N07W24R001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2550
2500
2450
2400
0
−50
−100
−150
1953
1963
1973
1983
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 235 ft bgs
Well screen: Unknown
Groundwater Observation



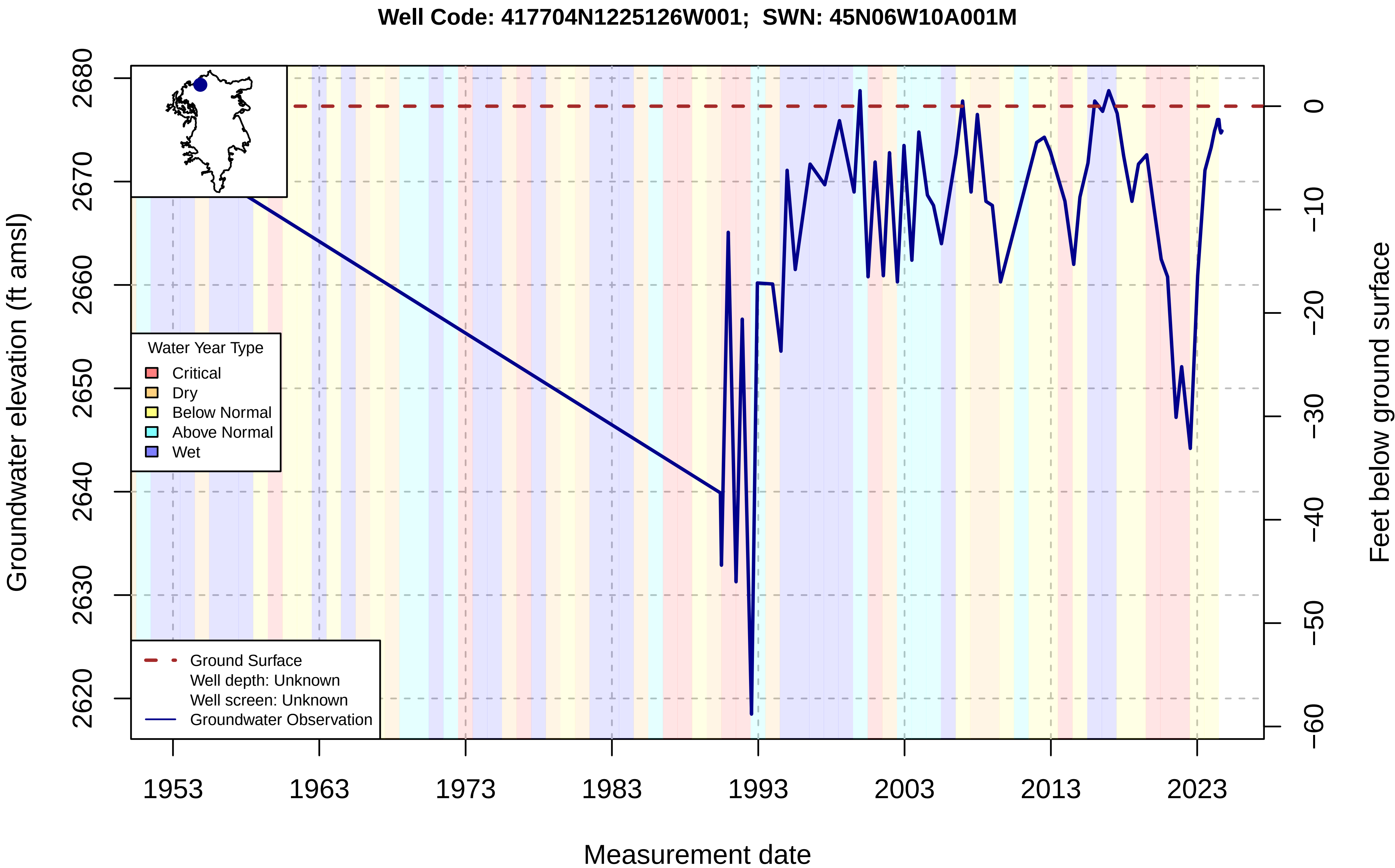
Well Code: 417638N1224574W001; SWN: 45N05W07H002M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2625
2630
2635
2640
2645
2650
2655
2660
0
−5
−10
−15
−20
−25
−30
−35
1990
2000
2010
2020
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 80 ft bgs
Screen: 40−80 ft bgs
Groundwater Observation

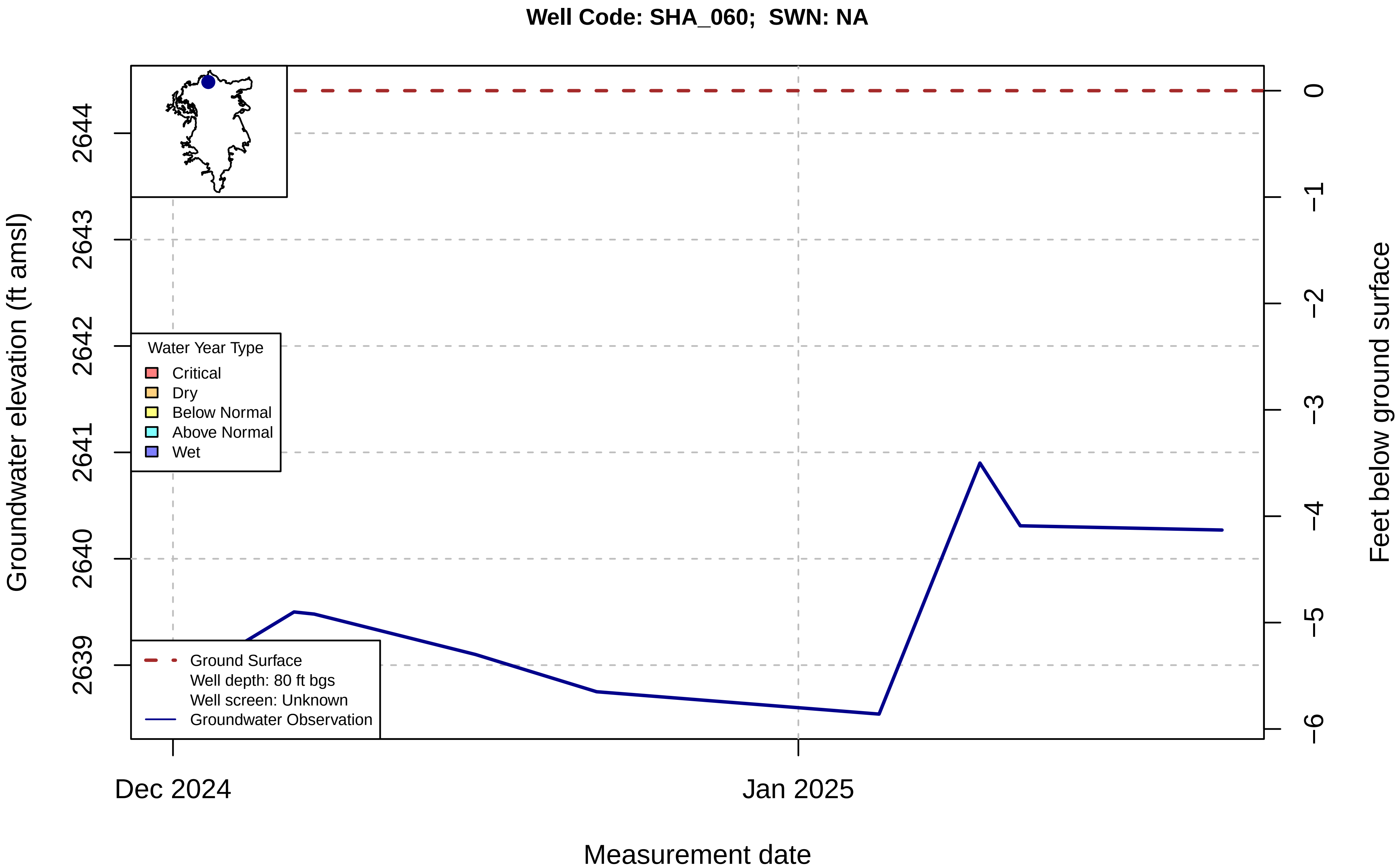


Well Code: SHA_003; SWN: NA
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2620
2610
2600
2590
2580
2570
2560
2550
0
−10
−20
−30
−40
−50
−60
Mar 2019
Mar 2020
Mar 2021
Mar 2022
Mar 2023
Mar 2024
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation

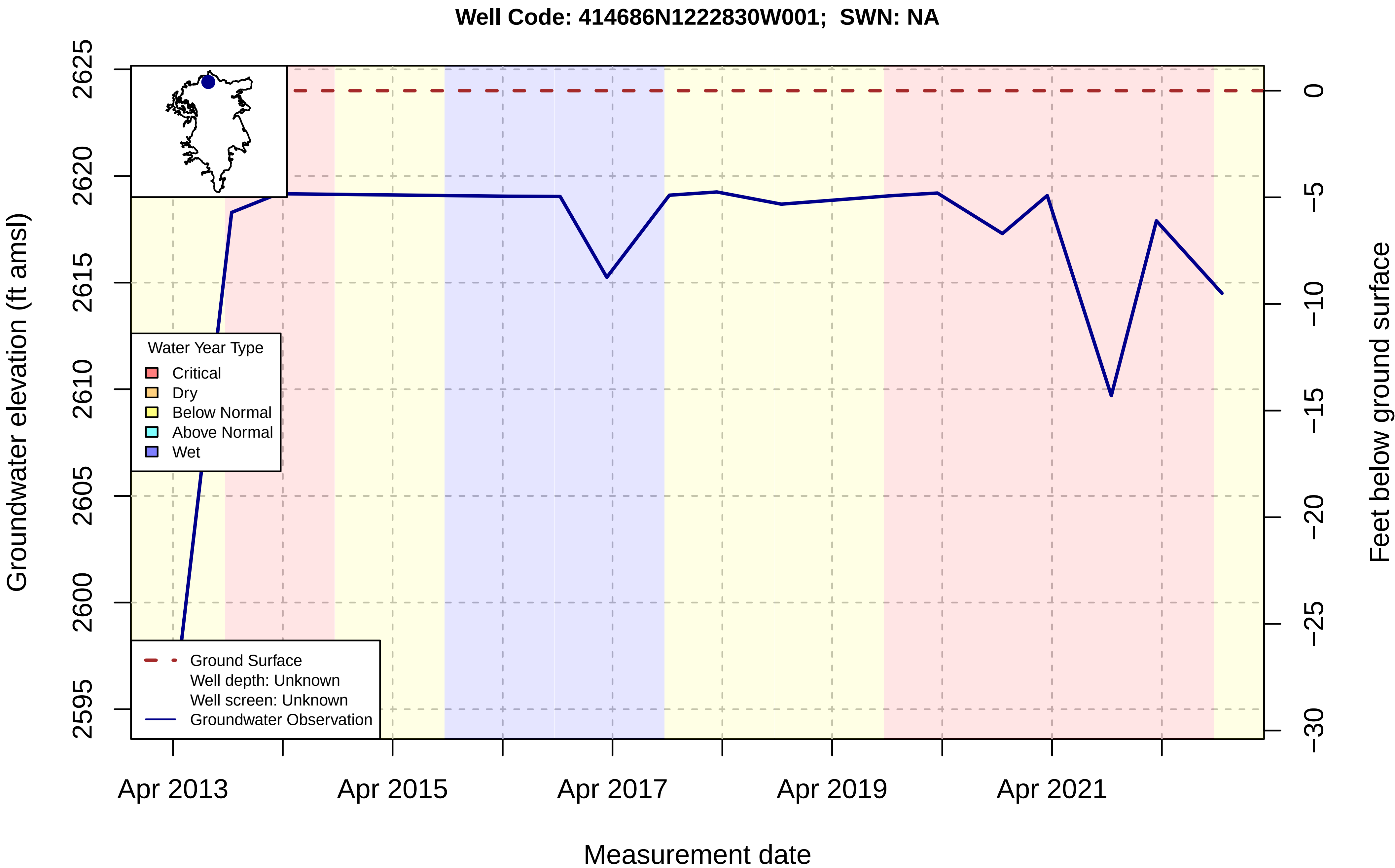


Well Code: 417660N1224811W001; SWN: 45N06W12G001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 150 ft bgs
Screen: 33−84 ft bgs
Groundwater Observation
2550
2560
2570
2580
2590
2600
2610
0
−10
−20
−30
−40
−50
−60
1990
2000
2010
2020

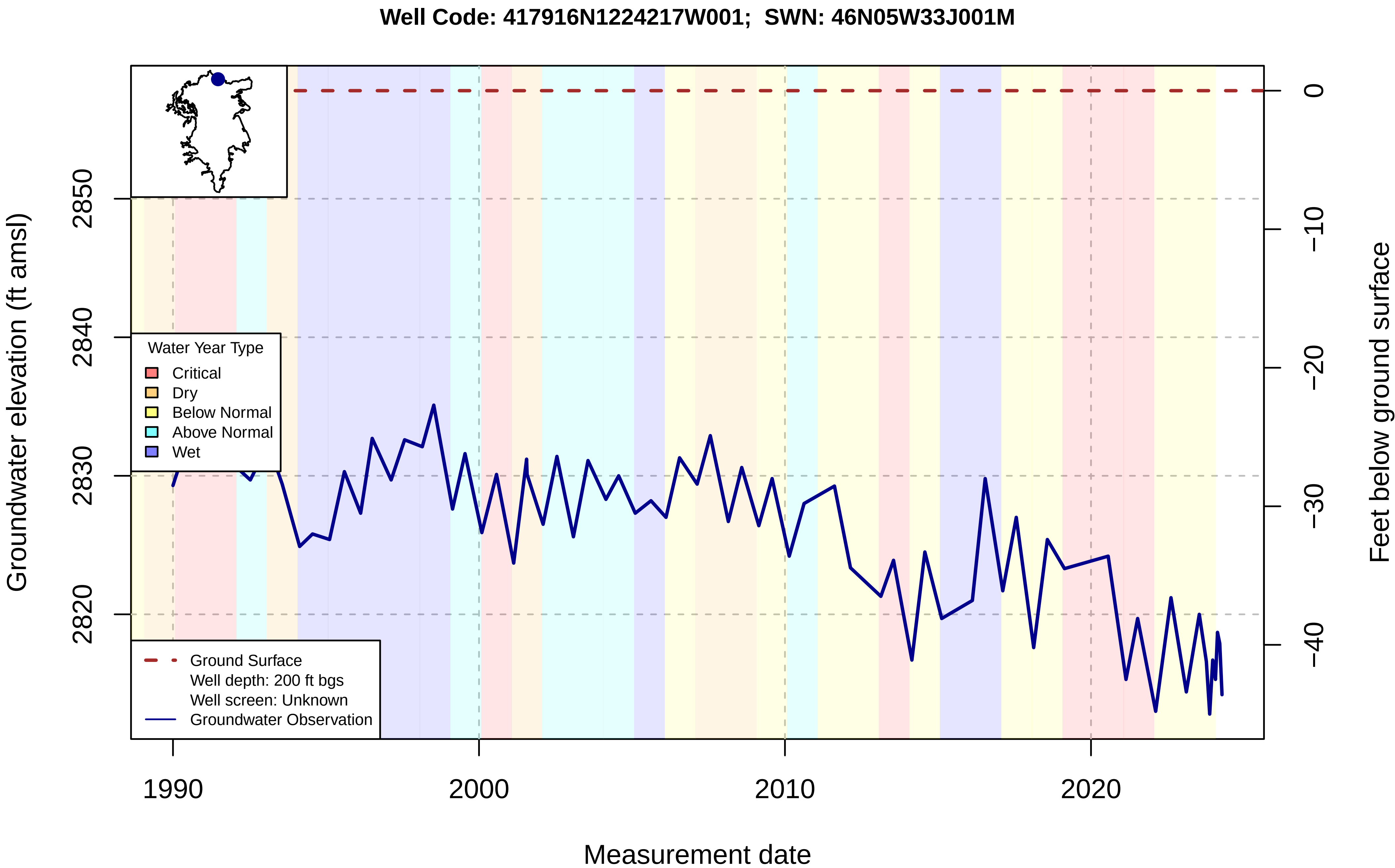

Well Code: 417704N1225126W001; SWN: 45N06W10A001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2620
2630
2640
2650
2660
2670
2680
0
−10
−20
−30
−40
−50
−60
1953
1963
1973
1983
1993
2003
2013
2023
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation



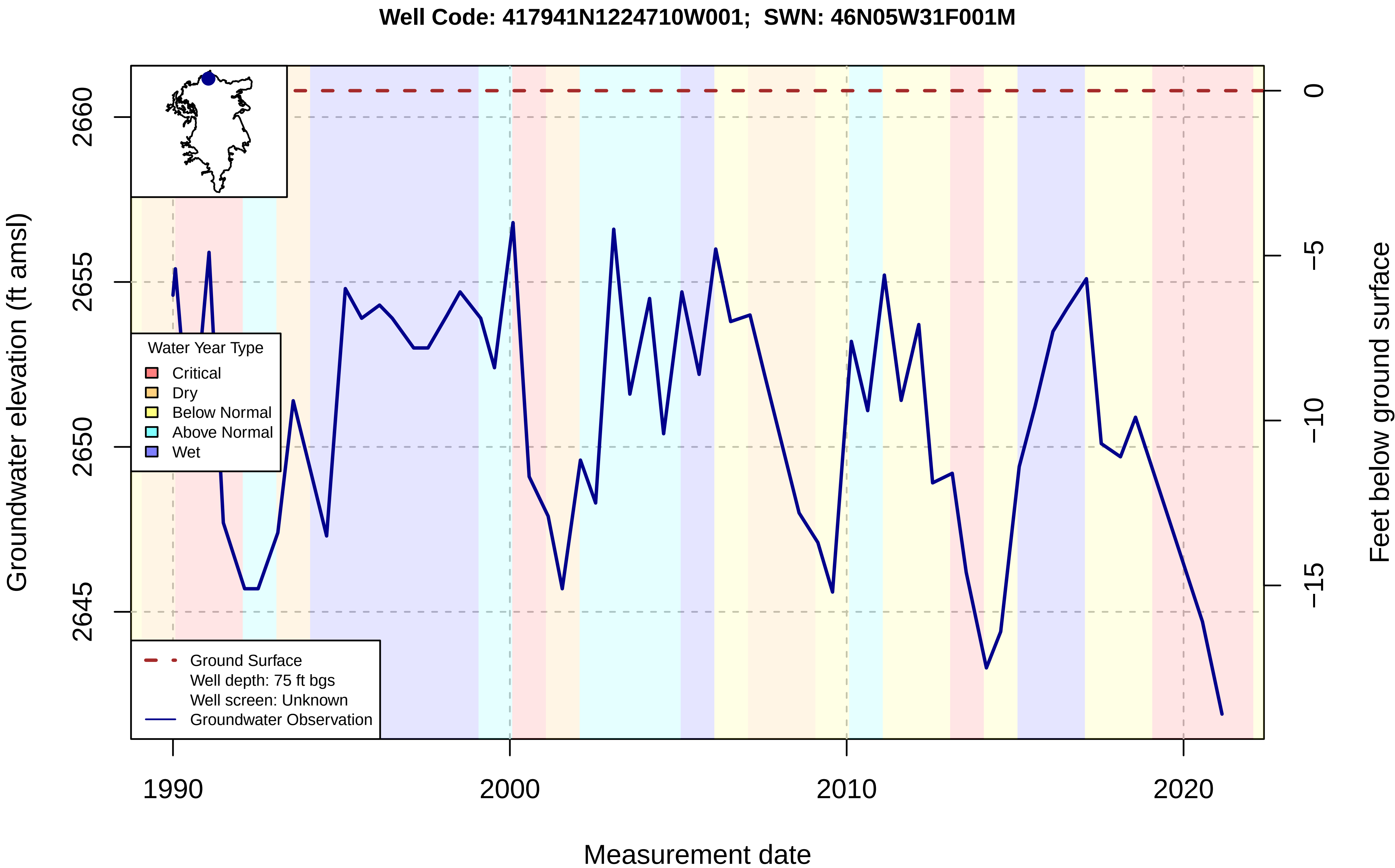
Well Code: SHA_060; SWN: NA
Groundwater elevation (ft amsl)
2639
2640
2641
2642
2643
2644
Feet below ground surface
0
−1
−2
−3
−4
−5
−6
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 80 ft bgs
Well screen: Unknown
Groundwater Observation
Dec 2024
Jan 2025
Measurement date



Well Code: 414686N1222830W001; SWN: NA
Groundwater elevation (ft amsl)
2595
2600
2605
2610
2615
2620
2625
Feet below ground surface
0
−5
−10
−15
−20
−25
−30
Apr 2013
Apr 2015
Apr 2017
Apr 2019
Apr 2021
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: Unknown
Well screen: Unknown
Groundwater Observation



Well Code: 417916N1224217W001; SWN: 46N05W33J001M
Groundwater elevation (ft amsl)
2820
2830
2840
2850
Feet below ground surface
0
−10
−20
−30
−40
1990
2000
2010
2020
Measurement date
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 200 ft bgs
Well screen: Unknown
Groundwater Observation



Well Code: 417941N1224710W001; SWN: 46N05W31F001M
Groundwater elevation (ft amsl)
Feet below ground surface
Measurement date
2645
2650
2655
2660
0
−5
−10
−15
1990
2000
2010
2020
Water Year Type
Critical
Dry
Below Normal
Above Normal
Wet
Ground Surface
Well depth: 75 ft bgs
Well screen: Unknown
Groundwater Observation

References

MRLC. 2019. “2019 National Land Cover Database.” Multi-Resolution Land Characteristics (MRLC) Consortium. https://www.mrlc.gov/viewer/.