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April 1, 2021

To: California Department of Water Resources

From: Santa Cruz Mid-County Groundwater Agency

Subject: Submittal of Second Annual Report for the Santa Cruz Mid-County Groundwater Agency

The Santa Cruz Mid-County Groundwater Agency (MGA) is the Groundwater Sustainability Agency for the Santa Cruz Mid-County Groundwater Basin (Basin) number 3-001. The Basin is classified by the California Department of Water Resources (DWR) as a high priority basin in a state of critical overdraft.

The MGA formed in March 2016 as a Joint Powers Authority, with four member agencies: Central Water District, City of Santa Cruz, County of Santa Cruz, and Soquel Creek Water District. The MGA Board of Directors includes two representatives from each member agency and three private well owner representatives. The MGA initiated development of the Groundwater Sustainability Plan (GSP) in 2017 to guide ongoing management of the Basin with a goal to achieve and maintain groundwater sustainability over a 50-year planning and implementation horizon. GSP development was a collaborative effort among the member agencies and technical consultants, and was informed by input from resource management agencies, community members, and stakeholders.

The GSP was adopted by the MGA Board on November 21, 2019 and submitted to DWR on January 30, 2020. The first Annual Report was submitted in April 2020.

As required by the California Code of Regulations for Groundwater Sustainability Plans, the MGA is pleased to submit the second Annual Report to the Department of Water Resources.

Feel free to contact me if you have any questions,

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& ASSOCIATES**

Water Resource Consultants

March 24, 2021

Santa Cruz Mid-County Basin Water Year 2020 Annual Report

Requirement of Groundwater Sustainability Plan Implementation

Prepared for:



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ACRONYMS & ABBREVIATIONS

ASR.....	Aquifer Storage and Recovery
Basin.....	Santa Cruz Mid-County Basin
CEQA.....	California Environmental Quality Act
CWD.....	Central Water District
DSWMAR.....	Distributed Storm Water Managed Aquifer Recharge
DWR.....	California Department of Water Resources
EPA.....	U.S. Environmental Protection Agency
GSP.....	Groundwater Sustainability Plan
MGA.....	Santa Cruz Mid-County Groundwater Agency
PRMS.....	Precipitation Runoff Modeling System
RMP.....	representative monitoring point
SCWD.....	City of Santa Cruz Water Department
SGMA.....	Sustainable Groundwater Management Act
SqCWD.....	Soquel Creek Water District
SWIC.....	Seawater Intrusion Control
TDS.....	total dissolved solids
WIFIA.....	Water Infrastructure Finance and Innovation Act
WUF.....	water use factor
WY.....	Water Year

EXECUTIVE SUMMARY

The Santa Cruz Mid-County Groundwater Agency (MGA) is required to submit an annual report for the Santa Cruz Mid-County Basin (Basin) to the California Department of Water Resources (DWR) by April 1 of each year following the MGA's 2019 adoption of its Groundwater Sustainability Plan (GSP or Plan). This second annual report covers Water Year 2020.

As described in the GSP, DWR lists the Basin as a high priority basin in critical overdraft. The high priority designation indicates that water users in the Basin have high dependence on groundwater. The Basin is listed in critical overdraft principally because active seawater intrusion impacts its productive aquifers as a result of historical over-pumping.

Although Water Year 2020 was classified as a dry year, there were encouraging increases in five-year moving average groundwater elevations along the coast that are used as a proxy for seawater intrusion sustainable management criteria. Increased groundwater elevations at the coast are attributable to 1) average groundwater extraction over the most recent seven years being 2,100 acre-feet per year less than prior years, and 2) redistribution of pumping away from the coast being successful in contributing to increased groundwater elevations. There are still options for pumping redistribution by Soquel Creek Water District (SqCWD) once a future supply well is drilled at Cunnison Lane.

Despite improving groundwater conditions at the coast, undesirable results for seawater intrusion continue to occur based on sustainable management criteria for coastal groundwater elevations. This means the Basin remains in a state of critical overdraft, but the MGA has until 2040 to continue to increase groundwater elevations until there are no more undesirable results.

Chloride concentrations at two monitoring wells (SC-A2RB and SC-A5B) were consistently above measurable objectives for seawater intrusion. This indicates that there is inland movement of seawater intrusion that may lead to undesirable results and therefore trigger early management action. The recommended action is a change in current operations by reducing pumping at SqCWD's Seascape well and possibly also their San Andreas well, the nearest municipal wells to these two monitoring wells.

Net groundwater pumping remains greater than sustainable yields in two of three aquifer groups: Aromas Red Sands and Purisima F aquifer group and Purisima DEF, BC, A, and AA aquifer group. Projects included in the GSP to reduce net groundwater pumping in order to achieve sustainability are expected to reduce net extraction of groundwater once they are implemented. Work to plan and implement these projects continued in 2020. The projects include Pure Water Soquel, Aquifer Storage and Recovery (ASR), Water Transfers / In-Lieu Groundwater Recharge, and Distributed Storm Water Managed Aquifer Recharge.

1 INTRODUCTION

1.1 Purpose of Annual Report

This annual report is a requirement of Water Code §10733.6 and pertains to the Sustainable Groundwater Management Act (SGMA). As the groundwater sustainability agency for the Santa Cruz Mid-County Basin (Basin), the Santa Cruz Mid-County Groundwater Agency (MGA) is required to submit an annual report to the California Department of Water Resources (DWR) by April 1 of each year following the adoption of its Groundwater Sustainability Plan (GSP or Plan). The MGA Board of Directors unanimously adopted the final GSP after a public hearing on November 21, 2019. The GSP was submitted online to DWR on January 30, 2020 and posted for public comment by DWR on February 19, 2020. DWR is currently reviewing the GSP and will complete its technical assessment by January 31, 2022.

The purpose of annual reports is to demonstrate to DWR during GSP implementation that progress is being made towards meeting interim milestones that are defined in the GSP and that lead to achieving groundwater sustainability. The content requirements of the annual report are outlined in §356.2 of the GSP Regulations.

This second annual report covers Water Year 2020 and includes a description of basin conditions through text, hydrographs, contour maps, estimation of change in groundwater in storage, and distribution of groundwater extraction across the Basin. A comparison of Water Year 2020 data against sustainability management criteria is provided as a measure of the Basin's progress towards the sustainability goal that must be reached by the end of Water Year 2039.

1.2 Santa Cruz Mid-County Groundwater Sustainability Agency

The MGA was created in March 2016 under a Joint Exercise of Powers Agreement. The MGA is governed by an 11-member board of directors consisting of representatives from each member agency and private well representatives within the boundaries of the MGA. The MGA board is composed of:

- Two representatives from the Central Water District appointed by the Central Water District Board of Directors.
- Two representatives from the City of Santa Cruz appointed by the City of Santa Cruz City Council.
- Two representatives from the County of Santa Cruz appointed by the County of Santa Cruz Board of Supervisors.

- Two representatives from the Soquel Creek Water District appointed by the Soquel Creek Water District Board of Directors.
- Three representatives of private well owners in the Basin appointed by majority vote of the eight public agency MGA directors.
- In addition, an alternate representative for each member agency and for the private well owners are appointed to act in the absence of a representative at Board meetings.

The MGA’s jurisdictional area coincides exactly with the Santa Cruz Mid-County Basin depicted on Figure 1.

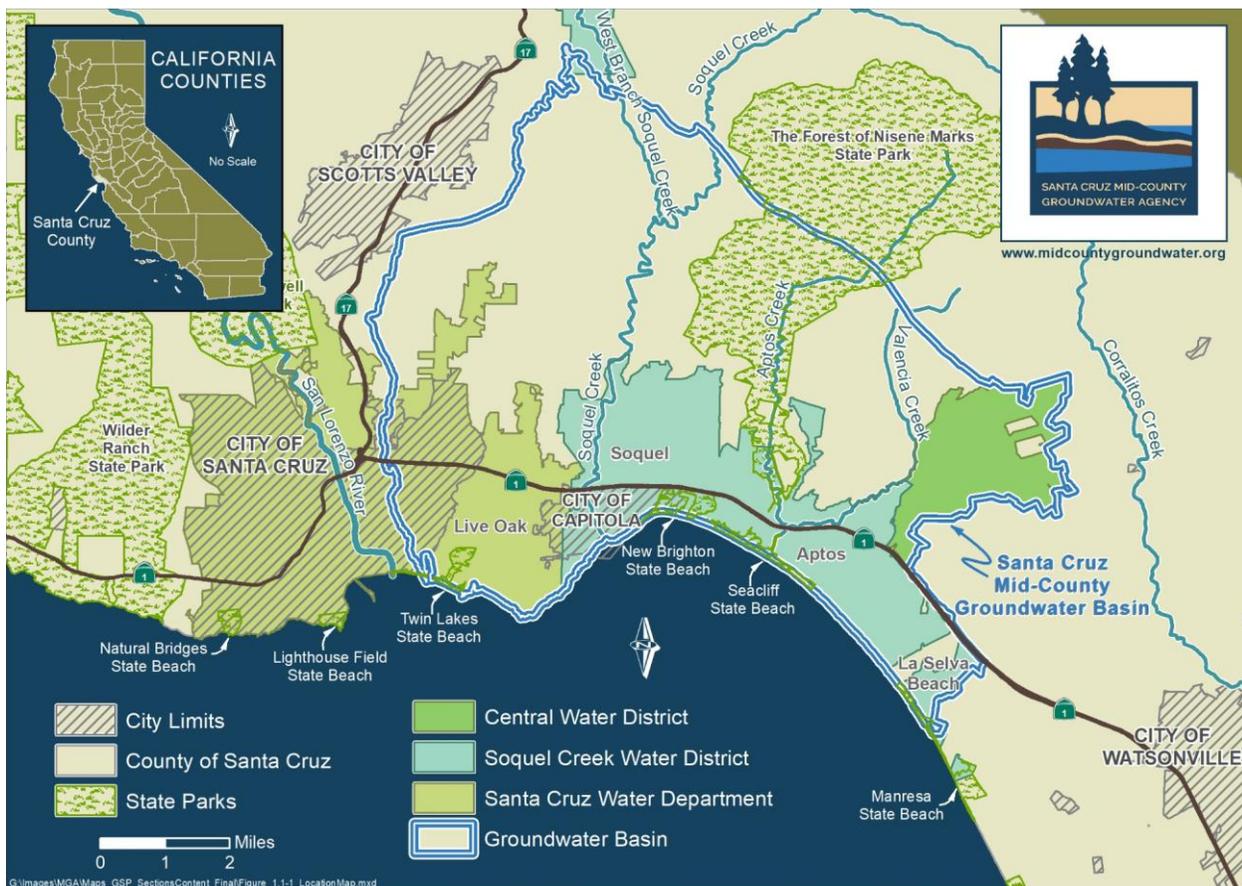


Figure 1. Santa Cruz Mid-County Basin Boundaries

2 BASIN SETTING

2.1 Basin Description

The Santa Cruz Mid-County Basin is identified by DWR as Basin 3-001 in Bulletin 118 Interim Update 2016. The Basin extends from the Santa Cruz Mountains to the Pacific Ocean and from the edge of the City of Santa Cruz near Twin Lakes in the west to La Selva Beach in the east (Figure 1). The Basin includes portions of the City of Santa Cruz, the entire City of Capitola, and Santa Cruz County census designated places of Twin Lakes, Live Oak, Pleasure Point, Soquel, Seacliff, Aptos, and Rio Del Mar. The Basin also includes portions of Santa Cruz County unincorporated census designated places of Day Valley, Corralitos, Aptos Hills-Larkin Valley, and La Selva Beach (DWR, Bulletin 118 Interim Update 2016).

The Basin boundary includes all areas where the stacked aquifer system of the Purisima Formation, Aromas Red Sands, and certain other Tertiary-age aquifer units underlying the Purisima Formation constitute the shared groundwater resource to be managed by the MGA. The Basin is defined by both geologic and jurisdictional boundaries. Basin boundaries to the west are primarily geologic. Basin boundaries to the east, adjacent to the Pajaro Valley Subbasin managed by Pajaro Valley Water Management Agency are primarily jurisdictional.

As described in the GSP, DWR lists the Basin as a high priority basin in critical overdraft. The high priority designation indicates that water supply in the Basin has high dependence on groundwater. The Basin is listed in critical overdraft principally because active seawater intrusion impacts its productive aquifers as a result of historical over-pumping of the aquifers.

2.2 Precipitation and Water Year Type

Precipitation at the Santa Cruz Cooperative climate station in Water Year 2020 was 13.3 inches. This is 40% of the long-term average annual precipitation at this station of 29.8 inches per year. Figure 2 charts annual rainfall at the Santa Cruz Cooperative climate station and water year type from Water Year 1984 to Water Year 2020. The annual average rainfall of 28.9 inches displayed on Figure 2 is the average since Water Year 1984, which is lower than the long-term average of 29.8 inches that starts in Water Year 1942.

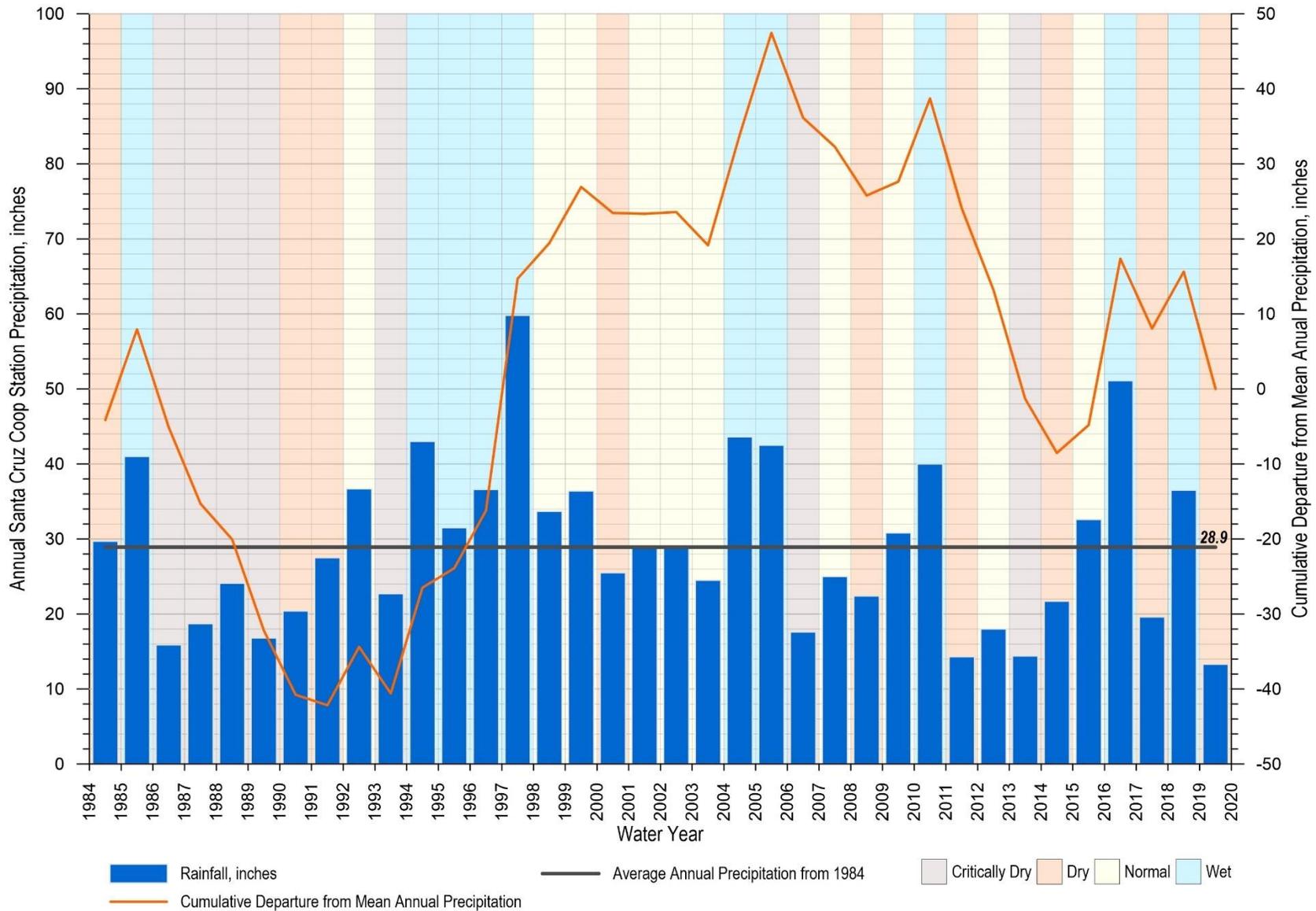


Figure 2. Annual Precipitation and Cumulative Change in Precipitation at Santa Cruz Cooperative Climate Station with Water Year Type

The water year type in the Santa Cruz area is based on a classification used by the City of Santa Cruz Water Department (SCWD). The classification is based on total annual runoff in the San Lorenzo River, the SCWD's most important water source, measured at the Big Trees gage in Henry Cowell Redwoods State Park. Under this classification system, Water Year 2020 (October 1, 2019 through September 30, 2020) is designated as a dry year. This follows a wet year in Water Year 2019, a dry year in Water Year 2018, and a wet year in Water Year 2017. Note that because the water year type is based on runoff, the amount of rainfall in the preceding years influences water year type classification. For example, there was more rainfall in 2014 than in 2020, but 2014 is classified as critically dry while 2020 is classified as dry. This is because 2014's preceding three years were average or dryer rainfall years that resulted in less runoff in 2014.

3 BASIN CONDITIONS

3.1 Groundwater Elevations

Contour maps representing spring and fall groundwater elevations for Water Year 2020 in each principal aquifer are included on

Figure 3 through Figure 12. Spring groundwater elevations represent seasonal high conditions while fall groundwater elevations represent seasonal low conditions.

The contour maps intend to represent seasonal average conditions in the aquifer units. Sustainability with respect to seawater intrusion is evaluated based on average groundwater elevations. Therefore, data used for the contour maps are based on the following:

1. Average transducer groundwater elevations calculated over March (spring) or September (fall) from monitoring wells, where available.
2. Manual monthly measurements from monitoring wells where transducer data are not available, which are less accurate but are the best available representation of seasonal average conditions in the aquifers.
3. Groundwater elevations from monitoring wells adjacent to production wells. Using average groundwater elevations calculated from transducer data that include levels recorded when the adjacent production well is pumping is the best representation of conditions in the aquifer over this time period.
4. Static groundwater elevations from production wells without adjacent monitoring wells. Pumping groundwater elevations from production wells are not representative of groundwater elevations in the aquifers due to pumping inefficiencies. Therefore, static groundwater elevations are preferable over pumping elevations, but are less accurate than average groundwater elevations from adjacent monitoring wells. Static elevations are therefore the best available representation of seasonal average aquifer conditions for these locations without adjacent monitoring wells.

The contour maps include groundwater elevation proxies of minimum thresholds (green text) for representative monitoring points (RMP) for seawater intrusion. Representative monitoring points with groundwater elevation proxies for seawater intrusion are included only in the principal aquifer unit where nearby municipal pumping takes place. This is because municipal pumping wells are assumed to be the deepest wells in the coastal areas. Groundwater elevation proxies are displayed for reference only as they cannot be directly compared to contours representing seasonal conditions to evaluate exceedances of minimum thresholds and undesirable results.

For that purpose, groundwater elevation proxies are compared to five-year moving averages at the seawater intrusion RMPs as described in Section 4.3.

Hydrographs for RMPs and other monitoring network wells used to evaluate the Basin are updated through Water Year 2020 and are provided in Appendix A. The hydrographs indicate the water year type and extend back historically the full period of record for each well. For RMPs, the minimum threshold and measurable objectives are included on the hydrographs (Figures A-1 through A-40).

Hydrographs in Appendix A are grouped based on the sustainability indicator for which groundwater elevations are used as sustainable management criteria as follows:

- Figures A-1 through A-17: Chronic Lowering of Groundwater Levels
- Figures A-18 through A-34: Seawater Intrusion Groundwater Elevation Proxies
- Figures A-35 through A-40: Depletion of Interconnected Surface Water Groundwater Elevation Proxies
- Figures A-41 through A-169: Wells in Monitoring Network not used as RMPs for Groundwater Elevations

3.1.1 Aromas Red Sands

Contour maps for the Aromas Red Sands are shown on

Figure 3 and Figure 4 for spring and fall, respectively. Groundwater generally flows from inland areas towards the coast with effects from pumping on contours at Central Water District's (CWD's) Rob Roy wellfield (CWD #10 and #12) and Soquel Creek Water District's (SqCWD's) Bonita and San Andreas production wells. Flow from inland includes flow from a portion of the Pajaro Valley Subbasin inland of SqCWD's service area. Groundwater elevations in the Aromas Red Sands are above sea level but less than 10 feet near the coast.

At the SC-A3A RMP for seawater intrusion, 2020 groundwater elevations are above the seawater intrusion minimum threshold (Appendix Figure A-18). Slight declines in elevations occurred at CWD #4 (Appendix Figure A-54) and CWD #10 (Appendix Figure A-52) in Central Water District's (CWD's) Rob Roy wellfield, but CWD #12 was stable over the past year (Appendix Figure A-53). Soquel Creek Water District's (SqCWD's) production wells (Country Club, Bonita, San Andreas, and Seascape) have stable groundwater elevations.

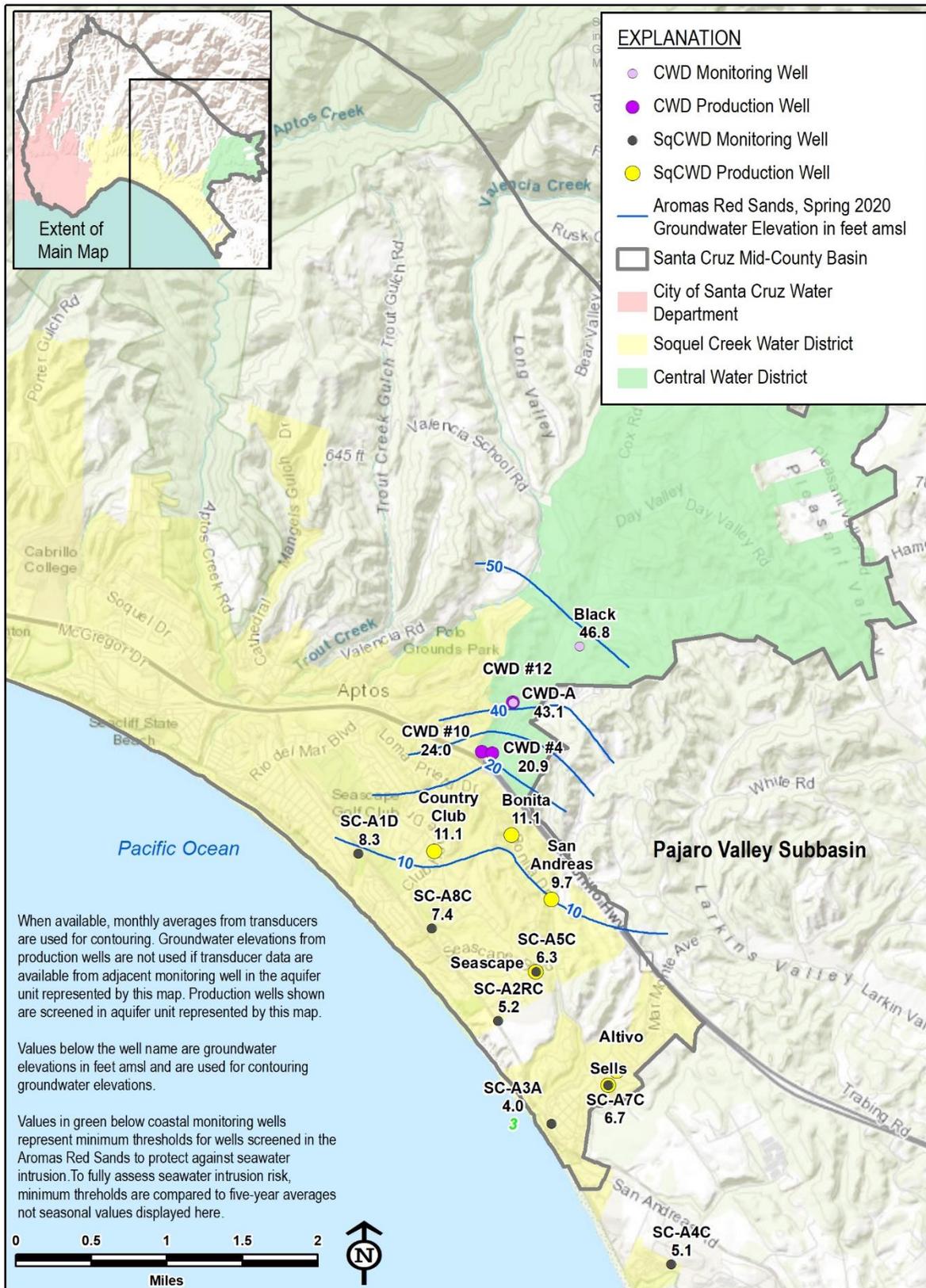


Figure 3. Aromas Red Sands Groundwater Elevations, Spring 2020

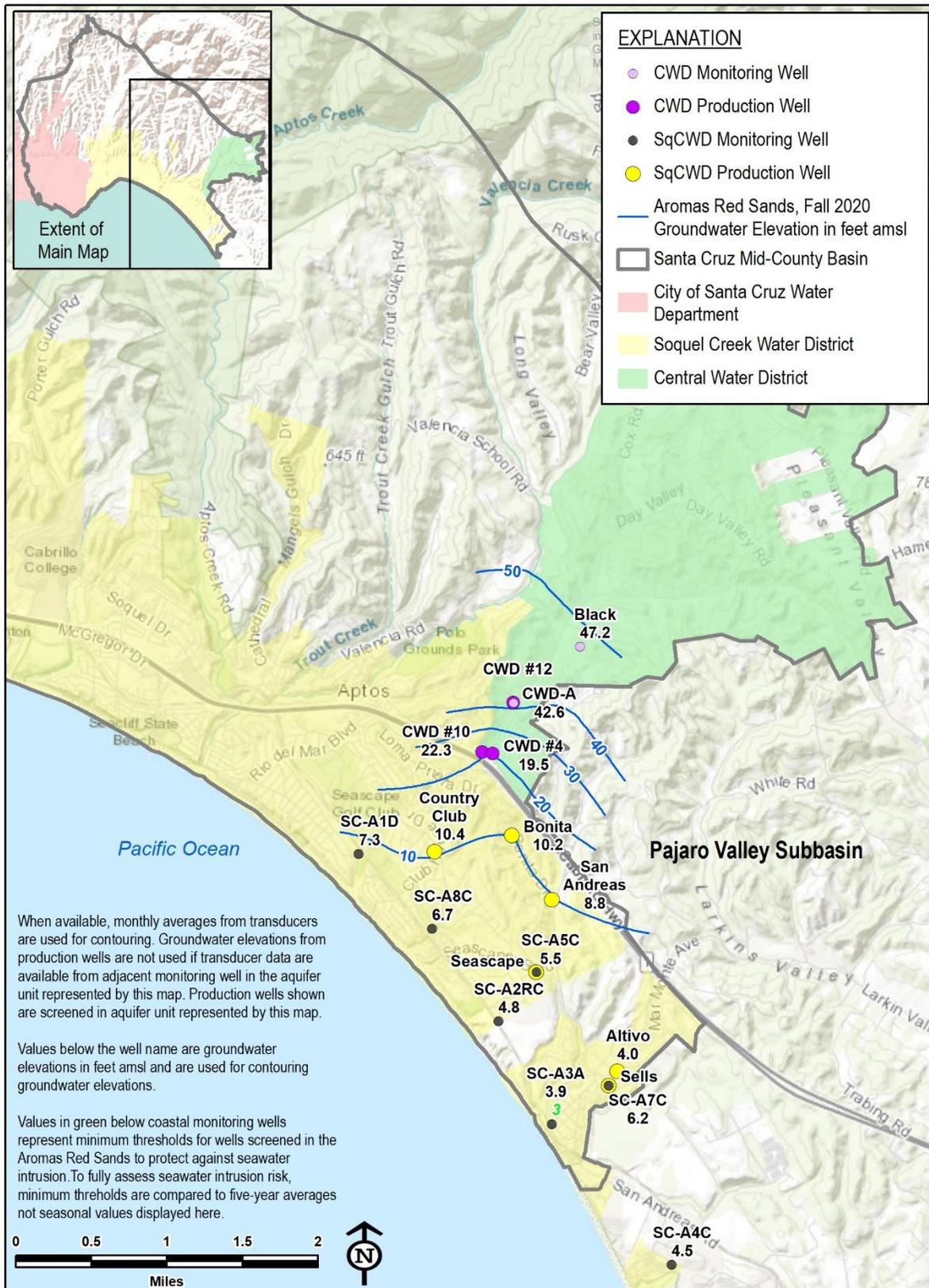


Figure 4. Aromas Red Sands Groundwater Elevations, Fall 2020

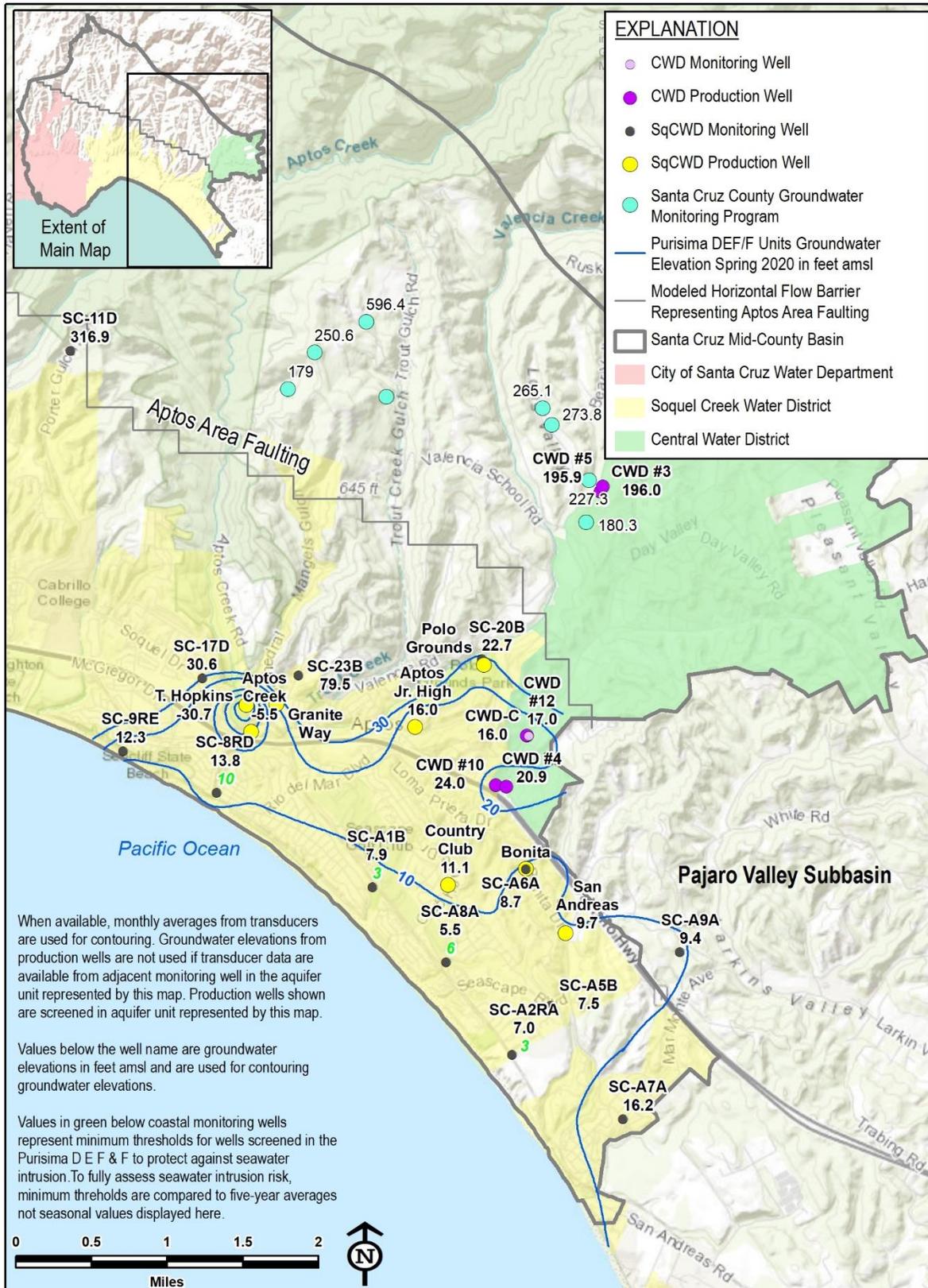
3.1.2 Purisima F and DEF Units

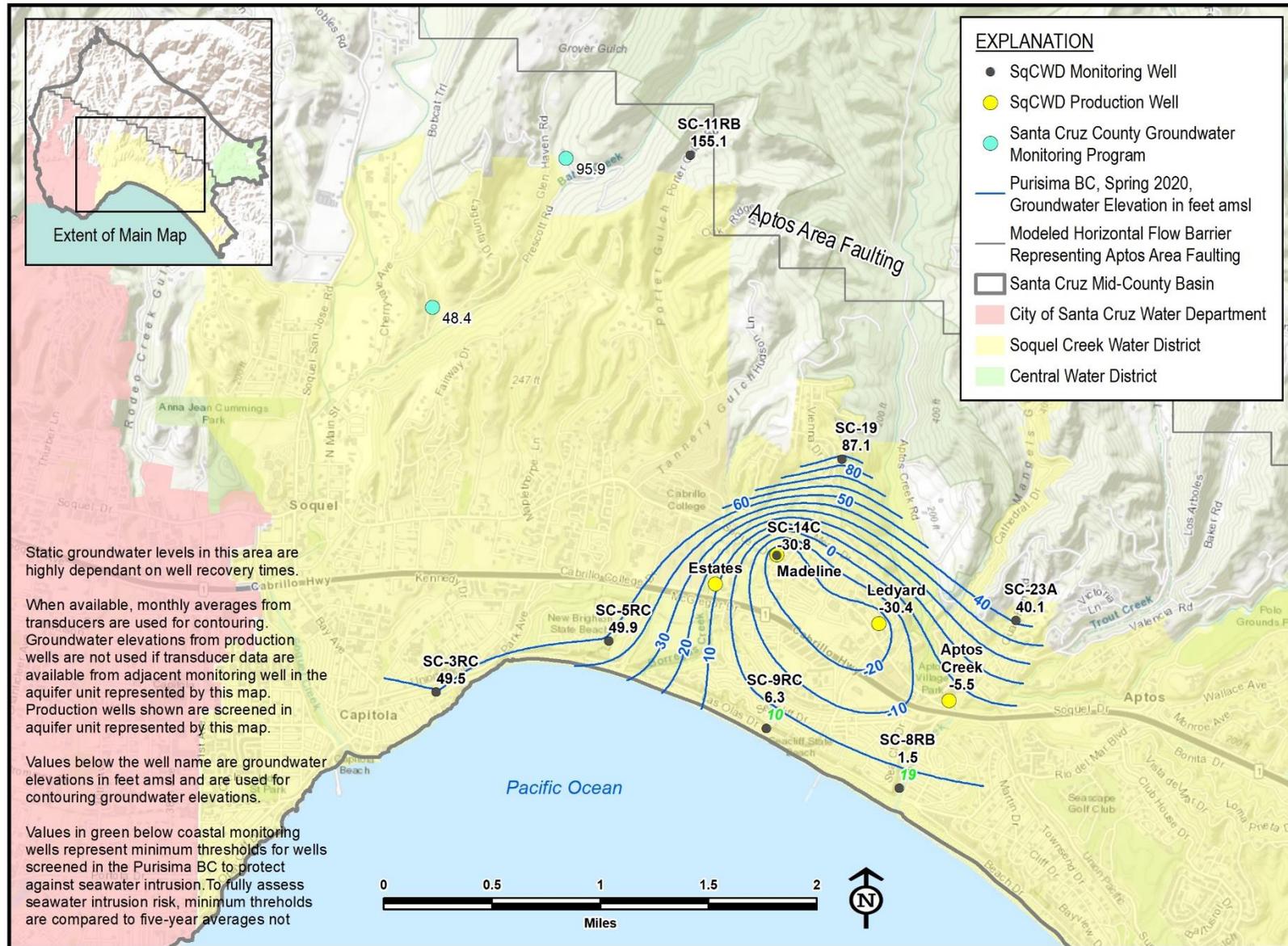
Contour maps for the Purisima F and DEF units are shown on Figure 5 and Figure 6 for spring and fall, respectively. The contour maps show cones of depression around the SqCWD's Bonita and San Andreas wells that are screened in both the Purisima F and Aromas Red Sands aquifer, around the SqCWD's Aptos Jr. High well and CWD's Rob Roy #12 (CWD #12) well in the Purisima F unit, and around SqCWD's T. Hopkins well in the Purisima DEF unit. Even with these pumping depressions, groundwater flows towards the coast. There is also groundwater flow into the Basin from the Pajaro Valley Subbasin. With the exception of SC-8RD where there was a 2 foot increase in spring elevations, coastal groundwater elevations decreased slightly over the previous year. Even though there were declines, three of four coastal representative monitoring wells in the Purisima F and DEF units are above their respective seawater intrusion minimum thresholds. Monitoring well SC-A8A (is the only coastal monitoring well in these units that has not yet achieved its minimum threshold.

The greatest change in groundwater elevations from Fall 2019 to Fall 2020 occurred in monitoring well SC-23B where there was a 21-foot drop in groundwater elevation. The decline is related to pumping at the Granite Way well which was put into production in May 2020. The cone of depression around SqCWD's T. Hopkins well increased in the fall to include the Granite Way well, as shown on Figure 6.

3.1.3 Purisima BC Unit

Contour maps for the Purisima BC unit are shown on Figure 7 and Figure 8 for spring and fall, respectively. Both these contour maps show a prominent cone of depression formed by SqCWD's Ledyard and Madeline production wells. Typically, the cone of depression is more developed in the fall when demand is greater, however in Fall 2020, contours on Figure 8 reflect a smaller depression than Spring 2020 (Figure 7). The Spring 2020 cone of depression around the Ledyard and Madeline production wells is larger than it was the previous spring (Figure 7) because of greater pumping at Madeline and Ledyard in Spring 2020 compared to the previous spring and the summer/fall of 2020. Lower spring elevations caused groundwater to flow inland towards the cone of depression instead of towards the coast as it usually does in the spring. There was also increased pumping at the Estates well compared to the previous year. Increased pumping from production wells screened in the Purisima BC unit, resulted in groundwater elevation declines of up to 6 feet since July 2019 in coastal monitoring wells, SC-8RB (Appendix Figure A-24) and SC-9RC (Appendix Figure A-23). Groundwater elevations in both wells remain below their respective seawater intrusion minimum thresholds.





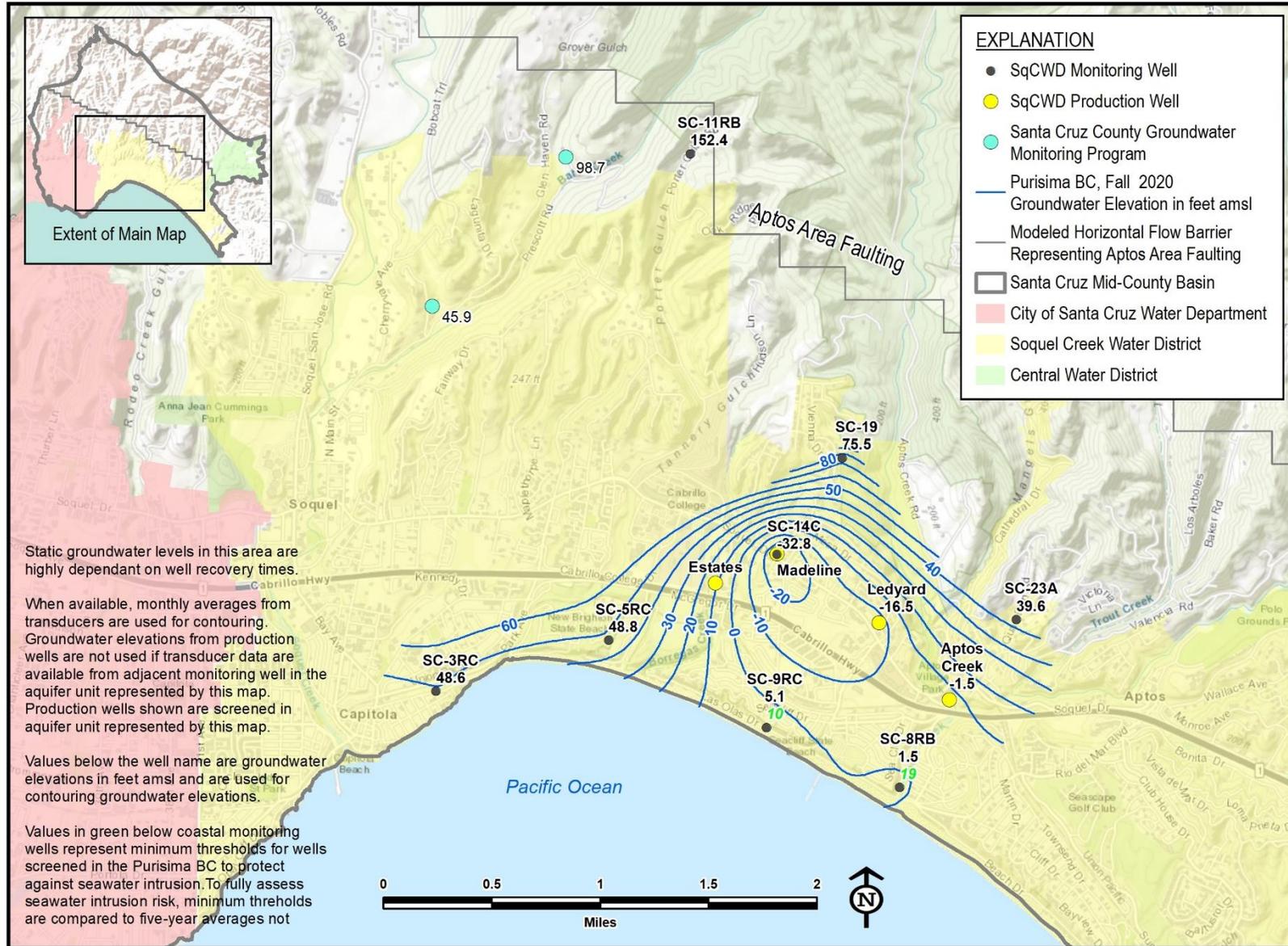


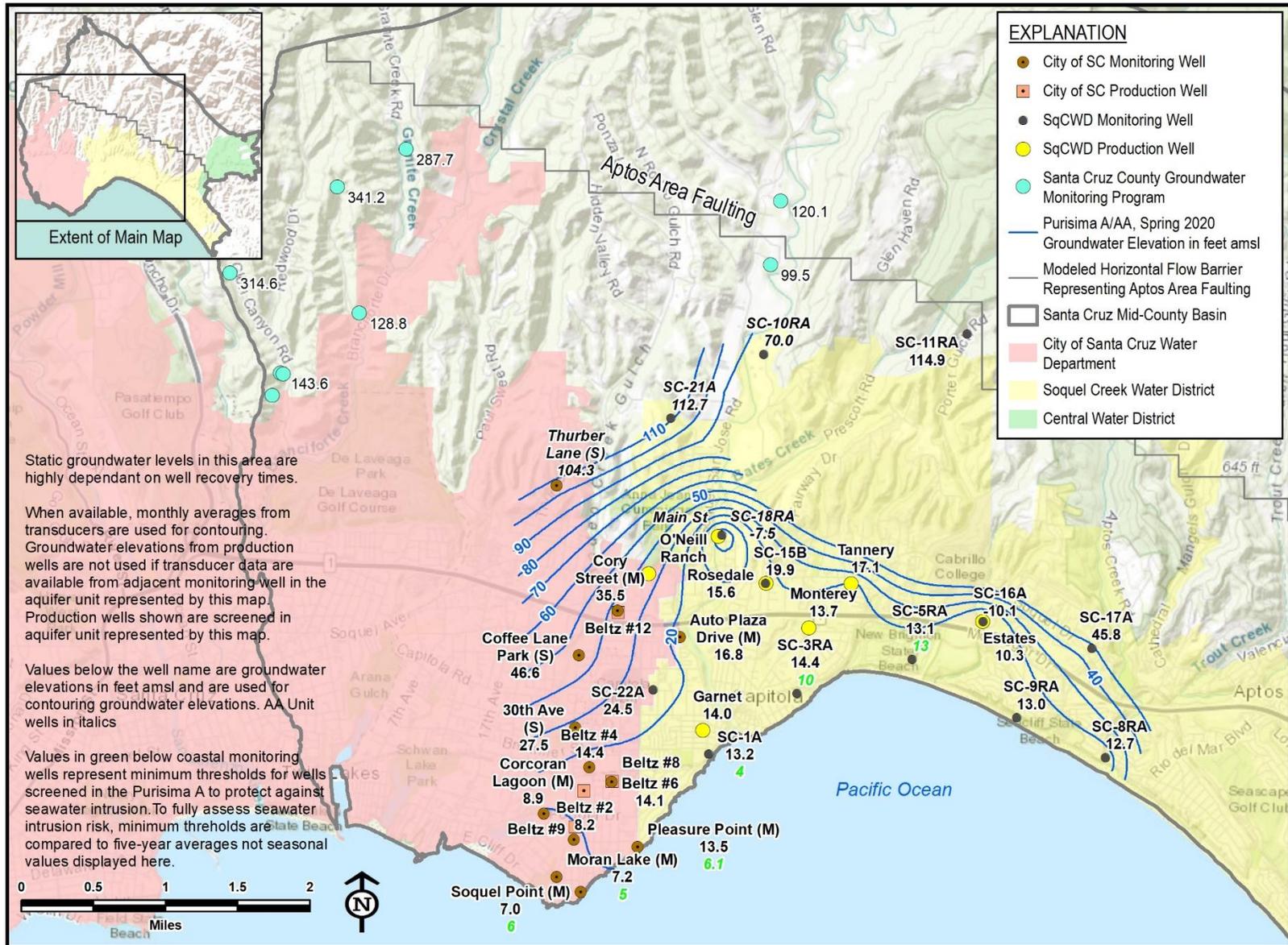
Figure 8. Purisima BC Groundwater Elevations, Fall 2020

3.1.4 Purisima A and AA Unit

Contour maps for the Purisima A and AA units are shown on Figure 9 and Figure 10 for spring and fall, respectively. Groundwater generally flows from inland towards the coast with localized depressions due to pumping at SqCWD and SCWD production wells. Cones of depression are more defined in the fall, particularly at SqCWD's Main Street and Estates production wells. Depressed groundwater elevations also occur at an inland location around the SC-10RA monitoring well where non-municipal pumping occurs.

Groundwater elevations at coastal wells SC-3A and SC-5A in the Purisima A unit are well above seawater intrusion minimum thresholds in the spring, but below in the fall. At Moran Lake, Soquel Point, Pleasure Point, and SC-1A RMPs in the Purisima A unit, groundwater elevations are higher than seawater intrusion minimum thresholds in both the spring and fall as pumping at the SCWD's Beltz wellfield has been lower over the past couple of years than in preceding years partially because of alternative well operations while ASR pilot testing takes place.

Groundwater elevations at SCWD's Cory Street (M) monitoring well ranged from 35.5 ft amsl to 14 ft amsl in response to pumping from Beltz #12 during the period from June through September 2020. The high elevation at Cory Street (M) of 59.1 ft amsl in Spring 2019 decreased to a more typical seasonal high elevation of 35.5 ft amsl in March 2020, due to there not being any injection at Beltz #12 in Water Year 2020. Groundwater elevations along the western portion of the contoured area around the Coffee Lane and 30th Ave monitoring wells remain stable.



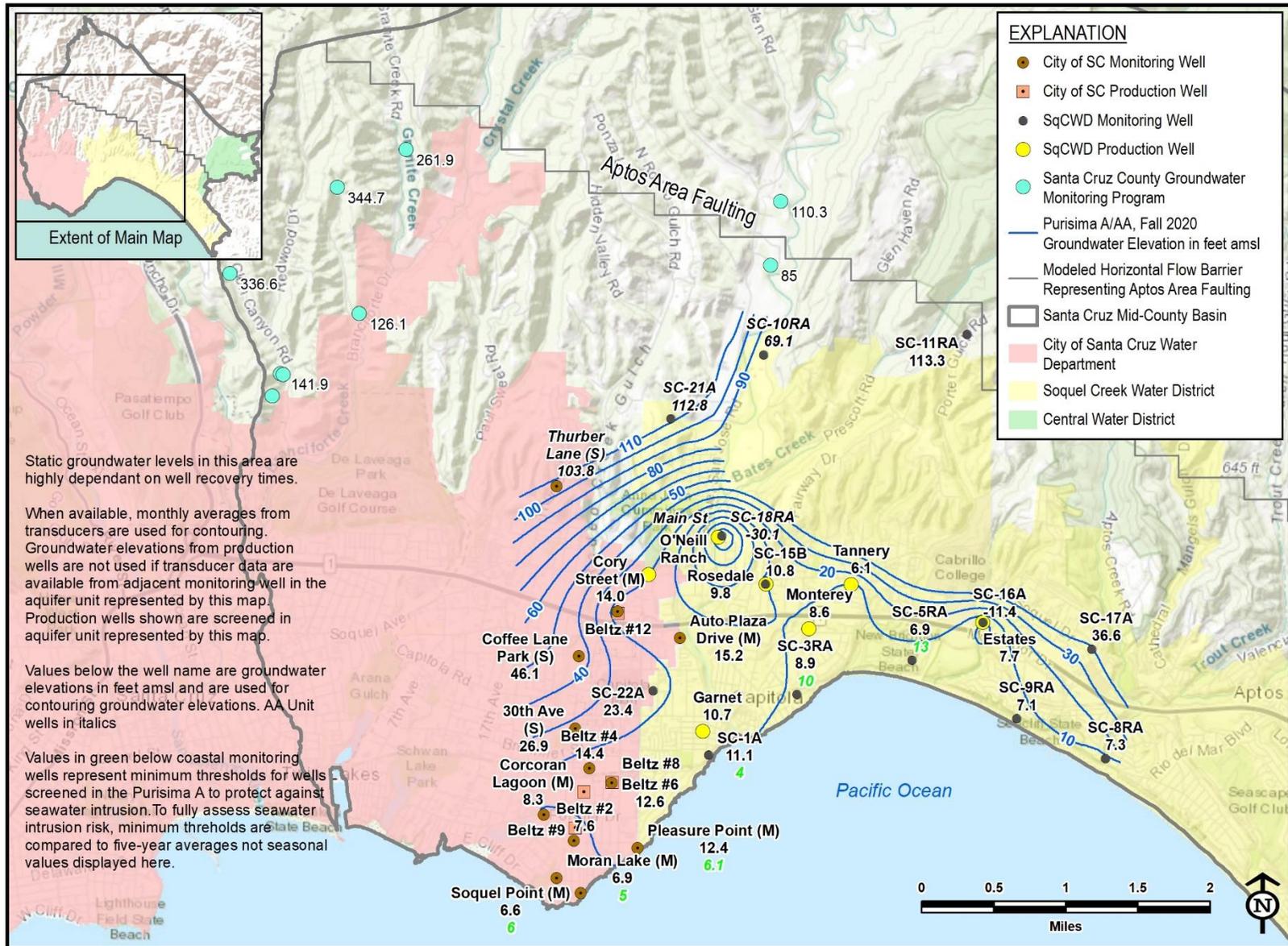


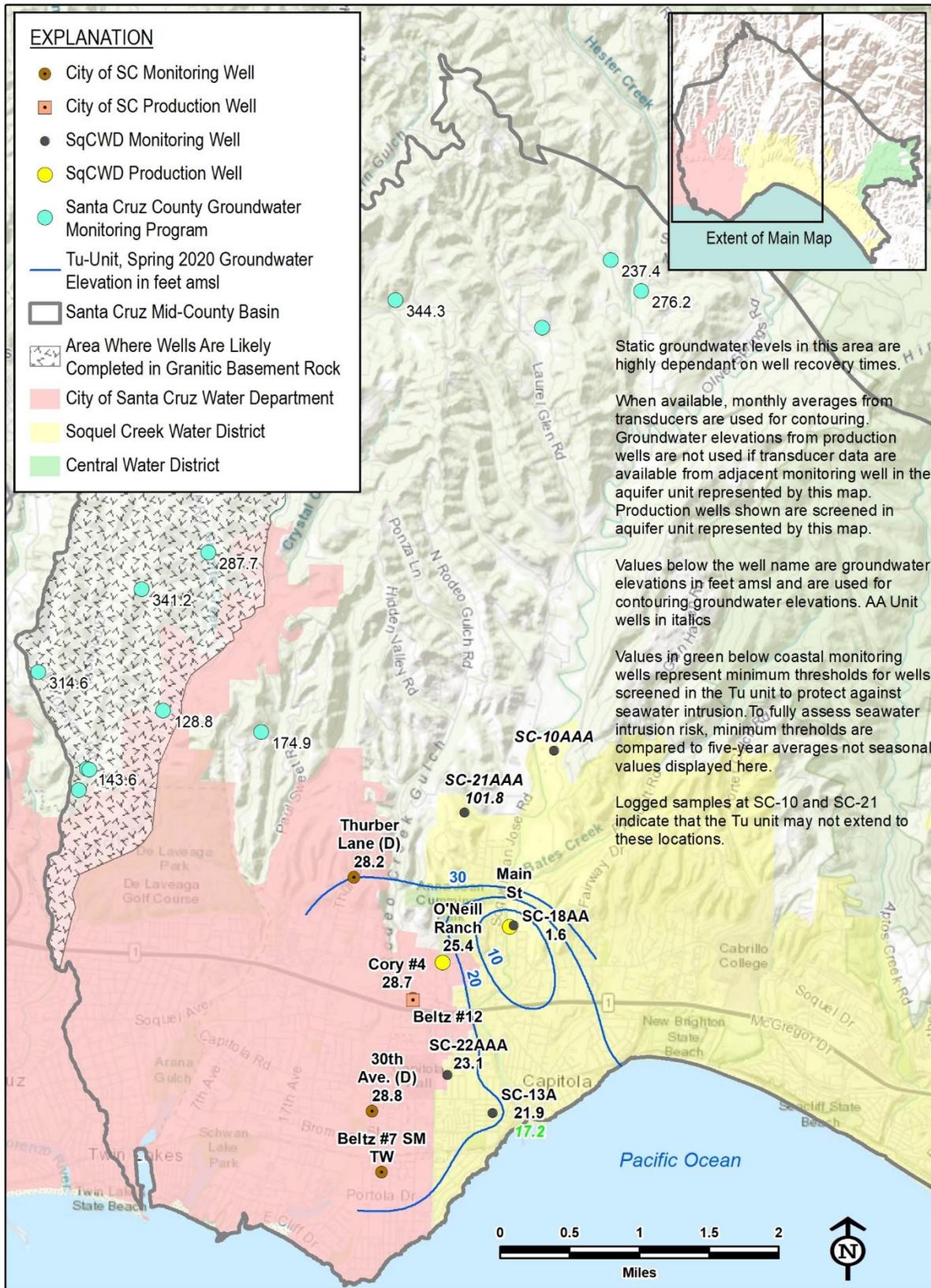
Figure 10. Purisima A and AA Groundwater Elevations, Fall 2020

3.1.5 Tu Unit

Contour maps for the Tu unit are included on Figure 11 (Spring 2020) and Figure 12 (Fall 2020). Overall, groundwater flow is from inland to the coast with localized spring and fall cone of depressions around the Main Street production well, and around the Beltz #12 well in the fall.

Higher than normal groundwater elevations in WY2019 were the result of 1) SCWD's Aquifer Storage and Recovery pilot testing, and 2) limited extraction occurring in the Beltz wellfield during ASR pilot testing. Since there was no injection related to ASR pilot testing and SCWD resumed pumping operations at the Beltz wellfield in Water Year 2020, the higher than normal groundwater elevations around Beltz #12 dissipated over the year. The result was a gradual drop in groundwater elevations at Beltz #12 from 67.4 ft amsl in Spring 2019 to 28.7 ft amsl in Spring 2020, and then a more severe drop to -11.6 ft amsl in Fall 2020 in response to pumping at Beltz #12 starting in June. The Fall 2020 elevations at Beltz #12 are more similar to elevations prior to ASR pilot testing. Declines in elevations associated with the dissipation of the injection mound are also observed in other wells, such as Thurber Lane Deep monitoring well, and the O'Neill Ranch and Main Street production wells. By Fall 2020, a cone of depression at Beltz #12 had returned and the depression around the Main Street production well deepened by approximately 21 feet because it was pumped more than the previous year. The O'Neill Ranch well did not produce water for supply purposes in 2020; it was only pumped minimally for ammonia testing purposes in June.

The coastal RMP at SC-13A had a 6.7 ft groundwater elevation decrease between Spring 2019 and Spring 2020 that is also likely a result of injection mound dissipation around the injection site at Beltz #12 and the resumption of Beltz #12 pumping. Groundwater elevations at the well remained above its minimum threshold in Spring 2020, however, by the fall, groundwater elevations fell five feet and below its minimum threshold.



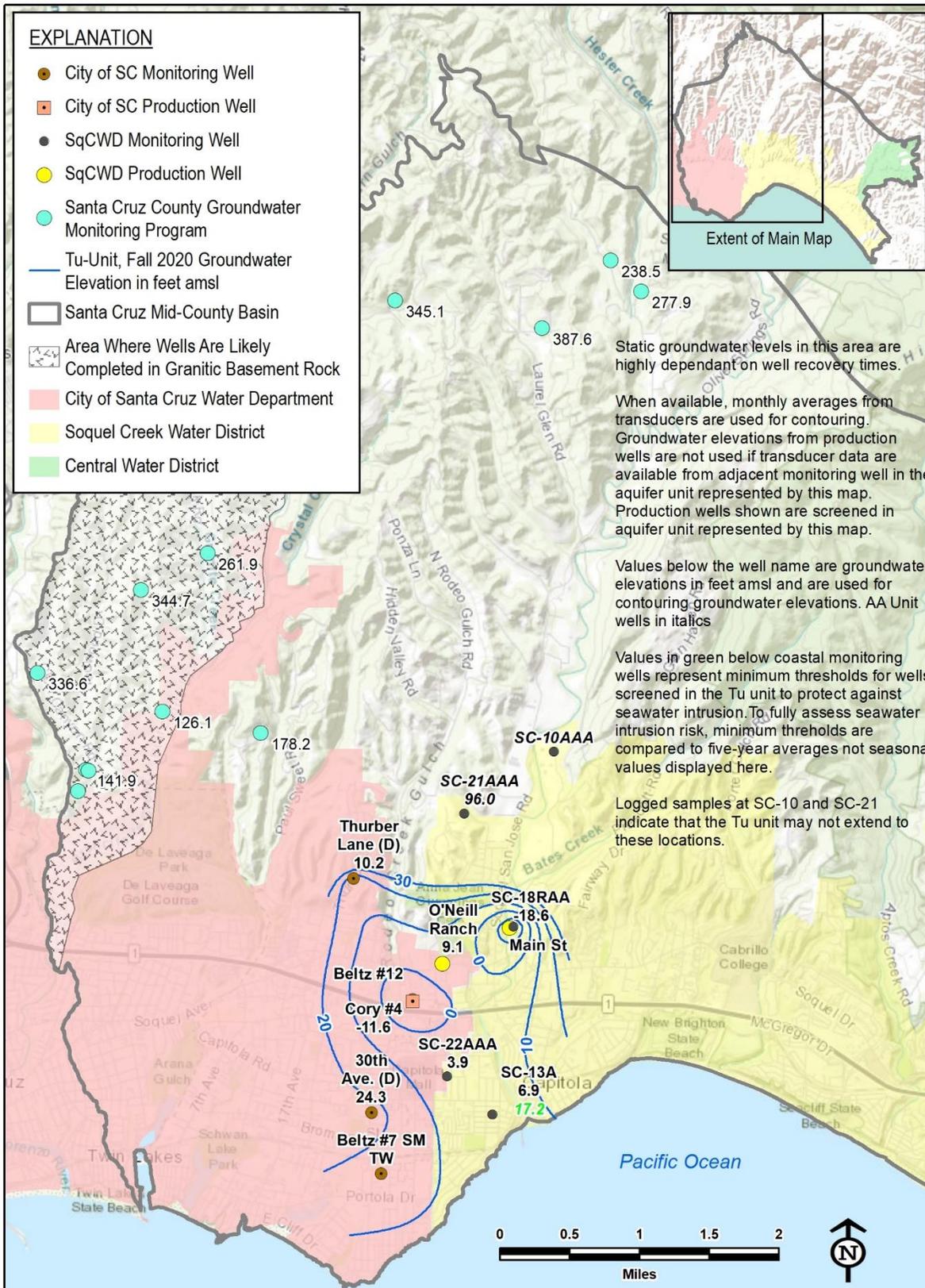


Figure 12. Tu Groundwater Elevations, Fall 2020

3.2 Groundwater Extraction

The volume of Santa Cruz Mid-County Basin groundwater extracted in Water Year 2020 is included in Table 1. The table summarizes groundwater extractions by water use sector and identifies the method of measurement, and accuracy of measurements. Appendix 2-B of the GSP describes the methodology for estimates. Figure 13 shows the general location and volume of groundwater extractions by use type. To meet requirements for annual reports in the SGMA regulations, Figure 13 only includes extractions and does not account for injection at Beltz #8 during SCWD’s Aquifer Storage and Recovery testing in Water Year 2020.

Overall, about 400 acre-feet more groundwater was extracted in Water Year 2020 compared to Water Year 2019. The Purisima DEF, BC, A, and AA units account for 43% of groundwater pumped, the Aromas Red Sands and Purisima F unit yield 40%, and the Tu unit provides 16% of groundwater pumped (Table 1). Unmetered domestic and institutional pumping are fairly constant from year to year due to assumed water use factor for these indoor uses being constant from year to year. Estimates of pumping to meet landscape and agricultural irrigation demand are variable each year because it is based on climate data.

Table 1. Water Year 2020 Groundwater Extracted in the Santa Cruz Mid-County Basin

Water Use Sector	Aquifer Group			Total (acre-feet)	Percentage
	Aromas Red Sands and Purisima F	Purisima DEF, BC, A and AA	Tu		
Private Domestic ¹	53	366	176	594	11%
Agricultural ²	208	175	24	407	8%
Institutional ³	199	112	7	318	6%
Municipal ⁴	1,635	1,601	634	3,870	75%
Total	2,094	2,254	840	5,188	
Percentage	40%	43%	16%		

¹ Estimated based on annual water use factor (WUF) per connection determined from metered Small Water Systems and applied to each residence outside of municipal water service areas (less accurate). WUF for WY2020 was 0.25 acre-feet per connection..

² Estimated based on irrigation demand determined using the GFLOW model, crop acreage, and crop coefficient (less accurate).

³ Estimated based on historical water usage for facility use including an estimate of turf irrigation based on irrigation demand determined using the GFLOW model, irrigation acreage, and turf’s crop coefficient (less accurate)

⁴ Direct measurement by meters (most accurate)

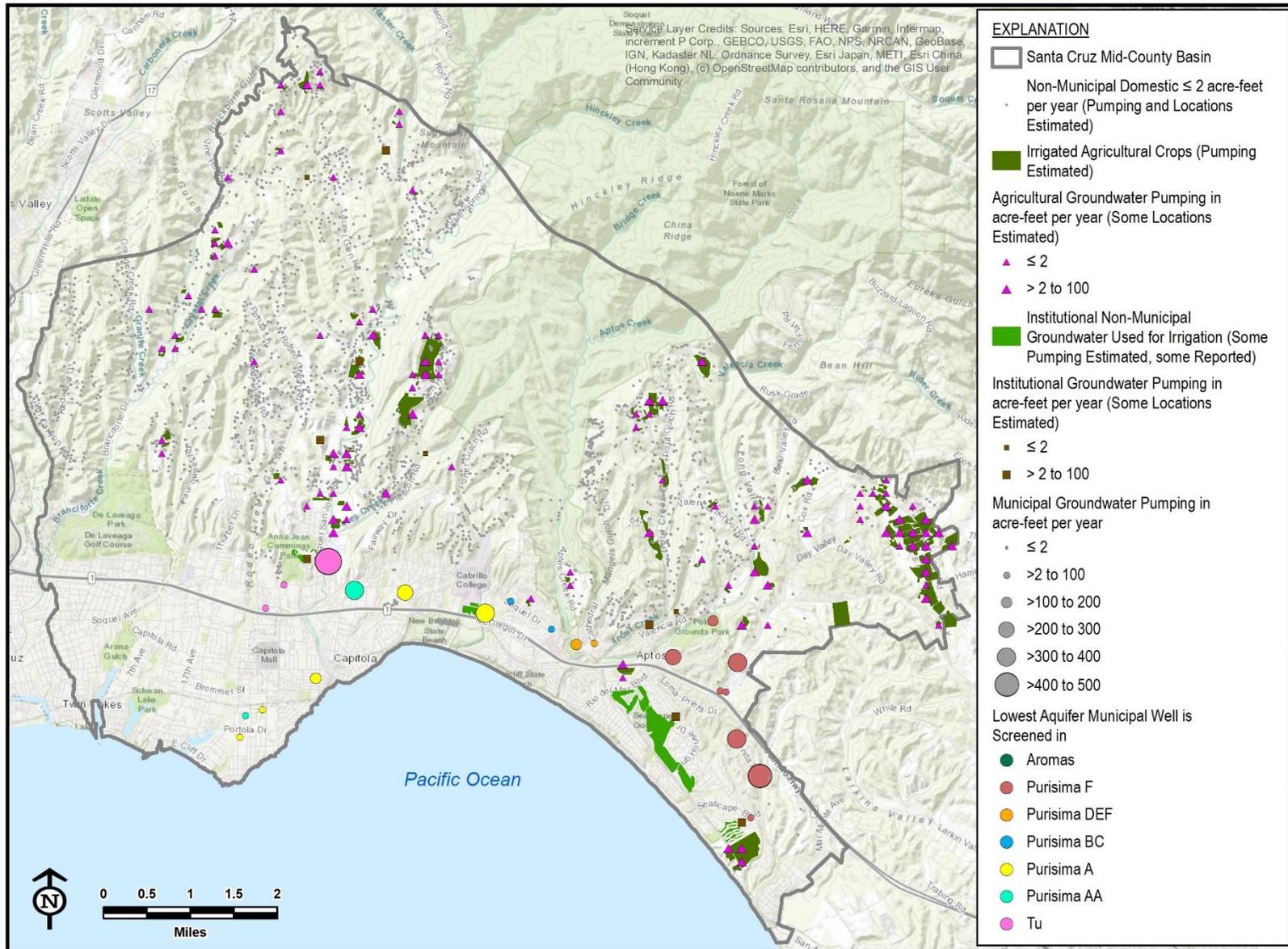


Figure 13. General Location of Water Year 2020 Groundwater Extracted in the Santa Cruz Mid-County Basin

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

In Water Year 2020, surface water was used in the Basin for the following purposes:

1. The SCWD performed pilot testing of Aquifer Storage and Recovery that included injection of some of its surface water supply at the Beltz #8 well into the Purisima A unit and potentially into the Purisima AA unit.
2. The SCWD and SqCWD continued the pilot project to transfer surface water supply from the SCWD to SqCWD for in-lieu use. In Water Year 2020, the pilot transfer occurred from December 2019 through January 2020, allowing the District to reduce pumping from the Purisima A and AA units and Tu unit.
3. SqCWD required emergency use of SCWD surface water in October 2019 due to PG&E's Public Safety Power Shutoffs which caused loss of power to a multitude of SqCWD facilities.

Table 2 summarizes surface water supply used in the Basin for groundwater recharge and in-lieu use for Water Year 2020.

Table 2. Water Year 2020 Surface Water Supply for Groundwater Recharge or In-Lieu Use

Purpose	Water User	Description	Total (acre-feet) ¹
Groundwater Recharge	City of Santa Cruz	Pilot Test of ASR at Beltz #8 Well	11
In-Lieu Use	Soquel Creek Water District	Pilot Transfer from City of Santa Cruz	104
Emergency Use	Soquel Creek Water District	Emergency use due to Public Safety Power Shutoffs	7
Total			122

¹ Direct measurement by meters

3.4 Total Water Use

Total water use volumes in the Santa Cruz Mid-County Basin are included in Table 1. The table summarizes total water use by water use sector, water source type, and identifies the method of measurement. The groundwater portion of water use does not include water recovered as part of the SCWD's ASR pilot tests because the water was pumped to waste and not used for water supply.

Total water use has been lower from Water Years 2015 through 2020 compared to previous years. As the majority of supply is provided by groundwater from the Basin, this reduced water use has resulted in less groundwater pumping in the Basin over the same period. In Water Year 2020, 59% of water use was provided by groundwater extraction in the Basin and 41% of water use was provided by surface water supply from outside the Basin.

The accuracy of measurement water use is directly correlated with the method used to determine the water use. Metered municipal data have the greatest accuracy while estimates of water use based on various assumptions (GSP Appendix 2-B) are less accurate. Although to the extent possible, reasonable checks are made to minimize order of magnitude inaccuracies.

Table 3. Annual Water Use in the Santa Cruz Mid-County Basin

Water Year	Sources with the Basin							Sources Outside of the Basin		Total Water Use, acre-feet per year
	Groundwater Extractions less Recovery of Injected Water), acre-feet per year							Surface Water, acre-feet per year		
	Private Domestic Use ¹	Agricultural Use ²	Institutional Use ³	Central Water District	City of Santa Cruz	Soquel Creek Water District	Total	City of Santa Cruz ⁵	Soquel Creek Water District ⁴	
				Municipal Use ⁴				Municipal Use		
1985	980	352	408	394	181	4,319	6,634	6,413	0	13,047
1986	1,001	329	382	404	102	4,272	6,490	6,561	0	13,051
1987	1,022	398	445	444	526	5,235	8,070	6,415	0	14,485
1988	1,031	372	444	438	943	4,859	8,087	5,314	0	13,401
1989	1,004	355	410	406	756	4,797	7,728	4,993	0	12,721
1990	1,022	361	420	429	842	4,818	7,892	4,295	0	12,187
1991	1,012	349	397	426	254	4,703	7,141	4,628	0	11,769
1992	1,017	394	438	467	716	4,908	7,940	4,695	0	12,635
1993	1,025	331	390	481	260	4,863	7,350	5,191	0	12,541
1994	1,033	329	389	482	463	5,089	7,785	5,178	0	12,963
1995	1,036	273	334	459	212	4,855	7,169	5,564	0	12,733
1996	1,042	337	397	526	143	5,183	7,628	5,998	0	13,626
1997	1,035	386	442	604	245	5,571	8,283	6,381	0	14,664
1998	1,041	249	325	534	268	4,966	7,383	5,616	0	12,999
1999	1,048	304	363	539	359	5,211	7,824	5,829	0	13,653
2000	1,058	325	380	547	593	5,271	8,174	5,587	0	13,761
2001	1,044	337	383	557	95	5,175	7,591	6,157	0	13,748
2002	1,039	336	397	593	336	5,376	8,077	5,731	0	13,808
2003	1,031	327	390	584	416	5,332	8,080	5,653	0	13,733
2004	1,019	380	422	633	421	5,372	8,247	5,765	0	14,012
2005	937	275	330	514	316	4,544	6,916	5,459	0	12,375

Water Year	Sources with the Basin							Sources Outside of the Basin		Total Water Use, acre-feet per year
	Groundwater Extractions less Recovery of Injected Water), acre-feet per year							Surface Water, acre-feet per year		
	Private Domestic Use ¹	Agricultural Use ²	Institutional Use ³	Central Water District	City of Santa Cruz	Soquel Creek Water District	Total	City of Santa Cruz ⁵	Soquel Creek Water District ⁴	
				Municipal Use ⁴				Municipal Use		
2006	935	305	359	544	296	4,549	6,988	5,278	0	12,266
2007	933	362	408	596	420	4,626	7,345	5,054	0	12,399
2008	939	380	439	584	561	4,557	7,460	4,971	0	12,431
2009	874	371	416	594	582	4,162	6,999	4,254	0	11,253
2010	879	304	360	481	451	3,933	6,408	4,311	0	10,719
2011	882	270	311	487	637	4,011	6,598	3,931	0	10,529
2012	890	361	400	535	494	4,159	6,839	4,374	0	11,213
2013	828	423	326	559	515	4,218	6,869	4,560	0	11,429
2014	691	436	310	500	510	3,703	6,150	3,571	0	9,721
2015	553	431	300	391	613	3,154	5,442	3,222	0	8,664
2016	552	375	293	383	450	3,094	5,147	3,472	0	8,619
2017	600	218	288	383	463	3,169	5,121	3,726	0	8,847
2018	599	375	313	377	635	3,340	5,639	3,489	0	9,128
2019*	595	336	308	385	83	3,019	4,726	3,794	165	8,685
2020	594	407	318	411	244	3,197	5,171	3,487	111	8,769

* 2019 groundwater use was revised to exclude extractions that took place to recover injected water from the injection pilot tests at Betlz #12 and the Twin Lakes Church pilot well.

¹ Estimated based on annual water use factor (WUF) per connection determined from metered Small Water Systems and applied to each residence outside of municipal water service areas (less accurate). WUF for WY2019 was 0.25 acre-feet per connection

² Estimated based on irrigation demand determined using the GFLOW model, crop acreage, and crop coefficient (less accurate).

³ Estimated based on historical water usage for facility use including an estimate of turf irrigation based on irrigation demand determined using the GFLOW model, irrigation acreage, and turf's crop coefficient (less accurate).

⁴ Direct measurement by meters (most accurate).

⁵ SCWD surface water use in the Basin is not directly metered since the City service area is also outside of the Basin. For purposes of reporting, surface water use in the Basin is estimated based on a proportion of metered consumption that falls within the Basin less groundwater pumped at the Beltz wellfield.

3.5 Change of Groundwater in Storage

In order to estimate change of groundwater in storage, the Basin's integrated surface water/groundwater model (Model) was updated with climate data, metered pumping and injection, and estimates of non-municipal pumping through Water Year 2020. Change of groundwater in storage is based on water budget output calculated by the updated Basin Model. Appendix 2-D, 2-E, 2-F, and 2-G of the GSP describe development of the Model that incorporated data through Water Year 2016.

Updated climate data included the following:

- Precipitation data from the Santa Cruz Co-op and Watsonville Waterworks station. Missing data were estimated based on correlation with DAYMET output for the two station locations.
- Temperature data from the Santa Cruz Co-op station. Missing data were estimated based on correlation with DAYMET output for the station locations.
- Temperature output from DAYMET for the upper watershed location through Water Year 2019. Water Year 2020 was estimated based on correlation with the Santa Cruz Co-op station.

Updated pumping data included the following:

- Municipal pumping and recharge volumes provided by Central Water District, City of Santa Cruz, and Soquel Creek Water District.
- Domestic water use factor of 0.25 acre-feet/year.
- Non-municipal irrigation demand estimated based on Precipitation Runoff Modeling system (PRMS) watershed simulation of potential and actual evapotranspiration using updated climate data.

As described in Appendix 2-F, the Model was calibrated based on simulation of Water Years 1985-2015. The Model has not been recalibrated for the update through Water Year 2020.

Based on the updated Basin Model simulation through Water Year 2020, Figure 14 shows the annual water budget for the Basin including annual change of groundwater in storage and cumulative change of groundwater in storage. Cumulative change of groundwater in storage has increased since 2015 due to reduced pumping and slightly above average rainfall. It is noticeable that the Basin's cumulative change in storage declines in dry and critically dry years, and increases in average and wet years.

Figure 15 through Figure 20 show modeled Water Year 2020 change of groundwater in storage across the Basin for the principal aquifer units represented by model layers: Aromas Red Sands, Purisima F/DEF units, Purisima BC unit, Purisima A unit, Purisima AA unit, and Tu unit. Results from the Basin Model simulation show a slight decrease (orange and red colors) of groundwater in storage for much of the Basin consistent with Figure 14. The Purisima A unit has increased groundwater in storage over Water Year 2020 (Figure 18) that is related to pilot testing injection at the Beltz #8 well and less SCWD groundwater pumping than occurred in years prior to WY2019 (Table 3).

In general, larger changes of groundwater in storage are limited to unconfined areas for the aquifer units. Therefore, these maps do not fully represent groundwater conditions in the Basin as many of the sustainable management criteria defining undesirable results relate to groundwater elevations in the confined areas of the aquifer units. In confined areas, groundwater elevations can change substantially with very small changes of groundwater in storage. For example, RMPs with groundwater elevation proxies for the seawater intrusion sustainability indicator are located in the confined area and this indicator cannot be evaluated by these maps. The maps also do not represent where more groundwater is extracted at wells as reduction of groundwater in storage can be a relatively small contribution of flow to wells. Reduction of groundwater in storage can be greater where flows are lower due to lower transmissivity of the aquifer unit.

While these maps are required for the annual report, their main utility is for evaluating how recharge over the water year has changed groundwater in storage in the unconfined areas of the Basin (Figure 15). As Water Year 2020 was a dry year, groundwater in storage in the unconfined Aromas Red Sands aquifer decreased over the year.

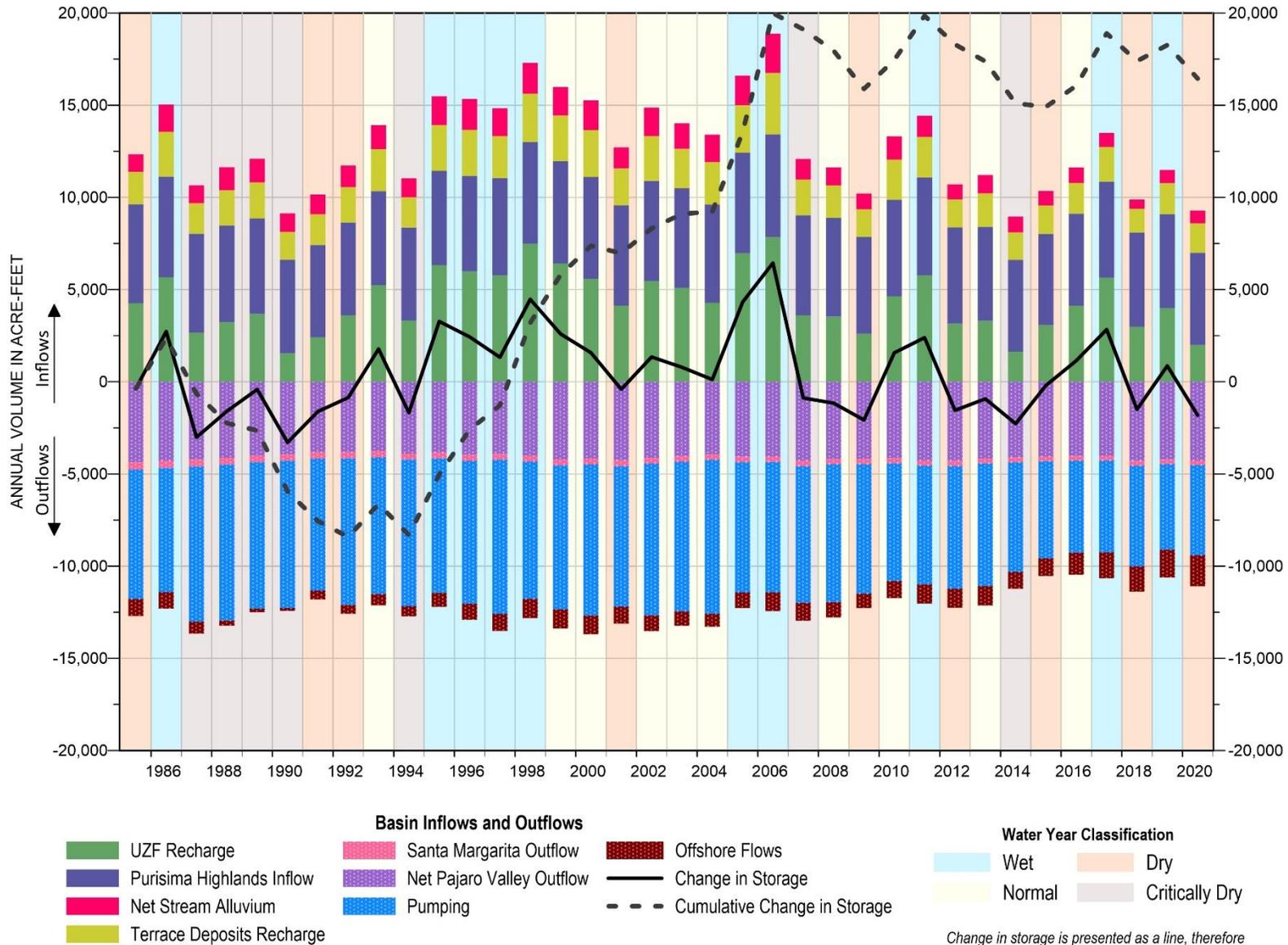
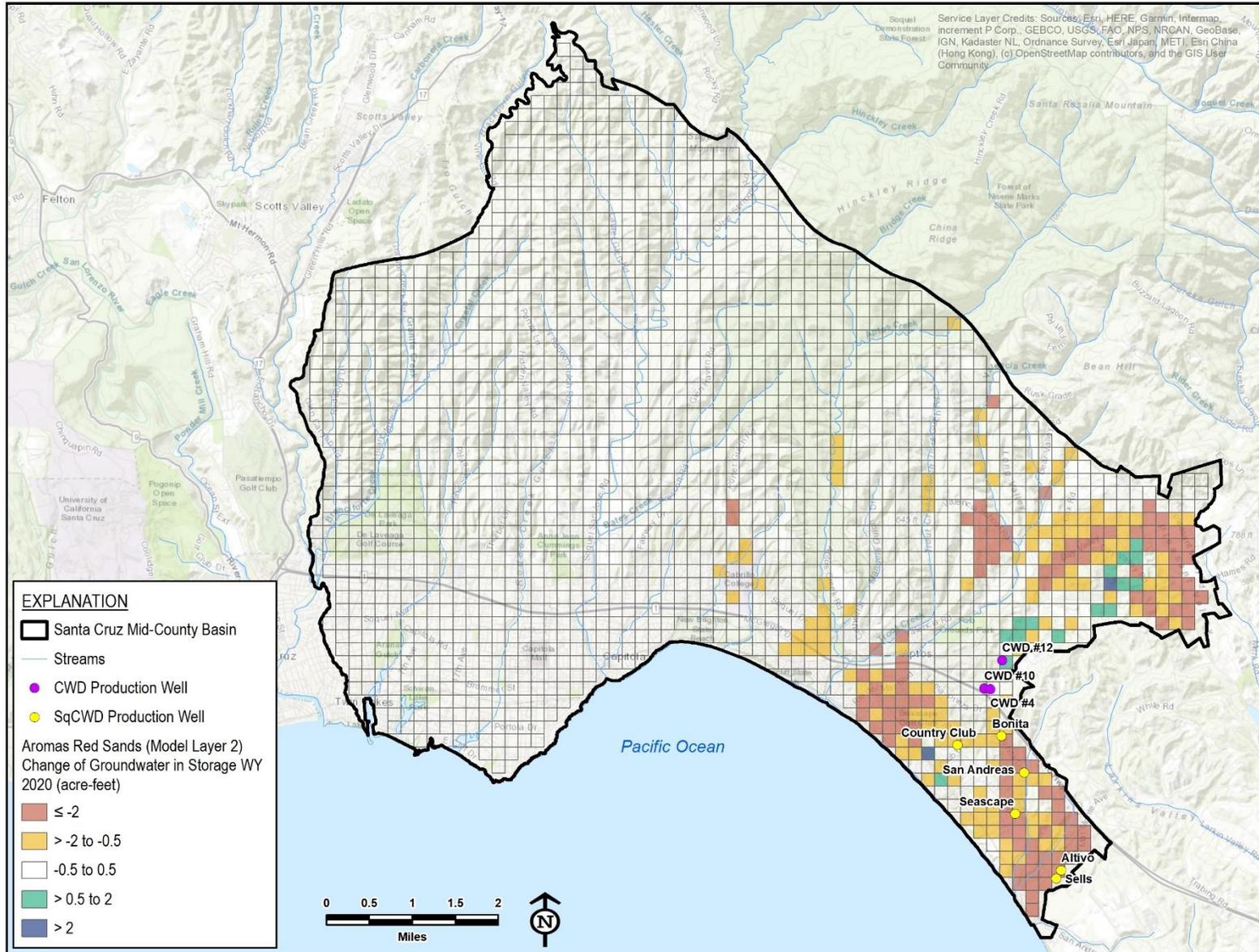


Figure 14. Annual Change in Groundwater in Storage for Santa Cruz Mid-County Basin



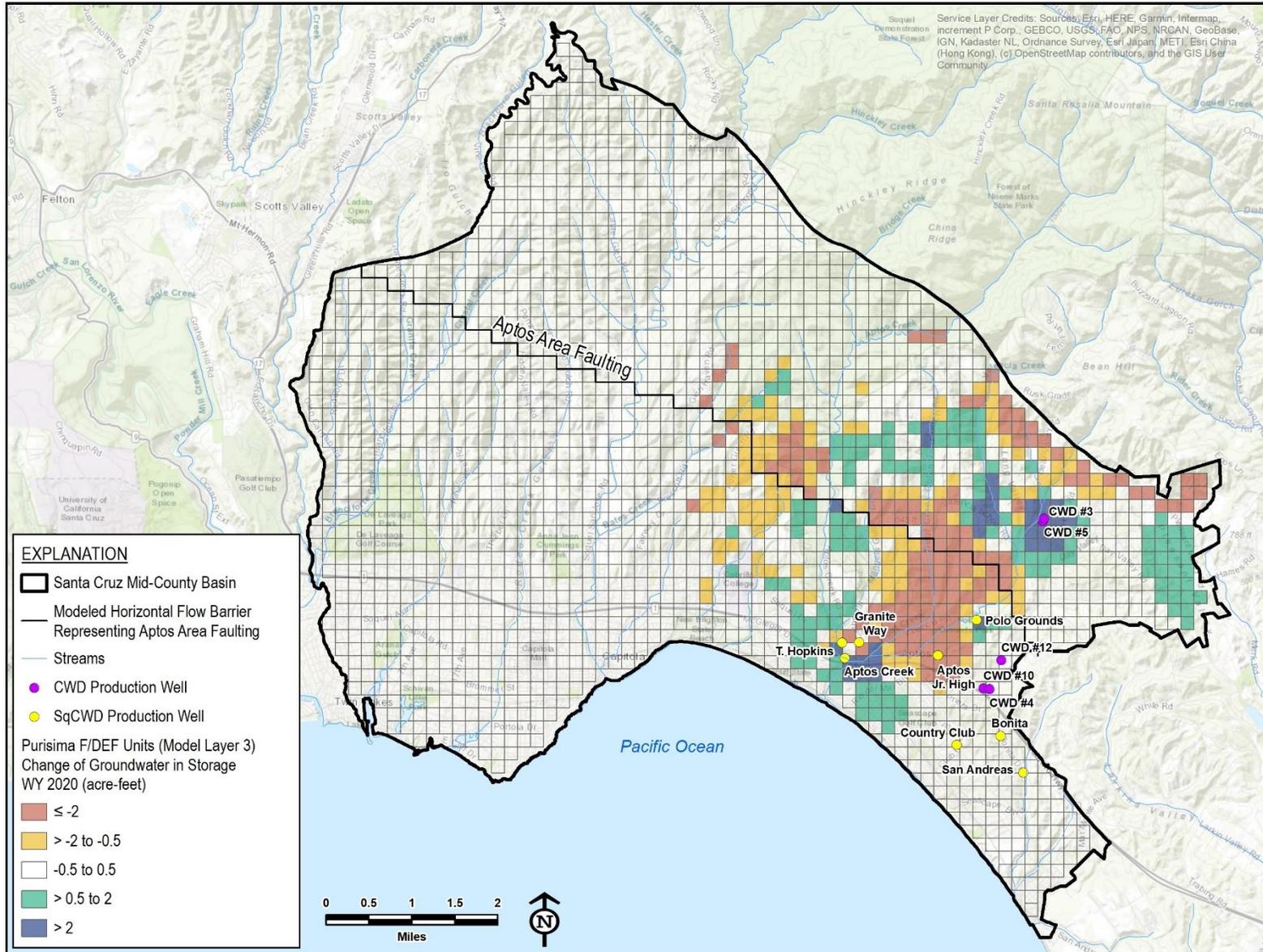


Figure 16. Water Year 2020 Change of Groundwater in Storage in Purisima F/DEF Units

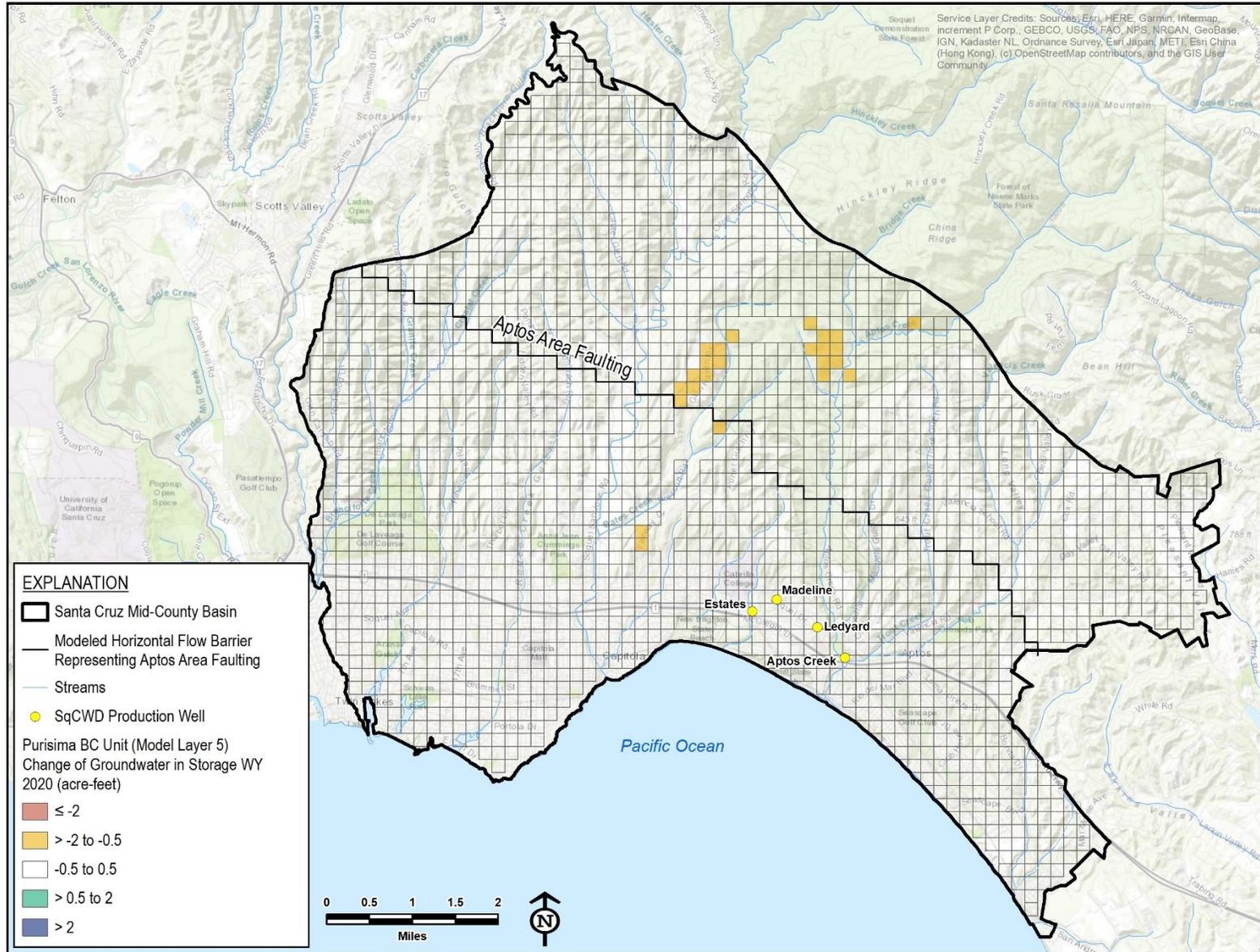


Figure 17. Water Year 2020 Change of Groundwater in Storage in Purisima BC Unit

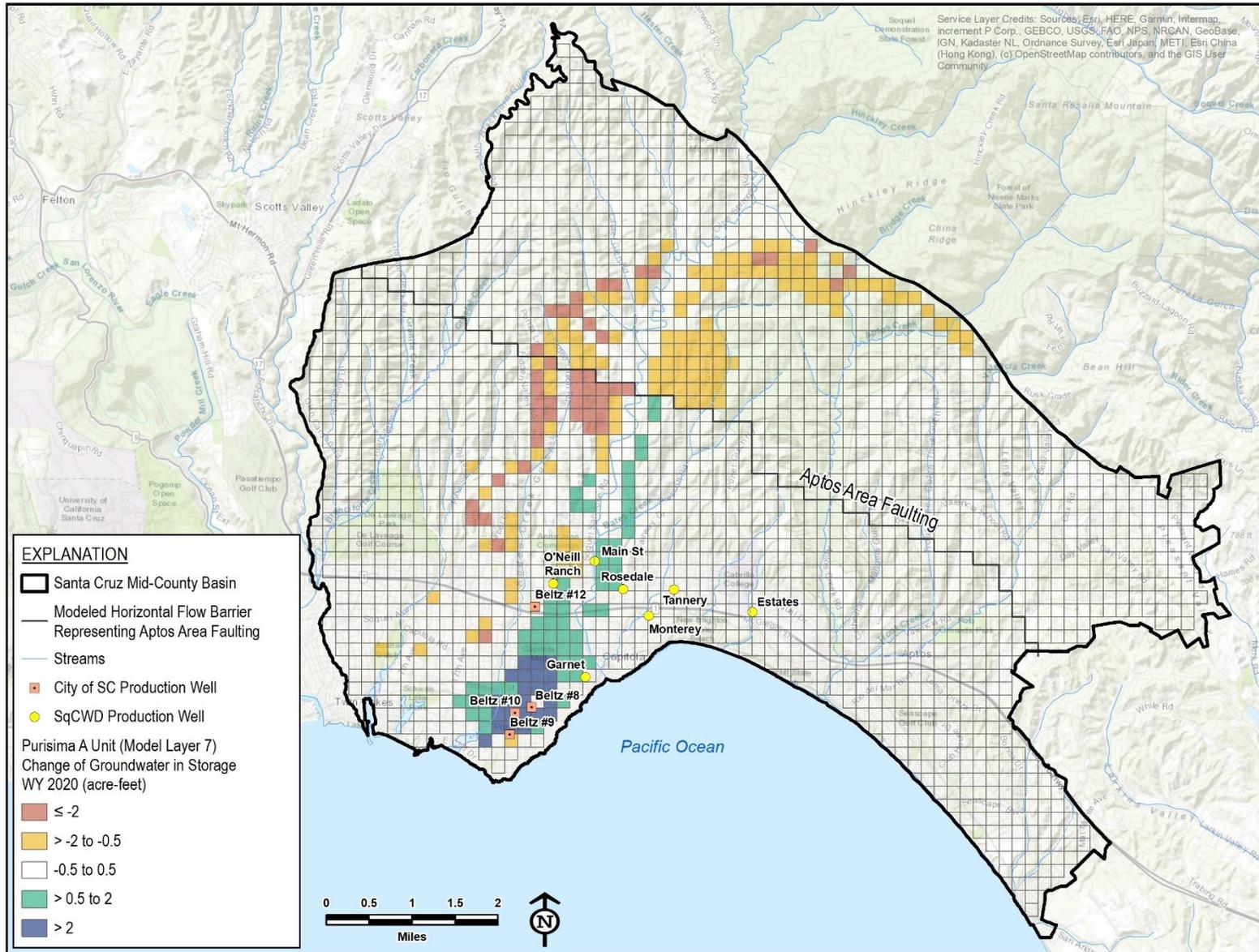


Figure 18. Water Year 2020 Change of Groundwater in Storage in Purisima A Unit

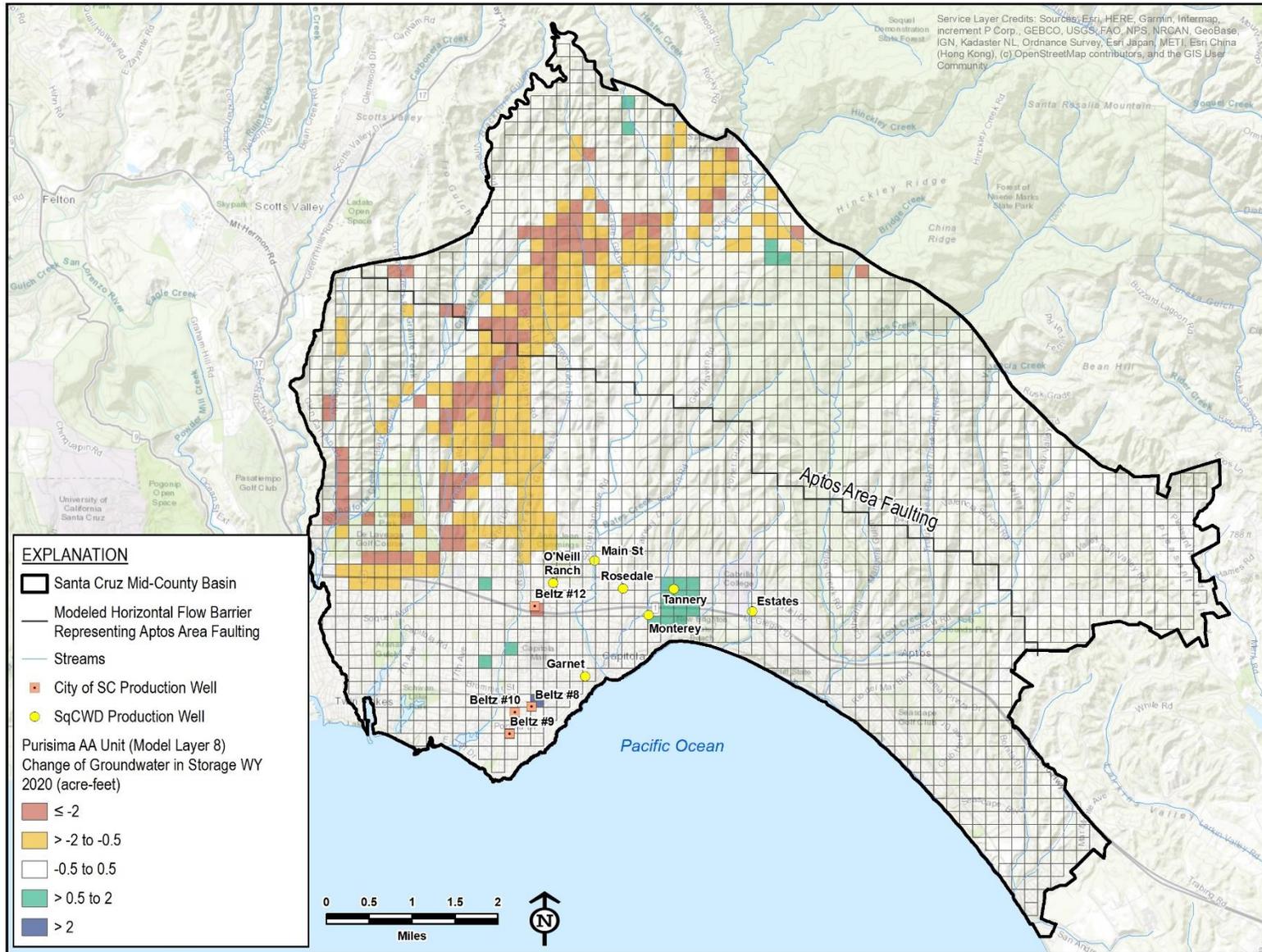


Figure 19. Water Year 2020 Change of Groundwater in Storage in Purisima AA Unit

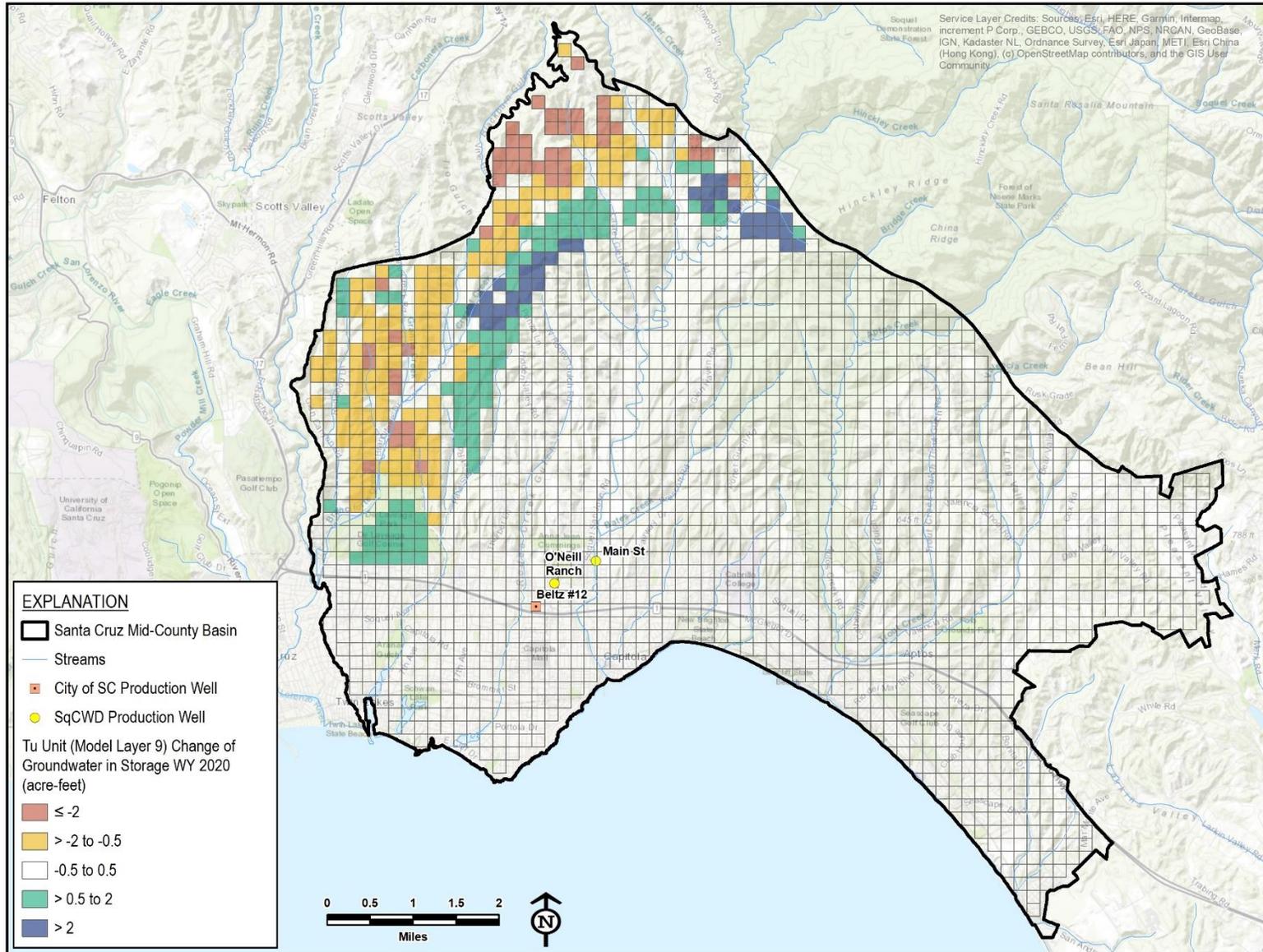


Figure 20. Water Year 2020 Change of Groundwater in Storage in Tu Unit

4 PROGRESS TOWARDS IMPLEMENTING THE PLAN

This section evaluates progress towards implementing the GSP by comparing groundwater conditions in Water Year 2020 to sustainable management criteria for each of the sustainability indicators required for SGMA. The section concludes with an update of implementation of projects and management actions to achieve sustainability.

4.1 Chronic Lowering of Groundwater Levels

Table 4 shows sustainable management criteria at RMPs for chronic lowering of groundwater levels. Sustainable management criteria for this indicator are met when groundwater elevations are at or above criteria. Hydrographs for chronic lowering of groundwater levels RMPs (Figures A-1 through A-17) show groundwater elevations above minimum thresholds at all wells so there are no undesirable results for chronic lowering of groundwater levels. Groundwater elevations are above measurable objectives for three wells out of the 17 RMPs for this indicator. Interim milestones are the same as the long-term measurable objectives so the GSP has a goal to meet measurable objectives by Water Year 2025.

4.2 Reduction of Groundwater in Storage

Table 5 shows sustainable management criteria for reduction of groundwater in storage, which is based on sustainable yields estimated in the GSP for three aquifer groups. Sustainable management criteria for this indicator are met when pumping is at or below criteria or sustainable yields. As sustainable yield is primarily based on eliminating critical overdraft related to seawater intrusion, the five-year moving average net extraction is used to be consistent with five-year moving averages used for seawater intrusion groundwater elevation proxies. Five-year moving average net extraction below the minimum threshold is considered sustainable.

The five-year net extraction through Water Year 2020 for the Tu unit was less than the sustainable yield for the aquifer unit and therefore met the minimum threshold. The five-year net extraction amounts for the Aromas Red Sands and Purisima F aquifer group and Purisima DEF, BC, A, and AA aquifer group were greater than the minimum thresholds. These exceedances indicate undesirable results for this sustainability indicator. Net extraction for these aquifer groups would need to be reduced to or below minimum thresholds to eliminate undesirable results.

The interim milestone for 2025 is based on planned schedule for implementation of projects and management actions to reduce net extraction to below sustainable yield. The five-year net

extraction for all three aquifer groups through Water Year 2020 did not meet these interim milestones as planned projects and management actions have not been implemented yet.

The measurable objective is based on annual net extraction that could occur while ensuring net annual groundwater extractions greater than the minimum threshold will not occur for any one of the three aquifer groups even if there were four subsequent years of maximum projected net groundwater extraction. Net extraction in Water Year 2020 did not meet this measurable objective for the three aquifer groups.

4.3 Seawater Intrusion

4.3.1 Chloride Concentrations

Table 6 shows the sustainable management criteria for chloride concentrations compared to maximum concentrations for the past five years, including Water Year 2020. Sustainable management criteria for this indicator are met when chloride concentrations are at or below criteria concentrations. There were two exceedances of minimum thresholds during Water Year 2020: SC-A2RB and SC-A5A both in the Purisima F unit near SqCWD's Seascape well. Both monitoring wells had only one exceedance out of each of their four samples taken during the year so there were not undesirable results for chloride concentrations in Water Year 2020.

Interim milestones are the same as measurable objectives for chloride concentrations. At wells in the Aromas Red Sands and Purisima F units other than those mentioned above, chloride concentrations met minimum thresholds but did not meet the measurable objective. All RMPs in the deeper Purisima units met measurable objectives except at the Soquel Point Deep well in the Purisima AA unit.

Figure 21 shows maximum chloride concentrations mapped with the chloride isocontour established as a minimum threshold in the GSP. Appendix B includes chemographs for chloride concentrations at coastal monitoring wells.

Table 4. Chronic Lowering of Groundwater Levels

Representative Monitoring Point	Well Type	Aquifer	Minimum Threshold	Measurable Objective	Interim Milestone 2025	WY2016	WY2017	WY2018	WY2019	WY2020
			Groundwater Elevation, feet above mean sea level			Minimum Average Monthly Groundwater Elevation, feet above mean sea level				
SC-A7C	Monitoring	Aromas	0	8	8	5.4	4.7	6.0	6.0	6.0
Private Well #2	Production	Purisima F	562	596	596	592.4	592.8	596.0	596.4	571.1
Black	Monitoring		10	41	41	41.0	40.5	42.0	46.1	46.8
CWD-5	Monitoring		140	194	194	191.7	192.0	195.3	195.1	195.0
SC-23C	Monitoring		15	49	49	46.5	46.3	45.9	45.8	45.4
SC-11RD	Monitoring	Purisima DEF	295	318	318	313.7	314.3	315.3	315.2	315.8
SC-23B	Monitoring		50	85	85	77.7	81.4	80.2	78.8	58.6
SC-11RB	Monitoring	Purisima BC	120	157	157	152.4	155.9	155.3	154.8	152.4
SC-19	Monitoring		56	95	95	87.2	89.8	88.5	78.4	75.5
SC-23A	Monitoring		0	44	44	30.5	41.6	39.8	38.8	39.6
Coffee Lane Shallow	Monitoring	Purisima A	27	47	47	43.3	43.6	45.3	44.7	45.7
SC-22A	Monitoring		2	44	44	20.9	20.9	22.3	22.2	23.4
SC-22AA	Monitoring	Purisima AA	0	22	22	18.7	18.6	20.4	20.3	21.3
SC-10RAA	Monitoring		35	76	76	71.5	70.8	70.3	69.3	70.1
Private Well #1	Production	Purisima AA/Tu	362	387	387	376.4	378.8	387.2	383.5	387.6
30 th Ave Deep	Monitoring	Tu	0	30	30	22.2	20.7	24.0	27.4	24.4
Thurber Lane Deep	Monitoring		-10	33	33	6.3	10.4	12.8	19.1	9.8

Minimum threshold not met

Minimum threshold achieved but measurable objective not met

Measurable objective met

Table 5. Reduction in Groundwater in Storage

Aquifer Unit Group	Minimum Threshold	Interim Milestone 2025	WY2016-2020	Measurable Objective	WY2020
	Five-Year moving average Net Extraction, acre-feet per year			Net Extraction, acre-feet per year	
Aromas Red Sands and Purisima F	1,740	1,930	1,980	1,680	1,955
Purisima DEF, BC, A and AA	2,280	2,110	2,348	960	2,110
Tu	930	720	848	620	733

Minimum threshold not met	Measurable objective not met
Minimum threshold met	Measurable objective met

Table 6. Chloride Concentrations Adjacent to 250 mg/L Chloride Isocontour for Seawater Intrusion

Representative Monitoring Point	Aquifer	Minimum Threshold	Measurable Objective	Interim Milestone 2025	WY2016	WY2017	WY2018	WY2019	WY2020
		Chloride Concentration, mg/L			Water Year Maximum Chloride Concentration, mg/L				
Coastal Monitoring Wells – Intruded (undesirable results if > minimum threshold in >=2 of 4 consecutive quarterly samples)									
SC-A3A	Aromas	22,000	17,955	17,955	18,000	18,000	18,000	18,400	18,500
SC-A3B	Aromas	4,330	676	676	1,200	1,200	1,000	1,100	767
SC-A8A	Purisima F	8,000	7,258	7,258	7,100	7,200	7,500	7,670	7,670
SC-A2RA	Purisima F	18,480	14,259	14,259	15,000	14,000	15,000	15,000	15,000
SC-A2RB	Purisima F	470	355	355	350	370	410	470	564*
Moran Lake Med	Purisima A	700	147	147	149	120	78	60	53
Soquel Point Med	Purisima A	1,300	1,104	1,104	1,200	1,100	1,100	1,000	1,200
Coastal Monitoring Wells - Unintruded (undesirable results if > 250 mg/L in >=2 of 4 consecutive quarterly samples)									
SC-A8B	Aromas	250	100	100	35	33	32	39	35
SC-A1B	Purisima F	250	100	100	26	26	26	28	29
SC-A1A	Purisima DEF	250	100	100	29	28	26	28	29
SC-8RD	Purisima DEF	250	100	100	69	21	66	21	21
SC-9RC	Purisima BC	250	100	100	30	36	31	32	32
SC-8RB	Purisima BC	250	100	100	17	17	not sampled	19	15
Pleasure Point Medium	Purisima A	250	100	100	35	37	36	35	36
SC-1A	Purisima A	250	100	100	38	38	38	44	49
SC-5RA	Purisima A	250	100	100	53	56	58	58	57
Sc-3RA	Purisima A	250	100	100	66	64	63	65	51
Moran Lake Deep	Purisima AA	250	100	100	66	64	63	65	66
Pleasure Point Deep	Purisima AA	250	100	100	23	23	22	23	22
Soquel Point Deep	Purisima AA	250	100	100	144	140	160	160	170

Representative Monitoring Point	Aquifer	Minimum Threshold	Measurable Objective	Interim Milestone 2025	WY2016	WY2017	WY2018	WY2019	WY2020
		Chloride Concentration, mg/L			Water Year Maximum Chloride Concentration, mg/L				
Inland Monitoring Well- Intruded (undesirable results if > minimum threshold in >=2 of 4 consecutive quarterly samples)									
SC-A5A	Purisima F	9,800	8,575	8,575	8,600	9,100	9,310	9,220	10,800*
Inland Production and Monitoring Wells- Unintruded (undesirable results if > 150 mg/L in >=2 or more consecutive quarterly samples)									
SC-A5B	Purisima F	150	100	100	94	120	130	159	133
San Andreas PW	Purisima F	150	100	100	24	21	29	30	22
Seascape PW	Purisima F	150	100	100	15		18	19	19
T. Hopkins PW	Purisima DEF	150	100	100	48	44	24	42	50
Estates PW	Purisima BC & A	150	100	100	44	49	50	45	48
Ledyard PW	Purisima BC	150	100	100	32	38	31	33	35
Garnet PW	Purisima A	150	100	100	76	81	76	84	85
Beltz #2	Purisima A	150	100	100	65	61	63	64	69
Beltz #8 PW	Purisima A	150	100	100	54	52	49	50	53
SC-22AA	Purisima AA	150	100	100	37	39	38	46	41
Corcoran Lagoon Deep	Purisima AA	150	100	100	21	20	21	22	23
Schwan Lake	Purisima AA	150	100	100	89	94	93	94	97

Minimum threshold not met ; * indicates undesirable result (2 of 4 minimum threshold exceedances)

Minimum threshold achieved but measurable objective not met

Measurable objective met

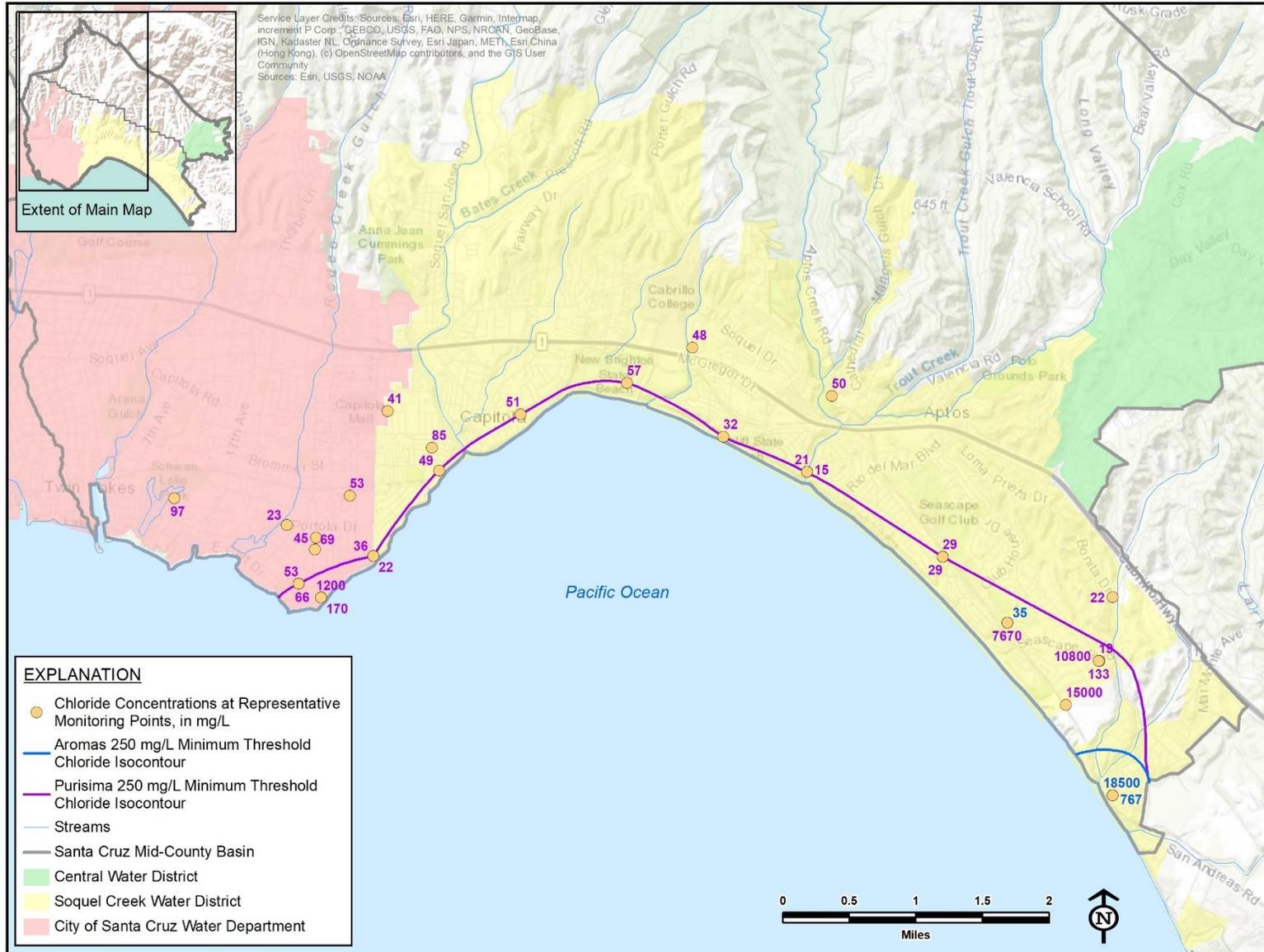


Figure 21. Water Year 2020 Chloride Concentration Map Compared to Minimum Threshold Isocontour

4.3.2 Groundwater Elevation Proxies

Table 7 lists groundwater elevation proxies used for seawater intrusion sustainable management criteria. These groundwater elevations are protective elevations estimated to prevent further seawater intrusion over the long-term. Sustainable management criteria for this indicator are met at a specific RMP when five-year moving average groundwater elevations are at or above the groundwater elevation proxy for each RMP.

Hydrographs for seawater intrusion groundwater elevation proxy RMPs (Figures A-18 through A-34) show five-year moving averages in comparison to groundwater elevation proxies for seawater intrusion sustainable management criteria. The five-year moving averages of groundwater elevations in all of the Tu, Purisima AA, A, BC, and DEF unit coastal RMPs increased in Water Year 2020. All Purisima F unit and Aromas coastal monitoring wells have fairly stable groundwater elevations. The five-year moving average groundwater elevation in Moran Lake Deep in the Purisima AA unit increased to above its minimum threshold for the first time since 2016.

Those coastal RMPs that have five-year moving averages below minimum thresholds include:

- SC-A3A, the only RMP in the Aromas Red Sands;
- One of three Purisima F unit RMPs (SC-A8A);
- Both RMPs in the Purisima BC unit: SC-9C and SC-8B, where the five-year moving averages for the two wells leveled out as groundwater levels were lower in 2020 than over the previous five year;
- Two of six RMPs in the Purisima A unit: SC-5RA and Soquel Point Medium; and
- One of three Purisima AA RMPs (Pleasure Point Deep).

Since there are RMPs with five-year moving average groundwater elevations below minimum thresholds, undesirable results for seawater intrusion continue to occur and the Basin remains in a state of critical overdraft.

Measurable objectives for groundwater elevation proxies were met at several RMPs that are screened in the Purisima F and A units. Five-year moving averages of groundwater elevations did not meet the measurable objective at SC-8RD, the only RMP in the Purisima DEF unit, although the minimum threshold was met at this well.

Interim milestones for Water Year 2025 are based on modeled groundwater level recovery as a result of implementation of projects in the GSP. Table 7 shows that 12 of 17 RMPs have groundwater elevations higher than Water Year 2025 interim milestones. Two of those have five-year moving average groundwater elevations that are below minimum thresholds.

Table 7. Groundwater Elevation Proxies for Seawater Intrusion

Representative Monitoring Point	Aquifer	Minimum Threshold	Measurable Objective	Interim Milestone 2025	WY2016	WY2017	WY2018	WY2019	WY2020
		Groundwater Elevation, feet above mean sea level			Annual Minimum of Five-Year Moving Average Groundwater Elevation, feet above mean sea level				
SC-A3A	Aromas	3	4	3	2.8	2.9	2.9	2.9	2.9
SC-A1B	Purisima F	3	5	3	7.3	7.4	7.5	7.5	7.5
SC-A8A	Purisima F	6	7	4.5	5.2	5.3	5.3	5.4	5.3
SC-A2RA	Purisima F	3	4	3	2.9	3.8	4.5	5.7	6.5
SC-8RD	Purisima DEF	10	11	10	4.9	7.5	9.4	10.1	12.6
SC-9RC	Purisima BC	10	11	4.6	-5.3	-1.6	2.2	5.2	8.9
SC-8RB	Purisima BC	19	20	8.4	-5.5	-2.4	0.2	2.7	5.8
SC-5RA	Purisima A	13	15	13	4.8	6.3	7.8	8.5	9.3
SC-3RA	Purisima A	10	12	10	7.6	8.8	9.6	10.6	11.7
SC-1A	Purisima A	4	6	4	9.5	9.6	9.5	9.5	9.7
Moran Lake Medium	Purisima A	5	6.8	5	5.4	5.5	5.6	5.6	5.9
Soquel Point Medium	Purisima A	6	7.1	6	4.9	5.1	5.2	5.3	5.7
Pleasure Point Medium	Purisima A	6.1	6.5	6.1	6.8	6.5	6.8	7.1	7.9
Moran Lake Deep	Purisima AA	6.7	16	6.7	6.0	6.2	6.4	6.5	6.8
Soquel Point Deep	Purisima AA	7.5	16	7.5	5.7	5.8	5.9	6.0	6.3
Pleasure Point Deep	Purisima AA	7.7	16	7.7	6.6	7.4	7.8	8.2	8.7
SC-13A	Tu	17.2	19	8.3	not previously measured			17.1	18.3

Minimum threshold not met

Minimum threshold achieved but measurable objective not met

Measurable objective met

4.3.3 Seawater Intrusion Triggers

Although not required by the SGMA regulations, the GSP includes triggers for preemptive actions to prevent significant and unreasonable conditions of seawater intrusion, the indicator for which the Basin is in critical overdraft. Chloride concentration triggers are exceeded when annual average concentrations exceed the average concentration for 2013-2017 (i.e., measurable objective) and show an increasing trend. Chemographs for these two wells in Appendix B show an increasing trend in chloride: SC-A2RB (Figure B-5) and SC-A5A (Figure B-21). The chloride concentrations at SC-A2RB and SC-A5B were consistently above measurable objectives for seawater intrusion. This indicates that there is inland movement of seawater intrusion that may lead to undesirable results and therefore triggers early management action. The recommended action is to reduce pumping at SqCWD's Seascape well and possibly also their San Andreas well, the nearest municipal wells to these two monitoring wells.

The GSP also includes triggers for groundwater elevation proxies. The only RMP to reach a trigger elevation in Water Year 2020 was SC-8RB in the Purisima BC unit, when its 30-day average groundwater elevation fell below the trigger level of 2 feet above mean sea level temporarily in October 2020 (see Appendix A: Figure A-24). The nearby Aptos Creek municipal well should not be re-activated until groundwater levels recover to be consistently above the trigger level.

4.4 Groundwater Quality

Table 8 shows sustainable management criteria, recent and Water Year 2020 concentrations at RMPs for degraded groundwater quality. Sustainable management criteria for this indicator are met when concentrations are at or below criteria. The minimum thresholds are based on drinking water standards for each constituent. Maximum concentrations at each well are also compared to measurable objectives specific to each well based on average concentrations observed during Water Years 2013-2017. Interim milestones for groundwater quality are the same as measurable objectives. Exceedances of minimum threshold for chloride are related to seawater intrusion and addressed by that indicator.

In Water Year 2020, iron concentrations at several RMPs exceed measurable objectives that are higher than minimum thresholds, indicating an increase in concentration since Water Years 2013-2017. This is not considered an undesirable result because it is a preexisting natural condition not associated with pumping or managed aquifer recharge.

Although not a constituent of concern listed in the GSP, elevated concentrations of ammonia at the SqCWD O'Neill Ranch well caused treatment issues limiting the ability to deliver drinking water pumped from the well.

4.5 Subsidence

Subsidence is not applicable in the Santa Cruz Mid-County Basin as an indicator of groundwater sustainability.

4.6 Interconnected Surface Water

Table 9 shows groundwater elevation proxies for sustainable management criteria at RMPs for depletion of interconnected surface water. Sustainable management criteria for this indicator are met when groundwater elevations are at or below proxies.

Hydrographs for depletion of interconnected surface water groundwater elevation proxy RMPs (Figures A-25 through A-40) show that, with the exception of the Nob Hill shallow well, groundwater elevations are at or above groundwater elevation proxies for minimum thresholds at shallow wells along Soquel Creek that are RMPs for surface water depletion. Since undesirable results are defined as any RMP for depletion of interconnected surface water being having a groundwater elevation below its minimum thresholds, undesirable results for surface water depletion are occurring. Groundwater levels are above the measurable objective for only the Wharf Road shallow well, which is one of the five RMPs for this sustainability indicator.

Table 8. Water Year 2020 Groundwater Quality

Aquifer	Representative Monitoring Point	Total Dissolved Solids, mg/L	Chloride, mg/L	Iron, µg/L	Manganese, µg/L	Arsenic, µg/L	Chromium (Total), µg/L	Nitrate as Nitrogen, mg/L	Organic Compound Detects, µg/L
	Minimum Threshold	1,000	250	300	50	10	50	10	various
Water Year 2019 Maximum Concentration									
Aromas	CWD-10 PW	350	32	non-detect	non-detect	non-detect	11	40.96	non-detect
	SC-A1C	354	31.7	10	1260	not analyzed	not analyzed	1.2	not analyzed
	SC-A2RC	406	50	629	44	not analyzed	not analyzed	4.3	not analyzed
	SC-A3A	33600	18500	264	210	not analyzed	not analyzed	0.1	not analyzed
	SC-A3C	420	105	351	27	not analyzed	not analyzed	7.6	not analyzed
	SC-A8B	380	34.8	11	200	not analyzed	not analyzed	non-detect	not analyzed
	SC-A8C	340	51.6	6	non-detect	not analyzed	not analyzed	5.6	not analyzed
Aromas/ Purisima F	Polo Grounds PW	270	22.8	16	207	non-detect	0.4	0.1	non-detect
	Aptos Jr. High 2 PW	322	33.2	14	283	non-detect	0.8	0.1	non-detect
	Country Club PW	346	35	not analyzed	not analyzed	not analyzed	not analyzed	5	not analyzed
	Bonita PW	336	28.8	non-detect	non-detect	non-detect	12.6	2.8	non-detect
	San Andreas PW	250	21.8	non-detect	5	0.6	18.9	1.5	non-detect
	Seascape PW	220	19.4	non-detect	non-detect	0.5	17.7	1.1	non-detect
Purisima F	CWD-4 PW	340	28	non-detect	non-detect	non-detect	11	4.9	non-detect
	CWD-12 PW	300	23	non-detect	non-detect	non-detect	4.7	1.4	non-detect
	SC-A2RA*	28400	15000	239	541	not analyzed	not analyzed	0.1	not analyzed
	SC-A8A	15600	7670	369	3390	not analyzed	not analyzed	0.2	not analyzed
Purisima BC	SC-8RD	362	20.8	9	non-detect	not analyzed	not analyzed	non-detect	not analyzed
	SC-9RE	520	153	70	60	not analyzed	not analyzed	0.01	not analyzed
	SC-A1A	244	29.2	122	48	not analyzed	not analyzed	non-detect	not analyzed
	T. Hopkins PW	334	49.8	24	107	1.8	non-detect	non-detect	non-detect
	Madeline 2 PW	392	35	259	11	non-detect	2.4	non-detect	non-detect
	Aptos Creek PW	not sampled	not sampled	not sampled	not sampled	not sampled	not sampled	not sampled	not sampled
	SC-23A	263	20	0.06	0.03	not analyzed	not analyzed	0.01	not analyzed
	SC-8RB	532	15.3	44	0.03	not analyzed	not analyzed	non-detect	not analyzed
	SC-9RC	396	32.2	9	0.03	not analyzed	not analyzed	0.1	not analyzed

Aquifer	Representative Monitoring Point	Total Dissolved Solids, mg/L	Chloride, mg/L	Iron, µg/L	Manganese, µg/L	Arsenic, µg/L	Chromium (Total), µg/L	Nitrate as Nitrogen, mg/L	Organic Compound Detects, µg/L
Purisima A	30th Ave Shallow	800	50	120	1300	not analyzed	not analyzed	not analyzed	not analyzed
	Pleasure Point Shallow	260	34	110	100	not analyzed	not analyzed	non-detect	not analyzed
	Estates PW	500	48.2	200	96	non-detect	Non-Detect	0.1	non-detect
	Garnet PW	608	84.7	1590	485	non-detect	Non-Detect	0.01	non-detect
	Tannery 2 PW	496	63.7	227	152	0.6	2.5	non-detect	non-detect
	Rosedale 2 PW	382	48.4	758	277	non-detect	2	non-detect	non-detect
	Beltz #8 PW	not analyzed	53	1200	210	6	not analyzed	non-detect	not analyzed
	Beltz #9 PW	not analyzed	45	1000	220	not analyzed	not analyzed	non-detect	not analyzed
	SC-3RC	434	47.7	61	35	not analyzed	not analyzed	non-detect	not analyzed
	SC-5RA	516	56.8	566	210	not analyzed	not analyzed	non-detect	not analyzed
	SC-9RA	404	14.7	244	14	not analyzed	not analyzed	non-detect	not analyzed
	SC-10RA	370	32.6	484	574	not analyzed	not analyzed	0.04	not analyzed
SC-22A	410	18.6	533	576	not analyzed	not analyzed	non-detect	not analyzed	
Purisima A/AA	Beltz #10 PW	not analyzed	63	1500	210	not analyzed	not analyzed	non-detect	not analyzed
Purisima AA	SC-10RAA	256	10.7	116	50	not analyzed	not analyzed	non-detect	not analyzed
	SC-22AAA	614	62	28	43	not analyzed	not analyzed	0.01	not analyzed
	Coffee Lane Deep	950	42	non-detect	130	not analyzed	not analyzed	non-detect	not analyzed
	Pleasure Point Deep	600	22	610	230	not analyzed	not analyzed	non-detect	not analyzed
	Thurber Lane Shallow	not sampled	not sampled	not sampled	not sampled	not sampled	not sampled	not sampled	not sampled
	Schwan Lake	760	97	790	120	not analyzed	not analyzed	non-detect	not analyzed
Purisima AA/Tu	O'Neill Ranch PW	Offline	Offline	Offline	Offline	Offline	Offline	Offline	Offline
	Beltz #12 PW	500	48	470	440	not analyzed	not analyzed	non-detect	not analyzed
Tu	SC-18RAA	230	14.5	45	24	not analyzed	not analyzed	non-detect	not analyzed
	Thurber Lane Deep	not sampled	not sampled	not sampled	not sampled	not sampled	not sampled	not sampled	not sampled

Maximum of minimum threshold and measurable objective not met

Minimum threshold met but measurable objective not met

Measurable objective met

Table 9. Groundwater Elevation Proxy for Depletion of Interconnected Surface Water

Well Name	Aquifer	Minimum Threshold	Measurable Objective	Interim Milestone 2025	WY2016	WY2017	WY2018	WY2019	WY2020
		Groundwater Elevation, feet above mean sea level			Minimum Average Monthly Groundwater Elevation, feet above mean sea level				
Balogh	Shallow Groundwater	29.1	30.6	29.1	29.2	29.7	29.2	29.1	29.1
Main St. Shallow		22.4	25.3	20.7	22.6	22.7	22.8	22.5	22.8
Wharf Road		11.9	12.1	11.3	12.1	12.1	12.2	12.1	12.4
Nob Hill		8.6	10.3	7.3	5.7	8.8	8.7	8.7	5.5
SC-10RA	Purisima A	68	70	68	69.8	69.6	69.2	69.2	69.0

Minimum threshold not met

Minimum threshold achieved but measurable objective not met

Measurable objective met

4.7 Update on Implementation of Projects and Management Actions

Below are current updates for 2020 for projects and management actions planned to reach sustainability, described as Group 2 in the GSP.

4.7.1 Pure Water Soquel

As described in the GSP, Soquel Creek Water District completed the California Environmental Quality Act (CEQA) review for Pure Water Soquel (PWS) and certified the Environmental Impact Report in December 2018. SqCWD is currently in the active phase of permitting, design, and construction of project implementation.

In September 2020 the U.S. Environmental Protection Agency (EPA) approved a low-interest loan to be used toward the PWS Groundwater Replenishment and Seawater Intrusion Prevention Project. The loan, up to a maximum of \$88.9 million at an interest rate of 1.34%, is part of the EPA's Water Infrastructure Finance and Innovation Act (WIFIA) funding program. This funding is in addition to a State Water Resources Board \$50 million Prop 1 Groundwater grant that was executed in July 2020, another low-interest (1.3%) loan from the State Water Board's Seawater Intrusion Control (SWIC) Program, and earlier \$2.25 million in state and federal grants for State grant for evaluation and design phases of the project. These are significant financial investments, demonstrating a strong investment and support in PWS from state and federal agencies.

As projected in the GSP, construction will continue through 2022 with the project to come online in early 2023. The project will injects purified water at three Seawater Intrusion Prevention (SWIP) wells to recharge the aquifer and raise groundwater levels above minimum thresholds for seawater intrusion in the District area. Two of the three SWIP wells have been constructed and developed. Construction of the third SWIP well is scheduled to commence prior to the deadline for submittal of this report to DWR of April 1, 2021.

SqCWD maintains a robust outreach and education program specific to the PWS that includes a dedicated section on it's website: <https://www.soquelcreekwater.org/pws> and PWS Project updates in the SqCWD's monthly email blast.

4.7.2 Aquifer Storage and Recovery

The City of Santa Cruz started a pilot test program for Aquifer Storage and Recovery (ASR) at its Beltz #8 well in 2020. Two of the three planned test cycles were completed. Several factors contributed to postponement of the third cycle: lack of rainfall, staffing during Covid-19 pandemic, and a temporary increase in detections of arsenic during the first two cycles.

Based on additional evaluation of the geochemistry related to arsenic detections, SCWD plans to resume the pilot test with by performing the third cycle as two stages in 2021.

The SCWD is currently preparing an Environmental Impact Report to comply with CEQA and updated water rights and petitions. Phased implementation of full-scale ASR at the SCWD's existing Beltz wells is estimated to commence in 2024.

4.7.3 Water Transfers / In Lieu Groundwater Recharge

As described in the GSP, a water transfer pilot test has been underway the past couple years. The water transfer involves SCWD delivering treated drinking water to SqCWD to serve a portion of SqCWD's service area. A second round of pilot testing to serve a larger portion of SqCWD's service area began in December 2019. However, the water transfer was put on hold at the beginning of January 2020 due to a lack of rain, SCWD water supply conditions and the water available from SCWD's north coast sources. A total of 104 acre-feet was transferred from the SCWD to SqCWD during this time.

Longer term implementation of water transfers will require a new agreement, including compliance with Proposition 218 requirements to set the cost of service for water delivered and, depending on the annual quantity transferred, waiting for resolution of the places of use changes of the SCWD's San Lorenzo River water rights. Given these and potential other factors, a likely timeline for implementation of a longer-term water transfer project is a minimum of two years.

4.7.4 Distributed Storm Water Managed Aquifer Recharge

The County continues to operate two Distributed Storm Water Managed Aquifer Recharge (DSWMAR) projects, one in Aptos at Polo Grounds County Park and another in Live Oak at Brommer Street Park. Total estimated recharge is 20 acre-feet per year.

The timetable for development at additional DSWMAR project sites is not available and continues to be speculative at this time.

4.8 Update on Improvement of Monitoring Network

In Water Year 2020, the only improvement to the monitoring network was a deep Tu unit monitoring well installed by SCWD at the Soquel Point monitoring well site called SP-5. This well has been added to the monitoring network and is included in the analysis of Basin conditions. It will also be added to SGMA Portal.

Monitoring features identified in the GSP as data gaps that will be installed in 2021 include a deep Tu unit well near existing monitoring well SC-3 called SC-3AA, and five streamflow gauges and eight shallow wells for monitoring depletion of interconnected surface water.

REFERENCES

HydroMetrics WRI, 2017. *Santa Cruz Mid-County Basin Groundwater Management Biennial Review and Report, Water Years 2015-2016*. Prepared for the Santa Cruz Mid-County Groundwater Agency. July

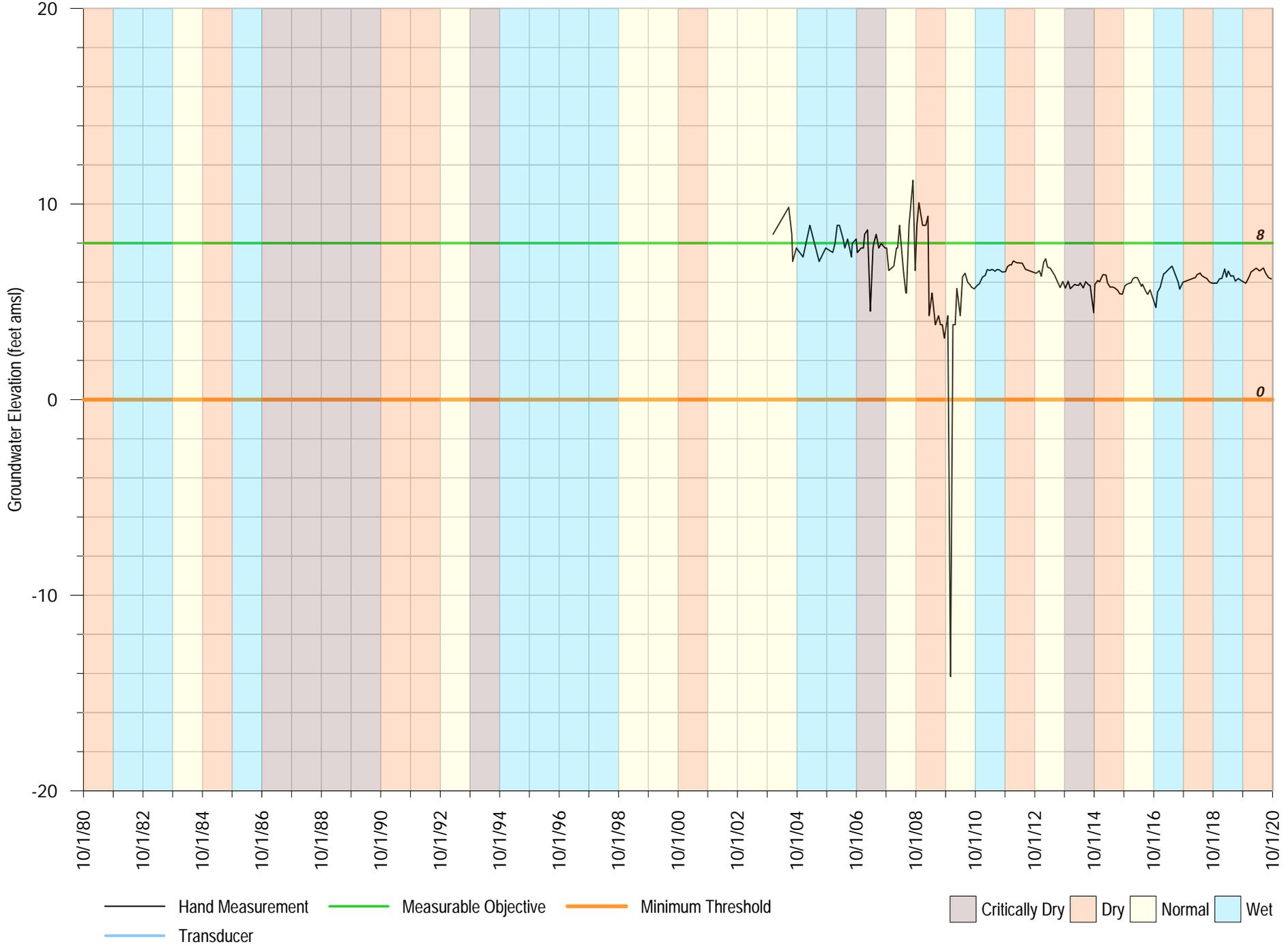
Santa Cruz Mid-County Groundwater Agency (MGA), 2019. *Santa Cruz Mid-County Basin Groundwater Sustainability Plan*. November.

Appendix A

Well Hydrographs

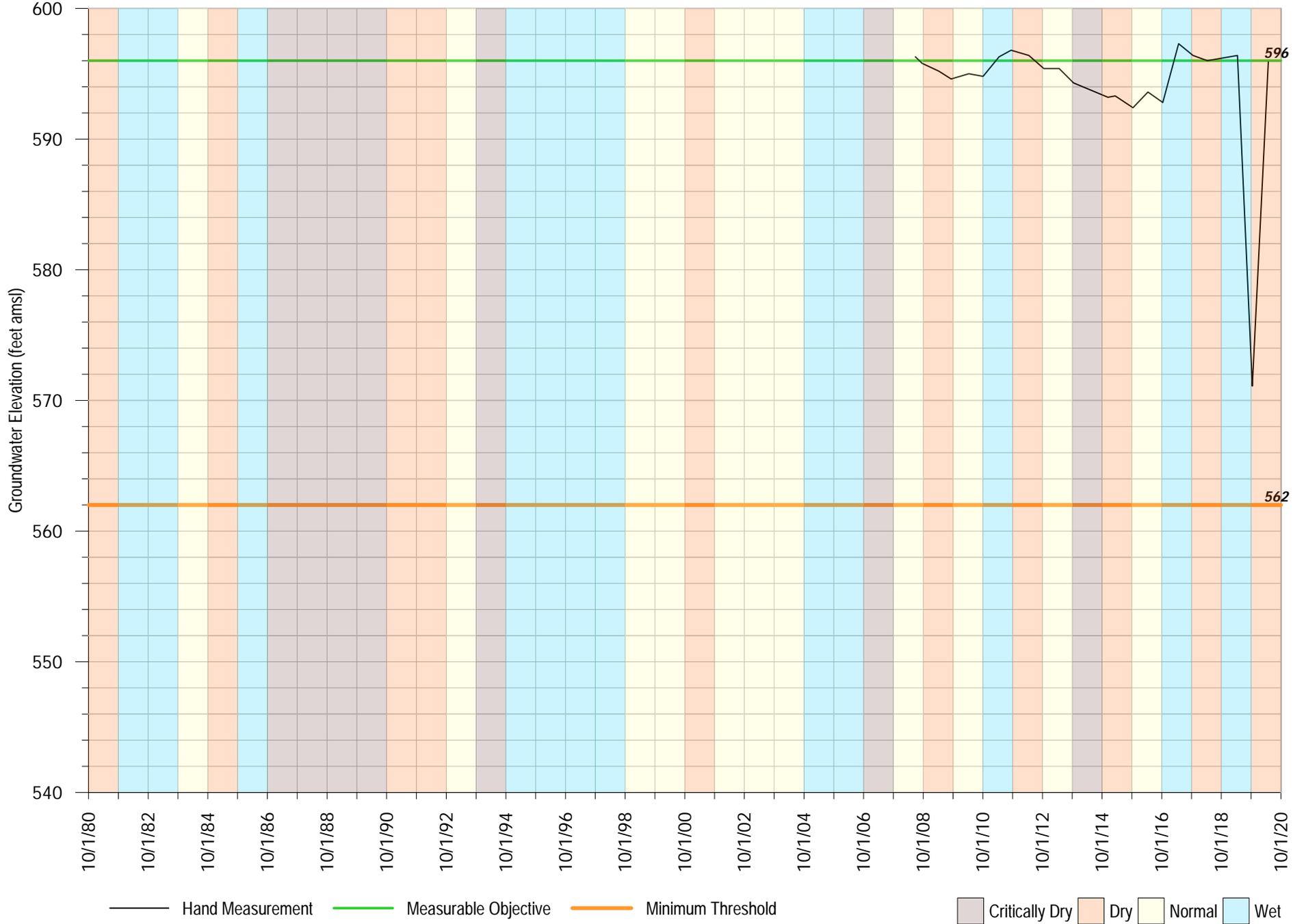
SC-A7C at Canon Del Sol

FIGURE A-1



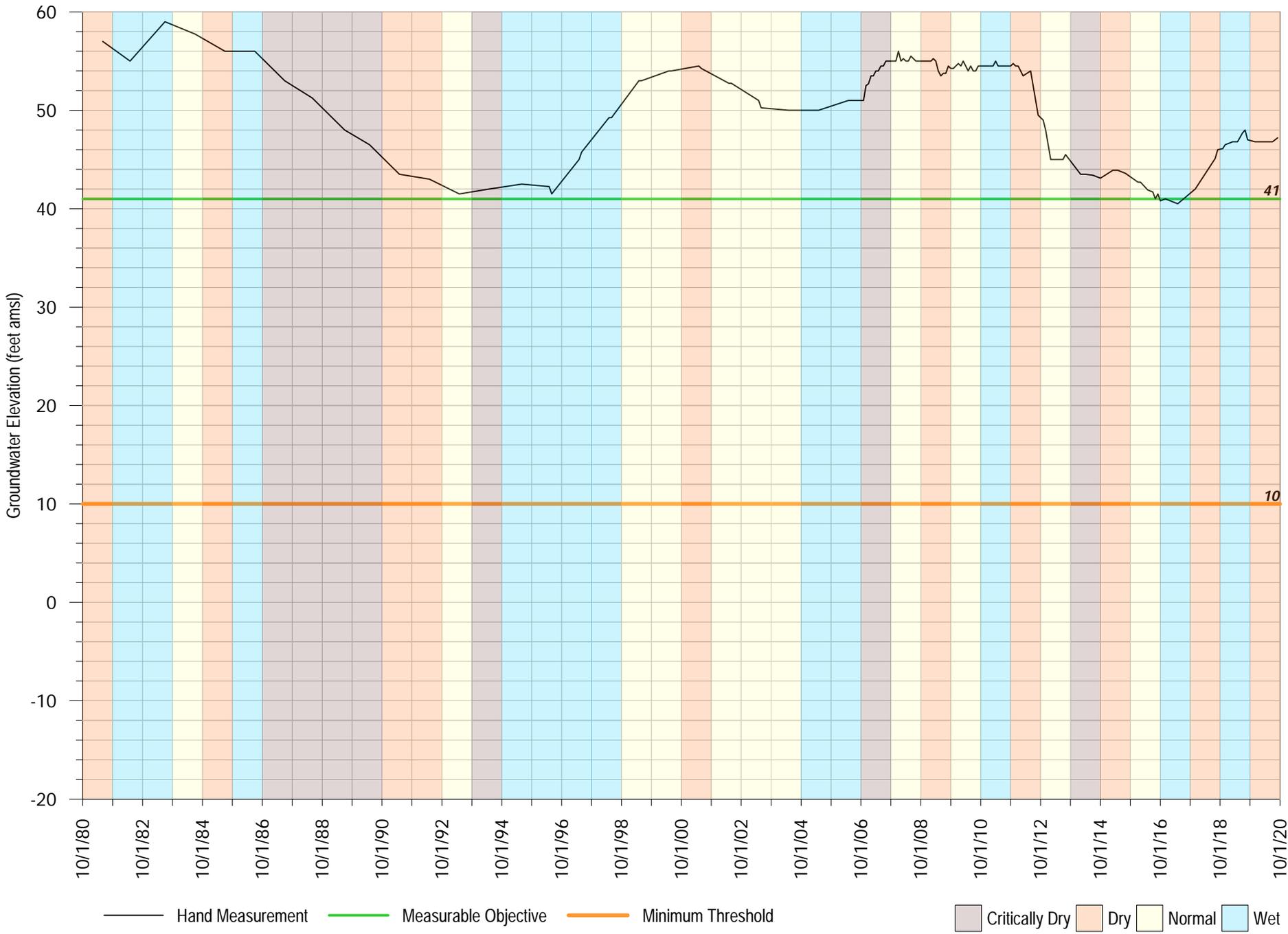
Private Well 2

FIGURE A-2



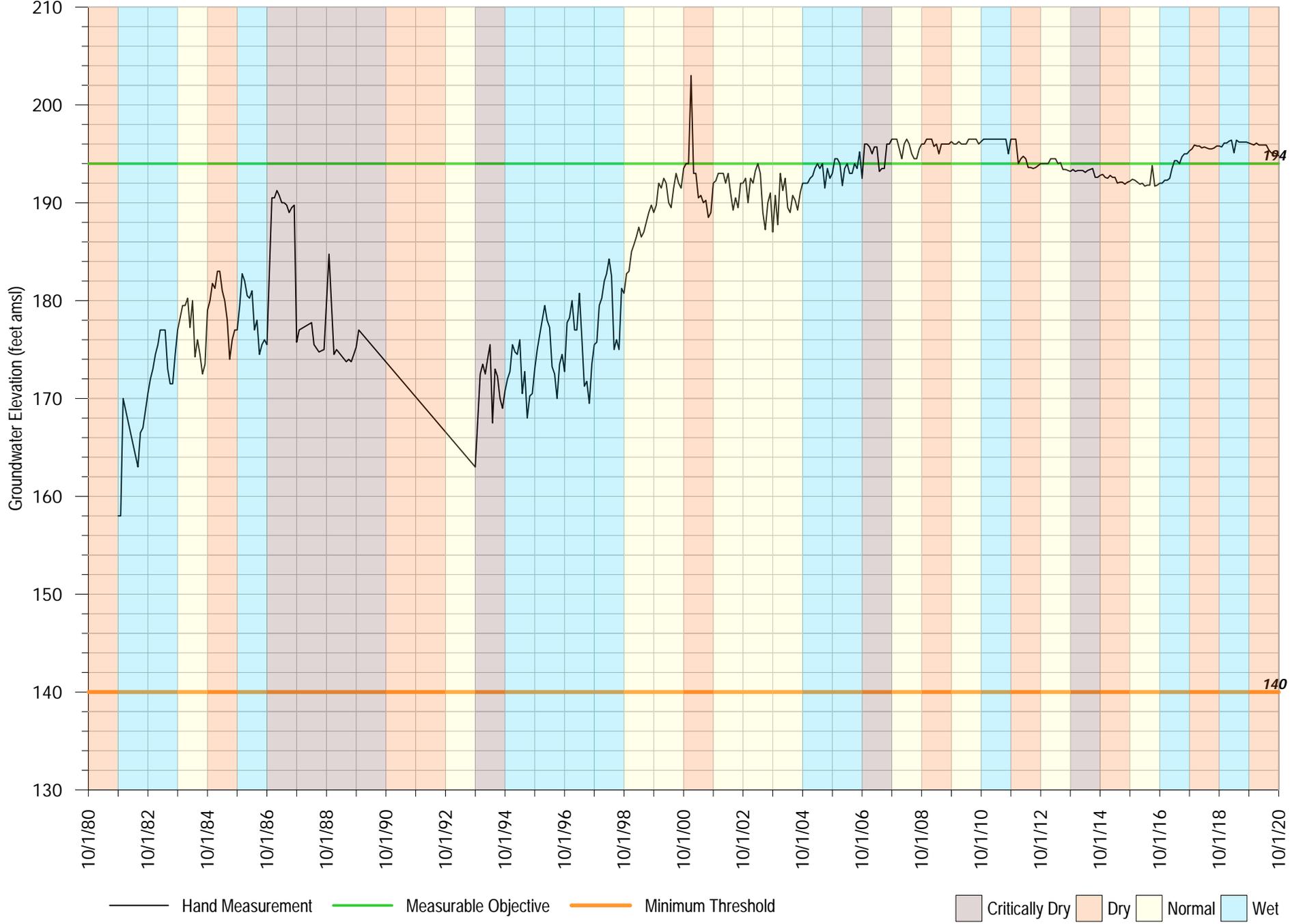
Black

FIGURE A-3



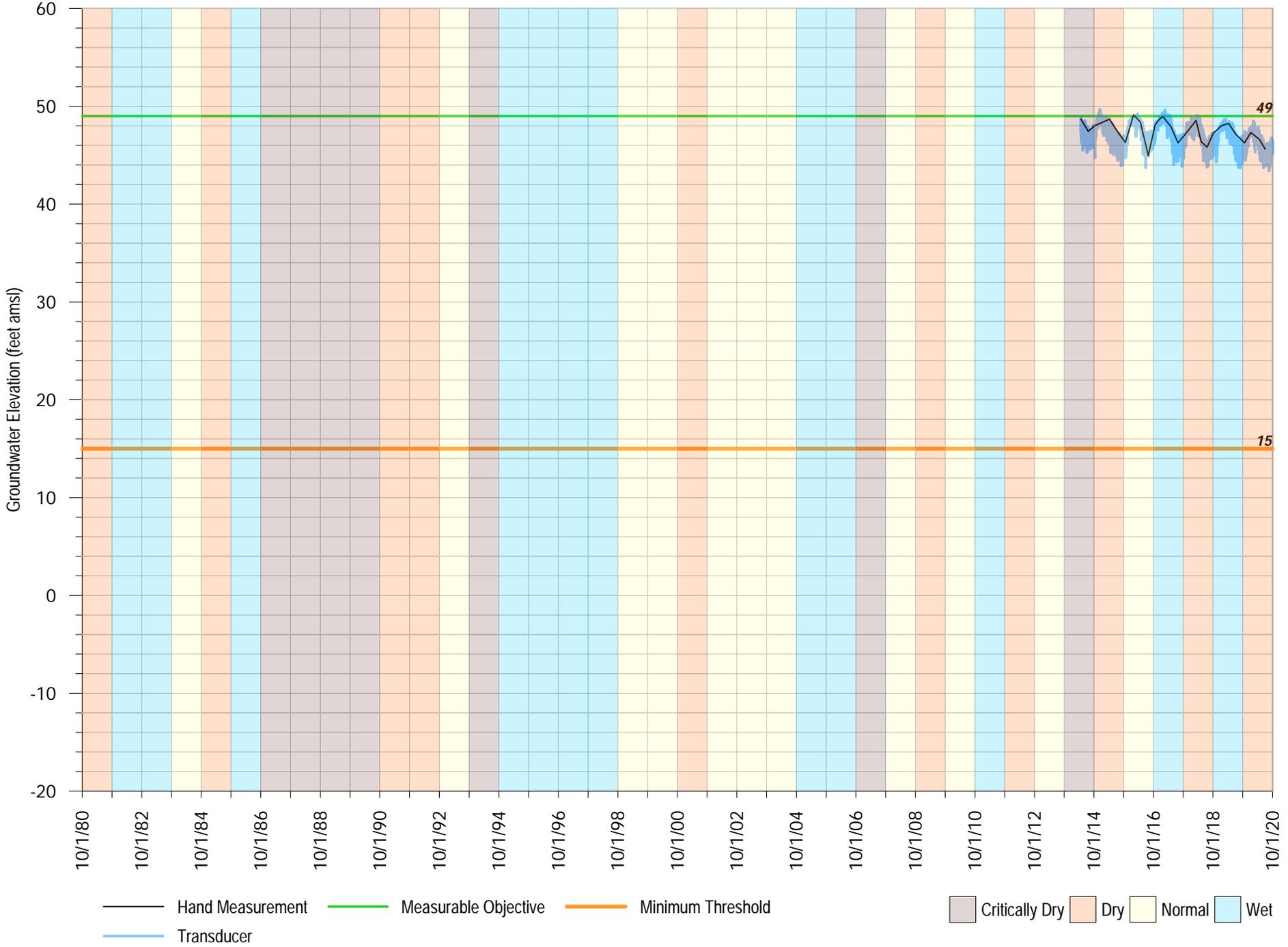
Cox 5

FIGURE A-4



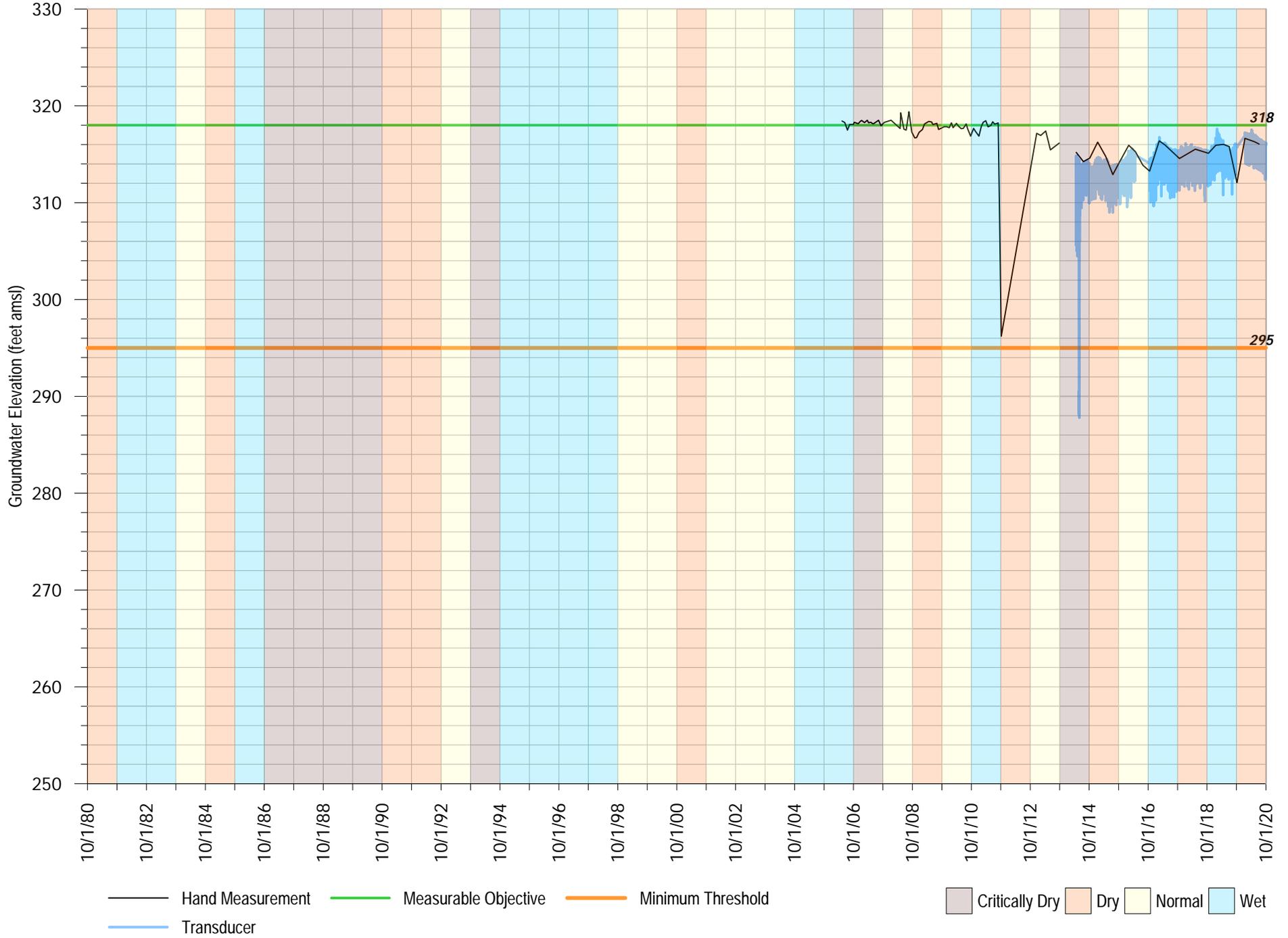
SC-23C at Quail Run

FIGURE A-5



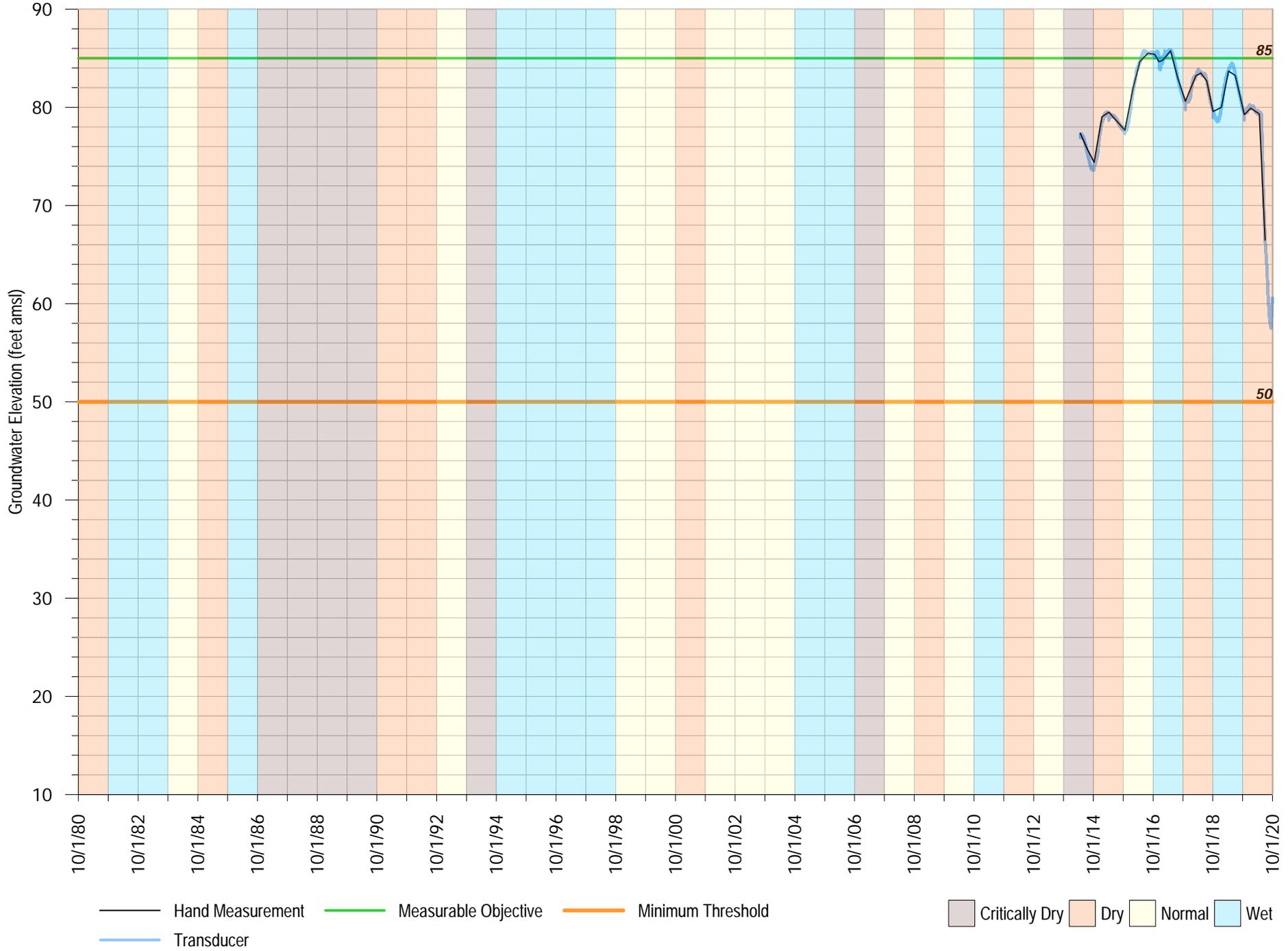
SC-11D & SC-11RD at Porter Gulch

FIGURE A-6



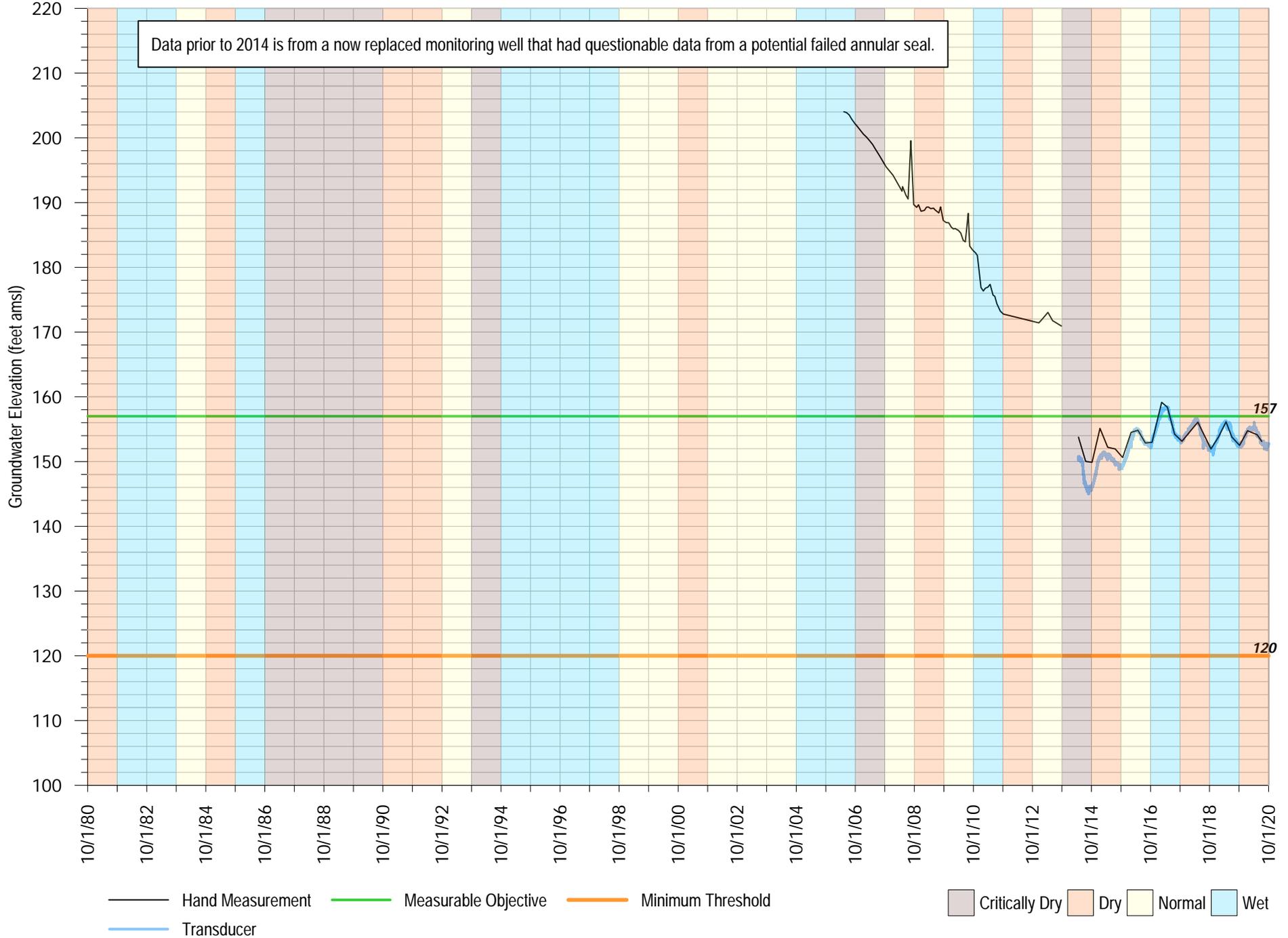
SC-23B at Quail Run

FIGURE A-7



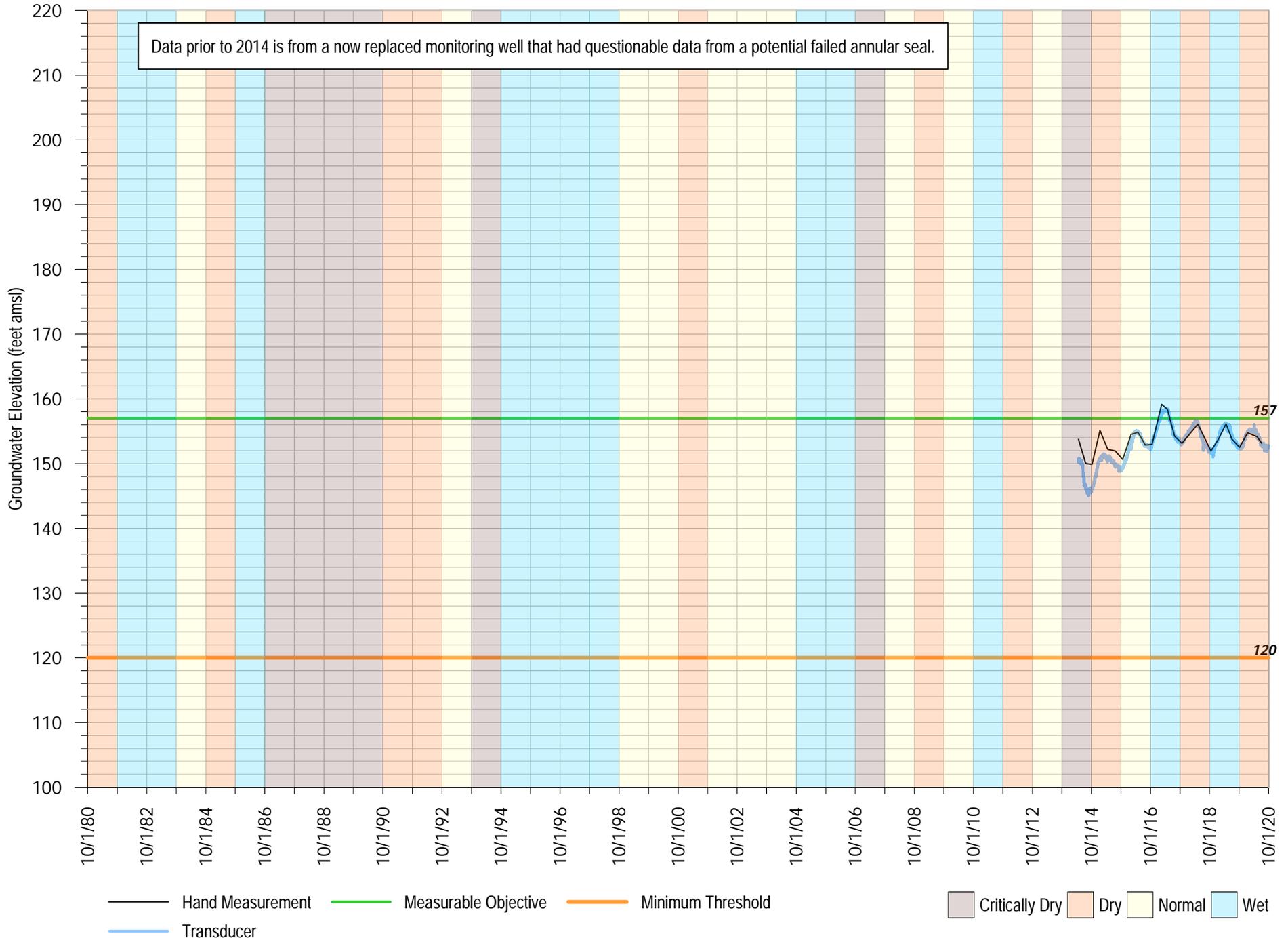
SC-11B & SC-11RB at Porter Gulch

FIGURE A-8



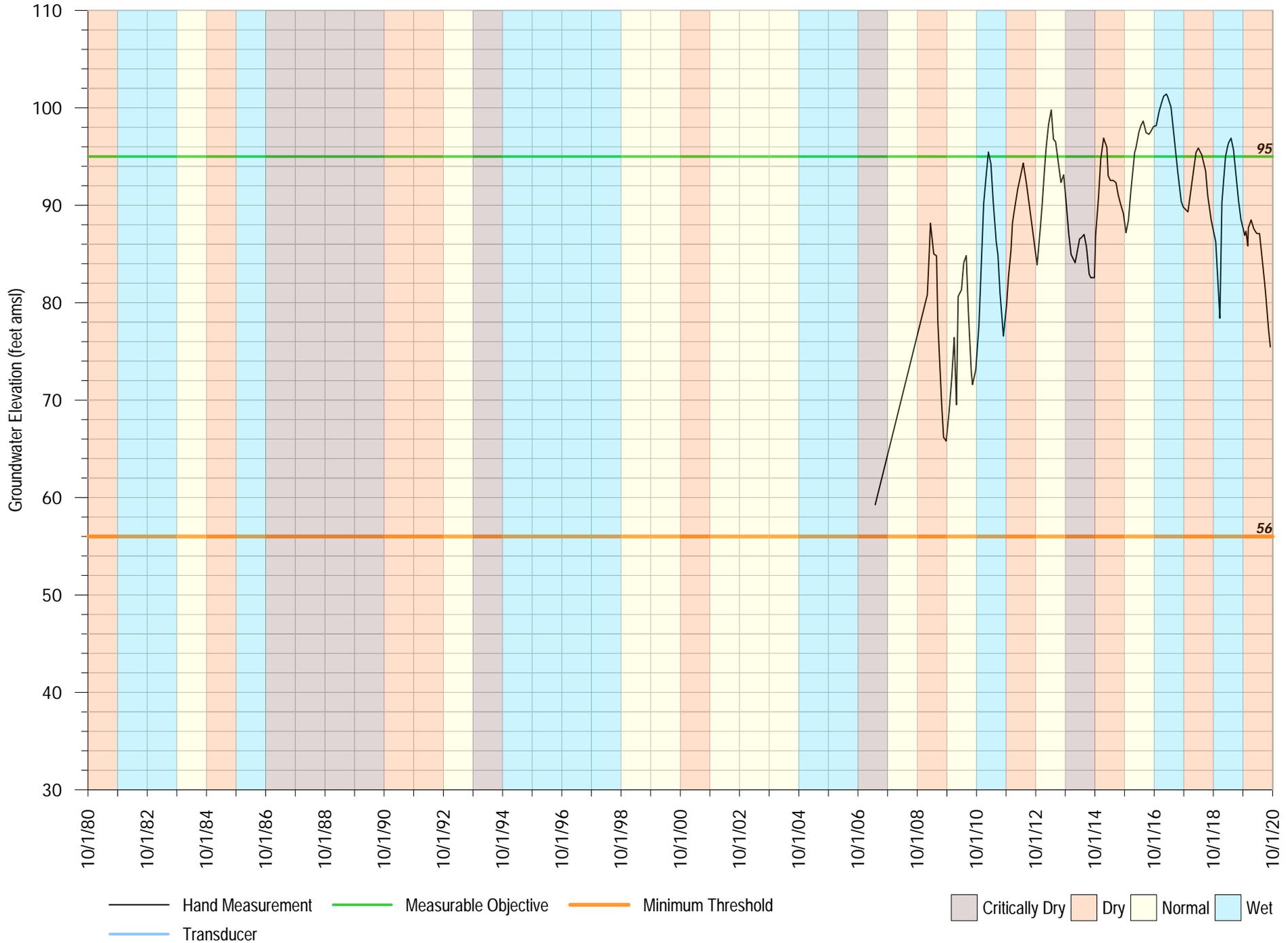
SC-11B at Porter Gulch

FIGURE A-8



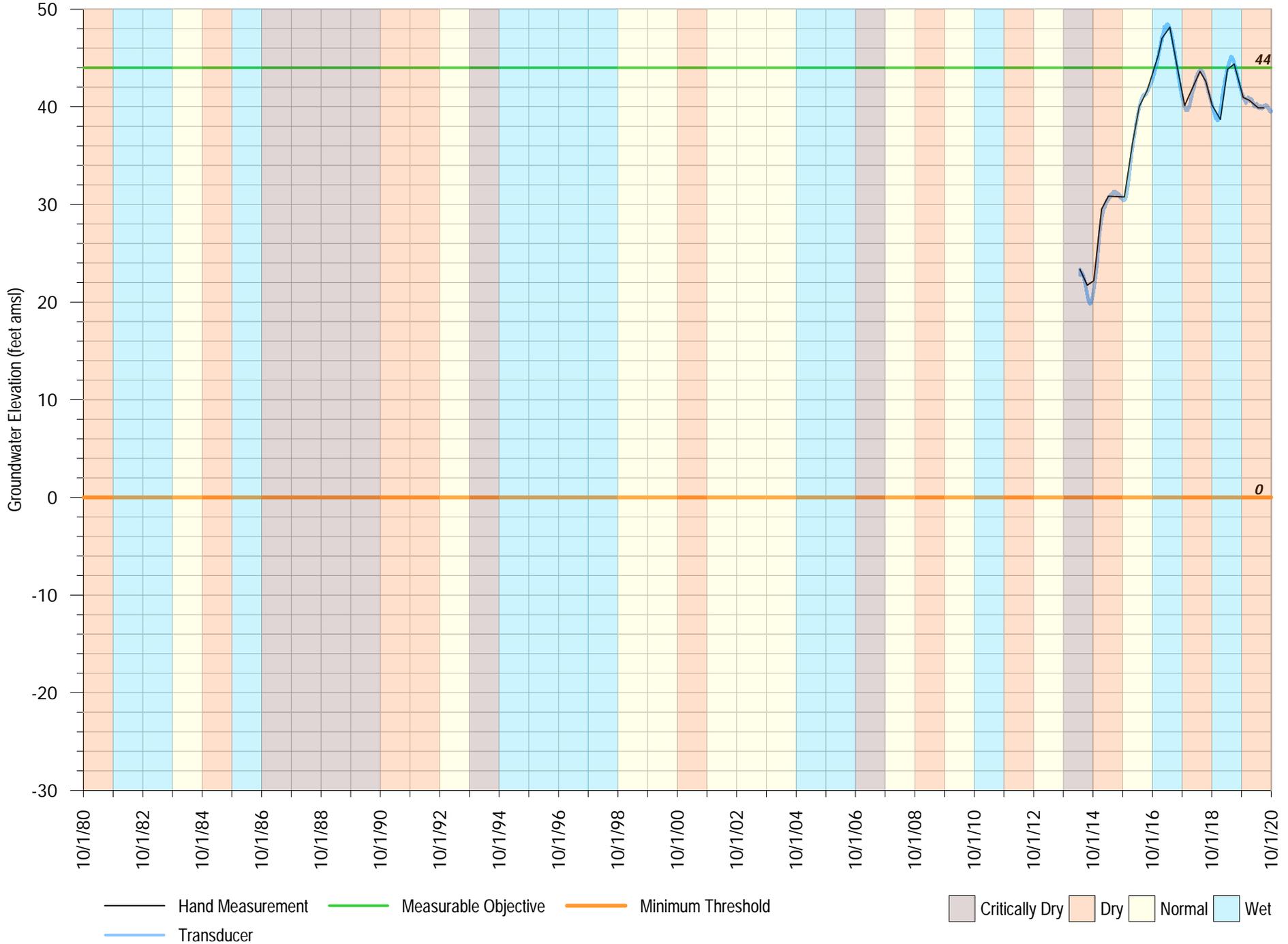
SC-19 at Austrian

FIGURE A-9



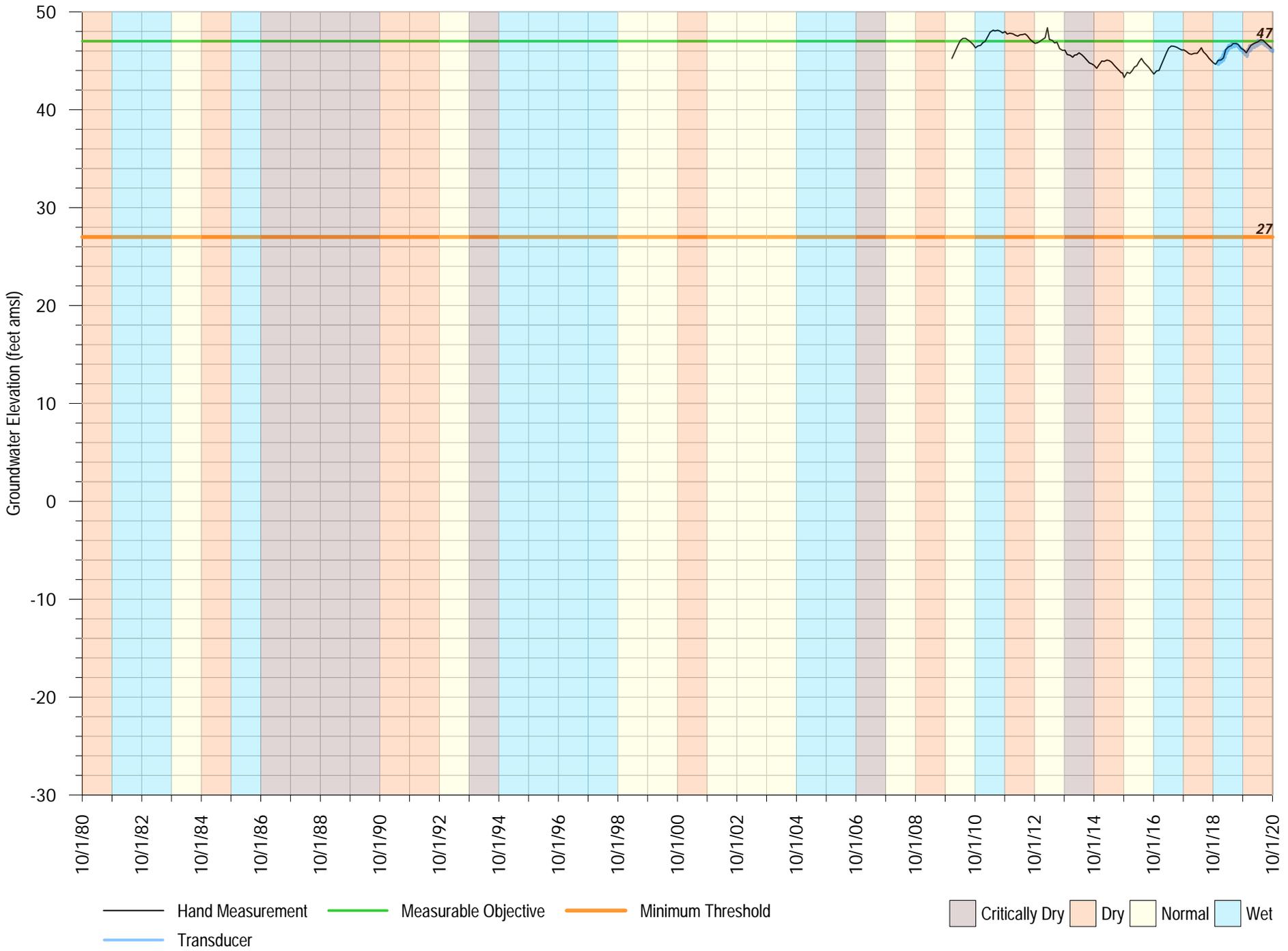
SC-23A at Quail Run

FIGURE A-10



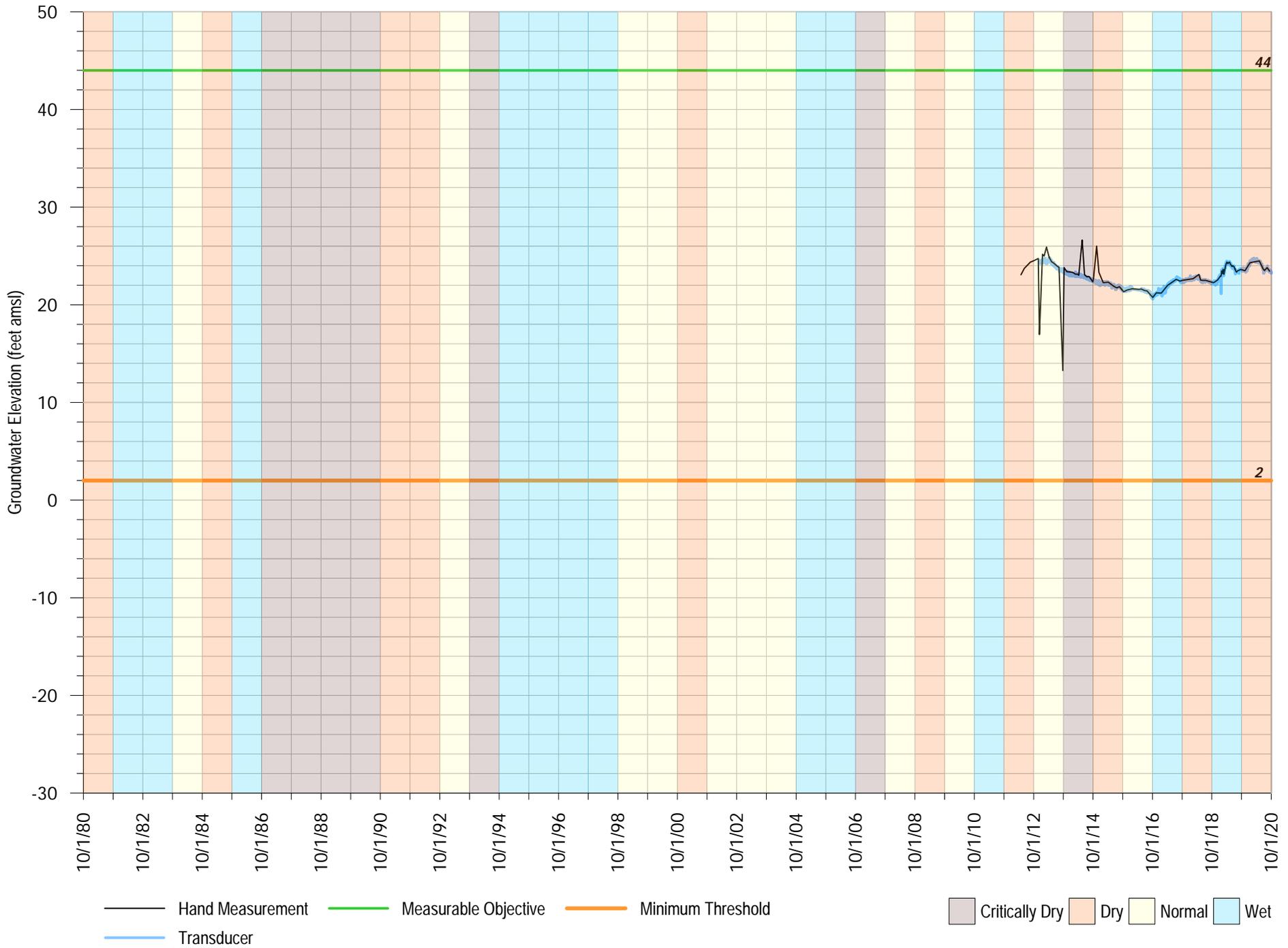
Coffee Lane Shallow

FIGURE A-11



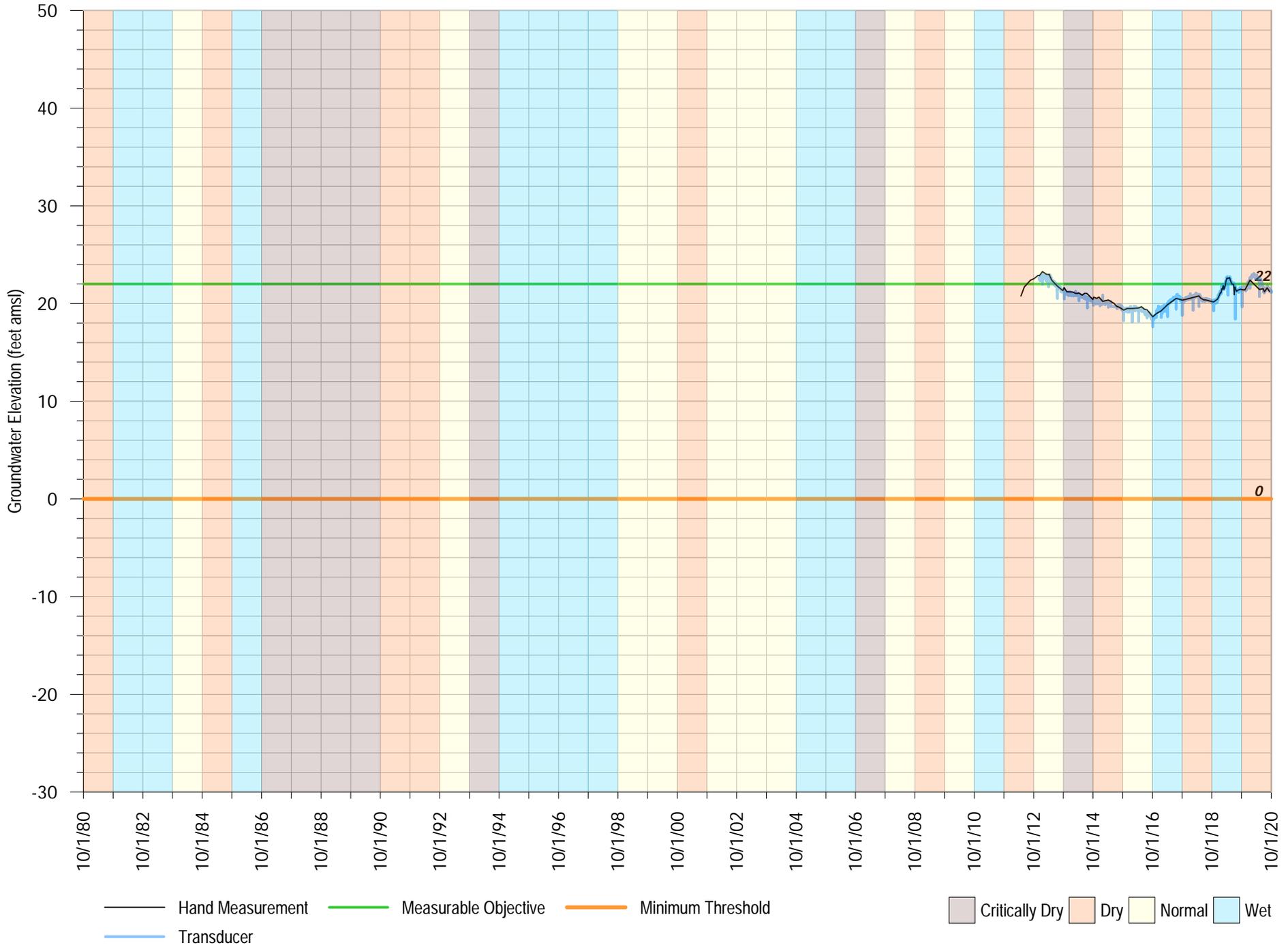
SC-22A at 41st Ave

FIGURE A-12



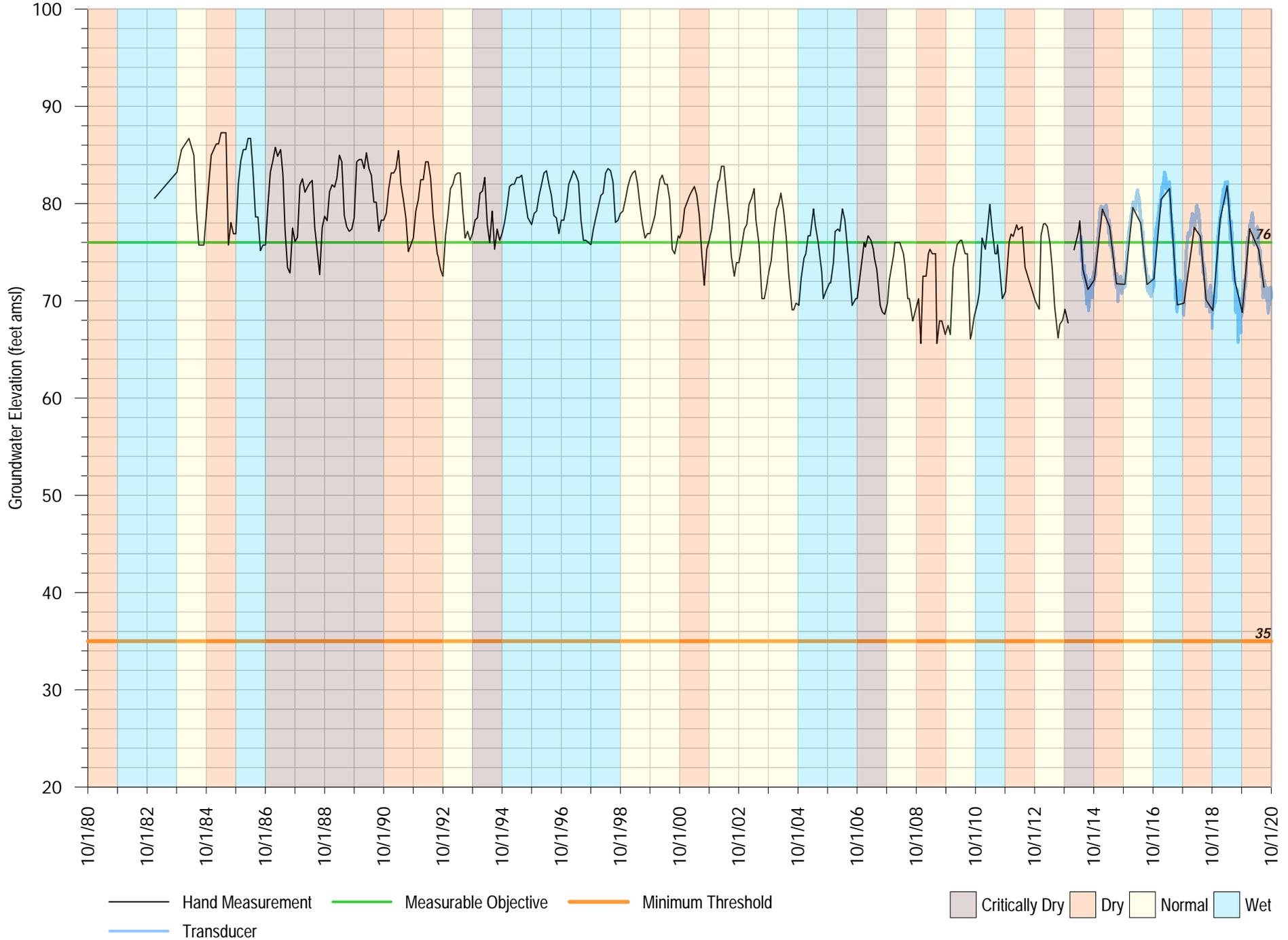
SC-22AA at 41st Ave

FIGURE A-13



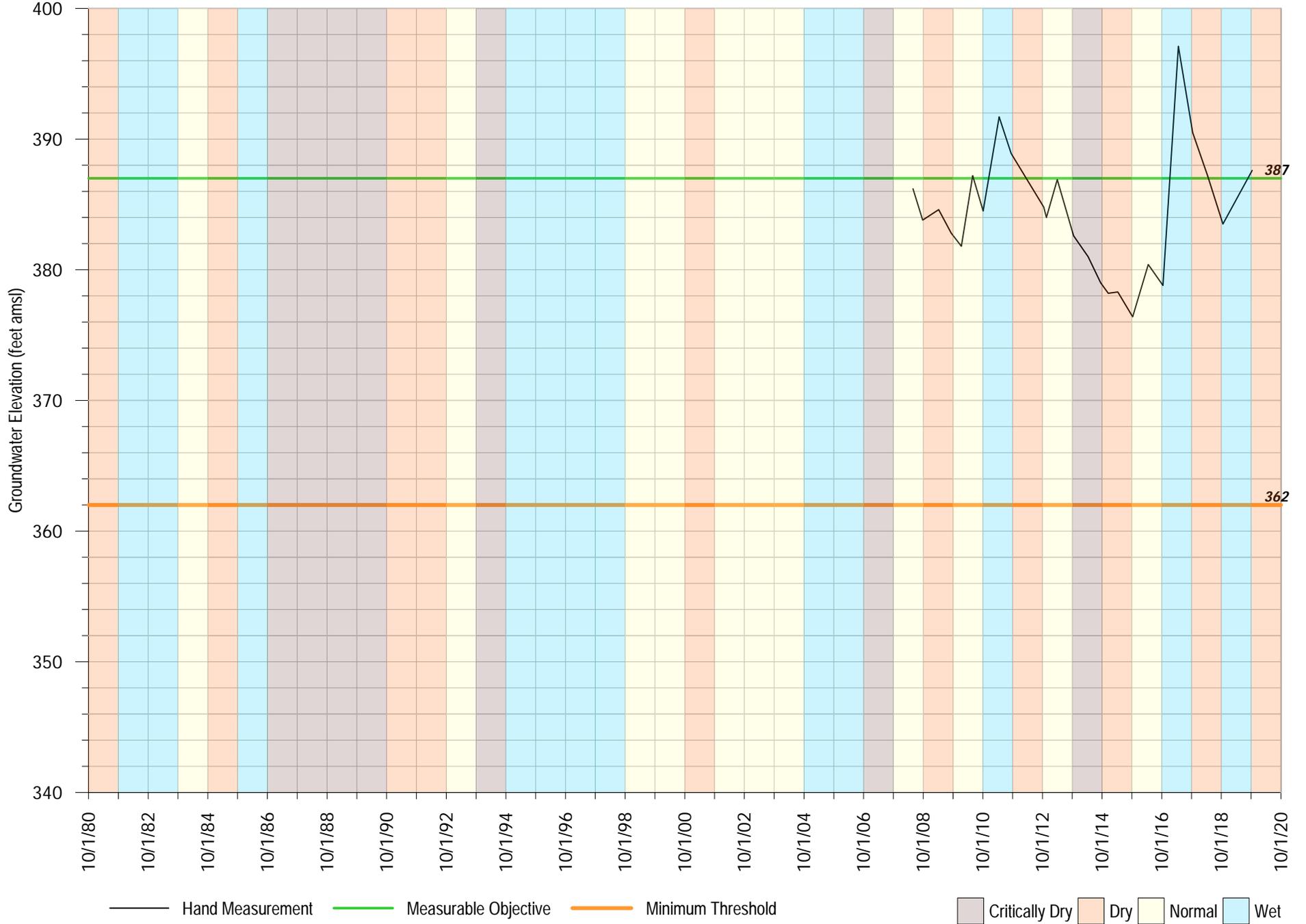
SC-10AA & SC-10RAA at Cherryvale

FIGURE A-14



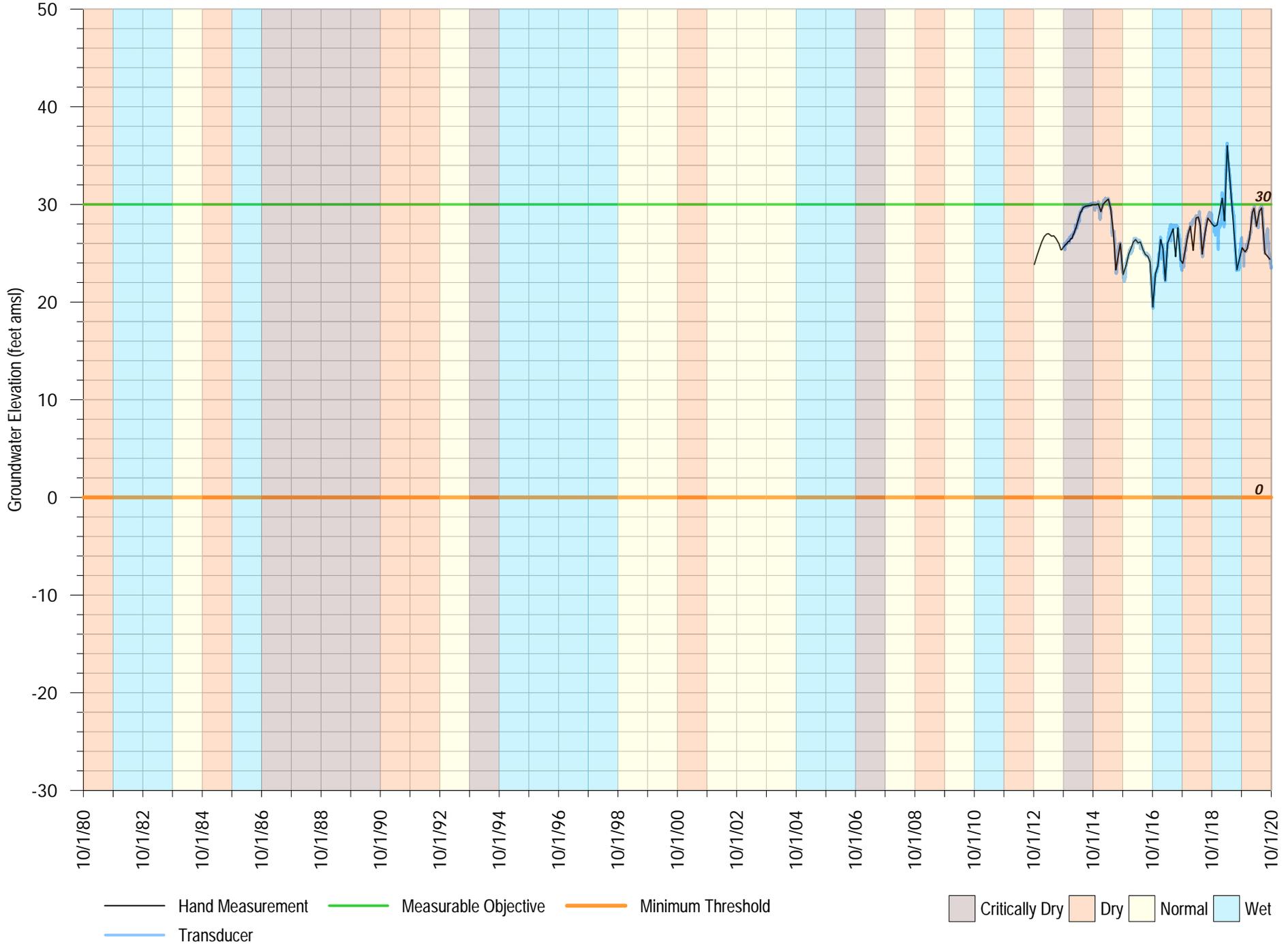
Private Well 1

FIGURE A-15



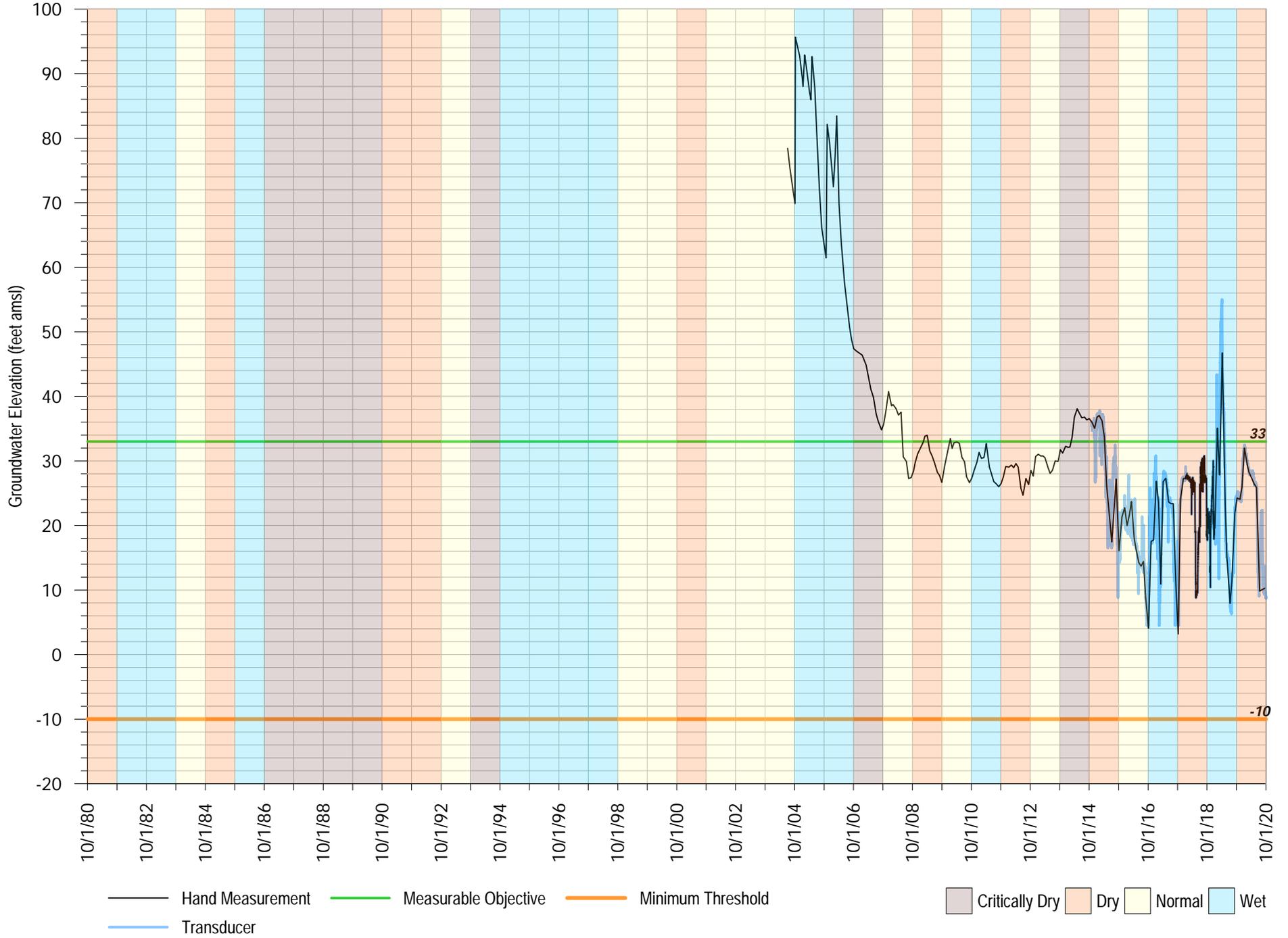
30th Ave Deep

FIGURE A-16



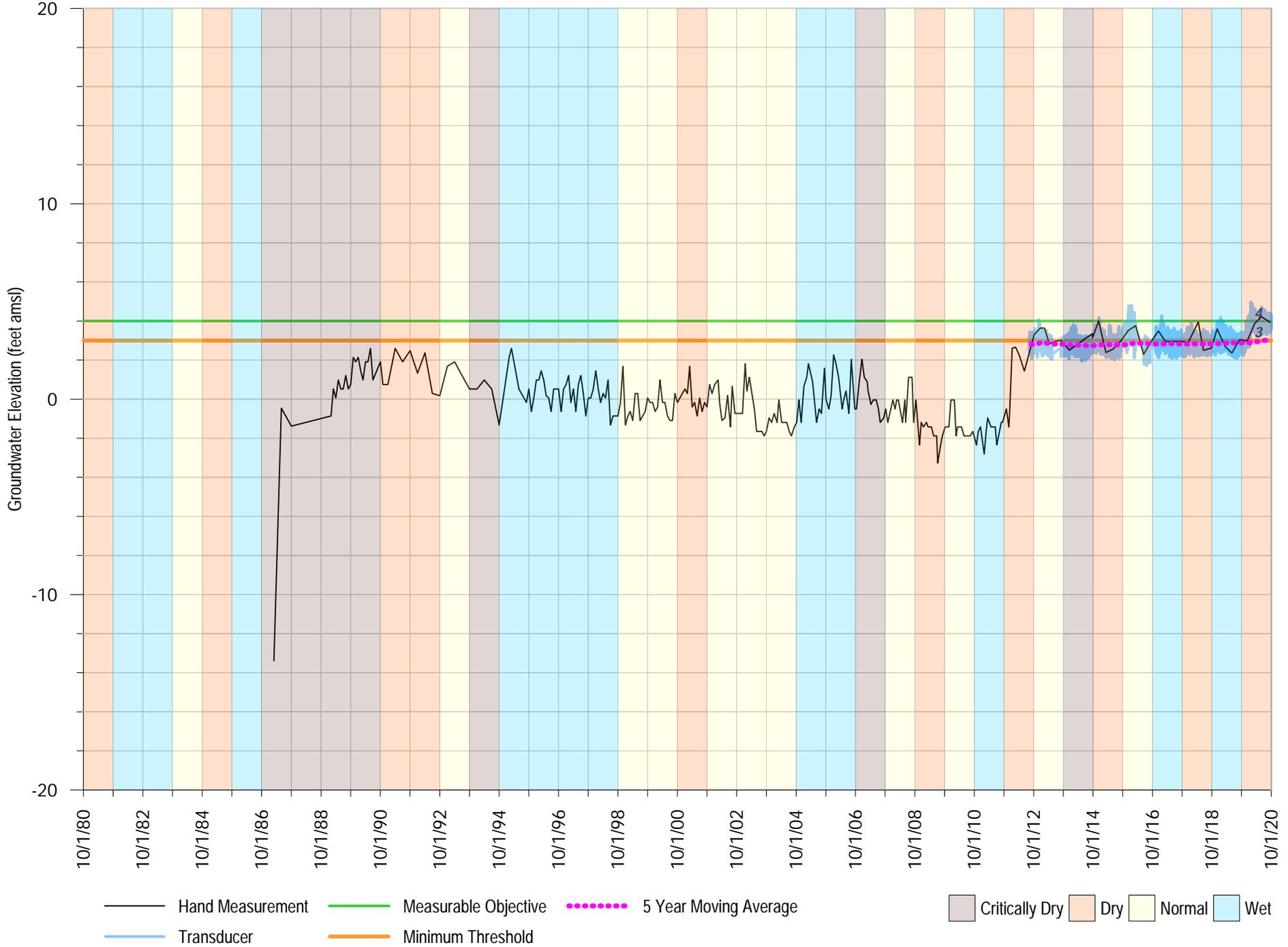
Thurber Deep

FIGURE A-17



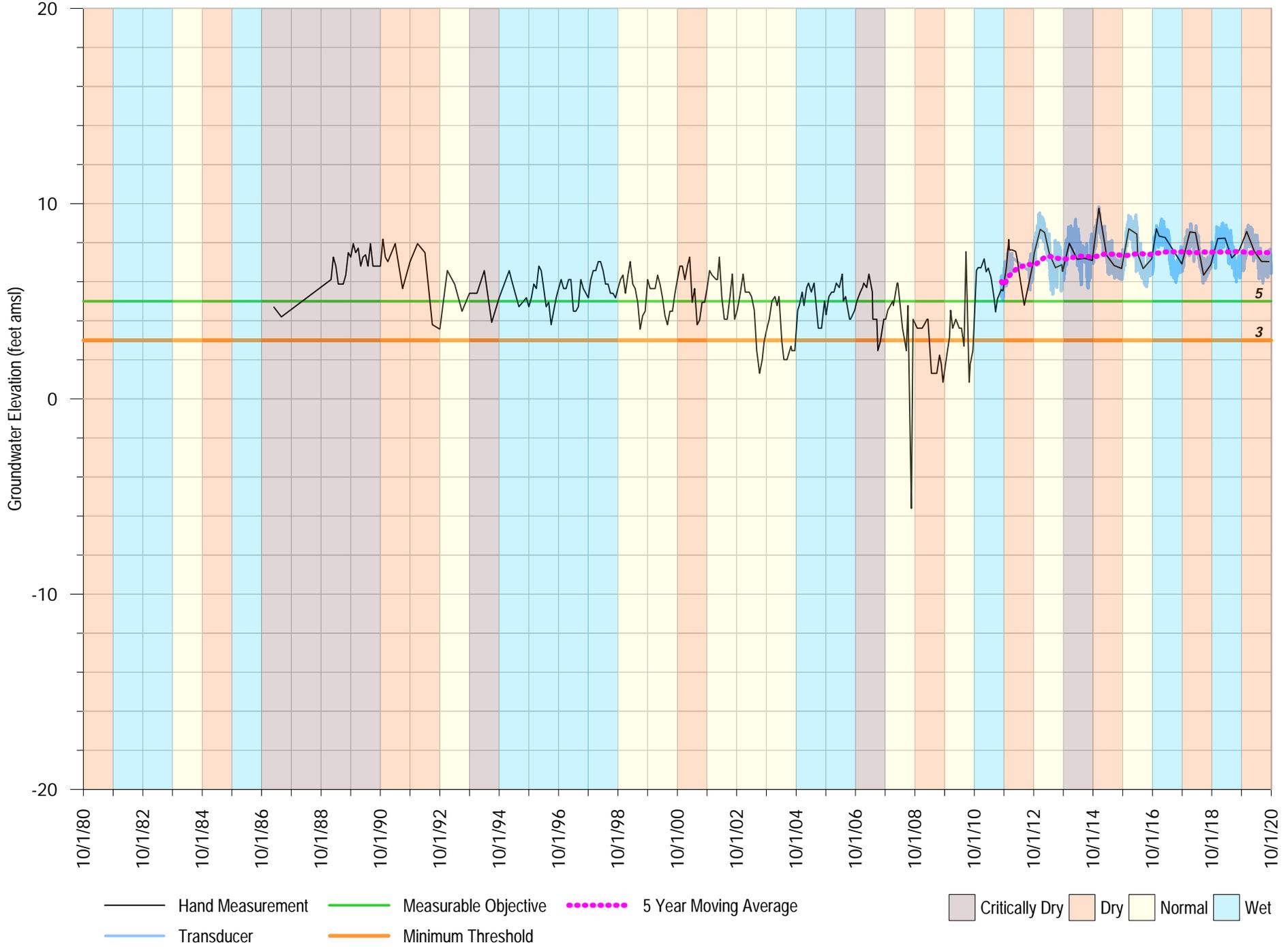
SC-A3A at Playa Visa

FIGURE A-18



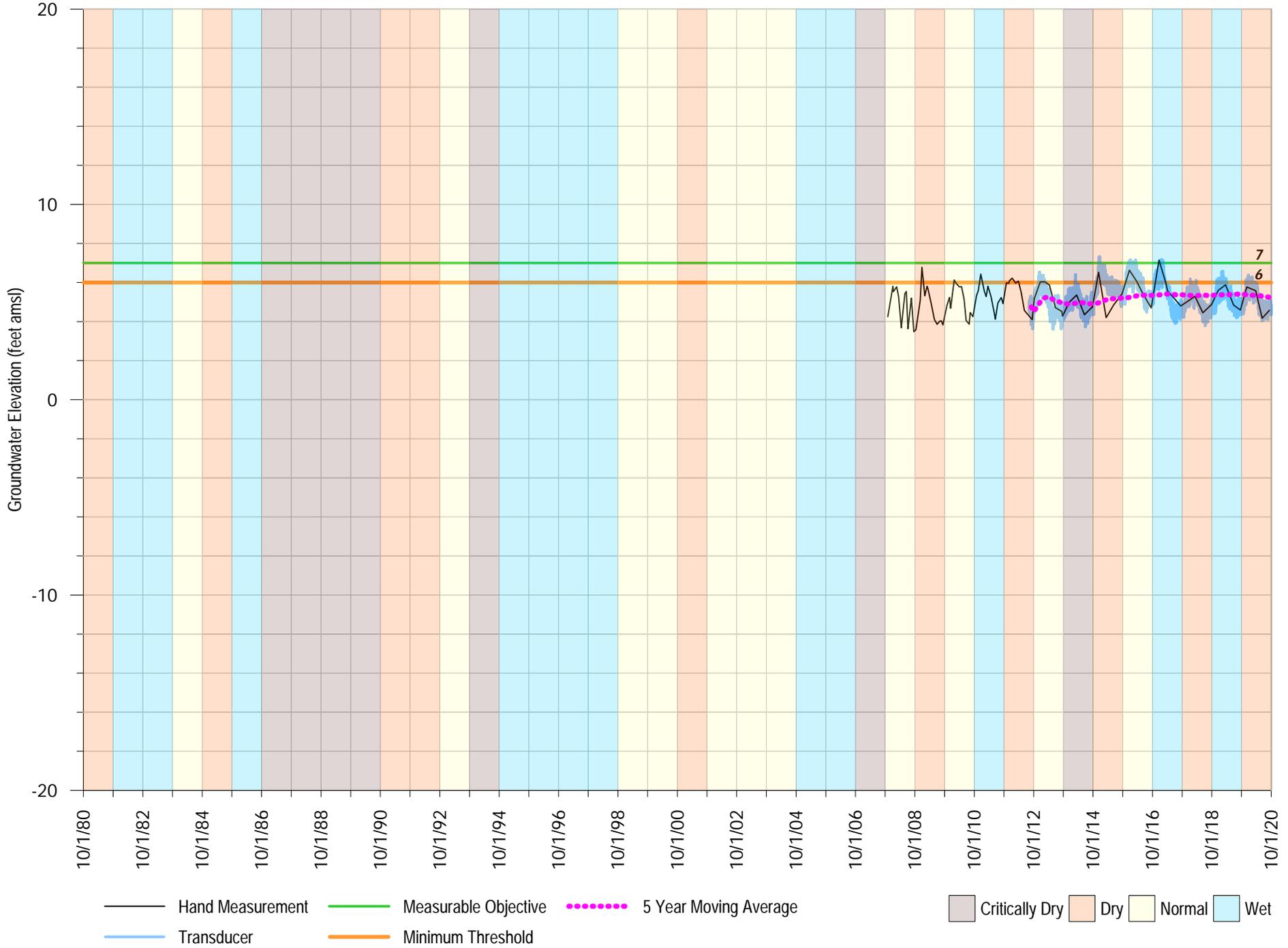
SC-A1B at Cliff Drive

FIGURE A-19



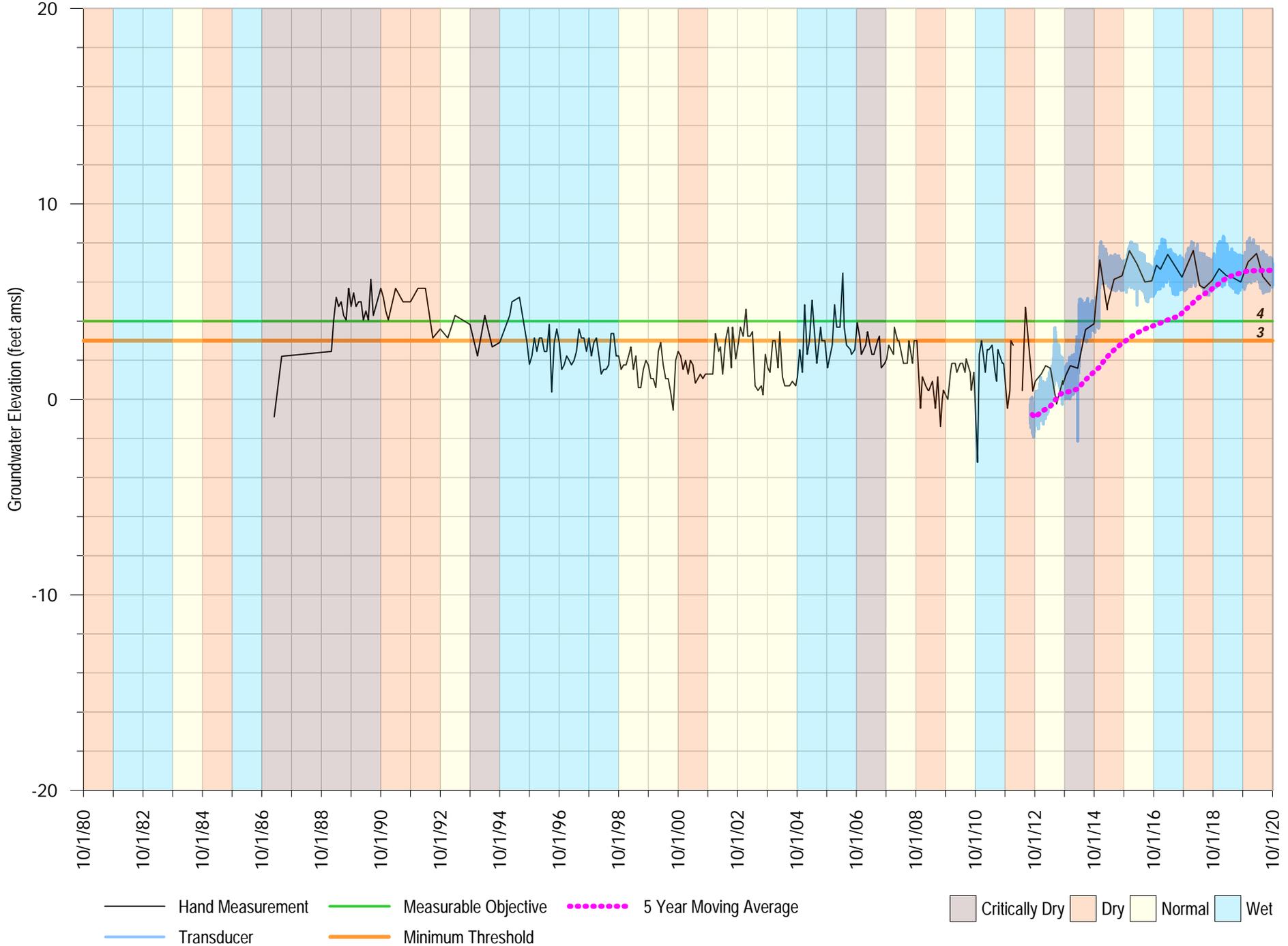
SC-A8A at Dolphin

FIGURE A-20



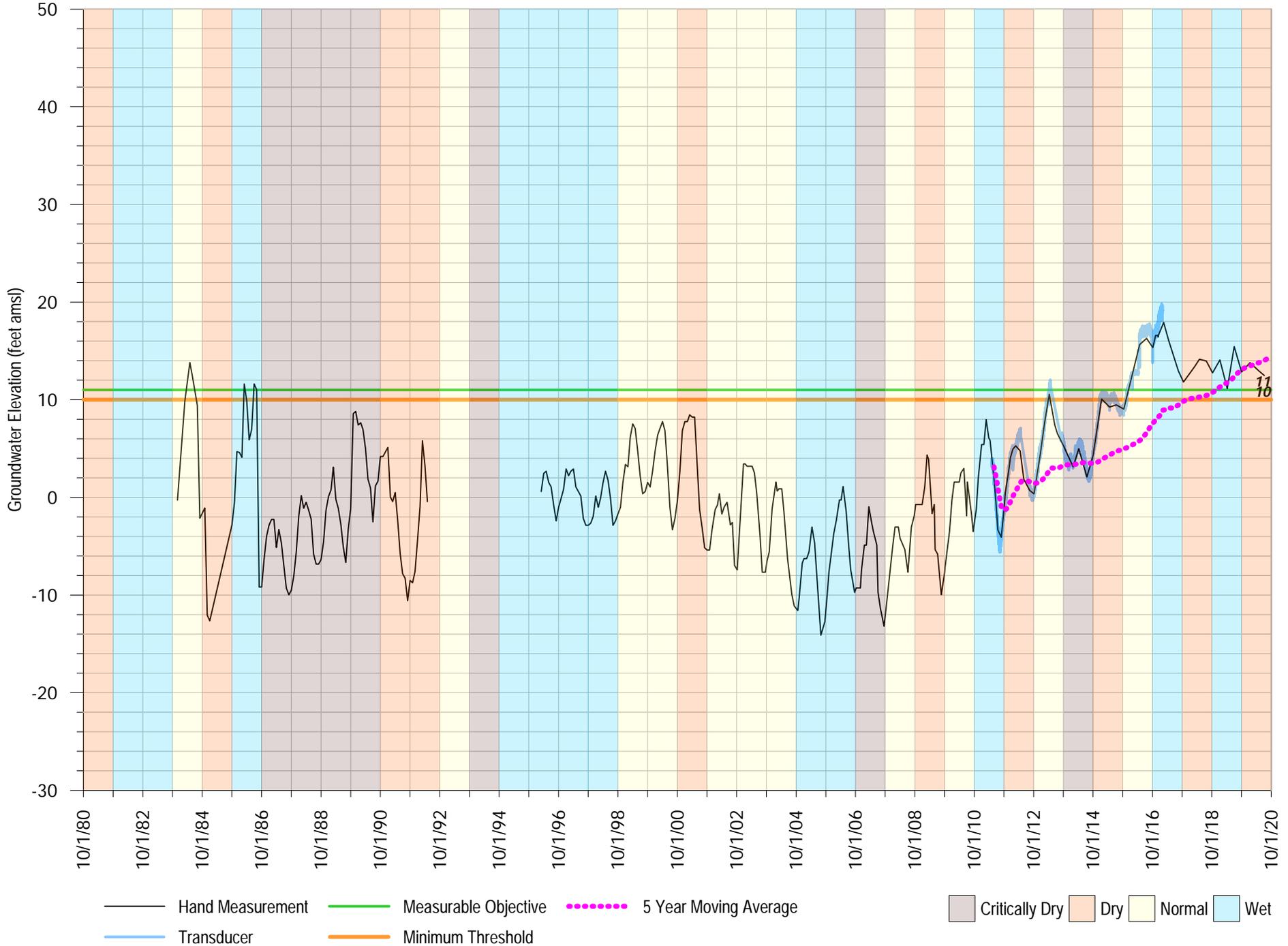
SC-A2A & SC-A2RA at Sumner

FIGURE A-21



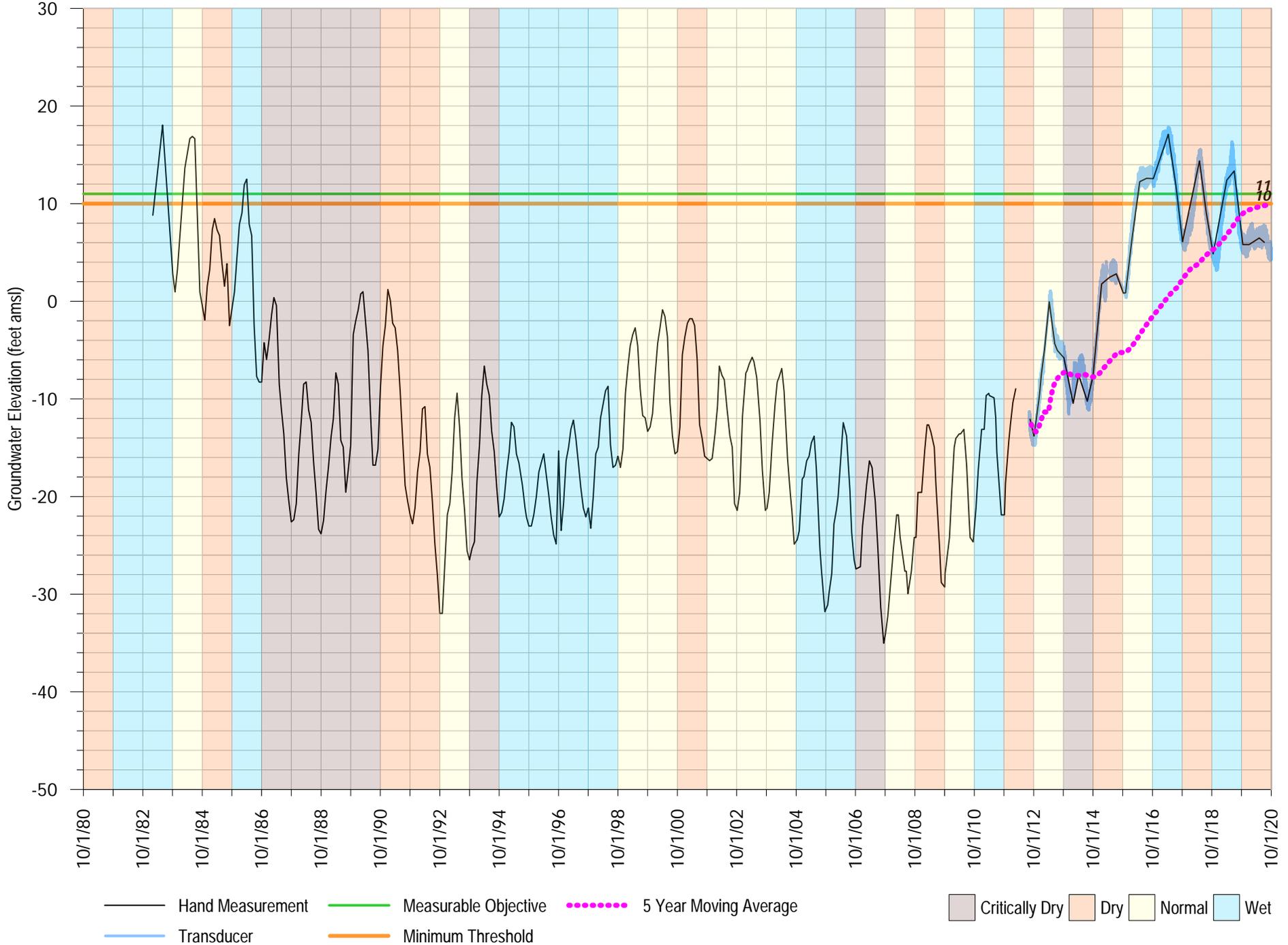
SC-8D & SC-8RD at Aptos Creek

FIGURE A-22



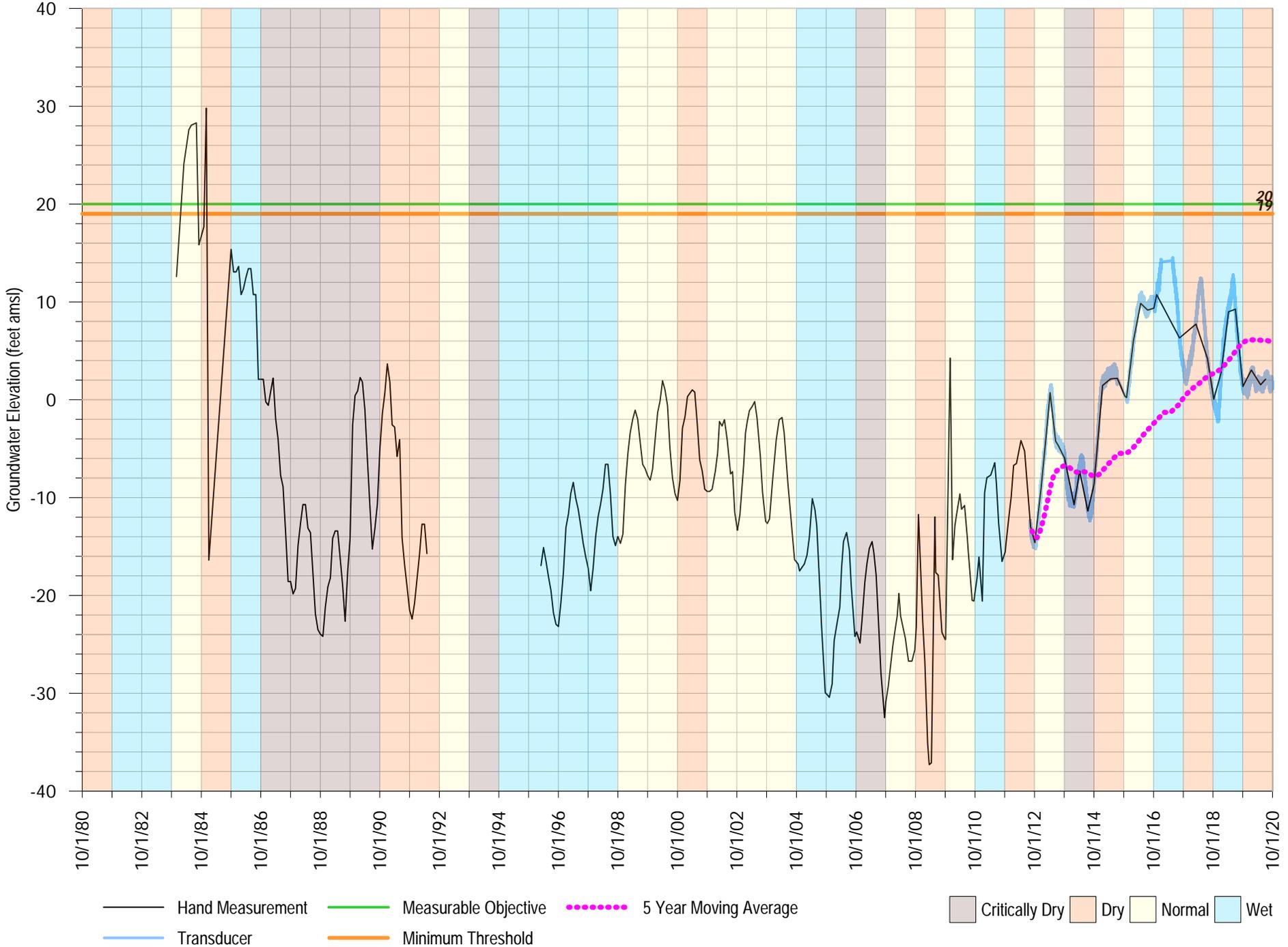
SC-9C & SC-9RC at Seacliff

FIGURE A-23



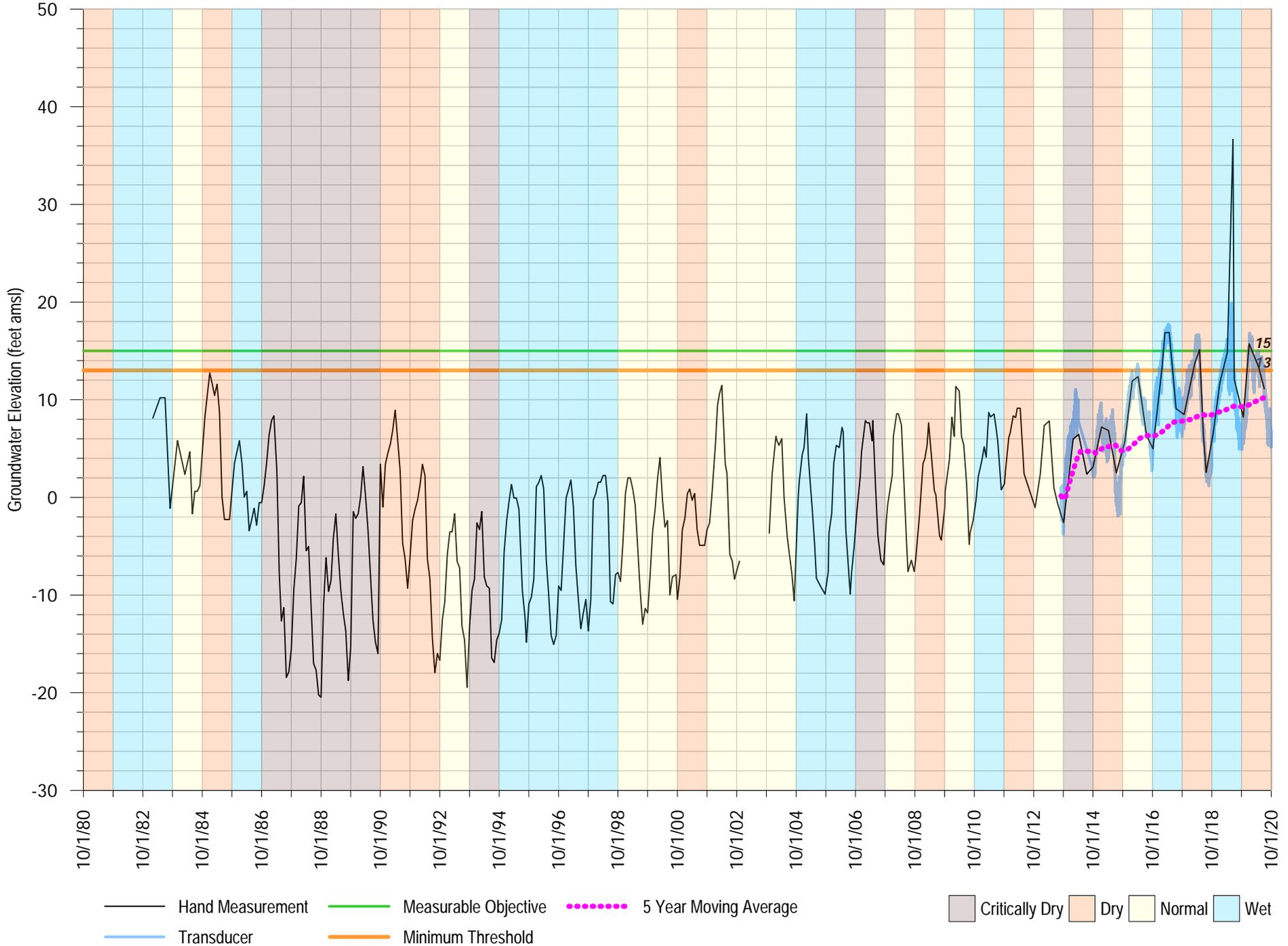
SC-8B & SC-8RB at Aptos Creek

FIGURE A-24



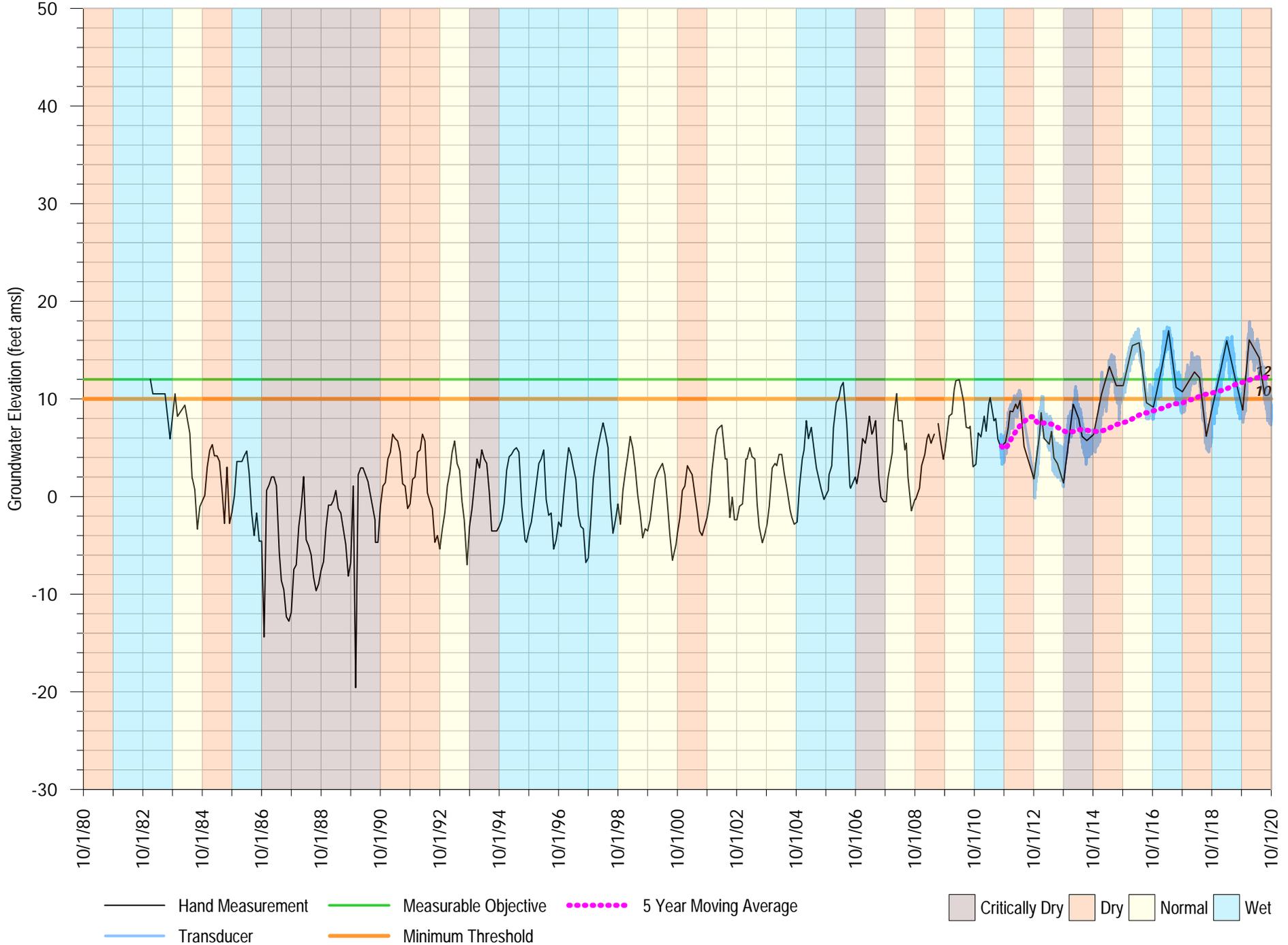
SC-5A & SC-5RA at New Brighton

FIGURE A-25



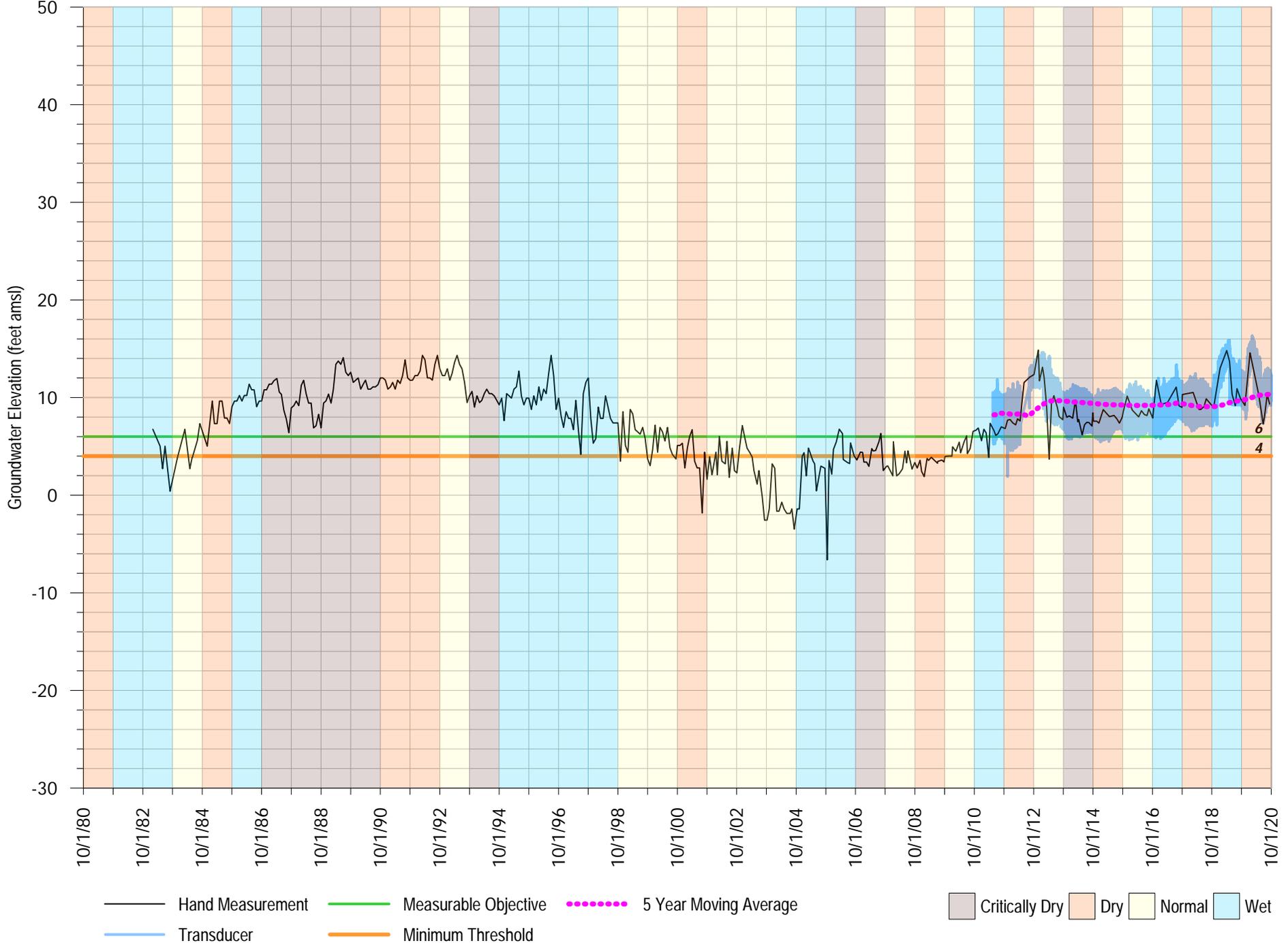
SC-3A & SC-3RA at Escalona

FIGURE A-26



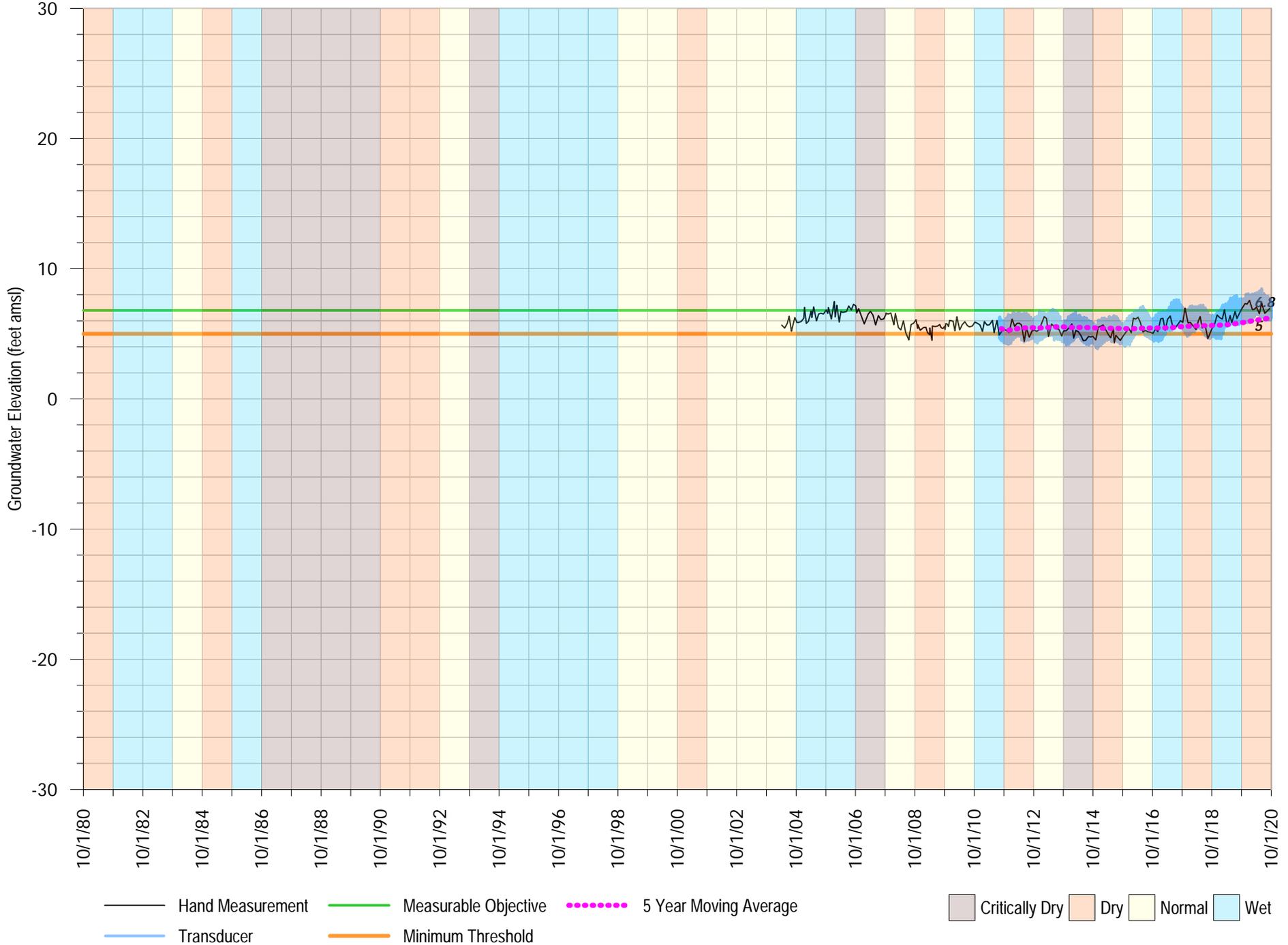
SC-1A at Prospect

FIGURE A-27



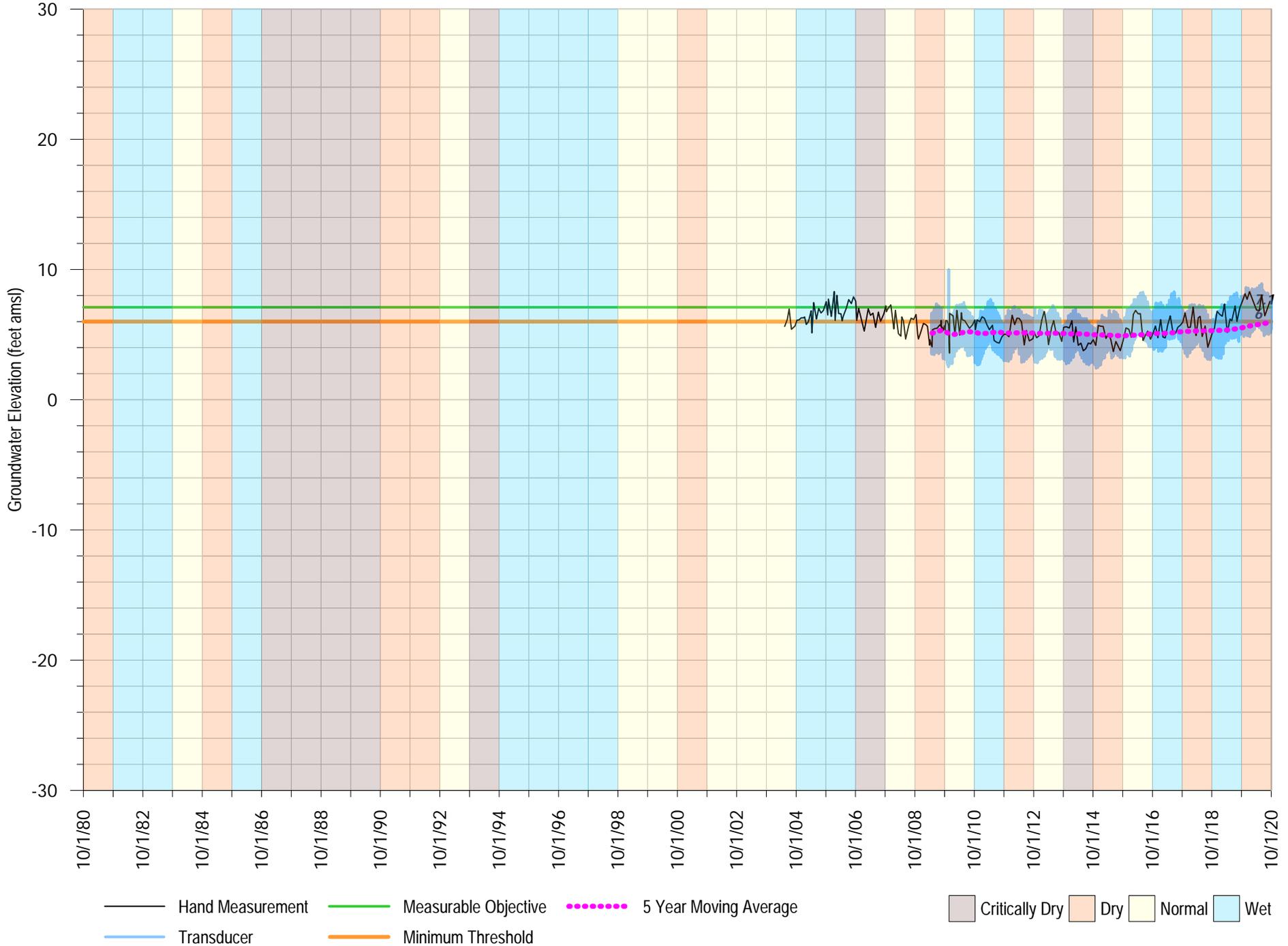
Moran Lake Medium

FIGURE A-28



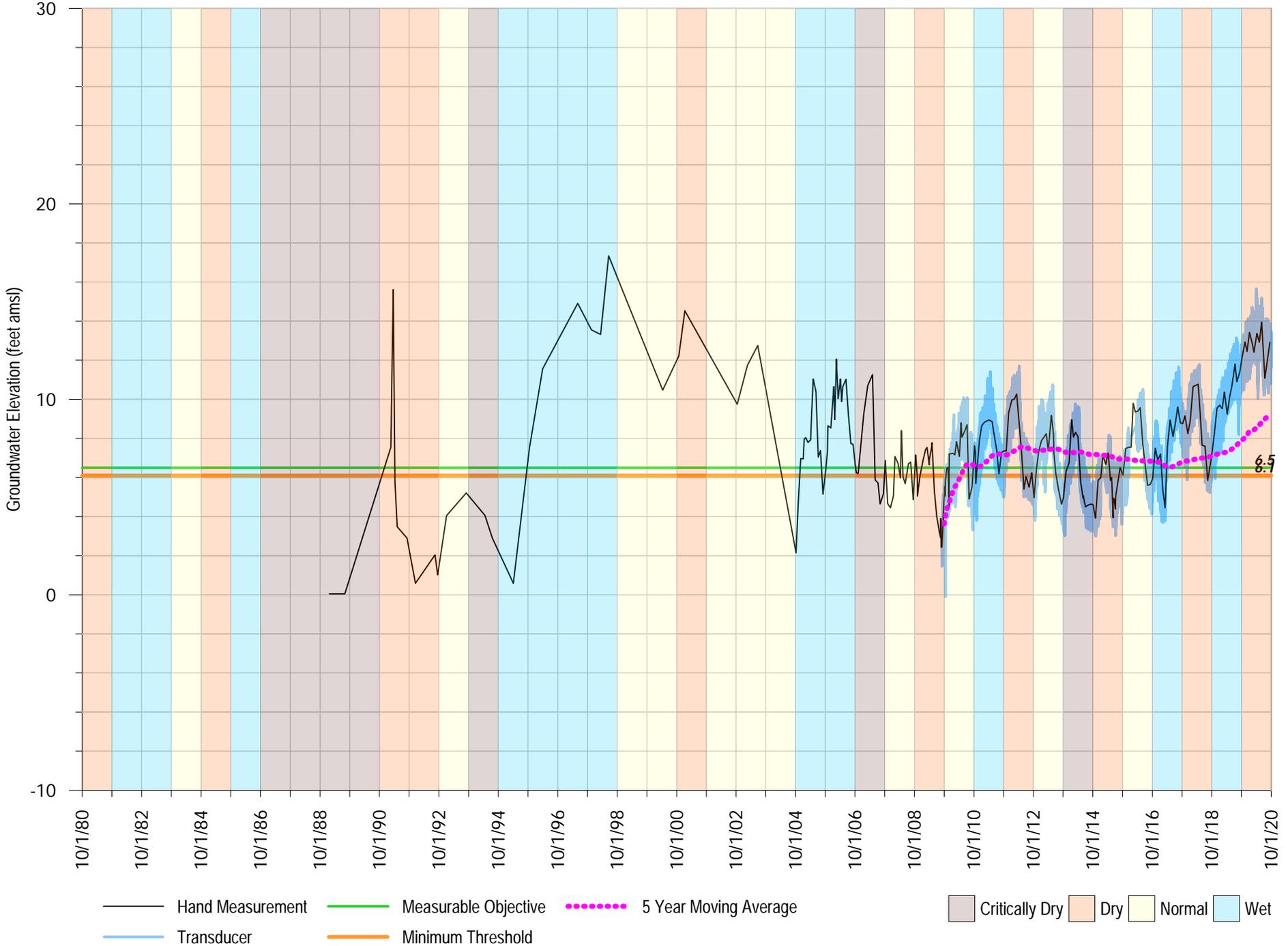
Soquel Point Medium

FIGURE A-29



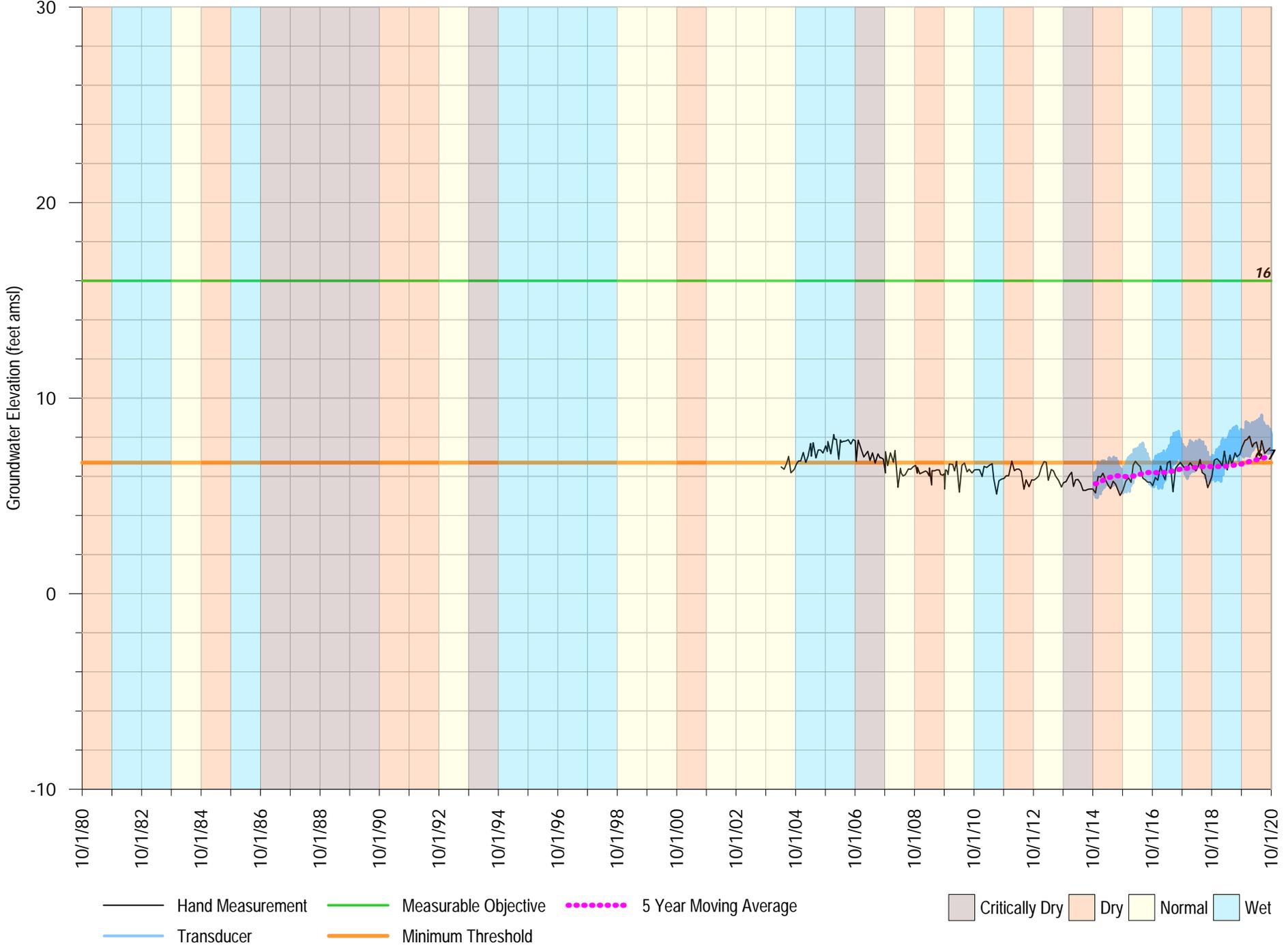
Pleasure Point Medium

FIGURE A-30



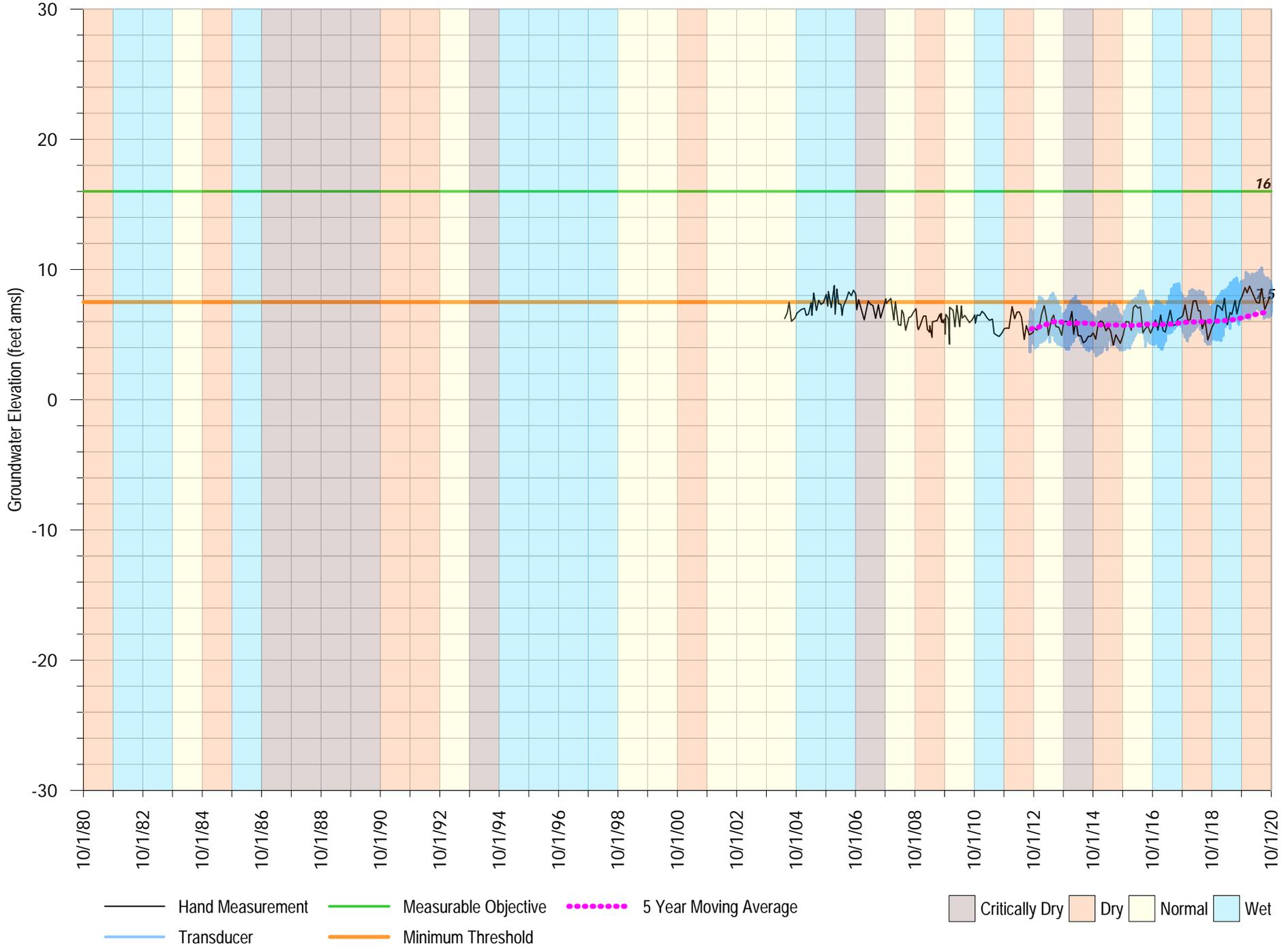
Moran Lake Deep

FIGURE A-31



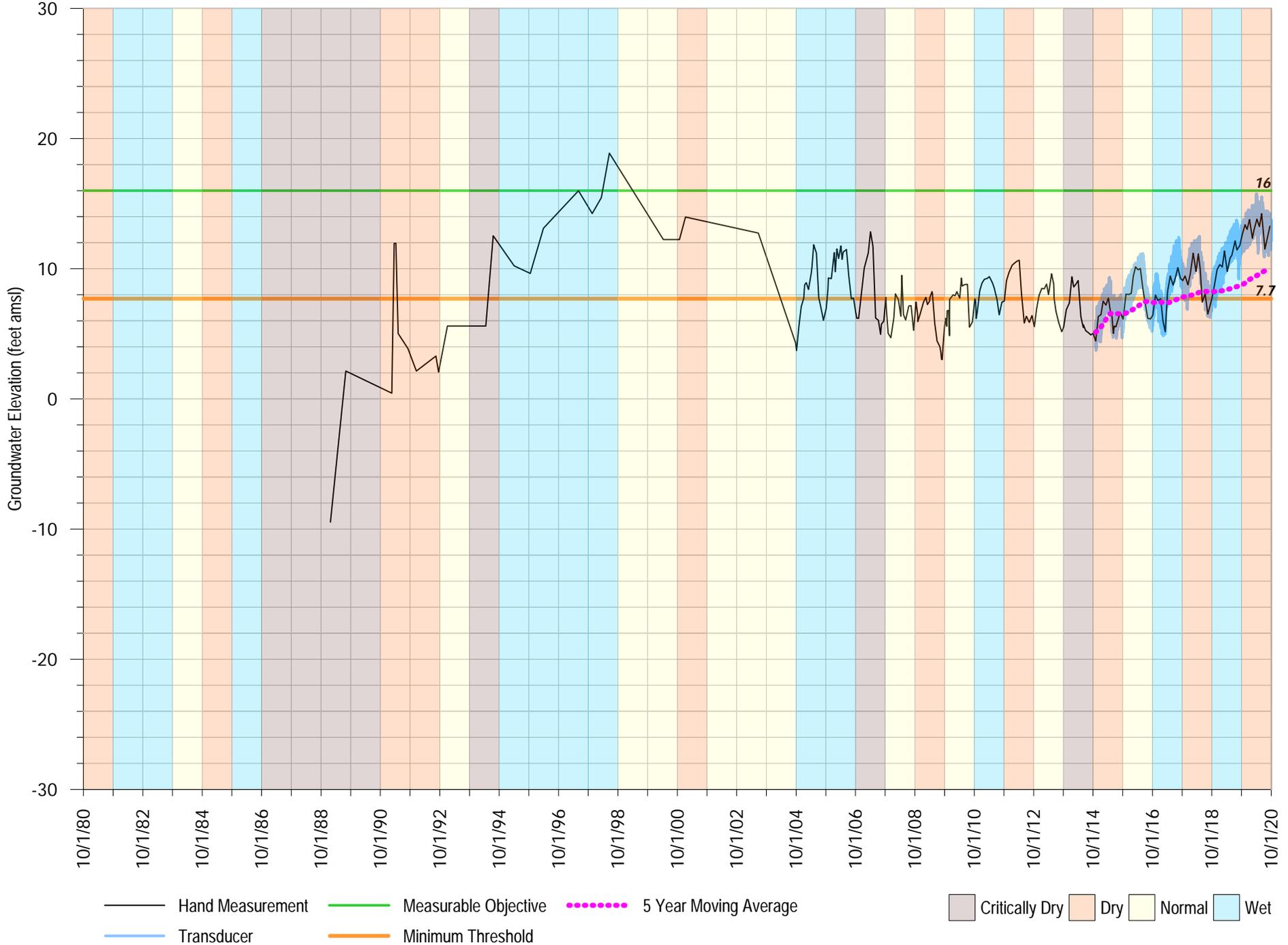
Soquel Point Deep

FIGURE A-32



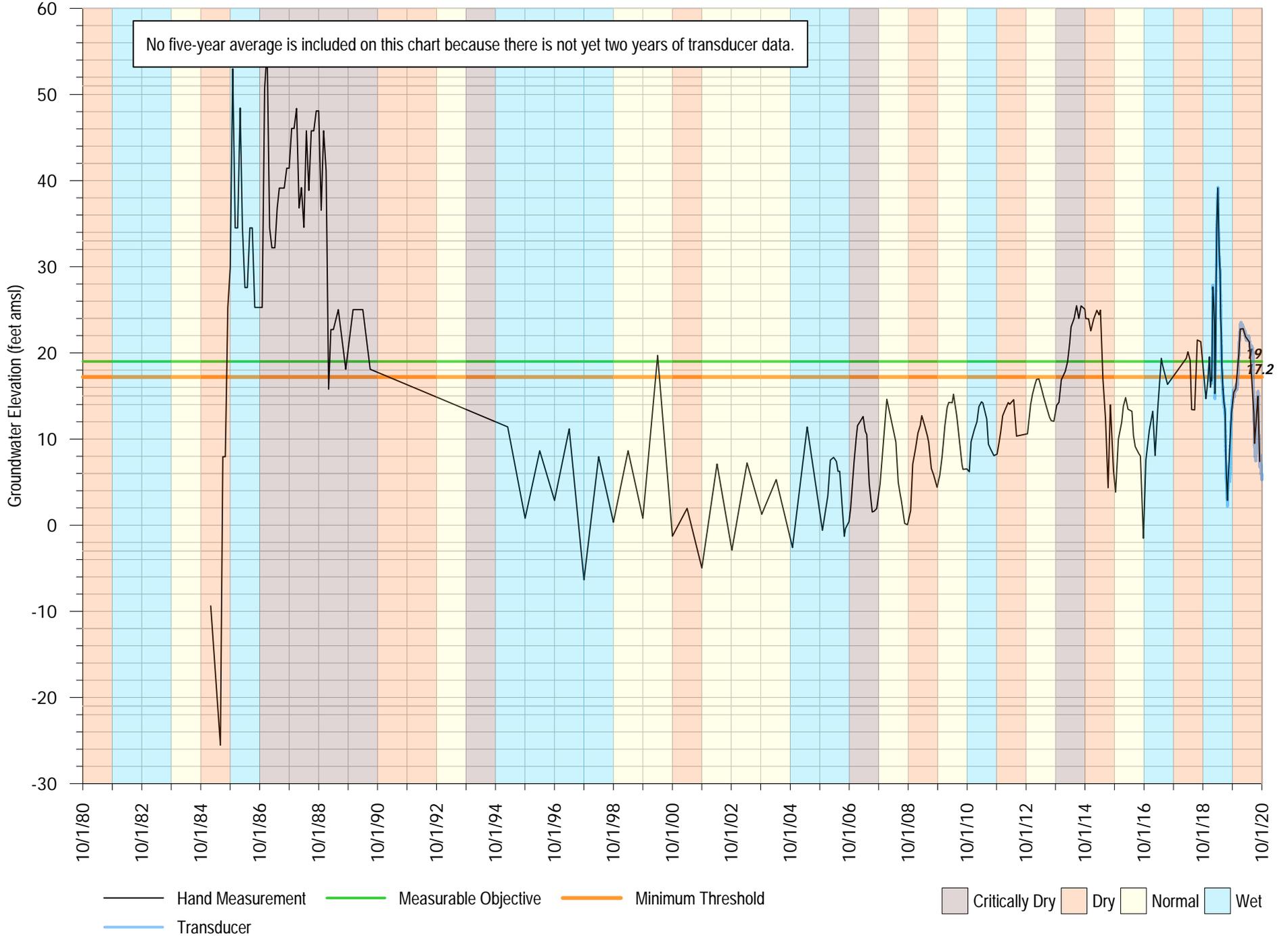
Pleasure Point Deep

FIGURE A-33



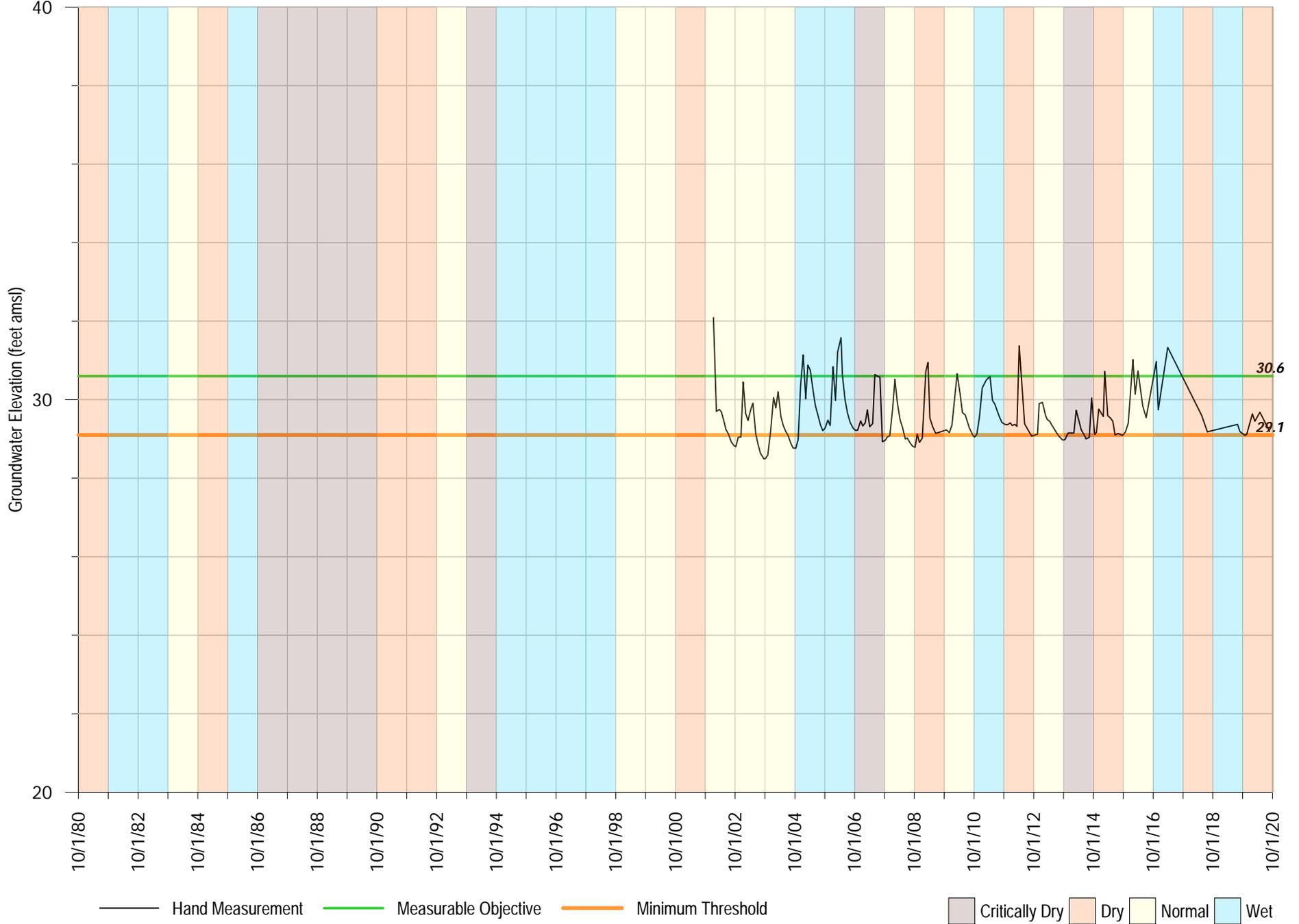
SC-13A at Garnet

FIGURE A-34



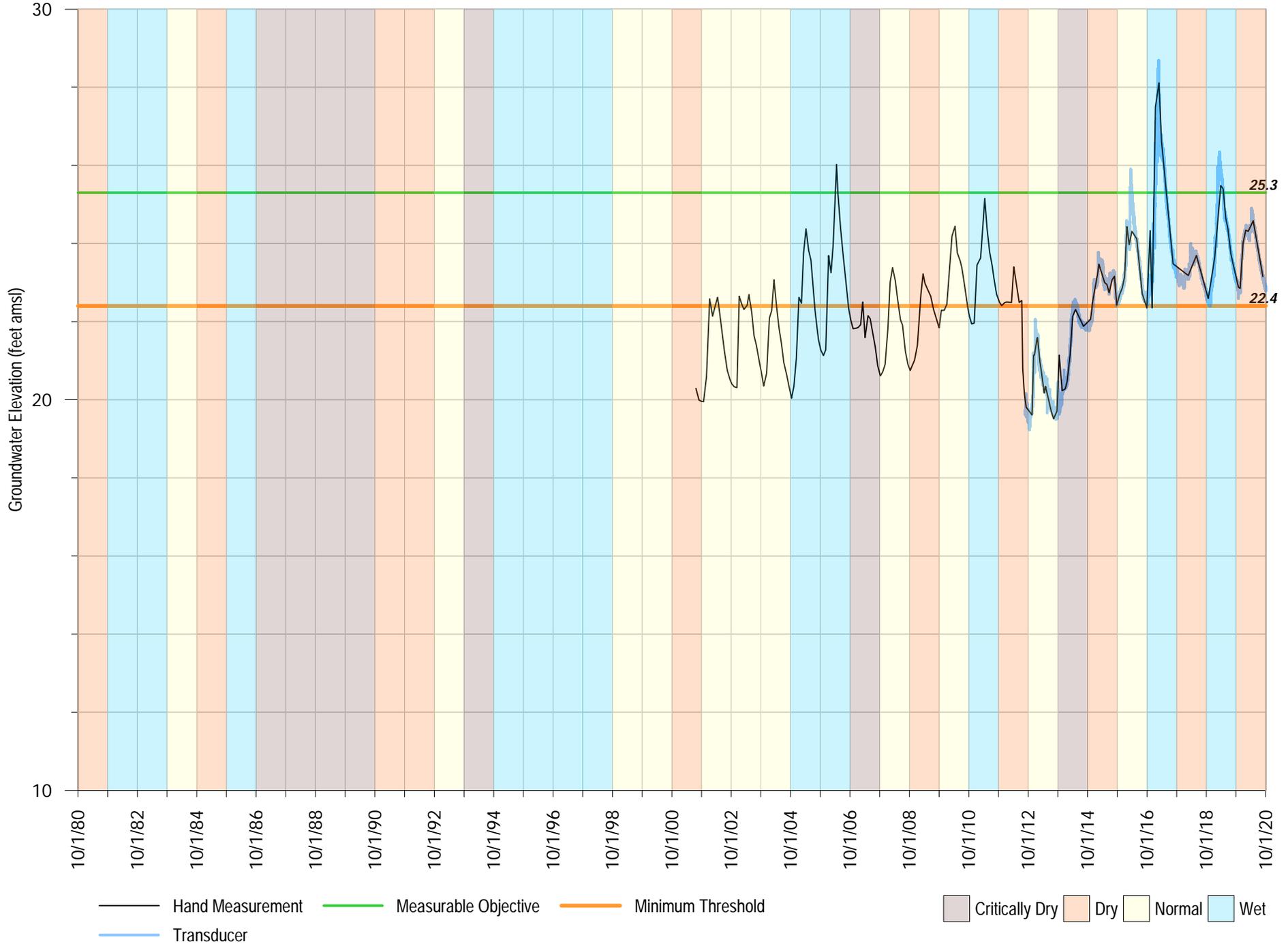
Balogh Shallow Well

FIGURE A-35



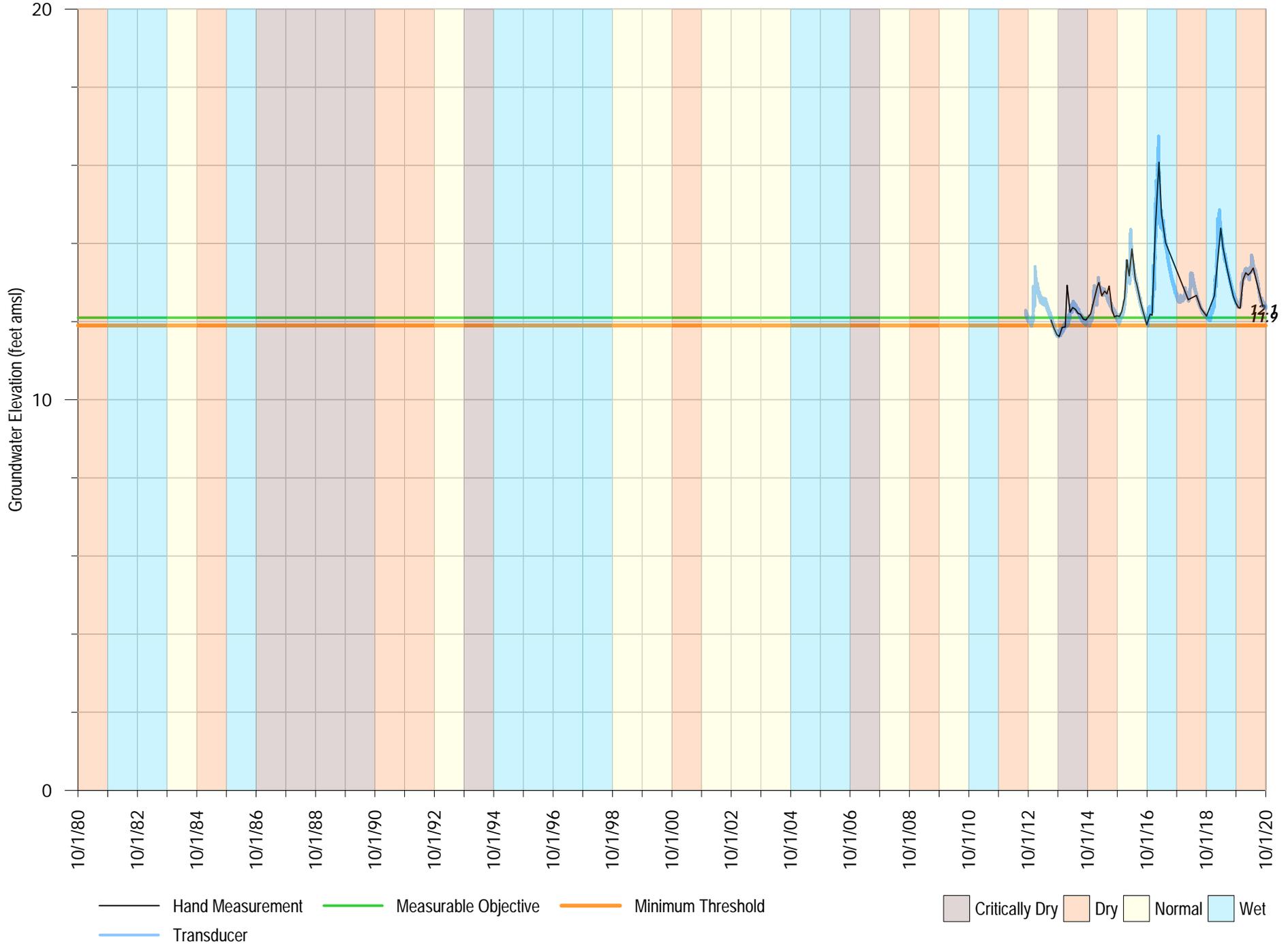
Main Street Shallow Well 1

FIGURE A-36



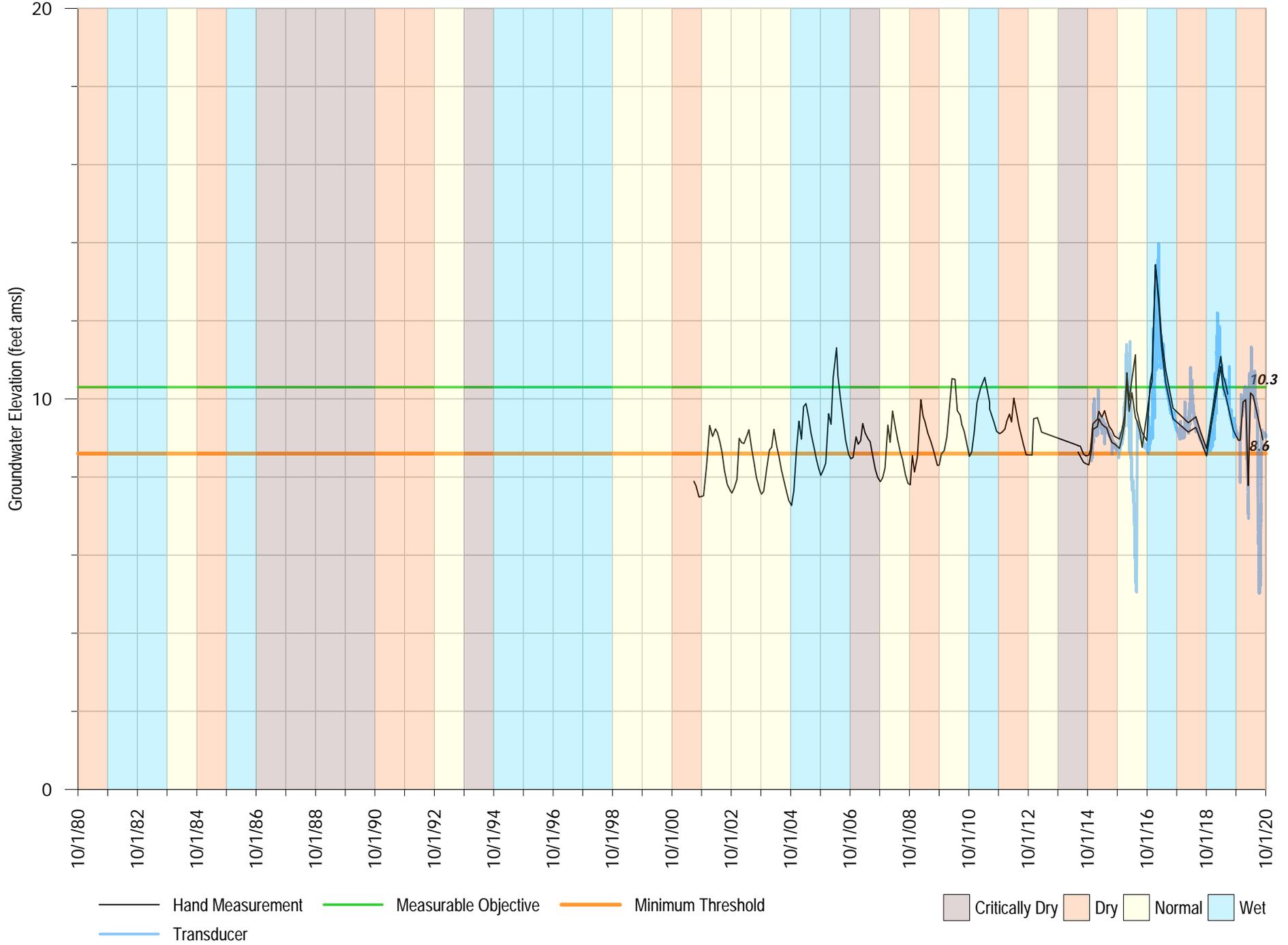
Soquel Wharf Shallow Well

FIGURE A-37



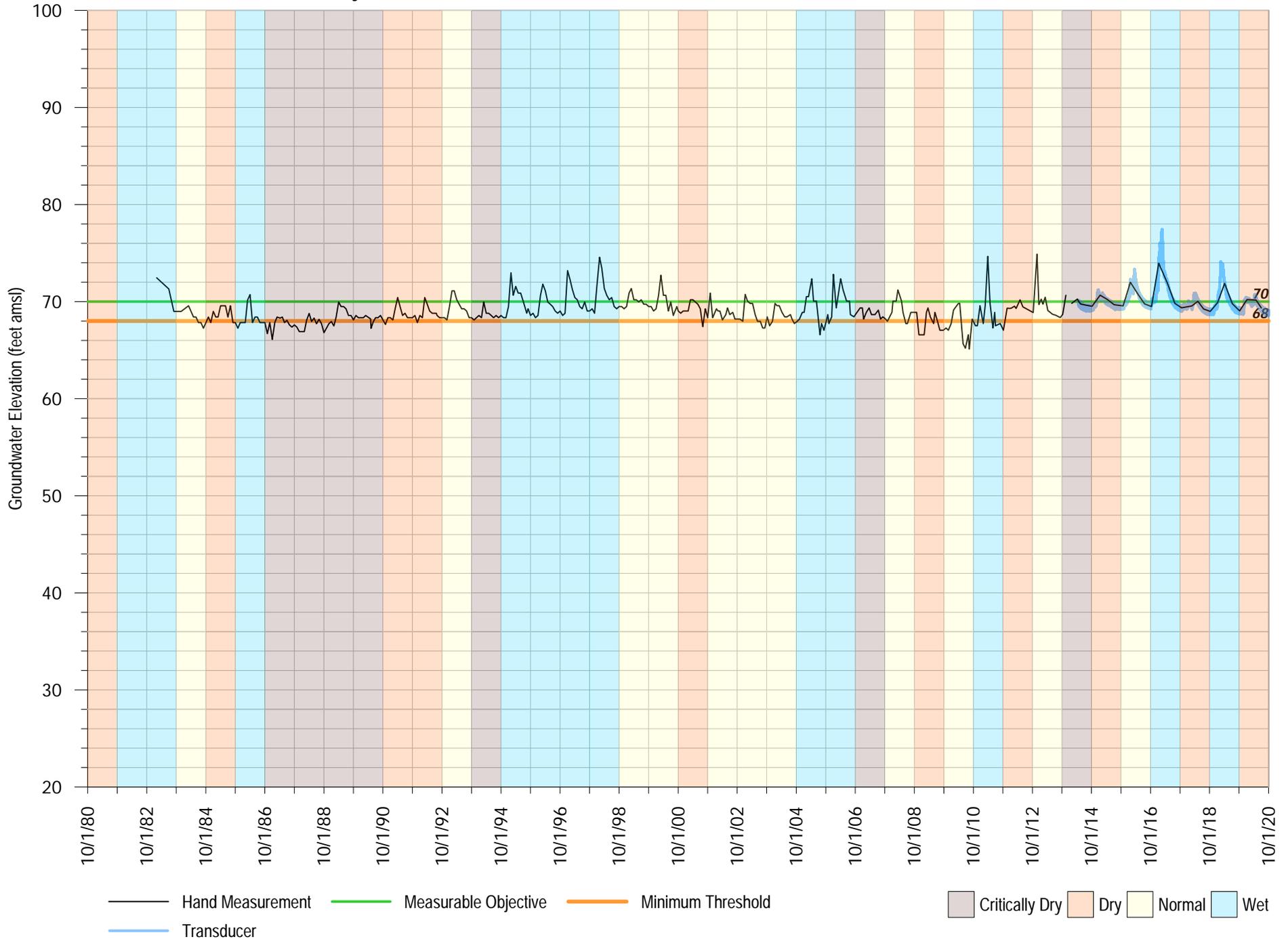
Nob Hill Shallow Well 1 & Nob Hill Shallow Well 2

FIGURE A-38



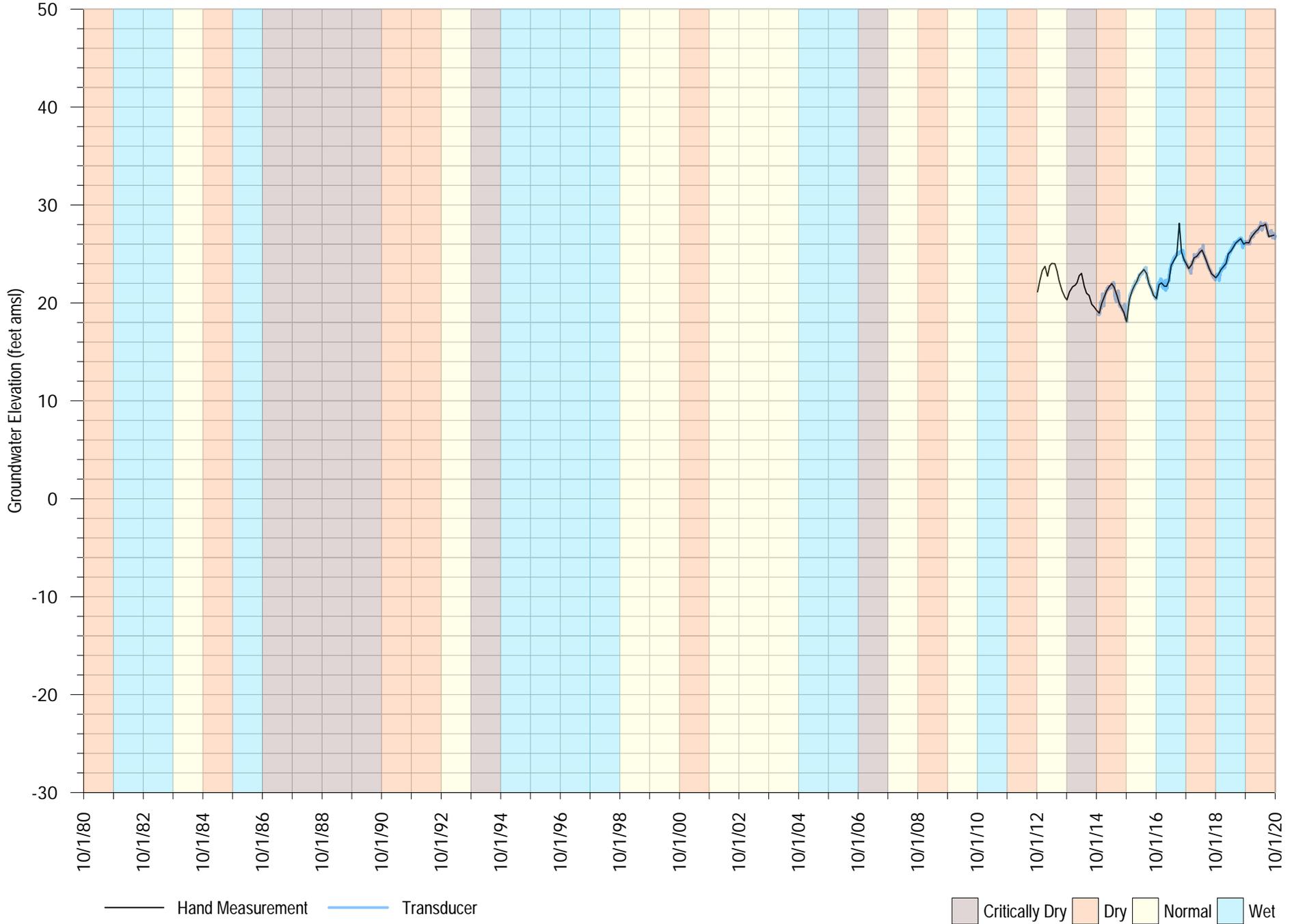
SC-10A & SC-10RA at Cherryvale

FIGURE A-39



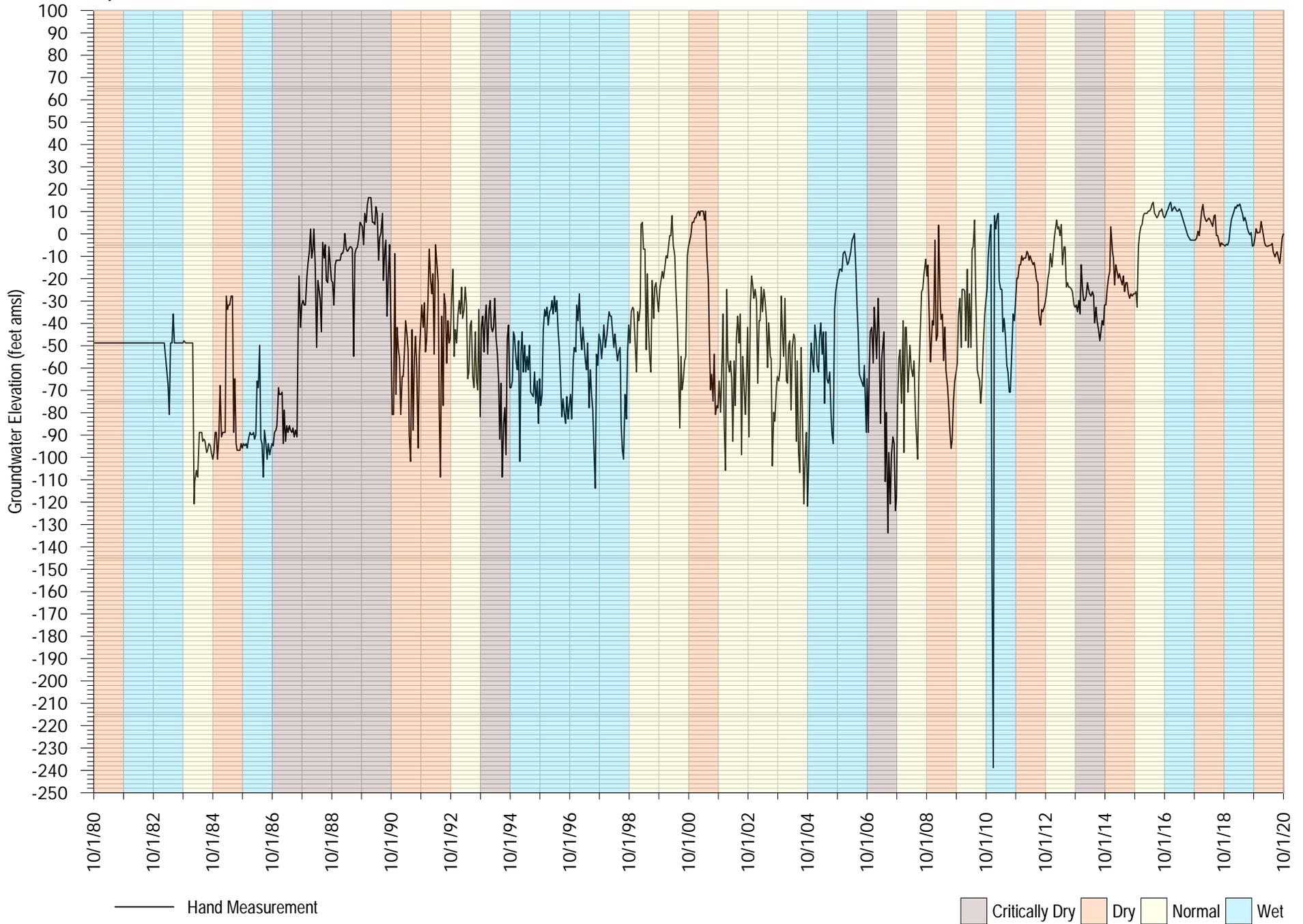
30th Ave Shallow

FIGURE A-40



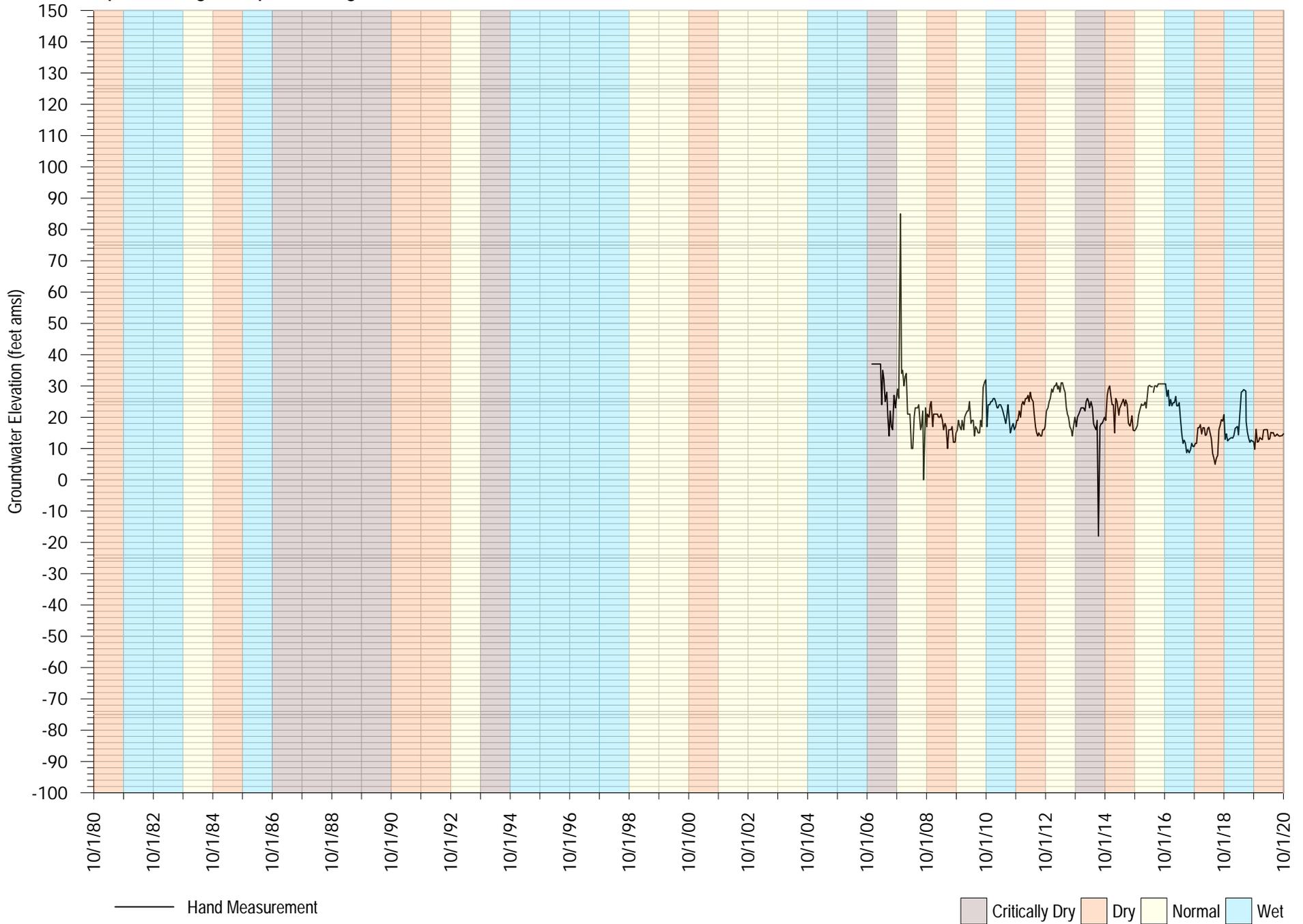
Aptos Creek

FIGURE A-41



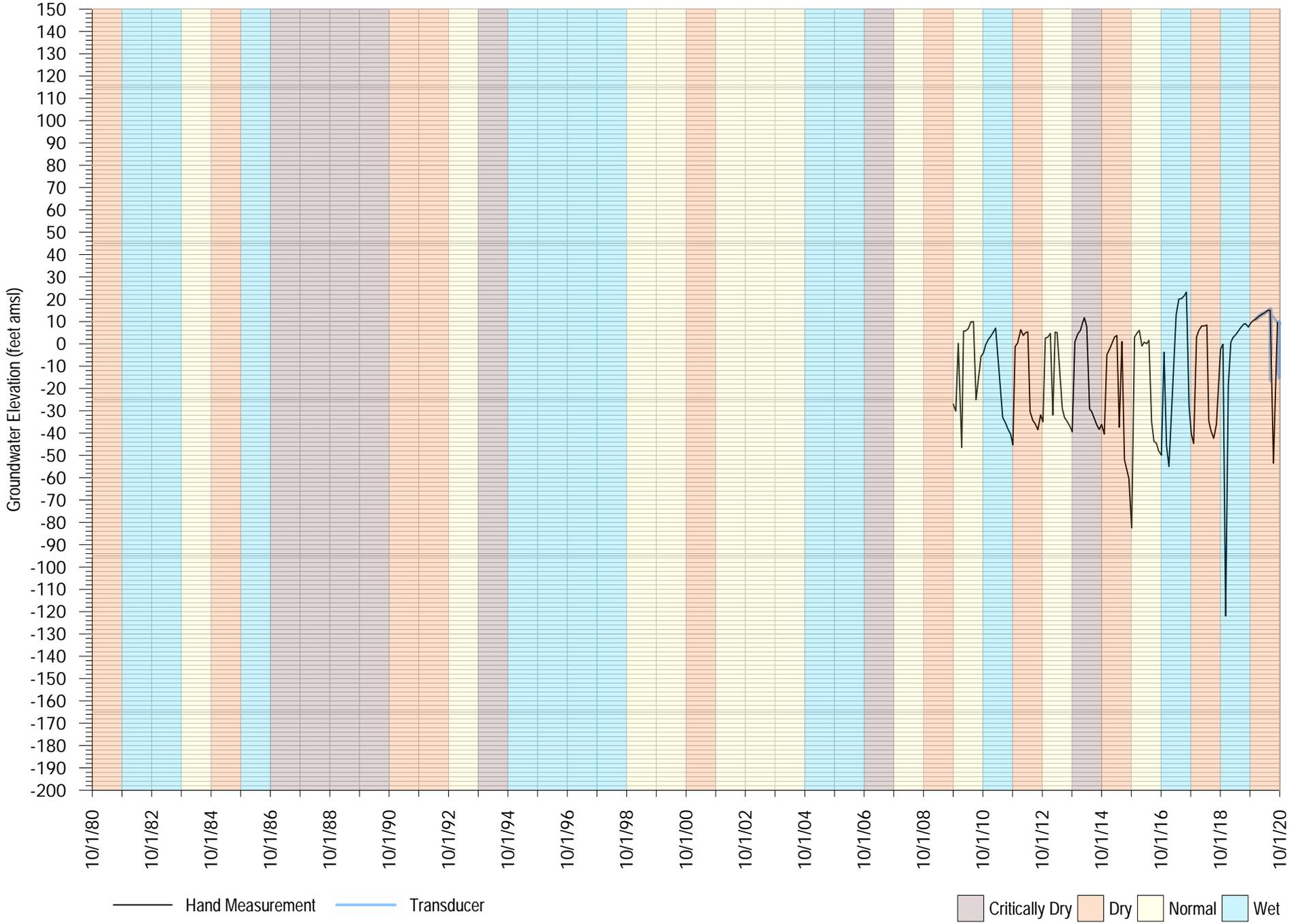
Aptos Jr High & Aptos Jr High 2

FIGURE A-42



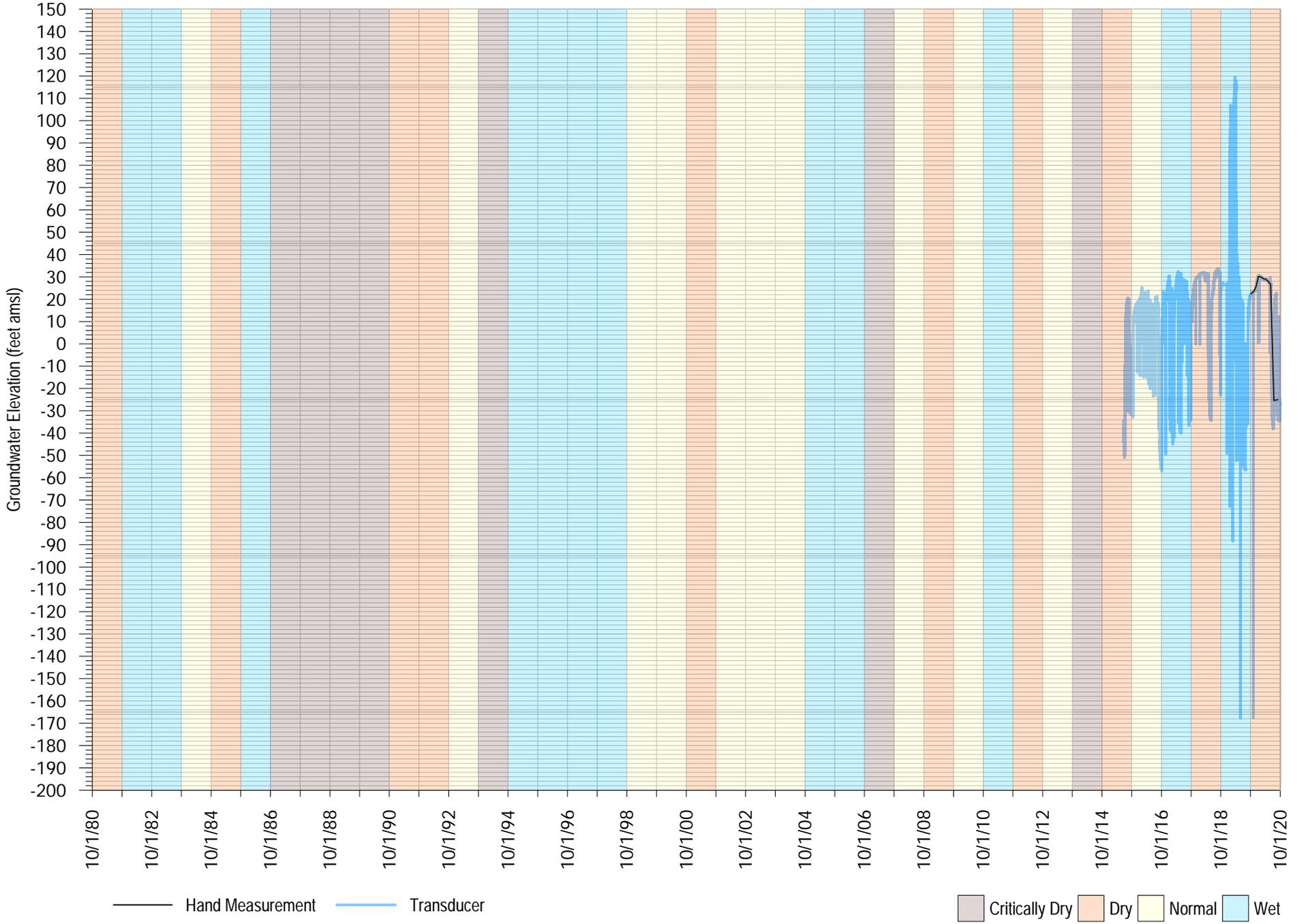
Beltz 10

FIGURE A-43



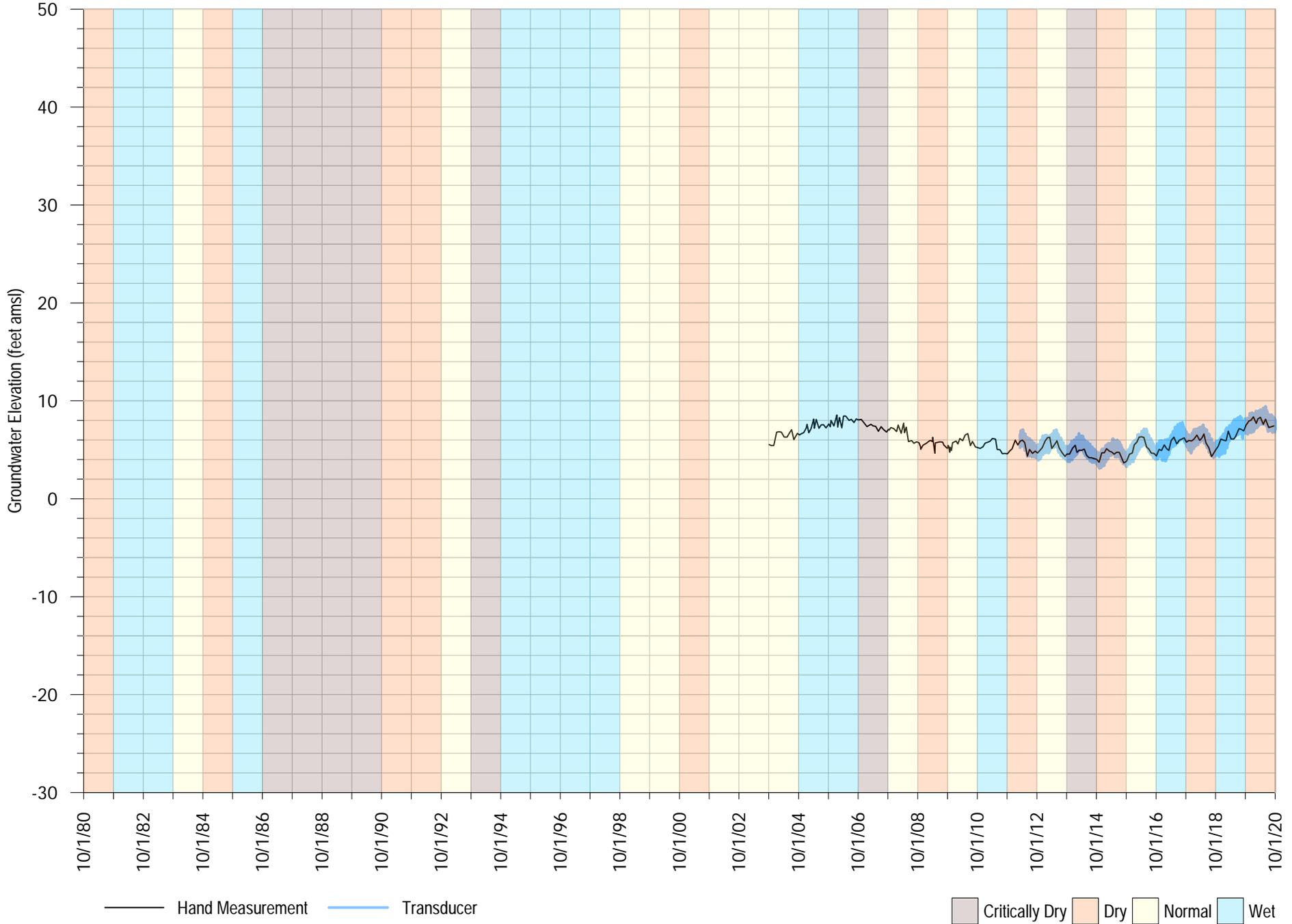
Beltz 12

FIGURE A-44



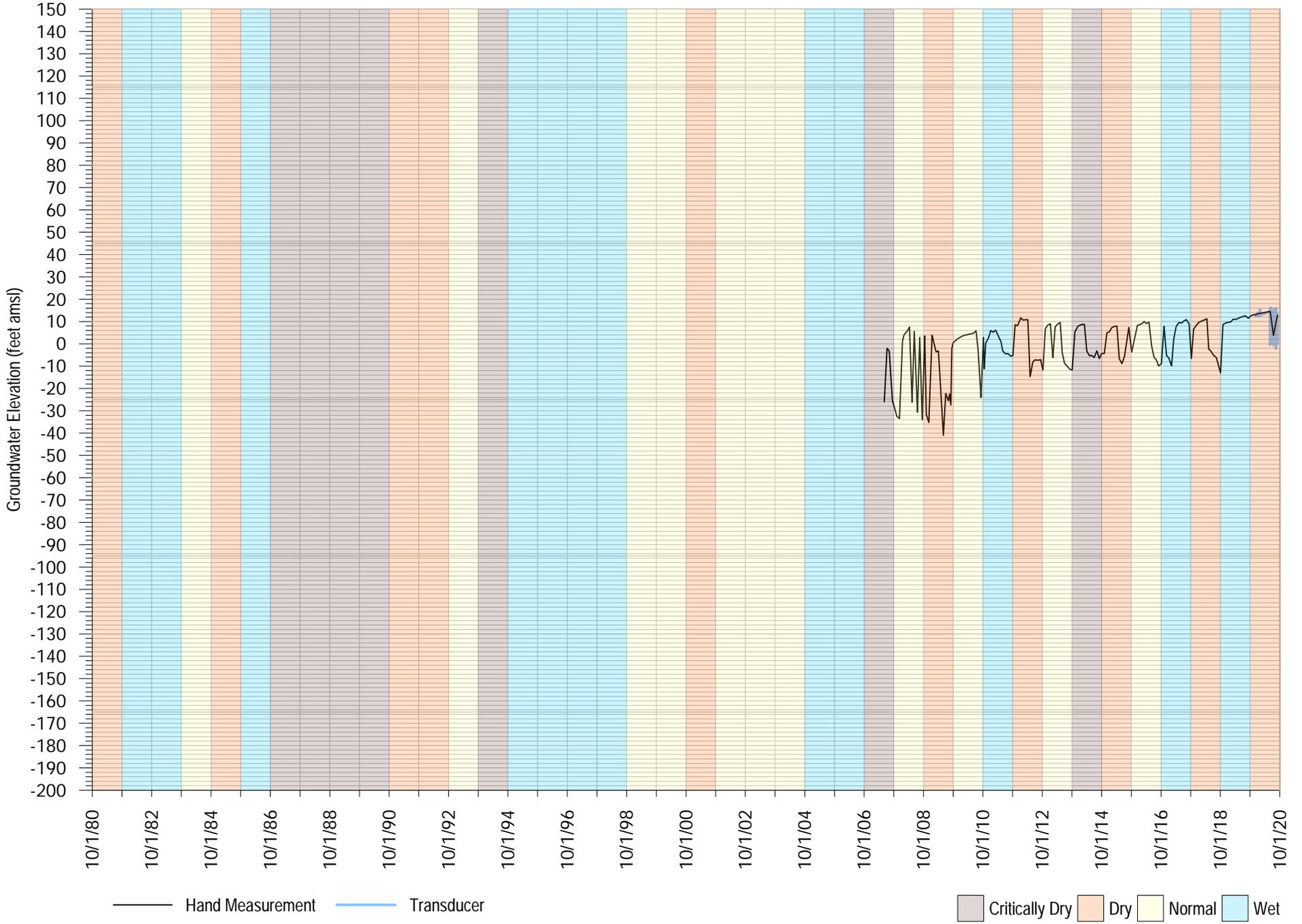
Beltz 2

FIGURE A-45



Belt 8

FIGURE A-46

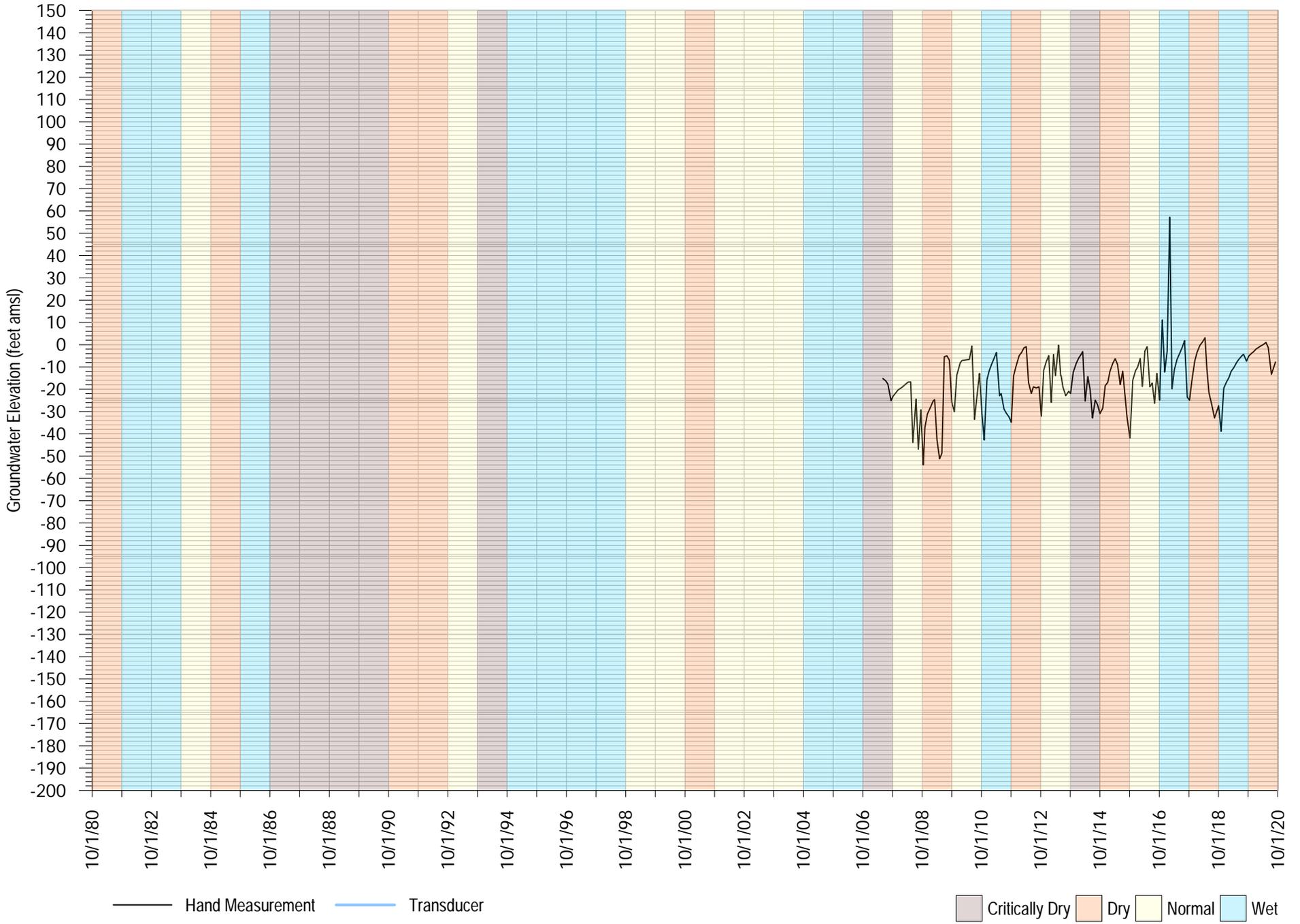


— Hand Measurement — Transducer

■ Critically Dry ■ Dry ■ Normal ■ Wet

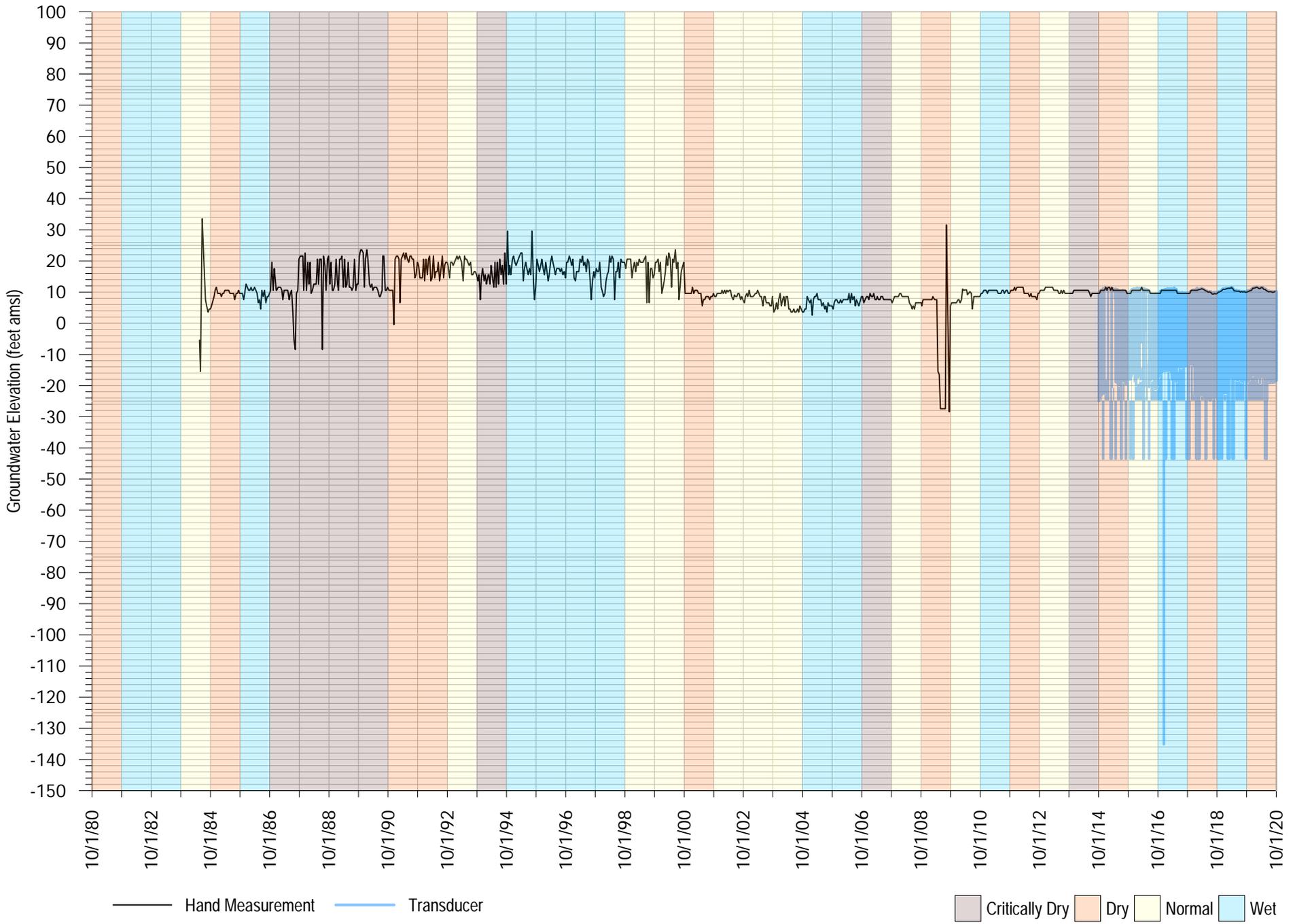
Belt 9

FIGURE A-47



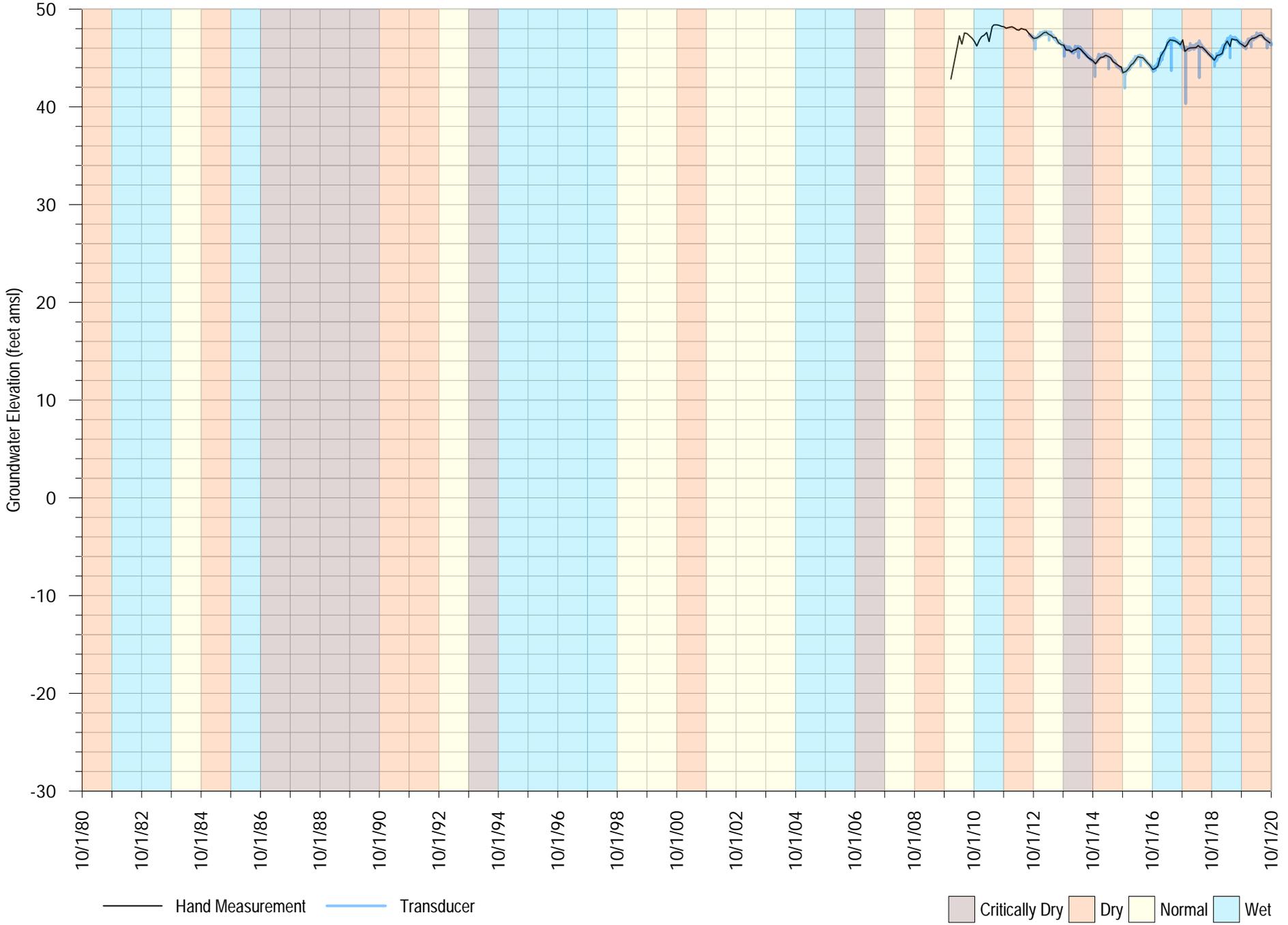
Bonita

FIGURE A-48



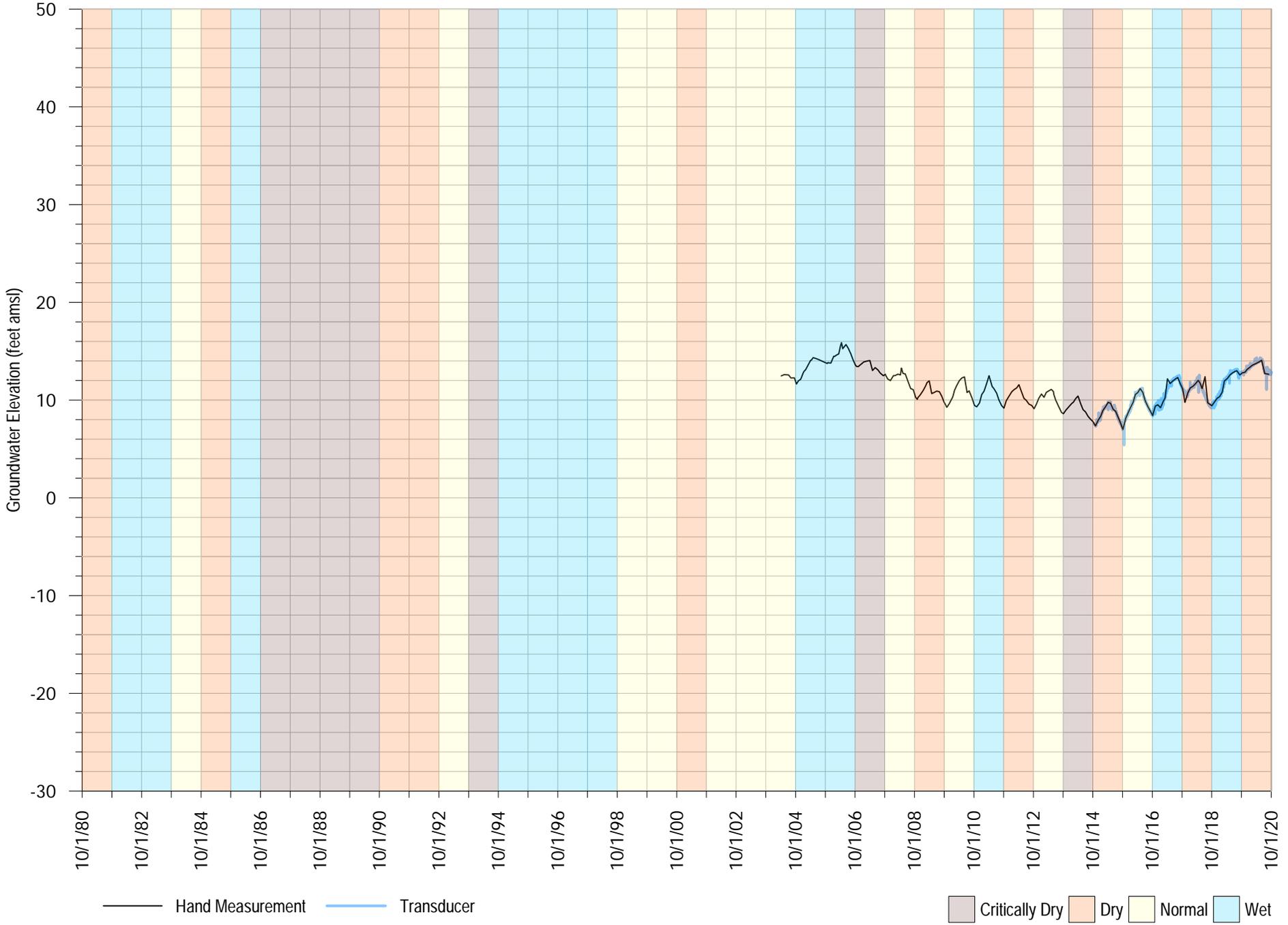
Coffee Lane Deep

FIGURE A-49



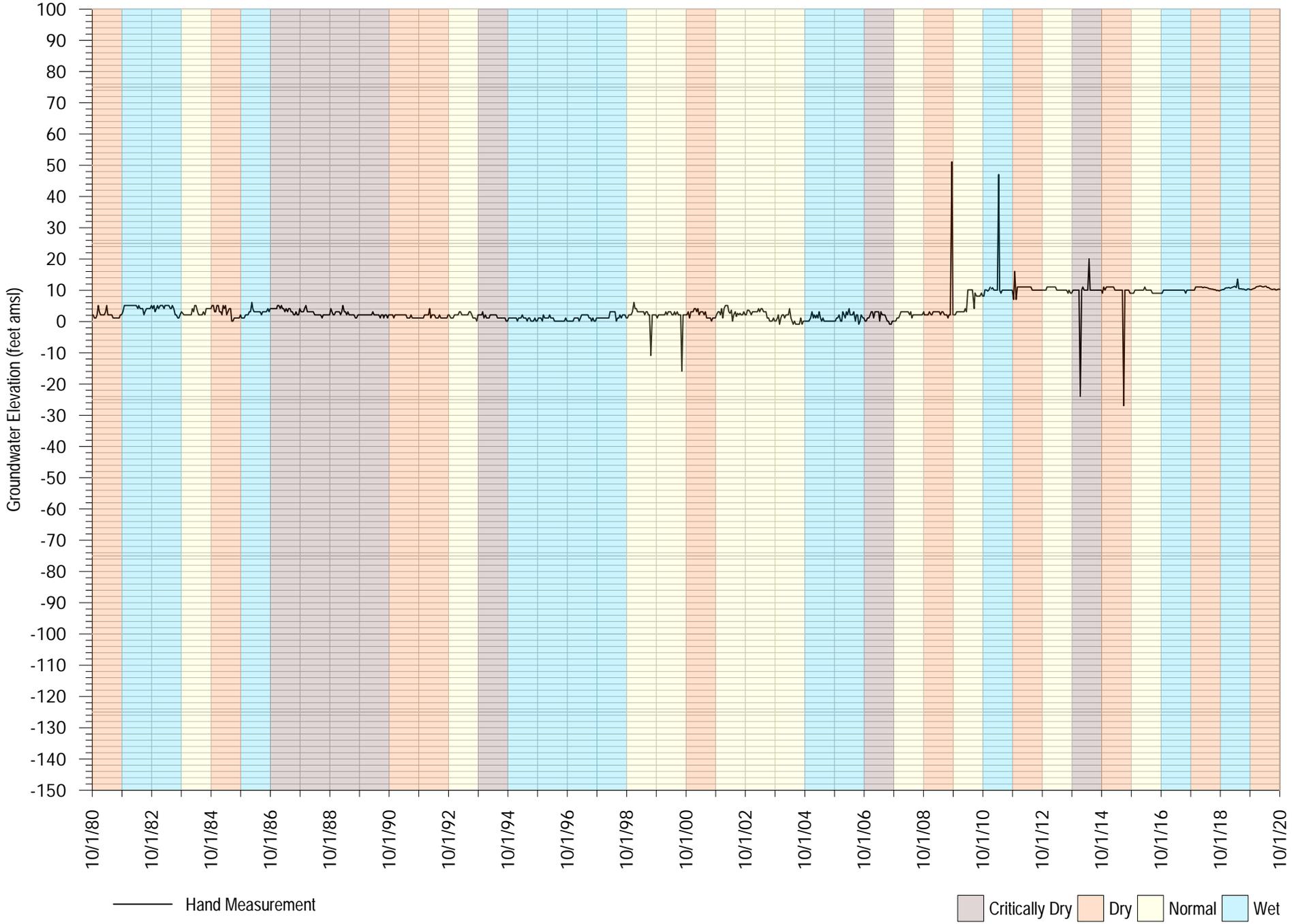
Corcoran Deep

FIGURE A-50



Country Club

FIGURE A-51

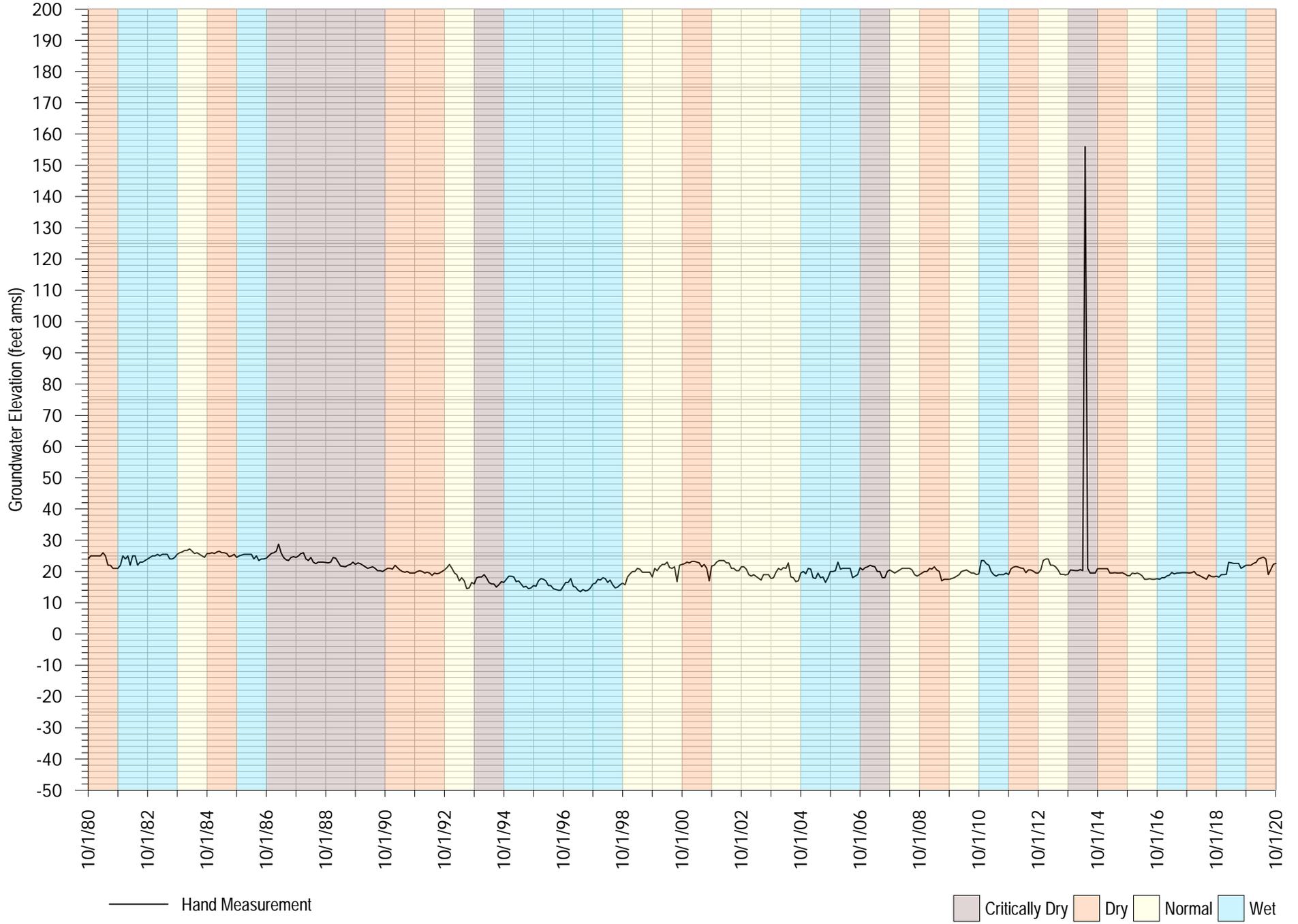


— Hand Measurement

Critically Dry Dry Normal Wet

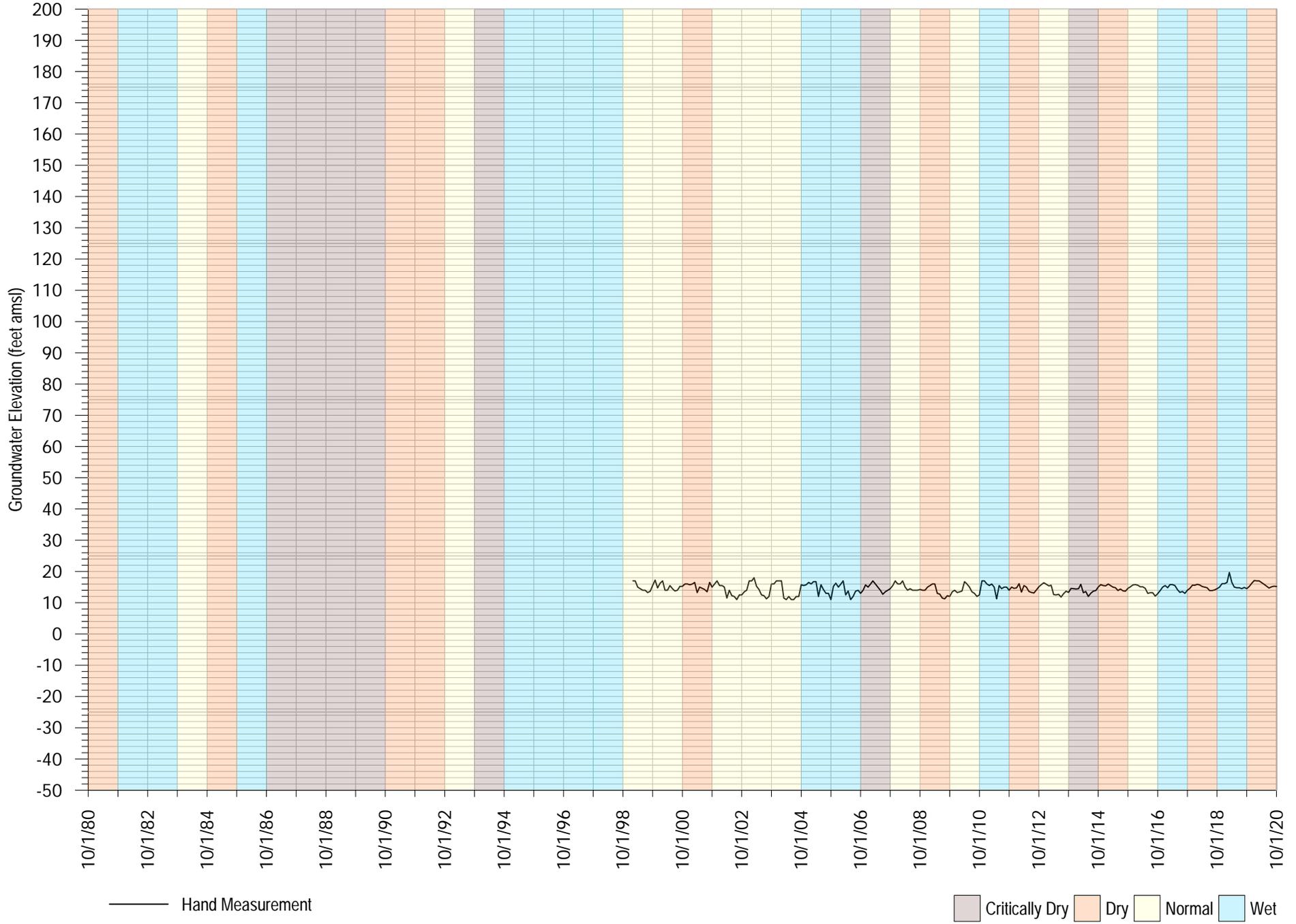
Rob Roy 10

FIGURE A-52



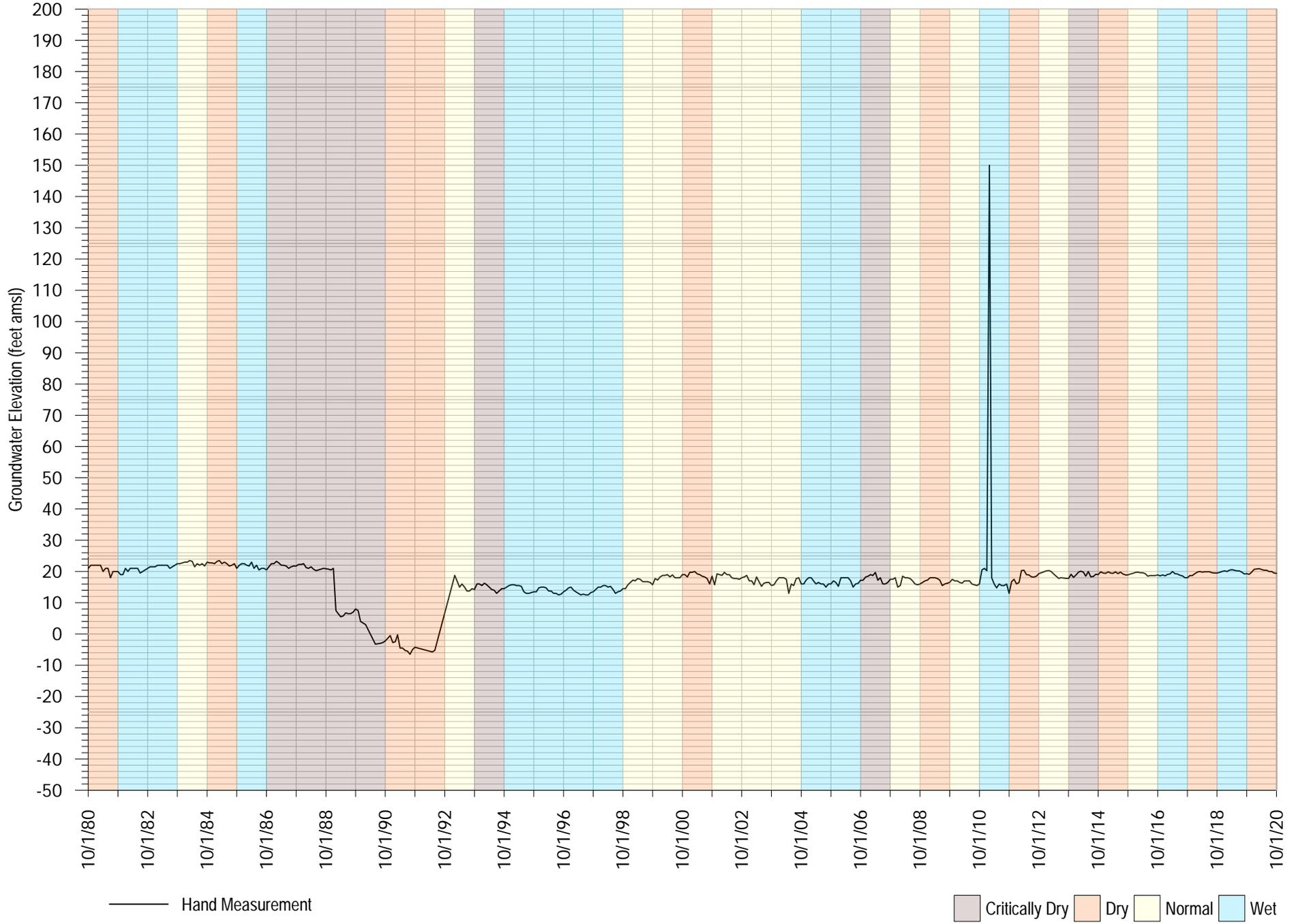
Rob Roy 12

FIGURE A-53



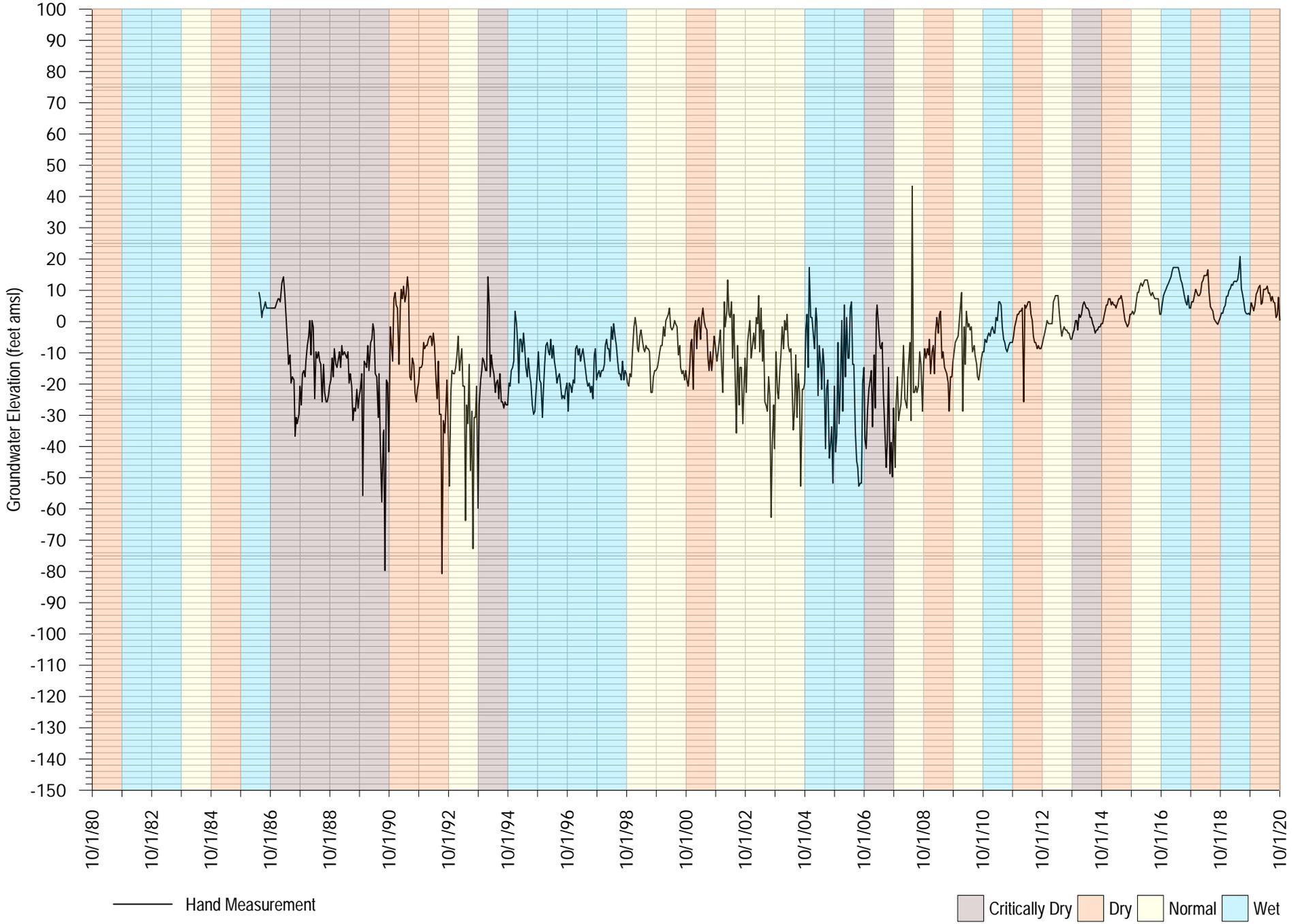
Rob Roy 4

FIGURE A-54



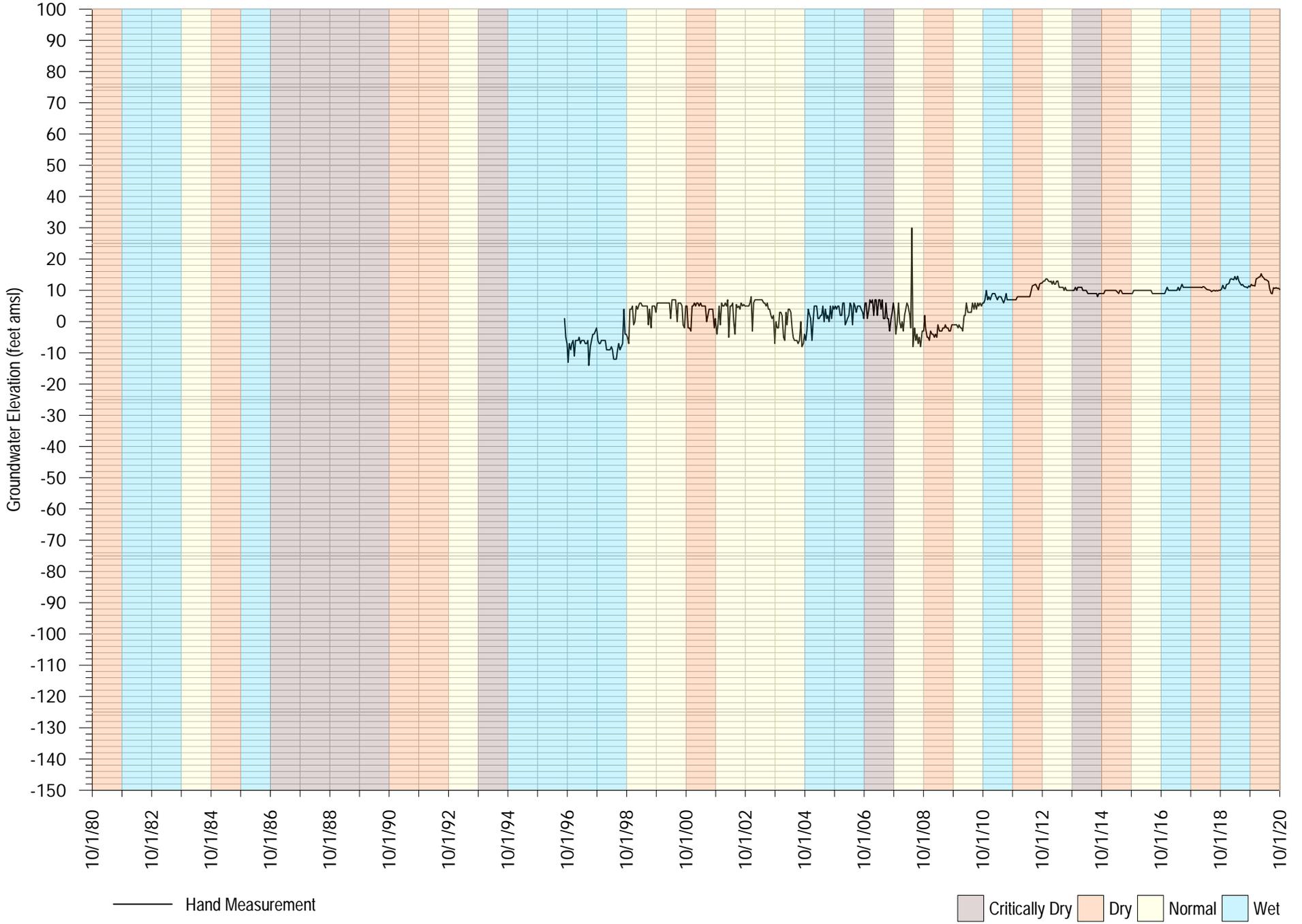
Estates

FIGURE A-55



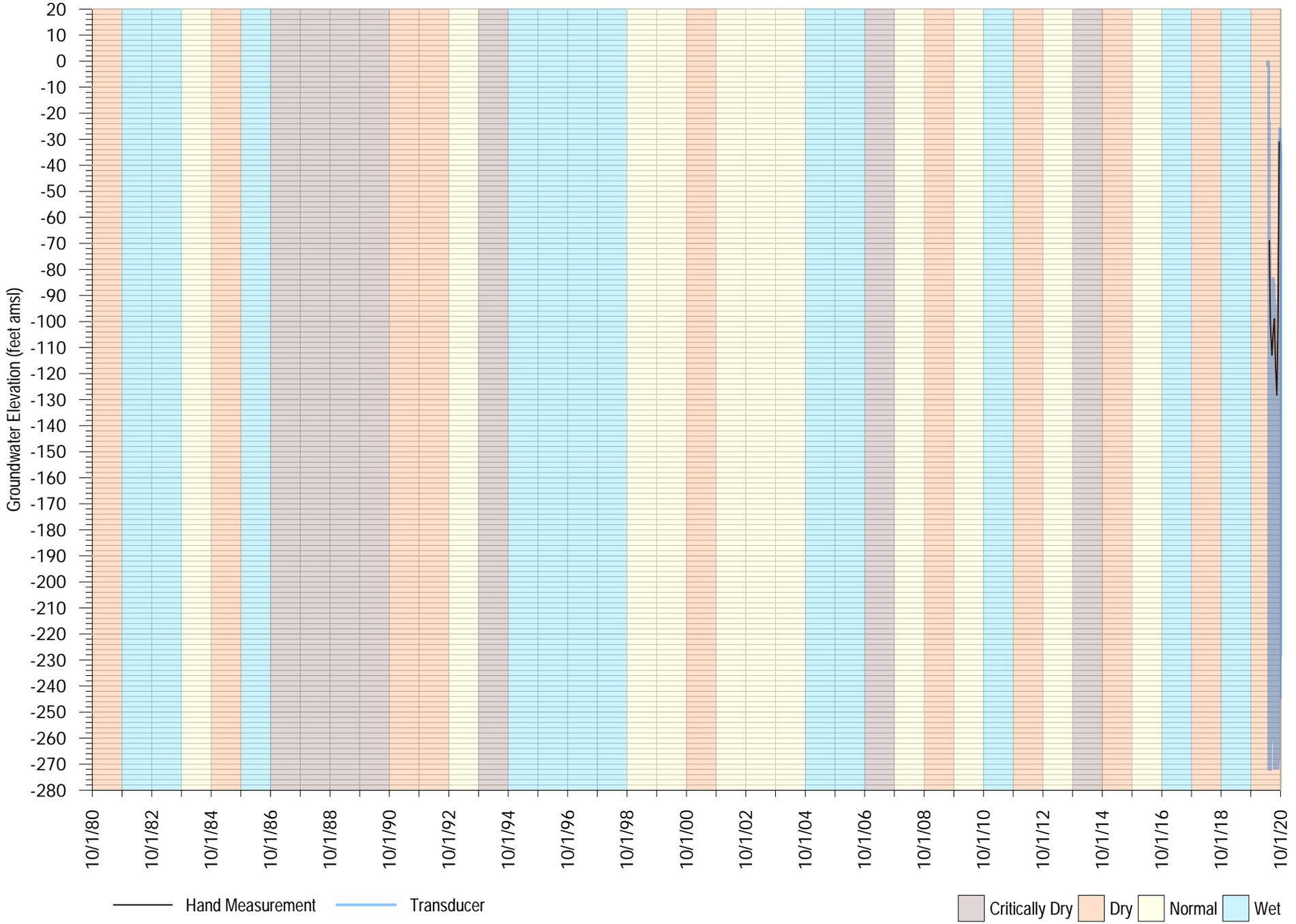
Garnet

FIGURE A-56



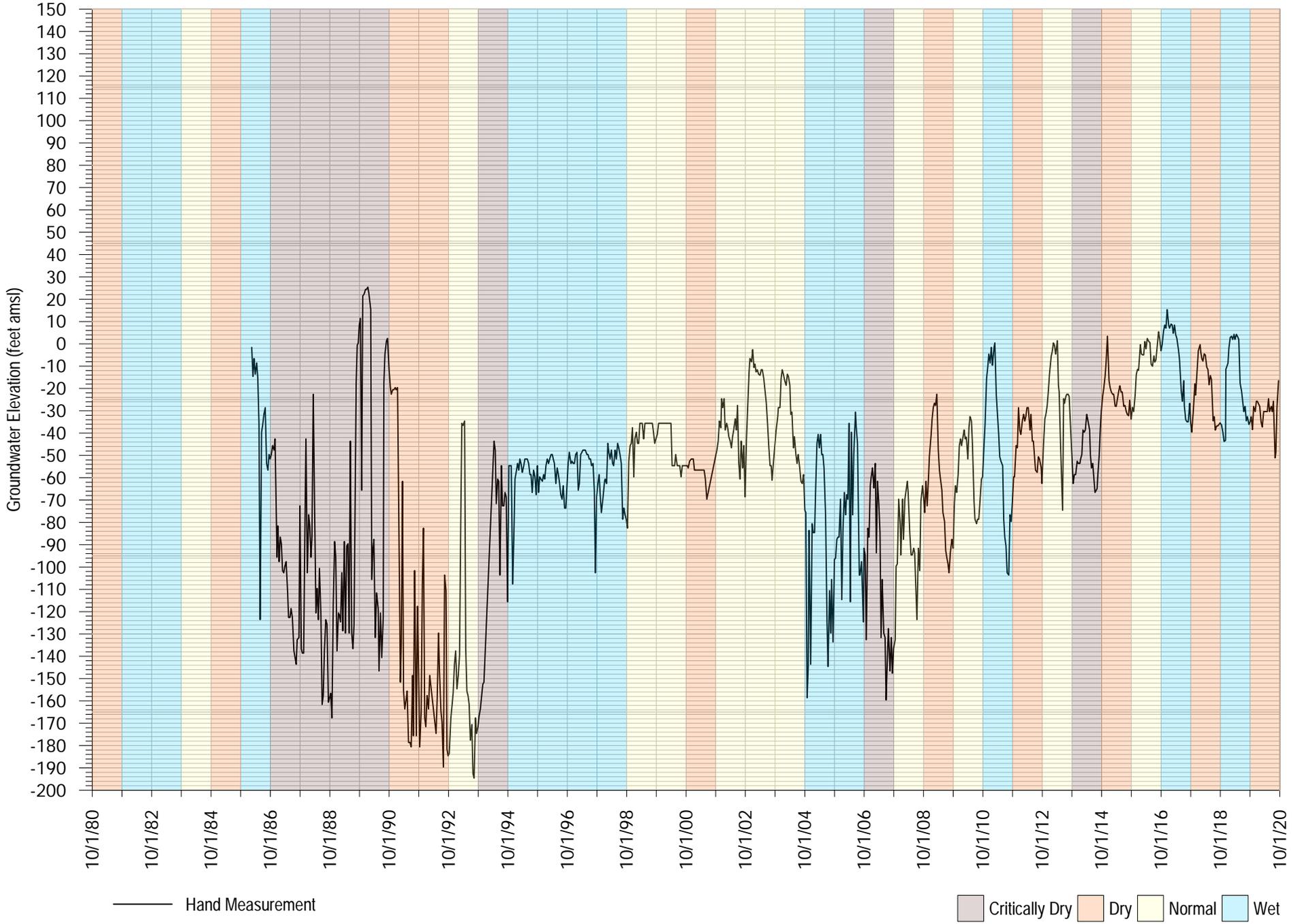
Granite Way

FIGURE A-57



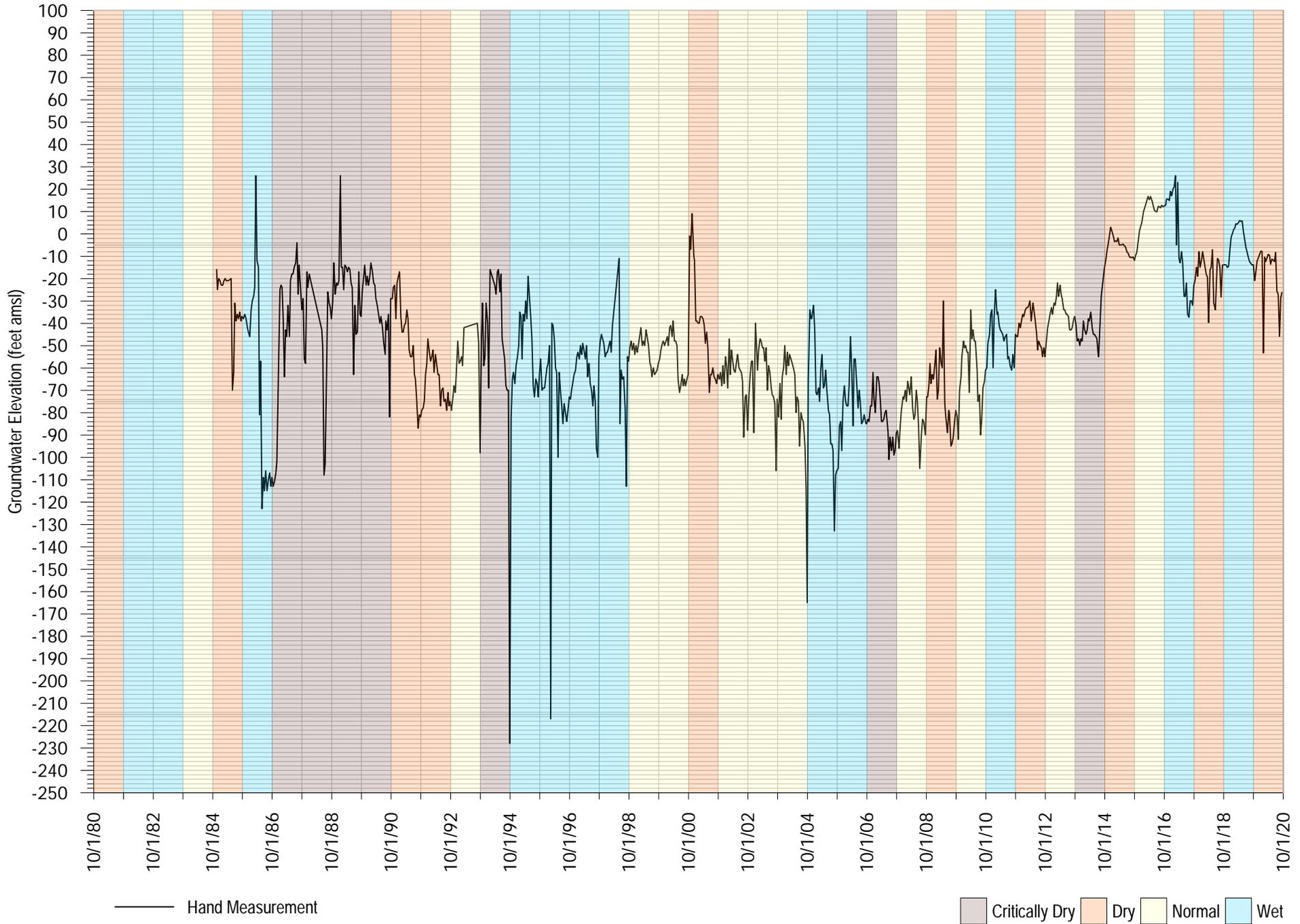
Ledyard

FIGURE A-58



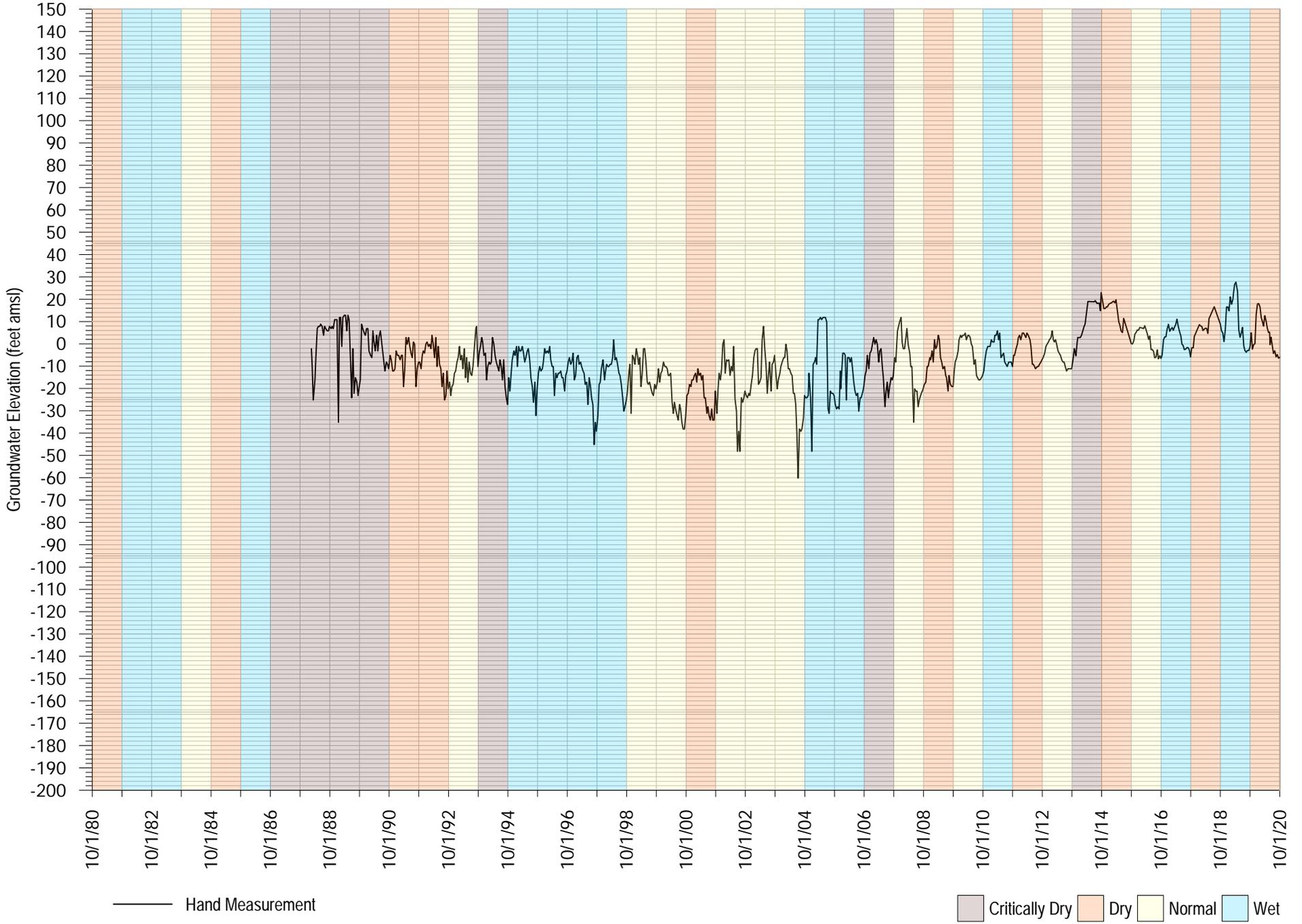
Madeline

FIGURE A-59



Main Street

FIGURE A-60

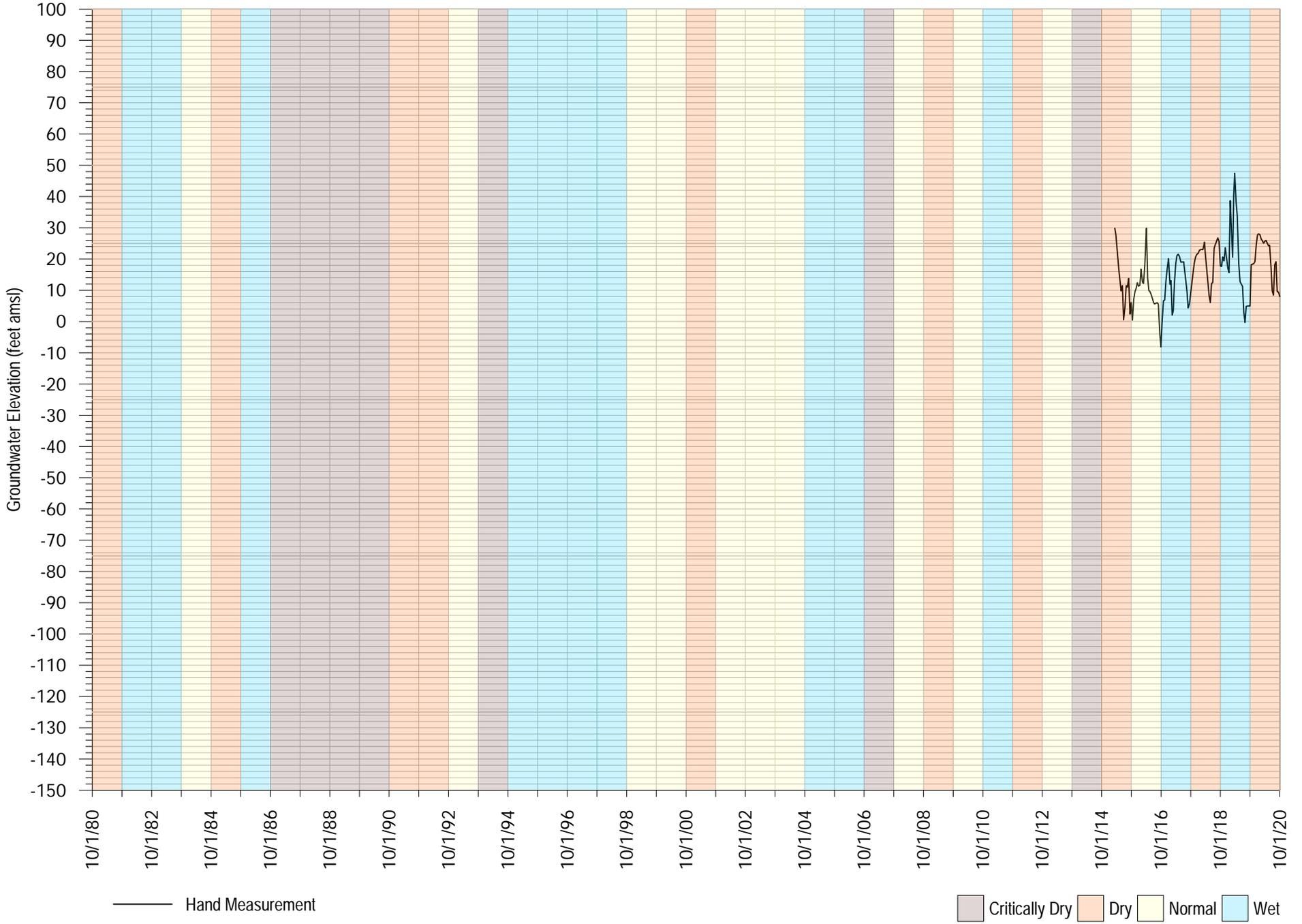


— Hand Measurement

Critically Dry Dry Normal Wet

O'Neill Ranch

FIGURE A-61

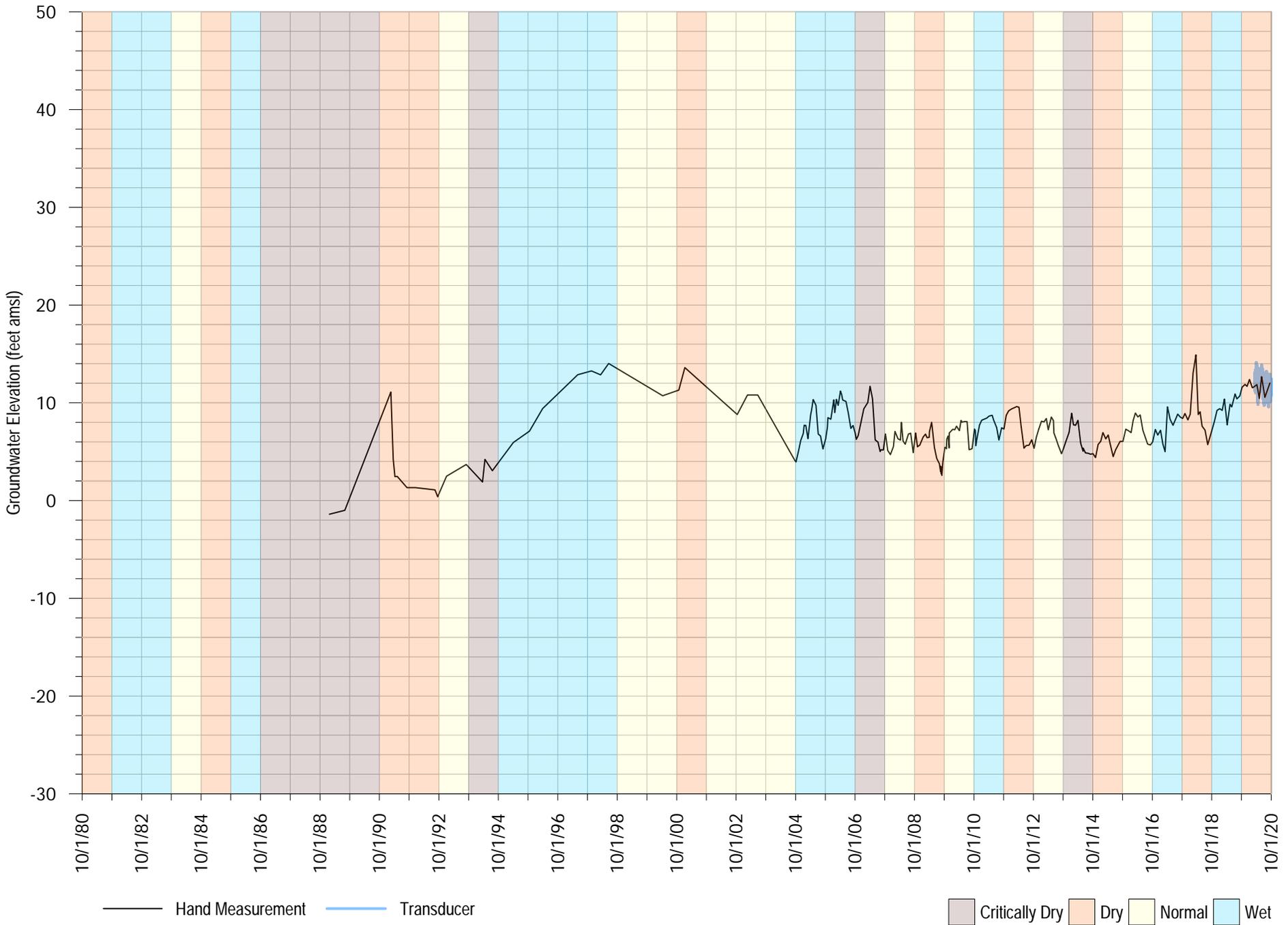


— Hand Measurement

Critically Dry Dry Normal Wet

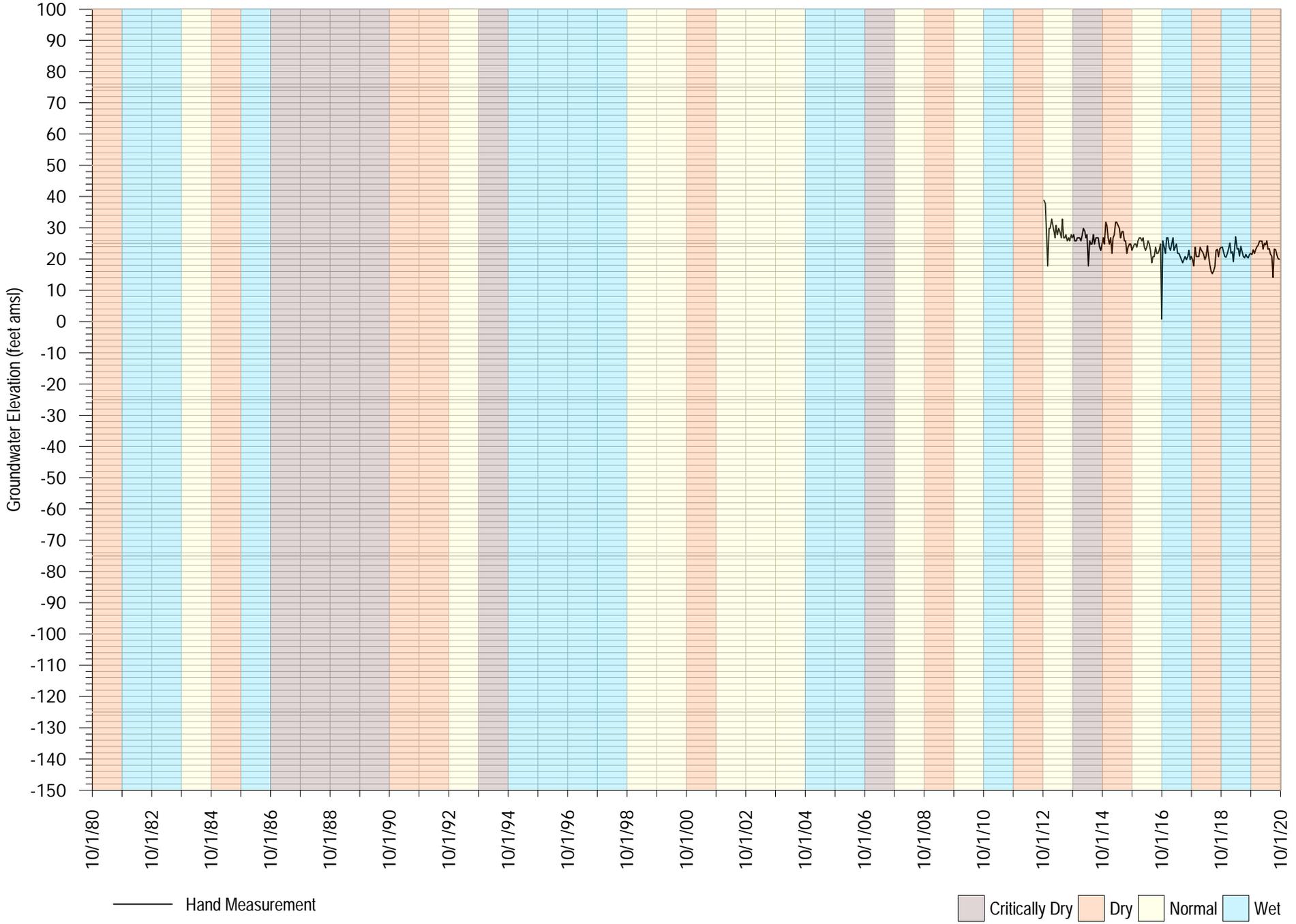
Pleasure Point Shallow

FIGURE A-62



Polo Grounds

FIGURE A-63

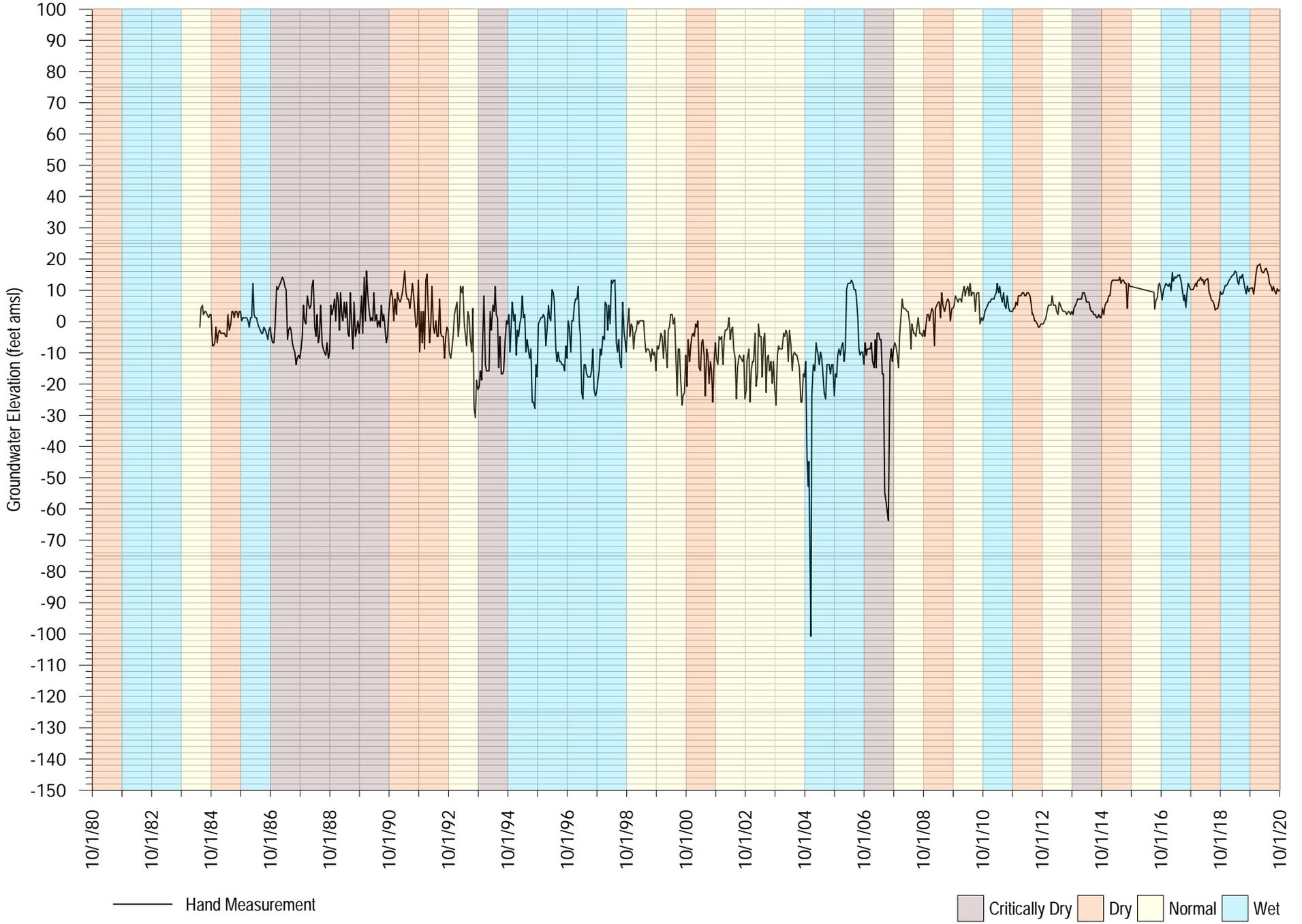


— Hand Measurement

Critically Dry Dry Normal Wet

Rosedale

FIGURE A-64

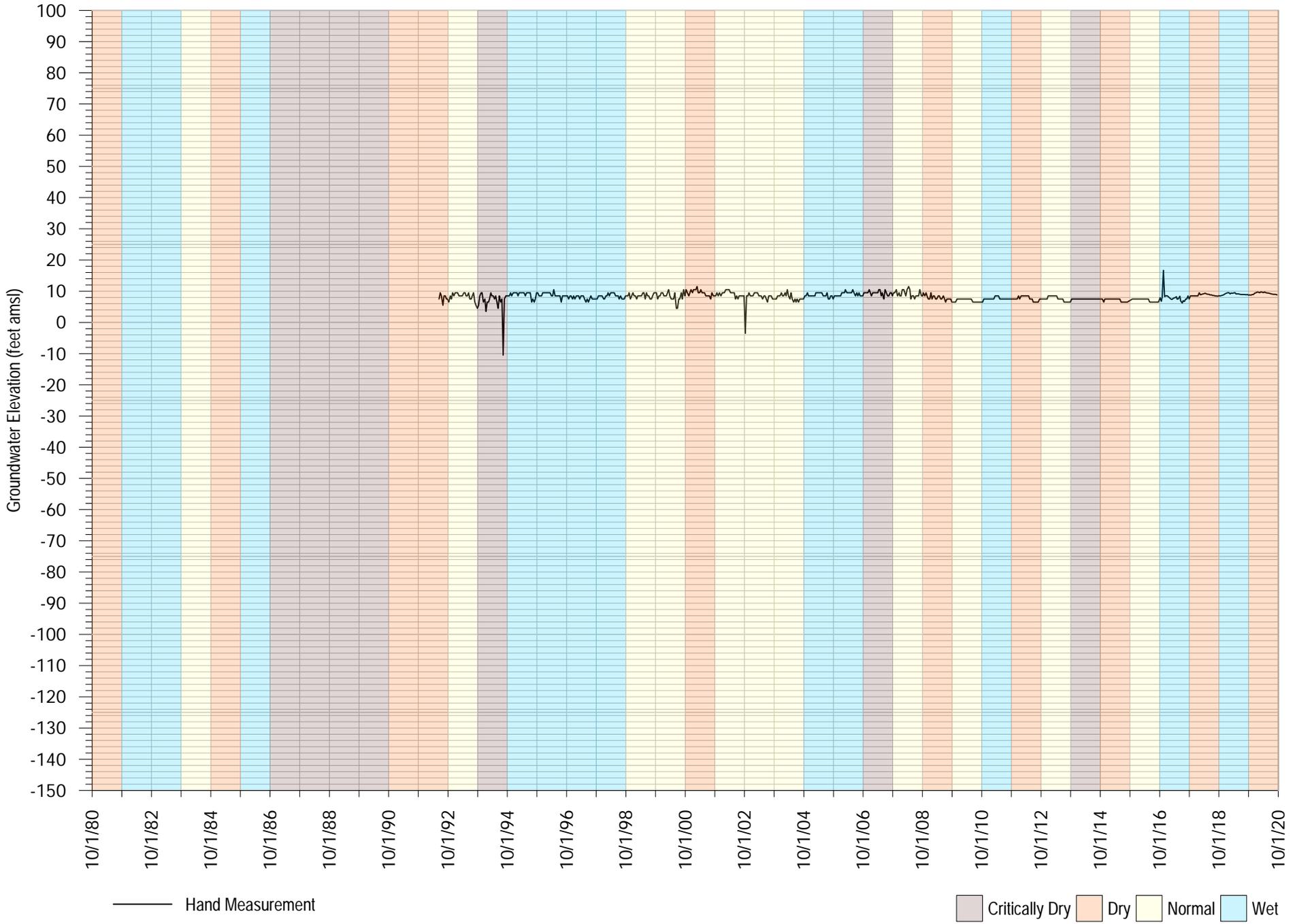


— Hand Measurement

Critically Dry Dry Normal Wet

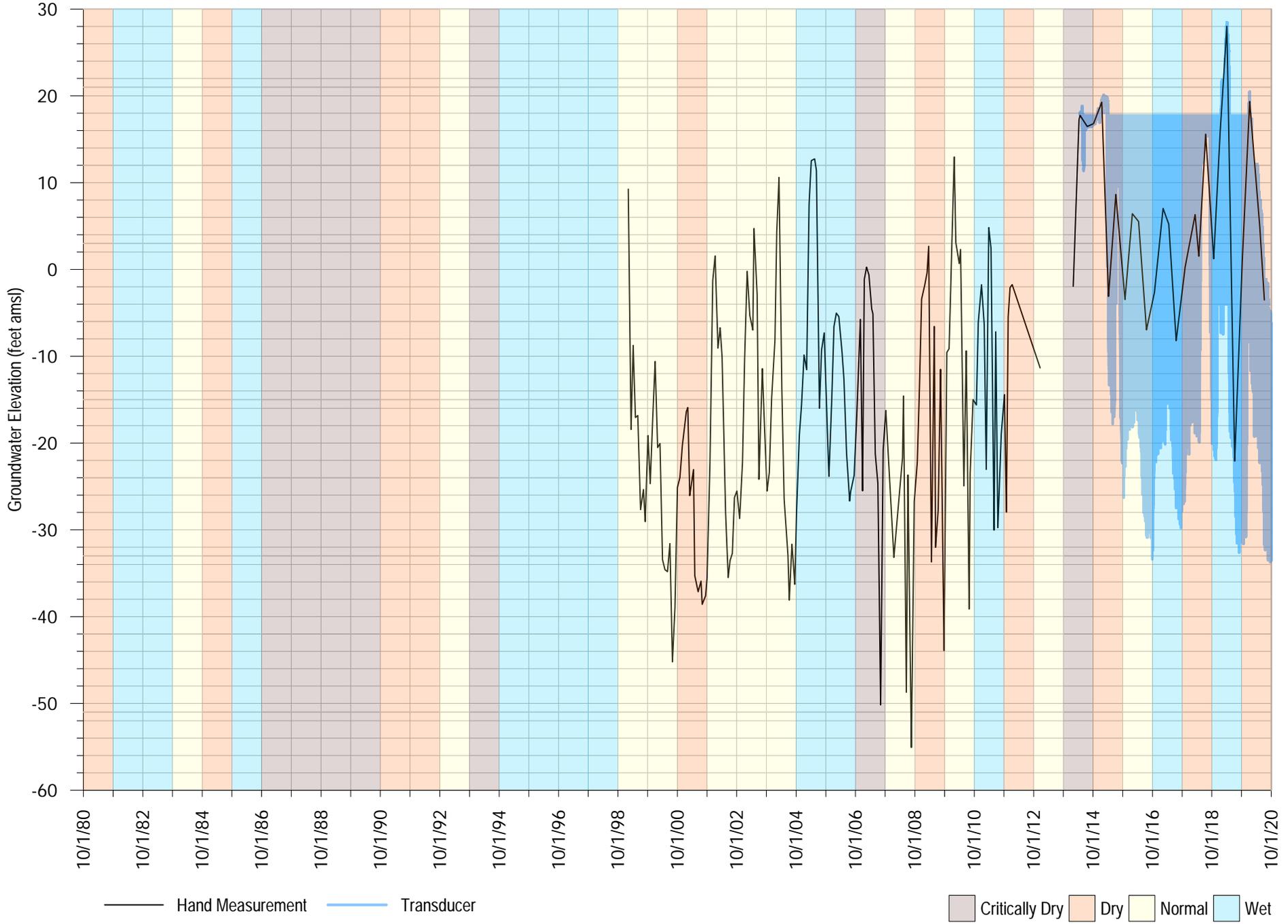
San Andreas

FIGURE A-65



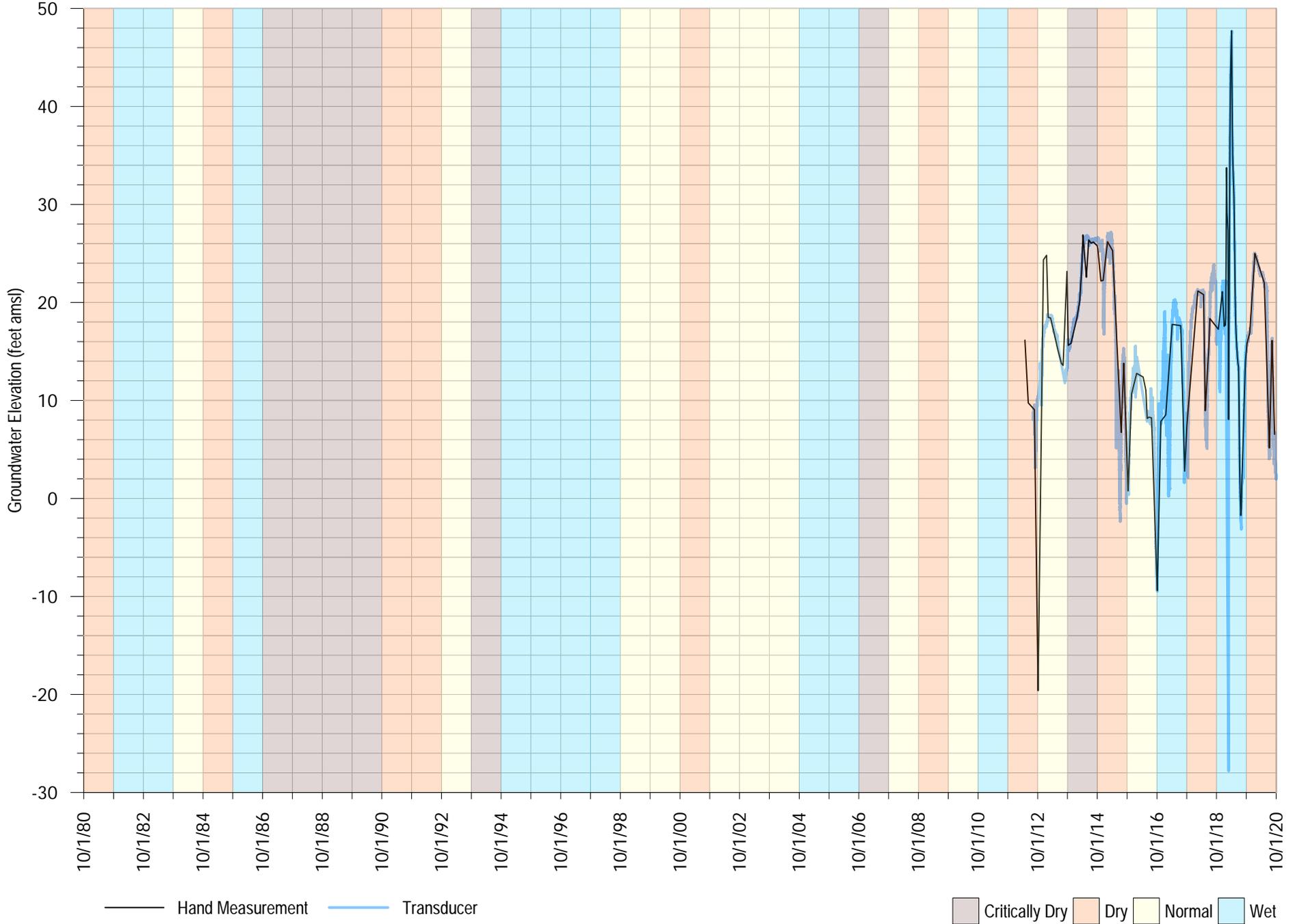
SC-18AA & SC-18RAA at Main Street

FIGURE A-66



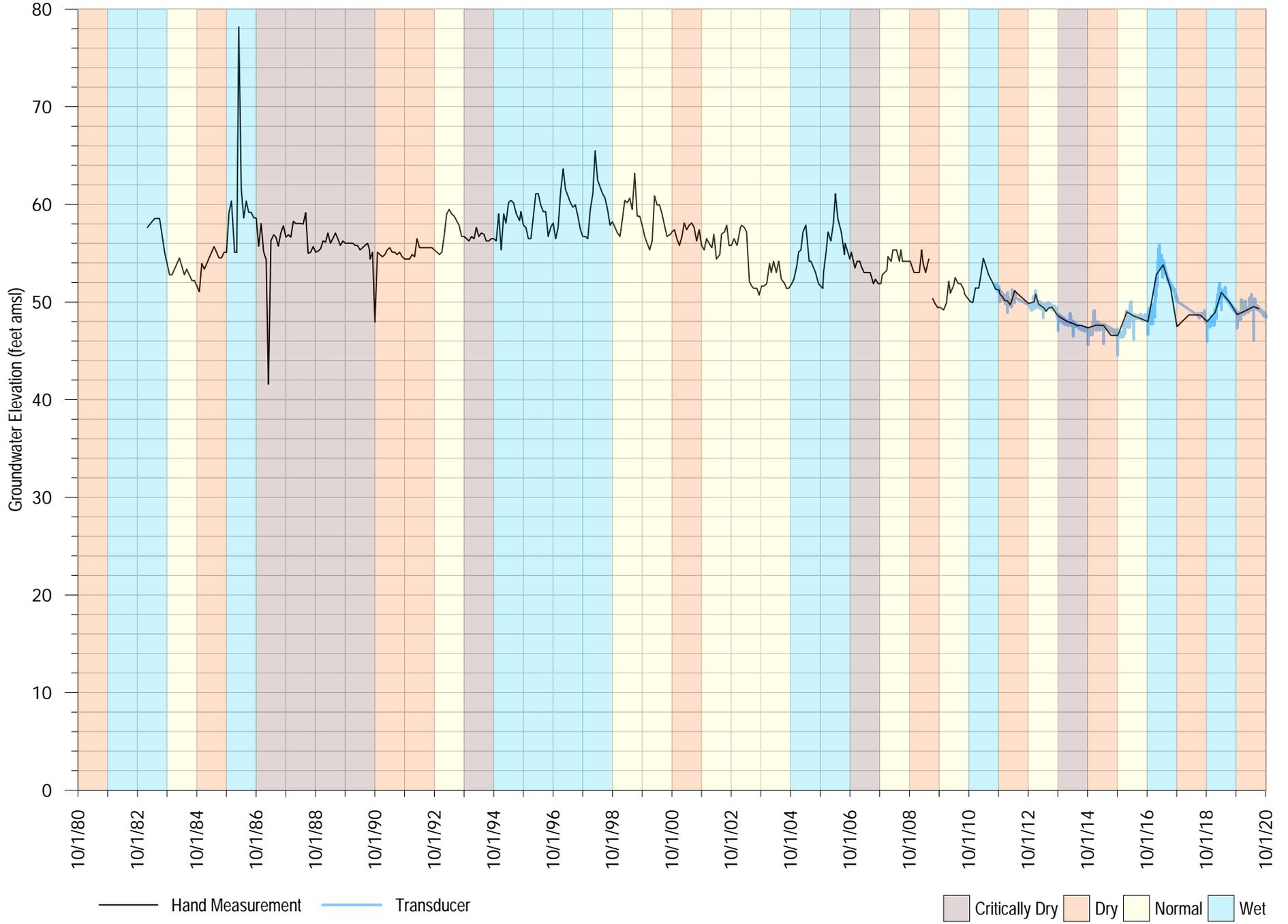
SC-22AAA at 41st Ave

FIGURE A-67



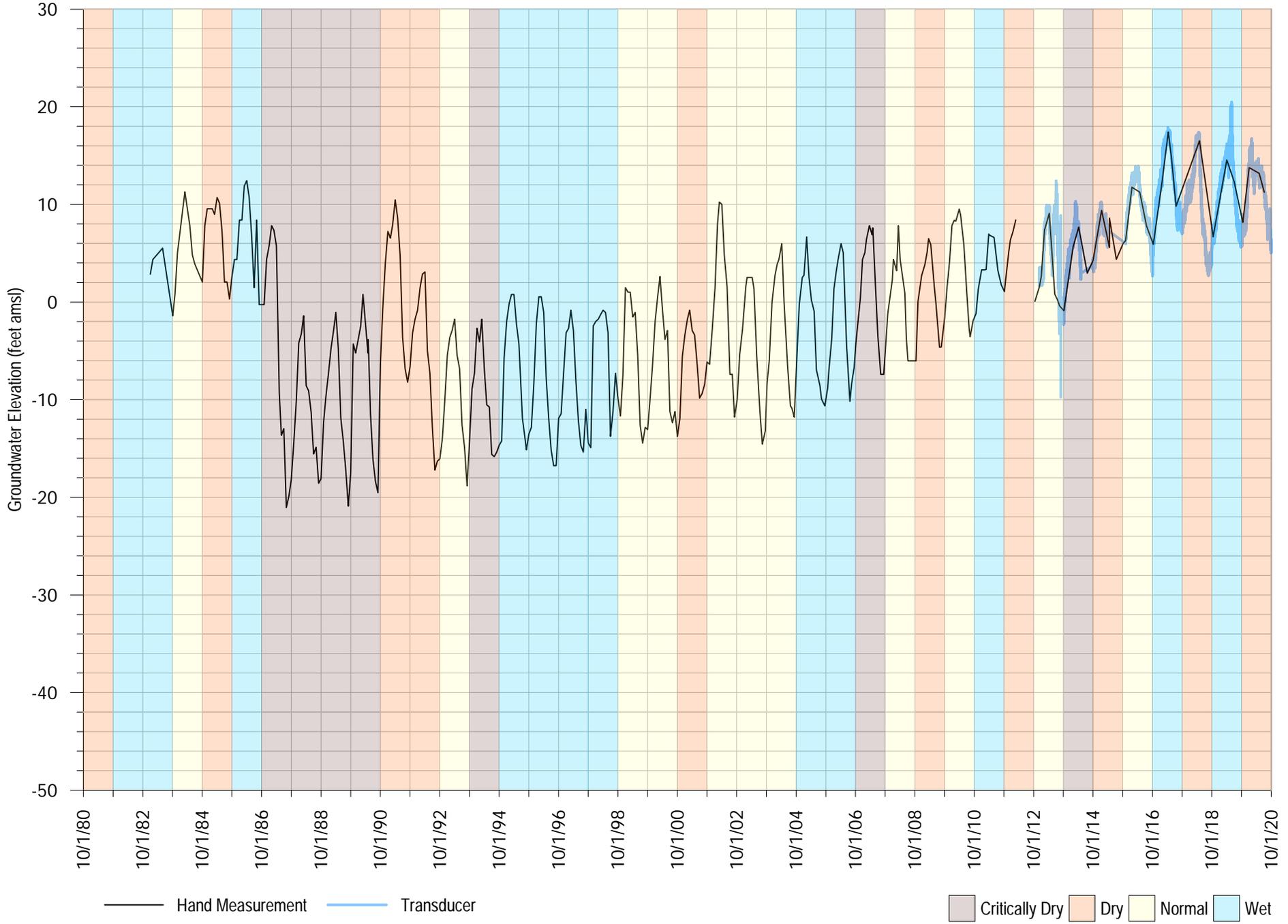
SC-3C & SC-3RC at Escalona

FIGURE A-68



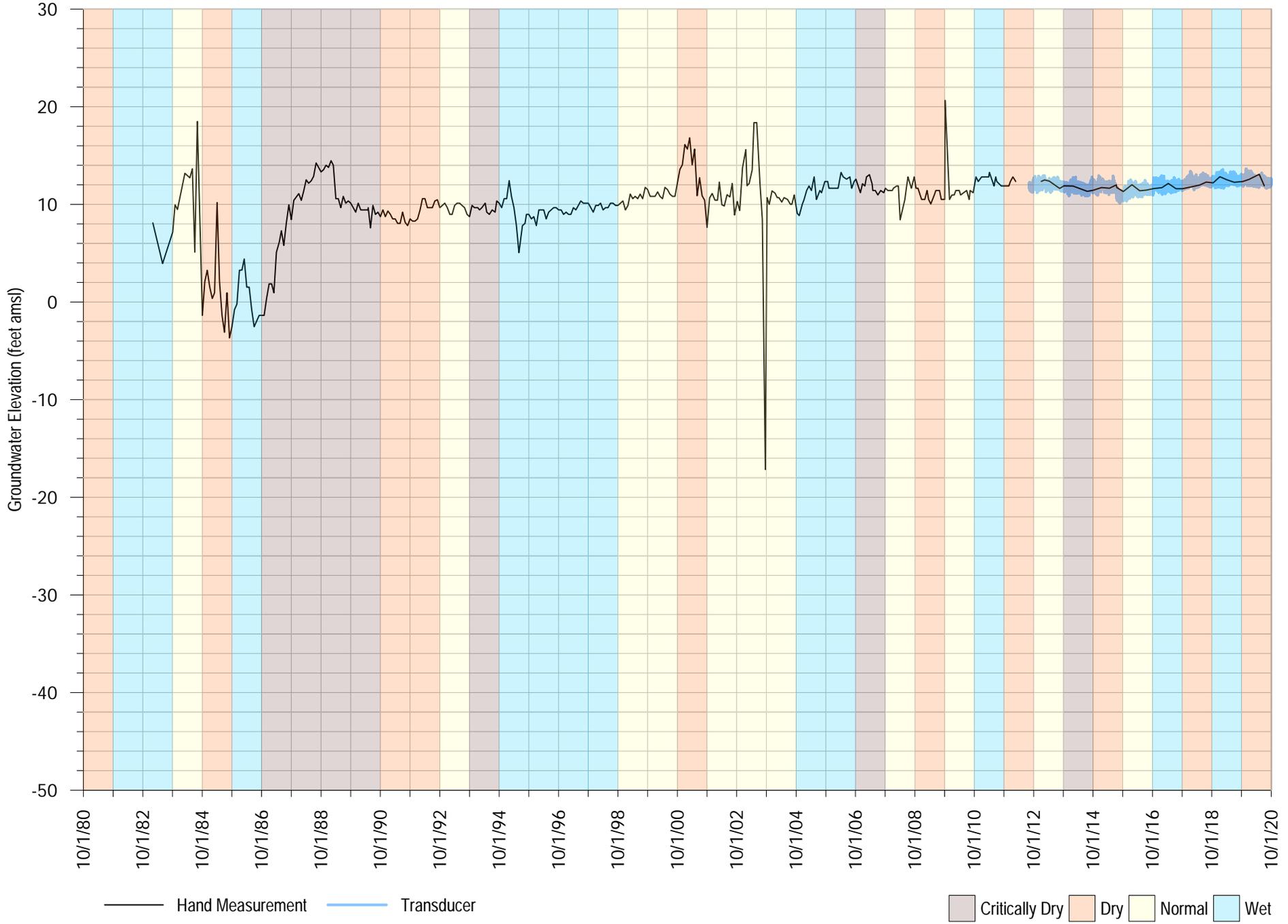
SC-9A & SC-9RA at Seacliff

FIGURE A-69



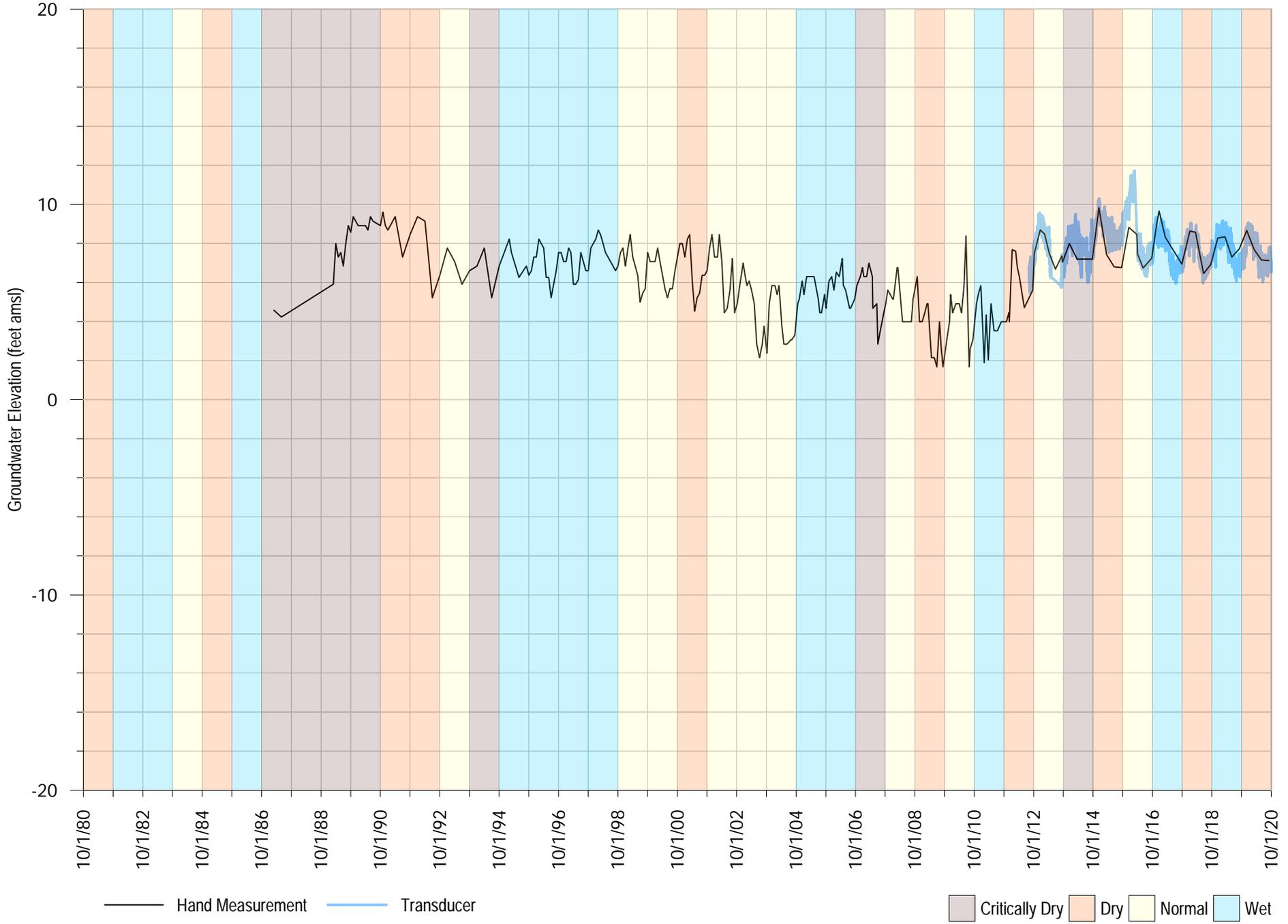
SC-9E & SC-9RE at Seacliff

FIGURE A-70



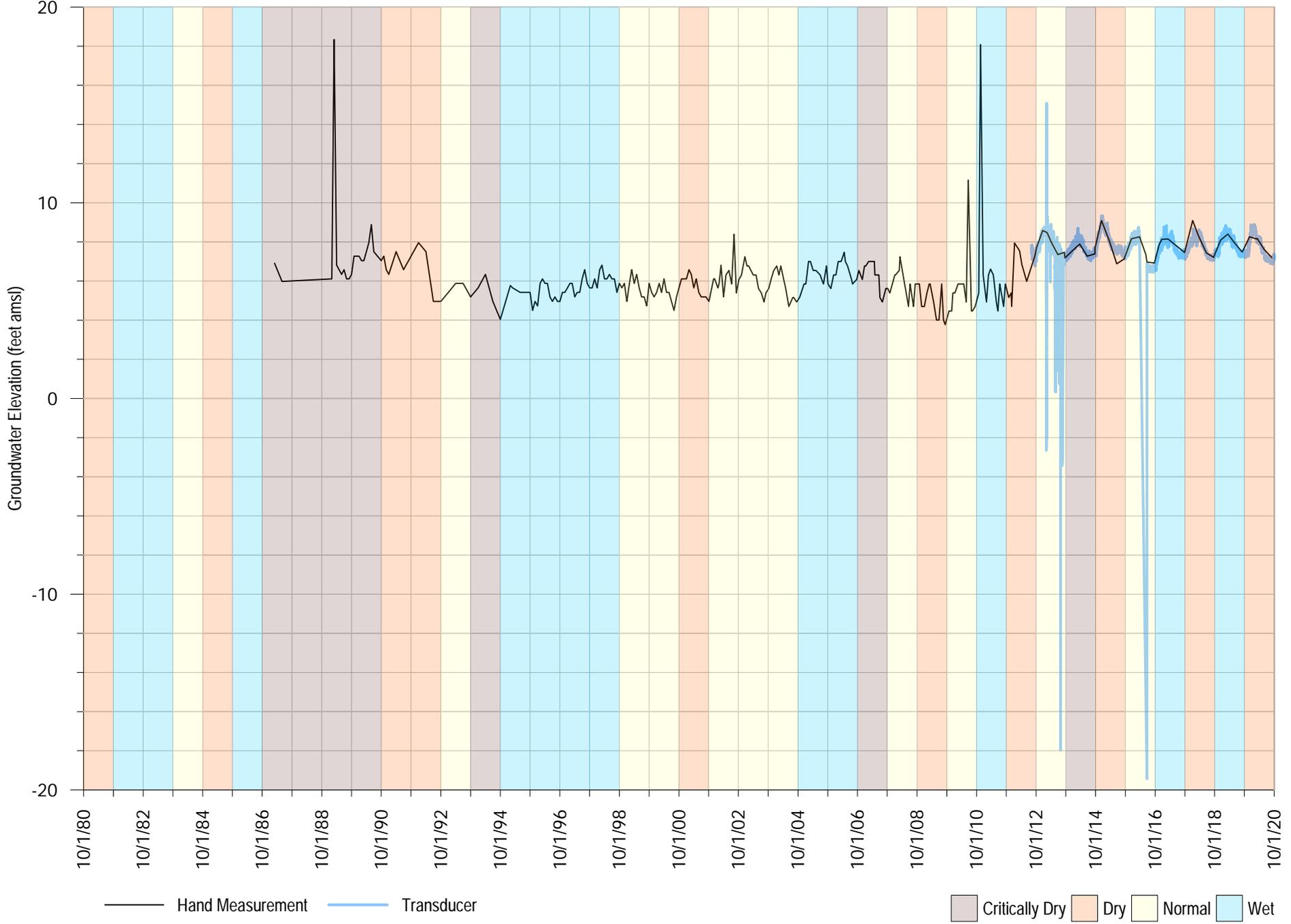
SC-A1A at Cliff Drive

FIGURE A-71



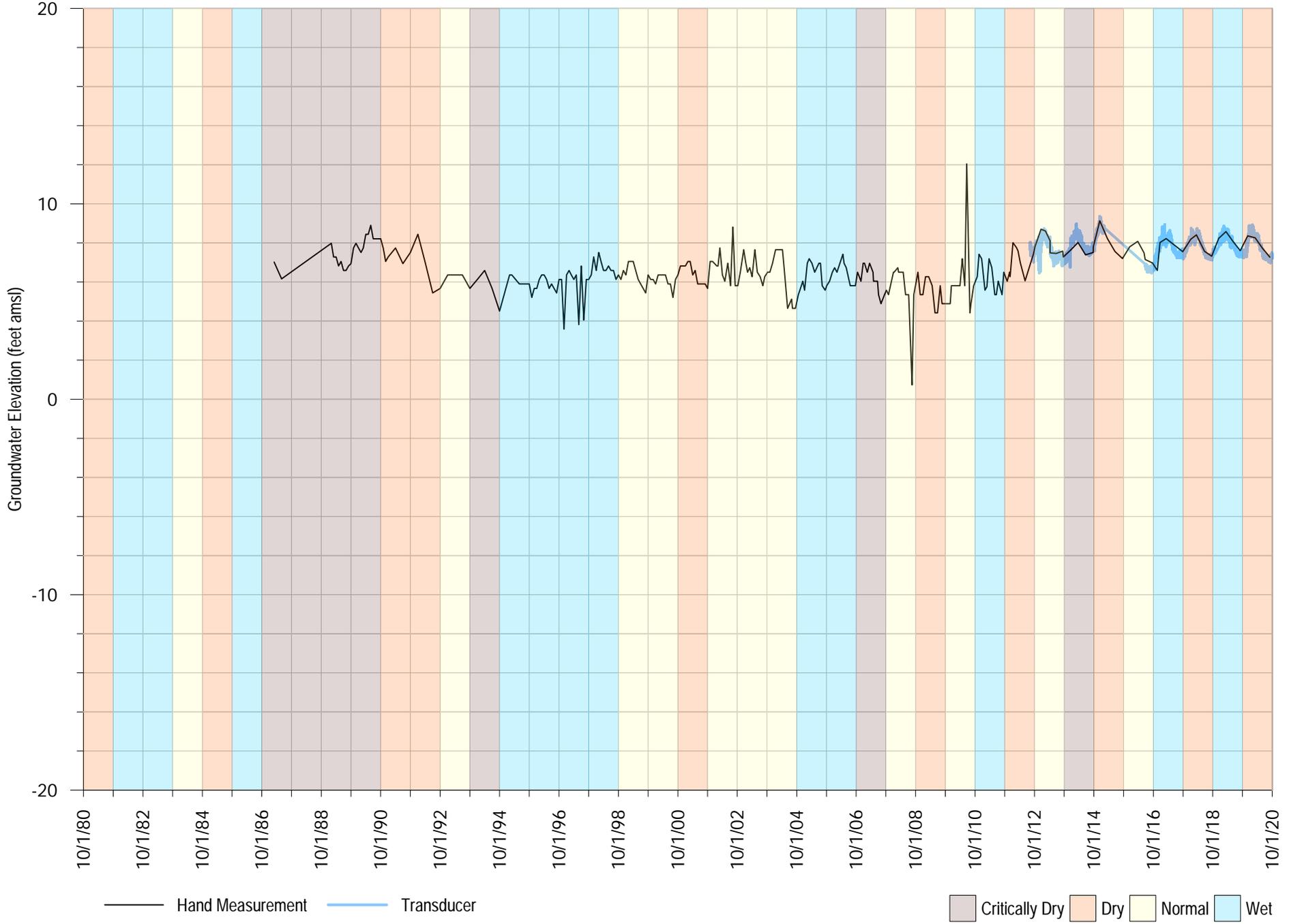
SC-A1C at Cliff Drive

FIGURE A-72



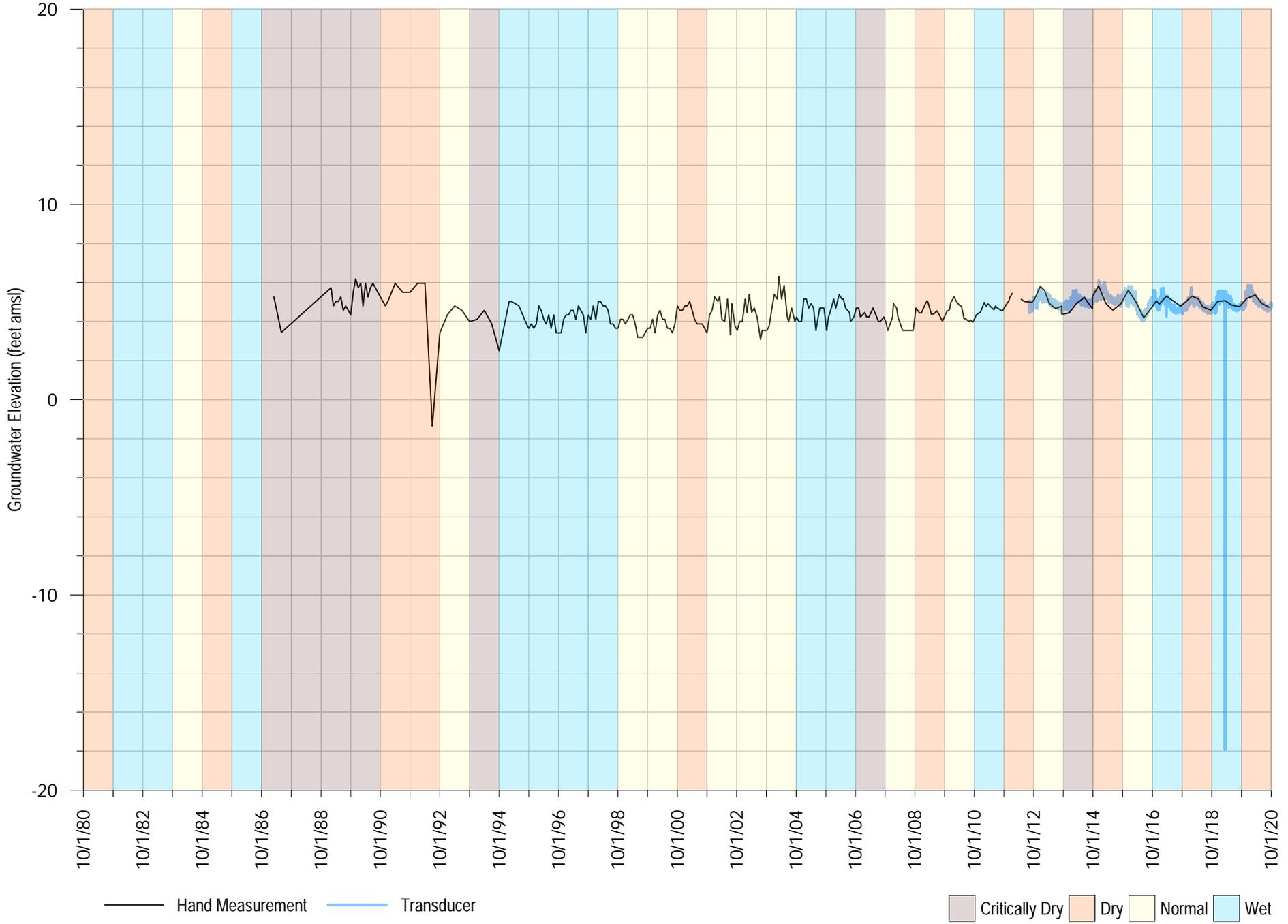
SC-A1D at Cliff Drive

FIGURE A-73



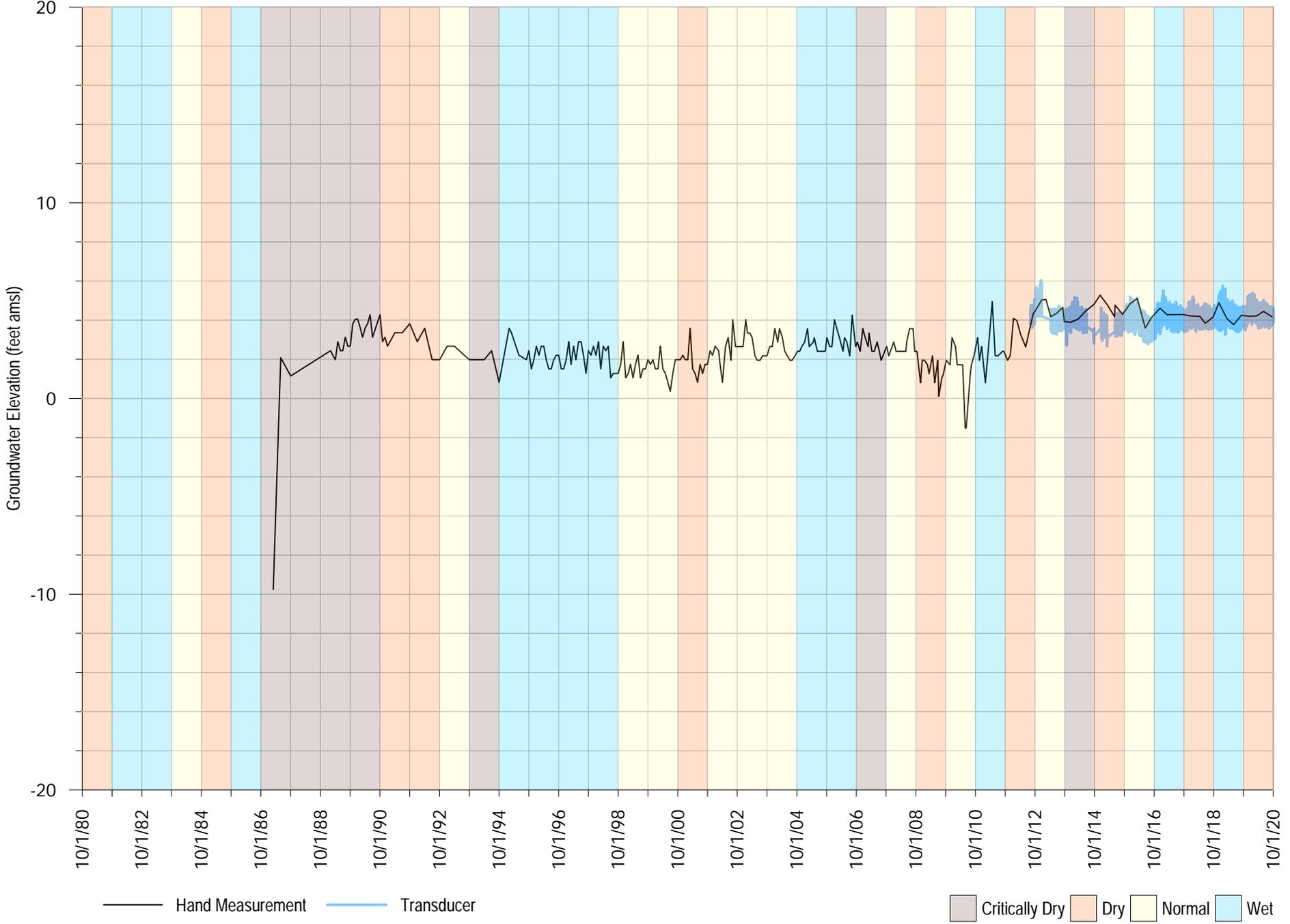
SC-A2C & SC-A2RC at Sumner

FIGURE A-74



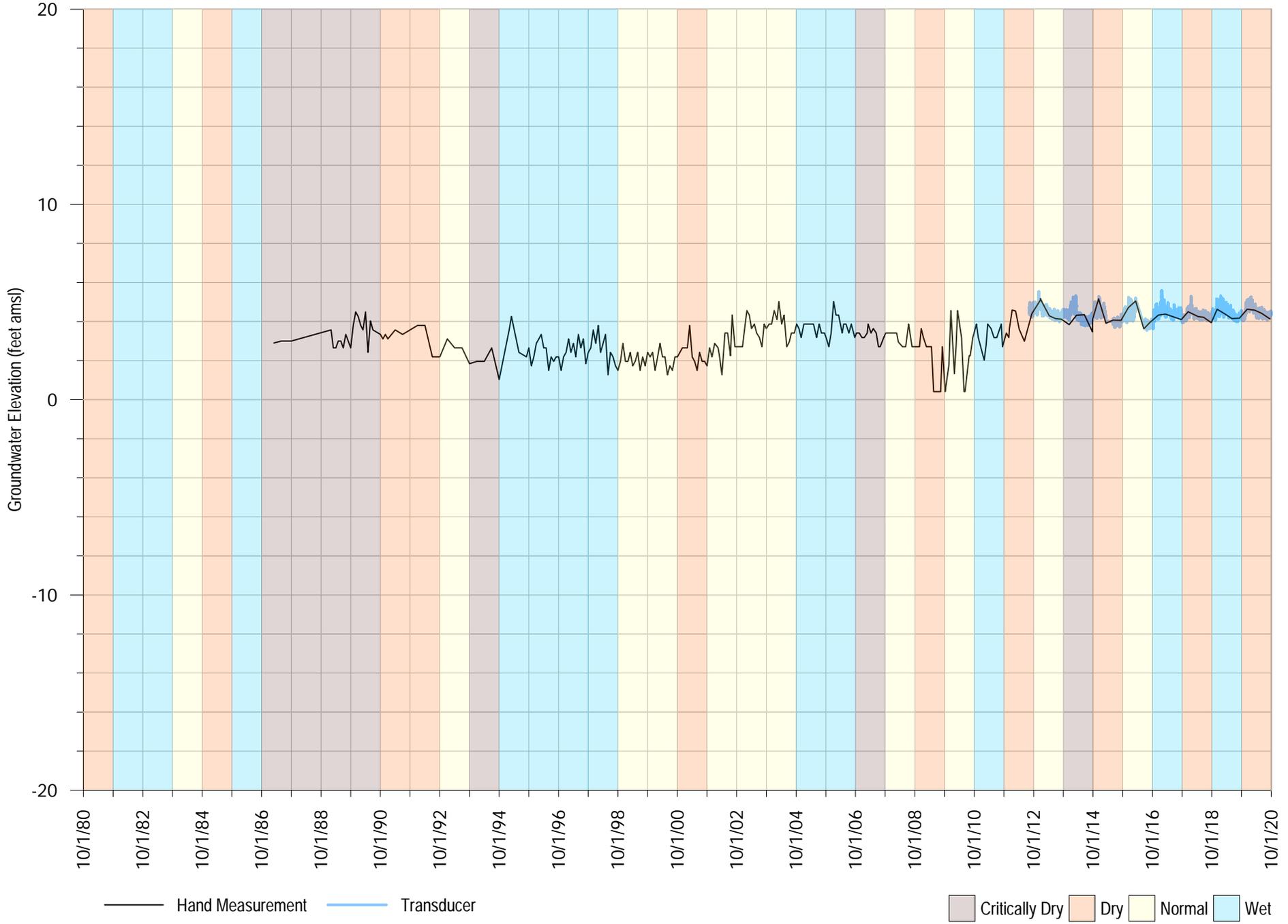
SC-A3B at Playa Vista

FIGURE A-75



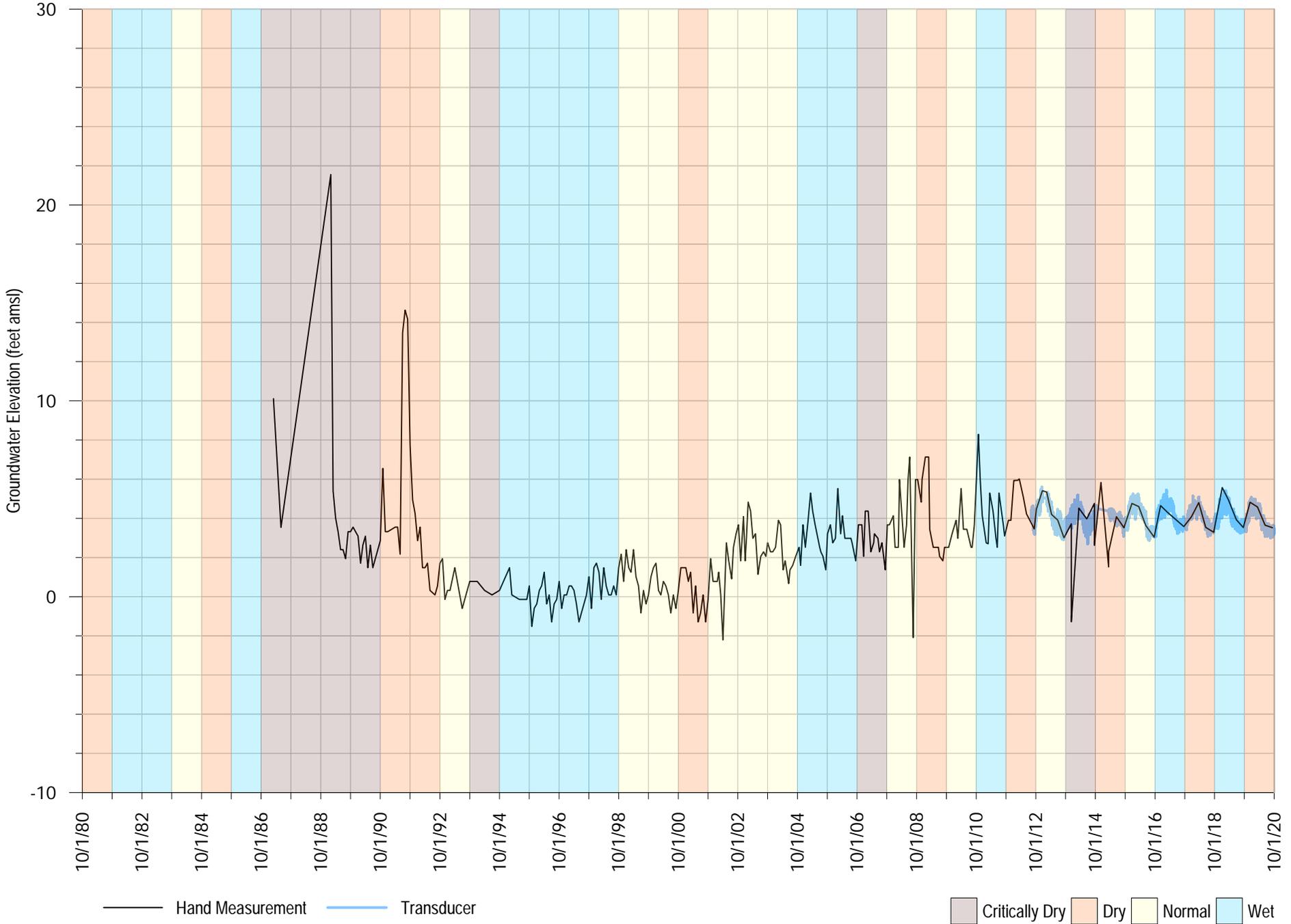
SC-A3C at Playa Vista

FIGURE A-76



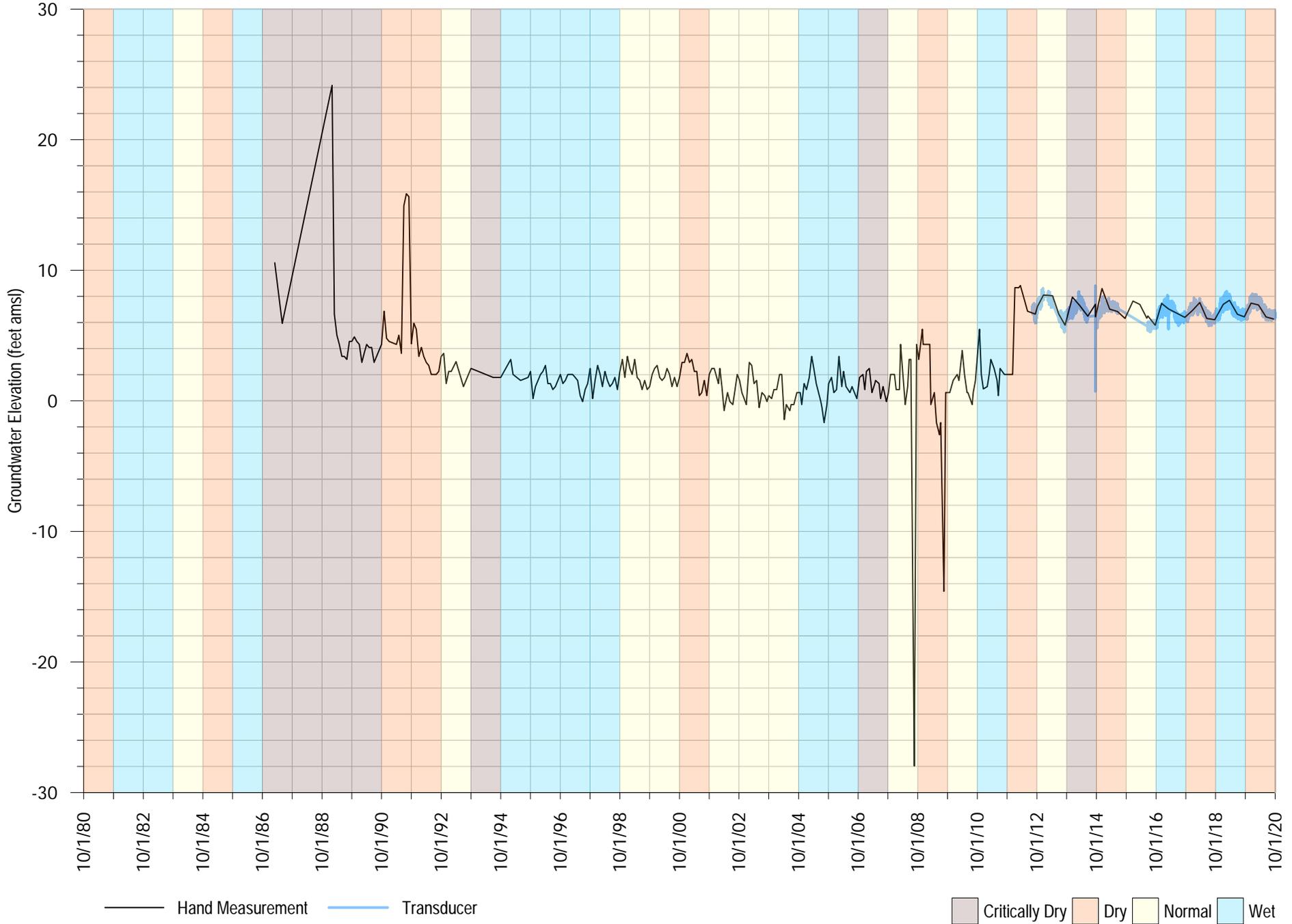
SC-A5A at Seascapes

FIGURE A-77



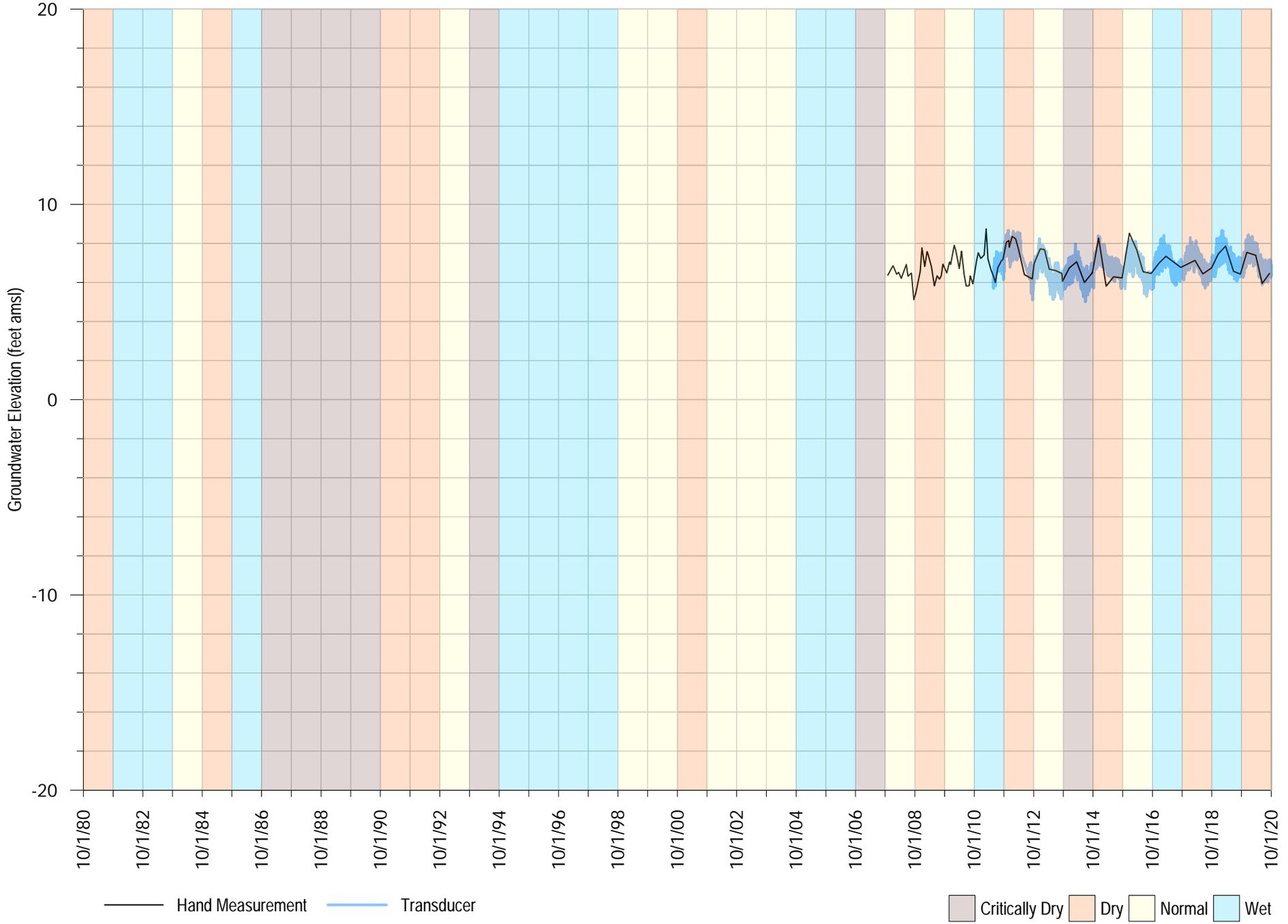
SC-A5B at Seascapes

FIGURE A-78



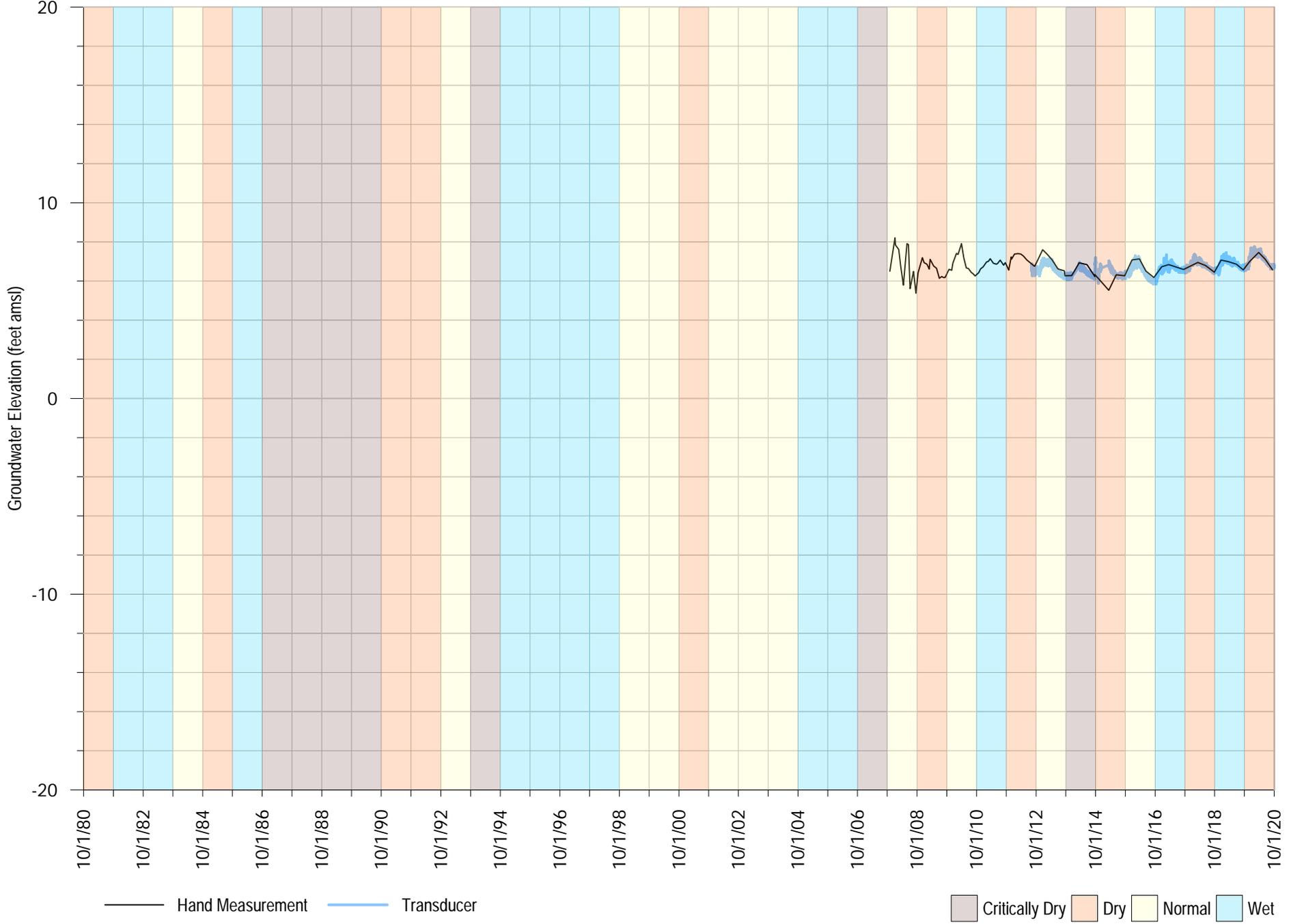
SC-A8B at Dolphin

FIGURE A-79



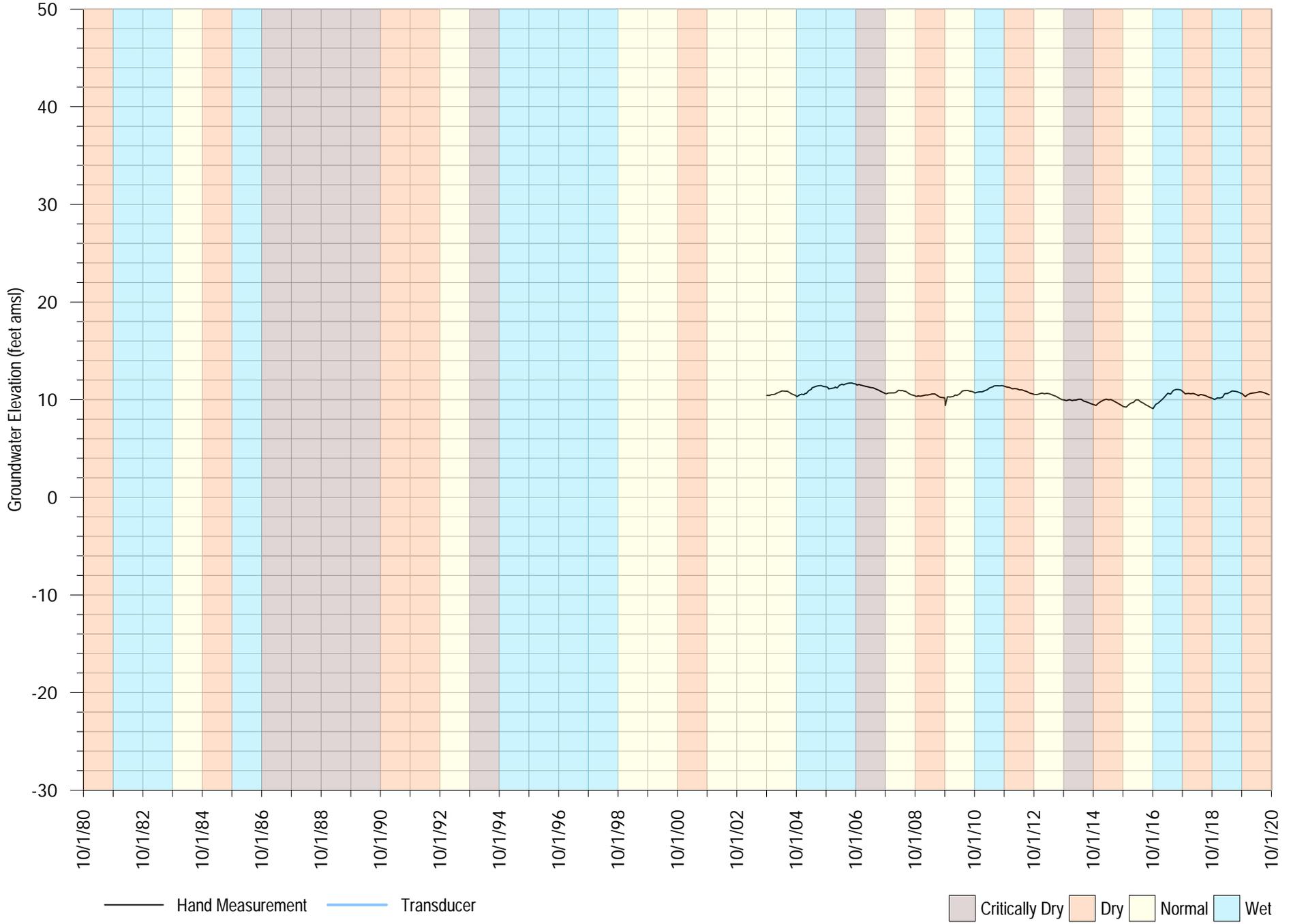
SC-A8C at Dolphin

FIGURE A-80



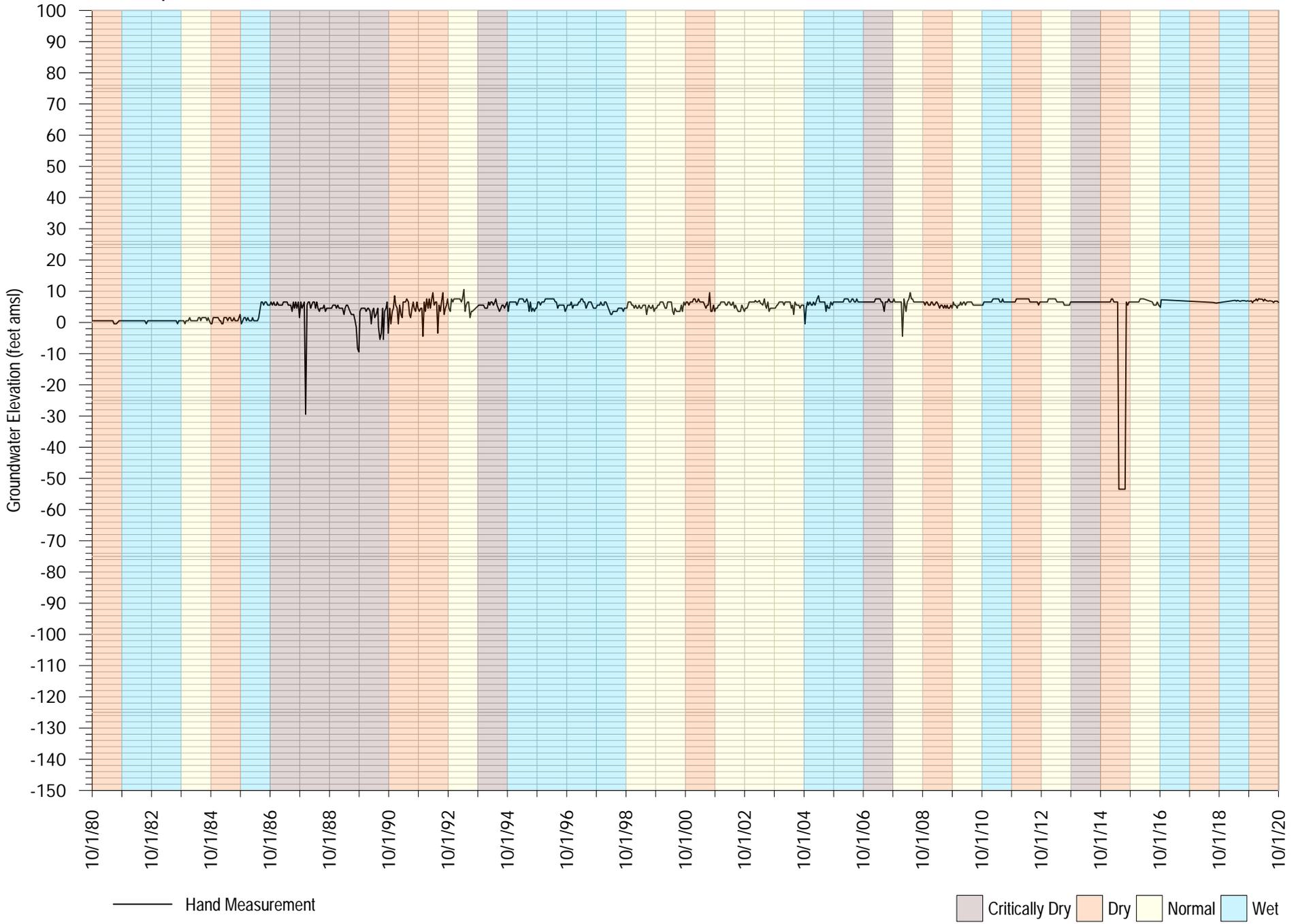
Schwan

FIGURE A-81



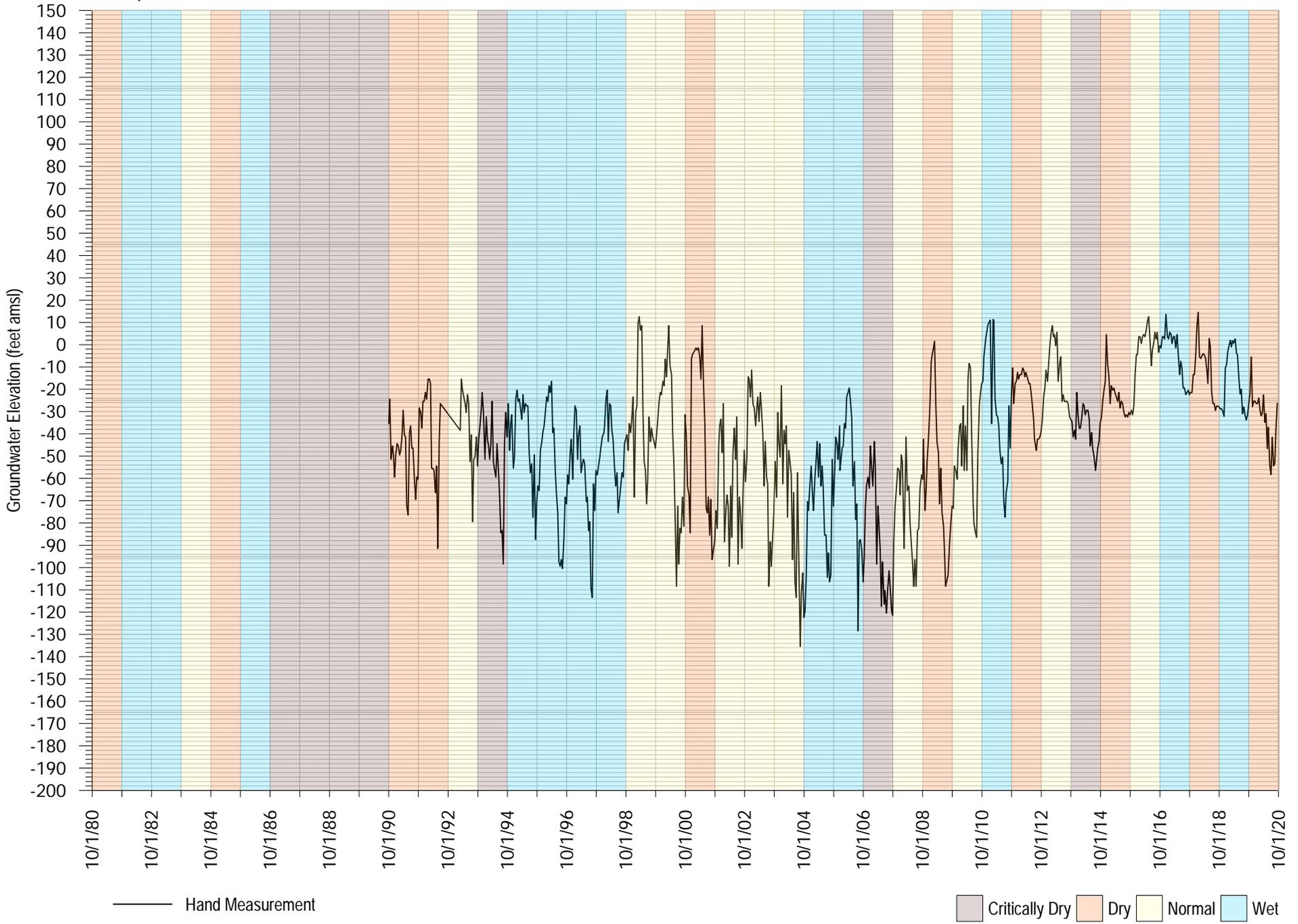
Seascape

FIGURE A-82



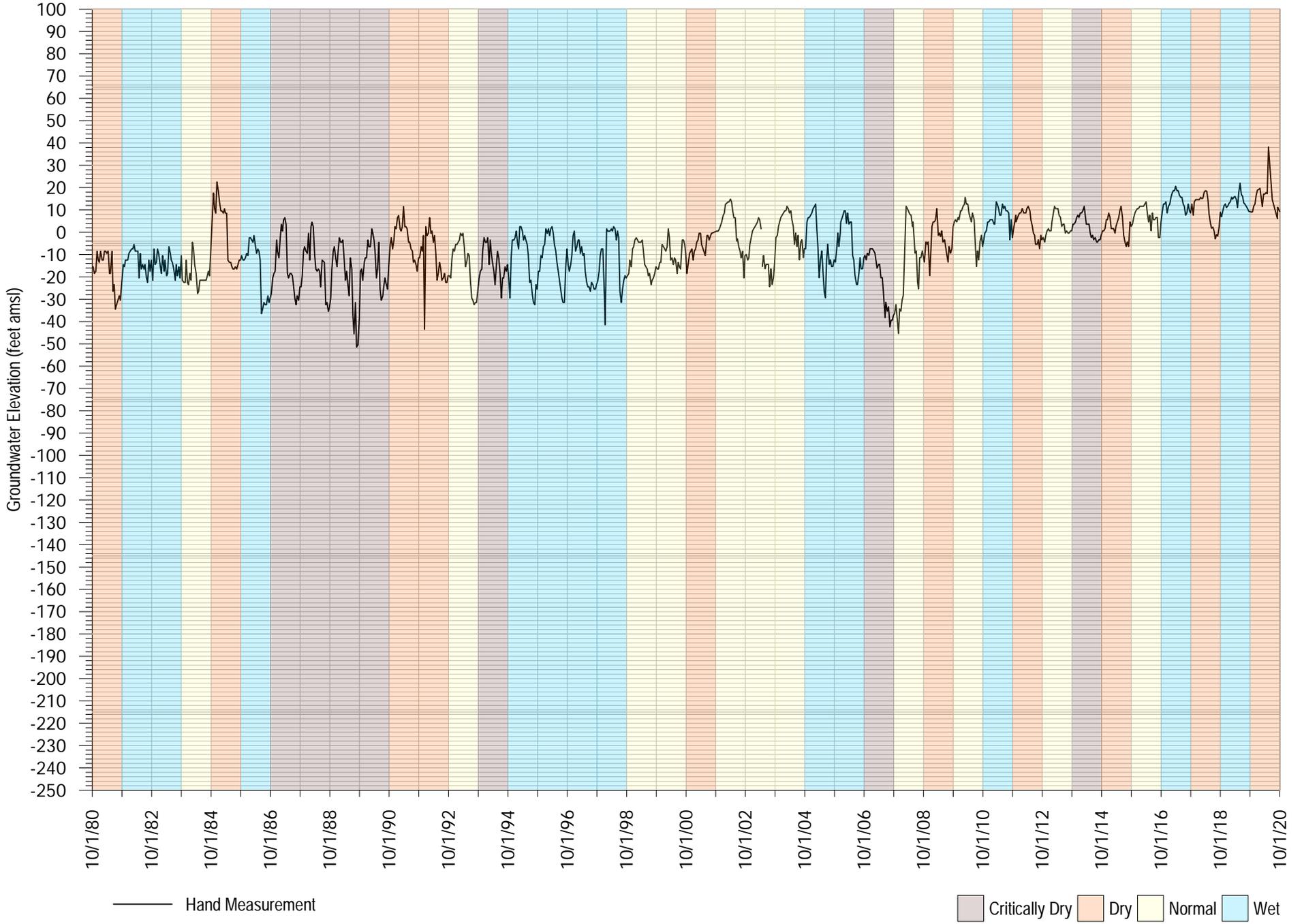
T.Hopkins

FIGURE A-83



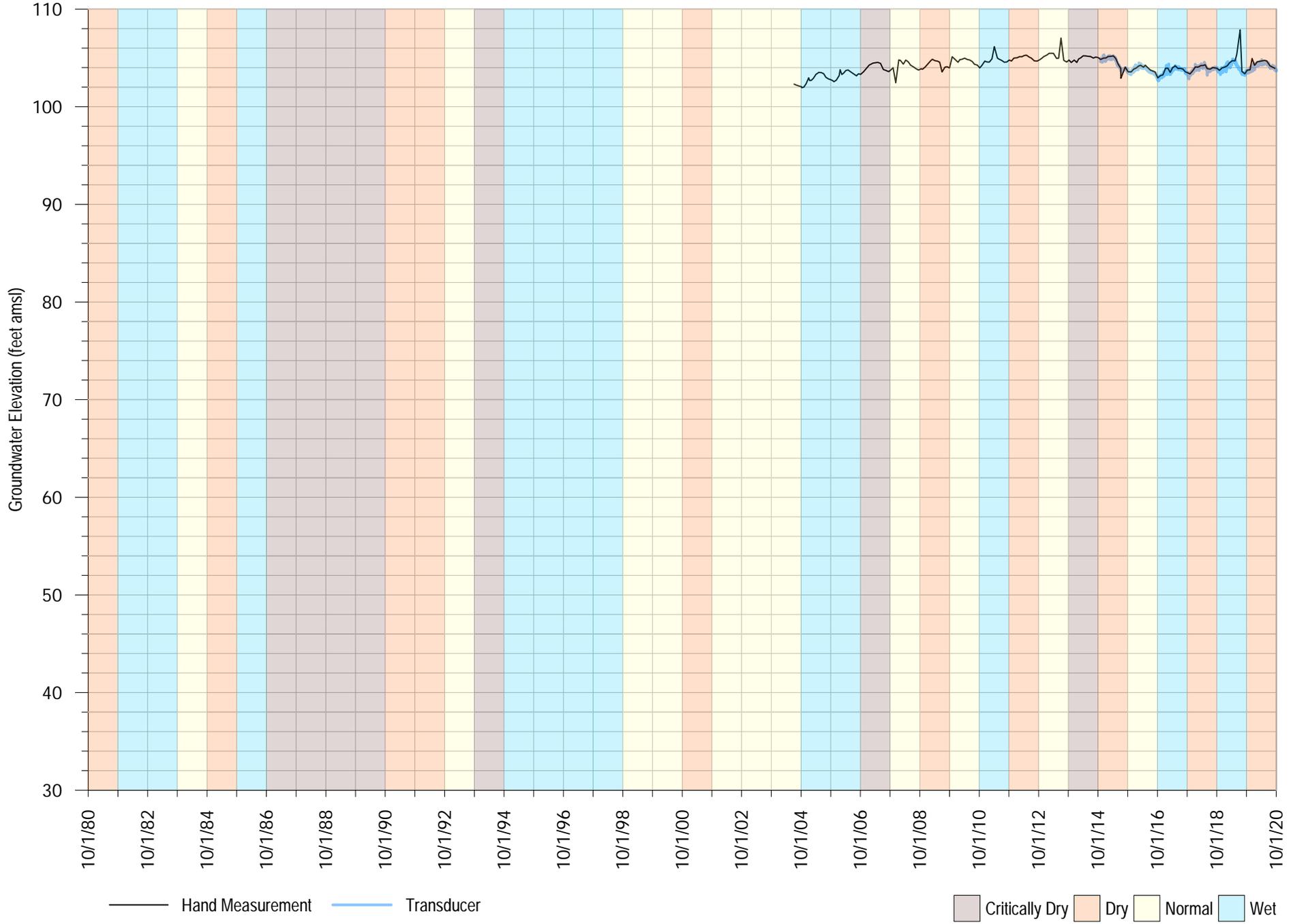
Tannery & Tannery 2

FIGURE A-84



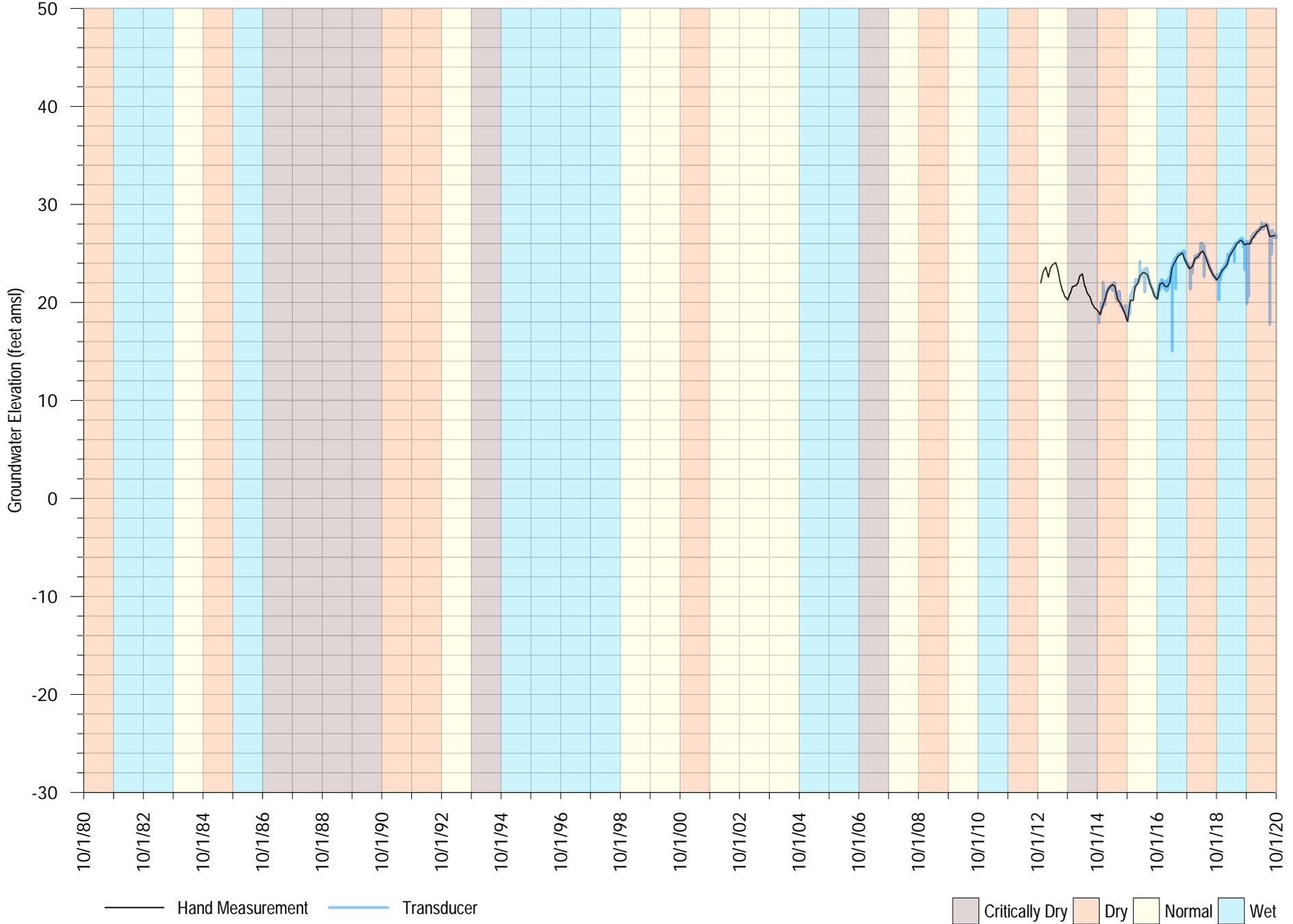
Thurber Shallow

FIGURE A-85



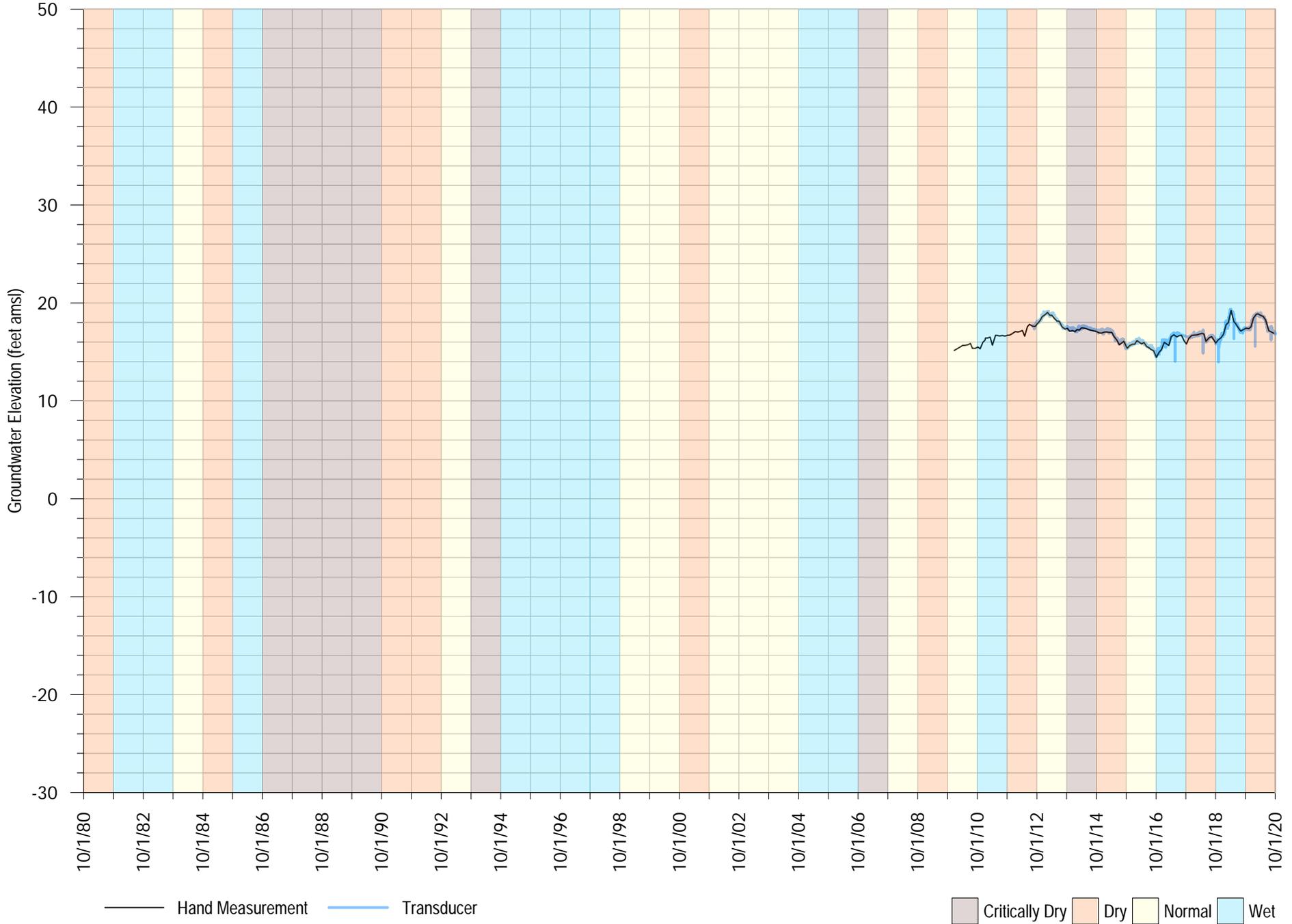
30th Ave Medium

FIGURE A-86



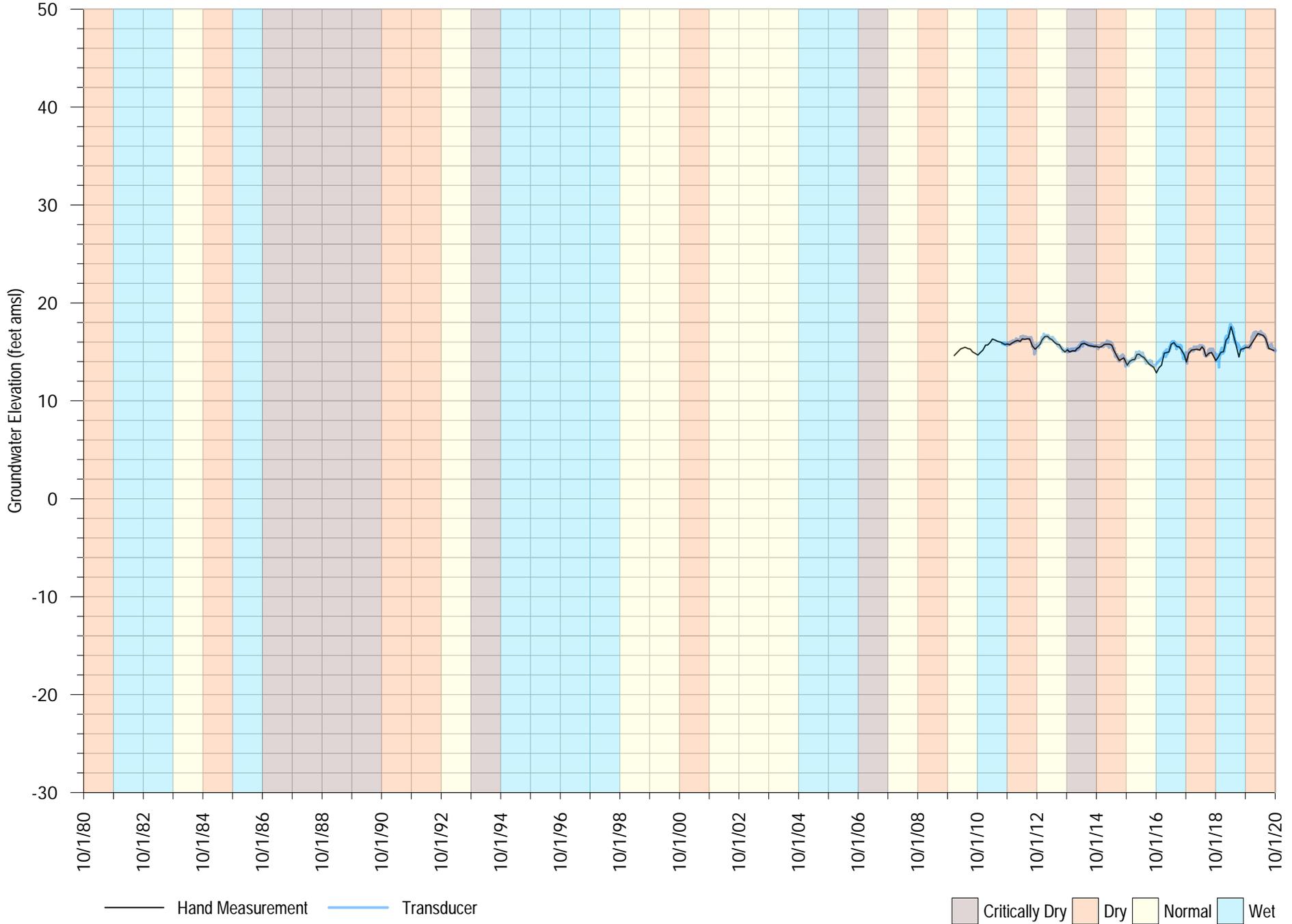
Auto Plaza Deep

FIGURE A-87



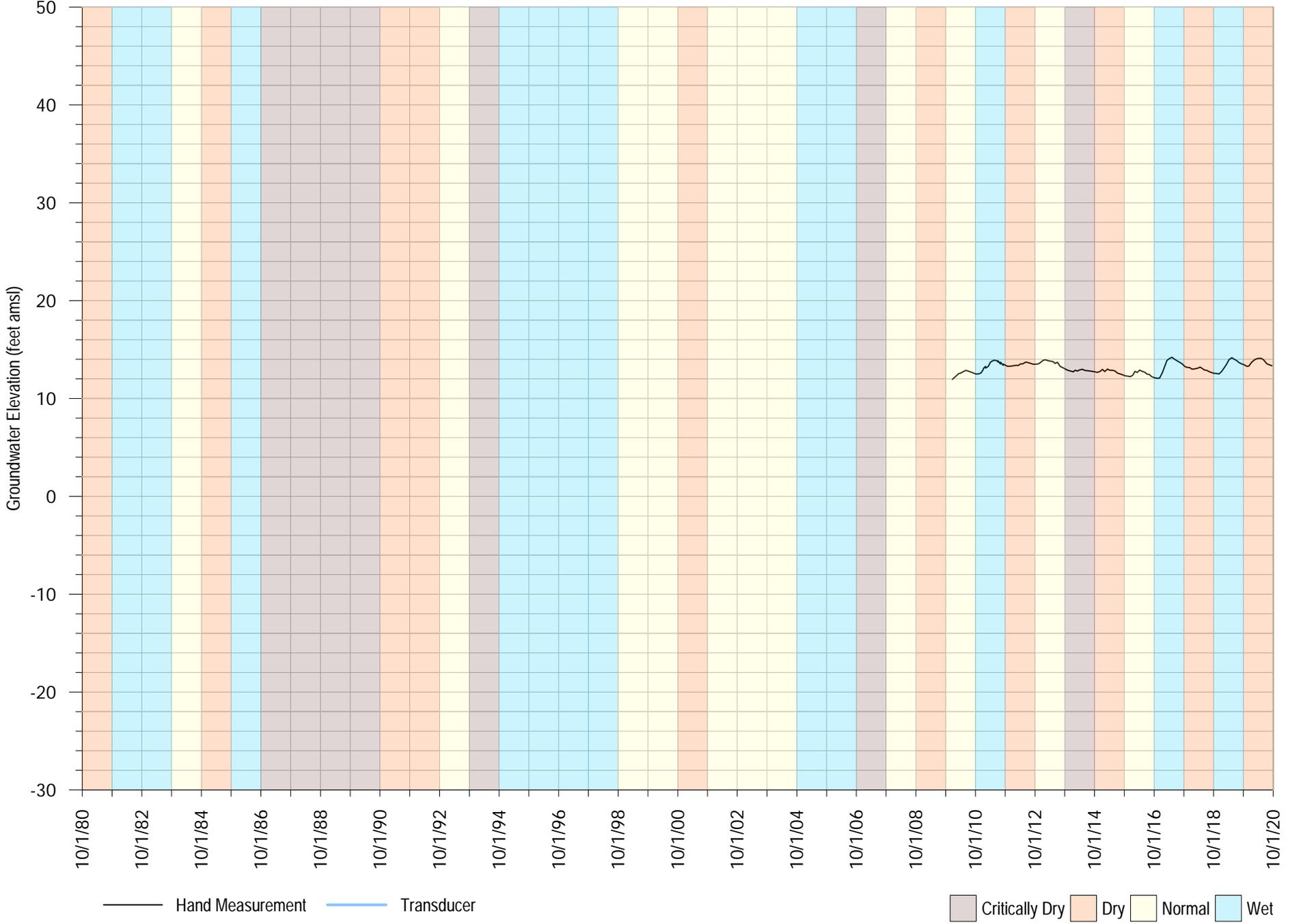
Auto Plaza Medium

FIGURE A-88



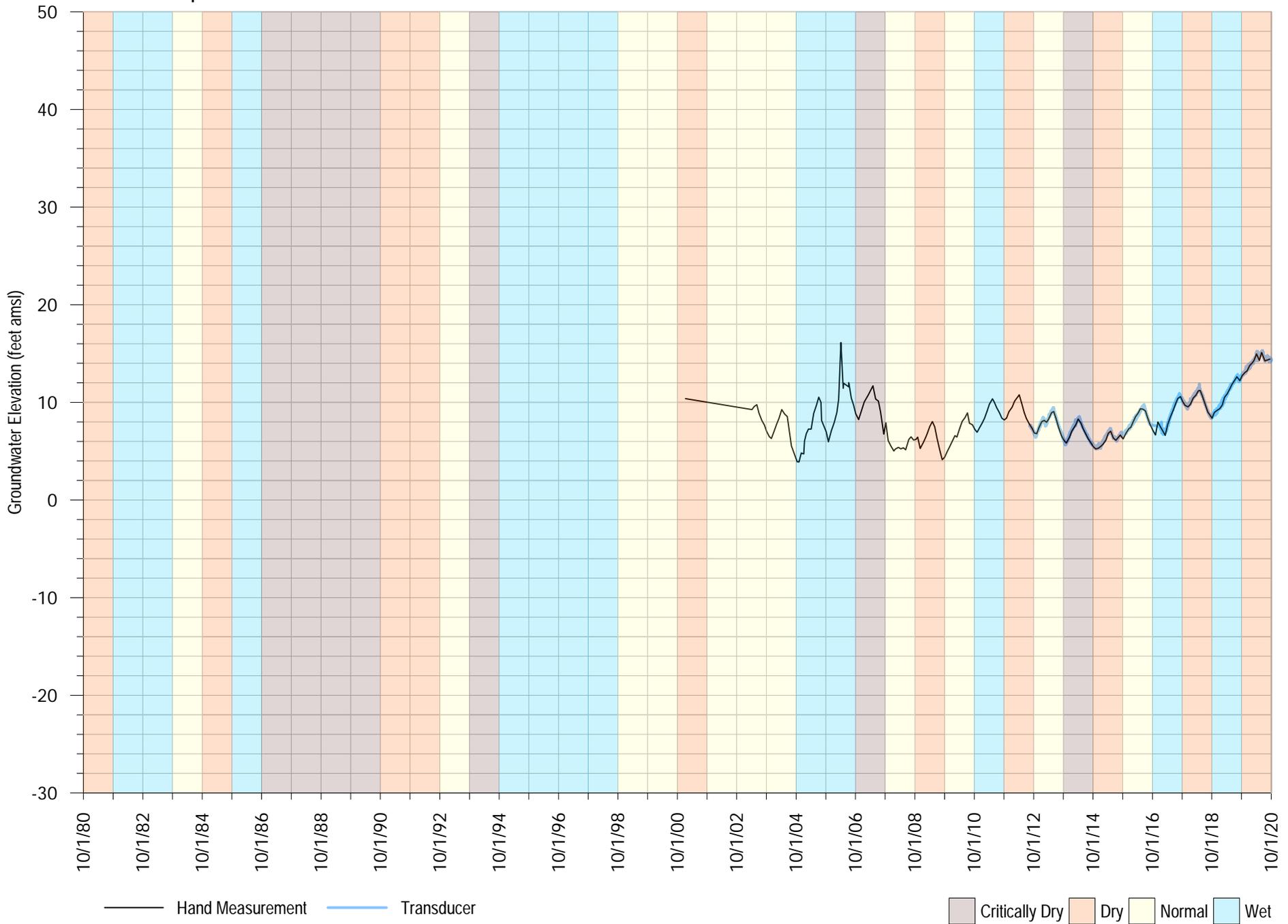
Auto Plaza Shallow

FIGURE A-89



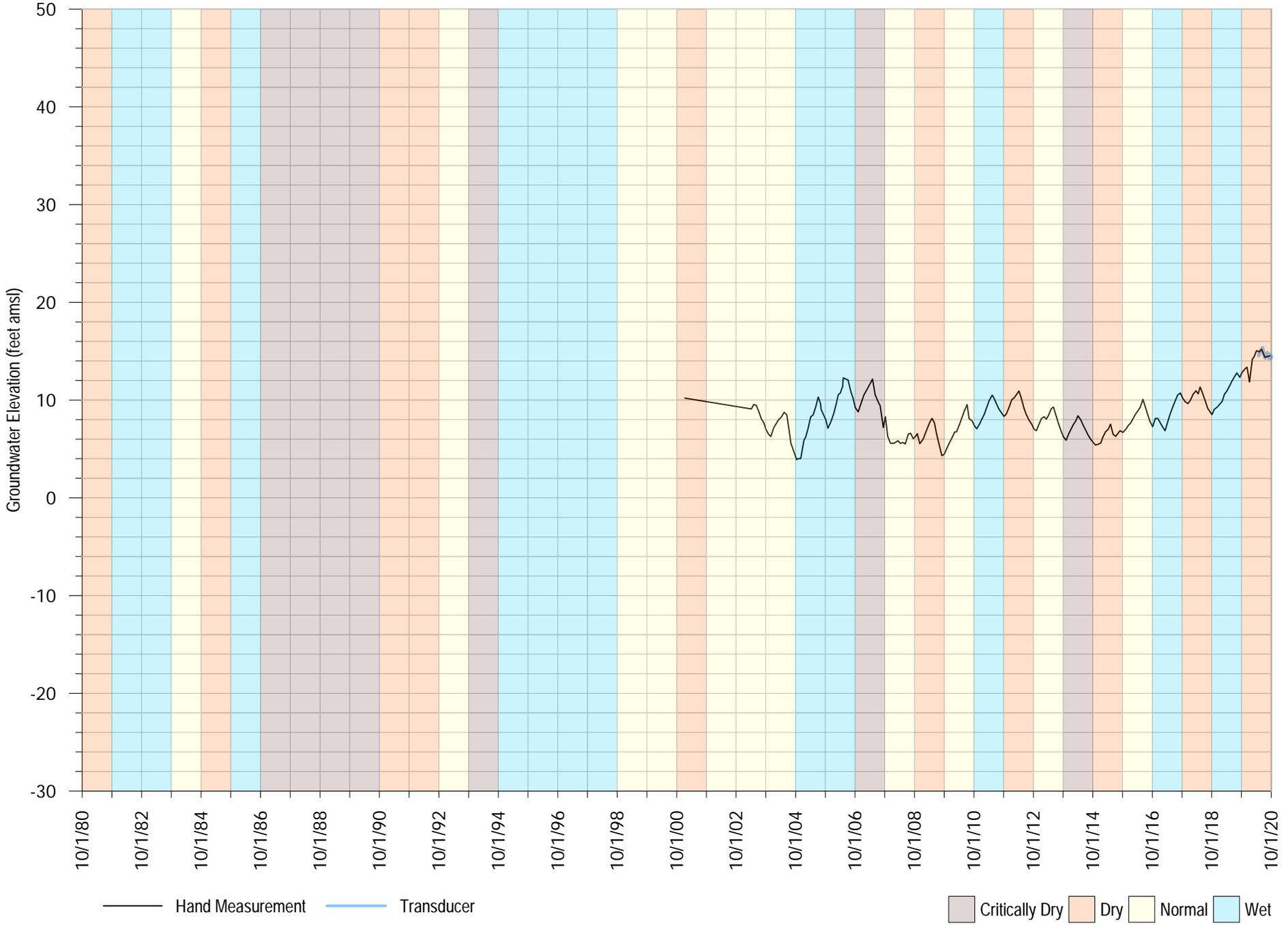
Belt 4 Deep

FIGURE A-90



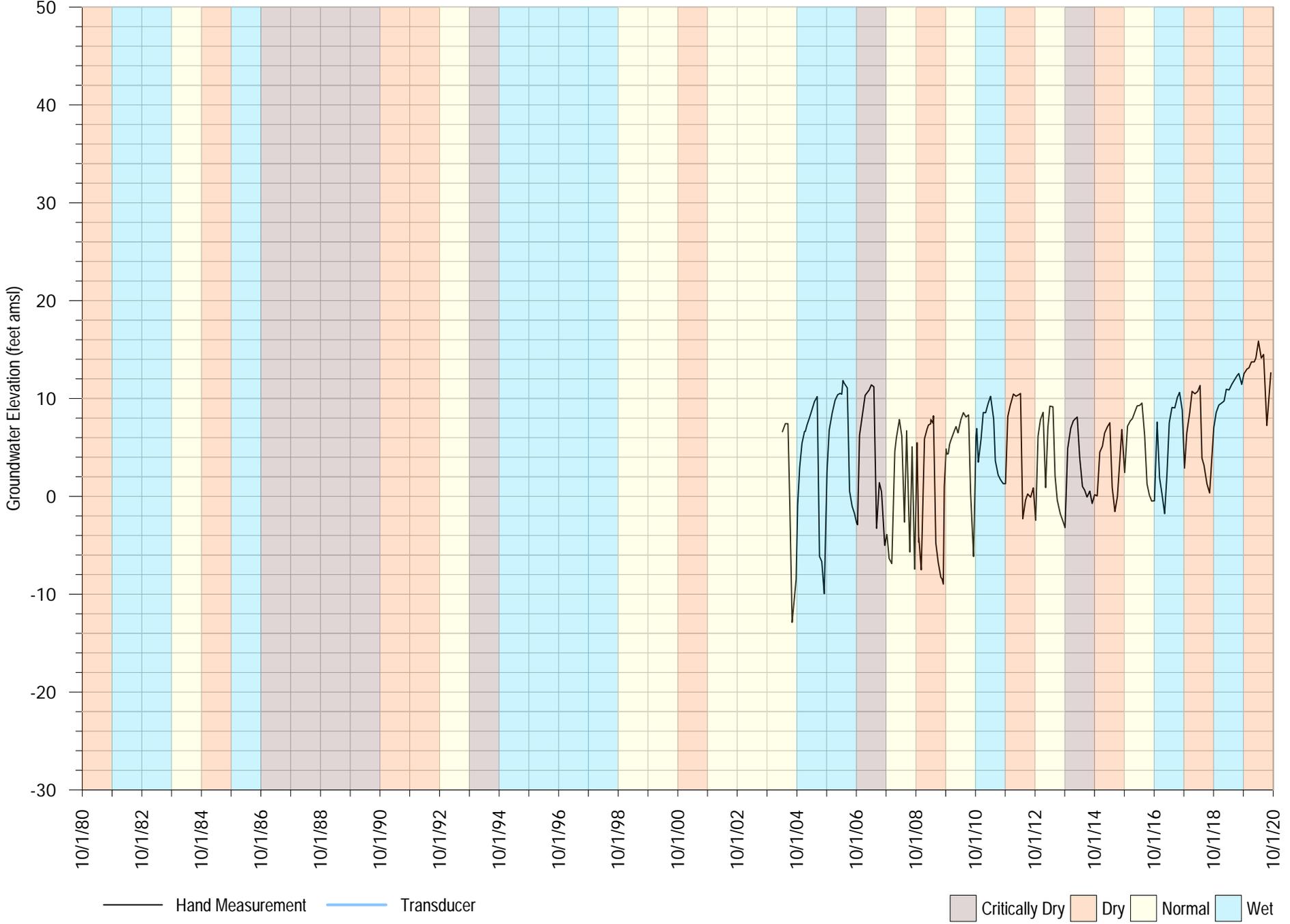
Belt 4 Shallow

FIGURE A-91



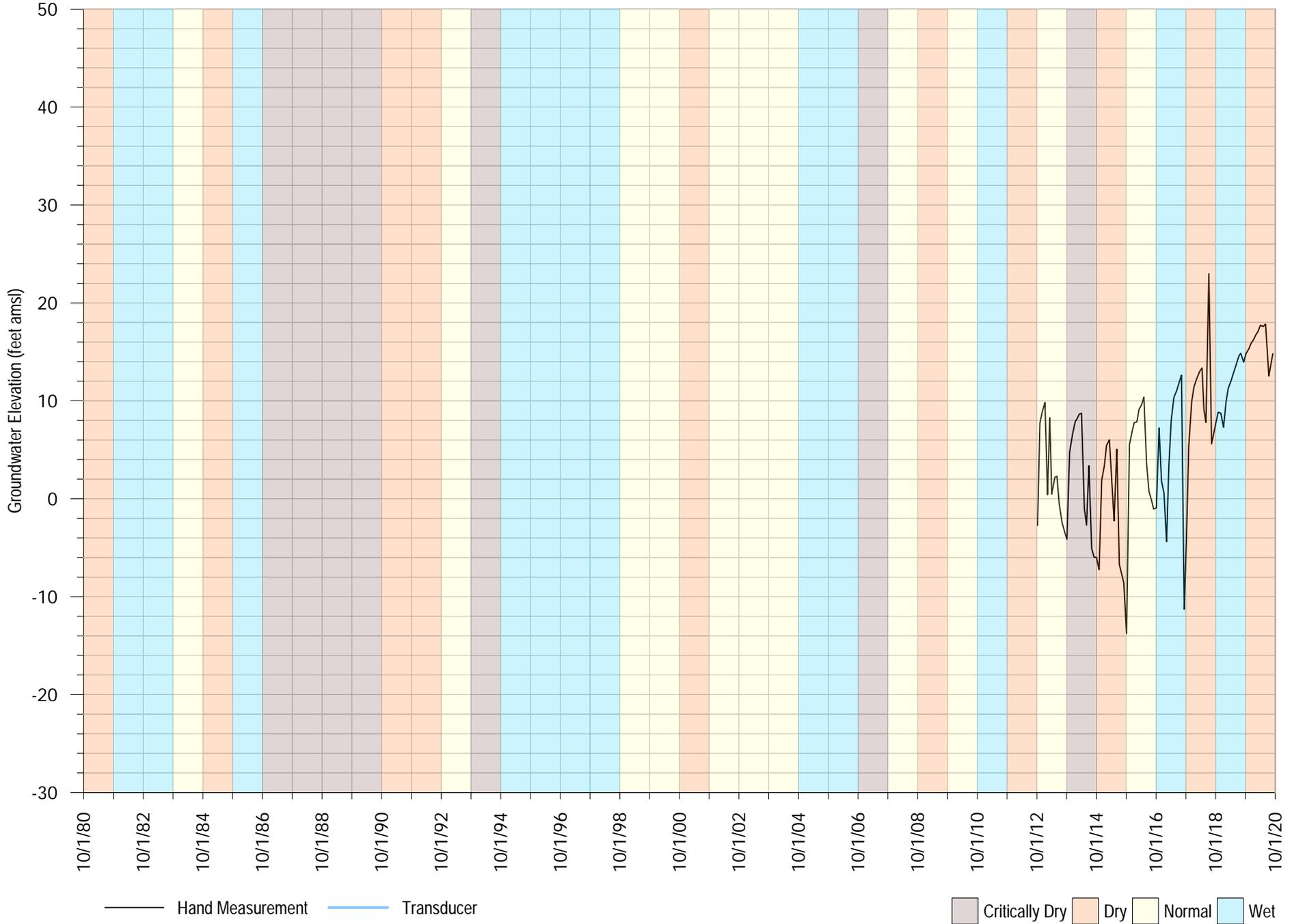
Belt 6

FIGURE A-92



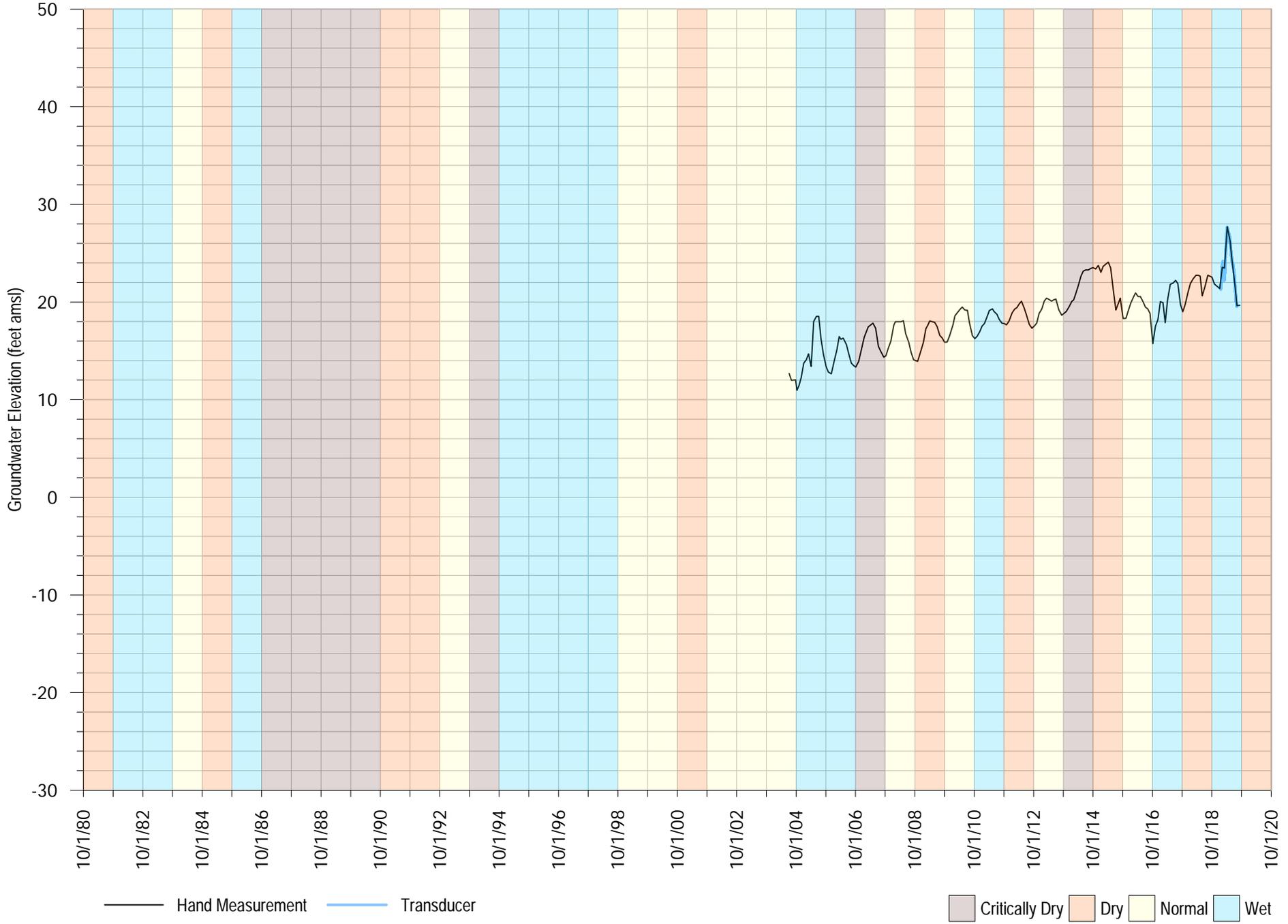
Beltz 7 Deep

FIGURE A-93



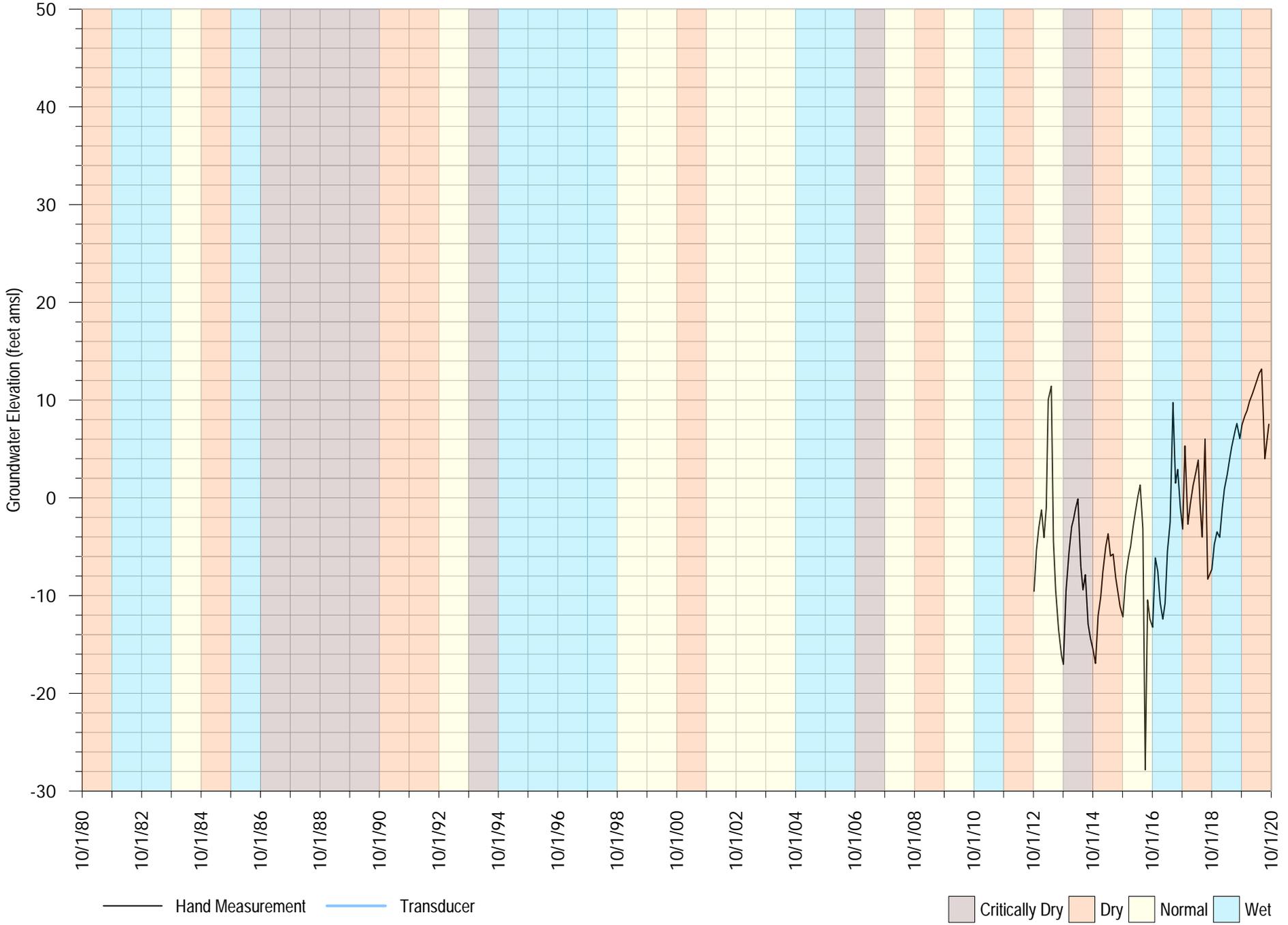
Beltz 7 Santa Margarita Test Well

FIGURE A-94



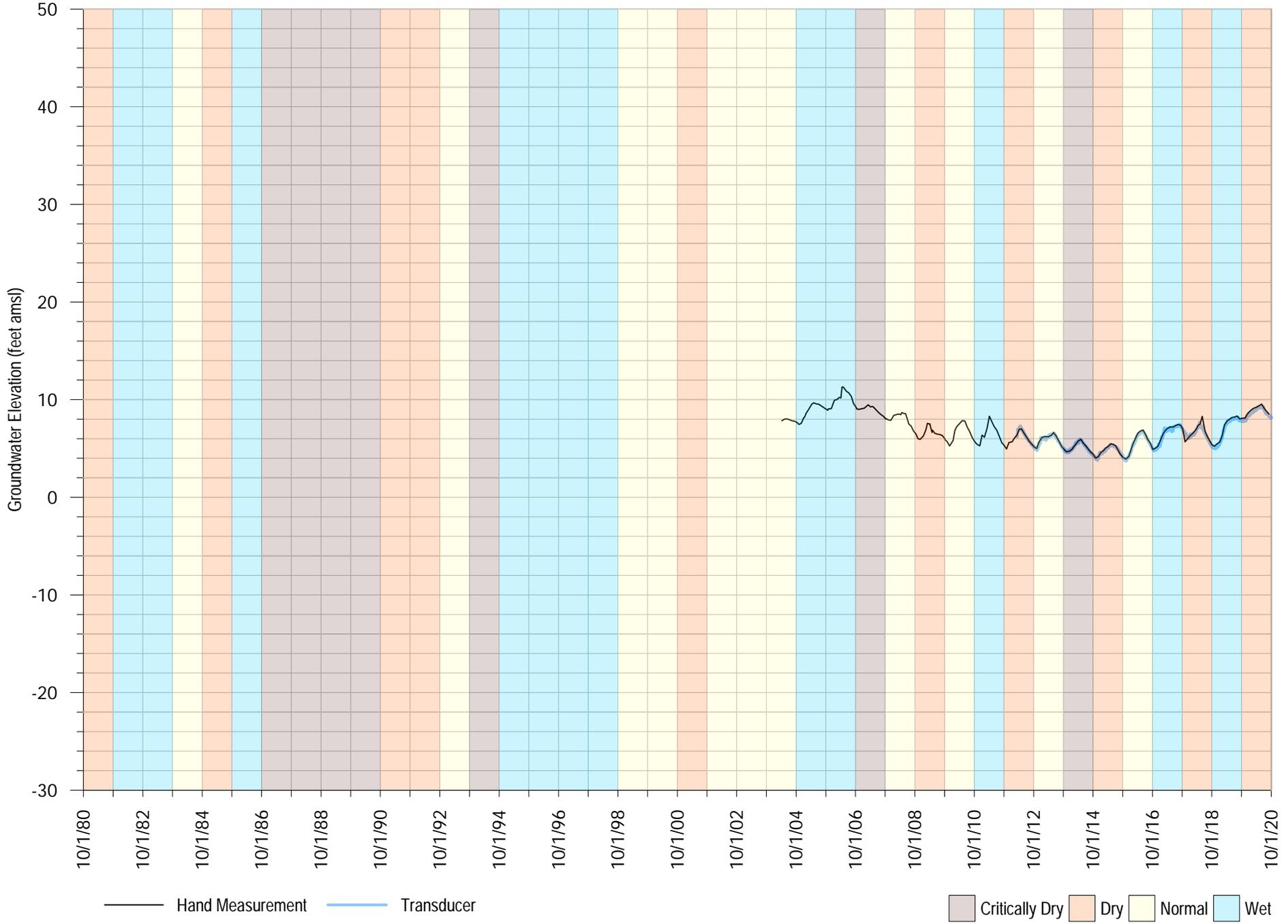
Beltz 7 Shallow

FIGURE A-95



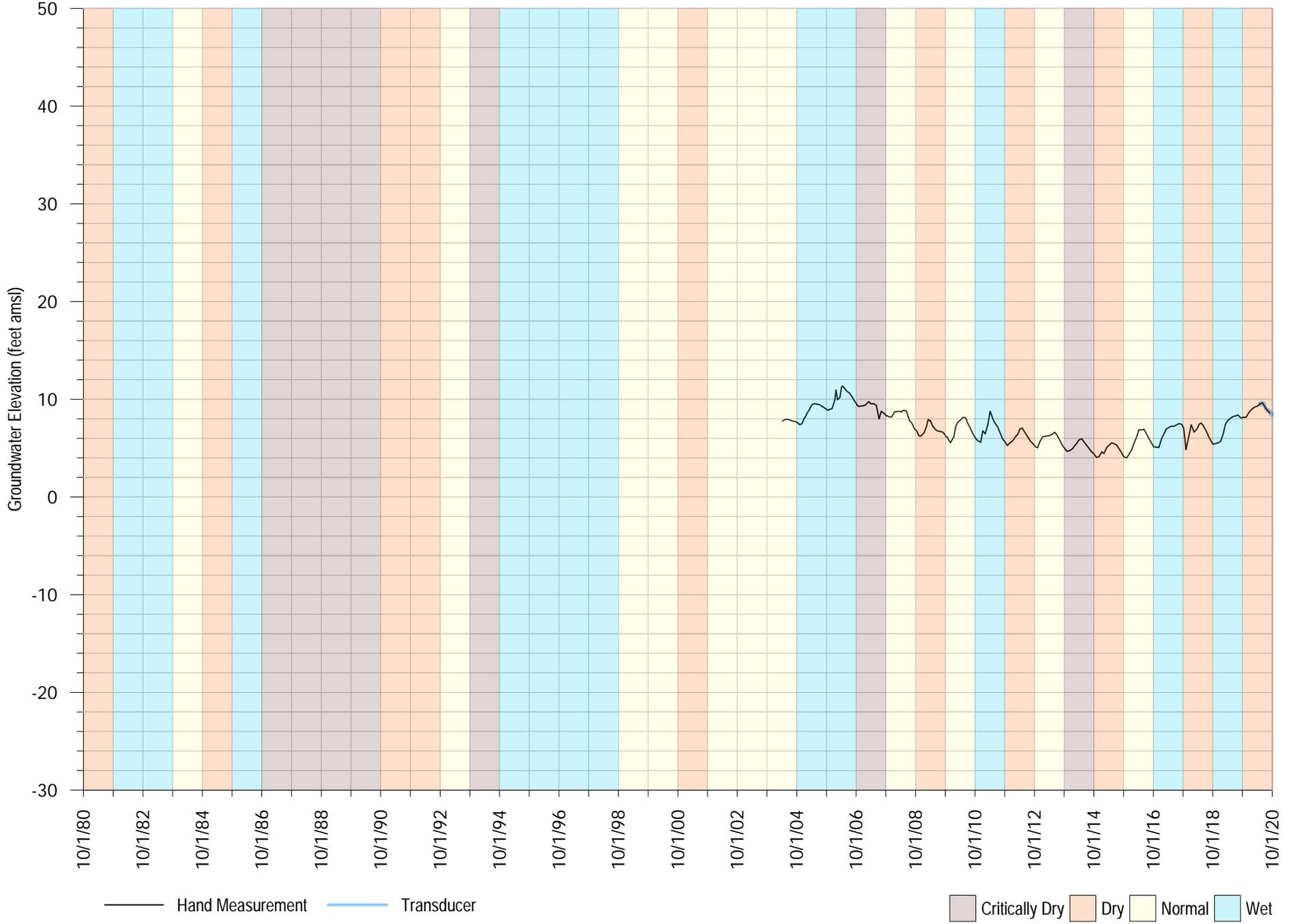
Corcoran Medium

FIGURE A-96



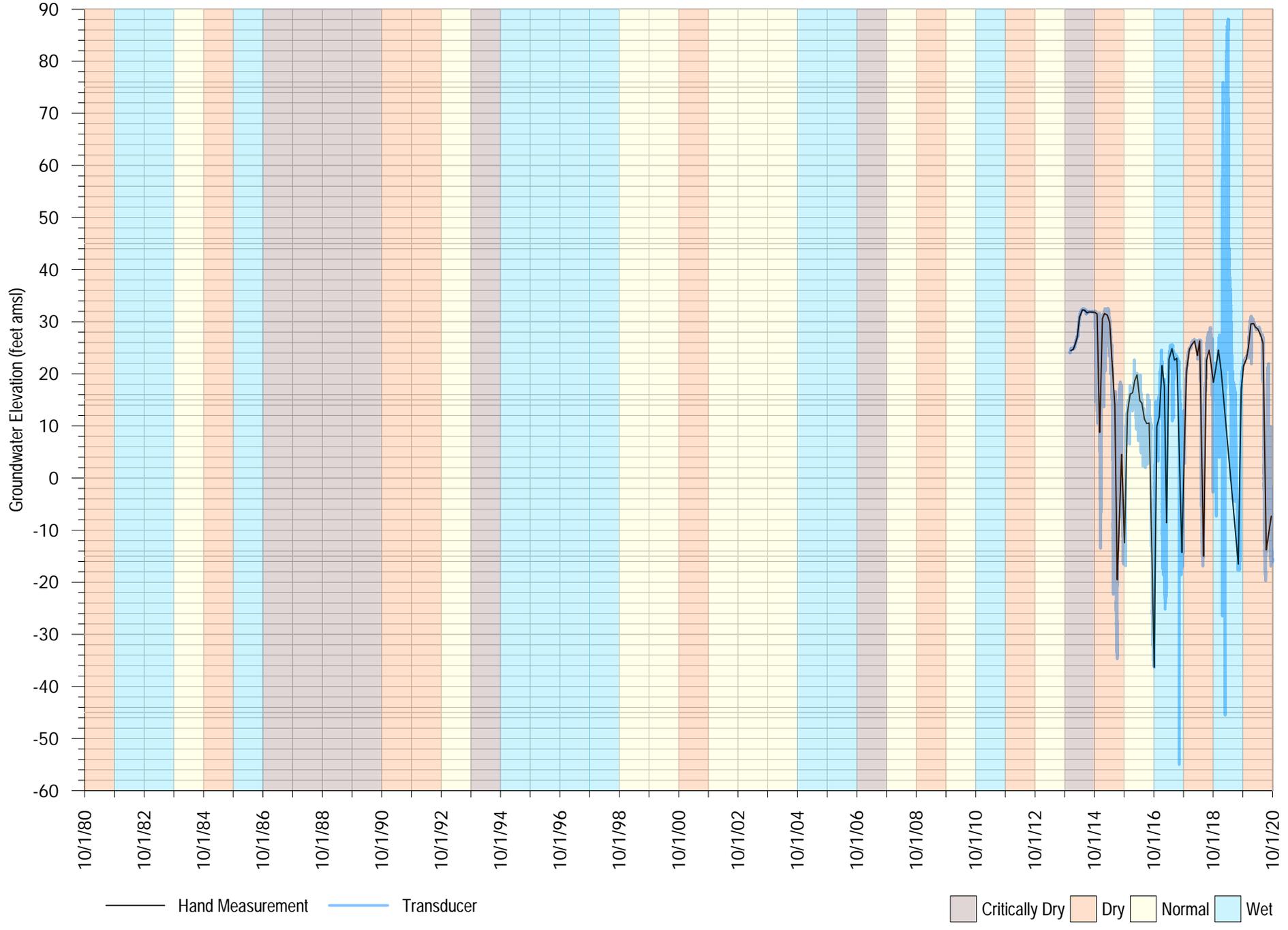
Corcoran Shallow

FIGURE A-97



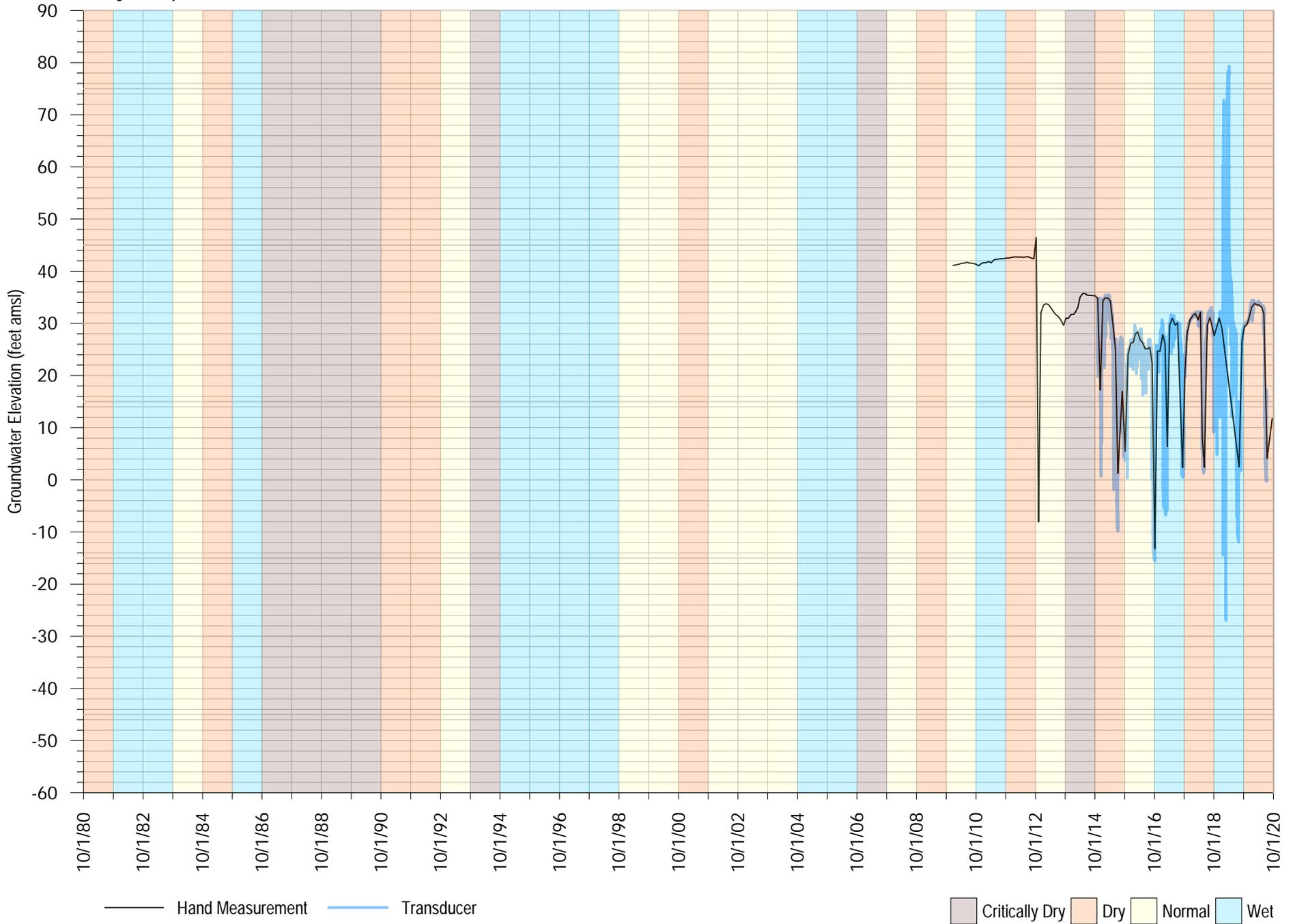
Cory 4

FIGURE A-98



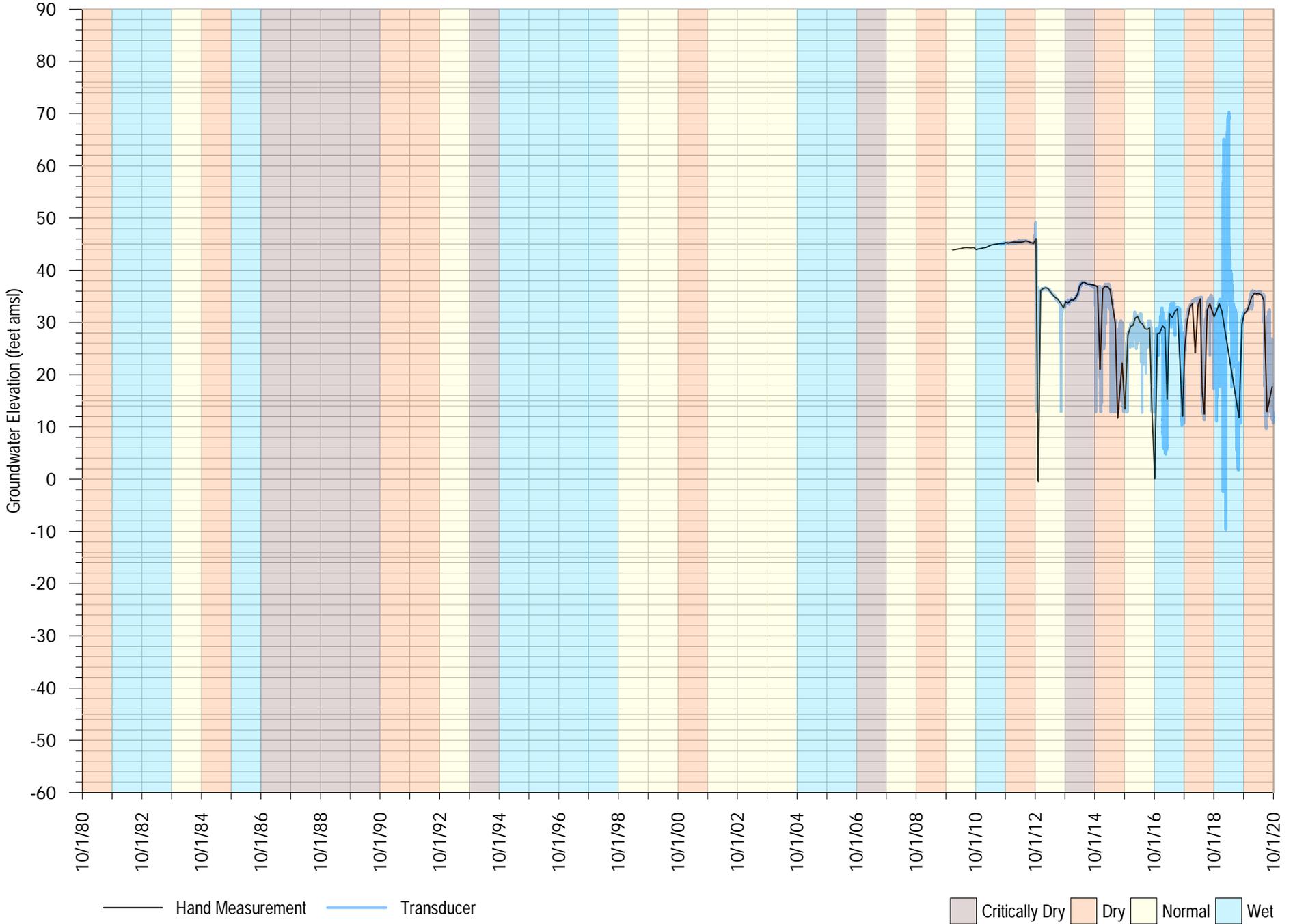
Cory Deep

FIGURE A-99



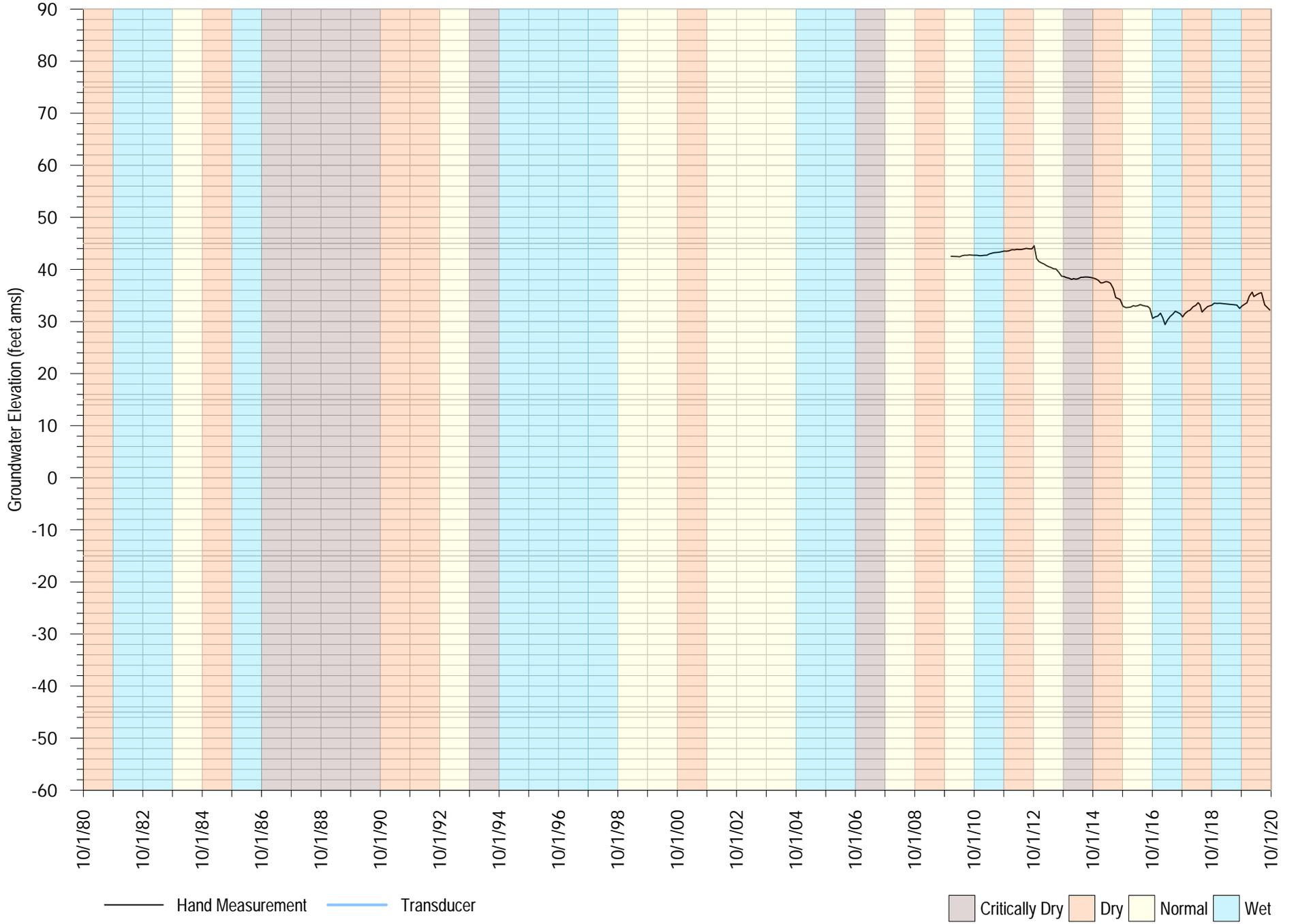
Cory Medium

FIGURE A-100



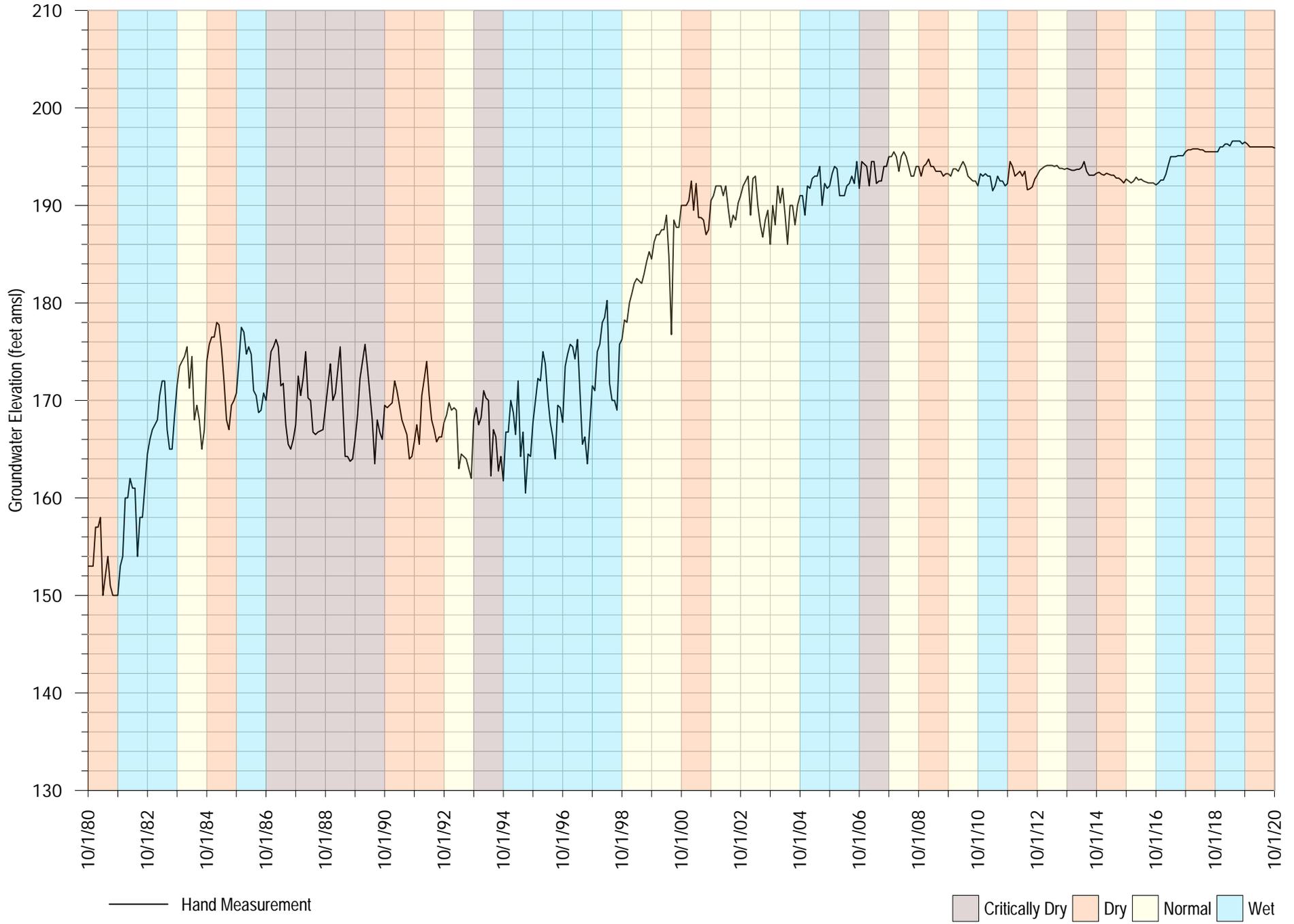
Cory Shallow

FIGURE A-101



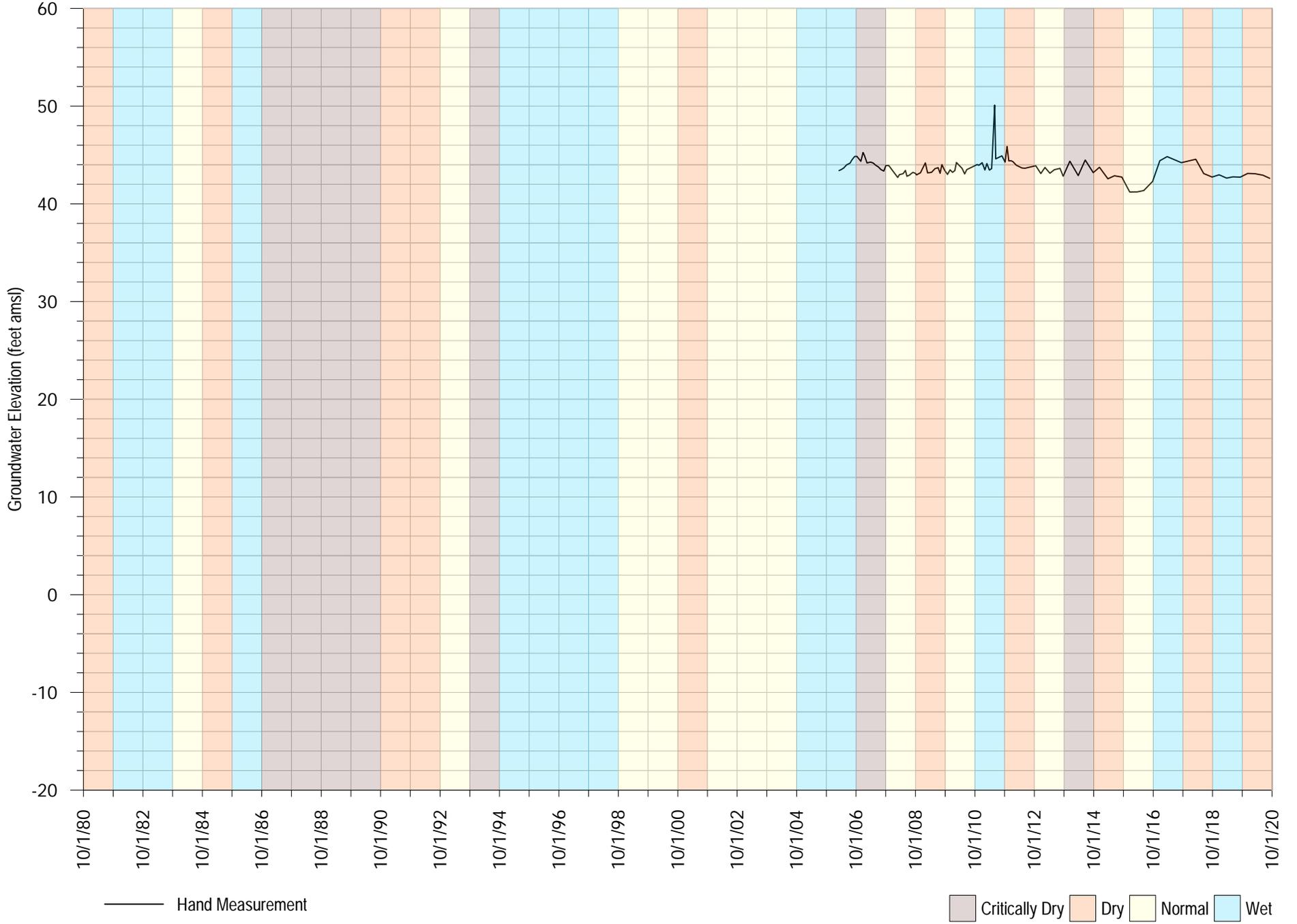
Cox 3

FIGURE A-102



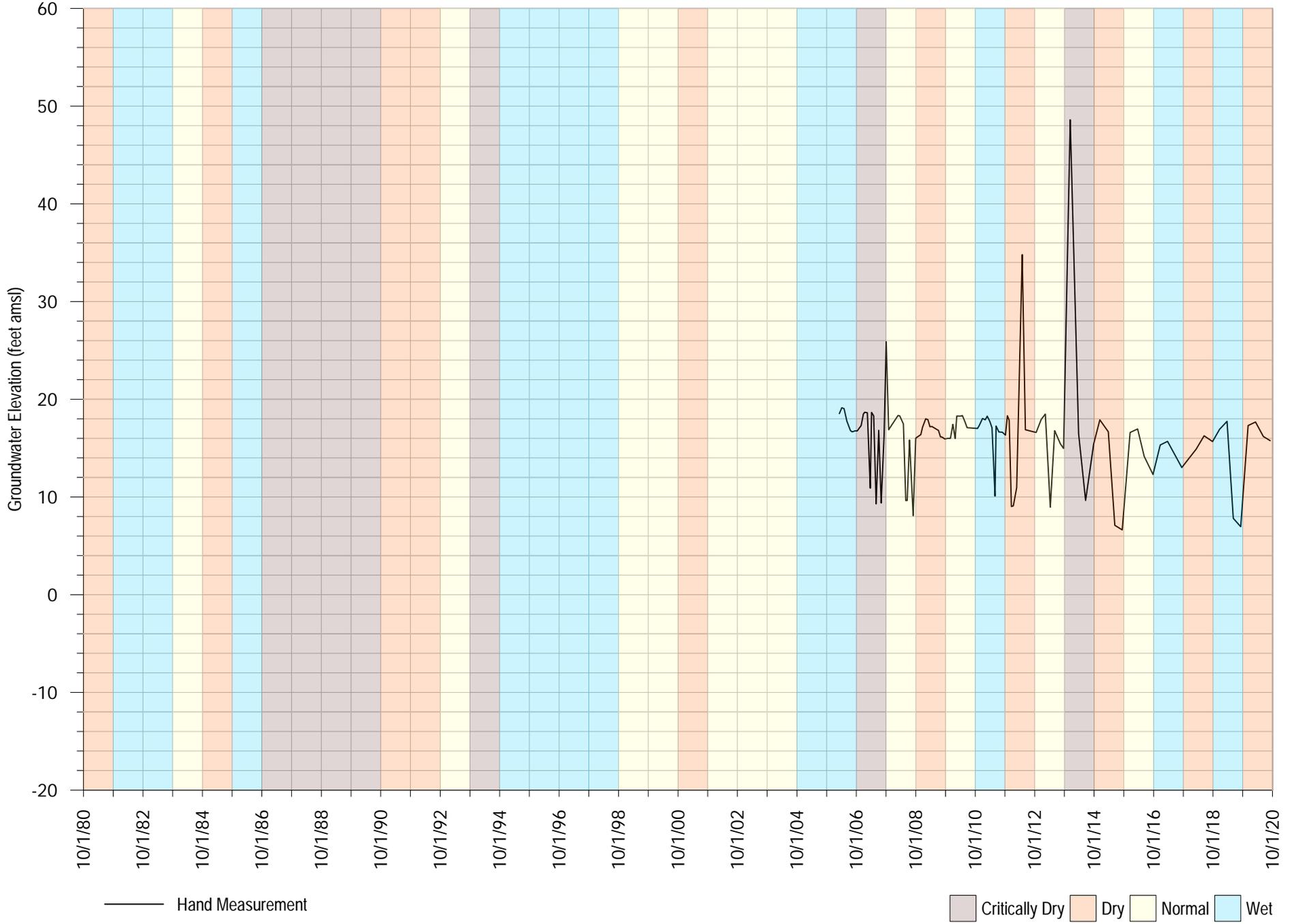
CWD-12A

FIGURE A-103



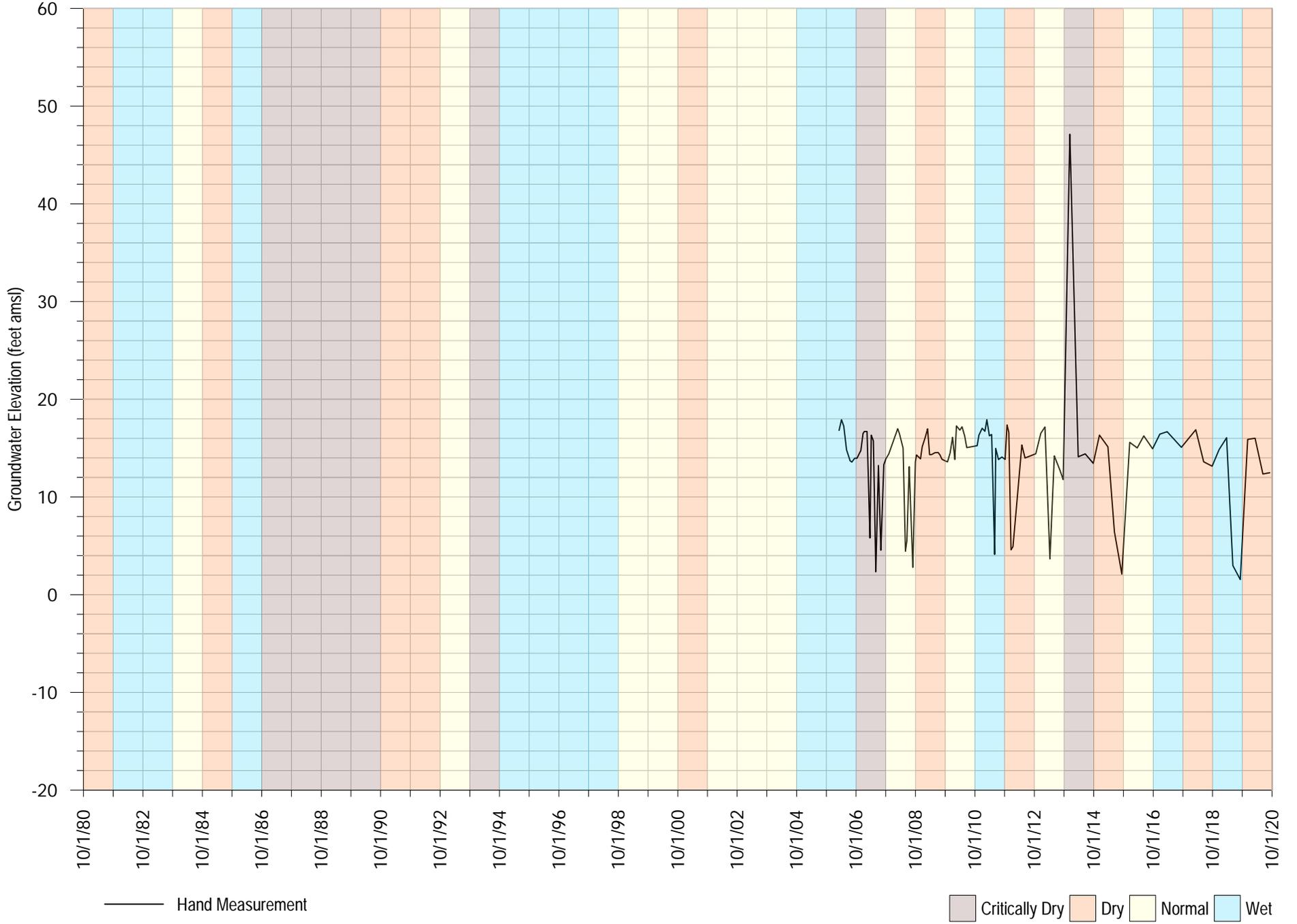
CWD-12B

FIGURE A-104



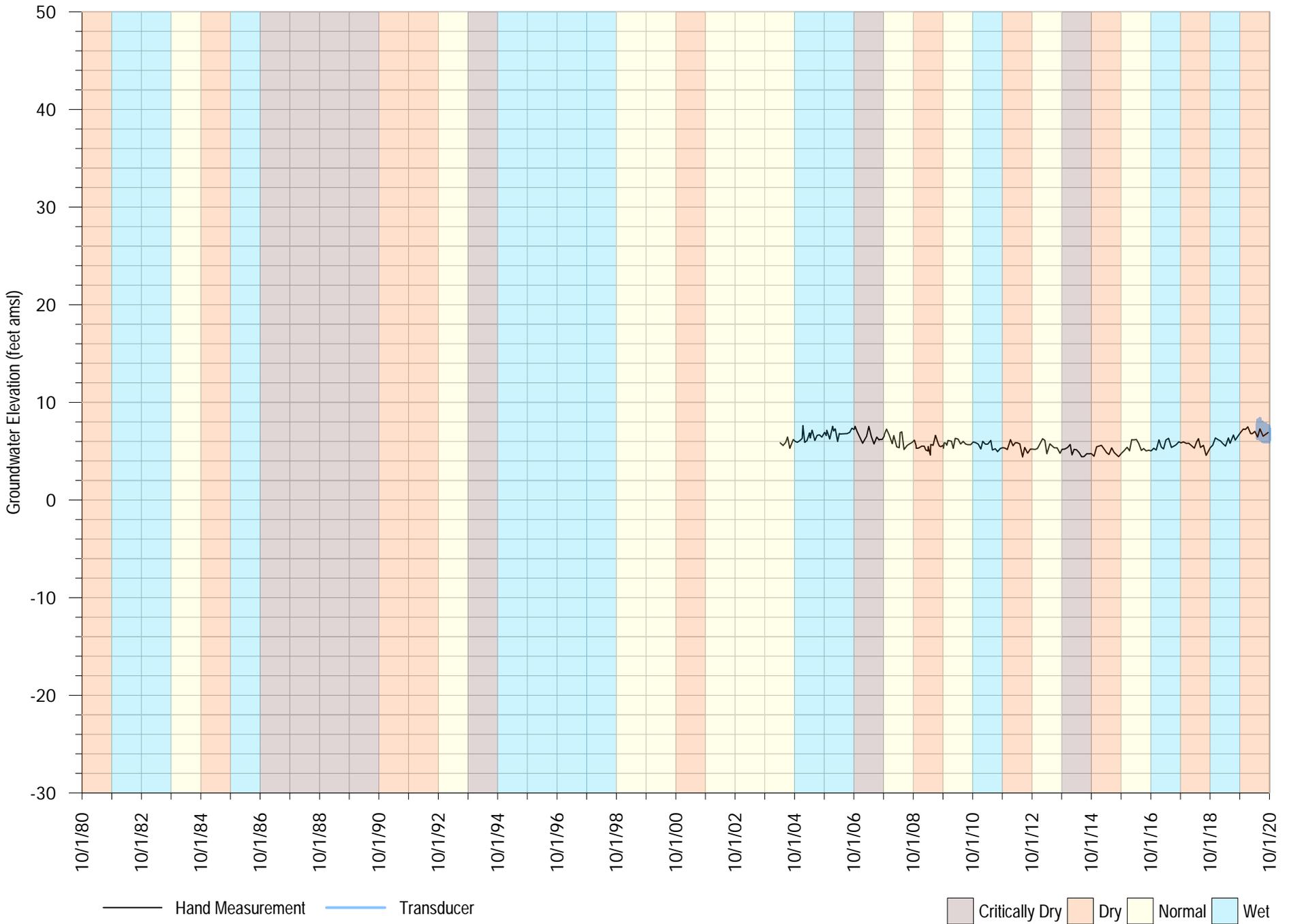
CWD-12C

FIGURE A-105



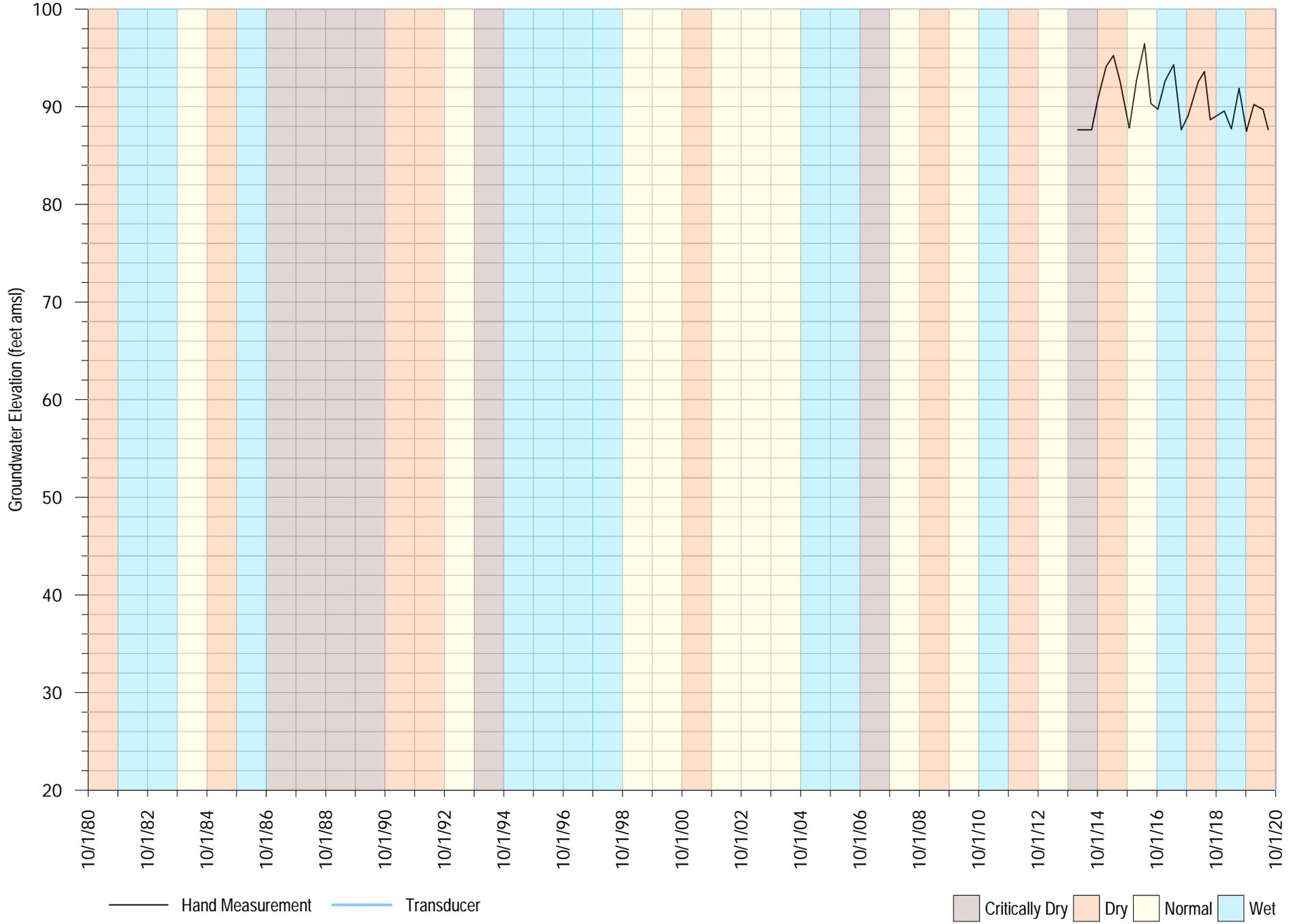
Moran Lake Shallow

FIGURE A-106



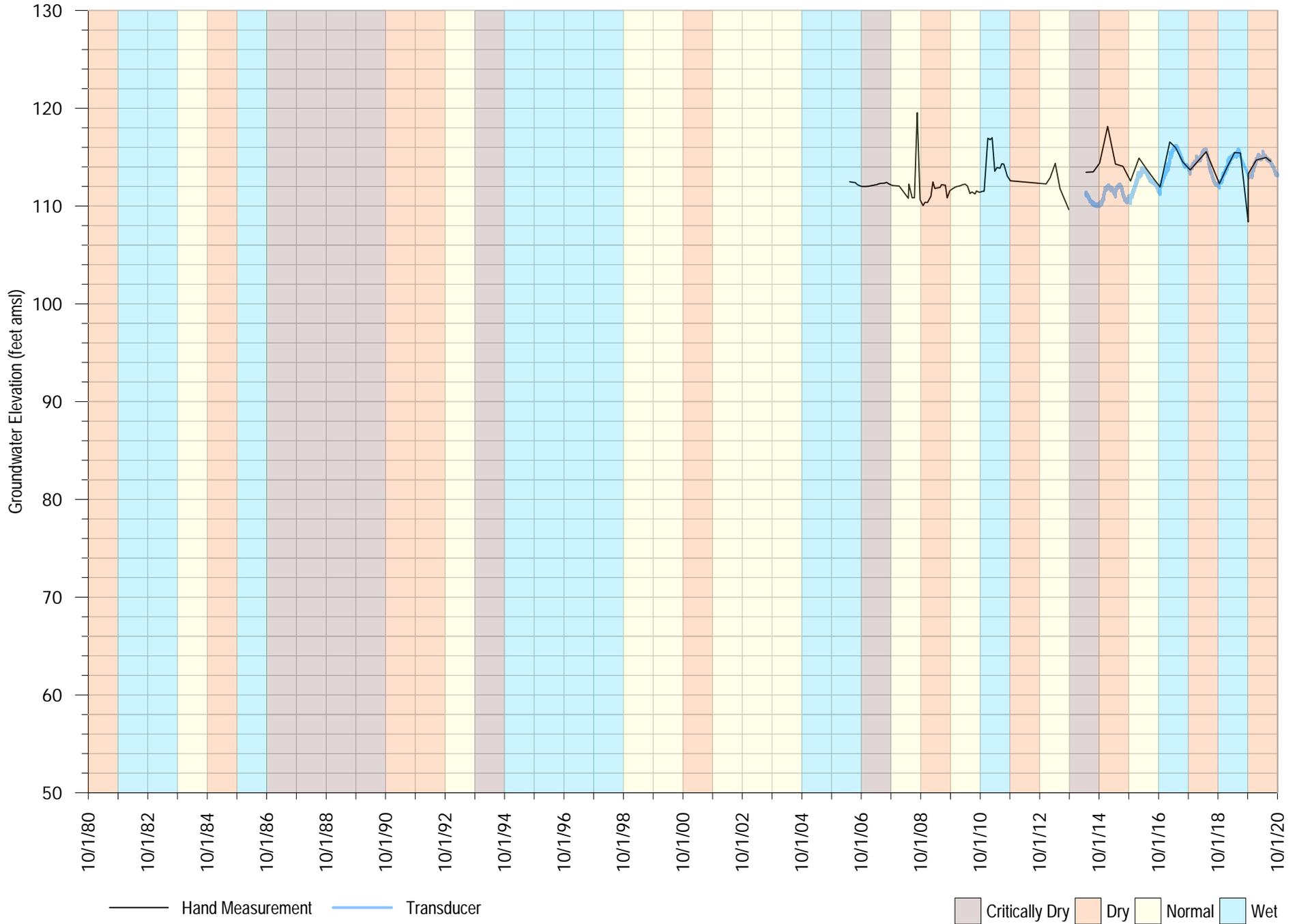
SC-10AAA at Cherryvale

FIGURE A-107



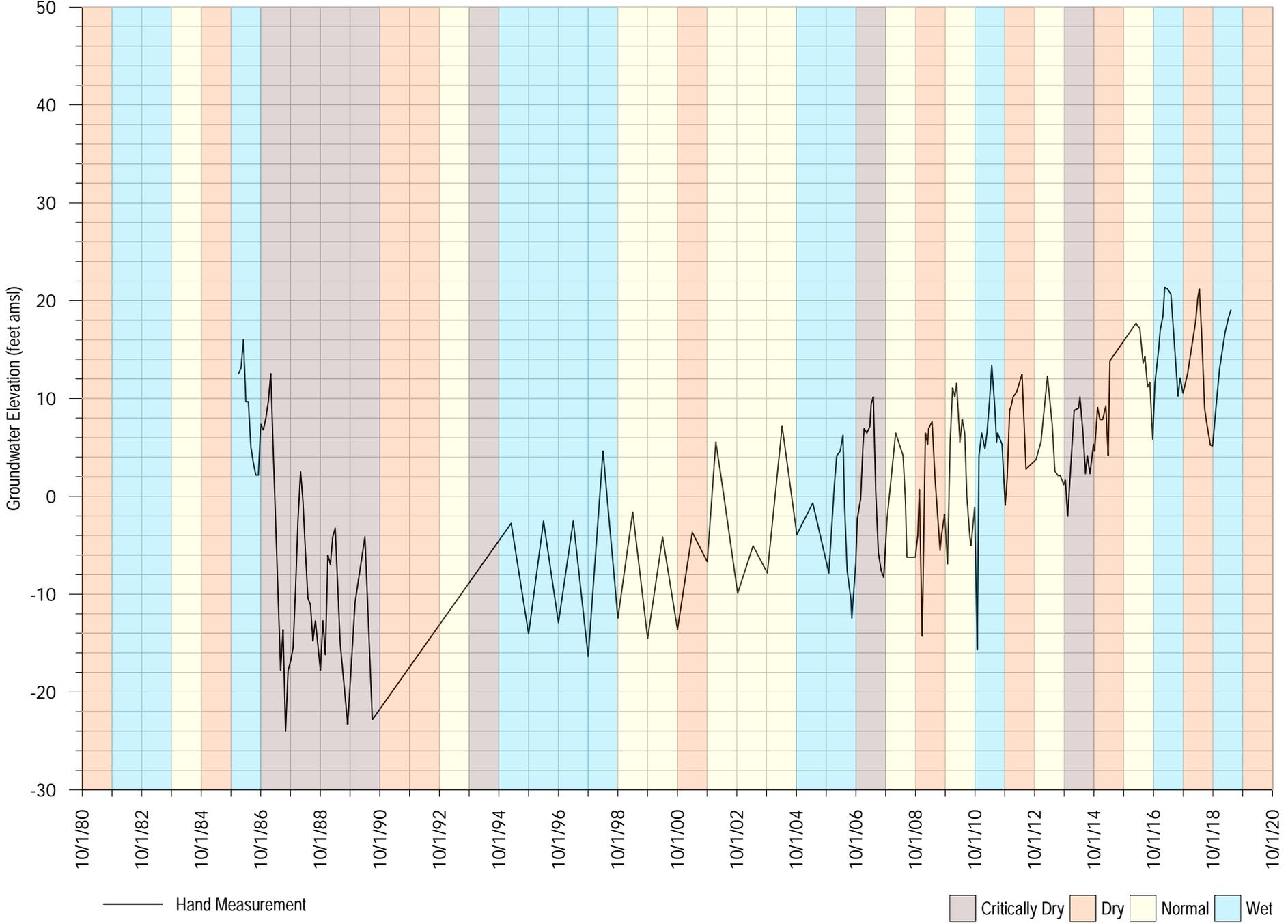
SC-11A & SC-11RA at Porter Gulch

FIGURE A-108



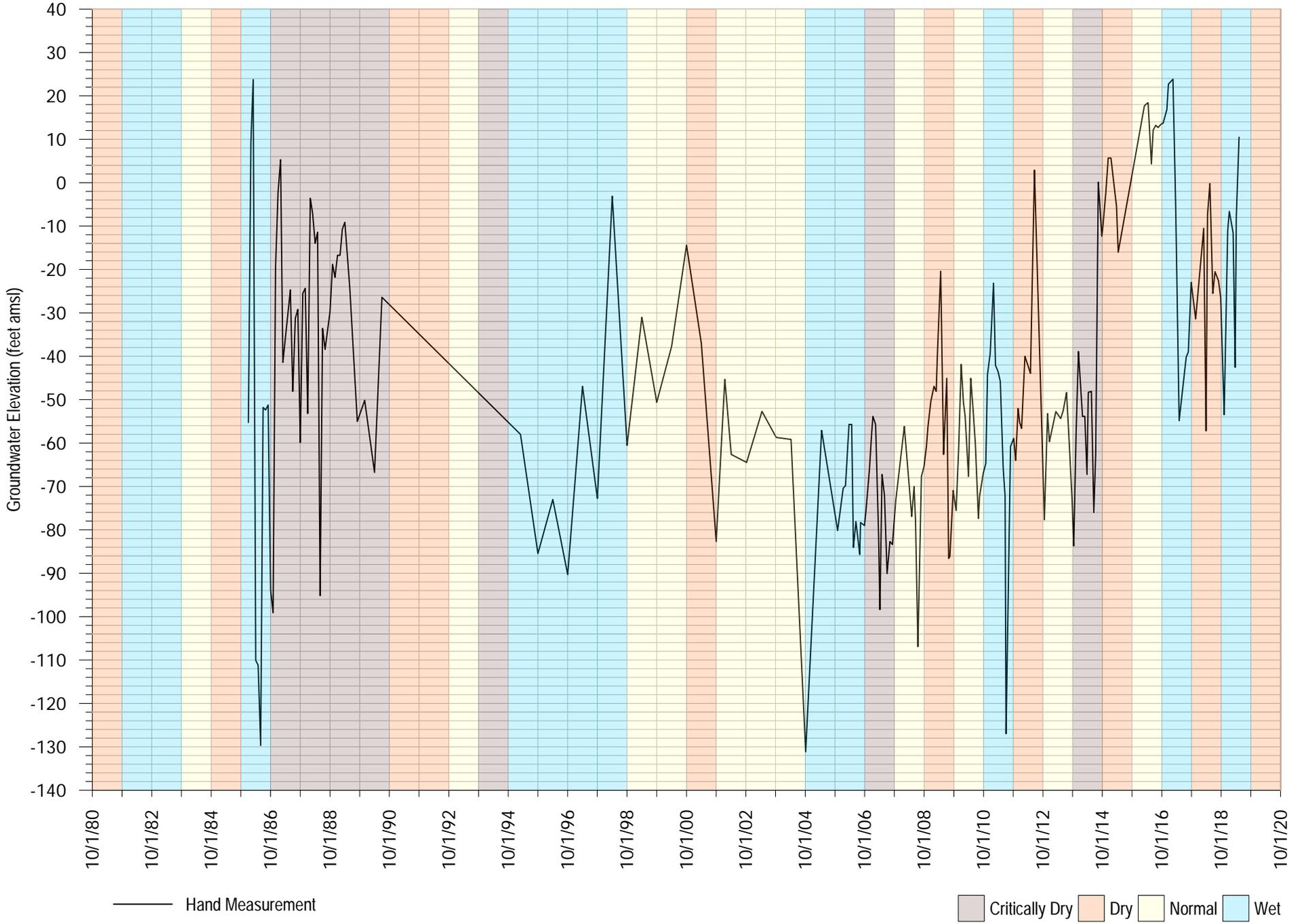
SC-14A at Madeline

FIGURE A-109



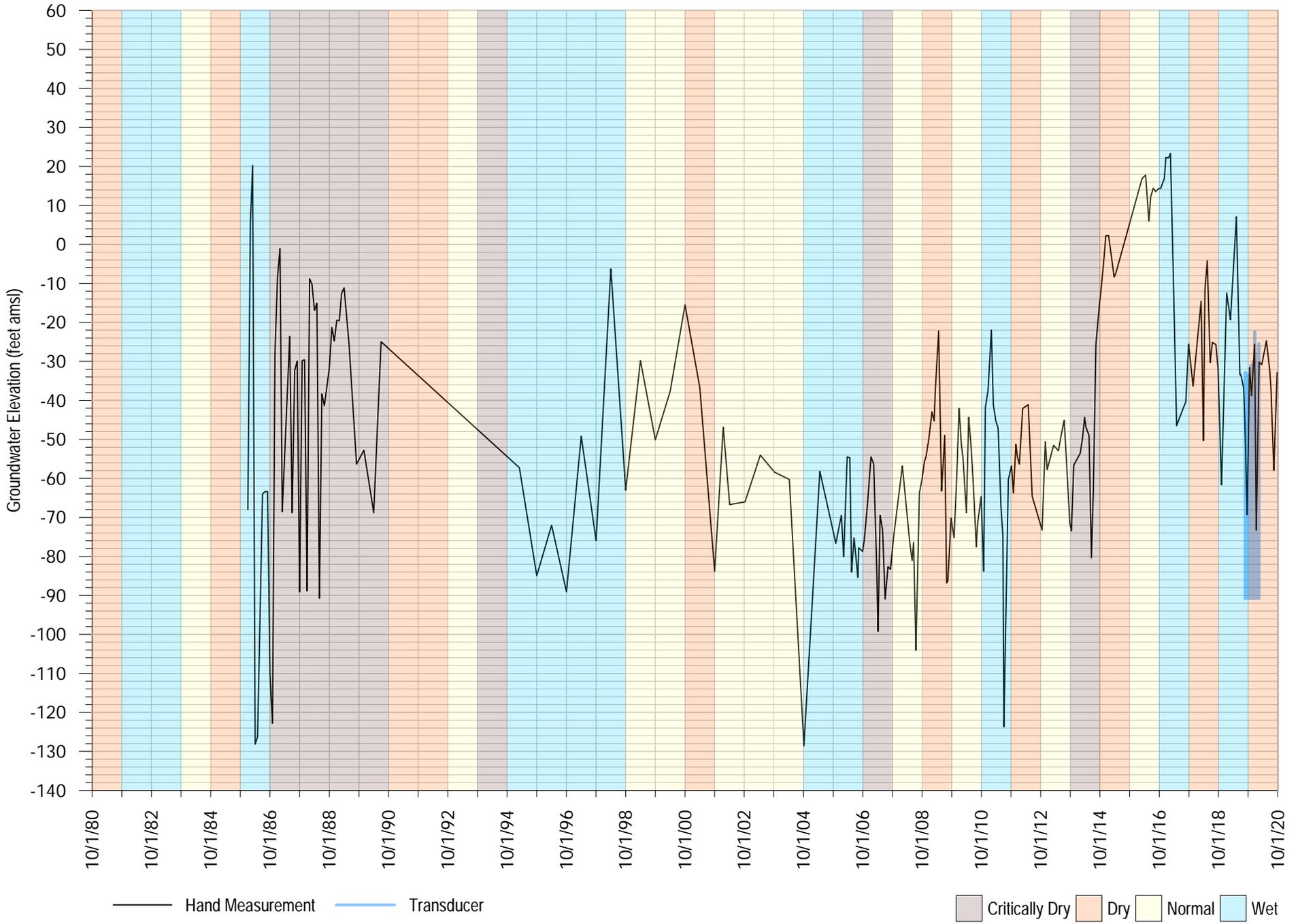
SC-14B at Madeline

FIGURE A-110



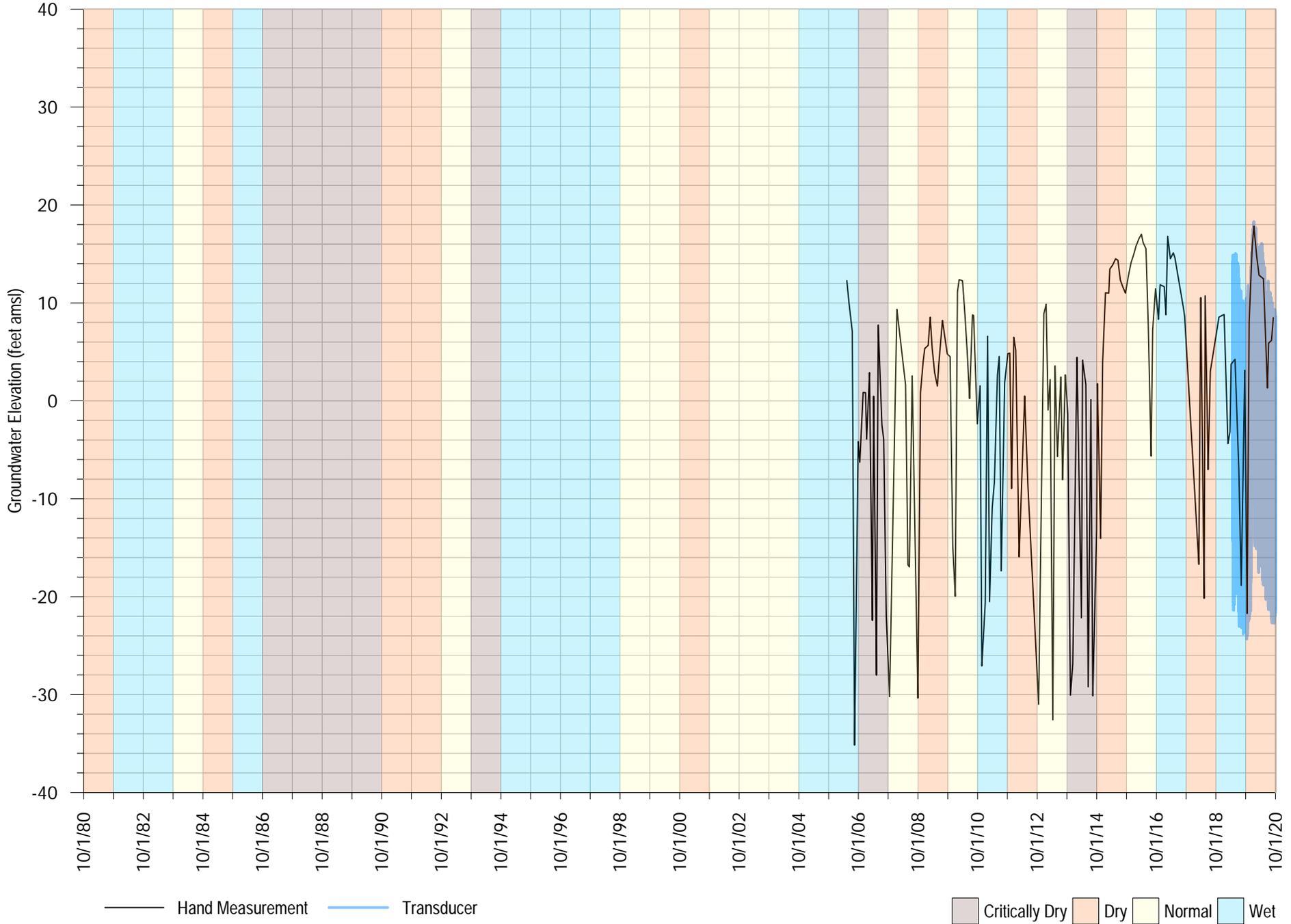
SC-14C at Madeline

FIGURE A-111



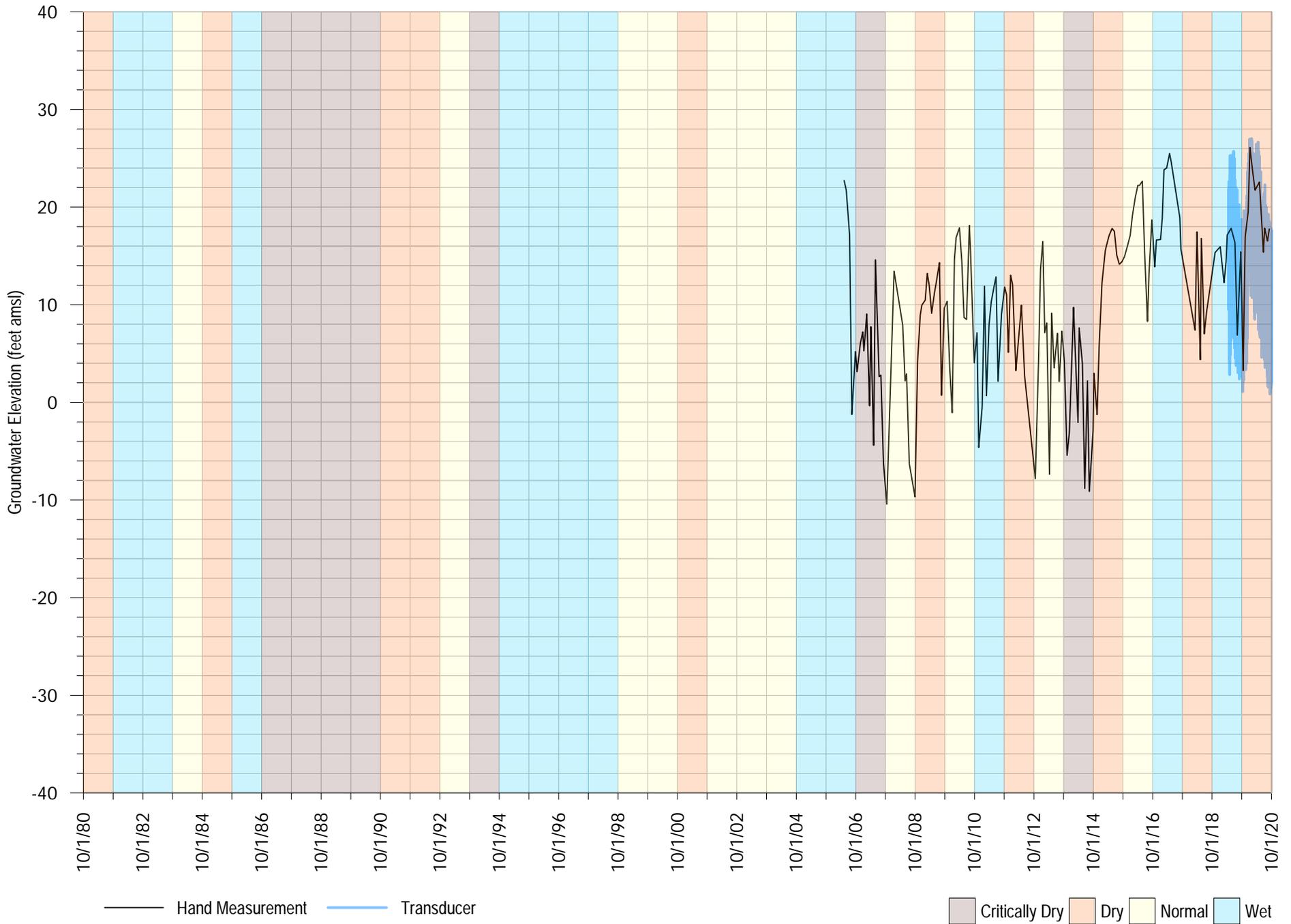
SC-15A at Rosedale

FIGURE A-112



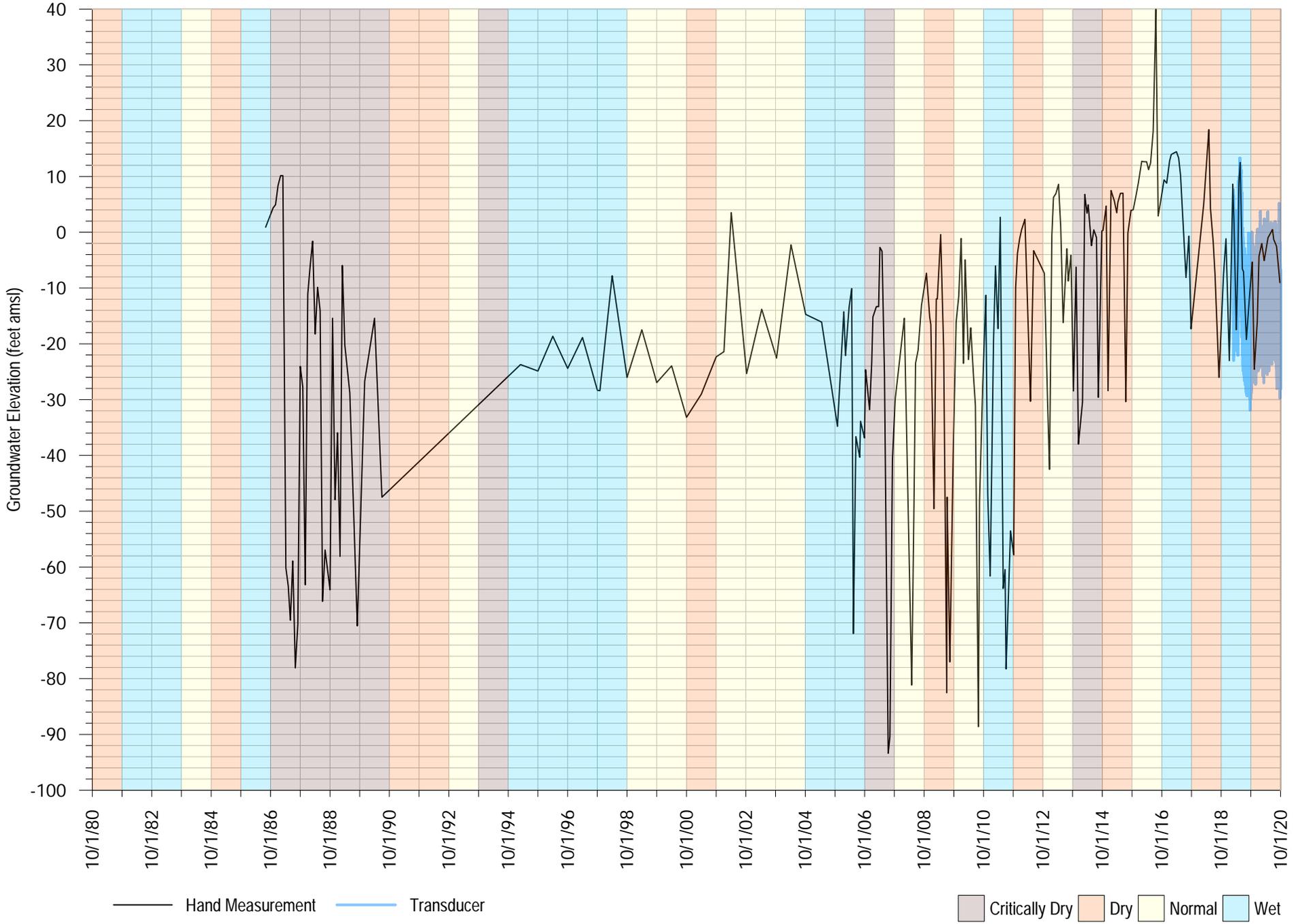
SC-15B at Rosedale

FIGURE A-113



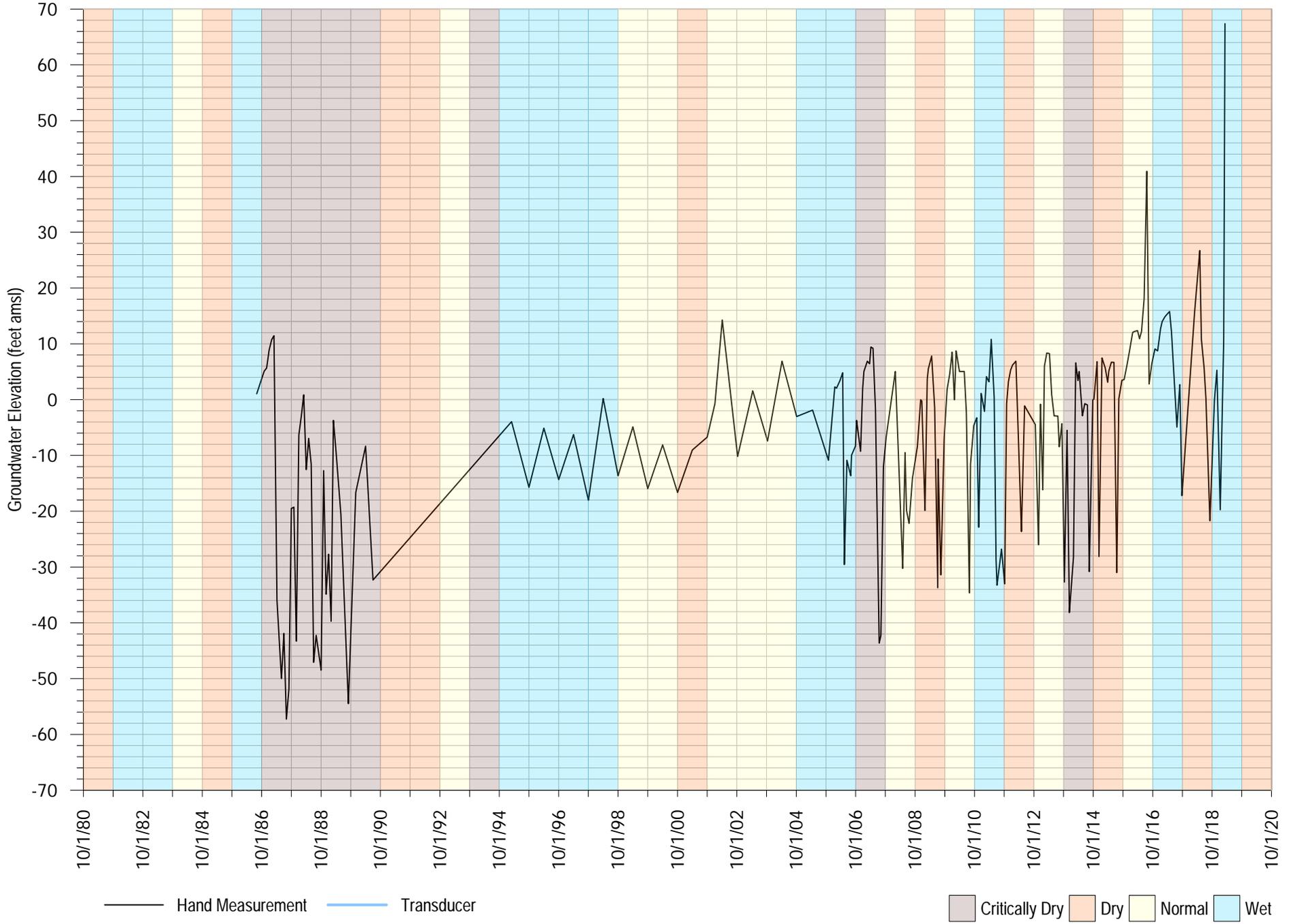
SC-16A at Estates

FIGURE A-114



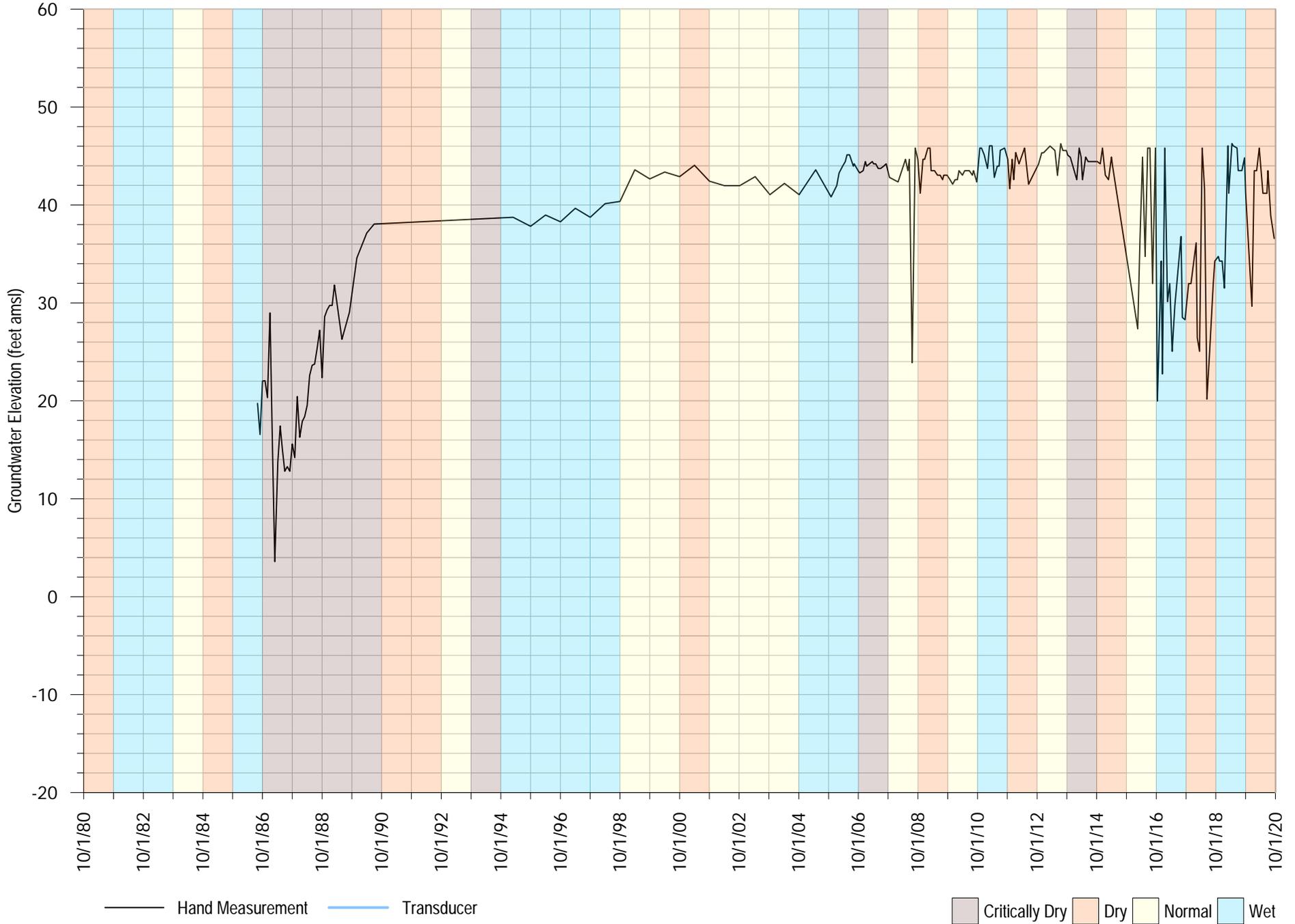
SC-16B at Estates

FIGURE A-115



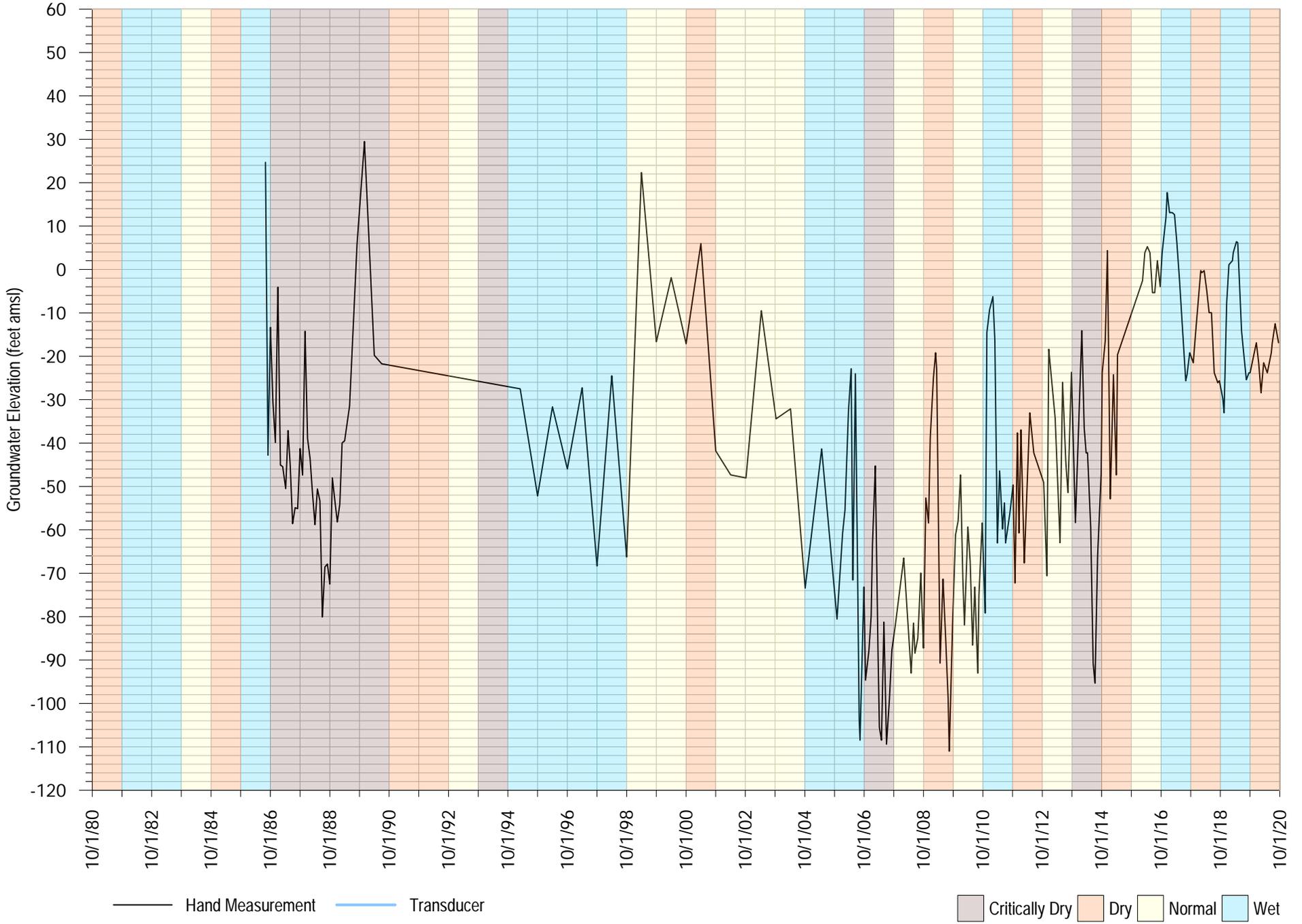
SC-17A at Ledyard

FIGURE A-116



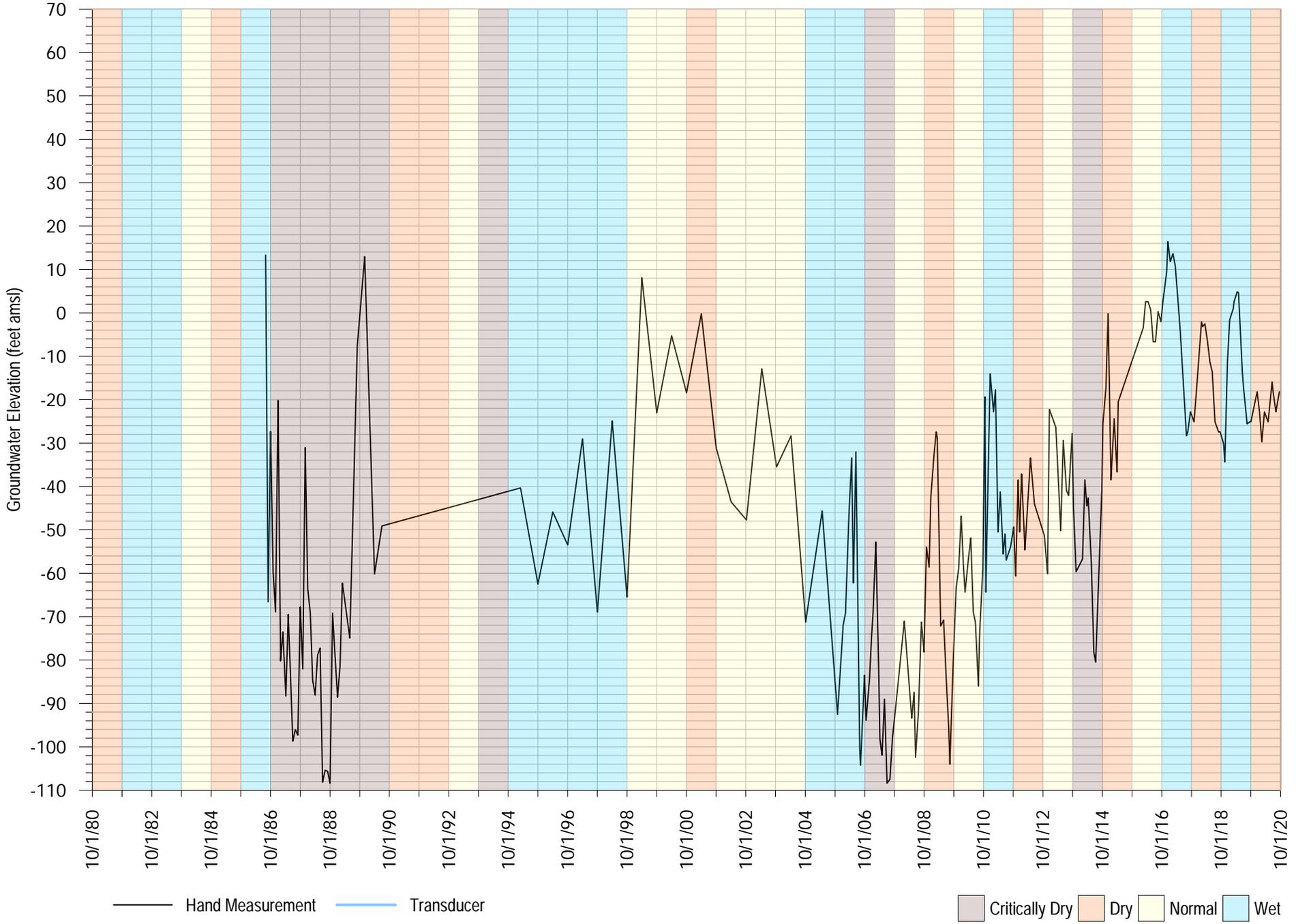
SC-17B at Ledyard

FIGURE A-117



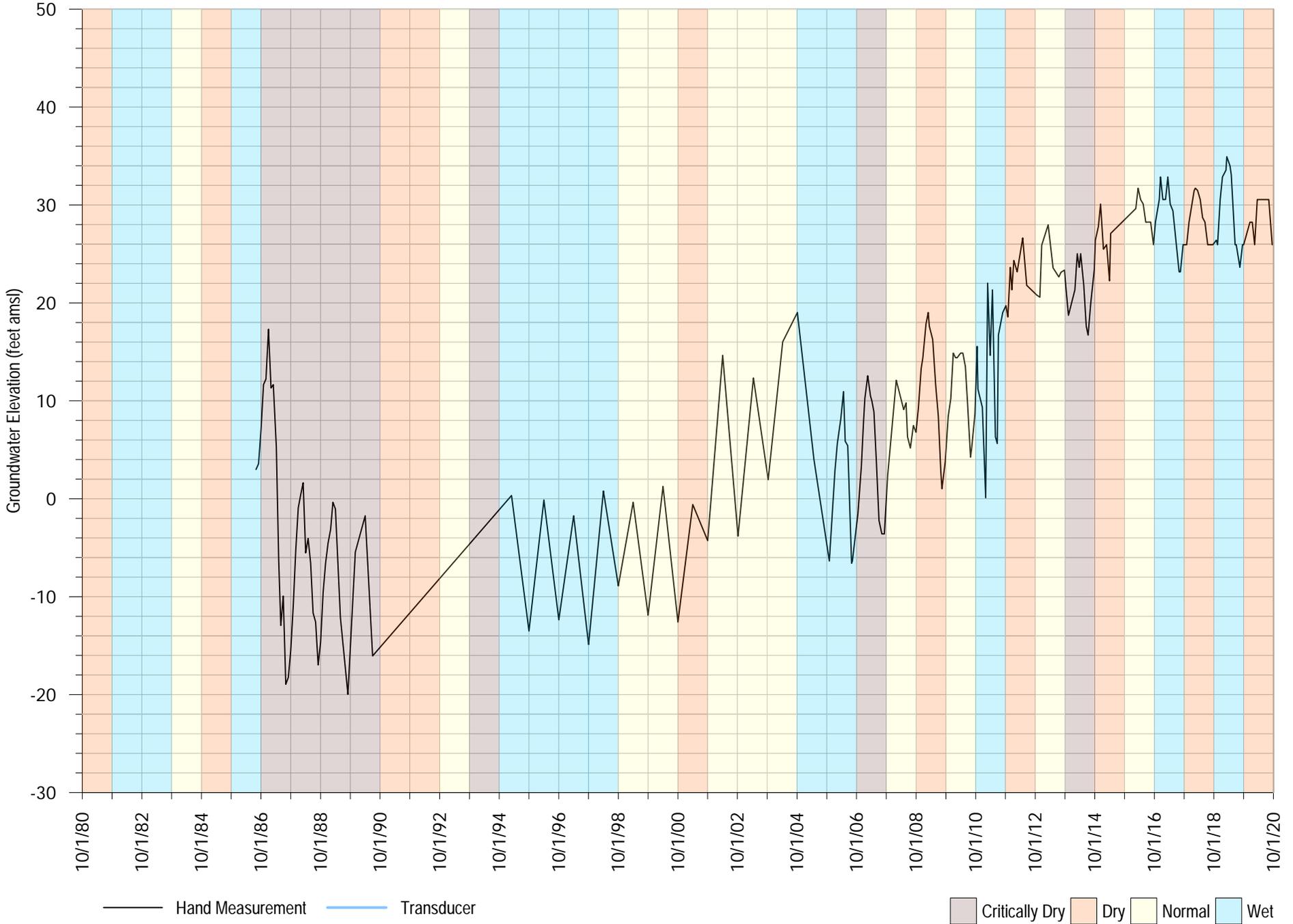
SC-17C at Ledyard

FIGURE A-118



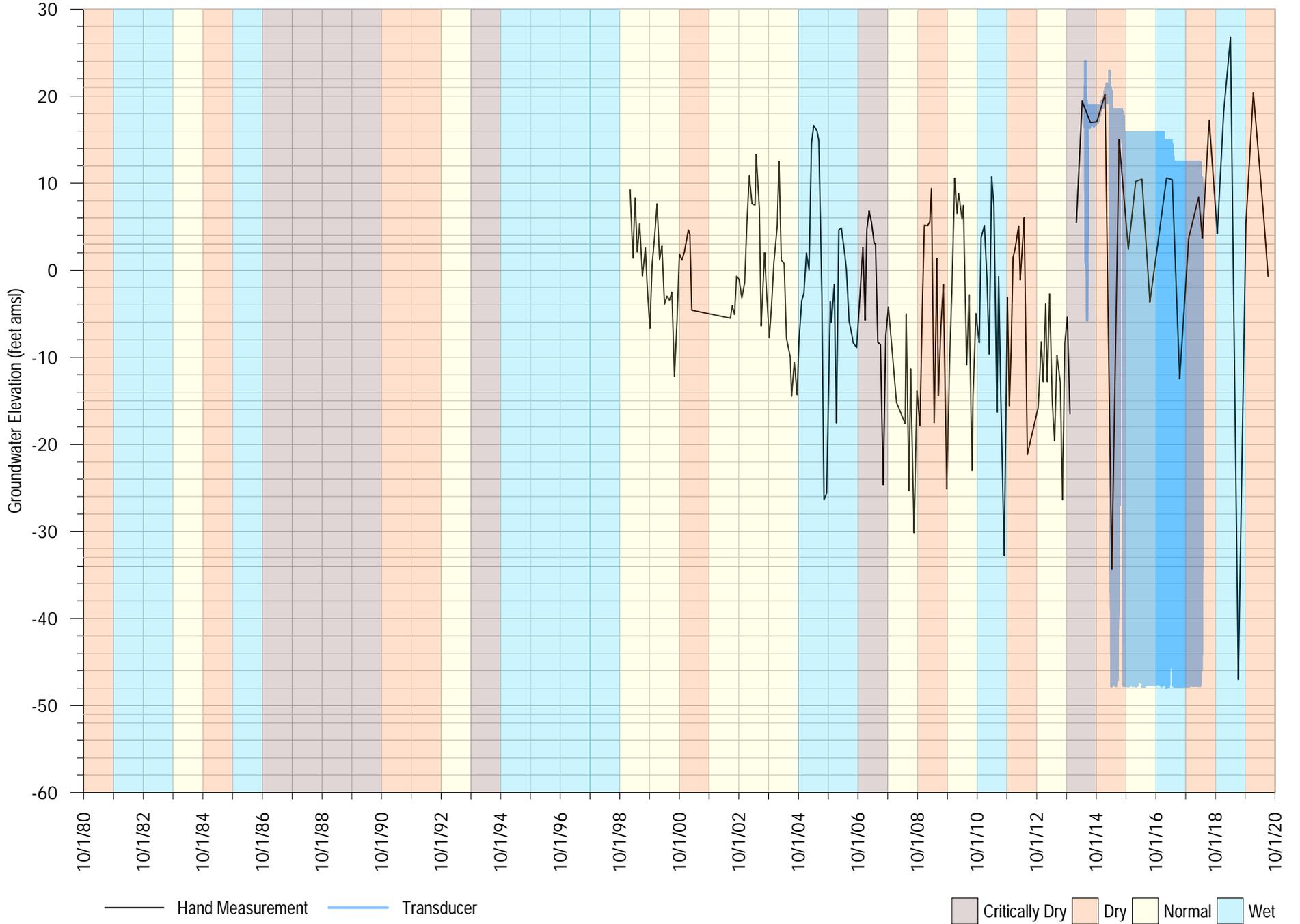
SC-17D at Ledyard

FIGURE A-119



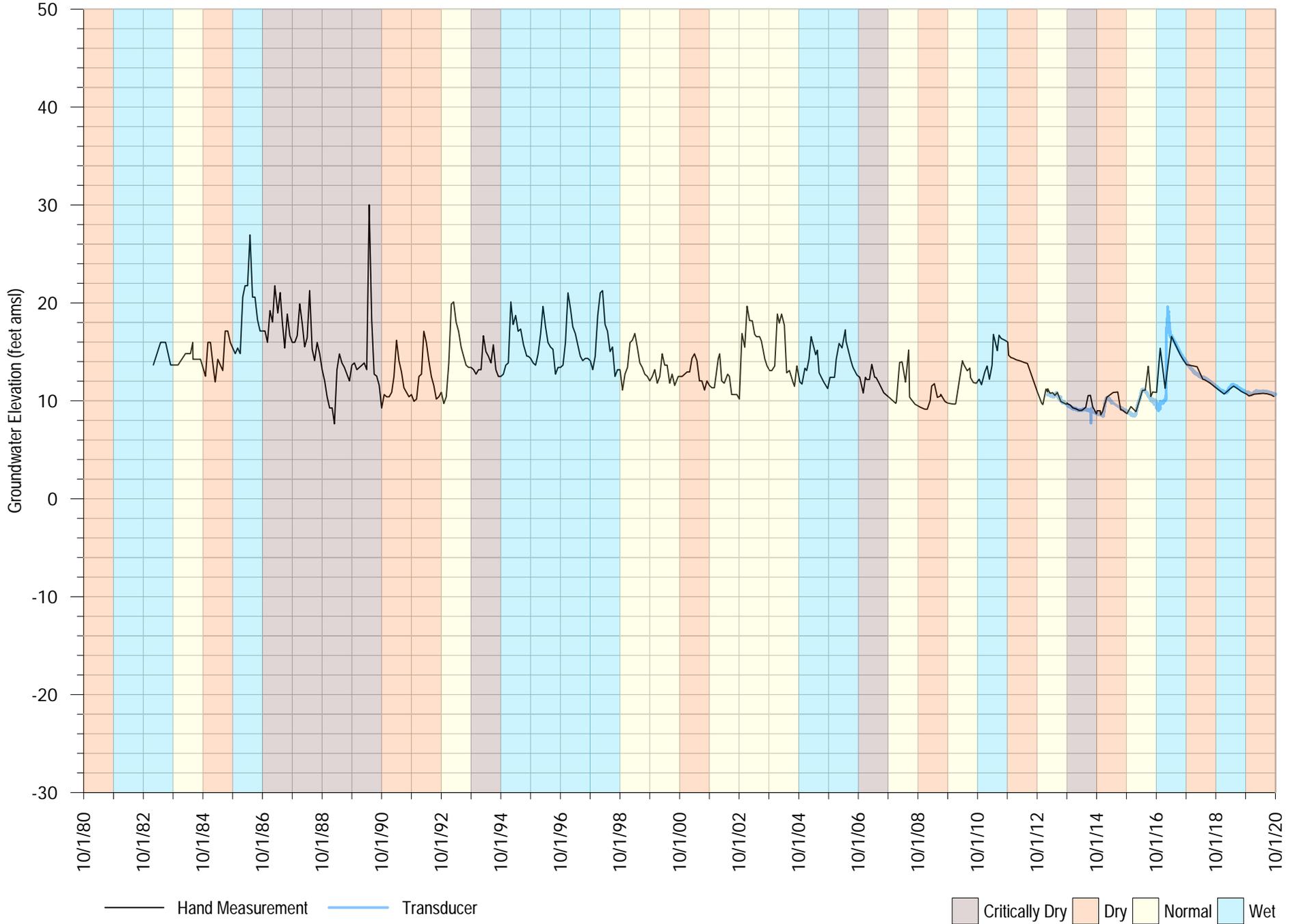
SC-18A & SC-18RA at Main Street

FIGURE A-120



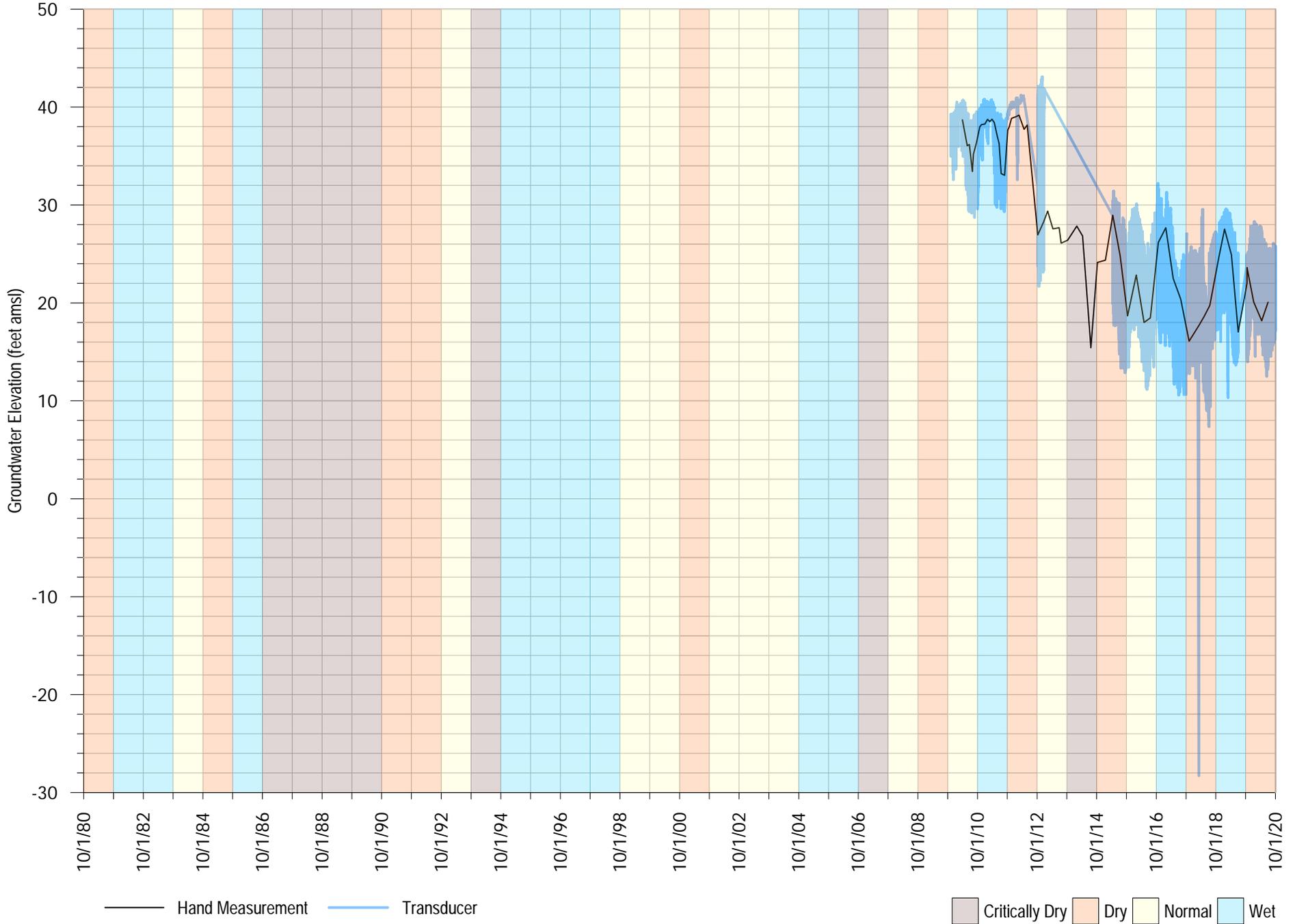
SC-1B at Prospect

FIGURE A-121



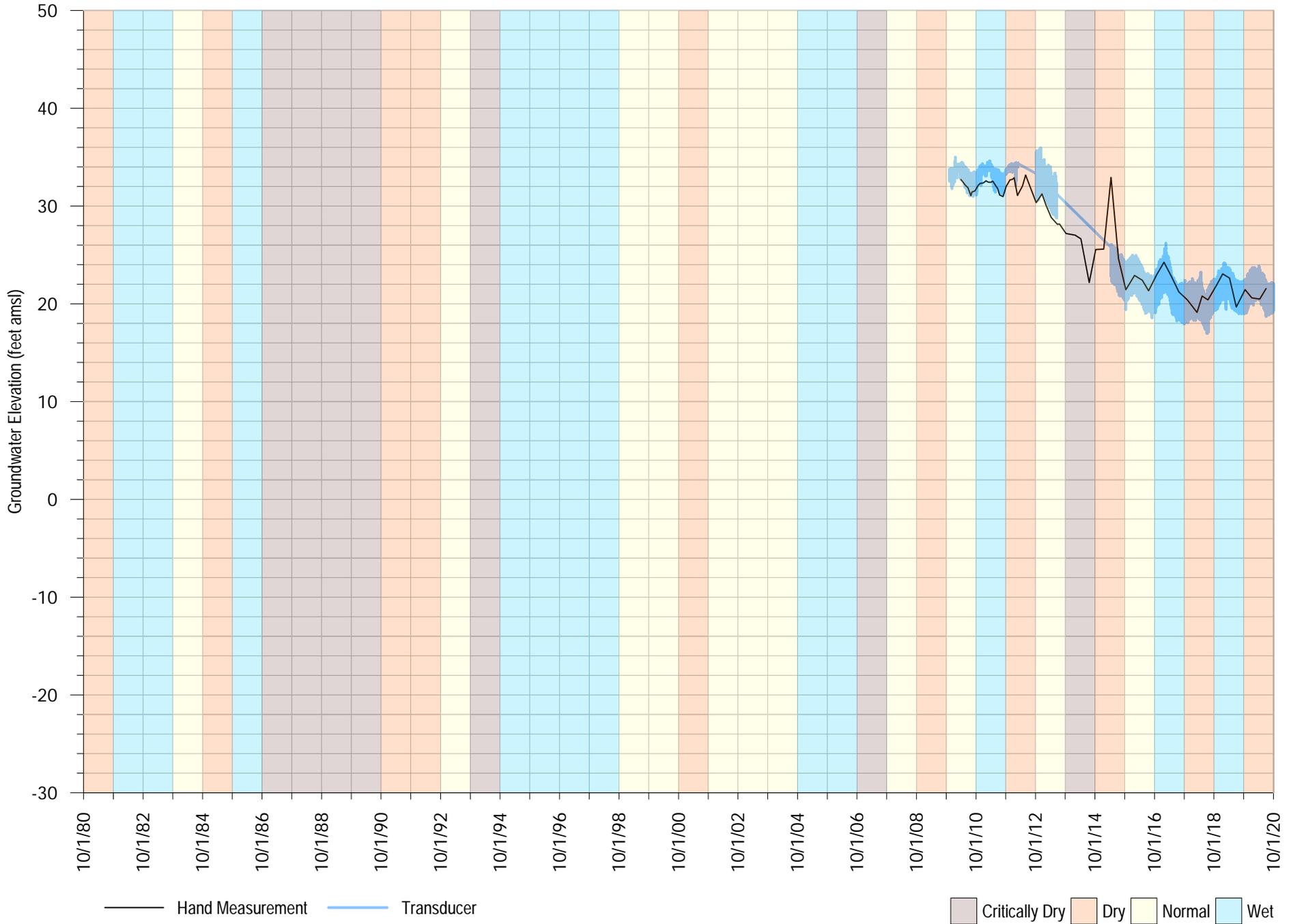
SC-20A at Polo Grounds

FIGURE A-122



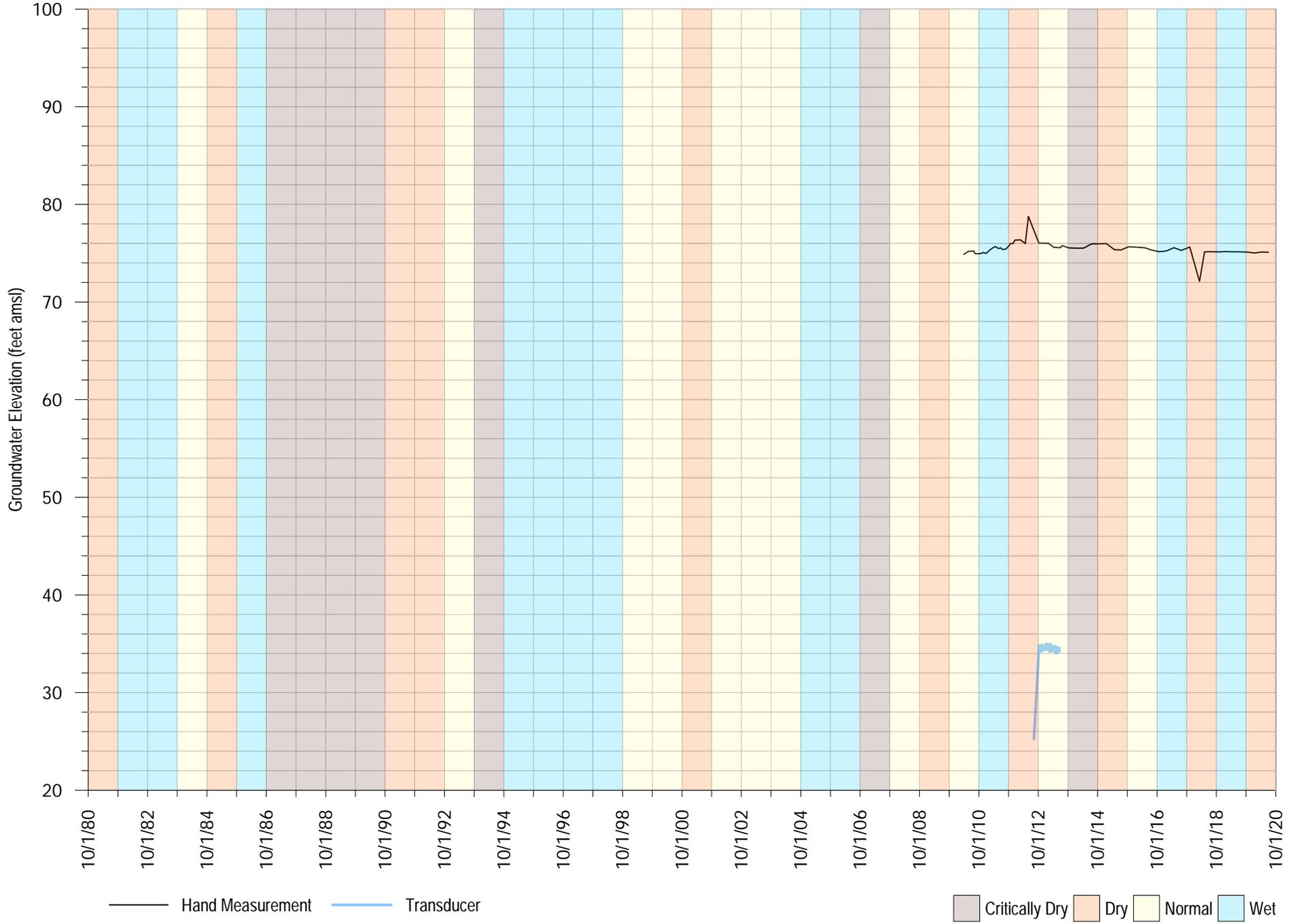
SC-20B at Polo Grounds

FIGURE A-123



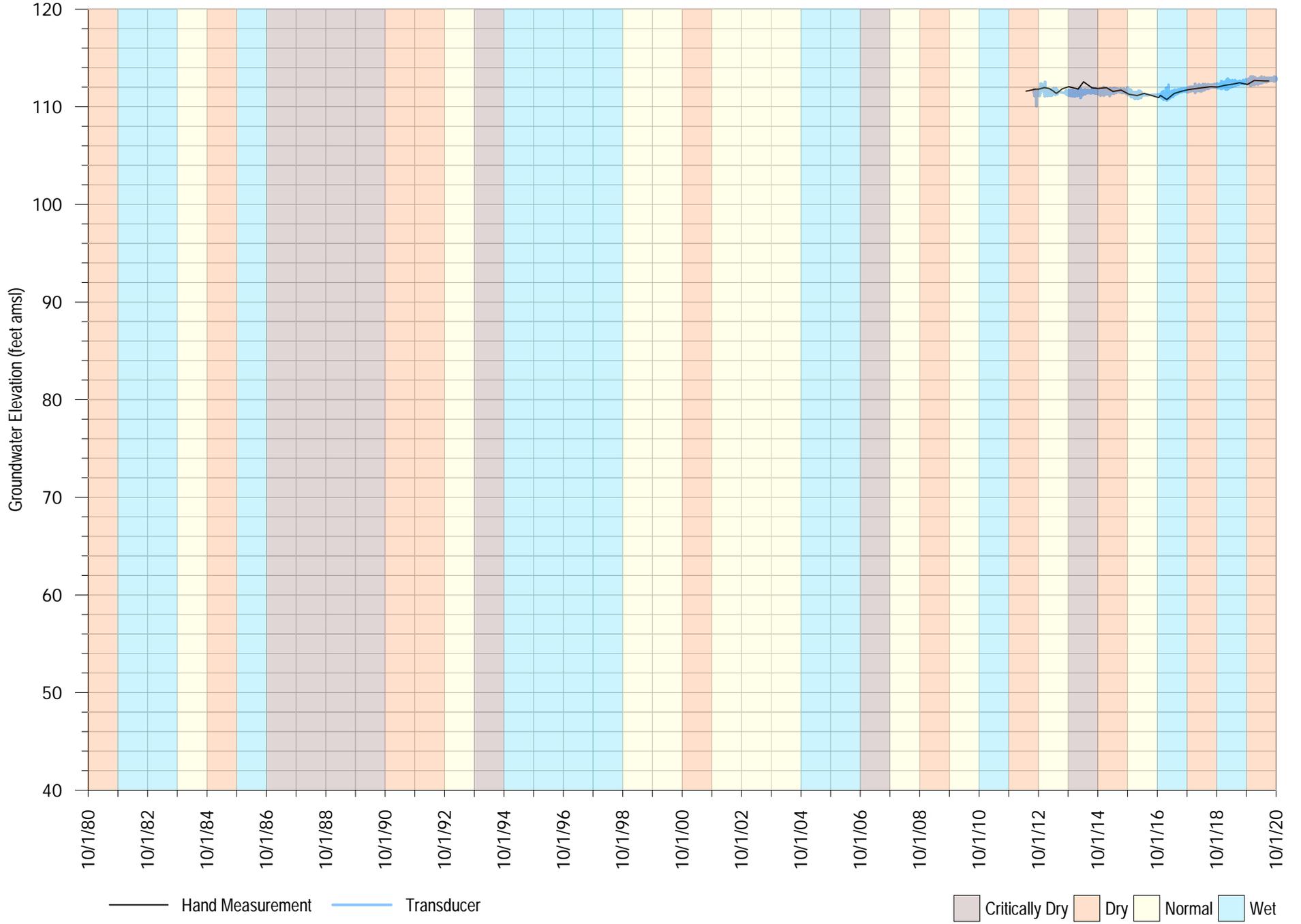
SC-20C at Polo Grounds

FIGURE A-124



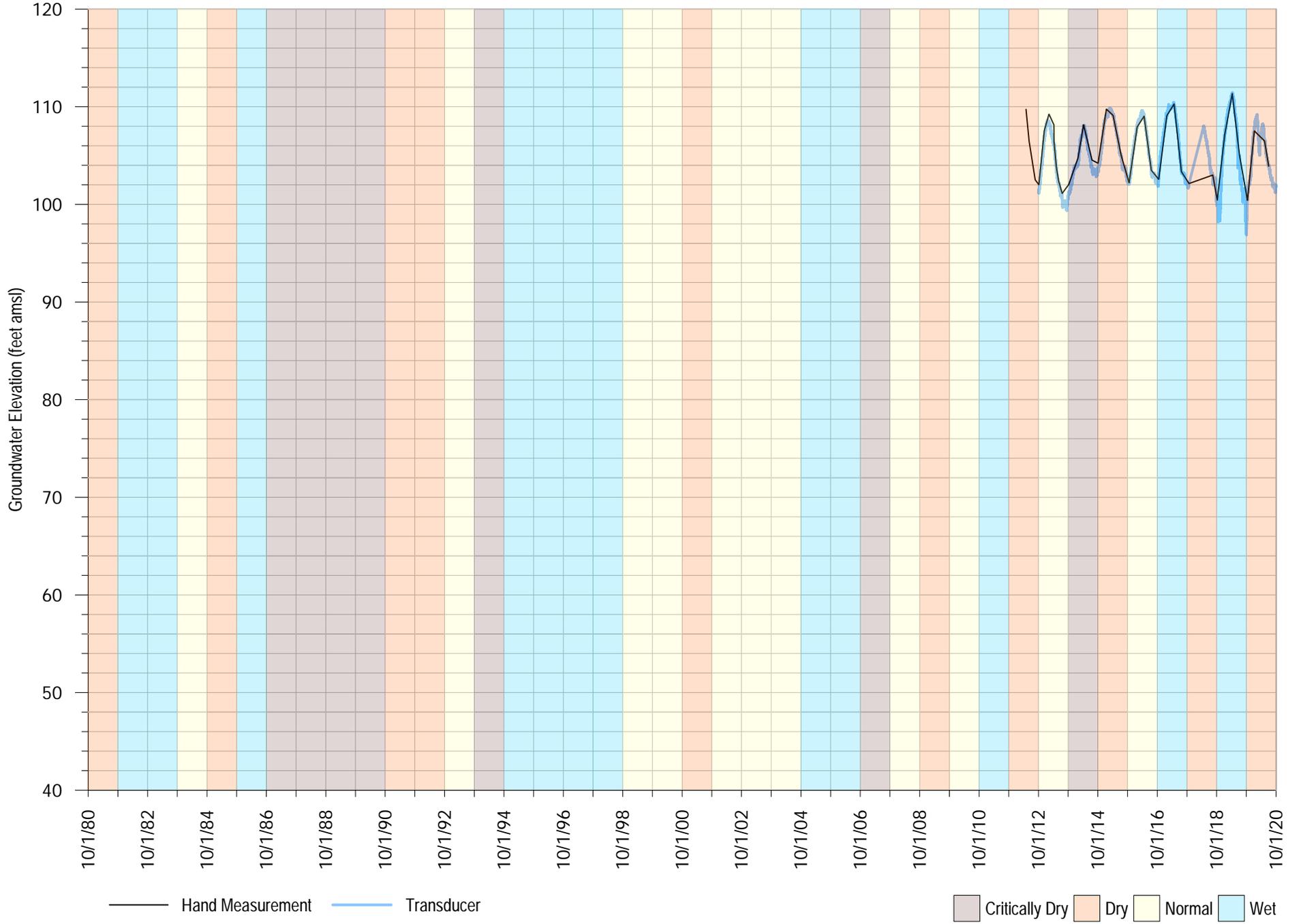
SC-21A at Cornwell

FIGURE A-125



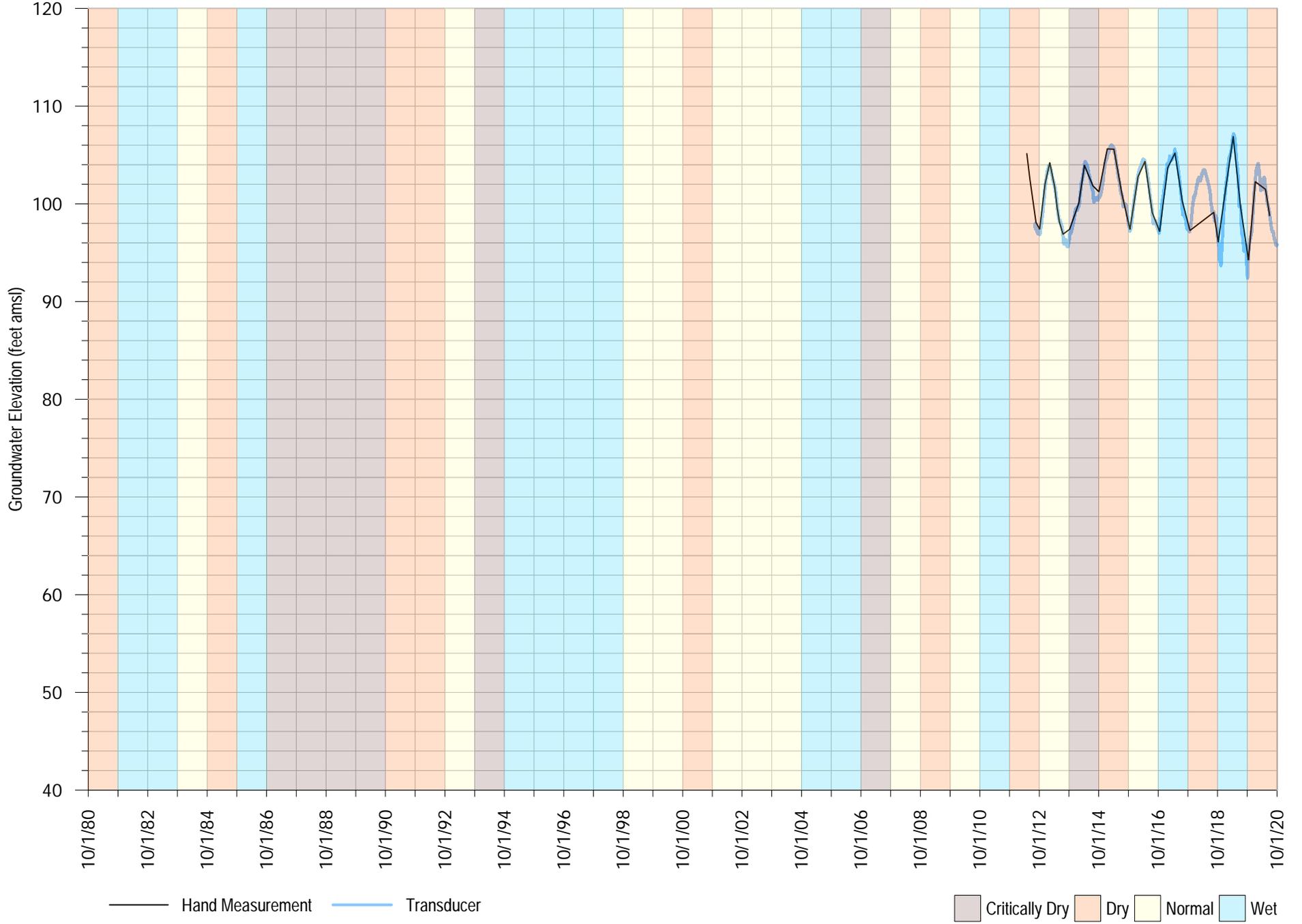
SC-21AA at Cornwell

FIGURE A-126



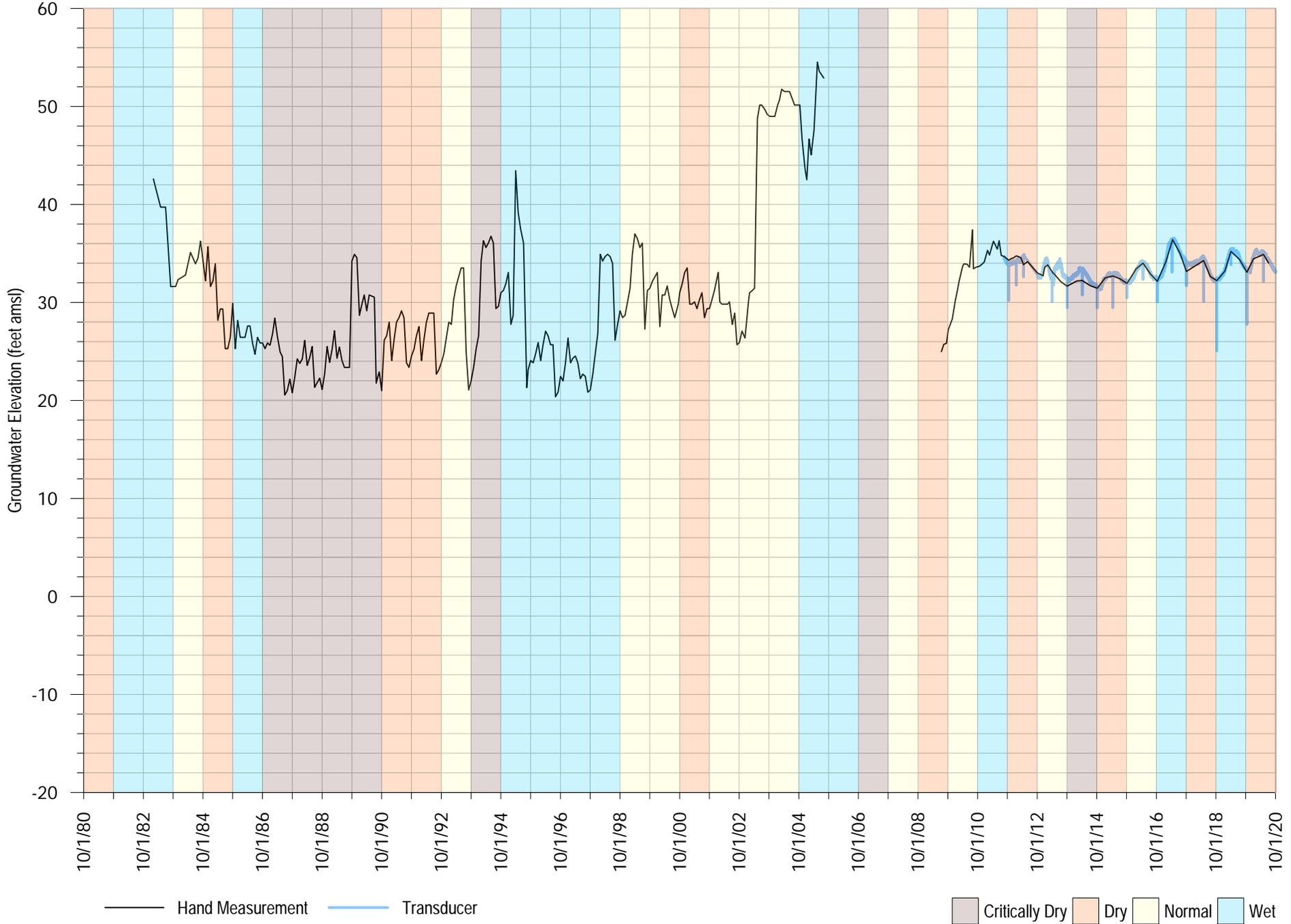
SC-21AAA at Cornwell

FIGURE A-127



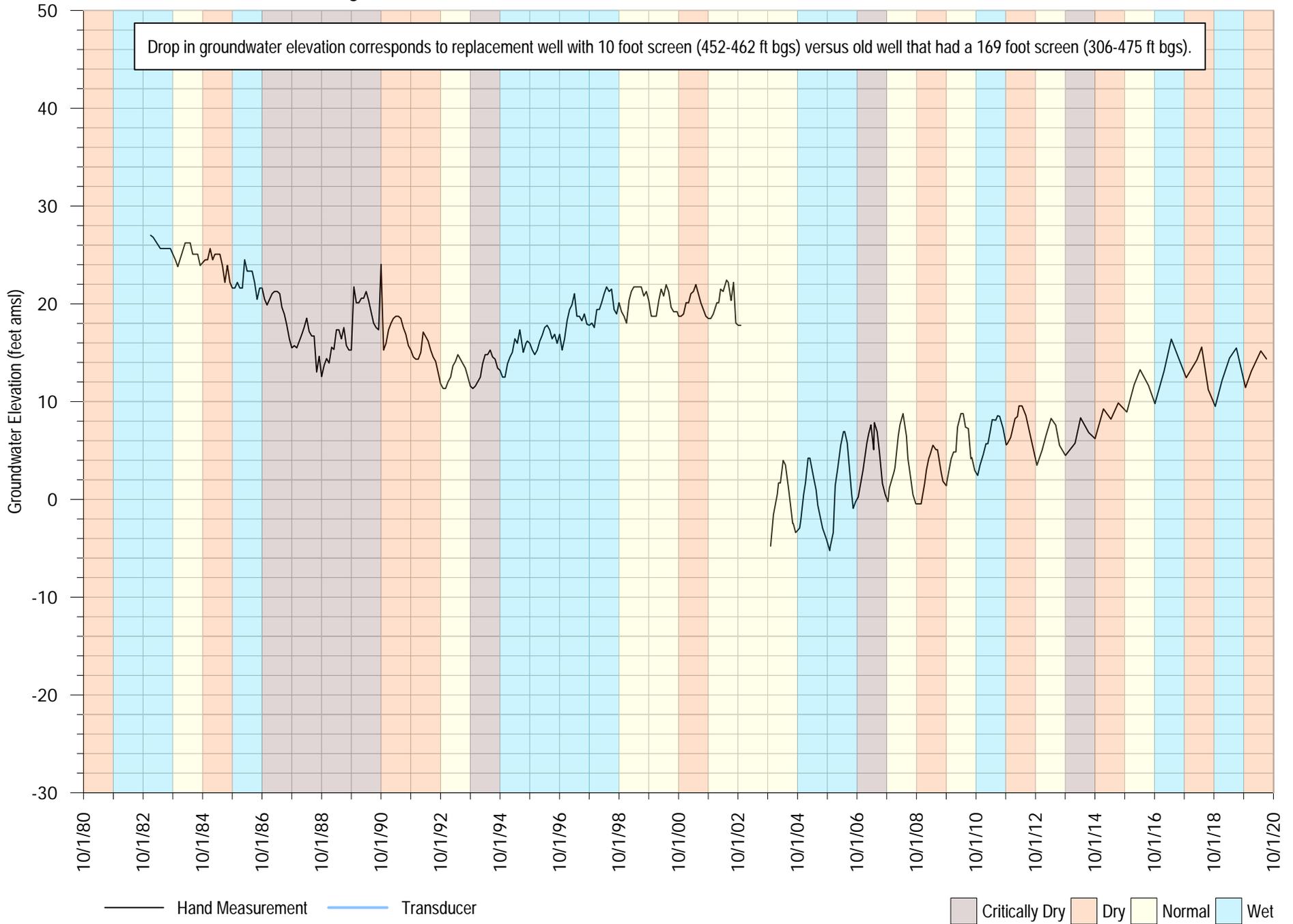
SC-3B & SC-3RB at Escalona

FIGURE A-128



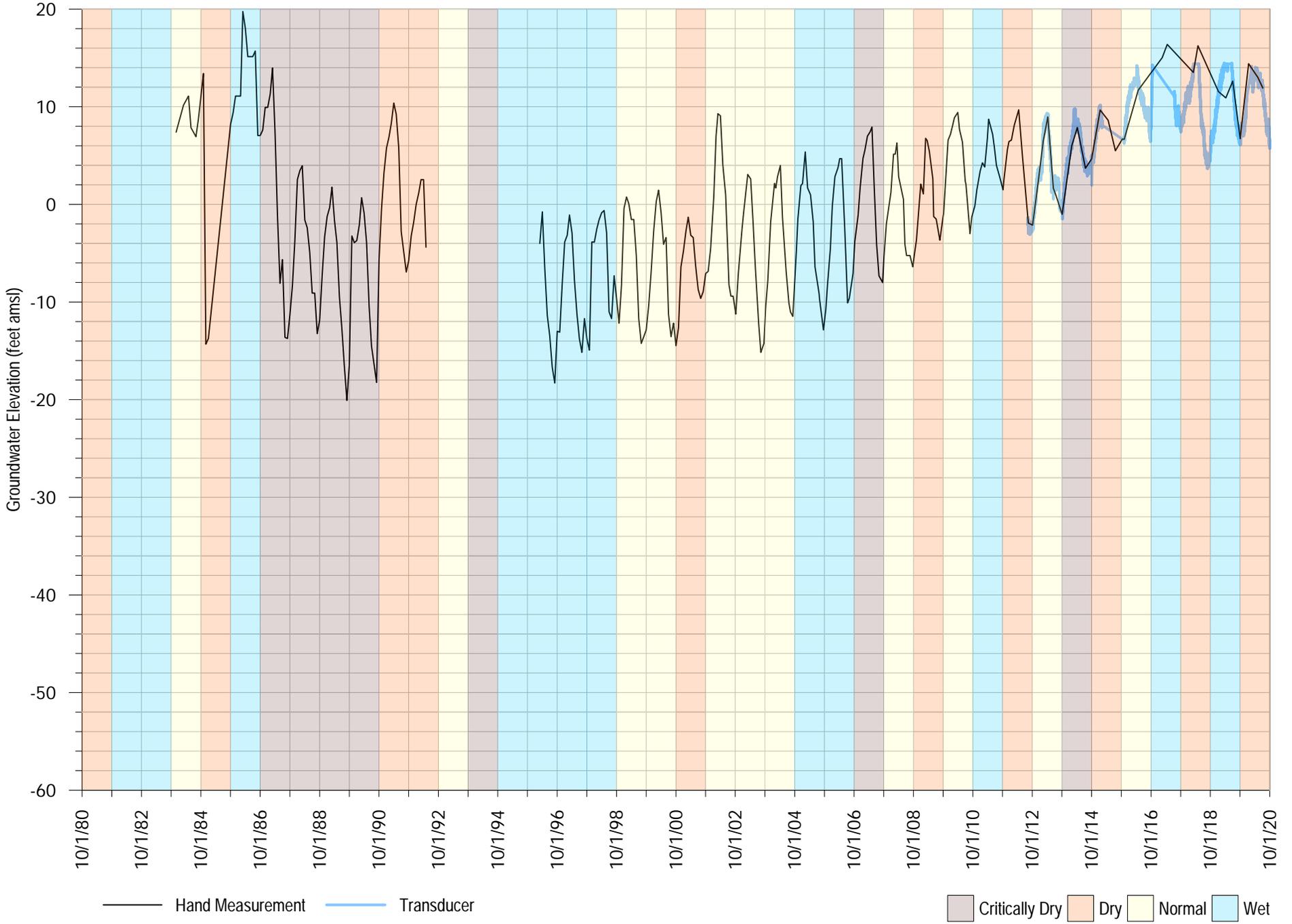
SC-5B & SC-5RB at New Brighton

FIGURE A-129



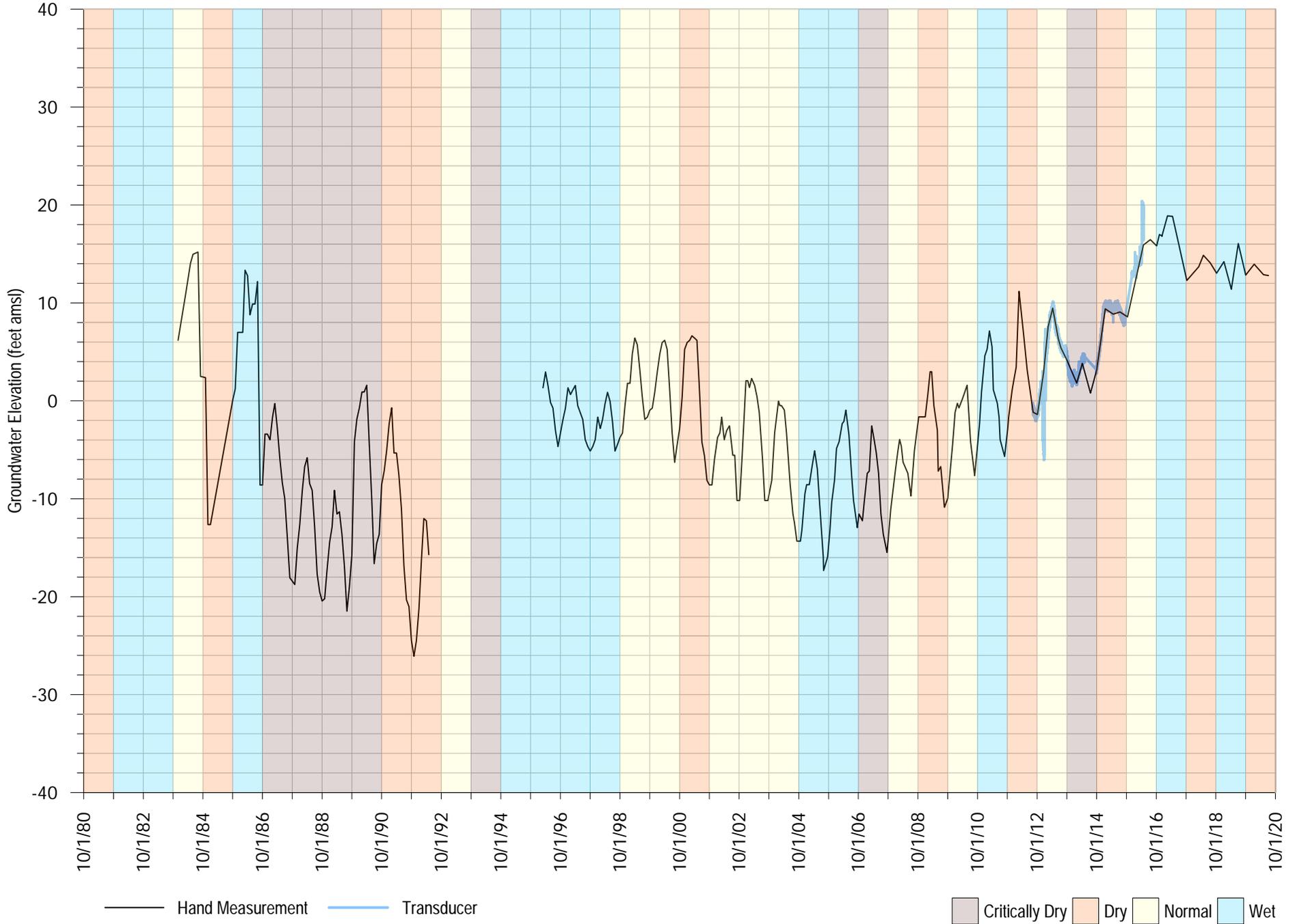
SC-8A & SC-8RA at Aptos Creek

FIGURE A-131



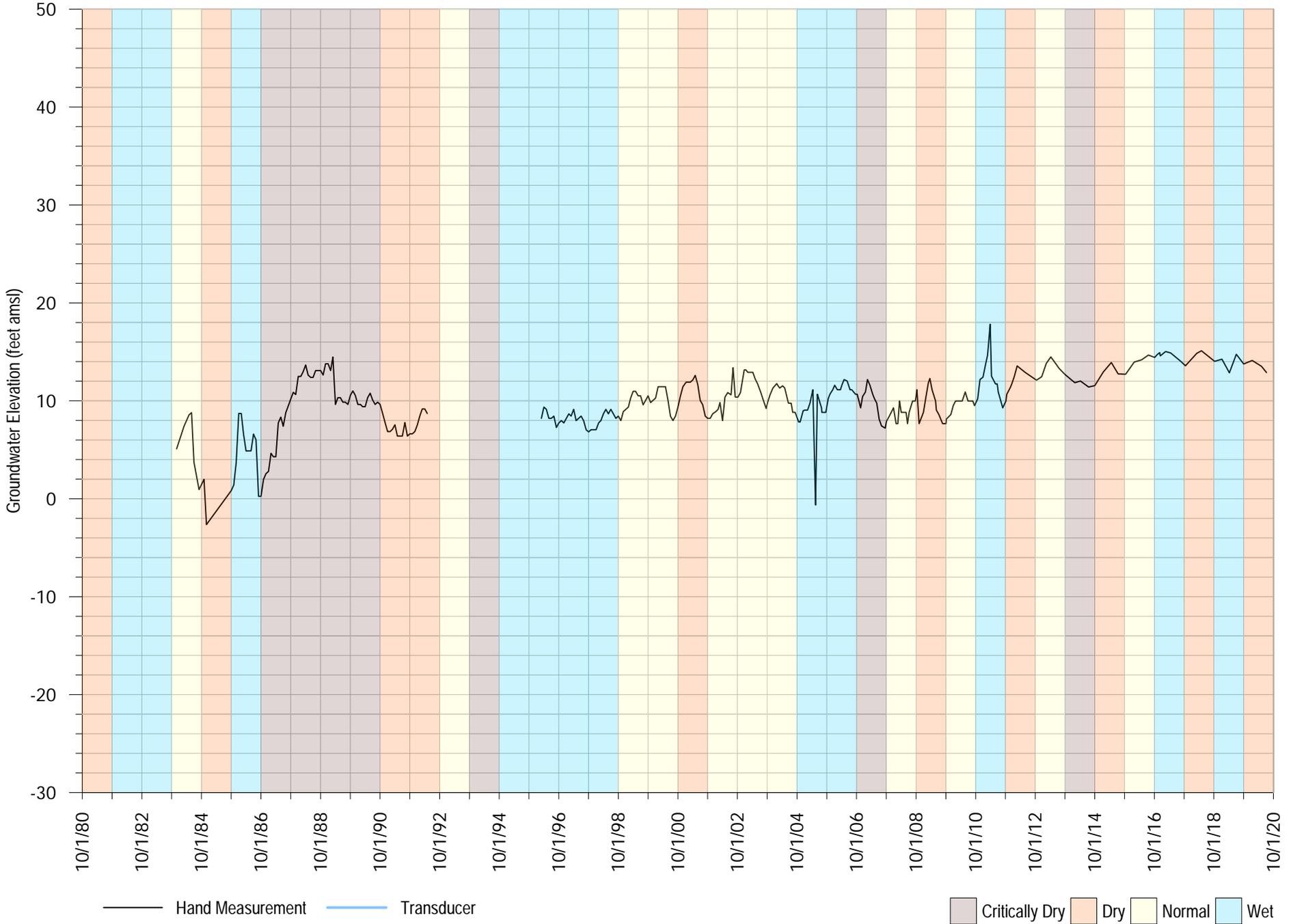
SC-8C & SC-8RC at Aptos Creek

FIGURE A-132



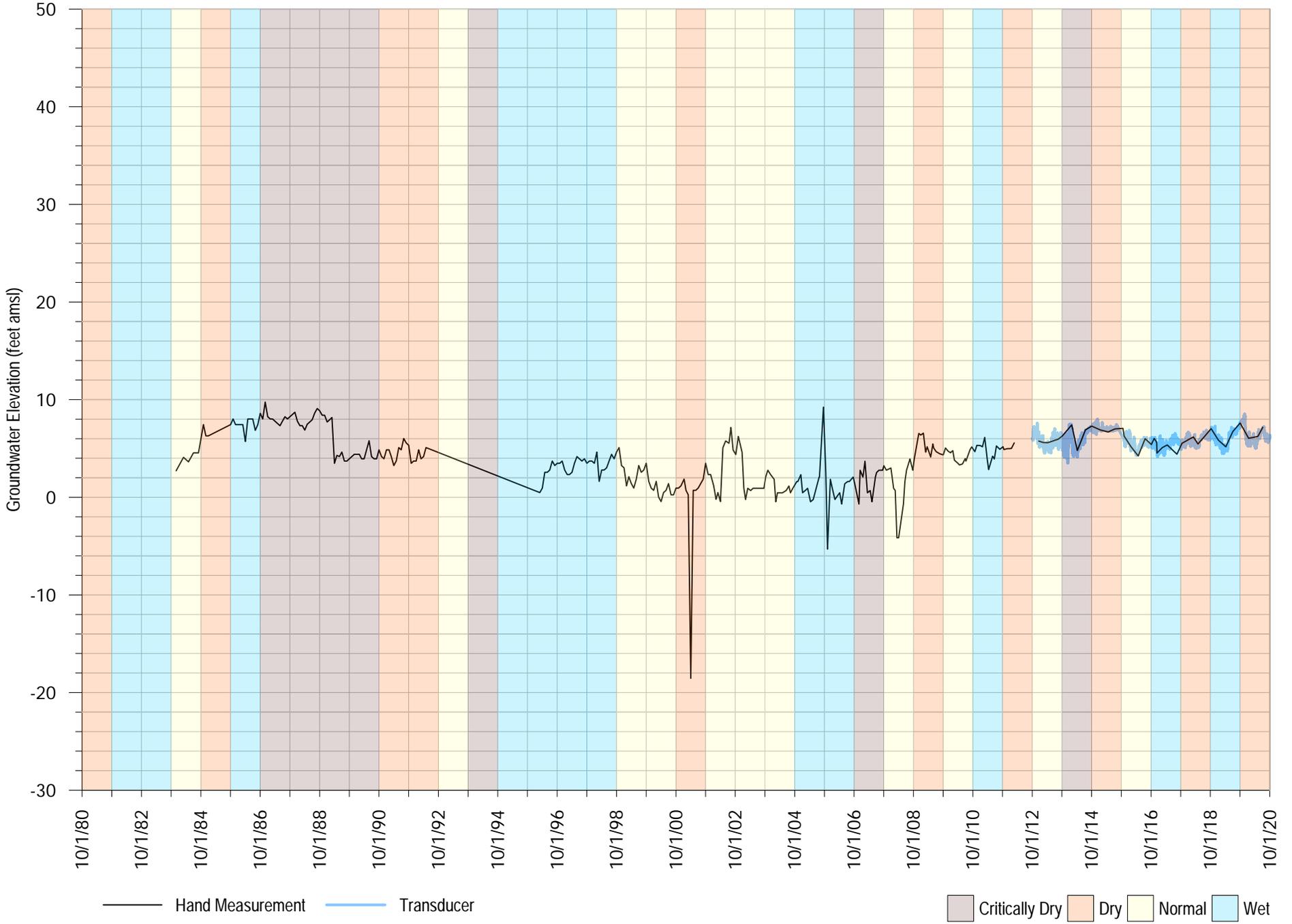
SC-8E & SC-8RE at Aptos Creek

FIGURE A-133



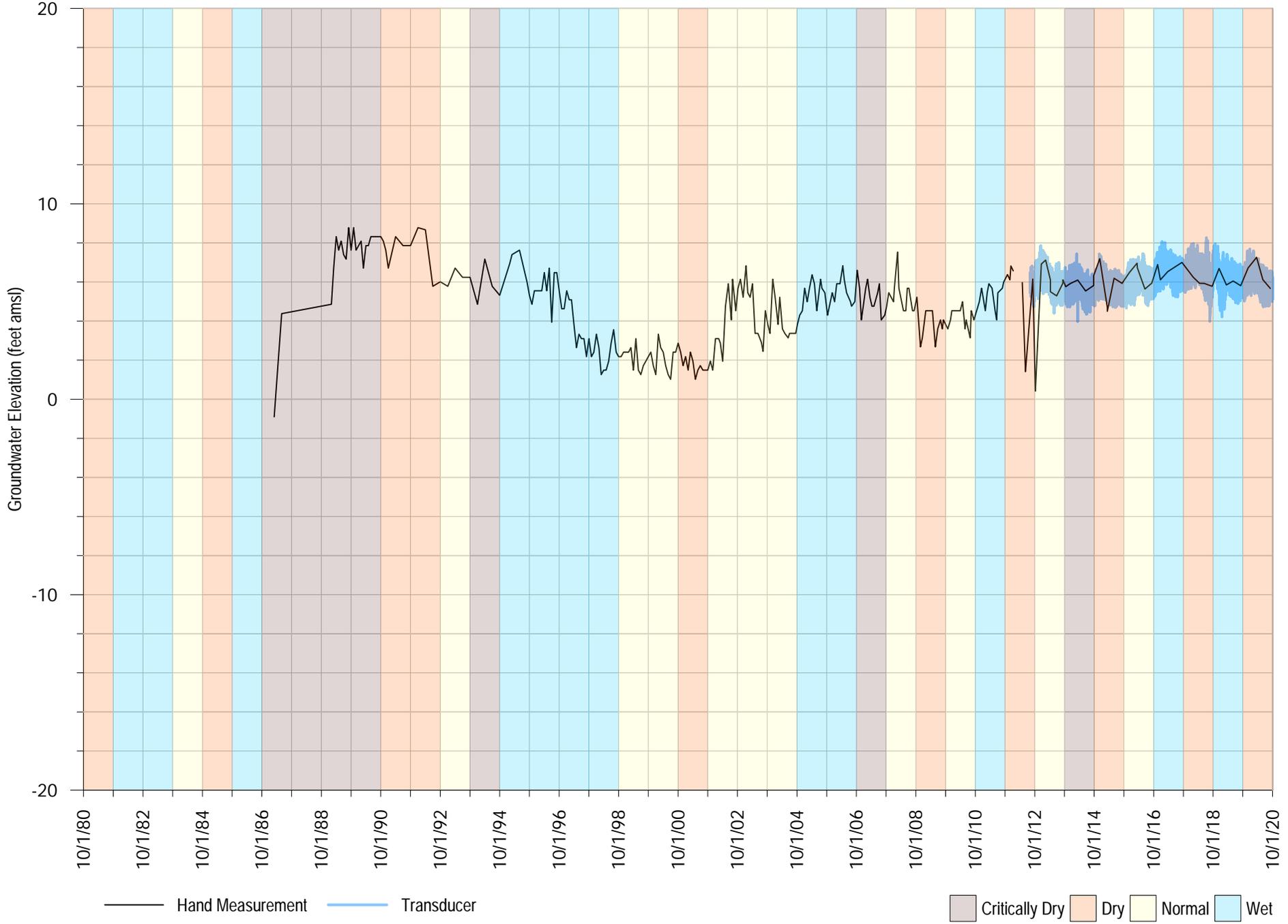
SC-8F & SC-8RF at Aptos Creek

FIGURE A-134



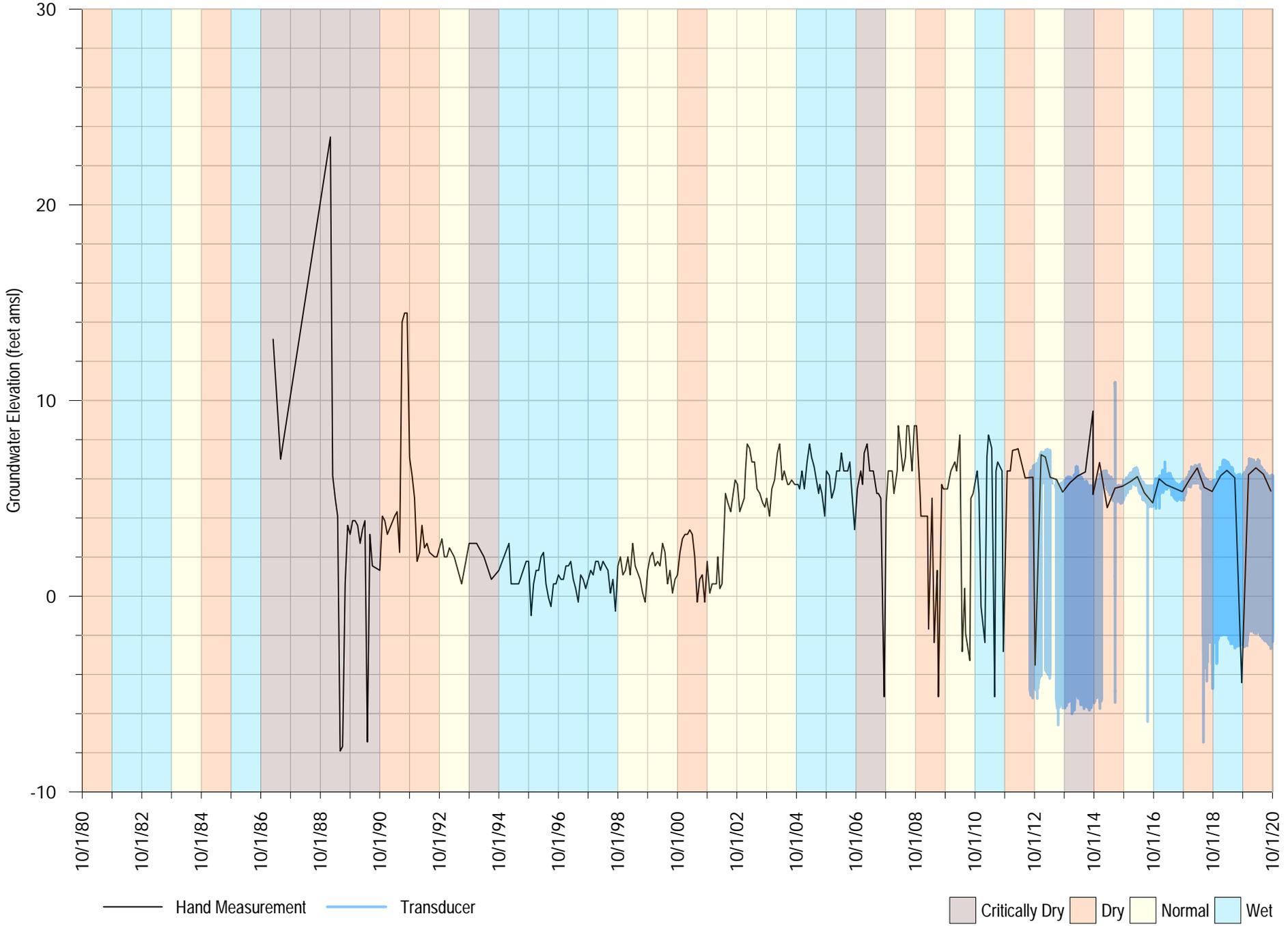
SC-A2B & SC-A2RB at Sumner

FIGURE A-135



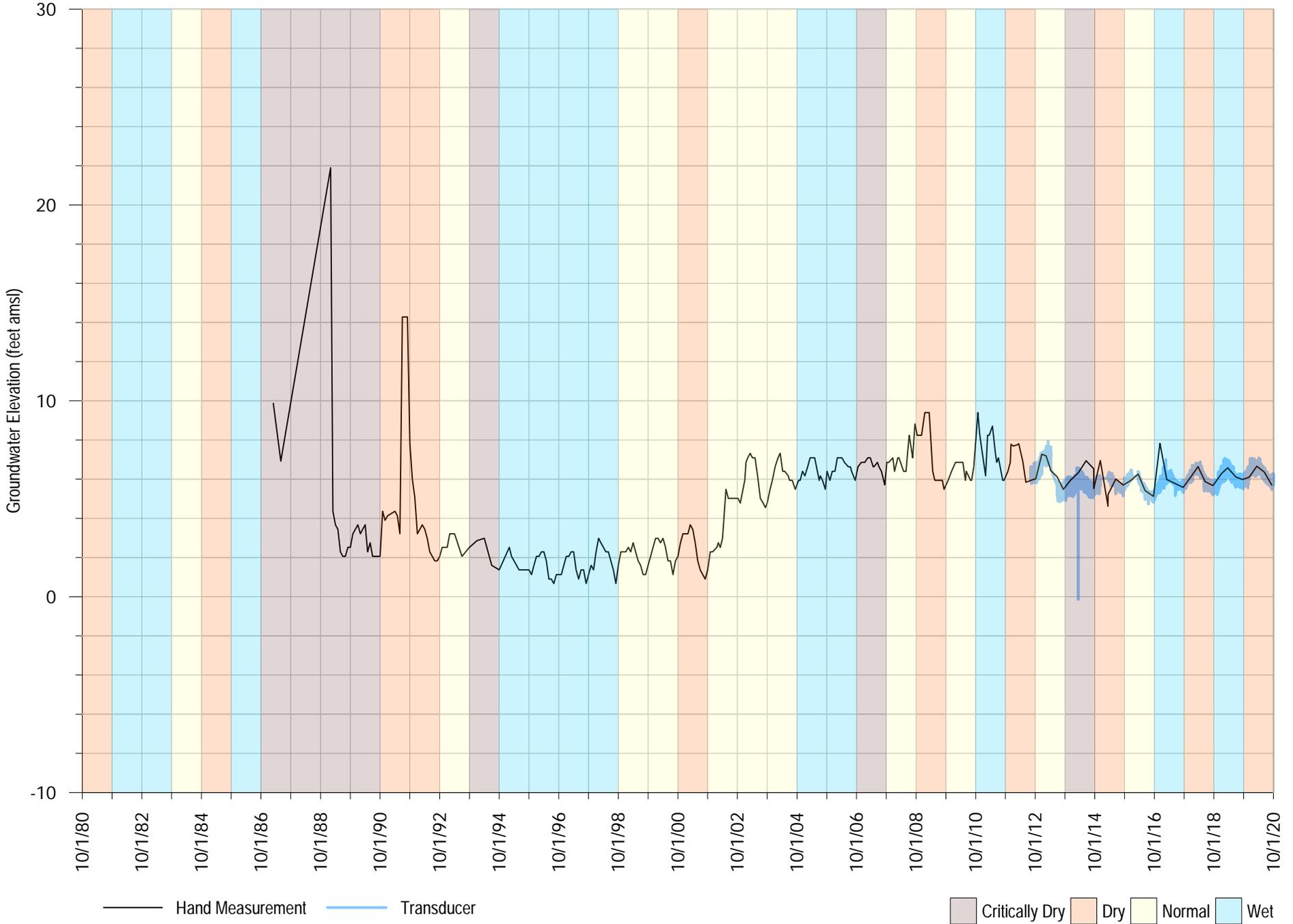
SC-A5C at Seascapes

FIGURE A-136



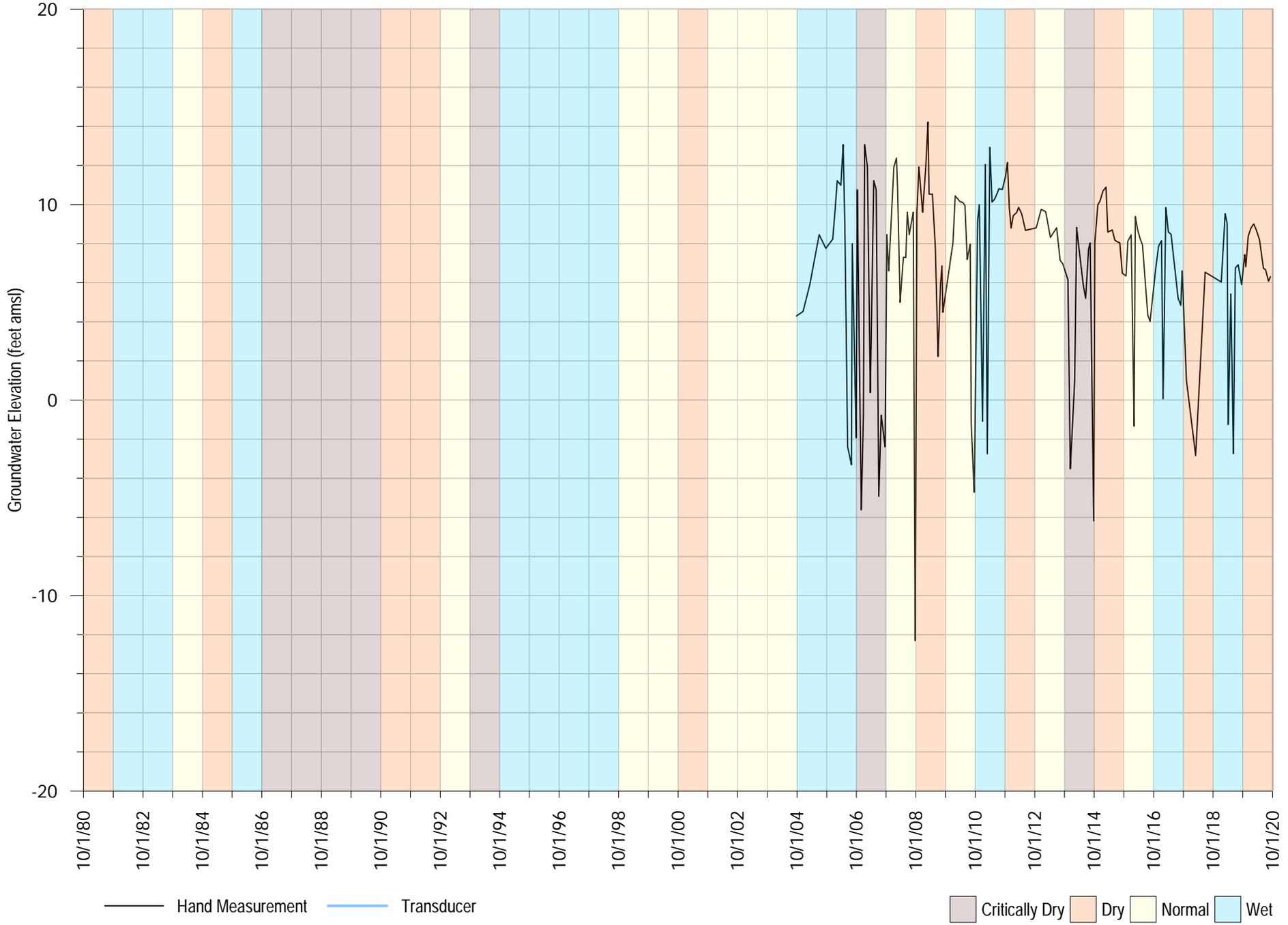
SC-A5D at Seascapes

FIGURE A-137



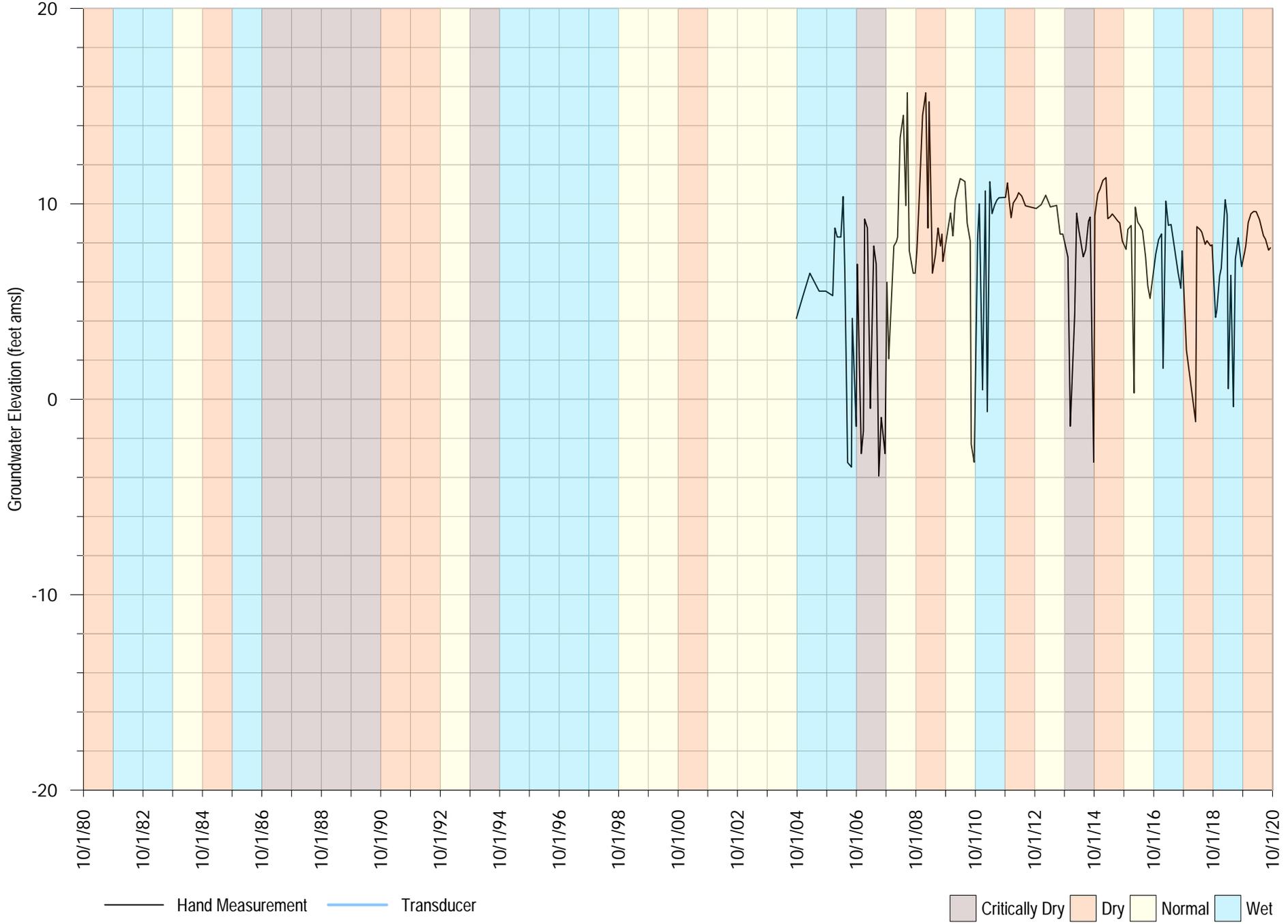
SC-A6A at Bonita

FIGURE A-138



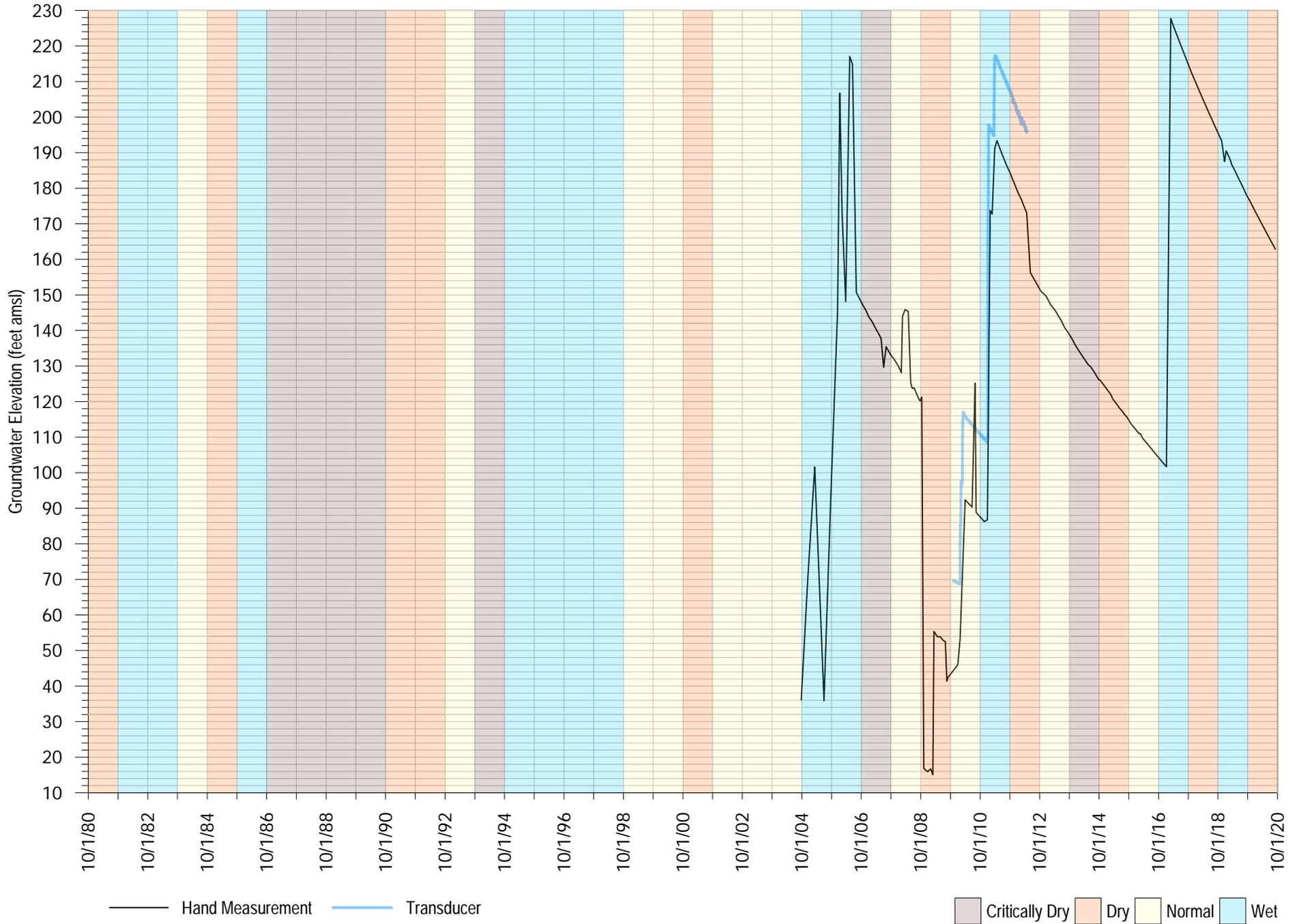
SC-A6B at Bonita

FIGURE A-139



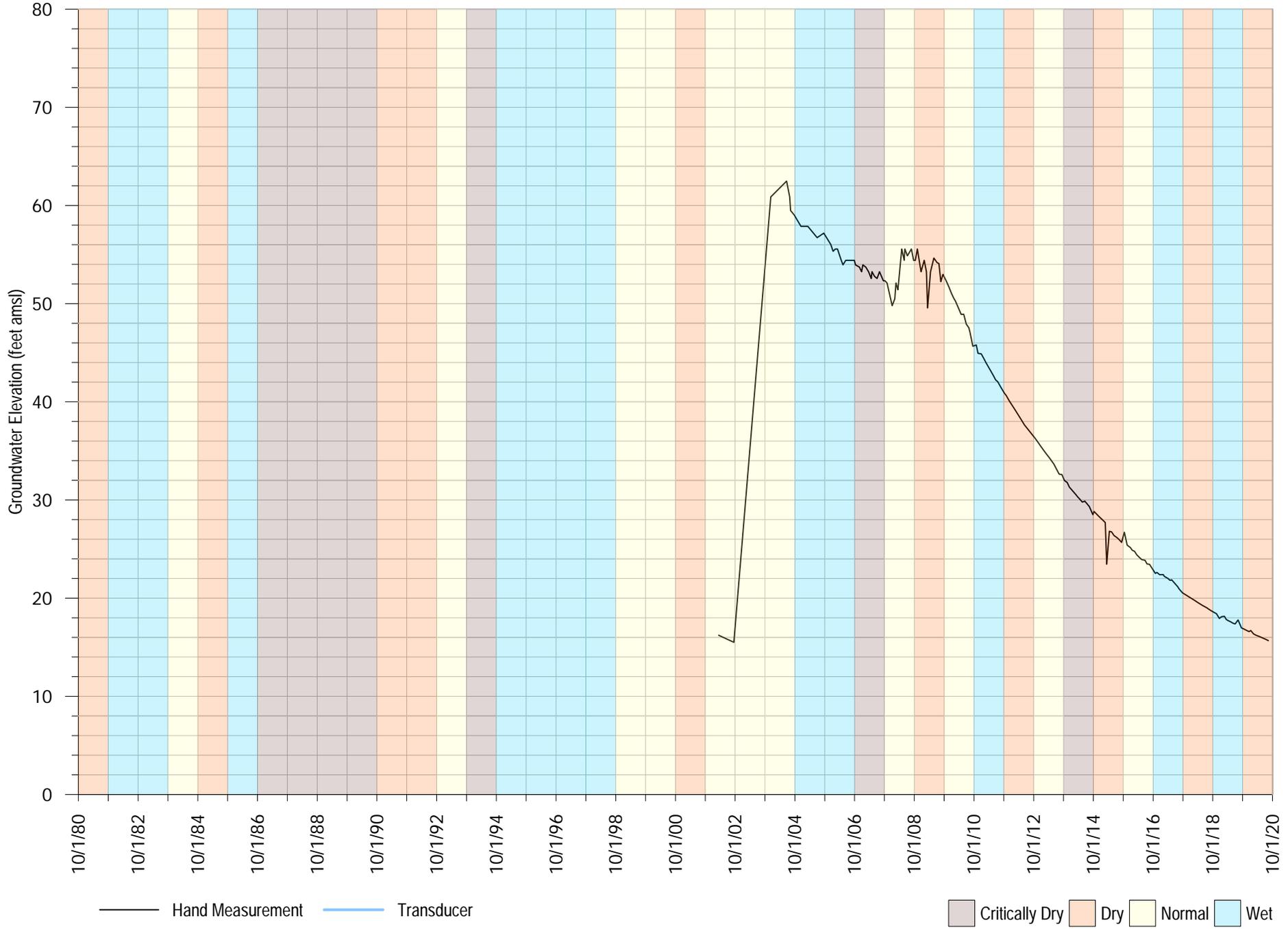
SC-A6C at Bonita

FIGURE A-140



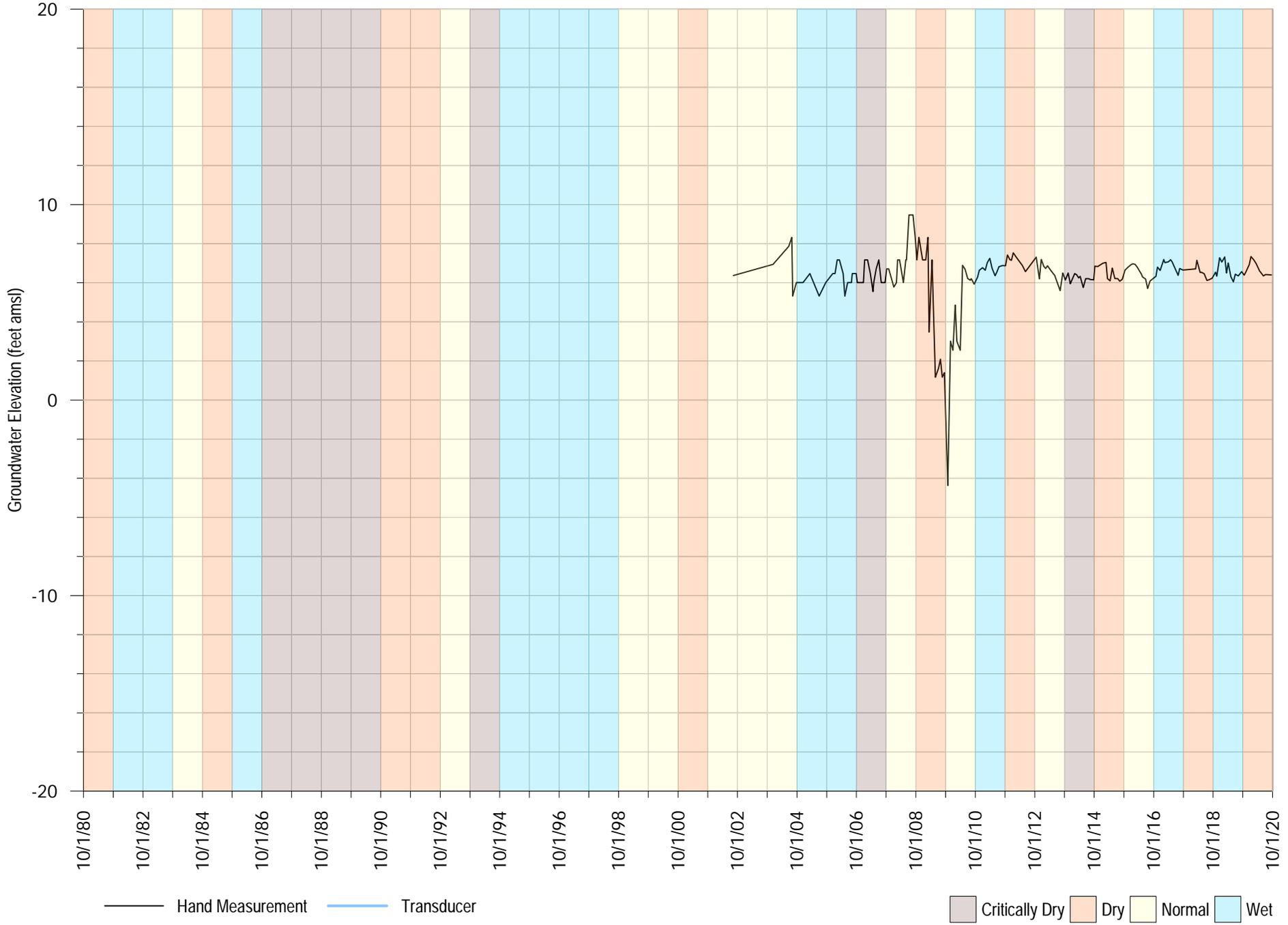
SC-A7A at Sells

FIGURE A-141



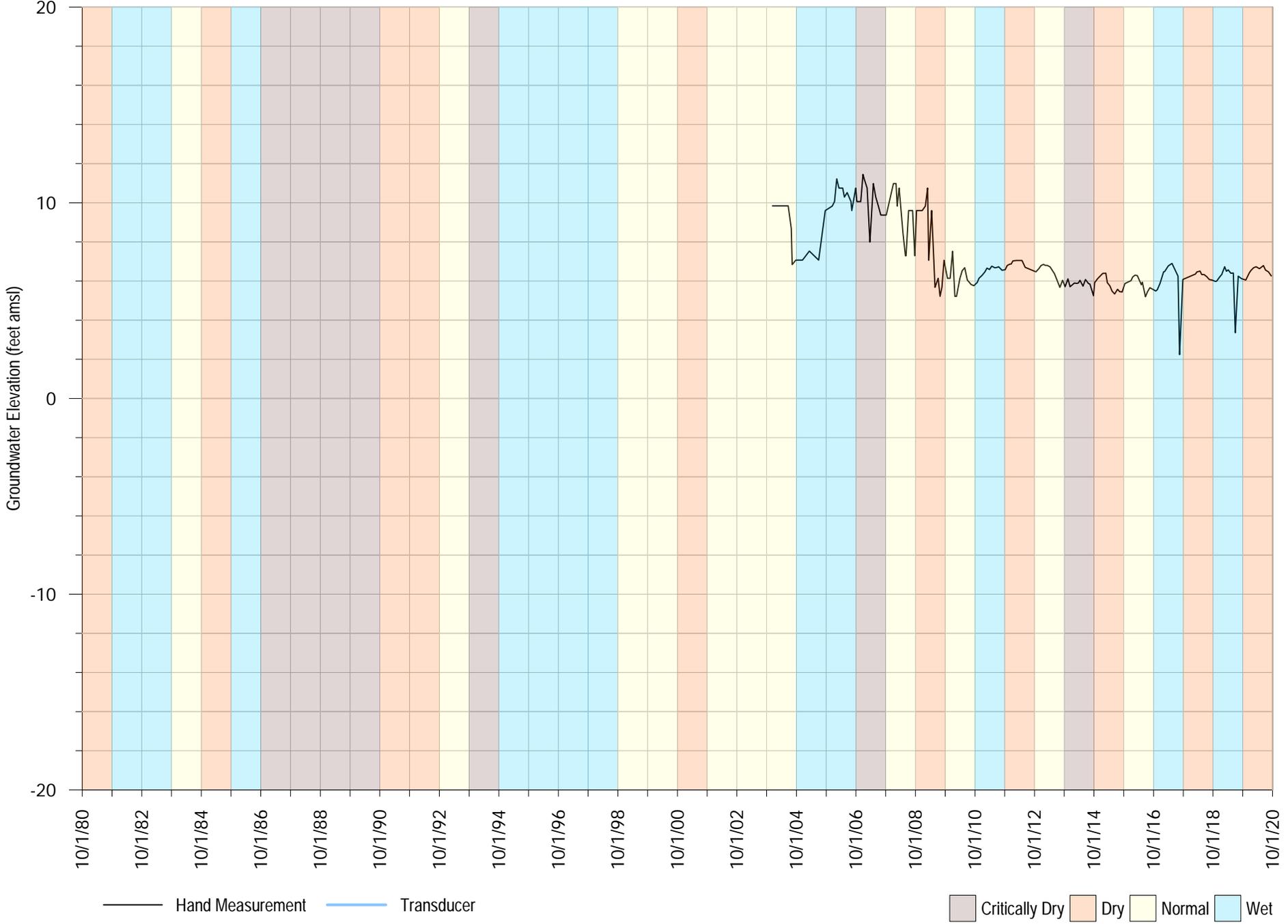
SC-A7B at Sells

FIGURE A-142



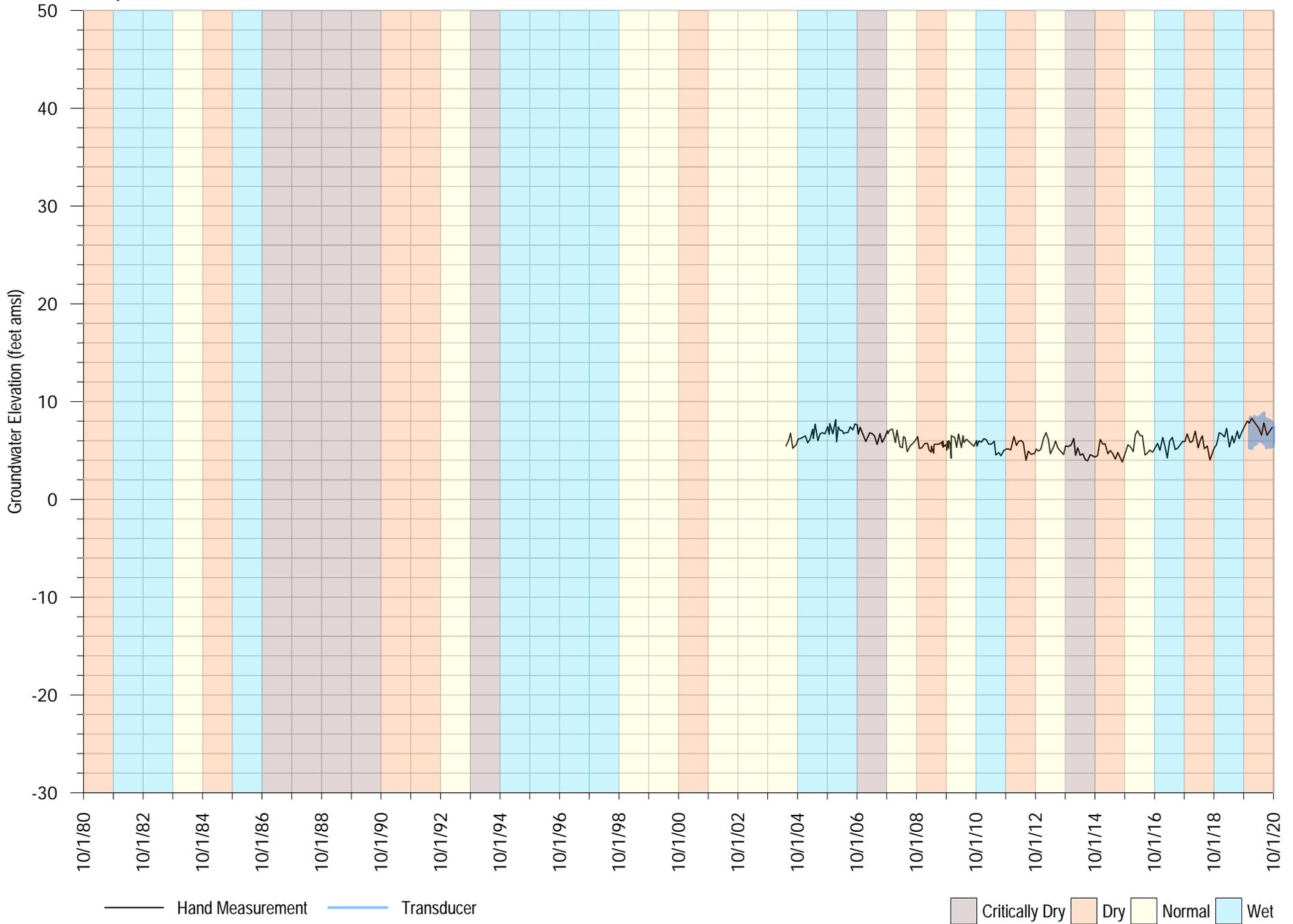
SC-A7D at Sells

FIGURE A-143



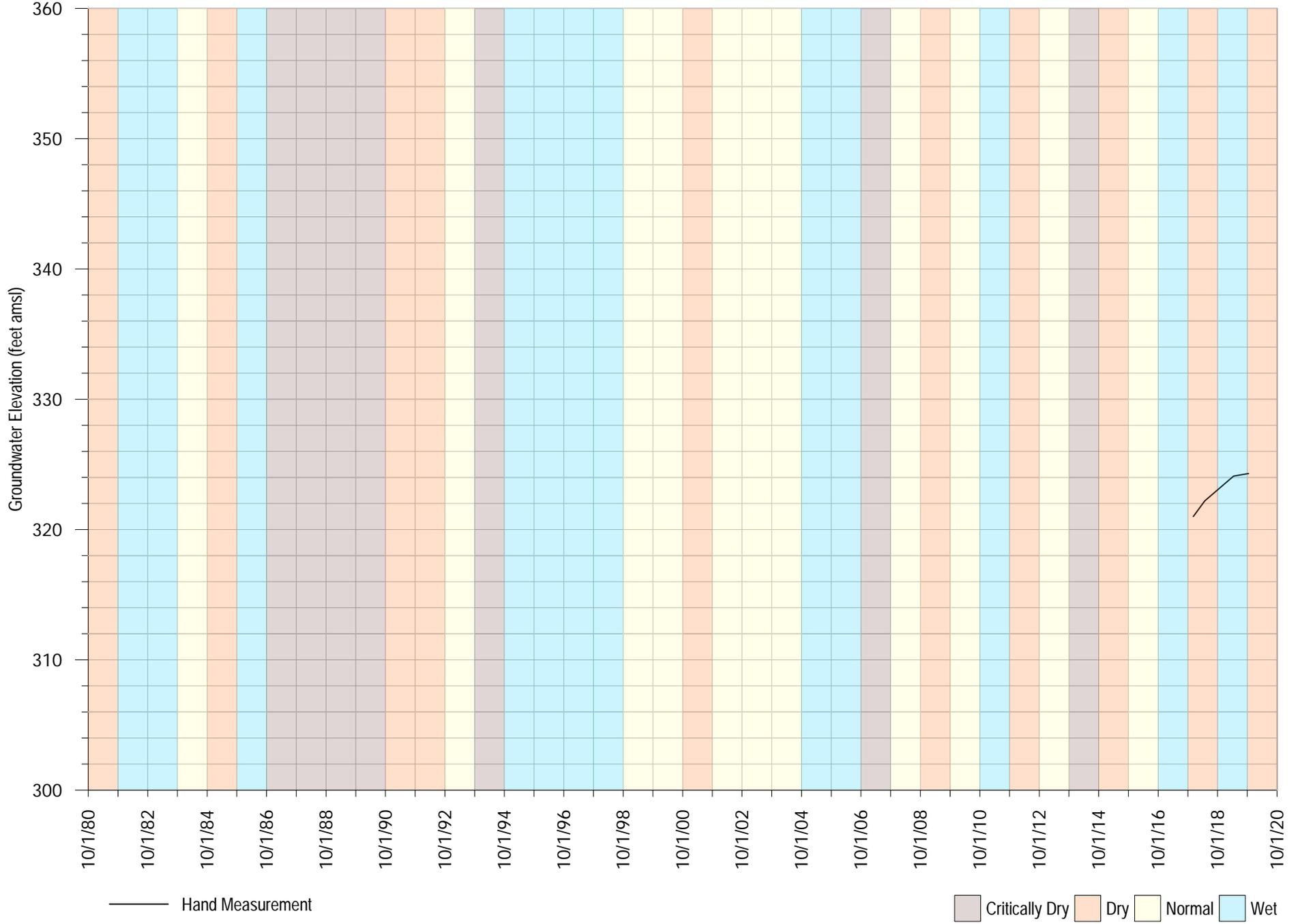
Soquel Point Shallow

FIGURE A-144



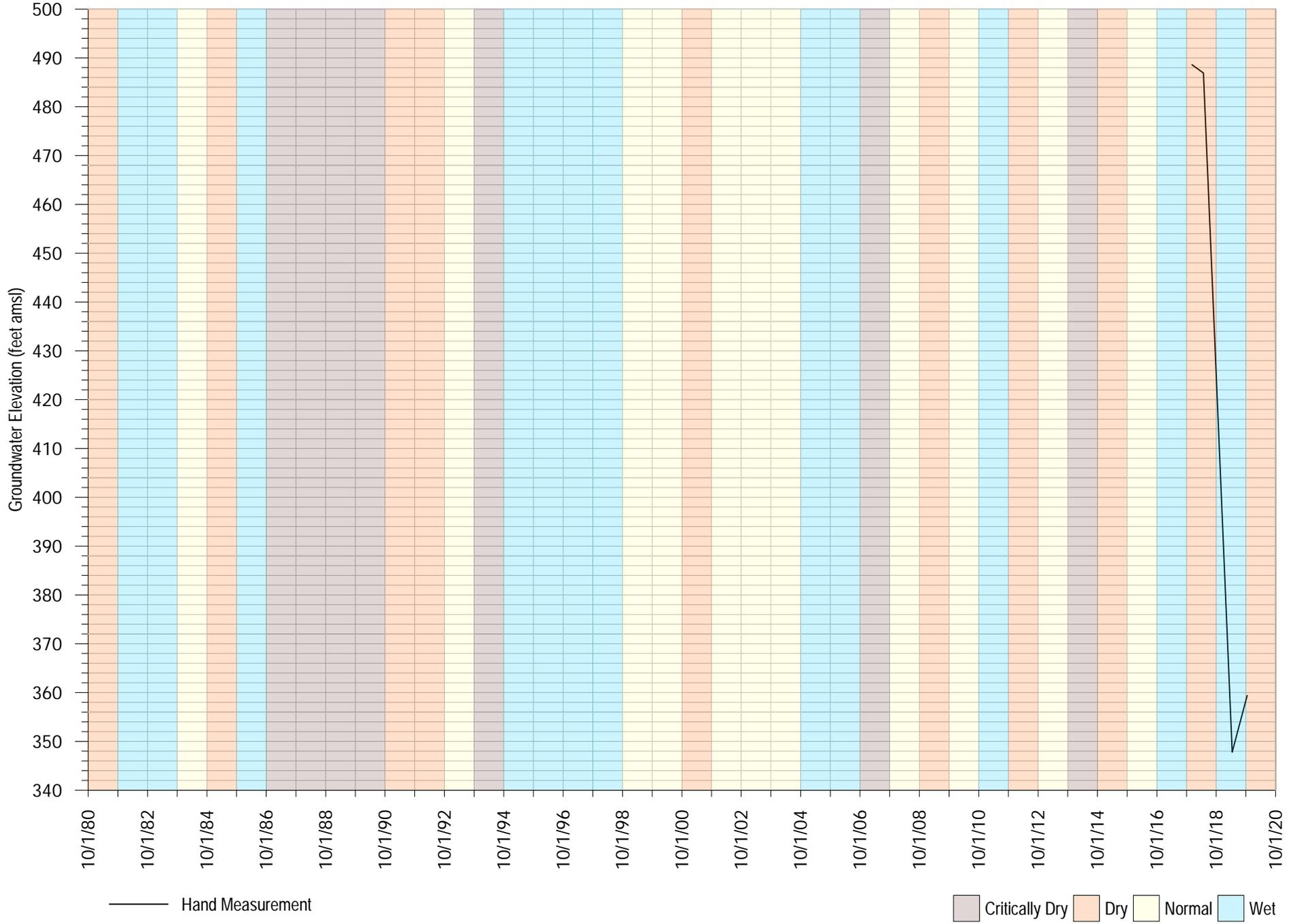
Private Well 3

FIGURE A-145



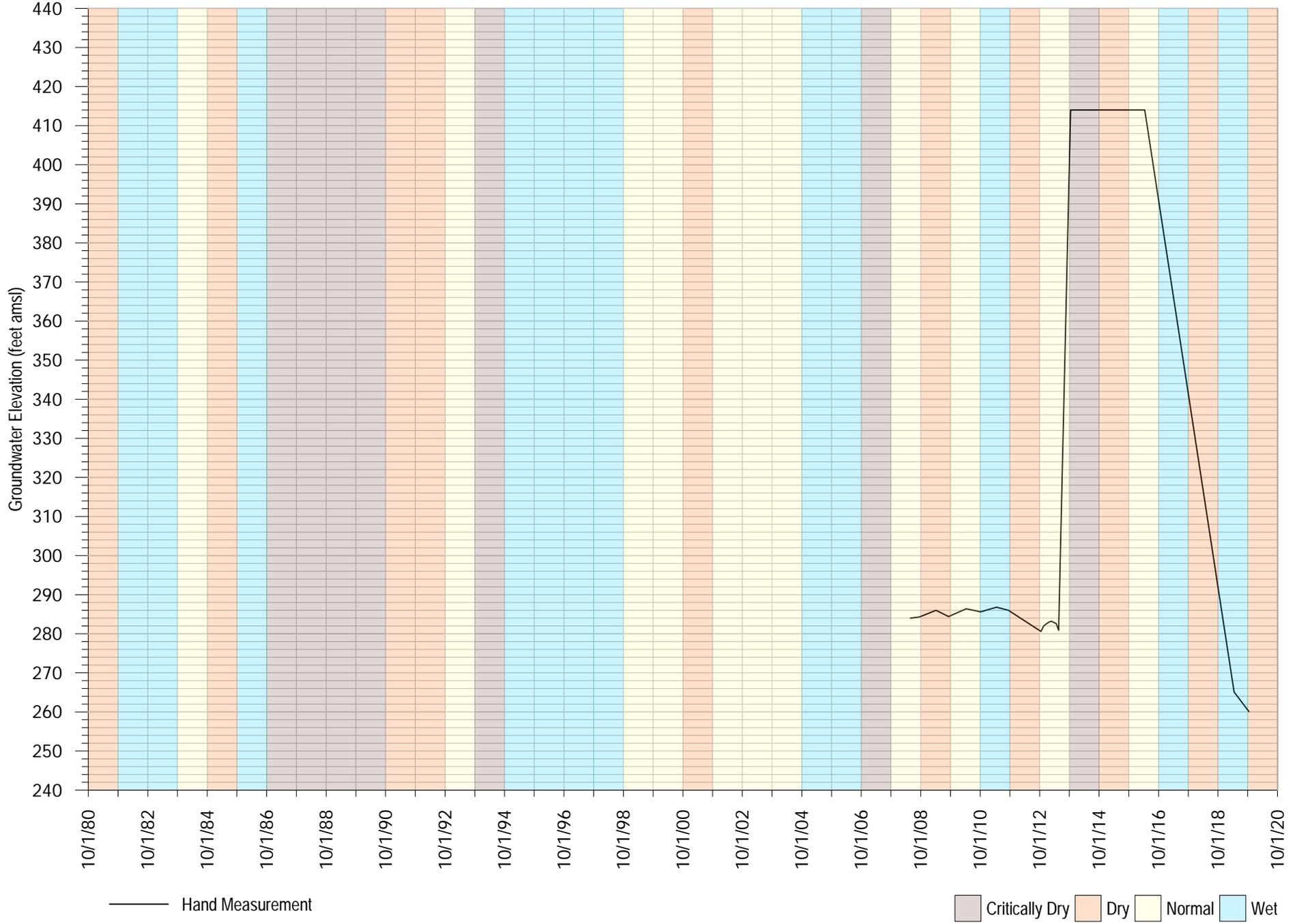
Private Well 4

FIGURE A-146



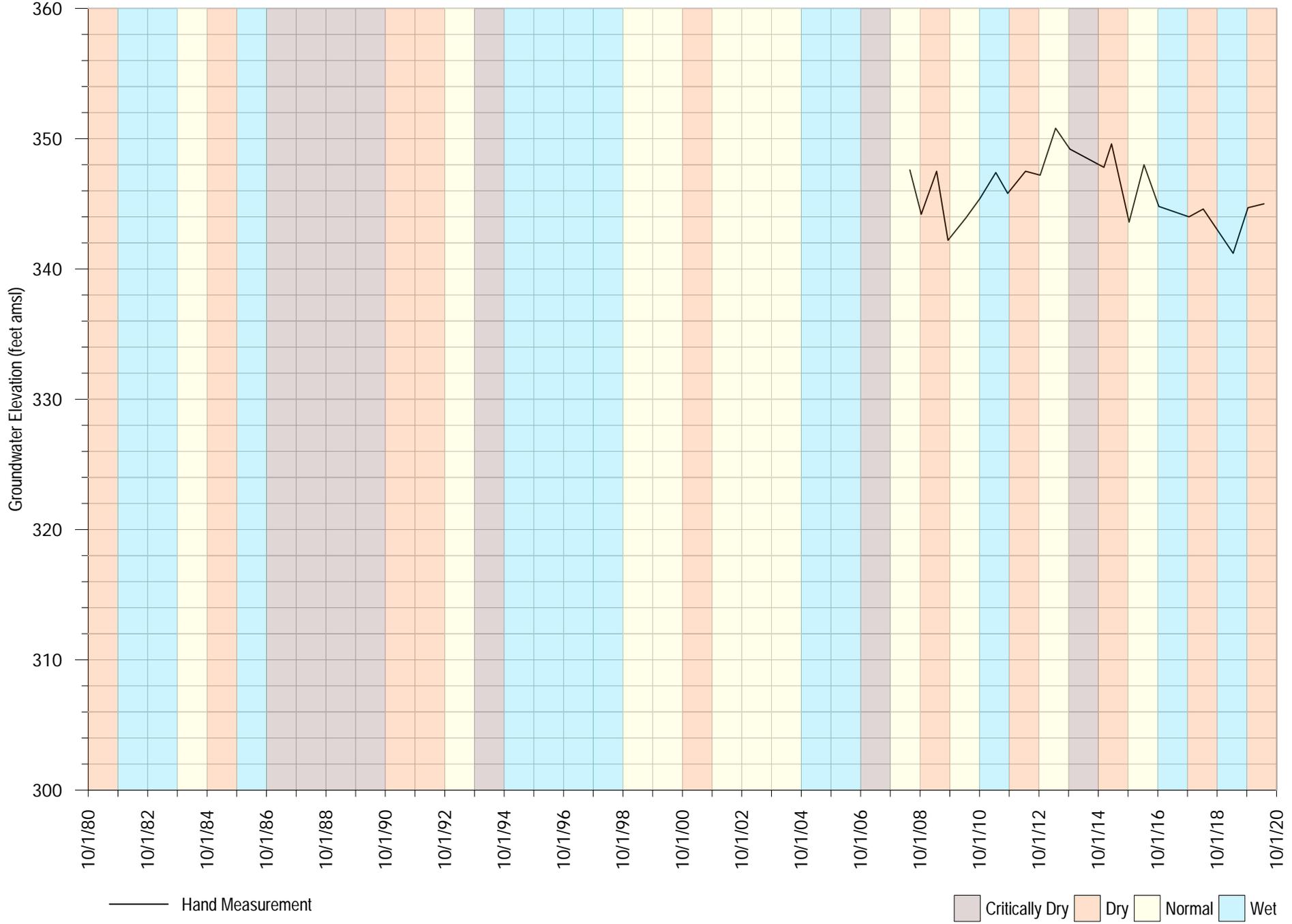
Private Well 5

FIGURE A-147



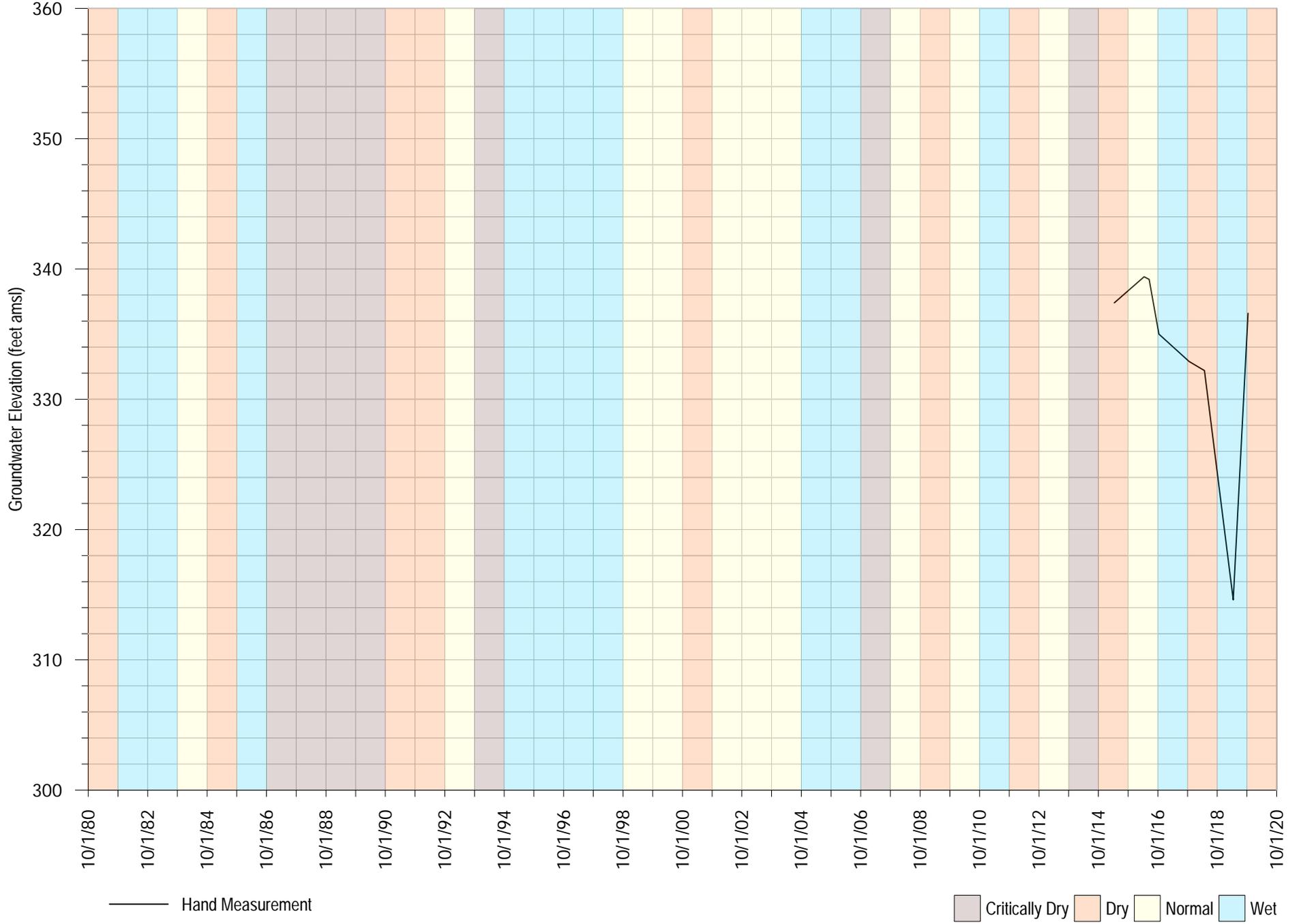
Private Well 6

FIGURE A-148



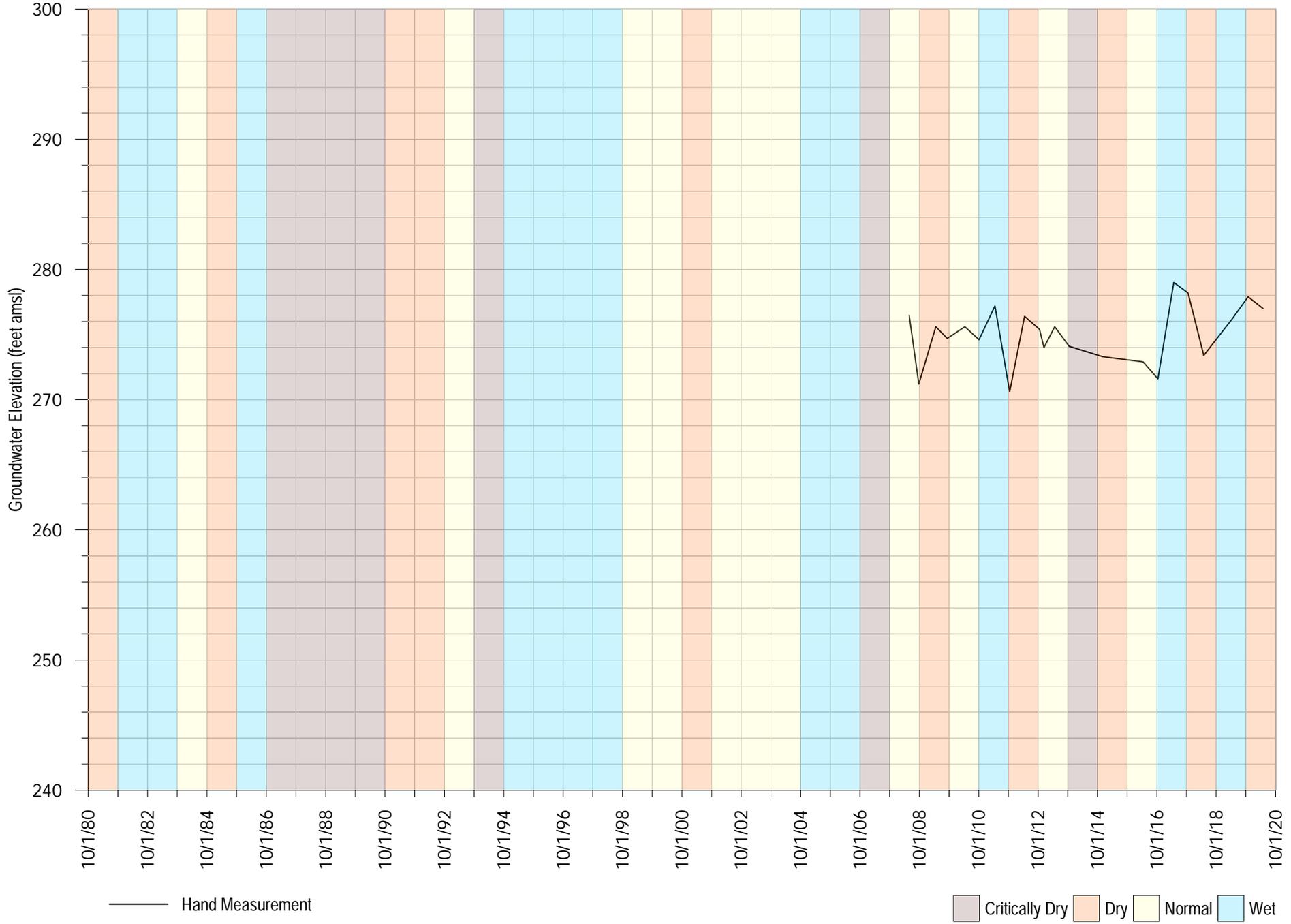
Private Well 7

FIGURE A-149



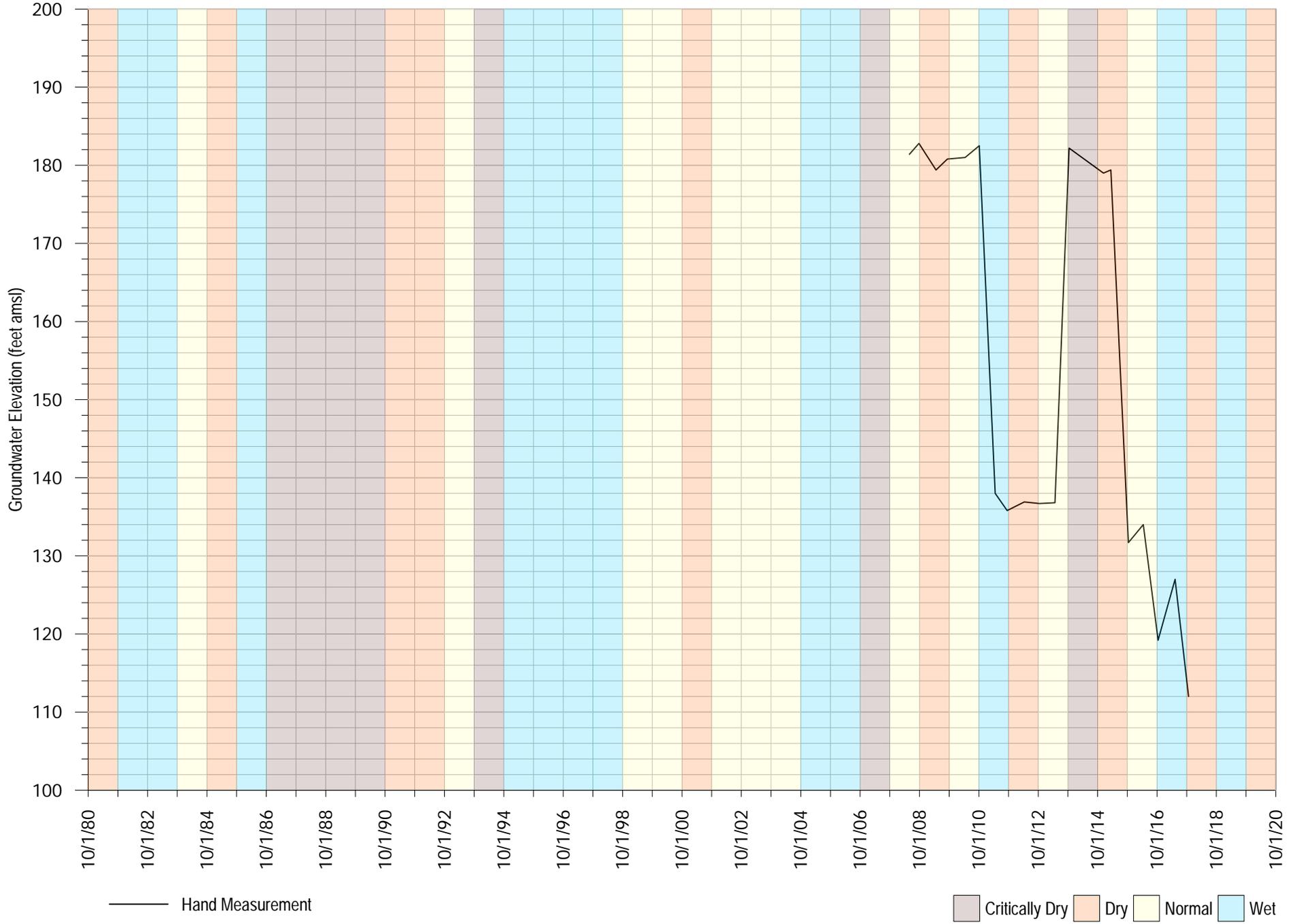
Private Well 8

FIGURE A-150



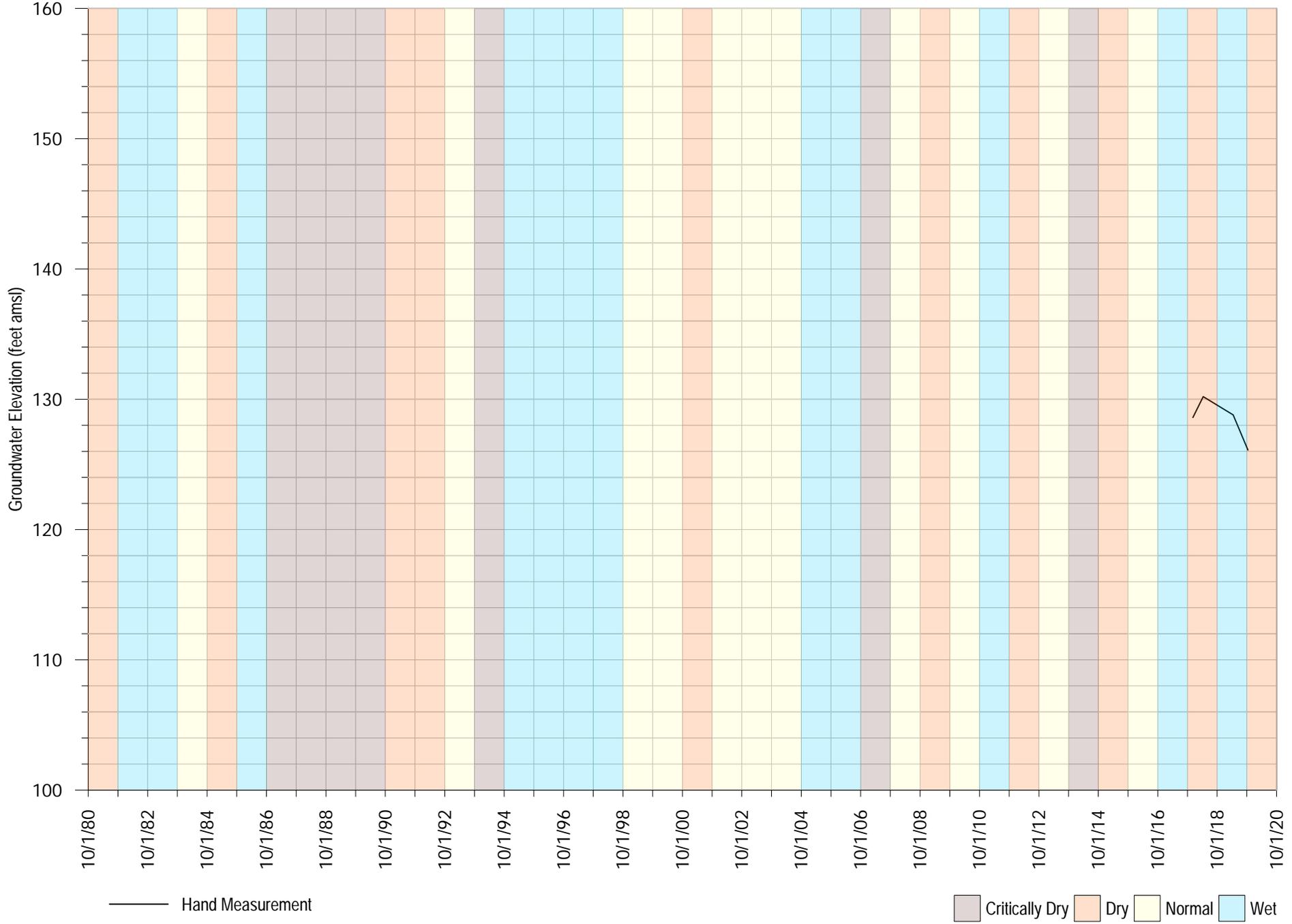
Private Well 9

FIGURE A-151



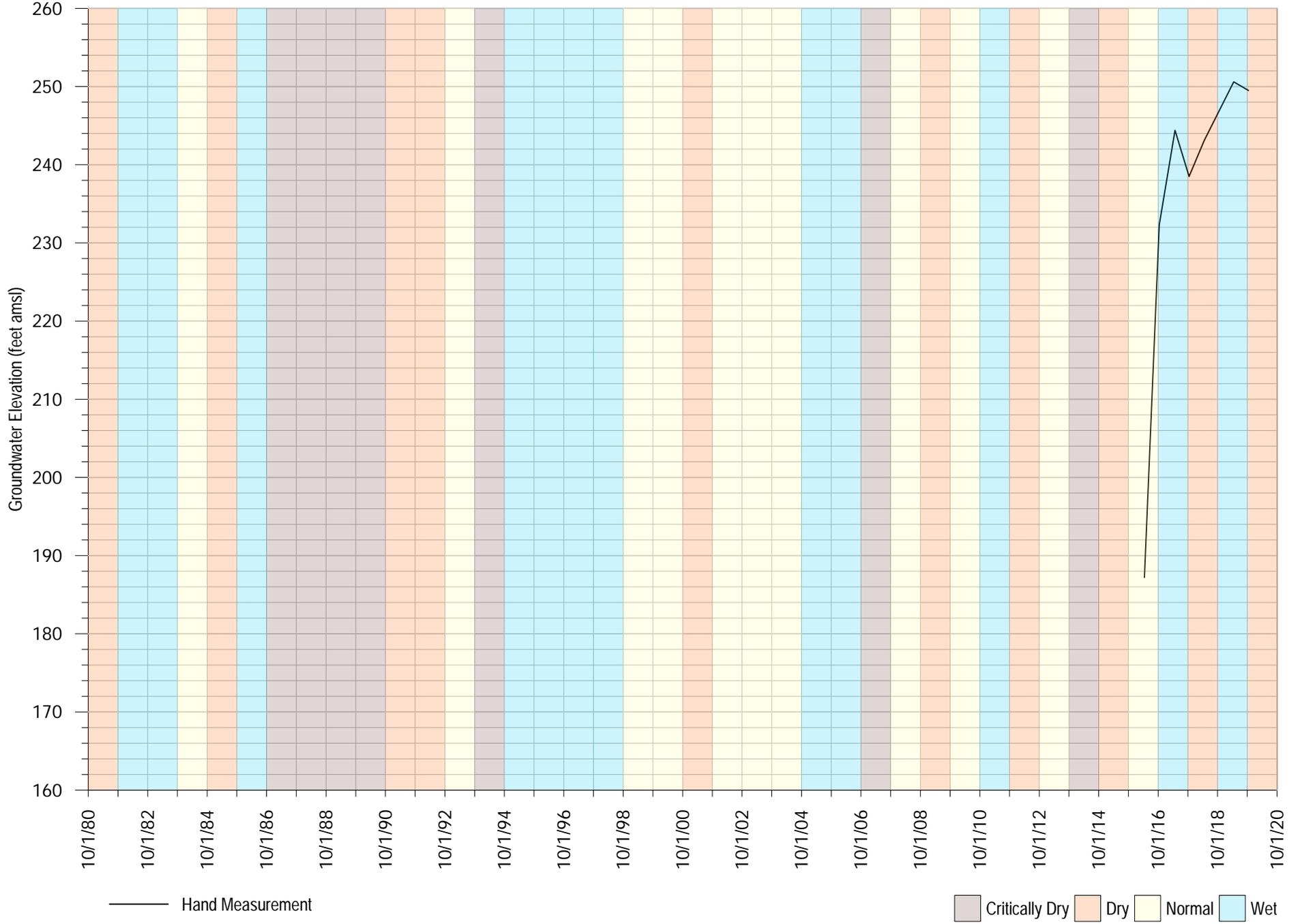
Private Well 10

FIGURE A-152



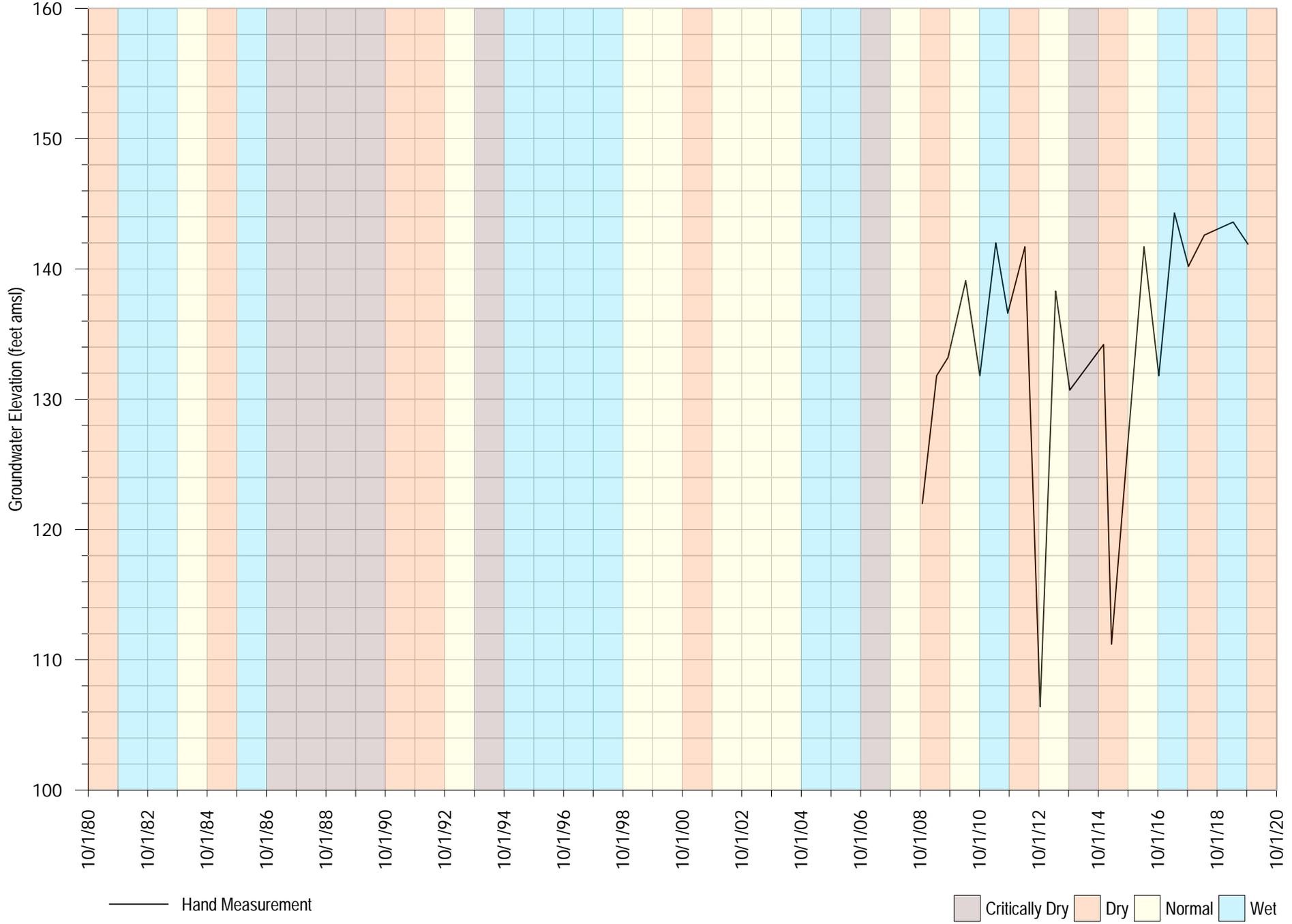
Private Well 11

FIGURE A-153



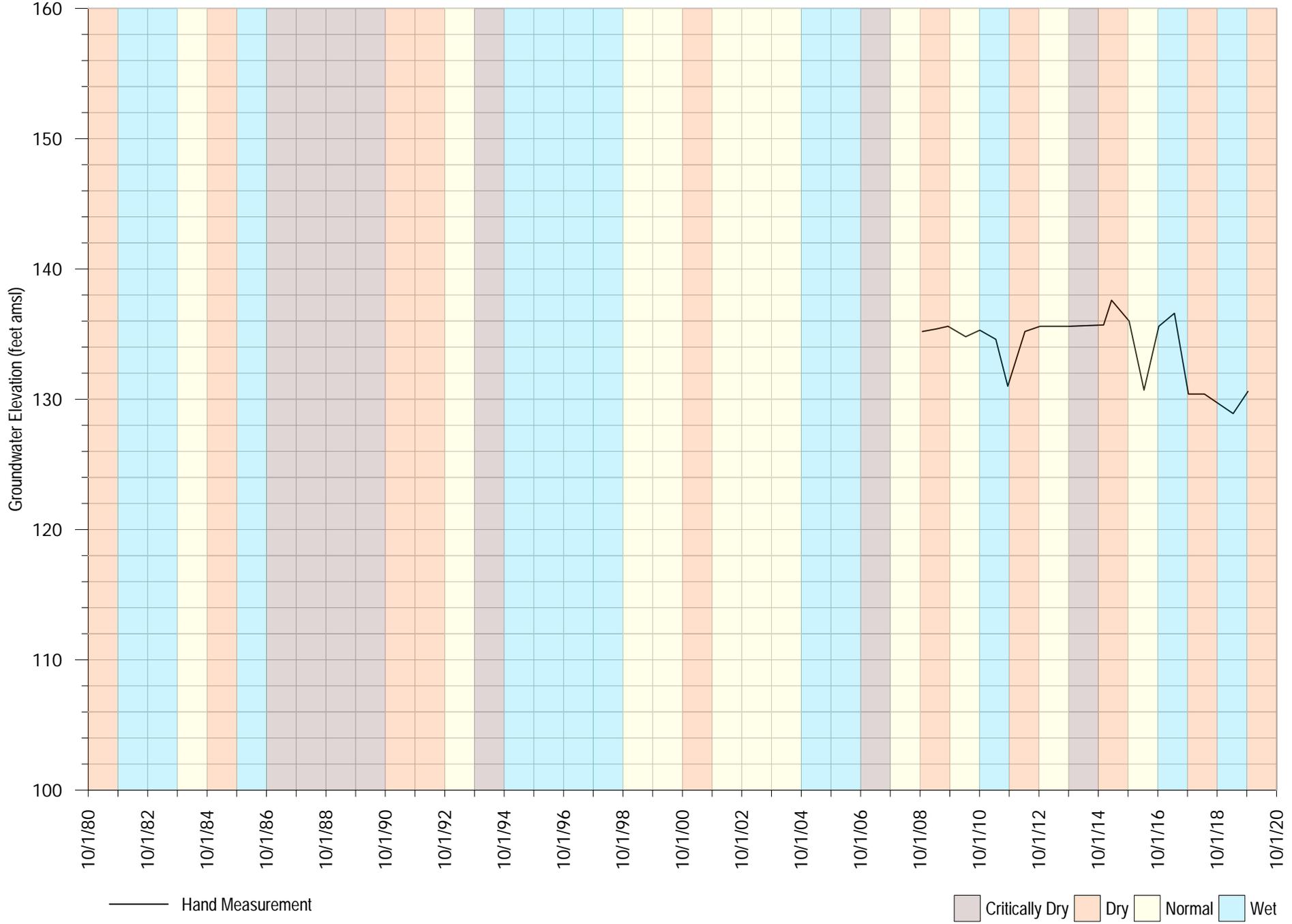
Private Well 12

FIGURE A-154



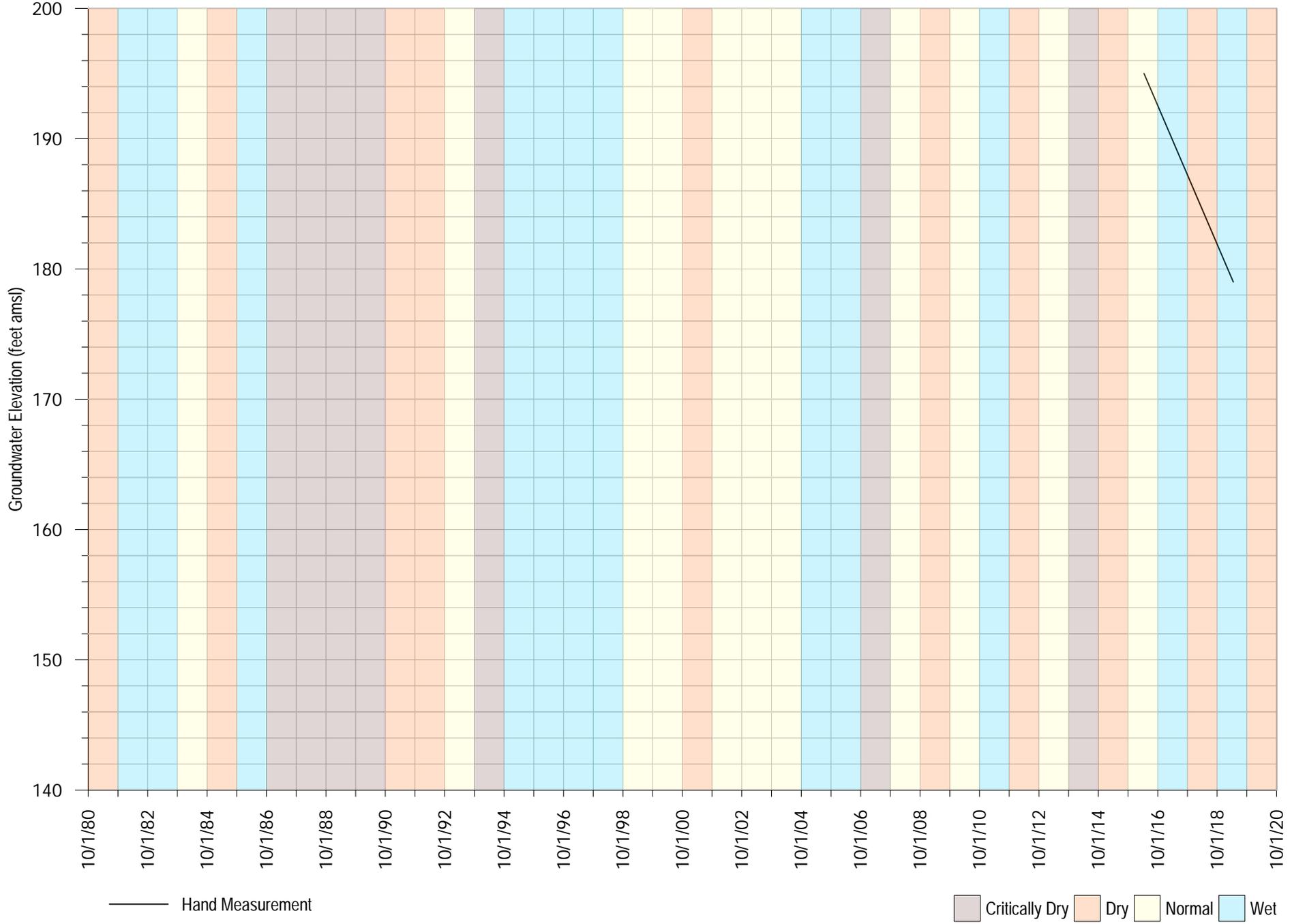
Private Well 13

FIGURE A-155



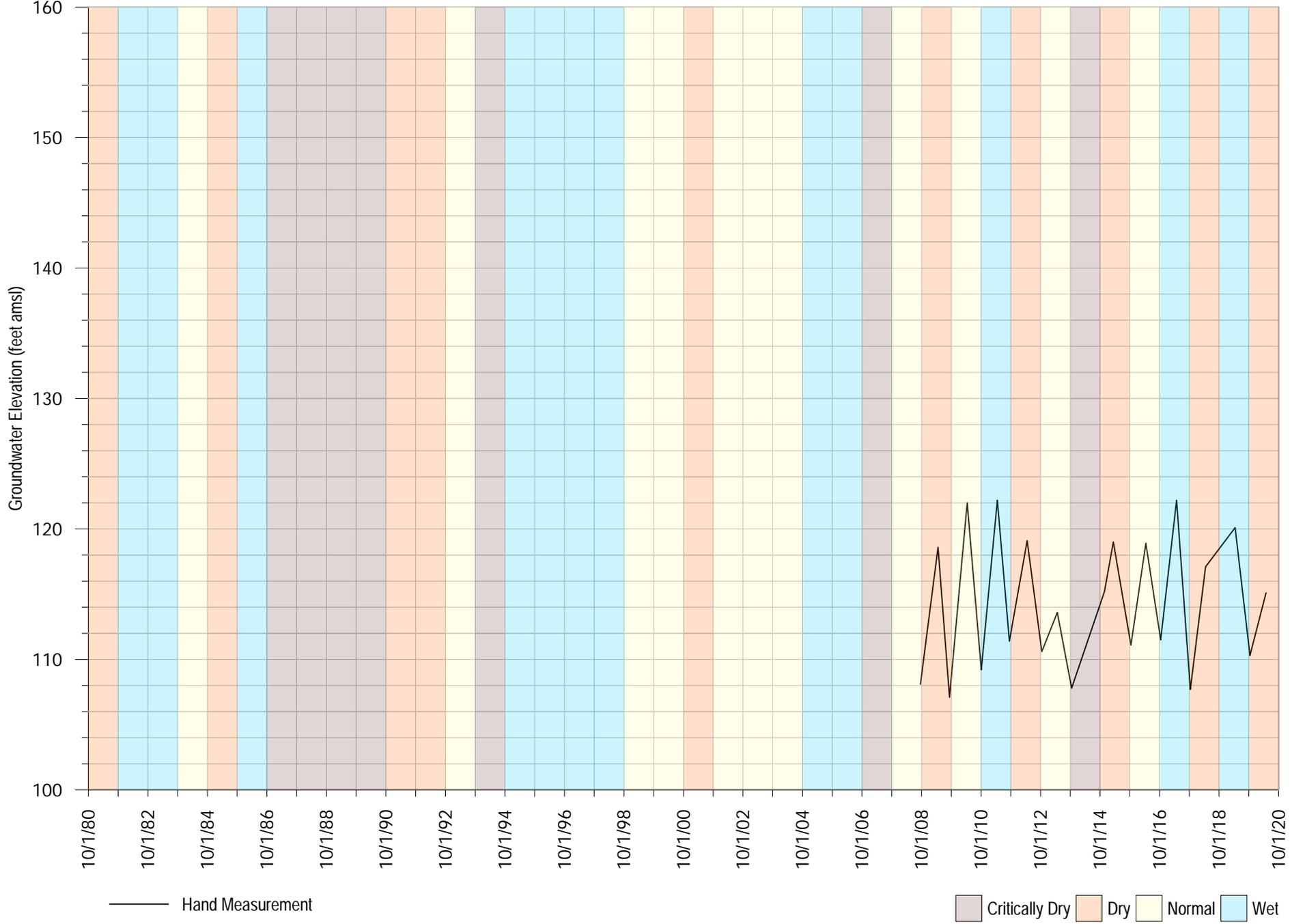
Private Well 14

FIGURE A-156



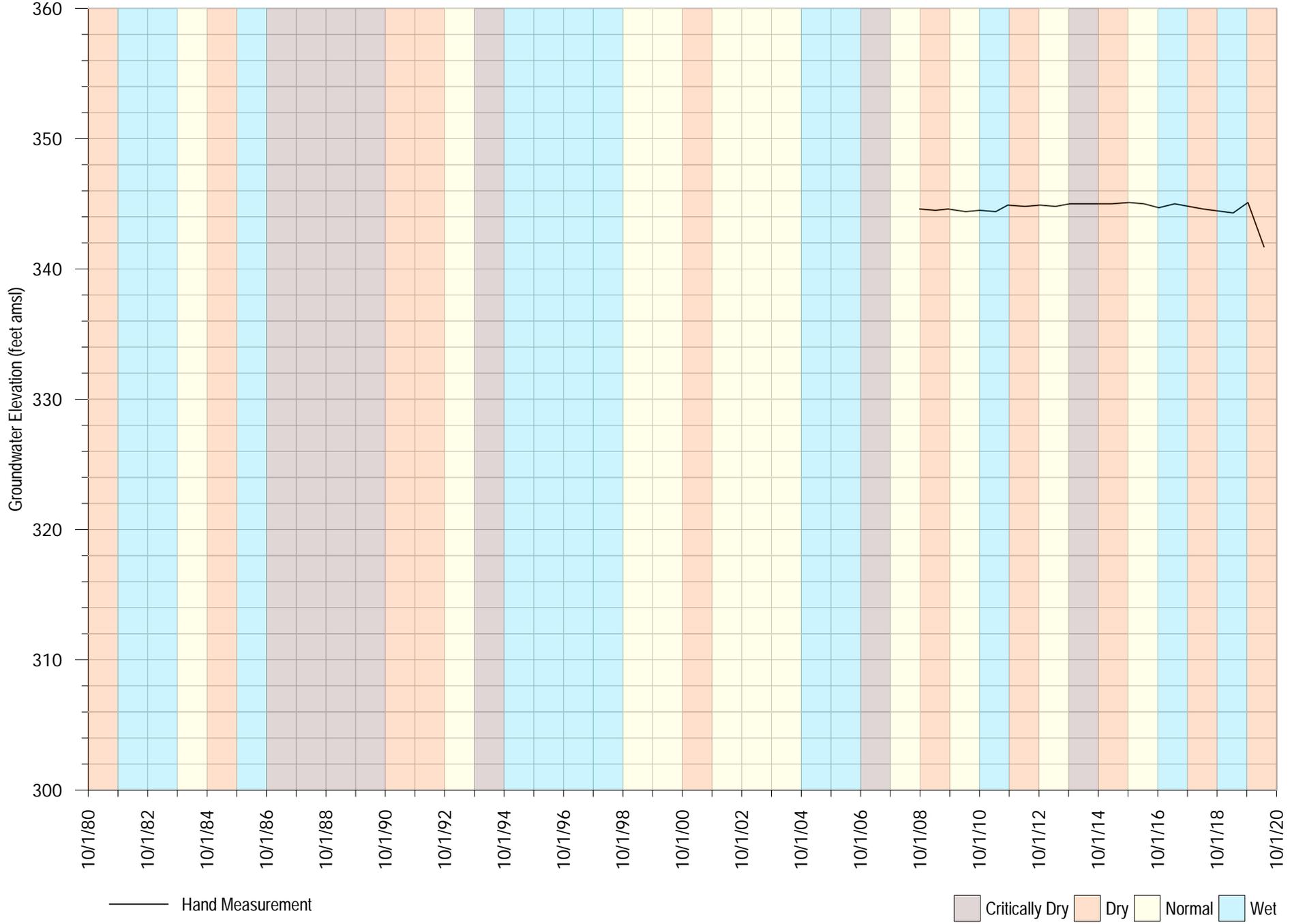
Private Well 15

FIGURE A-157



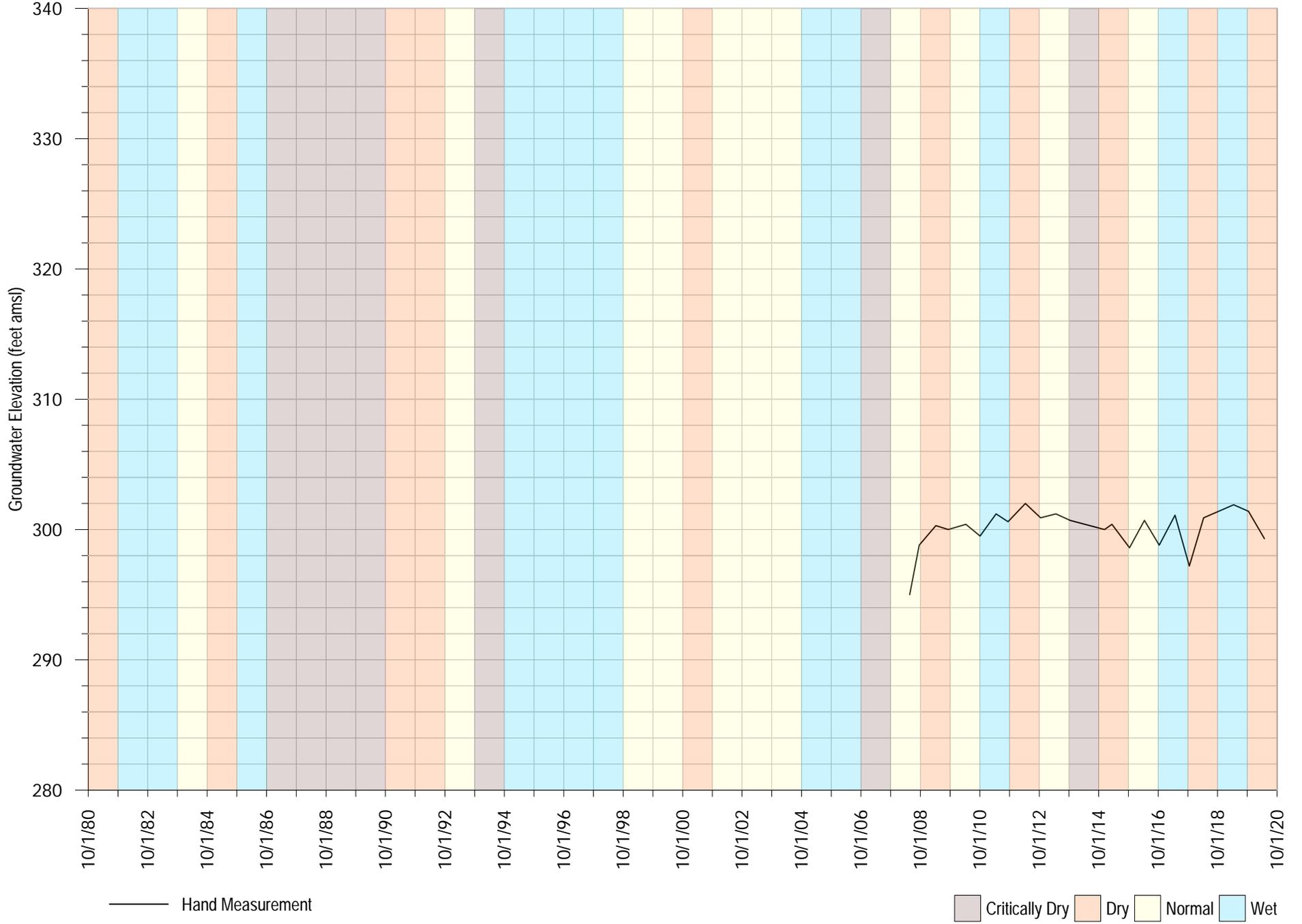
Private Well 16

FIGURE A-158



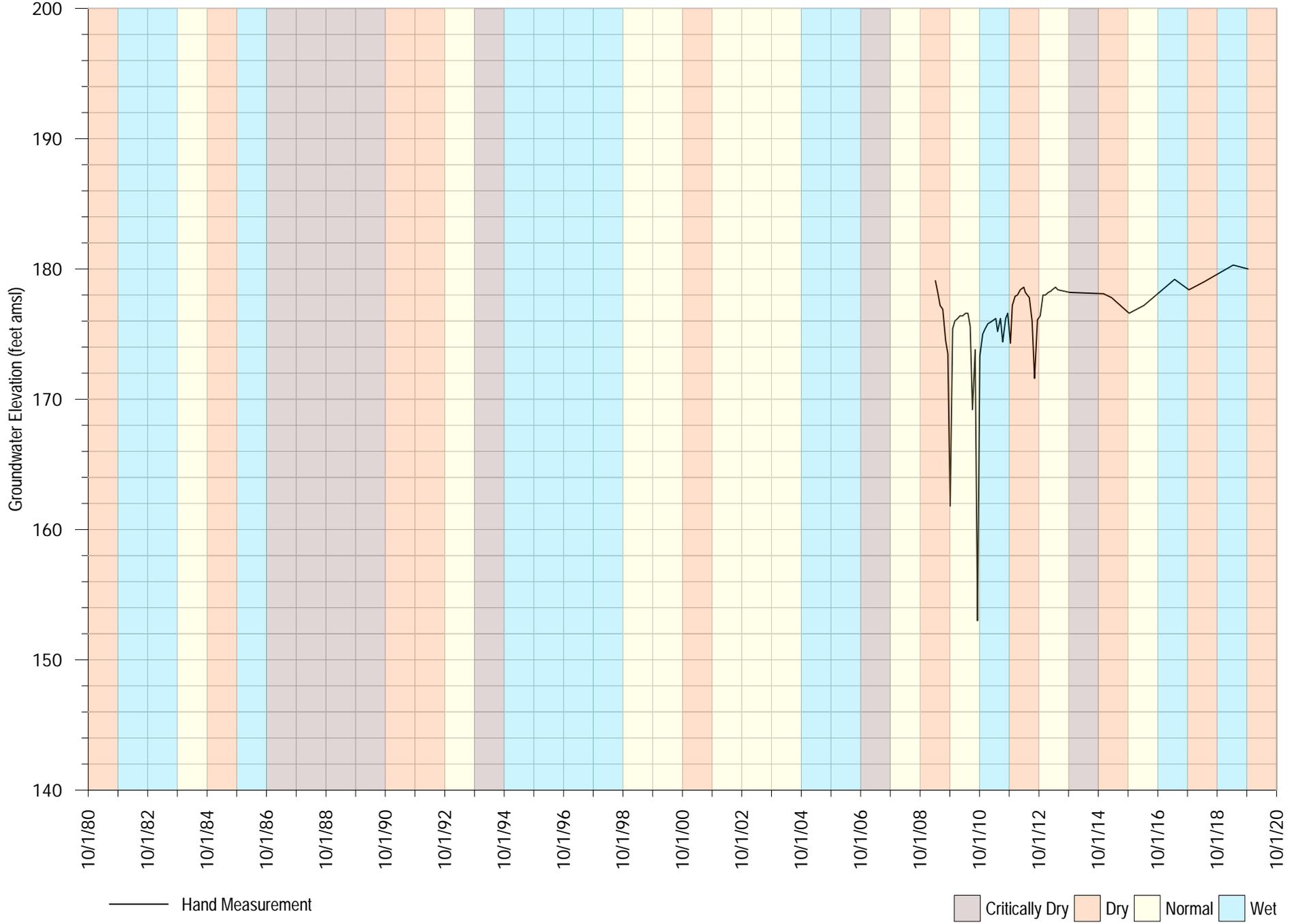
Private Well 17

FIGURE A-159



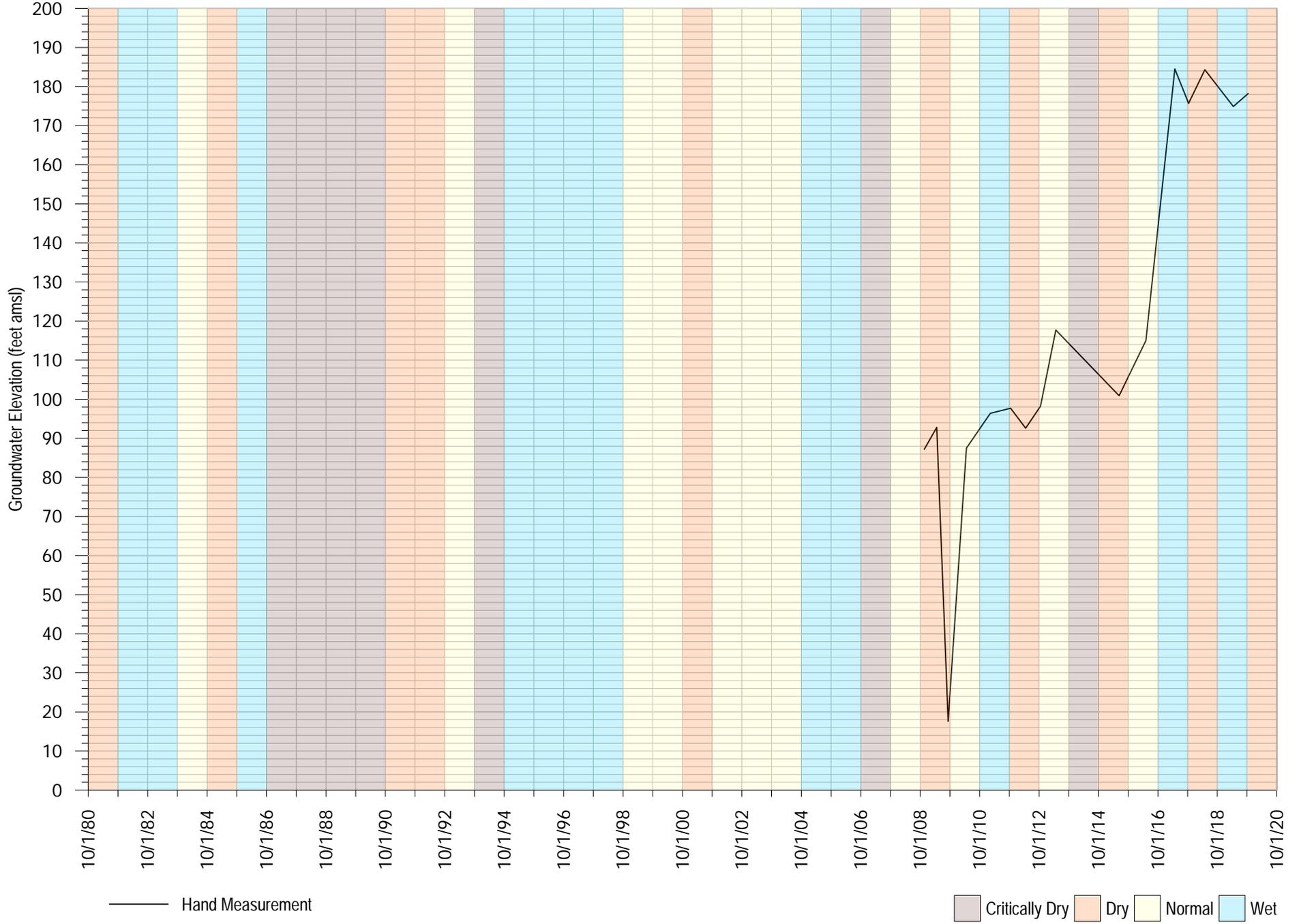
Private Well 18

FIGURE A-160



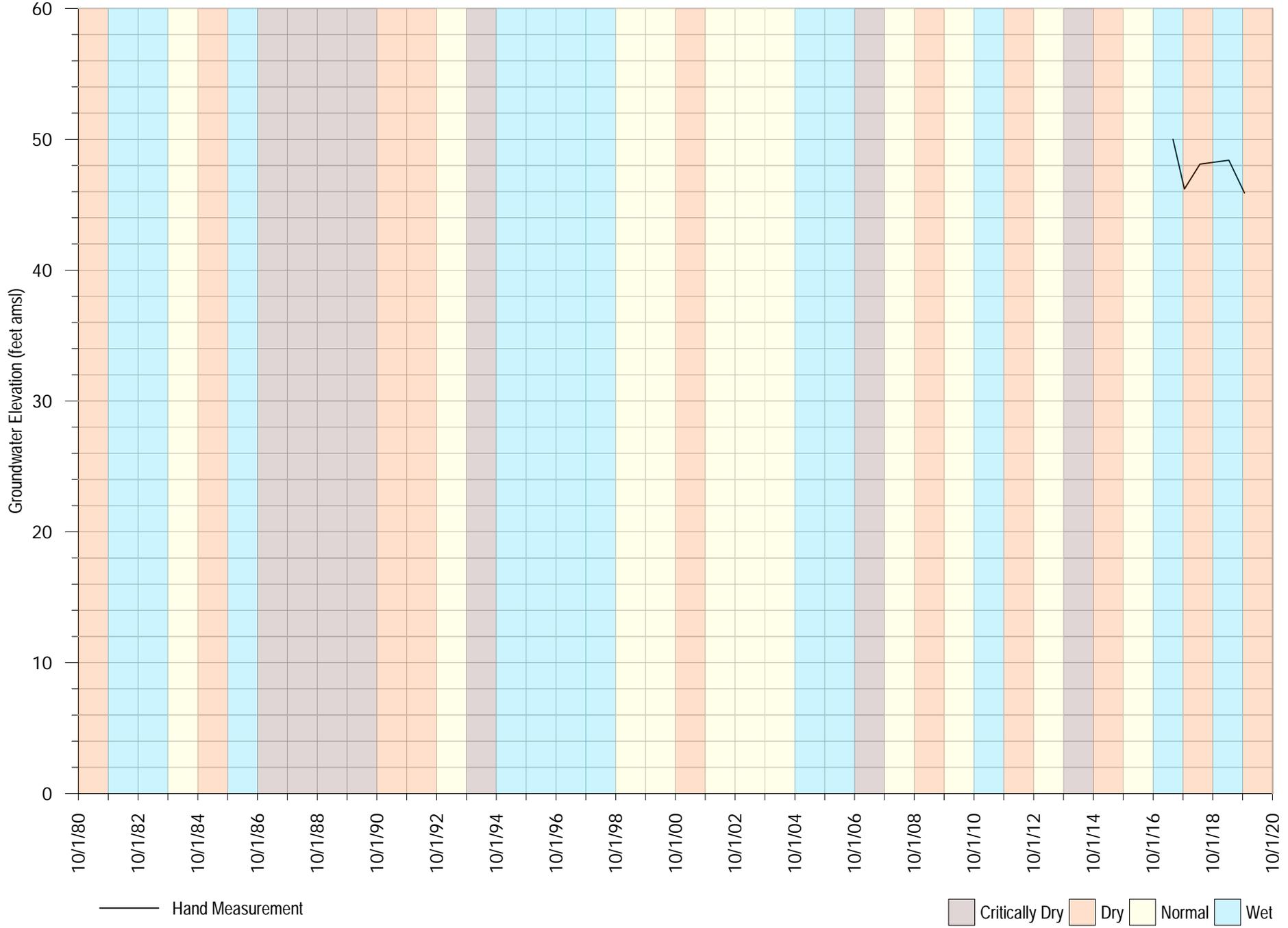
Private Well 19

FIGURE A-161



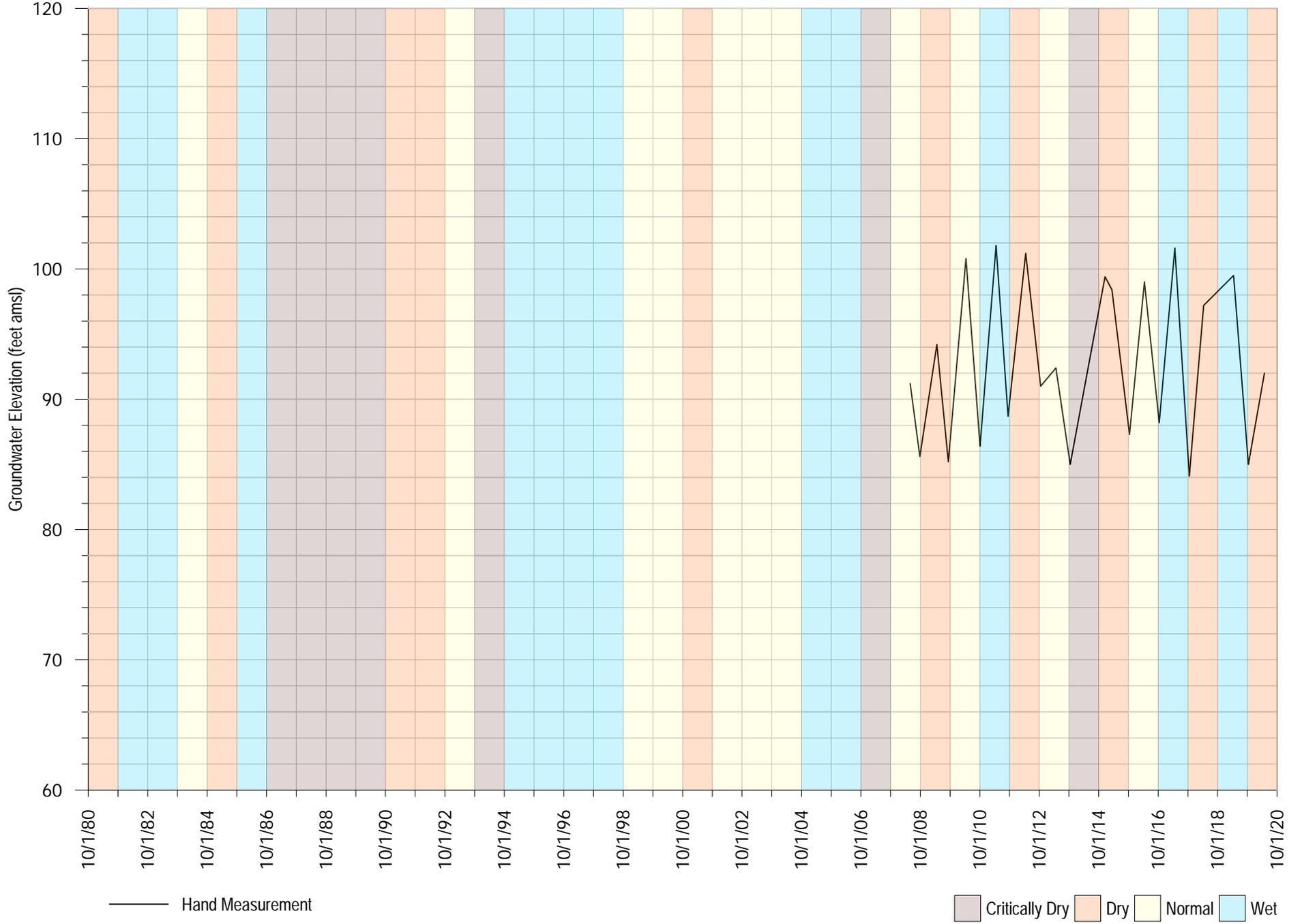
Private Well 20

FIGURE A-162



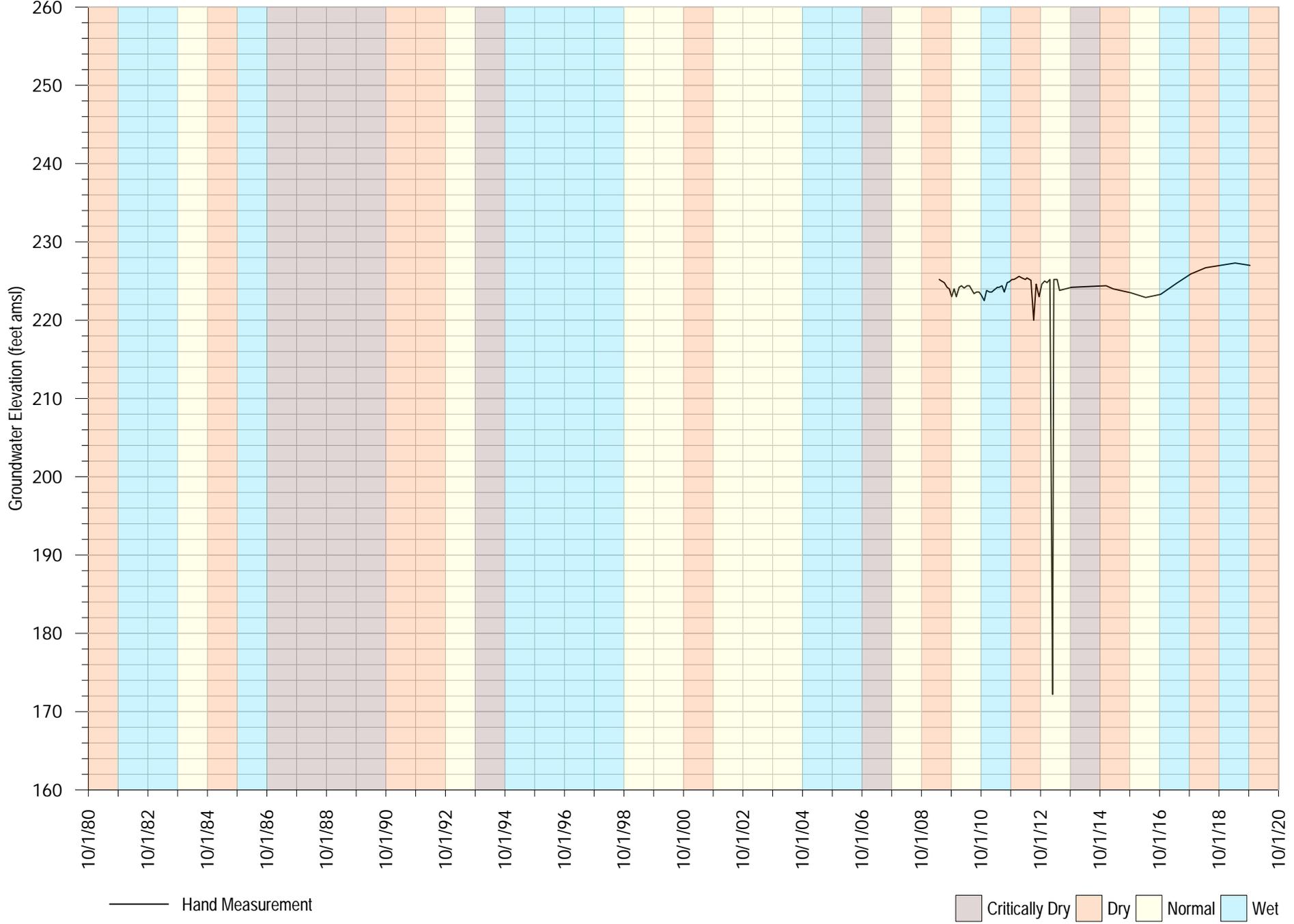
Private Well 21

FIGURE A-163



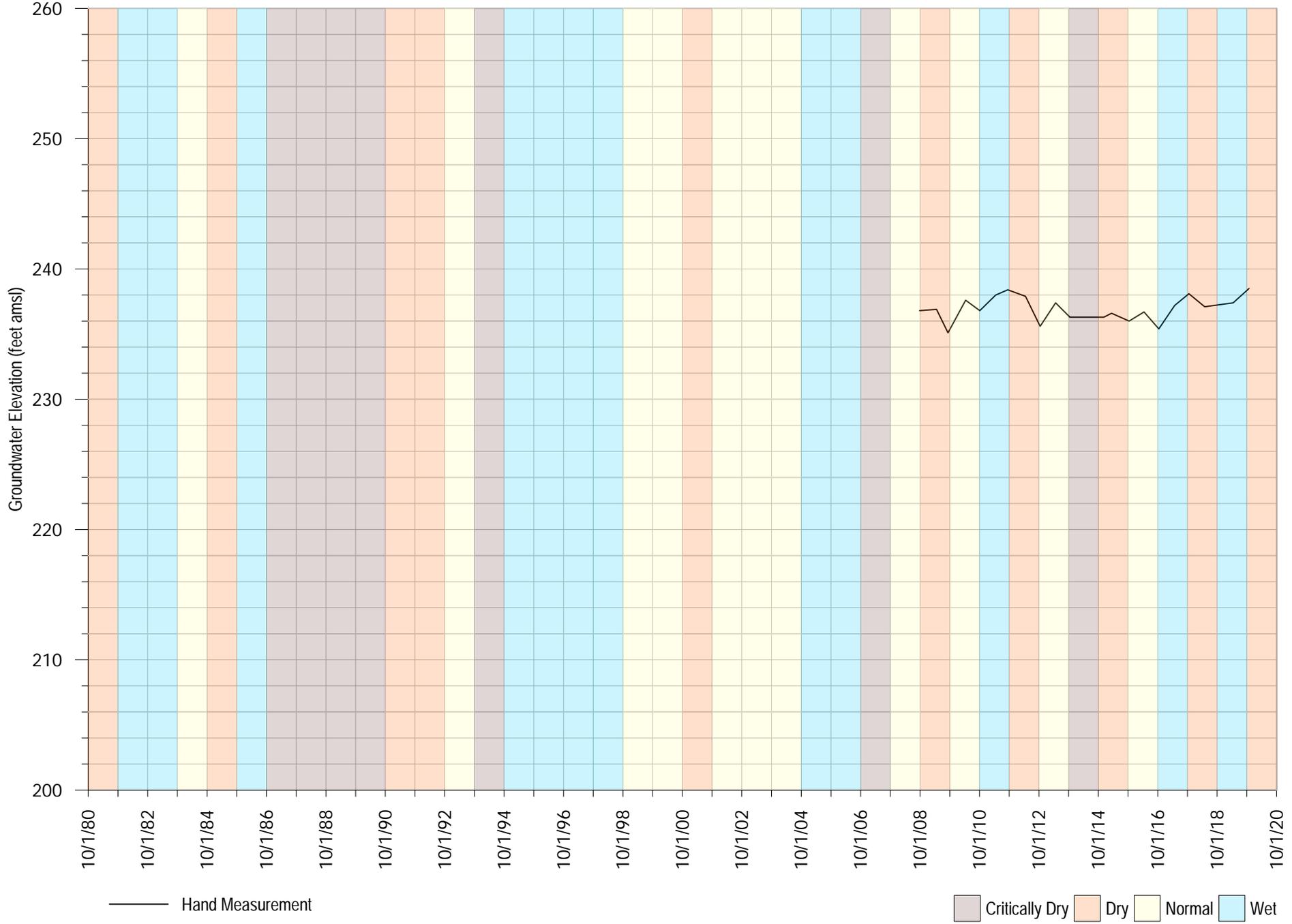
Private Well 22

FIGURE A-164



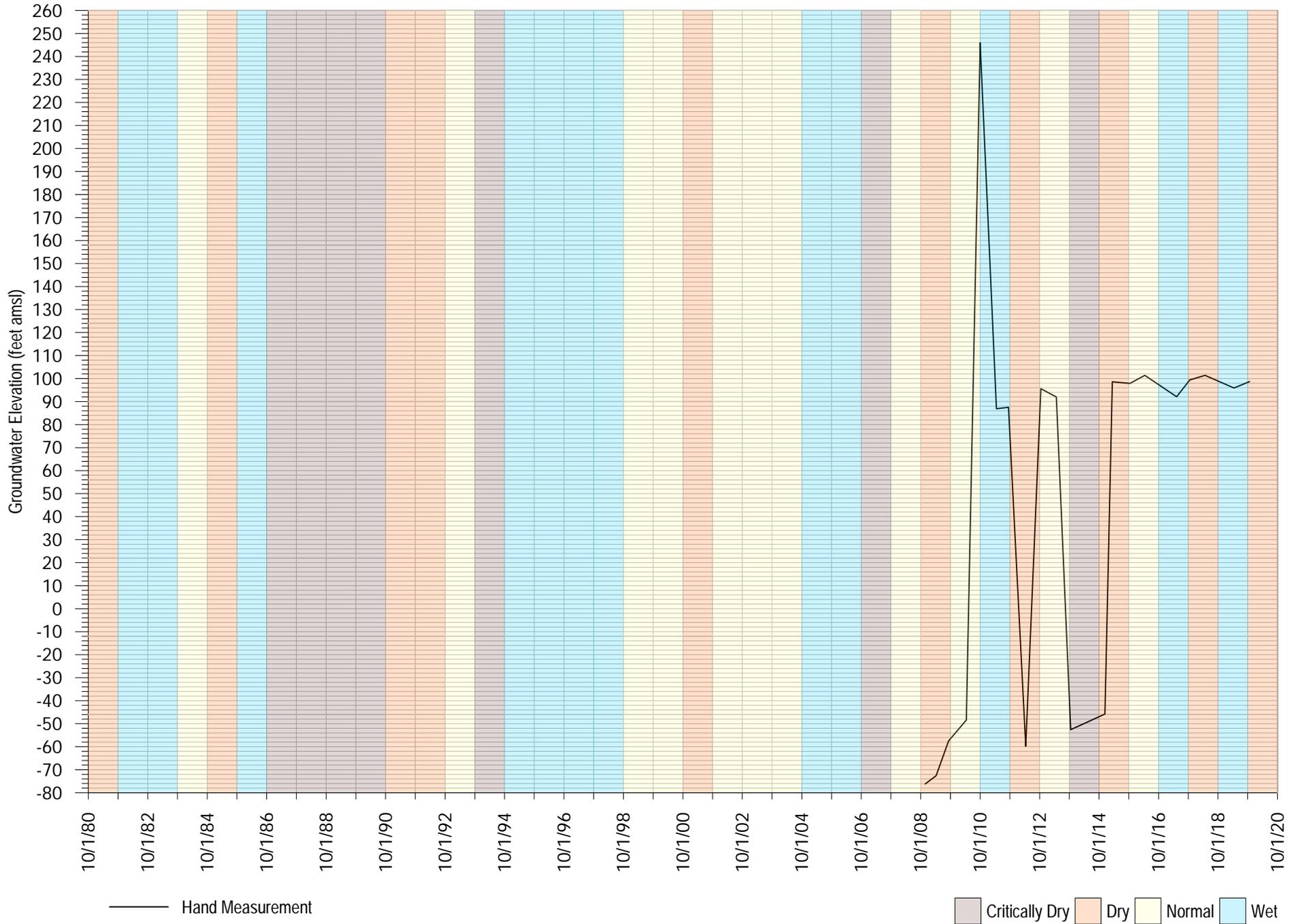
Private Well 23

FIGURE A-165



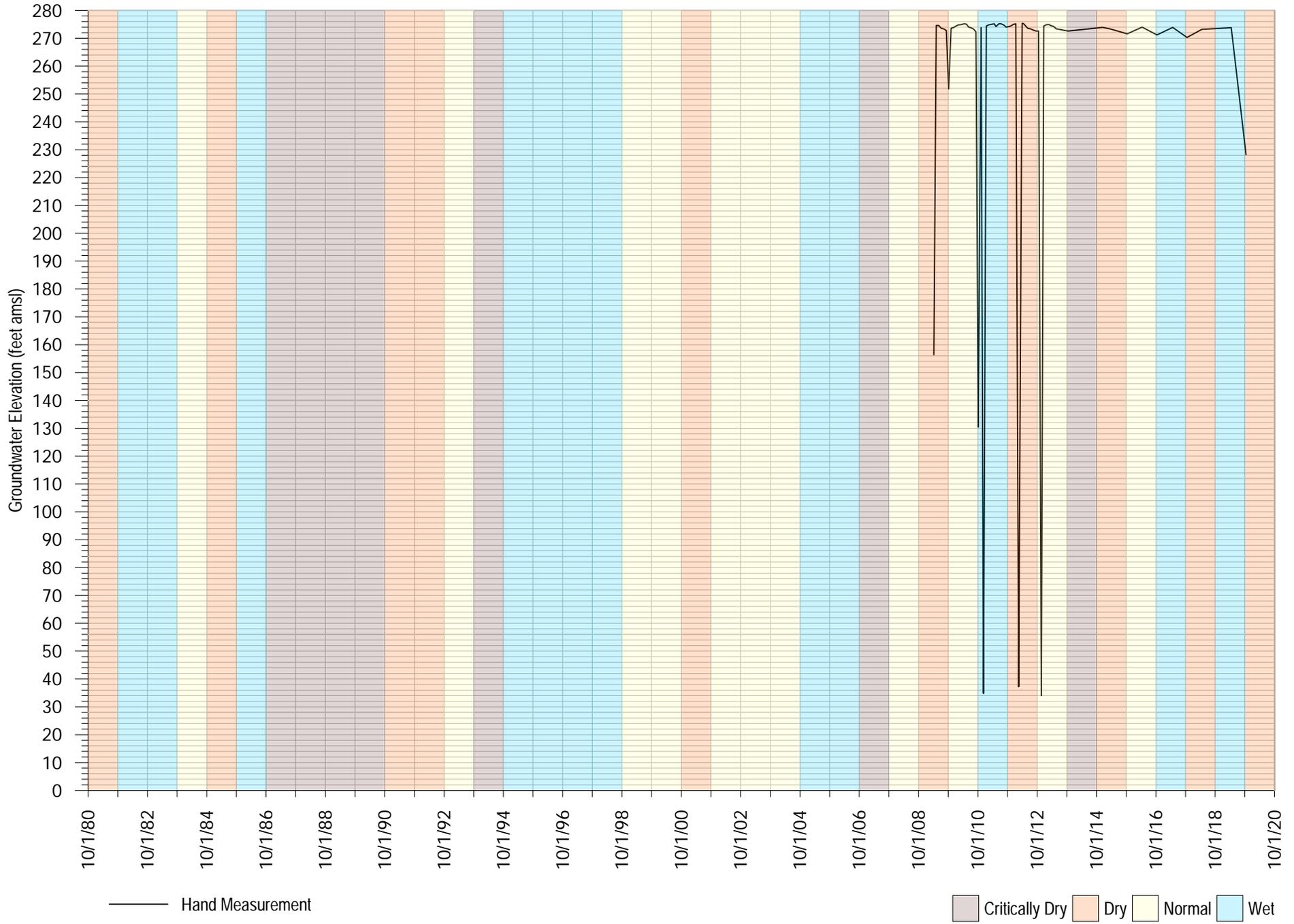
Private Well 24

FIGURE A-166



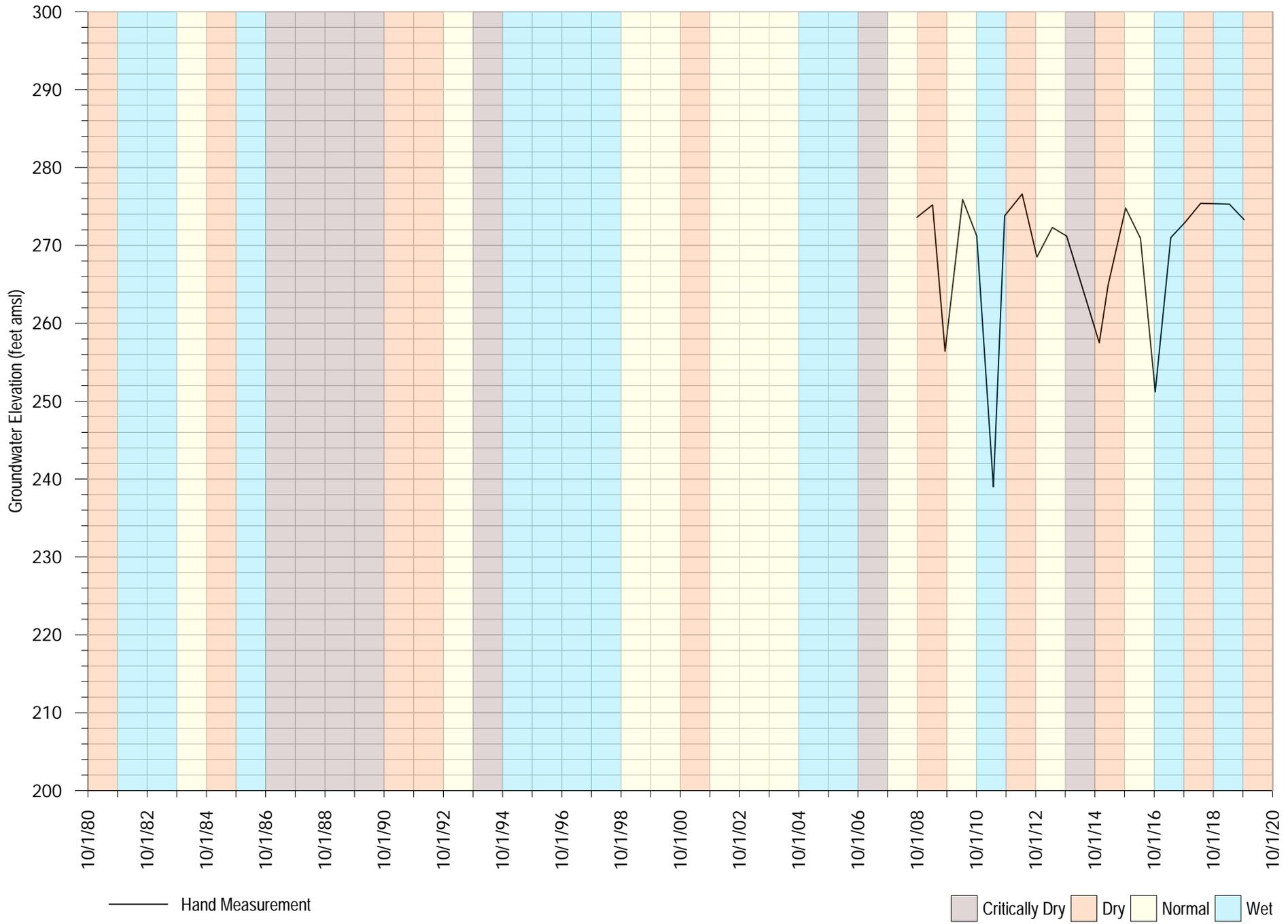
Private Well 25

FIGURE A-167



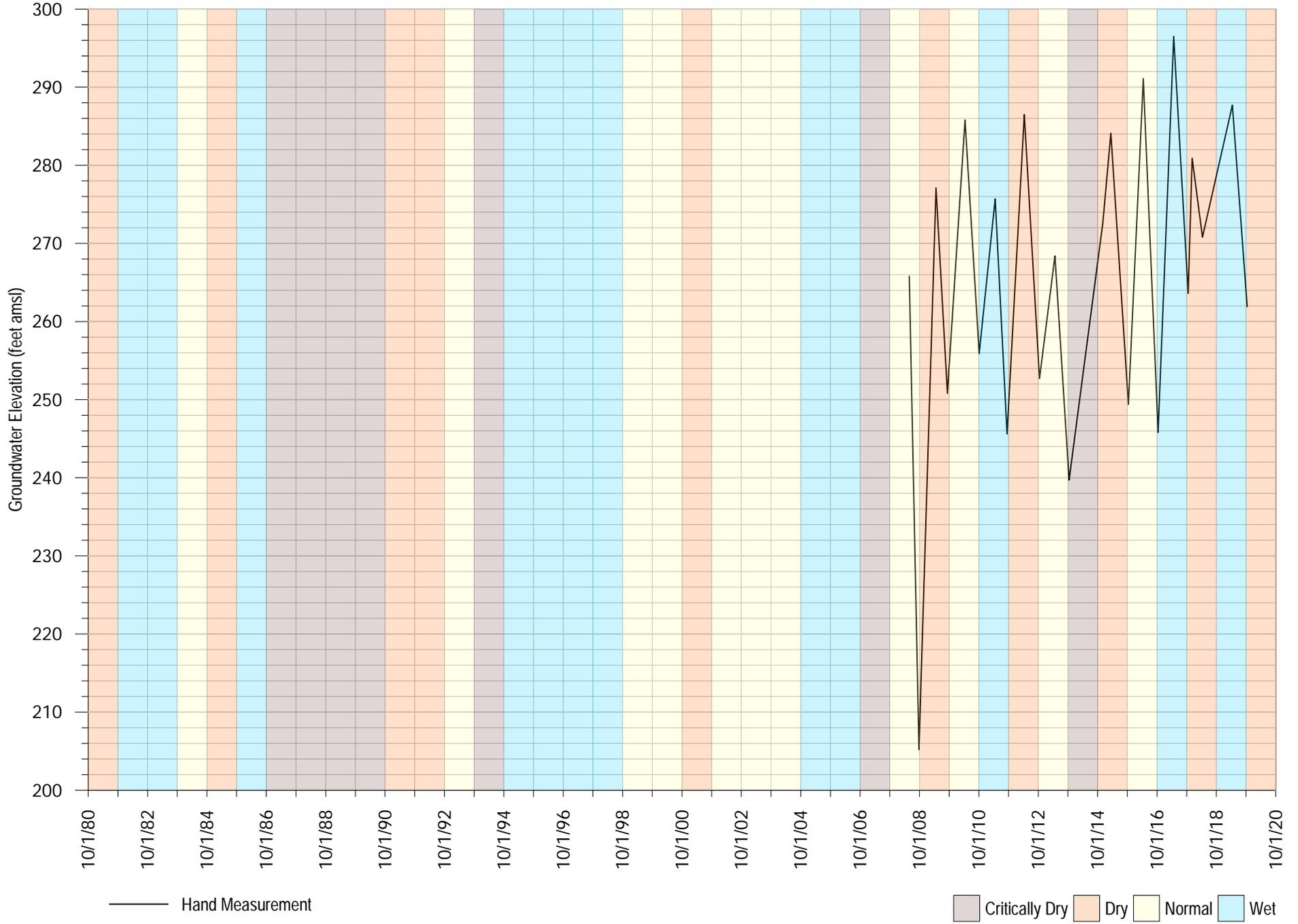
Private Well 26

FIGURE A-168



Private Well 27

FIGURE A-169

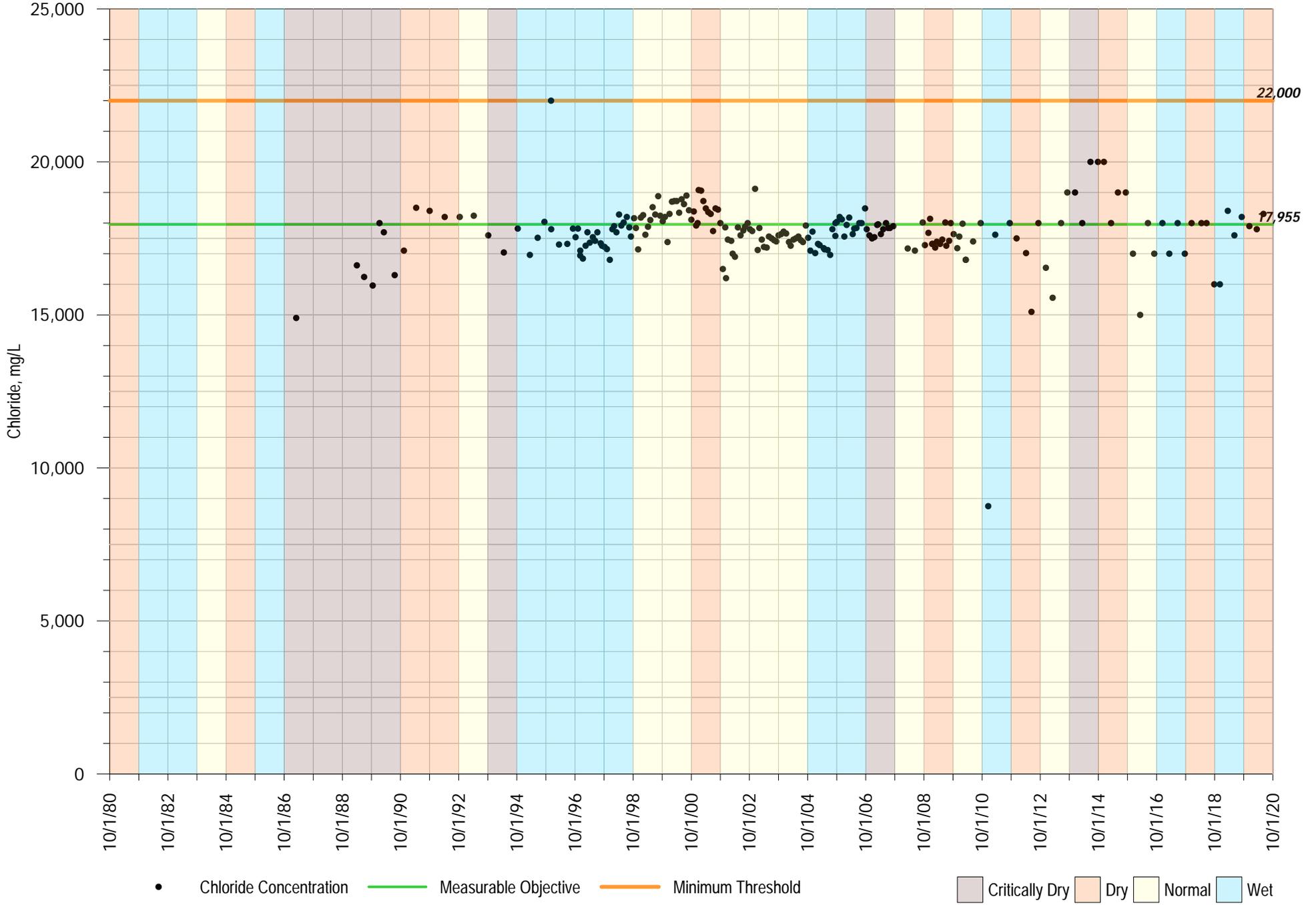


Appendix B

Coastal Monitoring Well Chemographs

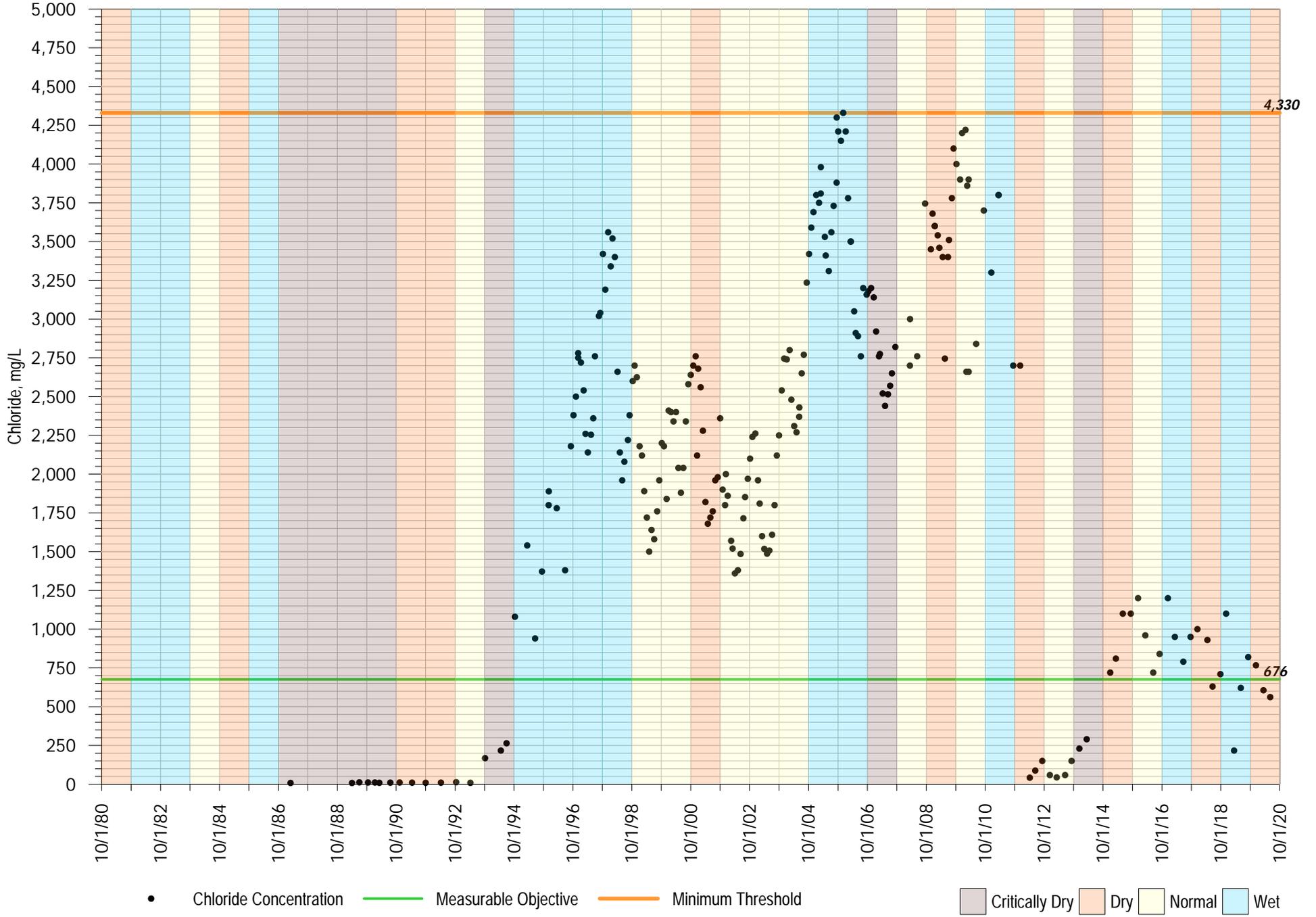
SC-A3A

FIGURE B-1



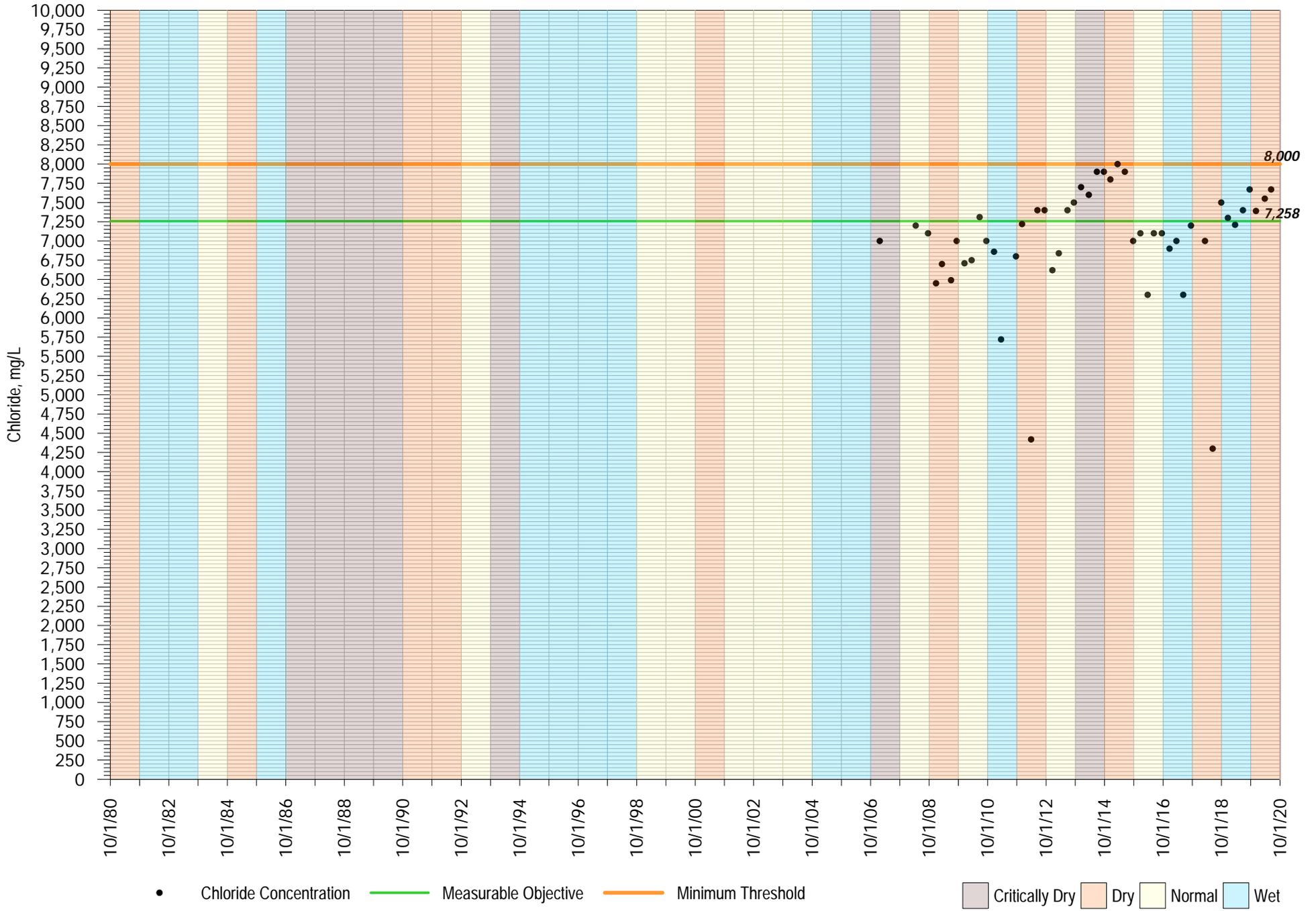
SC-A3B

FIGURE B-2



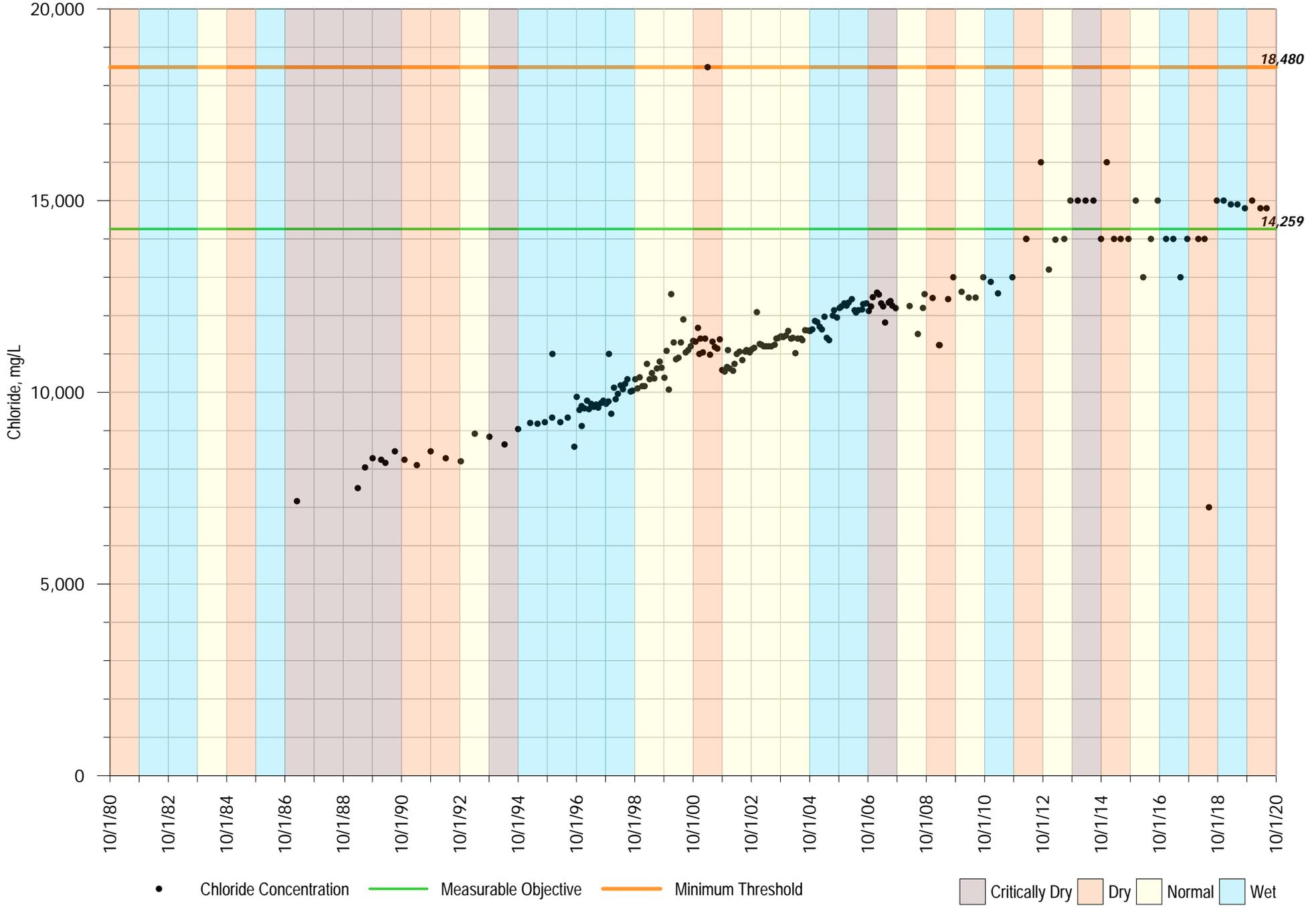
SC-A8A

FIGURE B-3



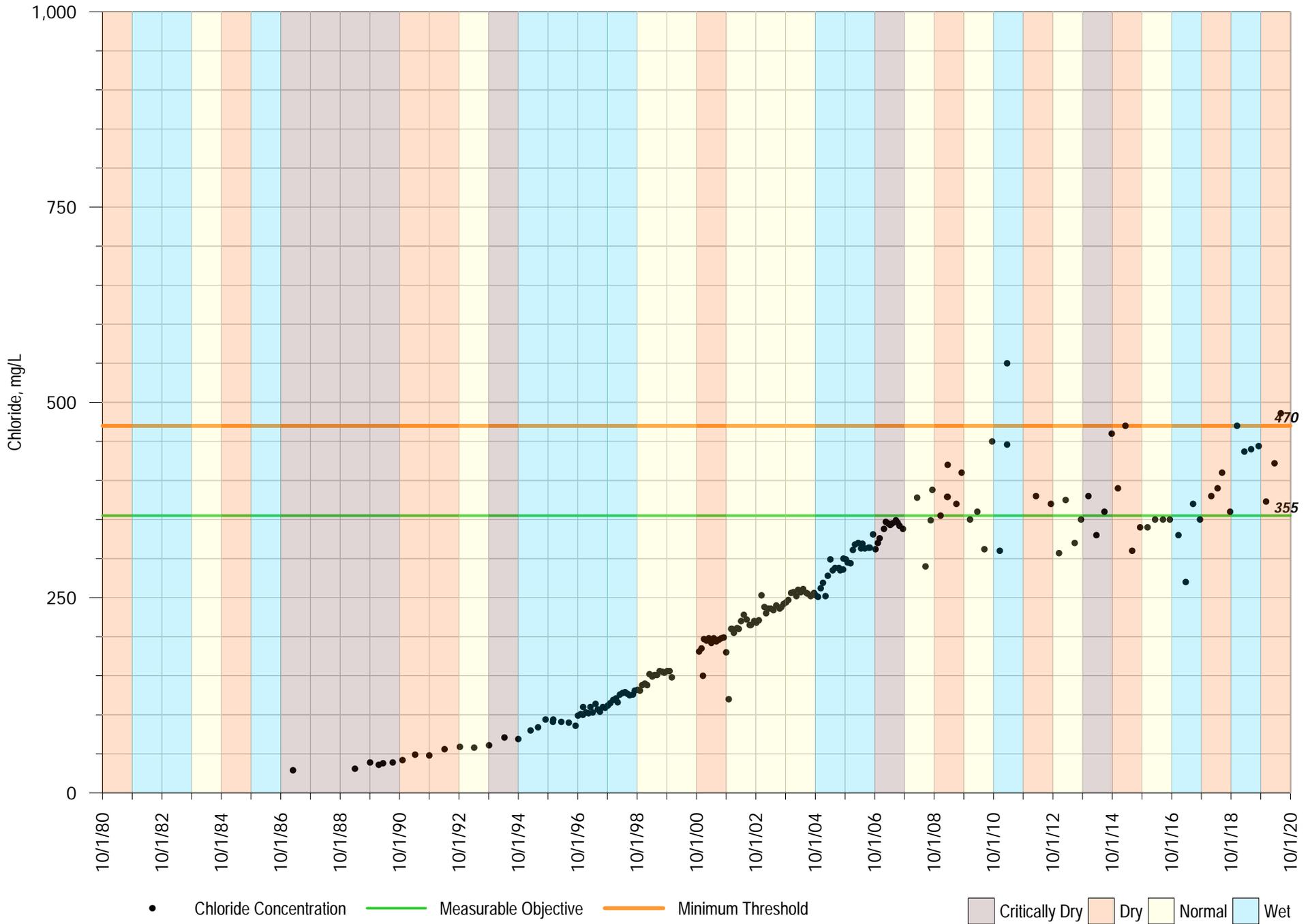
SC-A2A & SC-A2RA

FIGURE B-4



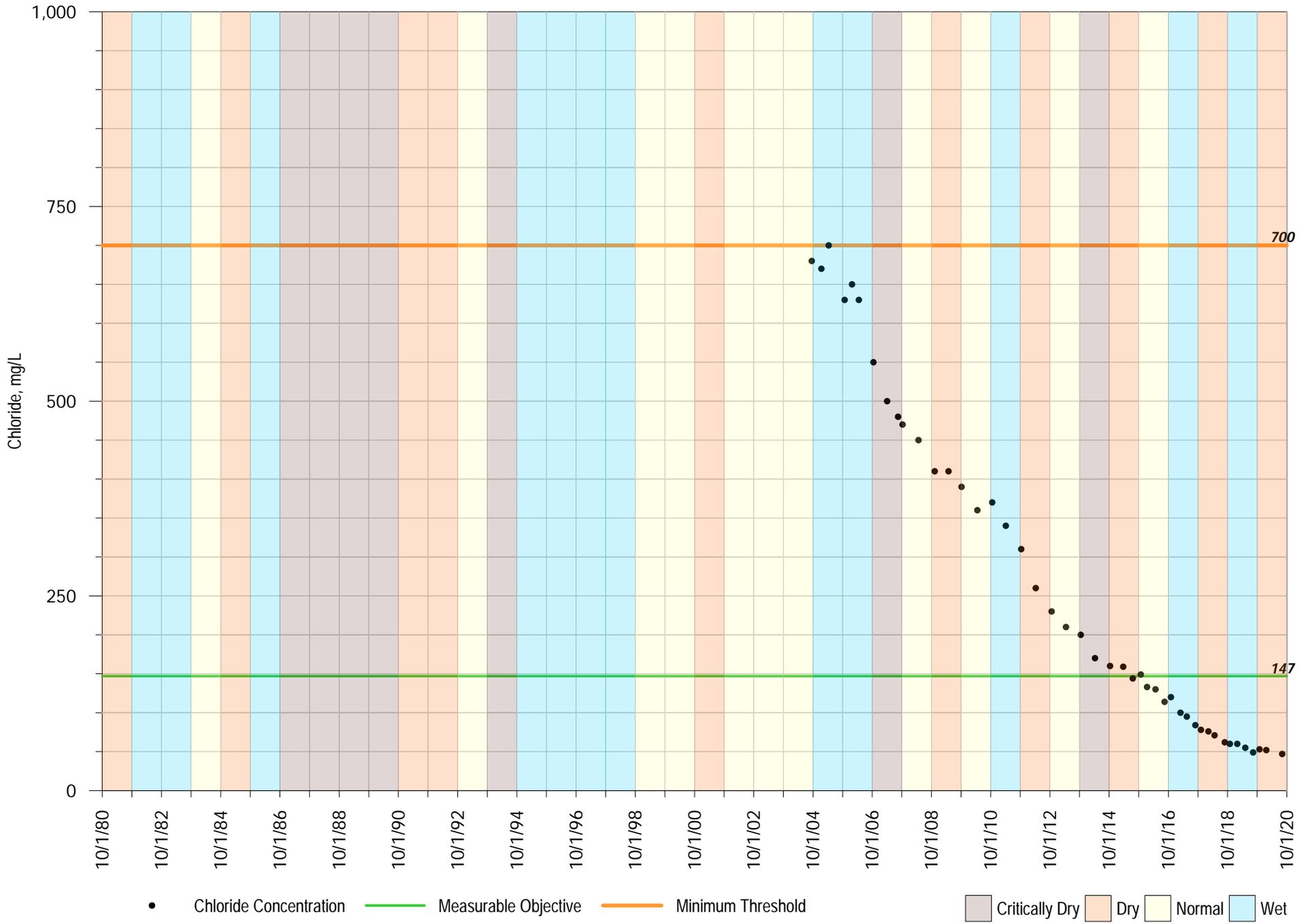
SC-A2B & SC-A2RB

FIGURE B-5



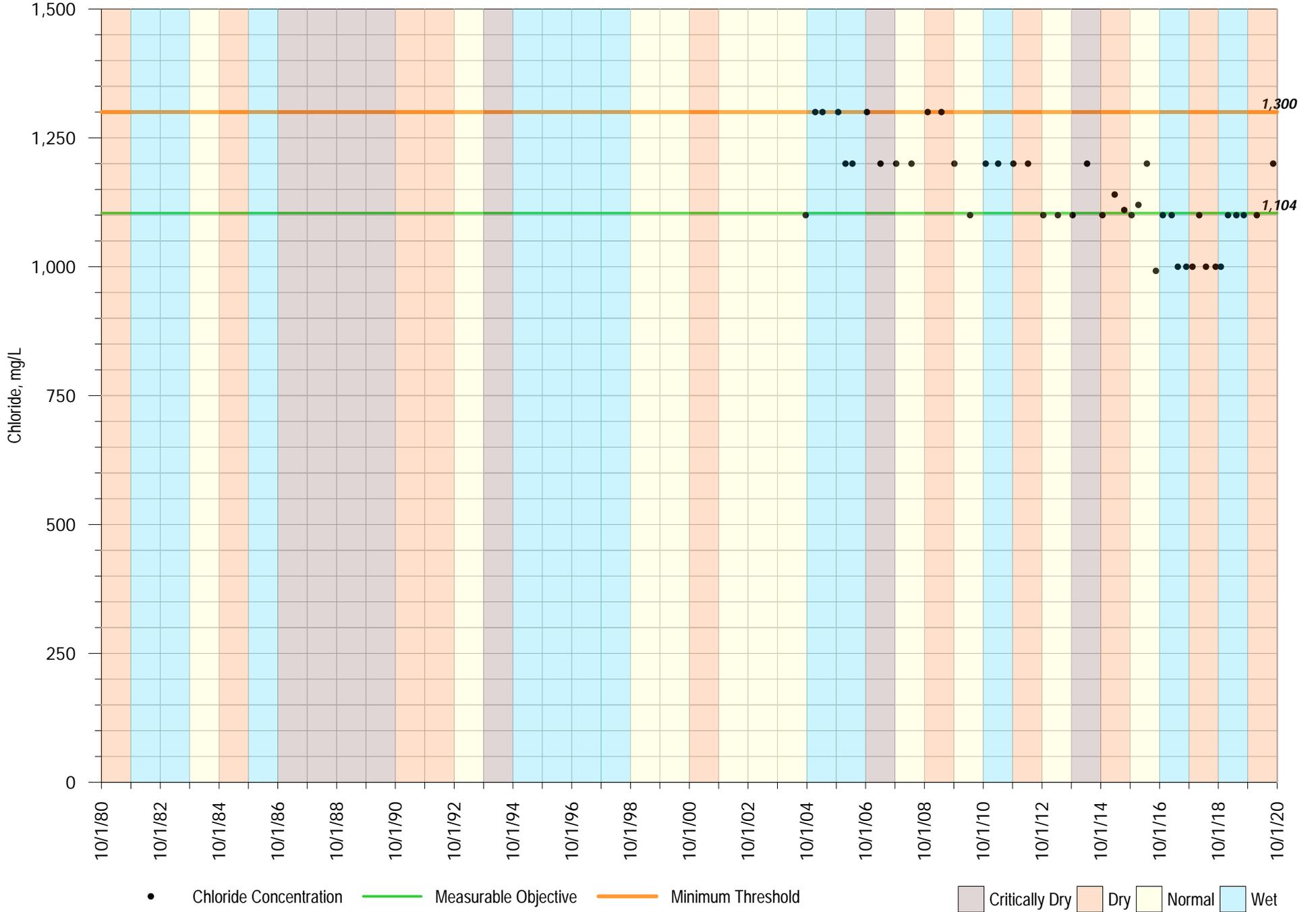
Moran Lake Medium

FIGURE B-6



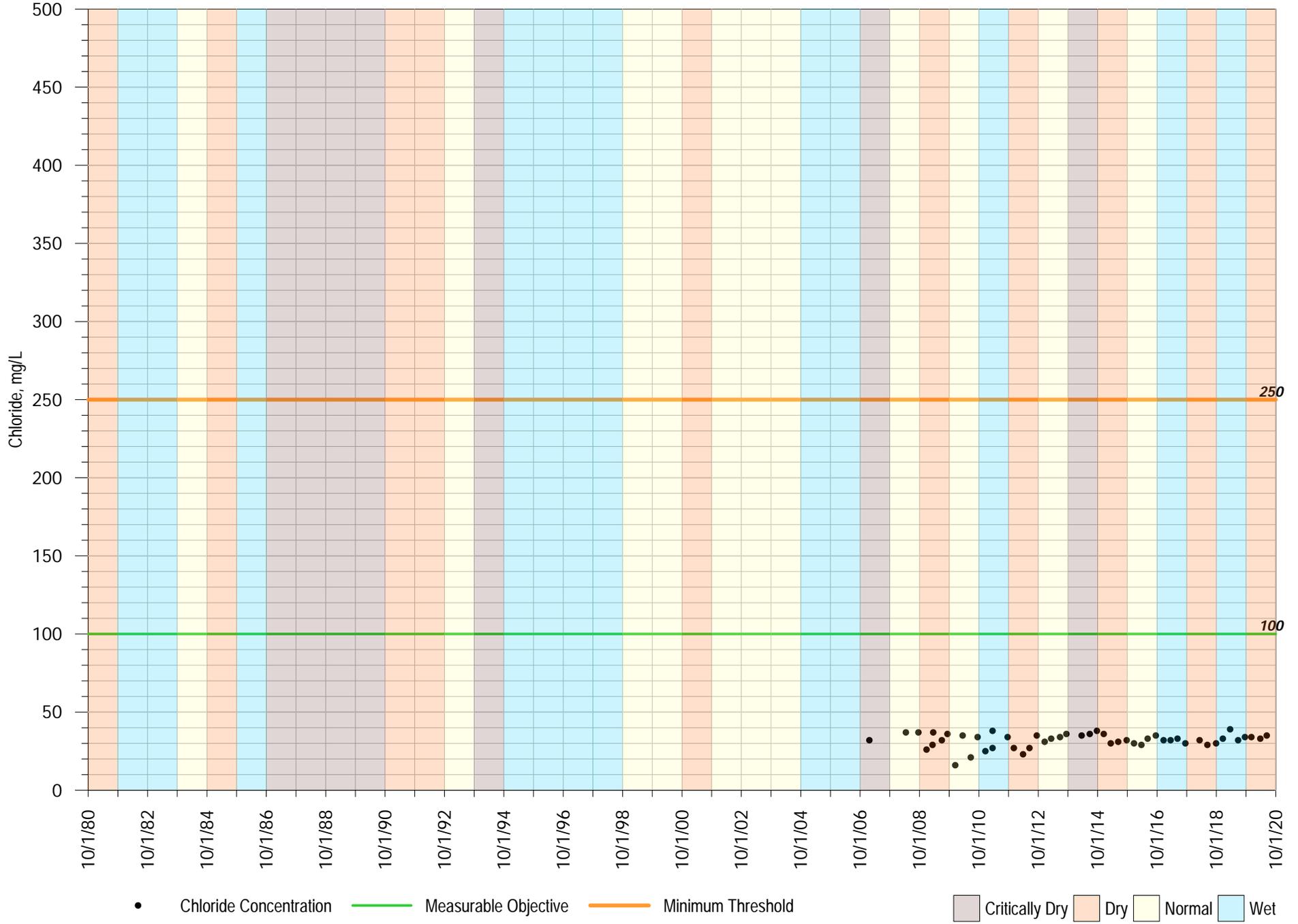
Soquel Point Medium

FIGURE B-7



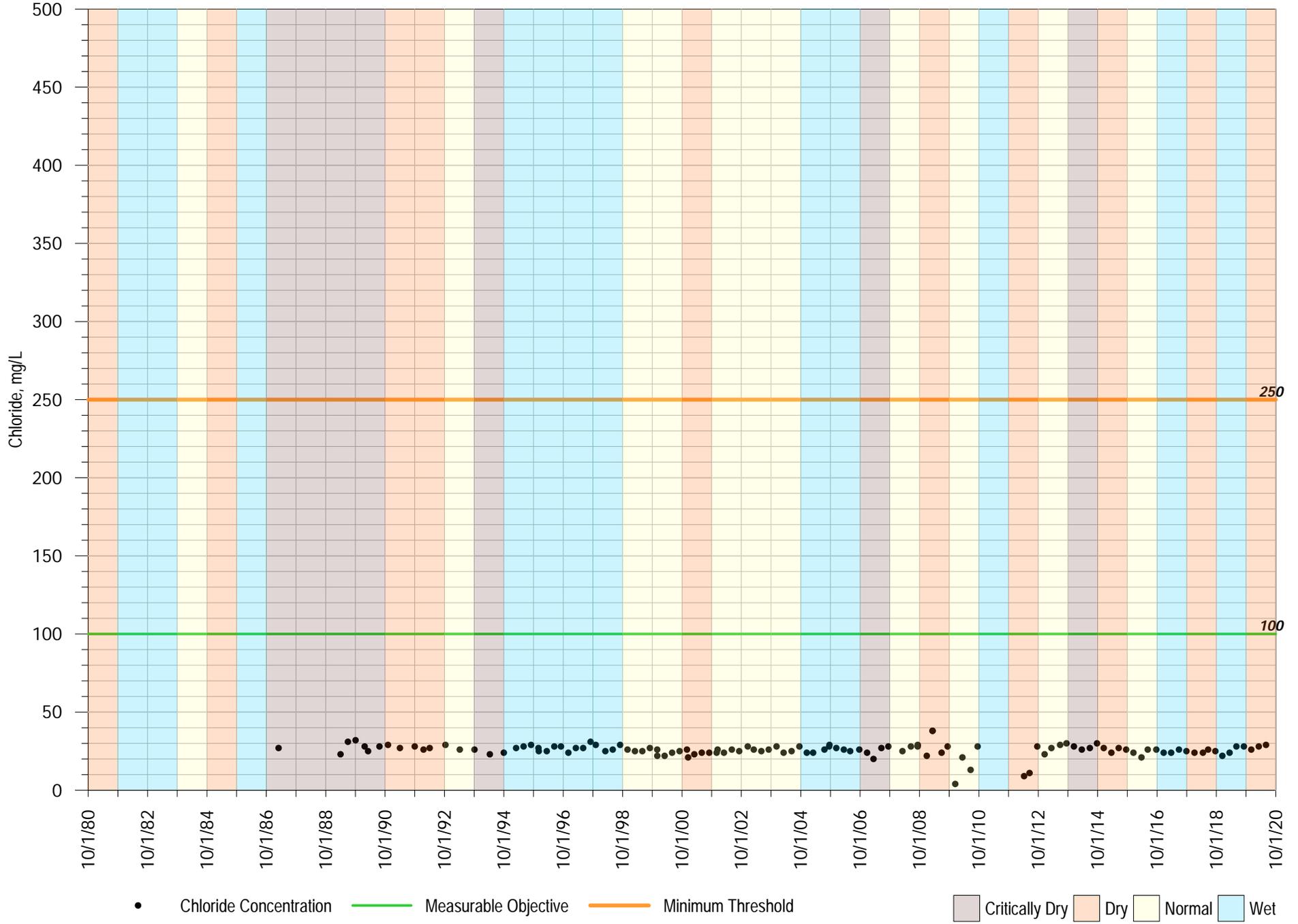
SC-A8B

FIGURE B-8



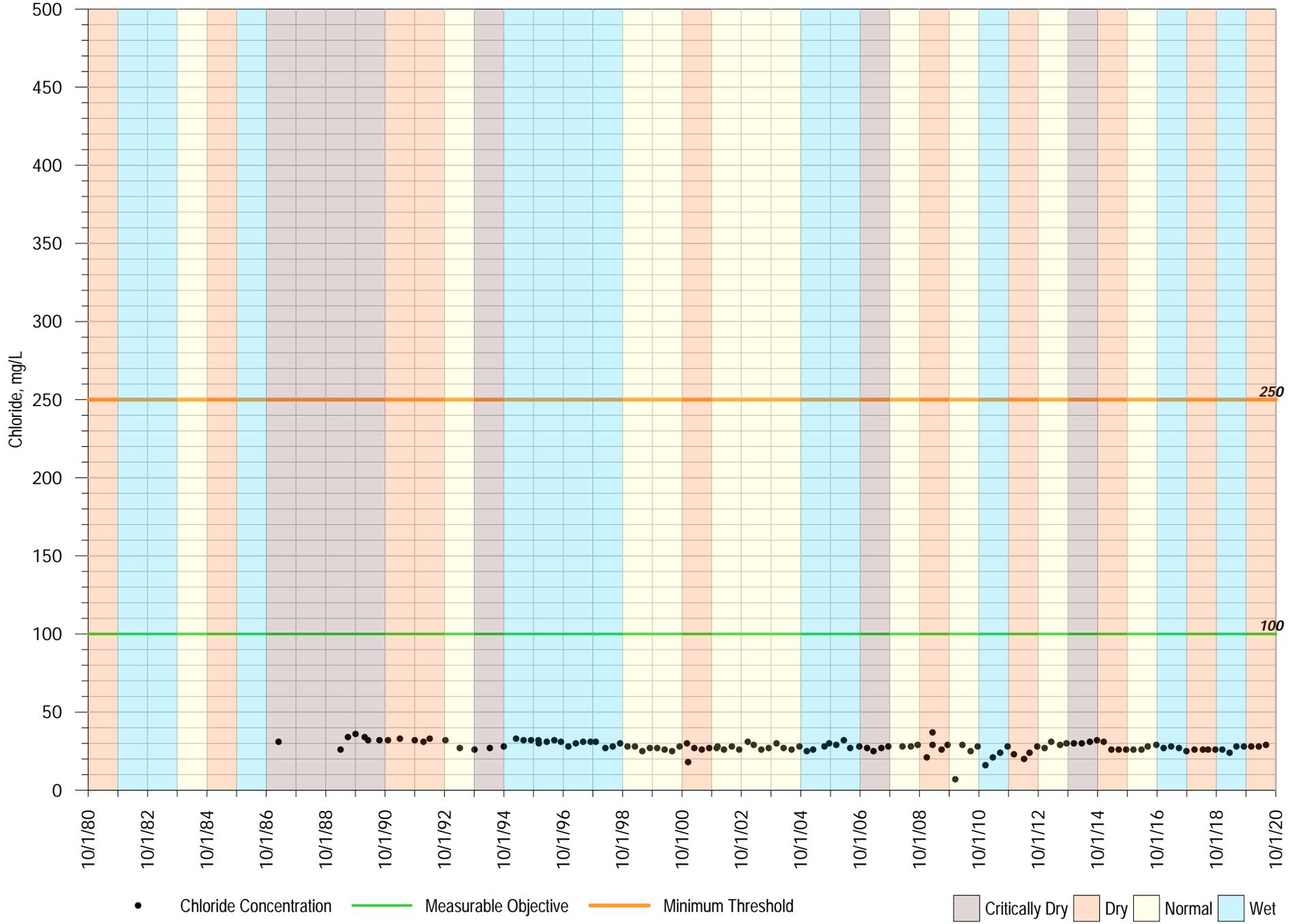
SC-A1B

FIGURE B-9



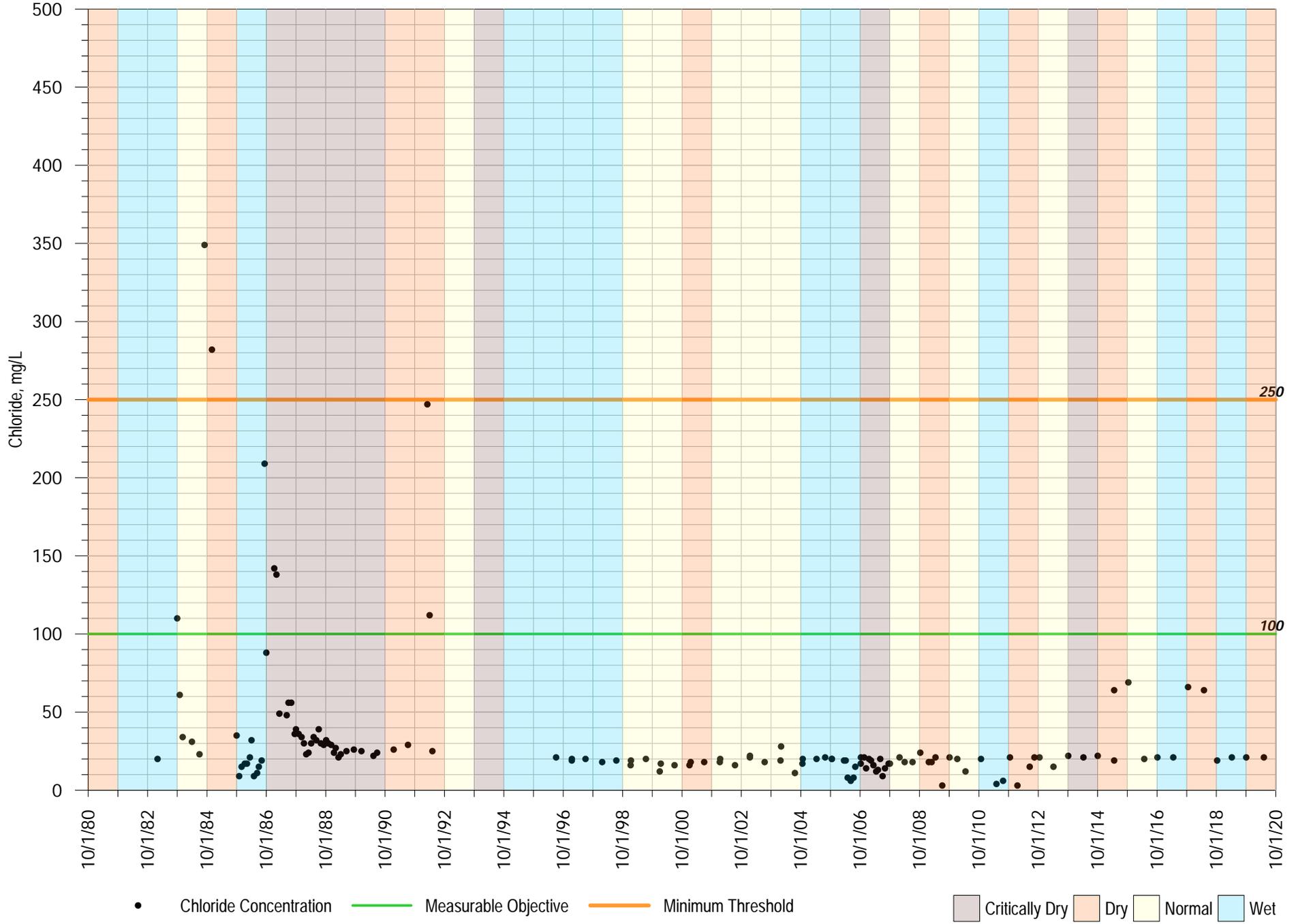
SC-A1A

FIGURE B-10



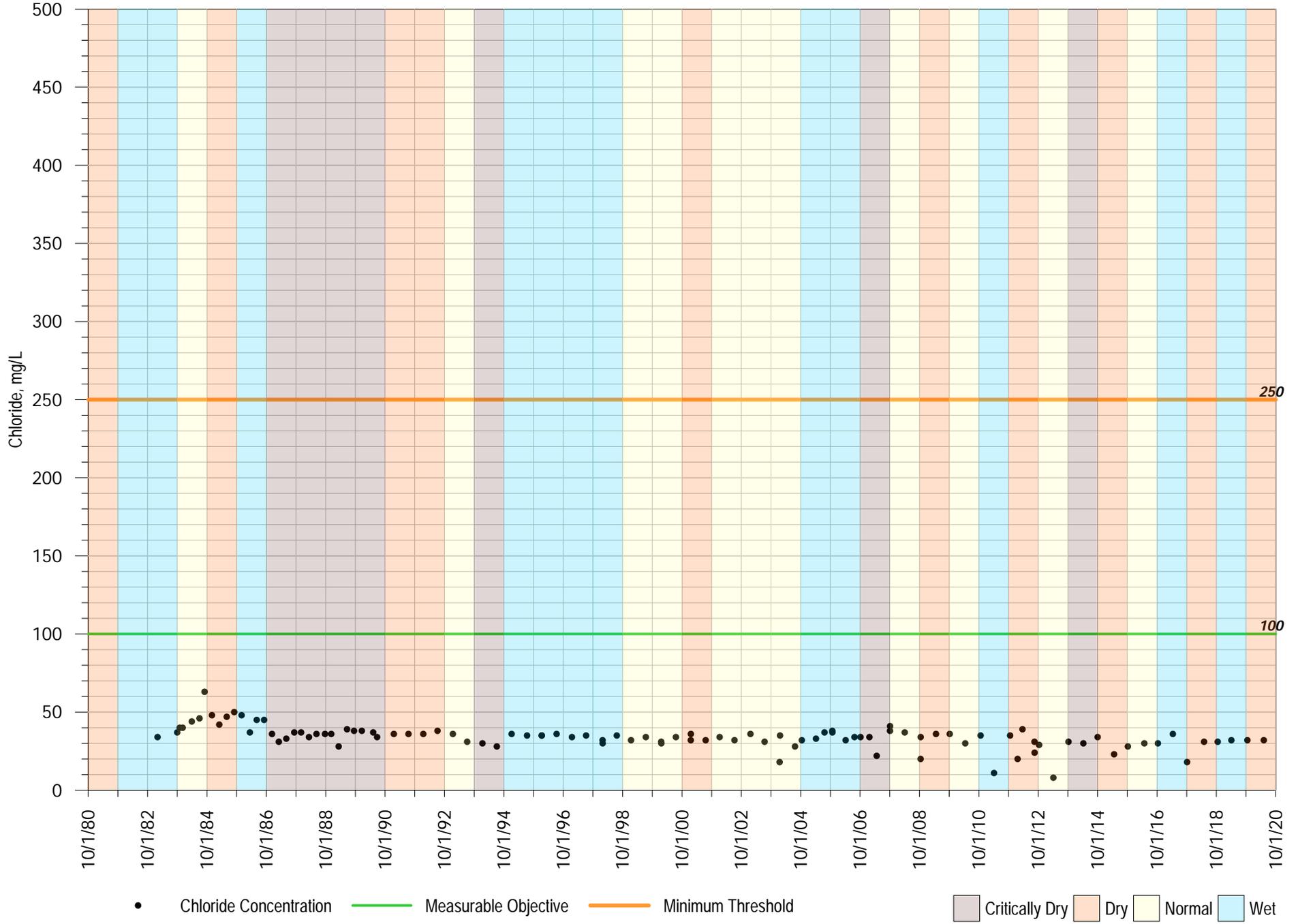
SC-8D & SC-8RD

FIGURE B-11



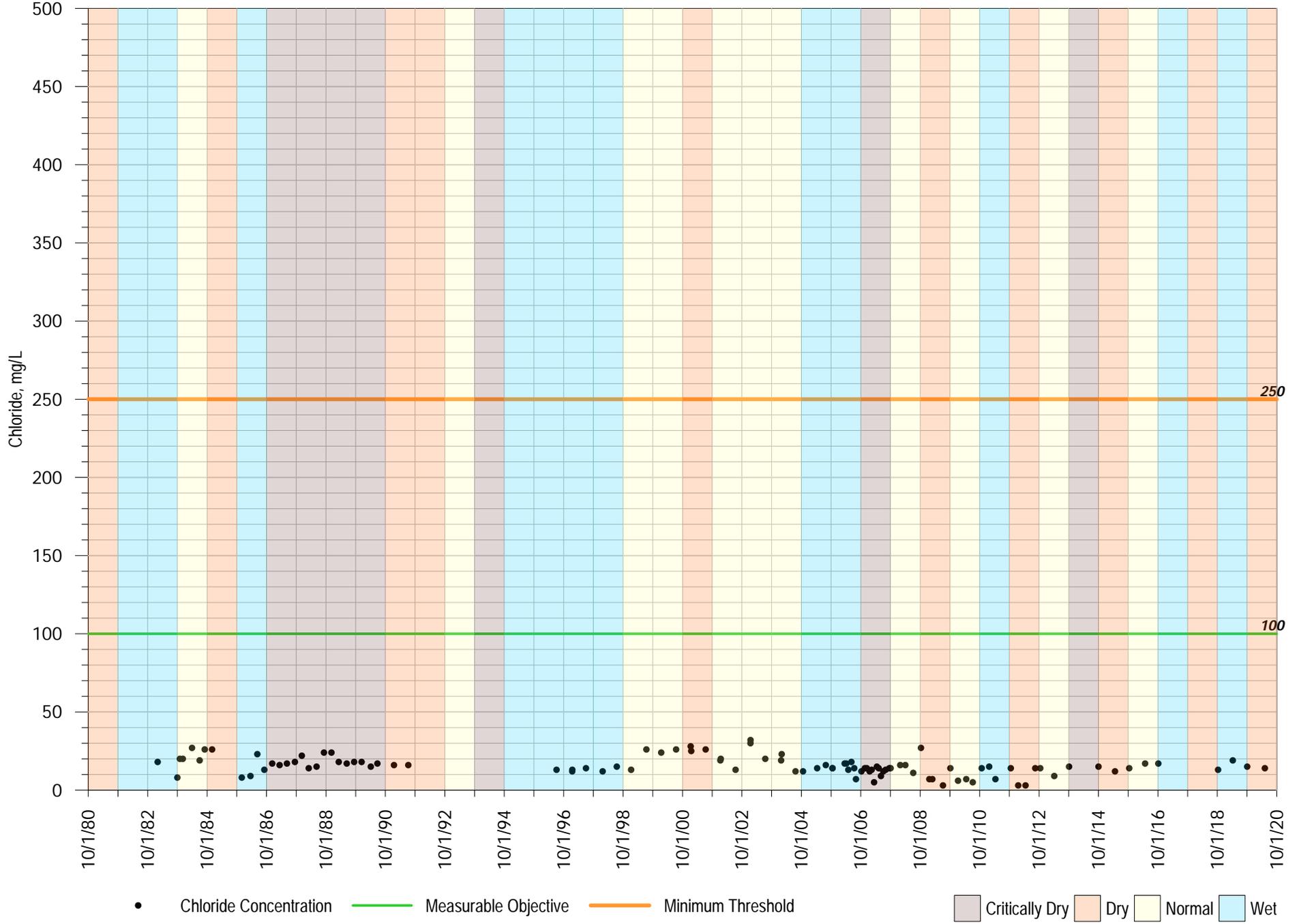
SC-9C & SC-9RC

FIGURE B-12



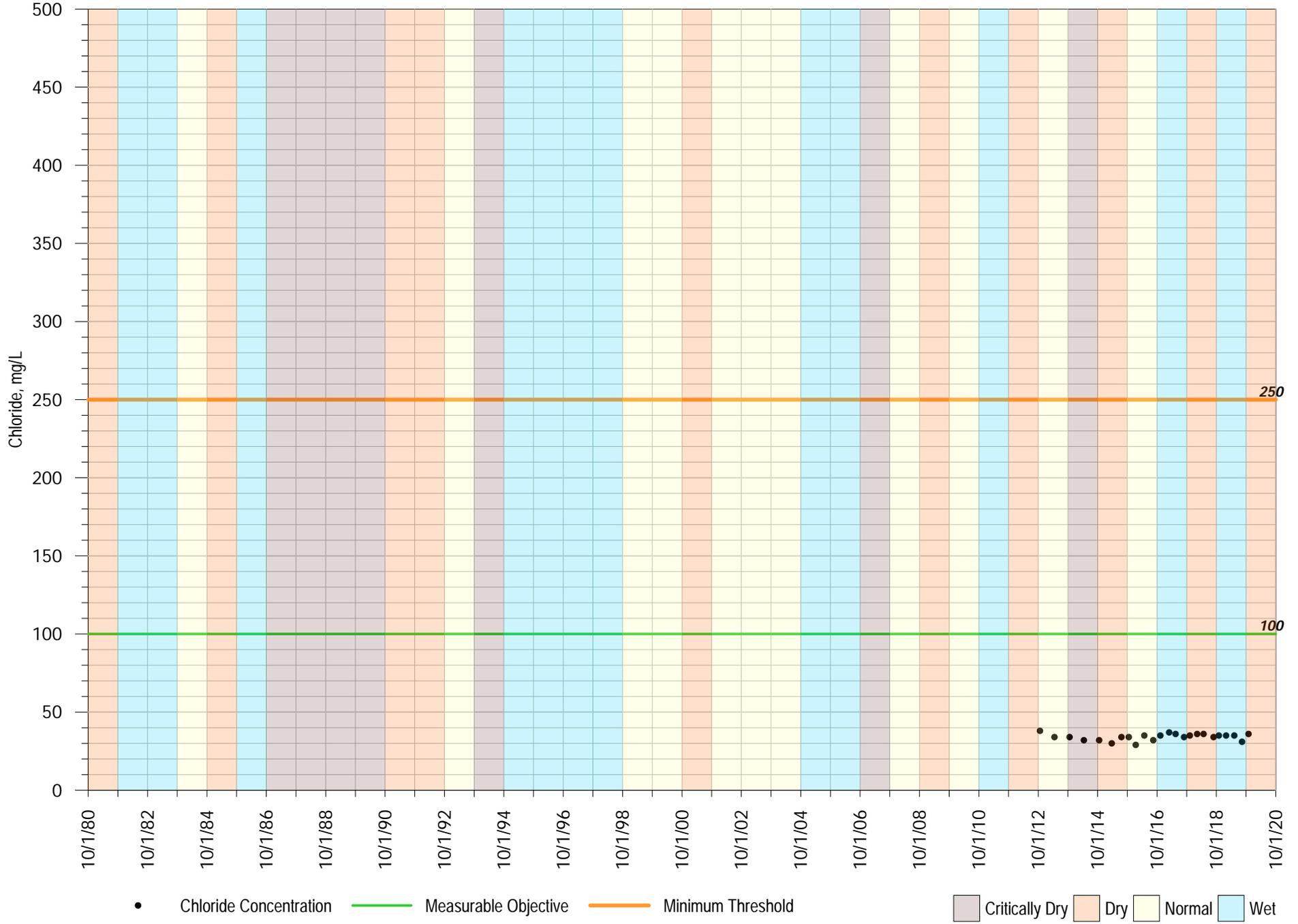
SC-8B & SC-8RB

FIGURE B-13



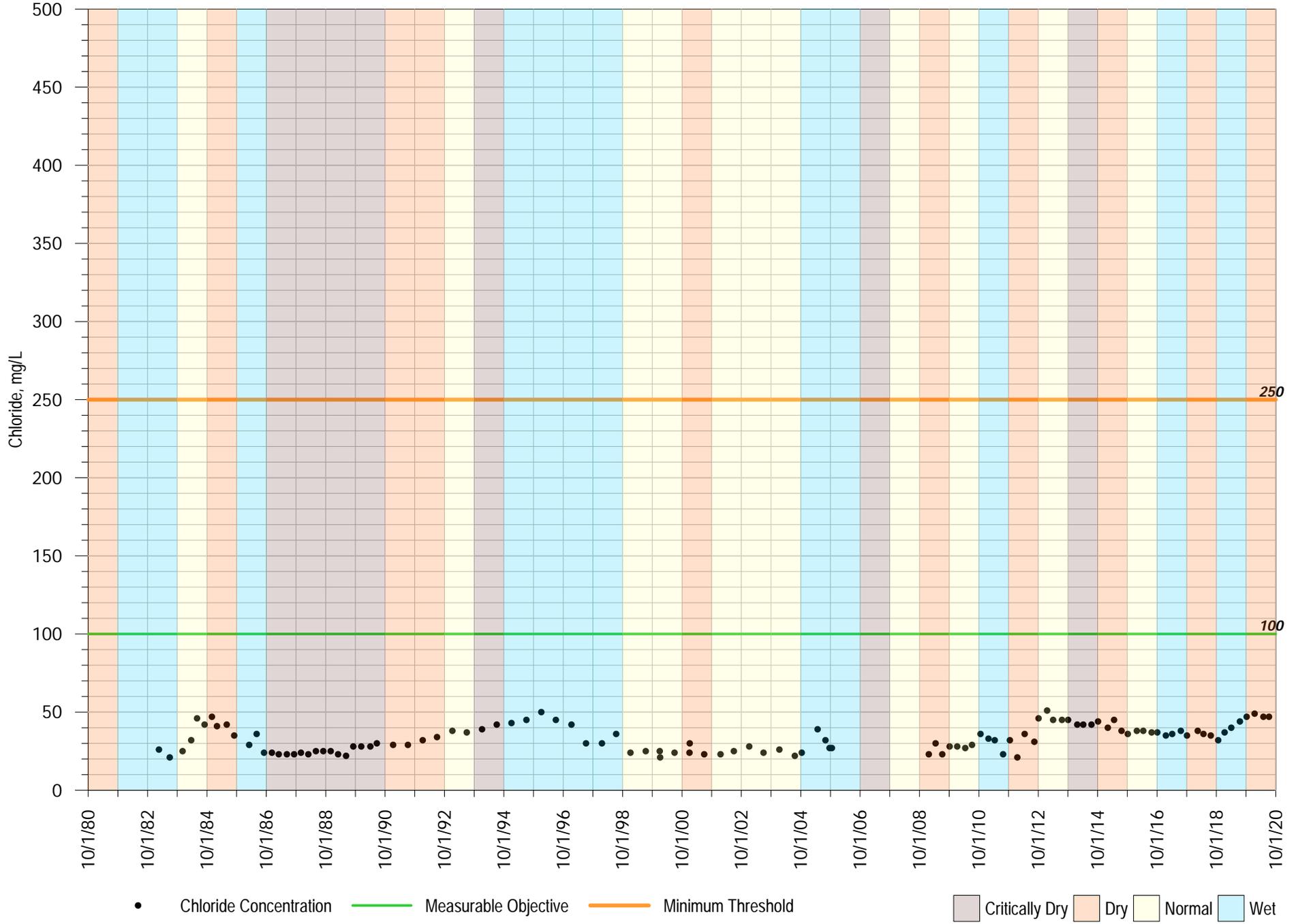
Pleasure Point Medium

FIGURE B-14



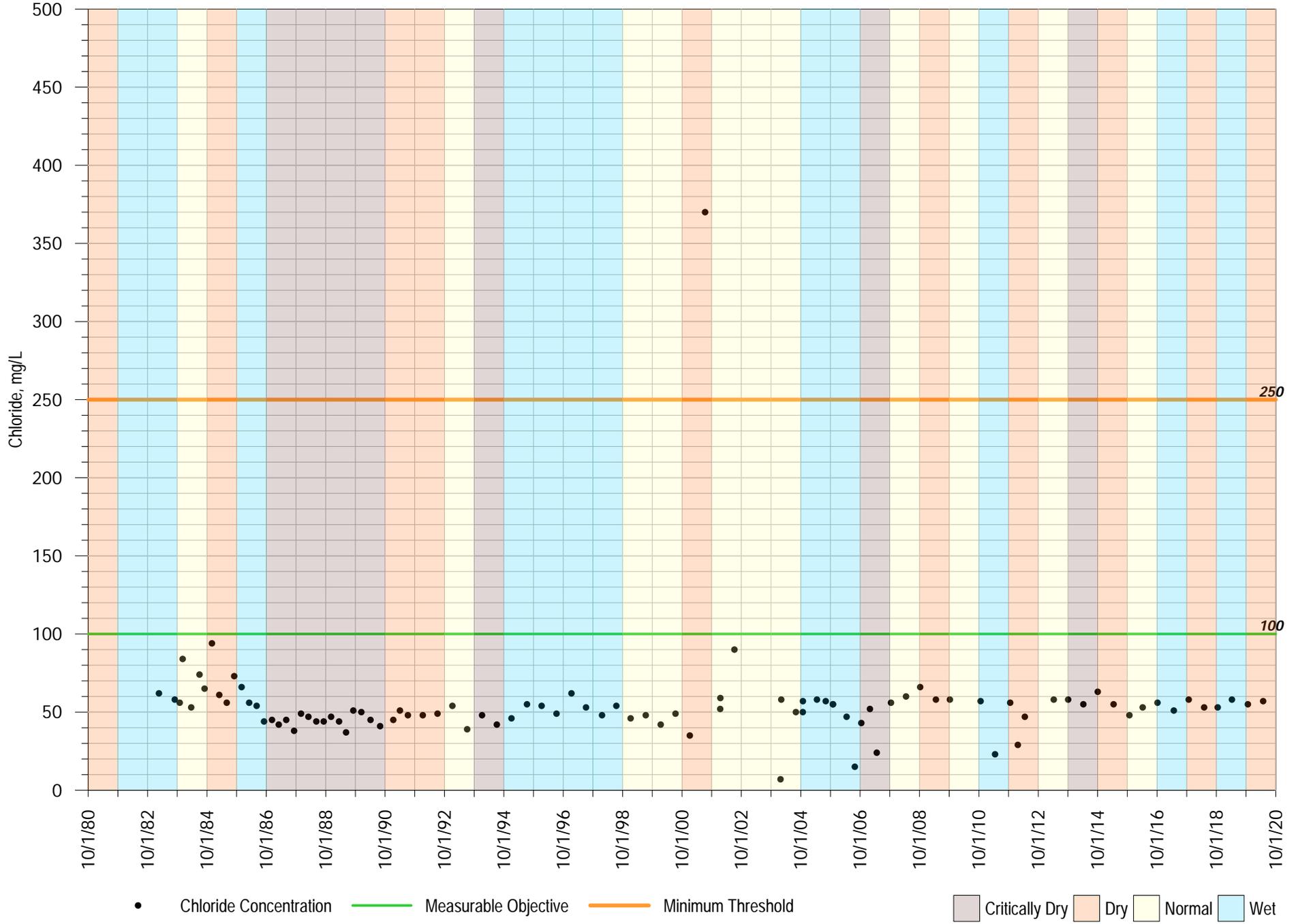
SC-1A

FIGURE B-15



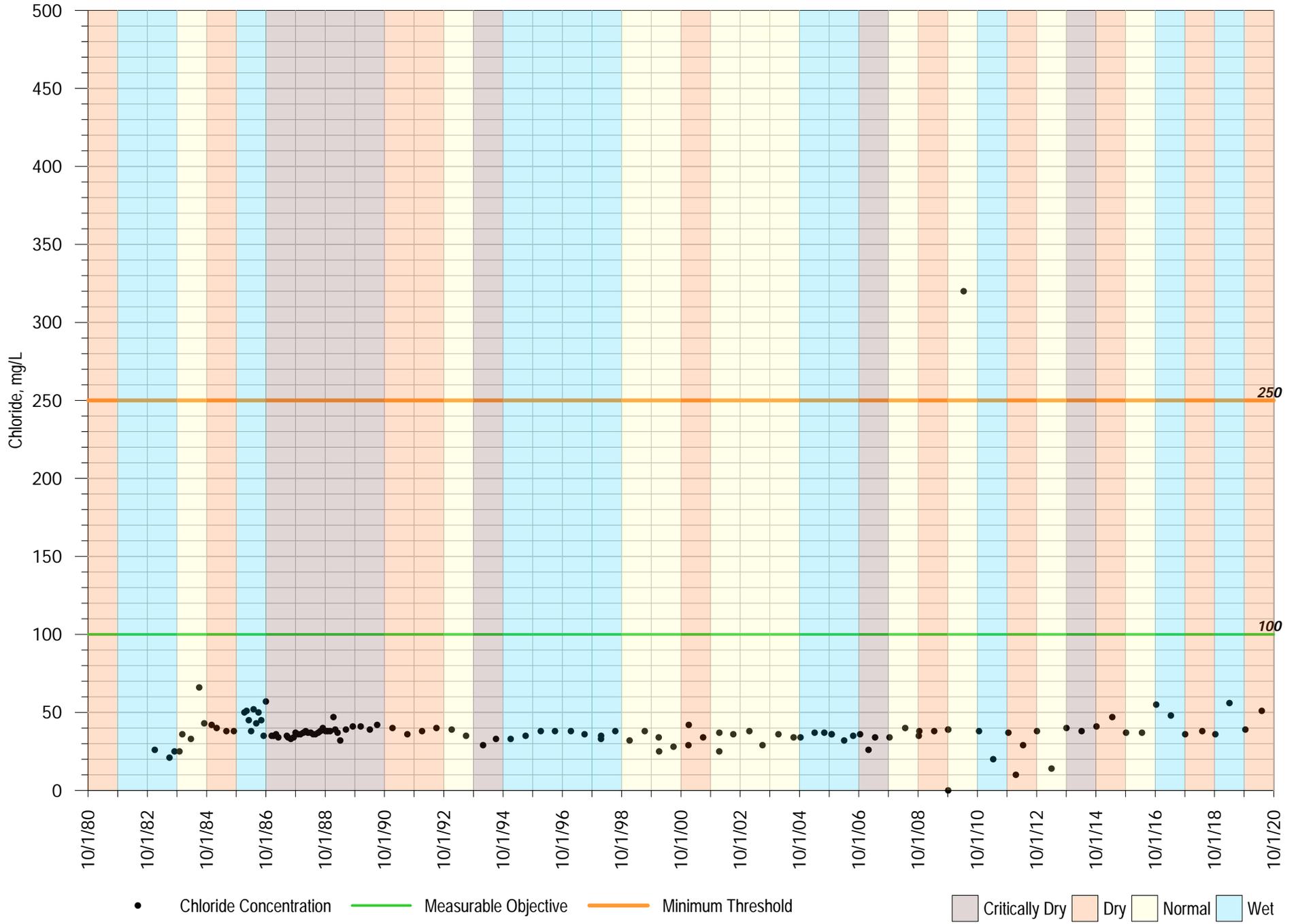
SC-5A & SC-5RA

FIGURE B-16



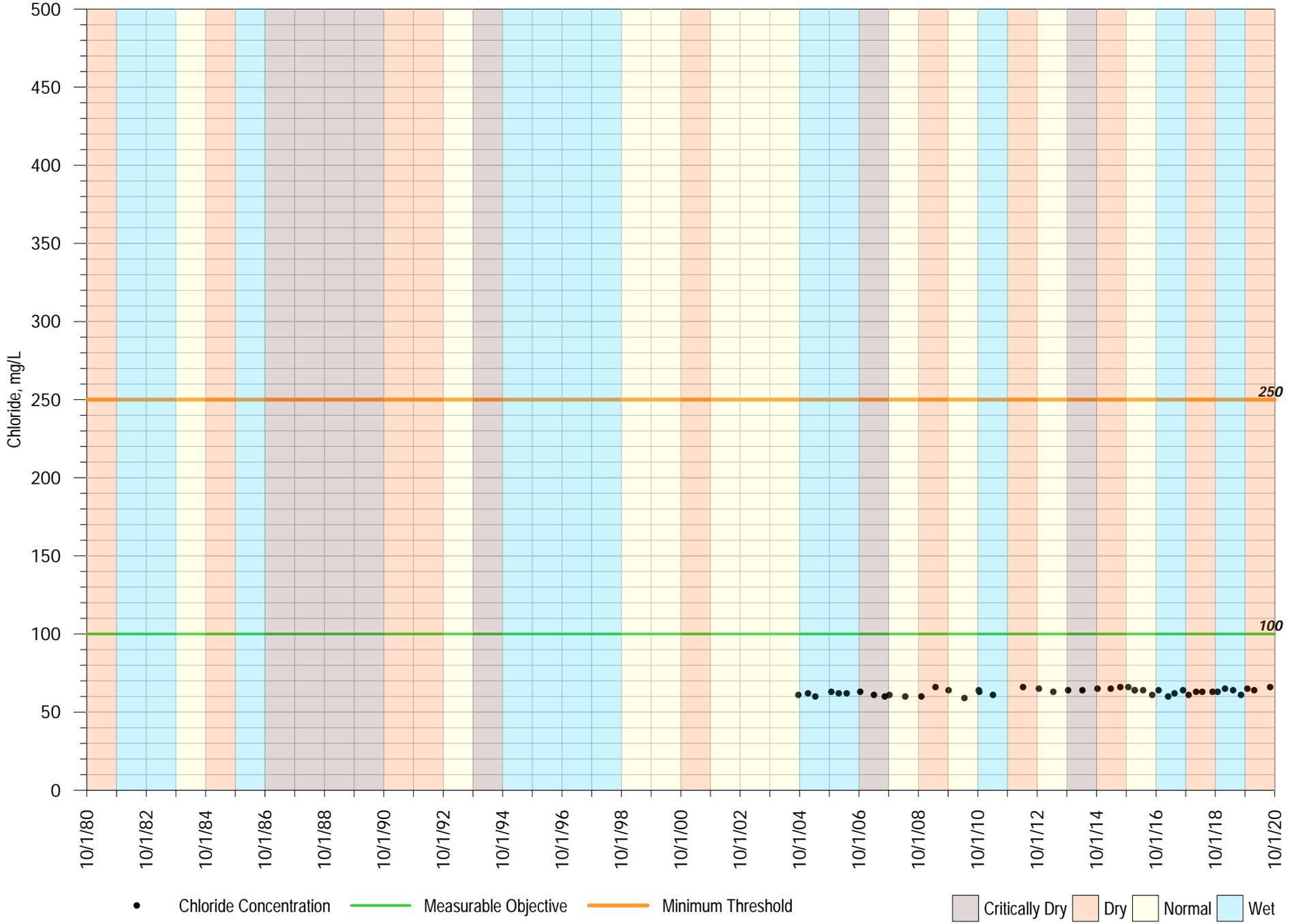
SC-3A & SC-3RA

FIGURE B-17



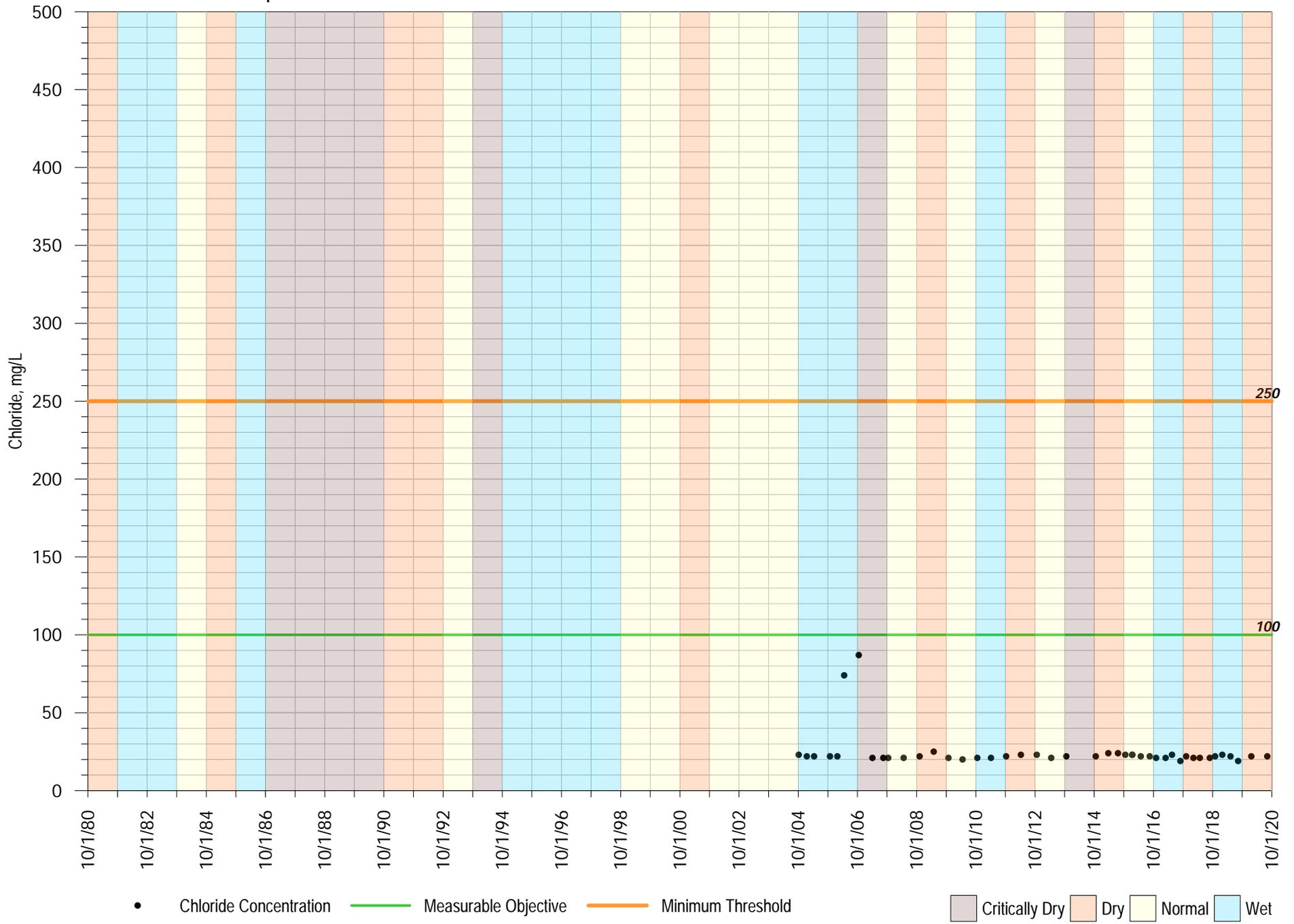
Moran Lake Deep

FIGURE B-18



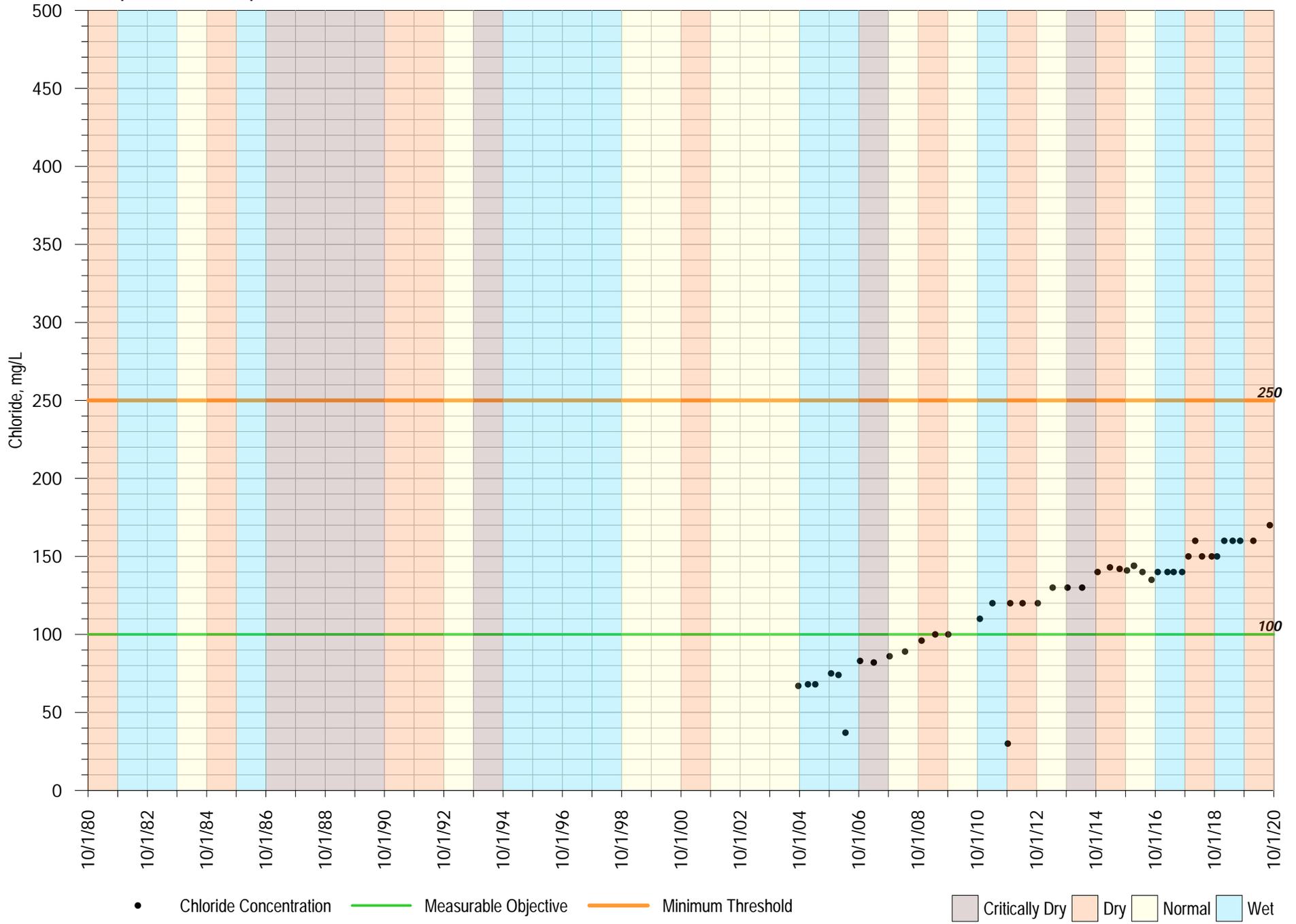
Pleasure Point Deep

FIGURE B-19



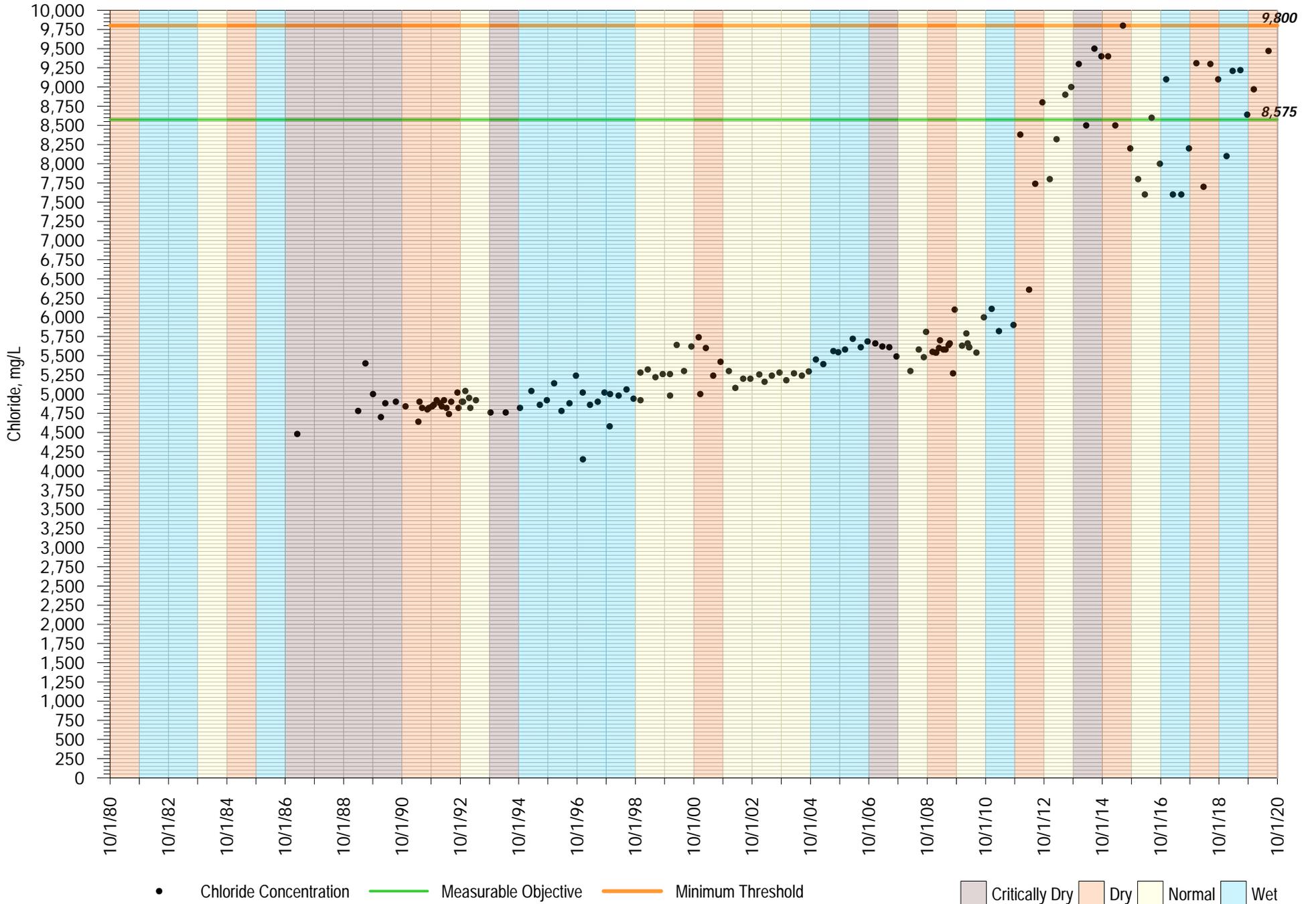
Soquel Point Deep

FIGURE B-20



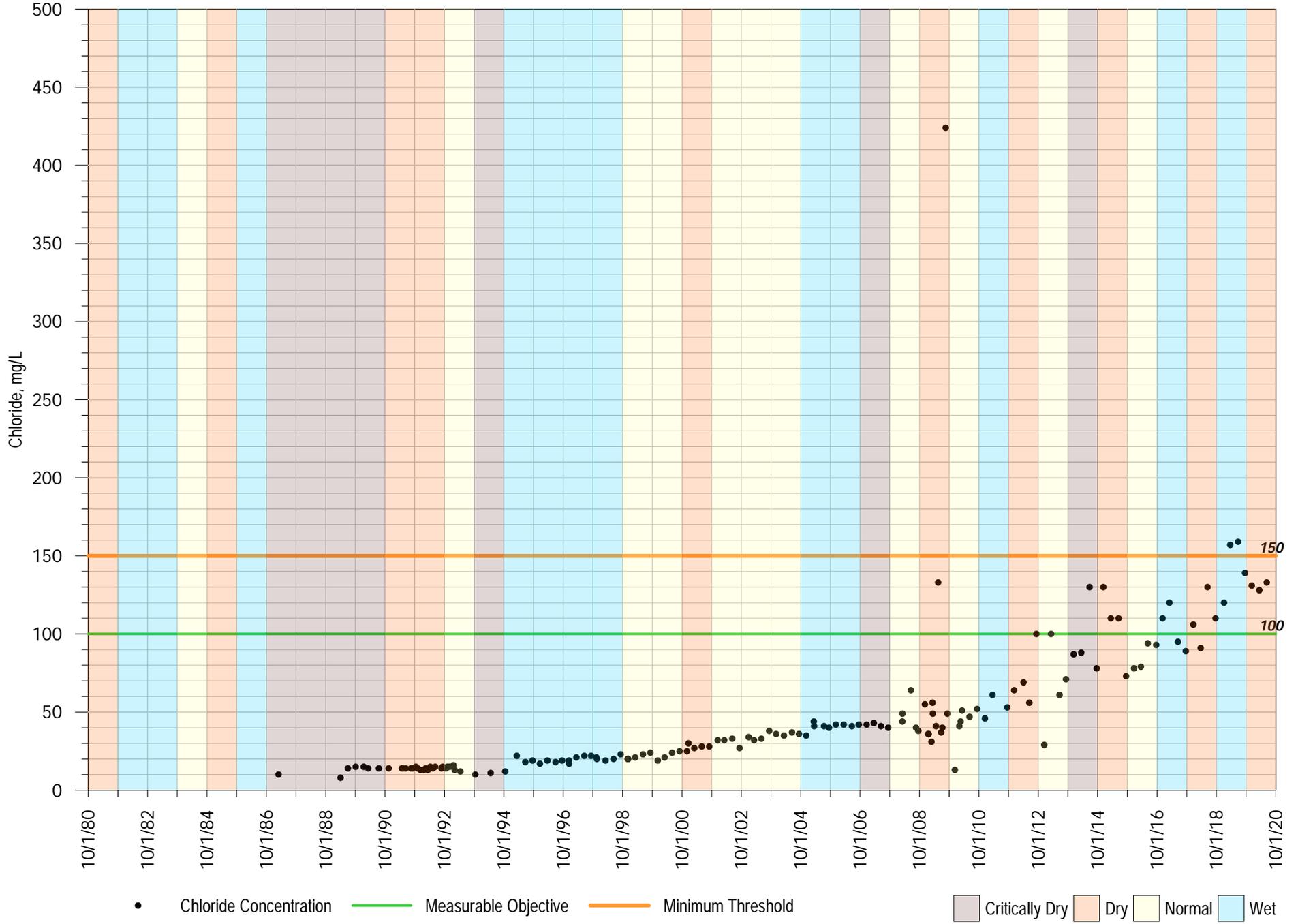
SC-A5A

FIGURE B-21



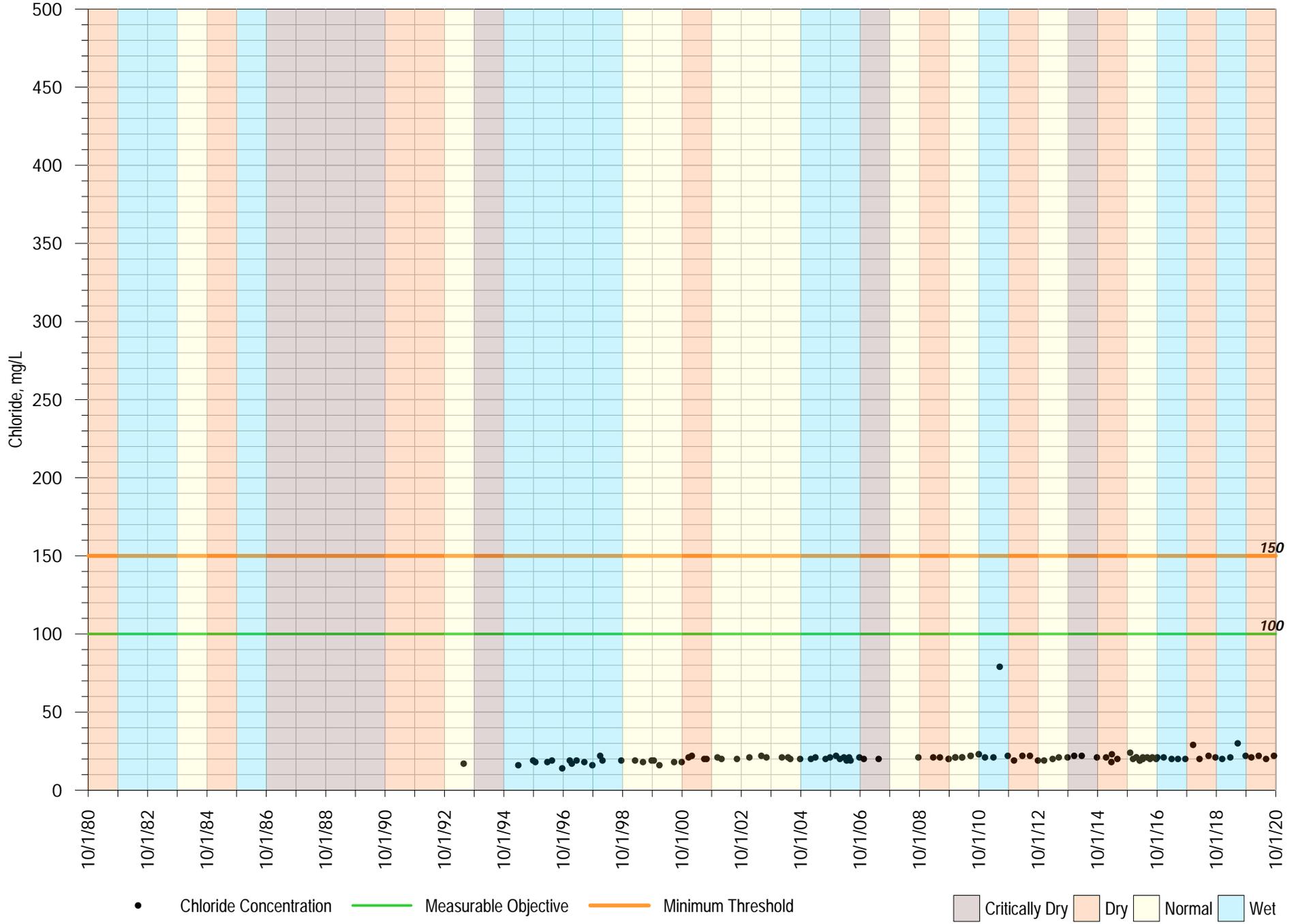
SC-A5B

FIGURE B-22



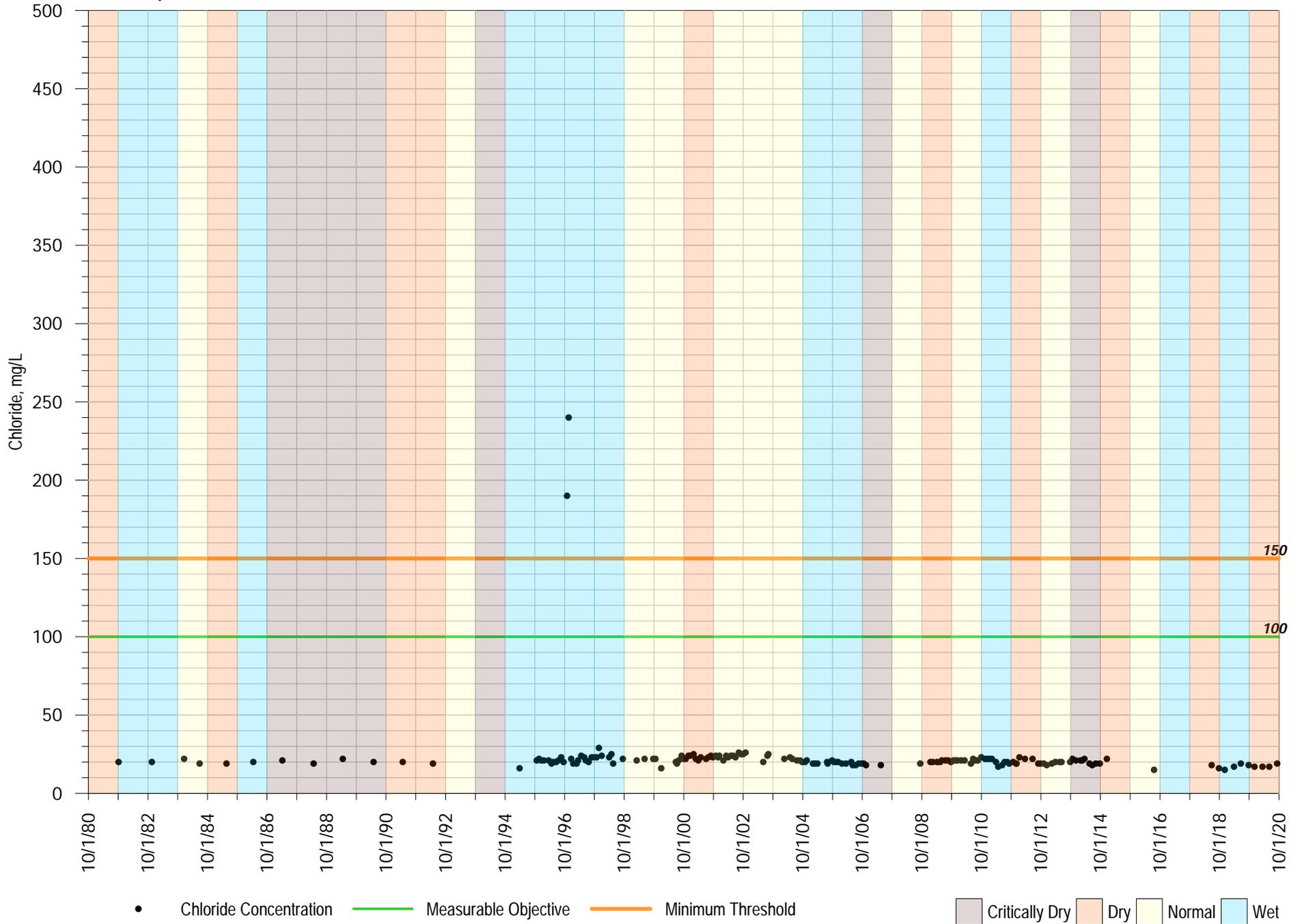
San Andreas

FIGURE B-23



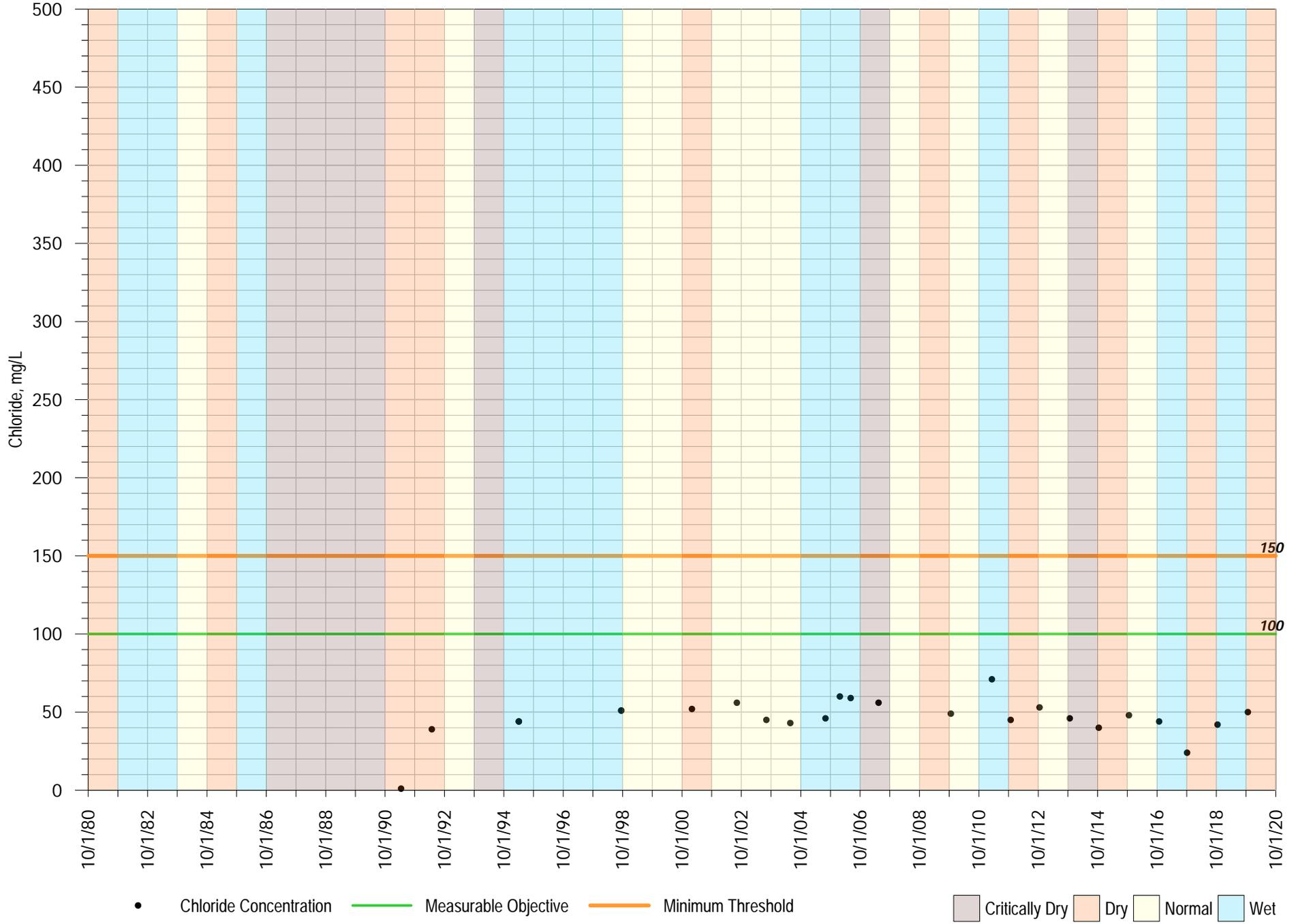
Seascape

FIGURE B-24



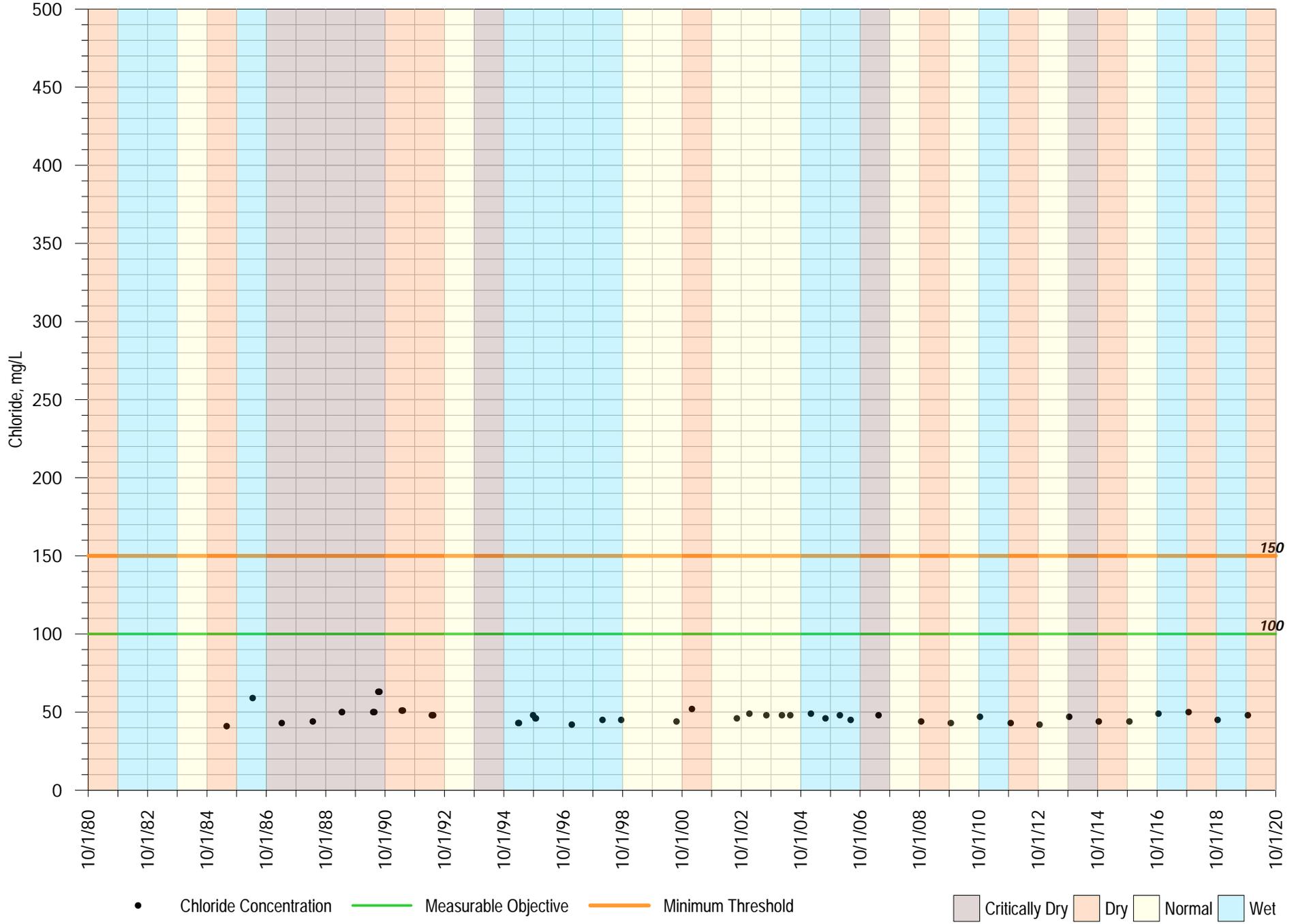
T.Hopkins

FIGURE B-25



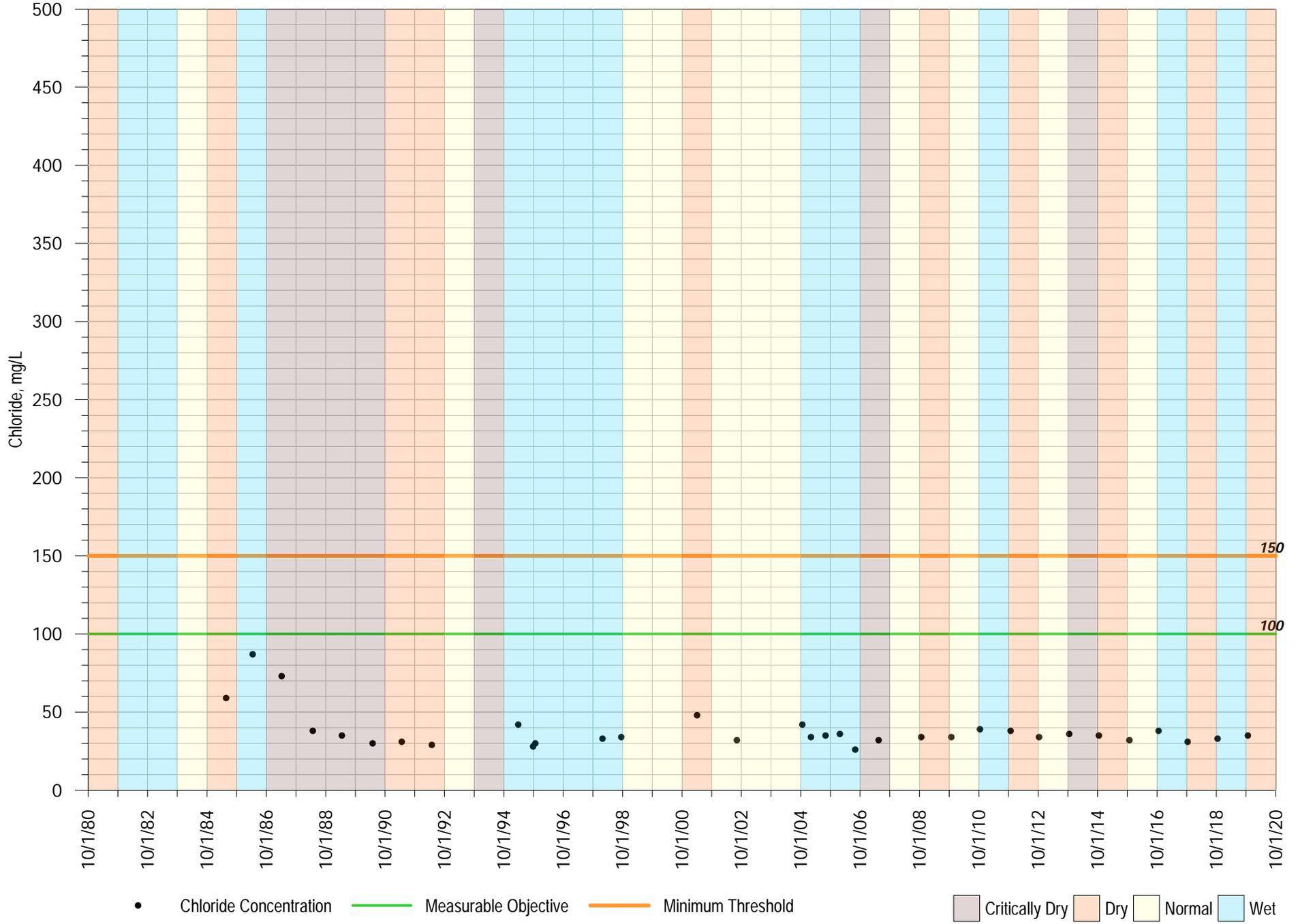
Estates

FIGURE B-26



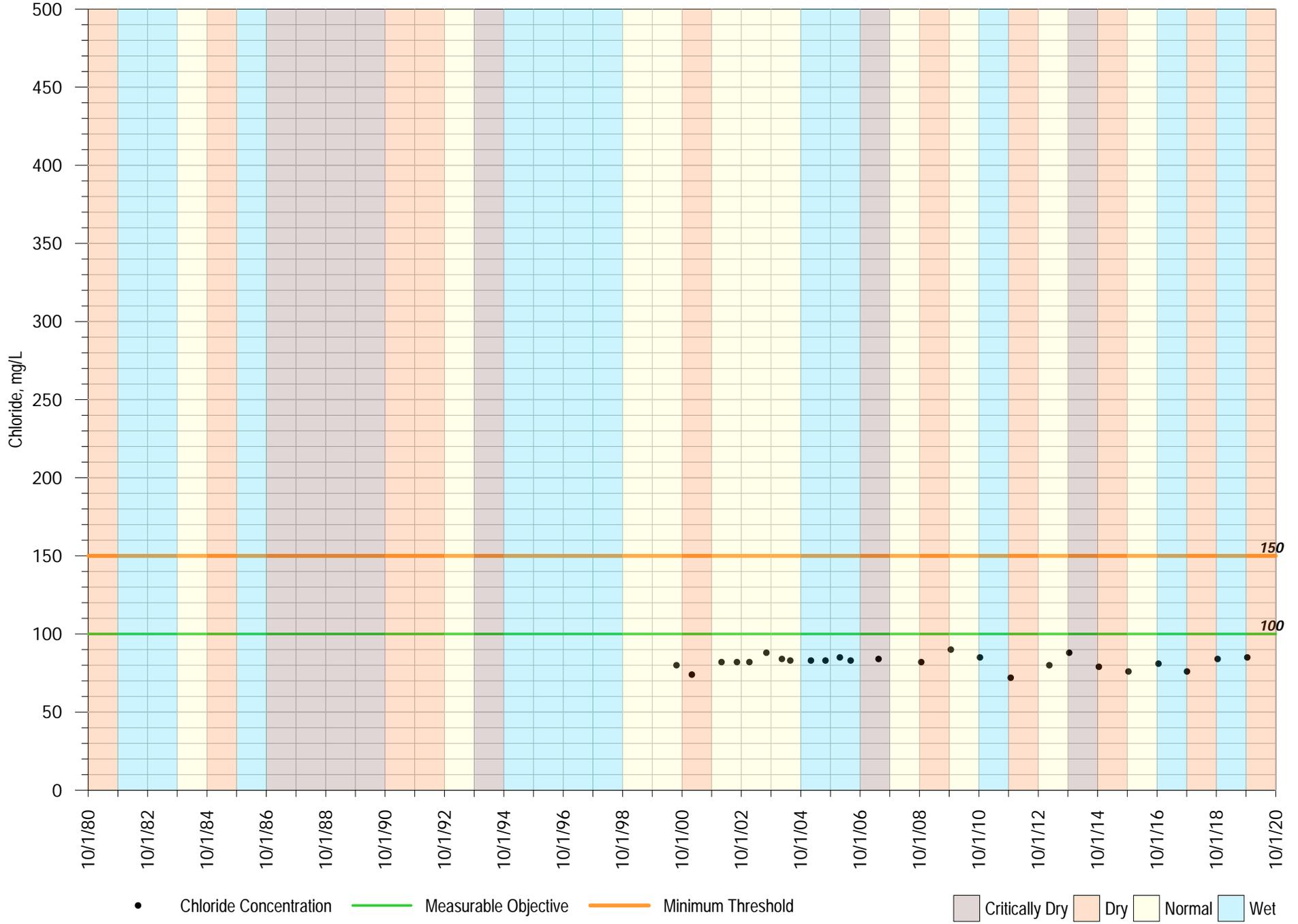
Ledyard

FIGURE B-27



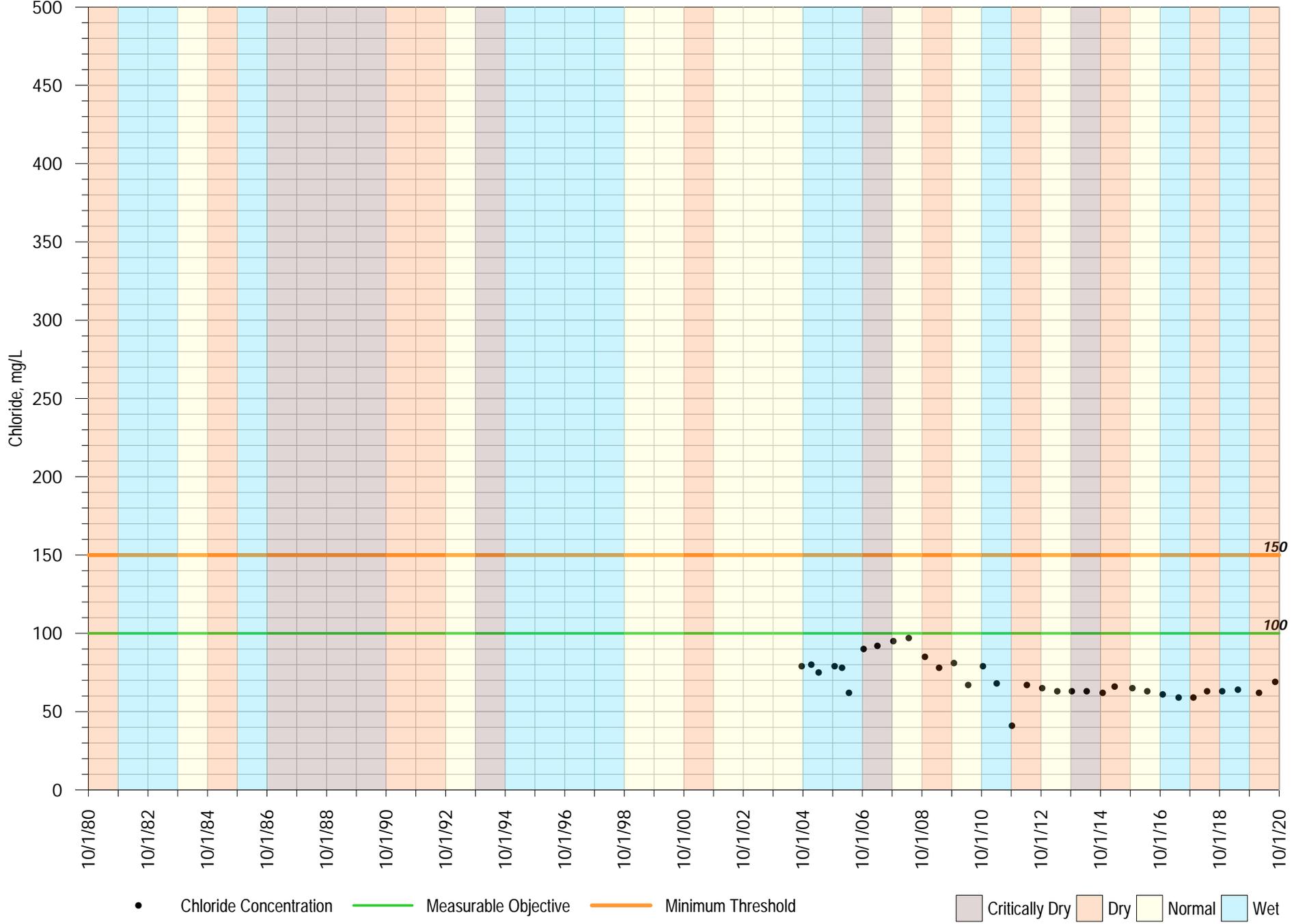
Garnet

FIGURE B-28



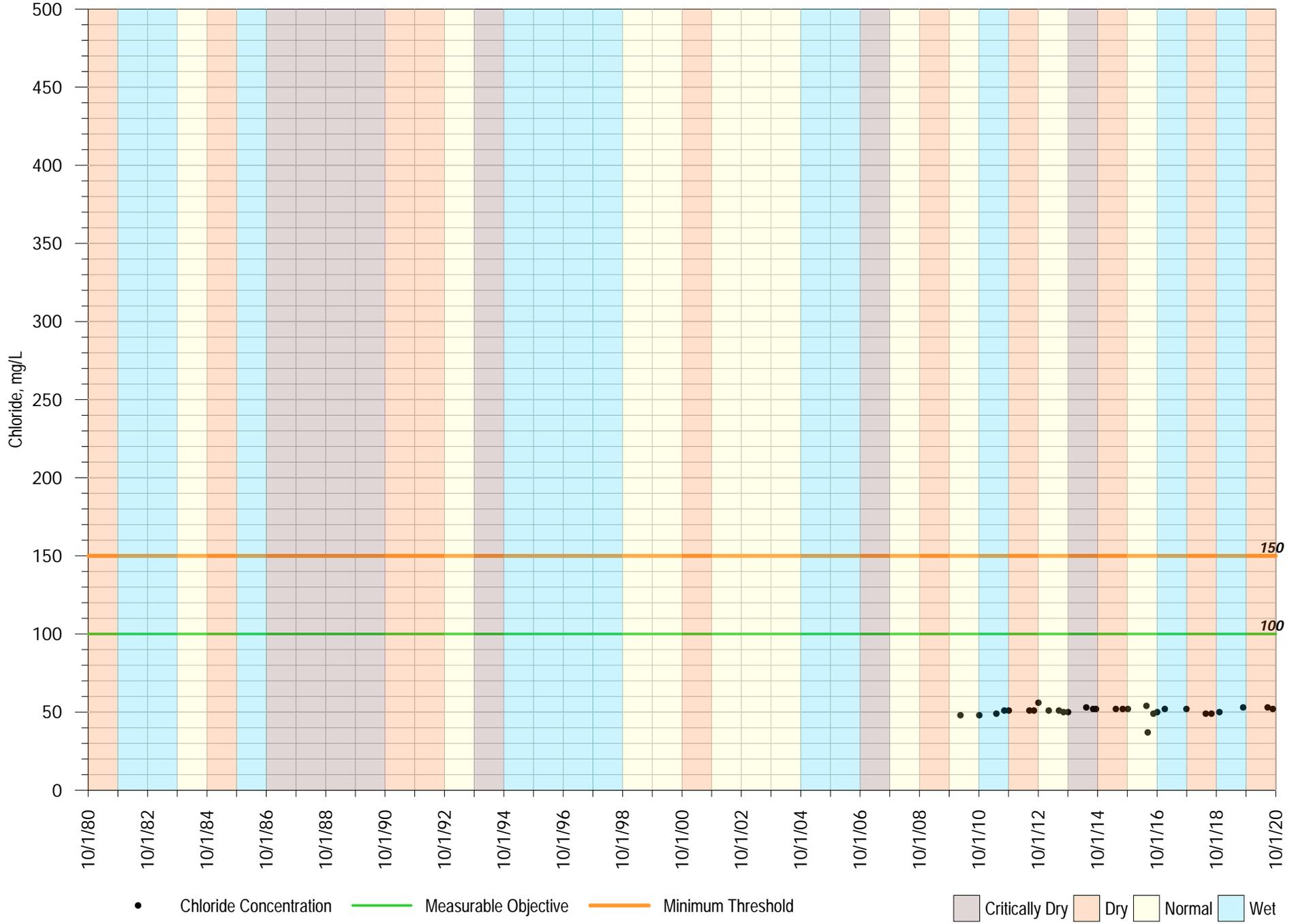
Beltz 2

FIGURE B-29



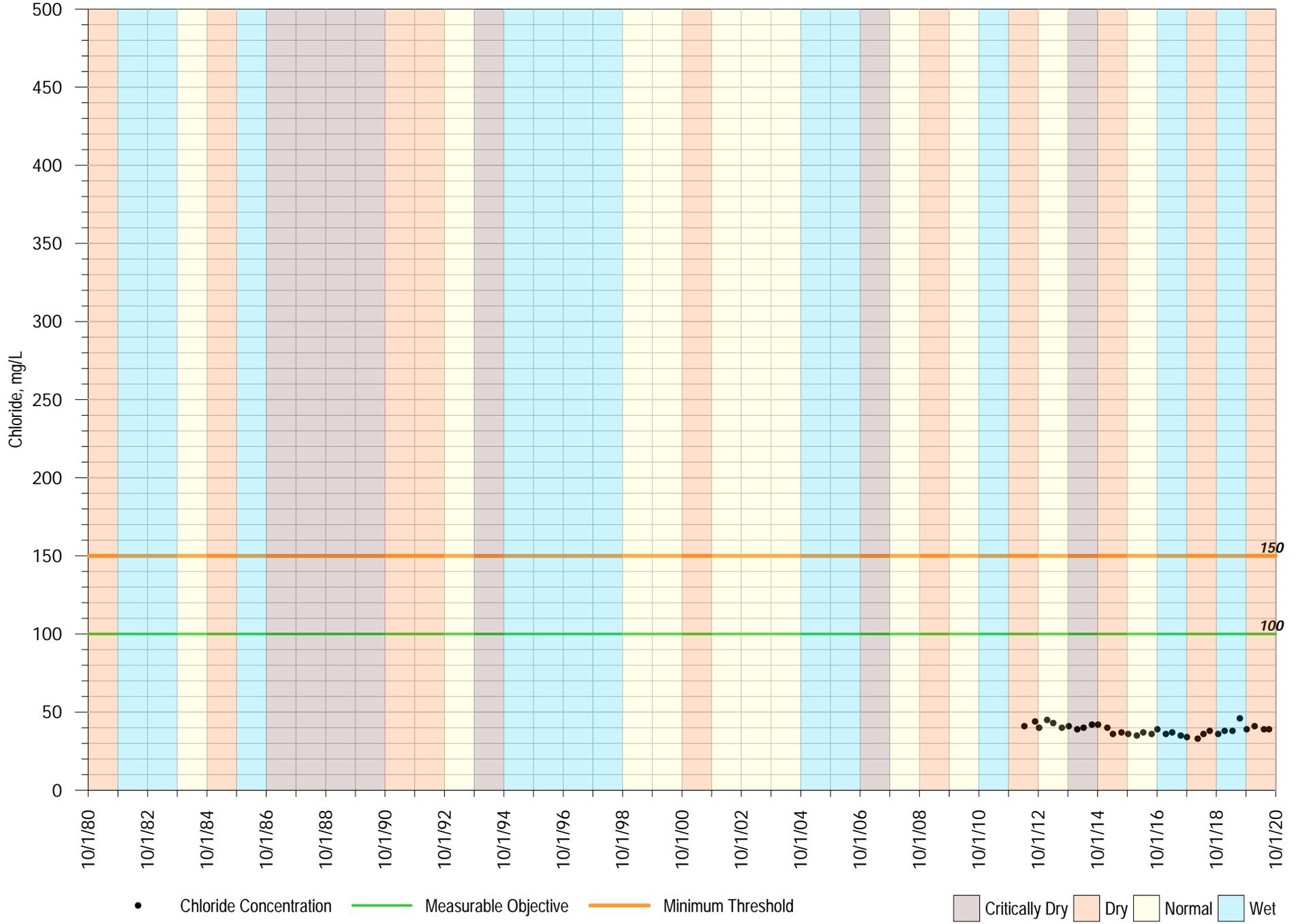
Belt 8

FIGURE B-30



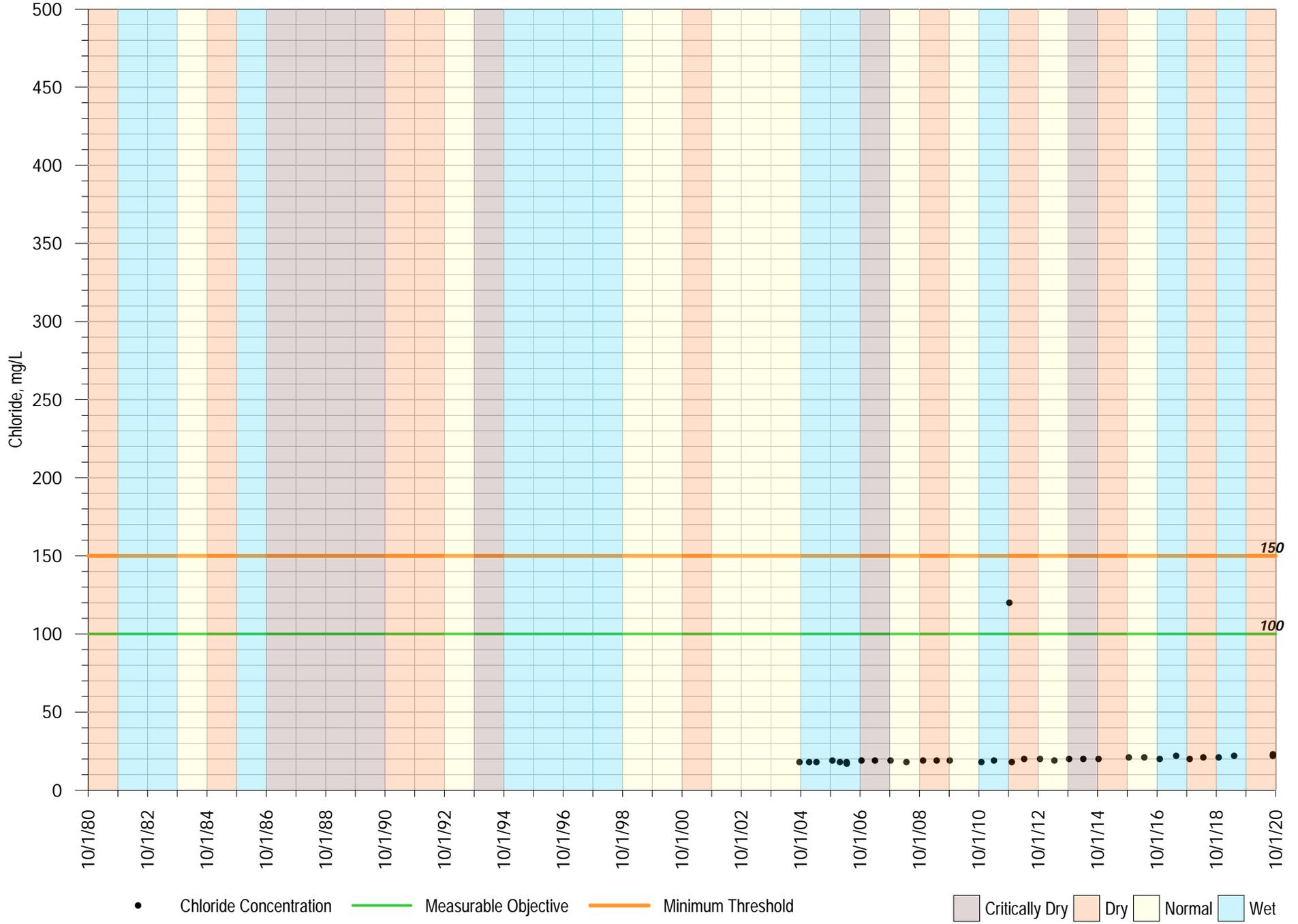
SC-22AA

FIGURE B-31



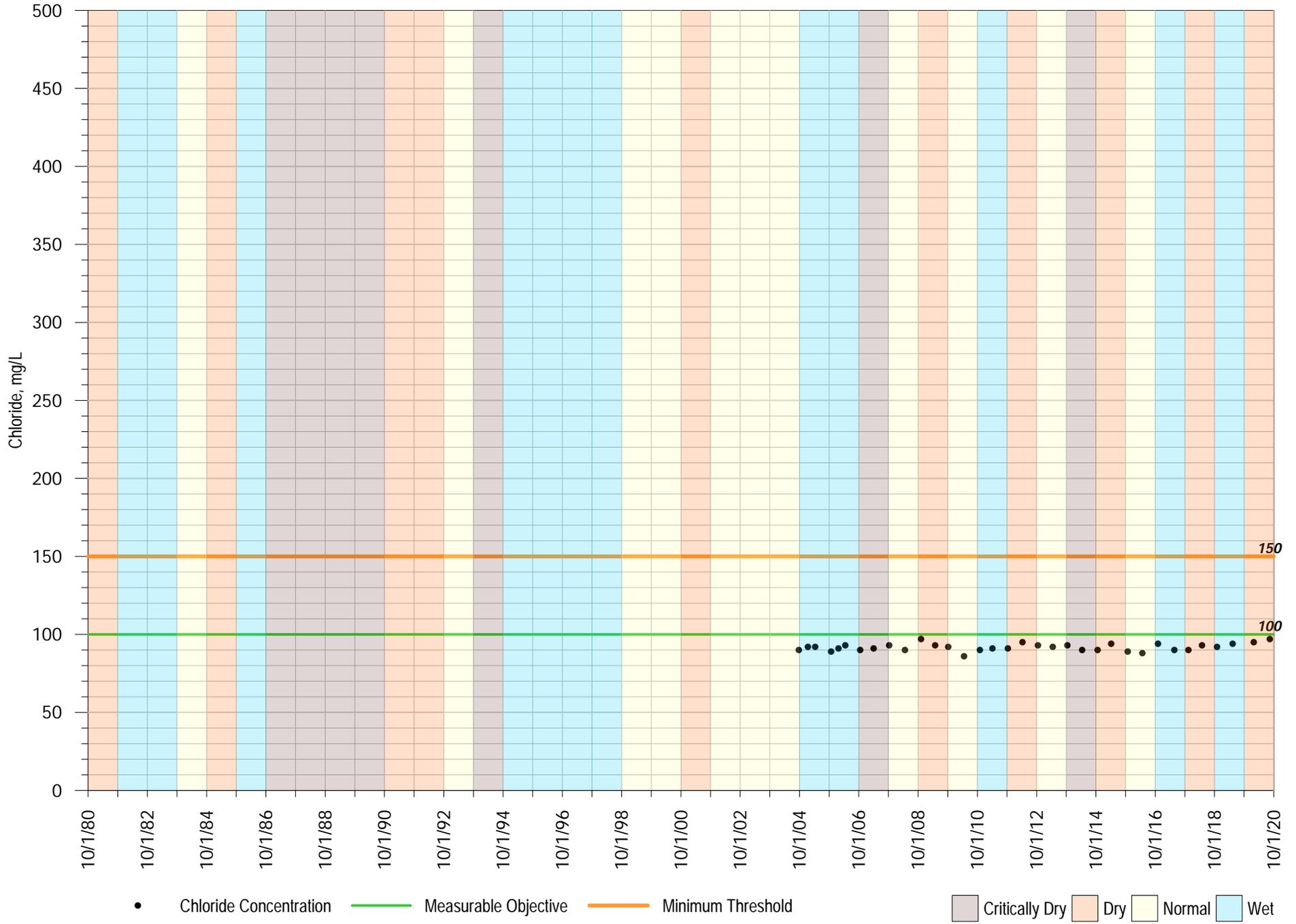
Corcoran Deep

FIGURE B-32



Schwan

FIGURE B-33



SC-22AAA

FIGURE B-34

