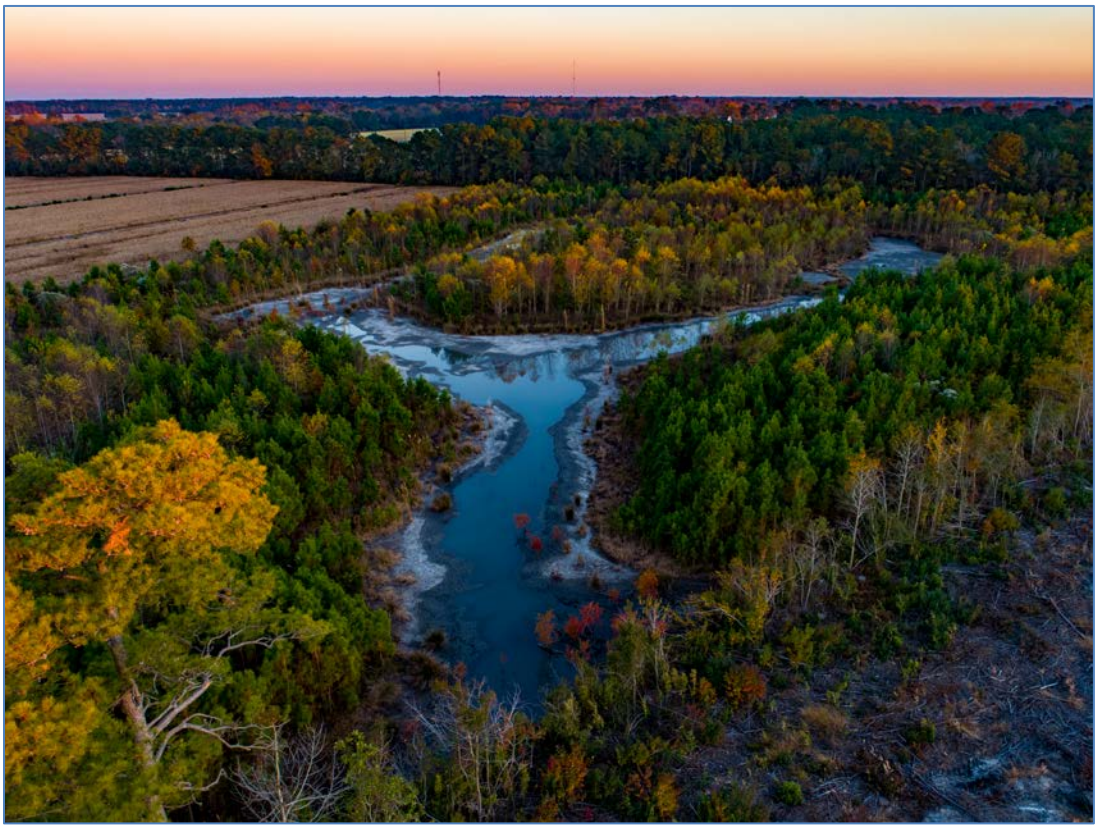
Bear Basin Restoration Site
Monitoring Report MY07
DMS Project # 95362
DMS Contract # 004741

Onslow County, NC
CU# 03030001
DWR# 2013-0456
SAW# 2012-01391



Submitted to:

NCDMS, 1652 Mail Service Center, Raleigh, NC 27699-1652

Construction Completed: February 2015
Data Collection: 2021
Submitted: February 2022

Monitoring and Design Firm

4505 Falls of Neuse Road
Suite 400
Raleigh, NC 27609
Phone: (919) 278-2514
Fax: (919) 783-9266

Project Manager: Tim Morris
Email: tim.morris@kci.com
KCI Project No: 20122266

Mitigation Services
ENVIRONMENTAL QUALITY

ROY COOPER
Governor

ELIZABETH BISER
Secretary

January 13, 2022

Sent via email: Tommy Seelinger

Tommy Seelinger
KCI Associates, Inc.

Subject: DMS Comments
Bear Basin, Project ID #95362 DMS Contract #4741

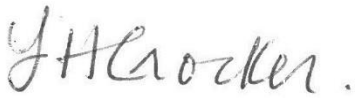
Tommy,

After receiving the MY7 draft report, DMS offers the following comments:

1. The report states that treatment of the pines is "planned." Specify when that occurred and/or when does KCI propose it to occur (what month, what areas, please more details of treatment).
2. Show the areas of treatment / proposed for treatment on CCPV map and visual assessment table.
3. The gauges that are not meeting present concerning data for MY7 and indicate credit risk, along with the areas of inundation that do not support vegetation. A suggestion may be to evaluate the data using a more modern growing season or field evaluate the soils in the fringe areas that have historically shown borderline success rates (along ditch zone of influence) and gages that have difficulty meeting success.
4. A recommendation that KCI provide color coding on the gage success table for clarity.
5. Hight data was a required MY7 closeout requirement. Provide table of planted stem height average by plot or describe how KCI plans to justify that performance standard.
6. Please explain why some of the gages were reinstalled early March 2021.
7. Confirm that KCI is not proposing this site for close out in 2022 and provide plans for future close out in response letter and/or report narrative (update final sentence in hydrology results narrative to explain game plan for close out).

To date, KCI was paid for 68.8% of the contract, equivalent to 6.880 WMU. The IRT has released 77.5% of the proposed assets, equivalent to 6.665 WMUs. DMS will withhold payment until IRT determines close out credits.

Thanks for your work,



Lindsay Crocker, DMS

KCI ASSOCIATES OF NORTH CAROLINA, PA

ENGINEERS • SCIENTISTS • SURVEYORS • CONSTRUCTION MANAGERS

4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 (919) 783-9214 (919) 783-9266 Fax

MEMORANDUM

Date: January 31, 2022
To: Lindsay Crocker, DMS Project Manager
From: Tim Morris, Project Manager
KCI Associates of North Carolina, PA
Subject: MY-07 Monitoring Report Comments
Bear Basin DMS#95362, Contract 004741
White Oak River Basin CU 03030001
Onslow County, North Carolina

Please find below our responses in italics to the MY-07 Monitoring Report comments from NCDMS received on January 13, 2022, for the Bear Basin Wetland Restoration Site.

1. The report states that treatment of the pines is "planned." Specify when that occurred and/or when does KCI propose it to occur (what month, what areas, please more details of treatment).
KCI Response: The pine treatment is scheduled for February 2022 and will include the area between the western easement boundary and the open water area as well as an area just to the north of the open water area (a total of approximately 3 acres). A polygon representing this area has been added to the CCPV. Treatment will consist of hand cutting all loblolly pine within the treatment area.

2. Show the areas of treatment / proposed for treatment on CCPV map and visual assessment table.
KCI Response: This change has been made

3. The gauges that are not meeting present concerning data for MY7 and indicate credit risk, along with the areas of inundation that do not support vegetation. A suggestion may be to evaluate the data using a more modern growing season or field evaluate the soils in the fringe areas that have historically shown borderline success rates (along ditch zone of influence) and gages that have difficulty meeting success.
KCI Response: KCI believes that all of the evidence points to the pine trees as being responsible for the concerning gauge data. Adjusting the growing season produces minimal change in success and the soils across the site show fairly uniform evidence of wetland hydrology, even in the areas near the ditches. There were 13 unsuccessful gauges across the first 4 monitoring years (2015 – 2018), while there were 27 unsuccessful gauges across the final 3 years (2019-2021). This extreme drop in the rate of gauge success coincided with the large scale colonization of the site by loblolly pines in 2019. It is believed that an additional year of monitoring after the pines are removed will demonstrate a similar rate of success as was seen in the first four monitoring years.

4. A recommendation that KCI provide color coding on the gage success table for.
KCI Response: This change has been made.

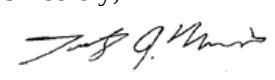
5. Height data was a required MY7 closeout requirement. Provide table of planted stem height average by plot or describe how KCI plans to justify that performance standard.
   KCI Response: This data has been added to the report. The average height across all seven plots was 12.3 feet.

6. Please explain why some of the gages were reinstalled early March.
   KCI Response: Several of the gauges had their batteries die between the last download of 2020 and the first download of 2021 and so were reinstalled.

7. Confirm that KCI is not proposing this site for close out in 2022 and provide plans for future close out in response letter and/or report narrative (update final sentence in hydrology results narrative to explain game plan for close out).
   KCI Response: KCI is not proposing this site for close out in 2022. KCI proposes to discontinue vegetation monitoring but to continue hydrology monitoring for an additional year to track the effect that the removal of the pines has on the water table. A discussion of this has been added to the report.

Please contact me if you have any questions or would like clarification concerning these responses.

Sincerely,



Tim Morris
Project Manager

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Appendix B – Visual Assessment Data

Appendix C – Vegetation Plot Data

Appendix D – Hydrologic Data

1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

The Bear Basin Restoration Site (BBRS) is a full-delivery project that was developed for the North Carolina Division of Mitigation Services (DMS). Construction was completed in February 2015. The site is within the 03030001 Watershed Cataloging Unit (8-digit HUC) and the Local Watershed Unit (14-digit HUC) 03030001010010. In DMS' most recent publication of excluded and Targeted Local Watersheds/Hydrologic Units, the 03030001010010 14-digit HUC has been identified as a Targeted Local Watershed.

The project site, which is protected by an 11.9-acre permanent conservation easement held by the State of North Carolina, is situated in Onslow County in the Carolina Flatwoods ecoregion of the Coastal Plains physiographic province. The site is located on a single parcel located off of Jesse Williams Road approximately five miles west of Richlands, North Carolina.

The project goals and objectives are listed below.

Project Goals

- Protect and improve water quality by reducing sediment and nutrient inputs
- The protection of a watershed draining into shellfish harvesting waters
- Provide habitat for aquatic flora and fauna by improving physical structure and vegetative composition
- Increase the local hydroperiod by encouraging both surface and subsurface storage and retention
- Restore and establish a functional and diverse wetland community

Project Objectives

- Fill field ditches to restore surface flow retention and elevate local groundwater levels.
- Redevelop longer wetland flow patterns to increase surface flow retention time.
- Restore a diverse wetland vegetation community through maintenance and germination of existing wetland seed stores, planting of wetland trees and shrubs, and incorporation of a custom wetland seed mix.

The BBRS provided mitigation for wetland impacts within Hydrologic Unit 03030001 by restoring 8.6 acres of wetland and preserving 1.9 acres of upland, generating 8.6 non-riparian wetland mitigation units (WMU's). The wetland site will be monitored to determine if the project is on-track to meeting jurisdictional wetland status. In the restoration areas, the wetland site will be deemed successful once hydrology is established and vegetation success criteria are met. The site will be monitored for at least seven years or until the success criteria are achieved.

As designed, the western and southernmost ditches, located adjacent to the project easement were left open and not filled during construction. It is anticipated that leaving these ditches open will have minimal impacts to the overall hydrologic performance of the site. The hydrologic influence of these ditches was modeled using Lateral Effect, a software program that determines the lateral effect of a drainage ditch or borrow pit on adjacent wetland hydrology (NCSU BAE, 2011). This analysis determined that the potential horizontal drainage influence averages 85'. Due to the fact that these ditches cannot be filled because of the potential for hydrologic trespass, the area immediately adjacent to the ditch will not be a credit generating part of the site. It is assumed that with the onsite modifications, such as filling field ditches and surface roughening, the entire site will have more surface and groundwater storage, which may decrease the effect of the open ditches. For this reason, the non-credit generating portion of the site is assumed to be half of the zone of influence for the ditch.

2.0 MONITORING RESULTS

2.1 VEGETATION MONITORING

The success criteria for the planted species in the mitigation area will be based on survival. The site will demonstrate the re-establishment of targeted vegetative communities through the survival and growth of planted species and volunteer colonization, with an average stem density of 320 stems/acre after three years, 288 stems/acre after four years, 260 stems/acre after five years, and 210 stems/acre after seven years to be considered successful. To determine the success of the planted mitigation area, seven permanent vegetation monitoring plots (10 by 10 meters) have been established in the wetland restoration area at a density that represents the total mitigation acreage. The average density of these plots will determine whether the site meets the success criterion.

The seventh year vegetation monitoring found all seven of the vegetation monitoring plots with greater than 210 planted stems/acre. Overall the site averaged 711 planted stems/acre. Including volunteers, the site averaged 1,393 stems/acre. In general the site is well vegetated, with widespread herbaceous coverage and healthy planted stems. Five of the seven plots had an average stem height greater than 10 feet. The two plots that did not achieve this height were plots 2 and 3, with average heights of 7.6 and 8.6 feet respectively. Across all seven plots the average height of planted stems was 12.3 feet.

Many loblolly pine are present on site. These pines began colonizing the site in MY05 (2019), which was an exceptionally dry year. The site is surrounded by timberlands, which provide an ample seed source for loblolly pine and the extremely dry conditions of MY05 allowed many loblolly seedlings to become established on the site. These timberlands were logged in spring 2021 and a treatment of the pines on site is planned for February 2022. KCI believes that this treatment and the removal of the primary seed source will prevent the establishment of loblolly pines from becoming a long term problem for the site.

Although the majority of the site has healthy and thriving vegetative cover, there is an area of open water that does not have significant vegetation. Over the course of the year, this area expands and shrinks with the seasons so that it reaches its fullest extent in the winter and its lowest during the summer. This results in areas around the edge that, while inundated during the winter, support vegetation during the summer. Species such as *Juncus effuses, Scirpus cyperinus, Scirpus atrovirens, Carex comosa, Carex vulpinodea,* and *Schoenoplectus tabernaemontani* are abundant in these areas. In December 2018, KCI used GPS to map the extent of the area that is inundated to the point of excluding vegetation year round and found it to be 0.87 acres. This area was surveyed again in September 2021 to evaluate whether it had decreased in size as a result of vegetation colonizing the fringes. This survey found the area to be 0.70 acres. It is believed that as the site continues to mature, this area will continue to decrease. See Appendix B – Visual Assessment Data for more information.

2.2 HYDROLOGY MONITORING

Wetland hydrology will be monitored with a series of automatic gauges that record water table depth. The site must present continuous saturated or inundated hydrologic conditions for at least 8% of the growing season with a 50% probability of reoccurrence during normal weather conditions. A “normal” year is based on NRCS climatological data for Onslow County using the 30th to 70th percentile thresholds as the range of normal as documented in the USACE Technical Report “Accessing and Using Meteorological Data to Evaluate Wetland Hydrology, April 2000.” The growing season for Onslow County is considered to extend from March 18 to November 16 (244 days). The water table of the restored wetlands must be within 12” of the soil surface continuously for at least 8% (20 days) of the 244-day growing season. Wetland hydrology will be monitored with twenty automatic gauges that record water table depth.

To monitor the effect of the unfilled ditches described in Section 1.0, four sets of coupled gauges were installed perpendicular to the unfilled ditches. Each set includes a gauge that is 50' from the open ditch and another that is 80' from the ditch. An additional four gauges were installed between the coupled gauges to monitor hydrology less than 42.5' from the open ditch in the non-credit bearing zone.

The daily rainfall data was obtained from a local weather station in Jacksonville, NC; provided by the NC State Climate Office. For the 2021 year, the month of August experienced average rainfall. January, March, April, May, July, September, and November experienced below average rainfall while February, June, and October recorded above average rainfall. Although the overall rainfall total for the site was average for the year, the first three months of the growing season were extremely dry. The water table is typically at its peak for the growing season during these months since evapotranspiration rates are not yet as high as they are later in the growing season, and the water table is still recharged from the typically wetter winter months. This is the time period that the gauges have historically met the success criteria, which was also true for the successful gauges this year. An evaluation of the rainfall using the USACE's Antecedent Precipitation Tool (APT) further backed up this analysis. The APT assigns a score to each day based on the amount of rainfall the area received in the past 90 days compared to 30 year rainfall averages. Scores between 10 and 14 are classified as "Normal Conditions," while lower scores are classified as "Drier than Normal," and higher scores are classified as "Wetter than Normal." According to the APT, the majority of the months of January, February, June and August were spent in wetter than normal conditions while March, July, and November were mostly under normal conditions. The months of April, May, September, and October were drier than normal for the majority of the month. Overall 12% of the growing season was classified as Wetter than Normal, 57% was classified as Normal Conditions, and 31% was classified as Drier than Normal. The average daily score for the site was 11.2.

During the site's seventh growing season, 15 of the 21 credit bearing gauges achieved the success criteria. Collectively the credit bearing gauges averaged 8% (20 days) continuous saturation during the growing season. Additionally, one of the four non-credit bearing gauges achieved the success criteria. Six of the nine non-achieving gauges are located near the unfilled ditch along the western boundary of the property. Two of the non-achieving gauges missed achieving the success criteria by only one day.

Another contributing factor to the low rate of success that was achieved this year and in the previous two monitoring years is the large number of loblolly pines that began colonizing the site in 2019, particularly in the area along the western boundary of the site where the majority of low performing gauges are located. It is believed that the historically low amount of rainfall and resulting dry conditions on the site in 2019 allowed many pines to become established and thrive on the site which otherwise would have been too wet for this. Many studies have shown the outsized impact that loblolly pines can have in lowering the water table (Aguilos, et al, 2021; Grace, Skaggs, and Chescheir, 2006; Lebo and Hermann, 1998; McNulty, Vose, and Swank, 1996). Once these pines became established on site, it is believed that they were the driving force in lowering the water table that resulted in the low rates of gauge success in MY06 and 07. KCI believes that once the majority of these pines have been treated and removed from the site this winter, that the water table will rise back to its pre-2019 levels and there will be a corresponding rise in gauge success.

KCI proposes to discontinue vegetation monitoring but to continue hydrologic monitoring of the site in 2022 in order to monitor the effect that the removal of the pine trees has on the water table.

3.0 REFERENCES

Aguilos, M., G. Sun, A. Noormets, J. Domec, S. McNulty, M. Gavazzi, K. Minick, B. Mitra, P. Prajapati, Y. Yang, and J. King. (2021). Effects of land-use change and drought on decadal evapotranspiration and water balance of natural and managed forested wetlands along the southeastern US lower coastal plan. *Agricultural and Forest Meteorology*, 303

Grace, J. M., R. W. Skaggs, G.M. Chescheir. (2006). Hydrologic and water quality effects of thinning loblolly pine. *Transactions of the ASABE*, 49(3): 645-654

Lebo, M. E. and R.B. Herman. (1998). Harvest impacts on forest outflow in coastal North Carolina. *Journal of Environmental Quality*, 27(6)

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. (2008). CVS-EEP Protocol for Recording Vegetation. Version 4.2 (http://cvs.bio.unc.edu/methods.htm)

McNulty, S. G., J. M. Vose, W. T. Swank, (1996). Loblolly pine hydrology and productivity across the southern United States. *Forest Ecology and Management*, 86: 241-251

Schultz, R. (1997). *Loblolly Pine: The Ecology and Culture of Loblolly Pine (Pinus taeda)*. US Department of Agriculture, Forest Service.

USACE. (2003). Stream Mitigation Guidelines. USACE, NCDENR-DWQ, USEPA, NCWRC.

Appendix A

Project Vicinity Map and Background Tables

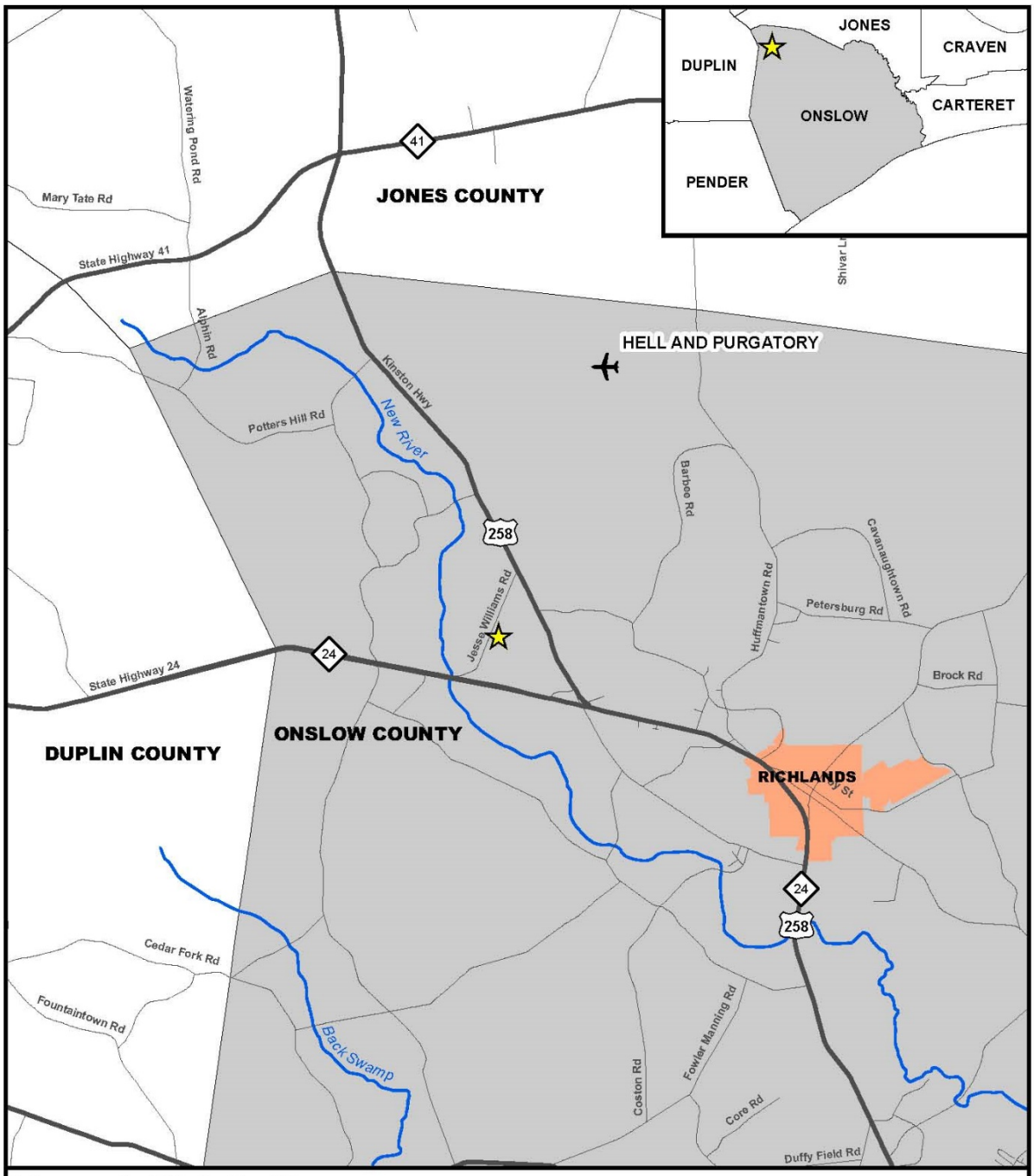


Figure 1. Vicinity Map

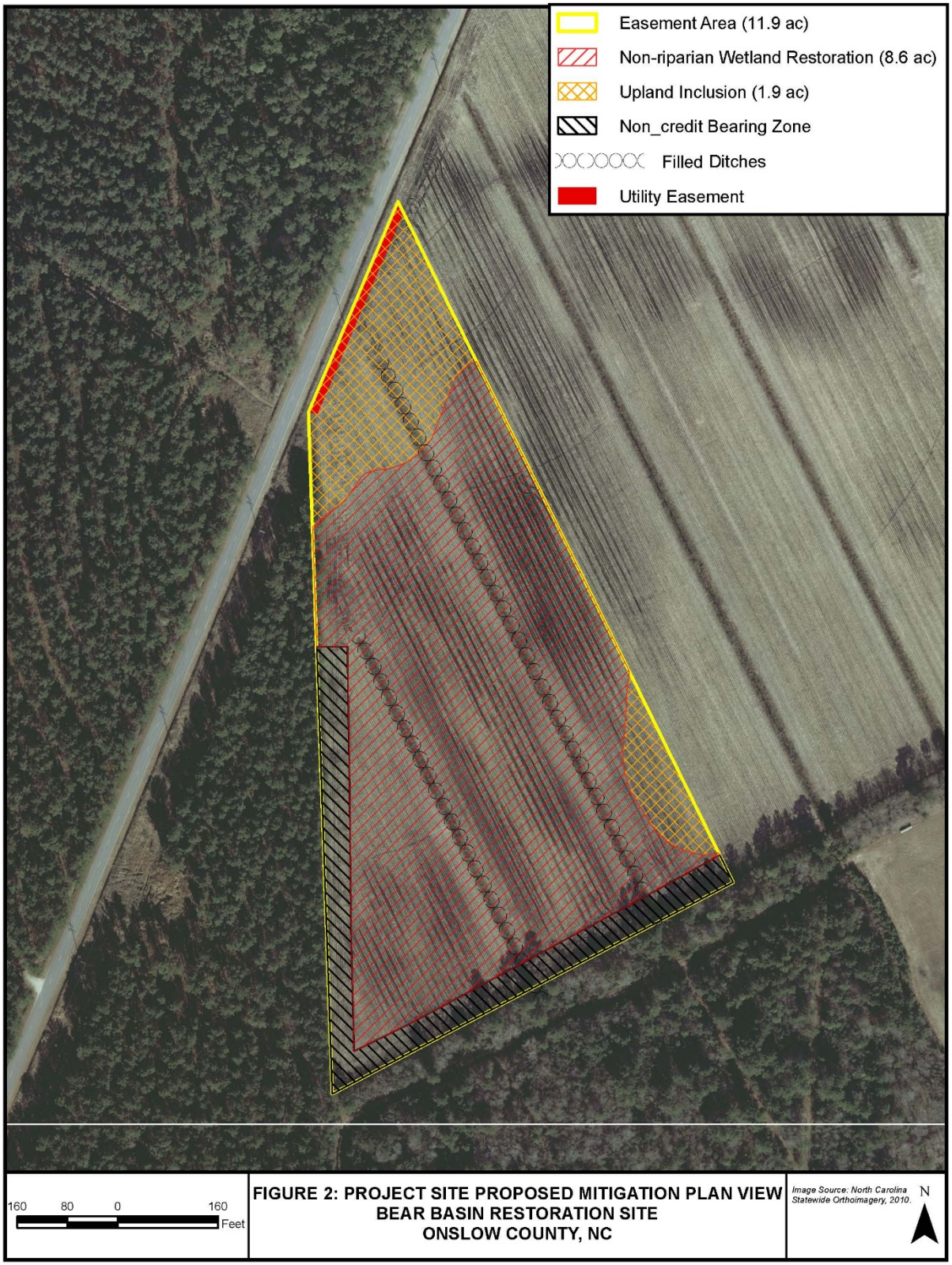


FIGURE 2: PROJECT SITE PROPOSED MITIGATION PLAN VIEW
BEAR BASIN RESTORATION SITE
ONSLOW COUNTY, NC

Table 1. Project Components
Project Number and Name: 95362 – Bear Basin Restoration Site

Mitigation Credits									
	Stream		**Riparian Wetland**		**Non-riparian Wetland**		**Buffer**	**Nitrogen Nutrient Offset**	**Phosphorous Nutrient Offset**
Type	R	RE	R	RE	R	RE			
Acres	-	-	-	-	8.6	-	-	-	-
Credits	-	-	-	-	8.6	-	-	-	-
TOTAL CREDITS	-		-		8.6		-	-	-

Project Components						
Project Component -or- Reach ID	**Stationing/ Location**	**Existing Footage/ Acreage**	**Approach (PI, PII etc.)**	**Restoration -or- Restoration Equivalent**	**Restoration Footage or Acreage**	**Mitigation Ratio**
Wetland Area	-	8.6 acres	-	Restoration	8.6 acres	1:1

Component Summation						
Restoration Level	**Stream (linear feet)**	**Riparian Wetland (acres)**		**Non-riparian Wetland (acres)**	**Buffer (square feet)**	**Upland (acres)**
		Riverine	Non-Riverine			
Restoration	-	-	-	8.6 acres	-	-
Enhancement		-	-	-	-	-
Enhancement I	-					
Enhancement II	-					
Creation		-	-	-		-
Preservation	-	-	-	-		1.9 acres
High Quality Preservation	-	-	-	-		-
TOTAL	-	-	-	8.6 acres		1.9 acres

Table 2. Project Activity & Reporting History		
Bear Basin Wetland Restoration Site, DMS Project# 95362		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Mitigation Plan		July 2014
Final Design – Construction Plans		July 2014
Construction		Dec 2014
Planting		March 2015
Baseline Monitoring/Report	May 2015	June 2015
Vegetation Monitoring	May 19, 2015	
Photo Points	May 26, 2015	
Year 1 Monitoring	Nov 2015	Jan 2015
Vegetation Monitoring	Oct 13, 2015	
Photo Points	Oct 13, 2015	
Gauge Downloads	Nov 25, 2015	
Year 2 Monitoring	Dec 2016	Dec 2016
Vegetation Monitoring	July 5, 2016	
Photo Points	Aug 16, 2016	
Gauge Downloads	Dec 14, 2016	
Year 3 Monitoring	Nov 2017	Jan 2018
Vegetation Monitoring	July 5, 2017	
Photo Points	Nov 30, 2017	
Gauge Downloads	Nov 30, 2017	
Year 4 Monitoring	Nov 2018	Jan 2018
Vegetation Monitoring	N/A	
Photo Points	Nov 13, 2018	
Gauge Downloads	Nov 13, 2018	
Year 5 Monitoring	Nov 2019	Dec 2019
Vegetation Monitoring	July 25, 2019	
Photo Points	Nov 20, 2019	
Gauge Downloads	Nov 20, 2019	
Year 6 Monitoring	Nov 2020	Dec 2020
Vegetation Monitoring	N/A	
Photo Points	Nov 20, 2020	
Gauge Downloads	Nov 20, 2020	
Year 7 Monitoring	Nov 2021	Dec 2021
Vegetation Monitoring	Aug 10, 2021	
Photo Points	Sept 10, 2021	
Gauge Downloads	Nov 19, 2021	

Table 3. Project Contacts **Project Number and Name: 95362 - Bear Basin Restoration Site**	
Design Firm	KCI Associates of North Carolina, PC 4505 Falls of Neuse Rd. Suite 400 Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512 Fax: (919) 783-9266
Construction Contractor	KCI Environmental Technologies and Construction, Inc. 4505 Falls of Neuse Rd. Suite 400 Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512 Fax: (919) 783-9266
Planting Contractor	Bruton Nurseries and Landscapes PO Box 1197 Freemont, NC 27830 Contact: Mr. Charlie Bruton Phone: (919) 242-6555
Monitoring Performers	
	KCI Associates of North Carolina, PC 4505 Falls of Neuse Rd. Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

Table 4. Project Attribute Table **Project Number and Name: 95362 – Bear Basin Restoration Site**			
County	Onslow County		
Project Area (acres)	11.9 acres		
Project Coordinates (lat. and long.)	34.925365 N , -77.607461 W		
Project Watershed Summary Information			
Physiographic Province	Coastal Plain		
River Basin	White Oak		
USGS Hydrologic Unit 8-digit	03030001	**USGS Hydrologic Unit 14-digit**	03030001010010
DWQ Sub-basin	03-05-02b		
Project Drainage Area (acres)	32.7 acres		
Project Drainage Area Percentage of Impervious Area	2%		
CGIA Land Use Classification	44% Cultivated, 4% Managed Herbaceous Cover, 50% Southern Yellow Pine, and 2% High-Intensity Developed		
Wetland Summary Information			
Parameters	**Wetland Area**		
Size of Wetland (acres)	8.6 acres		
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Non-riparian		
Mapped Soil Series	Rains and Stallings (Pantego and Lynchburg by detailed soil investigation)		
Drainage class	Poorly drained		
Soil Hydric Status	Drained Hydric		
Source of Hydrology	Precipitation		
Hydrologic Impairment	Ditching and Crops		
Native vegetation community	Crops		
Percent composition of exotic invasive vegetation	0%		

Appendix B

Visual Assessment Data

LEGEND:

- VEG PLOT ACHIEVING DENSITY CRITERION
- VEG PLOT BELOW DENSITY CRITERION
- VEG PLOT TOTAL / PLANTED STEM DENSITY ····· 1393/711
- WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION
- WETLAND GAUGE BELOW HYDROLOGIC CRITERION
- PHOTO POINT (PP)
- FILLED DITCHES
- NONRIPARIAN WETLAND RESTORATION = 8.6 ACRES
- CONSERVATION EASEMENT
- BARE AREA / OPEN WATER
- SWEETGUM & PINE TREATMENT (2022)

IMAGE SOURCE: NC 2020 GOOGLE EARTH

NC GRID NAD 83

–60′ –30′ 0′ 60′ 120′

GRAPHIC SCALE

VEG PLOT #3 1478/1012
VEG PLOT #4 1295/1052
VEG PLOT #5 809/526
VEG PLOT #2 1093/567
VEG PLOT #1 1982/607
VEG PLOT #6 1418/607
VEG PLOT #7 1740/607

GA1 GA2 GA3 GA4 GA5 GA6 GA7 GA8 GA9 GA10 GA11 GA12 GA13 GA14 GA15 GA16 GA17 GA18 GA19 GA20 GA21 GA22 GA23 GA24 GA25

PP1 PP2 PP3 PP4 PP5 PP6

NON-CREDIT BEARING ZONE

CORNWALLIS ROAD

NON-CREDIT BEARING ZONE

REVISIONS			
SYM.	DESCRIPTION	DATE	

NCDEQ DIVISION OF MITIGATION SERVICES

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4506 FALLS OF NEUSE ROAD
RALEIGH, NORTH CAROLINA 27609

BEAR BASIN RESTORATION SITE

DMS PROJECT #95362
RICHLANDS, ONSLOW COUNTY, NORTH CAROLINA
MONITORING YEAR 07

DATE: NOV 2021
SCALE: GRAPHIC

CURRENT CONDITION PLAN VIEW

SHEET 1 OF 1

FIGURE 3

Table 5. Vegetation Condition Assessment Assesment Date: 11/19/21

Project Number and Name: 95362 – Bear Basin Restoration Site

Planted Acreage 11.9 **Easement Acreage 8.6**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	1	0.70	5.9%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	0	0.00	0.0%
			Total	1	0.70	5.9%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
			Cumulative Total	1	0.70	5.9%
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	0	0.00	0.0%
5. Area of Dense Loblolly Pine	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	2	3.06	35.6%
6. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

Photo Reference Points

PP1 – MY-00 – 5/26/15

PP1 – MY-07 – 9/10/21

PP2 – MY-00 – 5/26/15

PP2 – MY-07 – 9/10/21

PP3 – MY-00 – 5/26/15

PP3 – MY-07 – 9/10/21

PP4 – MY-00 – 5/26/15

PP4 – MY-07 – 9/10/21

PP5 – MY-00 – 5/26/15

PP5 – MY-07 – 9/10/21

PP6 – MY-00 – 5/26/15

PP6 – MY-07 – 9/10/21

Vegetation Monitoring Plot Photos

Vegetation Plot 1 – MY-07 – 8/10/21

Vegetation Plot 2 – MY-07 – 8/10/21

Vegetation Plot 3 – MY-07 – 8/10/21

Vegetation Plot 4 – MY-07 – 8/10/21

Vegetation Plot 5 – MY-07 – 8/10/21

Vegetation Plot 6 – MY-07 – 8/10/21

Vegetation Plot 7 – MY-07 – 8/10/21

Appendix C

Vegetation Plot Data

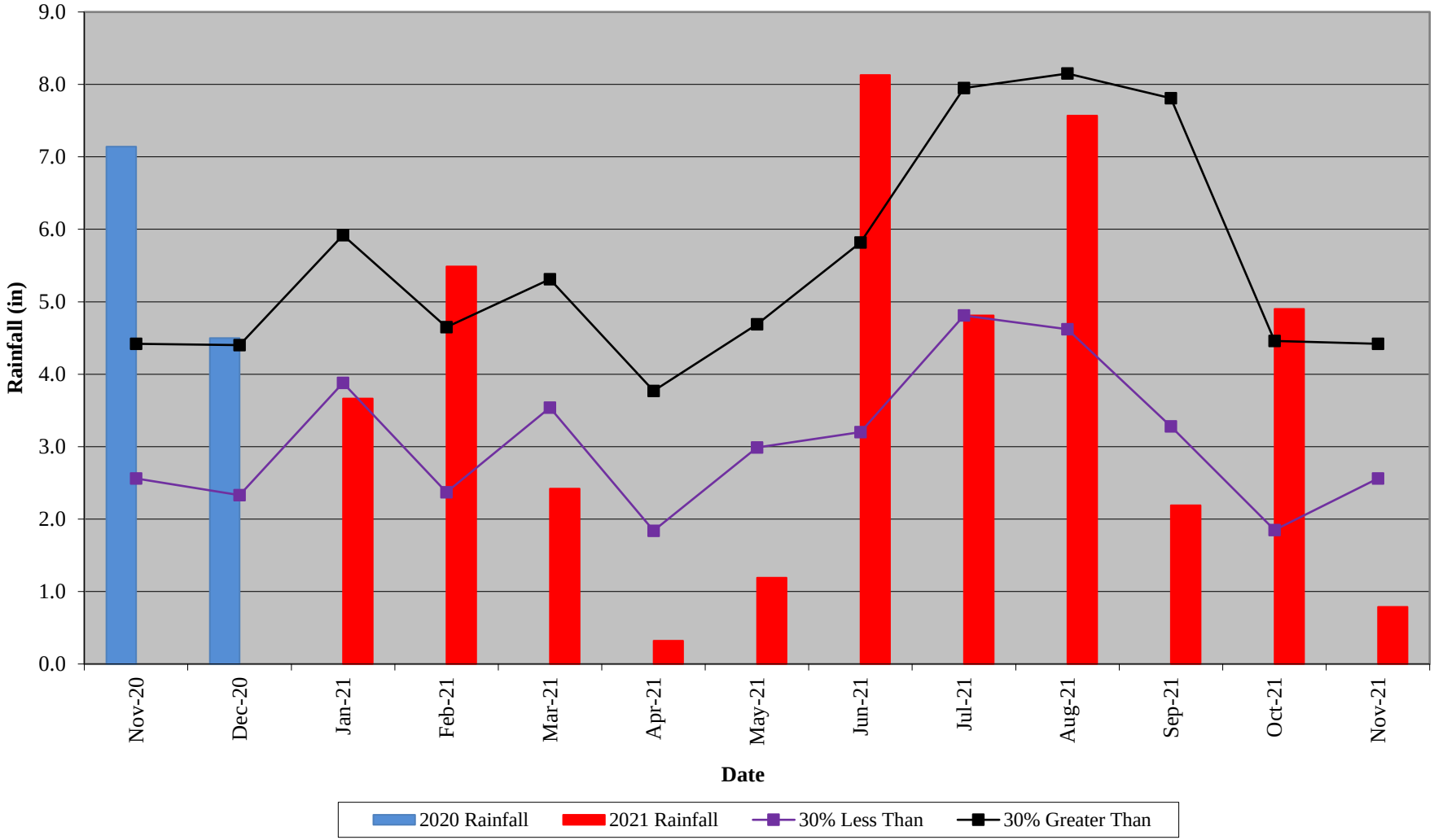
Table 6. CVS Stem Count by Plot and Species DMS Project Code 95362. Project Name: Bear Basin			Current Plot Data (MY7 2021)																				
			95362-01-0001			95362-01-0002			95362-01-0003			95362-01-0004			95362-01-0005			95362-01-0006			95362-01-0007		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree			1			1						2			3			2			2
Aronia arbutifolia	Red Chokeberry	Shrub																1	1	1	1	1	1
Baccharis halimifolia	eastern baccharis	Shrub																		1			
Betula nigra	river birch	Tree	1	1	1				4	4	4							1	1	1			
Celtis occidentalis	common hackberry	Tree																					
Cephalanthus occidentalis	common buttonbush	Shrub							1	1	1										1	1	1
Diospyros virginiana	common persimmon	Tree				5	5	5															
Fraxinus pennsylvanica	green ash	Tree	4	4	4				3	3	3												
Juglans nigra	black walnut	Tree															1			1			
Liquidambar styraciflua	sweetgum	Tree			3			2			1									4			2
Liriodendron tulipifera	tuliptree	Tree										2	2	2	3	3	4						
Magnolia virginiana	sweetbay	Tree	2	2	2				4	4	4	1	1	1				1	1	1			
Morella cerifera	wax myrtle	shrub			1			1						1									
Nyssa biflora	swamp tupelo	Tree	3	3	3																		
Pinus taeda	loblolly pine	Tree			28			9			9			2			2			11			23
Quercus	oak	Tree																					
Quercus laurifolia	laurel oak	Tree	1	1	1				2	2	2							2	2	3			
Quercus nigra	water oak	Tree																					
Quercus pagoda	cherrybark oak	Tree	4	4	4	9	9	9	9	9	9	23	23	24	3	3	3	4	4	4	11	11	12
Quercus phellos	willow oak	Tree	1	1	1				1	1	1				7	7	7	2	2	2	2	2	2
Salix nigra	black willow	Tree			1																		
Taxodium distichum	bald cypress	Tree							1	1	1							2	2	2			
Vaccinium corymbosum	highbush blueberry	Shrub																2	2	2			
Stem count			16	16	50	14	14	27	25	25	35	26	26	32	13	13	20	15	15	35	15	15	43
Average Stem Height			10.4			7.6			8.6			15.2			18.2			10.8			16.5		
size (ares)			1			1			1			1			1			1			1		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
Species count			7	7	12	2	2	6	8	8	10	3	3	6	3	3	6	8	8	13	4	4	7
Stems per ACRE			647	647	2023	567	567	1093	1012	1012	1416	1052	1052	1295	526	526	809	607	607	1416	607	607	1740

Table 6. CVS Stem Count by Plot and Species																				
DMS Project Code 95362. Project Name: Bear Basin			Annual Means																	
			MY7 (2021)			MY5 (2019)			MY3 (2017)			MY2 (2016)			MY1 (2015)			MY0 (2015)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree			11			10			2									
Aronia arbutifolia	Red Chokeberry	Shrub	2	2	2	3	3	3	4	4	4	3	3	3	4	4	4	4	4	4
Baccharis halimifolia	eastern baccharis	Shrub			1			3			1			2						
Betula nigra	river birch	Tree	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Celtis occidentalis	common hackberry	Tree										1	1	1						
Cephalanthus occidentalis	common buttonbush	Shrub	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1
Diospyros virginiana	common persimmon	Tree	5	5	5	5	5	5	5	5	5	5	5	5	6	6	7	7	7	7
Fraxinus pennsylvanica	green ash	Tree	7	7	7	8	8	8	8	8	8	8	8	8	7	7	7	8	8	8
Juglans nigra	black walnut	Tree			2			4			1									
Liquidambar styraciflua	sweetgum	Tree			12			17			9			5			8			
Liriodendron tulipifera	tuliptree	Tree	5	5	6	7	7	7	13	13	13	9	9	10	10	10	10	15	15	15
Magnolia virginiana	sweetbay	Tree	8	8	8	8	8	8	8	8	8	7	7	7	6	6	6	5	5	5
Morella cerifera	wax myrtle	shrub			3			2												
Nyssa biflora	swamp tupelo	Tree	3	3	3	4	4	4	4	4	4	4	4	4						
Pinus taeda	loblolly pine	Tree			84			81			13									
Quercus	oak	Tree							1	1	1	1	1	6	3	3	4	2	2	2
Quercus laurifolia	laurel oak	Tree	5	5	6	5	5	5												
Quercus nigra	water oak	Tree																1	1	1
Quercus pagoda	cherrybark oak	Tree	62	62	64	65	65	66	66	66	66	66	66	66	64	64	68	67	67	67
Quercus phellos	willow oak	Tree	13	13	13	13	13	14	18	18	18	16	16	16	15	15	15	16	16	16
Salix nigra	black willow	Tree			1			1												
Taxodium distichum	bald cypress	Tree	3	3	3	3	3	3	3	3	3	3	3	3	1	1	1			
Vaccinium corymbosum	highbush blueberry	Shrub	2	2	2	2	2	2	3	3	3	3	3	3	2	2	2	2	2	2
		Stem count	123	123	241	131	131	251	141	141	167	133	133	146	125	125	139	134	134	134
		size (ares)	7			7			7			7			7			7		
		size (ACRES)	0.17			0.17			0.17			0.17			0.17			0.17		
		Species count	13	13	20	13	13	20	13	13	18	14	14	16	12	12	13	12	12	12
		Stems per ACRE	711	711	1,393	757	757	1,451	815	815	965	769	769	844	723	723	804	775	775	775

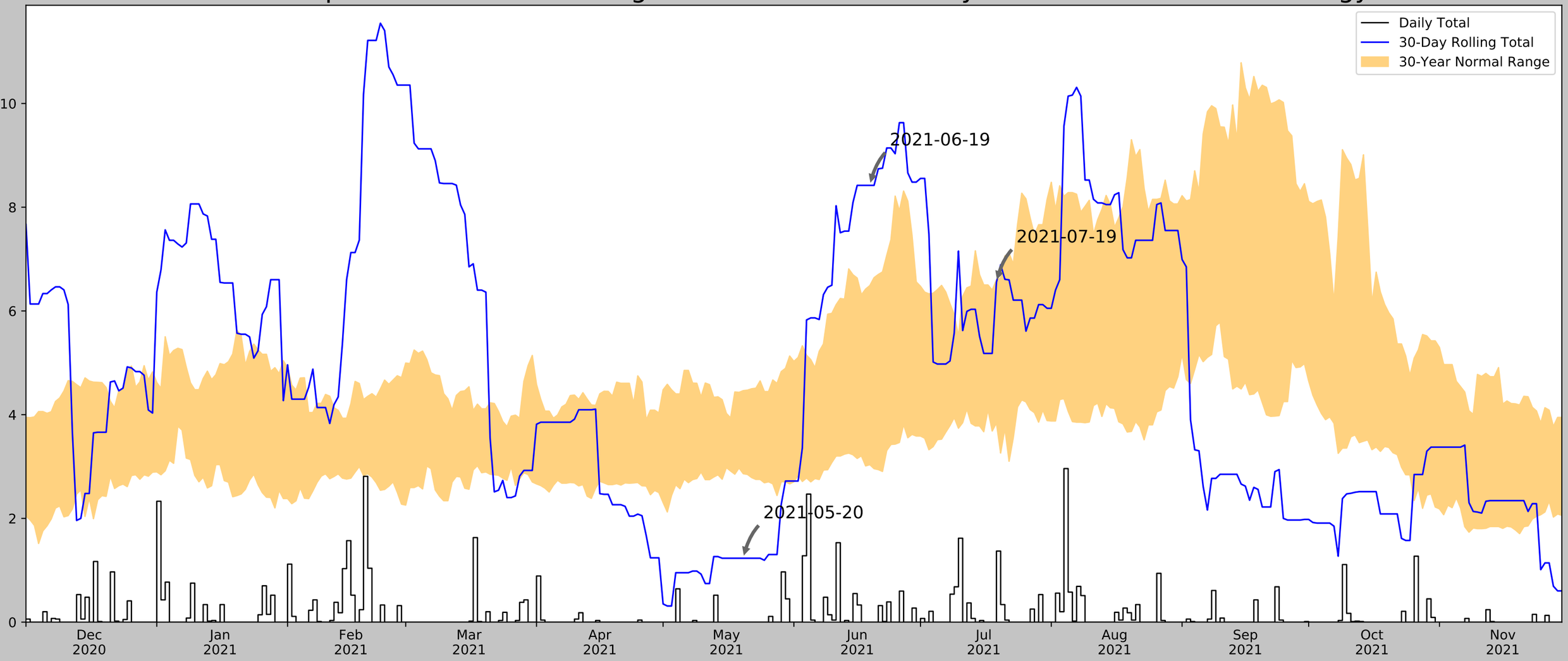
Appendix D

Hydrologic Data

Bear Basin Wetland Restoration Site
30-70 Percentile Graph
WETS Station Name: Maysville, NC



Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



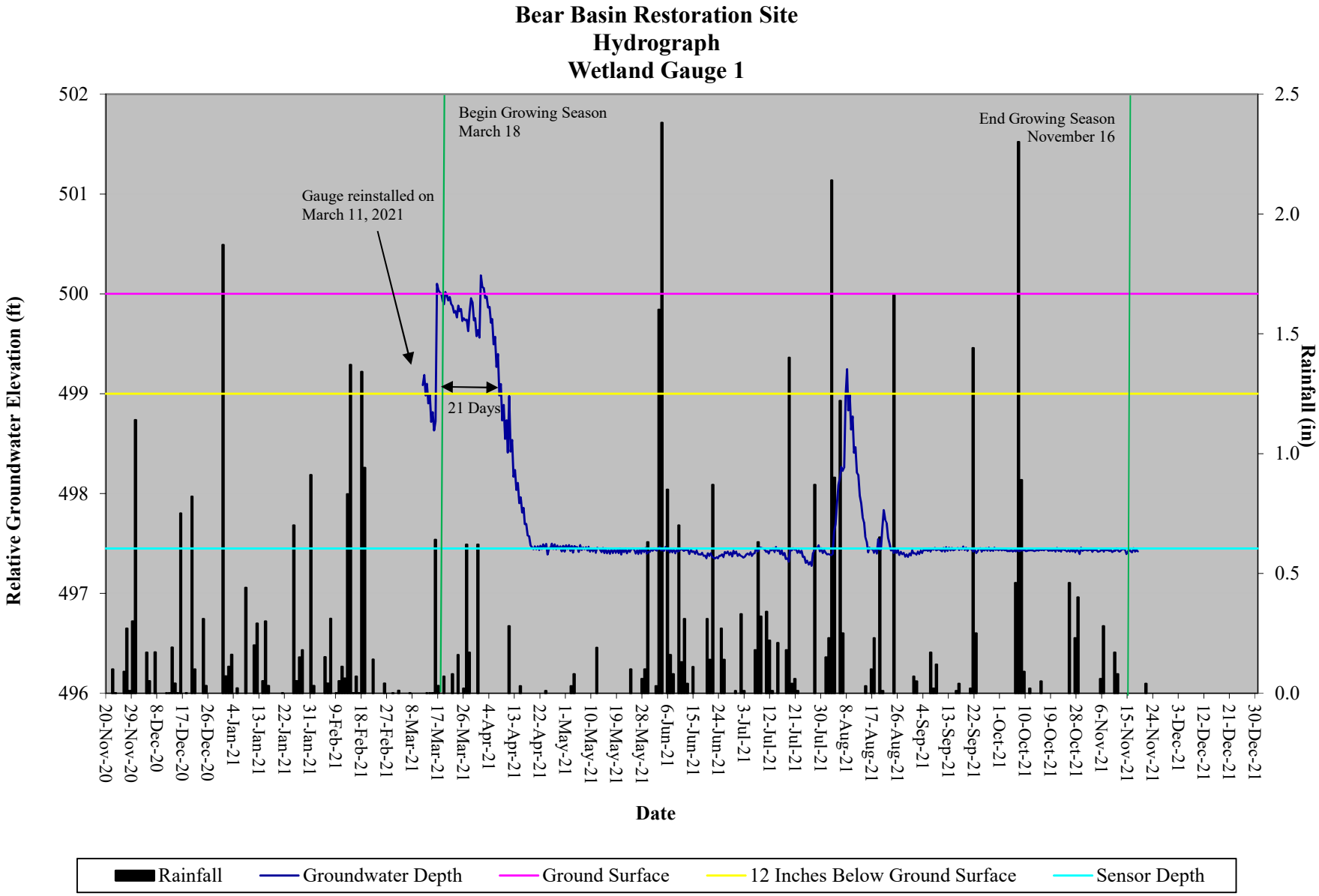
Coordinates	34.925365, -77.607461
Observation Date	2021-07-19
Elevation (ft)	71.8
Drought Index (PDSI)	Moderate wetness
WebWIMP H_2O Balance	Wet Season

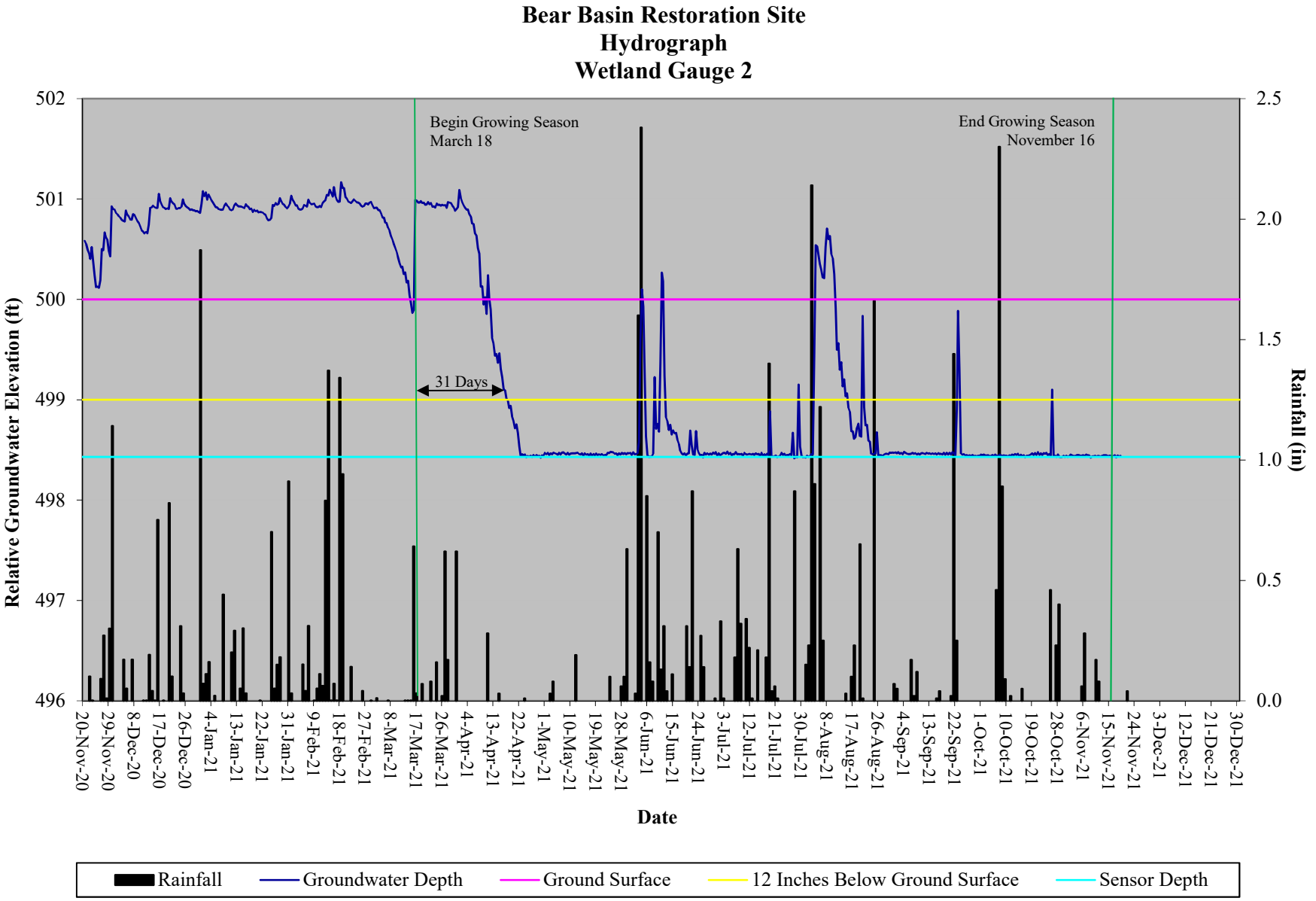
30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-07-19	3.840158	6.596851	6.551181	Normal	2	3	6
2021-06-19	3.035827	6.488977	8.42126	Wet	3	2	6
2021-05-20	2.861811	4.463386	1.232284	Dry	1	1	1
Result							Normal Conditions - 13

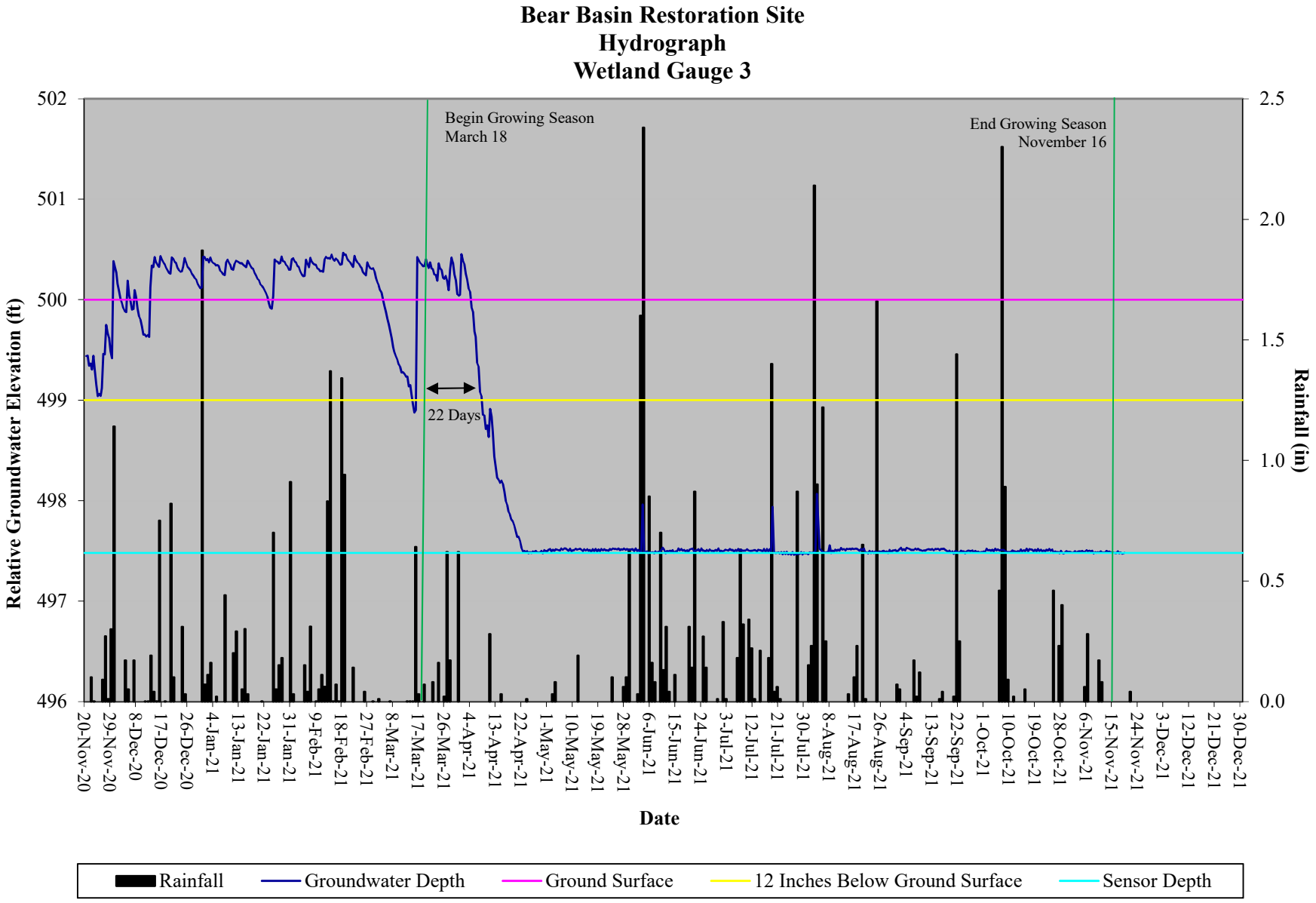
Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
NEW BERN 8.8 W	35.141, -77.2324	42.979	25.927	28.821	12.414	2426	72
NEW BERN 5.3 SW	35.0747, -77.1536	21.982	27.682	49.818	13.836	271	14
NEW BERN 4.6 SW	35.0746, -77.1373	6.89	28.538	64.91	14.695	34	4
RIVER BEND 0.8 ENE	35.076, -77.1392	1128.937	28.473	1057.137	42.913	1	0
STELLA 0.6 ENE	34.7776, -77.1408	14.108	28.361	57.692	14.399	401	0
MOUNT OLIVE 9.6 ESE	35.142, -77.9115	147.966	22.802	76.166	11.998	1382	0
ROSE HILL 0.1 NNW	34.8259, -78.0286	99.081	24.841	27.281	11.856	1	0
NEW BERN 4.4 SW	35.0716, -77.1283	16.076	28.941	55.724	14.636	9	0
LA GRANGE 0.2 NNW	35.308, -77.7899	102.034	28.377	30.234	13.628	111	0
RICHLANDS 0.2 NNE	34.9029, -77.5459	62.992	3.818	8.808	1.752	21	0
SWANSBORO 3.3 NW	34.7264, -77.1672	20.013	28.505	51.787	14.303	109	0
HOFMANN FOREST	34.8358, -77.3031	46.916	18.328	24.884	8.704	6291	0
JACKSONVILLE EOC	34.7964, -77.4011	17.06	14.706	54.74	7.423	187	0
KINSTON 7 SE	35.1967, -77.5433	23.95	19.095	47.85	9.506	109	0

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 1
Begin Growing Season
March 18
End Growing Season
November 16
Gauge reinstalled on
March 11, 2021
21 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 2
Begin Growing Season
March 18
End Growing Season
November 16
31 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 3
Begin Growing Season
March 18
End Growing Season
November 16
22 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
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22-Apr-21
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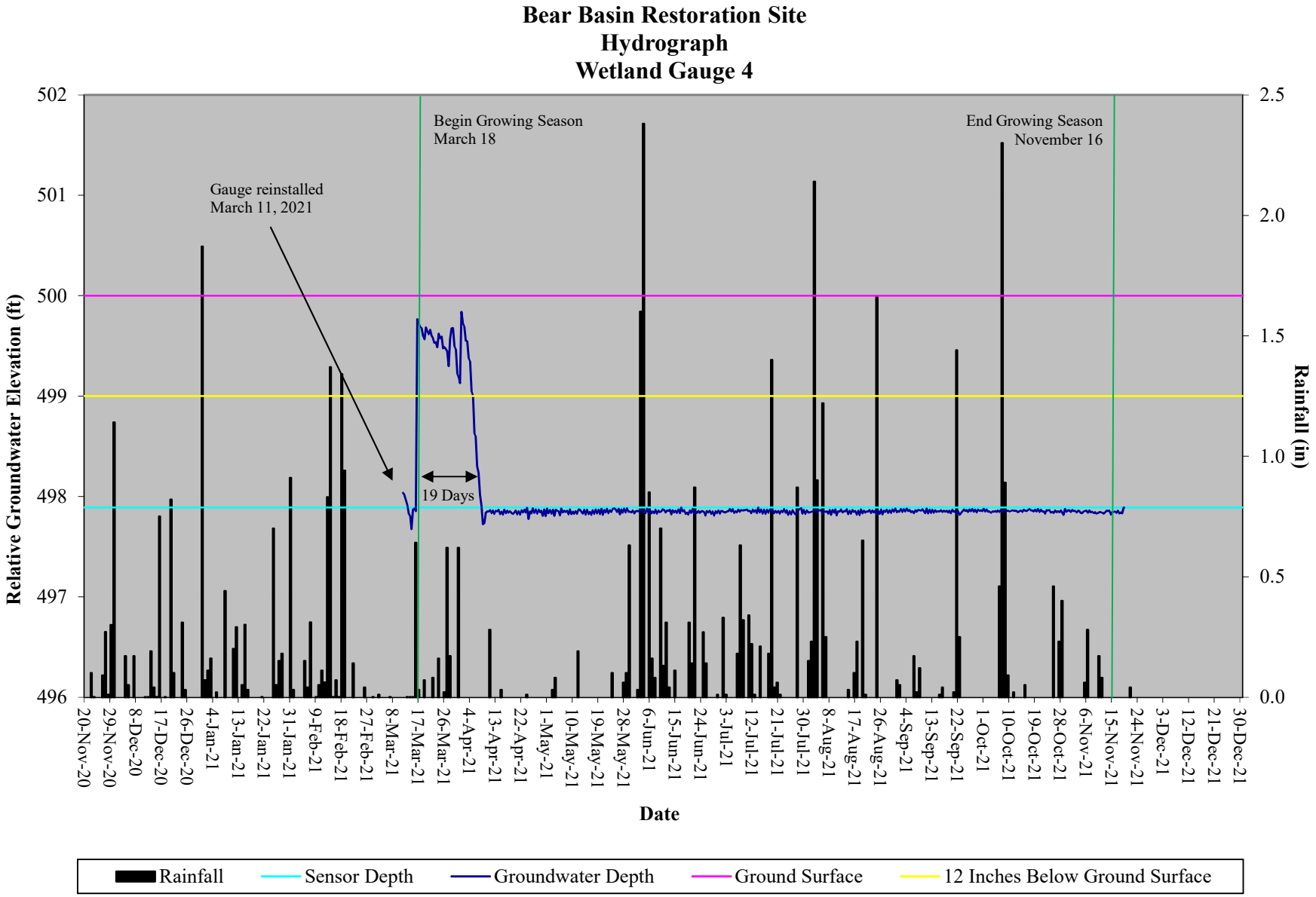
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 4
Begin Growing Season
March 18
End Growing Season
November 16
Gauge reinstalled
March 11, 2021
19 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
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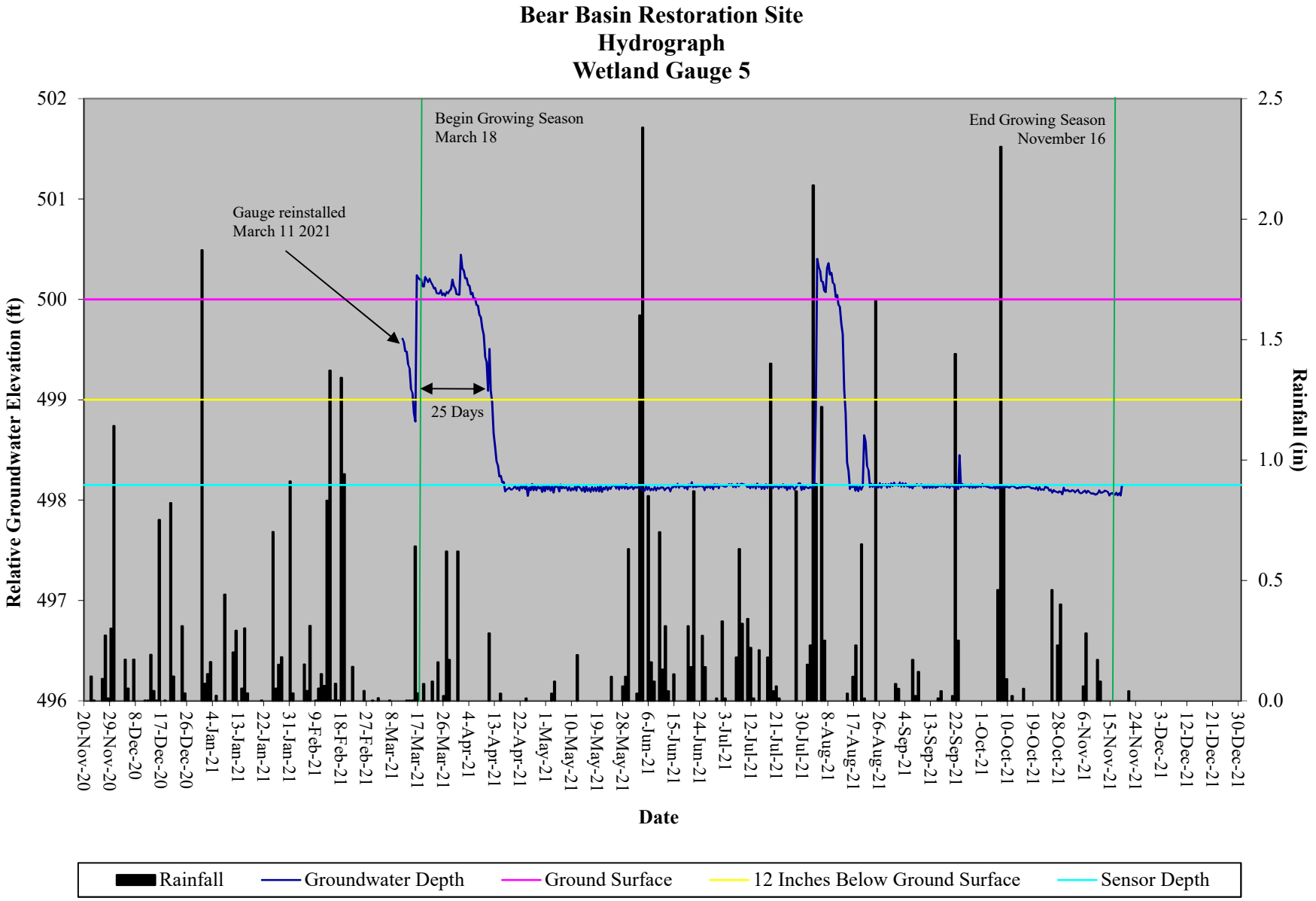
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 5
Begin Growing Season
March 18
End Growing Season
November 16
Gauge reinstalled
March 11 2021
25 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
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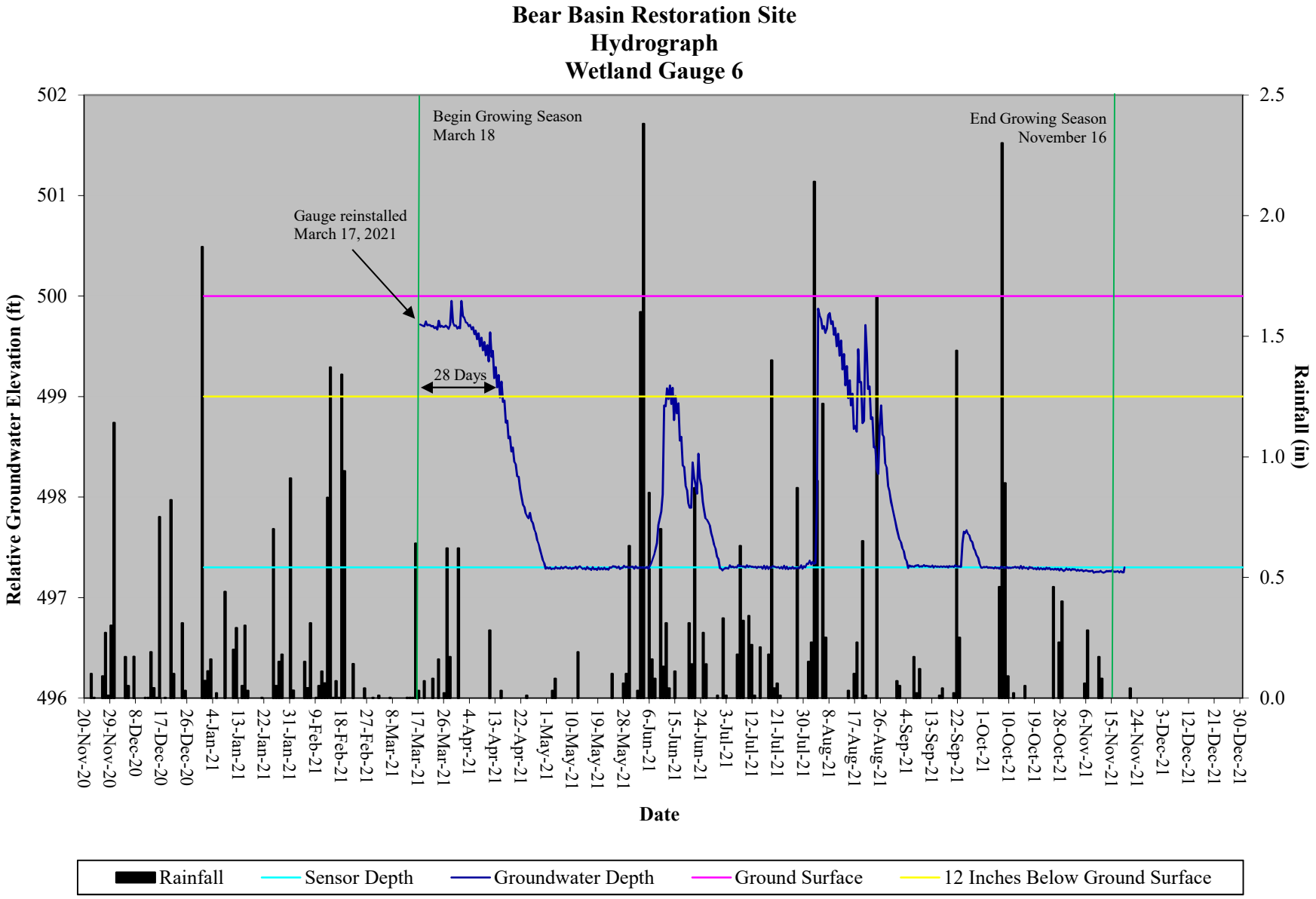
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 6
Begin Growing Season
March 18
End Growing Season
November 16
Gauge reinstalled
March 17, 2021
28 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
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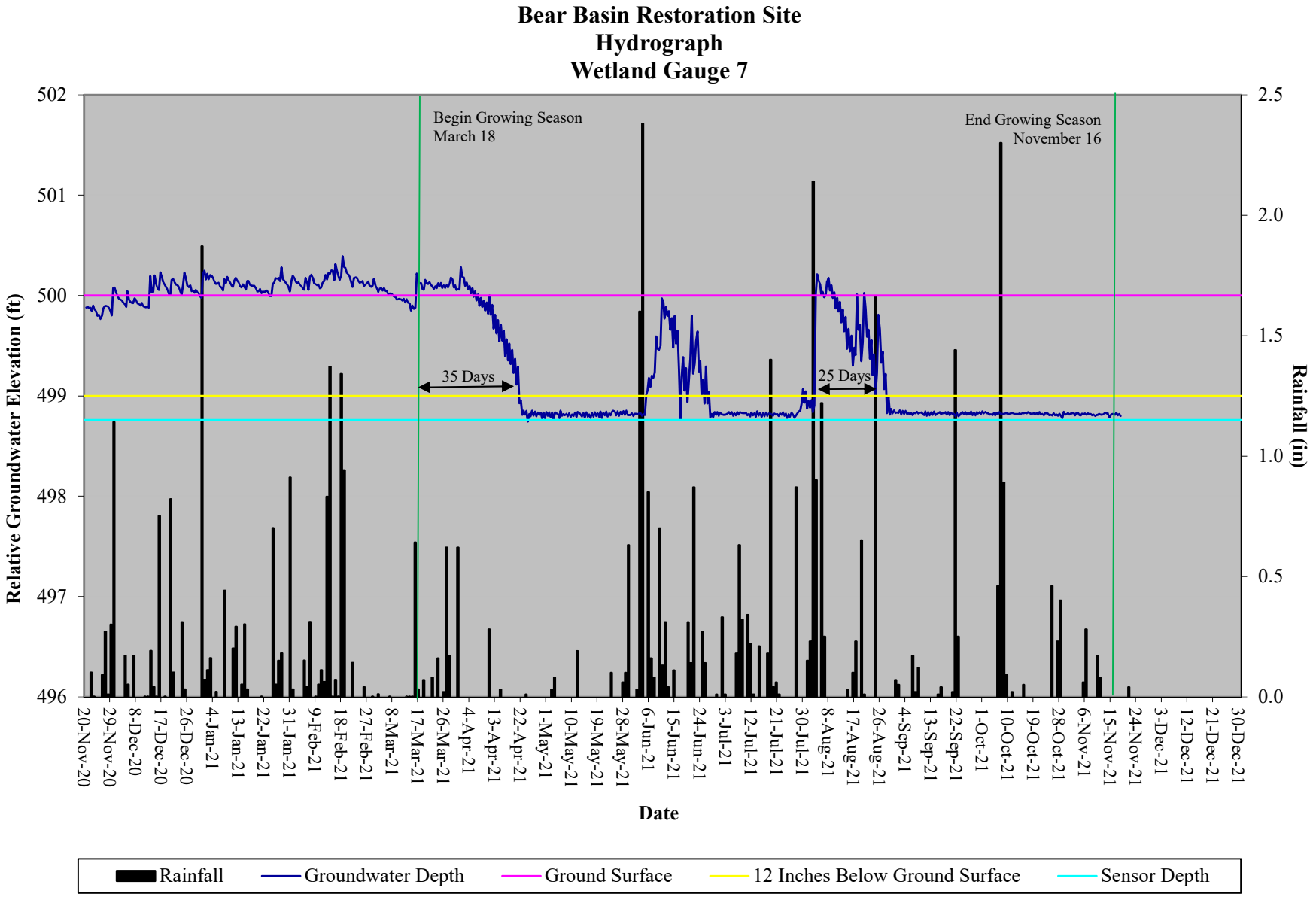
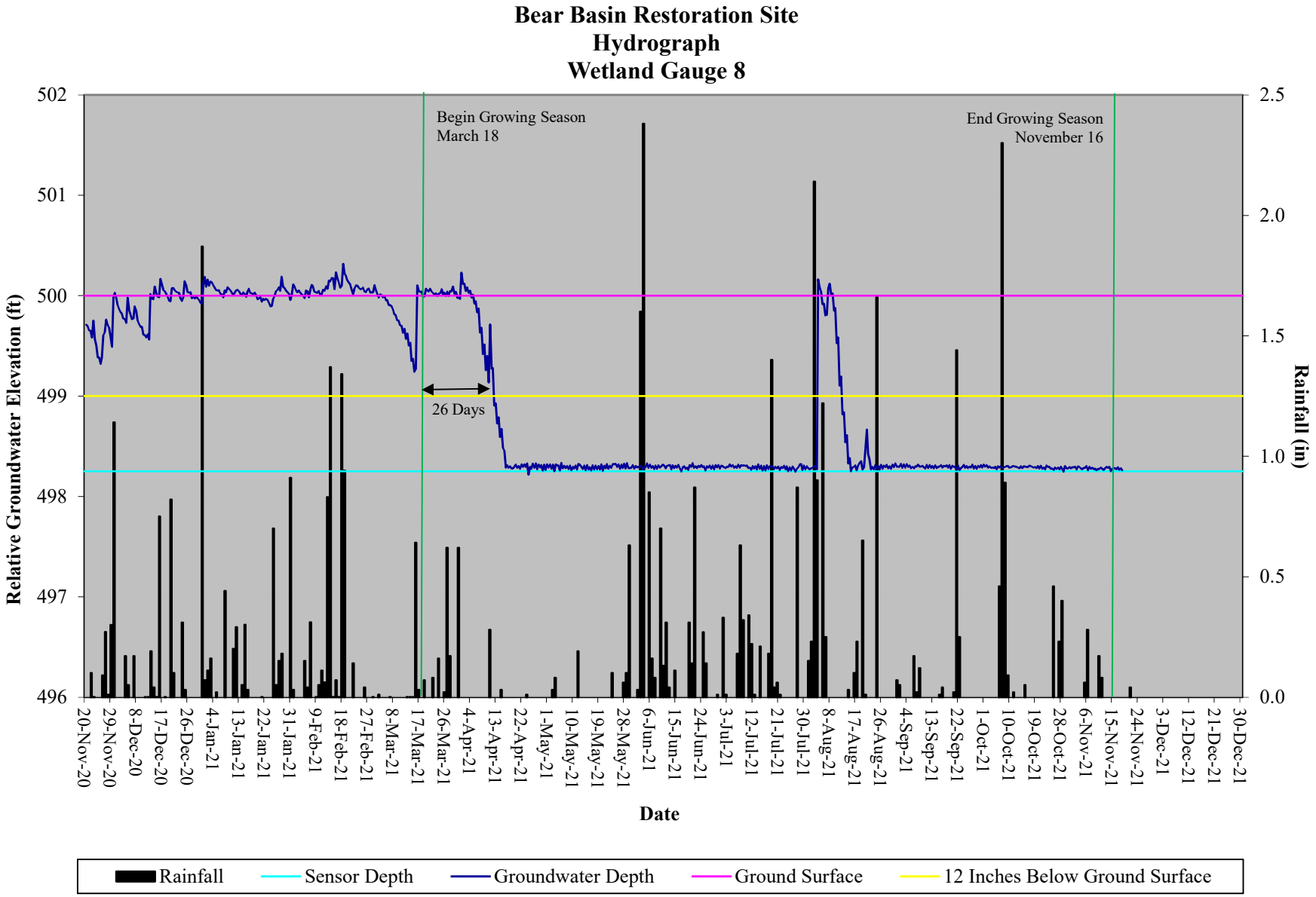
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 7
Begin Growing Season
March 18
End Growing Season
November 16
35 Days
25 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 8
Begin Growing Season
March 18
End Growing Season
November 16
26 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
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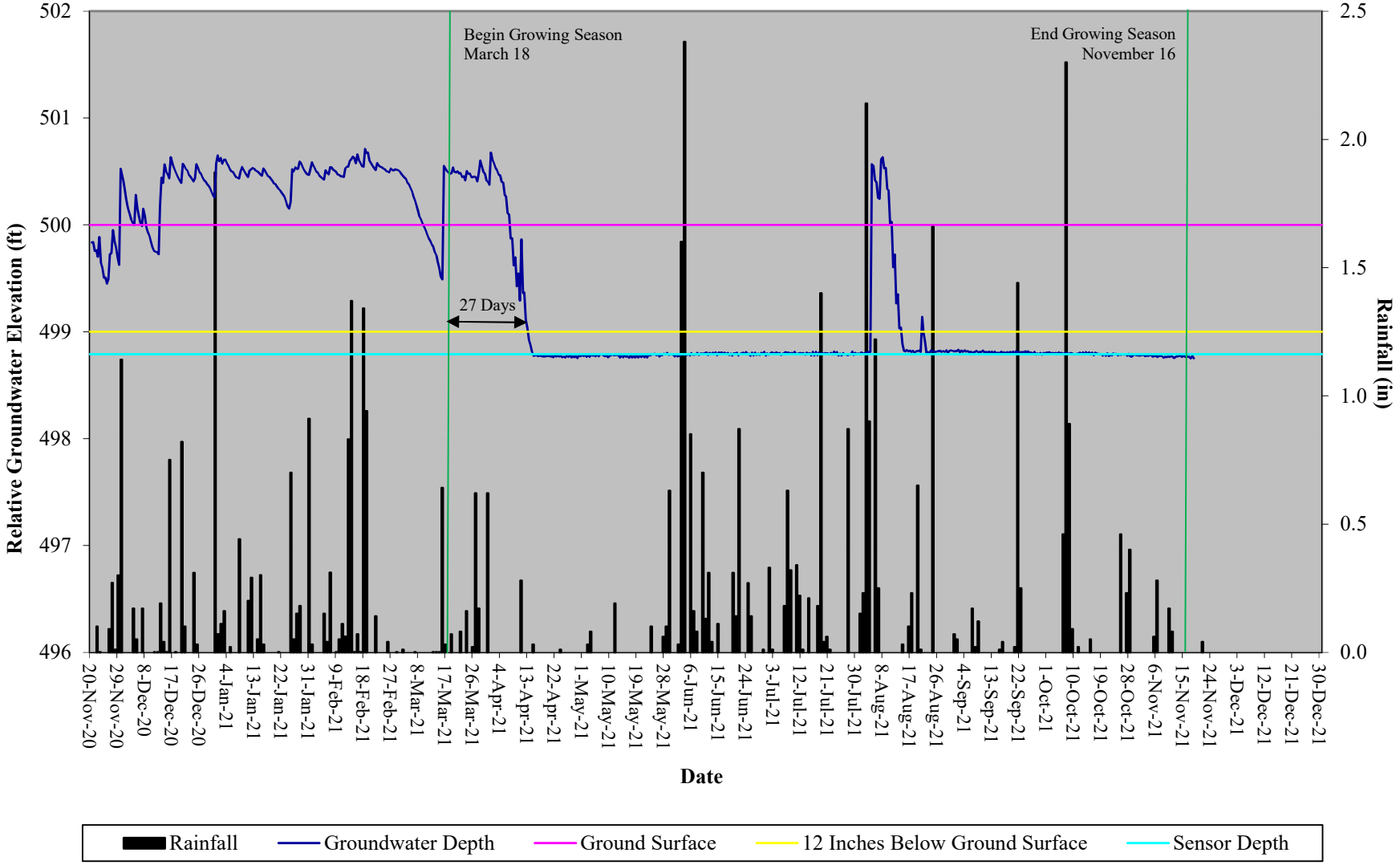
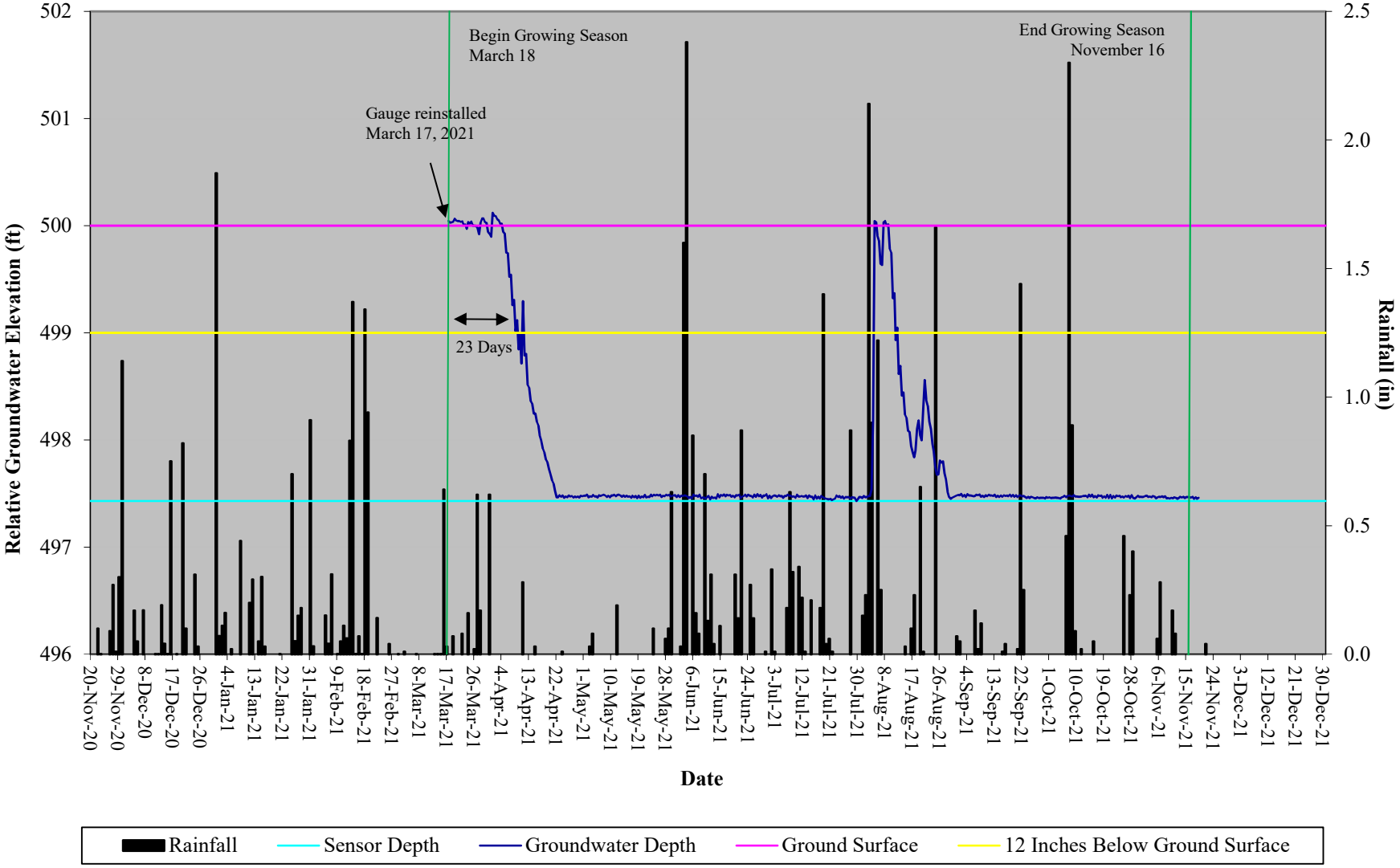
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface

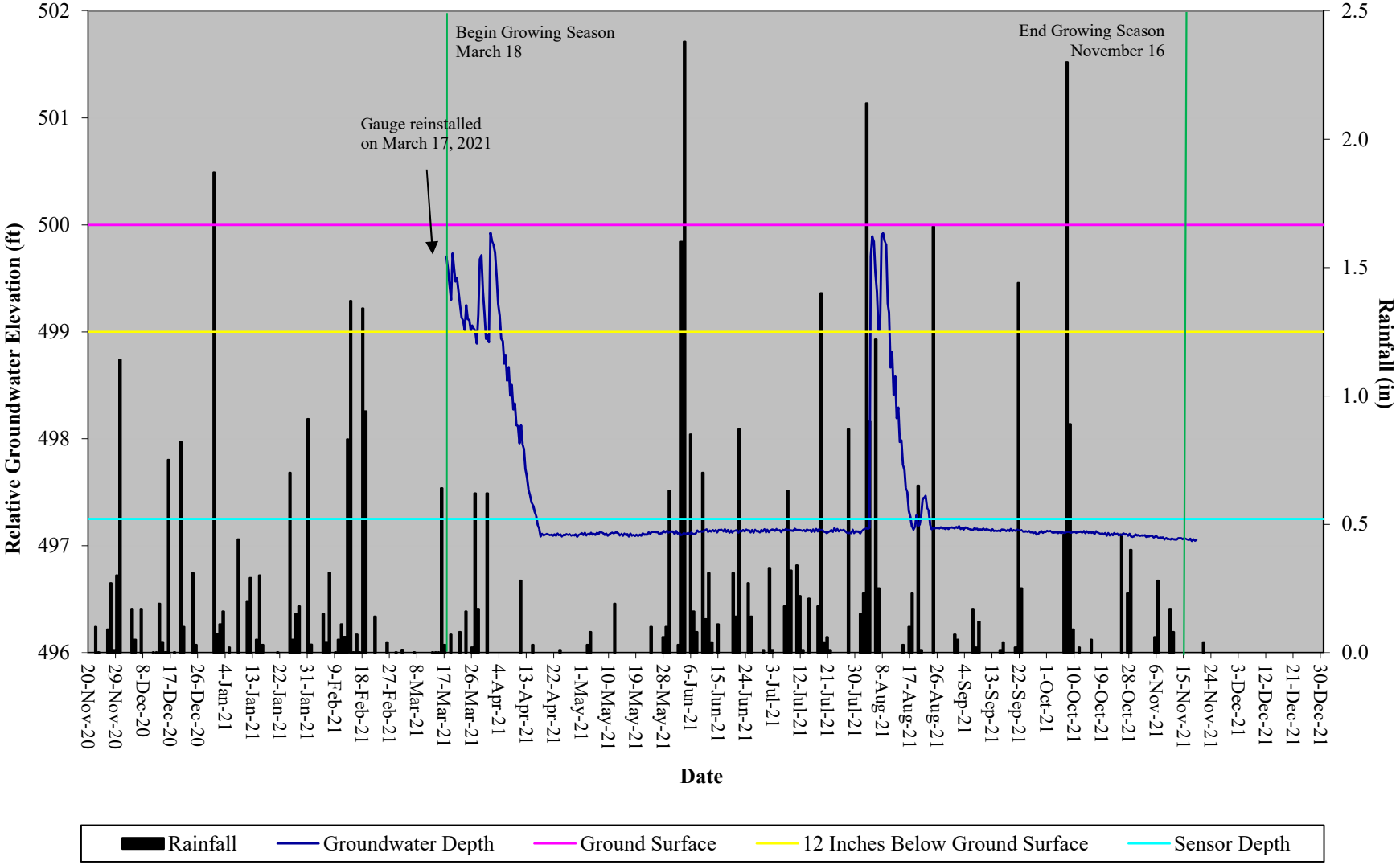
Bear Basin Restoration Site
Hydrograph
Wetland Gauge 9



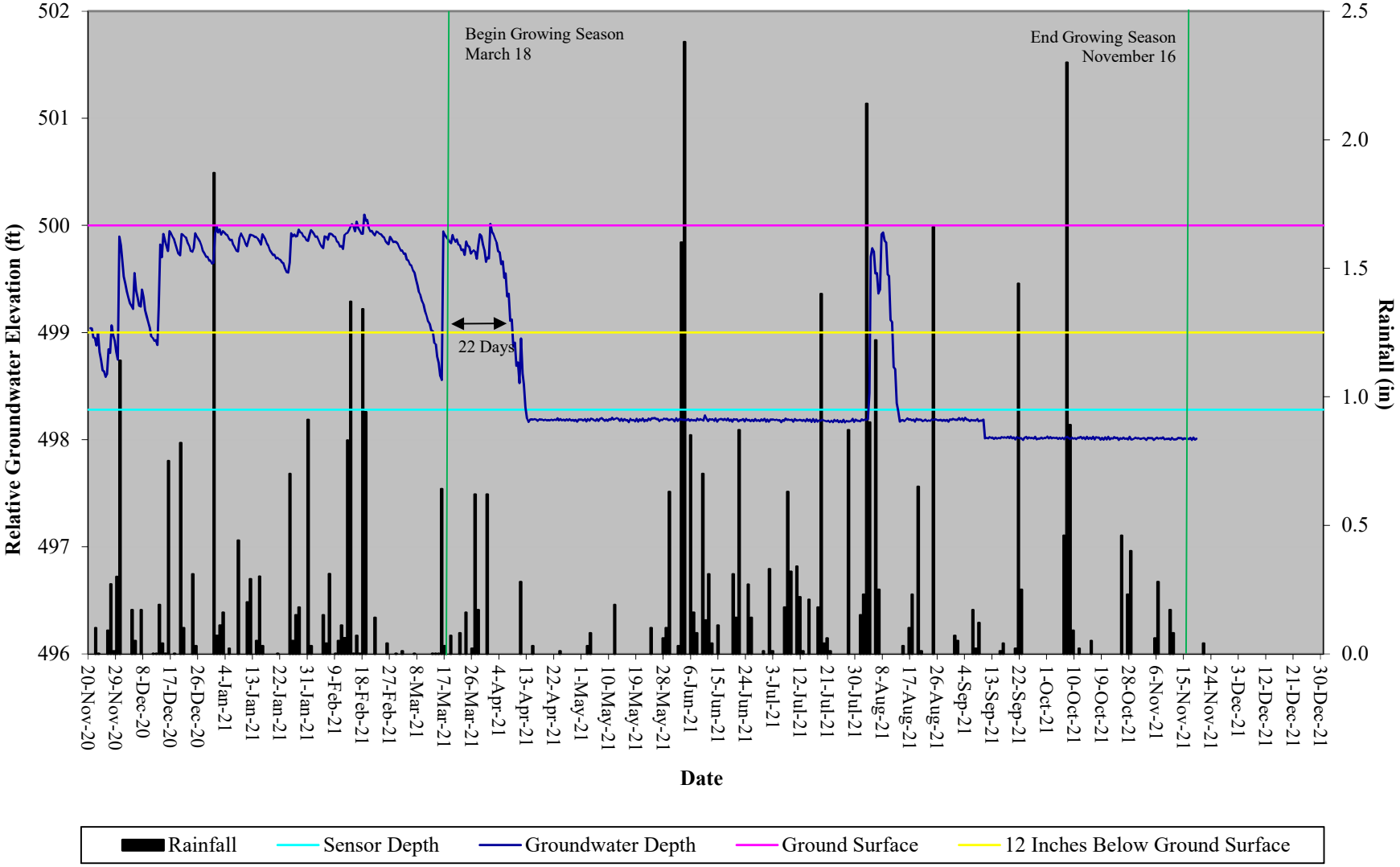
Bear Basin Restoration Site
Hydrograph
Wetland Gauge 10

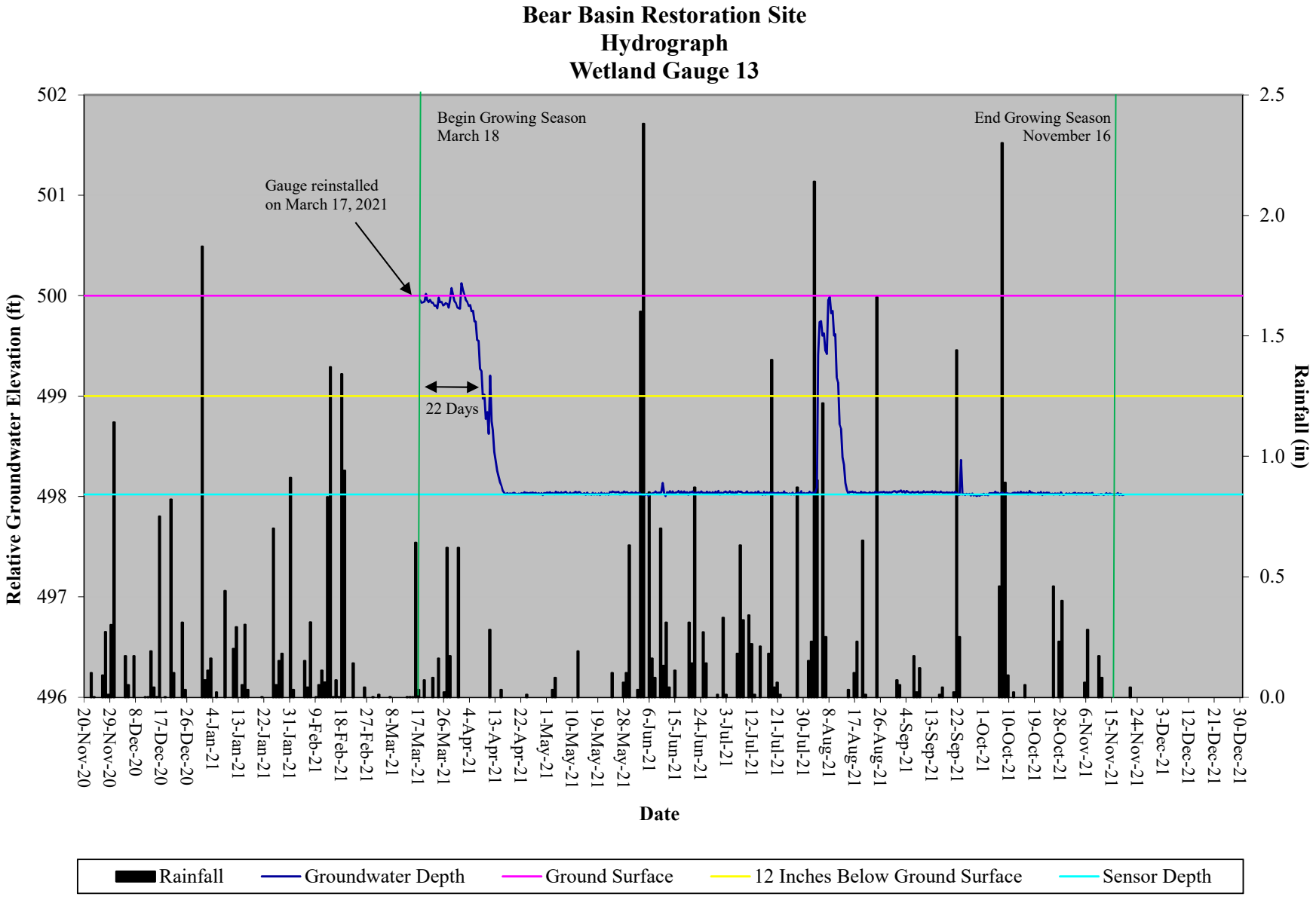


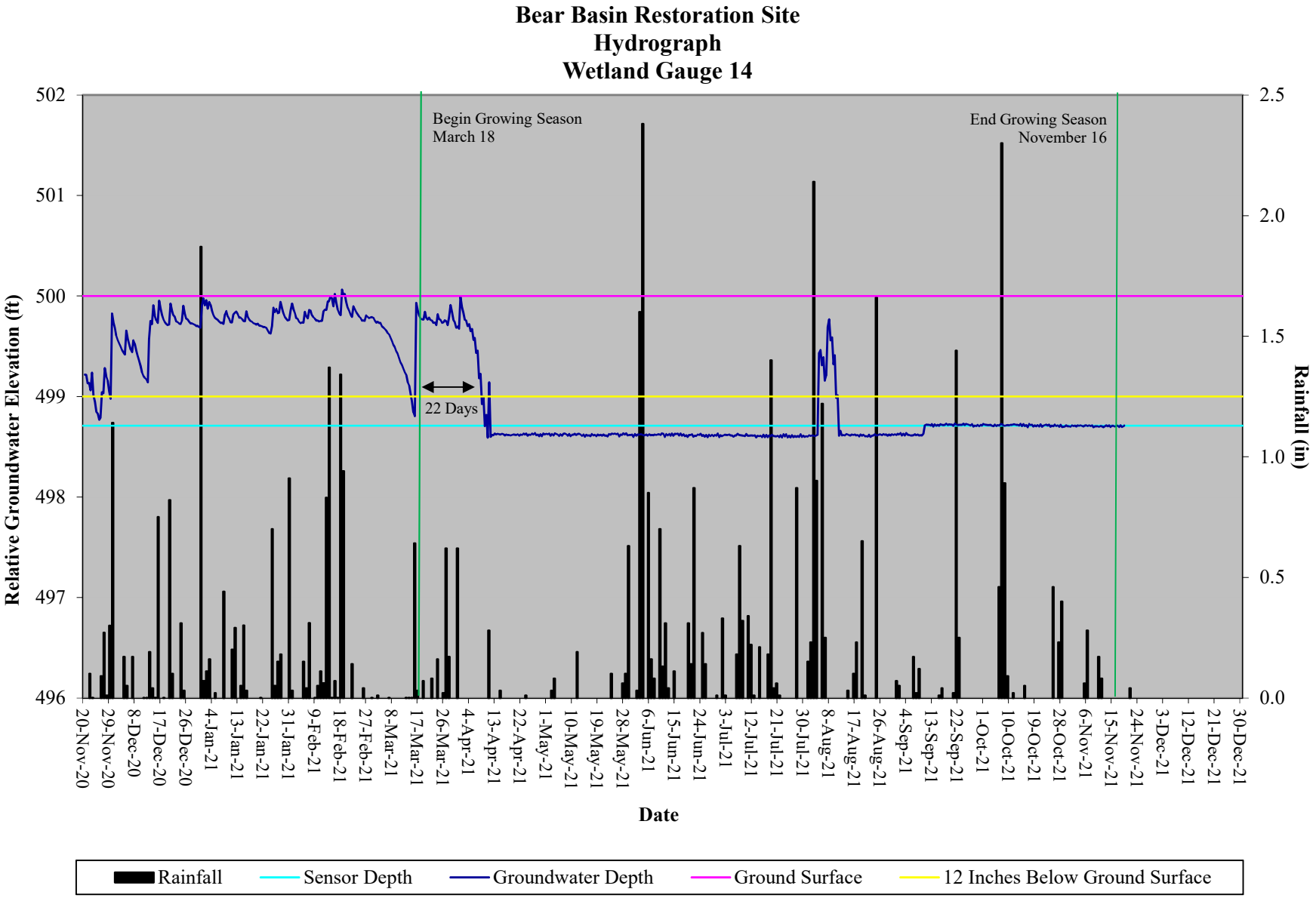
Bear Basin Restoration Site
Hydrograph
Wetland Gauge 11 - non-credit zone

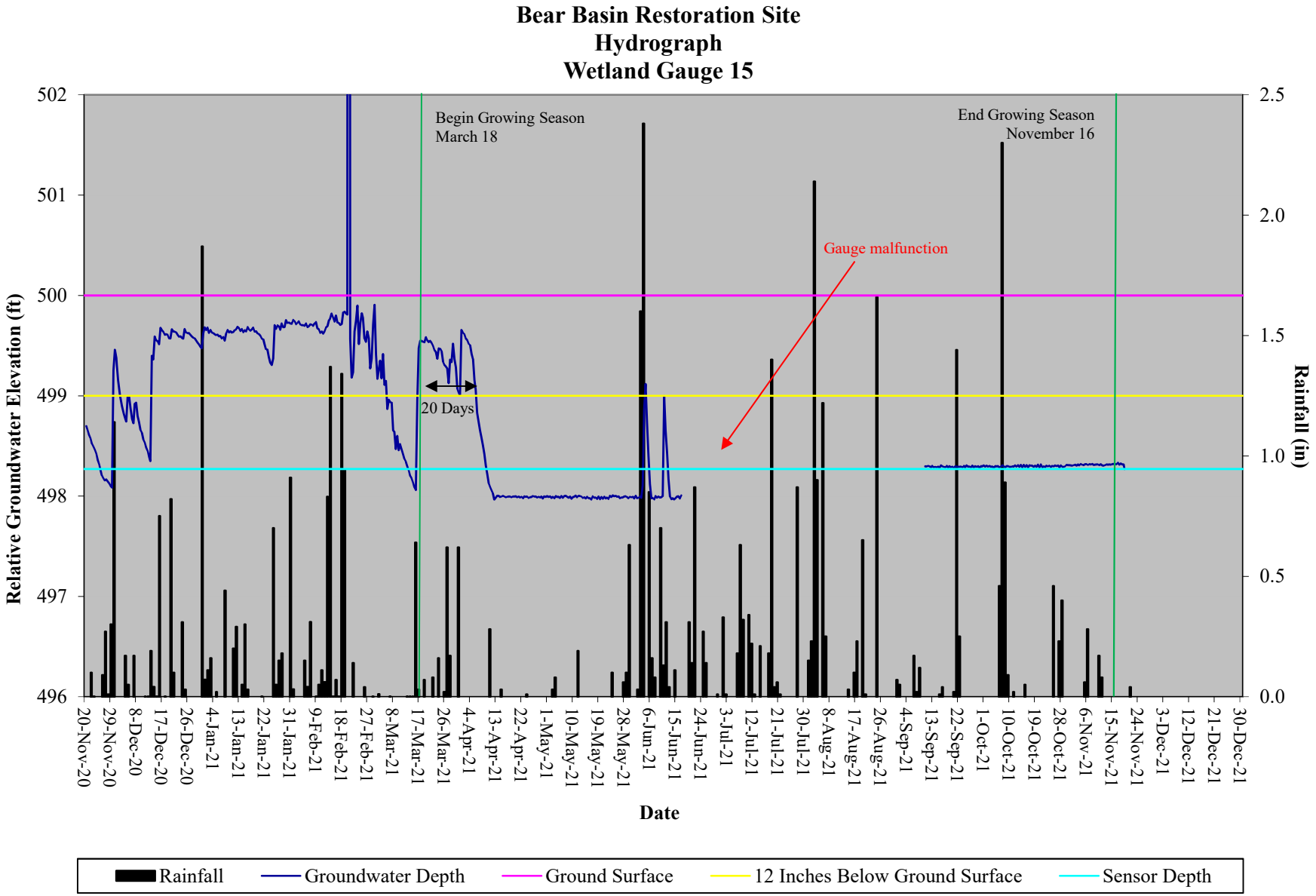


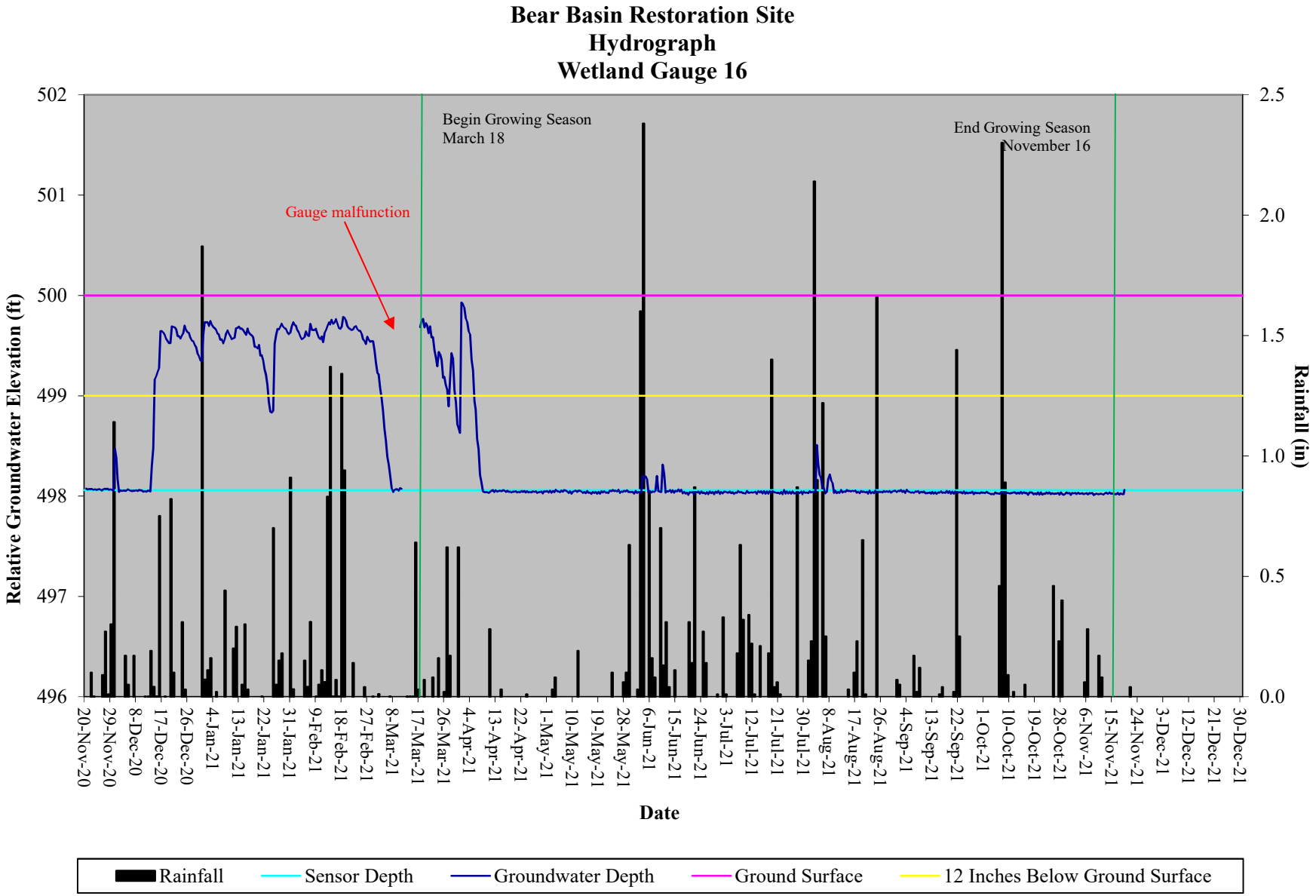
Bear Basin Restoration Site
Hydrograph
Wetland Gauge 12 - non-credit zone



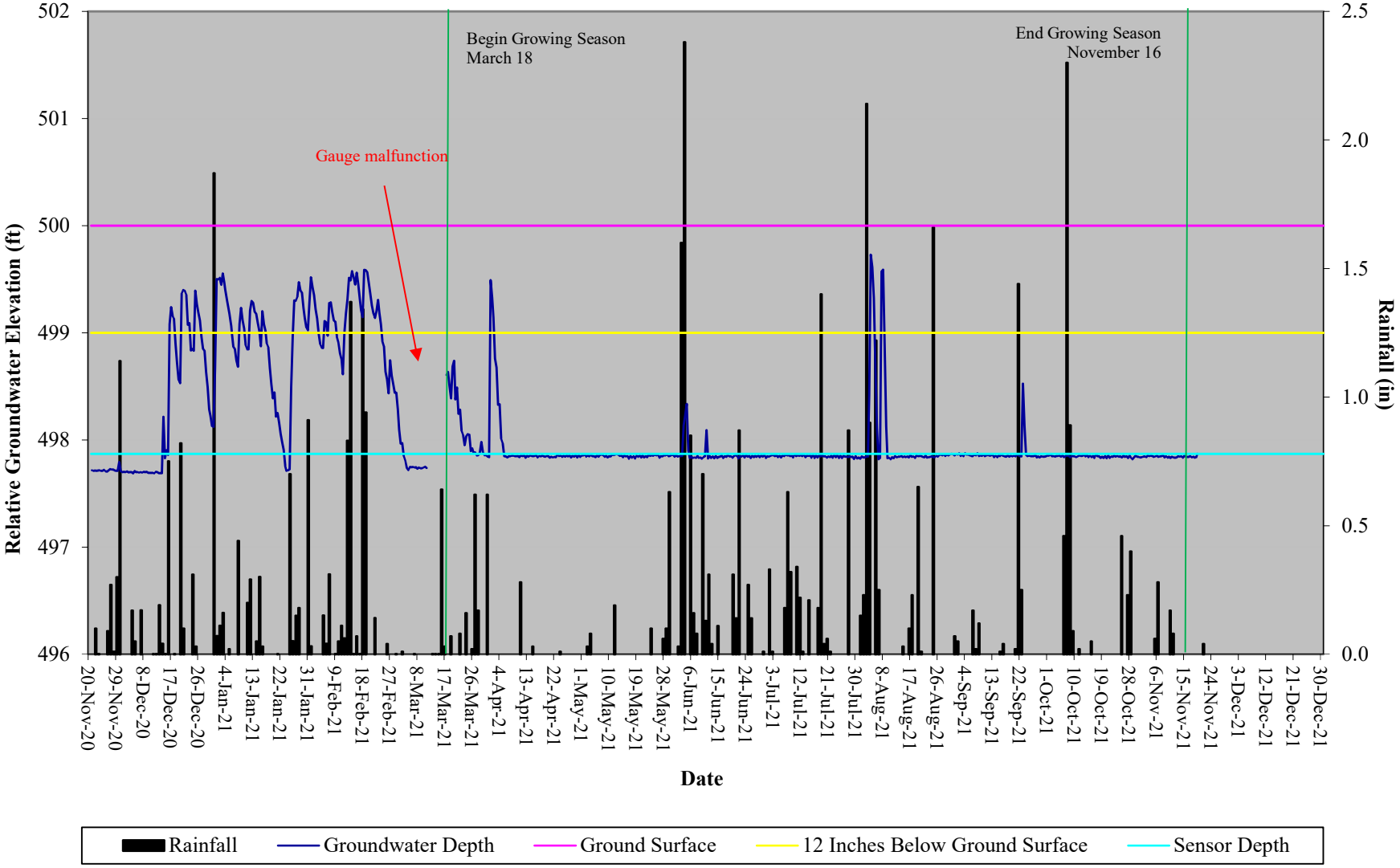

Bear Basin Restoration Site
Hydrograph
Wetland Gauge 13
Begin Growing Season
March 18
End Growing Season
November 16
Gauge reinstalled
on March 17, 2021
22 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

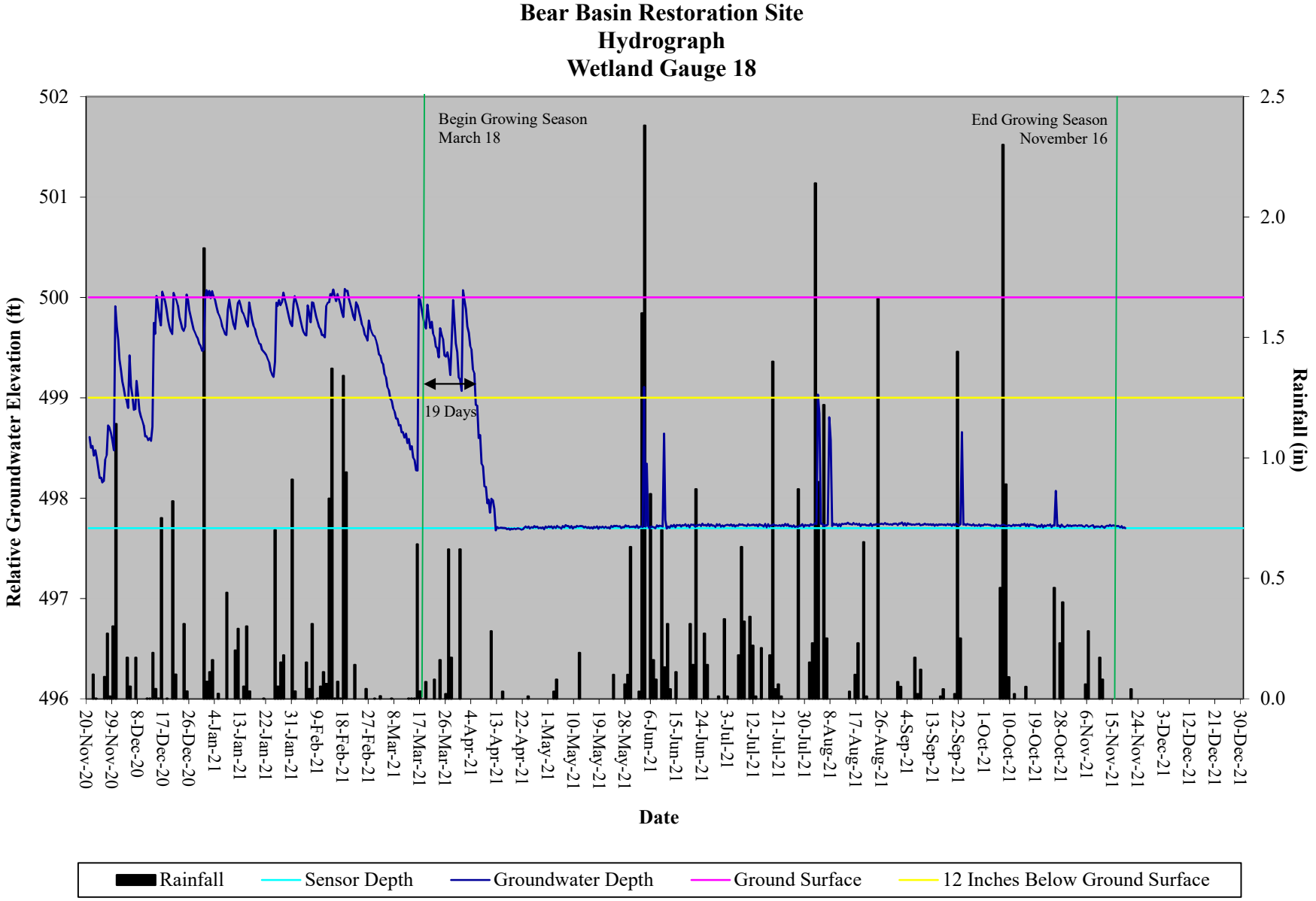

Bear Basin Restoration Site
Hydrograph
Wetland Gauge 14
Begin Growing Season
March 18
End Growing Season
November 16
22 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface

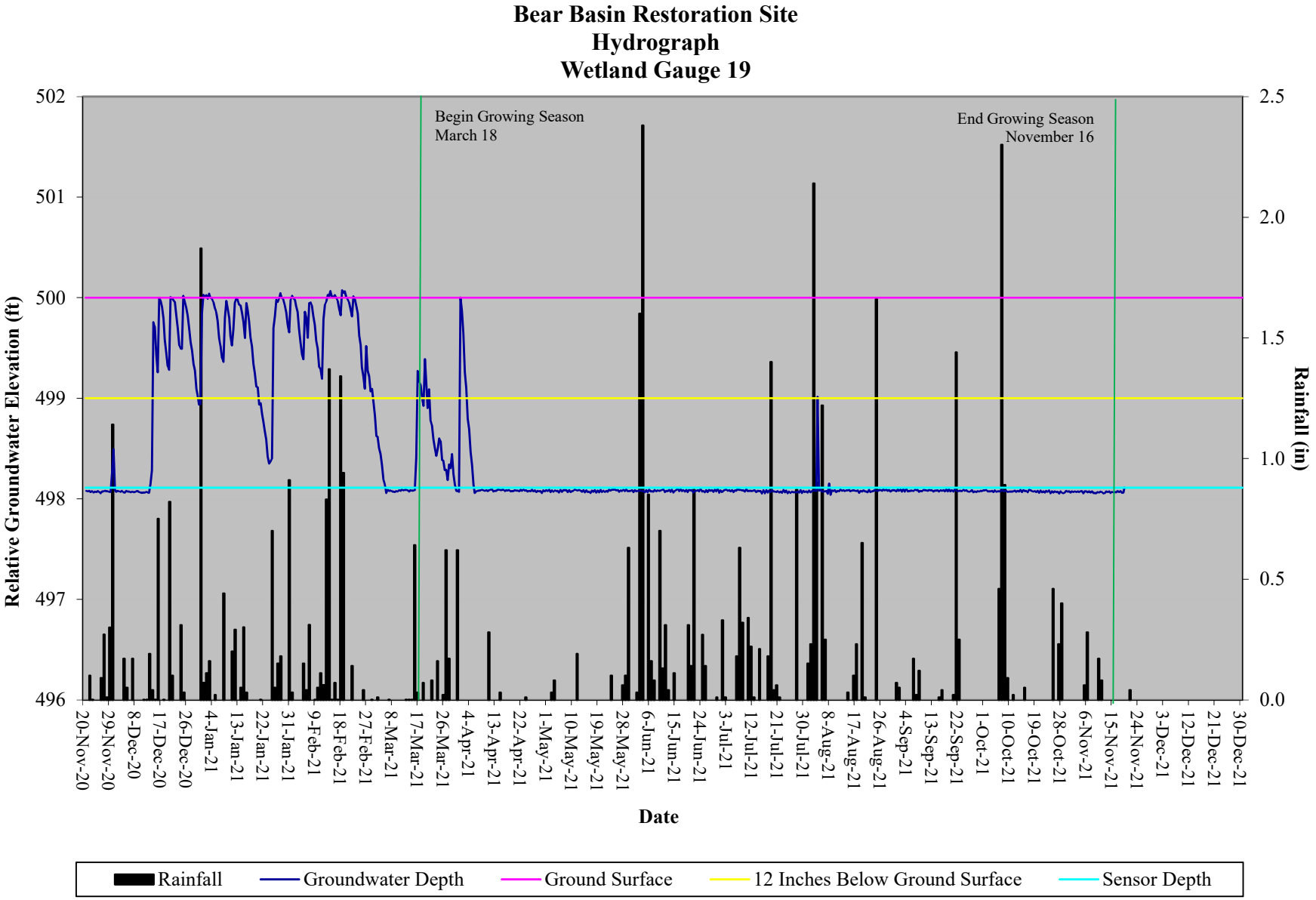

Bear Basin Restoration Site
Hydrograph
Wetland Gauge 15
Begin Growing Season
March 18
End Growing Season
November 16
Gauge malfunction
20 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 16
Begin Growing Season
March 18
End Growing Season
November 16
Gauge malfunction
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface

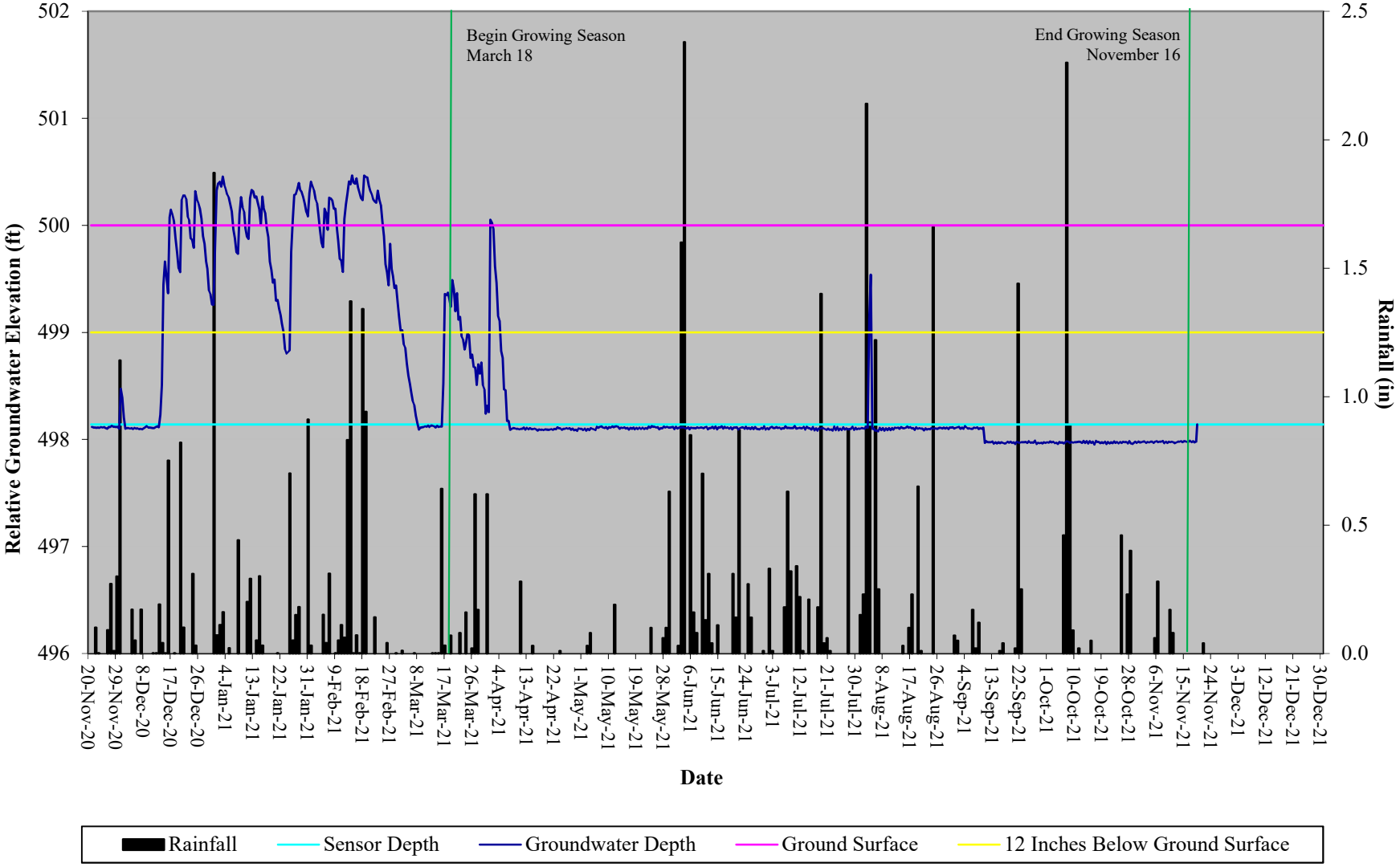
Bear Basin Restoration Site
Hydrograph
Wetland Gauge 17 - non-credit zone

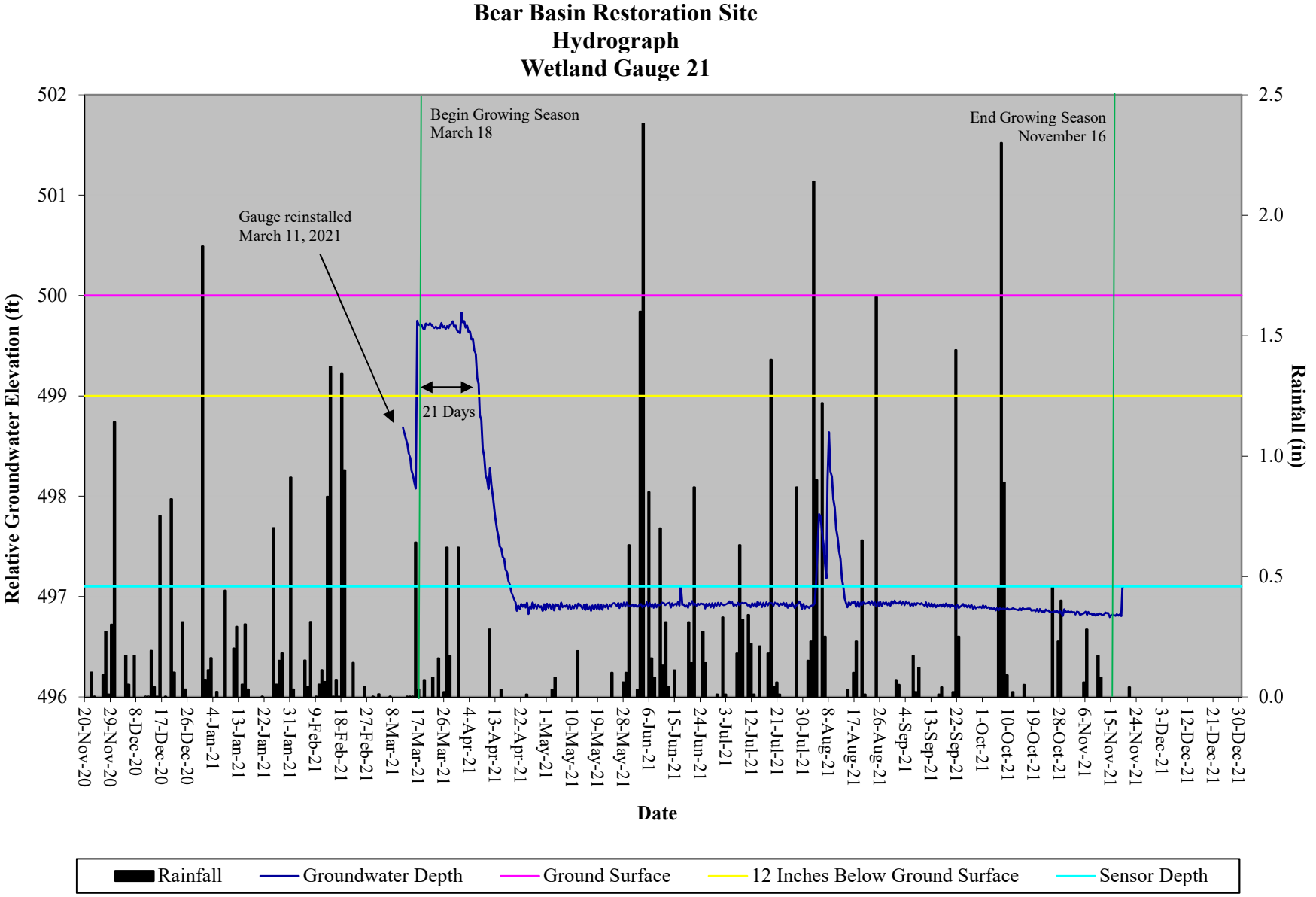


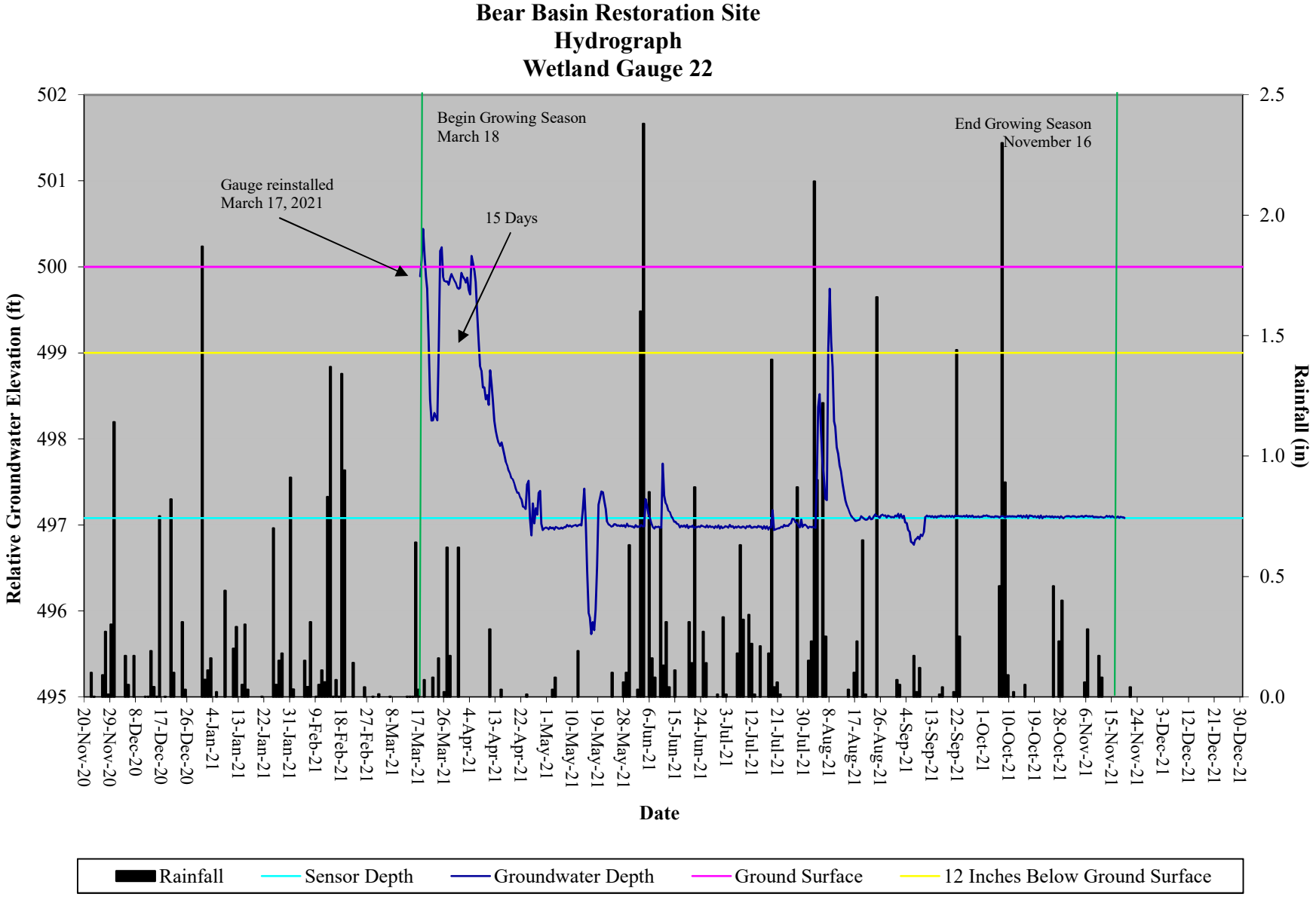

Bear Basin Restoration Site
Hydrograph
Wetland Gauge 18
Begin Growing Season
March 18
End Growing Season
November 16
19 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface

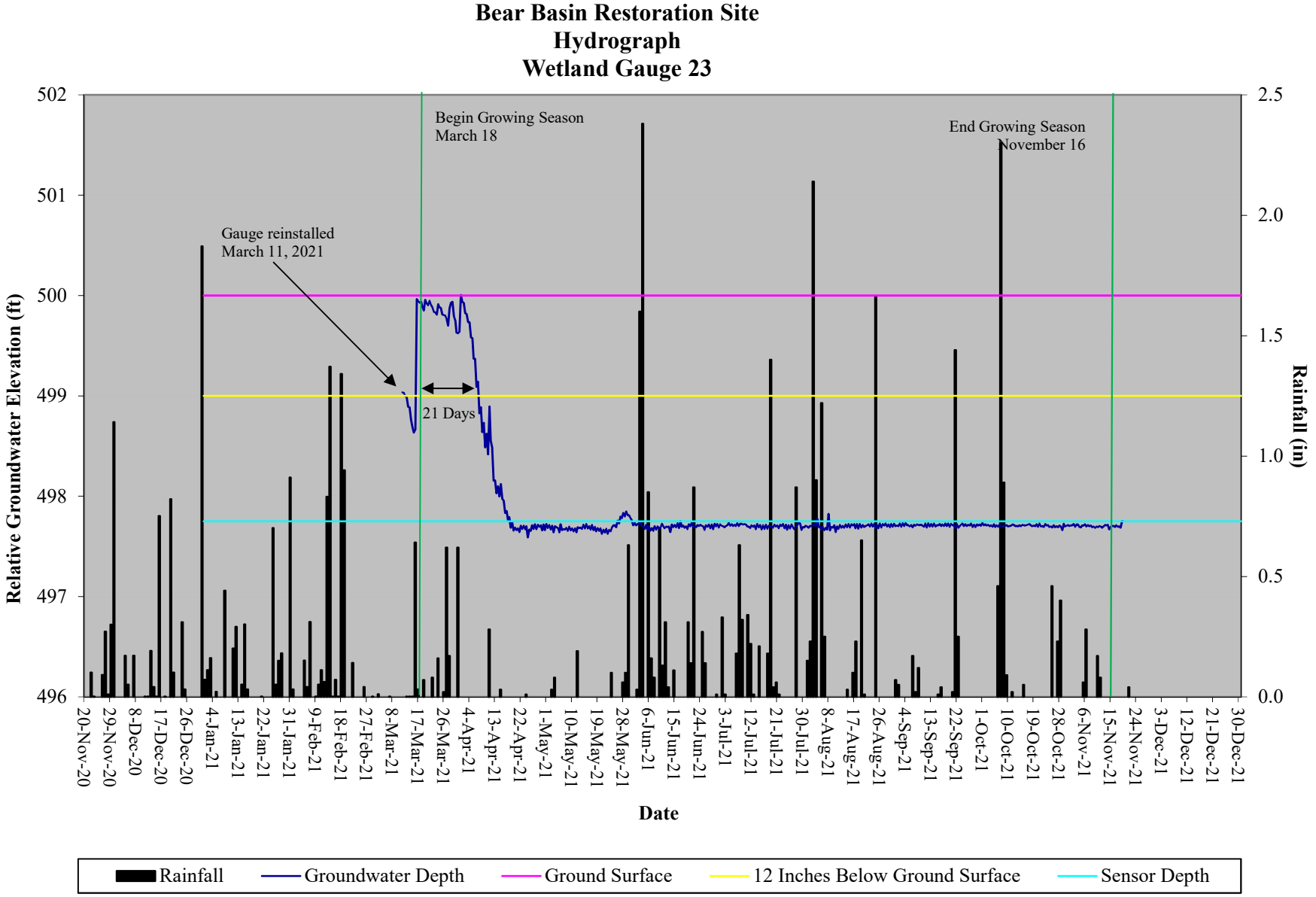

Bear Basin Restoration Site
Hydrograph
Wetland Gauge 19
Begin Growing Season
March 18
End Growing Season
November 16
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

Bear Basin Restoration Site
Hydrograph
Wetland Gauge 20 - non-credit zone

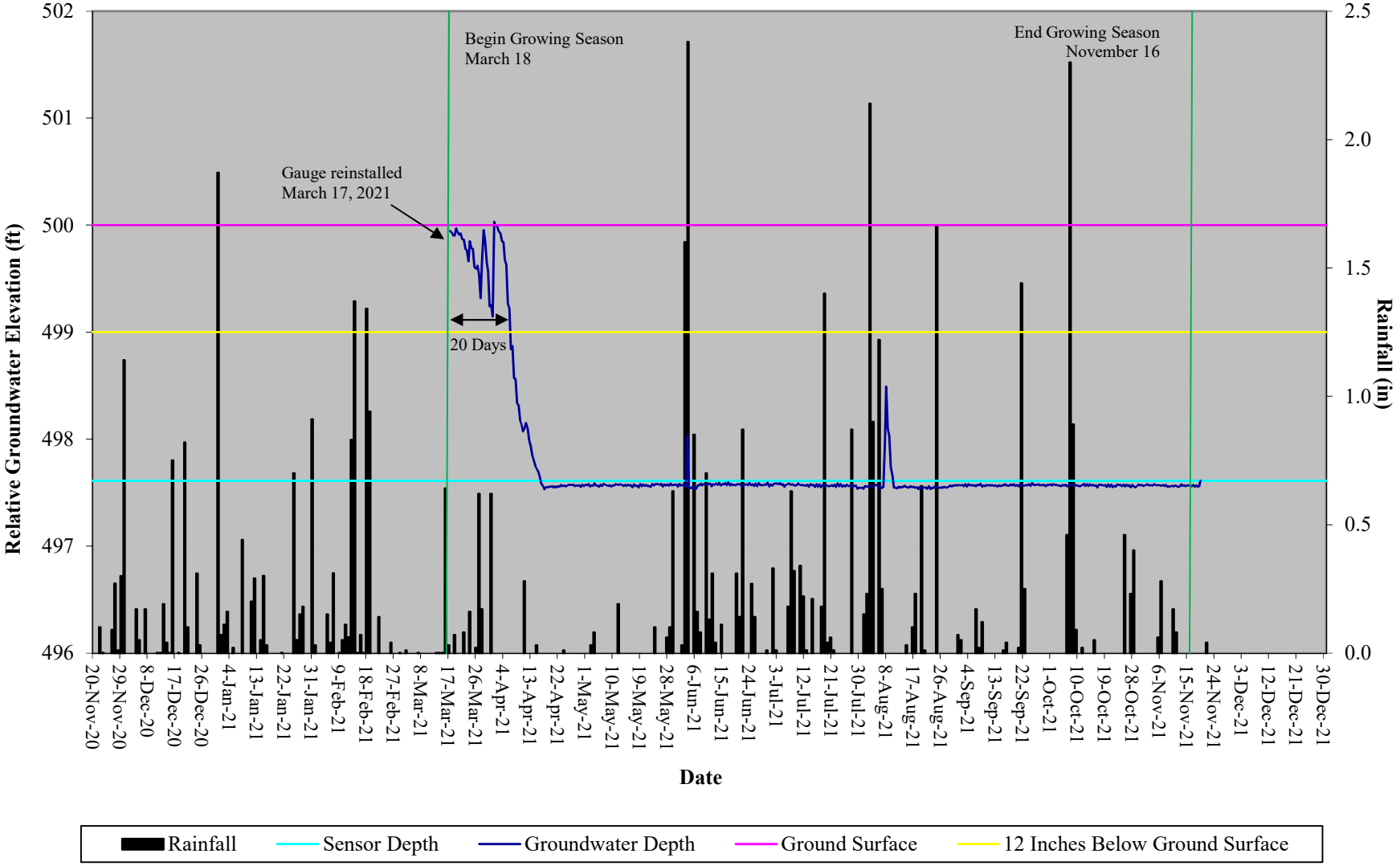



Bear Basin Restoration Site
Hydrograph
Wetland Gauge 21
Begin Growing Season
March 18
End Growing Season
November 16
Gauge reinstalled
March 11, 2021
21 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 22
Begin Growing Season
March 18
End Growing Season
November 16
Gauge reinstalled
March 17, 2021
15 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
495
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface


Bear Basin Restoration Site
Hydrograph
Wetland Gauge 23
Begin Growing Season
March 18
End Growing Season
November 16
Gauge reinstalled
March 11, 2021
21 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

Bear Basin Restoration Site
Hydrograph
Wetland Gauge 24



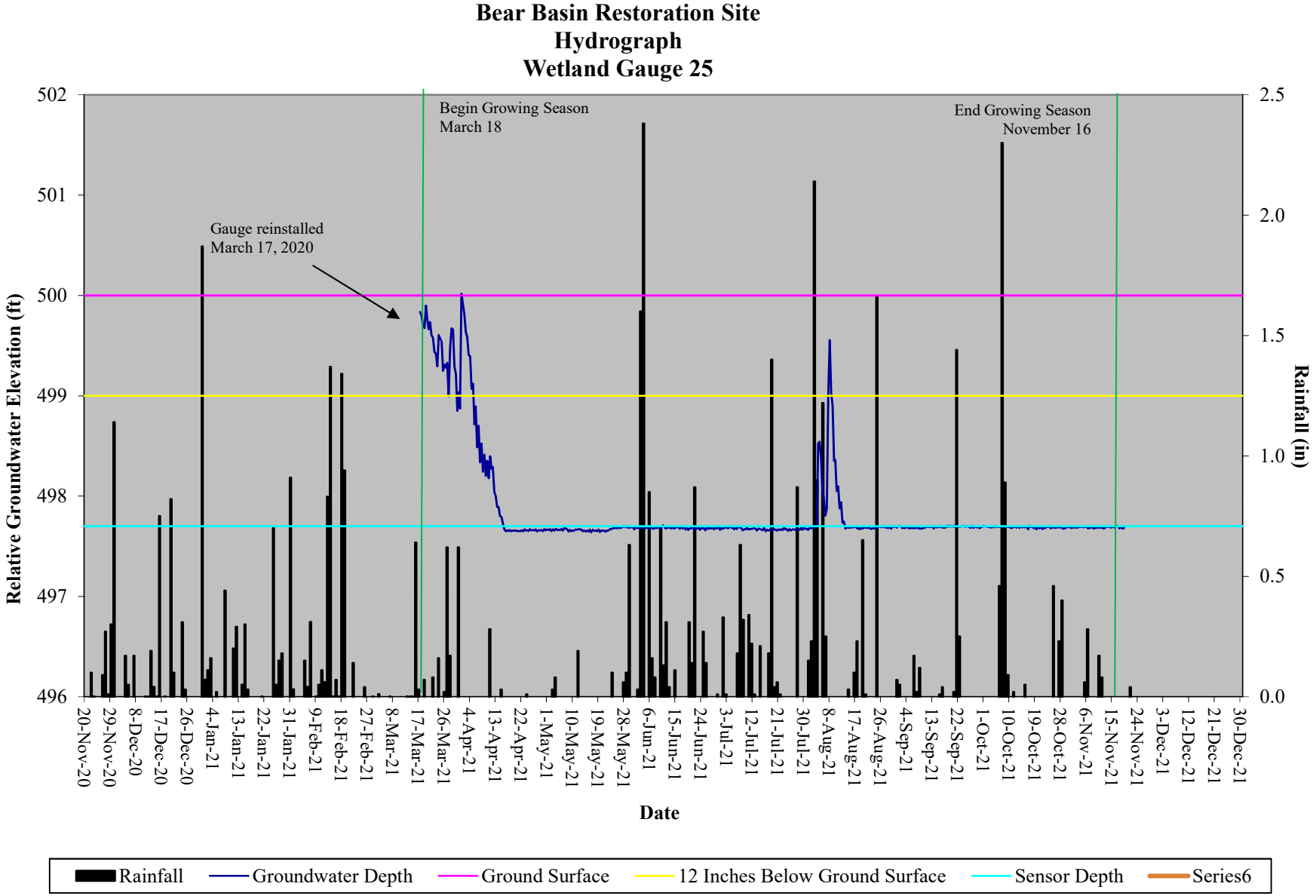

Bear Basin Restoration Site
Hydrograph
Wetland Gauge 25
Begin Growing Season
March 18
End Growing Season
November 16
Gauge reinstalled
March 17, 2020
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
502
501
500
499
498
497
496
2.5
2.0
1.5
1.0
0.5
0.0
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
4-Jan-21
13-Jan-21
22-Jan-21
31-Jan-21
9-Feb-21
18-Feb-21
27-Feb-21
8-Mar-21
17-Mar-21
26-Mar-21
4-Apr-21
13-Apr-21
22-Apr-21
1-May-21
10-May-21
19-May-21
28-May-21
6-Jun-21
15-Jun-21
24-Jun-21
3-Jul-21
12-Jul-21
21-Jul-21
30-Jul-21
8-Aug-21
17-Aug-21
26-Aug-21
4-Sep-21
13-Sep-21
22-Sep-21
1-Oct-21
10-Oct-21
19-Oct-21
28-Oct-21
6-Nov-21
15-Nov-21
24-Nov-21
3-Dec-21
12-Dec-21
21-Dec-21
30-Dec-21
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth
Series6

Table 7. Wetland Hydrology Criteria Attainment Table

Project Number and Name: 95362 - Bear Basin Restoration Site

	Success Criteria Achieved / Max Consecutive Days During Growing Season (Percentage)						
Success Criteria (20 Days) (8%)	**MY-01 2015**	**MY-02 2016**	**MY-03 2017**	**MY-04 2018**	**MY-05 2019**	**MY-06 2020**	**MY-07**
Gauge 1	Yes/23 (9.4%)	Yes/24 (9.8%)	Yes/26 (10.7%)	Yes/31 (12.7%)	No/12 (4.9%)	Yes/20 (8.2%)	Yes/21 (8.6%)
Gauge 2	Yes/28 (11.5%)	Yes/42 (17.2%)	Yes/28 (11.5%)	Yes/37 (15.2%)	Yes/40 (16.4%)	Yes/56 (23.0%)	Yes/31 (12.8%)
Gauge 3	Yes/22 (9.0%)	No/14 (5.7%)	No/10 (4.1%)	Yes/27 (11.1%)	Yes/24 (9.8%)	Yes/25 (10.2%)	Yes/22 (9.1%)
Gauge 4	No/17 (7.0%)	No/15 (6.1%)	Yes/25 (10.2%)	Yes/26 (10.7%)	No/9 (3.7%)	No/7 (2.9%)	No/19 (7.8%)
Gauge 5	Yes/90 (36.9%)	Yes/48 (19.7%)	Yes/30 (12.3%)	Yes/48 (19.7%)	Yes/43 (17.6%)	Yes/41 (16.8%)	Yes/25 (10.3%)
Gauge 6	Yes/28 (11.5%)	Yes/41 (16.8%)	Yes/29 (11.9%)	Yes/46 (18.9%)	Yes/39 (16.0%)	Yes/42 (17.2%)	Yes/28 (11.5%)
Gauge 7	Yes/51 (20.9%)	Yes/45 (18.4%)	Yes/25 (10.2%)	Yes/47 (19.3%)	Yes/56 (23.0%)	Yes/60 (24.6%)	Yes/35 (14.4%)
Gauge 8	Yes/28 (11.5%)	Yes/42 (17.2%)	Yes/27 (11.1%)	Yes/33 (13.5%)	Yes/41 (16.8%)	Yes/41 (16.8%)	Yes/26 (10.7%)
Gauge 9	Yes/23 (9.4%)	Yes/23 (9.4%)	Yes/25 (10.2%)	Yes/31 (12.7%)	No/13 (5.3%)	Yes/41 (16.8%)	Yes/27 (11.1%)
Gauge 10	Yes/24 (9.8%)	No/18 (7.4%)	Yes/26 (10.7%)	Yes/33 (13.5%)	Yes/23 (9.4%)	Yes/20 (8.2%)	Yes/23 (9.5%)
Gauge 11*	15 (6.1%)	15 (6.1%)	4 (1.6%)	13 (5.3%)	4 (1.6%)	5 (2.0%)	10 (4.1%)
Gauge 12*	25 (10.2%)	19 (7.8%)	25 (10.2%)	32 (13.1%)	23 (9.4%)	20 (8.2%)	22 (9.1%)
Gauge 13	Yes/27 (11.1%)	Yes/42 (17.2%)	Yes/26 (10.7%)	Yes/32 (13.1%)	No/11 (4.5%)	Yes/20 (8.2%)	Yes/22 (9.1%)
Gauge 14	Yes/25 (10.2%)	No/19 (7.8%)	Yes/26 (10.7%)	Yes/32 (13.1%)	Yes/23 (9.4%)	Yes/20 (8.2%)	Yes/22 (9.1%)
Gauge 15	Yes/35 (14.3%)	Yes/42 (17.2%)	Yes/27 (11.1%)	Yes/33 (13.5%)	No/13 (5.3%)	No/15 (6.1%)	Yes/20 (8.2%)
Gauge 16	Yes/22 (9.0%)	No/14 (5.7%)	No/10 (4.1%)	Yes/31 (12.7%)	No/12 (4.9%)	No/11 (4.5%)	No/10 (4.1%)
Gauge 17*	23 (9.4%)	14 (5.7%)	9 (3.7%)	14 (5.7%)	7 (2.9%)	4 (1.6%)	2 (0.8%)
Gauge 18	Yes/22 (9.0%)	No/14 (5.7%)	No/9 (3.7%)	Yes/26 (10.7%)	No/8 (3.3%)	No/10 (4.1%)	No/19 (7.8%)
Gauge 19	No/18 (7.4%)	No/12 (4.9%)	No/7 (2.9%)	Yes/25 (10.2%)	No/4 (1.6%)	No/8 (3.3%)	No/3 (1.2%)
Gauge 20*	19 (7.8%)	12 (4.9%)	7 (2.9%)	26 (10.7%)	8 (3.3%)	10 (4.1%)	5 (2.1%)
Gauge 21**				Yes/30 (12.3%)	Yes/23 (9.4%)	Yes/20 (8.2%)	Yes/21 (8.6%)
Gauge 22**				Yes/27 (11.1%)	No/10 (4.1%)	No/19 (7.8%)	No/15 (6.2%)
Gauge 23**				Yes/26 (10.7%)	No/12 (4.9%)	No/14 (5.7%)	Yes/21 (8.6%)
Gauge 24**				Yes/27 (11.1%)	No/9 (3.7%)	No/14 (5.7%)	Yes/20 (8.2%)
Gauge 25**				Yes/26 (10.7%)	No/8 (3.3%)	No/10 (4.1%)	No/10 (4.1%)

*=non-credit bearing area **=Gauge installed March 7, 2018