Monitoring Report

Norman's Pasture Restoration Site
DMS Contract 005010
DMS Project Number 95717

Norman's Pasture II Restoration Site
DMS Contract 5787
DMS Project Number 96310

USACE Action ID#: SWA-2013-00109
DWR Project #: 2014-0107
Sampson County, NC

Monitoring Year 04

Construction Completed: Feb 2016
Data Collection: 2019
Submitted: December 2019

Mitigation Project Name	**Norman's Pasture II**	**County**	**Sampson**	**USACE Action ID**	**2013-00109**
DMS ID	**96310**	**Date Project Instituted**	**2/5/2014**	**NCDWR Permit No**	**2014-0107**
River Basin	**Cape Fear**	**Date Prepared**	**6/13/2019**		
Cataloging Unit	**03030006**				

Credit Release Milestone	Stream Credits						Wetland Credits							
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Date (Wetland)
Potential Credits (Mitigation Plan)		**337.200**						**9.733**						
Potential Credits (As-Built Survey)		**337.200**						**9.733**						
1 (Site Establishment)	**N/A**				N/A	N/A	**N/A**				**N/A**		N/A	N/A
2 (Year 0 / As-Built)	**30%**	101.160			2016	6/24/2016	**30%**	2.920			**N/A**		2016	6/24/2016
3 (Year 1 Monitoring)	**10%**	33.720			2017	4/3/2017	**10%**	0.973			**N/A**		2017	4/3/2017
4 (Year 2 Monitoring)	**10%**	33.720			2018	4/25/2018	**10%**	0.973			**N/A**		2018	4/25/2018
5 (Year 3 Monitoring)	**10%**	33.720			2019	4/26/2019	**15%**	1.460			**N/A**		2019	4/26/2019
6 (Year 4 Monitoring)	**5%**				2020		**5%**				**N/A**		2020	
7 (Year 5 Monitoring)	**10%**				2021		**15%**				**N/A**		2021	
8 (Year 6 Monitoring)	**5%**				2022		**5%**				**N/A**		2022	
9 (Year 7 Monitoring)	**10%**				2023		**10%**				**N/A**		2023	
Stream Bankfull Standard	**10%**	33.720			2018	4/25/2018	**N/A**				**N/A**			
Total Credits Released to Date		**236.040**						**6.327**						

NOTES:

Contingencies (if any): None

Signature of Wilmington District Official Approving Credit Release

27 Sept 2019

Date

1 - For NCDMS, no credits are released during the first milestone

2 - For NCDMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCDMS Portal, provided the following criteria have been met:

1) Approval of the final Mitigation Plan
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
4) Reciept of necessary DA permit authorization or written DA approval for porjects where DA permit issuance is not required

3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met

Mitigation Project Name	**Norman's Pasture II**	**County**	**Sampson**	**USACE Action ID**	**2013-00109**
DMS ID	**96310**	**Date Project Instituted**	**2/5/2014**	**NCDWR Permit No**	**2014-0107**
River Basin	**Cape Fear**	**Date Prepared**	**6/13/2019**		
Cataloging Unit	**03030006**				

DEBITS (released credits only)

			Ratios	1	1.5	2.5	5	1	3	1.5	5	1	3	2	5	1	3	2	5
				Stream Restoration	Stream Enhancment I	Stream Enhancement II	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
As-Built Amounts (feet and acres)						**843.000**		**8.800**		**1.400**									
As-Built Amounts (mitigation credits)						**337.200**		**8.800**		**0.933**									
Percentage Released						**70%**		**65%**		**65%**									
Released Amounts (feet / acres)						**590.100**		**5.720**		**0.910**									
Released Amounts (credits)						**236.040**		**5.720**		**0.607**									
NCDWR Permit	USACE Action ID	Project Name																	
2012-0240	1992-03237	NCDOT TIP R-2303D - NC 24 Improvements, Sampson County				252.900													
2012-0240	1992-03237	NCDOT TIP R-2303D - NC 24 Improvements, Sampson County						2.910											
2012-0240	1992-03237	NCDOT TIP R-2303D - NC 24 Improvements, Sampson County				84.300													
Remaining Amounts (feet / acres)						**252.900**		**2.810**		**0.910**									
Remaining Amounts (credits)						**101.160**		**2.810**		**0.607**									

Monitoring and Design Firm

Prepared by:

KCI Associates of North Carolina, PC
4505 Falls of Neuse Rd. Suite 400
Raleigh, NC 27609
(919) 783-9214

Project Contact: Tim Morris
Email: tim.morris@kci.com
KCI Project # 20122925/20145090

December 2019

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: February 13, 2020
To: Jeremiah Dow, DMS Project Manager
From: Tim Morris, Project Manager
KCI Associates of North Carolina, PA
Subject: MY-04 Monitoring Report Comments
Norman's Pasture IMS#95717, Contract 005010
Norman's Pasture II IMS#96310, Contract 5787
Cape Fear River Basin CU 03030006
Sampson County, North Carolina

Please find below our responses in italics to the MY-04 Monitoring Report comments from NCDMS received on January 13, 2020, for the Norman's Pasture/Norman's Pasture II Restoration Sites.

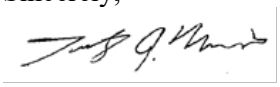
1. Digital Data:
   a. DMS is missing a spatial feature for NPII Tributary 1. Please provide a feature for Tributary that characterizes the creditable assets that have been reported, ensuring that the linear footage of the feature matches the linear footage reported in the asset table.
      KCI Response: This has been added to the digital deliverable.

2. Section 2.2
   a. 3rd paragraph – The last sentence referencing Table 10 in Appendix D should reference Table 8.
      KCI Response: This change has been made.

   b. NPII-8 has not met hydrologic success of 9% in all 4 years and does not appear to be trending in that direction. In MY3 KCI stated that an additional well would be installed between NPII-8 and NPII-15 before the start of the 2019 growing season, but it appears no gauges was installed. Please briefly discuss the reason for not installing a gauge as proposed.
      KCI Response: This gauge (NPII-17) was accidentally left out of this year's report. This error has been corrected.

   c. During the October 2019 IRT site visit, different possibilities were discussed regarding failing gauges at NPII including a delineation of at risk areas and an adaptive management plan to offset the loss around the gauge(s) by management activities. The area around NPII-8 represents credits at risk.
      KCI Response: KCI is aware that the area around NPII-8 represents credits at risk and is taking steps to determine the extent of the at-risk area.

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



Tim Morris
Project Manager

Table of Contents

1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

There are two separate projects included within this report. The projects are adjacent to each other, which is why the reporting structure for these projects is combined. The Norman's Pasture Restoration Site (NPRS) was completed in February 2016 and restored a total of 16.2 acres of riparian wetlands. Two on-site tributaries were also restored to integrated headwater/stream systems, but no stream mitigation credit is included in the NPRS. The NPRS is a riparian wetland system in the Cape Fear River Basin (03030006 8-digit HUC) in eastern Sampson County, North Carolina, that had been substantially modified to maximize agricultural production. The completed project will restore impacted agricultural lands to riparian wetland habitat.

The Norman's Pasture II Restoration Site (NPII) is located directly adjacent to NPRS, was also completed in February 2016, and includes a total of 10.2 acres of riparian wetland restoration and 843 linear feet of stream enhancement II. The NPII also includes 0.8 acres of existing wetland preservation. The completed NPII project will expand on the restoration efforts of the NPRS by extending restoration and protection initiatives to the headwater extents of much of the local watershed. The site will restore and protect a range of unique aquatic resources in one setting – existing riparian wetlands, a forested tributary that had lost connection with its historic floodplain, lower gradient seep-fed headwaters, and adjacent upland buffers.

The NPRS is protected by a 36.9-acre permanent conservation easement, while NPII is protected by a 16.3-acre permanent conservation easement, both held by the State of North Carolina. Both sites are located on two parcels located off of Cornwallis Road, approximately 5 miles west of Magnolia, North Carolina. The project sites are bounded by Stewarts Creek to the south, agricultural land to the north, Cornwallis Road to the east, and woodlands to the west. The sites have a long history of hydrologic modification in order to allow for farming to take place on the property.

The Cape Fear River Basin Restoration Priorities state the goals for the NPRS and NPII's 14-digit HUC are to protect and improve water quality throughout the Basin by reducing sediment and nutrient inputs into streams and rivers and to support efforts to restore local watersheds (NCDENR EEP, 2009). The project goals for NPRS and NPII are in line with the basin priorities and include the following:

- Reconnect a continuous stream and wetland headwater wetland system to Stewarts Creek.
- Expand and protect riparian habitat along Stewart's Creek.
- Buffer nutrient inputs from adjacent agricultural and grazing practices.

Additional goals for the project include:

- Increase the local hydroperiod by encouraging both surface and subsurface storage and retention.
- Restore and establish a functional and diverse stream/wetland complex.

The project goals will be addressed through the following objectives:

- Redevelop a stream/wetland complex that has previously been impacted by ditching and cattle grazing.
- Fill field ditches to restore surface flow retention and historic flow paths.
- Protect and integrate existing riparian wetlands into the project design.
- Re-forest riparian areas with native plant communities.
- Re-connect headwater seeps to the broader swamp forest community of Stewarts Creek being restored by NPRS and NPII

Project planting and construction were completed in February 2016. The NPRS involved restoration and establishment of a functional stream/wetland complex with 16.2 acres of riparian wetland restoration (15.5 acres of re-establishment and 0.7 acre of wetland rehabilitation). Select ditches across the site were modified or filled and seeps were redirected and redeveloped to retain and distribute surface flow across the site. The two project tributaries (Tributaries 1 and 2 to Stewarts Creek) were restored to integrated headwater/stream systems, but no stream mitigation credit is included in NPRS. Approximately 9.0 acres of wetland preservation is included throughout the NPRS, but for no additional credit.

The NPII aimed to restore and establish a stream/wetland complex with 10.2 acres of riparian wetland restoration (8.8 acres of re-establishment and 1.4 acres of rehabilitation). Approximately 843 linear feet of Tributary 1 to Stewarts Creek were improved with Enhancement II and reconnected to the historic floodplain. Also, approximately 0.8 acre of existing wetlands were included as preservation at NPII (no mitigation credit).

Both NPRS and NPII were constructed as designed with only a few modifications made to the design plan during construction. On NPRS, several portions of the on-site ditches were not filled and a ditch plug was not installed to allow Stewart's Creek better flood access to the site. Two extra areas were also planted as Headwater Forest Communities. On NPII, one riffle enhancement and one log drop were not installed at the very beginning of the stream reach. Several extra HDPE pipes were also added at the crossings to allow better hydraulic connectivity between the different areas of the site.

The monitoring components were installed in February and March 2016 for both sites. 22 monitoring gauges (9 on NPRS and 13 on NPII) were installed to evaluate the attainment of jurisdictional wetland hydrology for both sites. One monitoring gauge was installed in the stream on NPII to document the presence of surface water and record the occurrence of bankfull events. In addition to this, two other gauges were installed outside of the credit bearing area to monitor hydrology in what could become a (non-credit bearing) wetland creation area within the easement. Three more gauges were installed at NPII in February of 2018 and a fourth was installed in March 2019, for a total of 26 wetland hydrology gauges within the credit bearing portions of the site. To determine the success of the planted mitigation areas, 31 permanent vegetation monitoring plots (18 on NPRS and 13 on NPII) were established according to the CVS-EEP Level 2 protocol. Ten permanent photo points have been established with a total of twelve photos to be taken annually. The site will be monitored for five to seven years or until the success criteria are achieved. Reports will be submitted to the DMS each year.

The success criteria for the sites state that the planted wetlands must meet the success criteria of a site average 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. Vegetation monitoring did not take place during the fourth monitoring year, as stipulated in the Mitigation Plan.

Wetland hydrology is monitored with the series of 26 automatic gauges described above that record water table depth. Two additional gauges are installed outside of the credit bearing area to monitor hydrology in what could become a (non-credit bearing) wetland creation area within the easement. To meet the success criterion, the upper 12 inches of the soil profile must have continuously saturated or inundated conditions for at least 9.0% of the growing season in the Headwater Forest community and 12.0% of the growing season in the Riverine Swamp Forest community during normal weather conditions. During the site's fourth growing season, all of the 9 gauges at NPRS and 14 of the 17 gauges at NPII met the success

2.0 MONITORING RESULTS

2.1 Vegetation Monitoring Results

The vegetation monitoring success criterion for the planted mitigation area is a density of 320 stems/acre after the third year of monitoring and an allowance for 10% mortality in the following years for a stem density of 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, thirty-one permanent vegetation monitoring plots (10 by 10 meters) have been established in the mitigation area at a density that represents the total mitigation acreage. Eighteen of these plots are in NPRS and thirteen of these are in NPII. No vegetation monitoring occurred during the fourth monitoring year, as stipulated in the Mitigation Plan.

2.2 Hydrology Monitoring Results

Twenty-two groundwater monitoring gauges were installed at baseline in the wetland mitigation areas to measure wetland hydrology. Nine of these gauges are in Norman's Pasture (NP) and thirteen are in Norman's Pasture II (NPII). In addition to this, two other gauges were installed outside of the credit bearing area to monitor hydrology in what could become a (non-credit bearing) wetland creation area within the easement. Three more gauges were installed at NPII in February of 2018. The growing season for Sampson County begins February 28 and ends November 21 (267 days). The success criteria for the site states that the water table of the restored wetlands must be within 12" of the soils surface continuously for at least 9% (24 days) of the growing season for headwater forest systems and 12% (32 days) for riverine swamp forest systems during normal weather conditions. A "normal" year is based on NRCS climatological data for Sampson County, and 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" (Sprecher and Warne, 2000).

The daily rainfall data was obtained from a local weather station in Clinton, NC; provided by the NC State Climate Office. For the 2019-year, the months of April, August, and September experienced above average rainfall, while February, March, June, July, October, and November experienced average rainfall. The months of January and May recorded below average rainfall for the site. Overall, the area experienced average rainfall during the 2019 growing season.

During the site's fourth growing season, twenty-two of the twenty-five wells met the success criterion of having saturated soil conditions occurring within 12 inches of the ground surface for a minimum continuous period of 9% (24 days) for headwater forest systems or 12% (32 days) for riverine swamp forest systems of the 267 day growing season (February 28 to November 21). Please refer to Table 8 in Appendix D for gauge data.

The MY03 report erroneously used the dates of March 18 to November 11 as the growing season dates for the calculations of gauge success. This error was discovered during MY04 and gauge success has since been recalculated and corrected using the growing season dates from the approved mitigation plan (February 28 to November 21). In most cases this resulted in a minor change from what was reported in previous years for the number of days and percentage of the growing season that gauges were within 12 inches of the surface, but in seven cases Table 10 in the MY03 report contains errors in reporting whether success criteria was achieved or not. Gauge NP8 was incorrectly reported as meeting the success criteria during MY01, and Gauges NPII6, 7, 9, 10, 11, and 14 were incorrectly reported as not meeting the success criteria during MY03. These errors have been corrected and the growing season dates from the approved

mitigation plan will be used throughout the rest of the monitoring period. See Table 8 in Appendix D for the corrected hydrology results for all years.

As part of the site success criteria the stream must experience two bankfull events in separate years. The stream experienced several bankfull events in all four monitoring years, including one in 2019, and has met this criteria. See Table 7 in Appendix D.

2.3 Visual Monitoring Results

A yearly visual assessment of the enhanced stream on NPII will occur every year. The fourth year monitoring visual assessment found the stream to be in good condition. As the photos show, there has been a high survival rate of live stakes and herbaceous streamside vegetation is thriving. One small area of erosion developed shortly after construction and was repaired before the end of the first growing season. Despite numerous large flow events, the stream has shown no additional signs of erosion since. The stream corridor is also showing signs of a higher water table, which was a goal of raising the streambed elevation. This is evidenced by more standing surface water compared to pre-construction conditions and the gauge data from the adjacent monitored wetlands.

3.0 REFERENCES

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)

NCDENR, Ecosystem Enhancement Program. 2009. Cape Fear River Basin Restoration Priorities 2009. Raleigh, NC. https://ncdenr.s3.amazonaws.com/s3fs-public/PublicFolder/Work%20With/Watershed%20Planners/RBRP%20Cape%20Fear%202009.pdf

Sprecher, S. W., and Warne, A. G. (2000). "Accessing and Using Meteorological Data to Evaluate Wetland Hydrology," ERDC/EL TR-WRAP-00-1, U.S. Army Engineer Research and Development Center, Vicksburg, MS.USACE. 2003. Stream Mitigation Guidelines. USACE, NCDENR-DWQ, USEPA, NCWRC.

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

United States Department of Agriculture. 1985. Soil Survey of Sampson County, North Carolina. USDA, NCDENR, SCS. https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/north_carolina/NC163/0/sampson.pdf

Appendix A

Project Vicinity Map and Background Tables

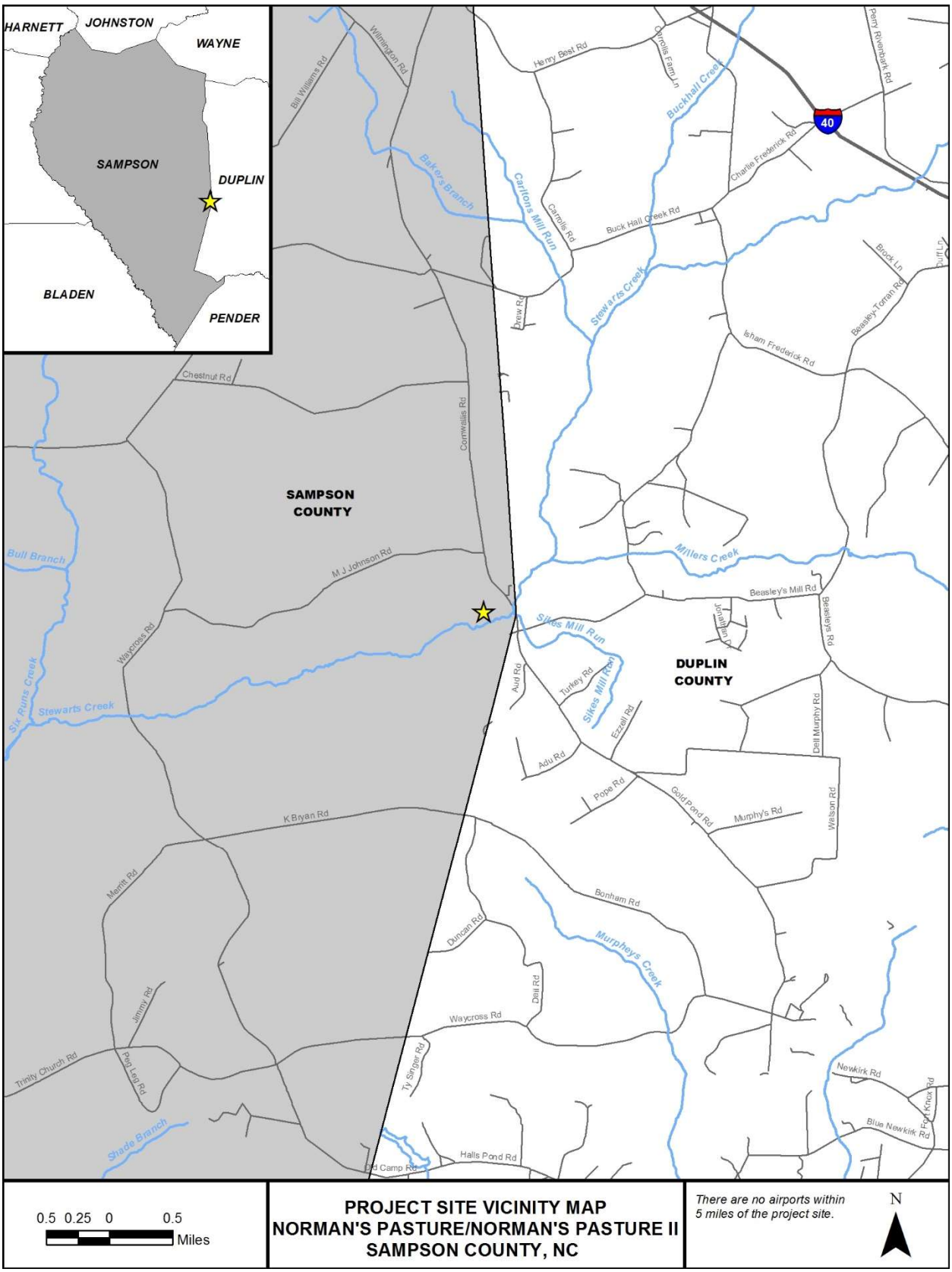

HARNETT
JOHNSTON
WAYNE
SAMPSON
DUPLIN
BLADEN
PENDER
SAMPSON COUNTY
DUPLIN COUNTY
Bill Williams Rd
Wilmington Rd
Henry Best Rd
Carrolls Farm Ln
Buckhall Creek
Perry Rivenbark Rd
40
Baker's Branch
Carlton's Mill Run
Carrolls Rd
Charlie Frederick Rd
Buck Hall Creek Rd
Brock Ln
Drew Rd
Stewarts Creek
Beasley-Torran Rd
Isham Frederick Rd
Chestnut Rd
Cornwallis Rd
Millers Creek
Bull Branch
M J Johnson Rd
Beasley's Mill Rd
Jonathan Ln
Beasleys Rd
Sikes Mill Run
Six Runs Creek
Waycross Rd
Stewarts Creek
Aud Rd
Turkey Rd
Sikes Mill Road
Ezzell Rd
Dell Murphy Rd
Adu Rd
Pope Rd
Gold Pond Rd
Murphy's Rd
Welson Rd
K Bryan Rd
Merritt Rd
Bonham Rd
Duncan Rd
Murpheys Creek
Dell Rd
Jimmy Rd
Waycross Rd
Ty Singer Rd
Trinity Church Rd
Peg Leg Rd
Newkirk Rd
Ford Knox Rd
Blue Newkirk Rd
Shade Branch
Halls Pond Rd
Old Camp Rd
0.5 0.25 0 0.5
Miles
PROJECT SITE VICINITY MAP
NORMAN'S PASTURE/NORMAN'S PASTURE II
SAMPSON COUNTY, NC
There are no airports within 5 miles of the project site.
N

Table 1a. Project Components and Mitigation Credits
Norman's Pasture Restoration Site, DMS Project #95717

Mitigation Credits

	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Length			16.2						
Credits			15.97						
TOTAL CREDITS			15.97						

Project Components

Project Component -or- Reach ID	Stationing/ Location	Existing Footage/ Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage/Acreage	Mitigation Ratio
Wetland Reestablishment				Restoration	15.5	1:1
Wetland Rehabilitation				Restoration	0.7	1.5:1
Wetland Preservation				Preservation	9.0	NA

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetlands (Acres)		Non-Riparian Wetlands (Acres)	Buffer (square feet)	Upland (Acres)
		Riverine	Non-Riverine			
Restoration		16.2				
Enhancement						
Enhancement I						
Enhancement II						
Creation						
Preservation						
High Quality Preservation						
TOTAL CREDITS		**15.97**				

Table 1b. Project Components and Mitigation Credits
Norman's II Restoration Site, DMS Project #96310

Mitigation Credits

	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Length		843	10.2						
Credits		337.2	9.73						
TOTAL CREDITS	337.2		9.73						

Project Components

Project Component -or- Reach ID	Stationing/ Location	Existing Footage/ Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage/Acreage	Mitigation Ratio
Tributary 1	10+00 – 18+43	843		Enhancement II	843	2.5:1
Wetland Reestablishment				Restoration	8.8	1:1
Wetland Rehabilitation				Restoration	1.4	1.5:1
Wetland Preservation				Preservation	0.8	NA

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetlands (Acres)		Non-Riparian Wetlands (Acres)	Buffer (square feet)	Upland (Acres)
		Riverine	Non-Riverine			
Restoration			10.2			
Enhancement						
Enhancement I						
Enhancement II	843					
Creation						
Preservation						
High Quality Preservation						
TOTAL CREDITS	**337.2**		**9.73**			

Table 2. Project Activity & Reporting History Norman's Pasture and Norman's II Restoration Sites		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Mitigation Plan		Nov 2014
Final Design - Construction Plans		Jan 2015
Construction		Jan 2016
Planting		Feb 2016
Baseline Monitoring/Report	April 2016	April 2016
Vegetation Monitoring	March 31, 2016	
Photo Points	April 15, 2016	
Year 1 Monitoring	Nov 2016	Dec 2016
Vegetation Monitoring	Nov 1, 2016	
Photo Points	Aug 16, 2016	
Gauge Downloads	Nov 22, 2016	
Year 2 Monitoring	Nov 2017	Jan 2018
Vegetation Monitoring	Aug 11, 2017	
Photo Points	Nov 30, 2017	
Gauge Downloads	Nov 30, 2017	
Year 3 Monitoring	Dec 2018	Dec 2018
Vegetation Monitoring	July 11, 2018	
Photo Points	Dec 5, 2018	
Gauge Downloads	Nov 12, 2018	
Year 4 Monitoring	Nov 2019	Dec 2019
Vegetation Monitoring	N/A	
Photo Points	Nov 13, 2019	
Gauge Downloads	Nov 13, 2019	

Table 3. Project Contacts Norman's Pasture and Norman's II Restoration Sites	
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 4505 Falls of Neuse Rd. Suite 400 Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512
Planting Contractor	Conservation Services Inc. 1620 N. Delphine Ave. Waynesboro, VA 22980 Contact: Mr. David Coleman Phone: (540) 941-0067
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 4a. Project Information, Norman's Pasture Restoration Site, DMS Project #95717				
Project Name	Norman's Pasture Restoration Site			
County	Sampson County			
Project Area (acres)	36.92 acres			
Project Coordinates (lat. and long.)	34.904893 N , -78.151460 W			
Project Watershed Summary Information				
Physiographic Province	Coastal Plain			
River Basin	Cape Fear			
USGS Hydrologic Unit 8-digit	03030006	**USGS Hydrologic Unit 14-digit**	03030006110040	
DWQ Sub-basin	03-06-19			
Project Drainage Area (acres)	186 acres			
Project Drainage Area Percentage of Impervious Area	1%			
CGIA Land Use Classification	Managed Herbaceous Cover 42% (77.3 ac), Cultivated 24% (44.3 ac), Bottomland Forest/ Hardwood Swamps 17% (31.0 ac), Southern Yellow Pine 10% (19.5 ac), Mixed Hardwoods/Conifers 5% (9.2 ac), and Evergreen Shrubland 2% (4.2 ac)			
Reach Summery Information (Post Restoration)				
Parameters	**T1**	**T2**		
Length of reach (linear feet)	1,585	1,612		
Valley classification	Valley Type X	Valley Type X		
Drainage area (acres)	112 acres	36 acres		
NCDWQ Water Quality Classification	Project Reach Not Classified; Receiving water = Stewart's Creek (C; SW)	Project Reach Not Classified; Receiving water = Stewart's Creek (C; SW)		
Morphological Description (stream type)	Portions ditched channel; other C5	Portions headwater stream; others ditched channel		
Evolutionary trend	Channelized	Channelized		
Mapped Soil Series	Chipley Johnston; Torhunta	Bibb and Johnston; Johnston; Lumbee		
Drainage class	Somewhat poorly drained, very poorly drained, very poorly drained	Poorly drained; very poorly drained; poorly drained		
Soil Hydric status	Drained hydric	Drained hydric		
Slope	0-2%	0-2%		
FEMA classification	Zone AE	Zone AE		
Native vegetation community	Pasture, Headwater Forest	Pasture, Riverine Swamp Forest		
Percent composition of exotic invasive vegetation	<5%	<5%		
Wetland Summary Information (Post Restoration)				
Parameters	**Area 1**	**Area 4**	**Area 9**	**Area 10**
Size of Wetland (acres)	1.99 acres	5.20 acres	2.19 acres	0.02 acres
Wetland Type	Riparian	Riparian	Riparian	Riparian
Mapped Soil Series	Bibb and Johnston	Lumbee	Bibb and Johnston	Bibb and Johnston
Drainage class	Poorly or very poorly drained	Poorly drained	Poorly or very poorly drained	Poorly or very poorly drained
Soil Hydric Status	Drained hydric	Drained hydric	Drained hydric	Drained hydric
Source of Hydrology	Seepage/ Precipitation	Seepage/ Precipitation	Seepage/ Precipitation	Seepage/ Precipitation
Hydrologic Impairment	Ditching and Crops	Ditching and Crops	Ditching and Crops	Ditching and Crops
Native vegetation community	Crops, Pasture, Wetland	Crops, Pasture, Forested Wetland	Crops, Pasture, Forested Wetland	Crops, Pasture
Percent composition of exotic invasive vegetation	<5%	<5%	<5%	<5%
Regulatory Considerations				

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States – Section 404	Yes	Yes	Jurisdictional Determination
Waters of the United States – Section 401	Yes	Yes	Jurisdictional Determination
Endangered Species Act	No	N/A	N/A
Historic Preservation Act	No	N/A	N/A
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	No-Rise Certification/FEMA Floodplain Checklist
Essential Fisheries Habitat	No	N/A	N/A

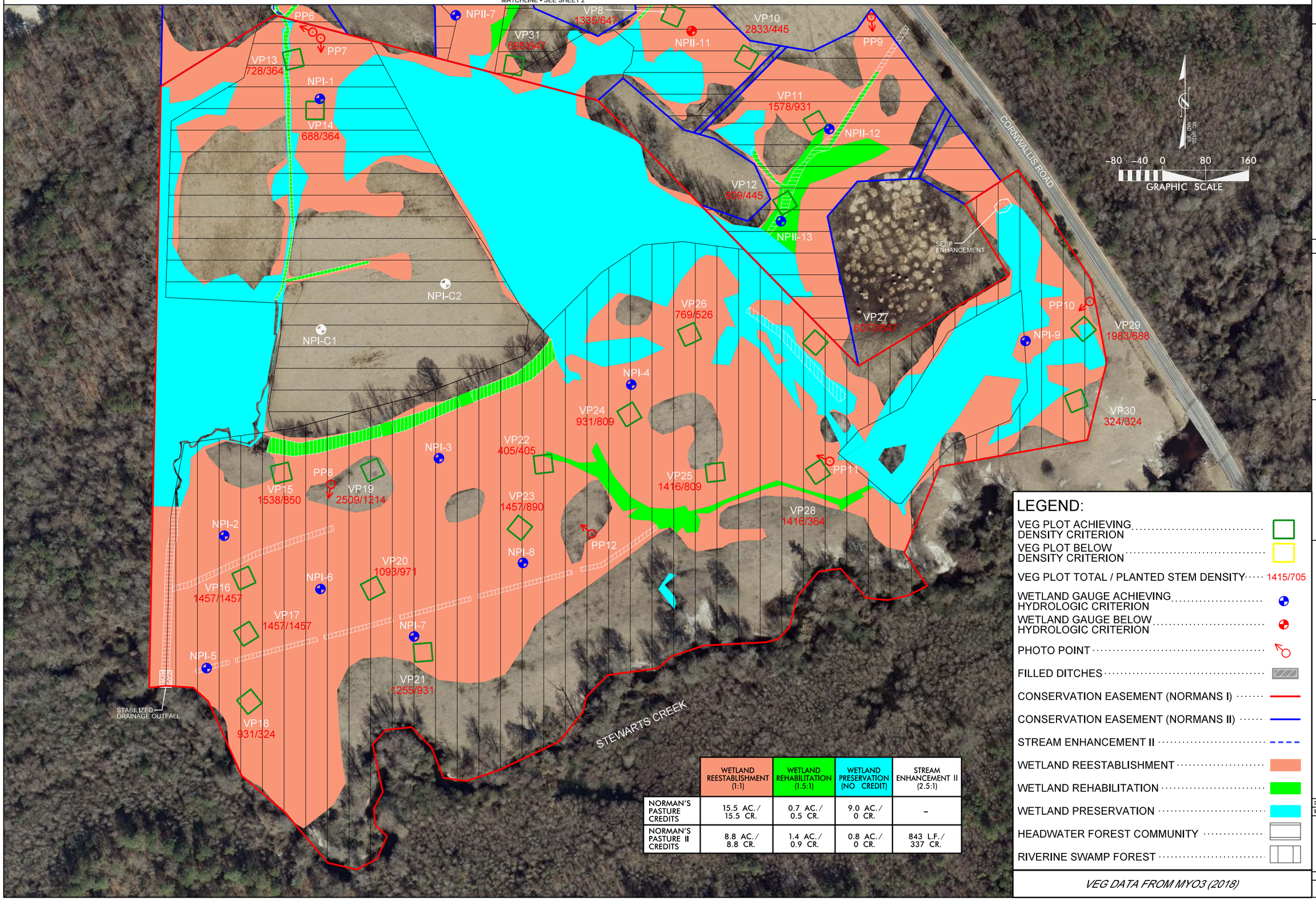
Table 4b. Project Information, Norman's II Restoration Site, DMS Project #96310					
Project Name	Norman's II Restoration Site				
County	Sampson County				
Project Area (acres)	16.3 acres				
Project Coordinates (lat. and long.)	34.906839 N , -78.151797 W				
Project Watershed Summary Information					
Physiographic Province	Coastal Plain				
River Basin	Cape Fear				
USGS Hydrologic Unit 8-digit	03030006	**USGS Hydrologic Unit 14-digit**	03030006110040		
DWQ Sub-basin	03-06-19				
Project Drainage Area (acres)	139 acres				
Project Drainage Area Percentage of Impervious Area	1%				
CGIA Land Use Classification	Cultivated 32% (44.3 ac), Managed Herbaceous Cover 31% (42.9 ac), Bottomland Forest/Hardwood Swamps 14% (19.5 ac), Southern Yellow Pine 14% (19.5 ac), Mixed Hardwoods/Conifers 6% (9.0 ac), and Evergreen Shrubland 3% (4.2 ac)				
Reach Summery Information (Post Restoration)					
Parameters	**T1**				
Length of reach (linear feet)	843				
Valley classification	Valley Type X				
Drainage area (acres)	112 acres				
NCDWQ Water Quality Classification	Project Reach Not Classified; Receiving water = Stewart's Creek (C; SW)				
Morphological Description (stream type)	Modified E5				
Evolutionary trend	Stage III				
Mapped Soil Series	Johnston				
Drainage class	Very poorly drained				
Soil Hydric status	Drained hydric				
Slope	0-1%				
FEMA classification	Zone AE & Zone X				
Native vegetation community	Headwater Forest				
Percent composition of exotic invasive vegetation	<5%				
Wetland Summary Information (Post Restoration)					
Parameters	**Area 6**	**Area 7**	**Area 8**	**Area 9**	**Area 11**
Size of Wetland (acres)	0.09 acre	0.17 acre	0.37 acre	0.02 acre	0.08 acre
Wetland Type	Riparian	Riparian	Pond and Riparian	Riparian	Riparian
Mapped Soil Series	Bibb and Johnston; Lumbee	Johnston loam	Lynn Haven	Bibb and Johnston	Torhunta Variant
Drainage class	Poorly or very poorly drained	Very poorly drained	Poorly or very poorly drained	Poorly or very poorly drained	Very poorly drained
Soil Hydric Status	Drained Hydric	Drained Hydric	Drained Hydric	Drained Hydric	Drained Hydric
Source of Hydrology	Seepage/ Precipitation	Seepage / Precipitation	Seepage/ Precipitation	Seepage / Precipitation	Seepage / Precipitation
Hydrologic Impairment	Ditching and Crops	Ditching and Crops	Ditching and Crops	Ditching and Crops	Ditching
Native vegetation community	Crops, Pasture, Wetland	Crops, Pasture, Wetland	Crops, Pasture	Crops, Pasture, Forested Wetland	Forested Wetland
Percent composition of exotic invasive vegetation	0%	0%	0%	0%	0%

Project Information continued - Norman's II Restoration Site Restoration Site			
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States – Section 404	Yes	Yes	Jurisdictional Determination
Waters of the United States – Section 401	Yes	Yes	Jurisdictional Determination
Endangered Species Act	No	N/A	N/A
Historic Preservation Act	No	N/A	N/A
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	FEMA Floodplain Checklist
Essential Fisheries Habitat	No	N/A	N/A

Appendix B

Visual Assessment Data

MATCHLINE - SEE SHEET 2



	WETLAND REESTABLISHMENT (1:1)	WETLAND REHABILITATION (1.5:1)	WETLAND PRESERVATION (NO CREDIT)	STREAM ENHANCEMENT II (2.5:1)
NORMAN'S PASTURE CREDITS	15.5 AC./ 15.5 CR.	0.7 AC./ 0.5 CR.	9.0 AC./ 0 CR.	–
NORMAN'S PASTURE II CREDITS	8.8 AC./ 8.8 CR.	1.4 AC./ 0.9 CR.	0.8 AC./ 0 CR.	843 L.F./ 337 CR.

LEGEND:

- VEG PLOT ACHIEVING DENSITY CRITERION
- VEG PLOT BELOW DENSITY CRITERION
- VEG PLOT TOTAL / PLANTED STEM DENSITY 1415/705
- WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION
- WETLAND GAUGE BELOW HYDROLOGIC CRITERION
- PHOTO POINT
- FILLED DITCHES
- CONSERVATION EASEMENT (NORMANS I)
- CONSERVATION EASEMENT (NORMANS II)
- STREAM ENHANCEMENT II
- WETLAND REESTABLISHMENT
- WETLAND REHABILITATION
- WETLAND PRESERVATION
- HEADWATER FOREST COMMUNITY
- RIVERINE SWAMP FOREST

VEG DATA FROM MY03 (2018)

DATE	REVISIONS

NCDEQ DIVISION OF MITIGATION SERVICES

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4505 FALLS OF NEUSE ROAD
RALEIGH, NORTH CAROLINA 27609

NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES

SAMPSON COUNTY, NORTH CAROLINA

MONITORING YEAR 04

DATE: DEC 2019
SCALE: GRAPHIC

CURRENT CONDITION PLAN VIEW

SHEET 1 OF 2

MATCHLINE - SEE SHEET 1

LEGEND:

- VEG PLOT ACHIEVING DENSITY CRITERION
- VEG PLOT BELOW DENSITY CRITERION
- VEG PLOT TOTAL / PLANTED STEM DENSITY 1415/705
- WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION
- WETLAND GAUGE BELOW HYDROLOGIC CRITERION
- PHOTO POINT
- FILLED DITCHES
- CONSERVATION EASEMENT (NORMANS I)
- CONSERVATION EASEMENT (NORMANS II)
- STREAM ENHANCEMENT II
- WETLAND REESTABLISHMENT
- WETLAND REHABILITATION
- WETLAND PRESERVATION
- HEADWATER FOREST COMMUNITY
- RIVERINE SWAMP FOREST

VEG DATA FROM MYO3 (2018)

	WETLAND REESTABLISHMENT (1:1)	WETLAND REHABILITATION (1.5:1)	WETLAND PRESERVATION (NO CREDIT)	STREAM ENHANCEMENT II (2.5:1)
NORMAN'S PASTURE CREDITS	15.5 AC./ 15.5 CR.	0.7 AC./ 0.5 CR.	9.0 AC./ 0 CR.	–
NORMAN'S PASTURE II CREDITS	8.8 AC./ 8.8 CR.	1.4 AC./ 0.9 CR.	0.8 AC./ 0 CR.	843 L.F./ 337 CR.

DATE

REVISIONS

NCDEQ DIVISION OF MITIGATION SERVICES

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4606 FALLS OF NEUSE ROAD
RALEIGH, NORTH CAROLINA 27609

NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES

SAMPSON COUNTY, NORTH CAROLINA

MONITORING YEAR 04

DATE: DEC 2019

SCALE: GRAPHIC

CURRENT CONDITION PLAN VIEW

Table 5a. Vegetation Condition Assessment
Norman's Pasture Restoration Site, DMS Project #95717

Planted Acreage 36.92 **Easement Acreage 36.92**

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 acre	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acre	Pattern and Color	0	0.00	0.0%
			Total	0	0.00	0.0%
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 acre	Pattern and Color	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1,000 SF	Pattern and Color	0	0.00	0.0%
5. 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%

Table 5b. Vegetation Condition Assessment
Norman's Pasture II Restoration Site, DMS Project #96310

Planted Acreage 16.3 **Easement Acreage 16.3**

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 acre	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acre	Pattern and Color	0	0.00	0.0%
			Total	0	0.00	0.0%
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 acre	Pattern and Color	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1,000 SF	Pattern and Color	0	0.00	0.0%
5. 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

PP01 – MY-00 – 4/15/16

PP01 – MY-04 – 11/13/19

PP02 – MY-00 – 4/15/16

PP02 – MY-04 – 11/13/19

PP03 – MY-00 – 4/15/16

PP03 – MY-04 – 11/13/19

PP04 – MY-00 – 4/15/16

PP04 – MY-04 – 11/13/19

PP05 – MY-00 – 4/15/16

PP05 – MY-04 – 11/13/19

PP06 – MY-00 – 4/15/16

PP06 – MY-04 – 11/13/19

PP07 – MY-00 – 4/15/16

PP07 – MY-04 – 11/13/19

PP08 – MY-00 – 4/15/16

PP08 – MY-04 – 11/13/19

PP09 – MY-00 – 4/15/16

PP09 – MY-04 – 11/13/19

PP10 – MY-00 – 4/15/16

PP10 – MY-04 – 11/13/19

PP11 – MY-00 – 4/15/16

PP11 – MY-04 – 11/13/19

PP12 – MY-00 – 4/15/16

PP12 – MY-04 – 11/13/19

Appendix C

Vegetation Plot Data

Table 6: CVS Stem Count Total and Planted by Plot and Species, Norman's Pasture and Norman's Pasture II Restoration Sites														
DMS Project #: 95717/96310			Annual Means											
			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2015)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree			241			178			92			
Alnus serrulata	hazel alder	Shrub			84			13			4			
Baccharis halimifolia	eastern baccharis	Shrub			21			16			2			
Betula nigra	river birch	Tree	47	47	80	48	48	83	47	47	61	42	42	42
Cephalanthus occidentalis	common buttonbush	Shrub	31	31	31	31	31	31	21	21	21			
Cornus amomum	silky dogwood	Shrub							2	2	2			
Corylus americana	American hazelnut	Shrub							4	4	4			
Crataegus	hawthorn	Tree			6			6			1			
Diospyros virginiana	common persimmon	Tree	3	3	29	3	3	32						
Fraxinus pennsylvanica	green ash	Tree	33	33	35	32	32	34	30	30	31	36	36	36
Juglans nigra	black walnut	Tree	2	2	5	2	2	9	2	2	5			
Liquidambar styraciflua	sweetgum	Tree			35			42			29			
Liriodendron tulipifera	tuliptree	Tree	17	17	24	18	18	22	19	19	21	10	10	10
Morella cerifera	wax myrtle	shrub			3			2			1			
Nyssa aquatica	water tupelo	Tree	62	62	62	75	75	75	79	79	79	60	60	60
Nyssa biflora	swamp tupelo	Tree	2	2	2	2	2	2	2	2	2			
Pinus palustris	longleaf pine	Tree						1						
Pinus taeda	loblolly pine	Tree			23			5						
Prunus serotina	black cherry	Tree			2			2			1			
Quercus laurifolia	laurel oak	Tree	57	57	57	64	64	64	70	70	70	68	68	68
Quercus lyrata	overcup oak	Tree	59	59	60	63	63	64	65	65	65	33	33	33
Quercus michauxii	swamp chestnut oak	Tree	52	52	52	59	59	59	60	60	60	42	42	42
Quercus phellos	willow oak	Tree	2	2	2	2	2	2	3	3	3	1	1	1
Rhus copallinum	flameleaf sumac	shrub			10			18			5			
Salix nigra	black willow	Tree			38			49			26			
Taxodium distichum	bald cypress	Tree	171	171	171	173	173	173	171	171	171	169	169	169
Ulmus americana	American elm	Tree			9			6			6			
Unknown		Shrub or Tree	2	2	2	4	4	4	21	21	35	213	213	213
		Stem count	540	540	1084	576	576	992	596	596	797	674	674	674
		size (ares)	31			31			31			31		
		size (ACRES)	0.77			0.77			0.77			0.77		
		Species count	14	14	25	14	14	26	15	15	25	10	10	10
		Stems per ACRE	705	705	1415	752	752	1295	778	778	1040	880	880	880

Appendix D

Hydrologic Data

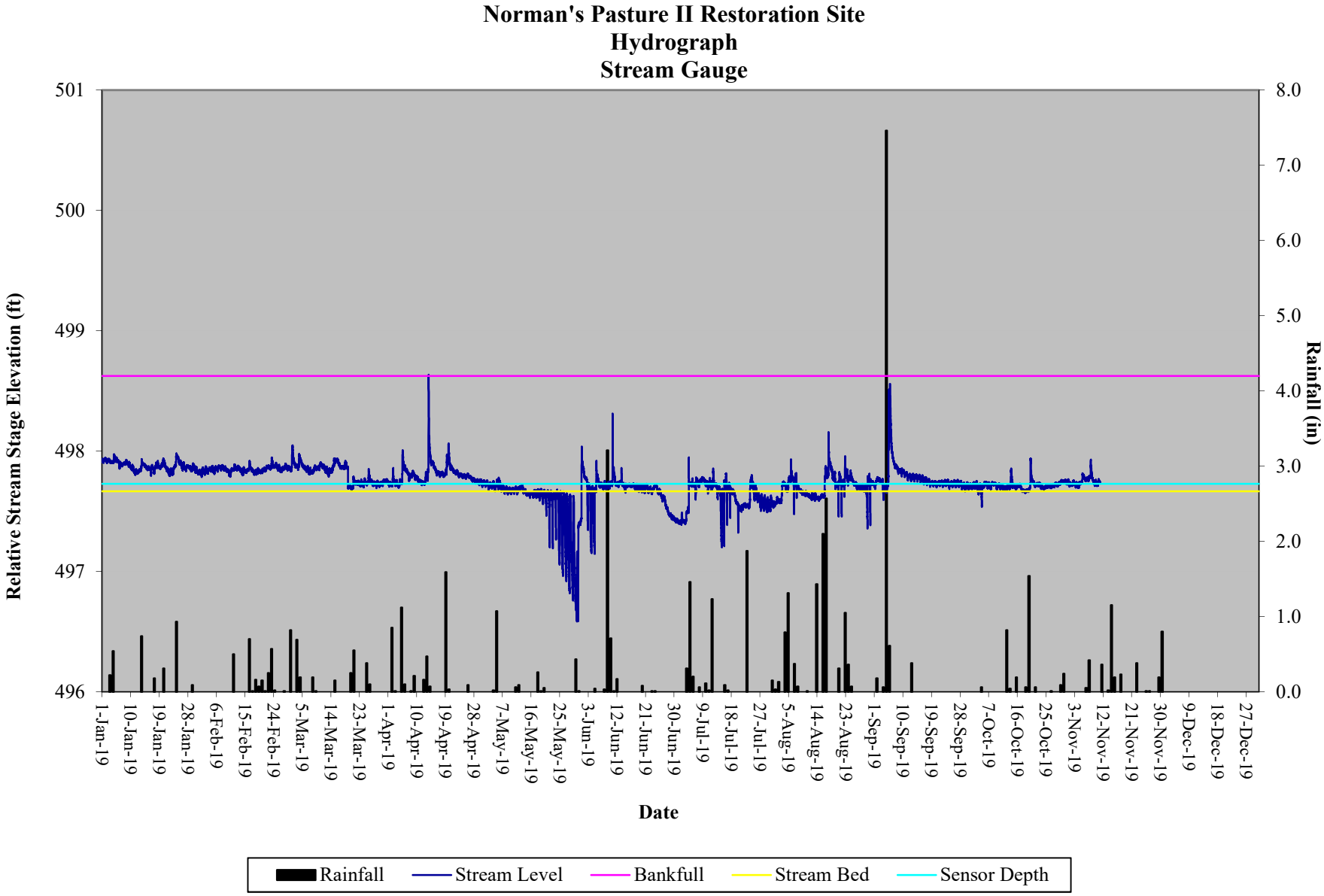
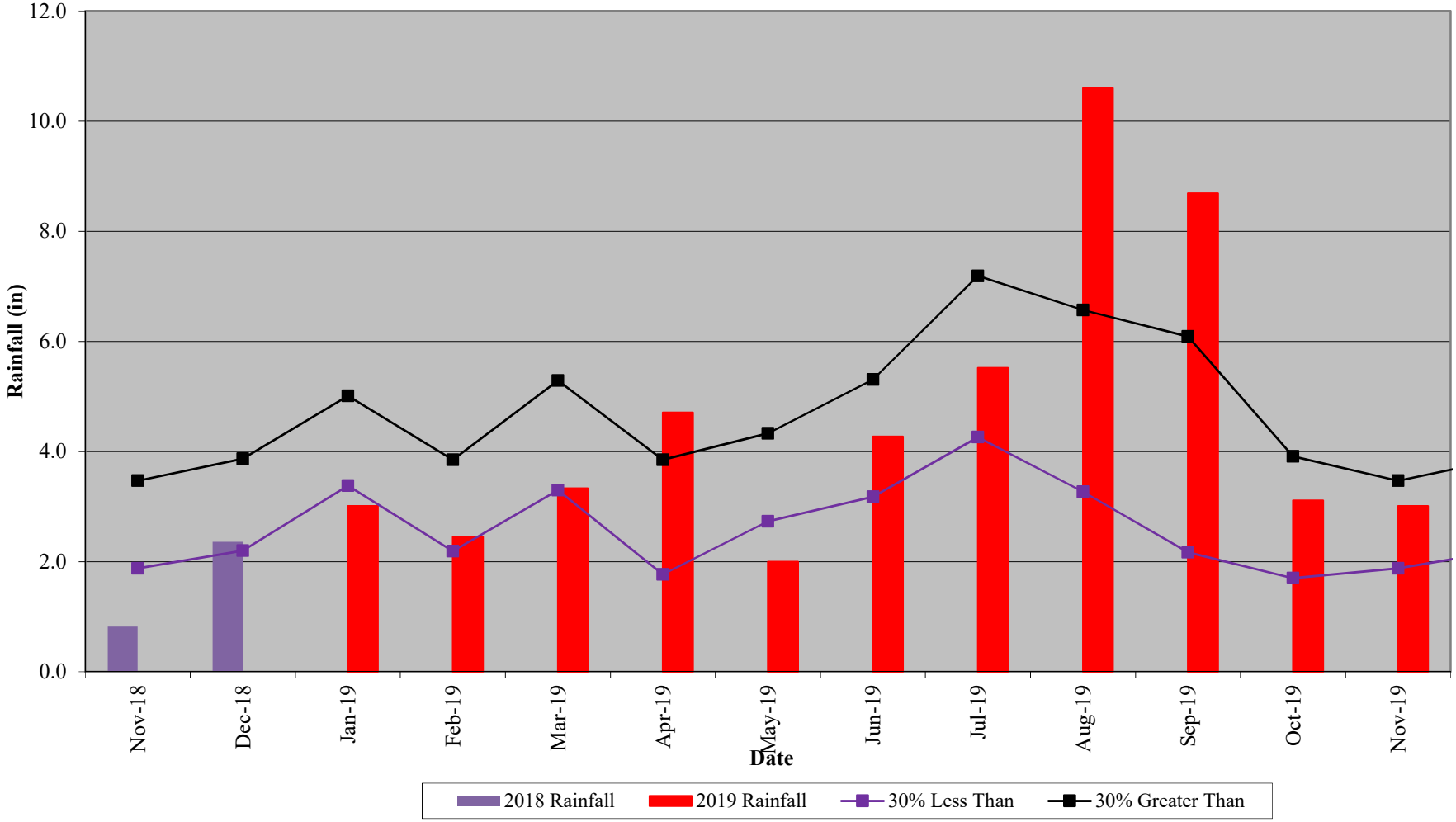
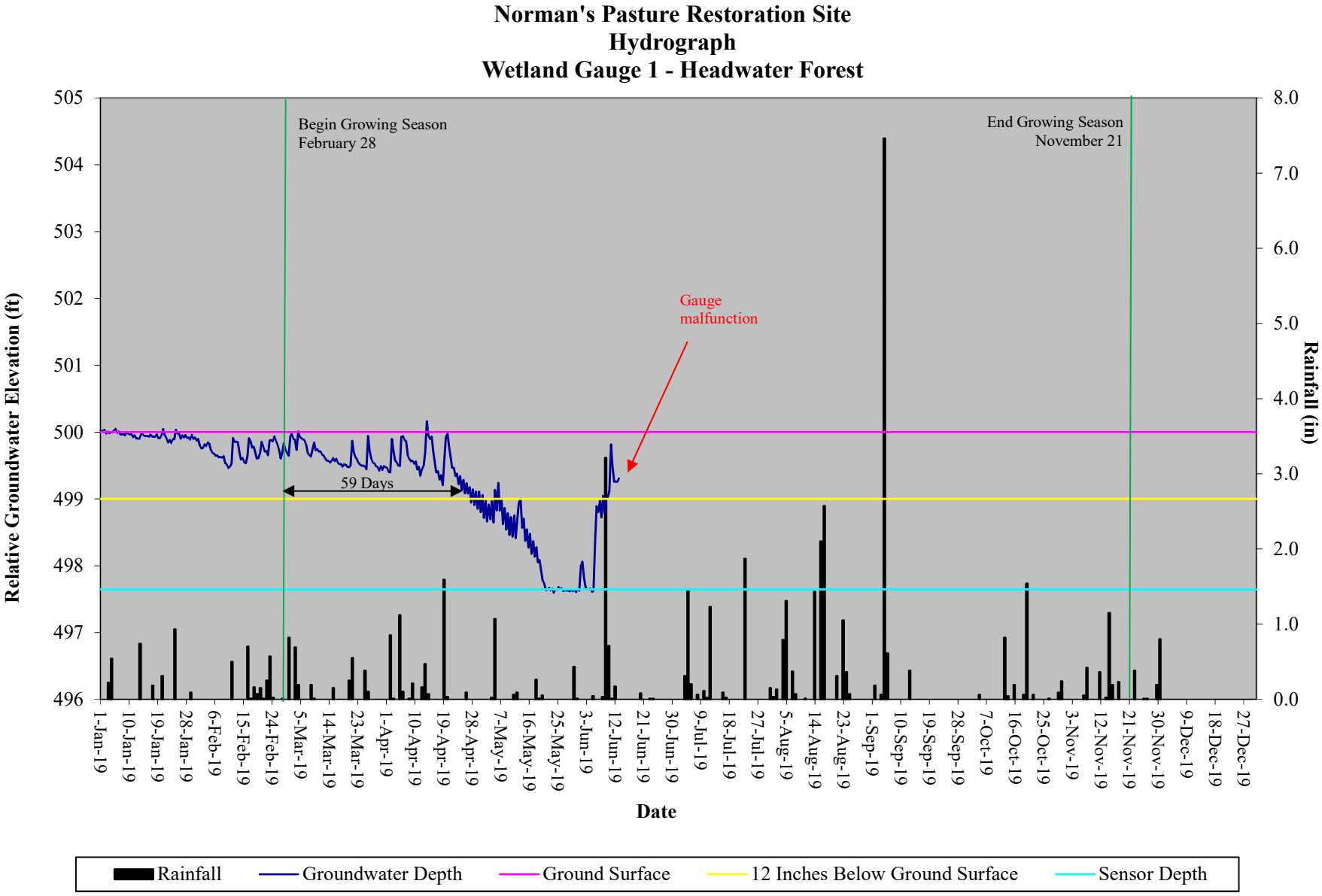

Norman's Pasture II Restoration Site
Hydrograph
Stream Gauge
Relative Stream Stage Elevation (ft)
Rainfall (in)
Date
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Stream Level
Bankfull
Stream Bed
Sensor Depth

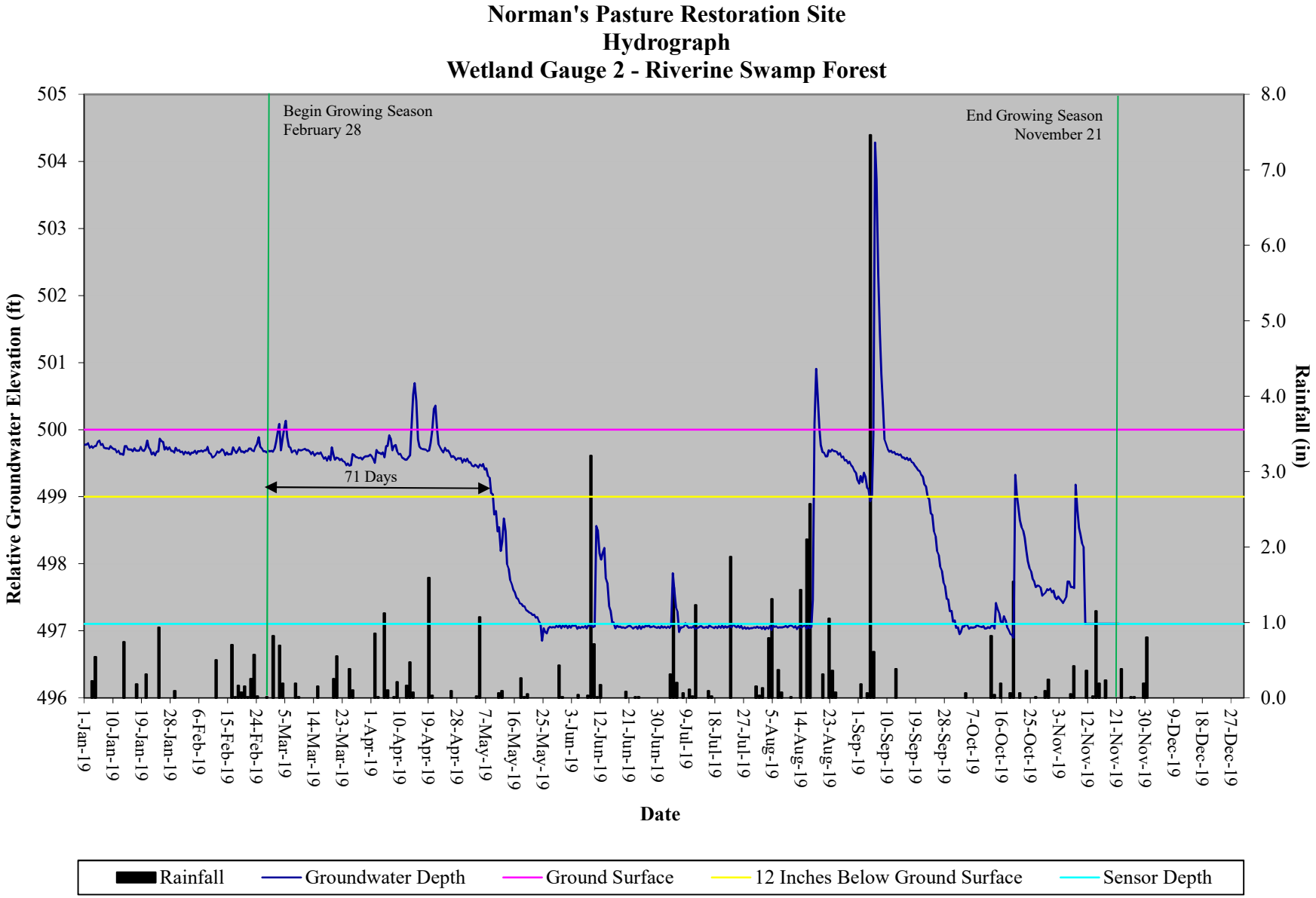
Table 7. Verification of Bankfull Events Norman's Pasture and Norman's Pasture II Restoration Sites, DMS Project Number 95717/96310			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo Number**
7/15/2016	7/15/2016	On-site automatic gauge	N/A
8/7/2016	8/7/2016	On-site automatic gauge	N/A
10/8/2016	10/8/2016	On-site automatic gauge	N/A
12/21/2016	12/21/2016	On-site automatic gauge	N/A
12/23/2016	12/23/2016	On-site automatic gauge	N/A
12/28/2016	12/28/2016	On-site automatic gauge	N/A
12/30/2016	12/30/2016	On-site automatic gauge	N/A
4/6 - 4/22/2017	4/6 - 4/22/2017	On-site automatic gauge	N/A
4/24/2017	4/24/2017	On-site automatic gauge	N/A
4/27/2017	4/27/2017	On-site automatic gauge	N/A
8/20/2018	8/20/2018	On-site automatic gauge	N/A
9/16/2018	9/16/2018	On-site automatic gauge	N/A
4/13/2019	4/13/2019	On-site automatic gauge	N/A

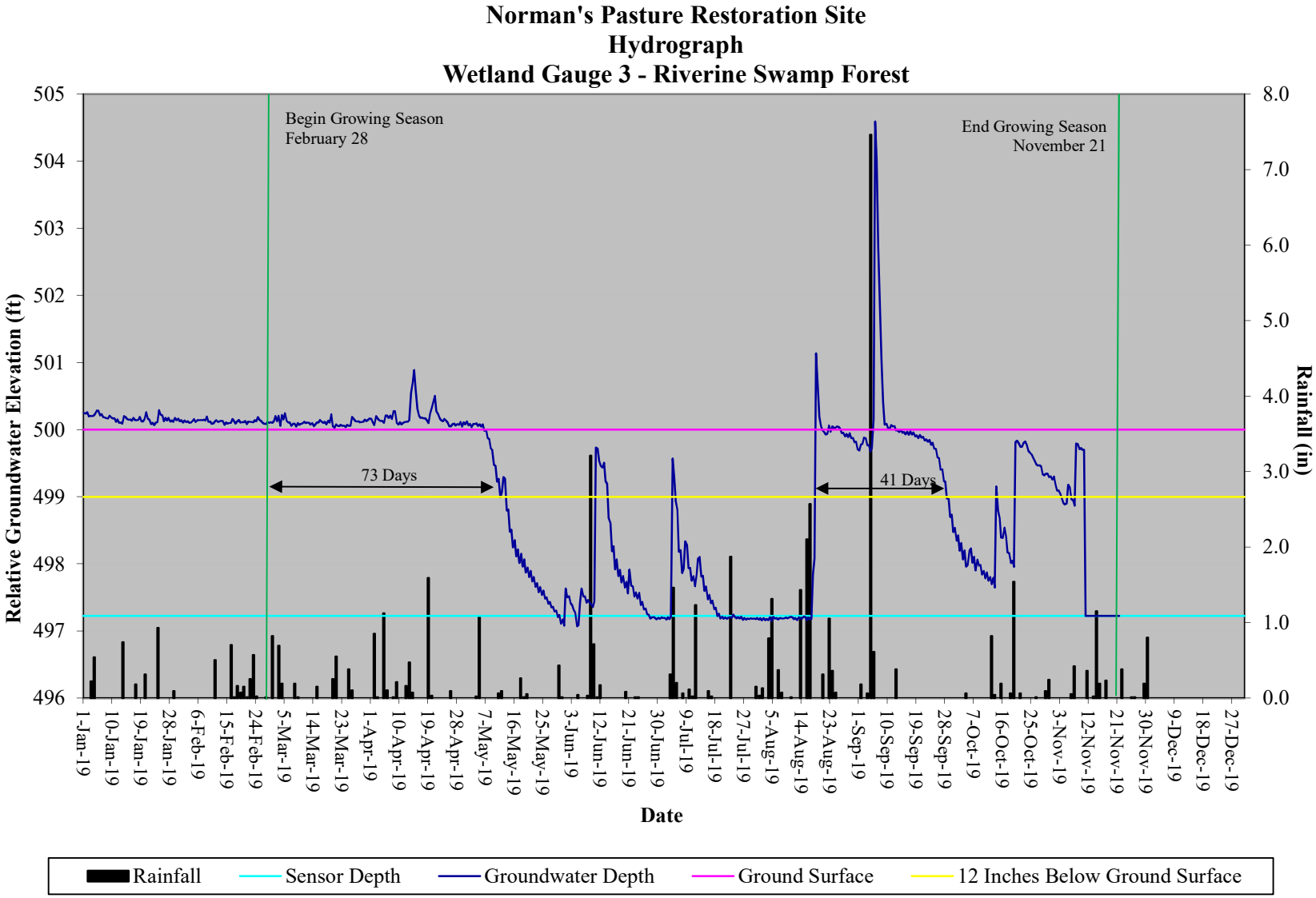
Table 8. Wetland Hydrology Criteria Attainment Norman's Pasture and Norman's Pasture II Restoration Sites, DMS Project Number 95717/96310								
Gauge Number	**Gauge Location**	**MY-01 (2016)**	**MY-02 (2017)**	**MY-03 (2018)**	**MY-04 (2019)**	**MY-05 (2020)**	**MY-06 (2021)**	**MY-07 (2022)**
NP1	Headwater Forest	Yes/111 (41.6%)	Yes/91 (34.1%)	Yes/106 (39.7%)	Yes/59 (22.1%)			
NP2	Riverine Swamp Forest	Yes/98 (36.7%)	Yes/84 (31.5%)	Yes/73 (27.3%)	Yes/71 (26.6%)			
NP3	Riverine Swamp Forest	Yes/99 (37.1%)	Yes/106 (39.7%)	Yes/106 (39.7%)	Yes/73 (27.3%)			
NP4	Riverine Swamp Forest	Yes/81 (30.3%)	Yes/105 (39.3%)	Yes/105 (39.3%)	Yes/77 (28.8%)			
NP5	Riverine Swamp Forest	Yes/64 (24.0%)	Yes/41 (15.4%)	Yes/67 (25.1%)	Yes/62 (23.2%)			
NP6	Riverine Swamp Forest	Yes/100 (37.5%)	Yes/103 (38.6%)	Yes/106 (39.7%)	Yes/76 (28.5%)			
NP7	Riverine Swamp Forest	Yes/64 (24.0%)	Yes/77 (28.8%)	Yes/60 (22.5%)	Yes/60 (22.5%)			
NP8	Riverine Swamp Forest	No/30 (11.2%)	Yes/58 (21.7%)	Yes/36 (13.5%)	Yes/59 (22.1%)			
NP9	Riverine Swamp Forest	Yes/39 (14.6%)	Yes/59 (22.1%)	Yes/35 (13.1%)	Yes/61 (22.8%)			
NPII 1	Headwater Forest	Yes/65 (24.3%)	Yes/77 (28.8%)	Yes/66 (24.7%)	Yes/64 (24.0%)			
NPII 2	Headwater Forest	Yes/81 (30.3%)	Yes/78 (29.2%)	Yes/65 (24.3%)	Yes/33 (12.4%)			
NPII 3	Headwater Forest	Yes/50 (18.7%)	Yes/77 (28.8%)	Yes/51 (19.1%)	Yes/39 (14.6%)			
NPII 4	Headwater Forest	Yes/64 (24.0%)	Yes/65 (24.3%)	Yes/65 (24.3%)	Yes/59 (22.1%)			
NPII 5	Headwater Forest	No/22 (8.2%)	Yes/35 (13.1%)	Yes/36 (13.5%)	Yes/58 (21.7%)			
NPII 6	Headwater Forest	No/6 (2.2%)	No/7 (2.6%)	Yes/33 (12.4%)	No/22 (8.2%)			
NPII 7	Headwater Forest	Yes/29 (10.9%)	Yes/53 (19.9%)	Yes/35 (13.1%)	Yes/57 (21.3%)			
NPII 8	Headwater Forest	No/12 (4.5%)	No/7 (2.6%)	No/18 (6.7%)	No/14 (5.2%)			
NPII 9	Headwater Forest	No/18 (6.7%)	Yes/35 (13.1%)	Yes/37 (13.9%)	Yes/50 (18.7%)			
NPII 10	Headwater Forest	No/18 (6.7%)	Yes/33 (12.4%)	Yes/35 (13.1%)	Yes/33 (12.4%)			
NPII 11	Headwater Forest	No/9 (3.4%)	Yes/31 (11.6%)	Yes/32 (12.0%)	No/22 (8.2%)			
NPII 12	Headwater Forest	Yes/27 (10.1%)	Yes/58 (21.7%)	Yes/35 (13.1%)	Yes/33 (12.4%)			
NPII 13	Headwater Forest	Yes/64 (24.0%)	Yes/ 81 (30.3%)	Yes/76 (28.5%)	Yes/70 (26.2%)			
NPII 14	Headwater Forest			Yes/36 (13.5%)	Yes/58 (21.7%)			
NPII 15	Headwater Forest			Yes/34 (12.7%)	Yes/24 (9.0%)			
NPII 16	Headwater Forest			Yes/53 (19.9%)	Yes/59 (22.1%)			
NPII 17	Headwater Forest				Yes/24 (9.0%)			
NPC1	Non-credited Creation Area	11 (4.1%)	38 (14.2%)	(13.1%)	18 (6.7%)			
NPC2	Non-credited Creation Area	24 (9.0%)	61 (22.8%)	71 (26.6%)	61 (22.8%)			

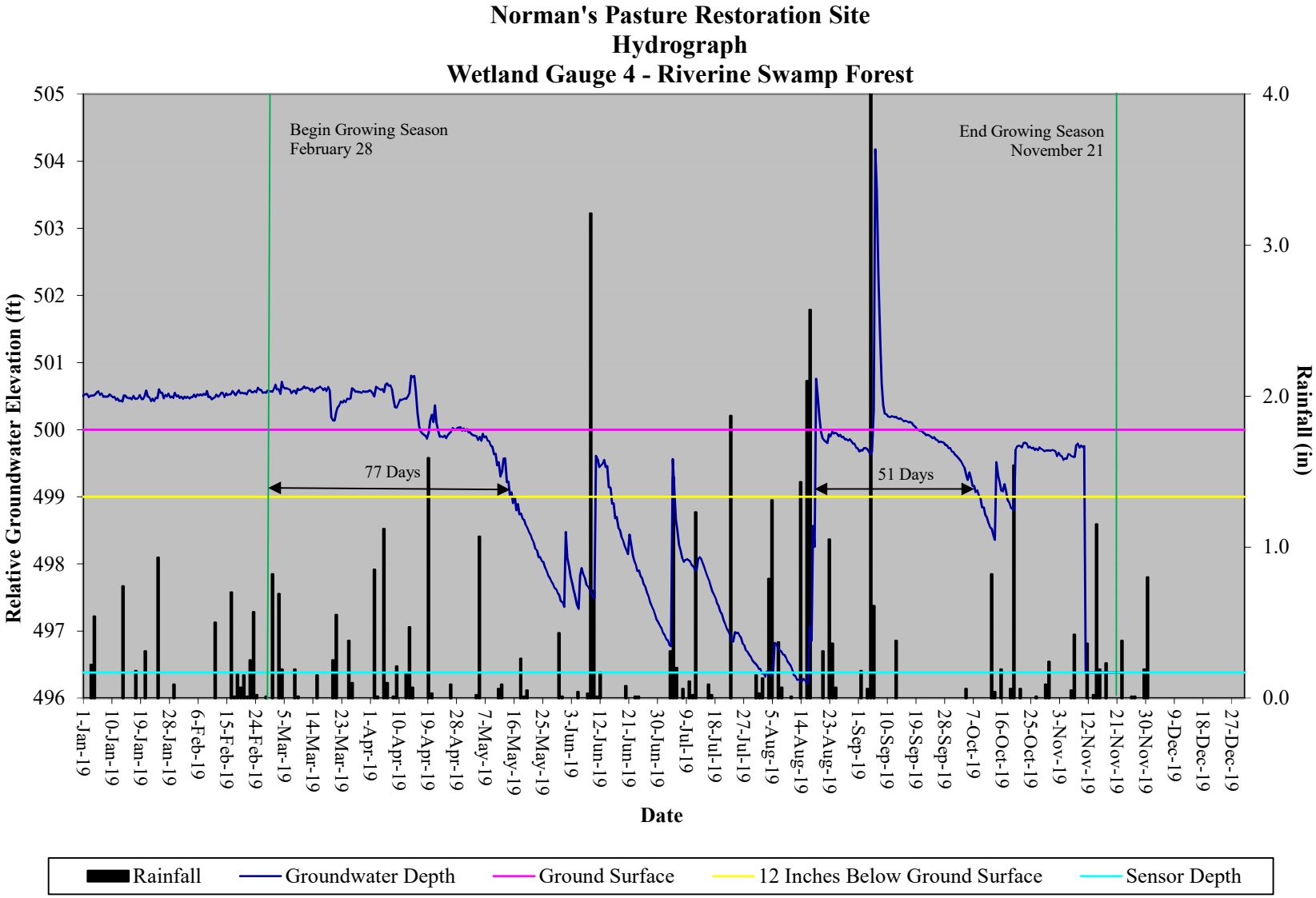
Norman's Pasture Wetland Restoration Site
30-70 Percentile Graph
WETS Station Name: Clinton, NC



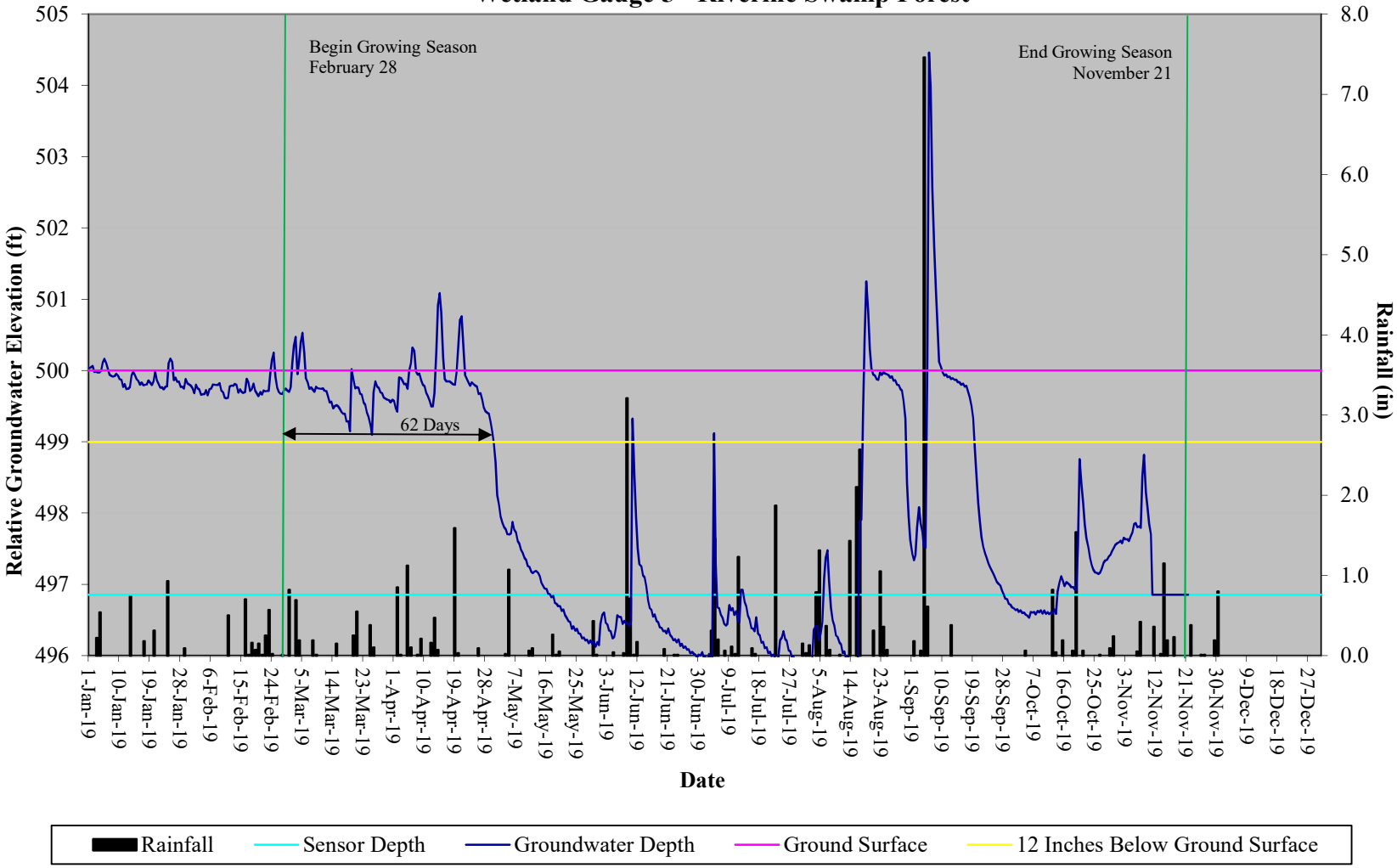

Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge 1 - Headwater Forest
Begin Growing Season
February 28
End Growing Season
November 21
Gauge
malfunction
59 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

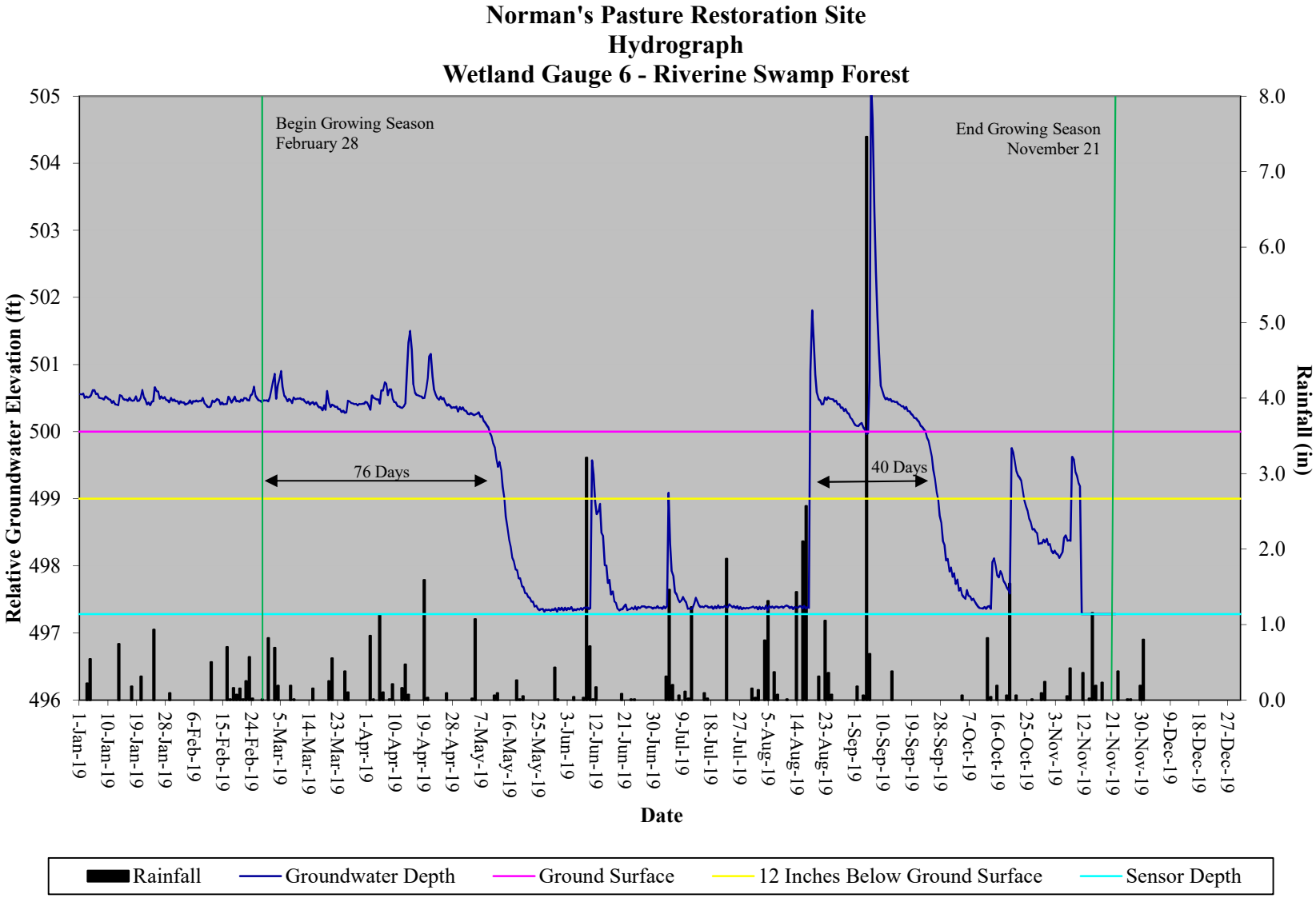

Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge 2 - Riverine Swamp Forest
Begin Growing Season
February 28
End Growing Season
November 21
71 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth


Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge 3 - Riverine Swamp Forest
Begin Growing Season
February 28
End Growing Season
November 21
73 Days
41 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface

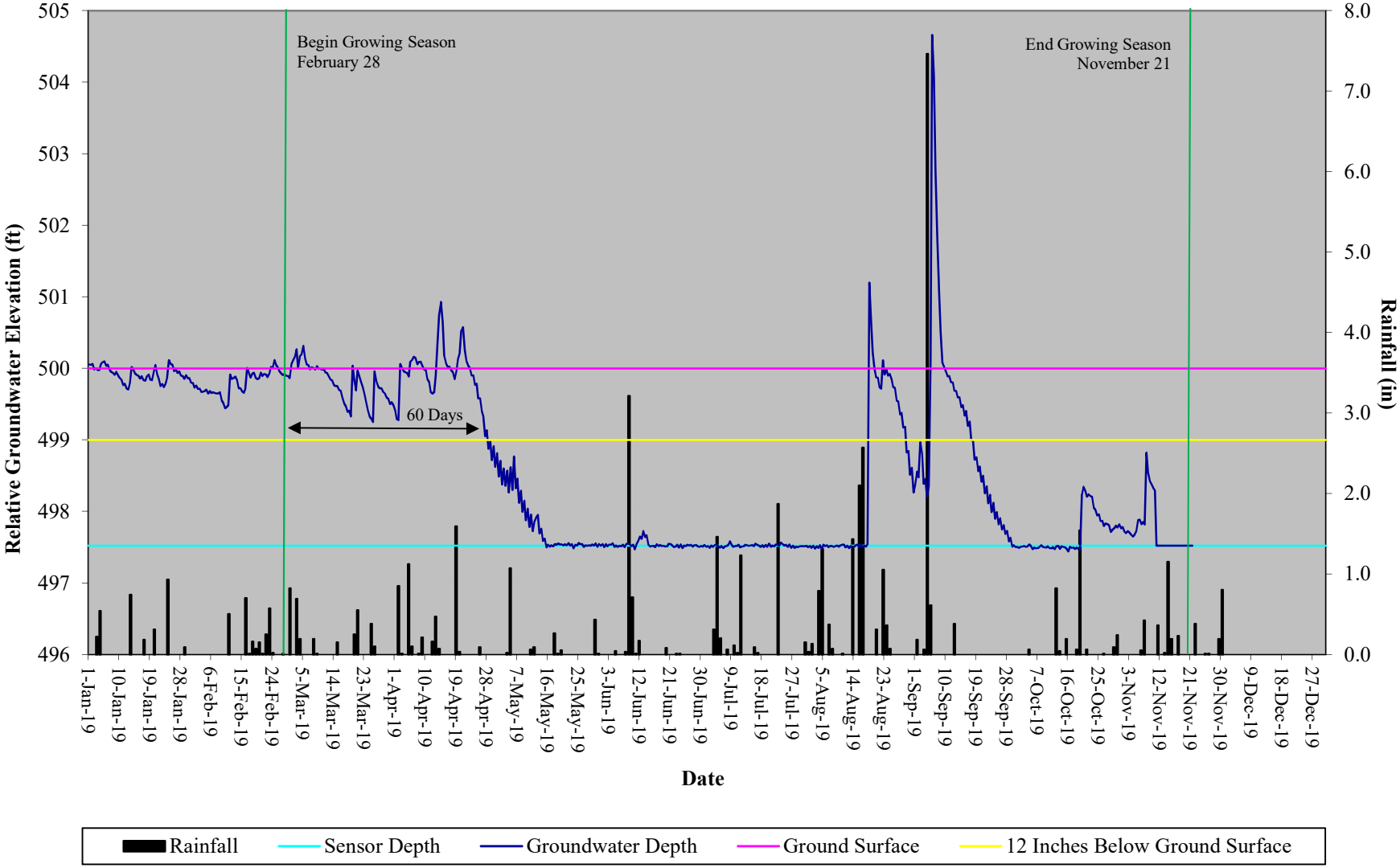

Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge 4 - Riverine Swamp Forest
Begin Growing Season
February 28
End Growing Season
November 21
77 Days
51 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge 5 - Riverine Swamp Forest

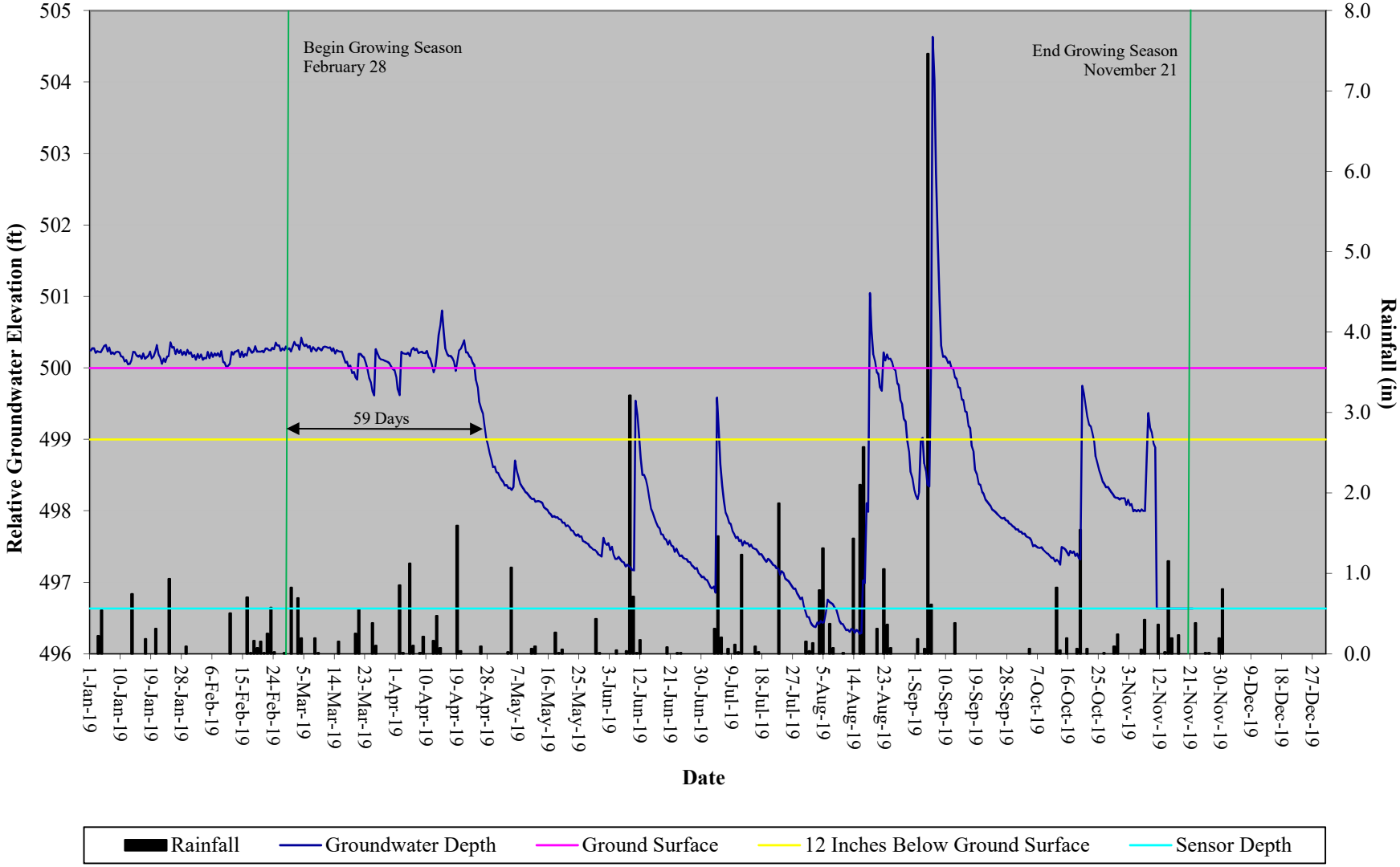



Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge 6 - Riverine Swamp Forest
Begin Growing Season
February 28
End Growing Season
November 21
76 Days
40 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

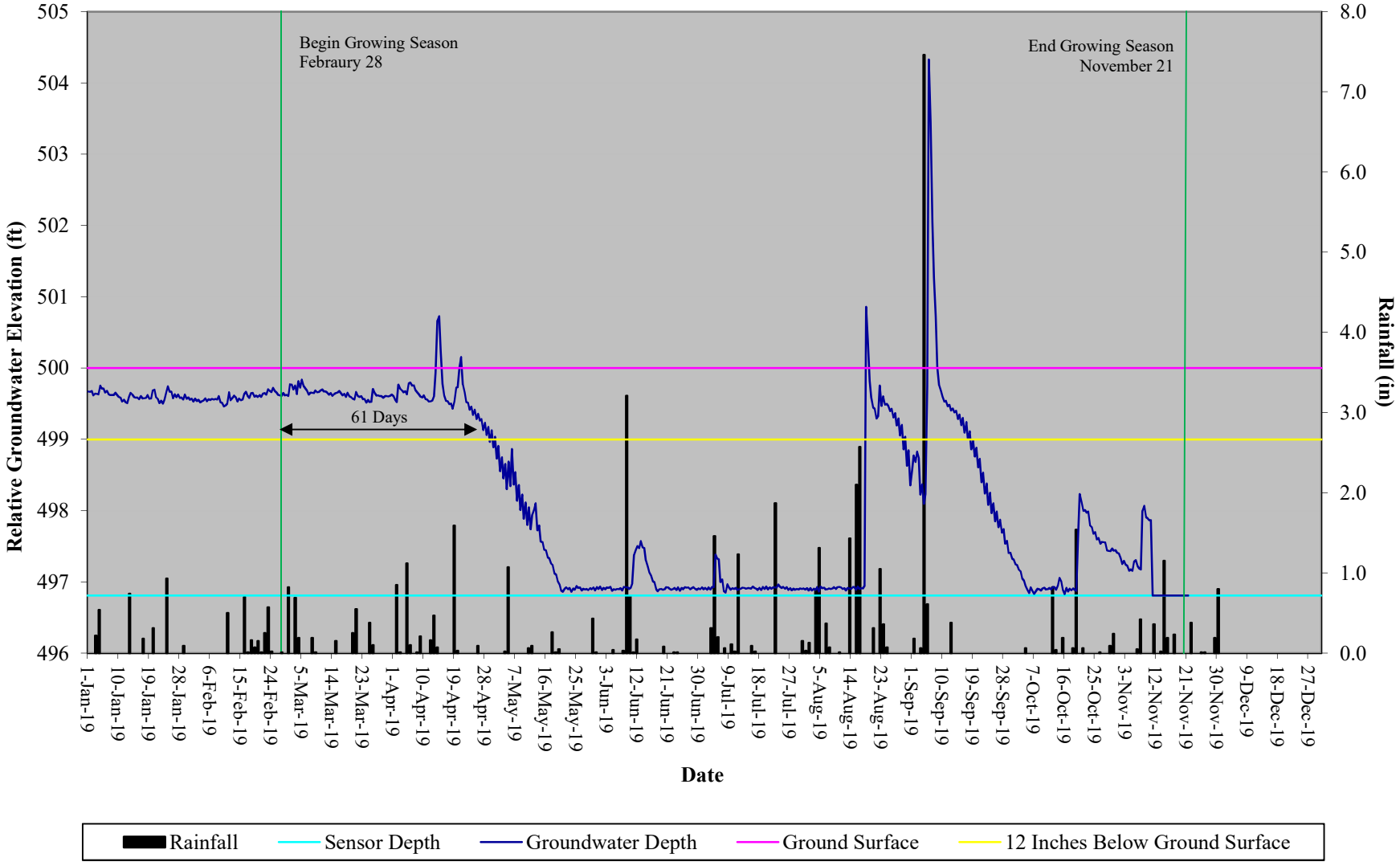
Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge 7 - Riverine Swamp Forest



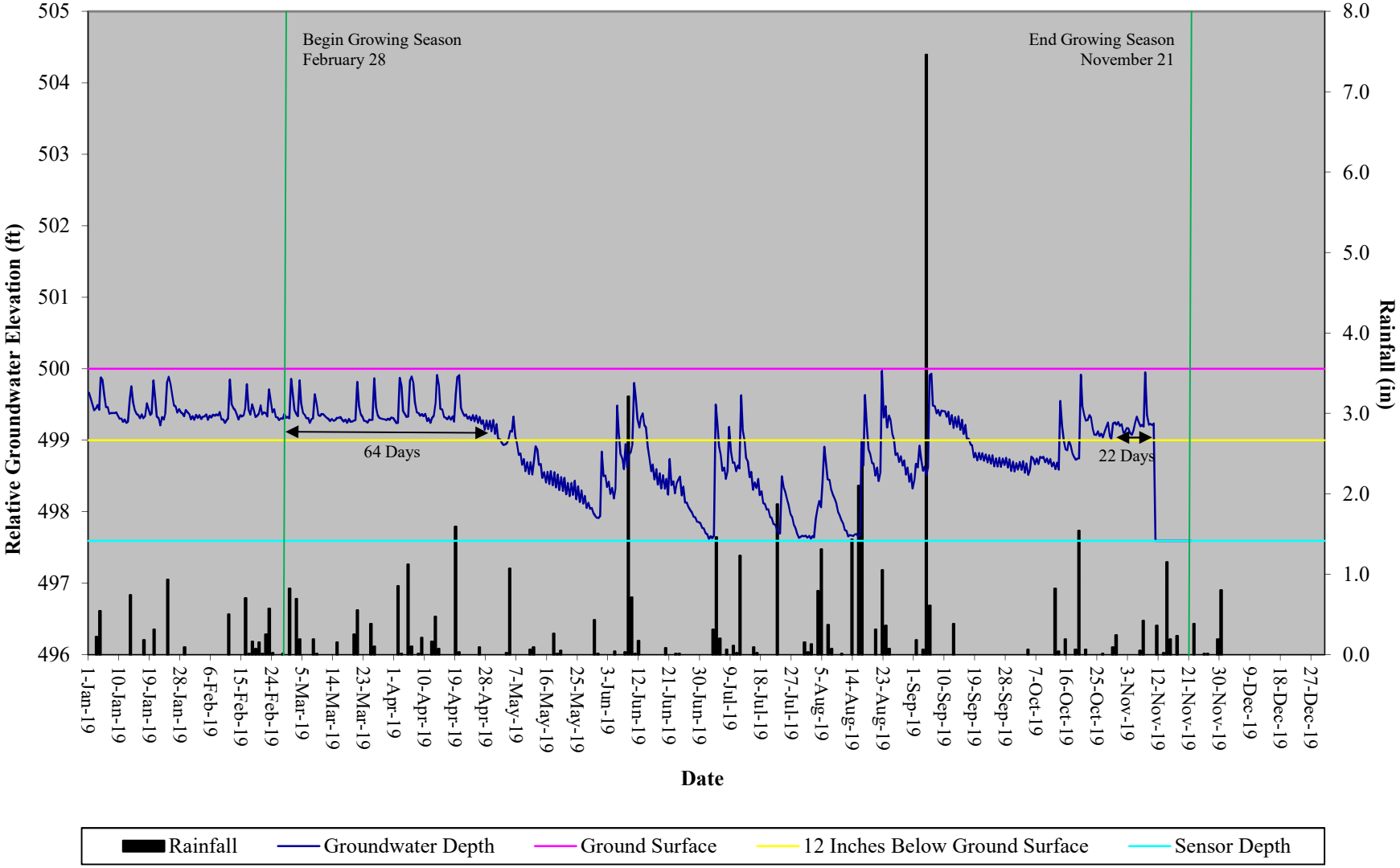
Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge 8 - Riverine Swamp Forest

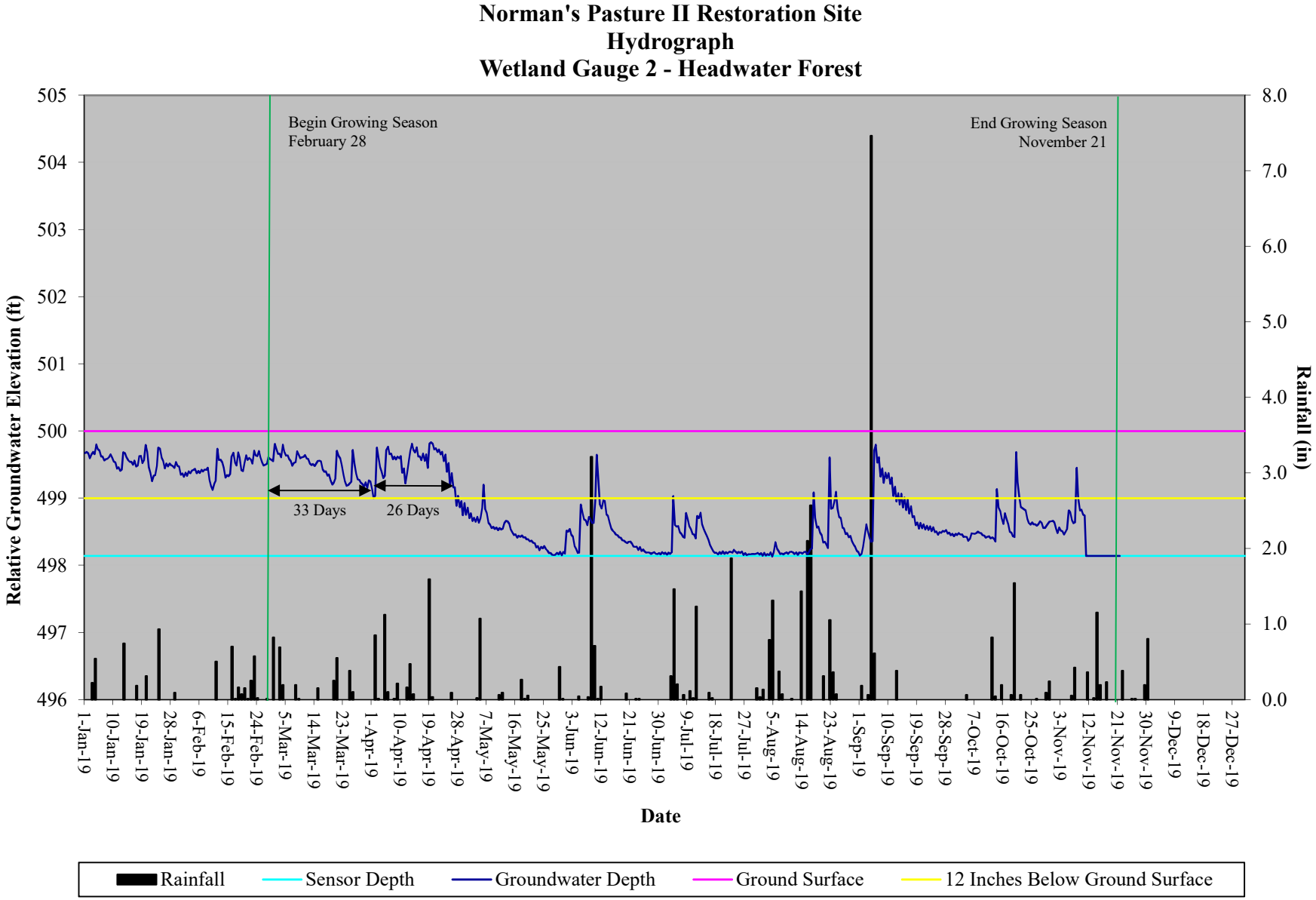


Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge 9 - Riverine Swamp Forest

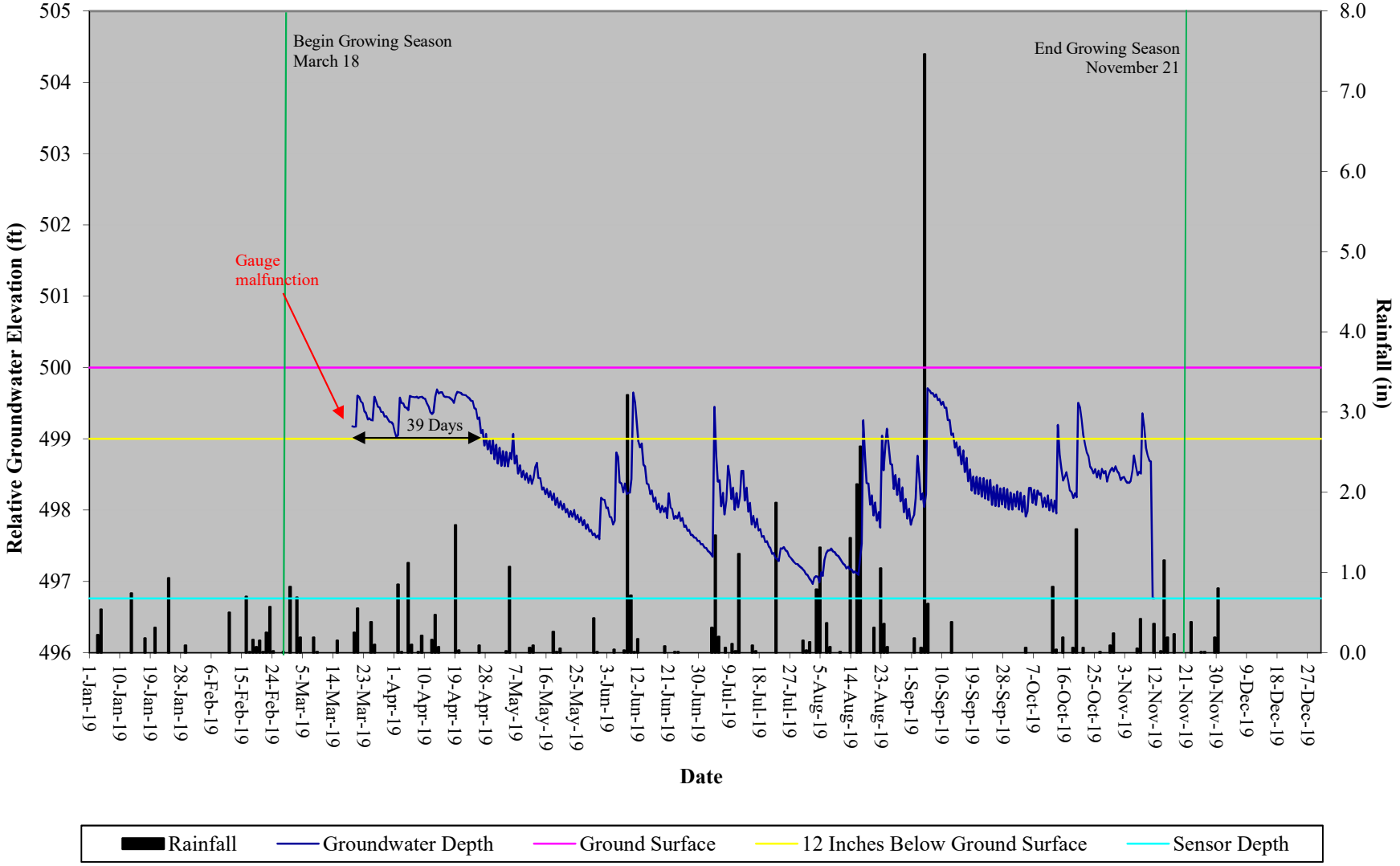


Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 1 - Headwater Forest

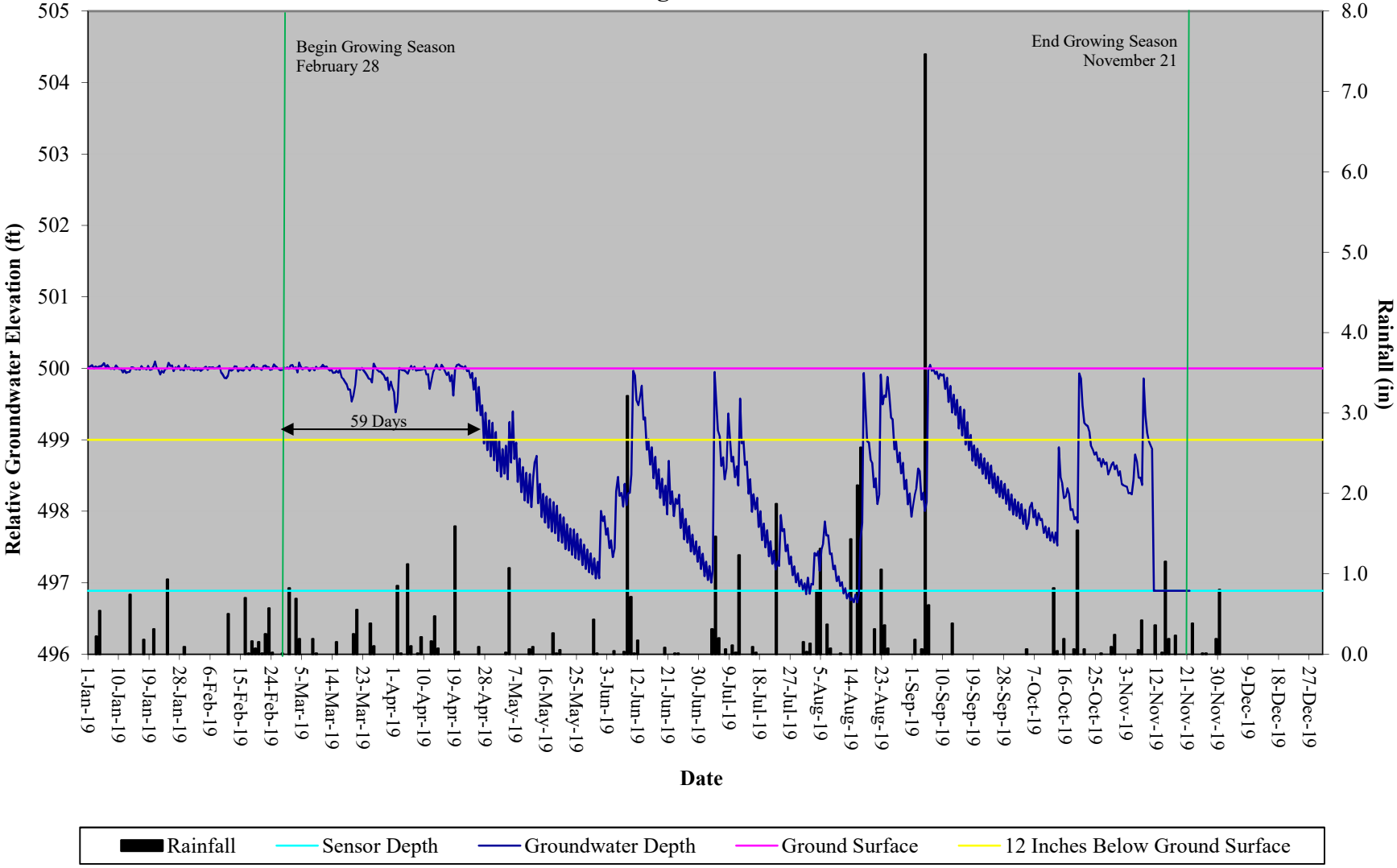


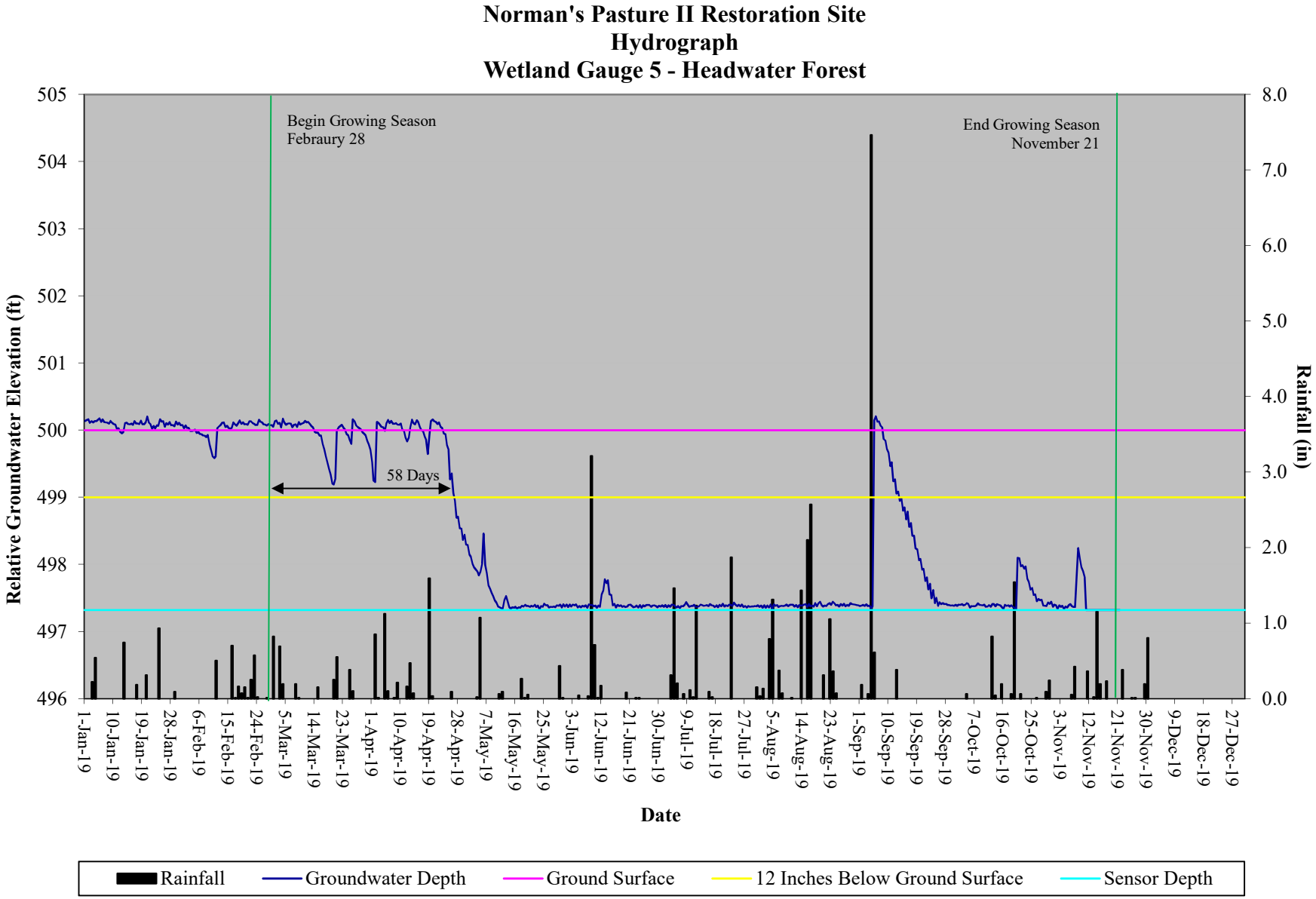

Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 2 - Headwater Forest
Begin Growing Season
February 28
End Growing Season
November 21
33 Days
26 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface

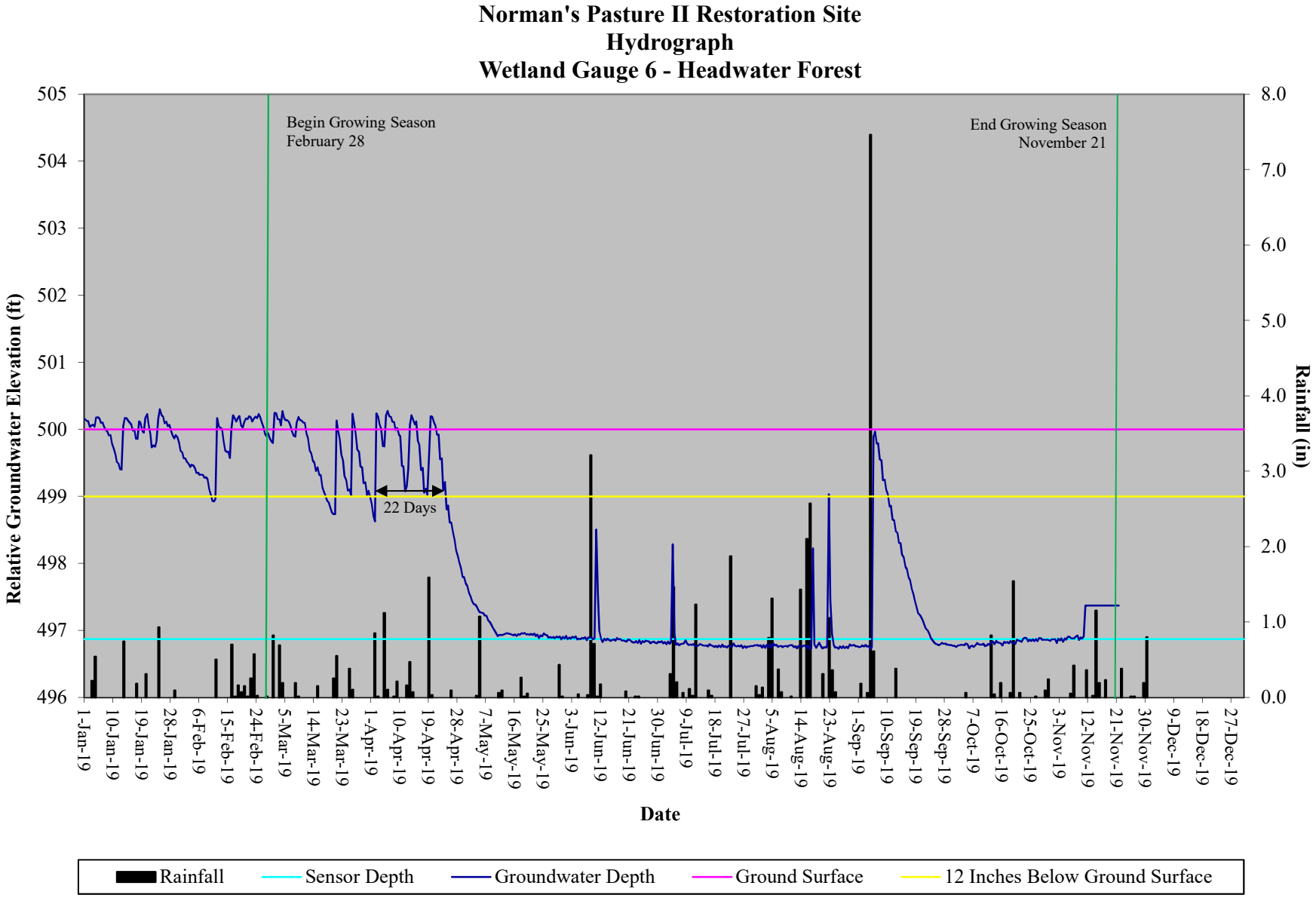
Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 3 - Headwater Forest



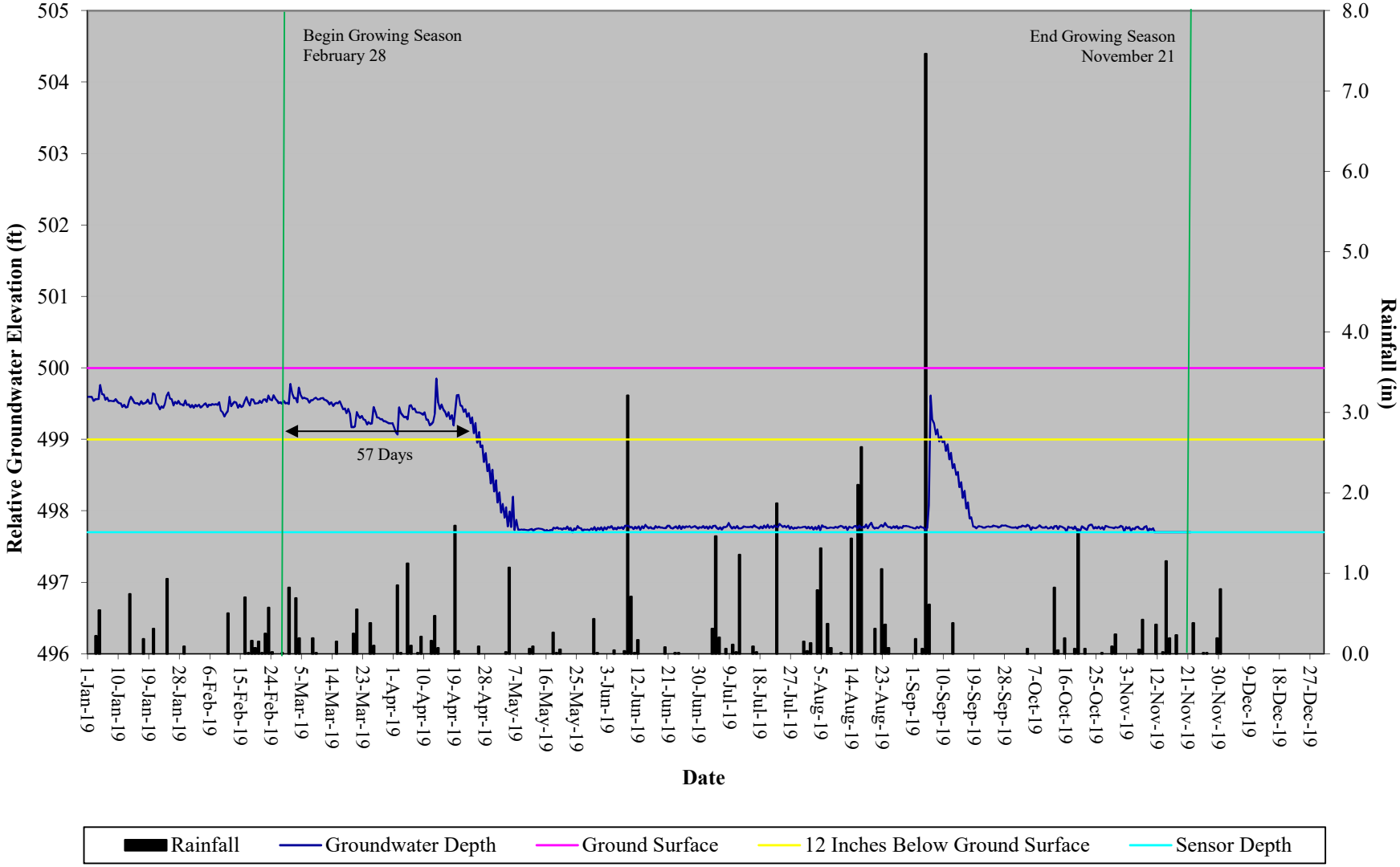
Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 4 - Headwater Forest



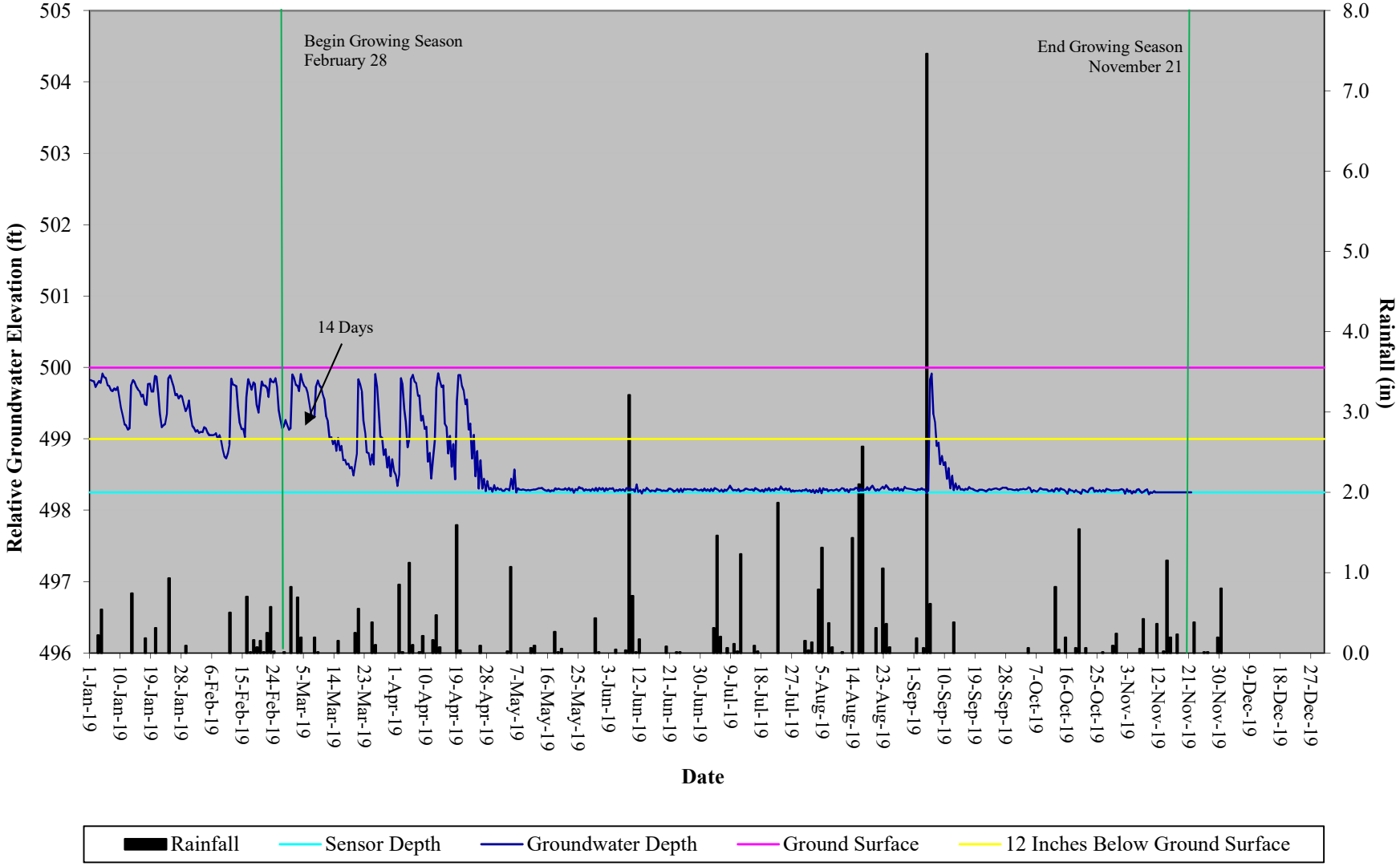

Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 5 - Headwater Forest
Begin Growing Season
Febraury 28
End Growing Season
November 21
58 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

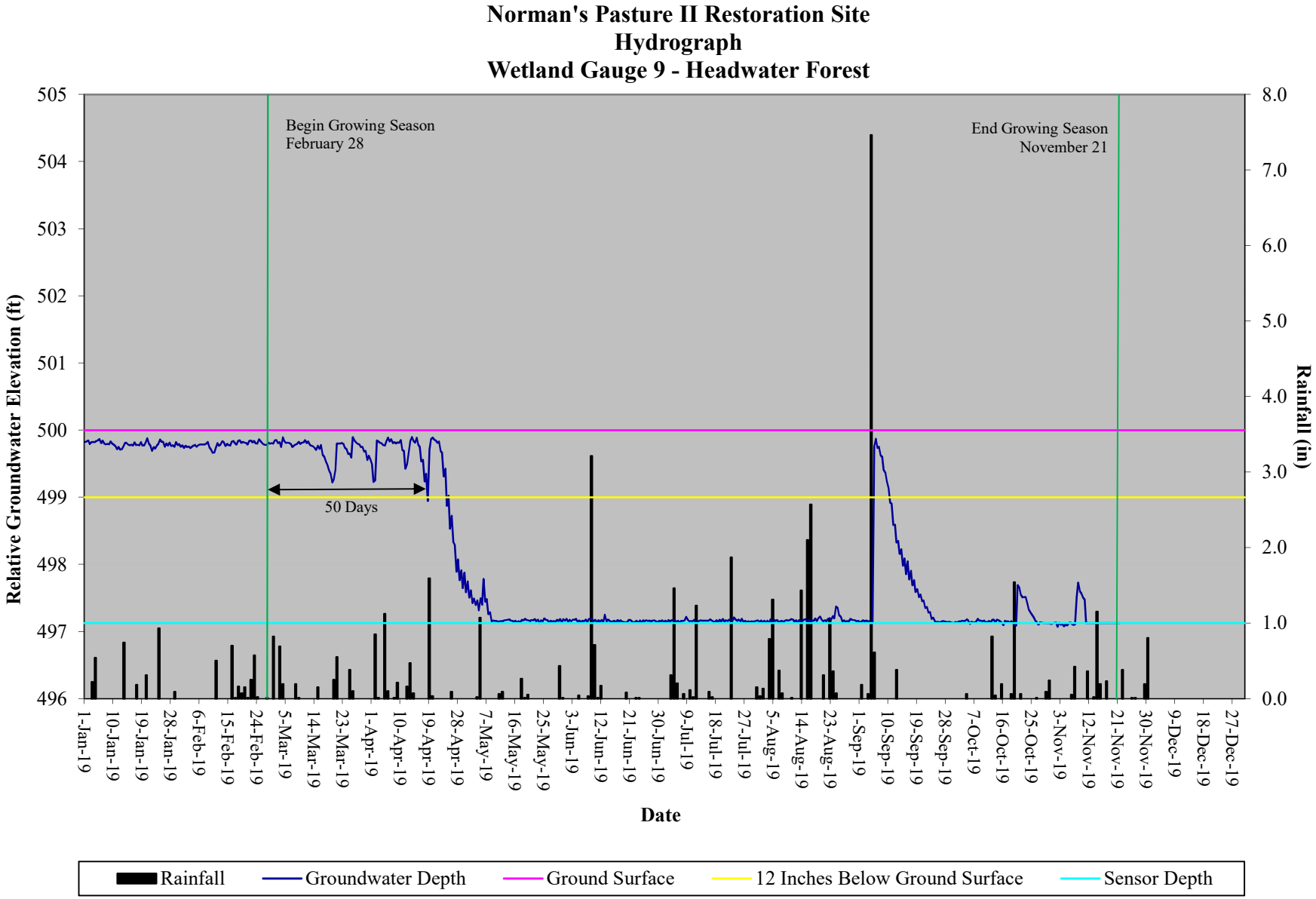

Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 6 - Headwater Forest
Begin Growing Season
February 28
End Growing Season
November 21
22 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Sensor Depth
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface

Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 7 - Headwater Forest

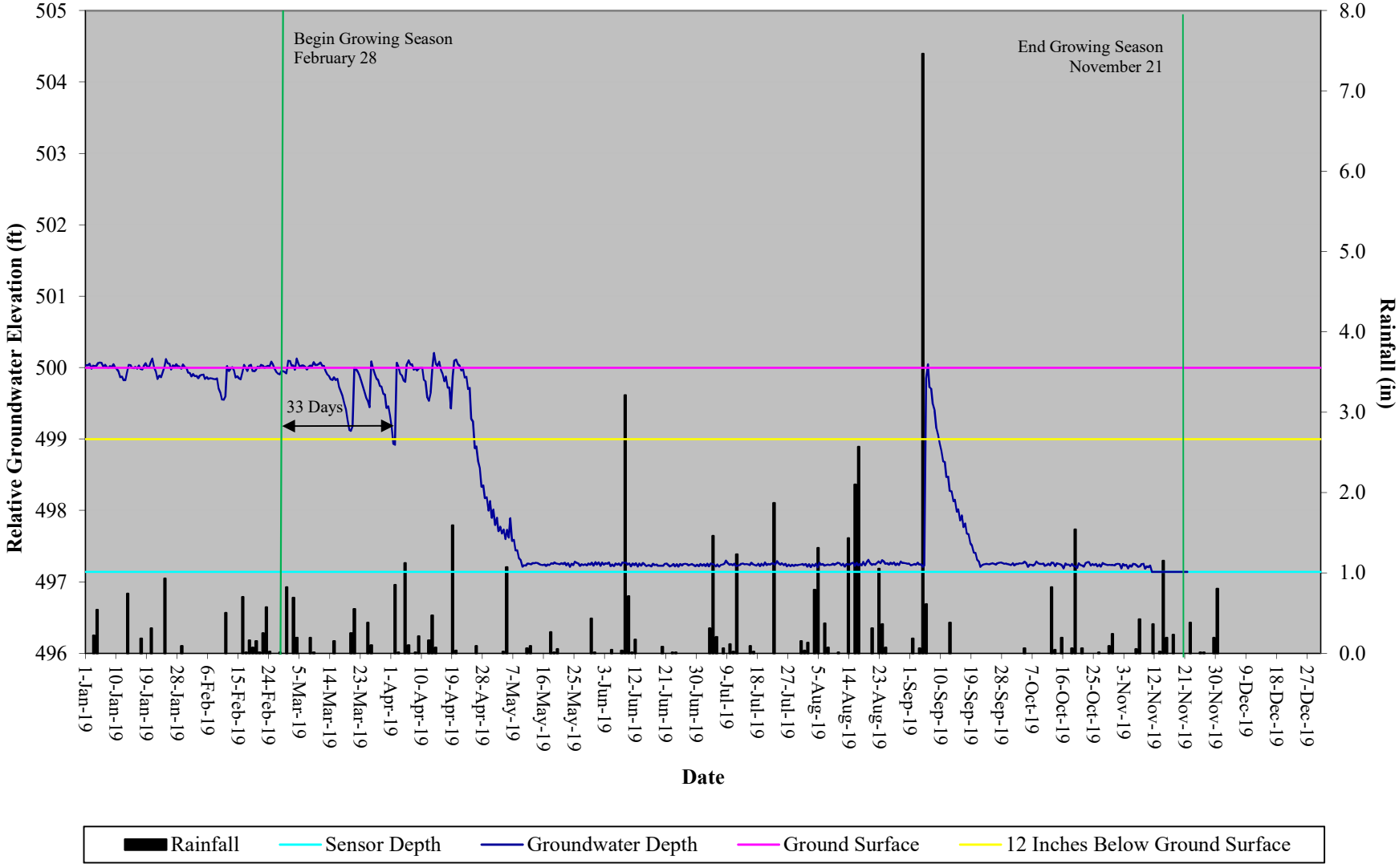


Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 8 - Headwater Forest

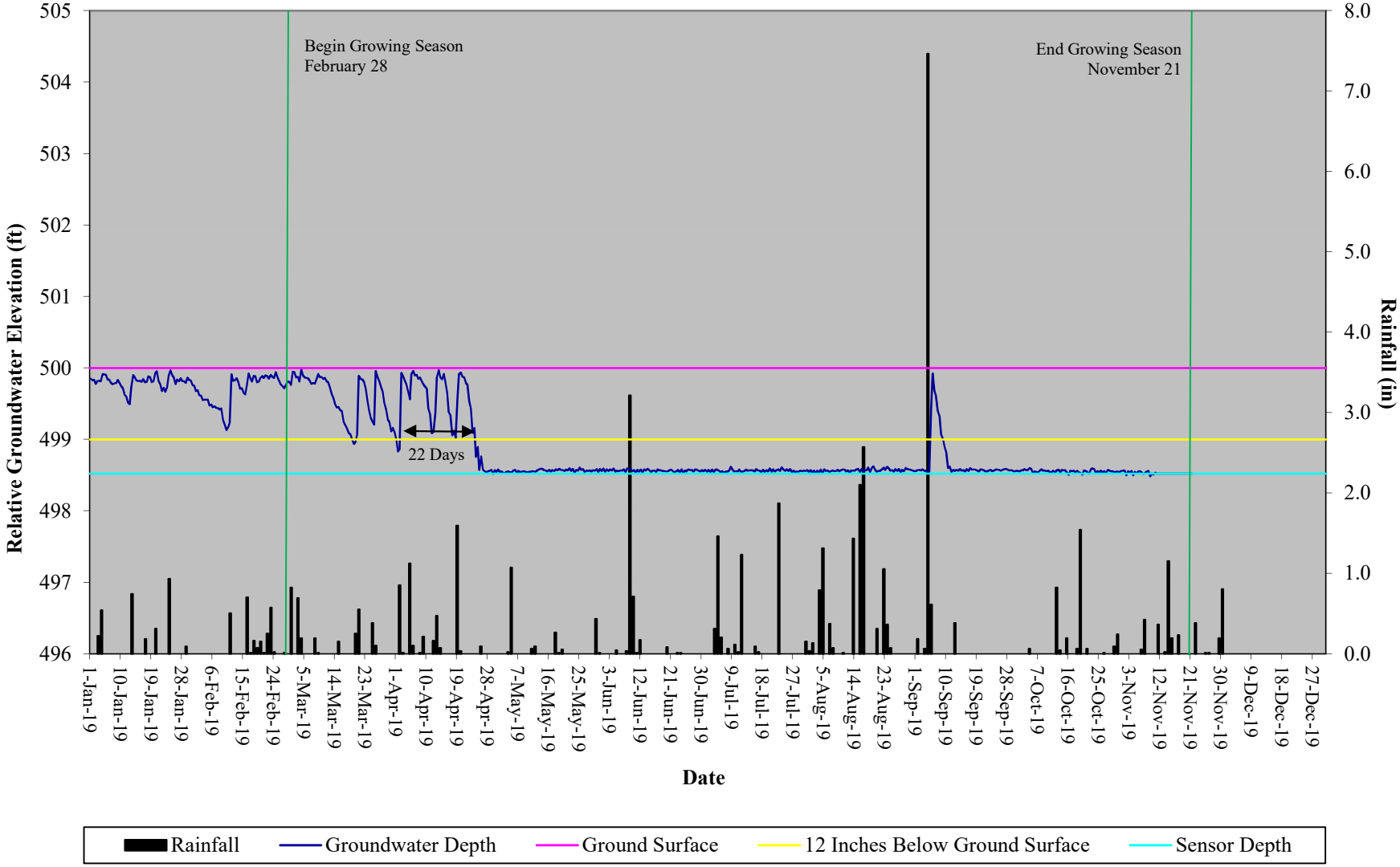



Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 9 - Headwater Forest
Begin Growing Season
February 28
End Growing Season
November 21
50 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

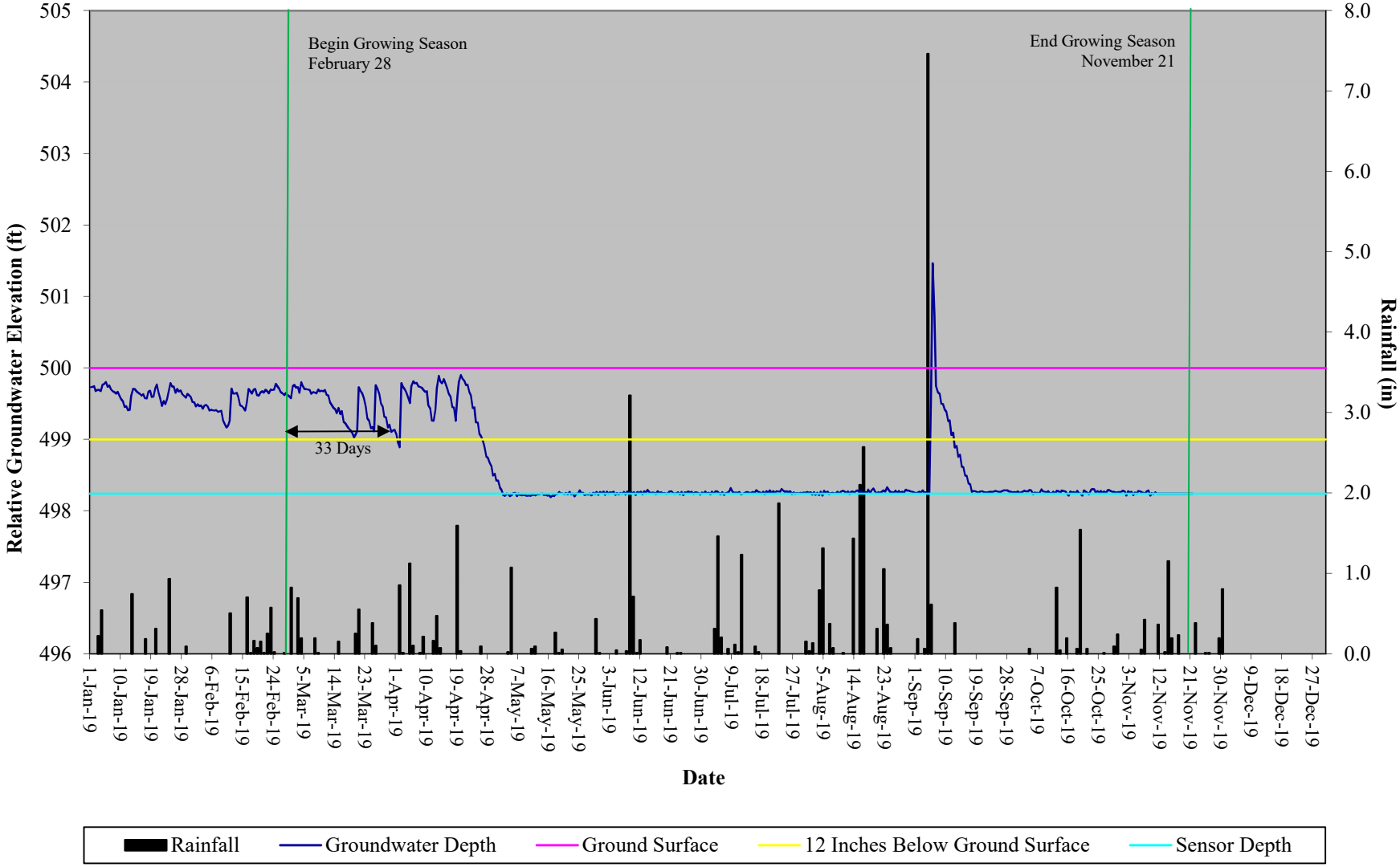
Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 10 - Headwater Forest



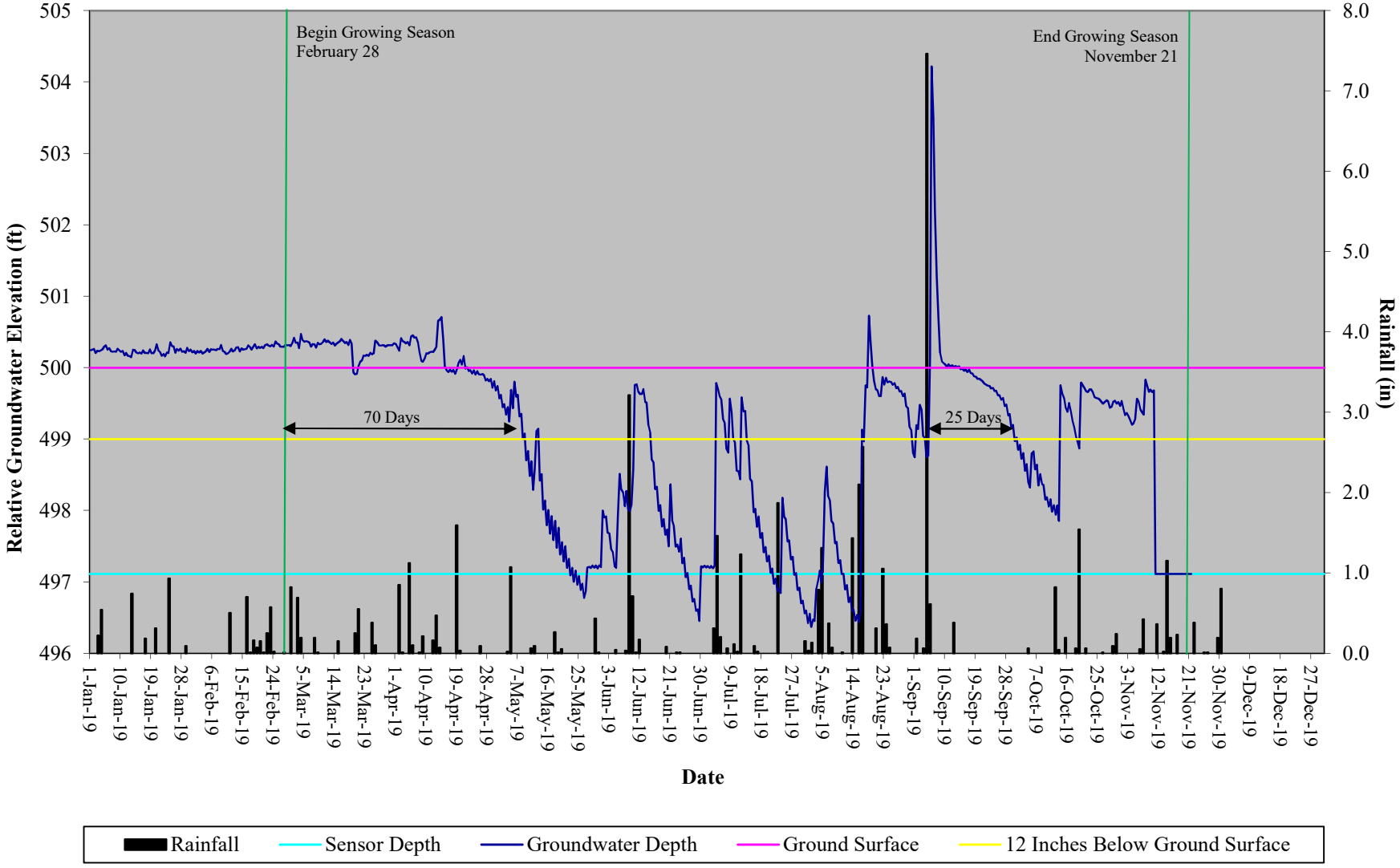
Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 11 - Headwater Forest



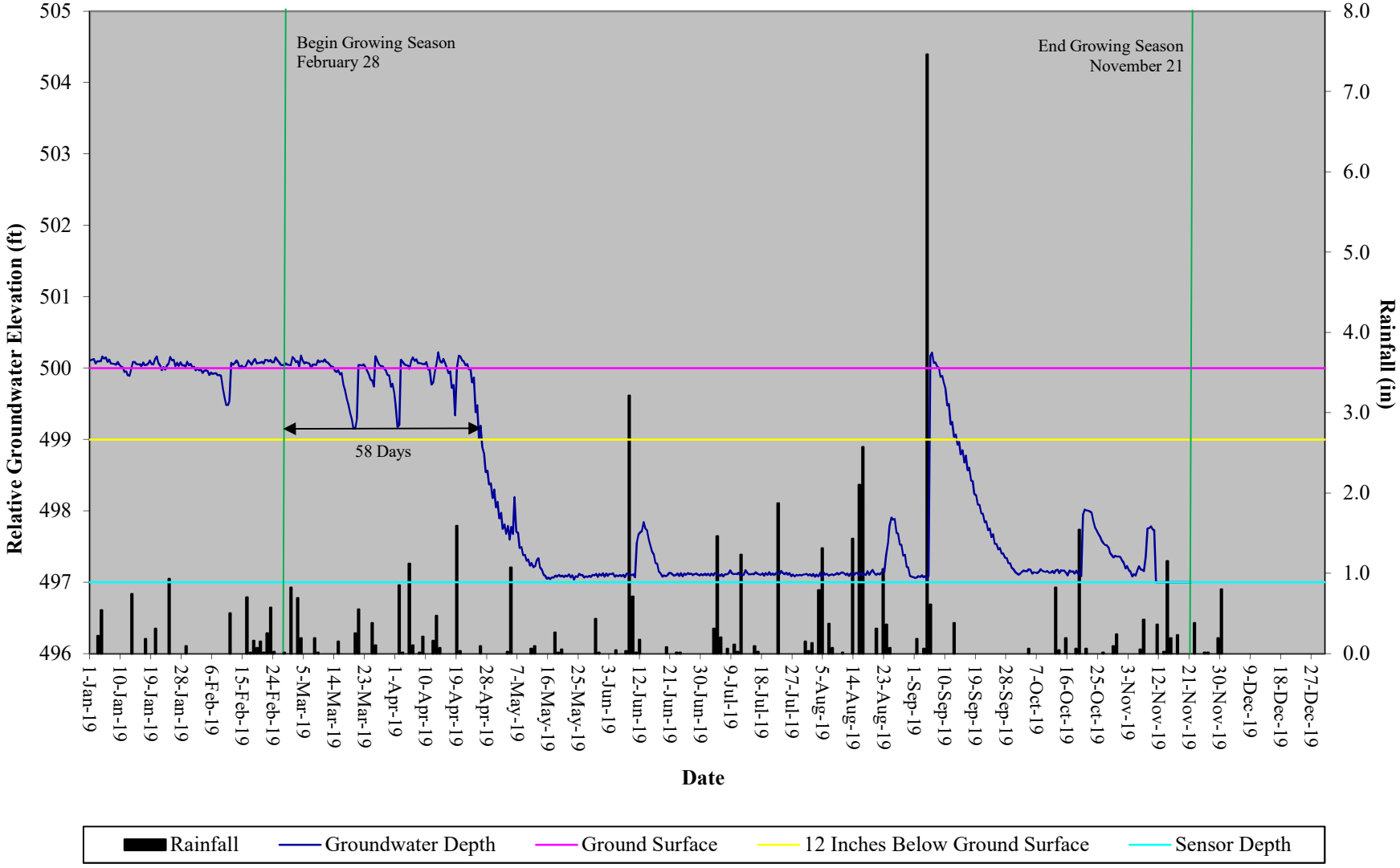
Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 12 - Headwater Forest



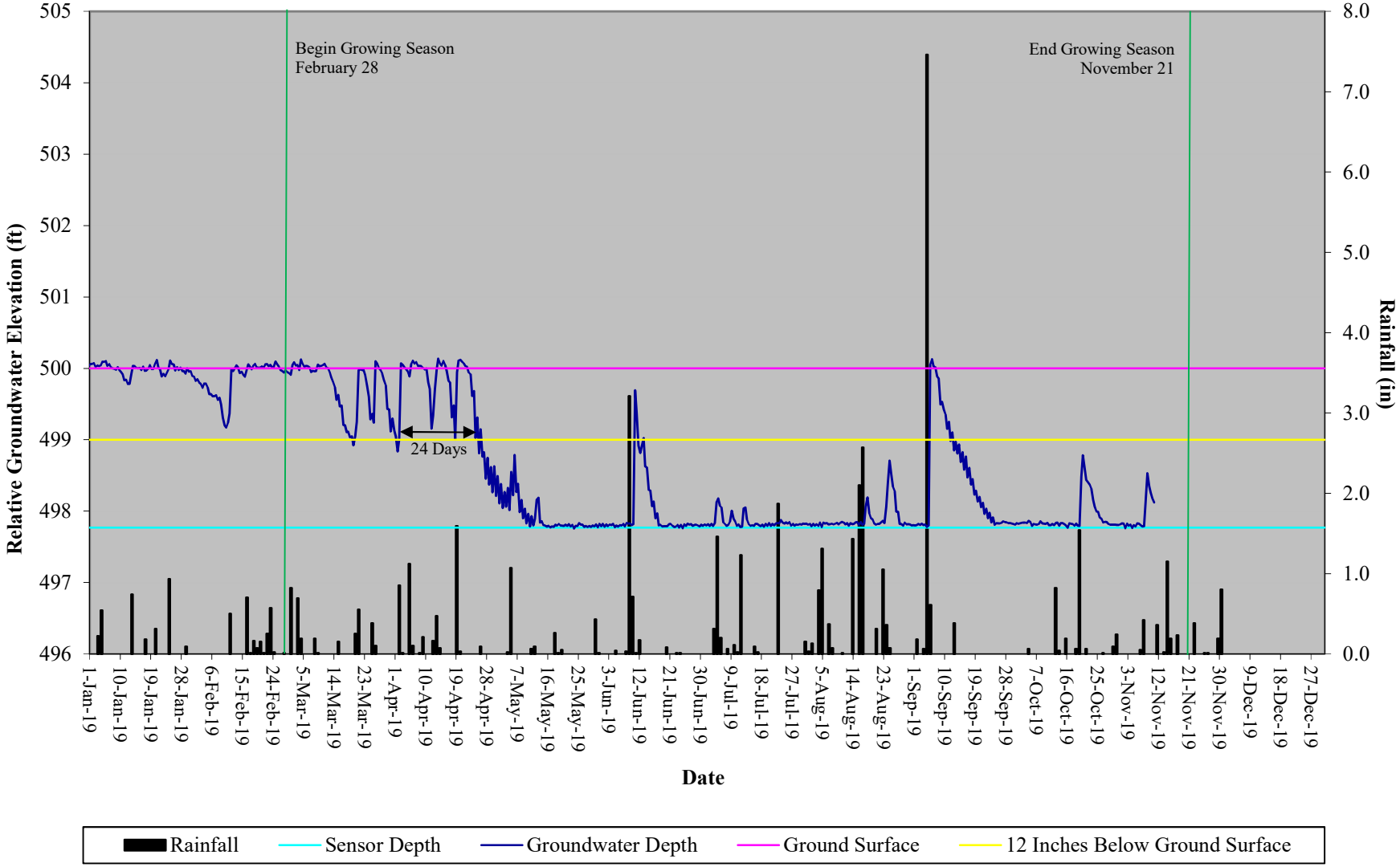
Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 13 - Headwater Forest



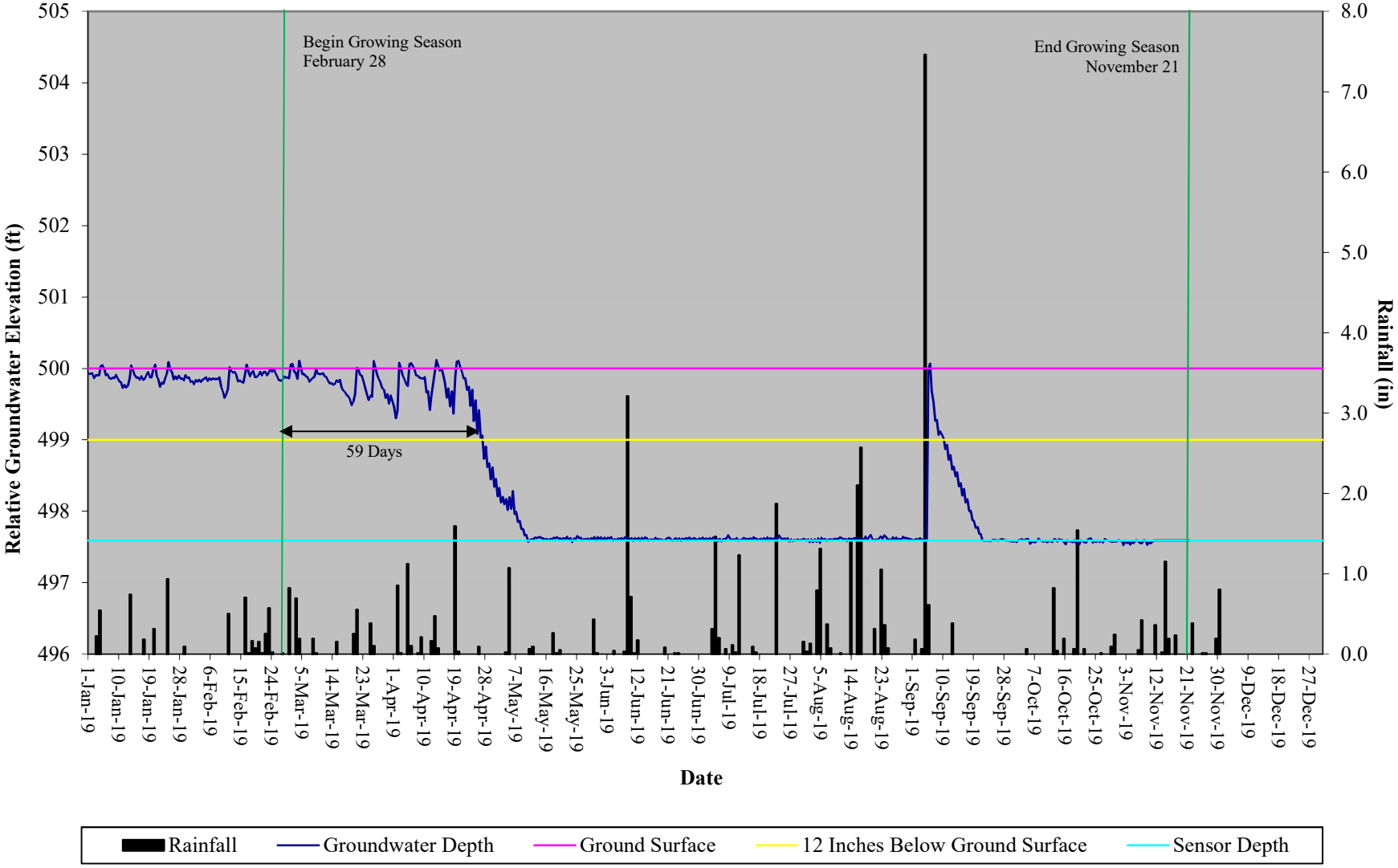
Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 14 - Headwater Forest



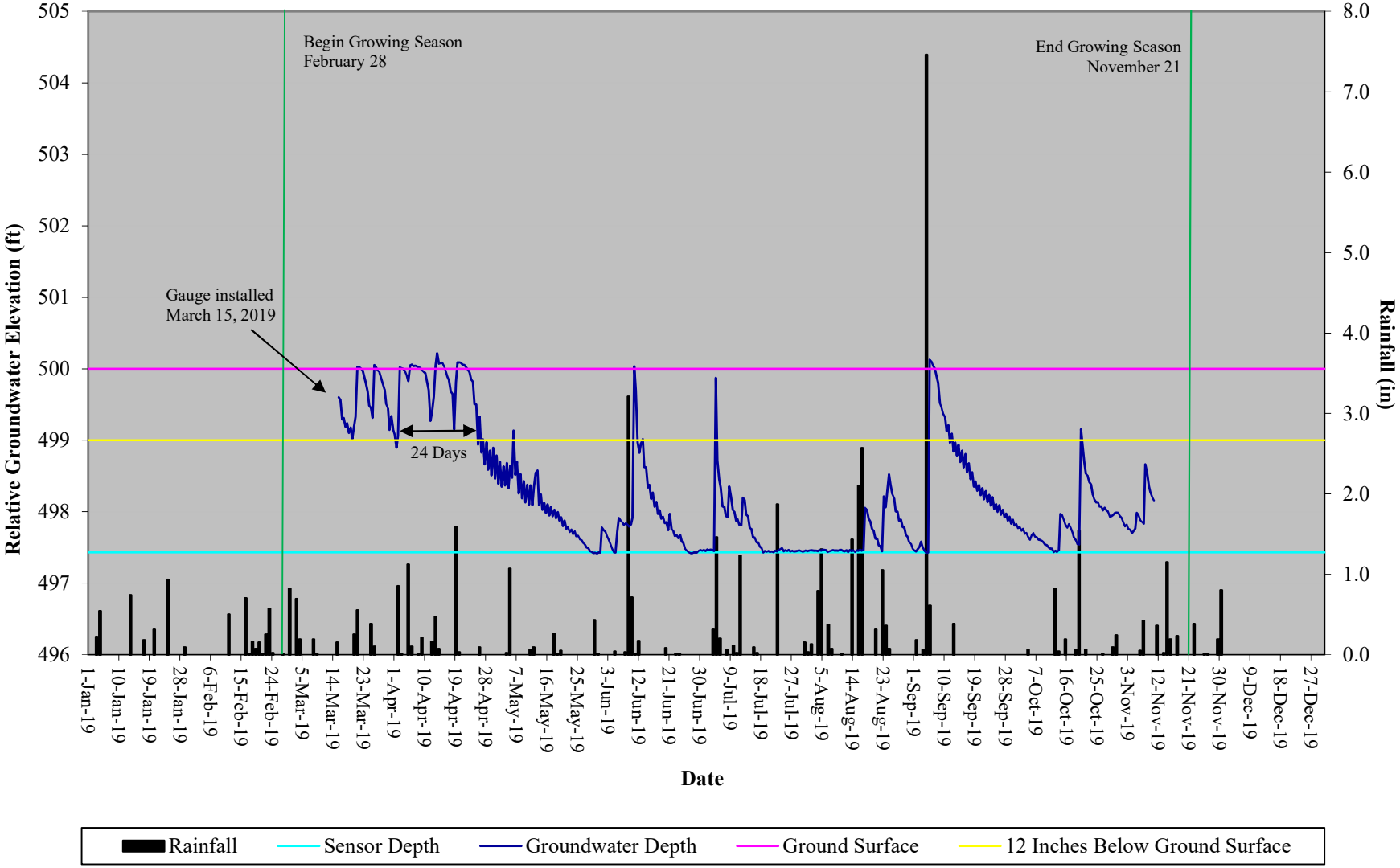
Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 15 - Headwater Forest

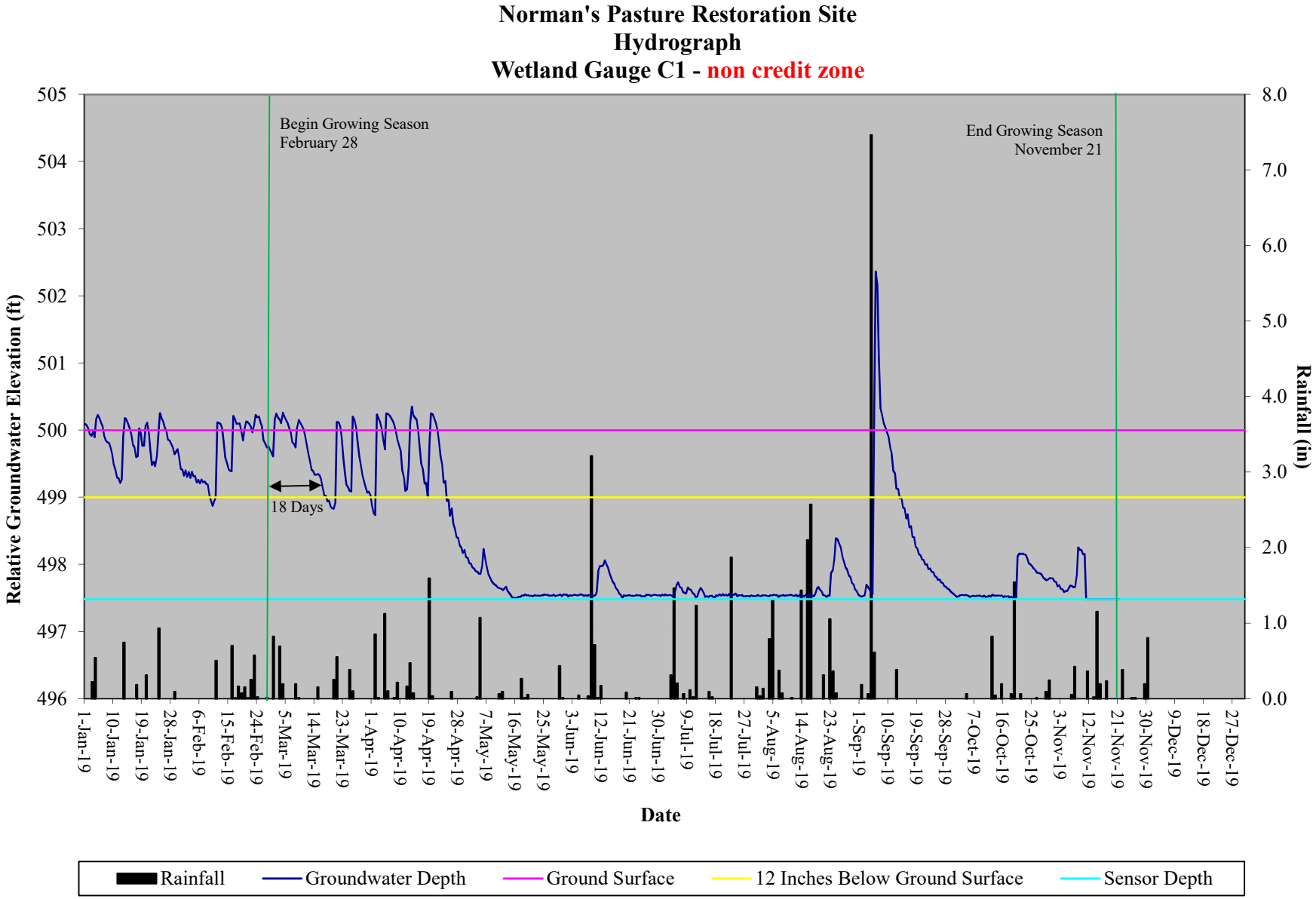


Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 16 - Headwater Forest



Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 17 - Headwater Forest




Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge C1 - non credit zone
Begin Growing Season
February 28
End Growing Season
November 21
18 Days
Relative Groundwater Elevation (ft)
Rainfall (in)
Date
505
504
503
502
501
500
499
498
497
496
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1-Jan-19
10-Jan-19
19-Jan-19
28-Jan-19
6-Feb-19
15-Feb-19
24-Feb-19
5-Mar-19
14-Mar-19
23-Mar-19
1-Apr-19
10-Apr-19
19-Apr-19
28-Apr-19
7-May-19
16-May-19
25-May-19
3-Jun-19
12-Jun-19
21-Jun-19
30-Jun-19
9-Jul-19
18-Jul-19
27-Jul-19
5-Aug-19
14-Aug-19
23-Aug-19
1-Sep-19
10-Sep-19
19-Sep-19
28-Sep-19
7-Oct-19
16-Oct-19
25-Oct-19
3-Nov-19
12-Nov-19
21-Nov-19
30-Nov-19
9-Dec-19
18-Dec-19
27-Dec-19
Rainfall
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth

Norman's Pasture Restoration Site
Hydrograph
Wetland Gauge C2 - non-credit zone