

Mitigation Project Name Norman's Pasture
 DMS ID 95717
 River Basin Cape Fear
 Cataloging Unit 03030006

County Sampson
 Date Project Instituted 11/29/2012
 Date Prepared 5/22/2018

USACE Action ID 2013-00109
 NCDWR Permit No 2014-0107

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)								15.967						
Potential Credits (As-Built Survey)								15.967						
1 (Site Establishment)	N/A				N/A	N/A	N/A				N/A		N/A	N/A
2 (Year 0 / As-Built)	30%				N/A	N/A	30%	4.790			30%		2016	6/24/2016
3 (Year 1 Monitoring)	10%				N/A	N/A	10%	1.597			10%		2017	4/3/2017
4 (Year 2 Monitoring)	10%				N/A	N/A	10%	1.597			10%		2018	4/25/2018
5 (Year 3 Monitoring)	10%				N/A	N/A	10%				10%		2019	
6 (Year 4 Monitoring)	5%				N/A	N/A	10%				10%		2020	
7 (Year 5 Monitoring)	10%				N/A	N/A	10%				10%		2021	
8 (Year 6 Monitoring)	5%				N/A	N/A	10%				10%		2022	
9 (Year 7 Monitoring)	10%				N/A	N/A	10%				10%		2023	
Stream Bankfull Standard	10%						N/A				N/A			
Total Credits Released to Date								7.984						

DEBITS (released credits only)

	Ratios															
	1	1.5	2.5	5	1.01459	3	2	5	1	3	2	5	1	3	2	5
	Stream Restoration	Stream Enhancement 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)					16.200											
As-Built Amounts (mitigation credits)					15.967											
Percentage Released					50%											
Released Amounts (feet / acres)					8.10											
Released Amounts (credits)					7.98											
NCDWR Permit	USACE Action ID	Project Name														
2012-0240	1992-03237	NCDOT TIP R-2303C - NC 24 Improvements, Sampson County														
		3.588														
2012-0240	1992-03237	NCDOT TIP R-2303D - NC 24 Improvements, Sampson County														
		0.376														
	2011-01919	SR 1002 - Bridge 144 - Division 3, Pender County														
	2011-02376	NCDOT TIP B-4818														
	2009-01697	NCDOT TIP B-4950														
		0.345														
		0.852														
		0.649														
Remaining Amounts (feet / acres)					2.290											
Remaining Amounts (credits)					2.257											

Contingencies (if any): None


 Signature of Wilmington District Official Approving Credit Release

9/6/18
 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) Receipt of necessary DA permit authorization or written DA approval for projects 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

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 03



Construction Completed: Feb 2016
Data Collection: July 2018
Submitted: December 2018

Monitoring and Design Firm

Prepared by:



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

December 2018



MEMORANDUM

Date: January 22, 2019
To: Jeff Schaffer, DMS Project Manager
From: Tim Morris, Project Manager
KCI Associates of North Carolina, PA
Subject: Norman's Pasture/Norman's II Restoration Sites
Year 3 Monitoring Report Comments
Cape Fear River Basin CU 03030006
Sampson County, North Carolina
DMS IMS #s 95717 & 96310

Please find below our responses in italics to the Year 3 Monitoring Report comments from NCDMS received on January 15, 2019, for the Norman's Pasture/Norman's II Restoration Sites.

1. Cover page: add the following:
 - a. USACE Action ID#: SWA-2013-00109
 - b. DWR Project#: 2014-0107
 - c. County

KCI Response: This change has been made.

2. Section 2.2 and Table 10 in Appendix D: NP116 and NP118 have not met the hydrologic success of 9% in all 3 years (though they did trend upward in MY3). While KCI's rationale of an atypical weather pattern is sound, the fact that these 2 wells have never met is concerning. If you have any other reason for what is going on with these 2 wells, please provide that in the report along with any potential remedial action KCI intends to take to improve hydrology in the areas of these gauges or other actions to address these concerns. KCI should also be aware that credits may be withheld by the IRT for Norman's Pasture II wetlands based on earlier discussions, so please be prepared to discuss at the upcoming credit release meeting.

KCI Response: Well NP116 is located very close to the edge of the easement, and as such is in a transitional area. The herbaceous layer around this well contains many wetland indicator plants, and it has shown increased hydrology every year. Last year, a new well (NP114) was installed in close proximity to NP116. No further action is planned for this well at this time. Well NP118 is located close to the highest elevation on the entire project. Last year two new wells (NP115 and NP116) were installed in the vicinity of this well. An additional well is going to be installed before the start of the 2019 growing season between NP118 and NP115.

3. Appendix A:
 - a. Table 1a: Please make the following changes
 - i. In Riparian Wetland section in Mitigation Credits section, change Credits and Total Credits in from 16.0 to 15.97. This eliminates rounding errors and better represents the credit calculations

- ii. In Riparian Wetland section in Component Summation section, change Total Credits in from 16.0 to 15.97. Again, this eliminates rounding errors and better represents the credit calculations.
- b. Table 1b: Please make the following changes:
 - i. In Stream section in Mitigation Credits section, change Credits and Total Credits from 337 to 337.2. This eliminates rounding errors and better represents the credit calculations.
 - ii. In Riparian Wetland section in Mitigation Credits section, change Credits and Total Credits from 9.7 to 9.73. This eliminates rounding errors and better represents the credit calculations
 - iii. In Components Summation Section, change stream linear feet to 843 and Total stream credits to 337.2. Also change acres of Riparian Wetland restoration to 10.2 and Total wetland credit to 9.73.

KCI Response: These changes have been made.

- 4. Appendix C: There are discrepancies in the stem counts shown on the CCPV and in Tables 6 and 8 for vegetation plots 6, 8, 10, 17, 23, 28 and 31. Please make necessary changes to ensure correct numbers are displayed in all 3 places.

KCI Response: These discrepancies arose from including Chinese Privet in the stem counts in some places but not others. Stem counts have been updated throughout the report to exclude invasive species.

- 5. Appendix D: No digital version of Table 10 was provided. Please submit with revised report.

KCI Response: This has been included in the new digital submission.

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

Sincerely,



Tim Morris
Project Manager

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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 NPPII 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 NPPII (no mitigation credit).

Both NPRS and NPPII 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 NPPII, 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 NPPII) were installed to evaluate the attainment of jurisdictional wetland hydrology for both sites. One monitoring gauge was installed in the stream on NPPII 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 NPPII in February of 2018, for a total of 25 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 NPPII) 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. The third year monitoring counted an average of 705 planted stems/acre and 1,415 total stems/acre. All 31 of the vegetation monitoring plots met the success criteria.

Wetland hydrology is monitored with the series of 25 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 third growing season, all of the 9 gauges at NPRS and 9 of the 16 gauges at NPPII met the success criteria.

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 NPPII. The third-year vegetation monitoring was based on the Level 2 CVS-EEP vegetation monitoring protocol. The site's average density for this monitoring period was 705 planted stems/acre. All 31 plots exceeded 320 planted stems/acre. Including volunteers, the site averaged 1,424 total stems/acre.

The vegetation monitoring was completed on July 11, 2018.

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 (NPPII). 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 NPPII in February of 2018. The soil survey for Sampson County estimates that the growing season begins March 18 and ends November 11 (237 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% (22 days) of the growing season for headwater forest systems and 12% (29 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 "Assessing 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 2018-year, the months of May, September, and November experienced an above average rainfall, while January, April, June, July, and August experienced average rainfall. The months of February, March, and October recorded below average rainfall for the site. Overall, the area experienced slightly above average rainfall during the 2018 growing season, largely due to the large amount of rain that fell during Hurricane Florence. If the month of September is excluded from these calculations, the site experienced slightly below average rainfall during 2018.

During the site's third growing season, eighteen 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 237 day growing season (March 18 to November 11). The gauges that did not meet are all located in the upper portion of NPPII. The unusually high number of non-achieving gauges is likely due to the very small amount of rain that the site received around the beginning of the growing season, which is when these gauges are typically expected to attain jurisdictional hydrology. Despite this, 5 of the 7 non-achieving wells were within 1.5% of achieving success. KCI does not believe that the high number of non-achieving gauges

is indicative of a problem with the site, but rather is a result of the atypical weather pattern (dry spring and wet fall) that the site experienced this year. Please refer to Table 10 in Appendix D for gauge data.

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 three monitoring years, including two in 2018, and has met this criteria. See Table 9 in Appendix D.

2.3 Visual Monitoring Results

A yearly visual assessment of the enhanced stream on NPII will occur every year. The third 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). "Assessing 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

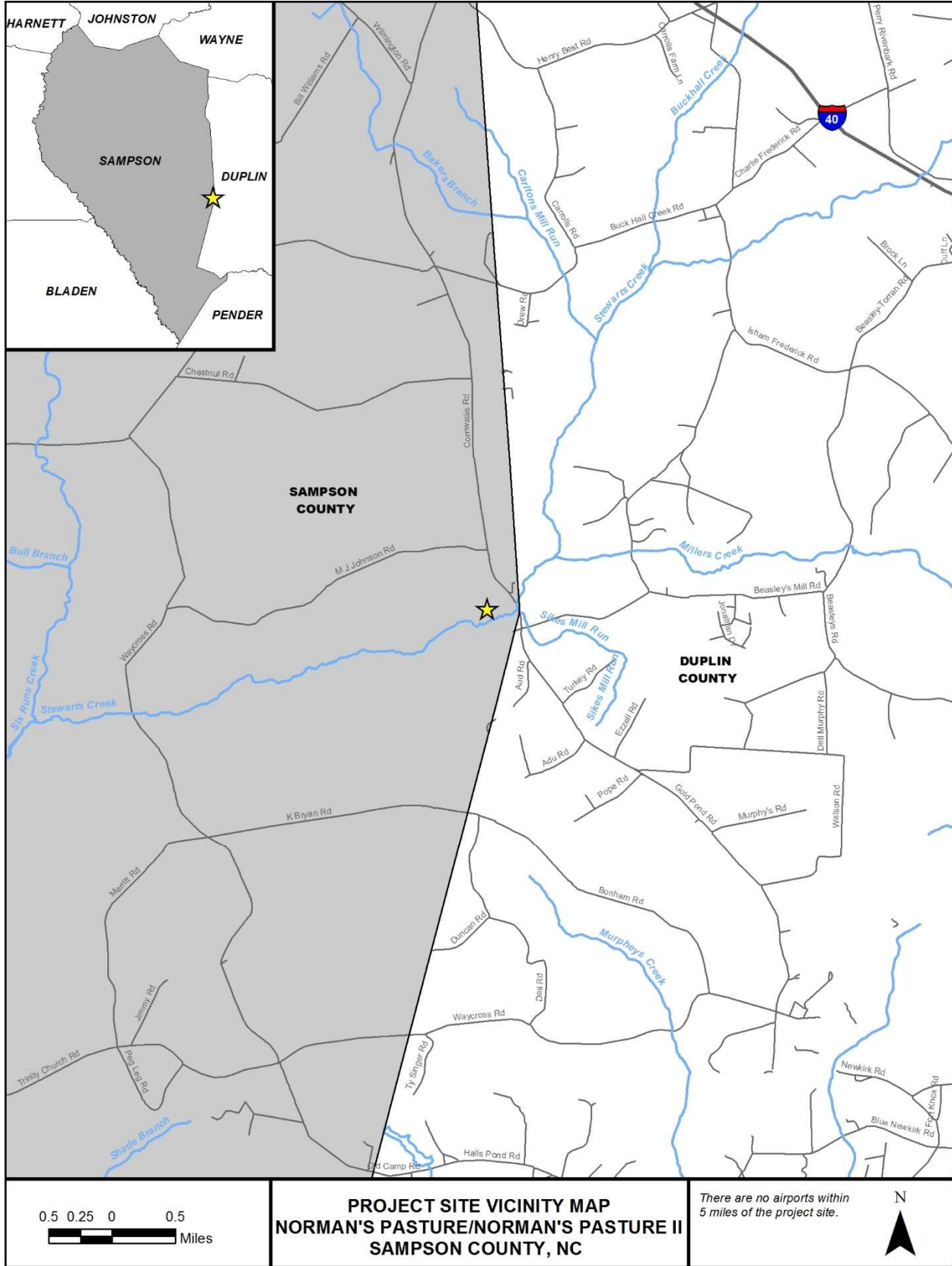


Table 1a. Project Components and Mitigation Credits									
Norman's Pasture Restoration Site, DMS Project #95717									
Mitigation Credits									
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Length			16.2						
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	

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 Summary 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	Chibley 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 Summary 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%

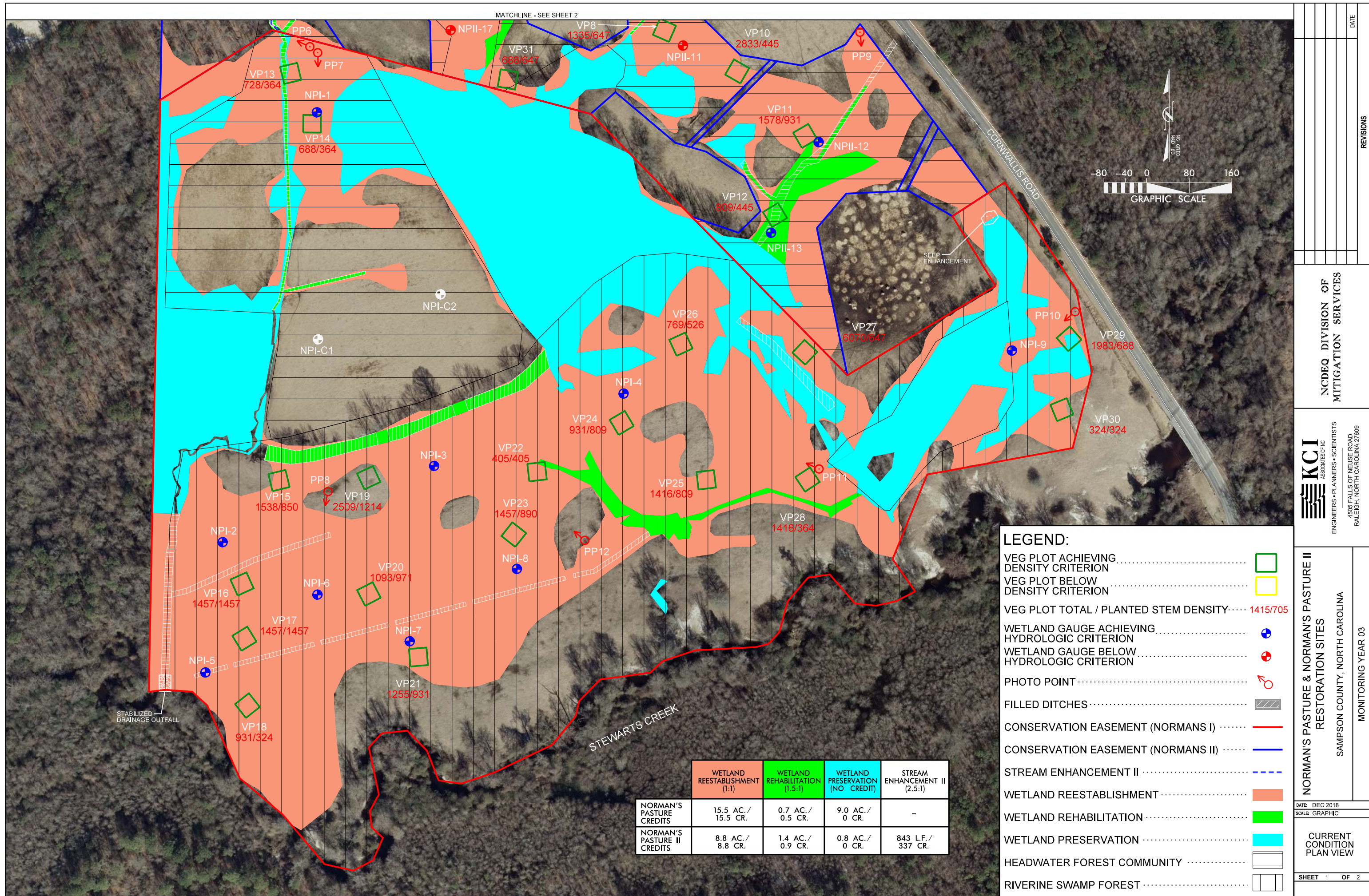
Project Information continued - Norman's II Restoration Site Restoration Site

Regulatory Considerations

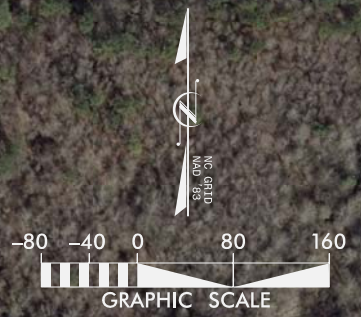
Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States – Section 404	Yes	Yes	Jurisdictional Determination
Waters of the United States – Section 401	Yes	Yes	Jurisdictional Determination
Endangered Species Act	No	N/A	N/A
Historic Preservation Act	No	N/A	N/A
Coastal Zone Management 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



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

	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.

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RALEIGH, NORTH CAROLINA 27609

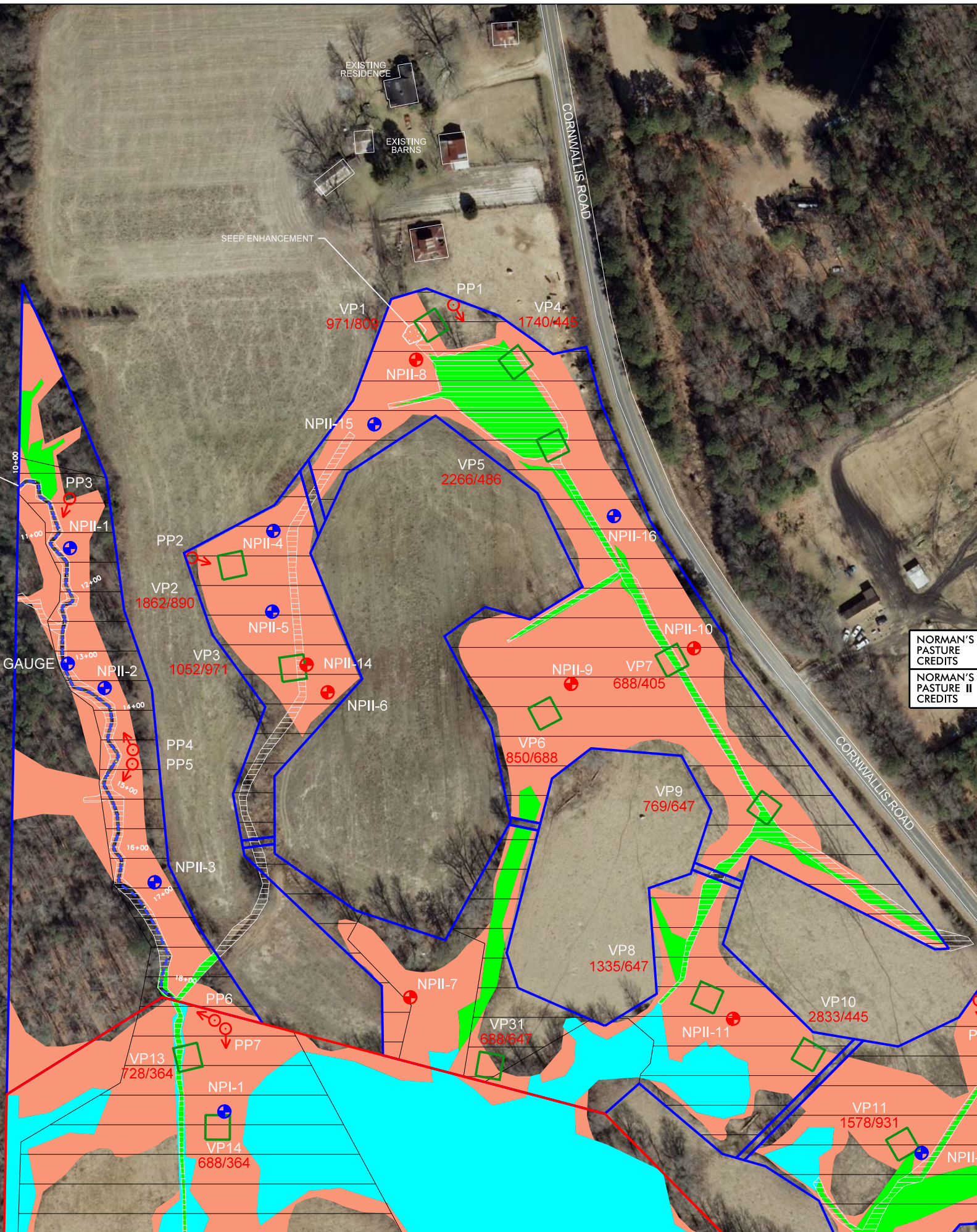
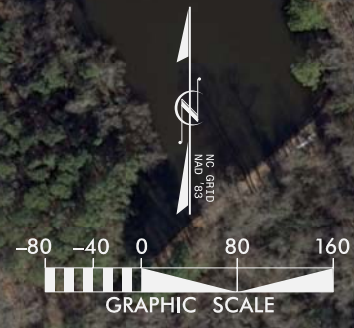
NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES
SAMPSON COUNTY, NORTH CAROLINA
MONITORING YEAR 03

DATE: DEC 2018
SCALE: GRAPHIC

CURRENT CONDITION PLAN VIEW

SHEET 1 OF 2

NO.	DATE	REVISIONS



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

	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 <small>ASSOCIATES OF NC</small> 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 03	
DATE: DEC 2018	
SCALE: GRAPHIC	
CURRENT CONDITION PLAN VIEW	
SHEET 2 OF 2	

MATCHLINE - SEE SHEET 1

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%

Vegetation Monitoring Plot Photos



Plot 1 – MY-03 – 7/11/18



Plot 2 – MY-03 – 7/11/18



Plot 3 – MY-03 – 7/11/18



Plot 4 – MY-03 – 7/11/18



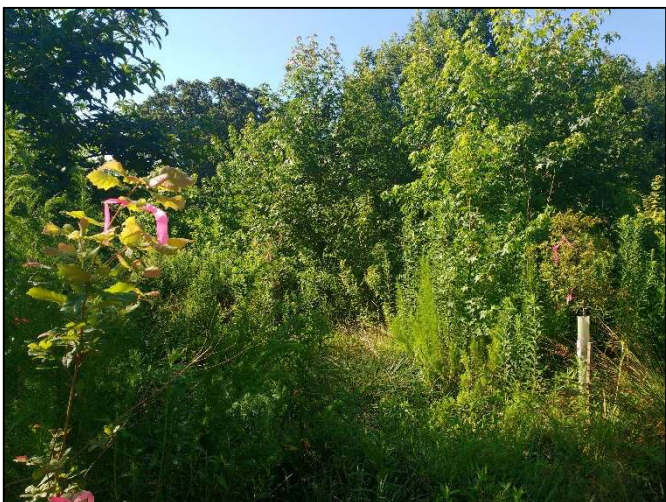
Plot 5 – MY-03 – 7/11/18



Plot 6 – MY-03 – 7/11/18



Plot 7 – MY-03 – 7/11/18



Plot 8 – MY-03 – 7/11/18



Plot 9 – MY-03 – 7/11/18



Plot 10 – MY-03 – 7/11/18



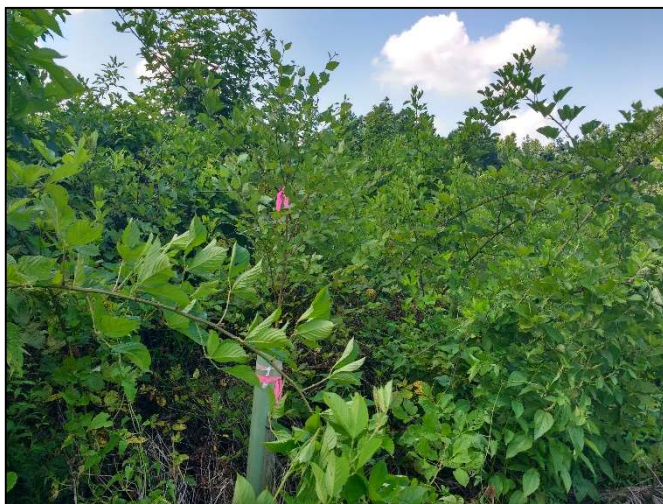
Plot 11 – MY-03 – 7/11/18



Plot 12 – MY-03 – 7/11/18



Plot 13 – MY-03 – 7/11/18



Plot 14 – MY-03 – 7/11/18



Plot 15 – MY-03 – 7/11/18



Plot 16 – MY-03 – 7/11/18



Plot 17 – MY-03 – 7/11/18



Plot 18 – MY-03 – 7/11/18



Plot 19 – MY-03 – 7/11/18



Plot 20 – MY-03 – 7/11/18



Plot 21 – MY-03 – 7/11/18



Plot 22 – MY-03 – 7/11/18



Plot 23 – MY-03 – 7/11/18



Plot 24 – MY-03 – 7/11/18



Plot 25 – MY-03 – 7/11/18



Plot 26 – MY-03 – 7/11/18



Plot 27 – MY-03 – 7/11/18



Plot 28 – MY-03 – 7/11/18



Plot 29 – MY-03 – 7/11/18



Plot 30 – MY-03 – 7/11/18



Plot 31 – MY-03 – 7/11/18

Photo Reference Points



PP01 – MY-00 – 4/15/16



PP01 – MY-03 – 12/5/18



PP02 – MY-00 – 4/15/16



PP02 – MY-03 – 12/5/18



PP03 – MY-00 – 4/15/16



PP03 – MY-03 – 12/5/18



PP04 – MY-00 – 4/15/16



PP04 – MY-03 – 12/5/18



PP05 – MY-00 – 4/15/16



PP05 – MY-03 – 12/5/18



PP06 – MY-00 – 4/15/16



PP06 – MY-03 – 12/5/18



PP07 – MY-00 – 4/15/16



PP07 – MY-03 – 12/5/18



PP08 – MY-00 – 4/15/16



PP08 – MY-03 – 12/5/18



PP09 – MY-00 – 4/15/16



PP09 – MY-03 – 12/5/18



PP10 – MY-00 – 4/15/16



PP10 – MY-03 – 12/5/18



PP11 – MY-00 – 4/15/16



PP11 – MY-03 – 12/5/18



PP12 – MY-00 – 4/15/16



PP12 – MY-03 – 12/5/18

Appendix C

Vegetation Plot Data

Table 6. Vegetation Plot Criteria Attainment				
Norman's Pasture & Norman's Pasture II Restoration Sites				
Vegetation Plot ID	Location	Vegetation Survival Threshold Met?	Monitoring Year 03 Planted Stem Density (stems/acre)	Monitoring Year 03 Total Stem Density (stems/acre)
1	NPII	Yes	809	971
2	NPII	Yes	890	1,862
3	NPII	Yes	971	1,052
4	NPII	Yes	445	1,740
5	NPII	Yes	486	2,266
6	NPII	Yes	688	850
7	NPII	Yes	405	688
8	NPII	Yes	647	1,335
9	NPII	Yes	647	769
10	NPII	Yes	445	2,833
11	NPII	Yes	931	1,578
12	NPII	Yes	445	809
13	NPRS	Yes	364	728
14	NPRS	Yes	364	688
15	NPRS	Yes	850	1,538
16	NPRS	Yes	1,457	1,457
17	NPRS	Yes	1,457	1,457
18	NPRS	Yes	324	931
19	NPRS	Yes	1,214	2,509
20	NPRS	Yes	971	1,093
21	NPRS	Yes	931	1,255
22	NPRS	Yes	405	405
23	NPRS	Yes	890	1,457
24	NPRS	Yes	809	931
25	NPRS	Yes	809	1,416
26	NPRS	Yes	526	769
27	NPRS	Yes	647	6,070
28	NPRS	Yes	364	1,416
29	NPRS	Yes	688	1,983
30	NPRS	Yes	324	324
31	NPII	Yes	647	688

Table 7. CVS Vegetation Plot Metadata	
Norman's Pasture & Norman's Pasture II Restoration Sites	
Report Prepared By	Drew Rosso
Date Prepared	7/26/2087 14:47
database name	KCI-2016-Normans.mdb
database location	M:\2012\20122925 Norman's Pasture FDP\Monitoring\Veg database
computer name	44-8PQ3J72
file size	50855936
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY-----	
Project Code	95717
project Name	Norman's Pasture
Description	wetland restoration site
River Basin	Cape Fear

Table 8: CVS Stem Count Total and Planted by Plot and Species, Norman's Pasture and Norman's Pasture II Restoration Sites																																	
DMS Project #: 95717/96310			Current Plot Data																														
Scientific Name	Common Name	Species Type	95717-01-0001			95717-01-0002			95717-01-0003			95717-01-0004			95717-01-0005			95717-01-0006			95717-01-0007			95717-01-0008			95717-01-0009			95717-01-0010			
			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	PnoLS	P-all	T	PnoLS	P-all	T				
Acer rubrum	red maple	Tree						12			1			7			33			2			6			9			3			52	
Alnus serrulata	hazel alder	Shrub																															
Baccharis halimifolia	eastern baccharis	Shrub						3					14			3																	
Betula nigra	river birch	Tree	2	2	2	1	1	1	1	1	1	3	3	3	5	5	5	8	8	8	2	2	2							1	1	1	
Cephalanthus occidentalis	common buttonbush	Shrub	1	1	1										1	1	1	1	1	1													
Cornus amomum	silky dogwood	Shrub																															
Corylus americana	American hazelnut	Shrub																															
Crataegus	hawthorn	Tree																													1		
Diospyros virginiana	common persimmon	Tree																															
Fraxinus pennsylvanica	green ash	Tree	4	4	4	3	3	4	5	5	5						1	1	1	3	3	3				4	4	4	2	2	3		
Juglans nigra	black walnut	Tree			1																												
Liquidambar styraciflua	sweetgum	Tree												3		1			2		1										4		
Liriodendron tulipifera	tuliptree	Tree	3	3	3	1	1	7			1	1	1	1											1	1	1	3	3	3	1	1	1
Morella cerifera	wax myrtle	shrub						2					1																				
Nyssa aquatica	water tupelo	Tree																															
Nyssa biflora	swamp tupelo	Tree																															
Pinus palustris	longleaf pine	Tree																															
Pinus taeda	loblolly pine	Tree															5																
Prunus serotina	black cherry	Tree																													1		
Quercus laurifolia	laurel oak	Tree	2	2	2	4	4	4	1	1	1						3	3	3	2	2	2	3	3	3	1	1	1	3	3	3		
Quercus lyrata	overcup oak	Tree	5	5	6	5	5	5	5	5	5				3	3	3	1	1	1				4	4	4	2	2	2	1	1	1	
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	3	3	3	4	4	4	7	7	7	2	2	2	2	2	2	1	1	1	5	5	5	1	1	1	1	1	1	
Quercus phellos	willow oak	Tree				1	1	1																									
Rhus copallinum	flameleaf sumac	shrub																															
Salix nigra	black willow	Tree			2									7		2															1		
Taxodium distichum	bald cypress	Tree	2	2	2	4	4	4	8	8	8				1	1	1				2	2	2	2	2	2	5	5	5	2	2	2	
Ulmus americana	American elm	Tree																															
Unknown		Shrub or Tree																															
Stem count			20	20	24	22	22	46	24	24	26	11	11	43	12	12	56	17	17	21	10	10	17	16	16	33	16	16	19	11	11	70	
size (ares)			1			1			1			1			1			1			1			1			1			1			
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			
Species count			8	8	10	8	8	11	6	6	8	3	3	8	5	5	10	7	7	9	5	5	7	6	6	10	6	6	7	7	11		
Stems per ACRE			809	809	971	890	890	1862	971	971	1052	445	445	1740	486	486	2266	688	688	850	405	405	688	647	647	1335	647	647	769	445	445	2833	

Table 8: CVS Stem Count Total and Planted by Plot and Species, Norman's Pasture and Norman's Pasture II Restoration Sites																																
DMS Project #: 95717/96310			Current Plot Data																													
Scientific Name	Common Name	Species Type	95717-01-0011			95717-01-0012			95717-01-0013			95717-01-0014			95717-01-0015			95717-01-0016			95717-01-0017			95717-01-0018			95717-01-0019			95717-01-0020		
			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	PnoLS	P-all	T	PnoLS	P-all	T			
Acer rubrum	red maple	Tree			2			8			8			5			10									9			25			1
Alnus serrulata	hazel alder	Shrub																											1			
Baccharis halimifolia	eastern baccharis	Shrub															1															
Betula nigra	river birch	Tree	3	3	3				1	1	1	1	1	1	2	2	2							2	2	2	3	3	3			
Cephalanthus occidentalis	common buttonbush	Shrub	6	6	6				2	2	2				2	2	2							6	6	6						
Cornus amomum	silky dogwood	Shrub																														
Corylus americana	American hazelnut	Shrub																														
Crataegus	hawthorn	Tree																														
Diospyros virginiana	common persimmon	Tree	1	1	2																											
Fraxinus pennsylvanica	green ash	Tree	4	4	4	3	3	3	3	3	3																					
Juglans nigra	black walnut	Tree	1	1	1																											
Liquidambar styraciflua	sweetgum	Tree						1			1			3												4						
Liriodendron tulipifera	tuliptree	Tree	2	2	2																											
Morella cerifera	wax myrtle	shrub																														
Nyssa aquatica	water tupelo	Tree													9	9	9	4	4	4	13	13	13	3	3	3	11	11	11	11	11	11
Nyssa biflora	swamp tupelo	Tree																						1	1	1						
Pinus palustris	longleaf pine	Tree																														
Pinus taeda	loblolly pine	Tree			3												6									1			6			
Prunus serotina	black cherry	Tree																														
Quercus laurifolia	laurel oak	Tree	2	2	2	1	1	1							5	5	5							1	1	1						
Quercus lyrata	overcup oak	Tree	2	2	2										1	1	1							1	1	1				3	3	3
Quercus michauxii	swamp chestnut oak	Tree	2	2	2				2	2	2	1	1	1	1	1	1				1	1	1				8	8	8	1	1	1
Quercus phellos	willow oak	Tree													1	1	1															
Rhus copallinum	flameleaf sumac	shrub			10																											
Salix nigra	black willow	Tree																														2
Taxodium distichum	bald cypress	Tree				7	7	7	1	1	1	7	7	7				32	32	32	16	16	16				8	8	8	9	9	9
Ulmus americana	American elm	Tree																								1						
Unknown		Shrub or Tree																														
Stem count			23	23	39	11	11	20	9	9	18	9	9	17	21	21	38	36	36	36	36	36	36	8	8	23	30	30	62	24	24	27
size (ares)			1			1			1			1			1			1			1			1			1					
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02					
Species count			9	9	12	3	3	5	5	5	7	3	3	5	7	7	10	2	2	2	4	4	4	5	5	9	4	4	7	4	4	6
Stems per ACRE			931	931	1578	445	445	809	364	364	728	364	364	688	850	850	1538	1457	1457	1457	1457	1457	1457	324	324	931	1214	1214	2509	971	971	1093

Table 8: CVS Stem Count Total and Planted by Plot and Species, Norman's Pasture and Norman's Pasture II Restoration Sites																																
DMS Project #: 95717/96310			Current Plot Data																													
Scientific Name	Common Name	Species Type	95717-01-0021			95717-01-0022			95717-01-0023			95717-01-0024			95717-01-0025			95717-01-0026			95717-01-0027			95717-01-0028			95717-01-0029			95717-01-0030		
			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	PnoLS	P-all	T	PnoLS	P-all	T			
Acer rubrum	red maple	Tree			3										4			5			8						28					
Alnus serrulata	hazel alder	Shrub															1			82												
Baccharis halimifolia	eastern baccharis	Shrub																														
Betula nigra	river birch	Tree	5	5	5									1	1	1	4	4	4			33			1	1	1					
Cephalanthus occidentalis	common buttonbush	Shrub	2	2	2	1	1	1									3	3	3	2	2	2				1	1	1	3	3	3	
Cornus amomum	silky dogwood	Shrub																														
Corylus americana	American hazelnut	Shrub																														
Crataegus	hawthorn	Tree													2											1		1				
Diospyros virginiana	common persimmon	Tree																						2	2	27						
Fraxinus pennsylvanica	green ash	Tree																														
Juglans nigra	black walnut	Tree										1																				
Liquidambar styraciflua	sweetgum	Tree			5										2													3				
Liriodendron tulipifera	tuliptree	Tree																														
Morella cerifera	wax myrtle	shrub																														
Nyssa aquatica	water tupelo	Tree	2	2	2					5	5	5	1	1	1									2	2	2			1	1	1	
Nyssa biflora	swamp tupelo	Tree													1	1	1															
Pinus palustris	longleaf pine	Tree																														
Pinus taeda	loblolly pine	Tree																														
Prunus serotina	black cherry	Tree																														
Quercus laurifolia	laurel oak	Tree	5	5	5	1	1	1	1	1	1			6	6	6	1	1	1	4	4	4	3	3	3			4	4	4		
Quercus lyrata	overcup oak	Tree				1	1	1						8	8	8				7	7	7				9	9	9				
Quercus michauxii	swamp chestnut oak	Tree	2	2	2					1	1	1			1	1	1				2	2	2									
Quercus phellos	willow oak	Tree																														
Rhus copallinum	flameleaf sumac	shrub																														
Salix nigra	black willow	Tree										12			3																	
Taxodium distichum	bald cypress	Tree	7	7	7	7	7	7	14	14	14	19	19	19	3	3	3	5	5	5	1	1	1	2	2	2	6	6	6			
Ulmus americana	American elm	Tree															7															
Unknown		Shrub or Tree							1	1	1																					
	Stem count		23	23	31	10	10	10	22	22	36	20	20	23	20	20	35	13	13	19	16	16	150	9	9	35	17	17	49	8	8	8
	size (ares)		1			1			1			1			1			1			1			1			1					
	size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02					
	Species count		6	6	8	4	4	4	5	5	8	2	2	3	6	6	10	4	4	6	5	5	10	4	4	5	4	4	7	3	3	3
	Stems per ACRE		931	931	1255	405	405	405	890	890	1457	809	809	931	809	809	1416	526	526	769	647	647	6070	364	364	1416	688	688	1983	324	324	324

Table 8: CVS Stem Count Total and Planted by Plot and Species, Norman's Pasture and Norman's Pasture II Restoration Sites																	
DMS Project #: 95717/96310			Current Plot Data			Annual Means											
Scientific Name	Common Name	Species Type	95717-01-0031			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2015)		
			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						241			178			92			
Alnus serrulata	hazel alder	Shrub						84			13			4			
Baccharis halimifolia	eastern baccharis	Shrub						21			16			2			
Betula nigra	river birch	Tree	1	1	1	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			1			6			6			1			
Diospyros virginiana	common persimmon	Tree				3	3	29	3	3	32						
Fraxinus pennsylvanica	green ash	Tree	1	1	1	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	5	5	5	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	4	4	4	57	57	57	64	64	64	70	70	70	68	68	68
Quercus lyrata	overcup oak	Tree	1	1	1	59	59	60	63	63	64	65	65	65	33	33	33
Quercus michauxii	swamp chestnut oak	Tree	3	3	3	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	1	1	1	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		16	16	17	540	540	1084	576	576	992	596	596	797	674	674	674
	size (ares)		1			31			31			31			31		
	size (ACRES)		0.02			0.77			0.77			0.77			0.77		
	Species count		7	7	8	14	14	25	14	14	26	15	15	25	10	10	10
	Stems per ACRE		647	647	688	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

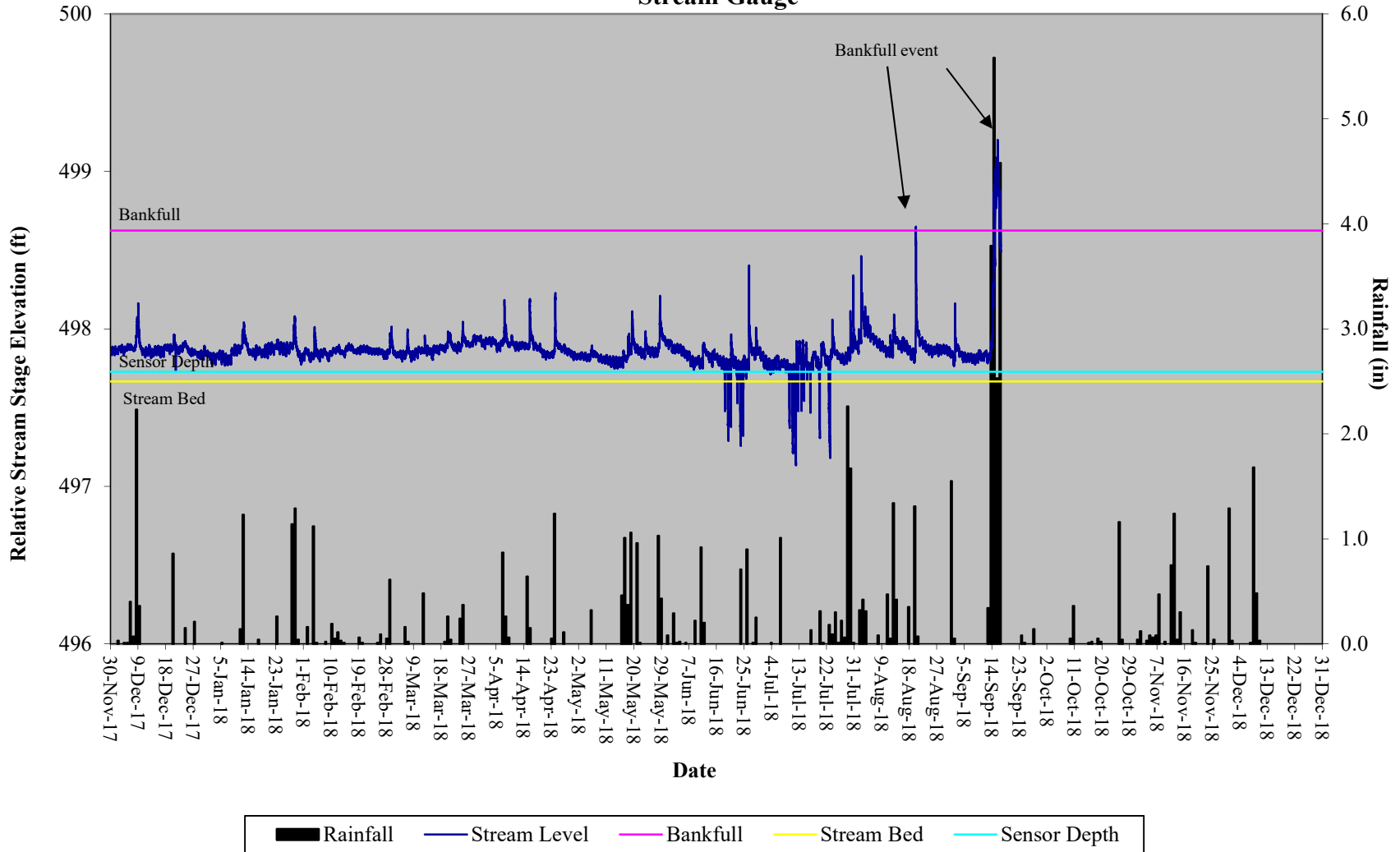


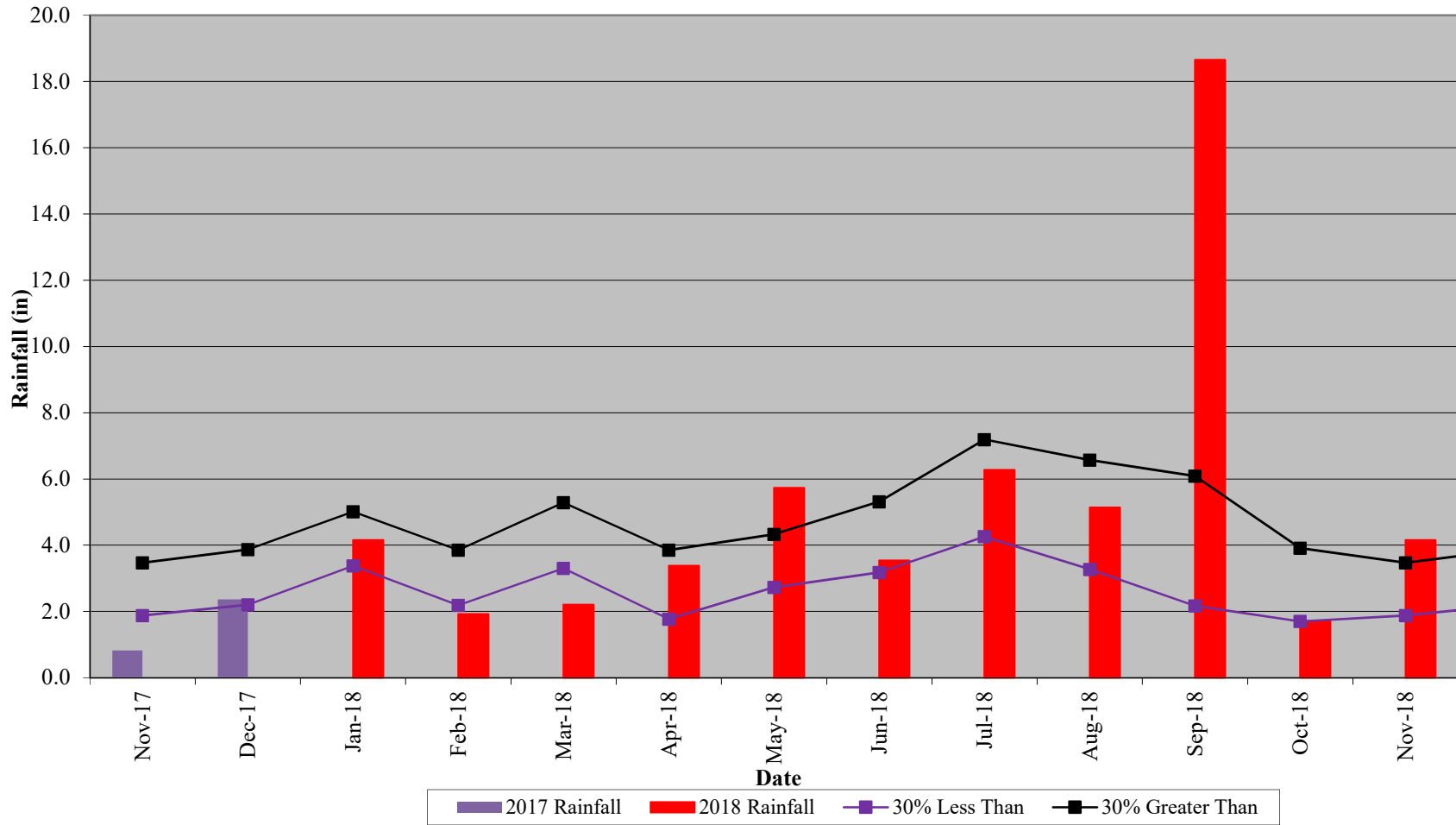
Table 9. Verification of Bankfull Events**Norman's Pasture and Norman's Pasture II Restoration Sites, DMS Project Number 95717/96310**

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

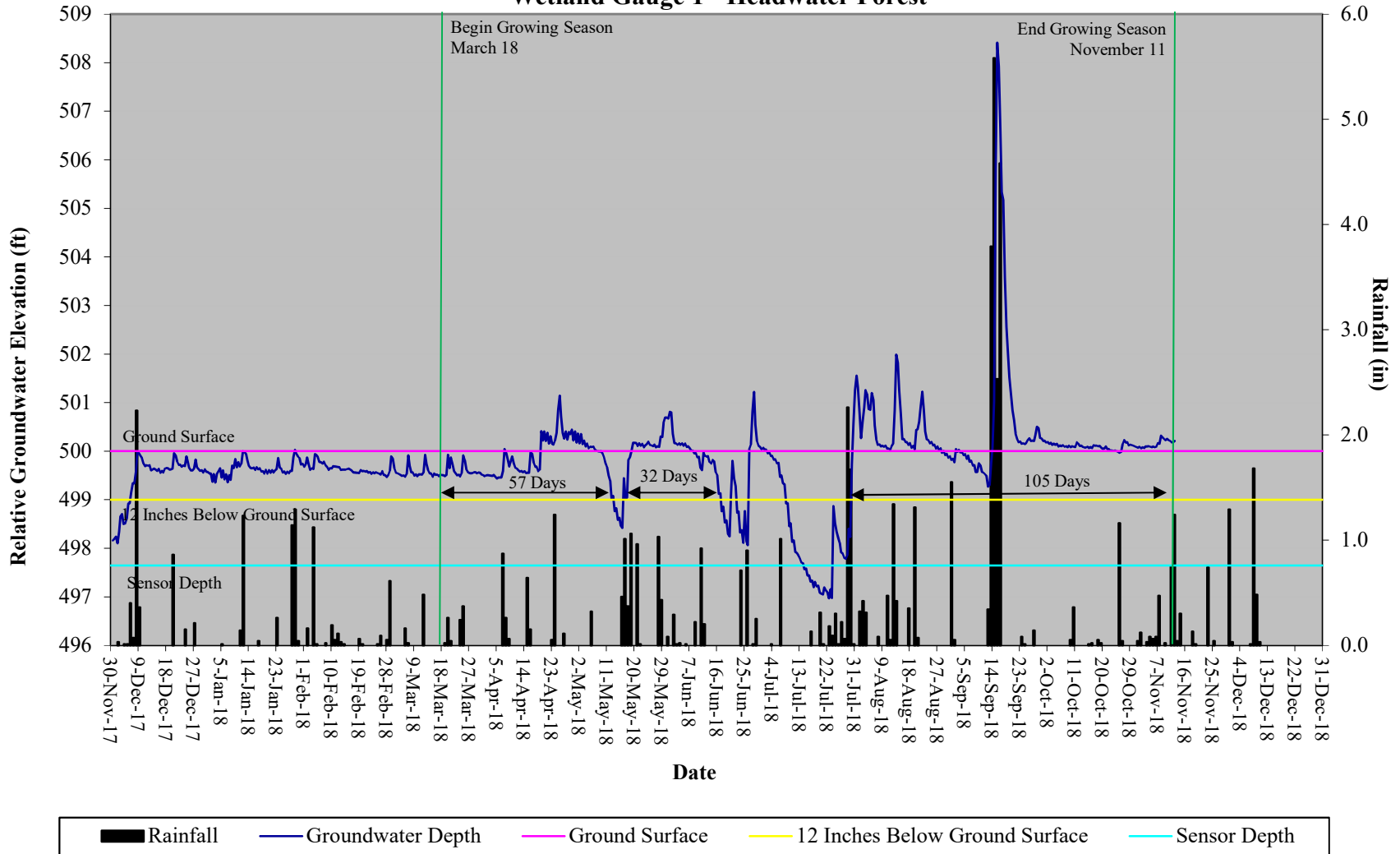
Table 10. Wetland Hydrology Criteria Attainment								
Norman's Pasture and Norman's Pasture II Restoration Sites, DMS Project Number 95717/96310								
Gauge Number	Gauge Location	MY-01 (2016)	MY-02 (2017)	MY-03 (2018)	MY-04 (2019)	MY-05 (2020)	MY-06 (2021)	MY-07 (2022)
NP1	Headwater Forest	Yes/101 (42.6%)	Yes/73 (30.8%)	Yes/105 (44.3%)				
NP2	Riverine Swamp Forest	Yes/98 (41.4%)	Yes/66 (37.8%)	Yes/60 (25.3%)				
NP3	Riverine Swamp Forest	Yes/99 (41.8%)	Yes/88 (37.1%)	Yes/105 (44.3%)				
NP4	Riverine Swamp Forest	Yes/71 (30.0%)	Yes/87 (36.7%)	Yes/105 (44.3%)				
NP5	Riverine Swamp Forest	Yes/54 (22.8%)	Yes/36 (15.2%)	Yes/59 (24.9%)				
NP6	Riverine Swamp Forest	Yes/100 (42.2%)	Yes/85 (35.9%)	Yes/105 (44.3%)				
NP7	Riverine Swamp Forest	Yes/54 (22.8%)	Yes/59 (24.9%)	Yes/59 (24.9%)				
NP8	Riverine Swamp Forest	Yes/30 (12.7%)	Yes/52 (21.9%)	Yes/30 (12.7%)				
NP9	Riverine Swamp Forest	Yes/32 (13.5%)	Yes/55 (23.2%)	Yes/29 (12.2%)				
NPII 1	Headwater Forest	Yes/48 (20.3%)	Yes/59 (24.9%)	Yes/60 (25.3%)				
NPII 2	Headwater Forest	Yes/71 (30.0%)	Yes/60 (25.3%)	Yes/47 (19.8%)				
NPII 3	Headwater Forest	Yes/50 (21.1%)	Yes/59 (24.9%)	Yes/33 (13.9%)				
NPII 4	Headwater Forest	Yes/54 (22.8%)	Yes/60 (25.3%)	Yes/47 (19.8%)				
NPII 5	Headwater Forest	Yes/22 (9.3%)	Yes/30 (12.7%)	Yes/22 (9.3%)				
NPII 6	Headwater Forest	No/6 (2.5%)	No/7 (3.0%)	No/16 (6.8%)				
NPII 7	Headwater Forest	Yes/22 (9.3%)	Yes/35 (14.8%)	No/19 (8.0%)				
NPII 8	Headwater Forest	No/12 (5.1%)	No/7 (3.0%)	No/18 (7.6%)				
NPII 9	Headwater Forest	No/18 (7.6%)	Yes/29 (12.2%)	No/19 (8.0%)				
NPII 10	Headwater Forest	No/18 (7.6%)	Yes/28 (11.8%)	No/20 (8.4%)				
NPII 11	Headwater Forest	No/9 (3.8%)	Yes/31 (13.1%)	No/16 (6.8%)				
NPII 12	Headwater Forest	Yes/27 (11.4%)	Yes/54 (22.8%)	Yes/33 (13.9%)				
NPII 13	Headwater Forest	Yes/54 (22.8%)	Yes/63 (26.6%)	Yes/60 (25.3%)				
NPII 14†	Headwater Forest			No/20 (8.4%)				
NPII 15†	Headwater Forest			Yes/22 (9.3%)				
NPII 16†	Headwater Forest			Yes/35 (14.8%)				
NPC1*	Non-credited Creation Area	11 (4.6%)	34 (14.3%)	19 (8.0%)				
NPC2*	Non-credited Creation Area	24 (10.1%)	56 (23.6%)	53 (22.4%)				

*= installed October 5, 2016 †=installed February 28, 2018

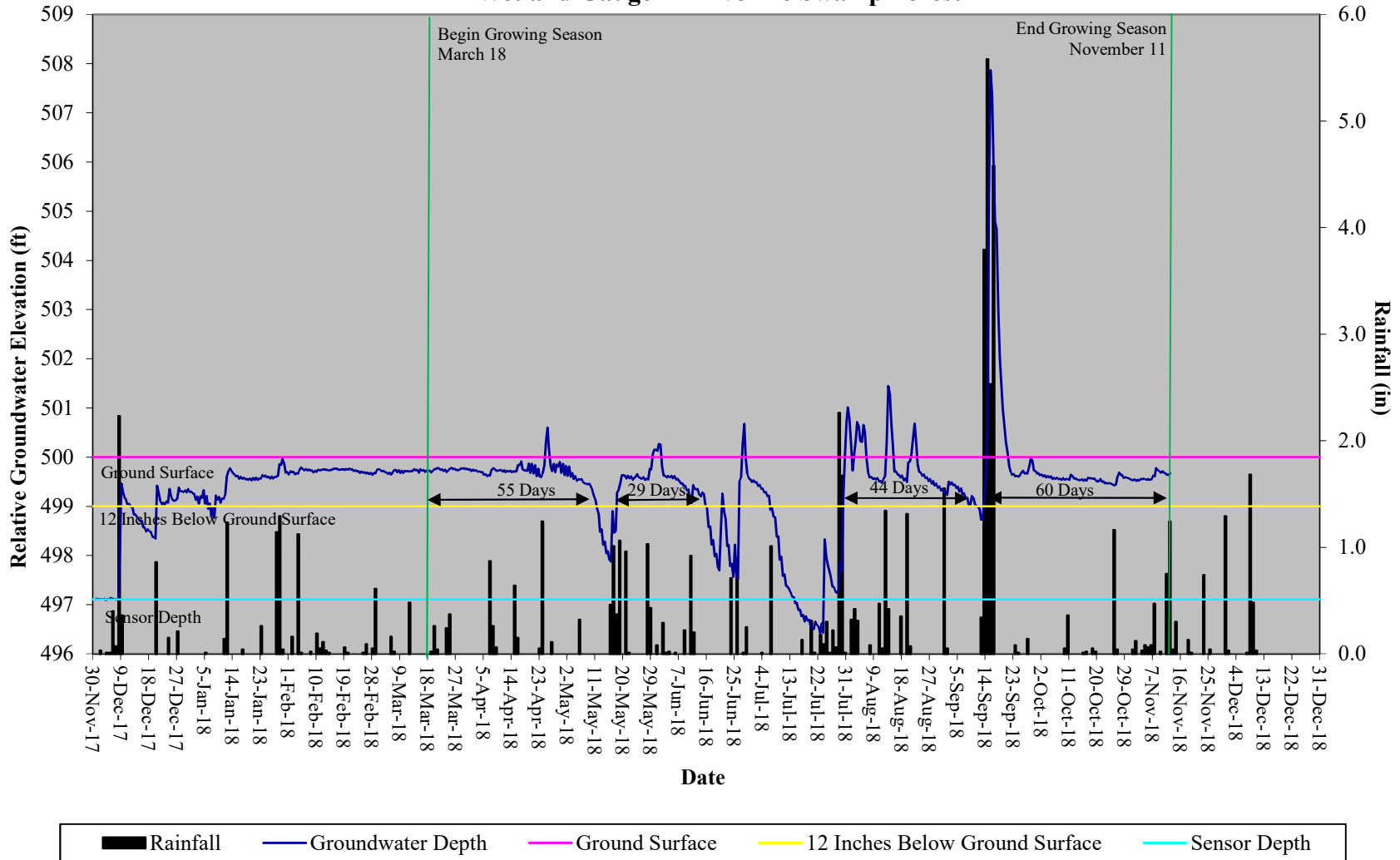
**Norman's Pasture Wetland Restoration Site
30-70 Percentile Graph
WETS Station Name: Clinton, NC**



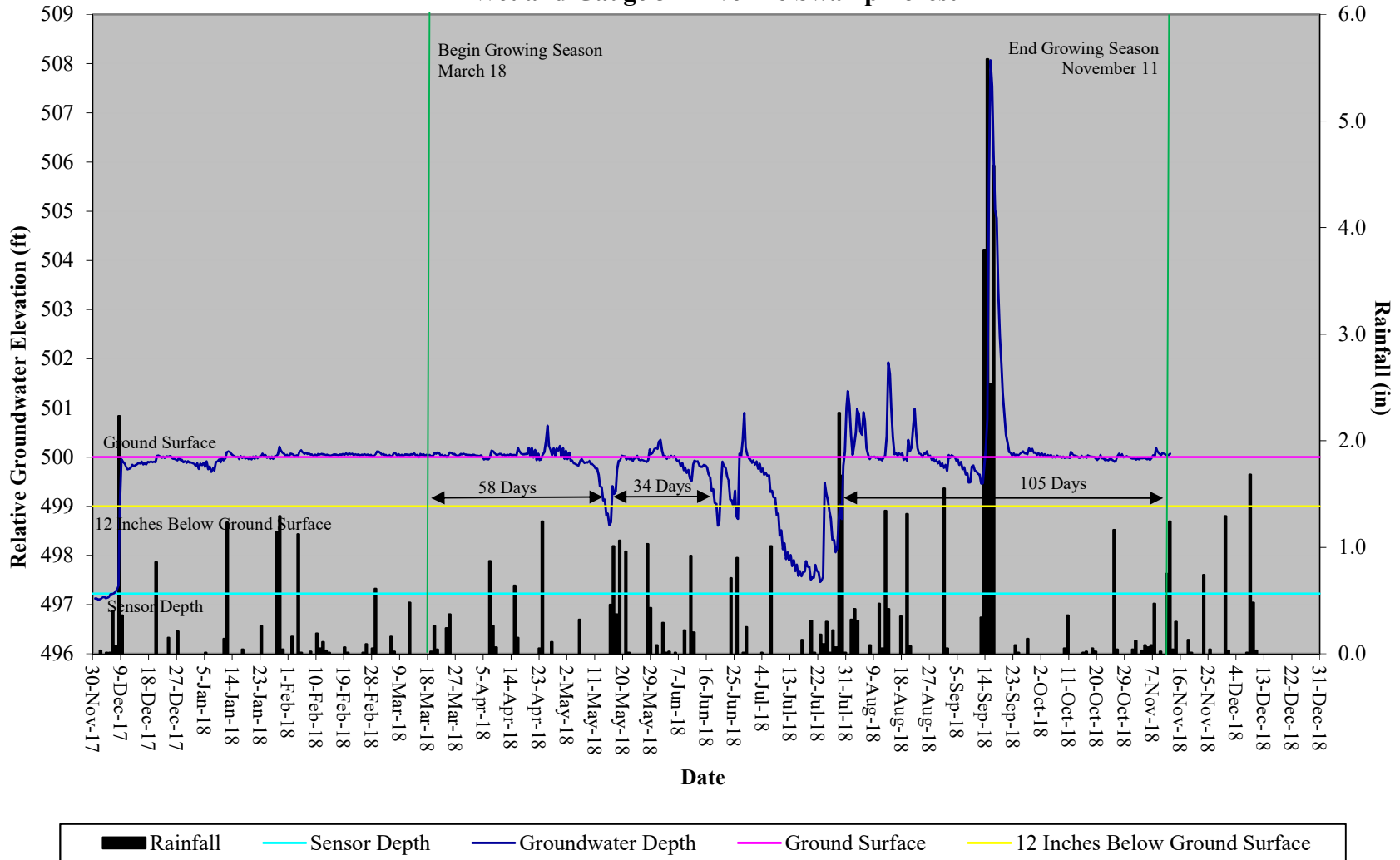
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 1 - Headwater Forest



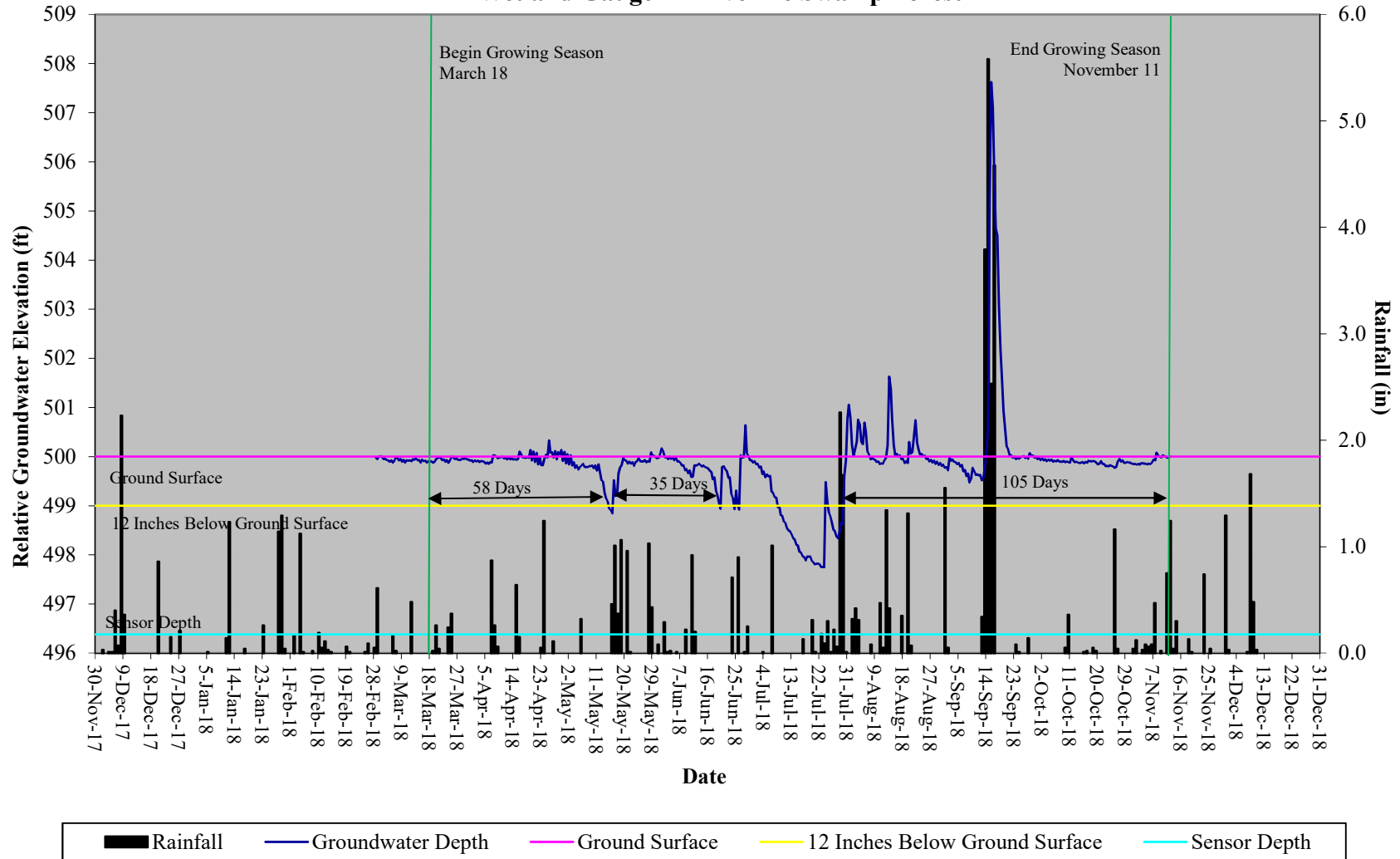
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 2 - Riverine Swamp Forest



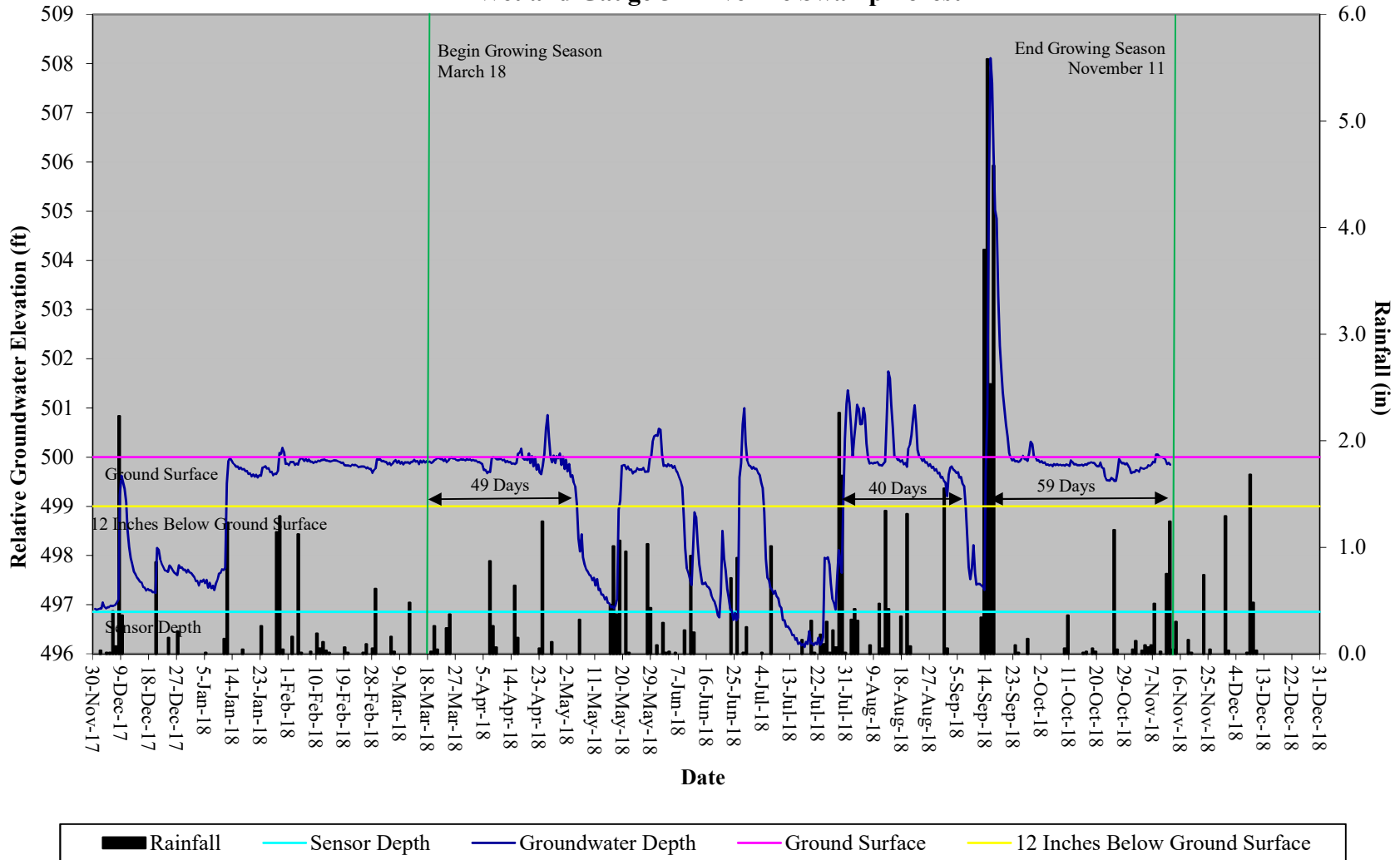
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 3 - Riverine Swamp Forest



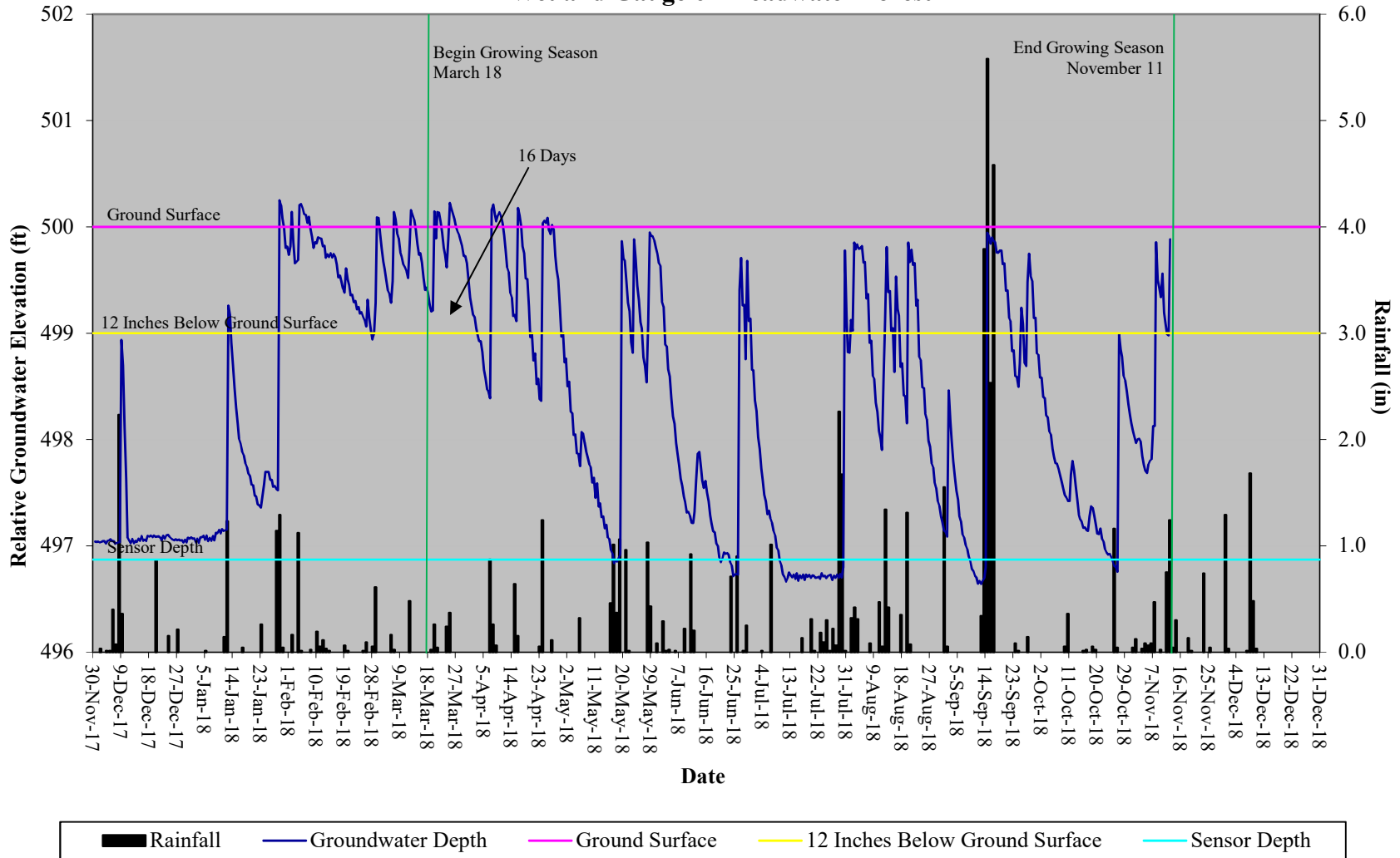
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 4 - Riverine Swamp Forest



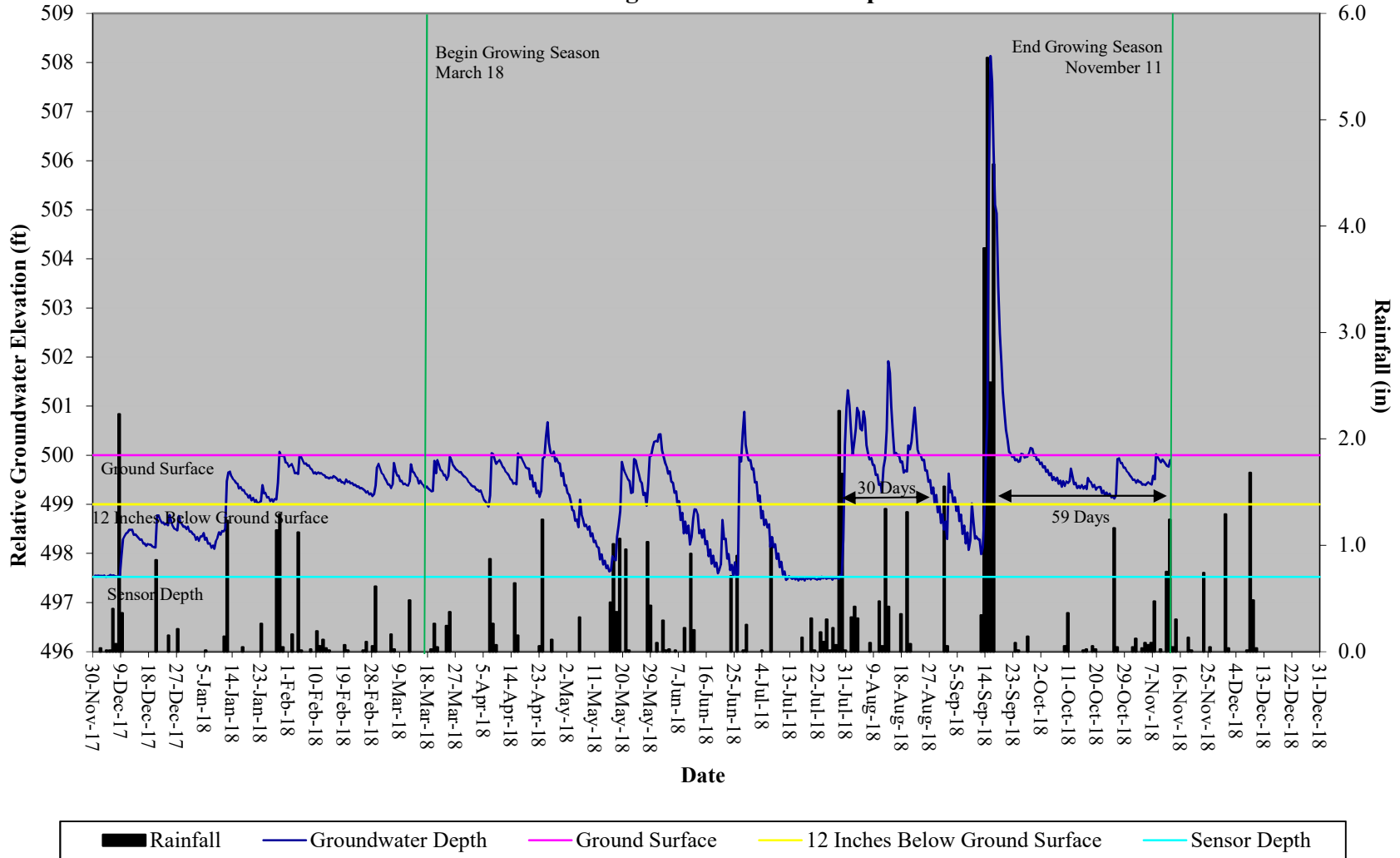
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 5 - Riverine Swamp Forest



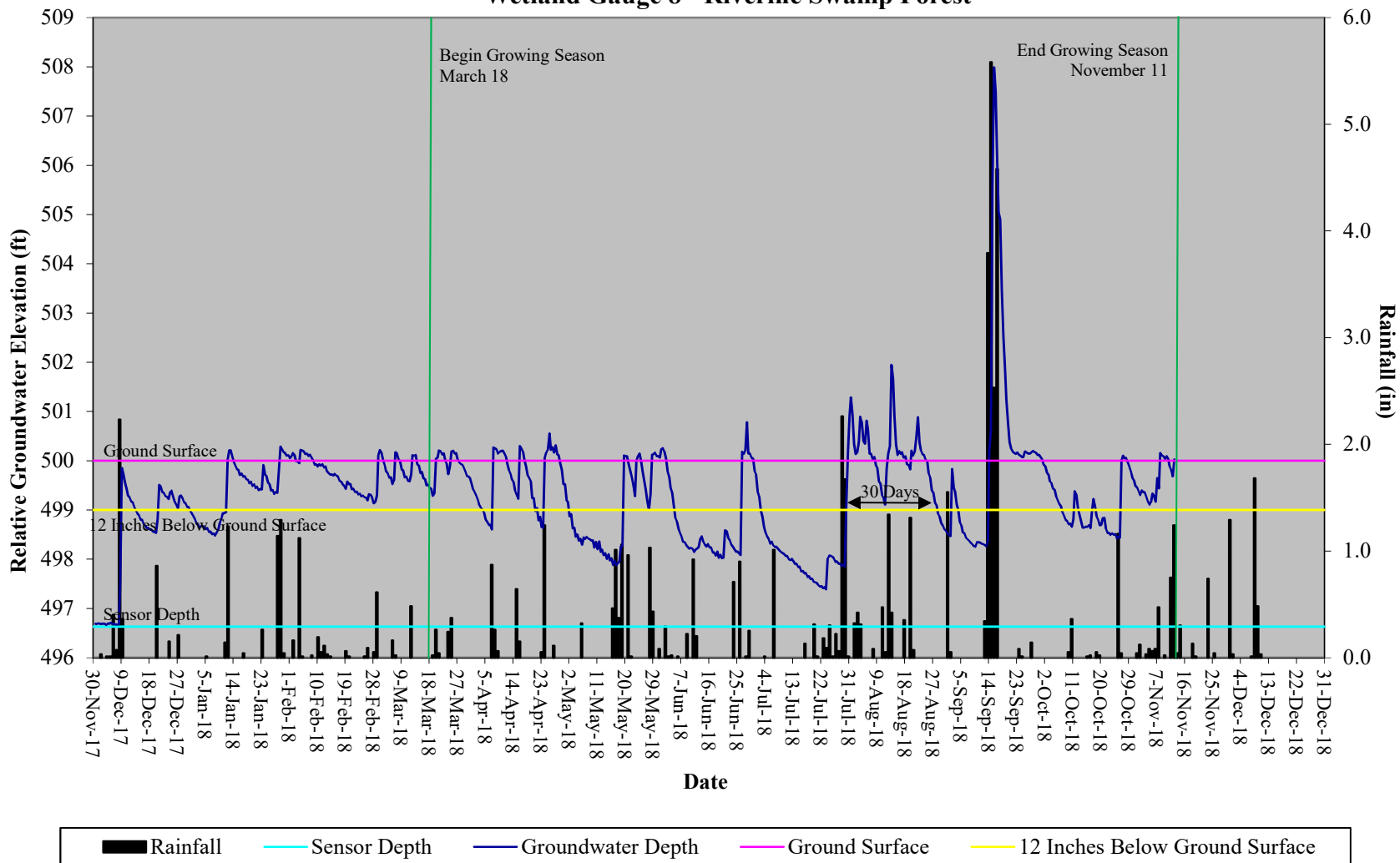
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 6 - Headwater Forest



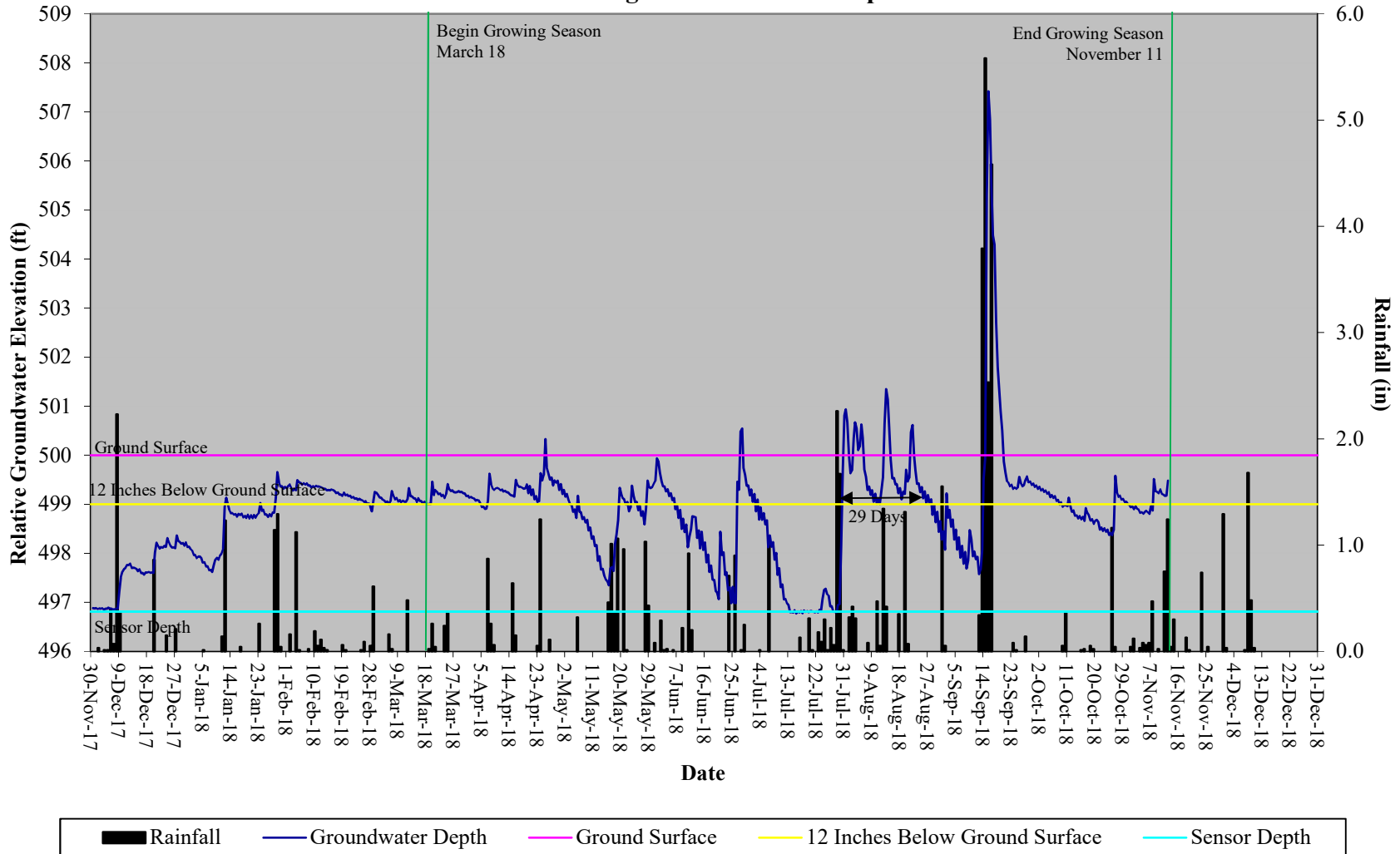
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 7 - Riverine Swamp Forest



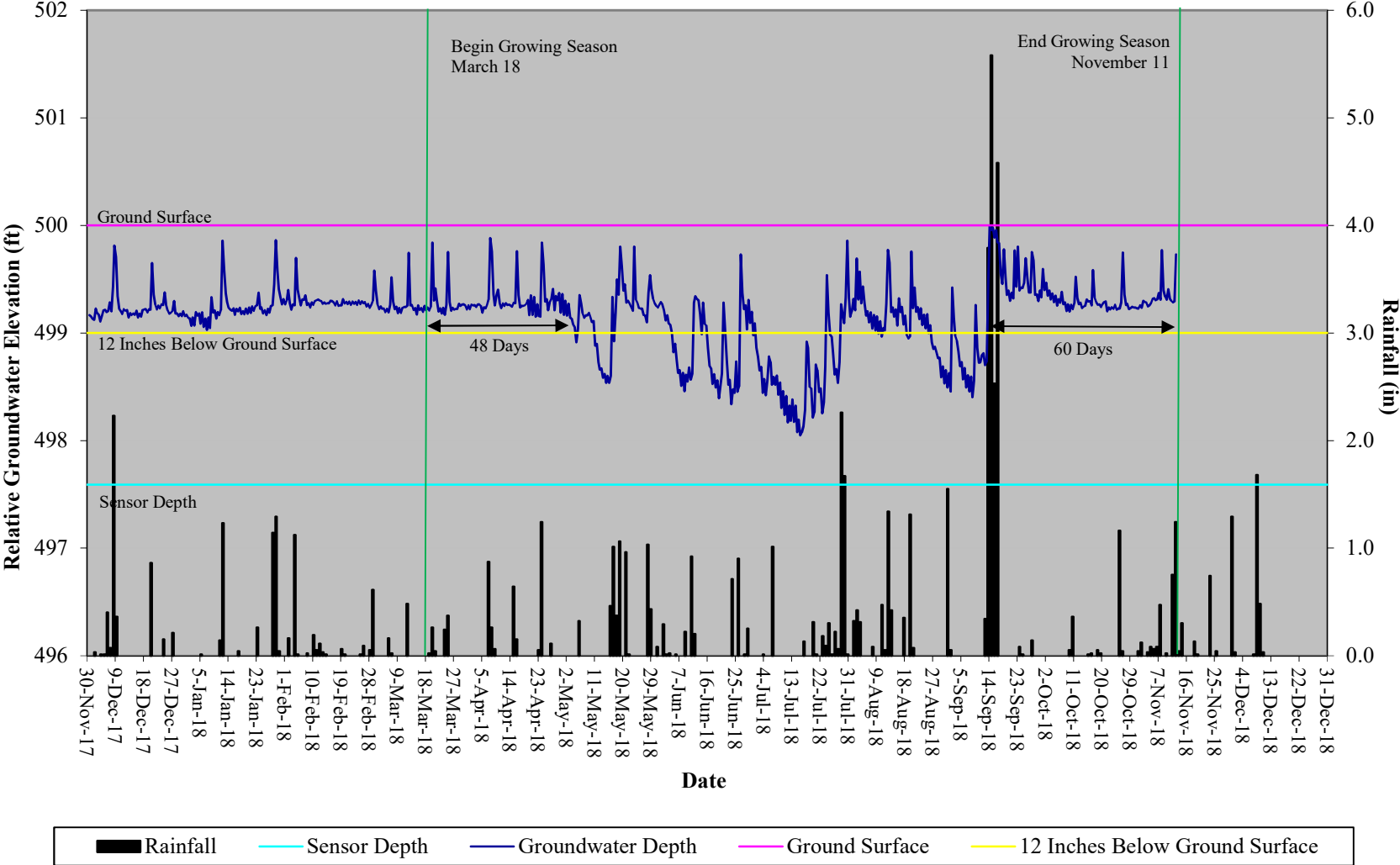
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 8 - Riverine Swamp Forest



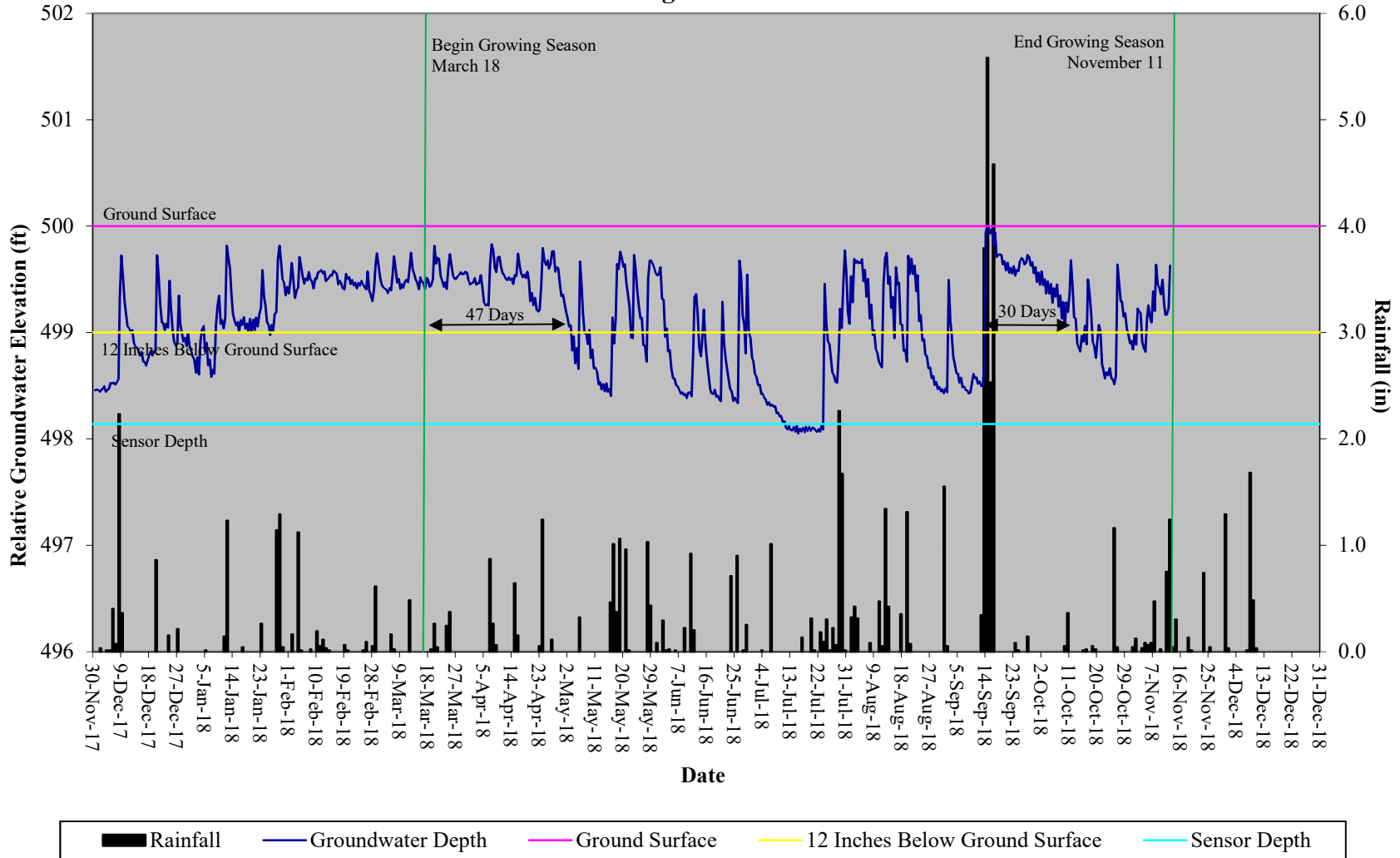
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 9 - Riverine Swamp Forest



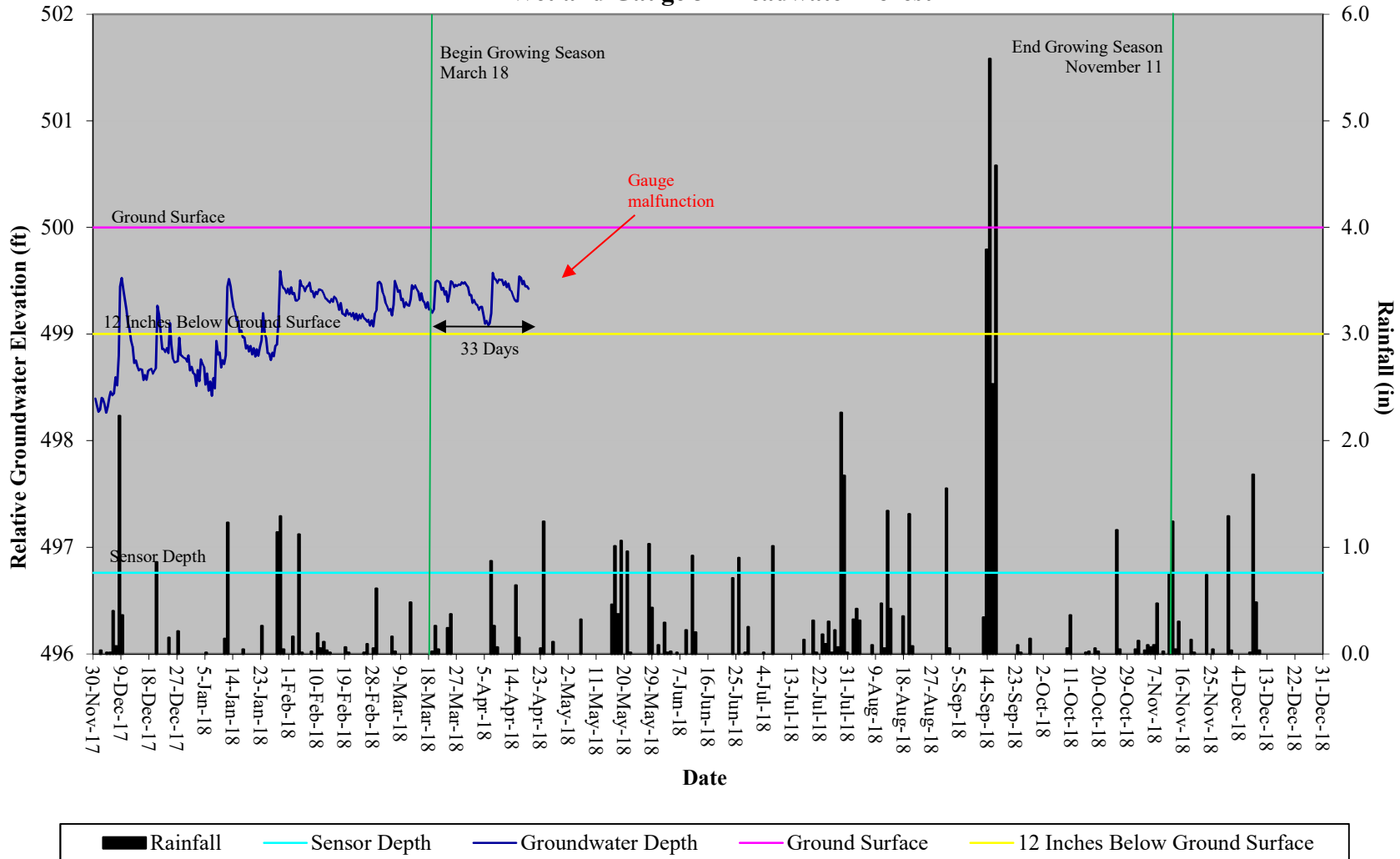
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 1 - Headwater Forest



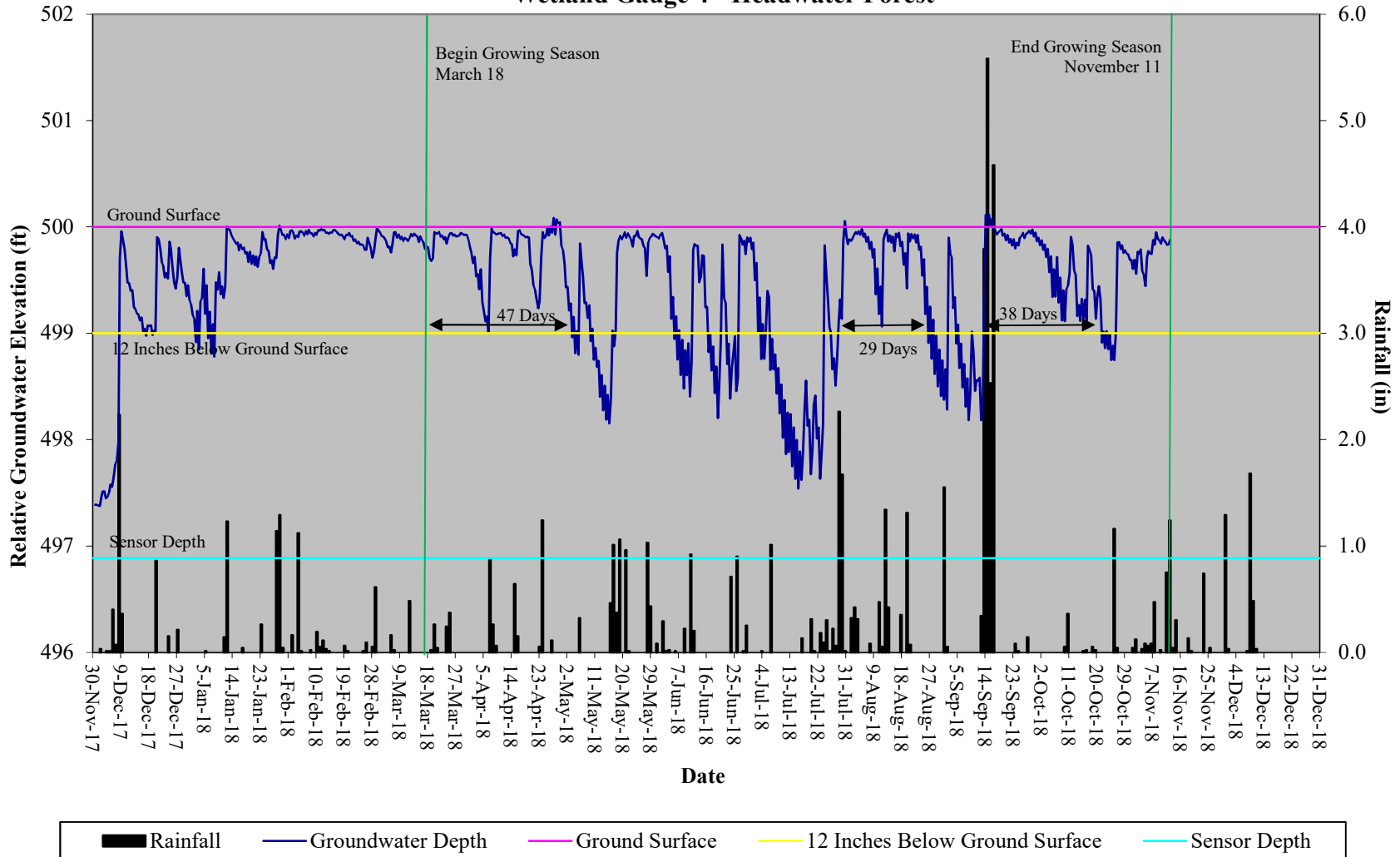
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 2 - Headwater Forest



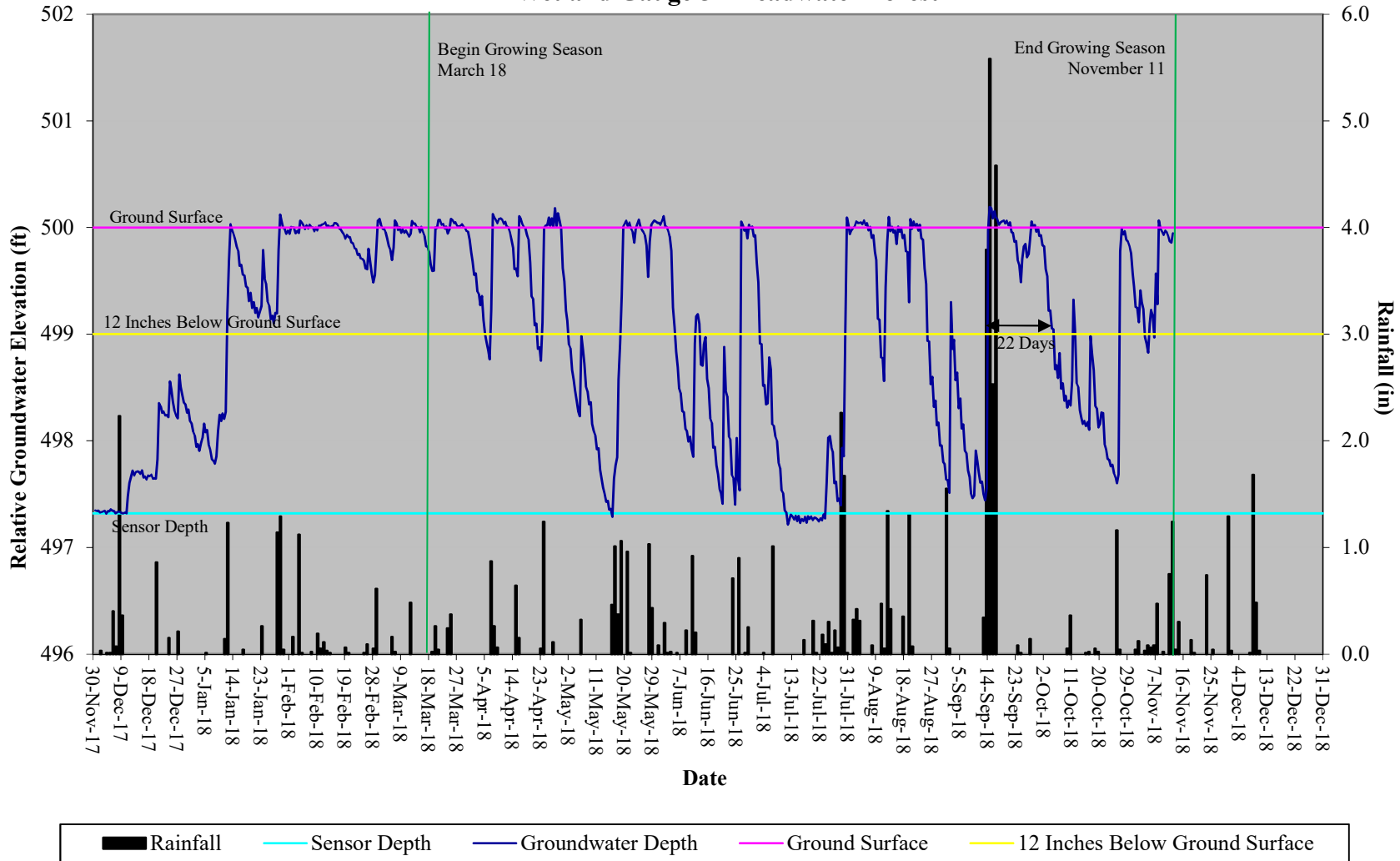
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 3 - Headwater Forest



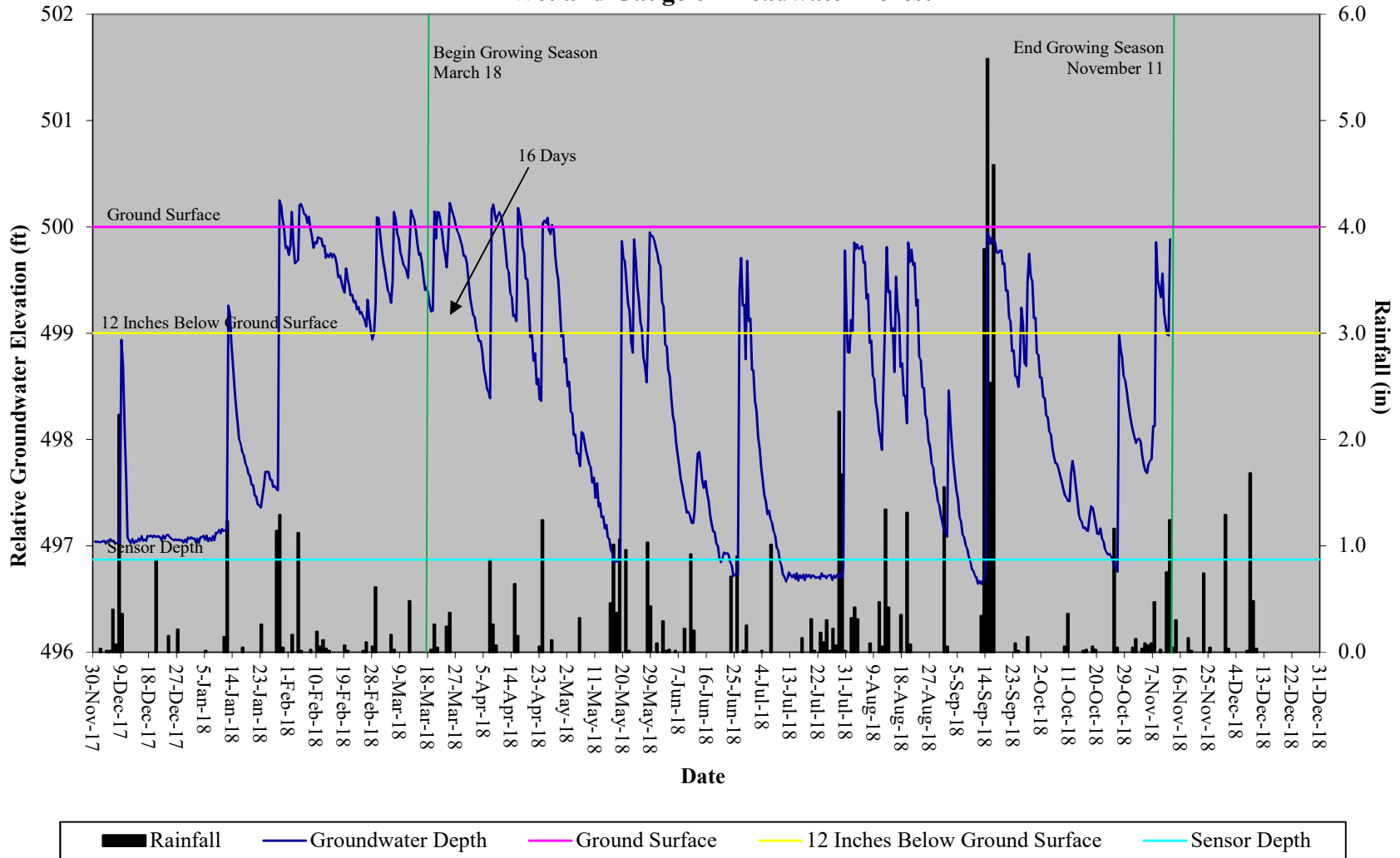
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 4 - Headwater Forest



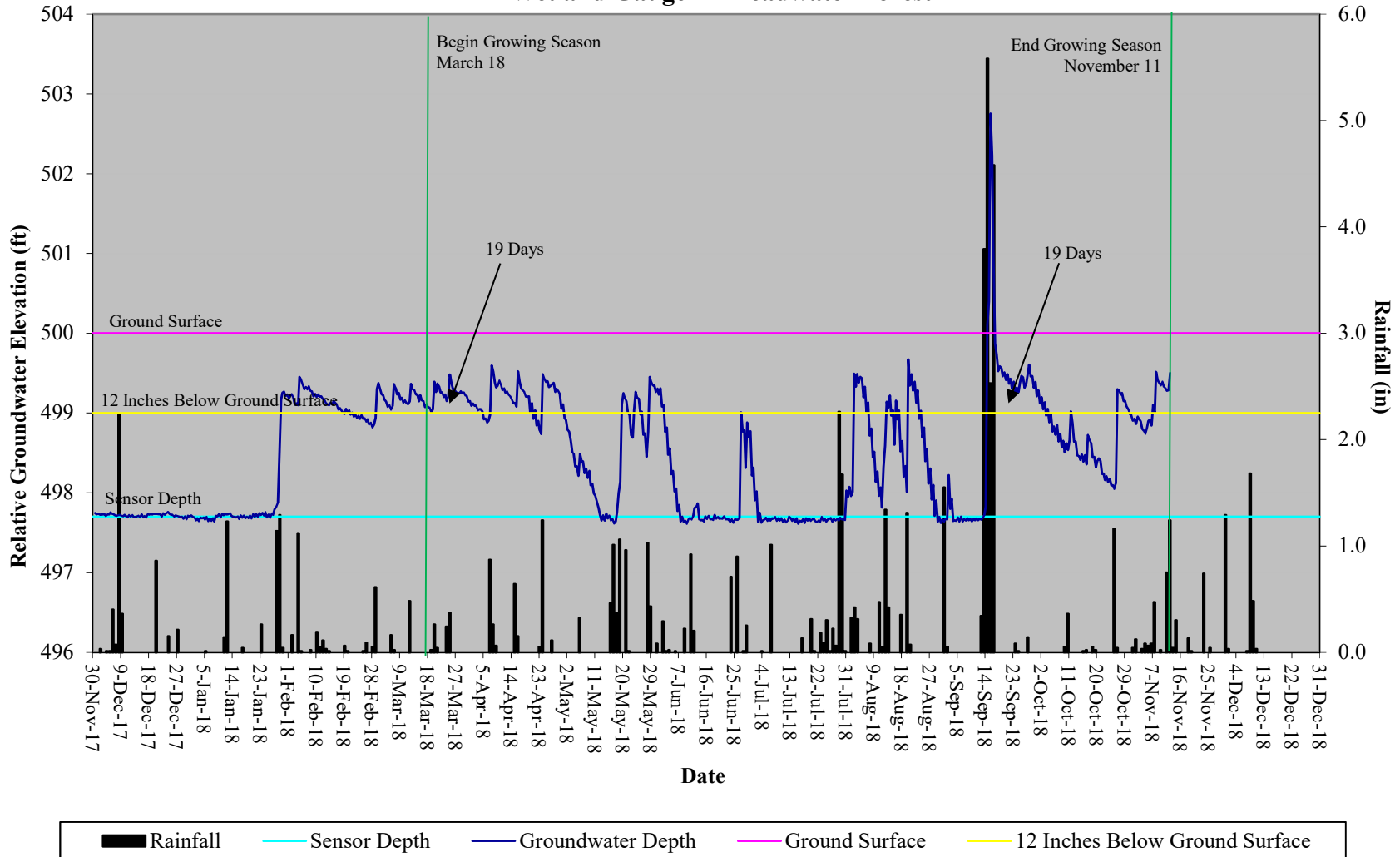
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 5 - Headwater Forest



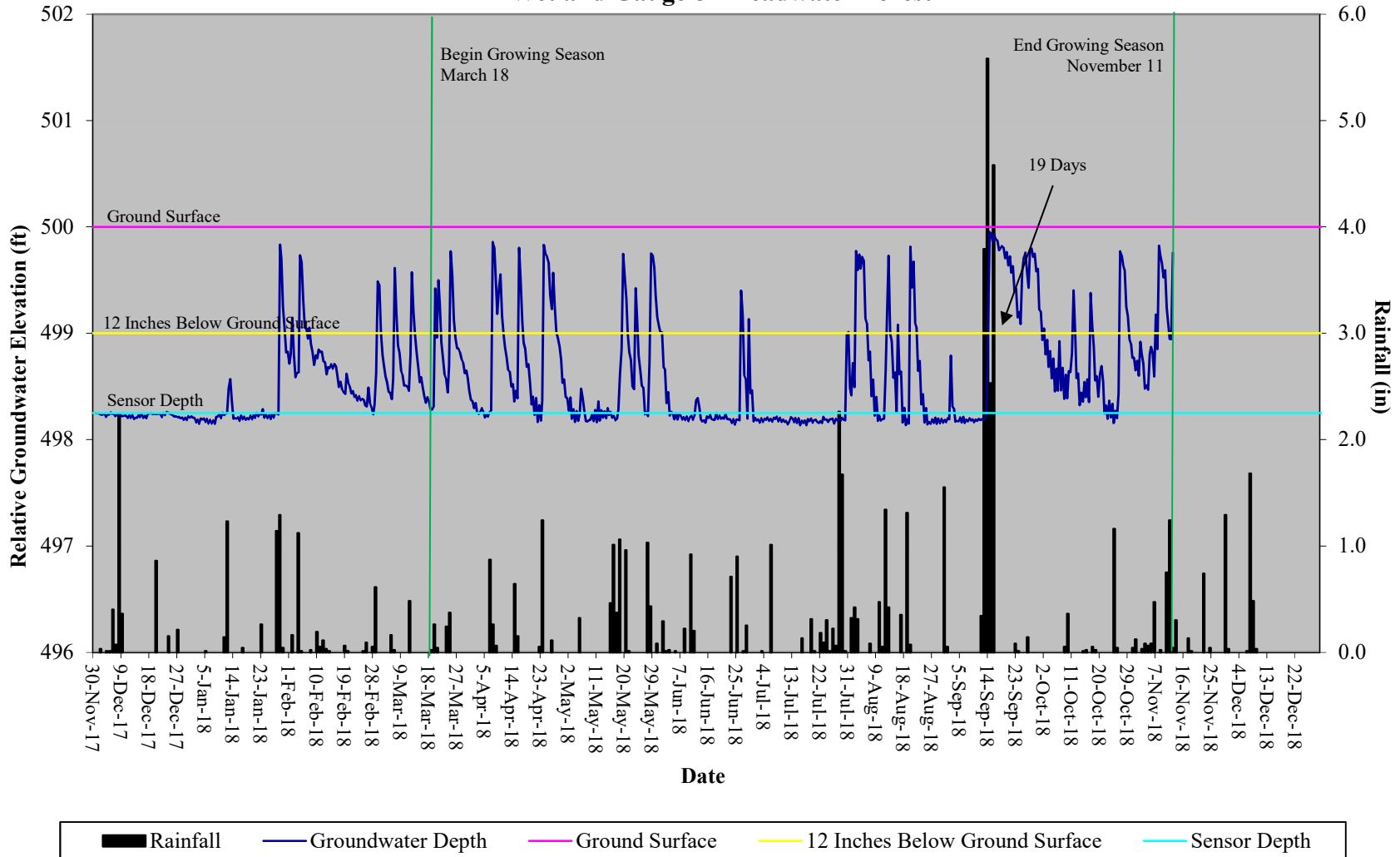
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 6 - Headwater Forest



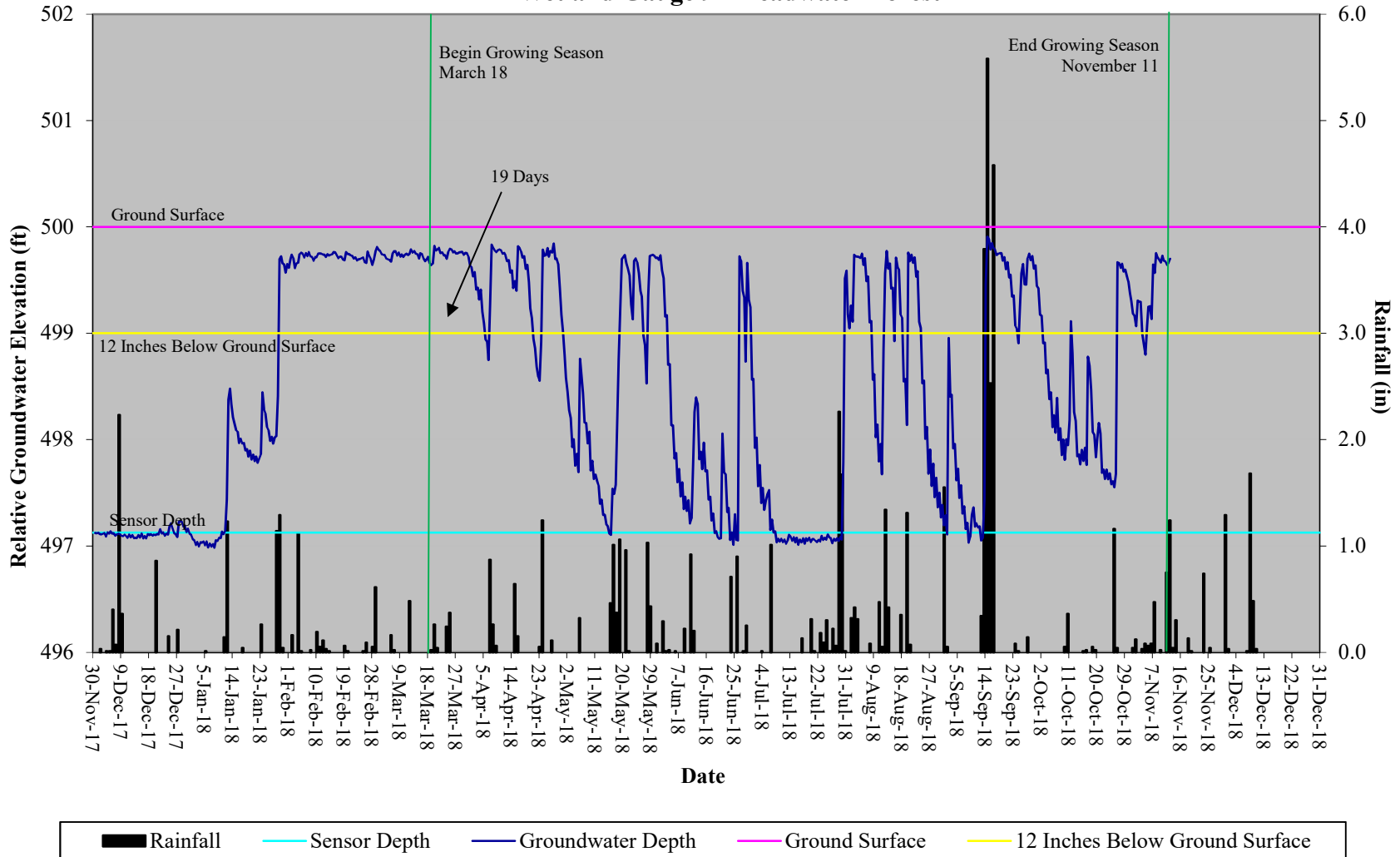
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 7 - Headwater Forest



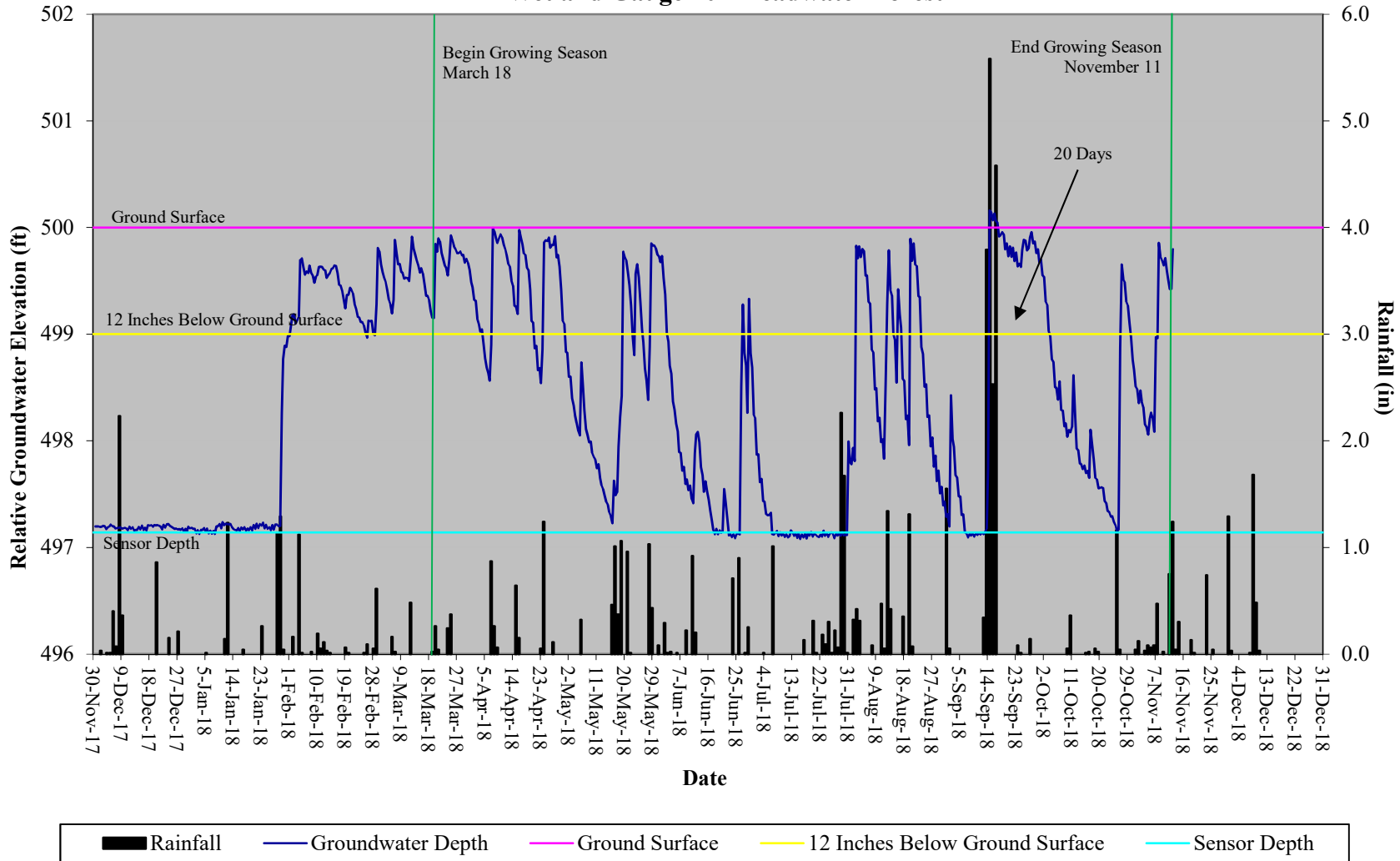
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 8 - Headwater Forest



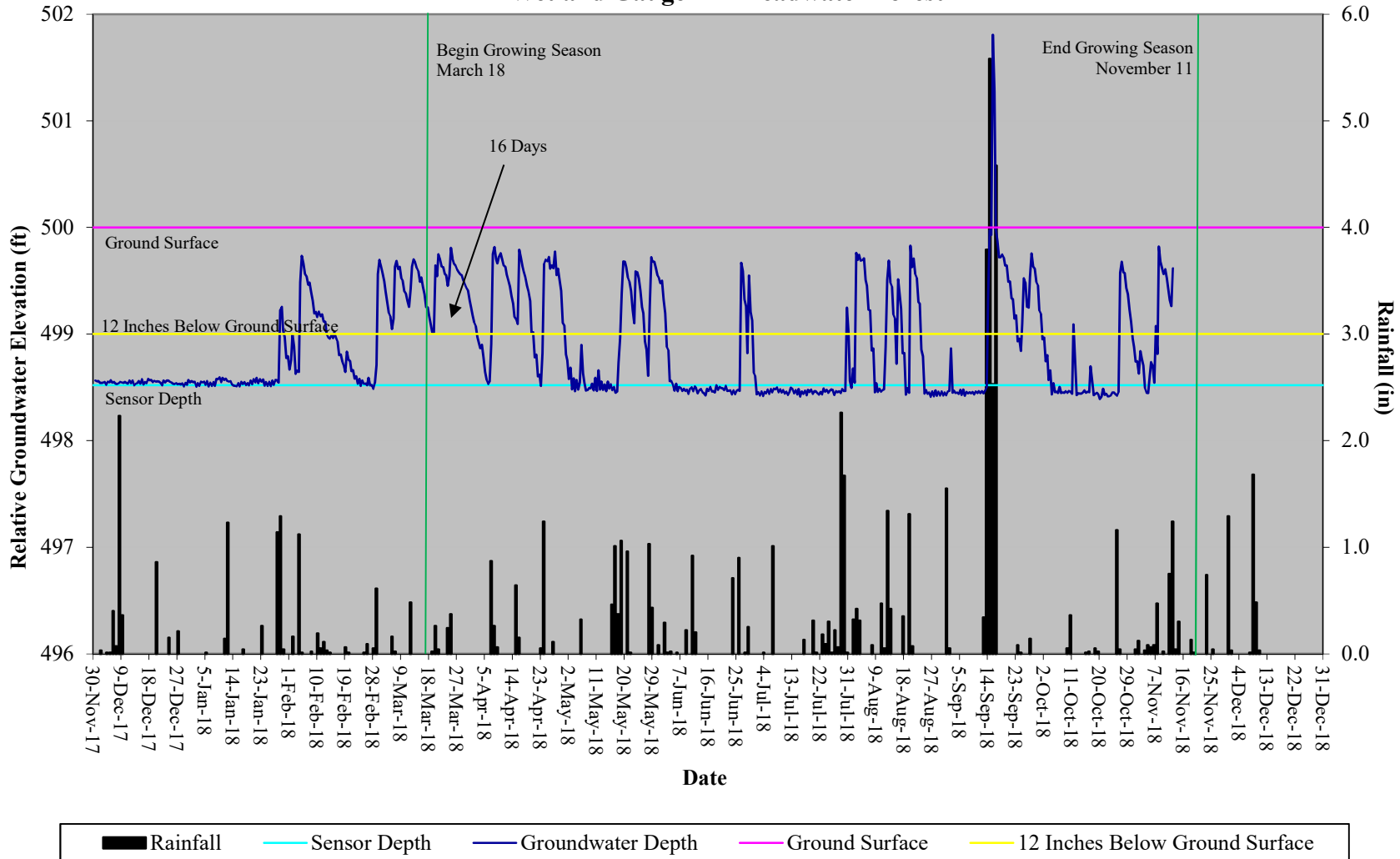
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 9 - Headwater Forest



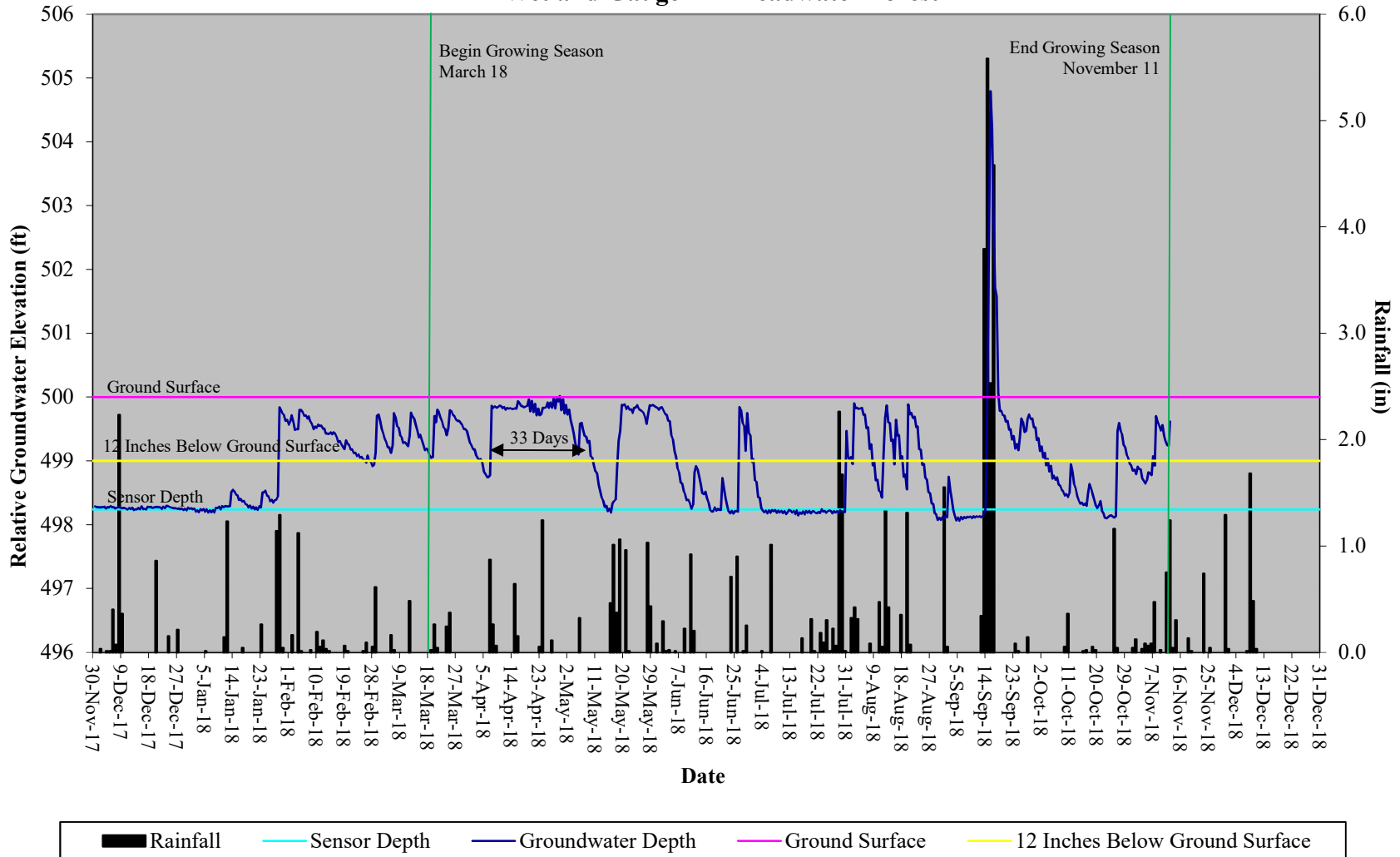
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 10 - Headwater Forest



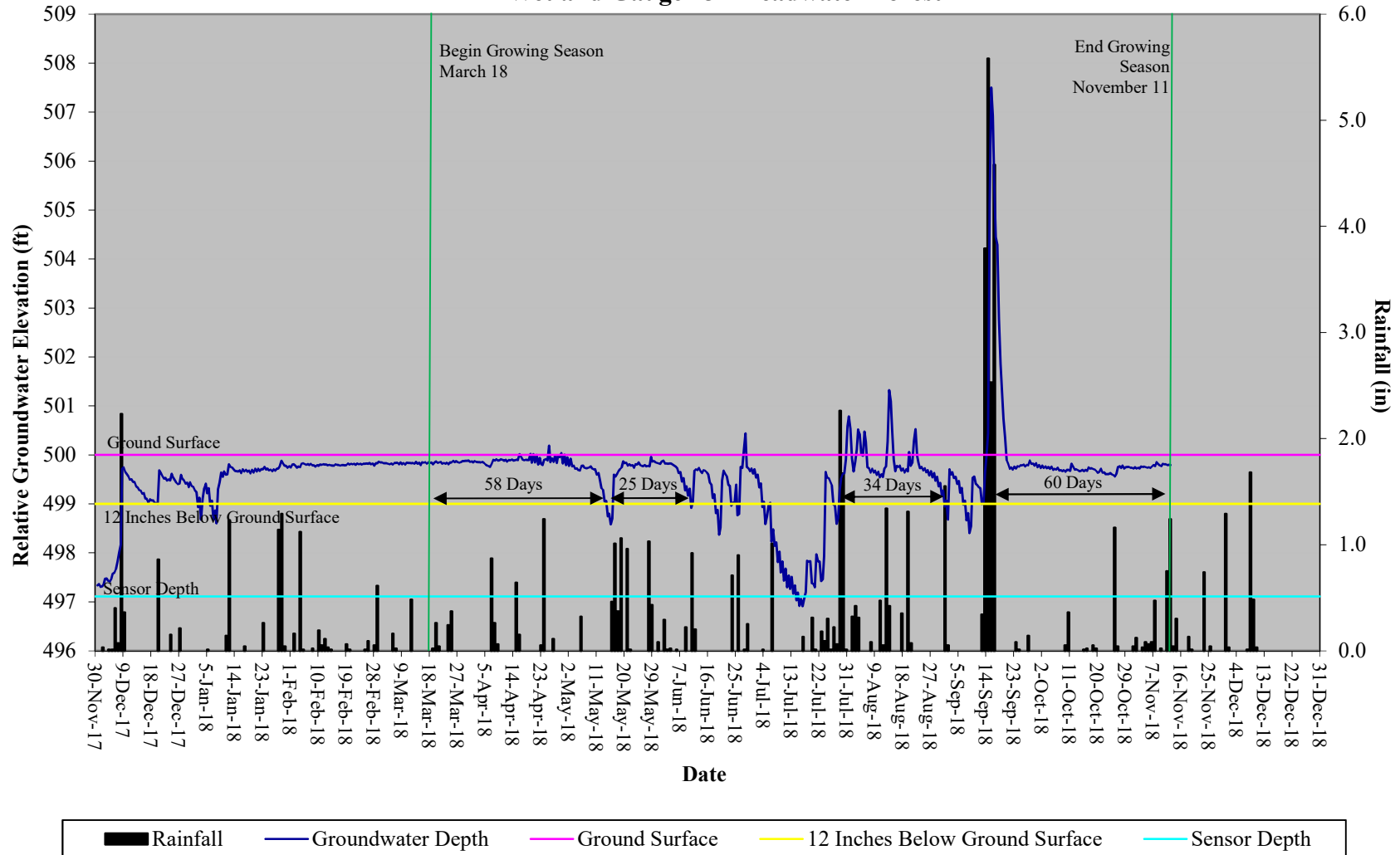
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 11 - Headwater Forest



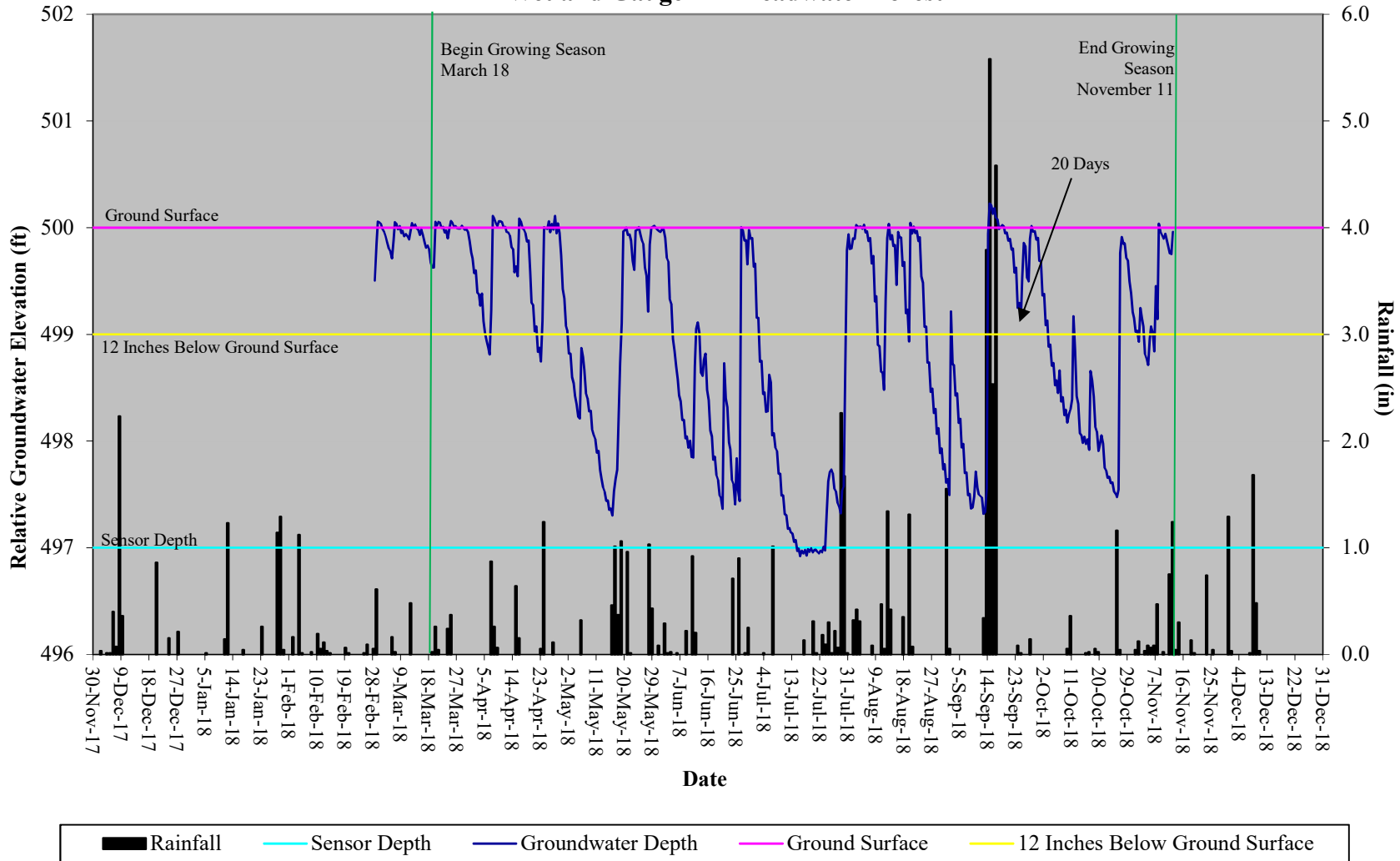
**Norman's Pasture II Restoration Site
Hydrograph
Wetland Gauge 12 - Headwater Forest**



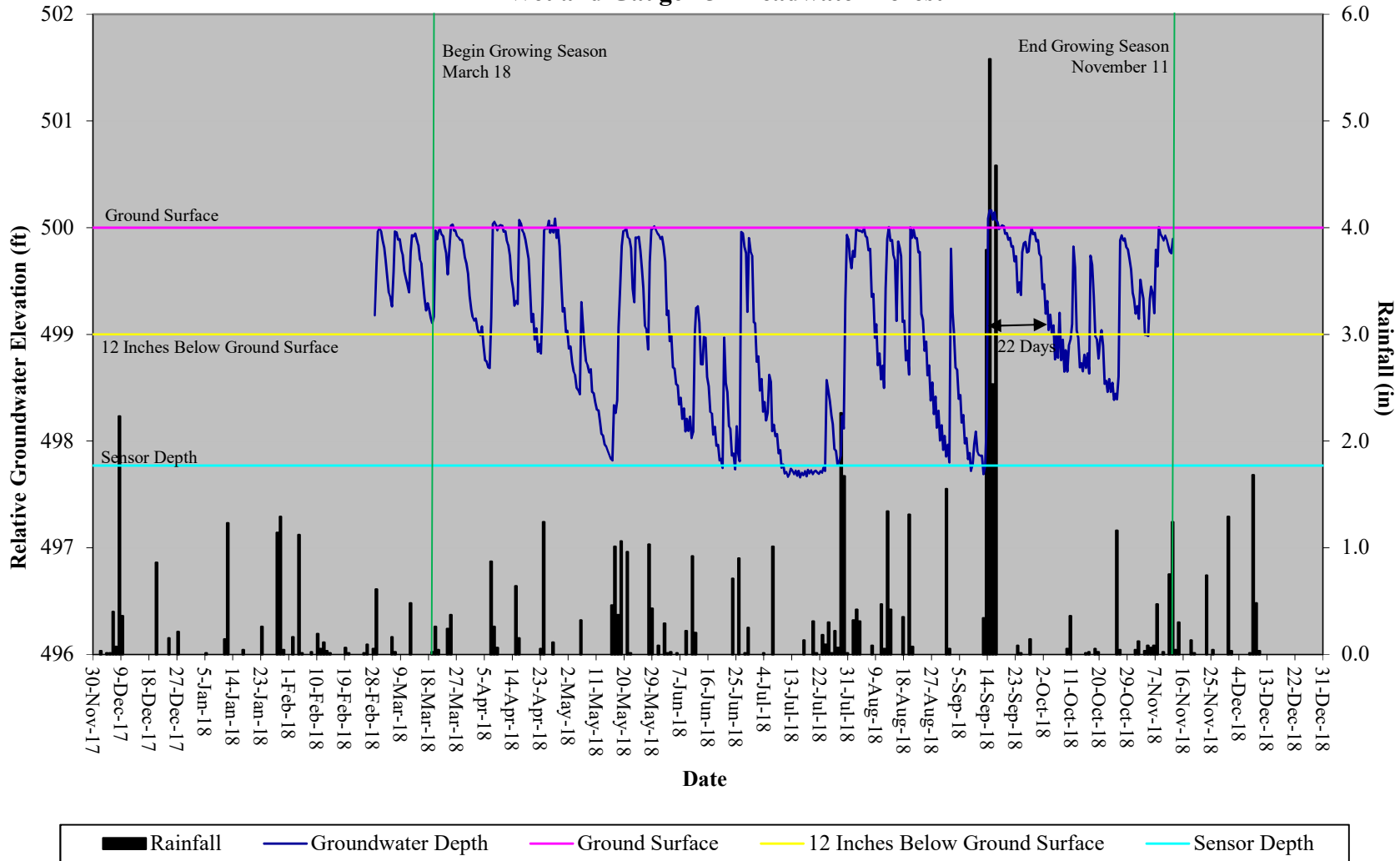
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 13 - Headwater Forest



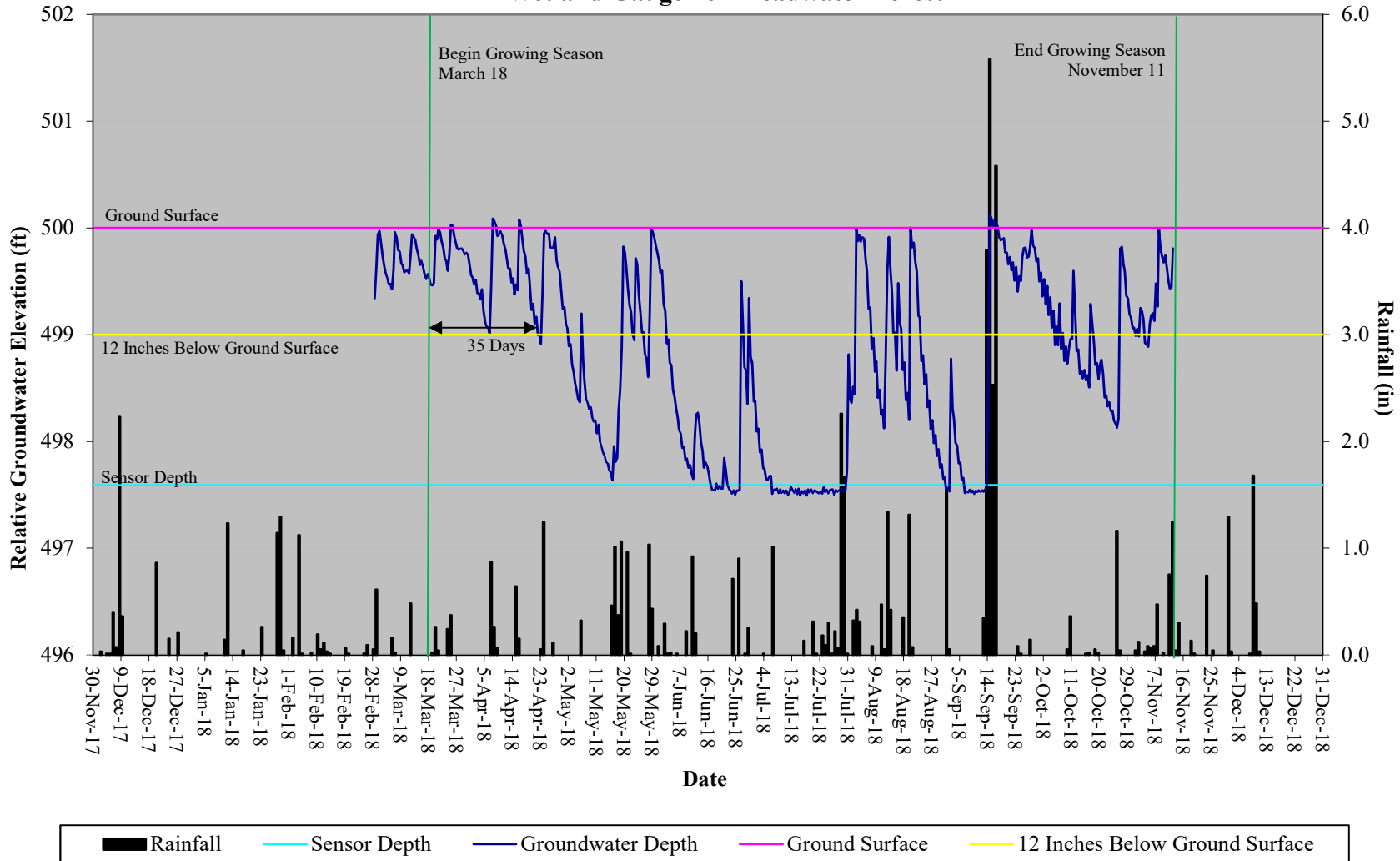
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 14 - Headwater Forest



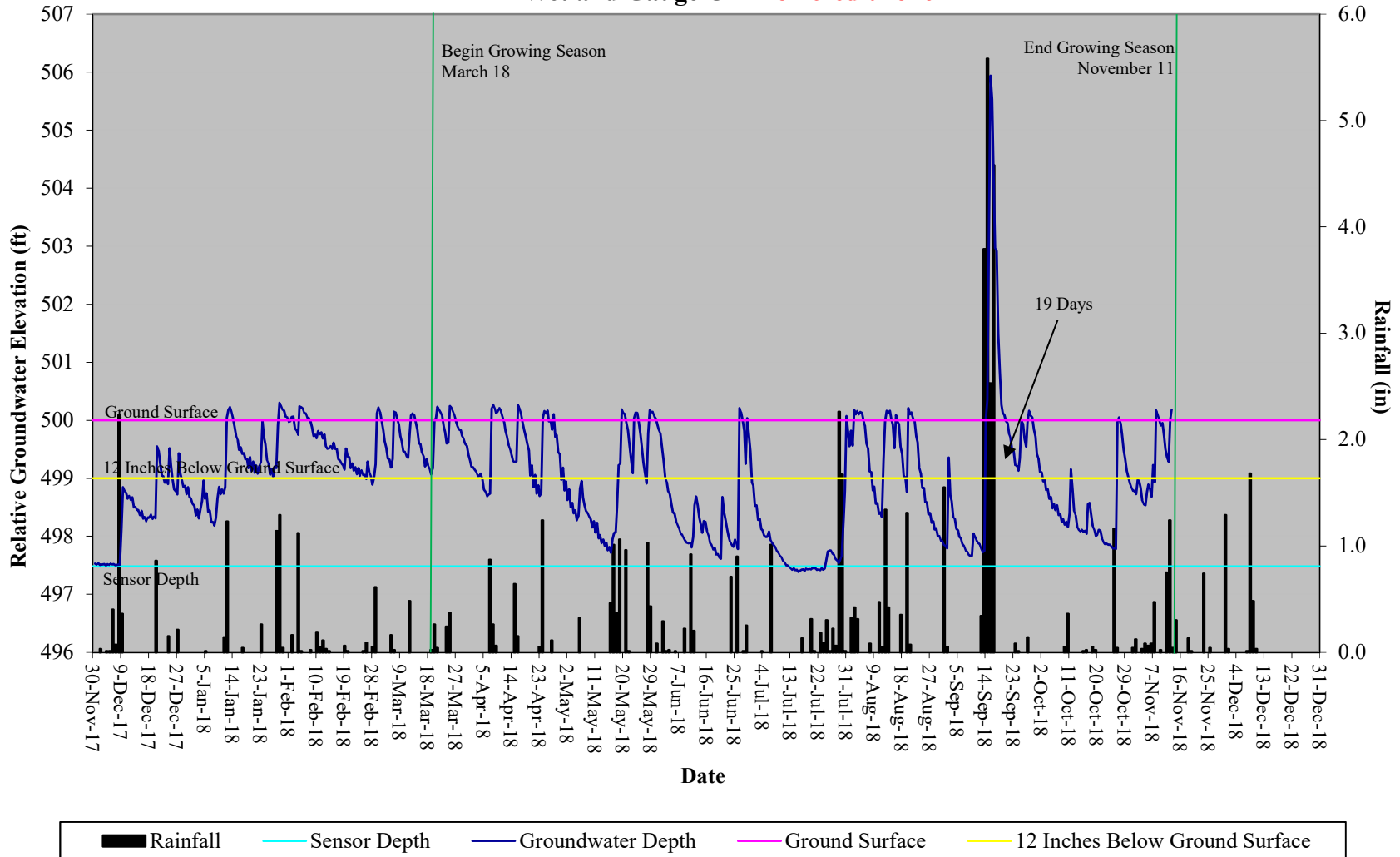
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 15 - Headwater Forest



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



Norman's Pasture Restoration Site Hydrograph Wetland Gauge C1 - non credit zone



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

