

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 05



Construction Completed: Feb 2016
Data Collection: 2020
Submitted: December 2020

Mitigation Project Name	Norman's Pasture II	USACE Action ID	2013-00109
DMS ID	96310	DWR Permit	2014-0107
River Basin	Cape Fear	Date Project Instituted	2/5/2014
Cataloging Unit	03030006	Date Prepared	4/21/2020
County	Sampson	Stream/Wet. Service Area	Cape Fear 03030006

Todd J. [Signature] 4/21/2020

Signature & Date of Official Approving Credit Release

- 1 - For NCDMS, no credits are released during the first milestone
 2 - For NCDMS projects, the initial credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the IRT by posting it to the DMS portal, provided the following have been met:
- 1) Approved of 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.

Credit Release Milestone	Warm Stream Credits						
	Scheduled Releases %	Proposed Releases %	Proposed Released #	Not Approved # Releases	Approved Credits	Anticipated Release Year	Actual Release Date
1 - Site Establishment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2 - Year 0 / As-Built	30.00%	30.00%	101.160	0.000	101.160	2016	6/24/2016
3 - Year 1 Monitoring	10.00%	10.00%	33.720	0.000	33.720	2017	4/3/2017
4 - Year 2 Monitoring	10.00%	10.00%	33.720	0.000	33.720	2018	4/25/2018
5 - Year 3 Monitoring	10.00%	10.00%	33.720	0.000	33.720	2019	4/26/2019
6 - Year 4 Monitoring	5.00%	5.00%	16.860	0.000	16.860	2020	4/21/2020
7 - Year 5 Monitoring	10.00%					2021	
8 - Year 6 Monitoring	5.00%					2022	
9 - Year 7 Monitoring	10.00%					2023	
Stream Bankfull Standard	10.00%	10.00%	33.720	0.000	33.720	2018	4/25/2018
			Totals	0.000	252.900		

Total Gross Credits	337.200
Total Unrealized Credits to Date	0.000
Total Released Credits to Date	252.900
Total Percentage Released	75.00%
Remaining Unreleased Credits	84.300

Credit Release Milestone	Riparian Credits						
	Scheduled Releases %	Proposed Releases %	Proposed Released #	Not Approved # Releases	Approved Credits	Anticipated Release Year	Actual Release Date
1 - Site Establishment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2 - Year 0 / As-Built	30.00%	30.00%	2.640	0.000	2.920	2016	6/24/2016
3 - Year 1 Monitoring	10.00%	10.00%	0.880	0.000	0.973	2017	4/3/2017
4 - Year 2 Monitoring	10.00%	10.00%	0.973	0.000	0.973	2018	4/25/2018
5 - Year 3 Monitoring	15.00%	15.00%	1.460	0.000	1.460	2019	4/26/2019
6 - Year 4 Monitoring	5.00%	5.00%	0.487	0.000	0.487	2020	4/21/2020
7 - Year 5 Monitoring	15.00%					2021	
8 - Year 6 Monitoring	5.00%					2022	
9 - Year 7 Monitoring	10.00%					2023	
Stream Bankfull Standard	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Totals	0.000	6.813		

Total Gross Credits	9.733
Total Unrealized Credits to Date	0.000
Total Released Credits to Date	6.813
Total Percentage Released	70.00%
Remaining Unreleased Credits	2.920

Mitigation Project Name	Norman's Pasture II	USACE Action ID	2013-00109
DMS ID	96310	DWR Permit	2014-0107
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Cataloging Unit	03030006	Date Prepared	4/21/2020
County	Sampson	Stream/Wet. Service Area	Cape Fear 03030006

Notes**Contingencies (if any)****Project Quantities**

Mitigation Type	Restoration Type	Physical Quantity
Warm Stream	Enhancement II	843.000
Riparian	Restoration	8.800
Riparian	Enhancement	1.400

Debits

							Stream Restoration Credits	Riparian Restoration	Riparian Restoration Equivalent Credits
Beginning Balance (mitigation credits)							337.200	8.800	0.933
Released Credit							252.900	6.160	0.653
Unrealized Credits							0.000	0.000	0.000
Owning Program	Req. Id	TIP #	Project Name	USACE Permit #	DWR Permit #	DCM Permit #			
NCDOT Stream & Wetland ILF Program	REQ-005843	R-2303D	NC 24 Improvements - Section D	1992-03237	2012-0240		101.160		
NCDOT Stream & Wetland ILF Program	REQ-005843	R-2303D	NC 24 Improvements - Section D	1992-03237	2012-0240		33.720		
NCDOT Stream & Wetland ILF Program	REQ-008243	R-2303E	NC 24 Improvements - Section E	1992-03237	2012-0240		101.160		
NCDOT Stream & Wetland ILF Program	REQ-005844	R-2303D	NC 24 Improvements - Section D	1992-03237	2012-0240			2.910	
Total Credits Debited							236.040	2.910	0.000
Remaining Available balance (Released credits)							16.860	3.250	0.653
Remaining balance (Unreleased credits)							84.300	2.640	0.280

Monitoring and Design Firm

Prepared by:



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Project Contact: Tim Morris
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KCI Project # 20122925/20145090



MEMORANDUM

Date: February 1, 2021
To: Jeremiah Dow, DMS Project Manager
From: Tim Morris, Project Manager
KCI Associates of North Carolina, PA
Subject: MY-05 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-05 Monitoring Report comments from NCDMS received on January 19, 2021, for the Norman's Pasture/Norman's Pasture II Restoration Sites.

1. Digital Data:

- a. Please submit the spatial feature that characterizes the Invasive Treatment area in the CCPV.
- b. Please submit a shapefile containing all wetland gauge points attributed with unique IDs and the year they were installed.

KCI Response: These shapefiles have been added to the digital deliverable.

2. Appendix B

- a. Tables 5a & 5b – Please fill out row in tables for Invasive Areas of Concern as needed.

KCI Response: The area of invasive treatment has been added to the visual assessment tables.

3. NP11-8 has not met hydrologic success of 9% in all 5 years. During the October 2019 IRT site visit a delineation of at risk areas and/or an adaptive management plan to offset the loss around the gauge(s) by picking up additional wetland area in other locations on site was discussed. Last year KCI stated in the response to DMS comments that "KCI is aware that the area around NP11-8 represents credits at risk and is taking steps to determine the extent of the at-risk area." Has this been completed, and if so, what is the area? Has additional wetland area been determined for any other location on site to offset the at risk area? Site assets are reported as 9.733 WMUs and KCI is under contract to deliver 9.43 WMUs, so payment is not likely to be affected. DMS simply needs to ensure that we do not debit more wetland credits than the site will deliver.

KCI Response: On January 29, 2021, KCI performed a detailed investigation of the area around Gauge NP11-8. After examining the vegetation, soils, and visual indicators of wetland hydrology in this area, KCI marked off the area of lower hydrology in the field and surveyed it with a handheld GPS. The results of this investigation was an area of 0.067 acres being marked as "at-risk." This area have been added to the CCPV.

4. As required by contract, specifically RFP#16-005295, KCI must submit an updated Monitoring Phase Performance Bond (MPPB) for Norman's Pasture II good through the end of Monitoring Year 6 (Task 12) to Jeff Jurek for his approval before DMS can authorize KCI to invoice for Task 11.

KCI Response: An updated MPPB will be submitted to Jeff Jurek.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Tim Morris".

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 (NPPII) 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 NPPII also includes 0.8 acres of existing wetland preservation. The completed NPPII 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 NPPII 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 NPPII'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 NPPII 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 NPPII

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.

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 fifth growing season, all of the 9 gauges at NPRS and 16 of the 17 gauges at NPII met the success criteria. The gauge that did not meet the success criteria (NPII-8) has not achieved the success criteria in any of the 5 monitoring years. On January 29, 2021, KCI performed a detailed investigation of the vegetation, soils, and visual hydrology indicators around this gauge. As a result of this investigation, 0.067 acres of wetland reestablishment have been designated as "at-risk." Please see the Current Conditions Plan View, and Appendix E – Additional Information for more information.

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 NP II.

Fifth year vegetation monitoring showed that the site is well vegetated with many large, healthy trees on the site. Twenty-eight of the thirty-one vegetation monitoring plots had greater than 260 stems per acre. Collectively the site averaged 606 planted stems per acre and including volunteer the site averaged 1,658 stems per acre. All three of the plots that did not meet are located towards the southern end of the site near Stewart's Creek. Although these plots are all located in a similar area of the site, they are all approximately 500 feet apart, with four successful plots between each unsuccessful one. In all there are ten other successful plots in this area of the site. As such, these plots do not represent a large area that is lacking in woody stems, but rather small, isolated areas that are slightly below the success criteria.

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 (NP II). 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 NP II 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 "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 2020-year, the months of February, May, September, and November experienced above average rainfall, January, March, April, June, July, August, and October experienced average rainfall. No months recorded below average rainfall for the site. Overall, the area experienced above average rainfall during the 2020 growing season.

During the site's fifth growing season, twenty-four 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 five monitoring years, including two in 2020, 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 fifth 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.

In December 2020 Chinese privet (*Ligustrum sinense*) growing on-site was treated with herbicide application. The majority of this privet was growing in areas where mature trees were left intact during construction, especially along the site's boundary with Stewart's Creek and along the edges of the stream enhancement area. Please see Appendix B – Visual Assessment Data for more information.

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>)

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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.

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United States Department of Agriculture. 1985. Soil Survey of Sampson County, North Carolina. USDA, NCDENR, SCS.

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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			

*0.067 acres of wetland around gauge NP11-8 has been identified as potentially at-risk due to NP11-8 not meeting the 9% hydroperiod success criteria in 5 out of 5 years to date.

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	
Invasive Treatment		Dec 3, 2020
Year 5 Monitoring	Nov 2020	Dec 2020
Vegetation Monitoring	July 27, 2020	
Photo Points	Nov 20, 2020	
Gauge Downloads	Nov 20, 2020	

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	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 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%

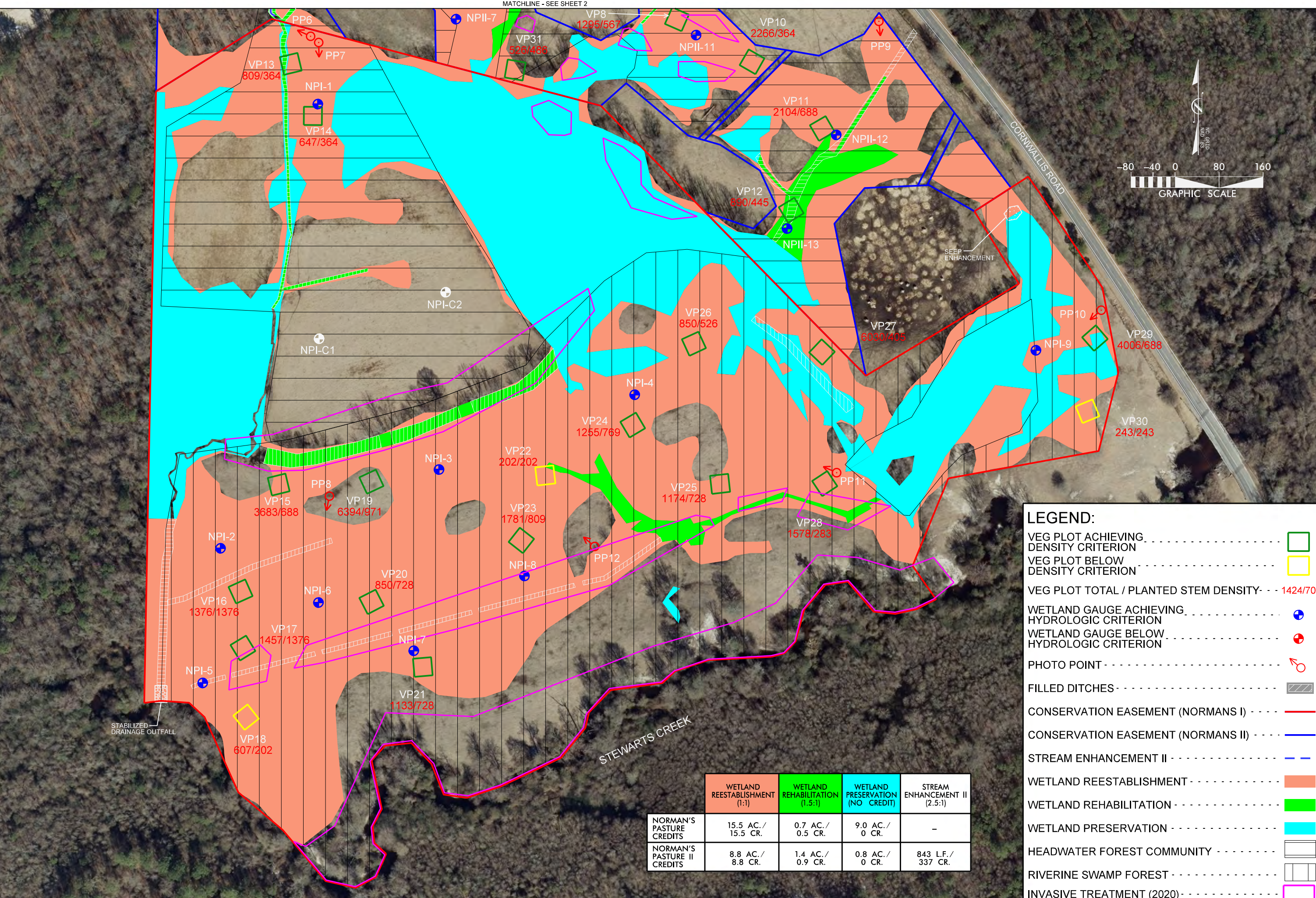
Project Information continued - Norman's II Restoration Site Restoration Site

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

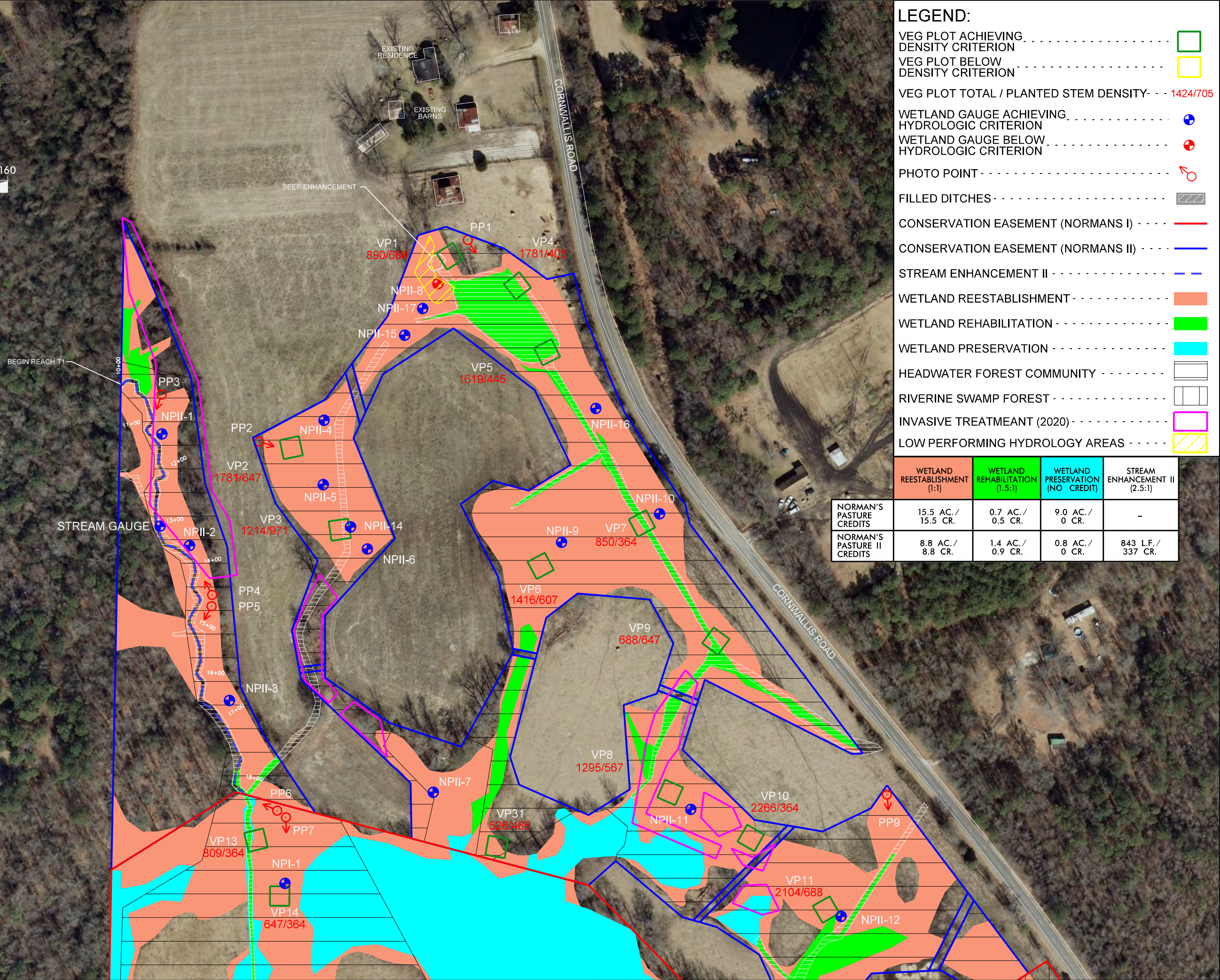
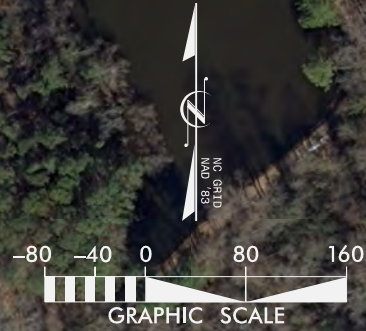


LEGEND:

- VEG PLOT ACHIEVING DENSITY CRITERION
- VEG PLOT BELOW DENSITY CRITERION
- VEG PLOT TOTAL / PLANTED STEM DENSITY: - - - 1424/705
- 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
- INVASIVE TREATMENT (2020)

	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.

<p>NCDEQ DIVISION OF MITIGATION SERVICES</p> <p>KCI ASSOCIATES OF IC ENGINEERS • PLANNERS • SCIENTISTS 4505 FALLS OF NEUSE ROAD RALEIGH, NORTH CAROLINA 27609</p>	<p>NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES SAMPSON COUNTY, NORTH CAROLINA MONITORING YEAR 05</p>
<p>DATE: DEC 2019 SCALE: GRAPHIC</p>	<p>DATE: _____ SCALE: _____</p>
<p>CURRENT CONDITION PLAN VIEW</p>	<p>REVISIONS</p>
<p>SHEET 1 OF 2</p>	<p>DATE</p>



- LEGEND:**
- VEG PLOT ACHIEVING DENSITY CRITERION
 - VEG PLOT BELOW DENSITY CRITERION
 - VEG PLOT TOTAL / PLANTED STEM DENSITY - - - 1424/705
 - 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 - - - -
 - INVASIVE TREATMENT (2020) - - - -
 - LOW PERFORMING HYDROLOGY AREAS - - - -

	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.

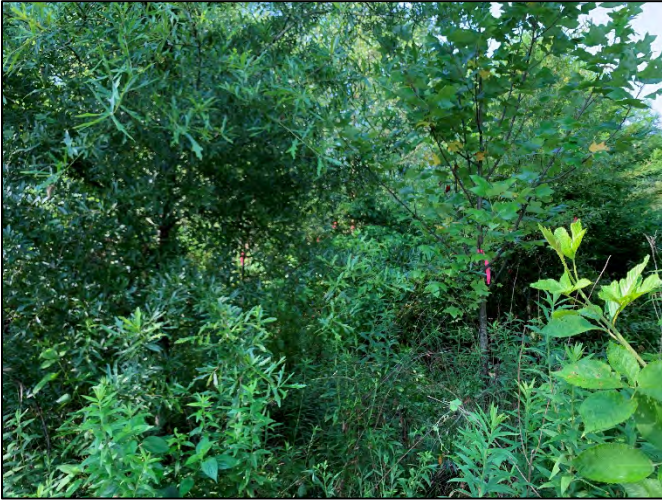
<p>NCDEQ DIVISION OF MITIGATION SERVICES</p>	<p>KCI ASSOCIATES OF IC ENGINEERS • PLANNERS • SCIENTISTS 4506 FALLS OF NEUSE ROAD RALEIGH, NORTH CAROLINA 27609</p>
<p>NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES SAMPSON COUNTY, NORTH CAROLINA MONITORING YEAR 05</p>	<p>DATE: DEC 2019 SCALE: GRAPHIC</p>
<p>CURRENT CONDITION PLAN VIEW</p>	
<p>SHEET 2 OF 2</p>	

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	8	5.19	14.1%
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	9	2.01	12.3%
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-05 – 07/06/20



Plot 2 – MY-05 – 07/06/20



Plot 3 – MY-05 – 07/06/20



Plot 4 – MY-05 – 07/06/20



Plot 5 – MY-05 – 07/06/20



Plot 6 – MY-05 – 07/02/20



Plot 7 – MY-05 – 07/06/20



Plot 8 – MY-05 – 07/02/20



Plot 9 – MY-05 – 07/20/20



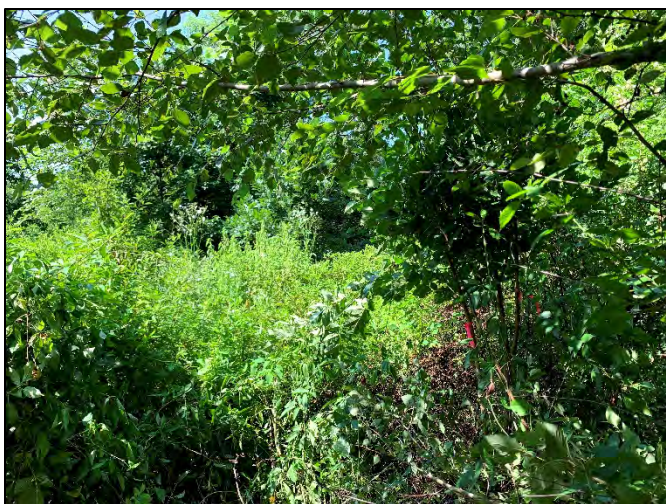
Plot 10 – MY-05 – 07/02/20



Plot 11 – MY-05 – 07/02/20



Plot 12 – MY-05 – 07/20/20



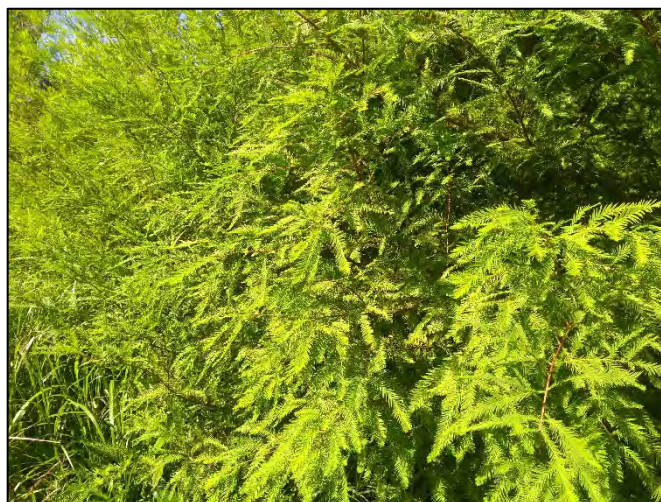
Plot 13 – MY-05 – 07/20/20



Plot 14 – MY-05 – 07/20/20



Plot 15 – MY-05 – 07/27/20



Plot 16 – MY-05 – 07/27/20



Plot 17 – MY-05 – 07/27/20



Plot 18 – MY-05 – 07/27/20



Plot 19 – MY-05 – 07/27/20



Plot 20 – MY-05 – 07/27/20



Plot 21 – MY-05 – 07/27/20



Plot 22 – MY-05 – 07/22/20



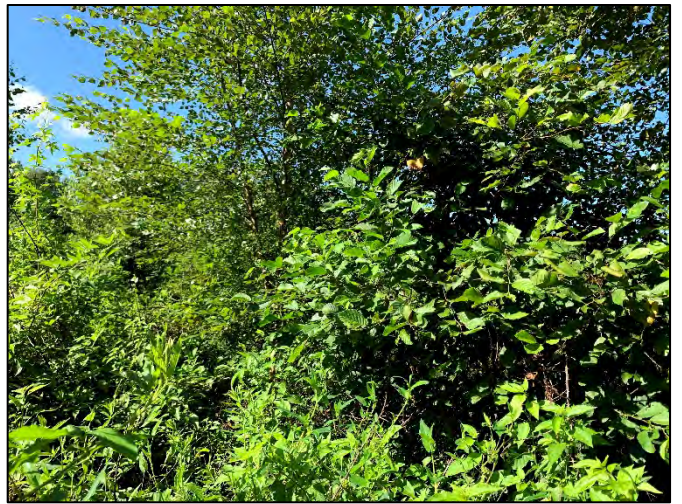
Plot 23 – MY-05 – 07/27/20



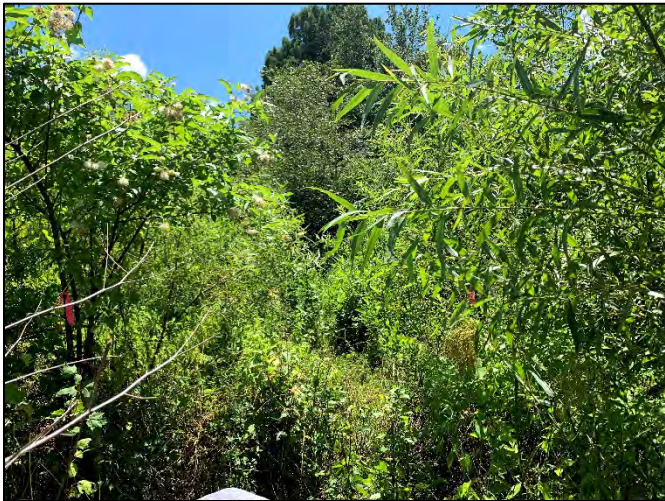
Plot 24 – MY-05 – 07/22/20



Plot 25 – MY-05 – 07/27/20



Plot 26 – MY-05 – 07/22/20



Plot 27 – MY-05 – 07/22/20



Plot 28 – MY-05 – 07/22/20



Plot 29 – MY-05 – 07/20/20



Plot 30 – MY-05 – 07/20/20



Plot 31 – MY-05 – 07/20/20

Photo Reference Points



PP01 – MY-00 – 4/15/16



PP01 – MY-05 – 11/20/20



PP02 – MY-00 – 4/15/16



PP02 – MY-05 – 11/20/20



PP03 – MY-00 – 4/15/16



PP03 – MY-05 – 11/20/20



PP04 – MY-00 – 4/15/16



PP04 – MY-05 – 11/20/20



PP05 – MY-00 – 4/15/16



PP05 – MY-05 – 11/20/20



PP06 – MY-00 – 4/15/16



PP06 – MY-05 – 11/20/20



PP07 – MY-00 – 4/15/16



PP07 – MY-05 – 11/20/20



PP08 – MY-00 – 4/15/16



PP08 – MY-05 – 11/20/20



PP09 – MY-00 – 4/15/16



PP09 – MY-05 – 11/20/20



PP10 – MY-00 – 4/15/16



PP10 – MY-05 – 11/20/20



PP11 – MY-00 – 4/15/16



PP11 – MY-05 – 11/20/20



PP12 – MY-00 – 4/15/16



PP12 – MY-05 – 11/20/20

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			Current Plot Data MY05 (2020)																		
Scientific Name	Common Name	Species Type	95717-01-0001			95717-01-0002			95717-01-0003			95717-01-0004			95717-01-0005			95717-01-0006			
			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						8			5										
Alnus serrulata	hazel alder	Shrub																			
Baccharis halimifolia	eastern baccharis	Shrub																			
Betula nigra	river birch	Tree	2	2	2	1	1	1	1	1	1	3	3	3	5	5	5	8	8	9	
Cephalanthus occidentalis	common buttonbush	Shrub	1	1	1									1	1	1	1	1	1	1	
Cornus amomum	silky dogwood	Shrub																			
Corylus americana	American hazelnut	Shrub																			
Crataegus phaenopyrum	Washington hawthorn	Shrub Tree																			
Diospyros virginiana	common persimmon	Tree																			
Fraxinus pennsylvanica	green ash	Tree	4	4	4	3	3	3	5	5	5							1	1	1	
Juglans nigra	black walnut	Tree																			
Liquidambar styraciflua	sweetgum	Tree			3								7			1				16	
Liriodendron tulipifera	tuliptree	Tree	1	1	1			8					1								
Morella cerifera	wax myrtle	shrub																			
Nyssa aquatica	water tupelo	Tree																			
Nyssa biflora	swamp tupelo	Tree																			
Pinus taeda	loblolly pine	Tree						1					15			4					
Platanus occidentalis	American sycamore	Tree																			
Prunus serotina	black cherry	Tree																			
Quercus laurifolia	laurel oak	Tree	2	2	2	1	1	1	1	1	1							1	1	1	
Quercus lyrata	overcup oak	Tree	4	4	4	5	5	5	5	5	5			3	3	3	1	1	1	1	
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	1	1	1	4	4	5	7	7	7	1	1	1	2	2	2	
Quercus nigra	water oak	Tree														1					
Quercus phellos	willow oak	Tree			2	1	1	1					1								
Quercus rubra	northern red oak	Tree						10					1			22				3	
Rhus copallinum	flameleaf sumac	shrub																			
Salix nigra	black willow	Tree																			
Taxodium distichum	bald cypress	Tree	2	2	2	4	4	4	8	8	8			1	1	1					
Ulmus americana	American elm	Tree																			
Unknown		Shrub or Tree						1					9			1	1	1	1	1	
Stem count			17	17	22	16	16	44	24	24	30	10	10	44	11	11	40	15	15	35	
size (ares)			1			1			1			1			1			1			
size (ACRES)			0.0247			0.025			0.0247			0.0247			0.0247			0.0247			
Species count			8	8	10	7	7	12	6	6	7	2	2	8	5	5	10	7	7	9	
Stems per ACRE			688	688	890	647	647	1781	971	971	1214	405	405	1781	445	445	1619	607	607	1416	

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			Current Plot Data MY05 (2020)																		
Scientific Name	Common Name	Species Type	95717-01-0007			95717-01-0008			95717-01-0009			95717-01-0010			95717-01-0011			95717-01-0012			
			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			4											4			10		
Alnus serrulata	hazel alder	Shrub																			
Baccharis halimifolia	eastern baccharis	Shrub																			
Betula nigra	river birch	Tree	2	2	2							1	1	1	3	3	3				
Cephalanthus occidentalis	common buttonbush	Shrub													2	2	2				
Cornus amomum	silky dogwood	Shrub																			
Corylus americana	American hazelnut	Shrub																			
Crataegus phaenopyrum	Washington hawthorn	Shrub Tree																			
Diospyros virginiana	common persimmon	Tree													1	1	1				
Fraxinus pennsylvanica	green ash	Tree	3	3	3				4	4	4	2	2	3	4	4	5	3	3	3	
Juglans nigra	black walnut	Tree				1	1	1							1	1	1				
Liquidambar styraciflua	sweetgum	Tree			4			13					3				11				
Liriodendron tulipifera	tuliptree	Tree							3	3	3				1	1	1				
Morella cerifera	wax myrtle	shrub																			
Nyssa aquatica	water tupelo	Tree																			
Nyssa biflora	swamp tupelo	Tree																			
Pinus taeda	loblolly pine	Tree									1						1				
Platanus occidentalis	American sycamore	Tree						1									1				
Prunus serotina	black cherry	Tree																			
Quercus laurifolia	laurel oak	Tree	1	1	1	2	2	2	1	1	1	2	2	2	1	1	1	1	1	1	
Quercus lyrata	overcup oak	Tree				4	4	4	2	2	2	1	1	1	2	2	2				
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	5	5	5	1	1	1	1	1	1	2	2	2				
Quercus nigra	water oak	Tree																			
Quercus phellos	willow oak	Tree																			
Quercus rubra	northern red oak	Tree			4			3					43				17				
Rhus copallinum	flameleaf sumac	shrub																			
Salix nigra	black willow	Tree																			
Taxodium distichum	bald cypress	Tree	2	2	2	2	2	2	5	5	5	2	2	2				7	7	8	
Ulmus americana	American elm	Tree																			
Unknown		Shrub or Tree						1													
Stem count			9	9	21	14	14	32	16	16	17	9	9	56	17	17	52	11	11	22	
size (ares)			1			1			1			1			1			1			
size (ACRES)			0.0247			0.025			0.0247			0.0247			0.0247			0.0247			
Species count			5	5	8	5	5	9	6	6	7	6	6	8	9	9	14	3	3	4	
Stems per ACRE			364	364	850	567	567	1295	647	647	688	364	364	2266	688	688	2104	445	445	890	

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			Current Plot Data MY05 (2020)																		
Scientific Name	Common Name	Species Type	95717-01-0013			95717-01-0014			95717-01-0015			95717-01-0016			95717-01-0017			95717-01-0018			
			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			9			5			63						1			5	
Alnus serrulata	hazel alder	Shrub																			
Baccharis halimifolia	eastern baccharis	Shrub																			
Betula nigra	river birch	Tree	1	1	1	1	1	1	2	2	6						1	2	2	2	
Cephalanthus occidentalis	common buttonbush	Shrub	2	2	2				2	2	2	1	1	1	6	6	6				
Cornus amomum	silky dogwood	Shrub																			
Corylus americana	American hazelnut	Shrub																			
Crataegus phaenopyrum	Washington hawthorn	Shrub Tree																			
Diospyros virginiana	common persimmon	Tree																			
Fraxinus pennsylvanica	green ash	Tree	3	3	3																
Juglans nigra	black walnut	Tree																			
Liquidambar styraciflua	sweetgum	Tree			2			2			1									4	
Liriodendron tulipifera	tuliptree	Tree																			
Morella cerifera	wax myrtle	shrub																			
Nyssa aquatica	water tupelo	Tree							8	8	8	1	1	1	12	12	12	1	1	1	
Nyssa biflora	swamp tupelo	Tree																1	1	1	
Pinus taeda	loblolly pine	Tree									4										
Platanus occidentalis	American sycamore	Tree																			
Prunus serotina	black cherry	Tree																			
Quercus laurifolia	laurel oak	Tree							2	2	2										
Quercus lyrata	overcup oak	Tree							1	1	1							1	1	1	
Quercus michauxii	swamp chestnut oak	Tree	2	2	2	1	1	1	1	1	1										
Quercus nigra	water oak	Tree																			
Quercus phellos	willow oak	Tree							1	1	1										
Quercus rubra	northern red oak	Tree																			
Rhus copallinum	flameleaf sumac	shrub																			
Salix nigra	black willow	Tree																			
Taxodium distichum	bald cypress	Tree	1	1	1	7	7	7				32	32	32	16	16	16				
Ulmus americana	American elm	Tree									2									1	
Unknown		Shrub or Tree																			
	Stem count		9	9	20	9	9	16	17	17	91	34	34	34	34	34	36	5	5	15	
	size (ares)		1			1			1			1			1			1			
	size (ACRES)		0.0247			0.025			0.0247			0.0247			0.0247			0.0247			
	Species count		5	5	7	3	3	5	7	7	11	3	3	3	3	3	5	4	4	7	
	Stems per ACRE		364	364	809	364	364	647	688	688	3683	1376	1376	1376	1376	1376	1457	202	202	607	

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			Current Plot Data MY05 (2020)																		
Scientific Name	Common Name	Species Type	95717-01-0019			95717-01-0020			95717-01-0021			95717-01-0022			95717-01-0023			95717-01-0024			
			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			129					3						6				9	
Alnus serrulata	hazel alder	Shrub																			
Baccharis halimifolia	eastern baccharis	Shrub																			
Betula nigra	river birch	Tree	3	3	3				5	5	5							1			
Cephalanthus occidentalis	common buttonbush	Shrub							2	2	2	1	1	1							
Cornus amomum	silky dogwood	Shrub																			
Corylus americana	American hazelnut	Shrub																			
Crataegus phaenopyrum	Washington hawthorn	Shrub Tree			1																
Diospyros virginiana	common persimmon	Tree																			
Fraxinus pennsylvanica	green ash	Tree																			
Juglans nigra	black walnut	Tree																			
Liquidambar styraciflua	sweetgum	Tree			4			1		7											
Liriodendron tulipifera	tuliptree	Tree																			
Morella cerifera	wax myrtle	shrub																			
Nyssa aquatica	water tupelo	Tree	6	6	6	6	6	6	1	1	1				5	5	5	1	1	1	
Nyssa biflora	swamp tupelo	Tree																			
Pinus taeda	loblolly pine	Tree																			
Platanus occidentalis	American sycamore	Tree																			
Prunus serotina	black cherry	Tree																			
Quercus laurifolia	laurel oak	Tree							2	2	2										
Quercus lyrata	overcup oak	Tree				3	3	3				1	1	1							
Quercus michauxii	swamp chestnut oak	Tree	7	7	7				1	1	1				1	1	1				
Quercus nigra	water oak	Tree																			
Quercus phellos	willow oak	Tree																		3	
Quercus rubra	northern red oak	Tree																			
Rhus copallinum	flameleaf sumac	shrub																			
Salix nigra	black willow	Tree						2												14	
Taxodium distichum	bald cypress	Tree	8	8	8	9	9	9	7	7	7	3	3	3	14	14	14	18	18	18	
Ulmus americana	American elm	Tree																		3	
Unknown		Shrub or Tree																			
Stem count			24	24	158	18	18	21	18	18	28	5	5	5	20	20	44	19	19	31	
size (ares)			1			1			1			1			1			1			
size (ACRES)			0.0247			0.025			0.0247			0.0247			0.0247			0.0247			
Species count			4	4	7	3	3	5	6	6	8	3	3	3	3	3	7	2	2	4	
Stems per ACRE			971	971	6394	728	728	850	728	728	1133	202	202	202	809	809	1781	769	769	1255	

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			Current Plot Data MY05 (2020)																		
Scientific Name	Common Name	Species Type	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	
Acer rubrum	red maple	Tree			1			5			21						67				
Alnus serrulata	hazel alder	Shrub																			
Baccharis halimifolia	eastern baccharis	Shrub																			
Betula nigra	river birch	Tree	1	1	1	4	4	4							1	1	1				
Cephalanthus occidentalis	common buttonbush	Shrub				3	3	5	2	2	2				1	1	1	2	2	2	
Cornus amomum	silky dogwood	Shrub																			
Corylus americana	American hazelnut	Shrub																			
Crataegus phaenopyrum	Washington hawthorn	Shrub Tree			2																
Diospyros virginiana	common persimmon	Tree									1	2	2	34							
Fraxinus pennsylvanica	green ash	Tree																			
Juglans nigra	black walnut	Tree			1																
Liquidambar styraciflua	sweetgum	Tree			4						14						5				
Liriodendron tulipifera	tuliptree	Tree																			
Morella cerifera	wax myrtle	shrub																			
Nyssa aquatica	water tupelo	Tree																1	1	1	
Nyssa biflora	swamp tupelo	Tree																			
Pinus taeda	loblolly pine	Tree																			
Platanus occidentalis	American sycamore	Tree																			
Prunus serotina	black cherry	Tree																			
Quercus laurifolia	laurel oak	Tree	7	7	7	1	1	1	1	1	1	3	3	3				3	3	3	
Quercus lyrata	overcup oak	Tree	6	6	6				5	5	5				9	9	9				
Quercus michauxii	swamp chestnut oak	Tree	1	1	1				1	1	1										
Quercus nigra	water oak	Tree																			
Quercus phellos	willow oak	Tree									3										
Quercus rubra	northern red oak	Tree															9				
Rhus copallinum	flameleaf sumac	shrub																			
Salix nigra	black willow	Tree																			
Taxodium distichum	bald cypress	Tree	3	3	3	5	5	5	1	1	1	2	2	2	6	6	6				
Ulmus americana	American elm	Tree			3																
Unknown		Shrub or Tree						1			100						1				
Stem count			18	18	29	13	13	21	10	10	149	7	7	39	17	17	99	6	6	6	
size (ares)			1			1			1			1			1			1			
size (ACRES)			0.0247			0.025			0.0247			0.0247			0.0247			0.0247			
Species count			5	5	10	4	4	6	5	5	10	3	3	3	4	4	8	3	3	3	
Stems per ACRE			728	728	1174	526	526	850	405	405	6030	283	283	1578	688	688	4006	243	243	243	

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		Species Type	Annual Means																		
Scientific Name	Common Name		95717-01-0031			MY5 (2020)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)			
			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						355			241			178			92				
Alnus serrulata	hazel alder	Shrub									84			13			4				
Baccharis halimifolia	eastern baccharis	Shrub									20			16			2				
Betula nigra	river birch	Tree	1	1	1	47	47	54	47	47	80	48	48	83	47	47	61	42	42	42	
Cephalanthus occidentalis	common buttonbush	Shrub				27	27	29	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 phaenopyrum	Washington hawthorn	Shrub Tree						3			6			6			1				
Diospyros virginiana	common persimmon	Tree				3	3	36	3	3	29	3	3	32							
Fraxinus pennsylvanica	green ash	Tree	1	1	1	33	33	35	33	33	35	32	32	34	30	30	31	36	36	36	
Juglans nigra	black walnut	Tree				2	2	3	2	2	5	2	2	9	2	2	5				
Liquidambar styraciflua	sweetgum	Tree						102			35			42			29				
Liriodendron tulipifera	tuliptree	Tree	1	1	1	6	6	15	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				42	42	42	62	62	62	75	75	75	79	79	79	60	60	60	
Nyssa biflora	swamp tupelo	Tree				1	1	1	2	2	2	2	2	2	2	2	2				
Pinus taeda	loblolly pine	Tree						26			23			6							
Platanus occidentalis	American sycamore	Tree						2													
Prunus serotina	black cherry	Tree									2			2			1				
Quercus laurifolia	laurel oak	Tree	4	4	4	36	36	36	57	57	57	64	64	64	70	70	70	68	68	68	
Quercus lyrata	overcup oak	Tree	1	1	1	54	54	54	59	59	60	63	63	64	65	65	65	33	33	33	
Quercus michauxii	swamp chestnut oak	Tree	3	3	3	44	44	45	52	52	52	59	59	59	60	60	60	42	42	42	
Quercus nigra	water oak	Tree						1													
Quercus phellos	willow oak	Tree				2	2	11	2	2	2	2	2	2	3	3	3	1	1	1	
Quercus rubra	northern red oak	Tree						112													
Rhus copallinum	flameleaf sumac	shrub									10			18			5				
Salix nigra	black willow	Tree						16			38			49			26				
Taxodium distichum	bald cypress	Tree	1	1	2	166	166	168	171	171	171	173	173	173	171	171	171	169	169	169	
Ulmus americana	American elm	Tree						9			9			6			6				
Unknown		Shrub or Tree				1	1	115	2	2	2	4	4	4	21	21	35	213	213	213	
	Stem count		12	12	13	464	464	1270	540	540	1083	576	576	992	596	596	797	674	674	674	
	size (ares)		1			31			31			31			31		31				
	size (ACRES)		0.0247			0.766			0.766			0.766			0.766		0.766				
	Species count		7	7	7	14	14	23	14	14	25	14	14	25	15	15	25	10	10	10	
	Stems per ACRE		486	486	526	606	606	1658	705	705	1414	752	752	1295	778	778	1040	880	880	880	

Appendix D

Hydrologic Data

Norman's Pasture II Restoration Site Hydrograph Stream Gauge

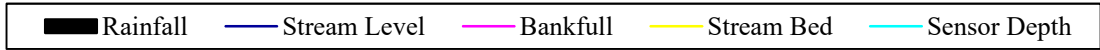
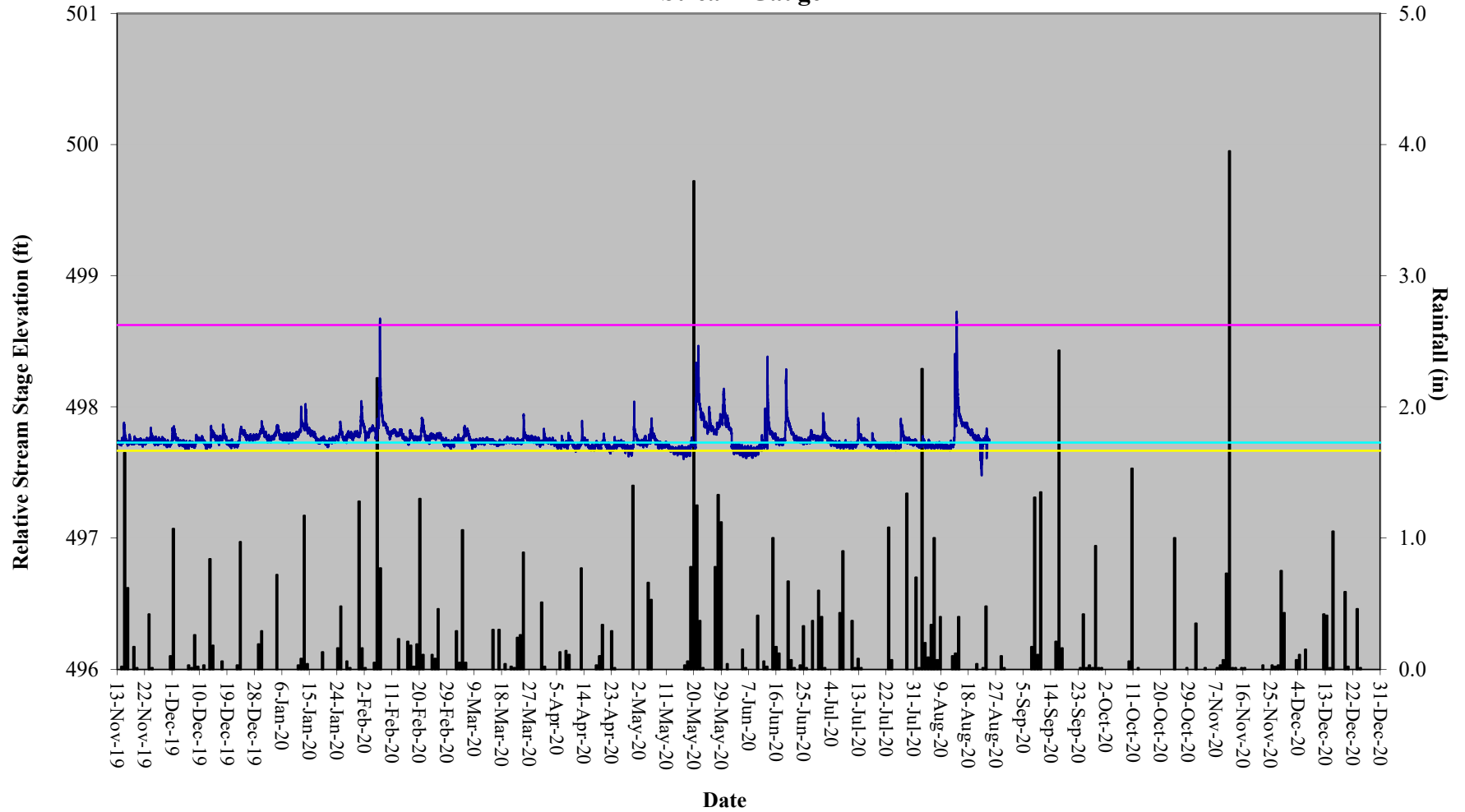
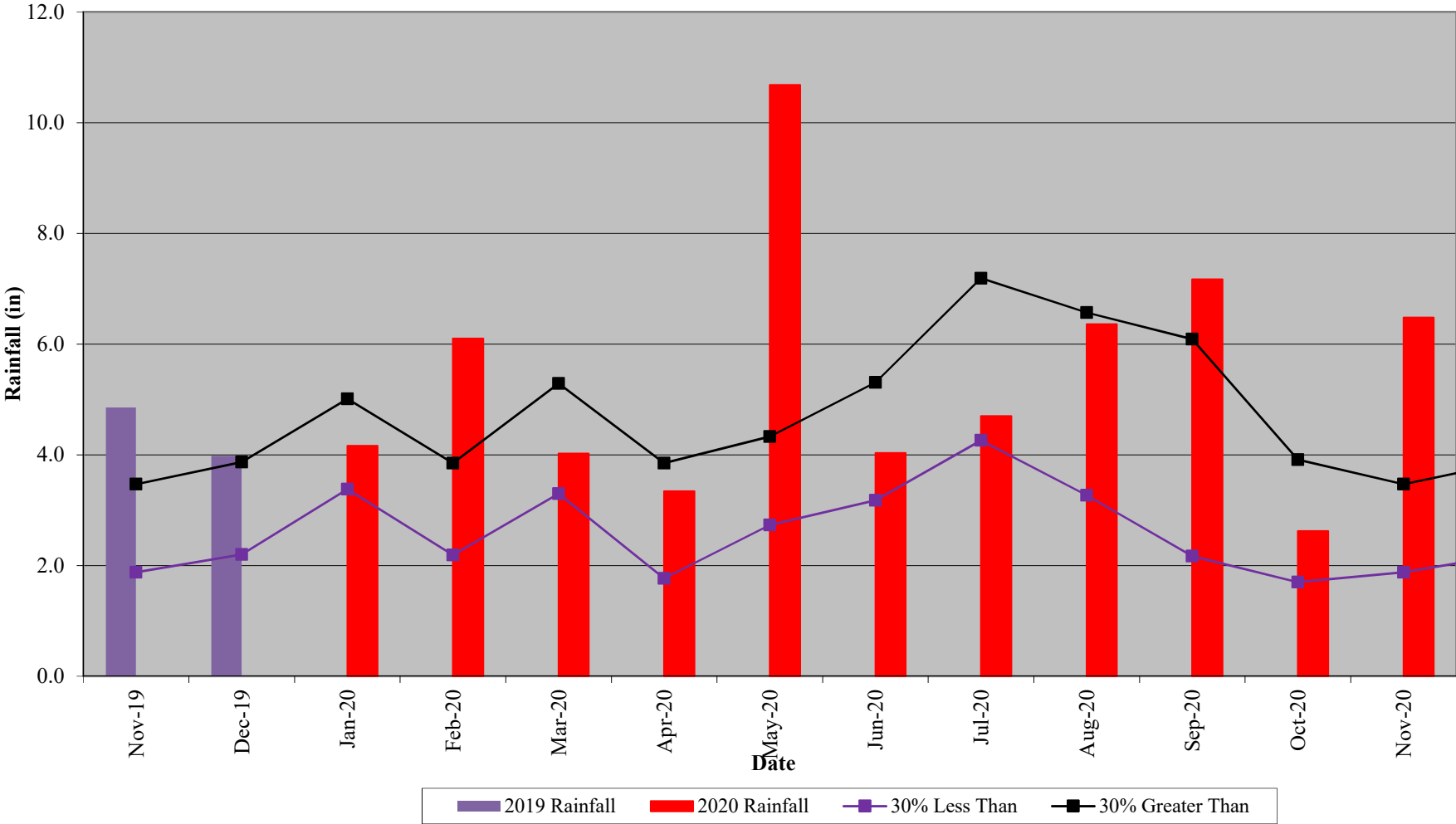


Table 7. Verification of Bankfull Events**Norman's Pasture and Norman's Pasture II Restoration Sites, DMS Project Number 95717/96310**

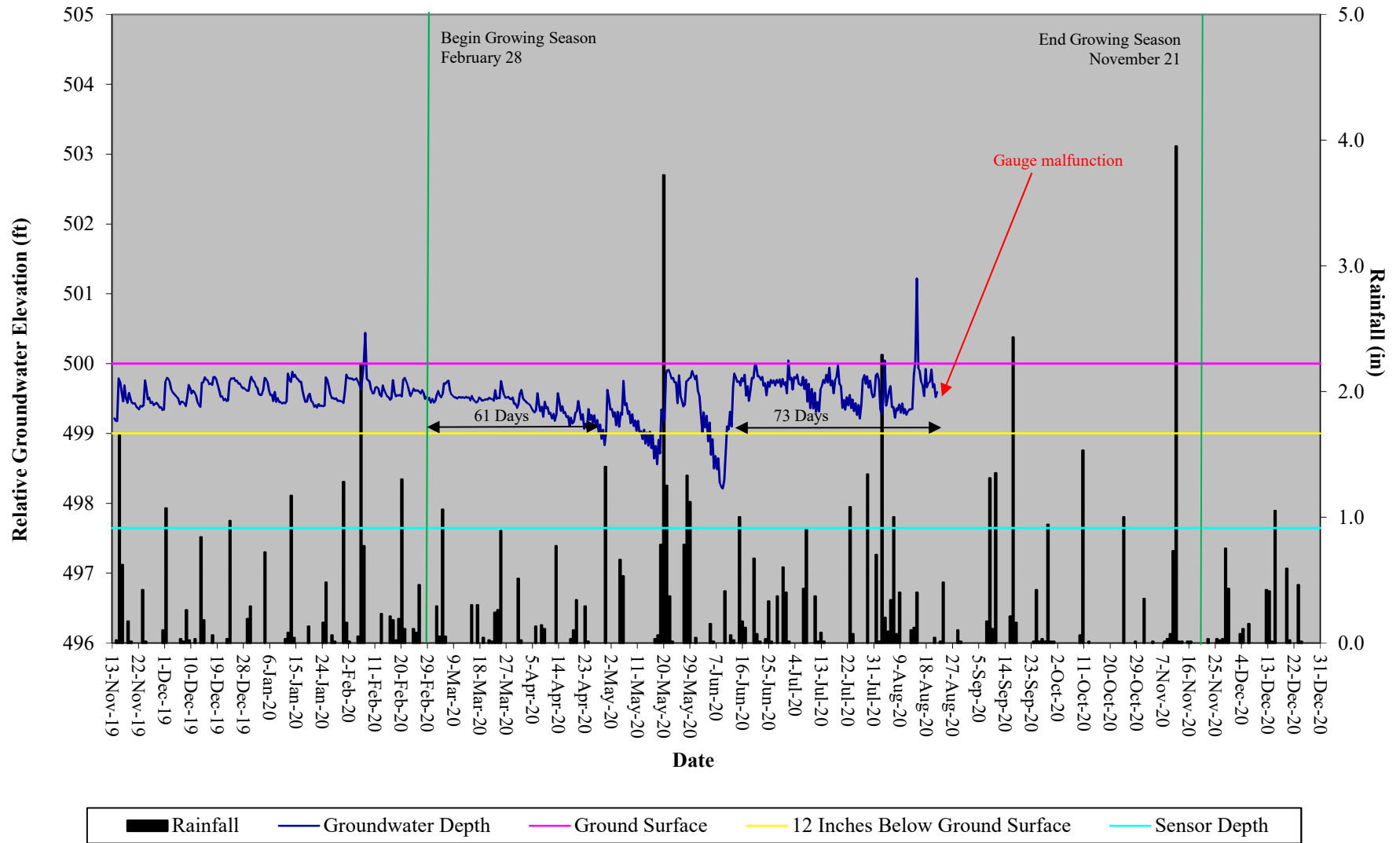
Date of Data Collection	Date of Occurrence	Method	Photo Number
7/15/2016	7/15/2016	On-site automatic gauge	N/A
8/7/2016	8/7/2016	On-site automatic gauge	N/A
10/8/2016	10/8/2016	On-site automatic gauge	N/A
12/21/2016	12/21/2016	On-site automatic gauge	N/A
12/23/2016	12/23/2016	On-site automatic gauge	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
2/7/2020	2/7/2020	On-site automatic gauge	N/A
8/14/2020	8/14/2020	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%)	Yes/73 (27.3%)		
NP2	Riverine Swamp Forest	Yes/98 (36.7%)	Yes/84 (31.5%)	Yes/73 (27.3%)	Yes/71 (26.6%)	Yes/80 (30.0%)		
NP3	Riverine Swamp Forest	Yes/99 (37.1%)	Yes/106 (39.7%)	Yes/106 (39.7%)	Yes/73 (27.3%)	Yes/101 (37.8%)		
NP4	Riverine Swamp Forest	Yes/81 (30.3%)	Yes/105 (39.3%)	Yes/105 (39.3%)	Yes/77 (28.8%)	Yes/176 (65.9%)		
NP5	Riverine Swamp Forest	Yes/64 (24.0%)	Yes/41 (15.4%)	Yes/67 (25.1%)	Yes/62 (23.2%)	Yes/71 (26.6%)		
NP6	Riverine Swamp Forest	Yes/100 (37.5%)	Yes/103 (38.6%)	Yes/106 (39.7%)	Yes/76 (28.5%)	Yes/121 (45.3%)		
NP7	Riverine Swamp Forest	Yes/64 (24.0%)	Yes/77 (28.8%)	Yes/60 (22.5%)	Yes/60 (22.5%)	Yes/71 (26.6%)		
NP8	Riverine Swamp Forest	No/30 (11.2%)	Yes/58 (21.7%)	Yes/36 (13.5%)	Yes/59 (22.1%)	Yes/71 (26.6%)		
NP9	Riverine Swamp Forest	Yes/39 (14.6%)	Yes/59 (22.1%)	Yes/35 (13.1%)	Yes/61 (22.8%)	Yes/101 (37.8%)		
NPII 1	Headwater Forest	Yes/65 (24.3%)	Yes/77 (28.8%)	Yes/66 (24.7%)	Yes/64 (24.0%)	Yes/55 (20.6%)		
NPII 2	Headwater Forest	Yes/81 (30.3%)	Yes/78 (29.2%)	Yes/65 (24.3%)	Yes/33 (12.4%)	Yes/41 (15.4%)		
NPII 3	Headwater Forest	Yes/50 (18.7%)	Yes/77 (28.8%)	Yes/51 (19.1%)	Yes/39 (14.6%)	Yes/45 (16.9%)		
NPII 4	Headwater Forest	Yes/64 (24.0%)	Yes/65 (24.3%)	Yes/65 (24.3%)	Yes/59 (22.1%)	Yes/60 (22.5%)		
NPII 5	Headwater Forest	No/22 (8.2%)	Yes/35 (13.1%)	Yes/36 (13.5%)	Yes/58 (21.7%)	Yes/51 (19.1%)		
NPII 6	Headwater Forest	No/6 (2.2%)	No/7 (2.6%)	Yes/33 (12.4%)	No/22 (8.2%)	Yes/37 (13.9%)		
NPII 7	Headwater Forest	Yes/29 (10.9%)	Yes/53 (19.9%)	Yes/35 (13.1%)	Yes/57 (21.3%)	Yes/37 (13.9%)		
NPII 8	Headwater Forest	No/12 (4.5%)	No/7 (2.6%)	No/18 (6.7%)	No/14 (5.2%)	No/22 (8.2%)		
NPII 9	Headwater Forest	No/18 (6.7%)	Yes/35 (13.1%)	Yes/37 (13.9%)	Yes/50 (18.7%)	Yes/44 (16.5%)		
NPII 10	Headwater Forest	No/18 (6.7%)	Yes/33 (12.4%)	Yes/35 (13.1%)	Yes/33 (12.4%)	Yes/38 (14.2%)		
NPII 11	Headwater Forest	No/9 (3.4%)	Yes/31 (11.6%)	Yes/32 (12.0%)	No/22 (8.2%)	Yes/37 (13.9%)		
NPII 12	Headwater Forest	Yes/27 (10.1%)	Yes/58 (21.7%)	Yes/35 (13.1%)	Yes/33 (12.4%)	Yes/37 (13.9%)		
NPII 13	Headwater Forest	Yes/64 (24.0%)	Yes/ 81 (30.3%)	Yes/76 (28.5%)	Yes/70 (26.2%)	Yes/95 (35.6%)		
NPII 14	Headwater Forest			Yes/36 (13.5%)	Yes/58 (21.7%)	Yes/45 (16.9%)		
NPII 15	Headwater Forest			Yes/34 (12.7%)	Yes/24 (9.0%)	Yes/44 (16.5%)		
NPII 16	Headwater Forest			Yes/53 (19.9%)	Yes/59 (22.1%)	Yes/50 (18.7%)		
NPII 17	Headwater Forest				Yes/24 (9.0%)	Yes/44 (16.5%)		
NPC1	Non-credited Creation Area	11 (4.1%)	38 (14.2%)	35 (13.1%)	18 (6.7%)	24 (9.0%)		
NPC2	Non-credited Creation Area	24 (9.0%)	61 (22.8%)	71 (26.6%)	61 (22.8%)	59 (22.1%)		

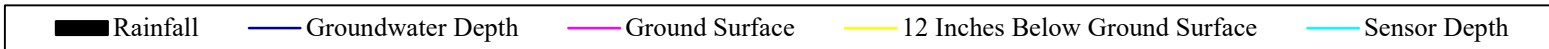
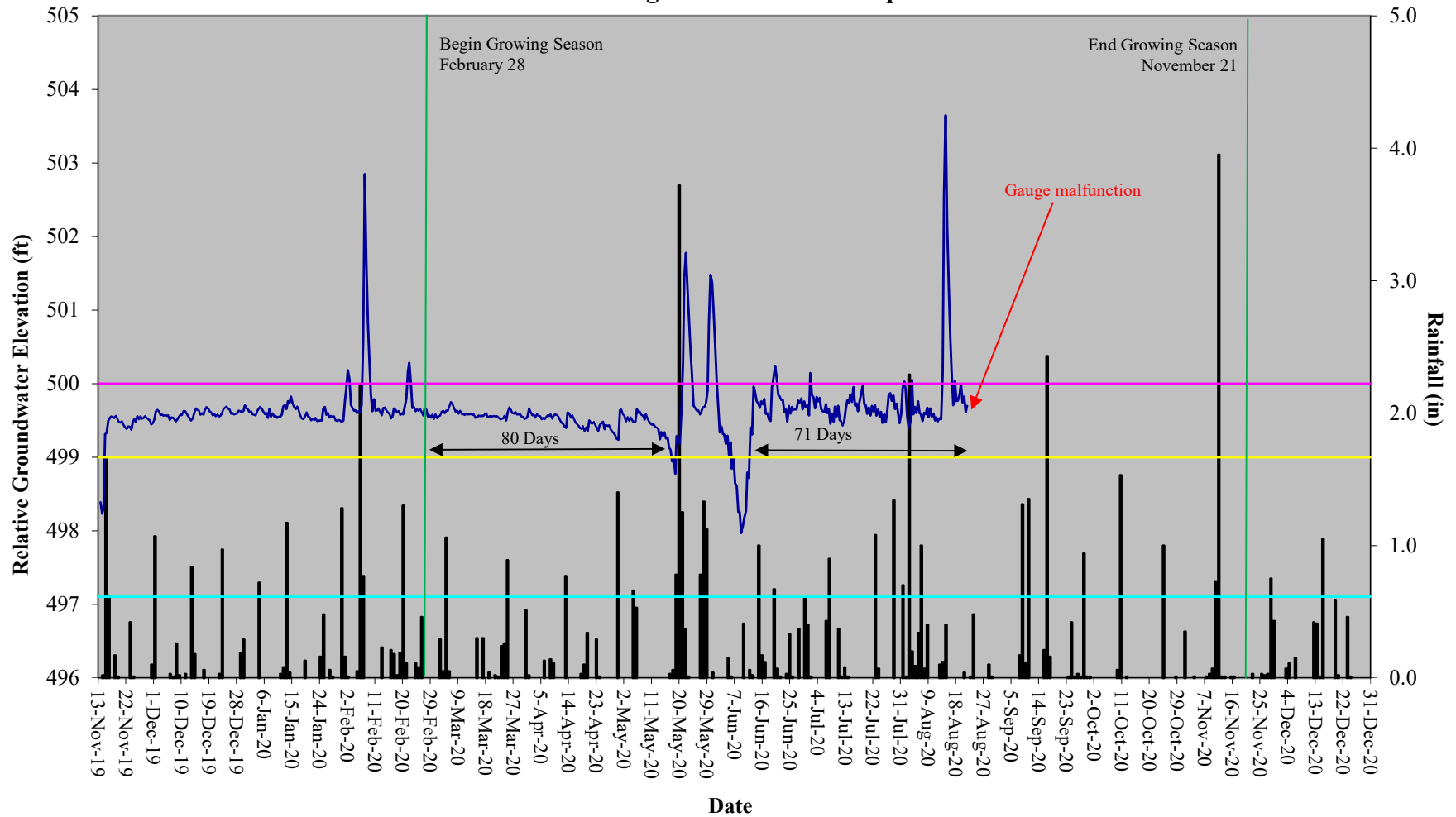
**Norman's Pasture Wetland Restoration Site
30-70 Percentile Graph
WETS Station Name: Clinton, NC**



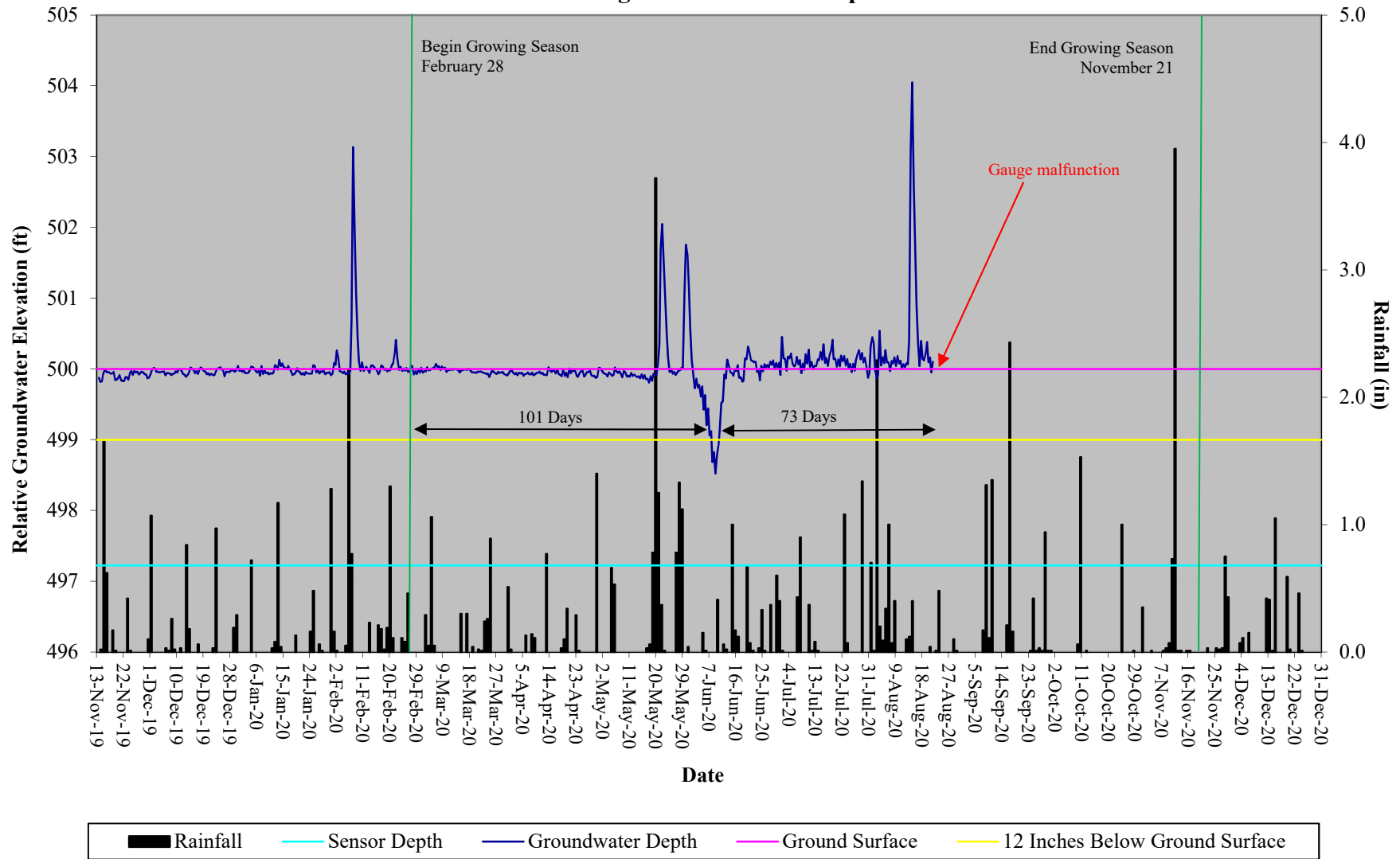
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 1 - Headwater Forest



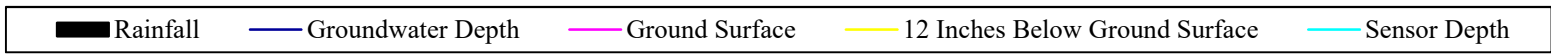
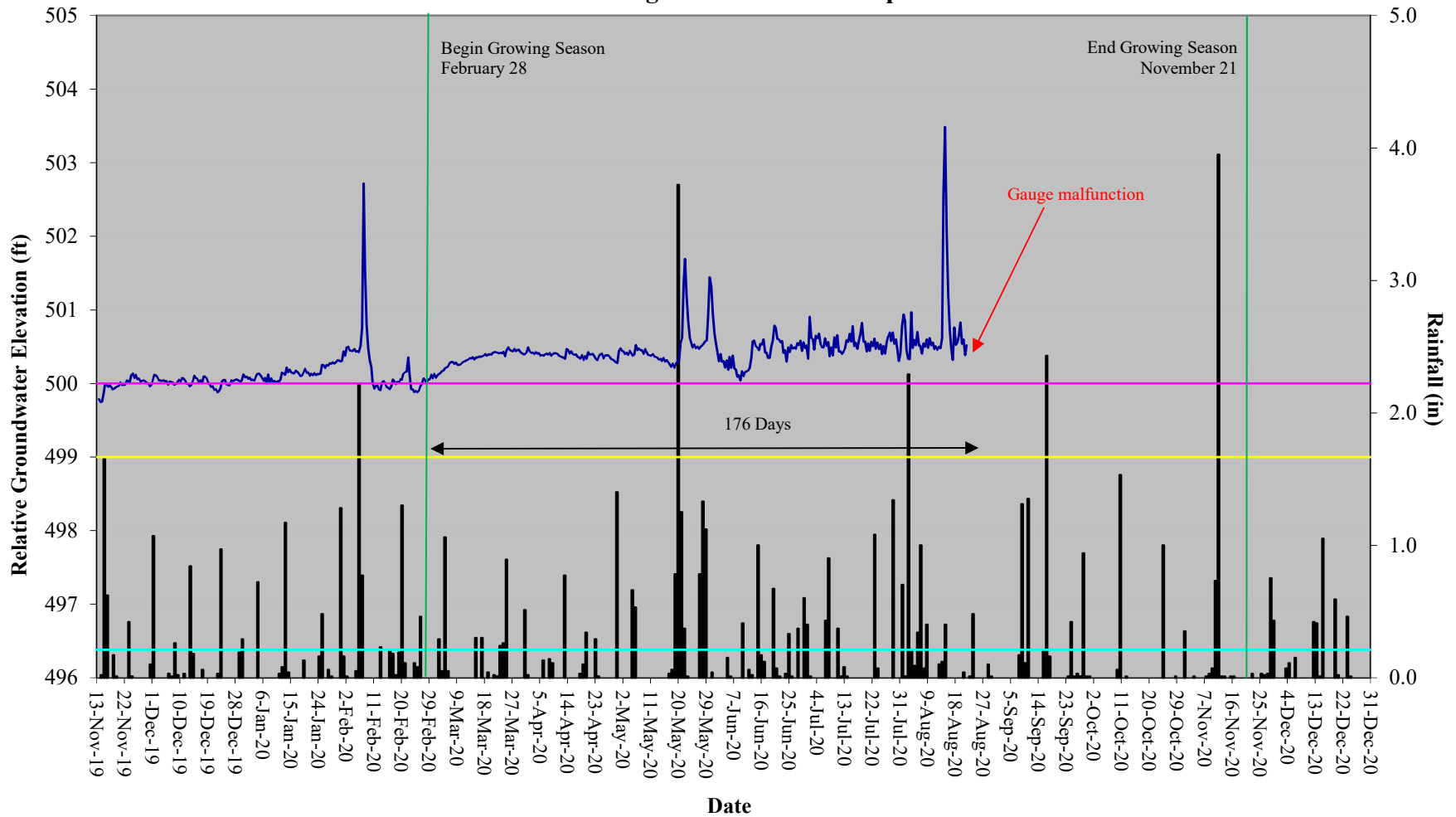
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 2 - Riverine Swamp Forest



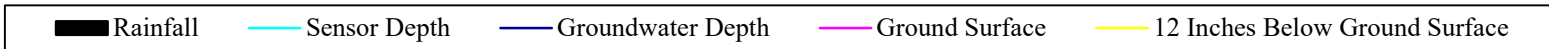
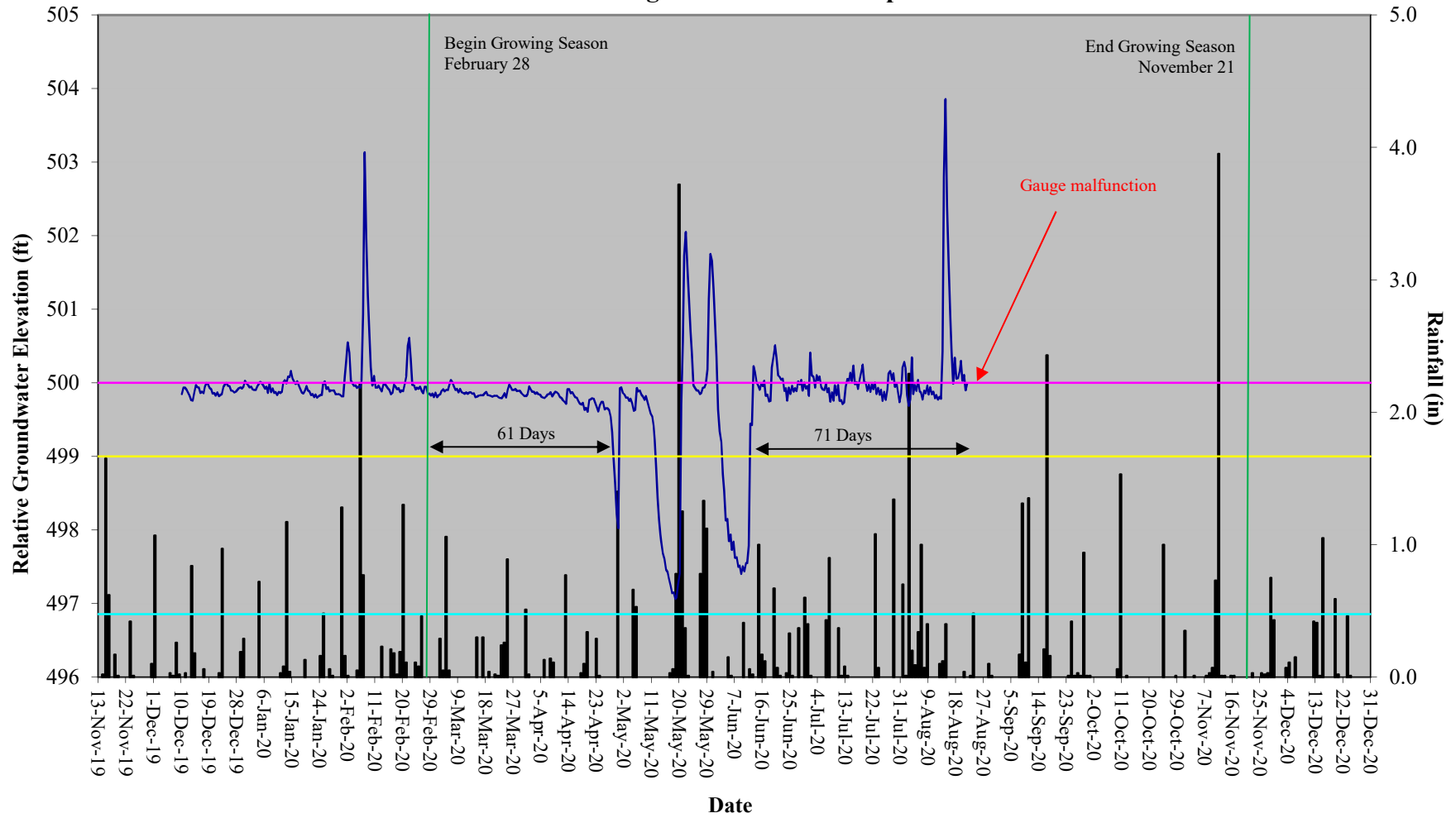
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 3 - Riverine Swamp Forest



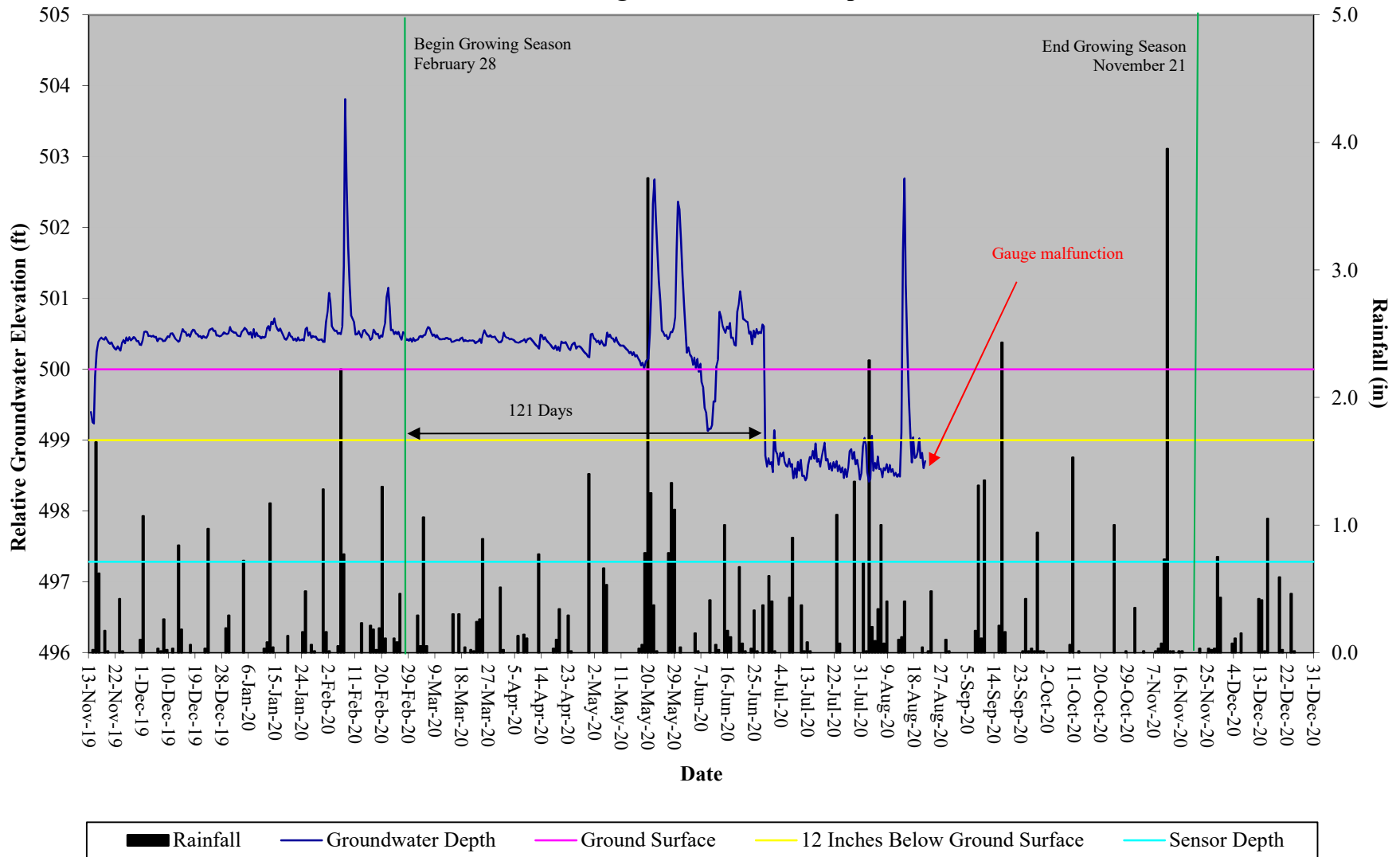
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 4 - Riverine Swamp Forest



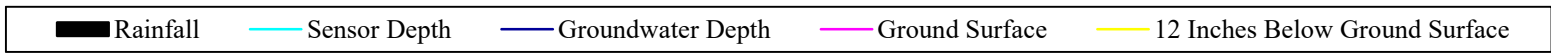
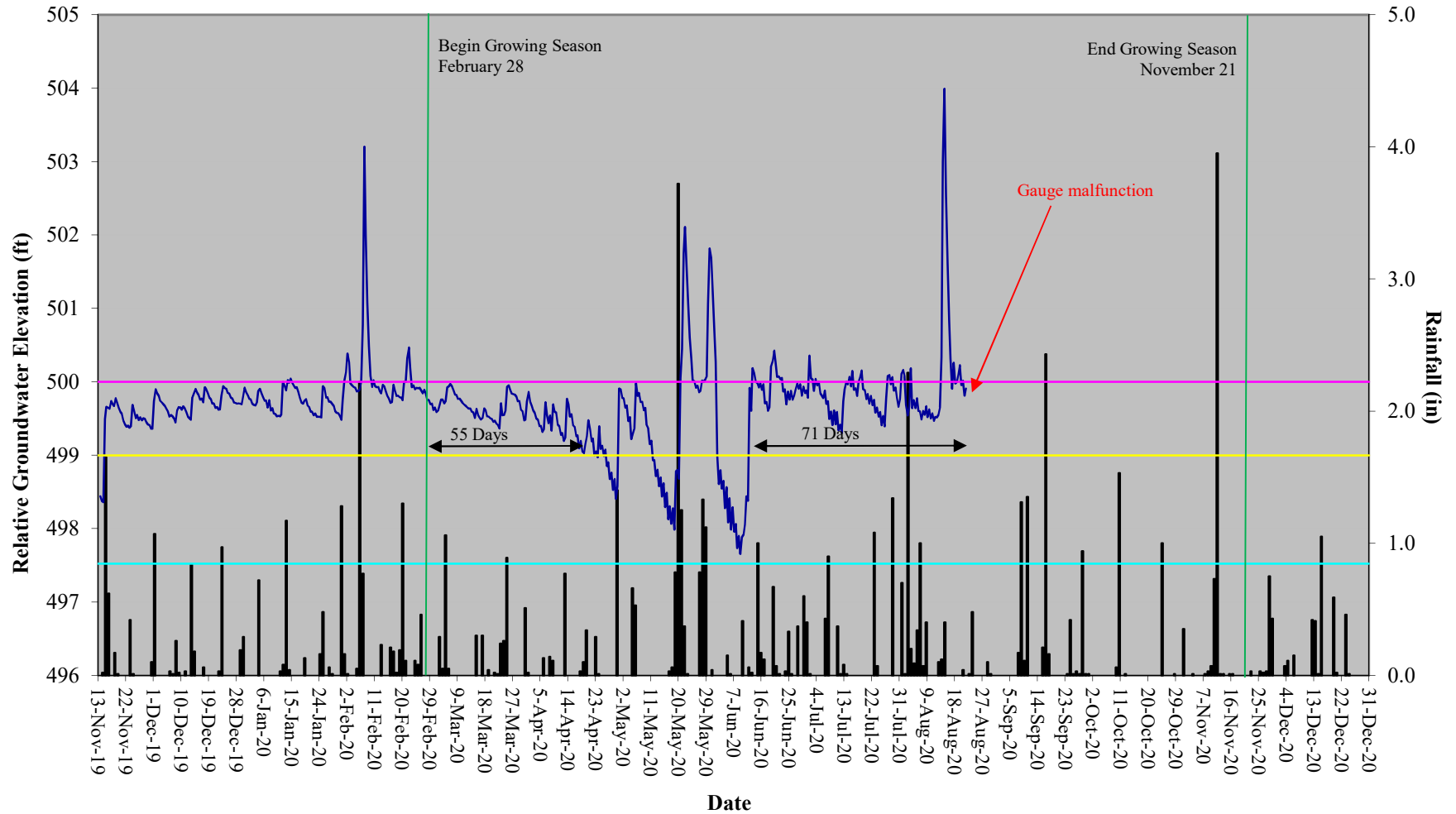
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 5 - Riverine Swamp Forest



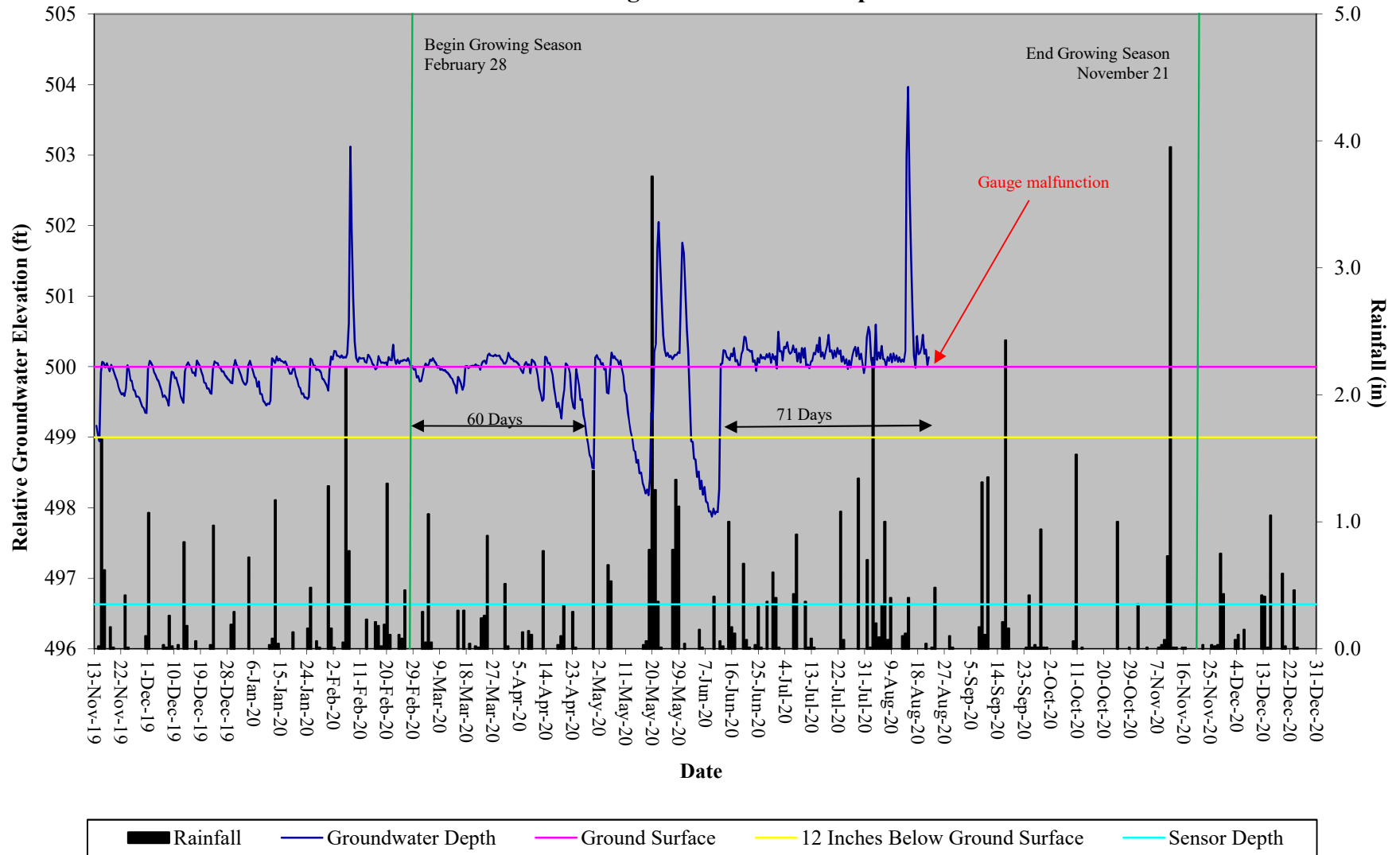
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 6 - Riverine Swamp Forest



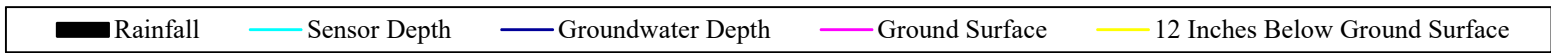
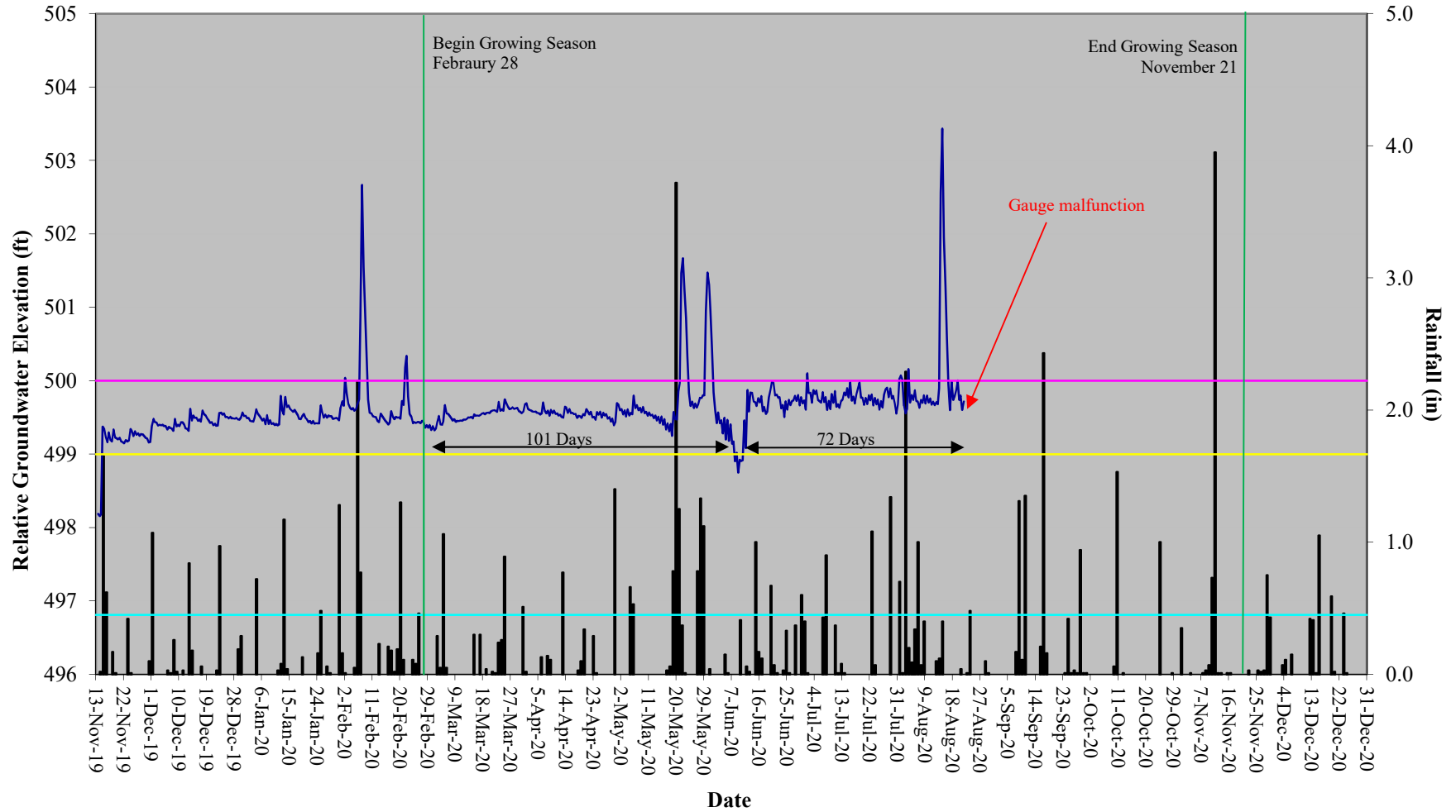
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 7 - Riverine Swamp Forest



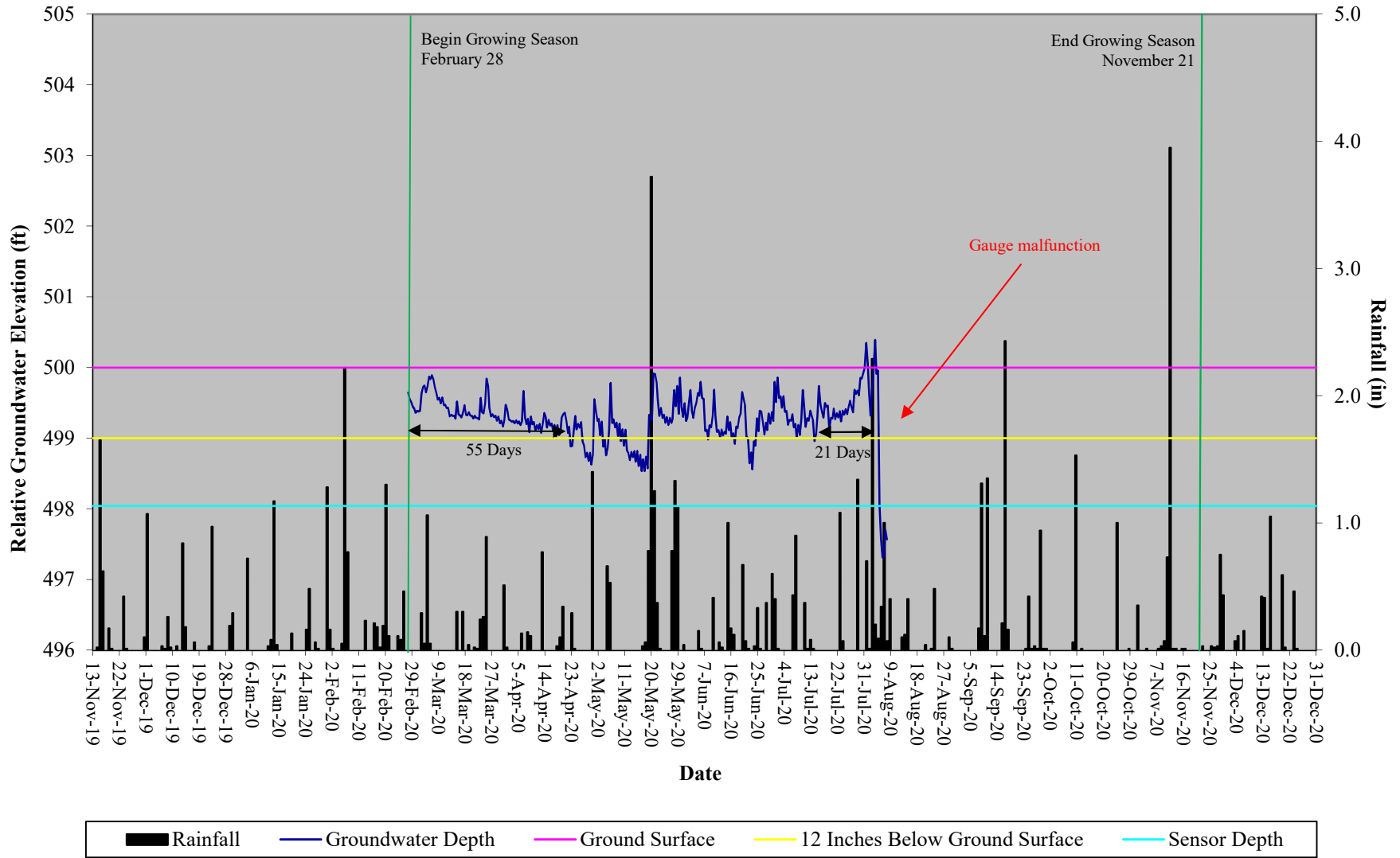
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 8 - Riverine Swamp Forest



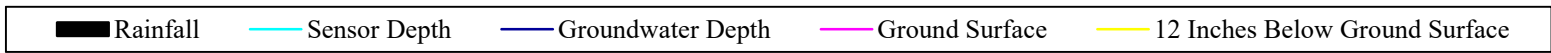
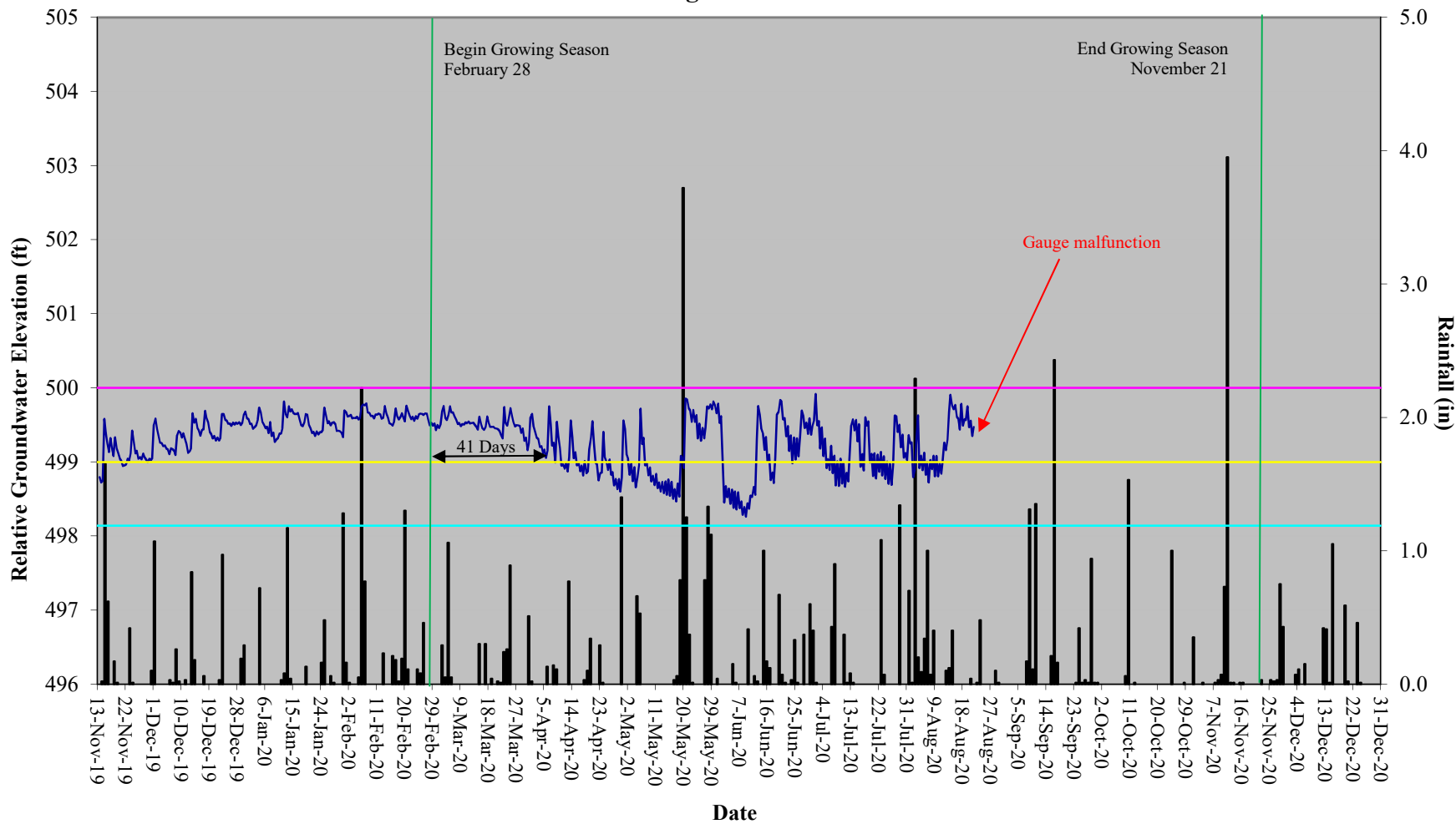
Norman's Pasture Restoration Site Hydrograph Wetland Gauge 9 - Riverine Swamp Forest



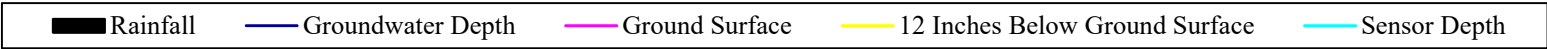
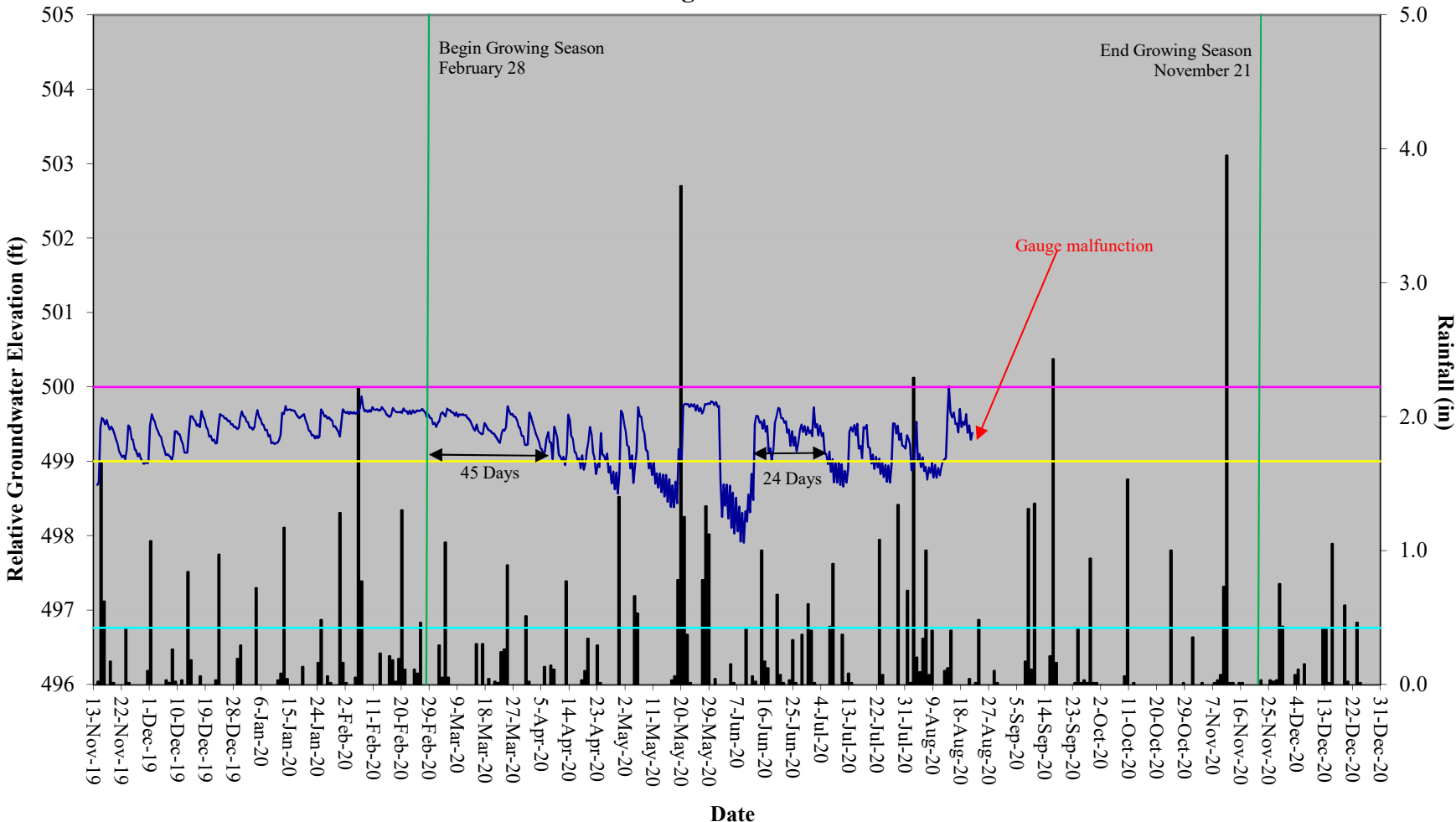
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 1 - Headwater Forest



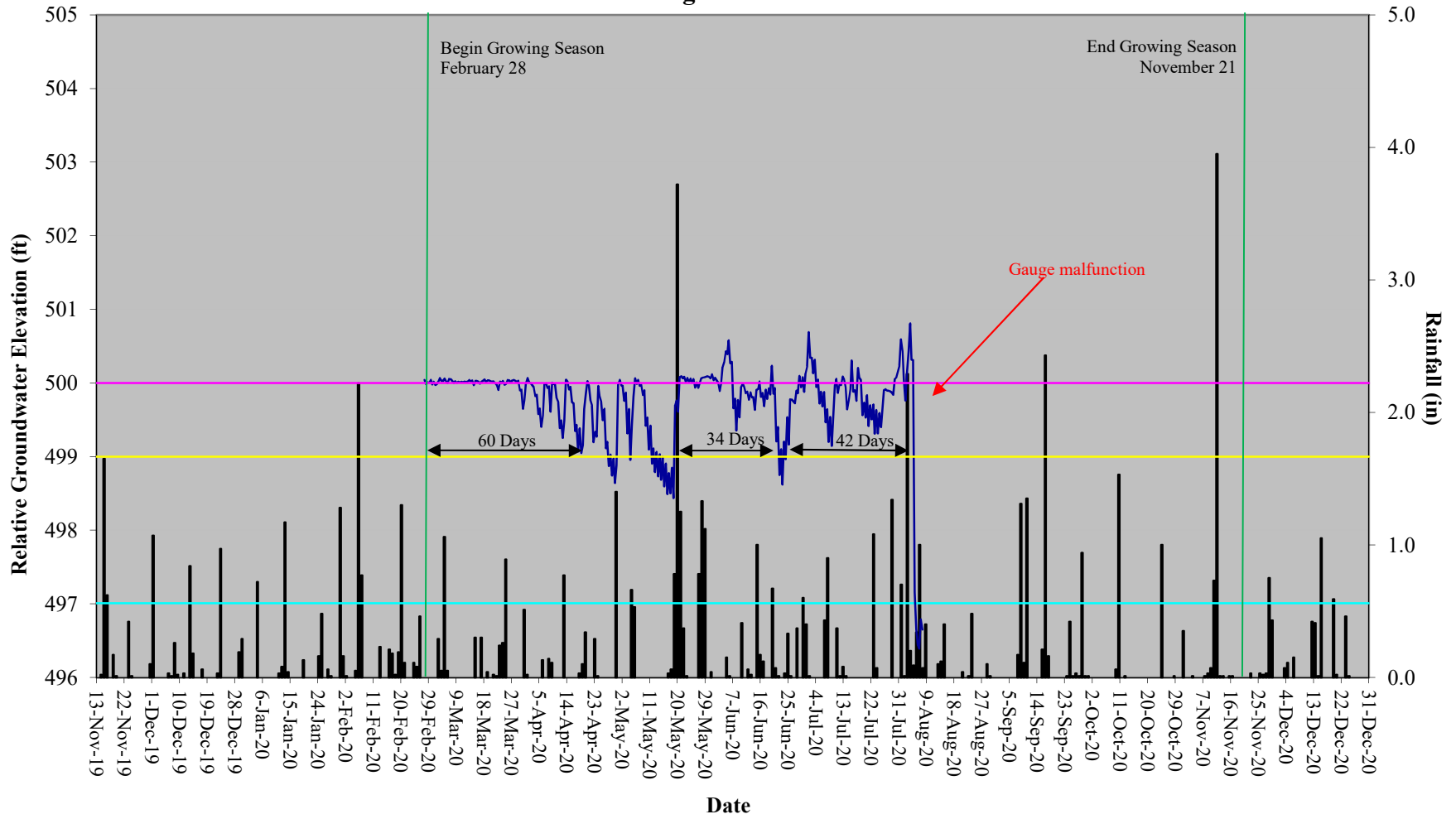
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 2 - Headwater Forest



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

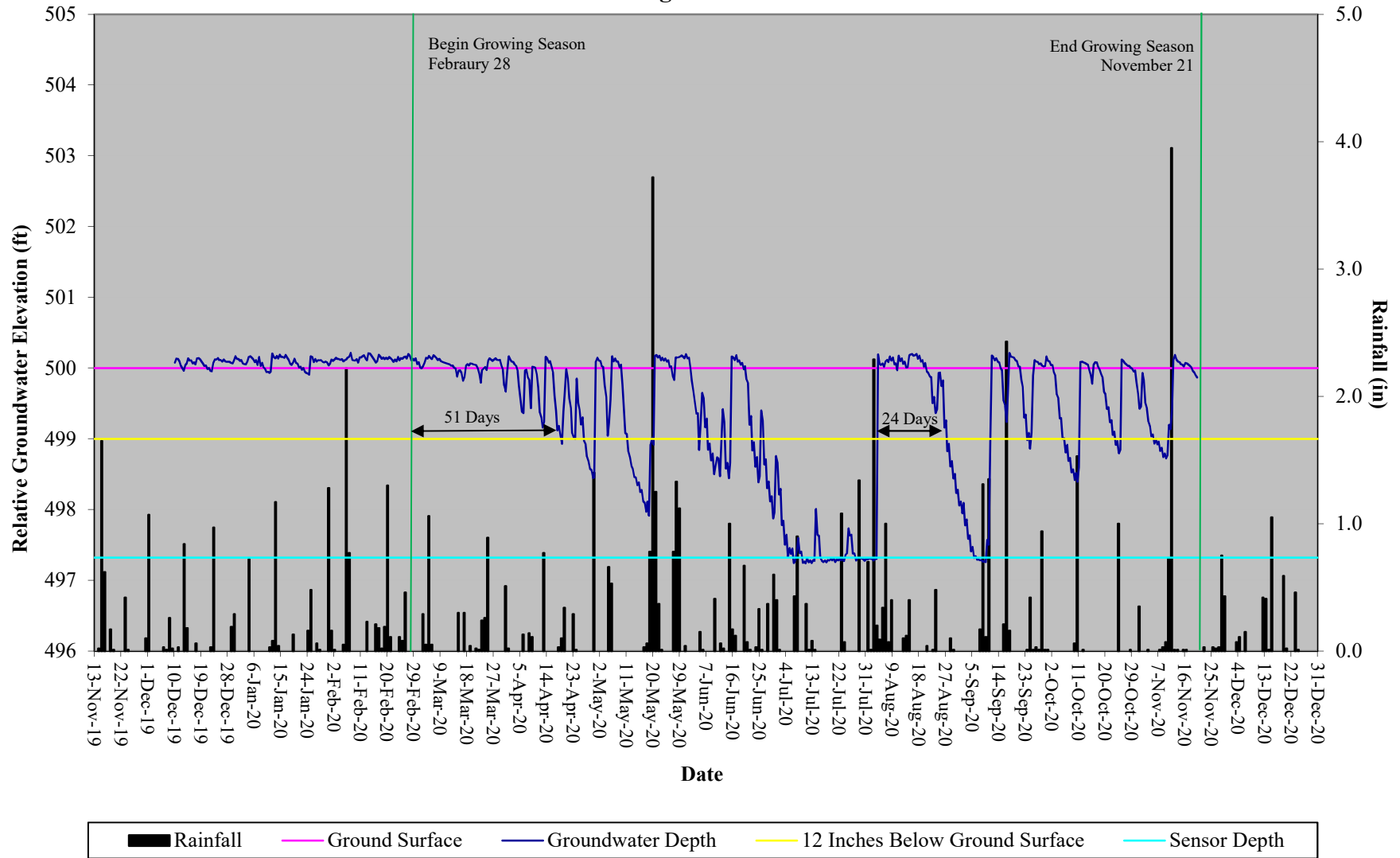


Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 4 - Headwater Forest

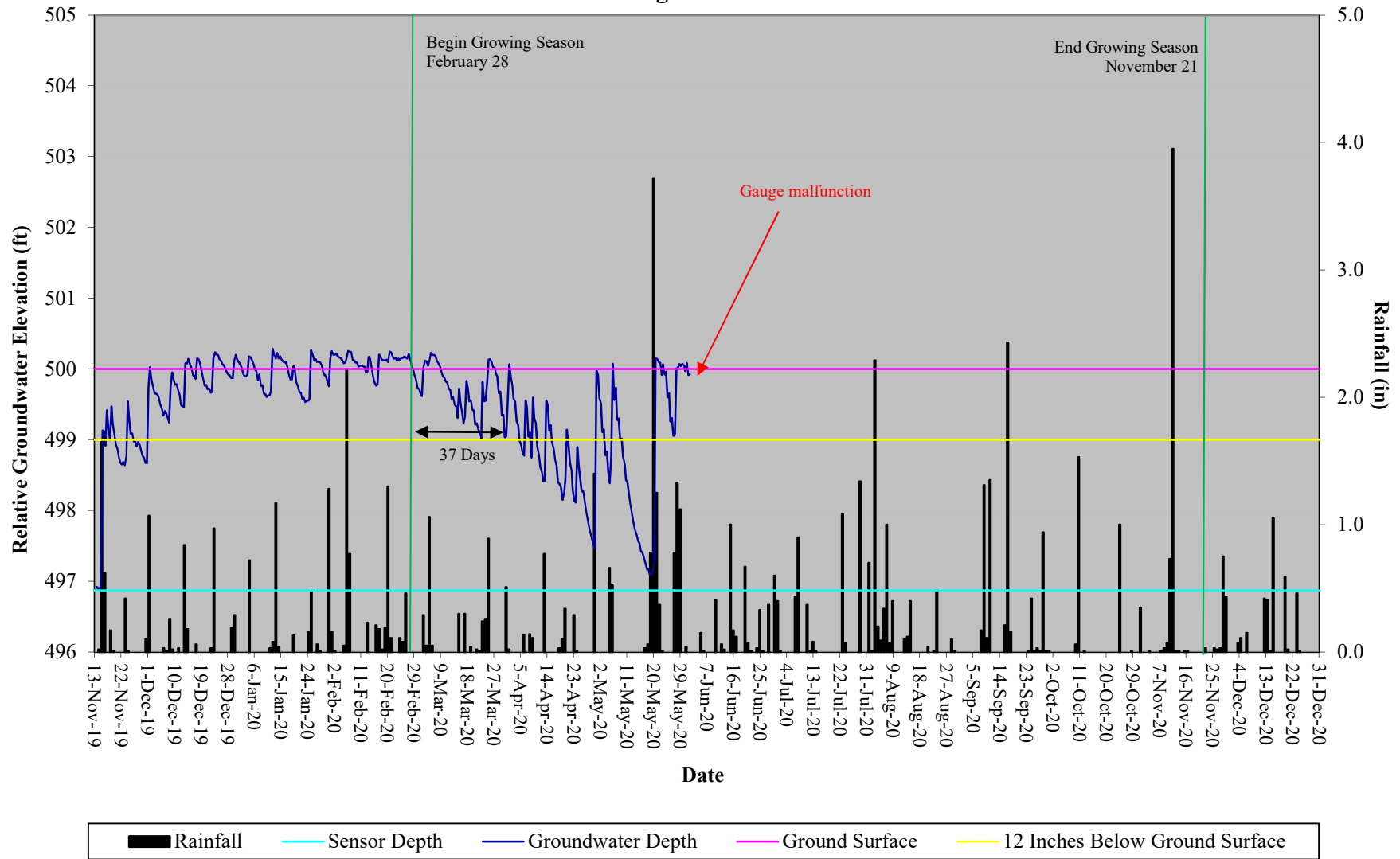


- Rainfall
- Sensor Depth
- Groundwater Depth
- Ground Surface
- 12 Inches Below Ground Surface

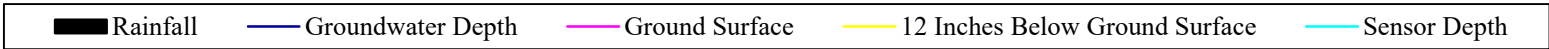
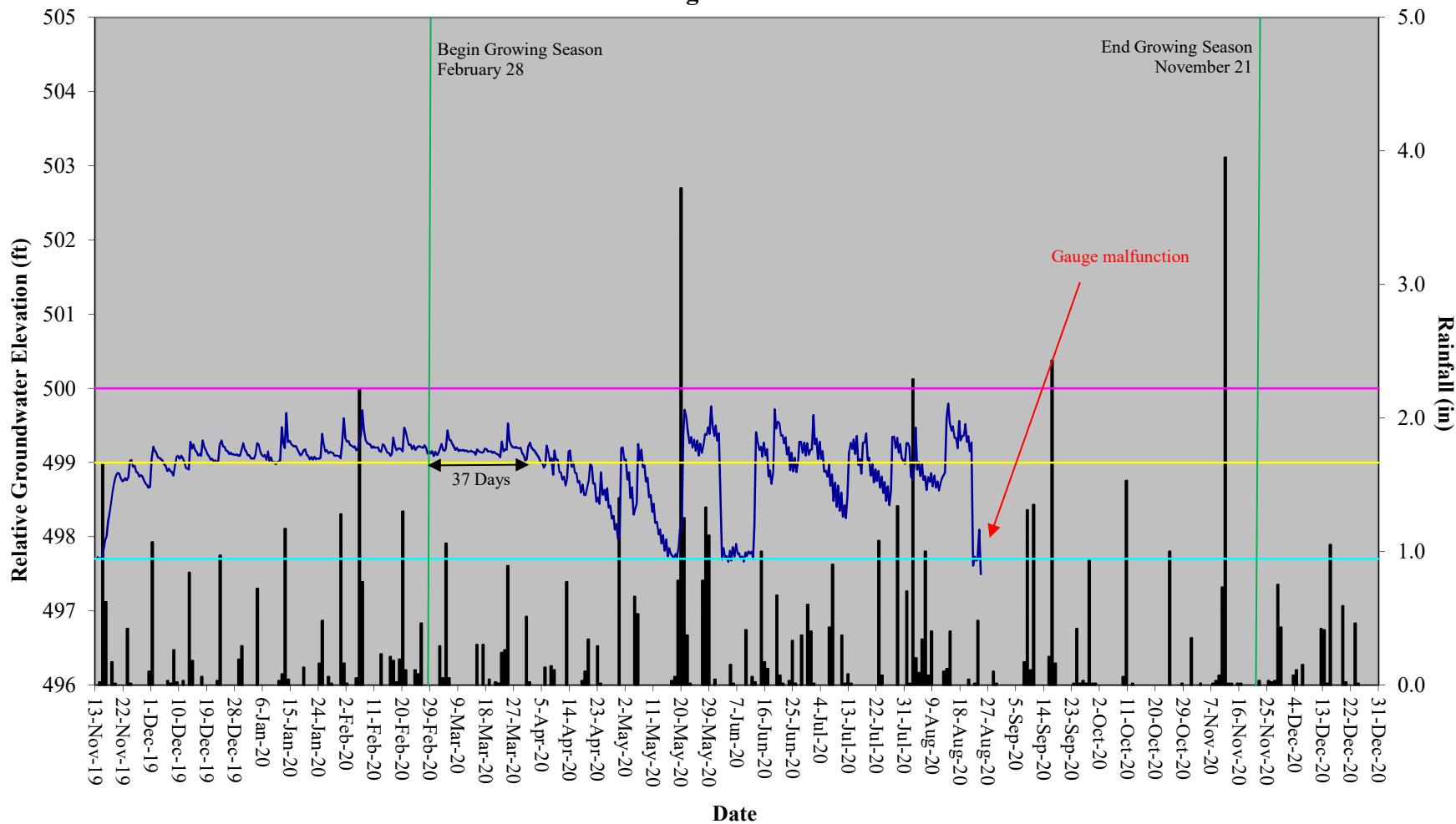
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 5 - Headwater Forest



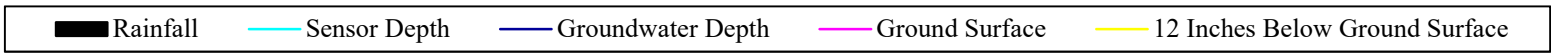
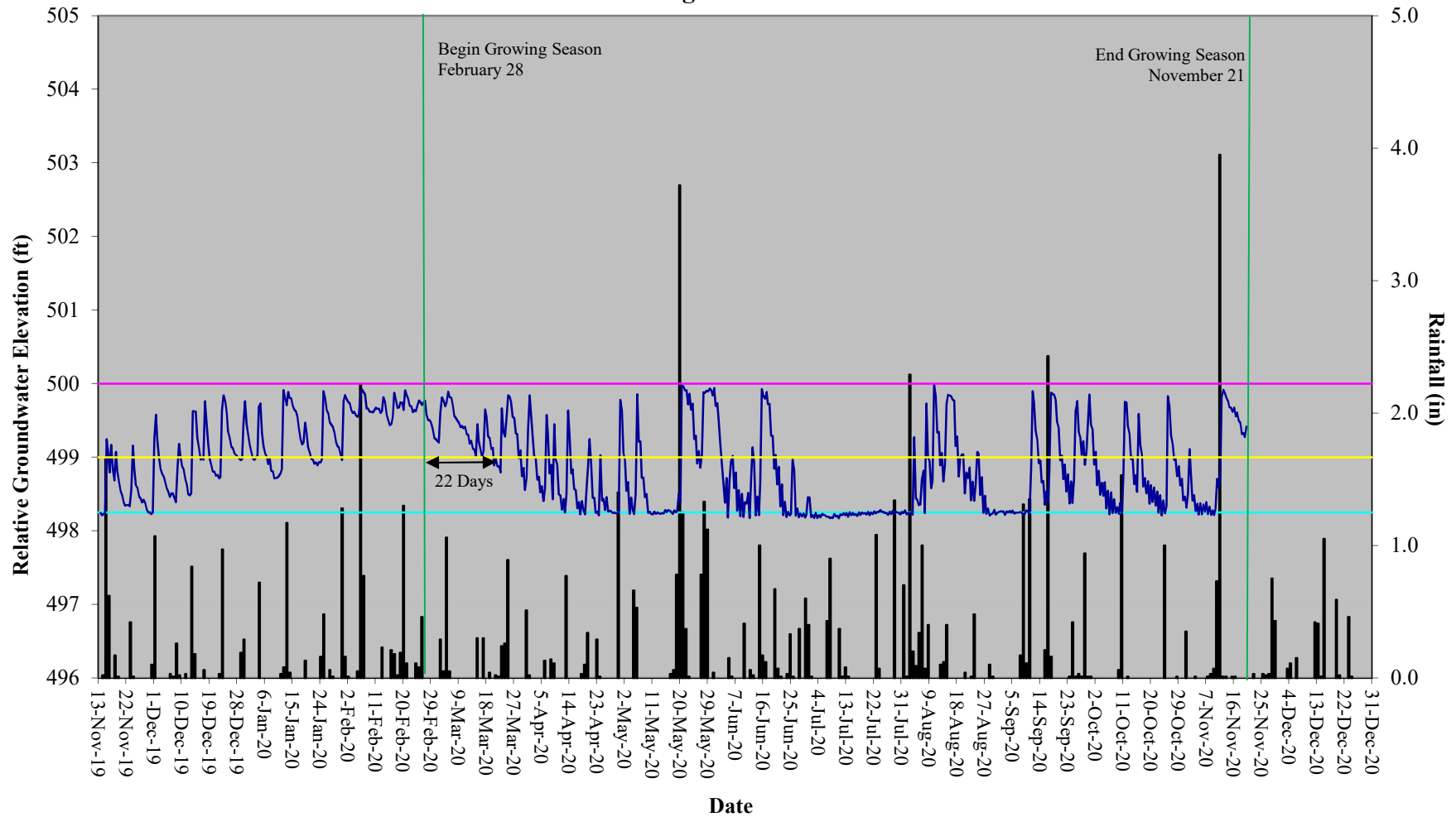
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 6 - Headwater Forest



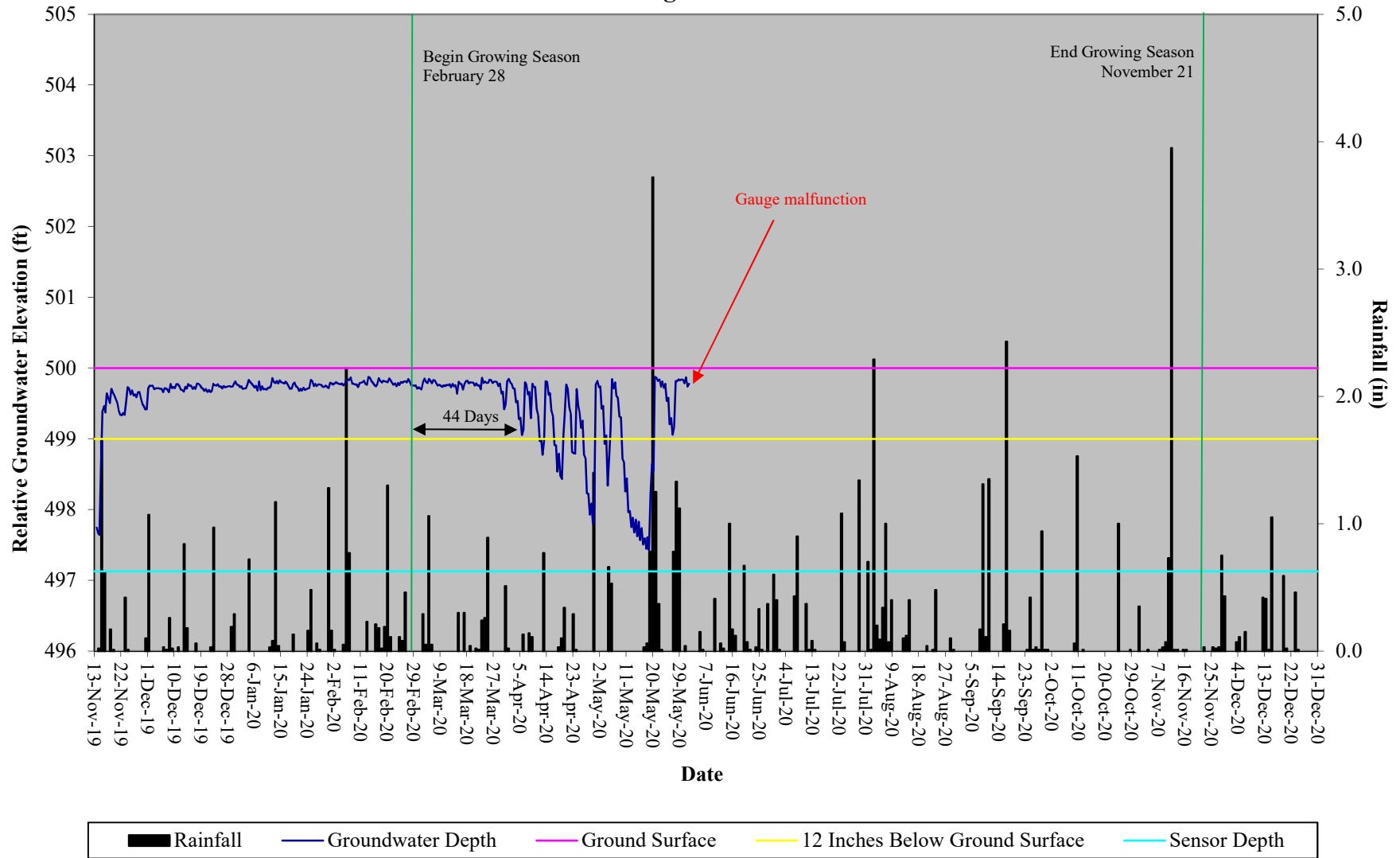
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 7 - Headwater Forest



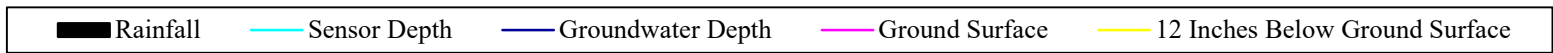
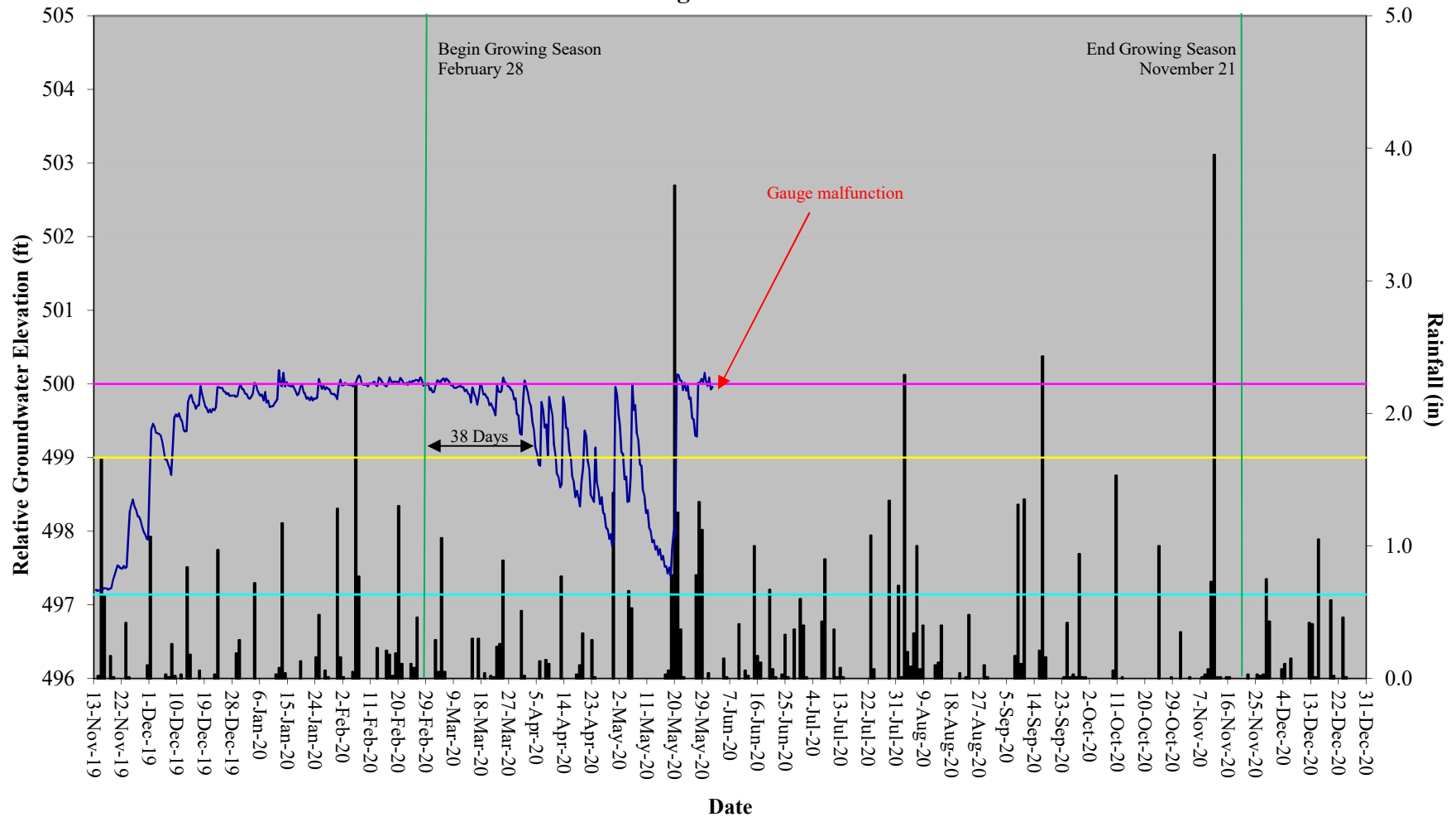
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 8 - Headwater Forest



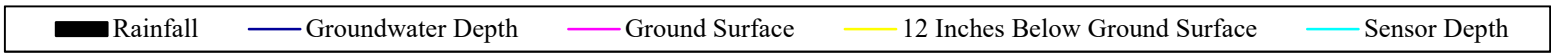
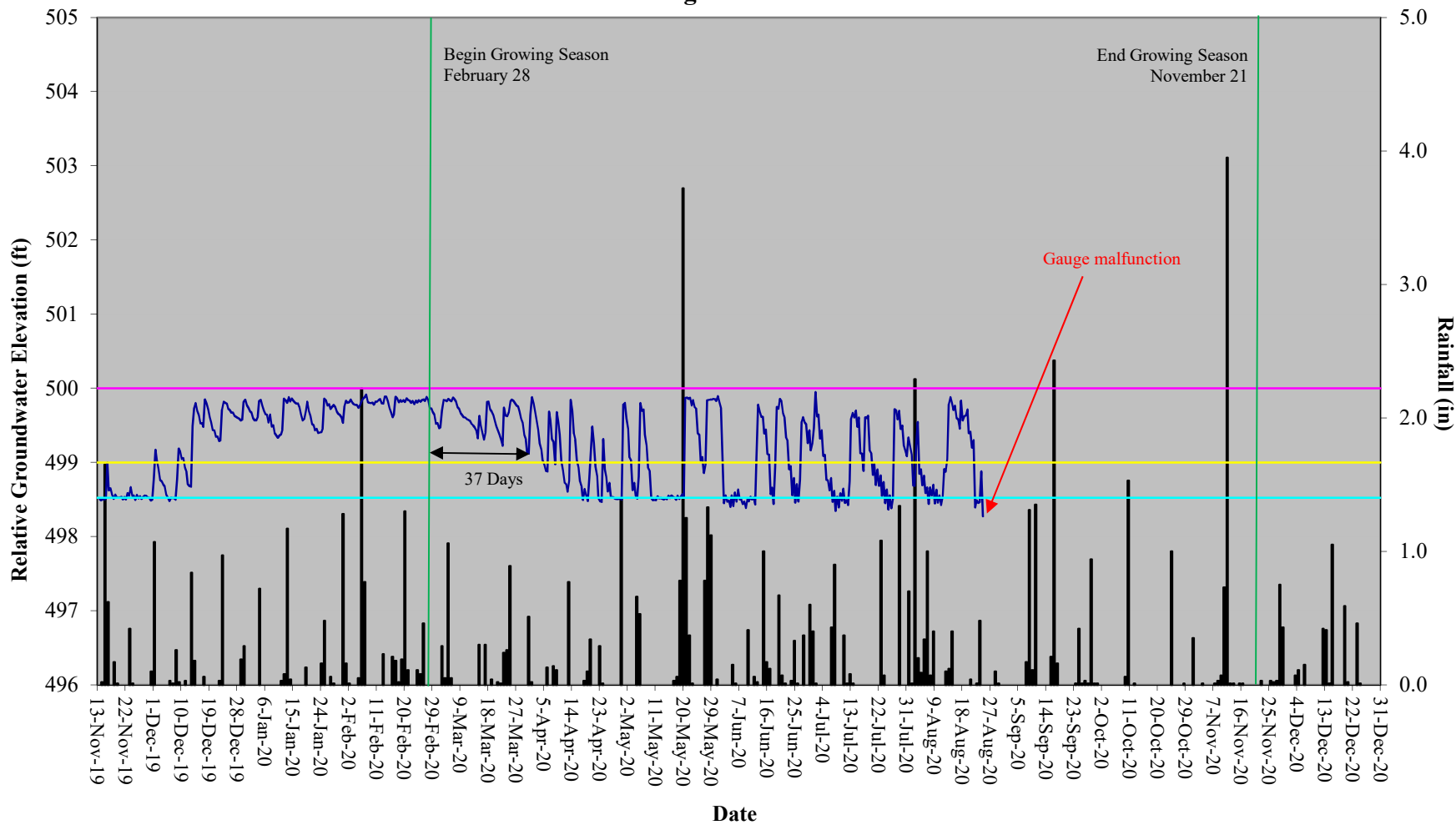
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 9 - Headwater Forest



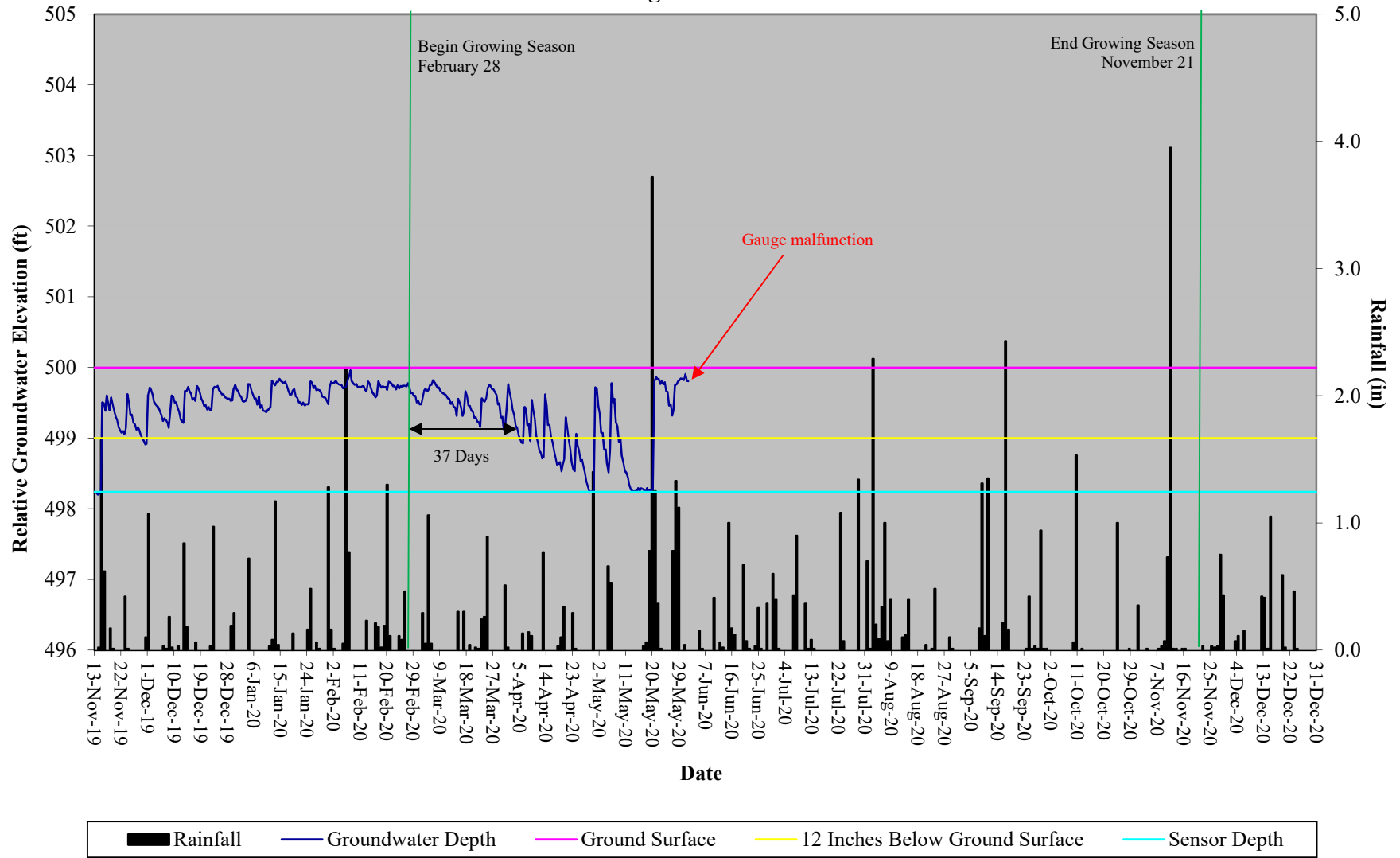
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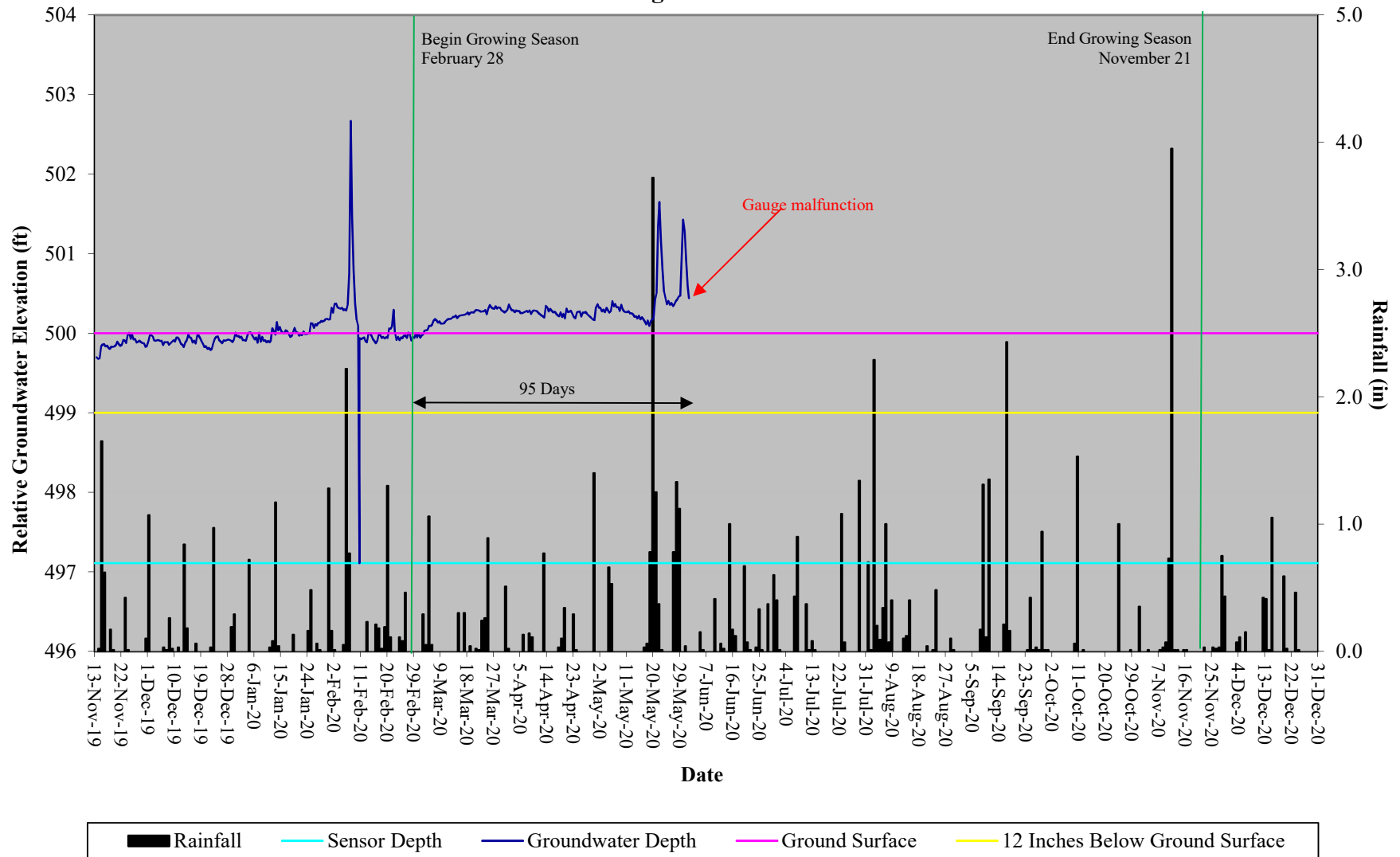
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 11 - Headwater Forest



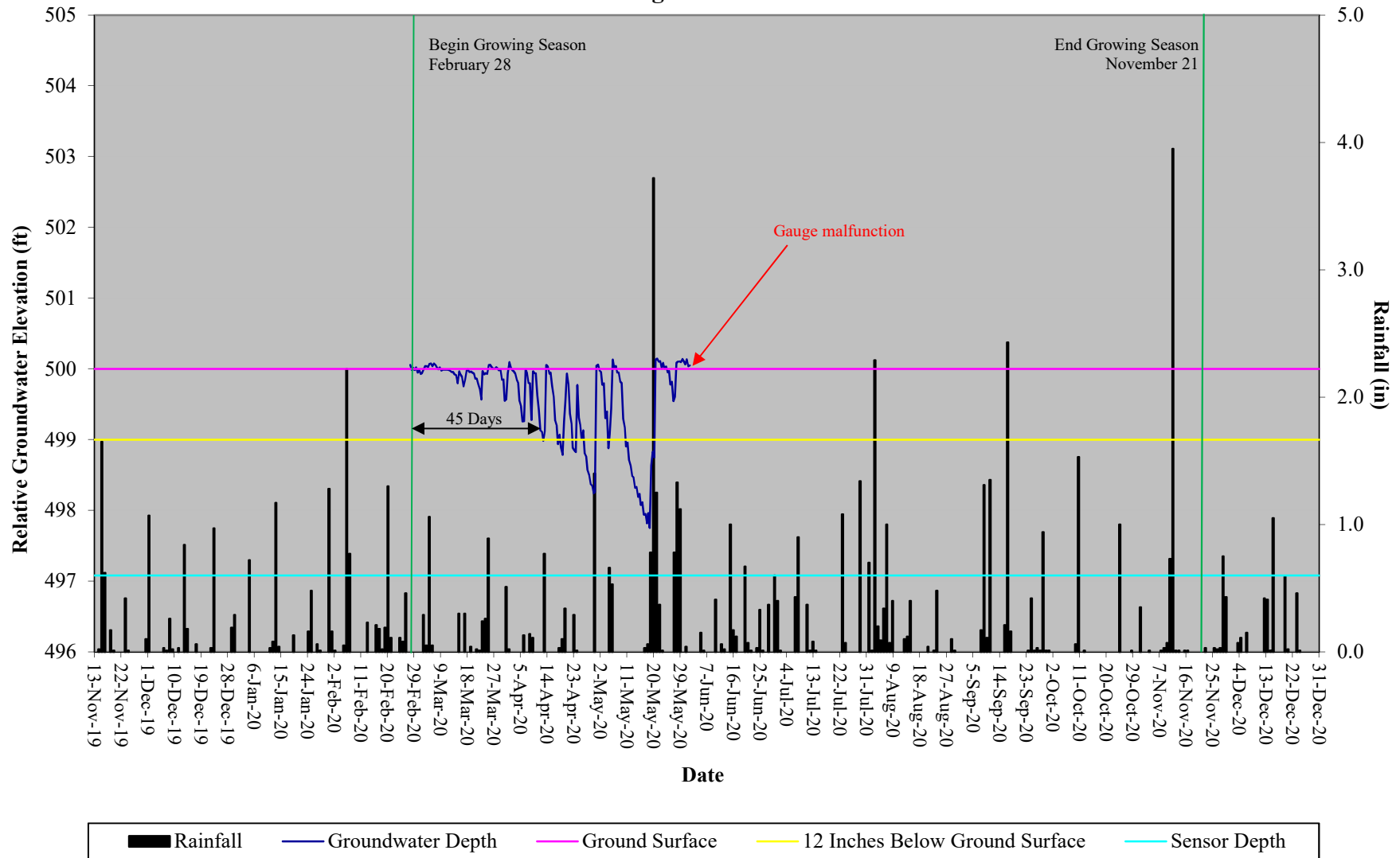
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 12 - Headwater Forest



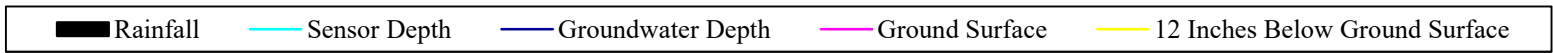
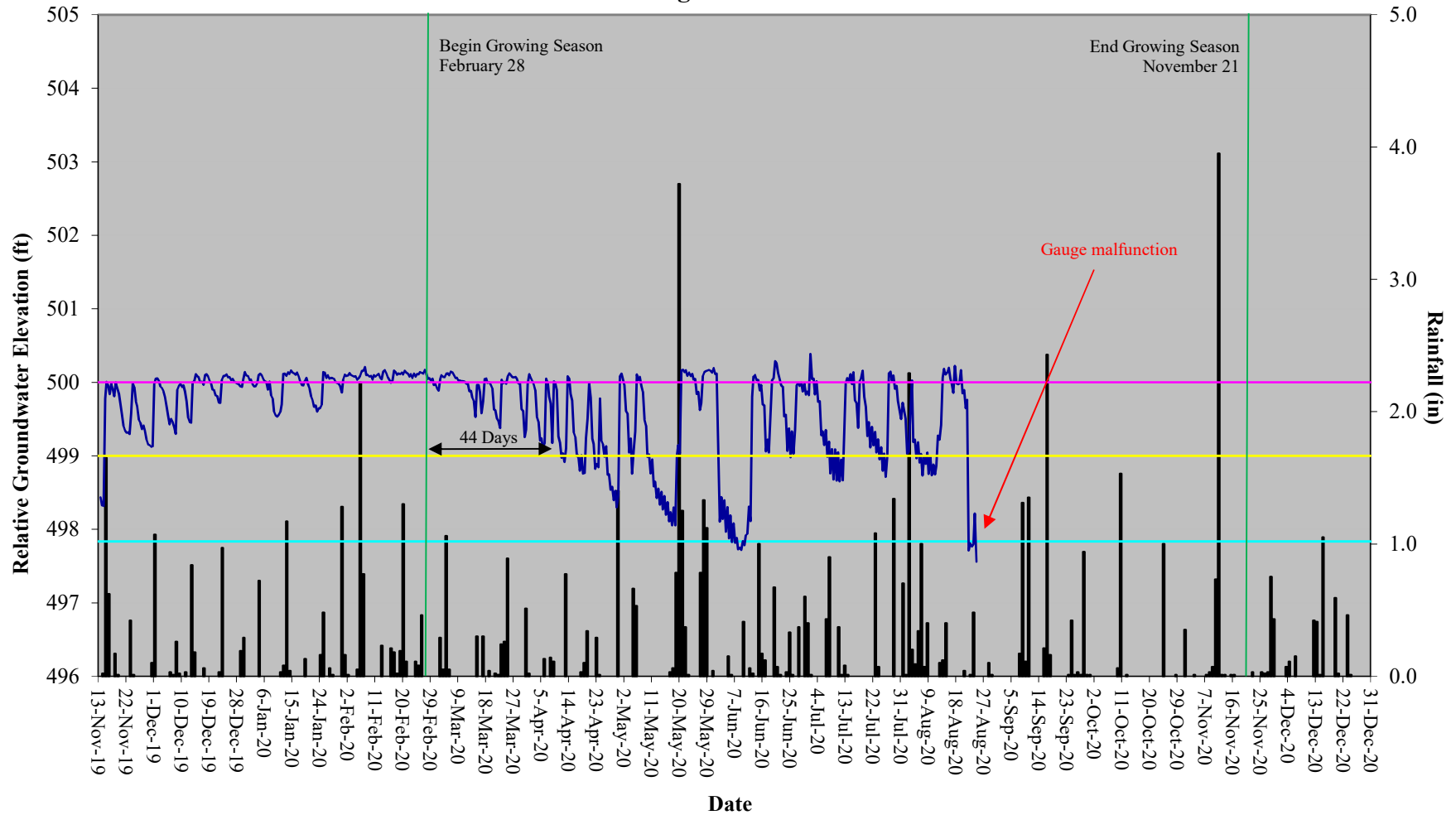
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 13 - Headwater Forest



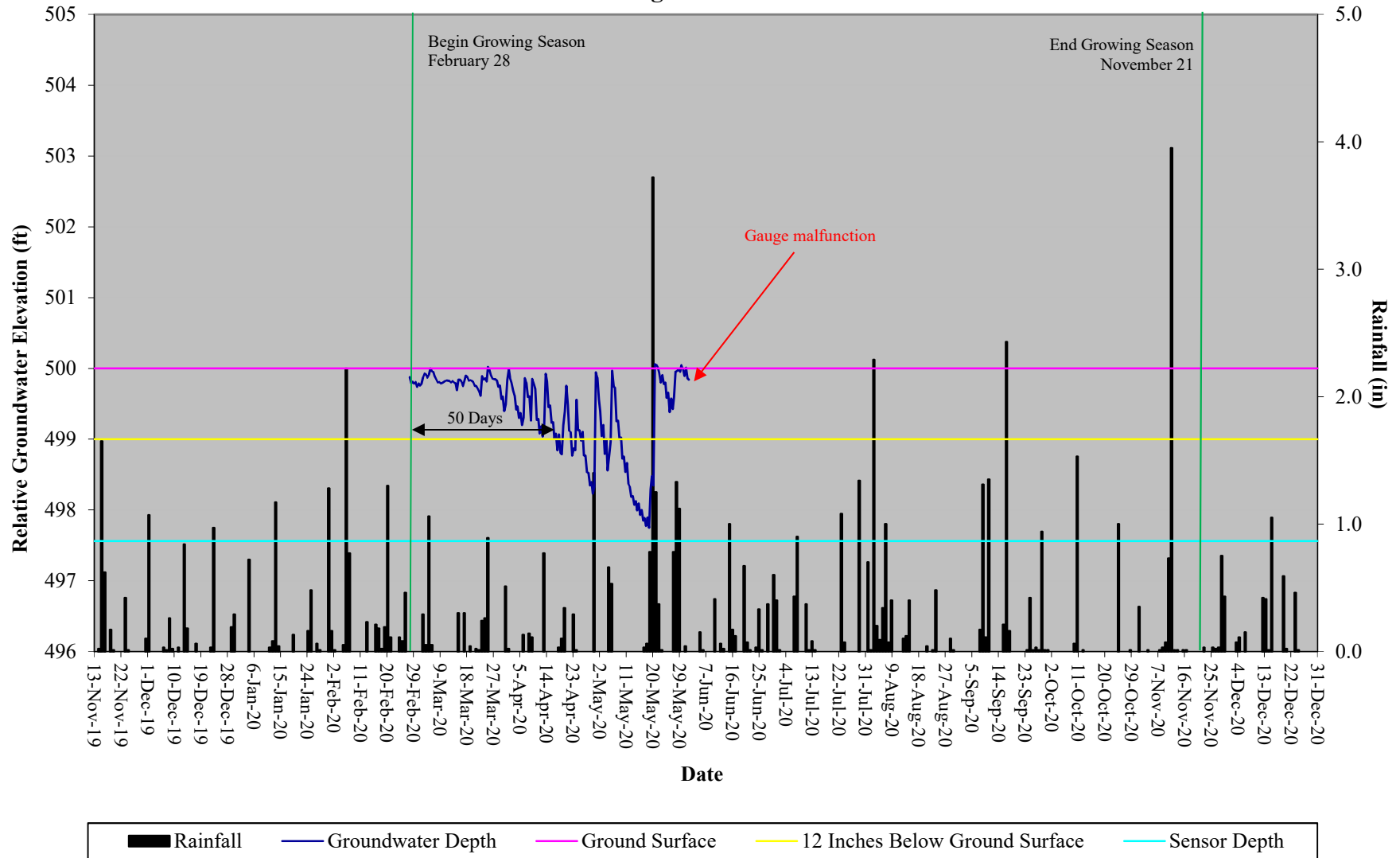
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 14 - Headwater Forest



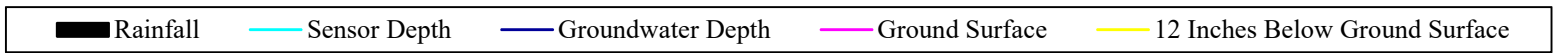
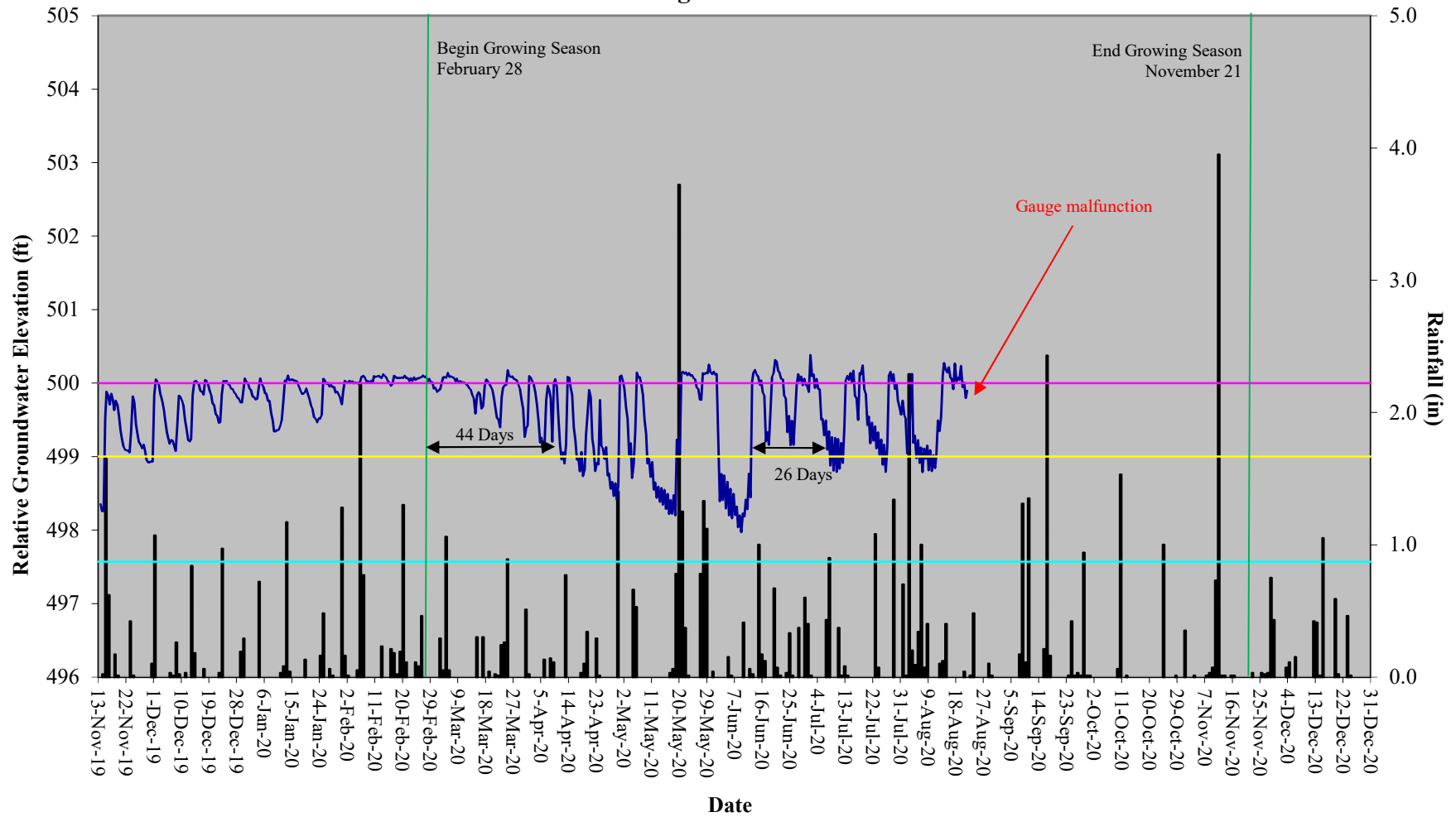
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 15 - Headwater Forest



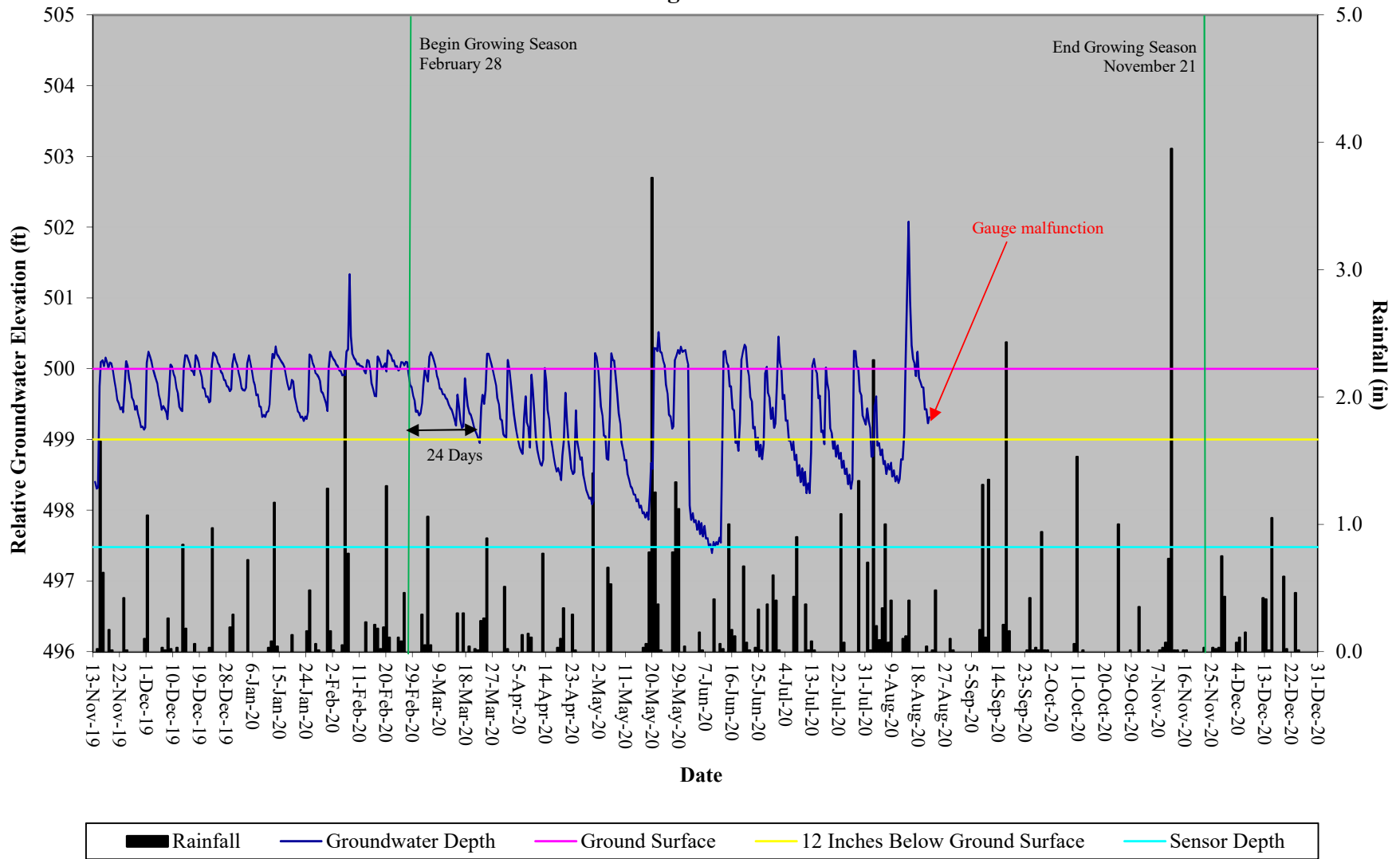
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 16 - Headwater Forest



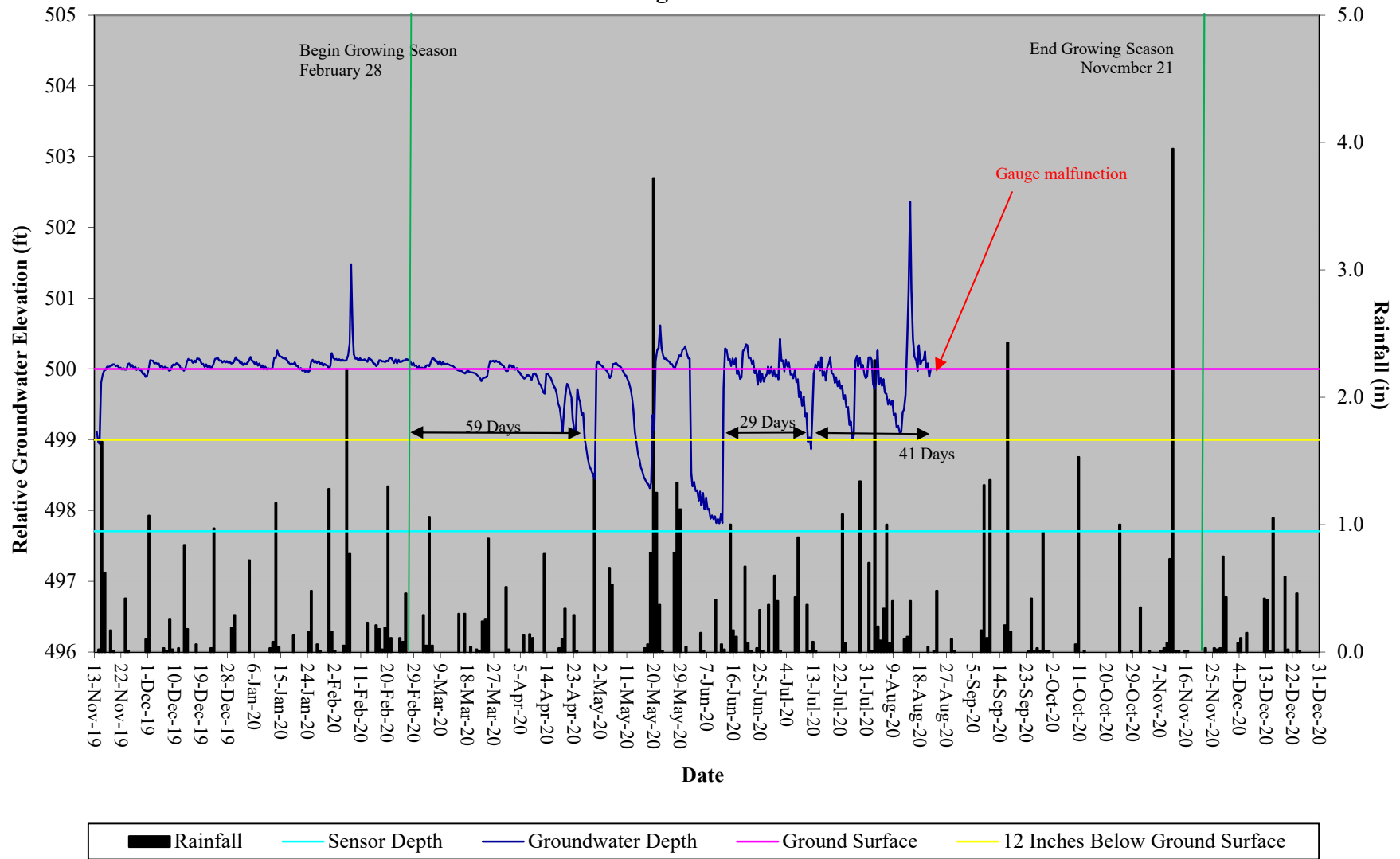
Norman's Pasture II Restoration Site Hydrograph Wetland Gauge 17 - Headwater Forest



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



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



Appendix E

Additional Information

