

# NOT AN INSTRUMENT PROJECT

## Year 4 Monitoring Report

Black Gum Creek Wetland Restoration Site

DMS Project Number 97063

DWR Number 2006-1819 USACE Action ID SAW-2015-01605

Lumber River Basin 03040203

Robeson County, North Carolina

February 2020



Prepared by:  
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*This report was written in conformance with the DOD and EPA 40 CFR Part 230 (Final Rule) and the*

**TABLE OF CONTENTS**

1.0 Project Summary.....4  
2.0 Performance Standards.....4  
    2.1 Vegetation.....4  
    2.2 Hydrology.....5  
3.0 Monitoring Plan.....5  
4.0 Maintenance & Contingency Plan.....5  
5.0 Year 4 Monitoring.....6

**Appendices**

Appendix A. Background Tables

- Table 1 Project Components
- Table 2 Project Activity & Reporting
- Table 3 Project Contacts
- Table 4 Project Attributes

Appendix B. Visual Assessment Data

- Figure 1 Vicinity Map
- Figure 2 Asset Map
- Figure 3 Current Condition Plan View
- Site Photos
- Table 5 Vegetation Condition Assessment

Appendix C. Vegetation Plot Data

- Table 6 Vegetation Plot Summary
- Table 7 Vegetation Density

Appendix D. Hydrologic Data

- Figure 4 Monthly Rainfall Data
- Figures 5a-5f Monitoring Gauge Data
- Table 8 Wetland Hydrology Criteria Attainment

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## 1.0 PROJECT SUMMARY

The Black Gum Creek Project (the site) is a wetland rehabilitation and preservation project constructed for the NC Division of Mitigation Services (DMS) to fulfill non-riparian wetland needs in the Lumber River Basin 03040203 Catalog Unit. The project is located in northwest Robeson County, approximately 6 miles north of Maxton, off Modest Rd (Figure 1). This project includes rehabilitation of non-riparian wetlands and preservation of existing forested and ponded wetlands (Table 1).

The Project site is a former agricultural field, located on an inter-stream divide between the Lumber River and Black Gum Swamp, surrounded by forested areas and agricultural parcels. The site was altered since the mid-80s, which included ditching and clearing.

The site contains approximately 9.940 acres exhibiting wetland hydrology and soils (Wetland 1), but initially was lacking in hydrophytic vegetation, lending itself to a rehabilitation restoration approach using the definitions provided in 40 CFR Part 230 (Final Rule). Additionally, there are two jurisdictional wetland communities on the site, as confirmed by an approved jurisdictional determination (JD) by the US Army Corps of Engineers on January 6, 2016, leading to a preservation approach to provide wetland restoration equivalents (RE). These preservation areas include 23.042 acres of a successional wetland and forested hardwood flat in the Southern section of the project (Wetland 2) and 51.382 acres of forested hardwood flat/pocosin and open water/wetland habitat in the northern section of the project, for a total of 74.424 acres of preservation (Figure 2). These acreages have been updated from the Mitigation Plan to As-Built stage due to GIS geometry calculation.

Wetland restoration activities included planting the rehabilitation areas in March 2016 with 5,010 bare root species from the Hardwood Flat Forest Community (NCWAM, v. 4.1 2010) as well as other similar species found in the adjacent forested wetland community. There were six (6) different species selected to reflect the target vegetative community.

### 1.1 Goals and Objectives

The Lumber River Basin Restoration Priorities state that the goals for the Black Gum Creek 14-digit HUC are:

- Replacing buffer
- Repairing channelized streams
- Preservation of existing resources.

The following specific project goals, as stated in the Mitigation Plan, include:

- Restoring a hardwood flat vegetation community
- Expanding forested wetland complex

The success of these project goals will be addressed through the following objectives:

- Plant native tree/shrub species
- Preserve existing hardwood flat/pocosin wetlands

## 2.0 PERFORMANCE STANDARDS

### 2.1 Vegetation

An average density of 260 stems/acre must be surviving after five years of monitoring. Upon completion of planting in March 2016, eight (8) permanent vegetation plots were installed and initial plant stocking was performed to determine species composition and density (Appendix C, Table 6). Vegetation was monitored using the Carolina Vegetation Survey (CVS) protocols level 2 monitoring.

## 2.2 Hydrology

The site will present continuous saturated or inundated hydrologic conditions for at least 8% of the growing season during normal weather conditions. A “normal” year is based on NRCS climatological data for Robeson County, using the 30th to 70th percentile thresholds as the range of normal. The growing season for Robeson County, using the 50% chance of higher than 28 F method, is from March 22th through November 5th, 228 days (WETS Table, Robeson County). Hydrologic performance will be determined through evaluation of automatic recording gauge data supplemented by documentation of wetland hydrology indicators as defined in the 1987 USACE Delineation Manual, daily data will be collected from automatic wells over the 5-year monitoring period.

Five (5) continuous monitoring groundwater gauges were installed to provide pre-restoration conditions, and data was downloaded to provide one more year of pre-restoration data for this as-built report. Data from the 2018 growing season is provided in Appendix D.

## 3.0 MONITORING PLAN

Annual monitoring data will be reported using the DMS monitoring template. The monitoring report provides a project data chronology to facilitate an understanding of project status and trends, population of DMS databases for analysis, research purposes, and assist in decision making regarding project close-out.

<u>Required</u>	<u>Parameter</u>	<u>Quantity</u>	<u>Frequency</u>	<u>Notes</u>
Yes	Groundwater Hydrology	Quantity and location of gauges will be determined in consultation with DMS	annual	Groundwater monitoring gauges with data recording devices will be installed on site; the data will be downloaded on a quarterly basis
Yes	Vegetation	Quantity and location of vegetation plots will be determined in consultation with DMS	Monitoring Years 1, 2,3,4,5	Vegetation will be monitored using the Carolina Vegetation Survey (CVS) protocols
	Exotic and nuisance vegetation		Semi-annual	Locations of exotic and nuisance vegetation will be mapped
	Project boundary		Semi-annual	Mapping of vegetation damage, boundary encroachments

The first scheduled vegetation monitoring was conducted during the first full growing season following project completion (2016) and continues for the next five years through 2020. The survivability of the vegetation plantings will be evaluated using a 100m<sup>2</sup> vegetative sampling plots randomly placed in the planted areas.

Groundwater elevations will be monitored to evaluate jurisdictional wetland hydrology. Verification of wetland hydrology will be determined by automatic recording of well data collected within the project area.

## 4.0 MAINTENANCE AND CONTINGENCY PLAN

DMS shall monitor the site and conduct a physical inspection of the site a minimum of once per year throughout the post-construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two years following site construction and may include the following:

Year 4 Annual Monitoring Report  
Black Gum Creek 97063

Component/Feature	Maintenance through project close-out	Remedial Measures
Vegetation	Vegetation shall be maintained to ensure survival. Routine vegetation maintenance and repair activities may include supplemental planting. The site will also be evaluated to ensure diffuse flow is still occurring.	Any remedial activities performed will be documented in the annual monitoring reports.
Site Boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as needed basis.	Any remedial activities performed will be documented in the annual monitoring reports.

## 5.0 YEAR 4 MONITORING

Year 4 annual monitoring (MY4) was conducted on July 24, 2019 (vegetation plots) and December 09, 2019 (final gauge downloads). Year 4 monitoring activities included visual monitoring and stem counts of the project vegetation; downloading monitoring gauge data; verifying the presence, or lack of, invasive species; checking the integrity of the easement; and taking photographs at the established photo points.

There were 5 gauges on this site, and a 6<sup>th</sup> gauge was installed 4/30/2019 (nearby gauge 4) for additional hydrologic data. This gauge (6) functioned through the July monitoring, but was destroyed by wildlife (likely a bear) before the December download. Nevertheless, gauge 6 performed at 11% hydroperiod during this time. It will be reinstalled in 2020.

Between the July and December site visits, there was trespass in the easement and along the credit line where someone bush hogged path that destroyed gauge 1 and mowed a shooting field outside the credit area to the east of gauge 2 (see pictures). DMS is working with Property attempting to reconcile the trespass because it is a remote site with an absentee landowner. Gauge 1 will be reinstalled, and a small number of trees replanted in the dormant season 2020 to ensure that the credit line is vegetated adequately. The length of path mowed inside the credit area is ~275' and ~4' wide (1,100 sf, see CCPV Figure 3).

Seven of the eight (8) vegetation plots met the vegetative success criteria with a project-wide average of 465 stems per acre (Figure 3, Appendix B and Table 7, Appendix C).

All six gauges met the hydrologic success target of greater than 8% of the growing season (Appendix D). Gauges 1 & 6 met success criteria despite being damaged. Hydrology for these gauges are represented through July 2019. Gauges 2 and 3 are both located outside of the wetland rehabilitation areas. Gauge 2, which is just outside the rehabilitation asset line, indicated that the water table was continuously above 12" for 16.6% of the growing season and gauge 3, further away from any proposed wetland rehabilitation, had 16.2% continuous hydrology. This information may indicate that the site's hydrologic footprint is expanding more than anticipated for the project.

**APPENDIX A**  
**BACKGROUND TABLES**

Table 1: Project Mitigation Components  
 Black Gum Creek, DMS Project ID# 97063

Mitigation Components									
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient	Phosphorous Nutrient Offset
	R	RE	R	RE	R	RE			
Type									
Acres					9.940	74.424			
Total Credits	-	-	-	-	6.627	7.442			
Project Components									
Project Component	Stationing/ Location	Existing Footage/Acreage	Approach		Restoration -or- Restoration Equivalent	Restoration Acreage	Mitigation Ratio		
			(PI, PII etc.)						
Wetland 1	-	9.940	-		R	9.940	1.5		
Wetland 2	-	23.042	-		RE	23.042	10		
Wetland 3	-	51.382	-		RE	51.382	10		
Component Summation									
Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non- (acres)	Buffer (square feet)	Upland (acres)			
		Riverine	Non-Riverine						
Restoration (Rehabilitation)	-	-	-	9.940	-	-			
Enhancement		-	-		-	-			
Enhancement I	-								
Enhancement II	-								
Creation		-	-	-					
Preservation	-	-	-	74.424		-			
High Quality Preservation	-	-	-	-		-			
R=Restoration, RE= Restoration Equivalent									



Table 2. Project Activity and Reporting History

<b>Activity or Deliverable</b>	<b>Data collection Complete</b>	<b>Completion or Delivery</b>
Institution Date	NA	Jul-05
404 permit date	NA	NA
Restoration Plan	NA	Jan-16
Site Planted	NA	Mar-16
Mitigation Plan / As-built Baseline	Apr-16	Apr-16
Year 1 Monitoring	Nov-16	Dec-16
Year 2 Monitoring	Dec-17	Dec-17
Year 3 Monitoring	Dec-18	Jan-19
Year 4 Monitoring	Dec-19	Jan-20
Year 5 Monitoring		

Table 3. Project Contacts Table

<b>Table 3. Project Contacts Table Black Gum Creek / DMS ID# 97063</b>	
<b>Project Management &amp; Design</b>	NCDEQ Division of Mitigation Services
Primary POC	Lindsay Crocker 910-594-3910
<b>Survey Contractor</b>	Landmark Surveying, Inc. PO Box 839, Graham, NC 27253-0839
Survey contractor POC	Doug Yarbrough - 336-263-1294
<b>Planting Contractor</b>	Bruton Natural Systems, Inc. PO Box 1197, Fremont, NC 27830
Planting contractor POC	Charlie Bruton - 919-242-6555
<b>Monitoring Performers</b>	NCDEQ Division of Mitigation Services 1652 Mail Service Center, Raleigh, NC 27699-1652
Vegetation Monitoring POC	Casey Haywood 919-707-8978
Wetland Monitoring POC	Casey Haywood 919-707-8978

Table 4. Project Attributes Table

Project Information			
Project Name	Black Gum Creek		
County	Robeson		
Project Area (acres)	147.47		
Project Coordinates (lat. & long.)	79°19'44" W 34°49'12" N		
Project Watershed Summary Information			
Physiographic Province	Coastal Plain		
River Basin	Lumber		
USGS Hydrologic Unit 8-Digit	3040203	USGS Hydrologic Unit 14-Digit	3040203020010
DWR Sub-basin	03-07-51		
Project Drainage Area (ac)	N/A		
Project Drainage Area % Impervious	<1%		
CGIA Land Use Classification	50% Forested, 41% Agriculture		
Existing Wetland Summary Information			
Parameters	1	2	3
Size of Wetland (acres)	9.940	23.042	51.382
Wetland Type	Non-riparian	Non-riparian	Non-riparian
Mapped Soil Series	Rains & Plummer/ Osier	Plummer/Osier & Rutledge	Rutledge
Drainage Class	Poorly & Very Poorly Drained	Very Poorly Drained	Very Poorly Drained
Soil Hydric Status	Hydric	Hydric	Hydric
Source of Hydrology	Precipitation	Precipitation	Precipitation
Hydrologic Impairment	None	None	None
Existing Vegetation	Crops	Successional	Forested
Percent composition of exotic invasive vegetation	0%	0%	0%
Regulatory Considerations			
Regulation	Applicable	Resolved	Supporting Documentation
Waters of the U.S. Section 404	Yes	Yes	Jurisdictional Determination
Waters of the U.S. Section 401	Yes	Yes	Jurisdictional Determination
Endangered Species Act	N/A	N/A	N/A
Historic Preservation Act	N/A	N/A	N/A
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	N/A	N/A	N/A
FEMA Floodplain Compliance	N/A	N/A	N/A
Essential Fisheries Habitat	N/A	N/A	N/A

APPENDIX B  
VISUAL ASSESSMENT DATA

Figure 1. Vicinity Map

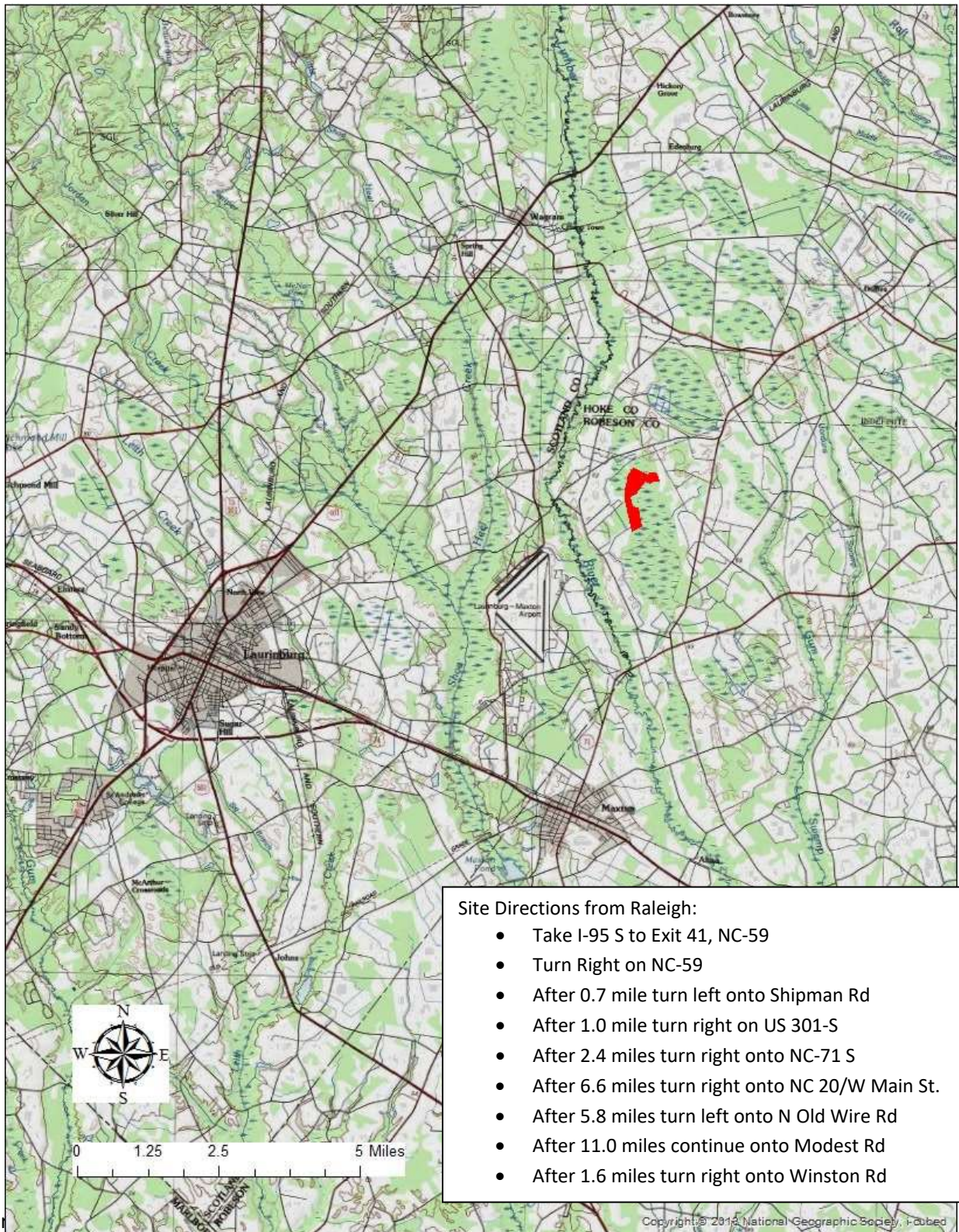


Figure 2. Asset Map

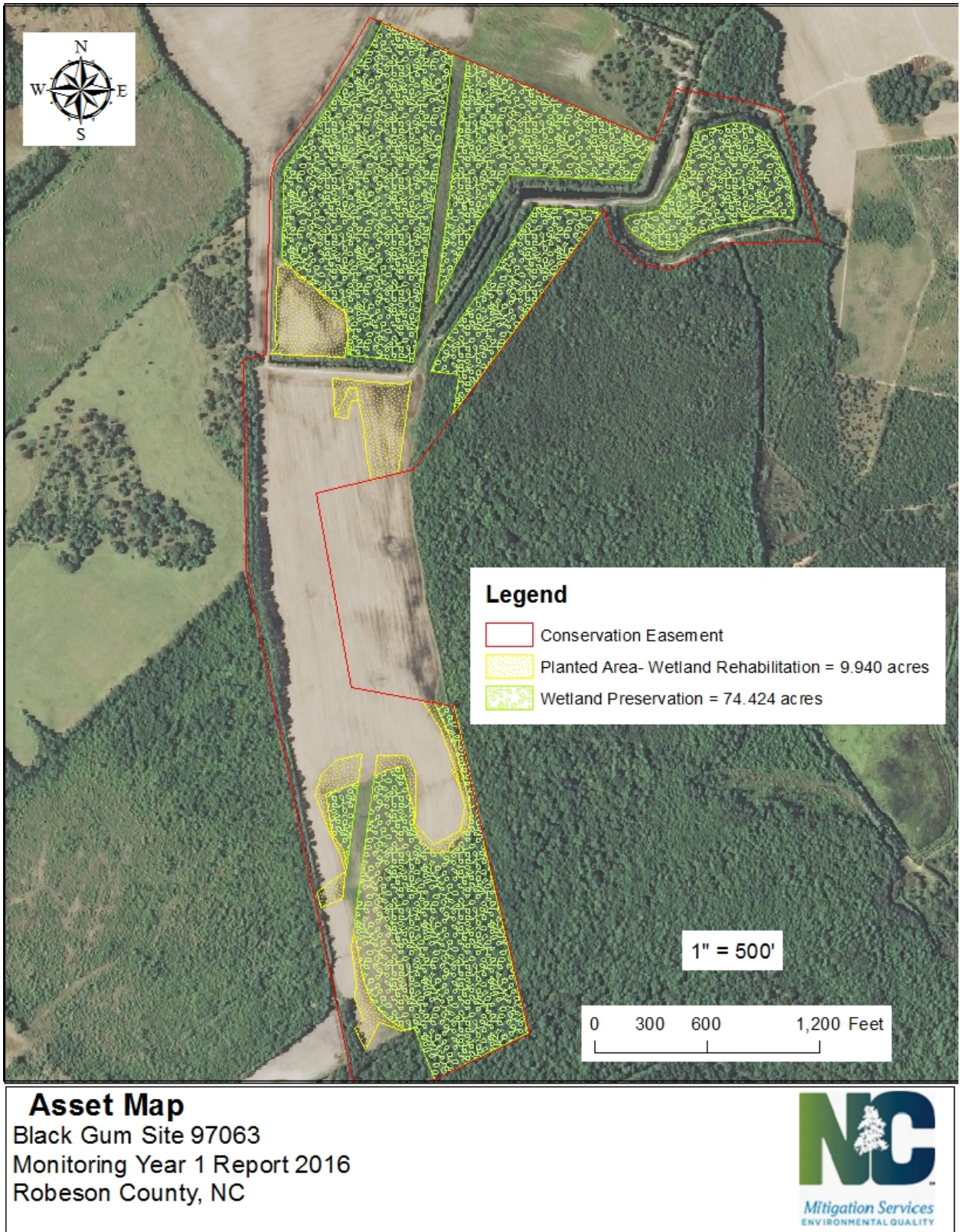
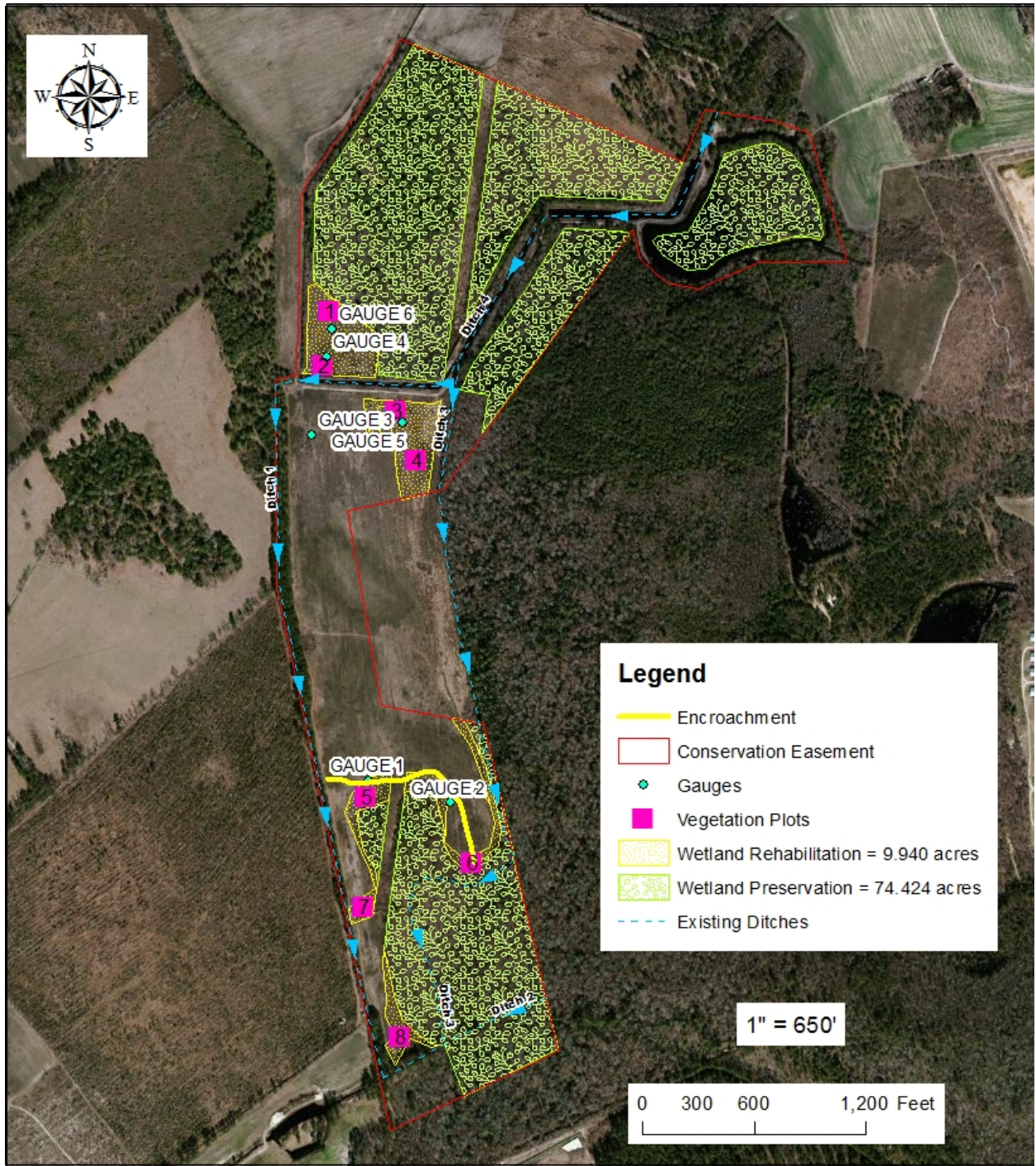


Figure 3. Current Conditions Plan View



**Current Conditions Plan View**

Black Gum Site 97063  
 Robeson County, NC

Note: Gauge 2 and 3 are not inside wetland asset areas, and are not counted toward success criteria  
 Imagery by NCOneMap 2/7/2020



Photos 1-8 taken 7/24/2019 (all photo points are located on the SE corner of the corresponding vegetation plot)



Photo Point 1



Photo Point 2



Photo Point 3



Photo Point 4



Photo Point 5



Photo Point 6



Photo Point 7



Photo Point 8



Large shooting field mowed outside credit /planted area East of wetland gauge 2. Area approximately 100' x 40' = 0.1 acre 12/9/20





Mowed path inside credit area and destroyed wetland gauge 1. 12/9/20  
Total area of mowed path ~1,200' x 4' wide = 0.1 acre



Gauge 6 destroyed by bear (top and right) 12/9/20



Table 5. Vegetation Condition Assessment  
 Black Gum Creek, DMS Project ID# 97063  
 Planted Acreage: 9.9 acres

<b>Table 5. Vegetation Condition Assessment Black Gum Creek, DMS Project ID# 97063 Planted Acreage 9.9</b>						
<b>Vegetation Category</b>	<b>Definitions</b>	<b>Mapping Threshold</b>	<b>CCPV Depiction</b>	<b>Number of Polygons</b>	<b>Combined Acreage</b>	<b>% of Planted Acreage</b>
<b>1. Bare Areas</b>	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0%
<b>2. Low Stem Density Areas</b>	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	0	0.00	0%
<b>Totals</b>				0	0.00	0%
<b>3. Areas of Poor Growth Rates or Vigor</b>	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0%
<b>Cumulative Totals</b>				0	0.00	0%
<b>Easement Acreage 14 acres</b>						
<b>Vegetation Category</b>	<b>Definitions</b>	<b>Mapping Threshold</b>	<b>CCPV Depiction</b>	<b>Number of Polygons</b>	<b>Combined Acreage</b>	<b>% of Easement Acreage</b>
<b>4. Invasive Areas of Concern</b>	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	0	0.00	0%
<b>5. Easement Encroachment Areas</b>	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	1	0.20	1%

APPENDIX C  
VEGETATION PLOT DATA

Table 6. Vegetation Plot Summary  
Black Gum Creek, DMS Project ID# 97063

Plot #	Stream/ Wetland Stems <sup>2</sup>	Total <sup>4</sup>	Success Criteria Met?
1	n/a	607	Y
2	n/a	931	Y
3	n/a	728	Y
4	n/a	728	Y
5	n/a	647	Y
6	n/a	324	Y
7	n/a	445	Y
8	n/a	769	Y
<b>Project Avg</b>	n/a	<b>647</b>	

Table 7. Vegetation Density  
Black Gum Creek, DMS Project ID# 97063

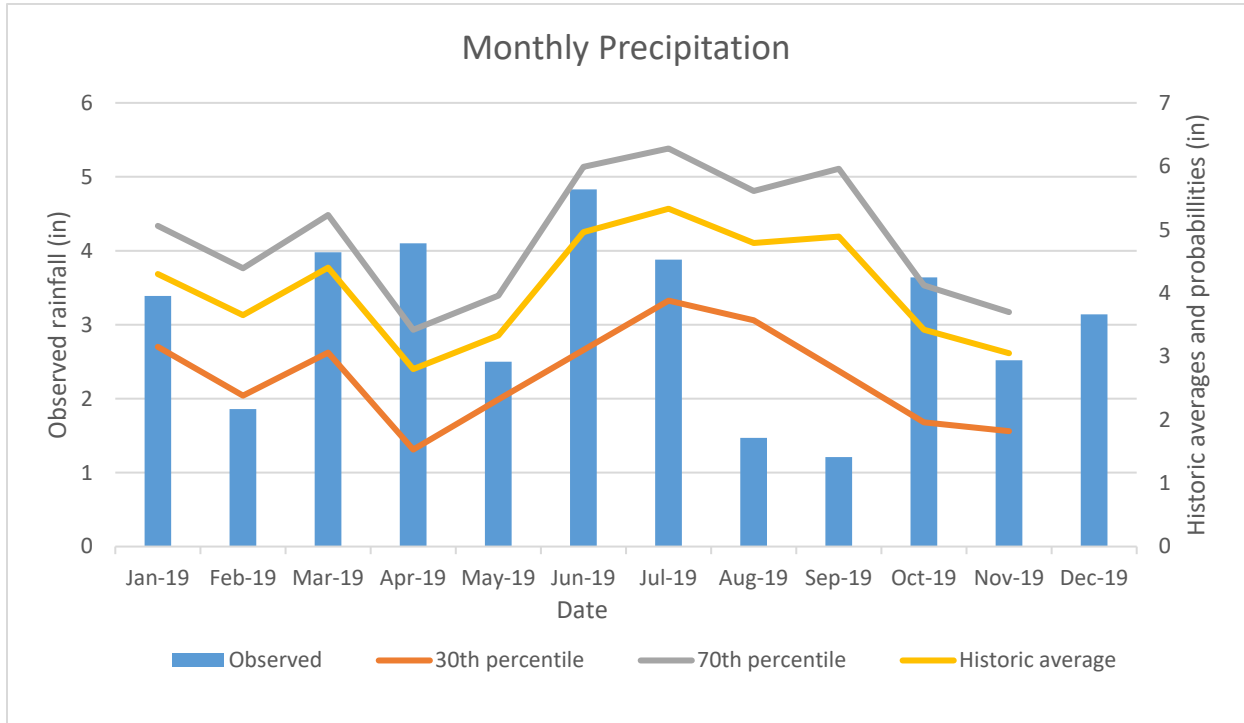
Scientific Name	Common Name	Species Type	Current Plot Data (MY4 2019)																								Annual Means														
			97063-01-0001			97063-01-0002			97063-01-0003			97063-01-0004			97063-01-0005			97063-01-0006			97063-01-0007			97063-01-0008			MY4 (2019)			MY3 (2018)			MY2 (2017)			MY1 (2016)			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	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			4	3	3	13	9	9	13	5	5	6	6	6	6	1	1	1	1	1	1	1	1	1	26	26	45	26	26	27	27	27	27	34	34	34	34	34	34
Betula nigra	river birch	Tree	1	1	1				2	2	2	1	1	1	4	4	4				4	4	4	1	1	1	13	13	13	13	13	14	13	13	13	17	17	17	18	18	18
Cornus amomum	silky dogwood	Shrub	2	2	2				1	1	1	1	1	1	3	3	3	1	1	1				4	4	4	12	12	12	13	13	13	13	13	13	16	16	16	18	18	18
Fraxinus pennsylvanica	green ash	Tree	6	6	6			2	1	1	1	2	2	3						2				3	3	12	12	12	26	13	13	20	11	11	11	22	22	22	22	22	22
Liquidambar styraciflua	sweetgum	Tree												1												1															
Pinus taeda	loblolly pine	Tree						1									1									2															
Platanus occidentalis	American sycamore	Tree				4	4	4				4	4	4	1	1	1	2	2	2	4	4	4				15	15	15	15	15	16	16	16	16	21	21	21	22	22	22
Quercus michauxii	swamp chestnut oak	Tree	2	2	2	3	3	3	1	1	1	2	2	2	1	1	1	2	2	2	2	2	2	1	1	1	14	14	14	15	15	16	15	15	15	13	13	13	13	13	13
Salix nigra	black willow	Tree																																							
Unknown		Shrub or Tree																																		2	2	2	2	2	2
<b>Stem count</b>			11	11	15	10	10	23	14	14	18	15	15	18	15	15	16	6	6	8	11	11	11	10	10	19	92	92	128	95	95	106	95	95	95	125	125	125	129	129	129
<b>size (ares)</b>			1			1			1			1			1			1			1			8			8			8			8			8					
<b>size (ACRES)</b>			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.20			0.20			0.20			0.20			0.20					
<b>Species count</b>			4	4	5	3	3	5	5	5	5	6	6	7	5	5	6	4	4	5	4	4	4	5	5	5	6	6	8	6	6	6	6	6	6	7	7	7	7	7	7
<b>Stems per ACRE</b>			445.2	445.2	607	404.7	404.7	930.8	566.6	566.6	728.4	607	607	728.4	607	607	647.5	242.8	242.8	323.7	445.2	445.2	445.2	404.7	404.7	768.9	465.4	465.4	647.5	480.6	480.6	536.2	480.6	480.6	480.6	632.3	632.3	632.3	652.6	652.6	652.6

**Color for Density**

- Exceeds requirements by 10%
- Exceeds requirements, but by less than 10%
- Fails to meet requirements, by less than 10%
- Fails to meet requirements by more than 10%

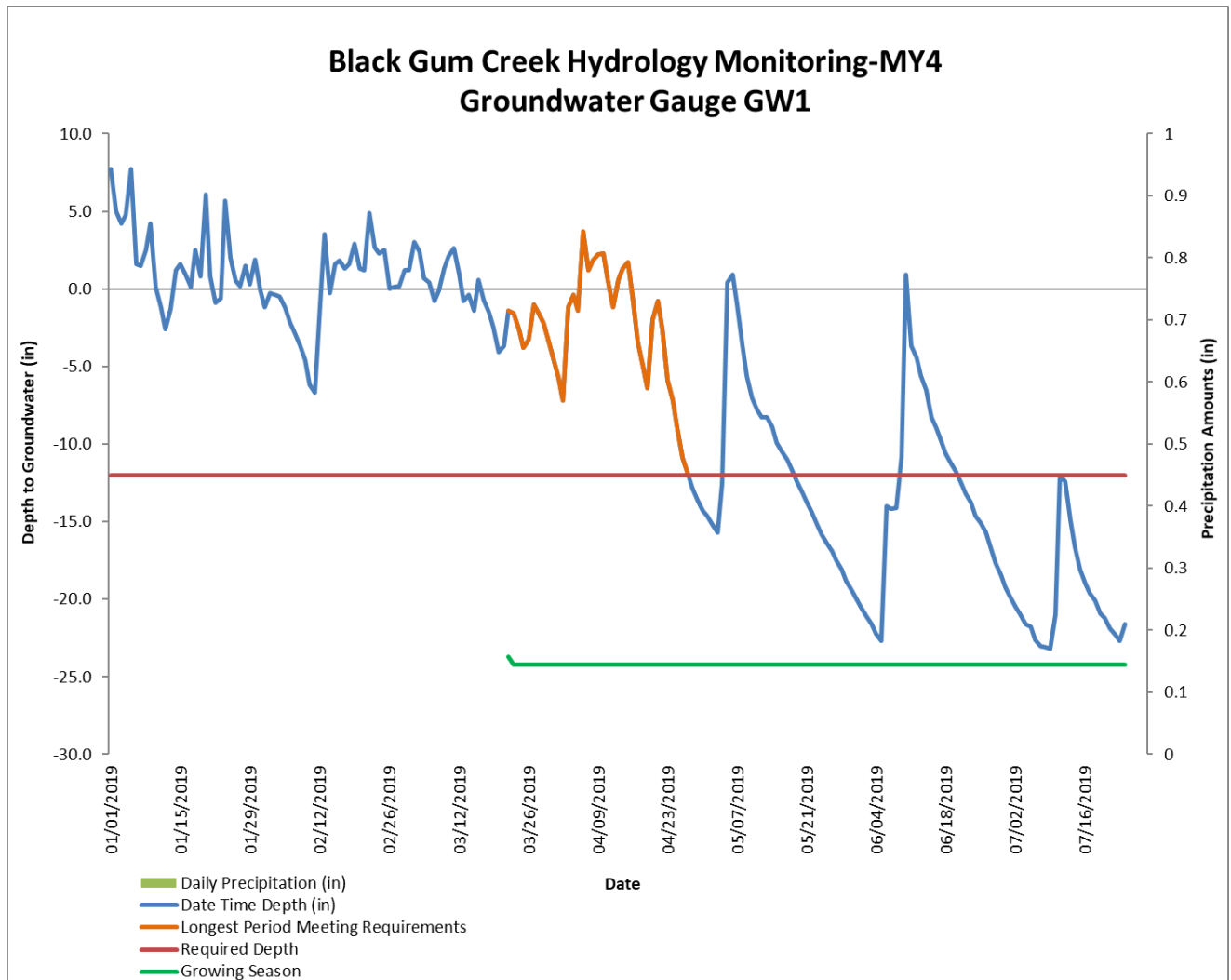
APPENDIX D  
HYDROLOGIC DATA

Figure 4. Monthly Rainfall Data  
 Black Gum Creek, DMS Project ID# 97063



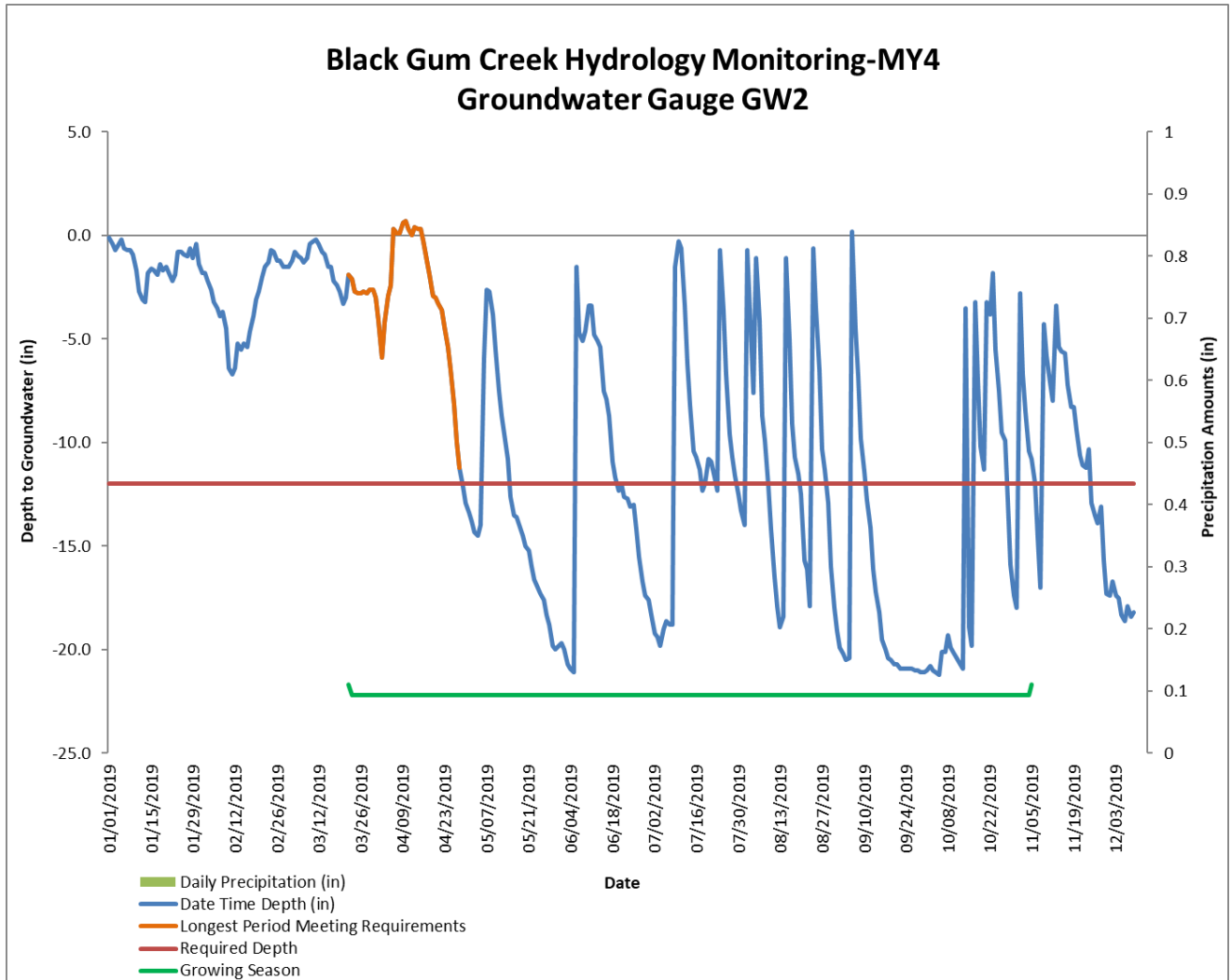
MY3 (2018) and MY4 (2019) observed and historic rainfall data collected from the USDA-NRCS Agricultural Applied Climate Information System, Laurinburg-Maxton Airport monitoring station in Scotland County. Data acquired for MY2 (2017) from USDA-NRCS Agricultural Applied Climate Information System (Red Springs 1 SE monitoring station) in Robeson County was not used for proceeding years due to missing data and/or data errors.

Figure 5a. Monitoring Gauge #1  
 Black Gum Creek, DMS Project ID# 97063



Growing Season Days: 228 (Mar 22 – Nov 5)  
 Target Hydroperiod Percent: 8%  
 Required Number of Days Meeting Requirements: 18  
 Longest Period Meeting Requirements: 37  
 Hydroperiod Percent: 16.2%

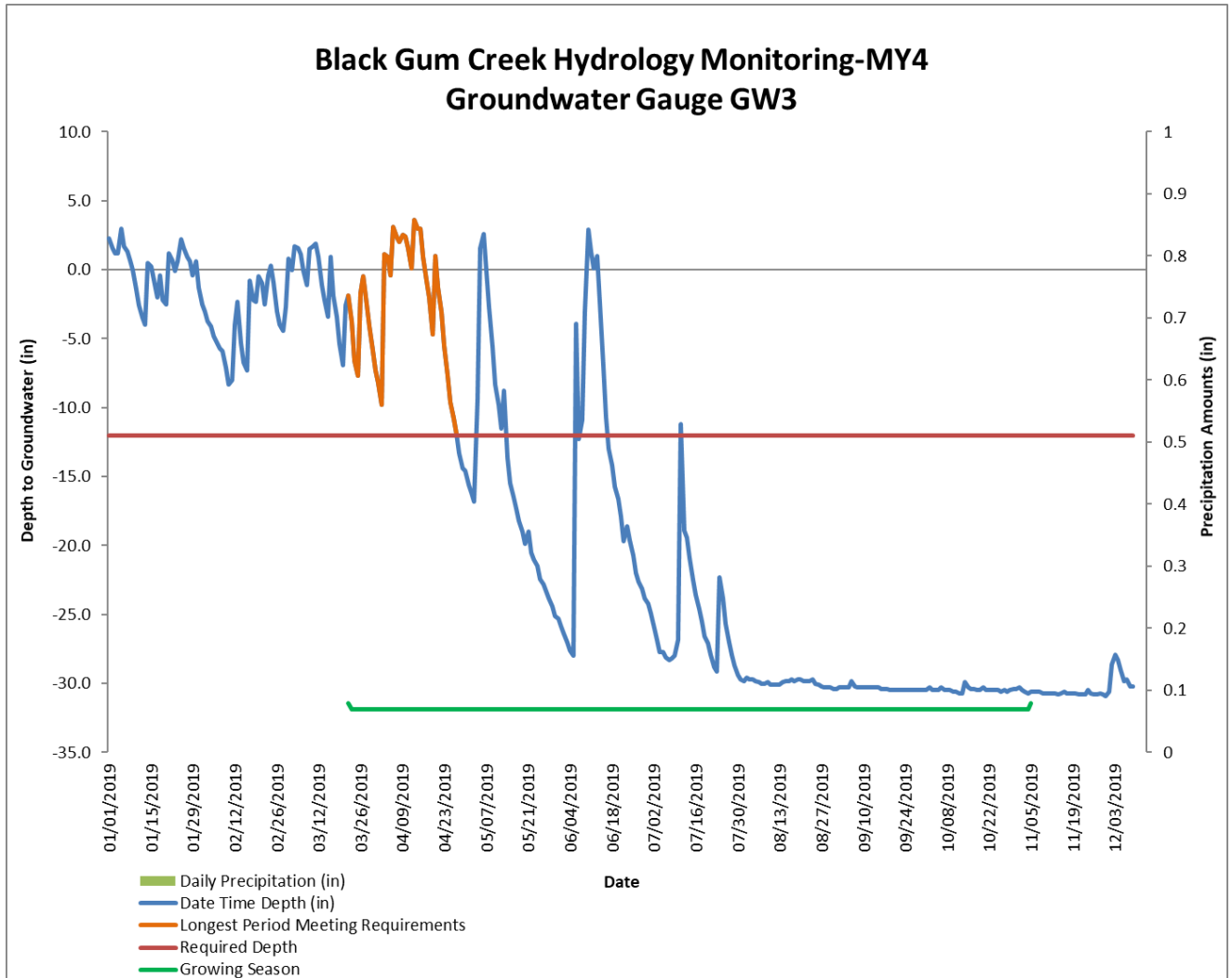
Figure 5b. Monitoring Gauge #2  
 Black Gum Creek, DMS Project ID# 97063



Growing Season Days: 228 (Mar 22 – Nov 5)  
 Target Hydroperiod Percent: 8%  
 Required Number of Days Meeting Requirements: 18  
 Longest Period Meeting Requirements: 38  
 Hydroperiod Percent: 16.6%

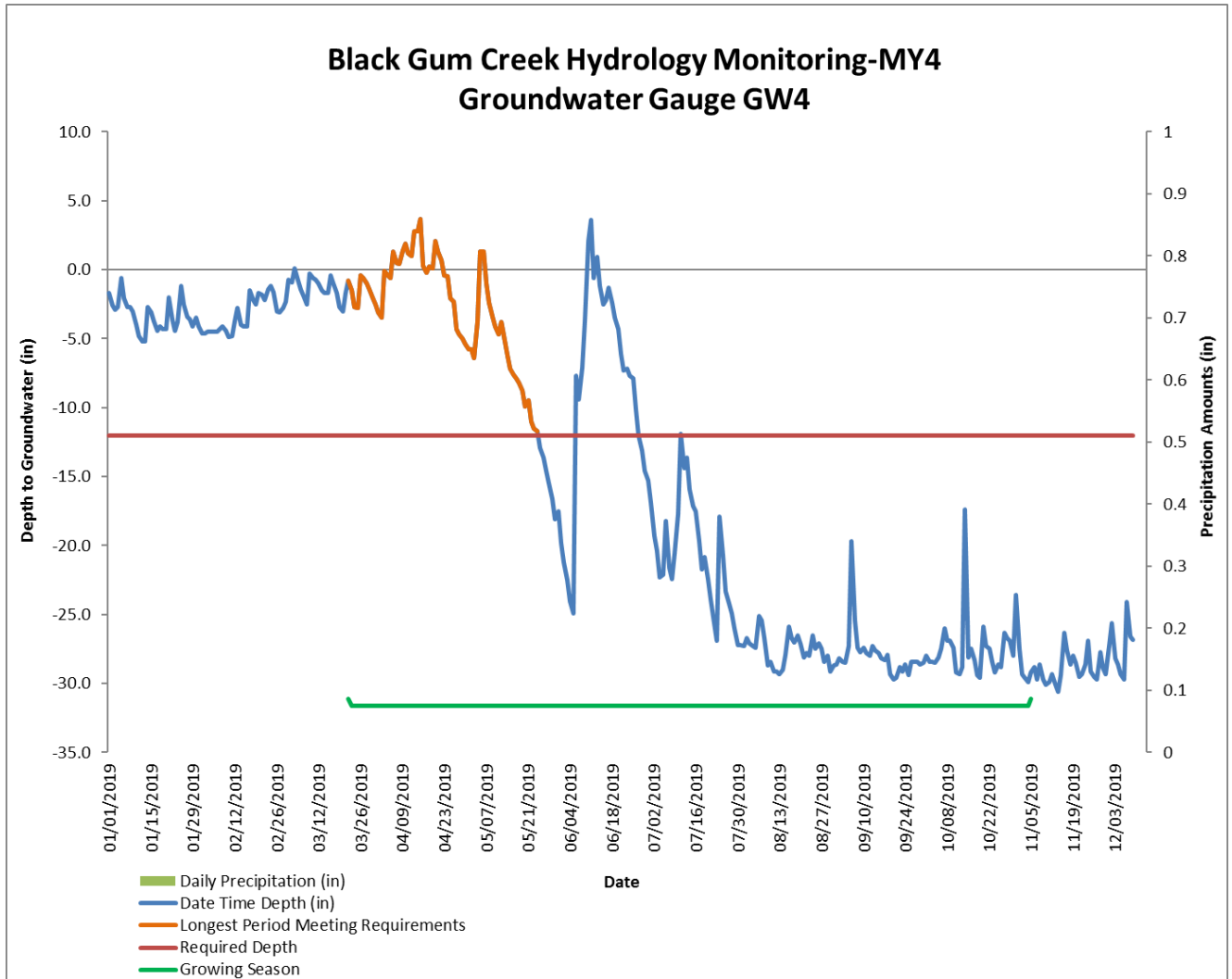


Figure 5c. Monitoring Gauge #3  
 Black Gum Creek, DMS Project ID# 97063



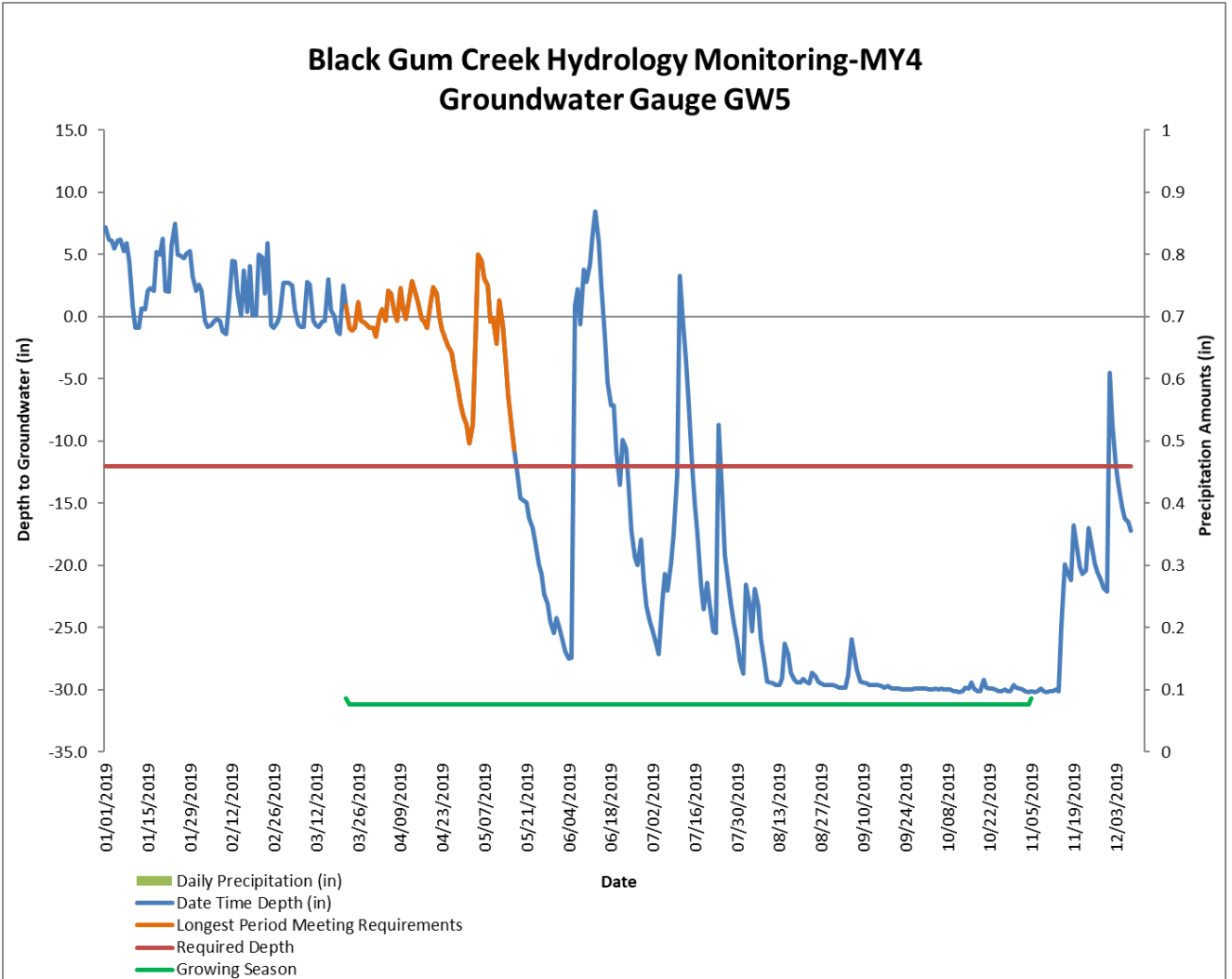
Growing Season Days: 228 (Mar 22 – Nov 5)  
 Target Hydroperiod Percent: 8%  
 Required Number of Days Meeting Requirements: 18  
 Longest Period Meeting Requirements: 37  
 Hydroperiod Percent: 16.2%

Figure 5d. Monitoring Gauge #4  
 Black Gum Creek, DMS Project ID# 97063



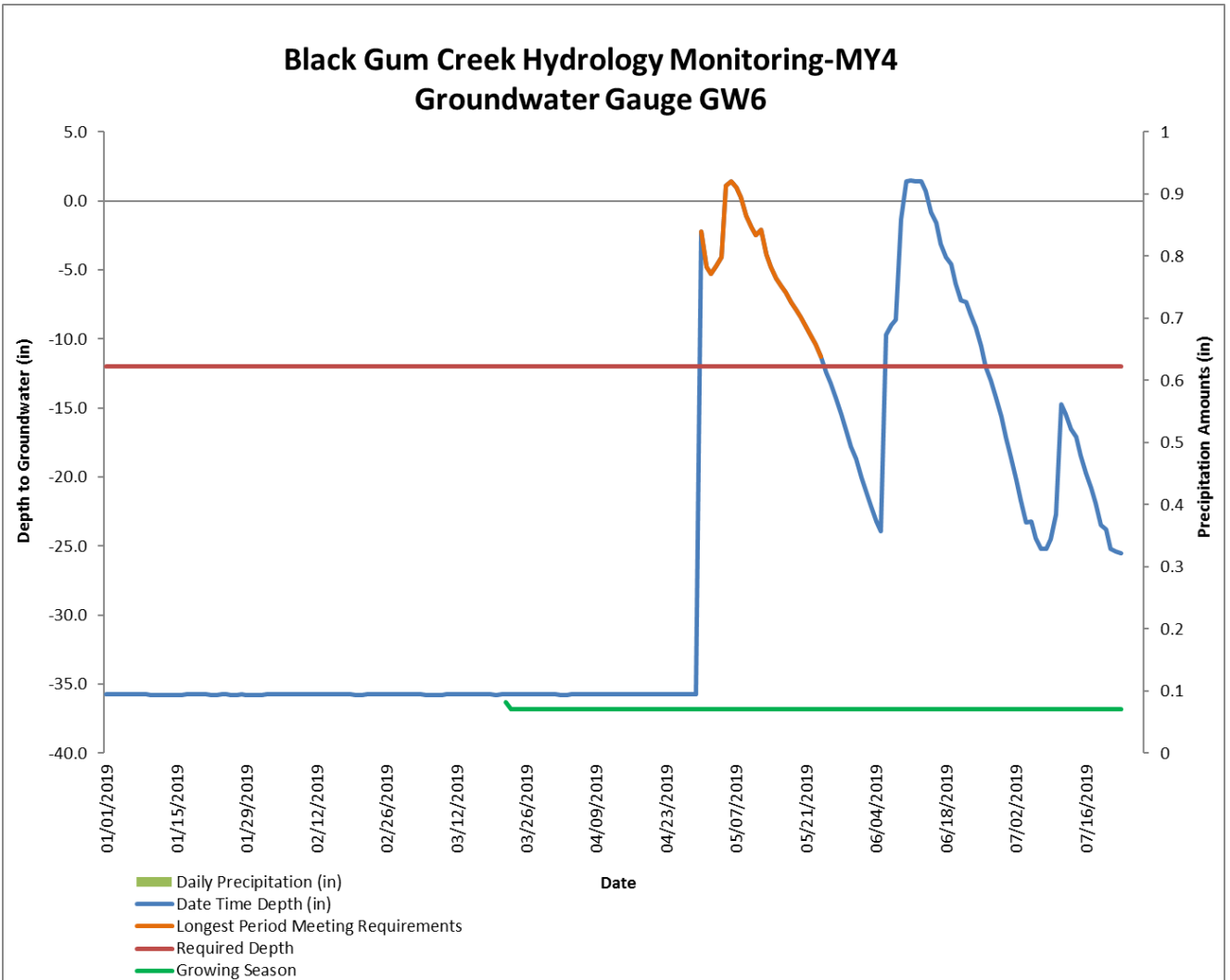
Growing Season Days: 228 (Mar 22 – Nov 5)  
 Target Hydroperiod Percent: 8%  
 Required Number of Days Meeting Requirements: 18  
 Longest Period Meeting Requirements: 64  
 Hydroperiod Percent: 27.9%

Figure 5e. Monitoring Gauge #5  
 Black Gum Creek, DMS Project ID# 97063



Growing Season Days: 228 (Mar 22 – Nov 5)  
 Target Hydroperiod Percent: 8%  
 Required Number of Days Meeting Requirements: 18  
 Longest Period Meeting Requirements: 57  
 Hydroperiod Percent: 24.9%

Figure 5f. Monitoring Gauge #6  
 Black Gum Creek, DMS Project ID# 97063



Growing Season Days: 228 (Mar 22-Nov 5)  
 Target Hydroperiod Percent: 8%  
 Required Number of Days Meeting Requirements: 18  
 Longest Period Meeting Requirements: 25  
 Hydroperiod Percent: 10.9%

Table 8. Wetland Hydrology Criteria Attainment  
 Black Gum Creek, DMS Project ID# 97063

	<b>Success Criteria Achieved/Max Consecutive Days During Growing Season</b> (Number of days/ Percentage)						
Gauge	Year 0 (2014)	Year 0 (2015)	Year 1 (2016)	Year 2 (2017)	Year 3 (2018)	Year 4 (2019)	Year 5 (2020)
1	Yes/ 46 21.0%	Not available***	Yes/26 11.4%	Yes/24 10.5%	Yes/52 22.8%	Yes/37 16.2%	
2**	N/A/ 10 4.4%	Not available***	N/A/ 11 4.8%	N/A/ 22 9.6%	N/A/ 52 22.7%	N/A/ 38 16.6%	
3**	N/A/ 12 5.3%	N/A/ 41 18.0%	N/A/ 7 3.1%	N/A/ 5 2.2%	N/A/ 15 6.6%	N/A/ 37 16.2%	
4	Yes / 52 22.8%	Yes/46 20.2%	Yes/39 17.0%	No/2 0.9%	No/10 4.4%	Yes/62 27.1%	
5	Yes / 23 10.1%	Yes/63 27.6%	Yes/67 29.3%	Yes/24 10.5%	Yes/44 19.3%	Yes/57 24.9%	
6	NA	NA	NA	NA	NA	Yes/25 10.9%	

Growing Season is 228 days. Eight (8) percent of the growing season is equal to 18 days or more of consecutive readings above 12 inches

\*\* Gauge 2 and 3 are located outside of asset areas.

\*\*\*Gauges 1 and 2 were destroyed by a bear and data could not be retrieved in 2015.

Gauge 6 was installed 4/30/2019. Gauge 1 and 6 were destroyed in 2019 and data could not be retrieved for the entire duration of the monitoring year. Data for these gauges for MY4 are indicative of hydrology through July 23, 2019.