NOT AN INSTRUMENT PROJECT

Year 3 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

December 2018

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This report was written in conformance with the DOD and EPA 40 CFR Part 230 (Final Rule) and the April 2003 US Army Corps of Engineers, Wilmington District Stream Mitigation Guidelines

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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.

Required	Parameter	Quantity	Frequency	Notes
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^2 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:

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 3 MONITORING

Year 3 annual monitoring (MY3) was conducted on June 20, 2018 and January 10, 2019. As stated in Section 3.0, year 3 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.

All eight (8) vegetation plots met the vegetative success criteria with a project-wide average of 481 stems per acre (Figure 3, Appendix B and Table 7, Appendix C). Veg plot 1 was reestablished February 6, 2018 due to a fire in the late 2016-17 dormant season. The fire was low intensity and did not affect vigor of planted hardwood trees. To avoid any potential future fire issues, pvc posts for veg plots 1 and 2 were replaced with metal conduit posts, and the southeast corner (0,0) of the remaining plots (3-8) were replaced with a metal conduit post.

Hydrology data indicated that two of three gauges in the rehabilitation area (gauges 1 & 5) met the hydrologic success target of greater than 8% of the growing season (Appendix D). Hydrology for gauge 4 did not meet success criteria. However, it is important to note that the location of gauge 4 exhibited signs of continuous inundation during multiple monitoring trips and has an established stand of obligate wetland grasses and rushes and several desirable species of volunteer trees. Gauge 4 was replaced February 6, 2018 due to a fire that burned through the northernmost portion of the project rehabilitation area in the late 2016-17 dormant season. 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 22.7% of the growing season while gauge 3, further away from any proposed wetland rehabilitation, only had 6.6% continuous hydrology; potentially indicating that the wetland asset lines for rehabilitation were drawn appropriately.

All gauges had an increase in hydrology from the prior monitoring year despite low antecedent rain conditions resulting in an extremely dry summer. This increase may be attributed to extreme weather conditions late in the season (Hurricane Florence, September 2018 and Hurricane Michael, October 2018). Future access to this site needs to be considered due to frequent inundation making it difficult to access.

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
Type	R	RE	R	RE	R	RE			
Acres					9.940	74.424			
Total Credits	-	-	-	-	6.627	7.442			

Project Components

Project Component	Stationing/ Location	Existing Footage/Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Acreage	Mitigation Ratio
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

Activity or Deliverable	Data collection Complete	Completion or Delivery
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		
Year 5 Monitoring		

Table 3. Project Contacts Table

Table 3. Project Contacts Table Black Gum Creek / DMS ID# 97063	
Designer	NCDEQ Division of Mitigation Services
Primary planting plan POC	Lindsay Crocker 910-594-3910
Survey Contractor	Landmark Surveying, Inc. PO Box 839, Graham, NC 27253-0839
Survey contractor POC	Doug Yarbrough - 336-263-1294
Planting Contractor	Bruton Natural Systems, Inc.
	PO Box 1197, Fremont, NC 27830
Planting contractor POC	Charlie Bruton - 919-242-6555
Monitoring Performers	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

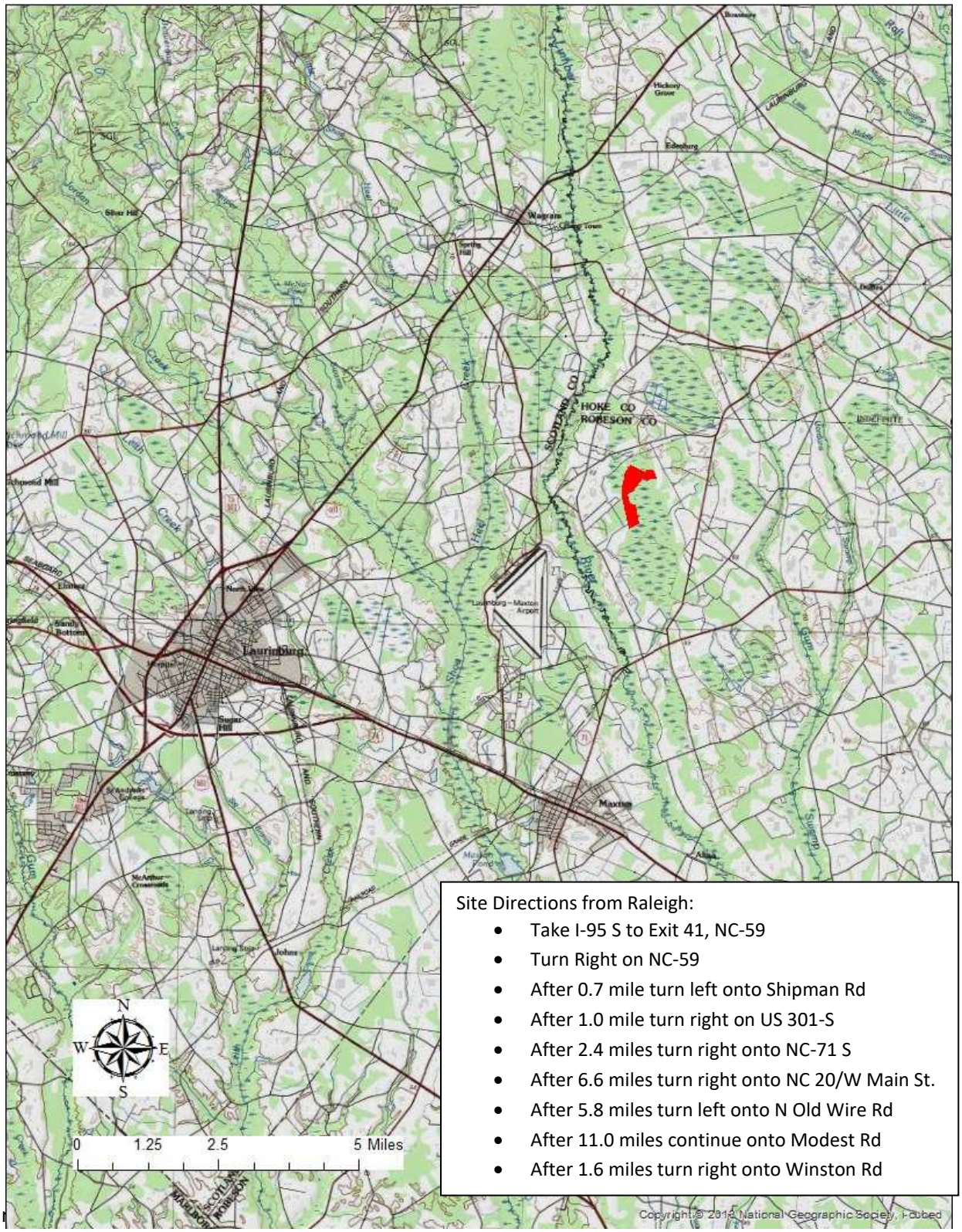
Table 4. Project Attributes Table

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



Site Directions from Raleigh:

- Take I-95 S to Exit 41, NC-59
- Turn Right on NC-59
- After 0.7 mile turn left onto Shipman Rd
- After 1.0 mile turn right on US 301-S
- After 2.4 miles turn right onto NC-71 S
- After 6.6 miles turn right onto NC 20/W Main St.
- After 5.8 miles turn left onto N Old Wire Rd
- After 11.0 miles continue onto Modest Rd
- After 1.6 miles turn right onto Winston Rd

Figure 2. Asset Map

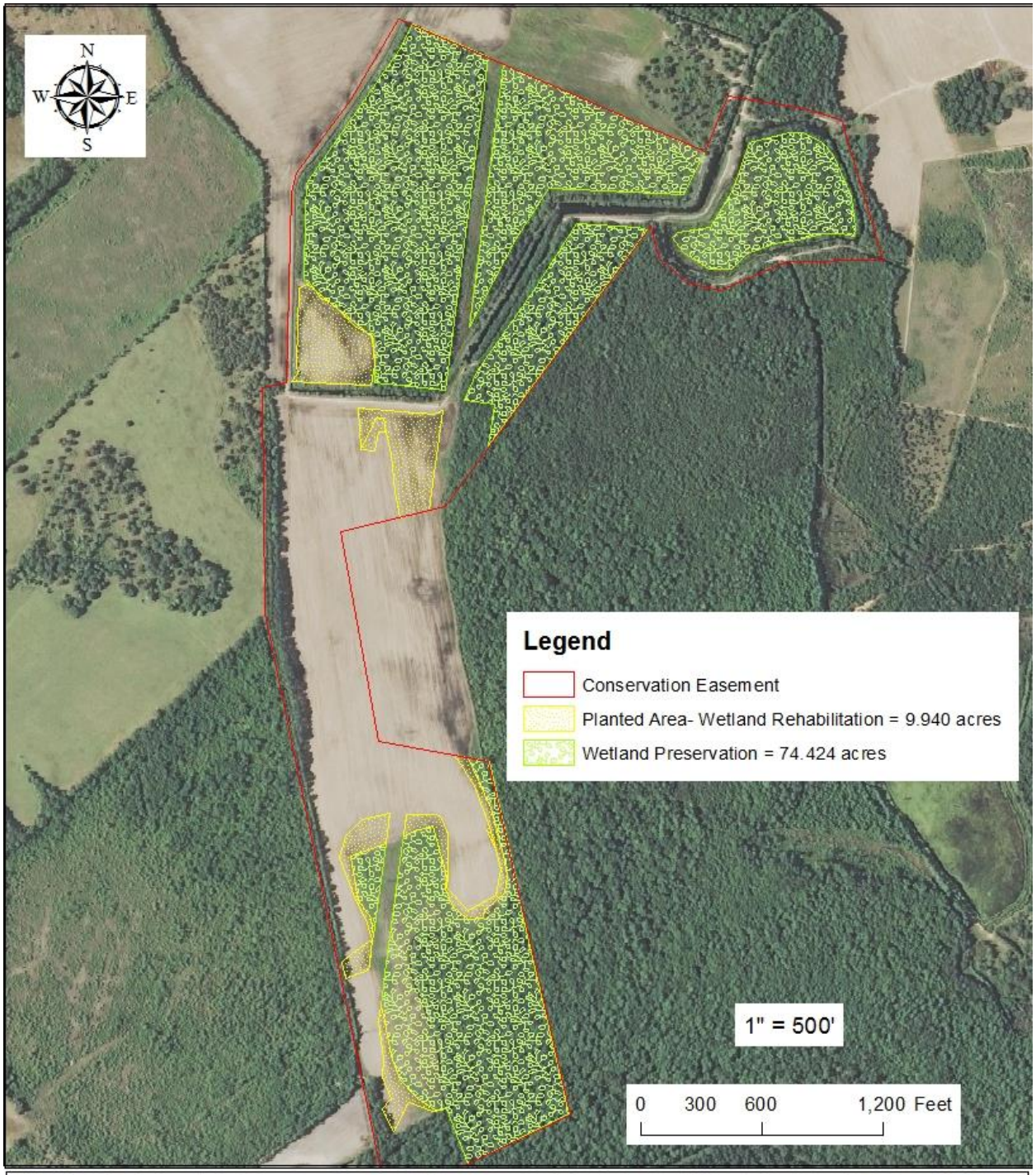
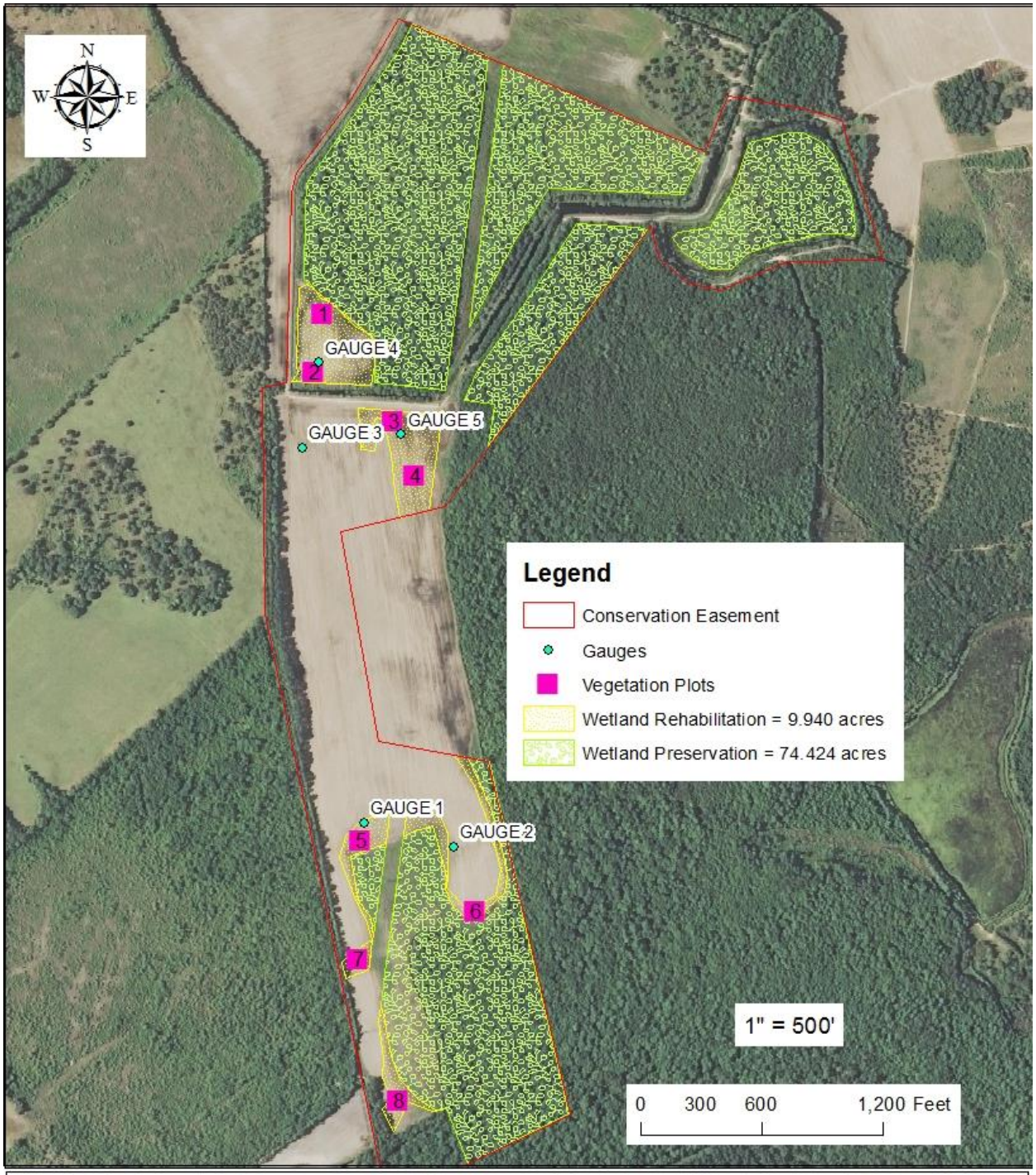


Figure 3. Current Conditions Plan View



Current Conditions Plan View
Black Gum Site 97063
Monitoring Year 2- 2017
Robeson County, NC
Note: Gauge 2 and 3 are not inside wetland asset areas, and are not counted toward success criteria

Mitigation Services
ENVIRONMENTAL QUALITY

Site Photos (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

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

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	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 acres	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 acres	Pattern and Color	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%
Easement Acreage[2]	**14**					
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Easement Acreage**
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	0	0.00	0.0%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

APPENDIX C

VEGETATION PLOT DATA

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

Plot #	Planted Stems	Avg. Stems per acre	Success Criteria Met?
1	13	526	Y
2	10	405	Y
3	14	567	Y
4	15	607	Y
5	15	607	Y
6	7	283	Y
7	11	445	Y
8	10	405	Y
Project Avg	0	481	Y

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

			Current Plot Data (MY3 2018)																									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			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree				3	3	3	9	9	9	5	5	5	6	6	6	1	1	1	1	1	1	1	1	2	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	2	13	13	14	13	13	13	17	17	17	16	16	16
Cornus amomum	silky dogwood	Shrub	2	2	2				1	1	1	1	1	1	3	3	3	2	2	2				4	4	4	13	13	13	13	13	13	16	16	16	16	16	16
Fraxinus pennsylvanica	green ash	Tree	7	7	7			2	1	1	1	2	2	2			1			1				3	3	6	13	13	20	11	11	11	22	22	22	16	16	16
Liquidambar styraciflua	sweetgum	Tree																																				
Pinus taeda	loblolly pine	Tree																																				
Platanus occidentalis	American sycamore	Tree				4	4	5				4	4	4	1	1	1	2	2	2	4	4	4				15	15	16	16	16	16	21	21	21	20	20	20
Quercus michauxii	swamp chestnut oak	Tree	3	3	3	3	3	4	1	1	1	2	2	2	1	1	1	2	2	2	2	2	2	1	1	1	15	15	16	15	15	15	13	13	13	12	12	12
Salix nigra	black willow	Tree																																				
Unknown		Shrub or Tree																															2	2	2	1	1	1
		Stem count	13	13	13	10	10	14	14	14	14	15	15	15	15	15	16	7	7	8	11	11	11	10	10	15	95	95	106	95	95	95	125	125	125	115	115	115
		size (ares)	1			1			1			1			1			1			1			1			8			8			8			8		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.20			0.20			0.20			0.20		
		Species count	4	4	4	3	3	4	5	5	5	6	6	6	5	5	6	4	4	5	4	4	4	5	5	5	6	6	6	6	6	6	7	7	7	7	7	7
		Stems per ACRE	526.1	526.1	526.1	404.7	404.7	566.6	566.6	566.6	566.6	607	607	607	607	607	647.5	283.3	283.3	323.7	445.2	445.2	445.2	404.7	404.7	607	480.6	480.6	536.2	480.6	480.6	480.6	632.3	632.3	632.3	581.7	581.7	581.7

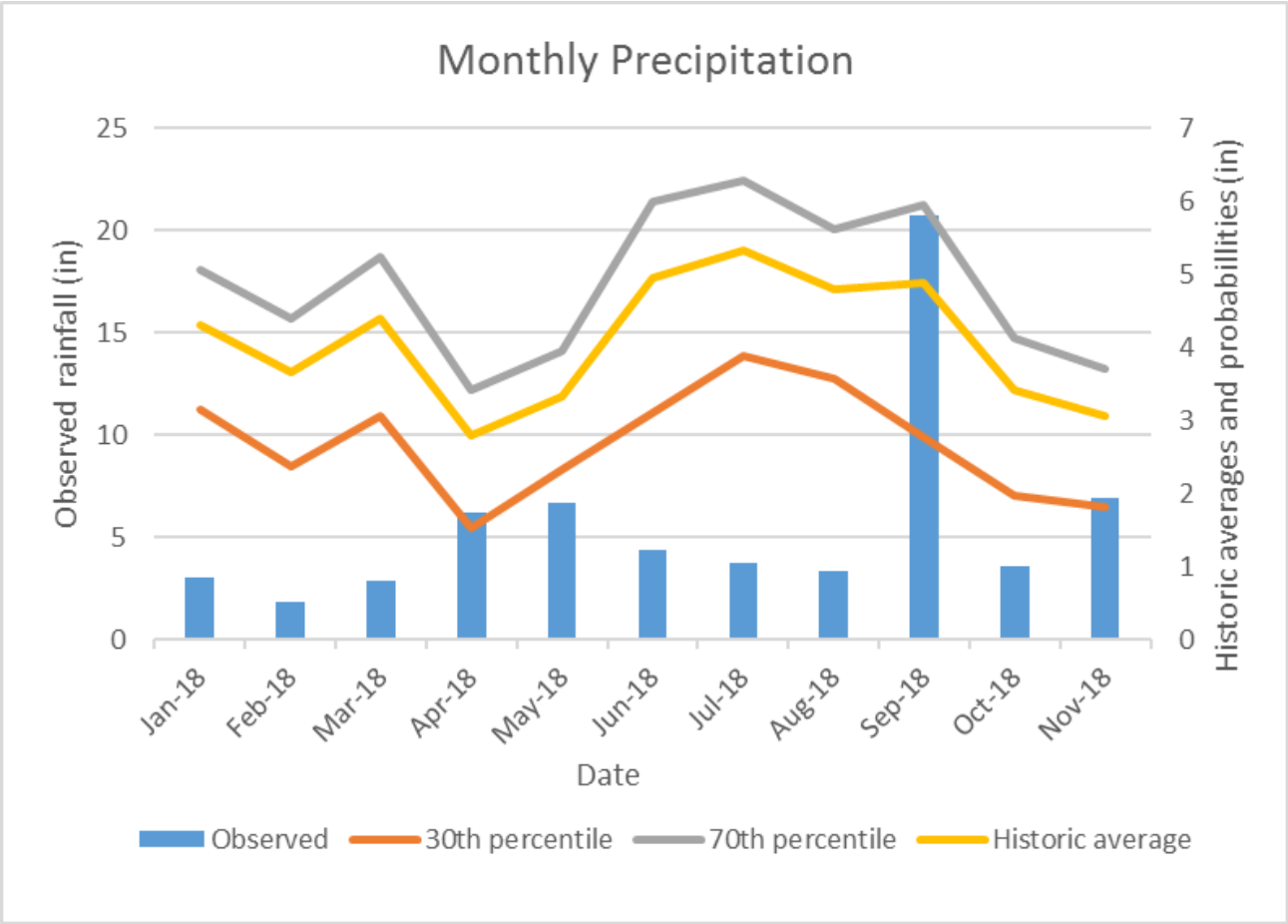
Color for Density

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

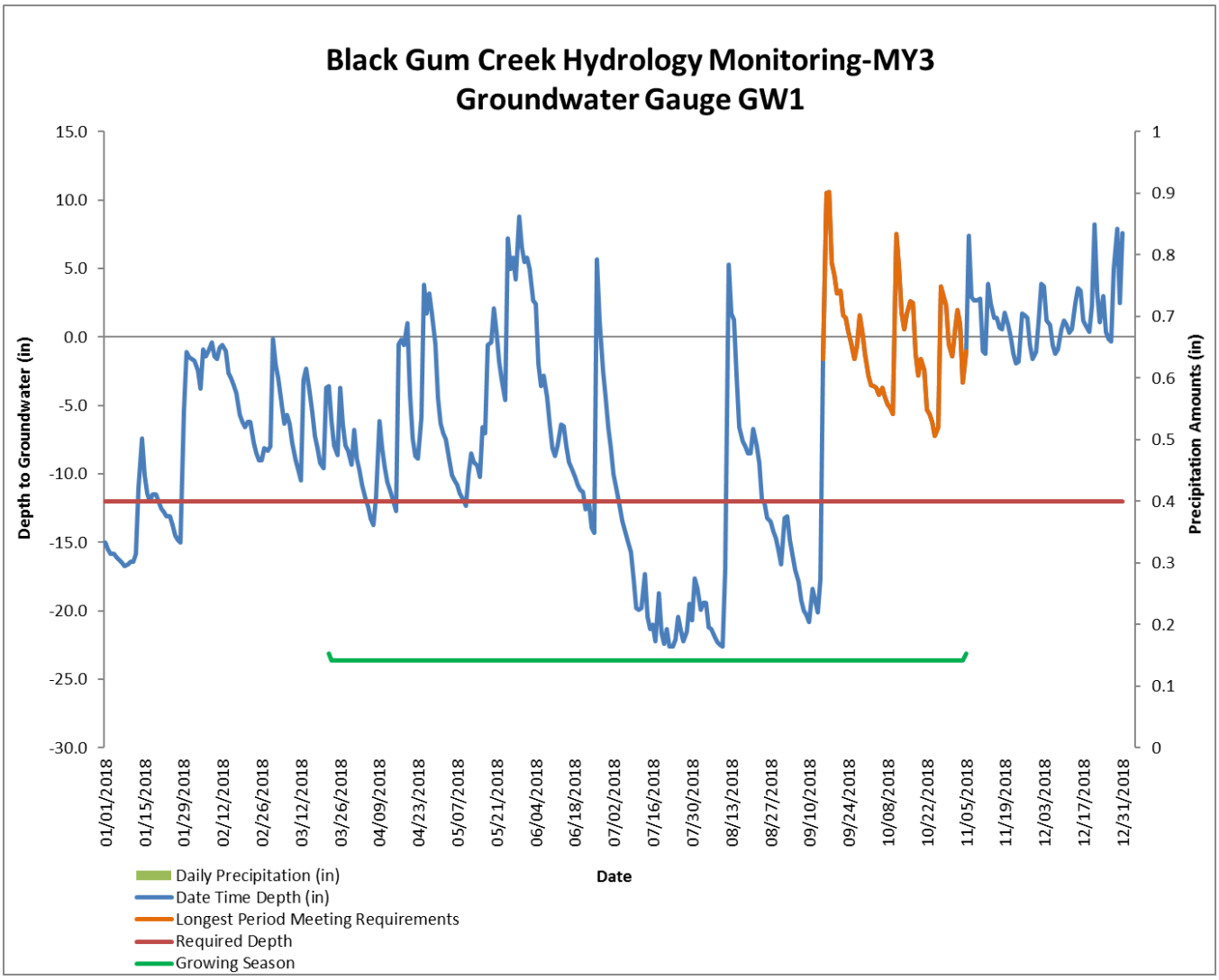
HYDROLOGIC DATA

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



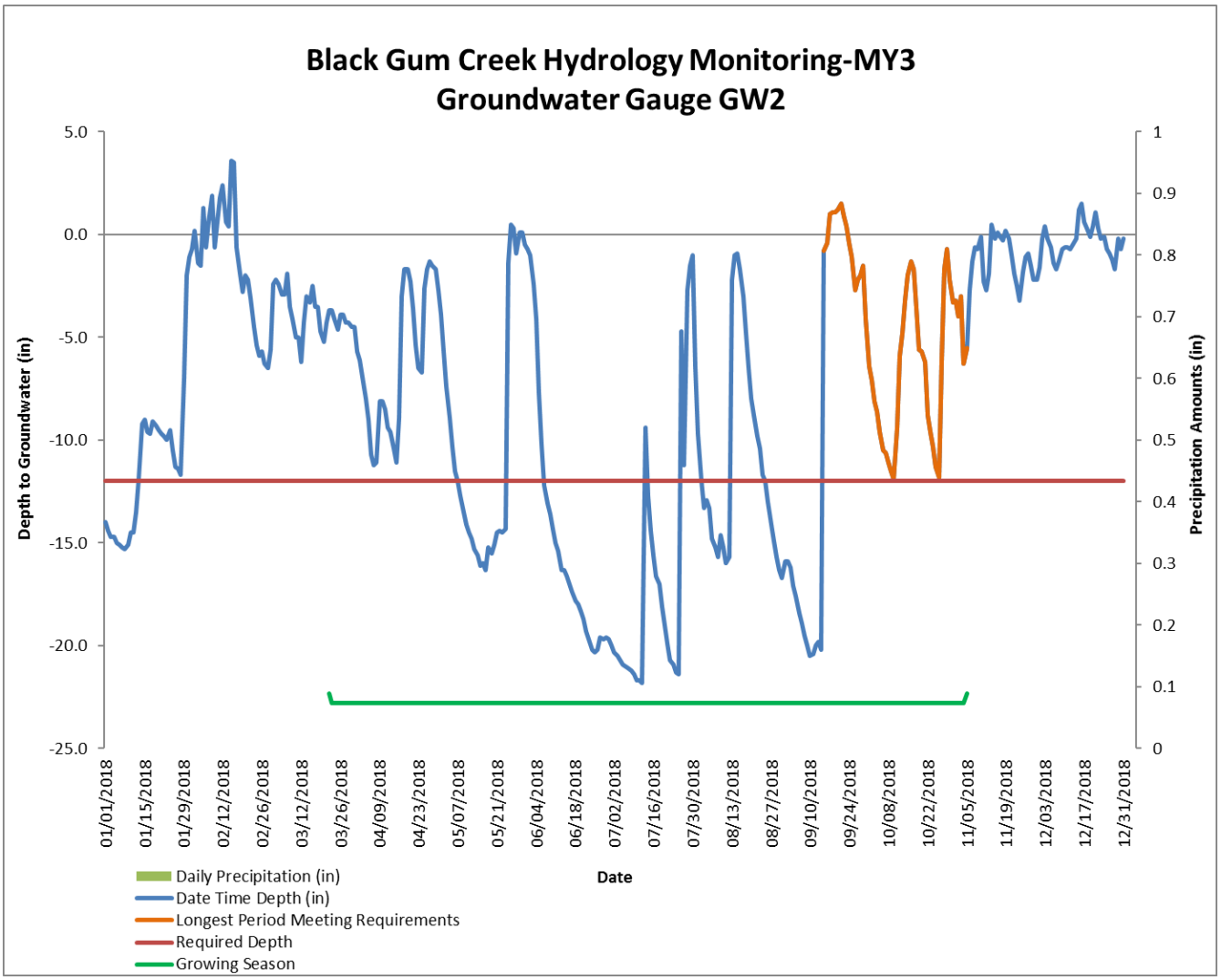
MY3 (2018) observed and historic rainfall data collected from the USDA-NRCS Agricultural Applied Climate Information System, Laurinburg-Maxton Airport monitoring station in Scotland County. Data acquired for MY2 (2017) from USDA-NRCS Agricultural Applied Climate Information System (Red Springs 1 SE monitoring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

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



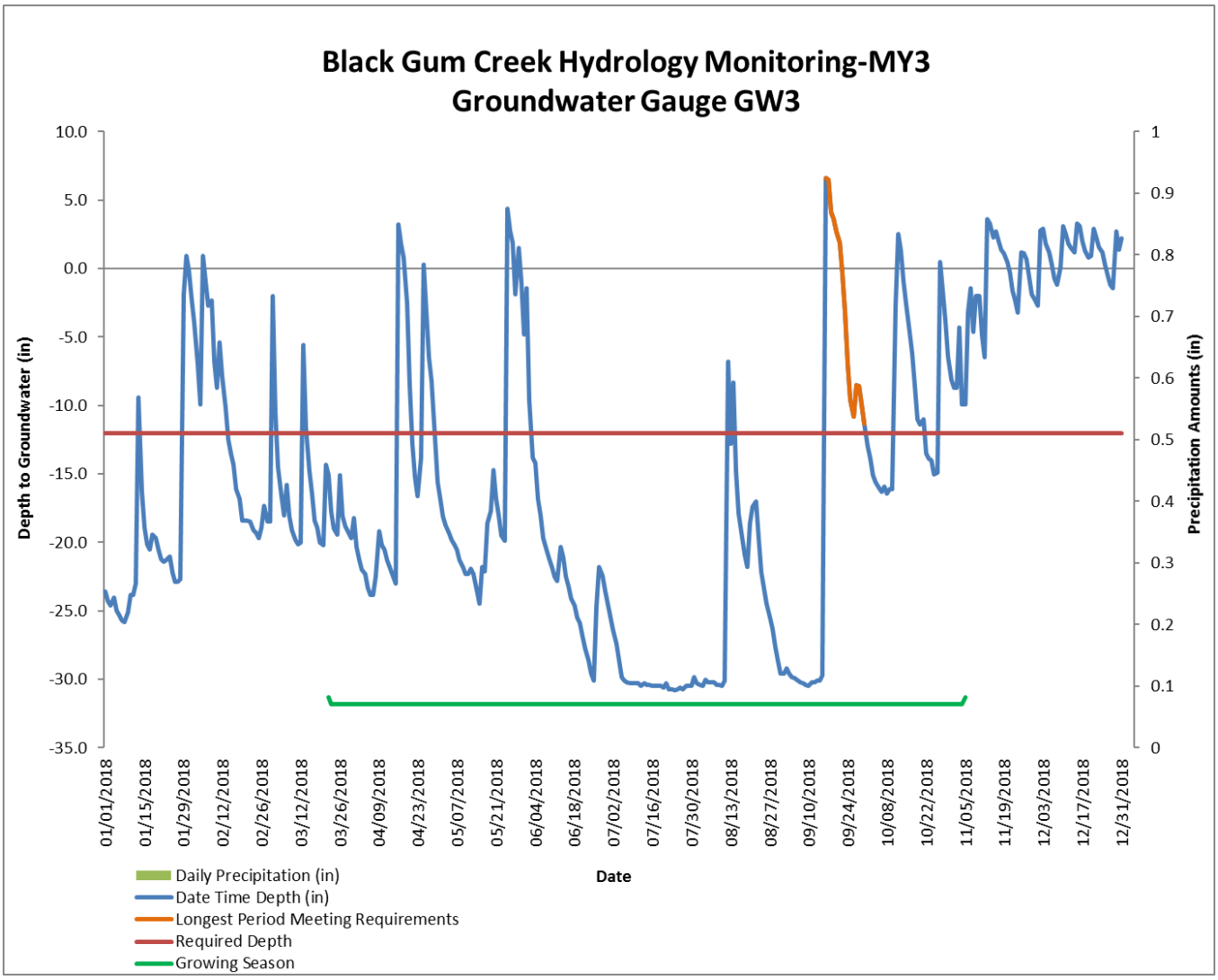
Growing Season Days: 228 (Mar 22 – Nov 5)
Target Hydroperiod Percent: 8%
Required Number of Days Meeting Requirements: 18
Longest Period Meeting Requirements: 52
Hydroperiod Percent: 22.8%

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



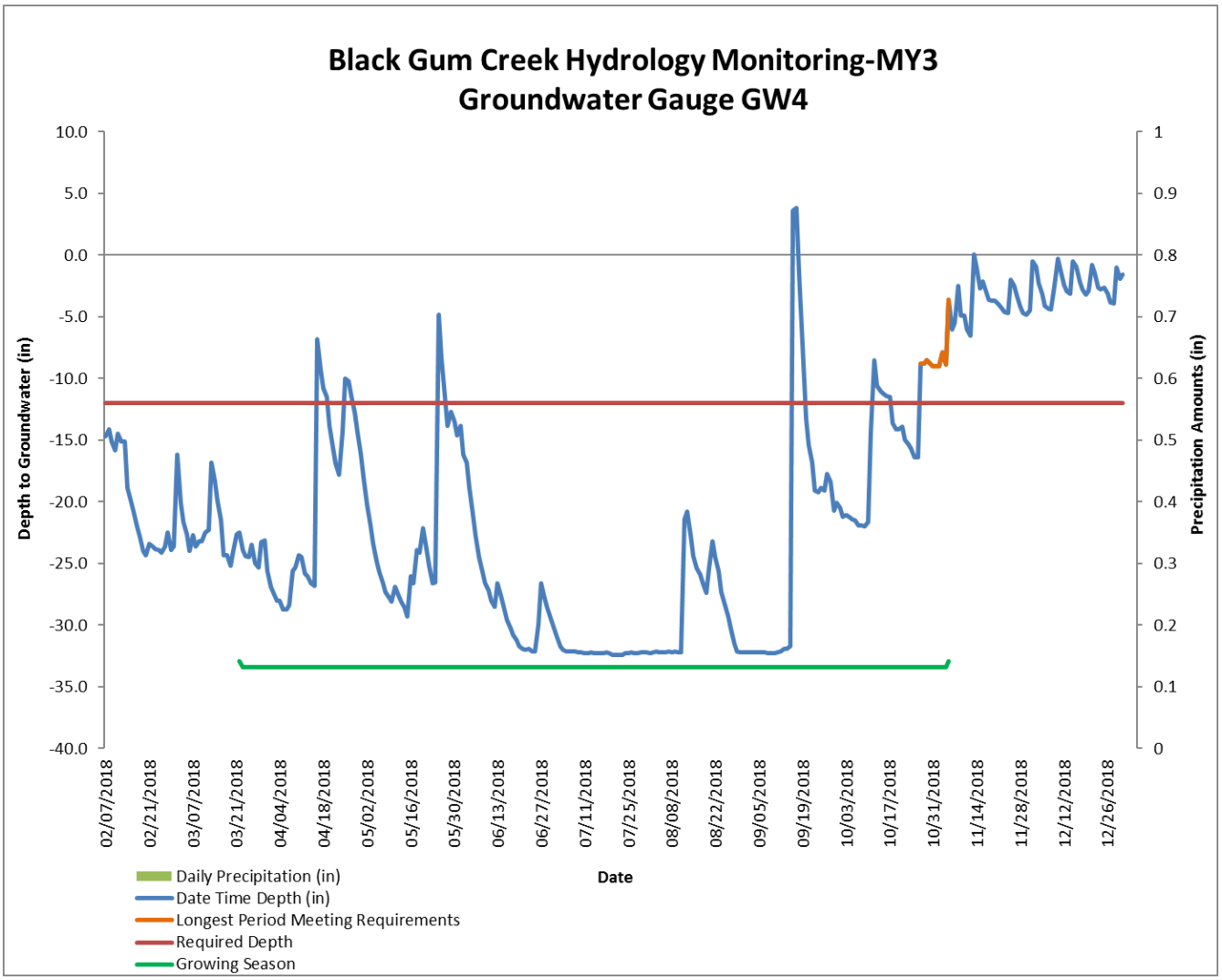
Growing Season Days: 228 (Mar 22 – Nov 5)
Target Hydroperiod Percent: 8%
Required Number of Days Meeting Requirements: 18
Longest Period Meeting Requirements: 52
Hydroperiod Percent: 22.7%

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



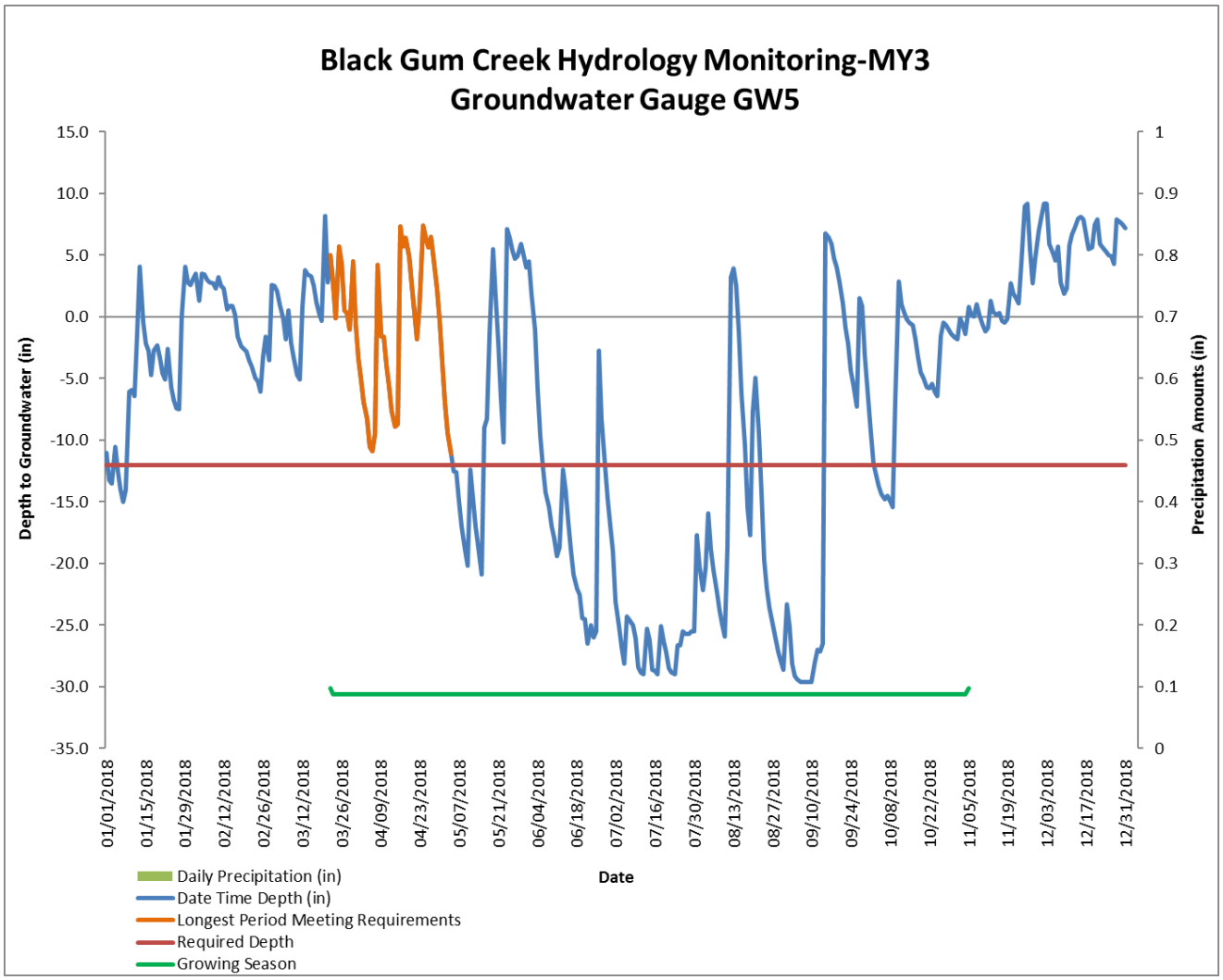
Growing Season Days: 228 (Mar 22 – Nov 5)
Target Hydroperiod Percent: 8%
Required Number of Days Meeting Requirements: 18
Longest Period Meeting Requirements: 15
Hydroperiod Percent: 6.6%

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: 10
Hydroperiod Percent: 4.4%

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: 44
Hydroperiod Percent: 19.3%

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

	Success Criteria Achieved/Max Consecutive Days During Growing Season (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%		
2**	N/A / 10 4.4%	Not available***	N/A / 11 4.8%	N/A / 22 9.6%	N/A / 52 22.7%		
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%		
4	Yes / 52 22.8%	Yes/46 20.2%	Yes/39 17.0%	No/2 0.9%	No/10 4.4%		
5	Yes / 23 10.1%	Yes/63 27.6%	Yes/67 29.3%	Yes/24 10.5%	Yes/44 19.3%		

* 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.