

Mitigation Project Name Tar River Headwaters Restoration
 DMS ID 97071
 River Basin Tar-Pamlico
 Cataloging Unit 03020101

County
 Date Project Instituted 2/8/2016
 Date Prepared 5/22/2018

USACE Action ID N/A
 NCDWR Permit No N/A

Credit Release Milestone	Stream Credits						Wetland Credits							
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Date (Wetland)
Potential Credits (Mitigation Plan)							7.277							
Potential Credits (As-Built Survey)							7.277							
1 (Site Establishment)	N/A				N/A	N/A	N/A				N/A		N/A	N/A
2 (Year 0 / As-Built)	30%				N/A	N/A	30%	2.183			30%		2017	4/26/2017
3 (Year 1 Monitoring)	10%				N/A	N/A	10%	0.728			10%		2018	4/25/2018
4 (Year 2 Monitoring)	10%				N/A	N/A	10%				15%		2019	
5 (Year 3 Monitoring)	10%				N/A	N/A	15%				20%		2020	
6 (Year 4 Monitoring)	5%				N/A	N/A	5%				10%		2021	
7 (Year 5 Monitoring)	10%				N/A	N/A	15%				15%		2022	
8 (Year 6 Monitoring)	5%				N/A	N/A	5%				N/A		2023	
9 (Year 7 Monitoring)	10%				N/A	N/A	10%				N/A		2024	
Stream Bankfull Standard	10%						N/A				N/A			
Total Credits Released to Date							2.911							

DEBITS (released credits only)

	Ratios	1	1.5	2.5	5	1.05123	3	2	5	1	3	2	5	1	3	2	5
		Stream Restoration	Stream Enhancement	Stream Enhancement	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
As-Built Amounts (feet and acres)						7.650											
As-Built Amounts (mitigation credits)						7.277											
Percentage Released						40%											
Released Amounts (feet / acres)						3.060											
Released Amounts (credits)						2.911											
NCDWR Permit	USACE Action ID	Project Name															
Remaining Amounts (feet / acres)						3.060											
Remaining Amounts (credits)						2.911											

Contingencies (if any): None



Signature of Wilmington District Official Approving Credit Release

9/6/18

Date

- 1 - For NCDMS, no credits are released during the first milestone
- 2 - For NCDMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCDMS Portal, provided the following criteria have been met:
 - 1) Approval of the final Mitigation Plan
 - 2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
 - 3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
 - 4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required
- 3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met

Tar River Headwaters Wetland Restoration Site

Person County NC -- Tar-Pamlico River HUC# 03020101-0102

MY-2 (2018) Annual Fall Monitoring Report

NC-DEQ Division of Mitigation Services: DMS Project # 97071
DEQ Contract #6746 DWR # 2016-0233 ACE #SAW-2016-01101
Data Collected: Oct-Nov 2018 Final Report: January 2019



Submitted To:
N.C. Department of Environmental Quality
DEQ Division of Mitigation Services
1652 Mail Service Ctr, Raleigh, NC 27699-1652

DMS Project Manager: Lindsay Crocker
DEQ-DMS Contract # 006746

MOGENSEN MITIGATION, INC.
P.O. Box 690429 Charlotte, NC 28227

(704) 576-1111 Rich@MogMit.com
(919) 556-8845 Gerald@MogMit.com





January 2, 2019

Sent via email to gpottern@rjccarolina.com

Gerald Pottern

Re: Tar River Headwaters Draft Year 2 Monitoring Report
Tar-Pam River Basin, Contract 006746, **Person County**, DMS Project No. **97071**

Gerald,

The Division of Mitigation Services (DMS) received the subject report on 12/19/2017 and a site visit occurred on or about 7/26/18. After review, DMS offers the following comments: **MMI responses in red, 5 Jan 2019.**

1. Add the DWR and IRT number (if applicable) on the cover page (DWR 2016-0233, does this have an SAW number). **Response: added DEQ Contract #6746, DWR # 2016-0233, ACE #SAW-2016-01101**
2. Table 6, first paragraph: Mogensen states that 3 plots “failed the criteria.” Your success criteria is based based on living stems per the Mitigation Plan. This means any of the species in the planting plan- Page 18 of your Mitigation plan, Table 5 MYO will count toward success (not loblolly, sweetgum, but others). It is suggested that the report states the number of plots that met success and then let the vegetative data speak for itself by referencing table. You do not need to use a percentage of plots for success when there are only 8 plots total. The vegetation plot that only has 4 stem...is this a problematic area or just a random low vigor area? **Response: Text and Tables 6-7 are revised to reflect total planted + volunteer stems of all planted species as success criteria. This reduced the number of failing plots to two. The failing plots (#21 and #24) do not reflect large areas of low stem density.**
3. Page 6, third paragraph, last sentence- this website reference does not link to an existing page. Remove or update. As previously commented by DMS, capillary fringe is a physical property and capillary movement a process of water movement in soil, usually related to texture, and is not indicative of wetland hydrology. This is fine to leave in, but Mogensen should be prepared to explain to IRT what this means in context of project. **Response: The website link is active (Jan 4); I copied it directly from the report text, and it is still working. We are prepared to explain capillary fringe saturation to IRT if requested.**
4. Table 1, Can you please update this table out to three significant digits for measurement (this will put your total assets at 7.277 and matching your credit release ledger). DMS understands that this was accepted as is last year and as-built and was a DMS oversight. Guidance (numbers) for table update below: **Response: Table 1 is revised as requested.**

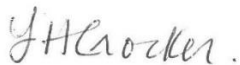
Riparian Wetland

	ac	ratio	credit
Re-establishment	6.530	1	6.530
Rehabilitation	1.120	1.5	0.747
TOTAL	7.650		7.277

5. CCPV: see vegetative comment above, update color coding of vegetation plots meeting on the CCPV, update if needed. **Response: VP-20 is now meeting criteria and is recolored green in Figure 2.**
6. Figure 3 (multiple). Title states MY01 (2017) on all pages with photos, revise to correct dates/year. Insert actual month and day of pictures if possible. **Response: Title corrected and photo dates added.**
7. Figure 4 (multiple). Title states MY2, but photo point titles all show MY1. Update with correct photos and correct dates/years. Insert actual month and day of pictures if possible. **Response: Same as above.**
8. Table 6. Update footnote to removed “planted.” **Response: “Success criteria based on planted + volunteer stems (counting planted spp only): 320 stems/ac at MY3, ...”**
9. Table 7. CCPV: Please review at your total planted water oak and willow oak. Is it possible that Mogensen erroneously evaluated some of the water oak as willow oak and/or vis versa in MY1? The numbers there don’t make sense. If this was a mis-id situation, it is ok to footnote this but please provide explanation. **Response: Footnote added: “Quercus phellos and Q. nigra identifications were corrected in 2018”**
10. Data files: these files look good. In the future, you do not have to submit any shapefiles as we have all those (unless there is a visual area of concern). **Response: NA**
11. Hydro data: why are there two sensor depths for R2-832? Was the gauge re-installed with a different offset? It appears there is a lot going on in these files, with multiple gauges, names, multiple offsets, etc. Please remove any data from any year besides MY2 for incorporation in our dataset, only include offset information for current year attributed by the Feature/Gauge ID that is used in the report, and make sure that is the case for future years for re-submittal. **Response: Yes, the Hobo logger at the ref gauge was reinstalled at a different depth (offset). Pre-2018 data are removed, and all gauges representing each site (letter) are combined into a single sheet in the workbook.**

Please let me know if you have any questions or need additional information. I can be reached by phone at 919-707-8944 or via email at Lindsay.crocker@ncdenr.gov. Upon revision, please reply to comments, submit three hardcopies of the revised report or **two copies and upload an additional digital file to the DWR on-line portal**, along with a CD that includes a .pdf of the updated report and any updated digital data.

Kind Regards,



Lindsay Crocker, Project Manager
NCDEQ Division of Mitigation Services

Table of Contents

1.0. Project Background Summary	3
1.1. Project Location and Setting	3
1.2. Pre-Restoration Conditions	3
1.3. Mitigation Goals and Performance Criteria	3
1.4. Mitigation Approach	5
2.0. Monitoring Methods	5
3.0. Current Conditions Summary	6
4.0. References	7

APPENDIX A. Project Background Data

- Figure 1. Project Vicinity Map
- Table 1. Project Components and Mitigation Credits
- Table 2. Project Activity and Reporting History
- Table 3. Project Contacts Table
- Table 4. Project Attributes

APPENDIX B. Visual Assessment Data

- Figure 2. Current Conditions Plan View
- Table 5. Vegetation Conditions Assessment
- Figure 3. Vegetation Plot Photos
- Figure 4. Photo Point Photos

APPENDIX C. Vegetation Plot Data

- Table 6. Vegetation Plot Success Summary
- Table 7. Vegetation Plot Stem Count Data

APPENDIX D. Hydrologic Data

- Figure 5. Monthly Rainfall Plot with Percentiles
- Figure 6. Groundwater Gauge and Rainfall Data
- Table 8. Hydrologic Success Attainment

1.0. Project Background Summary

1.1. Project Location and Setting

The Tar River Headwaters Wetland Restoration Site (TRHWR) is a full-delivery wetland mitigation project located in eastern Person County, between Roxboro and Oxford, North Carolina, within the Piedmont Physiographic Province (Figure 1). The easement comprises 9.98 acres, most of which is drained and degraded wetlands or former wetlands with hydric soil indicators. The remaining areas include non-hydric soils, drainage ditches, and a 570-foot long riparian corridor along a ditch and intermittent stream connecting the TRHWR site to the adjacent Tar River Headwaters Riparian Buffer and Nutrient Offset Mitigation Bank project. Both projects are implemented by Mogensen Mitigation, Inc. (MMI), and are located on a 228-acre farm owned by Roy and Joyce Huff, in the Tar-Pamlico River Basin 12-digit HUC # 03020101-0102. The Huff Farm property is located at 333 Bunnie Huff Road, Oxford NC 27565. The access road into the TRHWR site is at Latitude = 36.3913, Longitude = -78.8171.

1.2. Pre-Restoration Conditions

The TRHWR site was cleared and ditched for pasture use in the 1940s according to the owner, and was used for grazing cattle until January 2017 when the conservation easement fence was installed. The project involves plugging drainage ditches to restore wetland hydrology, fencing to exclude livestock, and planting native trees and shrubs to restore a Headwater Forest wetland ecosystem similar to what occurred prior to site clearing and drainage. Remnant native trees left for shade, hydrophytic groundcover plants mixed among the pasture grasses, and plant species recorded in adjacent natural forests (on the same soil mapping unit) provided data for the planting plan.

The project will restore approximately 7.65 acres of headwater riparian wetland (6.53 acres reestablishment plus 1.12 acres rehabilitation) and will generate an estimated 7.28 or more riparian wetland mitigation credits. Approximately 1.27 acres with non-hydric soils in the southeast corner of the mitigation site will also be reforested, and a 100-foot wide by 570-ft long riparian corridor (1.06 acre) extending southeastward along the ditch will connect the TRHWR site to MMI's adjacent stream restoration and nutrient buffer bank project to the south. Total acreage of the wetland mitigation site and riparian connector is 9.98 acres.

Restoration activities including tree planting, surface flow dispersal, and cattle exclusion will reduce soil erosion and nutrient-enriched runoff from adjacent pasture and cropland within its watershed, and help retain agricultural chemicals used on these lands. It is expected to improve water quality and habitat in the receiving tributary and reduce fine sediment loading which will enhance the overall watershed particularly in the adjacent stream and nutrient mitigation bank.

1.3. Mitigation Goals and Performance Criteria

The subject watershed HUC #03020101-0102 is designated by NCDEQ as a Targeted Local Watershed (TLW) for water quality improvement projects, and the Tar River reach within and downstream of this local HUC is recognized as a Significant Natural Heritage Area (SNHA) for its high diversity of aquatic life including protected species of river mussels and fishes. The TRHWR project is intended to support

these TLW and SNHA designations by improving water quality and habitat on the property and downstream. Specific project goals and objectives as identified in the TRHWR Final Mitigation Plan (December 2016) include:

GOALS:

- Restore the natural jurisdictional wetland hydro-period to five or more acres of forested wetland within a nine-acre site;
- Restore forested wetland habitat and improve habitat connectivity between Denny Store Gabbro Forest (NHP Natural Heritage Area) to the north and the Tar River tributaries;
- Buffer storm water runoff from fecal and other cattle-related pollutants and fertilizer.

OBJECTIVES:

- Plug existing ditches and create sheet flows throughout the site. Aerate soils to reduce compaction, improve infiltration, and create micro-topography to retain surface flows;
- Preserve the remnant mature Swamp White Oaks (a regionally rare species) for seed source. Plant appropriate native hardwood trees at a sufficient frequency to establish a diverse bottomland wetland forest. Treat and/or remove invasive species which may cause problems for site restoration, including Chinese privet and multi-flora rose;
- Install fencing to exclude cattle and establish a conservation easement to provide permanent protection on the site.

PERFORMANCE STANDARDS and MONITORING:

GOAL	OBJECTIVE	PERFORMANCE STANDARD	MONITORING APPROACH
Restore natural hydro-period for headwater forest wetland.	Plug existing ditches and create sheet flow throughout the site. Aerate soils to reduce compaction, improve infiltration, and create micro-topography to retain surface flows.	Water must be on or within 12 inches of the surface for 10% of the growing season. Hydrographs will indicate jurisdictional hydrology.	Use 11 shallow groundwater self-reading gauges throughout the site at a frequency of about one per acre. Visual inspection of ponding duration.
Restore forested wetland habitat and improve habitat connectivity with existing forests.	Preserve mature swamp white oak trees for seed source. Plant appropriate native hardwood trees at 10-ft average spacing (435 stems/ac) Treat invasive species.	Survival of 320 stems per acre at year 3, 260 stems per acre at year 5 and 210 stems per acre at MY 7.	Monitor vegetation plots annually and calculate densities of surviving planted & volunteer stems.
Buffer storm water runoff from fecal and other cattle-related nutrient inputs.	Plant trees, fence perimeter and establish a permanent conservation easement.	Insure the integrity of the cattle exclusion fencing for the life of the contract.	Visual inspection will note fence condition through site pictures. Observations will be included in annual monitoring reports.

1.4. Mitigation Approach

Prior to restoration, the TRHWR project area contained 6.53 acres of former riparian wetland (ditched and drained, grazed pasture) with redoximorphic soil characteristics indicating hydric soils, but lacking adequate wetland hydrology based on groundwater gauge data and field observations during 2015-2016. Although the drainage ditches are shallow, they have effectively reduced water retention across much of the site over the past 70 years due to the slow infiltration rate, rapid runoff, and shallow hardpan in these soils. The project will re-establish jurisdictional wetlands in this area by plugging the drainage ditches to increase rainfall retention and dispersal, fencing out livestock, controlling invasive species, and planting suitable native tree species. These 6.53 acres of wetland restoration will generate riparian wetland credits at 1:1 ratio, yielding 6.53 WMU.

Another 1.12 acres in the TRHWR project area has been less effectively drained by the ditches, and still has sufficient hydrology to meet jurisdictional wetland criteria, based on groundwater gauge data and field observations during 2015-2016. The project will rehabilitate these areas of degraded jurisdictional wetland (grazed pasture with reduced hydrology) by plugging ditches to increase hydrology, fencing out livestock, and planting suitable native tree species. These 1.12 acres of wetland rehabilitation will generate riparian wetland credits at 1.5:1 ratio, yielding 0.75 WMU. TRHWR project components and mitigations assets are summarized in Table 1, matching the proposed assets in the Mitigation Plan.

2.0. Monitoring Methods

Vegetation plots are monitored annually in accordance with current DMS monitoring guidance (June 2017). The nine installed CVS vegetation plots, each 10 x 10 meters, represents 2.8 percent of the planted mitigation area. Vegetation monitoring will occur between September and early November, prior to the loss of leaves. The vegetation success criteria are specified in the Performance Standards above. If success criteria are not met, site maintenance and monitoring will continue until the success criteria are met.

The twelve onsite groundwater monitoring gauges (RDS and Hobo) and one offsite reference wetland gauge are downloaded and maintained at least quarterly. Gauge data in the mitigation credit areas are plotted and evaluated for success based on the mitigation plan performance standard of continuous saturation within 12 inches of the ground surface for 10 percent of the growing season. Growing season based on air temperature at a weather station east of Roxboro is from March 28 to November 3, which is 221 days (from USDA WETS table). MMI installed a Hobo dual-probe soil temperature logger near the middle of the TRHWR site (beside GW-H) in late January 2017. Soil temperature on the site remained above 41 F at both 10-inch and 20-inch depths throughout February and March 2017. The lowest temperatures recorded were 42.7 F at 10 inches and 45.4 F at 20 inches. Based on soil temperatures remaining above the USDA-designated temperature for plant physiological activity, March 1 is used as the start of the growing season, based on field discussions with DMS and USACE. The revised growing season length is thus 248 days, and the groundwater hydrology success criterion is 25 days.

The conservation easement perimeter fence and ditch plug integrity will be monitored visually and documented with photo points.

3.0. Current Conditions Summary

MMI scientists made several visits to the TRHWR site between March and November 2018 to collect gauge data and evaluate the condition of the ditches, ditch plugs, and planted and volunteer trees. The CVS vegetation plot data collection was performed in early October. Seven of the nine CVS plots had 8 to 12 surviving stems (planted plus volunteers) and met the 320 stems per acre success criteria (Tables 6 and 7). Outside of the CVS plots, planted stem survival looks generally good throughout the site, with an estimated 10 to 20 percent apparent mortality. Leader die-back is common on many of the taller seedlings, especially on tulip poplar and river birch, but most of the trees exhibiting leader die-back also had vigorous basal sprouts. There are scattered small areas with tree densities less than 320 stems per acre, but none exceeding the “problem area” size threshold, and no “low woody density” areas or “invasive exotic” problem areas were designated this year. Groundcover vegetation is excellent throughout, with both treated areas (non-wetland and drained wetland) and non-treated areas (existing wetland) showing dense and diverse herbaceous cover. Small unflagged trees outside of the CVS plots remain difficult to see due to the dense groundcover.

All ditch plugs appear to be stable and performing as designed, despite 8 inches of rainfall during Hurricane Florence in mid-September. Survival of planted trees, live-stakes, and herbaceous cover on the plug slopes and tops appears to be providing good protection; no significant erosion on the plugs was observed. Ponding behind all of the ditch plugs was evident during spring and intermittently during summer and fall.

Twelve groundwater gauges (A through L) on the project site are roughly arranged in four transects perpendicular to the main ditch, as recommended by mitigation plan reviewers during field meetings (Figure 2). Three gauges (A, H and J) are within existing wetland rehabilitation areas, seven gauges (D, E, F, G, I, L, and K) are within the drained wetland reestablishment areas, and two gauges (B and C) are downslope from ditch plug #4 in areas not expected to generate wetland credits. Wetland hydrology success for the TRHWR site is based on saturation within 12 inches of the ground surface for 10% of the 248-day growing season (March 1 to November 3). The gauges measure the free water table depth and do not account for capillary fringe saturation which can extend well above the free water table in fine-textured soils (<https://vernonjames.ces.ncsu.edu/eleventh-annual-on-site/soil-wetness/>).

Rainfall in 2018, relative to the 30-year normal values (30th to 70th percentiles), was normal in January, low in February, normal in March, and above normal from April through June and from August through November (Figure 5). In 2018 all 13 gauges (ten in the mitigation credit area, two outside the credit area, and one off-site reference gauge) exceeded the minimum of 25 consecutive days for hydrologic success during the early part of the growing season, with consecutive day saturation periods ranging from 64 to 101 days (Figure 6).

Soil temperature data for 2018 support the accepted growing season start date of March 1. Soil temperature remained above 41 F from January 28 onward, and the lowest recorded soil temperature after March 1 was 44.3 F on March 15. The lowest recorded soil temperature in 2018 was 36.2 F during January 9-10 at 10 inches deep.

4.0. References

Lee, Michael T., Peet, Robert K., Roberts, Steven D., Wentworth, Thomas R. (2008). *CVS-EEP Protocol for Recording Vegetation version 4.2, October 2008*. Retrieved September 2011, from:

<http://cvs.bio.unc.edu/methods.htm>

LeGrand, Harry E. Jr. (2007) Natural Areas Inventory of Person County, NC. NC Natural Heritage Program, Raleigh NC.

NC Division of Mitigation Services. (2017). *NC-DMS Annual Monitoring Report Format, Data Requirements, and Content Guidance, June 2017*. <http://portal.ncdenr.org/web/eep/dbb-resources>

Schafale, M.P., Weakley, A.S. 1990. Classification of the Natural Communities of North Carolina, Third Approximation. NC Natural Heritage Program, Raleigh, NC.

Sink, Larry T. (1995). *Soil Survey of Person County, North Carolina*. USDA Soil Conservation Service (Natural Resources Conservation Service), Raleigh, NC.

United States Department of Agriculture, Natural Resources Conservation Service, 2016. Web Soil Survey. Available: <http://websoilsurvey.nrcs.usda.gov/app/>

APPENDIX A. Project Background Data

Figure 1. Project Vicinity Map

Table 1. Project Components and Mitigation Credits

Table 2. Project Activity and Reporting History

Table 3. Project Contacts Table

Table 4. Project Attributes

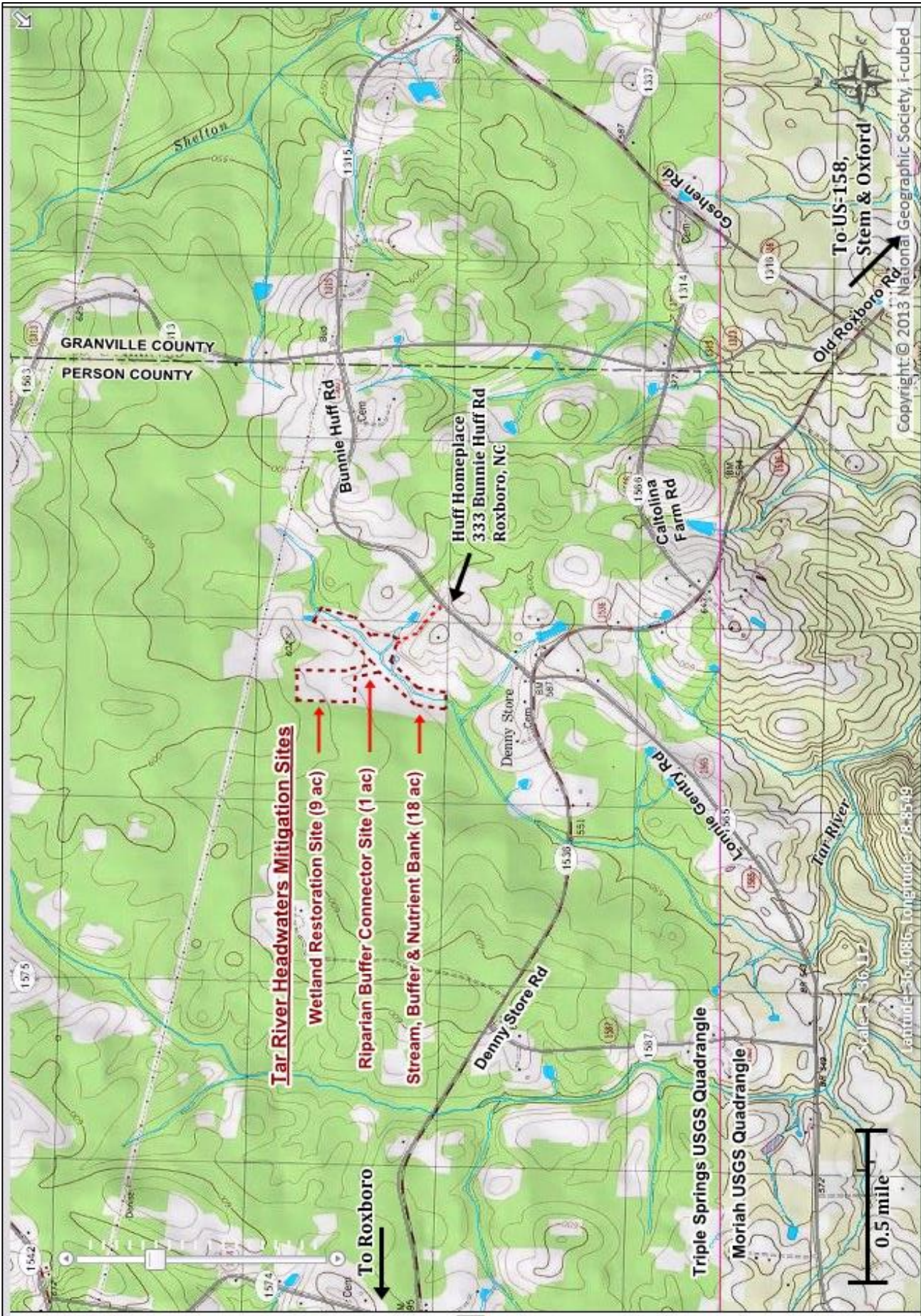


Figure 1. Project Vicinity Map: Tar River Headwaters Wetland Restoration Site and related mitigation projects on the Huff Farm property, Person County NC, Tar-Pamlico River HUC# 03020101-0102. DIRECTIONS: From US-158 in Berea, Granville County NC, turn right (northwest) on Old Roxboro Rd, which becomes Denny Store Rd where it crosses into Person County. Turn right (north) on Bunnie Huff Rd, go 0.4 mile, and turn left into the driveway just past the Huff Homeplace sign. Proceed through the gate at end of driveway to the project sites.

Table 1. Project Components and Mitigation Credits								
Tar River Headwaters Wetland Restoration Site, DMS Project # 97071								
Mitigation Credits								
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset
Type	R	RE	R	RE	R	RE		
Acres			7.650					
Credits			7.270					
TOTAL CREDITS			7.277					
Project Components								
Project Component or Reach ID	Stationing/ Location		Existing Footage or Acreage	Approach (PI, PII etc.)	Restoration or Restoration Equivalent	Restoration Footage or Acreage		
Drained Wetland	--		6.530	Restore Hydrology, Fence & Plant	R (Reestablish)	6.530 ac		
Grazed Wetland	--		1.120	Fence & Plant	R (Rehabilitate)	1.120 ac		
Component Summation								
Restoration Level	Stream (lin. feet)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer (sq. feet)	Upland (acres)		
		Riverine	Non-Riverine					
Re-establishment (1: 1.0)			6.530 ac					
Rehabilitation (1: 1.5)			1.120 ac					
Enhancement I								
Enhancement II								
Creation								
Preservation								
High Quality Preservation								
TOTAL feet or acres	-	-	7.650 ac					
TOTAL WMU	-	-	7.277					

Table 2. Project Activity & Reporting History		
Tar River Headwaters Wetland Restoration Site, DMS Project# 97071		
Activity or Report	Data Collection Complete	Actual Completion or Delivery
Mitigation Plan		Dec16
Final Construction Plans		Dec16
Construction		Jan 17
Planting		Feb 17
Baseline Monitoring/Report	Feb 17	Apr 17
Year 1 Monitoring	Nov 17	Dec17
Year 2 Monitoring	Nov 18	Dec 18
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

Table 3. Project Contacts Table	
Tar River Headwaters Wetland Restoration Site, DMS Project # 97071	
Designer	Ecological Engineering, Raleigh NC Heather Smith: 919-557-0929
Construction Contractor	KBS Earthworks, Greensboro NC Kory Strader & Brett Strader: 336-685-4339
Survey Contractor	Michael T. Brandon, PLS, Roxboro NC Michael Brandon: 336-597-8673
Fence Contractor	Strader Fencing, Inc., Julian NC Kenneth Strader: 336-314-2935
Herbicide and Seeding	KBS Earthworks, Greensboro NC Kory Strader & Brett Strader: 336-685-4339
Planting Contractor	Mogensen Mitigation Inc, Charlotte NC Rich Mogensen: 704-576-1111; Gerald Pottern: 919-556-8845
Nursery Stock Suppliers	Mellowmarsh Farms, Siler City NC Joanie McLean: 919-742-1200
Monitoring Performers	Mogensen Mitigation Inc, Charlotte NC Rich Mogensen: 704-576-1111; Gerald Pottern: 919-556-8845

Table 4. Project Attributes			
Tar River Headwaters Wetland Restoration Site, DMS Project # 97071			
Project Name	Tar River Headwaters Wetland Restoration Site		
County	Person County		
Project Area (acres)	9.9 acres (Wetland + Buffer Easement combined)		
Project Coordinates (lat. and long.)	36.3895, -78.8153		
Project Watershed Summary Information			
Physiographic Province	Piedmont, Carolina Slate Belt		
River Basin	Tar-Pamlico River-01		
USGS Hydrologic Unit 8-digit	3020101	USGS Hydrologic Unit 12-digit	-0102
DWQ Sub-basin	Tar-Pam-01		
Project Drainage Area (acres)	60		
Project Drainage Area Percentage of Impervious Area	0%		
CGIA Land Use Classification	Pasture, Crop, and Deciduous Forest		
Wetland Summary Information (Post-Restoration)			
Parameters	Wetland Area		
Size of Wetland (acres)	1.12 ac existing + 6.53 ac drained = 7.65 ac		
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian non-riverine (Headwater)		
Mapped Soil Series	Iredell Loam (IrB)		
Drainage class	Iredell = moderately well; Hydric inclusions = poorly		
Soil Hydric Status	Drained Hydric		
Source of Hydrology	Shallow ponding; perched on shallow aquitard		
Hydrologic Impairment	Drainage ditches (1940s)		
Native vegetation community	Headwater depression wetland forest (prior to pasture conversion)		
Percent composition exotic invasive vegetation	20% Fescue (sprayed)		
Regulatory Considerations			
Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States – Section 404	Yes	Yes	Prelim JD
Waters of the United States – Section 401	Yes	Yes	Prelim JD
Endangered Species Act	No	N/A	US FWS Letter
Historic Preservation Act	No	N/A	NC SHPO Letter
Coastal Zone Management Act (CZMA)	No	N/A	N/A
Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	NC Floodmaps Data
Essential Fisheries Habitat	No	N/A	N/A

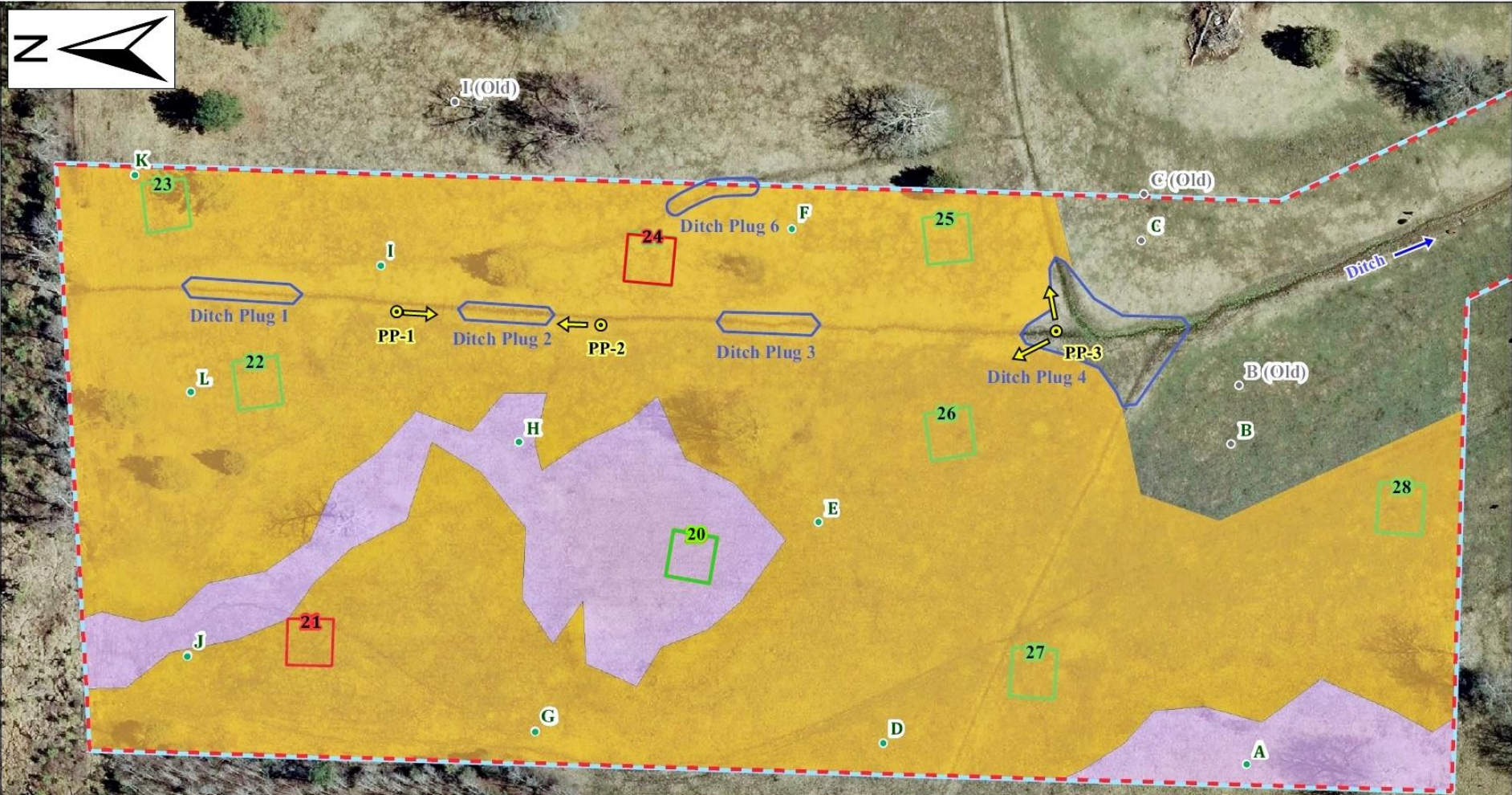
APPENDIX B. Visual Assessment Data

Figure 2. Current Conditions Plan View

Table 5. Vegetation Conditions Assessment

Figure 3. Vegetation Plot Photos

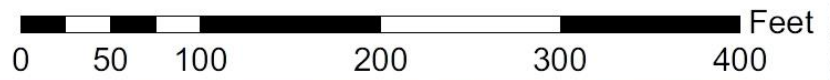
Figure 4. Photo Point Photos



Legend

- Wetland Rehabilitation (1.12 Ac)
- Wetland Reestablishment (6.64 Ac)
- GW Gauges 2018, 25-day Criteria Met
- GW Gauges 2018, 25-day Criteria Not Met
- GW Gauges (Criteria N/A)
- PP- Photo Points
- Vegetation Plots (Criteria Met)
- Vegetation Plots (Criteria Not Met)
- Ditch Plugs
- Conservation Easement
- Fence

Fence is 6"-12" outside the Conservation Easement.



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CURRENT CONDITIONS PLAN VIEW MY2 (2018)
 TAR RIVER HEADWATERS WETLAND RESTORATION SITE
 DMS PROJECT #97071

PERSON COUNTY
 NORTH CAROLINA



FIGURE 2

Table 5: Vegetation Condition Assessment Table -- MY-2 (2018)

Tar River Headwaters Wetland Restoration #97071. Person County HUC #03020101-0102

Planted Acreage = 7.65

Vegetation Problem Category	Definitions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	N/A	0	0	0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	N/A	0	0	0%
Total				0		0%
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	N/A	0	0	0%
Cumulative Total				0	0	0%

Easement Acreage = 9.98

Vegetation Problem Category	Definitions	Mapping Threshold (SF)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000	N/A	0	0	0%
Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	N/A	0	0	0%

Figure 3. Vegetation Plots: Tar River Headwaters Wetland Restoration Site #97071 MY-2 (Oct 2018)



Veg Plot20: 23 Feb 2017

CVS VegPlot-20: MY-0 Spring 2017



CVS VegPlot-20: MY-2 Oct 3, 2018



Veg Plot21: 23 Feb 2017

CVS VegPlot-21: MY-0 Spring 2017

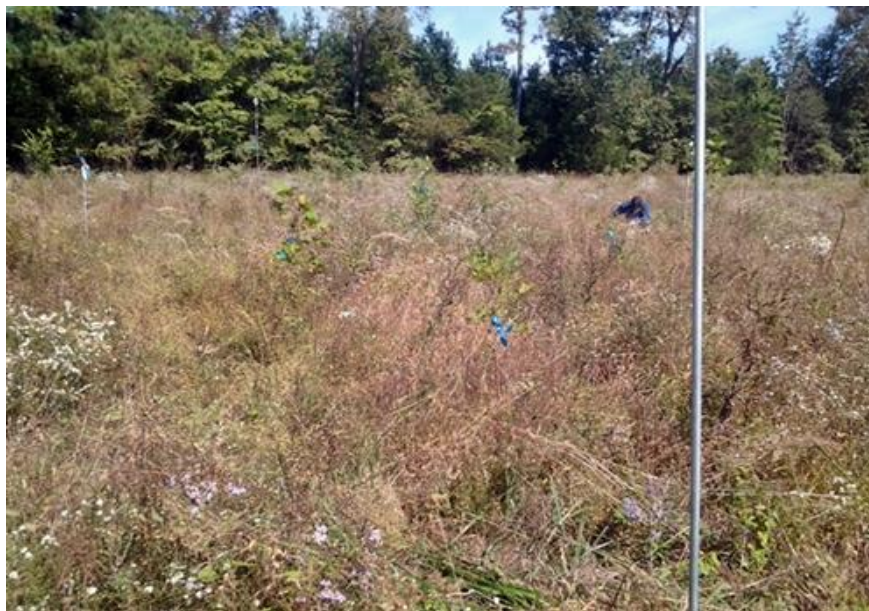


CVS VegPlot-21: MY-2 Oct 3, 2018

Figure 3. Vegetation Plots: Tar River Headwaters Wetland Restoration Site #97071 MY-2 (Oct 2018)



CVS VegPlot-22: MY-0 Spring 2017



CVS VegPlot-22: MY-2 Oct 3, 2018



CVS VegPlot-23: MY-0 Spring 2017



CVS VegPlot-23: MY-2 Oct 3, 2018

Figure 3. Vegetation Plots: Tar River Headwaters Wetland Restoration Site #97071 MY-2 (Oct 2018)



CVS VegPlot-24: MY-0 Spring 2017



CVS VegPlot-24: MY-2 Oct 3, 2018



CVS VegPlot-25: MY-0 Spring 2017



CVS VegPlot-25: MY-2 Oct 3, 2018

Figure 3. Vegetation Plots: Tar River Headwaters Wetland Restoration Site #97071 MY-2 (Oct 2018)



CVS VegPlot-26: MY-0 Spring 2017



CVS VegPlot-26: MY-2 Oct 3, 2018



CVS VegPlot-27: MY-0 Spring 2017



CVS VegPlot-27: MY-2 Oct 3, 2018

Figure 3. Vegetation Plots: Tar River Headwaters Wetland Restoration Site #97071 MY-2 (Oct 2018)



CVS VegPlot-28: MY-0 Spring 2017



CVS VegPlot-28: MY-2 Oct 3, 2018



CVS VegPlot-29: MY-0 Spring 2017



CVS VegPlot-29: MY-2 Oct 3, 2018

Figure 3. Vegetation Plots: Tar River Headwaters Wetland Restoration Site #97071 MY-1 (Oct 2017)



CVS VegPlot-28: MY-0 Spring 2017



CVS VegPlot-28: MY-2 Fall 2018



CVS VegPlot-29: MY-0 Spring 2017



CVS VegPlot-29: MY-2 Fall 2018

Figure 4. Photo Points: Tar River Headwaters Wetland Restoration Site #97071 MY-2 (Fall 2018)



Photo Point 1: MY-0 Spring 2017



Photo Point 1: MY-2 Oct 3, 2018



Photo Point 2: MY-0 Spring 2017



Photo Point 2: MY-2 Oct 3, 2018

Figure 4. Photo Points: Tar River Headwaters Wetland Restoration Site #97071 MY-2 (Fall 2018)



Ditch Plug #4 facing east, Feb 2017

Photo Point 3: MY-0 Spring 2017



Photo Point 3: MY-2 Oct 3, 2018 -- facing east



Photo Point 3: MY-2 Oct 3, 2018 -- facing northwest



Photo Point 3: MY-2 Oct 3, 2018 -- facing northeast

APPENDIX C. Vegetation Plot Data

Table 6. Vegetation Plot Success Summary

Table 7. Vegetation Plot Stem Count Data

**Tar River Headwaters Wetland Restoration (TRHWR) Project, DMS # 97071.
Monitoring Year 2 (Oct 2018) -- Person County NC. Tar-Pam HUC# 03020101**

Table 6. CVS Plot Stem Density and Success Summary

CVS Plot #	Wetland Planted Stems		Planted + Volunteer Stems		Invasive Woody Stems	Success Criteria Met?
	per plot	per acre	per plot	per acre		
97071- 20	7	283	13	526	0	Yes
97071- 21	5	202	7	283	0	No
97071- 22	8	324	18	728	0	Yes
97071- 23	12	486	15	607	0	Yes
97071- 24	4	162	4	162	0	No
97071- 25	8	324	8	324	0	Yes
97071- 26	9	364	9	364	0	Yes
97071- 27	9	364	12	486	0	Yes
97071- 28	10	405	10	405	0	Yes
Project Avg	8.0	324	10.7	432	0	Yes

Success Criteria based on planted + volunteer stems (count planted spp only): 320 stems per acre at MY3, 260 stems/ac at MY5, and 210 stems/ac at MY7.

Tar River Headwaters Wetland Restoration (TRHWR) Project, DMS # 97071.
Monitoring Year 2 (Oct 2018) -- Person County NC. Tar-Pamlico HUC# 03020101-0102.

Table 7. CVS Plot Stem Counts and Density by Species.

Scientific Name	Common Name	Growth Type	Current Plot Data (MY2 - Oct 2018)											
			97071-20		97071-21		97071-22		97071-23		97071-24		97071-25	
			Plant	Total	Plant	Total	Plant	Total	Plant	Total	Plant	Total	Plant	Total
Betula nigra	River Birch	Tree (P)	4	4	3	3	2	2	4	4				
Carpinus caroliniana	Musclewood	Tree (P)												
Cornus amomum	Silky dogwood	Tree		1										
Diospyros virginiana	Persimmon	Tree (P)	1	2				1						
Fraxinus pennsylvanica	Green Ash	Tree (P)			1	1	3	8	2	3	1	1		
Liriodendron tulipifera	Tulip Poplar	Tree (P)			1	2								
Liquidambar styraciflua	American sweetgum	Tree				2				1				
Nyssa biflora	Swamp Blackgum	Tree (P)												
Pinus taeda	Loblolly pine	Tree								3				
Platanus occidentalis	Sycamore	Tree (P)	2	2			2	2						
Quercus bicolor	Swamp White Oak	Tree (P)							2	2	1	1	1	1
Quercus phellos	Willow Oak	Tree (P)		1			1	1	3	3	2	2	7	7
Quercus nigra	Water Oak	Tree (P)							1	1				
Ulmus americana	American Elm	Tree (P)		4		1		4		2				
	Stem count		7	13	5	7	8	18	12	15	4	4	8	8
	ares		1	1	1	1	1	1	1	1	1	1	1	1
	acres		0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
	Species count		3	6	3	5	4	6	5	8	3	3	2	2
	Stems per ACRE		283	526	202	283	324	729	486	607	162	162	324	324

(P) = planted species

Scientific Name	Common Name	Growth Type	Current Plot Data (MY2 - Oct 2018)						Annual Means					
			97071-26		97071-27		97071-28		MY2 (2018)		MY1 (2017)		MY0 (2017)	
			Plant	Total	Plant	Total	Plant	Total	Plant	Total	Plant	Total	Plant	Total
Betula nigra	River Birch	Tree (P)	7	7			2	2	22	22	23	23	23	23
Carpinus caroliniana	Musclewood	Tree (P)			2	2	4	4	6	6	6	6	6	6
Cornus amomum	Silky dogwood	Tree							1					
Diospyros virginiana	Persimmon	Tree (P)						1	3			2	2	
Fraxinus pennsylvanica	Green Ash	Tree (P)			1	2	2	2	10	17	10	10	9	9
Liriodendron tulipifera	Tulip Poplar	Tree (P)						1	2	6	6	12	12	
Liquidambar styraciflua	American sweetgum	Tree							3					
Nyssa biflora	Swamp Blackgum	Tree (P)										1	1	
Pinus taeda	Loblolly pine	Tree							3					
Platanus occidentalis	Sycamore	Tree (P)			1	1			5	5	5	5	5	5
Quercus bicolor	Swamp White Oak	Tree (P)							4	4	3	3	3	3
Quercus phellos	Willow Oak	Tree (P)	2	2			2	2	17	18	1	1	14	14
Quercus nigra	Water Oak	Tree (P)							1	1	17	17	6	6
Ulmus americana	American Elm	Tree (P)			5	7			5	18	11	14	10	10
	Stem count		9	9	9	12	10	10	72	96	82	85	91	91
	ares		1	1	1	1	1	1	9	9	9	9	9	9
	acres		0.025	0.025	0.025	0.025	0.025	0.025	0.22	0.22	0.22	0.22	0.222	0.222
	Species count		2	2	4	4	4	4	10	13	11	11	11	11
	Stems per ACRE		364	364	364	486	405	405	324	432	369	382	409	409

Plant = Planted Stems; Total = Planted + Volunteer Stems

Color codes for Plot Density & Success

Exceeds criteria by 10% or more	(352 or more)
Exceeds criteria by less than 10%	(320 - 351)
Fails criteria by less than 10%	(289 - 319)
Fails criteria by more than 10%	(288 or less)

Quercus phellos and Q. nigra identifications were corrected in 2018.

APPENDIX D. Hydrologic Data

Figure 5. Monthly Rainfall Plot with Percentiles

Figure 6. Groundwater Gauge and Rainfall Data

Table 8. Hydrologic Success Attainment

Figure 5. Monthly Rainfall Totals (2018) with 30th and 70th Percentiles.
 From USDA WETS table, 30-year historical data (1981-2010) at ROXBORO 7 ESE, NC
 Rainfall Data from NC-CRONOS Gauge # 317516, CoCoRaHS Gauges # PN-3 and PN-11

Month	Total inches	30th P*	70th P*
Jan-18	3.59	2.45	4.46
Feb-18	2.31	2.58	3.82
Mar-18	4.65	2.99	5.32
Apr-18	5.80	2.18	4.21
May-18	7.57	2.51	4.04
Jun-18	6.56	2.15	4.45
Jul-18	3.87	3.38	5.44
Aug-18	7.84	2.57	4.90
Sep-18	8.96	1.94	4.85
Oct-18	6.35	2.65	4.72
Nov-18	8.40	1.89	4.42
Dec-18		2.56	4.52

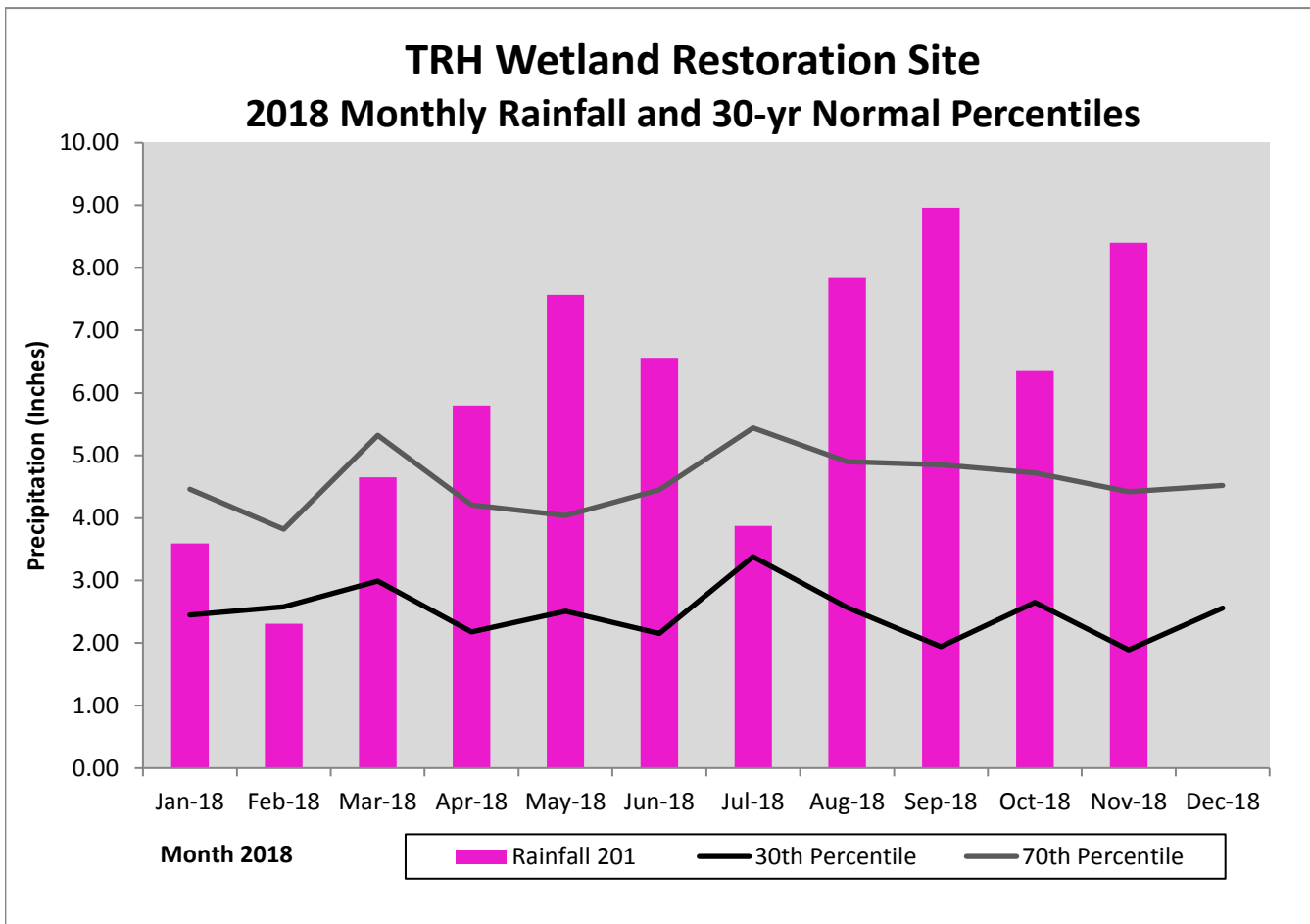


Figure 6A. Groundwater Gauges and Rainfall Data Plots 2018 -- Tar River Headwaters Wetland Restoration # 97071

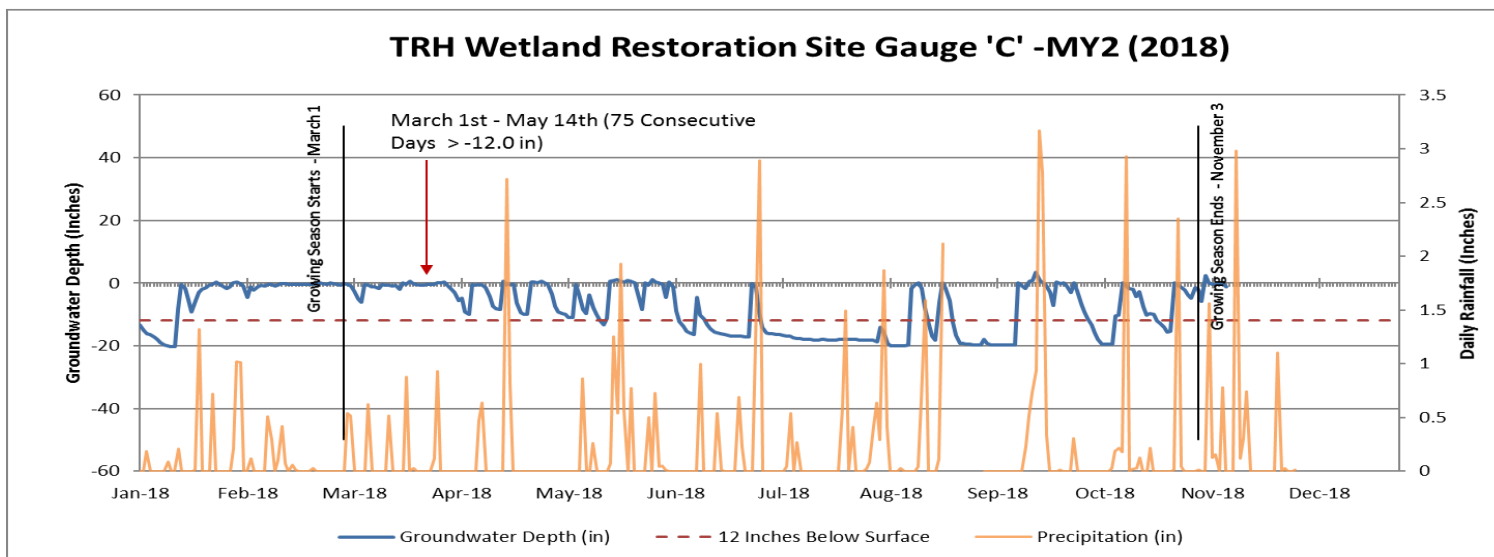
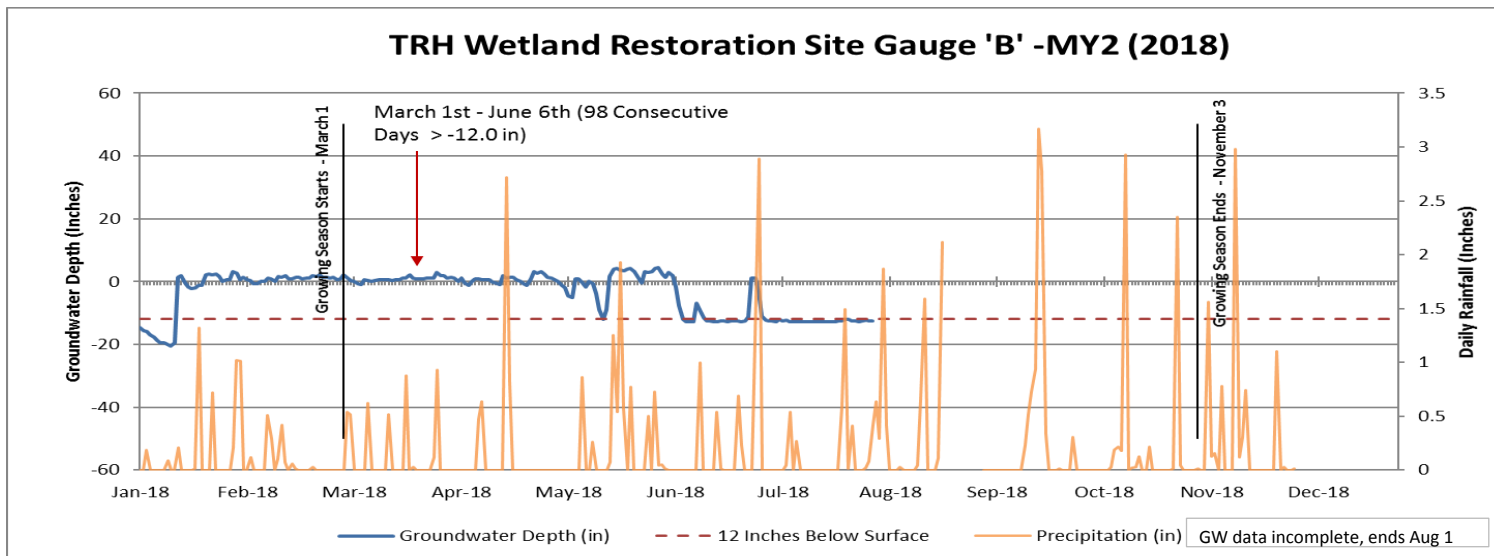
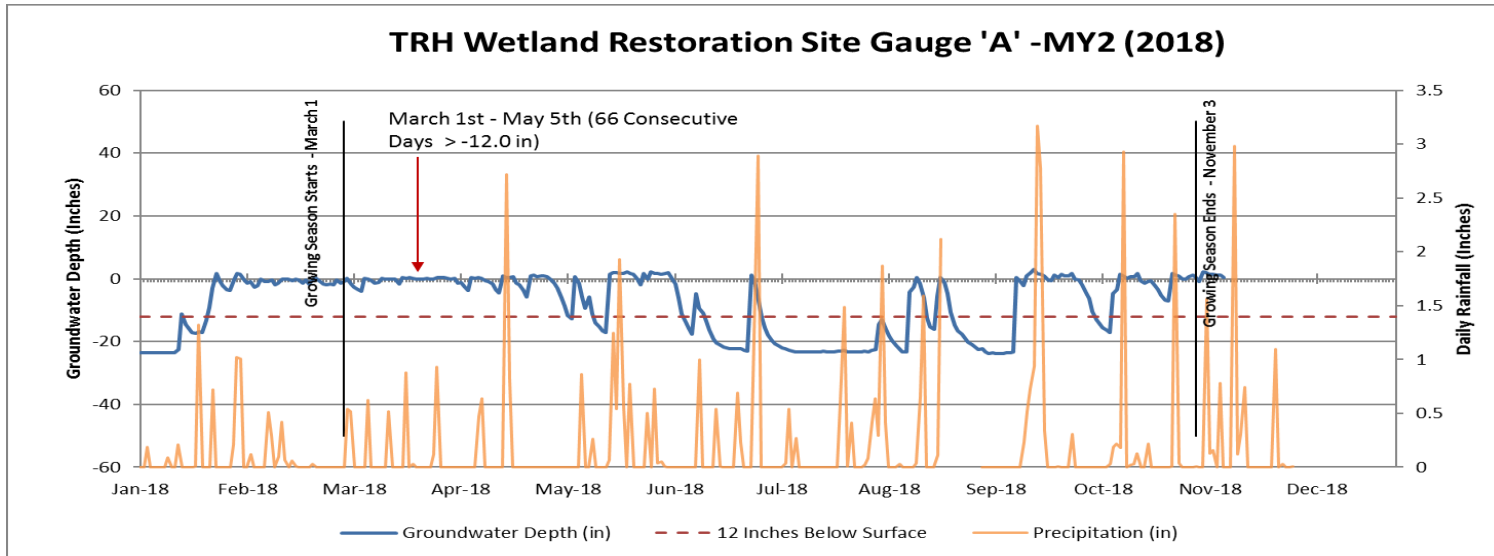


Figure 6B. Groundwater Gauges and Rainfall Data Plots 2018 -- Tar River Headwaters Wetland Restoration # 97071

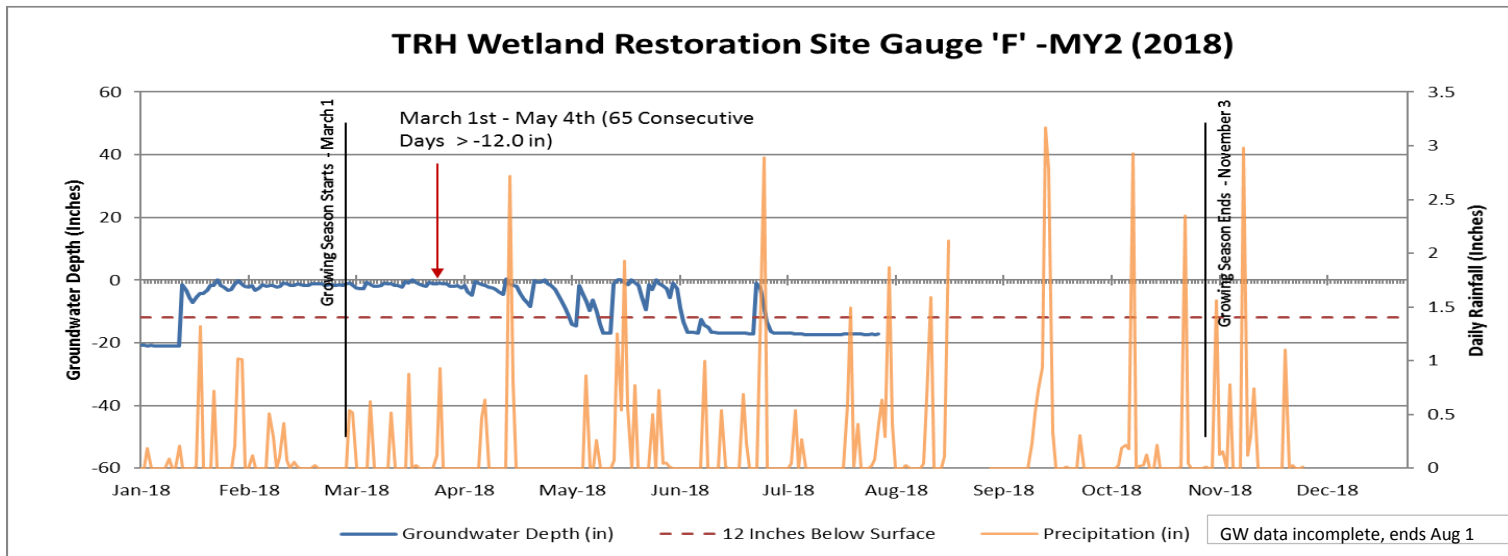
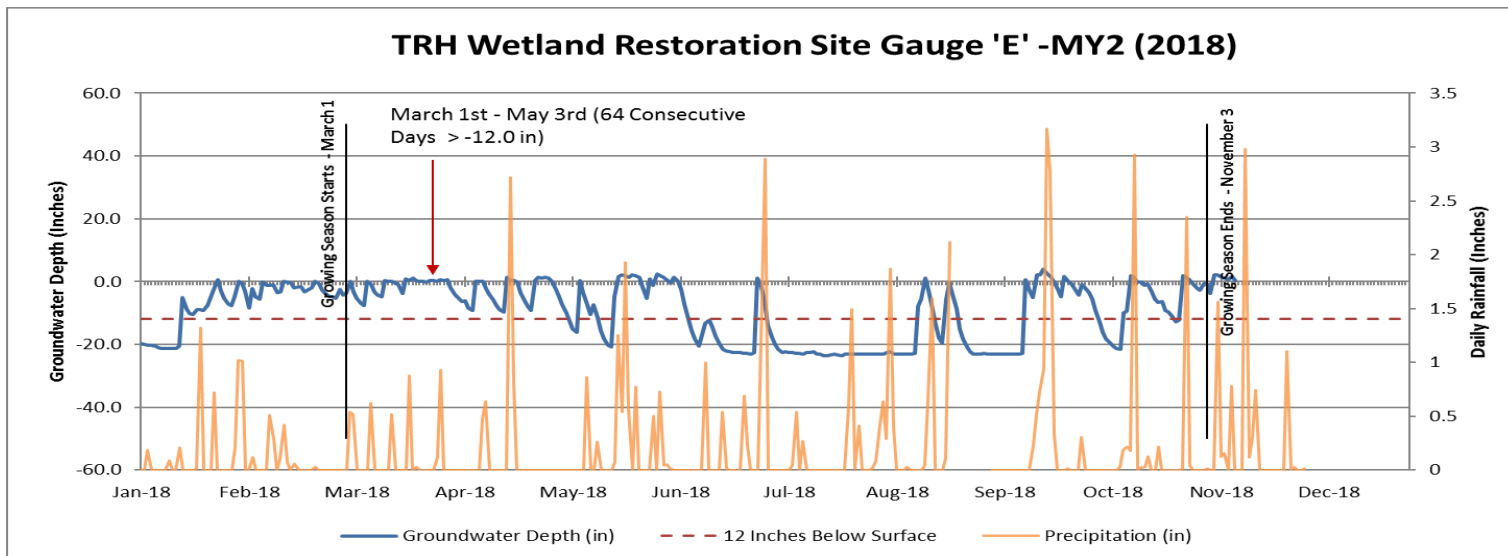
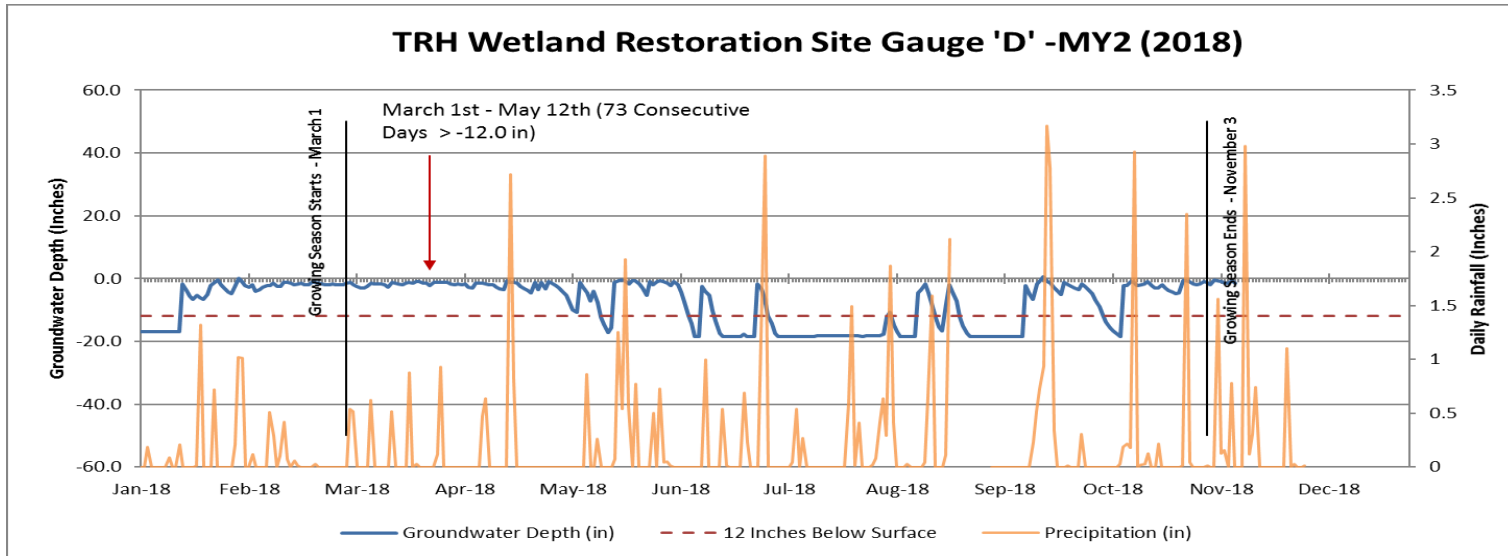


Figure 6C. Groundwater Gauges and Rainfall Data Plots 2018 -- Tar River Headwaters Wetland Restoration # 97071

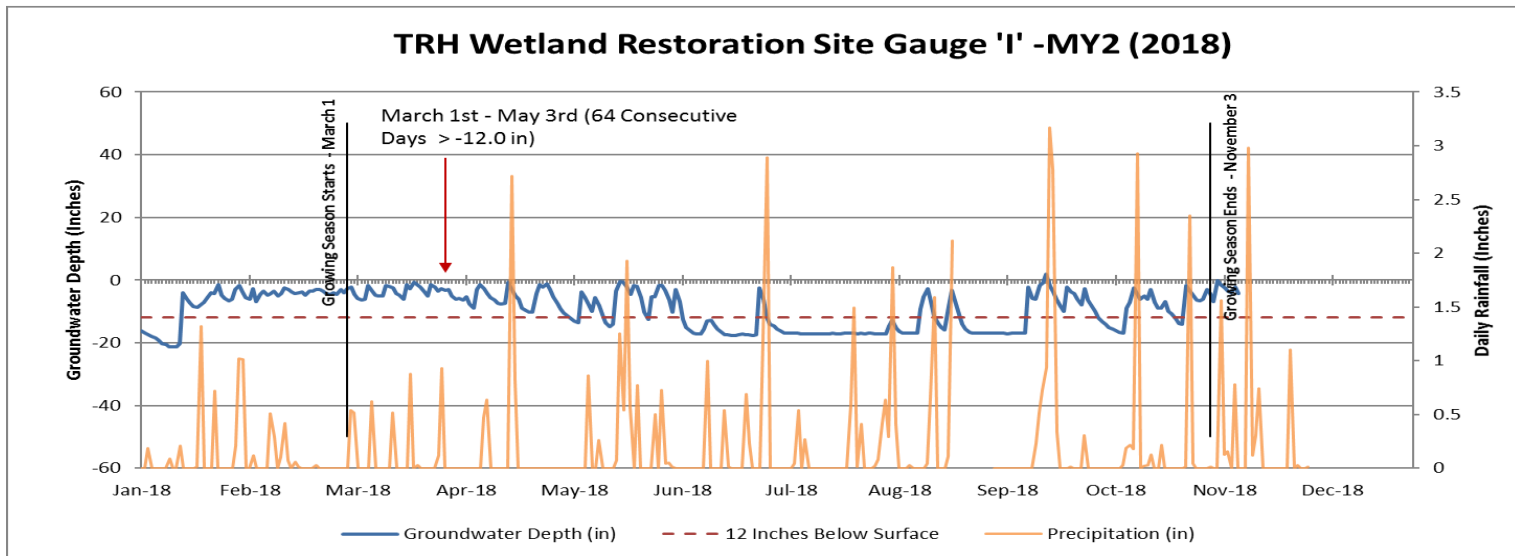
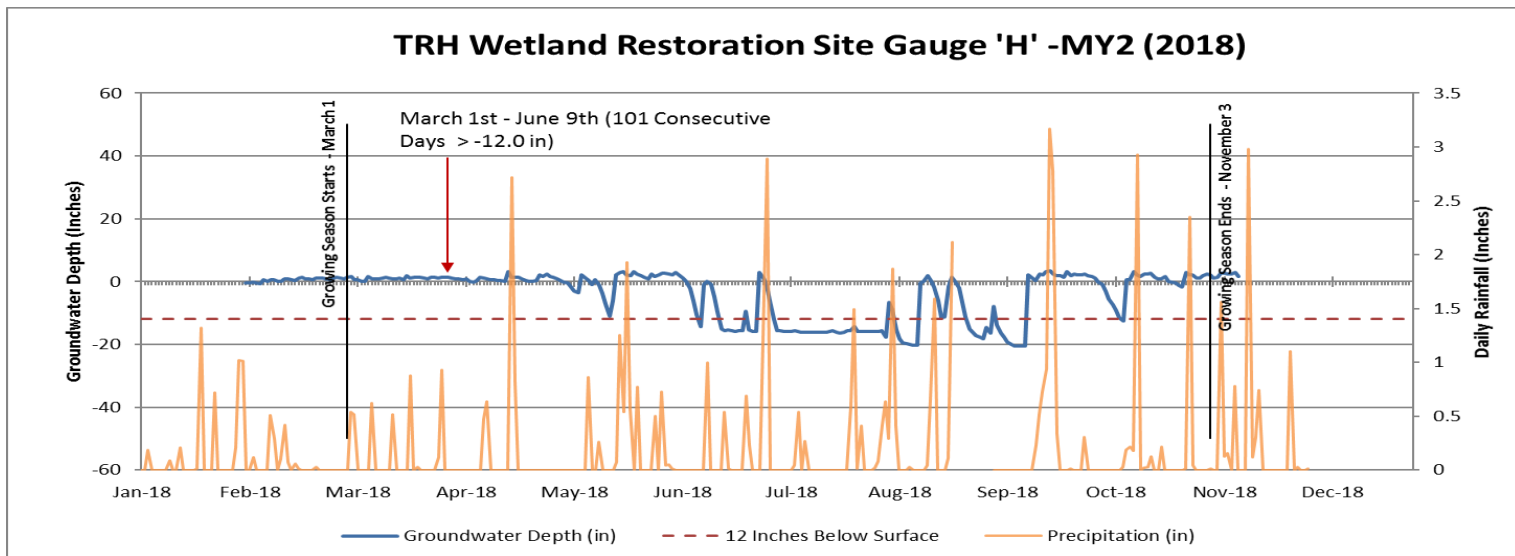
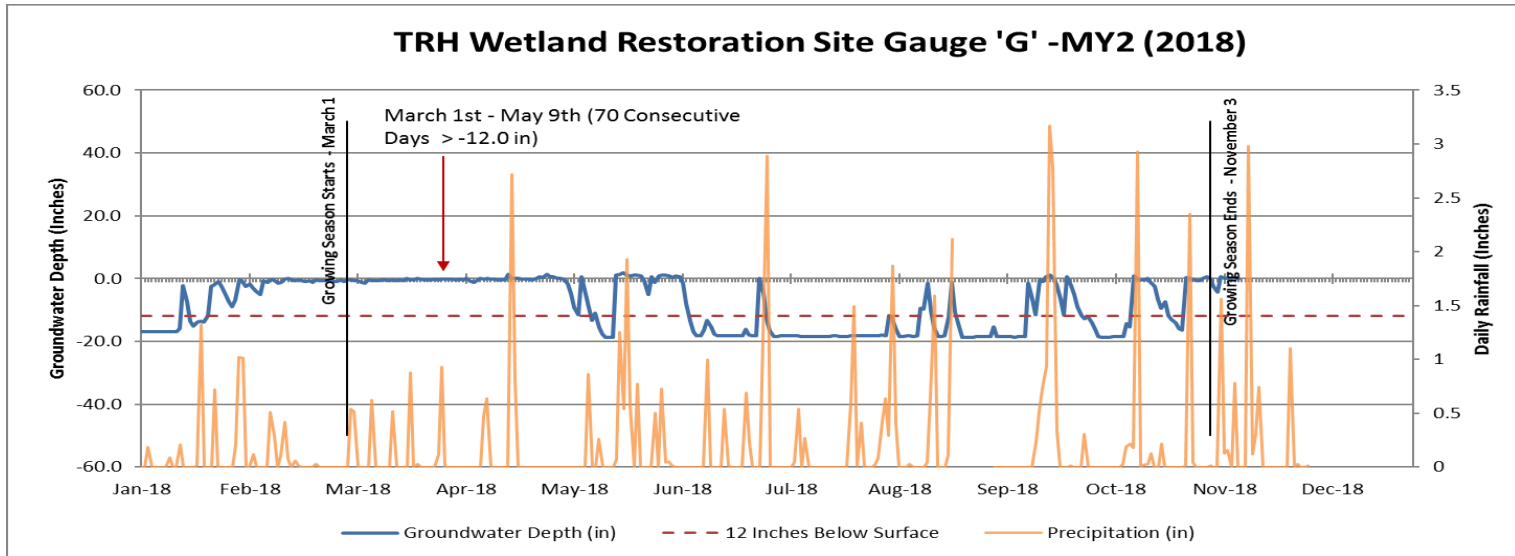


Figure 6D. Groundwater Gauges and Rainfall Data Plots 2018 -- Tar River Headwaters Wetland Restoration # 97071

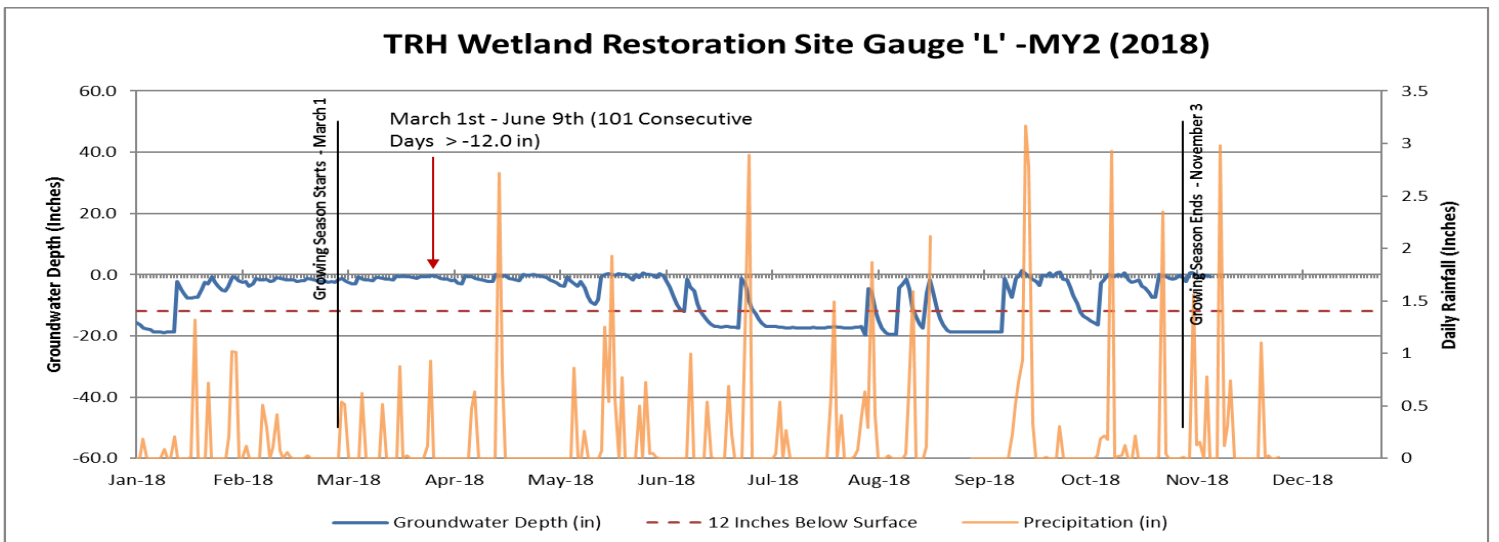
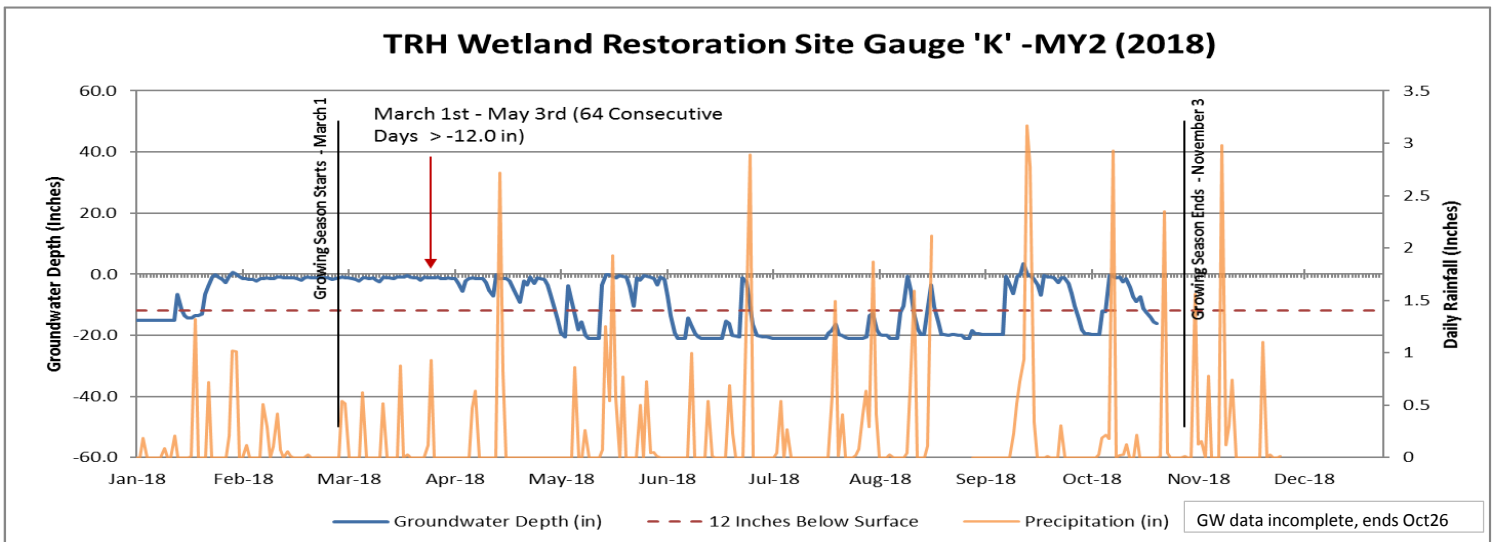
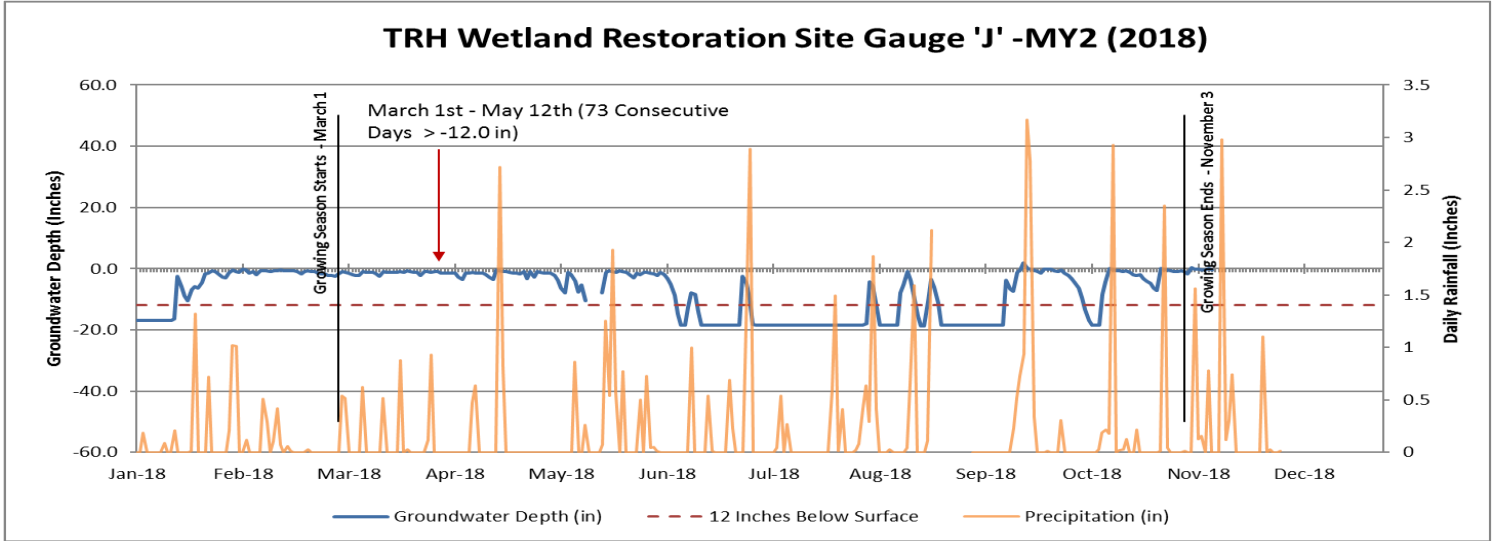
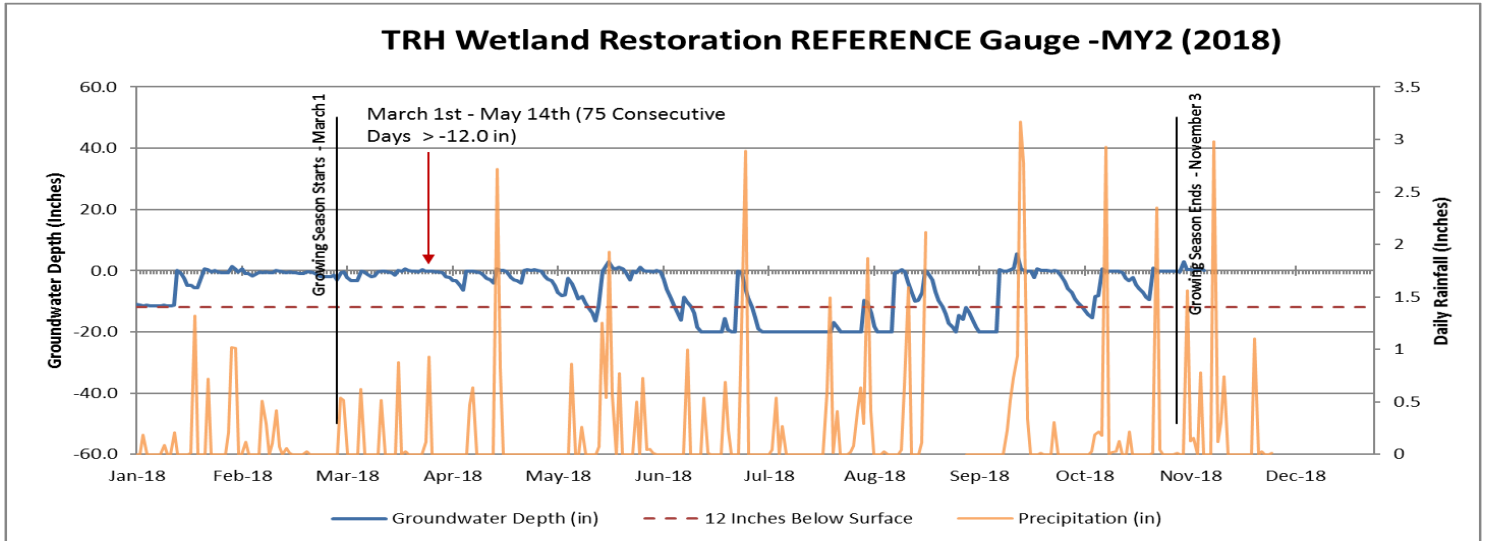


Figure 6E. Groundwater Gauges and Rainfall Data Plots 2018 -- Tar River Headwaters Wetland Restoration # 97071



**Table 8. Hydrologic Success Attainment, Groundwater Wells
Tar River Headwaters Wetland Mitigation Site # 97071.**

Gage #	MY2 2018			
	% Growing Season Monitored	Total # Days WT < 12" from surface	Max Consec Days <12" from surface	Success Criteria Attained?
A	100%	158 (64%)	66 (27%)	Yes
D	100%	161 (65%)	73 (29%)	Yes
E	100%	148 (60%)	64 (26%)	Yes
F	62%	94 (38%)	65 (26%)	Yes
G	100%	137 (55%)	70 (28%)	Yes
H	100%	181 (73%)	101 (41%)	Yes
I	100%	144 (58%)	64 (26%)	Yes
J	98%	159 (64%)	73 (29%)	Yes
K	97%	128 (52%)	64 (26%)	Yes
L	100%	170 (69%)	101 (41%)	Yes
B	62%	108 (44%)	98 (40%)	NA
C	100%	152 (61%)	75 (30%)	NA
REF	100%	174 (70%)	75 (30%)	Yes

Mitigation Plan success criterion is 10% of growing season (consecutive days < 12" below surface).

Growing Season based on USDA air temp data at Roxboso ESE gauge is Mar 28 to Nov 3 (221 Days).

Growing Season used here, based on on-site soil temperature > 41° F is Mar 1 to Nov 3 (248 Days).

10% of 248-day growing season is 25 consecutive days.

