St. Clair Creek Restoration Project
Year 2 Final Monitoring Report

Beaufort County, North Carolina

DMS Project ID No. 95015

DWR Project #13-0739, Beaufort County

USACE Action ID: 2008-02655

Tar-Pamlico River Basin: 03020104-040040

Project Info:	Monitoring Year: 2 of 7 Year of Data Collection: 2015 Year of Completed Construction: 2014 Submission Date: March 2016
Submitted To:	NC DEQ – Division of Mitigation Services 1625 Mail Service Center Raleigh, NC 27699 NC DEQ Contract ID No. 003986

St. Clair Creek Restoration Project
Year 2 Final Monitoring Report

Beaufort County, North Carolina

DMS Project ID No. 95015

Tar-Pamlico River Basin: 03020104-040040

Report Prepared and Submitted by Michael Baker International

NC Professional Engineering License # F-1084

Michael Baker
INTERNATIONAL

TABLE OF CONTENTS

APPENDICES

1.0 EXECUTIVE SUMMARY

Michael Baker Engineering, Inc. (Baker) restored 3,926 linear feet (LF) of perennial and intermittent stream, 2.8 acres (AC) of riparian wetlands, and planted 17.5 acres (AC) of native riparian vegetation within the entire conservation easement along two unnamed tributaries (UT2 and UT3) to St. Clair Creek in Beaufort County, North Carolina (NC) (Figure 1). The St. Clair Creek Restoration Project (Site) is located in Beaufort County, approximately five miles east of the Town of Bath. The Site is located in the NC Division of Water Resources (NCDWR) subbasin 03-03-07 and the NC Department of Environmental Quality (NC DEQ) (formerly Department of Environment and Natural Resources) and Division of Mitigation Services (DMS) formerly Ecosystem Enhancement Program) Targeted Local Watershed (TLW) 03020104-040040 of the Tar-Pamlico River Basin. The project involved the restoration of a Coastal Plain Headwater Small Stream Swamp system (NC WAM 2010, Schafale and Weakley 1990) from impairments within the project area due to past agricultural conversion and silviculture.

The primary restoration goals of the project were to improve ecological functions to the impaired areas within the Tar-Pamlico River Basin as described below:

- Create geomorphically stable conditions along the unnamed tributaries across the project,
- Implement agricultural BMPs to reduce nonpoint source inputs to the downstream estuary,
- Protect and improve water quality by reducing nutrient and sediment inputs,
- Restore stream and wetland hydrology by connecting historic flow paths and promoting natural flood processes, and
- Restore and protect riparian buffer functions and corridor habitat in perpetuity by establishing a permanent conservation easement.

To accomplish these goals, the following objectives were identified:

- Restore existing channelized streams by restoring the relic headwater valley and allowing diffuse flow, providing the streams access to their floodplains,
- Increase aquatic habitat value by allowing natural microtopography to form,
- Plant native species riparian buffer vegetation within the headwater valley and floodplain areas, and within the wetland areas, protected by a permanent conservation easement, to increase stormwater runoff filtering capacity, decrease erosion, and shade the stream to decrease water temperature,
- Improve aquatic and terrestrial habitat through improved substrate and in-stream cover, addition of woody debris, and reduction of water temperature, and
- Control invasive species vegetation within the project area and if necessary continue treatments during the monitoring period.

During Year 2 monitoring, the planted acreage performance categories were functioning at 100 percent with no bare areas or low stem density areas to report. The average density of total planted stems, based on data collected from the nine monitoring plots during Year 2 monitoring, is 643 stems per acre. The Year 2 data demonstrate that the Site is on track for meeting the minimum success interim criteria of 320 trees per acre by the end of Year 3.

Following Year 2 monitoring, Pinus taeda (loblolly pine) was documented in the areas of UT2. The loblolly pines are currently short but do have the potential to pose a future threat to the survival of planted species installed during the construction phase. To prevent this nuisance species from affecting the planted stems, a

thinning and removal effort will take place in Year 3/2016 and will target the loblolly pine. The methods used will be either hand/power tools and/or chemical applications.

In the fall of 2015, the restoration site landowner cut a network of drainage ditches adjacent to the easement boundaries of both UT2 and UT3 (shown as dashed green lines on Figure 3). The landowner implemented a plan to re-cut pre-existing lateral drainage ditches that joined a new deeper ditch that directly abuts the Site's conservation easements. These new ditches were cut on the eastern and western boundary of UT2 as well as the western boundary of UT3. The landowner cut the ditches with the intent to drain water away from his pine plantation that abuts both easement boundaries on the west and east. Additionally, the property and farm access road that lies to the north of the Site is also retaining water and needs to drain across the northern road into the conservation easement to prevent hydrologic trespass.

To remedy this ditching impact as described above, a proposed work plan described in Section 2.2.1 will take place in three different locations: (1) The northern conservation easement boundary of UT 2 along the existing farm road, (2) the western conservation easement boundary of UT2 along the wetland restoration area, and (3) along the western conservation easement boundary of UT3 along the wetland restoration area.

Year 2 wetland groundwater monitoring demonstrated that 3 of 4 groundwater monitoring wells located along UT2 and UT3 exhibited water levels within 12 inches of the ground surface that was greater than 12 percent of the growing season. The four on-site wetland monitoring wells demonstrated consecutive hydroperiods, which ranged from 3.3 to 13.4 percent of the growing season. The growing season for Beaufort County is from February 28 to December 6 (282 days). Additionally, during Year 2 monitoring, the on-site wetland reference wells demonstrated consecutive hydroperiods, which ranged from 57.9 to 60.1 percent of the growing season.

To provide additional groundwater data during the monitoring period, four new monitoring wells will be installed at the beginning of the growing season in Year 3/2016. These four additional wells will provide additional wetland success data, as well as collect groundwater levels adjacent to the areas where the additional ditching repairs will take place. These four new wells are to be installed as shown in Figure 2.

On-site flow through the restored headwater valleys of UT2 and UT3 was recorded periodically throughout 2015 by the use of pressure transducers. Of the six flow gauges installed on the Site, all gauges recorded flow in 2015. The flow gauges documented flow through the headwater valleys during Year 2, which ranged from 16.4 to 43.9 consecutive days. It is noted that the flow gauges demonstrated similar flow events relative to rainfall events on site as demonstrated in the gauge graphs in Appendix D.

In addition, currently contracted riparian buffer credits have been included as part of the project as referenced by the "Site Viability for Buffer Mitigation" memo from Karen Higgins (NCDWR) dated January 7, 2016 and included as an asset in this report. As part of the St. Clair Creek Restoration project, Riparian Buffer credits in excess of the contracted 6.8 acres (296,208 square feet) will be provided. Monitoring for success of riparian buffers will continue to follow the existing vegetation monitoring protocol and success criteria as stated in the approved mitigation plan for stream and wetland vegetation success. No additional vegetation monitoring plots are required to monitor buffer success as the existing monitoring plots serve to monitor the success of the vegetation of the headwater coastal plain stream and the riparian buffer.

Summary information/data related to the Site and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report Appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report and in the Mitigation Plan available on the North Carolina Division of Mitigation Services (NCDMS) website. All raw data supporting the tables and figures in the Appendices are available from NCDMS upon request.

2.0 METHODOLOGY

The seven-year monitoring plan for the Site includes criteria to evaluate the success of the stream, wetland and vegetation components of the project. The methodology and report template used to evaluate these components adheres to the NCDMS monitoring guidance document dated November 7, 2011, which will continue to serve as the template for subsequent monitoring years. The specific locations of monitoring features, such as vegetation plots, flow gauges and wells are shown on the CCPV sheets found in Appendix B.

The Year 2 well and flow data were collected December 2015. All visual site assessment data contained in Appendix B were collected in November 2015.

2.1 Stream Assessment – Reaches UT2 and UT3

The UT2 and UT3 mitigation approach involved the restoration of historic flow patterns and flooding functions in a multi-thread headwater stream system, monitoring efforts will focus on visual observations to document stability and the use of water level monitoring gauges to document saturation and flooding functions. The methods used and any related success criteria are described below for each parameter. Monitoring efforts focus on visual observations and in-channel flow gauges/pressure transducers to document stream success. Stream survey data was collected to a minimum of Class C Vertical and Class A Horizontal Accuracy using Leica TS06 Total Station and was georeferenced to the NAD83 State Plane Coordinate System, FIPS3200 in US Survey Feet, which was derived from the As-built Survey. This survey system collects point data with an accuracy of less than one tenth of a foot.

2.1.1 Hydrology

Total observed area rainfall for the period of January 2015 through November 2015 was 48.76 inches, as compared to the Beaufort County WETS table for the same period of 46.68 inches annually.

Four automated flow gauges (pressure transducers) were installed in the UT2 channel as well as two flow gauges installed in the UT3 channel. The gauges were installed approximately 500 feet apart within the restored systems to document flow duration. The automated loggers were programmed to collect data at every 15 minutes to document flow frequency and duration. Success criteria are considered to have been met if 30 consecutive days of flow were observed at any point during the monitoring year. Results indicate that flow gauges 1, 2, 5, and 6 each met the minimum consecutive days of surface flow required for success, while flow gauges 3 and 4 did not. The complete flow data and observed rainfall graphs for each gauge, along with the flow gauge success summary Table 11 are located in Appendix D.

2.1.2 Photographic Documentation

The reaches were photographed longitudinally beginning at the downstream end of both reaches, moving upstream to the beginning of each reach. Photographs were taken looking upstream at delineated locations throughout the restored stream valley. Points were close enough together to provide an overall view of the reach lengths and valley crenulations. Photographs of photo points, wetland wells, and flow gauges are located in Appendix B.

2.2 Wetland Assessment

Wetland monitoring is assessed by the use of four automated groundwater-monitoring stations that are installed in the UT2 and UT3 wetland restoration areas, as well as two additional reference wells installed in the downstream portion of the UT3 wetland restoration area. Installation of these groundwater monitoring stations follow Corps of Engineers Wetlands Research Program Technical Note VN-rs-4.1 (USACE 1997).

The automated loggers are programmed to collect data every 6 hours to document groundwater levels in the restored wetland areas. The success criteria for wetland hydrology are considered to have been met when the site is saturated within 12 inches of the soil surface for a consecutive number of days equal to a minimum of 12% of the growing season (34 consecutive days at this site). Results indicate that monitoring wells 1, 3, and 4 all met the minimum saturation success criteria while well 2 did not. Restoration well data and reference well data collected during Year 2 monitoring are located in Appendix D.

2.2.1 Wetland Concerns

Ditching

In the fall of 2015, the restoration site landowner cut a network of drainage ditches adjacent to the easement boundaries of both UT2 and UT3 (See Figure 3). The landowner implemented a plan to re-cut pre-existing ditches that joined a new deeper ditch that directly abuts the Site's conservation easements. These new ditches were cut on the eastern and western boundary of UT2 as well as the western boundary of UT3. The landowner cut the ditches with the intent to drain water away from his pine plantation that abuts both easement boundaries on the west and east. Additionally, the property and farm access road that lies to the north of the Site is also retaining water and needs to drain across the northern road into the conservation easement to prevent hydrologic trespass.

The work described above was designed and implemented without first consulting Baker. The ditches were first discovered during fall monitoring in late 2015.

To remedy the potential impacts of the new ditch network on restored wetland functions, Baker is implementing a work plan to alleviate the hydrologic trespass outside of the conservation easement and to fill the new ditches so wetland hydrology will be unimpaired. The proposed work will take place in three different locations (Figure 3). (1) The northern conservation easement boundary of UT 2 along the existing farm road, (2) the western conservation easement boundary of UT2 along the wetland restoration area, and (3) along the western conservation easement boundary of UT3 along the wetland restoration area.

Location (1): Work in this area will consist of connecting existing shallow drainage ditches from an adjacent property across the farm road into the conservation easement on UT2. A shallow ditch (1' deep by 2' wide) will be cut through the farm road and then filled with rip rap outside of the easement to allow water to filter through the rock (French drain) and move across the road, but will also allow the landowner to cross easily. Once the rock-filled ditch reaches the conservation easement boundary, a shallow, wide, flat depression (10' wide by 1' deep with a 0% slope) will be excavated to tie these depressions into the existing ground elevations within the conservation easement. The locations shown as pink lines on Figure 3 are to scale (length) and are aligned as such to utilize the existing drainage paths as discovered during a field visit for storm event. Flow will be diffuse through these depressions. These areas within the conservation easement will be seeded and re-planted with bare-root trees.

Location (2): Work in this area will consist of excavating shallow and wide depressions through the wetland restoration polygon along UT 2 to connect and help drain the existing lateral ditches outside the conservation easement that were plugged during construction. The depressions will be approximately 10' wide and 1' deep. The depression depth of 1' will be measured down from the existing ground surface inside the wetland area at the conservation easement boundary with the intent to prevent hydrologic trespass within the landowner's existing pine timber. The depression bottoms will be significantly higher than the existing lateral ditch bottoms within the timber. The depressions will essentially be a zero slope and will rely on the hydraulic head from the groundwater within the timber to promote flow. It is anticipated that flow will be diffuse and very low. The depressions will be excavated inside the conservation easement only as far as needed to tie into the existing ground elevations. The lengths of these depressions are shown to scale on the attached figure and are based upon survey data collected in early February 2016. The required excavations will be decrease as the

depressions get closer to the stream. In addition, the recently excavated ditch adjacent to the conservation easement will be filled. This is shown as a green dashed line on the attached figure. The disturbed areas within the conservation easement will be seeded and re-planted with bare-root trees.

Location (3): Work in this area will consist of only removing a small (~5' wide) plug that separates the newly excavated ditch along UT3 (dashed green line in Figure 3) and existing small depressions within the conservation easement. These depressions are likely old remnant ditches excavated many years before the current conditions. These depressions are vegetated and shallow which will serve to prevent hydrologic trespass in the timber areas outside the conservation easement between UT 2 and UT 3. Little to no grading will be required inside the conservation easement along UT 3. In addition, the recently excavated ditch adjacent to the conservation easement will be filled.

Construction of the proposed activities as described above is scheduled to be implemented in Year 3 (March 2016).

Additional Monitoring Wells

It is noted that in the spring of 2015 three wetland restoration wells (SCAW1, SCAW2 and SCAW4) had accumulated bentonite/mud in the bottom of the well casings. A thick, gooey material was found to be clogging the water pressure sensors located in the bottom of the pressure transducers. This accumulation of material was suspected to be the likely the cause for the observed erroneous water levels recorded in the well casings. To verify groundwater depths and check for logger accuracy, manual groundwater measurements were recorded during three site visits and compared to datalogger readings in the appropriate date/time windows. The manual measurements were then used to determine if there were any significant differences in the recorded groundwater levels. After comparing the data, it was found that three wetland restoration loggers had errors in depth than was recorded manually. To correct this issue, all well casings, including SCAW3 were pumped to clear excess bentonite/mud that had built up and to prevent further buildup on the pressure sensors. The on-site reference wells were not pumped during this time. Additionally, links in the suspension chains from which the loggers hang in the well casings were also removed so the chain would be shorter. This was an effort to raise the loggers off the bottom of the well casings as to be above the bentonite/mud buildup. Subsequent to these adjustments, all on-site well data loggers now are free of bentonite and the atmospheric pressure hole is clear of any obstructions.

Four new monitoring wells will be installed at the beginning of the growing season in Year 3/2016. These additional wells will provide additional wetland success data, as well as collect groundwater levels in the areas adjacent to where the additional ditching repairs will take place. These four new wells are to be installed as shown in Figure 3.

2.3 Vegetation Assessment

In order to determine if the criteria are achieved, vegetation-monitoring quadrants were installed and are monitored across the restoration site in accordance with the CVS-NCDMS Protocol for Recording Vegetation, Version 4.1 (2007) and the CVS-NCDMS data entry tool v 2.3.1 (2012). The vegetation monitoring plots are a minimum of 2 percent of the planted portion of the Site with nine plots established randomly within the Site's planted riparian buffer areas per Monitoring Levels 1. The sizes of individual quadrants are 100 square meters for woody tree species.

Year 2 vegetation assessment information is provided in Appendix B and C.

2.3.1 Vegetation Concerns

Following Year 2 monitoring, *Pinus taeda* (loblolly pine) was documented in the area of UT2. The loblolly pines are currently short but have the potential to pose a future threat to the survival of planted species installed during the construction phase. To prevent this nuisance species from affecting the

planted stems, a thinning and removal effort will take place in Year 3/2016 and will target the loblolly pine. The methods used will be either hand/power tools and/or chemical applications.

3.0 REFERENCES

Carolina Vegetation Survey (CVS) and NC Division of Mitigation Services (NCDMS). 2007. CVS-NCDMS Data Entry Tool v. 2.3.1. University of North Carolina, Raleigh, NC.

Lee, M., Peet R., Roberts, S., Wentworth, T. 2007. CVS-NCDMS Protocol for Recording Vegetation, Version 4.1.

North Carolina Division of Mitigation Services. 2011. Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation. November 7, 2011.

Rosgen, D. L. 1994. A Classification of Natural Rivers. Catena 22:169-199.

Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina, Third Approximation. North Carolina Natural Heritage Program. Division of Parks and Recreation, NC DEQ. Raleigh, NC.

United States Army Corps of Engineers. 1997. Corps of Engineers Wetlands Research Program. Technical Note VN-rs-4.1. Environmental Laboratory. U.S. Army Engineer Waterways Experiment Station. Vicksburg, MS.

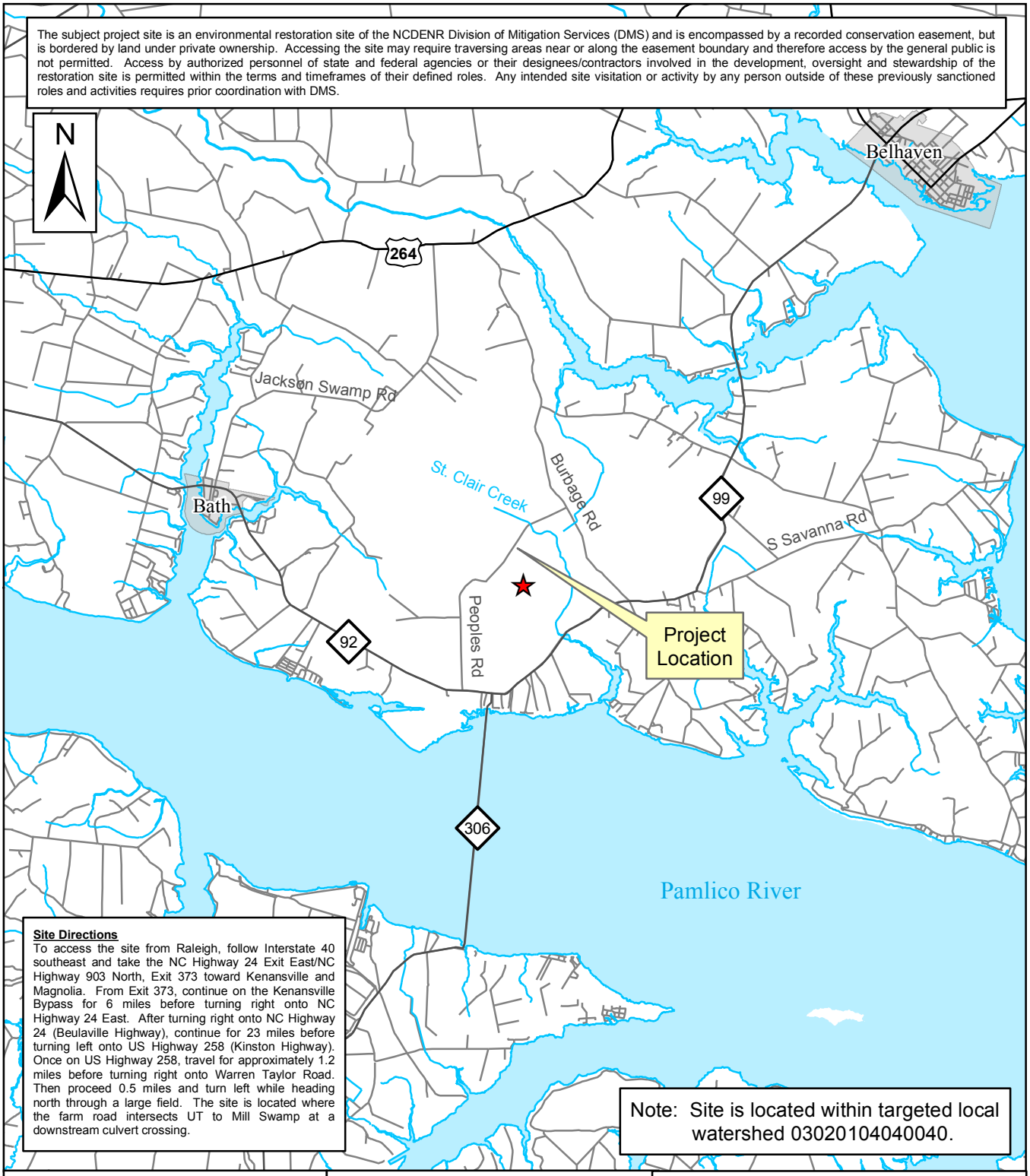
____. 2005. "Technical Standard for Water-Table Monitoring of Potential Wetland Sites," WRAP Technical Notes Collection (ERDC TN-WRAP-05-2), U.S. Army Engineer Research and Development Center. Vicksburg, MS.

____. 2003. Stream Mitigation Guidelines, April 2003, U.S. Army Corps of Engineers. Wilmington District.

Appendix A

Project Vicinity Map and Background Tables

The subject project site is an environmental restoration site of the NCDENR Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with DMS.



Site Directions
To access the site from Raleigh, follow Interstate 40 southeast and take the NC Highway 24 Exit East/NC Highway 903 North, Exit 373 toward Kenansville and Magnolia. From Exit 373, continue on the Kenansville Bypass for 6 miles before turning right onto NC Highway 24 East. After turning right onto NC Highway 24 (Beulaville Highway), continue for 23 miles before turning left onto US Highway 258 (Kinston Highway). Once on US Highway 258, travel for approximately 1.2 miles before turning right onto Warren Taylor Road. Then proceed 0.5 miles and turn left while heading north through a large field. The site is located where the farm road intersects UT to Mill Swamp at a downstream culvert crossing.

Note: Site is located within targeted local watershed 03020104040040.

Beaufort County

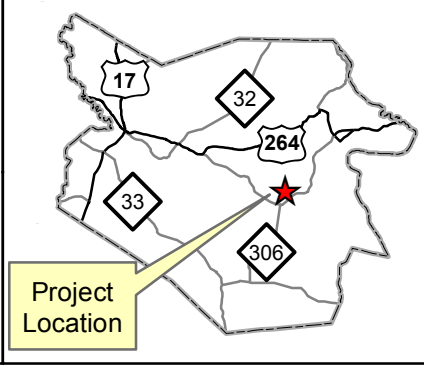


Figure 1
Project Vicinity Map
St. Clair Creek Restoration Site

DENR -
Division of Mitigation Services

Michael Baker
INTERNATIONAL

0 0.5 1 2 3 Miles

Table 1. Project Components and Mitigation Credits
St. Clair Creek Restoration Project: DMS Project No ID. 95015

Mitigation Credits								
	Stream	**Riparian Wetland**		**Non-riparian Wetland**		**Buffer**	**Nitrogen Nutrient Offset**	**Phosphorus Nutrient Offset**
Type	R	R	RE					
Totals	3,274 SMU	2.8 WMU	0			363,577 BMU		

Project Components						
Project Component or Reach ID	**Stationing/ Location**	**Existing Footage/ Acreage**	**Approach**	**Restoration/ Restoration Equivalent**	**Restoration Footage or Acreage**	**Mitigation Ratio**
UT2 Stream	12+64 – 34+00	2,660 LF	Headwater Restoration	2,133 SMU	2,133 LF	1:1
UT3 Stream	10+66 – 22+82	1,075 LF	Headwater Restoration	1,141 SMU	1,141 LF	1:1
UT2 Wetland	See plan sheets	0.0 AC	Restoration	1.1 WMU	1.1 WMU	1:1
UT3 Wetland	See plan sheets	0.0 AC	Restoration	1.7 WMU	1.7 WMU	1:1
UT2 Buffer	12+64 – 34+00	NA	Restoration	363,577 BMU	8.3 AC	1:1

Component Summation						
Restoration Level	**Stream (LF)**	**Riparian Wetland (AC)**		**Non-riparian Wetland (AC)**	**Buffer (ft^2) / (AC)**	**Upland (AC)**
		Riverine	Non-Riverine			
Restoration	3,274	2.8				
Enhancement I						
Enhancement II						
Creation						
Preservation						
High Quality Preservation						
Buffer Zone A: 0-50 ft					226002 / 5.2	
Buffer Zone B: 51-100 ft					137575 / 3.1	

BMP Elements			
Element	Location	Purpose/Function	Notes

BMP Elements: BR= Bioretention Cell; SF= Sand Filter; SW= Stormwater Wetland; WDP= Wet Detention Pond; DDP= Dry Detention Pond; FS= Filter Strip; S= Grassed Swale; LS= Level Spreader; NI=Natural Infiltration Area

Table 2. Project Activity and Reporting History St. Clair Creek Restoration Project: DMS Project No ID. 95015			
Activity or Report	**Scheduled Completion**	**Data Collection Complete**	**Actual Completion or Delivery**
Mitigation Plan Prepared	N/A	N/A	Jul-13
Mitigation Plan Amended	N/A	N/A	Sep-13
MItigation Plan Approved	N/A	N/A	Oct-13
Final Design – (at least 90% complete)	N/A	N/A	Nov-13
Construction Begins	N/A	N/A	Dec-13
Temporary S&E mix applied to entire project area	N/A	N/A	N/A
Permanent seed mix applied to entire project area	N/A	N/A	Mar-14
Planting of live stakes	N/A	N/A	N/A
Planting of bare root trees	N/A	N/A	Apr-14
End of Construction	N/A	N/A	Apr-14
Survey of As-built conditions (Year 0 Monitoring-baseline)	N/A	May-14	Jun-14
Year 1 Monitoring	Nov-14	Dec-14	Dec-14
Year 2 Monitoring	Nov-15	Nov-15	Mar-16
Year 3 Monitoring	Nov-16	N/A	N/A
Year 4 Monitoring	Nov-17	N/A	N/A
Year 5 Monitoring	Nov-18	N/A	N/A
Year 6 Monitoring	Nov-19	N/A	N/A
Year 7 Monitoring	Nov-20	N/A	N/A

Table 3. Project Contacts Table **St. Clair Creek Restoration Project: DMS Project ID No. 95015**	
Designer	
Michael Baker International	797 Haywood Road, Suite 201 Asheville, NC 28806 Contact: Jacob Byers, Tel. 919-259-4814
Construction Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Phillip Todd, Tel. 919-582-3575
Planting Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Phillip Todd, Tel. 919-582-3575
Seeding Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Phillip Todd, Tel. 919-582-3575
Seed Mix Sources	Green Resources, Tel. 336-855-6363
Nursery Stock Suppliers	Mellow Marsh Farm, 919-742-1200 ArborGen, 843-528-3204 Superior Tree, 850-971-5159
Monitoring Performers	
Michael Baker International	8000 Regency Parkway, Suite 600 Cary, NC 27518 Contact:
Stream Monitoring Point of Contact	Jacob Byers, Tel. 919-259-4814
Vegetation Monitoring Point of Contact	Jacob Byers, Tel. 919-259-4814
Wetland Monitoring Point of Contact	Jacob Byers, Tel. 919-259-4814

Table 4. Project Attributes
St. Clair Creek Restoration Project: DMS Project ID No. 95015

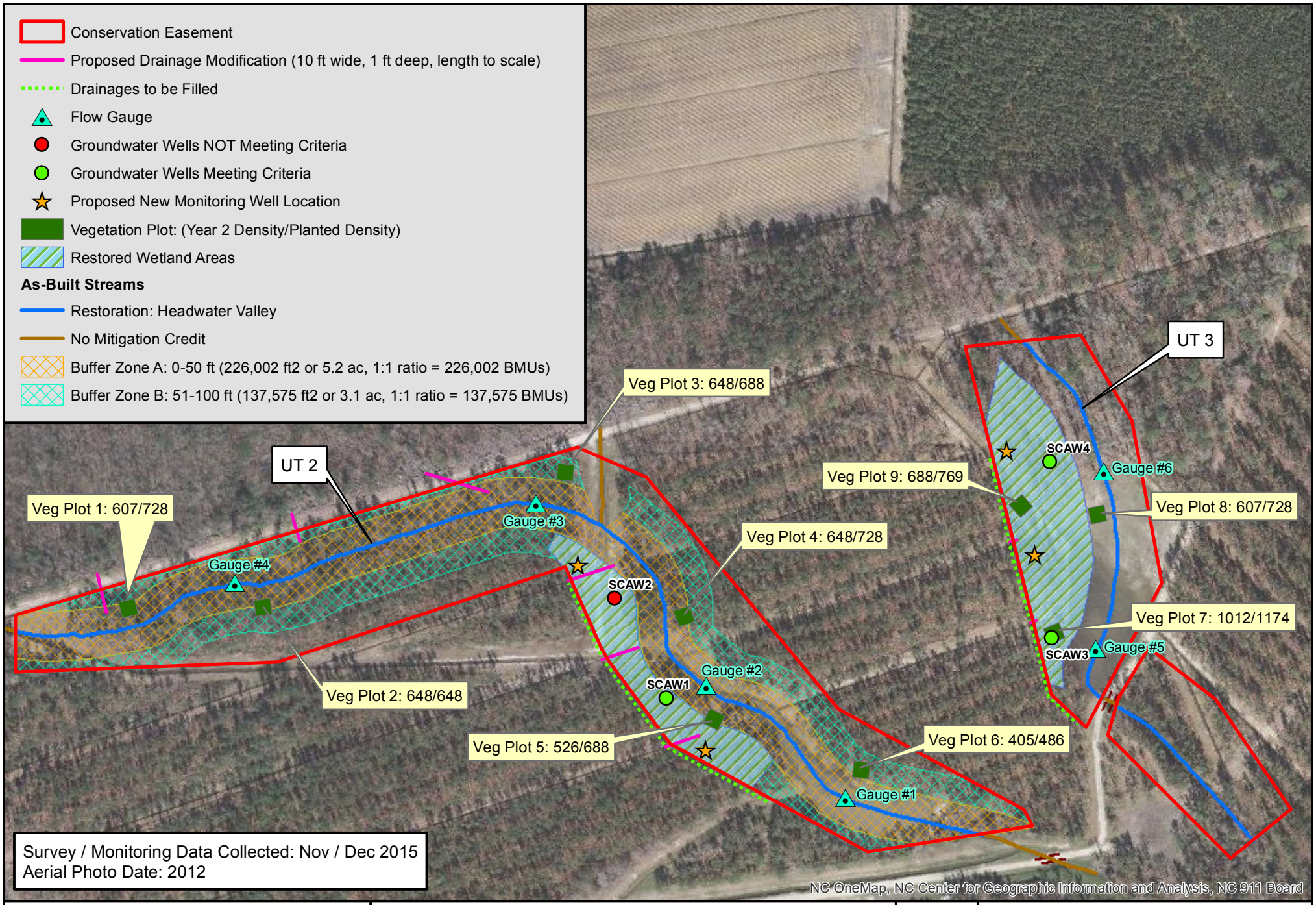
Project Information		
Project Name	St. Clair Creek Restoration Project	
County	Beaufort	
Project Area (acres)	17.5	
Project Coordinates (latitude and longitude)	35.452835 N, -76.76726215 W	
Watershed Summary Information		
Physiographic Province	Outer Coastal Plain	
River Basin	Tar-Pamlico	
USGS Hydrologic Unit 8-digit and 14-digit	03020104 / 03020104040040	
DWQ Sub-basin	03 03 07	
Project Drainage Area (AC)	89 (UT2), 30 (UT3)	
Project Drainage Area Percentage of Impervious Area	<1%	
CGIA Land Use Classification	3.02, Passively Managed Forest Stands, 2.01.01.07, Annual Row Crop Rotation;	
Stream Reach Summary Information		
Parameters	**Reach UT2**	**Reach UT3**
Length of Reach (LF)	2,133 (proposed) 2,660 (existing)	1,141 (proposed) 1,075 (existing)
Valley Classification (Rosgen)	X	X
Drainage Area (AC)	89	30
NCDWQ Stream Identification Score	36	20
NCDWQ Water Quality Classification	C; Sw, NSW	C; Sw, NSW
Morphological Description (Rosgen stream type)*	Channelized Headwater System (Perennial)	Channelized Headwater System (Intermittent)
Evolutionary Trend **	Restored G	Restored G
Underlying Mapped Soils	To, Hy, Ro	To, At
Drainage Class	Very poorly drained, poorly drained	Poorly drained, somewhat poorly drained
Soil Hydric Status	Hydric	Hydric
Average Channel Slope (ft/ft)	0.0006	0.0009
FEMA Classification	SFHA, AE	SFHA, AE
Native Vegetation Community	Coastal Plain Small Stream Swamp	Coastal Plain Small Stream Swamp
Percent Composition of Exotic/Invasive Vegetation	<5%	<5%
Wetland Summary Information		
Parameters	**Wetland Along UT2**	
Size of Wetland (AC)	1.1	
Wetland Type	Riparian Riverine	
Mapped Soil Series	To – Tomotley fine sandy loam	
Drainage Class	Poorly drained	
Soil Hydric Status	Hydric	
Source of Hydrology	Groundwater	
Hydrologic Impairment	Disconnected floodplain from ditches, lowered water table	
Native Vegetation Community	Coastal Plain Small Stream Swamp	
Percent Composition of Exotic/Invasive Vegetation	<5%	
Parameters	**Wetland Along UT3**	
Size of Wetland (AC)	1.7	
Wetland Type	Riparian Riverine	
Mapped Soil Series	To – Tomotley fine sandy loam	
Drainage Class	Poorly drained	
Soil Hydric Status	Hydric	
Source of Hydrology	Groundwater	
Hydrologic Impairment	Disconnected floodplain from ditches, lowered water table	
Native Vegetation Community	Coastal Plain Small Stream Swamp	
Percent Composition of Exotic/Invasive Vegetation	<5%	

Regulatory Considerations			
Regulation	**Applicable**	**Resolved**	**Supporting Documentation****
Waters of the United States – Section 404	Yes	Yes	(Appendix B)
Waters of the United States – Section 401	Yes	Yes	(Appendix B)
Endangered Species Act	No	N/A	Categorical Exclusion (Appendix B)
Historic Preservation Act	No	N/A	Categorical Exclusion (Appendix B)
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	Categorical Exclusion (Appendix B)
FEMA Floodplain Compliance	Yes	Yes	(Appendix B)
Essential Fisheries Habitat	No	N/A	Categorical Exclusion (Appendix B)
Notes:			

* Due to its channelized nature, the stream would most appropriately be classified as a Rosgen G stream type but use of this classification system on this channel is questionable due to its highly altered state. ** Supporting documentation is including in the approved Final Mitigation Plan.

Appendix B

Visual Assessment Data



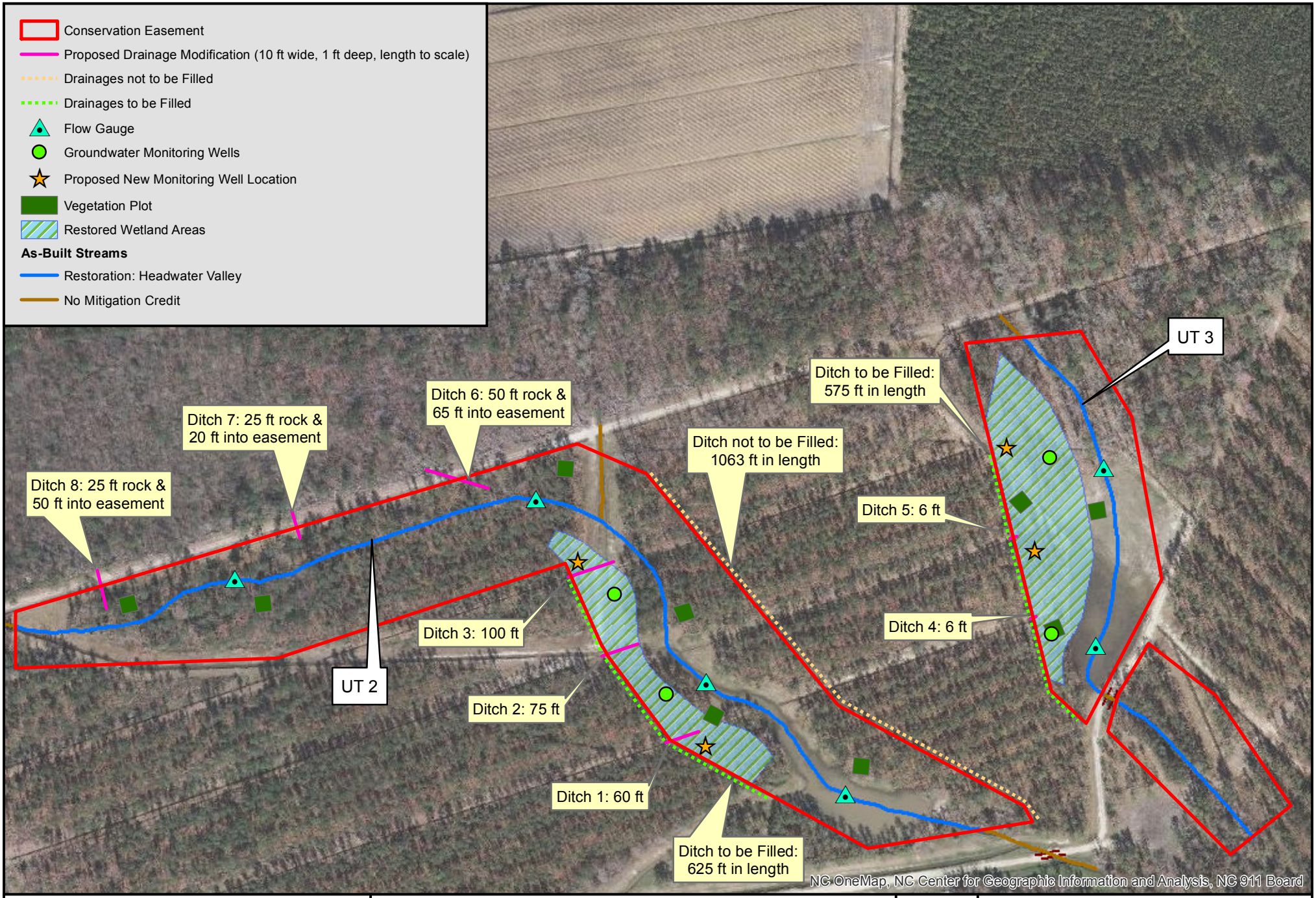
Michael Baker INTERNATIONAL

0 250 500 Feet

N

DEQ - Division of Mitigation Services
Project # 95015

Figure 2
Current Condition Plan View - MY2
St. Clair Creek Site
Beaufort County, NC



Michael Baker INTERNATIONAL

0 250 500 Feet

N

DEQ - Division of Mitigation Services
Project # 95015

Figure 3
Ditch Modification Map
St. Clair Creek Site
Beaufort County, NC

Table 5a. Visual Stream Morphology Stability Assessment
St. Clair Creek Restoration Project: DMS Project ID No. 95015

Reach ID: UT2

Assessed Length (LF): 2,133

Major Channel Category	Channel Sub-Category	Metric	Number Stable (Performing as Intended)	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.
1. Bed	1.Vertical Stability	1. Aggradation			0	0	100%			
		2. Degradation			0	0	100%			
	2. Riffle Condition	1. Texture Substrate	NA	NA						
	3. Meander Pool Condition	1. Depth	NA	NA						
		2. Length	NA	NA						
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	NA	NA						
		2. Thalweg centering at downstream of meander bend (Glide)	NA	NA						
		3. Thalweg centering along valley	Yes	2,133 LF						
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	2,133	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely			0	0	100%	0	2,133	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%	0	2,133	100%
		Totals			0	0	100%	0	0	100%
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	NA	NA						
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	NA	NA						
	2a. Piping	Structures lacking any substantial flow underneath sill or arms	NA	NA						
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	NA	NA						
	4. Habitat	Pool forming structures maintaining - Max Pool Depth	NA	NA						

Table 5a. Visual Stream Morphology Stability Assessment
St. Clair Creek Restoration Project: DMS Project ID No. 95015
Reach ID: UT3
Assessed Length (LF): 1,141

Major Channel Category	Channel Sub-Category	Metric	Number Stable (Performing as Intended)	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Veg.	Footage with Stabilizing Woody Veg.	Adjusted % for Stabilizing Woody Veg.
1. Bed	1.Vertical Stability	1. Aggradation			0	0	100%			
		2. Degradation			0	0	100%			
	2. Riffle Condition	1. Texture Substrate	NA	NA						
	3. Meander Pool Condition	1. Depth	NA	NA						
		2. Length	NA	NA						
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	NA	NA						
		2. Thalweg centering at downstream of meander bend (Glide)								
		3. Thalweg centering along valley	Yes	1,141 LF						
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	1,141	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely			0	0	100%	0	1,141	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%	0	1,141	100%
		Totals			0	0	100%	0	0	100%
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	NA	NA						
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	NA	NA						
	2a. Piping	Structures lacking any substantial flow underneath sill or arms	NA	NA						
	3. Bank Position	Bank erosion within the structures extent of influence does not exceed 15%	NA	NA						
	4. Habitat	Pool forming structures maintaining - Max Pool Depth	NA	NA						

Table 5b. Stream Problem Areas
St. Clair Creek Restoration Project: DMS Project ID No. 95015

Feature Issue	Station Number	Suspected Cause	Photo Number
None Observed	--	--	--

Table 6a. Vegetation Conditions Assessment
St. Clair Creek Restoration Project: DMS Project ID No. 95015

Reach ID: UT2

Planted Acreage: 11.6

Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	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	NA	0	0.00	0.0%
			Total	**0**	**0.00**	**0.0%**
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
			Cumulative Total	**0**	**0.00**	**0.0%**

Easement Acreage:

Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale)	none	NA	0	0.00	0.0%

Table 6a. Vegetation Conditions Assessment
St. Clair Restoration Project: EEP Project ID No. 95015

Reach ID: UT3

Planted Acreage: 5.9

Vegetation Category	Defintions	Mapping Threshold (acres)	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover both woody and herbaceous material.	0.1	NA	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	NA	0	0.00	0.0%
			Total	**0**	**0.00**	**0.0%**
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25	NA	0	0.00	0.0%
			Cumulative Total	**0**	**0.00**	**0.0%**

Easement Acreage:

Vegetation Category	Defintions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
5. Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale)	1000 ft²	NA	0	0.00	0.0%
6. Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale)	none	NA	0	0.00	0.0%

Table 6b. Vegetation Problem Areas
St. Clair Creek Restoration Project: DMS Project ID No. 95015

Feature Issue	Station Number	Suspected Cause	Photo Number
None Observed	--	--	--

Photo Point 1 – UT2

Photo Point 2 – UT2

Photo Point 3 – UT2

Photo Point 4 – UT2

Photo Point 5 – UT2

Photo Point 6 – UT2

Photo Point 7 – UT2

Photo Point 8 – UT2

Photo Point 9 – UT2

Photo Point 10 – UT2

Photo Point 11 – UT2

Photo Point 12 – UT2

Photo Point 13 – UT2

Photo Point 14 – UT2

Photo Point 15 – UT2

Photo Point 16 – UT3

Photo Point 17 – UT3

Photo Point 18 – UT3

Photo Point 19 – UT3

Photo Point 20 – UT3

Photo Point 21 – UT3

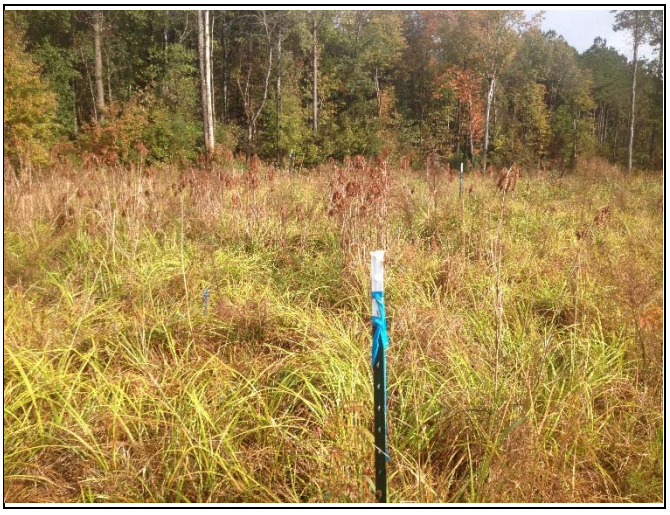
Photo Point 22 – UT3

Photo Point 23 – UT3

Photo Point 24 – UT3

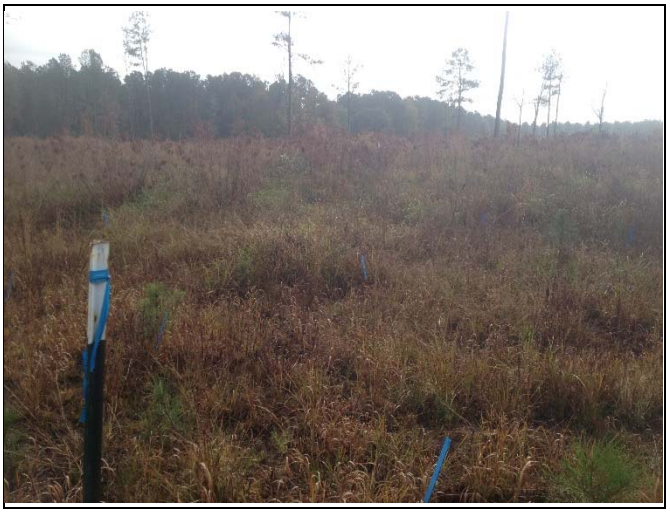
Vegetation Plot 1

Vegetation Plot 2



Vegetation Plot 3

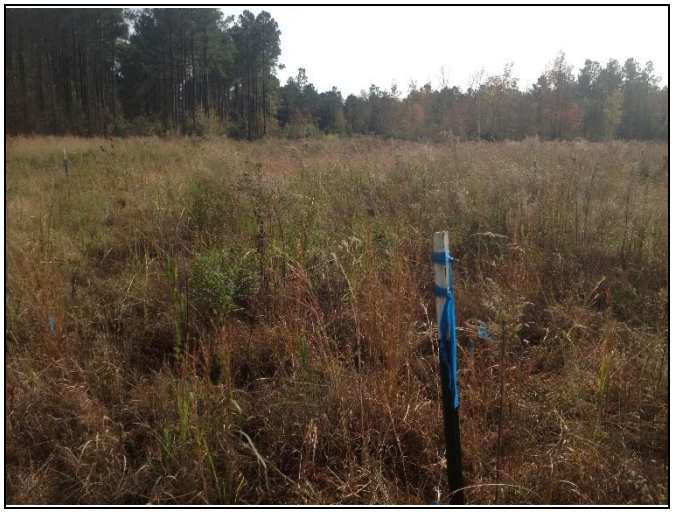
Vegetation Plot 4



Vegetation Plot 5

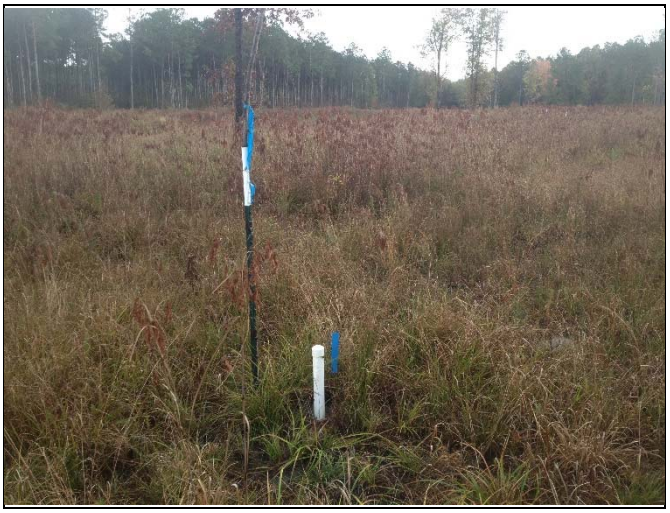
Vegetation Plot 6

Vegetation Plot 7

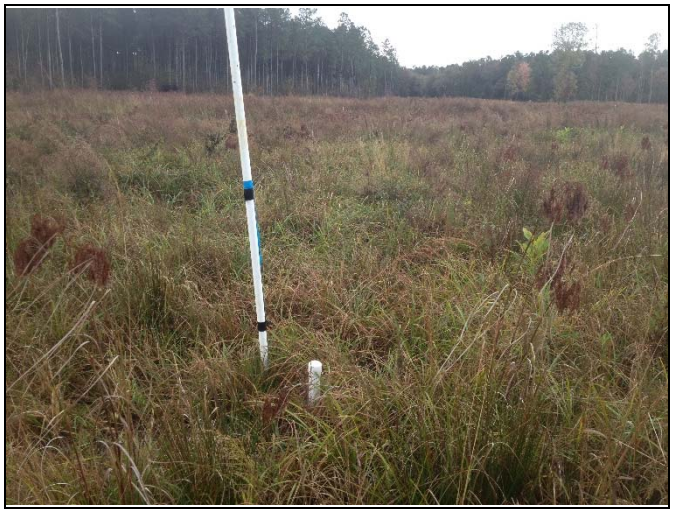


Vegetation Plot 8

Vegetation Plot 9



Auto Well – SCAW1, November 18, 2015



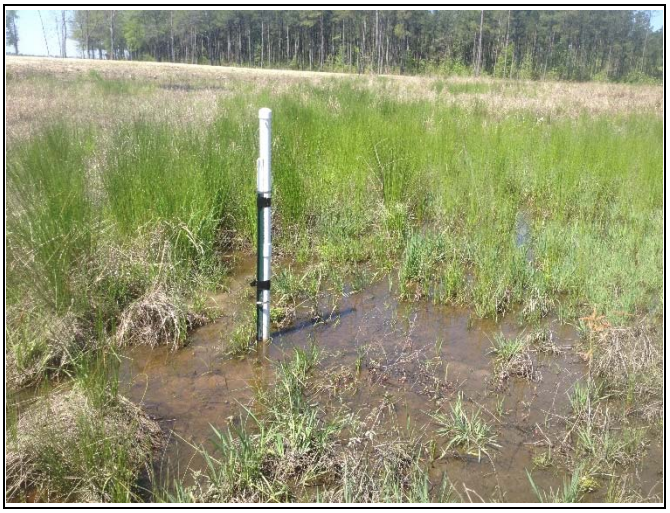
Auto Well – SCAW2, November 18, 2015

Auto Well – SCAW3, November 18, 2015

Auto Well – SCAW4, November 18, 2015

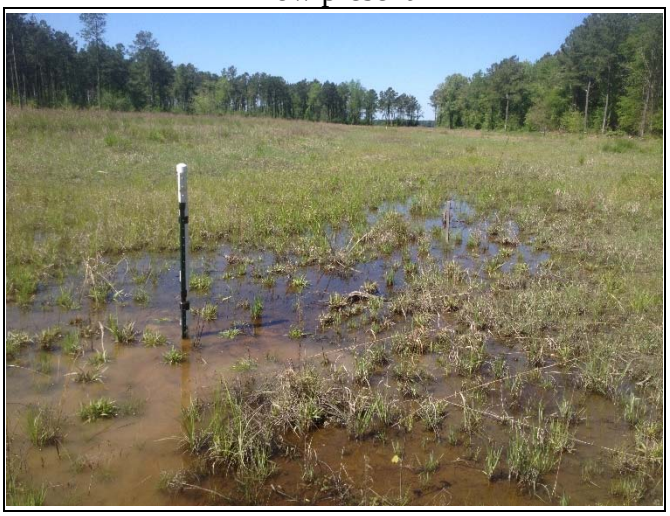
Auto Well – SCREF1, November 18, 2015

Auto Well – SCREF2, November 18, 2015



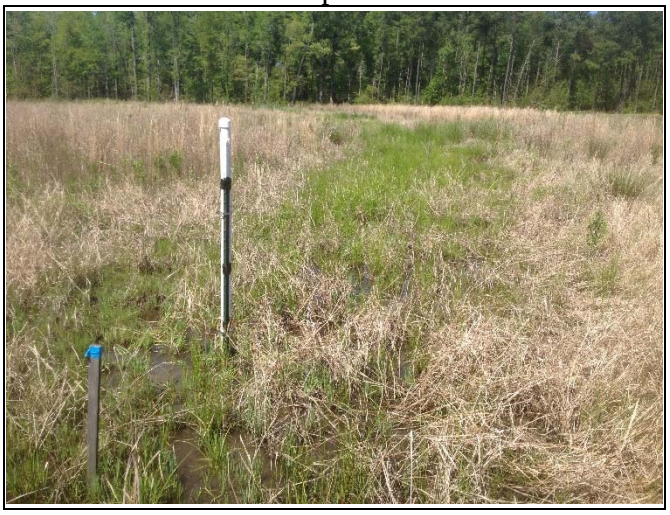
Flow Logger (UT2) – SCFL1, April 21, 2015
flow present

Flow Logger (UT2) – SCFL2, April 21, 2015
flow present



Flow Logger (UT2) – SCFL3, April 21, 2015
flow present

Flow Logger (UT2) – SCFL4, April 21, 2015
flow present



Flow Logger (UT3) – SCFL5, April 21, 2015
flow present

Flow Logger (UT3) – SCFL6, April 21, 2015
no flow present, but water is present around gauge

Appendix C

Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment
St. Clair Creek Restoration Project: DMS Project ID No. 95015

Plot ID	Vegetation Survival Threshold Met?	Total/Planted Stem Count*	Tract Mean
1	Y	607/728	643
2	Y	648/648	
3	Y	648/688	
4	Y	648/728	
5	Y	526/688	
6	Y	405/486	
7	Y	1012/1174	
8	Y	607/728	
9	Y	688/769	

Note: *Total/Planted Stem Count reflects the changes in stem density based on the density of stems at the time of the As-Built Survey (Planted) and the current total density of planted stems (Total)

Table 8. CVS Vegetation Metadata
St. Clair Creek Restoration Project: DMS Project ID No. 95015

Report Prepared By	Dwayne Huneycutt
Date Prepared	11/30/2015 13:41
database name	MichaelBaker_2015_StClair_95015.mdb
database location	L:\Monitoring\Veg Plot Info\CVS Data Tool\St Clair
computer name	CARYLDHUNEYCUTT
file size	47431680
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	95015
project Name	St Clair Creek Restoration Project
Description	
River Basin	Tar-Pamlico
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	9

Table 9a. CVS Stem Count of Planted Stems by Plot and Species
St. Clair Creek Restoration Project: DMS Project ID No. 95015

	Comment	Species	SpType	CommonName	Total Planted Stems	# plots	avg# stems	plot 95015-01-0001-year:2	plot 95015-01-0002-year:2	plot 95015-01-0003-year:2	plot 95015-01-0004-year:2	plot 95015-01-0005-year:2	plot 95015-01-0006-year:2	plot 95015-01-0007-year:2	plot 95015-01-0008-year:2	plot 95015-01-0009-year:2
		Aronia arbutifolia	Shrub	Red Chokeberry	6	3	2		4					1		1
		Carpinus caroliniana	Shrub Tree	American hornbeam	4	3	1.33		1					1		2
		Clethra alnifolia	Shrub	coastal sweetpepperbush	2	2	1	1							1	
		Fraxinus pennsylvanica	Tree	green ash	5	4	1.25	2			1			1		1
		Morella cerifera	Shrub Tree	wax myrtle	1	1	1								1	
		Nyssa sylvatica	Tree	blackgum	7	3	2.33		1					4	2	
		Persea palustris	Tree	swamp bay	6	2	3								2	4
		Quercus laurifolia	Tree	laurel oak	8	3	2.67	1		3		4				
		Quercus lyrata	Tree	overcup oak	14	7	2	4	2	1		2		2	1	2
		Quercus michauxii	Tree	swamp chestnut oak	27	6	4.5	1	4		4	5	5	8		
		Quercus phellos	Tree	willow oak	15	6	2.5			5	1	2	1	4	2	
		Taxodium distichum	Tree	bald cypress	16	4	4		4	3	8		1			
		Ulmus americana	Tree	American elm	19	6	3.17	1		4	2		1	4		7
		Vaccinium corymbosum	Shrub	highbush blueberry	5	3	1.67	2					1		2	
		Viburnum dentatum	Shrub Tree	southern arrowwood	8	3	2.67	3					1		4	
TOT:	**0**	**15**	**15**	**15**	**143**	**15**		**15**	**16**	**16**	**16**	**13**	**10**	**25**	**15**	**17**

Table 9b. Stem Count for Each Species Arranged by Plot
St. Clair Creek Restoration Project: DMS Project ID No. 95015

Botanical Name	Common Name	Plots									
		1	2	3	4	5	6	7	8	9	
Tree Species											
Fraxinus pennsylvanica	green ash	2			1			1		1	
Nyssa sylvatica	swamp tupelo		1					4	2		
Quercus michauxii	swamp chestnut oak	1	4		4	5	5	8			
Quercus laurifolia	laurel oak	1		3		4					
Quercus lyrata	overcup oak	4	2	1		2		2	1	2	
Quercus phellos	willow oak			5	1	2	1	4	2		
Taxodium distichium	bald cypress		4	3	8		1				
Ulmus americana	American elm	1		4	2		1	4		7	
Shrub Species											
Clethra alnifolia	sweet pepperbush	1							1		
Carpinus caroliniana	ironwood		1					1		2	
Magnolia virginiana	sweetbay magnolia										
Persea palustris	swamp bay								2	4	
Callicarpa americana	beautyberry										
Cornus foemina	swamp dogwood										
Morella cerifera	wax Myrtle								1		
Vaccinium corymbosum	blueberry	2					1		2		
Viburnum dentatum	arrowwood	3					1		4		
Rosa palustris	swamp rose										
Ilex glabra	inkberry										
Aronia arbutifolia	chokeberry		4					1		1	
Volunteer Species											
N/A											Average Stems Per Acre
Stems Per Plot (November 2015)		15	16	16	16	13	10	25	15	17	
Total Stems/Acre Year 2 (November 2015)		607	648	648	648	526	405	1012	607	688	**643**
Total Stems/Acre Year 1 (December 2014)		688	648	648	648	648	445	1052	648	728	**683**
Total Stems/ Acre for Year 0 As-Built (Baseline Data)		728	648	688	728	688	486	1174	728	769	**737**

Table 9c. Yearly Density Per Plot
St. Clair Creek Restoration Project: DMS Project ID No. 95015

			Current Plot Data (MY2 2015)																										Annual Means					
			95015-01-0001			95015-01-0002			95015-01-0003			95015-01-0004			95015-01-0005			95015-01-0006			95015-01-0007			95015-01-0008			95015-01-0009			MY2 (2015)			MY1 (2014)		
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
Aronia arbutifolia	Red Chokeberry	Shrub				4	4	4													1	1	1				1	1	1	6	6	6	6	6	6
Carpinus caroliniana	American hornbeam	Tree				1	1	1													1	1	1				2	2	2	4	4	4	3	3	3
Clethra alnifolia	coastal sweetpepperbush	Shrub	1	1	1																			1	1	1				2	2	2	1	1	1
Cornus foemina	stiff dogwood	Shrub Tree																															2	2	2
Fraxinus pennsylvanica	green ash	Tree	2	2	2							1	1	1							1	1	1				1	1	1	5	5	5	4	4	4
Morella cerifera	wax myrtle	shrub																						1	1	1				1	1	1	1	1	1
Nyssa sylvatica	blackgum	Tree				1	1	1													4	4	4	2	2	2				7	7	7	6	6	6
Persea palustris	swamp bay	tree																						2	2	2	4	4	4	6	6	6	6	6	6
Quercus laurifolia	laurel oak	Tree	1	1	1				3	3	3				4	4	4													8	8	8	14	14	14
Quercus lyrata	overcup oak	Tree	4	4	4	2	2	2	1	1	1				2	2	2				2	2	2	1	1	1	2	2	2	14	14	14	17	17	17
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	4	4	4				4	4	4	5	5	5	5	5	5	8	8	8							27	27	27	25	25	25
Quercus phellos	willow oak	Tree							5	5	5	1	1	1	2	2	2	1	1	1	4	4	4	2	2	2				15	15	15	11	11	11
Taxodium distichum	bald cypress	Tree				4	4	4	3	3	3	8	8	8				1	1	1										16	16	16	19	19	19
Ulmus americana	American elm	Tree	1	1	1				4	4	4	2	2	2				1	1	1	4	4	4				7	7	7	19	19	19	21	21	21
Unknown		Shrub or Tree																															5	5	5
Vaccinium corymbosum	highbush blueberry	Shrub	2	2	2													1	1	1				2	2	2				5	5	5	5	5	5
Viburnum dentatum	southern arrowwood	Shrub	3	3	3													1	1	1				4	4	4				8	8	8	6	6	6
		Stem count	15	15	15	16	16	16	16	16	16	16	16	16	13	13	13	10	10	10	25	25	25	15	15	15	17	17	17	143	143	143	152	152	152
		size (ares)	1			1			1			1			1			1			1			1			1			9			9		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.22			0.22		
		Species count	8	8	8	6	6	6	5	5	5	5	5	5	4	4	4	6	6	6	8	8	8	8	8	8	6	6	6	15	15	15	17	17	17
		Stems per ACRE	607.0	607.0	607.0	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	526.1	526.1	526.1	404.7	404.7	404.7	1011.7	1011.7	1011.7	607.0	607.0	607.0	688.0	688.0	688.0	643.0	643.0	643.0	683.5	683.5	683.5

Color for Density
Exceeds requirements by 10%

Table 9d. Vegetation Summary and Totals
St. Clair Creek Restoration Project: DMS Project ID No. 95015

Year 2 (18-Nov-2015)

Vegetation Plot Summary Information

Plot #	Riparian Buffer Stems[1]	Stream/ Wetland Stems[2]	Live Stakes	Invasives	Volunteers[3]	Total[4]	Unknown Growth Form
1	15	15	0	0	0	**15**	0
2	16	16	0	0	0	**16**	0
3	16	16	0	0	0	**16**	0
4	16	16	0	0	0	**16**	0
5	13	13	0	0	0	**13**	0
6	10	10	0	0	0	**10**	0
7	25	25	0	0	0	**25**	0
8	15	15	0	0	0	**15**	0
9	17	17	0	0	0	**17**	0

Wetland/Stream Vegetation Totals

(per acre)

Plot #	Stream/ Wetland Stems[2]	Volunteers[3]	Total[4]	Success Criteria Met?
1	607	0	607	Yes
2	647	0	647	Yes
3	647	0	647	Yes
4	647	0	647	Yes
5	526	0	526	Yes
6	405	0	405	Yes
7	1012	0	1012	Yes
8	607	0	607	Yes
9	688	0	688	Yes
Project Avg	**643**	**0**	**643**	**Yes**

Riparian Buffer Vegetation Totals

(per acre)

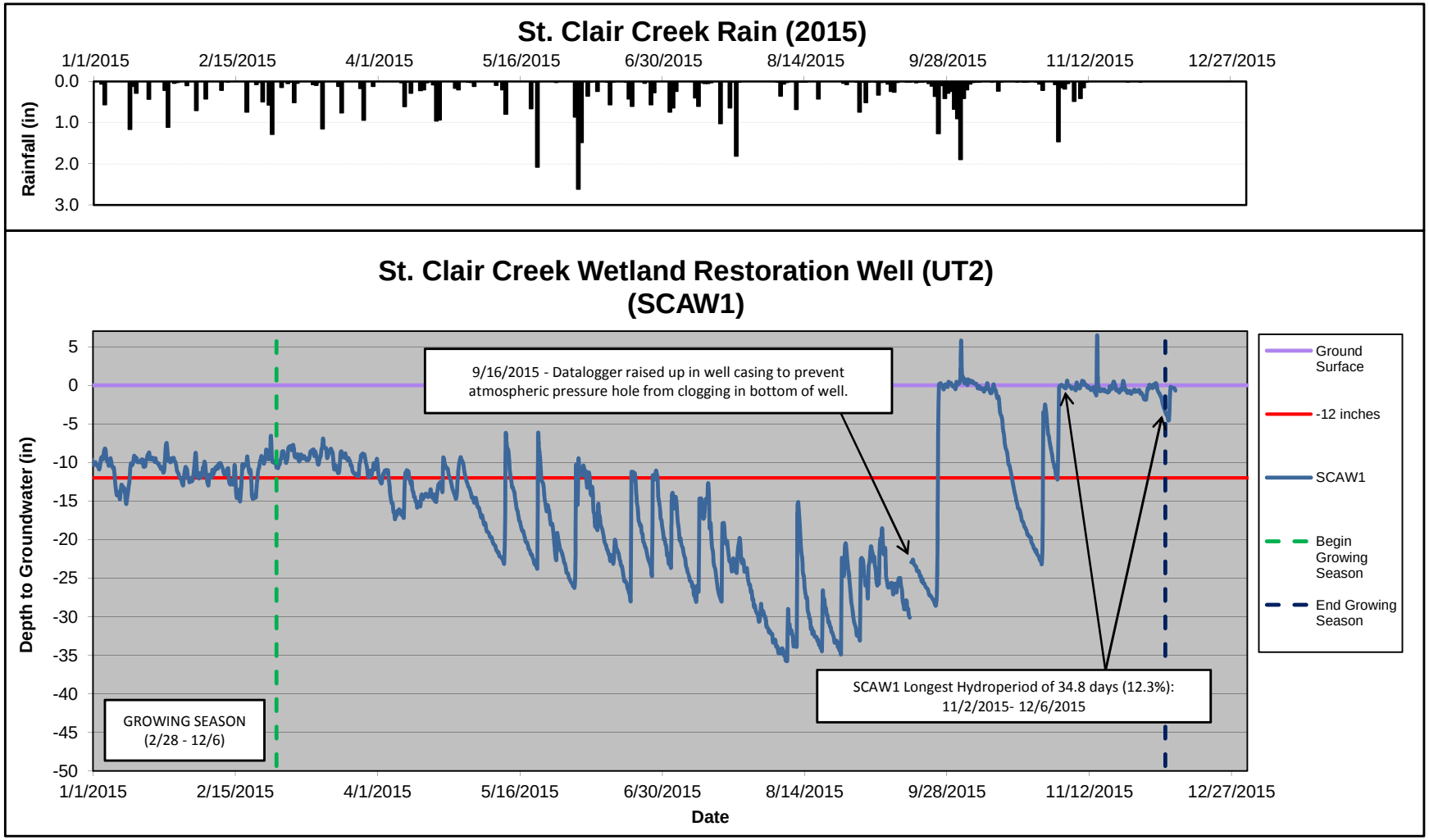
Plot #	Riparian Buffer Stems[1]	Success Criteria Met?
1	607	Yes
2	647	Yes
3	647	Yes
4	647	Yes
5	526	Yes
6	405	Yes
7	1012	Yes
8	607	Yes
9	688	Yes
Project Avg	**643**	**Yes**

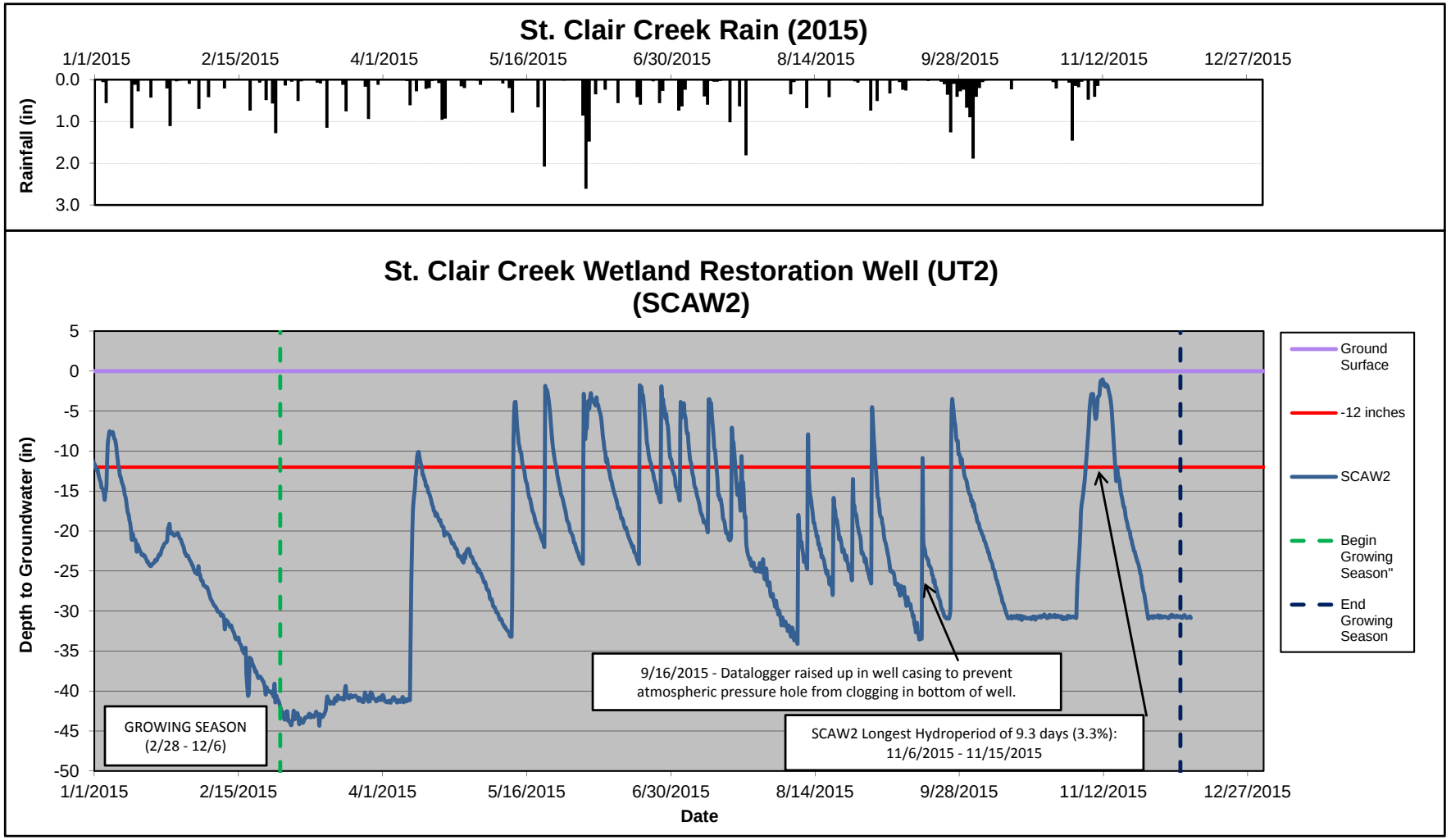
Stem Class	Characteristics
[1]Buffer Stems	Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.
[2]Stream/ Wetland Stems	Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines
[3]Volunteers	Native woody stems. Not planted. No vines.
[4]Total	Planted + volunteer native woody stems. Includes live stakes. Excl. exotics. Excl. vines.

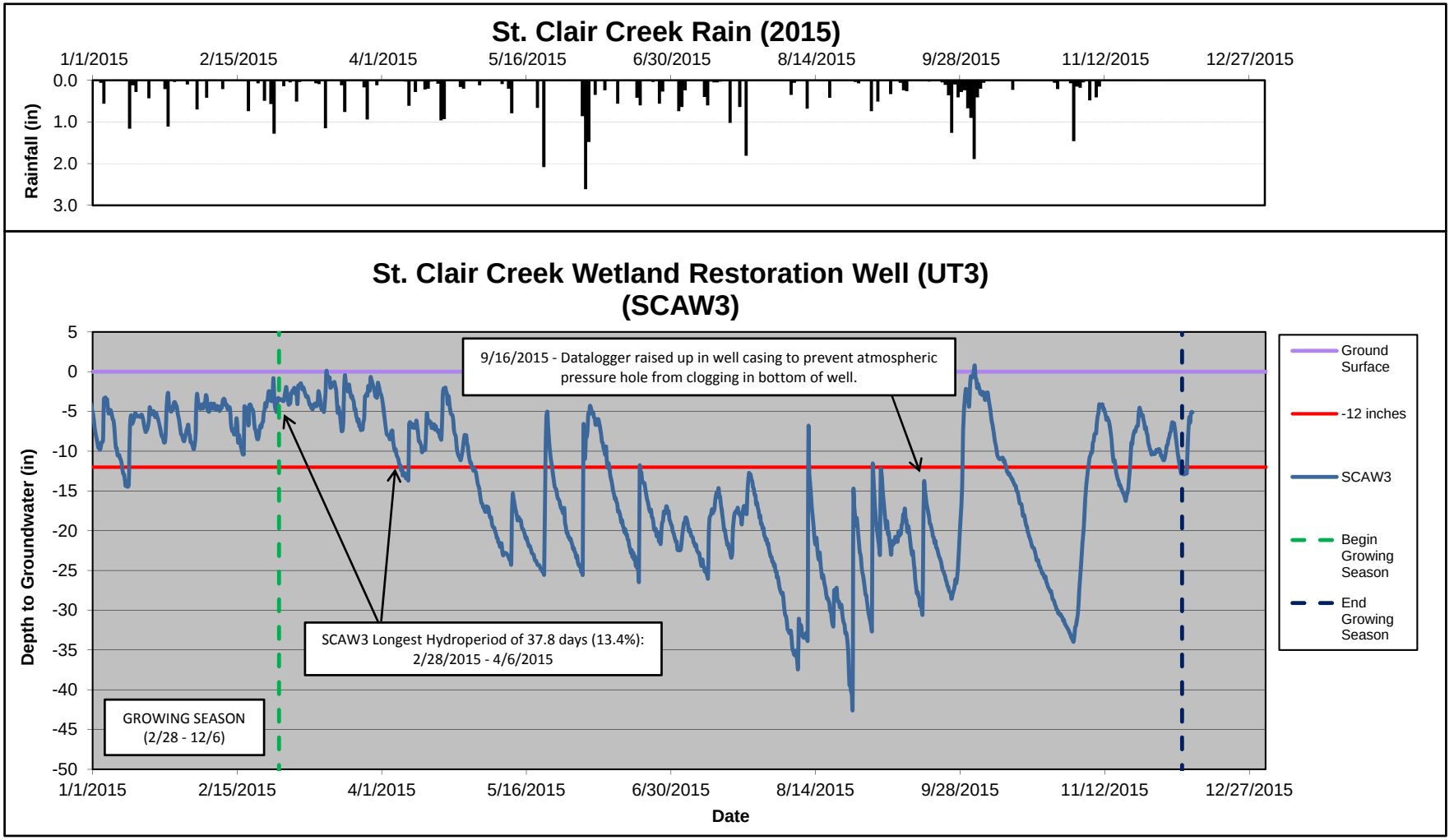
Appendix D

Hydrologic Data

Figure 4. Wetland Gauge Graphs




St. Clair Creek Rain (2015)
1/1/2015
2/15/2015
4/1/2015
5/16/2015
6/30/2015
8/14/2015
9/28/2015
11/12/2015
12/27/2015
Rainfall (in)
0.0
1.0
2.0
3.0
St. Clair Creek Wetland Restoration Well (UT2)
(SCAW2)
Depth to Groundwater (in)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
Date
Ground Surface
-12 inches
SCAW2
Begin Growing Season"
End Growing Season
GROWING SEASON
(2/28 - 12/6)
9/16/2015 - Datalogger raised up in well casing to prevent atmospheric pressure hole from clogging in bottom of well.
SCAW2 Longest Hydroperiod of 9.3 days (3.3%):
11/6/2015 - 11/15/2015


St. Clair Creek Rain (2015)
1/1/2015
2/15/2015
4/1/2015
5/16/2015
6/30/2015
8/14/2015
9/28/2015
11/12/2015
12/27/2015
0.0
1.0
2.0
3.0
Rainfall (in)
St. Clair Creek Wetland Restoration Well (UT3)
(SCAW3)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
Depth to Groundwater (in)
9/16/2015 - Datalogger raised up in well casing to prevent atmospheric pressure hole from clogging in bottom of well.
SCAW3 Longest Hydroperiod of 37.8 days (13.4%): 2/28/2015 - 4/6/2015
GROWING SEASON (2/28 - 12/6)
Ground Surface
-12 inches
SCAW3
Begin Growing Season
End Growing Season
Date

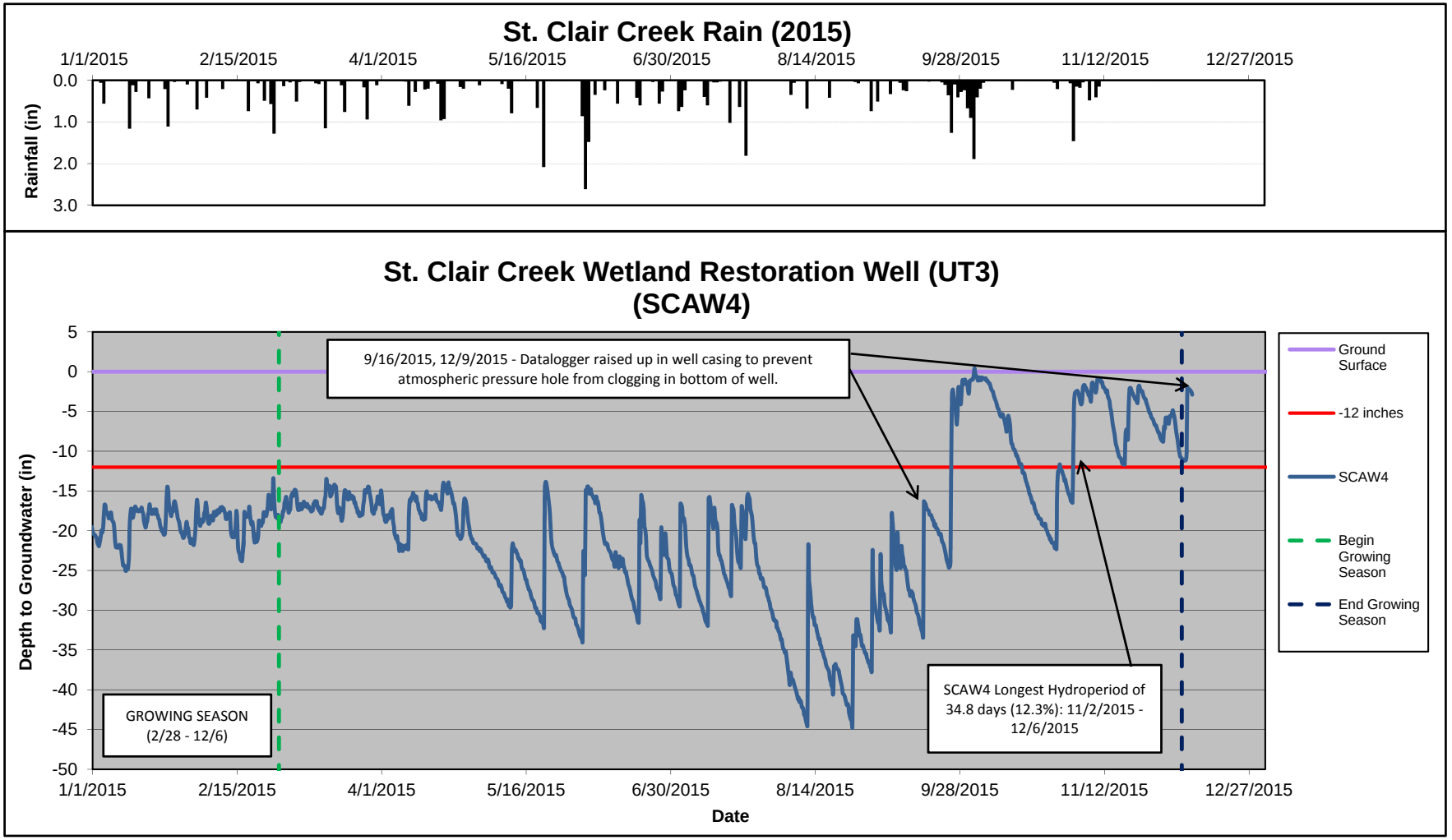
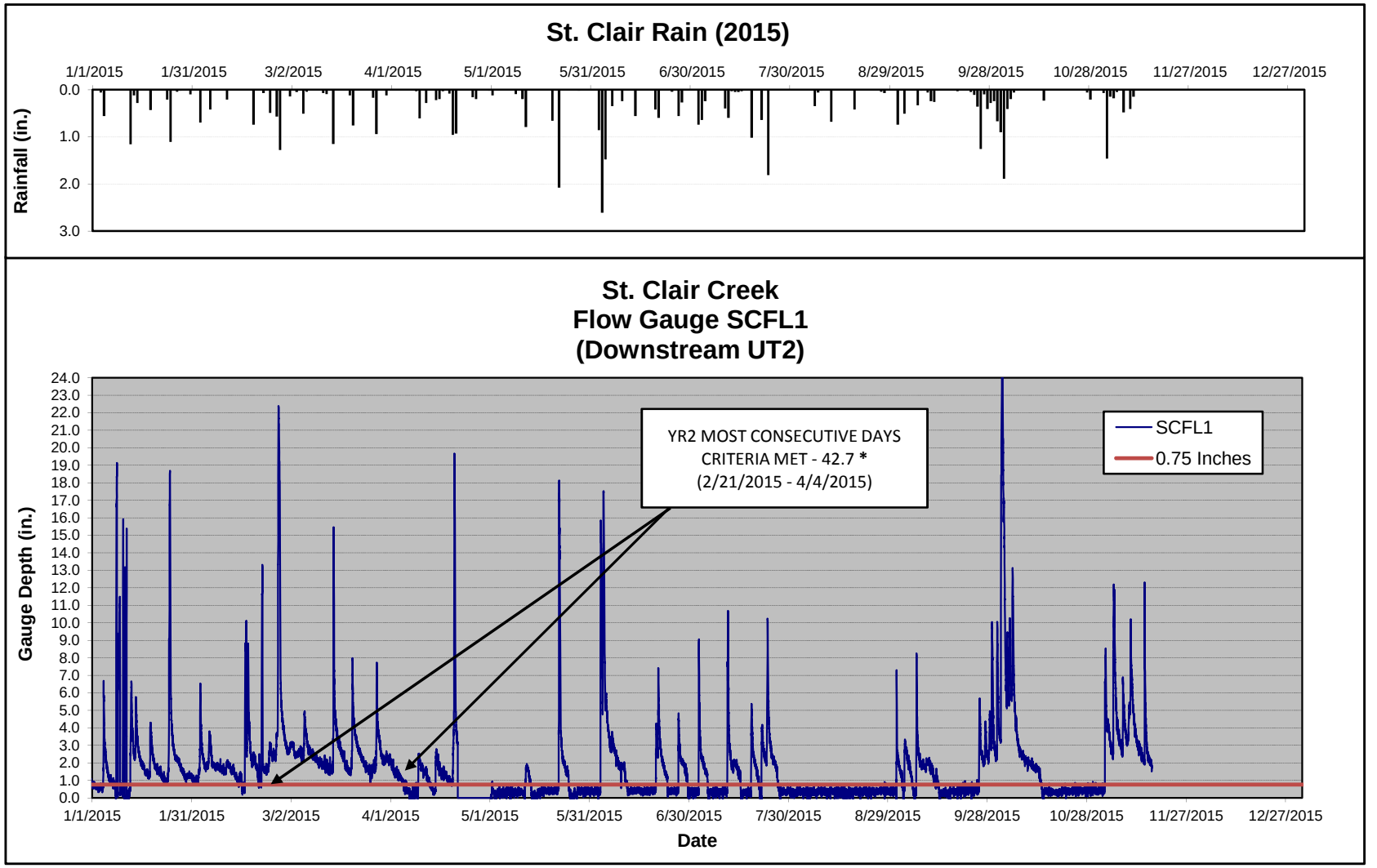
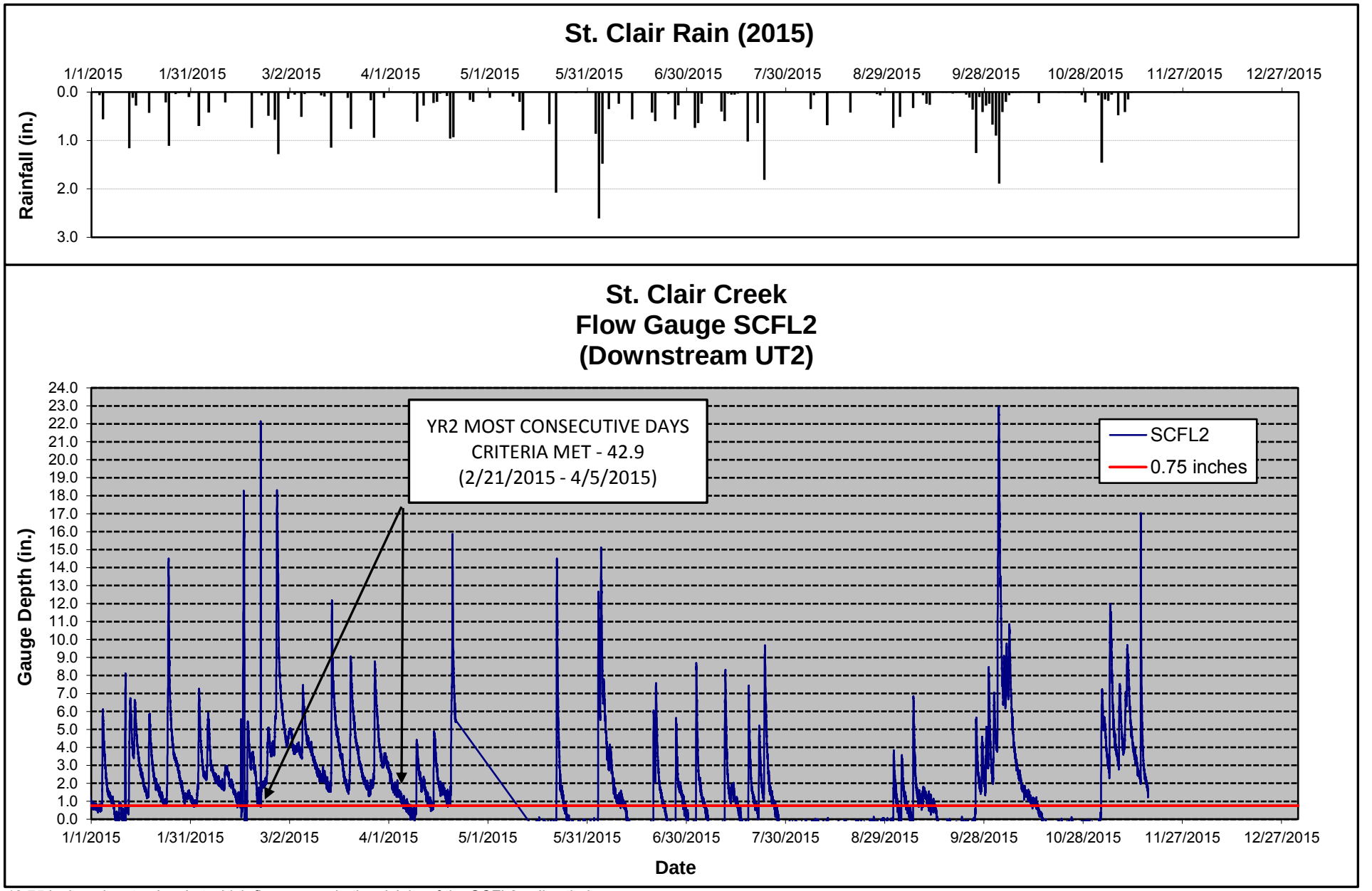

St. Clair Creek Rain (2015)
1/1/2015
2/15/2015
4/1/2015
5/16/2015
6/30/2015
8/14/2015
9/28/2015
11/12/2015
12/27/2015
Rainfall (in)
0.0
1.0
2.0
3.0
St. Clair Creek Wetland Restoration Well (UT3)
(SCAW4)
Depth to Groundwater (in)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
9/16/2015, 12/9/2015 - Datalogger raised up in well casing to prevent atmospheric pressure hole from clogging in bottom of well.
GROWING SEASON (2/28 - 12/6)
SCAW4 Longest Hydroperiod of 34.8 days (12.3%): 11/2/2015 - 12/6/2015
Ground Surface
-12 inches
SCAW4
Begin Growing Season
End Growing Season
Date

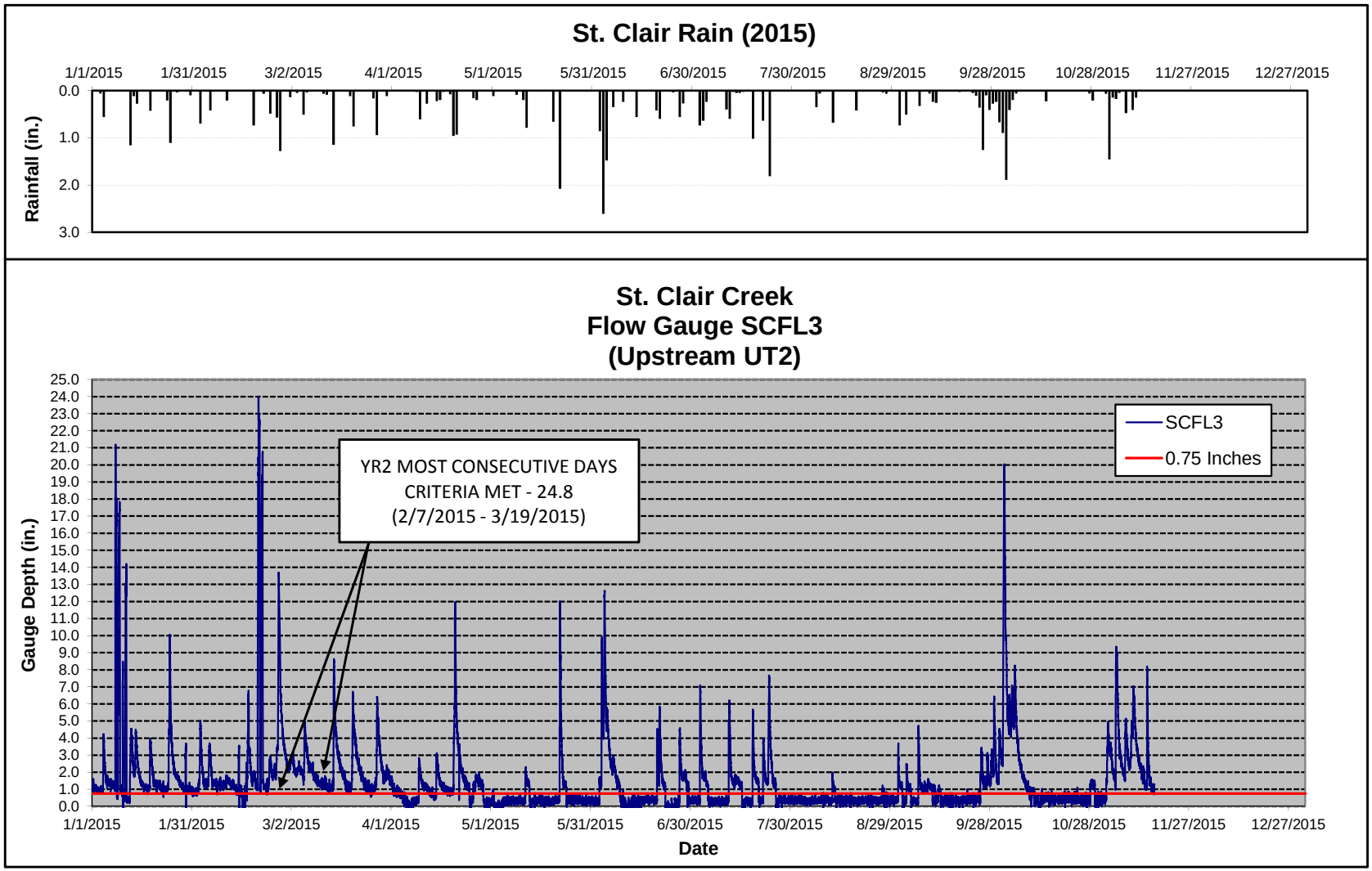
Figure 5. Flow Gauge Graphs



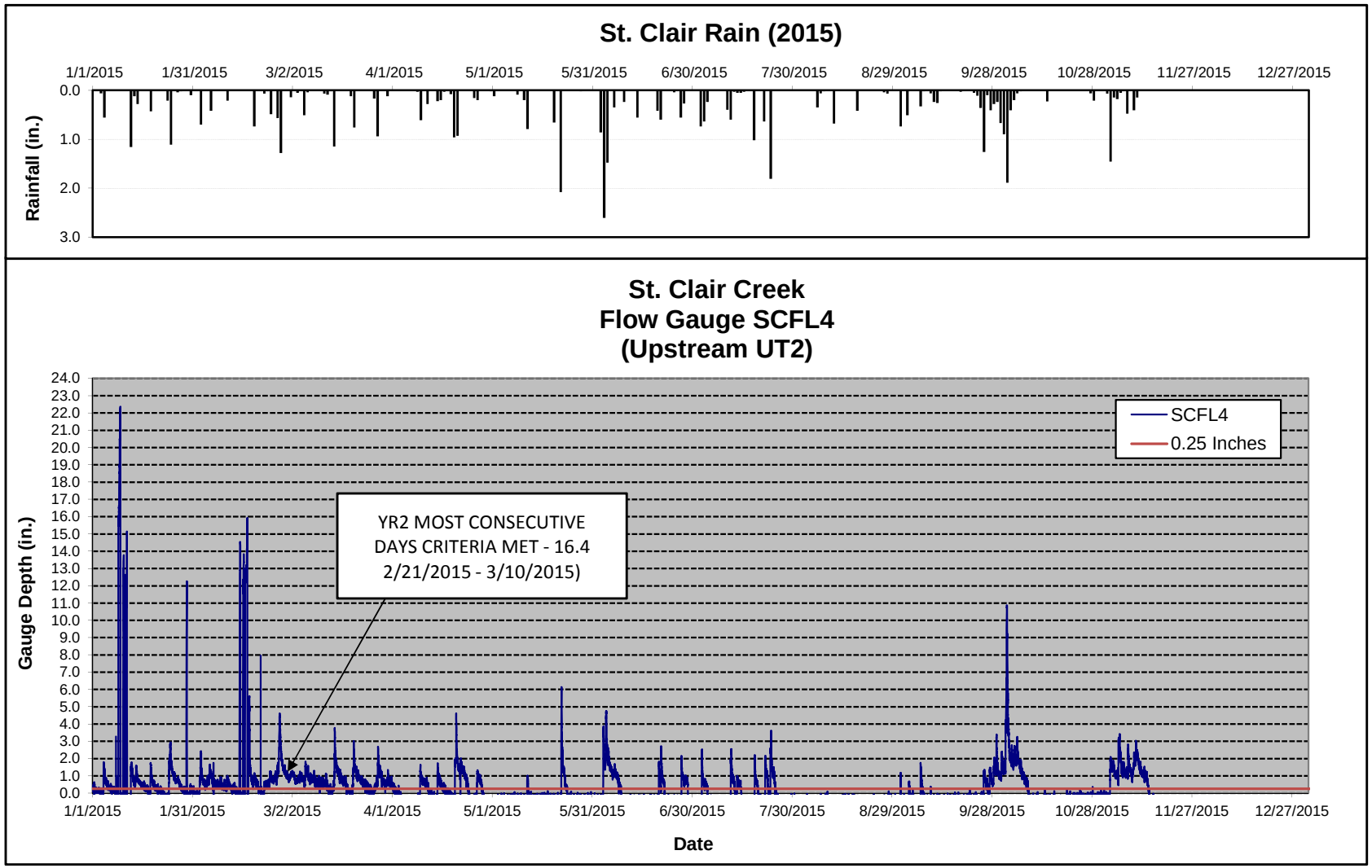
*0.75 inches denotes level at which flow occurs in the vicinity of the SCFL1 valley thalweg



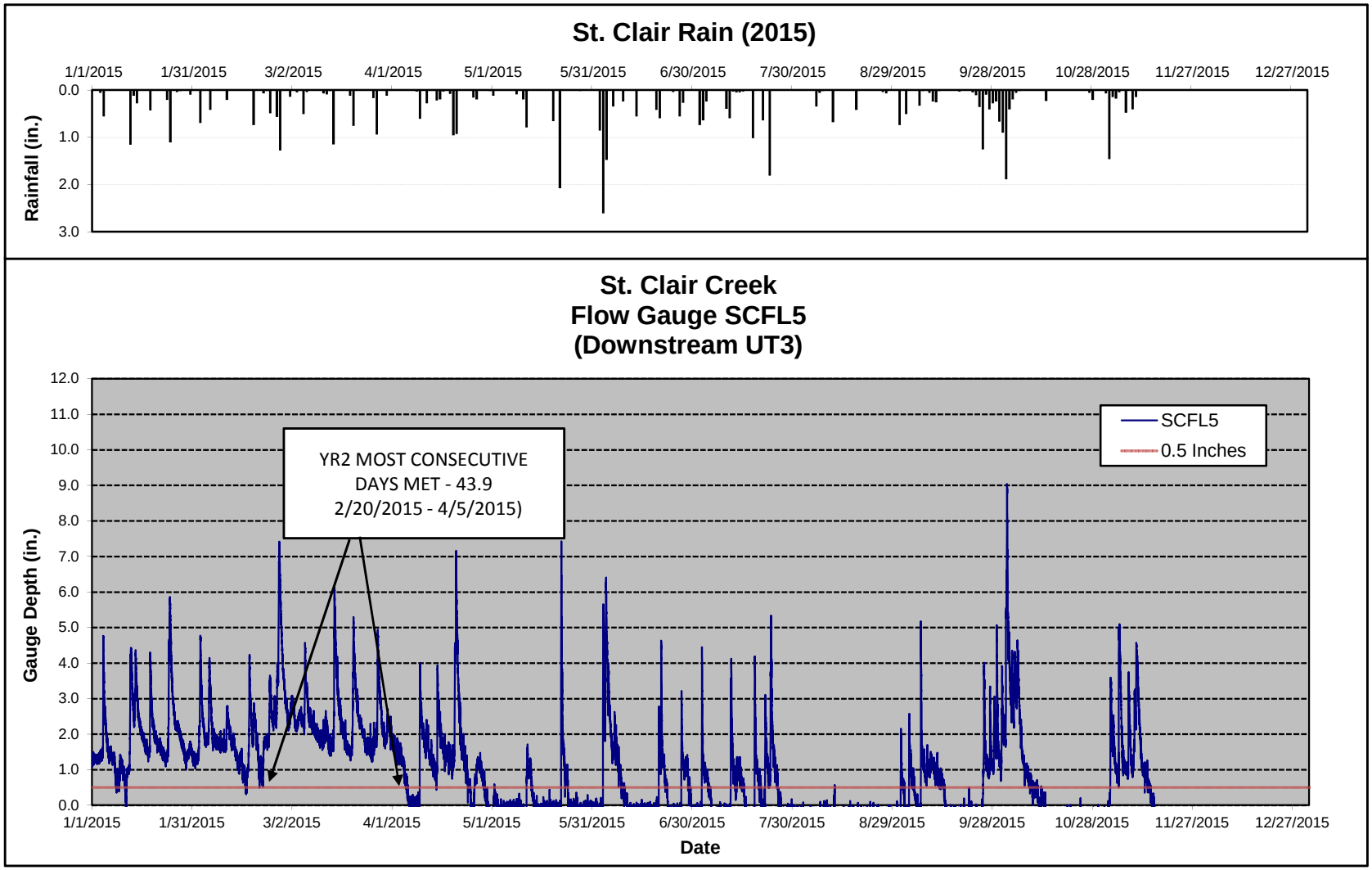
*0.75 inches denotes level at which flow occurs in the vicinity of the SCFL2 valley thalweg



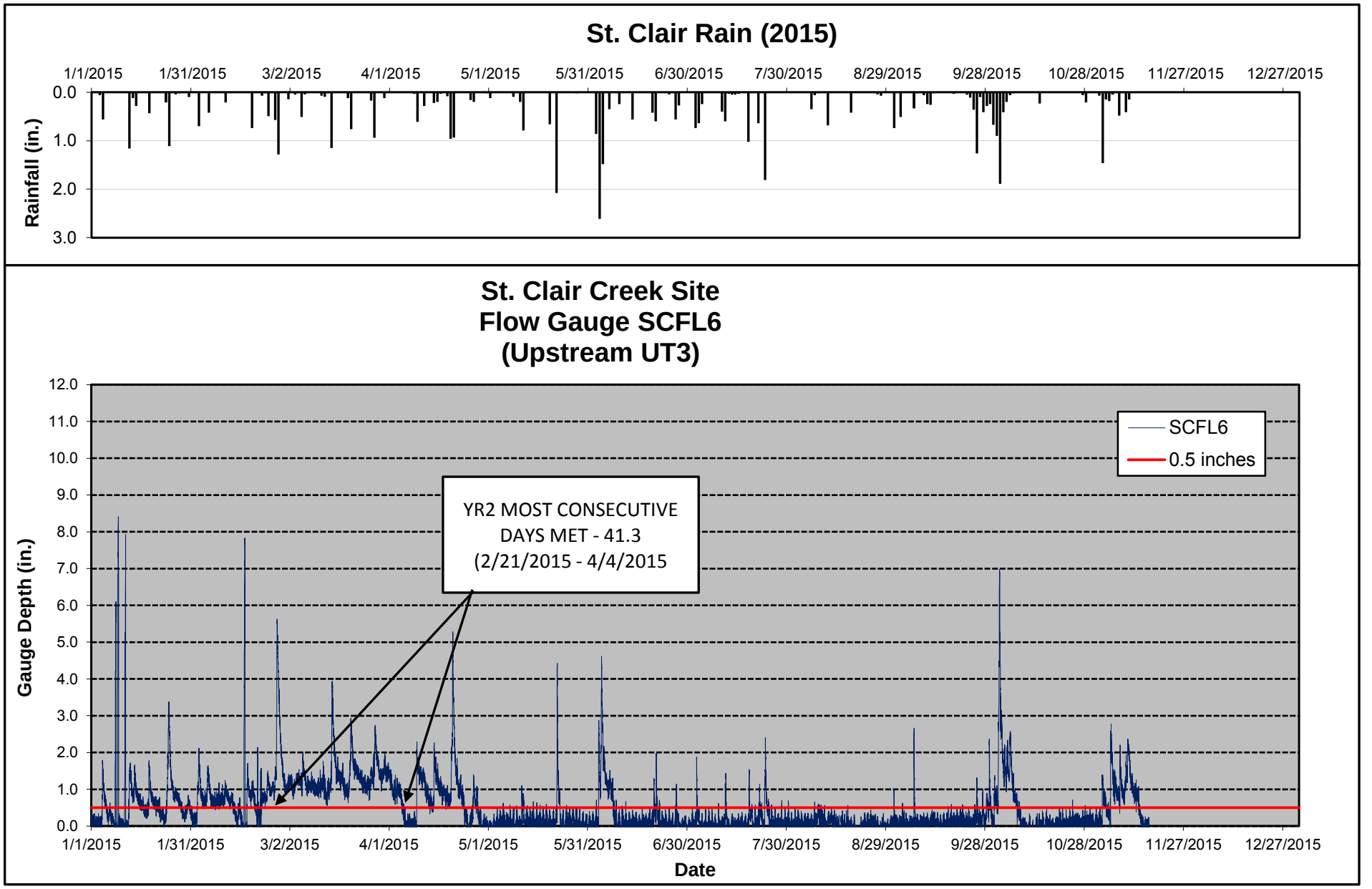
*0.75 inches denotes level at which flow occurs in the vicinity of the SCFL3 valley thalweg



*0.25 inches denotes level at which flow occurs in the vicinity of the SCFL1 valley thalweg



*0.50 inches denotes level at which flow occurs along the UT3 valley thalweg



*0.50 inches denotes level at which flow occurs along the UT3 valley thalweg

Table 10. Wetland Restoration Area Well Success
St. Clair Creek Restoration Project: DMS Project ID No. 95015

Well ID	Percentage of Consecutive Days <12 inches from Ground Surface[1]	Consecutive Days Meeting Criteria[2]	Percentage of Cumulative Days <12 inches from Ground Surface[3]	Cumulative Days Meeting Criteria[4]	Number of Consecutive Instances Meeting Criteria[5]
Wetland Wells					
SCAW1	12.3	34.8	39.3	110.8	17.0
SCAW2	3.3	9.3	16.1	45.5	12.0
SCAW3	13.4	37.8	37.5	105.8	7.0
SCAW4	12.3	34.8	20.3	57.3	2.0
Reference Wells					
SCAWREF1	57.9	163.3	93.7	264.3	3.0
SCAWREF2	60.1	169.5	94.1	265.5	3.0

Notes:

[1]Indicates the percentage of **consecutive** number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

[2]Indicates the **consecutive** number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

[3]Indicates the percentage of **cumulative** number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

[4]Indicates the **cumulative** number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

[5]Indicates the number of **consecutive** instances within the monitored growing season when the water table rose to 12 inches or less from the soil surface.

Growing season for Beaufort County is from February 28 to December 6 and is 282 days long.

HIGHLIGHTED indicates wells that *did not* to meet the success criteria of 12% of the growing seasaon within the monitored growing season with a water 12 inches or less from the soil surface

All In-Situ wetland monitoring dataloggers were installed on 3/21/2014. Reference wells installed on 7/17/2014.

Figure 6.
St. Clair Creek
Observed Rainfall versus Historic Average

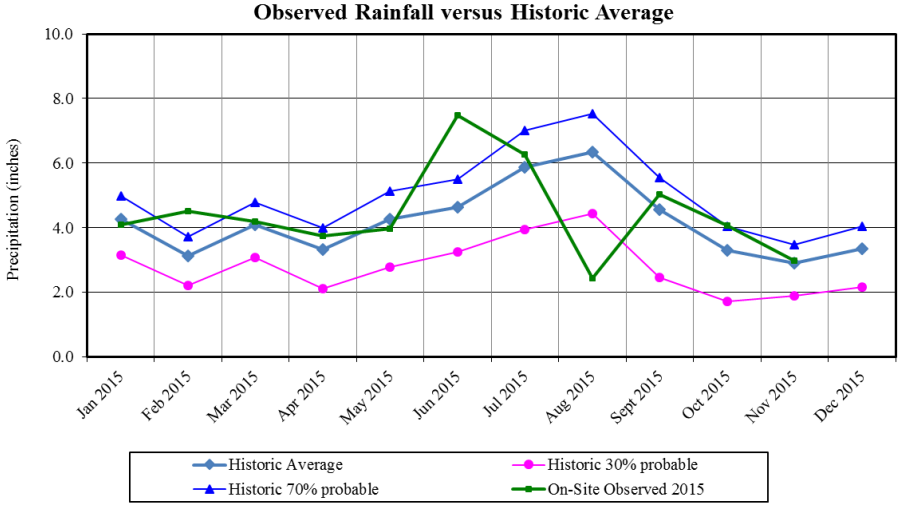


Table 11. St. Clair Creek Flow Gauge Success		
St. Clair Creek Restoration Project: DMS Project ID No. 95019		
Gauge ID	**Consecutive Days Meeting Criteria[1]**	**Cumulative Days Meeting Criteria[2]**
UT2 Flow Gauges		
SCFL1	42.7	205.1
SCFL2	42.9	200.8
SCFL3	24.8	173.6
SCFL4	16.4	117.6
UT3 Flow Gauges		
SCFL5	43.9	173.1
SCFL6	41.3	115.9
Notes:		
[1]Indicates the number of **consecutive** days within the monitoring year where flow was measured.		
[2]Indicates the number of **cumulative** days within the monitoring year where flow was measured.		
Flow success criteria for the Site is stated as: A surface water flow event will be considered perennial when the flow duration occurs for a minimum of 30 days.		