

# **Monitoring Report MY05**

**Cedar Branch Restoration Site  
Monitoring Year 05  
DMS Contract 6598  
DMS Project Number 97009  
RFP#16-006313 (Issue Date: January 21, 2015)**

**DWR #: 20150904  
USACE Action ID: 2003-21395  
Randolph County, North Carolina**



Prepared for:  
NCDMS, 1652 Mail Service Center, Raleigh, NC 27699-1652

**Monitoring Data Collected: 2022  
Date Submitted: January 2023**

## Monitoring and Design Firm

Prepared by:



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**Project Contact: Adam Spiller**  
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**MEMORANDUM**

Date: February 8, 2023

To: Matthew Reid, DMS Project Manager

From: Adam Spiller, Project Manager  
KCI Associates of North Carolina, PA

Subject: Cedar Branch Stream Restoration Site  
MY-05 Monitoring Report Comments  
Yadkin River Basin CU 03040103  
Randolph County, North Carolina  
NCDMS Project # 97009  
Contract # 006598

Please find below our responses in italics to the MY-05 Monitoring Report comments from NCDMS received on January 25, 2023, for the Cedar Branch Stream Restoration Site.

In an effort to identify and resolve property issues, please verify the conservation easement has been inspected, marking is up to date, fencing is intact, and no encroachments have been identified.

➤ *The conservation easement was inspected during the site inspection on December 13, 2022. In addition to one spot where a tree has fallen on the fence (no livestock kept in this area) and some trash in the easement that was noted last year, there is one bale of hay that has rolled into the easement along T4. KCI is working to address all of these issues.*

Please provide an update on the following items identified from the DMS MY4 site visit in 2022

- Several Tires, a metal hay bale feeder and concrete blocks were located within the conservation easement at the top of T1. Please verify items have been removed.
  - Fence down on the left flood plain near sta: 17+00 due to trees falling. Please verify fence has been repaired.
- *These issues were not addressed in 2022 but the fence will be repaired, and the trash and bale of hay will be removed as soon as possible.*

Title Page: Please add RFP#16-006313 (Issue Date: January 21, 2015) to title page.

➤ *This change has been made.*

Tables 5 and 6: Please include dates that the assessment occurred at the top of each graph.

➤ *This change has been made.*

Table 6: Invasive Areas of Concern shows 0.5% in the % of Easement Acreage column; however, no data is included in the Number of Polygons and Combined Acreage columns. Please review and revise.

➤ *The 0.5% was included in error. This error has been corrected.*

T1, T1-1 and T3 Stream Flow Graphs: Please add the max consecutive day information for both the camera and gauge similar to how the “49 Days” is shown on the T3 stream flow graph.

➤ *This change has been made.*

Sincerely,

A handwritten signature in black ink, appearing to read "Adam Spiller", enclosed within a thin black rectangular border.

Adam Spiller  
Project Manager

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## **PROJECT SUMMARY**

The Cedar Branch Restoration Site (CBRS) was completed in April 2018 and restored a total of 7,047 linear feet of stream. The CBRS is a riparian system in the Lower Yadkin River Basin (03040103 8-digit cataloging unit) in Randolph County, North Carolina. The site's natural hydrologic regime had been substantially modified through the relocation and straightening of the existing stream channels, impacted by cattle access, and cleared of any riparian buffer. This completed project restored impacted agricultural lands to a stable stream ecosystem with a functional riparian buffer and floodplain access.

The CBRS is protected by a 20.6 acre permanent conservation easement, held by the State of North Carolina. The site is located approximately 2.8 miles west of Sophia, North Carolina. Specifically, the site is 0.5 mile west on Mt. Olive Church Road from its intersection with Edgar Road (SR-1526).

The North Carolina Ecosystem Enhancement Program (NCEEP) publication in 2009 identified HUC 03040103050040 (Caraway Creek) as a Targeted Local Watershed (TLW). The project is also located within the Upper Uwharrie Local Watershed Plan (LWP) study area. The goals and priorities for the CBRS are based on the information presented in the Lower Yadkin River Basin Restoration Priorities: maintaining and enhancing water quality, restoring hydrology, and improving fish and wildlife habitat (NCEEP, 2009). The project will support the following basin priorities:

- Managing stormwater runoff
- Reducing fecal coliform inputs
- Improving/restoring riparian buffers
- Reducing sediment loading
- Improving stream stability
- Reducing nutrient loading
- Excluding livestock and implementing other agricultural BMP's

The goals for the project are to:

- Restore channelized and livestock-impacted streams to stable C/Cb channels.
- Restore a forested riparian buffer to provide bank stability, filtration, and shading.

The project goals will be addressed through the following objectives:

- Relocate a channelized stream to its historic landscape position.
- Install cross-sections sized to the bankfull discharge.
- Create bedform diversity with pools, riffles, and habitat structures
- Fence out livestock to reduce nutrient, bacterial, and sediment impacts from adjacent grazing and farming practices.
- Plant the site with native trees and shrubs and an herbaceous seed mix.

To restore the site, the stream was re-meandered and the bankfull elevation was tied to the historic floodplain where feasible. This restoration is expected to create wetland pockets throughout the new floodplain and bankfull bench. The entire site was planted to establish a forested riparian buffer.

The monitoring components were installed in April 2018. Three groundwater monitoring wells were installed to monitor the development of wetlands in the floodplain along the EI portions of T1 and T3. Three automatically recording pressure transducer stream gauges that take a reading every 10 minutes were installed near the top of T1, T1-1, and T3 to document flow within those reaches. Cameras were installed in the vicinity of each of these gauges and set to record a short video once a day to provide additional verification of flow. An additional stream gauge was installed along UTCC to record the occurrence of bankfull events. Thirteen 10 m x 10 m permanent vegetation monitoring plots were established. The locations of the planted stems relative to the origin within these plots, as well as the species, were recorded and planted stems were grouped into size categories (0-10 cm, 10-50 cm, 50-100 cm, >137 cm). Any

volunteers found within the plots were also grouped into size categories by species, but separate from the planted stems. Twelve permanent photo reference points were established and will be taken annually. Fifteen permanent cross-sections (ten riffle cross-sections and five pool cross-sections) were also established and a detailed longitudinal profile of the stream was taken. Wolman pebble counts were performed at all of the riffle cross-sections. The cross-section measurements will be repeated in future monitoring years, but the longitudinal profile will only be repeated if there are concerns about bed elevation adjustments. Reports will be submitted to DMS each year.

Vegetative success criteria for the site is 320 woody stems/acre after three years, 260 woody stems/acre after five years, and 210 woody stems/acre after seven years. A minimum of two bankfull events in separate years must also be recorded during the monitoring period. Bank height ratios should not exceed 1.2 and the entrenchment ratios should be 2.2 or greater. Visual assessments will also be used to identify problem areas.

### **MONITORING RESULTS**

The fifth-year vegetation monitoring was completed on July 19, 2022. The site averaged 697 planted stems/acre across all 13 plots. Twelve of the thirteen plots had greater than 260 planted stems/acre, including volunteers, the site averaged 794 total stems/acre. A supplemental planting of one hundred bare root stems was completed on January 4, 2022 in the area between T1 and T1A. Due to poorer soil conditions and being located further from the streams than other areas of the site, this area had not seen as vigorous growth as the rest of the site. Twenty-five each of tulip poplar (*Liriodendron tulipifera*), willow oak (*Quercus phellos*), persimmon (*Diospyros virginiana*), and southern red oak (*Quercus falcate*) were planted in this area to address this issue. A treatment of invasive species growing on site was completed in July 2022. This treatment targeted Chinese privet (*Ligustrum sinense*) in areas where preexisting vegetation was not cleared during construction, mainly around the upper reaches of T1. In general the site is well vegetated, with widespread herbaceous coverage and healthy planted stems.

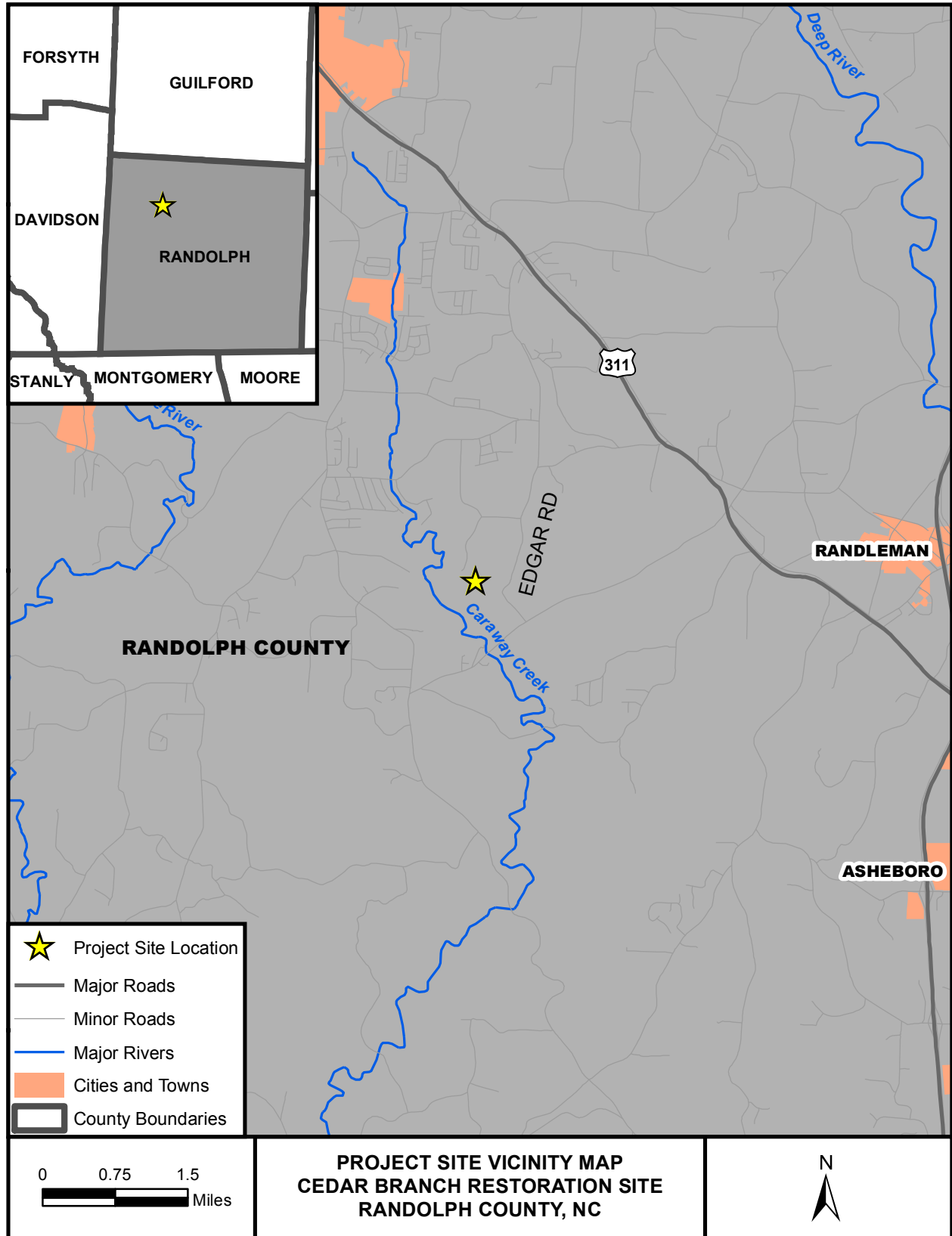
In addition to traditional stream monitoring, there are areas of fringe wetlands that were restored and enhanced along the bankfull benches of some reaches that are monitored for informational purposes. These areas do not have success criteria associated with them, but help illustrate the overall success of the restoration site. According to the Randolph County Soil Survey, the growing season at the CBRS extends from March 24 to November 13 (235 days). Daily rainfall data were obtained from the NC State Climate Office for a local weather station in Asheboro, NC. In 2022, March, April, and July experienced above average rainfall, while May, June, and September experienced average rainfall. The months of January, February, August, October, and November experienced below average rainfall for the site. Overall, the area experienced slightly below average rainfall during the 2022 growing season. During the site's fifth growing season, the groundwater monitoring well on T1 achieved 5 days (1.9%) of continuous saturation within twelve inches of the soil surface, while the two wells on T3 achieved 103 days (44.0%) and 18 days (7.7%). These lower than usual levels of success are due to the low levels of rainfall that the site received in 2022. Several species of hydrophytic vegetation have been noted growing along the floodplains of T1 and T3 in all monitoring years. These species including *Juncus effuses* (FACW), *Cyperus strigosus* (FACW), *Persicaria pensylvanica* (FACW), and *Persicaria sagittata* (OBL).

The stream gauge on UTCC recorded 8 bankfull events in 2022. All 3 of the flow cameras on site recorded at least 30 consecutive days of flow. The camera on T1 recorded 147 consecutive days of flow, while the camera on T1-1 recorded 115 consecutive days of flow. The camera on T3 recorded 173 consecutive days of flow. Due to the low levels of rainfall that the site received, only the stream flow gauge on T3 recorded at least 30 consecutive days of flow in 2022. This gauge recorded 49 consecutive days of flow. The difference in the success rates of the cameras compared to the gauges can be attributed to the fact that the cameras can provide better evidence of stream flow at the low levels of flow that the project streams experienced in 2022.

The fifth year cross-section survey was completed on December 14, 2022. This survey found the stream functioning as designed, with some small variation as is typical for stream restoration projects. There has been a small amount of aggradation in the cross-sections near the top of T1 (XS 1 and 2) and the cross-section near the top of T4 (XS10). This small build-up of sediment is part of the natural movement of sediment through the system and is not a reflection of instability.



Figure 1. Project Site Vicinity Map



## REFERENCES

- NCDENR, Ecosystem Enhancement Program. 2009. Broad River Basin Restoration Priorities 2009. Raleigh, NC. Last accessed 1/2016 at:  
[http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=705d1b58-cb91-451e-aa58-4ef128b1e5ab&groupId=60329](http://portal.ncdenr.org/c/document_library/get_file?uuid=705d1b58-cb91-451e-aa58-4ef128b1e5ab&groupId=60329)
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- Schafale, M.P. and A.S. Weakley. 2012. Guide to the Natural Communities of North Carolina: Fourth Approximation. Natural Heritage Program, Division of Parks and Recreation, N.C. Department of Environment and Natural Resources. Raleigh, NC.
- Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Soil Survey of Randolph County, North Carolina*. 2006

# **APPENDIX A**

## Background Tables

<b>Table 1. Project Components and Mitigation Credits Cedar Branch Restoration Site, DMS Project #97009</b>									
<b>Mitigation Credits</b>									
	<b>Stream</b>		<b>Riparian Wetland</b>		<b>Non-riparian Wetland</b>		<b>Buffer</b>	<b>Nitrogen Nutrient Offset</b>	<b>Phosphorous Nutrient Offset</b>
<b>Type</b>	R	RE	R	RE	R	RE			
<b>Linear Feet/Acres</b>	5,230	1,813							
<b>Credits†</b>	5,234	966							
<b>TOTAL CREDITS</b>	6,200								
<b>Project Components</b>									
<b>Project Component -or- Reach ID</b>	<b>Stationing/ Location</b>		<b>Existing Footage/ Acreage</b>	<b>Approach (PI, PII etc.)</b>	<b>Restoration -or- Restoration Equivalent</b>	<b>Restoration Footage/ Acreage</b>	<b>Mitigation Ratio</b>		
Tributary 1	50+00 to 55+50		550	Enhancement II	220	550	2.5:1		
	55+50 to 58+24		257	Enhancement I	183	274	1.5:1		
	58+24 to 61+17		229	Restoration	294	293	1:1		
Tributary 1-1	70+00 to 73+13		313	Enhancement II	125	313	2.5:1		
Tributary 2	80+00 to 80+49		46	Enhancement II	20	49	2.5:1		
	80+49 to 81+27		77	Restoration	78	78	1:1		
Tributary 3	90+00 to 96+27		624	Enhancement I	418	627	1.5:1		
	96+27 to 101-57		517	Restoration	530	530	1:1		
Tributary 3-1	150+00 to 150+78		68	Restoration	78	78	1:1		
Tributary 4*	250+00 to 257+42		677	Restoration	692	692	1:1		
Tributary 5**	300+00 to 300+95		64	N/A	0	(95)	N/A		
UTCC*	10+00 to 46+09		3,246	Restoration	3,562	3,559	1:1		
<b>Component Summation</b>									
<b>Restoration Level</b>	<b>Stream (linear feet)</b>	<b>Riparian Wetlands (Acres)</b>		<b>Non-Riparian Wetlands (Acres)</b>	<b>Buffer (square feet)</b>	<b>Upland (Acres)</b>			
		Riverine	Non-Riverine						
Restoration	5,234 lf								
Enhancement									
Enhancement I	901								
Enhancement II	912								
<b>TOTAL CREDITS</b>	<b>6,200</b>								

R= Restoration RE= Restoration Equivalent of Creation or Enhancement

\*=Crossings have been removed from creditable linear footage for all project streams.

\*\*=Tributary 5 does not have any mitigation credit, but is included to show its stationing as part of the mitigation project.

†=Changes made during construction resulted in the loss of 4 lf of stream, but per IRT review, this did not result in a loss of credits. Please see Appendix F for additional information.

<b>Table 2. Project Activity &amp; Reporting History Cedar Branch Restoration Sites, DMS Project #97009</b>		
<b>Activity or Report</b>	<b>Data Collection Complete</b>	<b>Actual Completion or Delivery</b>
Mitigation Plan		May 2017
Final Design - Construction Plans		March 8, 2017
Construction Grading Completed		March 28, 2018
Planting Completed		April 6, 2018
Baseline Monitoring/Report	April 2018	May 2018
<i>Vegetation Monitoring</i>	<i>April 10, 2018</i>	
<i>Stream Survey</i>	<i>April 11, 2018</i>	
Year 1 Monitoring	January 2019	January 2019
<i>Vegetation Monitoring</i>	<i>November 5, 2018</i>	
<i>Stream Survey</i>	<i>January 14, 2019</i>	
Crossing Repair(outside easement)	May 2019	
Year 2 Monitoring	July 2019	December 2019
<i>Vegetation Monitoring</i>	<i>July 9, 2019</i>	
<i>Stream Survey</i>	<i>June 26, 2019</i>	
Year 3 Monitoring	July 2020	December 2020
<i>Vegetation Monitoring</i>	<i>July 31, 2020</i>	
<i>Stream Survey</i>	<i>June 30, 2020</i>	
Invasive Treatment		July 16, 2021
Year 4 Monitoring	November 2021	December 2021
Supplemental Planting		January 4, 2022
Invasive Treatment		July 26, 2022
Year 5 Monitoring	December 2022	January 2023
<i>Vegetation Monitoring</i>	<i>July 19, 2022</i>	
<i>Stream Survey</i>	<i>December 14, 2022</i>	

<b>Table 3. Project Contacts Cedar Branch Restoration Site, DMS Project #97009</b>	
<b>Design Firm</b>	KCI Associates of North Carolina 4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266
<b>Construction Contractor</b>	KCI Environmental Technologies and Construction 4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514
<b>Planting Contractor</b>	Conservation Services Inc. 1620 N. Delphine Ave. Waynesboro, VA 22980 Contact: Mr. David Coleman Phone: (540) 941-0067
<b>Monitoring Performers</b>	KCI Associates of North Carolina 4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

<b>Table 4. Project Information</b>						
<b>Cedar Branch Restoration Site, DMS Project #97009</b>						
<b>Project Name</b>	Cedar Branch Restoration Site					
<b>County</b>	Randolph County					
<b>Project Area (acres)</b>	21.3 acres					
<b>Project Coordinates (lat. and long.)</b>	35.823878° N, -79.90855° W					
<b>Project Watershed Summary Information</b>						
<b>Physiographic Province</b>	Piedmont					
<b>River Basin</b>	Yadkin					
<b>USGS Hydrologic Unit 8-digit</b>	03040103	<b>USGS Hydrologic Unit 14-digit</b>			03040103050040	
<b>DWQ Sub-basin</b>	13-2-3					
<b>Project Drainage Area (acres)</b>	294 acres					
<b>Project Drainage Area Percentage of Impervious Area</b>	4%					
<b>CGIA Land Use Classification</b>	Managed Herbaceous Cover 59% (173 ac), Mixed Hardwoods/Conifers 34% (100 ac), Low Density Developed 5% (15 ac), Transportation 2% (6 ac)					
<b>Existing Reach Summary Information</b>						
<b>Parameters</b>	<b>UTCC</b>	<b>T1, T1-1</b>	<b>T2</b>	<b>T3, T3-1</b>	<b>T4</b>	<b>T5</b>
Length of reach (linear feet)	3,038	1,349	124	1,209	627	61
Drainage area (acres)	88 acres	30 acres	18 acres	28 acres	30 acres	31 acres
NCDWQ Water Quality Classification	C	C	C	C	C	C
Rosgen Classification	G4c-E4	G4	G4	E4	G4	C4b
Evolutionary trend	Channelized, Stage III	Channelized, Stage III	Channelized, Stage III	Channelized, Stage III	Channelized, Stage III	Stable
Mapped Soil Series	Mecklenburg Clay Loam	Wynott-Enon Complex	Mecklenburg Clay Loam	Mecklenburg Clay Loam	Mecklenburg Clay Loam	Mecklenburg Clay Loam
Drainage class	Well drained	Well drained	Well drained	Well drained	Well drained	Well drained
Soil Hydric status	Hydric	Hydric	Hydric	Hydric	Hydric	Hydric
Slope	1.5%	3.1%	3.1%	3.7%	3.1%	2.7%
FEMA classification	Zone X	Zone X	Zone X	Zone X	Zone X	Zone X
Existing vegetation community	Pasture, Headwater Forest	Pasture, Headwater Forest	Headwater Forest	Pasture	Pasture	Headwater Forest
<b>Existing Wetland Summary Information</b>						
<b>Parameters</b>						
Size of Wetland (acres)	0.02 (WA)		0.03 (WB and WC)			
Wetland Type	Bottomland Hardwood Forest		Bottomland Hardwood Forest			
Mapped Soil Series	Wynott-Enon Complex		Mecklenburg clay loam			
Drainage class	Well Drained		Well Drained			
Soil Hydric Status	Hydric		Hydric			
Source of Hydrology	Stream Floodplain		Hillside Seepage and Stream Floodplain			
Hydrologic Impairment	Ditching and Grazing		Ditching and Grazing			
Existing vegetation community	Forested Wetland (Headwater Forest)		Emergent Wetland (Non-Tidal Freshwater Marsh)			

<b>Regulatory Considerations</b>			
<b>Regulation</b>	<b>Applicable?</b>	<b>Resolved?</b>	<b>Supporting Documentation</b>
Waters of the United States – Section 404	Yes	NWP 27	Jurisdictional Determination
Waters of the United States – Section 401	Yes	NWP 27	Jurisdictional Determination
Endangered Species Act	No	N/A	N/A
Historic Preservation Act	No	N/A	N/A
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A



# **APPENDIX B**

## Visual Assessment Data



**LEGEND:**

- VEG PLOT ACHIEVING DENSITY CRITERION .....
- VEG PLOT BELOW DENSITY CRITERION .....
- VEG PLOT TOTAL / PLANTED STEM DENSITY ..... **794/697**
- STREAM GAUGE .....
- WETLAND GAUGE .....
- PHOTO POINT .....
- CROSS-SECTION .....
- CONSERVATION EASEMENT .....
- STREAM RESTORATION .....
- STREAM ENHANCEMENT I .....
- STREAM ENHANCEMENT II .....
- NON-CREDIT STREAM LENGTH .....
- STEP POOL .....
- RIFFLE CASCADE .....
- RIFFLE ENHANCEMENT .....
- RIFFLE GRADE CONTROL .....
- LIVE LIFT .....
- SUPPLEMENTAL PLANTING (2022) .....
- INVASIVE SPECIES TREATMENT (2022) .....
- LOW STEM DENSITY .....

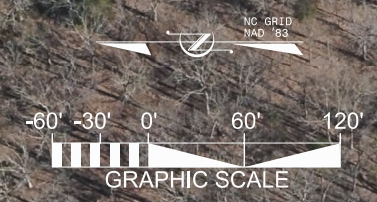


IMAGE SOURCE: NC 2018 STATEWIDE ORTHOIMAGERY

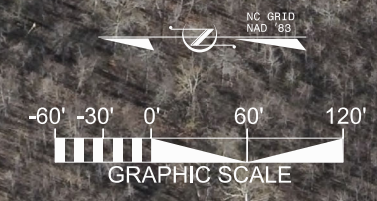
	REVISIONS
 <b>KCI</b> ASSOCIATES OF NC ENGINEERS • PLANNERS • SCIENTISTS 4505 FALLS OF NEUSE ROAD, SUITE 400 RALEIGH, NORTH CAROLINA 27609	
<b>CEDAR BRANCH          STREAM RESTORATION SITE          MONITORING YEAR 5</b> RANDOLPH COUNTY, NORTH CAROLINA	
DATE: DEC 2022 SCALE: GRAPHIC	
<b>CURRENT          CONDITION          PLAN VIEW</b>	
SHEET 1 OF 2	



**LEGEND:**

- VEG PLOT ACHIEVING DENSITY CRITERION .....
- VEG PLOT BELOW DENSITY CRITERION .....
- VEG PLOT TOTAL / PLANTED STEM DENSITY ..... **794/697**
- STREAM GAUGE .....
- WETLAND GAUGE .....
- PHOTO POINT .....
- CROSS-SECTION .....
- CONSERVATION EASEMENT .....
- STREAM RESTORATION .....
- STREAM ENHANCEMENT I .....
- STREAM ENHANCEMENT II .....
- NON-CREDIT STREAM LENGTH .....
- STEP POOL .....
- RIFFLE CASCADE .....
- RIFFLE ENHANCEMENT .....
- RIFFLE GRADE CONTROL .....
- LIVE LIFT .....
- SUPPLEMENTAL PLANTING (2022) .....
- INVASIVE SPECIES TREATMENT (2022) .....
- LOW STEM DENSITY .....

IMAGE SOURCE: NC 2018 STATEWIDE ORTHOIMAGERY



	REVISIONS
 <b>KCI</b> <small>ASSOCIATES OF NC</small> <b>ENGINEERS • PLANNERS • SCIENTISTS</b> <small>4605 FALLS OF NEUSE ROAD, SUITE 400          RALEIGH, NORTH CAROLINA 27609</small>	 <b>NC</b> <small>NC DEQ - DIVISION OF          MITIGATION SERVICES</small>
<b>CEDAR BRANCH          STREAM RESTORATION SITE          MONITORING YEAR 5</b> RANDOLPH COUNTY, NORTH CAROLINA	
DATE: DEC 2022 SCALE: GRAPHIC	
<b>CURRENT          CONDITION          PLAN VIEW</b>	
SHEET 2 OF 2	

Table 5 Visual Stream Morphology Stability Assessment

Assesment Date: 12/13/2022

Cedar Branch Stream Restoration Site, DMS Project#97009

Reach ID UTCC

Assessed Length 3,559

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	48	48			100%
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	47	47			100%
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	47	47			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	48	48			100%
2. Thalweg centering at downstream of meander (Glide)		47	47	100%			
<b>Totals</b>					0	0	100%
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
<b>Totals</b>					0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	36	36			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	36	36			100%
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	36	36			100%
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	36	36			100%
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	36	36			100%

Table 5 Visual Stream Morphology Stability Assessment

Assesment Date: 12/13/2022

Cedar Branch Stream Restoration Site, DMS Project#97009

Reach ID T1

Assessed Length 1,117

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	14	14			100%
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	14	14			100%
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	14	14			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	14	14			100%
2. Thalweg centering at downstream of meander (Glide)		14	14	100%			
<b>Totals</b>					0	0	100%
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
<b>Totals</b>					0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	5	5			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	5	5			100%
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	5	5			100%

Table 5 Visual Stream Morphology Stability Assessment

Assesment Date: 12/13/2022

Cedar Branch Stream Restoration Site, DMS Project#97009

Reach ID T2

Assessed Length 127

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	4	4		100%	
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	3	3		100%	
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	3	3		100%	
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	4	4		100%	
2. Thalweg centering at downstream of meander (Glide)		3	3	100%			
<b>Totals</b>					0	0	100%
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
<b>Totals</b>					0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	0	0		N/A	
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	0	0		N/A	
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	0	0		N/A	
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	0	0		N/A	
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	0	0		N/A	

Table 5 Visual Stream Morphology Stability Assessment

Assesment Date: 12/13/2022

Cedar Branch Stream Restoration Site, DMS Project#97009

Reach ID T3

Assessed Length 1,157

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	27	27			100%
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	37	37			100%
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	37	37			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	27	27			100%
2. Thalweg centering at downstream of meander (Glide)		37	37	100%			
<b>Totals</b>					0	0	100%
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
<b>Totals</b>					0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	28	28			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	28	28			100%
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	28	28			100%
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	28	28			100%
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	28	28			100%

Table 5 Visual Stream Morphology Stability Assessment

Assesment Date: 12/13/2022

Cedar Branch Stream Restoration Site, DMS Project#97009

Reach ID T4

Assessed Length 692

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	19	19		100%	
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	22	22		100%	
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	22	22		100%	
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	19	19		100%	
2. Thalweg centering at downstream of meander (Glide)		22	22	100%			
<b>Totals</b>					0	0	100%
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
<b>Totals</b>					0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	13	13		100%	
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	13	13		100%	
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	13	13		100%	
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	13	13		100%	
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	13	13		100%	



**Table 6** **Vegetation Condition Assessment**  
**Cedar Branch Stream Restoration Site, DMS Project# 97009**  
**Planted Acreage 20.6**

Assesment Date: 12/13/2022

<b>Vegetation Category</b>	<b>Definitions</b>	<b>Mapping Threshold</b>	<b>CCPV Depiction</b>	<b>Number of Polygons</b>	<b>Combined Acreage</b>	<b>% of Planted Acreage</b>
<b>1. Bare Areas</b>	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0.0%
<b>2. Low Stem Density Areas</b>	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	1	0.36	1.7%
<b>Total</b>				<b>1</b>	<b>0.36</b>	<b>1.7%</b>
<b>3. Areas of Poor Growth Rates or Vigor</b>	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
<b>Cumulative Total</b>				<b>1</b>	<b>0.36</b>	<b>1.7%</b>
<b>Easement Acreage 20.6</b>						
<b>Vegetation Category</b>	<b>Definitions</b>	<b>Mapping Threshold</b>	<b>CCPV Depiction</b>	<b>Number of Polygons</b>	<b>Combined Acreage</b>	<b>% of Easement Acreage</b>
<b>4. Invasive Areas of Concern</b>	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	0	0.00	0.0%
<b>5. Easement Encroachment Areas</b>	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

## Photo Reference Photos



PP1 – MY-00 – 4/18/18



PP1 – MY-05 – 12/13/22



PP2 – MY-00 – 4/18/18



PP2 – MY-05 – 12/13/22



PP3 – MY-00 – 4/18/18



PP3 – MY-05 – 12/13/22



PP4 – MY-00 – 4/18/18



PP4 – MY-05 – 12/13/22



PP5 – MY-00 – 4/18/18



PP5 – MY-05 – 12/13/22



PP6 – MY-00 – 4/18/18



PP6 – MY-05 – 12/13/22



PP7 – MY-00 – 4/18/18



PP7 – MY-05 – 12/13/22



PP8 – MY-00 – 4/18/18



PP8 – MY-05 – 12/13/22



PP9– MY-00 – 4/18/18



PP9– MY-05 – 12/13/22



PP10 – MY-00 – 4/18/18



PP10 – MY-05 – 12/13/22



PP11 – MY-00 – 4/18/18



PP11 – MY-05 – 12/13/22



PP12– MY-00 – 4/18/18



PP12– MY-05 – 12/13/22

## Vegetation Monitoring Plot Photos



Vegetation Plot 1 – MY-00 – 4/10/18



Vegetation Plot 1 – MY-05 – 7/18-22



Vegetation Plot 2 – MY-00 – 4/10/18



Vegetation Plot 2 – MY-05 – 7/18-22



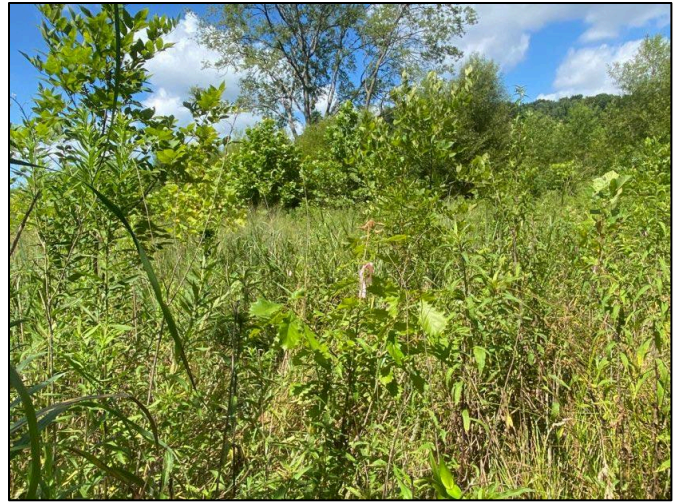
Vegetation Plot 3 – MY-00 – 4/10/18



Vegetation Plot 3 – MY-05 – 7/18-22



Vegetation Plot 4 – MY-00 – 4/10/18



Vegetation Plot 4 – MY-05 – 7/18-22



Vegetation Plot 5 – MY-00 – 4/11/18



Vegetation Plot 5 – MY-05 – 7/18-22



Vegetation Plot 6 – MY-00 – 4/11/18



Vegetation Plot 6 – MY-05 – 7/19/22



Vegetation Plot 7 – MY-00 – 4/11/18



Vegetation Plot 7 – MY-05 – 7/19/22



Vegetation Plot 8 – MY-00 – 4/11/18



Vegetation Plot 8 – MY-05 – 7/19/22



Vegetation Plot 9 – MY-00 – 4/11/18



Vegetation Plot 9 – MY-05 – 7/19/22

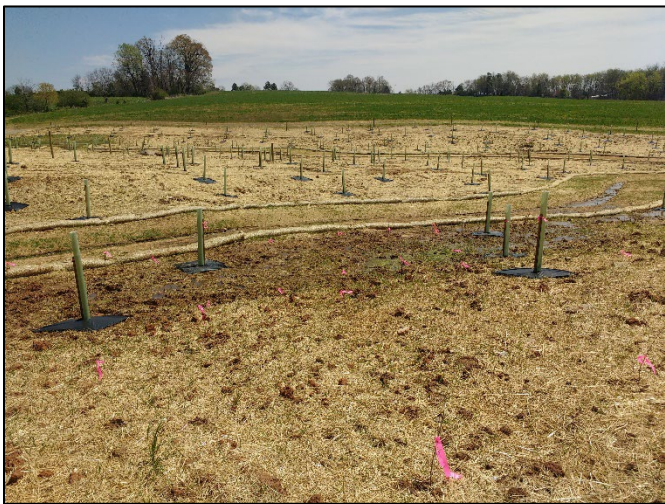




Vegetation Plot 10 – MY-00 – 4/10/18



Vegetation Plot 10 – MY-05 – 7/18-22



Vegetation Plot 11 – MY-00 – 4/10/18



Vegetation Plot 11 – MY-05 – 7/18-22



Vegetation Plot 12 – MY-00 – 4/11/18



Vegetation Plot 12 – MY-05 – 7/19/22



Vegetation Plot 13 – MY-00 – 4/11/18



Vegetation Plot 13 – MY-05 – 7/19/22

# **APPENDIX C**

## Vegetation Plot Data

Table 7. Stem Count by Plot and Species														
Cedar Branch Restoration Site, DMS Project #97009														
Species	Current Plot Data MY03 (2020)													
	Plot 01		Plot 02		Plot 03		Plot 04		Plot 05		Plot 06		Plot 07	
	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
American Elm ( <i>Ulmus americana</i> )														
Baccharis ( <i>Baccharis hamifolia</i> )														
Black Walnut ( <i>Juglans nigra</i> )				1		1								1
Black Willow ( <i>Salix nigra</i> )														
Eastern Sycamore ( <i>Platanus occidentalis</i> )				3	6	6	4	4	3	3	10	10	5	5
Green Ash ( <i>Fraxinus pennsylvanica</i> )				1	6	6	9	10	8	8	3	3	2	2
Oak ( <i>Quercus sp.</i> )														
Persimmon ( <i>Diospyros virginiana</i> )	2	2												
Pin Oak ( <i>Quercus palustris</i> )	1	1	2	3										
River Birch ( <i>Betula nigra</i> )					2	2					3	3		
Silver Willow ( <i>Salix sericea</i> )														
Smooth Sumac ( <i>Rhus glabra</i> )														
Swamp Chestnut Oak ( <i>Quercus michauxii</i> )					6	6	6	6	1	1	9	9	4	4
Sweetgum ( <i>Liquidambar styraciflua</i> )				2		1								
Tulip Poplar ( <i>Liriodendron tulipifera</i> )			6	6			2	2					1	1
White Oak ( <i>Quercus alba</i> )	2	2	4	4										
Willow Oak ( <i>Quercus phellos</i> )	1	1	7	7	3	3		1	2	2			1	1
Unknown														
<b>Stem count</b>	6	6	19	27	23	25	21	23	14	14	25	25	13	14
<b>size (ares)</b>	1		1		1		1		1		1		1	
<b>size (ACRES)</b>	0.025		0.025		0.025		0.025		0.025		0.025		0.025	
<b>Species count</b>	4	4	4	8	5	7	4	5	4	4	4	4	5	6
<b>Stems per ACRE</b>	243	243	769	1093	931	1012	850	931	567	567	1012	1012	526	567

Table 7. Stem Count by Plot and Species Cedar Branch Restoration Site, DMS Project #97009												
Species	Current Plot Data MY03 (2020)											
	Plot 08		Plot 09		Plot 10		Plot 11		Plot 12		Plot 13	
	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
American Elm ( <i>Ulmus americana</i> )				1						1		1
Baccharis ( <i>Baccharis hamifolia</i> )								1				
Black Walnut ( <i>Juglans nigra</i> )				3				1				
Black Willow ( <i>Salix nigra</i> )								3				
Eastern Sycamore ( <i>Platanus occidentalis</i> )	4	4	7	7	8	8		1				
Green Ash ( <i>Fraxinus pennsylvanica</i> )	6	6	1	2	2	2						
Oak ( <i>Quercus sp.</i> )												
Persimmon ( <i>Diospyros virginiana</i> )								2	2			8
Pin Oak ( <i>Quercus palustris</i> )								1	1			4
River Birch ( <i>Betula nigra</i> )	6	6	1	1	2	2						
Silver Willow ( <i>Salix sericea</i> )												
Smooth Sumac ( <i>Rhus glabra</i> )												
Swamp Chestnut Oak ( <i>Quercus michauxii</i> )	10	10	4	4								
Sweetgum ( <i>Liquidambar styraciflua</i> )				4						1		
Tulip Poplar ( <i>Liriodendron tulipifera</i> )			2	2	1	1	2	2			1	1
White Oak ( <i>Quercus alba</i> )							8	8	1	1	6	6
Willow Oak ( <i>Quercus phellos</i> )	2	2			1	1	3	3	9	9	1	1
Unknown												
<b>Stem count</b>	28	28	15	24	14	14	16	22	10	12	20	21
<b>size (ares)</b>	1		1		1		1		1		1	
<b>size (ACRES)</b>	0.025		0.025		0.025		0.025		0.025		0.025	
<b>Species count</b>	5	5	5	8	5	5	5	9	2	4	5	6
<b>Stems per ACRE</b>	1133	1133	607	971	567	567	647	890	405	486	809	850

Species	Annual Means									
	MY05 (2022)		MY03 (2020)		MY02 (2019)		MY01 (2018)		MY00 (2018)	
	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
American Elm ( <i>Ulmus americana</i> )		3		1		1				
Baccharis ( <i>Baccharis hamifolia</i> )		1		1						
Black Walnut ( <i>Juglans nigra</i> )		7		1		1				
Black Willow ( <i>Salix nigra</i> )		3		3		3		1		
Eastern Sycamore ( <i>Platanus occidentalis</i> )	47	51	46	48	46	48	46	46		
Green Ash ( <i>Fraxinus pennsylvanica</i> )	37	40	37	37	37	37	36	38		
Oak ( <i>Quercus sp.</i> )									30	30
Persimmon ( <i>Diospyros virginiana</i> )	12	12	12	13	12	13	8	8		
Pin Oak ( <i>Quercus palustris</i> )	8	9	5	5	5	5	5	5		
River Birch ( <i>Betula nigra</i> )	14	14	16	16	16	16	16	16	6	6
Silver Willow ( <i>Salix sericea</i> )				1		1		1		
Smooth Sumac ( <i>Rhus glabra</i> )								1		
Swamp Chestnut Oak ( <i>Quercus michauxii</i> )	40	40	52	52	52	52	68	68		
Sweet Gum ( <i>Liquidambar styraciflua</i> )		8		2						
Tulip Poplar ( <i>Liriodendron tulipifera</i> )	15	15	19	21	19	21	31	31	13	13
White Oak ( <i>Quercus alba</i> )	21	21	20	20	20	20				
Willow Oak ( <i>Quercus phellos</i> )	30	31	30	30	30	30	31	31	1	1
Unknown									280	280
<b>Stem count</b>	224	255	237	251	237	248	241	246	330	330
<b>size (ares)</b>	13		13		13		13		13	
<b>size (ACRES)</b>	0.321		0.321		0.321		0.321		0.321	
<b>Species count</b>	9	14	9	15	9	13	8	11	5	5
<b>Stems per ACRE</b>	697	794	738	781	738	772	750	766	1027	1027

# **APPENDIX D**

## Stream Measurement and Geomorphology Data

<b>Table 8. UTCC Baseline Stream Data Summary Cedar Branch Restoration Site, DMS Project #97009</b>																	
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>			<b>As-built</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	UTCC-1	UTCC-2	UTCC-3	Min	Mean	Max	n
Bankfull Width (ft)	7.8	10.5	10.1	13.9	4	9.0	13.3	13.1	17.7	6	11.7	13.2	15.0	11.7	13.4	15.2	5
Floodprone Width (ft)	9.6	31.7	33.5	50.0	4	13.1	55.6	50.0	100.0	6	90	100	105	>40	>40	>50	5
Bankfull Mean Depth (ft)	1.2	1.4	1.4	1.7	4	0.9	1.2	1.2	1.5	6	1.0	1.0	1.1	0.8	1.0	1.1	5
Bankfull Max Depth (ft)	1.7	2.2	2.2	2.8	4	1.3	1.7	1.7	2.0	6	1.5	1.5	1.7	1.4	1.6	1.8	5
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	11.3	14.6	15.1	16.9	4	10.4	16.4	14.0	24.7	6	11.3	13.2	16.9	9.6	12.8	15.8	5
Width/Depth Ratio	5.3	7.6	6.9	11.4	4	7.6	11.1	11.5	13.4	6	12.1	13.2	13.2	10.8	14.3	18.1	5
Entrenchment Ratio	1.2	2.9	2.6	5.0	4	1.3	3.8	3.9	5.9	6	>2.2	>2.2	>2.2	2.9	3.6	4.8	5
Bank Height Ratio	1.0	1.9	2.0	2.5	4	1.0	1.0	1.0	1.0	6	1.0	1.0	1.0	1.0	1.0	1.0	5
<b>Pattern</b>																	
Channel Beltwidth (ft)	*					45					41-54	46-58	53-74	41	54	74	47
Radius of Curvature (ft)	*					13-42					25-35	30-35	35-45	25	34	45	47
Rc:Bankfull width (ft/ft)	*					1.3-4.4					2.1-3.0	2.3-2.7	2.3-3.0	2.1	2.6	3.0	47
Meander Wavelength (ft)	*					93-136					101-150	115-155	153-180	101	142	180	47
Meander Width Ratio	*					4.5-5.0					3.5-4.6	3.5-4.4	3.5-4.9	3.5	4.1	4.9	47
<b>Profile</b>																	
Riffle Length (ft)														4.6	34.7	57.4	48
Riffle Slope (ft/ft)	0.021	0.032	0.03	0.048	4	0.013-0.028					0.020-0.037	0.020-0.035	0.020-0.035	0.039	0.023	0.053	48
Pool Length (ft)	*					3-25					19-42	20-49	36-61	4.3	28.5	55.0	47
Pool Spacing (ft)	*					30-59					50-83	67-91	79-105	37.3	77.5	124.0	47
<b>Substrate and Transport Parameters</b>																	
SC% / Sa% / G% / C% / B% /Be%	0%/23%/63%/13%/1%/0%					0.3%/19%/66%/14%/0.7%/0%								3%/6%/67%/23%/0%/0%			
d16 / d35 / d50 / d84 / d95 (mm)	1.5/5.4/16/55/90					1.7/6.4/19/56/93								10/27/37/78/113			
<b>Channel Characteristics</b>																	
Channel length (ft)	3,246										1,400	512	1,650	3,562			
Drainage Area (SM)	0.45					0.13-0.49					0.22	0.28	0.41	0.41			
Rosgen Classification	G4c-E4					B4c					C4	C4	C4	C4			
Sinuosity	1.0					1.2					1.2	1.2	1.2	1.2			
Water Surface Slope (ft/ft)	0.015					0.013					0.013	0.013	0.013	0.013			

\*No data shown due to channelization/lack of bed diversity



<b>Table 8. T1 Baseline Stream Data Summary</b>																			
<b>Cedar Branch Restoration Site, DMS Project #97009</b>																			
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data (UTCC)</b>					<b>Design</b>				<b>As-built</b>				
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Mean	Max	n	Min	Mean	Max	n	
Bankfull Width (ft)	5.8					9.0	13.3	13.1	17.7	6	7.8				8.9				
Floodprone Width (ft)	9.0					13.1	55.6	50.0	100.0	6	50				>40				
Bankfull Mean Depth (ft)	0.9					0.9	1.2	1.2	1.5	6	0.6				0.5				
Bankfull Max Depth (ft)	1.2					1.3	1.7	1.7	2.0	6	1.0				1.0				
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	5.0					10.4	16.4	14.0	24.7	6	5.0				4.6				
Width/Depth Ratio	6.7					7.6	11.1	11.5	13.4	6	12.1				17.0				
Entrenchment Ratio	1.5					1.3	3.8	3.9	5.9	6	>2.2				4.2				
Bank Height Ratio	2.3					1.0	1.0	1.0	1.0	6	1.0				1.0				
<b>Pattern</b>																			
Channel Beltwidth (ft)			*					45			29-36				29	33	36	14	
Radius of Curvature (ft)			*					13-42			15-25				15	20	25	14	
Rc:Bankfull width (ft/ft)			*					1.3-4.4			1.9-3.2				1.9	2.6	3.2	14	
Meander Wavelength (ft)			*					93-136			72-80				72	76	80	14	
Meander Width Ratio			*					4.5-5.0			3.7-4.6				3.7	4.2	4.6	14	
<b>Profile</b>																			
Riffle Length (ft)															3.6	20.9	32.9	14	
Riffle Slope (ft/ft)	0.018							0.013-0.028			0.025-0.040				0.019	0.042	0.076	14	
Pool Length (ft)	*							3-25			8-25				5.1	11.8	20.1	14	
Pool Spacing (ft)	*							30-59			42-51				17.1	40.1	58.5	14	
<b>Substrate and Transport Parameters</b>																			
SC% / Sa% / G% / C% / B% / Be%	0%/15%/75%/10%/0%/0%					0.3%/19%/66%/14%/0.7%/0%									1%/14%/79%/6%/0%/0%				
d16 / d35 / d50 / d84 / d95 (mm)	2.1/5/12/50/98					1.7/6.4/19/56/93									2.7/15/24/47/77				
Channel length (ft)	1,036										1,118				1,118				
Drainage Area (SM)	0.05					0.13-0.49					0.05				0.05				
Rosgen Classification	G4					B4c					C4b				C4b				
Sinuosity	1.0					1.2					1.3				1.3				
Water Surface Slope (ft/ft)	0.031					0.013					0.025				0.025				

\*No data shown due to channelization/lack of bed diversity

<b>Table 8. T2 Baseline Stream Data Summary</b>																		
<b>Cedar Branch Restoration Site, DMS Project #97009</b>																		
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data (UTCC)</b>					<b>Design</b>				<b>As-built</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Mean	Max	n	Min	Mean	Max	n
Bankfull Width (ft)	**					9.0	13.3	13.1	17.7	6	7.8				**			
Floodprone Width (ft)	**					13.1	55.6	50.0	100.0	6	30				**			
Bankfull Mean Depth (ft)	**					0.9	1.2	1.2	1.5	6	0.6				**			
Bankfull Max Depth (ft)	**					1.3	1.7	1.7	2.0	6	1.0				**			
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	**					10.4	16.4	14.0	24.7	6	5.0				**			
Width/Depth Ratio	**					7.6	11.1	11.5	13.4	6	12.1				**			
Entrenchment Ratio	**					1.3	3.8	3.9	5.9	6	>2.2				**			
Bank Height Ratio	**					1.0	1.0	1.0	1.0	6	1.0				**			
<b>Pattern</b>																		
Channel Beltwidth (ft)			*					45			N/A				**			
Radius of Curvature (ft)			*					13-42			15-25				**			
Rc:Bankfull width (ft/ft)			*					1.3-4.4			1.9-3.2				**			
Meander Wavelength (ft)			*					93-136			N/A				**			
Meander Width Ratio			*					4.5-5.0			N/A				**			
<b>Profile</b>																		
Riffle Length (ft)	**														9.4	20.0	24.9	4
Riffle Slope (ft/ft)	**							0.013-0.028			0.026-0.027				0.023	0.025	0.027	4
Pool Length (ft)	**							3-25			12-17				6.4	8.1	9.0	3
Pool Spacing (ft)	**							30-59			38				36.4	37.8	39.1	3
<b>Substrate and Transport Parameters</b>																		
SC% / Sa% / G% / C% / B% / Be%			**					0.3%/19%/66%/14%/0.7%/0%									**	
d16 / d35 / d50 / d84 / d95 (mm)			**					1.7/6.4/19/56/93									**	
Channel length (ft)				123									127					127
Drainage Area (SM)				0.03				0.13-0.49					0.03					0.03
Rosgen Classification				G4				B4c					C4					C4
Sinuosity				1.0				1.2					N/A					N/A
Water Surface Slope (ft/ft)				0.031				0.013					0.017					0.016

\*No data shown due to channelization/lack of bed diversity

<b>Table 8. T3 Baseline Stream Data Summary</b>																		
<b>Cedar Branch Restoration Site, DMS Project #97009</b>																		
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data (UTCC)</b>					<b>Design</b>				<b>As-built</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Mean	Max	n	Min	Mean	Max	n
Bankfull Width (ft)	4.7	5.4		6.0	2	9.0	13.3	13.1	17.7	6	7.8				5.9	5.9	6.0	2
Floodprone Width (ft)	11.3	13.5		15.7	2	13.1	55.6	50.0	100.0	6	30				>25	>25	>25	2
Bankfull Mean Depth (ft)	0.8	0.8		0.8	2	0.9	1.2	1.2	1.5	6	0.6				0.4	0.5	0.5	2
Bankfull Max Depth (ft)	1.3	1.3		1.3	2	1.3	1.7	1.7	2.0	6	1.0				0.7	0.8	0.8	2
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	3.9	4.5		5.0	2	10.4	16.4	14.0	24.7	6	5.0				2.5	2.8	3.1	2
Width/Depth Ratio	5.6	6.4		7.1	2	7.6	11.1	11.5	13.4	6	12.1				11.4	12.6	13.8	2
Entrenchment Ratio	1.3	2.4		3.4	2	1.3	3.8	3.9	5.9	6	>2.2				4.4	4.7	5.1	2
Bank Height Ratio	1.6	2.1		2.6	2	1.0	1.0	1.0	1.0	6	1.0				1.0	1.0	1.0	2
<b>Pattern</b>																		
Channel Beltwidth (ft)			*					45			N/A							
Radius of Curvature (ft)			*					13-42			15-25							
Rc:Bankfull width (ft/ft)			*					1.3-4.4			1.9-3.2							
Meander Wavelength (ft)			*					93-136			N/A							
Meander Width Ratio			*					4.5-5.0			N/A							
<b>Profile</b>																		
Riffle Length (ft)															19.7	28.1	68.8	26
Riffle Slope (ft/ft)	0.046	0.067		0.087	2			0.013-0.028			0.025-0.042				0.021	0.034	0.063	26
Pool Length (ft)	*							3-25			11-22				3.6	7.3	11.3	35
Pool Spacing (ft)	*							30-59			32-55				6.8	30.5	85.9	35
<b>Substrate and Transport Parameters</b>																		
SC% / Sa% / G% / C% / B% / Be%	0%/31%/63%/6%/0%/0%					0.3%/19%/66%/14%/0.7%/0%									6%/0%/75%/19%/0%/0%			
d16 / d35 / d50 / d84 / d95 (mm)	1.0/2.4/6.5/33/73					1.7/6.4/19/56/93									18/32/41/71/105			
Channel length (ft)	1,141										1,157				1,157			
Drainage Area (SM)	0.04					0.13-0.49					0.04				0.04			
Rosgen Classification	E4					B4c					C4b				C4b			
Sinuosity	1.0					1.2					N/A				N/A			
Water Surface Slope (ft/ft)	0.037					0.013					0.035				0.035			

\*No data shown due to channelization/lack of bed diversity

<b>Table 8. T4 Baseline Stream Data Summary</b>																			
<b>Cedar Branch Restoration Site, DMS Project #97009</b>																			
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data (UTCC)</b>					<b>Design</b>				<b>As-built</b>				
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Mean	Max	n	Min	Mean	Max	n	
Bankfull Width (ft)	6.5					9.0	13.3	13.1	17.7	6	7.8				6.7	6.8	6.9	2	
Floodprone Width (ft)	7.8					13.1	55.6	50.0	100.0	6	30				>30	>30	>30	2	
Bankfull Mean Depth (ft)	0.8					0.9	1.2	1.2	1.5	6	0.6				0.5	0.5	0.5	2	
Bankfull Max Depth (ft)	1.0					1.3	1.7	1.7	2.0	6	1.0				0.8	0.8	0.8	2	
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	5.0					10.4	16.4	14.0	24.7	6	5.0				3.3	3.4	3.5	2	
Width/Depth Ratio	8.5					7.6	11.1	11.5	13.4	6	12.1				12.7	13.6	14.6	2	
Entrenchment Ratio	1.2					1.3	3.8	3.9	5.9	6	>2.2				4.7	4.9	5.1	2	
Bank Height Ratio	4.5					1.0	1.0	1.0	1.0	6	1.0				1.0	1.0	1.0	2	
<b>Pattern</b>																			
Channel Beltwidth (ft)			*					45			N/A								
Radius of Curvature (ft)			*					13-42			15-25								
Rc:Bankfull width (ft/ft)			*					1.3-4.4			1.9-3.2								
Meander Wavelength (ft)			*					93-136			N/A								
Meander Width Ratio			*					4.5-5.0			N/A								
<b>Profile</b>																			
Riffle Length (ft)															5.5	21.5	42.1	19	
Riffle Slope (ft/ft)	0.038							0.013-0.028			0.030-0.040				0.017	0.040	0.121	19	
Pool Length (ft)	*							3-25			13-19				4.0	8.5	12.7	21	
Pool Spacing (ft)	*							30-59			34-48				5.5	32.3	55.1	21	
<b>Substrate and Transport Parameters</b>																			
SC% / Sa% / G% / C% / B% / Be%	0%/23%/72%/5%/0%/0%					0.3%/19%/66%/14%/0.7%/0%									3%/0%/73%/24%/0%/0%				
d16 / d35 / d50 / d84 / d95 (mm)	1.6/4.0/6.4/35/67					1.7/6.4/19/56/93									28/37/44/78/115				
Channel length (ft)	677										692				692				
Drainage Area (SM)	0.05					0.13-0.49					0.05				0.05				
Rosgen Classification	G4					B4c					C4b				C4b				
Sinuosity	1.0					1.2					N/A				N/A				
Water Surface Slope (ft/ft)	0.031					0.013					0.028				0.028				

\*No data shown due to channelization/lack of bed diversity

<b>Table 9. Cross-Section Morphology Data Tables</b>																					
<b>Cedar Branch Stream Restoration Site, DMS Project #97009</b>																					
<b>Dimension and Substrate</b>	<b>Cross-Section 1 (Riffle) Station 57+19, T1</b>							<b>Cross-Section 2 (Pool) Station 57+44, T1</b>							<b>Cross-Section 3 (Pool) Station 13+58, UTCC</b>						
Baseline Bankfull Elevation:	666.60							665.93							657.32						
	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Width (ft)	8.9	8.3	8.6	9.8	9.8			11.8	13.5	12.9	13.4	15.6			13.5	13.6	13.8	15.0	15.0		
Floodprone Width (ft)	>40	>40	>40	>40	>35			-	-	-	-	-			-	-	-	-	-		
Bankfull Mean Depth (ft)	0.5	0.6	0.5	0.5	0.5			1.1	1.0	1.0	0.9	0.9			1.5	1.5	1.5	1.3	1.3		
Bankfull Max Depth (ft)	1.0	1.0	1.0	1.1	1.1			2.1	2.0	2.0	2.1	2.1			2.8	2.8	2.9	2.8	2.8		
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	4.6	4.6	4.6	4.6	4.6			13.4	13.4	13.4	13.4	13.4			20.2	20.2	20.2	20.2	20.2		
Total Cross-Sectional Area (ft <sup>2</sup> )	4.6	4.3	4.4	3.9	3.9			13.4	11.8	12.2	9.8	9.8			20.2	20.0	20.2	20.1	20.1		
Bankfull Width/Depth Ratio	17.0	14.8	15.9	20.7	20.7			-	-	-	-	-			-	-	-	-	-		
Bankfull Entrenchment Ratio	4.2	4.6	4.0	3.8	3.8			-	-	-	-	-			-	-	-	-	-		
Bankfull Bank Height Ratio	1.0	0.9	1.0	1.0	0.9			-	-	-	-	-			-	-	-	-	-		
d50 (mm)	24	18	2.5	41	-			-	-	-	-	-			-	-	-	-	-		
	<b>Cross-Section 4 (Riffle) Station 13+85, UTCC</b>							<b>Cross-Section 5 (Riffle) Station 22+44, UTCC</b>							<b>Cross-Section 6 (Riffle) Station 96+69, T3</b>						
Baseline Bankfull Elevation:	666.93							656.55							656.12						
	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Width (ft)	12.1	12.5	12.7	12.0	11.1			14.5	14.3	14.1	14.8	14.8			6.0	6.5	5.8	6.7	5.3		
Floodprone Width (ft)	>50	>50	>50	>50	>50			>45	>45	>45	>45	>45			>30	>30	>30	>30	>25		
Bankfull Mean Depth (ft)	1.0	1.0	1.0	1.1	1.1			1.1	1.1	1.1	1.1	1.1			0.5	0.5	0.5	0.5	0.6		
Bankfull Max Depth (ft)	1.7	1.7	1.8	1.7	1.7			1.7	1.9	1.9	1.8	1.8			0.8	1.0	1.0	1.0	1.0		
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	12.6	12.6	12.6	12.6	12.6			15.8	15.8	15.8	15.8	15.8			3.1	3.1	3.1	3.1	3.1		
Total Cross-Sectional Area (ft <sup>2</sup> )	12.6	13.8	12.6	13.3	14.1			15.8	15.7	16.6	14.6	14.6			3.1	3.2	3.0	3.2	2.7		
Bankfull Width/Depth Ratio	11.6	12.3	12.7	11.4	9.8			13.3	13.0	12.6	13.9	13.9			11.7	13.7	10.8	14.4	8.9		
Bankfull Entrenchment Ratio	4.6	4.5	4.1	4.7	4.7			3.1	3.2	3.2	3.1	3.1			4.4	4.1	4.6	3.9	5.0		
Bankfull Bank Height Ratio	1.0	1.0	0.9	0.9	1.0			1.0	1.0	1.0	1.0	1.0			1.0	0.9	0.9	0.9	0.9		
d50 (mm)	33	49	40	18	-			31	40	69	26	-			41	41	54	15	-		

Bank Height Ratios are calculated based on the baseline (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section parameters are calculated based on the current year's low bank height.

**Table 9. Cross-Section Morphology Data Tables**  
**Cedar Branch Stream Restoration Site, DMS Project #97009**

Dimension and Substrate	Cross-Section 7 (Pool) Station 99+07, T3							Cross-Section 8 (Riffle) Station 99+25, T3							Cross-Section 9 (Riffle) Station 26+17, UTCC						
	666.60							665.93							657.32						
Baseline Bankfull Elevation:	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Width (ft)	10.3	8.9	8.5	9.1	10.2			6.0	5.6	6.1	5.4	5.4			13.2	13.0	13.8	13.6	13.6		
Floodprone Width (ft)	-	-	-	-	-			>30	>30	>30	>30	>30			>40	>40	>40	>40	>40		
Bankfull Mean Depth (ft)	0.7	0.8	0.8	0.8	0.7			0.4	0.4	0.4	0.5	0.5			1.0	1.0	0.9	1.0	1.0		
Bankfull Max Depth (ft)	1.8	1.6	1.7	1.7	1.6			0.7	0.9	0.9	0.8	0.8			1.8	1.8	2.0	1.9	1.9		
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	6.9	6.9	6.9	6.9	6.9			2.5	2.5	2.5	2.5	2.5			13.0	13.0	13.0	13.0	13.0		
Total Cross-Sectional Area (ft <sup>2</sup> )	6.9	8.7	7.2	7.6	6.8			2.5	2.7	2.7	2.3	2.3			13.0	12.0	12.7	12.1	12.1		
Bankfull Width/Depth Ratio	-	-	-	-	-			14.1	12.6	14.8	11.5	11.5			13.3	12.9	14.7	14.3	14.3		
Bankfull Entrenchment Ratio	-	-	-	-	-			5.0	5.4	4.9	5.7	5.7			3.4	3.5	3.2	3.3	3.3		
Bankfull Bank Height Ratio	-	-	-	-	-			1.0	1.1	1.0	1.0	1.0			1.0	0.9	1.0	0.9	1.0		
d50 (mm)	-	-	-	-	-			40	18	29	10	-			57	50	48	34	-		
Dimension and Substrate	Cross-Section 10 (Riffle) Station 252+25, T4							Cross-Section 11 (Pool) Station 225+97, T4							Cross-Section 12 (Riffle) Station 226+04, T4						
	666.93							656.55							656.12						
Baseline Bankfull Elevation:	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Width (ft)	7.0	8.7	7.2	7.9	7.9			10.2	9.6	10.0	9.9	9.9			6.7	6.9	7.0	7.3	7.3		
Floodprone Width (ft)	>30	>30	>30	>35	>35			-	-	-	-	-			>30	>30	>30	>30	>30		
Bankfull Mean Depth (ft)	0.5	0.4	0.5	0.4	0.4			1.1	1.1	1.1	1.1	1.1			0.5	0.5	0.5	0.5	0.5		
Bankfull Max Depth (ft)	0.8	1.0	1.0	1.0	1.0			2.1	2.0	2.0	2.1	2.1			0.8	0.8	0.9	0.8	0.9		
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	3.3	3.3	3.3	3.3	3.3			10.8	10.8	10.8	10.8	10.8			3.5	3.5	3.5	3.5	3.5		
Total Cross-Sectional Area (ft <sup>2</sup> )	3.3	3.0	2.4	2.4	2.4			10.8	11.9	11.6	11.6	11.6			3.5	3.8	3.1	2.7	2.7		
Bankfull Width/Depth Ratio	14.9	23.0	15.7	18.9	18.9			-	-	-	-	-			12.9	13.6	14.1	15.3	15.3		
Bankfull Entrenchment Ratio	5.1	4.1	5.0	4.5	4.5			-	-	-	-	-			4.7	4.6	4.5	4.3	4.3		
Bankfull Bank Height Ratio	1.0	0.9	1.0	1.0	1.0			-	-	-	-	-			1.0	1.0	1.0	1.0	0.9		
d50 (mm)	42	36	6	6	-			-	-	-	-	-			45	32	22	24	-		

Bank Height Ratios are calculated based on the baseline (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section parameters are calculated based on the current year's low bank height.

**Table 9. Cross-Section Morphology Data Tables**  
**Cedar Branch Stream Restoration Site, DMS Project #97009**

Dimension and Substrate	Cross-Section 13 (Riffle) Station 35+12, UTCC							Cross-Section 14 (Riffle) Station 41+94, UTCC							Cross-Section 15 (Pool) Station 42+58, UTCC						
	645.24							637.94							637.43						
Baseline Bankfull Elevation:	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Width (ft)	12.7	13.8	13.1	12.5	13.0			15.3	13.9	13.8	14.3	14.3			22.5	20.7	21.4	20.8	31.3		
Floodprone Width (ft)	>50	>50	>50	>50	>45			>40	>40	>40	>40	>40			-	-	-	-	-		
Bankfull Mean Depth (ft)	0.8	0.7	0.7	0.8	0.7			0.8	0.9	0.9	0.9	0.9			1.6	1.7	1.7	1.7	1.1		
Bankfull Max Depth (ft)	1.4	1.4	1.5	1.5	1.4			1.7	1.7	1.7	1.7	1.7			3.4	3.3	3.2	3.2	3.2		
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	9.6	9.6	9.6	9.6	9.6			12.8	12.8	12.8	12.8	12.8			35.8	35.8	35.8	35.8	35.8		
Total Cross-Sectional Area (ft <sup>2</sup> )	9.6	7.9	7.8	8.5	6.8			12.8	12.6	14.3	12.2	12.2			35.8	32.8	36.2	32.8	29.0		
Bankfull Width/Depth Ratio	16.7	19.8	17.8	16.3	17.7			18.3	15.1	14.8	16.0	16.0			-	-	-	-	-		
Bankfull Entrenchment Ratio	3.8	3.5	3.7	3.9	3.7			2.8	3.1	3.1	3.0	3.0			-	-	-	-	-		
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.1			1.0	1.1	1.0	1.2	1.2			-	-	-	-	-		
d50 (mm)	16	13	61	13	-			61	51	42	23	-			-	-	-	-	-		

Bank Height Ratios are calculated based on the baseline (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section parameters are calculated based on the current year's low bank height.

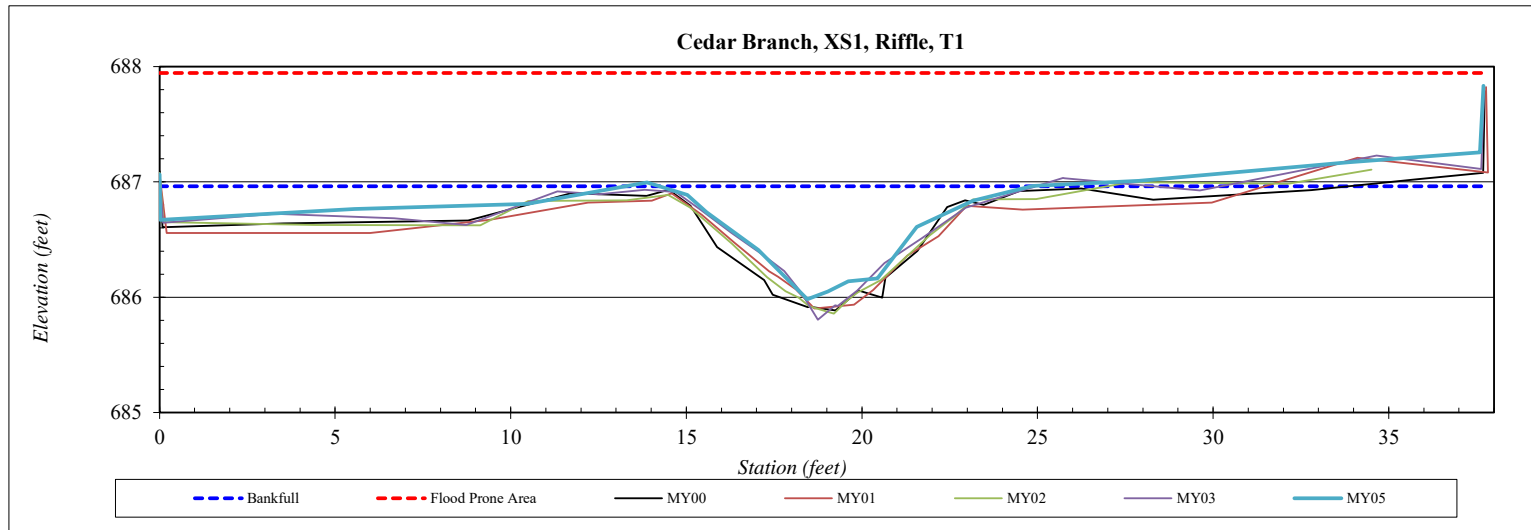
## Cross-Section Plots

<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS1
<b>Drainage Area (sq mi):</b>	0.05
<b>Date:</b>	12/13/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	687.07
0.0	686.67
5.6	686.77
10.5	686.81
13.9	687.00
15.0	686.89
15.6	686.74
17.0	686.41
18.0	686.11
18.4	685.98
19.0	686.05
19.6	686.14
20.4	686.16
21.6	686.61
23.2	686.84
24.9	686.96
27.9	687.01
33.9	687.17
37.6	687.26
37.7	687.83

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	686.96
<b>Bankfull Cross-Sectional Area:</b>	4.6
<b>Total Cross-Sectional Area:</b>	3.5
<b>Bankfull Width:</b>	10.6
<b>Flood Prone Area Elevation:</b>	687.9
<b>Flood Prone Width:</b>	37.7
<b>Max Depth at Bankfull:</b>	1.0
<b>Mean Depth at Bankfull:</b>	0.4
<b>W / D Ratio:</b>	24.4
<b>Entrenchment Ratio:</b>	3.5
<b>Bank Height Ratio:</b>	0.9



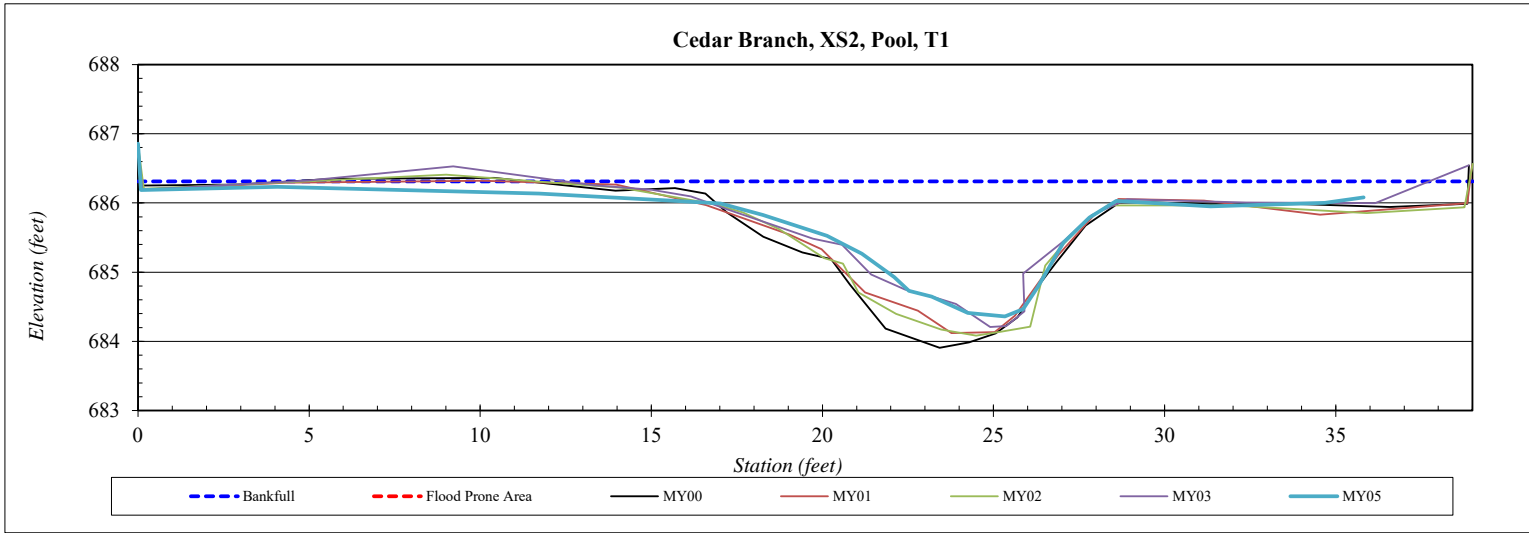


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS2
<b>Drainage Area (sq mi):</b>	0.05
<b>Date:</b>	12/13/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	686.86
0.1	686.19
4.1	686.23
11.7	686.14
15.6	686.03
17.0	685.99
18.3	685.82
20.1	685.52
21.2	685.27
22.1	684.93
22.5	684.73
23.2	684.65
24.2	684.41
25.3	684.36
25.9	684.47
26.3	684.78
27.0	685.43
27.8	685.79
28.6	686.03
31.3	685.95
34.7	686.00
35.8	686.08

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	686.32
<b>Bankfull Cross-Sectional Area:</b>	13.4
<b>Total Cross-Sectional Area:</b>	9.4
<b>Bankfull Width:</b>	13.0
<b>Flood Prone Area Elevation:</b>	---
<b>Flood Prone Width:</b>	---
<b>Max Depth at Bankfull:</b>	2.0
<b>Mean Depth at Bankfull:</b>	1.0
<b>W / D Ratio:</b>	---
<b>Entrenchment Ratio:</b>	---
<b>Bank Height Ratio:</b>	---

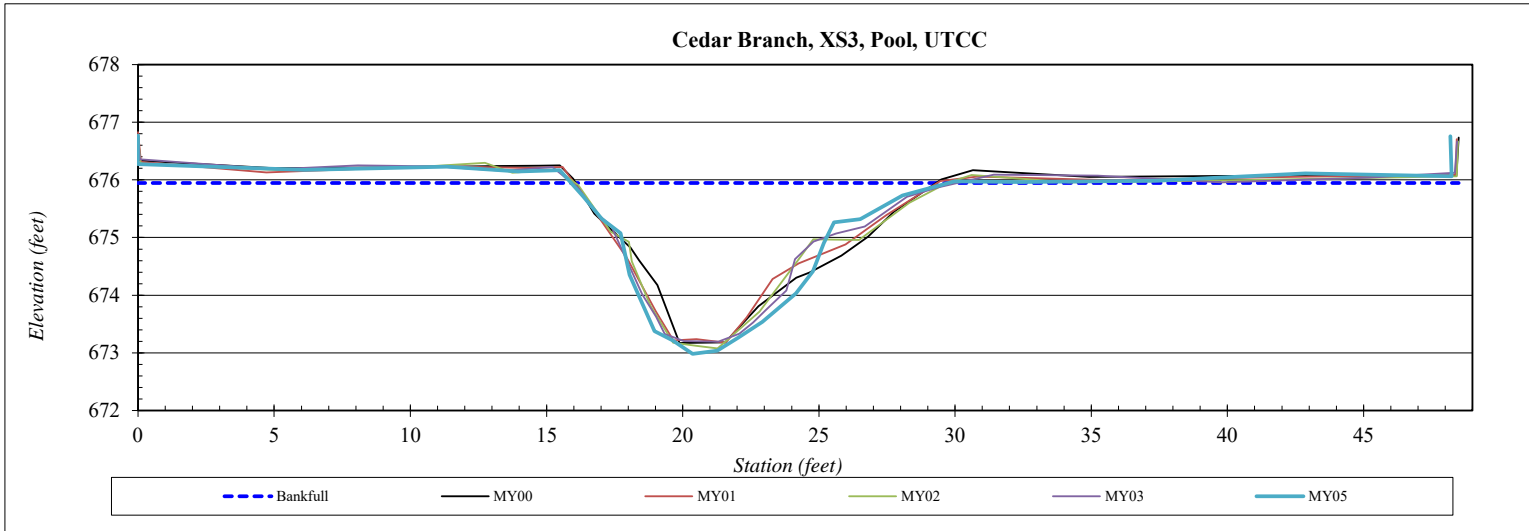


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS3
<b>Drainage Area (sq mi):</b>	0.21
<b>Date:</b>	12/13/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	676.77
0.0	676.27
6.1	676.18
11.4	676.23
14.0	676.15
15.5	676.17
16.4	675.71
17.0	675.33
17.7	675.08
18.0	674.35
19.0	673.38
19.6	673.22
20.4	672.99
21.3	673.04
22.0	673.25
22.9	673.54
24.2	674.03
24.8	674.41
25.2	674.90
25.6	675.26
26.5	675.32
28.1	675.73
30.0	675.98
32.4	675.97
37.3	675.98
42.9	676.11
48.2	676.06
48.2	676.76

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	675.95
<b>Bankfull Cross-Sectional Area:</b>	20.2
<b>Total Cross-Sectional Area:</b>	21.3
<b>Bankfull Width:</b>	13.9
<b>Flood Prone Area Elevation:</b>	---
<b>Flood Prone Width:</b>	---
<b>Max Depth at Bankfull:</b>	3.0
<b>Mean Depth at Bankfull:</b>	1.5
<b>W / D Ratio:</b>	---
<b>Entrenchment Ratio:</b>	---
<b>Bank Height Ratio:</b>	---

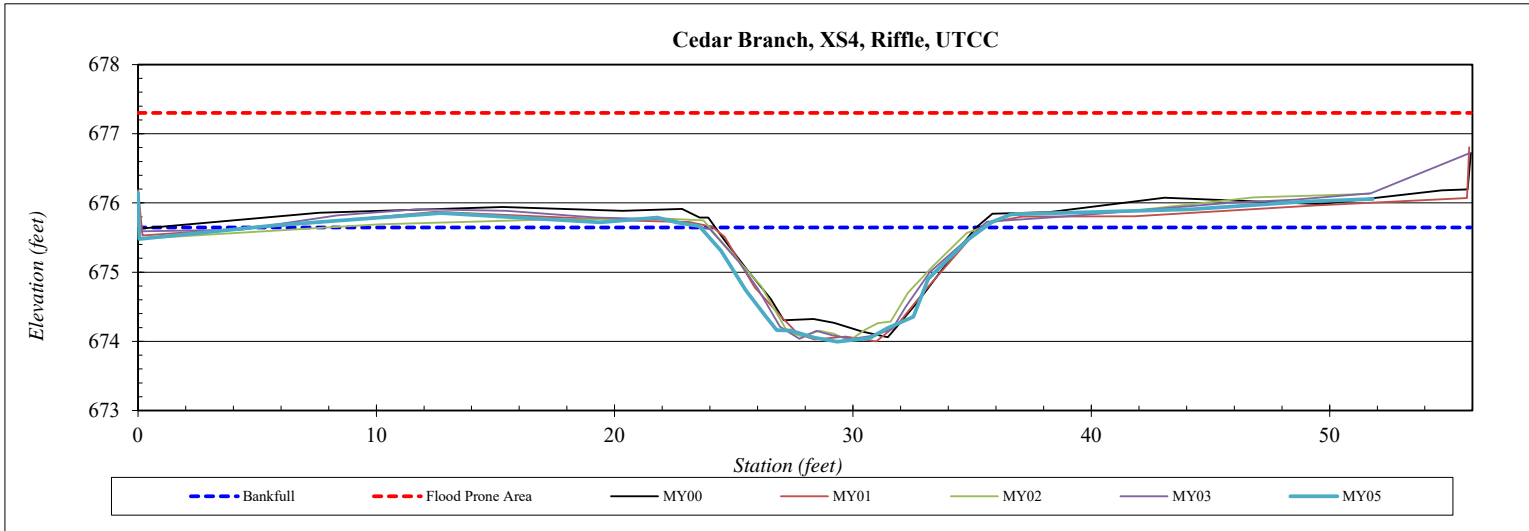


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS4
<b>Drainage Area (sq mi):</b>	0.21
<b>Date:</b>	12/13/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	676.15
0.0	675.48
5.8	675.68
12.7	675.85
19.4	675.72
21.8	675.79
22.6	675.72
23.6	675.66
24.5	675.31
25.5	674.74
26.3	674.36
26.8	674.16
27.4	674.16
28.4	674.05
29.3	674.00
30.1	674.02
30.7	674.05
31.4	674.19
32.5	674.36
33.2	674.90
34.8	675.48
35.8	675.72
36.7	675.84
38.5	675.86
44.2	675.91
49.0	676.02
51.8	676.06

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	675.65
<b>Bankfull Cross-Sectional Area:</b>	12.6
<b>Total Cross-Sectional Area:</b>	14.5
<b>Bankfull Width:</b>	11.9
<b>Flood Prone Area Elevation:</b>	677.3
<b>Flood Prone Width:</b>	51.8
<b>Max Depth at Bankfull:</b>	1.7
<b>Mean Depth at Bankfull:</b>	1.1
<b>W / D Ratio:</b>	11.3
<b>Entrenchment Ratio:</b>	4.3
<b>Bank Height Ratio:</b>	1.0

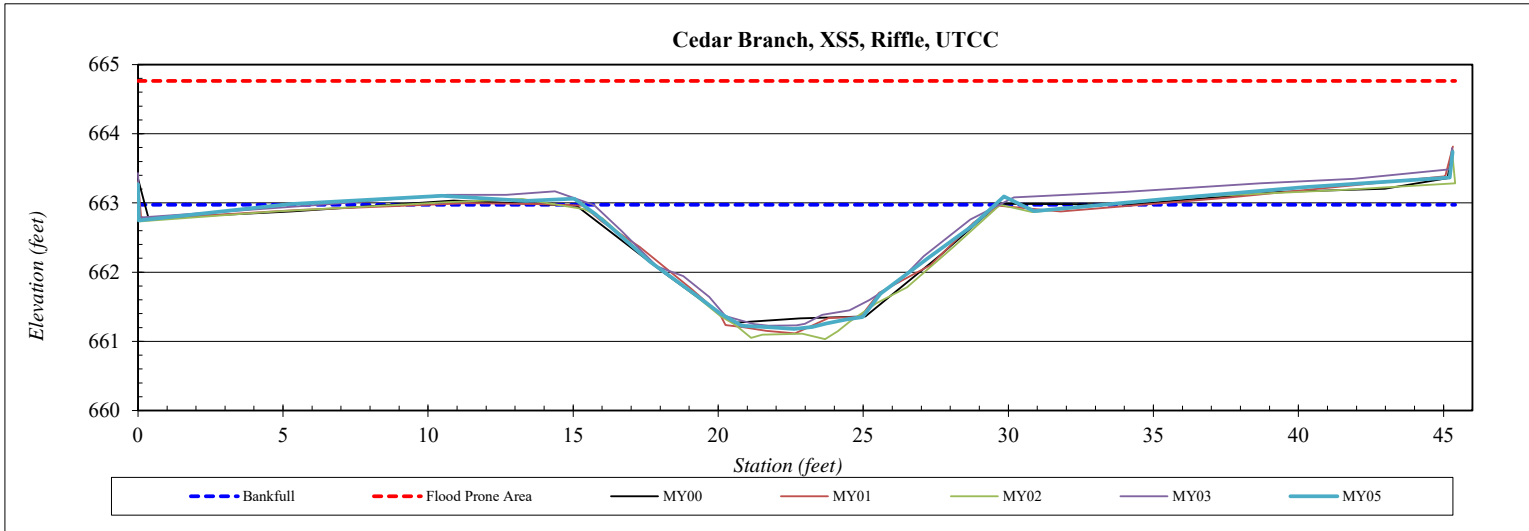


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS5
<b>Drainage Area (sq mi):</b>	0.21
<b>Date:</b>	12/13/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	663.27
0.0	662.75
5.2	662.98
10.5	663.11
13.4	663.03
15.0	663.06
15.8	662.84
16.3	662.66
17.6	662.15
19.2	661.67
20.1	661.40
20.8	661.23
22.0	661.20
22.6	661.18
23.2	661.21
23.7	661.26
24.4	661.32
25.0	661.35
25.6	661.69
27.3	662.21
28.8	662.67
29.8	663.10
30.9	662.88
35.4	663.06
40.2	663.23
45.2	663.37
45.3	663.74

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	662.97
<b>Bankfull Cross-Sectional Area:</b>	15.8
<b>Total Cross-Sectional Area:</b>	15.6
<b>Bankfull Width:</b>	14.2
<b>Flood Prone Area Elevation:</b>	664.8
<b>Flood Prone Width:</b>	45.3
<b>Max Depth at Bankfull:</b>	1.8
<b>Mean Depth at Bankfull:</b>	1.1
<b>W / D Ratio:</b>	12.8
<b>Entrenchment Ratio:</b>	3.2
<b>Bank Height Ratio:</b>	1.0

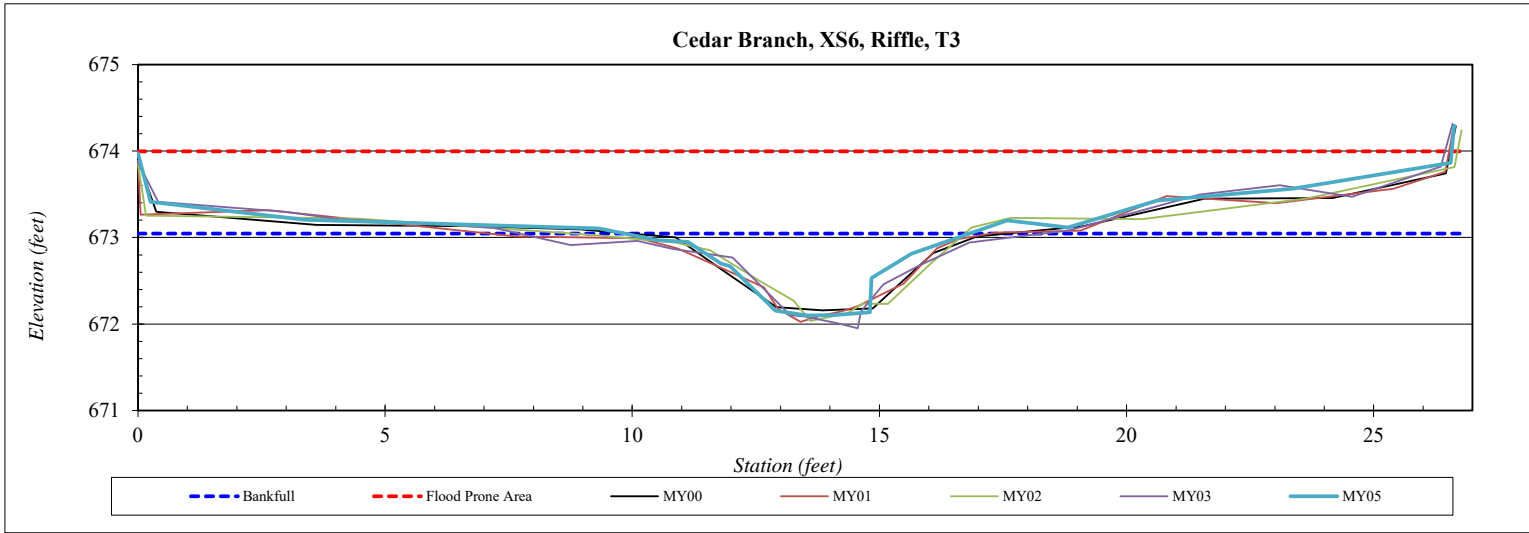


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS6
<b>Drainage Area (sq mi):</b>	0.04
<b>Date:</b>	12/13/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	673.98
0.3	673.41
3.4	673.20
6.9	673.15
9.3	673.11
10.5	672.97
11.1	672.95
11.8	672.70
12.0	672.67
12.9	672.16
13.5	672.10
13.9	672.10
14.0	672.10
14.8	672.14
14.8	672.53
15.6	672.81
17.6	673.20
18.8	673.12
20.6	673.43
23.4	673.56
26.6	673.86
26.6	674.30

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	673.05
<b>Bankfull Cross-Sectional Area:</b>	3.1
<b>Total Cross-Sectional Area:</b>	2.8
<b>Bankfull Width:</b>	7.0
<b>Flood Prone Area Elevation:</b>	674.0
<b>Flood Prone Width:</b>	26.6
<b>Max Depth at Bankfull:</b>	0.9
<b>Mean Depth at Bankfull:</b>	0.4
<b>W / D Ratio:</b>	15.7
<b>Entrenchment Ratio:</b>	3.8
<b>Bank Height Ratio:</b>	0.9

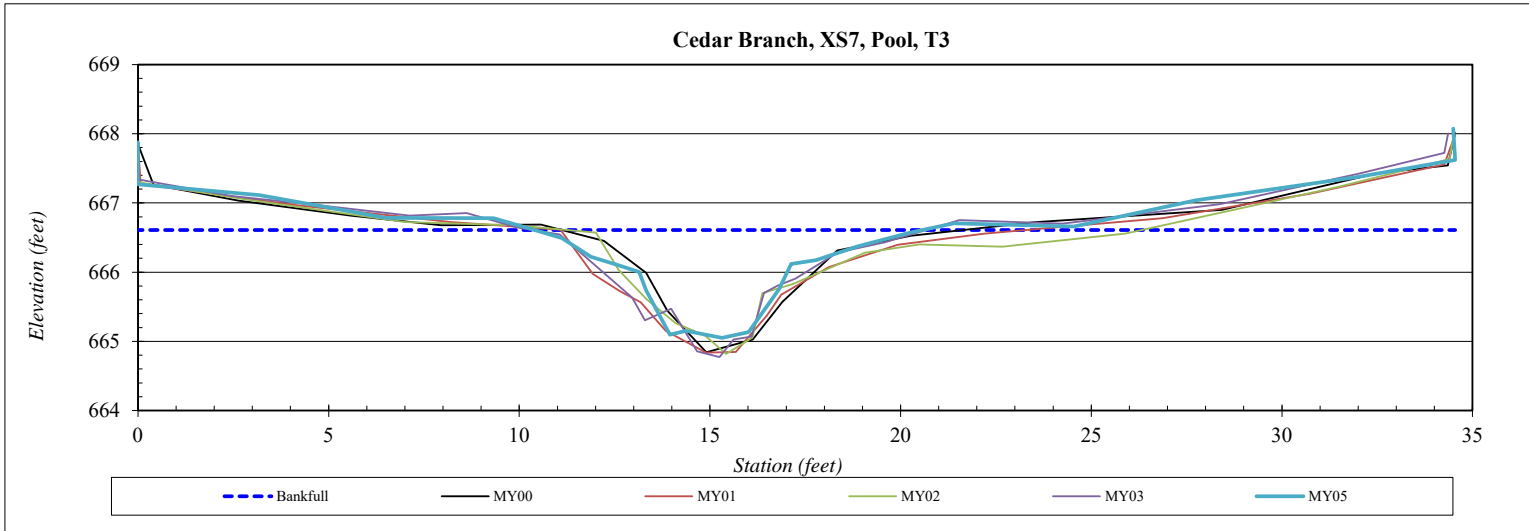


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS7
<b>Drainage Area (sq mi):</b>	0.04
<b>Date:</b>	12/13/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	667.87
0.0	667.27
3.2	667.11
6.5	666.79
9.3	666.78
10.3	666.63
11.1	666.49
11.9	666.22
12.5	666.11
13.1	666.00
13.3	665.74
13.9	665.10
14.4	665.15
15.3	665.05
16.0	665.13
16.8	665.75
17.1	666.12
17.8	666.17
18.9	666.37
20.3	666.57
21.4	666.70
24.5	666.66
27.7	667.04
32.0	667.38
34.5	667.62
34.5	668.08

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	666.61
<b>Bankfull Cross-Sectional Area:</b>	6.9
<b>Total Cross-Sectional Area:</b>	6.8
<b>Bankfull Width:</b>	10.2
<b>Flood Prone Area Elevation:</b>	---
<b>Flood Prone Width:</b>	---
<b>Max Depth at Bankfull:</b>	1.6
<b>Mean Depth at Bankfull:</b>	0.7
<b>W / D Ratio:</b>	---
<b>Entrenchment Ratio:</b>	---
<b>Bank Height Ratio:</b>	---

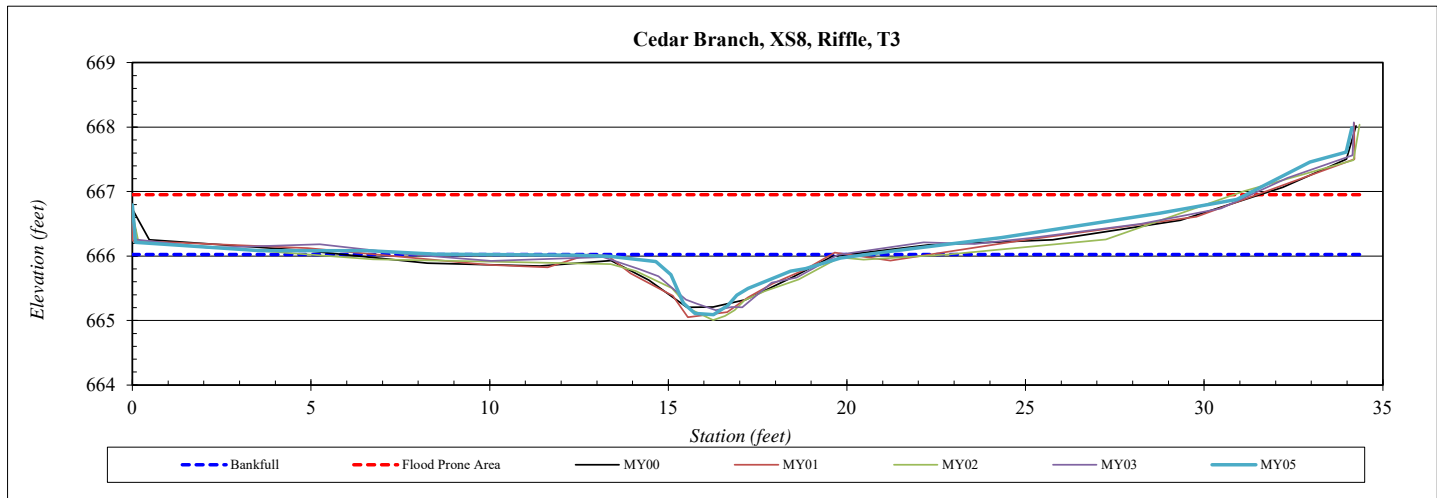


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS8
<b>Drainage Area (sq mi):</b>	0.04
<b>Date:</b>	12/13/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	666.80
0.1	666.21
3.6	666.09
6.6	666.09
8.5	666.03
12.4	666.01
13.4	666.00
14.6	665.91
15.1	665.71
15.4	665.27
15.7	665.11
16.3	665.09
16.7	665.24
16.9	665.39
17.2	665.50
18.4	665.77
18.8	665.81
19.8	665.97
21.2	666.07
24.3	666.29
28.8	666.67
30.9	666.88
33.0	667.46
34.0	667.61
34.1	667.99

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	666.02
<b>Bankfull Cross-Sectional Area:</b>	2.5
<b>Total Cross-Sectional Area:</b>	2.0
<b>Bankfull Width:</b>	7.2
<b>Flood Prone Area Elevation:</b>	667.0
<b>Flood Prone Width:</b>	31.2
<b>Max Depth at Bankfull:</b>	0.9
<b>Mean Depth at Bankfull:</b>	0.4
<b>W / D Ratio:</b>	20.3
<b>Entrenchment Ratio:</b>	4.3
<b>Bank Height Ratio:</b>	0.9

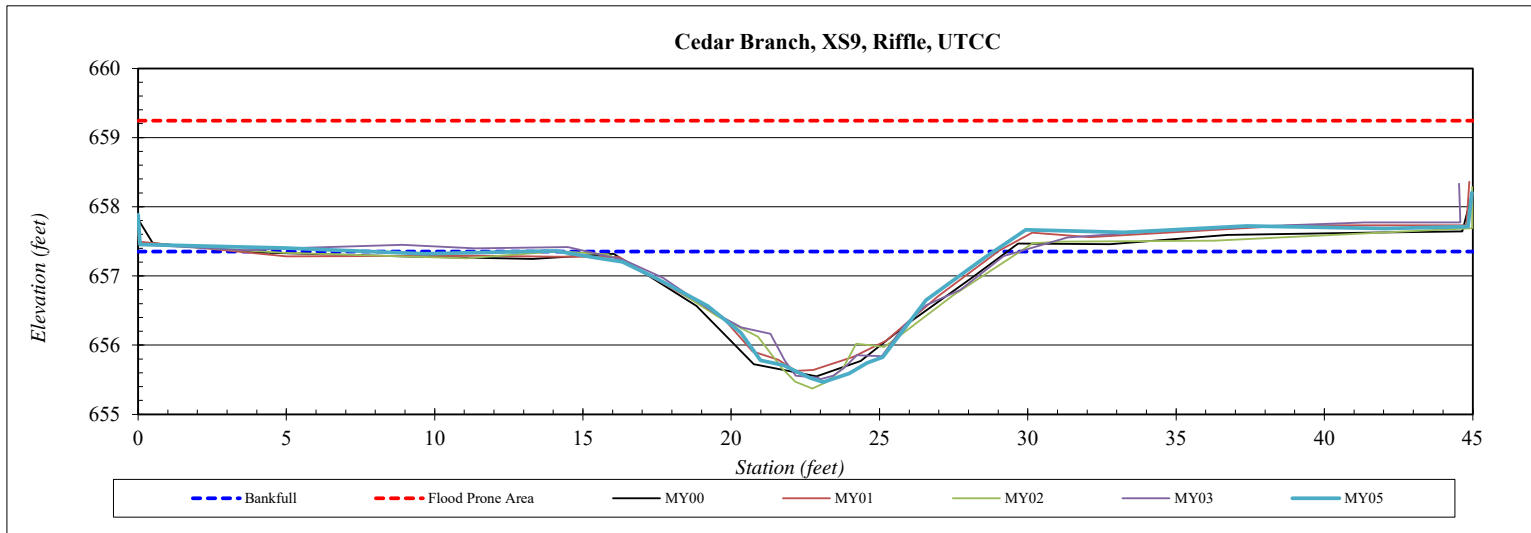


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS9
<b>Drainage Area (sq mi):</b>	0.28
<b>Date:</b>	12/14/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	657.89
0.1	657.45
5.0	657.41
9.7	657.32
13.0	657.35
14.1	657.36
15.4	657.27
16.3	657.20
17.5	656.97
19.2	656.57
20.3	656.18
21.0	655.78
21.8	655.71
22.7	655.53
23.1	655.47
24.0	655.59
24.6	655.74
25.1	655.82
26.6	656.65
28.5	657.26
29.9	657.67
33.2	657.63
37.4	657.72
42.1	657.68
44.8	657.72
45.0	658.21

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	657.36
<b>Bankfull Cross-Sectional Area:</b>	13.0
<b>Total Cross-Sectional Area:</b>	12.5
<b>Bankfull Width:</b>	14.7
<b>Flood Prone Area Elevation:</b>	659.2
<b>Flood Prone Width:</b>	45.0
<b>Max Depth at Bankfull:</b>	1.9
<b>Mean Depth at Bankfull:</b>	0.9
<b>W / D Ratio:</b>	16.5
<b>Entrenchment Ratio:</b>	3.1
<b>Bank Height Ratio:</b>	1.0



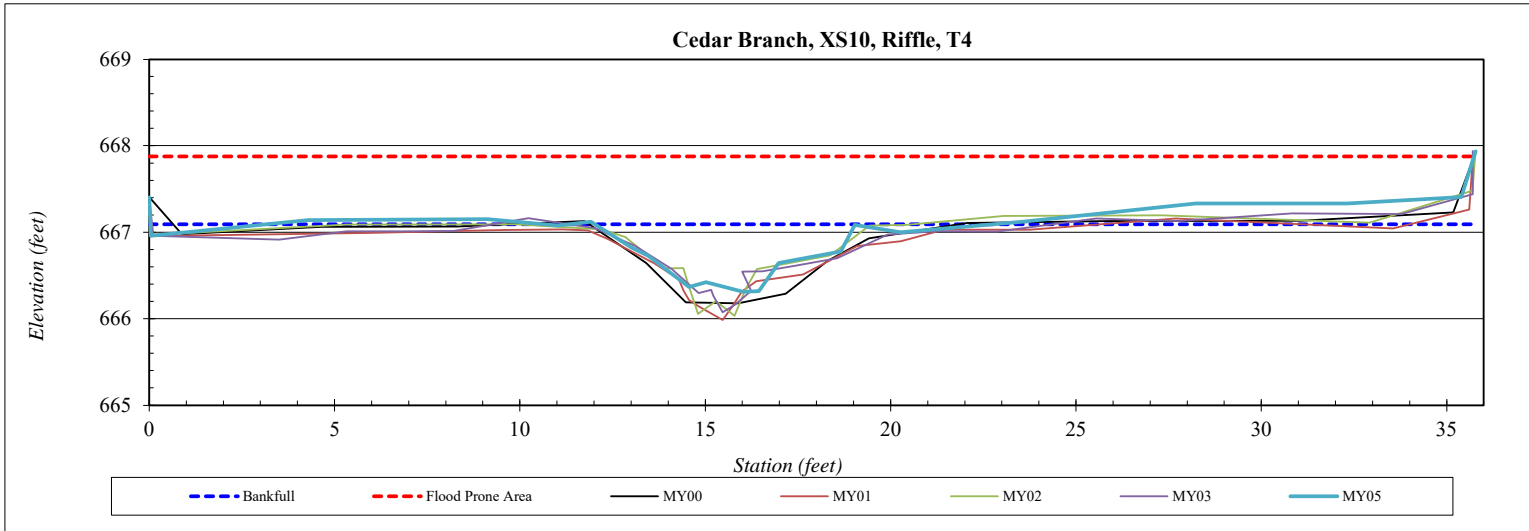


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS10
<b>Drainage Area (sq mi):</b>	0.05
<b>Date:</b>	12/14/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	667.40
0.0	666.96
4.3	667.14
9.1	667.15
11.0	667.08
11.9	667.12
13.0	666.83
13.5	666.73
14.6	666.37
15.0	666.42
16.0	666.31
16.4	666.32
17.0	666.64
18.7	666.78
19.0	667.08
20.3	667.00
23.6	667.12
28.2	667.33
32.3	667.33
35.4	667.41
35.8	667.94

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	667.09
<b>Bankfull Cross-Sectional Area:</b>	3.3
<b>Total Cross-Sectional Area:</b>	2.2
<b>Bankfull Width:</b>	7.0
<b>Flood Prone Area Elevation:</b>	667.9
<b>Flood Prone Width:</b>	35.7
<b>Max Depth at Bankfull:</b>	0.8
<b>Mean Depth at Bankfull:</b>	0.5
<b>W / D Ratio:</b>	15.0
<b>Entrenchment Ratio:</b>	5.1
<b>Bank Height Ratio:</b>	1.0

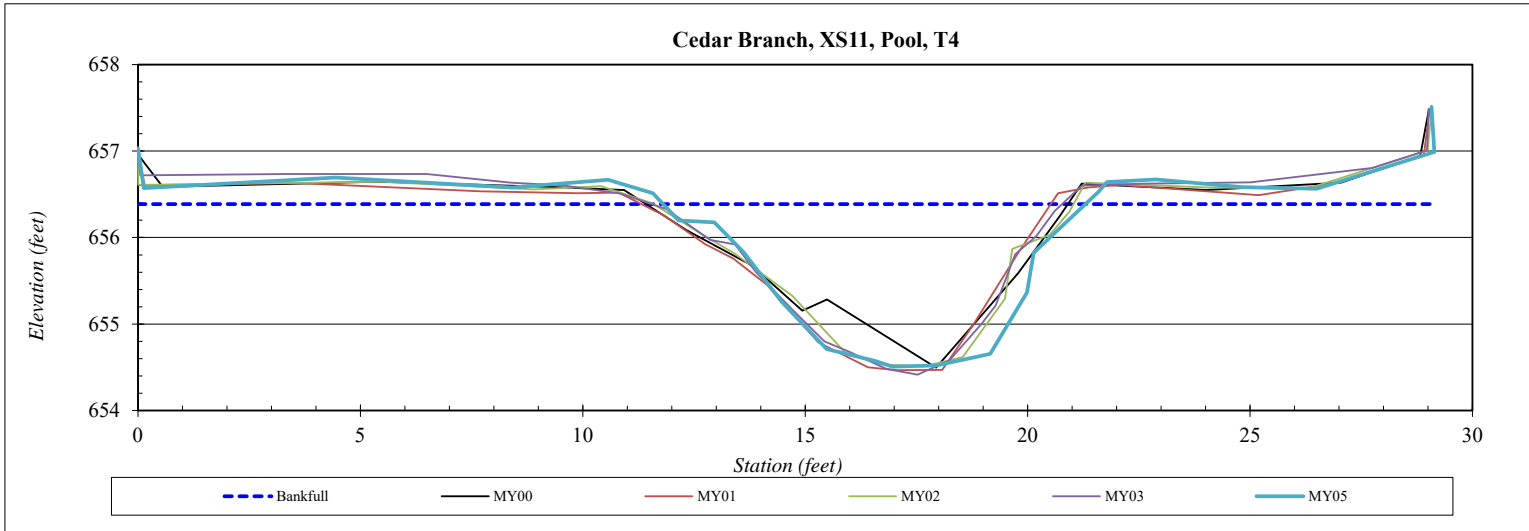


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS11
<b>Drainage Area (sq mi):</b>	0.05
<b>Date:</b>	12/14/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	657.03
0.1	656.57
4.4	656.69
8.4	656.58
10.6	656.67
11.6	656.51
12.2	656.20
13.0	656.18
13.6	655.83
14.5	655.26
15.5	654.71
16.6	654.57
17.0	654.51
18.0	654.52
19.2	654.65
20.0	655.37
20.1	655.83
21.6	656.53
21.8	656.64
22.9	656.67
24.8	656.58
26.5	656.57
29.1	656.99
29.1	657.51

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	656.39
<b>Bankfull Cross-Sectional Area:</b>	10.8
<b>Total Cross-Sectional Area:</b>	12.4
<b>Bankfull Width:</b>	9.5
<b>Flood Prone Area Elevation:</b>	---
<b>Flood Prone Width:</b>	---
<b>Max Depth at Bankfull:</b>	1.9
<b>Mean Depth at Bankfull:</b>	1.1
<b>W / D Ratio:</b>	---
<b>Entrenchment Ratio:</b>	---
<b>Bank Height Ratio:</b>	---

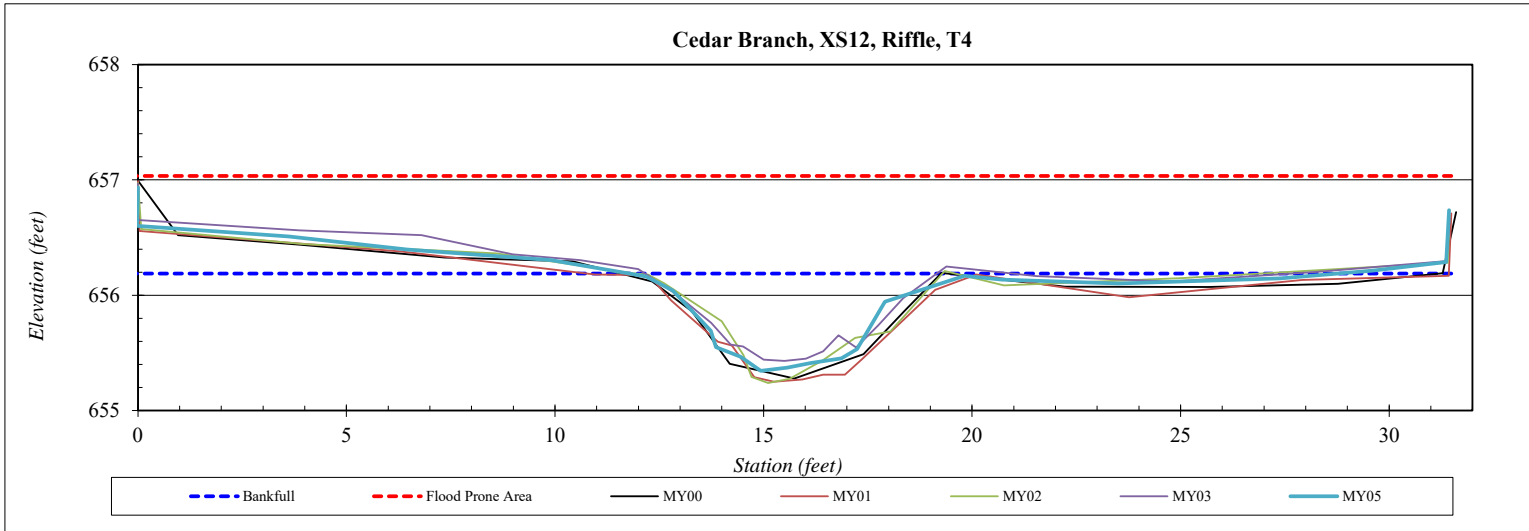


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS12
<b>Drainage Area (sq mi):</b>	0.05
<b>Date:</b>	12/14/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	656.94
0.0	656.60
3.6	656.51
6.5	656.40
9.9	656.30
12.2	656.16
12.8	656.04
13.7	655.69
13.9	655.55
14.4	655.47
14.9	655.35
15.6	655.37
16.1	655.41
16.9	655.45
17.2	655.53
17.9	655.94
19.8	656.17
20.7	656.14
23.5	656.10
27.4	656.15
29.6	656.21
31.4	656.29
31.4	656.74

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	656.19
<b>Bankfull Cross-Sectional Area:</b>	3.5
<b>Total Cross-Sectional Area:</b>	3.0
<b>Bankfull Width:</b>	7.0
<b>Flood Prone Area Elevation:</b>	657.0
<b>Flood Prone Width:</b>	31.4
<b>Max Depth at Bankfull:</b>	0.8
<b>Mean Depth at Bankfull:</b>	0.5
<b>W / D Ratio:</b>	14.0
<b>Entrenchment Ratio:</b>	4.5
<b>Bank Height Ratio:</b>	1.0

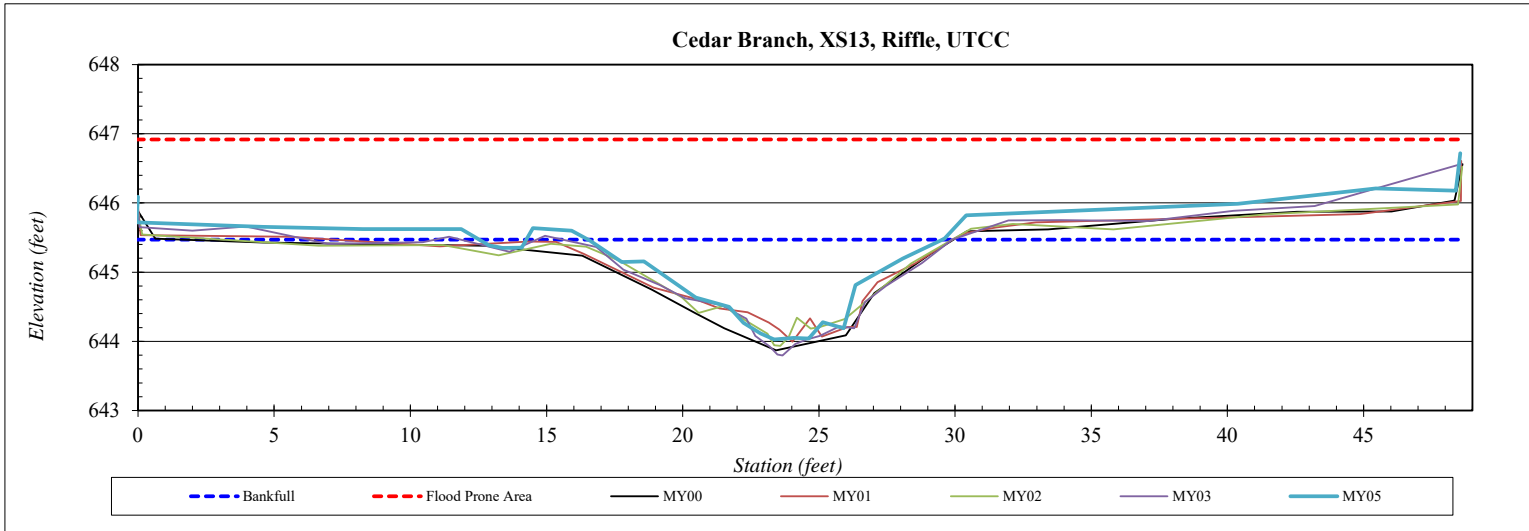


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS13
<b>Drainage Area (sq mi):</b>	0.41
<b>Date:</b>	12/14/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	646.09
-0.1	645.72
4.6	645.66
8.3	645.62
11.9	645.62
12.9	645.39
13.4	645.35
14.1	645.35
14.5	645.64
15.9	645.60
16.6	645.46
17.8	645.15
18.6	645.16
20.5	644.63
21.7	644.50
22.2	644.27
22.9	644.11
23.4	644.03
24.1	644.05
24.6	644.04
25.1	644.28
25.9	644.19
26.3	644.82
28.1	645.20
29.6	645.48
30.4	645.82
33.5	645.87
40.4	645.99
45.4	646.21
48.4	646.18
48.5	646.72

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	645.47
<b>Bankfull Cross-Sectional Area:</b>	9.6
<b>Total Cross-Sectional Area:</b>	6.8
<b>Bankfull Width:</b>	13.0
<b>Flood Prone Area Elevation:</b>	646.9
<b>Flood Prone Width:</b>	48.5
<b>Max Depth at Bankfull:</b>	1.4
<b>Mean Depth at Bankfull:</b>	0.7
<b>W / D Ratio:</b>	17.7
<b>Entrenchment Ratio:</b>	3.7
<b>Bank Height Ratio:</b>	1.1

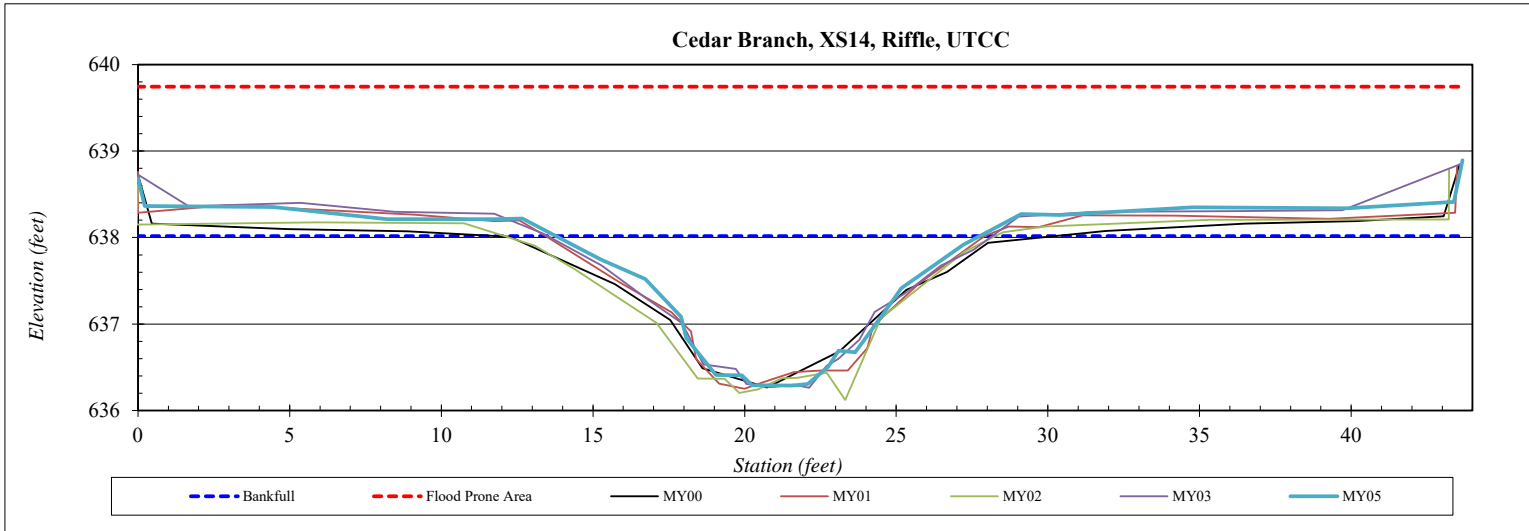


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS14
<b>Drainage Area (sq mi):</b>	0.41
<b>Date:</b>	12/14/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	638.84
0.2	638.52
4.5	638.50
8.2	638.36
11.8	638.36
12.7	638.37
13.6	638.21
15.3	637.90
16.7	637.67
17.9	637.24
18.1	636.99
19.1	636.56
19.9	636.56
20.3	636.44
21.6	636.44
22.1	636.46
22.8	636.66
23.1	636.84
23.6	636.83
23.9	636.95
24.9	637.42
25.2	637.56
27.2	638.07
29.1	638.42
30.4	638.41
34.8	638.50
39.9	638.49
43.4	638.56
43.7	639.05

SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	638.02
<b>Bankfull Cross-Sectional Area:</b>	12.8
<b>Total Cross-Sectional Area:</b>	11.7
<b>Bankfull Width:</b>	14.0
<b>Flood Prone Area Elevation:</b>	639.7
<b>Flood Prone Width:</b>	43.7
<b>Max Depth at Bankfull:</b>	1.7
<b>Mean Depth at Bankfull:</b>	0.9
<b>W / D Ratio:</b>	15.3
<b>Entrenchment Ratio:</b>	3.1
<b>Bank Height Ratio:</b>	1.2

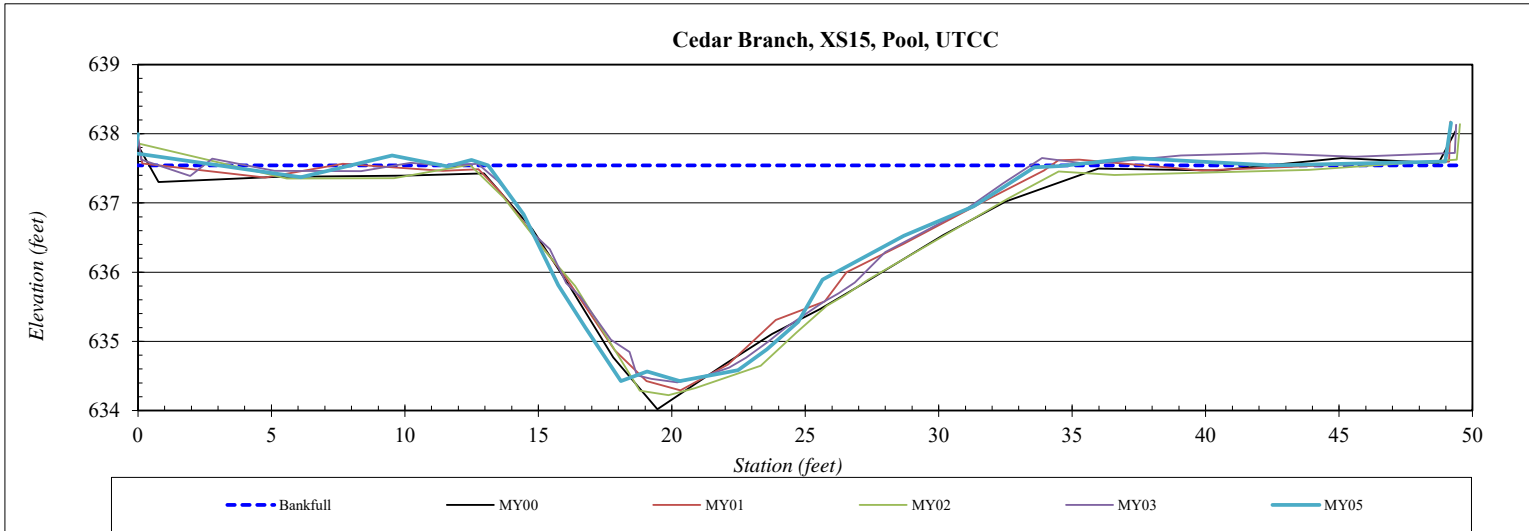


<b>River Basin:</b>	Yadkin River
<b>Site:</b>	Cedar Branch
<b>XS ID</b>	XS15
<b>Drainage Area (sq mi):</b>	0.41
<b>Date:</b>	12/14/2022
<b>Field Crew:</b>	TS, KB



Station	Elevation
0.0	638.15
-0.1	637.87
6.1	637.52
9.5	637.84
11.6	637.68
12.5	637.77
13.1	637.69
14.4	636.98
15.7	635.96
16.8	635.35
18.1	634.58
19.1	634.72
20.3	634.58
22.5	634.73
23.6	635.03
24.7	635.43
25.6	636.04
28.7	636.68
31.3	637.10
33.6	637.67
34.6	637.68
37.3	637.80
42.5	637.69
49.0	637.75
49.2	638.31

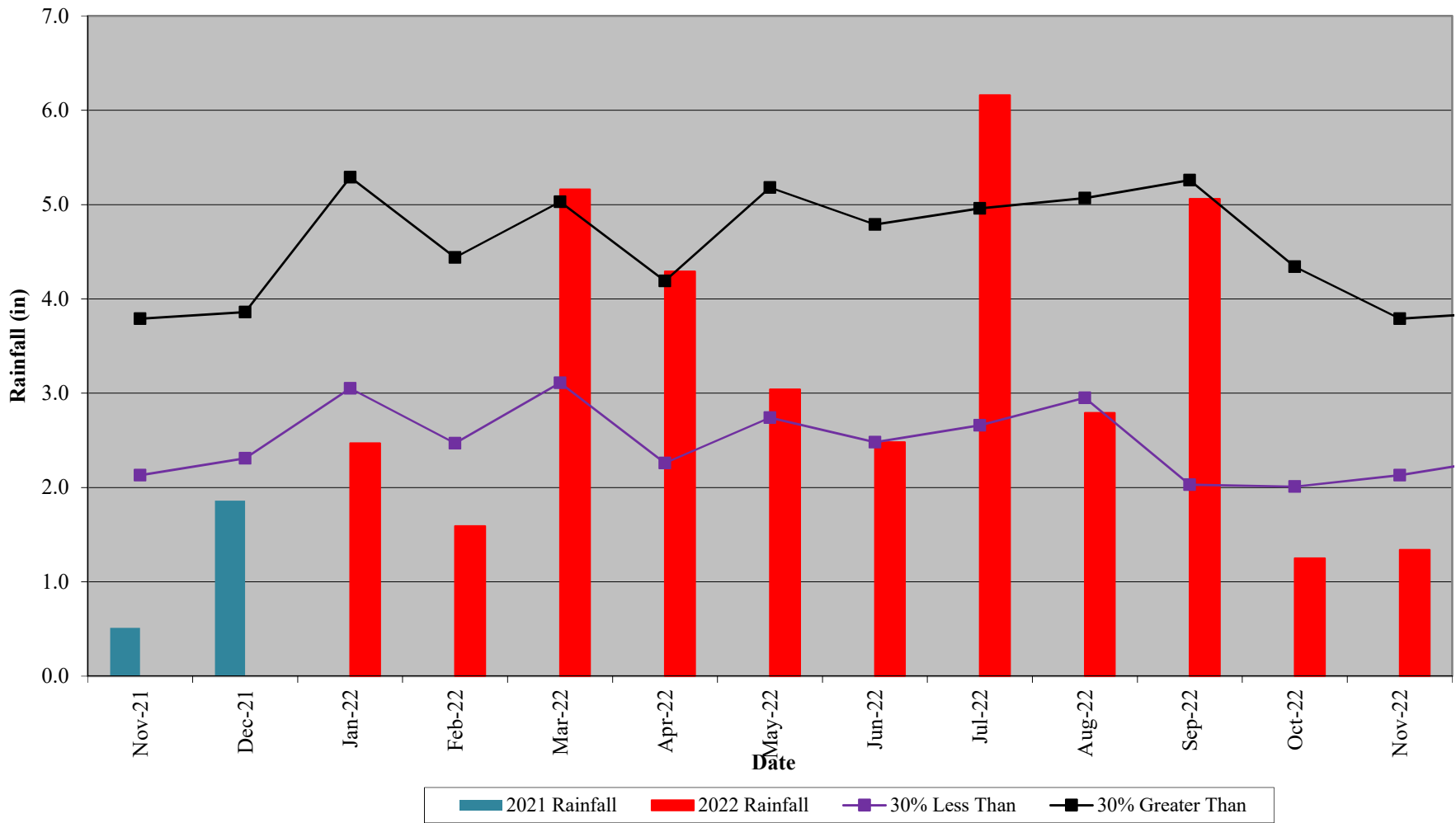
SUMMARY DATA	
<b>Current Bankfull Elevation:</b>	637.55
<b>Bankfull Cross-Sectional Area:</b>	35.8
<b>Total Cross-Sectional Area:</b>	33.3
<b>Bankfull Width:</b>	20.5
<b>Flood Prone Area Elevation:</b>	---
<b>Flood Prone Width:</b>	---
<b>Max Depth at Bankfull:</b>	3.1
<b>Mean Depth at Bankfull:</b>	1.7
<b>W / D Ratio:</b>	---
<b>Entrenchment Ratio:</b>	---
<b>Bank Height Ratio:</b>	---



# **APPENDIX E**

## Hydrologic Data

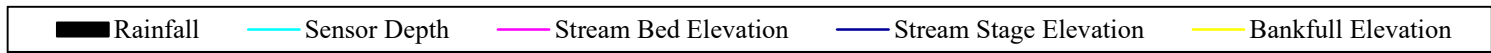
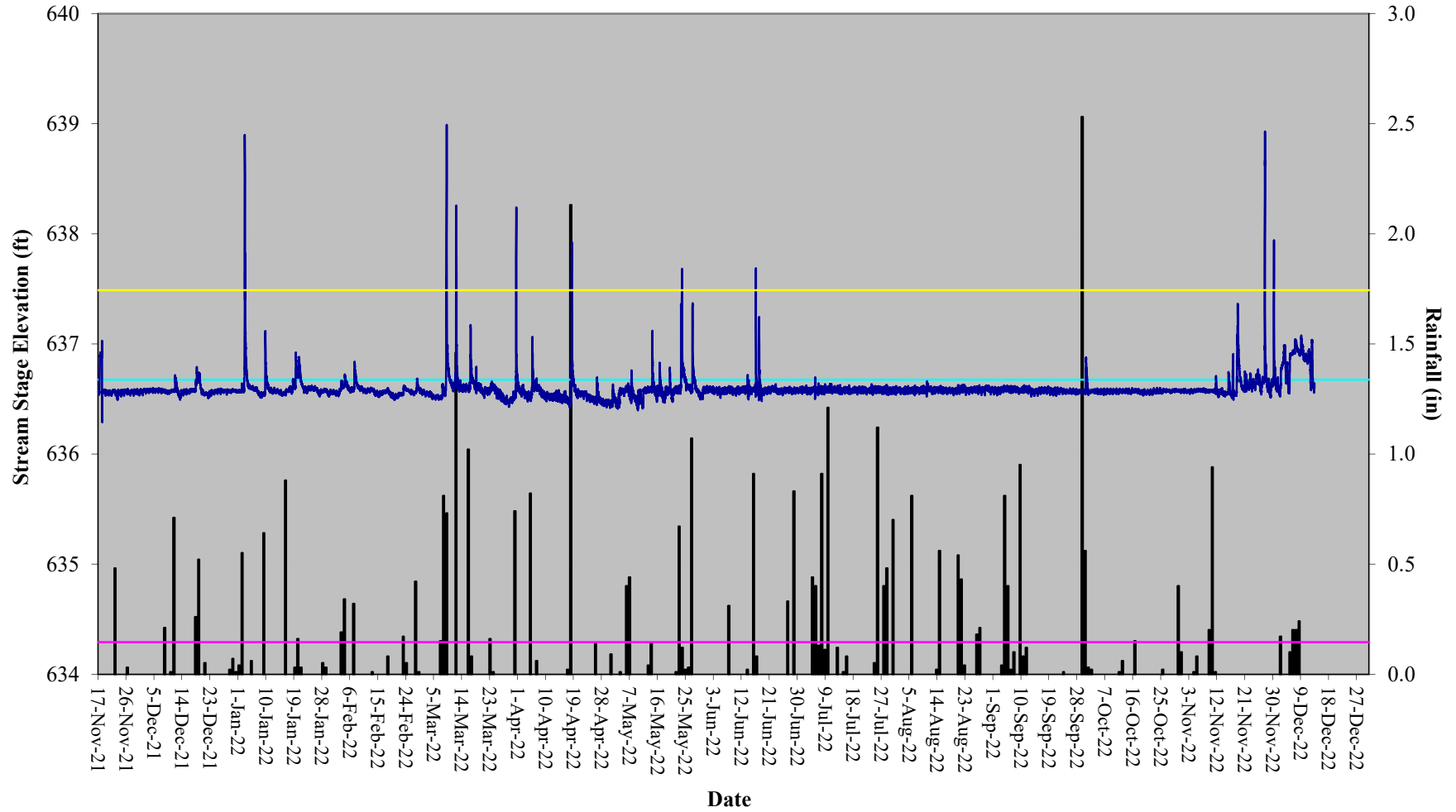
**Cedar Branch Restoration Site  
30-70 Percentile Graph  
WETS Station Name: Asheboro, NC**





<b>Table 10. Verification of Bankfull Events Cedar Branch Restoration Site, DMS Project #97009</b>							
<b>Gage ID</b>	<b>MY1 2018</b>	<b>MY2 2019</b>	<b>MY3 2020</b>	<b>MY4 2021</b>	<b>MY5 2022</b>	<b>MY6 2023</b>	<b>MY7 2024</b>
UTCC	5	15	17	9	8		

# Cedar Branch Restoration Site Hydrograph Stream Gauge UTCC



<b>Table 11. Verification of Stream Flow Cedar Branch Restoration Site, DMS Project #97009</b>				
	<b>Gauge</b>		<b>Camera</b>	
<b>Reach</b>	<b>Dates Achieving</b>	<b>Maximum Consecutive Days</b>	<b>Dates Achieving</b>	<b>Maximum Consecutive Days</b>
T1	N/A	3	Janaury1 – February 18; March 7 – July 31	147
T1-1	N/A	17	January 10 – May 4	115
T3	April 22 – June 9	49	February 10 – August 2	173

<b>Table 12. Stream Flow Criteria Attainment Cedar Branch Restoration Site, DMS Project #97009</b>							
	<b>Greater than 30 Days of Flow/Max Consecutive Days</b>						
<b>Reach</b>	<b>MY-01 2018</b>	<b>MY-02 2019</b>	<b>MY-03 2020</b>	<b>MY-04 2021</b>	<b>MY-05 2022</b>	<b>MY-06 2023</b>	<b>MY-07 2024</b>
T1 (Gauge)	Yes/60	Yes/46	Yes/142	Yes/242	No/3		
T1 (Camera)	Yes/102	Yes/260	Yes/189	Yes/178	Yes/147		
T1-1 (Gauge)	No/16	Yes/66	Yes/65	Yes/87	No/17		
T1-1 (Camera)	No/7*	Yes/105	Yes/63	No/7*	Yes/115		
T3 (Gauge)	Yes/83	Yes/187	Yes/65	Yes/86	Yes/49		
T3 (Camera)	Yes/93	Yes/252	Yes/174	Yes/61	Yes/173		

\*camera malfunction



T1 – 4/10/2022



T1 – 7/9/2022



T1-1 – 3/2/2022



T1-1 – 4/14/2020

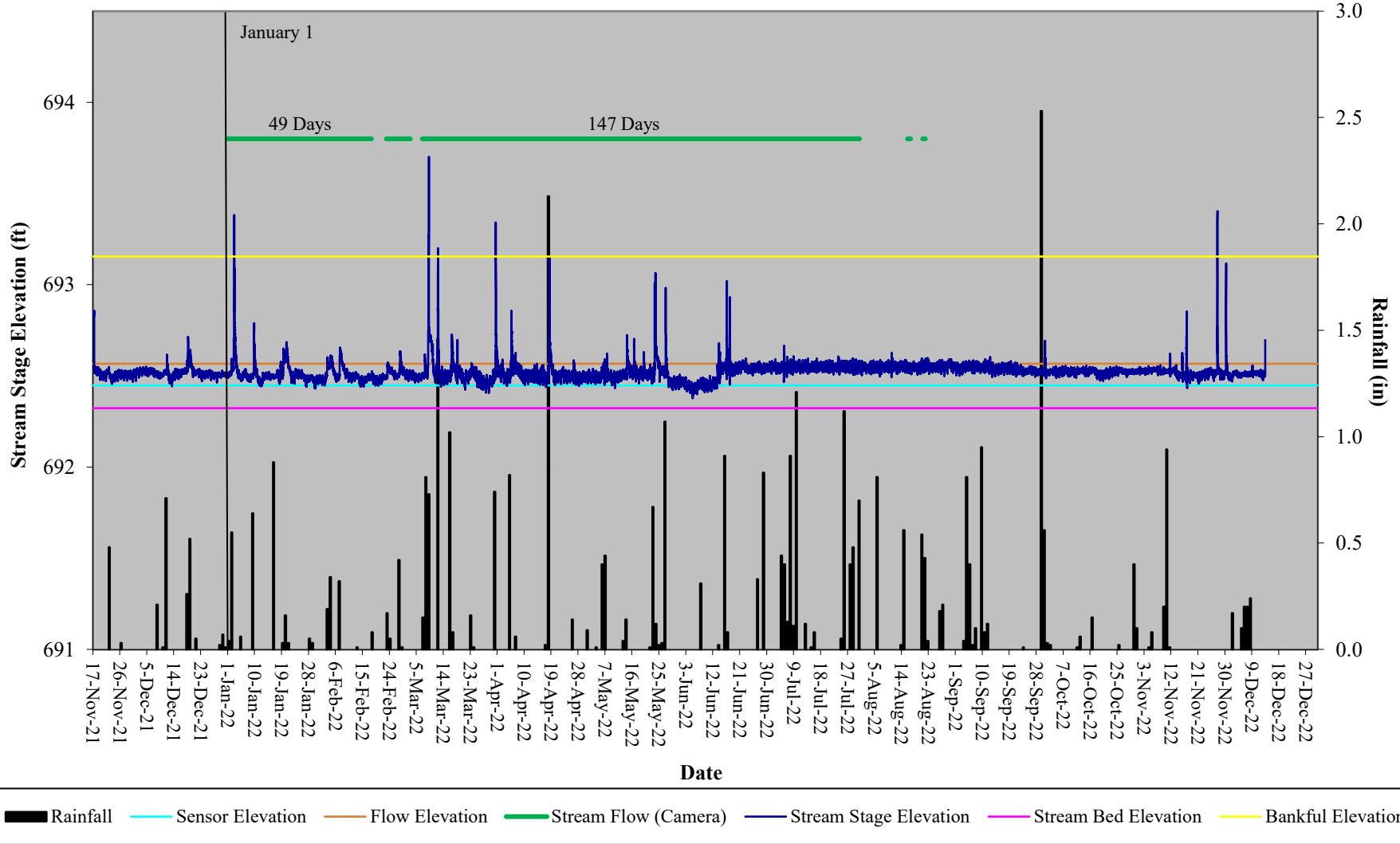


T3 – 2/10/2022

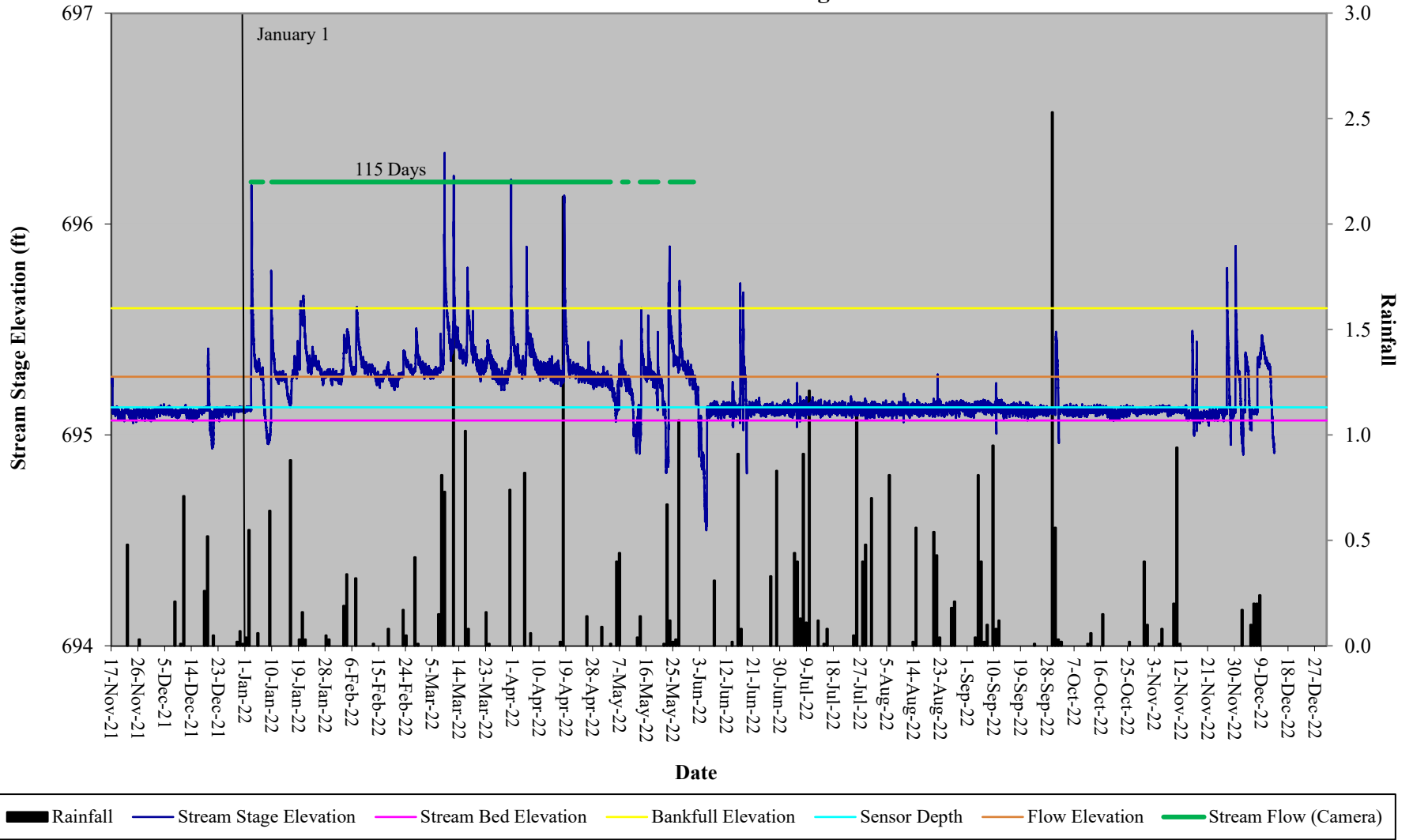


T3 – 4/13/2022

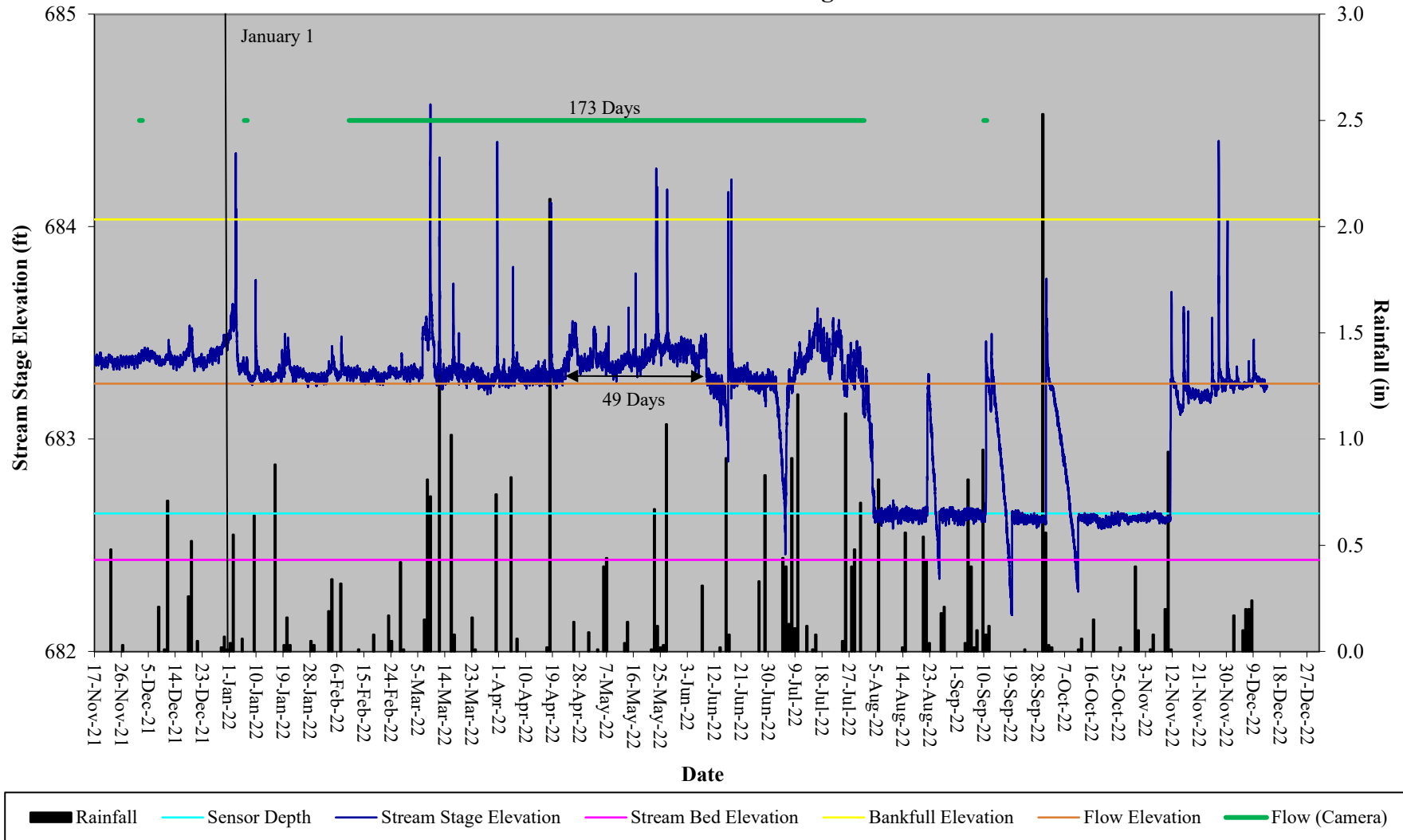
### Cedar Branch Restoration Site Hydrograph T1 Stream Flow Gauge



### Cedar Branch Restoration Site Hydrograph T1-1 Stream Flow Gauge



### Cedar Branch Restoration Site Hydrograph T3 Stream Flow Gauge

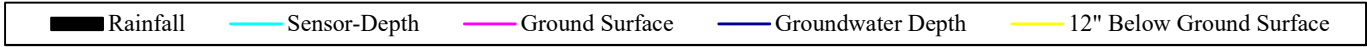
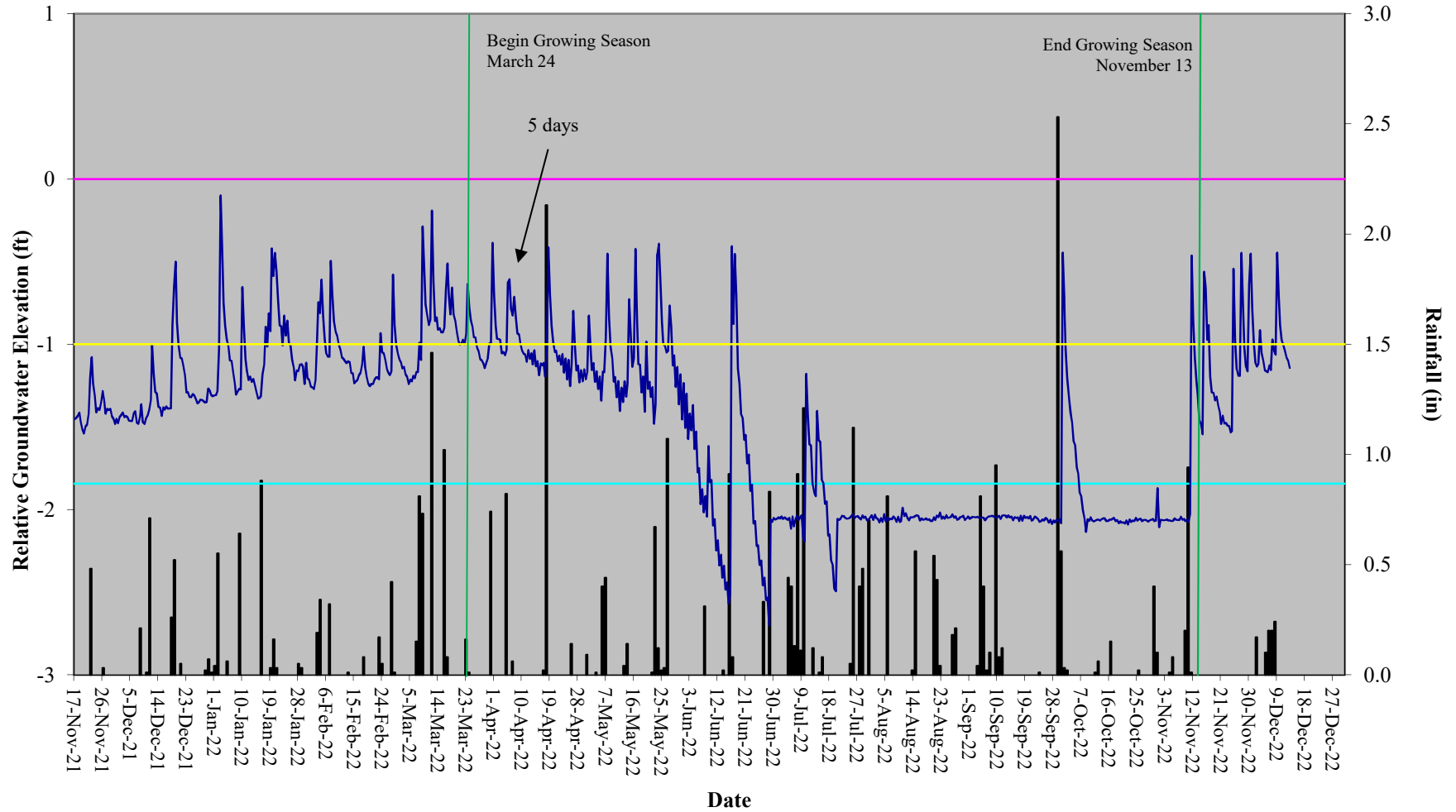


**Table 13. Wetland Hydrology Verification  
Cedar Branch Restoration Site, DMS Project #97009**

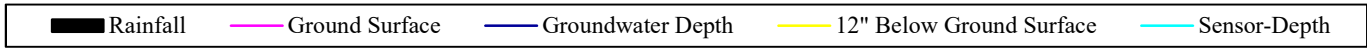
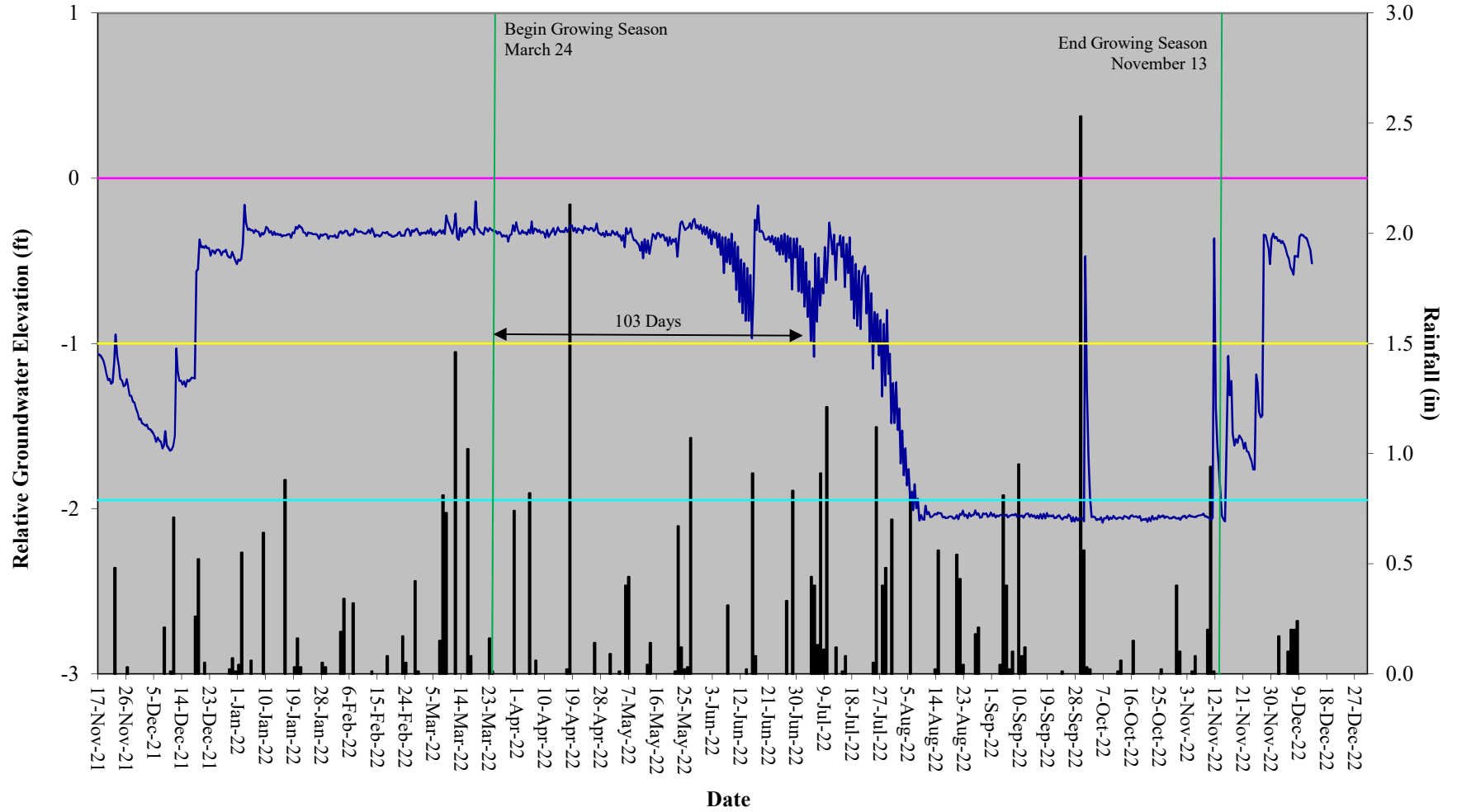
		<b>Max Consecutive Days During Growing Season (Percentage)</b>						
<b>Gauge #</b>	<b>Location</b>	<b>MY-01 2018</b>	<b>MY-02 2019</b>	<b>MY-03 2020</b>	<b>MY-04 2021</b>	<b>MY-05 2022</b>	<b>MY-06 2023</b>	<b>MY-07 2024</b>
Gauge 1	T1	64 (27.4%)	63 (26.7%)	55 (23.3%)	57 (24.1%)	3 (1.9%)		
Gauge 2	T3	104 (44.4%)	148 (63.2%)	119 (50.9%)	65 (27.6%)	103 (44.0%)		
Gauge 3	T3	21 (9.0%)	26 (10.9%)	13 (5.3%)	21 (9.0%)	18 (7.7%)		



## Cedar Branch Restoration Site Hydrograph Wetland Gauge 1



## Cedar Branch Restoration Site Hydrograph Wetland Gauge 2



### Cedar Branch Restoration Site Hydrograph Wetland Gauge 3

