Annual Monitoring Report

Monitoring Year 5 of 7

FINAL

Pee Dee Stream Restoration Project

NCDMS Contract No.: 004644

NCDMS Project No.: 95350

USACE Action ID: SAW-2012-01077

DWR #: 13-1140

Montgomery County, NC

Data Collected: January - November 2019

Date Submitted: January 2020

Submitted to:

North Carolina Division of Mitigation Services

NCDEQ-DMS, 1652 Mail Service Center Raleigh NC 27699-1652

Mitigation Project Name	**Pee Dee Stream Restoration Site**	**County**	**Montgomery**	**USACE Action ID**	**2012-01077**
DMS ID	**95350**	**Date Project Instituted**	**8/1/2012**	**NCDWR Permit No**	**2013-1140**
River Basin	**Yadkin**	**Date Prepared**	**7/12/2019**		
Cataloging Unit	**03040104**				

Credit Release Milestone	Stream Credits						Wetland Credits							
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Date (Wetland)
Potential Credits (Mitigation Plan)		**6,408.670**												
Potential Credits (As-Built Survey)		**6,504.000**												
Potential Credits (IRT Approved)		**6,408.267**												
1 (Site Establishment)	**N/A**				N/A	N/A	**N/A**				**N/A**		N/A	N/A
2 (Year 0 / As-Built)	**30%**	1,951.200			2015	10/5/2015	**N/A**				**N/A**		N/A	N/A
3 (Year 1 Monitoring)	**10%**	650.400			2016	4/25/2016	**N/A**				**N/A**		N/A	N/A
4 (Year 2 Monitoring)	**10%**	640.827			2017	10/20/2017	**N/A**				**N/A**		N/A	N/A
IRT Adjustment*		-38.293				10/20/2017							N/A	N/A
5 (Year 3 Monitoring) - Resubmitted	**10%**	640.827			2018	Not Released	**N/A**				**N/A**		N/A	N/A
6 (Year 4 Monitoring)	**5%**	320.413			2019	Not Released	**N/A**				**N/A**		N/A	N/A
7 (Year 5 Monitoring)	**10%**				2020		**N/A**				**N/A**		N/A	N/A
8 (Year 6 Monitoring)	**5%**				2021		**N/A**				**N/A**		N/A	N/A
9 (Year 7 Monitoring)	**10%**				2022		**N/A**				**N/A**		N/A	N/A
Stream Bankfull Standard	**10%**	640.827			2017	10/20/2017	**N/A**				**N/A**		N/A	N/A
Total Credits Released to Date		**3,844.960**												

NOTES:

10/20/2017: Adjustment required due to IRT concerns on how the as-built credits were calculated

CONTINGENCIES:

Signature of Wilmington District Official Approving Credit Release

27 Sept 2019

Date

1 - For NCDMS, no credits are released during the first milestone

2 - For NCDMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCDMS Portal, provided the following criteria have been met:

1) Approval of the final Mitigation Plan
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
4) Reciept of necessary DA permit authorization or written DA approval for porjects where DA permit issuance is not required

3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met

Mitigation Project Name	**Pee Dee Stream Restoration Site**		**County**	**Montgomery**	**USACE Action ID**	**2012-01077**
DMS ID	**95350**		**Date Project Instituted**	**8/1/2012**	**NCDWR Permit No**	**2013-1140**
River Basin	**Yadkin**		**Date Prepared**	**7/12/2019**		
Cataloging Unit	**03040104**					

DEBITS (released credits only)

			Ratios	1	1.5	2.5	5	1	3	2	5	1	3	2	5	1	3	2	5
				Stream Restoration	Stream Enhancment I	Stream Enhancement II	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
IRT Approved As-Built Amounts (feet and acres)				**5,991.600**	**625.000**														
IRT Approved As-Built Amounts (mitigation credits)				**5,991.600**	**416.667**														
Percentage Released				**60%**	**60%**														
Released Amounts (feet / acres)				**3,594.960**	**375.000**														
Released Amounts (credits)				**3,594.960**	**250.000**														
NCDWR Permit	USACE Action ID	Project Name																	
2016-0299	2002-01260	NCDOT TIP R-2536 - Asheboro Bypass, Randolph County		2,535.980															
	2016-02283	SR 1320 - Bridge 228 - Division 8, Montgomery County		82.000															
Remaining Amounts (feet / acres)				**976.980**	**375.000**														
Remaining Amounts (credits)				**976.980**	**250.000**														

302 Jefferson Street, Suite 110
Raleigh, NC 27605

Corporate Headquarters
6575 West Loop South, Suite 300
Bellaire, TX 77401
Main: 713.520.5400

January 24, 2020

Harry Tsomides
NC DEQ Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

RE: Pee Dee Stream Restoration Site: MY5 Monitoring Report (NCDMS ID 95350)

Listed below are comments provided by DMS on December 17, 2019 regarding the Pee Dee Stream Restoration Site: Year 5 Monitoring Report and RES' responses.

It would be helpful to list the USACE Action ID and DWR number on the report cover.
Done.

The revised asset amount listed in section 1.3 and in Table 1 is not consistent with the revised assets as indicated in the 6/13/2019 USACE e-approval modification letter, sent via email on that date. Please resolve this discrepancy.
Done.

There were a few misspelling/typos noticed in section 1.4.4. Please correct. This section should also reference the Adaptive Management Appendix (see further comment below).
The typos were corrected and referenced to Appendix F were added.

Common hackberry and buttonbush appear in large volunteer numbers (1164 and 221 respectively) in the CVS table MY2 summary but are absent after that. Please clarify.
RES believes these species were misidentified and/or have been shaded out.

Can RES speculate as to why there were no recorded bankfull events on the site in 2019? Table 15 (Rainfall summary) indicates several months where the listed rain station exceeded the 70 percent threshold.
RES speculates that there may have been bankfull events, but they were too small for the corkline crest gauges to detect. RES will calibrate the flow gauges to also document bankfull events to supplement the data in MY6 and MY7.

Methods section indicates that survey data from MY0, MY1, MY2, MY3, MY5 and MY7 were imported into CAD/ArcGIS and Excel. However, MY7 is in the future. Please revise this statement. Similarly, revise the vegetation success data statement to omit MY7.
Done.

Please add an Adaptive Management Appendix. This should include
a) 7/25/2018 credit release site meeting minutes,
b) 3/29/2019 Adaptive Management Plan,
c) 6/13/2019 USACE e-approval modification letter,
d) 6/13/2019 IRT Comment memo,

e) Memo from RES indicating any site Adaptive Management Work performed, when, and where, and how it followed (or varied from) the plan; include an ‘as built’ detail (zoomed in) map showing/describing the work as appropriate, with any new monitoring features. Any new monitoring features should also be shown on the CCPVs.
These items have been added to Appendix F.

Table 2 (Project Activities) should be updated to include any Adaptive Management work.
Done.

Geodatabase features do not match creditable assets. DMS needs representative features for the creditable assets, including; Thompson Creek 1-2, Dale Branch 1-2, Jerry Branch, and Hudson Branch. Other digital data components are present and complete.
RES has exported GIS shapes from the design CAD file. However, the numbers still do not match up exactly due to the reaches not being broken up in the CAD file. RES has also included the CAD file in the support files.

Prepared by:

302 Jefferson Street, Suite 110
Raleigh, North Carolina 27605

Contents

Appendices

Appendix A. General Tables and Figures

Table 1. Project Components and Mitigation Credits
Table 2. Project Activity and Reporting History
Table 3. Project Contacts
Table 4. Project Information
Figure 1. Vicinity Map
Figure 2. Current Conditions Plan View Maps

Appendix B. Visual Assessment Data

Table 5. Visual Stream Morphology Stability Assessment
Table 6. Vegetation Condition Assessment
2019 Photo Station Photos

Appendix C. Vegetation Plot Data

Table 7. Vegetation Plot Mitigation Success Summary
Table 8. CVS Vegetation Metadata
Table 9. Total Planted Stem Counts
Vegetation Plot Photos

Appendix D. Stream Geomorphology Data

Table 10. Baseline Stream Data Summary
Table 11a. Dimensional Morphology Summary
Table 11b. Stream Reach Data Summary
Cross Section Plots
Pebble Count Data
Table 12. Pebble Count Data Summary
Charts 1-9. MY5 Stream Reach Substrate Composition Charts
Table 13. Bank Pin Array Summary

Appendix E. Hydrology Data

Table 14. Verification of Bankfull and Flow Events
Table 15. 2019 Rainfall Summary
MY5 Flow Charts

Appendix F. Adaptive Management

Pee Dee MY3 IRT Credit Release Site Visit (7/25/18)
2019 Pee Dee Adaptive Management Plan (3/29/18)
Pee Dee e-Approval Modification Letter (6/13/19)
Pee Dee Adaptative Management Plan Comment Memo (6/13/19)
Pee Dee Adaptative Management Work Performed Memo (1/23/2020)

1.0 PROJECT SUMMARY

1.1. Goals and Objectives

The project goals address stressors identified in the TLW and include the following:

- Improve water quality within the restored channel reaches and downstream watercourses by reducing sediment and nutrient inputs and increasing dissolved oxygen levels
- Improve local aquatic and terrestrial ecological function via stream shading, habitat complexities, and organic/woody material introduction
- Improve aquatic and benthic macroinvertebrate habitat and associated stream bed form
- Improve site hydrology and attenuate flood flows on-site and downstream
- Provide approximately 18.6 acres of riparian area restoration with a native plant community
- Protect stream and riparian improvements with livestock best management practices
- Protect the site in perpetuity with a permanent conservation easement

The project goals will be addressed through the following project objectives:

- Implement Priority I or II restoration of 5,992 feet of stream and enhancement of 625 feet of stream
- Implement appropriate changes in dimension, pattern and/or profile to create geomorphologically stable conditions along project area reaches
- Modify degraded stream channels to enable proper sediment transport capacity and improved stream bed character
- Construct a floodplain bench that is accessible at the proposed bankfull channel elevation.
- Remove a major impoundment
- Integrate in-stream structures and native bank vegetation
- Plant native woody and herbaceous riparian vegetation with a minimum width of 50 feet from the edge of the restored channels
- Eradicate invasive, exotic or undesirable plant species
- Install cattle exclusion fencing, two new wells, two new cattle drinking stations, and upgrade eight existing cattle drinking stations

1.2. Success Criteria

The success criteria for the Pee Dee Stream Restoration Site follows accepted and approved success criteria presented in the USACE Stream Mitigation Guidelines and subsequent NCDMS and agency guidance. Specific success criteria components are presented below.

1.2.1. Stream Restoration

Dimension – Cross-section measurements should indicate little change from the as-built cross-sections. If changes do occur, they will be evaluated to determine whether the adjustments are associated with increased stability or whether they indicate movement towards an unstable condition. Cross-sections are to be monitoring in Years 1, 2, 3, 5, and 7.

Pattern and Profile − Measurements and calculated values should indicate stability with little deviation from as-built conditions and established morphological ranges for the restored stream type. Pool depths may vary from year to year, but the majority should maintain depths sufficient to be observed as distinct features in the profile. The pools should maintain their depth with flatter water surface slopes, while the riffles should remain shallower and steeper. Pattern measurements will not be collected unless conditions seem to indicate that a detectable change appears to have occurred based on profile and/or dimension measurements.

Substrate − Calculated D_{50} and D_{84} values should indicate coarser size class distributions of bed materials in riffles and finer size class distributions in pools. The majority of riffle pebble counts should indicate maintenance or coarsening of substrate distributions. Generally, it is anticipated that the bed material will coarsen over time.

Sediment Transport – Depositional features should be consistent with a stable stream that is effectively managing its sediment load. Point bar and inner berm features, if present, should develop without excessive encroachment of the channel. Isolated development of robust (i.e. comprised of coarse material and/or vegetation actively diverting flow) mid-channel or lateral bars will be acceptable. Likewise, development of a higher number of mid-channel or lateral bars that are minor in terms of their permanency such that profile measurements do not indicate systemic aggradation will be acceptable, but trends in the development of robust mid-channel or alternating bar features will be considered a destabilizing condition and may require intervention or have success implications.

1.2.2. Surface Water Hydrology

Monitoring of stream surface water stages should indicate recurrence of bankfull flows on average every 1 to 2 years. At a minimum, throughout the monitoring period, the surface water stage should achieve bankfull or greater elevations at least twice. The bankfull events must occur during separate monitoring years.

1.2.3. Vegetation

Riparian vegetation monitoring shall be conducted for a minimum of seven years to ensure that success criteria are met per USACE guidelines. Accordingly, success criteria will consist of a minimum survival of 320 stems per acre by the end of the Year 3 monitoring period, a minimum of 260 stems per acre at the end of Year 5, and a minimum of 210 stems per acre in Year 7. If monitoring indicates either that the specified survival rate is not being met or the development of detrimental conditions (i.e., invasive species, diseased vegetation), appropriate corrective actions will be developed and implemented. Vegetation data is to be monitored in Year 1, 2, 3, 5, and 7.

1.3. Project Setting and Background

The Pee Dee Stream Restoration Site (Site) encompasses approximately 21.0 acres of predominately agricultural land and includes three tributaries to Clarks Creek − Thompson Creek, Dale Branch, and Jerry Branch. The Site is located in the Yadkin River Watershed (NCDWR sub-basin 03-07-10 and HUC 03040104020020) approximately 1 mile south of the town of Pee Dee, NC in Montgomery County (**Figure 1**). Clarks Creek is listed as Class C water (NCDWR) and flows into the Pee Dee River. The Site is located within a NCDMS targeted local watershed.

Following 2016 monitoring the NCIRT requested a review of the differential between the Approved Mitigation Plan and Baseline Monitoring Report. The table below details the discrepancies by reach. The primary cause of increased baseline SMUs is survey methodology (thalweg vs. centerline). The Mitigation Plan lengths were based on centerline. Other causes of increased SMUs include field adjustments during construction and the design assumption of the channel pattern after pond removal. Additionally, RES has chosen to forgo credits in the pond bottom at the top of Thompson 1. This is discussed further in Section 1.4.4. The new SMU total for this site is 6,108 (**Table 1**).

1.4. Project Performance

Monitoring Year 5 (MY5) data was collected from January 2019 to November 2019. Monitoring activities included visual assessment of all reaches and the surrounding easement, 16 permanent photo stations, 14 permanent vegetation plots, 22 cross-sections, 12 pebble counts, and 6 bank pin arrays.

Summary information/data related to the occurrence of items such as beaver or easement encroachment 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 (formerly Mitigation Plan) and in the Mitigation Plan (formerly Restoration Plan) documents available on the NCDMS website (http://portal.ncdenr.org/web/eep). All raw data supporting the tables and figures in the appendices is available from NCDMS upon request.

1.4.1. Vegetation

Monitoring data collected during MY5 indicate that all vegetation monitoring plots have met the MY5 interim success criteria of 260 planted stems per acre except for VP5. Stem densities ranged from 162 to 971 stems per acre with a mean of 515 stems per acre across all plots. A total of 15 woody plant species were documented within the monitoring plots. When volunteer stems are included, densities ranged between 162 and 2,266 stems per acre with a mean of 980 stems per acre across all plots. The average planted stem height in MY5 was 18.5 feet. VP5 did not meet success due to a number of trees in the plot dying during the invasive species treatment on site. RES plans to plant container trees in the affected areas this winter.

Visual assessment of the easement (**Appendix B - Table 6, Figure 2**) indicates that herbaceous vegetation is well established throughout the project. Invasive exotic vegetation has been identified throughout the Site as Chinese privet (*Lingustrum sinense*). Invasive species treatments were administered in late July and August 2019. Treatments included mulching large strips through thick privet areas (**Appendix B**) and foliar spraying re-sprouted stems. The large strips of cleared area allow RES easier access to the center of the easement for future treatments. RES plans to administer another treatment in December 2019 and again multiple times in 2020. RES remapped the invasive areas in MY5 and the approximate size was reduced 0.61 acres which is about 20 percent (**Table 6** and on **Figure 2)**.

1.4.2. Stream Geomorphology

Geomorphic data for MY5 was collected during July 2019. Summary tables and cross-section plots related to stream morphology are located in **Appendix D**. MY5 stream morphology data indicate that, in general, the stream is stable and lacking in any significant change.

Substrate monitoring was performed during MY5. Riffle D_{50} ranged from medium gravel to coarse gravel on Jerry Branch, coarse gravel on Dale Branch, and coarse gravel on Thompson Branch. Substrate will be monitored in future years for shifts in particle size composition. Substrate composition data is presented in **Appendix D.**

Visual assessment of the stream was performed to document signs of channel instability, such as eroding banks, structural instability, or excessive sedimentation. With exception to the areas noted in Section 1.4.4, there was no indication of instability was observed during the visual assessment (**Table 5 and Figure 2**). Structures are intact and performing as designed.

1.4.3. Stream Hydrology

Since project completion in April 2015 at least six bankfull events have been documented on both Jerry and Thompson Branch and at least seven on Dale Branch. No bankfull events were recorded in MY5. In January 2019, RES installed flow monitoring gauges on Dale 1, Dale 2, and Thompson 1 per the request of the IRT. Each gauge is located in a pool and the elevation of the nearest downstream riffle is used to detect flow events. In MY5, Dale 1 recorded 152 consecutive days of flow, Dale 2 recorded 120 consecutive days of flow, and Thompson 1 recorded 97 consecutive days of flow. Bankfull and flow data is located in **Appendix E**.

1.4.4. Adaptive Management

During a site visit with NCIRT and NCDMS at the Pee Dee Site in July 2018, several problem areas were identified regarding the drained pond on Thompson 1 and the drained pond/wetland on Dale 1 (**Appendix F**). RES submitted an Adaptive Management Plan to NCIRT in March 2019 (**Appendix F**). The plan outlines the installation of the aforementioned flow monitoring gauges and the excavation of a baseflow channel through the old pond/wetland on Dale 1. The plan also discusses the decision to forgo the credits for the portion of Thompson 1 that is located in the old pond bottom. RES excavated the baseflow channel on Dale 1 in early January 2020. Additionally, Chinese privet treatment was administered on Thompson 1, Thompson 2, Dale 1, and Dale 2. More details about the adaptive management work performed are in **Appendix F**.

2.0 METHODS

Visual assessments of the project were performed at the beginning and end of the monitoring year. Permanent photo station photos were collected during vegetation monitoring. Additional vegetation or stream problem areas within the project area were photo-documented. Geomorphic measurements were taken using a Topcon GTS-312 Total Station. Three-dimensional coordinates associated with cross-section and profile data were collected in the field and geo-referenced (NAD83 State Plane feet FIPS 3200). Morphological data was limited to 22 cross-sections.

Survey data was imported into CAD, ArcGIS, and Excel for data processing and analysis. Channel substrate was characterized using a Wolman Pebble Count as outlined in Harrelson et al. (1994) and processed using Microsoft Excel.

Vegetation success is being monitored using 14 permanent monitoring plots. Vegetation monitoring followed CVS-EEP Level 1 Protocol for MY1 and is following Level 2 Protocol Version 4.2 for monitoring years 2-7 (Lee et al. 2008). Level 2 Protocol includes analysis of species composition and density of planted species. Data is processed using the CVS data entry tool. In the field, the four corners of each plot were permanently marked with rebar and photos of each plot taken from the origin each monitoring year.

Precipitation data is reported from the NCCRONOS station Uwharrie (Troy). Three crest gauges were installed to document bankfull events, one each on Jerry, Dale, and Thompson branches. During quarterly visits to the site, the height of the corkline was recorded and cross-referenced with known bankfull elevations at each crest gauge. Three flow monitoring gauges were installed in January 2019 to document consecutive days of flow on Dale 1, Dale 2, and Thompson 1. These gauges are made up of pressure transducers located in PVC piping and placed in pools. The pressure transducers record water levels at an hourly interval and the elevation of the downstream riffle is used to detect stream flow from the pool water levels.

3.0 REFERENCES

Harrelson, Cheryl, C. Rawlins and J. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Gen. Tech. Rep. RM-245. Rocky Mountain Forest and Range Experiment Station. USDA Forest Service. Fort Collins, Colorado

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. http://cvs.bio.unc.edu/methods.htm; accessed November 2008.

Appendix A
General Tables and Figures

Table 1. Project Components and Mitigation Credits

Pee Dee Stream Restoration Site

Mitigation Credits

	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	**6,108.267**						-	-	-

Project Components

Project Component -or- Reach ID	Stationing/Location	Existing Footage/Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage or Acreage[1]	Creditable Footage	Mitigation Ratio	Credits[3]	Notes[4]
Thompson Creek 1	100+0 - 102 + 50	250	PI	EI	250	250	1.5	166.667	Flow being monitored
Thompson Creek 1 - 2	102+50 - 115+64	1,346	PI	R	1,314	1,014	1	1,014	Credit removal in old pond
Dale Branch 1	200+00 - 203+75	375	PI	EI	375	375	1.5	250	Repaired 12/2019
Dale Branch 2 - 5	203+75 - 234+50	2,407	PI	R	2,955	2,955	1	2,955	
Jerry Branch	300+00 - 317+30	1,832	PI	R	1,670	1,670	1	1,670	
Hudson Branch	403+05 - 403+58	53	PI	R	52.6	52.6	1	53	

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	5,691.6	-	-	-	-	-
Enhancement	-	-	-	-	-	-
Enhancement I	625	-	-	-	-	-
Enhancement II	-	-	-	-	-	-
Creation	-	-	-	-	-	-
Preservation	-	-	-	-	-	-
High Quality Preservation	-	-	-	-	-	-

BMP Elements

Element[2]	Location	Purpose/Function	Notes
FB	Entire Site	Protect Stream	

[1]Restoration footage accounts for crossings and exclusions.

[2]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; FB = Forested Buffer

[3]Credit calculations were originally calculated along the as-built thalweg and updated to be calculated along stream centerlines for MY3 after discussions with NC IRT stemming from the April 3, 2017 Credit Release Meeting.

[4]An Adaptive Mangement Plan has been created to address the adjustments in Thompson Creek and Dale Branch. A breif description is included in Section 1.4.4 of the MY5 Report.

Table 2. Project Activity and Reporting History Pee Dee Stream Restoration Site		
Activity or Report	**Data Collection Complete**	**Completion or Delivery**
Mitigation Plan	Dec - 2013	Dec - 2013
Final Design - Construction Plans	N/A	Jan - 2014
Construction	N/A	April - 2015
Temporary S&E Mix Applied to Entire Project Area	N/A	April - 2015
Live Stakes and Bare Root Plantings for Entire Project Area	N/A	April - 2015
Baseline Monitoring Document (Year 0 Monitoring - Baseline)	April - 2015	July 2015
Year 1 Monitoring	Oct - 2015	Dec - 2015
Year 2 Monitoring	Jan - 2016	Oct - 2016
Year 3 Monitoring	Stream: June - 2017 Vegetation: Sept - 2017	Nov - 2017
Year 3 Invasive Species Treatment	---	June - 2017
Year 4 Invasive Species Treatment	---	Feb - 2018
Year 4 Invasive Species Treatment	---	June - 2018
Year 4 Monitoring	Nov -2018	Nov - 2018
Year 5 Invasive Species Treatment	---	July - 2019
Year 5 Monitoring	XS: July - 2019 VP: Aug - 2019	Nov - 2019
Year 5 Invasive Species Treatment	---	Dec - 2019
Dale 1 Flow Path Excavation	---	Dec - 2019
Year 6 Invasive Species Treatment	---	Jan - 2020
Year 6 Monitoring		
Year 7 Monitoring		

Table 3. Project Contacts	
Pee Dee Stream Restoration Site	
Prime Contractor	Resource Environmental Solutions, LLC 302 Jefferson Street; Suite 110 Raleigh, North Carolina 27605 David Godley (919) 209-1053
Designer	Wolf Creek Engineering 12-1/2 Wall St., Suite C Asheville, North Carolina 28801 Grant Ginn (828) 449-1930 ext 102
Construction Contractor	Northstate Environmental 2889 Lowery Street Winston Salem, North Carolina 27101 Darrell Westmoreland (336) 725-2010
Seeding Contractor	Northstate Environmental 2889 Lowery Street Winston Salem, North Carolina 27101 Darrell Westmoreland (336) 725-2010
Planting Contractor	Resource Environmental Solutions, LLC 302 Jefferson Street; Suite 110 Raleigh, North Carolina 27605 David Godley (919) 209-1053
As-built Surveys	Kee Mapping and Surveying PO Box 2566 Asheville, North Carolina 28802 Phillip B. Key (828) 575-9021
Seeding Mix Source	Green Resource 5204 Highgreen Court Colfax, NC 27235 (336) 855-6363
Bare Root Seedlings	ArborGen Inc. 2011 Broadbank Court Ridgeville, SC 29472 (888) 888-7158
	North Carolina Forest Service 762 Claridge Nursery Road Goldsboro, NC 27350 (888) 628-7337
Live Stakes	Bear Duck Farms, LLC 105 Dobbs Place Goldsboro, NC 27350
Monitoring Performers (Y0-Y2) 2015 - 2016	Equinox Environmental 37 Haywood St. Asheville, North Carolina 28802 Drew Alderman (828) 253-6856
Monitoring Performers (Y3+) 2017+	Resource Environmental Solutions, LLC 302 Jefferson Street; Suite 110 Raleigh, North Carolina 27605 Ryan Medric (919) 741-6268

Table 4. Project Baseline Information and Attributes

Project Information

Project Name	Pee Dee Stream Restoration
County	Montgomery County
Project Area (acres)	21
Project Coordinates (latitude and longitude)	35°15'26.95" N, 80°01'47.83" W

Project Watershed Summary Information

Physiographic Province		Piedmont	
River Basin		Yadkin	
USGS Hydrologic Unit 8-digit	03040104	USGS Hydrologic Unit 14-Digit	03040104020020
DWQ Sub-basin		03-07-10	
Project Drainage Area (acres)		286	
Project Drainage Area Percentage of Impervious Area		<10%	
CGIA Land Use Classification		2.01.03 Hay and Pasture Land	

Reach Summary Information

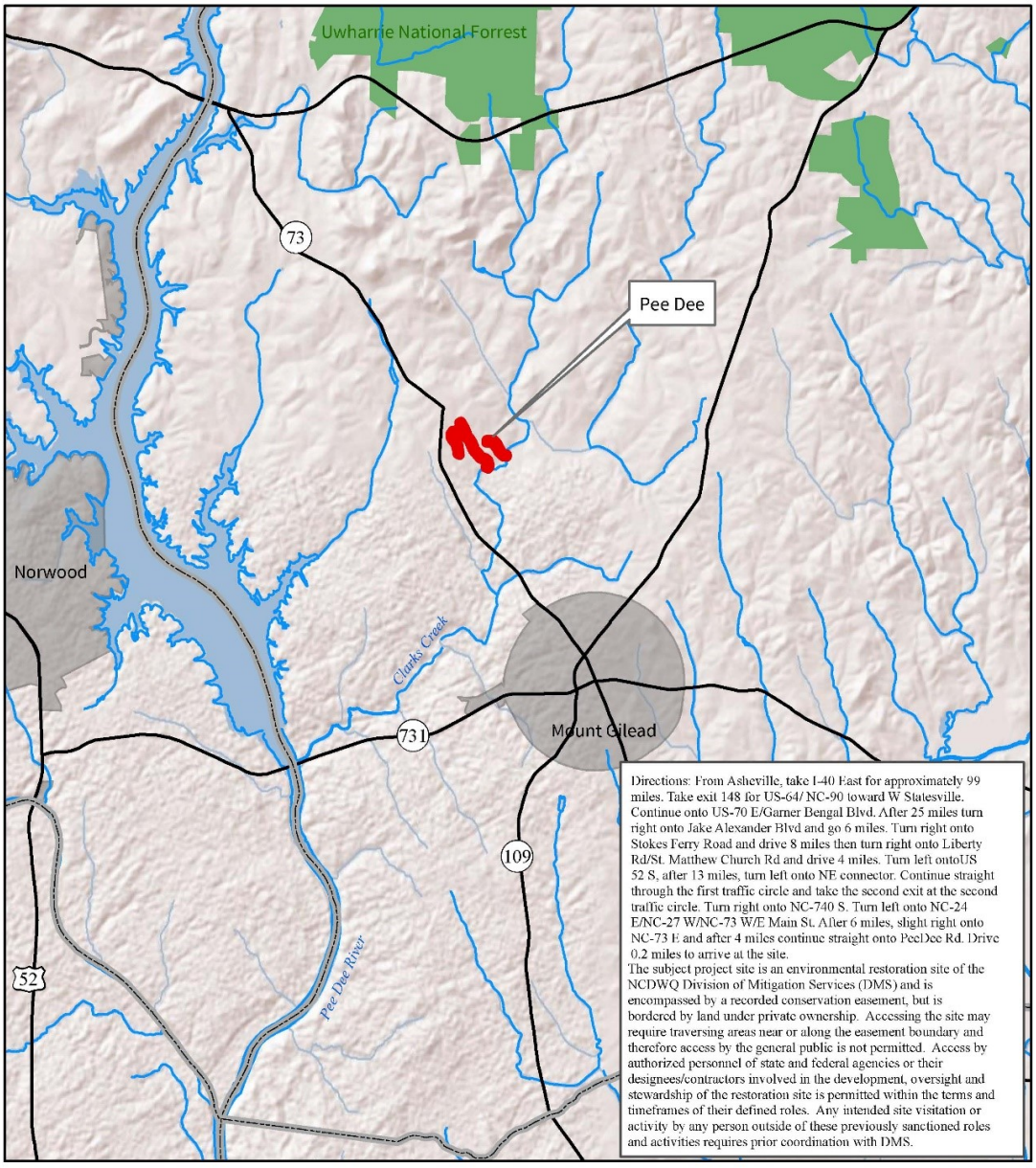
Parameters	Thompson Creek	Dale Branch	Jerry Branch	Hudson Branch
Length of reach (linear feet)	1,596	2,782	1,832	56
Valley classification (Rosgen)	II	II	II	II
Drainage area (acres)	102	58	83	19
NCDWQ stream identification score	30.5	34	30.5	21.5
NCDWQ Water Quality Classification	C	C	C	C
Morphological Description (stream type) (Rosgen)	B4	B4	B4	B4
Evolutionary trend (Rosgen)	IV	IV	IV	IV
Underlying mapped soils	GoE, BeC2, BaC2	GoE, CnA	GoE, BaC2, BaB2	BaC2
Drainage class	Well-drained	Well-drained	Well-drained	Well-drained
Soil Hydric status	Non-Hydric	Non-Hydric	Non-Hydric	Non-Hydric
Slope	2%	2%	2%	2%
FEMA classification	N/A	N/A	N/A	N/A
Native vegetation community	Agricultural	Agricultural	Agricultural	Agricultural
Percent composition of exotic invasive vegetation	5%	5%	5%	5%

Wetland Summary Information

Parameters	-	-	-
Size of Wetland (acres)	-	-	
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	-	-	-
Mapped Soil Series	-	-	-
Drainage class	-	-	-
Soil Hydric Status	-	-	-
Source of Hydrology	-	-	-
Hydrologic Impairment	-	-	-
Native vegetation community	-	-	-
Percent composition of exotic invasive vegetation	-	-	-

Regulatory Considerations

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States – Section 404	Yes	Yes	NWP
Waters of the United States – Section 401	Yes	Yes	401 Certification
Endangered Species Act	N/A		ERTR
Historic Preservation Act	N/A		ERTR
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	N/A		
FEMA Floodplain Compliance	N/A		
Essential Fisheries Habitat	N/A		ERTR



res

Figure 1: Vicinity Map

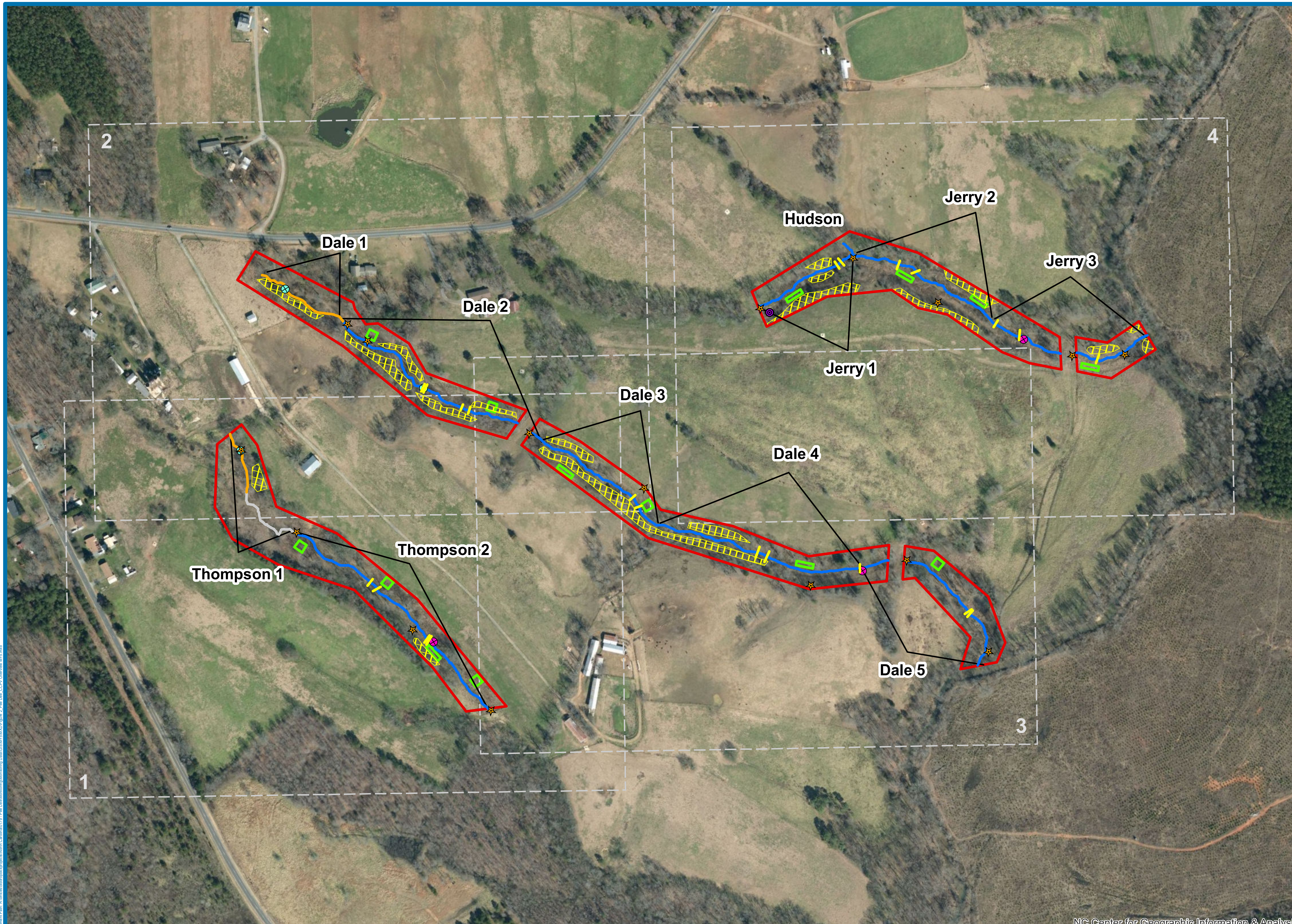
Pee Dee Stream Restoration Site

Project No. 95350

Montgomery County, North Carolina

Notes: Conservation Easement from Key Mapping & Survey, P.A.

0 0.5 1 2 3 Miles



res

0 175 350
Feet

1 inch = 350 feet

Figure 2

Pee Dee Stream Restoration Project MY5 2019

Current Conditions Overview Map

Date: 1/27/2020	Drawn by: RTM

LEGEND

- Conservation Easement
- Vegetation Plot
- Cross Section

Mitigation Type

- Restoration
- Enhancement I
- No Credit
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station

Vegetation Condition Assessment

Invasive Species	Target Community: Present	Marginal	Absent
Absent	No Fill		
Present			

0 75 150
Feet

1 inch = 150 feet

Figure 2
1

Pee Dee Stream Restoration Project MY5 2019

Current Conditions

Date: 1/27/2020	Drawn by: RTM

LEGEND

- Conservation Easement
- Vegetation Plot
- Cross Section
- Stream Structure

Mitigation Type

- Restoration
- Enhancement I
- No Credit
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station

Vegetation Condition Assessment

Invasive Species	Target Community: Present	Marginal	Absent
Absent	No Fill		
Present			

0 75 150
Feet

1 inch = 150 feet

Figure 2
2

Pee Dee Stream Restoration Project MY5 2019

Current Conditions

Date: 1/27/2020	Drawn by: RTM

LEGEND

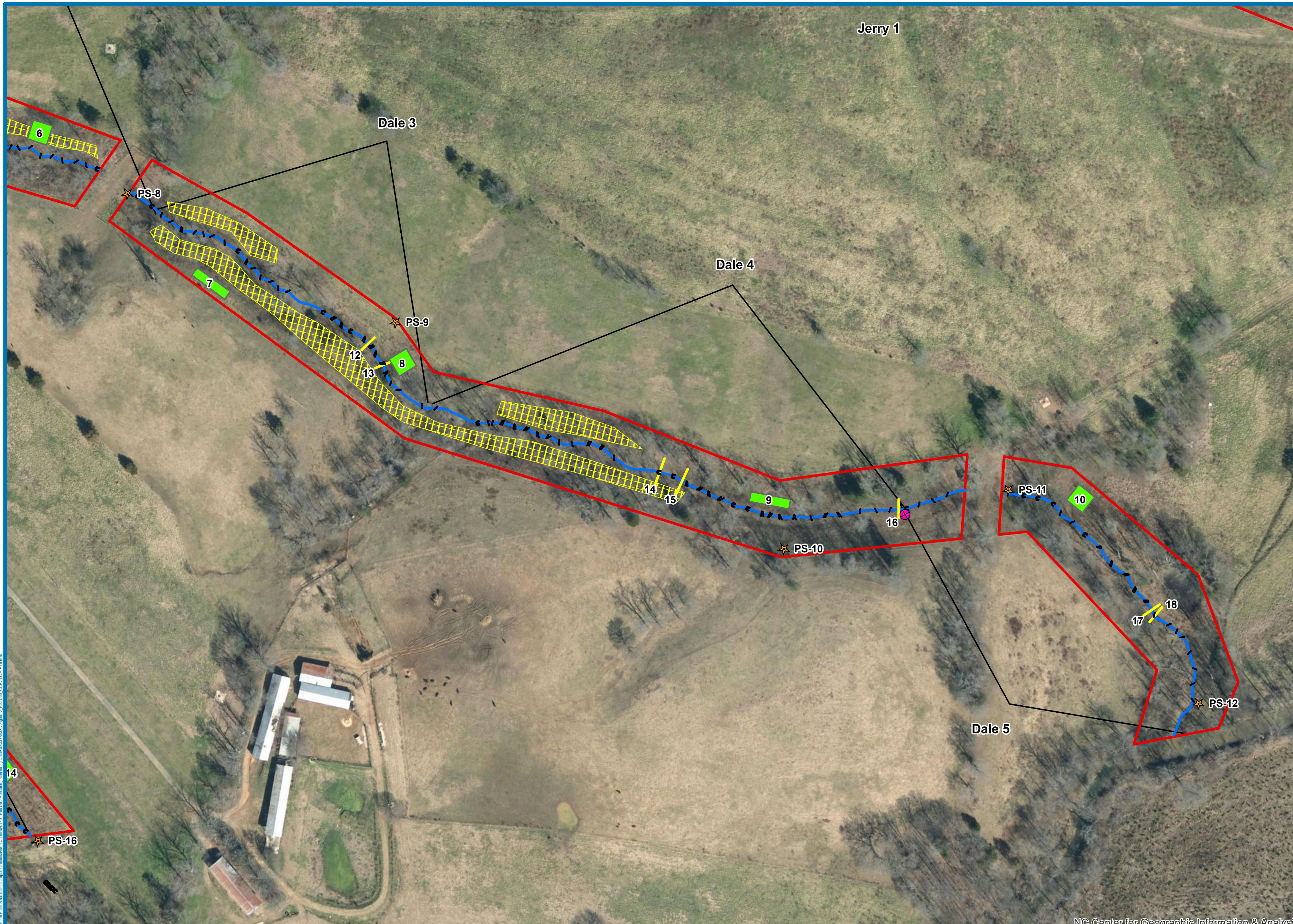
- Conservation Easement
- Vegetation Plot
- Cross Section
- Stream Structure

Mitigation Type

- Restoration
- Enhancement I
- No Credit
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station

Vegetation Condition Assessment

Invasive Species	Target Community: Present	Marginal	Absent
Absent	No Fill		
Present			



res

0 75 150
Feet
1 inch = 150 feet

Figure 2
3

Pee Dee Stream Restoration Project MY5 2019

Current Conditions

Date: 1/27/2020	Drawn by: RTM

LEGEND

- Conservation Easement
- Vegetation Plot
- Cross Section
- Stream Structure

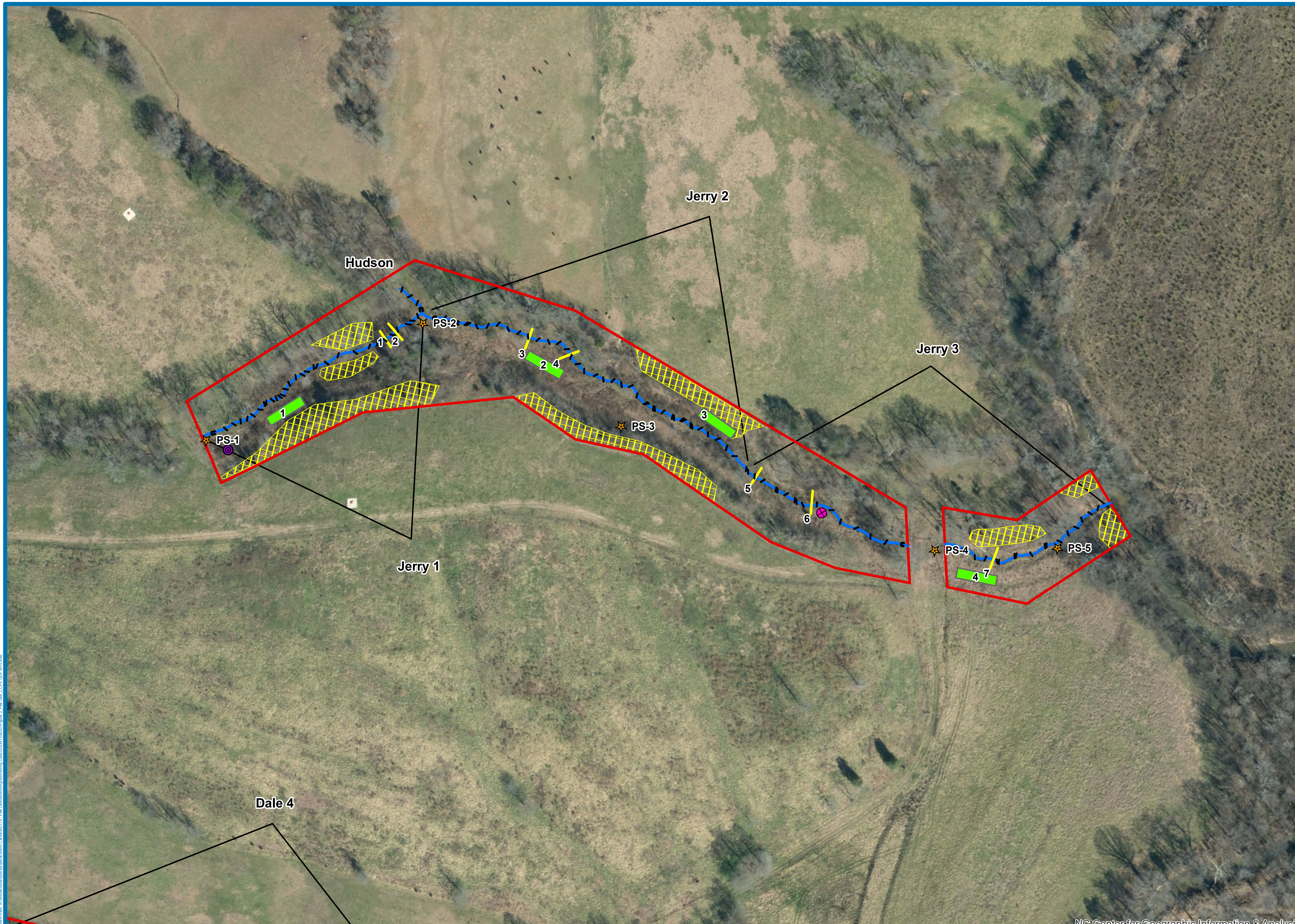
Mitigation Type

- Restoration
- Enhancement I
- No Credit
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station

Vegetation Condition Assessment

Invasive Species / Target Community

	Present	Marginal	Absent
Absent	No Fill		
Present			



res

0 75 150
Feet

1 inch = 150 feet

Figure 2
4
Pee Dee Stream Restoration Project MY5 2019

Current Conditions

Date: 1/27/2020	Drawn by: RTM

LEGEND

- Conservation Easement
- Vegetation Plot
- Cross Section
- Stream Structure

Mitigation Type
- Restoration
- Enhancement I
- No Credit
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station

Vegetation Condition Assessment

Invasive Species	Target Community: Present	Marginal	Absent
Absent	No Fill		
Present			

Appendix B
Visual Assessment Data

Table 5. Visual Stream Morphology Stability Assessment
Pee Dee Stream Restoration Site - Jerry Branch
Assessed Length 1,832 feet

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	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run Units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	90	90			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	90	90			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	90	90			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	N/A	N/A			N/A			
		2. Thalweg centering at downstream of meander bend (Glide).	90	90			100%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	91	91			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	91	91			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	91	91			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	91	91			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	91	91			100%			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Pee Dee Stream Restoration Site - Dale Branch
Assessed Length 2,782 feet

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	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run Units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			1	253	91%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	120	120			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	119	119			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	119	119			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	N/A	N/A			N/A			
		2. Thalweg centering at downstream of meander bend (Glide).	119	119			100%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	122	122			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	122	122			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	122	122			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	122	122			N/A			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	122	122			N/A			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Pee Dee Stream Restoration Site - Thompson Branch
Assessed Length 1,596 feet

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	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run Units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			1	300	81%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	50	50			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	50	50			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	50	50			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	N/A	N/A			N/A			
		2. Thalweg centering at downstream of meander bend (Glide).	50	50			100%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	51	51			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	51	51			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	51	51			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	51	51			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	51	51			100%			

Table 6. Vegetation Condition Assessment Pee Dee Stream Restoration Site Planted Acreage 21.0					
Vegetation Category	**Definitions**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Planted Acreage**
1. Bare Areas	Very limited cover of both woody and herbaceous material.	N/A	0	0.00	0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	N/A	0	0.00	0%
		Totals	0	0.00	0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	N/A	0	0.00	0%
		Cumulative Totals	0	0.00	0%
Easement Acreage 21.0 acres					
Vegetation Category	**Definitions**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Easement Acreage**
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	Yellow Crosshatch	18	2.51	12%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	N/A	0	0.00	0%

MY5 – 2019 Pee Dee Photo Station Photos

Jerry Branch – Permanent Photo Station 1
Station 300+25 - Downstream

Jerry Branch – Permanent Photo Station 2
Station 305+04 – Upstream

Jerry Branch – Permanent Photo Station 2
Station 305+04 - Downstream

Hudson Branch – Permanent Photo Station 2
Station 305+04 – Looking Upstream from Confluence with Jerry Branch
September 20, 2017

Jerry Branch – Permanent Photo Station 3
Looking North Northwest/Upstream Jerry Branch

Jerry Branch – Permanent Photo Station 4
Station 304+80 – Upstream

Jerry Branch – Permanent Photo Station 4
Station 304+80 – Downstream

Jerry Branch – Permanent Photo Station 5
Station 316+95 – Upstream

Dale Branch – Permanent Photo Station 6
Station 204+15 – Upstream

Dale Branch – Permanent Photo Station 7
Station 205+15 – Upstream

Dale Branch – Permanent Photo Station 8
Station 212+95 – Upstream

Dale Branch – Permanent Photo Station 8
Station 212+95 – Downstream

Dale Branch – Permanent Photo Station 9
Looking North-Northwest – Upstream Dale

Dale Branch – Permanent Photo Station 9
Looking South-Southeast- Downstream

Dale Branch – Permanent Photo Station 10
Looking North-Northeast – Upstream

Dale Branch – Permanent Photo Station 10
Looking South-Southwest – Downstream

Dale Branch – Permanent Photo Station 11
Station 229+20 – Upstream

Dale Branch – Permanent Photo Station 11
Station 229+20 – Downstream

Dale Branch – Permanent Photo Station 12
Station 234+25 – Upstream

Dale Branch – Permanent Photo Station 12
Station 234+25 – Downstream

Thompson Branch – Permanent Photo Station 13
Station 101+15 – Downstream

Thompson Branch – Permanent Photo Station 14
Station 105+25 – Upstream

Thompson Branch – Permanent Photo Station 14
Station 105+25 – Downstream

Thompson Branch – Permanent Photo Station 15
Station 115+50 – Upstream

Thompson Branch – Permanent Photo Station 15
Station 111+50 – Downstream

Thompson Branch – Permanent Photo Station 16
Station 115+85 – Upstream

Dale Branch – Privet Mulching Strip

Table 7. MY5 Vegetation Plot Criteria Attainment

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Planted Stem Height (ft)
1	971	486	1457	Yes	17.9
2	567	202	769	Yes	21.6
3	364	121	486	Yes	12.0
4	445	688	1133	Yes	8.1
5	162	0	162	No	10.2
6	324	567	890	Yes	7.7
7	364	162	526	Yes	6.1
8	324	486	809	Yes	11.4
9	809	405	1214	Yes	13.2
10	364	607	971	Yes	21.9
11	769	1497	2266	Yes	27.8
12	607	890	1497	Yes	21.0
13	445	81	526	Yes	28.8
14	688	324	1012	Yes	29.1
Project Avg	**515**	**465**	**980**	**Yes**	18.5

Table 8. CVS Vegetation Plot Metadata Pee Dee Stream Restoration Site	
Report Prepared By	Ryan Medric
Date Prepared	9/25/2019 0:00
database name	Pee Dee MY5 2019 CVS.mdb
database location	
computer name	FIELD-PC
file size	61739008
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.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	95350
project Name	Pee Dee
Description	
River Basin	
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	14

Table 9. Total Planted Stem Counts

Pee Dee			Current Plot Data (MY5 2019)																																				
			95350-01-0001			95350-01-0002			95350-01-0003			95350-01-0004			95350-01-0005			95350-01-0006			95350-01-0007			95350-01-0008			95350-01-0009			95350-01-0010			95350-01-0011			95350-01-0012			95350-01-0013			95350-01-0014		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree																															1			1								
Acer rubrum	red maple	Tree																									1																
Betula nigra	river birch	Tree	9	9	9	2	2	2													3	3	3				4	4	4							1	1	1						
Broussonetia papyrifera	paper mulberry	Exotic																																									
Carya	hickory	Tree																																									
Carya alba	mockernut hickory	Tree																																									
Celtis laevigata	sugarberry	Tree																		2																6							
Celtis occidentalis	common hackberry	Tree																																									
Cephalanthus occidentali	common buttonbush	Shrub																																									
Diospyros virginiana	common persimmon	Tree																																									
Fraxinus pennsylvanica	green ash	Tree	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4							5	5	5	2	2	2				1	1	1				1	1	1
Ilex opaca	American holly	Tree																																									
Juglans nigra	black walnut	Tree																																						1			2	
Liquidambar styraciflua	sweetgum	Tree			8			3																		1			6			5			3								2
Liriodendron tulipifera va	Tulip-tree, Yellow Po	Tree	3	3	3																1	1	5				1	1	2														
Pinus taeda	loblolly pine	Tree																																									
Platanus occidentalis	American sycamore	Tree																																									
Platanus occidentalis var.	Sycamore, Plane-tre	Tree	4	4	4	9	9	11	1	1	1	2	2	4							3	3	3				3	3	5	7	7	8	18	18	19	8	8	8	9	9	10	11	11	15
Quercus	oak	Tree																																									
Quercus michauxii	swamp chestnut oak	Tree				1	1	1	2	2	2	1	1	1				1	1	1				3	3	3	1	1	1				1	1	1				2	2	2	4	4	4
Quercus nigra	water oak	Tree	3	3	3				2	2	2	1	1	1	1	1	1	1	1	1				1	1	1																	
Quercus phellos	willow oak	Tree	3	3	5	1	1	1	3	3	3	6	6	6	2	2	2	3	3	3	2	2	2	4	4	4	6	6	6							5	5	5				1	1	1
Rhus copallinum	flameleaf sumac	shrub			2						3			15						1					1						2											
Rhus copallinum var. cop	flameleaf sumac	shrub																																									
Rhus glabra	smooth sumac	shrub																																									
Salix nigra	black willow	Tree																																									
Ulmus alata	winged elm	Tree																		10												9											
Ulmus americana	American elm	Tree																								10								30			15						
		Stem count	24	24	36	14	14	19	9	9	12	11	11	28	4	4	4	8	8	22	9	9	13	8	8	20	20	20	30	9	9	24	19	19	56	15	15	37	11	11	13	17	17	25
		size (ares)	1			1			1			1			1			1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	6	6	8	5	5	6	5	5	6	5	5	6	3	3	3	4	4	7	4	4	4	3	3	6	6	6	8	2	2	4	2	2	6	4	4	7	2	2	3	4	4	6
		Stems per ACRE	971	971	1457	567	567	769	364	364	486	445	445	1133	162	162	162	324	324	890	364	364	526	324	324	809	809	809	1214	364	364	971	769	769	2266	607	607	1497	445	445	526	688	688	1012

Pee Dee			Annual Means														
			MY5 (2019)			MY3 (2017)			MY2 (2016)			MY1 (2015)			MY0 (2015)		
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
Acer negundo	boxelder	Tree			2			5									
Acer rubrum	red maple	Tree			1			101									
Betula nigra	river birch	Tree	19	19	19	27	27	29	45	45	47	42	42	42	51	51	51
Broussonetia papyrifera	paper mulberry	Exotic												2			
Carya	hickory	Tree									4			4			
Carya alba	mockernut hickory	Tree						7						2			
Celtis laevigata	sugarberry	Tree			8												
Celtis occidentalis	common hackberry	Tree									1164			333			
Cephalanthus occidentali	common buttonbush	Shrub									221						
Diospyros virginiana	common persimmon	Tree						4			2			2			
Fraxinus pennsylvanica	green ash	Tree	18	18	19	24	24	26	26	26	37	29	29	29	33	33	33
Ilex opaca	American holly	Tree						2									
Juglans nigra	black walnut	Tree			3						15			4			
Liquidambar styraciflua	sweetgum	Tree			28			45			96			51			
Liriodendron tulipifera va	Tulip-tree, Yellow Po	Tree	5	5	10	5	5	19	7	7	7	6	6	6	16	16	16
Pinus taeda	loblolly pine	Tree						2									
Platanus occidentalis	American sycamore	Tree													1	1	1
Platanus occidentalis var.	Sycamore, Plane-tre	Tree	75	75	88	78	78	108	80	80	159	80	80	83	86	86	86
Quercus	oak	Tree							2	2	2	1	1	1	83	83	83
Quercus michauxii	swamp chestnut oak	Tree	16	16	16	22	22	22	26	26	26	27	27	27	14	14	14
Quercus nigra	water oak	Tree	9	9	9	16	16	16	16	16	16	16	16	16	17	17	17
Quercus phellos	willow oak	Tree	36	36	38	50	50	50	55	55	69	55	55	57	18	18	18
Rhus copallinum	flameleaf sumac	shrub			24									4			
Rhus copallinum var. cop	flameleaf sumac	shrub						18			47						
Rhus glabra	smooth sumac	shrub												12			
Salix nigra	black willow	Tree						2									
Ulmus alata	winged elm	Tree			19			84			6						
Ulmus americana	American elm	Tree			55			317									
		Stem count	178	178	339	222	222	857	257	257	1918	256	256	675	319	319	319
		size (ares)	14			14			14			14			14		
		size (ACRES)	0.35			0.35			0.35			0.35			0.35		
		Species count	7	7	15	7	7	18	8	8	16	8	8	17	9	9	9
		Stems per ACRE	515	515	980	642	642	2477	743	743	5544	740	740	1951	922	922	922

Color for Density

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

MY5 – 2019 Vegetation Plot Photos

Pee Dee - Vegetation Monitoring Plot 1

Pee Dee - Vegetation Monitoring Plot 2

Pee Dee - Vegetation Monitoring Plot 3

Pee Dee - Vegetation Monitoring Plot 4

Pee Dee - Vegetation Monitoring Plot 5

Pee Dee - Vegetation Monitoring Plot 6

Pee Dee - Vegetation Monitoring Plot 7

Pee Dee - Vegetation Monitoring Plot 8

Pee Dee - Vegetation Monitoring Plot 9

Pee Dee - Vegetation Monitoring Plot 10

Pee Dee - Vegetation Monitoring Plot 11

Pee Dee - Vegetation Monitoring Plot 12

Pee Dee - Vegetation Monitoring Plot 13

Pee Dee - Vegetation Monitoring Plot 14

Appendix D
Stream Geomorphology Data

Table 10. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Jerry Branch 1 (430 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	3.79	3.5	5.3	5.3	7.0	2.5	2	9.8	11.7	-	13.1	-	-	-	7.9	-	8.1	8.1	8.1	8.1	-	1
Floodprone Width (ft)				3.3	6.2	6.2	9.0	4.0	2	16.0	18.0	-	21	-	-	-	-	-	31.8	31.8	31.8	31.8	-	1
Bankfull Mean Depth (ft)	-	-	0.64	0.6	0.6	0.6	0.6	0.0	2	0.5	0.62	-	0.8	-	-	-	0.42	-	0.5	0.5	0.5	0.5	-	1
Bankfull Max Depth (ft)				0.7	0.8	0.8	0.9	0.1	2	0.8	0.9	-	1.2	-	-	-	0.65	-	1.0	1.0	1.0	1.0	-	1
Bankfull Cross Sectional Area (ft^2)	3.5			2.0	2.9	2.9	3.8	1.3	2	5.4	7.3	-	8	-	-	-	3.3	-	3.7	3.7	3.7	3.7	-	1
Width/Depth Ratio				6.0	9.4	9.4	12.8	4.8	2	12.3	18.8	-	19.6	-	-	-	18.6	-	17.7	17.7	17.7	17.7	-	1
Entrenchment Ratio				0.5	1.6	1.6	2.6	1.5	2	1.4	1.5	-	1.8	-	-	-	2.5	-	3.9	3.9	3.9	3.9	-	1
Bank Height Ratio				2.4	7.7	7.7	12.9	7.4	2	0.9	1	-	1.4	-	-	-	-	-	1.0	1.0	1.0	1.0	-	1
d50 (mm)				-	-	-	-	-	-	-	52	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	2.6	6.2	6.2	16.4	2.8	26
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	0.003	-	0.001	0.010	0.009	0.026	0.008	26
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	2.3	5.9	5.4	16.0	2.9	26
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	0.97	-	0.7	1.5	1.5	2.3	0.4	26
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	22.5	-	6.1	15.0	14.2	27.8	5.1	25
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	14.0	19.2	19.2	24.4	7.3	2
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	12.0	-	17.0	11.6	13.6	13.1	16.5	2.2	4
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	1.7	1.6	2.0	0.3	2
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23.8	44.4	47.1	55.0	11.9	6
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	2	-	1.7	2.4	2.4	3.0	0.9	2
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%				-						-									42% / 0% / 40% / 7% / 11%					
SC% / Sa% / G% / C% / B% / Be%				-						4% / 2% / 49% / 38% / 1% / 6%														
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)				--/5/6/13/22						14 / 36 / 52 / 110 / 170 / - / -														
Reach Shear Stress (Competency) lb/ft^2				-						0.562						-			-					
Max Part Size (mm) Mobilized at Bankfull				-						947						32			-					
Stream Power (Transport Capacity) W/m^2				-						-						-								
Additional Reach Parameters																								
Drainage Area (mi^2)				0.07						0.42														
Impervious Cover Estimate (%)				-						-														
Rosgen Classification				-						B4c						B4			B4					
Bankfull Velocity (fps)	-			-						3.8						-								
Bankfull Discharge (cfs)	13.12			G						28.0						13								
Valley Length (ft)				-						260.0						406								
Channel Thalweg Length (ft)				-						-						435			430					
Sinuosity				-						1.50						1.0			1.06					
Water Surface Slope (ft/ft)				-						-						0.037			0.0265					
Bankfull Slope (ft/ft)				-						-						-			0.0267					
Bankfull Floodplain Area (acres)				-						-						-								
Proportion Over Wide (%)				-						-														
Entrenchment Class (ER Range)				-						-														
Incision Class (BHR Range)				-						-														
BEHI				24.03						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10 cont'd. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Jerry Branch 2 (625 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	4.78	3.5	6.0	6.6	8.0	2.3	3	9.8	11.7	-	13.1	-	-	-	7.1	-	7.1	7.1	7.1	7.1	-	1
Floodprone Width (ft)				2.5	10.8	15.0	15.0	7.2	2	16.0	18.0	-	21	-	-	-	-	-	16.0	16.0	16.0	16.0	-	1
Bankfull Mean Depth (ft)	-	-	0.76	0.4	0.6	0.7	0.8	0.2	3	0.5	0.62	-	0.8	-	-	-	0.53	-	0.4	0.4	0.4	0.4	-	1
Bankfull Max Depth (ft)				0.5	0.7	0.8	1.0	0.2	3	0.8	0.9	-	1.2	-	-	-	0.75	-	0.7	0.7	0.7	0.7	-	1
Bankfull Cross Sectional Area (ft^2)	5.1			2.4	2.7	2.7	3.0	0.3	3	5.4	7.3	-	8	-	-	-	3.7	-	3.1	3.1	3.1	3.1	-	1
Width/Depth Ratio				4.6	15.2	14.6	26.3	10.9	3	12.3	18.8	-	19.6	-	-	-	13.4	-	16.4	16.4	16.4	16.4	-	1
Entrenchment Ratio				0.7	1.6	1.9	2.3	0.8	3	1.4	1.5	-	1.8	-	-	-	3.5	-	2.3	2.3	2.3	2.3	-	1
Bank Height Ratio				1.0	3.5	1.5	7.9	3.8	3	0.9	1	-	1.4	-	-	-	-	-	1.0	1.0	1.0	1.0	-	1
d50 (mm)				-	-	-	-	-	-	-	52	-		-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	3.1	9.0	8.7	26.5	4.5	29
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	0.002	-	0.005	0.019	0.018	0.042	0.010	29
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	2.3	4.8	4.7	7.8	1.5	31
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	1.13	-	0.9	1.5	1.5	2.2	0.3	29
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	21.7	-	12.0	18.0	16.8	36.2	5.1	30
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	13.4	20.3	22.4	25.6	5.1	6
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	11.0	-	17.0	12.1	13.4	12.7	16.5	1.8	5
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7	1.9	1.8	2.3	0.2	2
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.5	30.0	30.6	38.1	6.6	6
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	2	-	1.9	2.9	3.2	3.6	0.7	6
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%						-						-									47% / 0% / 27% / 12% / 14 /%			
SC% / Sa% / G% / C% / B% / Be%						-						4% / 2% / 49% / 38% / 1% / 6%												
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)						--/5/6/13/22						14 / 36 / 52 / 110 / 170 / - / -												
Reach Shear Stress (Competency) lb/ft^2						-						0.562					-				-			
Max Part Size (mm) Mobilized at Bankfull						-						947					32				-			
Stream Power (Transport Capacity) W/m^2						-						-					-							
Additional Reach Parameters																								
Drainage Area (mi^2)												0.42												
Impervious Cover Estimate (%)						-						-												
Rosgen Classification						-						B4c					B4				B4			
Bankfull Velocity (fps)	-					-						3.8					-							
Bankfull Discharge (cfs)	19.35					G						28.0					19							
Valley Length (ft)						-						260.0					485							
Channel Thalweg Length (ft)						-						-					625				625			
Sinuosity						-						1.50					1.1				1.29			
Water Surface Slope (ft/ft)						-						-					0.024				0.024			
Bankfull Slope (ft/ft)						-						-					-				0.024			
Bankfull Floodplain Area (acres)						-						-					-							
Proportion Over Wide (%)						-						-												
Entrenchment Class (ER Range)						-						-												
Incision Class (BHR Range)						-						-												
BEHI						26.67						-												
Channel Stability or Habitat Metric						-						-												
Biological or Other						-						-												

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10 cont'd. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Jerry Branch 3 (636 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	4.95	-	4.0	-	-	-	1	9.8	11.7	-	13.1	-	-	-	7.3	-	7.2	7.3	7.3	7.4	0.141	2
Floodprone Width (ft)				-	6.5	-	-	-	1	16.0	18.0	-	21	-	-	-	-	-	24.7	29.3	29.3	33.8	6.435	2
Bankfull Mean Depth (ft)	-	-	0.78	-	0.9	-	-	-	1	0.5	0.62	-	0.8	-	-	-	0.54	-	0.4	0.4	0.4	0.4	0	2
Bankfull Max Depth (ft)				-	1.1	-	-	-	1	0.8	0.9	-	1.2	-	-	-	0.77	-	0.8	0.9	0.9	0.9	0.071	2
Bankfull Cross Sectional Area (ft^2)	5.4			-	3.3	-	-	-	1	5.4	7.3	-	8	-	-	-	4.0	-	3.0	3.2	3.2	3.3	0.212	2
Width/Depth Ratio				-	4.8	-	-	-	1	12.3	18.8	-	19.6	-	-	-	13.5	-	16.6	17.2	17.2	17.7	0.778	2
Entrenchment Ratio				-	1.6	-	-	-	1	1.4	1.5	-	1.8	-	-	-	3.4	-	3.4	4.0	4.0	4.6	0.849	2
Bank Height Ratio				-	2.9	-	-	-	1	0.9	1	-	1.4	-	-	-	-	-	1.0	1.0	1.0	1.0	0.0	2
d50 (mm)				-	-	-	-	-	-	-	52	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	3.1	9.0	8.7	26.5	4.5	29
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	0.002	-	0.005	0.019	0.018	0.042	0.010	29
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	2.3	4.8	4.7	7.8	1.5	31
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	1.15	-	0.9	1.5	1.5	2.2	0.3	29
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	23.9	-	12.0	18.0	16.8	36.2	5.1	30
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	20.0	24.2	26.0	26.5	3.6	3
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	12.0	-	17.0	9.2	12.1	10.6	17.0	2.8	7
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3	1.7	1.5	2.3	0.4	1
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.1	43.9	44.8	54.4	8.1	6
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	2	-	2.7	3.3	3.6	3.6	0.5	3
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%						-						-							60% / 0% / 21% / 10% / 9%					
SC% / Sa% / G% / C% / B% / Be%						-						4% / 2% / 49% / 38% / 1% / 6%												
d16 / d35 / d50 / d84 / d95 / di^{p} / di^{ep} (mm)						--/5/6/13/22						14 / 36 / 52 / 110 / 170 / - / -												
Reach Shear Stress (Competency) lb/ft^2						-						0.562					-				-			
Max Part Size (mm) Mobilized at Bankfull						-						947					32				-			
Stream Power (Transport Capacity) W/m^2						-						-					-							
Additional Reach Parameters																								
Drainage Area (mi^2)												0.42												
Impervious Cover Estimate (%)						-						-												
Rosgen Classification						G						B4c					B4				B4			
Bankfull Velocity (fps)	-					-						3.8					-							
Bankfull Discharge (cfs)	20.49					-						28.0					20							
Valley Length (ft)						-						260.0					624							
Channel Thalweg Length (ft)						-						-					670				636			
Sinuosity						-						1.50					1.00				1.02			
Water Surface Slope (ft/ft)						-						-					0.0240				0.0235			
Bankfull Slope (ft/ft)						-						-					-				0.0239			
Bankfull Floodplain Area (acres)						-						-					-							
Proportion Over Wide (%)						-						-												
Entrenchment Class (ER Range)						-						-												
Incision Class (BHR Range)						-						-												
BEHI						21.4						-												
Channel Stability or Habitat Metric						-						-												
Biological or Other						-						-												

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10 cont'd. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Hudson Branch (59 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline[1]					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	2.63	-	4.5	-	-	-	1	9.8	11.7	-	13.1	-	-	-	7.3	-						
Floodprone Width (ft)				-	8.0	-	-	-	1	16.0	18.0	-	21	-	-	-	-	-						
Bankfull Mean Depth (ft)	-	-	0.49	-	0.5	-	-	-	1	0.5	0.62	-	0.8	-	-	-	0.34	-						
Bankfull Max Depth (ft)				-	0.7	-	-	-	1	0.8	0.9	-	1.2	-	-	-	0.52	-						
Bankfull Cross Sectional Area (ft^2)	2.0			-	2.1	-	-	-	1	5.4	7.3	-	8	-	-	-	2.1	-						
Width/Depth Ratio				-	9.5	-	-	-	1	12.3	18.8	-	19.6	-	-	-	18.7	-						
Entrenchment Ratio				-	1.8	-	-	-	1	1.4	1.5	-	1.8	-	-	-	4.8	-						
Bank Height Ratio				-	3.6	-	-	-	1	0.9	1	-	1.4	-	-	-	-	-						
d50 (mm)				-	-	-	-	-	-		52	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	8.89	10.2	10.2	11.5	1.86	2
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	0.003	-	0.017	0.017	0.017	0.018	0.001	2
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	5.4	7.33	7.1	9.51	2.07	3
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	0.77	-	1.37	1.77	1.82	2.14	0.39	3
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	15.9	-	11.5	16.6	16.6	21.8	7.26	2
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	10.2	10.2	10.2	10.2	-	1
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	9.0	-	14.0	-	-	-	-	-	-
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
Meander Wavelength (ft)				-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	2	-	1.4	1.4	1.4	1.4	-	1
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%						-						-									46% / 0% / 50% / 0% / 4%			
SC% / Sa% / G% / C% / B% / Be%						-						4% / 2% / 49% / 38% / 1% / 6%												
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)						-						14 / 36 / 52 / 110 / 170 / - / -												
Reach Shear Stress (Competency) lb/ft^2						-						0.562					-				-			
Max Part Size (mm) Mobilized at Bankfull						-						947					32				-			
Stream Power (Transport Capacity) W/m^2						-						-					-							
Additional Reach Parameters																								
Drainage Area (mi^2)												0.42												
Impervious Cover Estimate (%)						-						-												
Rosgen Classification						G						B4c					B4				B4			
Bankfull Velocity (fps)		-				-						3.8					-							
Bankfull Discharge (cfs)		7.13				-						28.0					7							
Valley Length (ft)						-						260.0					55							
Channel Thalweg Length (ft)						-						-					102				59			
Sinuosity						-						1.50					1.10				1.08			
Water Surface Slope (ft/ft)						-						-					0.0120				0.030			
Bankfull Slope (ft/ft)						-						-					-				0.043			
Bankfull Floodplain Area (acres)						-						-					-							
Proportion Over Wide (%)						-						-												
Entrenchment Class (ER Range)						-						-												
Incision Class (BHR Range)						-						-												
BEHI						-						-												
Channel Stability or Habitat Metric						-						-												
Biological or Other						-						-												

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

[1]This reach limited to visual assessment since it is less than 500 feet

Table 10 cont'd. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Dale Branch 1 (250 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline[1]					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	2.63	4.8	7.1	8.0	8.5	2.0	3	9.8	11.7	-	13.1	-	-	-	6.3	-						
Floodprone Width (ft)				7.0	15.0	18.0	20.0	7.0	2	16.0	18.0	-	21	-	-	-	-	-						
Bankfull Mean Depth (ft)	-	-	0.49	0.4	0.5	0.5	0.6	0.1	3	0.5	0.62	-	0.8	-	-	-	0.34	-						
Bankfull Max Depth (ft)				0.5	0.6	0.6	0.7	0.1	3	0.8	0.9	-	1.2	-	-	-	0.52	-						
Bankfull Cross Sectional Area (ft^2)	2.0			2.5	2.9	2.9	3.4	0.5	3	5.4	7.3	-	8	-	-	-	2.1	-						
Width/Depth Ratio				8.0	18.4	21.4	25.7	9.2	3	12.3	18.8	-	19.6	-	-	-	18.7	-						
Entrenchment Ratio				1.5	2.0	2.1	2.5	0.5	3	1.4	1.5	-	1.8	-	-	-	5.6	-						
Bank Height Ratio				1.0	1.8	1.2	3.1	1.2	3	0.9	1	-	1.4	-	-	-	-	-						
d50 (mm)				-	-	-	-	-	-	-	52	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-						
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	-	-						
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-						
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	0.77	-						
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	20.5	-						
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-							
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	9.0	-	14.0						
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	4	-						
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%				-						-														
SC% / Sa% / G% / C% / B% / Be%				-						4% / 2% / 49% / 38% / 1% / 6%														
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)				--/5/6/11/15						14 / 36 / 52 / 110 / 170 / - / -														
Reach Shear Stress (Competency) lb/ft^2				-						0.562						-								
Max Part Size (mm) Mobilized at Bankfull				-						947						32								
Stream Power (Transport Capacity) W/m^2				-						-						-								
Additional Reach Parameters																								
Drainage Area (mi^2)				-						0.42														
Impervious Cover Estimate (%)				-						-														
Rosgen Classification				C						B4c						B4								
Bankfull Velocity (fps)	-			-						3.8						-								
Bankfull Discharge (cfs)	7.13			-						28.0						7								
Valley Length (ft)				-						260.0						-								
Channel Thalweg Length (ft)				-						-						375								
Sinuosity				-						1.50						1.20								
Water Surface Slope (ft/ft)				-						-						0.0390								
Bankfull Slope (ft/ft)				-						-						-								
Bankfull Floodplain Area (acres)				-						-						-								
Proportion Over Wide (%)				-						-														
Entrenchment Class (ER Range)				-						-														
Incision Class (BHR Range)				-						-														
BEHI				25.64						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

[1]This reach received minor bank work with no adjustments to profile. No cross-sections set in this reach.

Table 10 cont'd. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Dale Branch 2 (920 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design[1]			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	2.98	-	5.0	-	-	-	1	9.8	11.7	-	13.1	-	-	-	5.4	-	6.4	6.7	6.7	7.0	0.42	2
Floodprone Width (ft)				-	7.0	-	-	-	1	16.0	18.0	-	21	-	-	-	-	-	15.1	19.5	19.5	23.9	6.22	2
Bankfull Mean Depth (ft)	-	-	0.54	-	0.6	-	-	-	1	0.5	0.62	-	0.8	-	-	-	0.37	-	0.3	0.3	0.3	0.3	0	2
Bankfull Max Depth (ft)				-	0.7	-	-	-	1	0.8	0.9	-	1.2	-	-	-	0.56	-	0.5	0.6	0.6	0.7	0.14	2
Bankfull Cross Sectional Area (ft^2)		2.4		-	2.8	-	-	-	1	5.4	7.3	-	8	-	-	-	2.0	-	1.8	1.9	1.9	2.0	0.14	2
Width/Depth Ratio				-	9.0	-	-	-	1	12.3	18.8	-	19.6	-	-	-	14.6	-	22.6	23.6	23.6	24.6	1.41	2
Entrenchment Ratio				-	1.4	-	-	-	1	1.4	1.5	-	1.8	-	-	-	8.2	-	2.4	2.9	2.9	3.4	0.71	2
Bank Height Ratio				-	7.9	-	-	-	1	0.9	1	-	1.4	-	-	-	-	-	1.0	1.0	1.0	1.0	0.0	2
d50 (mm)				-	-	-	-	-	-	-	52	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	3.2	10.1	9.0	21.3	4.8	28
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	0.003	-	0.007	0.027	0.027	0.046	0.011	28
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	1.5	3.2	2.9	9.6	1.6	29
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	0.84	-	1.1	1.6	1.4	2.8	0.5	28
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	20.7	-	9.4	19.7	19.3	31.4	4.9	28
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	18.0	20.6	19.0	24.4	3.1	5
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	10.0	-	15.0	8.2	13.8	14.7	16.7	3.4	5
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-		-	-	-	-	-	-	-	1.2	2.1	2.2	2.5	0.5	5
Meander Wavelength (ft)				-	-	-	-	-	-	-		-	-	-	-	-	-	-	33.1	38.9	39.6	41.5	3.1	6
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	4	-	2.7	3.1	2.8	3.6	0.9	6

Substrate, Bed and Transport Parameters					
Ri% / Ru% / P% / G% / S%		-	-		50%/ 7%/ 16%/ 10%/ 17%
SC% / Sa% / G% / C% / B% / Be%		-	4% / 2% / 49% / 38% / 1% / 6%		
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)		--/5/6/11/15	14 / 36 / 52 / 110 / 170 / - / -		
Reach Shear Stress (Competency) lb/ft^2		-	0.562	-	-
Max Part Size (mm) Mobilized at Bankfull		-	947	32	-
Stream Power (Transport Capacity) W/m^2		-	-	-	
Additional Reach Parameters					
Drainage Area (mi^2)		0.04	0.42		
Impervious Cover Estimate (%)		-	-		
Rosgen Classification		G	B4c	B4	B4
Bankfull Velocity (fps)	-	-	3.8	-	
Bankfull Discharge (cfs)	8.77	-	28.0	9	
Valley Length (ft)		-	260.0	896	
Channel Thalweg Length (ft)		-	-	975	920
Sinuosity		-	1.50	1.00	1.03
Water Surface Slope (ft/ft)		-	-	0.0420	0.029
Bankfull Slope (ft/ft)		-	-	-	0.028
Bankfull Floodplain Area (acres)		-	-	-	
Proportion Over Wide (%)		-	-		
Entrenchment Class (ER Range)		-	-		
Incision Class (BHR Range)		-	-		
BEHI		25.2	-		
Channel Stability or Habitat Metric		-	-		
Biological or Other		-	-		

[1]Based on average design values for Subreaches 2b-2e

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10 cont'd. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Dale Branch 3 (559 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	3.28	3.0	3.3	3.3	3.6	0.4	2	9.8	11.7	-	13.1	-	-	-	7.2	-	7.3	7.3	7.3	7.3	-	1
Floodprone Width (ft)				9.0	12.0	12.0	15.0	4.2	2	16.0	18.0	-	21	-	-	-	-	-	18.5	18.5	18.5	18.5	-	1
Bankfull Mean Depth (ft)	-	-	0.58	0.6	0.7	0.7	0.7	0.1	2	0.5	0.62	-	0.8	-	-	-	0.39	-	0.3	0.3	0.3	0.3	-	1
Bankfull Max Depth (ft)				0.7	0.8	0.8	0.9	0.1	2	0.8	0.9	-	1.2	-	-	-	0.59	-	0.7	0.7	0.7	0.7	-	1
Bankfull Cross Sectional Area (ft^2)	2.8			3.0	3.6	3.6	4.1	0.8	2	5.4	7.3	-	8	-	-	-	2.8	-	2.5	2.5	2.5	2.5	-	1
Width/Depth Ratio				8.8	10.4	10.4	11.9	2.2	2	12.3	18.8	-	19.6	-	-	-	18.7	-	21.1	21.1	21.1	21.1	-	1
Entrenchment Ratio				1.5	2.0	2.0	2.5	0.7	2	1.4	1.5	-	1.8	-	-	-	4.2	-	2.5	2.5	2.5	2.5	-	1
Bank Height Ratio				1.6	1.9	1.9	2.2	0.4	2	0.9	1	-	1.4	-	-	-	-	-	1.0	1.0	1.0	1.0	-	1
d50 (mm)				-	-	-	-	-	-	-	52	-		-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	0.5	12.6	10.7	60.6	10.9	24
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	0.008	-	0.005	0.026	0.025	0.061	0.014	24
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	1.3	3.3	2.9	9.0	1.5	23
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	0.89	-	0.8	1.3	1.3	1.7	0.2	23
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	21.9	-	13.3	21.0	18.5	63.1	10.1	23
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	17.8	26.7	27.9	33.4	7.4	4
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	11.0	-	16.0	8.7	10.2	9.8	12.1	1.4	6
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2	1.4	1.3	1.7	0.2	1
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29.6	39.9	37.4	55.7	10.0	6
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	2	-	2.4	3.7	3.8	4.6	1.0	4
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%				-						-									62% / 0% / 16% /11% /11%					
SC% / Sa% / G% / C% / B% / Be%				-						4% / 2% / 49% / 38% / 1% / 6%														
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)				--/5/6/11/15						14 / 36 / 52 / 110 / 170 / - / -														
Reach Shear Stress (Competency) lb/ft^2				-						0.562						-			-					
Max Part Size (mm) Mobilized at Bankfull				-						947						32			-					
Stream Power (Transport Capacity) W/m^2				-						-						-								
Additional Reach Parameters																								
Drainage Area (mi^2)				0.05						0.42														
Impervious Cover Estimate (%)				-						-														
Rosgen Classification				G						B4c						B4			B4					
Bankfull Velocity (fps)	-			-						3.8						-								
Bankfull Discharge (cfs)	10.3			-						28.0						10								
Valley Length (ft)				-						260.0						531								
Channel Thalweg Length (ft)				-						-						550			559					
Sinuosity				-						1.50						1.0			1.05					
Water Surface Slope (ft/ft)				-						-						0.027			0.024					
Bankfull Slope (ft/ft)				-						-						-			0.026					
Bankfull Floodplain Area (acres)				-						-						-								
Proportion Over Wide (%)				-						-														
Entrenchment Class (ER Range)				-						-														
Incision Class (BHR Range)				-						-														
BEHI				20.47						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

- Information unavailable.
Non-Applicable.

Table 10 cont'd. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Dale Branch 4 (835 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	4.01	5.5	6.0	6.0	6.5	0.7	2	9.8	11.7	-	13.1	-	-	-	6.1	-	6.3	6.4	6.4	6.5	0.14	2
Floodprone Width (ft)				6.5	7.8	7.8	9.0	1.8	2	16.0	18.0	-	21	-	-	-	-	-	22.0	33.1	33.1	44.2	15.7	2
Bankfull Mean Depth (ft)	-	-	0.67	0.8	0.8	0.8	0.8	0.0	2	0.5	0.62	-	0.8	-	-	-	0.47	-	0.3	0.4	0.4	0.5	0.14	2
Bankfull Max Depth (ft)				1.0	1.0	1.0	1.0	0.0	2	0.8	0.9	-	1.2	-	-	-	0.67	-	0.7	0.8	0.8	0.9	0.14	2
Bankfull Cross Sectional Area (ft^2)	3.9			4.1	4.6	4.6	5.0	0.6	2	5.4	7.3	-	8	-	-	-	2.9	-	1.9	2.5	2.5	3.1	0.85	2
Width/Depth Ratio				7.3	7.9	7.9	8.4	0.8	2	12.3	18.8	-	19.6	-	-	-	13.0	-	13.8	17.4	17.4	21.0	5.09	2
Entrenchment Ratio				1.2	1.3	1.3	1.4	0.1	2	1.4	1.5	-	1.8	-	-	-	4.1	-	3.5	5.2	5.2	6.8	2.33	2
Bank Height Ratio				3.3	3.5	3.5	3.7	0.3	2	0.9	1	-	1.4	-	-	-	-	-	1.0	1.0	1.0	1.0	0.0	2
d50 (mm)				-	-	-	-	-	-	-	52	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	7.8	17.8	14.5	68.7	12.3	31
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	0.002	-	0.003	0.018	0.016	0.048	0.009	31
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	1.5	3.2	2.9	12.5	2.1	30
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	1.01	-	0.1	1.4	1.4	2.1	0.3	33
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	19.6	-	14.4	26.0	22.2	77.4	13.7	31
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	16.7	18.7	18.0	22.2	2.5	4
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	9.0	-	14.0	9.3	13.1	13.6	16.4	2.9	6
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-		-	-	-	-	-	-	-	1.4	2.1	2.1	2.6	0.5	2
Meander Wavelength (ft)				-	-	-	-	-	-	-		-	-	-	-	-	-	-	34.4	45.9	39.9	62.7	12.5	6
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	2	-	2.6	2.9	2.8	3.5	0.4	4
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%				-						-									68%/ 0%/ 12%/ 8%/ 11%					
SC% / Sa% / G% / C% / B% / Be%				-						4% / 2% / 49% / 38% / 1% / 6%														
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)				--/5/6/11/15						14 / 36 / 52 / 110 / 170 / - / -														
Reach Shear Stress (Competency) lb/ft^2				-						0.562						-			-					
Max Part Size (mm) Mobilized at Bankfull				-						947						32			-					
Stream Power (Transport Capacity) W/m^2				-						-						-								
Additional Reach Parameters																								
Drainage Area (mi^2)				0.08						0.42														
Impervious Cover Estimate (%)				-						-														
Rosgen Classification				G						B4c						B4			B4					
Bankfull Velocity (fps)	-			-						3.8						-								
Bankfull Discharge (cfs)	14.45			-						28.0						14								
Valley Length (ft)				-						260.0						810								
Channel Thalweg Length (ft)				-						-						825			835					
Sinuosity				-						1.50						1.00			1.03					
Water Surface Slope (ft/ft)				-						-						0.028			0.024					
Bankfull Slope (ft/ft)				-						-						-			0.020					
Bankfull Floodplain Area (acres)				-						-						-								
Proportion Over Wide (%)				-						-														
Entrenchment Class (ER Range)				-						-														
Incision Class (BHR Range)				-						-														
BEHI				24.25						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10 cont'd. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Dale Branch 5 (679 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design[1]			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	4.2	-	8.0	-	-	-	1	9.8	11.7	-	13.1	-	-	-	6.4	-	7.1	7.1	7.1	7.1	-	1
Floodprone Width (ft)				-	9.0	-	-	-	1	16.0	18.0	-	21	-	-	-	-	-	23.9	23.9	23.9	23.9	-	1
Bankfull Mean Depth (ft)	-	-	0.7	-	0.8	-	-	-	1	0.5	0.62	-	0.8	-	-	-	0.49	-	0.5	0.5	0.5	0.5	-	1
Bankfull Max Depth (ft)				-	1.0	-	-	-	1	0.8	0.9	-	1.2	-	-	-	0.69	-	0.7	0.7	0.7	0.7	-	1
Bankfull Cross Sectional Area (ft^2)	4.2			-	5.0	-	-	-	1	5.4	7.3	-	8	-	-	-	3.1	-	3.3	3.3	3.3	3.3	-	1
Width/Depth Ratio				-	12.9	-	-	-	1	12.3	18.8	-	19.6	-	-	-	13.1	-	15.2	15.2	15.2	15.2	-	1
Entrenchment Ratio				-	1.1	-	-	-	1	1.4	1.5	-	1.8	-	-	-	3.1	-	3.4	3.4	3.4	3.4	-	1
Bank Height Ratio				-	2.6	-	-	-	1	0.9	1	-	1.4	-	-	-	-	-	1.0	1.0	1.0	1.0	-	1
d50 (mm)				-	-	-	-	-	-	-	52	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	7.2	18.3	20.3	25.1	6.0	11
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	0.002	-	0.005	0.022	0.024	0.044	0.011	11
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	1.8	3.0	3.1	4.0	0.7	12
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	1.04	-	1.1	1.5	1.4	2.2	0.4	11
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	29.9	-	12.1	26.4	28.4	35.2	6.8	11
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	13.2	15.3	15.6	17.1	1.9	3
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	7.0	-	12.0	8.7	14.1	15.6	16.7	3.6	4
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2	2.0	2.2	2.4	0.5	2
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.9	56.4	54.8	67.7	7.2	6
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	2	-	1.9	2.2	2.2	2.4	0.3	3
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%						-						-									68% / 0%/ 12%/ 13%/ 7%			
SC% / Sa% / G% / C% / B% / Be%						-						4% / 2% / 49% / 38% / 1% / 6%												
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)						--/5/6/11/15						14 / 36 / 52 / 110 / 170 / - / -												
Reach Shear Stress (Competency) lb/ft^2						-						0.562					-				-			
Max Part Size (mm) Mobilized at Bankfull						-						947					32				-			
Stream Power (Transport Capacity) W/m^2						-						-					-							
Additional Reach Parameters																								
Drainage Area (mi^2)						0.09						0.42												
Impervious Cover Estimate (%)						-						-												
Rosgen Classification						F						B4c					B4				B4			
Bankfull Velocity (fps)		-				-						3.8					-							
Bankfull Discharge (cfs)		15.73				-						28.0					16							
Valley Length (ft)						-						260.0					695							
Channel Thalweg Length (ft)						-						-					725				679			
Sinuosity						-						1.50					1.0				0.977			
Water Surface Slope (ft/ft)						-						-					0.023				0.024			
Bankfull Slope (ft/ft)						-						-					-				0.024			
Bankfull Floodplain Area (acres)						-						-					-							
Proportion Over Wide (%)						-						-												
Entrenchment Class (ER Range)						-						-												
Incision Class (BHR Range)						-						-												
BEHI						23.1						-												
Channel Stability or Habitat Metric						-						-												
Biological or Other						-						-												

[1]Values taken from Subreach 5b

- Information unavailable.

Non-Applicable.

Table 10 con't. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Thompson Branch 1 (530 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	4.6	-	5.0	-	-	-	1	9.8	11.7	-	13.1	-	-	-	8.8	-	-	-	-	-	-	-
Floodprone Width (ft)				-	20.0	-	-	-	1	16.0	18.0	-	21.0	-	-	-	-	-	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	-	-	0.7	-	1.0	-	-	-	1	0.5	0.6	-	0.8	-	-	-	0.48	-	-	-	-	-	-	-
Bankfull Max Depth (ft)				-	1.3	-	-	-	1	0.8	0.9	-	1.2	-	-	-	0.73	-	-	-	-	-	-	-
Bankfull Cross Sectional Area (ft^2)	4.8			-	4.6	-	-	-	1	5.4	7.3	-	8.0	-	-	-	4.2	-	-	-	-	-	-	-
Width/Depth Ratio				-	5.5	-	-	-	1	12.3	18.8	-	19.6	-	-	-	18.6	-	-	-	-	-	-	-
Entrenchment Ratio				-	4.0	-	-	-	1	1.4	1.5	-	1.8	-	-	-	3.4	-	-	-	-	-	-	-
Bank Height Ratio				-	1.2	-	-	-	1	0.9	1.0	-	1.4	-	-	-	-	-	-	-	-	-	-	-
d50 (mm)				-	-	-	-	-	-	-	52	-		-	-	-	-	-	-	-	-	-	-	-
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	44.7	44.7	44.7	44.7	-	1
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	-	-	0.006	0.006	0.006	0.006	-	1
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	9.6	20.6	17.0	35.0	11.6	6
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	1.1	-	1.6	2.0	1.9	2.3	0.3	7
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	28.6	-	11.0	22.3	18.3	36.5	11.2	6
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	19.0	26.1	22.9	36.4	9.1	3
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	13.0	-	19.0	12.3	13.1	13.2	13.7	0.7	3
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	1.5	1.5	1.6	0.1	1
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60.7	94.7	81.4	155.2	44.0	4
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	3	-	2.2	3.0	2.6	4.1	1.0	3
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%						-						-									25% / 0% / 69% / 0% / 6%			
SC% / Sa% / G% / C% / B% / Be%						-						4% / 2% / 49% / 38% / 1% / 6%												
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)						4 / 6 /8 /15 / 24						14 / 36 / 52 / 110 / 170 / - / -												
Reach Shear Stress (Competency) lb/ft^2						-						0.562					-				-			
Max Part Size (mm) Mobilized at Bankfull						-						947					37				-			
Stream Power (Transport Capacity) W/m^2						-						-					-							
Additional Reach Parameters																								
Drainage Area (mi^2)						0.11						0.42												
Impervious Cover Estimate (%)						-						-												
Rosgen Classification						G						B4c					B4				B4			
Bankfull Velocity (fps)		-				-						3.8					-							
Bankfull Discharge (cfs)		18.2				-						28.0					18							
Valley Length (ft)						-						260.0					294							
Channel Thalweg Length (ft)						-						-					511				530			
Sinuosity						-						1.50					1.0				1.06			
Water Surface Slope (ft/ft)						-						-					0.030				0.031			
Bankfull Slope (ft/ft)						-						-					-				0.030			
Bankfull Floodplain Area (acres)						-						-					-							
Proportion Over Wide (%)						-						-												
Entrenchment Class (ER Range)						-						-												
Incision Class (BHR Range)						-						-												
BEHI						30.9						-												
Channel Stability or Habitat Metric						-						-												
Biological or Other						-						-												

- Information unavailable.
Non-Applicable.

Table 10 cont'd. Baseline Stream Data Summary
Pee Dee Stream Restoration Site - Thompson Branch 2 (1,061 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	5.11	7.0	7.7	7.0	9.0	1.2	3	9.8	11.7	-	13.1	-	-	-	7.5	-	7.5	7.6	7.6	7.6	0.07	2
Floodprone Width (ft)				9.0	14.7	15.0	20.0	5.5	2	16.0	18.0	-	21.0	-	-	-	-	-	31.1	32.7	32.7	34.3	2.26	2
Bankfull Mean Depth (ft)	-	-	0.8	0.9	0.9	0.9	1.0	0.1	3	0.5	0.6	-	0.8	-	-	-	0.6	-	0.6	0.6	0.6	0.6	0	2
Bankfull Max Depth (ft)				1.1	1.1	1.1	1.2	0.1	3	0.8	0.9	-	1.2	-	-	-	0.78	-	1.1	1.2	1.2	1.2	0.07	2
Bankfull Cross Sectional Area (ft^2)	5.6			5.7	6.7	6.0	8.4	1.5	3	5.4	7.3	-	8.0	-	-	-	4.2	-	4.2	4.3	4.3	4.3	0.07	2
Width/Depth Ratio				8.1	8.8	8.5	9.7	0.8	3	12.3	18.8	-	19.6	-	-	-	13.5	-	13.3	13.4	13.4	13.4	0.07	2
Entrenchment Ratio				1.3	2.0	1.7	2.9	0.8	3	1.4	1.5	-	1.8	-	-	-	4.0	-	4.1	4.3	4.3	4.5	0.28	2
Bank Height Ratio				1.4	2.2	2.4	2.9	0.8	3	0.9	1.0	-	1.4	-	-	-	-	-	1.0	1.0	1.0	1.0	0.0	2
d50 (mm)				-	-	-	-	-	-		52	-		-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	4.0	14.0	-	30.0	-	-	-	-	-	10.0	15.8	15.2	25.4	3.9	32
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.017	0.027	-	0.059	-	-	-	0.008	-	0.005	0.014	0.013	0.023	0.005	32
Pool Length (ft)				-	-	-	-	-	-	7.0	13.0	-	30.0	-	-	-	-	-	1.8	5.0	4.6	18.3	3.0	32
Pool Max Depth (ft)				-	-	-	-	-	-	1.8	1.9	-	2.7	-	-	-	1.17	-	1.4	2.1	2.0	2.6	0.3	32
Pool Spacing (ft)				-	-	-	-	-	-	18.0	39.0	-	53.0	-	-	-	26.2	-	19.5	27.5	25.9	54.0	7.4	32
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	21.0	-	-	-	-	-	-	-	14.4	22.4	19.5	37.8	8.2	6
Radius of Curvature (ft)				-	-	-	-	-	-	-	18.0	-	-	-	-	12.0	-	18.0	10.5	18.3	18.5	25.9	6.7	4
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-		-	-	-	-	-	-	-	1.4	2.4	2.5	3.5	0.9	2
Meander Wavelength (ft)				-	-	-	-	-	-	-		-	-	-	-	-	-	-	34.3	48.7	50.5	60.9	9.8	6
Meander Width Ratio				-	-	-	-	-	-	-	1.8	-	-	-	-	-	3	-	2.2	3.0	2.6	4.1	1.0	3
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%				-						-									57% / 0% / 18% / 11% / 14%					
SC% / Sa% / G% / C% / B% / Be%				-						4% / 2% / 49% / 38% / 1% / 6%														
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)				4 / 6 / 8 / 15 /24						14 / 36 / 52 / 110 / 170 / - / -														
Reach Shear Stress (Competency) lb/ft^2				-						0.562						-			-					
Max Part Size (mm) Mobilized at Bankfull				-						947						37			-					
Stream Power (Transport Capacity) W/m^2				-						-						-								
Additional Reach Parameters																								
Drainage Area (mi^2)				0.14						0.42														
Impervious Cover Estimate (%)				-						-														
Rosgen Classification				G						B4c						B4			B4					
Bankfull Velocity (fps)	-			-						3.8						-								
Bankfull Discharge (cfs)	21.6			-						28.0						22								
Valley Length (ft)				-						260.0						1,010								
Channel Thalweg Length (ft)				-						-						1,150			1,061					
Sinuosity				-						1.50						1.1			1.05					
Water Surface Slope (ft/ft)				-						-						0.020			0.020					
Bankfull Slope (ft/ft)				-						-						0.022			0.022					
Bankfull Floodplain Area (acres)				-						-						-								
Proportion Over Wide (%)				-						-														
Entrenchment Class (ER Range)				-						-														
Incision Class (BHR Range)				-						-														
BEHI				29.8						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

- Information unavailable.
Non-Applicable.

Appendix D. Table 11a. - Monitoring Data - Dimensional Morphology Summary
(Dimensional Parameters - Cross Sections)
Pee Dee Stream Restoration Site - Jerry Branch

	Reach 1 Cross-Section 1 Pool								Reach 1 Cross-Section 2 Riffle								Reach 2 Cross-Section 3 Pool								Reach 2 Cross-Section 4 Riffle							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record elevation (datum) used[1]	320.1	320.1	320.1	320.1	---	N/A	---		319.6	319.6	319.6	319.6	---	319.71	---		312.9	312.9	312.9	312.9	---	N/A	---		310.6	310.6	310.6	310.6	---	310.67	---	
Bankfull Width (ft)[1]	9.1	8.3	8.3	8.2	---	N/A	---		8.1	7.0	6.7	6.9	---	8.6	---		7.8	8.1	8.1	9.8	---	N/A	---		7.1	7.2	7.2	7.7	---	7.3	---	
Floodprone Width (ft)[1]	>25	>25	>25	>25	---	N/A	---		>30	>30	>30	>30	---	>29.9	---		>30	>30	>30	>30	---	N/A	---		>25	>25	>25	>25	---	21.6	---	
Bankfull Mean Depth (ft)	0.9	0.8	0.8	0.8	---	---	---		0.5	0.3	0.4	0.4	---	---	---		1.1	1.0	1.1	1.0	---	---	---		0.4	0.4	0.4	0.3	---	---	---	
Bankfull Max Depth (ft)[2]	1.7	1.3	1.2	1.2	---	1.7	---		1.0	0.5	0.6	0.6	---	0.8	---		2.3	2	2.2	2.1	---	2.1	---		0.7	0.6	0.6	0.6	---	0.7	---	
Low Bank Elevation	-	-	-	-	---	320.33	---		-	-	-	-	---	319.68	---		-	-	-	-	---	312.68	---		-	-	-	-	---	310.63	---	
Bankfull Cross Sectional Area (ft^2)[2]	8.5	6.8	6.9	6.6	---	10.2	---		3.7	2.4	2.6	2.7	---	3.5	---		8.3	7.7	8.7	9.4	---	10.1	---		3.1	3.0	2.7	2.6	---	2.8	---	
Bankfull Width/Depth Ratio	9.8	10.1	9.9	10.1	---	---	---		17.7	20.3	17.5	17.6	---	---	---		7.4	8.4	7.6	10.2	---	---	---		16.4	17	19.4	22.6	---	---	---	
Bankfull Entrenchment Ratio[1]	>2.7	>3.0	>3.0	N/A	---	N/A	---		>3.7	>4.3	>4.5	4.0	---	>3.5	---		>3.8	>3.7	>3.7	N/A	---	N/A	---		>3.5	>3.5	>3.5	3.2	---	3	---	
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	N/A	---	N/A	---		1.0	1.0	1.0	1.0	---	1	---		1.0	1.0	1.0	N/A	---	N/A	---		1.0	1.0	1.0	0.9	---	<1	---	
d50 (mm)	N/A	N/A	N/A	N/A	---	N/A	---		N/A	0.2	0.062	12.0	---	12	---		N/A	N/A	N/A	N/A	---	N/A	---		N/A	22	5.2	12.0	---	22	---	

	Reach 3 Cross-Section 5 Pool								Reach 3 Cross-Section 6 Riffle								Reach 3 Cross-Section 7 Riffle							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record elevation (datum) used[1]	301.7	301.7	301.7	301.7	---	N/A	---		298.8	298.8	298.8	298.8	---	299.26	---		290.2	290.2	290.2	290.2	---	290.45	---	
Bankfull Width (ft)[1]	8.1	9.2	9.7	9.4	---	N/A	---		7.4	7.5	7.3	6.9	---	12	---		7.2	6.7	6.4	6.2	---	7.4	---	
Floodprone Width (ft)[1]	>25	>25	>25	>25	---	N/A	---		>30	>30	>30	>30	---	>33.8	---		>25	>25	>25	>25	---	23.7	---	
Bankfull Mean Depth (ft)	1.0	0.7	0.7	0.7	---	---	---		0.4	0.4	0.4	0.4	---	---	---		0.4	0.3	0.4	0.4	---	---	---	
Bankfull Max Depth (ft)[2]	1.8	1.3	1.3	1.4	---	0.9	---		0.9	0.6	0.6	0.6	---	0.5	---		0.8	0.5	0.5	0.5	---	0.5	---	
Low Bank Elevation	-	-	-	-	---	301.09	---		-	-	-	-	---	299.19	---		-	-	-	-	---	290.29	---	
Bankfull Cross Sectional Area (ft^2)[2]	7.9	6.3	6.8	6.9	---	3.2	---		3.3	3.3	2.9	2.4	---	2.5	---		3.0	2.3	2.4	2.2	---	2	---	
Bankfull Width/Depth Ratio	8.3	13.3	13.7	13.0	---	---	---		16.6	16.7	18.7	19.4	---	---	---		17.7	19.4	17.0	17.4	---	---	---	
Bankfull Entrenchment Ratio[1]	>3.1	>2.7	>2.6	N/A	---	N/A	---		>4.1	>4.0	>4.1	4.4	---	>2.8	---		>3.4	>3.7	>3.9	4.0	---	3.2	---	
Bankfull Bank Height Ratio[1]	N/A	N/A	N/A	N/A	---	N/A	---		1.0	1.0	1.0	1.0	---	<1	---		1.0	1.0	1.0	0.9	---	<1	---	
d50 (mm)	N/A	N/A	N/A	N/A	---	N/A	---		N/A	5.5	14.0	52.0	---	17	---		N/A	34.0	15.0	27.0	---	16	---	

N/A - Information Not Available

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Appendix D. Table 11a. cont'd - Monitoring Data - Dimensional Morphology Summary
(Dimensional Parameters - Cross Sections)
Pee Dee Stream Restoration Site - Dale Branch

	Reach 2 Cross-Section 8 Riffle								Reach 2 Cross-Section 9 Pool								Reach 2 Cross-Section 10 Riffle								Reach 2 Cross-Section 11 Pool							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record elevation (datum) used[1]	354.94	354.94	354.94	354.94	---	354.96	---		354.7	354.7	354.7	354.7	---	N/A	---		348.1	348.1	348.1	348.1	---	348.06	---		347.4	347.4	347.4	347.4	---	N/A	---	
Bankfull Width (ft)[1]	7.0	7.3	7.2	6.5	---	7.7	---		7.7	8.0	8.1	7.7	---	N/A	---		6.4	6.2	6.2	6.5	---	5.9	---		7.6	8	8.3	9.4	---	N/A	---	
Floodprone Width (ft)[1]	>25	>25	>25	>25	---	>24.5	---		>25	>25	>25	>25	---	N/A	---		>25	>25	>25	>25	---	15.2	---		>20	>20	>20	>20	---	N/A	---	
Bankfull Mean Depth (ft)	0.3	0.2	0.3	0.2	---	---	---		0.6	0.6	0.6	0.6	---	---	---		0.3	0.3	0.3	0.3	---	---	---		0.8	0.7	0.7	0.7	---	---	---	
Bankfull Max Depth (ft)[2]	0.7	0.5	0.5	0.5	---	0.6	---		1.7	1.5	1.7	1.5	---	1.5	---		0.5	0.5	0.5	0.6	---	0.5	---		1.6	1.2	1.3	1.3	---	1	---	
Low Bank Elevation	-	-	-	-	---	354.85	---		-	-	-	-	---	354.59	---		-	-	-	-	---	347.99	---		-	-	-	-	---	347.3	---	
Bankfull Cross Sectional Area (ft^2)[2]	2.0	1.7	2.0	1.6	---	1.3	---		4.8	4.8	5.0	5	---	4.2	---		1.8	1.6	1.7	1.8	---	1.4	---		6.1	5.9	6.0	6.7	---	4.6	---	
Bankfull Width/Depth Ratio	24.6	30.6	26.0	26.9	---	---	---		12.3	13.5	13.3	11.8	---	---	---		22.6	23.7	21.7	23.4	---	---	---		9.5	10.9	11.5	13.3	---	---	---	
Bankfull Entrenchment Ratio[1]	>3.6	>3.4	>3.5	3.9	---	>3.2	---		>3.1	>3.1	>3.1	N/A	---	N/A	---		>3.9	>4.0	>4.1	3.9	---	2.6	---		>2.6	>2.5	>2.4	N/A	---	N/A	---	
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	0.9	---	<1	---		1.0	1.0	1.0	N/A	---	N/A	---		1.0	1.0	1.0	0.9	---	<1	---		1.0	1.0	1.0	N/A	---	N/A	---	
d50 (mm)	N/A	8.0	8.3	7.1	---	16	---		N/A	N/A	N/A	N/A	---	N/A	---		N/A	19	4.3	25.0	---	41	---		N/A	N/A	N/A	N/A	---	N/A	---	

	Reach 3 Cross-Section 12 Riffle								Reach 3 Cross-Section 13 Pool								Reach 4 Cross-Section 14 Pool								Reach 4 Cross-Section 15 Riffle							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record elevation (datum) used[1]	327.8	327.8	327.8	327.8	---	327.77	---		326.1	326.1	326.1	326.1	---	N/A	---		315.3	315.3	315.3	315.3	---	N/A	---		314.1	314.1	314.1	314.1	---	313.88	---	
Bankfull Width (ft)[1]	7.3	7.1	7.1	7.8	---	5.4	---		7.8	7.6	7.7	8.3	---	N/A	---		6.7	7.2	7.0	5.8	---	N/A	---		6.5	6.2	6.5	6.8	---	5.4	---	
Floodprone Width (ft)[1]	>20	>20	>20	>20	---	17.7	---		>20	>20	>20	>20	---	N/A	---		>30	>30	>30	>30	---	N/A	---		>40	>40	>40	>40	---	>43.2	---	
Bankfull Mean Depth (ft)	0.3	0.3	0.4	0.4	---	---	---		0.5	0.5	0.4	0.4	---	---	---		0.9	0.6	0.7	0.8	---	---	---		0.5	0.5	0.5	0.5	---	---	---	
Bankfull Max Depth (ft)[2]	0.7	0.6	0.8	0.8	---	0.8	---		1.3	1.1	1.0	0.9	---	0.8	---		2.0	1.0	1.3	1.3	---	1.2	---		0.9	0.8	0.8	0.8	---	1.3	---	
Low Bank Elevation	-	-	-	-	---	327.84	---		-	-	-	-	---	325.82	---		-	-	-	-	---	315.2	---		-	-	-	-	---	314.19	---	
Bankfull Cross Sectional Area (ft^2)[2]	2.5	2.2	2.7	3.1	---	2.9	---		3.9	3.5	3.0	3.7	---	2.5	---		6.2	4.3	5.2	4.9	---	4.7	---		3.1	2.9	3.0	3.2	---	5	---	
Bankfull Width/Depth Ratio	21.1	23.1	18.7	19.3	---	---	---		15.7	16.7	19.7	18.5	---	---	---		7.1	12.1	9.5	7.0	---	---	---		13.8	13.2	14.2	14.7	---	---	---	
Bankfull Entrenchment Ratio[1]	>2.8	>2.8	>2.8	2.6	---	3.3	---		>2.6	>2.6	>2.6	N/A	---	N/A	---		>4.5	>4.2	>4.3	N/A	---	N/A	---		>6.1	>6.5	>6.2	5.9	---	>8	---	
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	0.5	---	1.1	---		1.0	1.0	1.0	N/A	---	N/A	---		1.0	1.0	1.0	N/A	---	N/A	---		1.0	1.0	1.0	1.0	---	1.3	---	
d50 (mm)	N/A	2.1	4.4	8.0	---	22	---		N/A	N/A	N/A	N/A	---	N/A	---		N/A	N/A	N/A	N/A	---	N/A	---		N/A	16.0	5.8	12.0	---	11	---	

	Reach 4 Cross-Section 16 Riffle								Reach 5 Cross-Section 17 Riffle								Reach 5 Cross-Section 18 Pool							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record elevation (datum) used[1]	303.5	303.5	303.5	303.5	---	303.57	---		286.8	286.8	286.8	286.8	---	286.8	---		286.6	286.6	286.6	286.6	---	N/A	---	
Bankfull Width (ft)[1]	6.3	7.2	7.6	6.7	---	6.4	---		7.1	7.9	7.9	9.1	---	7	---		7.2	8.0	7.7	7.4	---	N/A	---	
Floodprone Width (ft)[1]	>25	>25	>25	>25	---	17.5	---		>25	>25	>25	>25	---	>23.7	---		>25	>25	>25	>25	---	N/A	---	
Bankfull Mean Depth (ft)	0.3	0.3	0.4	0.3	---	---	---		0.5	0.5	0.5	0.4	---	---	---		0.8	0.7	0.7	0.7	---	---	---	
Bankfull Max Depth (ft)[2]	0.7	0.6	0.7	0.7	---	0.5	---		0.7	0.8	0.8	0.8	---	0.8	---		1.7	1.5	1.4	1.4	---	1.2	---	
Low Bank Elevation	-	-	-	-	---	303.55	---		-	-	-	-	---	286.9	---		-	-	-	-	---	286.59	---	
Bankfull Cross Sectional Area (ft^2)[2]	1.9	2.3	2.7	2.2	---	1.7	---		3.3	3.8	3.9	4.1	---	4	---		5.9	5.8	5.6	5.3	---	5.2	---	
Bankfull Width/Depth Ratio	21.0	23.0	20.9	19.9	---	---	---		15.2	16.2	16.3	20.6	---	---	---		8.7	11.0	10.7	10.4	---	---	---	
Bankfull Entrenchment Ratio[1]	>4.0	>3.5	>3.3	3.8	---	2.7	---		>3.5	>3.2	>3.2	2.7	---	>3.4	---		>3.5	>3.1	>3.2	N/A	---	N/A	---	
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	0.9	---	1	---		1.0	1.0	1.0	1.2	---	1.1	---		1.0	1.0	1.0	N/A	---	N/A	---	
d50 (mm)	N/A	26.0	4.7	16.0	---	25	---		N/A	33.0	16.0	32.0	---	24	---		N/A	N/A	N/A	N/A	---	N/A	---	

N/A - Information Not Available

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Appendix D. Table 11a. cont'd - Monitoring Data - Dimensional Morphology Summary
(Dimensional Parameters - Cross Sections)
Pee Dee Stream Restoration Site -Thompson Branch

	Reach 2 Cross-Section 19 Pool								Reach 2 Cross-Section 20 Riffle								Reach 2 Cross-Section 21 Pool								Reach 2 Cross-Section 22 Riffle							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record elevation (datum) used[1]	364.1	364.1	364.1	364.1	---	N/A	---		363.2	363.2	363.2	363.2	---	363.17	---		356.0	356.0	356.0	356.0	---	N/A	---		356.0	356.0	356.0	356.0	---	356	---	
Bankfull Width (ft)[1]	8.4	9.2	9.2	7.8	---	N/A	---		7.5	7.7	7.6	8.4	---	8.4	---		8.6	9.1	9.2	10.2	---	N/A	---		7.6	7.7	7.7	7.8	---	8.9	---	
Floodprone Width (ft)[1]	>30	>30	>30	>30	---	N/A	---		>30	>30	>30	>30	---	25	---		>30	>30	>30	>30	---	N/A	---		>30	>30	>30	>30	---	33.3	---	
Bankfull Mean Depth (ft)	1.0	0.9	0.8	1.0	---	---	---		0.6	0.6	0.6	0.6	---	---	---		1.0	0.8	0.8	0.8	---	---	---		0.6	0.6	0.6	0.6	---	---	---	
Bankfull Max Depth (ft)[2]	2.1	1.7	1.5	1.5	---	1.3	---		1.2	0.9	0.9	0.9	---	0.8	---		2.3	1.7	1.7	1.6	---	1.2	---		1.1	1.0	1.1	1.1	---	0.8	---	
Low Bank Elevation	-	-	-	-	---	364.01	---		-	-	-	-	---	363.16	---		-	-	-	-	---	355.64	---		-	-	-	-	---	355.8	---	
Bankfull Cross Sectional Area (ft^2)[2]	8.8	8.1	7.0	7.7	---	7.3	---		4.2	4.4	4.4	4.8	---	4.1	---		8.5	7.5	7.8	8	---	4.9	---		4.3	4.4	4.4	4.4	---	2.8	---	
Bankfull Width/Depth Ratio	8.0	10.4	12.1	8.0	---	---	---		13.3	13.5	13.0	14.5	---	---	---		8.7	10.9	10.9	12.9	---	---	---		13.4	13.5	13.5	13.8	---	---	---	
Bankfull Entrenchment Ratio[1]	>3.6	>3.3	>3.3	N/A	---	N/A	---		>4.0	>3.9	>3.9	3.6	---	3	---		>3.5	>3.3	>3.2	N/A	---	N/A	---		>3.9	>3.9	>3.9	3.9	---	3.7	---	
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	N/A	---	N/A	---		1.0	1.0	1.0	1.0	---	1	---		1.0	1.0	1.0	N/A	---	N/A	---		1.0	1.0	1.0	1.0	---	<1	---	
d50 (mm)	N/A	N/A	N/A	N/A	---	N/A	---		N/A	0.2	9.9	47.0	---	28	---		N/A	N/A	N/A	N/A	---	N/A	---		N/A	29.0	30.0	53.0	---	23	---	

N/A - Information Not Available

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 11b. Monitoring Data - Stream Reach Data Summary
Pee Dee Stream Restoration - Jerry Branch 1 (430 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	8.1	8.1	8.1	8.1	N/A	1	7.0	7.0	7.0	7.0	N/A	1	6.7	6.7	6.7	6.7	N/A	1	6.9	6.9	6.9	6.9	N/A	1							8.60	8.60	8.60	8.60	N/A	1.00												
Floodprone Width (ft)[1]	31.8	31.8	31.8	31.8	N/A	1	30.0	30.0	30.0	30.0	N/A	1	30.0	30.0	30.0	30.0	N/A	1	30.0	30.0	30.0	30.0	N/A	1							>29.9	>29.9	>29.9	>29.9	N/A	1.00												
Bankfull Mean Depth (ft)	0.5	0.5	0.5	0.5	N/A	1	0.3	0.3	0.3	0.3	N/A	1	0.4	0.4	0.4	0.4	N/A	1	0.4	0.4	0.4	0.4	N/A	1							---	---	---	---	---	---												
Bankfull Max Depth (ft)[2]	1.0	1.0	1.0	1.0	N/A	1	0.5	0.5	0.5	0.5	N/A	1	0.6	0.6	0.6	0.6	N/A	1	0.6	0.6	0.6	0.6	N/A	1							0.80	0.80	0.80	0.80	N/A	1.00												
Bankfull Cross Sectional Area (ft^2)[2]	3.7	3.7	3.7	3.7	N/A	1	2.4	2.4	2.4	2.4	N/A	1	2.6	2.6	2.6	2.6	N/A	1	2.7	2.7	2.7	2.7	N/A	1							3.50	3.50	3.50	3.50	N/A	1.00												
Bankfull Width/Depth Ratio	17.7	17.7	17.7	17.7	N/A	1	20.3	20.3	20.3	20.3	N/A	1	17.5	17.5	17.5	17.5	N/A	1	17.6	17.6	17.6	17.6	N/A	1							---	---	---	---	---	---												
Bankfull Entrenchment Ratio[1]	3.9	3.9	3.9	3.9	N/A	1	4.3	4.3	4.3	4.3	N/A	1	4.5	4.5	4.5	4.5	N/A	1	4.0	4.0	4.0	4.0	N/A	1							>3.5	>3.5	>3.5	>3.5	N/A	1.00												
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.0	N/A	1	1.0	1.0	1.0	1.0	N/A	1	1.0	1.0	1.0	1.0	N/A	1	1.0	1.0	1.0	1.0	N/A	1							1.00	1.00	1.00	1.00	N/A	1.00												
Profile																																															
Riffle Length (ft)	2.6	6.2	6.2	16.4	2.8	26																																									
Riffle Slope (ft/ft)	0.001	0.010	0.009	0.026	0.0	26																																									
Pool Length (ft)	2.3	5.9	5.4	16.0	2.9	26																																									
Pool Max Depth (ft)	0.7	1.5	1.5	2.3	0.4	26																																									
Pool Spacing (ft)	6.1	15.0	14.2	27.8	5.1	25																																									
Pattern																																															
Channel Belt Width (ft)	14.0	19.2	19.2	24.4	7.3	2																																									
Radius of Curvature (ft)	11.6	13.6	13.1	16.5	2.2	4																																									
Rc: Bankfull Width (ft/ft)	1.4	1.7	1.6	2.0	0.3	2																																									
Meander Wavelength (ft)	23.8	44.4	47.1	55.0	11.9	6																																									
Meander Width Ratio	1.7	2.4	2.4	3.0	0.9	2																																									
Additional Reach Parameters																																															
Rosgen Classification	B4																																														
Channel Thalweg Length (ft)	430																																														
Sinuosity (ft)	1.06																																														
Water Surface Slope (Channel) (ft/ft)	0.0265																																														
Bankfull Slope (ft/ft)	0.0267																																														
Ri% / Ru% / P% / G% / S%	42%	0%	40%	7%	11%																																									

N/A - Information does not apply.
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 11b cont'd. Monitoring Data - Stream Reach Data Summary
Pee Dee Stream Restoration Site - Jerry Branch 2 (625 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	7.1	7.1	7.1	7.1	N/A	1	7.2	7.2	7.2	7.2	N/A	1	7.2	7.2	7.2	7.2	N/A	1	7.7	7.7	7.7	7.7	N/A	1							7.3	7.3	7.3	7.3	N/A	1.00												
Floodprone Width (ft)[1]	16.0	16.0	16.0	16.0	N/A	1	25.0	25.0	25.0	25.0	N/A	1	25.0	25.0	25.0	25.0	N/A	1	25.0	25.0	25.0	25.0	N/A	1							21.6	21.6	21.6	21.6	N/A	1.00												
Bankfull Mean Depth (ft)	0.4	0.4	0.4	0.4	N/A	1	0.4	0.4	0.4	0.4	N/A	1	0.4	0.4	0.4	0.4	N/A	1	0.3	0.3	0.3	0.3	N/A	1							---	---	---	---	N/A	1.00												
Bankfull Max Depth (ft)[2]	0.7	0.7	0.7	0.7	N/A	1	0.6	0.6	0.6	0.6	N/A	1	0.6	0.6	0.6	0.6	N/A	1	0.6	0.6	0.6	0.6	N/A	1							0.7	0.7	0.7	0.7	N/A	1.00												
Bankfull Cross Sectional Area (ft^2)[2]	3.1	3.1	3.1	3.1	N/A	1	3.0	3.0	3.0	3.0	N/A	1	2.7	2.7	2.7	2.7	N/A	1	2.6	2.6	2.6	2.6	N/A	1							2.8	2.8	2.8	2.8	N/A	1.00												
Bankfull Width/Depth Ratio	16.4	16.4	16.4	16.4	N/A	1	17.0	17.0	17.0	17.0	N/A	1	19.4	19.4	19.4	19.4	N/A	1	22.6	22.6	22.6	22.6	N/A	1							---	---	---	---	N/A	1.00												
Bankfull Entrenchment Ratio[1]	2.3	2.3	2.3	2.3	N/A	1	3.5	3.5	3.5	3.5	N/A	1	3.5	3.5	3.5	3.5	N/A	1	3.2	3.2	3.2	3.2	N/A	1							3.0	3.0	3.0	3.0	N/A	1.00												
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.0	N/A	1	1.0	1.0	1.0	1.0	N/A	1	1.0	1.0	1.0	1.0	N/A	1	0.9	0.9	0.9	0.9	N/A	1							<1	<1	<1	<1	N/A	1.00												
Profile																																															
Riffle Length (ft)	3.1	9.0	8.7	26.5	4.5	29																																									
Riffle Slope (ft/ft)	0.005	0.019	0.018	0.042	0.010	29																																									
Pool Length (ft)	2.3	4.8	4.7	7.8	1.5	31																																									
Pool Max Depth (ft)	0.9	1.5	1.5	2.2	0.3	29																																									
Pool Spacing (ft)	12.0	18.0	16.8	36.2	5.1	30																																									
Pattern																																															
Channel Belt Width (ft)	13.4	20.3	22.4	25.6	5.1	6																																									
Radius of Curvature (ft)	12.1	13.4	12.7	16.5	1.8	5																																									
Rc: Bankfull Width (ft/ft)	1.70	1.9	1.8	2.3	0.2	2																																									
Meander Wavelength (ft)	18.5	30.0	30.6	38.1	6.6	6																																									
Meander Width Ratio	1.9	2.9	3.2	3.6	0.7	6																																									
Additional Reach Parameters																																															
Rosgen Classification	B4																																														
Channel Thalweg Length (ft)	625																																														
Sinuosity (ft)	1.29																																														
Water Surface Slope (Channel) (ft/ft)	0.024																																														
Bankfull Slope (ft/ft)	0.024																																														
Ri% / Ru% / P% / G% / S%	47%	0%	27%	12%	14%																																									

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 11b cont'd. Monitoring Data - Stream Reach Data Summary
Pee Dee Stream Restoration Site - Jerry Branch 3 (636 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	7.2	7.3	7.3	7.4	0.1	2	6.7	7.1	7.1	7.5	0.6	2	6.4	6.9	6.9	7.3	0.6	2	6.2	6.6	6.6	6.9	0.5	2							7.4	9.7	9.7	12.0	3.3	2.0												
Floodprone Width (ft)[1]	24.7	29.3	29.3	33.8	6.4	2	25.0	27.5	27.5	30.0	3.5	2	25.0	27.5	27.5	30.0	3.5	2	25.0	27.5	27.5	30.0	3.5	2							23.7	28.8	28.8	33.8	7.1	2.0												
Bankfull Mean Depth (ft)	0.4	0.4	0.4	0.4	0.0	2	0.3	0.4	0.4	0.4	0.1	2	0.4	0.4	0.4	0.4	0.0	2	0.4	0.4	0.4	0.4	0.0	2							---	---	---	---	---	---												
Bankfull Max Depth (ft)[2]	0.8	0.9	0.9	0.9	0.1	2	0.5	0.6	0.6	0.6	0.1	2	0.5	0.6	0.6	0.6	0.0	2	0.5	0.6	0.6	0.6	0.1	2							0.5	0.5	0.5	0.5	0.0	2.0												
Bankfull Cross Sectional Area (ft^2)[2]	3.0	3.2	3.2	3.3	0.2	2	2.3	2.8	2.8	3.3	0.7	2	2.4	2.6	2.6	2.9	0.3	2	2.2	2.3	2.3	2.4	0.1	2							2.0	2.3	2.3	2.5	0.4	2.0												
Bankfull Width/Depth Ratio	16.6	17.2	17.2	17.7	0.8	2	16.7	18.1	18.1	19.4	1.9	2	17.0	17.9	17.9	18.7	1.2	2	17.4	18.4	18.4	19.4	1.4	2							---	---	---	---	---	---												
Bankfull Entrenchment Ratio[1]	3.4	4.0	4.0	4.6	0.8	2	3.7	3.9	3.9	4.0	0.2	2	3.9	4.0	4.0	4.1	0.1	2	4.0	4.2	4.2	4.4	0.3	2							2.8	3.0	3.0	3.2	0.3	2.0												
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2							1.0	1.0	1.0	1.0	0.0	2.0												
Profile																																																
Riffle Length (ft)	3.1	9.0	8.7	26.5	4.5	29																																									
Riffle Slope (ft/ft)	0.00	0.019	0.018	0.042	0.010	29																																									
Pool Length (ft)	2.3	4.8	4.7	7.8	1.5	31																																									
Pool Max Depth (ft)	0.9	1.5	1.5	2.2	0.3	29																																									
Pool Spacing (ft)	12.0	18.0	16.8	36.2	5.1	30																																									
Pattern																																															
Channel Belt Width (ft)	20.0	24.2	26.0	26.5	3.6	3																																									
Radius of Curvature (ft)	9.2	12.1	10.6	17.0	2.8	7																																									
Rc: Bankfull Width (ft/ft)	1.3	1.7	1.5	2.3	0.4	2																																									
Meander Wavelength (ft)	34.1	43.9	44.8	54.4	8.1	6																																									
Meander Width Ratio	2.7	3.3	3.6	3.6	0.5	3																																									
Additional Reach Parameters																																															
Rosgen Classification	B4																																														
Channel Thalweg Length (ft)	636																																														
Sinuosity (ft)	1.02																																														
Water Surface Slope (Channel) (ft/ft)	0.0235																																														
Bankfull Slope (ft/ft)	0.0239																																														
Ri% / Ru% / P% / G% / S%	60%	0%	21%	10%	9%																																									

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 11b cont'd. Monitoring Data - Stream Reach Data Summary
Pee Dee Stream Restoration Site - Dale Branch 2 (920 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	6.4	6.7	6.7	7.0	0.4	2	6.2	6.8	6.8	7.3	0.8	2	6.2	6.7	6.7	7.2	0.7	2	6.5	6.5	6.5	6.5	0.0	2							5.9	6.8	6.8	7.7	1.3	2.0												
Floodprone Width (ft)[1]	15.1	19.5	19.5	23.9	6.2	2	25.0	25.0	25.0	25.0	0.0	2	25.0	25.0	25.0	25.0	0.0	2	25.0	25.0	25.0	25.0	0.0	2							15.2	19.9	19.9	24.5	6.6	2.0												
Bankfull Mean Depth (ft)	0.3	0.3	0.3	0.3	0.0	2	0.2	0.3	0.3	0.3	0.1	2	0.3	0.3	0.3	0.3	0.0	2	0.2	0.3	0.3	0.3	0.1	2							---	---	---	---	---	---												
Bankfull Max Depth (ft)[2]	0.5	0.6	0.6	0.7	0.1	2	0.5	0.5	0.5	0.5	0.0	2	0.5	0.5	0.5	0.5	0.0	2	0.5	0.6	0.6	0.6	0.1	2							0.5	0.6	0.6	0.6	0.1	2.0												
Bankfull Cross Sectional Area (ft^2)[2]	1.8	1.9	1.9	2.0	0.1	2	1.6	1.7	1.7	1.7	0.1	2	1.7	1.9	1.9	2.0	0.2	2	1.6	1.7	1.7	1.8	0.1	2							1.3	1.4	1.4	1.4	0.1	2.0												
Bankfull Width/Depth Ratio	22.6	23.6	23.6	24.6	1.4	2	23.7	27.2	27.2	30.6	4.9	2	21.7	23.9	23.9	26.0	3.0	2	23.4	25.2	25.2	26.9	2.5	2							---	---	---	---	---	---												
Bankfull Entrenchment Ratio[1]	2.4	2.9	2.9	3.4	0.7	2	3.3	3.7	3.7	4.0	0.5	2	3.5	3.8	3.8	4.1	0.4	2	3.9	3.9	3.9	3.9	0.0	2							2.6	2.9	2.9	3.2	0.4	2.0												
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	0.9	0.9	0.9	0.9	0.0	2							1.0	1.0	1.0	1.0	0.0	2.0												
Profile																																															
Riffle Length (ft)	3.2	10.1	9.0	21.3	4.8	28																																									
Riffle Slope (ft/ft)	0.007	0.027	0.027	0.046	0.011	28																																									
Pool Length (ft)	1.5	3.2	2.9	9.6	1.6	29																																									
Pool Max Depth (ft)	1.1	1.6	1.4	2.8	0.5	28																																									
Pool Spacing (ft)	9.4	19.7	19.3	31.4	4.9	28																																									
Pattern																																															
Channel Belt Width (ft)	18.0	20.6	19.0	24.4	3.1	5																																									
Radius of Curvature (ft)	8.2	13.8	14.7	16.7	3.4	5																																									
Rc: Bankfull Width (ft/ft)	1.2	2.1	2.2	2.5	0.5	5																																									
Meander Wavelength (ft)	33.1	38.9	39.6	41.5	3.1	6																																									
Meander Width Ratio	2.7	3.1	2.8	3.6	0.9	6																																									
Additional Reach Parameters																																															
Rosgen Classification	B4																																														
Channel Thalweg Length (ft)	920																																														
Sinuosity (ft)	1.03																																														
Water Surface Slope (Channel) (ft/ft)	0.029																																														
Bankfull Slope (ft/ft)	0.028																																														
Ri% / Ru% / P% / G% / S%	50%	7%	16%	10%	17%																																									

N/A - Information does not apply.
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 11b cont'd. Monitoring Data - Stream Reach Data Summary
Pee Dee Stream Restoration Site - Dale Branch 3 (559 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	7.3	7.3	7.3	7.3	N/A	1	7.1	7.1	7.1	7.1	N/A	1	7.1	7.1	7.1	7.1	N/A	1	7.8	7.8	7.8	7.8	N/A	1							5.40	5.40	5.40	5.40	N/A	1.00												
Floodprone Width (ft)[1]	18.5	18.5	18.5	18.5	N/A	1	20.0	20.0	20.0	20.0	N/A	1	20.0	20.0	20.0	20.0	N/A	1	20.0	20.0	20.0	20.0	N/A	1							17.70	17.70	17.70	17.70	N/A	1.00												
Bankfull Mean Depth (ft)	0.3	0.3	0.3	0.3	N/A	1	0.3	0.3	0.3	0.3	N/A	1	0.4	0.4	0.4	0.4	N/A	1	0.4	0.4	0.4	0.4	N/A	1							---	---	---	---	---	---												
Bankfull Max Depth (ft)[2]	0.7	0.7	0.7	0.7	N/A	1	0.6	0.6	0.6	0.6	N/A	1	0.8	0.8	0.8	0.8	N/A	1	0.8	0.8	0.8	0.8	N/A	1							0.80	0.80	0.80	0.80	N/A	1.00												
Bankfull Cross Sectional Area (ft^2)[2]	2.5	2.5	2.5	2.5	N/A	1	2.2	2.2	2.2	2.2	N/A	1	2.7	2.7	2.7	2.7	N/A	1	3.1	3.1	3.1	3.1	N/A	1							2.90	2.90	2.90	2.90	N/A	1.00												
Bankfull Width/Depth Ratio	21.1	21.1	21.1	21.1	N/A	1	23.1	23.1	23.1	23.1	N/A	1	18.7	18.7	18.7	18.7	N/A	1	19.3	19.3	19.3	19.3	N/A	1							---	---	---	---	---	---												
Bankfull Entrenchment Ratio[1]	2.5	2.5	2.5	2.5	N/A	1	2.8	2.8	2.8	2.8	N/A	1	2.8	2.8	2.8	2.8	N/A	1	2.6	2.6	2.6	2.6	N/A	1							3.30	3.30	3.30	3.30	N/A	1.00												
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.0	N/A	1	1.0	1.0	1.0	1.0	N/A	1	1.0	1.0	1.0	1.0	N/A	1	0.5	0.5	0.5	0.5	N/A	1							1.10	1.10	1.10	1.10	N/A	1.00												
Profile																																															
Riffle Length (ft)	0.5	12.6	10.7	60.6	10.9	24																																									
Riffle Slope (ft/ft)	0.005	0.026	0.025	0.061	0.014	24																																									
Pool Length (ft)	1.3	3.3	2.9	9.0	1.5	23																																									
Pool Max Depth (ft)	0.8	1.3	1.3	1.7	0.2	23																																									
Pool Spacing (ft)	13.3	21.0	18.5	63.1	10.1	23																																									
Pattern																																															
Channel Belt Width (ft)	17.8	26.7	27.9	33.4	7.4	4																																									
Radius of Curvature (ft)	8.7	10.2	9.8	12.1	1.4	6																																									
Rc: Bankfull Width (ft/ft)	1.2	1.4	1.3	1.7	0.2	1																																									
Meander Wavelength (ft)	29.6	39.9	37.4	55.7	10.0	6																																									
Meander Width Ratio	2.4	3.7	3.8	4.6	1.0	4																																									
Additional Reach Parameters																																															
Rosgen Classification	B4																																														
Channel Thalweg Length (ft)	559																																														
Sinuosity (ft)	1.05																																														
Water Surface Slope (Channel) (ft/ft)	0.024																																														
Bankfull Slope (ft/ft)	0.026																																														
Ri% / Ru% / P% / G% / S%	62%	0%	16%	11%	11%																																									

N/A - Information does not apply.
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 11b cont'd. Monitoring Data - Stream Reach Data Summary
Pee Dee Stream Restoration Site - Dale Branch 4 (835 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	6.3	6.4	6.4	6.5	0.1	2	6.2	6.7	6.7	7.2	0.7	2	6.5	7.0	7.0	7.6	0.7	2	6.7	6.8	6.8	6.8	0.1	2							5.40	5.90	5.90	6.40	0.71	2.00												
Floodprone Width (ft)[1]	22.0	33.1	33.1	44.2	15.7	2	25.0	32.5	32.5	40.0	10.6	2	25.0	32.5	32.5	40.0	10.6	2	25.0	32.5	32.5	40.0	10.6	2							17.50	30.35	30.35	43.20	18.17	2.00												
Bankfull Mean Depth (ft)	0.3	0.4	0.4	0.5	0.1	2	0.3	0.4	0.4	0.5	0.1	2	0.4	0.4	0.4	0.5	0.1	2	0.3	0.4	0.4	0.5	0.1	2							---	---	---	---	---	---												
Bankfull Max Depth (ft)[2]	0.7	0.8	0.8	0.9	0.1	2	0.6	0.7	0.7	0.8	0.1	2	0.7	0.8	0.8	0.8	0.0	2	0.7	0.8	0.8	0.8	0.1	2							0.50	0.90	0.90	1.30	0.57	2.00												
Bankfull Cross Sectional Area (ft^2)[2]	1.9	2.5	2.5	3.1	0.8	2	2.3	2.6	2.6	2.9	0.4	2	2.7	2.9	2.9	3.0	0.2	2	2.2	2.7	2.7	3.2	0.7	2							1.70	3.35	3.35	5.00	2.33	2.00												
Bankfull Width/Depth Ratio	13.8	17.4	17.4	21.0	5.1	2	13.2	18.1	18.1	23.0	6.9	2	14.2	17.5	17.5	20.9	4.7	2	14.7	17.3	17.3	19.9	3.7	2							---	---	---	---	---	---												
Bankfull Entrenchment Ratio[1]	3.5	5.2	5.2	6.8	2.3	2	3.5	4.9	4.9	6.2	1.9	2	3.3	4.7	4.7	6.2	2.0	2	3.8	4.9	4.9	5.9	1.5	2							2.70	5.35	5.35	8.00	3.75	2.00												
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	0.9	1.0	1.0	1.0	0.1	2							1.00	1.15	1.15	1.30	0.21	2.00												
Profile																																															
Riffle Length (ft)	7.8	17.8	14.5	68.7	12.3	31																																									
Riffle Slope (ft/ft)	0.003	0.018	0.016	0.048	0.009	31																																									
Pool Length (ft)	1.5	3.2	2.9	12.5	2.1	30																																									
Pool Max Depth (ft)	0.1	1.4	1.4	2.1	0.3	33																																									
Pool Spacing (ft)	14.4	26.0	22.2	77.4	13.7	31																																									
Pattern																																															
Channel Belt Width (ft)	16.7	18.7	18.0	22.2	2.5	4																																									
Radius of Curvature (ft)	9.3	13.1	13.6	16.4	2.9	6																																									
Rc: Bankfull Width (ft/ft)	1.4	2.1	2.1	2.6	0.5	2																																									
Meander Wavelength (ft)	34.4	45.9	39.9	62.7	12.5	6																																									
Meander Width Ratio	2.6	2.9	2.8	3.5	0.4	4																																									
Additional Reach Parameters																																															
Rosgen Classification	B4																																														
Channel Thalweg Length (ft)	835																																														
Sinuosity (ft)	1.03																																														
Water Surface Slope (Channel) (ft/ft)	0.024																																														
Bankfull Slope (ft/ft)	0.020																																														
Ri% / Ru% / P% / G% / S%	68%	0%	12.0%	8%	11%																																									

N/A - Information does not apply.
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 11b cont'd. Monitoring Data - Stream Reach Data Summary
Pee Dee Stream Restoration Site - Dale Branch 5 (679 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	7.1	7.1	7.1	7.1	N/A	1	7.9	7.9	7.9	7.9	N/A	1	7.9	7.9	7.9	7.9	N/A	1	9.1	9.1	9.1	9.1	N/A	1							7.0	7.0	7.0	7.0	N/A	1.0												
Floodprone Width (ft)[1]	23.9	23.9	23.9	23.9	N/A	1	25.0	25.0	25.0	25.0	N/A	1	25.0	25.0	25.0	25.0	N/A	1	25.0	25.0	25.0	25.0	N/A	1							>23.7	>23.7	>23.7	>23.7	N/A	1.0												
Bankfull Mean Depth (ft)	0.5	0.5	0.5	0.5	N/A	1	0.5	0.5	0.5	0.5	N/A	1	0.5	0.5	0.5	0.5	N/A	1	0.4	0.4	0.4	0.4	N/A	1							---	---	---	---	N/A	1.0												
Bankfull Max Depth (ft)[2]	0.7	0.7	0.7	0.7	N/A	1	0.8	0.8	0.8	0.8	N/A	1	0.8	0.8	0.8	0.8	N/A	1	0.8	0.8	0.8	0.8	N/A	1							0.8	0.8	0.8	0.8	N/A	1.0												
Bankfull Cross Sectional Area (ft^2)[2]	3.3	3.3	3.3	3.3	N/A	1	3.8	3.8	3.8	3.8	N/A	1	3.9	3.9	3.9	3.9	N/A	1	4.1	4.1	4.1	4.1	N/A	1							4.0	4.0	4.0	4.0	N/A	1.0												
Bankfull Width/Depth Ratio	15.2	15.2	15.2	15.2	N/A	1	16.2	16.2	16.2	16.2	N/A	1	16.3	16.3	16.3	16.3	N/A	1	20.6	20.6	20.6	20.6	N/A	1							---	---	---	---	N/A	1.0												
Bankfull Entrenchment Ratio[1]	3.4	3.4	3.4	3.4	N/A	1	3.2	3.2	3.2	3.2	N/A	1	3.2	3.2	3.2	3.2	N/A	1	2.7	2.7	2.7	2.7	N/A	1							>3.4	>3.4	>3.4	>3.4	N/A	1.0												
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.0	N/A	1	1.0	1.0	1.0	1.0	N/A	1	1.0	1.0	1.0	1.0	N/A	1	1.2	1.2	1.2	1.2	N/A	1							1.1	1.1	1.1	1.1	N/A	1.0												
Profile																																															
Riffle Length (ft)	7.2	18.3	20.3	25.1	6.0	11																																									
Riffle Slope (ft/ft)	0.005	0.022	0.024	0.044	0.011	11																																									
Pool Length (ft)	1.8	3.0	3.1	4.0	0.7	12																																									
Pool Max Depth (ft)	1.1	1.5	1.4	2.2	0.4	11																																									
Pool Spacing (ft)	12.1	26.4	28.4	35.2	6.8	11																																									
Pattern																																															
Channel Belt Width (ft)	13.2	15.3	15.6	17.1	1.9	3																																									
Radius of Curvature (ft)	8.7	14.1	15.6	16.7	3.6	4																																									
Rc: Bankfull Width (ft/ft)	1.2	2.0	2.2	2.4	0.5	2																																									
Meander Wavelength (ft)	47.9	56.4	54.8	67.7	7.2	6																																									
Meander Width Ratio	1.9	2.2	2.2	2.4	0.3	3																																									
Additional Reach Parameters																																															
Rosgen Classification	B4																																														
Channel Thalweg Length (ft)	679																																														
Sinuosity (ft)	0.977																																														
Water Surface Slope (Channel) (ft/ft)	0.024																																														
Bankfull Slope (ft/ft)	0.024																																														
Ri% / Ru% / P% / G% / S%	68%	0%	12%	13%	7%																																									

N/A - Information does not apply.
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 11b cont'd. Monitoring Data - Stream Reach Data Summary
Pee Dee Stream Restoration Site - Thompson Branch 2 (1,061 feet)

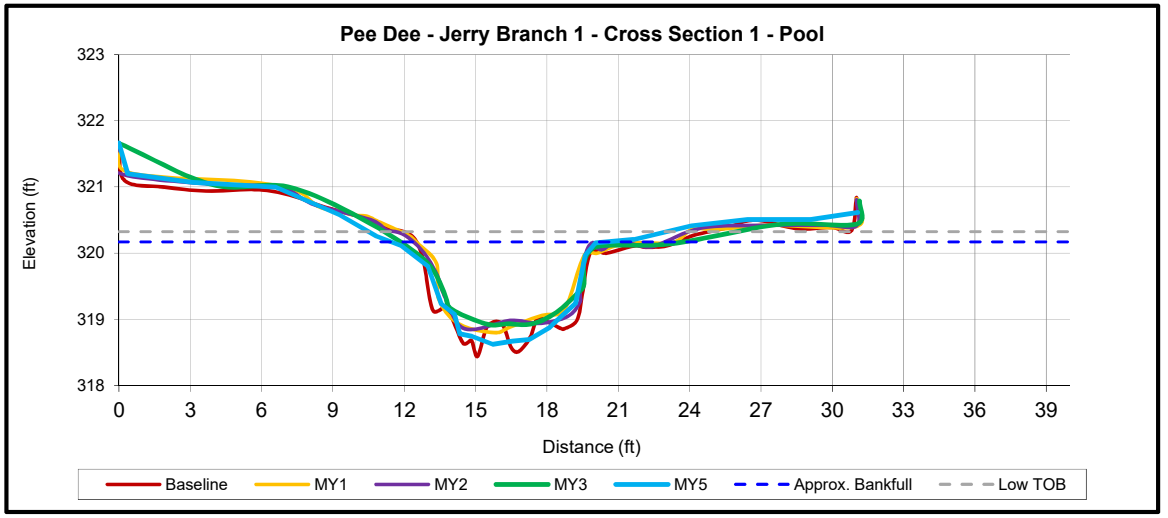
Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	7.5	7.6	7.6	7.6	0.1	2	7.7	7.7	7.7	7.7	0.0	2	7.6	7.7	7.7	7.7	0.1	2	7.8	8.1	8.1	8.4	0.4	2							8.4	8.7	8.7	8.9	0.4	2.0												
Floodprone Width (ft)[1]	31.1	32.7	32.7	34.3	2.3	2	30.0	30.0	30.0	30.0	0.0	2	30.0	30.0	30.0	30.0	0.0	2	30.0	30.0	30.0	30.0	0.0	2							25.0	29.2	29.2	33.3	5.9	2.0												
Bankfull Mean Depth (ft)	0.6	0.6	0.6	0.6	0.0	2	0.6	0.6	0.6	0.6	0.0	2	0.6	0.6	0.6	0.6	0.0	2	0.6	0.6	0.6	0.6	0.0	2							---	---	---	---	---	---												
Bankfull Max Depth (ft)[2]	1.1	1.2	1.2	1.2	0.1	2	0.9	1.0	1.0	1.0	0.1	2	0.9	1.0	1.0	1.1	0.1	2	0.9	1.0	1.0	1.1	0.1	2							0.8	0.8	0.8	0.8	0.0	2.0												
Bankfull Cross Sectional Area (ft^2)[2]	4.2	4.3	4.3	4.3	0.1	2	4.4	4.4	4.4	4.4	0.0	2	4.4	4.4	4.4	4.4	0.0	2	4.4	4.6	4.6	4.8	0.3	2							2.8	3.5	3.5	4.1	0.9	2.0												
Bankfull Width/Depth Ratio	13.3	13.4	13.4	13.4	0.1	2	13.5	13.5	13.5	13.5	0.0	2	13.0	13.3	13.3	13.5	0.4	2	13.8	14.2	14.2	14.5	0.5	2							---	---	---	---	---	---												
Bankfull Entrenchment Ratio[1]	4.1	4.3	4.3	4.5	0.3	2	3.9	3.9	3.9	3.9	0.0	2	3.9	3.9	3.9	3.9	0.0	2	3.6	3.8	3.8	3.9	0.2	2							3.0	3.4	3.4	3.7	0.5	2.0												
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2							1.0	1.0	1.0	1.0	0.0	2.0												
Profile																																																
Riffle Length (ft)	10.0	15.8	15.2	25.4	3.9	32																																									
Riffle Slope (ft/ft)	0.005	0.014	0.013	0.023	0.005	32																																									
Pool Length (ft)	1.8	5.0	4.6	18.3	3.0	32																																									
Pool Max Depth (ft)	1.4	2.1	2.0	2.6	0.3	32																																									
Pool Spacing (ft)	19.5	27.5	25.9	54.0	7.4	32																																									
Pattern																																															
Channel Belt Width (ft)	14.4	22.4	19.5	37.8	8.2	6																																									
Radius of Curvature (ft)	10.5	18.3	18.5	25.9	6.7	4																																									
Rc: Bankfull Width (ft/ft)	1.4	2.4	2.5	3.5	0.9	3																																									
Meander Wavelength (ft)	34.3	48.7	50.5	60.9	9.8	6																																									
Meander Width Ratio	2.2	3.0	2.6	4.1	1.0	3																																									
Additional Reach Parameters																																															
Rosgen Classification	B4																																														
Channel Thalweg Length (ft)	1,061																																														
Sinuosity (ft)	1.05																																														
Water Surface Slope (Channel) (ft/ft)	0.020																																														
Bankfull Slope (ft/ft)	0.022																																														
Ri% / Ru% / P% / G% / S%	57%	0%	18%	11%	14%																																									

N/A - Information does not apply
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Note: Starting in MY5, the parameters denoted with[1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with[2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

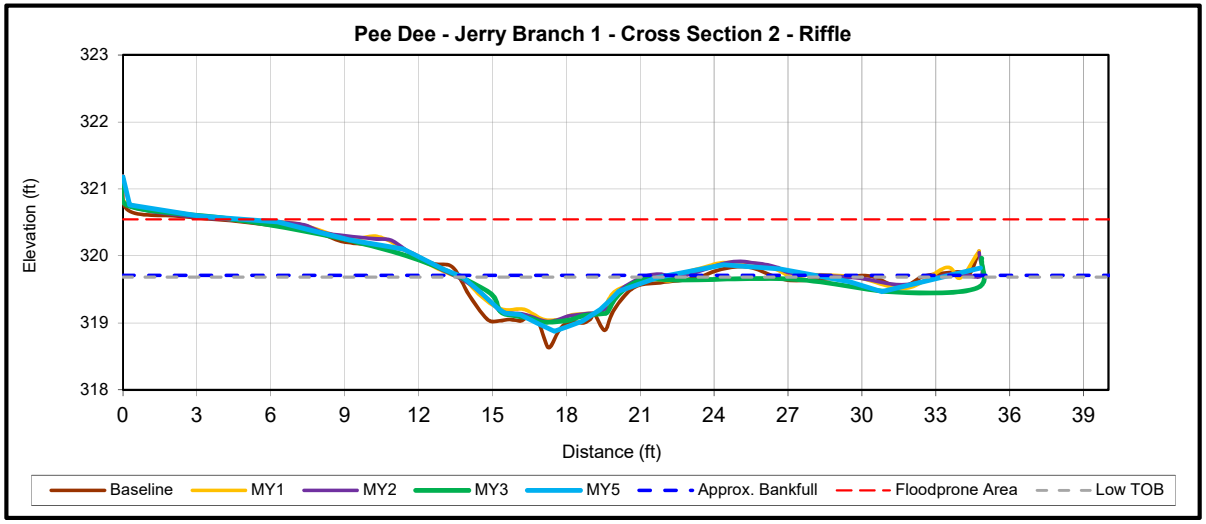


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	9.1	8.3	8.3	8.2	-	N/A	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	N/A	-	-
Bankfull Mean Depth (ft)	0.9	0.8	0.8	0.8	-	---	-	-
Bankfull Max Depth (ft)[2]	1.7	1.3	1.2	1.2	-	1.7	-	-
Bankfull Cross-Sectional Area (ft2)[2]	8.5	6.8	6.9	6.6	-	10.2	-	-
Width/Depth Ratio	9.8	10.1	9.9	10.1	-	---	-	-
Entrenchment Ratio[1]	2.7	3.0	3.0	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

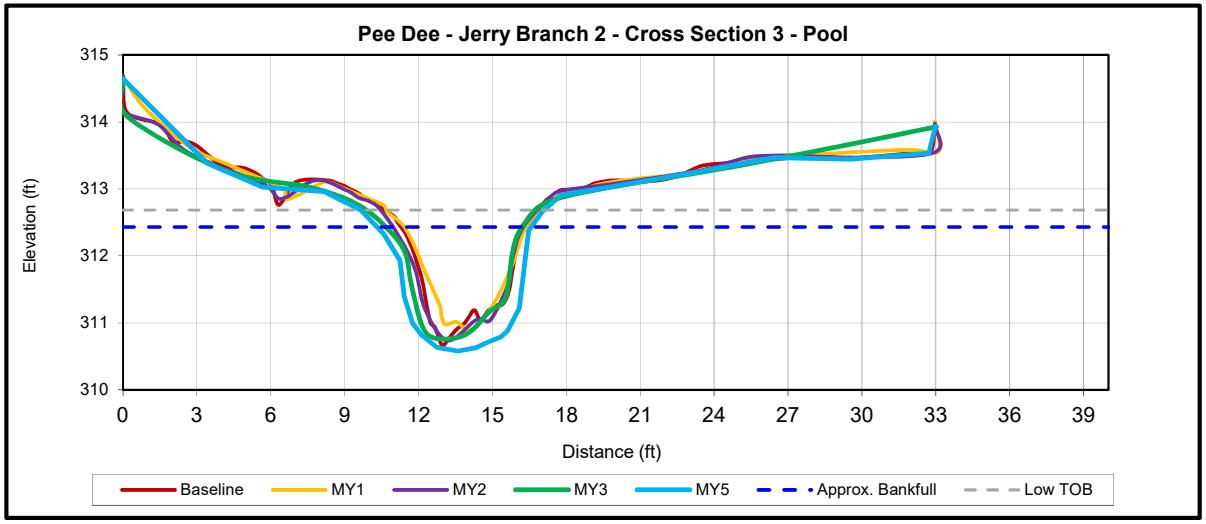


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	8.1	7.0	6.7	6.9	-	8.6	-	-
Floodprone Width (ft)[1]	30.0	30.0	30.0	30.0	-	>29.9	-	-
Bankfull Mean Depth (ft)	0.5	0.3	0.4	0.4	-	---	-	-
Bankfull Max Depth (ft)[2]	1.0	0.5	0.6	0.6	-	0.8	-	-
Bankfull Cross-Sectional Area (ft2)[2]	3.7	2.4	2.6	2.7	-	3.5	-	-
Width/Depth Ratio	17.7	20.3	17.5	17.6	-	---	-	-
Entrenchment Ratio[1]	3.7	4.3	4.5	4.0	-	>3.5	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	1.0	-	1.0	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

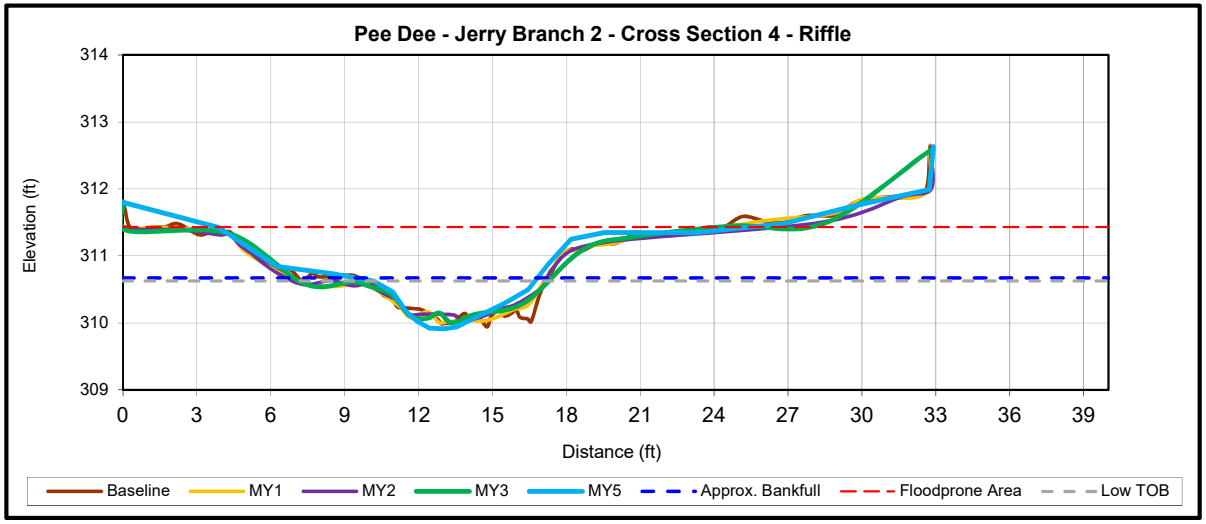


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.8	8.1	8.1	9.8	-	N/A	-	-
Floodprone Width (ft)[1]	30.0	30.0	30.0	30.0	-	N/A	-	-
Bankfull Mean Depth (ft)	1.1	1.0	1.1	1.0	-	---	-	-
Bankfull Max Depth (ft)[2]	2.3	2.0	2.2	2.1	-	2.1	-	-
Bankfull Cross-Sectional Area (ft2)[2]	8.3	7.7	8.7	9.4	-	10.1	-	-
Width/Depth Ratio	7.4	8.4	7.6	10.2	-	---	-	-
Entrenchment Ratio[1]	3.8	3.7	3.7	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

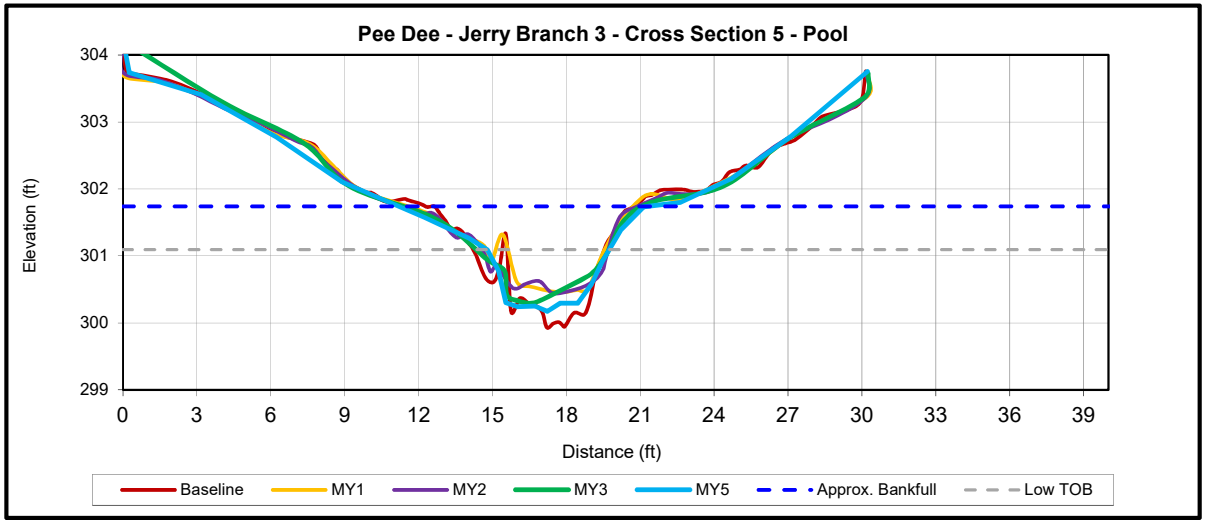


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.1	7.2	7.2	7.7	-	7.3	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	21.6	-	-
Bankfull Mean Depth (ft)	0.4	0.4	0.4	0.3	-	---	-	-
Bankfull Max Depth (ft)[2]	0.7	0.6	0.6	0.6	-	0.7	-	-
Bankfull Cross-Sectional Area (ft2)[2]	3.1	3.0	2.7	2.6	-	2.8	-	-
Width/Depth Ratio	16.4	17.0	19.4	22.6	-	---	-	-
Entrenchment Ratio[1]	3.5	3.5	3.5	3.2	-	3.0	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	0.9	-	<1	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

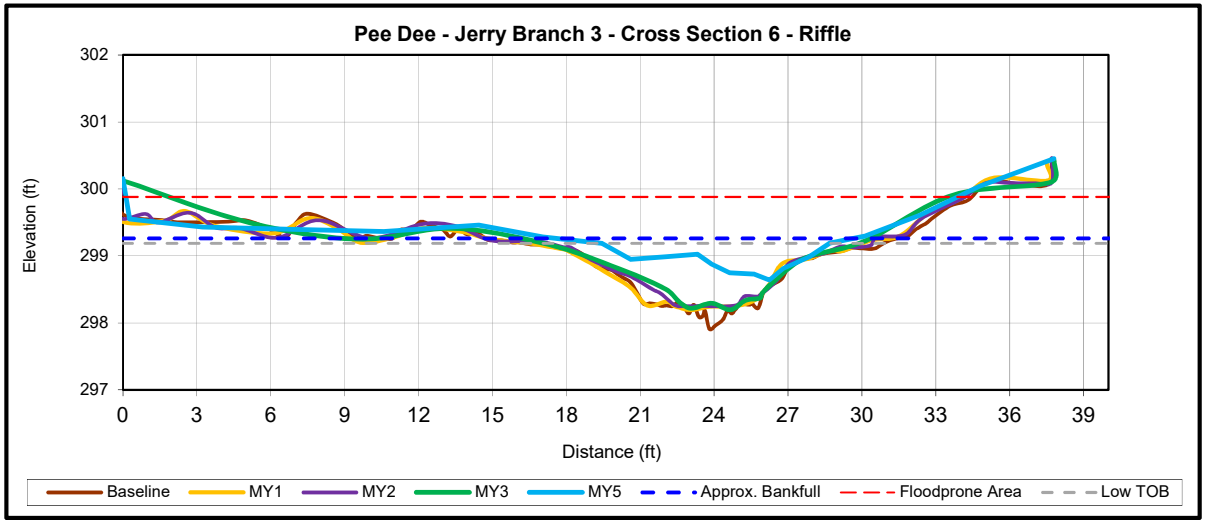


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	8.1	9.2	9.7	9.4	-	N/A	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	N/A	-	-
Bankfull Mean Depth (ft)	1.0	0.7	0.7	0.7	-	---	-	-
Bankfull Max Depth (ft)[2]	1.8	1.3	1.3	1.4	-	0.9	-	-
Bankfull Cross-Sectional Area (ft2)[2]	7.9	6.3	6.8	6.9	-	3.2	-	-
Width/Depth Ratio	8.3	13.2	13.7	13.0	-	---	-	-
Entrenchment Ratio[1]	3.1	2.7	2.6	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

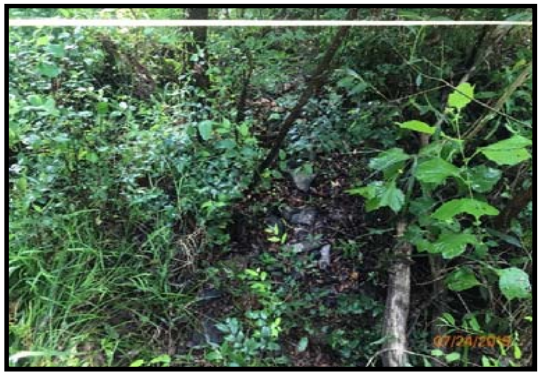
Downstream



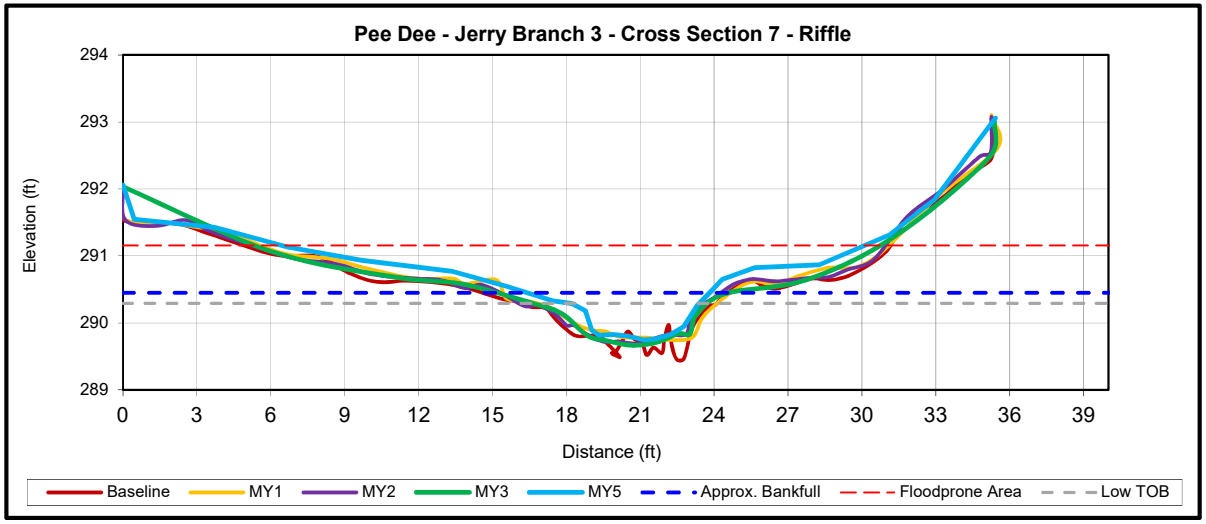
DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.4	7.5	7.3	6.9	-	12.0	-	-
Floodprone Width (ft)[1]	30.0	30.0	30.0	30.0	-	>33.8	-	-
Bankfull Mean Depth (ft)	0.4	0.4	0.4	0.4	-	---	-	-
Bankfull Max Depth (ft)[2]	0.9	0.6	0.6	0.6	-	0.5	-	-
Bankfull Cross-Sectional Area (ft2)[2]	3.3	3.3	2.9	2.4	-	2.5	-	-
Width/Depth Ratio	16.6	16.7	18.7	19.4	-	---	-	-
Entrenchment Ratio[1]	4.1	4.0	4.1	4.4	-	>2.8	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	1.0	-	<1	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream



Downstream

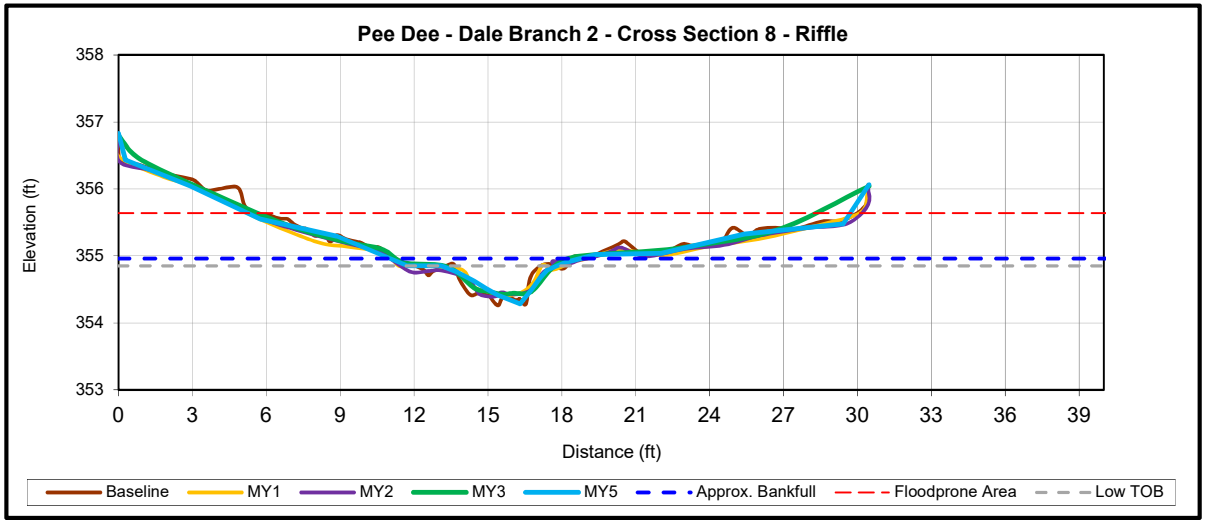


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.2	6.7	6.4	6.2	-	7.4	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	23.7	-	-
Bankfull Mean Depth (ft)	0.4	0.3	0.4	0.4	-	---	-	-
Bankfull Max Depth (ft)[2]	0.8	0.5	0.5	0.5	-	0.5	-	-
Bankfull Cross-Sectional Area (ft2)[2]	3.0	2.3	2.4	2.2	-	2.0	-	-
Width/Depth Ratio	17.7	19.4	17.0	17.4	-	---	-	-
Entrenchment Ratio[1]	3.4	3.7	3.9	4.0	-	3.2	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	0.9	-	<1	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

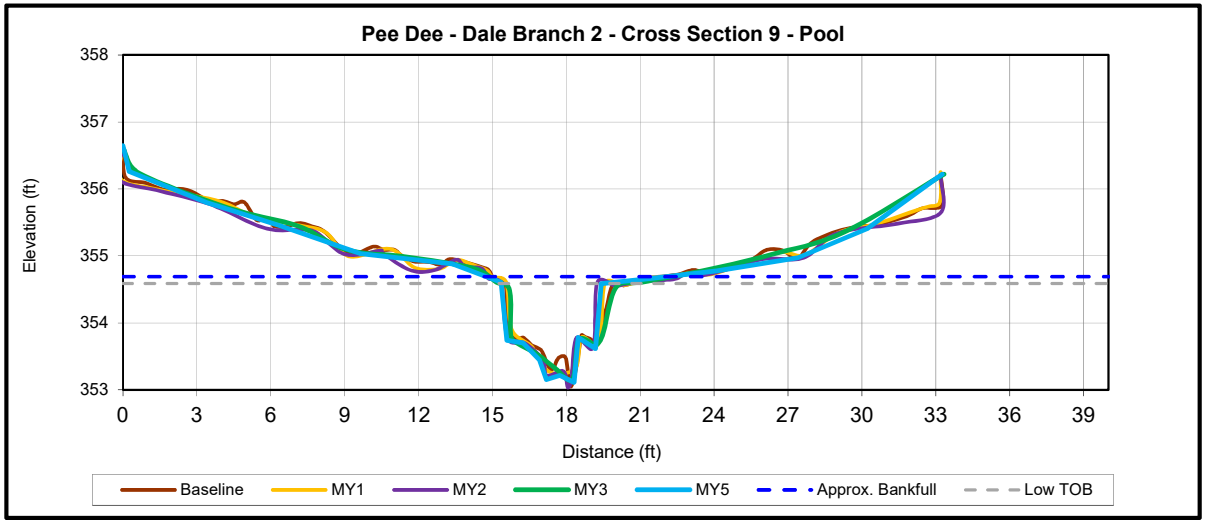


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.0	7.3	7.2	6.5	-	7.7	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	>24.5	-	-
Bankfull Mean Depth (ft)	0.3	0.2	0.3	0.2	-	---	-	-
Bankfull Max Depth (ft)[2]	0.7	0.5	0.5	0.5	-	0.6	-	-
Bankfull Cross-Sectional Area (ft2)[2]	2.0	1.7	2.0	1.6	-	1.3	-	-
Width/Depth Ratio	24.6	30.6	26.0	26.9	-	---	-	-
Entrenchment Ratio[1]	3.6	3.4	3.5	3.9	-	>3.2	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	0.9	-	<1	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

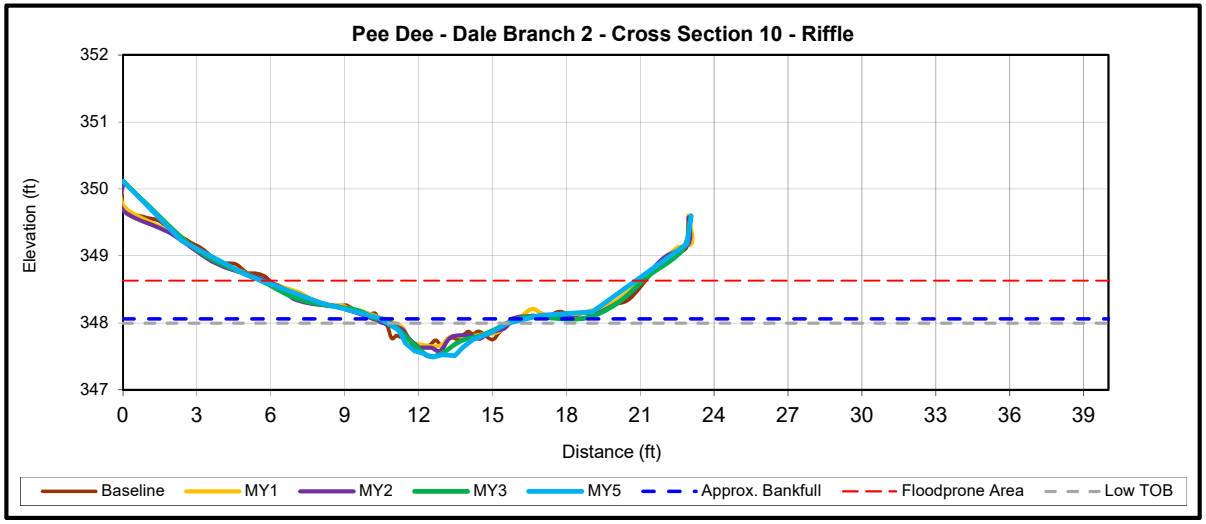


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.7	8.0	8.1	7.7	-	N/A	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	N/A	-	-
Bankfull Mean Depth (ft)	0.6	0.6	0.6	0.6	-	---	-	-
Bankfull Max Depth (ft)[2]	1.7	1.5	1.7	1.5	-	1.5	-	-
Bankfull Cross-Sectional Area (ft2)[2]	4.8	4.8	5.0	5.0	-	4.2	-	-
Width/Depth Ratio	12.3	13.5	13.3	11.8	-	---	-	-
Entrenchment Ratio[1]	3.3	3.1	3.1	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

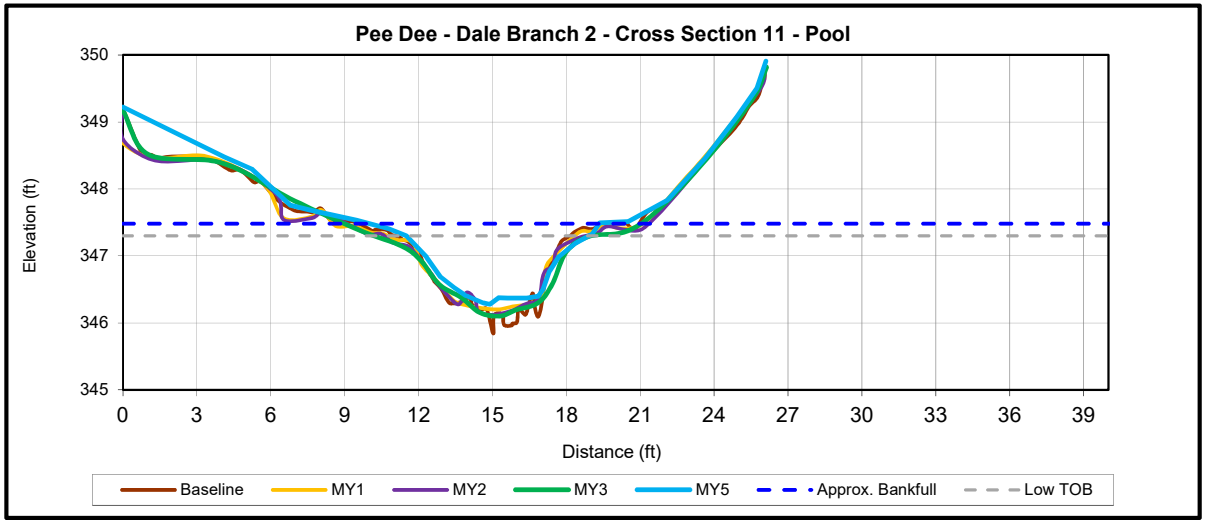


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	6.4	6.2	6.2	6.5	-	5.9	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	15.2	-	-
Bankfull Mean Depth (ft)	0.3	0.3	0.3	0.3	-	---	-	-
Bankfull Max Depth (ft)[2]	0.5	0.5	0.5	0.6	-	0.5	-	-
Bankfull Cross-Sectional Area (ft2)[2]	1.8	1.6	1.7	1.8	-	1.4	-	-
Width/Depth Ratio	22.6	23.7	21.7	23.4	-	---	-	-
Entrenchment Ratio[1]	3.9	4.0	4.1	3.9	-	2.6	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	0.9	-	<1	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

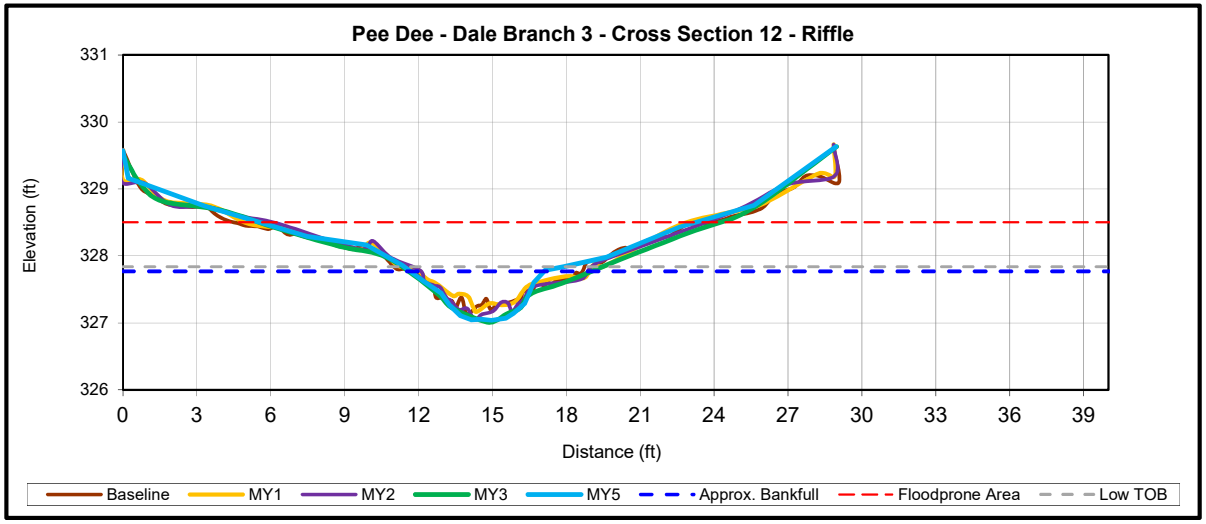


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.6	8.0	8.3	9.4	-	N/A	-	-
Floodprone Width (ft)[1]	20.0	20.0	20.0	20.0	-	N/A	-	-
Bankfull Mean Depth (ft)	0.8	0.7	0.7	0.7	-	---	-	-
Bankfull Max Depth (ft)[2]	1.6	1.2	1.3	1.3	-	1.0	-	-
Bankfull Cross-Sectional Area (ft2)[2]	6.1	5.9	6.0	6.7	-	4.6	-	-
Width/Depth Ratio	9.5	10.9	11.5	13.3	-	---	-	-
Entrenchment Ratio[1]	2.6	2.5	2.4	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

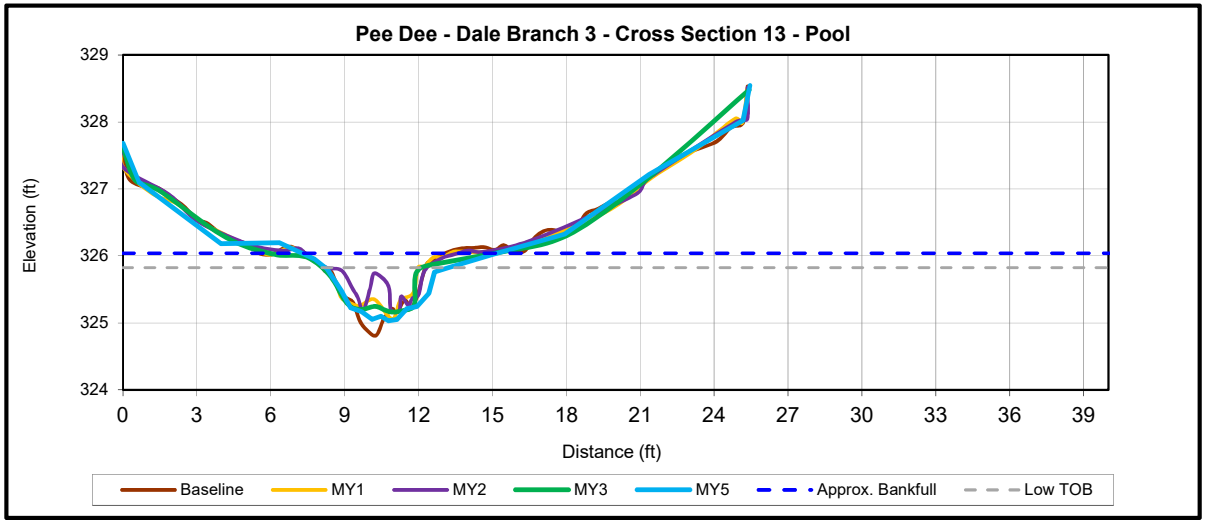


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.3	7.1	7.1	7.8	-	5.4	-	-
Floodprone Width (ft)[1]	20.0	20.0	20.0	20.0	-	17.7	-	-
Bankfull Mean Depth (ft)	0.3	0.3	0.4	0.4	-	---	-	-
Bankfull Max Depth (ft)[2]	0.7	0.6	0.8	0.8	-	0.8	-	-
Bankfull Cross-Sectional Area (ft2)[2]	2.5	2.2	2.7	3.1	-	2.9	-	-
Width/Depth Ratio	21.1	23.1	18.7	19.3	-	---	-	-
Entrenchment Ratio[1]	2.8	2.8	2.8	2.6	-	3.3	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	0.5	-	1.1	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

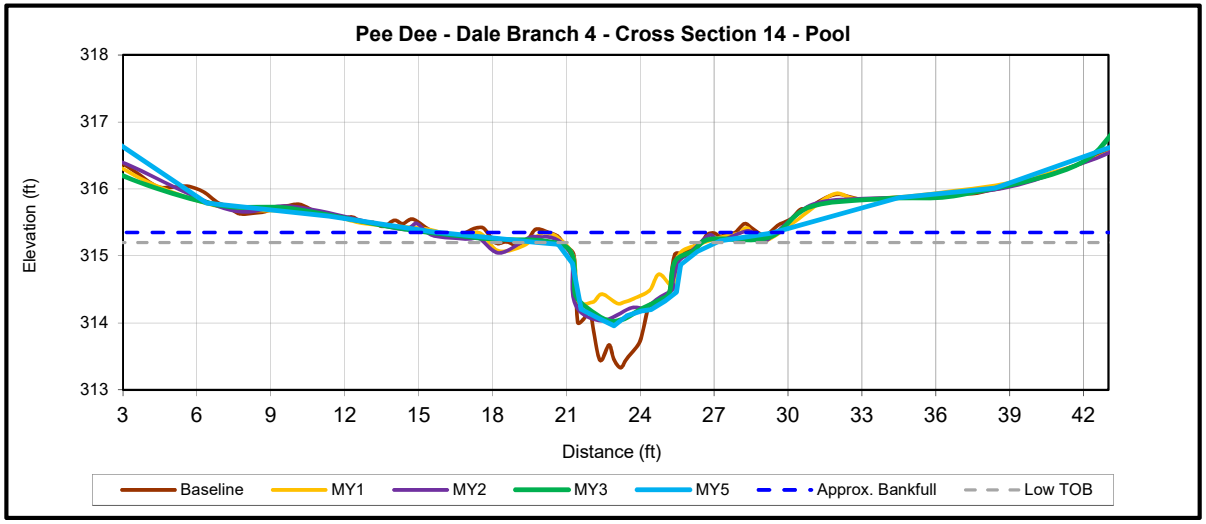


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.8	7.6	7.7	8.3	-	N/A	-	-
Floodprone Width (ft)[1]	20.0	20.0	20.0	20.0	-	N/A	-	-
Bankfull Mean Depth (ft)	0.5	0.5	0.4	0.4	-	---	-	-
Bankfull Max Depth (ft)[2]	1.3	1.1	1.0	0.9	-	0.8	-	-
Bankfull Cross-Sectional Area (ft2)[2]	3.9	3.5	3.0	3.7	-	2.5	-	-
Width/Depth Ratio	15.7	16.7	19.7	18.5	-	---	-	-
Entrenchment Ratio[1]	2.6	2.6	2.6	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

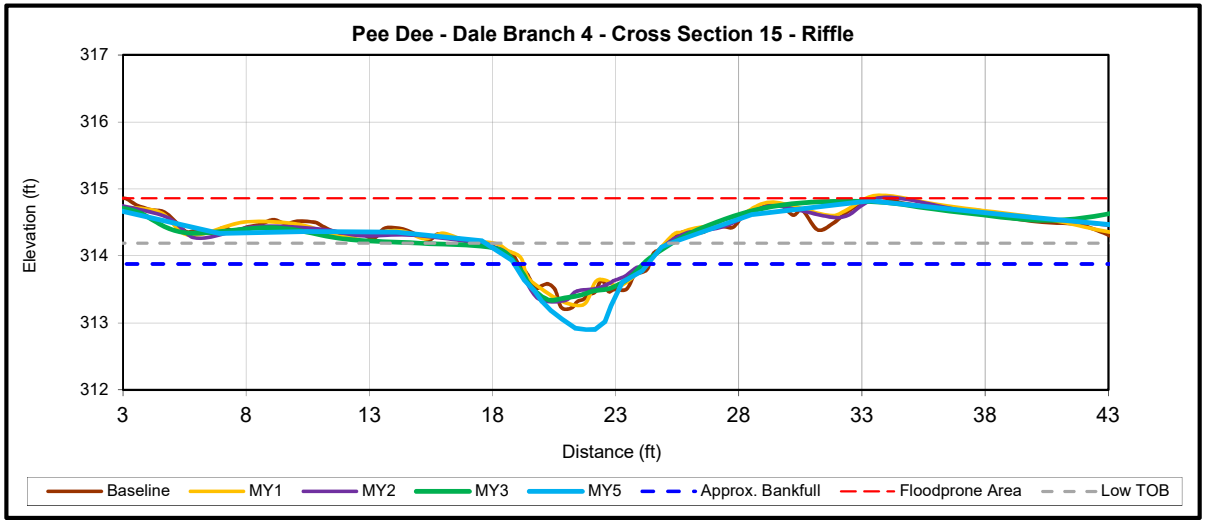


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	6.7	7.2	7.0	5.8	-	N/A	-	-
Floodprone Width (ft)[1]	30.0	30.0	30.0	30.0	-	N/A	-	-
Bankfull Mean Depth (ft)	0.9	0.6	0.7	0.8	-	---	-	-
Bankfull Max Depth (ft)[2]	2.0	1.0	1.3	1.3	-	1.2	-	-
Bankfull Cross-Sectional Area (ft2)[2]	6.2	4.3	5.2	4.9	-	4.7	-	-
Width/Depth Ratio	7.1	12.1	9.5	7.0	-	---	-	-
Entrenchment Ratio[1]	4.5	4.2	4.3	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

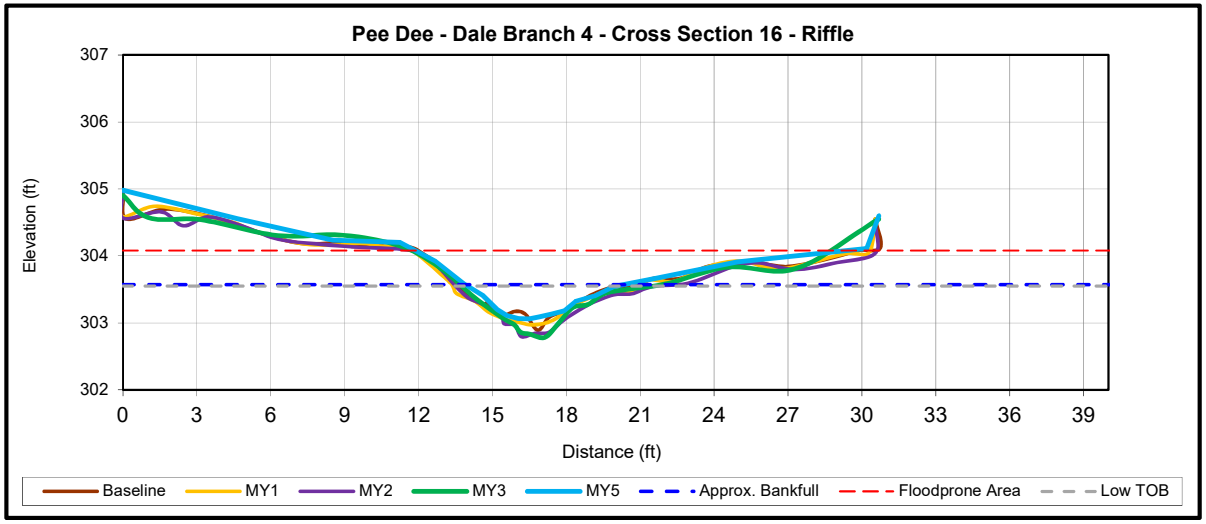


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	6.5	6.2	6.5	6.8	-	5.4	-	-
Floodprone Width (ft)[1]	40.0	40.0	40.0	40.0	-	>43.2	-	-
Bankfull Mean Depth (ft)	0.5	0.5	0.5	0.5	-	---	-	-
Bankfull Max Depth (ft)[2]	0.9	0.8	0.8	0.8	-	1.3	-	-
Bankfull Cross-Sectional Area (ft2)[2]	3.1	2.9	3.0	3.2	-	5.0	-	-
Width/Depth Ratio	13.8	13.2	14.2	14.7	-	---	-	-
Entrenchment Ratio[1]	6.1	6.5	6.2	5.9	-	>8	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	1.0	-	1.3	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

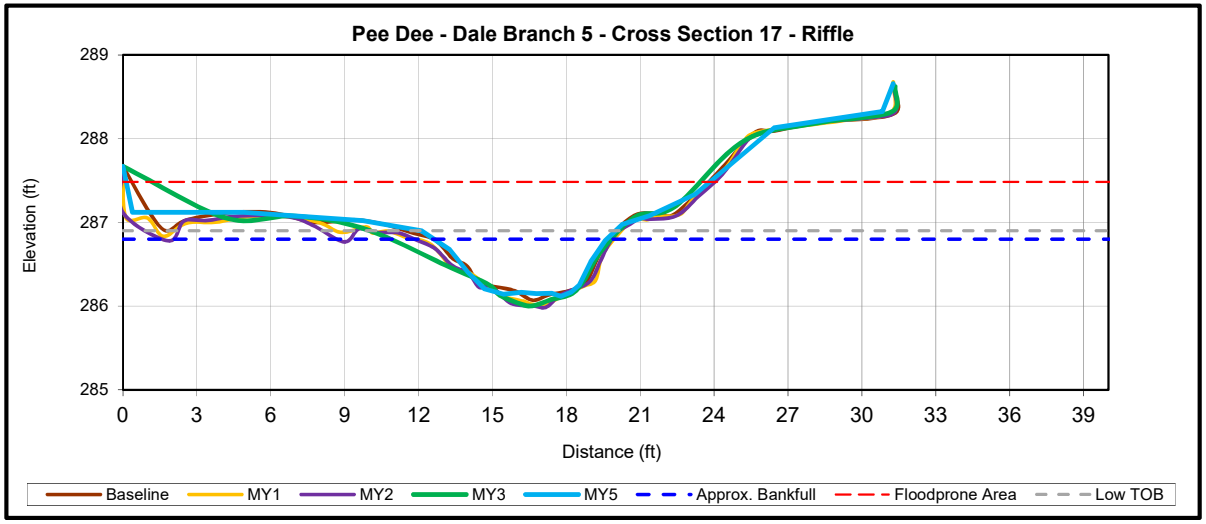


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	6.3	7.2	7.6	6.7	-	6.4	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	17.5	-	-
Bankfull Mean Depth (ft)	0.3	0.3	0.4	0.3	-	---	-	-
Bankfull Max Depth (ft)[2]	0.7	0.6	0.7	0.7	-	0.5	-	-
Bankfull Cross-Sectional Area (ft2)[2]	1.9	2.3	2.7	2.2	-	1.7	-	-
Width/Depth Ratio	21.0	23.0	20.9	19.9	-	---	-	-
Entrenchment Ratio[1]	4.0	3.5	3.3	3.8	-	2.7	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	0.9	-	1.0	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

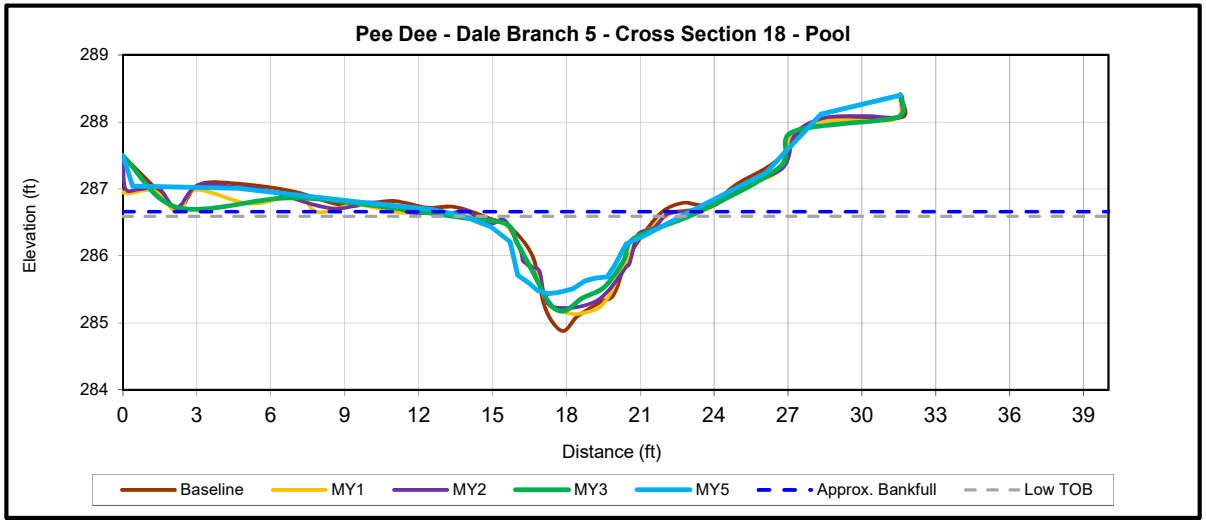


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.1	7.9	7.9	9.1	-	7.0	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	>23.7	-	-
Bankfull Mean Depth (ft)	0.5	0.5	0.5	0.4	-	---	-	-
Bankfull Max Depth (ft)[2]	0.7	0.8	0.8	0.8	-	0.8	-	-
Bankfull Cross-Sectional Area (ft2)[2]	3.3	3.8	3.9	4.1	-	4.0	-	-
Width/Depth Ratio	15.2	16.2	16.3	20.6	-	---	-	-
Entrenchment Ratio[1]	3.5	3.2	3.2	2.7	-	>3.4	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	1.2	-	1.1	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

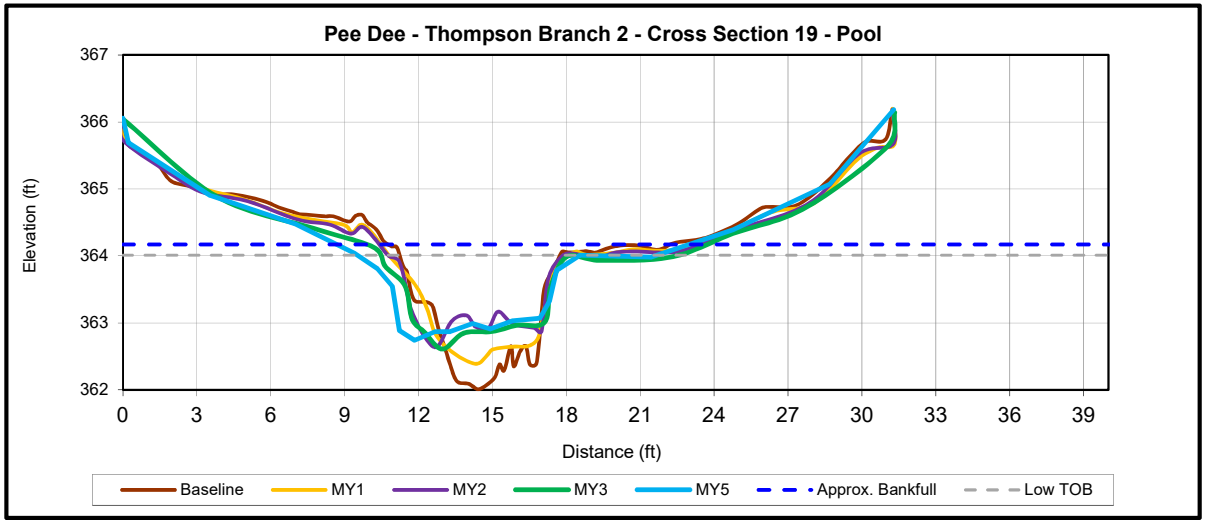


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.2	8.0	7.7	7.4	-	N/A	-	-
Floodprone Width (ft)[1]	25.0	25.0	25.0	25.0	-	N/A	-	-
Bankfull Mean Depth (ft)	0.8	0.7	0.7	0.7	-	---	-	-
Bankfull Max Depth (ft)[2]	1.7	1.5	1.4	1.4	-	1.2	-	-
Bankfull Cross-Sectional Area (ft2)[2]	5.9	5.8	5.6	5.3	-	5.2	-	-
Width/Depth Ratio	8.7	11.0	10.7	10.4	-	---	-	-
Entrenchment Ratio[1]	3.5	3.1	3.2	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

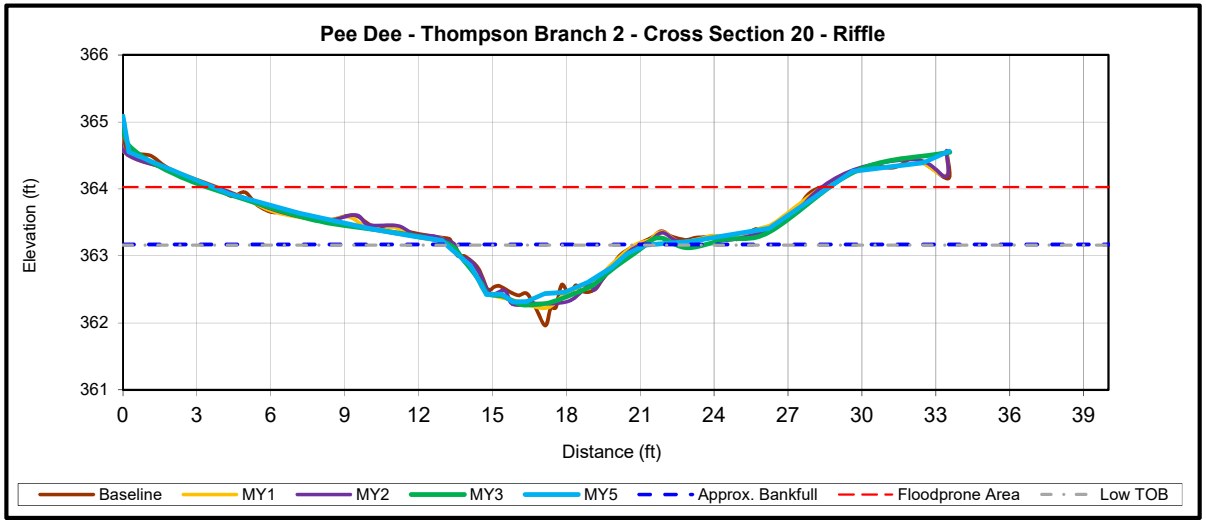


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	8.4	9.2	9.2	7.8	-	N/A	-	-
Floodprone Width (ft)[1]	30.0	30.0	30.0	30.0	-	N/A	-	-
Bankfull Mean Depth (ft)	1.0	0.9	0.8	1.0	-	---	-	-
Bankfull Max Depth (ft)[2]	2.1	1.7	1.5	1.5	-	1.3	-	-
Bankfull Cross-Sectional Area (ft2)[2]	8.8	8.1	7.0	7.7	-	7.3	-	-
Width/Depth Ratio	8.0	10.4	12.1	8.0	-	---	-	-
Entrenchment Ratio[1]	3.6	3.3	3.3	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

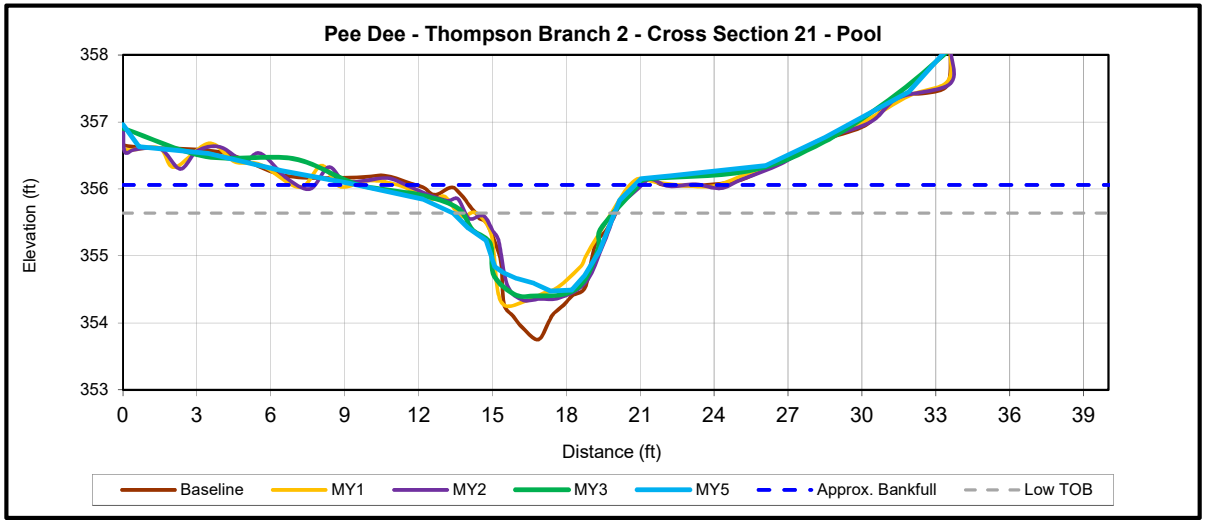


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.5	7.7	7.6	8.4	-	8.4	-	-
Floodprone Width (ft)[1]	30.0	30.0	30.0	30.0	-	25.0	-	-
Bankfull Mean Depth (ft)	0.6	0.6	0.6	0.6	-	---	-	-
Bankfull Max Depth (ft)[2]	1.2	0.9	0.9	0.9	-	0.8	-	-
Bankfull Cross-Sectional Area (ft2)[2]	4.2	4.4	4.4	4.8	-	4.1	-	-
Width/Depth Ratio	13.3	13.5	13.0	14.5	-	---	-	-
Entrenchment Ratio[1]	4.0	3.9	3.9	3.6	-	3.0	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	1.0	-	1.0	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

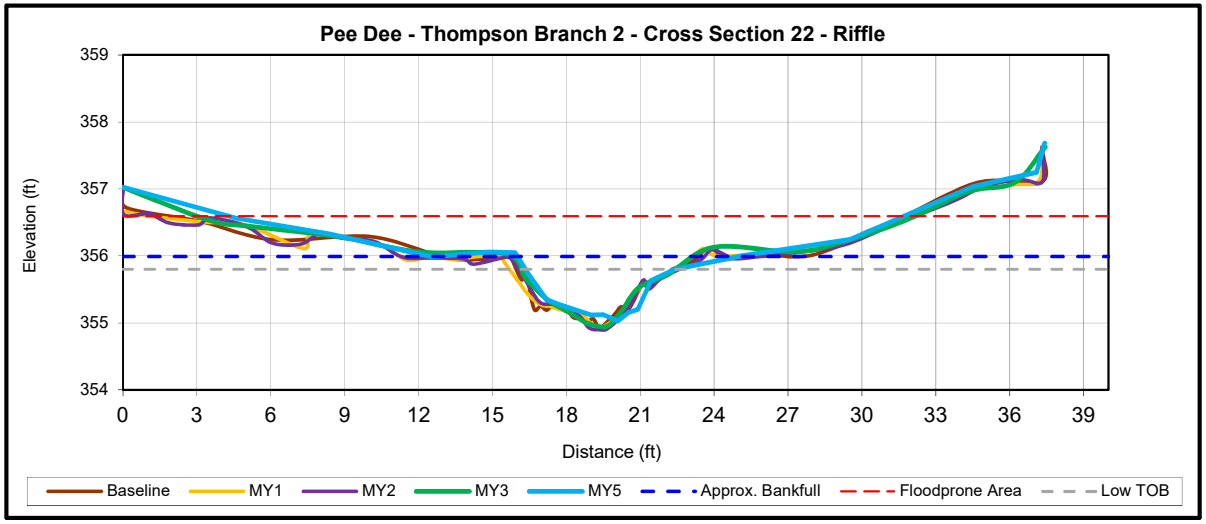


DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	8.6	9.1	9.2	10.2	-	N/A	-	-
Floodprone Width (ft)[1]	30.0	30.0	30.0	30.0	-	N/A	-	-
Bankfull Mean Depth (ft)	1.0	0.8	0.8	0.8	-	---	-	-
Bankfull Max Depth (ft)[2]	2.3	1.7	1.7	1.6	-	1.2	-	-
Bankfull Cross-Sectional Area (ft2)[2]	8.5	7.5	7.8	8.0	-	4.9	-	-
Width/Depth Ratio	8.7	10.9	10.9	12.9	-	---	-	-
Entrenchment Ratio[1]	3.5	3.3	3.2	N/A	-	N/A	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	N/A	-	N/A	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream



DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)[1]	7.6	7.7	7.7	7.8	-	8.9	-	-
Floodprone Width (ft)[1]	30.0	30.0	30.0	30.0	-	33.3	-	-
Bankfull Mean Depth (ft)	0.6	0.6	0.6	0.6	-	---	-	-
Bankfull Max Depth (ft)[2]	1.1	1.0	1.1	1.1	-	0.8	-	-
Bankfull Cross-Sectional Area (ft2)[2]	4.3	4.4	4.4	4.4	-	2.8	-	-
Width/Depth Ratio	13.4	13.5	13.5	13.8	-	---	-	-
Entrenchment Ratio[1]	3.9	3.9	3.9	3.9	-	3.7	-	-
Bank Height Ratio[1]	1.0	1.0	1.0	1.0	-	<1	-	-

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 12. Pebble Count Data Summary

Stream Reach	MY1 - 2015		MY2 - 2016		MY3 - 2017		MY4 - 2018		MY5 - 2019		MY6 - 2020		MY7 - 2021	
	Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count	
	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)
Jerry Branch 1	0.2	34	0.062	5.2	12	58	11	28	12	37				
Jerry Branch 2	22	44	5.2	9.6	12	30	22	78	22	60				
Jerry Branch 3	20	44	15	51	40	76	12.5	45	16.5	47				
Dale Branch 2	14	45	6.3	32	16	51	24	49	28.5	58.5				
Dale Branch 3	2.1	13	4.4	30	8	80	9.4	60	22	52				
Dale Branch 4	21	44	5	37	14	71	14.9	35	18	44.5				
Dale Branch 5	33	60	16	41	32	69	48	96	24	54				
Thompson Branch 2	15	51	20	51	50	95	30	76	25.5	58.5				

Charts 1-9. MY5 Stream Reach Substrate Composition Charts

Chart 1.

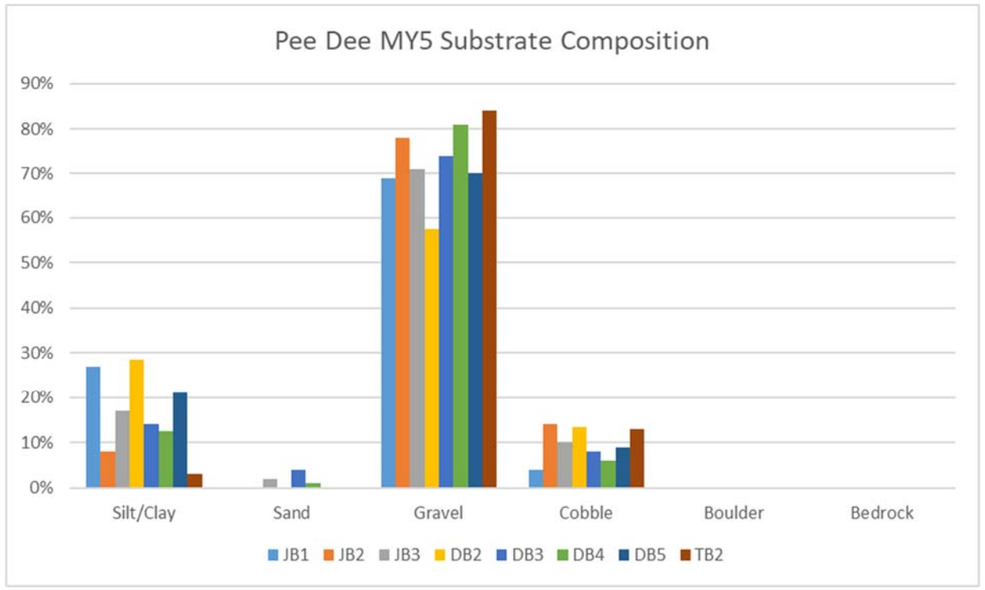


Chart 2.

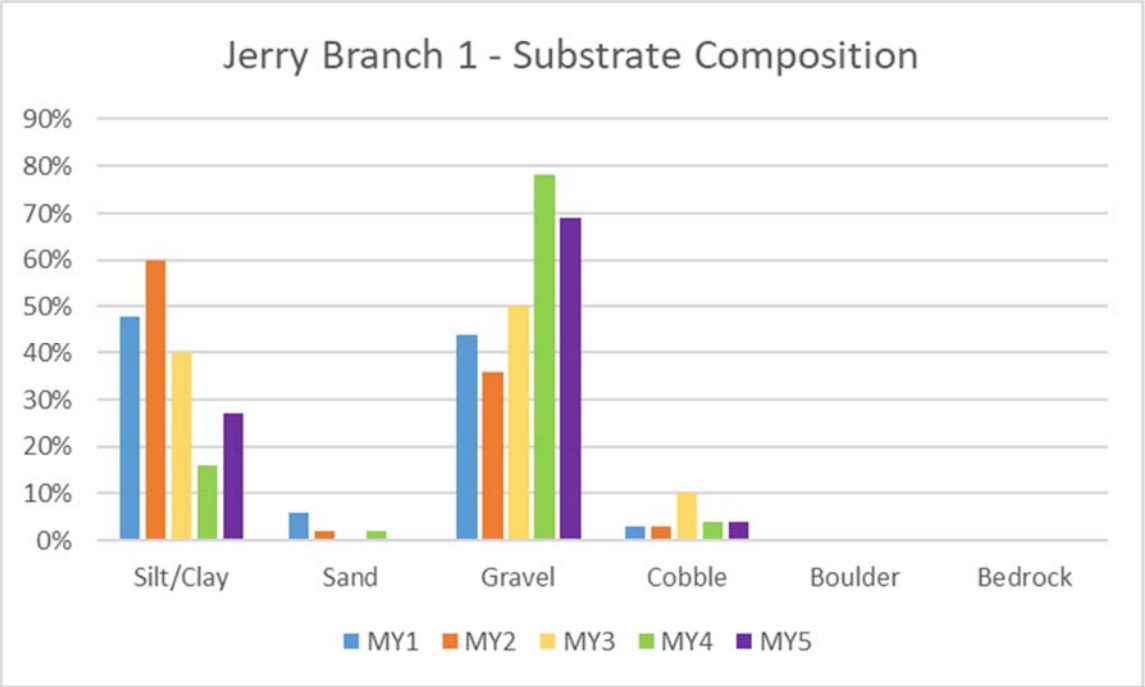


Chart 3.

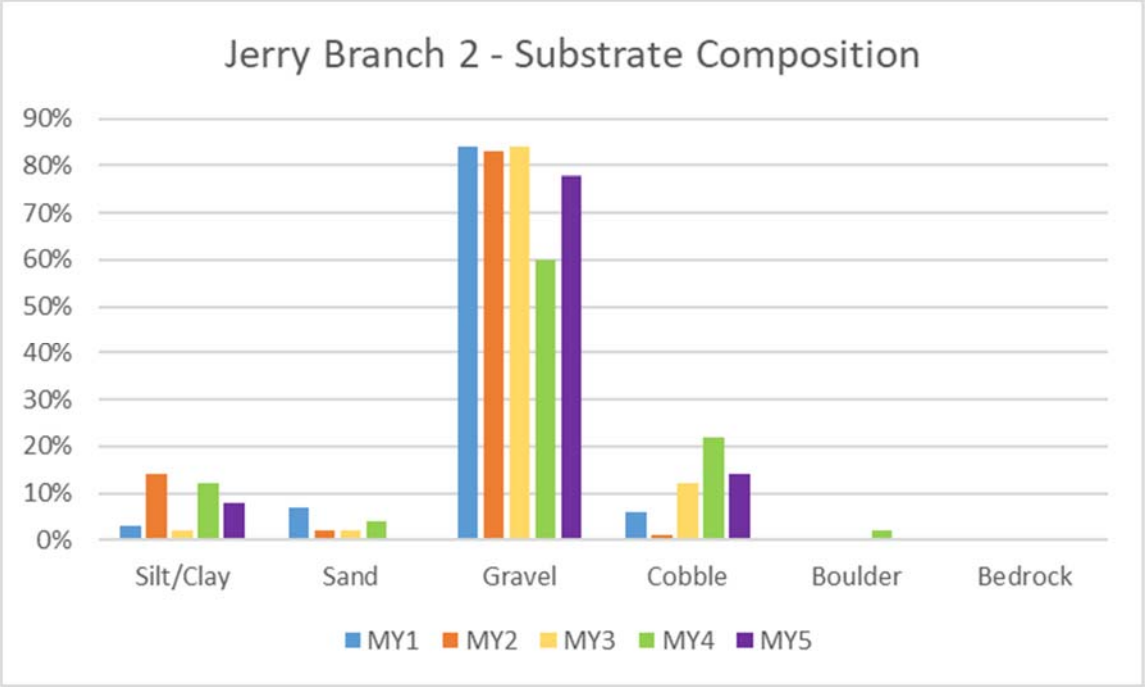


Chart 4.

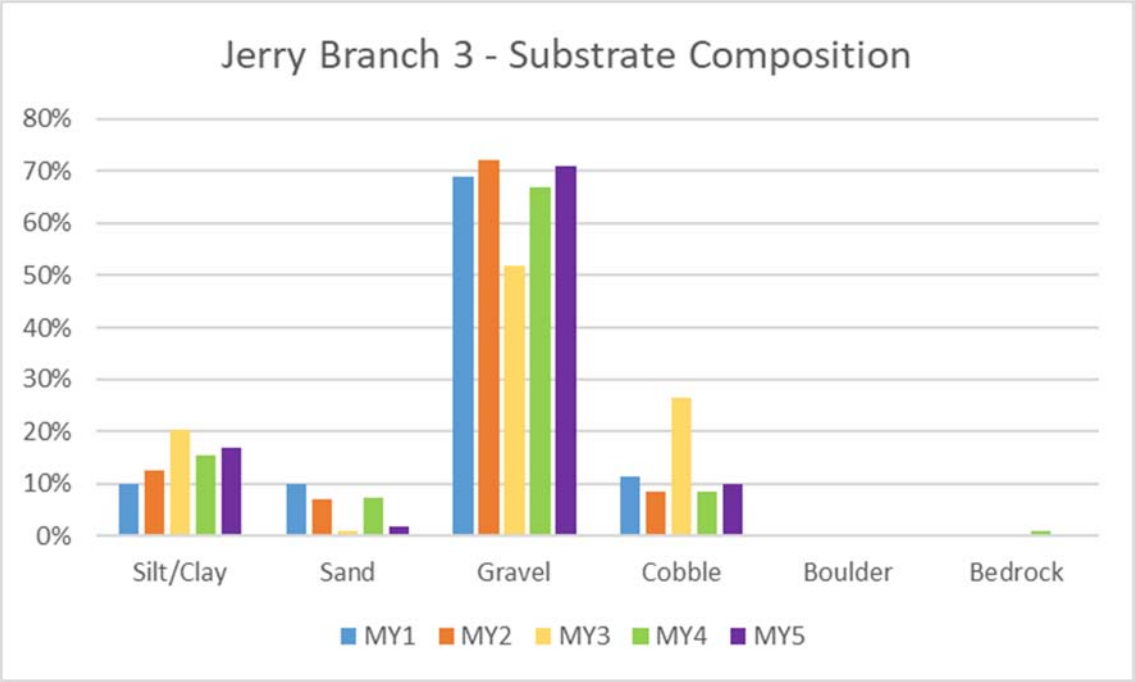


Chart 5.

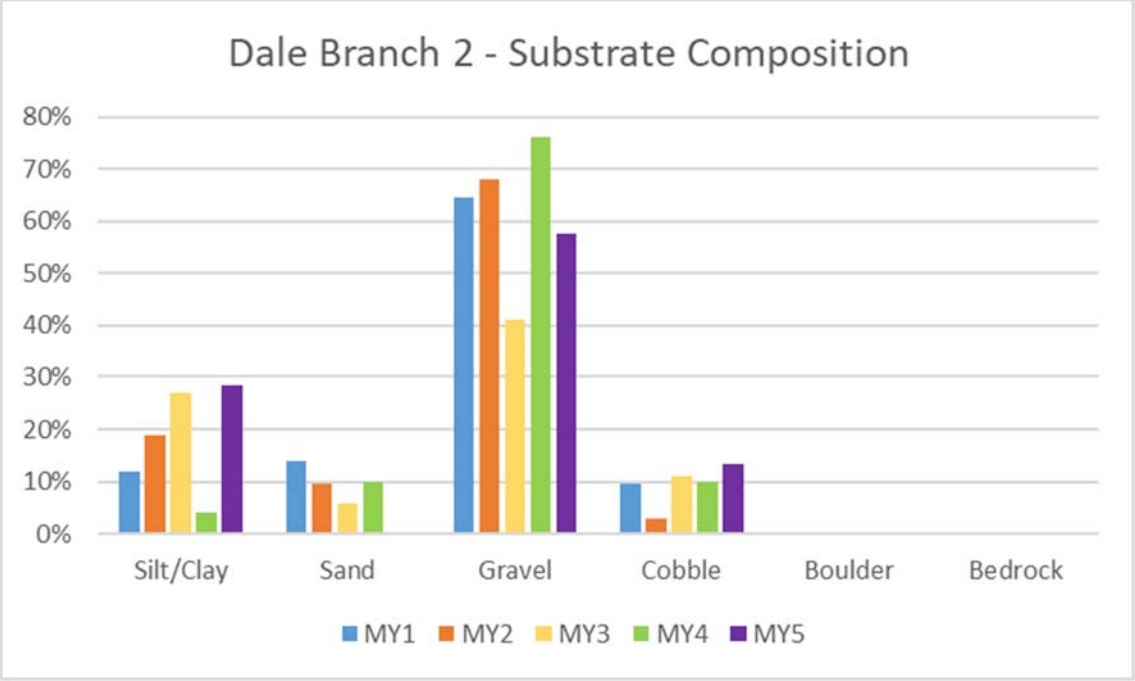


Chart 6.

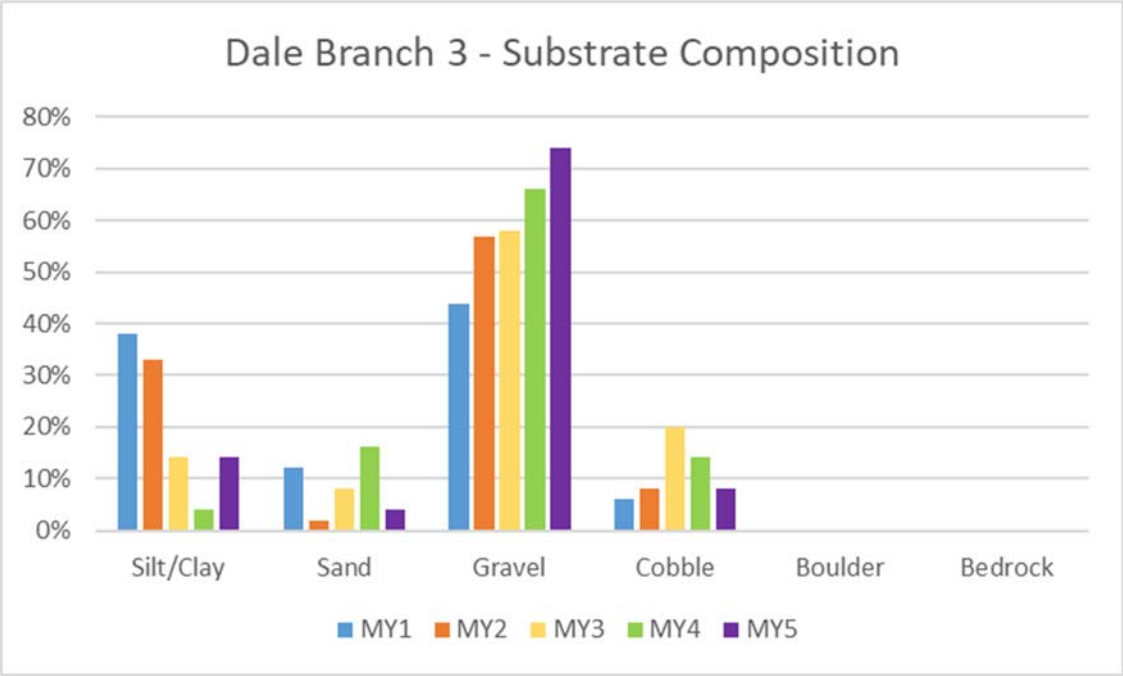


Chart 7.

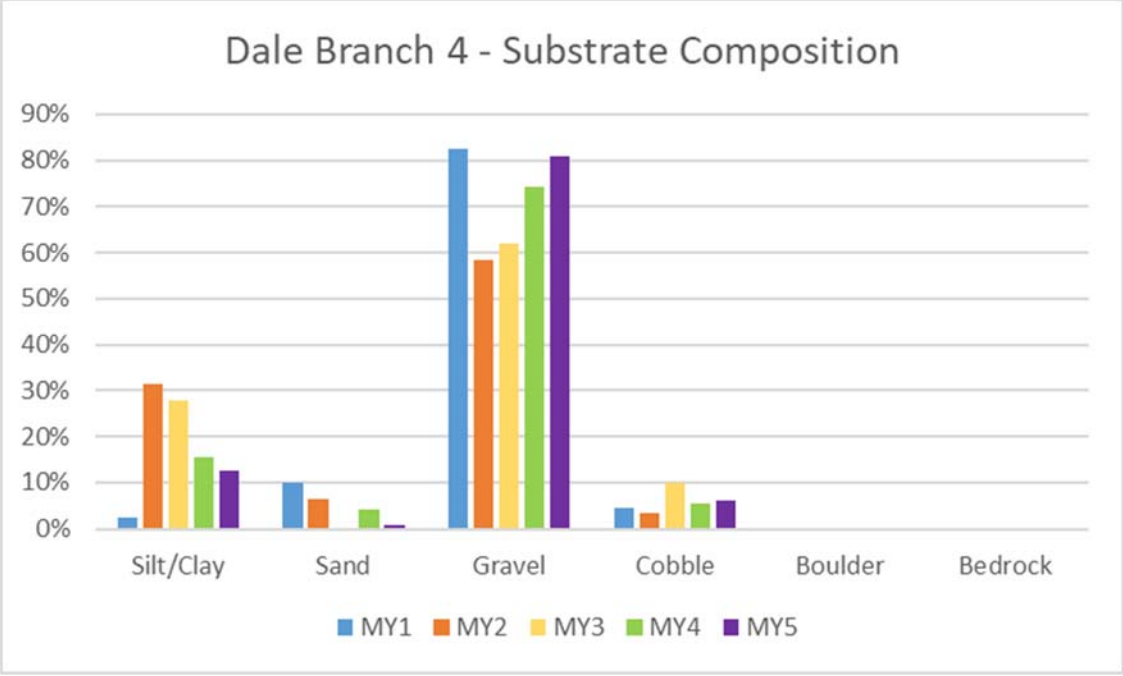


Chart 8.

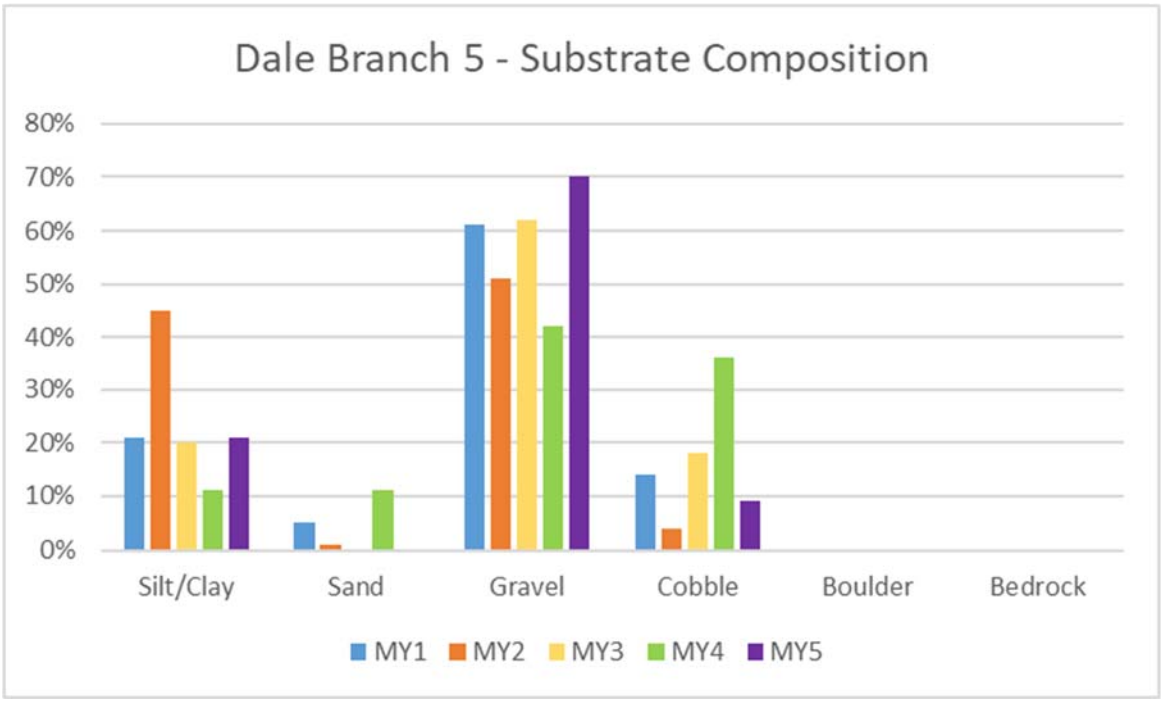


Chart 9.

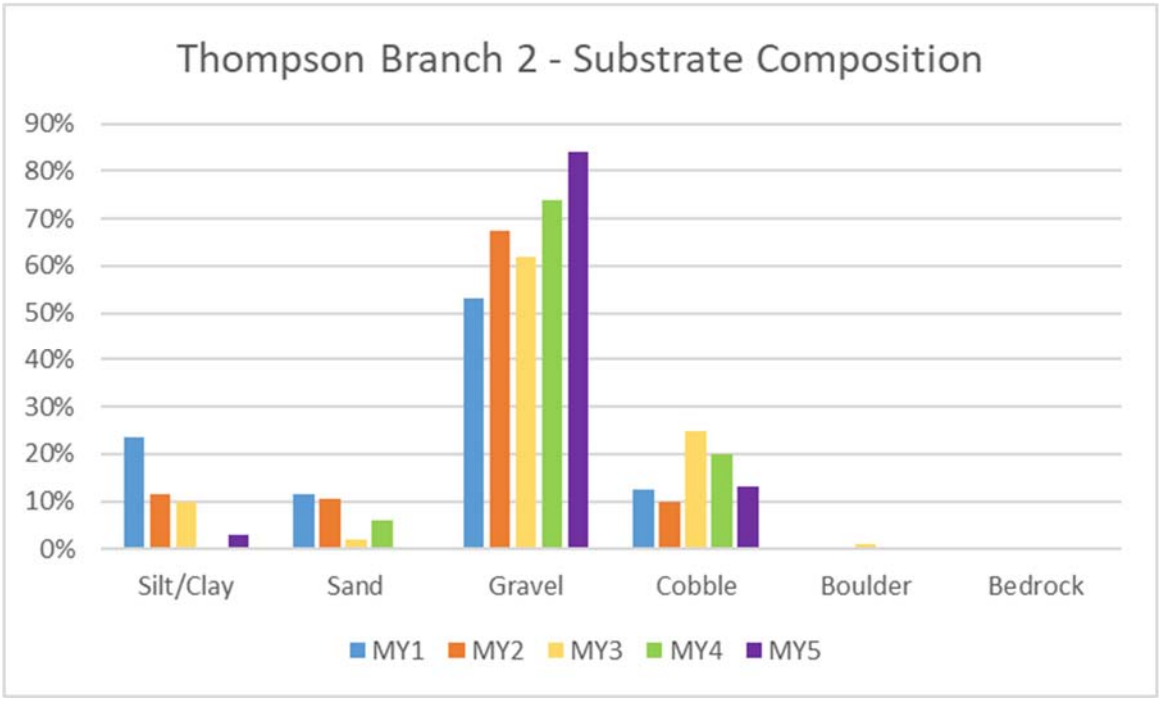


Table 13. Pee Dee Bank Pin Array Summary

Bank Pin Location	Position	Year 1 Reading (mm)	Year 2 Reading (mm)	Year 3 Reading (mm)	Year 5 Reading (mm)
Cross Section 1	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	0.0	0.0	0.0	0.0
	Downstream	0.0	6.35	0.00	0.00
Cross Section 5	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	0.0	0.0	0.0	0.0
	Downstream	0.0	0.0	0.0	0.0
Cross Section 13	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	0.0	0.0	0.0	0.0
	Downstream	0.0	0.0	0.0	0.0
Cross Section 18	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	19.1	0.0	0.0	0.0
	Downstream	0.0	0.0	0.0	0.0
Cross Section 19	Upstream	12.7	0.0	0.0	0.0
	At Cross Section	6.4	19.05	0.0	0.0
	Downstream	0.00	19.05	0.0	0.0
Cross Section 21	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	0.0	0.0	0.0	0.0
	Downstream	0.0	50.8	0.0	0.0

Appendix E
Hydrology Data

Table 14. Verification of Bankfull and Flow Events

Reach	Method	Number of Bankfull Events	Maximum Bankfull Height (ft.)
Jerry Branch	Crest Gauge	0	N/A
Dale Branch	Crest Gauge	0	N/A
Thompson Branch	Crest Gauge	0	N/A

Year	Consecutive Flow Days	Total Flow Days	Number of Flow Events
Dale 1			
MY5 2019	152	152	1
Dale 2			
MY5 2019	120	120	1
Thompson 1			
MY5 2019	97	104	2

Photo Verification of Bankfull and Flow Events

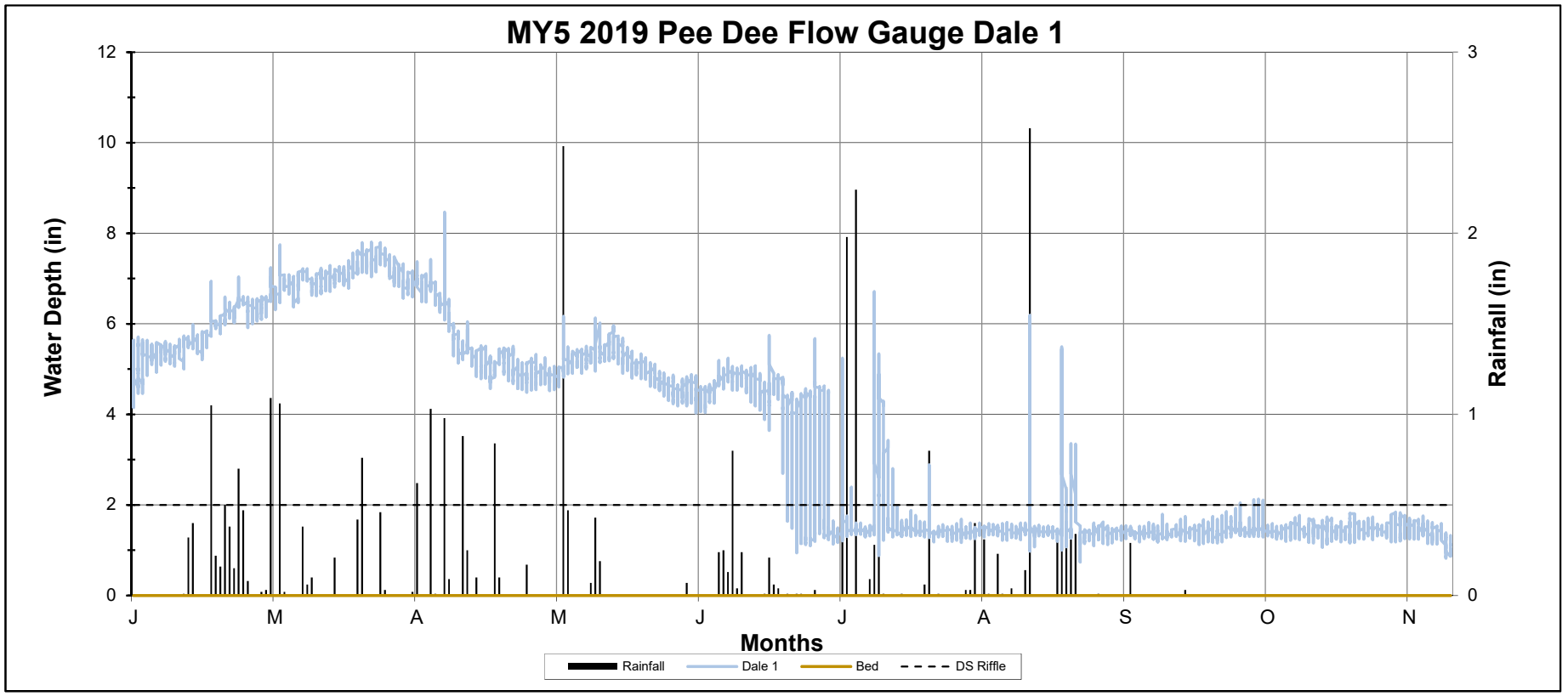
Water stain on FG Dale 1

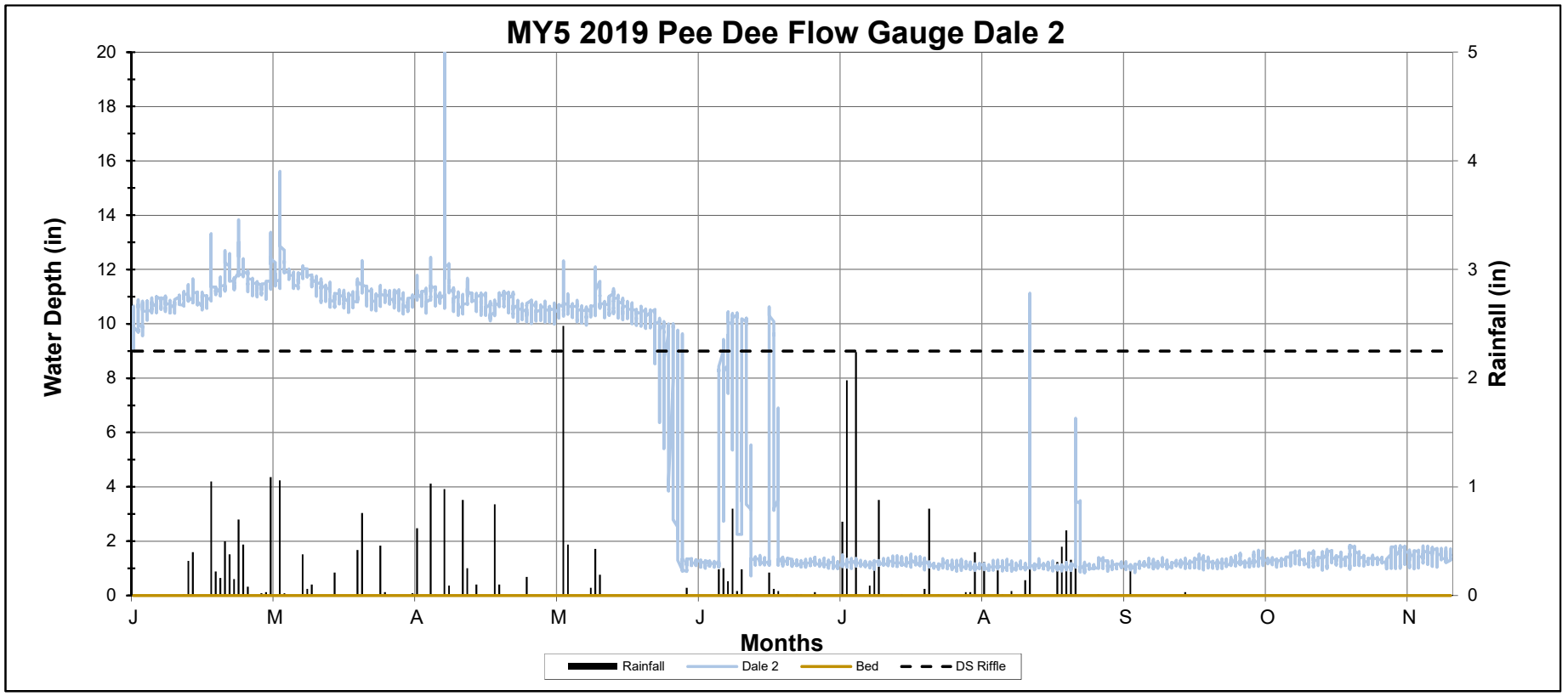
Water stain on FG Dale 2

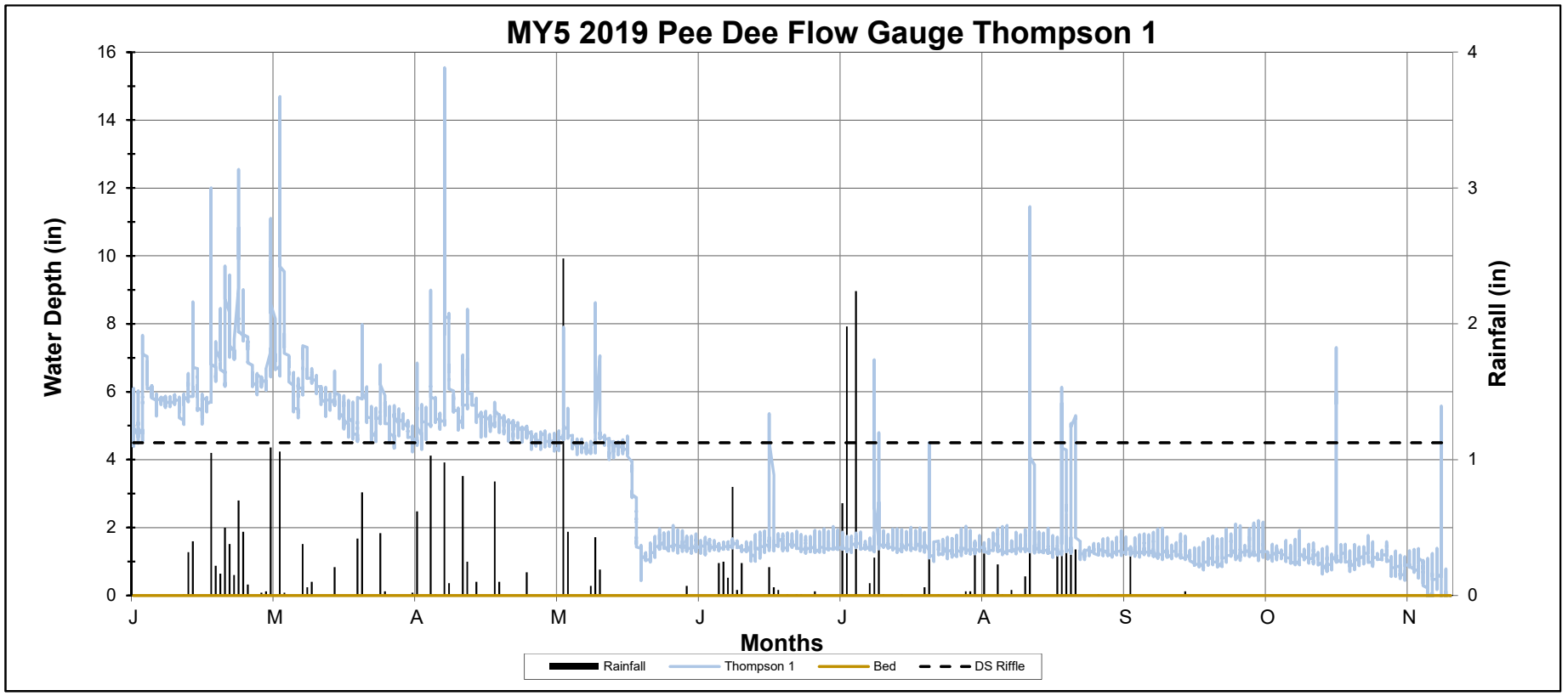
Water stain on FG Thompson 1

Table 15. 2019 Rainfall Summary

Month	Average	Normal Limits		Uwharrie Station Precipitation
		30 Percent	70 Percent	
January	4.07	2.74	4.87	---
February	3.41	2.47	4.03	4.49
March	4.28	3.05	5.07	4.59
April	3.15	1.86	3.82	5.09
May	3.61	2.54	4.28	3.71
June	4.34	2.56	5.27	2.08
July	4.84	3.08	5.83	7.07
August	4.50	2.89	5.42	5.79
September	4.48	2.26	5.48	0.33
October	3.75	2.19	4.53	4.81
November	3.34	1.98	4.05	1.42
December	3.66	2.52	4.35	---
Total	47.43	30.14	57.00	39.38


MY5 2019 Pee Dee Flow Gauge Dale 1
Water Depth (in)
Rainfall (in)
12
10
8
6
4
2
0
3
2
1
0
J
M
A
M
J
J
A
S
O
N
Months
Rainfall
Dale 1
Bed
DS Riffle


MY5 2019 Pee Dee Flow Gauge Dale 2
Water Depth (in)
Rainfall (in)
20
18
16
14
12
10
8
6
4
2
0
5
4
3
2
1
0
J
M
A
M
J
J
A
S
O
N
Months
Rainfall
Dale 2
Bed
DS Riffle


MY5 2019 Pee Dee Flow Gauge Thompson 1
Water Depth (in)
Rainfall (in)
16
14
12
10
8
6
4
2
0
4
3
2
1
0
J
M
A
M
J
J
A
S
O
N
Months
Rainfall
Thompson 1
Bed
DS Riffle

Appendix F
Adaptive Management

M E M O R A N D U M

302 Jefferson Street, Suite 110 Raleigh, North Carolina 27605 919.209.1052 tel. 919.829.9913 fax

TO: **NCIRT; NCDMS**

FROM: **Ryan Medric - RES**

DATE: **7/25/2018**

RE: **Pee Dee MY3 IRT Credit Release Site Visit**

Attendees: Todd Tugwell (USACE), Kim Browning (USACE), Mac Haupt (NCDWR), Paul Wiesner (NCDMS), Melonie Allen (NCDMS), Harry Tsomides (NCDMS), David Godley (RES), Brian Hockett (RES), Ryan Medric (RES)

Site Visit Date: July 12, 2018

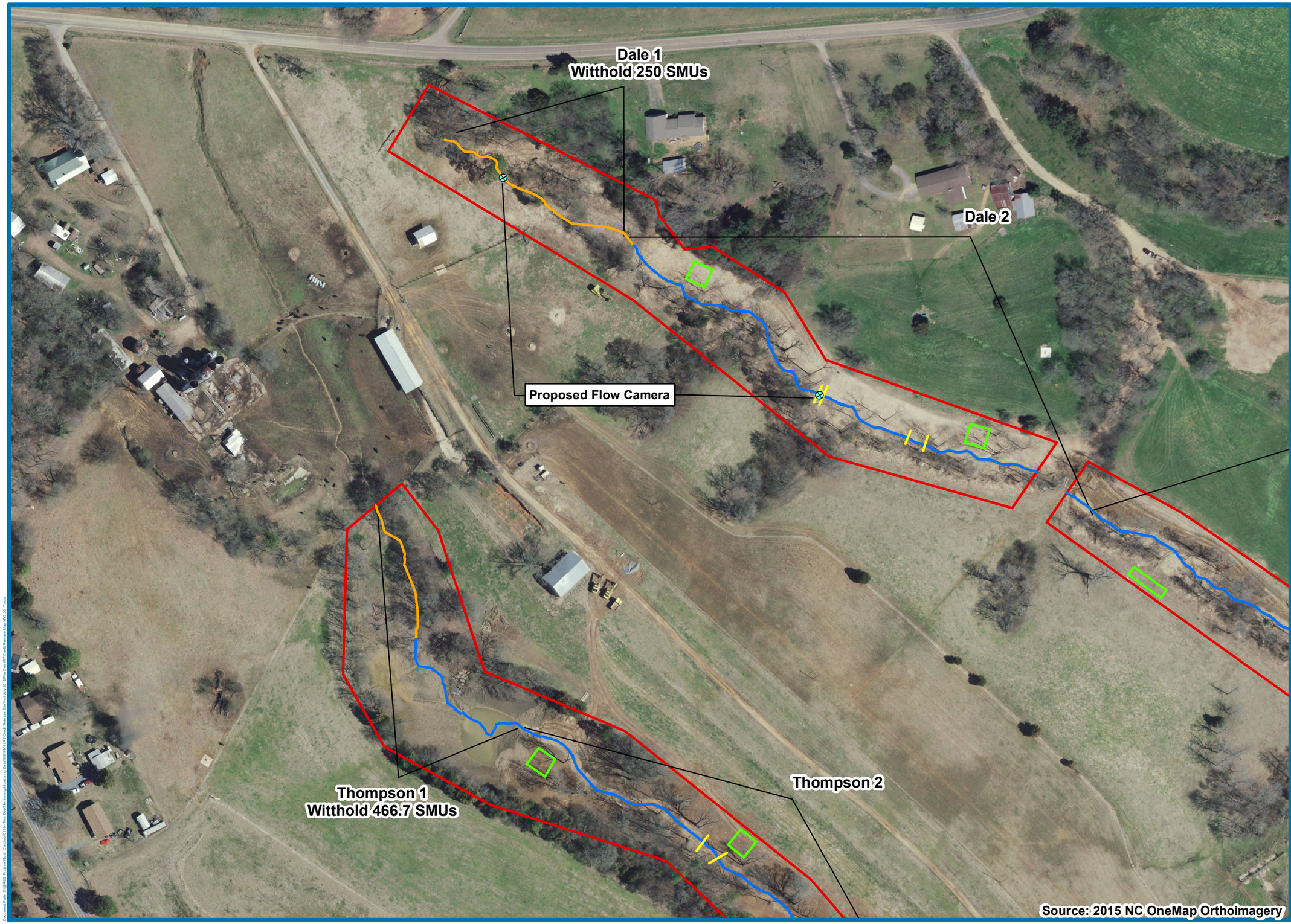
The IRT, DMS, and RES had a site visit at the Pee Dee Stream Restoration Site to discuss credit release. The main topic of discussion was the IRT's concern over the formation of the streams in and above the old ponds on Thompson 1 and Dale 1. Additionally, invasive species were seen throughout the easement. RES will need to continue to heavily treat the invasive species for the rest of the monitoring period. Specific comments and concerns are below.

- Thompson 1 (100+00-102+50): The IRT noted that this reach had a defined flow path but the lack of sorting in the bed material and uniform bedform were characteristic of a stream with less than intermittent flow. It was determined that in order to receive credit on this reach, RES would need to address the issues in the pond bottom below it. 250 feet of Enhancement I credit will be withheld (166.7 SMUs).
- Thompson 1 (102+50-105+50): The stream channel in the pond bottom could not be found. As it has been noted on previous site visits, the cracked soil from the pond bottom drying causes any surface water to quickly drain. It is obvious where the channel picks back up near the old dam location. In order to receive credit on any of Thompson 1, RES will need to submit a Remedial Action Plan to address the channel forming and stream flow issues. 300 feet of Restoration credit will continue to be withheld (300 SMUs).
- Dale 1 (200+00-201+22): The reach above the pond bottom/wetland had better bedform formation and sorting than the reach above the pond on Thompson. The IRT determined that in order to receive credit on this reach, RES would need to install a flow gauge/camera to document intermittent flow. Credits, however, will be withheld: 122 feet Enhancement I (81.3 SMUs).
- Dale 1 (201+22-203+75): This area consists of a wetland that formed in an old pond bottom prior to construction. The stream channel is absent of targeted bedform and riffle/pool sequence in this section. The IRT determined that to receive credits on this reach, RES

would need to develop a Remedial Action Plan to address the channel formation and flow issues. 253 feet of Enhancement I credit will be withheld (168.7 SMUs).

- Dale 2: The IRT suggested that it would be a good idea to install a flow gauge/camera on this reach preferably between XS 8 and 9 in order to help demonstrate at closeout that the reach was obtaining at least intermittent flows.
- Hudson: DMS brought the IRT to this reach to see if they thought it needed a flow gauge. The IRT decided that the reach was short enough that it did not need a flow gauge.

In total the amount of credits that are withheld from Pee Dee are 716.7 SMUs. RES will decide if a Remedial Action Plan is appropriate to address the problems in and above the old pond bottoms as well as add a flow camera above the pond bottom on Dale 1 and in-between XS 8 and 9 on Dale 2.



res

0 75 150
Feet

1 inch = 150 feet

Pee Dee Stream Restoration Project

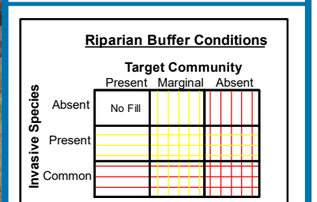
MY3 2017 Credit Release Map

Date: 7/16/2018	Drawn by: RTM

LEGEND

- Conservation Easement
- Crest Gauge
- Proposed Flow Camera
- Rain Gauge
- Cross Section
- Restoration
- Enhancement I
- Vegetation Plot

Riparian Buffer Conditions



302 Jefferson Street, Suite 110
Raleigh, NC 27605

Corporate Headquarters
5020 Montrose Blvd. Suite 650
Houston, TX 77006
Main: 713.520.5400

March 29, 2019

Harry Tsomides
NCDEQ – DMS
5 Ravenscroft Drive
Asheville, NC 28801

RE: Pee Dee Stream Restoration Site – 2019 Monitoring Adaptive Management Plan

Mr. Tsomides,

During a site visit with the IRT and NCDMS at the Pee Dee Site in July 2018, several problem areas were identified. Per the request of NCIRT, RES is providing this Adaptative Management Plan to address the stream problem areas listed below:

1. **Thompson 1 above the old pond bottom.**
   During the July 2018 site visit, the IRT noted that this reach had a defined flow path but the lack of sorting in the bed material and the uniform bedform was characteristic of a stream with less than intermittent flow. In January 2019, RES installed a flow gauge above the old pond bottom to document at least intermittent flow. RES will report consecutive and cumulative flow days in the annual monitoring reports. To further assess perenniality, RES completed NCDWR Stream Forms above the old pond bed and in the pasture upstream of the easement. The reach above the old pond bottom in the easement scored 27.5 and the reach above the old pond bottom in the pasture scored 25. The completed NCDWR Stream Forms are attached. Additionally, the new crossing (constructed in 2017) directly upstream of the easement was inspected to confirm it was not blocking flow.
2. **Thompson 1 in the old pond bottom.**
   Following dam removal, the pond bottom cracked as it was drained. The cracks in the soil are up to a few feet deep. Any surface water that enters the pond bottom is lost into the cracks and a single-thread flow path is difficult to locate. Due to risk and budgetary constraints, RES does not plan on doing any work in this area.
3. **Dale 1 above the old pond bottom.**
   During the July 2018 site visit, the IRT determined that RES needs to document at least intermittent flow on this reach to receive credit. In January 2019, RES installed a flow gauge on this reach to document at least intermittent flow. RES will report consecutive and cumulative flow days in the annual monitoring reports.
4. **Dale 1 in the old pond bottom**.
   This area is a drained pond turned wetland. The channel had overgrown with vegetation and the targeted bedform and riffle/pool sequence was hard to identify during the July 2018 site visit. In January 2019, RES staff identified the preferred flow path up against the toe of slope on the western side of the wetland. Photos of the preferred flow path through the wetland area attached. RES plans on hand excavating and adding riffle material to the channel to reestablish the proper bedform diversity as well as hand excavating a low flow

path above and below this reach to better connect it to the top of Dale 1 and the start of Dale 2.

5. **Dale 2.**
   The IRT requested the documentation of at least intermittent flow on this reach to assist with closeout decisions. In January 2019, RES installed a flow gauge at Cross Section 9 to document at least intermittent flow. RES will report consecutive and cumulative flow days in the annual monitoring reports.

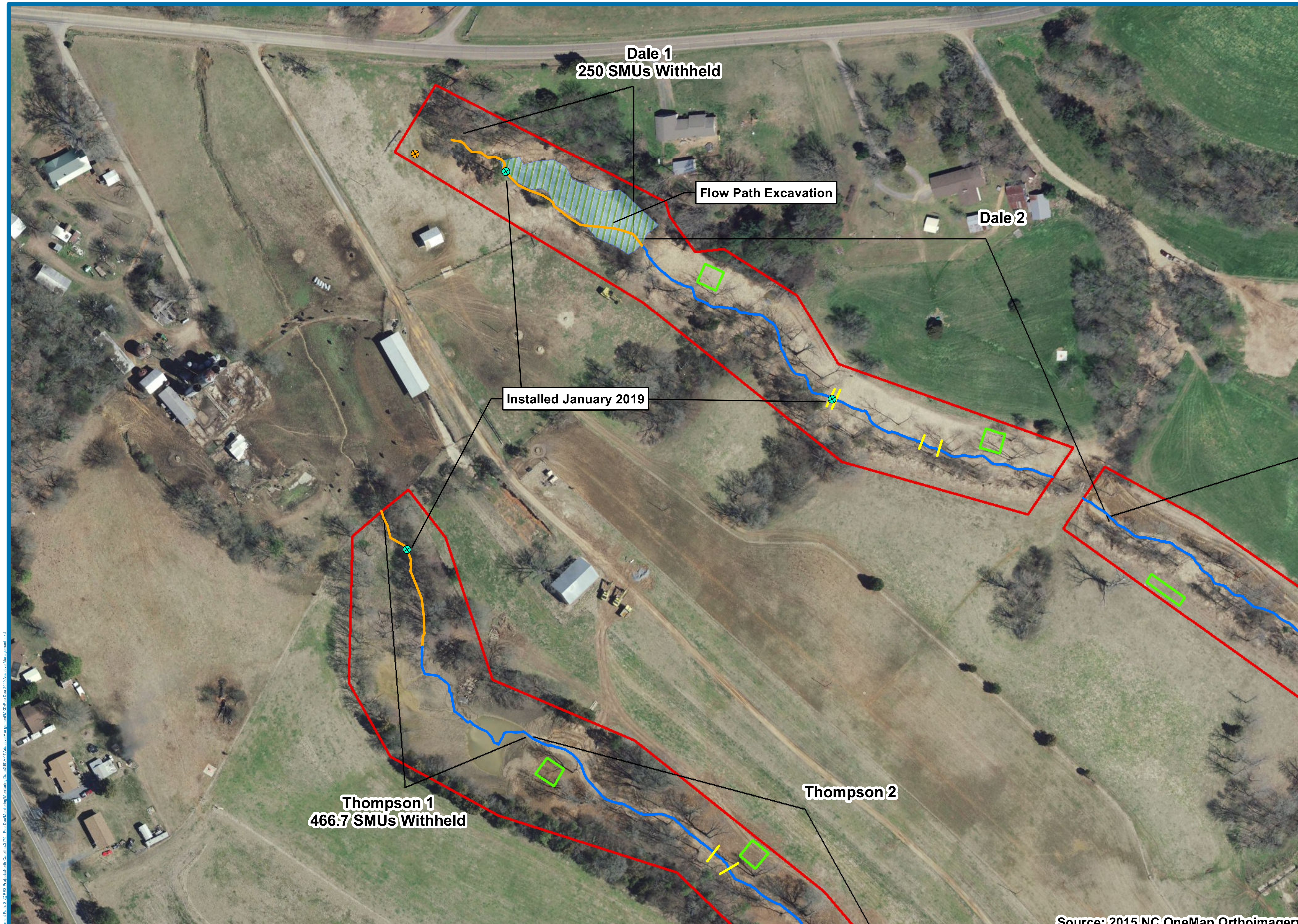
RES plans to perform the above-mentioned adaptive management activities on Dale 1 in spring of 2019. Once work is completed, RES will provide written notification to USACE along with photo documentation to inform work has been completed. RES plans on monitoring the adaptive management areas for the remainder of the seven-year monitoring period. Each annual report will include data from the flow gauges and the visual assessments. Also, RES will continue to treat the Chinese privet on site multiple times per year for the rest of the monitoring period.

A map displaying the locations of the items listed above is attached. Photos of the flow gauges and areas of note are also attached.

Thank you,

Ryan Medric

Ryan Medric | Ecologist



res

0 75 150
Feet

1 inch = 150 feet

Pee Dee Stream Restoration Project

2019 Adaptive Management Map

Date: 3/7/2019	Drawn by: RTM

LEGEND

- Conservation Easement
- Vegetation Plot
- Wetland
- Restoration
- Enhancement I
- Cross Section
- Ambient Gauge
- Crest Gauge
- Flow Gauge
- Rain Gauge

Pee Dee Adaptive Management Plan Photos (01/29/2019)

Thompson 1 above old pond looking upstream

Thompson 1 above old pond looking upstream at new crossing

Thompson 1 above old pond looking upstream

Thompson 1 above old pond looking upstream

Thompson 1 Flow Gauge

Thompson 1 above old pond looking downstream into pond bottom

Thompson 1 in the pasture upstream of the easement

Thompson 1 looking upstream at Pee Dee Road

Dale 2 Flow Gauge

Dale 1 in old pond looking upstream

Dale 1 in old pond looking downstream

Dale 1 Flow Gauge

Thompson 1 above pond (in easement)

NC DWQ Stream Identification Form Version 4.11

Date: 1/29/19	**Project/Site:** Pee Dee	**Latitude:** 35.255157
Evaluator: RTM	**County:**	**Longitude:** -80.030671
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 27.5	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 14.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	1	2	(3)
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	(0)	1	2	3
8. Headcuts	(0)	1	2	3
9. Grade control	0	0.5	1	(1.5)
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	(0)	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 6)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

Thompson 1 above pond (out of easement)

NC DWQ Stream Identification Form Version 4.11

Date: 1/29/19	**Project/Site:** Pee Dee	**Latitude:** 35.255931
Evaluator: RTM	**County:**	**Longitude:** -80.030592
Total Points: 25 *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 11.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	2	(3)
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	(0)	1	2	3
8. Headcuts	(0)	1	2	3
9. Grade control	(0)	0.5	1	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	(No = 0)		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	(0)	0.5	1	1.5
16. Organic debris lines or piles	(0)	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 6)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch: CRONOS Stanly County Airport

1/29/19 0.05"

1/24/19 0.53"

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

REPLY TO
ATTENTION OF:

June 13, 2019

Regulatory Division

Re: NCIRT Review and USACE Approval of the Modification of the Pee Dee Mitigation Plan and Adaptive Management Plan; SAW-2012-01077; NCDMS Project # 95350

Mr. Tim Baumgartner
North Carolina Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

Dear Mr. Baumgartner:

The purpose of this letter is to provide the North Carolina Division of Mitigation Services (NCDMS) with all comments generated by the North Carolina Interagency Review Team (NCIRT) during the 30-day comment period for the Modification of the Pee Dee Mitigation Plan, which closed on May 30, 2019. These comments are attached for your review.

Based on our review of these comments, we have determined that no major concerns have been identified with the revision of the Final Pee Dee Mitigation Plan, which is considered approved with this correspondence.

The following modifications were approved are attached to this document:

Proposed modification of credits approved in the mitigation plan due to pond-bed conditions.
Original Approved Mitigation Plan Assets: 6,408SMUs
Requested Revised Assets: 6,108 SMUs
Adaptive Management Plan

If you have any questions regarding this letter, the mitigation plan review process, or the requirements of the Mitigation Rule, please call me at 919-554-4884, ext 60.

Sincerely,

Kim Browning
Mitigation Project Manager
for Henry Wicker

Enclosures
Electronic Copies Furnished: NCIRT Distribution List, Paul Wiesner – NCDMS
Brad Breslow – RES

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

REPLY TO
ATTENTION OF:

CESAW-RG/Browning June 13, 2019

MEMORANDUM FOR RECORD

SUBJECT: Pee Dee Mitigation Site - NCIRT Comments during 30-day Mitigation Plan Review

PURPOSE: The comments listed below were provided during the 30-day comment period in accordance with Section 332.8(g) of the 2008 Mitigation Rule.

NCDMS Project Name: Pee Dee Mitigation Site, Montgomery County, NC

USACE AID#: SAW-2012-01077

NCDMS #: 95350

30-Day Comment Deadline: May 30, 2019

Todd Bowers, EPA:
In general, I agree with all responses and approaches to adaptive management that RES proposes to correct site deficiencies and resume credit release at the Pee Dee site. My only comment is that RES should clearly state the stream mitigation units that the proposed action will release or those that are no longer being sought such as the Thompson 1 old pond bottom that is not being reworked for credit (due to budgetary constraints).
As an IRT member, I encourage RES to continue to monitor the site and provide the IRT with adaptive management needs as they arise in order to minimize any time between problem identification and correction.

Mac Haupt/Erin Davis, NCDWR:
I am ok with the proposed Modification Plan. However, I would like some clarification as to how they are measuring stream flow given the placement of the flow gauges. I am assuming they are adjusting the elevation to the riffle above or below, since they are all located in pools.

Kim Browning, USACE:
I question the flow, and functional uplift, of including the reach above the cracked pond bottom. I generally agree with the adaptive management plan, especially the need for flow gauges on the reach above the pond and the privet treatment.

Kim Browning
Mitigation Project Manager
Regulatory Division

302 Jefferson Street, Suite 110
Raleigh, NC 27605

Corporate Headquarters
6575 West Loop South, Suite 300
Bellaire, TX 77401
Main: 713.520.5400

January 23, 2020

Harry Tsomides
NCDEQ – DMS
5 Ravenscroft Drive
Asheville, NC 28801

RE: Pee Dee Stream Restoration Site – 2020 Monitoring Adaptive Management Work Performed

Mr. Tsomides,

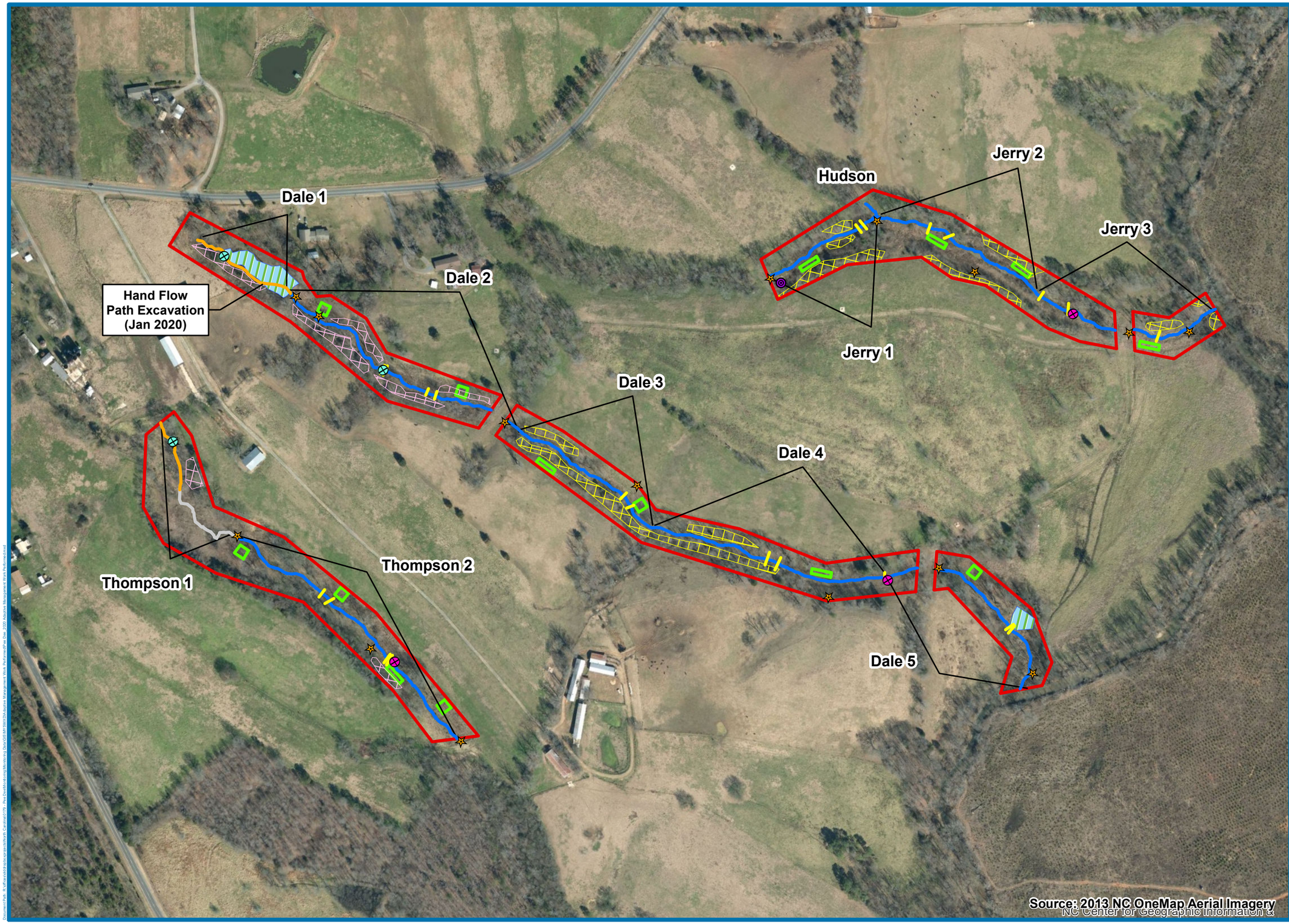
During a site visit with NCIRT and NCDMS at the Pee Dee Site in July 2018, several problem areas were identified. Per the request of NCIRT, RES provided an Adaptive Management Plan in March 2019 to address the problem areas. Part of the Adaptive Management Plan included installing flow gauges on Thompson 1, Dale 1, and Dale 2. These gauges were installed in January 2019 and reported at the end of MY5 with 97-152 consecutive days of flow.

In December 2019 and January 2020, RES executed more of the Adaptive Management Plan. The work included Chinese privet treatment and excavating a low flow path, by hand, through the old pond wetland on Dale 1. Chinese privet treatment was administered on Thompson 1, Thompson 2, Dale 1, and Dale 2 (map attached). The treatment consisted of cutting stems with loppers then applying herbicide directly to the stumps. RES decided to use this method due to its effectiveness and low risk of harming planted stems. Additionally, most of the stems were too large for foliar treatment to work. RES plans to continue using the stump cutting method for the remainder of the site this winter. Follow-up treatments will consist of foliar spraying on the re-sprouts from the stumps. The low flow path excavation was performed, using shovels, along the existing flow path (marked during high flow in early 2019) through the old pond wetland connecting the top of Dale 1 to Dale 2. Riffle material was added along the flow path and RES expects the channel to continue to form the rest of the 2020 water season. RES will include photos of the reach in the MY6 monitoring report as well as provide an updated invasive species area.

A map displaying the locations of the items mentioned above is attached.

Thank you,

Ryan Medric | Ecologist



res

0 150 300
Feet

1 inch = 300 feet

Pee Dee Stream Restoration Project

Adaptive Management Work Performed

Date: 1/27/2020	Drawn by: RTM

LEGEND

- Conservation Easement
- Vegetation Plot

Invasive Species Area

- Present
- Treated (Jan 2020)
- Existing Wetland
- Cross Section

Mitigation Type

- Restoration
- Enhancement I
- No Credit
- Crest Gauge
- Flow Gauge (Jan 2019)
- Rain Gauge
- Photo Station

Vegetation Condition Assessment