Annual Monitoring Report

Monitoring Year 6 of 7

FINAL

Poplin Ridge Stream Restoration Project
NCDMS Contract No.: 004672
NCDMS Project No.: 95359
USACE Permit Action ID: SAW-2012-01079
DWR Project No.: 13-1087

Union County, NC
Data Collected: November 2020
Date Submitted: January 2021

Submitted to:

North Carolina Division of Mitigation Services

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

Prepared by:

3600 Glenwood Avenue, Suite 100
Raleigh, North Carolina 27612

Mitigation Project Name	**Pen Dell Mitigation Project**	**USACE Action ID**	**2016-00885**
DMS ID	**97079**	**DWR Permit**	**2016-0403 v2**
River Basin	**Neuse**	**Date Project Instituted**	**3/18/2016**
Cataloging Unit	**03020201**	**Date Prepared**	**4/21/2020**
County	**Johnston**	**Stream/Wet. Service Area**	**Neuse 03020201**

Signature & Date of Official Approving Credit Release

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

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

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

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

Credit Release Milestone	**Warm Stream Credits**						
Project Credits	**Scheduled Releases %**	**Proposed Releases %**	**Proposed Released #**	**Not Approved # Releases**	**Approved Credits**	**Anticipated Release Year**	**Actual Release Date**
1 - Site Establishment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2 - Year 0 / As-Built	30.00%	30.00%	909.120	0.000	909.120	2019	3/21/2019
3 - Year 1 Monitoring	10.00%	10.00%	303.040	0.000	303.040	2019	8/19/2019
4 - Year 2 Monitoring	10.00%	10.00%	303.040	0.000	303.040	2020	4/21/2020
5 - Year 3 Monitoring	10.00%					2021	
6 - Year 4 Monitoring	5.00%					2022	
7 - Year 5 Monitoring	10.00%					2023	
8 - Year 6 Monitoring	5.00%					2024	
9 - Year 7 Monitoring	10.00%					2025	
Stream Bankfull Standard	10.00%						
			Totals	0.000	1,515.200		

Total Gross Credits	3,030.400
Total Unrealized Credits to Date	0.000
Total Released Credits to Date	1,515.200
Total Percentage Released	50.00%
Remaining Unreleased Credits	1,515.200

Notes

Contingencies (if any)

Project Quantities

Mitigation Type	**Restoration Type**	**Physical Quantity**
Warm Stream	Restoration	1,744.000
Warm Stream	Enhancement I	1,143.000
Warm Stream	Enhancement II	1,017.000
Warm Stream	Preservation	1,176.000

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County	**Johnston**	**Stream/Wet. Service Area**	**Neuse 03020201**

Debits

							Stream Restoration Credits	**Stream Restoration Equivalent Credits**
Beginning Balance (mitigation credits)							**2,912.800**	**117.600**
Released Credit							**0.000**	**0.000**
Unrealized Credits							**0.000**	**0.000**
Owning Program	**Req. Id**	**TIP #**	**Project Name**	**USACE Permit #**	**DWR Permit #**	**DCM Permit #**		
NCDOT Stream & Wetland ILF Program	REQ-008290	R-2721A	R-2721A - NC 540 - West of NC 55 to East of SR 1389	2009-02240	2018-1249		1,165.120	
NCDOT Stream & Wetland ILF Program	REQ-008187	I-5111 / I-4739	I-5111 / I-4739 - I-40 Widening (Wake & Johnston Counties)	2009-00556	2019-0593			47.040
Total Credits Debited							**1,165.120**	**47.040**
Remaining Available balance (Released credits)							**291.280**	**11.760**
Remaining balance (Unreleased credits)							**1,456.400**	**58.800**

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January 12, 2021

Paul Wiesner
NC DEQ Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

RE: Poplin Ridge Stream Restoration Site: MY6 Monitoring Report (NCDMS ID 95359)

Listed below are comments provided by DMS on December 18, 2020 regarding the Poplin Ridge Stream Restoration Site: Year 6 Monitoring Report and RES' responses.

General/ Report Text (Section 1.4 Project Performance): As noted in the 6/11/2020 IRT site visit meeting minutes in Appendix F; "*The IRT reminded RES to make sure the easement is properly marked due to a few small areas of easement scalloping and missing/damaged signage observed during the site visit. RES agreed to repair any easement scalloping/encroachment and agreed to ensure all required easement marking and signage are updated and present by the end of MY6.*" In the report text, please briefly discuss how the minor encroachment issues observed during the June 2020 IRT site visit were addressed in MY6 (2020). Please also discuss easement marking and signage repair and updates that were conducted in MY6 (2020). Lastly, please discuss any unresolved easement encroachment (if any) observed during the November 2020 RES site assessment.
In December 2020, RES inspected the entire easement boundary and replaced all missing easement signage. There was no easement encroachment observed. This was added to Section 1.4.1.

Table 5 - Vegetation Condition Assessment & Table 6 – Visual Stream Morphology Stability Assessment: Please confirm that no invasive areas of concern or current easement encroachment areas above the mapping thresholds exist and 100% of the project streams are functioning as intended (as reported in the tables).
Confirmed.

Appendix E – Flow Gauge Graph: DMS recommends showing the start and end points of the 135 days of consecutive flow reported.
Done.

Digital Support File Comments:
Last year DMS commented on the differences between the stream feature lengths and the asset table. Shapefiles were submitted but are not able to be opened in ArcMap or ArcPro because they are corrupted. Please re-submit these features, ensuring that they can be used in ArcMap/Pro.
The shapefile has been repaired and is included with the digital support files.

It looks like the bankfull cross sectional areas that were used as the baseline for BHR calculations (MY5) are different from what was contained in the MY5 LTOB spreadsheet. For example, XS1 had a cross sectional area of 3.7, but 4.2 is reported in the table and used in the BHR spreadsheet for MY6. Also, the BHR calculations were done correctly, but may be inaccurate due to rounding. Be aware that rounding baseline cross sectional area, and depths used in the BHR calculation can produce an inaccurate BHR, so please only round the final BHR value.
XS1 and XS2 are in the pond bottom which was repaired during MY5. The 4.2 cross sectional area was from the post-repair monitoring which is the very last cross section in the spreadsheet. RES notes the rounding comment.

Please submit the feature that represents the flow gauge, the photo point features with unique ID's included in the attribute table, and updated cross section features, including unique ID's.
Done.

Please include the photos as JPEGs.
Done.

Note that the data in the flow gauge figure is not plotted correctly in excel. Use the scatter plot (x,y) chart type, then add a line, rather than selecting the line chart type.
The line chart type has been changed to the scatter plot chart type.

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1.0 PROJECT SUMMARY

1.1. Goals and Objectives

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

- Nutrient removal,
- Sediment removal,
- Reducing runoff from animal operations,
- Filtration of runoff, and
- Improved aquatic and terrestrial habitat.

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

- Establishing riparian buffer areas adjacent to CAFOs.
- Converting active farm fields to forested buffers,
- Stabilization of eroding stream banks,
- Reduction in streambank slope,
- Restoration of riparian buffer bottomland hardwood habitats, and
- Construction of in-stream structures designed to improve bedform diversity and trap detritus.

1.2. Success Criteria

The success criteria for the Poplin Ridge 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

Bankfull Events - Two bankfull flow events must be documented within the seven-year monitoring period. The two bankfull events must occur in separate years. Otherwise, stream monitoring will continue until two bankfull events have been documented in separate years. Bankfull events will be documented using crest gauges, auto-logging crest gauges, photographs, and visual assessments for evidence of debris wrack lines.

Cross-Sections - There should be little change in as-built cross-section. If changes do take place, they should be evaluated to determine if they represent a movement toward a less stable condition, or minor changes that represent an increase in stability.

Bank Pin Arrays - Bank pin arrays will be used as a supplemental method to monitor erosion on selected meander bends. Bank pin exposure will be recorded at each monitoring event.

Digital Image Stations- Digital images will be used to subjectively evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of erosion control measures. Longitudinal images should indicate the absence of developing bars within the channel or an excessive increase in channel depth. Lateral images should not indicate excessive erosion or continuing degradation of banks over time. A series of images over time should indicate successional maturation of riparian vegetation.

1.2.2.Vegetation

Interim measures of vegetative success for the site will be the survival of at least 320 three-year-old trees per acre at the end of Year 3 and 260 five-year old trees per acre at the end of Year-5. The final vegetative success criteria will be the survival of 210 trees per acre at the end of Year 7.

1.3. Project Setting and Background

The Poplin Ridge Stream Restoration Site (Site) encompasses approximately 27.17 acres, of which 4.69 acres are wooded and the remaining 22.48 acres are agricultural fields and pastures. The western and eastern systems, UT1 and UT2 respectively, consist of unnamed tributaries to the East Fork of Stewarts Creek. UT1 is divided into seven reaches and UT2 is divided into five reaches. The Site is located within the Yadkin River Watershed (NCDWR sub basin 03-07-14 and HUC 03040105070050) in Union County, North Carolina, approximately six miles north of Monroe. The Site is located within the Stewarts Creek Watershed, 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. Also, UT2-4 had a large decrease in SMUs due to loss of land control. RES has reverted back to the Mitigation Plan (Proposed) SMUs.

Reach	Mitigation Type	Proposed Length (LF)*	Mitigation Ratio	Proposed SMUs	Baseline SMUs
UT1-1	Preservation	572	5:1	114	114
UT1-1	Enhancement I	566	1.5:1	377	377
UT1-2	P1 Restoration	1,171	1:1	1,171	1,178
UT1-3	P1 Restoration	901	1:1	901	893
UT1-4	Enhancement I	1,210	1.5:1	807	815
UT1-A	Enhancement I	217	1.5:1	145	144
UT1-B	Preservation	620	5:1	124	124
UT1-B	Enhancement I	455	1.5:1	303	303
UT1-C	Enhancement I	857	1.5:1	571	586
UT2-1	Enhancement II	490	2.5:1	196	196
UT2-2	P1 Restoration	847	1:1	847	847
UT2-3	P1 Restoration	521	1.5:1	347	347
UT2-4*	P1 Restoration	257	1:1	257	257
UT2-A	Enhancement II	463	2.5:1	185	184
	Total	**9,147**		**6,346**	**6,365**

*Reach was shortened due to loss of land control.

**The contracted amount of credits for this Site was 6,944 SMUs

On July 11, 2018, the IRT, DMS, and RES had a site visit to discuss credit release at Poplin Ridge. It was determined that credits from UT2-1, UT2-2, and UT2-A associated with the drained pond bottom would be withheld (812.2 SMUs). Additionally, it was requested that RES submits a Remedial Action Plan to address the issues in the drained pond bottom and that a flow gauge is to be installed on UT2-A to document at least intermittent flow. RES repaired this reach in September 2019 and added the flow gauge to UT2-A. NCIRT, NCDMS, and RES, had a site visit to review the pond bottom repairs in June 2020. Flow, bed and bank, and riffle/pool sequences were observed throughout the pond repair reach. NCIRT did not note any issue

with releasing MY5 credits. The adaptive management work and site visit are further detailed in **Appendix F**.

1.4. Project Performance

Monitoring Year 6 (MY6) data was collected throughout 2020 with the final field visit in November. Year 6 monitoring activities included visual assessment of all reaches and the surrounding easement, 17 permanent photo stations, 13 permanent vegetation monitoring plots, four pond bottom repair cross sections, and two pond bottom repair random vegetation plots. Per the approved Mitigation Plan, cross section monitoring was not collected in MY6, however MY5 data is presented below and in the appendices for reference.

Summary information and data related to the occurrence of items such as beaver activity 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 the Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on NCDMS' website (https://deq.nc.gov/about/divisions/mitigation-services/dms-projects). All raw data supporting the tables and figures in the appendices is available from NCDMS upon request.

1.4.1.Vegetation

Visual assessment of the site indicates that herbaceous vegetation has become well established on-site. RES replanted the MY5 low stem density areas as well as the pond bottom in April 2020. The invasive species treatments were performed in October and November 2020 and will continue as needed throughout the monitoring period. In December 2020, RES inspected the entire easement boundary and replaced all missing easement signage. There was no easement encroachment observed. RES plans to supplemental plant the area in and around Random Plot 2 (0.20 acres) this dormant season.

Monitoring of 13 permanent vegetation plots was completed in November 2020. Summary tables and photographs associated with MY6 monitoring can be found in **Appendix C**. MY6 monitoring data indicates that all vegetation monitoring plots met the MY6 interim success criteria of 210 planted stems per acre. Planted stem densities among the plots ranged from 243 to 890 planted stems per acre with a mean of 607 stems per acre across all plots. When volunteer stems are included, densities ranged between 243 and 1,497 total stems per acre with a mean of 750 stems per acre across all plots. A total of 15 plant species were documented within the monitoring plots. The average planted stem height in plots was 11.5 feet. The data from the two random vegetation plots in the pond bottom repair area showed 283 stems per acre in Random Plot 1 and 202 stems per acre in Random Plot 2. The average stem heights were 6.3 and 5.9 feet, respectively.

1.4.2. Stream Geomorphology

Visual assessment of the stream channel was performed in order to document signs of instability, such as eroding banks, structural instability, or excessive sedimentation. Small areas of bank scour, bed aggradation, and bed degradation were reported as problem areas in previous years but are no longer problem areas MY6. RES will continue to monitor these areas during future visits to assess the stability of the channel and the need for any repair.

Geomorphic data for MY6 was collected during November 2020 for XS1, 2, 30, and 31. Cross-section plots and summary tables related to stream morphology are located in **Appendix D**. Geomorphic data collection for XS 3-29 was not performed in MY6 per the approved Mitigation Plan. The MY6 stream morphology data indicate that, in general, the stream is stable. A few small changes were noted in the cross-section

dimensions; however, these are relatively minor and do not exceed expected adjustments in channel form. Starting in MY5, baseline cross sectional area was used to determine bankfull for riffle dimensions. No riffle cross sections documented a BHR over 1.2.

Bank pin arrays indicate that no erosion occurred during MY5. Bank pin array data will continue to be collected and analyzed in future monitoring years to monitor bank erosion trends.

Substrate monitoring was performed during MY5. Pebble count D_{50} fell into the coarse gravel range for UT1-1, medium gravel for UT1-2, coarse gravel for UT1-3, medium gravel for UT1-4, coarse gravel for UT1-A, coarse gravel for UT1-B, medium gravel for UT1-C, silty/clay for UT2-3, and medium gravel for UT2-A. A pebble count was not performed on UT2-4 due to a beaver pond. The channel substrate will continue to be monitored in future years for shifts in particle size distributions.

Overall, documented shifts in stream morphology for the repair reach show that a defined channel is continuing to form and maintain. The project is meeting success criteria regarding stable dimension as well as substrate and sediment transport.

1.4.3.Stream Hydrology

Since project completion in April 2015, 19 bankfull event have been recorded on UT1-2, 51 on UT1-4, and 45 on UT2-3. MY6 bankfull events were identified by transducer gauge readings. Stream hydrology issues were identified and discussed with the NCIRT during a site visit in July 2018. RES installed a flow gauge downstream of XS-3 on UT2-A in January 2019. The flow gauge recorded 135 consecutive days of flow and 307 total days of flow in MY6.

1.4.4.Adaptive Management

During a site visit with NCIRT and NCDMS at the Poplin Ridge Site in July 2018, several problem areas were identified. Per the request of NCIRT, RES provided an Adaptive Management Plan to the IRT August 2019. The work proposed in the Adaptive Management Plan was completed in September 2019. The construction was completed as designed. The pond bottom was planted in April 2020. Additionally, RES installed the flow gauge discussed in the Adaptive Management Plan, in January 2019.

In response to problem areas identified in the Poplin Ridge Stream Restoration Site Year 5 Monitoring Report and the 2019 Adaptive Management Plan, RES completed adaptive management work in fall 2019 and spring 2020. In September 2019, RES regraded and installed structures on UT2-2 through the pond bottom (including the lower portion of UT2-A) and replanted the pond bottom and other low stem density areas in April 2020. RES also installed monitoring devices in the pond bottom. The devices include Cross Sections 30 and 31 and two random vegetation plots. The cross-section data was surveyed again in November 2020 and is included in this report. The random vegetation plots were measured in November 2020 and the results are attached. The cross sections and random plots in the pond bottom will also be measured again during MY7 monitoring.

2.0 METHODS

Visual assessment of the project was performed at the beginning and end of the monitoring year. Permanent photo station photos were also collected during the morphologic and vegetation data collection events. Additionally, photos were taken of vegetation or stream problem areas not revealed in the permanent photo station images.

Geomorphic measurements (MY0, MY1, MY2, MY3, MY5, MY7) were taken during low flow conditions using a Topcon GTS-312 Total Station. Three-dimensional coordinates associated with each cross-section data were collected in the field and geo-referenced (NAD83 State Plane feet FIPS 3200). Morphological data was limited to 29 cross-sections. Survey data were 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 at 13 permanent monitoring plots. Vegetation monitoring follows the CVS-EEP Level 2 Protocol for Recording Vegetation, version 4.2 (Lee et al. 2008) and includes analysis of species composition and density of planted specimens. 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 are taken from the origin each monitoring year.

Precipitation data was collected using an Onset HOBO Data Logging Rain Gauge. Bankfull events were documented with manual crest gauges, which were installed within each of the following reaches - UT1-2, UT1-4, and UT2-3. Crest gauge data was downloaded during quarterly site visits. The flow gauge is a pressure transducer located in a pool. Flow data is calculated by detecting pool water elevations greater than the elevation of the downstream riffle.

3.0 REFERENCES

Environmental Banc & Exchange. 2014. Poplin Ridge Stream Restoration Project Final Mitigation Plan. North Carolina Ecosystems Enhancement Program, Raleigh.

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.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.

Appendix A
General Tables and Figures

Table 1. Project Components and Mitigation Credits
Poplin Ridge Stream Restoration Project

Mitigation Credits

	Stream*		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	6107.87	238.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Project Components

Project Component -or- Reach ID	As-Built Stationing/Location (LF)	Existing Footage/Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio	SMUs
UT1-1	1+20 to 6+92	572	Preservation	RE	572	1 : 5	114
UT1-1	6+92 to 12+58	566	EI	R	566	1 : 1.5	377
UT1-2	12+58 to 24+96	1,284	PI	R	1,171	1 : 1	1,171
UT1-3	24+96 to 34+50	833	PI	R	901	1 : 1	901
UT1-4	34+50 to 46+73	1,252	EI	R	1,210	1 : 1.5	807
UT1-A	0+73 to 2+89	197	EI	R	217	1 : 1.5	145
UT1-B	0+09 to 6+29	620	Preservation	RE	620	1 : 5	124
UT1-B	6+90 to 11+45	512	EI	R	455	1 : 1.5	303
UT1-C	1+21 to 10+01	883	EI	R	857	1 : 1.5	571
UT2-1	0+00 to 4+90	490	EII	R	490	1 : 2.5	196
UT2-2	4+90 to 13+97	875	PI	R	847	1 : 1	847
UT2-3	13+97 to 19+18	495	PI	R	521	1 : 1.5	347
UT2-4	19+18 to 22+07	270	PI	R	257	1 : 1	257
UT2-A	0+45 to 5+06	365	EII	R	463	1 : 2.5	185

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	3,697					
Enhancement I	3,305					
Enhancement II	953					
Creation						
Preservation	1,192					
High Quality Preservation						

BMP Elements

Element	Location	Purpose/Function	Notes
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BMP Elements

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

Table 2. Project Activity and Reporting History Poplin Ridge Stream Restoration Project		
Activity or Report	**Data Collection Complete**	**Completion or Delivery**
Mitigation Plan	NA	Jul-14
Final Design – Construction Plans	NA	Oct-14
Construction Completed	Apr-15	Apr-15
Site Planting Completed	Apr-15	Apr-15
Baseline Monitoring Document (Year 0 Monitoring – baseline)	Apr-15	Jul-15
Year 1 Monitoring	Dec-15	Jan-16
Year 2 Monitoring	Sep-16	Oct-16
Invasive Species Treatment	NA	Aug-17
Year 3 Monitoring	Stream: Sep-17 Vegetation: Sep-17	Nov-17
Invasive Species Treatment and Supplemental Planting	NA	Feb-18
Invasive Species Treatment	NA	June-18
Invasive Species Treatment	NA	Aug-18
Year 4 Monitoring	Vegetation: Sep-18	Feb-19
Beaver Dam Removal	NA	Sept-19
Stream Adaptive Management (UT2-2 Pond Bottom)	NA	Sept-19
Year 5 Monitoring	Stream: June/July-19 Vegetation: Aug-19	Jan-20
Supplemental Planting	NA	Apr-20
Invasive Species Treatment	NA	Oct-20
Invasive Species Treatment	NA	Nov-20
Year 6 Monitoring	Vegetation: Nov-20	Dec-20
Year 7 Monitoring		

Table 3. Project Contacts Table Poplin Ridge Stream Restoration Project	
Designer	WK Dickson and Co., Inc. 720 Corporate Center Drive Raleigh, NC 27607 (919) 782-0495 Frasier Mullen, PE
Construction Contractor	Wright Contracting PO Box 545 Siler City, NC 27344 (919) 663-0810 Joseph Wright
Planting Contractor	Resource Environmental Solutions, LLC 3600 Glenwood Avenue, Suite 100 Raleigh, NC 27612 (919) 209-1061 David Godley
Seeding Contractor	Wright Contracting PO Box 545 Siler City, NC 27344 (919) 663-0810 Joseph Wright
Seed Mix Sources	Green Resource
Nursery Stock Suppliers	Arbogen, NC Forestry Services Nursery
Full Delivery Provider Project Manager:	Resource Environmental Solutions, LLC 3600 Glenwood Avenue, Suite 100 Raleigh, NC 27612 Brad Breslow
Monitoring Performers (MY0) Project Manager:	Resource Environmental Solutions, LLC 3600 Glenwood Avenue, Suite 100 Raleigh, NC 27612 (919) 209-1061 Brian Hockett, PLS
Monitoring Performers (MY1-MY2) 2015-2016 Project Manager:	Equinox 37 Haywwod Street, Suite 100 Asheville, NC 28801 Drew Alderman (828) 253-6856
Monitoring Performers (MY3+) 2017+ Project Manager:	Resource Environmental Solutions, LLC 3600 Glenwood Avenue, Suite 100 Raleigh, NC 27612 (919) 741-6268 Ryan Medric

Table 4. Project Information Poplin Ridge Stream Restoration Project						
Project Name	Poplin Ridge Stream Restoration Project					
County	Union					
Project Area (acres)	27.17					
Project Coordinates (latitude and longitude)	UT1: 35° 03' 15.97" N 80° 34' 21.64" W					
	UT2: 35° 03' 17.99" N 80° 33' 46.77" W					
Project Watershed Summary Information						
Physiographic Province	Piedmont					
River Basin	Yadkin					
USGS Hydrologic Unit 8-digit	3040105					
USGS Hydrologic Unit 14-digit	03040105070050					
DWQ Sub-basin	03-07-14					
Project Drainage Area (acres)	UT1: 1.14 square miles (728 acres)					
	UT2: 1.35 square miles (861 acres)					
Project Drainage Area Percentage of Impervious Area	UT1: 8%					
	UT2: 5%					
CGIA Land Use Classification	developed (open space, low density, med. density, high density), cultivated crops, pasture/hay, deciduous forest, evergreen forest					
Reach Summary Information						
Parameters	**UT1-R1**	**UT1-R2**	**UT1-R3**	**UT1-R4**	**UT1-A**	**UT1-B**
Length of reach (linear feet)	1,138	1,178	893	1,223	216	1,075
Valley Classification	VIII	VIII	VIII	VIII	VIII	VIII
Drainage area (acres)	136	248	384	728	88	120
NCDWQ stream identification score	35	22.5	30	31	35	35
NCDWQ Water Quality Classification	WS-III	WS-III	WS-III	WS-III	WS-III	WS-III
Morphological Description (stream type)	E4	E4	E4	C4	E4	E4/C4
Evolutionary trend	Stage I	Stage II	Stage II	Stage V	Stage I	Stage I/III
Underlying mapped soils	CmB	CmB, TbB2	CmB, TbB2	ChA	CmB	CmB
Drainage class	mod. well	mod. well; well	mod. well; well	somewhat poorly	mod. well	mod. well
Soil Hydric status	Not Hydric	Not Hydric	Not Hydric	Partially Hydric	Not Hydric	Not hydric
Slope	0.48%	0.70%	0.40%	0.50%	1.20%	1.80%
FEMA classification	N/A	N/A	N/A	Zone AE	N/A	N/A
Native vegetation community	mixed hardwood forest, cultivated	cultivated	cultivated	cultivated	cultivated	mixed hardwood forest, cultivated
Percent composition of exotic invasive vegetation	10%	0%	0%	0%	5%	15%

Table 4 Cont'd. Project Information Poplin Ridge Stream Restoration Project						
Reach Summary Information						
Parameters	**UT1-C**	**UT2-R1**	**UT2-R2**	**UT2-R3**	**UT2-R4**	**UT2-A**
Length of reach (linear feet)	880	490	847	521	257	461
Valley Classification	VIII	VIII	VIII	VIII	VIII	VIII
Drainage area (acres)	250	631	726	792	861	49
NCDWQ stream identification score	35	33.5	33.5	22.5	33.5	33.5
NCDWQ Water Quality Classification	WS-III	WS-III	WS-III	WS-III	WS-III	WS-III
Morphological Description (stream type)	E4	C4c	N/A	E4	E4	C4
Evolutionary trend	Stage IV	Stage VI	N/A	Stage II	Stage II	Stage IV
Underlying mapped soils	TbB2	ChA	ChA	ChA, BaB	ChA	ChA, CmA
Drainage class	well	somewhat poorly	somewhat poorly	somewhat poorly; well	somewhat poorly	somewhat poorly; mod. well
Soil Hydric status	Not Hydric	Partially Hydric	Partially Hydric	Partially Hydric	Partially Hydric	Not Hydric
Slope	0.80%	0.27%	0.10%	0.57%	0.31%	1.30%
FEMA classification	N/A	Zone AE	Zone AE	Zone AE	Zone AE	N/A
Native vegetation community	cultivated	woody cover, cultivated	cultivated	cultivated	cultivated	cultivated
Percent composition of exotic invasive vegetation	0%	20%	0%	0%	0%	0%
Regulatory Considerations						
Regulation	**Applicable?**		**Resolved?**		**Supporting Documentation**	
Waters of the United States - Section 404	Yes		Yes		SAW-2012-01079	
Waters of the United States - Section 401	Yes		Yes		DWR# 13-1087	
Endangered Species Act	Yes		Yes		USFWS (Corr. Letter)	
Historic Preservation Act	Yes		Yes		SHPO (Corr. Letter)	
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No		N/A		N/A	
FEMA Floodplain Compliance	Yes		Yes		EEP Floodplain Requirements Checklist	
Essential Fisheries Habitat	No		N/A		N/A	

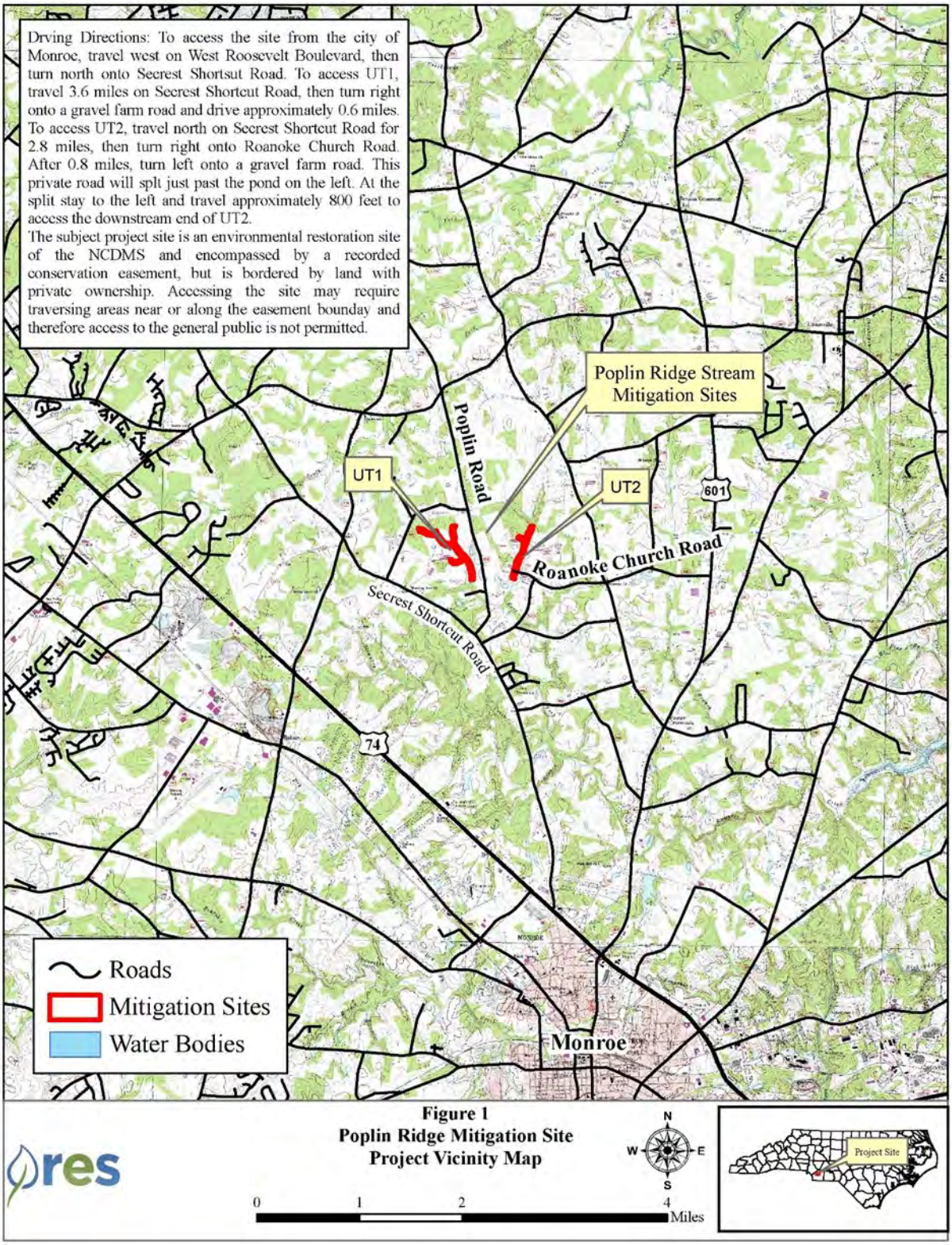

Figure 1
Poplin Ridge Mitigation Site
Project Vicinity Map

Appendix B
Visual Assessment Data

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N
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Feet

Figure 2
1

Poplin Ridge Stream Restoration Project MY6 2020

Current Conditions Plan View

Date: 12/4/2020	Drawn by: RTM

1 inch = 100 feet

LEGEND

- Conservation Easement

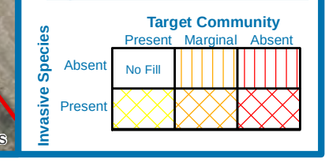
Vegetation Plot

- >210 stems/acre

Random Vegetation Plot

- >210 stems/acre
- <210 stems/acre
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment



res

N
W E
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0 50 100
Feet

Figure 2
2

Poplin Ridge Stream Restoration Project MY6 2020

Current Conditions Plan View

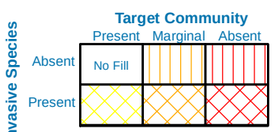
Date: 12/4/2020 | Drawn by: RTM

1 inch = 100 feet

LEGEND

- Conservation Easement
- **Vegetation Plot**
- >210 stems/acre
- **Random Vegetation Plot**
- >210 stems/acre
- <210 stems/acre
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment



res

N
W E
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0 50 100
Feet

Figure 2
3

Poplin Ridge Stream Restoration Project MY6 2020

Current Conditions Plan View

Date: 12/4/2020	Drawn by: RTM

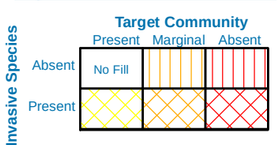
1 inch = 100 feet

LEGEND
- Conservation Easement

Vegetation Plot
- >210 stems/acre

Random Vegetation Plot
- >210 stems/acre
- <210 stems/acre
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment



N E S W

0 50 100
Feet

Figure 2
4

Poplin Ridge Stream Restoration Project MY6 2020

Current Conditions Plan View

Date: 12/4/2020	Drawn by: RTM

1 inch = 100 feet

LEGEND

- Conservation Easement

Vegetation Plot
- >210 stems/acre

Random Vegetation Plot
- >210 stems/acre
- <210 stems/acre
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment

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

res

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Feet

Figure 2
5

Poplin Ridge Stream Restoration Project MY6 2020

Current Conditions Plan View

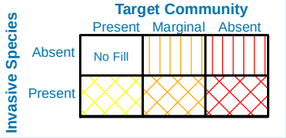
Date: 12/4/2020	Drawn by: RTM

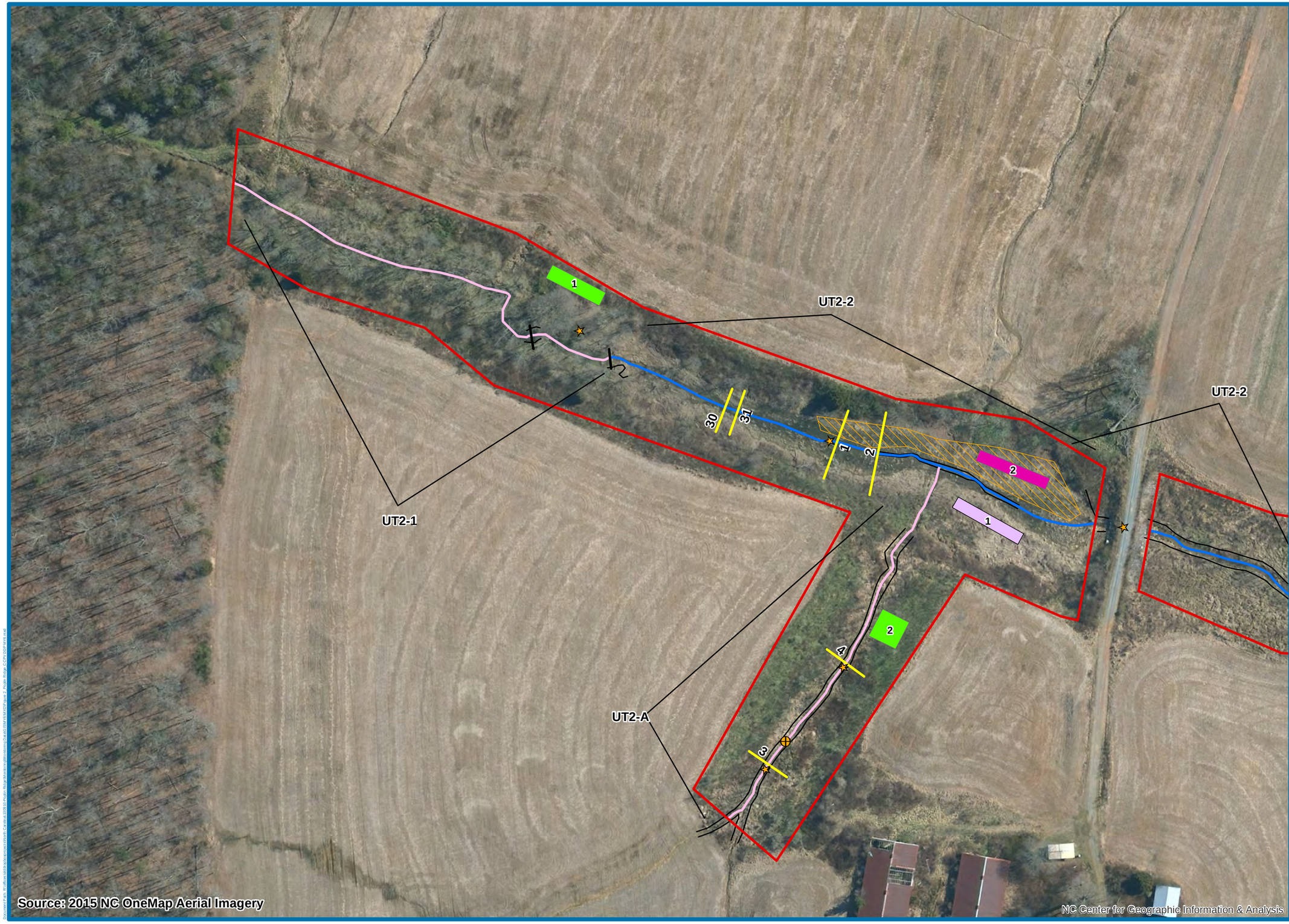
1 inch = 100 feet

LEGEND

- Conservation Easement
- **Vegetation Plot**
- >210 stems/acre
- **Random Vegetation Plot**
- >210 stems/acre
- <210 stems/acre
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment





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N E S W

0 50 100
Feet

Figure 2
6

Poplin Ridge Stream Restoration Project MY6 2020

Current Conditions Plan View

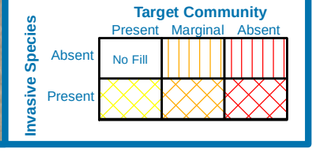
Date: 12/4/2020	Drawn by: RTM

1 inch = 100 feet

LEGEND

- Conservation Easement
- **Vegetation Plot**
  - >210 stems/acre
- **Random Vegetation Plot**
  - >210 stems/acre
  - <210 stems/acre
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment



res

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0 50 100
Feet

Figure 2
7

Poplin Ridge Stream Restoration Project MY6 2020

Current Conditions Plan View

Date: 12/4/2020	Drawn by: RTM

1 inch = 100 feet

LEGEND

- Conservation Easement

Vegetation Plot

- >210 stems/acre

Random Vegetation Plot

- >210 stems/acre
- <210 stems/acre
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment

Target Community

Invasive Species	Present	Marginal	Absent
Absent	No Fill		
Present			

Table 5. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-1 - Enhancement I
Assessed Length 566 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.	-	-			-			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	-	-			-			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	-	-			-			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	-	-			-			
		2. Thalweg centering at downstream of meander bend (Glide).	-	-			-			
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.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	3	3			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	3	3			100%			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-2 - P1 Restoration
Assessed Length 1,178 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.	26	26			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	25	25			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	25	25			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	25	25			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	25	25			100%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			1	8	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.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	3	3			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	3	3			100%			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-3 - P1 Restoration
Assessed Length 893 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.	18	18			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	18	18			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	18	18			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	18	18			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	18	18			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.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	3	3			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	3	3			100%			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-4 - Enhancement I
Assessed Length 1,223 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.	-	-			-			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	-	-			-			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	-	-			-			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	-	-			-			
		2. Thalweg centering at downstream of meander bend (Glide).	-	-			-			
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.	N/A	N/A			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	N/A	N/A			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.	N/A	N/A			N/A			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-A - Enhancement I
Assessed Length 216 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.	-	-			-			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	-	-			-			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	-	-			-			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	-	-			-			
		2. Thalweg centering at downstream of meander bend (Glide).	-	-			-			
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.	N/A	N/A			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	N/A	N/A			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.	N/A	N/A			N/A			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-B - Enhancement I
Assessed Length 455 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.	11	11			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	11	11			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	11	11			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	11	11			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	11	11			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.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	1	1			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	1	1			100%			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT1-C - Enhancement I
Assessed Length 880 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.	14	14			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	13	13			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	13	13			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	13	13			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	13	13			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.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	2	2			100%			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-1 - Enhancement II
Assessed Length 490 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.	-	-			-			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	-	-			-			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	-	-			-			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	-	-			-			
		2. Thalweg centering at downstream of meander bend (Glide).	-	-			-			
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.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	2	2			100%			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-2 - P1 Restoration
Assessed Length 847 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.	5	5			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	5	5			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	5	5			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	5	5			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	5	5			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.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	2	2			100%			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-3 - P1 Restoration
Assessed Length 521 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.	8	8			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	8	8			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	8	8			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	8	8			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	8	8			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.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	3	3			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	3	3			100%			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-4 - P1 Restoration
Assessed Length 257 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.	4	4			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	5	5			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	5	5			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	5	5			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	5	5			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.	N/A	N/A			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	N/A	N/A			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.	N/A	N/A			N/A			

Table 5 cont'd. Visual Stream Morphology Stability Assessment
Poplin Ridge Stream Restoration Site - UT2-A - Enhancement II
Assessed Length 461 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.	10	10			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	13	13			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	13	13			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	13	13			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	13	13			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.	5	5			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	5	5			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	5	5			100%			

Table 6. Vegetation Condition Assessment Poplin Ridge Stream Restoration Site					
Planted Acreage :	**22.5**				
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.	Orange Simple Hatch	1	0.20	1%
		Totals	1	0.20	1%
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	1	0.20	1%
Easement Acreage :	**27.1**				
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).	N/A	0	0.00	0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	N/A	0	0.00	0%

N/A - Item does not apply.

Monitoring Year 6 – 2020 Photo Station Photos

Project Reach UT1-1 – Permanent Photo Station 1
Station 8+53 – Looking Upstream

Project Reach UT1-2 – Permanent Photo Station 2
Station 14+58 – Looking Upstream
November 11, 2020

Project Reach UT1-2 – Permanent Photo Station 3
Station 21+50 – Looking Downstream

Project Reach UT1-3 – Permanent Photo Station 4
Station 26+50 – Looking Upstream at Crossing

Project Reach UT1-3 – Permanent Photo Station 5
Station 27+50 – Looking Downstream

Project Reach UT1-4 – Permanent Photo Station 6
Station 47+20 – Looking Upstream

Project Reach UT1-A - Permanent Photo Station 7
Station 2+00 – Looking Downstream

Project Reach UT1-B – Permanent Photo Station 8
Station 9+86 – Looking Downstream

Project Reach UT1-C – Permanent Photo Station 9
Station 2+50 – Looking Upstream

Project Reach UT2-1 – Permanent Photo Station 10
Station 4+50 – Looking Upstream

Project Reach UT2-2– Permanent Photo Station 11
Station 11+00 – Looking Upstream at Pond Bottom
November 2020

Project Reach UT2-2 – Permanent Photo Station 12
Station 11+00 – Looking Downstream

Project Reach UT2-2 – Permanent Photo Station 13
Station 7+59 – Looking Upstream

Project Reach UT2-3 – Permanent Photo Station 14
Station 13+83 – Looking Downstream

Project Reach UT2-4 – Permanent Photo Station 15
Station 20+39 – Looking Downstream

Project Reach UT2-A – Permanent Photo Station 16
Station 1+22 – Looking Downstream

Project Reach UT2-A – Permanent Photo Station 17
Station 2+62 – Looking Downstream

Appendix C
Vegetation Plot Data

Table 7. MY6 Vegetation Plot Criteria Attainment

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Planted Stem Height
1	607	283	890	Yes	12.2
2	364	0	364	Yes	12.8
3	647	81	728	Yes	15.3
4	890	202	1093	Yes	14.2
5	890	607	1497	Yes	10.3
6	769	0	769	Yes	10.3
7	688	0	688	Yes	15.7
8	688	526	1214	Yes	8.3
9	445	0	445	Yes	6.1
10	243	0	243	Yes	7
11	607	121	728	Yes	8.3
12	405	0	405	Yes	16.9
13	688	0	688	Yes	12.4
Project Avg	**610**	**140**	**750**	**Yes**	**11.5**

Table 8. CVS Vegetation Plot Metadata Poplin Ridge Stream Restoration Site	
Report Prepared By	Ryan Medric
Date Prepared	11/13/2020 0:00
database name	Poplin_Ridge_95359_2020_MY6_CVS_Vegetation.mdb
database location	
computer name	
file size	
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	95359
project Name	Poplin Ridge Stream Restoration Project
Description	
River Basin	Yadkin-Pee Dee
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	13

Table 9. Total Planted Stem Counts

Poplin Ridge			Current Plot Data (MY6 2020)																																				
			95359-01-0001			95359-01-0002			95359-01-0003			95359-01-0004			95359-01-0005			95359-01-0006			95359-01-0007			95359-01-0008			95359-01-0009			95359-01-0010			95359-01-0011			95359-01-0012			95359-01-0013		
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
Acer negundo	boxelder	Tree			7																																			
Acer rubrum	red maple	Tree																																						
Acer rubrum var. rubrum	red maple	Tree																																						
Asimina triloba	pawpaw	Tree																																						
Baccharis halimifolia	eastern baccharis	Shrub																																						
Betula nigra	river birch	Tree	2	2	2	3	3	3	3	3	3										1	1	1	2	2	3										1	1	1		
Carya	hickory	Tree																																						
Carya alba	mockernut hickory	Tree																																						
Carya glabra	pignut hickory	Tree																																						
Celtis laevigata	sugarberry	Tree																																						
Celtis occidentalis	common hackberry	Tree																																						
Diospyros virginiana	common persimmon	Tree									2																							1							
DONTKNOW: unsure record																																								
Fraxinus pennsylvanica	green ash	Tree				2	2	2																2	2	2				1	1	1			2					
Juniperus virginiana	eastern redcedar	Tree																																						
Liquidambar styraciflua	sweetgum	Tree												5			15																								
Liriodendron tulipifera	tuliptree	Tree				1	1	1	1	1	1				1	1	1							1	1	1										2	2	2		
Nyssa sylvatica	blackgum	Tree										4	4	4																										
Platanus occidentalis	American sycamore	Tree				1	1	1				2	2	2	3	3	3	3	3	3	5	5	5	5	5	5							2	2	2	3	3	3	3	3	3
Populus deltoides	eastern cottonwood	Tree																																						
Pyrus calleryana	Callery pear	Exotic																																						
Quercus	oak	Tree																																						
Quercus alba	white oak	Tree																																						
Quercus falcata	southern red oak	Tree																																						
Quercus lyrata	overcup oak	Tree										2	2	2				1	1	1																				
Quercus michauxii	swamp chestnut oak	Tree							1	1	1																														
Quercus nigra	water oak	Tree	12	12	12	1	1	1	3	3	3	8	8	8	4	4	4	1	1	1	6	6	6	3	3	3	3	3	3	1	1	1	5	5	5	3	3	3	6	6	6
Quercus phellos	willow oak	Tree	1	1	1				8	8	8	6	6	6	7	7	7	10	10	10	2	2	2	2	2	4	8	8	8	4	4	4	3	3	3	1	1	1	1	1	1
Quercus rubra	northern red oak	Tree													5	5	5	1	1	1	3	3	3	1	1	1							3	3	3	2	2	2	2	2	2
Quercus velutina	black oak	Tree				1	1	1							2	2	2	3	3	3				1	1	1							2	2	2	1	1	1	2	2	2
Sambucus canadensis	Common Elderberry	Shrub																																						
Ulmus alata	winged elm	Tree																								10														
Ulmus rubra	slippery elm	Tree																																						
Stem count			15	15	22	9	9	9	16	16	18	22	22	27	22	22	37	19	19	19	17	17	17	17	17	30	11	11	11	6	6	6	15	15	18	10	10	10	17	17	17
size (ares)			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		
Species count			3	3	4	6	6	6	5	5	6	5	5	6	6	6	7	6	6	6	5	5	5	8	8	9	2	2	2	3	3	3	5	5	7	5	5	5	7	7	7
Stems per ACRE			607	607	890	364	364	364	647	648	728	890	890	1093	890	890	1497	769	769	769	688	688	688	688	688	1214	445	445	445	243	243	243	607	607	728	405	405	405	688	688	688

Table 9. Total Planted Stem Counts

Poplin Ridge			Annual Means																					
			MY6 (2020)			MY5 (2019)			MY4 (2018)			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	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree			7			6			5			3									
Acer rubrum	red maple	Tree						2			3			123									
Acer rubrum var. rubrum	red maple	Tree															121						
Asimina triloba	pawpaw	Tree										1	1	1	4	4	4	5	5	5	21	21	21
Baccharis halimifolia	eastern baccharis	Shrub															10						
Betula nigra	river birch	Tree	12	12	13	12	12	12	12	12	12	7	7	7	9	9	9	9	9	9	27	27	27
Carya	hickory	Tree															6			2			
Carya alba	mockernut hickory	Tree									2			5									
Carya glabra	pignut hickory	Tree						2															
Celtis laevigata	sugarberry	Tree						2			2												
Celtis occidentalis	common hackberry	Tree															32			9			
Diospyros virginiana	common persimmon	Tree			3	1	1	5	1	1	5	1	1	7			4			2			
DONTKNOW: unsure record																					7	7	7
Fraxinus pennsylvanica	green ash	Tree	5	5	7	4	4	6	4	4	4	1	1	3			3			2			
Juniperus virginiana	eastern redcedar	Tree									2												
Liquidambar styraciflua	sweetgum	Tree			20			19			14			17			106			8			
Liriodendron tulipifera	tuliptree	Tree	6	6	6	6	6	8	6	6	6	6	6	6	7	7	7	7	7	7	34	34	34
Nyssa sylvatica	blackgum	Tree	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3			
Platanus occidentalis	American sycamore	Tree	27	27	27	27	27	27	27	27	27	21	21	21	21	21	21	20	20	20	26	26	26
Populus deltoides	eastern cottonwood	Tree						4												7			
Pyrus calleryana	Callery pear	Exotic						4															
Quercus	oak	Tree													2	2	2	31	31	31	126	126	126
Quercus alba	white oak	Tree																1	1	1	9	9	9
Quercus falcata	southern red oak	Tree																4	4	4	10	10	10
Quercus lyrata	overcup oak	Tree	3	3	3	3	3	3	3	3	3	3	3	3									
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	3	3	3	3	3	3	4	4	4	5	5	5	4	4	4	8	8	8
Quercus nigra	water oak	Tree	56	56	56	56	56	56	59	59	59	65	65	65	79	79	79	69	69	69	22	22	22
Quercus phellos	willow oak	Tree	53	53	55	41	41	41	42	42	42	45	45	45	43	43	43	46	46	46	50	50	50
Quercus rubra	northern red oak	Tree	17	17	17	17	17	17	18	18	18	19	19	19	21	21	21	8	8	17			
Quercus velutina	black oak	Tree	12	12	12	11	11	11	12	12	12	14	14	14	14	14	14	6	6	6			
Sambucus canadensis	Common Elderberry	Shrub						2									2						
Ulmus alata	winged elm	Tree			10						3			18									
Ulmus rubra	slippery elm	Tree															2						
		Stem count	196	196	241	185	185	234	191	191	226	191	191	365	209	209	495	213	213	252	340	340	340
		size (ares)	13			13			13			13			13			13			13		
		size (ACRES)	0.32			0.32			0.32			0.32			0.32			0.32			0.32		
		Species count	11	11	15	12	12	20	12	12	19	13	13	18	11	11	20	13	13	19	11	11	11
		Stems per ACRE	610	610	750	576	576	728	595	595	704	595	595	1136	651	651	1541	663	663	785	1058	1058	1058

November 2020 Random Vegetation Plots

Random Plot 1		
#	**Common Name**	**Height (cm)**
1	Sycamore	220
2	Willow Oak	145
3	Willow Oak	170
4	River Birch	140
5	Willow Oak	190
6	Sycamore	225
7	River Birch	250
Stems/Acre	283	
Average Height (cm)	191	
Average Height (ft)	6.3	
Plot Size (m)	25 x 4	

Random Plot 2		
#	**Common Name**	**Height (cm)**
1	Willow Oak	170
2	Black Willow	175
3	Willow Oak	160
4	Black Willow	180
5	Black Willow	220
Stems/Acre	202	
Average Height (cm)	181	
Average Height (ft)	5.9	
Plot Size (m)	25 x 4	

Monitoring Year 6 – 2020 Vegetation Plot Photos
11/10/2020

Poplin Ridge - Vegetation Monitoring Plot 1

Poplin Ridge - Vegetation Monitoring Plot 2

Poplin Ridge - Vegetation Monitoring Plot 3

Poplin Ridge - Vegetation Monitoring Plot 4

Poplin Ridge - Vegetation Monitoring Plot 5

Poplin Ridge - Vegetation Monitoring Plot 6

Poplin Ridge - Vegetation Monitoring Plot 7

Poplin Ridge - Vegetation Monitoring Plot 8

Poplin Ridge - Vegetation Monitoring Plot 9

Poplin Ridge - Vegetation Monitoring Plot 10

Poplin Ridge - Vegetation Monitoring Plot 11

Poplin Ridge - Vegetation Monitoring Plot 12

Poplin Ridge - Vegetation Monitoring Plot 13

Poplin Ridge – Random Vegetation Monitoring Plot 1

Poplin Ridge – Random Vegetation Monitoring Plot 2

Appendix D
Stream Geomorphology Data

Table 10 - Morphological Parameters Summary (Reach UT1)

Project Name/Number: Poplin Ridge Stream Restoration Project

	Reference Reach		Existing									Design				As-Built MY0			
			UT1-R1	UT1-R1	UT1-R2	UT1-R3	UT1-R4	UT1-A	UT1-B	UT1-B	UT1-C	UT1-R2		UT1-R3		UT1-R2		UT1-R3	
			Pres.	Enh. I	Rest.	Rest.	Enh. I	Enh. I	Pres.	Enh. I	Enh. I	Rest.		Rest.		Rest.		Rest.	
Feature	Riffle	Pool	Riffle	Riffle	Riffle	Riffle	Riffle	Riffle	Riffle	Riffle	Riffle	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool
Drainage Area (ac)	426	426	136	136	248	384	728	88	120	120	250	248		384		248		384	
NC Regional Curve Discharge (cfs)	69		31	31	47	64	100	22	28	28	47	47		64		47		64	
Design/Approx. Bankfull Discharge (cfs)	50		22	22	35	55	65	20	15	30	50	35		52		35		52	
Dimension																			
BF Width (ft)	13.7	15.0	7.9	7.5	9.9	12.8	17.5	6.9	11.2	6.0	10.0	11.8	12.8	13.6	14.8	12.95	14.85	15.35	15.15
Floodprone Width (ft)	>50	NA	>50	>50	>50	>50	>50	>50	>50	>50	>40	>50	NA	>50	>50	>50	>50	>50	NA
BF Cross Sectional Area (ft^2)	18.1	23.4	10.1	10.4	14.2	22.2	21.9	6.8	6.1	5.5	10.0	14.5	19.9	18.8	26.9	17.3	19.15	22.4	21.45
BF Mean Depth (ft)	1.4	1.6	1.3	1.4	1.4	1.7	1.2	1.0	0.5	0.9	1.0	1.2	1.6	1.4	1.8	1.3	1.25	1.45	1.45
BF Max Depth (ft)	1.7	2.7	2.0	1.8	2.0	2.4	2.3	1.4	1.0	1.1	1.3	1.8	2.4	1.9	2.8	2.1	2.35	2.25	2.55
Width/Depth Ratio	9.8	9.6	6.2	5.4	7.0	7.4	14.0	6.9	20.4	6.6	10.0	9.8	8.2	9.9	8.1	9.7	11.65	10.5	10.75
Entrenchment Ratio	>2.2	NA	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	>2.2	NA	>2.2	NA	>2.2	>2.2	>2.2	>2.2
Wetted Perimeter (ft)	14.9	16.8	10.4	9.1	11.6	14.5	19.0	8.2	11.8	7.5	11.1	12.6	14	14.7	16.2	13.9	15.95	16.35	16.4
Hydraulic Radius (ft)	1.2	1.4	1.0	1.1	1.2	1.5	1.2	0.8	0.5	0.7	0.9	1.1	1.4	1.4	1.7	1.25	1.15	1.4	1.3
Substrate																			
D16 (mm)	2.8		0.062	0.062	0.062	2	3	0.062	2	3	2	2		2		0.062		1.7	
D50 (mm)	11.0		0.062	16.0	2	8	25	0.1	29	12	11	8		8		0.062		25	
D84 (mm)	16.0		0.062	63.0	7	25	51	0.4	60	27	45	25		25		26		60	
Pattern																			
	Min	**Max**	**Med**	---	---	---	---	---	---	---	---	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Channel Beltwidth (ft)	26.3	55.5	37.3	---	---	---	---	---	---	---	---	38	57	44	65	35	60	42	65
Radius of Curvature (ft)	13.5	103.3	41.2	---	---	---	---	---	---	---	---	18	89	20	103	15	75	17	80
Radius of Curvature Ratio	1.0	7.6	3.0	---	---	---	---	---	---	---	---	1.5	7.6	1.5	7.6	1.5	7.6	1.5	7.6
Meander Wavelength (ft)	49.4	66.0	59.7	---	---	---	---	---	---	---	---	38	57	44	65	35	52	37	56
Meander Width Ratio	3.6	4.8	4.4	---	---	---	---	---	---	---	---	3.2	4.8	3.2	4.8	2.7	4.0	2.7	4.3
Profile																			
	Min	**Max**	**Med**	---	---	---	---	---	---	---	---	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Riffle Length (ft)	6	18	9	---	---	---	---	---	---	---	---	5	16	6	18	6	18	7	22
Riffle Slope (%)	1.1	3.4	2.3	---	---	---	---	---	---	---	---	1.1	3.4	1.1	3.4	1.0	3.6	1.0	3.7
Run Length (ft)	7	15	8	---	---	---	---	---	---	---	---	6	13	7	15	6	15	8.0	18.0
Run Slope (%)	4.8	11.5	8.2	---	---	---	---	---	---	---	---	4.8	11.5	4.8	11.5	4.6	12.0	5.0	11.0
Glide Length (ft)	5	13	9	---	---	---	---	---	---	---	---	4	11	5	13	4	12	6.0	13.2
Glide Slope (%)	4.8	9.2	7.0	---	---	---	---	---	---	---	---	4.8	9.2	4.8	9.2	4.7	10.0	5.0	10.9
Pool Length (ft)	5	42	15	---	---	---	---	---	---	---	---	4	36	5	42	6	42	8.0	50.0
Pool Slope (%)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.1	2.5	1.1	2.4
Pool-to-Pool Spacing (ft)	18.0	64.0	30.0	---	---	---	---	---	---	---	---	16	55	18	64	20	60	20	70
Additional Reach Parameters																			
Valley Length (ft)	279		622	534	1,173	731	1,294	264	573	434	908	---		---		1,070		1,115	
Channel Length (ft)	318		716	541	1,197	738	1,340	270	618	449	921	---		---		1,178		1,223	
Sinuosity	1.14		1.2	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.1		1.1		1.1		1.1	
Water Surface Slope (ft/ft)	0.0048		NA	NA	NA	0.003	0.004	NA	NA	NA	NA	---		---		NA		NA	
Channel Slope (ft/ft)	0.0047		0.0048	0.011	0.007	0.004	0.005	0.012	0.012	0.018	0.008	0.0059		0.0046		0.0066		0.0041	
Rosgen Classification	E4		E4	E4	E4	E4	C4	E5	C4	E4	E4	E4		E4		E4		E4	

Table 10 Cont'd - Morphological Parameters Summary (Reach UT2)

Project Name/Number: Poplin Ridge Stream Restoration Project

	Reference Reach		Existing					Design				As-Built MY0			
			UT2-R1	UT2-R2	UT2-R3	UT2-R4	UT2-A	UT1-R2		UT1-R3/R4		UT1-R2		UT1-R3/R4	
			Enh. II	Rest.	Rest.	Rest.	Enh. II	Rest.		Rest.		Rest.		Rest.	
Feature	Riffle	Pool	Riffle	Pond	Riffle	Riffle	Riffle	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool
Drainage Area (ac)	426	426	634	723	742	864	51	723		864		723		864	
NC Regional Curve Discharge (cfs)	69							100		113		100		113	
Design/Approx. Bankfull Discharge (cfs)	50		---	---	---	---	---	52		70		52		70	
Dimension															
BF Width (ft)	13.7	15.0	25.6	---	16.2	12.1	6.1	17.2	18.6	18.2	19.6	21	19.6	17.4	21.1
Floodprone Width (ft)	>50	NA	>50	---	>50	>50	>50	>50	NA	>50	NA	>50	>50	>50	>50
BF Cross Sectional Area (ft^2)	18.1	23.4	19.6	---	22.4	12.6	3.0	31.5	42	34.8	47.6	26.5	32.6	30.8	34.4
BF Mean Depth (ft)	1.4	1.6	0.8	---	1.4	1.0	0.5	1.8	2.3	1.9	2.4	1.3	1.7	1.8	1.6
BF Max Depth (ft)	1.7	2.7	1.7	---	2.6	1.6	1.2	2.5	3.5	2.6	3.8	2.2	3.1	2.5	3.5
Width/Depth Ratio	9.8	9.6	33.5	---	11.8	11.6	12.2	9.4	8.2	9.5	8.1	16.6	11.7	9.8	12.9
Entrenchment Ratio	>2.2	NA	>2.2	---	>2.2	>2.2	>2.2	>2.2	NA	>2.2	NA	>2.2	>2.2	>2.2	>2.2
Wetted Perimeter (ft)	14.9	16.8	26.2	---	17.9	13.1	7.0	18.5	20.3	19.5	21.5	21.7	21.2	18.5	22.9
Hydraulic Radius (ft)	1.2	1.4	0.7	---	1.3	1.0	0.4	1.7	2.1	1.8	2.2	1.2	1.5	1.7	1.5
Substrate															
D16 (mm)	2.8		0.062	---	0.062	1.5	0.062	1.5		1.5		0.062		0.062	
D50 (mm)	11.0		0.062	---	0.062	7.8	0.062	7.8		7.8		0.062		28	
D84 (mm)	16.0		0.72	---	4.8	15.0	0.57	15		15		24		61	
Pattern															
	Min	**Max**	**Med**	---	---	---	---	---	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Channel Beltwidth (ft)	26	56	37	---	---	---	---	---	55	83	58	87	67	101	56	84
Radius of Curvature (ft)	13	103	41	---	---	---	---	---	26	130	27	138	32	160	26	132
Radius of Curvature Ratio	1.0	7.6	3.0	---	---	---	---	---	1.5	7.6	1.5	7.6	1.5	7.6	1.5	7.6
Meander Wavelength (ft)	49	66	60	---	---	---	---	---	55	83	58	87	67	101	56	84
Meander Width Ratio	1.9	4.1	2.7	---	---	---	---	---	3.2	4.8	3.2	4.8	3.2	4.8	3.2	4.8
Profile															
	Min	**Max**	**Med**	---	---	---	---	---	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Riffle Length (ft)	6	18	9						8	23	8	24	9.0	25.0	8.2	26.5
Riffle Slope (%)	1.1	3.4	2.3	---	---	---	---	---	1.1	3.4	1.1	3.4	1.1	3.6	1.2	3.8
Run Length (ft)	7	15	8						9	19	9	20	11.0	17.0	10.2	21.0
Run Slope (%)	4.8	11.5	8.2	---	---	---	---	---	4.8	11.5	4.8	11.5	4.2	12.0	3.8	11.2
Glide Length (ft)	5	13	9						6	16	7	17	6.2	18.2	7.5	16.3
Glide Slope (%)	4.8	9.2	7.0	---	---	---	---	---	4.8	9.2	4.8	9.2	5.1	9.6	4.8	9.1
Pool Length (ft)	5	42	15						6	53	7	56	7.8	47.0	8.5	60.0
Pool Slope (%)	---	---	---	---	---	---	---	---	---	---	---	---	3.5	10.0	4.1	10.1
Pool-to-Pool Spacing (ft)	18.0	64.0	30.0	---	---	---	---	---	23	81	24	85	18.0	90.0	20.5	92.0
Additional Reach Parameters															
Valley Length (ft)	279		410	641	779	1,015	427	---		---		785		710	
Channel Length (ft)	318		443	641	781	1,032	437	---		---		847		778	
Sinuosity	1.14		1.1	1.0	1.0	1.0	1.0	1.1		1.1		1.08		1.1	
Water Surface Slope (ft/ft)	0.0048		NA	NA	NA	0.0027	NA	---		---		---		---	
Channel Slope (ft/ft)	0.0047		0.0027	0.001	0.0057	0.0031	0.013	0.0029		0.0028		0.0061		0.002	
Rosgen Classification	E4		C5c	NA	E5	E4	C5	E4		E4		E4		E4	

Table 11a. - Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Poplin Ridge Stream Restoration Project

	Cross Section 1 (Run) Reach UT2-2*								Cross Section 2 (Run) Reach UT2-2*								Cross Section 3 (Riffle) Reach UT2-A								Cross Section 4 (Riffle) Reach UT2-A								Cross Section 5 (Run) Reach UT2-3							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1[1]**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
Bankfull Elevation (ft) - Based on AB-XSA[1]	577.24	577.24	577.24	577.24	578.14	577.93			577.10	577.10	577.10	577.10	577.99	577.72			586.40	586.40	586.40	586.40	586.85	NA			585.00	585.00	585.00	585.00	585.39	NA			576.32	576.32	576.32	576.32	576.75	NA		
Bankfull Width (ft)[1]	3.2	5.5	5.2	4.3	10.8	5.5			3.0	5.6	5.3	3.9	8.0	6.3			8.2	8.0	7.5	7.5	10.7	NA			11.0	8.8	7.5	8.5	16.7	NA			21.0	19.3	18.0	17.1	28.3	NA		
Floodprone Width (ft)[1]	>17.2	>17.2	>17.2	26.2	52.4	65.6			>15.2	>15.2	>15.2	11.2	66.2	78.8			>50.0	>50.0	>50.0	44.0	>50.5	NA			>44.4	>44.4	>50.0	39.8	>49.8	NA			>50	>50	>50	>50	>50.5	NA		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---	---			0.4	0.5	0.4	0.1	---	---			1.0	0.8	0.8	0.6	---	NA			0.7	0.6	0.8	0.5	---	NA			1.3	1.3	1.3	1.1	---	NA		
Bankfull Max Depth (ft)[2]	0.9	1.4	1.1	0.5	0.8	1.5			0.6	1.3	0.8	0.3	1.1	2.2			1.7	1.5	1.3	1.2	1.1	NA			1.3	1.1	1.3	1.1	1.0	NA			2.2	2.2	2.4	1.8	2.0	NA		
Low Bank Elevation (ft)	-	-	-	-	578.14	577.91			-	-	-	-	577.99	578.28			-	-	-	-	586.39	NA			-	-	-	-	584.95	NA			-	-	-	-	576.39	NA		
Bankfull Cross Sectional Area (ft^2)[2]	0.6	3.7	3.3	1.1	4.2	4.1			1.1	2.7	2.2	0.5	5.8	10.3			7.9	6.7	5.7	4.7	7.9	NA			7.4	5.0	5.7	4.1	3.0	NA			26.5	25.2	22.9	19.0	17.9	NA		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---	---			7.9	11.5	12.5	28.8	---	---			8.5	9.5	9.9	11.9	---	NA			16.4	15.6	9.9	17.4	---	NA			16.6	14.9	14.2	15.5	---	NA		
Bankfull Entrenchment Ratio[1]	>2.2	>3.1	>3.3	6.0	4.8	14.2			>2.2	>2.7	>2.9	2.9	8.3	14.5			>2.2	>6.3	>6.7	5.9	>4.7	NA			>2.2	>5.0	>6.7	4.7	3.0	NA			>2.2	>2.6	>2.8	>2.9	>1.8	NA		
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.3	1.0	1.0			1.0	1.0	1.0	2.0	1.0	1.3			1.0	1.0	1.0	1.1	0.7	NA			1.0	1.0	1.0	1.1	0.7	NA			1.0	1.0	1.0	0.9	0.8	NA		

	Cross Section 6 (Pool) Reach UT2-3								Cross Section 7 (Pool) Reach UT2-4								Cross Section 8 (Riffle) Reach UT2-4								Cross Section 9 (Riffle) Reach UT1-1								Cross Section 10 (Pool) Reach UT1-1							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1[1]**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
Bankfull Elevation (ft) - Based on AB-XSA[1]	576.48	576.48	576.48	576.48	576.99	NA			575.00	575.00	575.00	575.00	575.17	NA			575.01	575.01	575.01	575.01	575.34	NA			602.06	602.06	602.06	602.06	602.07	NA			602.28	602.28	602.28	602.28	602.37	NA		
Bankfull Width (ft)[1]	19.6	19.1	19.4	18.7	22.3	NA			21.1	18.7	18.5	18.8	19.5	NA			17.4	17.1	16.9	17.2	16.2	NA			11.7	11.4	11.4	11.6	14.2	NA			15.2	14.7	14.6	15.5	16.9	NA		
Floodprone Width (ft)[1]	>50.0	>50.0	>50.0	>50.0	>50.1	NA			>50.0	>50.0	>50.0	>50.0	>50	NA			>50.0	>50.0	>50.0	>50.0	>50.2	NA			>50.0	>50.0	>50.0	>50.0	>48.7	NA			>50	>50	>50	>50	>50.0	NA		
Bankfull Mean Depth (ft)	1.7	1.6	1.6	1.4	---	NA			1.6	1.7	1.7	1.6	---	NA			1.8	1.7	1.7	1.6	---	NA			1.1	1.1	1.1	1.1	---	NA			1.4	1.3	1.3	1.3	---	NA		
Bankfull Max Depth (ft)[2]	3.1	3.0	3.0	2.8	2.1	NA			3.5	3.4	3.4	3.2	3.6	NA			2.5	2.4	2.5	2.3	2.8	NA			1.8	1.8	1.8	1.8	1.6	NA			2.6	2.5	2.5	2.6	1.5	NA		
Low Bank Elevation (ft)	-	-	-	-	576.14	NA			-	-	-	-	575.26	NA			-	-	-	-	575.41	NA			-	-	-	-	601.93	NA			-	-	-	-	601.18	NA		
Bankfull Cross Sectional Area (ft^2)[2]	32.6	30.0	30.5	25.6	17.0	NA			34.4	32.0	31.6	31.0	36.0	NA			30.8	28.4	28.5	26.7	32.0	NA			13.0	12.1	12.4	12.3	11.4	NA			21.0	19.8	19.7	20.2	7.6	NA		
Bankfull Width/Depth Ratio	11.7	12.2	12.3	13.7	---	NA			12.9	10.9	10.9	11.4	---	NA			9.8	10.3	10.0	11.0	---	NA			10.4	10.7	10.4	10.9	---	NA			11.1	10.9	10.9	11.9	---	NA		
Bankfull Entrenchment Ratio[1]	>2.2	>2.6	>2.6	N/A	N/A	NA			>2.2	>2.7	>2.7	N/A	N/A	NA			>2.2	>2.9	>3.0	>2.9	>3.1	NA			>2.2	>4.4	>4.4	>4.3	>3.4	NA			>2.2	>3.4	>3.4	N/A	N/A	NA		
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	N/A	N/A	NA			1.0	1.0	1.0	N/A	N/A	NA			1.0	1.0	1.0	1.1	1.0	NA			1.0	1.0	1.0	1.0	0.9	NA			1.0	1.0	1.0	N/A	N/A	NA		

	Cross Section 11 (Riffle) Reach UT1-A								Cross Section 12 (Pool) Reach UT1-2								Cross Section 13 (Riffle) Reach UT1-2								Cross Section 14 (Pool) Reach UT1-2								Cross Section 15 (Riffle) Reach UT1-2							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
Bankfull Elevation (ft) - Based on AB-XSA[1]	599.06	599.06	599.06	599.06	599.13	NA			596.26	596.26	596.26	596.26	596.61	NA			595.97	595.97	595.97	595.97	596.09	NA			591.21	591.21	591.21	591.21	591.22	NA			591.48	591.48	591.48	591.48	591.64	NA		
Bankfull Width (ft)[1]	10.0	10.2	10.0	9.6	11.0	NA			17.4	17.4	17.6	17.4	22.7	NA			12.5	12.2	12.3	12.6	14.1	NA			12.3	12.0	11.5	12.1	12.5	NA			13.4	12.9	12.9	13.2	13.4	NA		
Floodprone Width (ft)[1]	>50.0	>50.0	>50.0	>50.0	>50.1	NA			>50.0	>50.0	>50.0	>50.0	>50.4	NA			>50.0	>50.0	>50.0	>50.0	>50.2	NA			>50.0	>50.0	>50.0	>50.0	>50.2	NA			>50	>50	>50	>50	>49.8	NA		
Bankfull Mean Depth (ft)	1.0	1.0	1.0	1.1	---	NA			1.4	1.3	1.2	1.1	---	NA			1.2	1.2	1.2	1.2	---	NA			1.1	1.0	1.0	1.0	---	NA			1.4	1.3	1.3	1.3	---	NA		
Bankfull Max Depth (ft)[2]	1.7	1.6	1.6	1.6	1.7	NA			2.5	2.4	2.5	2.2	2.5	NA			1.9	1.9	2.0	2.2	2.5	NA			2.2	2.0	2.0	2.1	1.6	NA			2.3	2.2	2.2	2.1	2.3	NA		
Low Bank Elevation (ft)	-	-	-	-	599.12	NA			-	-	-	-	596.44	NA			-	-	-	-	596.00	NA			-	-	-	-	590.71	NA			-	-	-	-	591.64	NA		
Bankfull Cross Sectional Area (ft^2)[2]	10.5	10.1	10.1	10.1	10.5	NA			24.4	21.8	21.8	19.9	20.8	NA			15.6	14.4	14.6	14.8	14.4	NA			13.9	11.9	11.5	12.6	8.4	NA			19.0	17.3	17.2	17.0	19.1	NA		
Bankfull Width/Depth Ratio	9.6	10.3	10.0	9.1	---	NA			12.4	13.9	14.2	15.2	---	NA			10.0	10.4	10.3	10.7	---	NA			10.9	12.1	11.6	11.5	---	NA			9.4	9.7	9.7	10.3	---	NA		
Bankfull Entrenchment Ratio[1]	>2.2	>4.9	>5.0	>5.2	>4.6	NA			>2.2	>2.9	>2.8	N/A	N/A	NA			>2.2	>4.1	>4.1	>4.0	>3.6	NA			>2.2	>4.2	>4.3	N/A	N/A	NA			>2.2	>3.9	>3.9	>3.8	>3.7	NA		
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	0.9	1.0	NA			1.0	1.0	1.0	N/A	N/A	NA			1.0	1.0	1.0	1.0	1.0	NA			1.0	1.0	1.0	N/A	N/A	NA			1.0	1.0	1.0	1.0	1.0	NA		

[1]Calculations updated to show corrected values

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.

*Reach UT2-2 was reconstructed in September 2019

Table 11. Cont'd - Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Poplin Ridge Stream Restoration Project

	Cross Section 16 (Riffle) Reach UT1-B								Cross Section 17 (Pool) Reach UT1-B								Cross Section 18 (Pool) Reach UT1-3								Cross Section 19 (Riffle) Reach UT1-3								Cross Section 20 (Riffle) Reach UT1-3							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
Bankfull Elevation (ft) - Based on AB-XSA[1]	591.84	591.84	591.84	591.84	592.04	NA			590.93	590.93	590.93	590.93	591.07	NA			588.03	588.03	588.03	588.03	588.30	NA			588.19	588.19	588.19	588.19	588.38	NA			586.15	586.15	586.15	586.15	586.33	NA		
Bankfull Width (ft)[1]	11.7	10.8	10.5	11.1	13.6	NA			14.2	13.1	13.2	13.2	14.4	NA			14.5	14.3	13.9	14.2	16.2	NA			15.2	15.1	14.9	15.4	23.1	NA			15.5	16.1	15.2	15.1	16.0	NA		
Floodprone Width (ft)[1]	>50.0	>50.0	>50.0	>50.0	>50.0	NA			>50.0	>50.0	>50.0	>50.0	>50.0	NA			>50.0	>50.0	>50.0	>50.0	>50.6	NA			>50.0	>50.0	>50.0	>50.0	>50.2	NA			>50.0	>50.0	>50.0	>50.0	>50.2	NA		
Bankfull Mean Depth (ft)	1.1	1.0	1.1	1.0	---	NA			0.7	0.6	0.7	0.7	---	NA			1.5	1.4	1.4	1.4	---	NA			1.5	1.4	1.4	1.4	---	NA			1.4	1.3	1.3	1.3	---	NA		
Bankfull Max Depth (ft)[2]	1.8	1.7	1.7	1.7	1.9	NA			1.4	1.3	1.4	1.6	1.5	NA			2.6	2.6	2.5	2.6	2.7	NA			2.4	2.1	2.2	2.1	2.1	NA			2.1	2.1	2.1	2.1	2.3	NA		
Low Bank Elevation (ft)	-	-	-	-	591.95	NA			-	-	-	-	590.81	NA			-	-	-	-	588.20	NA			-	-	-	-	588.23	NA			-	-	-	-	586.36	NA		
Bankfull Cross Sectional Area (ft^2)[2]	12.3	11.2	11.1	10.8	11.2	NA			10.2	8.5	9.2	9.6	7.1	NA			21.5	19.6	19.7	19.3	19.7	NA			23.0	21.8	21.3	21.0	20.3	NA			21.9	20.9	20.0	19.6	22.4	NA		
Bankfull Width/Depth Ratio	11.2	10.4	9.9	11.3	---	NA			19.7	20.2	19.1	18.3	---	NA			9.8	10.4	9.9	10.5	---	NA			10.1	10.5	10.5	11.2	---	NA			11.0	12.4	11.6	11.6	---	NA		
Bankfull Entrenchment Ratio[1]	>2.2	>4.6	>4.8	>4.5	>3.7	NA			>2.2	>3.8	>3.8	N/A	N/A	NA			>2.2	>3.5	>3.6	N/A	N/A	NA			>2.2	>3.3	>3.3	>3.3	>2.2	NA			>2.2	>3.1	>3.3	>3.3	>3.1	NA		
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.1	1.0	NA			1.0	1.0	1.0	N/A	N/A	NA			1.0	1.0	1.0	N/A	N/A	NA			1.0	1.0	1.0	1.0	0.9	NA			1.0	1.0	1.0	1.1	1.0	NA		

	Cross Section 21 (Pool) Reach UT1-3								Cross Section 22 (Riffle) Reach UT1-C								Cross Section 23 (Pool) Reach UT1-C								Cross Section 24 (Riffle) Reach UT1-C								Cross Section 25 (Pool) Reach UT1-C							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
Bankfull Elevation (ft) - Based on AB-XSA[1]	585.60	585.60	585.60	585.60	585.82	NA			592.04	592.04	592.04	592.04	592.33	NA			591.80	591.80	591.80	591.80	592.04	NA			586.30	586.30	586.30	586.30	586.69	NA			585.80	585.80	585.80	585.80	586.15	NA		
Bankfull Width (ft)[1]	15.8	15.0	15.2	15.0	17.2	NA			13.2	12.5	12.5	12.4	15.2	NA			14.6	14.0	13.9	13.7	15.0	NA			14.2	13.8	14.0	14.0	15.1	NA			12.0	11.1	11.2	10.5	12.2	NA		
Floodprone Width (ft)[1]	>50.0	>50.0	>50.0	>50.0	>50.2	NA			>50.0	>50.0	>50.0	>50.0	>50.2	NA			>50.0	>50.0	>50.0	>50.0	>50.2	NA			>46.6	>46.6	>46.6	38.0	>50.0	NA			>50.0	>50.0	>50.0	>50.0	>50.2	NA		
Bankfull Mean Depth (ft)	1.4	1.3	1.3	1.3	---	NA			1.3	1.1	1.1	1.0	---	NA			1.3	1.1	1.0	1.0	---	NA			1.0	0.9	0.9	0.8	---	NA			1.3	1.3	1.3	1.3	---	NA		
Bankfull Max Depth (ft)[2]	2.5	2.4	2.6	2.7	3.1	NA			1.9	1.6	1.7	1.7	1.1	NA			2.1	1.9	2.0	2.2	1.6	NA			1.7	1.6	1.6	1.6	0.9	NA			2.3	2.1	2.1	2.1	1.5	NA		
Low Bank Elevation (ft)	-	-	-	-	585.95	NA			-	-	-	-	591.27	NA			-	-	-	-	591.07	NA			-	-	-	-	585.71	NA			-	-	-	-	585.48	NA		
Bankfull Cross Sectional Area (ft^2)[2]	21.4	19.1	19.4	19.3	23.7	NA			16.8	13.6	14.2	12.5	5.4	NA			19.1	14.8	14.2	14.3	8.8	NA			14.0	12.2	12.4	10.8	3.8	NA			15.5	14.3	14.5	14.1	9.2	NA		
Bankfull Width/Depth Ratio	11.7	11.8	11.8	11.7	---	NA			10.4	11.5	10.9	12.3	---	NA			11.1	13.3	13.5	13.2	---	NA			14.3	15.6	15.7	18.1	---	NA			9.4	8.6	8.7	7.8	---	NA		
Bankfull Entrenchment Ratio[1]	>2.2	>3.3	>3.3	N/A	N/A	NA			>2.2	>4.0	>4.0	>4.0	>3.3	NA			>2.2	>3.6	>3.6	N/A	N/A	NA			>2.2	>3.4	>3.3	2.7	>3.3	NA			>2.2	>4.5	>4.5	N/A	N/A	NA		
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	N/A	N/A	NA			1.0	1.0	1.0	0.9	0.5	NA			1.0	1.0	1.0	N/A	N/A	NA			1.0	1.0	1.0	1.5	0.5	NA			1.0	1.0	1.0	N/A	N/A	NA		

	Cross Section 26 (Pool) Reach UT1-4								Cross Section 27 (Riffle) Reach UT1-4								Cross Section 28 (Riffle) Reach UT1-4								Cross Section 29 (Pool) Reach UT1-4								Cross Section 30 (Riffle) Reach UT2-2*							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
Bankfull Elevation (ft) - Based on AB-XSA[1]	581.70	581.70	581.70	581.70	581.62	NA			582.15	582.15	582.15	582.15	582.52	NA			579.70	579.70	579.70	579.70	579.91	NA			579.80	579.80	579.80	579.80	580.04	NA			-	-	-	-	578.55	578.70		
Bankfull Width (ft)[1]	14.8	14.1	13.0	11.2	10.3	NA			16.5	15.9	15.6	15.4	17.6	NA			15.9	15.4	15.3	15.0	16.0	NA			20.3	20.8	20.0	19.4	21.7	NA			-	-	-	-	8.7	8.10		
Floodprone Width (ft)[1]	>47.0	>47.0	>47.0	>50.0	>50.3	NA			>50.0	>50.0	>50.0	>50.0	>50.0	NA			>50.0	>50.0	>50.0	>50.0	>50.4	NA			>50.0	>50.0	>50.0	>50.0	>42.7	NA			-	-	-	-	30.7	40.27		
Bankfull Mean Depth (ft)	1.2	1.2	1.3	1.6	---	NA			1.3	1.2	1.1	1.0	---	NA			1.5	1.4	1.4	1.3	---	NA			1.6	1.4	1.4	1.5	---	NA			-	-	-	-	---	---		
Bankfull Max Depth (ft)[2]	2.1	2.1	2.2	2.3	2.4	NA			2.1	1.9	1.9	1.8	2.6	NA			2.6	2.5	2.5	2.5	3.0	NA			3.1	2.9	2.9	3.0	2.7	NA			-	-	-	-	0.5	0.80		
Low Bank Elevation (ft)	-	-	-	-	581.69	NA			-	-	-	-	582.19	NA			-	-	-	-	580.10	NA			-	-	-	-	579.60	NA			-	-	-	-	578.55	578.89		
Bankfull Cross Sectional Area (ft^2)[2]	17.6	16.2	17.2	18.2	18.4	NA			21.5	18.3	17.8	15.6	16.2	NA			24.2	21.7	21.9	20.0	27.4	NA			33.2	30.0	28.9	29.2	24.6	NA			-	-	-	-	3.1	4.90		
Bankfull Width/Depth Ratio	12.5	12.3	9.7	6.9	---	NA			12.7	13.8	13.6	15.1	---	NA			10.4	10.9	10.8	11.2	---	NA			12.5	14.4	13.9	12.9	---	NA			-	-	-	-	---	---		
Bankfull Entrenchment Ratio[1]	>2.2	>3.3	>3.6	N/A	N/A	NA			>2.2	>3.1	>3.2	>3.3	>2.8	NA			>2.2	>3.3	>3.3	>3.3	>3.2	NA			>2.2	>2.4	>2.5	N/A	N/A	NA			-	-	-	-	3.5	6.20		
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	N/A	N/A	NA			1.0	1.0	1.0	1.1	0.9	NA			1.0	1.0	1.0	1.1	1.1	NA			1.0	1.0	1.0	N/A	N/A	NA			-	-	-	-	1.0	1.30		

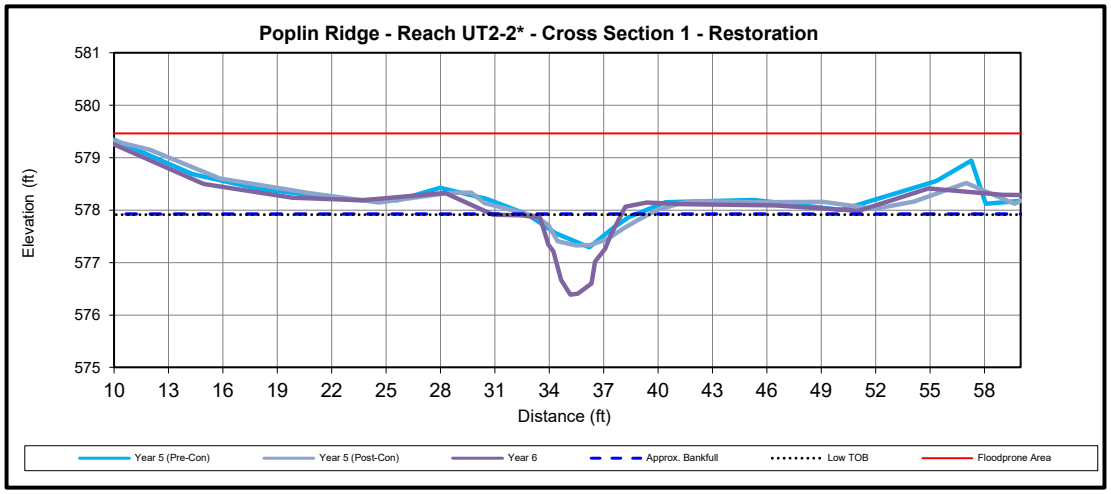
	Cross Section 31 (Pool) Reach UT2-2*							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
Bankfull Elevation (ft) - Based on AB-XSA[1]	-	-	-	-	578.37	578.00		
Bankfull Width (ft)[1]	-	-	-	-	9.7	8.5		
Floodprone Width (ft)[1]	-	-	-	-	48.3	46.3		
Bankfull Mean Depth (ft)	-	-	-	-	---	---		
Bankfull Max Depth (ft)[2]	-	-	-	-	1.5	2.3		
Low Bank Elevation (ft)	-	-	-	-	578.37	578.72		
Bankfull Cross Sectional Area (ft^2)[2]	-	-	-	-	8.8	16.5		
Bankfull Width/Depth Ratio	-	-	-	-	---	---		
Bankfull Entrenchment Ratio[1]	-	-	-	-	N/A	NA		
Bankfull Bank Height Ratio[1]	-	-	-	-	N/A	NA		

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.

*Reach UT2-2 was reconstructed in September 2019

Upstream

Downstream



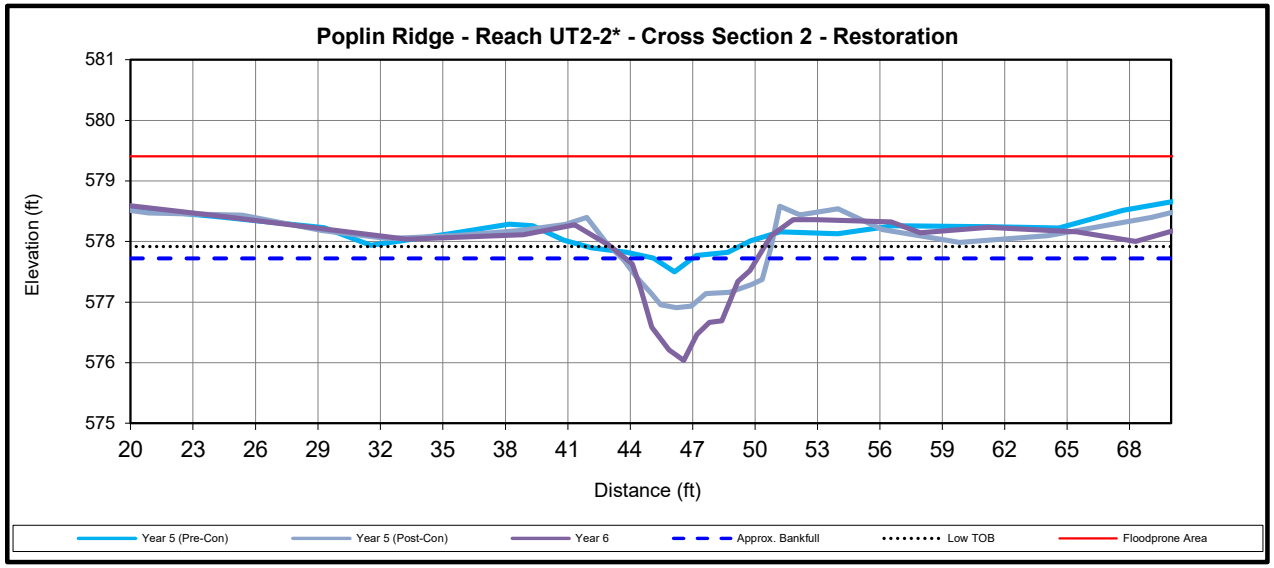
	Cross Section 1							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
Bankfull Elevation (ft) - Based on AB-XSA[1]	577.24	577.24	577.24	577.24	578.14	577.93		
Bankfull Width (ft)[1]	3.2	5.5	5.2	4.3	10.8	5.5		
Floodprone Width (ft)[1]	>17.2	>17.2	>17.2	26.2	52.4	65.6		
Bankfull Mean Depth (ft)	0.5	0.7	0.6	0.3	---	---		
Bankfull Max Depth (ft)[2]	0.9	1.4	1.1	0.5	0.8	1.5		
Low Bank Elevation (ft)	-	-	-	-	578.14	577.91		
Bankfull Cross Sectional Area (ft^2)[2]	0.6	3.7	3.3	1.1	4.2	4.1		
Bankfull Width/Depth Ratio	6.4	8.2	8.1	16.7	---	---		
Bankfull Entrenchment Ratio[1]	>2.2	>3.1	>3.3	6.0	4.8	14.2		
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	1.3	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.

*Reach UT2-2 was reconstructed in September 2019

Upstream

Downstream



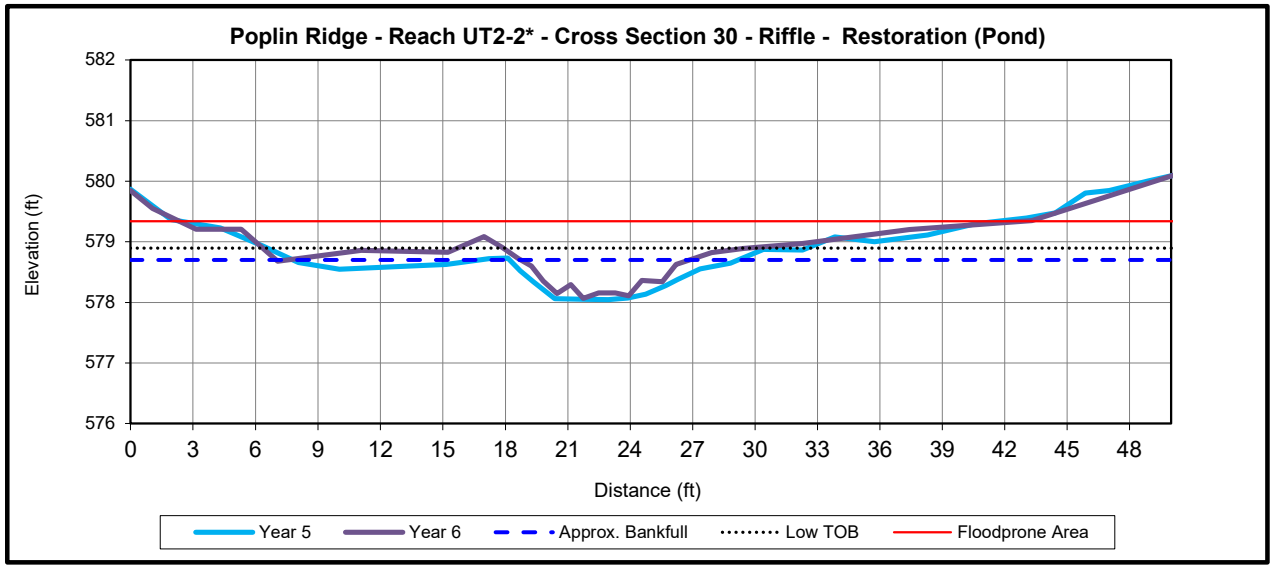
	Cross Section 2							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
Bankfull Elevation (ft) - Based on AB-XSA[1]	577.10	577.10	577.10	577.10	577.99	577.72		
Bankfull Width (ft)[1]	3.0	5.6	5.3	3.9	8.0	6.3		
Floodprone Width (ft)[1]	>15.2	>15.2	>15.2	11.2	66.2	78.8		
Bankfull Mean Depth (ft)	0.4	0.5	0.4	0.1	---	---		
Bankfull Max Depth (ft)[2]	0.6	1.3	0.8	0.3	1.1	2.2		
Low Bank Elevation (ft)	-	-	-	-	577.99	578.28		
Bankfull Cross Sectional Area (ft^2)[2]	1.1	2.7	2.2	0.5	5.8	10.3		
Bankfull Width/Depth Ratio	7.9	11.5	12.5	28.8	---	---		
Bankfull Entrenchment Ratio[1]	>2.2	>2.7	>2.9	2.9	8.3	14.5		
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	2.0	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.

*Reach UT2-2 was reconstructed in September 2019

Upstream

Downstream



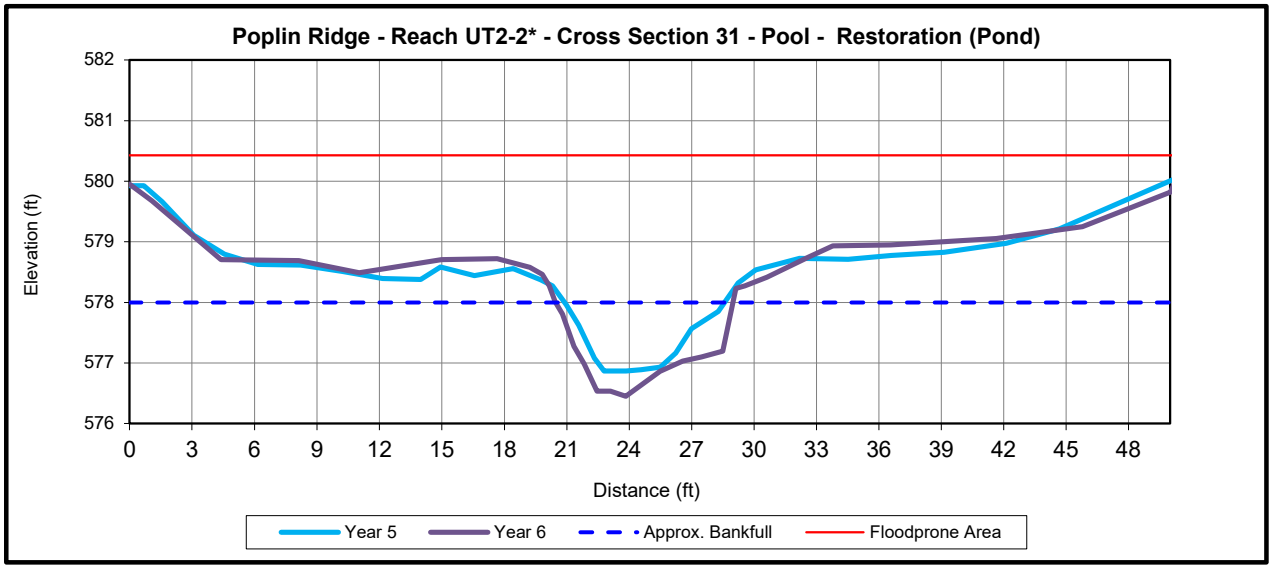
	Cross Section 30 (Riffle)							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
XSA[1]	-	-	-	-	578.55	578.70		
Bankfull Width (ft)[1]	-	-	-	-	8.7	8.10		
Floodprone Width (ft)[1]	-	-	-	-	30.7	40.27		
Bankfull Mean Depth (ft)	-	-	-	-	---	---		
Bankfull Max Depth (ft)[2]	-	-	-	-	0.5	0.80		
Low Bank Elevation (ft)	-	-	-	-	578.55	578.89		
Bankfull Cross Sectional Area (ft^2)[2]	-	-	-	-	3.1	4.90		
Bankfull Width/Depth Ratio	-	-	-	-	---	---		
Bankfull Entrenchment Ratio[1]	-	-	-	-	3.5	6.20		
Bankfull Bank Height Ratio[1]	-	-	-	-	1.0	1.30		

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.

*Reach UT2-2 was reconstructed in September 2019

Upstream

Downstream



	Cross Section 31 (Pool)							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY5**	**MY6**	**MY7**	**MY+**
XSA[1]	-	-	-	-	578.37	578.00		
Bankfull Width (ft)[1]	-	-	-	-	9.7	8.5		
Floodprone Width (ft)[1]	-	-	-	-	48.3	46.3		
Bankfull Mean Depth (ft)	-	-	-	-	---	---		
Bankfull Max Depth (ft)[2]	-	-	-	-	1.5	2.3		
Low Bank Elevation (ft)	-	-	-	-	578.37	578.72		
Bankfull Cross Sectional Area (ft^2)[2]	-	-	-	-	8.8	16.5		
Bankfull Width/Depth Ratio	-	-	-	-	---	---		
Bankfull Entrenchment Ratio[1]	-	-	-	-	N/A	NA		
Bankfull Bank Height Ratio[1]	-	-	-	-	N/A	NA		

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.

*Reach UT2-2 was reconstructed in September 2019

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)
UT1-1	13	43	5.2	26	48	76			24	43				
UT1-1A	0.15	0.64	0.2	26	0.062	32			11	57				
UT1-B	23	42	4.9	22	27	59			20	35				
UT1-C	9.6	24	3.5	24	9.6	51.5			14.5	25				
UT1-2	0.7	12.3	4.6	25.8	7.5	26.8			10.9	20				
UT1-3	23.5	62.5	7.9	29.5	16.7	80.5			19.5	33.5				
UT1-4	4	15.5	4.2	11.8	27.1	44			10.3	35				
UT2-A	0.062	0.6	0.6	6.1	6.5	14			9	15				
UT2-3	0.062	6.4	1.4	11	0.062	12			0.062	0.062				
UT2-4	0.062	42	0.062	24	28	79			*	*				

Charts 1-11. MY3 Stream Reach Substrate Composition Charts

Chart 1.

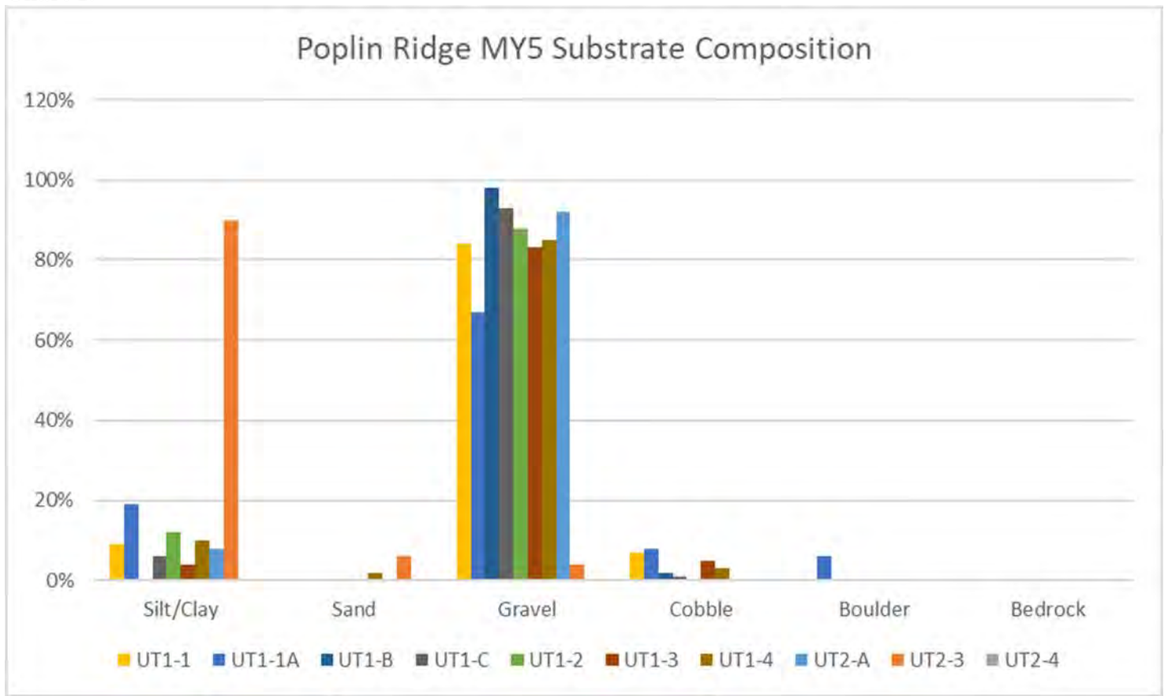


Chart 2.

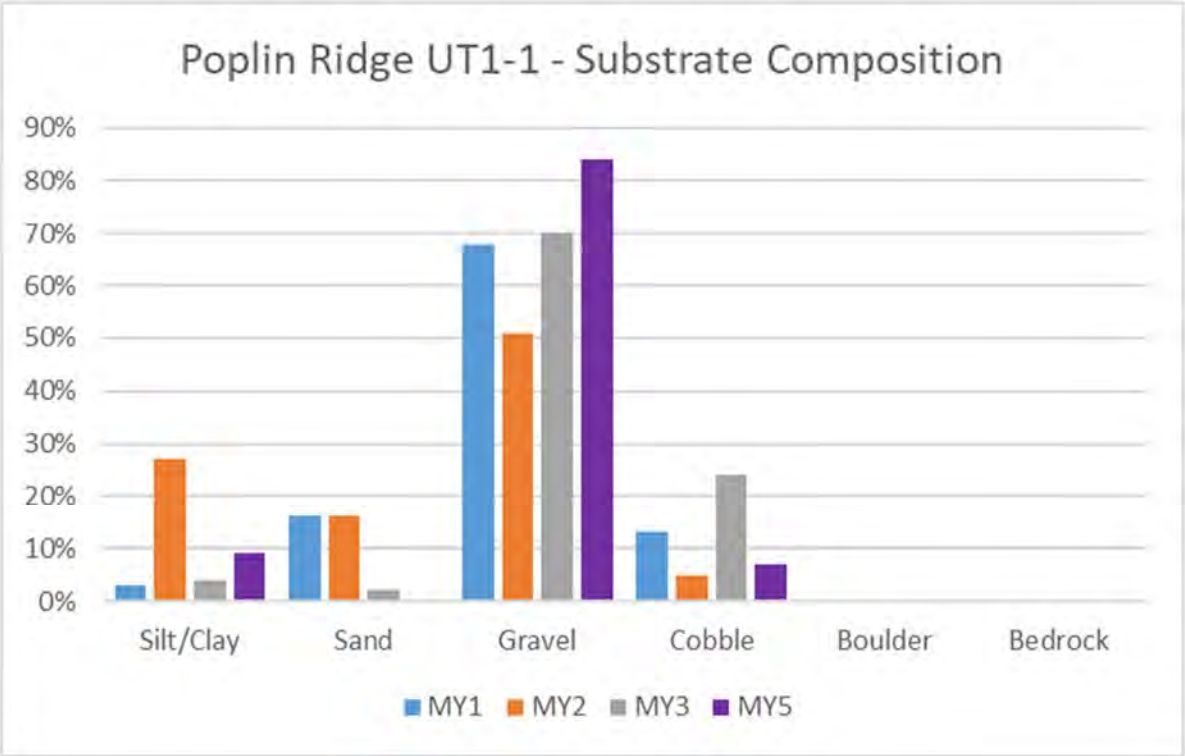


Chart 3.

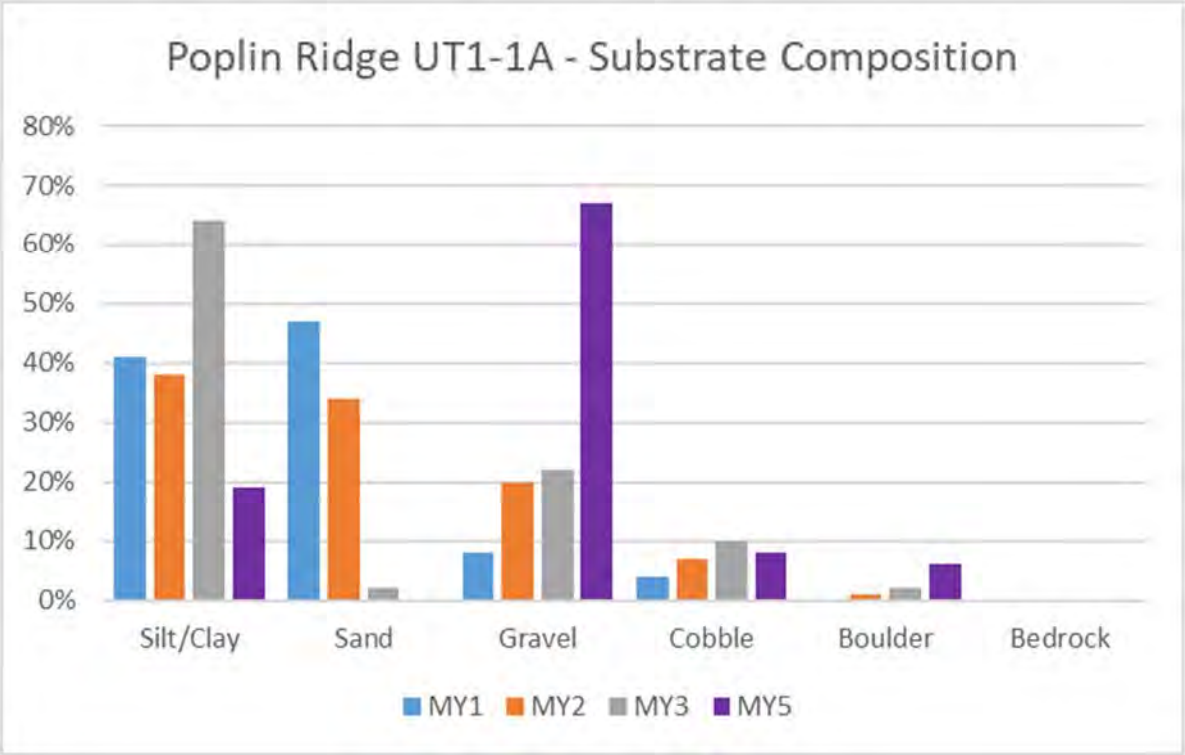


Chart 4.

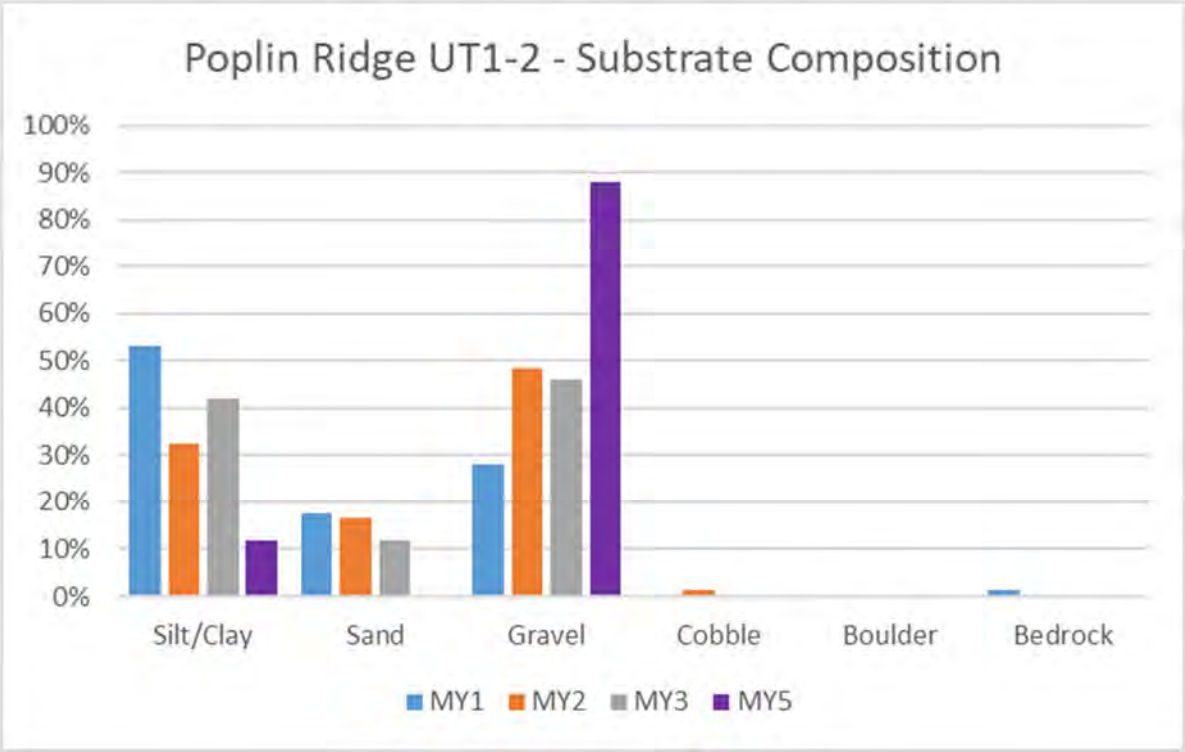


Chart 5.

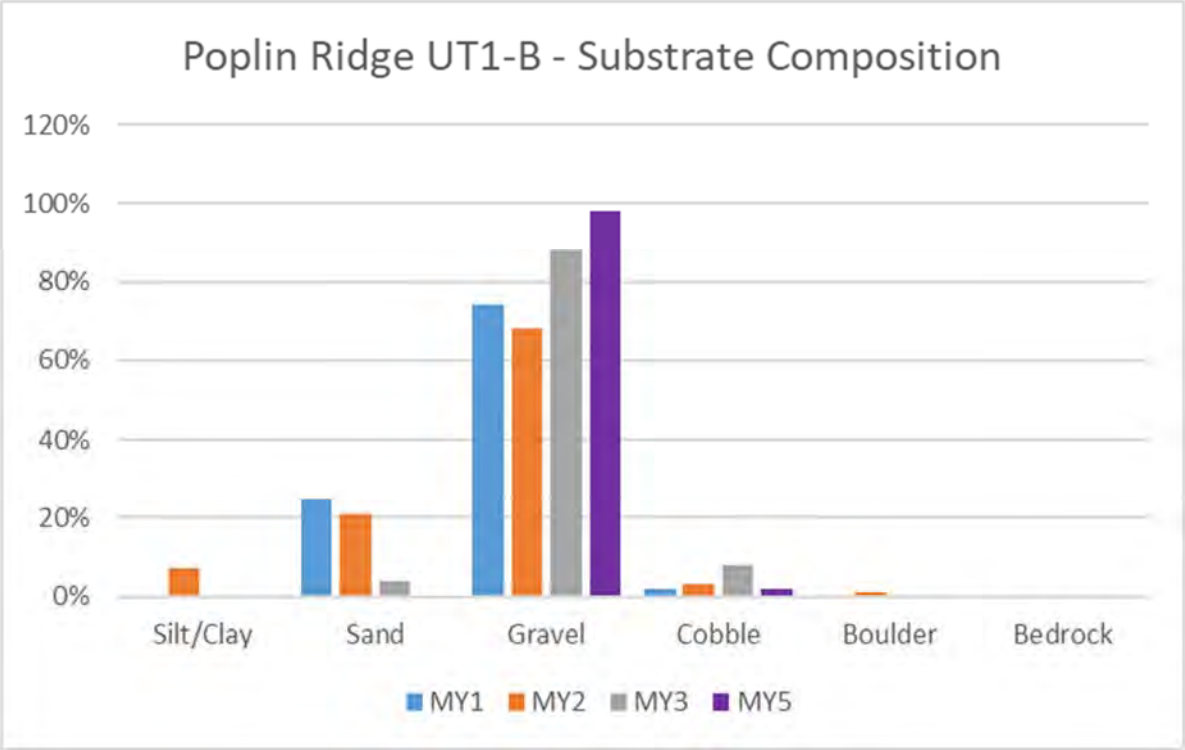


Chart 6.

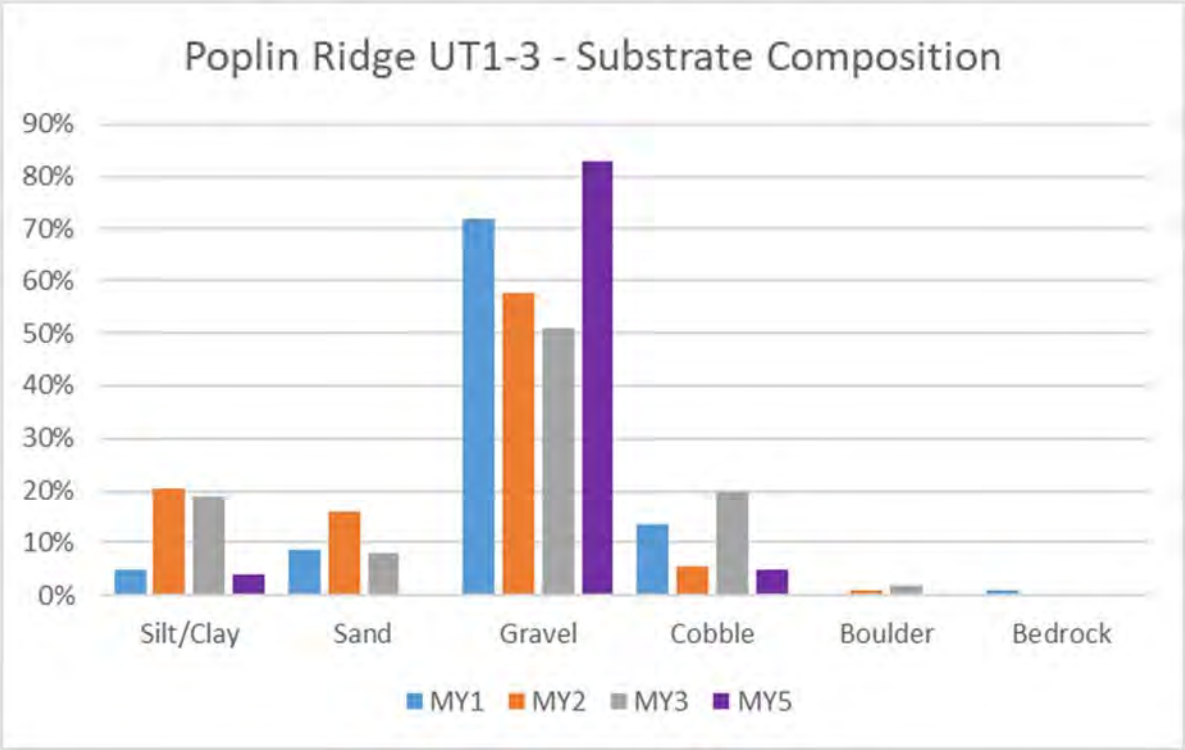


Chart 7.

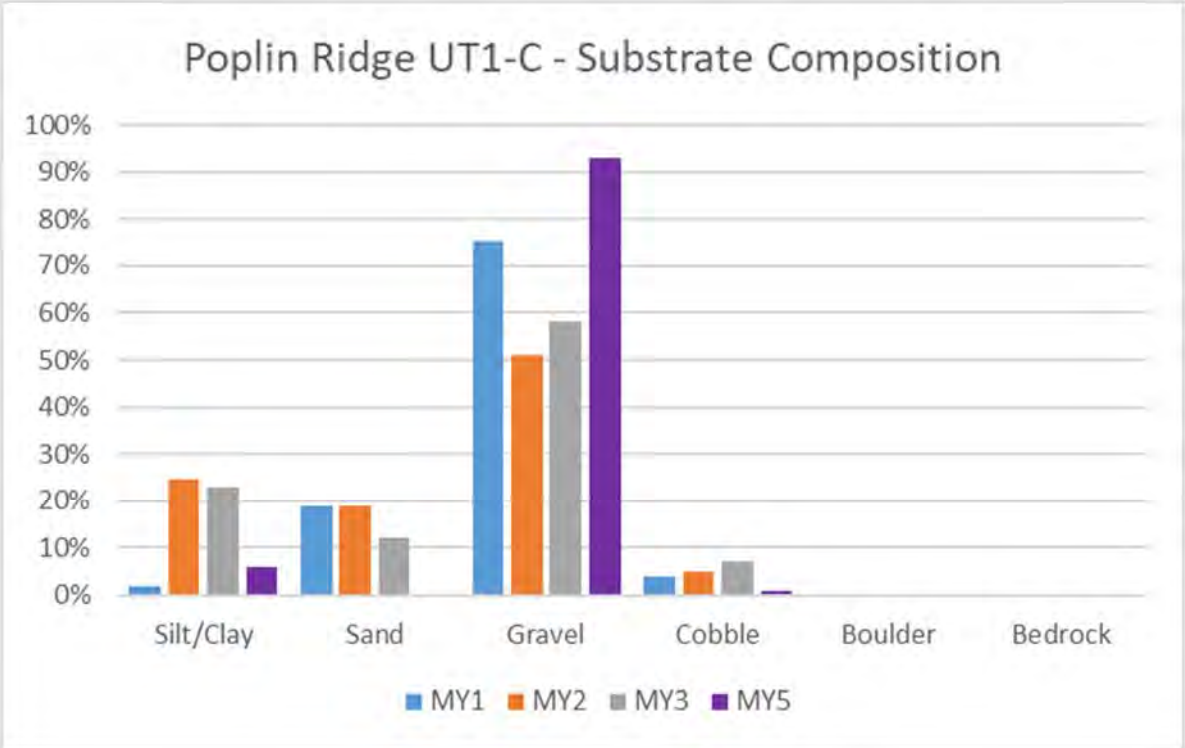


Chart 8.

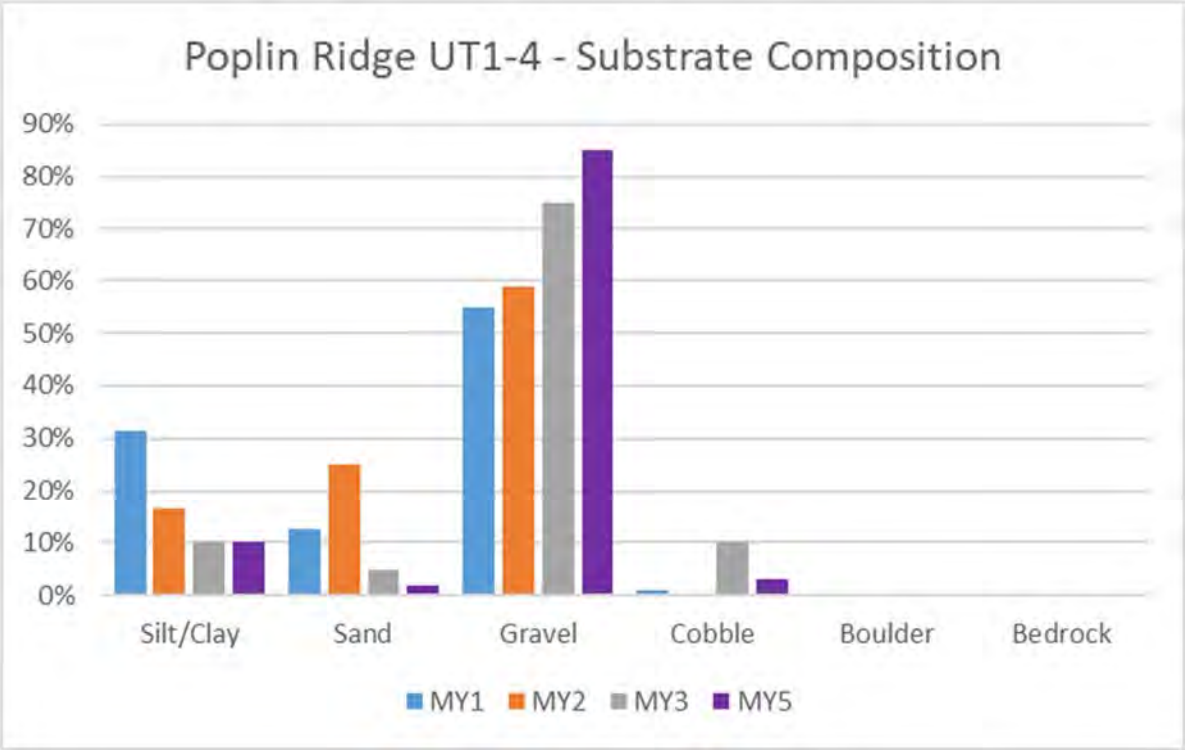


Chart 9.

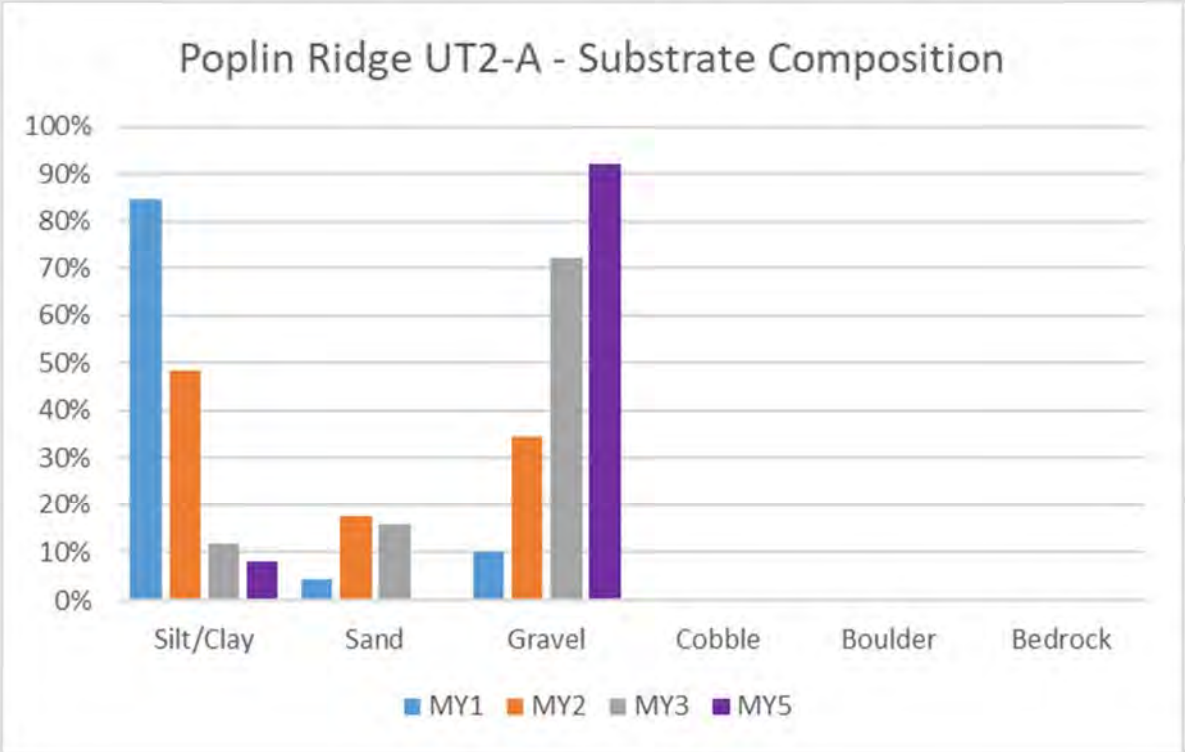


Chart 10.

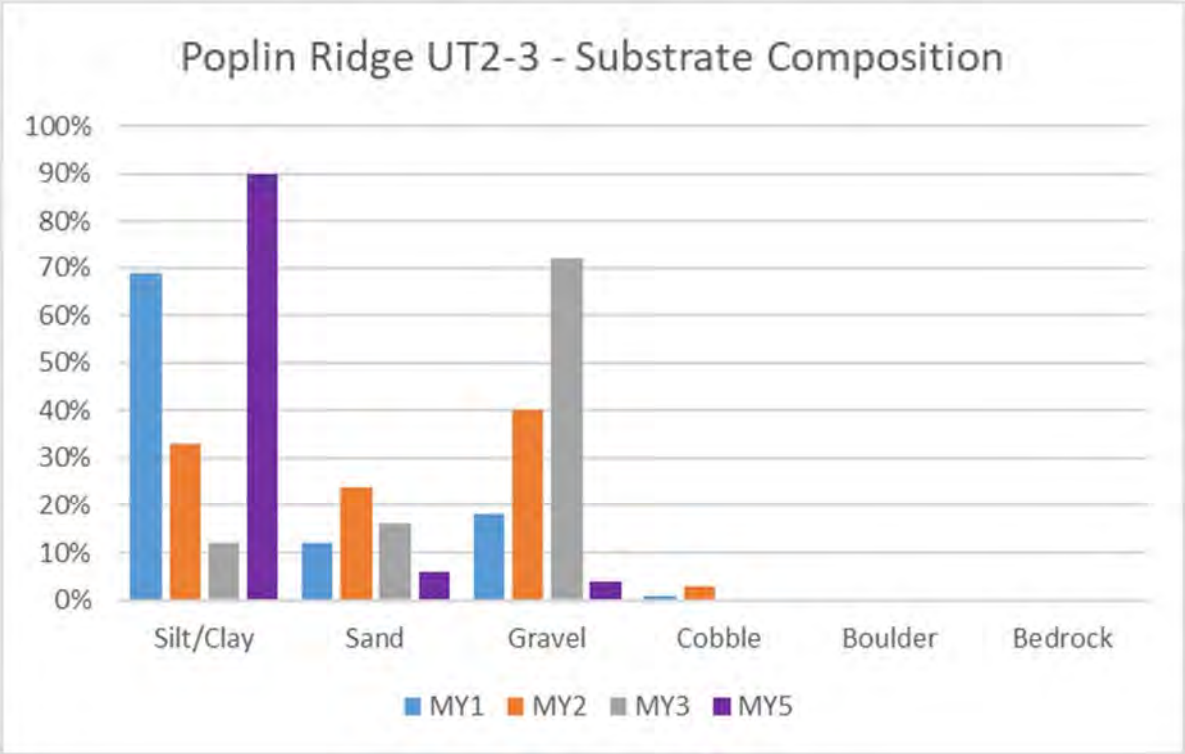


Chart 11.

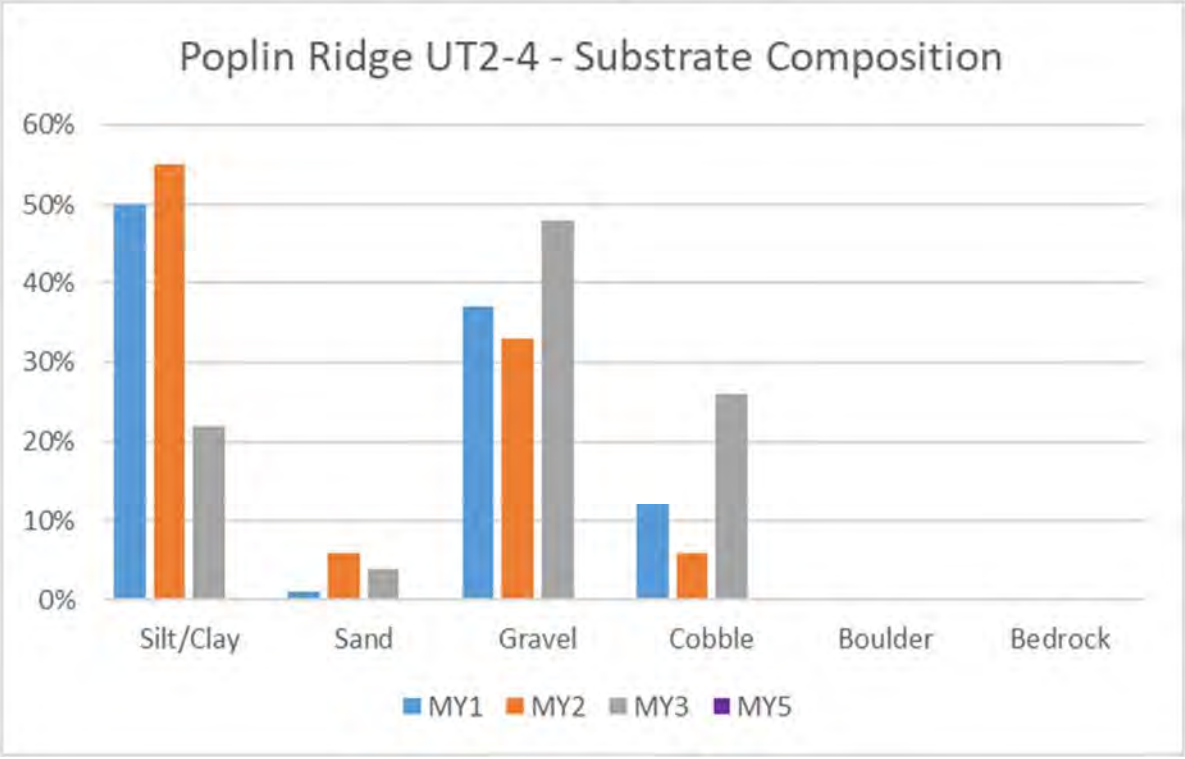


Table 13. Poplin Ridge Bank Pin Array Summary

Bank Pin Location	Position	Year 1 Reading (mm)	Year 2 Reading (mm)	Year 3 Reading (mm)	Year 5 Reading (mm)
Reach UT2-2	Upper	0.0	0.0	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	0.0	0.0	0.0	0.0
Reach UT2-3	Upper	0.0	0.0	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	0.0	0.0	0.0	0.0
Reach UT1-2	Upper	0.0	44.5	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	0.0	0.0	0.0	0.0
Reach UT1-3	Upper	44.5	0.0	0.0	0.0
	Middle	92.3	0.0	0.0	0.0
	Lower	31.8	0.0	0.0	0.0
Reach UT1-C	Upper	0.0	35.6	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	139.7	0.0	0.0	0.0
Reach UT1-4	Upper	0.0	31.8	0.0	0.0
	Middle	0.0	0.0	0.0	0.0
	Lower	108.0	0.0	0.0	0.0

Appendix E
Hydrology Data

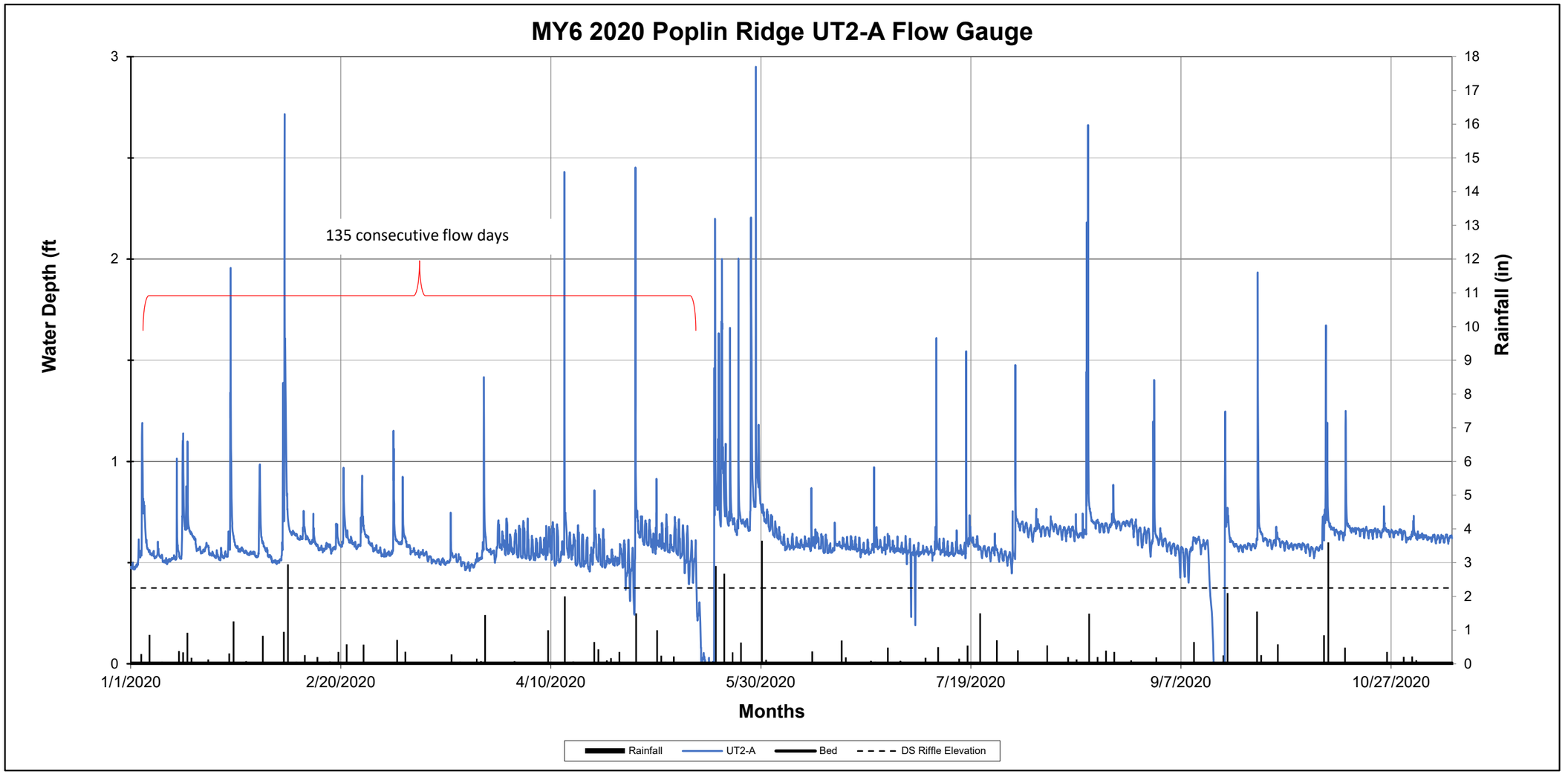
Table 14. Verification of Bankfull Events and Stream Flow Events

Year	Number of Bankfull Events	Maximum Bankfull Height (ft)
CG1 UT1-2		
MY1	1	0.50
MY2	0	N/A
MY3	4	0.49
MY4	1	0.95
MY5	0	N/A
MY6	13	2.22
CG2 UT1-4		
MY1	2	2.00
MY2	5	0.80
MY3	4	2.60
MY4	14	4.86
MY5	4	1.65
MY6	22	4.59
CG3 UT2-3		
MY1	2	4.30
MY2	5	2.00
MY3	3	2.83
MY4	6	3.70
MY5	13	1.98
MY6	16	5.17

Year	Consecutive Flow Days	Total Flow Days	Number of Flow Events
FG UT2-A			
MY5	93	155	6
MY6	135	307	3

Table 15. 2020 Rainfall Summary

Month	Average	Normal Limits		Monroe Station Precipitation
		30 Percent	70 Percent	
January	4.07	2.74	4.87	4.88
February	3.49	2.39	4.17	6.89
March	4.45	3.10	5.29	3.26
April	3.07	1.82	3.72	6.41
May	3.47	2.22	4.18	11.95
June	4.57	2.91	5.50	1.96
July	4.50	2.90	5.42	4.17
August	4.71	2.78	5.18	3.45
September	4.24	2.02	5.18	5.59
October	3.81	2.00	4.57	5.60
November	3.33	1.90	4.05	0.33
December	3.85	2.56	4.62	---
Total	47.56	29.34	56.75	54.49


MY6 2020 Poplin Ridge UT2-A Flow Gauge
Water Depth (ft
Rainfall (in)
135 consecutive flow days
3
2
1
0
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1/1/2020
2/20/2020
4/10/2020
5/30/2020
7/19/2020
9/7/2020
10/27/2020
Months
Rainfall
UT2-A
Bed
DS Riffle Elevation

Appendix F
Poplin Ridge 2020 Monitoring Adaptive Management

3600 Glenwood Avenue, Suite 100
Raleigh, NC 27612

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

April 15, 2020

Paul Wiesner
NCDEQ – DMS
5 Ravenscroft Drive
Asheville, NC 28801

RE: Poplin Ridge Stream Restoration Site – 2020 Monitoring Adaptive Management Work Completed

Mr. Wiesner,

In response to problem areas identified in the Poplin Ridge Stream Restoration Site Year 5 Monitoring Report and the 2019 Adaptive Management Plan, RES completed adaptive management work in fall 2019 and spring 2020. The work included regrading and installing structures on UT2-2 through the pond bottom (including the lower portion of UT2-A) and replanting the pond bottom and other low stem density areas. RES also installed monitoring devices in the pond bottom. The devices include Cross Sections 30 and 31 and a random vegetation plot. The cross section data was included in the MY5 report and will be surveyed again in MY6 and MY7. The random vegetation plot was measured right after planting in April 2020 and results are attached. The random plot will also be measured again during MY6 and MY7 monitoring. More information about the adaptive management work is detailed below:

Stream Work on UT2-2 and Lower UT2-A

Dates: August and September 2019
Method: Dimension/Profile Grading and Structure Installation as proposed in the 2019 Adaptive Management Plan. Installed structures are shown on the attached map.
Reach Length: +/- 500 linear feet

Constructed riffle looking upstream

Newly replaced log sill at the top of the reach (Area 1 from AMP) looking upstream

Lower UT2-A in the pond bottom looking upstream

UT2-2 Bank Livestaking

Date: April 6, 2020
Reach Length: +/- 500 linear feet
# of Livestakes: 800
Species: Black willow, Buttonbush, and Cottonwood

Livestakes on UT2-2 looking upstream

UT2-2 Container Tree Planting and Floodplain Livestaking

Date: April 6, 2020
Planting Area: +/- 0.50 acres
Stems/Acre: 1,060
# of Container Trees: 30
Species: Water Oak and Willow Oak
# of Livestakes: 500
Species: Black willow, Buttonbush, and Cottonwood

Random Vegetation Plot looking downstream

Low Stem Density Area Container Tree Planting in and around VP9 and VP10

Date: April 6, 2020
Method: Planted container trees in areas shown as low stem density areas in MY5 vegetation plot data.
Planting Area: +/- 0.25 acres
Stems/Acre: 280
# of Container Trees: 70
Species: Water Oak and Willow Oak

A map displaying the locations of the items mentioned above and the random plot data is attached.

Thank you,

Ryan Medric | Ecologist

res

N
W
E
S
0 50 100
Feet

Poplin Ridge Stream Restoration Project

MY6 2020

Adaptive Management

Date: 4/15/2020 | Drawn by: RTM

1 inch = 100 feet

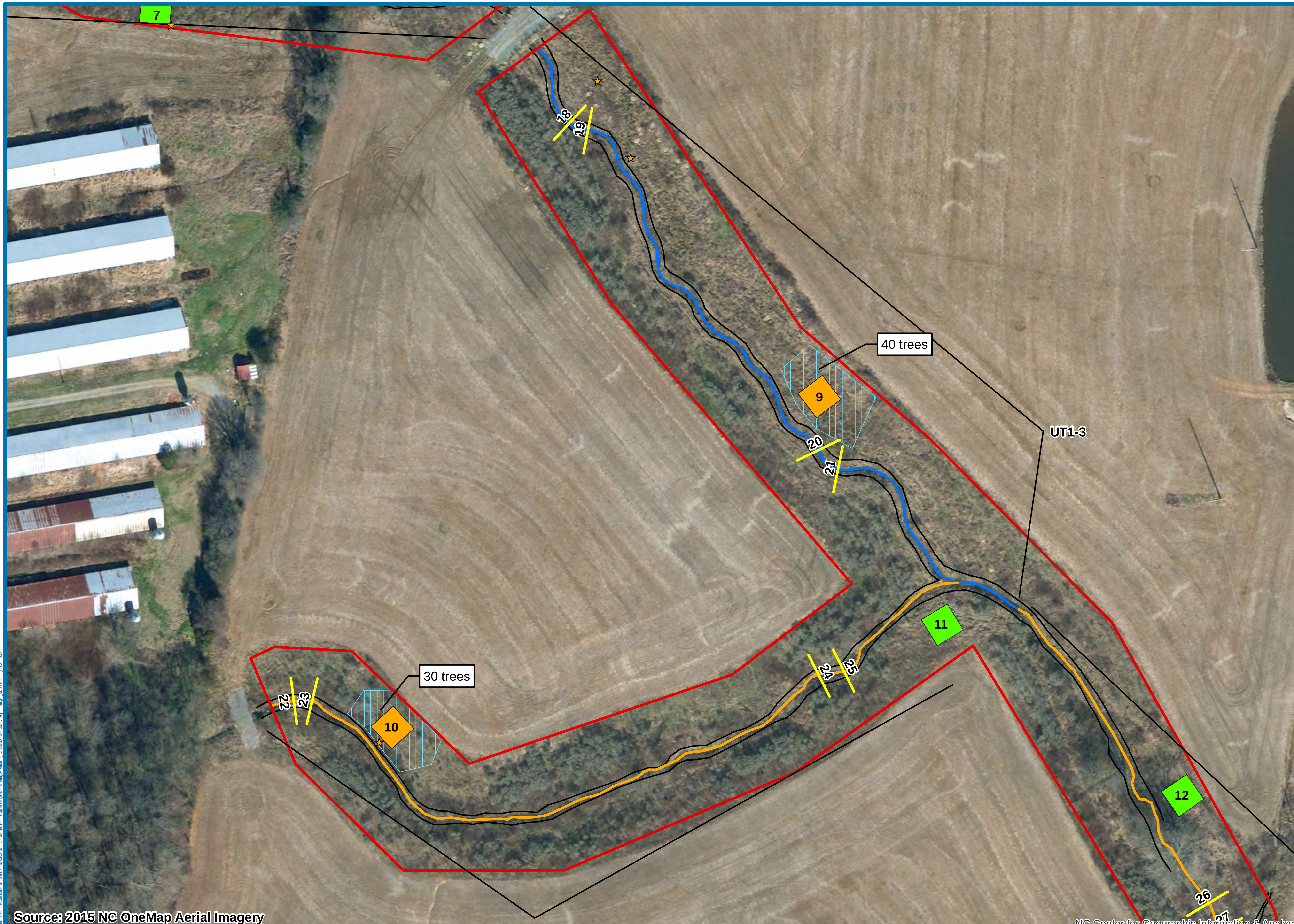
LEGEND

- Conservation Easement
- **Vegeation Plot**
- >320 stems/acre
- <320 stems/acre
- Supplemental Planting
- Random Plot (April 2020)
- New Structure
- Structure
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment

Target Community

Invasive Species	Present	Marginal	Absent
Absent	No Fill		
Present			



res

N
W
E
S
0 50 100
Feet

Poplin Ridge Stream Restoration Project

MY6 2020

Adaptive Management

Date: 4/13/2020 | Drawn by: RTM

1 inch = 100 feet

LEGEND

- Conservation Easement
- **Vegeation Plot**
- >320 stems/acre
- <320 stems/acre
- Supplemental Planting
- Cross Section
- BMP
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Structure
- Crest Gauge
- Flow Gauge
- Rain Gauge
- Photo Station
- Top of Bank

Vegetation Condition Assessment

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

April 2020 Random Vegetation Plot

Random Plot 1		
#	**Common Name**	**Height (cm)**
1	Cottonwood	36
2	Cottonwood	25
3	Cottonwood	37
4	Cottonwood	35
5	Cottonwood	32
6	Black Willow	60
7	Cottonwood	58
8	Black Willow	28
9	Black Willow	66
10	Water Oak	128
11	Cottonwood	22
12	Cottonwood	30
13	Cottonwood	40
14	Black Willow	69
15	Black Willow	66
16	Black Willow	60
17	Black Willow	38
18	Cottonwood	35
19	Buttonbush	38
20	Buttonbush	35
21	Willow Oak	150
22	Black Willow	38
23	Buttonbush	66
24	Willow Oak	162
25	Black Willow	65
26	Cottonwood	40
27	Cottonwood	23
28	Willow Oak	174
Stems/Acre	1133	
Average Height (cm)	59	
Average Height (ft)	1.9	
Plot Size (m)	25 x 4	

M E M O R A N D U M

3600 Glenwood Avenue, Suite 100 Raleigh, North Carolina 27612 919.209.1052 tel. 919.829.9913 fax

TO: Paul Wiesner - DMS

FROM: Ryan Medric - RES

DATE: 6/11/2020

RE: Poplin Ridge MY5 (2019) IRT Credit Release Site Visit

Attendees:
IRT: Mac Haupt (NCDWR), Erin Davis (NCDWR)
DMS: Paul Wiesner
RES: Brad Breslow, Ryan Medric

Site Visit Date: June 3, 2020

The IRT, DMS, and RES conducted a site visit at the Poplin Ridge Stream Restoration Site to discuss the Monitoring Year 5 (2019) credit release. The main topics of discussion were the pond reach repair and supplemental plantings that were completed in October 2019 and April 2020 respectively. Details are bulleted below:

- Flow, bed and bank, and riffle/pool sequences were observed throughout the pond reach repair section (including Reach UT2-A). The IRT noted a small head cut forming in the middle of the reach and commented that they would have liked to see more sills installed. RES will observe this area and will report any issues in the MY6 (2020) report.
- Live stakes were observed sprouting along the banks and in the floodplain as well as the presence of the container trees that were planted. The IRT, however, felt that the area was not planted sufficiently. RES replied that the pond was planted at a stem density of 1,060 stems per acre and it was hard to see most of the livestakes due to the herbaceous layer being matted down from a recent storm. RES will conduct a random vegetation transect in the pond bottom this fall (as proposed in the Adaptive Management Plan) and will plant more three-gallon container trees next winter if necessary. RES will also take photos of this pond reach repair area at the end of the 2020 growing season and will include the photos and a synopsis of the repair and vegetation in the MY6 (2020) report.
- The IRT observed aquatic vegetation growing in the riffles of UT2-2 and UT2-3; however, in-stream vegetation was not to a level where it was accumulating sediment or impeding flow. The IRT did not feel it was necessary for RES to treat in-stream vegetation on the reach unless it becomes more prevalent over the course of this growing season. RES and DMS believe that the in-stream vegetation observed will shade out over time.
- The IRT reminded RES to make sure the easement is properly marked due to a few small areas of easement scalloping and missing/damaged signage observed during the site visit. RES agreed to repair any easement scalloping/encroachment and agreed to ensure all required easement marking and signage are updated and present by the end of MY6. DMS agreed to conduct a site visit to confirm this work is complete before any payment is made for MY6 (2020) monitoring.

- Privet treatment was observed to be successful along UT2-1. Privet treatments will be administered throughout the remainder of the monitoring period within the conservation easement.
- The full IRT was not able to attend the meeting, however, DWR staff did not note any issue with releasing the 2019 project credit as proposed by DMS. DWR staff indicated that they would send their site visit notes to the USACE IRT chair for review.