



MONITORING YEAR 5

ANNUAL REPORT

Final

MOORES FORK STREAM MITIGATION PROJECT

Surry County, NC

DEQ Contract 6500

DMS Project Number 94709

DWR # 12-0396

USACE Action ID SAW-2011-02257

Data Collection Period: February - September 2020

Draft Submission Date: October 19, 2020

Final Submission Date: December 2, 2020

PREPARED FOR:



NC Department of Environmental Quality

Division of Mitigation Services

1652 Mail Service Center

Raleigh, NC 27699-1652

Mitigation Project Name **Moores Fork**
 DMS ID **94709**
 River Basin **Yadkin**
 Cataloging Unit **03040101**
 County **Surry**

USACE Action ID **2011-02257**
 DWR Permit **2012-0396**
 Date Project Instituted **10/18/2010**
 Date Prepared **4/20/2020**
 Stream/Wet. Service Area **Yadkin 03040101**



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	Cool Stream 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%	3,520.761	0.000	3,520.761	2016	9/30/2016
3 - Year 1 Monitoring	10.00%	10.00%	1,160.987	37.800	1,123.187	2017	8/8/2017
4 - Year 2 Monitoring	10.00%	10.00%	1,160.987	0.000	1,160.987	2018	4/25/2018
5 - Year 3 Monitoring	10.00%	10.00%	1,160.987	1,160.987	0.000	2019	7/15/2019
6 - Year 4 Monitoring	5.00%	5.00%	1,741.480	1,741.480	0.000	2020	4/20/2020
7 - Year 5 Monitoring	10.00%					2021	
8 - Year 6 Monitoring	5.00%					2022	
9 - Year 7 Monitoring	10.00%					2023	
Stream Bankfull Standard	10.00%	10.00%	1,160.987	0.000	1,160.987	2018	4/25/2018
			Totals		6,965.921		

Total Gross Credits	11,609.866
Total Unrealized Credits to Date	0.000
Total Released Credits to Date	6,965.921
Total Percentage Released	60.00%
Remaining Unreleased Credits	4,643.945

Notes

- 4/25/2018: Adjustment required due to IRT concerns on how the as-built credits were calculated
 7/15/2019: IRT did not approve any credit releases for this project in 2019.
 4/20/2020: Repair is currently underway on this project. IRT requested a site visit once repairs are complete and decided no release for this year.

Contingencies (if any)

Project Quantities

Mitigation Type	Restoration Type	Physical Quantity
Cool Stream	Restoration	2,071.000
Cool Stream	Enhancement I	6,592.000
Cool Stream	Enhancement II	6,645.000
Cool Stream	Preservation	4,279.000

Mitigation Project Name Moores Fork
DMS ID 94709
River Basin Yadkin
Cataloging Unit 03040101
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Date Prepared 4/20/2020
Stream/Wet. Service Area Yadkin 03040101

							Stream Restoration Credits	Stream Restoration Equivalent Credits
Debits								
Beginning Balance (mitigation credits)							10,754.066	855.800
Released Credits							6,452.445	513.480
Unrealized Credits							0.000	0.000
Owning Program	Req. Id	TIP #	Project Name	USACE Permit #	DWR Permit #	DCM Permit #		
Statewide Stream & Wetland ILF Program	REQ-004196	R-2239C	DOT - Widening of US 421	1999-20833	1999-0492		3.501	
Statewide Stream & Wetland ILF Program	REQ-004196	R-2239C	DOT - Widening of US 421	1999-20833	1999-0492		635.400	
Statewide Stream & Wetland ILF Program	REQ-004196	R-2239C	DOT - Widening of US 421	1999-20833	1999-0492		168.671	
Statewide Stream & Wetland ILF Program	REQ-004200	R-2240	DOT - Widening of US 421	1996-01926	1999-0995		0.002	
Statewide Stream & Wetland ILF Program	REQ-005025		Hartley Drive Extension	2007-03968	2007-1995		13.000	
Statewide Stream & Wetland ILF Program	REQ-006316		Courthouse Drive Extension	2014-01300	2015-0402		492.000	
Statewide Stream & Wetland ILF Program	REQ-006696		Mt. Airy Surry County Airport Improvements Phase 2	2010-01397	2011-0156		1,334.000	
Statewide Stream & Wetland ILF Program	REQ-006697		Mt. Airy Surry County Airport Improvements Phase 3	2010-01397	2011-0156		951.000	
Statewide Stream & Wetland ILF Program	REQ-004196	R-2239C	DOT - Widening of US 421	1999-20833	1999-0492			256.740
Statewide Stream & Wetland ILF Program	REQ-004196	R-2239C	DOT - Widening of US 421	1999-20833	1999-0492			46.390
Statewide Stream & Wetland ILF Program	REQ-005025		Hartley Drive Extension	2007-03968	2007-1995			207.000
Total Credits Debited							3,597.574	510.130
Remaining Available balance (Released credits)							2,854.871	3.350
Remaining balance (Unreleased credits)							4,301.621	342.320

PREPARED BY:



Wildlands Engineering, Inc.
1430 South Mint Street, Suite 104
Charlotte, NC 28203
Phone: 704.332.7754
Fax: 704.332.3306



December 2, 2020

Mr. Matthew Reid
Western Project Manager
Division of Mitigation Services
15 Buckhorn Gap Road
Biltmore Lake, NC 28715

RE: Moores Fork Stream Mitigation Project
Yadkin River Basin – CU# 03040101
Surry County, North Carolina
NCEEP Project # 94709
Contract No. 6500

Dear Mr. Reid:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services (DMS) comments from the Draft Monitoring Year 5 report for the Moores Fork Stream Mitigation Project. The following Wildlands responses to DMS's report comments are noted in italics lettering.

DMS comment; 1.2.2 Vegetation Areas of Concern: The invasive species contractor continued to treat invasives at the site throughout the monitoring year. Treatments occurred in May, June, and July during 2020. DMS will continue to treat invasives at the site through closeout.

Wildlands response; Text was added to section 1.2.2 to specify the months when invasive treatments occurred in 2020.

DMS comment; Table 2: Please add the following activities:

- **Invasive Species Treatment - May, June and July 2020**

Wildlands response; The invasive species treatment dates have been added to Table 2.

DMS comment; Please include the attached invasive species treatment log in the appendix for the updated final report.

Wildlands response; The invasive species treatment log has been included in Appendix F.

DMS comment; CCPV: Thanks for providing updated invasive species polygons. Please continue to update as treatment occurs and populations are reduced. This map is a useful tool for the contractor treating the site.

Wildlands response; You're welcome. Wildlands will continue to update the CCPV figures as treatment of invasive species occurs, and populations are reduced.



DMS comment; As noted in the report, DMS has completed a repair plan for nine areas of concern on the site. This repair will occur in January 2021. DMS will update Wildlands as the repair is completed and provide asbuilt/info to be included in the MY6 report.

Wildlands response; Text was updated in section 1.2.4 to indicate that the repair will occur in January 2021. The repair as-built information will be included in the MY6 report.

DMS comment; Digital Files: The Table 7 report from the CVS entry tool does not match Table 10 included in the monitoring report. Please ensure that the CVS tool includes all of the relevant data to replicate what is being included in the monitoring report.

Wildlands response; The "Table 7" report from the CVS entry tool seems to exclude new monitored stems (from supplemental plantings) that were added in MY5 to the "Planted woody stem entry" tab. However, using the "Simple reports" spreadsheet generated from the CVS entry tool matches Table 10 included in the monitoring report.

DMS comment; As Wildlands has done in the past, please include a response to the comment letter and how/where the comments were addressed. Please insert this letter directly behind the cover page in the final deliverables. The IRT has requested that we include this letter with the final deliverables. The response letter will need to be included with all future monitoring deliverables.

Wildlands response; The comment response letter has been inserted behind the cover page in the final deliverables.

Enclosed please find one (1) hard copy and one (1) electronic copy on CD of the Final Monitoring Report. Please contact me at 704-941-9093 if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Kirsten Y. Gimbert".

Kirsten Y. Gimbert
Project Manager
kgimbert@wildlandseng.com

EXECUTIVE SUMMARY

The North Carolina Department of Environmental Quality (NCDEQ) Division of Mitigation Services (DMS) restored, enhanced, and preserved approximately 19,587 linear feet (LF) of Moores Fork and 13 unnamed tributaries (UTs), provided livestock fencing and alternative water sources to keep livestock out of the streams, removed invasive plant species across the project, and established native riparian buffers. The restoration project was developed to fulfill stream mitigation requirements accepted by the DMS for the Upper Yadkin River Basin (Cataloging Unit 03040101). The Moores Fork Stream Mitigation Project (Site) will net 11,587.543 stream mitigation units through a combination of restoration, enhancement I and II, and preservation.

The Site is within a Targeted Local Watershed (TLW) identified in the Upper Yadkin River Basin Restoration Priority (RBRP) plan (NCDENR, 2009). The RBRP identified the Stewarts Creek 14-digit HUC 03040101100010 as a TLW. Agriculture is the primary land use in the watershed (36% agriculture land cover and only 3% impervious cover), and the RBRP identified degraded riparian buffers as the major stressor to water quality. The Site is also located within the identified as a priority subwatershed for stream restoration and agricultural BMPs during the initial Upper Yadkin-Ararat River local watershed planning (LWP).

The final design was completed in June of 2013. Construction activities and as-built surveys were completed in December of 2014. Planting of the site took place in February of 2015. A large flood event with an estimated return interval of 50 to 100 years occurred at the site on April 18-19, 2015, causing damage to the main stem of Moores Fork. This damage was repaired in March and April of 2016, and a second as-built survey was performed on the repaired areas in April of 2016. The baseline monitoring efforts began in June of 2016 and monitoring year one efforts were initiated in late October of 2016. The Monitoring Year (MY) 5 activities were completed in September 2020.

Overall, the Site is on track to meet monitoring success criteria for MY7 vegetation, geomorphology, and hydrology performance standards. The MY5 vegetation survey resulted in an average stem density of 479 planted stems per acre. The Site has met the MY5 density requirement of 260 planted stems per acre, with all 12 plots (100%) individually meeting this requirement. The MY5 vegetation assessment revealed that invasive plant populations have been significantly reduced due to ongoing treatment. A few instances of localized bank erosion and structure instability are present on the Site and are likely to require the implementation of maintenance measures to deter further degradation. During MY5, at least two bankfull events occurred on Moores Fork and one bankfull event occurred on Silage Tributary. The performance standard of two recorded bankfull events in separate monitoring years was met in MY3 for Moores Fork and Silage Tributary.



MOORES FORK STREAM MITIGATION PROJECT
Year 5 Monitoring Report

TABLE OF CONTENTS

Section 1: PROJECT OVERVIEW1-1

 1.1 Project Goals and Objectives 1-1

 1.2 Monitoring Year 5 Data Assessment..... 1-2

 1.2.1 Vegetation Assessment..... 1-2

 1.2.2 Vegetation Areas of Concern and Management Activity 1-3

 1.2.3 Stream Assessment..... 1-3

 1.2.4 Stream Areas of Concern and Management Activity..... 1-3

 1.2.5 Hydrology Assessment..... 1-4

 1.3 Monitoring Year 5 Summary 1-4

Section 2: METHODOLOGY.....2-1

Section 3: REFERENCES3-1

APPENDICES

Appendix A General Tables and Figures

Figure 1 Project Vicinity Map

Figure 2 Project Component/Asset Map

Table 1 Project Components and Mitigation Credits

Table 2 Project Activity and Reporting History

Table 3 Project Contacts Table

Table 4a-b Project Baseline Information and Attributes

Table 5 Monitoring Component Summary

Appendix B Visual Assessment Data

Figures 3.0-3.6 Current Condition Plan View Maps

Table 6a-j Visual Stream Morphology Stability Assessment Table

Table 7 Vegetation Condition Assessment Table

Stream Photographs

Vegetation Photographs

Appendix C Vegetation Plot Data

Table 8 Vegetation Plot Criteria Attainment

Table 9 CVS Vegetation Plot Metadata

Table 10 Planted and Total Stem Counts (Species by Plot with Annual Means)

Appendix D Morphological Summary Data and Plots

Table 11a-b Baseline Stream Data Summary

Table 12a-b Morphology and Hydraulic Summary (Dimensional Parameters – Cross-Section)
Cross-Section Plots with Annual Overlays
Cross-Section Pebble Count Plots with Annual Overlays

Appendix E Hydrology Summary Data and Plots

Table 13 Verification of Bankfull Events
Monthly Rainfall Data

Appendix F Invasive Species Treatment Logs

Section 1: PROJECT OVERVIEW

The Site was implemented under a design-bid-build contract with DMS in Surry County, NC. The Site is located in the Yadkin River Basin; eight-digit Hydrologic Unit Code (HUC) 03040101 and the 14-digit HUC 03040101100010 (Figure 1). Located in the Piedmont physiographic province (NCGS 2004), the project watershed primarily includes agricultural land cover. The drainage area for the lower end of Moores Fork is 1,527 acres, and the drainage area for Silage Tributary is 156 acres. The Site is located approximately 0.25 mile north of NC 89 on Horton Road. The project site is located on both sides of Horton Road. Latitude and longitude for the site are 36.506671 N and -80.704115 W, respectively (Figure 1).

The NCDEQ DMS restored, enhanced, and preserved approximately 19,587 LF of Moores Fork and 13 unnamed tributaries (UTs), provided livestock fencing and alternative water sources to keep livestock out of the streams, removed invasive plant species across the project, and established native riparian buffers. The restoration project was developed to fulfill stream mitigation requirements accepted by the DMS for the Upper Yadkin River Basin (HUC 03040101). Mitigation work within the Site included restoring and enhancing 15,308 LF and preserving 4,279 LF of stream. The Moores Fork Stream Restoration Project will net 11,587.543 stream mitigation units (SMUs) through a combination of restoration, enhancement I and II, and preservation. Due to overhead utility easements that cross project streams, 7.8 SMUs were removed on Silage Tributary Reach 2 (starting at STA 30+10.49 and ending at STA 30+33.95), 10.4 SMUs were removed on Moores Fork (starting at STA 37+22.01 and ending at STA 37+42.79), and 4.1 SMUs were removed on Corn Trib (starting at STA 19+38.58 and ending at STA 19+59.15) as shown in Table 1 of Appendix A.

The final design was completed in June of 2013. Construction activities and as-built surveys were completed in December of 2014. Planting of the site took place in March of 2015. A large flood event with an estimated return interval of 50 to 100 years occurred at the site on April 18-19, 2015, causing damage to the main stem of Moores Fork. This damage was repaired in March and April of 2016, and a second as-built survey was performed on the repaired areas in April of 2016. The baseline monitoring efforts began in June of 2016 and monitoring year one efforts were initiated in late October of 2016. The Monitoring Year 5 monitoring activities were completed in September 2020. More detailed information related to the project activity, history, and contacts can be found in Appendix A, Tables 1 and 2. Directions and a map of the Site are provided in Figure 1 and, project components are illustrated for the Site in Figure 2. Please refer to the Project Component Map (Figure 2) for the stream features and to Table 1 for the project component and mitigation credit information for the Site. This report documents the results of the MY5 monitoring efforts.

1.1 Project Goals and Objectives

Prior to construction activities, dairy and farming operations on the site had deforested riparian buffers and allowed direct livestock access to the stream, leading to elevated temperatures and nutrients. Channel straightening and dredging throughout much of the project had also contributed to channel degradation. Table 11 in Appendix D present the pre-restoration conditions in detail.

This mitigation site is intended to provide numerous ecological benefits within the Yadkin River Basin. The project goals identified in the Mitigation Plan (Confluence, 2012) include:

- Improve water quality in Moores Fork and the UTs through reductions in sediment and nutrient inputs from local sources;
- Create conditions for dynamic equilibrium of water and sediment movement between the supply reaches and project reaches;



- Promote floodwater attenuation and secondary functions associated with more frequent and extensive floodwater contact times;
- Improve in-stream habitat by increasing the diversity of bedform features;
- Enhance and protect native riparian vegetation communities; and
- Reduce fecal, nutrient, and sediment loads to project streams by promoting and implementing livestock best management practices.

The project objectives have been defined as follows:

- Restoration of the dimension, pattern, profile of approximately 1,828 LF of Moores Fork Reach 2 and 243 LF of the Pond Tributary;
- Restoration of the dimension and profile (Enhancement I) of the channel for approximately 2,832 LF of Moores Fork Reach 3, 900 LF of Silage Reach 1, 2,448 LF of Silage Reach 2, 300 LF of Barn Reach 1 and 112 LF of Corn Reach 2;
- Limited channel work coupled with livestock exclusion, gully stabilization, invasive species control and buffer planting (Enhancement II) on approximately 761 LF of Moores Fork Reach 1, 167 LF of Cow Tributary 1, 767 LF of Cow Tributary 2, 3,134 LF of Barn Reach 2, 1,350 LF of Corn Reach 1, and 466 LF of UT1;
- Livestock exclusion fencing and other best management practice installations;
- Invasive plant species control measures across the entire project wherever necessary; and
- Preservation of approximately 4,279 LF of relatively un-impacted forested streams (UTs 2, 3, 6, 7, 8, 9, and 10) in a permanent conservation easement.

1.2 Monitoring Year 5 Data Assessment

Annual monitoring was conducted between February and September 2020 to assess the condition of the project. The stream restoration success criteria for the Site follows the approved performance standards presented in the Moores Fork Stream Mitigation Project Final Mitigation Plan (Confluence, 2012).

Annual monitoring will be conducted for seven years to provide a project data chronology that will facilitate an understanding of project status and trends.

1.2.1 Vegetation Assessment

A total of 12 vegetation monitoring plots were established during the baseline monitoring within the project easement areas using a standard 10 by 10 meter plot. Please refer to Figures 3.0-3.6 in Appendix B for the vegetation monitoring locations. At the end of year five of the monitoring period, the vegetation success criterion is the survival of 260 planted stems per acre in the riparian corridor along restored and enhanced reaches. The final vegetation success criterion is the survival of 210 planted stems per acre at the end of year seven of the monitoring period.

The MY5 vegetation survey was completed in August 2020, resulting in an average stem density of 479 planted stems per acre. The Site is exceeding the MY5 density requirement of 260 planted stems per acre, with all 12 plots (100%) individually meeting this requirement. Vegetation plots 2 and 3 have increased densities compared to last year due to supplemental planting and previously missing stems that were found alive this year. Therefore, the site overall has an increased stem density of 4%. The MY5 average stem height for all plots is about 11.9 feet. Approximately 11% of the planted stems scored a vigor of 2, indicating that they have fair plant health with some damage present. Stems with a vigor of 1 that are unlikely to survive next year accounted for roughly 2% of the monitored stems. This low vigor rating is due to damage from storm events, vine strangulation, suffocation from dense herbaceous cover, insects, deer, or other unknown factors. Planted black gum trees (*Nyssa sylvatica*), which are a favorite among the deer, had previously been stunted and are now starting to grow to a height where

they can survive. Desirable volunteer species such as tulip poplar, red maple, river birch, and tulip poplar are present throughout the Site. Please refer to Appendix B for vegetation plot photographs and Appendix C for vegetation data tables.

1.2.2 Vegetation Areas of Concern and Management Activity

Areas of invasive plant populations were identified in MY5 throughout the Site. Species included: kudzu (*Pueraria montana*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Multiflora rose (*Rosa multiflora*), oriental bittersweet (*Celastrus orbiculatus*), morning glory (*Convolvulus sp.*), and English ivy (*Hedera helix*). The invasive treatments that occurred in 2019 and continued in 2020 have caused over a 40% reduction compared to MY4. Currently, less than 2% of the easement acreage is mapped with some invasive species areas of concern. In 2020, invasive treatments occurred in May, June, and July and will continue through closeout. Along the left floodplain of Moores Fork, there continue to be some persistent areas of kudzu and additional pockets discovered in MY5 along the stream banks.

In areas that received supplemental planting in 2019, stems were found to be healthy and stem density appears higher. Isolated bare/poorly vegetated areas observed in MY5 continue to be improving with herbaceous cover becoming established. These vegetation areas of concern are shown in Figures 3.0-3.6 in Appendix B.

1.2.3 Stream Assessment

Morphological surveys for MY5 were conducted in April and June 2020. Overall, surveyed cross-sections along Moores Fork indicate the channel is maintaining stable dimensions. At both Moores Fork riffle cross-section M4 and pool cross-section M6, an increase in cross-sectional area is evident due to stone toe boulder structures that are dislodged at both cross-sections. Alluvial deposition along the banks and floodplain is present along Moores Fork and visible within most cross-sections. However, riffles are maintaining appropriate width-to-depth ratios and pools are maintaining max depths compared to MY0. In addition, MY5 riffle pebble counts along Moores Fork indicate coarser sediment size distribution as compared to MY0. Therefore, Moores Fork appears to be transporting sediment efficiently and functioning as designed.

Along Silage Tributary, the surveyed cross-sections, are representative of vertical and lateral instability observed throughout Silage Tributary Reach 1 and 2. Downcutting present at cross-sections ST2, ST3, and ST6, and bank scour present at cross-sections ST1 and ST5, accounts for the increased channel dimensions as compared to MY0. In general, MY5 riffle pebble counts indicate similar or coarser sediment size distribution as compared to MY0. See section 1.2.4 for further discussion about stream areas of concern along Silage Tributary. Please refer to Appendix D for cross-section plots and morphological summary tables.

1.2.4 Stream Areas of Concern and Management Activity

Stream areas of concern include localized instances of bank instability and sediment deposition. Along Moores Fork, new or expanded areas of bank instability were noted in MY5 (STA 19+10, 43+10, 44+90, and 64+10). At both wetland outlets to Moores Fork below UT8 and UT10, the headcuts have continued to worsen and are migrating further up into the wetlands. Along Moores Fork, a few additional boulder toe structures have shifted resulting in bank scour behind them. However, these stream areas of concern seem to be isolated and not prevalent along Moores Fork.

Along Silage Tributary, several new or expanded areas of bank instability were noted in MY5 (STA 13+40, 21+80, 25+70, 30+30, 32+50, and 37+60) where woody vegetation has failed to become established along the banks. Several structures that were used for grade control along Silage Tributary have been

undermined by flow piping under or around them. The nature of this confined steep valley in combination with flashy runoff from recent numerous storm events has amplified areas of stream instability, as displayed in the surveyed cross-sections along these reaches.

Other stream areas of concern are present in some of the smaller tributaries on the Site. Pond Tributary continues to experience sedimentation along the upper portion, but well-established willows and other woody vegetation are maintaining the channel function. At the project start of Corn Tributary, a significant headcut and erosion around the culvert continues to downcut. These areas will continue to be monitored in future years for signs of accelerated instability.

DMS has contracted with a design firm to develop a repair plan for approximately nine areas of instability throughout the Site. The assessment and design occurred fall/winter 2019 followed by construction that will occur in January 2021. Stream repairs will be captured in the MY7 (2022) geomorphic stream assessment. DMS has also contracted with APHIS to control beaver and dams at the Site in 2019. APHIS removed multiple beaver and dams in 2019 and will continue to monitor the Site for beaver activity through closeout. Stream areas of concern and management activities are shown in Figures 3.0-3.6 in Appendix B.

1.2.5 Hydrology Assessment

Bankfull data collected on February 27 and September 8, 2020 indicate that bankfull events occurred in MY5. At least two bankfull events on Moores Fork and one bankfull event on Silage Tributary were documented with recent alluvial deposits and obvious wracklines in MY5. Monthly rainfall data indicate higher than normal rainfall amounts occurred during the months of February, April, May, and August 2020 (NCCRONOS, 2020). Hydrologic success criteria for the Site states that two bankfull flow events must be documented on restoration reaches within the seven-year monitoring period and must occur in separate years. Five bankfull events have been documented for Moores Fork and four bankfull events have been documented for Silage Tributary in separate years. Therefore, the performance standard for the Site was met in MY3. Refer to Appendix E for hydrologic data and graphs.

1.3 Monitoring Year 5 Summary

Overall, the Site is on track to meet monitoring success criteria for MY7 vegetation, geomorphology, and hydrology performance standards. The MY5 vegetation survey resulted in an average stem density of 479 planted stems per acre. The Site has exceeded the MY5 density requirement of 260 planted stems per acre, with all 12 plots (100%) individually meeting this requirement. Additionally, the MY5 vegetation assessment revealed that invasive plant populations have been significantly reduced due to ongoing treatment. A few instances of localized bank erosion and structure instability are present on the Site and maintenance may be warranted to prevent further degradation. At least two bankfull events occurred on Moores Fork and one bankfull event occurred on Silage Tributary. The performance standard of two recorded bankfull events in separate monitoring years has been met for both Moores Fork and Silage Tributary.

Summary information and data related to the 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 annual monitoring reports can be found in the Mitigation Plan documents available on DMS's website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.



Section 2: METHODOLOGY

The stream monitoring methodologies utilized in 2020 are based on standard guidance and procedures documents (Rosgen 1996 and USACE 2003). Geomorphic data were collected following the standards outlined in *The Stream Channel Reference Site: An Illustrated Guide to Field Techniques* (Harrelson et al., 1994) and in the *Stream Restoration: A Natural Channel Design Handbook* (Doll et al., 2003). All Integrated Current Condition Mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcGIS. Planted woody vegetation is being monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008). Crest gages were installed in surveyed riffle cross-sections and monitored semi-annually.



Section 3: REFERENCES

- Confluence Engineering, PC. 2012. Moores Fork Stream Mitigation Plan. NCEEP, Raleigh, NC.
- Doll, B.A., Grabow, G.L., Hall, K.A., Halley, J., Harman, W.A., Jennings, G.D., and Wise, D.E. 2003. Stream Restoration A Natural Channel Design Handbook.
- Harrelson, Cheryl C; Rawlins, C.L.; Potyondy, John P. 1994. *Stream Channel Reference Sites: An Illustrated Guide to Field Technique*. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.
- Lee, Michael T., Peet, Robert K., Steven D., Wentworth, Thomas R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2. Retrieved from: <http://cvs.bio.unc.edu/protocol/cvs-eep-protocol-v4.2-lev1-2.pdf>
- North Carolina Climate Retrieval and Observations Network of the Southeast Database (NCCRONOS). 2020. State Climate Office of North Carolina. Version 2.7.2. MT Airy 2 W. Station ID No. 315890. Accessed September 2020.
- North Carolina Division of Water Resources (NCDWR). 2016. Surface Water Classifications. Retrieved from <http://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/classifications>
- NCDENR. 2009. Upper Yadkin River Basin Restoration Priorities. Retrieved from <https://deq.nc.gov/about/divisions/mitigation-services/dms-planning/watershed-planning-documents/yadkin-river-basin>
- North Carolina Geological Survey (NCGS). 2004. Physiography of North Carolina. Map compiled by the Division of Land Resources. Raleigh.
- Rosgen, D.L. 1996. Applied River Morphology. Pagosa Springs, CO: Wildland Hydrology Books.
- United States Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. USACE, NCDENR-DWQ, USEPA, NCWRC.
- United States Geological Survey (USGS), 1998. North Carolina Geology. <https://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/>



APPENDIX A. General Tables and Figures

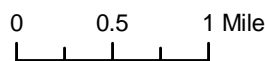
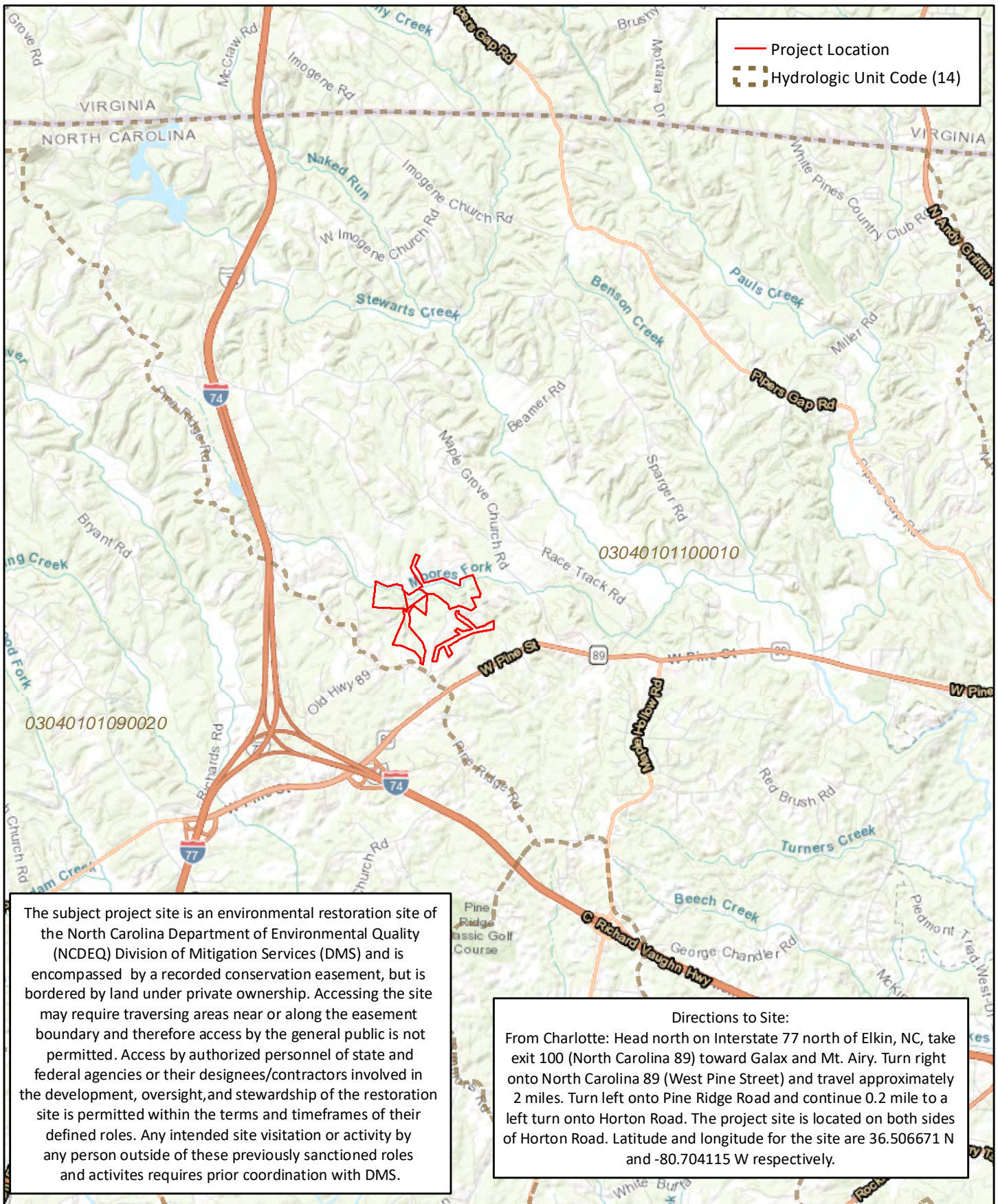


Figure 1 Project Vicinity Map
 Moores Fork Stream Mitigation Site
 DMS Project No. 94709
 Monitoring Year 5 - 2020

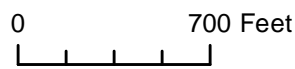
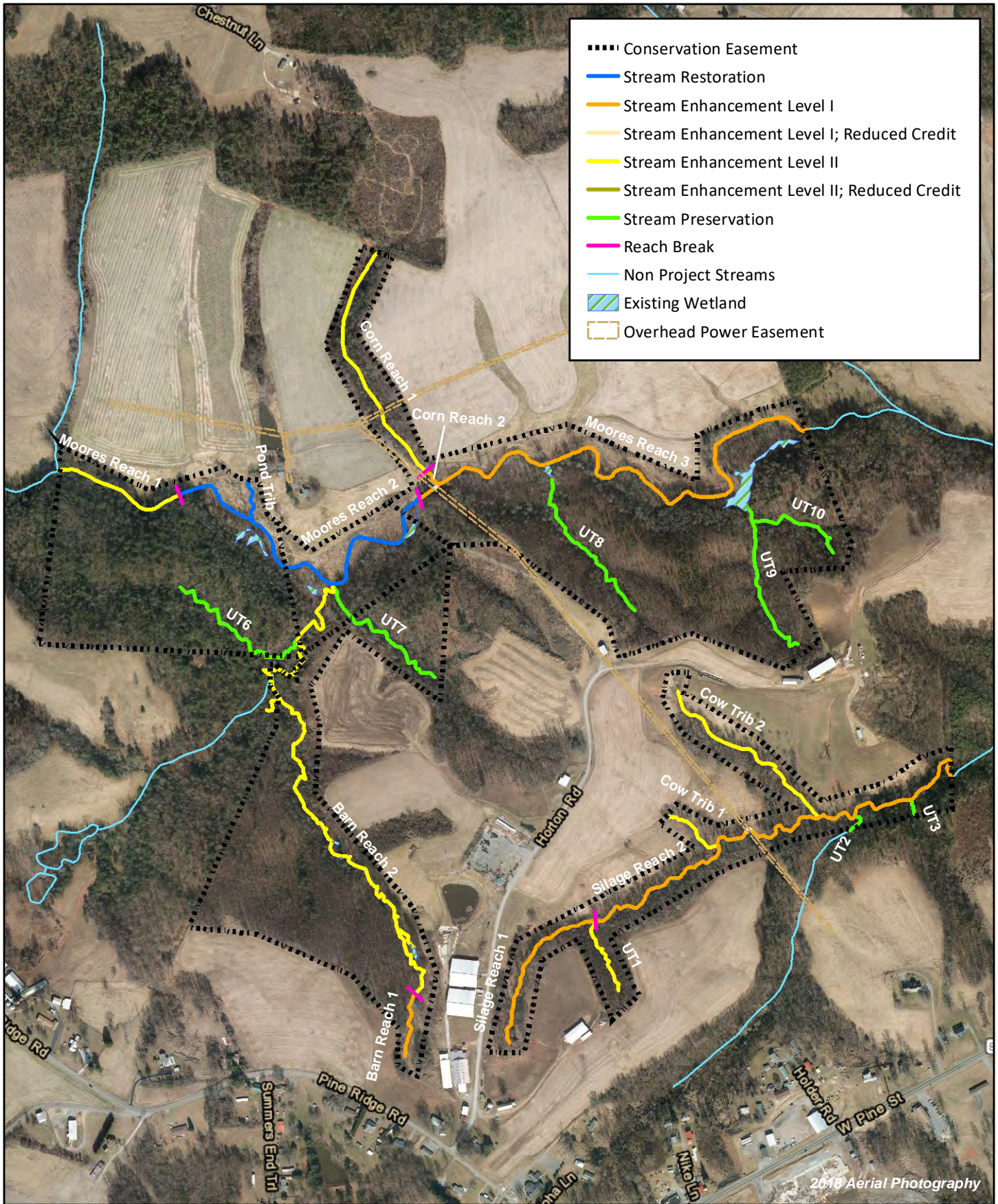


Figure 2 Project Component/Asset Map
 Moores Fork Stream Mitigation Site
 DMS Project No. 94709
 Monitoring Year 5 - 2020

Table 1. Project Components and Mitigation Credits

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Mitigation Credit Summaries ¹								
Type	Restoration	Enhancement I	Enhancement II	Preservation				
Total	2071.000	5757.790	2902.953	855.800				
Project Components ¹								
Project Component or Reach ID	Stationing	Pre-project Footage or Acreage	Restoration Footage or Acreage	Restoration Level	Restoration or Rest Equiv.	Mitigation Ratio	Mitigation Credits	Notes
Moore's Reach 1	STA 989-1750	761	761	N/A	EII	2.5:1	304.400	-
Moore's Reach 2	STA 1750-3578	1,636	1,828	P2	R	1:1	1,828.000	-
Moore's Reach 3	STA 3578-6410	2,856	2,832	P2/3	EI	1:1	2,821.610	Reduction in 10.39 SMU because of 20' overhead powerline easement
Silage Reach 1	STA 1000-1900	900	900	P1	EI	1:1	900.000	-
Silage Reach 2	STA 1900-4348	2,448	2,448	P3	EI	1.5:1	1,624.180	Reduction in 7.82 SMU because of 20' overhead powerline easement.
Cow Trib 1	STA 1219-1386	167	167	P4	EII	1.5:1	111.333	-
Cow Trib 2	STA 1331-2098	767	767	P4	EII	1.5:1	511.333	-
Pond Trib	STA 1000-1243	194	243	P2	R	1:1	243.000	-
Barn Reach 1	STA 1000-1300	300	300	P3	EI	1:1	300.000	-
Barn Reach 2	STA 1350-3746; STA 4069-4757	3,134	3,134	N/A	EII	2.5:1	1,253.600	-
Corn Reach 1	STA 1000-2350	1,350	1,350	N/A	EII	2.5:1	535.886	Reduction in 4.114 SMU because of 20' overhead powerline
Corn Reach 2	STA 2350-2462	112	112	P3	EI	1:1	112.000	-
UT1	STA 1000-1466	466	466	N/A	EII	2.5:1	186.400	-
Preservation Reaches	UTs 2,3,6,7,8,9,10	4,279	4,279	N/A	P	5:1	855.800	-
Length and Area Summations ¹								
Restoration Level	Stream (Linear Feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (Square feet)		Upland (acres)	
		Riverine	Non-Riverine					
		-						
Restoration	2,071	-	-	-	-	-	-	-
Enhancement		-	-	-	-	-	-	-
Enhancement I	6,592							
Enhancement II	6,645							
Creation		-	-	-			-	-
Preservation	4,279	-	-	-			-	-
High Quality Preservation		-	-	-			-	-
		-	-	-			-	-

N/A - Not Applicable

¹Project components and mitigation credits reverted back to Mitigation Plan totals as requested by IRT.

Table 2. Project Activity and Reporting History

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Activity or Deliverable		Data Collection Complete	Completion or Delivery
Mitigation Plan		December 2011	November 2012
Final Design – Construction Plans		N/A	June 2013
Construction (Repairs)		N/A	December 2014 (April 2016)
Temporary S&E Mix Applied		N/A	December 2014 (April 2016)
Permanent Seed Mix Applied		N/A	December 2014 (April 2016)
Containerized, Bare Root and B&B Plantings For Reach/Segments		N/A	February 2015 (April 2016)
Invasive Species Treatment		May 2016	May 2016
Baseline Monitoring Document (Year 0)	Vegetation Survey	June 2016	August 2016
	Stream Survey	June 2016	
Invasive Species Treatment		September 2016	September 2016
Year 1 Monitoring	Vegetation Survey	October 2016	November 2016
	Stream Survey	November 2016	
Year 2 Monitoring	Vegetation Survey	August 2017	November 2017
	Stream Survey	July 2017	
Invasive Species Treatment		July, Aug, Sept & Nov 2018	November 2018
Year 3 Monitoring	Vegetation Survey	August 2018	November 2018
	Stream Survey	June 2018	
Supplemental Planting		March 2019	November 2019
Beaver/Dam Removal		July 2019	November 2019
Invasive Species Treatment		Feb, July, & Sept 2019	September 2019
Year 4 Monitoring	Vegetation Survey	August 2019	November 2019
	Stream Survey	N/A	
Invasive Species Treatment		May, June, & July 2020	July 2020
Year 5 Monitoring	Vegetation Survey	August 2020	November 2020
	Stream Survey	July 2020	
Year 6 Monitoring	Vegetation Survey	2021	November 2021
	Stream Survey	N/A	
Year 7 Monitoring	Vegetation Survey	2022	November 2022
	Stream Survey	2022	

N/A - Not Applicable

Table 3. Project Contacts Table

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Designer	Confluence Engineering, PC 16 Broad Street Asheville, NC 28801
Primary project design POC	Andrew Bick 828-606-0306
Construction Contractor	Carolina Environmental Contracting, Inc. 150 Pine Ridge Road Mount Airy, NC 27030
Construction contractor POC	Wayne Taylor 336-341-6489
Survey Contractor	Turner Land Surveying, PLLC PO Box 41023 Raleigh, NC 27629
Survey Contractor POC	David Turner 919-623-5095
Planting Contractor	Keller Environmental, LLC 7921 Haymarket Lane Raleigh, NC 27615
Planting Contractor POC	Jay Keller 919-749-8259
Seeding Contractor	Carolina Environmental Contracting, Inc. 150 Pine Ridge Road Mount Airy, NC 27030
Seeding Contractor POC	Wayne Taylor 336-341-6489
Seed Mix Sources	Green Resources 336-855-6363
Nursery Stock Suppliers	Foggy Mountain Nursery 336-384-5323
Monitoring Performers	Wildlands Engineering, Inc. 1430 South Mint Street, Ste 104 Charlotte, NC 28205 704.332.7754
Monitoring POC	Kirsten Gimbert 704-332-7754

Table 4a. Project Baseline Information and Attributes

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Project Information					
Project Name	Moores Fork Stream Mitigation Project				
County	Surry				
Project Area (acres)	~140				
Project Coordinates (latitude and longitude)	36.506671 N, 80.704115 W				
Project Watershed Summary Information					
Physiographic Province	Piedmont				
River Basin	Yadkin				
USGS Hydrologic Unit 8-digit	03040101				
USGS Hydrologic Unit 14-digit	03040101100010				
DWR Sub-basin	Pee Dee River Subbasin 03-07-02				
Project Drainage Area (acres)	1,527 ac (2.39 mi ²)				
Project Drainage Area Percentage of Impervious Area	<5%				
CGIA Land Use Classification	Cropland and Pasture, Confined Animal Operations				
Reach Summary Information					
Parameters	Moores Fork Reach 1 & 2	Moores Fork Reach 3	Silage	Cow Trib 1	Cow Trib 2
Length of Reach Post Construction (LF)	2,636	2,885	3,348	167	767
Valley classification (Rosgen)	VIII	VIII	II/IV	II	II
Drainage area (acres)	1,193	1,527	156	4	16
NCDWQ stream identification score	35	34.5	23.5	20	23.5
NCDWQ Water Quality Classification	WS-IV	WS-IV	WS-IV	WS-IV	WS-IV
Morphological Description (Rosgen stream type)	C4	C4	G4/C4	G5	G5
Evolutionary trend	C-F	C-F	G-F	G	G
Underlying mapped soils	CsA, FsE	CsA, FsE	FeD2	FeD2	FeD2
Drainage class	well drained	well drained	well drained	well drained	well drained
Soil Hydric status	not hydric	not hydric	not hydric	not hydric	not hydric
Slope	0.008	0.006	0.030	0.056	0.038
FEMA classification	Not in SFHA	Not in SFHA	Not in SFHA	Not in SFHA	Not in SFHA
Native vegetation community	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest
Percent composition of exotic invasive vegetation	0	0	0	0	0
Wetland Summary Information					
Parameters	Wetland 1	Wetland 2	Wetland 3	Wetland 4	
Size of Wetland (acres)	0.49	0.04	0.08	0.15	
Wetland Type	riparian non-riverine	riparian non-riverine	riparian non-riverine	riparian non-riverine	
Mapped Soil Series	FsE	FsE	CsA	FsE & CsA	
Drainage class	well drained	well drained	well drained	well drained	
Soil Hydric Status	not hydric	not hydric	not hydric	not hydric	
Source of Hydrology	UT9 & UT10	UT8	Toe seep	Toe seep	
Hydrologic Impairment	none	none	none	none	
Native vegetation community	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest	
Percent composition of exotic invasive vegetation	0	0	0	0	
Regulatory Considerations					
Regulation	Applicable?	Resolved?	Supporting Documentation		
Waters of the United States – Section 404	Y	Y	USACE ID No. SAW-2011-02257		
Waters of the United States – Section 401	Y	Y	NCDWR # 12-0396		
Endangered Species Act	Y	Y	CE Approved 12/21/11		
Historic Preservation Act	N	N/A	-		
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	N	N/A	-		
FEMA Floodplain Compliance	N	N/A	-		
Essential Fisheries Habitat	N	N/A	-		

N/A Not-applicable

Table 4b. Project Baseline Information and Attributes

Moores Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 5 - 2020

Project Information				
Project Name	Moores Fork Stream Mitigation Project			
County	Surry			
Project Area (acres)	~140			
Project Coordinates (latitude and longitude)	36.506671 N, 80.704115 W			
Project Watershed Summary Information				
Physiographic Province	Piedmont			
River Basin	Yadkin			
USGS Hydrologic Unit 8-digit	03040101			
USGS Hydrologic Unit 14-digit	03040101100010			
DWR Sub-basin	Pee Dee River Subbasin 03-07-02			
Project Drainage Area (acres)	1,527 ac (2.39 mi ²)			
Project Drainage Area Percentage of Impervious Area	<5%			
CGIA Land Use Classification	Cropland and Pasture, Confined Animal Operations			
Reach Summary Information				
Parameters	Pond Trib	Barn Reach 1 & 2	Corn Reach 1 & 2	UT1
Length of Reach Post Construction (LF)	243	3,434	1,452	466
Valley classification (Rosgen)	VIII	IV	IV	IV
Drainage area (acres)	27	184	30	6
NCDWQ stream identification score	20	36.5	21	23
NCDWQ Water Quality Classification	WS-IV	WS-IV	WS-IV	WS-IV
Morphological Description (Rosgen stream type)	B4/5	G4	G4	B4
Evolutionary trend	B-C-F	G-F	G-F	-
Underlying mapped soils	CsA	FeD2, FsE	CsA, FsE	FeD2
Drainage class	well drained	well drained	well drained	well drained
Soil Hydric status	not hydric	not hydric	not hydric	not hydric
Slope	0.029	0.025	0.057	0.040 +/-
FEMA classification	Not in SFHA	Not in SFHA	Not in SFHA	Not in SFHA
Native vegetation community	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest
Percent composition of exotic invasive vegetation	0	0	0	0
Wetland Summary Information				
Parameters	Wetland 5	Wetland 6		
Size of Wetland (acres)	0.03	0.06		
Wetland Type	riparian non-riverine	riparian non-riverine		
Mapped Soil Series	FeD2	FsE & FeD2		
Drainage class	well drained	well drained		
Soil Hydric Status	not hydric	not hydric		
Source of Hydrology	Toe Seep	Toe Seep		
Hydrologic Impairment	none	none		
Native vegetation community	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest		
Percent composition of exotic invasive vegetation	0	0		

N/A Not-applicable

Table 5. Monitoring Component Summary

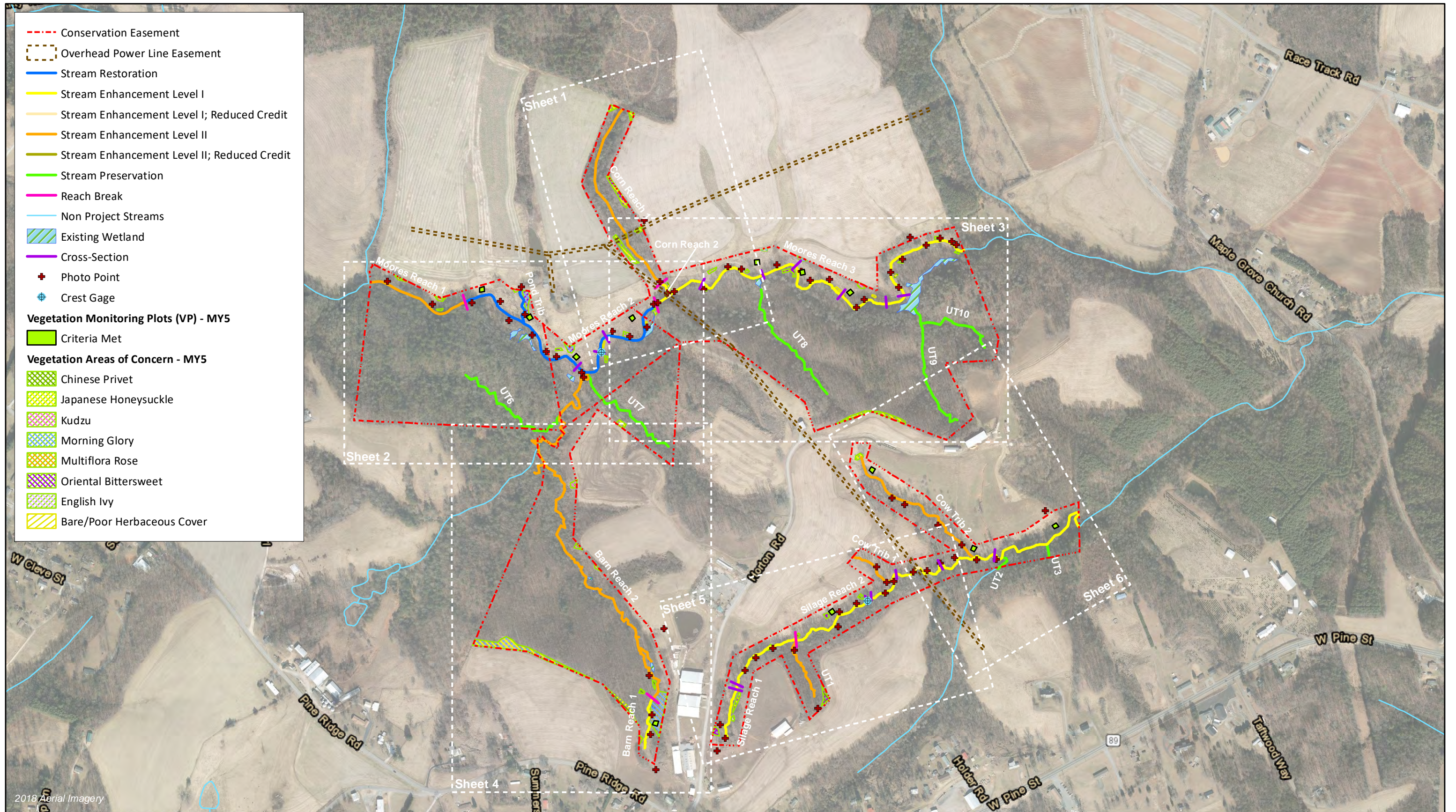
Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Parameter	Monitoring Feature	Quantity/ Length by Reach													Frequency	
		Moores Reach 1	Pond Trib	Moores Reach 2	Corn Reach 1	Corn Reach 2	Moores Reach 3	Silage Reach 1	Silage Reach 2	UT1	Cow Trib 1	Cow Trib 2	Barn 1	Barn 2		
Dimension	Riffle XS			2			4	1	3						Years 1, 2, 3, 5, 7	
	Pool XS			1			2	2	Years 1, 2, 3, 5, 7							
Substrate	100 Pebble Count			2			4	1	3						Annual	
Hydrology	Crest Gage			1											1	Semi-Annual
Vegetation	Vegetation Plots			4			3	1	2							1
Visual Assessment	Project Site	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Semi-Annual	
Reference Photos	Permanent Photo Points	2	2	11	1	2	19	6	12	2	2	4	3	3	Annual	

APPENDIX B. Visual Assessment Data



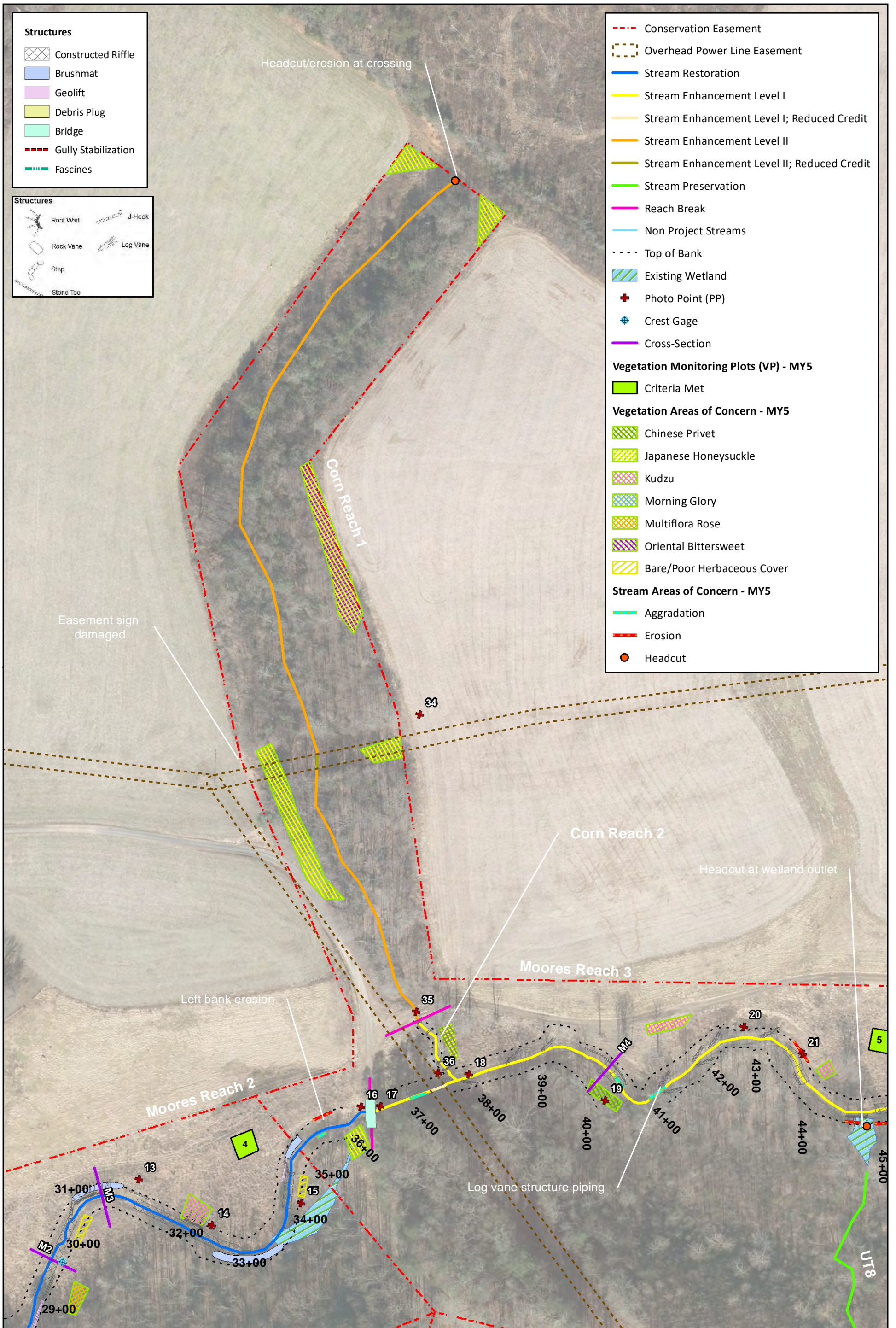
2018 Aerial Imagery

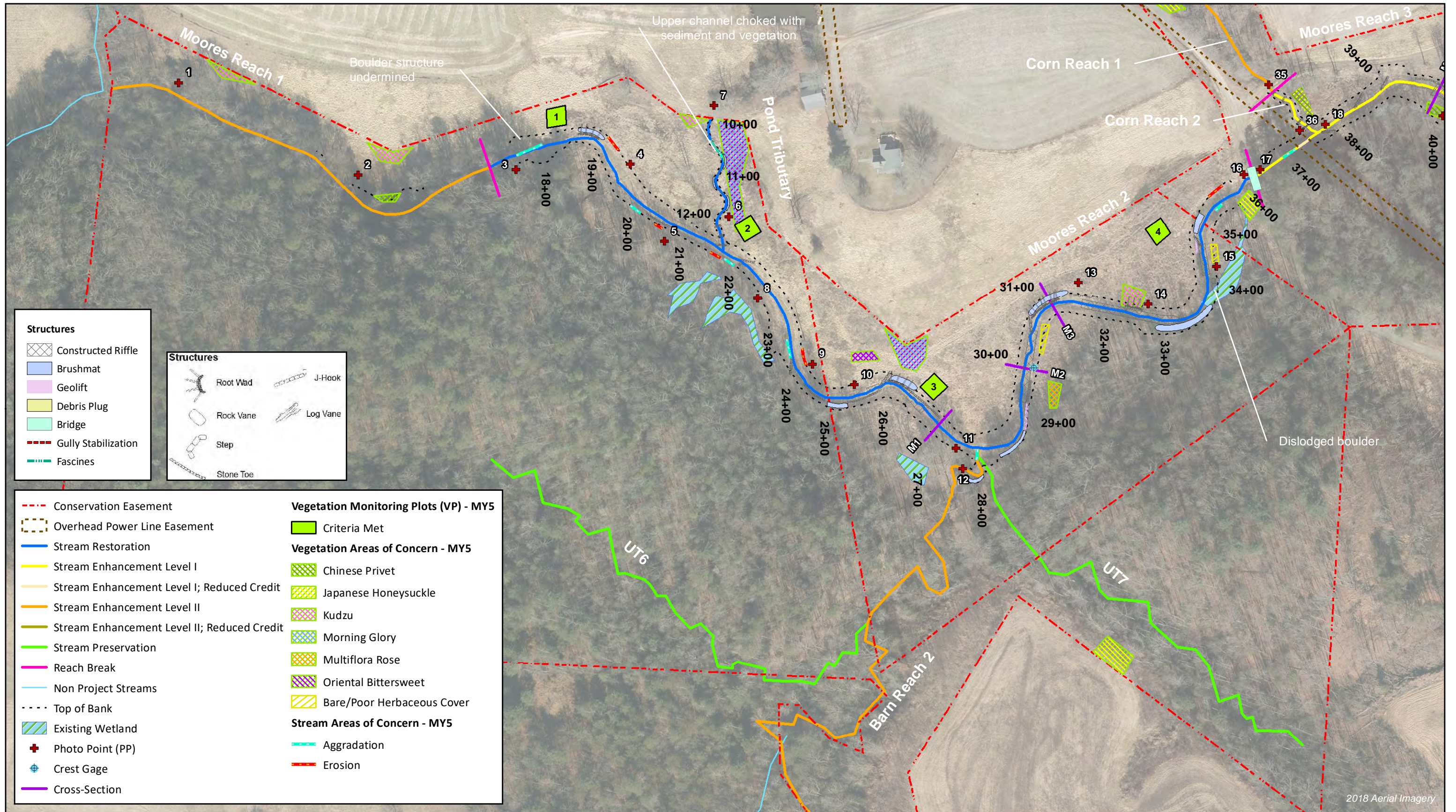


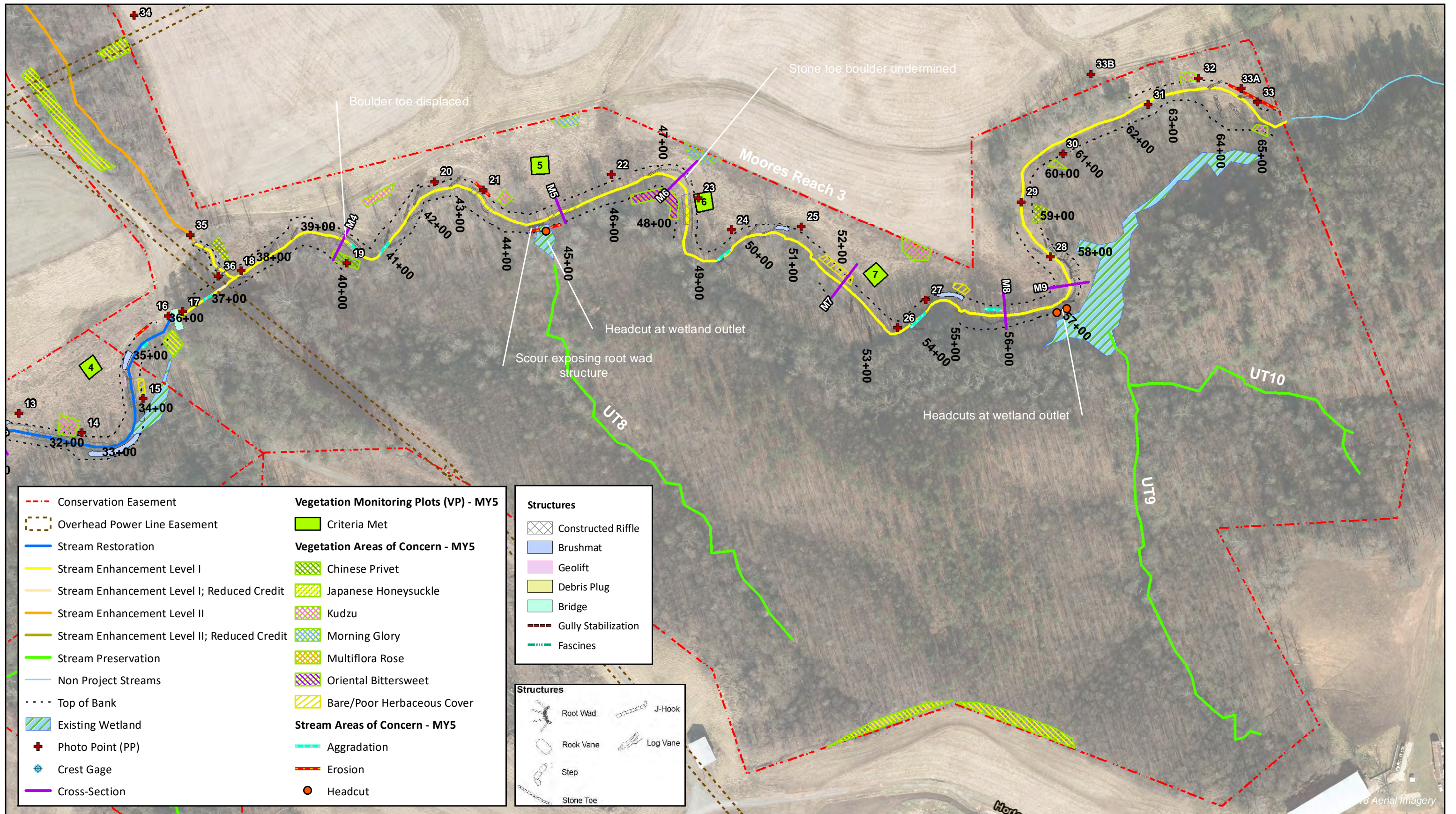
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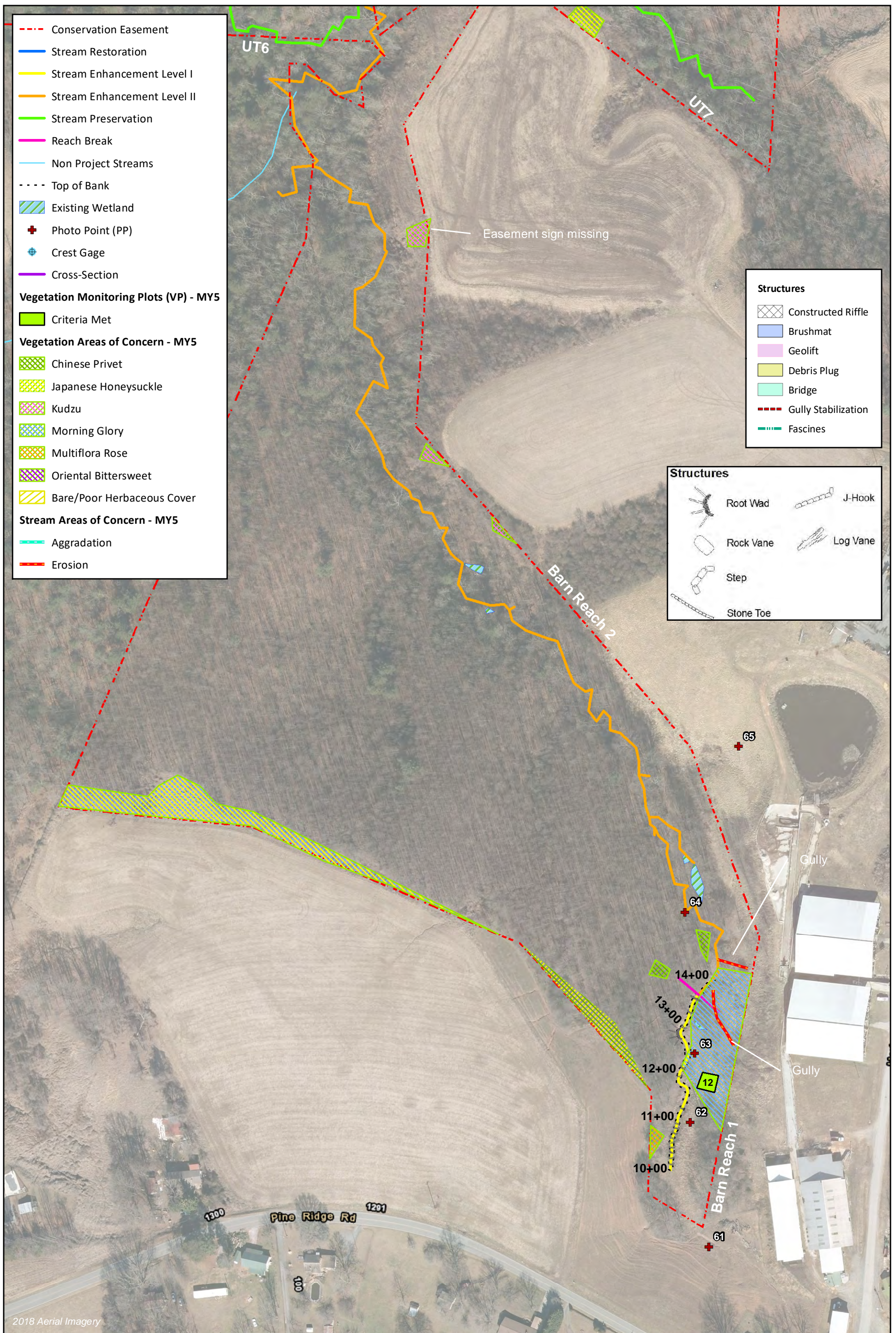


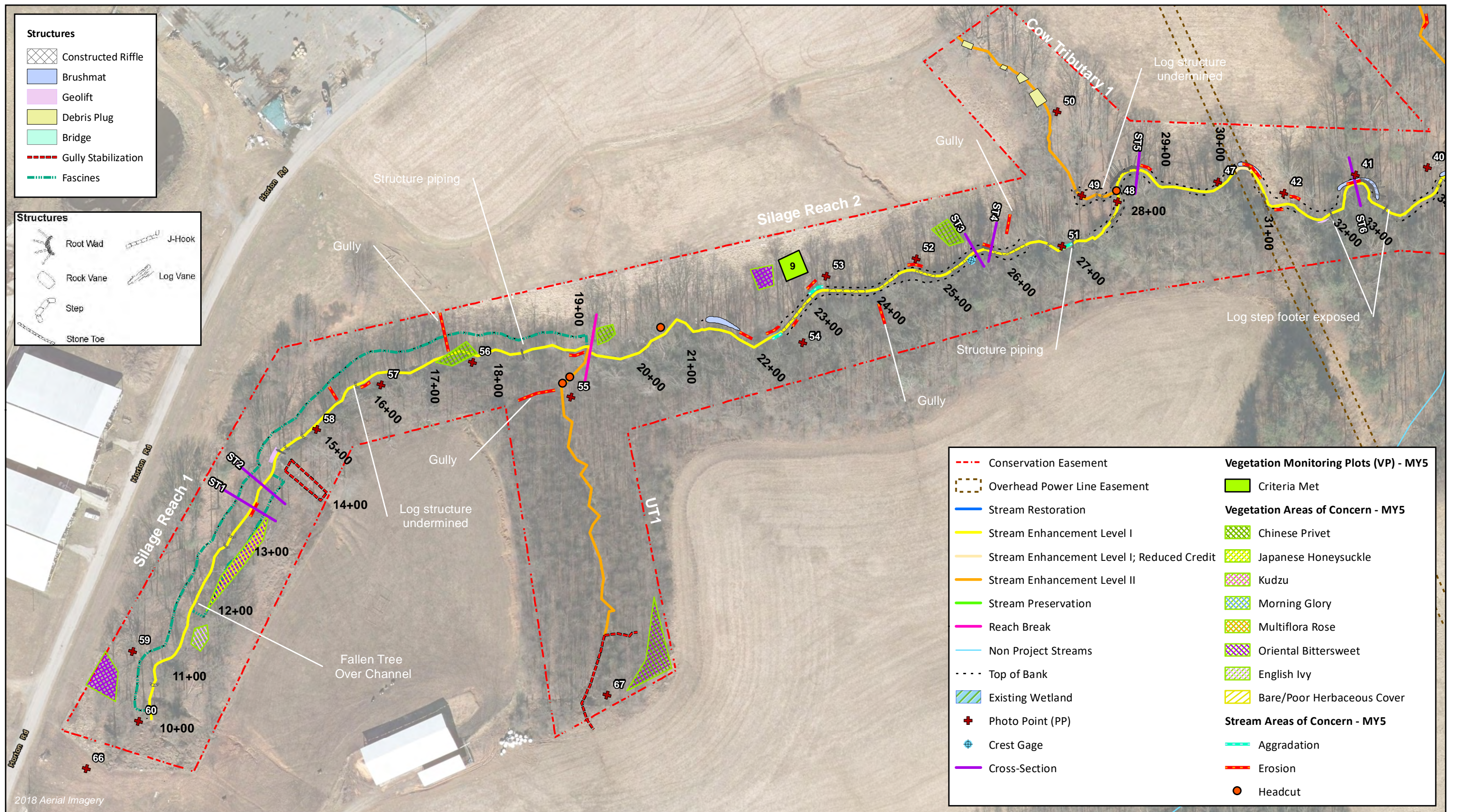
Figure 3.0 Current Condition Plan View (Key)
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 5 - 2020











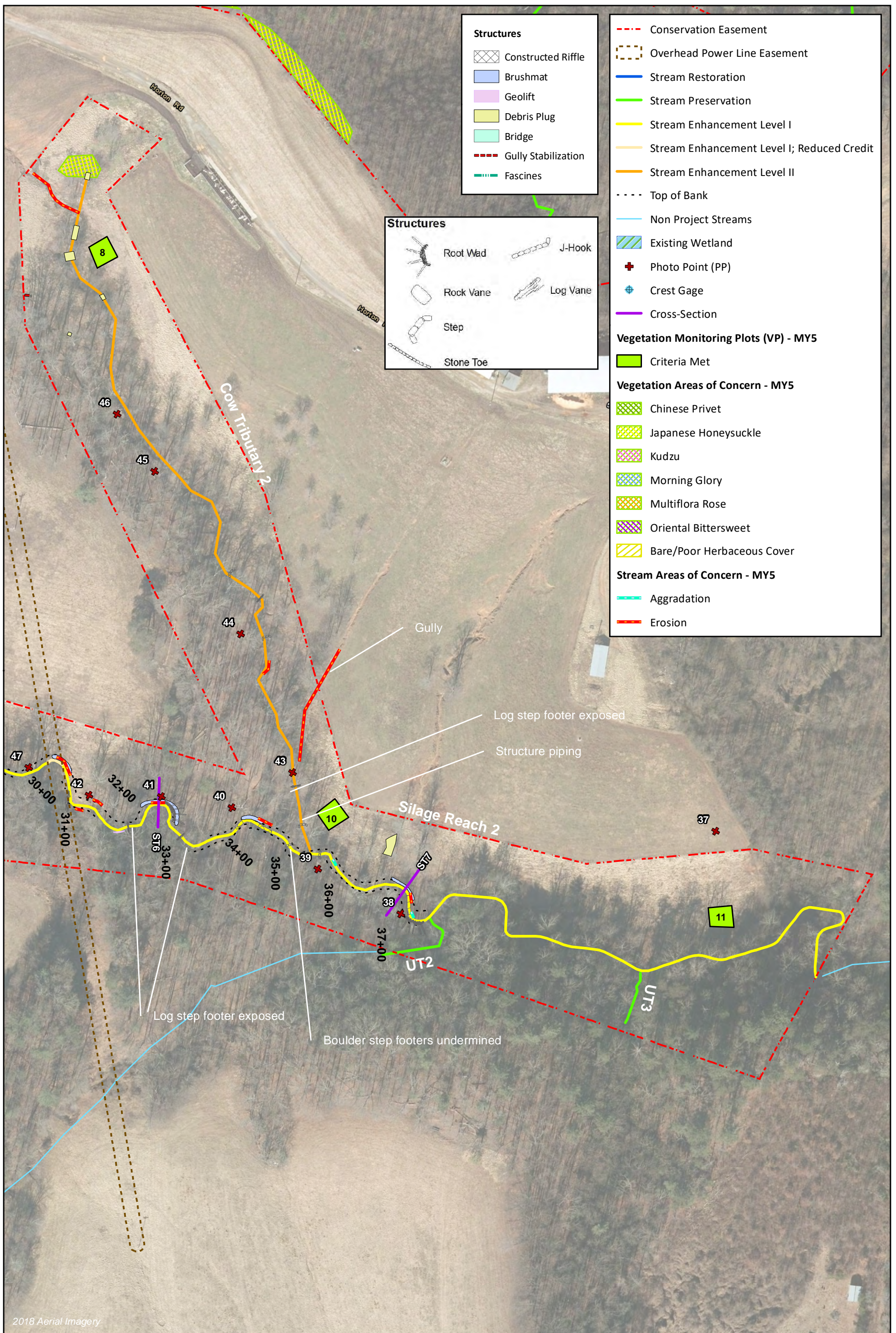


Table 6a. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Moores Fork Reach 1 (Assessed Length : 761 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	4	4		100%				
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	5	5		100%				
		2. <u>Length</u> 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 (Glide)		5	5	100%						
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals					0	0	100%	0	0	100%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	N/A	N/A		N/A				
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A		N/A				
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A		N/A				
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A		N/A				
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A		N/A				

Table 6b. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Moores Fork Reach 2 (Assessed Length : 1875 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			5	136	93%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	8	8			100%			
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	6	7			86%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	6	7			86%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	6	7			86%			
2. Thalweg centering at downstream of meander (Glide)		6	7	86%						
Totals					5	125	97%	2	40	98%
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			4	95	97%	2	40	99%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			1	30	99%	0	0	99%
Totals					5	125	97%	2	40	98%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	14	16			88%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	14	16			88%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	8	9			89%			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	2	2			100%			

Table 6c. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Moores Fork Reach 3 (Assessed Length : 2885 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			6	178	94%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	13	13			100%			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	16	16			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	16	16			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	16	16			100%			
2. Thalweg centering at downstream of meander (Glide)		16	16			100%				
					Totals					
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			4	175	97%	0	0	97%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
					Totals					
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	24	27			89%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	24	27			89%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	17	18			94%			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	2	3			67%			

Table 6d. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Silage Reach 1 (Assessed Length : 900 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	12	12			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	12	12			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	12	12			100%			
2. Thalweg centering at downstream of meander (Glide)		12	12			100%				
					Totals					
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			3	60	97%	0	0	97%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
					Totals					
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	6	8			75%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	6	8			75%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	1	1			100%			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6e. Visual Stream Morphology Stability Assessment Table

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Silage Reach 2 (Assessed Length : 2448 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			6	178	93%				
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%				
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	14	15			93%				
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	13	16			81%				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	13	16			81%				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	13	16			81%				
2. Thalweg centering at downstream of meander (Glide)		13	16			81%					
					Totals	13	240	95%	1	15	95%
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			13	240	95%	1	15	95%	
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%	
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%	
					Totals	13	240	95%	1	15	95%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	12	16			75%				
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	12	16			75%				
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	12	16			75%				
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A				
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	3	4			75%				

Table 6f. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cow Trib 1 (Assessed Length : 167 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	2	2			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	2	2			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	N/A	N/A			N/A			
2. Thalweg centering at downstream of meander (Glide)		N/A	N/A			N/A				
Totals										
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals										
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	12	13			92%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	12	13			92%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	12	13			92%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6g. Visual Stream Morphology Stability Assessment Table

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cow Trib 2 (Assessed Length : 767 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A		N/A				
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	N/A	N/A		N/A				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	N/A	N/A		N/A				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	N/A	N/A		N/A				
2. Thalweg centering at downstream of meander (Glide)		N/A	N/A	N/A						
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	20	99%	0	0	99%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals					1	20	99%	0	0	99%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	22	24		92%				
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	22	24		92%				
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	22	24		92%				
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A		N/A				
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A		N/A				

Table 6h. Visual Stream Morphology Stability Assessment Table

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Pond Trib (Assessed Length : 243 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			1	40	84%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	N/A	N/A			N/A			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	N/A	N/A			N/A			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	N/A	N/A			N/A			
2. Thalweg centering at downstream of meander (Glide)		N/A	N/A	N/A						
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals					0	0	100%	0	0	100%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	7	7			100%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	7	7			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6i. Visual Stream Morphology Stability Assessment Table

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Barn Trib Reach 1 (Assessed Length : 350 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A		N/A				
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	N/A	N/A		N/A				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	N/A	N/A		N/A				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	N/A	N/A		N/A				
2. Thalweg centering at downstream of meander (Glide)		N/A	N/A	N/A						
Totals										
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals										
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	15	15			100%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	15	15			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	15	15			100%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	1	1			100%			

Table 6j. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Corn Trib Reach 2 (Assessed Length : 112 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. <u>Depth Sufficient</u> (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	1	1			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	1	1			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	1	1			100%			
2. Thalweg centering at downstream of meander (Glide)		1	1			100%				
Totals					0	0	100%	0	0	100%
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals					0	0	100%	0	0	100%
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	4	4			100%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	4	4			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	4	4			100%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 7. Visual Stream Morphology Stability Assessment Table

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Planted Acreage 15.4

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Cross Hatch Yellow	4	0.05	0.3%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	N/A	0	0.00	0.0%
Total				4	0.05	0.3%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	N/A	0	0.00	0.0%
Cumulative Total				4	0.05	0.3%

Easement Acreage 140

Vegetation Category	Definitions	Mapping Threshold	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).	1000 SF	Cross Hatch (Color varies by species)	48	2.7	1.9%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	None	N/A	0	0.00	0.0%

Stream Photographs



PP1 – Moores Reach 1, looking upstream (06/18/2020)



PP2 – Moores Reach 1, looking downstream (06/18/2020)



PP3 – Moores Reach 2, looking downstream (06/18/2020)



PP4 – Moores Reach 2, looking downstream (06/18/2020)



PP5 – Moores Reach 2, looking upstream (06/18/2020)



PP6 – Pond Tributary, looking downstream (06/18/2020)



PP7 – Pond Tributary, looking downstream (06/18/2020)



PP8 – Moores Reach 2, looking downstream (06/18/2020)



PP9 – Moores Reach 2, looking downstream (06/18/2020)



PP10 – Moores Reach 2, looking downstream (06/18/2020)



PP11 – Moores Reach 2, looking downstream (06/18/2020)



PP12 – Barn Reach 2, looking upstream (06/18/2020)



PP13 – Moores Reach 2, looking downstream (06/18/2020)



PP14 – Moores Reach 2, looking downstream (06/18/2020)



PP15 – Moores Reach 2, looking downstream (06/18/2020)



PP16 – Moores Reach 2, looking upstream (06/18/2020)



PP17 – Moores Reach 3, looking downstream (06/18/2020)



PP18 – Moores Reach 3, looking downstream (06/18/2020)



PP19 – Moores Reach 3, looking downstream (06/18/2020)



PP20 – Moores Reach 3, looking downstream (06/18/2020)



PP21 – Moores Reach 3, looking downstream (06/18/2020)



PP22 – Moores Reach 3, looking downstream (06/18/2020)



PP23 – Moores Reach 3, looking downstream (06/18/2020)



PP24 – Moores Reach 3, looking downstream (06/18/2020)



PP25 – Moores Reach 3, looking downstream (06/18/2020)



PP26 – Moores Reach 3, looking downstream (06/18/2020)



PP27 – Moores Reach 3, looking downstream (06/18/2020)



PP28 – Moores Reach 3, looking downstream (06/18/2020)



PP29 – Moores Reach 3, looking downstream (06/18/2020)



PP30 – Moores Reach 3, looking downstream (06/18/2020)



PP31 – Moores Reach 3, looking downstream (06/18/2020)



PP32 – Moores Reach 3, looking downstream (06/18/2020)



PP33 – Moores Reach 3, looking downstream (06/18/2020)



PP33a – Moores Reach 3, looking upstream (06/18/2020)



PP33b – Moores Reach 3, looking downstream (06/18/2020)



PP34 – Corn Reach 1, looking downslope (06/18/2020)



PP35 – Corn Reach 2, looking downstream (06/18/2020)



PP36 – Corn Reach 2, looking upstream (06/18/2020)



PP37 – Silage Reach 2, looking downslope (06/18/2020)



PP38 – Silage Reach 2, looking downstream (06/18/2020)



PP39 – Silage Reach 2, looking upstream (06/18/2020)



PP40 – Silage Reach 2, looking downstream (06/18/2020)



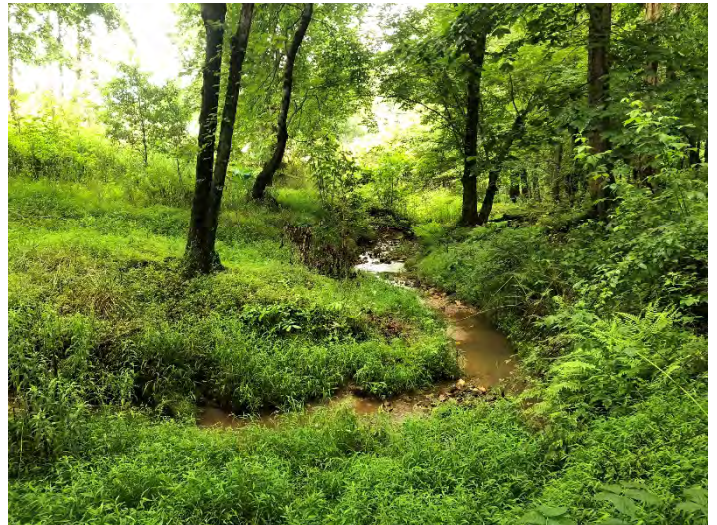
PP41 – Silage Reach 2, looking downstream (06/18/2020)



PP42 – Silage Reach 2, looking downstream (06/18/2020)



PP43 – Cow Tributary 2, looking downstream (06/18/2020)



PP44 – Cow Tributary 2, looking downstream (06/18/2020)



PP45 – Cow Tributary 2, looking downstream (06/18/2020)



PP46 – Cow Tributary 2, looking upstream (06/18/2020)



PP47 – Silage Reach 2, looking downstream (06/18/2020)



PP48 – Silage Reach 2, looking upstream (06/18/2020)



PP49 – Cow Tributary 1, looking upstream (06/18/2020)



PP50 – Cow Tributary 1, looking upstream (06/18/2020)



PP51 – Silage Reach 2, looking downstream (06/18/2020)



PP52 – Silage Reach 2, looking upstream (06/18/2020)



PP53 – Silage Reach 2, looking downstream (06/18/2020)



PP54 – Silage Reach 2, looking upstream (06/18/2020)



PP55 – UT1, looking upstream (06/18/2020)



PP56 – Silage Reach 1, looking downstream (9/9/2020)



PP57 – Silage Reach 1, looking upstream (06/18/2020)



PP58 – Silage Reach 1, looking upstream (06/18/2020)



PP59 – Silage Reach 1, looking downstream (06/18/2020)



PP60 – Silage Reach 1, looking downstream (06/18/2020)



PP61 – Barn Reach 1, looking downslope (06/18/2020)



PP62 – Barn Reach 1, looking downstream (06/18/2020)



PP63 – Barn Reach 1, looking downstream (06/18/2020)



PP64 – Barn Reach 2, looking downstream (06/18/2020)



PP65 – Barn Reach 2, looking downslope (06/18/2020)



PP66 – Silage Reach 1, looking upslope (06/18/2020)



PP67 – UT1, looking downstream (9/9/2020)

Vegetation Photographs



Vegetation Plot 1 – (8/12/2020)



Vegetation Plot 2 – (8/12/2020)



Vegetation Plot 3 – (8/12/2020)



Vegetation Plot 4 – (8/12/2020)



Vegetation Plot 5 – (8/12/2020)



Vegetation Plot 6 – (8/12/2020)



Vegetation Plot 7 – (8/12/2020)



Vegetation Plot 8 – (8/13/2020)



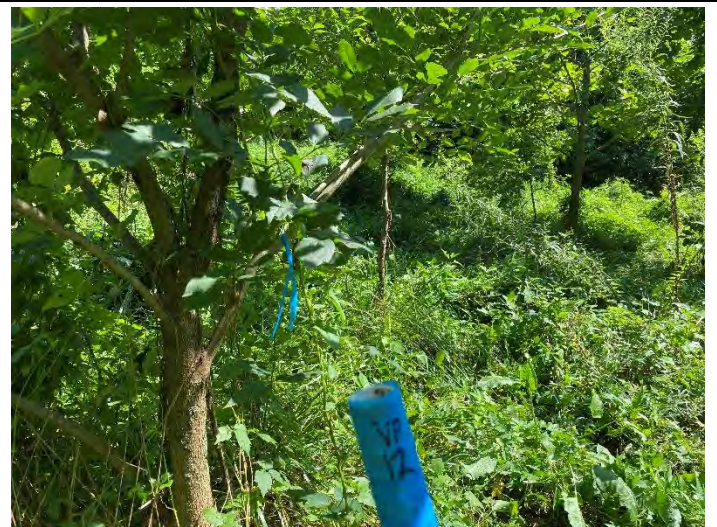
Vegetation Plot 9 – (8/13/2020)



Vegetation Plot 10 – (8/12/2020)



Vegetation Plot 11 – (8/13/2020)



Vegetation Plot 12 – (8/11/2020)

APPENDIX C. Vegetation Plot Data

Table 8. Vegetation Plot Criteria Attainment

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 5 - 2020

Plot	MY4 Success Criteria Met (Y/N)	Tract Mean
1	Y	100%
2	Y	
3	Y	
4	Y	
5	Y	
6	Y	
7	Y	
8	Y	
9	Y	
10	Y	
11	Y	
12	Y	

Table 9. CVS Vegetation Plot Metadata

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 5 - 2020

Database Name	cvs-eep-entrytool-v2.5.0 Moores MY5.mdb
Database Location	L:\Active Projects\005-02153 Moores Monitoring\Monitoring\Monitoring Year 5 (2020)\Vegetation Assessment
Computer Name	MIMI-PC
File Size	53542912
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	94709
Project Name	Moore's Fork Stream Mitigation
Description	
River Basin	
Length(ft)	
Stream-to-edge Width (ft)	
Area (sq m)	
Required Plots (calculated)	
Sampled Plots	12
Required Plots (calculated)	12
Sampled Plots	12

Table 10. Planted and Total Stem Counts

Moore's Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 5 - 2020

Scientific Name	Common Name	Species Type	Current Plot Data (MY5 2020)																											
			94709-01-0001			94709-01-0002			94709-01-0003			94709-01-0004			94709-01-0005			94709-01-0006			94709-01-0007			94709-01-0008			94709-01-0009			
			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	
<i>Acer rubrum</i>	Red Maple	Tree																												
<i>Betula nigra</i>	River Birch, Red Birch	Tree									1	1	1			3			1											
<i>Cercis canadensis</i>	Redbud	Shrub Tree							1	1	1												1	1	3					
<i>Cornus florida</i>	Flowering dogwood	Tree																												
<i>Diospyros virginiana</i>	American Persimmon	Tree	3	3	3	1	1	1										1	1	1							1	1	2	
<i>Fraxinus pennsylvanica</i>	Green Ash, Red Ash	Tree									8	8	8	2	2	2	1	1	1	4	4	5								
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree							3	3	3						1	1	1				1	1	1			2		
<i>Nyssa sylvatica</i>	Black Gum	Tree															2	2	2	2	2	2	2	2	2	2	1	1	1	
<i>Platanus occidentalis</i>	Sycamore	Tree							1	1	1	4	4	4	9	9	9	2	2	2	7	7	7							
<i>Prunus serotina</i>	Black Cherry	Tree																								2				
<i>Pyrus calleryana</i>	Bradford Pear	Tree																												
<i>Quercus lyrata</i>	Overcup Oak	Tree	6	6	6	4	4	4				2	2	2											4	4	4	6	6	6
<i>Quercus montana</i>	Rock Chestnut Oak	Tree				1	1	1	1	1	1						1	1	1								1	1	1	
<i>Quercus nigra</i>	Water Oak	Tree	3	3	3	1	1	1				1	1	1	1	1	1							1	1	1	6	6	6	
<i>Quercus phellos</i>	Willow Oak	Tree										1	1	1	2	2	2										1	1	1	
<i>Quercus rubra</i>	Northern Red Oak	Tree							1	1	1																	1		
<i>Rhus copallinum</i>	Winged Sumac	Shrub Tree																									1			
<i>Rhus glabra</i>	Smooth Sumac	Shrub Tree																												
	Stem count		12	12	12	7	7	7	7	7	7	17	17	17	14	14	17	11	11	12	13	13	14	9	9	14	16	16	20	
	size (ares)		1			1			1			1			1			1			1			1			1			
	size (ACRES)		0.025			0.025			0.025			0.025			0.025			0.025			0.025			0.025			0.025			
	Species count		3	3	3	4	4	4	5	5	5	6	6	6	4	4	5	7	7	8	3	3	3	5	5	7	6	6	8	
	Stems per ACRE		486	486	486	283	283	283	283	283	283	688	688	688	567	567	688	445	445	486	526	526	567	364	364	567	647	647	809	

Scientific Name	Common Name	Species Type	Annual Stem Counts & Means																										
			Current Plot Data (MY5 2020)									Annual Stem Counts & Means																	
			94709-01-0010			94709-01-0011			94709-01-0012			MY5 (2020)			MY4 (2019)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)		
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
<i>Acer rubrum</i>	Red Maple	Tree			140																								
<i>Betula nigra</i>	River Birch, Red Birch	Tree										1	1	5	1	1	3			1	1	1	3					2	
<i>Cercis canadensis</i>	Redbud	Shrub Tree										2	2	4						1									
<i>Cornus florida</i>	Flowering dogwood	Tree			2									2															
<i>Diospyros virginiana</i>	American Persimmon	Tree	4	4	4	1	1	1	7	7	7	18	18	19	17	17	18	17	17	21	16	16	17	14	14	14	14	14	14
<i>Fraxinus pennsylvanica</i>	Green Ash, Red Ash	Tree							2	2	2	17	17	18	15	15	15	15	15	17	15	15	16	13	13	13	14	14	14
<i>Liriodendron tulipifera</i>	Tulip Poplar	Tree			48							5	5	55	4	4	41	4	4	48	4	4	70	4	4	8	4	4	4
<i>Nyssa sylvatica</i>	Black Gum	Tree	4	4	4	5	5	5				16	16	16	16	16	16	16	16	17	17	17	20	20	20	20	19	19	19
<i>Platanus occidentalis</i>	Sycamore	Tree							1	1	1	24	24	24	24	24	24	23	23	23	24	24	24	25	25	26	26	26	26
<i>Prunus serotina</i>	Black Cherry	Tree																											
<i>Pyrus calleryana</i>	Bradford Pear	Tree																											
<i>Quercus lyrata</i>	Overcup Oak	Tree				3	3	3	1	1	1	29	29	29	29	29	29	28	28	28	30	30	30	28	28	28	29	29	29
<i>Quercus montana</i>	Rock Chestnut Oak	Tree				5	5	5				9	9	9	11	11	11	14	14	14	14	14	14	21	21	21	22	22	22
<i>Quercus nigra</i>	Water Oak	Tree	3	3	3							16	16	16	15	15	15	15	15	15	15	15	17	14	14	14	14	14	14
<i>Quercus phellos</i>	Willow Oak	Tree										4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	7	7	7
<i>Quercus rubra</i>	Northern Red Oak	Tree										1	1	2															
<i>Rhus copallinum</i>	Winged Sumac	Shrub Tree																											
<i>Rhus glabra</i>	Smooth Sumac	Shrub Tree																											
	Stem count		11	11	201	14	14	18	11	11	11	142	142	350	136	136	191	136	136	213	140	140	221	146	146	154	149	149	149
	size (ares)		1			1			1			12			12			12			12			12			12		
	size (ACRES)		0.025			0.025			0.025			0.297			0.297			0.297			0.297			0.297			0.297		
	Species count		3	3	6	4	4	5	4	4	4	12	12	16	10	10	14	9	9	13	10	10	12	9	9	11	9	9	9
	Stems per ACRE		445	445	8134	567	567	728	445	445	445	479	479	1180	459	459	644	459	459	718	472	472	745	492	492	519	502	502	502

Color for Density

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total stems

APPENDIX D. Morphological Summary Data and Plots

Table 11a. Baseline Stream Data Summary

Moore's Fork Stream Mitigation Project
 DMS Project No.94709
 Monitoring Year 5 - 2020

Moore's Fork Reach 1, Reach 2, & Reach 3; Silage Reach 1 & Reach 2

Parameter	Gage	PRE-RESTORATION CONDITION								REFERENCE REACH DATA		DESIGN								AS-BUILT/BASELINE							
		Moore's Fork Reaches 1/2		Moore's Fork Reach 3		Silage Reach 1		Silage Reach 2		Mill Branch		Moore's Fork Reaches 1/2		Moore's Fork Reach 3		Silage Reach 1		Silage Reach 2		Moore's Fork Reaches 1/2		Moore's Fork Reach 3		Silage Reach 1		Silage Reach 2	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																											
Bankfull Width (ft)	N/A	27.3	30.6	24.9	34.2	6.7	6.9	18.2	27.2	33.6	36.5	37.0	8.8	12.5	31.8	33.2	30.2	52.2	4.2	10.6	14.6						
Floodprone Width (ft)		109.0	137.7	104.0	125.0	11	16.0	100.0	72.1	72.5	145	124	19	28	145	124	9.4	23	30								
Bankfull Mean Depth		1.7	2.6	2.3	2.9	0.8	1.2	1.7	1.9	2.2	2.2	2.3	0.6	1.00	2.1	2.2	1.9	2.6	0.7	0.6	0.8						
Bankfull Max Depth		3.0	3.4	4.0	1.2	1.7	2.3	2.4	2.7	3.5	3.6	0.8	1.50	3.3	3.5	3.3	4.1	1.2	1.3	1.5							
Bankfull Cross-sectional Area (ft ²)		46.9	78.2	73.3	77.6	5.6	8.4	31.6	50.8	72.4	82.1	85.3	5.1	13.1	67.2	74.1	72.5	101.1	2.8	6.9	9.3						
Width/Depth Ratio		12.0	15.9	8.4	15.1	5.7	8.0	10.5	14.5	15.6	16.2	16.0	15.1	11.9	14.9	15	12.5	26.9	6.4	16.2	22.7						
Entrenchment Ratio		4.0	4.5	3.7	4.2	1.6	2.3	5.5	2.7	5.0	4.0	2.2	2.2	4.4	4.6	2.5	4.1	4.5	1.3	2.6							
Bank Height Ratio		1.2	1.4	1.2	1.9	1.0	1.6	3.1	1.0	1.1	1.0	1.0	1.0	1.0	1.5	1.0	1.0	1.0	1.0								
D50 (mm)			29	30	4	23	20	29	30	4	23	11	25	13	28	16	6	14									
Riffle Length (ft)	N/A	---	---	---	---	---	---	50	70	10	195	---	16	63	32	178	26.0	199.0	---	13.12	55.95						
Riffle Slope (ft/ft)		---	---	---	---	---	---	0.0059	0.0180	0.0038	0.02	---	0.0492	0.0514	0.0045	0.0158	0.0027	0.0180	---	0.0017	0.0554						
Pool Length (ft)		---	---	---	---	---	---	42	140	40	112	---	15	35	63	170	81.0	139.0	---	10	19						
Pool Max Depth (ft)		---	---	---	---	---	---	---	5.0	5.5	---	---	---	---	3.0	6.0	4.3	8.5	1.2	1.4	2.4						
Pool Spacing (ft)		---	---	---	---	---	---	---	130	270	78	334	20	23	15	75	118	295	106	325	13.3	171.5	21	79			
Pattern																											
Channel Beltwidth (ft)	N/A	52	161	43	208	---	---	86	55	165	53	267	---	---	7	84	8	59	7	36	8	59					
Radius of Curvature (ft)		65.8	102.7	41	94	---	---	19.6	25.8	53	124	58	74	---	---	25	58	13	24	9	25	13	24				
Rc:Bankfull Width (ft/ft)		2.4	3.4	1.7	2.8	---	---	0.7	0.9	2.0	6.0	1.7	4.0	---	---	0.8	1.8	0.4	0.8	2.1	6.0	1.2	2.3				
Meander Length (ft)		N/A	N/A	N/A	---	---	---	N/A	N/A	N/A	N/A	---	---	---	---	123	210	63	158	61	100	63	158				
Meander Width Ratio		1.9	5.3	1.7	6.1	---	---	3.2	1.9	5.7	1.7	8.6	---	---	3.9	6.6	2.1	5.2	14.5	23.8	5.9	14.9					
Substrate, Bed and Transport Parameters																											
Ri%/Ru%/P%/G%/S%	N/A																										
SC%/Sa%/G%/C%/B%/Be%																											
d50/d84/d95		28/67/89 and 29/43/56	---	---	40/89/133	---	---	---	---	25/58/90 and 11/38/110	8; 28/62/150; 13/28/51; 2	16/35/61	9.8/37/64 and 6/31/72														
Max part size (mm) mobilized at bankfull																											
Stream Power (Capacity) W/m ²																											
Additional Reach Parameters																											
Drainage Area (SM)	N/A	1.9	2.39	0.070	0.24	5	1.90	2.34	0.070	0.24	1.90	2.34	0.070	0.24	1.90	2.34	0.070	0.24									
Watershed Impervious Cover Estimate (%)		<5%	<5%	<5%	<5%	---	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%								
Rosgen Classification		C4	C4	G4/B4	E4	C4	C4	B4	E4	C4	C4	B4	E4	C4	C4	B4	E4										
Bankfull Velocity (fps)		4.1	5.3	4.6	5.2	5.4	6.6	6.3	5.0	5.5	5.0	4.9	4.5	4.5	4.4	4.6	4.2	5.1	5.0	4.5	5.1						
Bankfull Discharge (cfs)		193.9	411.4	380.1	358.4	30.2	55.1	197.5	N/A	250-260	260	24	60	297.6	340.8	348.4	468.7	13.8	31.2	44.3							
Q-USGS NC HR1 (2-yr)		237-278	278	29	63	385	237-278	278	29	63	237-278	278	29	63	237-278	278	29	63									
Valley Length (ft)		2227	2234	1079	1200	4730	2227	2234	1079	1200	2227	2234	1079	1200	2227	2234	1079	1200									
Channel Thalweg Length (ft)		2393	2847	1198	1441	2847	1198	1441	2847	1198	1441	2847	1198	1441	2847	1198	1441	2847									
Sinuosity		1.07	1.27	1.11	1.20	1.26	1.16	1.26	1.11	1.20	1.2	1.11	1.20	1.2	1.11	1.20	1.2	1.11									
Water Surface Slope (ft/ft) ²		0.0077	0.0067	0.0357	0.0294	0.0101	0.0076	0.0064	0.0357	0.0294	0.005541	0.005511	0.0389	0.02758													
Bankfull Slope (ft/ft)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

(---): Data was not provided

N/A: Not Applicable

Table 11b. Baseline Stream Data Summary

Moore's Fork Stream Mitigation Project

DMS Project No.94709

Monitoring Year 5 - 2020

Barn Trib, Corn Trib, Pond Trib

Parameter	Gage	PRE-RESTORATION CONDITION						REFERENCE REACH DATA				DESIGN						AS-BUILT/BASELINE						
		Barn		Corn		Pond		Barn Trib Pres Rch		Corn Trib Pres Rch		Barn (Reach 1)		Corn		Pond		Barn (Reach 1)		Corn (Reach 2)		Pond		
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Dimension and Substrate - Riffle																								
Bankfull Width (ft)	N/A	1.6	4.6	16.3	7.0	4.1	6.0	6.6	8.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Floodprone Width (ft)		4.0	7.8	50.0	9.9	13.7	19	20	25	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Bankfull Mean Depth		0.6	0.5	1.5	0.7	0.4	0.5	0.4	0.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Bankfull Max Depth		0.8	0.7	2.6	1.1	0.5	0.8	0.6	1.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Bankfull Cross-sectional Area (ft ²)		0.9	2.4	24.4	4.6	1.5	3.2	2.9	5.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Width/Depth Ratio		2.9	8.9	10.9	10.6	11.2	11.3	15.1	11.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Entrenchment Ratio		2.5	1.7	3.1	1.4	3.3	3.2	3.0	3.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Bank Height Ratio		7.6	3.8	1.1	1.6	1.7	1.0	1.0	1.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
D50 (mm)		---	---	---	46	46	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Riffle Length (ft)		N/A	---	---	---	---	---	---	---	5	31	---	---	---	---	---	---	12.0	8.4	27.3	---	---	---	
Riffle Slope (ft/ft)	---		---	---	---	---	---	---	0.02	0.0538	---	---	---	---	---	---	0.0498	0.0136	0.0241	---	---	---		
Pool Length (ft)	---		---	---	---	---	---	---	8	13	---	---	---	---	---	---	17.5	32.9	27.8	37.9	---	---		
Pool Max Depth (ft)	---		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.6	3.6	0.7	1.4	---	---	
Pool Spacing (ft)	---		---	---	---	---	---	---	8	10	---	---	---	---	---	---	15	54	6.11	77.7	9	56	22	43
Pool Volume (ft ³)	---		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Pattern																								
Channel Beltwidth (ft)	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	13	26	20	22	24	24		
Radius of Curvature (ft)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	12	30	12	29	15	21		
Rc:Bankfull Width (ft/ft)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Meander Length (ft)		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	71	85	49	61	66	78	
Meander Width Ratio		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Substrate, Bed and Transport Parameters																								
Ri%/Ru%/P%/G%/S%	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
SC%/Sa%/G%/C%/B%/Be%		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
d50/d84/d95		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Max part size (mm) mobilized at bankfull		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Stream Power (Capacity) W/m ²		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Additional Reach Parameters																								
Drainage Area (SM)	N/A	0.01	0.05	0.04	0.08	0.05	0.01	0.05	0.040	0.01	0.05	0.040	0.01	0.05	0.040	0.01	0.05	0.040	0.01	0.05	0.040	0.01		
Watershed Impervious Cover Estimate (%)		<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	
Rosgen Classification		G4	G4	C4b (trampled)	B4	E4b	E4b	B4	C4b	E4b	B4	C4b	E4b	B4	C4b	E4b	B4	C4b	E4b	B4	C4b	E4b	B4	
Bankfull Velocity (fps)		2.70	5.01	7.4	3.84	2.7	3.31	4.7	3.93	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Bankfull Discharge (cfs)		2.5	12.0	181.4	17.7	4.0	11	---	19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Q-USGS NC HR1 (2-yr)		8	---	20	---	---	---	---	20	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Q-Mannings		11	---	19	---	---	---	---	19	---	---	---	---	---	---	---	---	11	---	---	---	---	19	
Valley Length (ft)		622	84	187	622	---	330	84	187	330	84	187	330	84	187	330	84	187	330	84	187	330	84	
Channel Thalweg Length (ft)		250	97	194	84	28	350	97	243	350	97	243	350	97	243	350	97	112	112	112	112	112	112	
Sinuosity		0.40	1.15	1.04	0.14	---	1.06	1.15	1.30	1.06	1.15	1.30	1.06	1.15	1.30	1.06	1.15	1.30	1.06	1.15	1.30	1.06	1.15	
Water Surface Slope (ft/ft) ²		0.0206	0.0567	0.029	0.0211	0.0243	0.0206	0.0567	0.0176	0.0478	0.1124	0.0425	0.0118	0.0478	0.1124	0.0425	0.0118	0.0478	0.1124	0.0425	0.0118	0.0478	0.1124	
Bankfull Slope (ft/ft)		---	---	---	---	---	---	---	---	0.0463	0.1005	0.0478	0.0129	0.0463	0.1005	0.0478	0.0129	0.0463	0.1005	0.0478	0.0129	0.0463	0.1005	

(---): Data was not provided

N/A: Not Applicable

Table 12a. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)

Moore's Fork Stream Mitigation Project

DMS Project No.94709

Monitoring Year 5 - 2020

Moore's Fork

Dimension and Substrate	Cross-Section M1 (Riffle)								Cross-Section M2 (Riffle)								Cross-Section M3 (Pool)							
	Base	MY1	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base	MY1	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base ¹	MY1 ¹	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7
bankfull elevation (ft)	1150.4	1150.4	1150.4	1150.5		1150.7			1148.7	1148.7	1148.7	1149.1		1149.3			1148.4	1148.4	1148.4	1148.4		1149.0		
low bank elevation (ft)	1150.4	1150.5	1150.4	1150.3		1150.4			1148.7	1148.7	1148.6	1148.8		1149.4			1148.4	1148.3	1148.4	1148.4		1149.0		
Bankfull Width (ft)	33.2	34.2	34.1	36.0		32.4			31.8	32.5	32.5	38.5		33.8			39.1	39.3	38.9	38.0		40.4		
Floodprone Width (ft)	145.0	145.0	145.0	145.0		145.0			145.0	145.0	145.0	145.0		145.0			---	---	---	---		---		
Bankfull Mean Depth (ft)	2.2	2.2	2.1	2.1		2.0			2.1	2.0	1.9	1.7		2.1			2.3	2.3	2.3	2.2		2.4		
Bankfull Max Depth (ft)	3.3	3.2	3.4	3.5		3.3			3.5	3.4	3.4	3.7		4.0			5.2	5.1	5.2	5.1		5.5		
Bankfull Cross-Sectional Area (ft ²)	74.1	74.3	71.9	74.1		65.3			67.2	65.6	62.0	67.2		70.5			91.8	90.1	87.8	81.8		95.5		
Bankfull Width/Depth Ratio	14.9	15.7	16.1	17.5		16.0			15.0	16.1	17.0	22.1		16.2			16.6	17.2	17.2	17.6		17.1		
Bankfull Entrenchment Ratio	4.4	4.2	4.3	4.0		4.5			4.6	4.5	4.5	3.8		4.3			---	---	---	---		---		
Bankfull Bank Height Ratio	1.0	1.0	1.0	<1.0		<1.0			1.0	1.0	1.0	<1.0		1.0			---	---	---	---		---		
Dimension and Substrate	Cross-Section M4 (Riffle)								Cross-Section M5 (Riffle)								Cross-Section M6 (Pool)							
	Base	MY1	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base ¹	MY1	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base ¹	MY1	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7
bankfull elevation (ft)	1142.3	1142.3	1142.3	1142.5		1142.5			1139.5	1139.5	1139.5	1139.5		1139.5			1138.6	1138.6	1138.6	1138.7		1138.3		
low bank elevation (ft)	1142.3	1141.6	1141.6	1142.2		1142.3			1139.5	1139.4	1139.7	1139.7		1139.9			1138.6	1138.5	1138.5	1138.7		1138.3		
Bankfull Width (ft)	52.2	51.6	52.3	52.3		52.4			32.0	31.6	32.6	32.7		34.7			39.3	39.1	39.3	48.1		39.9		
Floodprone Width (ft)	124.0	124.0	124.0	124.0		124.0			124.0	124.0	124.0	124.0		124.0			---	---	---	---		---		
Bankfull Mean Depth (ft)	1.9	1.9	1.8	1.6		1.7			2.3	2.3	2.2	2.2		2.5			2.7	2.7	2.9	2.4		2.7		
Bankfull Max Depth (ft)	3.3	3.2	3.7	3.2		4.0			3.5	3.6	3.6	3.8		4.4			5.1	5.5	5.2	5.2		5.8		
Bankfull Cross-Sectional Area (ft ²)	101.1	97.4	95.8	83.8		89.9			73.0	72.4	72.8	73.0		84.7			106.1	106.2	115.6	116.7		107.7		
Bankfull Width/Depth Ratio	26.9	27.3	28.6	32.7		30.5			14.0	13.8	14.6	14.6		14.1			14.5	14.4	13.3	19.8		14.8		
Bankfull Entrenchment Ratio	2.4	2.4	2.4	2.4		2.4			3.9	3.9	4.1	3.8		3.6			---	---	---	---		---		
Bankfull Bank Height Ratio	1.0	<1.0	<1.0	<1.0		<1.0			1.0	1.0	1.1	1.0		1.1			---	---	---	---		---		
Dimension and Substrate	Cross-Section M7 (Run)								Cross-Section M8 (Riffle)								Cross-Section M9 (Pool)							
	Base ¹	MY1	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base	MY1 ¹	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base ¹	MY1 ¹	MY2 ¹	MY3 ²	MY4 ³	MY5	MY6	MY7
bankfull elevation (ft)	1134.9	1134.9	1134.9	1135.0		1135.1			1132.4	1132.4	1132.4	1132.4		1132.5			1132.1	1132.1	1132.1	1132.1		1132.2		
low bank elevation (ft)	1134.9	1134.9	1135.0	1134.8		1134.9			1132.4	1132.3	1132.3	1132.2		1132.6			1132.1	1132.1	1132.1	1132.1		1132.2		
Bankfull Width (ft)	49.5	49.2	49.6	51.0		48.5			34.6	34.0	33.5	36.5		35.9			52.0	53.7	54.3	57.9		55.0		
Floodprone Width (ft)	124.0	124.0	124.0	124.0		124.0			124.0	124.0	124.0	124.0		124.0			---	---	---	---		---		
Bankfull Mean Depth (ft)	2.4	2.4	2.4	2.3		2.2			2.6	2.7	2.7	2.5		2.7			2.8	2.8	2.7	2.5		2.4		
Bankfull Max Depth (ft)	3.5	3.5	3.8	4.0		3.7			4.1	4.3	4.2	4.3		4.9			6.3	6.3	6.5	6.2		6.6		
Bankfull Cross-Sectional Area (ft ²)	118.1	117.0	117.7	118.1		105.4			91.5	91.5	89.2	91.5		96.6			146.3	149.5	146.1	146.1		133.3		
Bankfull Width/Depth Ratio	20.7	20.7	20.9	22.0		22.3			13.1	12.6	12.6	14.6		13.3			18.5	19.3	20.1	23.0		22.7		
Bankfull Entrenchment Ratio	2.5	2.5	2.5	2.4		2.6			3.6	3.6	3.7	3.4		3.5			---	---	---	---		---		
Bankfull Bank Height Ratio	1.0	1.0	1.0	<1.0		<1.0			1.0	1.0	1.0	1.0		1.0			---	---	---	---		---		

¹Adjustment in survey points included in bankfull calculations resulting in change to previous monitoring year bankfull dimensions.

²Prior to MY3, bankfull dimensions were calculated using a fixed bankfull elevation. For MY3-MY7, Bank Height Ratio is calculated based on the As-built (Base) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the low bank elevation.

³MY4 and MY6 are reduced monitoring years. No geomorphic data collected.

Table 12b. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)

Moore's Fork Stream Mitigation Project

DMS Project No.94709

Monitoring Year 5 - 2020

Silage Tributary

Dimension and Substrate	Cross-Section ST1 (Riffle)								Cross-Section ST2 (Pool)								Cross-Section ST3 (Riffle)								
	Base	MY1	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base	MY1 ¹	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base ¹	MY1 ¹	MY2 ¹	MY3 ²	MY4 ³	MY5	MY6	MY7	
bankfull elevation (ft)	1234.6	1234.6	1234.6	1234.1		1234.1			1233.4	1233.4	1233.4	1233.5		1233.6			1193.0	1193.0	1193.0	1192.8			1192.6		
low bank elevation (ft)	1234.6	1234.6	1234.6	1234.4		1234.6			1233.4	1233.4	1233.5	1233.5		1233.6			1193.0	1192.9	1192.7	1192.7			1192.9		
Bankfull Width (ft)	4.2	4.0	4.5	4.2		5.4			5.1	4.5	5.3	5.1		5.7			9.6	10.2	10.2	6.5			7.9		
Floodprone Width (ft)	9.4	9.2	9.6	10.7		9.7			---	---	---	---		---			15.0	15.0	22.1	20.0			21.0		
Bankfull Mean Depth (ft)	0.7	0.6	0.9	0.7		0.9			0.6	0.6	0.6	0.8		1.0			0.5	0.4	0.6	0.7			0.8		
Bankfull Max Depth (ft)	1.2	1.1	1.5	0.9		1.3			1.2	1.2	1.1	1.2		1.7			0.9	0.9	1.5	1.3			1.3		
Bankfull Cross-Sectional Area (ft ²)	2.8	2.3	4.1	2.8		5.1			3.2	2.8	3.0	4.1		5.6			4.9	4.2	6.5	4.8			6.6		
Bankfull Width/Depth Ratio	6.4	6.7	4.8	6.2		5.8			8.0	7.2	9.2	6.4		5.8			18.7	24.9	15.9	8.9			9.4		
Bankfull Entrenchment Ratio	2.2	2.3	2.2	2.6		1.8			---	---	---	---		---			1.6	1.5	2.2	3.1			2.7		
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.3		1.6			---	---	---	---		---			1.0	<1.0	<1.0	1.0			1.2		
Dimension and Substrate	Cross-Section ST4 (Pool)								Cross-Section ST5 (Pool)								Cross-Section ST6 (Riffle)								
	Base ¹	MY1 ¹	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base ¹	MY1 ¹	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	Base ¹	MY1 ¹	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7	
bankfull elevation (ft)	1193.1	1193.1	1193.1	1193.1		1192.5			1185.1	1185.1	1185.1	1184.7		1185.0			1175.4	1175.4	1175.4	1175.4			1174.9		
low bank elevation (ft)	1193.1	1192.9	1192.9	1193.1		1192.5			1185.1	1184.9	1185.0	1184.7		1185.0			1175.4	1175.3	1175.3	1175.4			1175.7		
Bankfull Width (ft)	13.9	14.9	14.7	16.5		13.9			7.8	8.7	8.4	8.2		10.1			9.6	8.4	8.7	8.3			8.3		
Floodprone Width (ft)	---	---	---	---		---			---	---	---	---		---			28.0	28.0	28.0	28.0			28.0		
Bankfull Mean Depth (ft)	1.1	1.3	1.1	1.2		0.8			1.0	0.9	1.0	0.9		1.0			0.7	0.7	0.8	0.8			1.6		
Bankfull Max Depth (ft)	2.4	2.7	2.3	2.5		1.7			1.4	1.5	1.6	1.3		1.4			1.3	1.5	1.5	1.5			2.2		
Bankfull Cross-Sectional Area (ft ²)	15.5	19.4	16.0	19.1		10.8			7.9	8.1	8.7	7.1		9.7			6.8	6.1	7.3	7.0			13.2		
Bankfull Width/Depth Ratio	12.5	11.4	13.4	14.3		17.9			7.7	9.4	8.1	9.4		10.5			13.5	11.6	10.4	9.9			5.2		
Bankfull Entrenchment Ratio	---	---	---	---		---			---	---	---	---		---			2.9	3.3	3.2	3.4			3.4		
Bankfull Bank Height Ratio	---	---	---	---		---			---	---	---	---		---			1.0	<1.0	<1.0	1.0			1.6		
Dimension and Substrate	Cross-Section ST7 (Riffle)																								
	Base ¹	MY1 ¹	MY2	MY3 ²	MY4 ³	MY5	MY6	MY7																	
bankfull elevation (ft)	1164.7	1164.7	1164.7	1164.7		1164.7																			
low bank elevation (ft)	1164.7	1164.6	1164.6	1164.6		1165.0																			
Bankfull Width (ft)	10.3	10.5	10.8	8.7		10.5																			
Floodprone Width (ft)	29.6	31.8	33.6	31.0		34.0																			
Bankfull Mean Depth (ft)	0.9	0.9	0.9	1.0		1.1																			
Bankfull Max Depth (ft)	1.5	1.6	1.8	1.6		1.9																			
Bankfull Cross-Sectional Area (ft ²)	8.8	9.3	9.6	8.3		12.0																			
Bankfull Width/Depth Ratio	12.0	12.0	12.1	9.1		9.2																			
Bankfull Entrenchment Ratio	2.9	3.0	3.1	3.6		3.2																			
Bankfull Bank Height Ratio	1.0	<1.0	1.0	<1.0		1.2																			

¹Adjustment in survey points included in bankfull calculations resulting in change to previous monitoring year bankfull dimensions.

²Prior to MY3, bankfull dimensions were calculated using a fixed bankfull elevation. For MY3-MY7, Bank Height Ratio is calculated based on the As-built (Base) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the low bank elevation.

³MY4 and MY6 are reduced monitoring years. No geomorphic data collected.

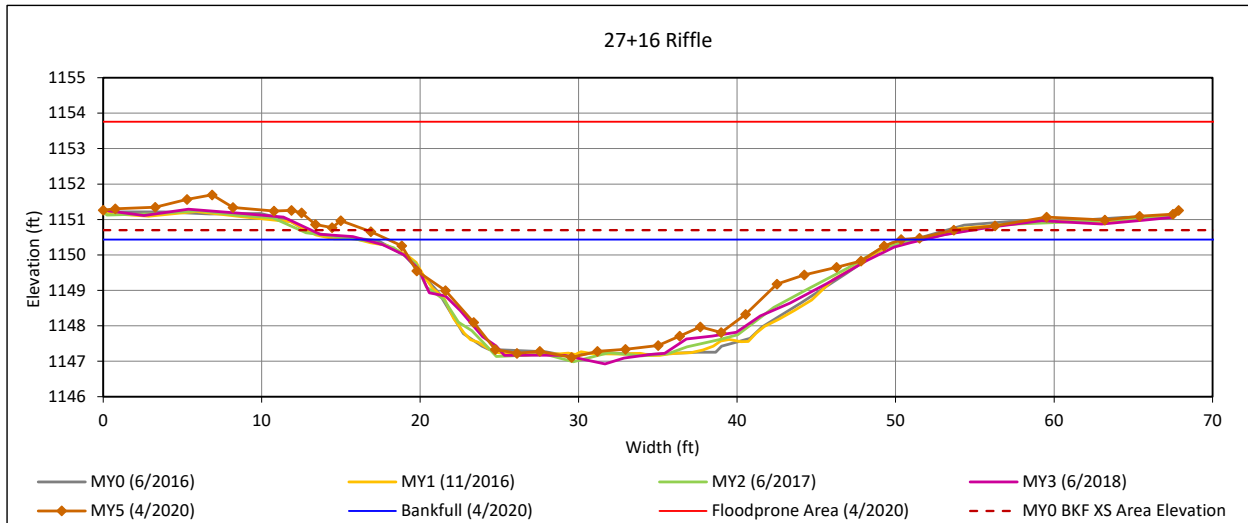
Cross-Section Plots

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cross-Section M1- Moore's Fork



Bankfull Dimensions

65.3	x-section area (ft.sq.)
32.4	width (ft)
2.0	mean depth (ft)
3.3	max depth (ft)
33.6	wetted perimeter (ft)
1.9	hydraulic radius (ft)
16.0	width-depth ratio
145.0	W flood prone area (ft)
4.5	entrenchment ratio
0.9	low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



View Downstream

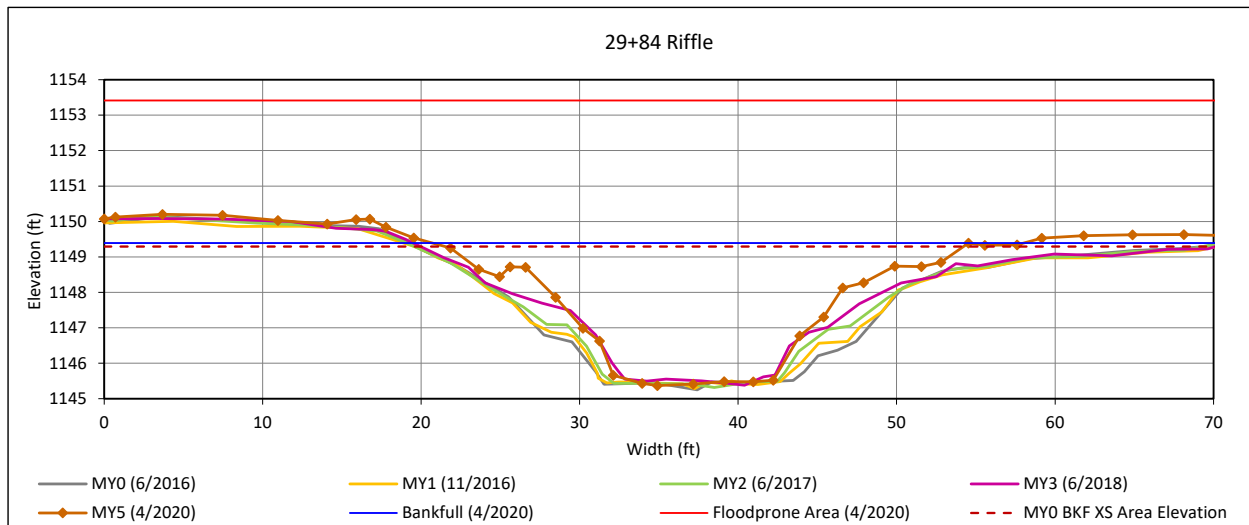
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cross-Section M2- Moores Fork



Bankfull Dimensions

70.5	x-section area (ft.sq.)
33.8	width (ft)
2.1	mean depth (ft)
4.0	max depth (ft)
35.8	wetted perimeter (ft)
2.0	hydraulic radius (ft)
16.2	width-depth ratio
145.0	W flood prone area (ft)
4.3	entrenchment ratio
1.0	low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



View Downstream

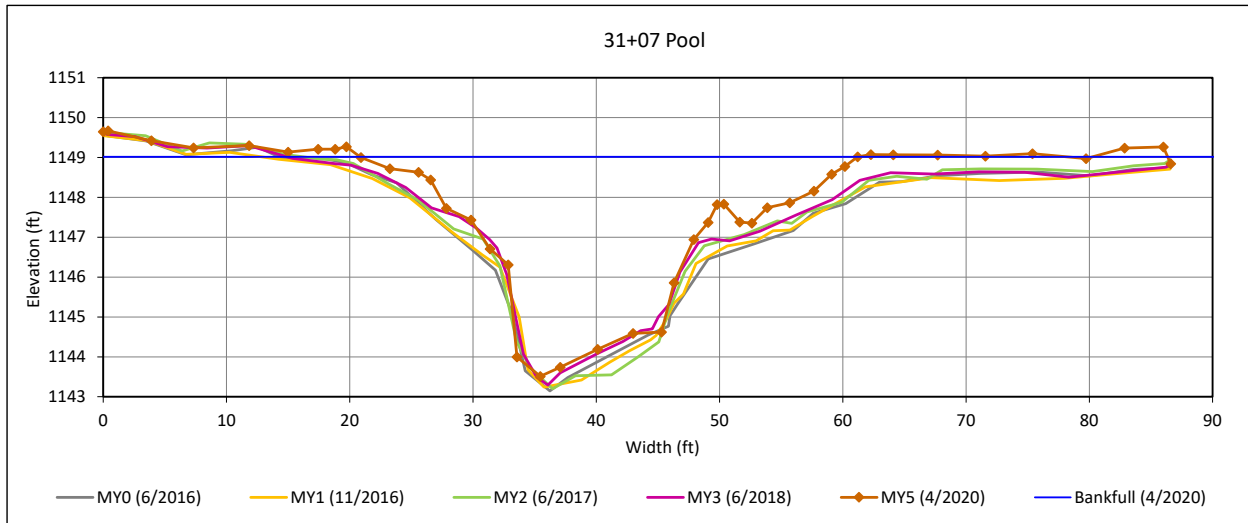
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

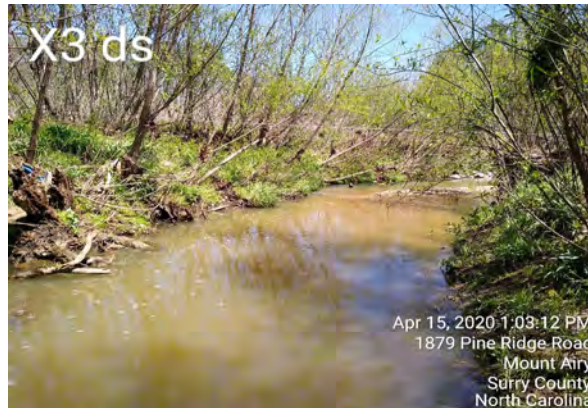
Monitoring Year 5 - 2020

Cross-Section M3- Moores Fork



Bankfull Dimensions

95.5	x-section area (ft.sq.)
40.4	width (ft)
2.4	mean depth (ft)
5.5	max depth (ft)
44.1	wetted perimeter (ft)
2.2	hydraulic radius (ft)
17.1	width-depth ratio



Survey Date: 4/2020

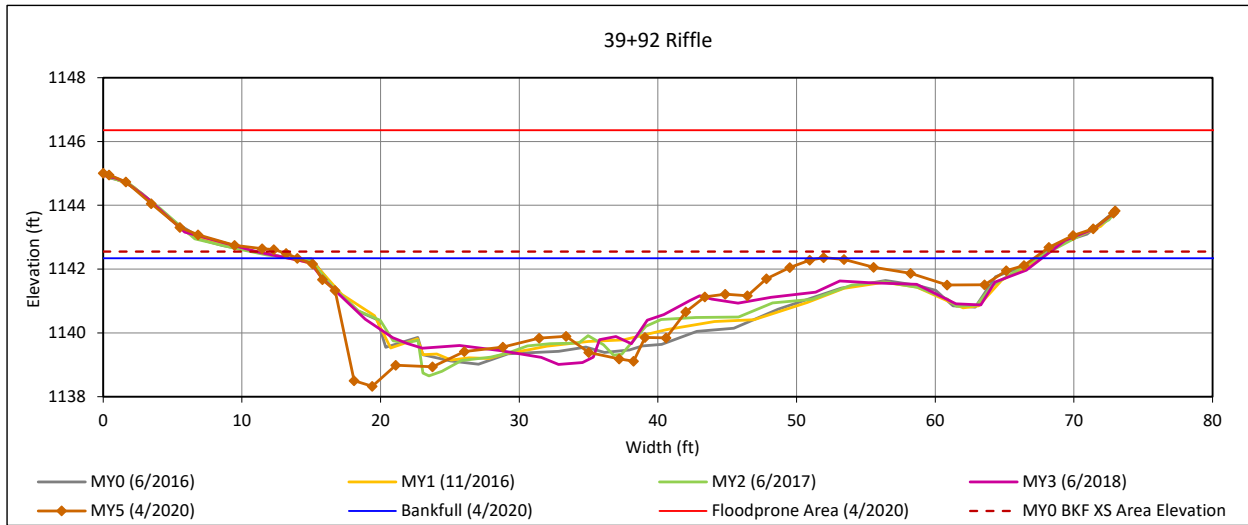
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Cross-Section M4- Moores Fork



Bankfull Dimensions

89.9	x-section area (ft.sq.)
52.4	width (ft)
1.7	mean depth (ft)
4.0	max depth (ft)
55.6	wetted perimeter (ft)
1.6	hydraulic radius (ft)
30.5	width-depth ratio
124.0	W flood prone area (ft)
2.4	entrenchment ratio
0.95	low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



View Downstream

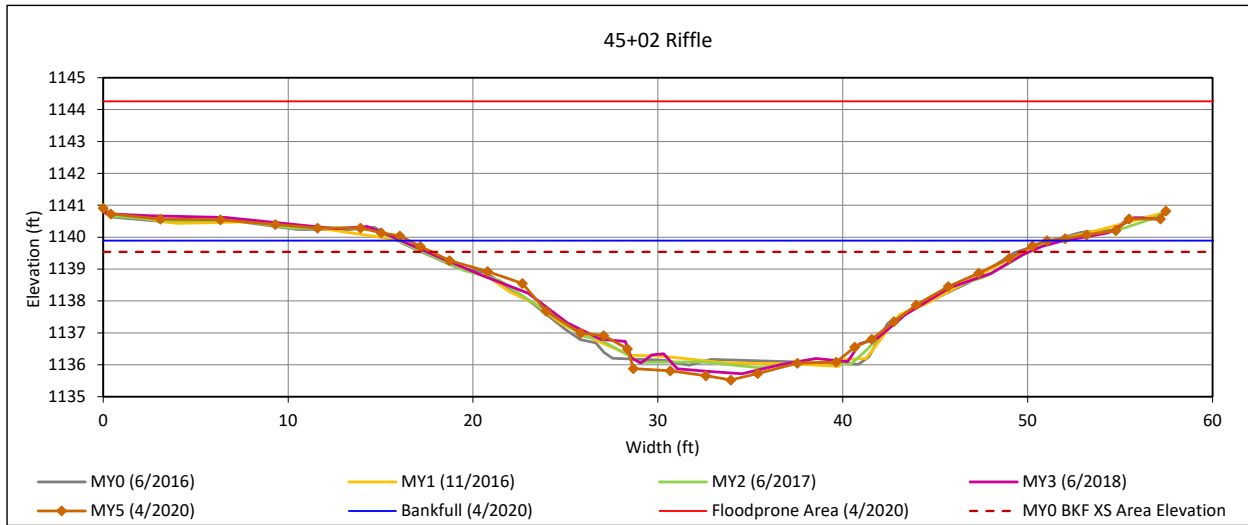
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cross-Section M5- Moores Fork



Bankfull Dimensions

84.7	x-section area (ft.sq.)
34.5	width (ft)
2.5	mean depth (ft)
4.4	max depth (ft)
36.2	wetted perimeter (ft)
2.3	hydraulic radius (ft)
14.1	width-depth ratio
124.0	W flood prone area (ft)
3.6	entrenchment ratio
1.1	low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



View Downstream

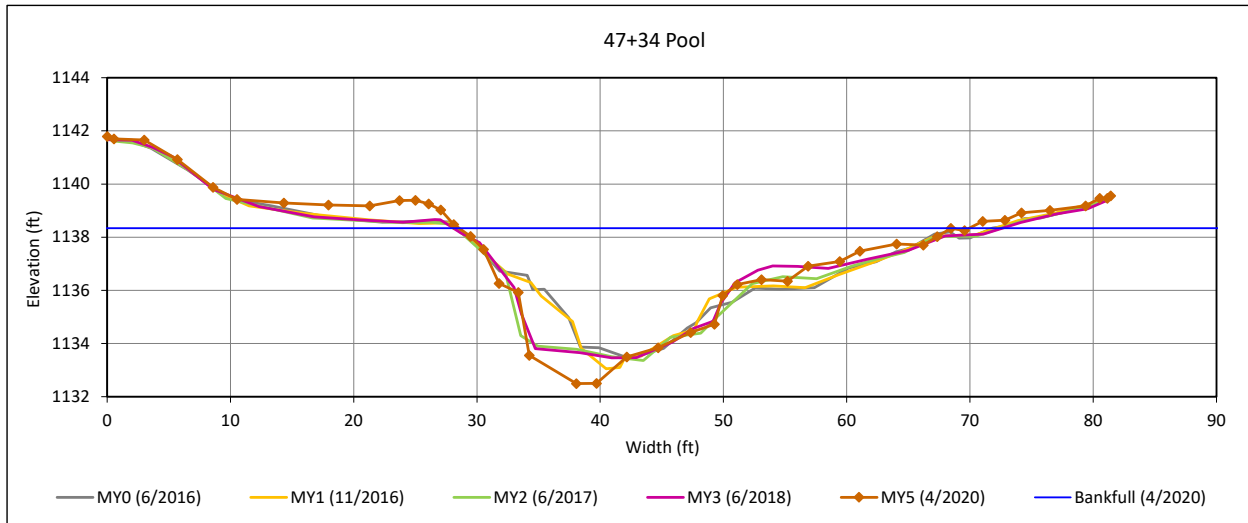
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cross-Section M6- Moores Fork



Bankfull Dimensions

107.7	x-section area (ft.sq.)
39.9	width (ft)
2.7	mean depth (ft)
5.8	max depth (ft)
43.7	wetted perimeter (ft)
2.5	hydraulic radius (ft)
14.8	width-depth ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



View Downstream

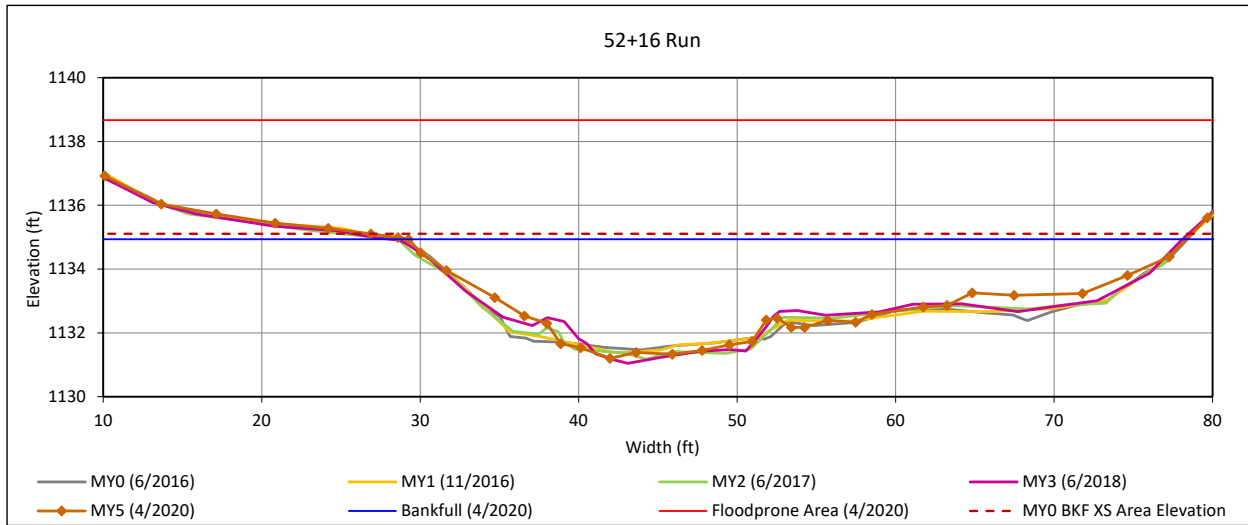
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cross-Section M7- Moores Fork



Bankfull Dimensions

109.7	x-section area (ft.sq.)
49.1	width (ft)
2.2	mean depth (ft)
3.7	max depth (ft)
50.4	wetted perimeter (ft)
2.2	hydraulic radius (ft)
22.0	width-depth ratio
124.0	W flood prone area (ft)
2.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



View Downstream

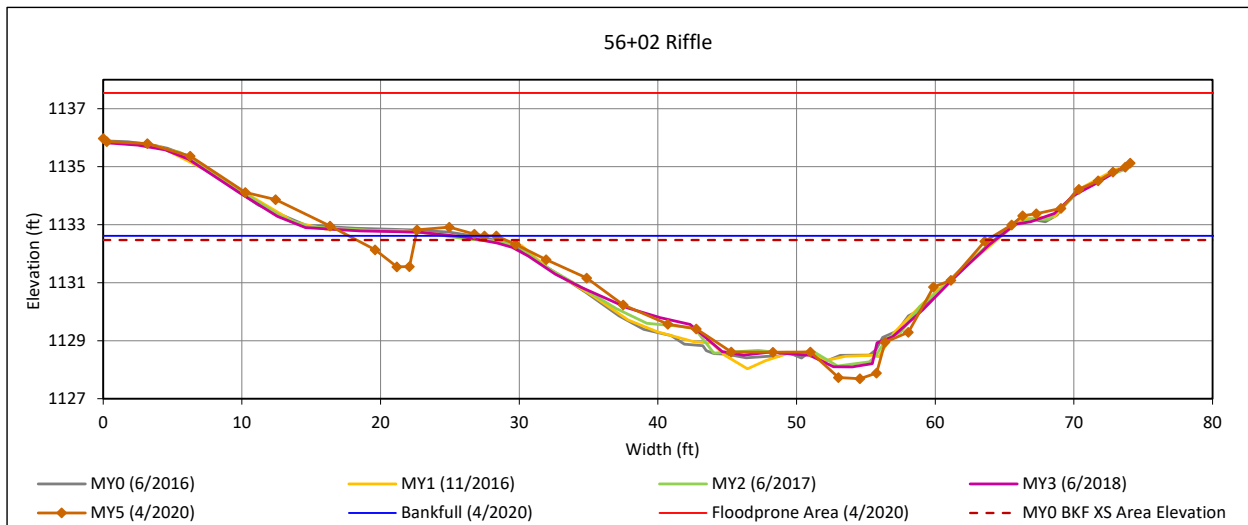
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cross-Section M8- Moores Fork

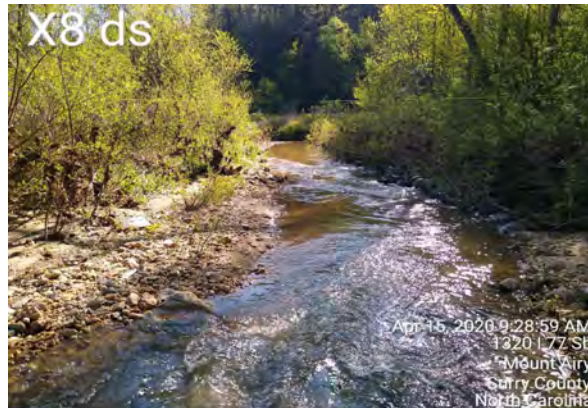


Bankfull Dimensions

96.6	x-section area (ft.sq.)
35.9	width (ft)
2.7	mean depth (ft)
4.9	max depth (ft)
38.2	wetted perimeter (ft)
2.5	hydraulic radius (ft)
13.3	width-depth ratio
124.0	W flood prone area (ft)
3.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



View Downstream

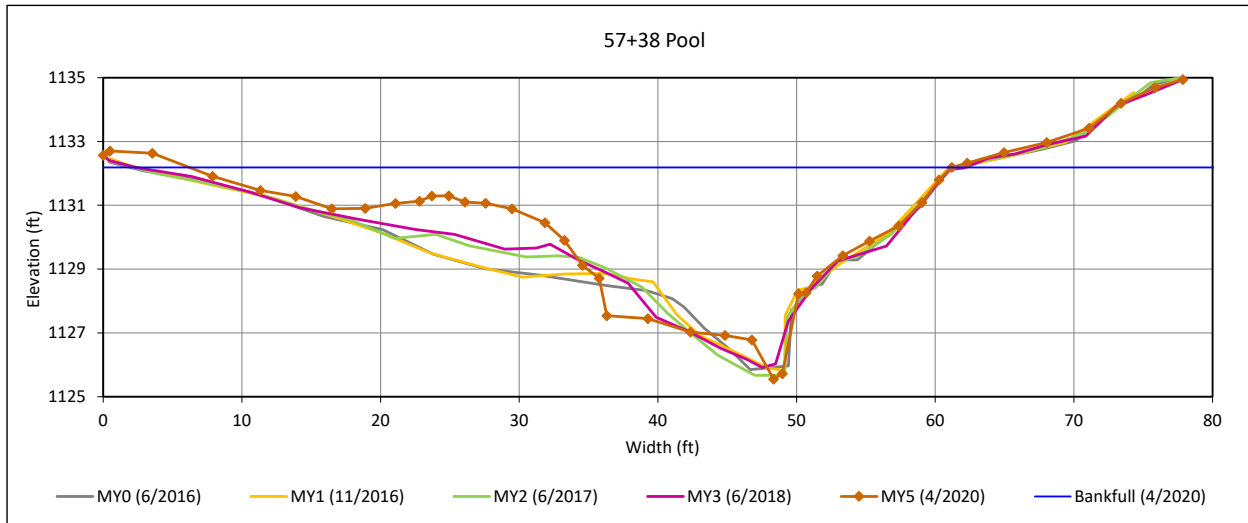
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cross-Section M9- Moores Fork



Bankfull Dimensions

133.3	x-section area (ft.sq.)
55.0	width (ft)
2.4	mean depth (ft)
6.6	max depth (ft)
59.2	wetted perimeter (ft)
2.3	hydraulic radius (ft)
22.7	width-depth ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



View Downstream

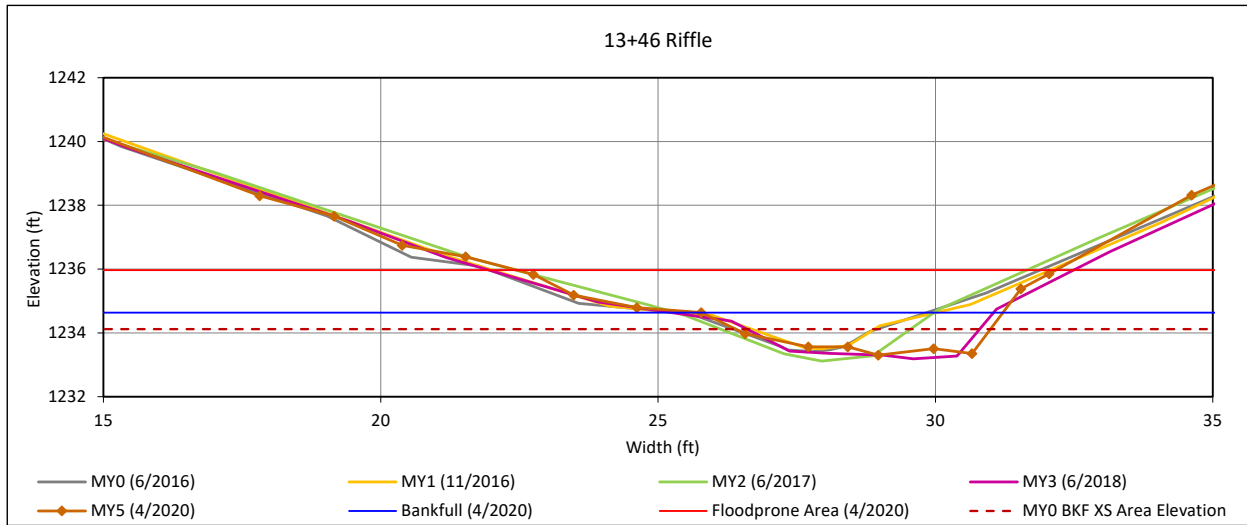
Cross-Section Plots

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cross-Section ST1- Silage Trib



Bankfull Dimensions

- 5.1 x-section area (ft.sq.)
- 5.4 width (ft)
- 0.9 mean depth (ft)
- 1.3 max depth (ft)
- 6.7 wetted perimeter (ft)
- 0.8 hydraulic radius (ft)
- 5.8 width-depth ratio
- 9.7 W flood prone area (ft)
- 1.8 entrenchment ratio
- 1.6 low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying

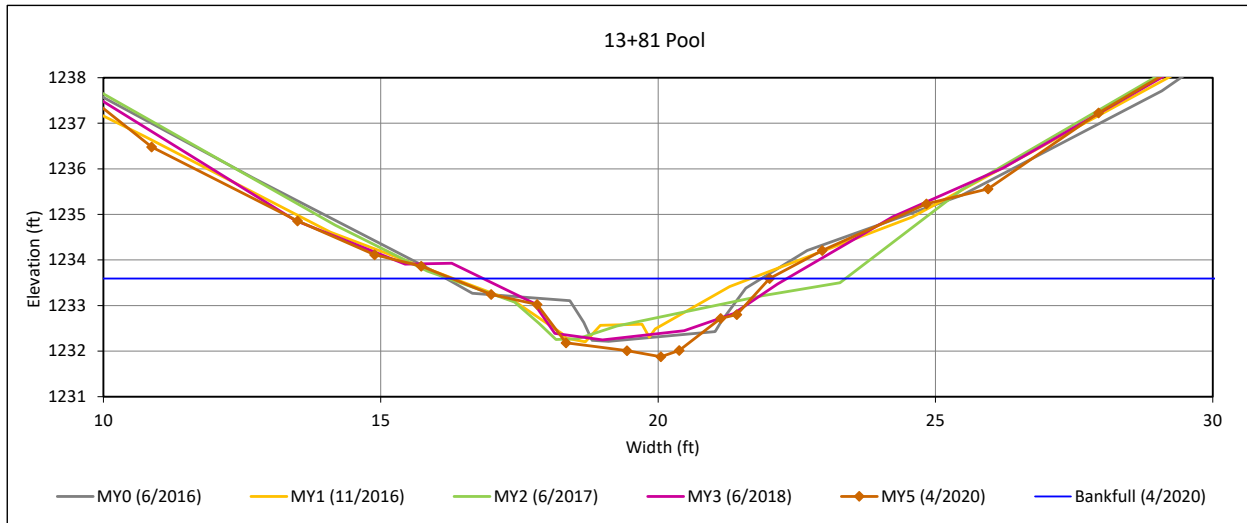


View Downstream

Cross-Section Plots

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

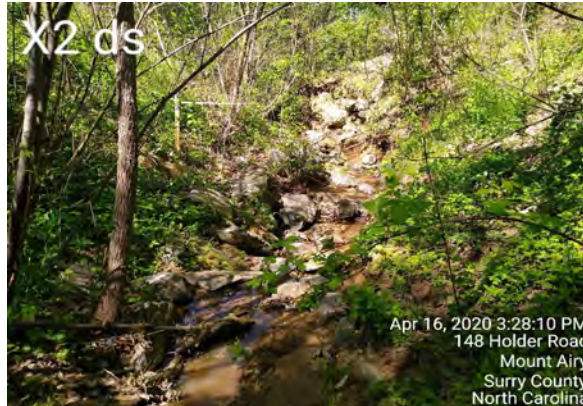
Cross Section ST2- Silage Trib



Bankfull Dimensions

- 5.6 x-section area (ft.sq.)
- 5.7 width (ft)
- 1.0 mean depth (ft)
- 1.7 max depth (ft)
- 7.0 wetted perimeter (ft)
- 0.8 hydraulic radius (ft)
- 5.8 width-depth ratio

Survey Date: 4/2020
 Field Crew: Kee Mapping & Surveying

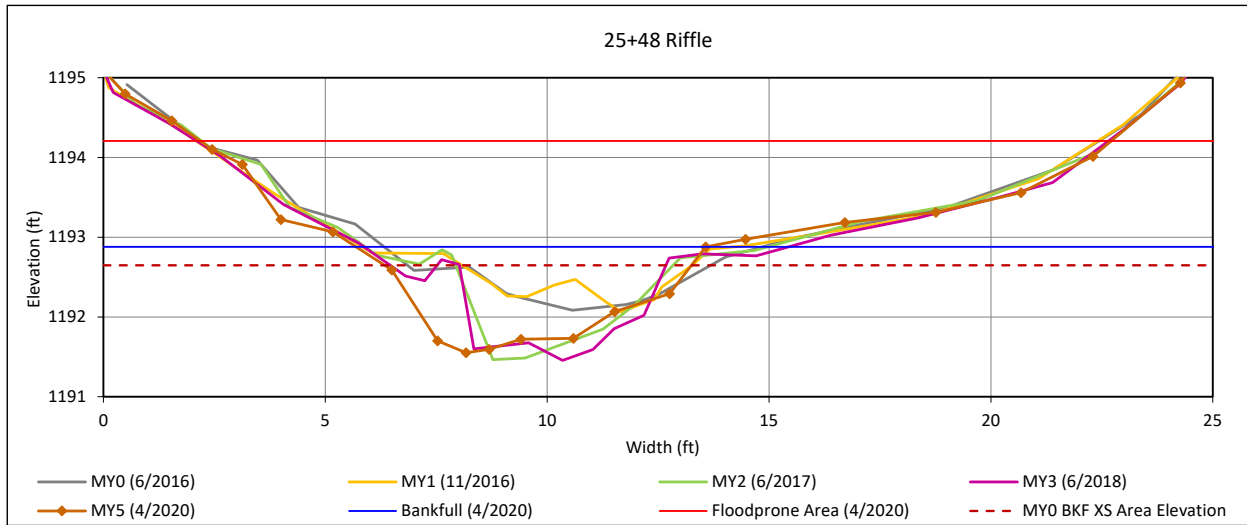


View Downstream

Cross-Section Plots

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Cross-Section ST3 - Silage Trib



Bankfull Dimensions

- 6.6 x-section area (ft.sq.)
- 7.9 width (ft)
- 0.8 mean depth (ft)
- 1.3 max depth (ft)
- 8.6 wetted perimeter (ft)
- 0.8 hydraulic radius (ft)
- 9.4 width-depth ratio
- 21.0 W flood prone area (ft)
- 2.7 entrenchment ratio
- 1.2 low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



View Downstream

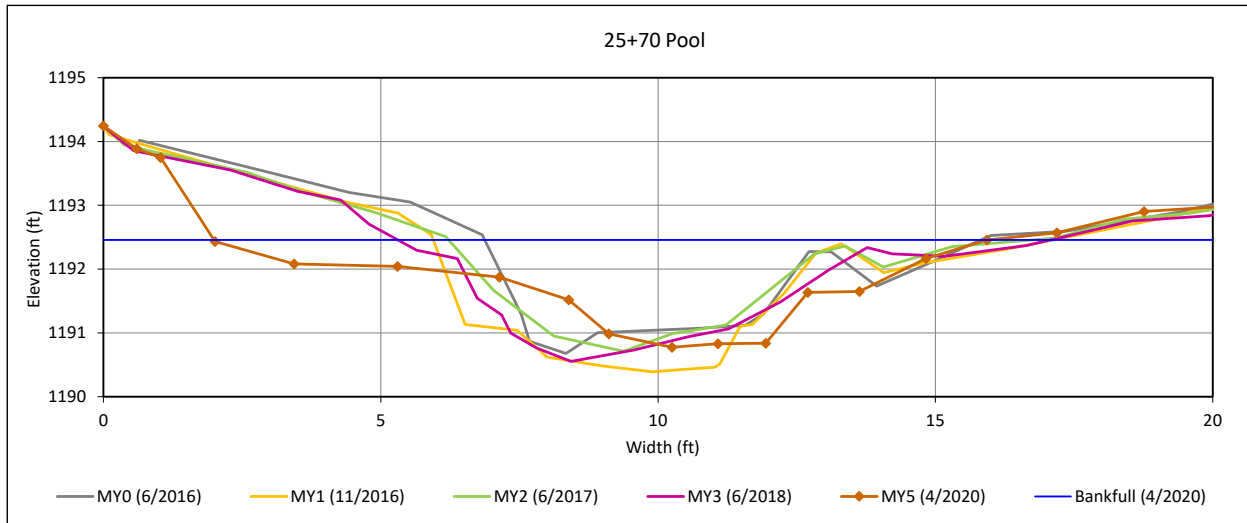
Cross-Section Plots

Moore's Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 5 - 2020

Cross-Section ST4 - Silage Trib



Bankfull Dimensions

- 10.8 x-section area (ft.sq.)
- 13.9 width (ft)
- 0.8 mean depth (ft)
- 1.7 max depth (ft)
- 14.7 wetted perimeter (ft)
- 0.7 hydraulic radius (ft)
- 17.9 width-depth ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying

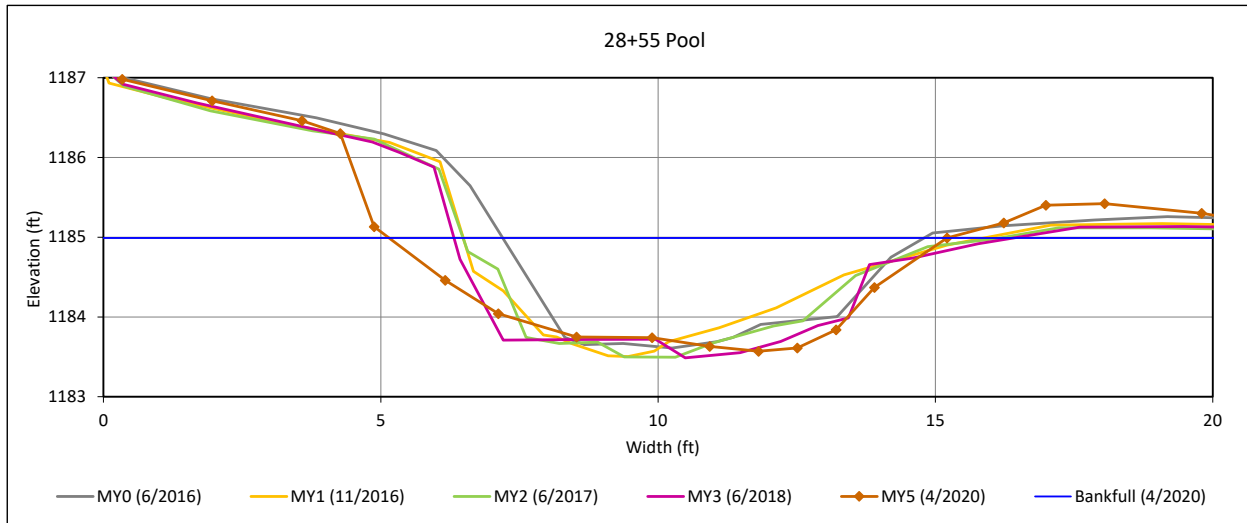


View Downstream

Cross-Section Plots

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Cross-Section ST5 - Silage Trib



Bankfull Dimensions

- 9.7 x-section area (ft.sq.)
- 10.1 width (ft)
- 1.0 mean depth (ft)
- 1.4 max depth (ft)
- 10.7 wetted perimeter (ft)
- 0.9 hydraulic radius (ft)
- 10.5 width-depth ratio

Survey Date: 4/2020
 Field Crew: Kee Mapping & Surveying

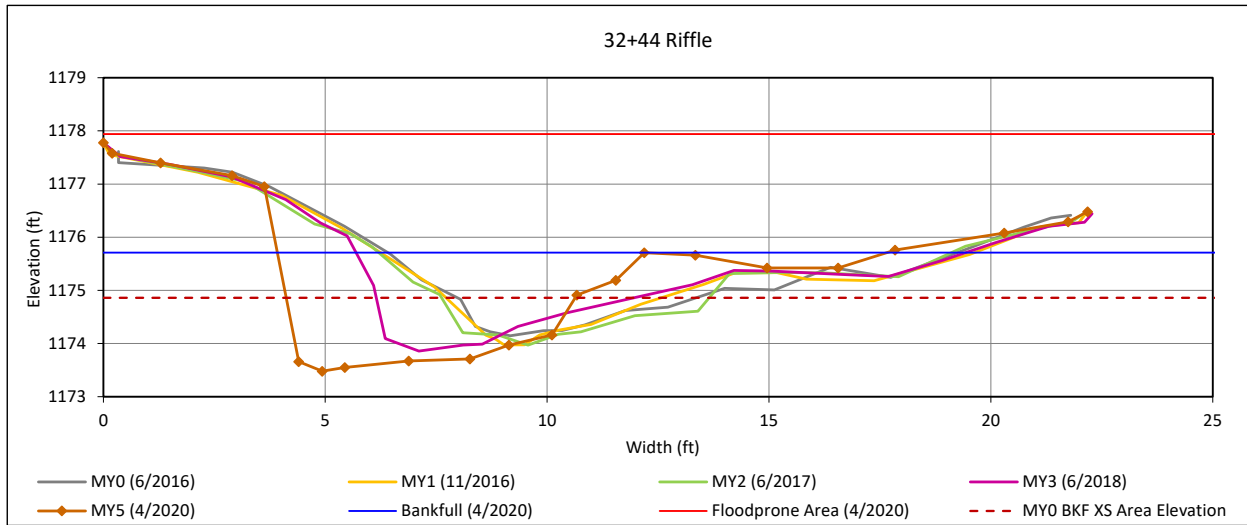


View Downstream

Cross-Section Plots

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Cross-Section ST6 - Silage Trib



Bankfull Dimensions

13.2	x-section area (ft.sq.)
8.3	width (ft)
1.6	mean depth (ft)
2.2	max depth (ft)
10.6	wetted perimeter (ft)
1.2	hydraulic radius (ft)
5.2	width-depth ratio
28.0	W flood prone area (ft)
3.4	entrenchment ratio
1.6	low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying

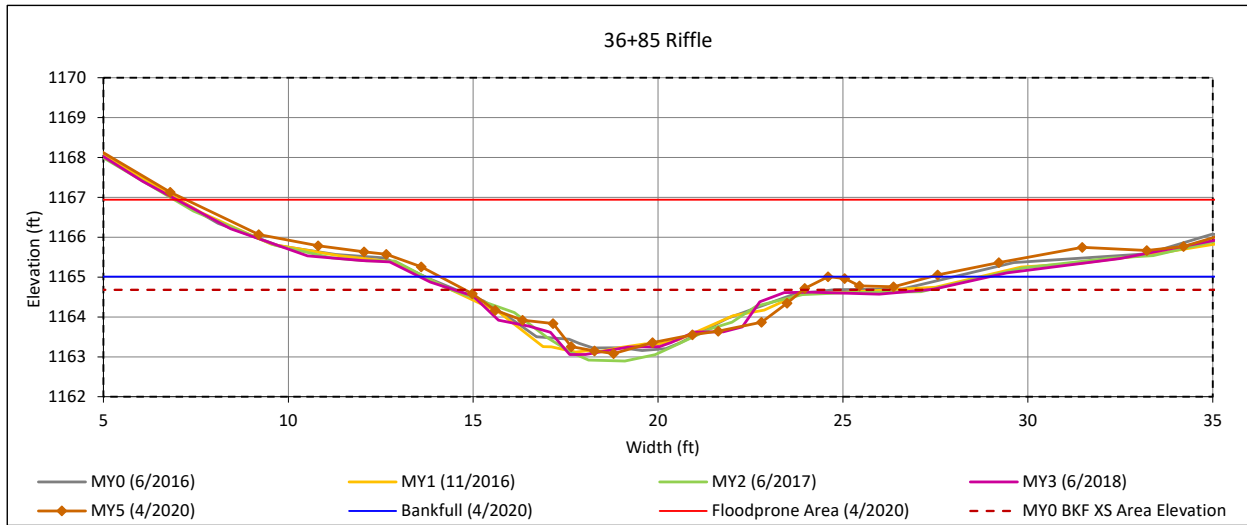


View Downstream

Cross-Section Plots

Moore's Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Cross-Section ST7- Silage Trib



Bankfull Dimensions

- 12.0 x-section area (ft.sq.)
- 10.5 width (ft)
- 1.1 mean depth (ft)
- 1.9 max depth (ft)
- 11.5 wetted perimeter (ft)
- 1.0 hydraulic radius (ft)
- 9.2 width-depth ratio
- 34.0 W flood prone area (ft)
- 3.2 entrenchment ratio
- 1.2 low bank height ratio

Survey Date: 4/2020

Field Crew: Kee Mapping & Surveying



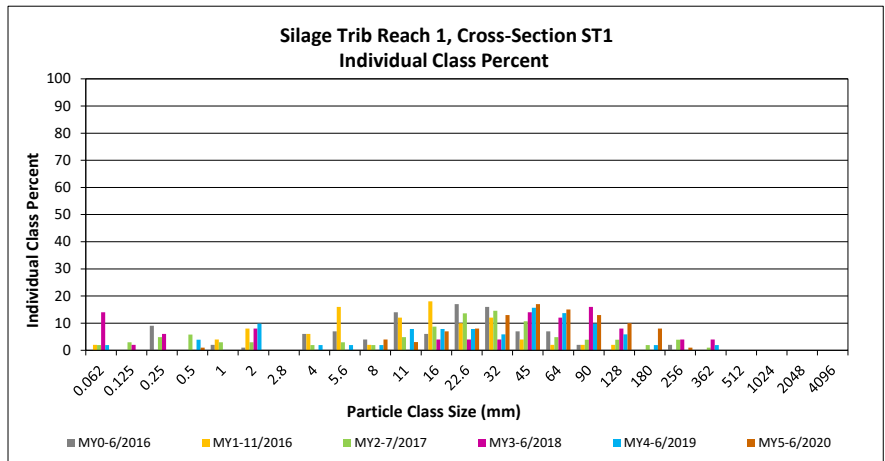
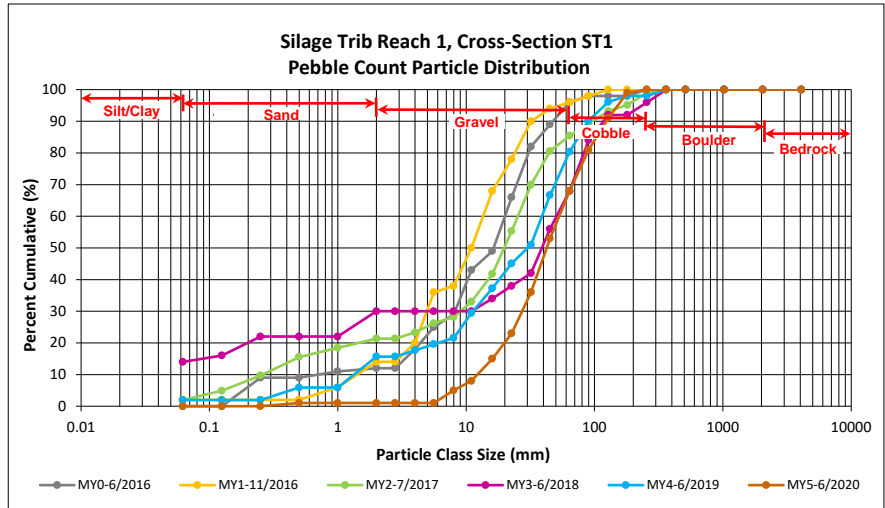
View Downstream

Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Silage Trib Reach 1, Cross-Section ST1

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	1	1	1
	Coarse	0.5	1.0			1
	Very Coarse	1.0	2.0			1
GRAVEL	Very Fine	2.0	2.8			1
	Very Fine	2.8	4.0			1
	Fine	4.0	5.6			1
	Fine	5.6	8.0	4	4	5
	Medium	8.0	11.0	3	3	8
	Medium	11.0	16.0	7	7	15
	Coarse	16.0	22.6	8	8	23
	Coarse	22.6	32	13	13	36
	Very Coarse	32	45	17	17	53
Very Coarse	45	64	15	15	68	
COBBLE	Small	64	90	13	13	81
	Small	90	128	10	10	91
	Large	128	180	8	8	99
	Large	180	256	1	1	100
BEDROCK	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
		Total		100	100	100

Cross-Section ST1 Channel materials (mm)	
D ₁₆ =	16.7
D ₃₅ =	31.2
D ₅₀ =	42.4
D ₈₄ =	100.0
D ₉₅ =	151.8
D ₁₀₀ =	256.0

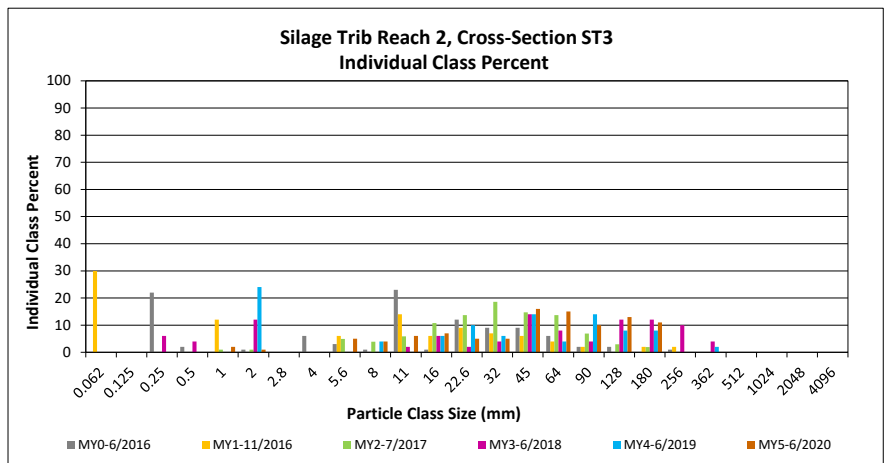
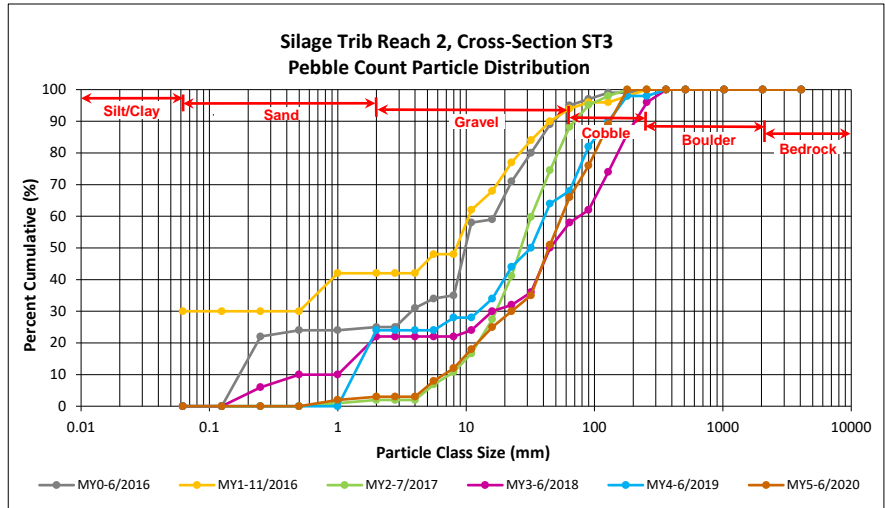


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Silage Trib Reach 2, Cross-Section ST3

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay		0.000	0.062	0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0	2	2	2
	Very Coarse	1.0	2.0	1	1	3
GRAVEL	Very Fine	2.0	2.8			3
	Very Fine	2.8	4.0			3
	Fine	4.0	5.6	5	5	8
	Fine	5.6	8.0	4	4	12
	Medium	8.0	11.0	6	6	18
	Medium	11.0	16.0	7	7	25
	Coarse	16.0	22.6	5	5	30
	Coarse	22.6	32	5	5	35
	Very Coarse	32	45	16	16	51
	Very Coarse	45	64	15	15	66
COBBLE	Small	64	90	10	10	76
	Small	90	128	13	13	89
	Large	128	180	11	11	100
	Large	180	256			100
BEDROCK	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
BEDROCK	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
Total				100		100

Cross-Section ST3	
Channel materials (mm)	
D ₁₆ =	9.9
D ₃₅ =	32.0
D ₅₀ =	44.1
D ₈₄ =	111.8
D ₉₅ =	154.2
D ₁₀₀ =	180.0

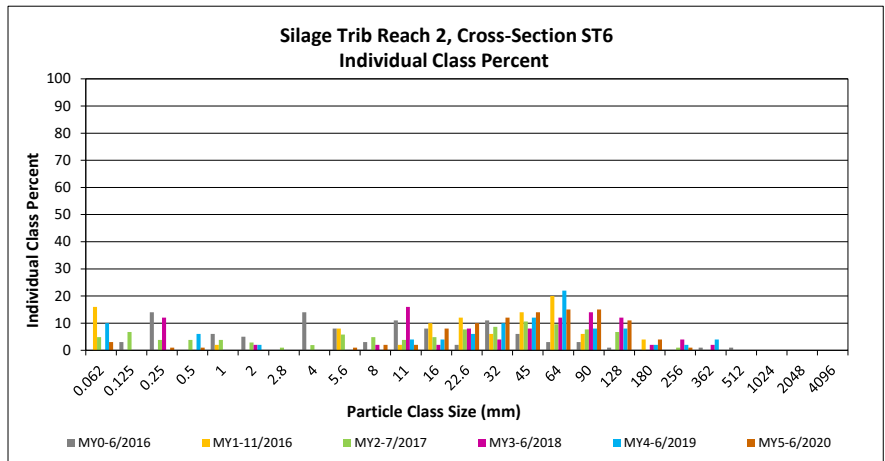
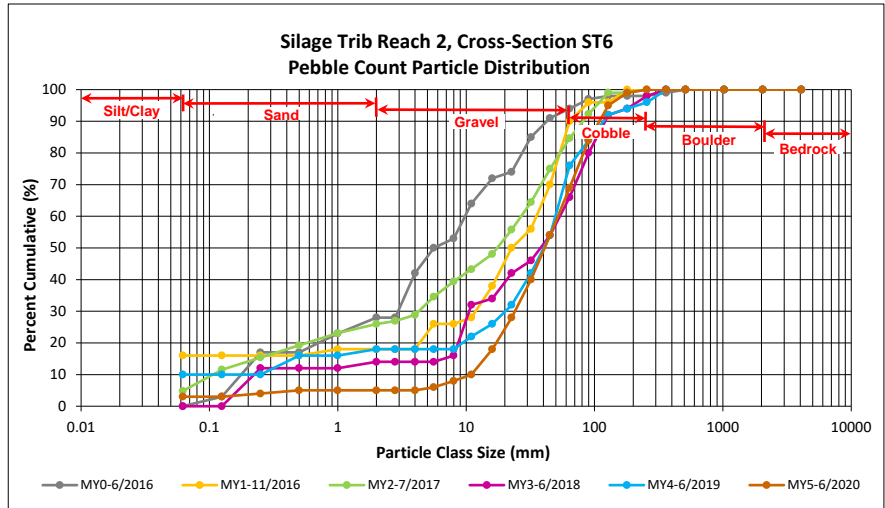


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Silage Trib Reach 2, Cross-Section ST6

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062	3	3	3
SAND	Very fine	0.062	0.125			3
	Fine	0.125	0.250	1	1	4
	Medium	0.25	0.50	1	1	5
	Coarse	0.5	1.0			5
	Very Coarse	1.0	2.0			5
GRAVEL	Very Fine	2.0	2.8			5
	Very Fine	2.8	4.0			5
	Fine	4.0	5.6	1	1	6
	Fine	5.6	8.0	2	2	8
	Medium	8.0	11.0	2	2	10
	Medium	11.0	16.0	8	8	18
	Coarse	16.0	22.6	10	10	28
	Coarse	22.6	32	12	12	40
	Very Coarse	32	45	14	14	54
	Very Coarse	45	64	15	15	69
COBBLE	Small	64	90	15	15	84
	Small	90	128	11	11	95
	Large	128	180	4	4	99
	Large	180	256	1	1	100
BEDROCK	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
BEDROCK		Large/Very Large	1024 2048			100
BEDROCK		Bedrock	2048 >2048			100
		Total		100	100	100

Cross-Section ST6	
Channel materials (mm)	
D ₁₆ =	14.6
D ₃₅ =	27.7
D ₅₀ =	40.8
D ₈₄ =	90.0
D ₉₅ =	128.0
D ₁₀₀ =	256.0

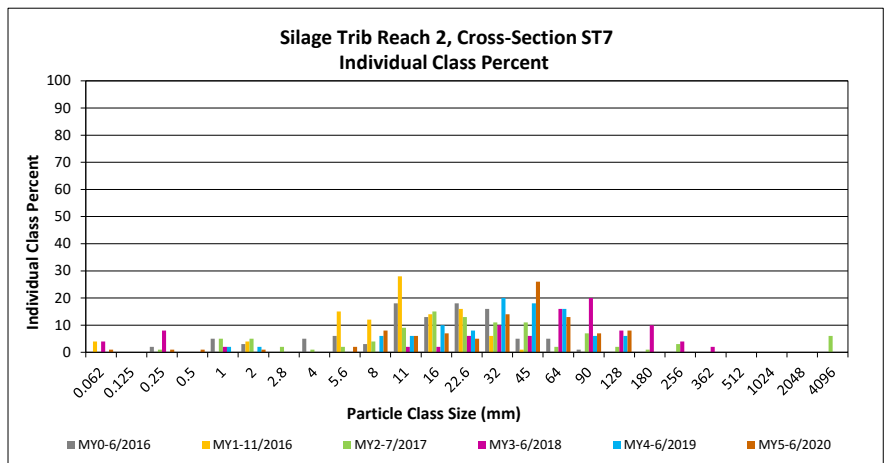
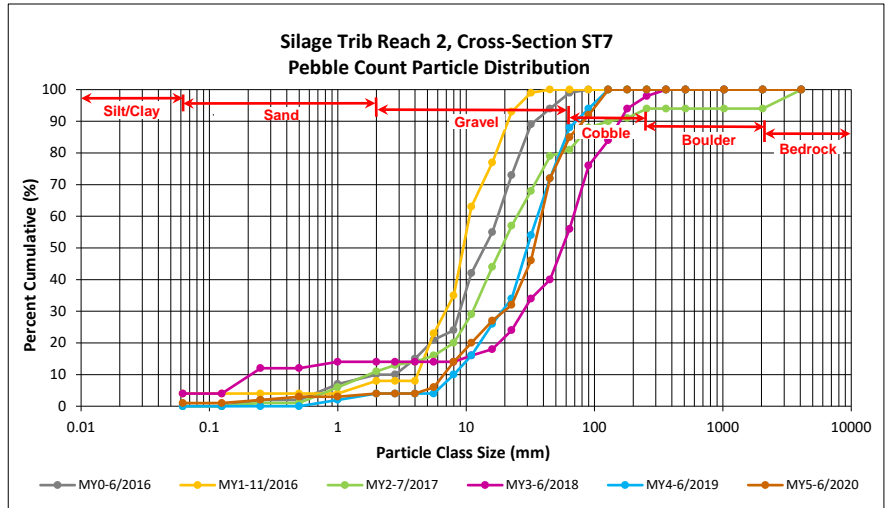


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Silage Trib Reach 2, Cross-Section ST7

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062	1	1	1
SAND	Very fine	0.062	0.125			1
	Fine	0.125	0.250	1	1	2
	Medium	0.25	0.50	1	1	3
	Coarse	0.5	1.0			3
	Very Coarse	1.0	2.0	1	1	4
GRAVEL	Very Fine	2.0	2.8			4
	Very Fine	2.8	4.0			4
	Fine	4.0	5.6	2	2	6
	Fine	5.6	8.0	8	8	14
	Medium	8.0	11.0	6	6	20
	Medium	11.0	16.0	7	7	27
	Coarse	16.0	22.6	5	5	32
	Coarse	22.6	32	14	14	46
	Very Coarse	32	45	26	26	72
	Very Coarse	45	64	13	13	85
COBBLE	Small	64	90	7	7	92
	Small	90	128	8	8	100
	Large	128	180			100
BEDROCK	Large	180	256			100
	Small	256	362			100
	Small	362	512			100
BEDROCK	Medium	512	1024			100
	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total		100	100	100

Cross-Section ST7	
Channel materials (mm)	
D ₁₆ =	8.9
D ₃₅ =	24.3
D ₅₀ =	33.7
D ₈₄ =	62.3
D ₉₅ =	102.7
D ₁₀₀ =	128.0

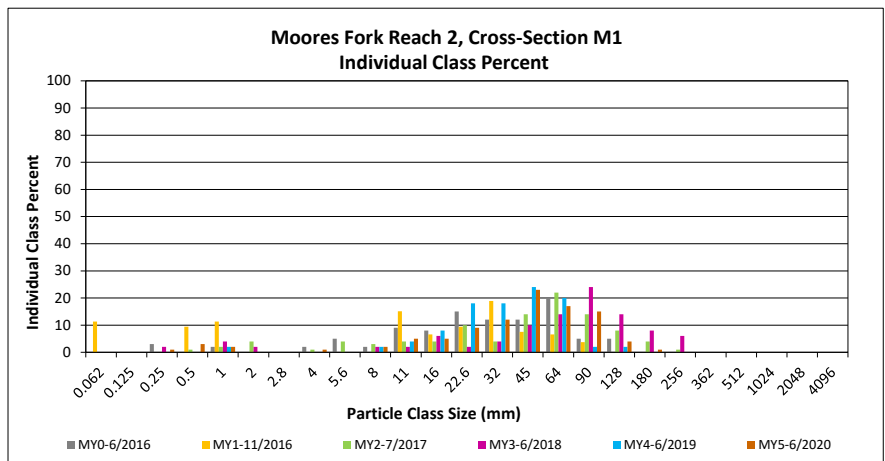
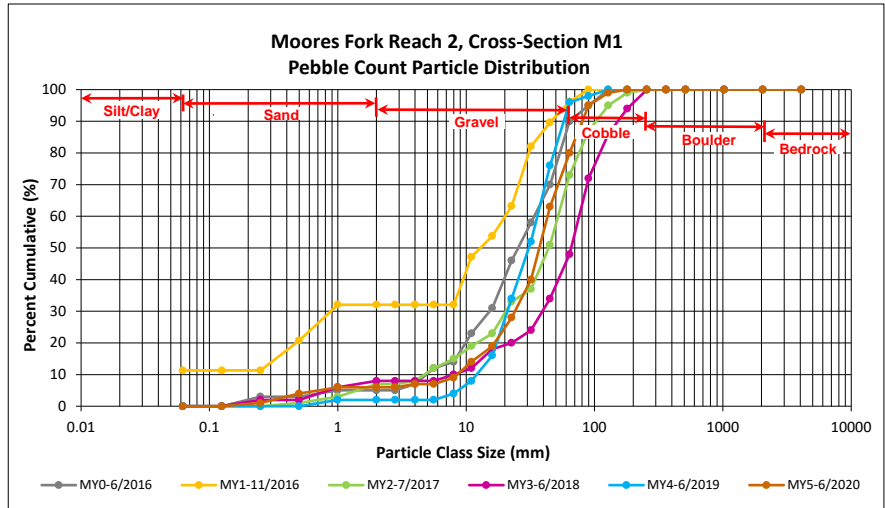


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Moores Fork Reach 2, Cross-Section M1

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000	0.062		0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	1	1	1
	Medium	0.25	0.50	3	3	4
	Coarse	0.5	1.0	2	2	6
	Very Coarse	1.0	2.0			6
GRAVEL	Very Fine	2.0	2.8			6
	Very Fine	2.8	4.0	1	1	7
	Fine	4.0	5.6			7
	Fine	5.6	8.0	2	2	9
	Medium	8.0	11.0	5	5	14
	Medium	11.0	16.0	5	5	19
	Coarse	16.0	22.6	9	9	28
	Coarse	22.6	32	12	12	40
COBBLE	Very Coarse	32	45	23	23	63
	Very Coarse	45	64	17	17	80
	Small	64	90	15	15	95
	Small	90	128	4	4	99
	Large	128	180	1	1	100
BEDROCK	Large	180	256			100
	Small	256	362			100
	Small	362	512			100
BEDROCK	Medium	512	1024			100
	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total			100	100

Cross-Section M1	
Channel materials (mm)	
D ₁₆ =	12.8
D ₃₅ =	27.7
D ₅₀ =	37.1
D ₈₄ =	70.1
D ₉₅ =	90.0
D ₁₀₀ =	180.0

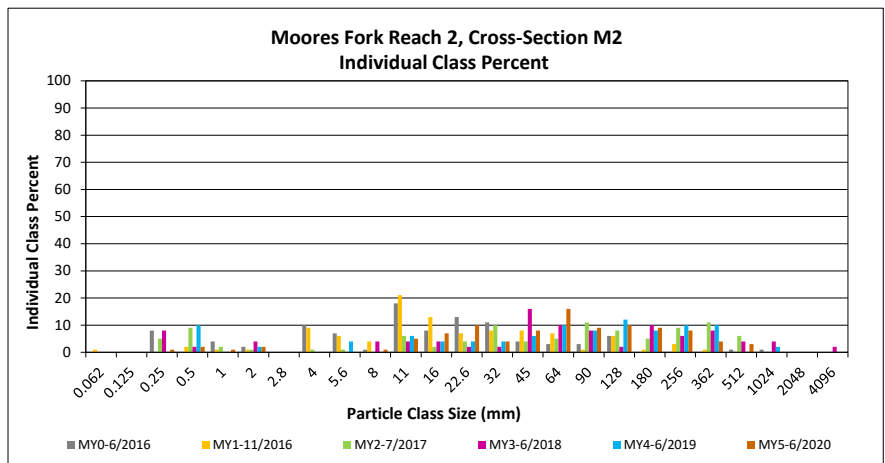
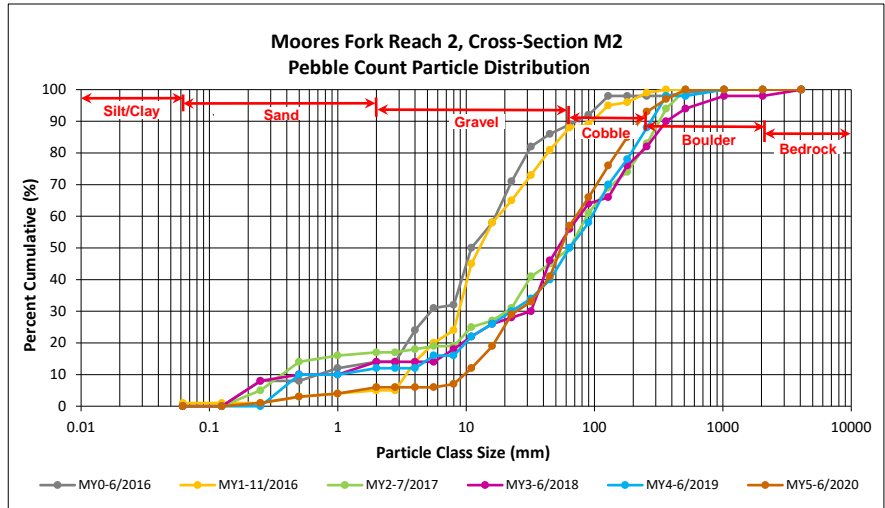


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Moores Fork Reach 2, Cross-Section M2

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000	0.062		0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	1	1	1
	Medium	0.25	0.50	2	2	3
	Coarse	0.5	1.0	1	1	4
	Very Coarse	1.0	2.0	2	2	6
GRAVEL	Very Fine	2.0	2.8			6
	Very Fine	2.8	4.0			6
	Fine	4.0	5.6			6
	Fine	5.6	8.0	1	1	7
	Medium	8.0	11.0	5	5	12
	Medium	11.0	16.0	7	7	19
	Coarse	16.0	22.6	10	10	29
	Coarse	22.6	32	4	4	33
	Very Coarse	32	45	8	8	41
	Very Coarse	45	64	16	16	57
COBBLE	Small	64	90	9	9	66
	Small	90	128	10	10	76
	Large	128	180	9	9	85
	Large	180	256	8	8	93
BEDROCK	Small	256	362	4	4	97
	Small	362	512	3	3	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
		Total			100	100

Cross-Section M2	
Channel materials (mm)	
D ₁₆ =	13.6
D ₃₅ =	34.8
D ₅₀ =	54.9
D ₈₄ =	173.3
D ₉₅ =	304.4
D ₁₀₀ =	512.0

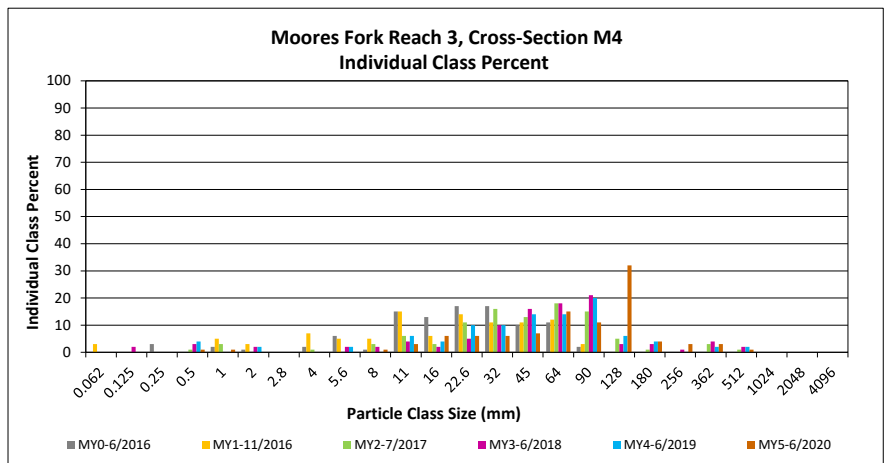
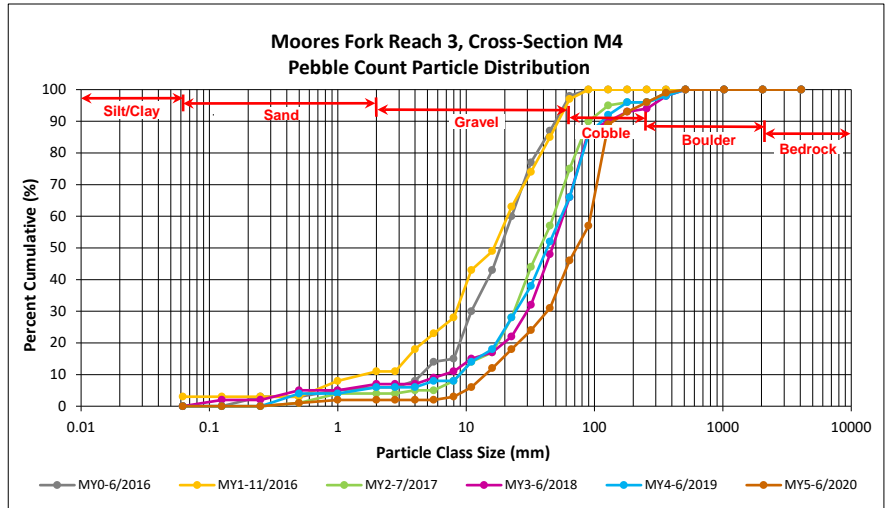


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Moores Fork Reach 3, Cross-Section M4

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000	0.062		0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	1	1	1
	Coarse	0.5	1.0	1	1	2
	Very Coarse	1.0	2.0			2
GRAVEL	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.6			2
	Fine	5.6	8.0	1	1	3
	Medium	8.0	11.0	3	3	6
	Medium	11.0	16.0	6	6	12
	Coarse	16.0	22.6	6	6	18
	Coarse	22.6	32	6	6	24
COBBLE	Very Coarse	32	45	7	7	31
	Very Coarse	45	64	15	15	46
	Small	64	90	11	11	57
	Small	90	128	32	32	89
BEDROCK	Large	128	180	4	4	93
	Large	180	256	3	3	96
	Small	256	362	3	3	99
BEDROCK	Small	362	512	1	1	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
		Total			100	100

Cross-Section M4	
Channel materials (mm)	
D ₁₆ =	20.1
D ₃₅ =	49.4
D ₅₀ =	72.4
D ₈₄ =	121.1
D ₉₅ =	227.6
D ₁₀₀ =	512.0

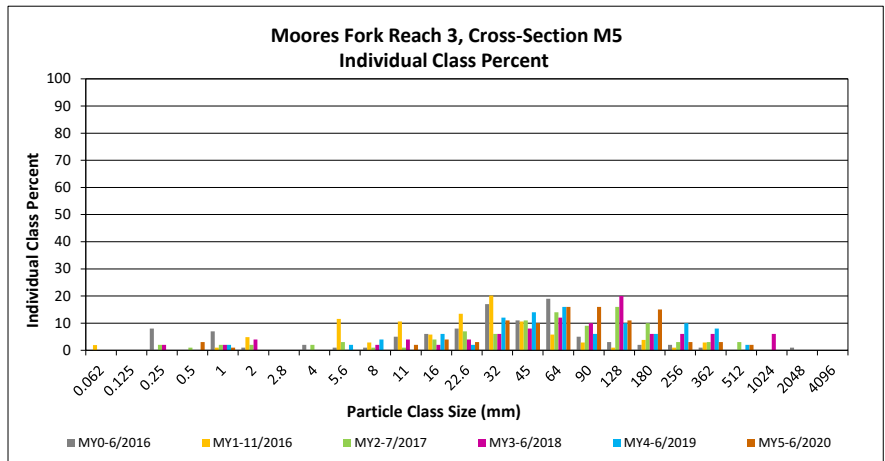
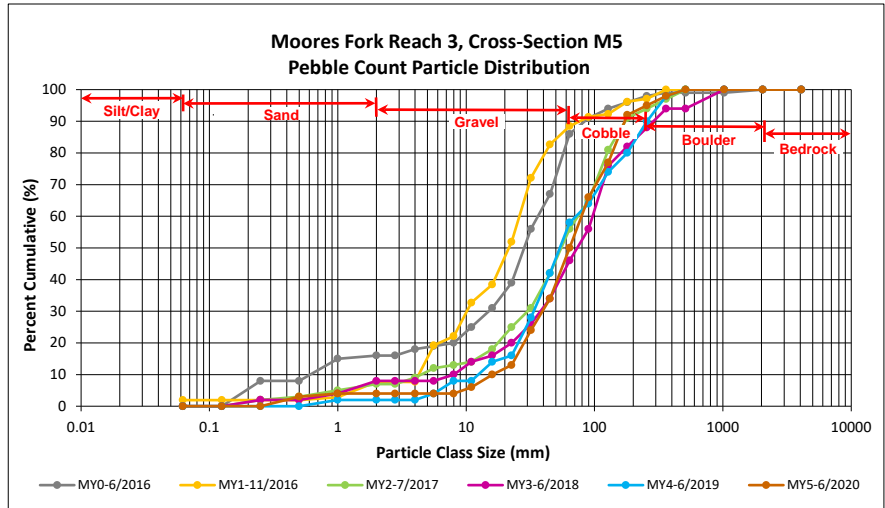


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Moores Fork Reach 3, Cross-Section M5

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000	0.062		0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	3	3	3
	Coarse	0.5	1.0	1	1	4
	Very Coarse	1.0	2.0			4
GRAVEL	Very Fine	2.0	2.8			4
	Very Fine	2.8	4.0			4
	Fine	4.0	5.6			4
	Fine	5.6	8.0			4
	Medium	8.0	11.0	2	2	6
	Medium	11.0	16.0	4	4	10
	Coarse	16.0	22.6	3	3	13
	Coarse	22.6	32	11	11	24
COBBLE	Very Coarse	32	45	10	10	34
	Very Coarse	45	64	16	16	50
	Small	64	90	16	16	66
	Small	90	128	11	11	77
COBBLE	Large	128	180	15	15	92
	Large	180	256	3	3	95
	Large	256	362	3	3	98
BOULDER	Small	362	512	2	2	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
		Total			100	100

Cross-Section M5	
Channel materials (mm)	
D ₁₆ =	24.8
D ₃₅ =	46.0
D ₅₀ =	64.0
D ₈₄ =	150.1
D ₉₅ =	256.0
D ₁₀₀ =	512.0

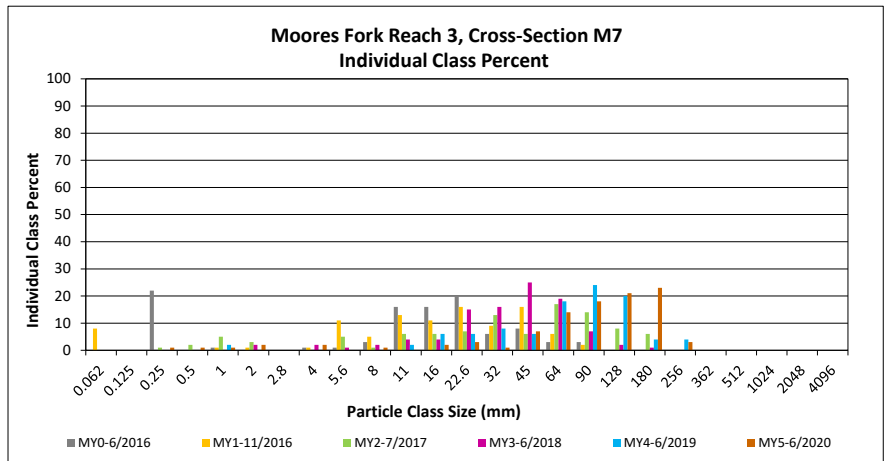
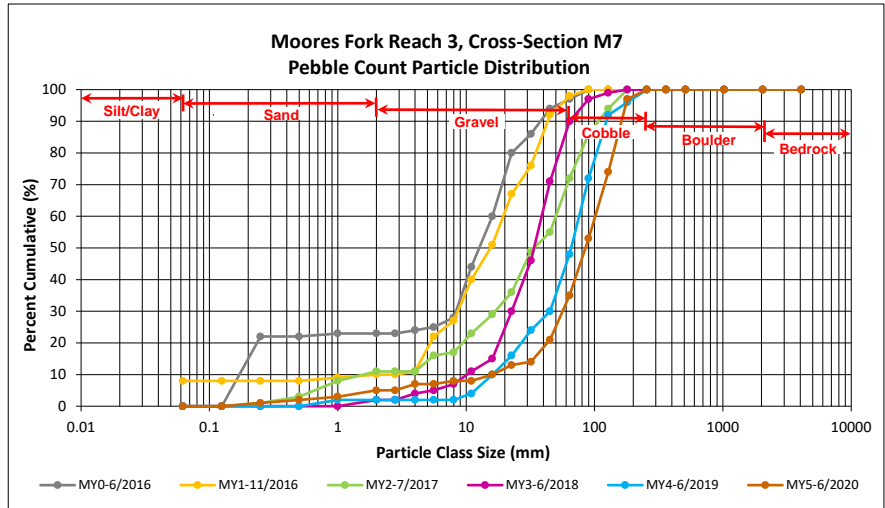


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Moores Fork Reach 3, Cross-Section M7

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	1	1	1
	Medium	0.25	0.50	1	1	2
	Coarse	0.5	1.0	1	1	3
	Very Coarse	1.0	2.0	2	2	5
GRAVEL	Very Fine	2.0	2.8			5
	Very Fine	2.8	4.0	2	2	7
	Fine	4.0	5.6			7
	Fine	5.6	8.0	1	1	8
	Medium	8.0	11.0			8
	Medium	11.0	16.0	2	2	10
	Coarse	16.0	22.6	3	3	13
	Coarse	22.6	32	1	1	14
	Very Coarse	32	45	7	7	21
	Very Coarse	45	64	14	14	35
COBBLE	Small	64	90	18	18	53
	Small	90	128	21	21	74
	Large	128	180	23	23	97
	Large	180	256	3	3	100
BEDROCK	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
BEDROCK	Large/Very Large	1024	2048			100
	Bedrock	2048	>2048			100
		Total		100	100	100

Cross-Section M7	
Channel materials (mm)	
D ₁₆ =	35.3
D ₃₅ =	64.0
D ₅₀ =	85.0
D ₈₄ =	148.5
D ₉₅ =	174.7
D ₁₀₀ =	256.0

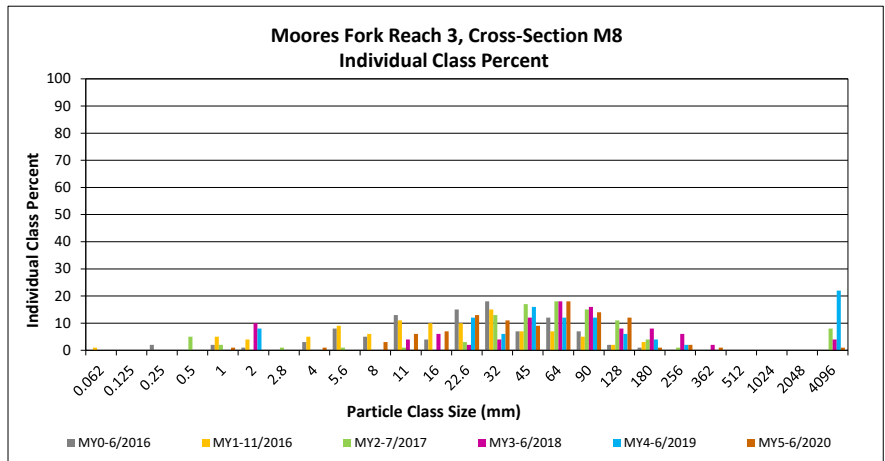
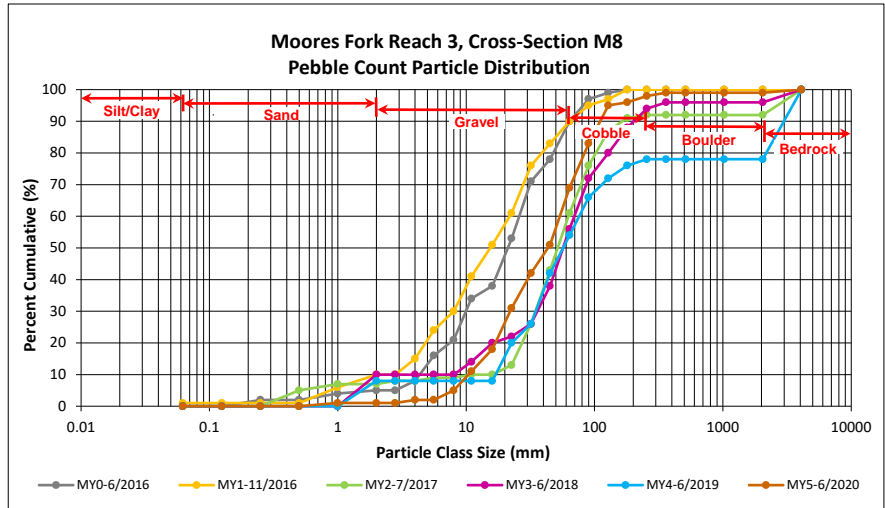


Cross-Section Pebble Count Plots
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
Monitoring Year 5 - 2020

Moores Fork Reach 3, Cross-Section M8

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY		Silt/Clay	0.000 0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0	1	1	1
	Very Coarse	1.0	2.0			1
GRAVEL	Very Fine	2.0	2.8			1
	Very Fine	2.8	4.0	1	1	2
	Fine	4.0	5.6			2
	Fine	5.6	8.0	3	3	5
	Medium	8.0	11.0	6	6	11
	Medium	11.0	16.0	7	7	18
	Coarse	16.0	22.6	13	13	31
	Coarse	22.6	32	11	11	42
COBBLE	Very Coarse	32	45	9	9	51
	Very Coarse	45	64	18	18	69
	Small	64	90	14	14	83
	Small	90	128	12	12	95
	Large	128	180	1	1	96
BEDROCK	Large	180	256	2	2	98
	Small	256	362	1	1	99
	Small	362	512			99
BEDROCK	Medium	512	1024			99
	Large/Very Large	1024	2048			99
	Bedrock	2048	>2048	1	1	100
		Total		100	100	100

Cross-Section M8	
Channel materials (mm)	
D ₁₆ =	14.4
D ₃₅ =	25.6
D ₅₀ =	43.3
D ₈₄ =	92.7
D ₉₅ =	128.0
D ₁₀₀ =	>2048



APPENDIX E. Hydrology Summary Data and Plots

Table 13. Verification of Bankfull Events

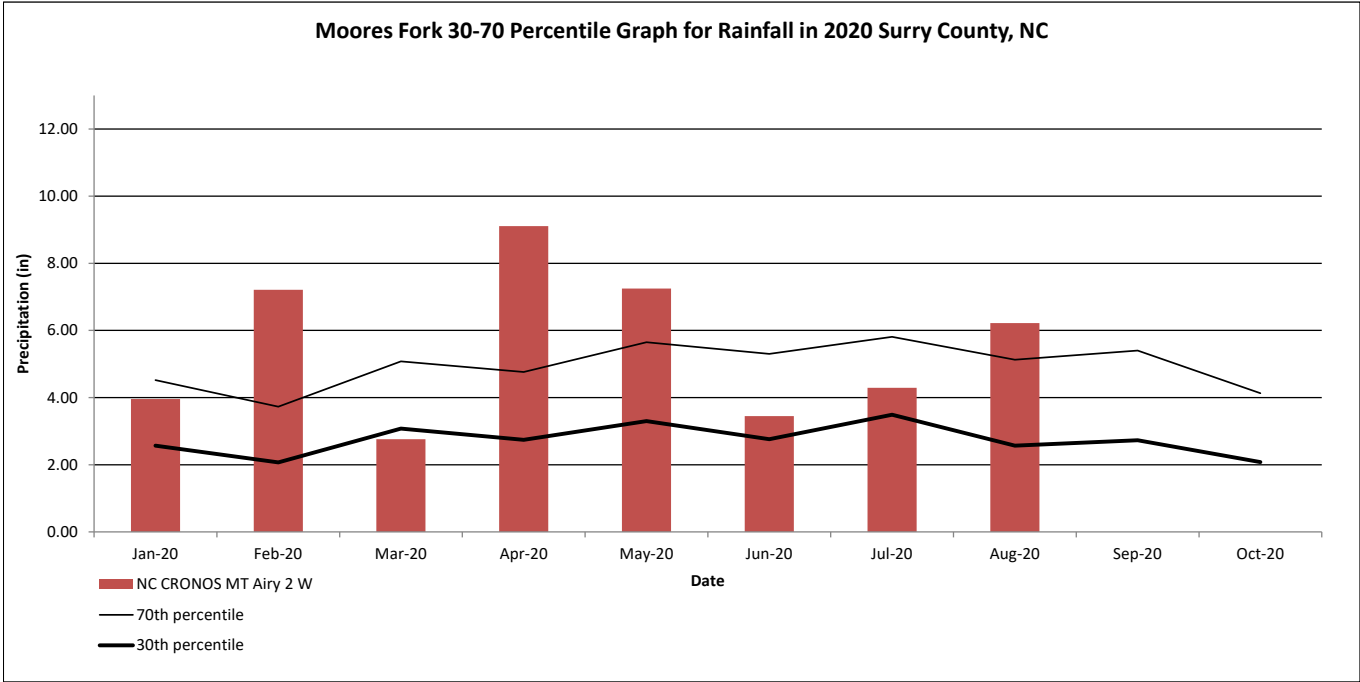
Moores Fork Stream Mitigation Project

DMS Project No.94709

Monitoring Year 5 - 2020

Reach	Monitoring Year	Date of Data Collection	Date of Occurrence	Method	Measurement (ft)
Moores Fork Reach 2	MY1	10/25/2016	~8/4/2016	Crest Gage	1.30
	MY2	7/10/2017	~5/25/2017	Crest Gage	2.55
	MY3	4/12/2018	~3/25/2018	Crest Gage	2.73
	MY4	3/13/2019	~2/24/2019	Crest Gage	2.30
		6/19/2019	~6/18/2019	Debris wracklines	N/A
	MY5	2/27/2020	~1/25/2020	Debris wracklines	N/A
9/8/2020		~9/1/2020	Debris wracklines	N/A	
Silage Reach 2	MY1	10/25/2016	~8/4/2016	Crest Gage	0.75
	MY3	4/12/2018	~3/25/2018	Debris wracklines	N/A
	MY4	6/19/2019	~6/18/2019	Crest Gage/Debris wracklines	N/A
	MY5	9/8/2020	~9/1/2020	Debris wracklines	N/A

Monthly Rainfall Data
 Moores Fork Stream Mitigation Project
 DMS Project No.94709
 Monitoring Year 5 - 2020



¹ 2020 rainfall collected from NC CRONOS Station Name: MT AIRY 2 W (NCCRONOS, 2020)

² 30th and 70th percentile rainfall data collected from weather station MT AIRY 2 W, NC (NCCRONOS, 2020)

APPENDIX F. Invasive Species Treatment Logs

MEMO

To: Matthew Reid and Kelly Phillips, NCDEQ
From: Ben Balke and Joe Secoges
Date: October 2020
Subject: Moore's Fork Mitigation Site Maintenance Report

For reporting purposes, Eastern Forest Consultants produced a map delineating five management units. The units are labeled A through E on a map attached to the memo to help describe tasks performed in various areas of the property.

Tasks Performed:

- **Management Area A-**

- Management Area A was treated on Friday May 29, 2020. Invasive species found in the management area include Japanese honeysuckle, Chinese privet, multi-flora rose and oriental bittersweet. There were large amounts of bittersweet sprayed in the cove area on the southwest side. A few Chinese privet were sporadically scattered throughout all of the area, but populations have been significantly reduced over the past two years. Rodeo and Vastlan were used at a rate of 4 oz per gallon and 2 oz per gallon respectively.
- Kudzu patches in the area were treated on July 20, 2020. Kudzu located away from the creeks was treated using the maximum rate of Transline (21 oz / ac) while kudzu near water was treated using Vastlan at 6 oz / gallon of water. The kudzu locator map from 2018 has been updated to show the level of infestation found at each kudzu patch in 2020.

- **Management Area B-**

- Management Area B was treated on May 29, 2020. Invasive species found in the area include Japanese honeysuckle, kudzu, Chinese privet, multi-flora rose and oriental bittersweet. Several honeysuckle and bittersweet patches have become established along field edges. Kudzu patches were also found to be mostly pushed back to the higher reaches of trees. Rodeo and Vastlan were used at a rate of 4 oz per gallon and 2 oz per gallon respectively.
- On June 2, 2020 Eastern Forest Consultants treated the eastern and southern edges of Management Area B along field edges using the high volume ATV sprayer. Invasive species such as oriental bittersweet, kudzu, Japanese honeysuckle, multi-flora rose, Chinese privet and morning glory were all treated in this area. Primary

targets were kudzu and oriental bittersweet that had climbed high into the trees. Rodeo and Vastlan were used at a rate of 4 oz per gallon and 2 oz per gallon respectively.

- Kudzu patches in the area were treated on July 20, 2020. Kudzu located away from the creeks was treated using the maximum rate of Transline (21 oz / ac) while kudzu near water was treated using Vastlan at 6 oz / gallon of water. The kudzu locator map from 2018 has been updated to show the level of infestation found at each kudzu patch in 2020.

- **Management Area C-**

- Management Area C was treated May 29, 2020. Invasive species found in the management area include Japanese honeysuckle, kudzu, Chinese privet, multi-flora rose and oriental bittersweet. The north side of the stream area was not heavily populated with invasive species. The south side of the stream was more heavily populated, but was still sporadic. Rodeo and Vastlan were used at a rate of 4 oz per gallon and 2 oz per gallon respectively.
- Kudzu patches in the area were treated on July 20, 2020. Kudzu located away from the creeks was treated using the maximum rate of Transline (21 oz / ac) while kudzu near water was treated using Vastlan at 6 oz / gallon of water. The kudzu locator map from 2018 has been updated to show the level of infestation found at each kudzu patch in 2020.

- **Management Area D-**

- Management Area D was treated May 29, 2020. Invasive species found in the management area include Japanese honeysuckle, Chinese privet, multi-flora rose and oriental bittersweet. Invasive species populations in this area were sporadic. Rodeo and Vastlan were used at a rate of 4 oz per gallon and 2 oz per gallon respectively.
- On June 2, 2020 Eastern Forest Consultants treated the area near the gravel driveway and powerline right-of-way intersection using the high volume ATV sprayer for kudzu, oriental bittersweet, multi-flora rose, Chinese privet, and Japanese honeysuckle, mainly targeting vines climbing high into the trees. Rodeo and Vastlan were used at a rate of 4 oz per gallon and 2 oz per gallon respectively.
- Kudzu patches in the area were treated on July 20, 2020. Kudzu located away from the creeks was treated using the maximum rate of Transline (21 oz / ac) while kudzu near water was treated using Vastlan at 6 oz / gallon of water. The kudzu locator map from 2018 has been updated to show the level of infestation found at each kudzu patch in 2020.

- **Management Area E-**
 - Management Area E was treated on May 29, 2020. Invasive species found in the management area include Japanese honeysuckle, kudzu, Chinese privet, multi-flora rose and Oriental bittersweet. The area was dense in honeysuckle, and bittersweet. Rodeo and Vastlan were used at a rate of 4 oz per gallon and 2 oz per gallon respectively.
 - Kudzu patches in the area were treated on July 20, 2020. Kudzu located away from the creeks was treated using the maximum rate of Transline (21 oz / ac) while kudzu near water was treated using Vastlan at 6 oz / gallon of water. The kudzu locator map from 2018 has been updated to show the level of infestation found at each kudzu patch in 2020.

Other Notable Information:

- Kudzu vines property-wide that were still alive because they were too tall or got missed on the 7/20/2020 treatment were clipped with loppers during a 9/3/2020 site visit.

PESTICIDE/HERBICIDE APPLICATION RECORD

PROPERTY OWNER/MANAGER:

Name: Matthew Reid
NC DEQ DMS

Address: 5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

Telephone #: 828-231-7912

ADDRESS/LOCATION OF APPLICATION SITE (if different than above):

Address/Location: Moore's Fork Mitigation Site – Surry County

CERTIFIED APPLICATOR:

Joseph M. Secoges (Applicator Cert. # 026-34911 / Consultant Cert. # 030-1312)
Eastern Forest Consultants LLC
P.O. Box 1577
Clemmons, NC 27012
240-446-1583

DATE + START/END TIME OF APPLICATION: 5/29/2020; 0900-1600

RESTRICTED ENTRY INTERVAL (REI):

DURATION (# OF HOURS): 4 Hours

EXPIRATION (DATE/TIME): 5/30/2020 @ 2000

PLANTS/SITES TREATED: Upland Area around Stream

PRINCIPLE PESTS TO BE CONTROLLED: Privet, Honeysuckle, Multi-flora
Rose, Kudzu, Bittersweet

ACREAGE, AREA, OR NUMBER OF PLANTS TREATED:

Spot Spray As Needed

IDENTIFICATION/AMOUNT OF PESTICIDES USED:

- 1) Brand/Common Name: Rodeo
EPA Reg. Number: 62719-324
Amount Applied to Site: 144 oz
Application Rate: 4 oz/gallon
- 2) Brand/Common Name: Vastlan
EPA Reg. Number: 62719-687
Amount Applied to Site: 72 oz
Application Rate: 2 oz/gallon
- 3) Brand/Common Name: CWC 90 Surfactant
EPA Reg. Number: N/A
Amount Applied to Site: 36 oz
Application Rate: 1 oz / gallon
- 4) Brand/Common Name: Bullseye Spray Pattern Indicator
EPA Reg. Number: N/A
Amount Applied to Site: 36 oz
Application Rate: 1 oz / gallon

DILUENTS USED (Water, Oil, Fuel, etc.):

- 1) Diluent: Water
Amount Applied to Site: 36 gallons
Application Rate: As Needed
- 2) Diluent:
Amount Applied to Site:
Application Rate:

TYPE OF APPLICATION EQUIPMENT USED: Back-pack Sprayers

WEATHER:

Temp: 65-70 deg F

Wind Speed: 0-5 mph

Wind Direction: variable

NOTES: Joe not on site. Treated by Ben Balke, Caleb Cothron, and Luke Whiteside. All areas addressed except for spots with thick bittersweet and kudzu which will be treated later using ATV sprayer from field edges. Light rain fell around 12:30pm...not expected to have impact of effectiveness of treatment.

PESTICIDE/HERBICIDE APPLICATION RECORD

PROPERTY OWNER/MANAGER:

Name: Matthew Reid
NC DEQ DMS

Address: 5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

Telephone #: 828-231-7912

ADDRESS/LOCATION OF APPLICATION SITE (if different than above):

Address/Location: Moore's Fork Mitigation Site – Surry County

CERTIFIED APPLICATOR:

Joseph M. Secoges (Applicator Cert. # 026-34911 / Consultant Cert. # 030-1312)
Eastern Forest Consultants LLC
P.O. Box 1577
Clemmons, NC 27012
240-446-1583

DATE + START/END TIME OF APPLICATION: 6/2/2020; 0930-1500

RESTRICTED ENTRY INTERVAL (REI):

DURATION (# OF HOURS): 4 Hours

EXPIRATION (DATE/TIME): 6/2/2020 @ 1900

PLANTS/SITES TREATED: Forest Edges

PRINCIPLE PESTS TO BE CONTROLLED: Privet, Honeysuckle, Multi-flora
Rose, Kudzu, Bittersweet

ACREAGE, AREA, OR NUMBER OF PLANTS TREATED:

Spot Spray As Needed

IDENTIFICATION/AMOUNT OF PESTICIDES USED:

- 1) Brand/Common Name: Rodeo
EPA Reg. Number: 62719-324
Amount Applied to Site: 280 oz
Application Rate: 4 oz/gallon
- 2) Brand/Common Name: Vastlan
EPA Reg. Number: 62719-687
Amount Applied to Site: 140 oz
Application Rate: 2 oz/gallon
- 3) Brand/Common Name: CWC 90 Surfactant
EPA Reg. Number: N/A
Amount Applied to Site: 70 oz
Application Rate: 1 oz / gallon
- 4) Brand/Common Name: Bullseye Spray Pattern Indicator
EPA Reg. Number: N/A
Amount Applied to Site: 70 oz
Application Rate: 1 oz / gallon

DILUENTS USED (Water, Oil, Fuel, etc.):

- 1) Diluent: Water
Amount Applied to Site: 70 gallons
Application Rate: As Needed
- 2) Diluent:
Amount Applied to Site:
Application Rate:

TYPE OF APPLICATION EQUIPMENT USED: ATV Sprayer

WEATHER:

Temp: 70-85 deg F

Wind Speed: 5-15 mph

Wind Direction: mostly due north

NOTES: Sprayed with Ben Balke. Mostly treated wood edges on north and south of management unit B

PESTICIDE/HERBICIDE APPLICATION RECORD

PROPERTY OWNER/MANAGER:

Name: Matthew Reid
NC DEQ DMS

Address: 5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

Telephone #: 828-231-7912

ADDRESS/LOCATION OF APPLICATION SITE (if different than above):

Address/Location: Moore's Fork Mitigation Site – Surry County

CERTIFIED APPLICATOR:

Joseph M. Secoges (Applicator Cert. # 026-34911 / Consultant Cert. # 030-1312)
Eastern Forest Consultants LLC
P.O. Box 1577
Clemmons, NC 27012
240-446-1583

DATE + START/END TIME OF APPLICATION: 7/20/2020; 0930-1500

RESTRICTED ENTRY INTERVAL (REI):

DURATION (# OF HOURS): 12 Hours

EXPIRATION (DATE/TIME): 7/21/2020 @ 0300

PLANTS/SITES TREATED: Upland Area around Stream

PRINCIPLE PESTS TO BE CONTROLLED: Kudzu

ACREAGE, AREA, OR NUMBER OF PLANTS TREATED:

Spot Spray As Needed

IDENTIFICATION/AMOUNT OF PESTICIDES USED:

- 1) Brand/Common Name: Transline
EPA Reg. Number: 62719-259
Amount Applied to Site: 21 oz
Application Rate: 21 oz/acre
- 2) Brand/Common Name: Vastlan
EPA Reg. Number: 62719-687
Amount Applied to Site: 18 oz
Application Rate: 6 oz/gallon
- 3) Brand/Common Name: CWC 90 Surfactant
EPA Reg. Number: N/A
Amount Applied to Site: 15 oz
Application Rate: 1 oz / gallon
- 4) Brand/Common Name: Bullseye Spray Pattern Indicator
EPA Reg. Number: N/A
Amount Applied to Site: 15 oz
Application Rate: 1 oz / gallon

DILUENTS USED (Water, Oil, Fuel, etc.):

- 1) Diluent: Water
Amount Applied to Site: 15 gallons
Application Rate: As Needed
- 2) Diluent:
Amount Applied to Site:
Application Rate:

TYPE OF APPLICATION EQUIPMENT USED: Back-pack Sprayers

WEATHER:

Temp: 85-95 deg F

Wind Speed: 0-5 mph

Wind Direction: variable

NOTES: Joe not on site. Treated by John Smith, Caleb Cothron, and Luke Whiteside. Transline was used away from creek. Kudzu near creek was treated with Vastlan.

2018 Kudzu Locations - July 2020 Status



- Conservation Easement
- Stream Restoration
- Stream Preservation
- Stream Enhancement Level I
- Stream Enhancement Level I; Reduced Credit
- Stream Enhancement Level II
- Reach Breaks
- Existing Wetland
- Overhead Power Easement
- Cross-Section
- Crest Gauge
- Vegetation Monitoring Plots (VP) - MY2
 - Criteria Met
 - Criteria Not Met
- Vegetation Areas of Concern - MY3
 - Invasive Plant Population
 - Bare/poor Herbaceous Cover

Site Assessment Report
 Integrated Current Condition Plan View (Key)
 Moores Fork Stream Mitigation Project
 DMS Project No. 94709
 Monitoring Year 3 - 2018
 Surry County, NC

0-1 Little / No Kudzu Found
 2 Moderate Infestation
 3 Heavy Infestation

