YEAR 2 (2017) MONITORING REPORT
AYCOCK SPRINGS
STREAM AND WETLAND MITIGATION SITE
ALAMANCE COUNTY, NORTH CAROLINA
DMS PROJECT NO. 96312
FULL DELIVERY CONTRACT NO. 5791

CAPE FEAR RIVER BASIN
CATALOGING UNIT 03030002

Data Collection – May-October 2017

PREPARED FOR:

N.C. DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1601 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1601

January 2018

YEAR 2 (2017) MONITORING REPORT
AYCOCK SPRINGS
STREAM AND WETLAND MITIGATION SITE
ALAMANCE COUNTY, NORTH CAROLINA
DMS PROJECT NO. 96312
FULL DELIVERY CONTRACT NO. 5791

CAPE FEAR RIVER BASIN
CATALOGING UNIT 03030002

Data Collection – May-October 2017

PREPARED BY:

RESTORATION SYSTEMS, LLC
1101 HAYNES STREET, SUITE 211
RALEIGH, NORTH CAROLINA 27604

AND

AXIOM ENVIRONMENTAL, INC.
218 SNOW AVENUE
RALEIGH, NORTH CAROLINA 27603

January 2018

Table of Contents

Appendices

1.0 EXECUTIVE SUMMARY

Monitoring Year 2 (2017), of the Aycock Springs Stream and Wetland Mitigation Site (Site), showed a continued trend towards long-term stability and success of the project. In October of 2017, the NC IRT released Yr. 1 monitoring credits as proposed without condition.

Year 2 (2017) stem count measurements were performed on July 25, 2017, and showed a Site average of 379 planted stems per acre (excluding livestakes) and 494 stems per acre when including natural recruits but excluding livestakes. Twelve of the fourteen individual vegetation plots met success criteria based on planted stems alone. When including naturally recruited stems of box elder (*Acer negundo*) and elm (*Ulmus* sp.), plot 13 was above success criteria.

Five additional temporary 50-meter by 2-meter or 25-meter by 4-meter vegetation survey transects were established in 2017 in areas of replanting. Stem counts were performed in April and again in October, with October results reporting an average density of 477 stems per acre. Bare root planting conducted after construction continues to struggle in areas where remedial planting occurred. However, monitoring efforts, do indicate the remedial planting has been successful. RS is not proposing additional replanting or remedial action for vegetation at this time but will continue to use random linear vegetation plots to help assist in vegetation monitoring efforts.

Axiom Environmental performed Year 2 (2017) stream measurements on April 19th and 20th. As a whole, monitoring measurements indicate minimal changes in the cross-sections as compared to Yr. 1 (2016) data. The channel geometry compares favorably with the proposed conditions as outlined in the detailed mitigation plan and as constructed.

Immediately after construction and before ground cover established, multiple heavy rain events (2+ inches) caused some sedimentation in the streambed. This aggradation can be seen in several of the UT-1 and UT-2 cross-sections and noted during the 2016 monitoring year review. Both visual and physical monitoring of the reaches did not indicate further issues, sediment transport appears to have naturalized, and adjacent riparian areas have stabilized.

The above-mentioned rain events were also responsible for moderate bed erosion of two rifles, approximately 30 feet in length near UT-1 cross-section 9. Streambed erosion was noted shortly after as-built measurements were taken. RS created and implemented a remedial action plan during late winter of 2016/2017 (see Section 3.0). These repairs appeared stable during Year 2 (2017) monitoring and will continue to be monitored during subsequent monitoring years as will sediment transport within the UT-1 and UT-2.

All in-stream structures are intact and functioning as designed and no stream areas of concern were identified during Year 2 (2017) monitoring. As part of the stream morphology analysis (Table 12a-f, Appendix D), bank height ratios were calculated for each cross-section. This value shows the extent of aggradation and/or down-cutting in the streambed. Several cross-sections exhibited small variation in bank height ratio during Year 2 (2017). Results are summarized and discussed in Section 3.0 of this report and further detailed on the specific cross-section details located in Appendix D.

During the fall/winter, monthly visual monitoring efforts revealed the establishment of a beaver dam within the Enhancement-II reach of Travis Creek, between the outfalls of UT-3 and 4. RS is working with the landowner on trapping resident beaver over the winter of 2017/2018 and will physically remove the dam just before the 2018 growing season. No issues with cattle intrusion or fence failure were observed during Yr. 2 monitoring efforts.

2.0 PROJECT SUMMARY

The Aycock Springs Stream and Wetland Mitigation Site (Site) encompasses approximately 13 acres located roughly 1.5 miles north of Elon and Gibsonville in western Alamance County within 14-digit Cataloging Unit and Targeted Local Watershed 03030002030010 of the Cape Fear River Basin (Figure 1, Appendix B and Table 4, Appendix A). Prior to construction, the Site consisted of agricultural land used for livestock grazing, hay production, and timber harvest. Streams were cleared, trampled by livestock, eroded vertically and laterally, and received extensive sediment and nutrient inputs from livestock and timber harvest activities. Stream impacts in Travis Creek also occurred due to a breached dam that impounded water during storm events. In addition, streamside wetlands were drained by channel incision, soil compaction, the loss of forest vegetation, and land uses. Completed project activities, reporting history, completion dates, project contacts, and project attributes are summarized in Tables 1-4 (Appendix A).

Positive aspects supporting mitigation activities at the Site include the following.

- Streams have a Best Usage Classification of WS-V, NSW
- Located in a Targeted Local Watershed and within the NCDMS Travis, Tickle, Little Alamance Local Watershed Planning (LWP) Area
- Travis Creek is listed on the NCDENR 2012 303(d) list for ecological/biological integrity
- Immediately south and abutting the Site is a property identified in the *Little Alamance, Travis, & Tickle Creek Watersheds Restoration Plan* (PTCOG 2008) as a target property for wetland restoration and streambank enhancement/conservation
- Immediately west of the Site is a large tract associated with Guilford County open space

Based on the *Cape Fear River Basin Restoration Priorities Report 2009* (NCEEP 2009) and the *Little Alamance, Travis, & Tickle Creek Watersheds Restoration Plan* (PTCOG 2008), Targeted Local Watershed 03030002030010 is not meeting its designated use of supporting aquatic life. Agricultural land use appears to be the main source of stress in the Hydrologic Unit, as well as land clearing and poor riparian management. This project will meet the eight priority goals of the Travis, Tickle, Little Alamance Local Watershed Plan (LWP) including the following.

1) Reduce sediment loading
2) Reduce nutrient loading
3) Manage stormwater runoff
4) Reduce toxic inputs
5) Provide and improve instream habitat
6) Provide and improve terrestrial habitat
7) Improve stream stability
8) Improve hydrologic function

The following six goals were identified by the Stakeholder group of the Travis, Tickle, Little Alamance LWP Phase I assessment which address the water quality impacts and watershed needs in all of the Little Alamance, Travis, Tickle watersheds in 2006.

1) Increase local government awareness of the impacts of urban growth on water resources
2) Strengthen watershed protection standards
3) Improve water quality through stormwater management
4) Identify and rank parcels for retrofits, stream repair, preservation, and/or conservation
5) Assess aquatic health to identify stressors that are the most likely causes of poor biological conditions
6) Meet requirements of outside funding sources for implementation of projects

The following table summarizes the project goals/objectives and proposed functional uplift based on restoration activities and observations of two reference areas located in the vicinity of the Site. Goals and objectives target functional uplift identified in the Travis, Tickle, Little Alamance LWP and based on stream/wetland functional assessments developed by the regulatory agencies.

Project Goals and Objectives

Project Goal/Objective	How Goal/Objective will be Accomplished
Improve Hydrology	
Restore Floodplain Access	Building a new channel at the historic floodplain elevation to restore overbank flows
Restore Wooded Riparian Buffer	Planting a woody riparian buffer
Restore Stream Stability	Providing proper channel width and depth, stabilizing channel banks, providing gravel/cobble substrate, planting a woody riparian buffer, and removing cattle
Improve Sediment Transport to Convert the UTs from Sand/Silt Dominated to Gravel/Cobble Dominated Streams	
Improve Stream Geomorphology	
Increase Surface Storage and Retention	Building a new channel at the historic floodplain elevation restoring overbank flows, removing cattle, scarifying compacted soils, and planting woody vegetation
Restore Appropriate Inundation/Duration	
Increase Subsurface Storage and Retention	Raising the stream bed elevation and rip compacted soils
Improve Water Quality	
Increase Upland Pollutant Filtration	Planting a native, woody riparian buffer
Increase Thermoregulation	Planting a native, woody riparian buffer
Reduce Stressors and Sources of Pollution	Removing cattle and other agricultural inputs
Increase Removal and Retention of Pathogens, Particulates (Sediments), Dissolved Materials (Nutrients), and Toxins from the Water Column	Raising the stream bed elevation, restoring overbank flows, planting with woody vegetation, removing cattle, increasing surface storage and retention, and restoring appropriate inundation/duration
Increase Energy Dissipation of Overbank/Overland Flows/Stormwater Runoff	Raising the stream bed elevation, restoring overbank flows, and planting with woody vegetation
Restore Habitat	
Restore In-stream Habitat	Building a stable channel with a cobble/gravel bed and planting a woody riparian buffer
Restore Stream-side Habitat	Planting a woody riparian buffer
Improve Vegetation Composition and Structure	

Project construction was completed April 6, 2016 and planting was completed April 8, 2016. Site activities included the restoration of perennial and intermittent stream channels, enhancement (Level II) of perennial stream channel, and re-establishment of riparian wetlands. Priority I restoration of intermittent channels at the Site is imperative to provide significant functional uplift to Site hydrology, water quality, and habitat, in addition to restore adjacent streamside, riparian wetlands. A total of **3581.1 Stream Mitigation Units (SMUs) and 0.5 Riparian Wetland Mitigation Units (WMUs)** are being provided as depicted in the following table.

Stream Mitigation Type	Perennial Stream (linear feet)	Intermittent Stream (linear feet)	Ratio	Stream Mitigation Units
Restoration	**3147**	**90**	1:1	**3237**
Restoration (See Notes below)**		**122**	1:5:1	**81.3**
Enhancement (Level II)	**657**	--	2.5:1	**262.8**
TOTAL	**3804**	**212**		**3581.1**
Wetland Mitigation Type	**Acreage**	**Ratio**	**Riparian Wetland Mitigation Units**	
Riparian Re-establishment	0.5	1:1	0.5	
Riparian Enhancement	1.5*		--	
TOTAL	**2.0**		**0.5**	

* Wetland enhancement acreage is not included in mitigation credit calculations as per RFP 16-005568 requirements.

** Prior to Site selection, the landowner received a violation for unauthorized discharge of fill material into Waters of the United States. Fill resulted from unpermitted upgrades to a farm pond dam, including widening the dam footprint, dredging stream channel, and casting spoil material adjacent to the stream channel on jurisdictional wetlands. Prior to restoration activities the landowner was required to obtain an after-the-fact permit to resolve the violations of Section 301 of the Clean Water Act (Action ID:SAW-2014-00665). In addition, stream reaches and wetland areas associated with the violation have been removed from credit generation.

In addition, the landowner received a violation for riparian buffer impacts due to clearing of trees adjacent to streams draining to Jordan Lake (NOV-2013-BV-0001). As a result of this violation, the upper 122 linear feet of UT 3 has a reduced credit ratio (1.5:1). On-site visits conducted with USACE representatives determined that the functional uplift of project restoration to UT 3 would be satisfactory to generate credit at this ratio.

Stream Success Criteria

Monitoring and success criteria for stream restoration should relate to project goals and objectives. From a mitigation perspective, several of the goals and objectives are assumed to be functionally elevated by restoration activities without direct measurement. Other goals and objectives will be considered successful upon achieving vegetation success criteria. The following summarizes stream success criteria related to goals and objectives.

Project Goal/Objective	Stream Success Criteria
Improve Hydrology	
Restore Floodplain Access	Two overbank events in separate monitoring years will be documented during the monitoring period.
Restore Wooded Riparian Buffer	Attaining Vegetation Success Criteria.
Restore Stream Stability	Cross-sections, monitored annually, will be compared to as-built measurements to determine channel stability and maintenance of channel geomorphology.
Improve Stream Geomorphology	Convert stream channels from unstable G- and F-type channels to stable E- and C- type stream channels.
Increase Surface Storage and Retention	Two overbank events in separate monitoring years, and attaining Wetland and Vegetation Success Criteria.
Restore Appropriate Inundation/Duration	
Increase Subsurface Storage and Retention	Two overbank events will be documented, in separate years, during the monitoring period and documentation of an elevated groundwater table (within 12 inches of the soil surface) for greater than 10 percent of the growing season during average climatic conditions.
Improve Sediment Transport to Convert the UTs from Sand/Silt Dominated to Gravel/Cobble Dominated Streams	Pebble counts documenting coarsening of bed material from pre-existing conditions of sand and silt to post restoration conditions of gravel and cobble.

Improve Water Quality	
Increase Upland Pollutant Filtration	Attaining Wetland and Vegetation Success Criteria (Sections 2.3 and 2.2)
Increase Thermoregulation	Attaining Vegetation Success Criteria (Section 2.2).
Reduce Stressors and Sources of Pollution	Fencing maintained throughout the monitoring period and encroachment within the easement eliminated.
Increase Removal and Retention of Pathogens, Particulates (Sediments), Dissolved Materials (Nutrients), and Toxins from the Water Column	Removal of cattle, documentation of two overbank events in separate monitoring years, and attaining Vegetation Success Criteria (Section 2.2)
Increase Energy Dissipation of Overbank/Overland Flows/Stormwater Runoff	Documentation of two overbank events in separate monitoring years and attaining Vegetation Success Criteria (Section 2.2)
Restore Habitat	
Restore In-stream Habitat	Pebble counts documenting coarsening of bed material from pre-existing conditions of sand and silt to post restoration conditions of gravel and cobble, and attaining Vegetation Success Criteria (Section 2.2)
Restore Stream-side Habitat	Attaining Vegetation Success Criteria (Section 2.2)
Improve Vegetation Composition and Structure	Attaining Vegetation Success Criteria (Section 2.2)

Vegetation Success Criteria

An average density of 320 planted stems per acre must be surviving in the first three monitoring years. Subsequently, 290 planted stems per acre must be surviving in year 4, 260 planted stems per acre in year 5, and 210 planted stems per acre in year 7. In addition, planted vegetation must average 10 feet in height in each plot at year 7 since this Site is located in the Piedmont. Volunteer stems may be considered on a case-by-case basis in determining overall vegetation success; however, volunteer stems should be counted separately from planted stems.

Wetland Success Criteria

Monitoring and success criteria for wetland re-establishment should relate to project goals and objectives. From a mitigation perspective, several of the goals and objectives are assumed to be functionally elevated by restoration activities without direct measurement. Other goals and objectives will be considered successful upon achieving vegetation success criteria. The following summarizes wetland success criteria related to goals and objectives.

Wetland Goals and Success Criteria

Project Goal/Objective	Wetland Success Criteria
Improve Hydrology	
Restore Wooded Riparian Buffer	Attaining Vegetation Success Criteria.
Increase Surface Storage and Retention	Two overbank events in separate monitoring years, and attaining Wetland and Vegetation Success Criteria.
Restore Appropriate Inundation/Duration	
Increase Subsurface Storage and Retention	
Improve Water Quality	
Increase Upland Pollutant Filtration	Attaining Wetland and Vegetation Success Criteria.
Reduce Stressors and Sources of Pollution	Fencing maintained throughout the monitoring period and encroachment within the easement eliminated.
Increase Removal and Retention of Pathogens,	Removal of cattle, documentation of two overbank events in

Particulates (Sediments), Dissolved Materials (Nutrients), and Toxins from the Water Column	separate monitoring years, and attaining Vegetation Success Criteria.
Increase Energy Dissipation of Overbank/Overland Flows/Stormwater Runoff	Documentation of two overbank events in separate monitoring years, and attaining Vegetation Success Criteria.
Restore Habitat	
Restore Stream-side Habitat	Attaining Vegetation Success Criteria.
Improve Vegetation Composition and Structure	

According to the *Soil Survey of Alamance County*, the growing season for Alamance County is from April 17 – October 22 (USDA 1960). However, the start date for the growing season is not typical for the Piedmont region; therefore, for purposes of this project gauge hydrologic success will be determined using data from February 1 - October 22 to more accurately represent the period of biological activity. This will be confirmed annually by soil temperatures and/or bud burst. The growing season will be initiated each year on the documented date of biological activity. Photographic evidence of bud burst and field logs of date and temperature will be included in the annual monitoring reports.

Target hydrological characteristics include saturation or inundation for 10 percent of the monitored period (February 1-October 22), during average climatic conditions. During years with atypical climatic conditions, groundwater gauges in reference wetlands may dictate threshold hydrology success criteria (75 percent of reference). These areas are expected to support hydrophytic vegetation. If wetland parameters are marginal as indicated by vegetation and/or hydrology monitoring, a jurisdictional determination will be performed.

Summary of Monitoring Period/Hydrology Success Criteria by Year

Year	Soil Temperatures/Date Bud Burst Documented	Monitoring Period Used for Determining Success	10 Percent of Monitoring Period
2016 (Year 1)	--	April 17*-October 22 (198 days)	19 days
2017 (Year 2)	Bud burst on red maple (*Acer rubrum*) and soil temperature of 58◦F documented on February 28, 2017	February 28-October 22 (237 days)	23 days
2018 (Year 3)			
2019 (Year 4)			
2020 (Year 5)			

*Gauges were installed on May 5 during year 1 (2016), so April 17 was used as the start of the growing season (NRCS).

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in tables and figures within this report's appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on the NC Division of Mitigation Services (NCDMS) website. All raw data supporting the tables and figures in the appendices are available from NCDMS upon request.

3.0 METHODOLOGY

Monitoring requirements and success criteria outlined in the US Army Corps of Engineers (USACE) April 2003 guidance (*Stream Mitigation Guidelines*) will be followed and are briefly outlined below. Monitoring data collected at the Site should include reference photos, plant survival analysis, channel stability analysis, and biological data, if specifically required by permit conditions.

Wetland hydrology is proposed to be monitored for a period of seven years (years 1-7). Riparian vegetation and stream morphology is proposed to be monitored for a period of seven years with measurements completed in years 1-3, year 5, and year 7. Monitoring reports for years 4 and 6 will include photo documentation of stream stability and wetland hydrology monitoring data. If monitoring demonstrates the Site is successful by year 5 and no concerns have been identified, Restoration Systems (RS) may propose to terminate monitoring at the Site and forego monitoring requirements for years 6 and 7. Early closure will only be provided through written approval from the USACE in consultation with the Interagency Review Team (NC IRT). Monitoring will be conducted by Axiom Environmental, Inc (AXE). Annual monitoring reports of the data collected will be submitted to the NCDMS by RS no later than December 31 of each monitoring year data is collected.

3.1 Streams

Annual monitoring will include development of channel cross-sections and substrate on riffles and pools. Data to be presented in graphic and tabular format will include 1) cross-sectional area, 2) bankfull width, 3) average depth, 4) maximum depth, 5) width-to-depth ratio, 6) bank height ratio, and 7) entrenchment ratio. Longitudinal profiles will not be measured routinely unless monitoring demonstrates channel bank or bed instability, in which case, longitudinal profiles may be required by the USACE along reaches of concern to track changes and demonstrate stability.

Visual assessment of in-stream structures will be conducted to determine if failure has occurred. Failure of a structure may be indicated by collapse of the structure, undermining of the structure, abandonment of the channel around the structure, and/or stream flow beneath the structure. In addition, visual assessments of the entire channel will be conducted in years 1-3, 5, and 7 of monitoring as outlined in NCDMS *Monitoring Requirements and Reporting Standards for Stream and/or Wetland Mitigation*. Areas of concern will be depicted on a plan view figure identifying the location of concern along with a written assessment and photograph of the area.

Year 2 (2017) Stream measurements were performed April 19-20. As a whole, monitoring measurements indicate minimal changes in the cross-sections as compared to as-built and Year 1 data. The channel geometry compares favorably with the proposed conditions as set forth in the detailed mitigation plan and as constructed.

Immediately after construction and before ground cover established, multiple heavy rain events (2+ inches) caused some sedimentation in the streambed. This aggradation can be seen in several of the UT-1 and UT-2 cross-sections and noted during the 2016 monitoring year review. Both visual and physical monitoring of the reaches did not indicate further issues, sediment transport appears to have naturalized, and adjacent riparian areas have stabilized.

The above-mentioned rain events were also responsible for moderate bed erosion of two rifles, approximately 30 feet in length near UT-1 cross-section 9. Streambed erosion was noted shortly after as-built measurements were taken. RS created and implemented a remedial action plan during late winter of 2016/2017 (see Section 3.0). These repairs appeared stable during Year 2 (2017) monitoring and will continue to be monitored during subsequent monitoring years as will sediment transport within the UT-1 and UT-2.

As part of the stream morphology analysis (Table 12a-f, Appendix D), bank height ratios were calculated for each cross-section. This value shows the extent of aggradation and/or down-cutting in the streambed. Several cross-sections exhibited small variation in bank height ratio during Year 2 (2017). These are summarized and discussed in the table below:

XS #	Reach	BHR	Notes
2	Travis Cr	1.04	
4	Travis Cr	1.04	
5	Travis Cr		Sediment deposition in pool appears natural and is not expected to lead to instability.
7	Travis Cr		Sediment deposition in pool appears natural and is not expected to lead to instability.
11	Travis Cr	1.06	
12	Travis Cr	1.03	
13	Travis Cr		Sediment deposition in pool appears natural and is not expected to lead to instability.
8 and 9	UT 1		Cross sections 8 and 9 (UT 1) are located in the vicinity of a bed material repair. Additional bed material was added by hand in this reach.
13	UT 1		Point bar development appears stable after years 1 and 2 monitoring.
16	UT 1		Sediment transport appears to be natural and has stabilized during years 1 and 2 monitoring. No problems appears to be occurring in this reach.
17	UT 1	1.14	No problems have been noted in this reach. Elevated BHR results from shallow channel depth.
18	UT 1	1.33	No problems have been noted in this reach. Elevated BHR results from shallow channel depth.
19	UT 3		Point bar development appears stable after years 1 and 2 monitoring.
21	UT 4		Point bar development appears stable after years 1 and 2 monitoring.
23	UT 5	1.17	No problems have been noted in this reach. Elevated BHR results from shallow channel depth.

Across the site, all in-stream structures are intact and functioning as designed. No stream areas of concern were identified during Year 2 (2017) monitoring. Tables for annual quantitative assessments are included in Appendix D.

3.2 Vegetation

After planting was completed on April 8, 2016, an initial evaluation was performed to verify planting methods and to determine initial species composition and density. For quantitative vegetation sampling, 14 sample plots (10-meter by 10-meter) were installed within the Site per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). In each sample plot, vegetation parameters to be monitored include species composition and species density. Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph.

Year 2 (2017) stem count measurements were performed on July 25, 2017 and indicate an average of 379 planted stems per acre (excluding livestakes) across the Site; therefore, the Site is meeting vegetation success criteria. Twelve of the fourteen individual vegetation plots met success criteria based on planted stems alone. When including naturally recruited stems of box elder (*Acer negundo*) and elm (*Ulmus* sp.), plot 13 was above success criteria. Year 2 (2017) vegetation plot information can be found in Appendix C.

Year 1 (2016) vegetation data showed clearly that bare root planting did not take well and success criteria were not being met. In a proactive approach, RS worked with Carolina Silvics, on developing a remedial action plan in the late fall of 2016. During the week of December 20th, 2016, RS implemented that plan by planting 1,030 containerized trees, consisting of 755 1-gallon pots and 275 3-gallon pots. Specific species planted included the following: *Betula nigra, Fraxinus pennsylvanica, Platanus occiendentalis, Quercus falcata, Quercus nigra, Quercus palustris, Quercus phellos, and Quercus rubra*. The remedial planting plan report detailing location of planting and density is provided in Appendix G.

Five additional temporary 50-meter by 2-meter or 25-meter by 4-meter vegetation survey transects were established in 2017 in areas of replanting. Stem counts were performed in April and again in October, with October results reporting an average density of 477 stems per acre. Bare root planting conducted after construction continues to struggle in areas where remedial planting occurred. However, monitoring efforts, do indicate the remedial planting has been successful. RS is not proposing additional replanting or remedial action for vegetation at this time but will continue to use random linear vegetation plots to help assist in vegetation monitoring efforts.

3.3 Wetland Hydrology

Three groundwater monitoring gauges were installed to take measurements after hydrological modifications were performed at the Site. Hydrological sampling will continue throughout the growing season at intervals necessary to satisfy jurisdictional hydrology success criteria (USEPA 1990). A surface water gauge has been installed in Tributary 3 to monitor flow regime of the tributary. Approximate locations of gauges are depicted on Figure 2 (Appendix A). An on-site rain gauge will document rainfall data for comparison of groundwater conditions with extended drought conditions and floodplain crest gauges will confirm overbank flooding events.

All groundwater gauges were successful in year 2 (2017) (Appendix E).

3.4 Biotic Community Change

Changes in the biotic community are anticipated from a shift in habitat opportunities as tributaries are restored. In-stream, biological monitoring is proposed to track the changes during the monitoring period. The benthic macroinvertebrate community will be sampled using NCDWQ protocols found in the *Standard Operating Procedures for Benthic Macroinvertebrates* (NCDWQ 2006) and *Benthic Macroinvertebrate Protocols for Compensatory Stream Restoration Projects* (NCDWQ 2001). Biological sampling of benthic macroinvertebrates will be used to compare preconstruction baseline data with postconstruction restored conditions.

Two benthic macroinvertebrate monitoring locations will be established within restoration reaches. Postrestoration collections will occur in the approximate location of the prerestoration sampling. Benthic macroinvertebrate samples will be collected from individual reaches using the Qual-4 collection method. Sampling techniques of the Qual-4 collection method consist of kick nets, sweep nets, leaf packs, and visual searches. Preproject biological sampling occurred on June 26, 2014; postproject monitoring will occur in June of monitoring years 2-5.

Identification of collected organisms will be performed by personnel with North Carolina Division of Water Resources (NCDWR) or by a NCDWR certified laboratory. Other data collected will include D50 values/NCDWR habitat assessment forms. Biological sampling for year 3 (2017) occurred on June 15, 2017. The samples were sent to Pennington and Associates, a NCDWR certified laboratory, for identification and analysis. The results and Habitat Assessment Dataforms are included in Appendix F.

4.0 REMEDIAL ACTION PLAN

A remedial action plan was developed in order to address stream and vegetation problem areas observed during Year 1 (2016) monitoring. 20107 monitoring efforts of the remedial actions yielded favorable results. Vegetation establishment is treading towards meeting Year 7 success criteria and sediment transport appears to have naturalized across the Site.

The completed remedial action report can be found in Appendix G.

4.1 Stream

The observed degradation in and adjacent to cross-sections 9 and 10 on UT-1 encompasses approximately 12 linear feet and 15 linear feet of stream, respectively (<1 percent of the project length). As noted above, bed material placed during construction was too fine. All of UT-1 used bed material harvested on-site. The material used along these stream reaches was too fine and washed from the riffles during heavy rainfall events, resulting in minor bed scour and a small, less than 6 inch head cut beginning to develop at the top of riffle. Suitable sized channel bed material was installed on February 23, 2017 at the proper elevation in the two riffles within UT-1. Bed material was installed such that bank toe protection is provided and planting with willow stakes will occur. Bank toe protection designates that channel bed material will extend up the lower one-third of the bank. The riffle will be monitored by established cross-sections 9 and 10.

4.2 Vegetation

Multiple factors are contributing to poor vegetative success; a later than desired initial bare-root planting, heavy herbaceous competition primarily from fescue (Site was previously a cattle pasture), and sporadic rain events, which left upland areas of the site dry for extended periods of the growing season. On site observations do indicate a greater survival of planted species within riparian areas. Upland areas of the site are where survival rates were low.

The remedial action plan supplemented the bare-root planting over 5.44 acres with 1030 additional trees (755 1-gallon pots and 275 3-gallon pots). The remedial action plan figure (Appendix G) details the areas that received remedial planting along with density and number of species being placed into vegetation plots. Working with Carolina Silvics, RS acquired and re-planted identified areas during the week of December 20th, 2016. Species of planted tree included *Betula nigra, Fraxinus pennsylvanica, Platanus occiendentalis, Quercus falcata, Quercus nigra, Quercus palustris, Quercus phellos,* and *Quercus rubra*.

It should be noted that vegetation plot 13 is located within an existing wooded area and has a number of large natural recruit species (box elder and American elm).

5.0 REFERENCES

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Environmental Laboratory. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0). United States Army Engineer Research and Development Station, Vicksburg, Mississippi.

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.

North Carolina Division of Water Quality (NCDWQ). 2001. Benthic Macroinvertebrate Monitoring Protocols for Compensatory Mitigation. 401/Wetlands Unit, Department of Environment and Natural Resources. Raleigh, North Carolina.

North Carolina Division of Water Quality (NCDWQ). 2006. Standard Operating Procedures for Benthic Macroinvertebrates. Biological Assessment Unit, North Carolina Department of Environment and Natural Resources. Raleigh, North Carolina.

North Carolina Division of Mitigation Services (NCDMS 2009). Cape Fear River Basin Restoration Priorities 2009 (online). Available: http://portal.ncdenr.org/c/document_library/get_file?uuid=864e82e8-725c-415e-8ed9-c72dfcb55012&groupId=60329

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, NC

United States Department of Agriculture (USDA). 1960. Soil Survey of Alamance County, North Carolina. Soil Conservation Service.

United States Environmental Protection Agency (USEPA). 1990. Mitigation Site Type Classification (MiST). EPA Workshop, August 13-15, 1989. EPA Region IV and Hardwood Research Cooperative, NCSU, Raleigh, North Carolina

APPENDIX A

PROJECT BACKGROUND DATA AND MAPS

Figure 1. Vicinity Map

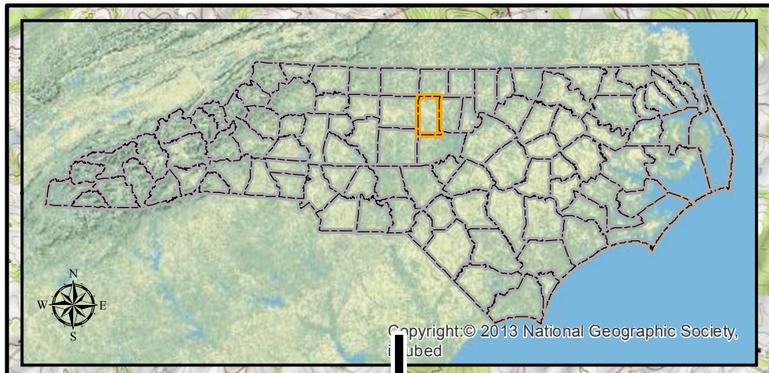
Table 1. Project Components and Mitigation Credits

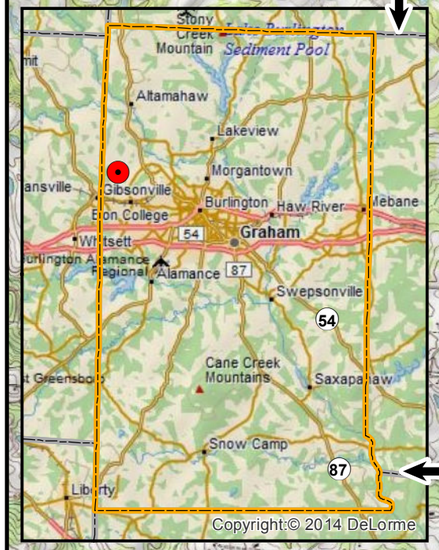
Table 2. Project Activity and Reporting History

Table 3. Project Contacts Table

Table 4. Project Baseline Information and Attributes

Directions to the Site from Interstates 40/85 in Burlington/Elon, NC:
- Exit onto University Drive (I-40/85 Exit 140) and travel north (toward Elon)
- Travel north for 2.8 miles and merge with NC 100
- Continue on University Drive (NC 100) for 0.5 mile and turn left onto Manning Street (SR 1503)
- Travel northwest for 0.8 mile and turn right onto Gibsonville-Ossipee Road (SR 1500)
- Travel north for 0.7 mile and Site is on the right





Aycock Springs Stream and Wetland Mitigation Site

36.127271 N
-79.525214 W

GUILFORD COUNTY
ALAMANCE COUNTY
Gibsonville-Ossipee Road

GIBSONVILLE
WHITSETT
ELON
BURLINGTON

Legend
- Aycock Springs Stream and Wetland Mitigation Site
- County lines

1 0.5 0 1 2 3 Miles

Axiom Environmental, Inc.

Prepared for:
RESTORATION SYSTEMS LLC

Project:
Aycock Springs Stream and Wetland Mitigation Site
Alamance County, NC

Title:
Project Location

Notes:
Background Imagery sources (provided by ESRI Data and Maps):
1. Physical Map of the United States (2009) created by the U.S. Park Service (upper inset).
2. Delorme World Basemap digital mapping (2010, lower inset).
3. Burlington, NC (1980), Lake Burlington, NC (1969), Gibsonville, NC (1970), and Ossipee, NC (1970) 7.5-minute topographic quadrangles provided by the U.S. Geological Survey.

Drawn by:	SGD
Date:	May 2016
Scale:	As Shown
Project No.:	14-006

FIGURE
1

Table 1. Project Components and Mitigation Credits
Aycock Springs Mitigation Site

Mitigation Credits			
Stream	**Stream**	**Riparian Wetland**	**Nonriparian Wetland**
Restoration	**Enhancement**	**Re-establishment**	**Re-establishment**
3237	**344.1**	**0.5**	**--**

Projects Components							
Station Range	**Existing Linear Footage/ Acreage**	**Priority Approach**	**Restoration/ Restoration Equivalent**	**Restoration Linear Footage/ Acreage**	**Mitigation Ratio**	**Mitigation Credits**	**Comment**
UT 1 Station 10+04 to 23+21	1173	PI	Restoration	1317-24= 1293	1:1	1293	24 lf of UT 1 is located outside of easement and is not credit generating
UT 2 Station 10+00 to 16+75	723	PI	Restoration	675	1:1	675	
UT 3 Station 10+00 to 11+22	147	PI	Restoration	122	1.5:1	81.3	*** The upper 122 linear feet of channel is in a violation area and is generating credit at a reduced ratio of 1.5:1
UT 3 Station 11+22 to 12+12	16	PI	Restoration	90	1:1	90	
UT 4 Station 10+00 to 14+13	448	PI	Restoration	413-107= 306	1:1	306	****The upper 107 linear feet of channel is in a violation area and is not credit generating
Travis Creek Station 10+00 to 15+78	578		EII	578-20= 558	2.5:1	223.2	The upper 20 linear feet of Travis Creek is within a powerline easement and is not credit generating
Travis Creek Station 15+78 to 17+87	274	PII	Restoration	209	1:1	209	
Travis Creek Station 17+87 to 18+86	99		EII	99	2.5:1	39.6	
Travis Creek Station 23+71 to 30+35	936	PI	Restoration	664	1:1	664	

Table 1. Project Components and Mitigation Credits (continued)
Aycock Springs Mitigation Site

Component Summation			
Restoration Level	**Stream (linear footage)**	**Riparian Wetland (acreage)**	**Nonriparian Wetland (acreage)**
Restoration	3237	0.5	--
Enhancement (Level 1)	122	--	--
Enhancement (Level II)	657	--	
Enhancement	--	1.5**	
Totals	**4016**	--	--
Mitigation Units	**3581.1 SMUs**	**0.5 Riparian WMUs**	**0.00 Nonriparian WMUs**

**Wetland enhancement acreage is not included in mitigation credit calculations as per RFP 16-005568 requirements.

***Prior to Site selection, the landowner received a violation for riparian buffer impacts due to clearing of trees adjacent to streams draining to Jordan Lake (NOV-2013-BV-0001). As a result of this violation, the upper 122 linear feet of UT 3 has a reduced credit ratio of 1.5:1. On-site visits conducted with USACE representatives determined that the functional uplift of project restoration to UT 3 would be satisfactory to generate credit at this ratio.

**** Prior to Site selection, the landowner received a violation for unauthorized discharge of fill material into Waters of the United States. Fill resulted from unpermitted upgrades to a farm pond dam, including widening the dam footprint, dredging stream channel, and casting spoil material adjacent to the stream channel on jurisdictional wetlands. Prior to restoration activities the landowner was required to obtain an after-the-fact permit to resolve the violations of Section 301 of the Clean Water Act (Action ID:SAW-2014-00665). In addition, stream reaches and wetland areas associated with the violation area have been removed from credit generation – UT 4 begins credit generation at Station 11+07).

.

Table 2. Project Activity and Reporting History
Aycock Springs Mitigation Site

Activity or Deliverable	Stream Monitoring Complete	Vegetation Monitoring Complete	All Data Collection Complete	Completion or Delivery
Technical Proposal (RFP No. 16-005568)	--	--	--	October 2013
DMS Contract No. 5791	--	--	--	February 2014
Mitigation Plan	--	--	October 2014	May 2015
Construction Plans	--	--	--	June 2015
Construction Earthwork	--	--	--	April 6, 2016
Planting	--	--	--	April 8, 2016
As-Built Documentation	April 6, 2016	April 13, 2016	April 2016	May 2016
Year 1 Monitoring	October 18, 2016	October 13, 2016	October 2016	December 2016
Supplemental Planting	--	--	--	December 2016
Year 2 Monitoring	April 19-20, 2017	July 25, 2017	October 2017	November 2017

Table 3. Project Contacts Table
Aycock Springs Mitigation Site

Full Delivery Provider	Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 Worth Creech 919-755-9490
Designer and Monitoring Provider	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis 919-215-1693

Table 4. Project Attribute Table
Aycock Springs Mitigation Site

Project Information	
Project Name	Aycock Springs Restoration Site
Project County	Alamance County, North Carolina
Project Area (acres)	15
Project Coordinates (latitude & latitude)	36.127271ºN, 79.525214ºW
Project Watershed Summary Information	
Physiographic Province	Piedmont
Project River Basin	Cape Fear
USGS HUC for Project (14-digit)	03030002030010
NCDEQ Sub-basin for Project	03-06-02
Project Drainage Area (acres)	26-3008
Project Drainage Area Percentage of Impervious Area	<2%

Table 4. Project Attribute Table (continued)
Aycock Springs Mitigation Site

Reach Summary Information				
Parameters	**Travis Cr**	**UT 1/UT2**	**UT 3**	**UT 4**
Length of reach (linear feet)	1550	1966	212	413
Valley Classification	alluvial			
Drainage Area (acres)	3008	68	26	119
NCDWQ Stream ID Score	--	30.75/25.5	26.75	27.5
NCDWR Water Quality Classification	WS-V, NSW			
Existing Morphological Description (Rosgen 1996)	Cg 5/6-, Eg 5-, and Fc 5-type			
Existing Evolutionary Stage (Simon and Hupp 1986)	IV	IV	III	III
Underlying Mapped Soils	Cecil, Helena, Mixed Alluvial Land, Severely Gullied Land, Worsham			
Drainage Class	Well-drained, moderately well-drained, poorly drained, variable, poorly drained			
Hydric Soil Status	Nonhydric and Hydric			
Slope	0.0023	0.0249	0.0153	0.0093
FEMA Classification	AE	Special Hazard Flood Area		
Native Vegetation Community	Piedmont Alluvial Forest/Dry-Mesic Oak-Hickory Forest			
Watershed Land Use/Land Cover (Site)	42% forest, 53% agricultural land, <5% low density residential/impervious surface			
Watershed Land Use/Land Cover (Cedarock Reference Channel)	65% forest, 30% agricultural land, <5% low density residential/impervious surface			
Percent Composition of Exotic Invasive Vegetation	< 5%			

Wetland Summary Information	
Parameters	**Wetlands**
Wetland acreage	1.6
Wetland Type	Riparian
Mapped Soil Series	Worsham and Mixed Alluvial Land
Drainage Class	Poorly drained
Hydric Soil Status	Hydric
Source of Hydrology	Groundwater, stream overbank
Hydrologic Impairment	Incised streams, compacted soils, livestock
Native Vegetation Community	Piedmont/Low Mountain Alluvial Forest
Percent Composition of Exotic Invasive Vegetation	<5%

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States-Section 401	Yes	Resolved	404 Permit
Waters of the United States-Section 404	Yes	Resolved	401 Certification
Endangered Species Act	No	--	CE Doc.
Historic Preservation Act	No	--	CE Doc.
Coastal Zone Management Act	No	--	NA
FEMA Floodplain Compliance	Yes	In progress	CLOMR/LOMR
Essential Fisheries Habitat	No	--	NA

APPENDIX B

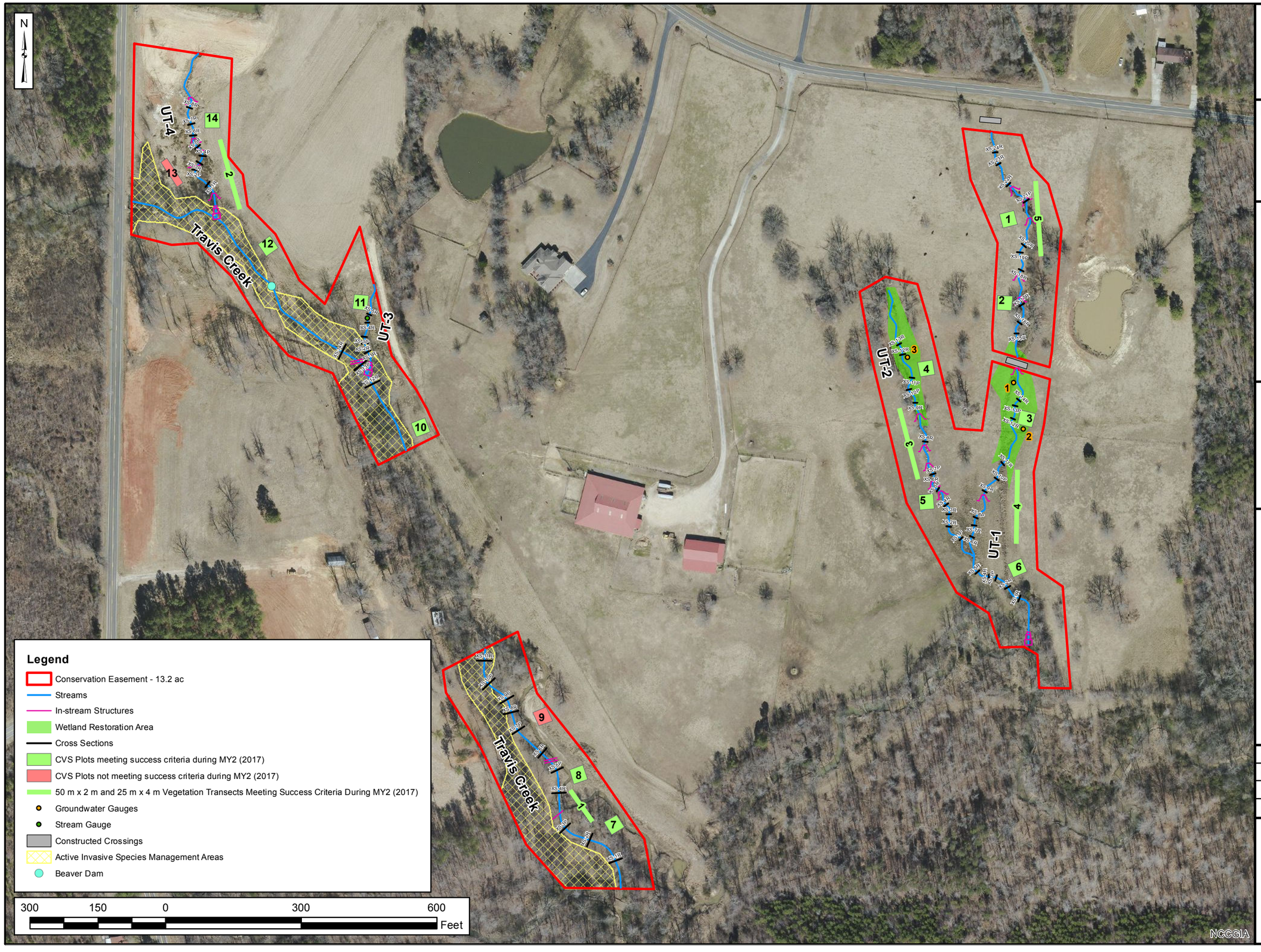
VISUAL ASSESSMENT DATA

Figure 2. Current Conditions Plan View (CCPV)

Tables 5A-5E. Visual Stream Morphology Stability Assessment

Table 6. Vegetation Condition Assessment

Vegetation Plot Photographs



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS LLC

Project:

Aycock Springs Stream and Wetland Mitigation Site

Alamance County, NC

Title:

Current Conditions Plan View

Notes:

1. Background Imagery source: 2014 aerial photography provided by the NC OneMap Program (online, supported by the NC Geographic Information Coordination Council).

Drawn by:	KRJ
Date:	OCT 2017
Scale:	1:2400
Project No.:	14-006

FIGURE

2

Table 5A **Visual Stream Morphology Stability Assessment**
Reach ID **Aycock Springs - Travis Creek**
Assessed Length **2128**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	10	10			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	9	9			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	9	9			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	9	9			100%			
		2. Thalweg centering at downstream of meander (Glide)	9	9			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	9	9			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	9	9			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	9	9			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	9	9			100%			

Table 5B **Visual Stream Morphology Stability Assessment**
Reach ID **Aycock Springs UT1**
Assessed Length **1317**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	45	45			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	44	44			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	44	44			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	44	44			100%			
		2. Thalweg centering at downstream of meander (Glide)	44	44			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	10	10			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	10	10			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	10	10			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	10	10			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	10	10			100%			

Table 5C **Visual Stream Morphology Stability Assessment**
Reach ID **Aycock Springs UT2**
Assessed Length **675**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	25	25			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	24	24			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	24	24			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	24	24			100%			
		2. Thalweg centering at downstream of meander (Glide)	24	24			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	6	6			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	6	6			100%			

Table 5D **Visual Stream Morphology Stability Assessment**
Reach ID **Aycock Springs UT3**
Assessed Length **212**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	9	9			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	8	8			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	8	8			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	8	8			100%			
		2. Thalweg centering at downstream of meander (Glide)	8	8			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	1	1			100%			

Table 5E **Visual Stream Morphology Stability Assessment**
Reach ID **Aycock Springs UT4**
Assessed Length **413**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	9	9			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	8	8			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	8	8			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	8	8			100%			
		2. Thalweg centering at downstream of meander (Glide)	8	8			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	5	5			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	5	5			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	5	5			100%			

Table 6 — Vegetation Condition Assessment

Aycock Springs

Planted Acreage[1] 11.9

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	None	0.1 acres	none	0	0.00	0.0%
2. Low Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
2B. Low Planted Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	None	0.25 acres	none	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%

Easement Acreage[2] 13.3

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Ongoing Invasive Species Management Areas[4]	Management of Chinese privet and multiflora rose is active and ongoing along Travis Creek. 2017 invasives management has improved vegetation condition in this area, however treatment is ongoing.	1000 SF	none	2	2.38	17.9%
5. Easement Encroachment Areas[3]	None	none	none	0	0.00	0.0%

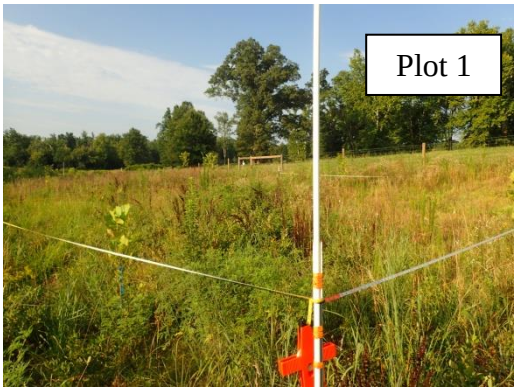
1 = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

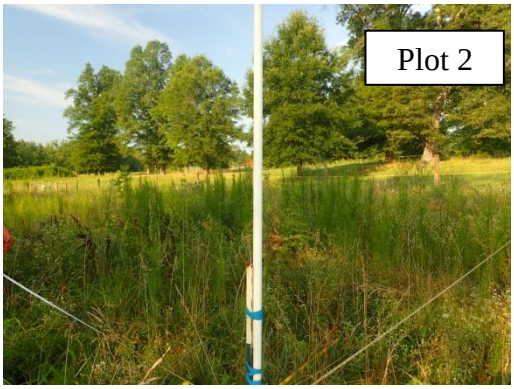
2 = The acreage within the easement boundaries.

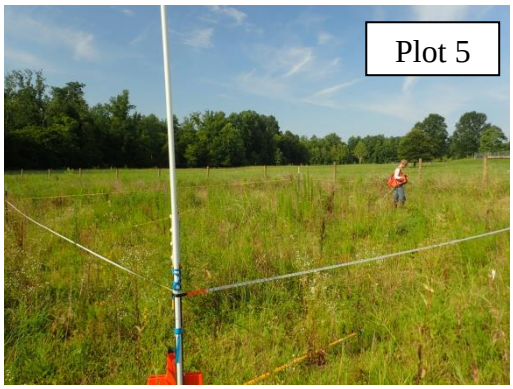
3 = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.

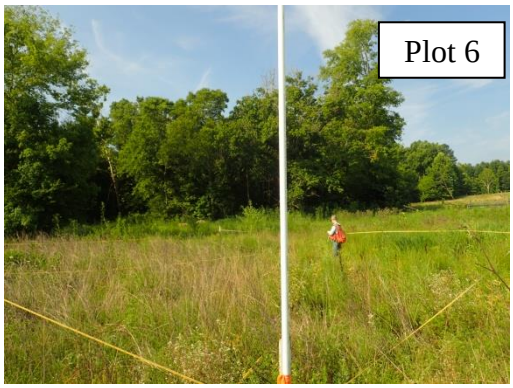
4 = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern spcies are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by DMS such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of Microstegium in the herb layer will not likley trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly ealry in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolzing invasives polygons, particulalry for situations where the conditon for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.

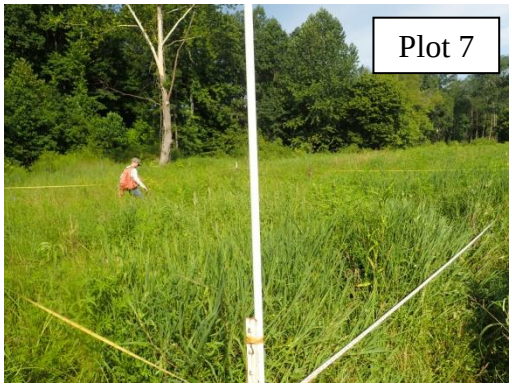
Aycock Springs
Year 2 Vegetation Monitoring Photographs
Taken July 2017



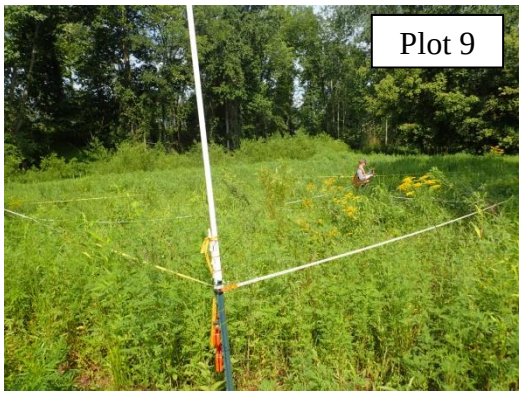


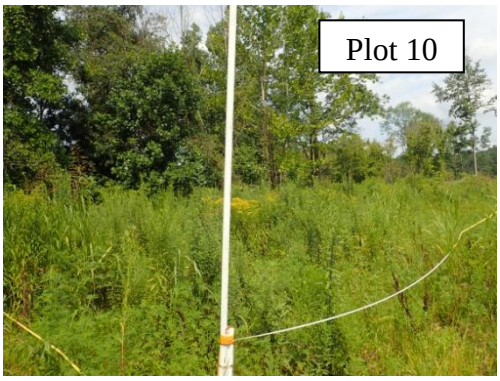


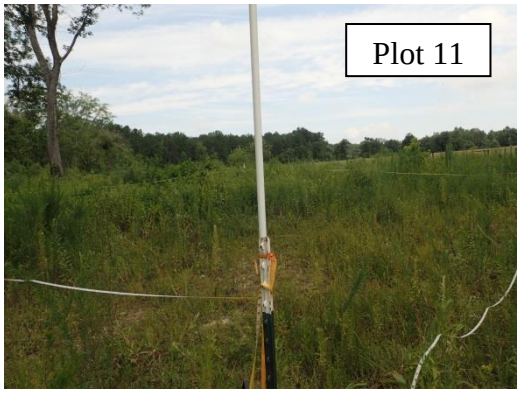


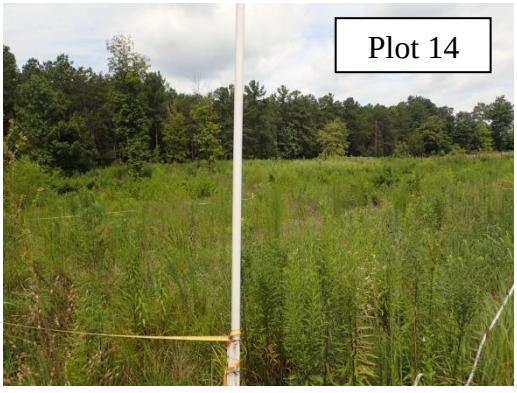


Aycock Springs
Year 2 Vegetation Monitoring Photographs
Taken July 2017
(continued)









APPENDIX C

VEGETATION PLOT DATA

Table 7. Vegetation Plot Criteria Attainment

Table 8. CVS Vegetation Plot Metadata

Table 9. Total and Planted Stems by Plot and Species

Table 10a-b. Supplemental Vegetation Transect Data

Table 7. Vegetation Plot Criteria Attainment Based on Planted Stems

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	86%
2	Yes	
3	Yes	
4	Yes	
5	Yes	
6	Yes	
7	Yes	
8	Yes	
9	No	
10	Yes	
11	Yes	
12	Yes	
13	No*	
14	Yes	

*This plot did not meet success criteria based on planted stems only; however, when including naturally recruited stems of elm (*Ulmus* sp.) and box elder (*Acer negundo*) this plot was above success criteria.

Table 8. CVS Vegetation Plot Metadata

Report Prepared By	Corri Faquin
Date Prepared	9/6/2017 15:22
database name	RS-Aycock_2017-v2.3.1.mdb
database location	S:\Business\Projects\14\14-006 Acyock Springs Detailed\2017 YEAR-02\CVS
computer name	KEENAN-PC
file size	56627200
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	14-006
project Name	Aycock Springs
Description	
River Basin	Cape Fear
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	14

Table 9. Planted and Total Stems
Project Code 14.006. Project Name: Aycock Springs

			Current Plot Data (MY2 2017)																									
			14.006-01-0001			14.006-01-0002			14.006-01-0003			14.006-01-0004			14.006-01-0005			14.006-01-0006			14.006-01-0007			14.006-01-0008			14.006-01-0009		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree																										
Acer rubrum	red maple	Tree									2																	
Betula nigra	river birch	Tree																1	1	1				2	2	2		
Callicarpa	beautyberry	Shrub																										
Callicarpa americana	American beautyberry	Shrub																										
Carpinus caroliniana	American hornbeam	Tree																3	3	3							1	1	1
Cephalanthus occidentalis	common buttonbush	Shrub																		2								
Cornus amomum	silky dogwood	Shrub	9	9	9	3	3	3	3	3	3	3	3	3	3	3	3	10	10	10	6	6	6	4	4	4	1	1	1
Cornus florida	flowering dogwood	Tree																										
Diospyros virginiana	common persimmon	Tree																						1	1	1		
Fraxinus pennsylvanica	green ash	Tree			2			3			4	1	1	6	1	1	1							1	1	3		
Liquidambar	sweetgum	Tree																										
Nyssa sylvatica	blackgum	Tree																			1	1	1					
Platanus occidentalis	American sycamore	Tree	2	2	4							1	1	1							1	1	1				1	1	1
Quercus	oak	Tree							1	1	1																1	1	1
Quercus alba	white oak	Tree	1	1	1																							
Quercus falcata	southern red oak	Tree													3	3	3										1	1	1
Quercus michauxii	swamp chestnut oak	Tree							2	2	2	2	2	2														
Quercus nigra	water oak	Tree													1	1	1											
Quercus pagoda	cherrybark oak	Tree													1	1	1											
Quercus phellos	willow oak	Tree	1	1	1	1	1	1													1	1	1					
Quercus rubra	northern red oak	Tree	4	4	4	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1								
Sambucus canadensis	Common Elderberry	Shrub				3	3	3	2	2	2							1	1	1								
Ulmus	elm	Tree																										
Ulmus alata	winged elm	Tree																										
Ulmus americana	American elm	Tree																										
		Stem count	17	17	21	8	8	11	9	9	15	9	9	14	10	10	10	16	16	18	9	9	9	8	8	10	5	5	5
		size (ares)	1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	5	5	6	4	4	5	5	5	7	5	5	5	6	6	6	5	5	6	4	4	4	4	4	4	5	5	5
		Stems per ACRE	688	688	849.8	323.7	323.7	445.2	364.2	364.2	607	364.2	364.2	566.6	404.7	404.7	404.7	647.5	647.5	728.4	364.2	364.2	364.2	323.7	323.7	404.7	202.3	202.3	202.3

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%

PnoLS = Planted excluding livestakes

P-all = Planting including livestakes

T = All planted and natural recruits including livestakes

T includes natural recruits

Table 9. Planted and Total Stems (continued)
Project Code 14.006. Project Name: Aycock Springs

			Current Plot Data (MY2 2017)														Annual Means								
			14.006-01-0010			14.006-01-0011			14.006-01-0012			14.006-01-0013			14.006-01-0014			MY2 (2017)			MY1 (2016)			MY0 (2016)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree												9						9			5			7
Acer rubrum	red maple	Tree																		2			5			
Betula nigra	river birch	Tree													2	2	2	5	5	5	5	5	5	9	9	9
Callicarpa	beautyberry	Shrub									1									1						
Callicarpa americana	American beautyberry	Shrub																					1			
Carpinus caroliniana	American hornbeam	Tree				1	1	1	1	1	1							6	6	6	5	5	5	7	7	7
Cephalanthus occidentalis	common buttonbush	Shrub																		2			4			
Cornus amomum	silky dogwood	Shrub	4	4	4	2	2	2				1	1	1				49	49	49	52	52	52	57	57	57
Cornus florida	flowering dogwood	Tree				2	2	2										2	2	2	4	4	4	4	4	4
Diospyros virginiana	common persimmon	Tree	1	1	1													2	2	2	1	1	1	2	2	2
Fraxinus pennsylvanica	green ash	Tree	1	1	5				3	3	3				3	3	4	10	10	31	5	5	13	3	3	5
Liquidambar	sweetgum	Tree												1						1						
Nyssa sylvatica	blackgum	Tree							2	2	2							3	3	3	3	3	3	6	6	6
Platanus occidentalis	American sycamore	Tree				1	1	1							1	1	1	7	7	9	1	1	1	5	5	5
Quercus	oak	Tree	2	2	2							1	1	1				5	5	5	4	4	4	11	11	11
Quercus alba	white oak	Tree																1	1	1	1	1	1	2	2	2
Quercus falcata	southern red oak	Tree																4	4	4						
Quercus michauxii	swamp chestnut oak	Tree													3	3	3	7	7	7	5	5	5			
Quercus nigra	water oak	Tree																1	1	1						
Quercus pagoda	cherrybark oak	Tree																1	1	1	1	1	1	6	6	6
Quercus phellos	willow oak	Tree	1	1	1	3	3	3	1	1	1	1	1	1				9	9	9	6	6	6	18	18	18
Quercus rubra	northern red oak	Tree	1	1	1				1	1	1							12	12	12	11	11	11	13	13	13
Sambucus canadensis	Common Elderberry	Shrub				1	1	1										7	7	7	11	11	11	62	62	62
Ulmus	elm	Tree												2						2						
Ulmus alata	winged elm	Tree																								2
Ulmus americana	American elm	Tree																					3			
	Stem count		10	10	14	10	10	10	8	8	9	3	3	15	9	9	10	131	131	171	115	115	141	205	205	216
	size (ares)		1			1			1			1			1			14			14			14		
	size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.35			0.35			0.35		
	Species count		6	6	6	6	6	6	5	5	6	3	3	6	4	4	4	17	17	23	15	15	20	14	14	16
	Stems per ACRE		404.7	404.7	566.6	404.7	404.7	404.7	323.7	323.7	364.2	121.4	121.4	607	364.2	364.2	404.7	378.7	378.7	494.3	332.4	332.4	407.6	592.6	592.6	624.4

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%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

Table 10a. Supplemental Vegetation Transect Data – April 2017

Scientific Name	Common Name	Species Type	Temporary Plot 1 2m x 50m	Temporary Plot 2 2m x 50m	Temporary Plot 3 2m x 50m	Temporary Plot 4 2m x 50m	Temporary Plot 5 2m x 50m
Betula nigra	River birch	Tree		1	1		
Carpinus caroliniana	American hornbeam	Tree	2		2		
Cornus amomum	Silky dogwood	Tree	1		3	6	3
Fraxinus pennsylvanica	Green ash	Tree	2	3	3		2
Platanus occidentalis	Sycamore	Tree	2	1			
Quercus lyrata	Overcup oak	Tree					1
Quercus michauxii	Swamp chestnut oak	Tree			1		
Quercus nigra	Water oak	Tree	1	1			2
Quercus phellos	Willow oak	Tree	3	2	1	1	1
Quercus rubra	Northern red oak	Tree	1	1	2	2	3
		Stem Count	**12**	**9**	**13**	**9**	**12**
		Size (Ares)	1	1	1	1	1
		Size (Acres)	0.0247	0.0247	0.0247	0.0247	0.0247
		Species count	7	6	7	3	6
		Stems per acre	**485.8**	**364.4**	**526.3**	**364.4**	**485.8**

Table 10b. Supplemental Vegetation Transect Data – October 2017

Scientific Name	Common Name	Species Type	Temporary Plot 1 2m x 50m	Temporary Plot 2 2m x 50m	Temporary Plot 3 2m x 50m	Temporary Plot 4 2m x 50m	Temporary Plot 5 2m x 50m
Betula nigra	River birch	Tree		1			
Carpinus caroliniana	American hornbeam	Tree	2		2		
Cornus amomum	Silky dogwood	Tree	1		3	6	3
Fraxinus pennsylvanica	Green ash	Tree	2	3	3		2
Platanus occidentalis	Sycamore	Tree	8	2			
Quercus lyrata	Overcup oak	Tree					1
Quercus michauxii	Swamp chestnut oak	Tree			1		
Quercus nigra	Water oak	Tree	1	1			1
Quercus phellos	Willow oak	Tree	3	2	1		1
Quercus rubra	Northern red oak	Tree	1	1	2	2	3
		Stem Count	**18**	**10**	**12**	**8**	**11**
		Size (Ares)	1	1	1	1	1
		Size (Acres)	0.0247	0.0247	0.0247	0.0247	0.0247
		Species count	7	6	6	2	6
		Stems per acre	**728.7**	**404.9**	**485.8**	**323.9**	**445.3**

APPENDIX D

STREAM SURVEY DATA

Cross-section Plots

Substrate Plots

Tables 11a-e. Baseline Stream Data Summary

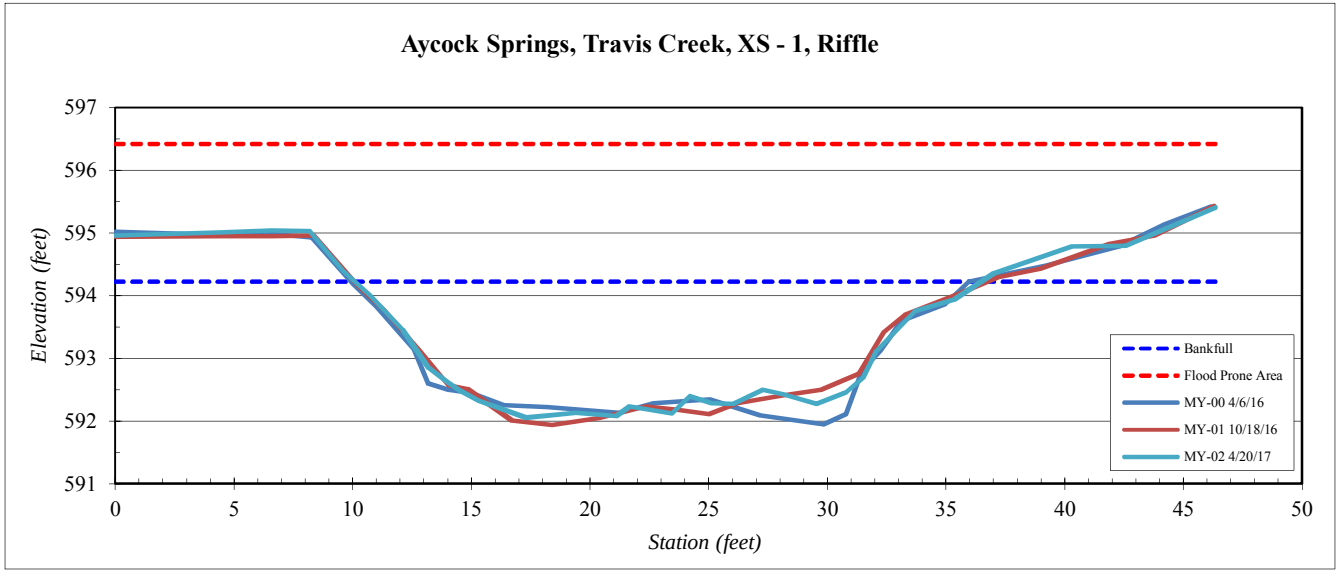
Tables 12a-f. Monitoring Data

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 1, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	594.96
4.5	595.00
6.6	595.04
8.2	595.03
9.6	594.39
10.7	594.00
12.1	593.46
13.2	592.84
14.0	592.61
14.5	592.49
15.3	592.32
17.3	592.05
19.4	592.13
21.1	592.07
21.7	592.23
23.4	592.12
24.2	592.39
25.1	592.28
26.0	592.27
27.3	592.49
28.1	592.4
29.5	592.3
30.8	592.5
31.5	592.7
32.0	593.1
33.7	593.7
35.4	593.9
37.0	594.4
40.3	594.8
42.6	594.8
46.4	595.4

SUMMARY DATA	
Bankfull Elevation:	594.2
Bankfull Cross-Sectional Area:	40.1
Bankfull Width:	26.4
Flood Prone Area Elevation:	596.4
Flood Prone Width:	150.0
Max Depth at Bankfull:	2.2
Mean Depth at Bankfull:	1.5
W / D Ratio:	17.4
Entrenchment Ratio:	5.7
Bank Height Ratio:	1.0

Stream Type	C/E

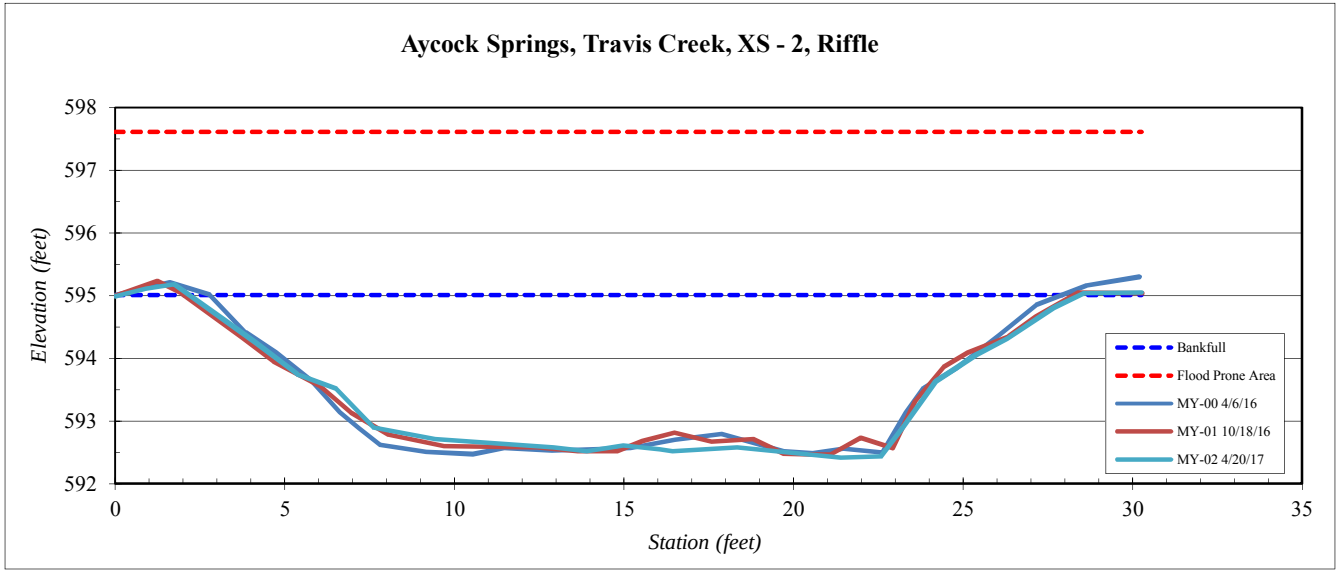


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 2, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	594.99
0.9	595.11
1.8	595.18
3.2	594.60
4.1	594.26
5.4	593.75
6.5	593.51
7.6	592.89
9.4	592.71
12.9	592.58
13.9	592.52
15.0	592.61
16.1	592.54
16.4	592.52
18.3	592.58
21.4	592.41
22.6	592.44
23.2	592.91
24.2	593.63
25.4	594.06
26.3	594.3
27.7	594.8
28.6	595.0
30.3	595.1

SUMMARY DATA	
Bankfull Elevation:	595.0
Bankfull Cross-Sectional Area:	47.9
Bankfull Width:	26.3
Flood Prone Area Elevation:	597.6
Flood Prone Width:	150.0
Max Depth at Bankfull:	2.6
Mean Depth at Bankfull:	1.8
W / D Ratio:	14.4
Entrenchment Ratio:	5.7
Bank Height Ratio:	1.04

Stream Type	C/E

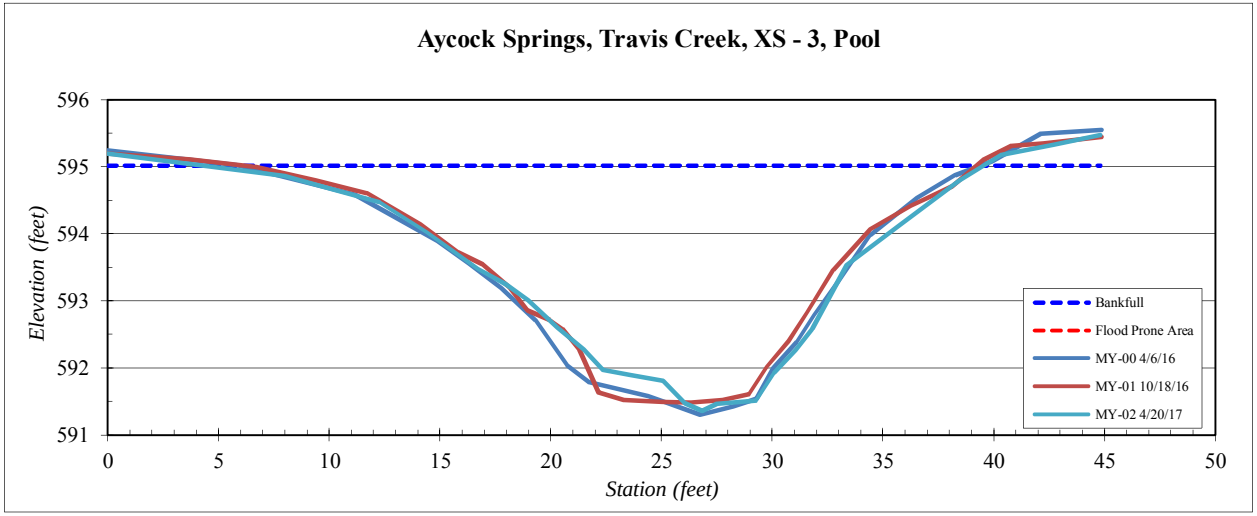


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 3, Pool
Feature	Pool
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	595.2
8.0	594.9
10.2	594.7
12.3	594.5
14.4	594.0
16.7	593.5
18.0	593.2
19.0	593.0
20.3	592.6
21.5	592.3
22.4	592.0
23.6	591.9
25.1	591.8
26.1	591.5
26.8	591.4
27.5	591.5
29.3	591.5
30.1	591.9
31.1	592.3
31.8	592.6
33.4	593.5
35.8	594.1
38.5	594.8
40.4	595.2
42.7	595.3
44.8	595.5

SUMMARY DATA	
Bankfull Elevation:	595.0
Bankfull Cross-Sectional Area:	57.2
Bankfull Width:	35.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	3.7
Mean Depth at Bankfull:	1.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

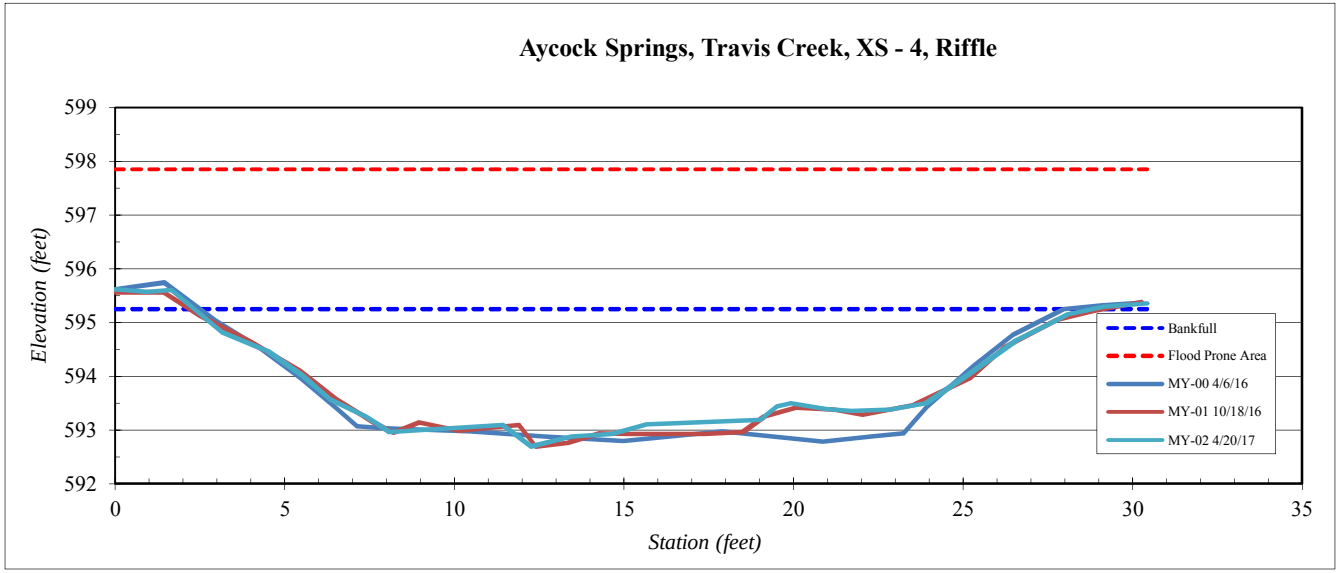


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 4, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	595.61
0.9	595.57
1.7	595.60
3.1	594.82
4.5	594.46
5.5	594.00
6.3	593.57
7.4	593.25
8.1	592.96
11.4	593.10
12.3	592.69
13.4	592.88
14.7	592.92
15.7	593.11
19.0	593.19
19.5	593.44
19.9	593.49
21.0	593.39
21.7	593.36
22.8	593.38
23.9	593.5
25.1	594.0
26.6	594.7
28.1	595.2
29.2	595.3
30.4	595.4

SUMMARY DATA	
Bankfull Elevation:	595.3
Bankfull Cross-Sectional Area:	43.8
Bankfull Width:	26.5
Flood Prone Area Elevation:	597.9
Flood Prone Width:	150.0
Max Depth at Bankfull:	2.6
Mean Depth at Bankfull:	1.7
W / D Ratio:	16.0
Entrenchment Ratio:	5.7
Bank Height Ratio:	1.04

Stream Type	C/E

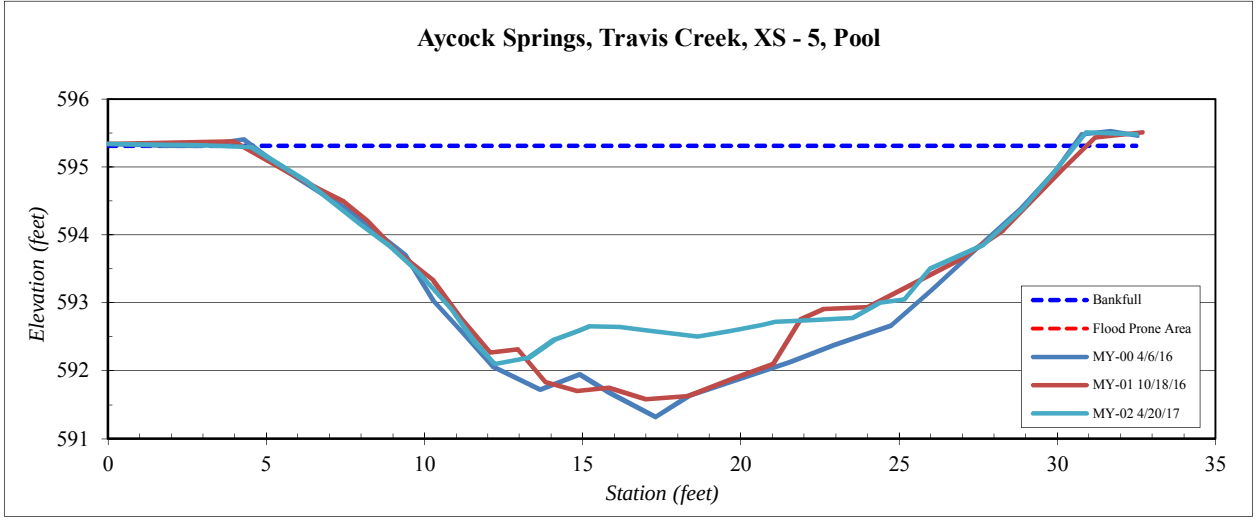


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 5, Pool
Feature	Pool
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	595.3
2.9	595.3
4.5	595.3
6.3	594.8
8.0	594.2
8.9	593.8
9.8	593.4
10.8	592.9
11.6	592.4
12.2	592.1
13.3	592.2
14.1	592.5
14.9	592.6
15.2	592.7
16.2	592.6
17.0	592.6
18.6	592.5
19.7	592.6
20.7	592.7
21.1	592.7
22.4	592.7
23.5	592.8
24.4	593.0
25.2	593.0
26.0	593.5
27.6	593.9
28.9	594.4
29.9	594.9
30.9	595.51
32.5	595.48

SUMMARY DATA	
Bankfull Elevation:	595.3
Bankfull Cross-Sectional Area:	52.3
Bankfull Width:	26.0
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	3.2
Mean Depth at Bankfull:	2.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E



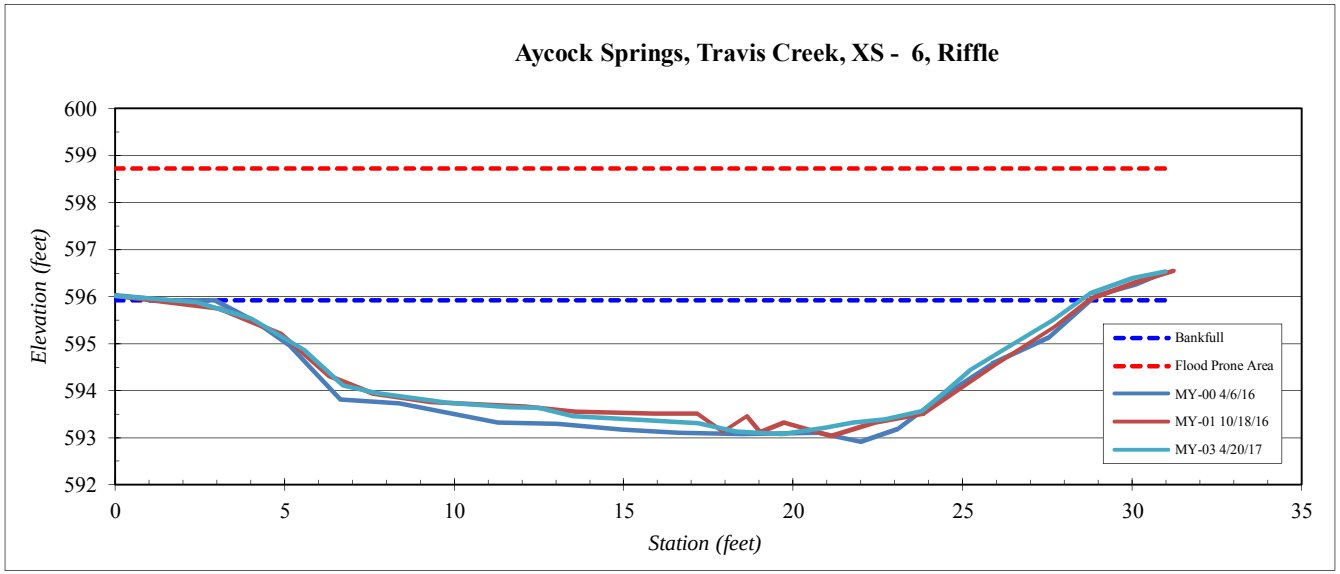
Note: Sediment Deposition in pool appears natural and is not expected to lead to instability.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 6, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	596.02
2.4	595.89
4.0	595.54
5.6	594.85
6.7	594.11
7.7	593.95
9.8	593.74
11.6	593.64
12.5	593.64
13.5	593.45
15.6	593.38
17.2	593.31
18.3	593.13
19.7	593.08
21.0	593.22
21.8	593.32
22.7	593.39
23.8	593.57
24.5	593.99
25.2	594.43
26.6	595.0
27.7	595.5
28.8	596.1
30.0	596.4
31.0	596.5

SUMMARY DATA	
Bankfull Elevation:	595.9
Bankfull Cross-Sectional Area:	50.3
Bankfull Width:	26.8
Flood Prone Area Elevation:	598.7
Flood Prone Width:	150.0
Max Depth at Bankfull:	2.8
Mean Depth at Bankfull:	1.9
W / D Ratio:	14.3
Entrenchment Ratio:	5.6
Bank Height Ratio:	1.0

Stream Type	C/E

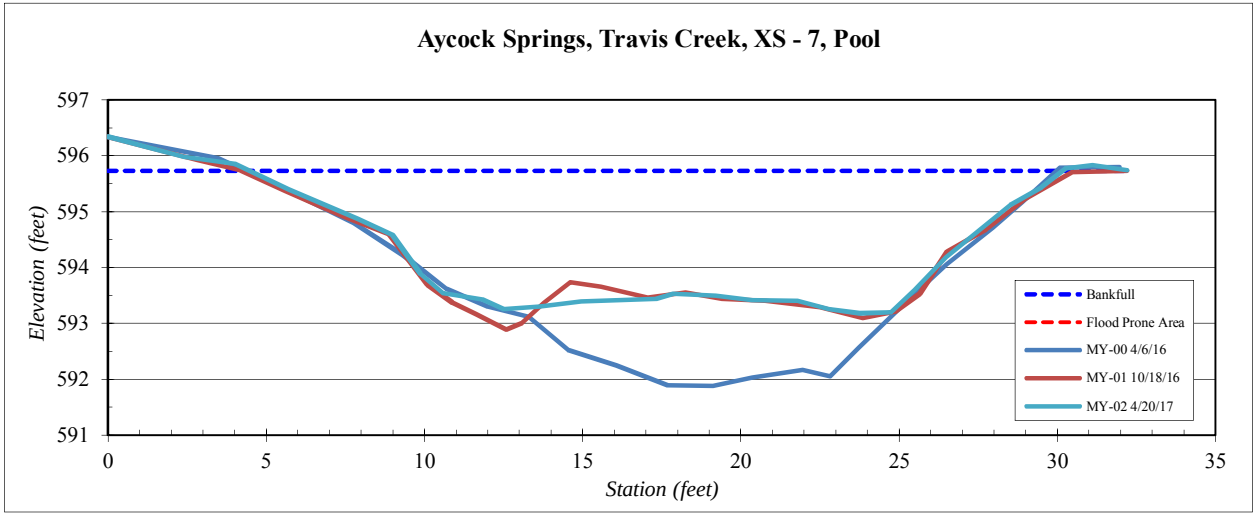


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 7, Pool
Feature	Pool
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	596.3
2.4	596.0
4.0	595.9
5.7	595.4
7.9	594.9
9.0	594.6
9.9	593.9
10.6	593.5
11.8	593.4
12.5	593.3
13.6	593.3
14.9	593.4
17.3	593.4
17.9	593.5
19.2	593.5
20.4	593.4
21.8	593.4
22.8	593.3
23.8	593.2
24.7	593.2
25.5	593.6
26.5	594.2
28.5	595.1
29.5	595.4
30.3	595.8
31.1	595.8
32.2	595.7

SUMMARY DATA	
Bankfull Elevation:	595.7
Bankfull Cross-Sectional Area:	44.9
Bankfull Width:	25.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.5
Mean Depth at Bankfull:	1.7
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E



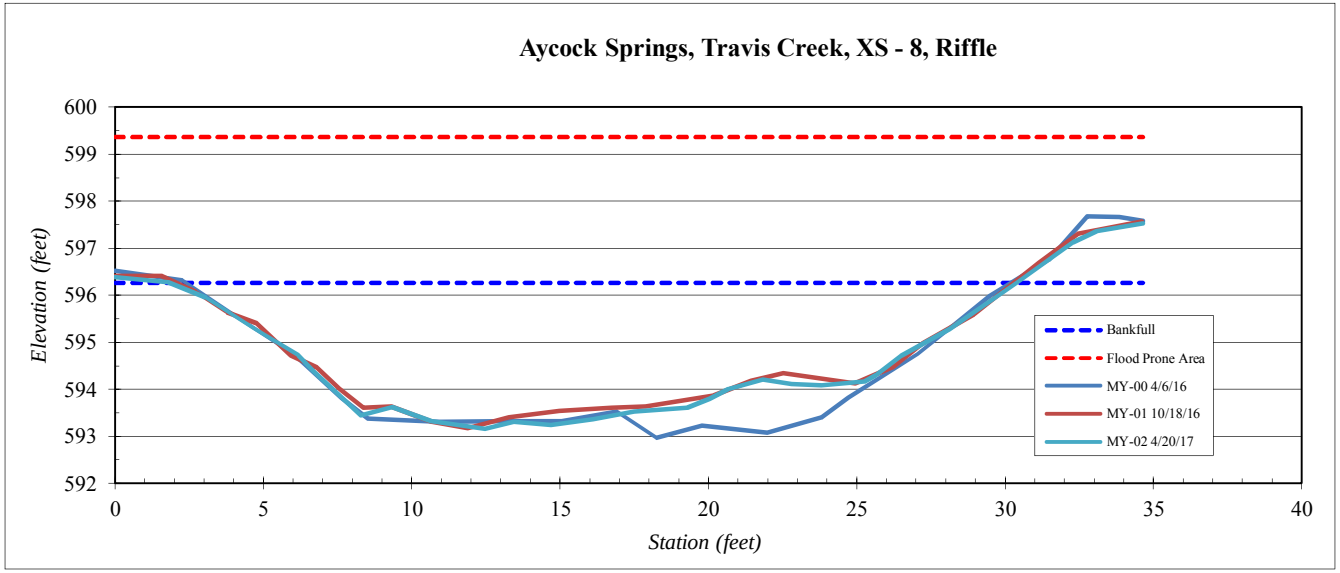
Note: Sediment Deposition in pool appears natural and is not expected to lead to instability.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 8, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	596.39
1.8	596.27
3.1	595.95
4.7	595.30
6.2	594.72
6.7	594.39
8.3	593.45
9.3	593.62
10.7	593.33
12.5	593.15
13.4	593.31
14.7	593.24
16.1	593.37
17.5	593.52
19.3	593.61
20.0	593.80
20.7	594.00
21.8	594.20
22.8	594.12
23.8	594.08
25.3	594.2
25.7	594.3
26.5	594.7
28.1	595.3
30.4	596.3
32.3	597.1
33.1	597.4
34.6	597.5

SUMMARY DATA	
Bankfull Elevation:	596.3
Bankfull Cross-Sectional Area:	58.3
Bankfull Width:	28.6
Flood Prone Area Elevation:	599.4
Flood Prone Width:	150.0
Max Depth at Bankfull:	3.1
Mean Depth at Bankfull:	2.0
W / D Ratio:	14.0
Entrenchment Ratio:	5.2
Bank Height Ratio:	1.0

Stream Type	C/E

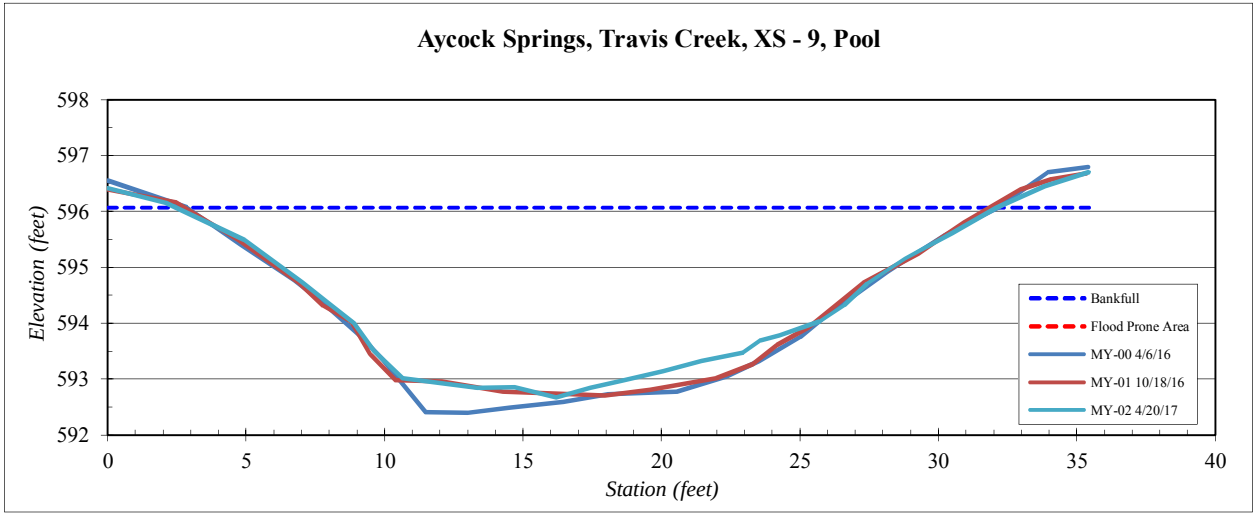


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 9, Pool
Feature	Pool
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	596.4
2.1	596.1
4.9	595.5
7.0	594.7
7.9	594.4
8.9	594.0
9.6	593.5
10.7	593.0
13.4	592.8
14.7	592.8
16.2	592.7
17.4	592.8
18.6	593.0
20.1	593.1
21.4	593.3
22.9	593.5
23.6	593.7
24.3	593.8
25.7	594.0
26.6	594.3
27.4	594.7
28.8	595.2
30.5	595.6
32.1	596.1
33.8	596.5
35.4	596.7

SUMMARY DATA	
Bankfull Elevation:	596.1
Bankfull Cross-Sectional Area:	60.8
Bankfull Width:	29.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	3.4
Mean Depth at Bankfull:	2.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

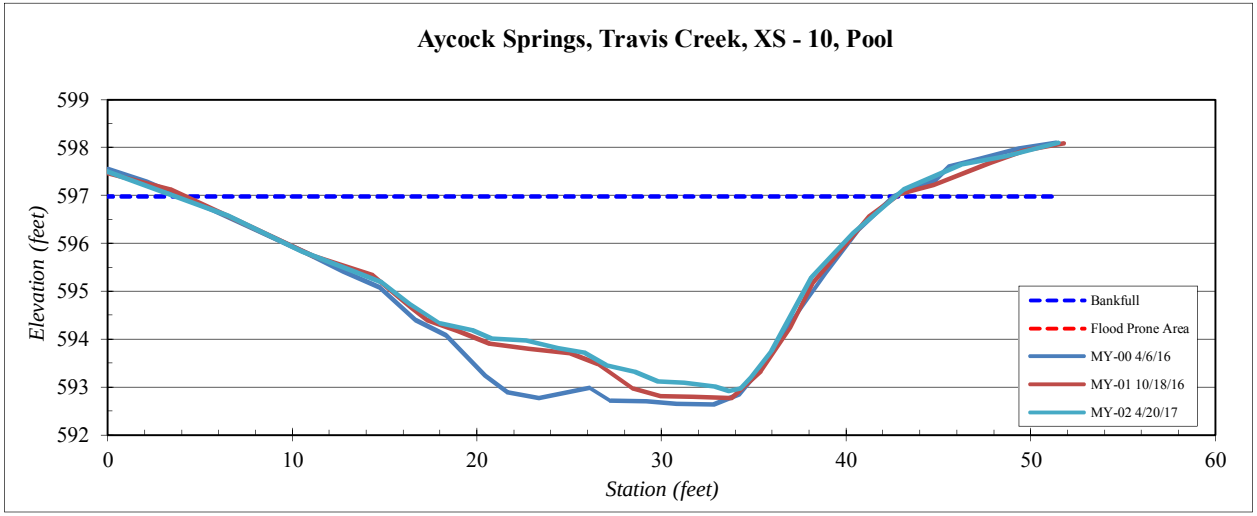


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 10, Pool
Feature	Pool
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	597.5
6.5	596.6
10.5	595.8
13.2	595.4
14.8	595.2
16.4	594.7
18.0	594.3
19.8	594.2
20.8	594.0
22.7	594.0
24.4	593.8
25.8	593.7
27.0	593.4
28.6	593.3
29.8	593.1
31.2	593.1
32.9	593.0
33.6	592.9
34.3	593.0
34.9	593.2
36.0	593.7
38.1	595.3
40.4	596.2
43.1	597.1
46.3	597.7
48.7	597.8
51.5	598.1

SUMMARY DATA	
Bankfull Elevation:	597.0
Bankfull Cross-Sectional Area:	87.5
Bankfull Width:	39.1
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	4.1
Mean Depth at Bankfull:	2.2
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

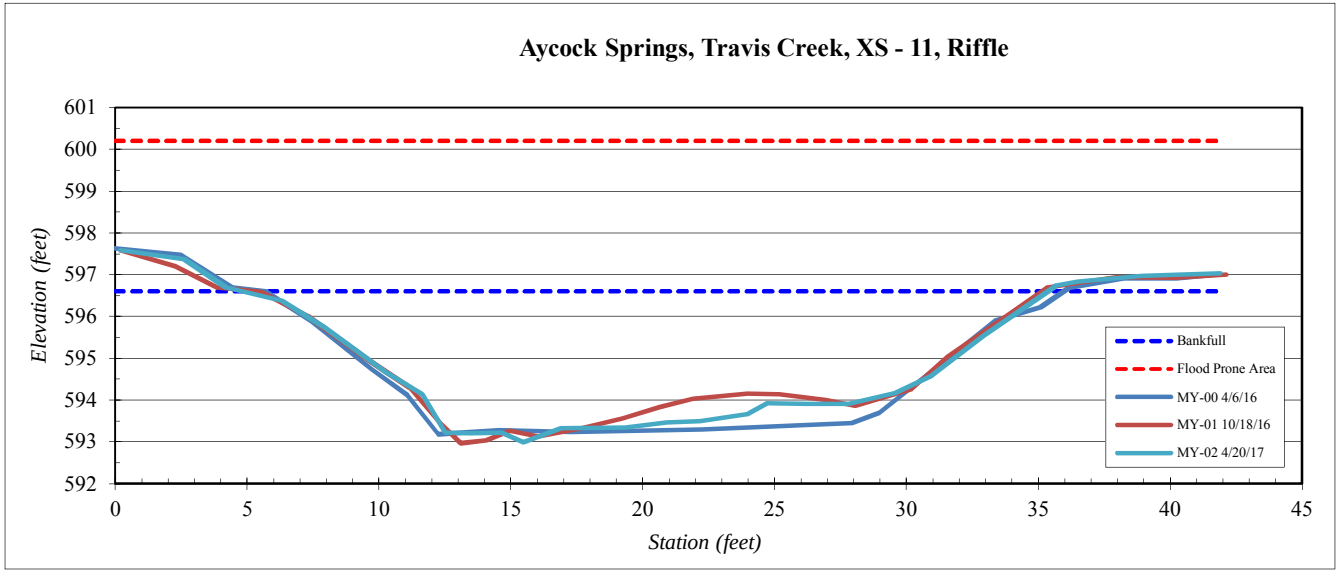


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 11, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	597.58
2.6	597.36
4.2	596.69
6.3	596.38
7.9	595.75
10.3	594.66
11.6	594.14
12.5	593.22
13.5	593.20
14.7	593.22
15.5	592.99
16.9	593.33
19.3	593.35
20.9	593.47
22.2	593.50
24.0	593.66
24.7	593.92
26.2	593.90
27.8	593.90
29.6	594.16
31.0	594.6
32.9	595.5
35.7	596.7
36.5	596.8
38.9	597.0
41.9	597.0

SUMMARY DATA	
Bankfull Elevation:	596.6
Bankfull Cross-Sectional Area:	69.6
Bankfull Width:	30.5
Flood Prone Area Elevation:	600.2
Flood Prone Width:	150.0
Max Depth at Bankfull:	3.6
Mean Depth at Bankfull:	2.3
W / D Ratio:	13.4
Entrenchment Ratio:	4.9
Bank Height Ratio:	1.06

Stream Type	C/E

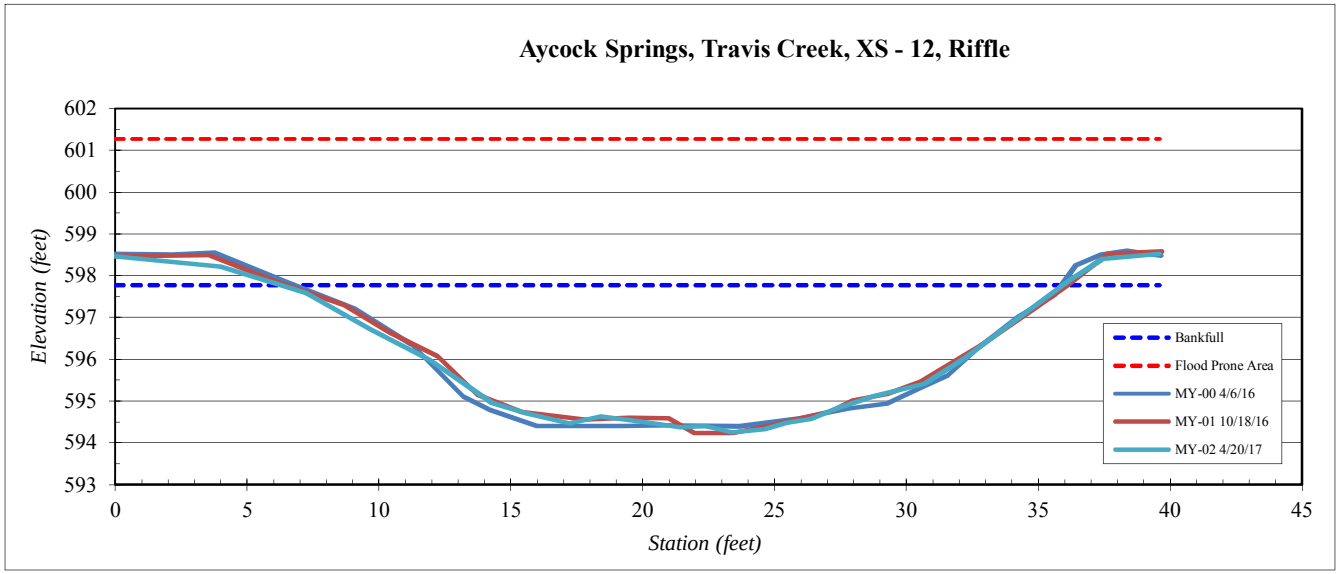


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 12, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	598.46
4.0	598.22
7.2	597.59
9.7	596.71
11.9	595.98
14.3	594.95
15.6	594.71
17.2	594.47
18.4	594.64
20.3	594.47
21.4	594.38
22.4	594.41
23.4	594.25
24.6	594.33
25.4	594.48
26.4	594.57
27.4	594.83
28.8	595.12
30.7	595.41
32.2	596.02
34.3	597.0
36.2	597.9
37.4	598.4
39.6	598.5

SUMMARY DATA	
Bankfull Elevation:	597.8
Bankfull Cross-Sectional Area:	67.9
Bankfull Width:	29.7
Flood Prone Area Elevation:	601.3
Flood Prone Width:	150.0
Max Depth at Bankfull:	3.5
Mean Depth at Bankfull:	2.3
W / D Ratio:	13.0
Entrenchment Ratio:	5.1
Bank Height Ratio:	1.03

Stream Type	C/E

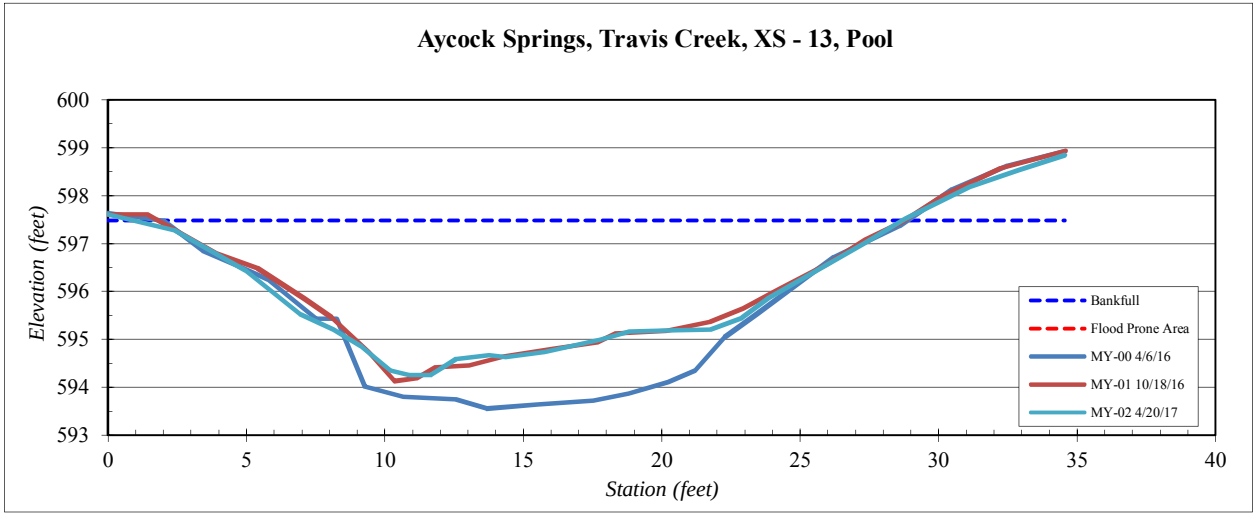


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 13, Pool
Feature	Pool
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	597.6
2.4	597.3
5.0	596.4
6.9	595.5
8.2	595.2
9.1	594.9
10.2	594.3
10.9	594.3
11.7	594.3
12.6	594.6
13.8	594.7
14.4	594.6
15.8	594.7
17.8	595.0
18.8	595.2
20.6	595.2
21.7	595.2
22.9	595.4
23.9	595.9
25.2	596.3
27.3	597.0
28.8	597.5
31.1	598.2
32.9	598.5
34.6	598.8

SUMMARY DATA	
Bankfull Elevation:	597.5
Bankfull Cross-Sectional Area:	51.9
Bankfull Width:	27.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	3.2
Mean Depth at Bankfull:	1.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E



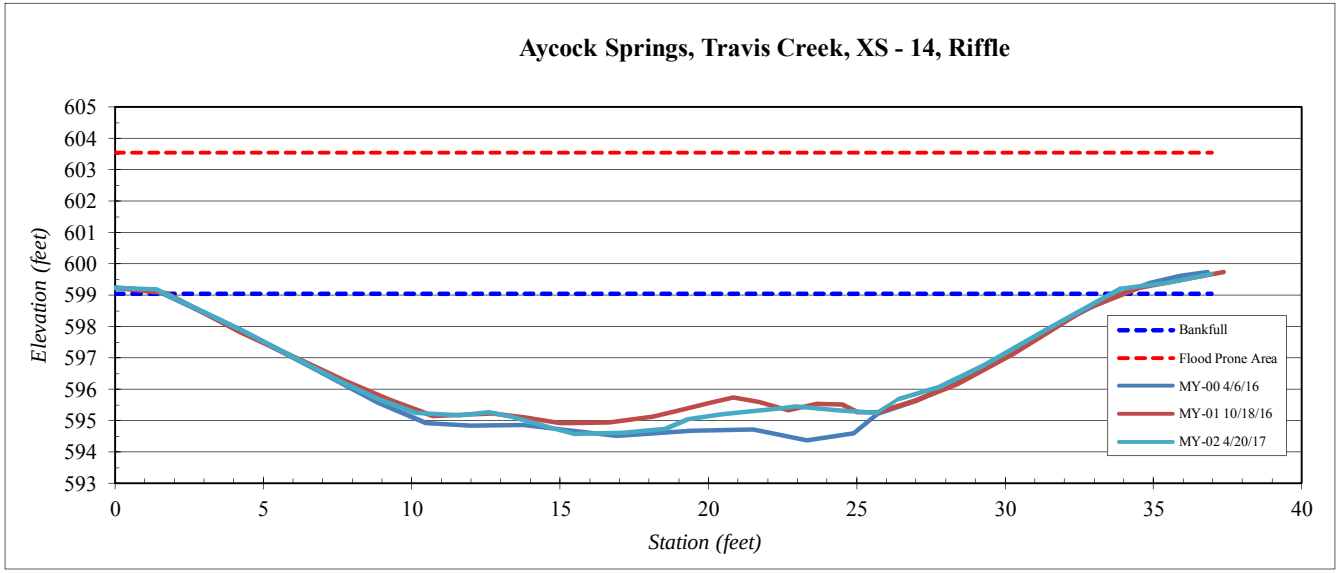
Note: Sediment Deposition in pool appears natural and is not expected to lead to instability.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	Travis Creek, XS - 14, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	599.22
1.4	599.20
4.3	597.89
7.5	596.29
8.8	595.69
10.2	595.24
11.6	595.17
12.6	595.28
13.4	595.12
14.7	594.77
15.5	594.57
17.2	594.62
18.6	594.75
19.3	595.05
20.5	595.20
22.4	595.39
23.0	595.45
24.3	595.32
25.7	595.26
26.4	595.68
27.8	596.1
29.3	596.8
31.6	598.0
33.9	599.2
35.5	599.4
37.0	599.7

SUMMARY DATA	
Bankfull Elevation:	599.1
Bankfull Cross-Sectional Area:	94.6
Bankfull Width:	31.9
Flood Prone Area Elevation:	603.6
Flood Prone Width:	150.0
Max Depth at Bankfull:	4.5
Mean Depth at Bankfull:	3.0
W / D Ratio:	10.8
Entrenchment Ratio:	4.7
Bank Height Ratio:	1.0

Stream Type	C/E

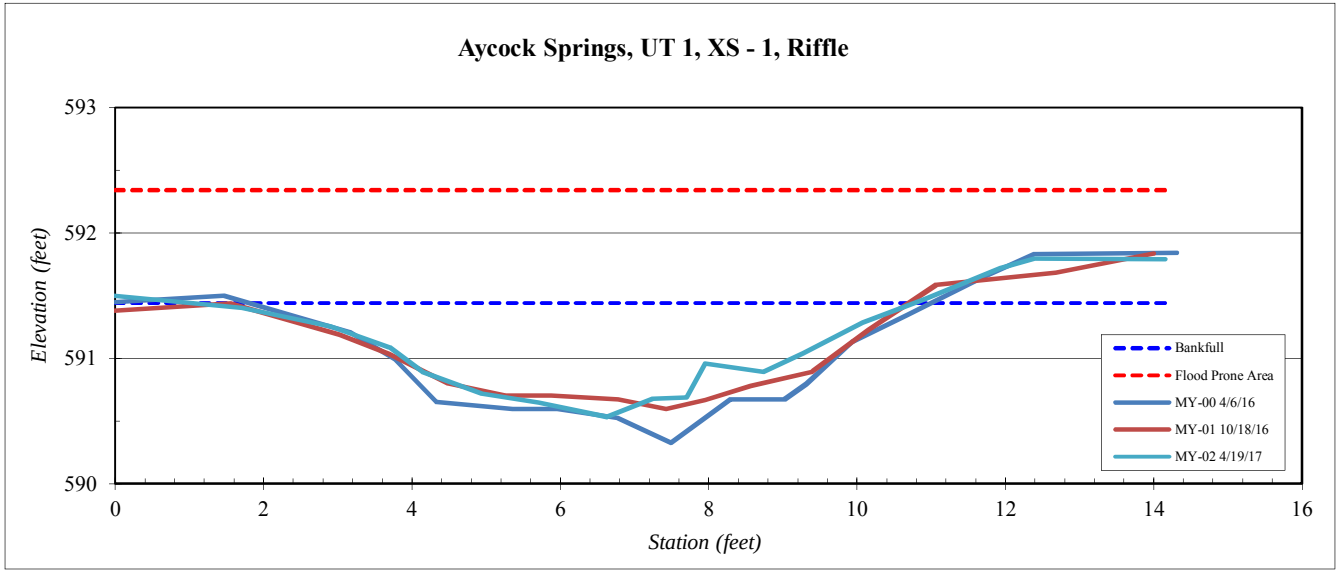


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 1, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.3	591.52
1.7	591.40
2.9	591.26
3.7	591.08
4.1	590.89
4.9	590.72
5.7	590.65
6.6	590.53
7.2	590.68
7.7	590.69
8.0	590.96
8.7	590.89
9.3	591.04
10.1	591.28
10.9	591.48
11.9	591.72
12.4	591.79
14.2	591.79

SUMMARY DATA	
Bankfull Elevation:	591.4
Bankfull Cross-Sectional Area:	4.4
Bankfull Width:	9.7
Flood Prone Area Elevation:	592.3
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	21.4
Entrenchment Ratio:	9.3
Bank Height Ratio:	1.0

Stream Type	C/E

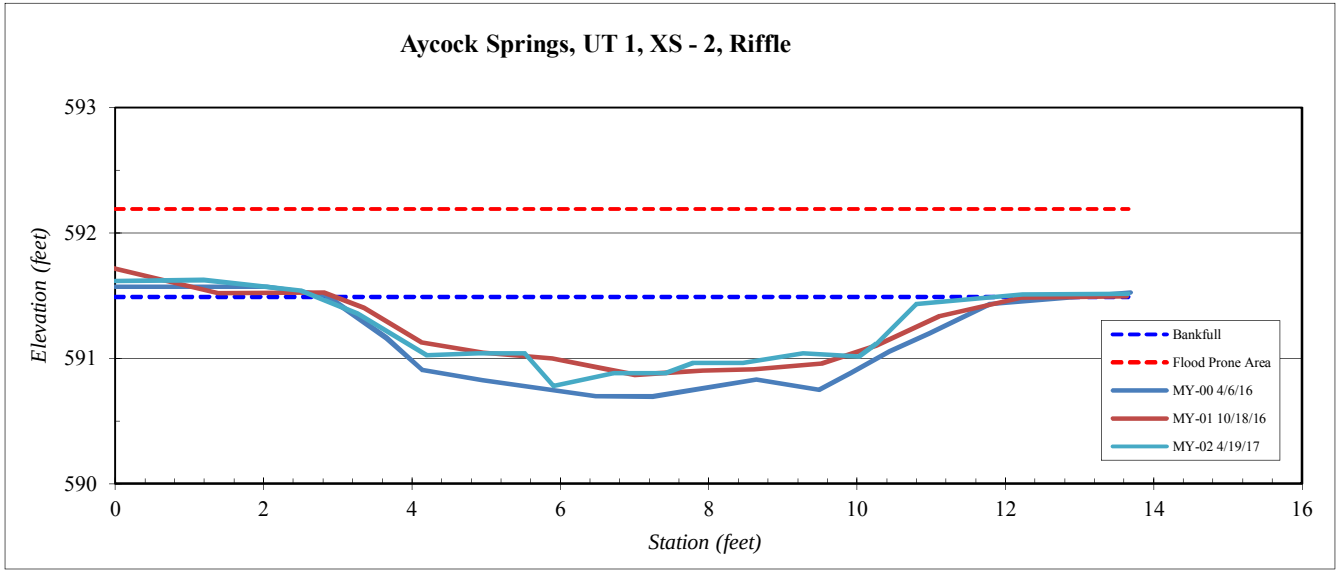


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 2, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	591.62
1.2	591.63
2.5	591.54
3.3	591.36
4.2	591.03
4.9	591.04
5.5	591.04
5.9	590.78
6.7	590.88
7.4	590.88
7.8	590.96
8.5	590.96
9.3	591.04
10.0	591.01
10.3	591.12
10.8	591.43
12.2	591.51
13.7	591.51

SUMMARY DATA	
Bankfull Elevation:	591.5
Bankfull Cross-Sectional Area:	3.7
Bankfull Width:	9.2
Flood Prone Area Elevation:	592.2
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	22.9
Entrenchment Ratio:	9.8
Bank Height Ratio:	1.0

Stream Type	C/E

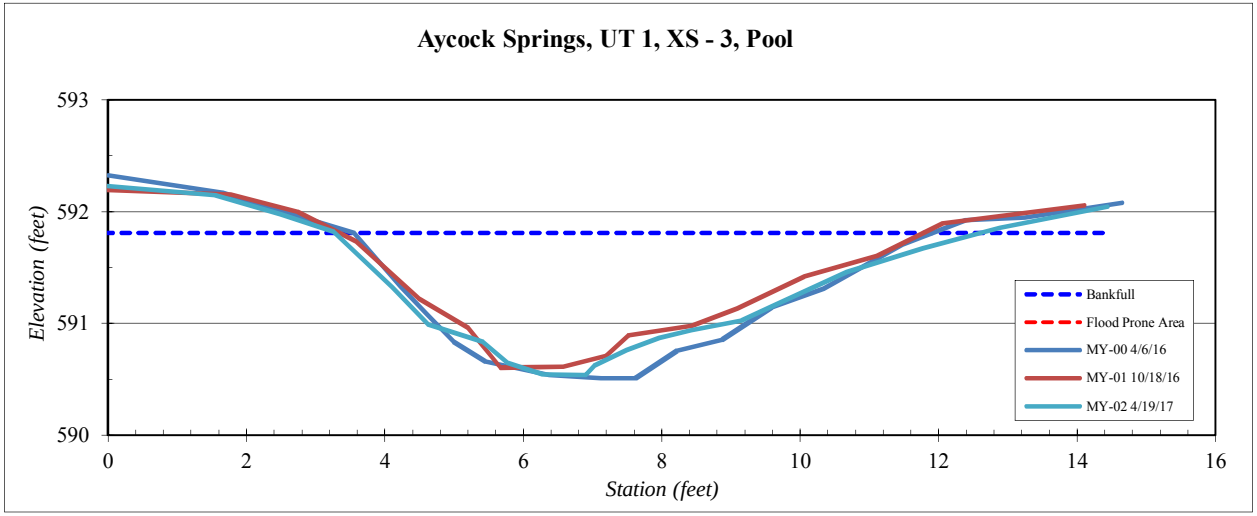


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 3, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.3	592.2
1.5	592.1
2.5	592.0
3.3	591.8
4.1	591.3
4.6	591.0
5.4	590.8
5.8	590.6
6.3	590.5
6.9	590.5
7.0	590.6
7.5	590.8
8.0	590.9
8.4	590.9
9.1	591.0
9.6	591.2
10.7	591.5
11.8	591.7
12.9	591.9
14.4	592.0

SUMMARY DATA	
Bankfull Elevation:	591.8
Bankfull Cross-Sectional Area:	6.4
Bankfull Width:	9.3
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	0.7
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

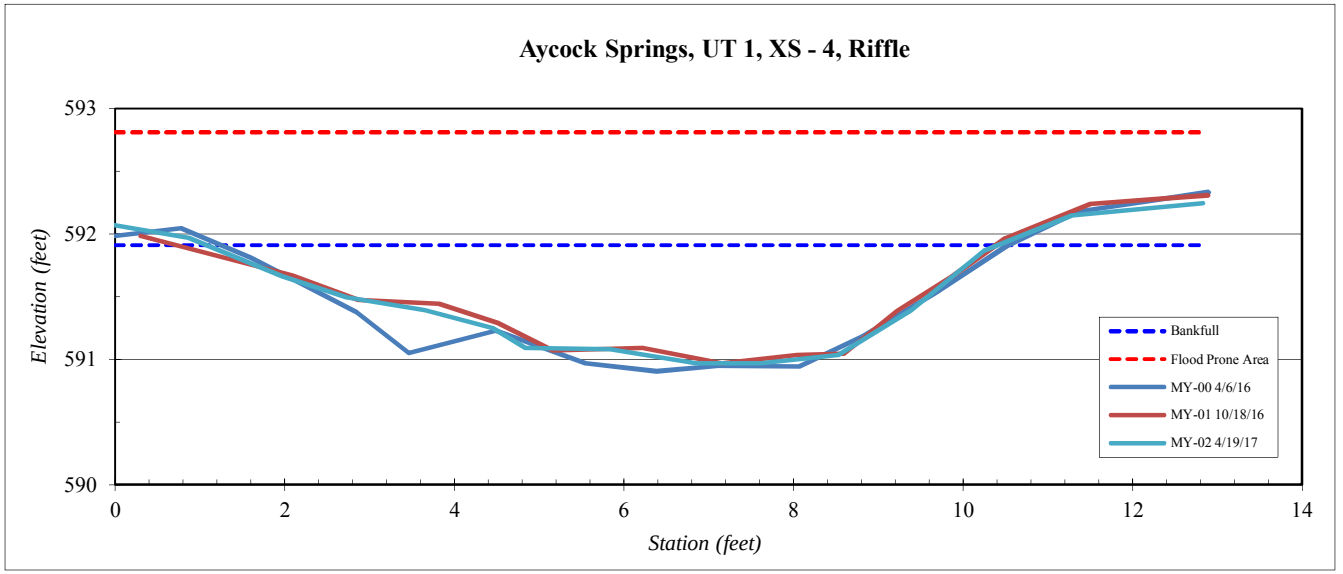


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 4, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	592.09
0.9	591.97
2.0	591.66
2.7	591.49
3.7	591.39
4.5	591.25
4.8	591.09
5.8	591.08
6.9	590.97
7.6	590.97
8.5	591.03
9.4	591.39
10.2	591.87
11.3	592.15
12.8	592.24

SUMMARY DATA	
Bankfull Elevation:	591.9
Bankfull Cross-Sectional Area:	5.7
Bankfull Width:	9.3
Flood Prone Area Elevation:	592.8
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.6
W / D Ratio:	15.2
Entrenchment Ratio:	9.7
Bank Height Ratio:	1.0

Stream Type	C/E

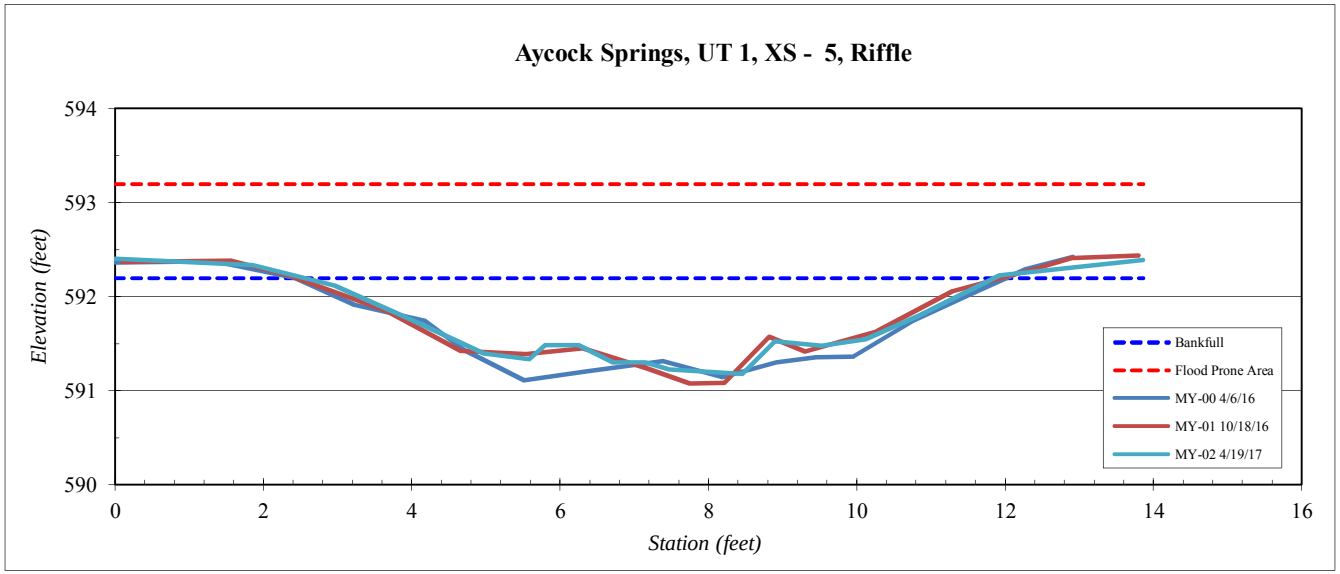


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 5, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	592.40
1.9	592.33
3.0	592.12
4.0	591.76
5.0	591.40
5.6	591.33
5.8	591.49
6.3	591.48
6.7	591.30
7.2	591.30
7.5	591.23
8.5	591.18
8.9	591.53
9.5	591.48
10.1	591.55
10.8	591.80
11.9	592.23
13.9	592.39

SUMMARY DATA	
Bankfull Elevation:	592.2
Bankfull Cross-Sectional Area:	5.8
Bankfull Width:	9.3
Flood Prone Area Elevation:	593.2
Flood Prone Width:	90.0
Max Depth at Bankfull:	1.0
Mean Depth at Bankfull:	0.6
W / D Ratio:	14.9
Entrenchment Ratio:	9.7
Bank Height Ratio:	1.0

Stream Type	C/E

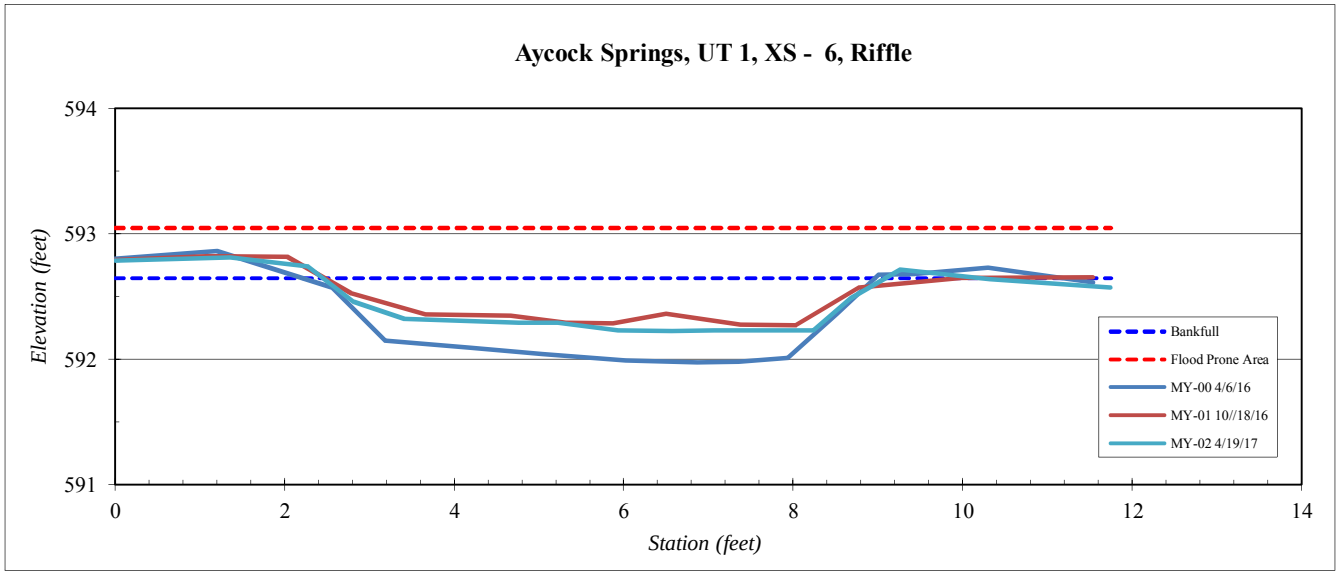


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 6, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	592.79
1.4	592.81
2.3	592.74
2.8	592.46
3.4	592.32
4.8	592.29
5.2	592.29
5.9	592.23
6.6	592.23
7.1	592.23
7.5	592.23
8.2	592.23
8.7	592.49
9.3	592.71
10.3	592.64
11.7	592.58

SUMMARY DATA	
Bankfull Elevation:	592.7
Bankfull Cross-Sectional Area:	2.2
Bankfull Width:	6.7
Flood Prone Area Elevation:	593.1
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.4
Mean Depth at Bankfull:	0.3
W / D Ratio:	20.4
Entrenchment Ratio:	13.4
Bank Height Ratio:	1.0

Stream Type	C/E

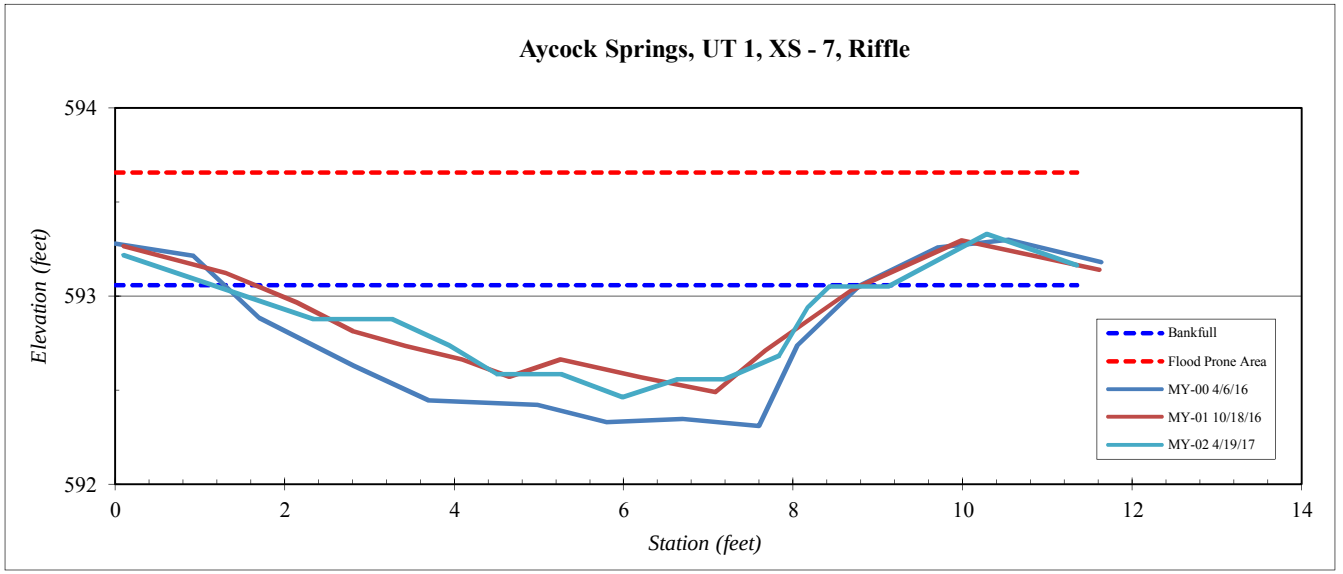


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 7, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	593.22
2.3	592.88
3.3	592.88
3.9	592.74
4.5	592.58
5.3	592.59
6.0	592.46
6.6	592.56
7.2	592.56
7.8	592.69
8.2	592.94
8.4	593.05
9.1	593.05
10.3	593.33
11.4	593.17

SUMMARY DATA	
Bankfull Elevation:	593.1
Bankfull Cross-Sectional Area:	2.4
Bankfull Width:	7.3
Flood Prone Area Elevation:	593.7
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.3
W / D Ratio:	22.2
Entrenchment Ratio:	12.3
Bank Height Ratio:	1.0

Stream Type	C/E

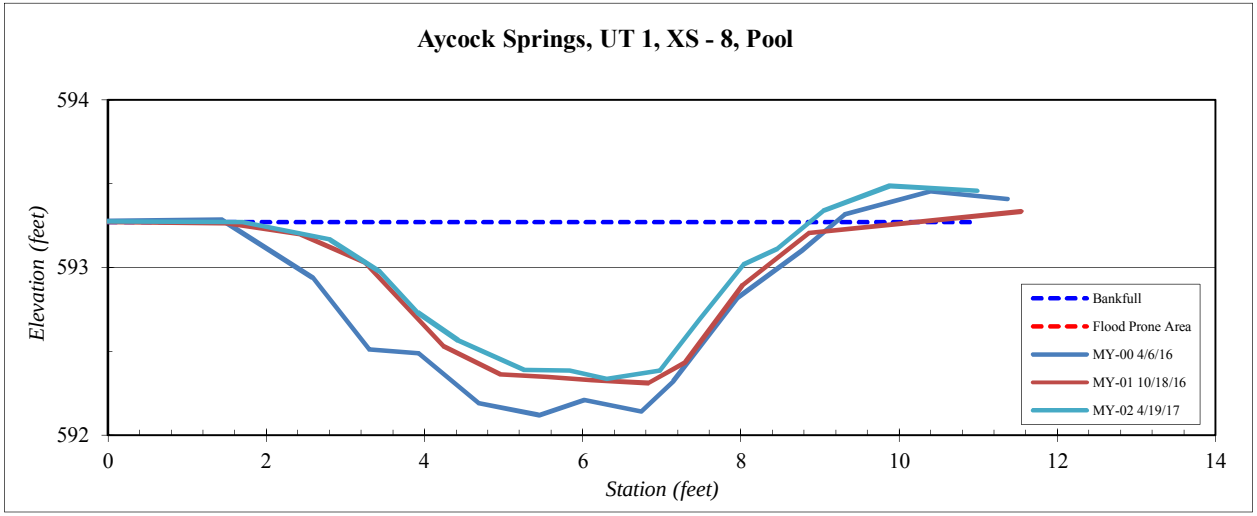


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 8, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	593.3
1.7	593.3
2.8	593.2
3.4	593.0
3.9	592.7
4.4	592.6
5.3	592.4
5.8	592.4
6.3	592.3
7.0	592.4
7.5	592.7
8.0	593.0
8.5	593.1
9.0	593.3
9.9	593.5
11.0	593.5

SUMMARY DATA	
Bankfull Elevation:	593.3
Bankfull Cross-Sectional Area:	3.6
Bankfull Width:	7.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E



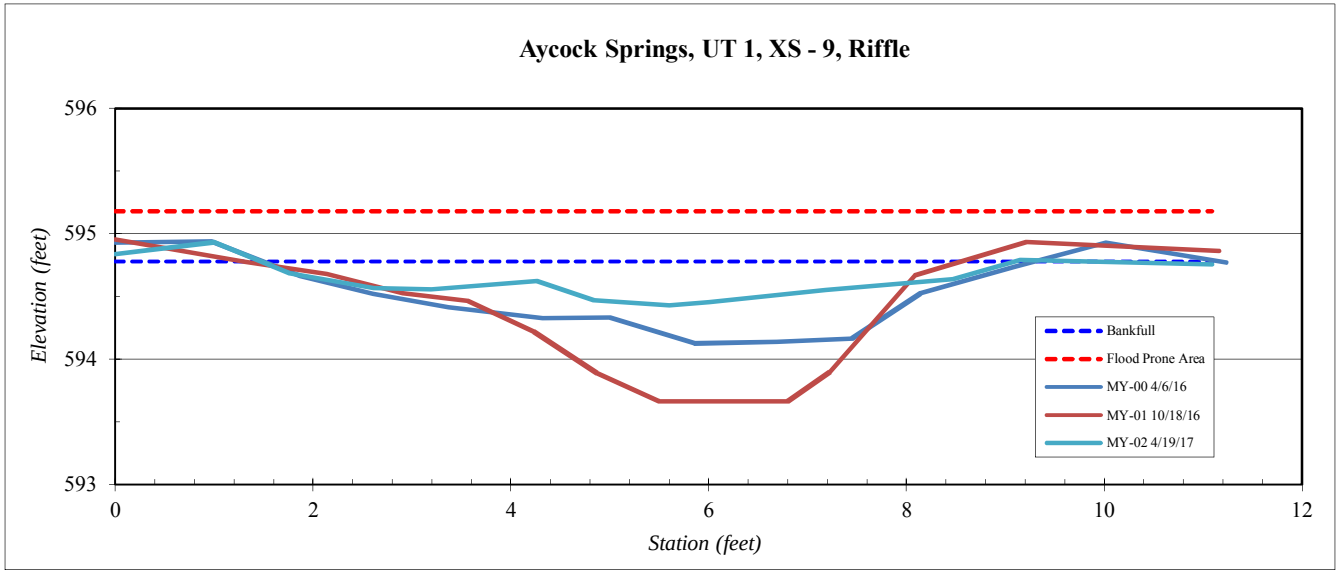
Note: Cross Sections 8 and 9 (UT 1) are located in the vicinity of a bed material repair. Additional bed material was added by hand in this reach.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 9, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	594.84
1.0	594.93
1.8	594.68
2.6	594.57
3.2	594.56
4.3	594.63
4.8	594.47
5.6	594.43
6.0	594.45
7.2	594.55
8.5	594.64
9.2	594.79
11.1	594.76

SUMMARY DATA	
Bankfull Elevation:	594.8
Bankfull Cross-Sectional Area:	1.6
Bankfull Width:	7.6
Flood Prone Area Elevation:	595.2
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.4
Mean Depth at Bankfull:	0.2
W / D Ratio:	36.1
Entrenchment Ratio:	11.8
Bank Height Ratio:	1.0

Stream Type	C/E



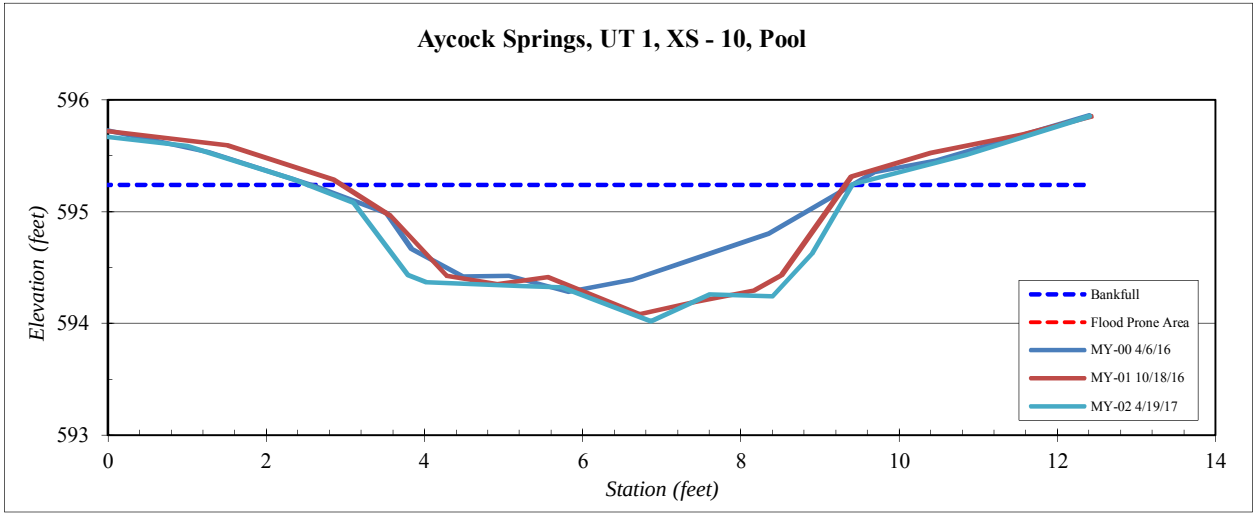
Note: Cross Sections 8 and 9 (UT 1) are located in the vicinity of a bed material repair. Additional bed material was added by hand in this reach.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 10, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.5	595.7
1.0	595.6
2.3	595.3
3.1	595.1
3.8	594.4
4.0	594.4
5.2	594.3
5.7	594.3
6.9	594.0
7.6	594.3
8.4	594.2
8.9	594.6
9.4	595.2
10.8	595.5
12.4	595.9

SUMMARY DATA	
Bankfull Elevation:	595.2
Bankfull Cross-Sectional Area:	5.5
Bankfull Width:	6.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

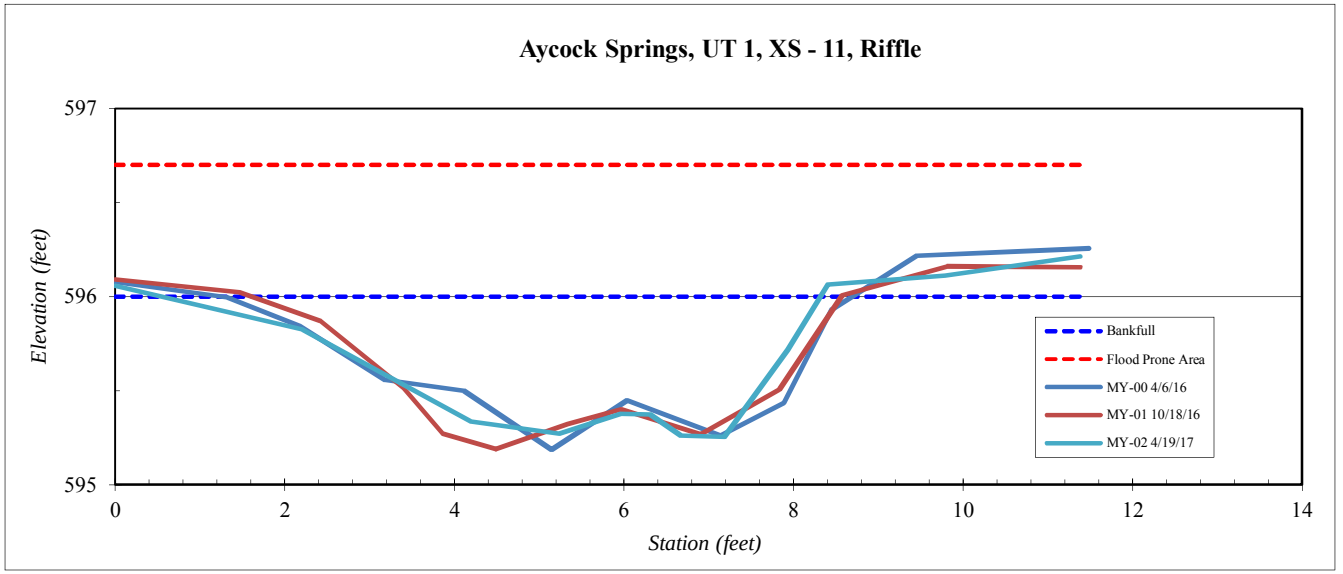


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 11, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	596.06
2.2	595.83
4.2	595.34
5.2	595.27
6.0	595.38
6.3	595.37
6.7	595.26
7.2	595.25
7.9	595.72
8.4	596.06
9.8	596.11
11.4	596.21

SUMMARY DATA	
Bankfull Elevation:	596.0
Bankfull Cross-Sectional Area:	3.5
Bankfull Width:	7.8
Flood Prone Area Elevation:	596.7
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	17.4
Entrenchment Ratio:	11.5
Bank Height Ratio:	1.0

Stream Type	C/E

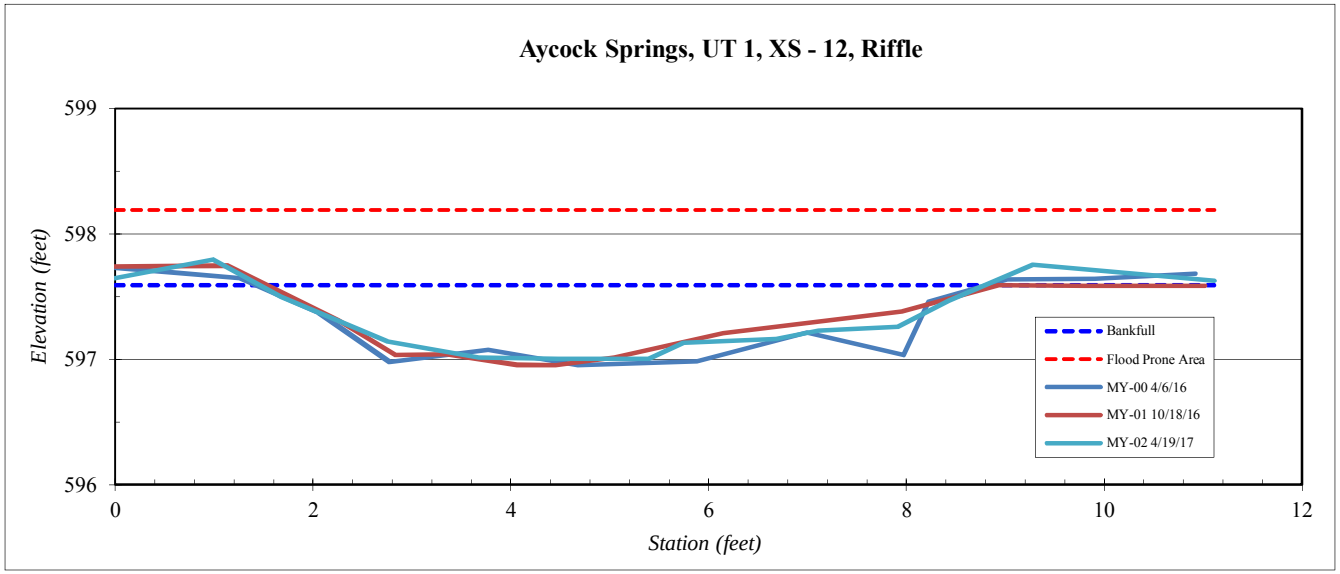


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 12, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	597.65
1.0	597.80
1.7	597.50
2.8	597.14
3.7	597.01
4.5	597.01
5.4	597.00
5.7	597.13
6.7	597.16
7.1	597.23
7.9	597.26
8.4	597.47
9.3	597.75
11.1	597.63

SUMMARY DATA	
Bankfull Elevation:	597.6
Bankfull Cross-Sectional Area:	2.8
Bankfull Width:	6.4
Flood Prone Area Elevation:	598.2
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	14.6
Entrenchment Ratio:	14.1
Bank Height Ratio:	1.0

Stream Type	C/E

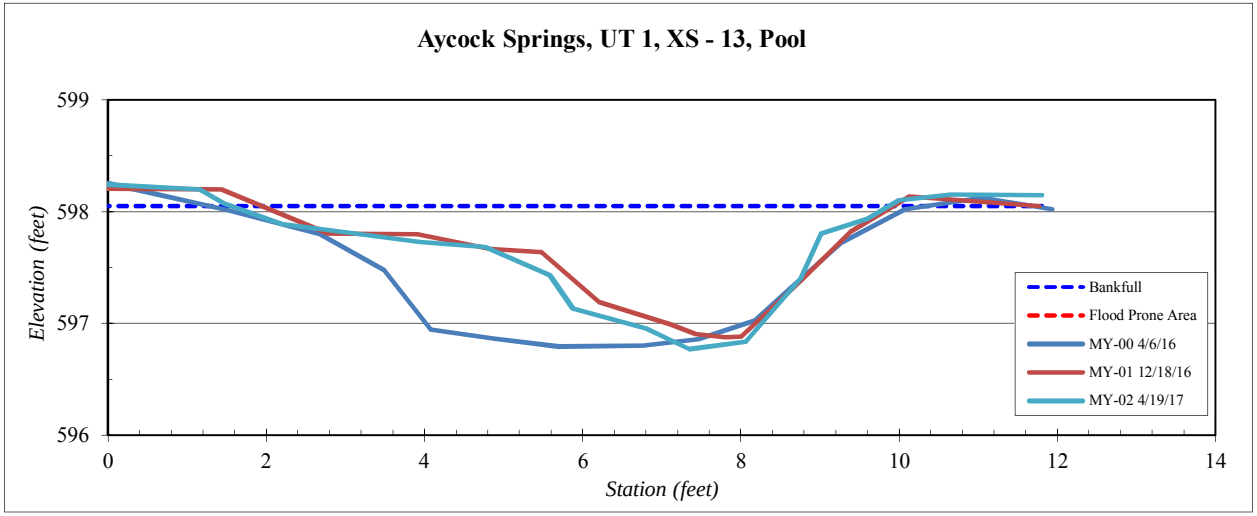


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 13, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.3	598.3
1.2	598.2
1.5	598.1
2.2	597.9
3.9	597.7
4.8	597.7
5.6	597.4
5.9	597.1
6.8	597.0
7.3	596.8
8.1	596.8
8.8	597.4
9.0	597.8
9.6	597.9
10.0	598.1
10.7	598.2
11.8	598.1

SUMMARY DATA	
Bankfull Elevation:	598.1
Bankfull Cross-Sectional Area:	4.7
Bankfull Width:	8.3
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E



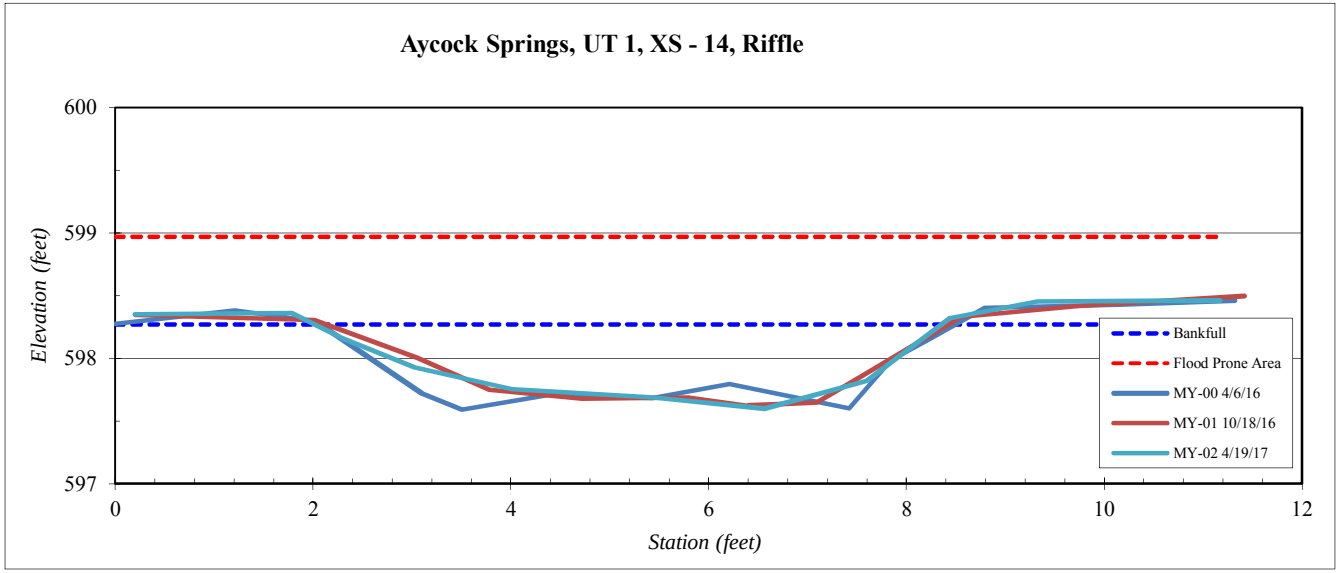
Note: Point bar development appears stable after years 1 and 2 monitoring.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 14, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	598.35
1.8	598.36
2.3	598.16
3.0	597.93
4.0	597.75
5.4	597.69
6.6	597.60
7.6	597.82
8.4	598.32
9.3	598.46
11.2	598.46

SUMMARY DATA	
Bankfull Elevation:	598.3
Bankfull Cross-Sectional Area:	2.8
Bankfull Width:	6.3
Flood Prone Area Elevation:	599.0
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	14.2
Entrenchment Ratio:	14.3
Bank Height Ratio:	1.0

Stream Type	C/E

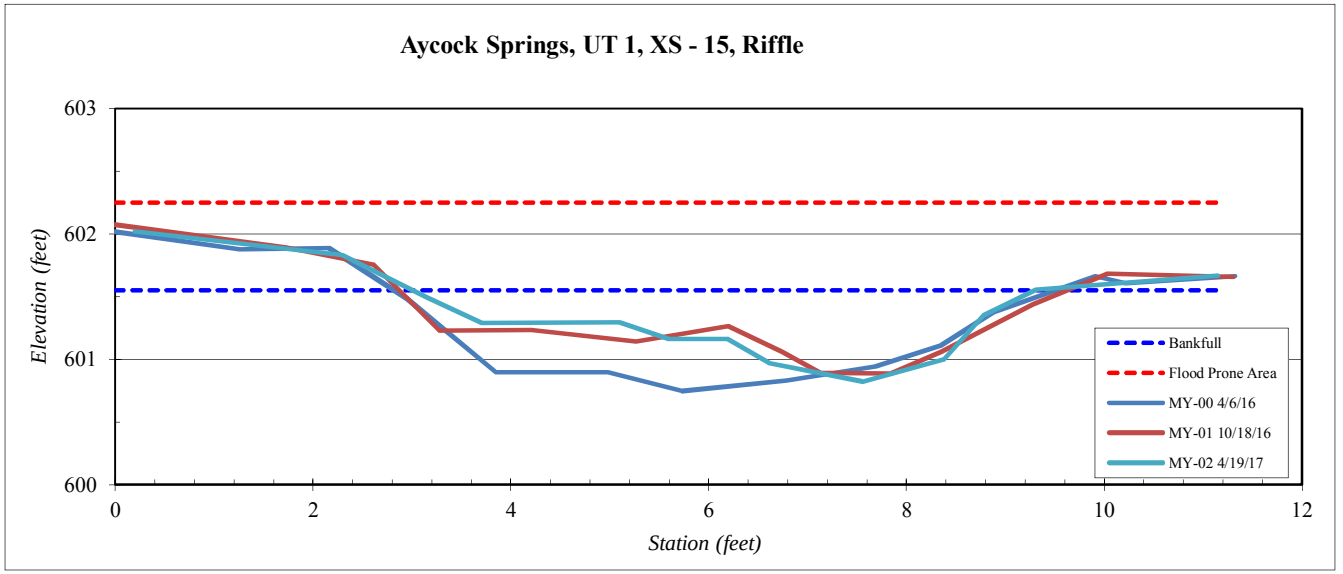


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 15, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	602.02
2.3	601.83
3.2	601.50
3.7	601.29
5.1	601.29
5.6	601.16
6.2	601.16
6.6	600.97
7.6	600.82
8.4	601.00
8.8	601.35
9.3	601.55
11.1	601.67

SUMMARY DATA	
Bankfull Elevation:	601.6
Bankfull Cross-Sectional Area:	2.4
Bankfull Width:	6.3
Flood Prone Area Elevation:	602.3
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	16.5
Entrenchment Ratio:	14.3
Bank Height Ratio:	1.0

Stream Type	C/E

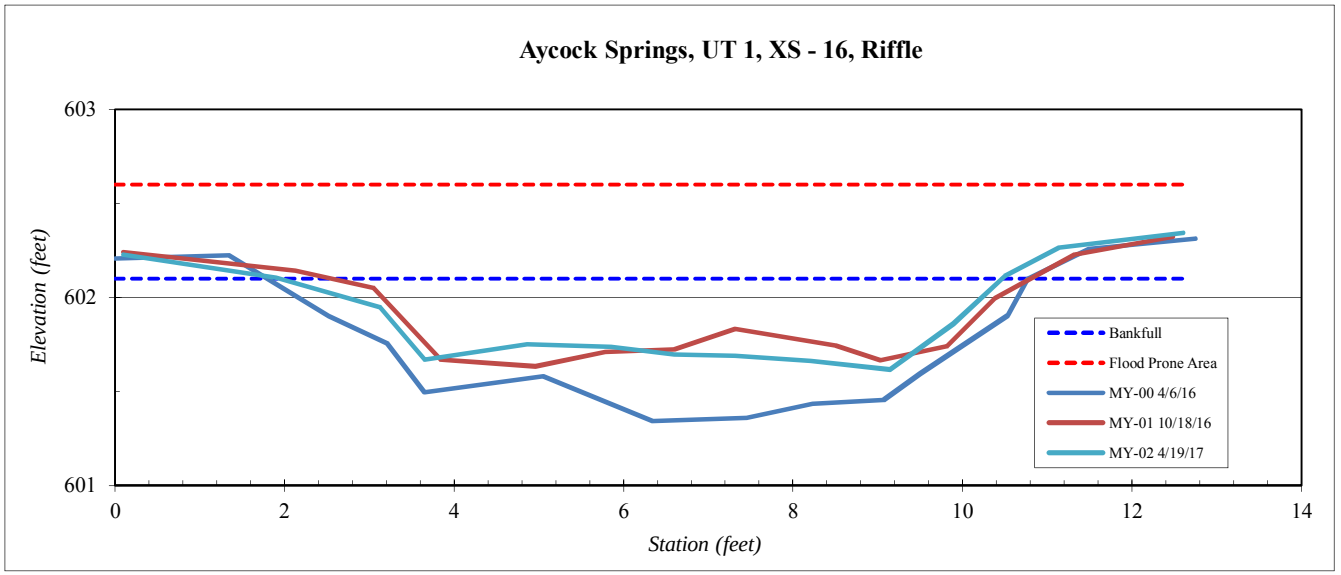


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 16, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	602.23
1.9	602.10
3.1	601.95
3.7	601.67
4.9	601.75
5.9	601.74
6.6	601.70
7.3	601.69
8.2	601.66
9.1	601.62
9.9	601.86
10.5	602.11
11.1	602.27
12.6	602.34

SUMMARY DATA	
Bankfull Elevation:	602.1
Bankfull Cross-Sectional Area:	2.8
Bankfull Width:	8.5
Flood Prone Area Elevation:	602.6
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.5
Mean Depth at Bankfull:	0.3
W / D Ratio:	25.8
Entrenchment Ratio:	10.6
Bank Height Ratio:	1.0

Stream Type	C/E



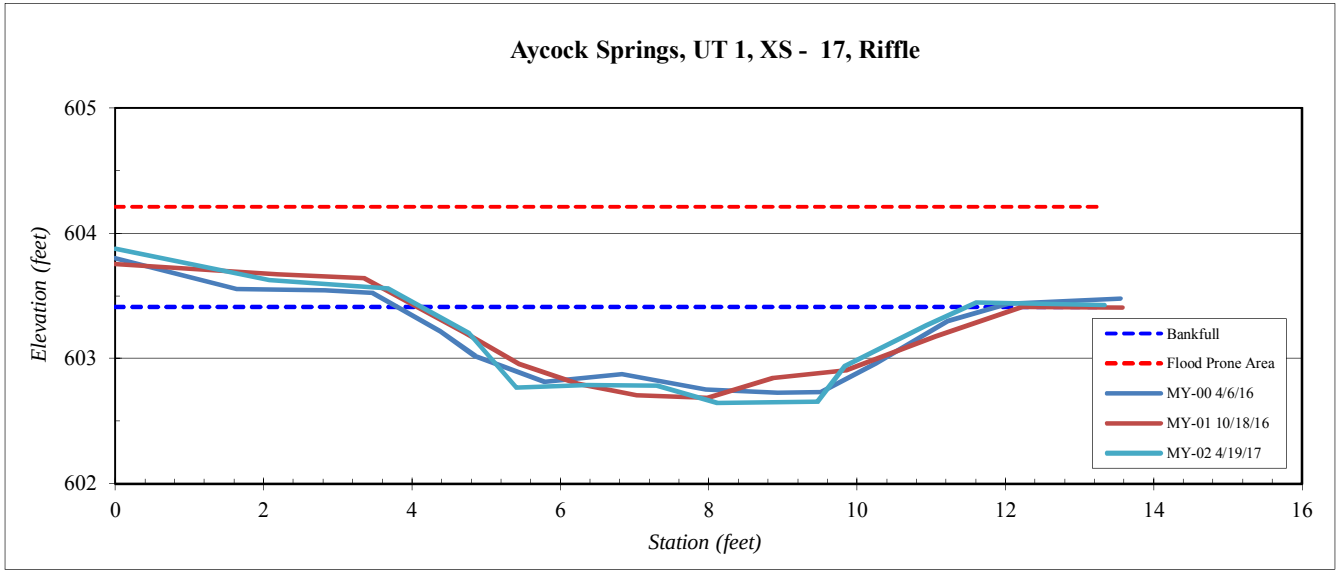
Note: Sediment transport appears to be natural and has stabilized during years 1 and 2 monitoring. No problems appear to be occuring in this reach.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 17, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	603.87
2.1	603.63
3.7	603.56
4.8	603.20
5.4	602.77
6.4	602.79
7.3	602.78
8.1	602.65
9.5	602.65
9.8	602.94
10.9	603.26
11.6	603.45
13.3	603.43

SUMMARY DATA	
Bankfull Elevation:	603.4
Bankfull Cross-Sectional Area:	3.7
Bankfull Width:	7.4
Flood Prone Area Elevation:	604.2
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	14.8
Entrenchment Ratio:	12.2
Bank Height Ratio:	1.14

Stream Type	C/E



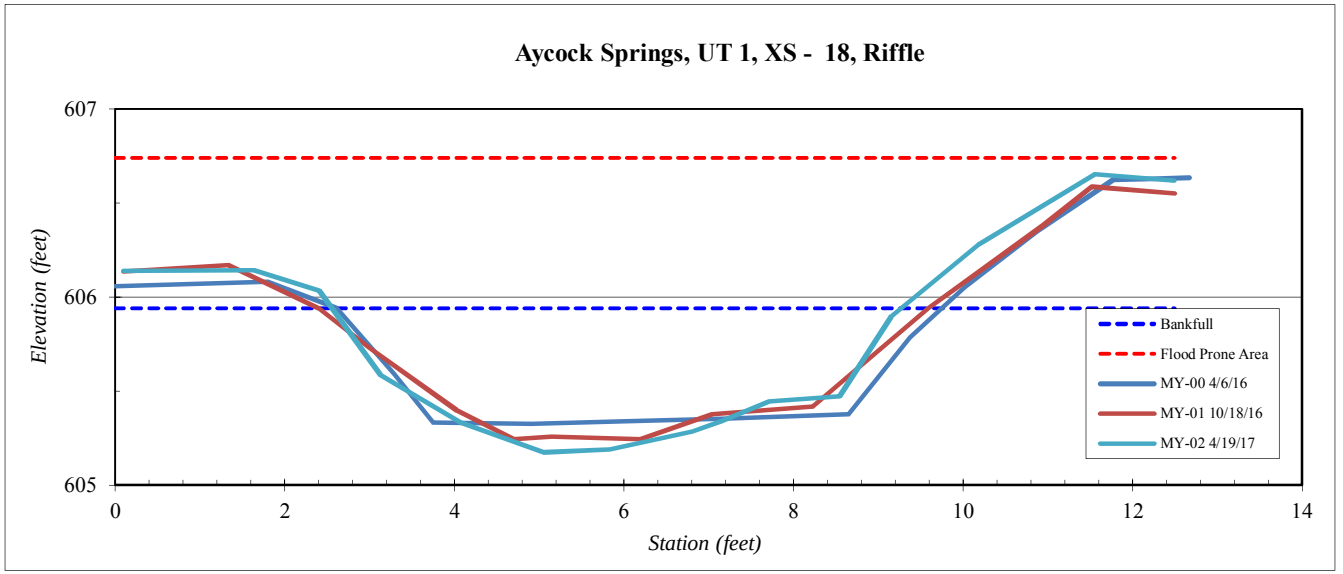
Note: No problems have been noted in this reach. Elevated BHR results from shallow channel depth.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 18, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	606.14
1.6	606.14
2.4	606.03
3.1	605.58
4.1	605.33
5.1	605.17
5.8	605.19
6.8	605.28
7.2	605.34
7.7	605.45
8.5	605.47
9.2	605.90
10.2	606.28
11.6	606.65
12.5	606.62

SUMMARY DATA	
Bankfull Elevation:	605.9
Bankfull Cross-Sectional Area:	3.6
Bankfull Width:	6.7
Flood Prone Area Elevation:	606.7
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	12.5
Entrenchment Ratio:	13.4
Bank Height Ratio:	1.33

Stream Type	C/E



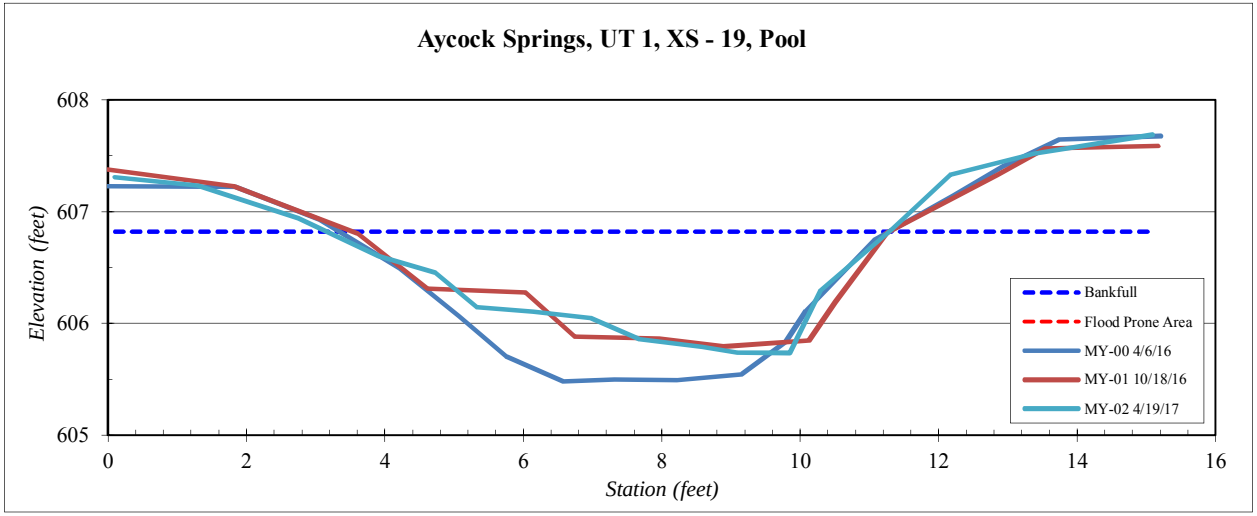
Note: No problems have been noted in this reach. Elevated BHR results from shallow channel depth.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 19, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	607.3
1.3	607.2
2.7	606.9
3.9	606.6
4.7	606.5
5.3	606.1
6.1	606.1
7.0	606.0
7.7	605.9
8.6	605.8
9.1	605.7
9.8	605.7
10.3	606.3
11.3	606.8
12.2	607.3
13.4	607.5
15.1	607.7

SUMMARY DATA	
Bankfull Elevation:	606.8
Bankfull Cross-Sectional Area:	5.3
Bankfull Width:	8.1
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.7
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E



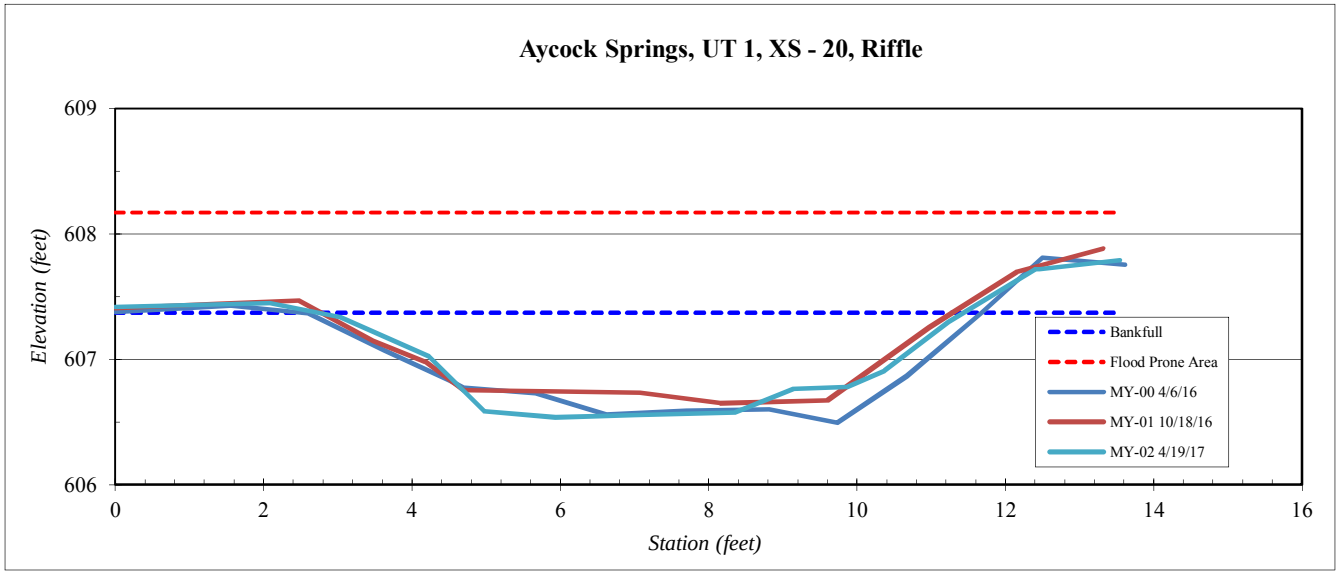
Note: Point bar development appears stable after years 1 and 2 monitoring.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 20, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	607.42
2.1	607.45
3.0	607.33
4.2	607.02
5.0	606.58
5.9	606.54
7.0	606.55
8.4	606.57
9.1	606.77
9.9	606.78
10.4	606.91
11.2	607.30
12.4	607.72
12.5	607.72
13.5	607.79

SUMMARY DATA	
Bankfull Elevation:	607.4
Bankfull Cross-Sectional Area:	4.9
Bankfull Width:	8.7
Flood Prone Area Elevation:	608.2
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.6
W / D Ratio:	15.4
Entrenchment Ratio:	10.3
Bank Height Ratio:	1.0

Stream Type	C/E

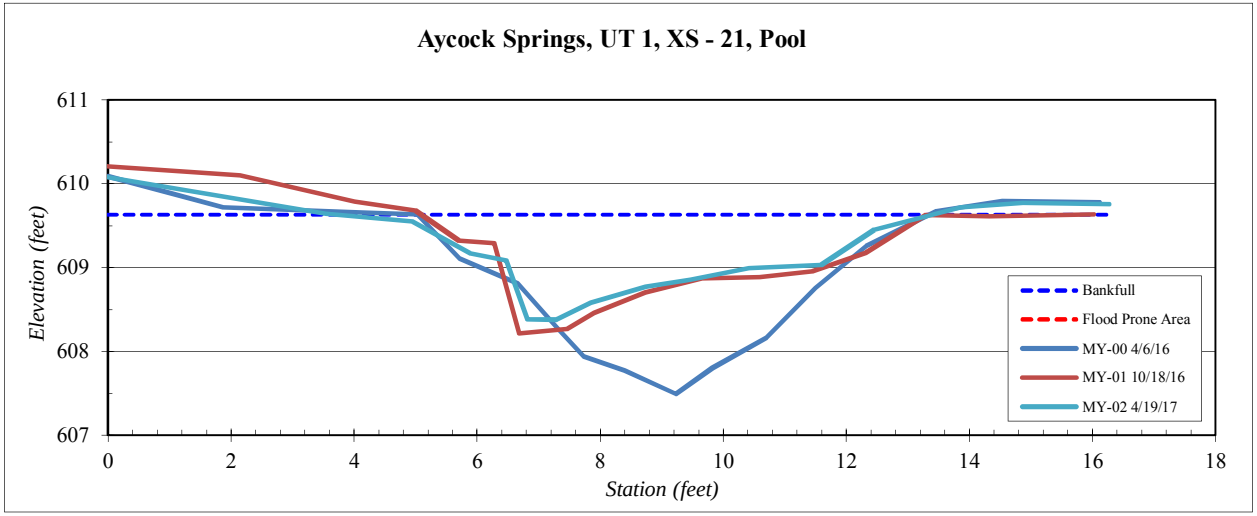


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 21, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	610.1
3.5	609.6
4.9	609.5
5.9	609.2
6.5	609.1
6.8	608.4
7.3	608.4
7.8	608.6
8.7	608.8
9.5	608.9
10.4	609.0
11.6	609.0
12.5	609.4
13.9	609.7
14.9	609.8
16.3	609.8

SUMMARY DATA	
Bankfull Elevation:	609.6
Bankfull Cross-Sectional Area:	5.4
Bankfull Width:	9.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E



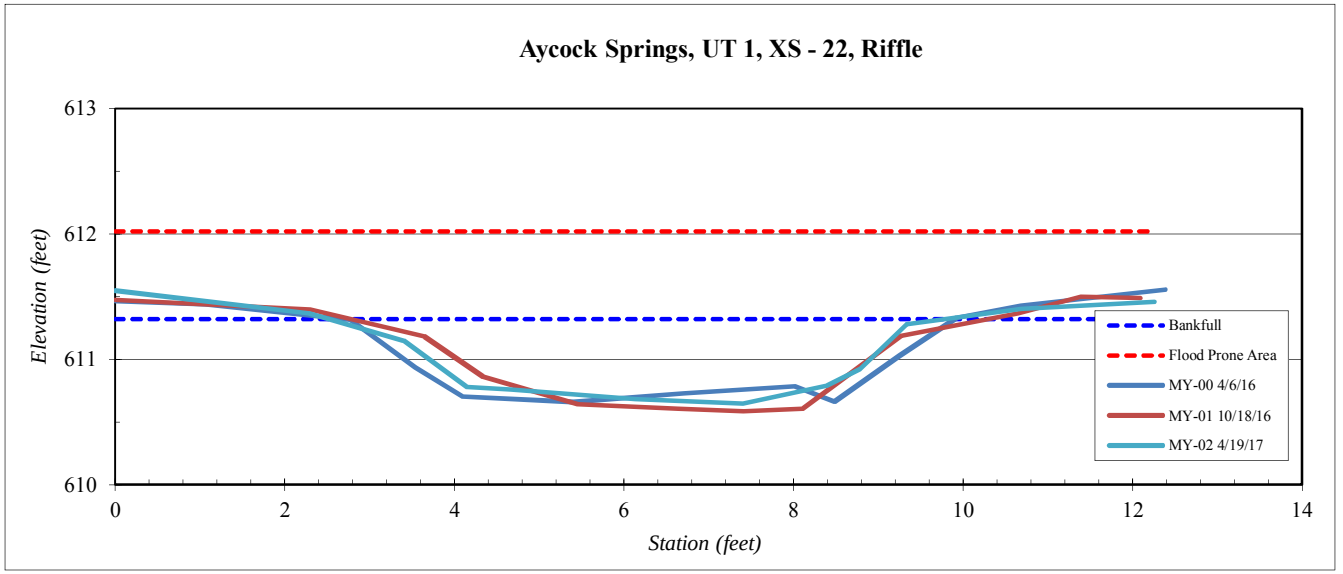
Note: Point bar development appears stable after years 1 and 2 monitoring.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 22, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	611.55
2.3	611.37
3.4	611.15
4.1	610.78
4.7	610.76
6.1	610.68
7.4	610.65
8.4	610.79
8.8	610.92
9.3	611.28
10.7	611.40
12.3	611.46

SUMMARY DATA	
Bankfull Elevation:	611.3
Bankfull Cross-Sectional Area:	3.3
Bankfull Width:	7.3
Flood Prone Area Elevation:	612.0
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.5
W / D Ratio:	16.1
Entrenchment Ratio:	12.3
Bank Height Ratio:	1.0

Stream Type	C/E

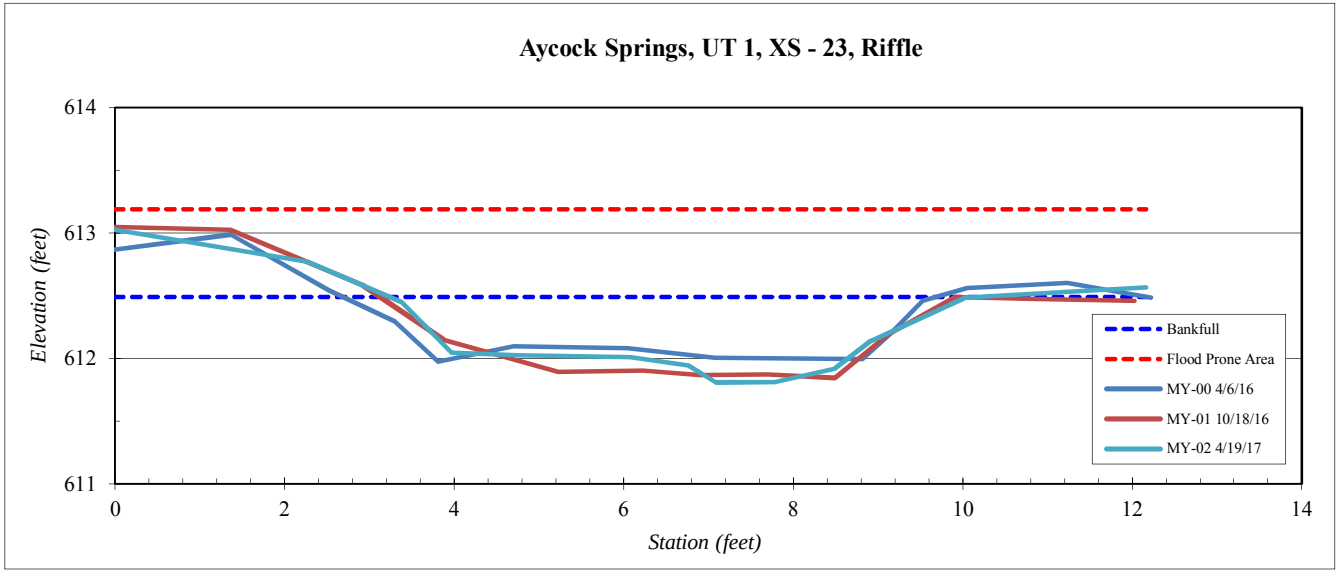


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 23, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	613.03
2.3	612.77
3.4	612.45
4.0	612.04
4.7	612.02
6.1	612.01
6.8	611.94
7.1	611.81
7.8	611.81
8.5	611.92
8.9	612.14
10.0	612.48
12.2	612.56

SUMMARY DATA	
Bankfull Elevation:	612.5
Bankfull Cross-Sectional Area:	3.0
Bankfull Width:	7.0
Flood Prone Area Elevation:	613.2
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	16.3
Entrenchment Ratio:	12.9
Bank Height Ratio:	1.17

Stream Type	C/E



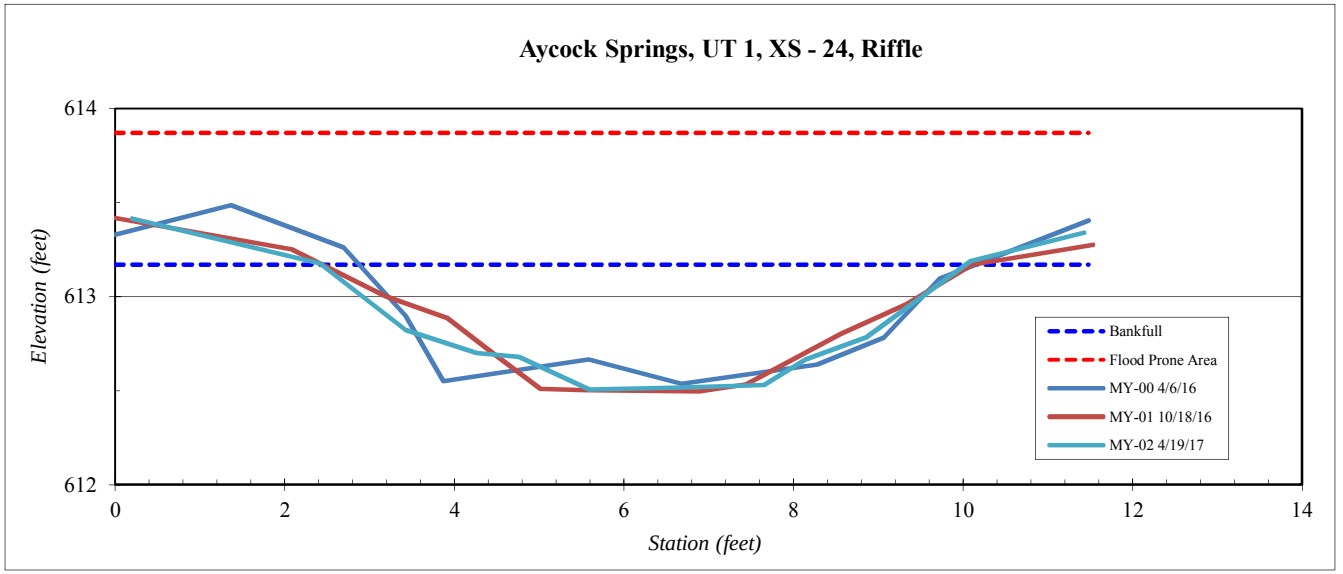
Note: No problems have been noted in this reach. Elevated BHR results from shallow channel depth.

Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 24, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	613.42
2.4	613.17
3.4	612.82
4.3	612.70
4.8	612.68
5.6	612.51
6.6	612.52
7.7	612.53
8.1	612.67
8.9	612.78
10.1	613.19
11.4	613.34

SUMMARY DATA	
Bankfull Elevation:	613.2
Bankfull Cross-Sectional Area:	3.4
Bankfull Width:	7.6
Flood Prone Area Elevation:	613.9
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	17.0
Entrenchment Ratio:	11.8
Bank Height Ratio:	1.0

Stream Type	C/E

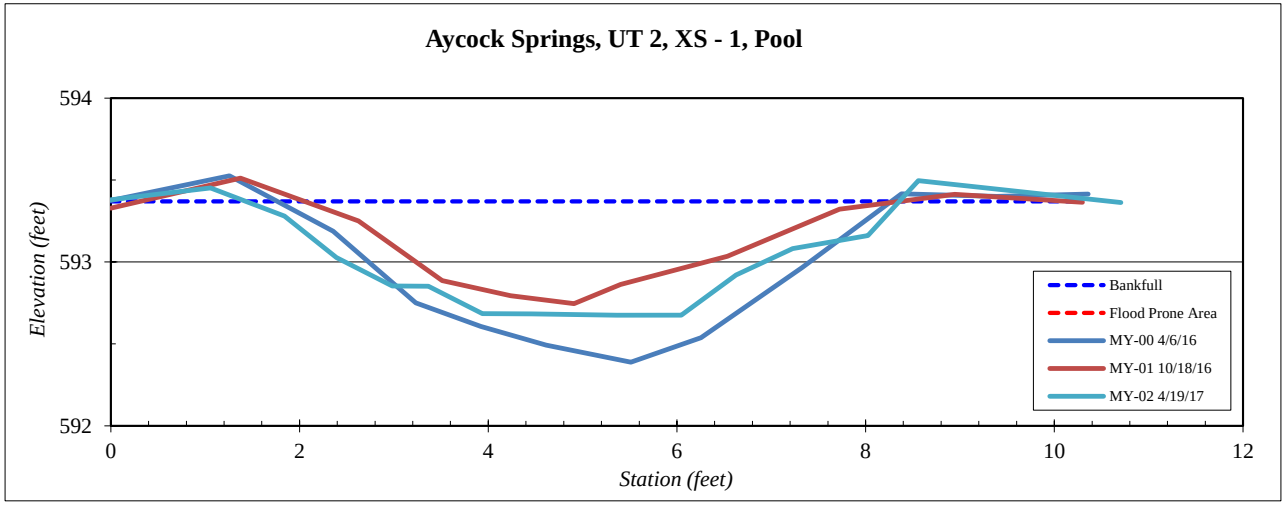


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 1, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	593.3
1.4	593.5
2.6	593.3
3.5	592.9
4.2	592.8
4.9	592.7
5.4	592.9
6.5	593.0
7.7	593.3
8.9	593.4
10.3	593.4

SUMMARY DATA	
Bankfull Elevation:	593.4
Bankfull Cross-Sectional Area:	3.2
Bankfull Width:	6.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

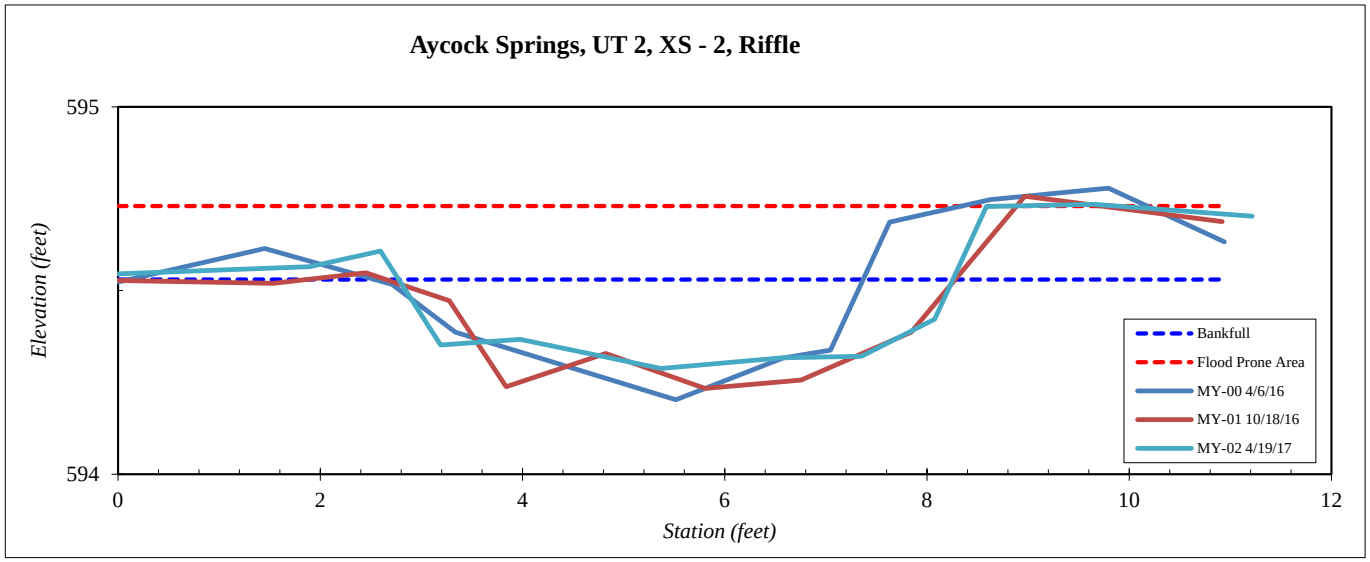


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 2, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	594.03
1.5	594.02
2.4	594.05
3.3	593.97
3.8	593.74
4.8	593.83
5.8	593.73
6.8	593.76
7.8	593.89
9.0	594.26
10.9	594.19

SUMMARY DATA	
Bankfull Elevation:	594.0
Bankfull Cross-Sectional Area:	1.0
Bankfull Width:	5.5
Flood Prone Area Elevation:	594.2
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.2
Mean Depth at Bankfull:	0.2
W / D Ratio:	30.3
Entrenchment Ratio:	16.4
Bank Height Ratio:	1.0

Stream Type	C/E

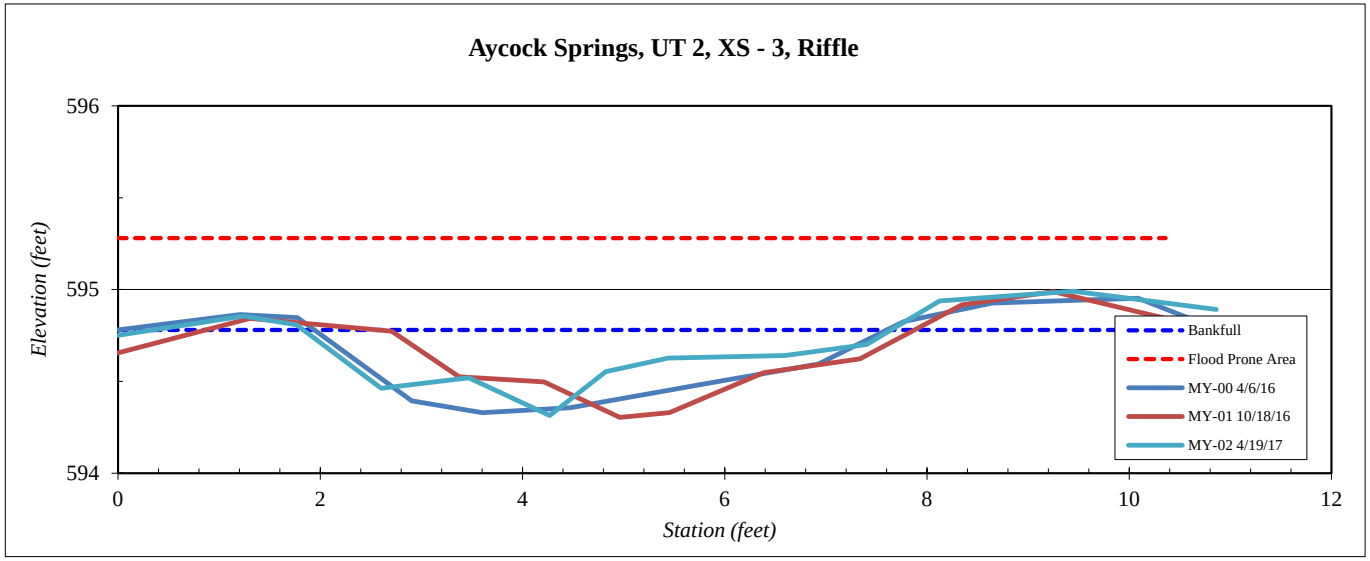


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 3, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.1	594.64
1.3	594.84
2.7	594.77
3.4	594.53
4.2	594.50
5.0	594.30
5.5	594.33
6.4	594.55
7.3	594.62
8.3	594.92
9.2	594.99
10.4	594.84

SUMMARY DATA	
Bankfull Elevation:	594.8
Bankfull Cross-Sectional Area:	1.2
Bankfull Width:	5.8
Flood Prone Area Elevation:	595.3
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.5
Mean Depth at Bankfull:	0.2
W / D Ratio:	28.0
Entrenchment Ratio:	15.5
Bank Height Ratio:	1.0

Stream Type	C/E

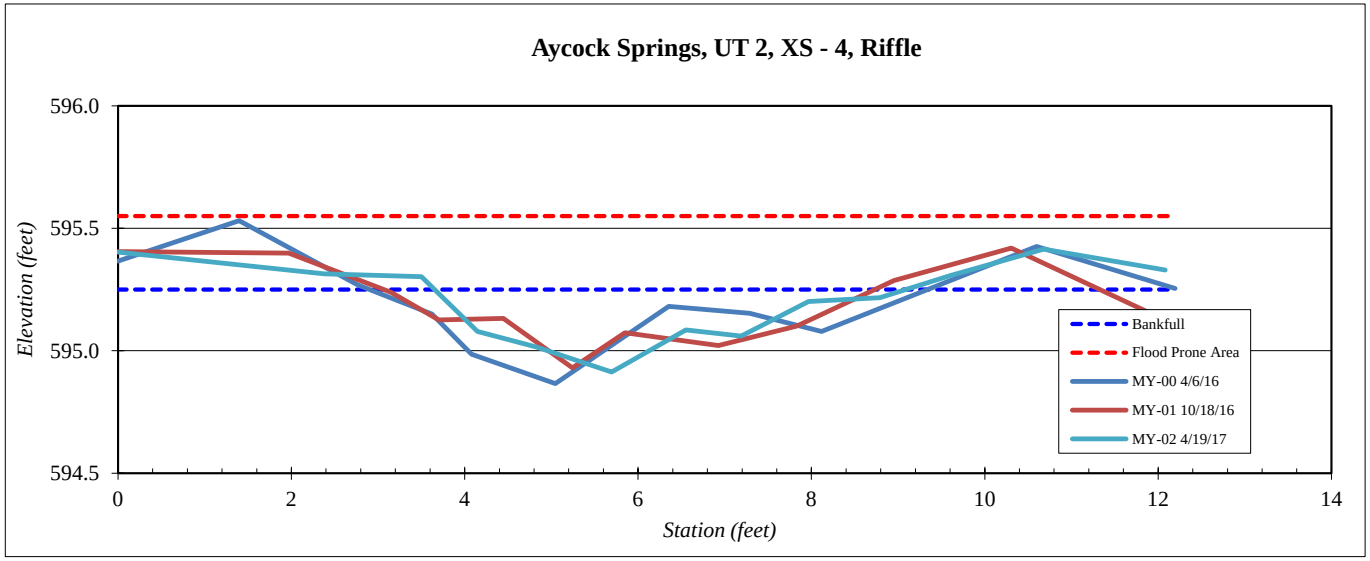


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 4, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	595.40
2.0	595.40
3.1	595.24
3.7	595.13
4.4	595.13
5.2	594.93
5.8	595.07
6.9	595.02
7.8	595.10
9.0	595.29
10.3	595.42
12.0	595.14

SUMMARY DATA	
Bankfull Elevation:	595.3
Bankfull Cross-Sectional Area:	0.9
Bankfull Width:	5.4
Flood Prone Area Elevation:	595.6
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.3
Mean Depth at Bankfull:	0.2
W / D Ratio:	32.4
Entrenchment Ratio:	16.7
Bank Height Ratio:	1.0

Stream Type	C/E

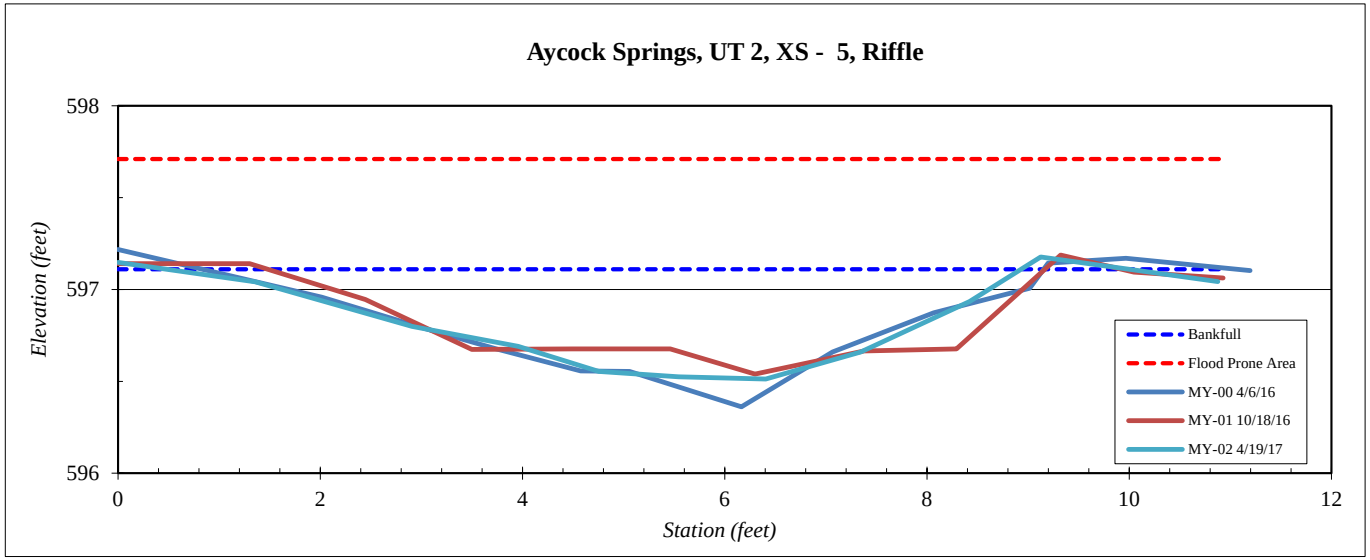


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 5, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	597.14
1.3	597.14
2.4	596.94
3.5	596.67
4.5	596.68
5.5	596.68
6.3	596.54
7.4	596.67
8.3	596.68
9.3	597.19
10.0	597.09
10.9	597.06

SUMMARY DATA	
Bankfull Elevation:	597.1
Bankfull Cross-Sectional Area:	2.9
Bankfull Width:	8.5
Flood Prone Area Elevation:	597.7
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.3
W / D Ratio:	24.9
Entrenchment Ratio:	10.6
Bank Height Ratio:	1.0

Stream Type	C/E

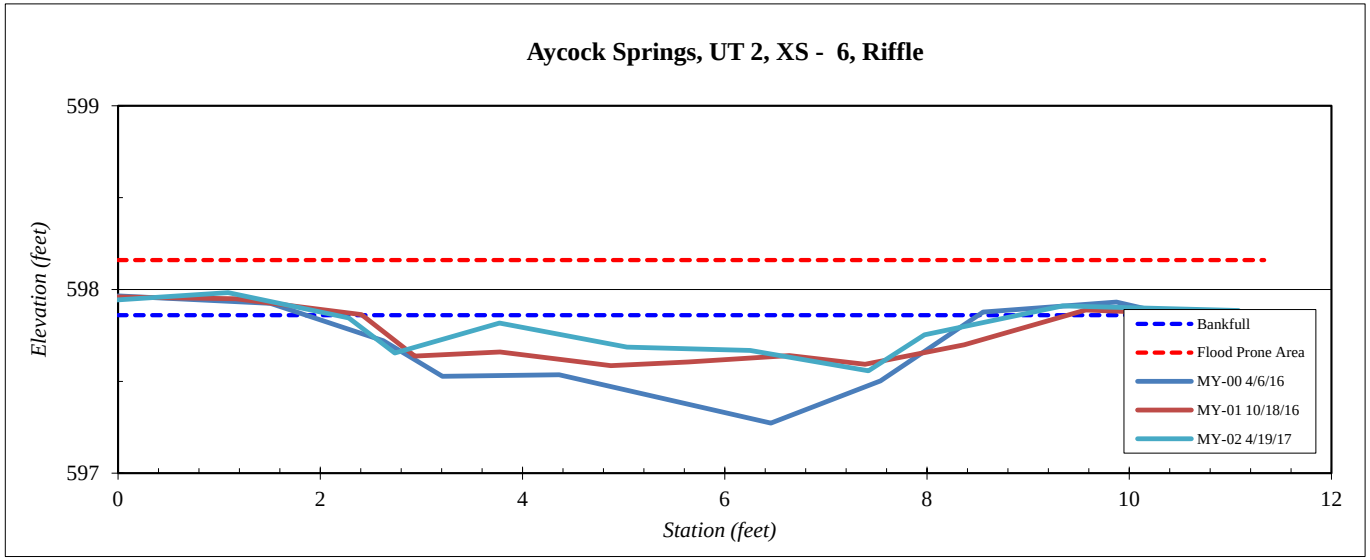


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 6, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.1	597.96
1.2	597.95
2.4	597.86
2.9	597.64
3.8	597.66
4.9	597.59
5.6	597.61
6.6	597.64
7.4	597.59
8.4	597.70
9.6	597.89
11.3	597.85

SUMMARY DATA	
Bankfull Elevation:	597.9
Bankfull Cross-Sectional Area:	1.0
Bankfull Width:	6.8
Flood Prone Area Elevation:	598.2
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.3
Mean Depth at Bankfull:	0.1
W / D Ratio:	46.2
Entrenchment Ratio:	13.2
Bank Height Ratio:	1.0

Stream Type	C/E

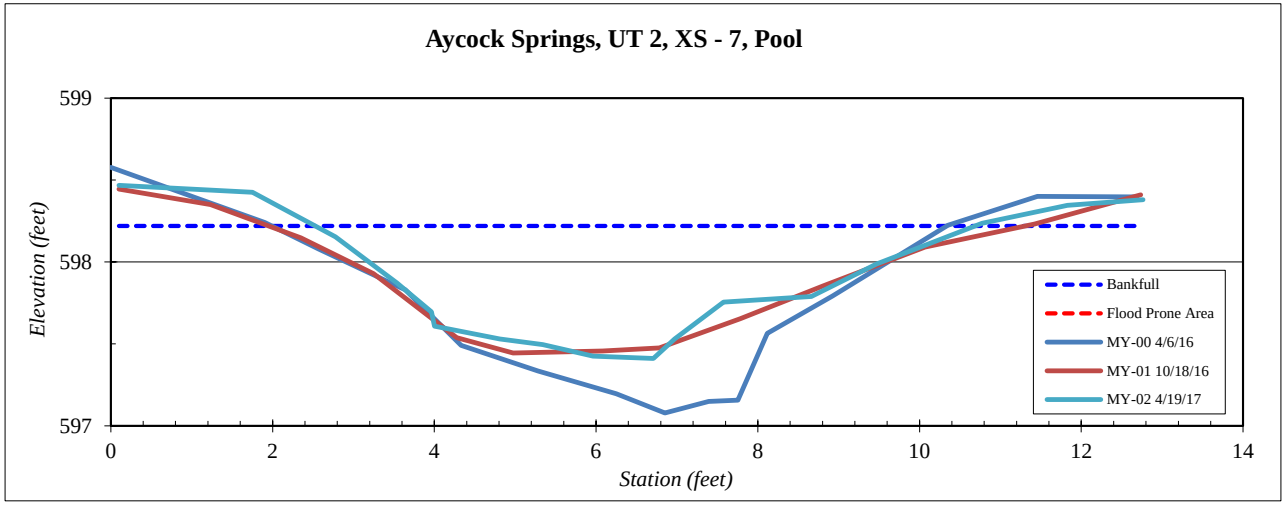


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 7, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	598.4
1.2	598.4
2.3	598.1
3.2	597.9
4.3	597.5
5.0	597.4
6.1	597.5
6.8	597.5
7.8	597.7
8.8	597.9
10.1	598.1
11.4	598.2
12.7	598.4

SUMMARY DATA	
Bankfull Elevation:	598.2
Bankfull Cross-Sectional Area:	3.8
Bankfull Width:	8.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

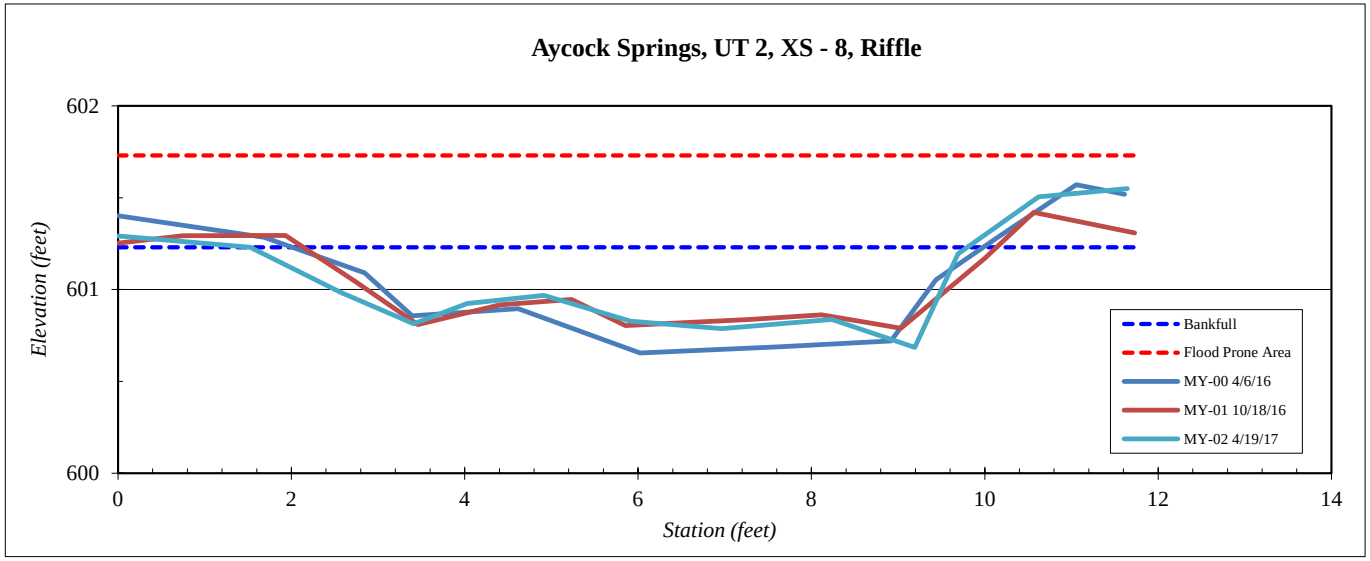


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 8, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	601.25
0.8	601.29
1.9	601.29
2.7	601.05
3.5	600.81
4.4	600.92
5.2	600.95
5.9	600.80
7.3	600.84
8.1	600.86
9.0	600.79
10.0	601.17
10.6	601.42
11.7	601.31

SUMMARY DATA	
Bankfull Elevation:	601.2
Bankfull Cross-Sectional Area:	2.8
Bankfull Width:	8.3
Flood Prone Area Elevation:	601.7
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.5
Mean Depth at Bankfull:	0.3
W / D Ratio:	24.6
Entrenchment Ratio:	10.8
Bank Height Ratio:	1.0

Stream Type	C/E

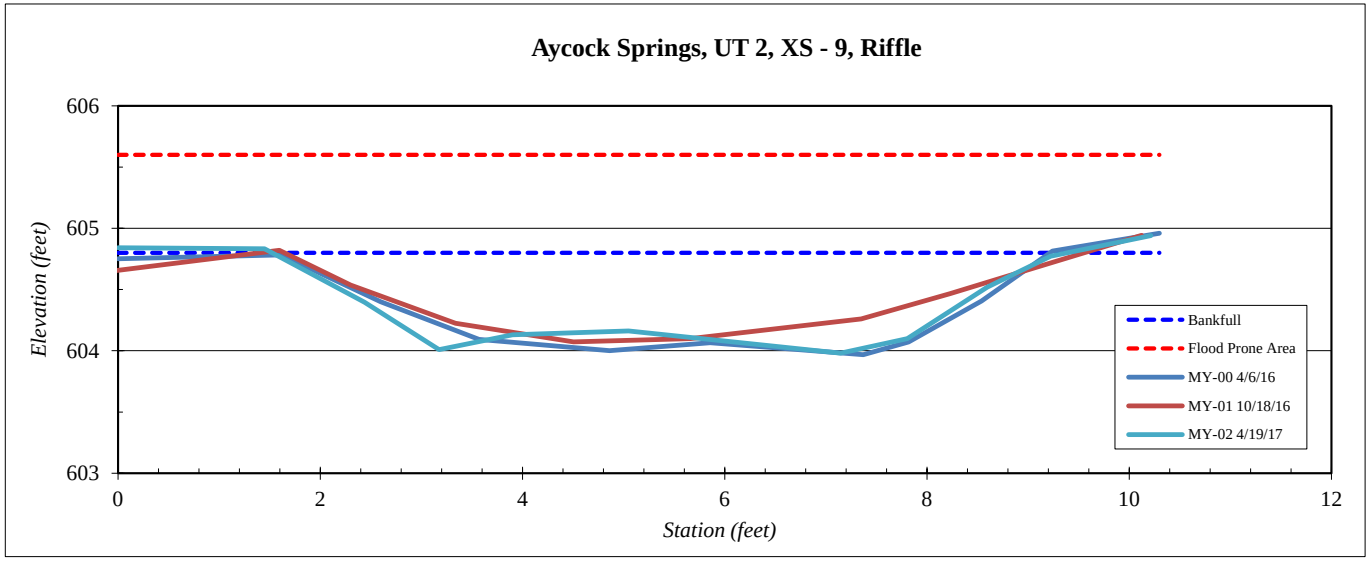


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 9, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	604.64
1.6	604.82
2.3	604.54
3.3	604.23
4.5	604.07
5.7	604.10
7.3	604.26
8.2	604.47
9.0	604.66
10.1	604.94

SUMMARY DATA	
Bankfull Elevation:	604.8
Bankfull Cross-Sectional Area:	4.4
Bankfull Width:	7.9
Flood Prone Area Elevation:	605.6
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.6
W / D Ratio:	14.2
Entrenchment Ratio:	11.4
Bank Height Ratio:	1.0

Stream Type	C/E

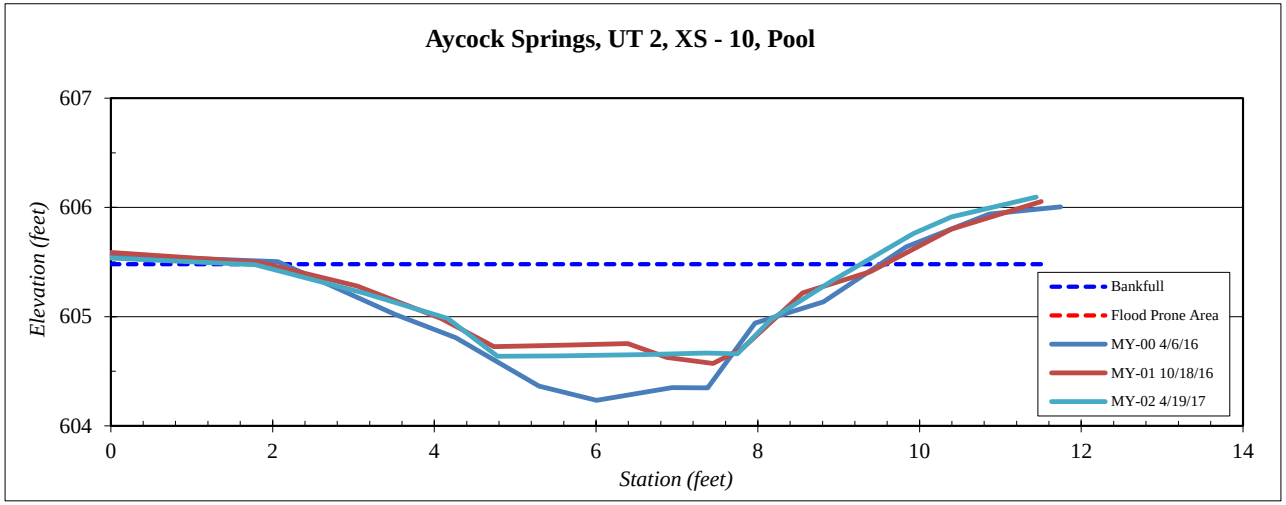


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 10, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	605.6
1.8	605.5
3.0	605.3
4.1	605.0
4.7	604.7
5.6	604.7
6.4	604.8
6.9	604.6
7.4	604.6
7.8	604.7
8.6	605.2
9.4	605.4
10.4	605.8
11.5	606.1

SUMMARY DATA	
Bankfull Elevation:	605.5
Bankfull Cross-Sectional Area:	4.0
Bankfull Width:	7.6
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

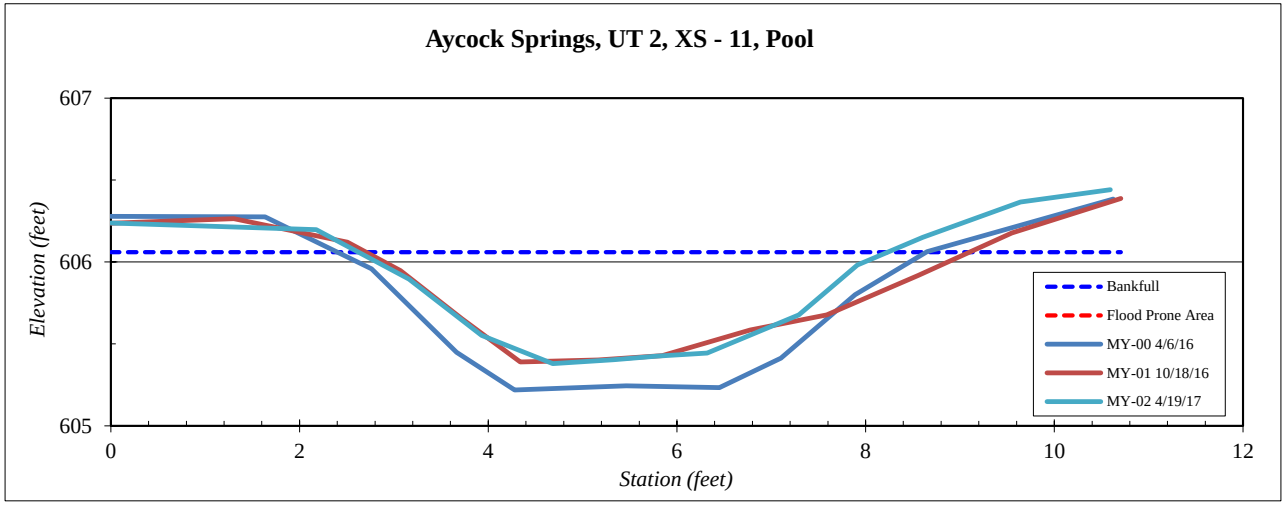


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 11, Pool
Feature	Pool
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	606.2
1.3	606.3
2.5	606.1
3.1	605.9
3.7	605.7
4.3	605.4
5.2	605.4
5.8	605.4
6.8	605.6
7.6	605.7
8.6	605.9
9.5	606.2
10.7	606.4

SUMMARY DATA	
Bankfull Elevation:	606.1
Bankfull Cross-Sectional Area:	2.5
Bankfull Width:	5.6
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

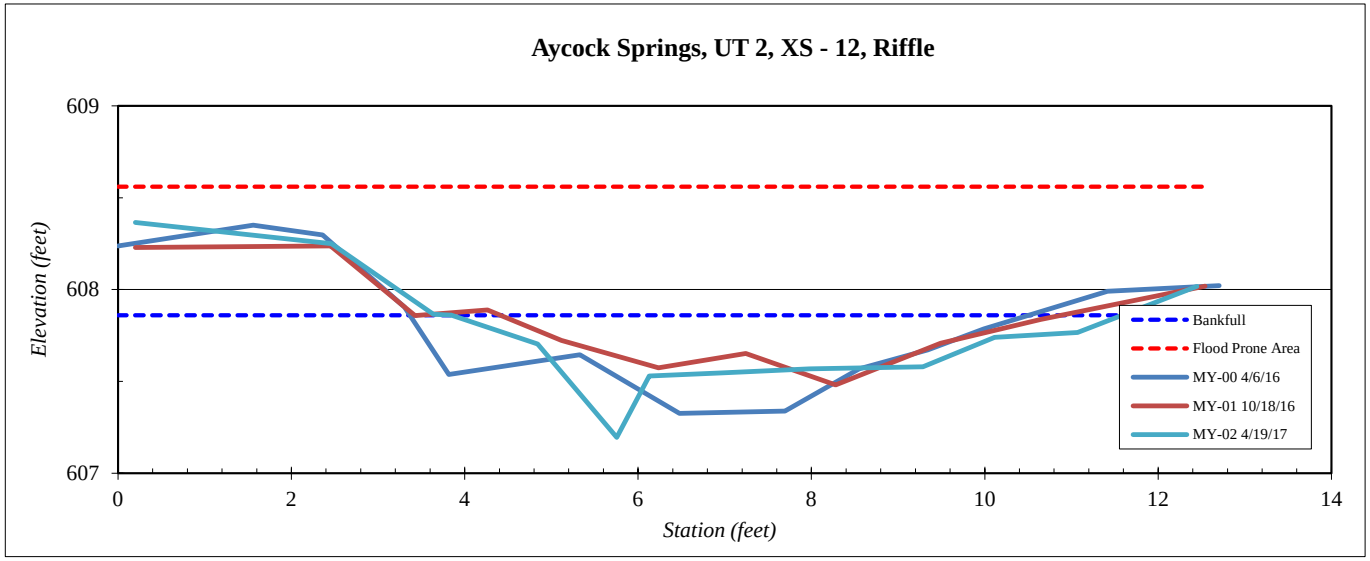


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 12, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	608.23
2.5	608.24
3.4	607.86
4.3	607.89
5.1	607.72
6.2	607.57
7.2	607.65
8.3	607.48
9.5	607.71
10.6	607.84
12.5	608.02

SUMMARY DATA	
Bankfull Elevation:	607.9
Bankfull Cross-Sectional Area:	1.9
Bankfull Width:	7.7
Flood Prone Area Elevation:	608.6
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.2
W / D Ratio:	31.2
Entrenchment Ratio:	11.7
Bank Height Ratio:	1.0

Stream Type	C/E

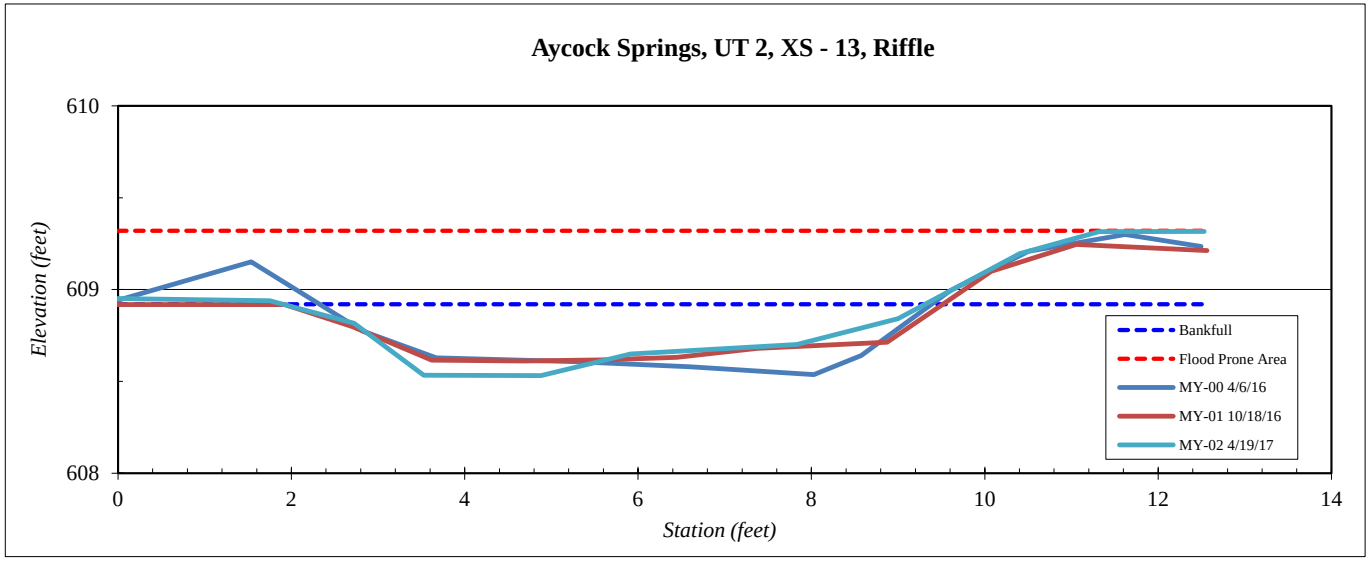


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 2, XS - 13, Riffle
Feature	Riffle
Date:	4/19/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.1	608.92
1.9	608.92
2.7	608.80
3.6	608.62
4.7	608.61
5.6	608.62
6.4	608.63
7.4	608.68
8.9	608.71
10.1	609.10
11.1	609.25
12.6	609.21

SUMMARY DATA	
Bankfull Elevation:	608.9
Bankfull Cross-Sectional Area:	1.8
Bankfull Width:	7.4
Flood Prone Area Elevation:	609.3
Flood Prone Width:	90.0
Max Depth at Bankfull:	0.4
Mean Depth at Bankfull:	0.2
W / D Ratio:	30.4
Entrenchment Ratio:	12.2
Bank Height Ratio:	1.0

Stream Type	C/E

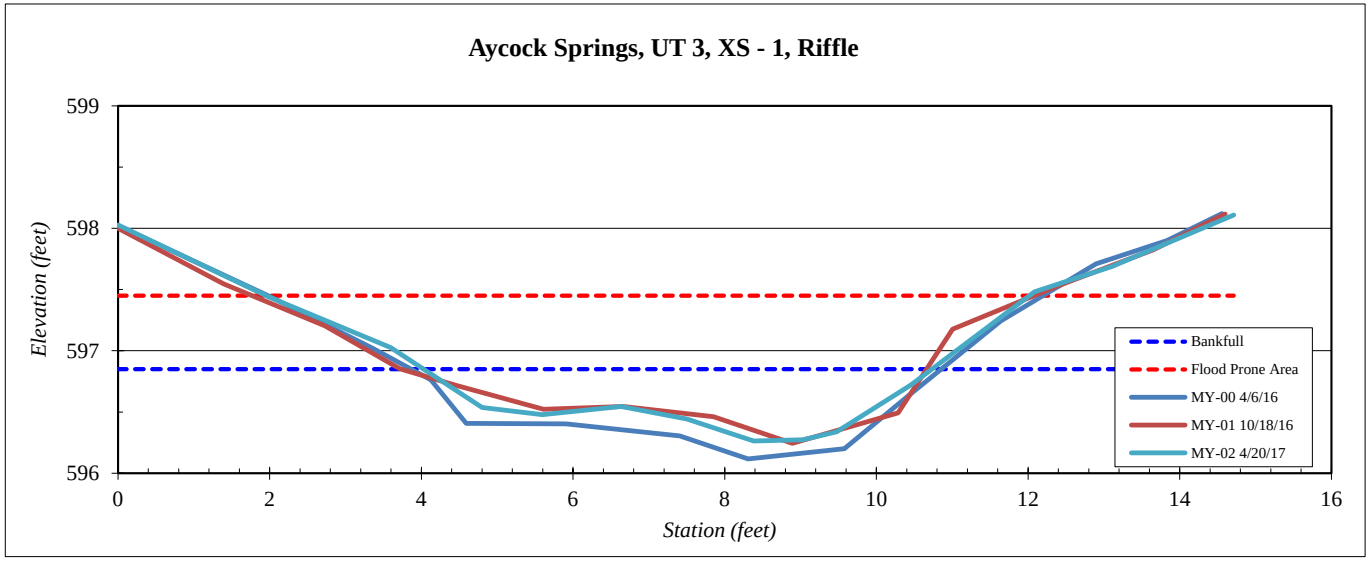


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 3, XS - 1, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	598.03
2.0	597.44
3.6	597.03
4.8	596.54
5.6	596.48
6.6	596.55
7.5	596.44
8.4	596.26
9.0	596.27
9.5	596.34
10.5	596.72
12.1	597.48
13.1	597.69
14.7	598.11

SUMMARY DATA	
Bankfull Elevation:	596.9
Bankfull Cross-Sectional Area:	2.4
Bankfull Width:	6.7
Flood Prone Area Elevation:	597.5
Flood Prone Width:	11.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	18.7
Entrenchment Ratio:	1.6
Bank Height Ratio:	1.0

Stream Type	C/E

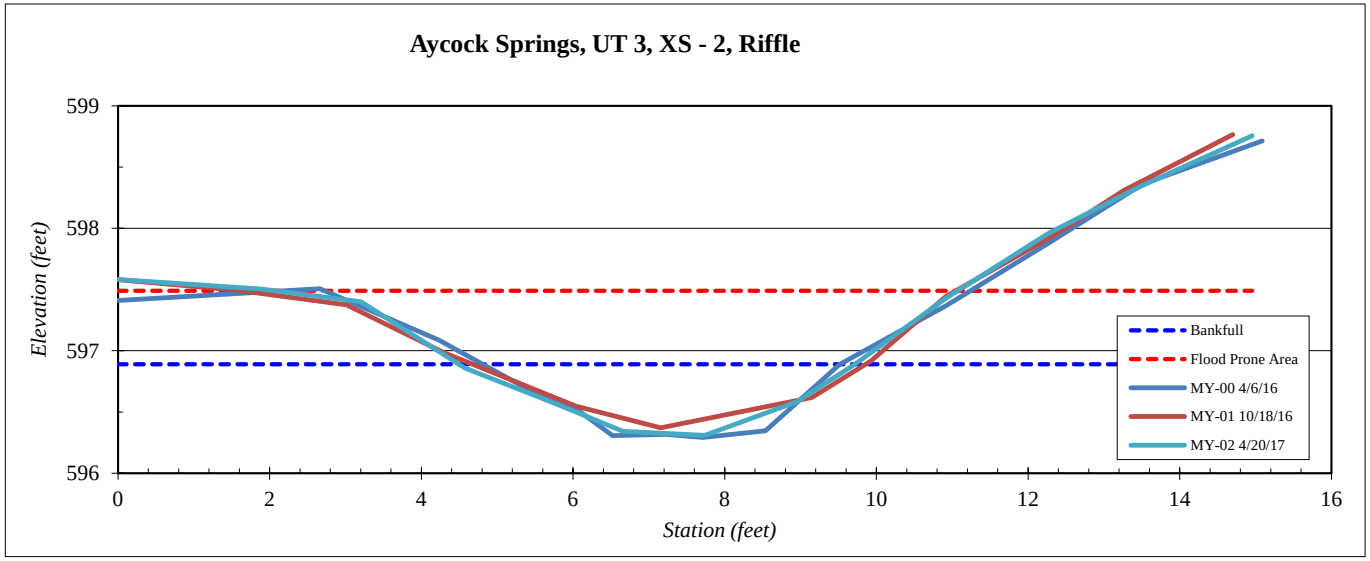


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 3, XS - 2, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	597.59
1.9	597.50
3.2	597.40
4.6	596.86
5.7	596.58
6.7	596.34
7.7	596.31
8.9	596.58
9.7	596.89
10.9	597.43
12.3	597.96
13.5	598.34
15.0	598.76

SUMMARY DATA	
Bankfull Elevation:	596.9
Bankfull Cross-Sectional Area:	1.9
Bankfull Width:	5.2
Flood Prone Area Elevation:	597.5
Flood Prone Width:	8.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	14.2
Entrenchment Ratio:	1.5
Bank Height Ratio:	1.0

Stream Type	C/E

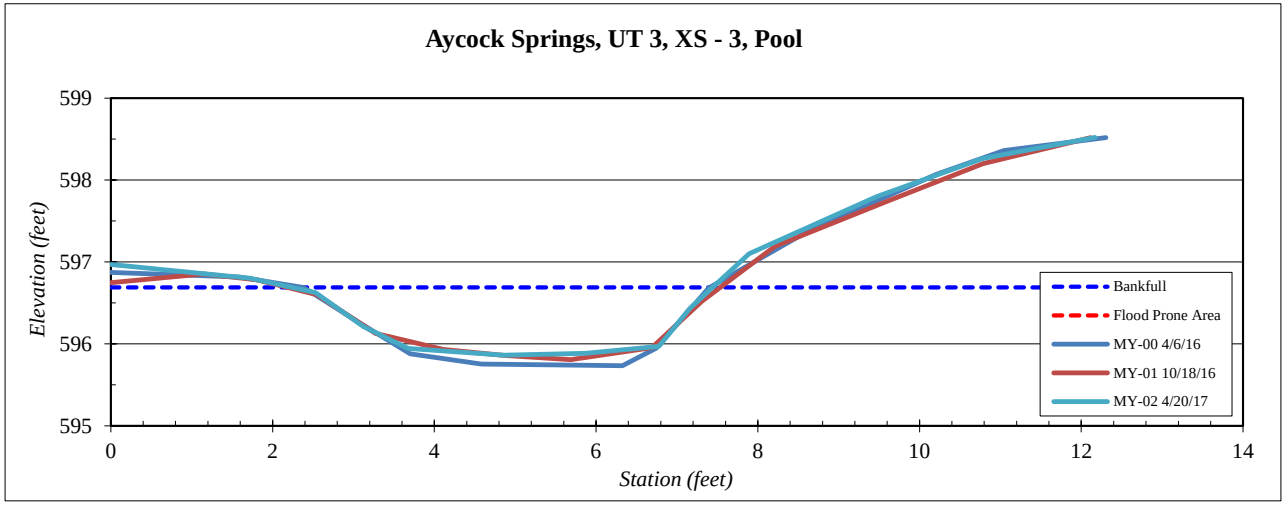


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 3, XS - 3, Pool
Feature	Pool
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	597.0
1.7	596.8
2.5	596.6
3.1	596.2
3.7	595.9
4.9	595.9
5.9	595.9
6.8	596.0
7.2	596.4
7.9	597.1
9.5	597.8
10.8	598.3
12.2	598.5

SUMMARY DATA	
Bankfull Elevation:	596.7
Bankfull Cross-Sectional Area:	3.2
Bankfull Width:	5.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

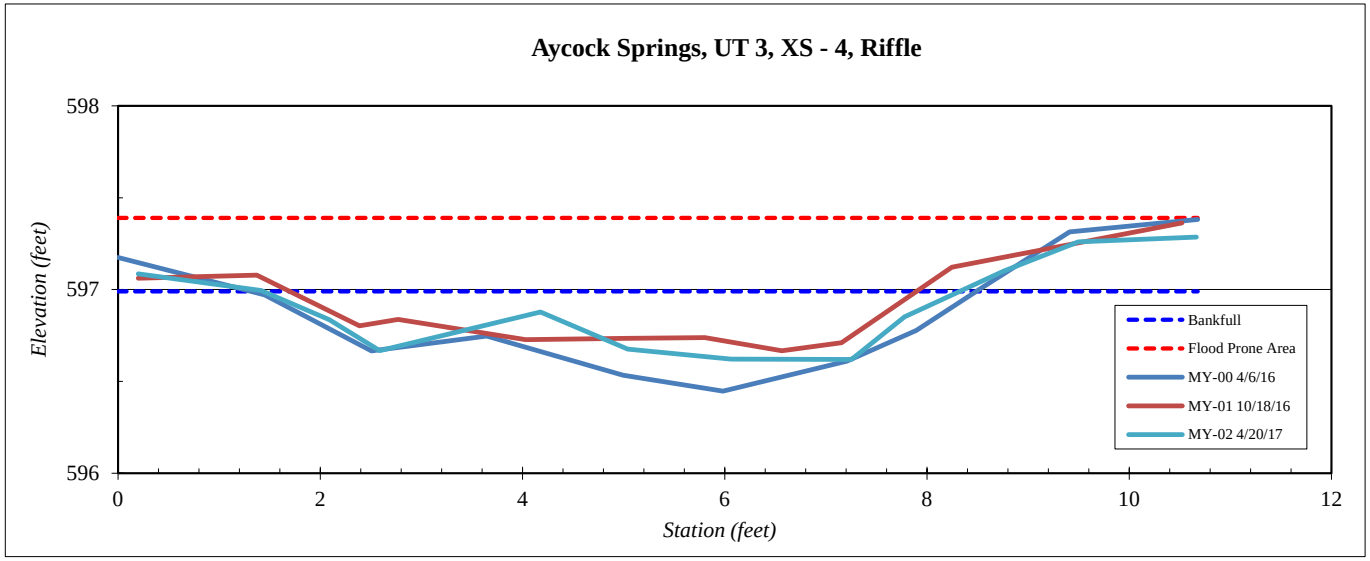


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 3, XS - 4, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	597.09
1.4	596.99
2.1	596.84
2.6	596.67
4.2	596.88
5.0	596.68
6.1	596.62
7.3	596.62
7.8	596.85
8.8	597.10
9.5	597.26
10.7	597.29

SUMMARY DATA	
Bankfull Elevation:	597.0
Bankfull Cross-Sectional Area:	1.7
Bankfull Width:	6.9
Flood Prone Area Elevation:	597.4
Flood Prone Width:	20.0
Max Depth at Bankfull:	0.4
Mean Depth at Bankfull:	0.2
W / D Ratio:	28.0
Entrenchment Ratio:	2.9
Bank Height Ratio:	1.0

Stream Type	C/E

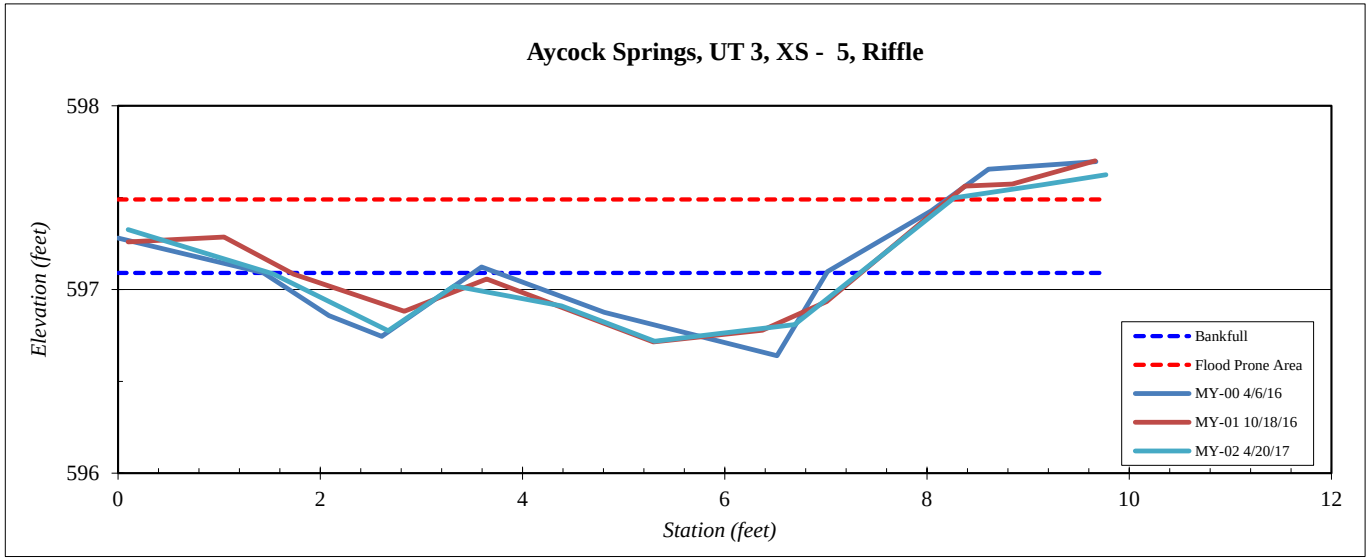


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 3, XS - 5, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	597.33
1.5	597.09
2.7	596.78
3.3	597.02
4.4	596.91
5.3	596.72
6.7	596.81
7.5	597.18
8.3	597.50
9.1	597.57
9.8	597.62

SUMMARY DATA	
Bankfull Elevation:	597.1
Bankfull Cross-Sectional Area:	1.2
Bankfull Width:	5.8
Flood Prone Area Elevation:	597.5
Flood Prone Width:	20.0
Max Depth at Bankfull:	0.4
Mean Depth at Bankfull:	0.2
W / D Ratio:	28.0
Entrenchment Ratio:	3.4
Bank Height Ratio:	1.0

Stream Type	C/E

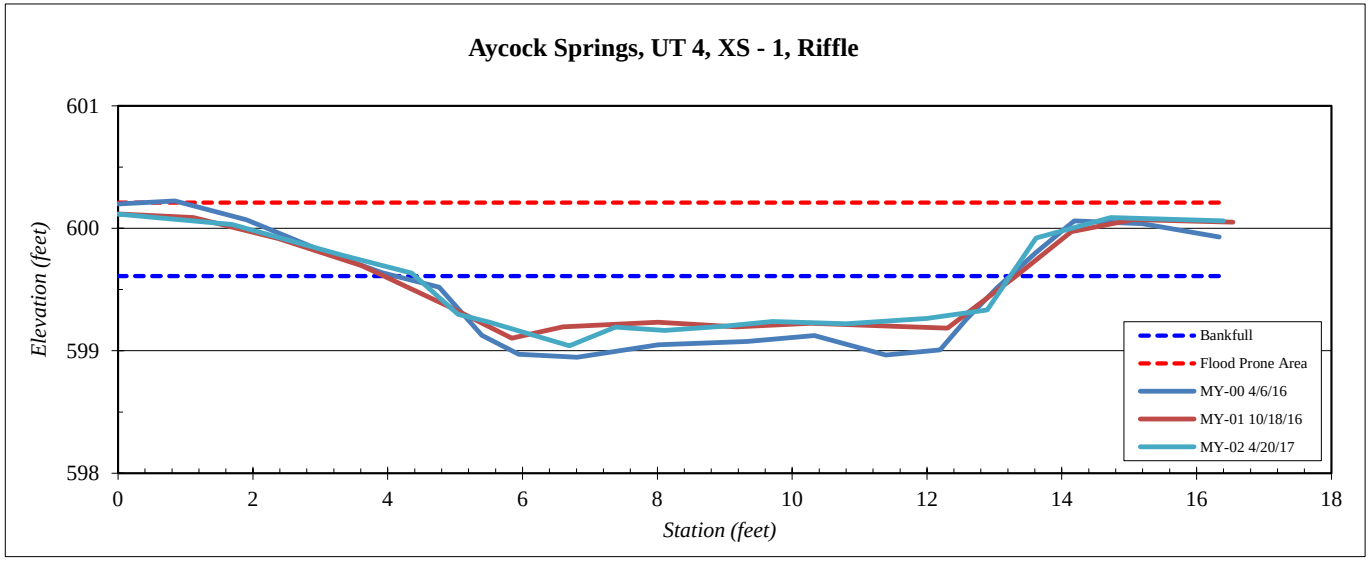


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 1, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	600.12
1.7	600.03
3.3	599.78
4.4	599.63
5.0	599.30
5.5	599.23
6.7	599.04
7.4	599.19
8.1	599.17
9.0	599.20
9.7	599.24
10.8	599.22
12.0	599.26
12.9	599.33
13.6	599.92
14.7	600.09
16.4	600.06

SUMMARY DATA	
Bankfull Elevation:	599.6
Bankfull Cross-Sectional Area:	3.3
Bankfull Width:	8.8
Flood Prone Area Elevation:	600.2
Flood Prone Width:	50.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	23.5
Entrenchment Ratio:	5.7
Bank Height Ratio:	1.0

Stream Type	C/E

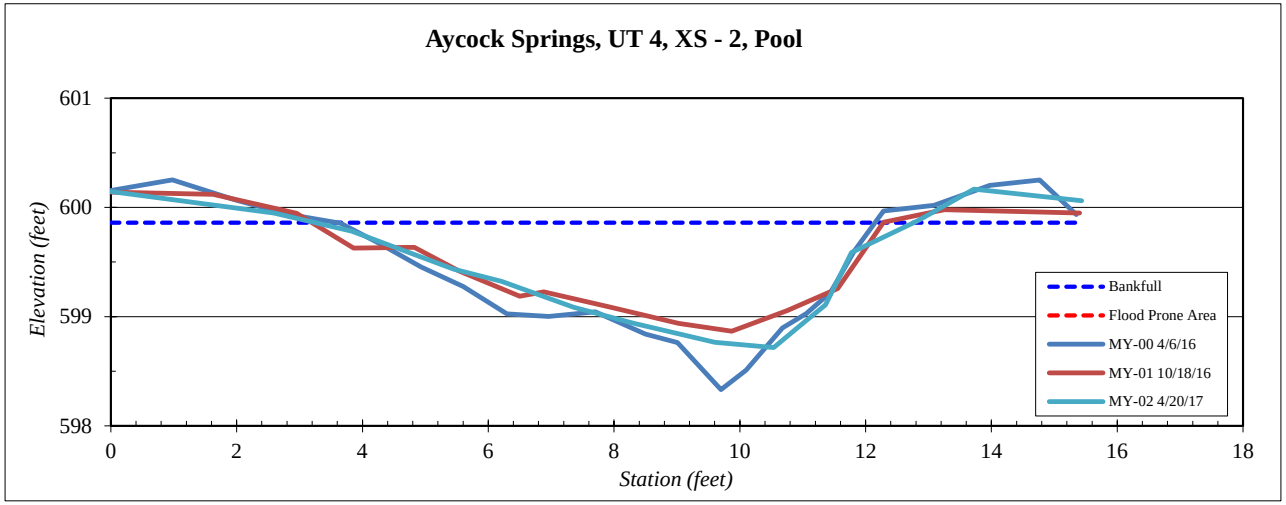


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 2, Pool
Feature	Pool
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	600.1
2.6	599.9
3.8	599.8
5.4	599.4
6.2	599.3
7.4	599.1
8.3	598.9
9.6	598.8
10.5	598.7
11.0	598.9
11.4	599.1
11.8	599.6
12.8	599.9
13.7	600.2
15.4	600.1

SUMMARY DATA	
Bankfull Elevation:	599.9
Bankfull Cross-Sectional Area:	5.8
Bankfull Width:	9.5
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

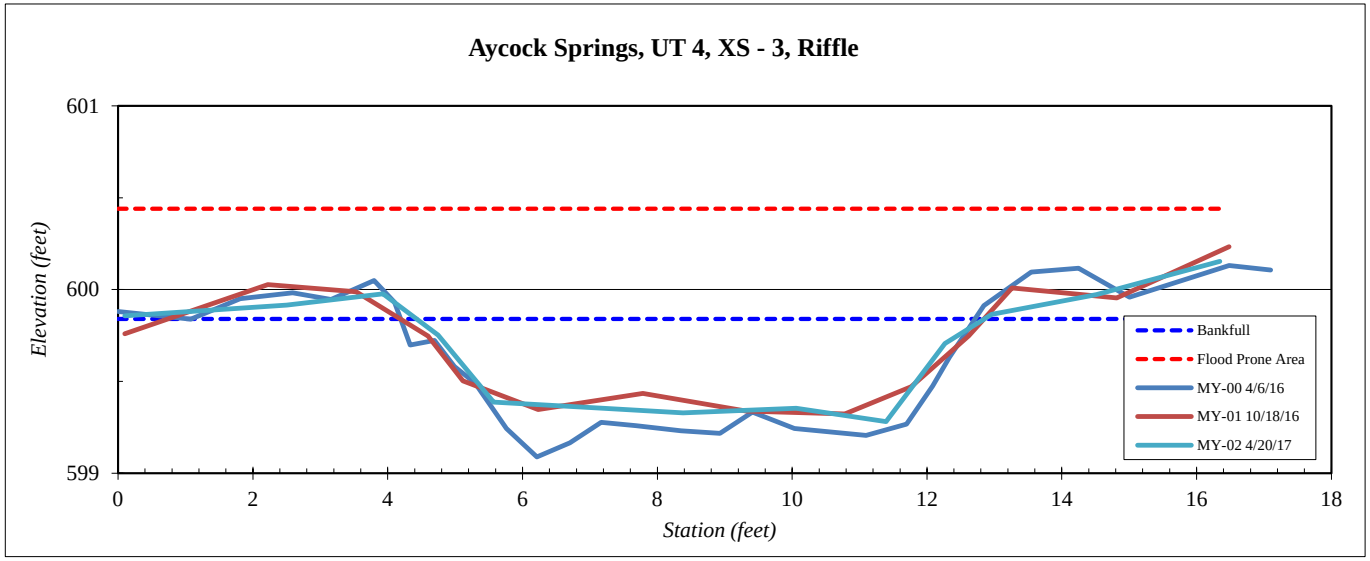


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 3, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	599.86
2.5	599.92
3.9	599.98
4.7	599.75
5.6	599.39
7.1	599.36
8.4	599.33
10.1	599.35
11.4	599.28
12.3	599.71
13.0	599.86
14.5	599.97
16.3	600.15

SUMMARY DATA	
Bankfull Elevation:	599.8
Bankfull Cross-Sectional Area:	3.5
Bankfull Width:	8.4
Flood Prone Area Elevation:	600.4
Flood Prone Width:	50.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	20.2
Entrenchment Ratio:	6.0
Bank Height Ratio:	1.0

Stream Type	C/E

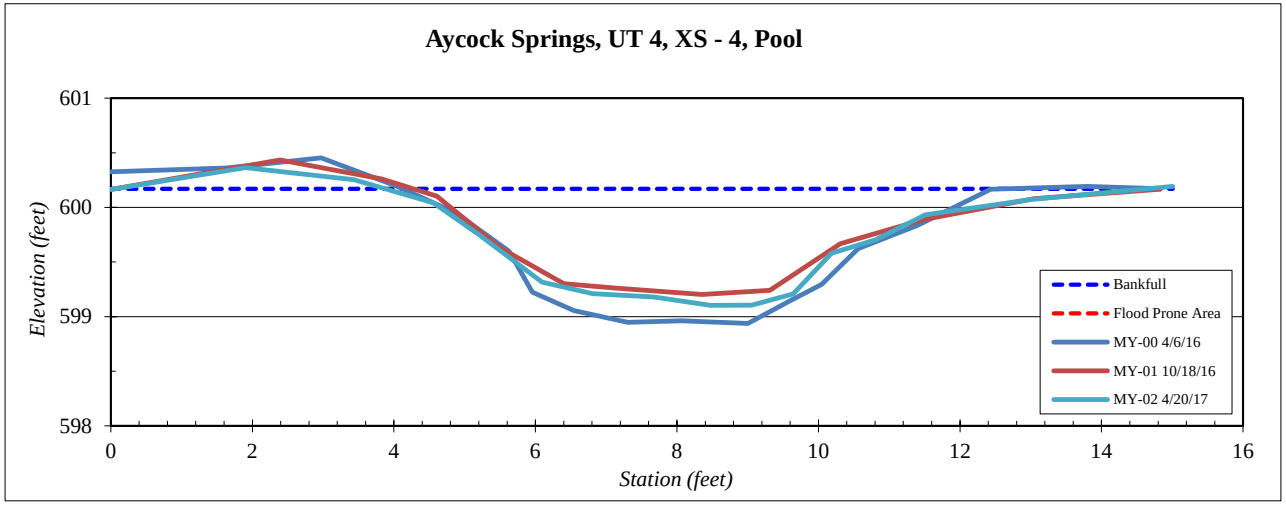


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 4, Pool
Feature	Pool
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	600.2
1.9	600.4
3.4	600.3
4.6	600.0
5.2	599.8
6.1	599.3
6.8	599.2
7.7	599.2
8.5	599.1
9.1	599.1
9.6	599.2
10.2	599.6
10.8	599.7
11.5	599.9
13.0	600.1
15.0	600.2

SUMMARY DATA	
Bankfull Elevation:	600.2
Bankfull Cross-Sectional Area:	5.6
Bankfull Width:	10.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C/E

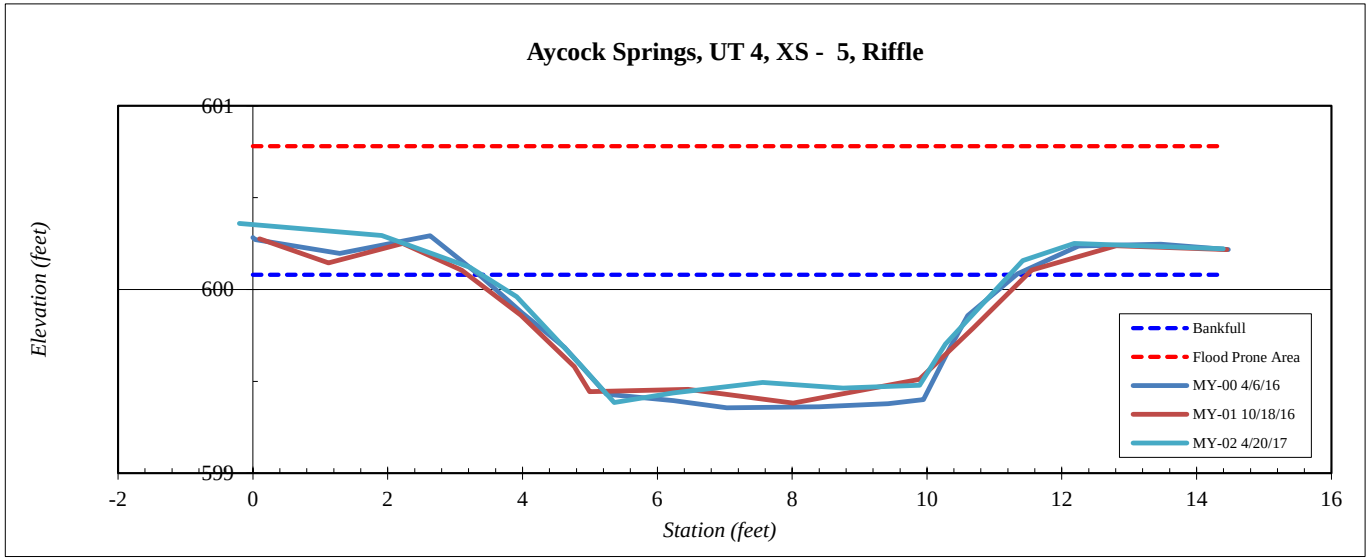


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 5, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	600.36
1.9	600.29
3.2	600.12
3.9	599.96
4.9	599.59
5.4	599.38
6.2	599.44
7.6	599.49
8.8	599.46
9.9	599.48
10.3	599.70
11.4	600.16
12.2	600.25
14.4	600.22

SUMMARY DATA	
Bankfull Elevation:	600.1
Bankfull Cross-Sectional Area:	3.8
Bankfull Width:	7.8
Flood Prone Area Elevation:	600.8
Flood Prone Width:	50.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.5
W / D Ratio:	16.0
Entrenchment Ratio:	6.4
Bank Height Ratio:	1.0

Stream Type	C/E

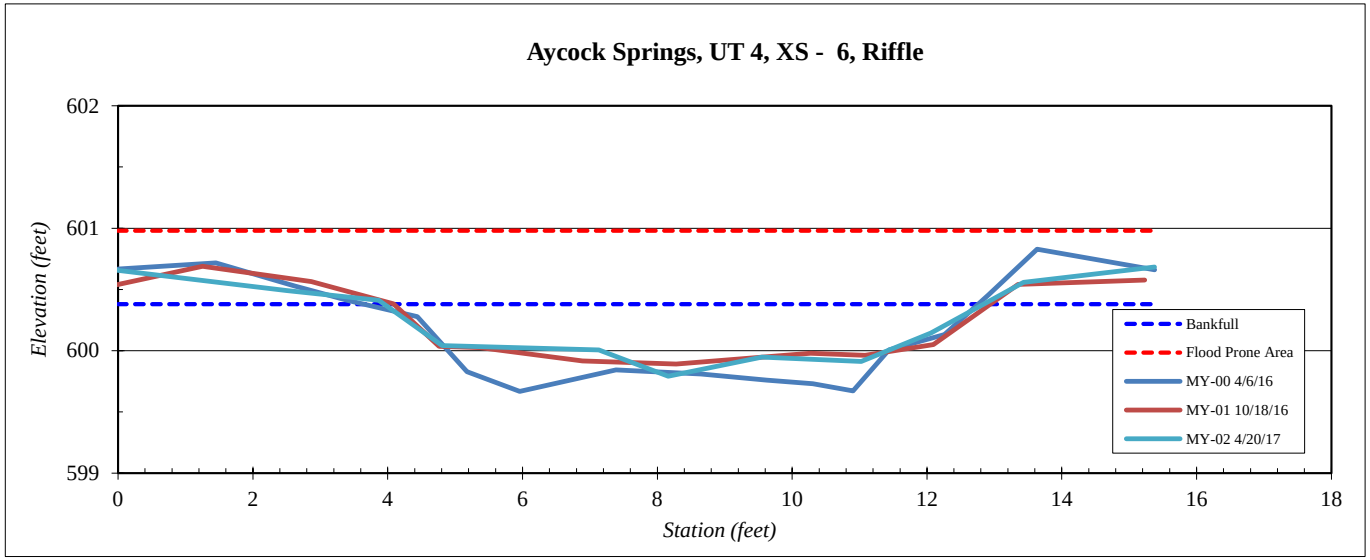


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 6, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
-0.1	600.66
2.5	600.49
3.9	600.41
4.8	600.04
7.1	600.01
8.2	599.79
9.6	599.95
11.0	599.91
12.1	600.14
13.4	600.56
15.4	600.68

SUMMARY DATA	
Bankfull Elevation:	600.4
Bankfull Cross-Sectional Area:	3.3
Bankfull Width:	8.9
Flood Prone Area Elevation:	601.0
Flood Prone Width:	50.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	24.0
Entrenchment Ratio:	5.6
Bank Height Ratio:	1.0

Stream Type	C/E

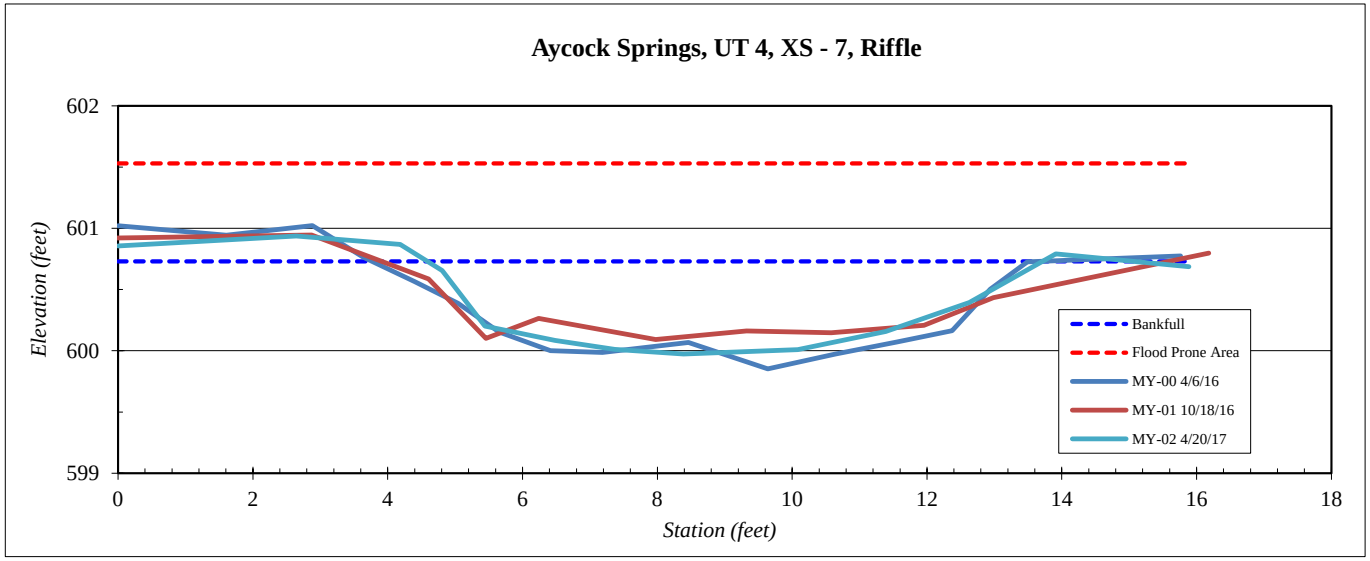


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 7, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	600.86
2.6	600.94
4.2	600.87
4.8	600.65
5.4	600.20
6.5	600.08
7.4	600.01
8.4	599.97
10.1	600.01
11.4	600.16
12.6	600.39
13.9	600.79
15.9	600.69

SUMMARY DATA	
Bankfull Elevation:	600.7
Bankfull Cross-Sectional Area:	5.0
Bankfull Width:	9.1
Flood Prone Area Elevation:	601.5
Flood Prone Width:	50.0
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	16.6
Entrenchment Ratio:	5.5
Bank Height Ratio:	1.0

Stream Type	C/E

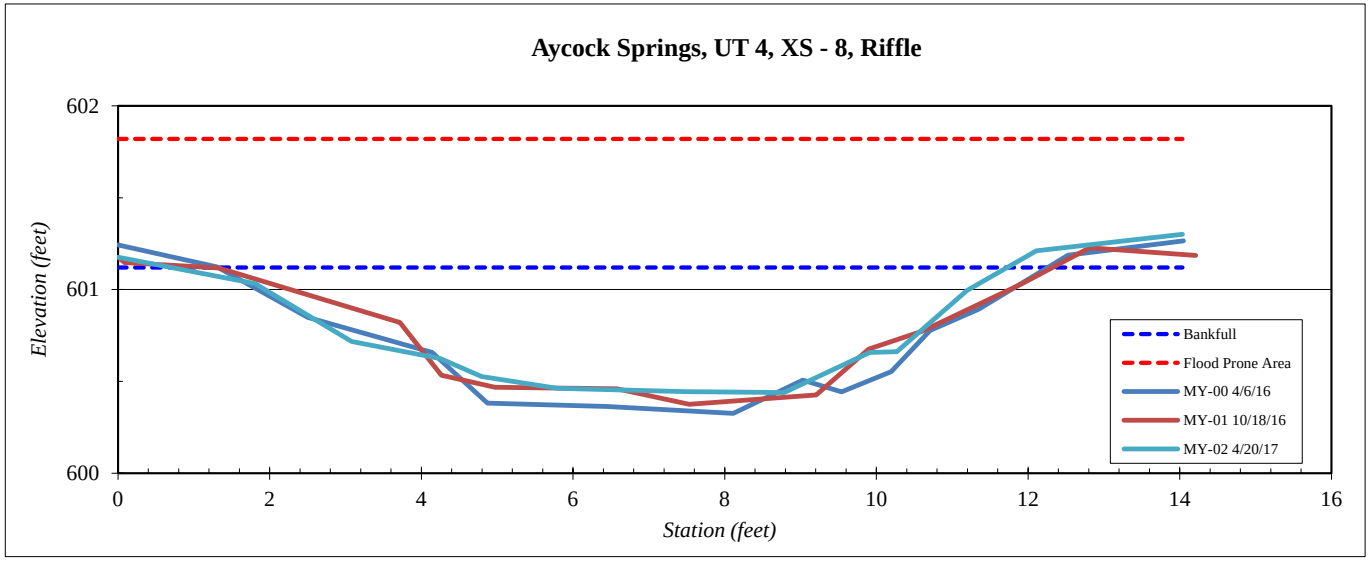


Site	Aycock Springs
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 8, Riffle
Feature	Riffle
Date:	4/20/2017
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	601.18
1.8	601.03
3.1	600.72
4.2	600.62
4.8	600.53
5.8	600.46
7.5	600.44
8.8	600.44
9.9	600.66
10.3	600.66
11.2	600.99
12.1	601.21
14.0	601.30

SUMMARY DATA	
Bankfull Elevation:	601.1
Bankfull Cross-Sectional Area:	4.9
Bankfull Width:	11.0
Flood Prone Area Elevation:	601.8
Flood Prone Width:	50.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	24.7
Entrenchment Ratio:	4.5
Bank Height Ratio:	1.0

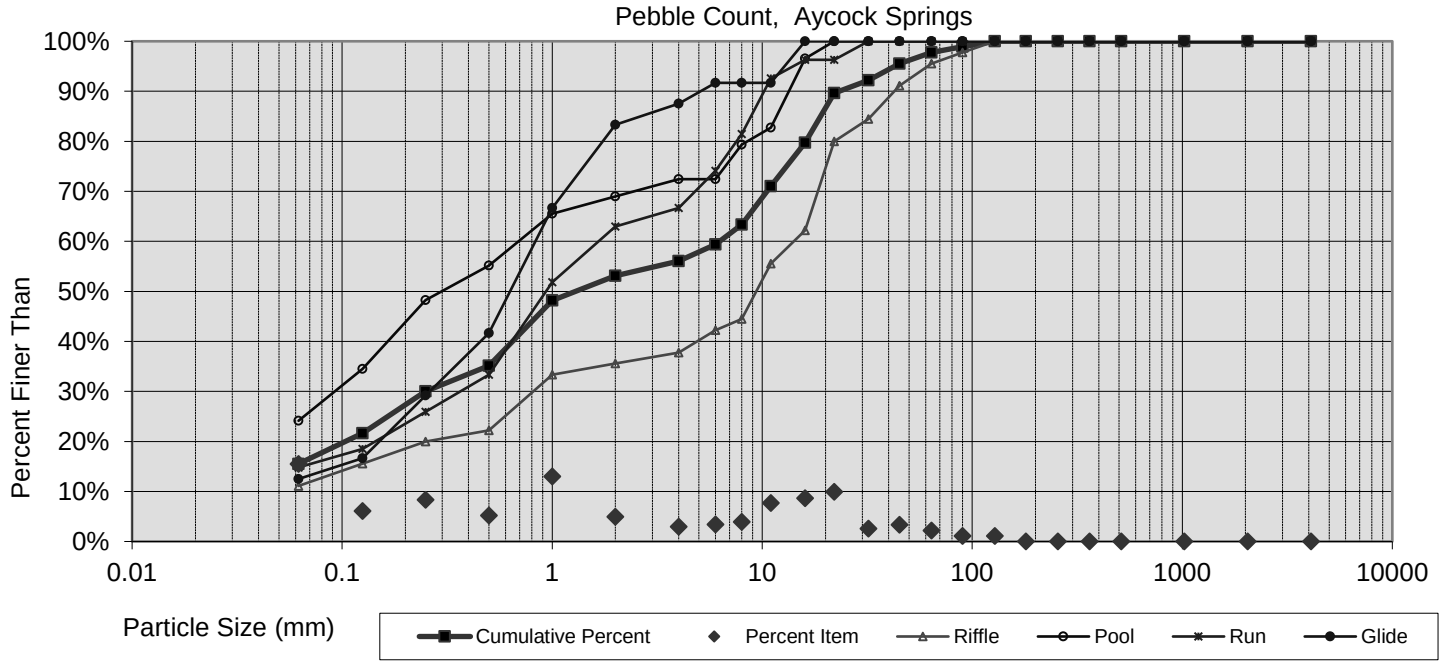
Stream Type	C/E



10	
10	Pebble Count,

	Aycock Springs
	Cape Fear

Note:	**UT-1 - Reach-wide**

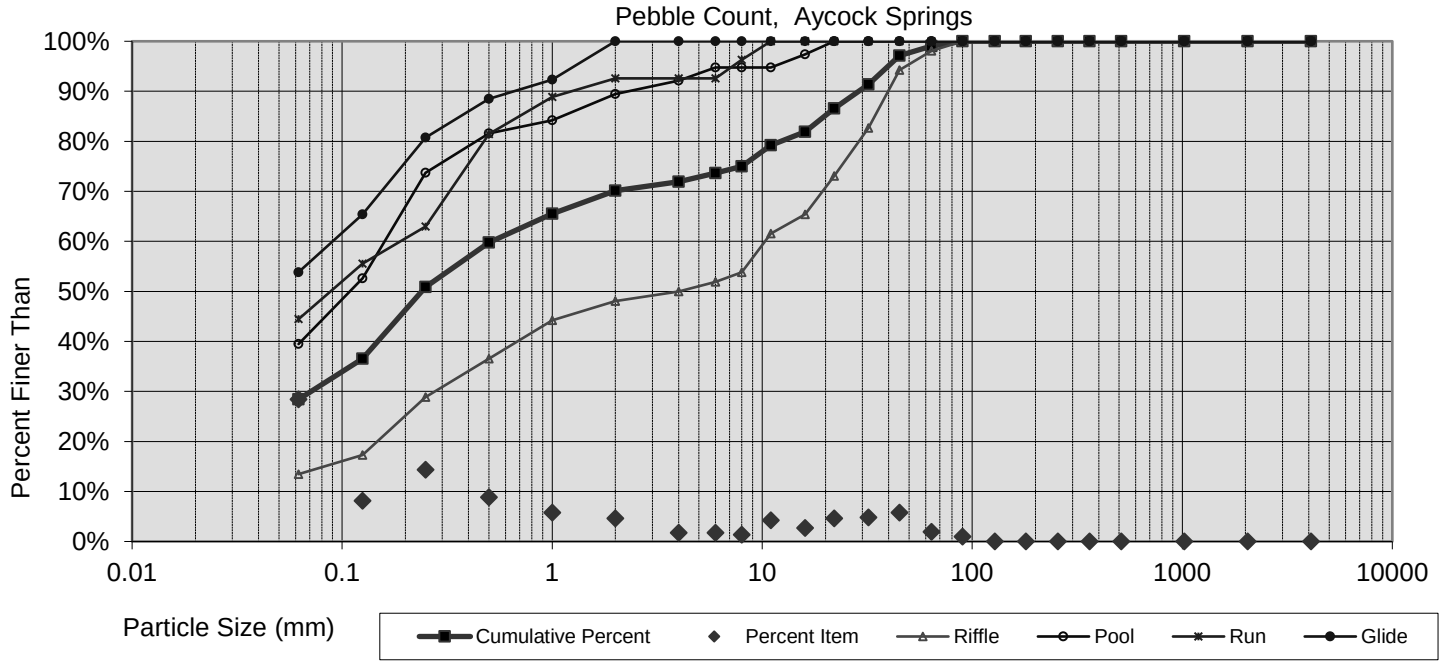


Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
0.065	0.49	1.3	18	43	16%	38%	45%	2%	0%	0%

10	
10	Pebble Count,

	Aycock Springs
	Cape Fear

Note:	**UT-2 - Reach-wide**

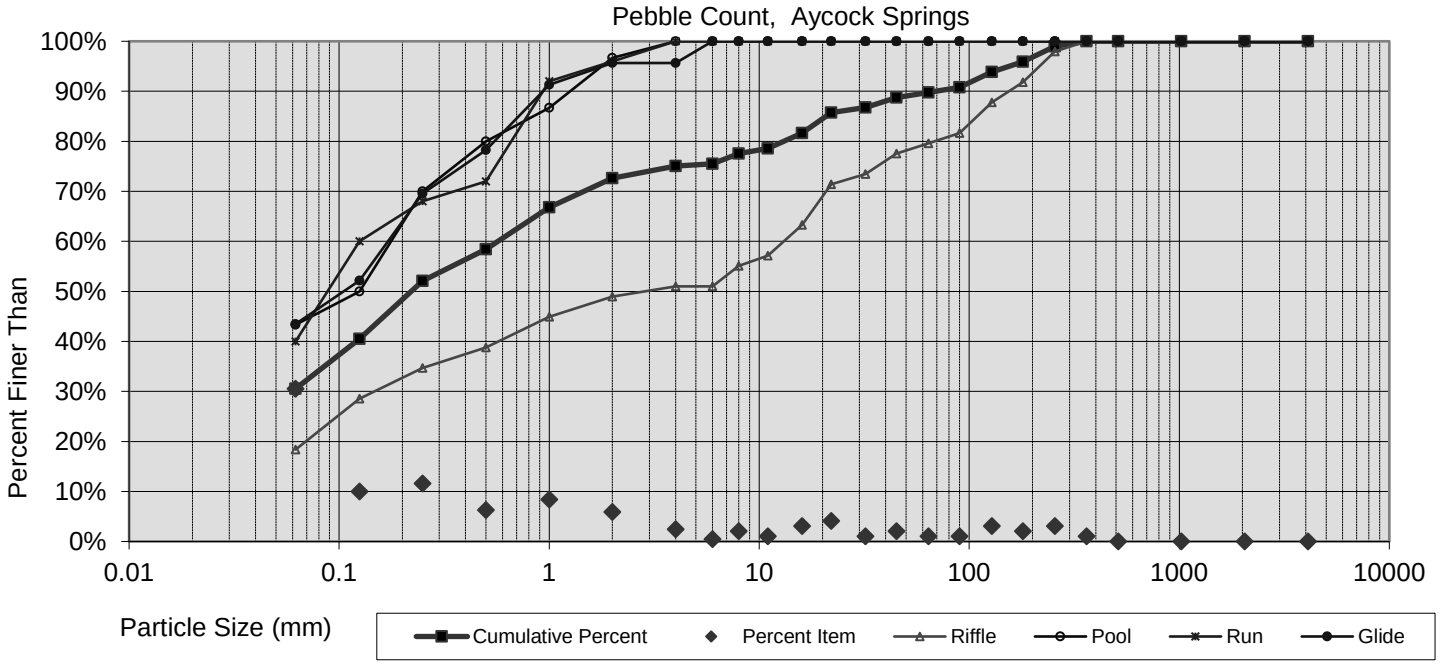


Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	0.11	0.2	18	40	28%	42%	29%	1%	0%	0%

10	
10	Pebble Count,

	Aycock Springs
	Cape Fear

Note:	**UT-3 - Reach-wide**

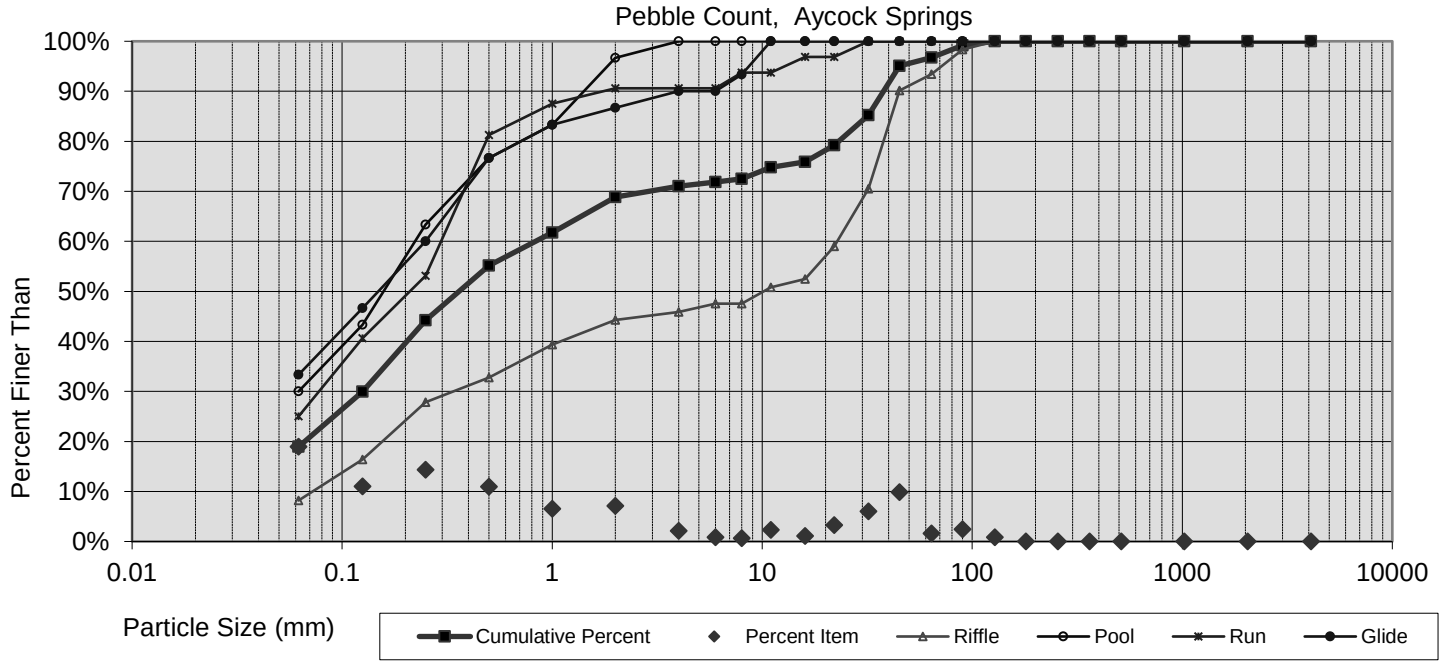


Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	0.08	0.2	19	154	31%	42%	17%	9%	1%	0%

10	
10	Pebble Count,

	Aycock Springs
	Cape Fear

Note:	**UT-4 - Reach-wide**

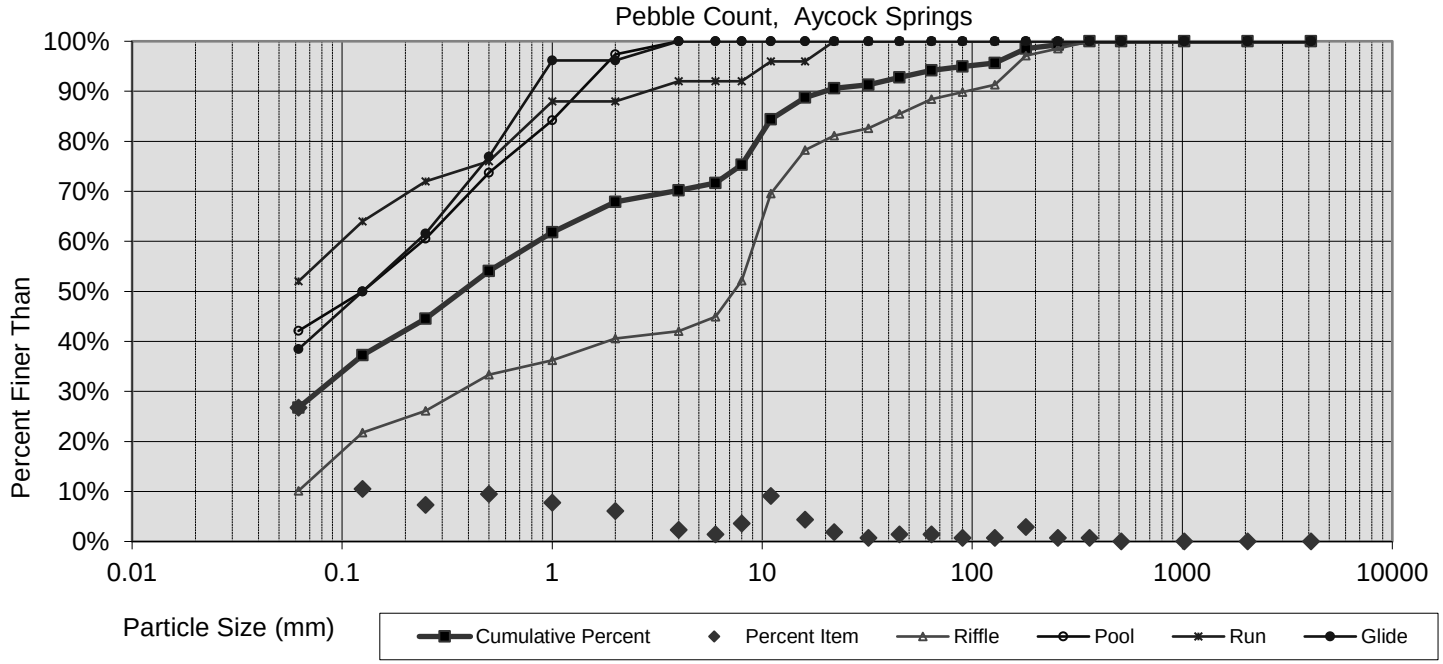


Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	0.16	0.4	30	45	19%	50%	28%	3%	0%	0%

10	
10	Pebble Count,

	Aycock Springs
	Cape Fear

Note:	**Travis Cr - Reach-wide**



Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	0.11	0.4	11	93	27%	41%	26%	5%	1%	0%

Table 11A. Baseline Morphology and Hydraulic Summary
Aycock Springs UT 1

Parameter	USGS Gage Data			Pre-Existing Condition			Project Reference Cedarock Park			Project Reference Cripple Creek			Design			As-built		
Dimension	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
BF Width (ft)	USGS gage data is unavailable for this project			3.8	9.6	6.7	8	12.1	8.1	3	6.1	4.6	7.2	8.3	7.8	6.4	9.6	8.0
Floodprone Width (ft)				8	73	30	15	25	18	150	150	150	20	70	50			90
BF Cross Sectional Area (ft2)						4.3			8			5.9			4.3	3	6.6	3.9
BF Mean Depth (ft)				0.8	1	0.8	0.8	1	0.8	0.7	1.5	1.1	0.5	0.7	0.6	0.4	0.7	0.5
BF Max Depth (ft)				1.1	1.4	1.4	1.1	1.4	1.4	1	2.3	1.7	0.7	0.9	0.8	0.6	1.1	0.7
Width/Depth Ratio				8	15.1	10.1	8	15.1	10.1	4	4.3	4.2	12	16	14	11	19	15
Entrenchment Ratio				1.9	2.2	2.1	1.9	2.2	2.1	24.6	50	37.3	2.6	9	6.4	9	14	11.3
Bank Height Ratio				1	1.8	1	1	1.8	1	1	1.5	1.3	1	1.2	1			1
Wetted Perimeter(ft)						===			===			===			===			===
Hydraulic radius (ft)						===			===			===			===			===
Pattern																		
Channel Beltwidth (ft)				No pattern of riffles and pools due to straightening activties			20	38	22.8	15.1	29.2	24.3	23	47	31	23	47	31
Radius of Curvature (ft)							11	27	16.5	8.9	19.4	13.2	14	31	23	14	31	23
Meander Wavelength (ft)							44	116	68.4	31	74	47.8	47	94	66	47	94	66
Meander Width ratio							2.4	4.7	2.8	2.1	4	3.4	3	6	4	3	6	4
Profile																		
Riffle length (ft)				No pattern of riffles and pools due to straightening activties					===			===			===	9	70	16
Riffle slope (ft/ft)							1.00%	5.76%	3.16%	0.00%	1.54%	0.83%	2.77%	6.47%	4.16%	0.01%	4.33%	2.23%
Pool length (ft)									===			===			===	4	23	9
Pool spacing (ft)							25	69	37.2	14	39.6	32.4	23	62	31	23	62	31
Substrate																		
d50 (mm)						===			===			===			===			===
d84 (mm)						===			===			===			===			===
Additional Reach Parameters																		
Valley Length (ft)						===			===			===			===			===
Channel Length (ft)						===			===			===			===			===
Sinuosity						1.02			1.2			1.22			1.1			1.1
Water Surface Slope (ft/ft)						1.37% - 3.61%			2.58%			0.50%			1.27% - 3.35%			1.89%
BF slope (ft/ft)						===			===			===			===			===
Rosgen Classification						Cg			E			E			E/C			E/C

Table 11B. Baseline Morphology and Hydraulic Summary
Aycock Springs UT 2

Parameter	USGS Gage Data			Pre-Existing Condition			Project Reference Cedarock Park			Project Reference Cripple Creek			Design			As-built		
Dimension	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
BF Width (ft)	USGS gage data is unavailable for this project			3.8	9.6	6.7	8	12.1	8.1	3	6.1	4.6	7.2	8.3	7.8	4.8	8.6	7.2
Floodprone Width (ft)				8	73	30	15	25	18	150	150	150	20	70	50			90
BF Cross Sectional Area (ft2)						4.3			8			5.9			4.3	1	4.2	2.3
BF Mean Depth (ft)				0.8	1	0.8	0.8	1	0.8	0.7	1.5	1.1	0.5	0.7	0.6	0.2	0.6	0.3
BF Max Depth (ft)				1.1	1.4	1.4	1.1	1.4	1.4	1	2.3	1.7	0.7	0.9	0.8	0.3	0.8	0.6
Width/Depth Ratio				8	15.1	10.1	8	15.1	10.1	4	4.3	4.2	12	16	14	12	32	22
Entrenchment Ratio				1.9	2.2	2.1	1.9	2.2	2.1	24.6	50	37.3	2.6	9	6.4	11	19	13
Bank Height Ratio				1	1.8	1	1	1.8	1	1	1.5	1.3	1	1.2	1			1
Wetted Perimeter(ft)						===			===			===			===			===
Hydraulic radius (ft)						===			===			===			===			===
Pattern																		
Channel Beltwidth (ft)				No pattern of riffles and pools due to straightening activties			20	38	22.8	15.1	29.2	24.3	23	47	31	23	47	31
Radius of Curvature (ft)							11	27	16.5	8.9	19.4	13.2	14	31	23	14	31	23
Meander Wavelength (ft)							44	116	68.4	31	74	47.8	47	94	66	47	94	66
Meander Width ratio							2.4	4.7	2.8	2.1	4	3.4	3	6	4	3	6	4
Profile																		
Riffle length (ft)				No pattern of riffles and pools due to straightening activties					===			===			===	9	23	14
Riffle slope (ft/ft)							1.00%	5.76%	3.16%	0.00%	1.54%	0.83%	2.77%	6.47%	4.16%	0.00%	5.24%	2.88%
Pool length (ft)									===			===			===	5	17	10
Pool spacing (ft)							25	69	37.2	14	39.6	32.4	23	62	31	23	62	31
Substrate																		
d50 (mm)						===			===			===			===			===
d84 (mm)						===			===			===			===			===
Additional Reach Parameters																		
Valley Length (ft)						===			===			===			===			===
Channel Length (ft)						===			===			===			===			===
Sinuosity						1.02			1.2			1.22			1.1			1.1
Water Surface Slope (ft/ft)						1.37% - 3.61%			2.58%			0.50%			1.27% - 3.35%			3.01%
BF slope (ft/ft)						===			===			===			===			===
Rosgen Classification						Cg			E			E			E/C			E/C

Note: UT 2 is characterized by a spring/seep, with a very small watershed. The channel was constructed with a smaller Bankfull Cross Sectional area to account for the smaller stormwater pulses and controlled discharge. In addition, the lower reaches of the channel are low slope wetlands that elevate the width-to-depth ratio in post construction measurements.

Table 11C. Baseline Morphology and Hydraulic Summary
Aycock Springs UT 3

Parameter	USGS Gage Data			Pre-Existing Condition			Project Reference Cedarock Park			Project Reference Cripple Creek			Design			As-built		
Dimension	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
BF Width (ft)	USGS gage data is unavailable for this project			4.1	5	4.5	8	12.1	8.1	3	6.1	4.6	7.2	8.3	7.8	4.7	7	5.9
Floodprone Width (ft)				7	18	12	15	25	18	150	150	150	20	70	50	10	20	20
BF Cross Sectional Area (ft2)						2.2			8			5.9			4.3	1.2	2.7	2.1
BF Mean Depth (ft)				0.4	0.5	0.5	0.8	1	0.8	0.7	1.5	1.1	0.5	0.7	0.6	0.2	0.4	0.4
BF Max Depth (ft)				0.8	1.1	1	1.1	1.4	1.4	1	2.3	1.7	0.7	0.9	0.8	0.5	0.6	0.6
Width/Depth Ratio				8.2	12.5	9.9	8	15.1	10.1	4	4.3	4.2	12	16	14	12	26	20
Entrenchment Ratio				1.7	3.6	2.5	1.9	2.2	2.1	24.6	50	37.3	2.6	9	6.4	2	4	3.3
Bank Height Ratio				1	3	2	1	1.8	1	1	1.5	1.3	1	1.2	1			1
Wetted Perimeter(ft)						===			===			===			===			===
Hydraulic radius (ft)						===			===			===			===			===
Pattern																		
Channel Beltwidth (ft)				No pattern of riffles and pools due to straightening activties			20	38	22.8	15.1	29.2	24.3	23	47	31	23	47	31
Radius of Curvature (ft)							11	27	16.5	8.9	19.4	13.2	14	31	23	14	31	23
Meander Wavelength (ft)							44	116	68.4	31	74	47.8	47	94	66	47	94	66
Meander Width ratio							2.4	4.7	2.8	2.1	4	3.4	3	6	4	3	6	4
Profile																		
Riffle length (ft)				No pattern of riffles and pools due to straightening activties					===			===			===	8	24	14
Riffle slope (ft/ft)							1.00%	5.76%	3.16%	0.00%	1.54%	0.83%	2.77%	6.47%	4.16%	0.52%	2.54%	1.71%
Pool length (ft)									===			===			===	6	10	8
Pool spacing (ft)							25	69	37.2	14	39.6	32.4	23	62	31	23	62	31
Substrate																		
d50 (mm)						===			===			===			===			===
d84 (mm)						===			===			===			===			===
Additional Reach Parameters																		
Valley Length (ft)						===			===			===			===			===
Channel Length (ft)						===			===			===			===			===
Sinuosity						1.01			1.2			1.22			1.1			1.1
Water Surface Slope (ft/ft)						1.53%			2.58%			0.50%			1.27% - 3.35%			0.92%
BF slope (ft/ft)						===			===			===			===			===
Rosgen Classification						Eg			E			E			E/C			E/C

Note: UT 3 is characterized by a pond in the headwaters; therefore, the channel was constructed with a smaller Bankfull Cross Sectional area than other tributaries associated with the project.

Table 11D. Baseline Morphology and Hydraulic Summary
Aycock Springs UT 4

Parameter	USGS Gage Data			Pre-Existing Condition			Project Reference Cedarock Park			Project Reference Cripple Creek			Design			As-built		
Dimension	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
BF Width (ft)	USGS gage data is unavailable for this project			4.8	11.7	8.3	8	12.1	8.1	3	6.1	4.6	8.7	10	9.4	8	10.9	8.5
Floodprone Width (ft)				8	70	39	15	25	18	150	150	150	70	200	150			50
BF Cross Sectional Area (ft2)						6.3			8			5.9			6.3	3.5	5.6	4.3
BF Mean Depth (ft)				0.5	1.3	0.8	0.8	1	0.8	0.7	1.5	1.1	0.6	0.8	0.7	0.4	0.6	0.5
BF Max Depth (ft)				0.9	2	1.5	1.1	1.4	1.4	1	2.3	1.7	0.8	1.1	1	0.6	0.9	0.8
Width/Depth Ratio				3.7	23.4	12.4	8	15.1	10.1	4	4.3	4.2	12	16	14	16	22	19
Entrenchment Ratio				1.2	11.5	4.9	1.9	2.2	2.1	24.6	50	37.3	7.5	21.3	16	5	6	6
Bank Height Ratio				1.2	2.4	1.8	1	1.8	1	1	1.5	1.3	1	1.2	1			1
Wetted Perimeter(ft)						===			===			===			===			===
Hydraulic radius (ft)						===			===			===			===			===
Pattern																		
Channel Beltwidth (ft)				No pattern of riffles and pools due to straightening activties			20	38	22.8	15.1	29.2	24.3	28	56	38	28	56	38
Radius of Curvature (ft)							11	27	16.5	8.9	19.4	13.2	17	38	28	17	38	28
Meander Wavelength (ft)							44	116	68.4	31	74	47.8	56	113	80	56	113	80
Meander Width ratio							2.4	4.7	2.8	2.1	4	3.4	3	6	4	3	6	4
Profile																		
Riffle length (ft)				No pattern of riffles and pools due to straightening activties					===			===			===	12	35	16
Riffle slope (ft/ft)							1.00%	5.76%	3.16%	0.00%	1.54%	0.83%	1.12%	2.60%	1.67%	0.61%	2.42%	1.28%
Pool length (ft)									===			===			===	14	42	22
Pool spacing (ft)							25	69	37.2	14	39.6	32.4	28	75	38	28	75	38
Substrate																		
d50 (mm)						===			===			===			===			===
d84 (mm)						===			===			===			===			===
Additional Reach Parameters																		
Valley Length (ft)						===			===			===			===			===
Channel Length (ft)						===			===			===			===			===
Sinuosity						1.1			1.2			1.22			1.1			1.1
Water Surface Slope (ft/ft)						0.93%			2.58%			0.50%			0.93%			0.66%
BF slope (ft/ft)						===			===			===			===			===
Rosgen Classification						Eg			E			E			E/C			E/C

Table 11E. Baseline Morphology and Hydraulic Summary
Aycock Springs Travis Creek

Parameter	USGS Gage Data			Pre-Existing Condition			Project Reference Cedarock Park			Project Reference Cripple Creek			Design			As-built		
Dimension	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
BF Width (ft)	USGS gage data is unavailable for this project			30	51.7	41.4	8	12.1	8.1	3	6.1	4.6	25.7	29.6	27.7	25.2	30.3	26.7
Floodprone Width (ft)				68	160	122	15	25	18	150	150	150	200	300	250			150
BF Cross Sectional Area (ft2)						54.9			8			5.9			54.9	41.3	73.9	51.2
BF Mean Depth (ft)				1.1	1.8	1.4	0.8	1	0.8	0.7	1.5	1.1	1.9	2.1	2	1.6	2.4	2
BF Max Depth (ft)				3.3	4.1	3.7	1.1	1.4	1.4	1	2.3	1.7	2.7	3	2.8	2.3	3.4	2.8
Width/Depth Ratio				16.7	47	32.1	8	15.1	10.1	4	4.3	4.2	12	16	14	12	16	13
Entrenchment Ratio				1.6	5.3	3.2	1.9	2.2	2.1	24.6	50	37.3	7.2	10.8	9	5	6	5.6
Bank Height Ratio				1	1.1	1	1	1.8	1	1	1.5	1.3	1	1.2	1			1
Wetted Perimeter(ft)						===			===			===			===			===
Hydraulic radius (ft)						===			===			===			===			===
Pattern																		
Channel Beltwidth (ft)				No pattern of riffles and pools due to straightening activties			20	38	22.8	15.1	29.2	24.3	83	166	111	83	166	111
Radius of Curvature (ft)							11	27	16.5	8.9	19.4	13.2	55	111	83	55	111	83
Meander Wavelength (ft)							44	116	68.4	31	74	47.8	166	332	236	166	332	236
Meander Width ratio							2.4	4.7	2.8	2.1	4	3.4	3	6	4	3	6	4
Profile																		
Riffle length (ft)				No pattern of riffles and pools due to straightening activties					===			===			===	16	87	54
Riffle slope (ft/ft)							1.00%	5.76%	3.16%	0.00%	1.54%	0.83%	0.28%	0.64%	0.41%	0.00%	0.70%	0.19%
Pool length (ft)									===			===			===	27	70	43
Pool spacing (ft)							25	69	37.2	14	39.6	32.4	83	222	111	83	222	111
Substrate																		
d50 (mm)						===			===			===			===			===
d84 (mm)						===			===			===			===			===
Additional Reach Parameters																		
Valley Length (ft)						===			===			===			===			===
Channel Length (ft)						===			===			===			===			===
Sinuosity						1.05			1.2			1.22			1.05			1.05
Water Surface Slope (ft/ft)						NA			2.58%			0.50%			0.23%			0.10%
BF slope (ft/ft)						===			===			===			===			===
Rosgen Classification						Fc			E			E			E/C			E/C

Table 12A. Morphology and Hydraulic Monitoring Summary
Aycock Travis Creek (Downstream) - Stream and Wetland Restoration Site

Parameter	XS 1 Riffle (Travis Down)						XS 2 Riffle (Travis Down)						XS 3 Pool (Travis Down)						XS 4 Riffle (Travis Down)						XS 5 Pool (Travis Down)						XS 6 Riffle (Travis Down)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	26	26.7	26.4				25.2	26.2	26.3				33.7	33.2	35.4				25.5	27	26.5				26	26.7	26				27.3	27.7	26.8			
Floodprone Width (ft)	150	150	150				150	150	150				----	----	----				150	150	150				----	----	----				150	150	150			
BF Cross Sectional Area (ft2)	41.3	40	40.1				47.5	47.4	47.9				58.7	55.8	57.2				47.2	44.6	43.8				61.4	58.1	52.3				54.9	50.6	50.3			
BF Mean Depth (ft)	1.6	1.5	1.5				1.9	1.8	1.8				1.7	1.7	1.6				1.9	1.7	1.7				2.4	2.2	2.0				2.0	1.8	1.9			
BF Max Depth (ft)	2.3	2.3	2.2				2.5	2.5	2.6				3.7	3.5	3.7				2.5	2.6	2.6				4	3.7	3.2				3	2.9	2.8			
Width/Depth Ratio	16.4	17.8	17.4				13.4	14.5	14.4				----	----	----				13.8	16.3	16.0				----	----	----				13.6	15.2	14.3			
Entrenchment Ratio	5.8	5.6	5.7				6.0	5.7	5.7				----	----	----				5.9	5.6	5.7				----	----	----				5.5	5.4	5.6			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.04				----	----	----				1.0	1.04	1.04				----	----	----				1.0	1.0	1.0			
Wetted Perimeter (ft)	27.1	27.4	27.2				26.4	27.5	27.3				34.8	34.4	36.4				26.6	28	27.5				27.6	28.2	27.3				28.7	29.1	27.9			
Hydraulic Radius (ft)	1.5	1.5	1.5				1.8	1.7	1.8				1.7	1.6	1.6				1.8	1.6	1.6				2.2	2.1	1.9				1.9	1.7	1.8			
Substrate																																				
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			

Parameter	XS 7 Pool (Travis Down)						XS 8 Riffle (Travis Down)						XS 9 Pool (Travis Down)						XS 10 Pool (Travis Down)						XS 11 Riffle (Travis Down)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	25.9	27.7	25.7				28.1	28.5	28.6				29.3	29.1	29.7				38.6	38.6	39.1				30.3	29.8	30.5			
Floodprone Width (ft)	----	----	----				150	150	150				----	----	----				----	----	----				150	150	150			
BF Cross Sectional Area (ft2)	60	45.8	44.9				64.6	57.4	58.3				65.9	63.1	60.8				100.1	91	87.5				73.9	66.6	69.6			
BF Mean Depth (ft)	2.3	1.7	1.7				2.3	2.0	2.0				2.2	2.2	2.0				2.6	2.4	2.2				2.4	2.2	2.3			
BF Max Depth (ft)	3.9	2.8	2.5				3.3	3.1	3.1				3.7	3.4	3.4				4.3	4.2	4.1				3.4	3.6	3.6			
Width/Depth Ratio	----	----	----				12.2	14.2	14.0				----	----	----				----	----	----				12.4	13.3	13.4			
Entrenchment Ratio	----	----	----				5.3	5.3	5.2				----	----	----				----	----	----				5.0	5.0	4.9			
Bank Height Ratio	----	----	----				1.0	1.0	1.0				----	----	----				----	----	----				1.00	1.06	1.06			
Wetted Perimeter (ft)	27.5	29.1	26.8				29.5	29.7	29.8				30.6	30.3	30.8				40.2	40	40.4				31.8	31.4	32.1			
Hydraulic Radius (ft)	2.2	1.6	1.7				2.2	1.9	2.0				2.2	2.1	2.0				2.5	2.3	2.2				2.3	2.1	2.2			
Substrate																														
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			

Table 12B. Morphology and Hydraulic Monitoring Summary
Aycock Travis Creek (Upstream) - Stream and Wetland Restoration Site

Parameter	XS 12 Riffle (Travis Up)						XS 13 Pool (Travis Up)						XS 14 Riffle (Travis Up)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	29	29.6	29.7				26.9	26.9	27.8				32.8	32.3	31.9			
Floodprone Width (ft)	150	150	150				----	----	----				150	150	150			
BF Cross Sectional Area (ft2)	68.7	66.4	67.9				64.0	50.3	51.9				104.5	92.4	94.6			
BF Mean Depth (ft)	2.4	2.2	2.3				2.4	1.9	1.9				3.2	2.9	3.0			
BF Max Depth (ft)	3.4	3.5	3.5				3.9	3.3	3.2				4.8	4.1	4.5			
Width/Depth Ratio	12.2	13.2	13.0				----	----	----				10.295	11.29	10.76			
Entrenchment Ratio	5.2	5.1	5.1				----	----	----				4.6	4.6	4.7			
Bank Height Ratio	1.00	1.03	1.03				----	----	----				1.0	1.0	1.0			
Wetted Perimeter (ft)	30.4	30.8	30.9				28.8	28.1	28.8				35.0	34.2	33.8			
Hydraulic Radius (ft)	2.3	2.2	2.2				2.2	1.8	1.8				3.0	2.7	2.8			
Substrate																		
d50 (mm)	----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----			

Table 12C. Morphology and Hydraulic Monitoring Summary
Aycock UT-1 - Stream and Wetland Restoration Site

Parameter	XS 1 Riffle (UT 1)						XS 2 Riffle (UT 1)						XS 3 Pool (UT 1)						XS 4 Riffle (UT 1)						XS 5 Riffle (UT 1)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	9.3	9.2	9.7				8.8	9.3	9.2				8.4	8.4	9.3				9.3	9.7	9.3				9.6	9.5	9.3			
Floodprone Width (ft)	90	90	90				90	90	90				----	----	----				90	90	90				90	90	90			
BF Cross Sectional Area (ft2)	5.6	4.7	4.4				4.6	3.7	3.7				6.7	5.6	6.4				6.2	5.5	5.7				6.6	5.9	5.8			
BF Mean Depth (ft)	0.6	0.5	0.5				0.5	0.4	0.4				0.8	0.7	0.7				0.7	0.6	0.6				0.7	0.6	0.6			
BF Max Depth (ft)	1.1	0.8	0.9				0.7	0.6	0.7				1.3	1.2	1.3				1	0.9	0.9				1.1	1.1	1			
Width/Depth Ratio	15.4	18.0	21.4				16.8	23.4	22.9				----	----	----				14.0	17.1	15.2				14.0	15.3	14.9			
Entrenchment Ratio	9.7	9.8	9.3				10.2	9.7	9.8				----	----	----				9.7	9.3	9.7				9.4	9.5	9.7			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				----	----	----				1.0	1.0	1.0				1.0	1.0	1.0			
Wetted Perimeter (ft)	9.7	9.4	10				9	9.4	9.4				8.9	8.9	9.8				9.7	10	9.6				10	10	9.8			
Hydraulic Radius (ft)	0.6	0.5	0.4				0.5	0.4	0.4				0.7	0.6	0.7				0.6	0.6	0.6				0.7	0.6	0.6			
Substrate																														
d50 (mm)	----	----					----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----					----	----	----				----	----	----				----	----	----				----	----	----			

Parameter	XS 6 Riffle (UT 1)						XS 7 Riffle (UT 1)						XS 8 Pool (UT 1)						XS 9 Riffle (UT 1)						XS 10 Pool (UT 1)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	6.9	7.5	6.7				7.5	7.2	7.3				7.8	8.7	7.2				7.9	7.2	7.6				7.6	7	6.9			
Floodprone Width (ft)	90	90	90				90	90	90				----	----	----				90	90	90				----	----	----			
BF Cross Sectional Area (ft2)	3.6	1.9	2.2				3.9	2.4	2.4				5.7	4.1	3.6				3	4.1	1.6				4.7	5.6	5.5			
BF Mean Depth (ft)	0.5	0.3	0.3				0.5	0.3	0.3				0.7	0.5	0.5				0.4	0.6	0.2				0.6	0.8	0.8			
BF Max Depth (ft)	0.7	0.4	0.4				0.7	0.6	0.6				1.2	1	0.9				0.7	1.1	0.4				1.1	1.3	1.2			
Width/Depth Ratio	13.2	29.6	20.4				14.4	21.6	22.2				----	----	----				20.8	12.6	36.1				----	----	----			
Entrenchment Ratio	13.0	12.0	13.4				12.0	12.5	12.3				----	----	----				11.4	12.5	11.8				----	----	----			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				----	----	----				1.0	1.0	1.0				----	----	----			
Wetted Perimeter (ft)	7.2	7.6	6.8				7.8	7.3	7.5				8.3	9.1	7.5				8	7.8	7.7				8	7.7	7.7			
Hydraulic Radius (ft)	0.5	0.3	0.3				0.5	0.3	0.3				0.7	0.5	0.5				0.4	0.5	0.2				0.6	0.7	0.7			
Substrate																														
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			

Parameter	XS 11 Riffle (UT 1)						XS 12 Riffle (UT 1)						XS 13 Pool (UT 1)						XS 14 Riffle (UT 1)						XS 15 Riffle (UT 1)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	7.4	7	7.8				8	7.4	6.4				8.6	8	8.3				6.4	6.3	6.3				7.1	7.2	6.3			
Floodprone Width (ft)	90	90	90				90	90	90				----	----	----				90	90	90				90	90	90			
BF Cross Sectional Area (ft2)	3.5	3.5	3.5				3.7	2.8	2.8				6.5	4.3	4.7				3.1	2.8	2.8				4	3.3	2.4			
BF Mean Depth (ft)	0.5	0.5	0.4				0.5	0.4	0.4				0.8	0.5	0.6				0.5	0.4	0.4				0.6	0.5	0.4			
BF Max Depth (ft)	0.8	0.8	0.7				0.7	0.6	0.6				1.2	1.2	1.3				0.7	0.6	0.7				0.9	0.8	0.7			
Width/Depth Ratio	15.6	14.0	17.4				17.3	19.6	14.6				----	----	----				13.2	14.2	14.2				12.6	15.7	16.5			
Entrenchment Ratio	12.2	12.9	11.5				11.3	12.2	14.1				----	----	----				14.1	14.3	14.3				12.7	12.5	14.3			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				----	----	----				1.0	1.0	1.0				1.0	1.0	1.0			
Wetted Perimeter (ft)	7.8	7.3	8.1				8.5	7.6	6.6				9.2	8.5	9.0				6.8	6.5	6.6				7.4	7.6	6.6			
Hydraulic Radius (ft)	0.4	0.5	0.4				0.4	0.4	0.4				0.7	0.5	0.5				0.5	0.4	0.4				0.5	0.4	0.4			
Substrate																														
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			

Table 12C continued. Morphology and Hydraulic Monitoring Summary
Aycock UT-1 - Stream and Wetland Restoration Site

Parameter	XS 16 Riffle (UT 1)						XS 17 Riffle (UT 1)						XS 18 Riffle (UT 1)						XS 19 Pool (UT 1)						XS 20 Riffle (UT 1)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	9	8.3	8.5				8.5	8.1	7.4				7.1	7.2	6.7				7.6	7.7	8.1				9.1	8.5	8.7			
Floodprone Width (ft)	90	90	90				90	90	90				90	90	90				----	----	----				90	90	90			
BF Cross Sectional Area (ft2)	4.6	2.6	2.8				3.9	3.6	3.7				3.5	3.4	3.6				6.5	5.4	5.3				5.3	4.4	4.9			
BF Mean Depth (ft)	0.5	0.3	0.3				0.5	0.4	0.5				0.5	0.5	0.5				0.9	0.7	0.7				0.6	0.5	0.6			
BF Max Depth (ft)	0.8	0.5	0.5				0.7	0.7	0.8				0.6	0.7	0.8				1.3	1	1.1				0.9	0.7	0.8			
Width/Depth Ratio	17.6	26.5	25.8				18.5	18.2	14.8				14.4	15.2	12.5				----	----	----				15.6	16.4	15.4			
Entrenchment Ratio	10.0	10.8	10.6				10.6	11.1	12.2				12.7	12.5	13.4				----	----	----				9.9	10.6	10.3			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.14				1.0	1.16	1.33				----	----	----				1.0	1.0	1.0			
Wetted Perimeter (ft)	9.3	8.4	8.7				8.7	8.3	7.7				7.4	7.4	7.0				8.2	8.3	8.7				9.4	8.7	9.0			
Hydraulic Radius (ft)	0.5	0.3	0.3				0.5	0.4	0.5				0.5	0.5	0.5				0.8	0.7	0.6				0.6	0.5	0.5			
Substrate																														
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			

Parameter	XS 21 Pool (UT 1)						XS 22 Riffle (UT 1)						XS 23 Riffle (UT 1)						XS 24 Riffle (UT 1)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	8.3	8.2	9.7				7.2	7.5	7.3				7.6	6.8	7				8	7.7	7.6			
Floodprone Width (ft)	----	----	----				90	90	90				90	90	90				90	90	90			
BF Cross Sectional Area (ft2)	9.3	5.9	5.4				3.6	3.4	3.3				3.2	3.2	3				4	3.2	3.4			
BF Mean Depth (ft)	1.1	0.7	0.6				0.5	0.5	0.5				0.4	0.5	0.4				0.5	0.4	0.4			
BF Max Depth (ft)	2.1	1.4	1.3				0.7	0.7	0.7				0.6	0.6	0.7				0.7	0.7	0.7			
Width/Depth Ratio	----	----	----				14.4	16.5	16.1				18.1	14.5	16.3				16.0	18.5	17.0			
Entrenchment Ratio	----	----	----				12.5	12.0	12.3				11.8	13.2	12.9				11.3	11.7	11.8			
Bank Height Ratio	----	----	----				1.0	1.0	1.0				1.0	1.0	1.17				1.0	1.0	1.0			
Wetted Perimeter (ft)	9.5	9.2	10.4				7.5	7.8	7.5				9.3	7.0	7.2				9.3	7.8	7.8			
Hydraulic Radius (ft)	1	0.6	0.5				0.5	0.4	0.4				0.5	0.5	0.4				0.5	0.4	0.4			
Substrate																								
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----			

Table 12D. Morphology and Hydraulic Monitoring Summary
Aycock UT-2 - Stream and Wetland Restoration Site

Parameter	XS 1 Pool (UT 2)						XS 2 Riffle (UT 2)						XS 3 Riffle (UT 2)						XS 4 Riffle (UT 2)						XS 5 Riffle (UT 2)						XS 6 Riffle (UT 2)						XS 7 Pool (UT 2)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	6.5	6.3	6.9				4.8	5.6	5.5				5.7	5.3	5.8				6.4	5.7	5.4				8.4	7.7	8.5				6.9	7	6.8				8.3	9.4	8.2			
Floodprone Width (ft)	----	----	----				90	90	90				90	90	90				90	90	90				90	90	90				90	90	90				----	----	----			
BF Cross Sectional Area (ft2)	3.8	2.1	3.2				1	1.1	1				1.7	1.4	1.2				1	0.9	0.9				3.1	2.8	2.9				2.3	1.4	1				5.1	4.1	3.8			
BF Mean Depth (ft)	0.6	0.3	0.5				0.2	0.2	0.2				0.3	0.3	0.2				0.2	0.2	0.2				0.4	0.4	0.3				0.3	0.2	0.1				0.6	0.4	0.5			
BF Max Depth (ft)	1	0.6	0.7				0.3	0.3	0.2				0.5	0.5	0.5				0.4	0.3	0.3				0.7	0.6	0.6				0.6	0.3	0.3				1.1	0.8	0.8			
Width/Depth Ratio	----	----	----				23.0	28.5	30.3				19.1	20.1	28.0				41.0	36.1	32.4				22.8	21.2	24.9				20.7	35.0	46.2				----	----	----			
Entrenchment Ratio	----	----	----				18.8	16.1	16.4				15.8	17.0	15.5				14.1	15.8	16.7				10.7	11.7	10.6				13.0	12.9	13.2				----	----	----			
Bank Height Ratio	----	----	----				1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0				----	----	----			
Wetted Perimeter (ft)	6.9	6.5	7.2				4.9	5.7	5.6				5.8	5.4	6.0				6.5	5.7	5.5				8.6	7.9	8.6				7.0	7.0	6.9				8.8	9.5	8.4			
Hydraulic Radius (ft)	0.6	0.3	0.4				0.2	0.2	0.2				0.3	0.3	0.2				0.2	0.2	0.2				0.4	0.4	0.3				0.3	0.2	0.1				0.6	0.4	0.5			
Substrate																																											
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			

Parameter	XS 8 Riffle (UT 2)						XS 9 Riffle (UT 2)						XS 10 Pool (UT 2)						XS 11 Pool (UT 2)						XS 12 Riffle (UT 2)						XS 13 Riffle (UT 2)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	8.6	8.3	8.3				7.4	7.9	7.9				7.5	7.8	7.6				6.2	6.4	5.6				8.3	9.2	7.7				7.2	7.6	7.4			
Floodprone Width (ft)	90	90	90				90	90	90				----	----	----				----	----	----				90	90	90				90	90	90			
BF Cross Sectional Area (ft2)	3.6	3.1	2.8				4.2	3.8	4.4				5.2	4	4				3.5	2.7	2.5				3.2	2.3	1.9				2.1	1.7	1.8			
BF Mean Depth (ft)	0.4	0.4	0.3				0.6	0.5	0.6				0.7	0.5	0.5				0.6	0.4	0.4				0.4	0.3	0.2				0.3	0.2	0.2			
BF Max Depth (ft)	0.6	0.5	0.5				0.8	0.7	0.8				1.3	0.9	0.8				0.8	0.7	0.7				0.7	0.5	0.7				0.4	0.3	0.4			
Width/Depth Ratio	20.5	22.2	24.6				13.0	16.4	14.2				----	----	----				----	----	----				21.5	36.8	31.2				24.7	34.0	30.4			
Entrenchment Ratio	10.5	10.8	10.8				12.2	11.4	11.4				----	----	----				----	----	----				10.8	9.8	11.7				12.5	11.8	12.2			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				----	----	----				----	----	----				1.0	1.0	1.0				1.0	1.0	1.0			
Wetted Perimeter (ft)	8.8	8.5	8.6				7.7	8.1	8.2				8.1	8.2	8.0				6.6	6.6	5.8				8.6	9.3	8.0				7.3	7.7	7.5			
Hydraulic Radius (ft)	0.4	0.4	0.3				0.5	0.5	0.5				0.7	0.5	0.5				0.5	0.4	0.4				0.4	0.2	0.2				0.3	0.2	0.2			
Substrate																																											
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			

Table 12E. Morphology and Hydraulic Monitoring Summary
Aycock UT-3 - Stream and Wetland Restoration Site

Parameter	XS 1 Riffle (UT 3)						XS 2 Riffle (UT 3)						XS 3 Pool (UT 3)						XS 4 Riffle (UT 3)						XS 5 Riffle (UT 3)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	6.5	6.9	6.7				4.7	5.2	5.2				5	5.4	5.2				7	6.8	6.9				5.3	5.6	5.8			
Floodprone Width (ft)	10	11	11				20	8	8				----	----	----				20	20	20				20	20	20			
BF Cross Sectional Area (ft2)	2.7	2.3	2.4				1.9	1.6	1.9				3.6	3.2	3.2				2.2	1.9	1.7				1.2	1.1	1.2			
BF Mean Depth (ft)	0.4	0.3	0.4				0.4	0.3	0.4				0.7	0.6	0.6				0.3	0.3	0.2				0.2	0.2	0.2			
BF Max Depth (ft)	0.6	0.6	0.6				0.6	0.5	0.6				1	0.9	0.8				0.5	0.4	0.4				0.5	0.4	0.4			
Width/Depth Ratio	15.6	20.7	18.7				11.6	16.9	14.2				----	----	----				22.3	24.3	28.0				23.4	28.5	28.0			
Entrenchment Ratio	1.5	1.6	1.6				4.3	1.5	1.5				----	----	----				2.9	2.9	2.9				3.8	3.6	3.4			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				----	----	----				1.0	1.0	1.0				1.0	1.0	1.0			
Wetted Perimeter (ft)	6.8	7.1	6.9				5.0	5.3	5.4				5.7	5.8	5.7				7.1	6.9	7.0				5.7	5.8	6.0			
Hydraulic Radius (ft)	0.4	0.3	0.3				0.4	0.3	0.4				0.6	0.6	0.6				0.3	0.3	0.2				0.2	0.2	0.2			
Substrate	.						.																							
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			

Table 12F. Morphology and Hydraulic Monitoring Summary
Aycock UT-4 - Stream and Wetland Restoration Site

Parameter	XS 1 Riffle (UT 4)						XS 2 Pool (UT 4)						XS 3 Riffle (UT 4)						XS 4 Pool (UT 4)						XS 5 Riffle (UT 4)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	8.3	9.4	8.8				8.5	9.1	9.5				8.6	8.7	8.4				8.5	10.6	10.7				8	8.3	7.8			
Floodprone Width (ft)	50	50	50				----	----	----				50	50	50				----	----	----				50	50	50			
BF Cross Sectional Area (ft2)	3.7	3.3	3.3				6.4	5.4	5.8				4.3	3.4	3.5				6.2	5.2	5.6				4.3	4.1	3.8			
BF Mean Depth (ft)	0.4	0.4	0.4				0.8	0.6	0.6				0.5	0.4	0.4				0.7	0.5	0.5				0.5	0.5	0.5			
BF Max Depth (ft)	0.6	0.5	0.6				1.5	1	1.1				0.8	0.5	0.6				1.2	1	1.1				0.7	0.7	0.7			
Width/Depth Ratio	18.6	26.8	23.5				----	----	----				17.2	22.3	20.2				----	----	----				14.9	16.8	16.0			
Entrenchment Ratio	6.0	5.3	5.7				----	----	----				5.8	5.7	6.0				----	----	----				6.3	6.0	6.4			
Bank Height Ratio	1.0	1.0	1.0				----	----	----				1.0	1.0	1.0				----	----	----				1.0	1.0	1.0			
Wetted Perimeter (ft)	8.6	9.5	9.0				9.2	9.5	10.0				9.0	8.8	8.6				9.1	10.9	11.1				8.3	8.5	8.1			
Hydraulic Radius (ft)	0.4	0.3	0.4				0.7	0.6	0.6				0.5	0.4	0.4				0.7	0.5	0.5				0.5	0.5	0.5			
Substrate																														
d50 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----				----	----	----				----	----	----			

Parameter	XS 6 Riffle (UT 4)						XS 7 Riffle (UT 4)						XS 8 Riffle (UT 4)					
Dimension	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY 0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
BF Width (ft)	8.1	8.9	8.9				9.9	11.7	9.1				10.9	11.1	11			
Floodprone Width (ft)	50	50	50				50	50	50				50	50	50			
BF Cross Sectional Area (ft2)	3.5	3.3	3.3				5.6	4.9	5				5.6	4.9	4.9			
BF Mean Depth (ft)	0.4	0.4	0.4				0.6	0.4	0.5				0.5	0.4	0.4			
BF Max Depth (ft)	0.6	0.5	0.6				0.9	0.6	0.8				0.8	0.7	0.7			
Width/Depth Ratio	18.7	24.0	24.0				17.5	27.9	16.6				21.2	25.1	24.7			
Entrenchment Ratio	6.2	5.6	5.6				5.1	4.3	5.5				4.6	4.5	4.5			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0			
Wetted Perimeter (ft)	8.4	9.0	9.0				10.2	11.9	9.4				11.1	11.3	11.2			
Hydraulic Radius (ft)	0.4	0.4	0.4				0.6	0.4	0.5				0.5	0.4	0.4			
Substrate																		
d50 (mm)	----	----	----				----	----	----				----	----	----			
d84 (mm)	----	----	----				----	----	----				----	----	----			

APPENDIX E

HYDROLOGY DATA

Table 13. UT3 Channel Evidence

Stream Gauge Graphs

Table 14. Verification of Bankfull Events

Groundwater Gauge Graphs

Table 15. Groundwater Hydrology Data

Table 13. UT3 Channel Evidence

UT3 Channel Evidence	Year 1 (2016)	Year 2 (2017)
Max consecutive days channel flow	37	110
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

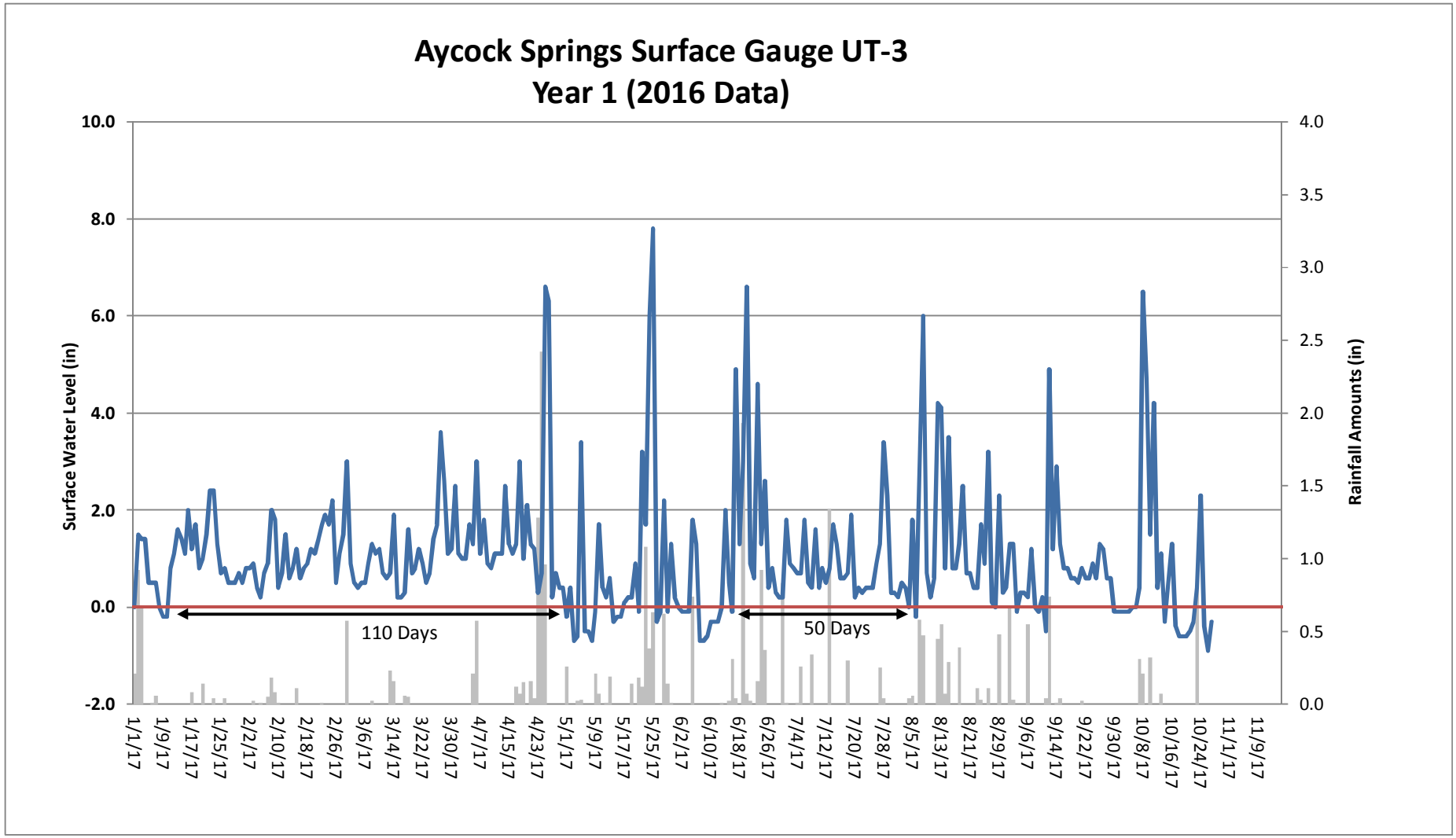
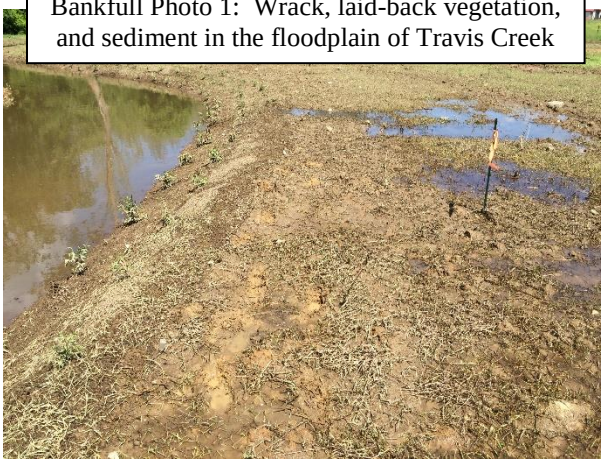

Aycock Springs Surface Gauge UT-3
Year 1 (2016 Data)
Surface Water Level (in)
Rainfall Amounts (in)
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
110 Days
50 Days
1/1/17
1/9/17
1/17/17
1/25/17
2/2/17
2/10/17
2/18/17
2/26/17
3/6/17
3/14/17
3/22/17
3/30/17
4/7/17
4/15/17
4/23/17
5/1/17
5/9/17
5/17/17
5/25/17
6/2/17
6/10/17
6/18/17
6/26/17
7/4/17
7/12/17
7/20/17
7/28/17
8/5/17
8/13/17
8/21/17
8/29/17
9/6/17
9/14/17
9/22/17
9/30/17
10/8/17
10/16/17
10/24/17
11/1/17
11/9/17

Table 14. Verification of Bankfull Events

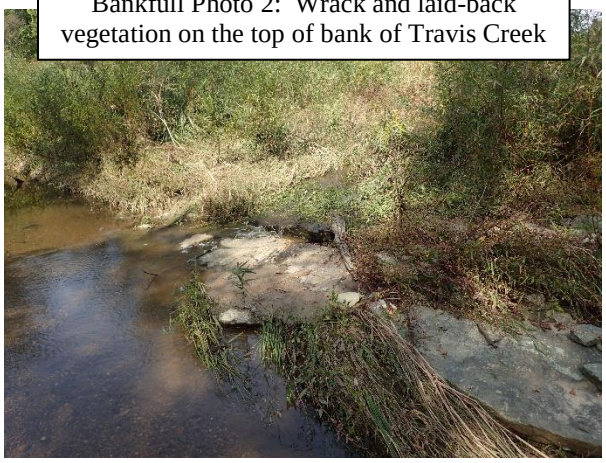
Date of Data Collection	Date of Occurrence	Method	Photo (if available)
May 5, 2016	May 3, 2016	Wrack, laid-back vegetation, sediment, and standing water observed in the floodplain after 1.55 inches of rain documented* on May 3, 2016 at a nearby rain gauge.	1
October 13, 2016	September 28, 2016	2.05 inches of rain was recorded on September 28, 2016 at an onsite rain gauge.	--
October 13, 2016	October 8, 2016	Wrack and laid-back vegetation observed on top of bank after 3.05 inches of rain was recorded on October 8, 2016 at an onsite rain gauge.	2
June 15, 2017	April 25, 2017	4.66 inches of rain was recorded between April 23 and 25, 2017 at an onsite rain gauge.	--
October 27, 2017	June 19, 2017	Wrack and laid back vegetation observed in the floodplain of Travis Creek after 1.93 inches of rain was recorded on June 19, 2017 at an onsite rain gauge	3

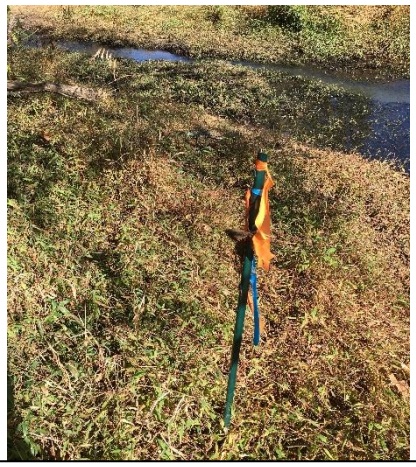
*The onsite rain gauge was installed on May 18, 2016, therefore rain data from a nearby Site (Abbey Lamm Stream and Wetland Mitigation Site) was used to confirm this bankfull event.

Bankfull Photo 1: Wrack, laid-back vegetation, and sediment in the floodplain of Travis Creek



Bankfull Photo 2: Wrack and laid-back vegetation on the top of bank of Travis Creek





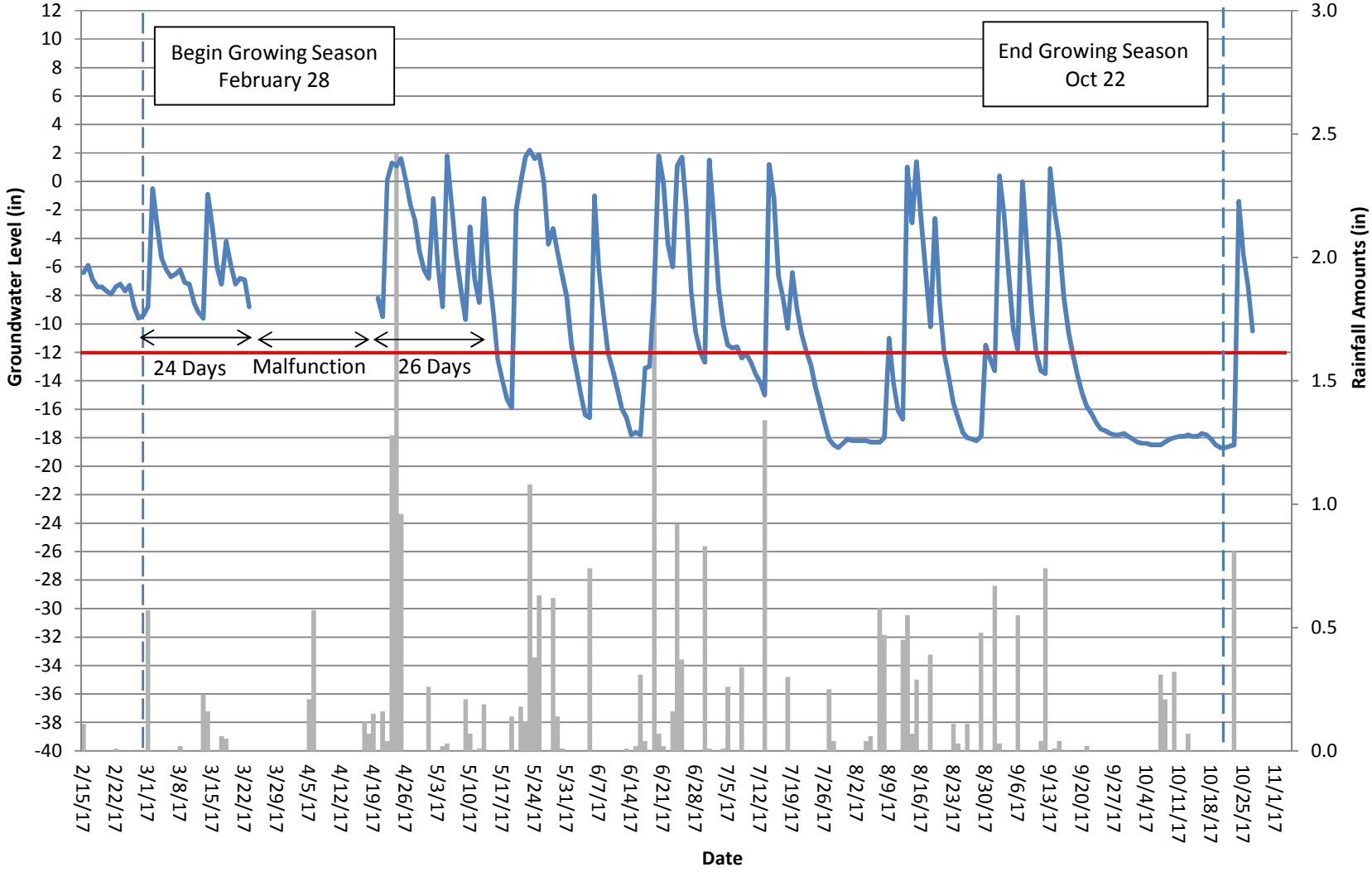
Bankfull Photo 3: Wrack and laid-back vegetation around a cross-section marker in the floodplain of Travis Creek

Table 15. Groundwater Hydrology Data

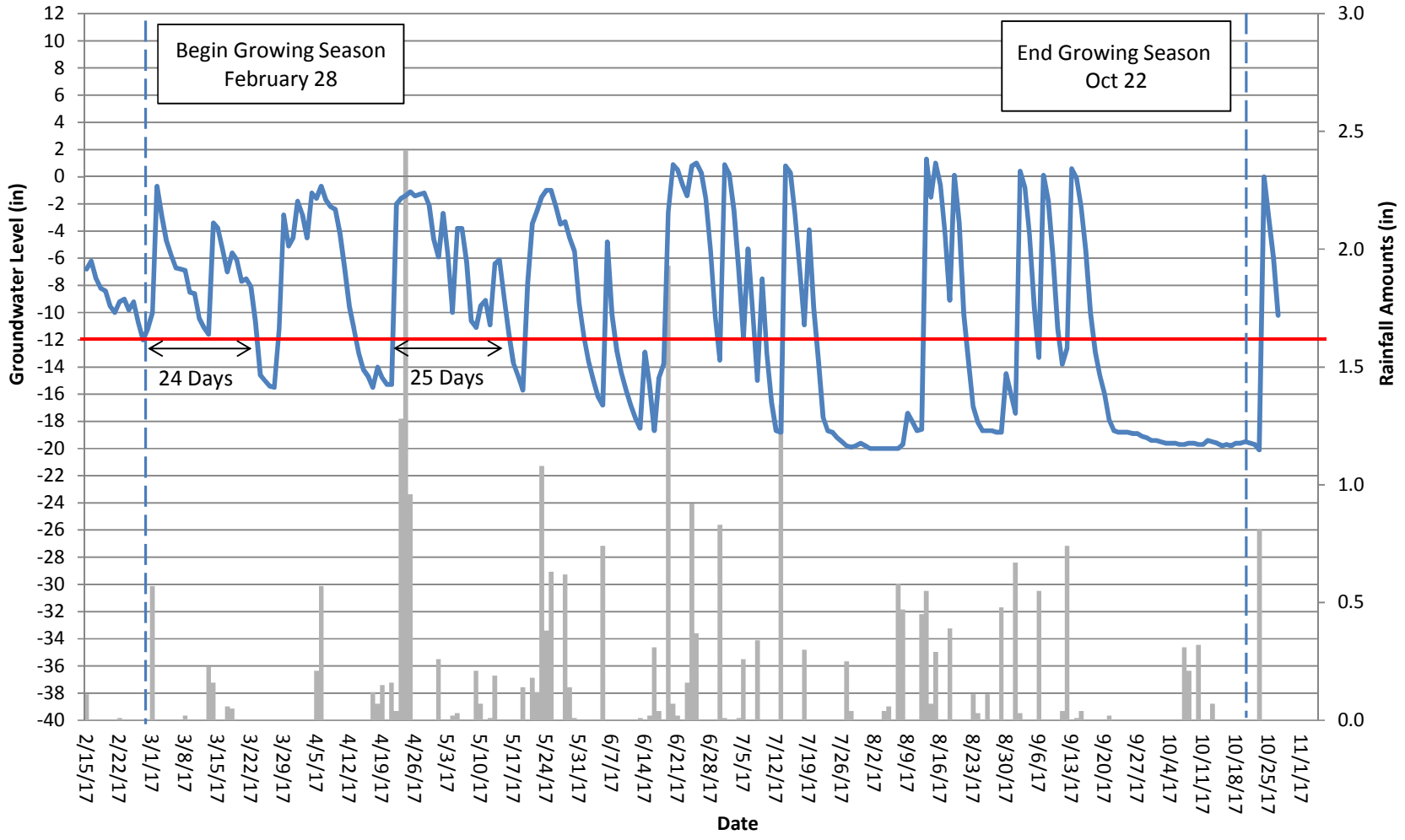
Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1* (2016)	**Year 2 (2017)**	**Year 3 (2018)**	**Year 4 (2019)**	**Year 5 (2020)**	**Year 6 (2021)**	**Year 7 (2022)**
1	Yes/55 days (29.1 percent)	Yes/26 days (11.0 percent)					
2	Yes/46 days (24.3 percent)	Yes/25 days (10.5 percent)					
3	Yes/44 days (23.3 percent)	Yes/25 days (10.5 percent)					

*Due to Site construction activities, groundwater gauges were not installed until May 5, 2016; therefore, the growing season for Year 1 (2016) is based on the soil survey start date of April 17. It is expected that all gauges would meet success criteria at the beginning of the growing season.

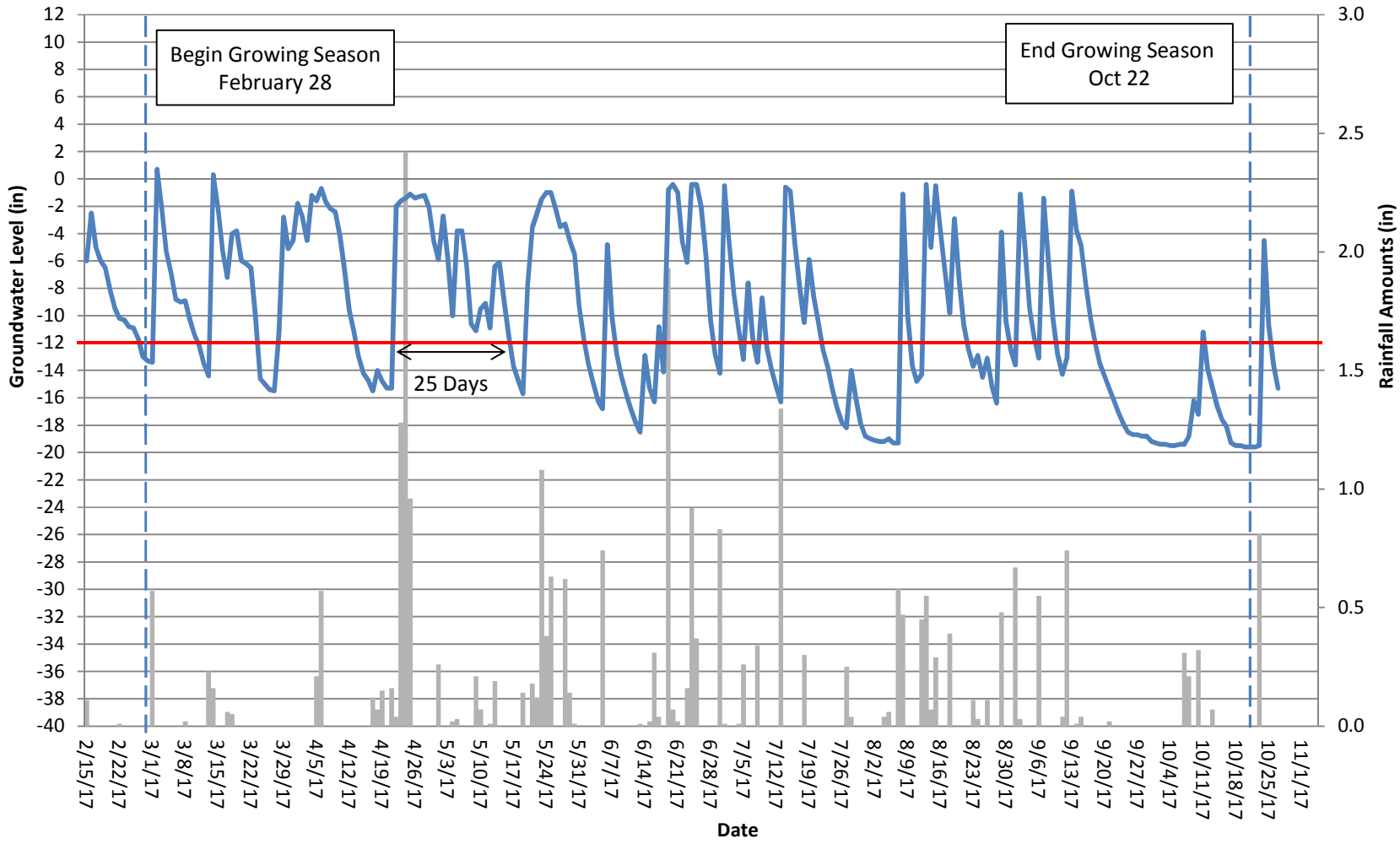
Aycock Springs Groundwater Gauge 1
Year 2 (2017 Data)



Aycock Springs Groundwater Gauge 2
Year 2 (2017 Data)



Aycock Springs Groundwater Gauge 3
Year 2 (2017 Data)



APPENDIX F

BENTHIC DATA

Results

Habitat Assessment Data Sheets

AXIOM ENVIRONMENT AYCOCK PROJECT, BENTHIC MACROINVERTEBRATES COLLECTED FORM ALAMANCE COUNTY, NC, 6/15/2017.

PAI ID NO			50157	50158	50159
STATION			UT-1	UT-2	UT-4
DATE			6/15/2017	6/15/2017	6/15/2017
SPECIES	TOLERANCE VALUE	FUNCTIONAL FEEDING GROUP			
MOLLUSCA					
Gastropoda					
Basommatophora					
Physidae					
Physella sp.	**8.7**	**CG**	2	1	3
ANNELIDA					
Oligochaeta		**CG**			
Lumbriculida					
Lumbriculidae		**CG**		3	
Hirudinea		**P**			
Arhynchobdellida					
Erpobdellidae		**P**			1
ARTHROPODA					
Crustacea					
Ostracoda			1		
Isopoda					
Asellidae		**SH**			
Caecidotea sp.	**8.4**	**CG**	3	5	1
Amphipoda		**CG**			
Crangonyctidae					
Crangonyx sp.	**7.2**	**CG**		1	
Decapoda					
Cambaridae					
Procambarus sp.	**9.3**	**SH**	1		
Insecta					
Collembola					
Isotomidae				1	
Ephemeroptera					
Caenidae		**CG**			
Caenis sp.	**6.8**	**CG**	36		
Odonata					
Coenagrionidae		**P**			
Ischnura sp.	**9.5**		5		1
Libellulidae		**P**		1	
Plathemis lydia	**9.8**				1
Somatochlora tenebrosa	**8.9**	**P**		1	
Hemiptera					
Belostomatidae			1		
Corixidae		**PI**	1		
Coleoptera					

AXIOM ENVIRONMENT AYCOCK PROJECT, BENTHIC MACROINVERTEBRATES COLLECTED FORM ALAMANCE COUNTY, NC, 6/15/2017.

PAI ID NO			**50157**	**50158**	**50159**
STATION			**UT-1**	**UT-2**	**UT-4**
DATE			**6/15/2017**	**6/15/2017**	**6/15/2017**
SPECIES	**TOLERANCE VALUE**	**FUNCTIONAL FEEDING GROUP**			
Dytiscidae		**P**			
Laccophilus fasciatus rufus	**9.8**	**P**	1		
Hydrophilidae		**P**	2	1	
Tropisternus sp.	**9.3**	**P**	6	1	3
Diptera					
Ceratopogonidae		**P**			1
Chironomidae					
Conchapelopia sp.	**8.4**	**P**	1		
TOTAL NO. OF ORGANISMS			**60**	**15**	**11**
TOTAL NO. OF TAXA			**12**	**9**	**7**
EPT INDEX			**1**	**0**	**0**
BIOTIC INDEX Assigned values			**8.08**	**8.47**	**9.08**

3/06 Revision 6

Habitat Assessment Field Data Sheet
Mountain/ Piedmont Streams

Aycock UT-1

Biological Assessment Unit, DWQ **TOTAL SCORE** 77

Directions for use: The observer is to survey a **minimum of 100 meters with 200 meters preferred** of stream, preferably in an **upstream** direction starting above the bridge pool and the road right-of-way. The segment which is assessed should represent average stream conditions. To perform a proper habitat evaluation the observer needs to get into the stream. To complete the form, select the description which best fits the observed habitats and then circle the score. If the observed habitat falls in between two descriptions, select an intermediate score. A final habitat score is determined by adding the results from the different metrics.

Stream UT to Travis Creek Location/road: Off Gibsonville Ossippee Road (Road Name) County Alamance

Date 6/15/17 **CC#** 03030002 Basin Cape Fear Subbasin 03-06-02

Observer(s) Fagan/Perkinson Type of Study: ☐ Fish ☒ Benthos ☐ Basinwide ☐ Special Study (Describe) _____

Latitude 36.128077 Longitude -79.521127 Ecoregion: ☐ MT ☒ P ☐ Slate Belt ☐ Triassic Basin

Water Quality: Temperature ___ °C DO ___ mg/l Conductivity (corr.) ___ µS/cm pH ___

Physical Characterization: Visible land use refers to immediate area that you can see from sampling location - include what you estimate driving thru the watershed in watershed land use.

Visible Land Use: 10 %Forest ___ %Residential 90 %Active Pasture ___ % Active Crops
___ %Fallow Fields ___ % Commercial ___ %Industrial ___ %Other - Describe: ___

Watershed land use : ☒ Forest ☒ Agriculture ☐ Urban ☐ Animal operations upstream

Width: (meters) Stream 0.5 Channel (at top of bank) 1.5 **Stream Depth**: (m) Avg 0.1 Max 0.3
☐ Width variable ☐ Large river >25m wide

Bank Height (from deepest part of riffle to top of bank-first flat surface you stand on): (m) 0.5

Bank Angle: 45 ° or ☐ NA (Vertical is 90°, horizontal is 0°. Angles > 90° indicate slope is towards mid-channel, < 90° indicate slope is away from channel. NA if bank is too low for bank angle to matter.)

☐ Channelized Ditch
☐ Deeply incised-steep, straight banks ☐ Both banks undercut at bend ☐ Channel filled in with sediment
☐ Recent overbank deposits ☐ Bar development ☐ Buried structures ☐ Exposed bedrock
☐ Excessive periphyton growth ☐ Heavy filamentous algae growth ☐ Green tinge ☐ Sewage smell
Manmade Stabilization: ☐ N ☒ Y: ☐ Rip-rap, cement, gabions ☐ Sediment/grade-control structure ☐ Berm/levee
Flow conditions : ☐ High ☐ Normal ☒ Low
Turbidity: ☒ Clear ☐ Slightly Turbid ☐ Turbid ☐ Tannic ☐ Milky ☐ Colored (from dyes)
Good potential for Wetlands Restoration Project?? ☒ **YES** ☐ **NO Details** Mitigation site

Channel Flow Status

Useful especially under abnormal or low flow conditions.

A. Water reaches base of both lower banks, minimal channel substrate exposed	☒
B. Water fills >75% of available channel, or <25% of channel substrate is exposed	☐
C. Water fills 25-75% of available channel, many logs/snags exposed	☐
D. Root mats out of water	☐
E. Very little water in channel, mostly present as standing pools	☐

Weather Conditions: hot, sunny **Photos:** ☐ N ☒ Y ☐ Digital ☐ 35mm

Remarks: Restoration project; fish (small minnows) abundant; water beetles, crayfish, water bugs, algae present; abundance of eggs on underside of rocks; abundance of snails

I. Channel Modification

	Score
A. channel natural, frequent bends	(5)
B. channel natural, infrequent bends (channelization could be old)	4
C. some channelization present	3
D. more extensive channelization, >40% of stream disrupted	2
E. no bends, completely channelized or rip rapped or gabioned, etc	0

☐ Evidence of dredging ☐Evidence of desnagging=no large woody debris in stream ☐Banks of uniform shape/height

Remarks Restoration reach Subtotal 5

II. Instream Habitat: Consider the percentage of the reach that is favorable for benthos colonization or fish cover. If >70% of the reach is rocks, 1 type is present, circle the score of 17. Definition: leafpacks consist of older leaves that are packed together and have begun to decay (not piles of leaves in pool areas). Mark as **R**are, **C**ommon, or **A**bundant.

C **Rocks** A **Macrophytes** R **Sticks and leafpacks** ___ **Snags and logs** C **Undercut banks or root mats**

AMOUNT OF REACH FAVORABLE FOR COLONIZATION OR COVER

	>70% Score	40-70% Score	20-40% Score	<20% Score
4 or 5 types present	20	(16)	12	8
3 types present	19	15	11	7
2 types present	18	14	10	6
1 type present	17	13	9	5
No types present	0			

☐ No woody vegetation in riparian zone Remarks ___ Subtotal 16

III. Bottom Substrate (silt, sand, detritus, gravel, cobble, boulder) Look at entire reach for substrate scoring, but only look at riffle for embeddedness, and use rocks from all parts of riffle-look for "mud line" or difficulty extracting rocks.

	Score
A. substrate with good mix of gravel, cobble and boulders	
1. embeddedness <20% (very little sand, usually only behind large boulders)	15
2. embeddedness 20-40%	12
3. embeddedness 40-80%	8
4. embeddedness >80%	3
B. substrate gravel and cobble	
1. embeddedness <20%	14
2. embeddedness 20-40%	11
3. embeddedness 40-80%	(6)
4. embeddedness >80%	2
C. substrate mostly gravel	
1. embeddedness <50%	8
2. embeddedness >50%	4
D. substrate homogeneous	
1. substrate nearly all bedrock	3
2. substrate nearly all sand	3
3. substrate nearly all detritus	2
4. substrate nearly all silt/ clay	1

Remarks ___ Subtotal 6

IV. Pool Variety Pools are areas of deeper than average maximum depths with little or no surface turbulence. Water velocities associated with pools are always slow. Pools may take the form of "pocket water", small pools behind boulders or obstructions, in large high gradient streams, or side eddies.

	Score
A. Pools present	
1. Pools Frequent (>30% of 200m area surveyed)	
a. variety of pool sizes	(10)
b. pools about the same size (indicates pools filling in)	8
2. Pools Infrequent (<30% of the 200m area surveyed)	
a. variety of pool sizes	6
b. pools about the same size	4
B. Pools absent	0

Subtotal 10

☐ Pool bottom boulder-cobble=hard ☐ Bottom sandy-sink as you walk ☑ Silt bottom ☐ Some pools over wader depth

Remarks ___

Page Total 37

V. Riffle Habitats

Definition: Riffle is area of reaeration-can be debris dam, or narrow channel area.

	Riffles **Frequent** Score	Riffles **Infrequent** Score
A. well defined riffle and run, riffle as wide as stream and extends 2X width of stream....	(16)	12
B. riffle as wide as stream but riffle length is not 2X stream width	14	7
C. riffle not as wide as stream and riffle length is not 2X stream width	10	3
D. riffles absent......	0	

Channel Slope: ☑Typical for area ☐Steep=fast flow ☐Low=like a coastal stream Subtotal 16

VI. Bank Stability and Vegetation

FACE UPSTREAM	Left Bank Score	Rt. Bank Score
A. Banks stable		
1. little evidence of erosion or bank failure(except outside of bends), little potential for erosion..	(7)	(7)
B. Erosion areas present		
1. diverse **trees**, shrubs, grass; plants healthy with good root systems.....	6	6
2. few trees or small trees and **shrubs**; vegetation appears generally healthy.....	5	5
3. sparse **mixed** vegetation; plant types and conditions suggest poorer soil binding.....	3	3
4. mostly **grasses**, few if any trees and shrubs, high erosion and failure potential at high flow..	2	2
5. little or no bank vegetation, mass erosion and bank failure evident.....	0	0
		Total 14

Remarks_____

VII. Light Penetration Canopy is defined as tree or vegetative cover directly above the stream's surface. Canopy would block out sunlight when the sun is directly overhead. Note shading from mountains, but not use to score this metric.

	Score
A. Stream with **good** canopy with some breaks for light penetration	10
B. Stream with **full canopy** - breaks for light penetration absent.....	8
C. Stream with **partial** canopy - sunlight and shading are essentially equal.....	7
D. Stream with **minimal** canopy - full sun in all but a few areas.....	(2)
E. **No canopy** and no shading.....	0

Remarks Year 2 post restoration. Subtotal 2

VIII. Riparian Vegetative Zone Width

Definition: Riparian zone for this form is area of natural vegetation adjacent to stream (can go beyond floodplain). Definition: A break in the riparian zone is any place on the stream banks which allows sediment or pollutants to directly enter the stream, such as paths down to stream, storm drains, uprooted trees, otter slides, etc.

FACE UPSTREAM	Lft. Bank Score	Rt. Bank Score
Dominant vegetation: ☑Trees ☑Shrubs ☑Grasses ☐ Weeds/old field ☐Exotics (kudzu, etc)		
A. Riparian zone **intact** (no breaks)		
1. width > 18 meters.....	5	5
2. width 12-18 meters.....	(4)	(4)
3. width 6-12 meters.....	3	3
4. width < 6 meters.....	2	2
B. Riparian zone **not intact** (breaks)		
1. breaks rare		
a. width > 18 meters.....	4	4
b. width 12-18 meters.....	3	3
c. width 6-12 meters.....	2	2
d. width < 6 meters.....	1	1
2. breaks common		
a. width > 18 meters.....	3	3
b. width 12-18 meters.....	2	2
c. width 6-12 meters.....	1	1
d. width < 6 meters.....	0	0
		Total 8

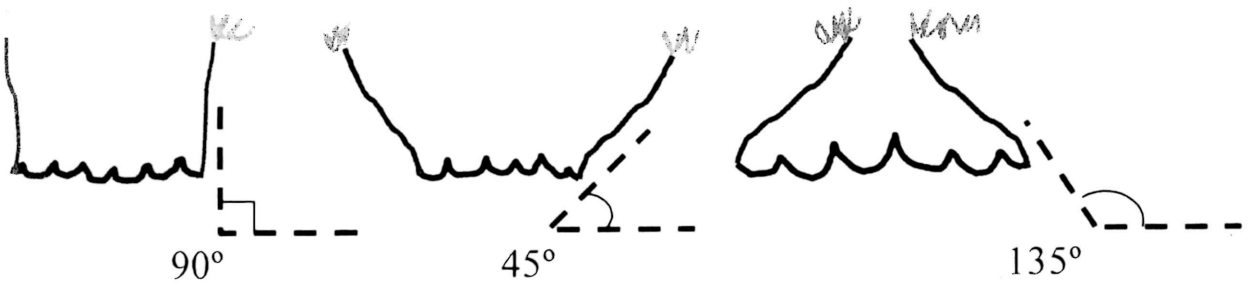
Remarks Year 2 post restoration

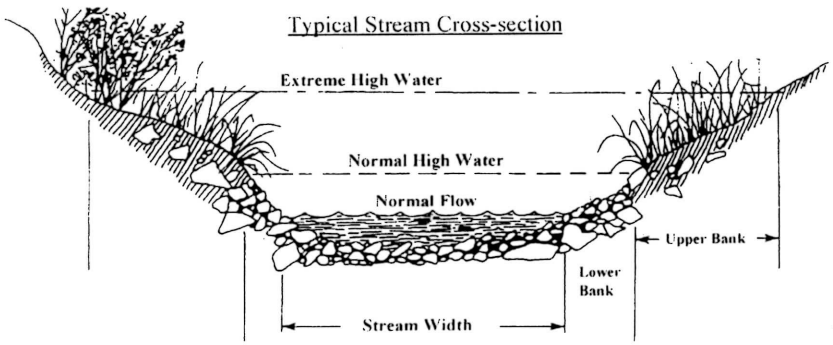
Page Total 40

☐ Disclaimer-form filled out, but score doesn't match subjective opinion-atypical stream. **TOTAL SCORE** 77

Supplement for Habitat Assessment Field Data Sheet

Diagram to determine bank angle:





This side is 45° bank angle.

Site Sketch:

Other comments: _____

_____

_____

_____

_____

3/06 Revision 6

Aycock - UT-2

Habitat Assessment Field Data Sheet
Mountain/ Piedmont Streams

Biological Assessment Unit, DWQ **TOTAL SCORE** 79

Directions for use: The observer is to survey a **minimum of 100 meters with 200 meters preferred** of stream, preferably in an **upstream** direction starting above the bridge pool and the road right-of-way. The segment which is assessed should represent average stream conditions. To perform a proper habitat evaluation the observer needs to get into the stream. To complete the form, select the description which best fits the observed habitats and then circle the score. If the observed habitat falls in between two descriptions, select an intermediate score. A final habitat score is determined by adding the results from the different metrics.

Stream UT to Travis Creek Location/road: Off Gibsonville Ossippee Road (Road Name) County Alamance

Date 6/15/17 **CC#** 03030002 Basin Cape Fear Subbasin 03-06-02

Observer(s) Faquin Perkinson Type of Study: ☐ Fish ☒ Benthos ☐ Basinwide ☐ Special Study (Describe) _____

Latitude 36.128128 Longitude -79.521813 Ecoregion: ☐ MT ☒ P ☐ Slate Belt ☐ Triassic Basin

Water Quality: Temperature — °C DO — mg/l Conductivity (corr.) — µS/cm pH —

Physical Characterization: Visible land use refers to immediate area that you can see from sampling location - include what you estimate driving thru the watershed in watershed land use.

Visible Land Use: 10 %Forest ____ %Residential 90 %Active Pasture ____ % Active Crops
____ %Fallow Fields ____ % Commercial ____ %Industrial ____ %Other - Describe: ____

Watershed land use : ☒ Forest ☒ Agriculture ☐ Urban ☐ Animal operations upstream

Width: (meters) Stream 0.3 Channel (at top of bank) 1.5 **Stream Depth**: (m) Avg 0.025 Max 0.05
☐ Width variable ☐ Large river >25m wide
Bank Height (from deepest part of riffle to top of bank-first flat surface you stand on): (m) 0.25-0.5

Bank Angle: 45 ° or ☐ NA (Vertical is 90°, horizontal is 0°. Angles > 90° indicate slope is towards mid-channel, < 90° indicate slope is away from channel. NA if bank is too low for bank angle to matter.)
☐ Channelized Ditch
☐ Deeply incised-steep, straight banks ☐ Both banks undercut at bend ☐ Channel filled in with sediment
☐ Recent overbank deposits ☐ Bar development ☐ Buried structures ☐ Exposed bedrock
☐ Excessive periphyton growth ☐ Heavy filamentous algae growth ☐ Green tinge ☐ Sewage smell
Manmade Stabilization: ☐ N ☑ Y: ☐ Rip-rap, cement, gabions ☐ Sediment/grade-control structure ☐ Berm/levee
Flow conditions : ☐ High ☐ Normal ☑ Low
Turbidity: ☐ Clear ☐ Slightly Turbid ☐ Turbid ☐ Tannic ☐ Milky ☐ Colored (from dyes)
Good potential for Wetlands Restoration Project?? ☑ **YES** ☐ **NO Details** mitigation site

Channel Flow Status
Useful especially under abnormal or low flow conditions.

A. Water reaches base of both lower banks, minimal channel substrate exposed	☐
B. Water fills >75% of available channel, or <25% of channel substrate is exposed	☐
C. Water fills 25-75% of available channel, many logs/snags exposed	☐
D. Root mats out of water	☑
E. Very little water in channel, mostly present as standing pools	☐

Weather Conditions: hot sunny **Photos:** ☐ N ☑ Y ☐ Digital ☐ 35mm

Remarks: aquatic vegetation in channel is abundant; abundance of tadpoles; abundance of snails

I. Channel Modification

	Score
A. channel natural, frequent bends	(5)
B. channel natural, infrequent bends (channelization could be old)	4
C. some channelization present	3
D. more extensive channelization, >40% of stream disrupted	2
E. no bends, completely channelized or rip rapped or gabioned, etc	0

☐ Evidence of dredging ☐Evidence of desnagging=no large woody debris in stream ☐Banks of uniform shape/height

Remarks_____ Subtotal 5

II. Instream Habitat: Consider the percentage of the reach that is favorable for benthos colonization or fish cover. If >70% of the reach is rocks, 1 type is present, circle the score of 17. Definition: leafpacks consist of older leaves that are packed together and have begun to decay (not piles of leaves in pool areas). Mark as **R**are, **C**ommon, or **A**bundant.

R **Rocks** A **Macrophytes** R **Sticks and leafpacks** ___ **Snags and logs** A **Undercut banks or root mats**

AMOUNT OF REACH FAVORABLE FOR COLONIZATION OR COVER

	>70% Score	40-70% Score	20-40% Score	<20% Score
4 or 5 types present	(20)	16	12	8
3 types present	19	15	11	7
2 types present	18	14	10	6
1 type present	17	13	9	5
No types present	0			

☐ No woody vegetation in riparian zone Remarks_____ Subtotal 20

III. Bottom Substrate (silt, sand, detritus, gravel, cobble, boulder) Look at entire reach for substrate scoring, but only look at riffle for embeddedness, and use rocks from all parts of riffle-look for "mud line" or difficulty extracting rocks.

A. substrate with good mix of gravel, cobble and boulders	Score
1. embeddedness <20% (very little sand, usually only behind large boulders)	15
2. embeddedness 20-40%	12
3. embeddedness 40-80%	8
4. embeddedness >80%	3
B. substrate gravel and cobble	
1. embeddedness <20%	14
2. embeddedness 20-40%	11
3. embeddedness 40-80%	(6)
4. embeddedness >80%	2
C. substrate mostly gravel	
1. embeddedness <50%	8
2. embeddedness >50%	4
D. substrate homogeneous	
1. substrate nearly all bedrock	3
2. substrate nearly all sand	3
3. substrate nearly all detritus	2
4. substrate nearly all silt/ clay	1

Remarks_____ Subtotal 6

IV. Pool Variety Pools are areas of deeper than average maximum depths with little or no surface turbulence. Water velocities associated with pools are always slow. Pools may take the form of "pocket water", small pools behind boulders or obstructions, in large high gradient streams, or side eddies.

A. Pools present	Score
1. Pools Frequent (>30% of 200m area surveyed)	
a. variety of pool sizes	10
b. pools about the same size (indicates pools filling in)	(8)
2. Pools Infrequent (<30% of the 200m area surveyed)	
a. variety of pool sizes	6
b. pools about the same size	4
B. Pools absent	0

Subtotal 8

☐ Pool bottom boulder-cobble=hard ☐ Bottom sandy-sink as you walk ☑ Silt bottom ☐ Some pools over wader depth

Remarks_____

Page Total 39

V. Riffle Habitats

Definition: Riffle is area of reaeration-can be debris dam, or narrow channel area.

	Riffles **Frequent** Score	Riffles **Infrequent** Score
A. well defined riffle and run, riffle as wide as stream and extends 2X width of stream....	16	12
B. riffle as wide as stream but riffle length is not 2X stream width	14	7
C. riffle not as wide as stream and riffle length is not 2X stream width	10	3
D. riffles absent.....	0	

Channel Slope: ☑Typical for area ☐Steep=fast flow ☐Low=like a coastal stream Subtotal 16

VI. Bank Stability and Vegetation

FACE UPSTREAM	Left Bank Score	Rt. Bank Score
A. Banks stable		
1. little evidence of erosion or bank failure(except outside of bends), little potential for erosion..	7	7
B. Erosion areas present		
1. diverse **trees**, shrubs, grass; plants healthy with good root systems.....	6	6
2. few trees or small trees and **shrubs**; vegetation appears generally healthy.....	5	5
3. sparse **mixed** vegetation; plant types and conditions suggest poorer soil binding.....	3	3
4. mostly **grasses**, few if any trees and shrubs, high erosion and failure potential at high flow..	2	2
5. little or no bank vegetation, mass erosion and bank failure evident.....	0	0
		Total 14

Remarks_____

VII. Light Penetration Canopy is defined as tree or vegetative cover directly above the stream's surface. Canopy would block out sunlight when the sun is directly overhead. Note shading from mountains, but not use to score this metric.

	Score
A. Stream with **good** canopy with some breaks for light penetration	10
B. Stream with **full canopy** - breaks for light penetration absent.....	8
C. Stream with **partial** canopy - sunlight and shading are essentially equal.....	7
D. Stream with **minimal** canopy - full sun in all but a few areas.....	2
E. **No canopy** and no shading.....	0

Remarks Year 2 post construction Subtotal 2

VIII. Riparian Vegetative Zone Width

Definition: Riparian zone for this form is area of natural vegetation adjacent to stream (can go beyond floodplain). Definition: A break in the riparian zone is any place on the stream banks which allows sediment or pollutants to directly enter the stream, such as paths down to stream, storm drains, uprooted trees, otter slides, etc.

FACE UPSTREAM	Lft. Bank Score	Rt. Bank Score
Dominant vegetation: ☑Trees ☑Shrubs ☑Grasses ☐Weeds/old field ☐Exotics (kudzu, etc)		
A. Riparian zone **intact** (no breaks)		
1. width > 18 meters.....	5	5
2. width 12-18 meters.....	4	4
3. width 6-12 meters.....	3	3
4. width < 6 meters.....	2	2
B. Riparian zone **not intact** (breaks)		
1. breaks rare		
a. width > 18 meters.....	4	4
b. width 12-18 meters.....	3	3
c. width 6-12 meters.....	2	2
d. width < 6 meters.....	1	1
2. breaks common		
a. width > 18 meters.....	3	3
b. width 12-18 meters.....	2	2
c. width 6-12 meters.....	1	1
d. width < 6 meters.....	0	0
		Total 8

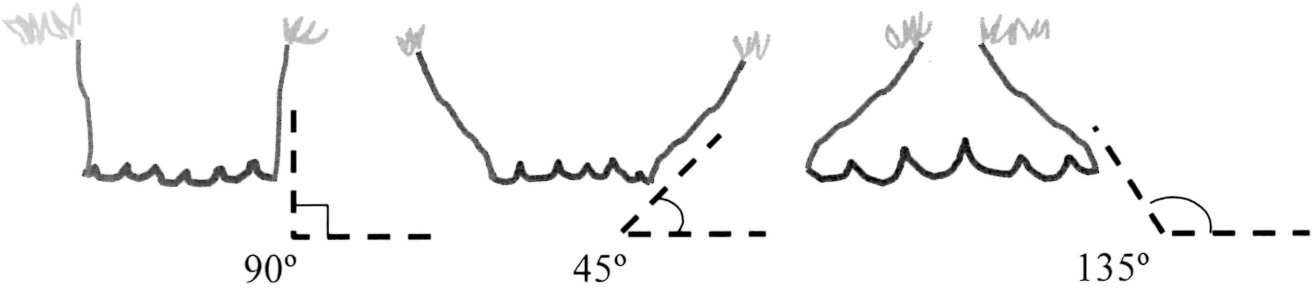
Remarks Year 2 post restoration

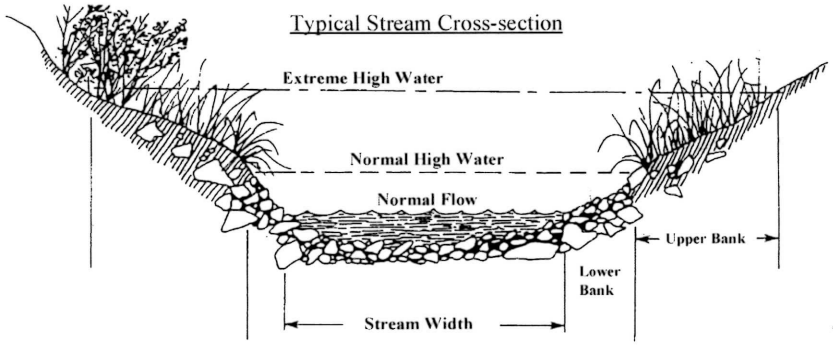
Page Total 40

☐ Disclaimer-form filled out, but score doesn't match subjective opinion-atypical stream. **TOTAL SCORE** 79

Supplement for Habitat Assessment Field Data Sheet

Diagram to determine bank angle:





This side is 45° bank angle.

Site Sketch:

Other comments:_____

_____

_____

_____

_____

3/06 Revision 6

Aycock UT-4

Habitat Assessment Field Data Sheet
Mountain/ Piedmont Streams

Biological Assessment Unit, DWQ **TOTAL SCORE** 80

Directions for use: The observer is to survey a **minimum of 100 meters with 200 meters preferred** of stream, preferably in an **upstream** direction starting above the bridge pool and the road right-of-way. The segment which is assessed should represent average stream conditions. To perform a proper habitat evaluation the observer needs to get into the stream. To complete the form, select the description which best fits the observed habitats and then circle the score. If the observed habitat falls in between two descriptions, select an intermediate score. A final habitat score is determined by adding the results from the different metrics.

Stream UT to Travis Creek Location/road: Gibsonville Ossipee Road (Road Name) County Alamance

Date 6/15/17 **CC#** 03030002 Basin Cape Fear Subbasin 03-06-02

Observer(s) Fagin/Berkinson Type of Study: ☐ Fish ☒ Benthos ☐ Basinwide ☐ Special Study (Describe) _____

Latitude 36.129805 Longitude -79.527165 Ecoregion: ☐ MT ☒ P ☐ Slate Belt ☐ Triassic Basin

Water Quality: Temperature ___ °C DO ___ mg/l Conductivity (corr.) ___ µS/cm pH ___

Physical Characterization: Visible land use refers to immediate area that you can see from sampling location - include what you estimate driving thru the watershed in watershed land use.

Visible Land Use: 10 %Forest ___ %Residential 90 %Active Pasture ___ % Active Crops
___ %Fallow Fields ___ % Commercial ___ %Industrial ___ %Other - Describe: ___

Watershed land use : ☒ Forest ☒ Agriculture ☐ Urban ☐ Animal operations upstream

Width: (meters) Stream 1.5 Channel (at top of bank) 2 **Stream Depth**: (m) Avg 0.1 Max 0.25
☐ Width variable ☐ Large river >25m wide

Bank Height (from deepest part of riffle to top of bank-first flat surface you stand on): (m) 1.0

Bank Angle: 45 ° or ☐ NA (Vertical is 90°, horizontal is 0°. Angles > 90° indicate slope is towards mid-channel, < 90° indicate slope is away from channel. NA if bank is too low for bank angle to matter.)

☐ Channelized Ditch
☐ Deeply incised-steep, straight banks ☐ Both banks undercut at bend ☐ Channel filled in with sediment
☐ Recent overbank deposits ☐ Bar development ☐ Buried structures ☐ Exposed bedrock
☐ Excessive periphyton growth ☐ Heavy filamentous algae growth ☐ Green tinge ☐ Sewage smell
Manmade Stabilization: ☐ N ☒ Y: ☐ Rip-rap, cement, gabions ☐ Sediment/grade-control structure ☐ Berm/levee
Flow conditions : ☐ High ☐ Normal ☒ Low
Turbidity: ☐ Clear ☒ Slightly Turbid ☐ Turbid ☐ Tannic ☐ Milky ☐ Colored (from dyes)
Good potential for Wetlands Restoration Project?? ☒ **YES** ☐ **NO Details** _____

Channel Flow Status
Useful especially under abnormal or low flow conditions.

A. Water reaches base of both lower banks, minimal channel substrate exposed	☒
B. Water fills >75% of available channel, or <25% of channel substrate is exposed	☐
C. Water fills 25-75% of available channel, many logs/snags exposed	☐
D. Root mats out of water	☐
E. Very little water in channel, mostly present as standing pools	☐

Weather Conditions: hot, sunny **Photos:** ☐ N ☒ Y ☐ Digital ☐ 35mm

Remarks: abundance of eggs on under side of rocks; abundance of snails

I. Channel Modification

	Score
A. channel natural, frequent bends	(5)
B. channel natural, infrequent bends (channelization could be old)	4
C. some channelization present	3
D. more extensive channelization, >40% of stream disrupted	2
E. no bends, completely channelized or rip rapped or gabioned, etc	0

☐ Evidence of dredging ☐Evidence of desnagging=no large woody debris in stream ☐Banks of uniform shape/height

Remarks_____ Subtotal 5

II. Instream Habitat: Consider the percentage of the reach that is favorable for benthos colonization or fish cover. If >70% of the reach is rocks, 1 type is present, circle the score of 17. Definition: leafpacks consist of older leaves that are packed together and have begun to decay (not piles of leaves in pool areas). Mark as **R**are, **C**ommon, or **A**bundant.

C **Rocks** R **Macrophytes** R **Sticks and leafpacks** ___ **Snags and logs** R **Undercut banks or root mats**

AMOUNT OF REACH FAVORABLE FOR COLONIZATION OR COVER

	>70% Score	40-70% Score	20-40% Score	<20% Score
4 or 5 types present	20	(16)	12	8
3 types present	19	15	11	7
2 types present	18	14	10	6
1 type present	17	13	9	5
No types present	0			

☐ No woody vegetation in riparian zone Remarks_____ Subtotal 16

III. Bottom Substrate (silt, sand, detritus, gravel, cobble, boulder) Look at entire reach for substrate scoring, but only look at riffle for embeddedness, and use rocks from all parts of riffle-look for "mud line" or difficulty extracting rocks.

A. substrate with good mix of gravel, cobble and boulders	**Score**
1. embeddedness <20% (very little sand, usually only behind large boulders)	15
2. embeddedness 20-40%	12
3. embeddedness 40-80%	8
4. embeddedness >80%	3
B. substrate gravel and cobble	
1. embeddedness <20%	14
2. embeddedness 20-40%	(11)
3. embeddedness 40-80%	6
4. embeddedness >80%	2
C. substrate mostly gravel	
1. embeddedness <50%	8
2. embeddedness >50%	4
D. substrate homogeneous	
1. substrate nearly all bedrock	3
2. substrate nearly all sand	3
3. substrate nearly all detritus	2
4. substrate nearly all silt/ clay	1

Remarks_____ Subtotal 11

IV. Pool Variety Pools are areas of deeper than average maximum depths with little or no surface turbulence. Water velocities associated with pools are always slow. Pools may take the form of "pocket water", small pools behind boulders or obstructions, in large high gradient streams, or side eddies.

A. Pools present	Score
1. Pools Frequent (>30% of 200m area surveyed)	
a. variety of pool sizes	10
b. pools about the same size (indicates pools filling in)	(8)
2. Pools Infrequent (<30% of the 200m area surveyed)	
a. variety of pool sizes	6
b. pools about the same size	4
B. Pools absent	0

Subtotal 8

☐ Pool bottom boulder-cobble=hard ☐ Bottom sandy-sink as you walk ☑ Silt bottom ☐ Some pools over wader depth

Remarks_____

Page Total 40

V. Riffle Habitats

Definition: Riffle is area of reaeration-can be debris dam, or narrow channel area.

	Riffles **Frequent** Score	Riffles **Infrequent** Score
A. well defined riffle and run, riffle as wide as stream and extends 2X width of stream....	16	12
B. riffle as wide as stream but riffle length is not 2X stream width	14	7
C. riffle not as wide as stream and riffle length is not 2X stream width	10	3
D. riffles absent.....	0	

Channel Slope: ☐Typical for area ☐Steep=fast flow ☐Low=like a coastal stream Subtotal 16

VI. Bank Stability and Vegetation

FACE UPSTREAM	Left Bank Score	Rt. Bank Score
A. Banks stable		
1. little evidence of erosion or bank failure(except outside of bends), little potential for erosion.	7	7
B. Erosion areas present		
1. diverse **trees**, shrubs, grass; plants healthy with good root systems.....	6	6
2. few trees or small trees and **shrubs**; vegetation appears generally healthy.....	5	5
3. sparse **mixed** vegetation; plant types and conditions suggest poorer soil binding.....	3	3
4. mostly **grasses**, few if any trees and shrubs, high erosion and failure potential at high flow..	2	2
5. little or no bank vegetation, mass erosion and bank failure evident.....	0	0
		Total 14

Remarks_____

VII. Light Penetration Canopy is defined as tree or vegetative cover directly above the stream's surface. Canopy would block out sunlight when the sun is directly overhead. Note shading from mountains, but not use to score this metric.

	Score
A. Stream with **good** canopy with some breaks for light penetration	10
B. Stream with **full canopy** - breaks for light penetration absent.....	8
C. Stream with **partial** canopy - sunlight and shading are essentially equal.....	7
D. Stream with **minimal** canopy - full sun in all but a few areas.....	2
E. **No canopy** and no shading.....	0

Remarks Year 2 Post Restoration Subtotal 2

VIII. Riparian Vegetative Zone Width

Definition: Riparian zone for this form is area of natural vegetation adjacent to stream (can go beyond floodplain). Definition: A break in the riparian zone is any place on the stream banks which allows sediment or pollutants to directly enter the stream, such as paths down to stream, storm drains, uprooted trees, otter slides, etc.

Dominant vegetation: ☑ Trees ☑ Shrubs ☑ Grasses ☐ Weeds/old field ☐ Exotics (kudzu, etc)

FACE UPSTREAM	Lft. Bank Score	Rt. Bank Score
A. Riparian zone **intact** (no breaks)		
1. width > 18 meters.....	5	5
2. width 12-18 meters.....	4	4
3. width 6-12 meters.....	3	3
4. width < 6 meters.....	2	2
B. Riparian zone **not intact** (breaks)		
1. breaks rare		
a. width > 18 meters.....	4	4
b. width 12-18 meters.....	3	3
c. width 6-12 meters.....	2	2
d. width < 6 meters.....	1	1
2. breaks common		
a. width > 18 meters.....	3	3
b. width 12-18 meters.....	2	2
c. width 6-12 meters.....	1	1
d. width < 6 meters.....	0	0
		Total 8

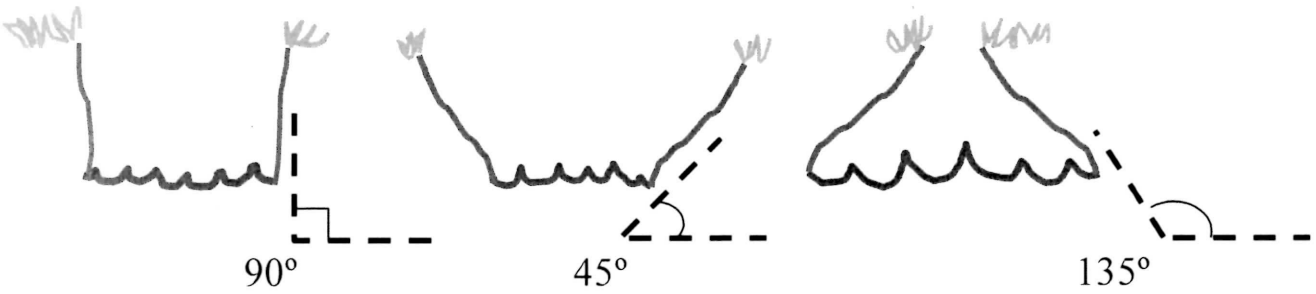
Remarks Year 2 Post Restoration.

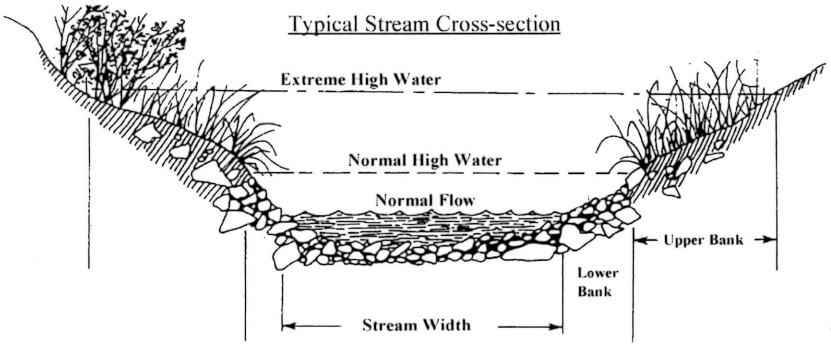
Page Total 40

☐ Disclaimer-form filled out, but score doesn't match subjective opinion-atypical stream. **TOTAL SCORE** 80

Supplement for Habitat Assessment Field Data Sheet

Diagram to determine bank angle:





This side is 45° bank angle.

Site Sketch:

Other comments:_____

_____

_____

_____

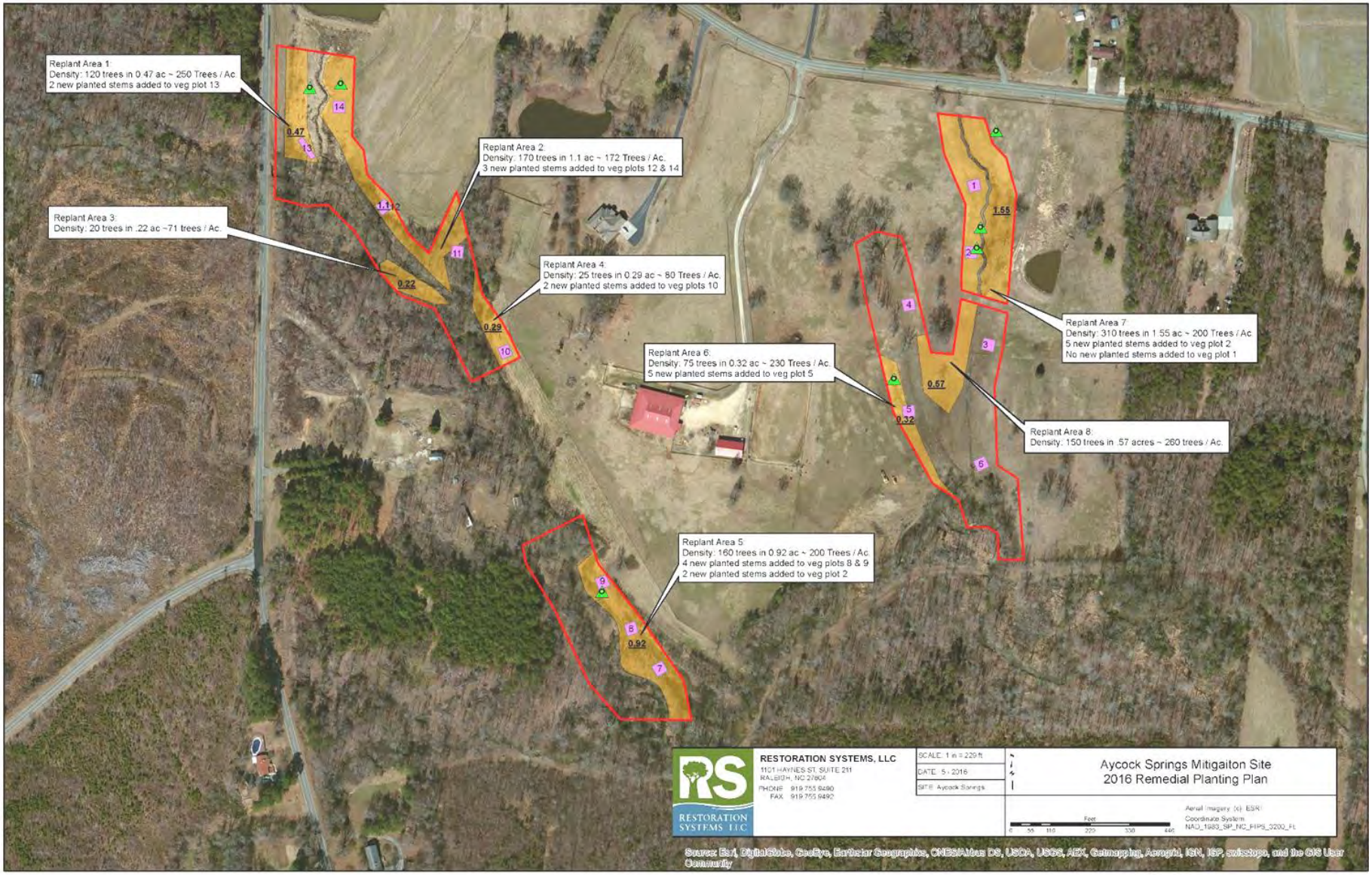
_____

APPENDIX G

REMEDIAL ACTION PLAN


Aycock Springs Stream and Wetland Mitigation Site
Remedial Action Update March 3, 2017
NC DMS Contract #5791

Aycock Springs– Remedial Action Plan - Vegetation Update



Map of Replant Areas- green dots indicate approximate location of where photos were taken.

Photo 1: Looking SW. along Replant Area -1

Photo Date: 1-13-2017

Photo 2: Looking S. in Replant Area 2, just N. of veg. plot 14

Photo Date: 1-13-2017

Photo 3: Looking SE. in Replant Area 4, near veg. plot 9

Photo Date: 1-13-2017

Photo 5: Looking S. in Replant Area 5, N. of veg. plot 5

Photo Date: 1-13-2017

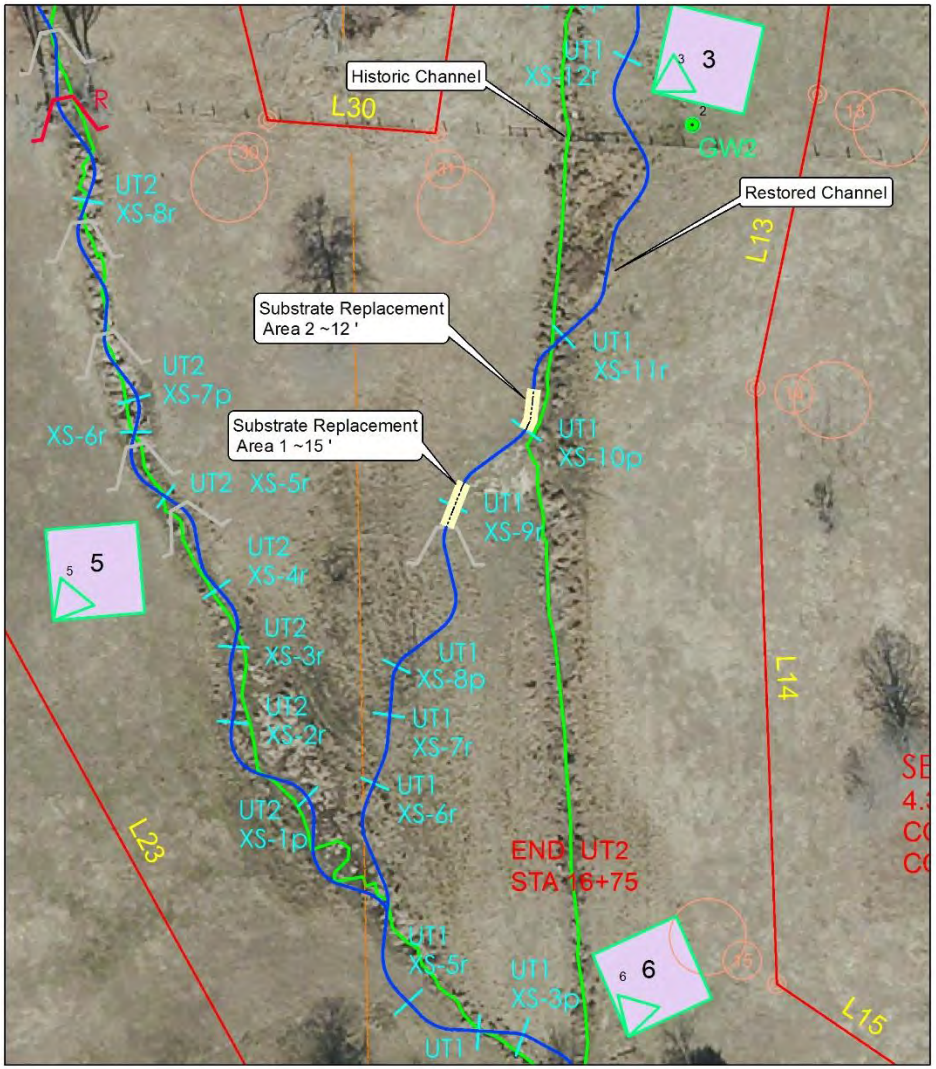
Photo 4: Looking S. in Replant Area 6, from outside of the easement

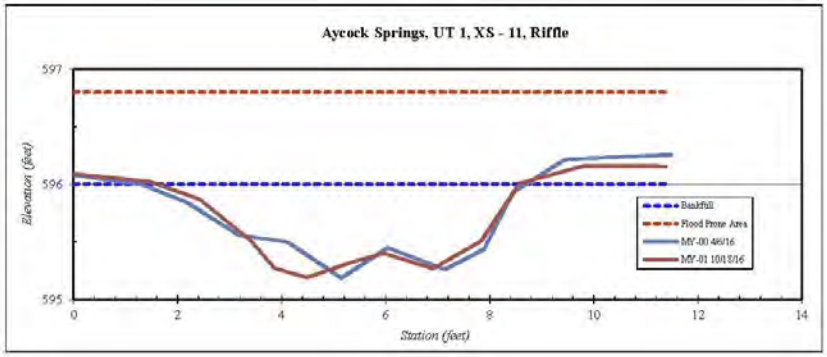
Photo Date: 1-13-2017

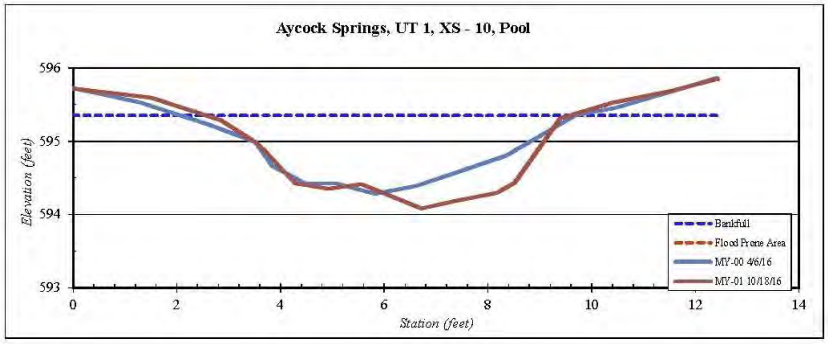
Photo 6 / 7: Live stake establishment on bank in Replant area 6

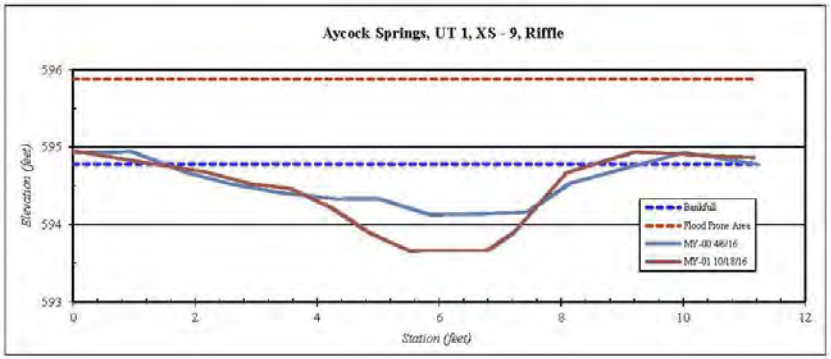
Photo Date: 1-13-2017

Aycock Springs– Remedial Action Plan Substrate Replacement - Update









RESTORATION SYSTEMS, LLC
1101 HAYNES ST, SUITE 211
RALEIGH, NC 27604
PHONE : 919.755.9490
FAX : 919.755.9492

SCALE: 1 in = 42 ft
DATE: 2 - 2017
SITE:

Aycock Springs
Substrate replacement - 2-23-2017

Feet
0 5 10 20 30 40

Aerial Imagery: (c) ESRI
Coordinate System:
NAD_1983_SP_NC_FIPS_3200_Ft.

Map of Area – UT 1, XC 9, 10, 11

Photo 1: Substrate loss, 6” head-cut at UT 1, XC 9

Photo 2: Pool, upstream of 6” head-cut at UT 1, XC 9 (XC 10 in background)

Photo 3: Substrate replacement at UT 1, XC 9

Photo 3: Substrate loss, upstream riffle of XC 10 (pool)

Photo 4: Substrate replaced, upstream riffle of XC 10 (pool)

Photo 5: post replacement overview

Photo 6: UT-1 looking downstream from XC-11

Photo 7: XC-9 – Post 3-1-2017 0.92 inch rain event (Per USGS Guage at BUFFALO CREEK (SR2819 NR MCLEANSVILLE, NC) ~ 7 miles from Site

Photo 7: XC-10 – Post 3-1-2017 0.92 inch rain event (Per USGS Guage at BUFFALO CREEK (SR2819 NR MCLEANSVILLE, NC) ~ 7 miles from Site

APPENDIX F

INVASIVE SPECIES TREATMENT LOGS

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0397

Client	Restoration Systems		
Project SIte	Aycock Springs		
Date	04-06-2017		
Start Time	10:00	**End Time**	15:30
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	1 of 2
Sky Cover	Cloudy	**Temp (F)**	61
Wind Direction	W	**Wind Speed**	11-15mph
Applicators	Joshua G Merritt (NC 026-33717) Grainger Coughtrey (NC 026-34612) Sebastian Kimlinger (NC 026-34613)		
Application Method	Basal Bark		
Herbicide	Garlon® 4 (triclopyr)		
Herbicide Rate (%)	15	**Total Concentrate**	290 fl oz
Surfactant or Adjuvant (1)			
Surfactant/Adjudivant 1 Rate (%)			
Other			
Other Rate/Amt			
Diluent	Diesel fuel		
Total Solution	15 gallons		
Species Controlled	Privet spp. Multiflora Rose		
Area Description	Large privet downstream		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0464

Client	Restoration Systems		
Project SIte	Aycock Springs		
Date	09-05-2017		
Start Time	9:00	**End Time**	14:00
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	2 of 2
Sky Cover	Clear	**Temp (F)**	81
Wind Direction	S	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717) Grainger Coughtrey (NC 026-34612) Sebastian Kimlinger (NC 026-34613)		
Application Method	Foliar Spray (Backpack)		
Herbicide	Roundup® Custom (glyphosate)		
Herbicide Rate (%)	5	**Total Concentrate**	78 fl oz
Surfactant or Adjuvant (1)	Hel-fire®		
Surfactant/Adjudivant 1 Rate (%)	.5		
Other	Blue Dye		
Other Rate/Amt	1 fl oz		
Diluent	Water		
Total Solution	12 gallons		
Species Controlled	Privet spp. Multiflora Rose		
Area Description	The majority of the site is clear of invasive species. The privet and rose present were small re-sproutes from recent treatments.		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0465

Client	Restoration Systems		
Project SIte	Aycock Srpings		
Date	09-05-2017		
Start Time	14:00	**End Time**	16:00
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	3 of 3
Sky Cover	Clear	**Temp (F)**	81
Wind Direction	S	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717) Grainger Coughtrey (NC 026-34612) Sebastian Kimlinger (NC 026-34613)		
Application Method	Cut and Stump Spray		
Herbicide	Garlon® 3A (triclopyr)		
Herbicide Rate (%)	50	**Total Concentrate**	50 fl oz
Surfactant or Adjuvant (1)			
Surfactant/Adjudivant 1 Rate (%)			
Other			
Other Rate/Amt			
Diluent	Water		
Total Solution	100 fl oz		
Species Controlled	Jap. Honeysuckle Privet spp. Tree-of-Heaven Multiflora Rose		
Area Description	Cut and Stump Sprayed a large patch of all invasive species listed above. The patch itself was only 20 ft by 50 ft consisting of small specimen. Loppers were used to clear the area.		
Additional Comments	The area cut is actually located outside of the easement boundaries according to PDF maps. I spoke with Ray Holz and he gave the green light to carry on with the treatment in this area. A map can be provided upon request.		

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0468

Client	Restoration Systems		
Project SIte	Aycock Springs		
Date	09-05-2017		
Start Time	9:00	**End Time**	16:00
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	1 of 2
Sky Cover	Clear	**Temp (F)**	81
Wind Direction	S	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717)		
Application Method	Foliar Spray (Backpack)		
Herbicide	Garlon® 3A (triclopyr)		
Herbicide Rate (%)	3	**Total Concentrate**	8 fl oz
Surfactant or Adjuvant (1)	Hel-fire®		
Surfactant/Adjudivant 1 Rate (%)			
Other			
Other Rate/Amt			
Diluent	Water		
Total Solution	2 gallons		
Species Controlled	Privet spp. Multiflora Rose		
Area Description	Large amount of privet in back corner of site		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0264

Client	Restoration Systems		
Project SIte	Aycock Spring		
Date	08-16-2016		
Start Time	13:00	**End Time**	17:30
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	2 of 2
Sky Cover	Clear	**Temp (F)**	100
Wind Direction	SW	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717) Grainger Coughtrey		
Application Method	Cut and Stump Spray		
Herbicide	Garlon® 3A (triclopyr)		
Herbicide Rate (%)	50	**Total Concentrate**	32 fl oz
Surfactant or Adjuvant (1)			
Surfactant/Adjudivant 1 Rate (%)			
Other			
Other Rate/Amt			
Diluent	Water		
Total Solution	.5 gallons		
Species Controlled	Privet spp. Multiflora Rose		
Area Description	Treated the up stream area of the easement. The density of invasive were moderate. The composed mainly small plants with a few large stems spread throughout.		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0463

Client	Restoration Systems		
Project SIte	Aycock Srpings		
Date	09-05-2017		
Start Time	9:00	**End Time**	16:00
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	1 of 3
Sky Cover	Clear	**Temp (F)**	81
Wind Direction	S	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717)		
Application Method	Foliar Spray (Backpack)		
Herbicide	Garlon® 3A (triclopyr)		
Herbicide Rate (%)	3	**Total Concentrate**	8 fl oz
Surfactant or Adjuvant (1)	Hel-fire®		
Surfactant/Adjudivant 1 Rate (%)	.5		
Other	Blue Dye		
Other Rate/Amt	1 fl oz z		
Diluent	Water		
Total Solution	2 gal		
Species Controlled	Callery Pear Privet spp. Multiflora Rose		
Area Description	The majority of the site is clear of invasive species. The privet and rose present were small re-sproutes from recent treatments.		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0348

Client	Restoration Systems		
Project SIte	Aycock Springs		
Date	10-28-2016		
Start Time	8:30	**End Time**	16:00
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	1 of 2
Sky Cover	Partly Cloudy	**Temp (F)**	71
Wind Direction	NNW	**Wind Speed**	6-10 mph
Applicators	Grainger Coughtrey (NC 026-34612) Sebastian Kimlinger (NC 026-34613)		
Application Method	Basal Bark		
Herbicide	Garlon® 4 (triclopyr)		
Herbicide Rate (%)	15	**Total Concentrate**	190 fl oz
Surfactant or Adjuvant (1)			
Surfactant/Adjudivant 1 Rate (%)			
Other	Blue Dye		
Other Rate/Amt	1 fl oz		
Diluent	Diesel fuel		
Total Solution	10 gallons		
Species Controlled	Privet spp. Multiflora Rose		
Area Description	Performed a walk through of the site. The previous treatment was effective. This treatment focused on regrowth and missed plants.		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0267

Client	Restoration Systems		
Project SIte	Aycock Spring		
Date	08-17-2016		
Start Time	7:00	**End Time**	13:30
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	3 of 3
Sky Cover	Clear	**Temp (F)**	100
Wind Direction	S	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717)		
Application Method	Basal Bark		
Herbicide	Garlon® 4 (triclopyr)		
Herbicide Rate (%)	20	**Total Concentrate**	300 fl oz
Surfactant or Adjuvant (1)			
Surfactant/Adjudivant 1 Rate (%)			
Other	Blue Dye		
Other Rate/Amt	1 fl oz		
Diluent	Diesel fuel		
Total Solution	12 gallons		
Species Controlled	Privet spp. Tree-of-Heaven Multiflora Rose Sweet Gum		
Area Description	Treated the up stream area of the easement. The density of invasive were moderate. The composed mainly small plants with a few large stems spread throughout.		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0265

Client	Restoration Systems		
Project SIte	Aycock Spring		
Date	08-17-2016		
Start Time	7:30	**End Time**	13:30
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	1 of 3
Sky Cover	Clear	**Temp (F)**	97
Wind Direction	S	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717) Grainger Coughtrey Sebastian Kimlinger		
Application Method	Cut and Stump Spray		
Herbicide	Garlon® 3A (triclopyr)		
Herbicide Rate (%)	50	**Total Concentrate**	128 fl oz
Surfactant or Adjuvant (1)			
Surfactant/Adjudivant 1 Rate (%)			
Other			
Other Rate/Amt			
Diluent	Water		
Total Solution	2 gallons		
Species Controlled	Callery Pear Privet spp. Multiflora Rose		
Area Description	Treated the up stream area of the easement. The density of invasive were moderate. The composed mainly small plants with a few large stems spread throughout.		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0469

Client	Restoration Systems		
Project SIte	Aycock Springs		
Date	09-05-2017		
Start Time	9:00	**End Time**	16:00
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	2 of 2
Sky Cover	Clear	**Temp (F)**	81
Wind Direction	S	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717) Grainger Coughtrey (NC 026-34612) Sebastian Kimlinger (NC 026-34613)		
Application Method	Foliar Spray (Backpack)		
Herbicide	Refuge® (glyphosate)		
Herbicide Rate (%)	5	**Total Concentrate**	78 fl oz
Surfactant or Adjuvant (1)	Hel-fire®		
Surfactant/Adjudivant 1 Rate (%)	.5		
Other			
Other Rate/Amt			
Diluent	Water		
Total Solution	12 gallons		
Species Controlled	Privet spp. Multiflora Rose		
Area Description	Large amount of privet in back corner of site, some small invasives near the stream		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0349

Client	Restoration Systems		
Project SIte	Aycock Springs		
Date	10-28-2016		
Start Time	14:00	**End Time**	16:00
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	2 of 2
Sky Cover	Clear	**Temp (F)**	71
Wind Direction	NNW	**Wind Speed**	6-10 mph
Applicators	Grainger Coughtrey (NC 026-34612) Sebastian Kimlinger (NC 026-34613)		
Application Method	Foliar Spray (Backpack)		
Herbicide	Roundup® Custom (glyphosate)		
Herbicide Rate (%)	3	**Total Concentrate**	16 fl oz
Surfactant or Adjuvant (1)	Hel-fire®		
Surfactant/Adjudivant 1 Rate (%)	.5		
Other	Blu Dye		
Other Rate/Amt	1 fl oz		
Diluent	Water		
Total Solution	4 gallons		
Species Controlled	Privet spp. Multiflora Rose		
Area Description	Foliar treated saplings that were too small to basal bark. Overall the site has improved since last treatment.		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0398

Client	Restoration Systems		
Project SIte	Aycock Springs		
Date	04-06-2017		
Start Time	12:30	**End Time**	14:30
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	2 of 2
Sky Cover	Cloudy	**Temp (F)**	61
Wind Direction	W	**Wind Speed**	11-15mph
Applicators	Sebastian Kimlinger (NC 026-34613)		
Application Method	Foliar Spray (Backpack)		
Herbicide	Roundup® Custom (glyphosate)		
Herbicide Rate (%)	5	**Total Concentrate**	20 fl oz
Surfactant or Adjuvant (1)	Hel-fire®		
Surfactant/Adjudivant 1 Rate (%)	.5		
Other			
Other Rate/Amt			
Diluent	Water		
Total Solution	3 gallons		
Species Controlled	Privet spp. Multiflora Rose		
Area Description			
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0263

Client	Restoration Systems		
Project SIte	Aycock Springs		
Date	08-16-2016		
Start Time	15:00	**End Time**	17:30
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	1 of 2
Sky Cover	Clear	**Temp (F)**	100
Wind Direction	SW	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717) Grainger Coughtrey (NC 026-34612) Sebastian Kimlinger (NC 026-34613)		
Application Method	Basal Bark		
Herbicide	Garlon® 4 (triclopyr)		
Herbicide Rate (%)	20	**Total Concentrate**	32 fl oz
Surfactant or Adjuvant (1)			
Surfactant/Adjudivant 1 Rate (%)			
Other	Blue Dye		
Other Rate/Amt	1 fl oz		
Diluent	Diesel fuel		
Total Solution	2 gallons		
Species Controlled	Privet spp. Multiflora Rose		
Area Description	Treated the up stream area of the easement. The density of invasive were moderate. The composed mainly small plants with a few large stems spread throughout.		
Additional Comments			

Carolina Silvics, Inc. Pesticide Application Log

CarSilv - 0266

Client	Restoration Systems		
Project SIte	Aycock Spring		
Date	08-17-2016		
Start Time	7:00	**End Time**	12:00
Only PAL for Site for This Day?	No	**If NO, this is PAL # of ##**	2 of 3
Sky Cover	Clear	**Temp (F)**	97
Wind Direction	S	**Wind Speed**	1-5 mph
Applicators	Joshua G Merritt (NC 026-33717) Grainger Coughtrey (NC 026-34612) Sebastian Kimlinger (NC 026-34613)		
Application Method	Foliar Spray (Backpack)		
Herbicide	Garlon® 3A (triclopyr)		
Herbicide Rate (%)	3	**Total Concentrate**	4 fl oz
Surfactant or Adjuvant (1)	Hel-fire®		
Surfactant/Adjudivant 1 Rate (%)	0.5		
Other			
Other Rate/Amt			
Diluent	Water		
Total Solution	1 gallon		
Species Controlled	Privet spp.		
Area Description	Treated small privet (waste high and lower.)Treated the up stream area of the easement. The density of invasive were moderate. The composed mainly small plants with a few large stems spread throughout.		
Additional Comments			