

Mitigation Project Name Junea Branch
 DMS ID 95927
 River Basin Little Tennessee
 Cataloging Unit 06010203

County Jackson
 Date Project Initiated 7/14/2011
 Date Prepared 6/16/2018

USACE Action ID 2012-01101
 NCDWR Permit No 2012-0748

Credit Release Milestone	Stream Credits					Wetland Credits								
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riparian	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Date (Wetland)
Potential Credits (Mitigation Plan)				3,093,000										
Potential Credits (As-Built Survey)				3,182,000										
Potential Credits (IRT Approved)				3,093,000										
1 (Site Establishment)	N/A				N/A	N/A					N/A		N/A	N/A
2 (Year 0 / As-Built)	30%			848,000	2014	6/22/2014					30%		N/A	N/A
3 (Year 1 Monitoring)	10%			318,000	2015	4/25/2016					10%		N/A	N/A
4 (Year 2 Monitoring)	10%			318,000	2016	4/25/2018					10%		N/A	N/A
5 (Year 3 Monitoring)	10%			309,300	2017	8/8/2017					20%		N/A	N/A
IRT Adjustment				(84,000)										
6 (Year 4 Monitoring) - NOT RELEASED	10%			309,300	2018	N/A Released					10%		N/A	N/A
7 (Year 5 Monitoring)	15%				2018						15%		N/A	N/A
Stream Bankfull Standard	15%			483,000	2017	8/8/2017					N/A		N/A	N/A
Total Credits Released to Date				2,319,750										

*NOTE: Adjustment required due to IRT concerns on how the as-built credits were calculated
 **NOTE: IRT concerned about potential credits associated with Darts Branch and Higdon Branch and decided to hold releasing Year 4 Monitoring credits.

DEBITS (released credits only)

	Rates	1	1.5	2.5	5	1	3	2	5	1	3	2	5	1	3	2	5	
		Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull	Stream Bankfull
IRT Adjusted As-Built Amounts (feet and acres)		3,093,000																
IRT Adjusted As-Built Amounts (mitigation credits)		3,093,000																
Percentage Released		75.00%																
Released Amounts (feet / acres)		2,319,750																
Released Amounts (credits)		2,319,750																
NCDWR Permit / USACE Action ID / Project Name																		
2003-1502 / 2004-30200 / ConMat																		
1998-1130 / 1998-31148 / Highlands Cove																		
SR 1120 - Bridge 298 - Division 14																		
SR 1387 - Bridge 141 - Division 14																		
SR 1700 Improvements - Division 14																		
2013-00891 / SR 1700 Improvements - Division 14																		
NC DOT TIP R-5000 (SCC Connector from NC 116 to NC 107)																		
2012-01068 / NC 107																		
1998-1130 / 1998-31148 / Highlands Cove																		
NC DOT TIP R-5000 (SCC Connector from NC 116 to NC 107)																		
2012-01068 / NC 107																		
SR 1303 - Division 14, Jackson County																		
2008-02746-350 / Jackson County																		
SR 1400 - Division 14, Jackson County																		
2008-40607-350 / Jackson County																		
SR 1400 - Division 14, Jackson County																		
2008-40607-350 / Jackson County																		
1998-1130 / 1998-31148 / Highlands Cove																		
SR 1757 Improvements - Division 14, Jackson Co																		
2007-01485-357 / Division 14, Jackson Co																		
SR 1163 - Bridge 138 - Division 14 (B-6496)																		
2015-02266 / SR 1750 Improvements - Division 14																		
SR 1750 Improvements - Division 14																		
2015-01874 / Division 14																		
1998-1130 / 1998-31148 / Highlands Cove																		
SR 1552 - Bridge 55 - Division 14, Jackson County																		
2017-00889 / Division 14, Jackson County																		
Remaining Amounts (feet / acres)																		
Remaining Amounts (credits)																		

Contingencies (if any): None

Signature of Wilmington District Official Approving Credit Release

9/6/18
Date

1 - For DMS, no credits are released during the first milestone
 2 - For DMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCEEP Portal, provided the following criteria have been met:

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

3 - A 15% reserve of credits is to be held back until the bankfull event performance standard has been met

Annual Monitoring Report

Monitoring Year 5 of 5

FINAL

Project Name: Junes Branch Stream Restoration

NCDMS Contract No.: 003979

NCDMS Project No.: 95027

USACE Permit Action ID: 2012-01101

DWR Project No.: 20120748

Jackson County, NC

Data Collected: January 2018 - December 2018

Date Submitted: January 2019



Submitted to:

North Carolina Division of Mitigation Services

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



302 Jefferson Street, Suite 110
Raleigh, NC 27605

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

January 31, 2019

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

RE: Junes Branch Stream Restoration Site: MY5 Monitoring Report (NCDMS ID 95027)

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

On January 3, 2019, the Division of Mitigation Services (DMS) received the DRAFT Monitoring Year 5 report for the Junes Branch Stream Restoration site from Resource Environmental Solutions, LLC (RES). The report establishes the year 5 monitoring conditions at the site. Anticipated mitigation on the site includes 3,093 linear feet of stream restoration for a total of 3,093 Stream Mitigation Units (SMUs) (R).

General: Per RFP 16-003573 (Task 11), the final project invoice should be submitted once the IRT closeout process is complete. The final invoice should reflect the final credits approved by the IRT at project closeout.

[Noted.](#)

General: RES may want to consider adding containerized plants along Doris and Higdon Branch in the dormant season to accelerate stream shading and channel development along the reaches prior to project closeout.

[RES plans to add containerized trees to both banks of Doris and Higdon Branch before the start of the growing season in 2019. This has been added to the report.](#)

Table 5 (Doris Branch and Higdon Branch): The table currently indicates that both reaches are 100% stable and performing as intended. The cross sections and longitudinal profiles indicate aggradation on both reaches over the monitoring term. Please review, confirm the assessment and update the report if necessary.

[The aggradation issue on Doris Branch and Higdon Branch has stabilized in MY5 and has improved in some areas especially when compared to MY3 and MY4. Despite an increase in bed elevation, both reaches still maintain riffles and pools. Based on this data, RES proposes credits be released in full for these two reaches.](#)

Table 13: Please add the 2018 bankfull event noted in the report text (wrack lines) to the table.

[Done.](#)

Prepared by:



302 Jefferson Street, Suite 110
Raleigh, North Carolina 27605

Contents

1.0	Project Summary	5
1.1.	Goals and Objectives	5
1.2.	Success Criteria.....	5
1.3.	Project Setting and Background.....	7
1.4.	Project Approach	7
1.5.	Project Performance.....	7
2.0	Methods.....	9
3.0	References.....	10

Appendices

Appendix A. General Tables and Figures

Table 1. Project Components and Mitigation Credits
Table 2. Project Activity and Reporting History
Table 3. Project Contacts
Table 4. Project Information
Figure 1. Vicinity Map

Appendix B. Visual Assessment Data

Figures 2. Current Conditions Plan View Map
Table 5. Visual Stream Morphology Stability Assessment
Table 6. Vegetation Condition Assessment
2018 Photo Station Photos

Appendix C. Vegetation Plot Data

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

Appendix D. Stream Geomorphology Data

Table 10a. Dimensional Morphology Summary
Table 10b. Stream Reach Data Summary
Cross Section Plots
Pebble Count Data
Table 11. Pebble Count Data Summary
Charts 1-6. MY5 Stream Reach Substrate Composition Charts

Appendix E. Hydrology Data

Table 12. Verification of Bankfull Events
Photo Verification of Bankfull Events
Table 13. 2018 Rainfall Summary

Appendix F. Memorandum

Junes Branch IRT Site Visit on 4/18/2017 Meeting Summary

1.0 PROJECT SUMMARY

1.1. Goals and Objectives

The project goals address stressors identified in the Targeted Local Watershed (TLW) and include the following:

- Improve water quality within the restored channel reaches and downstream watercourses through:
 - reducing turbidity by stabilizing existing stream banks and altering stream channel dimension, pattern and profile
 - reducing nutrient loads and fecal coliform bacteria from adjacent agricultural fields by fencing the riparian area to keep livestock out of the stream and restoring a wooded riparian buffer
- Improve local aquatic and terrestrial habitat and diversity within the restored channels and their vicinity through:
 - reducing water temperatures by planting native vegetation in the riparian zone and creating shade
 - improving habitat complexity by restoring the stream profile to stable riffle/pool and step/pool complexes
 - improving terrestrial habitat by excluding livestock and creating a riparian buffer comprised of native plant species
 - improving aquatic habitat by establishing tree canopy to provide organic material such as woody debris and leaf packs to stream
 - removing invasive exotic species and planting native vegetation in the riparian buffer
- Improve flood flow attenuation on-site and downstream through:
 - raising the bed or creating bankfull benches to allow for overbank flows every 1-2 years and improve the connection to the active floodplain.

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

- Restore stable channel morphology and proper sediment transport capacity.
- Create and improve stream bed form and improve aquatic and benthic macroinvertebrate habitat.
- Reconnect the stream to the historic floodplain or construct a floodplain bench that is accessible at the proposed bankfull channel elevation.
- Improve channel and stream bank stabilization by integrating in-stream structures and native bank vegetation.
- Provide riparian buffer restoration by establishing a native forested and herbaceous riparian buffer plant community with a minimum width of 30 feet from the edge of the restored channels. This new community will be established in conjunction with the eradication of any existing exotic or undesirable plant species.

1.2. Success Criteria

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

1.2.1. Morphological Parameters and Channel Stability

Restored and enhanced streams shall be in compliance with the standards set forth in the USACE 2003 Stream Mitigation Guidelines and should demonstrate morphologic stability to be considered successful. Stability does not equate to an absence of change, but rather to sustainable rates of change or stable patterns of variation. Restored streams often demonstrate some level of initial adjustment in the several months that follow construction and some change/variation subsequent to that is also to be expected. However, the observed change should not be unidirectional such that it represents a robust trend. If some trend is evident, it should be very modest or indicate migration to a stable form.

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

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

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

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

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

1.2.2. Vegetation

Riparian vegetation monitoring shall be conducted for a minimum of five years to ensure that success criteria are met per USACE (2003) guidelines. Accordingly, success criteria will consist of a minimum survival of 320 stems per acre by the end of the Year 3 monitoring period and a minimum of 260 stems per acre at the end of Year 5. If monitoring indicates either that the specified survival rate is not being met or the development of detrimental conditions (i.e., invasive species, diseased vegetation), appropriate corrective actions will be developed and implemented.

1.3. Project Setting and Background

The Junes Branch Restoration Site (Site) is located in central Jackson County approximately 2 miles east of Sylva, NC (**Figure 1**). The site encompasses 5.8 acres of formerly agricultural land and includes portions of Bumgarner Branch and three unnamed tributaries that, for purposes of the project, are referred to as Junes Branch, Higdon Branch, and Doris Branch. The Site is located within the Little Tennessee River Basin, United States Geological Survey (USGS) 14-digit Hydrologic Unit 06010203020010, and the North Carolina Division of Environmental Quality (NCDEQ) sub basin 04-04-02. The site watershed is characteristic of the Blue Ridge region with moderate rainfall with annual precipitation averaging 52.9 inches. Elevation within the site ranges from 2,200 feet at the northwestern extent, to 2,150 feet along Junes Branch. The drainage area of Bumgarner Branch at the downstream end of the Site is 1.03 square miles (668 acres). Land use within the watershed is predominately forested (68%) with the remaining land use composed of low-density residential (21%) and agricultural (11%). Additional information regarding project setting and background is found in the Final Mitigation Plan (EBX 2013).

Following 2016 monitoring the NCIRT requested a review of the differential between the Approved Mitigation Plan and Baseline Monitoring Report. The table below details the discrepancies by reach. The cause of increased baseline SMUs is construction field adjustments and survey methodology (thalweg vs. centerline). The Mitigation Plan lengths were based on centerline. Credits have reverted to the Approved Mitigation Plan: 3,093 SMUs.

Reach	Mitigation Type*	Proposed Length (LF)	Mitigation Ratio	Proposed SMUs	Baseline SMUs
Bumgarner Branch 1	P1 Restoration	594	1:1	594	631
Bumgarner Branch 2	P1 Restoration	476	1:1	476	501
June's Branch	P1 Restoration	1,319	1:1	1,319	1,374
Higdon Branch	P1 Restoration	422	1:1	422	376
Doris Branch	P1 Restoration	282	1:1	282	280
Total		3,093		3,093	3,162

*P1=Priority 1

**The contracted amount of credits for this Site is 3,000 SMUs

1.4. Project Approach

Channel restoration involving improved pattern, dimension, and longitudinal profile was completed on all four stream reaches. A Priority I approach was applied to all four reaches of the project (Rosgen 1996; NCSRI 2004).

1.5. Project Performance

Monitoring Year 5 (MY5) data was collected from January 2018 to December 2018. Monitoring included the following activities: visual assessment of all reaches and the surrounding easement, collection of photos at 14 permanent photo stations, documentation of eight permanent vegetation monitoring plots, surveying of 3,050 feet of longitudinal profile and 15 cross-sections, and conducting pebble counts at eight riffles.

Generally, visual assessment of the project indicates that the streams are performing as desired and vegetation is well established throughout the easement. Summary tables and photos taken at the permanent photo stations associated with the visual assessment are presented in **Appendix B**. Visual assessment of the stream was performed to document signs of instability, such as eroding banks, in-stream structural instability, or excessive sedimentation. Excessive sedimentation was observed on Higdon and Doris Branch throughout the monitoring period but has improved/stabilized in MY5. This is discussed further in the next

paragraph and in Section 1.5.2. Structures are intact and performing as designed. Herbaceous vegetation has become well established in both the wetland fringes along the stream as well as upland areas. Planted stems are well established. The small bare area reported in previous years has continued to stabilize with herbaceous vegetation and is no longer considered a problem area.

In April of 2017, RES and the IRT met to discuss the sediment aggradation noted on Doris Branch and Higdon Branch. On Higdon Branch, the IRT agreed there was sediment aggradation but a defined channel was present. No maintenance, remedial actions or credit deductions were requested. On Doris Branch, however, the sedimentation had diminished the distinct channel features. The IRT requested no specific maintenance and recommended a final decision on crediting be made after additional monitoring. The IRT also noticed that overall Junes Branch has a high sediment load but concluded that it appeared to be maintaining appropriate geomorphology. The meeting summary is documented in **Appendix F**. The sediment aggradation was observed again on these reaches at the end of MY4. In July 2018, RES performed light maintenance on Higdon and Doris Branch by treating the vegetation in the channels with aquatic safe herbicide and mechanically removing the dead vegetation from the channels. The goal is by removing the vegetation in the channels, the trapped sediment will be free to move down the system.

Summary information and data related to the occurrence of items such as beaver activity or easement encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report (formerly the Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on NCDMS' website (<http://deq.nc.gov/about/divisions/mitigation-services>). All raw data supporting the tables and figures in the appendices is available from NCDMS upon request.

1.5.1. Vegetation

Monitoring of eight permanent vegetation plots was completed during October 2018. Summary tables and photographs associated with MY5 monitoring can be found in **Appendix C**. With the exception of Plot 2, MY5 monitoring data indicates that all vegetation monitoring plots met the MY5 interim success criteria of 260 planted stems per acre. Low planted stem densities at Plot 2 can be attributed to a large density of recruited black willows (*Salix nigra*) outcompeting the planted stems; however, the surviving five trees in Plot 2 average eight feet tall. While Plot 2 is not meeting interim success criteria for planted stems, with recruits, the stem density is 18,413 stems/ acre, far exceeding the MY5 interim success criteria of 260 stems per acre. Six species were documented in the plots as volunteers. Planted stem densities among the plots ranged from 202 to 850 planted stems per acre with a mean of 531 stems per acre across all plots. When volunteer stems are included, densities ranged between 567 and 18,413 total stems per acre with a mean of 3,278 stems per acre across all plots. The estimated average stem height was 7.7 feet. No invasive species were observed in the easement in MY5. An invasive species treatment, however, was conducted in July 2018 along the edge of the easement where invasive species were beginning to grow back towards the easement area.

1.5.2. Stream Geomorphology

Geomorphic data for MY5 was collected in December 2018. Cross-section plots, longitudinal profiles, and summary tables related to stream morphology are in **Appendix D**. The MY5 stream morphology data indicate that, in general, streams are stable. Cross-section and longitudinal profile data suggests that Higdon Branch and Doris Branch have aggraded in a few areas but overall have improved or stabilized since MY4. As for Bumgarner Branch and Junes Branch, several small changes were noted in the cross-section dimensions and longitudinal profile; however, these are minor and do not exceed expected adjustments in

channel form. One area on Junes Branch (about 28 feet) shows aggradation about 6 inches higher than previous years at Cross Section 6. As discussed at the April 2017 site visit, Junes Branch is a high sediment load system and RES expects this sediment to continue to move through the system as the issue is at the top of the reach, close to the unprotected segment of the reach. Starting in MY5, all dimensional parameters including BHR, were calculated on riffles using the baseline cross sectional area. None of the riffle cross sections exceeded a 1.2 BHR.

MY5 substrate monitoring was performed in December 2018 (**Table 12 & Charts 1-6**). The pebble counts fell into the medium gravel range for Bumgarner I, small cobble for Bumgarner II, and medium gravel for Junes Branch. Pebble counts remained in the silt/clay range for both the Higdon and Doris Branches.

Overall, shifts in stream morphology between MY4 and MY5 were within the normal range. The project has met success criteria regarding stable dimension and profile as well as substrate and sediment transport. As for Higdon and Doris Branch, per MY5 data, the aggradation issue has stabilized and even improved in some areas especially when compared to MY3 and MY4. Despite an increase in bed elevation both reaches still maintain riffles and pools. RES will continue to apply the same maintenance as 2018 up until the closeout site visit and plans on planting containerized trees along the banks of Higdon and Doris Branch in early 2019. The IRT recommended a final decision on crediting be made after the monitoring period.

1.5.3. Stream Hydrology

Stream hydrology was documented utilizing manual crest gauges to record bankfull events (**Table 13**). No manual crest gauge readings were recorded in MY5, but wrack lines were observed throughout the site during the December 2018 field work. Over the five-year monitoring period Bumgarner II recorded one crest gauge reading in 2015 and two in 2016; and Junes Branch recorded one reading in 2016 and two in 2017.

2.0 METHODS

Visual assessment of the Junes Branch restoration site was performed during each site visit throughout the monitoring period. Permanent photo station photos were collected during the initial visual assessment. Vegetation or stream problem areas occurring outside of the monitoring stations were documented with additional photographs.

Geomorphic measurements were taken during low flow conditions using a Topcon GTS-312 Total Station. Three-dimensional coordinates associated with cross-sections and longitudinal profiles were collected in the field and geo-referenced (NAD83 State Plane feet FIPS 3200). Morphological data was limited to 15 cross-sections, and 3,050 feet of longitudinal profile. Survey data were imported into CAD, ArcGIS®, and Microsoft Excel® for data processing and analysis. Channel substrate was characterized using a Wolman Pebble Count outlined in the Harrelson et al (1994) and processed using Microsoft Excel.

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

Precipitation data were collected using an Onset® HOBO® Data Logging Rain Gauge. Bankfull events were documented with crest gauges. During quarterly visits to the site, the height of the corkline was recorded and cross-referenced with known bankfull elevations at each crest gauge.

3.0 REFERENCES

- EBX (Environmental Banc and Exchange). 2013. Junes Branch Stream Restoration, Final Mitigation Plan, Jackson County, North Carolina. NCEEP Project No. 95027.
- Harrelson, Cheryl, C. Rawlins and J. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Gen. Tech. Rep. RM-245. Rocky Mountain Forest and Range Experiment Station. USDA Forest Service. Fort Collins, Colorado
- Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. <http://cvs.bio.unc.edu/methods.htm>.
- NCSRI (North Carolina Stream Restoration Institute). 2004. Stream Restoration: A Natural Channel Design Handbook. North Carolina Stream Restoration Institute and North Carolina Sea Grant. Raleigh. <http://www.bae.ncsu.edu/programs/extension/wqg/srp/guidebook.html>
- Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.
- USACE (U.S. Army Corps of Engineers). 2003. Stream Mitigation Guidelines. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, North Carolina Wildlife Resources Commission, North Carolina Department of Environment and Natural Resources-Division of Water Quality. Wilmington District.

Appendix A

General Tables and Figures

Table 1. Project Components and Mitigation Credits

Table 2. Project Activity and Reporting History

Table 3. Project Contacts

Table 4. Project Information

Figure 1. Vicinity Map

**Table 1. Project Components and Mitigation Credits
Junes Branch / Project Number 95027**

Mitigation Credits									
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen	Phosphorous Nutrient
	R	RE	R	RE	R	RE		Nutrient Offset	Offset
Type	R	RE	R	RE	R	RE			
Totals	3,093	-	-	-	-	-	-	-	-
Project Components									
Project Component -or- Reach ID	Stationing/Location	Existing Footage/Acreage	Approach		Restoration -or- Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio		
			(PI, PII etc.)						
Bumgarner Branch I	100+37 - 107+27	610	PI		R	594	1:1		
Bumgarner Branch II	107+27 - 112+50	550	PI		R	476	1:1		
June's Branch	200+97 - 215+15	1,311	PI		R	1,319	1:1		
Higdon Branch	300+46 - 304+08	530	PI		R	422	1:1		
Doris Branch	400+00 - 402+37	260	PI		R	282	1:1		
Component Summation									
Restoration Level	Stream	Riparian Wetland		Non-riparian Wetland		Buffer	Upland		
	(linear feet)	(acres)		(acres)		(square feet)	(acres)		
		Riverine	Non-Riverine						
Restoration	3,093	-	-	-	-	-	-	-	
Enhancement	-	-	-	-	-	-	-	-	
Enhancement I	-	-	-	-	-	-	-	-	
Enhancement II	-	-	-	-	-	-	-	-	
Creation	-	-	-	-	-	-	-	-	
Preservation	-	-	-	-	-	-	-	-	
High Quality Preservation	-	-	-	-	-	-	-	-	
BMP Elements									
Element	Location	Purpose/Function				Notes			
FB	Entire Site	Protect Stream							

¹BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer

Note: Stream credit calculations were originally calculated along the as-built thalweg. Based on the April 3, 2017 IRT Credit Release Meeting, these stream credits have been reverted back to the amounts in the IRT approved mitigation plan

Table 2. Project Activity and Reporting History**Junes Branch / Project Number 95027**

Activity or Report	Data Collection Complete	Completion or Delivery
Mitigation Plan	Aug-12	Apr-13
Final Design - Construction Plans	-	Apr-13
Construction	-	Jun-14
Temporary S&E Mix Applied to Entire Project Area		May-14
Permanent Seed Mix Applied		May-14
Containerized and B&B Plantings		May-14
Baseline Monitoring Document (Year 0 Monitoring - Baseline)	Jul-14	Jul-14
Year 1 Invasive Species Treatment	-	Oct-14
Year 1 Monitoring	Jan-15	Feb-15
Year 2 Monitoring	Nov-15	Nov-15
Year 3 Monitoring	Dec-16	Dec-16
Year 4 Monitoring	Vegetation: Oct-17 Stream: Nov-17	Jan-18
Year 5 Invasive Species and Stream Vegetation Treatment	---	Jul-18
Year 5 Monitoring	Vegetation: Oct-18 Stream: Dec-18	Dec-18

Table 3. Project Contacts	
Junes Branch Stream Restoration Site – Project # 95027	
Prime Contractor	Resource Environmental Solutions, LLC 302 Jefferson St., Suite 110 Raleigh, North Carolina 27605 Brian Hockett (919) 209-1061
Designer	Wolf Creek Engineering 12-1/2 Wall St., Suite C Asheville, North Carolina 28801 Grant Ginn (828) 449-1930 ext 102
Construction Contractor	Northstate Environmental 2889 Lowery Street Winston Salem, North Carolina 27101 Darrell Westmoreland (336) 725-2010
Planting Contractor	Northstate Environmental 2889 Lowery Street Winston Salem, North Carolina 27101 Darrell Westmoreland (336) 725-2010
As-built Surveys	Kee Mapping and Surveying PO Box 2566 Asheville, North Carolina 28802 Phillip B. Key (828) 575-9021
Seeding Mix Source	Green Resource 5204 Highgreen Court Colfax, North Carolina 27235 (336) 855-6363
Bare Root Seedlings	Dykes & Son Nursery 825 Maude Etter Road McMinnville, Tennessee (931) 668-8833
Live Stakes	Foggy Mountain Nursery 797 Helton Creek Road Lansing, North Carolina 28643 (336) 384-5323
Monitoring Performers (Y0-MY3) 2014 - 2016	Equinox 37 Haywood St. Asheville, North Carolina 28801 Drew Alderman (828) 253-6856
Monitoring Performers (Y4-MY5) 2017-2018	Resource Environmental Solutions, LLC 302 Jefferson St., Suite 110 Raleigh, North Carolina 27605 Ryan Medric (919) 741-6268

Table 4. Project Baseline Information and Attributes

Junes Branch Stream Restoration Site – Project # 95027

Project Information

Project Name	Junes Branch
County	Jackson County
Project Area (acres)	5.8 ac.
Project Coordinates (latitude and longitude)	35.357378° N; 83.191391° W

Project Watershed Summary Information

Physiographic Province	Blue Ridge		
River Basin	Little Tennessee		
USGS Hydrologic Unit 8-digit	06010203	USGS Hydrologic Unit 14-digit	6010203020010
DWQ Sub-basin	4/4/2002		
Project Drainage Area (acres)	668		
Project Drainage Area Percentage of Impervious Area	<5%		
CGIA Land Use Classification	2.01.03 Hay and Pasture Land		

Reach Summary Information

Parameters	Bumgarner Br. I	Bumgarner Br. II	Junes Br.	Higdon Br.	Doris Br.
Length of reach (linear feet)	610	550	1,311	530	260
Valley classification (Rosgen)	II	II	II	II	II
Drainage area	0.93	1.03	0.23	0.08	0.01
NCDWQ stream identification score	40	40	38	38	29.5
NCDWQ Water Quality Classification	C	C	-	-	-
Morphological Description (stream type) (Rosgen)	E	G	G	E	G
Evolutionary trend (Rosgen)	C	F	F	E	G
Underlying mapped soils	CwA, WtB	CwA, WtB	WtB	CwA	CwA
Drainage class	Somewhat Poorly Drained- Mod. Well Drained	Somewhat Poorly Drained- Mod. Well Drained	Mod. Well Drained	Somewhat Poorly Drained	Somewhat Poorly Drained
Soil Hydric status	Non-Hydric	Non-Hydric	Non-Hydric	Non-Hydric	Non-Hydric
Slope	2.20%	2.20%	2.30%		
FEMA classification	N/A	N/A	N/A	N/A	N/A
Native vegetation community	Agricultural	Agricultural	Agricultural	Agricultural	Agricultural
Percent composition of exotic invasive vegetation	30%	30%	30%	40%	40%

Wetland Summary Information

Parameters	Wetland 1	Wetland 2
Size of Wetland (acres)	0.03	0.13
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian	Riparian
	Non-Riverine	Non-Riverine
Mapped Soil Series	CwA	CwA
Drainage class	Somewhat Poorly Drained	Somewhat Poorly Drained
Soil Hydric Status	Hydric	Hydric
Source of Hydrology	Seep	Seep
Hydrologic Impairment	None	Dredging/Ditching
Native vegetation community	Scrub-Shrub	Forested
Percent composition of exotic invasive vegetation	2%	42%

Regulatory Considerations

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States – Section 404	Yes	Resolved	Action ID #2012-01101
Waters of the United States – Section 401	Yes	Resolved	NCDWR Project # 20120748
Endangered Species Act	No	Yes	ERTR
Historic Preservation Act	No	Yes	ERTR
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	
FEMA Floodplain Compliance	N/A	N/A	
Essential Fisheries Habitat	N/A	N/A	

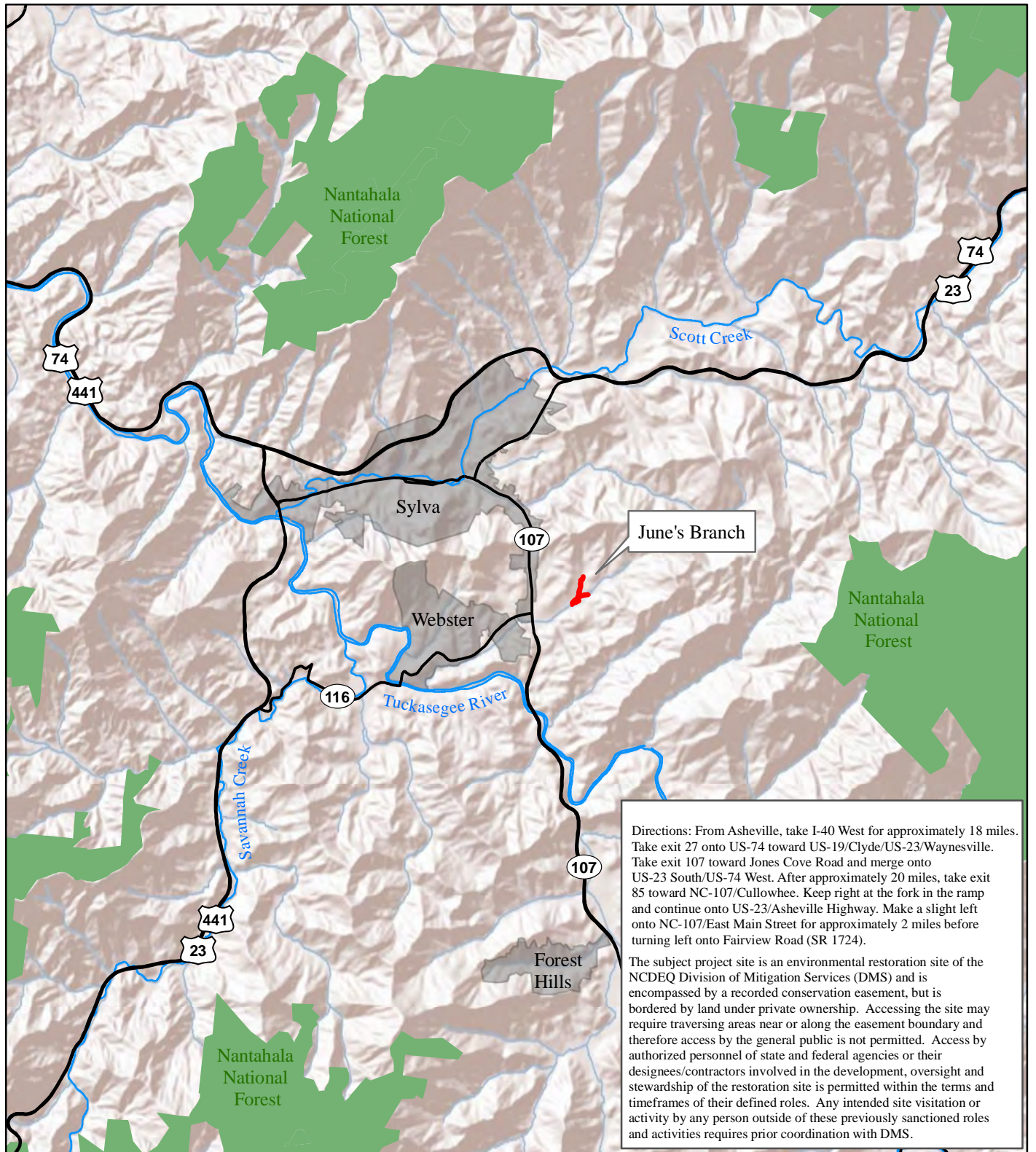
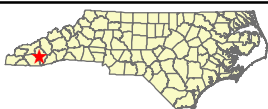


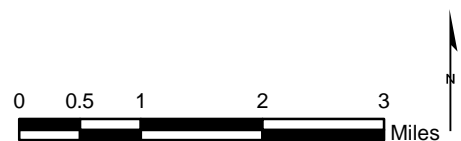
Figure 1: Vicinity Map

June's Branch
Project No. 95027

Jackson County, North Carolina



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



Appendix B

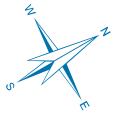
Visual Assessment Data

Figures 2. Current Conditions Plan View Maps

Table 5. Visual Stream Morphology Stability Assessment

Table 6. Vegetation Condition Assessment

2018 Photo Station Photos



1 inch = 150 feet

Figure 2

Junes Branch Stream Restoration Project MY5 2018

Current Conditions Plan View

Date: 12/17/2018

Drawn by: RTM

LEGEND

- Conservation Easement
- Vegetation Plot
- > 260 stems/acre
- < 260 stems/acre
- Stream Restoration
- Cross Section
- Structure
- MY5 SPA
- Long Pro Begin/End
- Rain Gauge
- Photo Station
- Crest Gauge

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill		
	Present			



**Table 5. Visual Stream Morphology Stability Assessment
Junes Branch / Project No. 95027 - Bumgarner Branch I
Assessed Length 631 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation		
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%					
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%					
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	13	13			100%					
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	13			13				100%	
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).		N/A	N/A			N/A					
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	13	13			100%					
		2. Thalweg centering at downstream of meander bend (Glide).	12	12			100%					
2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.					0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.					0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A		
	Totals				0	0	100%	N/A	N/A	N/A		
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	14	14			100%					
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	14	14			100%					
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	14	14			100%					
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	14	14			100%					
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	14	14			100%					

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
 Junes Branch / Project No. 95027 - Bumgarner Branch II
 Assessed Length 543 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	7	7			100%			
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	8	8			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	2	2			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	8	8			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	8	8			100%			
2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
	Totals					0	0	100%	N/A	N/A
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	7	7			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	7	7			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	7	7			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	7	7			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	7	7			100%			

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Junes Branch / Project No. 95027 - Junes Branch
Assessed Length 1,375 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation		
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			1	28	90%					
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%					
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	45	45			100%					
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	45			45				100%	
	4. Thalweg Position	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	N/A	N/A			N/A					
		1. Thalweg centering at upstream of meander bend (Run).	45	45			100%					
		2. Thalweg centering at downstream of meander bend (Glide).	45	45			100%					
2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.					0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.					0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A		
	Totals				0	0	100%	N/A	N/A	N/A		
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	45	45			100%					
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	45	45			100%					
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	45	45			100%					
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	45	45			100%					
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	45	45			100%					

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Junes Branch / Project No. 95027 - Higdon Branch
Assessed Length 376 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation		
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%					
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%					
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	18	18			100%					
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	18			18				100%	
			2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	3			3				100%	
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	18	18			100%					
		2. Thalweg centering at downstream of meander bend (Glide).	18	18			100%					
2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.					0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.					0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A		
	Totals				0	0	100%	N/A	N/A	N/A		
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	15	15			100%					
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	15	15			100%					
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	15	15			100%					
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	15	15			100%					
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	15	15			100%					

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Junes Branch / Project No. 95027 - Doris Branch
Assessed Length 288 feet**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	23	23		100%				
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	23	23		100%				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	N/A	N/A		N/A				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	23	23		100%				
		2. Thalweg centering at downstream of meander bend (Glide).	23	23		100%				
2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
	Totals				0	0	100%	N/A	N/A	N/A
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	23	23		100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	23	23		100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	23	23		100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	23	23		100%				
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	23	23		100%				

**Table 6. Vegetation Condition Assessment
Junes Branch / Project No. 95027**

Planted Acreage: 5.81					
Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	N/A	0	0.00	0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	N/A	0	0.00	0%
Totals			0	0.00	0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	N/A	0	0.00	0%
Cumulative Totals			0	0.00	0%
Easement Acreage: 5.81					
Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	N/A	0	0.00	0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	N/A	0	0.00	0%

N/A - Item does not apply.

MY5 2018 Photo Station Photos



Junes Branch – Permanent Photo Station 1
Station 202+60 – Downstream



Junes Branch – Permanent Photo Station 1
Station 202+60 – Upstream



Junes Branch – Permanent Photo Station 2
Station 206+30 – Downstream



Junes Branch – Permanent Photo Station 2
Station 206+30 – Upstream



Junes Branch – Permanent Photo Station 3
Looking South/Downstream Junes Branch



Junes Branch – Permanent Photo Station 3
Looking North/Upstream – Upstream



Junes Branch – Permanent Photo Station 4
Station 210+60 – Downstream



Junes Branch – Permanent Photo Station 4
Station 210+60 – Upstream



Junes Branch – Permanent Photo Station 5
Station 211+10 – Upstream



Junes Branch – Permanent Photo Station 6
Station 214+00 – Downstream



Junes Branch – Permanent Photo Station 6
Station 214+00 – Upstream



Bumgarner Branch I – Permanent Photo Station 7
Station 100+21 – Downstream



Bumgarner Branch I – Permanent Photo Station 8
Station 102+70 – Downstream



Bumgarner Branch I – Permanent Photo Station 8
Station 102+70- Upstream



Bumgarner Branch I – Permanent Photo Station 9
Station 105+25 – Downstream



Bumgarner Branch I – Permanent Photo Station 9
Station 105+25 – Upstream



Bumgarner Branch I – Permanent Photo Station 10
Looking Upstream from Confluence with Junes Branch



Junes Branch – Permanent Photo Station 10
Looking Upstream from Confluence with Bumgarner Branch



Bumgarner Branch II – Permanent Photo Station 11
Looking Upstream from Confluence with Higdon Branch



Higdon Branch – Permanent Photo Station 11
Looking Upstream from Confluence with Bumgarner Branch II



Bumgarner Branch II – Permanent Photo Station 12
Looking Upstream from Confluence with Doris Branch



Doris Branch – Permanent Photo Station 12
Looking Upstream from Confluence with Bumgarner Branch II



Higdon Branch – Permanent Photo Station 13
Station 302+80 – Downstream



Higdon Branch – Permanent Photo Station 13
Station 302+80 – Upstream



Doris Branch – Permanent Photo Station 14
Station 400+00 – Downstream



Doris Branch – General Conditions



Doris Branch – General Conditions



Higdon Branch – General Conditions

Appendix C

Vegetation Plot Data

Table 7. Vegetation Plot Mitigation Success Summary

Table 8. CVS Vegetation Metadata

Table 9. Total Planted Stem Counts

Vegetation Plot Photos

Table 7. Vegetation Plot Criteria Attainment

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Stem Height (ft)
1	607	202	809	Yes	5.0
2	202	18211	18413	No	7.9
3	364	2671	3035	Yes	11.7
4	405	324	728	Yes	5.2
5	324	243	567	Yes	5.5
6	850	121	971	Yes	5.4
7	728	81	809	Yes	10.1
8	769	121	890	Yes	10.2
Project Avg	531	2747	3278	Yes	7.7

Table 8. CVS Vegetation Metadata

Junes Branch Stream and Wetland Restoration Site	
Report Prepared By	Ryan Medric
Date Prepared	10/6/2018 0:00
database name	Junes Branch_MY5_2018.mdb
database location	C:\Users\rmedric\Dropbox (RES)\@RES Projects\North Carolina\Junes Branch\Monitoring\Monitoring Data\MY5_2018\Vegetation Data
computer name	D4V0KGH2
file size	61837312
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	95027
project Name	Junes Branch
Description	
River Basin	Little Tennessee
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	8

Table 9. Total Planted Stem Counts

Junes Branch			Current Plot Data (MY5 2018)																							
Scientific Name	Common Name	Species Type	95027-01-0001			95027-01-0002			95027-01-0003			95027-01-0004			95027-01-0005			95027-01-0006			95027-01-0007			95027-01-0008		
			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 rubrum	red maple	Tree																								
Alnus serrulata	hazel alder	Shrub															8	8	8	4	4	4	1	1	1	
Betula nigra	river birch	Tree	4	4	4					4	2	2	2	2	2	3	1	1	2	3	3	3				
Carpinus caroliniana var.	Coastal American Ho	Tree																								
Carya ovata	shagbark hickory	Tree																								
Cornus amomum	silky dogwood	Shrub																								
Cornus florida	flowering dogwood	Tree																								
Diospyros virginiana	common persimmon	Tree																					1	1	1	
Fraxinus pennsylvanica	green ash	Tree	8	8	8				2	2	2	5	5	7	4	4	6	1	1	1			2	2	2	
Hamamelis virginiana var.	American witchhazel	Tree																			1	1	1			
Juglans nigra	black walnut	Tree																								
Liriodendron tulipifera	tuliptree	Tree								4																
Liriodendron tulipifera va	Tulip-tree, Yellow Pd	Tree			1								4	2	2	2	6	6	6	5	5	6				
Platanus occidentalis	American sycamore	Tree																								
Platanus occidentalis var.	Sycamore, Plane-tree	Tree	1	1	1	5	5	5	7	7	15	2	2	2		2	4	4	6	5	5	6	15	15	15	
Prunus cerasus	sour cherry	Exotic																								
Prunus serotina	black cherry	Tree																								
Prunus serotina var. serot	black cherry	Tree																								
Quercus	oak	Tree																								
Quercus michauxii	swamp chestnut oak	Tree	1	1	1																					
Quercus phellos	willow oak	Tree															1	1	1							
Quercus rubra	northern red oak	Tree	1	1	1							1	1	1												
Quercus rubra var. rubra	northern red oak	Tree																								
Salix nigra	black willow	Tree			4		450			50		2			1										3	
Sambucus canadensis	Common Elderberry	Shrub																								
Unknown		Shrub or Tree																								
Vitis aestivalis	summer grape	Vine																								
Vitis rotundifolia	muscadine	Vine																								
Stem count			15	15	20	5	5	455	9	9	75	10	10	18	8	8	14	21	21	24	18	18	20	19	19	22
size (ares)			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		
Species count			5	5	7	1	1	2	2	2	5	4	4	6	3	3	5	6	6	6	5	5	5	4	4	5
Stems per ACRE			607	607	809	202	202	18413	364	364	3035	405	405	728	324	324	567	850	850	971	728	728	809	769	769	890

Junes Branch			Annual Means																	
Scientific Name	Common Name	Species Type	MY5 (2018)			MY4 (2017)			MY3 (2016)			MY2 (2015)			MY1 (2015)			MY0 (2014)		
			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 rubrum	red maple	Tree						5												
Alnus serrulata	hazel alder	Shrub	13	13	13	14	14	16	13	13	15			5						
Betula nigra	river birch	Tree	12	12	18	11	11	19	9	9	13	5	5	20	6	6	6	11	11	11
Carpinus caroliniana var.	Coastal American Ho	Tree				3	3	3	4	4	4	5	5	5	5	5	5	4	4	4
Carya ovata	shagbark hickory	Tree						1												
Cornus amomum	silky dogwood	Shrub						20			50			3						
Cornus florida	flowering dogwood	Tree				2	2	3	2	2	2	3	3	3	3	3	3	3	3	3
Diospyros virginiana	common persimmon	Tree	1	1	1	3	3	3	3	3	6			4						
Fraxinus pennsylvanica	green ash	Tree	22	22	26	23	23	27	25	25	28	20	20	28	20	20	20	21	21	21
Hamamelis virginiana var.	American witchhazel	Tree	1	1	1	3	3	3	3	3	3	3	3	3	5	5	5	5	5	5
Juglans nigra	black walnut	Tree							1	1	6	1	1	5	1	1	1	1	1	1
Liriodendron tulipifera	tuliptree	Tree			4									5						
Liriodendron tulipifera va	Tulip-tree, Yellow Pd	Tree	13	13	19	15	15	27	17	17	17	4	4	4	6	6	6	7	7	7
Platanus occidentalis	American sycamore	Tree												24						
Platanus occidentalis var.	Sycamore, Plane-tree	Tree	39	39	52	42	42	55	43	43	53	16	16	16	17	17	17	17	17	17
Prunus cerasus	sour cherry	Exotic									3									
Prunus serotina	black cherry	Tree						1												
Prunus serotina var. serot	black cherry	Tree				2	2	2	2	2	2	2	2	2	1	1	1	3	3	3
Quercus	oak	Tree				1	1	1	2	2	2	4	4	4	6	6	6	6	6	6
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	1	1	1	1	1	1									
Quercus phellos	willow oak	Tree	1	1	1	2	2	2	2	2	2			2						
Quercus rubra	northern red oak	Tree	2	2	2	1	1	1												
Quercus rubra var. rubra	northern red oak	Tree							1	1	1	3	3	3	6	6	6	5	5	5
Salix nigra	black willow	Tree			510			270			77			53			81			
Sambucus canadensis	Common Elderberry	Shrub												3						
Unknown		Shrub or Tree																4	4	4
Vitis aestivalis	summer grape	Vine												2						
Vitis rotundifolia	muscadine	Vine												2						
Stem count			105	105	648	123	123	460	128	128	285	66	66	196	76	76	157	87	87	87
size (ares)			8			8			8			5			5			5		
size (ACRES)			0.20			0.20			0.20			0.12			0.12			0.12		
Species count			10	10	12	14	14	19	15	15	18	11	11	21	11	11	12	12	12	12
Stems per ACRE			531	531	3278	622	622	2327	647	647	1442	534	534	1586	615	615	1271	704	704	704

Vegetation Plot Photos



Junes Branch - Vegetation Monitoring Plot 1



Junes Branch - Vegetation Monitoring Plot 2



Junes Branch - Vegetation Monitoring Plot 3



Junes Branch - Vegetation Monitoring Plot 4



Junes Branch - Vegetation Monitoring Plot 5



Junes Branch - Vegetation Monitoring Plot 6



Junes Branch - Vegetation Monitoring Plot 7



Junes Branch - Vegetation Monitoring Plot 8

Appendix D

Stream Geomorphology Data

Table 11a. Dimensional Morphology Summary

Table 11b. Stream Reach Data Summary

Cross Section Plots

Longitudinal Profile with Annual Overlay

Pebble Count Data

Table 12. Pebble Count Data Summary

Charts 1-11. MY4 Stream Reach Substrate Composition Charts

**Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Sections)
Junes Branch / Project No. 95027 - Bumgarner I (631 feet)**

	Cross-Section 1 Riffle						Cross-Section 2 Pool						Cross-Section 3 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	2,153.11	2,153.11	2,153.11	2,153.11	2,153.11	2,153.23	2,152.68	2,152.68	2,152.68	2,152.68	2,152.68	2,153.05	2,145.60	2,145.60	2,145.60	2,145.60	2,145.60	2,145.22
Bankfull Width (ft)	13.3	13.4	12.7	12.9	13.2	20.0	13.4	13.1	13.2	12.7	13.4	29.7	15.8	16.8	16.3	18.0	18.3	13.9
Floodprone Width (ft)	>79	>79	>79	>79	>33	>33	>124	>124	>124	124	>39	>38.6	>42	>42	>42	>42	>42	>41.1
Bankfull Mean Depth (ft)	0.9	0.8	0.8	0.7	0.7	0.6	1.5	1.1	0.9	0.9	0.9	0.7	0.8	0.9	0.9	0.9	1.0	0.9
Bankfull Max Depth (ft)	1.5	1.3	1.3	1.4	1.5	1.8	2.9	1.9	2.1	2.0	2.3	2.5	1.2	1.7	1.9	2.1	2.2	2.0
Bankfull Cross Sectional Area (ft²)	11.7	11.3	10.2	9.6	8.6	11.7	20.6	14.0	12.2	11.3	12.2	20.6	12.2	14.5	14.8	15.8	17.5	12.2
Bankfull Width/Depth Ratio	15.2	15.8	15.8	17.2	20.2	34.3	8.7	12.3	14.3	14.4	14.6	42.6	20.4	19.4	18.0	20.5	19.1	15.7
Bankfull Entrenchment Ratio	>5.9	>5.9	>6.2	6.1	>2.5	>1.7	>9.3	>9.5	>9.4	>9.7	N/A	N/A	>2.7	>2.5	>2.6	>2.3	>2.3	>3.0
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.1	1.1	0.9	1.0	1.0	1.0	1.0	N/A	N/A	1.0	1.0	1.0	1.0	0.9	1.0
d50 (mm)	N/A	27	0.67	1.5	15	29	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16	0.68	0.24	14	1.6

**Table 11a cont'd. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Sections)
Junes Branch / Project No. 95027 - Bumgarner II (543 feet)**

	Cross-Section 4 Pool						Cross-Section 5 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	2,140.17	2,140.17	2,140.17	2,140.17	2,140.17	2,140.23	2,139.81	2,139.81	2,139.81	2,139.81	2,139.81	2,139.68
Bankfull Width (ft)	16.5	16.1	16.5	15.2	13.8	32.0	16.3	15.7	16.2	16.0	15.1	22.0
Floodprone Width (ft)	>50	>50	>50	>50	>49	>49	>48	>48	>48	>48	>47	>48
Bankfull Mean Depth (ft)	1.4	1.2	1.1	1.2	1.2	0.7	0.7	0.9	0.8	0.9	0.6	0.5
Bankfull Max Depth (ft)	2.6	2.4	2.5	2.3	2.3	2.6	1.2	1.3	1.3	1.4	1.4	1.5
Bankfull Cross Sectional Area (ft²)	23.0	18.9	18.5	17.9	16.6	23.0	11.9	13.4	12.6	13.7	9.4	11.9
Bankfull Width/Depth Ratio	11.9	13.7	14.8	12.8	11.5	44.6	22.2	18.4	20.8	18.6	24.3	40.8
Bankfull Entrenchment Ratio	>3.0	>3.1	>3.0	>3.3	N/A	N/A	>3.0	>3.1	>3	>3.0	>3.1	>2.2
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	N/A	1.0	1.0	1.0	1.0	1.1	0.8
d50 (mm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25	4.9	4.3	57	67

N/A - Item does not apply.

Note: Starting in MY4, Bankfull Bank Height Ratio was calculated on riffles using the baseline bankfull elevation.

Note: Starting in MY5, all dimensional parameter calculations are based on fixed baseline cross sectional area; therefore, bankfull elevations were adjusted accordingly.

**Table 11a cont'd. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Sections)
Junes Branch / Project No. 95027 - Junes (1,375 feet)**

	Cross-Section 6 Riffle						Cross-Section 7 Pool						Cross-Section 8 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	2,172.66	2,172.66	2,172.66	2,172.66	2,172.66	2,173.11	2,171.35	2,171.35	2,171.35	2,171.35	2,171.35	2,171.80	2,163.28	2,163.28	2,163.28	2,163.28	2,163.28	2,163.50
Bankfull Width (ft)	8.6	8.8	8.0	6.3	3.9	18.3	8.2	8.8	7.8	8.3	6.8	17.8	9.6	10.8	10.6	10.6	10.1	17.5
Floodprone Width (ft)	>94	>94	>94	>94	>23	>30	>111	>111	>111	>111	>32	>33	>53	>53	>53	>53	>36	>38
Bankfull Mean Depth (ft)	0.4	0.5	0.4	0.3	0.2	0.2	1.0	0.7	0.6	0.4	0.4	0.5	0.7	0.6	0.5	0.5	0.4	0.4
Bankfull Max Depth (ft)	0.7	0.9	0.7	0.5	0.5	0.4	2.1	1.6	1.3	1.0	1.3	1.7	1.2	1.1	1.0	1.2	1.1	1.5
Bankfull Cross Sectional Area (ft²)	3.7	4.1	3.0	1.7	0.8	3.7	8.6	6.1	4.8	3.7	2.7	8.6	6.4	6.4	5.7	5.6	3.6	6.4
Bankfull Width/Depth Ratio	19.7	18.9	21.7	23.0	19.4	89.6	7.9	12.7	12.7	18.8	17.0	36.6	14.3	18.2	19.8	20.0	28.3	47.9
Bankfull Entrenchment Ratio	>11.0	>10.7	>11.7	>14.8	>5.8	>1.7	>13.5	>12.6	>14.2	>13.4	N/A	N/A	>5.5	>4.9	>5.0	>5.0	>3.6	>2.2
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.1	0.9	1.0	1.0	1.0	1.0	N/A	N/A	1.0	1.0	1.0	1.0	1.0	0.6
d50 (mm)	N/A	1.4	0.13	0.062	2.8	1.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.7	0.65	0.062	1.9	5.4

**Table 11a cont'd. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Sections)
Junes Branch / Project No. 95027 - Junes (1,375 feet)**

	Cross-Section 9 Pool						Cross-Section 10 Pool						Cross-Section 11 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	2,162.64	2,162.64	2,162.64	2,162.64	2,162.64	2,163.12	2,144.35	2,144.35	2,144.35	2,144.35	2,144.35	2,144.32	2,143.99	2,143.99	2,143.99	2,143.99	2,143.99	2,143.92
Bankfull Width (ft)	10.5	11.1	10.1	9.8	7.3	26.9	11.0	10.9	11.0	10.3	10.7	17.7	9.8	9.0	8.6	9.2	10	12.9
Floodprone Width (ft)	>56	>56	>56	>56	>36	>42	>39	>39	>39	>39	>39	>39	>38	>38	>38	>38	>38	>37
Bankfull Mean Depth (ft)	1.0	0.8	0.7	0.9	0.4	0.4	0.8	0.7	0.7	0.7	0.7	0.5	0.6	0.6	0.6	0.6	0.6	0.5
Bankfull Max Depth (ft)	2.0	1.8	1.6	2.0	0.9	1.5	1.7	1.5	1.5	1.5	1.6	1.7	1.2	1.0	1.2	1.3	1.4	1.4
Bankfull Cross Sectional Area (ft²)	10.5	8.4	7.5	8.4	3.3	10.5	9.0	7.9	7.6	7.6	7.9	9	5.8	5.2	5.2	5.7	5.7	5.8
Bankfull Width/Depth Ratio	10.4	14.7	13.7	11.5	16.3	69.4	13.4	15.0	16.1	14.1	14.3	34.7	16.5	15.9	14.1	14.7	17.6	28.6
Bankfull Entrenchment Ratio	>5.3	>5	>5.5	>5.7	N/A	N/A	>3.5	>3.5	>3.5	>3.8	N/A	N/A	>3.9	>4.2	>4.4	>4.1	>3.8	>2.8
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	N/A	1.0	1.0	1.0	1.0	N/A	N/A	1.0	1.0	1.0	1.1	1.0	0.9
d50 (mm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12	0.21	4.3	27	32.0

N/A - Item does not apply.

Note: Starting in MY4, Bankfull Bank Height Ratio was calculated on riffles using the baseline bankfull elevation.

Note: Starting in MY5, all dimensional parameter calculations are based on fixed baseline cross sectional area; therefore, bankfull elevations were adjusted accordingly.

**Table 11a. cont'd. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Sections)
Junes Branch / Project No. 95027 -Higdon Branch (376 feet)**

	Cross-Section 12 Riffle						Cross-Section 13 Pool					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	2,140.85	2,140.85	2,140.85	2,140.85	2,140.85	2,140.96	2,140.14	2,140.14	2,140.14	2,140.14	2,140.14	2,140.50
Bankfull Width (ft)	6.6	8.1	7.0	7.7	5.4	10.8	8.0	7.2	7.0	7.0	5.6	17.2
Floodprone Width (ft)	>40	>40	>40	>40	>21	>25	>30	>30	>30	>30	>8	>28
Bankfull Mean Depth (ft)	0.4	0.3	0.3	0.3	0.2	0.2	0.7	0.6	0.3	0.3	0.1	0.3
Bankfull Max Depth (ft)	0.7	0.7	0.9	0.7	0.6	0.7	1.7	1.1	0.5	0.4	0.1	0.8
Bankfull Cross Sectional Area (ft²)	2.5	2.6	2.4	2.1	1.2	2.5	5.9	4.0	2.1	1.9	0.5	5.9
Bankfull Width/Depth Ratio	17.6	24.7	20.6	28.8	23.3	47.1	10.8	13.0	23.9	25.5	62.5	50.2
Bankfull Entrenchment Ratio	>6.0	>4.9	>5.6	>5.2	>3.9	>2.3	>3.7	>4.1	>4.2	>4.3	N/A	N/A
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.1	N/A	N/A
d50 (mm)	N/A	15	0.13	0.062	0.062	0.062	N/A	N/A	N/A	N/A	N/A	N/A

N/A - Item does not apply.

Note: Starting in MY4, Bankfull Bank Height Ratio was calculated on riffles using the baseline bankfull elevation.

Note: Starting in MY5, all dimensional parameter calculations are based on fixed baseline cross sectional area; therefore, bankfull elevations were adjusted accordingly.

**Table 11a. cont'd Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Sections)
Junes Branch / Project No. 95027 -Doris Branch (288 feet)**

Dimension	Cross-Section 14 Riffle						Cross-Section 15 Pool					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	2,138.93	2,138.93	2,138.93	2,138.93	2,138.93	2,138.93	2,138.74	2,138.74	2,138.74	2,138.74	2,138.74	2,138.91
Bankfull Width (ft)	6.2	6.6	6.9	7.3	3.5	8.5	11.6	11.7	11.9	12.4	9.5	18.4
Floodprone Width (ft)	>23	>23	>23	>23	>20	>21	>21	>21	>21	>21	>21	>21
Bankfull Mean Depth (ft)	0.4	0.4	0.3	0.3	0.3	0.3	0.8	0.7	0.6	0.5	0.3	0.5
Bankfull Max Depth (ft)	0.7	0.7	0.7	0.7	0.5	0.5	2.3	1.7	1.4	1.2	0.8	1.4
Bankfull Cross Sectional Area (ft²)	2.3	2.4	1.9	2.1	0.9	2.3	9.4	8.3	7.4	6.5	2.8	9.4
Bankfull Width/Depth Ratio	16.7	18.2	25.7	25.9	13.3	31.7	14.3	16.5	19.1	23.6	32.1	36.0
Bankfull Entrenchment Ratio	>3.8	>3.5	>3.4	>3.2	>5.6	.2.5	>1.8	>1.8	>1.8	>1.7	N/A	N/A
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	N/A
d50 (mm)	N/A	0.062	0.062	0.062	0.062	0.062	N/A	N/A	N/A	N/A	N/A	N/A

N/A - Item does not apply.

Note: Starting in MY4, Bankfull Bank Height Ratio was calculated on riffles using the baseline bankfull elevation.

Note: Starting in MY5, all dimensional parameter calculations are based on fixed baseline cross sectional area; therefore, bankfull elevations were adjusted accordingly.

**Table 11b. Monitoring Data - Stream Reach Data Summary
Junes Branch / Project No. 95027 - Bumgarner I (631 feet)**

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5					
	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension & Substrate - Riffle																																				
Bankfull Width (ft)	13.3	14.6	14.6	15.8	N/A	2	13.4	15.5	15.5	17.6	3.0	2	12.7	14.5	14.5	16.3	2.5	2	12.9	15.4	15.4	18.0	3.6	2	13.2	15.8	15.8	18.3	3.6	2	13.9	17.0	17.0	20.0	4.3	2
Floodprone Width (ft)	>42	>61	>61	>79	N/A	2	>42	>61	>61	>79	26.2	2	>42	>61	>61	>79	26.2	2	>42	>60	>60	>79	26.2	2	>33	>37.5	>37.5	>42	6.4	2	>33	>37.1	>37.1	>41.1	5.7	2
Bankfull Mean Depth (ft)	0.8	0.9	0.9	0.9	N/A	2	0.8	0.8	0.8	0.8	0	2	0.8	0.9	0.9	0.9	0.1	2	0.7	0.8	0.8	0.9	0.1	2	0.7	0.9	0.9	1.0	0.2	2	0.6	0.8	0.8	0.9	0.2	2
Bankfull Max Depth (ft)	1.2	1.4	1.4	1.5	N/A	2	1.3	1.5	1.5	1.7	0.3	2	1.3	1.6	1.6	1.9	0.4	2	1.4	1.7	1.7	2.1	0.5	2	1.5	1.9	1.9	2.2	0.5	2	1.8	1.9	1.9	2.0	0.1	2
Bankfull Cross-Sectional Area (ft ²)	11.7	12.0	12.0	12.2	N/A	2	11.3	16.4	16.4	21.4	7.1	2	10.2	12.5	12.5	14.8	3.3	2	9.6	12.7	12.7	15.8	4.3	2	8.6	13.1	13.1	17.5	6.3	2	11.7	12.0	12.0	12.2	0.4	2
Width/Depth Ratio	15.2	17.8	17.8	20.4	N/A	2	15.8	18.6	18.6	21.4	4.0	2	15.8	16.9	16.9	18.0	1.6	2	17.2	18.9	18.9	20.5	2.3	2	19.1	19.7	19.7	20.2	0.8	2	15.7	25.0	25.0	34.3	13.2	2
Entrenchment Ratio	>2.7	>4.3	>4.3	>5.9	N/A	2	>2.4	>4.15	>4.15	>5.9	2.5	2	>2.6	>4.4	>4.4	>6.2	2.5	2	>2.3	>4.2	>4.2	>6.1	2.7	2	>2.3	>2.4	>2.4	>2.5	0.1	2	>1.7	>2.4	>2.4	>3.0	0.9	2
Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	1.0	1.1	1.0	1.1	0.1	2	0.9	1.0	1.0	1.1	0.1	2	0.9	1.0	1.0	1.0	0.1	2
Profile																																				
Riffle Length (ft)	0.5	13.7	14.4	23.0	7.4	14	10.5	17.0	14.5	25.6	5.7	11	11.4	17.5	14.9	26.6	6.1	11	9.4	15.5	12.4	27.3	6.3	11	3.3	15.2	14.2	37.2	8.1	13	5.5	12.5	11.2	25.2	6.2	19
Riffle Slope (ft/ft)	0.016	0.061	0.039	0.251	0.063	14	0.019	0.030	0.027	0.055	0.010	11	0.017	0.028	0.025	0.040	0.009	11	0.007	0.022	0.021	0.042	0.012	11	0.001	0.023	0.015	0.061	0.020	13	0.000	0.032	0.025	0.078	0.019	19
Pool Length (ft)	5.2	10.2	9.2	22.5	4.3	12	5.0	7.6	7.3	13.4	2.2	12	5.4	7.7	7.0	12.9	2.1	12	4.9	9.2	8.1	19.1	3.7	12	6.1	12.1	9.6	24.8	5.9	14	5.0	11.5	11.3	18.8	4.2	19
Pool Max Depth (ft)	2.1	2.8	2.8	3.6	0.5	14	1.9	2.5	2.4	3.7	0.5	14	1.9	2.3	2.2	2.7	0.3	14	1.5	1.9	1.9	2.6	0.3	14	2.1	2.6	2.6	3.4	0.3	14	1.9	2.4	2.4	3.0	0.3	19
Pool Spacing (ft)	24.2	45.2	44.1	60.3	10.3	11	25.3	41.8	41.1	59.9	11.9	11	28.8	41.4	37.6	57.5	10.3	11	23.6	41.3	36.3	56.6	10.9	11	25.9	51.7	45.6	106.3	24.1	13	15.4	38.8	39.2	88.8	19.7	18
Pattern																																				
Channel Belt Width (ft)	24.5	25.3	25.3	26.2	N/A	2																														
Radius of Curvature (ft)	41.6	48.3	41.6	60.1	10.3	3																														
Rc: Bankfull Width (ft/ft)	2.8	3.3	2.9	4.1	0.7	3																														
Meander Wavelength (ft)	69.8	81.7	75.9	105.4	16.6	4																														
Meander Width Ratio	1.9	2.0	2.0	2.1	N/A	2																														
Additional Reach Parameters																																				
Rosgen Classification	Bc						B						B						B						B4c						B4					
Channel Thalweg Length (ft)	728						713						704						703						693						700					
Sinuosity (ft)	1.09						1.09						1.07						1.06						1.06						1.09					
Water Surface Slope (Channel) (ft/ft)	0.0233						0.0243						0.0247						0.0247						0.0253						0.0248					
Bankfull Slope (ft/ft)	0.0235						0.0245						0.0250						0.0254						0.0248						0.0247					
Ri% / Ru% / P% / G% / S%	37%	32%	24%	7%	0%		38%	34%	19%	9%	0%		40%	35%	19%	7%	0%		35%	36%	23%	6%	0%		29%	33%	24%	14%	0%		33%	31%	30%	6%	0%	
SC% / SA% / G% / C% / B% / Be%*																															1%	43%	43%	14%	0%	0%
d16 / d35 / d50 / d84 / d95 (mm)																															3.0	9.7	15.3	53.5	92.0	
% of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

N/A - Information does not apply.
 Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
 SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock

Table 11b. Monitoring Data - Stream Reach Data Summary
Junes Branch / Project No. 95027 - Bumgarner II (543 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5							
	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n		
Bankfull Width (ft)	-	16.3	-	-	N/A	1	-	15.7	-	-	N/A	1	-	16.2	-	-	N/A	1	-	16.0	-	-	N/A	1	-	15.1	-	-	N/A	1	-	22.0	-	-	N/A	1		
Floodprone Width (ft)	-	>47	-	-	N/A	1	-	>48	-	-	N/A	1	-	>48	-	-	N/A	1	-	>48	-	-	N/A	1	-	>47	-	-	N/A	1	-	>48	-	-	N/A	1		
Bankfull Mean Depth (ft)	-	0.7	-	-	N/A	1	-	0.9	-	-	N/A	1	-	0.8	-	-	N/A	1	-	0.9	-	-	N/A	1	-	0.6	-	-	N/A	1	-	0.5	-	-	N/A	1		
Bankfull Max Depth (ft)	-	1.2	-	-	N/A	1	-	1.3	-	-	N/A	1	-	1.3	-	-	N/A	1	-	1.4	-	-	N/A	1	-	1.4	-	-	N/A	1	-	1.5	-	-	N/A	1		
Bankfull Cross-Sectional Area (ft ²)	-	11.9	-	-	N/A	1	-	13.4	-	-	N/A	1	-	12.6	-	-	N/A	1	-	13.7	-	-	N/A	1	-	9.4	-	-	N/A	1	-	11.9	-	-	N/A	1		
Width/Depth Ratio	-	22.2	-	-	N/A	1	-	18.4	-	-	N/A	1	-	20.8	-	-	N/A	1	-	18.6	-	-	N/A	1	-	24.3	-	-	N/A	1	-	40.8	-	-	N/A	1		
Entrenchment Ratio	-	>3	-	-	N/A	1	-	>3.1	-	-	N/A	1	-	>3.0	-	-	N/A	1	-	>3.0	-	-	N/A	1	-	>3.1	-	-	N/A	1	-	>2.2	-	-	N/A	1		
Bank Height Ratio	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.1	-	-	N/A	1	-	0.8	-	-	N/A	1		
Profile																																						
Riffle Length (ft)	3.1	29	32.3	38.6	12	7	27.2	34.5	34.5	42.0	5.5	6	26.5	32.9	32.3	42.0	5.9	6	27.9	33.1	30.6	43.2	5.7	6	20.6	27.9	27.7	34.6	4.9	7	26.8	33.2	31.3	44.0	6.7	8		
Riffle Slope (ft/ft)	0.016	0.026	0.020	0.064	0.017	7	0.015	0.017	0.016	0.021	0.002	6	0.013	0.017	0.015	0.024	0.005	6	0.008	0.015	0.016	0.017	0.004	6	-0.001	0.015	0.011	0.037	0.013	7	0.003	0.016	0.017	0.023	0.006	8		
Pool Length (ft)	12.1	17.8	19.2	22.4	4	7	9.1	13.9	12.7	25.2	5.6	7	7.9	14.6	14.0	20.1	4.1	7	10.1	17.2	15.9	24.7	5.1	7	9.0	17.3	15.8	27.1	5.9	7	15.4	21.0	19.5	28.7	4.8	7		
Pool Max Depth (ft)	2.3	2.9	3.1	3.4	0.4	7	2.2	2.7	2.7	3.2	0.4	7	2.1	2.6	2.7	3.0	0.3	7	1.9	2.3	2.2	2.6	0.3	7	1.6	2.0	2.0	2.5	0.3	7	2.5	3.0	3.0	3.7	0.4	7		
Pool Spacing (ft)	61.5	70.2	69.9	80.2	6	6	60.7	66.7	66.4	74.5	5.1	6	59.0	67.6	67.7	75.8	5.7	6	60.3	67.8	68.4	76.6	6.1	6	14.6	68.0	63.4	129.9	38.8	6	54.8	69.4	68.3	84.4	10.9	6		
Pattern																																						
Channel Belt Width (ft)	25.4	28.0	26.2	26.2	3.8	3																																
Radius of Curvature (ft)	39.5	54.4	54.4	69.3	N/A	2																																
Rc: Bankfull Width (ft/ft)	3.1	4.3	4.3	5.5	N/A	2																																
Meander Wavelength (ft)	109.3	123.2	65.2	134.6	12.8	3																																
Meander Width Ratio	2.0	2.2	2.1	2.6	0.3	3																																
Additional Reach Parameters																																						
Rosgen Classification	Bc						Bc						Bc						Bc						B4c						B3c							
Channel Thalweg Length (ft)	543						522						526						536						501						534							
Sinuosity (ft)	1.07						1.06						1.07						1.08						1.05						1.07							
Water Surface Slope (Channel) (ft/ft)	0.0140						0.0151						0.0166						0.0164						0.0158						0.0160							
Bankfull Slope (ft/ft)	0.0152						0.0154						0.0145						0.0154						0.0152						0.0154							
Ri% / Ru% / P% / G% / S%	45%	18%	28%	8%	0%		50%	16%	24%	10%	0%		48%	18%	25%	10%	0%		47%	18%	28%	7%	0%		39%	17%	27%	17%	0%		51%	6%	28%	15%	0%			
SC% / SA% / G% / C% / B% / Be%*																																						
d16 / d35 / d50 / d84 / d95 (mm)																																						
% of Reach with Eroding Banks																																						
Channel Stability or Habitat Metric																																						
Biological or Other																																						

N/A - Information does not apply.
 Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
 SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock

Table 11b. Monitoring Data - Stream Reach Data Summary
Junes Branch / Project No. 95027 - Junes Branch (1,375 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5					
	Min	Mean	Med	Max	SD	n ¹	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	8.6	9.3	9.6	9.8	0.6	3	8.8	9.6	9.0	10.8	1.1	3	8.0	9.1	8.6	10.6	1.4	3	6.3	8.7	9.2	10.6	2.17	3	3.9	8.0	10.0	10.1	3.6	3	12.9	16.2	17.5	18.3	2.9	3
Floodprone Width (ft)	>38	>62	>53	>94	29.204	3	>38	>62	>53	>94	29.0	3	>38	>62	>53	>94	29.0	3	>38	>62	>53	>94	29	3	>23	>32.3	>36	>38	8.1	3	>30	>35	>37	>38	4.4	3
Bankfull Mean Depth (ft)	0.4	0.6	0.6	0.7	0.2	3	0.5	0.5	0.6	0.6	0.1	3	0.4	0.5	0.5	0.6	0.1	3	0.3	0.5	0.5	0.6	0.2	3	0.2	0.4	0.4	0.6	0.2	3	0.2	0.4	0.4	0.5	0.2	3
Bankfull Max Depth (ft)	0.7	1.0	1.2	1.2	0.3	3	0.9	1.0	1.0	1.1	0.1	3	0.7	1.0	1.0	1.2	0.3	3	0.5	1.0	1.2	1.3	0.4	3	0.5	1.0	1.1	1.4	0.5	3	0.4	1.1	1.4	1.5	0.6	3
Bankfull Cross-Sectional Area (ft ²)	3.7	5.3	5.8	6.4	1.4	3	4.1	5.2	5.2	6.4	1.2	3	3.0	4.6	5.2	5.7	1.4	3	1.7	4.4	5.6	5.7	2.3	3	0.8	3.4	3.6	5.7	2.5	3	3.7	5.3	5.8	6.4	1.4	3
Width/Depth Ratio	14.3	16.8	16.5	19.7	2.7	3	15.9	17.7	18.2	18.9	1.6	3	14.1	18.5	19.8	21.7	4.0	3	14.7	19.2	20.0	23.0	4.2	3	17.6	21.8	19.4	28.3	5.7	3	28.6	55.4	47.9	89.6	31.2	3
Entrenchment Ratio	>3.9	>6.8	>5.5	>11	3.7	3	>4.2	>6.6	>4.9	>10.7	3.6	3	>4.4	>7.0	>5.0	>11.7	4.1	3	>4.1	>8.0	>5.0	>14.8	5.9	3	>3.6	>4.4	>3.8	>5.8	1.2	3	>1.7	>2.2	>2.2	>2.8	0.6	3
Bank Height Ratio	1.0	1.0	1.0	1.0	0	3	1.0	1.0	1.0	1.0	0.0	3	1.0	1.0	1.0	1.0	0.0	3	1.0	1.0	1.0	1.1	0.1	3	1.0	1.0	1.0	1.1	0.1	3	0.6	0.8	0.9	0.9	0.2	3
Riffle Length (ft)	7.8	14.9	14.4	33.7	4.1	44	4.9	13.8	14.1	20.5	3.5	43	5.6	13.6	13.8	20.9	3.4	43	6.2	16.2	16.2	26.9	5.0	43	3.2	16.0	11.6	39.5	8.8	39	1.7	11.3	8.0	23.4	6.7	47
Riffle Slope (ft/ft)	0.007	0.029	0.030	0.052	0.010	44	0.007	0.030	0.032	0.049	0.010	43	0.014	0.034	0.031	0.093	0.014	43	0.004	0.031	0.028	0.081	0.016	43	0.000	0.021	0.021	0.075	0.019	39	-0.006	0.026	0.023	0.064	0.018	47
Pool Length (ft)	4.7	10.7	10.4	19.5	3.0	42	1.6	7.8	7.6	14.8	2.9	43	3.7	9.7	9.7	14.5	2.7	43	3.1	8.8	9.0	13.8	2.3	43	4.1	14.0	11.0	27.9	6.4	43	1.8	6.8	4.5	15.6	3.0	46
Pool Max Depth (ft)	1.3	1.9	1.9	3.2	0.4	44	1.0	2.1	2.0	3.8	0.6	43	0.8	2.0	2.0	3.6	0.6	44	0.9	2.0	1.9	3.5	0.6	45	0.6	1.6	1.6	2.8	0.6	43	0.3	1.6	1.4	3.5	0.7	46
Pool Spacing (ft)	12.3	30.0	30.5	42.1	6.2	41	19.7	29.8	31.5	38.2	5.4	40	11.9	29.0	30.0	38.6	6.4	41	9.1	29.1	28.9	40.7	7.4	41	4.1	32.4	26.4	94.8	13.5	42	5.9	30.3	25.7	94.5	12.7	44
Pattern																																				
Channel Belt Width (ft)	18.5	19.7	20.1	21.0	1.5	3																														
Radius of Curvature (ft)	31.9	35.8	36.7	38.9	3.6	3																														
Rc: Bankfull Width (ft/ft)	3.3	3.7	3.8	4.0	0.4	3																														
Meander Wavelength (ft)	53.7	67.1	61.4	88.3	12.5	6																														
Meander Width Ratio	1.9	2.1	2.1	2.2	0.2	3																														
Additional Reach Parameters																																				
Rosgen Classification	Bc						B						B						B						B4c						B4					
Channel Thalweg Length (ft)	1,480						1,427 ²						1,414						1,424						1,405						1,415					
Sinuosity (ft)	1.1						1.1						1.1						1.1						1.1						1.1					
Water Surface Slope (Channel) (ft/ft)	0.0231						0.0245						0.0271						0.0261						0.0259						0.0255					
Bankfull Slope (ft/ft)	0.0246						0.0248						0.0272						0.0263						0.0256						0.0259					
Ri% / Ru% / P% / G% / S%	50%	0%	34%	9%	7%		47%	0%	26%	18%	9%		46%	0%	33%	13%	8%		55%	0%	30%	8%	7%		44%	0%	43%	10%	3%		38%	25%	22%	15%	0%	
SC% / SA% / G% / C% / B% / Be%*																															11%	32%	38%	18%	0%	0%
d16 / d35 / d50 / d84 / d95 (mm)																															0.8	7.3	13	58.8	75.1	
% of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

N/A - Information does not apply.
 Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
 SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock

Table 11b. Monitoring Data - Stream Reach Data Summary
Junes Branch / Project No. 95027 - Higdon Branch (376 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5							
	Min	Mean ¹	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n		
Bankfull Width (ft)	-	8.0	-	-	N/A	1	-	8.1	-	-	N/A	1	-	7.0	-	-	N/A	1	-	7.7	-	-	N/A	1	-	5.4	-	-	N/A	1	-	10.8	-	-	N/A	1		
Floodprone Width (ft)	-	>40	-	-	N/A	1	-	>40	-	-	N/A	1	-	>39	-	-	N/A	1	-	40.0	-	-	N/A	1	-	>21	-	-	N/A	1	-	>25	-	-	N/A	1		
Bankfull Mean Depth (ft)	-	0.4	-	-	N/A	1	-	0.3	-	-	N/A	1	-	0.3	-	-	N/A	1	-	0.3	-	-	N/A	1	-	0.2	-	-	N/A	1	-	0.2	-	-	N/A	1		
Bankfull Max Depth (ft)	-	0.7	-	-	N/A	1	-	0.7	-	-	N/A	1	-	0.9	-	-	N/A	1	-	0.7	-	-	N/A	1	-	0.6	-	-	N/A	1	-	0.7	-	-	N/A	1		
Bankfull Cross-Sectional Area (ft ²)	-	2.5	-	-	N/A	1	-	2.6	-	-	N/A	1	-	2.4	-	-	N/A	1	-	2.1	-	-	N/A	1	-	1.2	-	-	N/A	1	-	2.5	-	-	N/A	1		
Width/Depth Ratio	-	17.6	-	-	N/A	1	-	24.7	-	-	N/A	1	-	20.6	-	-	N/A	1	-	28.8	-	-	N/A	1	-	23.3	-	-	N/A	1	-	47.1	-	-	N/A	1		
Entrenchment Ratio	-	>6	-	-	N/A	1	-	>4.9	-	-	N/A	1	-	>5.6	-	-	N/A	1	-	5.2	-	-	N/A	1	-	>3.9	-	-	N/A	1	-	>2.3	-	-	N/A	1		
Bank Height Ratio	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.1	-	-	N/A	1	-	1.1	-	-	N/A	1	-	1.0	-	-	N/A	1		
Profile																																						
Rifle Length (ft)	2.5	7.7	7.6	15	2.9	13	6.5	9.8	9.1	15.6	2.9	13	4.9	8.9	8.4	14.8	2.8	13	3.4	11.2	10.8	17.6	4.0	13	4.9	12.6	11.5	24.1	6.5	12	3.8	12.3	10.4	28.4	7.5	12		
Rifle Slope (ft/ft)	0.002	0.021	0.017	0.047	0.012	13	0.007	0.021	0.019	0.040	0.011	13	0.006	0.019	0.016	0.036	0.009	13	0.004	0.021	0.020	0.046	0.011	13	0.004	0.020	0.019	0.037	0.010	12	0.003	0.038	0.026	0.102	0.030	12		
Pool Length (ft)	4.6	8.1	8.4	11	1.8	14	2.5	6.1	6.3	9.1	1.7	14	2.5	5.6	5.5	8.2	1.8	14	1.6	4.5	3.3	10.6	2.5	14	6.2	11.1	11.4	18.6	4.0	11	7.2	12.2	11.9	18.0	3.6	11		
Pool Max Depth (ft)	1.3	1.7	1.7	2	0.2	13	1.2	1.5	1.4	2.0	0.3	12	1.2	1.4	1.4	1.7	0.2	14	0.6	1.0	1.0	1.5	0.2	14	0.4	1.3	1.1	2.1	0.5	11	0.4	0.8	0.7	1.3	0.3	9		
Pool Spacing (ft)	13.1	18.6	17.5	26.6	3.8	13	14.6	20.3	19.0	31.2	4.5	12	12.7	18.8	18.3	25.8	3.5	13	13.8	18.9	18.7	24.4	3.3	13	18.7	30.1	24.6	53.7	12.3	10	17.7	28.3	22.6	61.6	14.7	10		
Pattern																																						
Channel Belt Width (ft)	9.1	10.6	10.6	12.1	2.1	2																																
Radius of Curvature (ft)	16.2	19.7	20.1	22.9	3.4	3																																
Rc: Bankfull Width (ft/ft)	2.0	2.5	2.5	2.9	0.4	3																																
Meander Wavelength (ft)	11.8	31.1	31.5	39.5	9.3	7																																
Meander Width Ratio	1.1	1.3	1.3	1.5	N/A	2																																
Additional Reach Parameters																																						
Rosgen Classification	Bc						Bc						Bc						Bc						B6c						B6c							
Channel Thalweg Length (ft)	382						370						368						369						368						367							
Sinuosity (ft)	1.06						1.05						1.06						1.05						1.13						1.14							
Water Surface Slope (Channel) (ft/ft)	0.020						0.0191						0.0184						0.0162						0.0176						0.0186							
Bankfull Slope (ft/ft)	0.018						0.0156						0.0153						0.0164						0.0204						0.0180							
Ri% / Ru% / P% / G% / S%	42%	1%	47%	7%	2%		51%	5%	34%	11%	0%		46%	6%	31%	15%	2%		58%	4%	25%	13%	2%		41%	8%	33%	16%	1%		40%	14%	37%	9%	0%			
SC% / SA% / G% / C% / B% / Be%*																																						
d16 / d35 / d50 / d84 / d95 (mm)																																						
% of Reach with Eroding Banks																																						
Channel Stability or Habitat Metric																																						
Biological or Other																																						

N/A - Information does not apply.
 Ri = Rifle / Ru = Run / P = Pool / G = Glide / S = Step
 SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock

**Table 11b. Monitoring Data - Stream Reach Data Summary
Junes Branch / Project No. 95027 - Doris Branch (288 feet)**

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5							
	Min	Mean ¹	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n		
Bankfull Width (ft)	-	6.2	-	-	N/A	1	-	6.6	-	-	N/A	1	-	6.9	-	-	N/A	1	-	7.3	-	-	N/A	1	-	5.6	-	-	N/A	1	-	8.5	-	-	N/A	1		
Floodprone Width (ft)	-	>23	-	-	N/A	1	-	>23	-	-	N/A	1	-	>23	-	-	N/A	1	-	23.0	-	-	N/A	1	-	>8	-	-	N/A	1	-	>21	-	-	N/A	1		
Bankfull Mean Depth (ft)	-	0.4	-	-	N/A	1	-	0.4	-	-	N/A	1	-	0.3	-	-	N/A	1	-	0.3	-	-	N/A	1	-	0.1	-	-	N/A	1	-	0.3	-	-	N/A	1		
Bankfull Max Depth (ft)	-	0.7	-	-	N/A	1	-	0.7	-	-	N/A	1	-	0.7	-	-	N/A	1	-	0.7	-	-	N/A	1	-	0.1	-	-	N/A	1	-	0.5	-	-	N/A	1		
Bankfull Cross-Sectional Area (ft ²)	-	2.3	-	-	N/A	1	-	2.4	-	-	N/A	1	-	1.9	-	-	N/A	1	-	2.1	-	-	N/A	1	-	0.5	-	-	N/A	1	-	2.3	-	-	N/A	1		
Width/Depth Ratio	-	16.7	-	-	N/A	1	-	18.2	-	-	N/A	1	-	25.7	-	-	N/A	1	-	25.9	-	-	N/A	1	-	62.5	-	-	N/A	1	-	31.7	-	-	N/A	1		
Entrenchment Ratio	-	>3.8	-	-	N/A	1	-	>3.5	-	-	N/A	1	-	>3.4	-	-	N/A	1	-	3.2	-	-	N/A	1	-	>1.4	-	-	N/A	1	-	2.5	-	-	N/A	1		
Bank Height Ratio	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1	-	1.0	-	-	N/A	1		
Profile																																						
Rifle Length (ft)	2.5	6.1	6.3	11.4	2.5	18	3.7	6.5	6.5	11.3	2.0	18	3.6	6.3	6.1	9.3	1.9	18	3.2	6.3	5.8	11.9	2.4	18	5.2	9.5	8.3	20.4	4.5	11	5.1	9.7	7.7	18.9	4.8	10		
Rifle Slope (ft/ft)	0.011	0.022	0.013	0.036	0.008	18	0.002	0.023	0.020	0.055	0.014	18	0.004	0.026	0.027	0.056	0.014	18	0.004	0.022	0.022	0.044	0.013	18	-0.003	0.026	0.020	0.065	0.019	11	0.004	0.038	0.034	0.090	0.026	10		
Pool Length (ft)	2.4	3.7	3.5	6.6	1	19	2.5	3.8	3.8	5.3	0.8	19	2.5	3.8	3.6	7.3	1.1	19	2.0	3.7	3.4	6.8	1.3	19	4.6	7.2	7.0	9.7	1.6	9	7.0	9.4	8.7	13.3	2.4	10		
Pool Max Depth (ft)	1.2	1.6	1.6	2.3	0.3	18	0.7	1.1	1.1	1.5	0.2	19	0.6	1.2	1.2	1.8	0.3	19	0.6	0.9	0.9	1.3	0.2	19	0.4	0.8	0.8	1.2	0.3	9	1.5	1.7	1.7	2.2	0.2	9		
Pool Spacing (ft)	7.2	12.4	12.6	19.9	2.9	18	7.5	12.4	13.3	18.4	3.0	18	7.6	12.4	12.9	18.5	3.0	18	8.6	12.6	12.2	18.8	2.9	18	11.5	28.6	21.7	66.8	18.4	8	13.5	24.3	21.1	37.7	8.4	9		
Pattern																																						
Channel Belt Width (ft)	9.4	9.9	10.0	10.3	0.5	3																																
Radius of Curvature (ft)	7.9	12.0	12.0	16.1	5.8	2																																
Rc: Bankfull Width (ft/ft)	3.1	4.3	4.3	5.5	N/A	2																																
Meander Wavelength (ft)	16.6	22.6	24.5	27.1	4.5	6																																
Meander Width Ratio	2.0	2.1	2.1	2.2	0.1	3																																
Additional Reach Parameters																																						
Rosgen Classification	Bc						Bc						Bc						Bc						B6c						B6c							
Channel Thalweg Length (ft)	288						274						274						278						268						271							
Sinuosity (ft)	1.06						1.06						1.06						1.08						1.03						1.04							
Water Surface Slope (Channel) (ft/ft)	0.018						0.019						0.020						0.019						0.024						0.0206							
Bankfull Slope (ft/ft)	0.018						0.020						0.020						0.020						0.023						0.0191							
Ri% / Ru% / P% / G% / S%	48%	8%	31%	12%	1%		51%	6%	32%	11%	0%		49%	7%	31%	11%	2%		49%	13%	31%	7%	1%		41%	19%	24%	15%	1%		36%	12%	35%	17%	0%			
SC% / SA% / G% / C% / B% / Be%*																																						
d16 / d35 / d50 / d84 / d95 (mm)																																						
% of Reach with Eroding Banks																																						
Channel Stability or Habitat Metric																																						
Biological or Other																																						

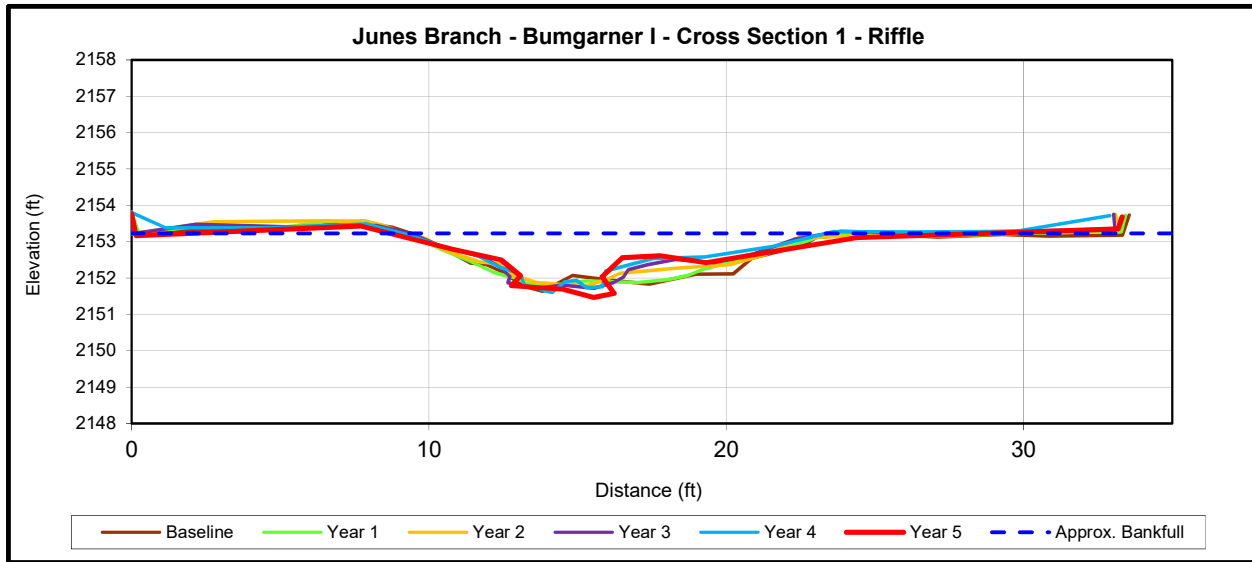
N/A - Information does not apply.
 Ri = Rifle / Ru = Run / P = Pool / G = Glide / S = Step
 SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock



Upstream



Downstream



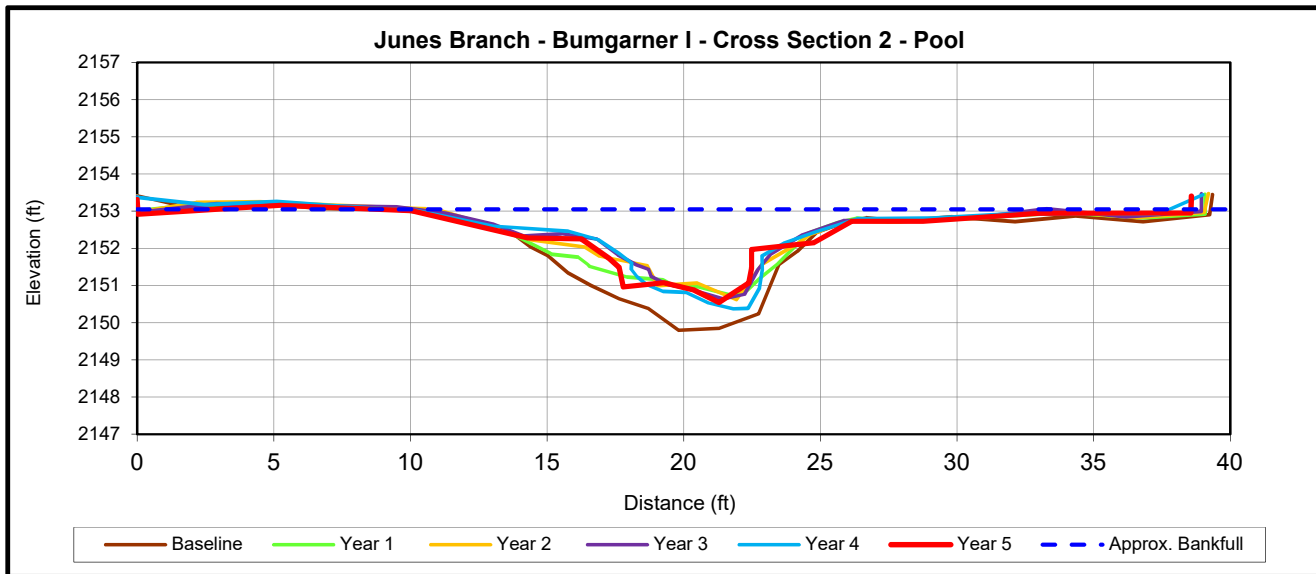
	Cross Section 1 (Riffle)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2153.1	2153.1	2153.1	2153.1	2153.1	2153.2
Bankfull Width (ft)	13.3	13.4	12.7	12.9	13.2	20.0
Floodprone Width (ft)	>79	>79	>79	>79	>33	>33
Bankfull Mean Depth (ft)	0.9	0.8	0.8	0.7	0.7	0.6
Bankfull Max Depth (ft)	1.5	1.3	1.3	1.4	1.5	1.8
Bankfull Cross Sectional Area (ft²)	11.7	11.3	10.2	9.6	8.6	11.7
Bankfull Width/Depth Ratio	15.2	15.8	15.8	17.2	20.2	34.3
Bankfull Entrenchment Ratio	>5.9	>5.9	>6.2	6.1	>2.5	>1.7
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.1	1.1	0.9



Upstream



Downstream



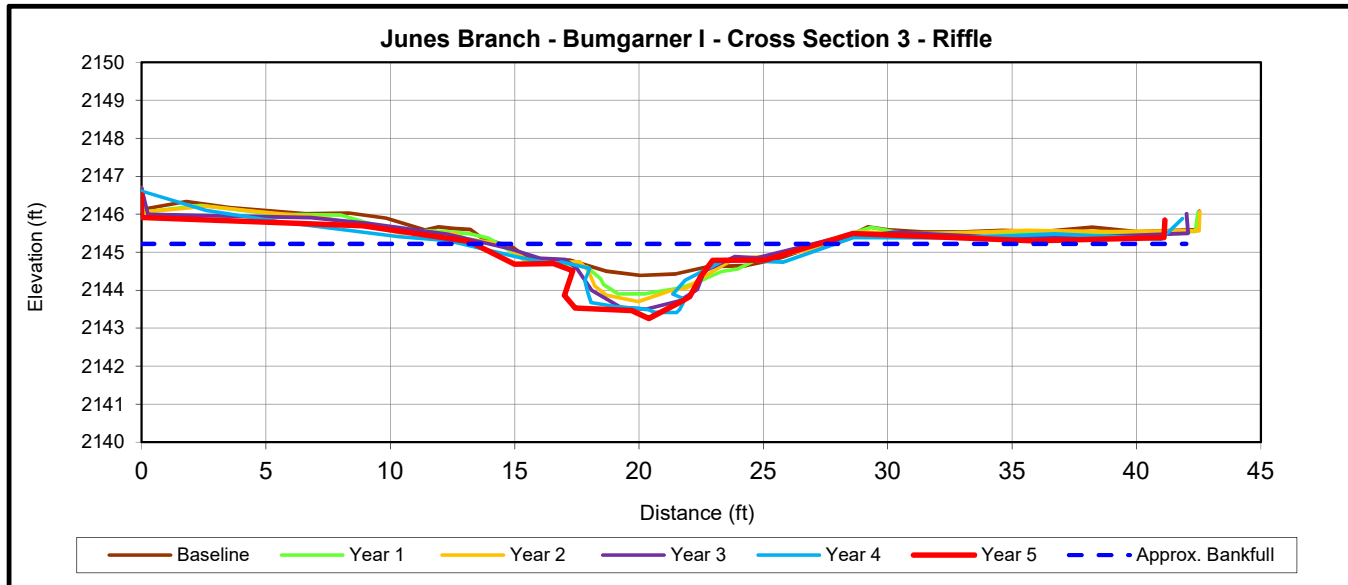
	Cross Section 2 (Pool)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2152.7	2152.7	2152.7	2152.7	2152.7	2153.1
Bankfull Width (ft)	13.4	13.1	13.2	12.7	13.4	29.7
Floodprone Width (ft)	>124	>124	>124	124.0	>39	>38.6
Bankfull Mean Depth (ft)	1.5	1.1	0.9	0.9	0.9	0.7
Bankfull Max Depth (ft)	2.9	1.9	2.1	2.0	2.3	2.5
Bankfull Cross Sectional Area (ft²)	20.6	14.0	12.2	11.3	12.2	20.6
Bankfull Width/Depth Ratio	8.7	12.3	14.3	14.4	14.6	42.6
Bankfull Entrenchment Ratio	>9.3	>9.5	>9.4	>9.7	N/A	N/A
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	N/A



Upstream



Downstream



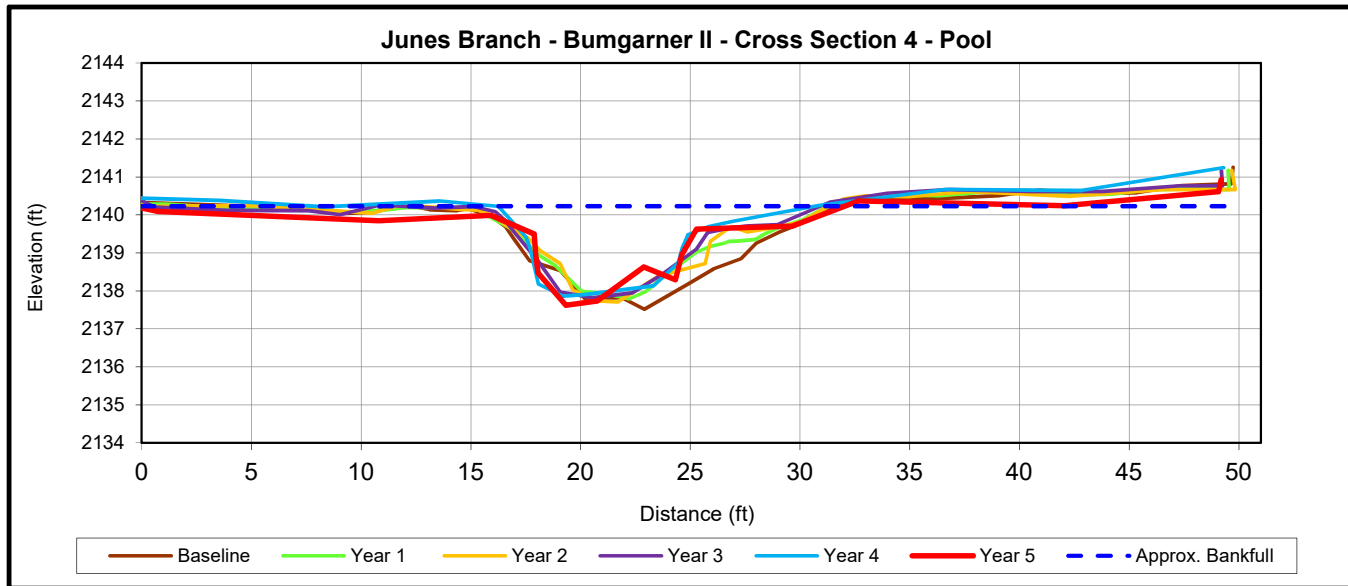
	Cross Section 3 (Riffle)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2145.6	2145.6	2145.6	2145.6	2145.6	2145.2
Bankfull Width (ft)	15.8	16.8	16.3	18.0	18.3	13.9
Floodprone Width (ft)	>42	>42	>42	>42	>42	>41.1
Bankfull Mean Depth (ft)	0.8	0.9	0.9	0.9	1.0	0.9
Bankfull Max Depth (ft)	1.2	1.7	1.9	2.1	2.2	2.0
Bankfull Cross Sectional Area (ft²)	12.2	14.5	14.8	15.8	17.5	12.2
Bankfull Width/Depth Ratio	20.4	19.4	18.0	20.5	19.1	15.7
Bankfull Entrenchment Ratio	>2.7	>2.5	>2.6	>2.3	>2.3	>3.0
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	0.9	1.0



Upstream



Downstream



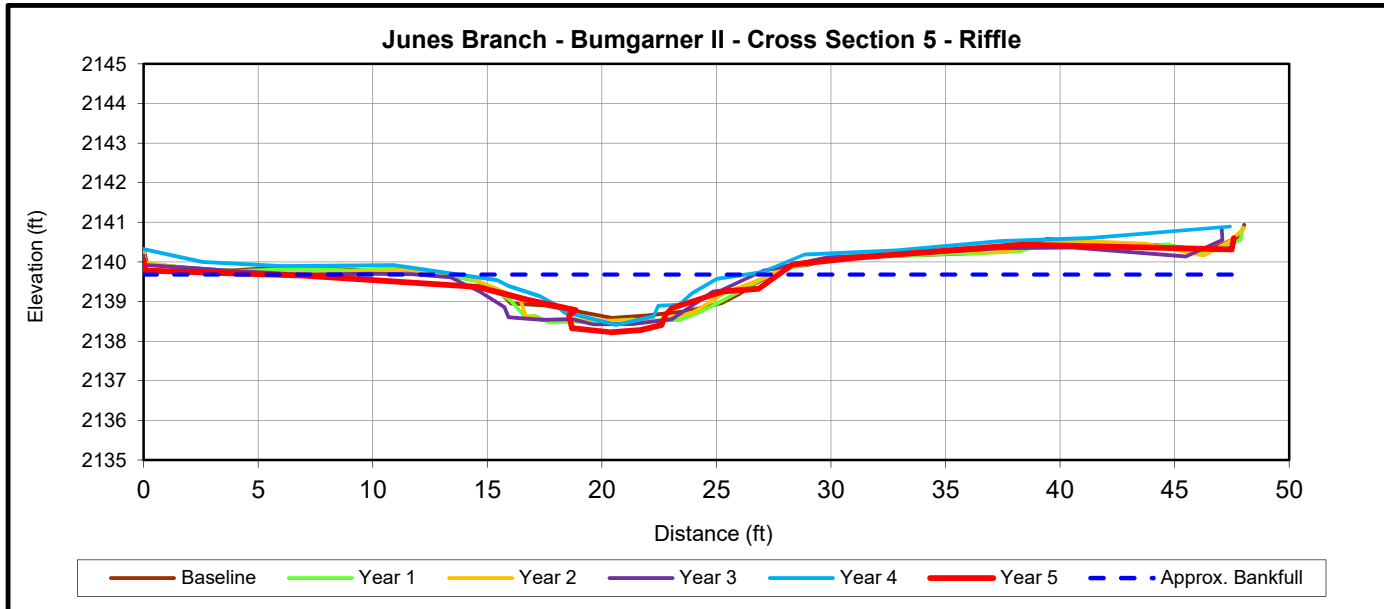
	Cross Section 4 (Pool)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2140.2	2140.2	2140.2	2140.2	2140.2	
Bankfull Width (ft)	16.5	16.1	16.5	15.2	13.8	
Floodprone Width (ft)	>50	>50	>50	>50	>49	
Bankfull Mean Depth (ft)	1.4	1.2	1.1	1.2	1.2	
Bankfull Max Depth (ft)	2.6	2.4	2.5	2.3	2.3	
Bankfull Cross Sectional Area (ft ²)	23.0	18.9	18.5	17.9	16.6	
Bankfull Width/Depth Ratio	11.9	13.7	14.8	12.8	11.5	
Bankfull Entrenchment Ratio	>3.0	>3.1	>3.0	>3.3	N/A	
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	



Upstream



Downstream



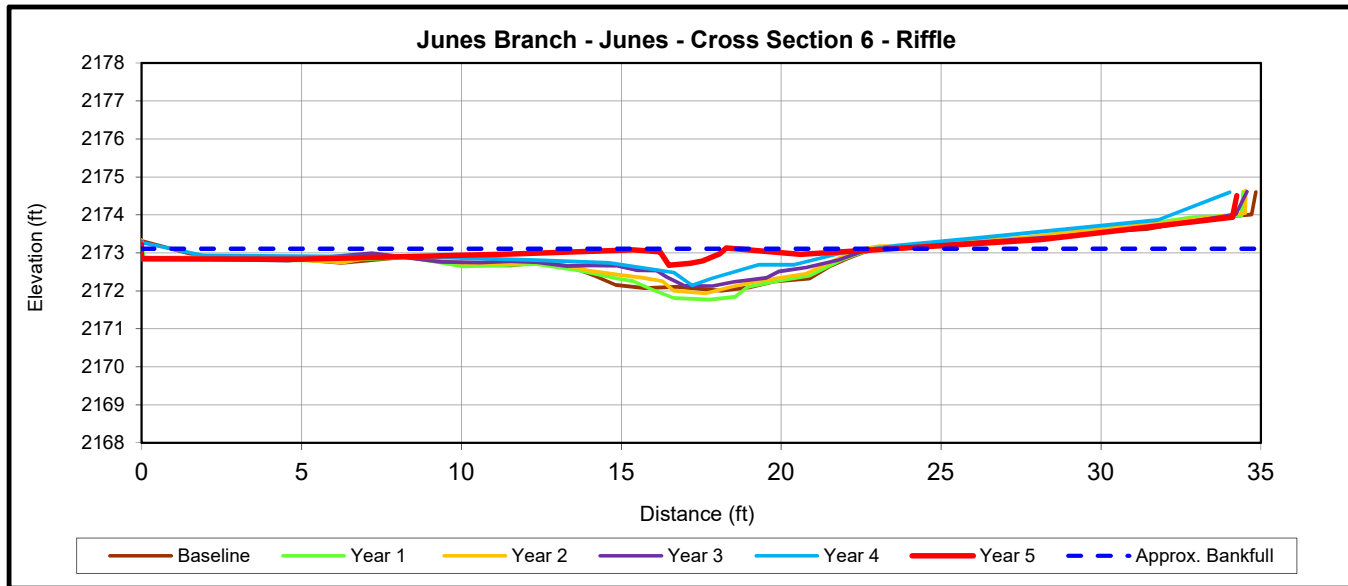
	Cross Section 5 (Riffle)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2139.8	2139.8	2139.8	2139.8	2139.8	2139.7
Bankfull Width (ft)	16.3	15.7	16.2	16.0	15.1	22.0
Floodprone Width (ft)	>48	>48	>48	>48	>47	>48
Bankfull Mean Depth (ft)	0.7	0.9	0.8	0.9	0.6	0.5
Bankfull Max Depth (ft)	1.2	1.3	1.3	1.4	1.4	1.5
Bankfull Cross Sectional Area (ft²)	11.9	13.4	12.6	13.7	9.4	11.9
Bankfull Width/Depth Ratio	22.2	18.4	20.8	18.6	24.3	40.8
Bankfull Entrenchment Ratio	>3.0	>3.1	>3	>3.0	>3.1	>2.2
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.1	0.8



Upstream



Downstream



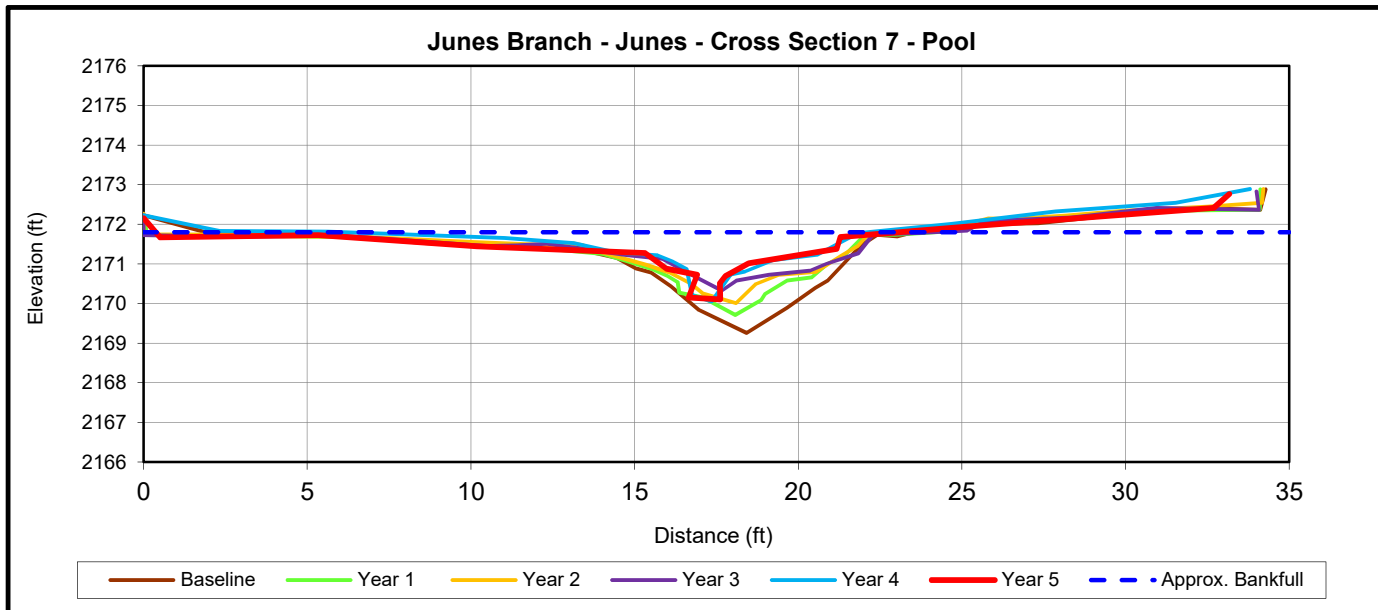
	Cross Section 6 (Riffle)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2172.7	2172.7	2172.7	2172.7	2172.7	2173.1
Bankfull Width (ft)	8.6	8.8	8.0	6.3	3.9	18.3
Floodprone Width (ft)	>94	>94	>94	>94	>23	>30
Bankfull Mean Depth (ft)	0.4	0.5	0.4	0.3	0.2	0.2
Bankfull Max Depth (ft)	0.7	0.9	0.7	0.5	0.5	0.4
Bankfull Cross Sectional Area (ft²)	3.7	4.1	3.0	1.7	0.8	3.7
Bankfull Width/Depth Ratio	19.7	18.9	21.7	23.0	19.4	89.6
Bankfull Entrenchment Ratio	>11.0	>10.7	>11.7	>14.8	>5.8	>1.7
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.1	0.9



Upstream



Downstream



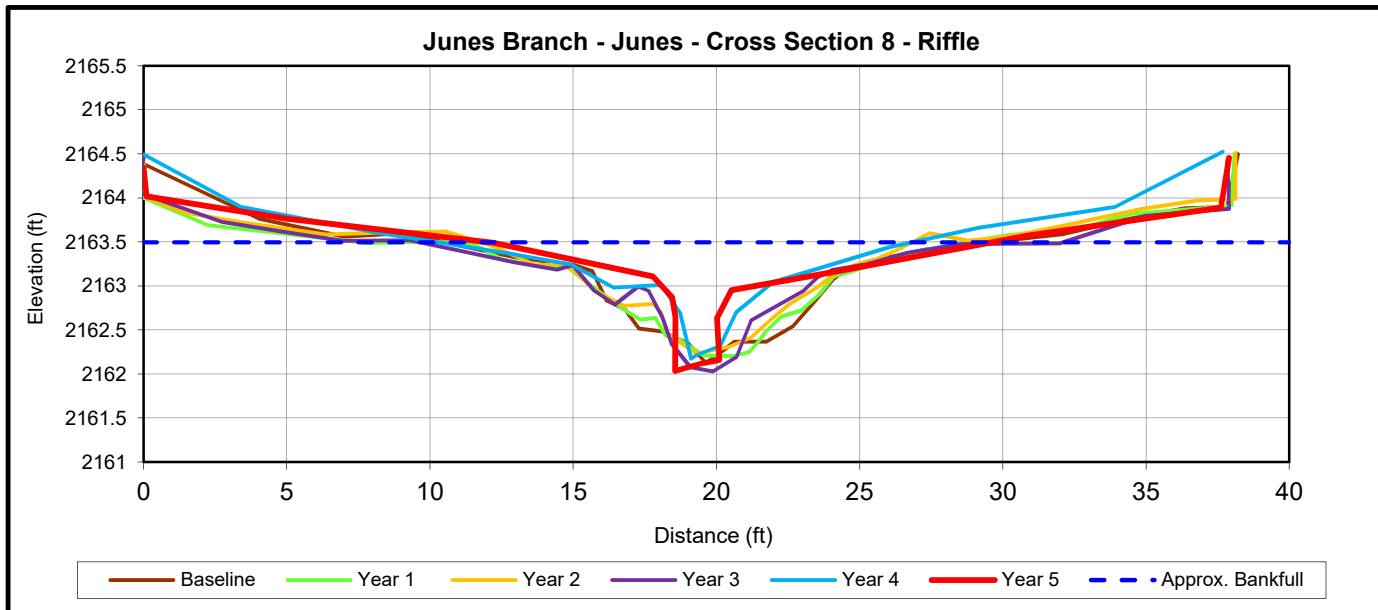
	Cross Section 7 (Pool)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2171.4	2171.4	2171.4	2171.4	2171.4	2171.8
Bankfull Width (ft)	8.2	8.8	7.8	8.3	6.8	17.8
Floodprone Width (ft)	>111	>111	>111	>111	>32	>33
Bankfull Mean Depth (ft)	1.0	0.7	0.6	0.4	0.4	0.5
Bankfull Max Depth (ft)	2.1	1.6	1.3	1.0	1.3	1.7
Bankfull Cross Sectional Area (ft²)	8.6	6.1	4.8	3.7	2.7	8.6
Bankfull Width/Depth Ratio	7.9	12.7	12.7	18.8	17.0	36.6
Bankfull Entrenchment Ratio	>13.5	>12.6	>14.2	>13.4	N/A	N/A
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	N/A



Upstream



Downstream



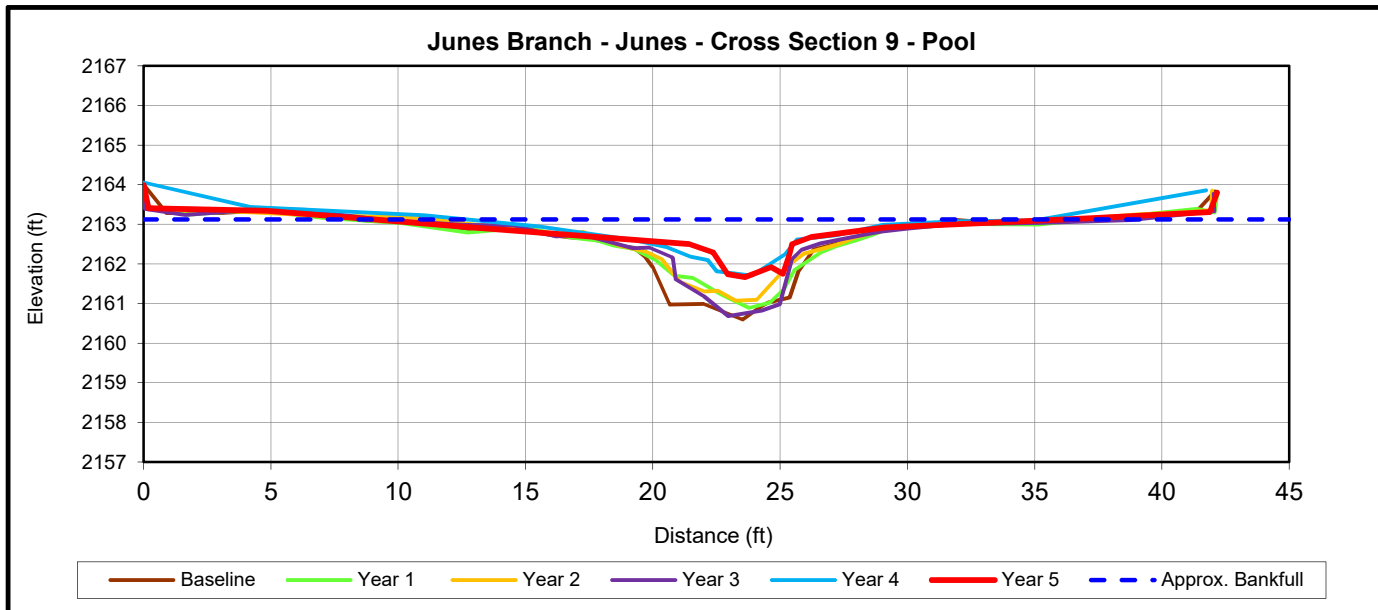
	Cross Section 8 (Riffle)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2163.3	2163.3	2163.3	2163.3	2163.3	2163.5
Bankfull Width (ft)	9.6	10.8	10.6	10.6	10.1	17.5
Floodprone Width (ft)	>53	>53	>53	>53	>36	>38
Bankfull Mean Depth (ft)	0.7	0.6	0.5	0.5	0.4	0.4
Bankfull Max Depth (ft)	1.2	1.1	1.0	1.2	1.1	1.5
Bankfull Cross Sectional Area (ft²)	6.4	6.4	5.7	5.6	3.6	6.4
Bankfull Width/Depth Ratio	14.3	18.2	19.8	20.0	28.3	47.9
Bankfull Entrenchment Ratio	>5.5	>4.9	>5.0	>5.0	>3.6	>2.2
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	0.6



Upstream



Downstream



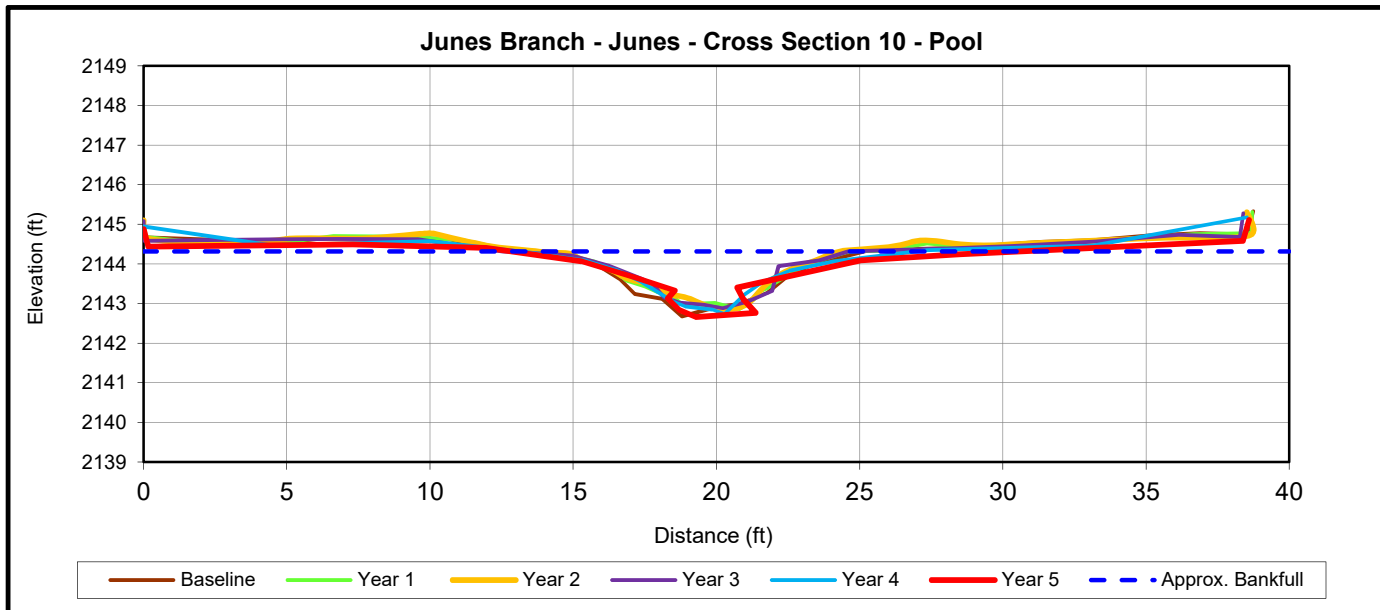
	Cross Section 9 (Pool)					
Based on fixed baseline bank full elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2162.6	2162.6	2162.6	2162.6	2162.6	2163.1
Bankfull Width (ft)	10.5	11.1	10.1	9.8	7.3	26.9
Floodprone Width (ft)	>56	>56	>56	>56	>36	>42
Bankfull Mean Depth (ft)	1.0	0.8	0.7	0.9	0.4	0.4
Bankfull Max Depth (ft)	2.0	1.8	1.6	2.0	0.9	1.5
Bankfull Cross Sectional Area (ft²)	10.5	8.4	7.5	8.4	3.3	10.5
Bankfull Width/Depth Ratio	10.4	14.7	13.7	11.5	16.3	69.4
Bankfull Entrenchment Ratio	>5.3	>5	>5.5	>5.7	N/A	N/A
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	N/A



Upstream



Downstream



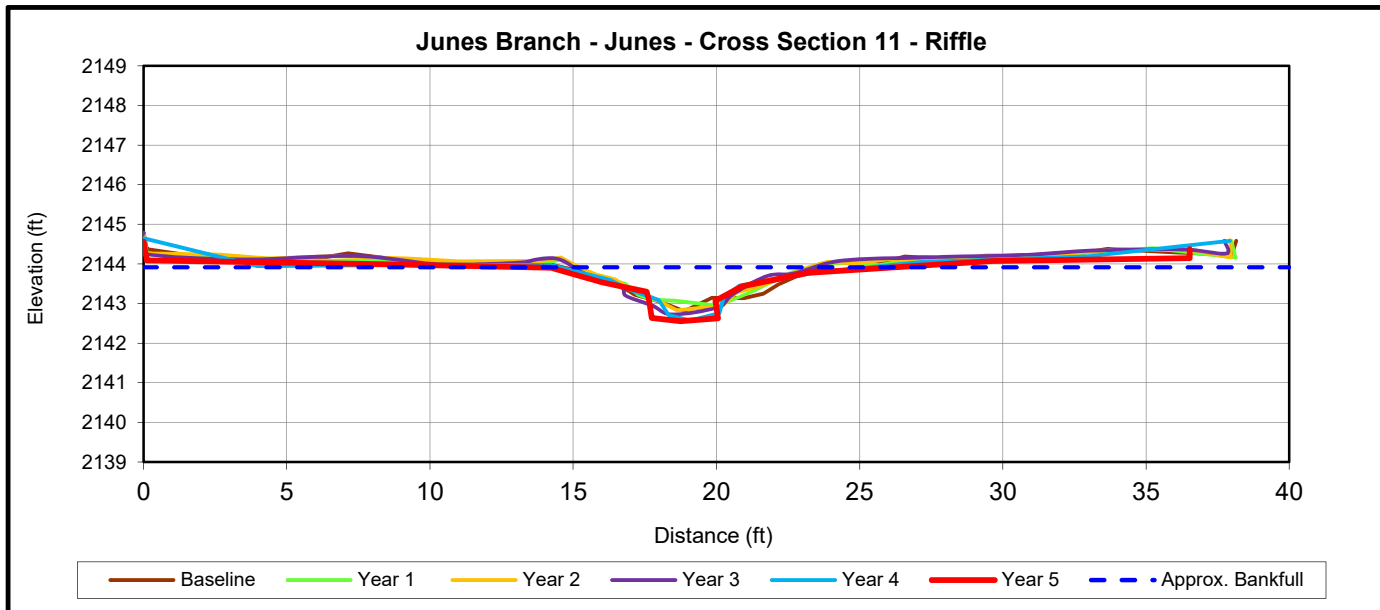
	Cross Section 10 (Pool)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2144.4	2144.4	2144.4	2144.4	2144.4	2144.3
Bankfull Width (ft)	11.0	10.9	11.0	10.3	10.7	17.7
Floodprone Width (ft)	>39	>39	>39	>39	>39	>39
Bankfull Mean Depth (ft)	0.8	0.7	0.7	0.7	0.7	0.5
Bankfull Max Depth (ft)	1.7	1.5	1.5	1.5	1.6	1.7
Bankfull Cross Sectional Area (ft²)	9.0	7.9	7.6	7.6	7.9	9.0
Bankfull Width/Depth Ratio	13.4	15.0	16.1	14.1	14.3	34.7
Bankfull Entrenchment Ratio	>3.5	>3.5	>3.5	>3.8	N/A	N/A
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	N/A



Upstream



Downstream



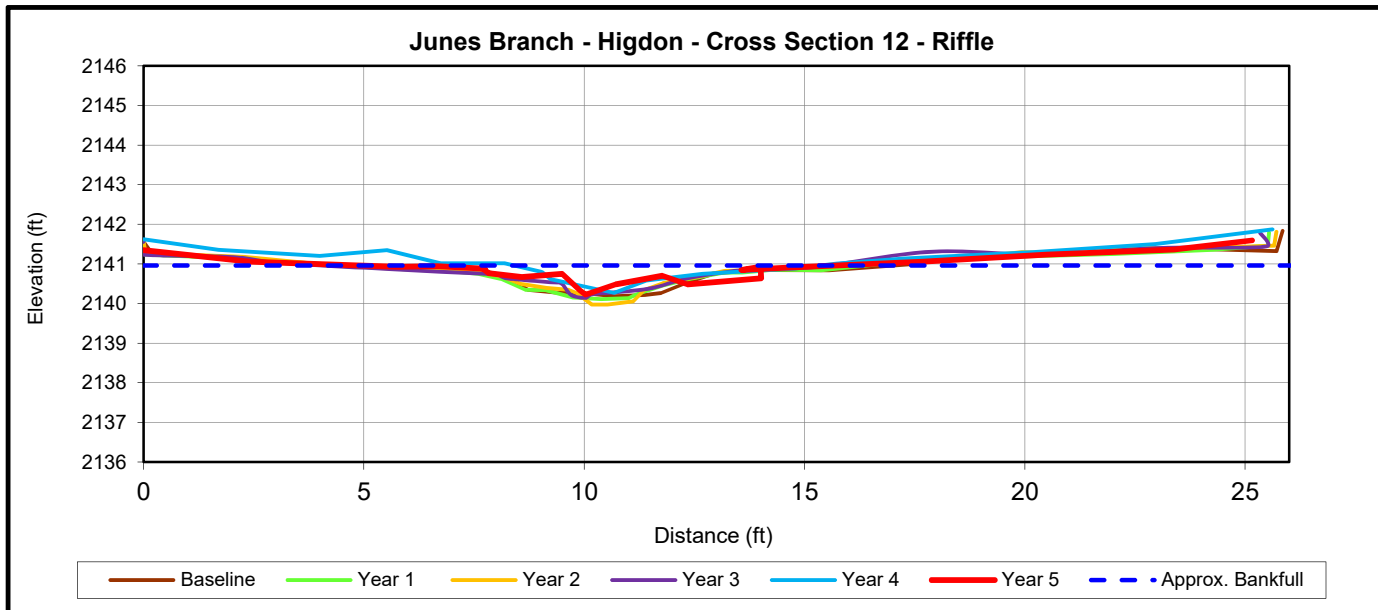
	Cross Section 11 (Riffle)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2144.0	2144.0	2144.0	2144.0	2144.0	2143.9
Bankfull Width (ft)	9.8	9.0	8.6	9.2	10.0	12.9
Floodprone Width (ft)	>38	>38	>38	>38	>38	>37
Bankfull Mean Depth (ft)	0.6	0.6	0.6	0.6	0.6	0.5
Bankfull Max Depth (ft)	1.2	1.0	1.2	1.3	1.4	1.4
Bankfull Cross Sectional Area (ft²)	5.8	5.2	5.2	5.7	5.7	5.8
Bankfull Width/Depth Ratio	16.5	15.9	14.1	14.7	17.6	28.6
Bankfull Entrenchment Ratio	>3.9	>4.2	>4.4	>4.1	>3.8	>2.8
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.1	1.0	0.9



Upstream



Downstream



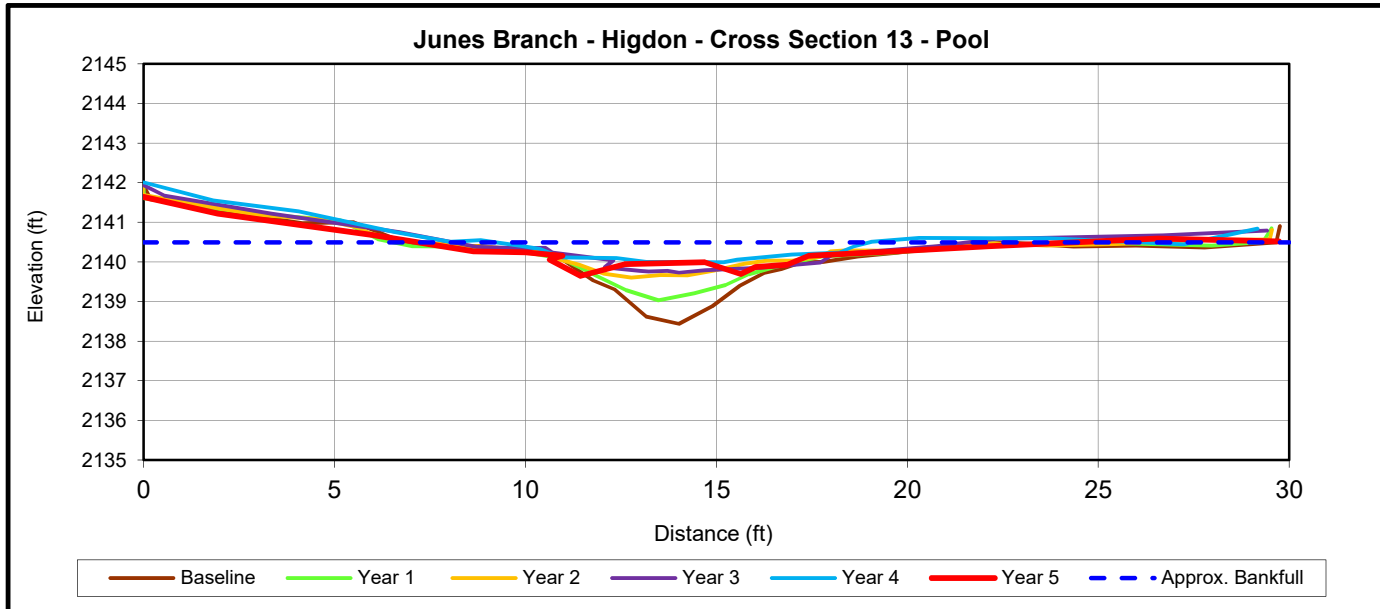
	Cross Section 12 (Riffle)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2140.9	2140.9	2140.9	2140.9	2140.9	2141.0
Bankfull Width (ft)	6.6	8.1	7.0	7.7	5.4	10.8
Floodprone Width (ft)	>40	>40	>40	>40	>21	>25
Bankfull Mean Depth (ft)	0.4	0.3	0.3	0.3	0.2	0.2
Bankfull Max Depth (ft)	0.7	0.7	0.9	0.7	0.6	0.7
Bankfull Cross Sectional Area (ft²)	2.5	2.6	2.4	2.1	1.2	2.5
Bankfull Width/Depth Ratio	17.6	24.7	20.6	28.8	23.3	47.1
Bankfull Entrenchment Ratio	>6.0	>4.9	>5.6	>5.2	>3.9	>2.3
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.1	1.0



Upstream



Downstream



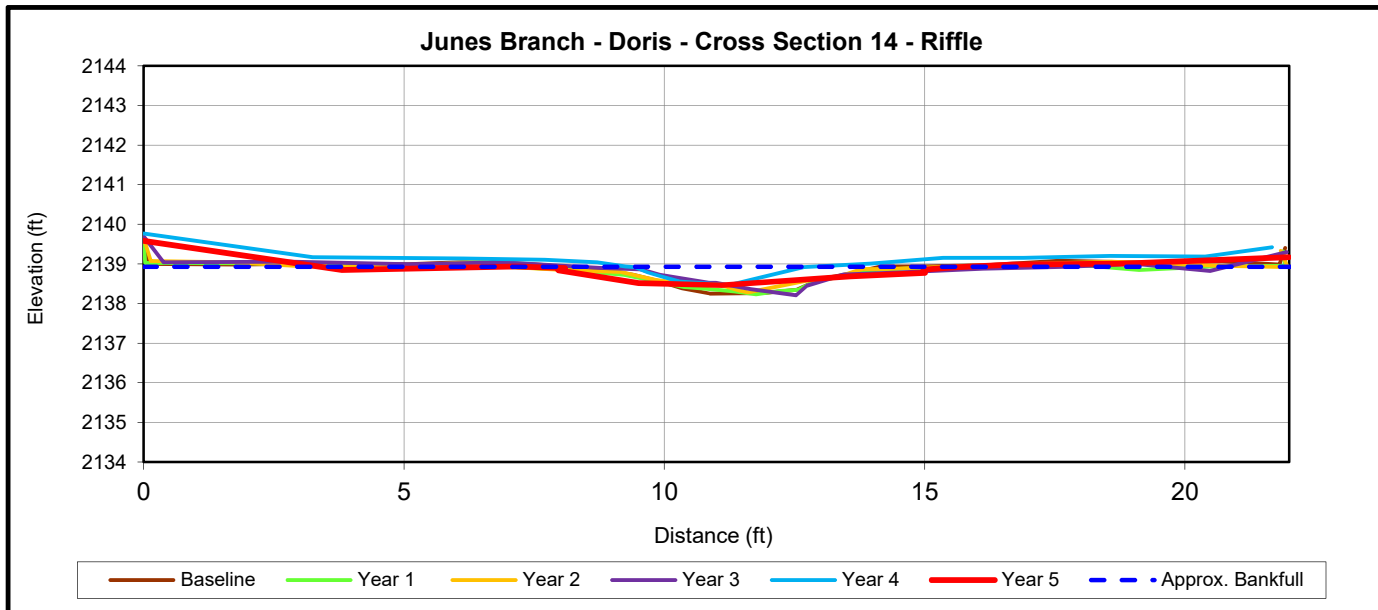
Cross Section 13 (Pool)						
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2140.1	2140.1	2140.1	2140.1	2140.1	2140.5
Bankfull Width (ft)	8.0	7.2	7.0	7.0	5.6	17.2
Floodprone Width (ft)	>30	>30	>30	>30	>8	>28
Bankfull Mean Depth (ft)	0.7	0.6	0.3	0.3	0.1	0.3
Bankfull Max Depth (ft)	1.7	1.1	0.5	0.4	0.1	0.8
Bankfull Cross Sectional Area (ft²)	5.9	4.0	2.1	1.9	0.5	5.9
Bankfull Width/Depth Ratio	10.8	13.0	23.9	25.5	62.5	50.2
Bankfull Entrenchment Ratio	>3.7	>4.1	>4.2	>4.3	N/A	N/A
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.1	N/A	N/A



Upstream



Downstream



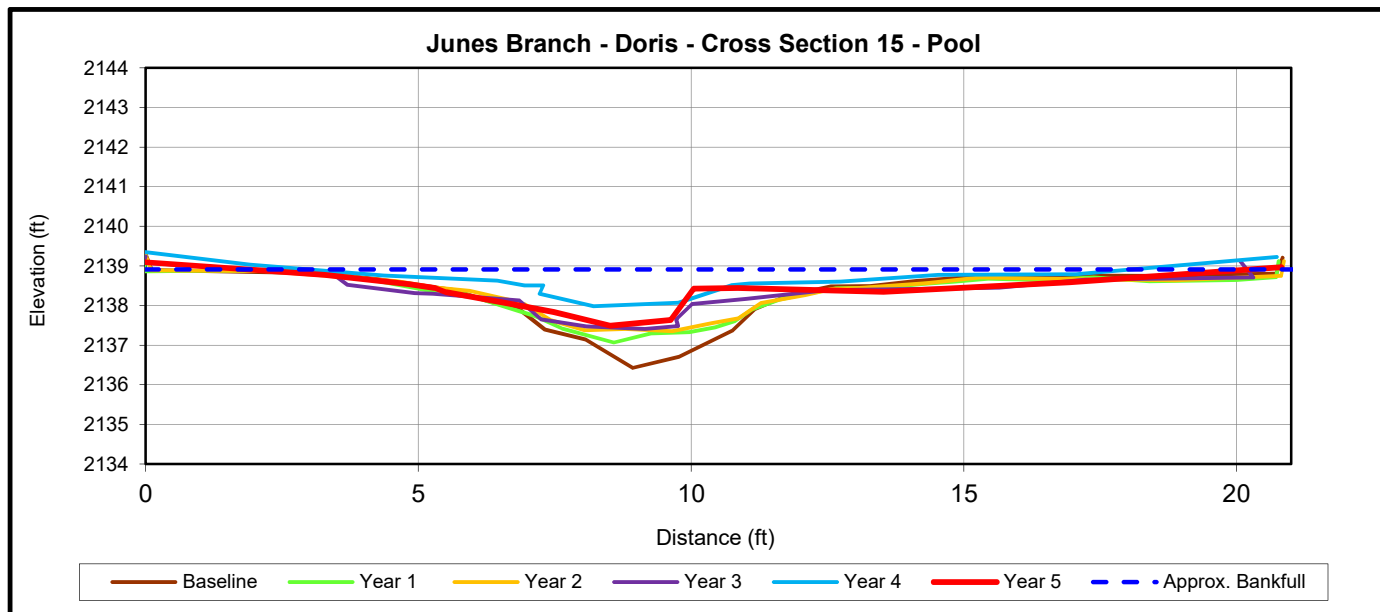
	Cross Section 14 (Riffle)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2138.9	2138.9	2138.9	2138.9	2138.9	2138.9
Bankfull Width (ft)	6.2	6.6	6.9	7.3	3.5	8.5
Floodprone Width (ft)	>23	>23	>23	>23	>20	>21
Bankfull Mean Depth (ft)	0.4	0.4	0.3	0.3	0.3	0.3
Bankfull Max Depth (ft)	0.7	0.7	0.7	0.7	0.5	0.5
Bankfull Cross Sectional Area (ft²)	2.3	2.4	1.9	2.1	0.9	2.3
Bankfull Width/Depth Ratio	16.7	18.2	25.7	25.9	13.3	31.7
Bankfull Entrenchment Ratio	>3.8	>3.5	>3.4	>3.2	>5.6	.25
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0



Upstream

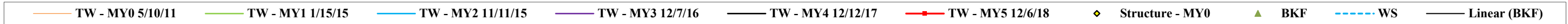
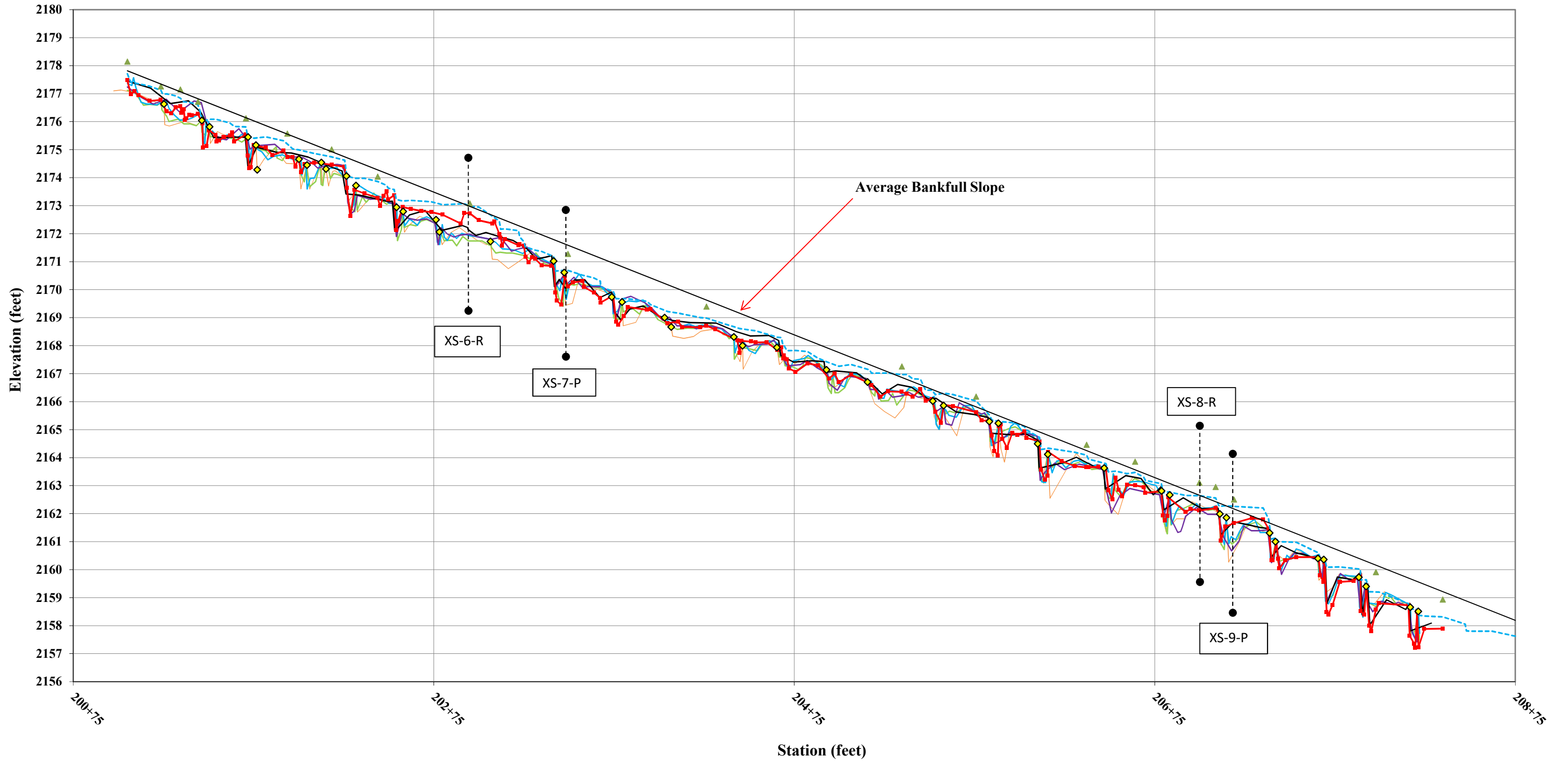


Downstream

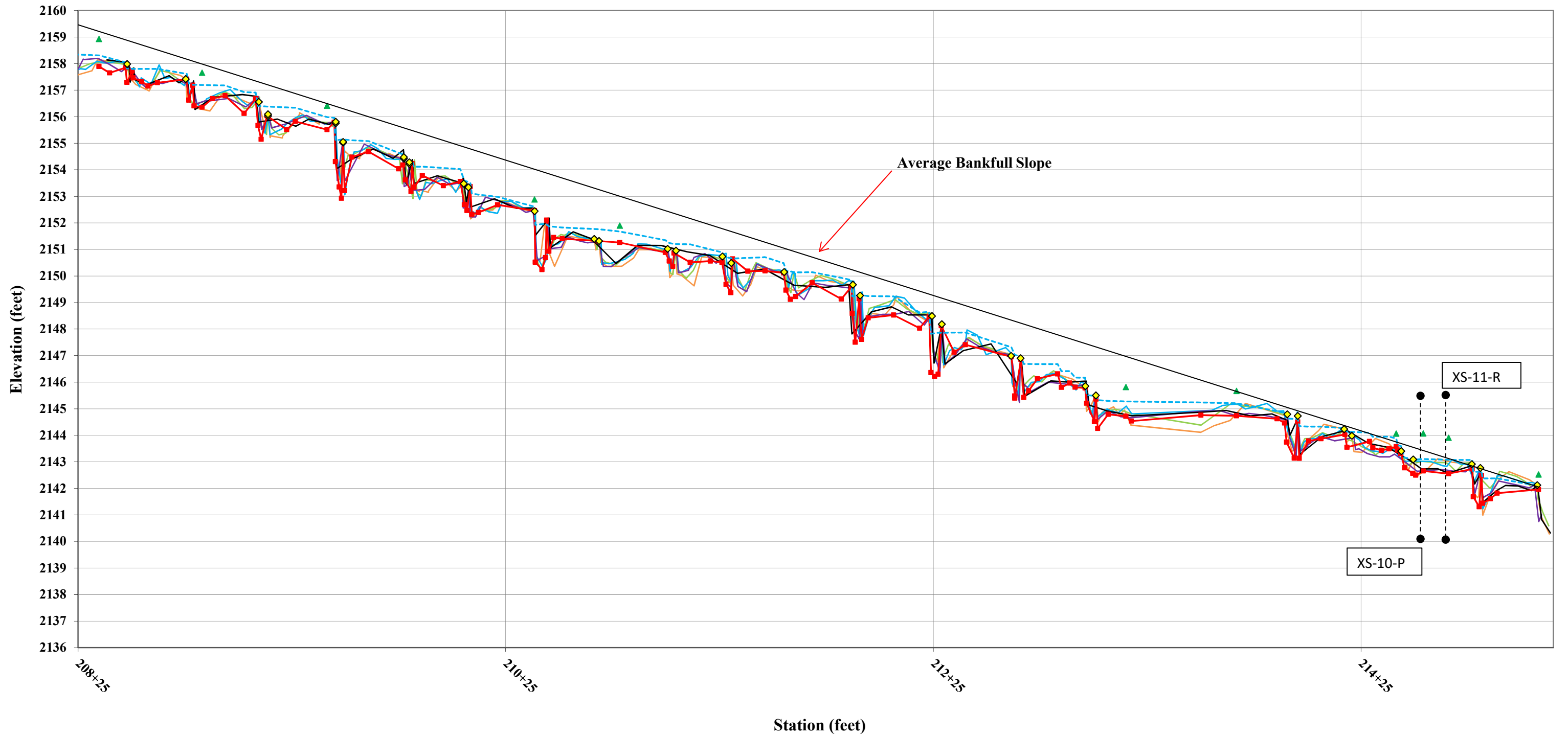


	Cross Section 15 (Pool)					
Based on fixed baseline bankfull elevation	Base	MY1	MY2	MY3	MY4	MY5
Record elevation (datum) used	2138.7	2138.7	2138.7	2138.7	2138.7	2138.9
Bankfull Width (ft)	11.6	11.7	11.9	12.4	9.5	18.4
Floodprone Width (ft)	>21	>21	>21	>21	>21	>21
Bankfull Mean Depth (ft)	0.8	0.7	0.6	0.5	0.3	0.5
Bankfull Max Depth (ft)	2.3	1.7	1.4	1.2	0.8	1.4
Bankfull Cross Sectional Area (ft²)	9.4	8.3	7.4	6.5	2.8	9.4
Bankfull Width/Depth Ratio	14.3	16.5	19.1	23.6	32.1	36.0
Bankfull Entrenchment Ratio	>1.8	>1.8	>1.8	>1.7	N/A	N/A
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	N/A

**Junes Branch - Sheet 1
Longitudinal Profile
Staioning 200+97 to 215+15**



**Junes Branch - Sheet 2
Longitudinal Profile
Staioning 200+97 to 215+15**

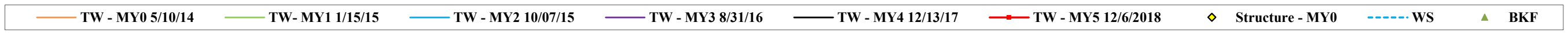
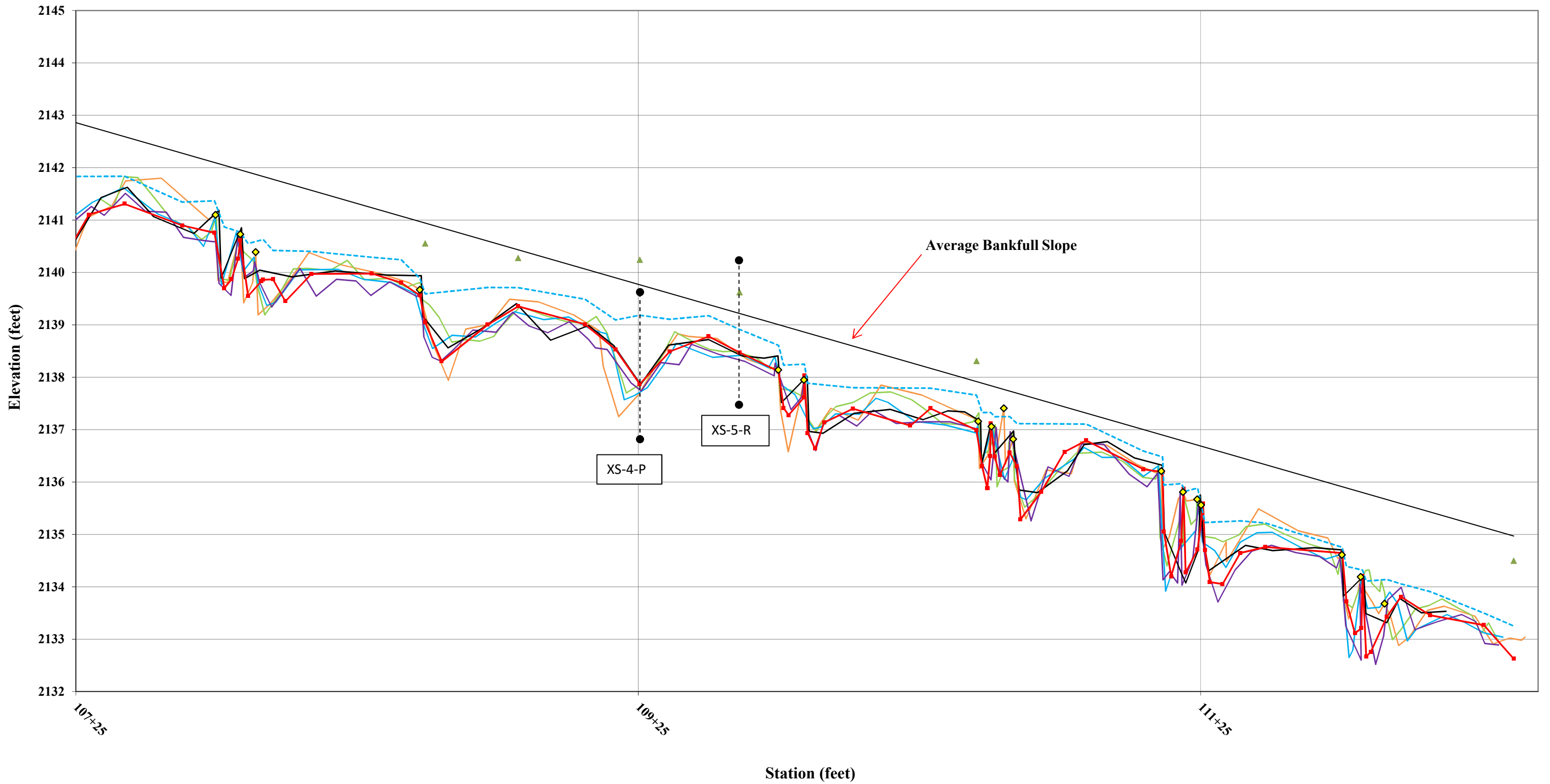


**Bumgarner Branch I
Longitudinal Profile
Staioning 100+37 to 107+27**

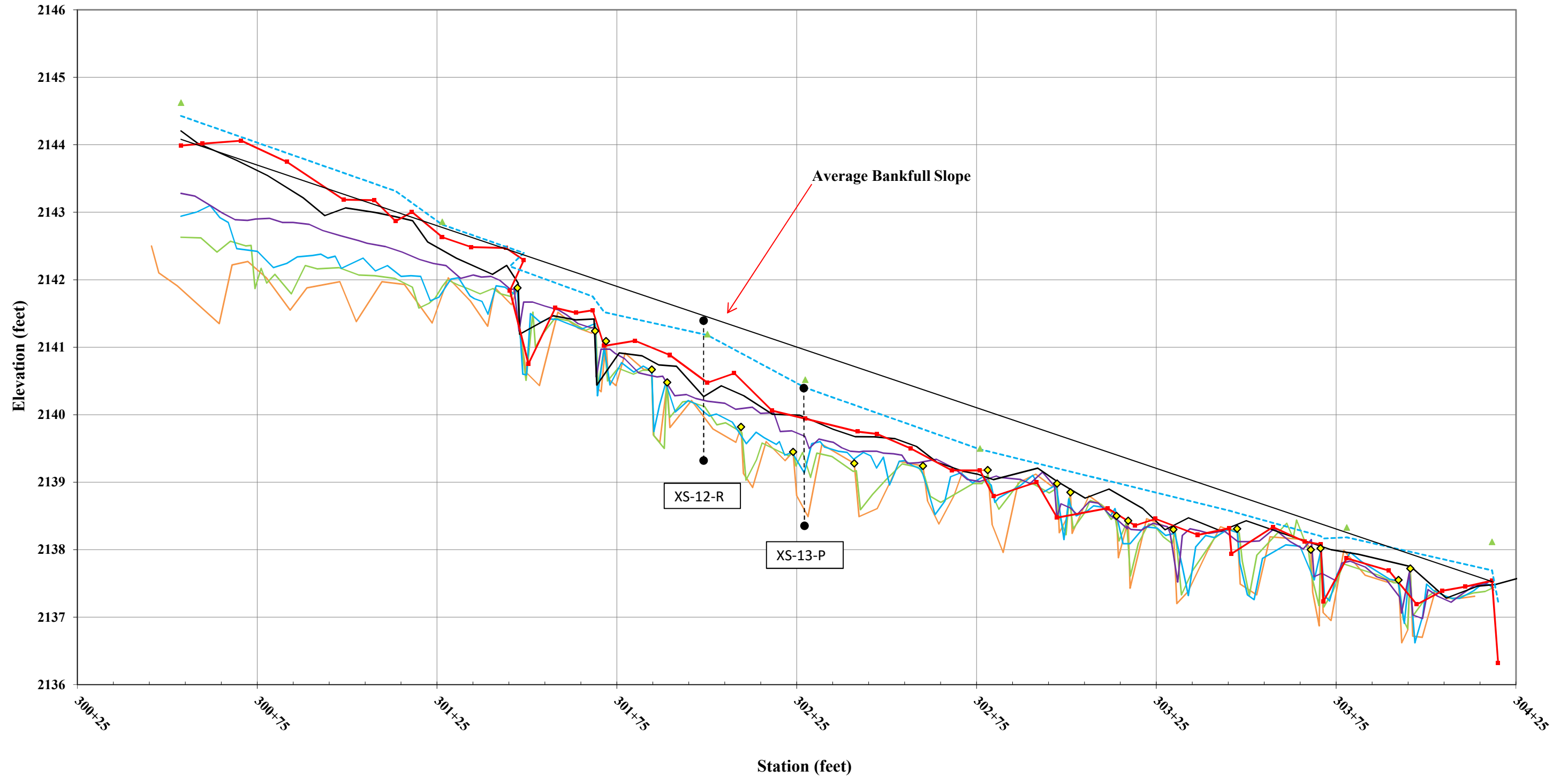


- | | | | | | | | | |
|------------------|------------------|------------------|------------------|-------------------|------------------|-----------------|----|-----|
| TW - MY0 5/10/14 | TW - MY1 1/15/15 | TW - MY2 7/07/15 | TW - MY3 8/10/16 | TW - MY4 12/14/17 | TW - MY5 12/6/18 | Structure - MY0 | WS | BKF |
|------------------|------------------|------------------|------------------|-------------------|------------------|-----------------|----|-----|

**Bumgarner Branch II
Longitudinal Profile
Staioning 107+27 to 112+35**



**Hidgon Branch
Longitudinal Profile
Staioning 300+46 to 304+22**



- | | | | | | | | | |
|------------------|------------------|-------------------|------------------|-------------------|--------------------|-----------------|----|-----|
| TW - MY0 5/10/11 | TW - MY1 1/15/15 | TW - MY2 11/10/15 | TW - MY3 6/28/16 | TW - MY4 12/13/17 | TW - MY5 12/6/2018 | Structure - MY0 | WS | BKF |
|------------------|------------------|-------------------|------------------|-------------------|--------------------|-----------------|----|-----|

**Doris Branch
Longitudinal Profile
Staining 400+00 to 402+82**

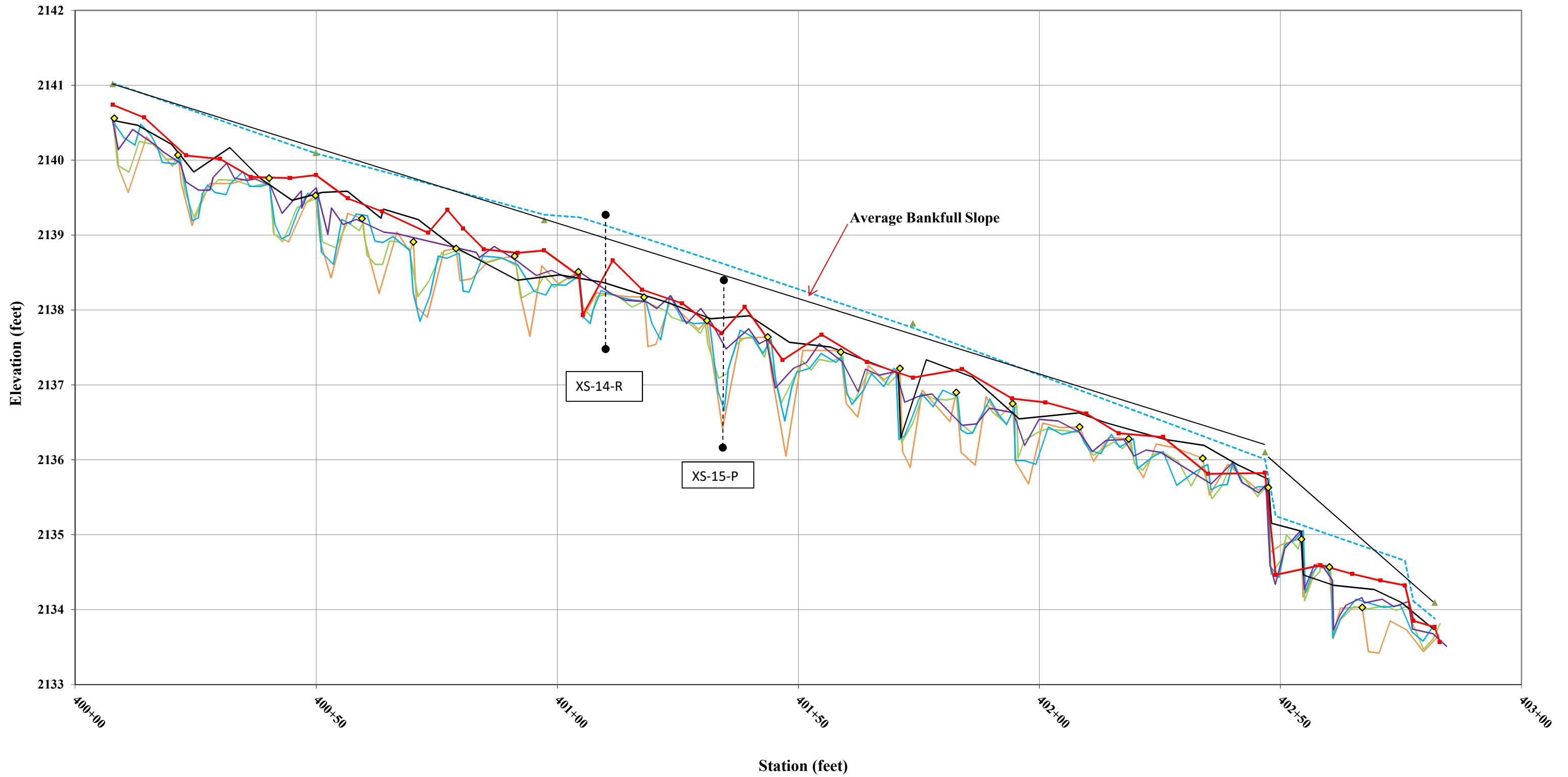


Table 12. Pebble Count Data Summary

Table 12. Pebble Count Data Summary										
Junes Branch										
Stream Reach	MY1 - 2014		MY2 - 2015		MY3 - 2016		MY4 - 2017		MY5 - 2018	
	Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count	
	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)
Bumgarner I	25	63	0.675	54	0.9	27.0	14.5	75	15.3	53.5
Bumgarner II	27	61	6.4	55	6.1	54	57	81	67	110
Junes Branch	6.7	47	0.33	55	2.108	18	10.567	56	13.0333	58.7667
Higdon Branch	15	50	0.13	55	0.062	0.062	0.062	0.062	0.062	0.062
Doris Branch	0.062	32	0.062	7.9	0.062	0.062	0.062	0.062	0.062	0.062

MY5 Stream Reach Substrate Composition Charts 1-6

Chart 1.

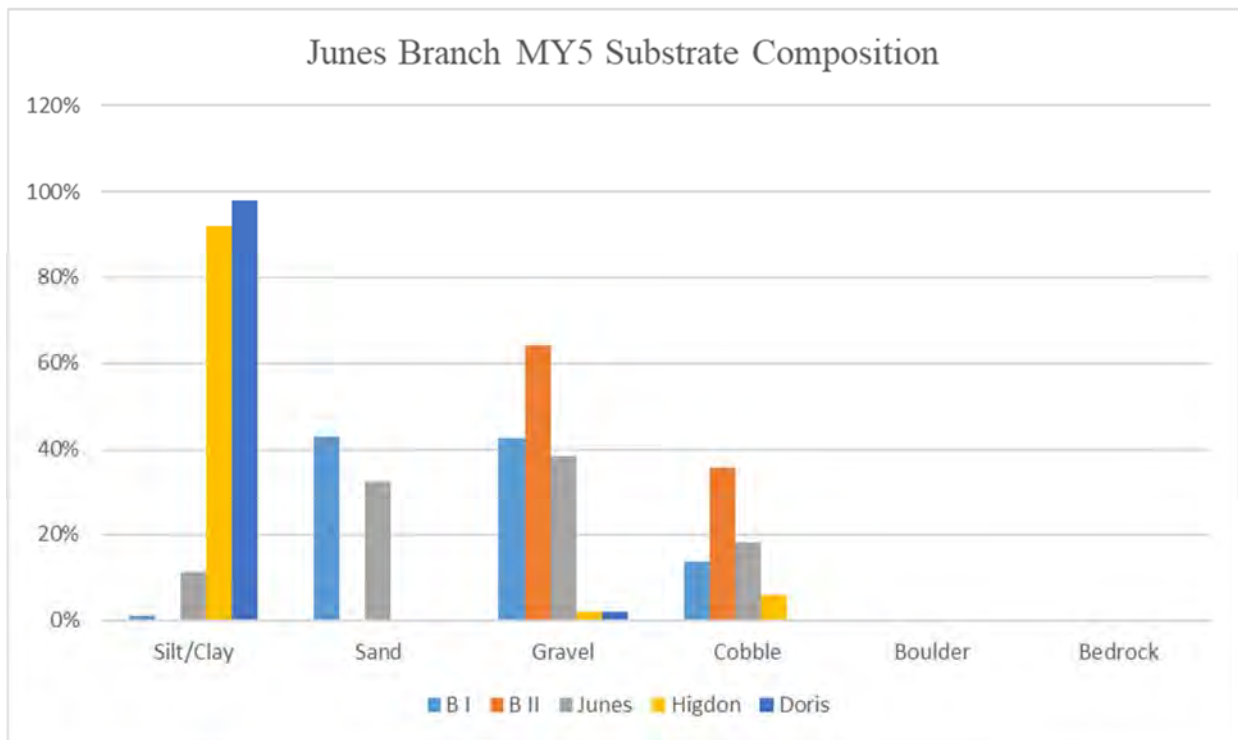


Chart 2.

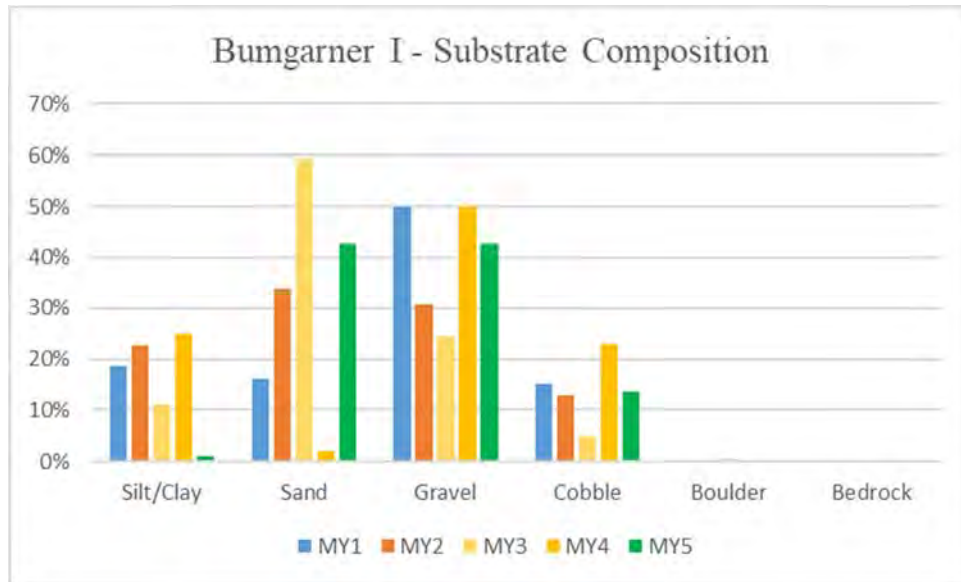


Chart 3.

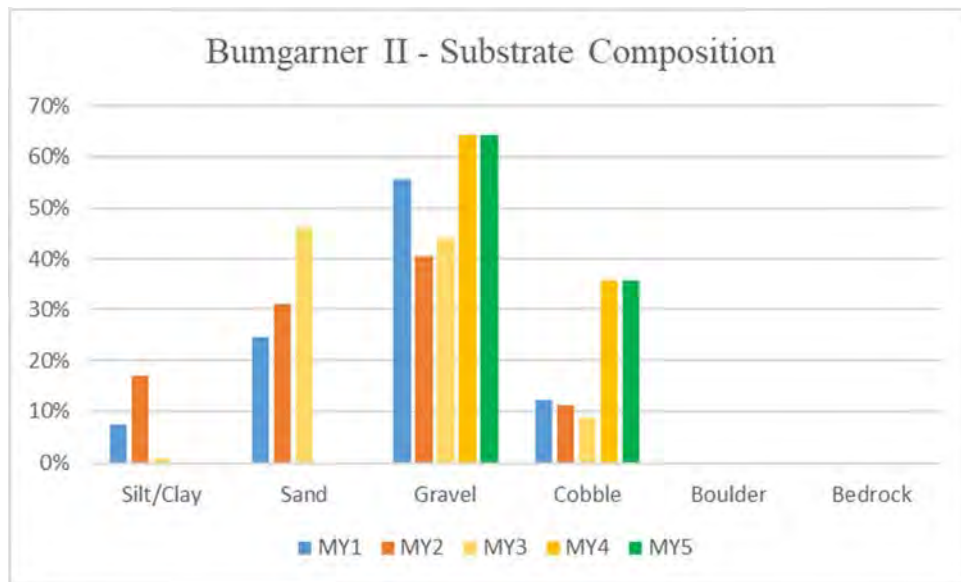


Chart 4.

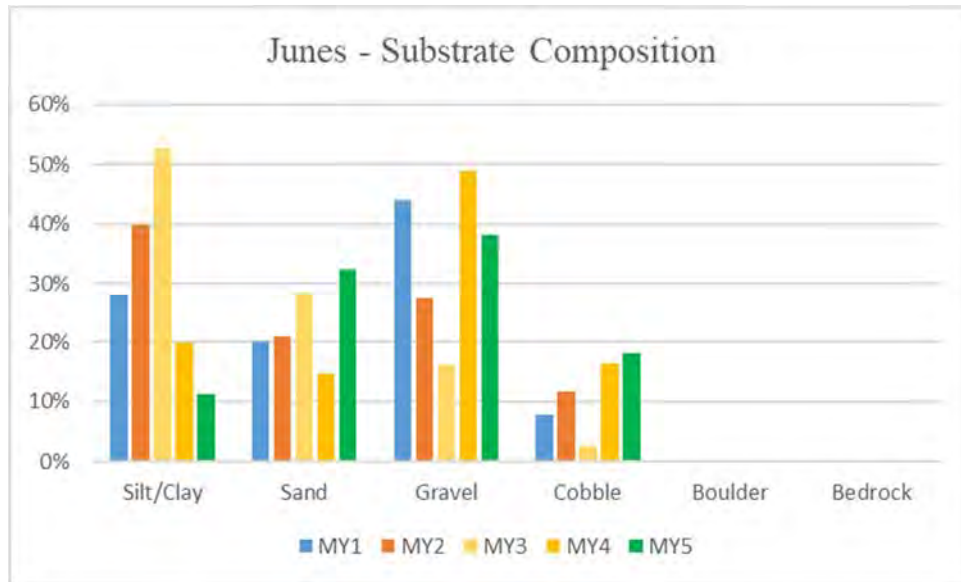


Chart 5.

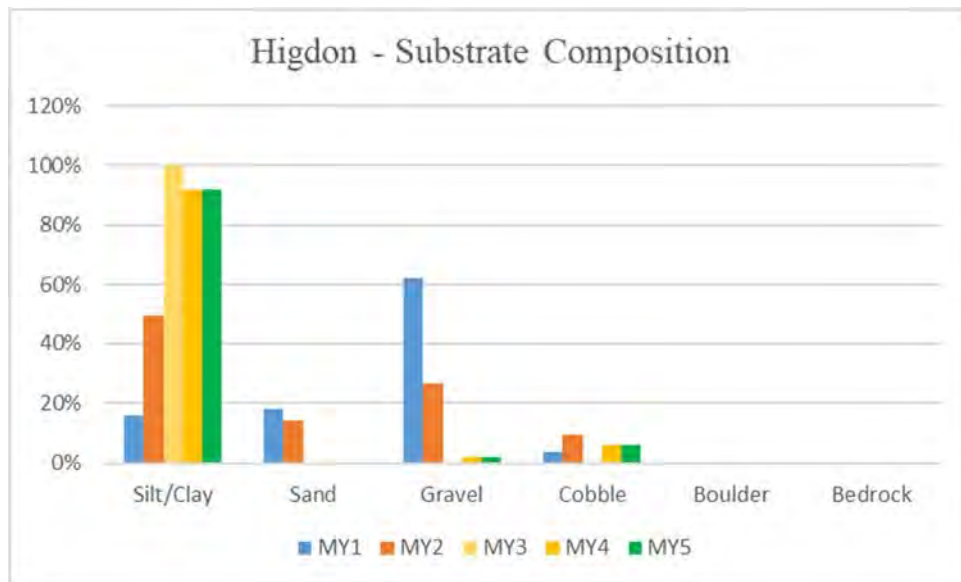
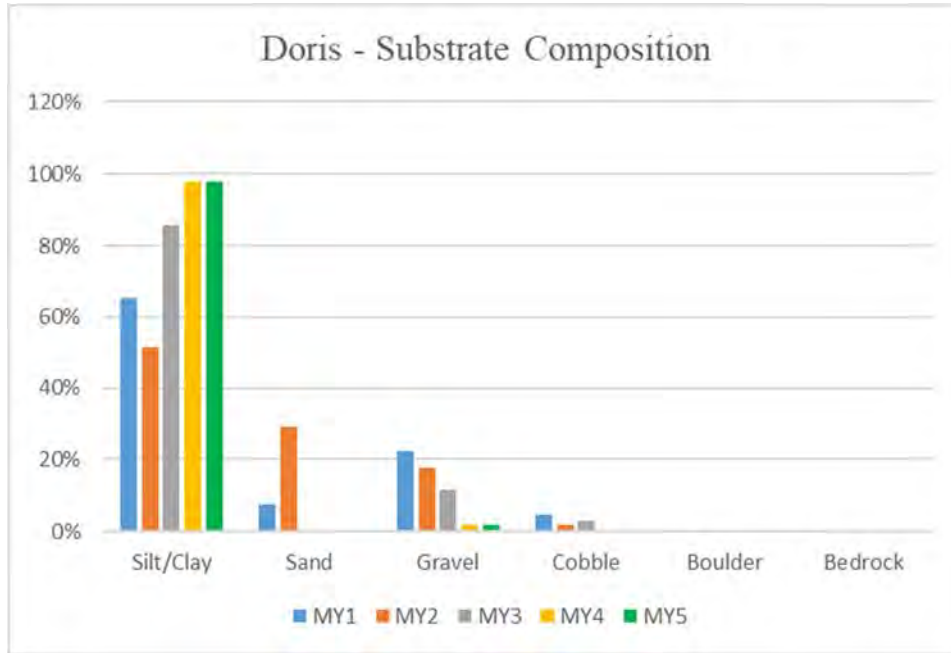


Chart 6.



Appendix E

Hydrology Data

Table 13. Verification of Bankfull Events

Photo Verification of Bankfull Events

Table 14. 2018 Rainfall Summary

Table 13. Verification of Bankfull Events

Junes Branch				
Date of Data Collection	Date of Occurrence	Method	Feet Above Bankfull Elevation	Photo # (if available)
Bumgarner II				
7/28/2015	Unknown	Crest Gauge	0.1	MY2
1/11/2016	Unknown	Crest Gauge	0.23	MY3
6/23/2016	Unknown	Crest Gauge	0.23	MY3
12/4/2018	11/13/2018	Wrack Lines	NA	NA
Junes Branch				
6/23/2016	Unknown	Crest Gauge	0.66	MY3
12/12/2017	8/12/2017	Crest Gauge	0.7	MY4
12/12/2017	10/9/2017	Crest Gauge	0.55	MY4
12/4/2018	11/13/2018	Wrack Lines	NA	NA

Photo Verification of Bankfull Events

N/A

Table 14. 2018 Rainfall Summary

Month	Average	Normal Limits		Cullowhee NCRONOS Station
		30 Percent	70 Percent	
January	4.92	3.36	5.87	3.14
February	4.69	3.22	5.59	6.99
March	5.43	3.83	6.45	5.70
April	3.91	2.51	4.7	4.98
May	4.86	3.49	5.75	7.50
June	4.34	2.73	5.24	5.38
July	4.27	2.76	5.14	6.68
August	3.91	2.29	4.75	4.92
September	3.57	2.07	4.34	3.18
October	3.20	1.51	3.91	4.16
November	4.28	3.28	4.98	6.90
December	4.33	2.98	5.16	9.07
Total	51.71	34.03	61.88	68.60

Appendix F

Memorandum

Junes Branch IRT Site Visit on 4/18/2017 Meeting Summary



MEMORANDUM

To: Paul Wiesner, NCDMS

From: Daniel Ingram, RES

Re: Junes Branch IRT Site Visit on 4/18/2017, DMS project #(95027), FD contract #(003979)

Date: 4/24/2017

Meeting Summary

Date: 4/18/2017, 8:30am to 11:00am

Location: Junes Branch Site, Jackson County

Attendees: Todd Tugwell, Kim Browning, David Brown, and Steve Kichefski (USACE); Mac Haupt (NCDWR); Paul Wiesner and Matthew Reid (NCDMS), Daniel Ingram and Brian Hockett (RES)

RES and NCDMS requested a site visit at Junes Branch during the 2017 Credit Release IRT meeting. Specific items to review were two reaches with sediment aggradation (Doris Branch and Higdon Branch). IRT members also wanted to discuss the monitoring schedule over the previous three years. Junes Branch is entering into Monitoring Year 4 of 5. The IRT intends to revamp the close-out process by providing increased review of monitoring reports and providing feedback in advance of close-out. In light of that approach, the IRT members wanted to walk the entire project area to review all project components. Their comments are presented below by reach. At the outset of the meeting RES presented a detailed monitoring schedule to the IRT and DMS staff (see below). IRT feedback on the schedule was they do not want to see two monitoring events in the same calendar year. RES explained the reasoning behind the schedule, noted that over six months had elapsed between each monitoring event, and noted the lack of clear guidance and interpretation of the mitigation guidelines. Paul W. stated that he approved the compressed monitoring schedule. RES asked what remedy the IRT proposed and was answered that we just shouldn't do it again on other sites, but no specific remedy or consequence for Junes Branch was proposed. RES and DMS noted the clear direction from the IRT and will incorporate these comments into future project activities.

412 N. 4th St. #300
Baton Rouge, LA 70802

1200 Camellia Blvd. #220
Lafayette, LA 70508

1434 Odenton Rd.
Odenton, MD 21113

10055 Red Run Blvd. #130
Owings Mills, MD 21117

302 Jefferson St. #110
Raleigh, NC 27605

33 Terminal Way #431
Pittsburgh, PA 15219

701 E. Bay St. #306
Charleston, SC 29403

5020 Montrose Blvd. #650
Houston, TX 77006

2750 Prosperity Ave. #220
Fairfax, VA 22031

1521 W. Main 2nd Floor
Richmond, VA 23233

3751 Westerre Pkwy. #A
Richmond, VA 23220

5367 Telephone Rd.
Warrenton, VA 20187

137½ East Main St. #210
Oak Hill, WV 25901



Activity	Date of Data Collection	Notes
Earthwork Complete	May 2014	
Planting Complete	May 2014	
As-Built Veg	June 2014	
As-Built Survey	June 2004	
Year 1 Veg	Jan 2015	7 months from As-Built
Year 1 Survey	Jan 2015	7 months from As-Built
Year 2 Veg	Sep 2015	8 months from Year 1
Year 2 Survey	Oct-Nov 2015	9 months from Year 1
Year 3 Veg	June 2016	9 months from Year 2
Year 3 Survey	Aug-Dec 2016	10 months from Year 2

Junes Branch

- No specific problem areas or concerns were noted on Junes Branch.
- Overall the system has a high sediment load but appears to be maintaining appropriate geomorphology.

Bumgarner I and II

- No problems or concerns were noted on Bumgarner I and II.

Higdon Branch

- Sediment accumulation was noted in Higdon Branch, but a defined channel was present.
- No maintenance, remedial actions, or credit deductions were requested by the IRT.

412 N. 4th St. #300
Baton Rouge, LA 70802

1200 Camellia Blvd. #220
Lafayette, LA 70508

1434 Odenton Rd.
Odenton, MD 21113

10055 Red Run Blvd. #130
Owings Mills, MD 21117

302 Jefferson St. #110
Raleigh, NC 27605

33 Terminal Way #431
Pittsburgh, PA 15219

701 E. Bay St. #306
Charleston, SC 29403

5020 Montrose Blvd. #650
Houston, TX 77006

2750 Prosperity Ave. #220
Fairfax, VA 22031

1521 W. Main 2nd Floor
Richmond, VA 23233

3751 Westerre Pkwy. #A
Richmond, VA 23220

5367 Telephone Rd.
Warrenton, VA 20187

137½ East Main St. #210
Oak Hill, WV 25901



Doris Branch

- Sediment accumulation was observed in Doris Branch and distinct channel features are absent along much of the reach.
- No specific maintenance was requested by the IRT.
- Todd T. stated the system appeared to be more of a linear wetland seep.
- Mac H. and David B. both observed that some aquatic function was still provided by the restoration.
- Mac H. commented that a reduced credit ratio, such as 2:1, may be warranted.
- David B. and Paul W. both stated the pre-construction condition was a shallow ditch/swale through a disturbed old field with groundwater flow.
- Based on monitoring data the reach appears to have spring fed perennial flow, but limited watershed size and is lacking channel-forming flow events.
- IRT members did not request any specific remedial actions and recommended a final decision on crediting be made after additional monitoring.

412 N. 4th St. #300
Baton Rouge, LA 70802

1200 Camellia Blvd. #220
Lafayette, LA 70508

1434 Odenton Rd.
Odenton, MD 21113

10055 Red Run Blvd. #130
Owings Mills, MD 21117

302 Jefferson St. #110
Raleigh, NC 27605

33 Terminal Way #431
Pittsburgh, PA 15219

701 E. Bay St. #306
Charleston, SC 29403

5020 Montrose Blvd. #650
Houston, TX 77006

2750 Prosperity Ave. #220
Fairfax, VA 22031

1521 W. Main 2nd Floor
Richmond, VA 23233

3751 Westerre Pkwy. #A
Richmond, VA 23220

5367 Telephone Rd.
Warrenton, VA 20187

137½ East Main St. #210
Oak Hill, WV 25901