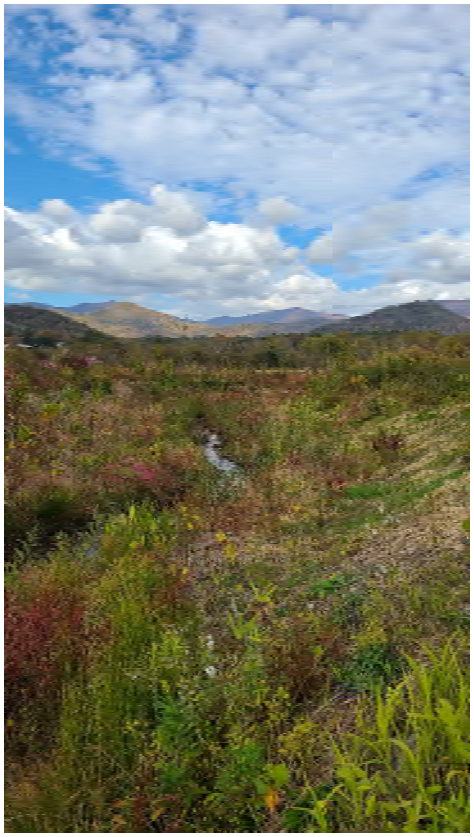
FINAL
MONITORING REPORT (MY1)

WARREN WILSON COLLEGE STREAM MITIGATION SITE
Buncombe County, North Carolina

NCDMS Project ID No. 100019
Full Delivery Contract No. 7188
USACE Action ID No. SAW-2017-01557
NCDWR No. 20171158
RFP No. 16-006991 (Issued: 9/16/16)

French Broad River Basin
Cataloging Unit 06010105

Data Collection: January - November 2020
Submission: January 2021



Prepared for:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1652

Mitigation Project Name	**Warren Wilson College**	**USACE Action ID**	**2017-01557**
DMS ID	**100019**	**DWR Permit**	**2017-1158**
River Basin	**French Broad**	**Date Project Instituted**	**5/22/2017**
Cataloging Unit	**06010105**	**Stream/Wet. Service**	**French Broad 06010105**
County	**Buncombe**	**Date Printed**	**10/1/2020**

BROWNING.KIMBERLY.DANIELLE.1527683510 Digitally signed by BROWNING.KIMBERLY.DANIELLE.1527683510
Date: 2020.10.05 11:02:35 -04'00'

Signature of Official Approving Credit Release

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

2 - For NCDMS projects, the initial credit release milestone occurs when the as-built report (baseline monitoring report) has been approved by the NCIRT and posted to the NCDMS Portal, provided the following criteria have been met:

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

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

Credit Release Milestone	**Cold Stream Credits**						
Project Credits	**Scheduled Releases %**	**Estimated Scheduled Release #**	**Proposed Released #**	**Not Approved # Releases**	**Approved Credits**	**Anticipated Release Year**	**Actual Release Date**
1 - Site Establishment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2 - Year 0 / As-Built	30.00%	3,015.280	3,015.280	0.000	3,015.280	2019	10/1/2020
3 - Year 1 Monitoring	10.00%	1,005.093				2020	
4 - Year 2 Monitoring	10.00%	1,005.093				2021	
5 - Year 3 Monitoring	10.00%	1,005.093				2022	
6 - Year 4 Monitoring	5.00%	502.547				2023	
7 - Year 5 Monitoring	10.00%	1,005.093				2024	
8 - Year 6 Monitoring	5.00%	502.547				2025	
9 - Year 7 Monitoring	10.00%	1,005.093				2026	
Stream Bankfull Standard	10.00%	1,005.093				2022	
			Totals		3,015.280		

Total Gross Credits	10,050.933
Total Unrealized Credits to Date	0.000
Total Released Credits to Date	3,015.280
Total Percentage Released	30.00%
Remaining Unreleased Credits	7,035.653

Notes

Contingencies (if any)

Project Quantities

Mitigation Type	**Restoration Type**	**Physical Quantity**
Cold Stream	Restoration	9,220.000
Cold Stream	Enhancement I	62.000
Cold Stream	Enhancement II	1,974.000

NCDMS Comment Responses:

- **Report Cover Pages (2):** Please also provide the date of issuance with the RFP#: ***RFP# 16-006991 (Issued: 9/16/16)***.
  The RFP date of issuance was added to the cover pages.

- **General:** Please include RS's comment responses to the IRT's MY0/ As-Built Baseline Monitoring Report comments issued via email on 10/5/20. The IRT comments and RS comment responses should be included in the final MY1 report appendices.
  RS's responses to the IRT's MY0 comments have been included as Appendix G.

- **Site Permitting/Monitoring Activity and Reporting History Table & Table 2:** Please remove the RFP Issuance date and RFP Opening date rows from the tables. The RFP # and issuance date are included on the report covers. The RFP opening date is not applicable.
  The RFP Issuance and opening date entries were removed from table 2.

- **Section 1.1 Project Goals and Objectives:** #6 - 31.2 x 1011 colonies [col] should be updated to 31.2 x 10^{11} colonies [col].
  This number was updated.

- **Section 1.2 Project Background:** "*Creditable stream removed from the easement were also removed from mitigation assets.*" In the report text, please also note that a mitigation plan addendum for the reduction in project credit was submitted to the IRT as part of the MY0/ As-Built Baseline Monitoring Report review and was approved by the IRT via email on 10/5/2020.
  This was noted in the text.

- **Section 2.0: Methods:** Per RFP 16-006991, each annual monitoring report must be submitted to the DMS by December 1st of the year during which the monitoring was conducted. Please update the text accordingly.
  The text was revised to indicate the December 1st deadline.

- **Section 2.1 Monitoring/ Wetland Summary:** Please include soil temperature data and bud burst documentation (photos) in the report appendices to substantiate the growing season start date of March 16, 2020. The location of the data should be referenced in the report text.
  Bud burst photos and the soil temperature graph (Figure E-1) were added to Appendix E and are referenced in the footnote of the "Summary of Monitoring Period/Hydrology Success Criteria by Year" table in section 2.1.

- **Section 2.1 Monitoring/ Vegetation Summary:** Please include a brief explanation of Plot 11 not meeting the established success criteria. The explanation should be similar to what is provided in the initial monitoring summary after the first MY1 cover page. Please also report if any supplemental planting is proposed in MY2 (2021).
  An explanation for plot 11 was added to the Vegetation Summary. No supplemental planting is planned at this time, and this is indicated in the report.

- **CCPV Map (Figure 2) & Table 6:** No invasive areas are shown on the CCPV map or reported in Table 6. Please confirm that current invasives on the site are beneath the mapping threshold (1,000 SqF) or revise the CCPV map and table as necessary.
  Invasive species occurrences are scattered and are all currently below the mapping threshold. With the 2020 invasive treatments, it is not expected that invasives will be an issue, but if they increase in area to a point at or above mapping threshold during MY2 (2021), they will be reported in the annual monitoring report.

- **Appendix D – Cross Sections:** The bankfull line appears to be missing on some of the cross-sections provided. Please review and update as necessary.
  When the bankfull elevations (dashed blue lines) were close to or equal to the MY-00 TOB (solid green lines), they were covered and were not visible. The bankfull lines have been brought to the front of the display order on the cross-section figures, so both lines are now visible when the elevations are the same.

WWC Year 1, 2020 Monitoring Summary

General Notes

- No encroachment was identified in Year 1
- No evidence of nuisance animal activity (i.e., beaver, heavy deer browsing, etc.) was observed.

Streams

- Stream monitoring show that all stream channels and structures are stable.

Wetlands

- Overall, based on groundwater gauge data, wetland hydrology improved from pre-construction conditions to year 1 (2020). Nine out of ten gauges displayed hydroperiods greater than 10% of the growing season during year 1 (2020); however, no wetland mitigation credit is being generated by site wetlands.

Vegetation

- During quantitative vegetation sampling, 25 sample plots (10-meter by 10-meter) were installed within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). Year 1 (2020) vegetation measurements occurred October 19-21, 2020 and included 4 additional random sample plots (50-meter by 2-meter). Measurements of all 29 plots resulted in an average of 672 planted stems/acre excluding livestakes. Additionally, all individual plots met success criteria except plot 11 (Tables 8-10, Appendix C). Plot 11 is located in a wetland area adjacent to Gauge 8 that was meeting wetland success 231 consecutive days. This area may need additional planting of a more wet tolerant species.

Site Permitting/Monitoring Activity and Reporting History

Activity or Deliverable	Data Collection Complete	Completion or Delivery
RFP No. 16-006991 Issuance Date	--	September 16, 2016
RFP No. 16-006991 Opening Date	--	February 15, 2017
Institution Date (NCDMS Contract No. 100014)	--	May 22, 2017
Mitigation Plan	March 2018	November 2018
Construction Plans	--	January 10, 2020
404 Permit	--	May 13, 2019
Site Construction	--	March 4, 2020
Planting	--	March 16, 2020
As-built Baseline Monitoring (MY0)	January-March 2020	August 2020
Annual Monitoring (MY1)	November 2020	January 2021

Site Maintenance Report (2020)

Invasive Species Work	Maintenance work
7-27-2020-Kudzu, Rose, Privet, Honeysuckle, English Ivy 10-8-2020- Kudzu, Princess Tree, Privet, Rose, Japanese Bittersweet, Honeysuckle	N/A

FINAL
MONITORING REPORT (MY1)

WARREN WILSON COLLEGE STREAM MITIGATION SITE
Buncombe County, North Carolina

NCDMS Project ID No. 100019
Full Delivery Contract No. 7188
USACE Action ID No. SAW-2017-01557
NCDWR No. 20171158
RFP No. 16-006991 (Issued: 9/16/16)

French Broad River Basin
Cataloging Unit 06010105

Data Collection: January - November 2020
Submission: January 2021

Prepared for:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1652

Prepared by:

Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, North Carolina 27604
Contact: Worth Creech
919-755-9490 (phone)
919-755-9492 (fax)

Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603
Contact: Grant Lewis
919-215-1693 (phone)

TABLE OF CONTENTS

APPENDICES

1.0 PROJECT SUMMARY

Restoration Systems, LLC has established the North Carolina Division of Mitigation Services (NCDMS) Warren Wilson College Stream Restoration Site (Site).

1.1 Project Goals & Objectives

Stressors documented in the *French Broad River Basin Restoration Priorities* (RBRP) report (NCEEP 2009) include habitat degradation, poor riparian buffers, nutrient enrichment, channelization, sedimentation, and toxicity primarily attributed to urban and residential runoff and development.

Within the Site, stressors prior to construction could further be attributed to soil instability, increased runoff, and water quality impairments in the receiving watersheds. The project is not located in a Regional or Local Watershed Planning Area; however, the RBRP goals outlined below are addressed by project activities as follows (Site-specific information follows each RBRP goal in parentheses).

1. Reduce sediment inputs (based on the sediment model, Site construction eliminates approximately 228 tons per year [tons/year] of sediment that resulted from streambank erosion, excessive fines from channel straightening, channel incision, lack of cobble substrate in disturbed reaches, and a narrow or absent riparian buffer)
2. Reduce nutrient inputs (based on the nutrient model, Site construction eliminates 657.4 pounds per year [lbs/yr] of nitrogen and 54.5 lbs/yr of phosphorus due to the installation of marsh treatment areas, removal of preconstruction land uses and livestock, and elimination of fertilizer application)
3. Restore riparian buffers (removal of preconstruction land uses and livestock, control of invasive species, and approximately 19.6 acres of woody riparian buffers were planted adjacent to streams)
4. Stabilize streambanks (restored stable channels at the historic floodplain elevation, and enhanced oversized and incised channels by raising the stream invert and using grade control/habitat structures)
5. Restore and/or protect aquatic habitat (restored aquatic habitat in restoration and enhancement [Level I] reaches by installing grade control/habitat structures, coarsening channel bed materials, removing nutrient inputs, and planting woody riparian buffers to provide shade and organic matter to streams)
6. Reduce fecal coliform inputs (based on the nutrient model, Site construction eliminates 31.2×10^{11} colonies [col] of fecal coliform per day by removing preconstruction land uses and livestock and treating agricultural runoff with marsh treatment areas)
7. Implement agricultural best management practices (BMPs) (the easement is fenced to eliminated livestock from accessing the easement and marsh treatment areas were installed).

Site specific mitigation goals and objectives were developed through the use of North Carolina Stream Assessment Method (NC SAM) analyses of preconstruction and reference stream systems at the Site (NC SFAT 2015) (see Table 1).

Stream/Wetland Targeted Functions, Goals, and Objectives

Targeted Functions	Goals	Objectives	Compatibility of Success Criteria
(1) HYDROLOGY			
(2) Flood Flow (Floodplain Access) (3) Streamside Area Attenuation (4) Floodplain Access (4) Wooded Riparian Buffer (4) Microtopography	• Attenuate flood flow across the Site. • Minimize downstream flooding to the maximum extent possible. • Connect streams to functioning wetland systems.	• Construct new channel at historic floodplain elevation to restore overbank flows and enhance existing jurisdictional wetlands • Plant woody riparian buffer • Remove livestock and cease agricultural practices within areas protected by the conservation easement. • Deep rip floodplain soils to reduce compaction and increase soil surface roughness • Protect riparian buffers with a perpetual conservation easement	• BHR not to exceed 1.2 • Document four overbank events in separate monitoring years • Livestock excluded from the easement • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded
(3) Stream Stability (4) Channel Stability (4) Sediment Transport (4) Thermoregulation (4) Stream Geomorphology	• Increase stream stability within the Site so that channels are neither aggrading nor degrading.	• Construct channels with proper pattern, dimension, longitudinal profile, and substrate • Remove livestock and cease agricultural practices within areas protected by the conservation easement. • Construct stable channels with gravel substrate • Stabilize streambanks • Plant woody riparian buffer	• Cross-section measurements and visual assessments indicate stable channels and structures • BHR not to exceed 1.2 • ER of 1.4 or greater • < 10% change in BHR and ER • Livestock excluded from the easement • Attain Vegetation Success Criteria
(1) WATER QUALITY			
(2) Streamside Area Vegetation (3) Upland Pollutant Filtration (2) Indicators of Stressors	• Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters.	• Remove livestock and reduce agricultural land/inputs • Install marsh treatment areas • Plant woody riparian buffer • Enhance jurisdictional wetlands adjacent to Site streams • Provide surface roughness and reduce compaction through deep ripping/plowing • Restore overbank flooding by constructing channels at historic floodplain elevation	• Livestock excluded from the easement • Attain Vegetation Success Criteria
(1) HABITAT			
(2) In-stream Habitat (3) Substrate (3) Stream Stability (3) In-Stream Habitat (2) Stream-side Habitat (3) Stream-side Habitat (3) Thermoregulation	• Improve instream and stream-side habitat.	• Construct stable channels with gravel substrate • Plant woody riparian buffer to provide organic matter and shade • Construct new channel at historic floodplain elevation to restore overbank flows • Protect riparian buffers with a perpetual conservation easement • Enhance jurisdictional wetlands adjacent to Site streams • Remove invasive plant species • Add large woody debris to Site channels	• Cross-section measurements and visual assessments indicate stable channels and structures. • Attain Vegetation Success Criteria • Conservation Easement recorded

1.2 Project Background

The Warren Wilson College Stream Mitigation Site (hereafter referred to as the "Site") encompasses a 25.3-acre easement (pending easement modification) along cold-water, unnamed tributaries (UTs) to the Swannanoa River. Warren Wilson College occupies approximately 1200 acres, and the Site is part of an actively managed farm and forest system on the Warren Wilson College property that includes livestock management areas, pastureland, agricultural row crops, and a sustainably managed forest. The Site is located approximately 2 miles west of Swannanoa and 5 miles east of Asheville in Buncombe County, North Carolina (Figure 1, Appendix A).

Prior to construction, the Site consisted of agricultural and managed forest land accessible to livestock. Site streams were part of an actively managed farm and forest system that included livestock, pastureland, agricultural row crops, and sustainable forest management. Streams were eroded vertically and laterally, received extensive sediment and nutrient inputs, and were dredged and straightened and/or rerouted to the floodplain edge. Preconstruction Site conditions resulted in degraded water quality, a loss of aquatic habitat, reduced nutrient and sediment retention, and unstable channel characteristics (loss of horizontal flow vectors that maintain pools and an increase in erosive forces to channel bed and banks). Site restoration activities restored riffle-pool morphology, aided in energy dissipation, increased aquatic habitat, stabilized channel banks, and greatly reduced sediment loss from channel banks.

<u>Preconstruction Groundwater Gauges:</u>
Preconstruction groundwater gauges were installed along UT-3 upper (Clingman's) upon the request of IRT members to model pre-construction wetland characteristics. Data was collected for 2018 and the beginning of 2019 within gauges nested in transects perpendicular to the existing channel. In addition, a crest gauge along the existing incised reach was installed to measure overbank events.

Results of preconstruction gauge data, included in Table 12 (Appendix F, indicate that gauges near the incised stream showed reduced hydroperiod as compared to those further from the channel. 2018 exhibited normal rainfall patterns, and one gauge appeared to meet jurisdictional criteria based on groundwater level being within 12 inches of the surface for 12.5% of the growing season (26 days, based on the NRCS growing season of April 2 to November 1). 2019 exhibited wetter than average rainfall patterns, and six gauges appeared to meet the same jurisdictional criteria. In addition, the crest gauge installed on UT-3 showed no overbank events during 2018 and one during 2019 after a 4.56-inch rainfall.

1.3 Project Components and Structure

Proposed Site restoration activities generated 10,050.933 Stream Mitigation Units (SMUs – pending easement modification) as the result of the following.

- Restored 9220 linear feet of perennial stream channel by constructing stable streams in the historic floodplain location and elevation.
- Enhanced (Level I) 62 linear feet of stream by installing in-stream structures, providing proper channel dimension and appropriate floodplain width, reducing shear on eroding

banks, controlling invasive species within the riparian area, and planting with native riparian vegetation.
- Enhanced (Level II) 1974 linear feet of stream channel by removing current land use practices, controlling invasive species within the riparian area, and planting native vegetation.

Additional activities that occurred at the Site included the following.
- Installation of four marsh treatment areas to treat stormwater runoff before it enters Site streams.
- Established a minimum 30-foot-wide woody riparian buffer adjacent to Site streams,
- Fenced the conservation easement boundaries in areas used for livestock management.
- Protected the Site in perpetuity with a conservation easement.

Deviations from the construction plans included the modifications of two grade control structures. A log vane structure along the lower portion of reach UT-6B was constructed with boulders in order to accommodate the culverted crossing just upstream. Additionally, a vane arm was removed from a log vane along the upper portion of reach UT-7A in order to avoid the destruction of a mature black walnut tree. The log sill was constructed as designed and is holding grade. These changes are depicted on the As-built Plan Sheets (Appendix E). Also, HDPE pipe was replaced with corrugated metal pipe throughout the project at the request of USFWS.

Additionally, during the initial DMS as-built review, it was discovered that several culvert pipes extend into the recorded conservation easement. Once the encroachments were located and documented via GPS, easement modifications were initiated to remove any crossing materials from the conservation easement. Creditable stream removed from the easement were also removed from mitigation assets. A mitigation plan addendum for the reduction in project credit was submitted to the IRT as part of the MY0/ As-Built Baseline Monitoring Report review and was approved by the IRT via email on October 5, 2020.

Site design was completed on January 10, 2020. Construction started on September 1, 2019 and ended within a final walkthrough on March 4, 2020. Site planting was completed on March 16, 2020. Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 1-4 (Appendix A).

1.4 Success Criteria

Project success criteria have been established per the October 24, 2016 NC Interagency Review Team *Wilmington District Stream and Wetland Compensatory Mitigation Update*. Monitoring and success criteria relate to project goals and objectives. From a mitigation perspective, several of the goals and objectives are assumed to be functionally elevated by restoration activities without direct measurement. Other goals and objectives will be considered successful upon achieving success criteria. The following table summarizes Site success criteria.

Success Criteria

Streams
• All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05. • Continuous surface flow must be documented each year for at least 30 consecutive days. • Bank height ratio (BHR) cannot exceed 1.2 at any measured cross-section. • Entrenchment ratio (ER) must be no less than 2.2 for E- and C-type channels at any measured riffle cross-section. • BHR and ER at any measure riffle cross-section should not change by more than 10% from baseline condition during any given monitoring period. • The stream project shall remain stable and all other performance standards shall be met through four separate bankfull events, occurring in separate years, during the monitoring years 1-7.
Wetland Hydrology
• Groundwater gauge data will be used to observe fluctuations in groundwater hydrology pre- and postconstruction as the result of overbank events; however, no wetland mitigation credit is being acquired and there are no wetland hydrology success criteria proposed at this time. • Jurisdictional wetland adjacent to UT-3 will demonstrate a 10 to 20% increase in wetland hydrology as compared to pre-construction hydrology, under similar climactic conditions.
Vegetation
• Within planted portions of the site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 5; and a minimum of 210 stems per acre must be present at year 7.   • Areas of dense river cane (canebrakes) are a natural niche habitat within the Swannanoa River floodplain that contribute native habitat for endangered species. River cane may outcompete woody seedlings during the initial establishment of vegetation. Within the Swannanoa floodplain (UT-6, UT-7, and UT-8), the presence of canebrakes may supersede the vegetative success criteria for planted stems per acre. • Trees must average 6 feet in height at year 5, and 8 feet in height at year 7 in each plot. • Planted and volunteer stems are counted, provided they are included in the approved planting list for the site; natural recruits not on the planting list may be considered by the IRT on a case-by-case basis.

2.0 METHODS

Monitoring requirements and success criteria outlined in this plan follow the October 24, 2016 NC Interagency Review Team *Wilmington District Stream and Wetland Compensatory Mitigation Update*. Monitoring will be conducted by Axiom Environmental, Inc. Annual monitoring reports of the data collected will be submitted to the NCDMS by Restoration Systems no later than December 1 of each monitoring year data is collected. The monitoring schedule is summarized in the following table.

Monitoring Schedule

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Streams	■	■	■		■		■
Wetlands	■	■	■	■	■	■	■
Vegetation	■	■	■		■		■
Visual Assessment	■	■	■	■	■	■	■
Report Submittal	■	■	■	■	■	■	■

2.1 Monitoring

The monitoring parameters are summarized in the following table.

Monitoring Summary

Stream Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Stream Profile	Full longitudinal survey	As-built (unless otherwise required)	All restored stream channels	Graphic and tabular data.
Stream Dimension	Cross-sections	Years 1, 2, 3, 5, and 7	Total of 50 cross-sections on restored channels	Graphic and tabular data.
Channel Stability	Visual Assessments	Yearly	All restored stream channels	Areas of concern to be depicted on a plan view figure with a written assessment and photograph of the area included in the report.
	Additional Cross-sections	Yearly	Only if instability is documented during monitoring	Graphic and tabular data.
Stream Hydrology	Continuous monitoring surface water gauges and trail cameras	Continuous recording through monitoring period	Total of 3 surface water gauges (UT3, UT6, & UT8)	Surface water data for each monitoring period
Bankfull Events	Continuous monitoring surface water gauges and trail cameras	Continuous recording through monitoring period	Total of 3 surface water gauges (UT3, UT6, & UT8)	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through monitoring period	All restored stream channels	Visual evidence, photo documentation, and/or rain data.
Wetland Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Wetland Rehabilitation	Groundwater gauges	Preconstruction, As-built, Years 1-7	10 gauges in wetlands adjacent to UT1[+], UT3*[+], & UT6[+]	Graphic and tabular data.
Vegetation Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Vegetation establishment and vigor	Permanent vegetation plots 0.0247 acre (100 square meters) in size; *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008)	As-built, Years 1, 2, 3, 5, and 7	25 plots spread across the Site	Species, height, planted vs. volunteer, stems/acre
	Annual random vegetation plots, 0.0247 acre (100 square meters) in size	As-built, Years 1, 2, 3, 5, and 7	Number of randomly selected plots to be determined each year. as needed	Species

* Seven groundwater monitoring gauges were installed in jurisdictional wetland areas adjacent to UT-3 to take measurements before and after hydrological modifications were performed at the Site. The preconstruction condition of the upper reach of UT-3 was an incised Eg-type channel with bank-height-ratios ranging from 1.8-2.4. The majority of UT-3 upper has been restored (priority I) with construction of channels at the historic floodplain elevation to restore overbank flows to adjacent wetlands. A stream flow gauge and trail camera were installed on UT-3 upper to verify overbank events. Groundwater gauge data will be used to observe fluctuations in groundwater hydrology pre- and post-construction as the result of overbank events; however, no wetland mitigation credit is being acquired and there are no wetland hydrology success criteria proposed at this time.

[+] Three groundwater gauges were installed, one adjacent to UT-1, one adjacent to UT-3 lower, and one adjacent to UT-6, in order to show no net loss in function, due to project activities, in existing wetlands along these tributaries. In order to monitor an area of potential wetland creation associated with stream channel restoration, two additional gauges (gauges 4 and 5) were installed along the right bank of UT-3 upper. This area was previously determined non-jurisdictional.

Stream Summary

All streams are functioning as designed, and no stream areas of concern were observed during year 1 (2020) monitoring. Stream morphology data is available in Appendix D.

Wetland Summary

Summary of Monitoring Period/Hydrology Success Criteria by Year

Year	Soil Temperatures/Date Bud Burst Documented	Monitoring Period Used for Determining Success	10 Percent of Monitoring Period
2020 (Year 1)	March 16, 2020*	March 16-November 1 (231 days)	23 days

*Based on observed/documented bud burst and data collected from a soil temperature data logger located on the Site (Figure E-1, Appendix E).

Overall, based on groundwater gauge data, wetland hydrology improved from pre-construction conditions to year 1 (2020). Nine out of ten gauges displayed hydroperiods greater than 10% of the growing season during year 1 (2020); however, no wetland mitigation credit is being generated by site wetlands. Wetland habitat adjacent to reach UT-3B (Clingman's/Little Berea) experienced increased inundation periods and improved hydrology following stream restoration. In 2019, gauges 1A, 1B, and 1C (Figure 3, Appendix F) were inundated from 1% to 27% of the growing season; whereas, in year 1 (2020), gauges 3, 4, and 5, which were installed in approximately the same locations (Figure 2, Appendix B), were inundated from 14% to 75%. Additionally, in 2019, gauges 3A, 3B, and 3C (Figure 3, Appendix F) ranged from 1% to 65% inundation; whereas, during year 1 (2020), gauges 6, 7, and 8, which were installed in approximately the same locations (Figure 2, Appendix B), ranged from 31% to 100% (Table 17, Appendix E and Table 18, Appendix F). Although several gauge malfunctions throughout the year 1 (2020) growing season hindered data collection, overall improvements in wetland hydrology were recorded in areas adjacent to UT-3B.

Vegetation Summary

During quantitative vegetation sampling, 25 sample plots (10-meter by 10-meter) were installed within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). Year 1 (2020) vegetation measurements occurred October 19-21, 2020 and included 4 additional random sample plots (50-meter by 2-meter). Measurements of all 29 plots resulted in an average of 672 planted stems/acre excluding livestakes. Additionally, all individual plots met success criteria except plot 11 (Tables 8-10, Appendix C). Plot 11 is in a wetland area adjacent to Gauge 8 that was meeting wetland success 231 consecutive days. This area may need additional planting of a more wet tolerant species. RS will evaluate this area during MY2 (2021) monitoring; however, no supplemental planting is currently proposed.

3.0 REFERENCES

Griffith, G.E., J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelbourne. 2002. Ecoregions of North Carolina and South Carolina. U.S. Geological Survey, Reston, Virginia.

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

North Carolina Division of Mitigation Services (NCDMS). 2014. Stream and Wetland Mitigation Monitoring Guidelines. North Carolina Department of Environmental Quality, Raleigh, North Carolina.

North Carolina Ecosystem Enhancement Program (NCEEP), 2009. French Broad River Basin Restoration Priorities 2009 (online). Available at: https://ncdenr.s3.amazonaws.com/s3fspublic/PublicFolder/Work%20With/Watershed%20Planners/French_Broad_RBRP_15july09.pdf [June 1, 2016]. North Carolina Department of Environment and Natural Resources, Raleigh.

North Carolina Stream Functional Assessment Team. (NC SFAT 2015). N.C. Stream Assessment Method (NC SAM) User Manual. Version 2.1.

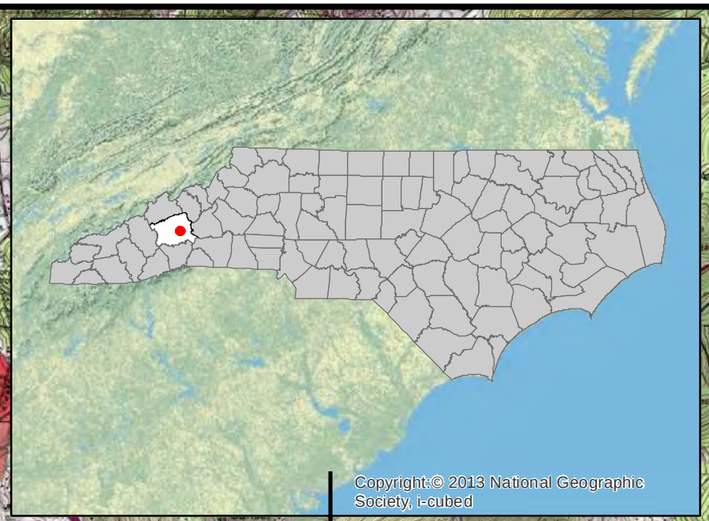
Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

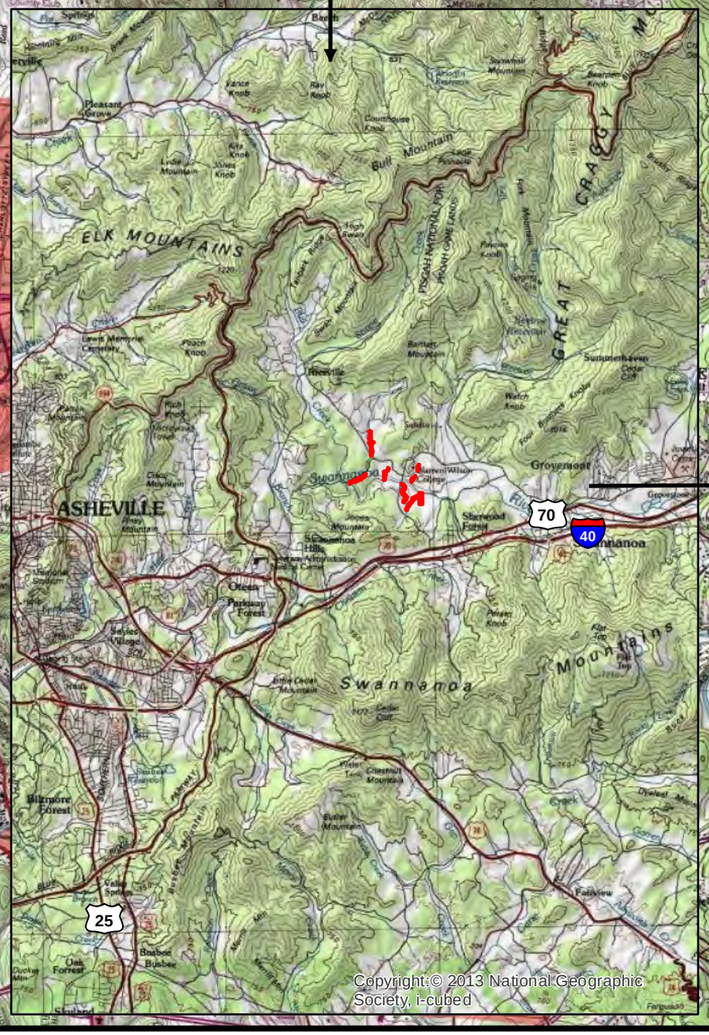
Simon A, Hupp CR. 1986. Geomorphic and Vegetative Recovery Processes Along Modified Tennessee Streams: An Interdisciplinary Approach to Disturbed Fluvial Systems. Forest Hydrology and Watershed Management. IAHS-AISH Publ.167.

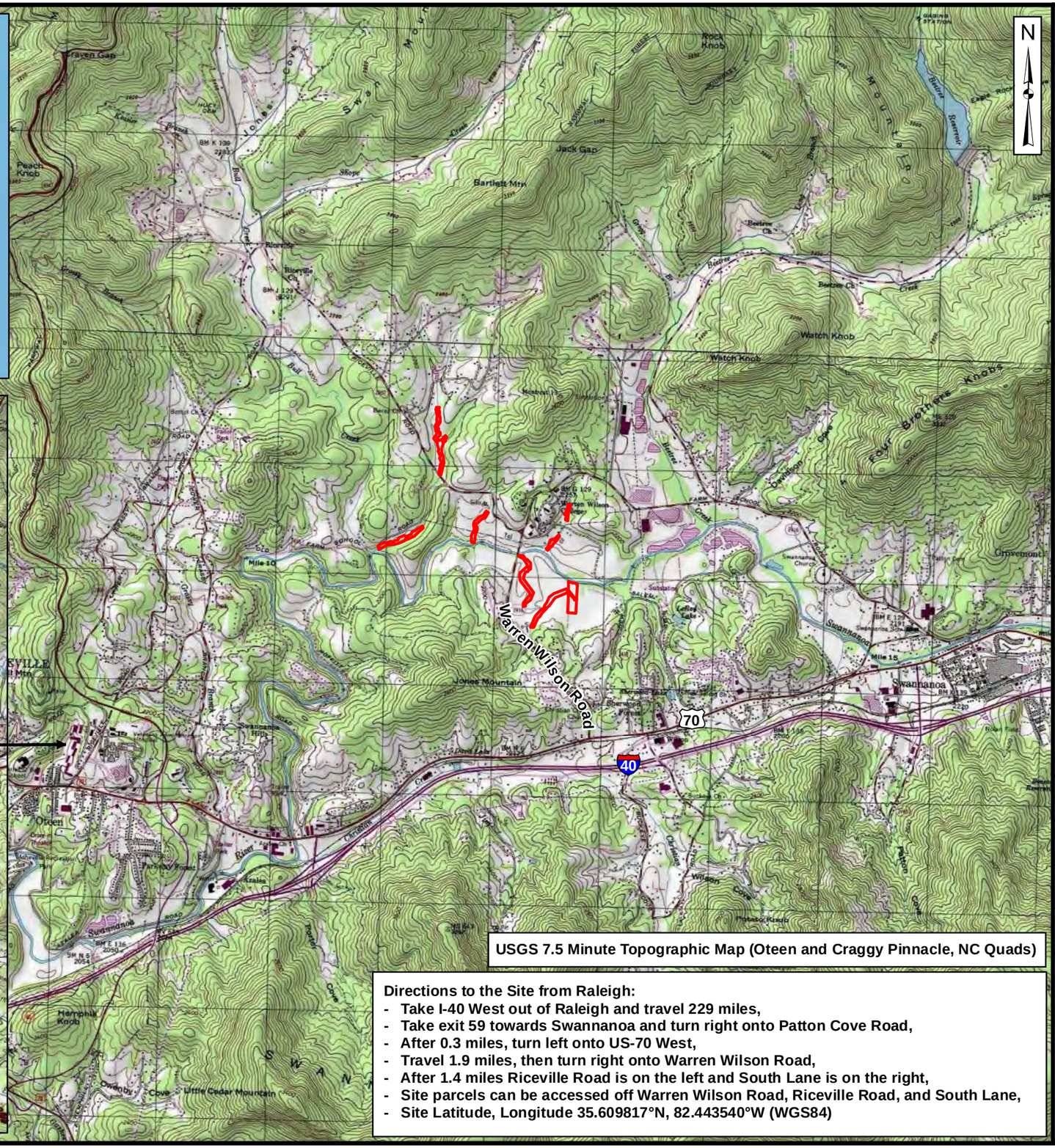
United States Department of Agriculture (USDA). 2016. Web Soil Survey (online). Available: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx [August 2016].

United States Department of Agriculture (USDA), 2009. Soil Survey for Buncombe County North Carolina. US Department of Agriculture. Available at: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/north_carolina/buncombeNC2009/Buncombe_NC.pdf [June 7, 2016].

Appendix A
Background Map and Tables







USGS 7.5 Minute Topographic Map (Oteen and Craggy Pinnacle, NC Quads)

Directions to the Site from Raleigh:
- **Take I-40 West out of Raleigh and travel 229 miles,**
- **Take exit 59 towards Swannanoa and turn right onto Patton Cove Road,**
- **After 0.3 miles, turn left onto US-70 West,**
- **Travel 1.9 miles, then turn right onto Warren Wilson Road,**
- **After 1.4 miles Riceville Road is on the left and South Lane is on the right,**
- **Site parcels can be accessed off Warren Wilson Road, Riceville Road, and South Lane,**
- **Site Latitude, Longitude 35.609817°N, 82.443540°W (WGS84)**

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

SITE LOCATION

Drawn by: KRJ

Date: APR 2020

Scale: 1:40000

Project No.: 20-004

FIGURE

1

Table 1. Mitigation Assets and Components
Warren Wilson College Stream Mitigation Site

Project Segment	Stream Stationing/ Wetland Type	Existing Footage/ Acreage	Mitigation Plan Footage/ Acreage	Restoration Level	Mitigation Ratio	Restoration Footage/ Acreage^	Calculated Credit^	Comment
UT 1A	0+09-4+92	189	483	Restoration (Priority I)	1:1	483	483.000	
UT 1B	1+09-1+22	13	13	Enhancement (Level II)	2.5:1	12	4.800	
UT 1C	1+22-7+06	554	584-20=564*	Restoration (Priority I)	1:1	584-42=542*	542.000	42 lf is outside of the easement and therefore is non-credit-generating.
UT 3A	0+05-0+50	45	45	Enhancement (Level II)	2.5:1	50	20.000	
UT 3B	0+50-21+66	1901	2116-20-5=2091*	Restoration (Priority I/II)	1:1	2116-52-5=2059*	2059.000	52 lf is outside of the easement and 5 lf is located at a foot crossing within the easement; therefore, are non-credit-generating.
UT 3C	21+66-22+28	62	62	Enhancement (Level I)	1.5:1	62	41.333	
UT 3D	0+00-5+00	428	500	Restoration (Priority I)	1:1	500	500.000	
UT 3E	5+00-8+34	334	334	Enhancement (Level II)	2.5:1	334	133.600	
UT 3F	8+34-9+60	91	126	Restoration (Priority I)	1:1	126	126.000	
UT 3G	9+60-16+81	721	721-21=700*	Enhancement (Level II)	2.5:1	721-21=700*	280.000	21 lf is outside of the easement and therefore is non-credit-generating.
UT 4A	0+00-2+33	70	233	Restoration (Priority I)	1:1	187	187.000	
UT 4B	2+33-4+75	242	242-20=222*	Enhancement (Level II)	2.5:1	288-107=181*	72.400	107 lf is outside of the easement and therefore is non-credit-generating.
UT 5A	0+00-0+48	48	48	Enhancement (Level II)	2.5:1	47	18.800	
UT 5B	0+48-11+58	719	1110-31=1079*	Restoration (Priority I)	1:1	1117-38=1079*	1079.000	38 lf is outside of the easement and therefore is non-credit-generating.
UT 6A	0+08-1+63	155	155	Enhancement (Level II)	2.5:1	155	62.000	
UT 6B	2+16-16+48	713	1432-20=1412*	Restoration (Priority I/II)	1:1	1432-44=1388*	1388.000	44 lf is outside of the easement and therefore is non-credit-generating.
UT 6C	16+48-21+43	495	495	Enhancement (Level II)	2.5:1	495	198.000	
UT 7A	0+00-19+85	2426	1985-36-20-45=1884*	Restoration (Priority I)	1:1	1940-39-54=1847*	1847.000	93 lf is outside of the easement and therefore is non-credit-generating.
UT 8A	0+18-10+65	957	1047-38=1009*	Restoration (Priority I/II)	1:1	1047-38=1009*	1009.000	38 lf is outside of the easement and therefore is non-credit-generating.

*Areas located outside of the easement or at a foot path crossing within the easement and therefore are non-credit generating.
^Several credited stream segments were reduced in length during as-built due to a modification to remove all crossing materials from the easement.

Table 1 (continued). Project Credits
Warren Wilson College Stream Mitigation Site

	Stream			Riparian Wetland		Non-Rip	Coastal
Restoration Level	Warm	Cool	Cold	Riverine	Non-Riv	Wetland	Marsh
Restoration			**9220.000**				
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I			**41.333**				
Enhancement II			**789.600**				
Creation							
Preservation							
TOTALS			**10,050.933**				

Table 2. Project Activity and Reporting History
Warren Wilson College Stream Mitigation Site

Activity or Deliverable	**Data Collection Complete**	**Completion or Delivery**
Institution Date (NCDMS Contract No. 100014)	--	May 22, 2017
Mitigation Plan	March 2018	November 2018
Construction Plans	--	January 10, 2020
404 Permit	--	May 13, 2019
Site Construction	--	March 4, 2020
Planting	--	March 16, 2020
As-built Baseline Monitoring (MY0)	January-March 2020	August 2020
Annual Monitoring (MY1)	November 2020	January 2021

Table 3. Project Contacts Table
Warren Wilson College Restoration Site

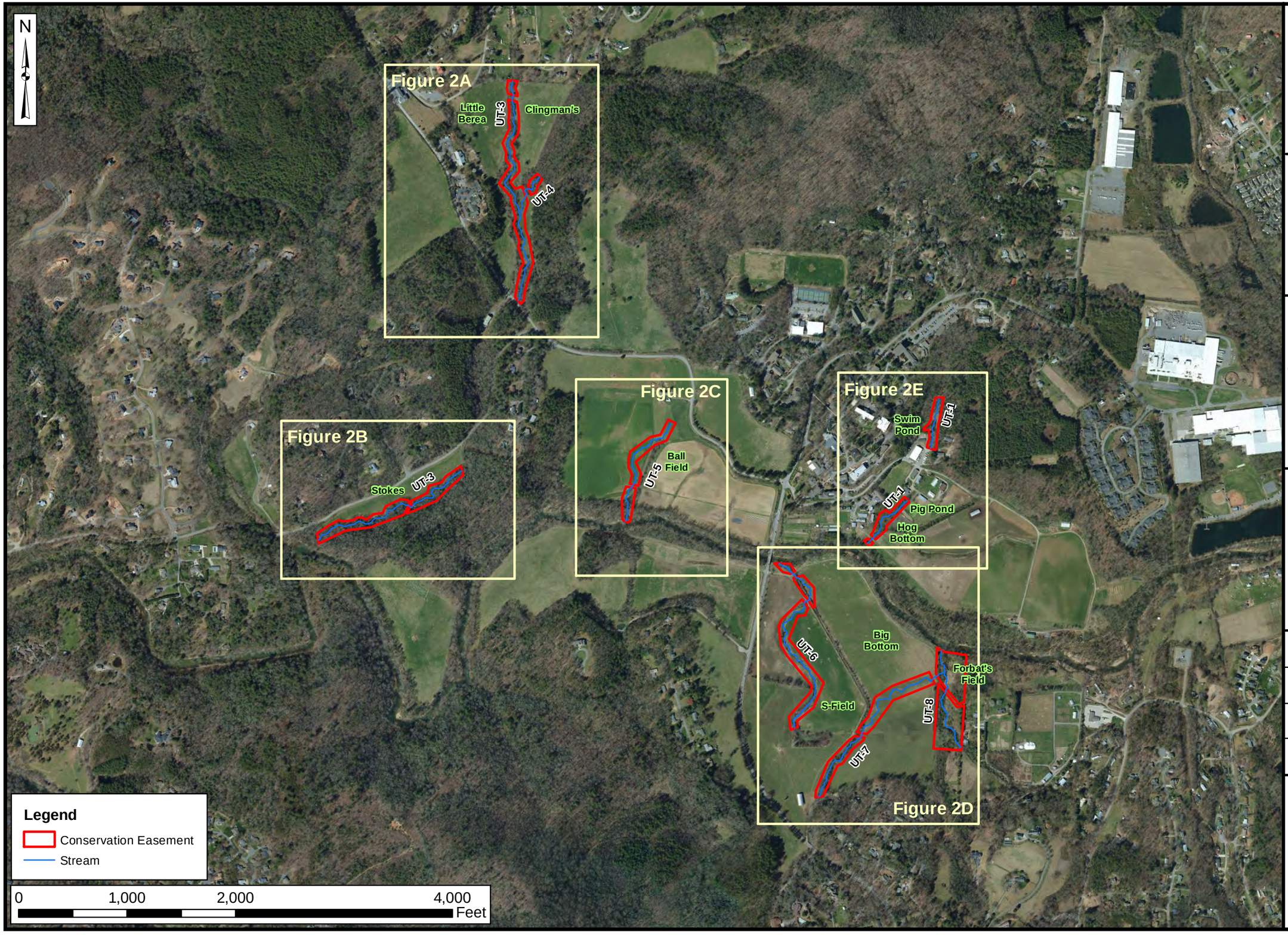
Full Delivery Provider	Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 Worth Creech 919-755-9490
Designer	Anchor QEA of North Carolina, PLLC 231 Haywood Street Asheville, NC 28801 Sara Stavinoha 828-771-0279
As-built Monitoring Provider	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis 919-215-1693

Table 4. Project Attribute Table
Warren Wilson Stream Mitigation Site

Project Information							
Project Name	Warren Wilson Stream Mitigation Site						
Project County	Buncombe County, North Carolina						
Project Area (acres)	25.3 (pending easement modification)						
Project Coordinates (latitude & latitude)	35.609817ºN, 82.443540ºW						
Planted Area (acres)	19.64						
Project Watershed Summary Information							
Physiographic Province	Blue Ridge						
Project River Basin	French Broad						
USGS HUC for Project (14-digit)	06010105070030						
NCDWR Sub-basin for Project	04-03-02						
Project Drainage Area	49.9 to 822.3 acres (0.08 to 1.28 square miles)						
Percentage of Project Drainage Area that is Impervious	<5%						
CGIA Land Use Classification	Cultivated, Managed Herbaceous Vegetation, Unmanaged Herbaceous Vegetation, Hardwood Swamp, Oak/Gum/Cypress						
Reach Summary Information							
Parameters	**UT1**	**UT 3**	**UT4**	**UT 5**	**UT6**	**UT 7**	**UT 8**
Length of reach (linear feet)	756	3582	312	769	1363	2425	957
Valley Classification & Confinement	Moderately confined to somewhat unconfined (UT-3 & UT-5)						
Drainage Area (acres and square miles)	171.3 ac. (0.27 sq. mi.)	822.3 ac. (1.28 sq. mi.)	153.9 ac. (0.24 sq. mi.)	98.3 ac. (0.15 sq. mi.)	49.9 ac. (0.08 sq. mi.)	141.0 ac. (0.22 sq. mi.)	64.4 ac. (0.10 sq. mi.)
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Perennial	Intermittent/ Perennial	Perennial	Perennial
NCDWR Water Quality Classification	C						
Existing Morphological Description (Rosgen 1996)	Cg4	Eg4	G4	G3	G3	Gb4	Eg4
Proposed Stream Classification (Rosgen 1996)	Cb4	Ce4	C4	Ce4	Ce4	Gb4	C4
Existing Evolutionary Stage (Simon and Hupp 1986)	II/III (Channelized/Degraded)						
FEMA Classification	NA	Zone AE	NA	NA	NA	NA	NA
Thermal Regime	Cold						

Appendix B
Visual Assessment Data

Figures 2 & 2A-2E. Current Conditions Plan View
Tables 5A-5G. Visual Stream Morphology Stability Assessment
Table 6. Vegetation Condition Assessment
Vegetation Plot Photographs



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

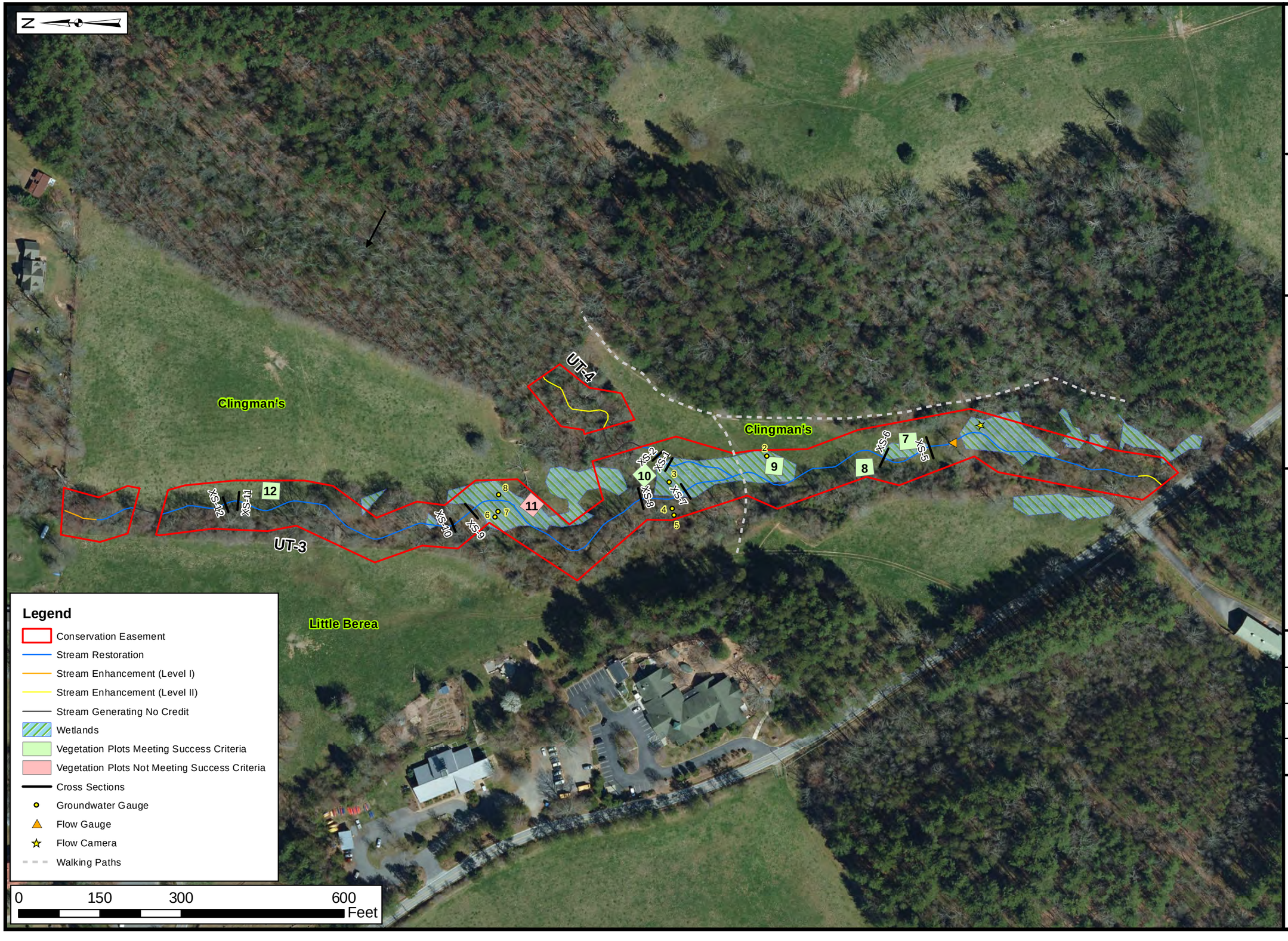
Date: DEC 2020

Scale: 1:10,000

Project No.: 20-004

FIGURE

2



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

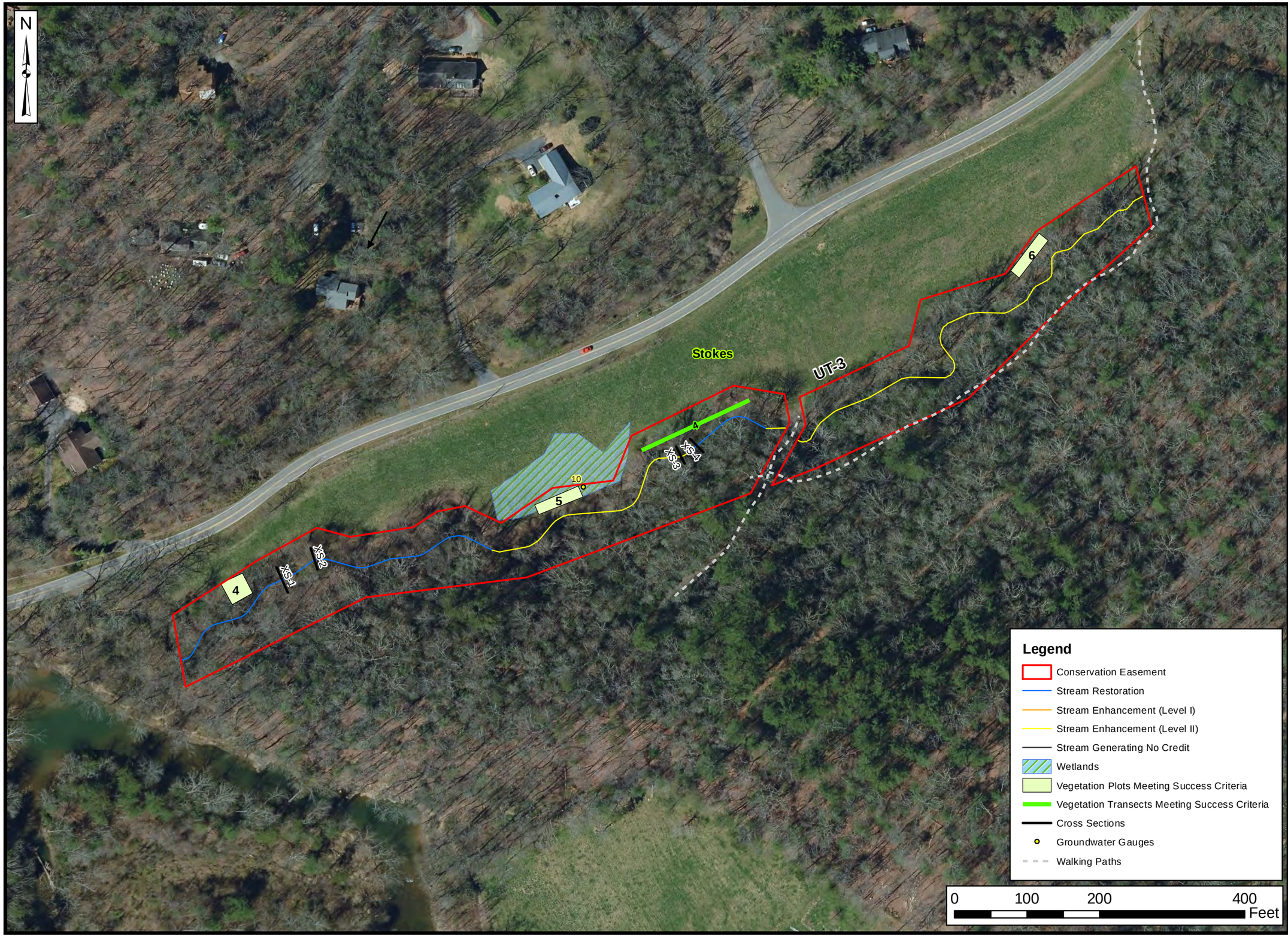
Date: DEC 2020

Scale: 1:2000

Project No.: 20-004

FIGURE

2A



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

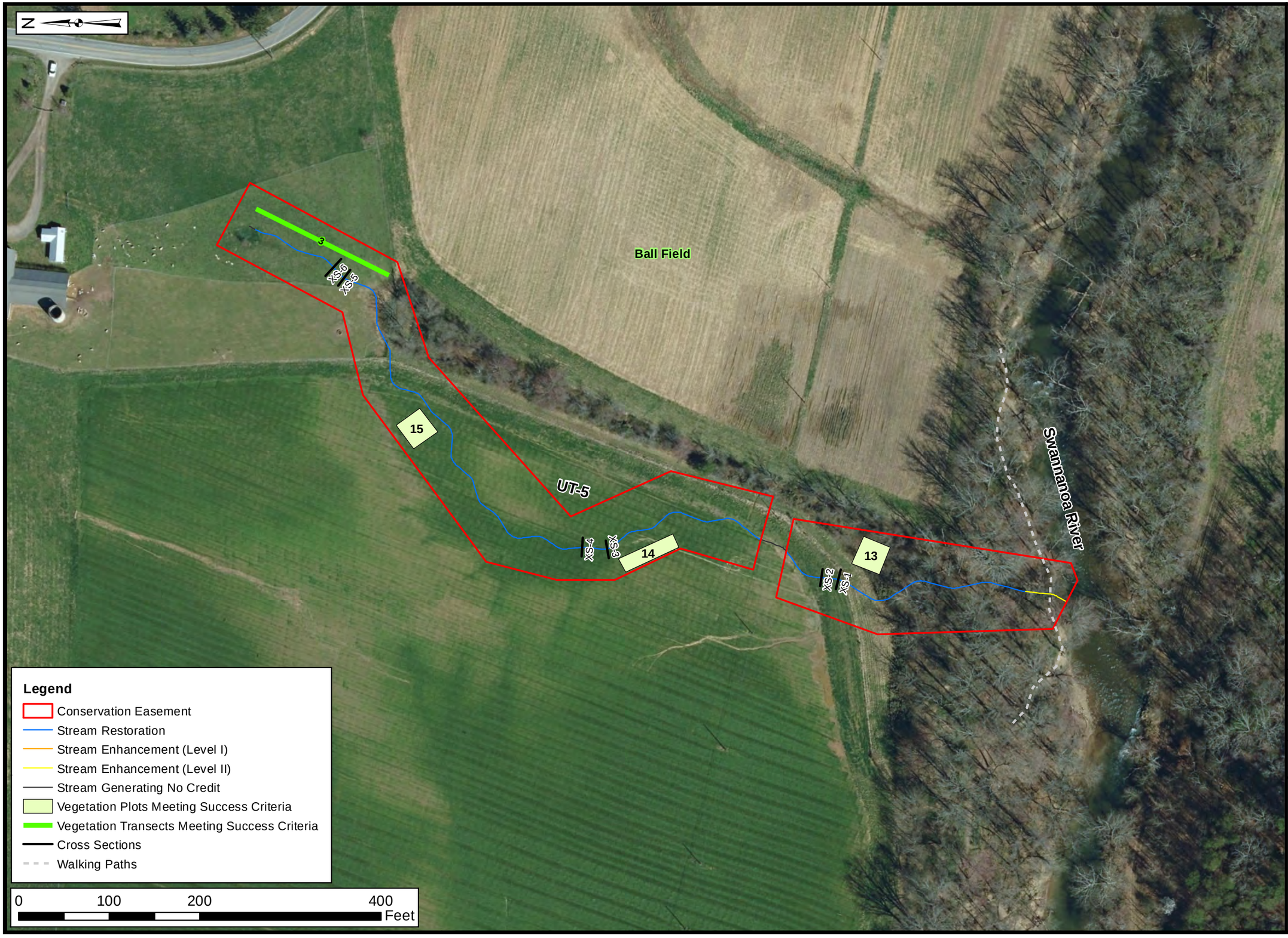
Date: DEC 2020

Scale: 1:1500

Project No.: 20-004

FIGURE

2B



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

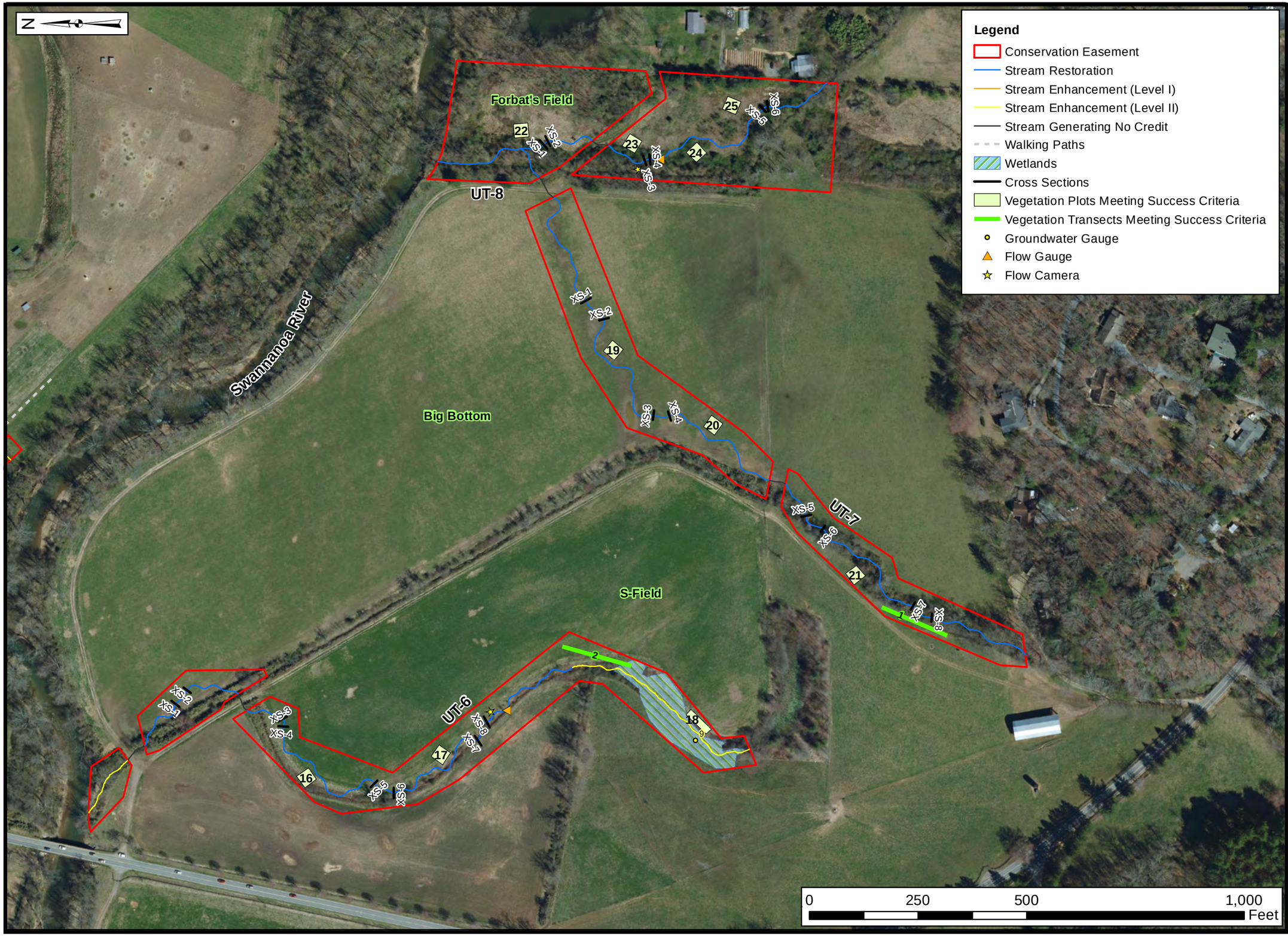
Date: DEC 2020

Scale: 1:1200

Project No.: 20-004

FIGURE

2C



Legend

- Conservation Easement
- Stream Restoration
- Stream Enhancement (Level I)
- Stream Enhancement (Level II)
- Stream Generating No Credit
- Walking Paths
- Wetlands
- Cross Sections
- Vegetation Plots Meeting Success Criteria
- Vegetation Transects Meeting Success Criteria
- Groundwater Gauge
- Flow Gauge
- Flow Camera

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

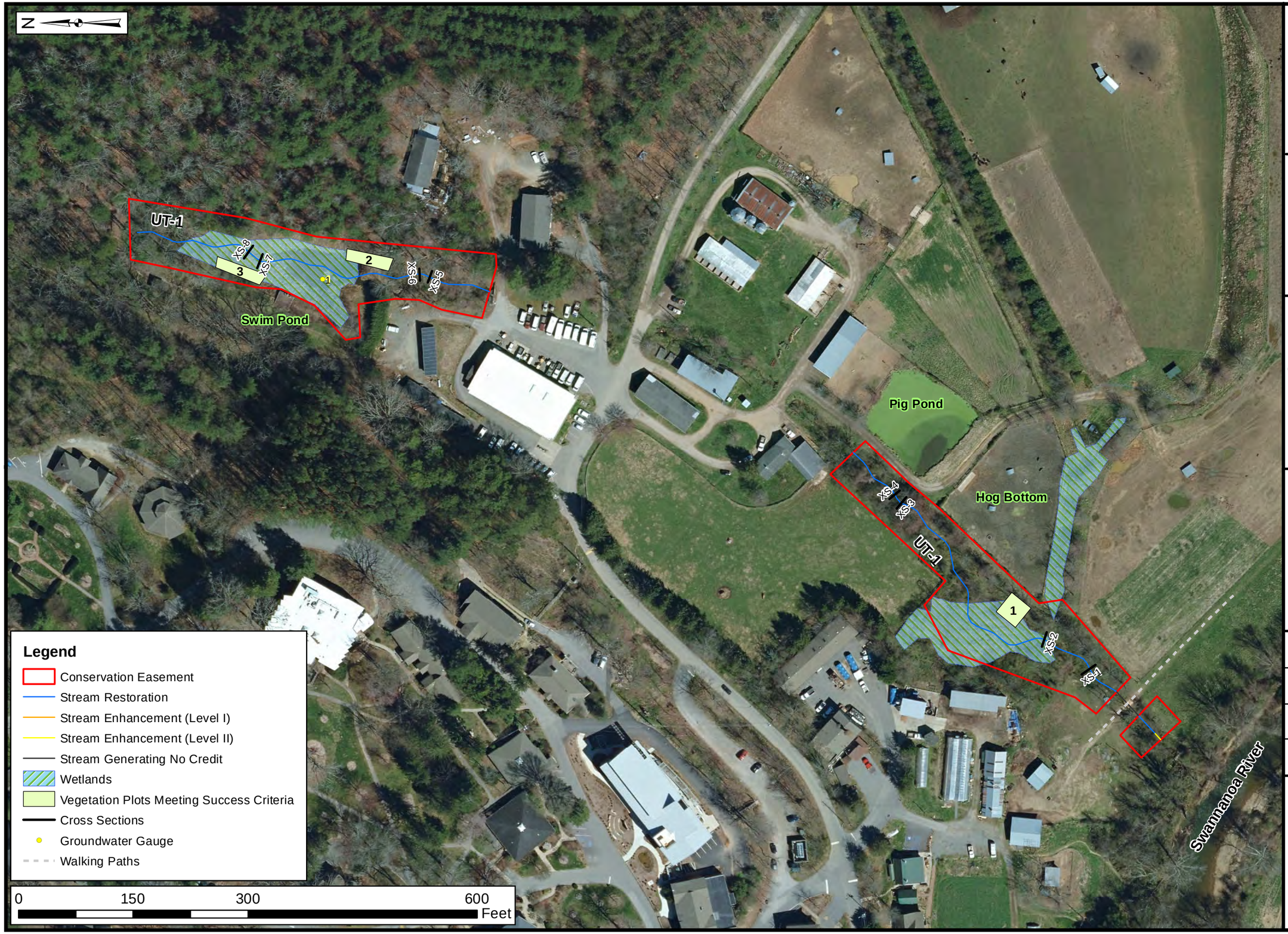
Date: DEC 2020

Scale: 1:2500

Project No.: 20-004

FIGURE

2D



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

Date: DEC 2020

Scale: 1:1400

Project No.: 20-004

FIGURE

2E

Table 5A **Visual Stream Morphology Stability Assessment**
Reach ID **Warren Wilson College UT-1**
Assessed Length **756**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	21	21			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	21	21			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	21	21			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	21	21			100%			
		2. Thalweg centering at downstream of meander (Glide)	21	21			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	22	22			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	22	22			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	22	22			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	22	22			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	22	22			100%			

Table 5B **Visual Stream Morphology Stability Assessment**
Reach ID **Warren Wilson College UT-3**
Assessed Length **3582**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	44	44			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	45	45			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	45	45			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	45	45			100%			
		2. Thalweg centering at downstream of meander (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%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	46	46			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	46	46			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	46	46			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	46	46			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	46	46			100%			

Table 5C **Visual Stream Morphology Stability Assessment**
Reach ID **Warren Wilson College UT-4**
Assessed Length **312**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	6	6			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	6	6			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	6	6			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	6	6			100%			
		2. Thalweg centering at downstream of meander (Glide)	6	6			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	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 not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	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 5D **Visual Stream Morphology Stability Assessment**
Reach ID **Warren Wilson College UT-5**
Assessed Length **769**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	27	27			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	27	27			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	27	27			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	27	27			100%			
		2. Thalweg centering at downstream of meander (Glide)	27	27			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	27	27			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	27	27			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	27	27			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	27	27			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	27	27			100%			

Table 5E **Visual Stream Morphology Stability Assessment**
Reach ID **Warren Wilson College UT-6**
Assessed Length **1363**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	46	46			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	46	46			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	46	46			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	46	46			100%			
		2. Thalweg centering at downstream of meander (Glide)	46	46			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	47	47			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	47	47			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	47	47			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	47	47			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	47	47			100%			

Table 5F **Visual Stream Morphology Stability Assessment**
Reach ID **Warren Wilson College UT-7**
Assessed Length **2425**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	42	42			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	43	43			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	43	43			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	43	43			100%			
		2. Thalweg centering at downstream of meander (Glide)	43	43			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	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 not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	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 5G **Visual Stream Morphology Stability Assessment**
Reach ID **Warren Wilson College UT-8**
Assessed Length **957**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	30	30			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	30	30			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	30	30			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	30	30			100%			
		2. Thalweg centering at downstream of meander (Glide)	30	30			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	31	31			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	31	31			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	31	31			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	31	31			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	31	31			100%			

Table 6 — Vegetation Condition Assessment

Warren Wilson College

Planted Acreage[1] **19.64**

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

Easement Acreage[2] **25.3**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	None	1000 SF	none	0	0.00	0.0%
5. Easement Encroachment Areas[3]	None	none	none	0	0.00	0.0%

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

2 = The acreage within the easement boundaries.

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

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

Warren Wilson College
MY-01 (2020) Vegetation Monitoring Photographs
Taken October 2020

Plot 1

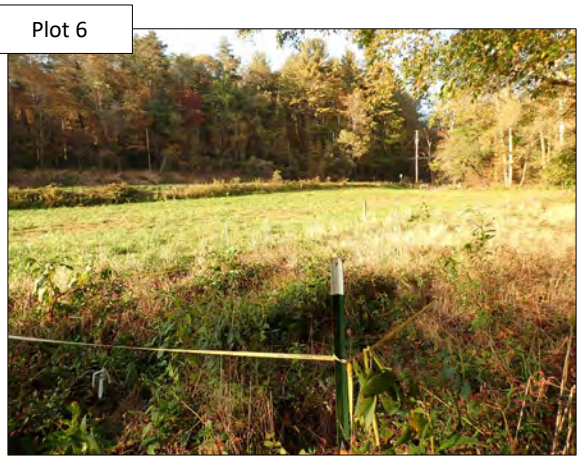
Plot 2

Plot 3

Plot 4

Plot 5

Plot 6



Warren Wilson College
MY-01 (2020) Vegetation Monitoring Photographs
Taken October 2020

Plot 7

Plot 8

Plot 9

Plot 10

Plot 11

Plot 12

Warren Wilson College
MY-01 (2020) Vegetation Monitoring Photographs
Taken October 2020

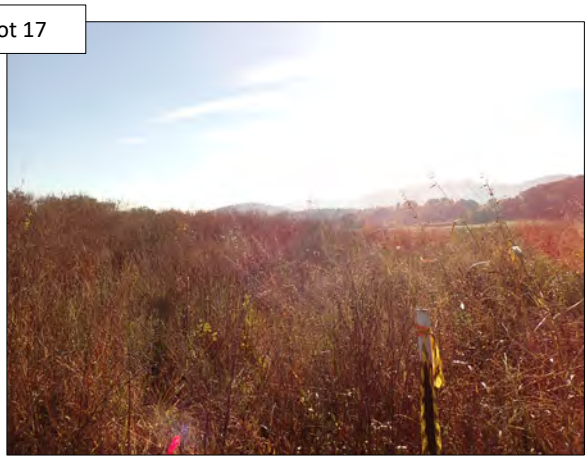
Plot 13

Plot 14

Plot 15

Plot 16

Plot 17



Plot 18

Warren Wilson College
MY-01 (2020) Vegetation Monitoring Photographs
Taken October 2020

Plot 19

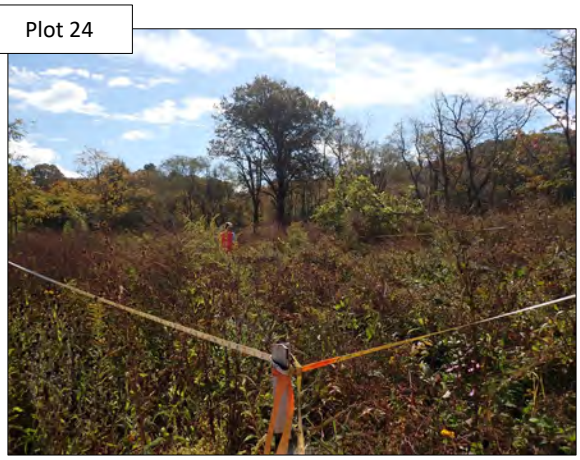
Plot 20

Plot 21

Plot 22

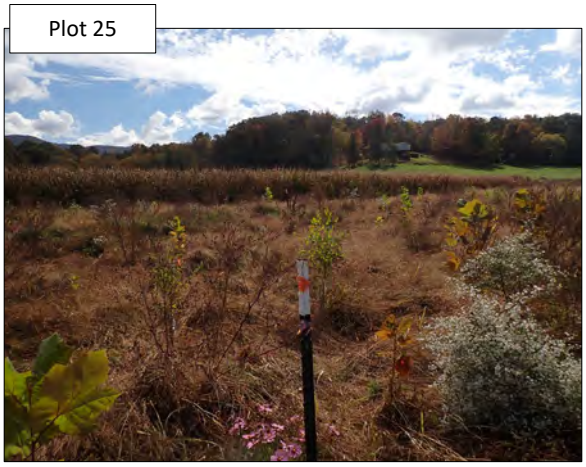
Plot 23 (Photo taken March 18, 2020

Plot 24



Warren Wilson College
MY-01 (2020) Vegetation Monitoring Photographs
Taken October 2020

Plot 25



Appendix C
Vegetation Data

Table 7. Planted Bare Root Woody Vegetation
Table 8. Total Stems by Plot and Species
Table 9. Temporary Vegetation Plot Data
Table 10. Planted Vegetation Totals

Table 7. Planted Bare Root Woody Vegetation
Warren Wilson College Stream Mitigation Site

Species	**Total***
Acres	**19.64**
Cephalanthus occidentalis	50
Diospyros virginiana	500
Liriodendron tulipifera	900
Betula nigra	2800
Fraxinus pennsylvanica	3800
Cornus amomum	3900
Quercus alba	4200
Quercus nigra	4200
Platanus occidentalis	5600
TOTALS	**25,950***

**Approximately 5000 live stakes of willow (*Salix* spp.), elderberry (*Sambucus candensis*), silky dogwood (*Cornus amomum*), and ninebark (*Physocarpus opulifolius*) were planted, but are not included in this table.

Table 8. Planted Stems by Plot and Species
CVS Project Code 20004. Project Name: Warren Wilson College

			Current Plot Data (MY1 2020)																									
			20004-01-0001			20004-01-0002			20004-01-0003			20004-01-0004			20004-01-0005			20004-01-0006			20004-01-0007			20004-01-0008			20004-01-0009		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Betula nigra	river birch	Tree	1	1	1	1	1	1	10	10	10	12	12	12				2	2	2	5	5	5				2	2	2
Cephalanthus occidentalis	common buttonbush	Shrub																										
Cornus amomum	silky dogwood	Shrub				8	8	8	12	12	12				4	4	4				6	6	6	1	1	1	3	3	3
Diospyros virginiana	common persimmon	Tree				1	1	1													3	3	3				1	1	1
Fraxinus pennsylvanica	green ash	Tree																										
Liriodendron tulipifera	tuliptree	Tree													5	5	5										3	3	3
Platanus occidentalis	American sycamore	Tree				4	4	4	3	3	3	3	3	3				1	1	1	5	5	5	10	10	10			
Quercus	oak	Tree	4	4	4	2	2	2	4	4	4	1	1	1	5	5	5	5	5	5	3	3	3	2	2	2	1	1	1
Quercus alba	white oak	Tree	3	3	3				2	2	2	1	1	1				11	11	11	2	2	2	1	1	1	1	1	1
Quercus nigra	water oak	Tree	1	1	1							6	6	6	1	1	1				2	2	2				1	1	1
Quercus rubra	northern red oak	Tree																										
Unknown		Shrub or Tree																										
Wisteria frutescens	American wisteria	Vine													1	1	1											
Wisteria sinensis	Chinese wisteria	Exotic																									1	1	1
		Stem count	9	9	9	16	16	16	31	31	31	23	23	23	16	16	16	19	19	19	26	26	26	14	14	14	13	13	13
		size (ares)	1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	4	4	4	7	7	7	4	4	4	8	8	8
		Stems per ACRE	364.2	364.2	364.2	647.5	647.5	647.5	1255	1255	1255	930.8	930.8	930.8	647.5	647.5	647.5	768.9	768.9	768.9	1052	1052	1052	566.6	566.6	566.6	526.1	526.1	526.1

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes

P-all = Planted including livestakes

T = All planted and natural recruits including livestakes

T includes natural recruits

Table 8. Planted Stems by Plot and Species (continued)
CVS Project Code 20004. Project Name: Warren Wilson College

			Current Plot Data (MY1 2020)																									
			20004-01-0010			20004-01-0011			20004-01-0012			20004-01-0013			20004-01-0014			20004-01-0015			20004-01-0016			20004-01-0017			20004-01-0018		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Betula nigra	river birch	Tree	2	2	2	4	4	4	3	3	3	1	1	1							3	3	3	6	6	6	3	3	3
Cephalanthus occidentalis	common buttonbush	Shrub										1	1	1														
Cornus amomum	silky dogwood	Shrub	3	3	3				2	2	2				2	2	2	3	3	3	4	4	4	4	4	4	1	1	1
Diospyros virginiana	common persimmon	Tree	3	3	3							1	1	1													1	1	1
Fraxinus pennsylvanica	green ash	Tree																											
Liriodendron tulipifera	tuliptree	Tree										4	4	4				2	2	2									
Platanus occidentalis	American sycamore	Tree	4	4	4				3	3	3			18	16	16	16	13	13	13	9	9	9	3	3	3	1	1	1
Quercus	oak	Tree	1	1	1	2	2	2	1	1	1				2	2	2	1	1	1	5	5	5	3	3	3	11	11	11
Quercus alba	white oak	Tree	2	2	2				1	1	1							1	1	1	2	2	2	1	1	1			
Quercus nigra	water oak	Tree							5	5	5							1	1	1				1	1	1	3	3	3
Quercus rubra	northern red oak	Tree										1	1	1										1	1	1			
Unknown		Shrub or Tree																											
Wisteria frutescens	American wisteria	Vine																											
Wisteria sinensis	Chinese wisteria	Exotic																											
		Stem count	15	15	15	6	6	6	15	15	15	8	8	26	20	20	20	21	21	21	23	23	23	19	19	19	20	20	20
		size (ares)	1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	6	6	6	2	2	2	6	6	6	5	5	6	3	3	3	6	6	6	5	5	5	7	7	7	6	6	6
		Stems per ACRE	607	607	607	242.8	242.8	242.8	607	607	607	323.7	323.7	1052	809.4	809.4	809.4	849.8	849.8	849.8	930.8	930.8	930.8	768.9	768.9	768.9	809.4	809.4	809.4

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes

P-all = Planted including livestakes

T = All planted and natural recruits including livestakes

T includes natural recruits

Table 8. Planted Stems by Plot and Species (continued)
CVS Project Code 20004. Project Name: Warren Wilson College

			Current Plot Data (MY1 2020)																			Annual Means					
			20004-01-0019			20004-01-0020			20004-01-0021			20004-01-0022			20004-01-0023			20004-01-0024			20004-01-0025			MY1 (2020)			MY0 (2020)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Betula nigra	river birch	Tree	4	4	4	2	2	2	5	5	5	1	1	1	3	3	3	1	1	1	4	4	4	75	75	75	77	77	77
Cephalanthus occidentalis	common buttonbush	Shrub																						1	1	1	1	1	1
Cornus amomum	silky dogwood	Shrub				1	1	1				4	4	4	3	3	3	7	7	7	2	2	2	70	70	70	75	75	75
Diospyros virginiana	common persimmon	Tree	2	2	2							1	1	1				3	3	3				16	16	16	22	22	22
Fraxinus pennsylvanica	green ash	Tree							1	1	1													1	1	1	1	1	1
Liriodendron tulipifera	tuliptree	Tree				1	1	1							1	1	1							16	16	16	18	18	18
Platanus occidentalis	American sycamore	Tree	11	11	11	8	8	8	4	4	4	5	5	5	4	4	4	1	1	1	8	8	8	116	116	134	115	115	115
Quercus	oak	Tree				2	2	2	1	1	1				3	3	3	2	2	2	3	3	3	64	64	64	93	93	93
Quercus alba	white oak	Tree				1	1	1	3	3	3	2	2	2	1	1	1				2	2	2	37	37	37	35	35	35
Quercus nigra	water oak	Tree													2	2	2	2	2	2				25	25	25	29	29	29
Quercus rubra	northern red oak	Tree																						2	2	2			
Unknown		Shrub or Tree																									5	5	5
Wisteria frutescens	American wisteria	Vine																						1	1	1			
Wisteria sinensis	Chinese wisteria	Exotic																2	2	2				3	3	3			
		Stem count	17	17	17	15	15	15	14	14	14	13	13	13	17	17	17	18	18	18	19	19	19	427	427	445	471	471	471
		size (ares)	1			1			1			1			1			1			1			25			25		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.62			0.62		
		Species count	3	3	3	6	6	6	5	5	5	5	5	5	7	7	7	7	7	7	5	5	5	13	13	13	11	11	11
		Stems per ACRE	688	688	688	607	607	607	566.6	566.6	566.6	526.1	526.1	526.1	688	688	688	728.4	728.4	728.4	768.9	768.9	768.9	691.2	691.2	720.3	762.4	762.4	762.4

Color for Density

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

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

Table 9. MY1 Temporary Vegetation Plot Data
Warren Wilson College Restoration Site

Species	Common Name	T-1 (216°)	T-2 (145°)	T-3 (212°)	T-4 (270°)
Betula nigra	River birch	2	2		1
Liriodendron tulipifera	Tulip poplar	1		1	1
Nyssa sylvatica	Black gum			2	
Diospyros virginiana	Common persimmon	1			
Quercus alba	White oak	2			1
Platanus occidentalis	American sycamore	6	1	7	1
Quercus phellos	Willow oak			9	
Quercus spp.	Oak				5
Cornus amomum	Silky dogwood	1	7	1	3
Total Number of Stems	Stem Count	**13**	**10**	**20**	**12**
	Size (Ares)	1	1	1	1
	Size (Acres)	0.02	0.02	0.02	0.02
	Species count	6	5	6	6
Stems/Acre	Stems per acre	**526**	**405**	**809**	**486**

Table 10. Planted Vegetation Totals
Warren Wilson College Stream Mitigation Site

Plot #	Planted Stems/Acre	Success Criteria Met?
1	364	Yes
2	647	Yes
3	1255	Yes
4	931	Yes
5	647	Yes
6	769	Yes
7	1052	Yes
8	567	Yes
9	526	Yes
10	607	Yes
11	243	No
12	607	Yes
13	324	Yes
14	809	Yes
15	850	Yes
16	931	Yes
17	769	Yes
18	809	Yes
19	688	Yes
20	607	Yes
21	567	Yes
22	526	Yes
23	688	Yes
24	728	Yes
25	769	Yes
T-1	526	Yes
T-2	404	Yes
T-3	809	Yes
T-4	485	Yes
Average Planted Stems/Acre Across Permanent & Temporary Plots	**672**	**Yes**

Appendix D
Stream Geomorphology Data

Tables 11A-I. Baseline Stream Data Summary
Tables 12A-I. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Tables 13A-I. Monitoring Data-Dimensional Morphology Summary (Dimensional Parameters-Cross-sections)
Tables 14A-I. Monitoring Data-Stream Reach Data Summary
Cross-section Plots

Table 11a. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Lower (572 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						UT4 Reference Data						Chemtronics Reference Data						Design			Monitoring Baseline					
		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Dimension and Substrate - Riffle Only																														
Bankfull Width (ft)					2.6	10.9		19.3			5.1	6.8		9.4			11.3	14.0		15.8			9.2	10.0	10.7	10.6	11.2	11.2	11.9		2.0
Floodprone Width (ft)					27.0	55.0		75.0			15.0	20.0		28.0			16.5	19.0		25.0			25.0	55.0	75.0	100.0	100.0	100.0	100.0		2.0
Bankfull Mean Depth (ft)					0.4	0.6		1.2			0.8	0.9		1.0			0.4	0.6		1.2			0.7	0.7	0.8	0.9	1.0	1.0	1.1		2.0
[1]Bankfull Max Depth (ft)					0.6	1.7		1.7			1.3	1.4		1.5			1.7	1.8		2.0			0.9	1.1	1.3	1.7	1.9	1.9	2.1		2.0
Bankfull Cross Sectional Area (ft^2)					3.2	6.8		7.1			6.2	6.2		6.2			16.7	16.7		16.7			7.1	7.1	7.1	9.4	11.1	11.1	12.8		2.0
Width/Depth Ratio					2.1	17.0		53.2			5.1	7.6		11.8			8.1	12.0		14.8			12.0	14.0	16.0	11.1	11.5	11.5	11.9		2.0
Entrenchment Ratio					1.4	6.9		21.2			2.7	2.9		3.0			16.5	19.0		22.0			1.3	2.9	3.0	8.4	8.9	8.9	9.5		2.0
[1]Bank Height Ratio					**1.0**	**1.8**		**5.7**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**		**2.0**
Profile																														
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities																					1.9	14.9	8.9	55.2	14.8	20.0
Riffle Slope (ft/ft)											0.0090	0.0400		0.0754			0.0156	0.0228		0.0468			0.0286	0.0457	0.0857	0.0055	0.0201	0.0192	0.0387	0.0095	20.0
Pool Length (ft)																										2.4	10.7	11.2	19.4	4.8	20.0
Pool Max depth (ft)											2.0	2.3		2.6			1.9	2.1		2.3			1.0	1.4	1.4						
Pool Spacing (ft)											27.3	37.1		45.8			28.8	50.7		70.7			29.9	39.9	69.8	6.9	30.6	28.0	66.9	16.2	19.0
Pattern																														
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						15.4	19.0		25.2			13.4	14.7		16.6			15.0	29.9	39.9	15.0		29.9	39.9		
Radius of Curvature (ft)											8.7	15.8		29.4			0.8	2.2		3.3			19.9	29.9	39.9	15.0		29.9	39.9		
Rc:Bankfull width (ft/ft)																														
Meander Wavelength (ft)											56.5	63.8		76.0			59.8	96.3		117.2			59.8	84.7	119.6	59.8		84.7	119.6		
Meander Width Ratio											2.3	2.8		3.7			1.0	1.1		1.2			1.5	3.0	4.0	1.5		3.0	4.0		
Transport parameters																														
Reach Shear Stress (competency) lb/f^2					7.63																		0.78								
Max part size (mm) mobilized at bankfull																														
Stream Power (transport capacity) W/m^2					50.82																		49.43								
Additional Reach Parameters																														
Rosgen Classification					Cg 4						Eb 4						B 4						Cb 4			Cb 4					
Bankfull Velocity (fps)					0.6																									
Bankfull Discharge (cfs)					27.7																									
Valley length (ft)					567.0																									
Channel Thalweg length (ft)					578.0																		610.0			601.0					
Sinuosity (ft)					1.0						1.2						1.0						1.1			1.1					
Water Surface Slope (Channel) (ft/ft)					0.0294						0.0226						0.0167						0.0286			0.0163					
BF slope (ft/ft)																														
[3]Bankfull Floodplain Area (acres)																														
[4]% of Reach with Eroding Banks																														
Channel Stability or Habitat Metric																														
Biological or Other																														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11b. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Upper (436 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						UT4 Reference Data						Chemtronics Reference Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					2.6	10.9		19.3			5.1	6.8		9.4			11.3	14.0		15.8			9.2	10.0	10.7	8.5	9.1	9.1	9.6		2.0
Floodprone Width (ft)					27.0	55.0		75.0			15.0	20.0		28.0			16.5	19.0		25.0			25.0	55.0	75.0	100.0	100.0	100.0	100.0		2.0
Bankfull Mean Depth (ft)					0.4	0.6		1.2			0.8	0.9		1.0			0.4	0.6		1.2			0.7	0.7	0.8	0.5	0.6	0.6	0.7		2.0
[1]Bankfull Max Depth (ft)					0.6	1.7		1.7			1.3	1.4		1.5			1.7	1.8		2.0			0.9	1.1	1.3	0.8	1.1	1.1	1.4		2.0
Bankfull Cross Sectional Area (ft^2)					3.2	6.8		7.1			6.2	6.2		6.2			16.7	16.7		16.7			7.1	7.1	7.1	4.3	5.4	5.4	6.6		2.0
Width/Depth Ratio					2.1	17.0		53.2			5.1	7.6		11.8			8.1	12.0		14.8			12.0	14.0	16.0	14.0	15.5	15.5	16.9		2.0
Entrenchment Ratio					1.4	6.9		21.2			2.7	2.9		3.0			16.5	19.0		22.0			1.3	2.9	3.0	10.4	11.1	11.1	11.8		2.0
[1]Bank Height Ratio					**1.0**	**1.8**		**5.7**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**		**1.0**
Profile																															
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities																					1.9	14.9	8.9	55.2	14.8	20.0
Riffle Slope (ft/ft)											0.0090	0.0400		0.0754			0.0156	0.0228		0.0468			0.0286	0.0457	0.0857	0.0055	0.0201	0.0192	0.0387	0.0095	20.0
Pool Length (ft)																										2.4	10.7	11.2	19.4	4.8	20.0
Pool Max depth (ft)											2.0	2.3		2.6			1.9	2.1		2.3			1.0	1.4	1.4						
Pool Spacing (ft)											27.3	37.1		45.8			28.8	50.7		70.7			29.9	39.9	69.8	6.9	30.6	28.0	66.9	16.2	19.0
Pattern																															
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						15.4	19.0		25.2			13.4	14.7		16.6			15.0	29.9	39.9	15.0		29.9	39.9		
Radius of Curvature (ft)											8.7	15.8		29.4			0.8	2.2		3.3			19.9	29.9	39.9	15.0		29.9	39.9		
Rc:Bankfull width (ft/ft)																															
Meander Wavelength (ft)											56.5	63.8		76.0			59.8	96.3		117.2			59.8	84.7	119.6	59.8		84.7	119.6		
Meander Width Ratio											2.3	2.8		3.7			1.0	1.1		1.2			1.5	3.0	4.0	1.5		3.0	4.0		
Transport parameters																															
Reach Shear Stress (competency) lb/ft^2					7.6																		0.8								
Max part size (mm) mobilized at bankfull																															
Stream Power (transport capacity) W/m^2					50.8																		49.4								
Additional Reach Parameters																															
Rosgen Classification					Cg 4						Eb 4						B 4						Cb 4			Cb 4					
Bankfull Velocity (fps)					0.6																										
Bankfull Discharge (cfs)					27.7																										
Valley length (ft)					189.0																										
Channel Thalweg length (ft)					193.0																		478.0			458.0					
Sinuosity (ft)					1.0						1.2						1.0						1.1			1.1					
Water Surface Slope (Channel) (ft/ft)					0.0294						0.0226						0.0167						0.0286			0.0372					
BF slope (ft/ft)																															
[3]Bankfull Floodplain Area (acres)																															
[4]% of Reach with Eroding Banks																															
Channel Stability or Habitat Metric																															
Biological or Other																															

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11c. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Lower (873 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						UT4 Reference Data						Chemtronics Reference Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					11.5	12.1		14.1			5.1	6.8		9.4			11.3	14.0		15.8			14.8	16.0	17.1	10.6	17.0	17.0	23.5		2.0
Floodprone Width (ft)					19.0	29.0		100.0			15.0	20.0		28.0			16.5	19.0		25.0			80.0	100.0	120.0	100.0	100.0	100.0	100.0		2.0
Bankfull Mean Depth (ft)					1.3	1.5		1.6			0.8	0.9		1.0			0.4	0.6		1.2			1.1	1.1	1.2	0.9	1.0	1.0	1.2		2.0
[1]Bankfull Max Depth (ft)					1.6	2.0		2.2			1.3	1.4		1.5			1.7	1.8		2.0			1.4	1.7	2.1	1.7	1.9	1.9	2.1		2.0
Bankfull Cross Sectional Area (ft^2)					18.2	18.2		18.2			6.2	6.2		6.2			16.7	16.7		16.7			18.2	18.2	18.2	9.4	18.3	18.3	27.2		2.0
Width/Depth Ratio					7.3	8.0		10.9			5.1	7.6		11.8			8.1	12.0		14.8			12.0	14.0	16.0	11.9	16.1	16.1	20.2		2.0
Entrenchment Ratio					1.3	2.5		8.3			2.7	2.9		3.0			16.5	19.0		22.0			5.4	6.3	7.0	4.3	6.9	6.9	9.5		2.0
[1]Bank Height Ratio					**1.8**	**2.0**		**2.4**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**		**2.0**
Profile																															
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities																					16.7	35.3	33.0	65.0	13.7	15.0
Riffle Slope (ft/ft)											0.0090	0.0400		0.0754			0.0156	0.0228		0.0468			0.0141	0.0225	0.0423	0.0081	0.0183	0.0194	0.0276	0.0055	15.0
Pool Length (ft)																										11.3	20.4	20.3	29.2	6.5	15.0
Pool Max depth (ft)											2.0	2.3		2.6			1.9	2.1		2.3			1.6	2.2	2.3						
Pool Spacing (ft)											27.3	37.1		45.8			28.8	50.7		70.7			47.9	63.8	111.7	32.2	64.0	57.0	104.0	18.9	15.0
Pattern																															
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						15.4	19.0		25.2			13.4	14.7		16.6			23.9	47.9.	63.8	23.9		47.9	63.8		
Radius of Curvature (ft)											8.7	15.8		29.4			0.8	2.2		3.3			31.9	47.9	63.8	31.9		47.9	47.9		
Rc:Bankfull width (ft/ft)																															
Meander Wavelength (ft)											56.5	63.8		76.0			59.8	96.3		117.2			95.8	135.7	191.5	95.8		165.7	191.5		
Meander Width Ratio											2.3	2.8		3.7			1.0	1.1		1.2			1.5	3.0	4.0	1.5		3.0	4.0		
Transport parameters																															
Reach Shear Stress (competency) lb/ft^2					3.0																		0.9								
Max part size (mm) mobilized at bankfull																															
Stream Power (transport capacity) W/m^2					69.1																		66.7								
Additional Reach Parameters																															
Rosgen Classification					Eg 4						Eb 4						B 4						Ce 4			Ce 4					
Bankfull Velocity (fps)					1.5																		4.2			960.0					
Bankfull Discharge (cfs)					75.8																										
Valley length (ft)					1681.0																										
Channel Thalweg length (ft)					3582.0																		971.0			960.0					
Sinuosity (ft)					1.1						1.2						1.0						1.1			1.1					
Water Surface Slope (Channel) (ft/ft)					0.0146						0.0226						0.0167						0.0155			0.0129					
BF slope (ft/ft)																															
[3]Bankfull Floodplain Area (acres)																															
[4]% of Reach with Eroding Banks																															
Channel Stability or Habitat Metric																															
Biological or Other																															

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11d. Baseline Stream Data Summary

Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Upper (1995 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						UT4 Reference Data						Chemtronics Reference Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					11.5	12.1		14.1			5.1	6.8		9.4			11.3	14.0		15.8			14.8	16.0	17.1	14.2	16.1	15.7	18.7	2.1	4.0
Floodprone Width (ft)					19.0	29.0		100.0			15.0	20.0		28.0			16.5	19.0		25.0			80.0	100.0	120.0	100.0	100.0	100.0	100.0	0.0	4.0
Bankfull Mean Depth (ft)					1.3	1.5		1.6			0.8	0.9		1.0			0.4	0.6		1.2			1.1	1.1	1.2	1.0	1.0	1.0	1.1	0.1	4.0
[1]Bankfull Max Depth (ft)					1.6	2.0		2.2			1.3	1.4		1.5			1.7	1.8		2.0			1.4	1.7	2.1	1.6	1.8	1.8	1.9	0.1	4.0
Bankfull Cross Sectional Area (ft^2)					18.2	18.2		18.2			6.2	6.2		6.2			16.7	16.7		16.7			18.2	18.2	18.2	13.6	16.8	16.2	21.4	3.3	4.0
Width/Depth Ratio					7.3	8.0		10.9			5.1	7.6		11.8			8.1	12.0		14.8			12.0	14.0	16.0	13.3	15.5	15.6	17.4	1.7	4.0
Entrenchment Ratio					1.3	2.5		8.3			2.7	2.9		3.0			16.5	19.0		22.0			5.4	6.3	7.0	5.4	6.3	6.4	7.0	0.8	4.0
[1]Bank Height Ratio					**1.8**	**2.0**		**2.4**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**	**0.0**	**4.0**
Profile																															
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities																					8.7	33.7	29.5	79.6	18.6	34.0
Riffle Slope (ft/ft)											0.0090	0.0400		0.0754			0.0156	0.0228		0.0468			0.0141	0.0225	0.0423	0.0082	0.0183	0.0176	0.0338	0.0059	34.0
Pool Length (ft)																										10.1	19.3	17.4	42.7	6.6	34.0
Pool Max depth (ft)											2.0	2.3		2.6			1.9	2.1		2.3			1.6	2.2	2.3						
Pool Spacing (ft)											27.3	37.1		45.8			28.8	50.7		70.7			47.9	63.8	111.7	33.6	65.4	61.3	108.0	17.8	33.0
Pattern																															
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						15.4	19.0		25.2			13.4	14.7		16.6			23.9	47.9.	63.8	23.9		47.9	63.8		
Radius of Curvature (ft)											8.7	15.8		29.4			0.8	2.2		3.3			31.9	47.9	63.8	31.9		47.9	63.8		
Rc:Bankfull width (ft/ft)																															
Meander Wavelength (ft)											56.5	63.8		76.0			59.8	96.3		117.2			95.8	135.7	191.5	95.8		165.7	191.5		
Meander Width Ratio											2.3	2.8		3.7			1.0	1.1		1.2			1.5	3.0	4.0	1.5		3.0	4.0		
Transport parameters																															
Reach Shear Stress (competency) lb/ft^2					3.0																		0.9								
Max part size (mm) mobilized at bankfull																															
Stream Power (transport capacity) W/m^2					69.1																		66.7								
Additional Reach Parameters																															
Rosgen Classification					Eg 4						Eb 4						B 4						Ce 4			**Ce 4**					
Bankfull Velocity (fps)					1.5																		4.2								
Bankfull Discharge (cfs)					75.8																										
Valley length (ft)					2223.0																										
Channel Thalweg length (ft)					3582.0																		2116.0			2195.0					
Sinuosity (ft)					1.1						1.2						1.0						1.1			1.1					
Water Surface Slope (Channel) (ft/ft)					0.0146						0.0226						0.0167						0.0155			0.0139					
BF slope (ft/ft)																															
[3]Bankfull Floodplain Area (acres)																															
[4]% of Reach with Eroding Banks																															
Channel Stability or Habitat Metric																															
Biological or Other																															

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11e. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 4 (278 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						UT4 Reference Data						Chemtronics Reference Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)											5.1	6.8		9.4			11.3	14.0		15.8			8.6	9.3	10.0	14.0	14.0	14.0	14.0		1.0
Floodprone Width (ft)											15.0	20.0		28.0			16.5	19.0		25.0			20.0	70.0	120.0	100.0	100.0	100.0	100.0		1.0
Bankfull Mean Depth (ft)											0.8	0.9		1.0			0.4	0.6		1.2			0.6	0.7	0.7	1.0	1.0	1.0	1.0		1.0
[1]Bankfull Max Depth (ft)											1.3	1.4		1.5			1.7	1.8		2.0			0.8	1.0	1.2	1.6	1.6	1.6	1.6		1.0
Bankfull Cross Sectional Area (ft^2)											6.2	6.2		6.2			16.7	16.7		16.7			6.2	6.2	6.2	13.3	13.3	13.3	13.3		1.0
Width/Depth Ratio											5.1	7.6		11.8			8.1	12.0		14.8			12.0	14.0	16.0	14.7	14.7	14.7	14.7		1.0
Entrenchment Ratio											2.7	2.9		3.0			16.5	19.0		22.0			2.3	7.5	12.0	7.2	7.2	7.2	7.2		1.0
[1]Bank Height Ratio											**1.0**	**1.0**		**1.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**		**1.0**
Profile																														
Riffle Length (ft)																										10.4	25.1	19.3	63.9	19.9	6.0
Riffle Slope (ft/ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						0.0090	0.0400		0.0754			0.0156	0.0228		0.0468			0.0194	0.0311	0.0583	0.0095	0.0338	0.0380	0.0619	0.0189	6.0
Pool Length (ft)																										12.8	15.0	14.8	19.2	2.3	6.0
Pool Max depth (ft)											2.0	2.3		2.6			1.9	2.1		2.3			0.9	1.3	1.3						
Pool Spacing (ft)											27.3	37.1		45.8			28.8	50.7		70.7			27.9	37.3	65.2	28.3	38.0	42.0	45.3	8.2	6.0
Pattern																														
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						15.4	19.0		25.2			13.4	14.7		16.6			14.0	27.9	37.3	27.9		27.9	37.3		
Radius of Curvature (ft)											8.7	15.8		29.4			0.8	2.2		3.3			18.6	27.9	37.3	18.6		27.9	37.3		
Rc:Bankfull width (ft/ft)																															
Meander Wavelength (ft)											56.5	63.8		76.0			59.8	96.3		117.2			55.9	79.2	111.8	55.9		79.2	111.8		
Meander Width Ratio											2.3	2.8		3.7			1.0	1.1		1.2			1.5	3.0	4.0	1.5		3.0	4.0		
Transport parameters																														
Reach Shear Stress (competency) lb/f^2																								0.7						
Max part size (mm) mobilized at bankfull																														
Stream Power (transport capacity) W/m^2																								28.9						
Additional Reach Parameters																														
Rosgen Classification					G 4						Eb 4						B 4						C4			C 4					
Bankfull Velocity (fps)					1.2																		3.9								
Bankfull Discharge (cfs)					29.6																										
Valley length (ft)					312.0																										
Channel Thalweg length (ft)					362.0																		233.0			292.0					
Sinuosity (ft)					1.2						1.2						1.0						1.1			1.1					
Water Surface Slope (Channel) (ft/ft)					0.0226						0.0226						0.0167						0.0194			0.0235					
BF slope (ft/ft)																															
[3]Bankfull Floodplain Area (acres)																															
[4]% of Reach with Eroding Banks																															
Channel Stability or Habitat Metric																															
Biological or Other																															

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11f. Baseline Stream Data Summary

Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 5 (1024 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						UT4 Reference Data						Chemtronics Reference Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					5.6	6.1		7.6			5.1	6.8		9.4			11.3	14.0		15.8			7.6	8.2	8.8	7.3	10.5	9.9	14.4		3.0
Floodprone Width (ft)					8.0	9.0		9.0			15.0	20.0		28.0			16.5	19.0		25.0			80.0	100.0	120.0	100.0	100.0	100.0	100.0		3.0
Bankfull Mean Depth (ft)					0.6	0.8		0.9			0.8	0.9		1.0			0.4	0.6		1.2			0.5	0.6	0.6	0.6	0.7	0.7	0.8		3.0
[1]Bankfull Max Depth (ft)					0.8	1.2		1.3			1.3	1.4		1.5			1.7	1.8		2.0			0.7	0.9	1.1	1.0	1.3	1.5	1.5		3.0
Bankfull Cross Sectional Area (ft^2)					4.8	4.8		4.8			6.2	6.2		6.2			16.7	16.7		16.7			4.8	4.8	4.8	4.5	7.6	7.9	10.4		3.0
Width/Depth Ratio					6.5	7.8		12.0			5.1	7.6		11.8			8.1	12.0		14.8			12.0	14.0	16.0	11.9	14.7	12.5	19.8		3.0
Entrenchment Ratio					1.2	1.4		1.5			2.7	2.9		3.0			16.5	19.0		22.0			10.5	12.2	13.7	7.0	10.3	10.1	13.7		3.0
[1]Bank Height Ratio					**2.4**	**4.8**		**5.8**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**		**3.0**
Profile																															
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities																					9.2	17.7	15.2	36.5	7.6	31.0
Riffle Slope (ft/ft)											0.0090	0.0400		0.0754			0.0156	0.0228		0.0468			0.0134	0.0214	0.0401	0.0111	0.0268	0.0248	0.0631	0.0105	31.0
Pool Length (ft)																										5.5	12.1	12.5	18.2	3.0	30.0
Pool Max depth (ft)											2.0	2.3		2.6			1.9	2.1		2.3			0.8	1.1	1.2						
Pool Spacing (ft)											27.3	37.1		45.8			28.8	50.7		70.7			24.6	32.8	57.4	24.0	34.6	32.5	50.2	6.8	30.0
Pattern																															
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						15.4	19.0		25.2			13.4	14.7		16.6			12.3	24.6	32.8	12.3		24.6	32.8		
Radius of Curvature (ft)											8.7	15.8		29.4			0.8	2.2		3.3			16.4	24.6	32.8	16.4		32.8	47.9		
Rc:Bankfull width (ft/ft)																															
Meander Wavelength (ft)											56.5	63.8		76.0			59.8	96.3		117.2			49.2	69.7	98.4	49.2		69.7	98.4		
Meander Width Ratio											2.3	2.8		3.7			1.0	1.1		1.2			1.5	3.0	4.0	1.5		3.0	4.0		
Transport parameters																															
Reach Shear Stress (competency) lb/ft^2					7.6																		0.4								
Max part size (mm) mobilized at bankfull																															
Stream Power (transport capacity) W/m^2					15.8																		15.1								
Additional Reach Parameters																															
Rosgen Classification					G 3						Eb 4						B 4						Ce 4			Ce 4					
Bankfull Velocity (fps)					0.3																		3.8								
Bankfull Discharge (cfs)					18.1																										
Valley length (ft)					1158.0																										
Channel Thalweg length (ft)					769.0																		1076.0			1076.0					
Sinuosity (ft)					1.1						1.2						1.0						1.1			1.1					
Water Surface Slope (Channel) (ft/ft)					0.014						0.0226						0.0167						0.0134			0.0221					
BF slope (ft/ft)																															
[3]Bankfull Floodplain Area (acres)																															
[4]% of Reach with Eroding Banks																															
Channel Stability or Habitat Metric																															
Biological or Other																															

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11g. Baseline Stream Data Summary

Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 6 (1265 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						UT4 Reference Data						Chemtronics Reference Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					4.2	5.5		6.4			5.1	6.8		9.4			11.3	14.0		15.8			6.1	6.6	7.0	9.5	10.4	10.1	11.7	1.0	4.0
Floodprone Width (ft)					8.0	9.0		9.0			15.0	20.0		28.0			16.5	19.0		25.0			25.0	50.0	75.0	100.0	100.0	100.0	100.0	0.0	4.0
Bankfull Mean Depth (ft)					0.5	0.6		0.7			0.8	0.9		1.0			0.4	0.6		1.2			0.4	0.5	0.5	0.5	0.7	0.7	0.9	0.2	4.0
[1]Bankfull Max Depth (ft)					0.6	1.0		1.3			1.3	1.4		1.5			1.7	1.8		2.0			0.6	0.7	0.9	0.9	1.1	1.1	1.3	0.2	4.0
Bankfull Cross Sectional Area (ft^2)					3.1	3.1		3.1			6.2	6.2		6.2			16.7	16.7		16.7			3.1	3.1	3.1	5.6	7.0	7.1	8.1	1.3	4.0
Width/Depth Ratio					5.7	9.8		13.2			5.1	7.6		11.8			8.1	12.0		14.8			12.0	14.0	16.0	11.1	16.0	15.5	22.0	5.1	4.0
Entrenchment Ratio					1.4	1.5		2.1			2.7	2.9		3.0			16.5	19.0		22.0			4.1	7.6	10.6	8.5	9.7	9.9	10.5	0.9	4.0
[1]Bank Height Ratio					**2.8**	**3.9**		**5.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**	**0.0**	**4.0**
Profile																															
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities																					4.8	16.1	13.5	45.8	8.4	47.0
Riffle Slope (ft/ft)											0.0090	0.0400		0.0754			0.0156	0.0228		0.0468			0.0042	0.0067	0.0125	0.0004	0.0085	0.0066	0.0510	0.0087	36.0
Pool Length (ft)																										2.0	10.3	10.9	15.7	3.5	46.0
Pool Max depth (ft)											2.0	2.3		2.6			1.9	2.1		2.3			0.7	0.9	0.9						
Pool Spacing (ft)											27.3	37.1		45.8			28.8	50.7		70.7			19.8	26.4	46.1	14.5	30.9	29.5	60.5	8.8	46.0
Pattern																															
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						15.4	19.0		25.2			13.4	14.7		16.6			9.9	19.8	26.4	9.9		19.8	26.4		
Radius of Curvature (ft)											8.7	15.8		29.4			0.8	2.2		3.3			13.2	19.8	26.4	13.2		19.8	26.4		
Rc:Bankfull width (ft/ft)																															
Meander Wavelength (ft)											56.5	63.8		76.0			59.8	96.3		117.2			39.5	56.0	79.1	39.5		56.0	79.1		
Meander Width Ratio											2.3	2.8		3.7			1.0	1.1		1.2			1.5	3.0	4.0	1.5		3.0	4.0		
Transport parameters																															
Reach Shear Stress (competency) lb/ft^2					1.1																		0.1								
Max part size (mm) mobilized at bankfull																															
Stream Power (transport capacity) W/m^2					2.8																		3.0								
Additional Reach Parameters																															
Rosgen Classification					G 3						Eb 4						B 4						Ce 4			Ce 4					
Bankfull Velocity (fps)					0.4																		3.7								
Bankfull Discharge (cfs)					11.5																										
Valley length (ft)					2135.0																										
Channel Thalweg length (ft)					1363.0																		1455.0			1455					
Sinuosity (ft)					1.0						1.2						1.0						1.2			1.2					
Water Surface Slope (Channel) (ft/ft)					0.0039						0.0226						0.0167						0.0042			0.0051					
BF slope (ft/ft)																															
[3]Bankfull Floodplain Area (acres)																															
[4]% of Reach with Eroding Banks																															
Channel Stability or Habitat Metric																															
Biological or Other																															

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11h. Baseline Stream Data Summary

Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 7 (1844 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						UT4 Reference Data						Chemtronics Reference Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					7.0	7.4		9.7			5.1	6.8		9.4			11.3	14.0		15.8			8.6	9.3	10.0	10.1	11.9	12.2	13.2	1.4	4.0
Floodprone Width (ft)					10.0	13.0		17.0			15.0	20.0		28.0			16.5	19.0		25.0			20.0	70.0	120.0	100.0	100.0	100.0	100.0	0.0	4.0
Bankfull Mean Depth (ft)					0.6	0.8		0.9			0.8	0.9		1.0			0.4	0.6		1.2			0.6	0.7	0.7	0.5	0.7	0.7	0.8	0.1	4.0
[1]Bankfull Max Depth (ft)					0.9	1.1		1.3			1.3	1.4		1.5			1.7	1.8		2.0			0.8	1.0	1.2	0.8	1.1	1.2	1.3	0.2	4.0
Bankfull Cross Sectional Area (ft^2)					6.2	6.2		6.2			6.2	6.2		6.2			16.7	16.7		16.7			6.2	6.2	6.2	5.2	8.3	8.6	10.7	2.5	4.0
Width/Depth Ratio					7.9	8.8		15.2			5.1	7.6		11.8			8.1	12.0		14.8			12.0	14.0	16.0	15.5	17.8	18.0	19.6	1.7	4.0
Entrenchment Ratio					1.4	1.5		2.4			2.7	2.9		3.0			16.5	19.0		22.0			2.3	7.5	12.0	7.6	8.5	8.2	9.9	1.1	4.0
[1]Bank Height Ratio					**1.4**	**1.9**		**2.6**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**	**0.0**	**4.0**
Profile																															
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities																					7.7	27.4	24.3	91.3	15.5	44.0
Riffle Slope (ft/ft)											0.0090	0.0400		0.0754			0.0156	0.0228		0.0468			0.0194	0.0311	0.0583	0.0003	0.0126	0.0097	0.0396	0.0113	44.0
Pool Length (ft)																										4.0	11.3	11.7	15.8	2.7	44.0
Pool Max depth (ft)											2.0	2.3		2.6			1.9	2.1		2.3			0.9	1.3	1.3						
Pool Spacing (ft)											27.3	37.1		45.8			28.8	50.7		70.7			27.9	37.3	65.2	22.3	44.2	40.1	107.9	16.3	43.0
Pattern																															
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						15.4	19.0		25.2			13.4	14.7		16.6			14.0	27.9	37.3	27.9		27.9	37.3		
Radius of Curvature (ft)											8.7	15.8		29.4			0.8	2.2		3.3			18.6	27.9	37.3	18.6		27.9	37.3		
Rc:Bankfull width (ft/ft)																															
Meander Wavelength (ft)											56.5	63.8		76.0			59.8	96.3		117.2			55.9	79.2	111.8	55.9		79.2	111.8		
Meander Width Ratio											2.3	2.8		3.7			1.0	1.1		1.2			1.5	3.0	4.0	1.5		3.0	4.0		
Transport parameters																															
Reach Shear Stress (competency) lb/ft^2					2.1																		0.7								
Max part size (mm) mobilized at bankfull																															
Stream Power (transport capacity) W/m^2					30.1																		28.9								
Additional Reach Parameters																															
Rosgen Classification					Gb 4						Eb 4						B 4						Eb 4			Eb 4					
Bankfull Velocity (fps)					1.6																		3.9								
Bankfull Discharge (cfs)					23.9																										
Valley length (ft)					1985.0																										
Channel Thalweg length (ft)					2426.0																		1973.0			1973					
Sinuosity (ft)					1.0						1.2						1.0						1.1			1.1					
Water Surface Slope (Channel) (ft/ft)					0.0202						0.0226						0.0167						0.0194			0.0103					
BF slope (ft/ft)																															
[3]Bankfull Floodplain Area (acres)																															
[4]% of Reach with Eroding Banks																															
Channel Stability or Habitat Metric																															
Biological or Other																															

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11i. Baseline Stream Data Summary

Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 8 (760 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						UT4 Reference Data						Chemtronics Reference Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					5.6	6.8		9.4			5.1	6.8		9.4			11.3	14.0		15.8			6.6	7.1	7.6	10.3	12.0	12.1	13.7		3.0
Floodprone Width (ft)					11.0	12.0		19.0			15.0	20.0		28.0			16.5	19.0		25.0			25.0	50.0	75.0	100.0	100.0	100.0	100.0		3.0
Bankfull Mean Depth (ft)					0.4	0.5		0.6			0.8	0.9		1.0			0.4	0.6		1.2			0.5	0.5	0.5	0.6	0.7	0.7	0.7		3.0
[1]Bankfull Max Depth (ft)					0.6	0.8		0.9			1.3	1.4		1.5			1.7	1.8		2.0			0.6	0.8	0.9	1.2	1.4	1.4	1.7		3.0
Bankfull Cross Sectional Area (ft^2)					3.6	3.6		3.6			6.2	6.2		6.2			16.7	16.7		16.7			3.6	3.6	3.6	6.4	8.3	8.3	10.2		3.0
Width/Depth Ratio					8.7	12.8		24.5			5.1	7.6		11.8			8.1	12.0		14.8			12.0	14.0	16.0	16.6	17.5	17.7	18.3		3.0
Entrenchment Ratio					1.8	2.0		2.0			2.7	2.9		3.0			16.5	19.0		22.0			3.8	7.0	9.9	7.3	8.4	8.2	9.7		3.0
[1]Bank Height Ratio					**2.3**	**2.7**		**3.8**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**		**1.0**			**1.0**	**1.0**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**		**3.0**
Profile																															
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities																					7.8	15.9	13.8	32.4	7.2	27.0
Riffle Slope (ft/ft)											0.0090	0.0400		0.0754			0.0156	0.0228		0.0468			0.0144	0.0231	0.0433	0.0002	0.0098	0.0101	0.0231	0.0056	27.0
Pool Length (ft)																										6.8	12.2	12.4	19.9	2.6	27.0
Pool Max depth (ft)											2.0	2.3		2.6			1.9	2.1		2.3			0.7	1.0	1.0						
Pool Spacing (ft)											27.3	37.1		45.8			28.8	50.7		70.7			21.3	28.4	49.7	24.1	32.2	30.6	48.2	6.9	26.0
Pattern																															
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to staightening activities						15.4	19.0		25.2			13.4	14.7		16.6			10.6	21.3	28.4	10.6		21.3	28.4		
Radius of Curvature (ft)											8.7	15.8		29.4			0.8	2.2		3.3			14.2	21.3	28.4	14.2		21.3	28.4		
Rc:Bankfull width (ft/ft)																															
Meander Wavelength (ft)											56.5	63.8		76.0			59.8	96.3		117.2			42.6	63.9	85.2	42.6		64.0	85.2		
Meander Width Ratio											2.3	2.8		3.7			1.0	1.1		1.2			1.5	3.0	4.0	1.5		3.0	4.0		
Transport parameters																															
Reach Shear Stress (competency) lb/ft^2					1.1																		0.4								
Max part size (mm) mobilized at bankfull																															
Stream Power (transport capacity) W/m^2					3.9																		12.3								
Additional Reach Parameters																															
Rosgen Classification					Eg 4						Eb 4						B 4						C 4			C 4					
Bankfull Velocity (fps)					0.4																		3.8								
Bankfull Discharge (cfs)					13.5																										
Valley length (ft)					1047.0																										
Channel Thalweg length (ft)					957.0																		874.0			874.0					
Sinuosity (ft)					1.0						1.2						1.0						1.2			1.2					
Water Surface Slope (Channel) (ft/ft)					0.0046						0.0226						0.0167						0.0144			0.0063					
BF slope (ft/ft)																															
[3]Bankfull Floodplain Area (acres)																															
[4]% of Reach with Eroding Banks																															
Channel Stability or Habitat Metric																															
Biological or Other																															

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 12a. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Lower (572 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												49	5	39	10			
[1]SC% / Sa% / G% / C% / B% / Be%																																			
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)																																			
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																																			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																																			

Table 12b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Upper (436 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												58	5	26	7			
[1]SC% / Sa% / G% / C% / B% / Be%																																			
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)																																			
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																																			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																																			

Table 12c. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Lower (873 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												55	3	32	10			
[1]SC% / Sa% / G% / C% / B% / Be%																																			
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)																																			
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																																			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																																			

Shaded cells indicate that these will typically not be filled in.
1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates
3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary.
The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions.
ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design measurements), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-construtions distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section measurements and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Table 12d. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Upper (1995 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												52	6	30	12			
[1]SC% / Sa% / G% / C% / B% / Be%																																		
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)																																		
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																																		
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																																		

Table 12e. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 4 (278 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												52	3	31	9			
[1]SC% / Sa% / G% / C% / B% / Be%																																		
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)																																		
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																																		
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																																		

Table 12f. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 5 (1024 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												51	4	34	11			
[1]SC% / Sa% / G% / C% / B% / Be%																																		
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)																																		
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																																		
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																																		

Shaded cells indicate that these will typically not be filled in.
1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates
3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary.
The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions.
ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design measurements), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-construtution distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section measurements and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Table 12g. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 6 (1265 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												50	6	31	10			
[1]SC% / Sa% / G% / C% / B% / Be%																																			
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)																																			
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																																			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																																			

Table 12h. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 7 (1844 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												61	5	25	7			
[1]SC% / Sa% / G% / C% / B% / Be%																																			
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)																																			
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																																			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																																			

Table 12i. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 8 (760 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												49	5	38	9			
[1]SC% / Sa% / G% / C% / B% / Be%																																			
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)																																			
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																																			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																																			

Shaded cells indicate that these will typically not be filled in.

1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates

3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary.
The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions.
ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design measurements), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-construtution distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section measurements and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Table 13a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Lower (572 feet)

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)						
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																												
Bankfull Width (ft)	11.9	13.4						8.2	8.2						9.2	9.3						10.6	11.8					
Floodprone Width (ft)	100.0	100.0						NA	NA						NA	NA						100.0	100.0					
Bankfull Mean Depth (ft)	1.1	1.0						1.0	1.0						0.8	0.8						0.9	0.8					
Bankfull Max Depth (ft)	2.1	1.9						1.9	1.9						1.4	1.5						1.7	1.7					
Low Bank Height (ft)	2.1	1.9						1.9	1.9						1.4	1.5						1.7	2.0					
Bankfull Cross Sectional Area (ft^2)	12.8	12.8						8.3	8.3						7.4	7.4						9.4	9.4					
Bankfull Width/Depth Ratio	11.1	14.0						NA	NA						NA	NA						11.9	14.8					
Bankfull Entrenchment Ratio	8.4	7.5						NA	NA						NA	NA						9.5	8.5					
Bankfull Bank Height Ratio	1.0	1.0						1.0	1.0						1.0	1.0						1.0	1.2					
Cross Sectional Area between end pins (ft^2)	46.9	42.4						22.5	22.5						23.2	23.4						15.8	15.6					
d50 (mm)																												

Table 13b. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Upper (436 feet)

	Cross Section 5 (Riffle)							Cross Section 6 (Pool)							Cross Section 7 (Pool)							Cross Section 8 (Riffle)						
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																												
Bankfull Width (ft)	8.5	9.0						6.2	9.0						10.0	11.8						9.6	10.0					
Floodprone Width (ft)	100.0	100.0						NA	NA						NA	NA						100.0	100.0					
Bankfull Mean Depth (ft)	0.5	0.5						0.6	0.4						0.9	0.8						0.7	0.7					
Bankfull Max Depth (ft)	0.8	1.0						1.3	1.1						2.3	1.8						1.4	1.4					
Low Bank Height (ft)	0.8	1.0						1.3	1.1						2.3	1.8						1.4	1.4					
Bankfull Cross Sectional Area (ft^2)	4.3	4.3						3.8	3.8						9.0	9.0						6.6	6.6					
Bankfull Width/Depth Ratio	16.9	18.8						NA	NA						NA	NA						14.0	15.2					
Bankfull Entrenchment Ratio	11.8	11.1						NA	NA						NA	NA						10.4	10.0					
Bankfull Bank Height Ratio	1.0	1.0						1.0	1.0						1.0	1.0						1.0	1.0					
Cross Sectional Area between end pins (ft^2)	11.6	13.5						14.1	18.1						17.1	13.6						10.3	9.6					
d50 (mm)																												

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Table 13c. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Lower (873 feet)

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)													
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+							
Record elevation (datum) used																																			
Bankfull Width (ft)	23.5	31.6						13.8	11.1						14.5	21.0						17.6	23.8												
Floodprone Width (ft)	100.0	100.0						NA	NA						NA	NA						100.0	100.0												
Bankfull Mean Depth (ft)	1.2	0.9						1.0	1.5						0.8	1.0						0.9	0.7												
Bankfull Max Depth (ft)	2.1	2.0						2.5	2.7						2.6	2.3						1.4	1.4												
Low Bank Height (ft)	2.1	2.0						2.5	2.6						2.6	2.3						1.4	1.4												
Bankfull Cross Sectional Area (ft^2)	27.2	27.2						16.7	16.7						21.3	21.3						17.0	17.0												
Bankfull Width/Depth Ratio	20.2	36.7						NA	NA						NA	NA						18.1	33.3												
Bankfull Entrenchment Ratio	4.3	3.2						NA	NA						NA	NA						5.7	4.2												
Bankfull Bank Height Ratio	1.0	1.0						1.0	1.0						1.0	1.0						1.0	1.0												
Cross Sectional Area between end pins (ft^2)	45.6	46.3						31.1	31.9						43.1	39.4						39.2	38.1												
d50 (mm)																																			
	Cross Section 6 (Riffle)							Cross Section 7 (Pool)							Cross Section 8 (Riffle)							Cross Section 9 (Riffle)							Cross Section 10 (Pool)						

Table 13d. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Upper (1995 feet)

	Cross Section 5 (Pool)							Cross Section 6 (Riffle)							Cross Section 7 (Riffle)							Cross Section 8 (Pool)							Cross Section 9 (Riffle)						
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																			
Bankfull Width (ft)	14.3	13.9						18.7	19.7						14.2	24.8						16.0	14.9						16.9	27.7					
Floodprone Width (ft)	NA	NA						100.0	100.0						100.0	100.0						NA	NA						100.0	100.0					
Bankfull Mean Depth (ft)	1.3	1.4						1.1	1.1						1.0	0.5						1.3	1.4						1.0	0.6					
Bankfull Max Depth (ft)	2.2	2.4						1.9	1.9						1.8	1.4						2.9	2.7						1.6	1.5					
Low Bank Height (ft)	2.2	2.3						1.9	1.9						1.8	1.4						2.9	2.7						1.6	1.5					
Bankfull Cross Sectional Area (ft^2)	19.1	19.1						21.4	21.4						13.6	13.6						20.8	20.8						16.4	16.4					
Bankfull Width/Depth Ratio	NA	NA						16.3	18.1						15.0	45.2						NA	NA						17.4	46.8					
Bankfull Entrenchment Ratio	NA	NA						5.4	5.1						7.0	4.0						NA	NA						5.9	3.6					
Bankfull Bank Height Ratio	1.0	1.0						1.0	1.0						1.0	1.0						1.0	1.0						1.0	1.0					
Cross Sectional Area between end pins (ft^2)	61.5	66.1						31.0	29.9						29.5	23.1						28.5	30.5						28.5	22.9					
d50 (mm)																																			
	Cross Section 10 (Pool)							Cross Section 11 (Pool)							Cross Section 12 (Riffle)																					
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+															
Record elevation (datum) used																																			
Bankfull Width (ft)	16.4	15.8						20.7	22.9						14.6	13.4																			
Floodprone Width (ft)	NA	NA						NA	NA						100.0	100.0																			
Bankfull Mean Depth (ft)	1.0	1.1						1.4	1.3						1.1	1.2																			
Bankfull Max Depth (ft)	2.5	2.7						3.3	3.0						1.9	2.5																			
Low Bank Height (ft)	2.5	2.7						3.3	2.9						1.9	2.5																			
Bankfull Cross Sectional Area (ft^2)	16.7	16.7						28.8	28.8						16.0	16.0																			
Bankfull Width/Depth Ratio	NA	NA						NA	NA						13.3	11.2																			
Bankfull Entrenchment Ratio	NA	NA						NA	NA						6.8	7.5																			
Bankfull Bank Height Ratio	1.0	1.0						1.0	1.0						1.0	1.0																			
Cross Sectional Area between end pins (ft^2)	29.3	25.4						52.7	50.2						36.8	37.4																			
d50 (mm)																																			

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Table 13e. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 4 (278 feet)

	Cross Section 1 (Pool)							Cross Section 2 (Riffle)						
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used														
Bankfull Width (ft)	12.0	11.0						14.0	20.5					
Floodprone Width (ft)	NA	NA						100.0	100.0					
Bankfull Mean Depth (ft)	1.0	1.1						1.0	0.6					
Bankfull Max Depth (ft)	1.9	1.9						1.6	1.6					
Low Bank Height (ft)	1.9	1.9						1.6	1.6					
Bankfull Cross Sectional Area (ft^2)	11.8	11.8						13.3	13.3					
Bankfull Width/Depth Ratio	NA	NA						14.7	31.6					
Bankfull Entrenchment Ratio	NA	NA						7.2	4.9					
Bankfull Bank Height Ratio	1.0	1.0						1.0	1.0					
Cross Sectional Area between end pins (ft^2)	21.1	21.6						18.6	18.5					
d50 (mm)														

Table 13f. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 5 (1024 feet)

	Cross Section 1 (Pool)							Cross Section 2 (Riffle)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)							Cross Section 5 (Pool)						
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																			
Bankfull Width (ft)	11.1	11.7						9.9	10.5						8.6	9.0						21.1	21.0						7.8	8.4					
Floodprone Width (ft)	NA	NA						100.0	100.0						NA	NA						100.0	100.0						NA	NA					
Bankfull Mean Depth (ft)	1.4	1.3						0.8	0.8						0.9	0.8						0.3	0.3						1.1	1.0					
Bankfull Max Depth (ft)	2.6	2.6						1.5	1.3						1.5	1.6						1.2	1.4						1.8	1.9					
Low Bank Height (ft)	2.6	2.6						1.5	1.3						1.5	1.5						1.2	1.4						1.8	2.0					
Bankfull Cross Sectional Area (ft^2)	15.3	15.3						7.9	7.9						7.4	7.4						7.3	7.3						8.7	8.7					
Bankfull Width/Depth Ratio	NA	NA						12.5	14.0						NA	NA						61.0	60.4						NA	NA					
Bankfull Entrenchment Ratio	NA	NA						10.1	9.5						NA	NA						4.7	4.8						NA	NA					
Bankfull Bank Height Ratio	1.0	1.0						1.0	1.0						1.0	0.9						1.0	1.0						1.0	1.1					
Cross Sectional Area between end pins (ft^2)	22.2	21.4						13.4	13.8						10.7	11.2						6.2	7.3						19.7	20.9					
d50 (mm)																																			
	Cross Section 6 (Riffle)																																		
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+																												
Record elevation (datum) used																																			
Bankfull Width (ft)	14.4	18.3																																	
Floodprone Width (ft)	100.0	100.0																																	
Bankfull Mean Depth (ft)	0.7	0.6																																	
Bankfull Max Depth (ft)	1.5	1.4																																	
Low Bank Height (ft)	1.5	1.3																																	
Bankfull Cross Sectional Area (ft^2)	10.4	10.4																																	
Bankfull Width/Depth Ratio	19.8	32.2																																	
Bankfull Entrenchment Ratio	7.0	5.5																																	
Bankfull Bank Height Ratio	1.0	0.9																																	
Cross Sectional Area between end pins (ft^2)	20.0	18.2																																	
d50 (mm)																																			

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Table 13g. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 6 (1265 feet)

	Cross Section 1 (Pool)							Cross Section 2 (Riffle)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)							Cross Section 5 (Riffle)						
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																			
Bankfull Width (ft)	9.0	11.2						10.2	10.6						11.5	13.9						10.1	13.6						9.5	12.7					
Floodprone Width (ft)	NA	NA						100.0	100.0						NA	NA						100.0	100.0						100.0	100.0					
Bankfull Mean Depth (ft)	0.9	0.7						0.6	0.5						0.9	0.7						0.8	0.6						0.9	0.6					
Bankfull Max Depth (ft)	1.7	1.6						0.9	0.9						1.7	1.3						1.1	1.1						1.3	1.3					
Low Bank Height (ft)	1.7	1.6						0.9	0.9						1.7	1.2						1.1	1.1						1.3	1.3					
Bankfull Cross Sectional Area (ft^2)	8.3	8.3						5.6	5.6						9.8	9.8						8.0	8.0						8.1	8.1					
Bankfull Width/Depth Ratio	NA	NA						18.3	20.1						NA	NA						12.6	23.1						11.1	19.9					
Bankfull Entrenchment Ratio	NA	NA						9.8	9.4						NA	NA						9.9	7.4						10.5	7.9					
Bankfull Bank Height Ratio	1.0	1.0						1.0	1.0						1.0	0.9						1.0	1.0						1.0	1.0					
Cross Sectional Area between end pins (ft^2)	19.4	17.5						14.3	15.1						25.8	25.3						16.6	17.5						12.8	12.9					
d50 (mm)																																			
	Cross Section 6 (Pool)							**Cross Section 7 (Pool)**							**Cross Section 8 (Riffle)**																				
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+														
Record elevation (datum) used																																			
Bankfull Width (ft)	9.6	13.1						13.2	13.2						11.7	13.2																			
Floodprone Width (ft)	NA	NA						NA	NA						100.0	100.0																			
Bankfull Mean Depth (ft)	0.9	0.6						0.8	0.8						0.5	0.5																			
Bankfull Max Depth (ft)	1.5	1.4						1.8	1.7						1.0	1.0																			
Low Bank Height (ft)	1.5	1.3						1.8	1.6						1.0	1.1																			
Bankfull Cross Sectional Area (ft^2)	8.4	8.4						11.1	11.1						6.3	6.3																			
Bankfull Width/Depth Ratio	NA	NA						NA	NA						22.0	27.7																			
Bankfull Entrenchment Ratio	NA	NA						NA	NA						8.5	7.6																			
Bankfull Bank Height Ratio	1.0	0.9						1.0	0.9						1.0	1.1																			
Cross Sectional Area between end pins (ft^2)	18.5	16.9						26.5	26.5						17.4	15.5																			
d50 (mm)																																			

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Table 13h. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 7 (1844 feet)

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)							Cross Section 5 (Riffle)						
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																			
Bankfull Width (ft)	12.9	15.1						14.2	18.4						13.2	14.7						11.4	12.6						11.6	12.2					
Floodprone Width (ft)	100.0	100.0						NA	NA						100.0	100.0						NA	NA						100.0	100.0					
Bankfull Mean Depth (ft)	0.8	0.7						1.3	1.0						0.8	0.7						1.1	1.0						0.6	0.6					
Bankfull Max Depth (ft)	1.3	1.3						2.1	2.2						1.3	1.2						1.8	1.8						1.1	1.1					
Low Bank Height (ft)	1.3	1.3						2.1	2.2						1.3	1.2						1.8	1.9						1.1	1.2					
Bankfull Cross Sectional Area (ft^2)	10.7	10.7						18.2	18.2						9.9	9.9						13.0	12.6						7.2	7.2					
Bankfull Width/Depth Ratio	15.5	21.3						NA	NA						17.5	21.8						NA	NA						18.5	20.7					
Bankfull Entrenchment Ratio	7.8	6.6						NA	NA						7.6	6.8						NA	NA						8.6	8.2					
Bankfull Bank Height Ratio	1.0	1.0						1.0	1.0						1.0	1.0						1.0	1.1						1.0	1.1					
Cross Sectional Area between end pins (ft^2)	18.6	18.6						34.1	28.0						20.9	18.6						23.6	25.9						20.3	19.9					
d50 (mm)																																			
	Cross Section 6 (Pool)							**Cross Section 7 (Pool)**							**Cross Section 8 (Riffle)**																					
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																			
Bankfull Width (ft)	8.8	10.6						9.1	11.4						10.1	10.1																			
Floodprone Width (ft)	NA	NA						NA	NA						100.0	100.0																			
Bankfull Mean Depth (ft)	1.2	1.0						1.3	1.0						0.5	0.5																			
Bankfull Max Depth (ft)	1.9	1.9						2.0	1.9						0.8	1.0																			
Low Bank Height (ft)	1.9	1.8						2.0	1.8						0.8	1.2																			
Bankfull Cross Sectional Area (ft^2)	10.7	10.7						11.6	11.6						5.2	5.2																			
Bankfull Width/Depth Ratio	NA	NA						NA	NA						19.6	19.6																			
Bankfull Entrenchment Ratio	NA	NA						NA	NA						9.9	9.9																			
Bankfull Bank Height Ratio	1.0	0.9						1.0	0.9						1.0	1.2																			
Cross Sectional Area between end pins (ft^2)	17.1	16.7						21.0	18.5						11.2	15.2																			
d50 (mm)																																			

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Table 13i. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 8 (760 feet)

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)							Cross Section 5 (Riffle)						
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																			
Bankfull Width (ft)	13.7	15.2						11.4	13.4						12.1	12.9						10.2	11.0						10.3	10.3					
Floodprone Width (ft)	100.0	100.0						NA	NA						100.0	100.0						NA	NA						100.0	100.0					
Bankfull Mean Depth (ft)	0.7	0.7						1.2	1.0						0.7	0.6						0.9	0.8						0.6	0.6					
Bankfull Max Depth (ft)	1.7	1.3						2.0	1.9						1.4	1.4						1.7	1.6						1.2	1.2					
Low Bank Height (ft)	1.7	1.5						2.0	1.9						1.4	1.5						1.7	1.6						1.2	1.3					
Bankfull Cross Sectional Area (ft^2)	10.2	10.2						13.9	13.9						8.3	8.3						9.1	9.1						6.4	6.4					
Bankfull Width/Depth Ratio	18.3	22.7						NA	NA						17.7	20.0						NA	NA						16.6	16.6					
Bankfull Entrenchment Ratio	7.3	6.6						NA	NA						8.2	7.8						NA	NA						9.7	9.7					
Bankfull Bank Height Ratio	1.0	1.2						1.0	1.0						1.0	1.1						1.0	1.0						1.0	1.1					
Cross Sectional Area between end pins (ft^2)	31.1	30.5						38.2	32.0						18.8	19.6						19.8	20.6						13.5	12.2					
d50 (mm)																																			
	Cross Section 6 (Pool)																																		
Based on fixed baseline bankfull elevation [1]	Base	MY1	MY2	MY3	MY4	MY5	MY+																												
Record elevation (datum) used																																			
Bankfull Width (ft)	15.9	14.4																																	
Floodprone Width (ft)	NA	NA																																	
Bankfull Mean Depth (ft)	0.8	0.9																																	
Bankfull Max Depth (ft)	1.9	1.8																																	
Low Bank Height (ft)	1.9	1.8																																	
Bankfull Cross Sectional Area (ft^2)	13.1	13.1																																	
Bankfull Width/Depth Ratio	NA	NA																																	
Bankfull Entrenchment Ratio	NA	NA																																	
Bankfull Bank Height Ratio	1.0	1.0																																	
Cross Sectional Area between end pins (ft^2)	25.0	24.6																																	
d50 (mm)																																			

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Table 14a. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Lower (572 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	10.56	11.22	11.22	11.88		2	11.8	11.1	11.1	12.8		2																								
Floodprone Width (ft)	100	100	100	100		2	100	100	100	100		2																								
Bankfull Mean Depth (ft)	0.888	0.981	0.981	1.075		2	0.8	0.9	0.9	1		2																								
[1]Bankfull Max Depth (ft)	1.703	1.895	1.895	2.087		2	1.7	1.8	1.8	1.9		2																								
Bankfull Cross Sectional Area (ft^2)	9.378	11.07	11.07	12.77		2	9.4	11.1	11.1	12.8		2																								
Width/Depth Ratio	11.06	11.47	11.47	11.88		2	14	14.4	14.4	14.8		2																								
Entrenchment Ratio	8.416	8.944	8.944	9.472		2	7.5	8	8	8.5		2																								
[1]Bank Height Ratio	**1**	**1**	**1**	**1**		**2**	**1**	**1.1**	**1.1**	**1.2**		**2**																								
Profile																																				
Riffle Length (ft)	1.924	14.87	8.897	55.19	14.76	20																														
Riffle Slope (ft/ft)	0.006	0.020	0.019	0.039	0.010	20																														
Pool Length (ft)	2.416	10.68	11.19	19.43	4.772	20																														
Pool Max depth (ft)																																				
Pool Spacing (ft)	6.911	30.62	28.03	66.88	16.18	19																														
Pattern																																				
Channel Beltwidth (ft)	15		29.9	39.9																																
Radius of Curvature (ft)	15		29.9	39.9																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	59.82		84.7	119.6																																
Meander Width Ratio	1.5		3	4																																
Additional Reach Parameters																																				
Rosgen Classification	Cb 4																																			
Channel Thalweg length (ft)	601																																			
Sinuosity (ft)	1.05																																			
Water Surface Slope (Channel) (ft/ft)	0.0163																																			
BF slope (ft/ft)	**------**																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

Table 14b. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Upper (436 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	8.5	9.052	9.052	9.603		2	9	9.5	9.5	10		2																								
Floodprone Width (ft)	100	100	100	100		2	100	100	100	100		2																								
Bankfull Mean Depth (ft)	0.503	0.593	0.593	0.684		2	0.5	0.6	0.6	0.7		2																								
[1]Bankfull Max Depth (ft)	0.831	1.111	1.111	1.391		2	1	1.2	1.2	1.4		2																								
Bankfull Cross Sectional Area (ft^2)	4.276	5.421	5.421	6.566		2	4.3	5.5	5.5	6.6		2																								
Width/Depth Ratio	14.05	15.47	15.47	16.9		2	15.2	17	17	18.8		2																								
Entrenchment Ratio	10.41	11.09	11.09	11.76		2	2.8	6.4	6.4	10		2																								
[1]Bank Height Ratio	**1**	**1**	**1**	**1**		**2**	**1**	**1**	**1**	**1**		**2**																								
Profile																																				
Riffle Length (ft)	12.63	22.14	20.55	43.08	8.919	12																														
Riffle Slope (ft/ft)	0.021	0.040	0.039	0.066	0.014	12																														
Pool Length (ft)	6.968	9.924	8.689	18.48	3.385	12																														
Pool Max depth (ft)																																				
Pool Spacing (ft)	26.4	37.44	34.84	52.16	8.468	11																														
Pattern																																				
Channel Beltwidth (ft)	15		29.9	39.9																																
Radius of Curvature (ft)	15		29.9	39.9																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	59.82		84.7	119.6																																
Meander Width Ratio	1.5		3	4																																
Additional Reach Parameters																																				
Rosgen Classification	Cb 4																																			
Channel Thalweg length (ft)	458																																			
Sinuosity (ft)	1.05																																			
Water Surface Slope (Channel) (ft/ft)	0.0372																																			
BF slope (ft/ft)	------																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

4. = Of value/needed only if the n exceeds 3

Table 14c. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Lower (873 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	Mean	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	10.56	17.01	17.01	23.46		2	23.5	23.7	23.7	23.8		2																								
Floodprone Width (ft)	100	100	100	100		2	100	100	100	100		2																								
Bankfull Mean Depth (ft)	0.888	1.024	1.024	1.159		2	0.7	0.9	0.9	1.2		2																								
[1]Bankfull Max Depth (ft)	1.703	1.899	1.899	2.094		2	1.4	1.8	1.8	2.1		2																								
Bankfull Cross Sectional Area (ft^2)	17	22.1	22.1	27.2		2	17	22.1	22.1	27.2		2																								
Width/Depth Ratio	11.88	16.06	16.06	20.24		2	20.3	26.8	26.8	33.3		2																								
Entrenchment Ratio	4.262	6.867	6.867	9.472		2	4.2	4.2	4.2	4.3		2																								
[1]Bank Height Ratio	**1**	**1**	**1**	**1**		**2**	**1**	**1**	**1**	**1**		**2**																								
Profile																																				
Riffle Length (ft)	16.73	35.32	33.02	64.95	13.72	15																														
Riffle Slope (ft/ft)	0.008	0.018	0.019	0.028	0.006	15																														
Pool Length (ft)	11.32	20.36	20.28	29.23	6.49	15																														
Pool Max depth (ft)																																				
Pool Spacing (ft)	32.17	64.03	56.97	104	18.91	15																														
Pattern																																				
Channel Beltwidth (ft)	23.9		47.9	63.8																																
Radius of Curvature (ft)	31.9		47.9	47.9																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	95.8		165.7	191.5																																
Meander Width Ratio	1.5		3	4																																
Additional Reach Parameters																																				
Rosgen Classification	Ce 4																																			
Channel Thalweg length (ft)	960																																			
Sinuosity (ft)	1.1																																			
Water Surface Slope (Channel) (ft/ft)	0.0129																																			
BF slope (ft/ft)	------																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

4. = Of value/needed only if the n exceeds 3

Table 14d. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Upper (1995 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	14.25	16.1	15.75	18.67	2.069	4	9	11.7	11.7	27.7		4																								
Floodprone Width (ft)	100	100	100	100	0	4	100	100	100	100		4																								
Bankfull Mean Depth (ft)	0.951	1.041	1.033	1.146	0.095	4	0.5	0.6	0.6	1.2		4																								
[1]Bankfull Max Depth (ft)	1.611	1.793	1.83	1.903	0.131	4	1	1.5	1.5	2.5		4																								
Bankfull Cross Sectional Area (ft^2)	13.55	16.84	16.2	21.4	3.291	4	13.6	16.2	16.2	21.4		4																								
Width/Depth Ratio	13.34	15.5	15.63	17.38	1.739	4	11.2	17	17	46.8		4																								
Entrenchment Ratio	5.356	6.286	6.384	7.02	0.783	4	2.8	5.5	5.5	10		4																								
[1]Bank Height Ratio	**1**	**1**	**1**	**1**	**0**	**4**	**1**	**1**	**1**	**1**		**4**																								
Profile																																				
Riffle Length (ft)	8.655	33.73	29.5	79.65	18.55	34																														
Riffle Slope (ft/ft)	0.008	0.018	0.018	0.034	0.006	34																														
Pool Length (ft)	10.08	19.26	17.43	42.65	6.576	34																														
Pool Max depth (ft)																																				
Pool Spacing (ft)	33.58	65.36	61.27	108	17.84	33																														
Pattern																																				
Channel Beltwidth (ft)	23.9		47.9	63.8																																
Radius of Curvature (ft)	31.9		47.9	63.8																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	95.8		165.7	191.5																																
Meander Width Ratio	1.5		3	4																																
Additional Reach Parameters																																				
Rosgen Classification	Ce 4																																			
Channel Thalweg length (ft)	2195																																			
Sinuosity (ft)	1.1																																			
Water Surface Slope (Channel) (ft/ft)	0.0139																																			
BF slope (ft/ft)	------																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

4. = Of value/needed only if the n exceeds 3

Table 14e. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 4 (278 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	13.97	13.97	13.97	13.97		1	20.5	20.5	20.5	20.5		1																								
Floodprone Width (ft)	100	100	100	100		1	100	100	100	100		1																								
Bankfull Mean Depth (ft)	0.952	0.952	0.952	0.952		1	0.6	0.6	0.6	0.6		1																								
[1]Bankfull Max Depth (ft)	1.613	1.613	1.613	1.613		1	1.6	1.6	1.6	1.6		1																								
Bankfull Cross Sectional Area (ft^2)	13.3	13.3	13.3	13.3		1	13.3	13.3	13.3	13.3		1																								
Width/Depth Ratio	14.67	14.67	14.67	14.67		1	31.6	31.6	31.6	31.6		1																								
Entrenchment Ratio	7.158	7.158	7.158	7.158		1	4.9	4.9	4.9	4.9		1																								
[1]Bank Height Ratio	**1**	**1**	**1**	**1**		**1**	**1**	**1**	**1**	**1**		**1**																								
Profile																																				
Riffle Length (ft)	10.42	25.15	19.31	63.94	19.9	6																														
Riffle Slope (ft/ft)	0.009	0.034	0.038	0.062	0.019	6																														
Pool Length (ft)	12.84	14.96	14.76	19.24	2.287	6																														
Pool Max depth (ft)																																				
Pool Spacing (ft)	28.34	38	42.04	45.35	8.199	6																														
Pattern																																				
Channel Beltwidth (ft)	27.9		27.9	37.3																																
Radius of Curvature (ft)	18.6		27.9	37.3																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	55.9		79.2	111.8																																
Meander Width Ratio	1.5		3	4																																
Additional Reach Parameters																																				
Rosgen Classification	C 4																																			
Channel Thalweg length (ft)	292																																			
Sinuosity (ft)	1.05																																			
Water Surface Slope (Channel) (ft/ft)	0.0235																																			
BF slope (ft/ft)	------																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

4. = Of value/needed only if the n exceeds 3

Table 14f. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 5 (1024 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	7.288	10.52	9.918	14.36		3	10.5	18.3	18.3	21		3																								
Floodprone Width (ft)	100	100	100	100		3	100	100	100	100		3																								
Bankfull Mean Depth (ft)	0.614	0.711	0.725	0.796		3	0.3	0.6	0.6	0.8		3																								
[1]Bankfull Max Depth (ft)	0.978	1.348	1.528	1.54		3	1.3	1.4	1.4	1.4		3																								
Bankfull Cross Sectional Area (ft^2)	7.3	7.9	7.9	10.4		3	7.3	7.9	7.9	10.4		3																								
Width/Depth Ratio	11.87	14.72	12.47	19.81		3	14	32.2	32.2	60.4		3																								
Entrenchment Ratio	6.966	10.26	10.08	13.72		3	1.9	2.2	2.2	3.8		3																								
[1]Bank Height Ratio	**1**	**1**	**1**	**1**		**3**	**1**	**0.9**	**0.9**	**1**		**3**																								
Profile																																				
Riffle Length (ft)	9.158	17.7	15.15	36.54	7.615	31																														
Riffle Slope (ft/ft)	0.011	0.027	0.025	0.063	0.010	31																														
Pool Length (ft)	5.509	12.12	12.54	18.16	3.017	30																														
Pool Max depth (ft)																																				
Pool Spacing (ft)	24.01	34.63	32.47	50.16	6.837	30																														
Pattern																																				
Channel Beltwidth (ft)	12.3		24.6	32.8																																
Radius of Curvature (ft)	16.4		32.8	47.9																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	49.19		69.7	98.37																																
Meander Width Ratio	1.5		3	4																																
Additional Reach Parameters																																				
Rosgen Classification	Ce 4																																			
Channel Thalweg length (ft)	1076																																			
Sinuosity (ft)	1.05																																			
Water Surface Slope (Channel) (ft/ft)	0.0221																																			
BF slope (ft/ft)	------																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

4. = Of value/needed only if the n exceeds 3

Table 14g. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 6 (1265 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	9.483	10.37	10.12	11.74	0.964	4	10.6	13	13	13.6		4																								
Floodprone Width (ft)	100	100	100	100	0	4	100	100	100	100		4																								
Bankfull Mean Depth (ft)	0.533	0.686	0.676	0.857	0.166	4	0.5	0.6	0.6	0.6		4																								
[1]Bankfull Max Depth (ft)	0.865	1.074	1.056	1.319	0.198	4	0.9	1.1	1.1	1.3		4																								
Bankfull Cross Sectional Area (ft^2)	5.639	7.015	7.145	8.131	1.26	4	5.6	7.2	7.2	8.1		4																								
Width/Depth Ratio	11.06	16.01	15.47	22.04	5.078	4	19.9	21.6	21.6	27.7		4																								
Entrenchment Ratio	8.519	9.707	9.882	10.54	0.852	4	2	7.5	7.5	9.4		4																								
[1]Bank Height Ratio	**1**	**1**	**1**	**1**	**0**	**4**	**1**	**1**	**1**	**1**		**4**																								
Profile																																				
Riffle Length (ft)	4.81	16.05	13.49	45.77	8.382	47																														
Riffle Slope (ft/ft)	0.000	0.008	0.007	0.051	0.009	36																														
Pool Length (ft)	1.97	10.27	10.89	15.65	3.499	46																														
Pool Max depth (ft)																																				
Pool Spacing (ft)	14.55	30.95	29.52	60.46	8.806	46																														
Pattern																																				
Channel Beltwidth (ft)	9.9		19.8	26.4																																
Radius of Curvature (ft)	13.2		19.8	26.4																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	39.5		56	79.1																																
Meander Width Ratio	1.5		3	4																																
Additional Reach Parameters																																				
Rosgen Classification	Ce 4																																			
Channel Thalweg length (ft)	1455																																			
Sinuosity (ft)	1.15																																			
Water Surface Slope (Channel) (ft/ft)	0.0051																																			
BF slope (ft/ft)	------																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

4. = Of value/needed only if the n exceeds 3

Table 14h. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 7 (1844 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	10.09	11.92	12.22	13.15	1.402	4	10.1	13.5	13.5	15.1		4																								
Floodprone Width (ft)	100	100	100	100	0	4	100	100	100	100		4																								
Bankfull Mean Depth (ft)	0.515	0.681	0.69	0.83	0.139	4	0.5	0.6	0.6	0.7		4																								
[1]Bankfull Max Depth (ft)	0.82	1.123	1.163	1.345	0.235	4	1	1.2	1.2	1.3		4																								
Bankfull Cross Sectional Area (ft^2)	5.196	8.26	8.583	10.68	2.517	4	5.2	8.6	8.6	10.7		4																								
Width/Depth Ratio	15.52	17.76	17.95	19.61	1.734	4	19.6	21	21	21.8		4																								
Entrenchment Ratio	7.602	8.481	8.207	9.908	1.056	4	0.7	1.5	1.5	2		4																								
[1]Bank Height Ratio	**1**	**1**	**1**	**1**	**0**	**4**	**1**	**1**	**1**	**1.2**		**4**																								
Profile																																				
Riffle Length (ft)	7.735	27.4	24.34	91.32	15.53	44																														
Riffle Slope (ft/ft)	0.000	0.013	0.010	0.040	0.011	44																														
Pool Length (ft)	4.044	11.28	11.73	15.84	2.729	44																														
Pool Max depth (ft)																																				
Pool Spacing (ft)	22.31	44.19	40.07	107.9	16.31	43																														
Pattern																																				
Channel Beltwidth (ft)	27.9		27.9	37.3																																
Radius of Curvature (ft)	18.6		27.9	37.3																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	55.9		79.2	111.8																																
Meander Width Ratio	1.5		3	4																																
Additional Reach Parameters																																				
Rosgen Classification	Eb 4																																			
Channel Thalweg length (ft)	1973																																			
Sinuosity (ft)	1.07																																			
Water Surface Slope (Channel) (ft/ft)	0.0103																																			
BF slope (ft/ft)	------																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

Table 14i. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 8 (760 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	10.34	12.04	12.13	13.66		3	10.3	12.9	12.9	15.2		3																								
Floodprone Width (ft)	100	100	100	100		3	100	100	100	100		3																								
Bankfull Mean Depth (ft)	0.624	0.684	0.684	0.745		3	0.6	0.6	0.6	0.7		3																								
[1]Bankfull Max Depth (ft)	1.197	1.433	1.426	1.677		3	1.2	1.3	1.3	1.4		3																								
Bankfull Cross Sectional Area (ft^2)	6.446	8.305	8.293	10.18		3	6.4	8.3	8.3	10.2		3																								
Width/Depth Ratio	16.57	17.55	17.74	18.34		3	16.6	20	20	22.7		3																								
Entrenchment Ratio	7.32	8.413	8.244	9.676		3	1.6	1.9	1.9	2.2		3																								
[1]Bank Height Ratio	**1**	**1**	**1**	**1**		**3**	**1.1**	**1.1**	**1.1**	**1.2**		**3**																								
Profile																																				
Riffle Length (ft)	7.812	15.86	13.77	32.44	7.157	27																														
Riffle Slope (ft/ft)	0.000	0.010	0.010	0.023	0.006	27																														
Pool Length (ft)	6.84	12.15	12.42	19.87	2.569	27																														
Pool Max depth (ft)																																				
Pool Spacing (ft)	24.07	32.15	30.62	48.15	6.855	26																														
Pattern																																				
Channel Beltwidth (ft)	10.65		21.3	28.4																																
Radius of Curvature (ft)	14.2		21.3	28.4																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	42.6		64	85.2																																
Meander Width Ratio	1.5		3	4																																
Additional Reach Parameters																																				
Rosgen Classification	C 4																																			
Channel Thalweg length (ft)	874																																			
Sinuosity (ft)	1.15																																			
Water Surface Slope (Channel) (ft/ft)	0.0063																																			
BF slope (ft/ft)	------																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

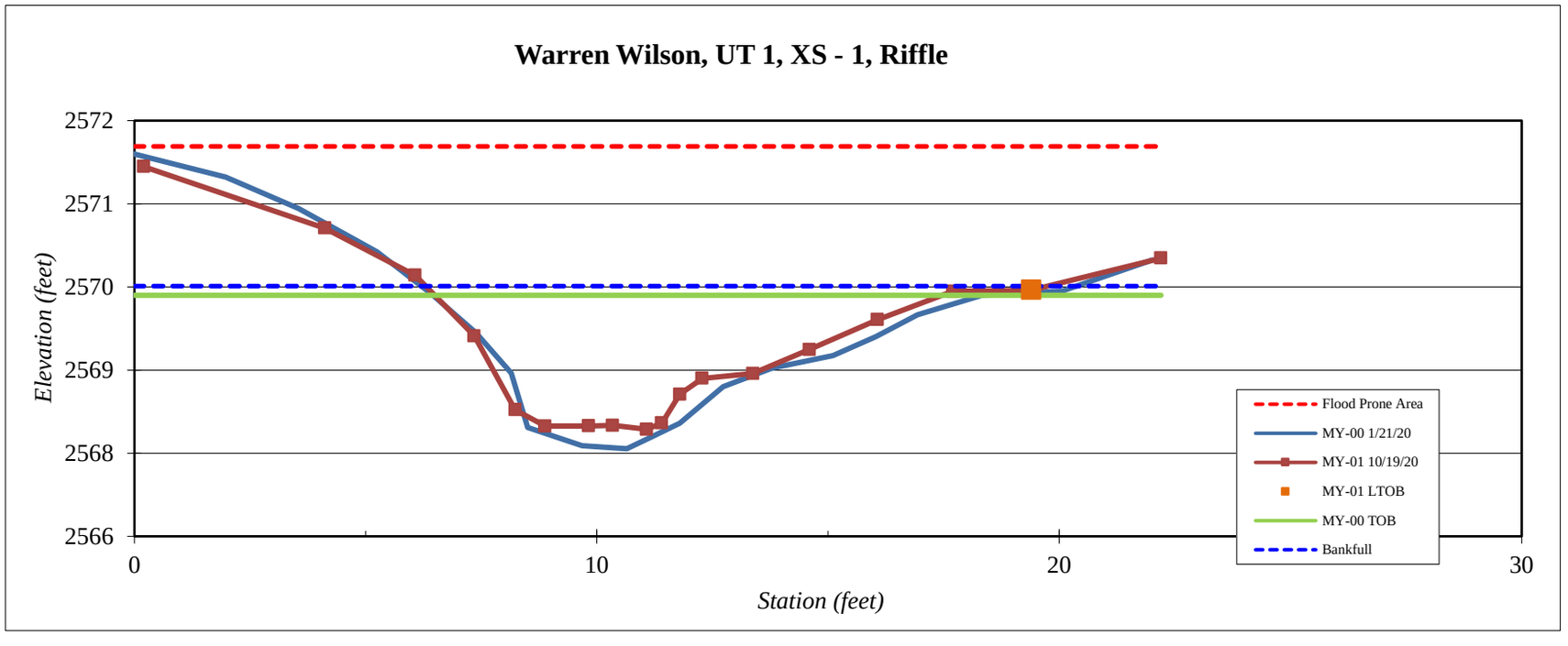
4. = Of value/needed only if the n exceeds 3

Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 1, XS -1, Riffle
Feature	Riffle
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	2571.5
4.1	2570.6
6.1	2570.0
7.4	2569.2
8.2	2568.2
8.9	2568.0
9.8	2568.0
10.3	2568.0
11.1	2567.9
11.4	2568.0
11.8	2568.4
12.3	2568.6
13.4	2568.7
14.6	2569.0
16.1	2569.4
17.7	2569.8
19.4	2569.8
22.2	2570.2

SUMMARY DATA	
Bankfull Elevation:	2569.9
Bankfull Cross-Sectional Area:	12.8
Bankfull Width:	13.4
Flood Prone Area Elevation:	2571.8
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.9
Low Bank Height:	1.9
Mean Depth at Bankfull:	1.0
W / D Ratio:	14.1
Entrenchment Ratio:	7.5
Bank Height Ratio:	1.0

Stream Type	Cb 4

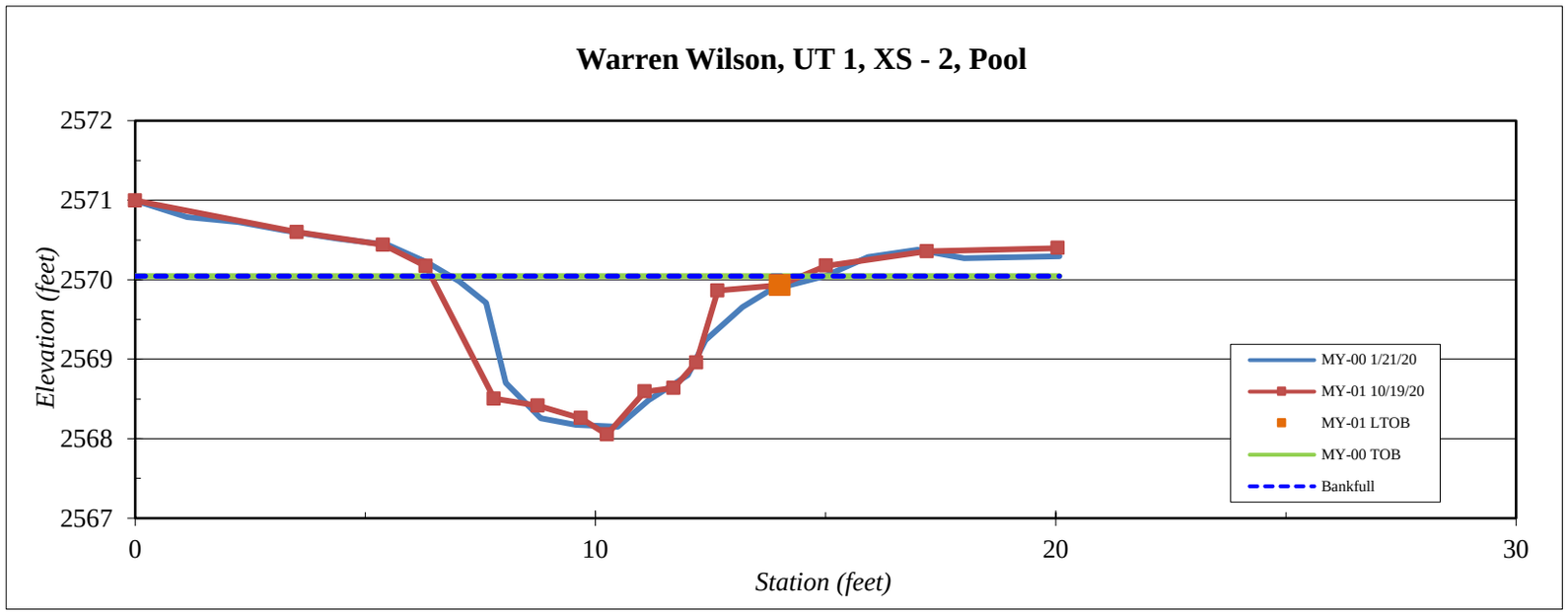


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 1, XS - 2, Pool
Feature	Pool
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2571.0
3.5	2570.6
5.4	2570.4
6.3	2570.2
7.8	2568.5
8.7	2568.4
9.7	2568.3
10.3	2568.1
11.1	2568.6
11.7	2568.6
12.2	2569.0
12.7	2569.9
14.0	2569.9
15.0	2570.2
17.2	2570.4
20.0	2570.4
13.2	2569.7
13.8	2569.9
15.0	2570.0
15.9	2570.3
17.0	2570.4
18.0	2570.3
20.1	2570.3

SUMMARY DATA	
Bankfull Elevation:	2570.0
Bankfull Cross-Sectional Area:	8.3
Bankfull Width:	7.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.9
Low Bank Height:	1.9
Mean Depth at Bankfull:	1.1
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Cb 4

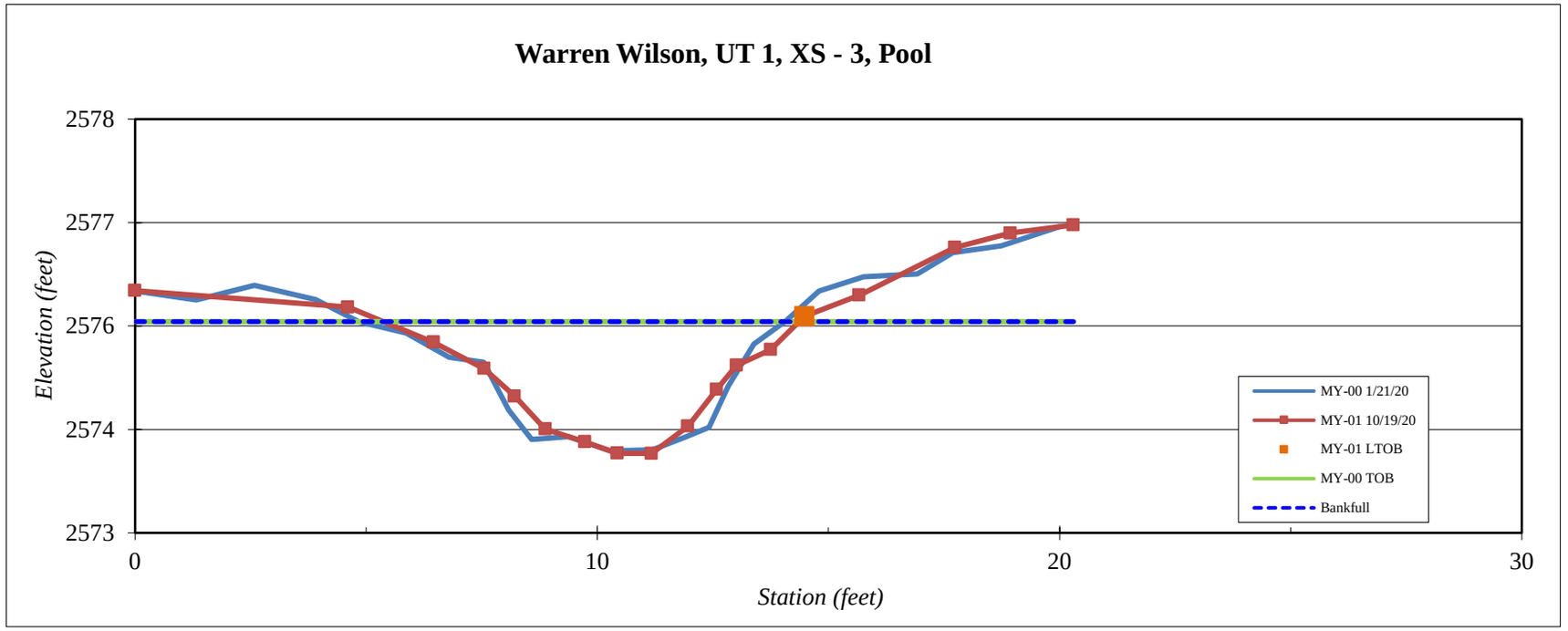


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 1, XS - 3, Pool
Feature	Pool
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2575.9
4.6	2575.7
6.5	2575.3
7.5	2575.0
8.2	2574.7
8.9	2574.4
9.7	2574.2
10.4	2574.1
11.2	2574.1
12.0	2574.4
12.6	2574.8
13.0	2575.1
13.8	2575.2
14.5	2575.6
15.7	2575.8
17.7	2576.4
18.9	2576.5
20.3	2576.6

SUMMARY DATA	
Bankfull Elevation:	2575.6
Bankfull Cross-Sectional Area:	7.4
Bankfull Width:	9.3
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.5
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Cb 4

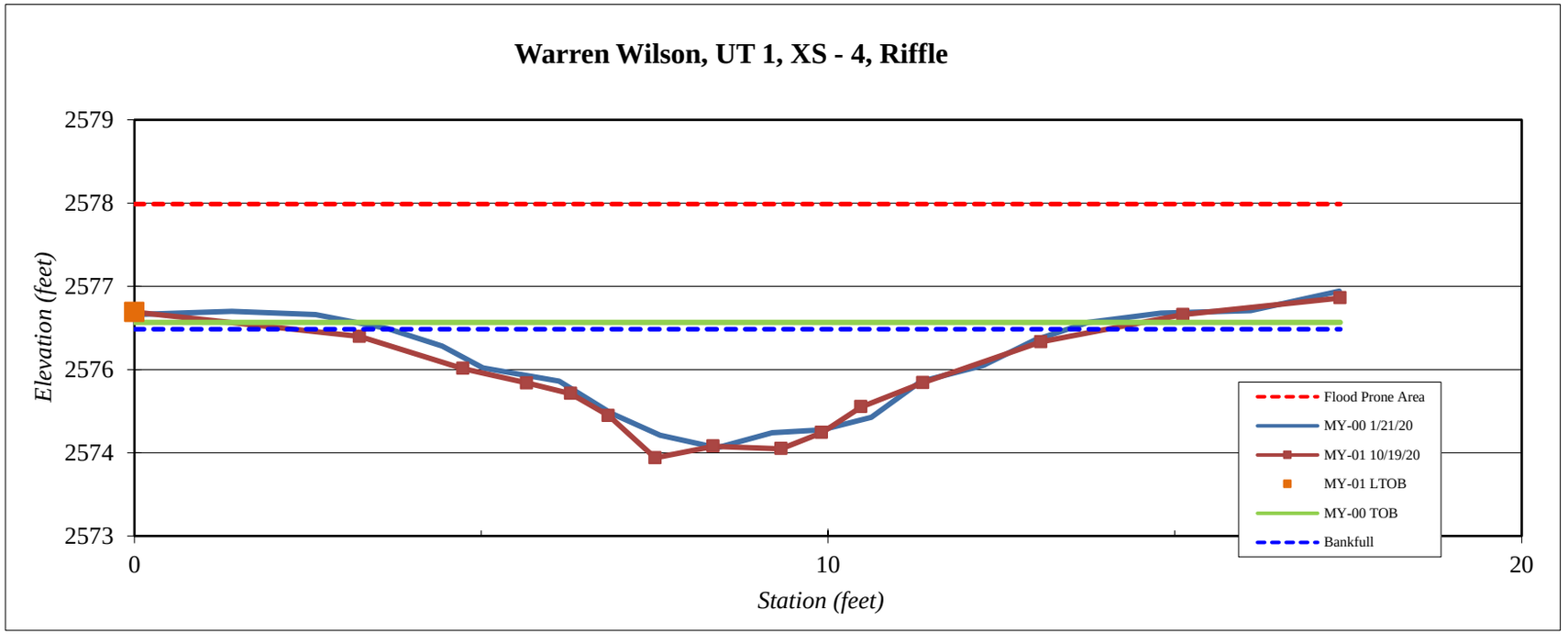


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 1, XS -4, Riffle
Feature	Riffle
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2576.3
3.2	2576.0
4.7	2575.5
5.7	2575.3
6.3	2575.2
6.8	2574.9
7.5	2574.3
8.3	2574.5
9.3	2574.4
9.9	2574.6
10.5	2575.0
11.4	2575.3
13.1	2575.9
15.1	2576.2
17.4	2576.5

SUMMARY DATA	
Bankfull Elevation:	2576.1
Bankfull Cross-Sectional Area:	9.4
Bankfull Width:	11.8
Flood Prone Area Elevation:	2577.8
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.7
Low Bank Height:	2.0
Mean Depth at Bankfull:	0.8
W / D Ratio:	14.8
Entrenchment Ratio:	8.5
Bank Height Ratio:	1.2

Stream Type	Cb 4

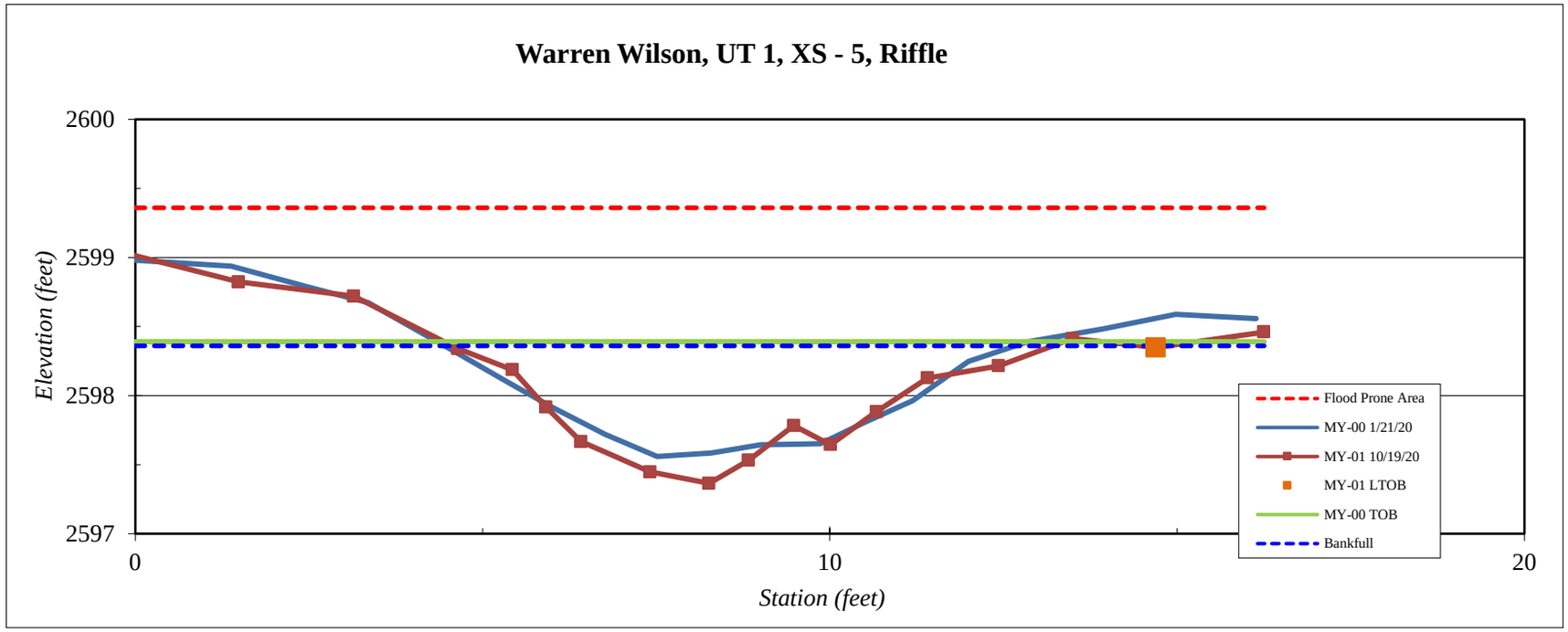


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 1, XS - 5, Riffle
Feature	Riffle
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	2599.0
1.5	2598.8
3.1	2598.7
4.6	2598.3
5.4	2598.2
5.9	2597.9
6.4	2597.7
7.4	2597.4
8.3	2597.4
8.8	2597.5
9.5	2597.8
10.0	2597.6
10.7	2597.9
11.4	2598.1
12.4	2598.2
13.5	2598.4
14.7	2598.3
16.3	2598.5

SUMMARY DATA	
Bankfull Elevation:	2598.4
Bankfull Cross-Sectional Area:	4.3
Bankfull Width:	9.0
Flood Prone Area Elevation:	2599.4
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.0
Low Bank Height:	1.0
Mean Depth at Bankfull:	0.5
W / D Ratio:	18.9
Entrenchment Ratio:	11.1
Bank Height Ratio:	1.0

Stream Type	Cb 4

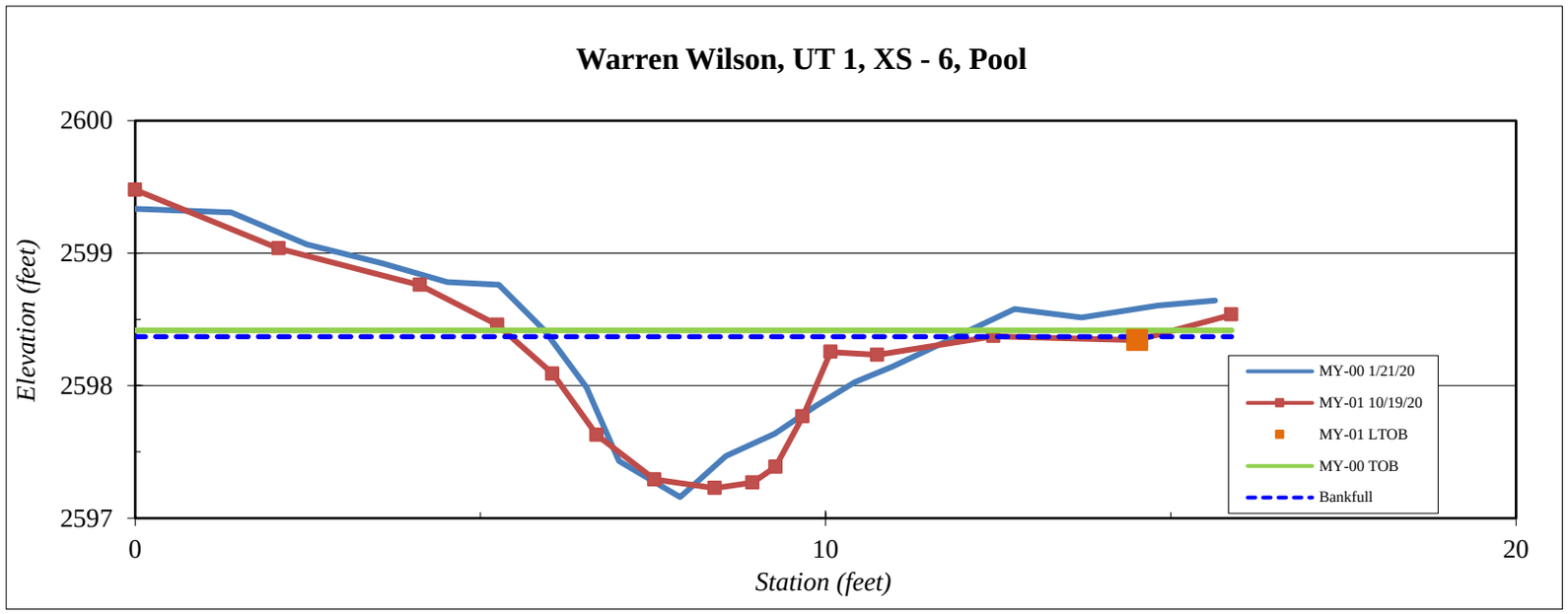


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 1, XS - 6, Pool
Feature	Pool
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2599.5
2.1	2599.0
4.1	2598.8
5.2	2598.5
6.0	2598.1
6.7	2597.6
7.5	2597.3
8.4	2597.2
8.9	2597.3
9.3	2597.4
9.7	2597.8
10.1	2598.3
10.8	2598.2
12.4	2598.4
14.5	2598.3
15.9	2598.5

SUMMARY DATA	
Bankfull Elevation:	2598.4
Bankfull Cross-Sectional Area:	3.8
Bankfull Width:	9.0
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.1
Low Bank Height:	1.1
Mean Depth at Bankfull:	0.4
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Cb 4

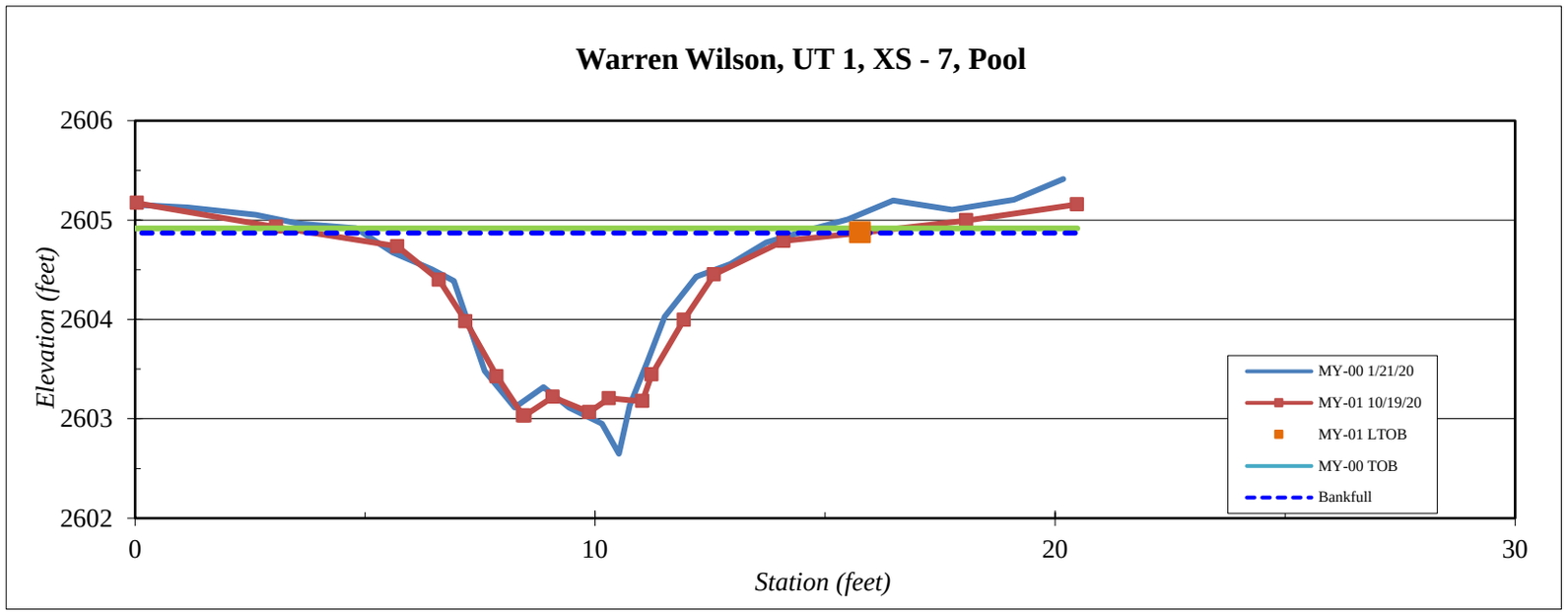


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 1, XS - 7, Pool
Feature	Pool
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.3	2605.2
0.0	2605.2
3.1	2604.9
5.7	2604.7
6.6	2604.4
7.2	2604.0
7.9	2603.4
8.4	2603.0
8.5	2603.0
9.1	2603.2
9.9	2603.1
10.3	2603.2
11.0	2603.2
11.2	2603.4
11.9	2604.0
12.6	2604.5
14.1	2604.8
15.8	2604.9
18.1	2605.0
20.5	2605.2

SUMMARY DATA	
Bankfull Elevation:	2604.9
Bankfull Cross-Sectional Area:	9.0
Bankfull Width:	11.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.8
Low Bank Height:	1.8
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Cb 4

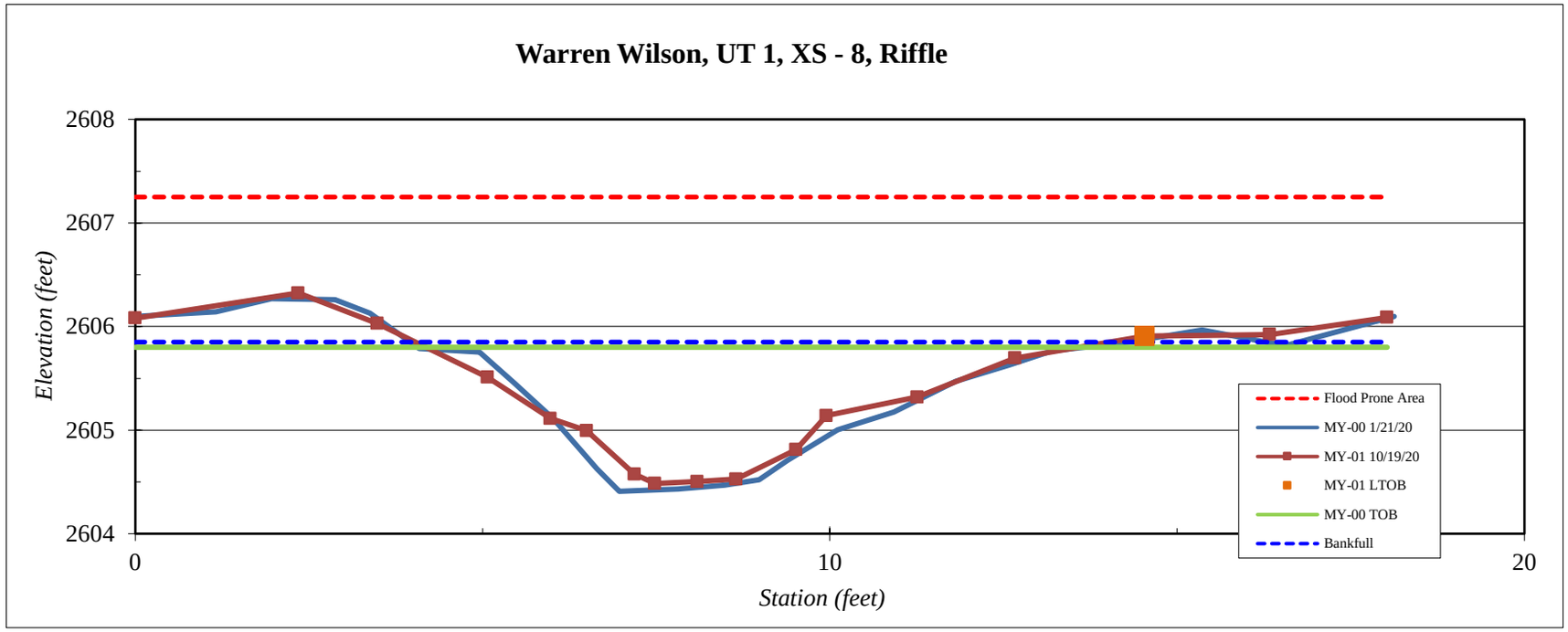


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 1, XS - 8, Riffle
Feature	Riffle
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2606.1
2.3	2606.3
3.5	2606.0
5.1	2605.5
6.0	2605.1
6.5	2605.0
7.2	2604.6
7.5	2604.5
8.1	2604.5
8.7	2604.5
9.5	2604.8
10.0	2605.1
11.3	2605.3
12.7	2605.7
14.5	2605.9
16.3	2605.9
18.0	2606.1

SUMMARY DATA	
Bankfull Elevation:	2605.9
Bankfull Cross-Sectional Area:	6.6
Bankfull Width:	10.0
Flood Prone Area Elevation:	2607.3
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.4
Low Bank Height:	1.4
Mean Depth at Bankfull:	0.7
W / D Ratio:	15.2
Entrenchment Ratio:	10.0
Bank Height Ratio:	1.0

Stream Type	Cb 4

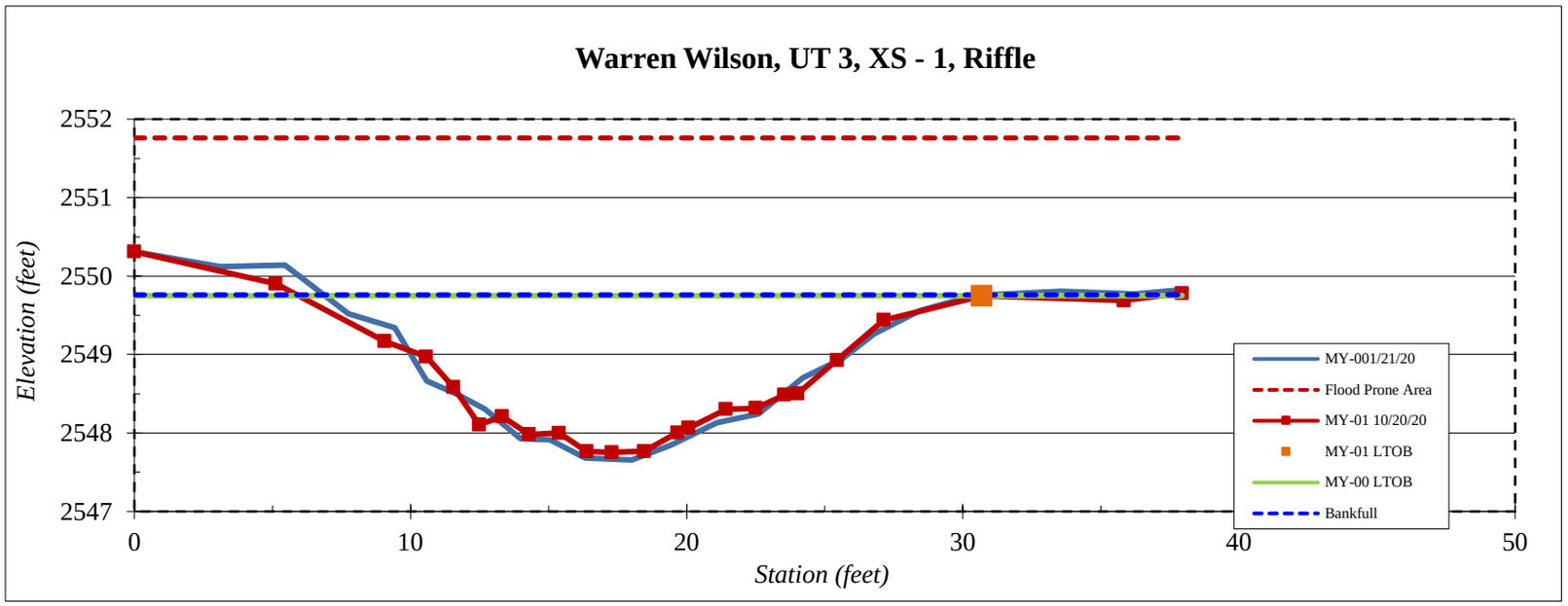


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 1, Riffle
Feature	Riffle
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2550.3
5.1	2549.9
9.1	2549.2
10.6	2549.0
11.6	2548.6
12.5	2548.1
13.3	2548.2
14.3	2548.0
15.4	2548.0
16.4	2547.8
17.3	2547.8
18.5	2547.8
19.7	2548.0
20.1	2548.1
21.4	2548.3
22.5	2548.3
23.5	2548.5
24.0	2548.5
25.4	2548.9
27.1	2549.4
30.7	2549.7
35.8	2549.7
37.9	2549.8

SUMMARY DATA	
Bankfull Elevation:	2549.8
Bankfull Cross-Sectional Area:	27.2
Bankfull Width:	31.6
Flood Prone Area Elevation:	2551.8
Flood Prone Width:	100.0
Max Depth at Bankfull:	2.0
Low Bank Height:	2.0
Mean Depth at Bankfull:	0.9
W / D Ratio:	36.7
Entrenchment Ratio:	3.2
Bank Height Ratio:	1.0

Stream Type	Ce 4

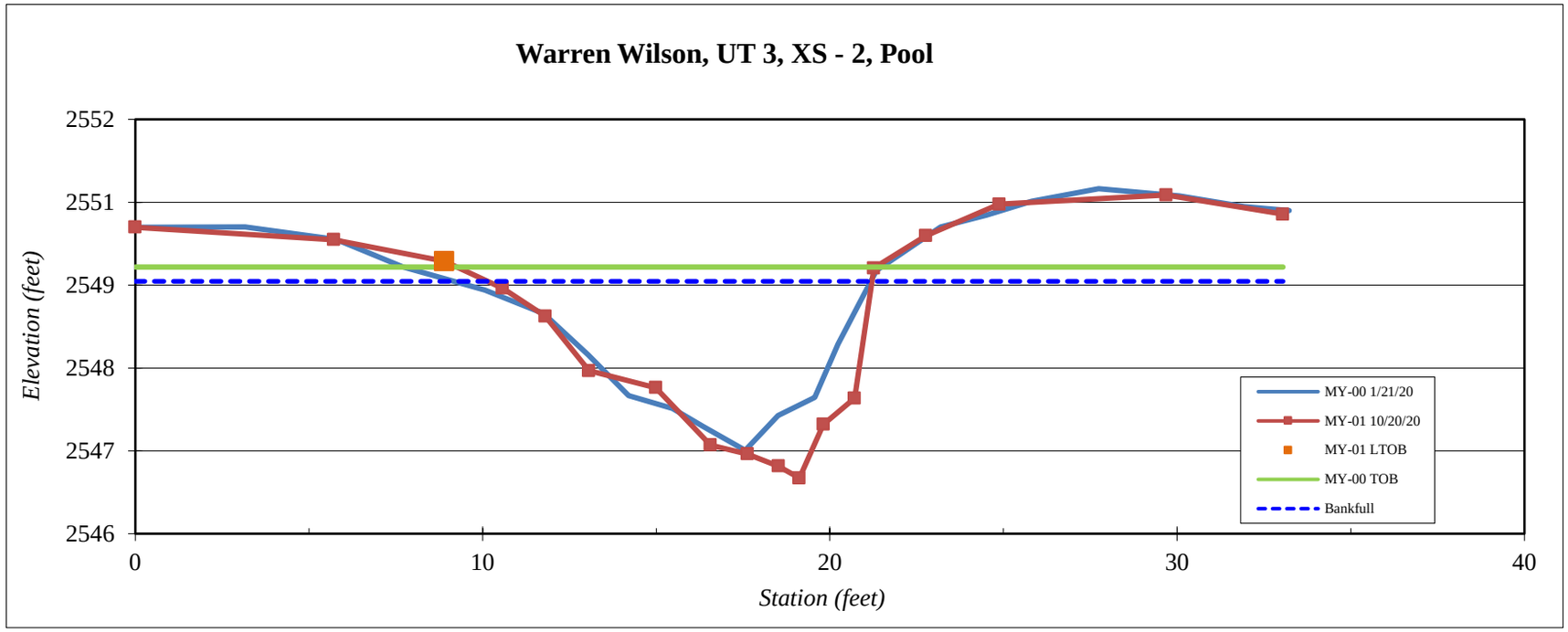


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 2, Pool
Feature	Pool
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2550.3
5.7	2550.1
8.9	2549.8
10.6	2549.5
11.8	2549.1
13.1	2548.3
15.0	2548.1
16.6	2547.3
17.6	2547.2
18.5	2547.0
19.1	2546.9
19.8	2547.6
20.7	2548.0
21.3	2549.7
22.8	2550.2
24.9	2550.6
29.7	2550.7
33.0	2550.5

SUMMARY DATA	
Bankfull Elevation:	2549.6
Bankfull Cross-Sectional Area:	16.7
Bankfull Width:	11.1
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.7
Low Bank Height:	2.6
Mean Depth at Bankfull:	1.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Ce 4

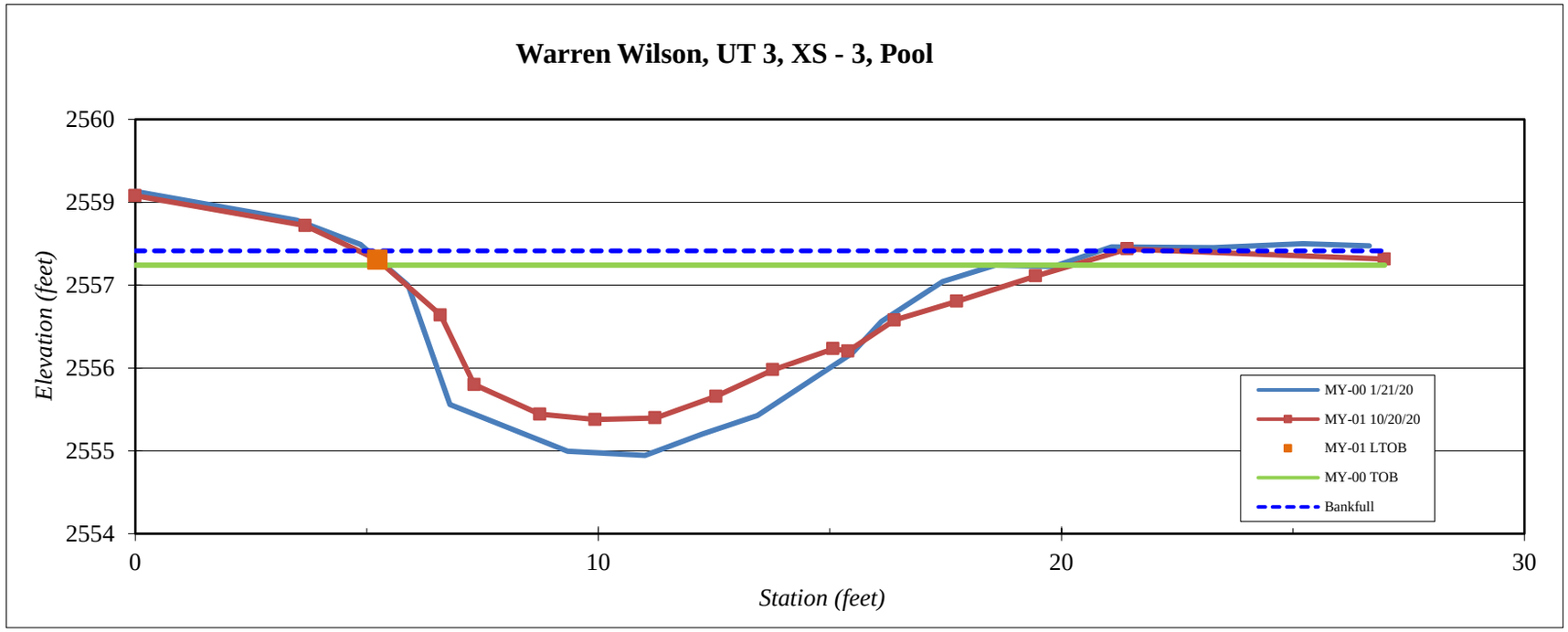


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT3, XS - 3, Pool
Feature	Pool
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2558.6
3.7	2558.2
5.2	2557.8
6.6	2557.0
7.3	2556.1
8.7	2555.6
9.9	2555.6
11.2	2555.6
12.5	2555.9
13.8	2556.3
15.1	2556.5
15.4	2556.5
16.4	2556.9
17.7	2557.2
19.4	2557.5
21.4	2557.9
27.0	2557.8

SUMMARY DATA	
Bankfull Elevation:	2557.9
Bankfull Cross-Sectional Area:	21.3
Bankfull Width:	21.0
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.3
Low Bank Height:	2.3
Mean Depth at Bankfull:	1.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Ce 4

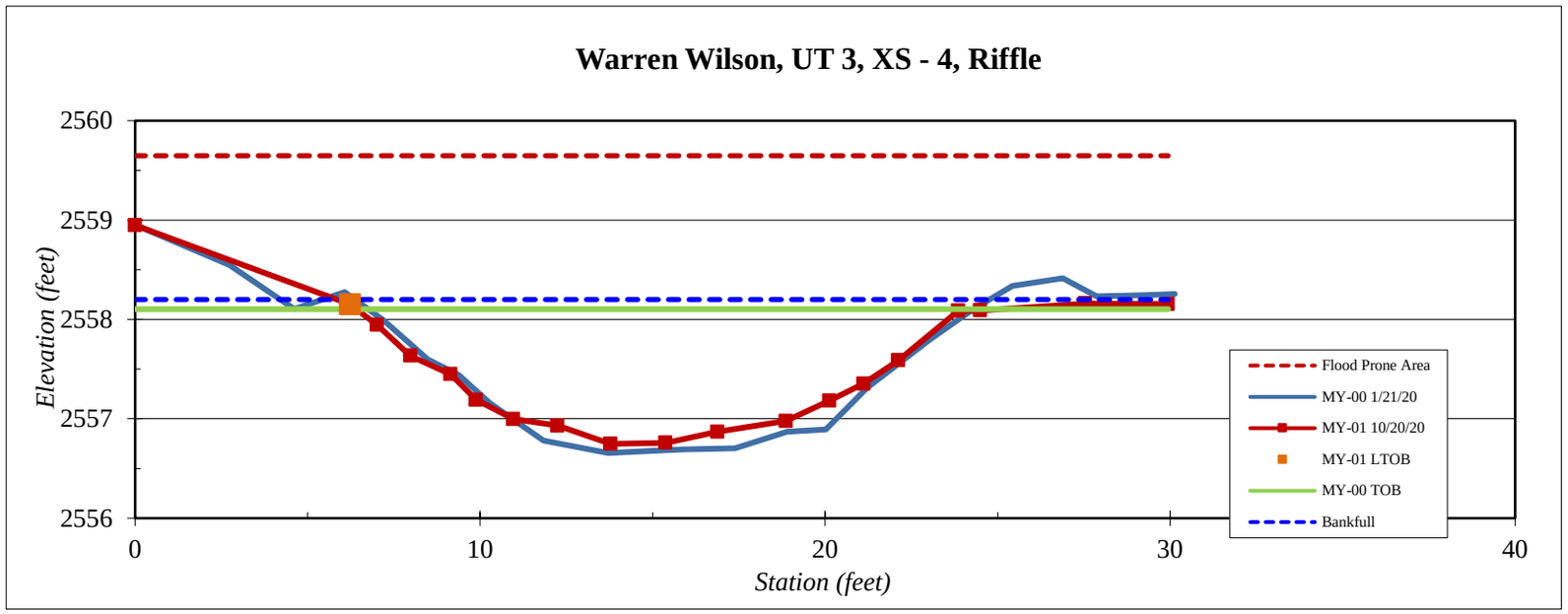


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 4, Riffle
Feature	Riffle
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2558.9
6.2	2558.2
7.0	2557.9
8.0	2557.6
9.1	2557.4
9.9	2557.2
11.0	2557.0
12.2	2556.9
13.8	2556.7
15.4	2556.8
16.9	2556.9
18.9	2557.0
20.1	2557.2
21.1	2557.4
22.1	2557.6
23.9	2558.1
24.5	2558.1
27.5	2558.2
29.9	2558.2

SUMMARY DATA	
Bankfull Elevation:	2558.2
Bankfull Cross-Sectional Area:	17.0
Bankfull Width:	23.8
Flood Prone Area Elevation:	2559.6
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.4
Low Bank Height:	1.4
Mean Depth at Bankfull:	0.7
W / D Ratio:	33.3
Entrenchment Ratio:	4.2
Bank Height Ratio:	1.0

Stream Type	Ce 4

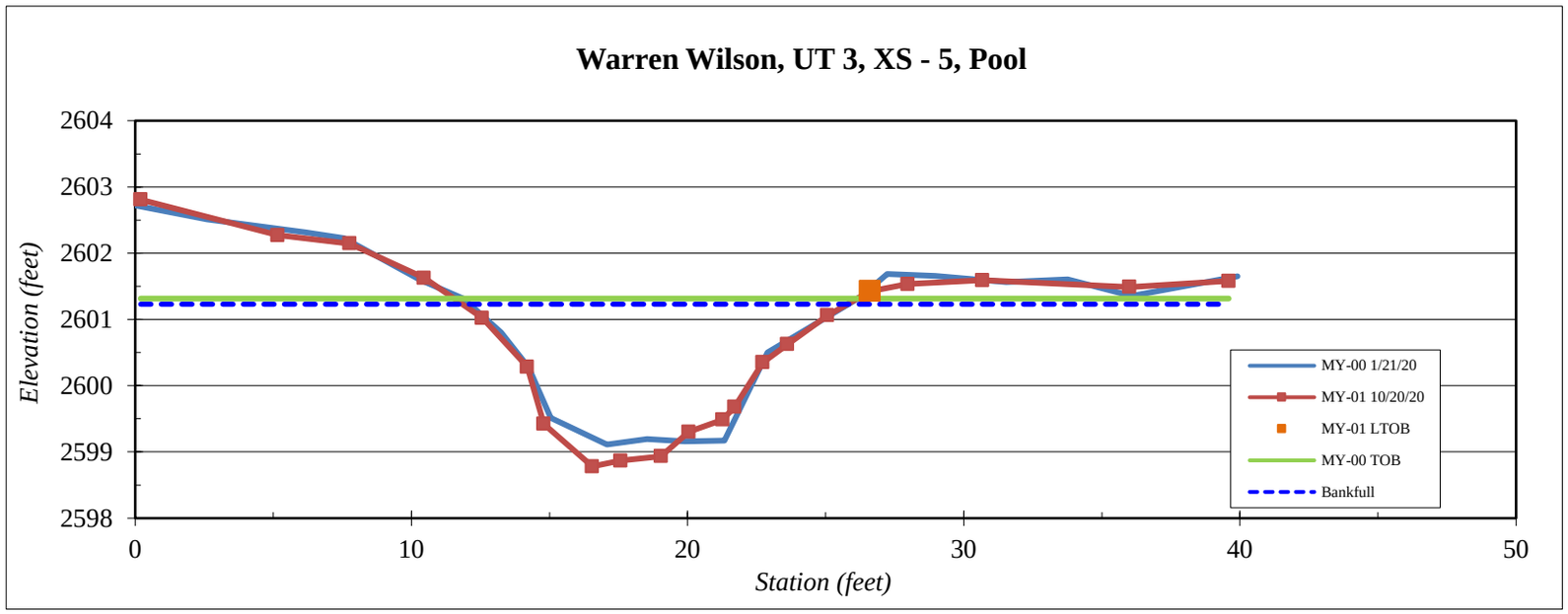


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 5, Pool
Feature	Pool
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	2602.8
5.2	2602.3
7.8	2602.1
10.5	2601.6
12.6	2601.0
14.2	2600.3
14.8	2599.4
16.5	2598.8
17.6	2598.9
19.0	2598.9
20.0	2599.3
21.3	2599.5
21.7	2599.7
22.7	2600.4
23.6	2600.6
25.1	2601.1
26.6	2601.4
28.0	2601.5
30.7	2601.6
36.0	2601.5
39.6	2601.6

SUMMARY DATA	
Bankfull Elevation:	2601.2
Bankfull Cross-Sectional Area:	19.1
Bankfull Width:	13.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.4
Low Bank Height:	2.3
Mean Depth at Bankfull:	1.4
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Ce 4

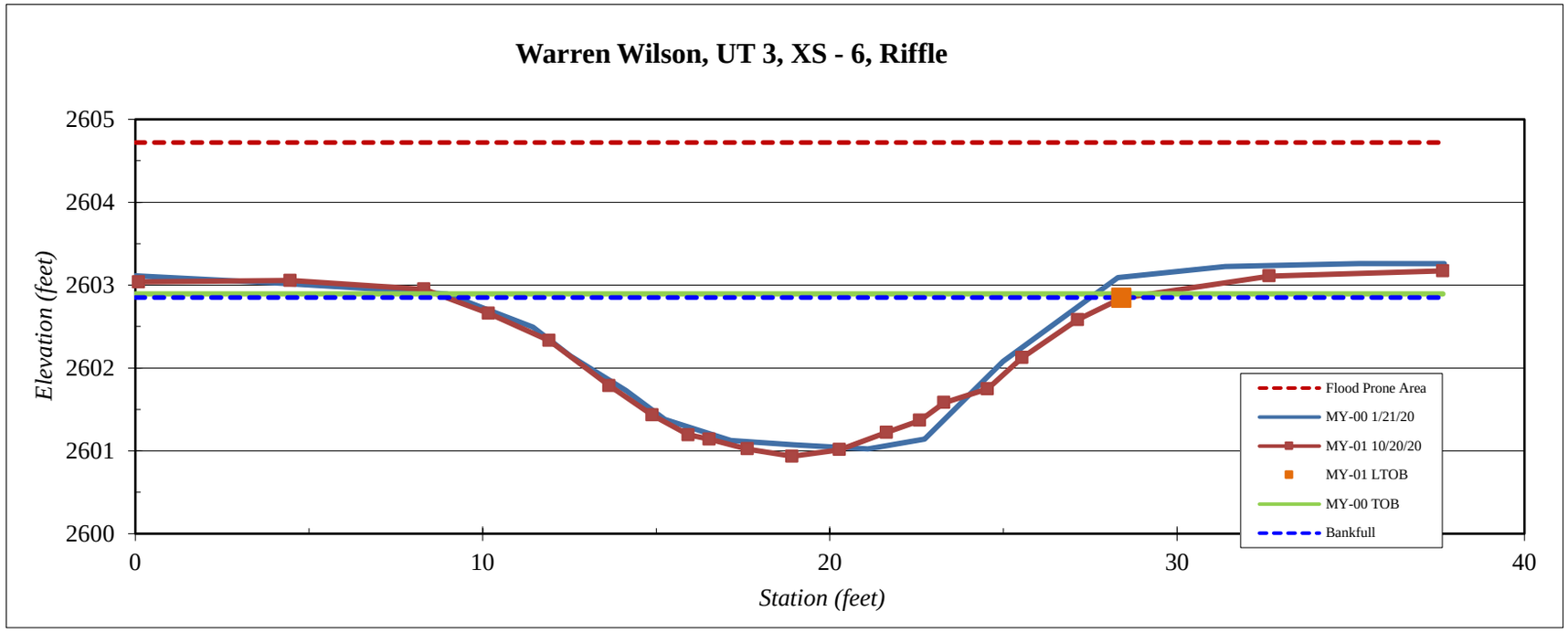


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 6, Riffle
Feature	Riffle
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	2603.0
4.5	2603.1
8.3	2602.9
10.2	2602.7
11.9	2602.3
13.6	2601.8
14.9	2601.4
15.9	2601.2
16.5	2601.1
17.6	2601.0
18.9	2600.9
20.3	2601.0
21.6	2601.2
22.6	2601.4
23.3	2601.6
24.5	2601.7
25.5	2602.1
27.1	2602.6
28.4	2602.84
32.7	2603.11
37.7	2603.17

SUMMARY DATA	
Bankfull Elevation:	2602.9
Bankfull Cross-Sectional Area:	21.4
Bankfull Width:	19.7
Flood Prone Area Elevation:	2604.7
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.9
Low Bank Height:	1.9
Mean Depth at Bankfull:	1.1
W / D Ratio:	18.1
Entrenchment Ratio:	5.1
Bank Height Ratio:	1.0

Stream Type	Ce 4

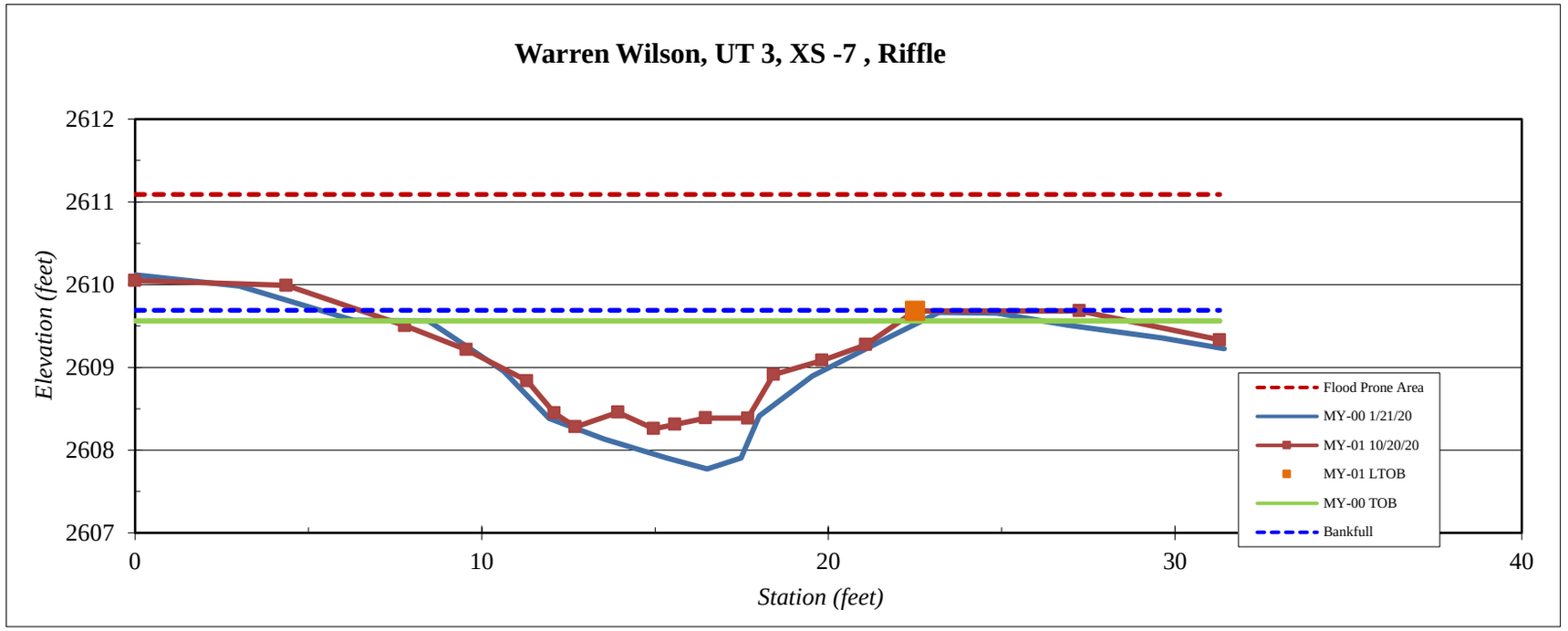


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 7, Riffle
Feature	Riffle
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2610.0
4.4	2610.0
7.8	2609.5
9.6	2609.2
11.3	2608.8
12.1	2608.4
12.7	2608.3
13.9	2608.5
15.0	2608.3
15.6	2608.3
16.5	2608.4
17.7	2608.4
18.4	2608.9
19.8	2609.1
21.1	2609.3
22.5	2609.7
27.2	2609.7
31.3	2609.3

SUMMARY DATA	
Bankfull Elevation:	2609.7
Bankfull Cross-Sectional Area:	13.6
Bankfull Width:	24.8
Flood Prone Area Elevation:	2611.1
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.4
Low Bank Height:	1.4
Mean Depth at Bankfull:	0.5
W / D Ratio:	45.4
Entrenchment Ratio:	4.0
Bank Height Ratio:	1.0

Stream Type	Ce 4

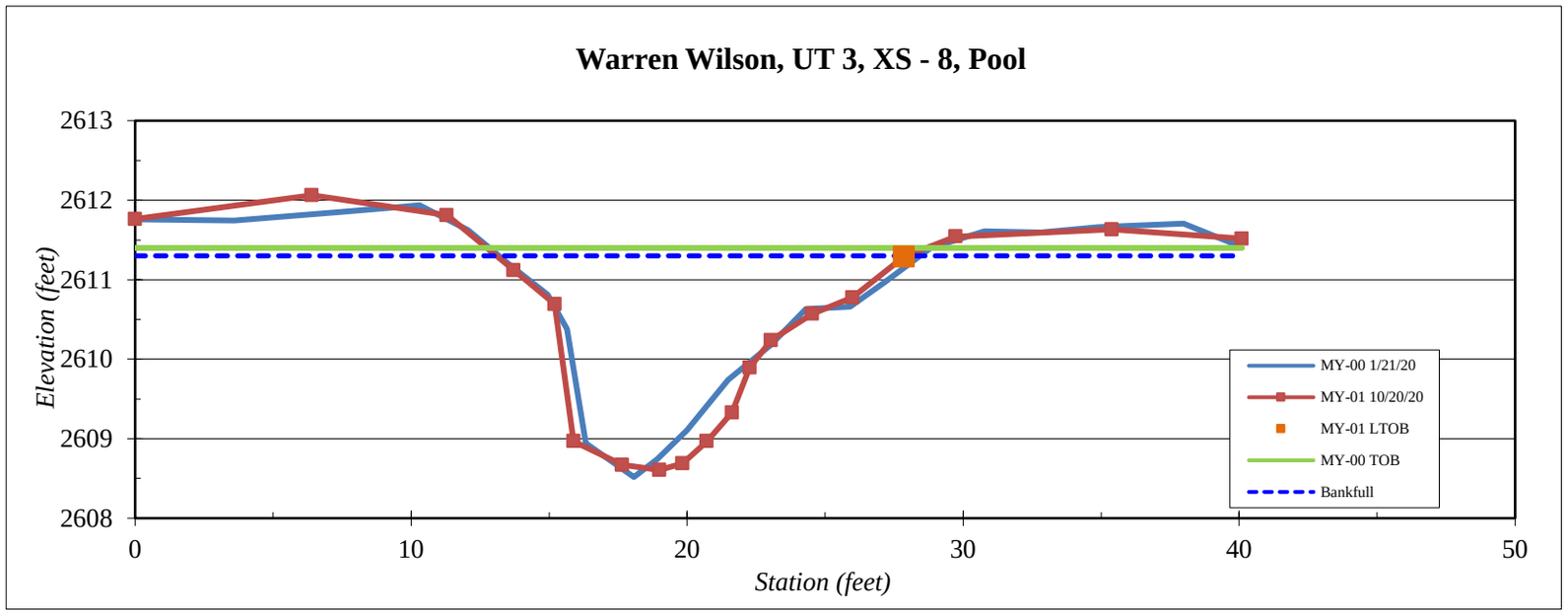


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 8, Pool
Feature	Pool
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2611.8
6.4	2612.1
11.3	2611.8
13.7	2611.1
15.2	2610.7
15.9	2609.0
17.7	2608.7
19.0	2608.6
19.8	2608.7
20.7	2609.0
21.6	2609.3
22.3	2609.9
23.0	2610.2
24.5	2610.6
26.0	2610.8
27.9	2611.3
29.7	2611.5
35.4	2611.6
40.1	2611.5

SUMMARY DATA	
Bankfull Elevation:	2611.3
Bankfull Cross-Sectional Area:	20.8
Bankfull Width:	14.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.7
Low Bank Height:	2.7
Mean Depth at Bankfull:	1.4
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Ce 4

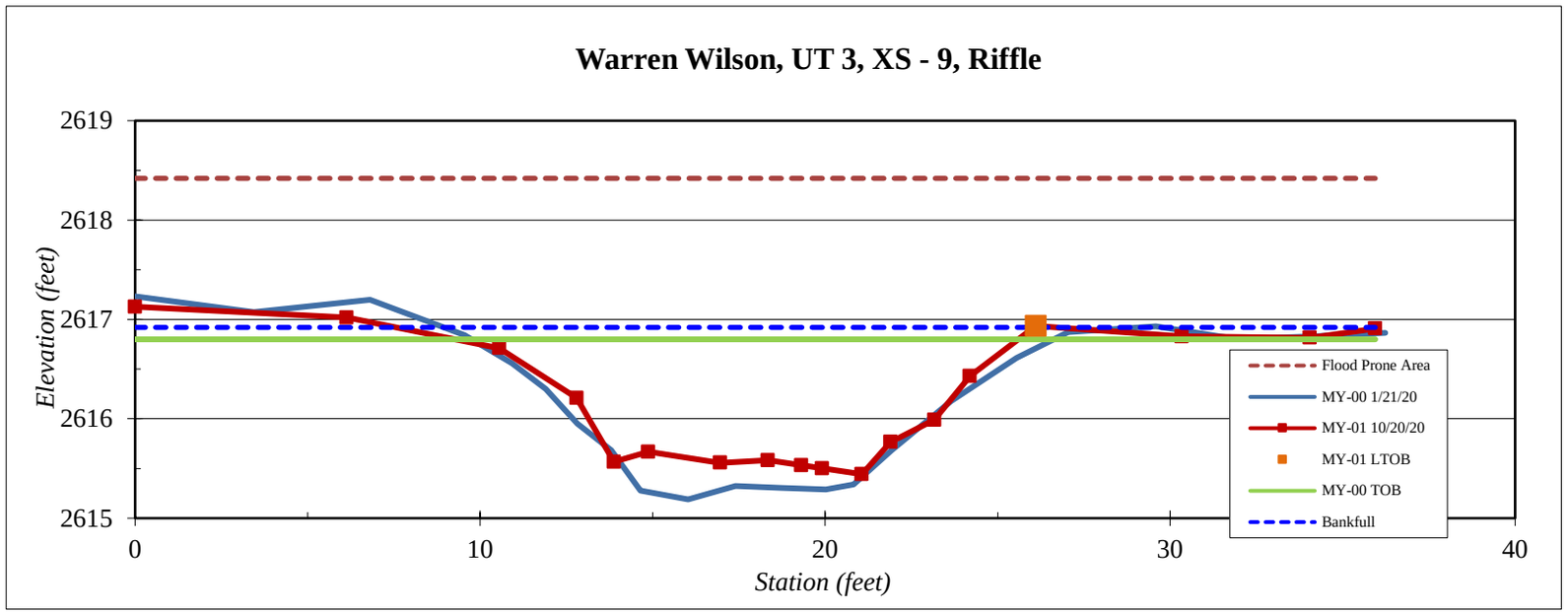


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 9, Riffle
Feature	Riffle
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2617.1
6.1	2617.0
10.6	2616.7
12.8	2616.2
13.9	2615.6
14.9	2615.7
17.0	2615.6
18.3	2615.6
19.3	2615.5
19.9	2615.5
21.1	2615.4
21.9	2615.8
23.2	2616.0
24.2	2616.4
26.1	2616.9
30.3	2616.8
34.0	2616.8
35.9	2616.9

SUMMARY DATA	
Bankfull Elevation:	2616.9
Bankfull Cross-Sectional Area:	16.4
Bankfull Width:	27.7
Flood Prone Area Elevation:	2618.4
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.5
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.6
W / D Ratio:	46.8
Entrenchment Ratio:	3.6
Bank Height Ratio:	1.0

Stream Type	Ce 4

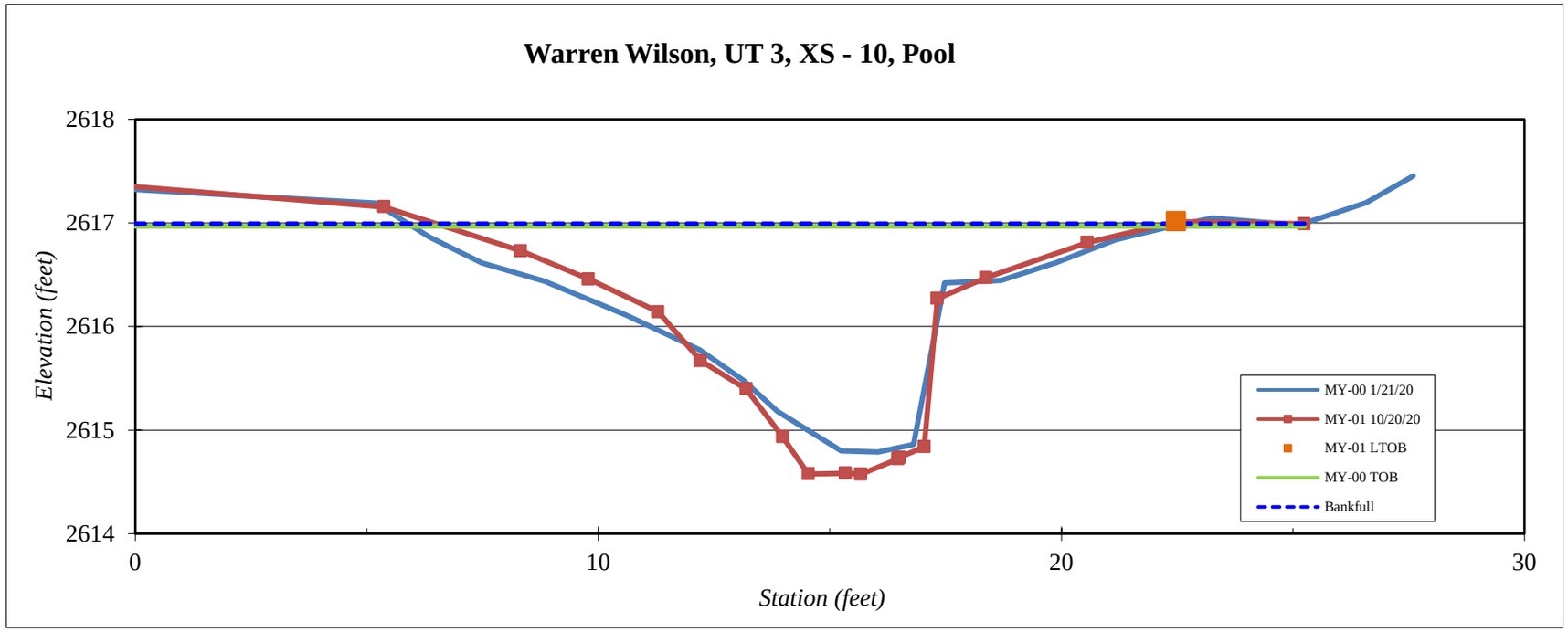


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 10, Pool
Feature	Pool
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.1	2617.7
5.4	2617.5
8.3	2617.0
9.8	2616.7
11.3	2616.4
12.2	2615.8
13.2	2615.5
14.0	2615.0
14.5	2614.6
15.3	2614.6
15.7	2614.6
16.5	2614.8
16.5	2614.8
17.0	2614.9
17.3	2616.5
18.4	2616.7
20.6	2617.1
22.5	2617.3
25.2	2617.3

SUMMARY DATA	
Bankfull Elevation:	2617.3
Bankfull Cross-Sectional Area:	16.7
Bankfull Width:	15.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.7
Low Bank Height:	2.7
Mean Depth at Bankfull:	1.1
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Ce 4

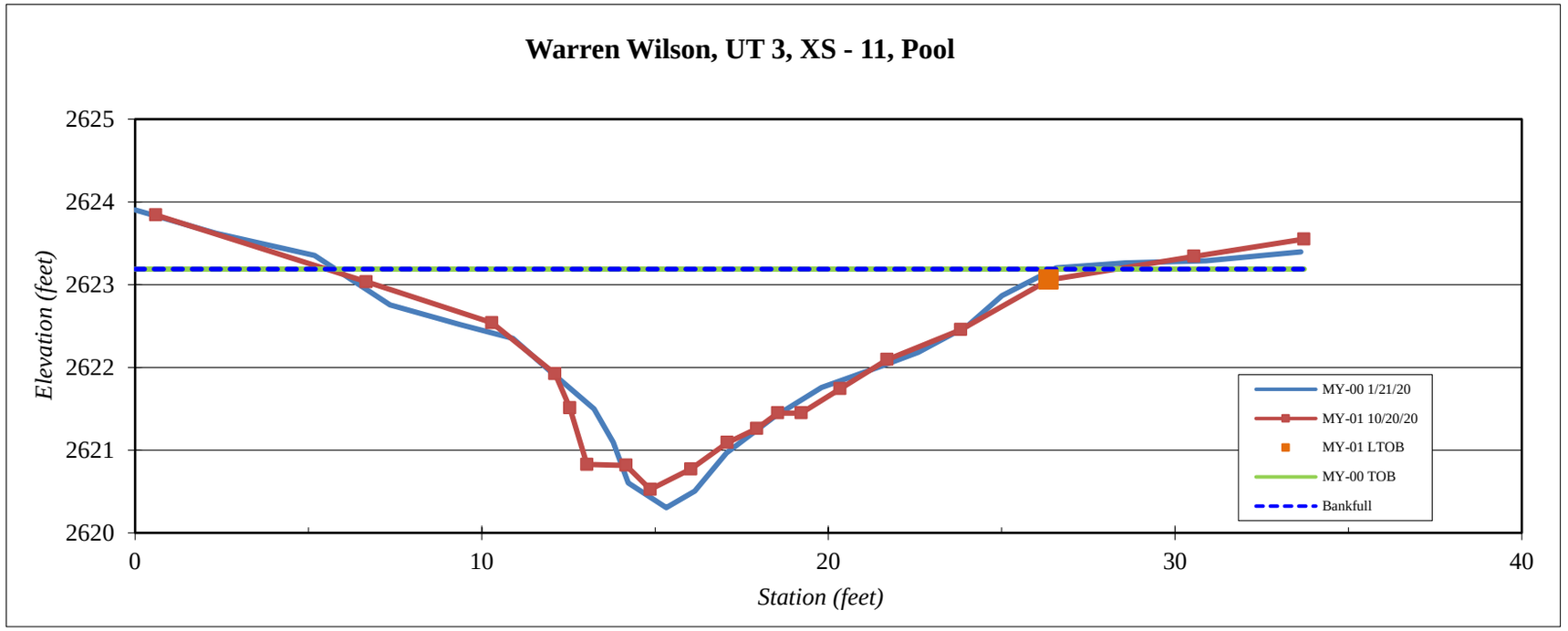


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 11, Pool
Feature	Pool
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.6	2623.9
6.7	2623.0
10.3	2622.5
12.1	2621.8
12.5	2621.3
13.0	2620.5
14.2	2620.5
14.9	2620.2
16.0	2620.5
17.1	2620.8
17.9	2621.0
18.5	2621.2
19.2	2621.2
20.3	2621.6
21.7	2622.0
23.8	2622.4
26.4	2623.1
30.5	2623.4
33.7	2623.6

SUMMARY DATA	
Bankfull Elevation:	2623.2
Bankfull Cross-Sectional Area:	28.8
Bankfull Width:	22.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	3.0
Low Bank Height:	2.9
Mean Depth at Bankfull:	1.3
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Ce 4

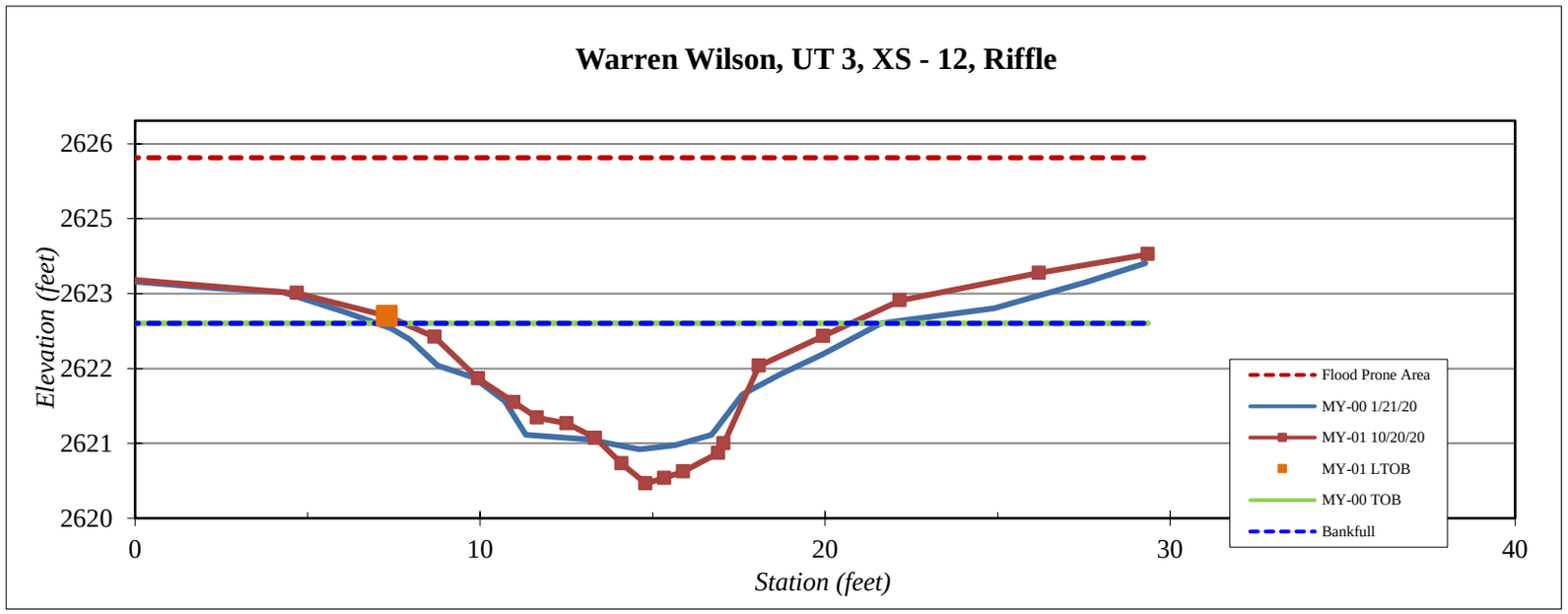


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 3, XS - 12, Riffle
Feature	Riffle
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	2623.6
4.7	2623.4
7.3	2623.1
8.7	2622.7
9.9	2622.1
11.0	2621.8
11.7	2621.5
12.5	2621.4
13.3	2621.2
14.1	2620.8
14.8	2620.5
15.3	2620.6
15.9	2620.7
16.9	2621.0
17.1	2621.1
18.1	2622.3
19.9	2622.8
22.2	2623.3
26.2	2623.7
29.4	2624.0

SUMMARY DATA	
Bankfull Elevation:	2622.9
Bankfull Cross-Sectional Area:	16.0
Bankfull Width:	13.4
Flood Prone Area Elevation:	2625.4
Flood Prone Width:	100.0
Max Depth at Bankfull:	2.5
Low Bank Height:	2.5
Mean Depth at Bankfull:	1.2
W / D Ratio:	11.2
Entrenchment Ratio:	7.5
Bank Height Ratio:	1.0

Stream Type	Ce 4

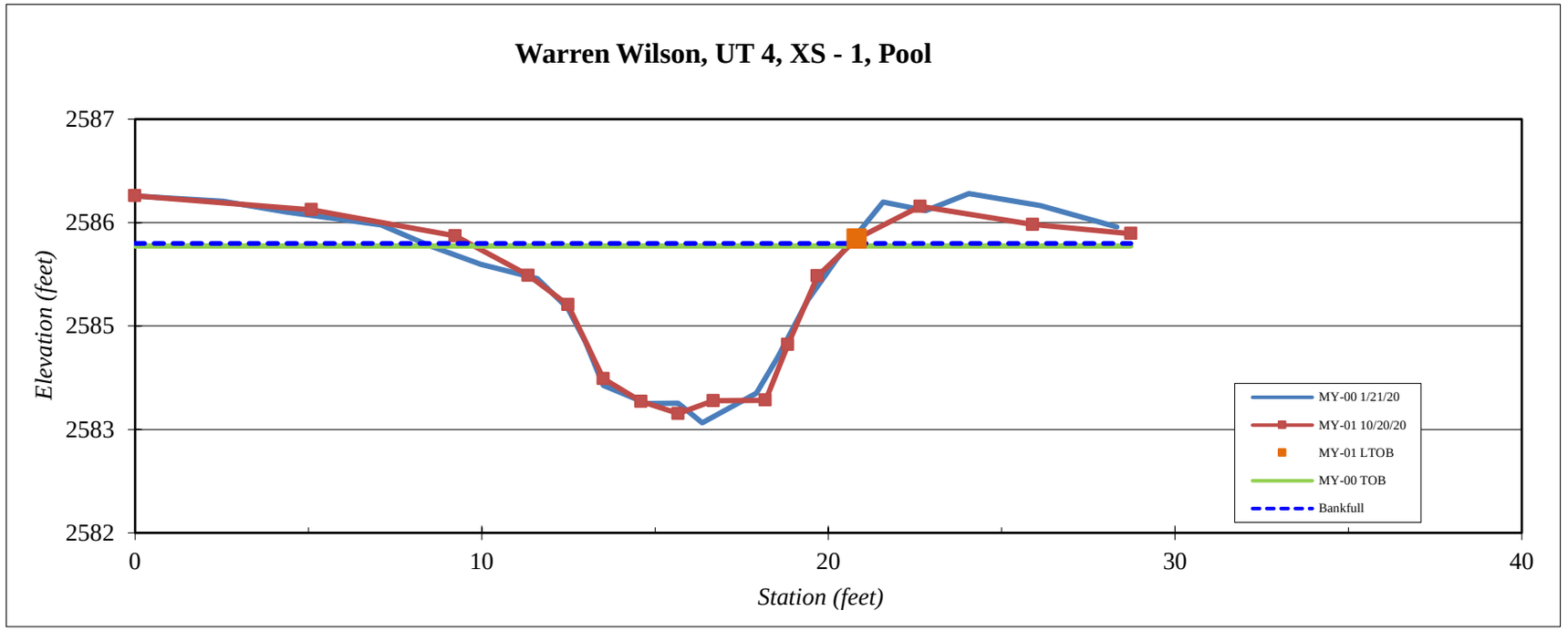


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 4, XS - 1, Pool
Feature	Pool
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2586.0
5.1	2585.8
9.2	2585.5
11.3	2585.1
12.5	2584.8
13.5	2584.0
14.6	2583.7
15.7	2583.6
16.7	2583.7
18.2	2583.7
18.8	2584.3
19.7	2585.1
20.8	2585.5
22.6	2585.9
25.9	2585.7
28.7	2585.6

SUMMARY DATA	
Bankfull Elevation:	2585.5
Bankfull Cross-Sectional Area:	11.8
Bankfull Width:	11.0
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.9
Low Bank Height:	1.9
Mean Depth at Bankfull:	1.1
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C 4

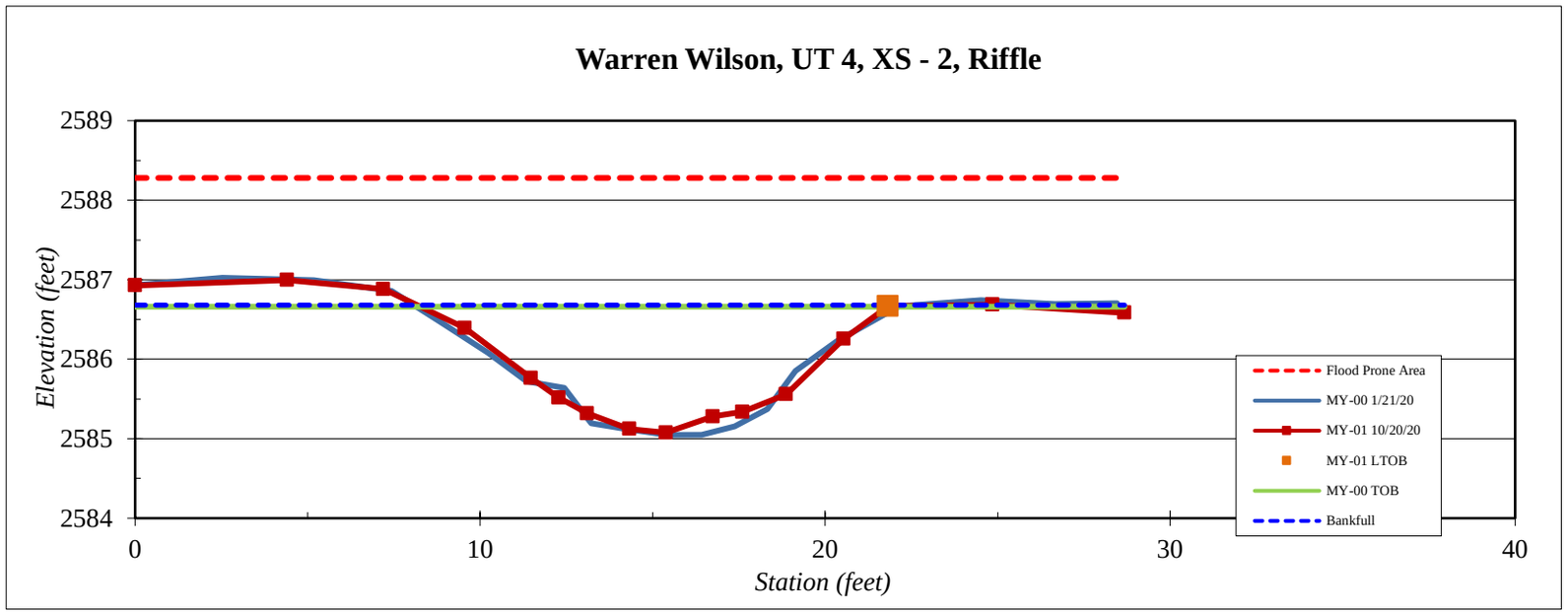


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 4, XS - 2, Riffle
Feature	Riffle
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2586.9
4.4	2587.0
7.2	2586.9
9.6	2586.4
11.5	2585.8
12.3	2585.5
13.1	2585.3
14.3	2585.1
15.4	2585.1
16.8	2585.3
17.6	2585.3
18.9	2585.6
20.5	2586.3
21.8	2586.7
24.9	2586.7
28.7	2586.6

SUMMARY DATA	
Bankfull Elevation:	2586.7
Bankfull Cross-Sectional Area:	13.3
Bankfull Width:	20.5
Flood Prone Area Elevation:	2588.3
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.6
Low Bank Height:	1.6
Mean Depth at Bankfull:	0.6
W / D Ratio:	31.6
Entrenchment Ratio:	4.9
Bank Height Ratio:	1.0

Stream Type	C 4

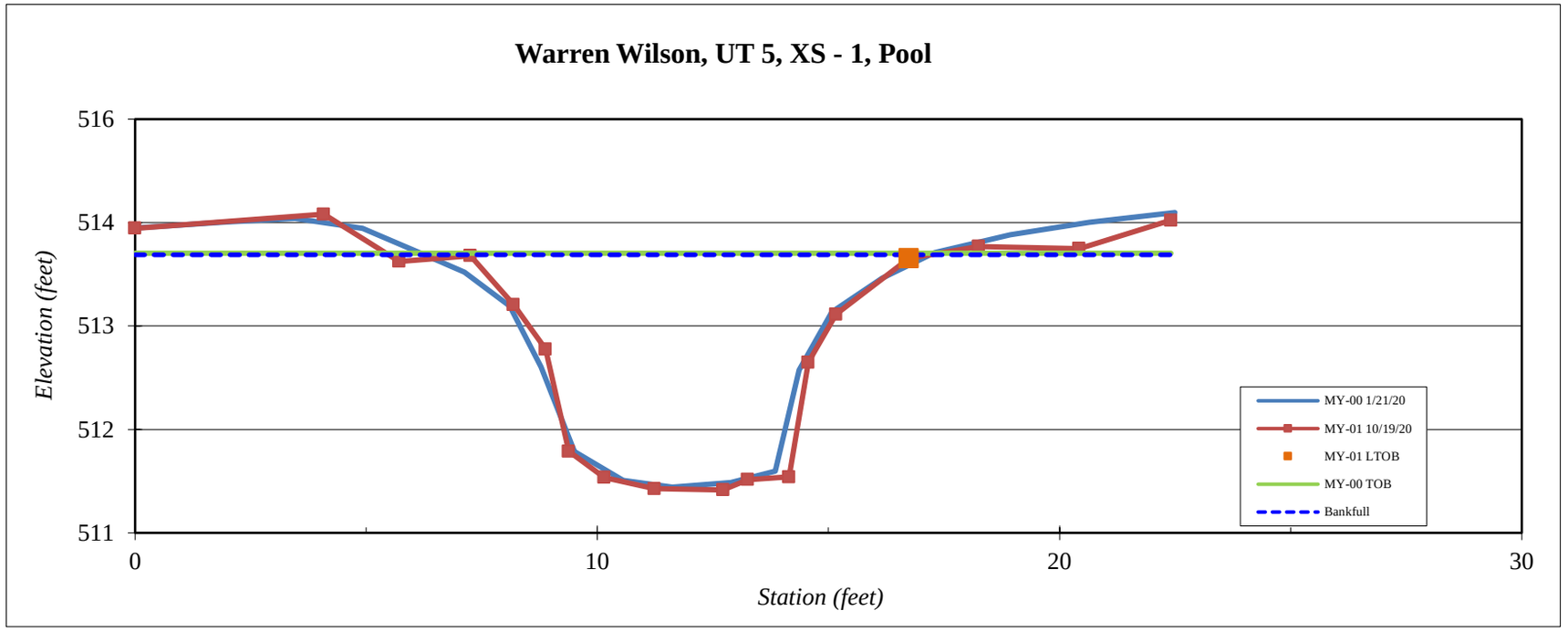


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 5, XS - 1, Pool
Feature	Pool
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	514.4
4.1	514.5
5.7	514.0
7.3	514.1
8.2	513.5
8.9	513.0
9.4	511.9
10.2	511.6
11.2	511.5
12.7	511.5
13.3	511.6
14.1	511.6
14.6	512.9
15.2	513.4
16.7	514.0
18.2	514.2
20.4	514.1
22.4	514.4

SUMMARY DATA	
Bankfull Elevation:	514.1
Bankfull Cross-Sectional Area:	15.3
Bankfull Width:	11.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.6
Low Bank Height:	2.6
Mean Depth at Bankfull:	1.3
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Ce 4

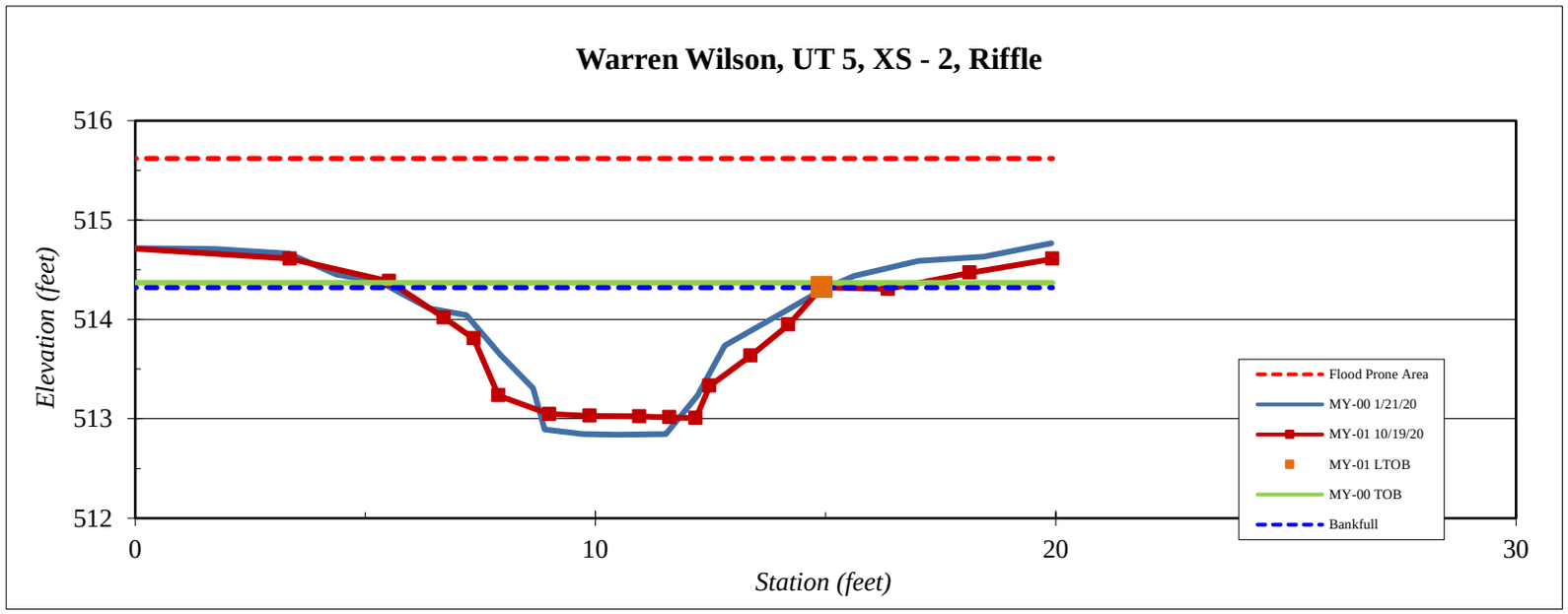


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 5, XS - 2, Riffle
Feature	Riffle
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	514.7
3.4	514.6
5.5	514.4
6.7	514.0
7.4	513.8
7.9	513.2
9.0	513.0
9.9	513.0
11.0	513.0
11.6	513.0
12.2	513.0
12.5	513.3
13.4	513.6
14.2	513.9
14.9	514.3
16.4	514.3
18.1	514.5
19.9	514.6

SUMMARY DATA	
Bankfull Elevation:	514.3
Bankfull Cross-Sectional Area:	7.9
Bankfull Width:	10.5
Flood Prone Area Elevation:	515.6
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.3
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.8
W / D Ratio:	14.0
Entrenchment Ratio:	9.5
Bank Height Ratio:	1.0

Stream Type	Ce 4

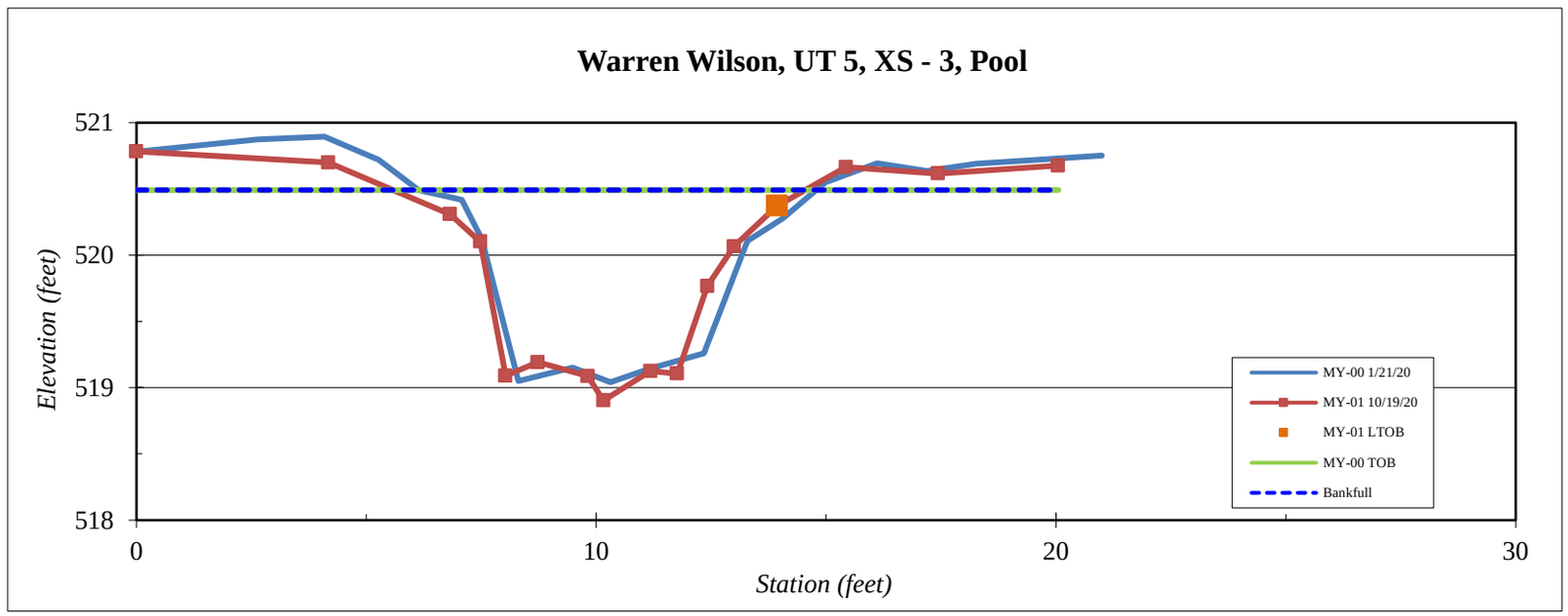


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 5, XS - 3, Pool
Feature	Pool
Date:	10/19/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	520.8
4.2	520.7
6.8	520.3
7.5	520.1
8.0	519.1
8.7	519.2
9.8	519.1
10.2	518.9
11.2	519.1
11.8	519.1
12.4	519.8
13.0	520.1
13.9	520.4
15.4	520.7
17.4	520.6
20.1	520.7

SUMMARY DATA	
Bankfull Elevation:	520.5
Bankfull Cross-Sectional Area:	7.4
Bankfull Width:	9.0
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.6
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.9

Stream Type	Ce 4

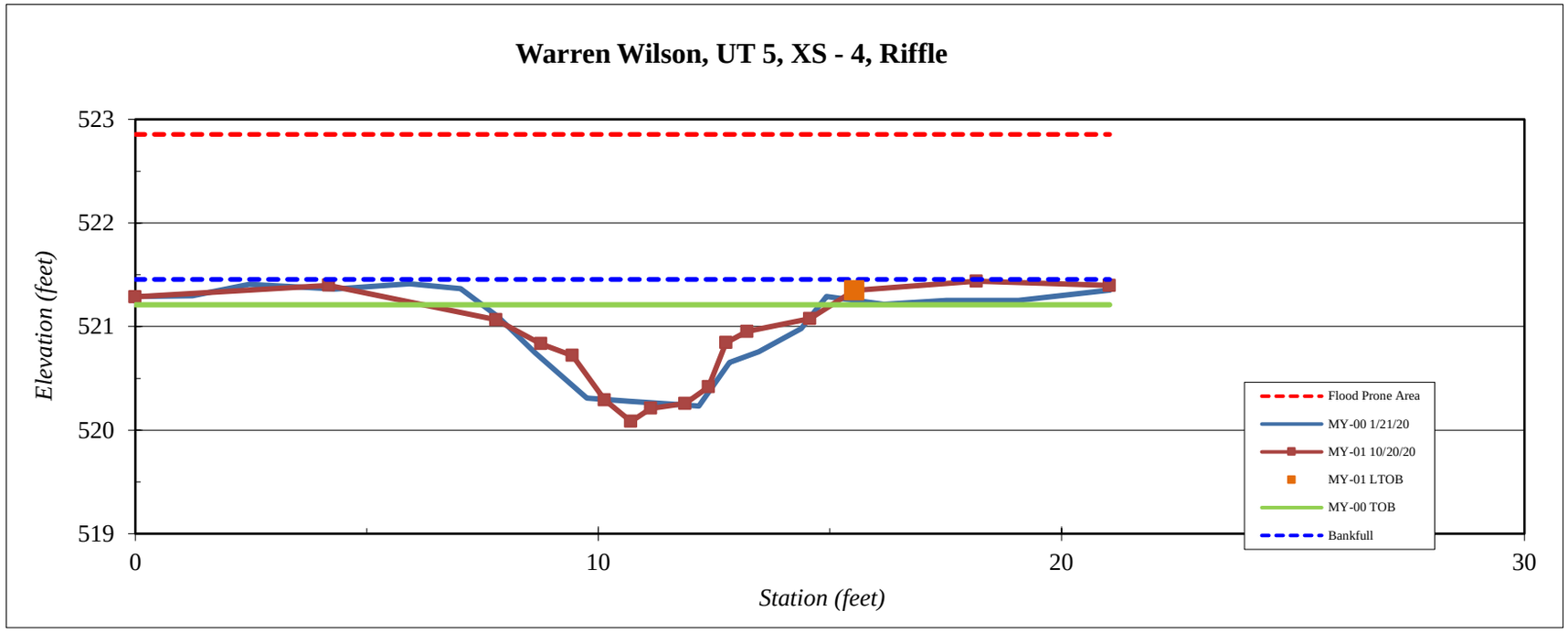


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 5, XS - 4, Riffle
Feature	Riffle
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	521.3
4.2	521.4
7.8	521.1
8.8	520.8
9.4	520.7
10.1	520.3
10.7	520.1
11.1	520.2
11.9	520.3
12.4	520.4
12.8	520.8
13.2	521.0
14.6	521.1
15.5	521.3
18.2	521.4
21.0	521.4

SUMMARY DATA	
Bankfull Elevation:	521.5
Bankfull Cross-Sectional Area:	7.3
Bankfull Width:	21.0
Flood Prone Area Elevation:	522.9
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.4
Low Bank Height:	1.4
Mean Depth at Bankfull:	0.3
W / D Ratio:	60.5
Entrenchment Ratio:	4.8
Bank Height Ratio:	1.0

Stream Type	Ce 4

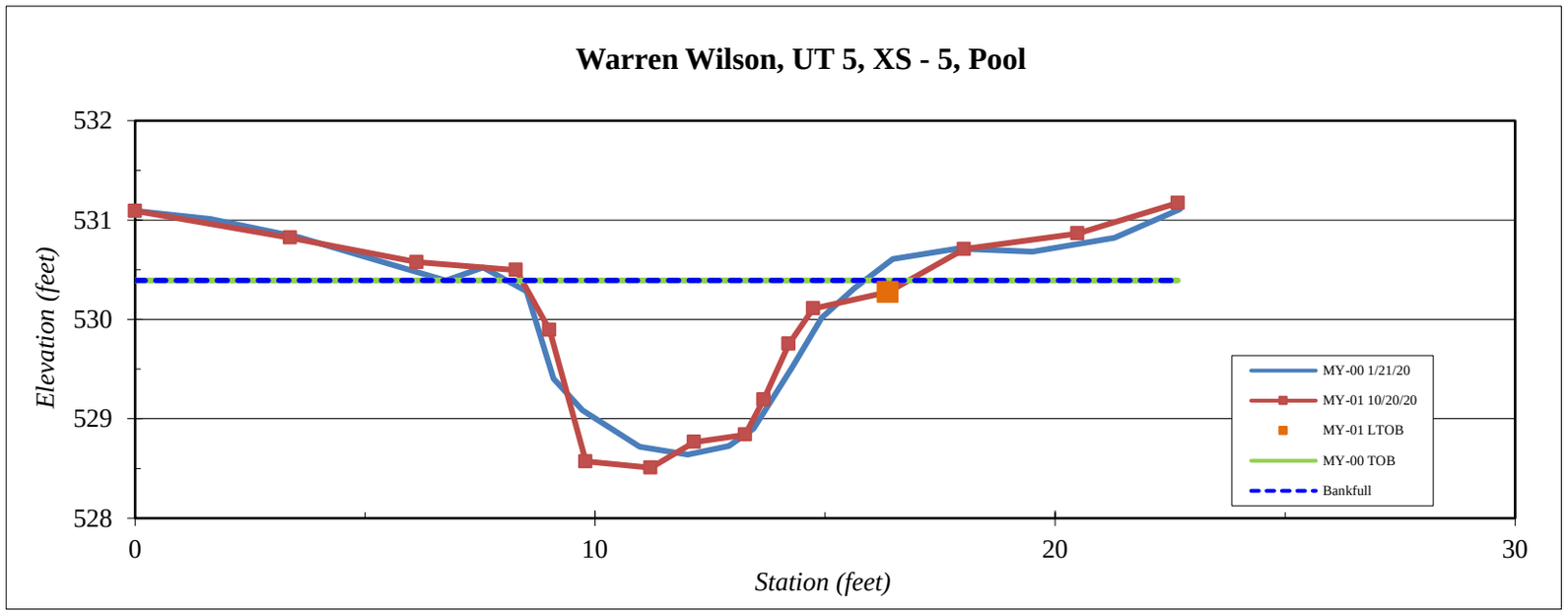


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 5, XS - 5, Pool
Feature	Pool
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	531.1
3.4	530.8
6.1	530.6
8.3	530.5
9.0	529.9
9.8	528.6
11.2	528.5
12.2	528.8
13.3	528.8
13.7	529.2
14.2	529.8
14.7	530.1
16.4	530.3
18.0	530.7
20.5	530.9
22.7	531.2

SUMMARY DATA	
Bankfull Elevation:	530.4
Bankfull Cross-Sectional Area:	8.7
Bankfull Width:	8.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.9
Low Bank Height:	2.0
Mean Depth at Bankfull:	1.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.1

Stream Type	Ce 4

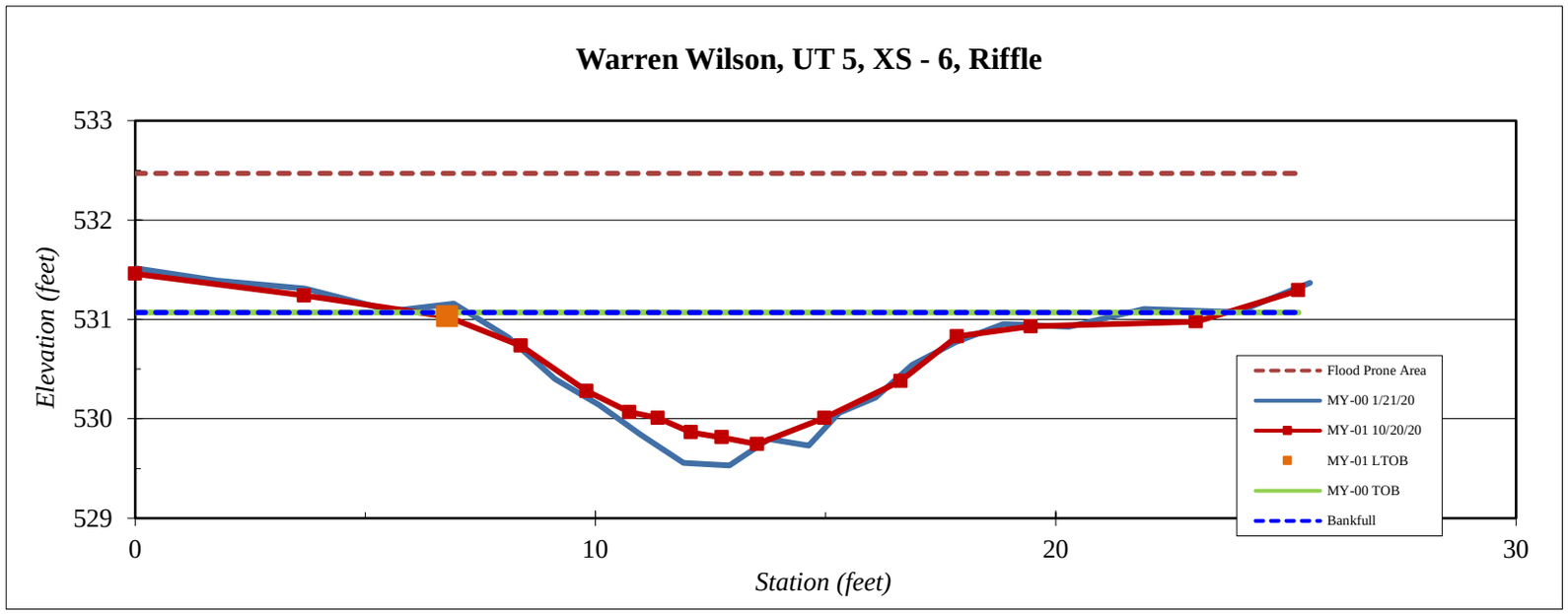


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 5, XS -6, Riffle
Feature	Riffle
Date:	10/20/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	531.5
3.7	531.2
6.8	531.0
8.4	530.7
9.8	530.3
10.7	530.1
11.4	530.0
12.1	529.9
12.7	529.8
13.5	529.7
15.0	530.0
16.6	530.4
17.9	530.8
19.5	530.9
23.0	531.0
25.3	531.3

SUMMARY DATA	
Bankfull Elevation:	531.1
Bankfull Cross-Sectional Area:	10.4
Bankfull Width:	18.3
Flood Prone Area Elevation:	532.5
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.4
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.6
W / D Ratio:	32.2
Entrenchment Ratio:	5.5
Bank Height Ratio:	0.9

Stream Type	Ce 4

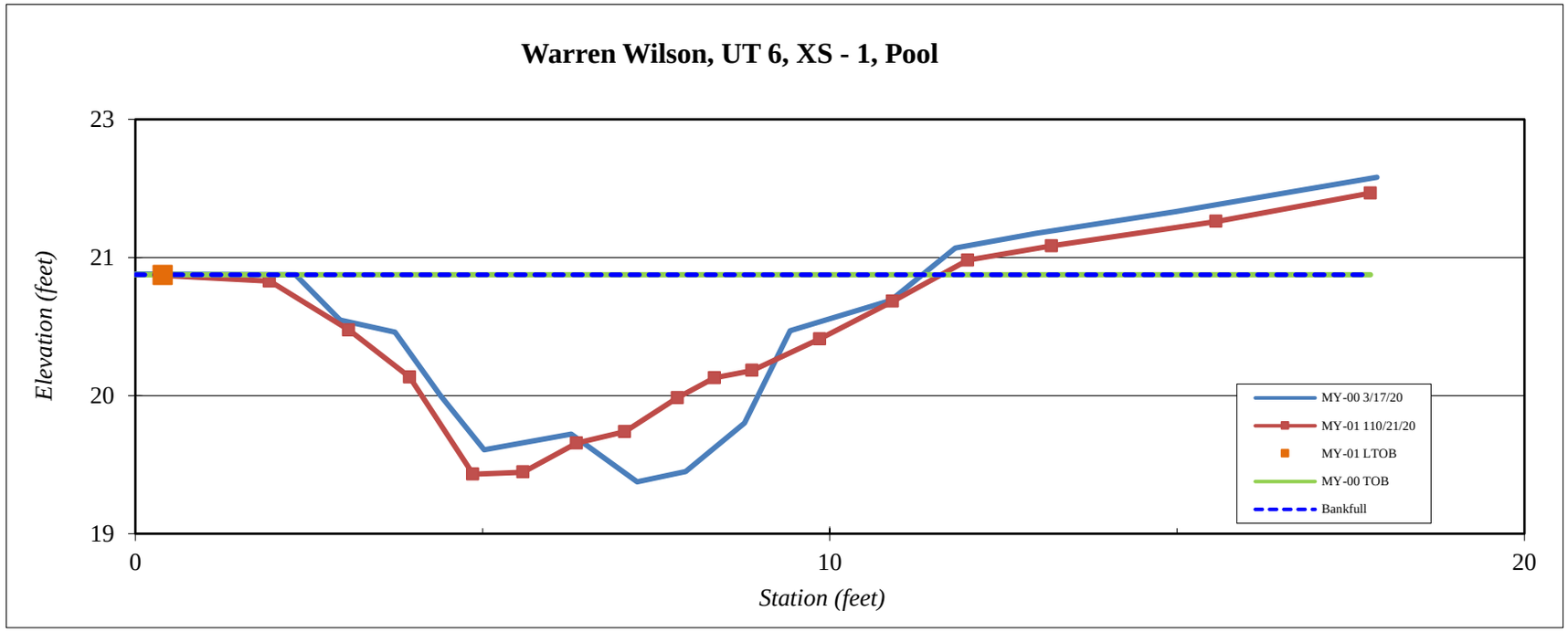


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 6, XS - 1, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.4	21.3
1.9	21.3
3.1	20.9
4.0	20.5
4.9	19.7
5.6	19.7
6.4	20.0
7.0	20.1
7.8	20.3
8.3	20.5
8.9	20.6
9.9	20.8
10.9	21.1
12.0	21.5
13.2	21.6
15.6	21.8
17.8	22.0

SUMMARY DATA	
Bankfull Elevation:	21.3
Bankfull Cross-Sectional Area:	8.3
Bankfull Width:	11.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.6
Low Bank Height:	1.6
Mean Depth at Bankfull:	0.7
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Ce 4

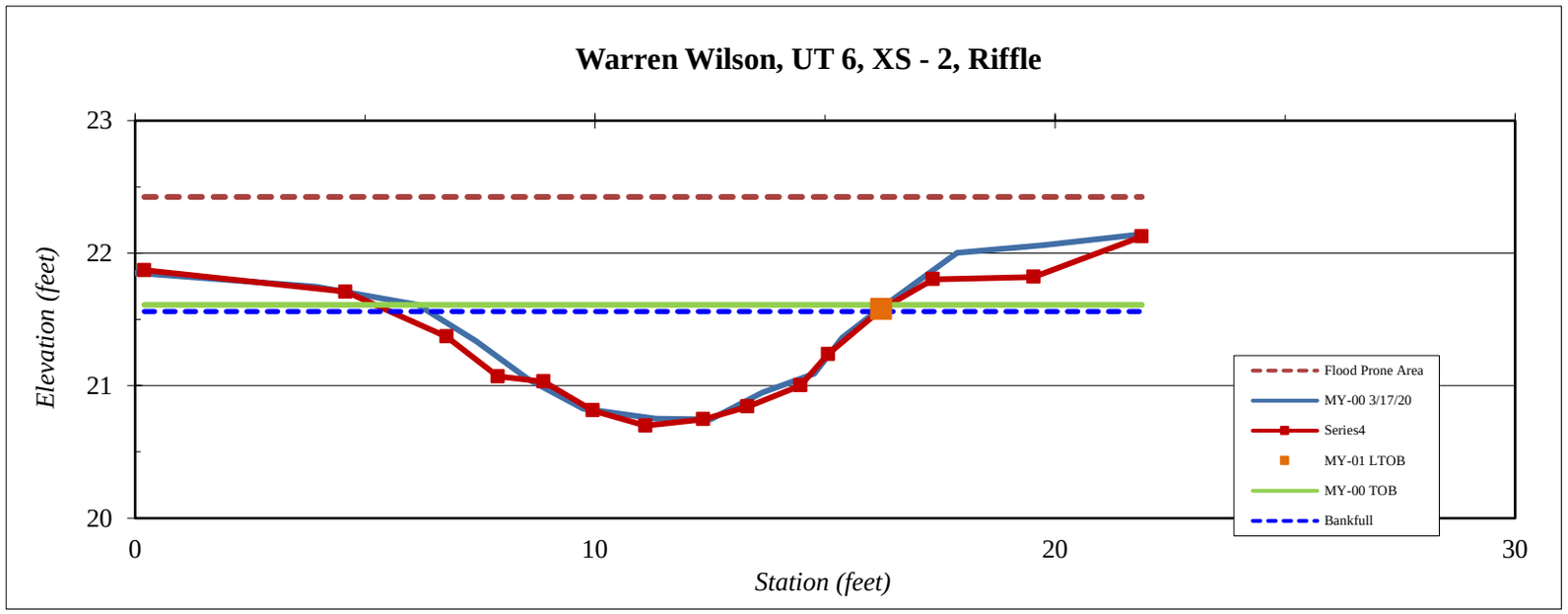


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 6, XS -2, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	21.9
4.6	21.7
6.8	21.4
7.9	21.1
8.9	21.0
10.0	20.8
11.1	20.7
12.4	20.7
13.3	20.8
14.5	21.0
15.1	21.2
16.2	21.6
17.3	21.8
19.5	21.8
21.9	22.1

SUMMARY DATA	
Bankfull Elevation:	21.6
Bankfull Cross-Sectional Area:	5.6
Bankfull Width:	10.6
Flood Prone Area Elevation:	22.4
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.9
Low Bank Height:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	19.9
Entrenchment Ratio:	9.4
Bank Height Ratio:	1.0

Stream Type	Ce 4

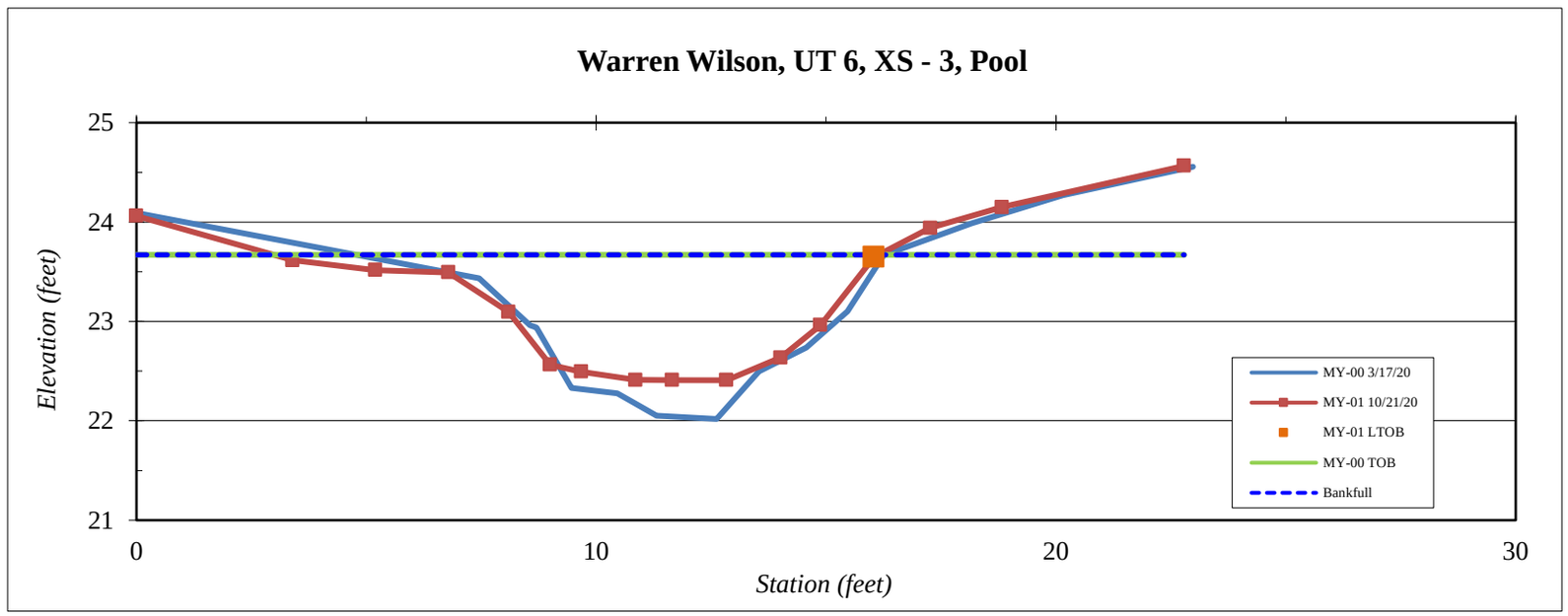


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 6, XS - 3, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	24.1
3.4	23.6
5.2	23.5
6.8	23.5
8.1	23.1
9.0	22.6
9.7	22.5
10.9	22.4
11.7	22.4
12.8	22.4
14.0	22.6
14.9	23.0
16.0	23.6
17.3	23.9
18.8	24.1
22.8	24.6

SUMMARY DATA	
Bankfull Elevation:	23.7
Bankfull Cross-Sectional Area:	9.8
Bankfull Width:	11.5
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.7
Low Bank Height:	1.7
Mean Depth at Bankfull:	0.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

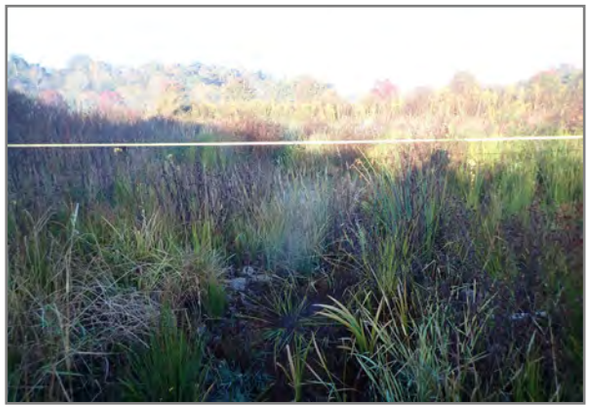
Stream Type	Ce 4



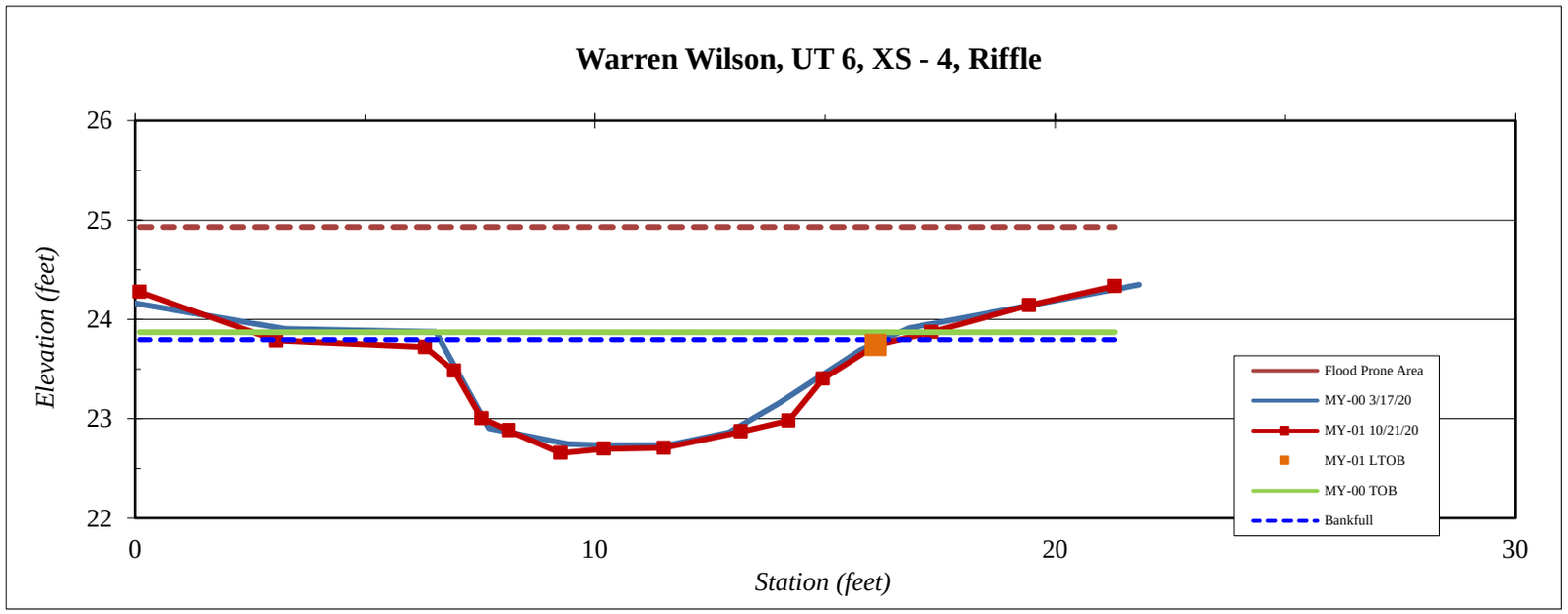
Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 6, XS -4, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	24.3
3.1	23.8
6.3	23.7
6.9	23.5
7.5	23.0
8.1	22.9
9.2	22.7
10.2	22.7
11.5	22.7
13.2	22.9
14.2	23.0
15.0	23.4
16.1	23.7
17.3	23.9
19.4	24.1
21.3	24.3

SUMMARY DATA	
Bankfull Elevation:	23.8
Bankfull Cross-Sectional Area:	8.0
Bankfull Width:	13.6
Flood Prone Area Elevation:	24.9
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.1
Low Bank Height:	1.1
Mean Depth at Bankfull:	0.6
W / D Ratio:	23.0
Entrenchment Ratio:	7.4
Bank Height Ratio:	1.0



Stream Type	Ce 4

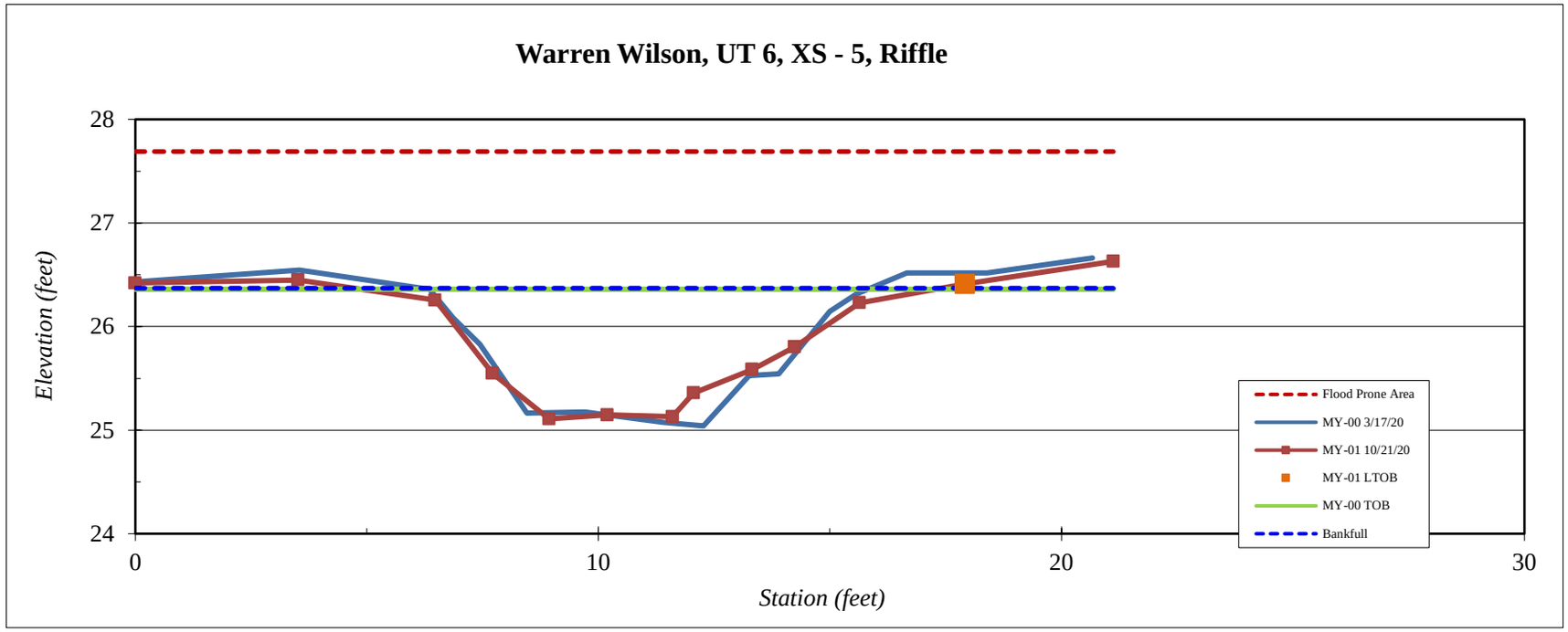


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 6, XS -5, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	26.4
3.5	26.4
6.5	26.3
7.7	25.5
8.9	25.1
10.2	25.1
11.6	25.1
12.1	25.4
13.3	25.6
14.2	25.8
15.6	26.2
17.9	26.4
21.1	26.6

SUMMARY DATA	
Bankfull Elevation:	26.4
Bankfull Cross-Sectional Area:	8.1
Bankfull Width:	12.7
Flood Prone Area Elevation:	27.7
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.3
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.6
W / D Ratio:	19.8
Entrenchment Ratio:	7.9
Bank Height Ratio:	1.0

Stream Type	Ce 4

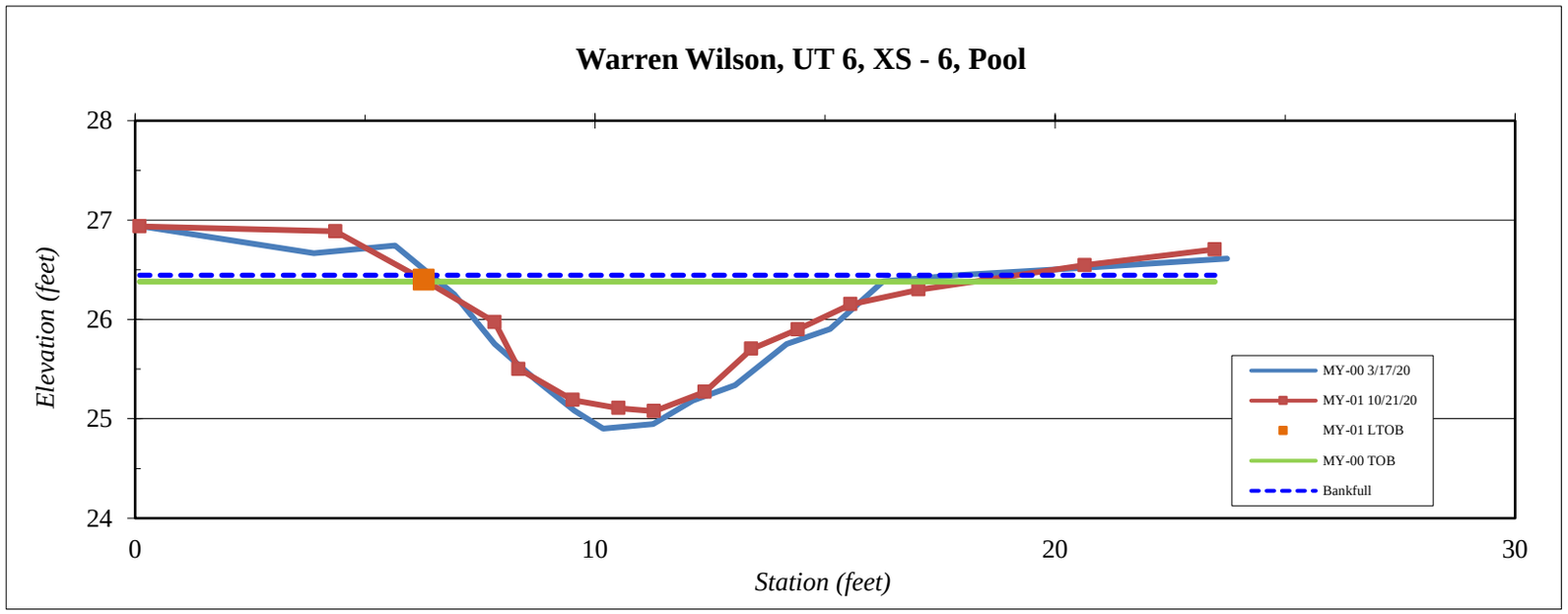


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 6, XS - 6, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	26.9
4.4	26.9
6.3	26.4
7.8	26.0
8.3	25.5
9.5	25.2
10.5	25.1
11.3	25.1
12.4	25.3
13.4	25.7
14.4	25.9
15.6	26.2
17.0	26.3
20.6	26.5
23.5	26.7

SUMMARY DATA	
Bankfull Elevation:	26.4
Bankfull Cross-Sectional Area:	8.4
Bankfull Width:	13.1
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.4
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.9

Stream Type	Ce 4

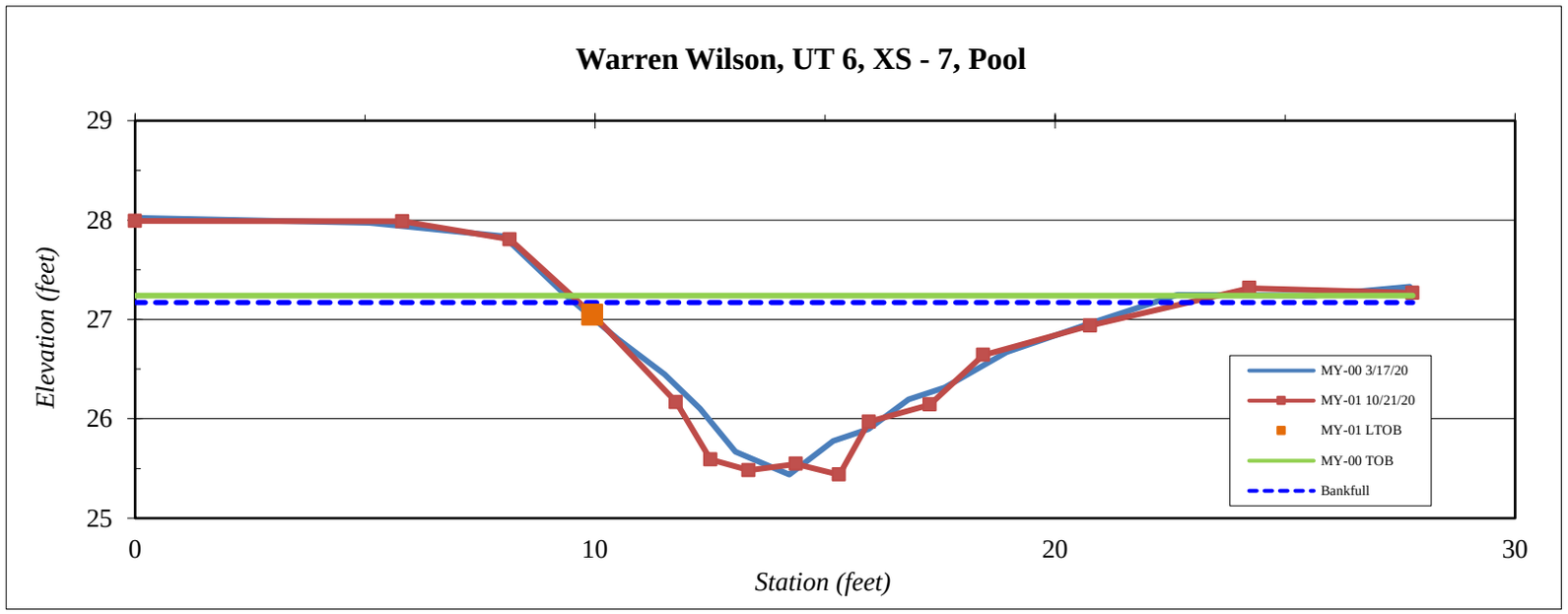


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 6, XS - 7, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	28.0
5.8	28.0
8.1	27.8
9.9	27.0
11.8	26.2
12.5	25.6
13.3	25.5
14.4	25.5
15.3	25.4
16.0	26.0
17.3	26.1
18.4	26.6
20.8	26.9
24.2	27.3
27.8	27.3

SUMMARY DATA	
Bankfull Elevation:	27.2
Bankfull Cross-Sectional Area:	11.1
Bankfull Width:	13.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.7
Low Bank Height:	1.6
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.9

Stream Type	Ce 4

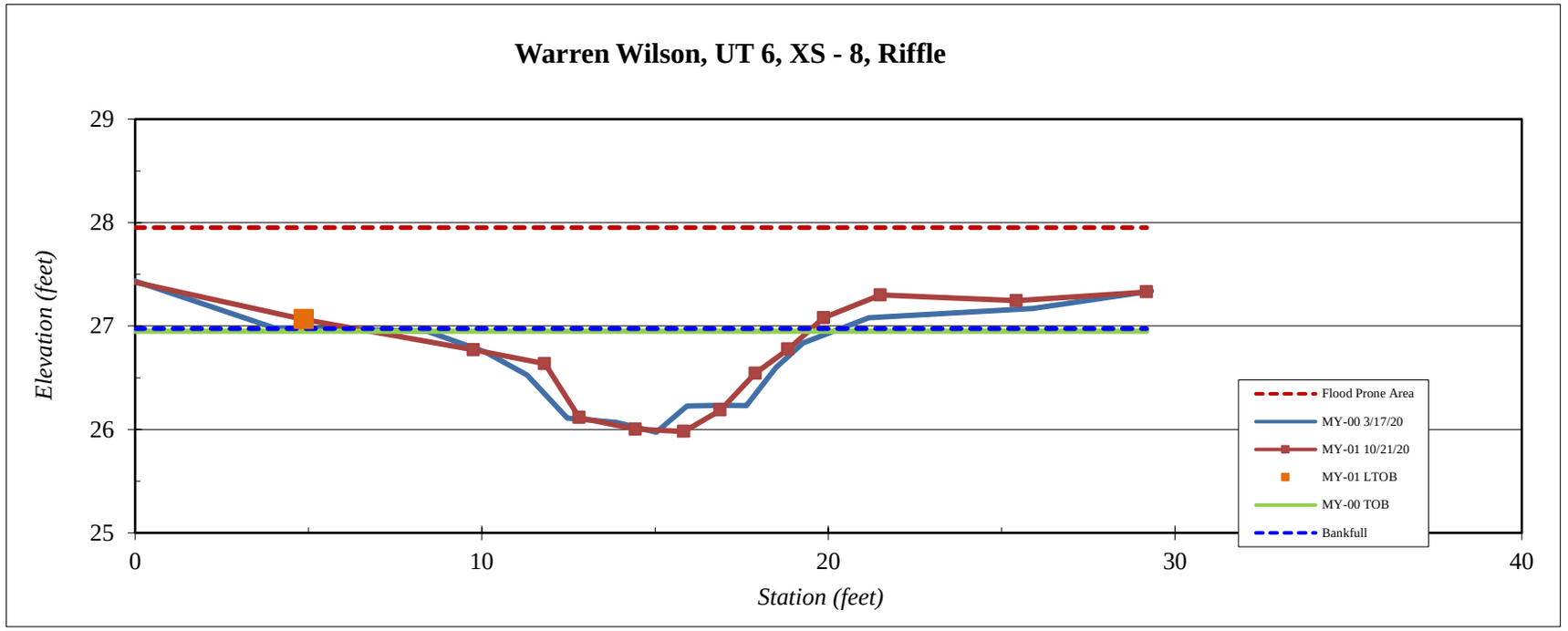


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 6, XS -8, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.1	27.4
4.9	27.1
9.8	26.8
11.8	26.6
12.8	26.1
14.4	26.0
15.8	26.0
16.9	26.2
17.9	26.5
18.8	26.8
19.9	27.1
21.5	27.3
25.4	27.2
29.2	27.3

SUMMARY DATA	
Bankfull Elevation:	27.0
Bankfull Cross-Sectional Area:	6.3
Bankfull Width:	13.2
Flood Prone Area Elevation:	28.0
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.0
Low Bank Height:	1.1
Mean Depth at Bankfull:	0.5
W / D Ratio:	27.9
Entrenchment Ratio:	7.6
Bank Height Ratio:	1.1

Stream Type	Ce 4

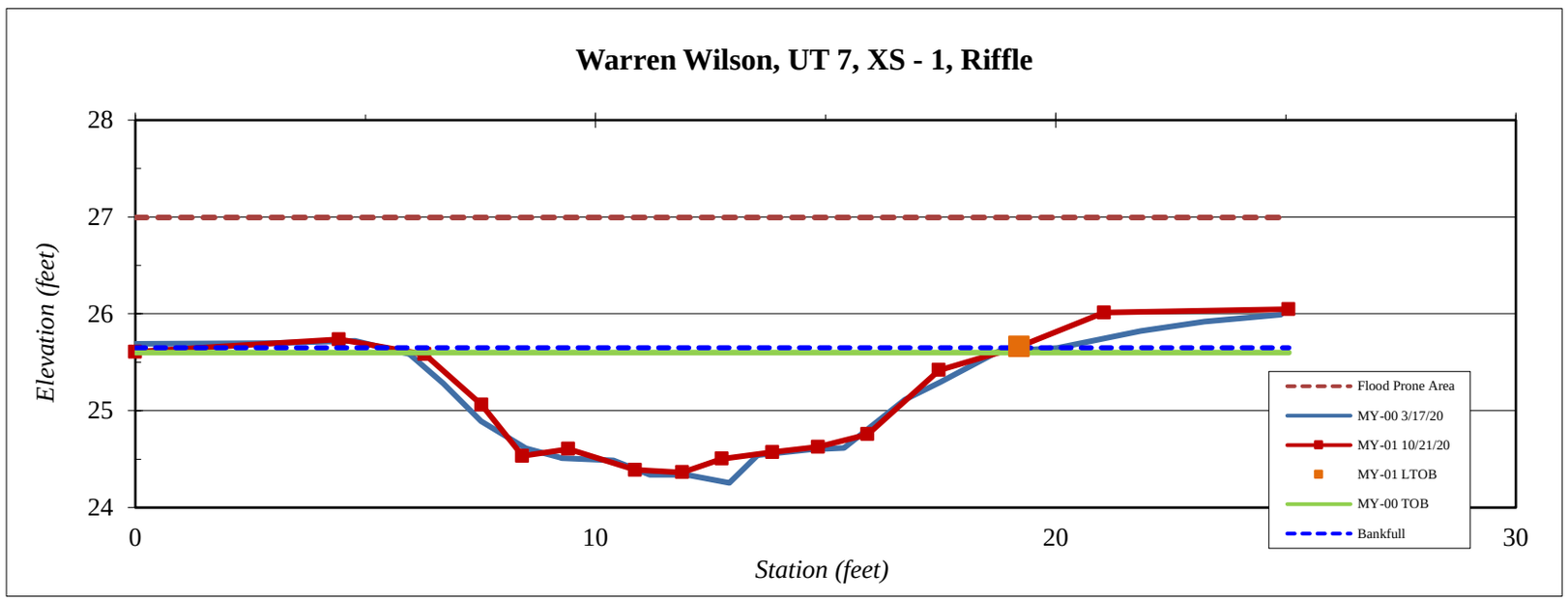


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 7, XS -1, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	25.6
4.4	25.7
6.3	25.6
7.5	25.1
8.4	24.5
9.4	24.6
10.9	24.4
11.9	24.4
12.7	24.5
13.8	24.6
14.8	24.6
15.9	24.8
17.5	25.4
19.2	25.7
21.1	26.0
25.1	26.0

SUMMARY DATA	
Bankfull Elevation:	25.7
Bankfull Cross-Sectional Area:	10.7
Bankfull Width:	15.1
Flood Prone Area Elevation:	27.0
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.3
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.7
W / D Ratio:	21.4
Entrenchment Ratio:	6.6
Bank Height Ratio:	1.0

Stream Type	Eb 4

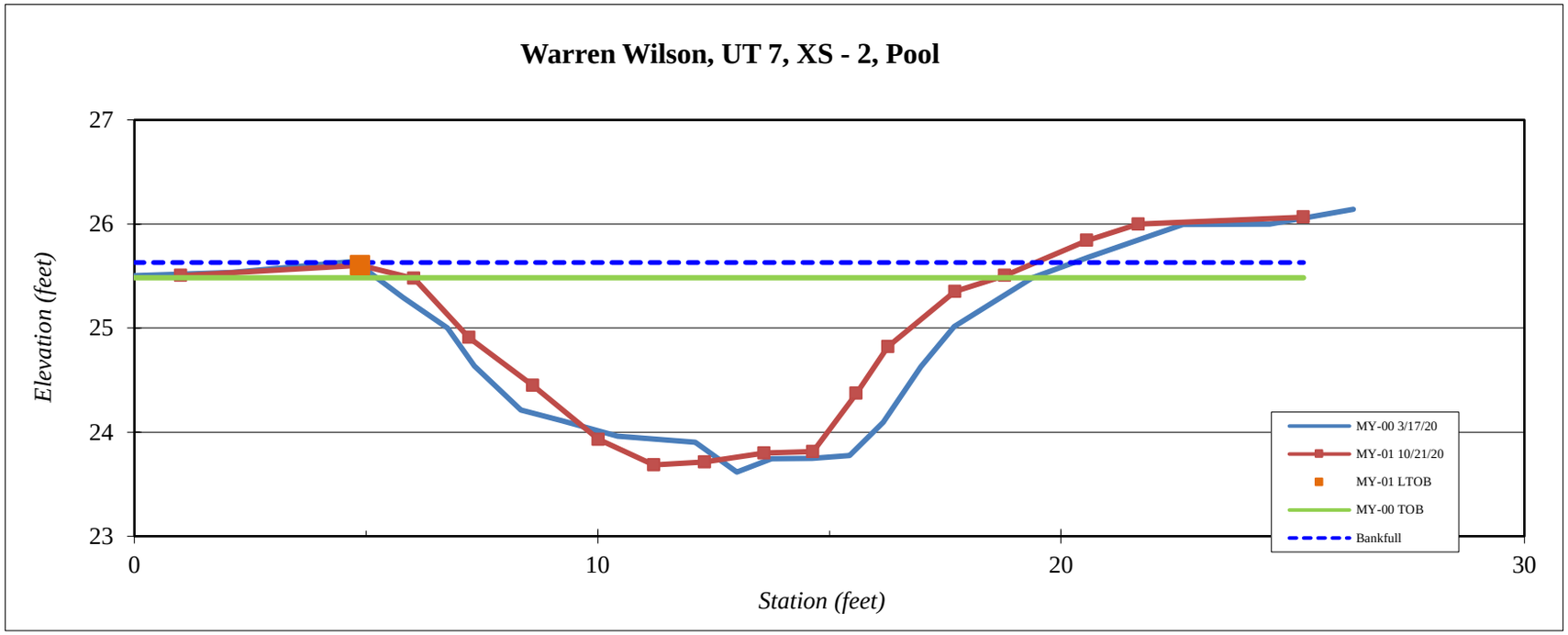


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 7, XS - 2, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
1.0	25.4
4.9	25.6
6.0	25.4
7.2	24.8
8.6	24.2
10.0	23.7
11.2	23.4
12.3	23.4
13.6	23.5
14.6	23.5
15.6	24.2
16.3	24.7
17.7	25.3
18.8	25.4
20.6	25.8
21.7	26.0
25.2	26.1

SUMMARY DATA	
Bankfull Elevation:	25.6
Bankfull Cross-Sectional Area:	18.2
Bankfull Width:	18.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.1
Low Bank Height:	2.1
Mean Depth at Bankfull:	1.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Eb 4

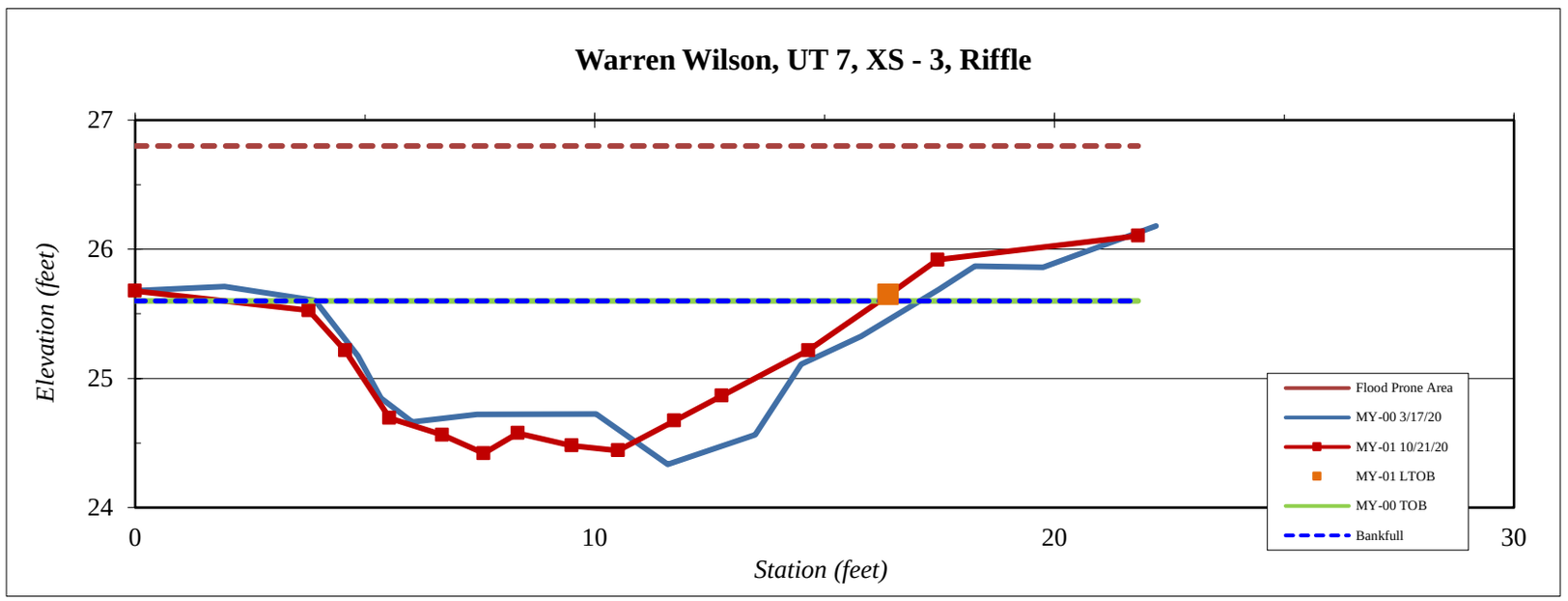


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 7, XS -3, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	25.7
3.8	25.5
4.6	25.2
5.5	24.7
6.7	24.6
7.6	24.4
8.3	24.6
9.5	24.5
10.5	24.4
11.7	24.7
12.8	24.9
14.6	25.2
16.4	25.6
17.5	25.9
21.8	26.1

SUMMARY DATA	
Bankfull Elevation:	25.6
Bankfull Cross-Sectional Area:	9.9
Bankfull Width:	14.7
Flood Prone Area Elevation:	26.8
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.2
Low Bank Height:	1.2
Mean Depth at Bankfull:	0.7
W / D Ratio:	21.8
Entrenchment Ratio:	6.8
Bank Height Ratio:	1.0

Stream Type	Eb 4

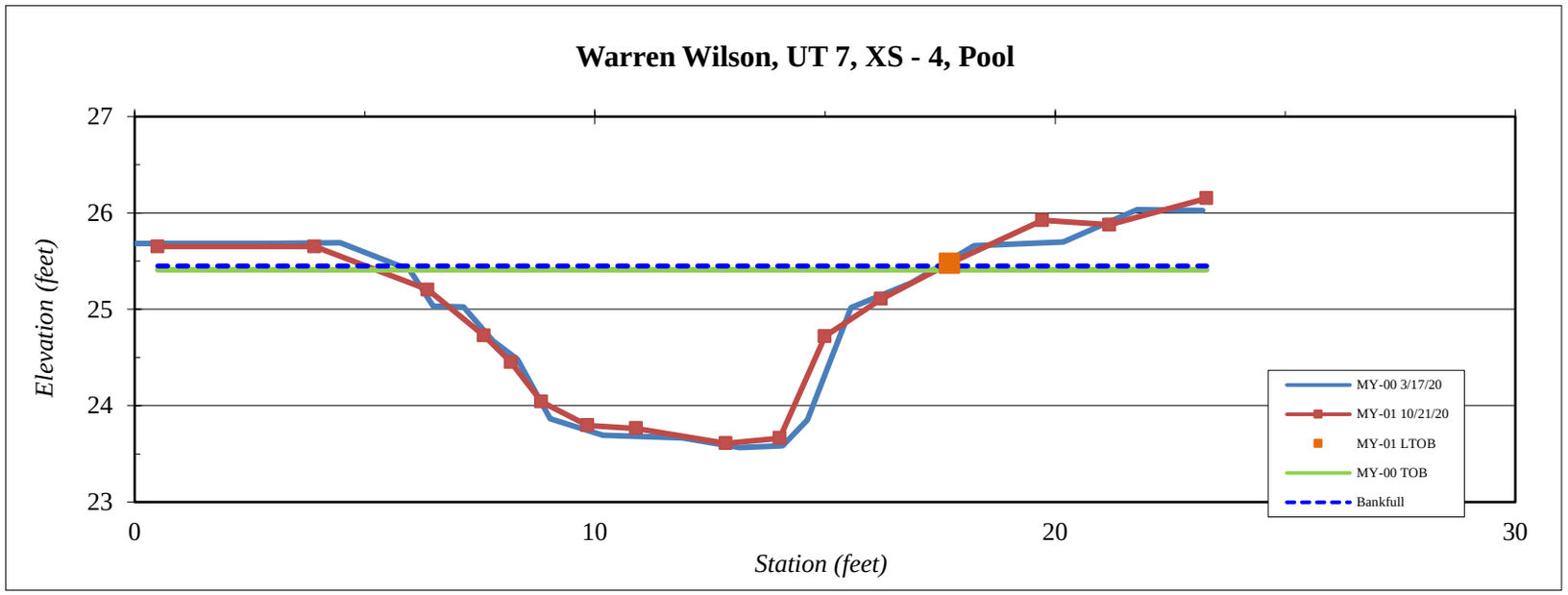


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 7, XS - 4, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.5	25.7
3.9	25.7
6.4	25.2
7.6	24.7
8.2	24.5
8.8	24.0
9.8	23.8
10.9	23.8
12.8	23.6
14.0	23.7
15.0	24.7
16.2	25.1
17.7	25.5
19.7	25.9
21.2	25.9
23.3	26.2

SUMMARY DATA	
Bankfull Elevation:	25.5
Bankfull Cross-Sectional Area:	13.0
Bankfull Width:	12.6
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.8
Low Bank Height:	1.9
Mean Depth at Bankfull:	1.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	Eb 4

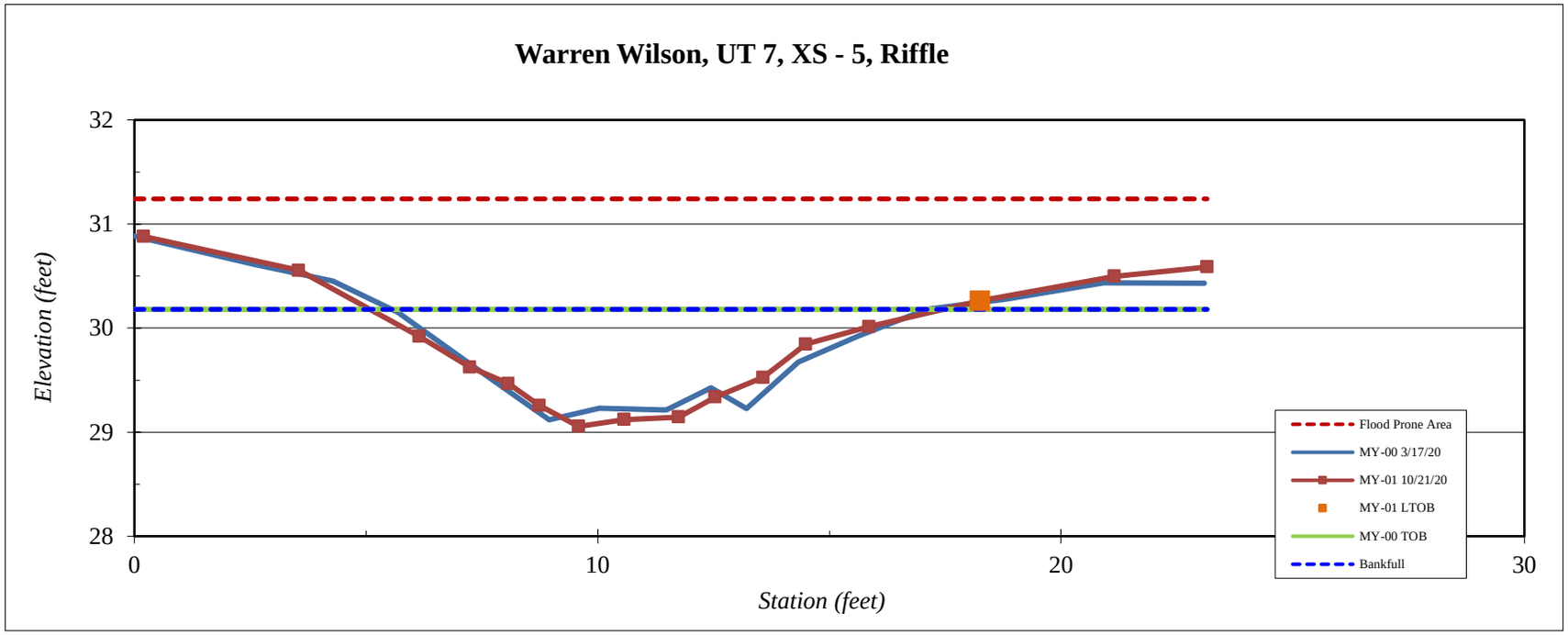


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 7, XS -5, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	30.9
3.5	30.6
6.2	29.9
7.2	29.6
8.1	29.5
8.7	29.3
9.6	29.1
10.6	29.1
11.7	29.1
12.5	29.3
13.6	29.5
14.5	29.8
15.9	30.0
18.3	30.3
21.2	30.5
23.2	30.6

SUMMARY DATA	
Bankfull Elevation:	30.2
Bankfull Cross-Sectional Area:	7.2
Bankfull Width:	12.2
Flood Prone Area Elevation:	31.2
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.1
Low Bank Height:	1.2
Mean Depth at Bankfull:	0.6
W / D Ratio:	20.5
Entrenchment Ratio:	8.2
Bank Height Ratio:	1.1

Stream Type	Eb 4

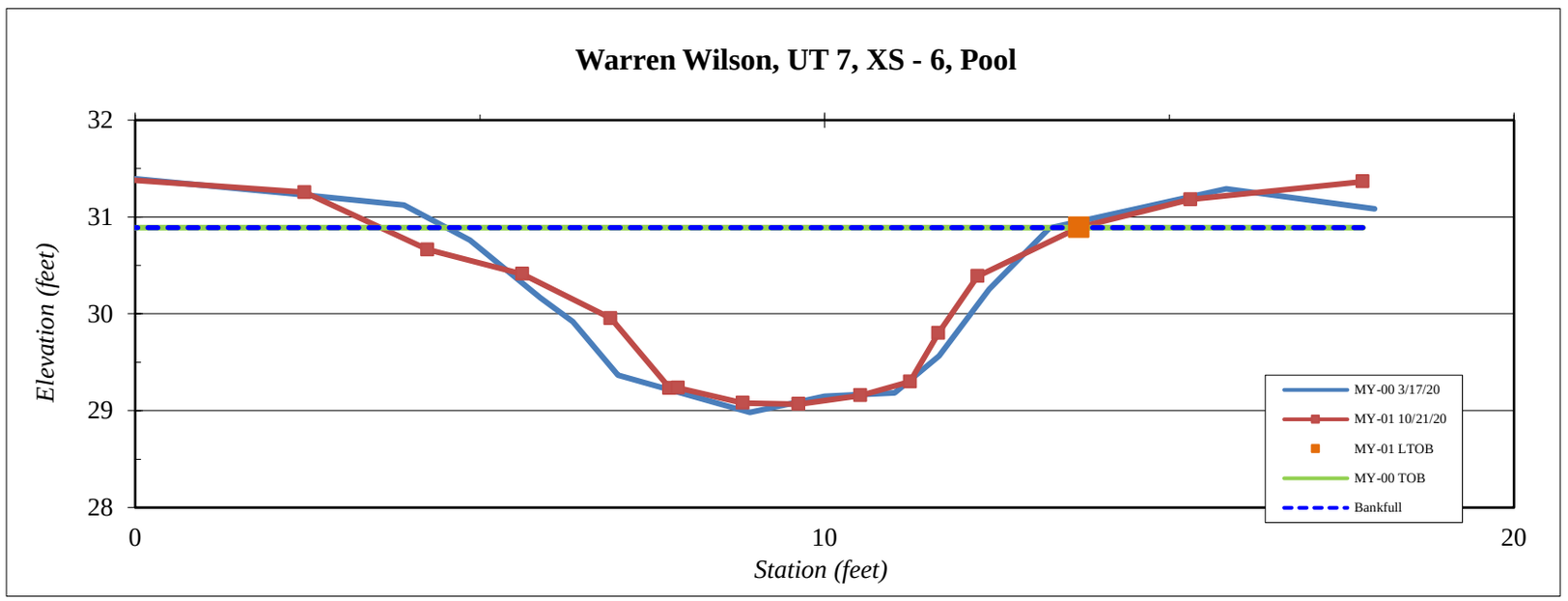


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 7, XS - 6, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.4	31.4
2.5	31.3
4.2	30.7
5.6	30.4
6.9	30.0
7.7	29.2
7.9	29.2
8.8	29.1
9.6	29.1
10.5	29.2
11.2	29.3
11.7	29.8
12.2	30.4
13.7	30.9
15.3	31.2
17.8	31.4

SUMMARY DATA	
Bankfull Elevation:	30.9
Bankfull Cross-Sectional Area:	10.7
Bankfull Width:	10.6
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.9
Low Bank Height:	1.8
Mean Depth at Bankfull:	1.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.9

Stream Type	Eb 4

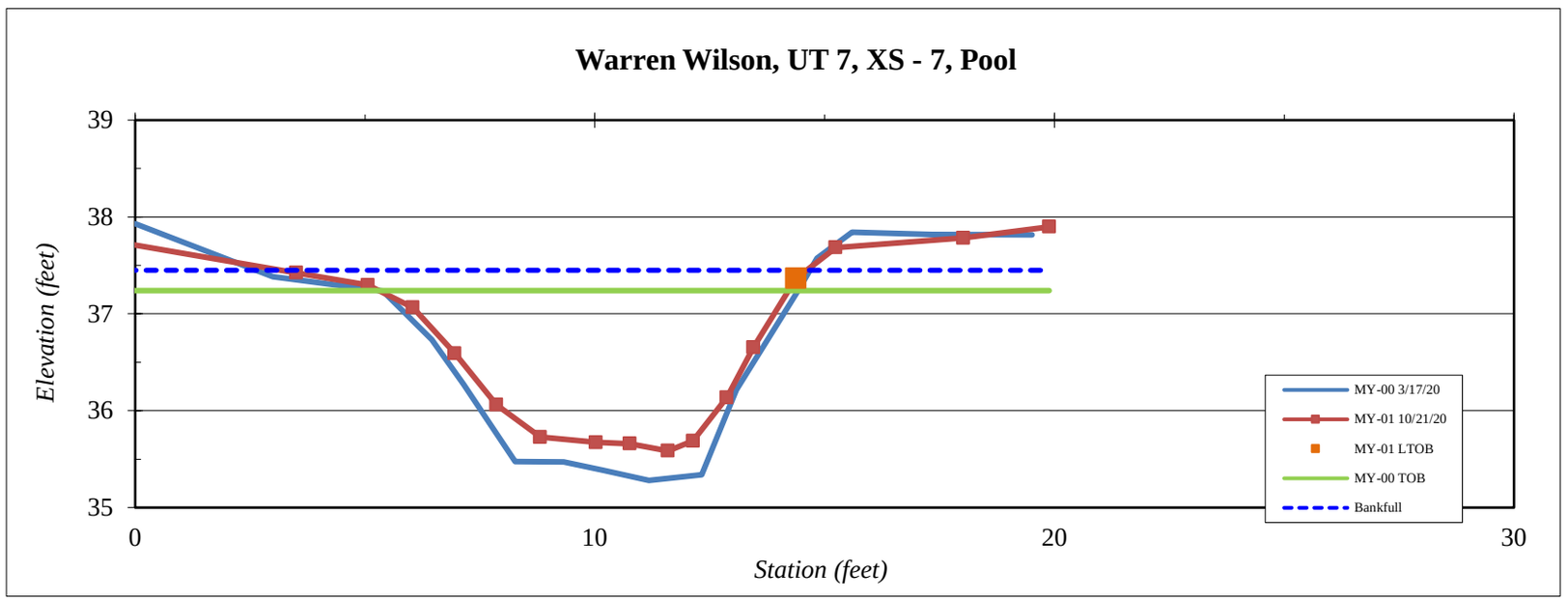


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 7, XS - 7, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	37.7
3.5	37.4
5.1	37.3
6.0	37.1
7.0	36.6
7.9	36.1
8.8	35.7
10.0	35.7
10.8	35.7
11.6	35.6
12.1	35.7
12.9	36.1
13.5	36.7
14.4	37.4
15.2	37.7
18.0	37.8
19.9	37.9

SUMMARY DATA	
Bankfull Elevation:	37.5
Bankfull Cross-Sectional Area:	11.6
Bankfull Width:	11.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.9
Low Bank Height:	1.8
Mean Depth at Bankfull:	1.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.9

Stream Type	Eb 4

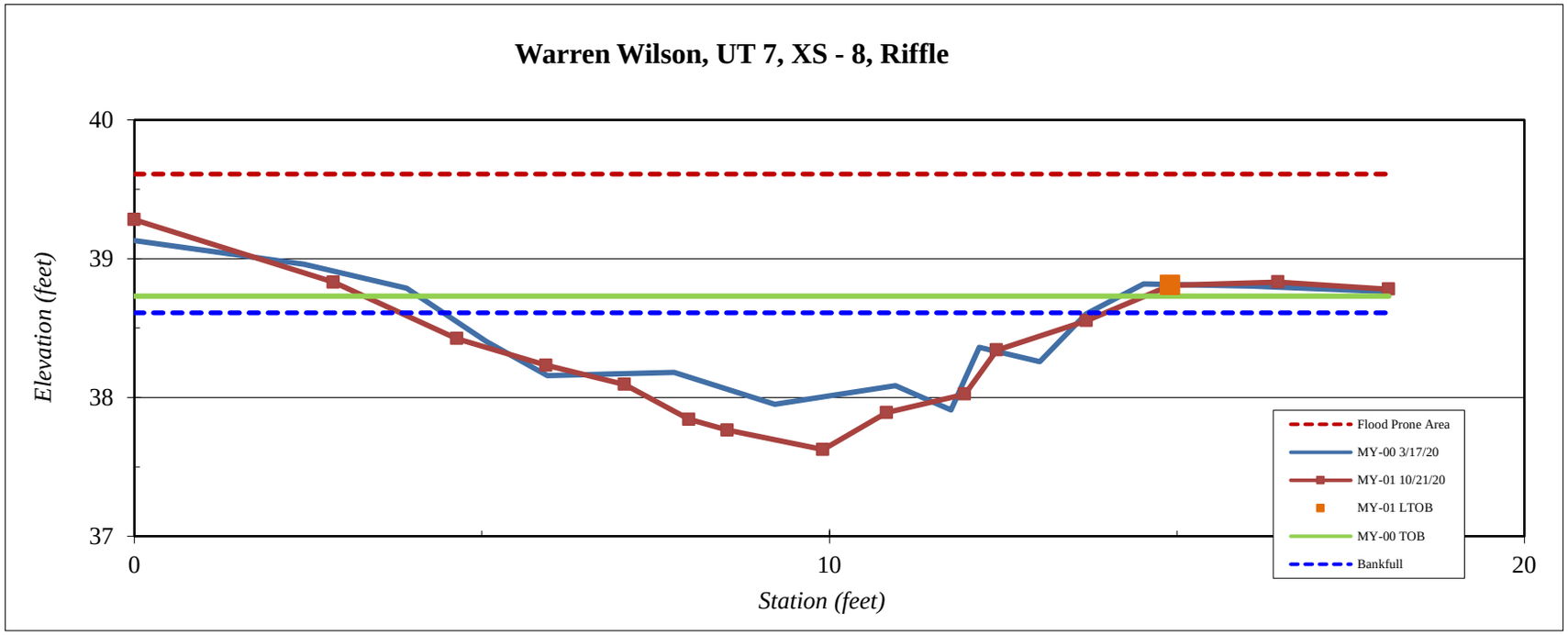


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 7, XS -8, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	39.3
2.9	38.8
4.6	38.4
5.9	38.2
7.1	38.1
8.0	37.8
8.5	37.8
9.9	37.6
10.8	37.9
11.9	38.0
12.4	38.3
13.7	38.6
14.9	38.8
16.5	38.8
18.0	38.8

SUMMARY DATA	
Bankfull Elevation:	38.6
Bankfull Cross-Sectional Area:	5.2
Bankfull Width:	10.1
Flood Prone Area Elevation:	39.6
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.0
Low Bank Height:	1.2
Mean Depth at Bankfull:	0.5
W / D Ratio:	19.6
Entrenchment Ratio:	9.9
Bank Height Ratio:	1.2

Stream Type	Eb 4

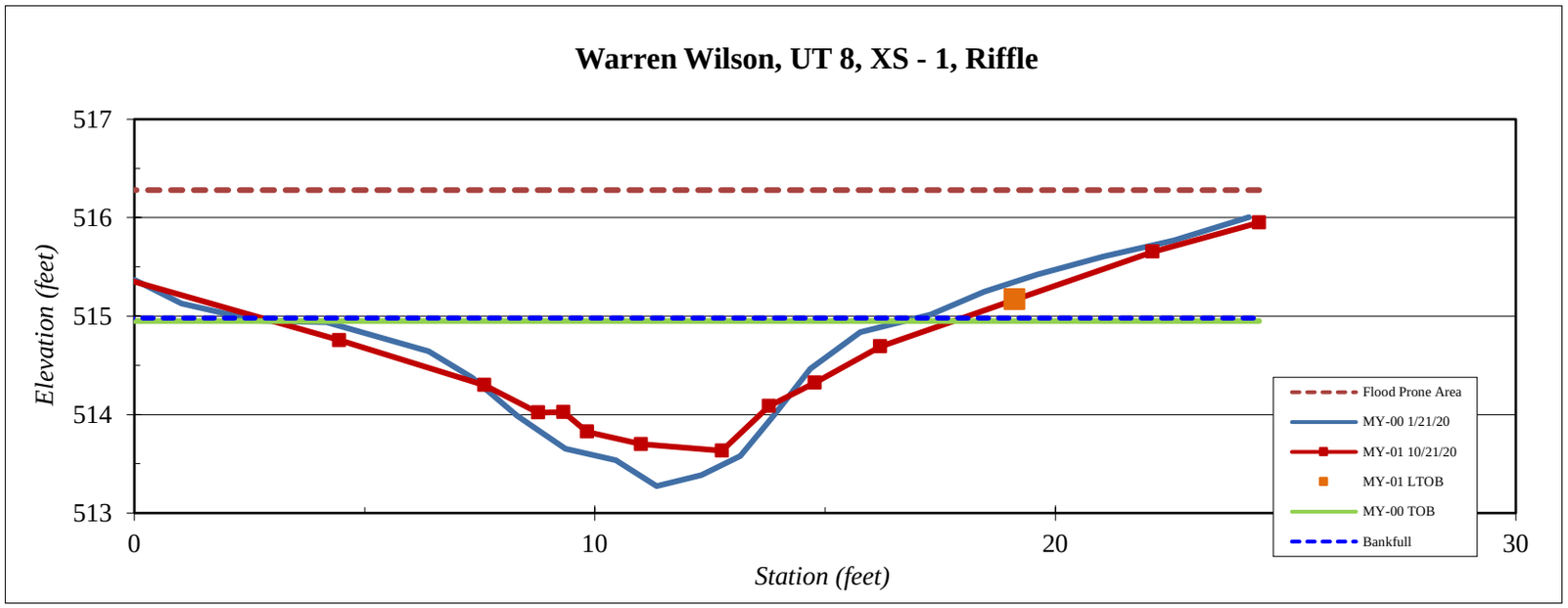


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 8, XS -1, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.7	515.4
4.5	514.8
7.6	514.3
8.8	514.0
9.3	514.0
9.8	513.8
11.0	513.7
12.8	513.6
13.8	514.1
14.8	514.3
16.2	514.7
19.1	515.2
22.1	515.7
24.4	515.9

SUMMARY DATA	
Bankfull Elevation:	515.0
Bankfull Cross-Sectional Area:	10.2
Bankfull Width:	15.2
Flood Prone Area Elevation:	516.3
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.3
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.7
W / D Ratio:	22.7
Entrenchment Ratio:	6.6
Bank Height Ratio:	1.2

Stream Type	C 4

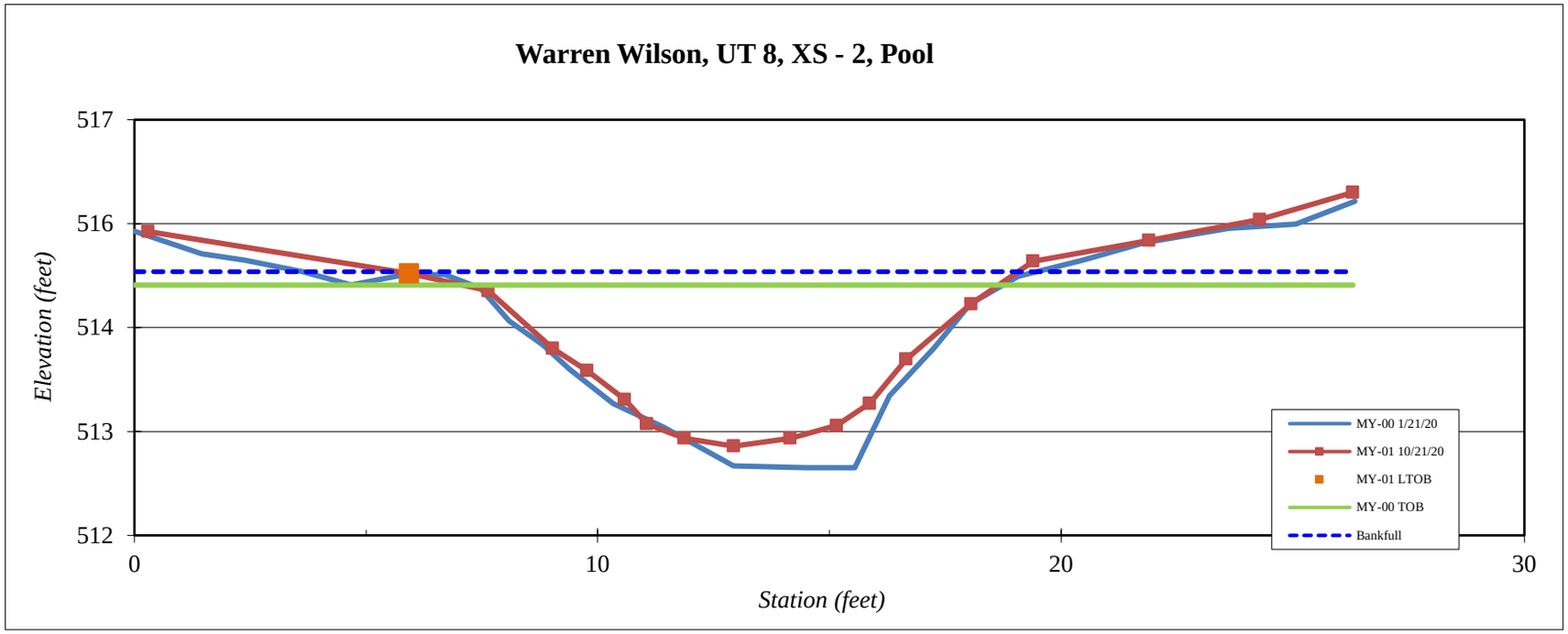


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 8, XS - 2, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.3	515.5
5.9	515.0
7.6	514.8
9.0	514.2
9.8	514.0
10.6	513.6
11.1	513.4
11.9	513.2
12.9	513.1
14.2	513.2
15.2	513.4
15.9	513.6
16.7	514.1
18.1	514.7
19.4	515.1
21.9	515.4
24.3	515.6
26.3	515.9

SUMMARY DATA	
Bankfull Elevation:	515.0
Bankfull Cross-Sectional Area:	13.9
Bankfull Width:	13.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.9
Low Bank Height:	1.9
Mean Depth at Bankfull:	1.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C 4

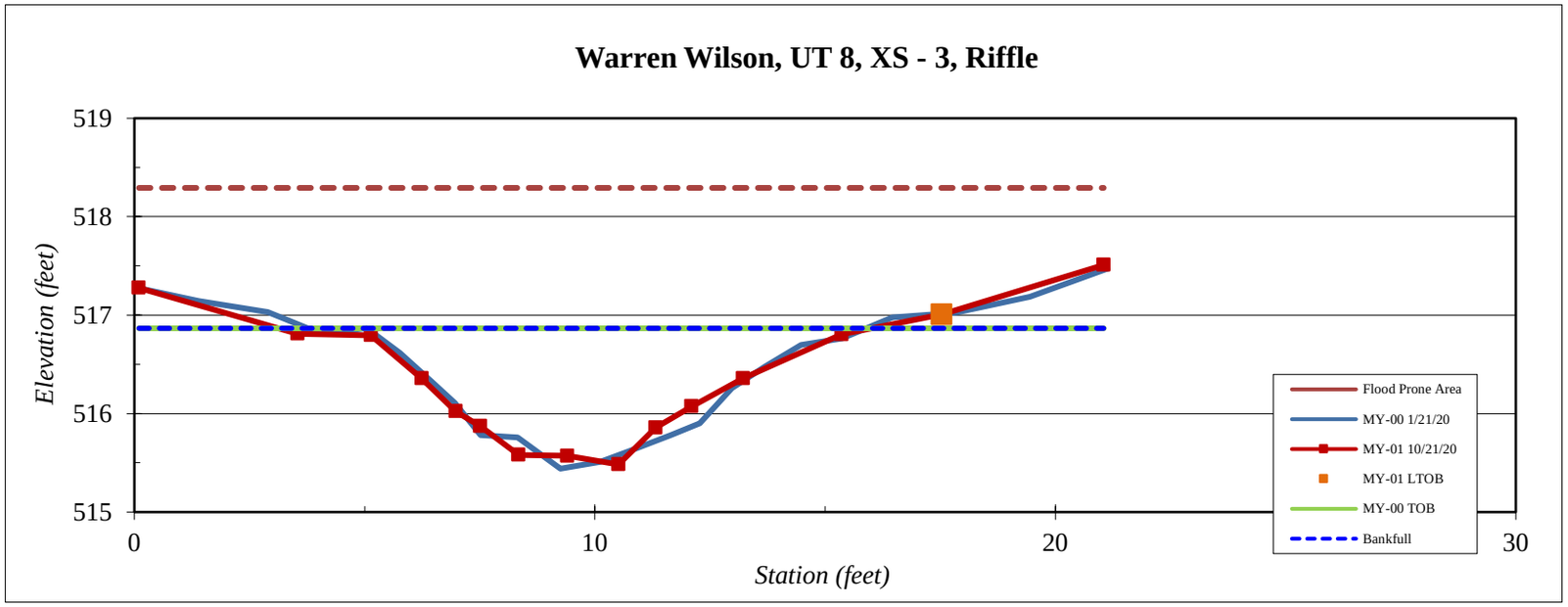


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 8, XS - 3, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.1	517.3
3.5	516.8
5.1	516.8
6.2	516.4
7.0	516.0
7.5	515.9
8.3	515.6
9.4	515.6
10.5	515.5
11.3	515.9
12.1	516.1
13.2	516.4
15.4	516.8
17.5	517.0
21.1	517.5

SUMMARY DATA	
Bankfull Elevation:	516.9
Bankfull Cross-Sectional Area:	8.3
Bankfull Width:	12.9
Flood Prone Area Elevation:	518.3
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.4
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.6
W / D Ratio:	20.1
Entrenchment Ratio:	7.8
Bank Height Ratio:	1.1

Stream Type	C 4

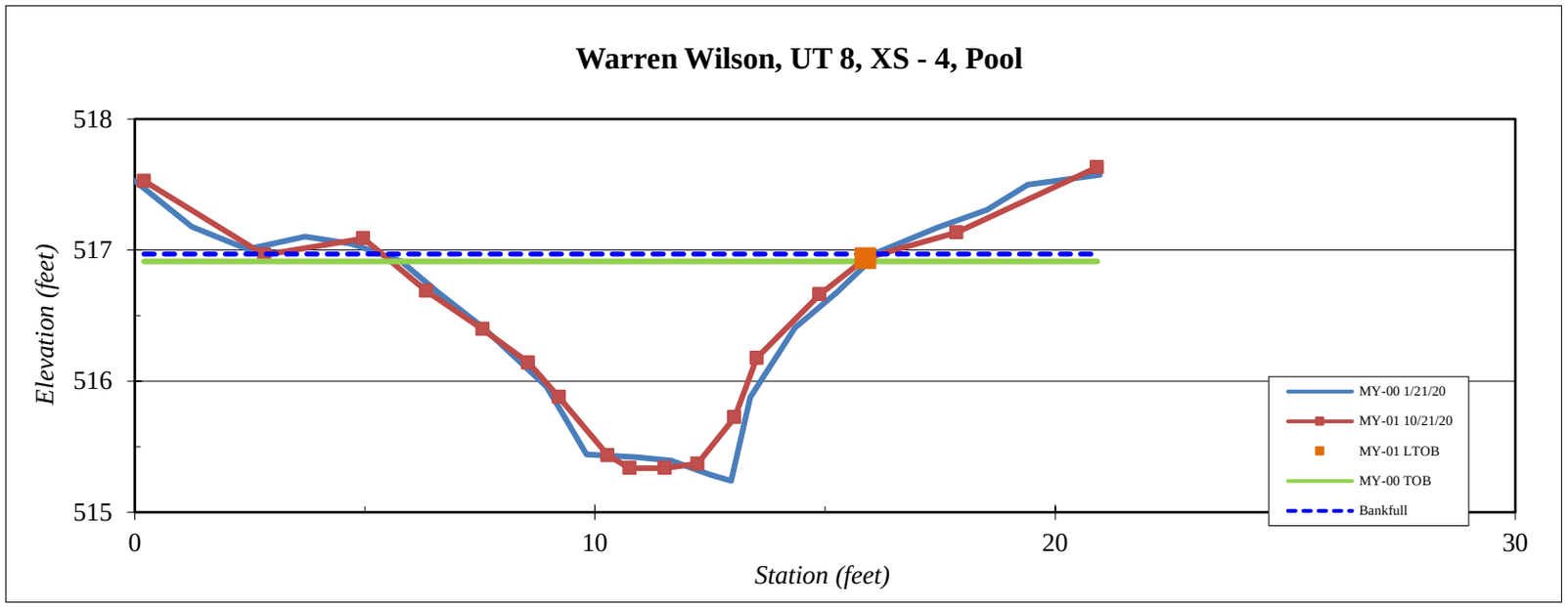


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 8, XS - 4, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.2	517.5
2.8	517.0
5.0	517.1
6.3	516.7
7.6	516.4
8.6	516.1
9.2	515.9
10.3	515.4
10.8	515.3
11.5	515.3
12.2	515.4
13.0	515.7
13.5	516.2
14.9	516.7
15.9	516.9
17.9	517.1
20.9	517.6

SUMMARY DATA	
Bankfull Elevation:	517.0
Bankfull Cross-Sectional Area:	9.1
Bankfull Width:	11.0
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.6
Low Bank Height:	1.6
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C 4

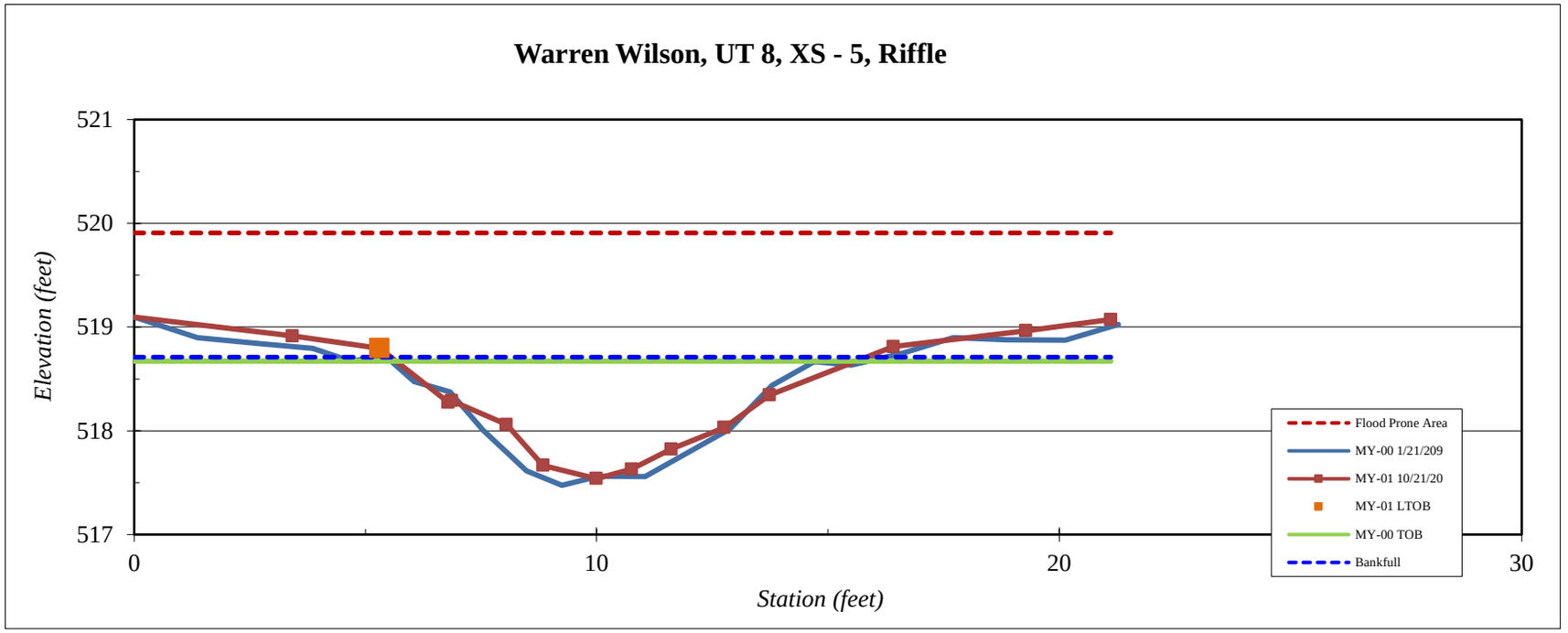


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 8, XS -5, Riffle
Feature	Riffle
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.1	519.1
3.4	518.9
5.3	518.8
6.8	518.3
6.9	518.3
8.1	518.1
8.8	517.7
10.0	517.5
10.8	517.6
11.6	517.8
12.8	518.0
13.7	518.3
16.4	518.8
19.3	519.0
21.1	519.1

SUMMARY DATA	
Bankfull Elevation:	518.7
Bankfull Cross-Sectional Area:	6.4
Bankfull Width:	10.3
Flood Prone Area Elevation:	519.9
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.2
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.6
W / D Ratio:	16.6
Entrenchment Ratio:	9.7
Bank Height Ratio:	1.1

Stream Type	C 4

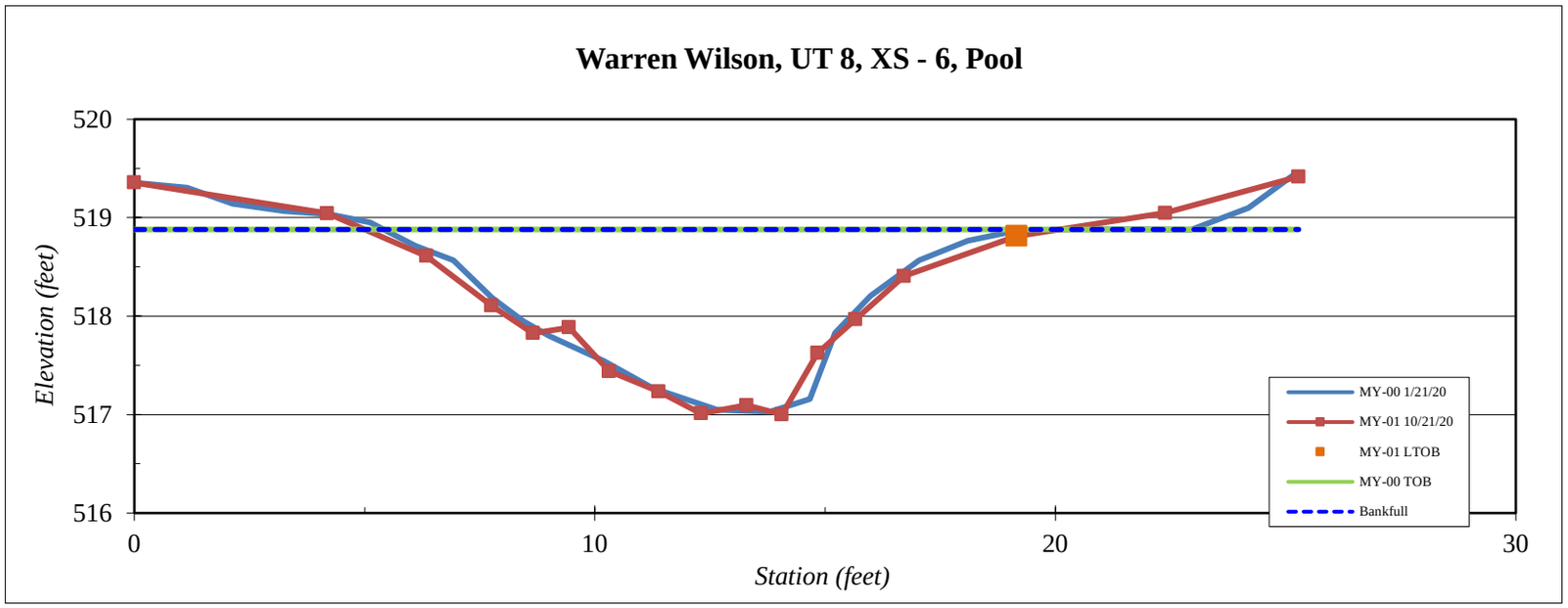


Site	Warren Wilson
Watershed:	French Broad, 06010105
XS ID	UT 8, XS - 6, Pool
Feature	Pool
Date:	10/21/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	519.4
4.2	519.0
6.3	518.6
7.8	518.1
8.7	517.8
9.4	517.9
10.3	517.4
11.4	517.2
12.3	517.0
13.3	517.1
14.1	517.0
14.8	517.6
15.7	518.0
16.7	518.4
19.2	518.8
22.4	519.0
25.3	519.4

SUMMARY DATA	
Bankfull Elevation:	518.9
Bankfull Cross-Sectional Area:	13.1
Bankfull Width:	14.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.8
Low Bank Height:	1.8
Mean Depth at Bankfull:	0.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	C 4



Appendix E
HYDROLOGY DATA

Tables 15A-C Channel Evidence
Stream Gauge Graphs
Table 16. Verification of Bankfull Events
Table 17A-B. Groundwater Hydrology Data
Groundwater Gauge Graphs
Bud Burst Documentation Photographs
Figure E-1. Year 1 (2020) Soil Temperature Data

Table 15A. UT3 Channel Evidence

UT3 Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	159						
Presence of litter and debris (wracking)	Yes						
Leaf litter disturbed or washed away	Yes						
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes						
Sediment deposition and/or scour indicating sediment transport	Yes						
Water staining due to continual presence of water	Yes						
Formation of channel bed and banks	Yes						
Sediment sorting within the primary path of flow	Yes						
Sediment shelving or a natural line impressed on the banks	Yes						
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes						
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes						
Exposure of woody plant roots within the primary path of flow	No						
Other:							

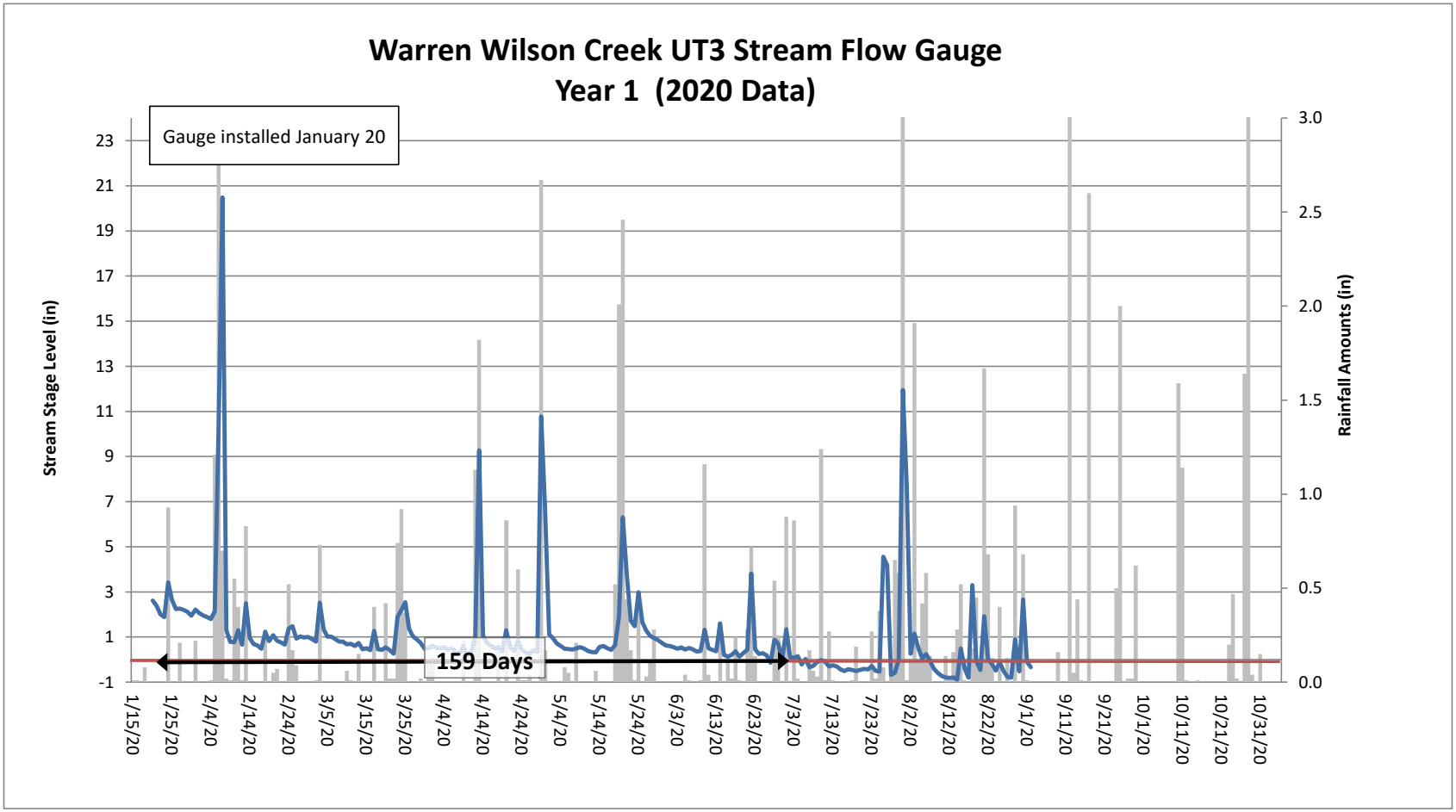

Warren Wilson Creek UT3 Stream Flow Gauge
Year 1 (2020 Data)
Gauge installed January 20
159 Days
Stream Stage Level (in)
Rainfall Amounts (in)
23
21
19
17
15
13
11
9
7
5
3
1
-1
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/15/20
1/25/20
2/4/20
2/14/20
2/24/20
3/5/20
3/15/20
3/25/20
4/4/20
4/14/20
4/24/20
5/4/20
5/14/20
5/24/20
6/3/20
6/13/20
6/23/20
7/3/20
7/13/20
7/23/20
8/2/20
8/12/20
8/22/20
9/1/20
9/11/20
9/21/20
10/1/20
10/11/20
10/21/20
10/31/20

Table 15B. UT6 Channel Evidence

UT6 Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	33*						
Presence of litter and debris (wracking)	Yes						
Leaf litter disturbed or washed away	Yes						
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes						
Sediment deposition and/or scour indicating sediment transport	Yes						
Water staining due to continual presence of water	Yes						
Formation of channel bed and banks	Yes						
Sediment sorting within the primary path of flow	Yes						
Sediment shelving or a natural line impressed on the banks	Yes						
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes						
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes						
Exposure of woody plant roots within the primary path of flow	No						
Other:							

*The gauge was installed August 1, 2020. Based on precipitation data, adjacent groundwater gauge data (Gauge 9), and other Site stream gauge data, it is expected to have flowed consecutively for much of the year 1 (2020) monitoring period.

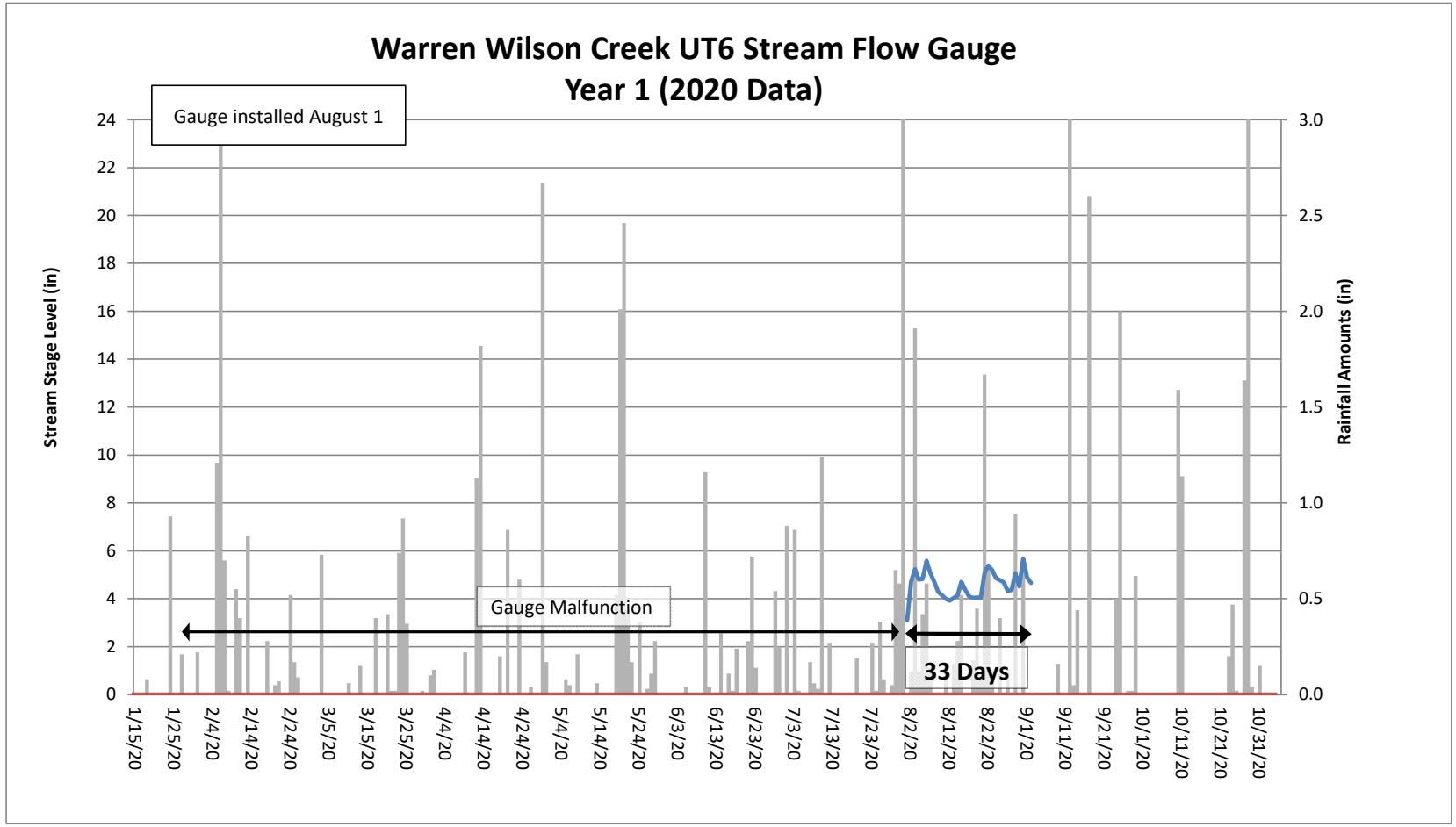

Warren Wilson Creek UT6 Stream Flow Gauge
Year 1 (2020 Data)
Gauge installed August 1
Gauge Malfunction
33 Days
Stream Stage Level (in)
Rainfall Amounts (in)
24
22
20
18
16
14
12
10
8
6
4
2
0
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/15/20
1/25/20
2/4/20
2/14/20
2/24/20
3/5/20
3/15/20
3/25/20
4/4/20
4/14/20
4/24/20
5/4/20
5/14/20
5/24/20
6/3/20
6/13/20
6/23/20
7/3/20
7/13/20
7/23/20
8/2/20
8/12/20
8/22/20
9/1/20
9/11/20
9/21/20
10/1/20
10/11/20
10/21/20
10/31/20

Table 15C. UT8 Channel Evidence

UT8 Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	241						
Presence of litter and debris (wracking)	Yes						
Leaf litter disturbed or washed away	Yes						
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes						
Sediment deposition and/or scour indicating sediment transport	Yes						
Water staining due to continual presence of water	Yes						
Formation of channel bed and banks	Yes						
Sediment sorting within the primary path of flow	Yes						
Sediment shelving or a natural line impressed on the banks	Yes						
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes						
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes						
Exposure of woody plant roots within the primary path of flow	No						
Other:							

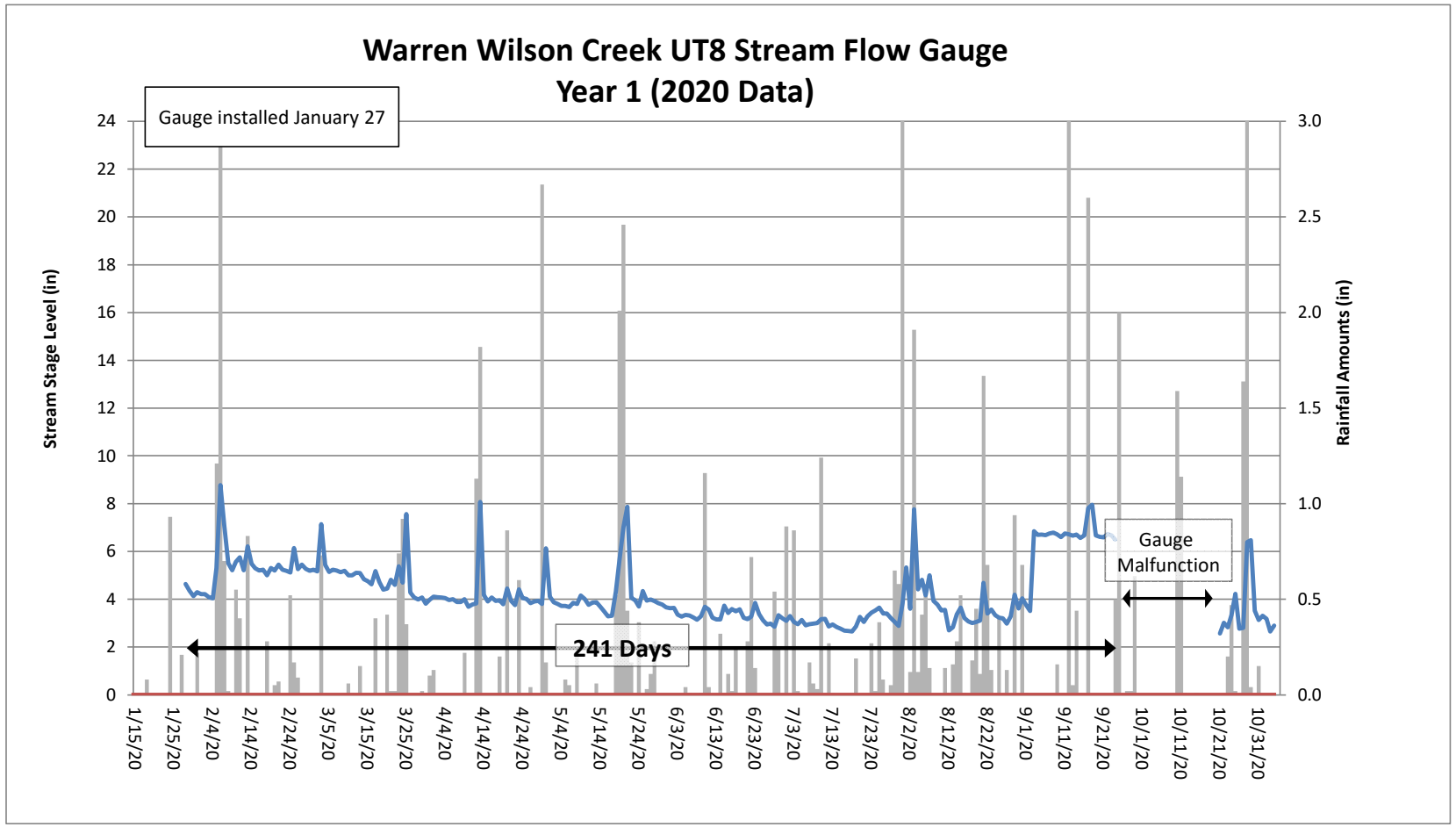

Warren Wilson Creek UT8 Stream Flow Gauge
Year 1 (2020 Data)
Gauge installed January 27
Stream Stage Level (in)
Rainfall Amounts (in)
241 Days
Gauge Malfunction
0
2
4
6
8
10
12
14
16
18
20
22
24
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1/15/20
1/25/20
2/4/20
2/14/20
2/24/20
3/5/20
3/15/20
3/25/20
4/4/20
4/14/20
4/24/20
5/4/20
5/14/20
5/24/20
6/3/20
6/13/20
6/23/20
7/3/20
7/13/20
7/23/20
8/2/20
8/12/20
8/22/20
9/1/20
9/11/20
9/21/20
10/1/20
10/11/20
10/21/20
10/31/20

Table 16. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
May 20, 2020	May 20, 2020	Stream gauges and trail cameras captured a bankfull event at UT8 after 4.47 inches of rain was documented between May 19 and 20, 2020 at a nearby weather station.	1
November 4, 2020	October 27, 2020	Wrack and laid-back vegetation were observed outside the TOB of UT3 after 4.7 inches of rain was documented between October 27 and 28, 2020 at a nearby weather station.	2

Photo 1: UT8 at bankfull stage.

Photo 2: Wrack and laid-back vegetation outside the TOB of UT3 after a bankfull event.

Table 17A. Groundwater Hydrology Data: Mitigation Success (UT-3B, Little Berea/ Clingman's)

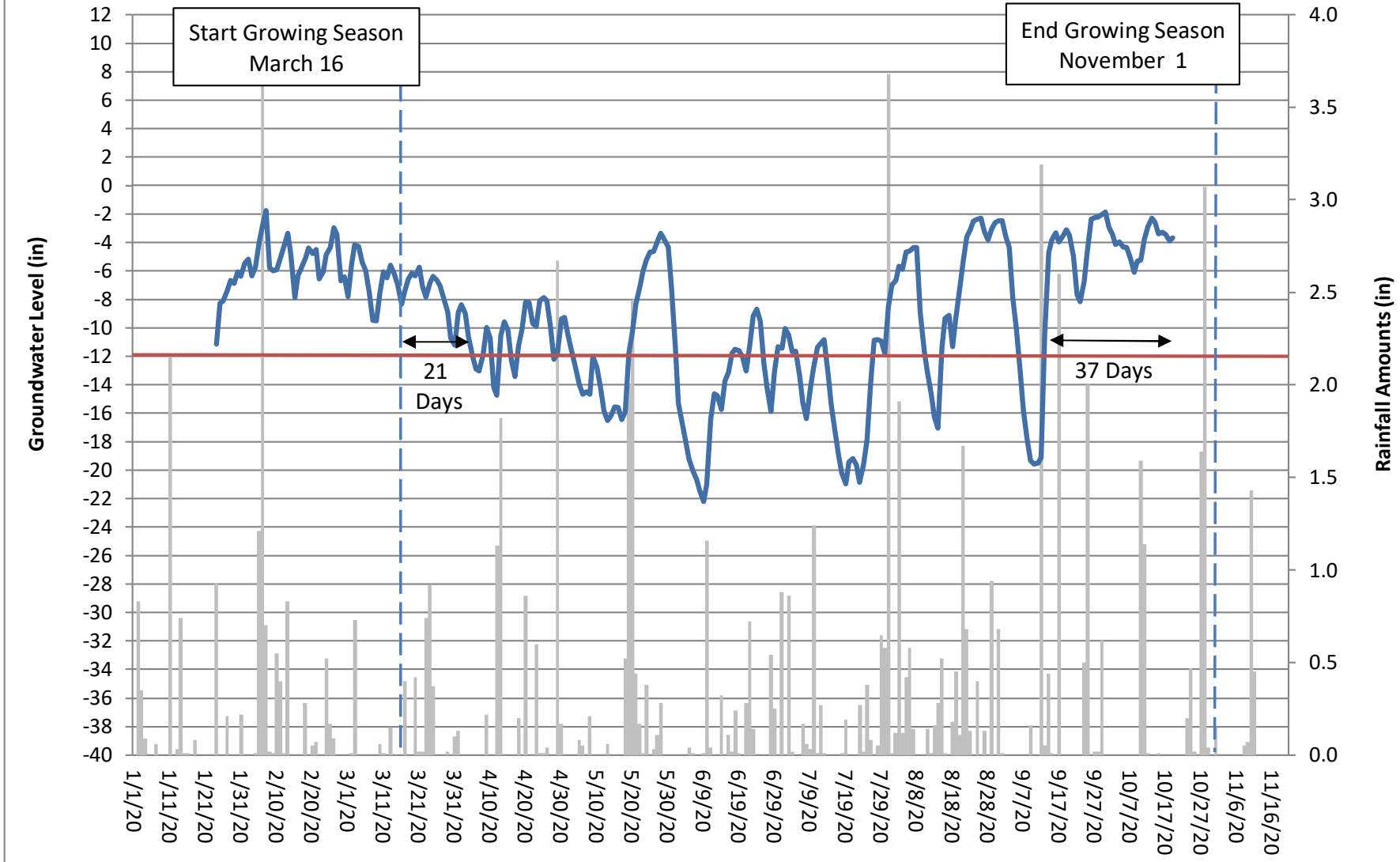
Gauge	Typical Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2019)	**Year 2 (2020)**	**Year 3 (2021)**	**Year 4 (2022)**	**Year 5 (2023)**	**Year 6 (2024)**	**Year 7 (2025)**
3	Yes 127 days (55.0%)						
4	Yes 32 days (13.9%)						
5	Yes 174 days (75.3%)						
6	Yes 93 days (40.3%)						
7	Yes 72 days (31.2%)						
8	Yes 231 days (100%)						

Table 17B. Groundwater Hydrology Data: Potential Wetland Loss Monitoring Areas

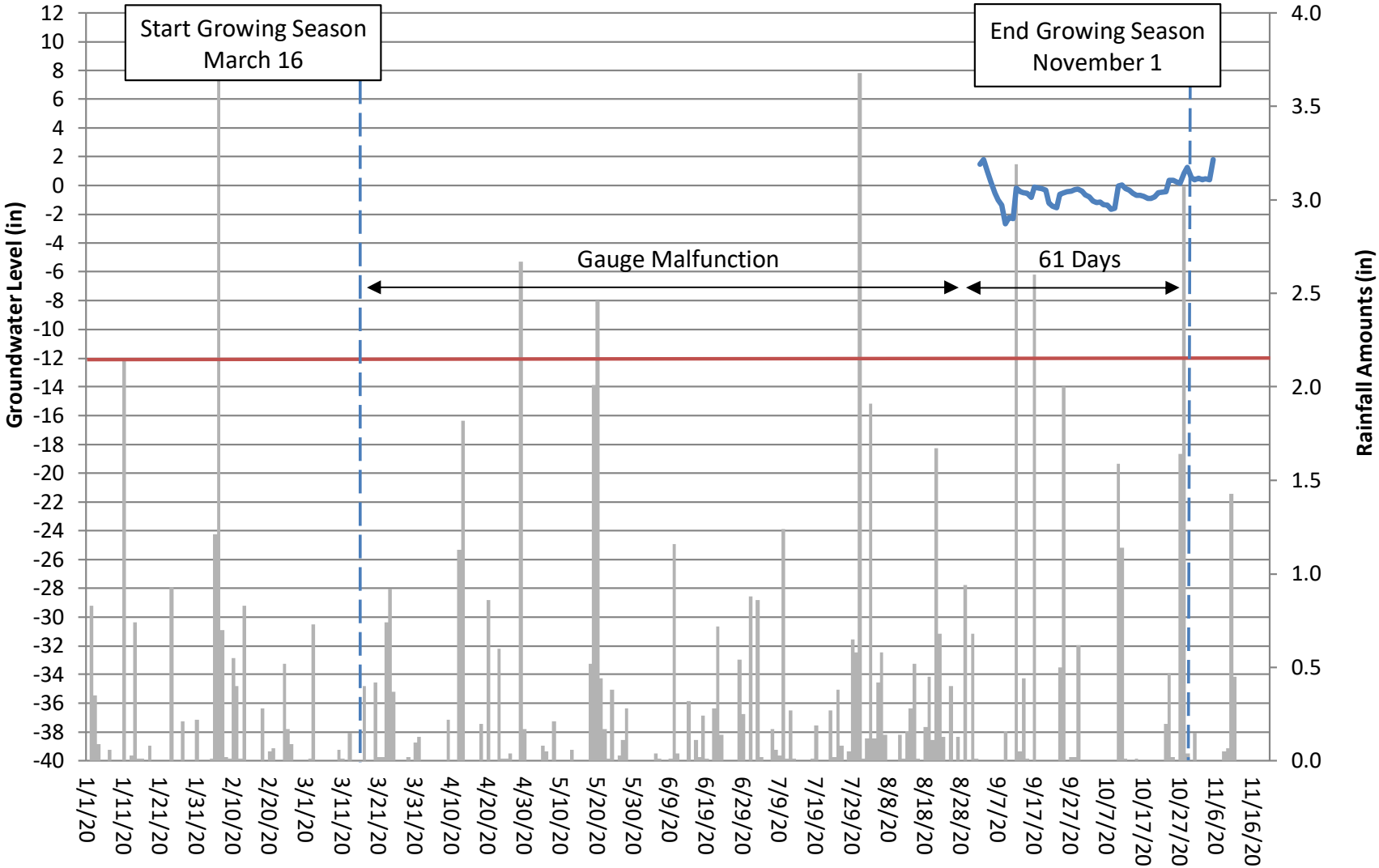
Gauge	Typical Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2019)	**Year 2 (2020)**	**Year 3 (2021)**	**Year 4 (2022)**	**Year 5 (2023)**	**Year 6 (2024)**	**Year 7 (2025)**
1	Yes 37 days (16.0%)						
2	Yes 61 days (26.4%)						
9	Yes 175 days (75.8%)						
10	No* 9 days (3.9%)						

*Gauge was not installed until August 1, 2020. It is expected to have exceeded typical wetland success criteria had it been installed earlier in the growing season.

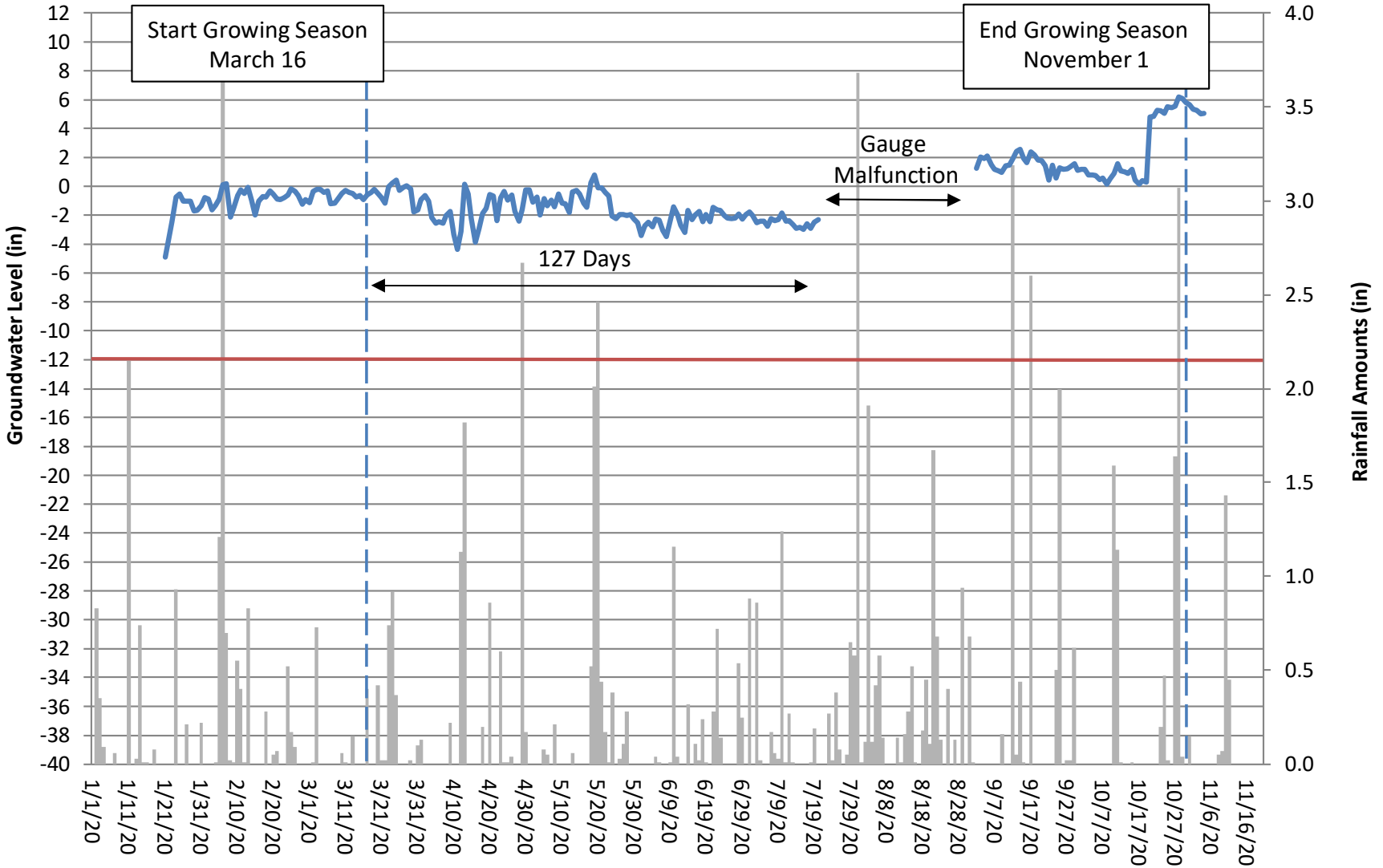
Warren Wilson Groundwater Gauge 1
Year 1 (2020 Data)



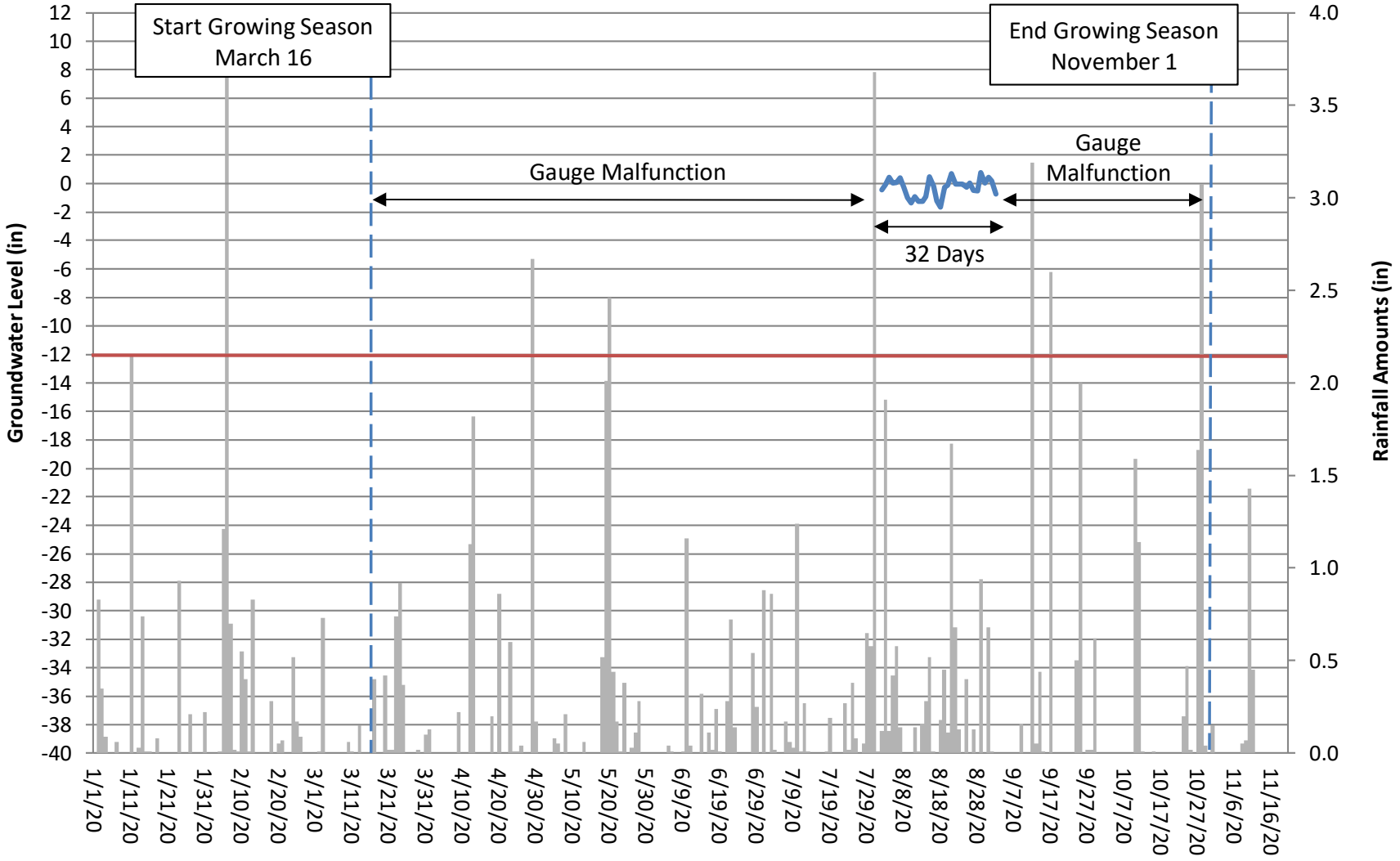
Warren Wilson Groundwater Gauge 2
Year 1 (2020 Data)



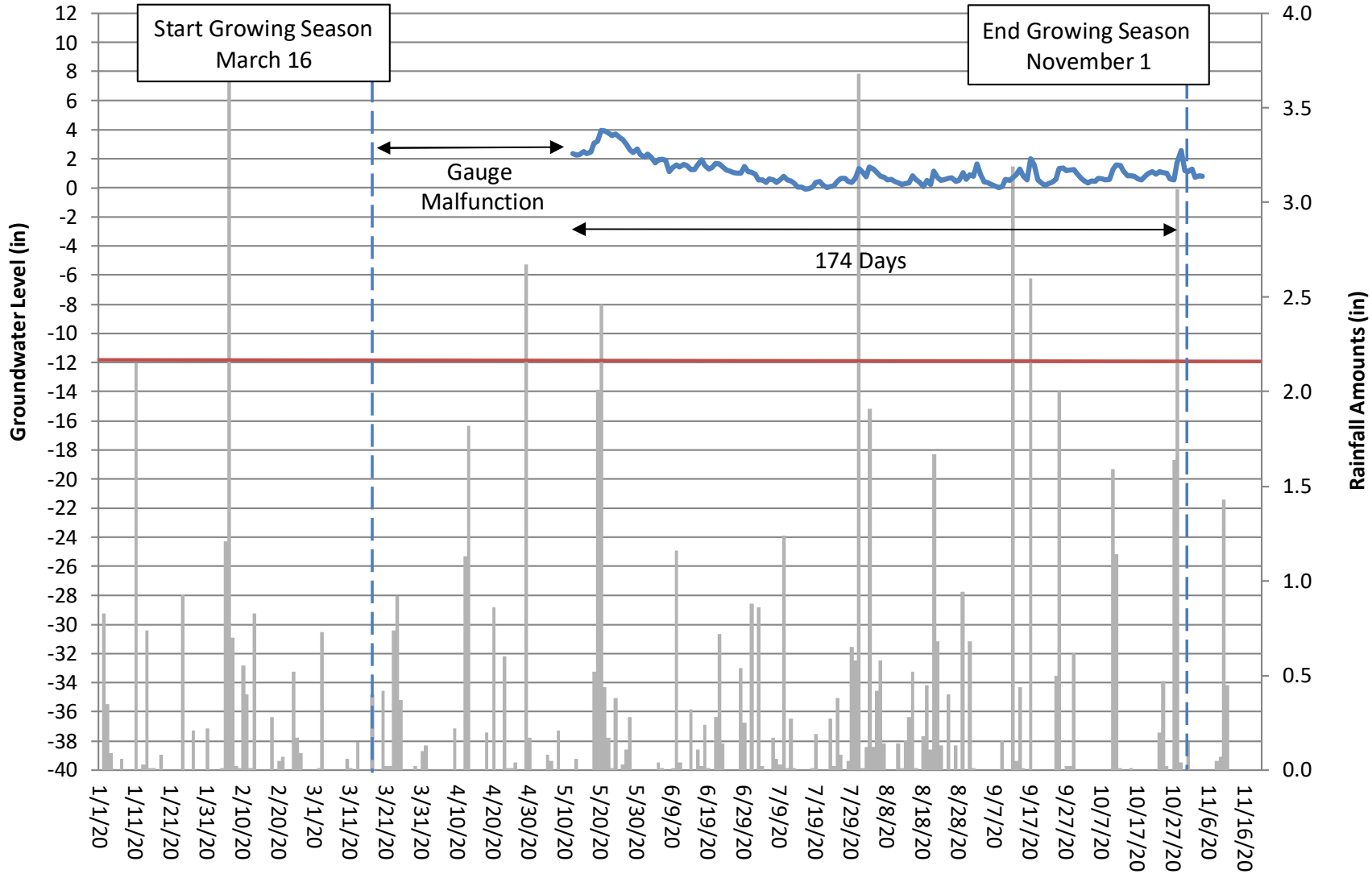
Warren Wilson Groundwater Gauge 3
Year 1 (2020 Data)

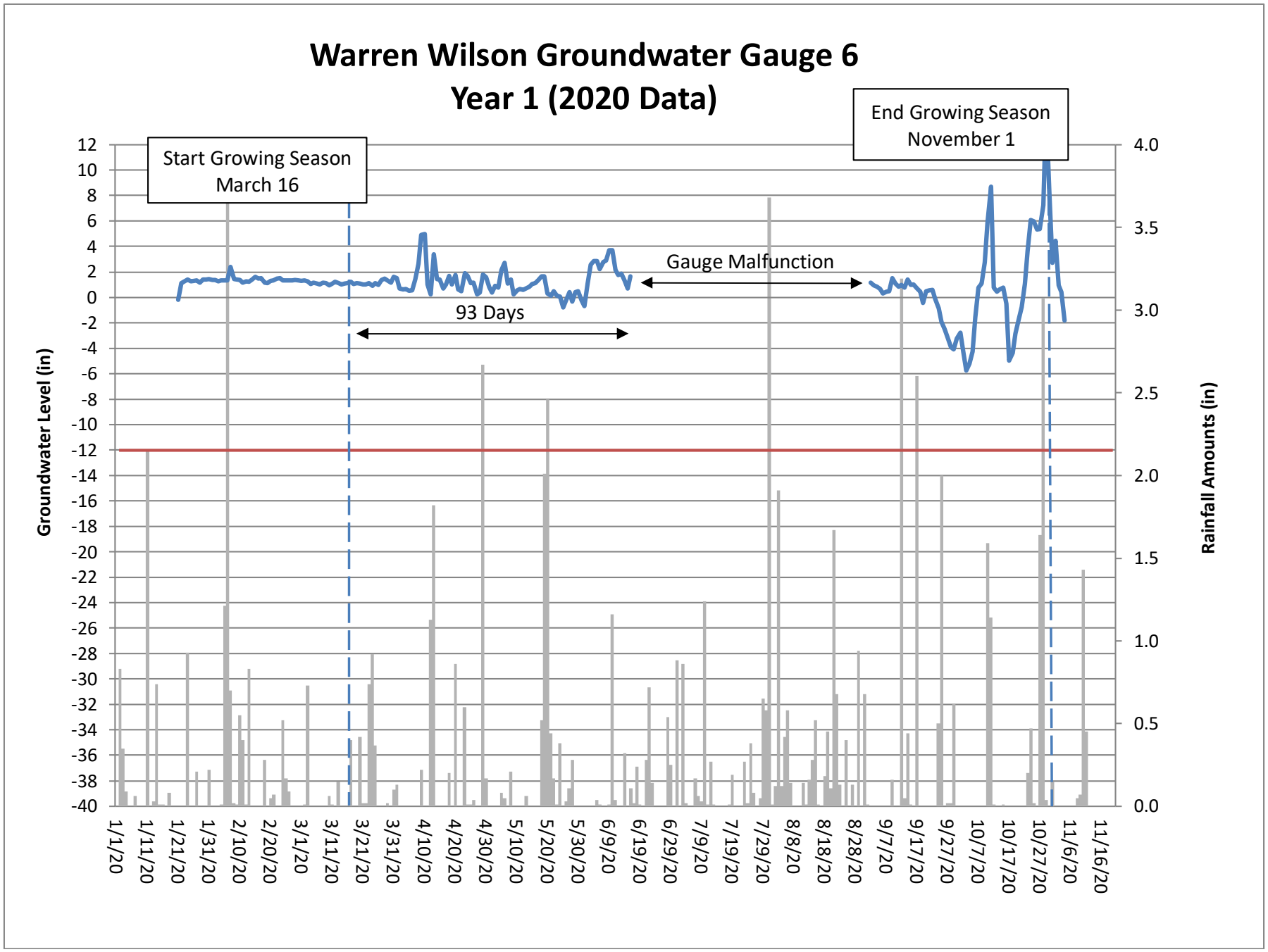


Warren Wilson Groundwater Gauge 4
Year 1 (2020 Data)

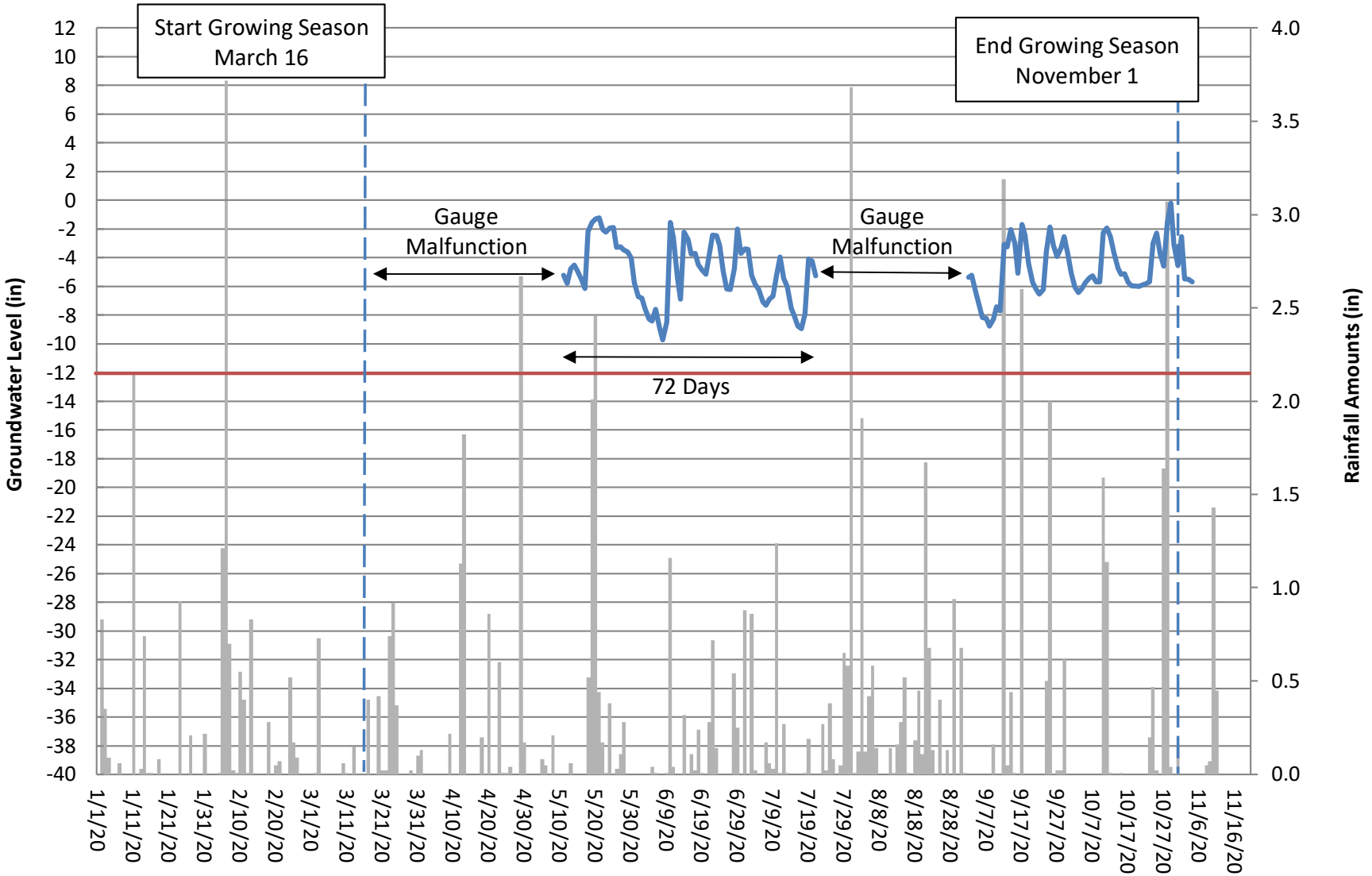


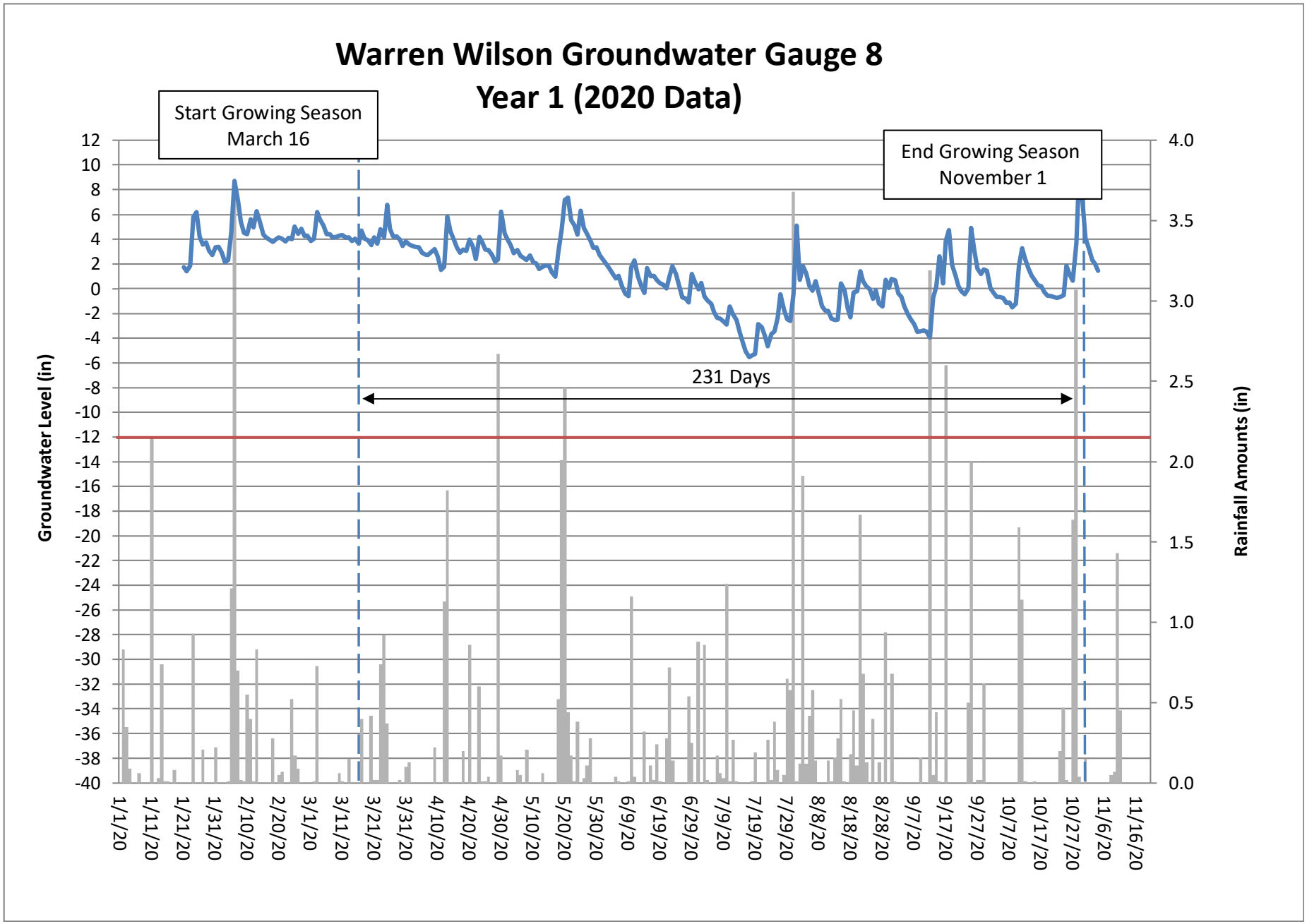
Warren Wilson Groundwater Gauge 5
Year 1 (2020 Data)



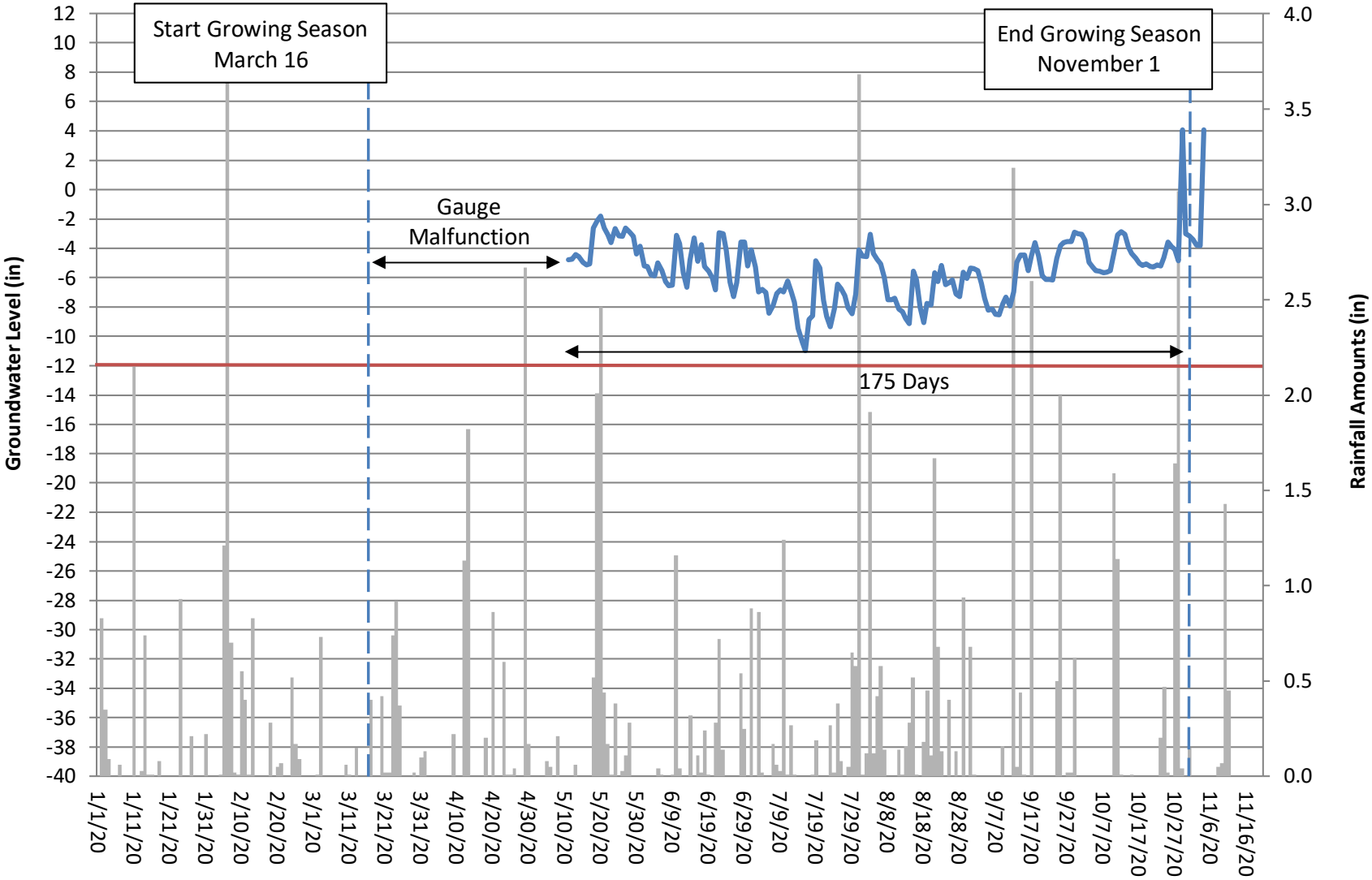

Warren Wilson Groundwater Gauge 6
Year 1 (2020 Data)
Start Growing Season
March 16
End Growing Season
November 1
Gauge Malfunction
93 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20
11/6/20
11/16/20

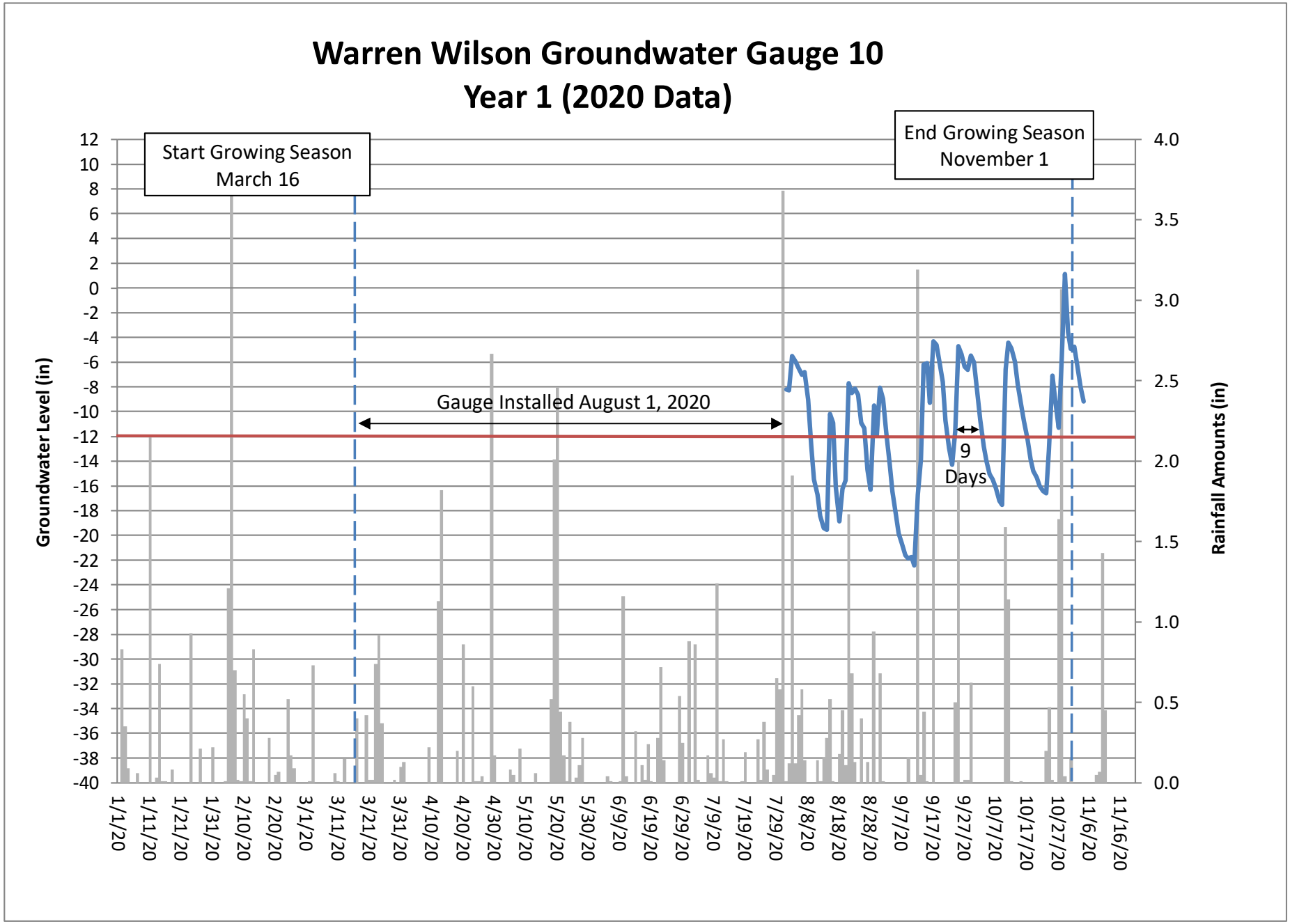
Warren Wilson Groundwater Gauge 7
Year 1 (2020 Data)




Warren Wilson Groundwater Gauge 8
Year 1 (2020 Data)
Start Growing Season
March 16
End Growing Season
November 1
231 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20
11/6/20
11/16/20

Warren Wilson Groundwater Gauge 9
Year 1 (2020 Data)



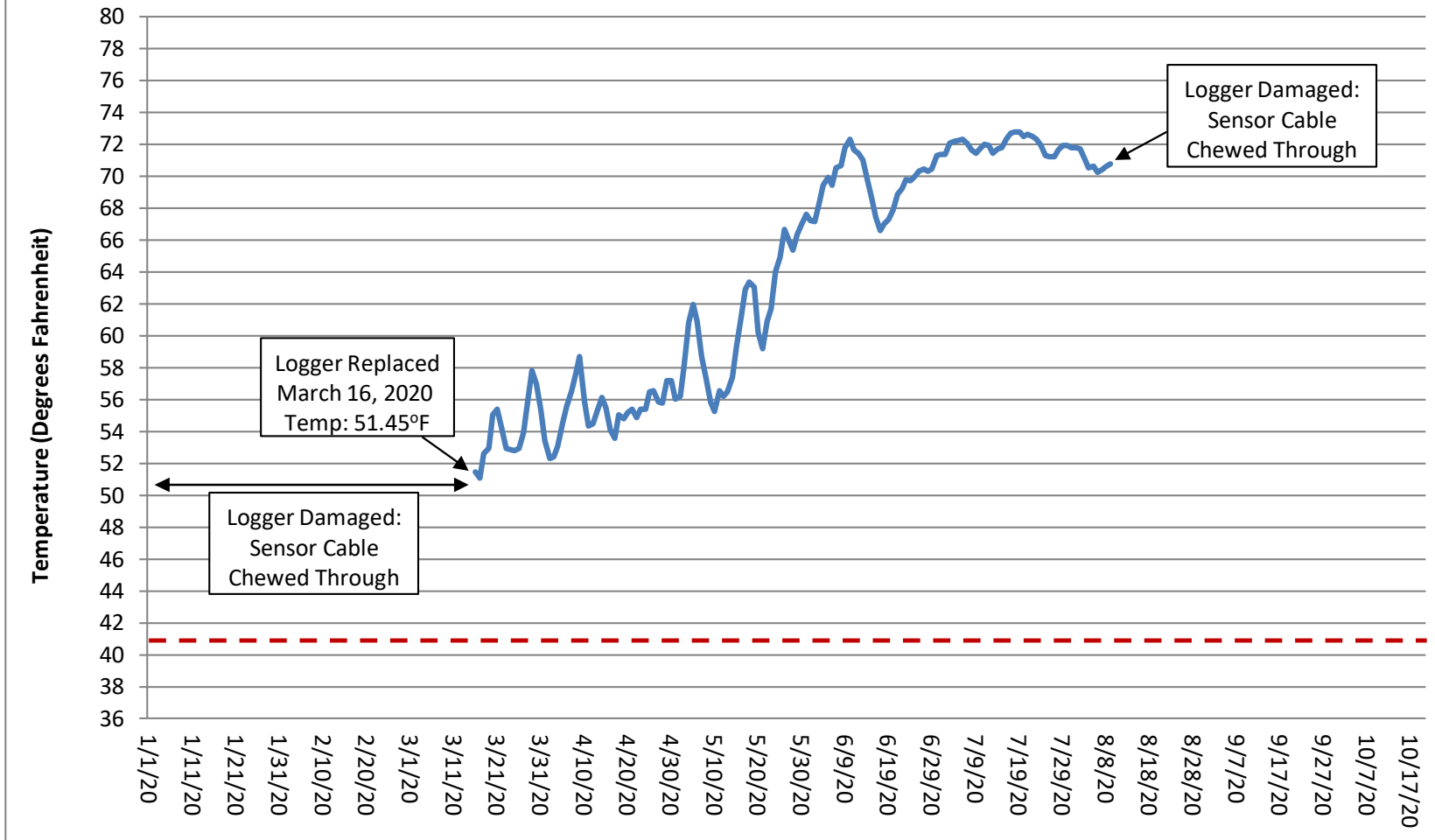

Warren Wilson Groundwater Gauge 10
Year 1 (2020 Data)
Start Growing Season
March 16
End Growing Season
November 1
Gauge Installed August 1, 2020
9
Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20
11/6/20
11/16/20

Warren Wilson College
MY-01 (2020) Bud Burst Documentation Photographs
Taken March 16-18, 2020

Photo 1: Bud burst of *Prunus serotina*, *Acer rubrum*, and *Rubus* sp.

Photo 2: Bud burst of *Ulmus americana* and *Ligustrum sinense*.

Figure E-1. Year 1 (2020) Soil Temperature Data



Appendix F
Preconstruction Wetland Hydrology Data

Figure 3. Preconstruction Gauge Locations
Table 18. Preconstruction Groundwater Gauge Data Summary

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

PRE-CONSTRUCTION GAUGE LOCATIONS

Drawn by: KRJ

Date: Jul 2020

Scale: 1:2000

Project No.: 20-004

FIGURE

3

Table 18. Preconstruction Groundwater Gauge Data Summary

Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)	
	2018 Data	2019 Data
1A	No/21 days (9.8 percent)	Yes/57 days (27 percent)
1B	No/9 days (4.2 percent)	Yes/50 days (23 percent)
1C	No/3 days (1.4 percent)	No/3 days (1.4 percent)
2A	NA*	Yes/48 days (22 percent)
2B	No/20 days (9.3 percent)	No/0 days (0 percent)
2C	No/12 days (5.6 percent)	Yes/50 days (23 percent)
3A	No/24 days (11.2 percent)	Yes/124 days (58 percent)
3B	Yes/117 days (54.7 percent)	Yes/140 days (65 percent)
3C	No/4 days (1.9 percent)	No/3 days (1.4 percent)

*Gauge 2A was damaged during 2018 and data was not recoverable. It was replaced in 2019.

Appendix G
Responses to MY0 IRT Comments