# FINAL
# MY4 (2023) MONITORING REPORT

## WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, North Carolina
French Broad River Basin
Cataloging Unit 06010105

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)

Data Collection: January - October 2023
Submission: January 2024

**Prepared for**:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
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**Response to DMS Comment – MY4 (2023)**

Warren Wilson College Stream Restoration Site
French Broad River Basin – CU# 06010105– Buncombe County
DMS Project ID No. 100019
Contract # 7188

Comments Received (Black Text) & Responses (Blue Text)

**General:**

1. General: In the report text, please confirm that RS conducted a full project site boundary inspection at the end of the MY4 (2023) growing season. Please report the results of the boundary inspection and confirm that no current easement encroachments were observed. Please also report the integrity of the boundary marking and confirm that it currently meets the required DMS specifications.
   Response: This information has been added to the Monitoring Summary under General Notes.

2. RS submitted the IRT 6/23/23 site visit notes to the IRT on 6/29/23. DMS does not have any record of an IRT response. Please confirm that the IRT did not respond directly to RS. If received, please include any additional documentation along with the IRT site visit notes in Appendix H.
   Response: No direct response was received.

3. Monitoring Summary – General Notes: The IRT site visit was conducted on June 23, 2023. Please update the 3rd bullet accordingly.
   Response: This date has been updated.

4. Site Permitting/Monitoring Activity and Reporting History Table & Table 2 Project Activity and Reporting History: The IRT approved the project mitigation plan on 12/21/2018. Please update the mitigation plan completion date accordingly. Please also consider including the June 23, 2023, IRT site visit in the tables for regulatory reference.
   Response: The date of the project mitigation plan approval has been updated and the IRT site visit has been added to both tables.

5. Monitoring Requirements Summary Table: The IRT approved mitigation plan notes 5 vegetation plots randomly selected each year along with the 25 permanent vegetation plots. The MY4 (2023) table indicates "Number of randomly selected plots to be determined each year, as needed." DMS recommends updating the Table, so it matches the IRT approved mitigation plan.
   Response: The monitoring requirements summary table has been updated.

6. Table 7 Planted Bare Root Woody Vegetation: Please update the table name to confirm that the table represents the initial project planting effort (MY0).
   Response: The title of Table 7 has been updated to "MY0 Planted Bare Root Woody Vegetation".

7. Table 8B Herbaceous Vegetation Plots & CCPV Maps: Please include the species common names in the table and define the Herbaceous Vegetation Plot "Success Criteria" in the revised report text and as a table footnote. Only three (3) herbaceous plots are shown on Figure 2A and they are not labeled. The additional two (2) plots should be added (with labels) to figure 2E. Please review and update the report and figures accordingly.
   Response: Common names for species have been added to Table 8B. Success criteria for herbaceous plots has been added to the vegetation summary and as a footnote to Table 8B. Herbaceous plots have been labeled, and plots 1 and 2 have been added to Figure 2E.

8. Appendix D MY3 Stream Geomorphology Data: Please include the MY3 (2022) cross section graphs in the Appendix for reference.
   Response: Year 3 (2022) cross section graphs have been added to Appendix D.

9. Appendix E Hydrology Data: Please include the date and monitoring year for all of the bankfull photos provided in the Appendix.
   Response: The date and monitoring year each photo was taken has been added to each photo caption in Appendix E.

**Digital Support File Comments:**

None

**WWC Year 4, 2023 Monitoring Summary**

**General Notes**

- An IRT site visit was conducted on June 23, 2023. Notes are included in Appendix H.

- Beaver activity was observed during Year 3 and 4. Beaver were trapped during the spring and early summer of 2023 at the outfall of UT8 and UT7. Minimal damage to planted vegetation along the stream corridors was noted during the IRT credit release visit on June 23, 2023. RS removed the dams in June and continues to monitor beaver activity.

- All stream gauges were replaced with HOBO U20-001-04 loggers during Year 4.

- The entire boundary was inspected in 2023, with additional signage completed during fall 2023 to bring the site up to the marking standard required by contract. This included a survey effort of Easement Area 16 along L208 where minor encroachment was found by the neighboring homeowner (0.046 acres – shown on CCPV Figure 2D). A swing set was extending about 6' into the easement. This encroachment included an area of mowing which will be replanted and marked with horse tape or similar in Q1 2024.

**Streams**

- Stream measurements were not performed in year 4 (2023), in accordance with the monitoring schedule.

- A visual assessment indicates that across the Site, all in-stream structures are intact and functioning as designed. Channel geometry compares favorably with the proposed conditions outlined in the Detailed Restoration Plan and as constructed. No stream areas of concern were identified during year 4 (2023) visual monitoring. Tables for year 3 (2022) data and annual quantitative assessments are included in Appendix D.

- One bankfull event was documented during Year 4, making a total of 6 bankfull events documented during the monitoring period (Table 15, Appendix E).

- Stream channel formation was evident throughout all site tributaries during year 4 (2023). Channel formation tables and graphs are in Appendix E.

**Wetlands**

- All gauges were saturated/inundated for greater than 10 percent of the year 4 (2023) growing season. Table 17A-B, Appendix E). No wetland mitigation credit is being generated.

**Vegetation**

- In accordance with the monitoring schedule, vegetation plot monitoring was not performed on the permanent vegetation plots in year 4 (2023). However, as per IRT request, measurements of 5 herbaceous plots and 5 temporary plots were performed in specifically requested locations of concern. Locations of plots are depicted on Figures 2A-2E (Appendix B), and results of the measurements are in Tables 8A-B (Appendix C).

- Supplemental planting is planned for the 2023-2024 dormant season. See Figures 2A-E (Appendix B) for supplemental planting locations and table 9 (Appendix C) for supplemental planting species

and totals. Completion dates and photography of the supplemental planting effort will be provided in the Monitoring Year 5 report.

**Site Maintenance Report (2023)**

| Invasive Species Work | Maintenance work |
|---|---|
| 6/29/23 Parrot Feather, Multiflora rose, Privet, Chinese Bittersweet<br><br>09/15/2023<br>Chinese privet, Multiflora rose, Japanese knotweed, Bradford pear | Beaver trapping and dam removal completed in spring/summer 2023.<br><br>Additional boundary marking and easement signage installed fall 2023. |

**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 | December 21, 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 |
| Treatment of Kudzu, Rose, Privet, Honeysuckle, English Ivy | -- | July 27, 2020 |
| Treatment of Kudzu, Princess Tree, Privet, Rose, Japanese Bittersweet, Honeysuckle | -- | October 8, 2020 |
| Annual Monitoring (MY1) | November 2020 | January 2021 |
| Treatment of Japanese Bittersweet, Parrot Feather, Privet, Multiflora Rose, Cattail, Air Potato, Honeysuckle, Japanese Knotweed, English Ivy | -- | May 24-27, 2022 & September 29 to October 1, 2022 |
| Annual Monitoring (MY2) | October 2021 | December 2021 |
| Treatment of Parrot Feather, Multiflora rose, Privet, Chinese Bittersweet, Cattail, Johnson Grass, Air Potato, Japanese Knotweed | -- | June 27-28, 2022 |
| Treatment of Chinese Bittersweet, Air Potato, Multiflora rose, Parrot feather, Privet, Cattail | -- | September 15, 2022 |
| Annual Monitoring (MY3) | October 2022 | February 2023 |
| IRT Site Visit | -- | June 23, 2023 |
| Invasive Species Treatment | -- | June 27-28, 2023, & September 15, 2023 |
| Supplemental Planting | -- | Dormant Season 2024 |
| Annual Monitoring (MY4) | October 2023 | January 2024 |

# MONITORING REPORT (MY4)

**WARREN WILSON COLLEGE STREAM MITIGATION SITE**
Buncombe County, North Carolina
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## APPENDICES

## 1.0 PROJECT SUMMARY

Restoration Systems, LLC (RS) 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 x $10^{11}$ 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 below).

**Stream/Wetland Targeted Functions, Goals, and Objectives**

| Targeted Functions | Goals | Objectives | Compatibility of Success Criteria |
|---|---|---|---|
| **(1) HYDROLOGY** | | | |
| (2) Flood Flow (Floodplain Access)<br>(3) Streamside Area Attenuation<br>(4) Floodplain Access<br>(4) Wooded Riparian Buffer<br>(4) Microtopography | • Attenuate flood flow across the Site.<br>• Minimize downstream flooding to the maximum extent possible.<br>• Connect streams to functioning wetland systems. | • Construct new channel at historic floodplain elevation to restore overbank flows and enhance existing jurisdictional wetlands<br>• Plant woody riparian buffer<br>• Remove livestock and cease agricultural practices within areas protected by the conservation easement.<br>• Deep rip floodplain soils to reduce compaction and increase soil surface roughness<br>• Protect riparian buffers with a perpetual conservation easement | • BHR not to exceed 1.2<br>• Document four overbank events in separate monitoring years<br>• Livestock excluded from the easement<br>• Attain Wetland Hydrology Success Criteria<br>• Attain Vegetation Success Criteria<br>• Conservation Easement recorded |
| (3) Stream Stability<br>(4) Channel Stability<br>(4) Sediment Transport<br>(4) Thermoregulation<br>(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<br>• Remove livestock and cease agricultural practices within areas protected by the conservation easement.<br>• Construct stable channels with gravel substrate<br>• Stabilize streambanks<br>• Plant woody riparian buffer | • Cross-section measurements and visual assessments indicate stable channels and structures<br>• BHR not to exceed 1.2<br>• ER of 1.4 or greater<br>• < 10% change in BHR and ER<br>• Livestock excluded from the easement<br>• Attain Vegetation Success Criteria |
| **(1) WATER QUALITY** | | | |
| (2) Streamside Area Vegetation<br>(3) Upland Pollutant Filtration<br>(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<br>• Install marsh treatment areas<br>• Plant woody riparian buffer<br>• Enhance jurisdictional wetlands adjacent to Site streams<br>• Provide surface roughness and reduce compaction through deep ripping/plowing<br>• Restore overbank flooding by constructing channels at historic floodplain elevation | • Livestock excluded from the easement<br>• Attain Vegetation Success Criteria |

**Stream/Wetland Targeted Functions, Goals, and Objectives (Continued)**

| (1) HABITAT | | | |
|---|---|---|---|
| (2) In-stream Habitat<br>(3) Substrate<br>(3) Stream Stability<br>(3) In-Stream Habitat<br>(2) Stream-side Habitat<br>(3) Stream-side Habitat<br>(3) Thermoregulation | • Improve instream and stream-side habitat. | • Construct stable channels with gravel substrate<br>• Plant woody riparian buffer to provide organic matter and shade<br>• Construct new channel at historic floodplain elevation to restore overbank flows<br>• Protect riparian buffers with a perpetual conservation easement<br>• Enhance jurisdictional wetlands adjacent to Site streams<br>• Remove invasive plant species<br>• Add large woody debris to Site channels | • Cross-section measurements and visual assessments indicate stable channels and structures.<br>• Attain Vegetation Success Criteria<br>• 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 along cold-water, unnamed tributaries (UTs) to the Swannanoa River. Warren Wilson College occupies approximately 1,200 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 18 (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) as the result of the following.

- Restored 9,220 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) 1,974 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.

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 were established in the IRT-approved detailed mitigation plan and in accordance with 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.<br>• Continuous surface flow must be documented each year for at least 30 consecutive days.<br>• Bank height ratio (BHR) cannot exceed 1.2 at any measured cross-section.<br>• Entrenchment ratio (ER) must be ≥ 2.2 for E- and C-type channels at measured riffle cross-sections.<br>• BHR and ER at any measure riffle cross-section should not change by more than 10% from baseline condition during any given monitoring period.<br>• 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.<br>• 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.<br>• Trees must average 6 feet in height at year 5, and 8 feet in height at year 7 in each plot.<br>• Planted and volunteer stems are counted, provided they are included in the approved list for the site; natural recruits not on the planting list may be considered by the IRT on a case-by-case basis.<br>• Areas of dense river cane (*Arundinaria gigantea*; known as 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. |

## 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 | X | X | X | | X | | X |
| Wetlands | X | X | X | X | X | X | X |
| Vegetation | X | X | X | | X | | X |
| Visual Assessment | X | X | X | X | X | X | X |
| Report Submittal | X | X | X | X | X | X | X |

## 2.1 Monitoring

The monitoring parameters were established in the IRT-approved detailed mitigation plan and are summarized in the following table.

**Monitoring Requirements 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 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 | 5 plots randomly selected each year | Species |

***Monitoring Requirements Summary Table Footnotes***:
** 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.*

## 2.2 Monitoring Results (MY4) 2023

The data collected as required in 2023 is summarized below.

**Stream Summary**

Stream measurements were not performed in year 4 (2023), in accordance with the monitoring schedule. A visual assessment indicates that across the Site, all in-stream structures are intact and functioning as designed. Channel geometry compares favorably with the proposed conditions outlined in the Detailed Restoration Plan and as constructed. No stream areas of concern were identified during year 4 (2023) monitoring. Tables for year 3 (2022) data and annual quantitative assessments are included in Appendix C. Stream flow gauge data show strong evidence of channel formation and water flow was observed in all Site streams during year 4 (2023) (Tables 15A-C, Appendix E).

**Wetland Summary**

Overall, based on groundwater gauge data, wetland hydrology has significantly increased from preconstruction and year 1 (2020) conditions. All gauges were saturated/inundated **for greater than 10 percent** of the year 4 (2023) growing season, with gauges 3-7 and 9 inundated for approximately 90% of the growing season (Table 17A-B, Appendix E).

**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 |
| 2021 (Year 2) | April 6, 2021** | April 6-November 12 (221 days) | 22 days |
| 2022 (Year 3) | April 2, 2022^ | April 2-November 1 (214 days) | 21 days |
| 2023 (Year 4) | April 2, 2023^^ | April 2-November 1 (214 days) | 21 days |

***Monitoring Period/Hydrology Success Criteria by Year Table Footnotes***:

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

** During year 1, the growing season was determined based the Soil Survey of Buncombe County (April 2 – November 1) and onsite bud burst documentation. However, based on a 2021 discussion with the IRT, concern arose that the Soil Survey growing season does not accurately represent the current growing season end date. As a result, the growing season methodology was changed to use the most current WETS (USDA 2021) data to determine the growing season end date. After year 2 review, the IRT requested that providers use the growing season methodology from the approved mitigation plan.

^Soil temperature of 44.27°F was documented on March 1 and remained above 41°F thereafter. However, there was no site visit to document bud burst. Therefore, the Buncombe County soil survey start/end dates are used for year 3 (2022).

^^USACE noted that the growing season should remain consistent with the IRT approved mitigation plan and is based on the NRCS growing season of April 2 to November 1.

**Vegetation Summary**

In accordance with the monitoring schedule, vegetation plot monitoring was not performed in year 4 (2023). Visual assessment indicates that vegetation on the Site is vigorous. However, as per IRT request, measurements of 5 herbaceous plots and 5 temporary plots were performed in specifically requested locations of concern. Herbaceous plots were measured to determine sufficient herbaceous diversity within areas dominated by herbaceous species. Herbaceous success criteria is defined by the observation of at least 4 unique herbaceous species within each plot. Locations of plots are depicted on Figure 2A-E (Appendix B), and results of the measurements are in Tables 8A-B (Appendix C). Supplemental planting is planned for the 2023-2024 dormant season. See Figures 2A-E (Appendix B) for supplemental planting locations and Table 9 (Appendix C) for proposed supplemental planting species and totals.

During year 3 (2022), Parrot feather (*Myriophyllum aquaticum*) was treated throughout the upper reach of UT-3. During a June 2023 IRT Site visit, it was noted that great progress had been made in controlling this population. Treatment of the species will continue throughout the reach of UT3 as needed, however, channel shading, combined with previous treatments, has drastically reduced the extent of Parrot feather within the channel. General invasives treatment efforts (including Parrotfeather, Ligustrum, Multiflora Rose, Japanese knotweed, Callery pear, Oriental bittersweet, etc) continue with sitewide treatments made in June 2023 and September 2023. Treatments will be continued as necessary until project closeout but have generally been considered quite effective and allowed desirable vegetation to dominate the site.

Soil testing was completed in 2023 for a small area along Lower UT-8 near PVMP#25 where herbaceous coverage was unique. No soil amendments are warranted at this time, and test results have been included in Appendix C.

River Cane (*Arundinaria gigantea*) was a significant herbaceous component in several areas before restoration. During construction care was taken to promote the plant by minimizing removal and transplanting when possible. Existing cane impacted by construction has rebounded in multiple locations, particularly close to the river. The primary area of dense and sizeable canes is located at the lower end of UT-6 and shown in Figure 2D. Other rebounding locations include lower UT-1, lower UT-5, and an outlying section of UT-7 near XS-5. Transplanted clumps are located along UT-6, UT-7, and UT-8. These relocated

clumps showed some dieback in the first few years of monitoring but appear to be well established at this time though not aggressively spreading. Ground and aerial drone photos of the river cane populations can be seen in the Site photo log (Appendix G).

## 3.0 REFERENCES


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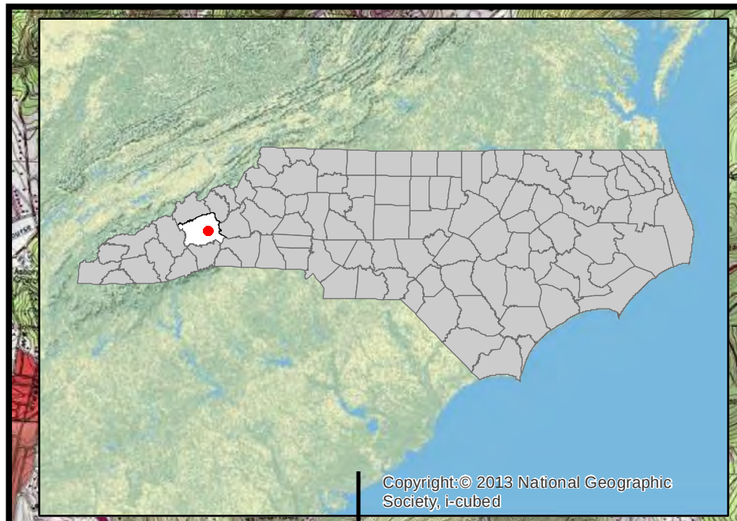
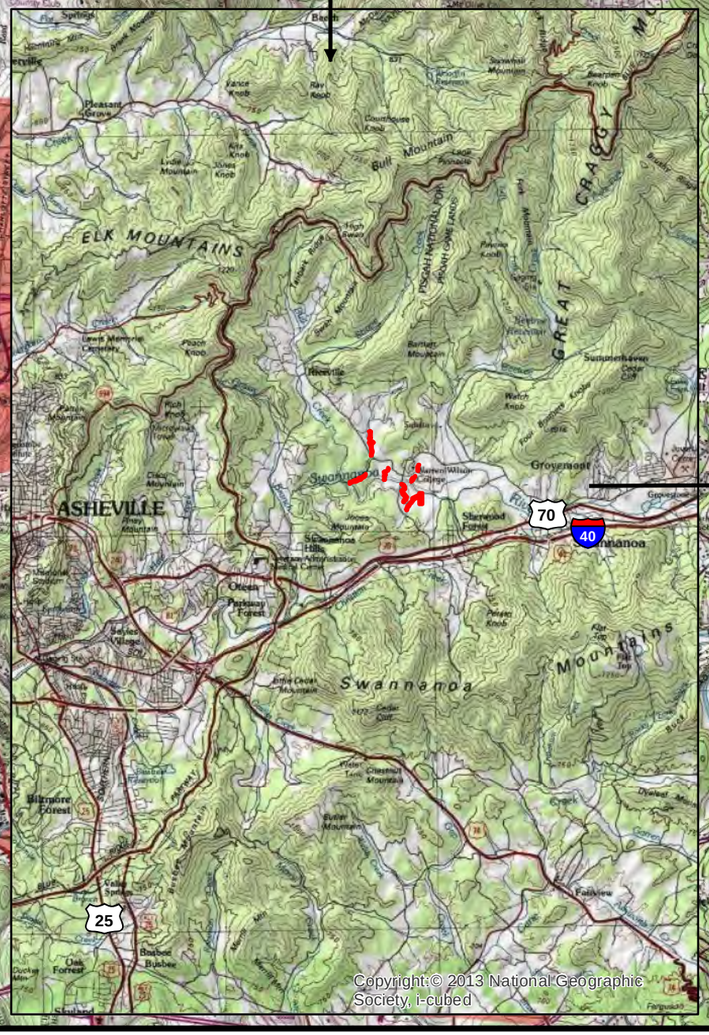
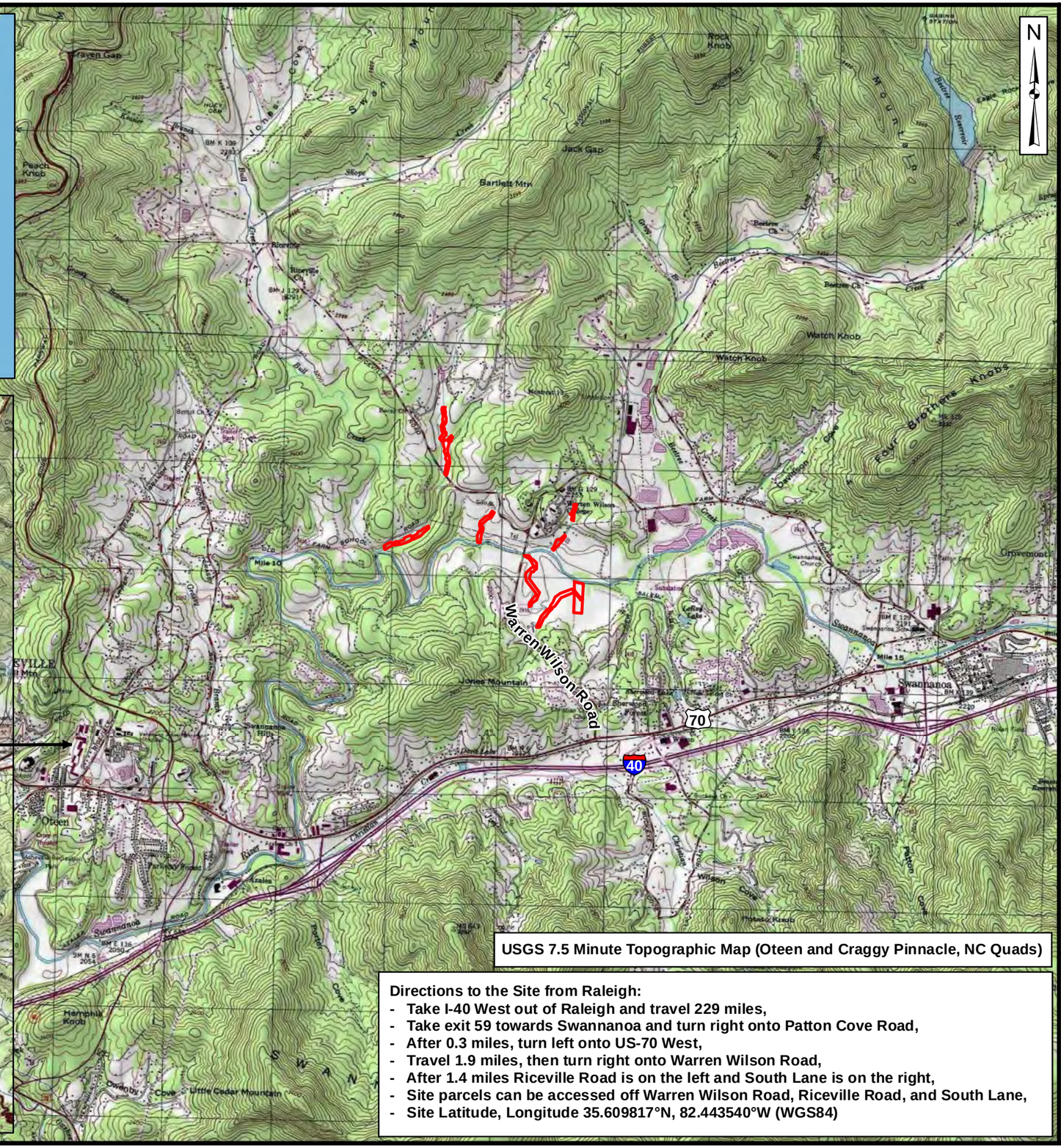
## Appendix A
## Background Map and Tables

Figure 1. Project Location
Table 1. Mitigation Assets and Components
Table 2. Project Activity and Reporting History
Table 3. Project Contacts Table
Table 4. Project Attributes Table




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**

| Restoration Level | Stream | | | Riparian Wetland | Non-Rip | Coastal | |
|---|---|---|---|---|---|---|---|
| | Warm | Cool | Cold | Riverine | Non-Riverine | Wetland | Marsh |
| Restoration | | | **9,220.000** | | | | |
| 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 |
|---|---|---|
| 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 | December 21, 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 |
| Treatment of Kudzu, Rose, Privet, Honeysuckle, English Ivy | -- | July 27, 2020 |
| Treatment of Kudzu, Princess Tree, Privet, Rose, Japanese Bittersweet, Honeysuckle | -- | October 8, 2020 |
| Annual Monitoring (MY1) | November 2020 | January 2021 |
| Treatment of Japanese Bittersweet, Parrot Feather, Privet, Multiflora Rose, Cattail, Air Potato, Honeysuckle, Japanese Knotweed, English Ivy | -- | May 24-27, 2022 & September 29 to October 1, 2022 |
| Annual Monitoring (MY2) | October 2021 | December 2021 |
| Treatment of Parrot Feather, Multiflora rose, Privet, Chinese Bittersweet, Cattail, Johnson Grass, Air Potato, Japanese Knotweed | -- | June 27-28, 2022 |
| Treatment of Chinese Bittersweet, Air Potato, Multiflora rose, Parrot feather, Privet, Cattail | -- | September 15, 2022 |
| Annual Monitoring (MY3) | October 2022 | February 2023 |
| IRT Site Visit | -- | June 23, 2023 |
| Invasive Species Treatment | -- | June 27-28, 2023, & September 15, 2023 |
| Supplemental Planting | -- | Dormant Season 2024 |
| Annual Monitoring (MY4) | October 2023 | January 2024 |

**Table 3. Project Contacts Table**
**Warren Wilson College Stream Mitigation Site**

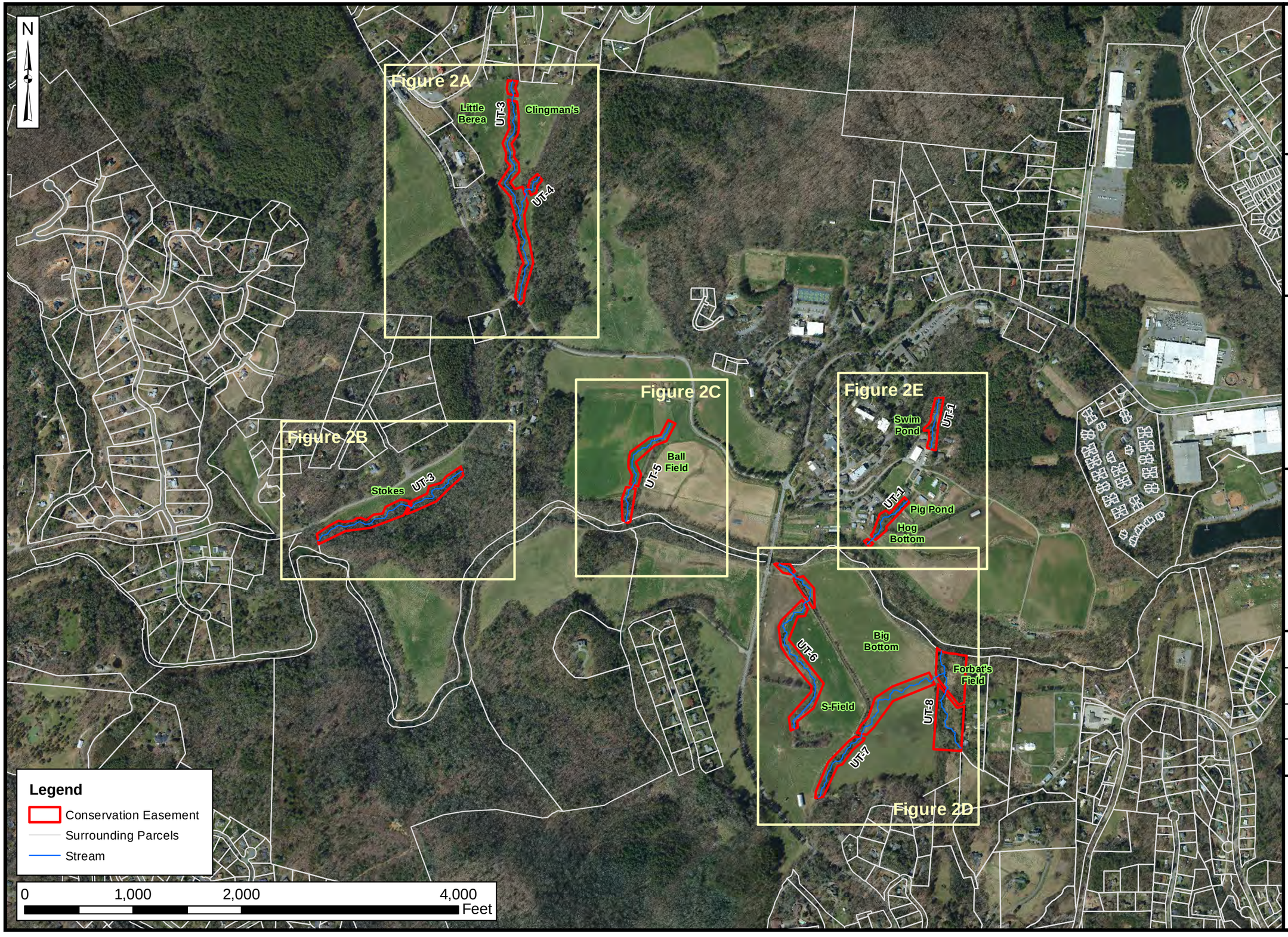
| | |
|---|---|
| **Full Delivery Provider**<br>Restoration Systems<br>1101 Haynes Street, Suite 211<br>Raleigh, North Carolina 27604<br>Worth Creech<br>919-755-9490 | **Monitoring Provider**<br>Axiom Environmental, Inc.<br>218 Snow Avenue<br>Raleigh, NC 27603<br>Grant Lewis<br>919-215-1693 |
| **Designer**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

**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 | | | | | | |
| 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) | | | | | | |
| % 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




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

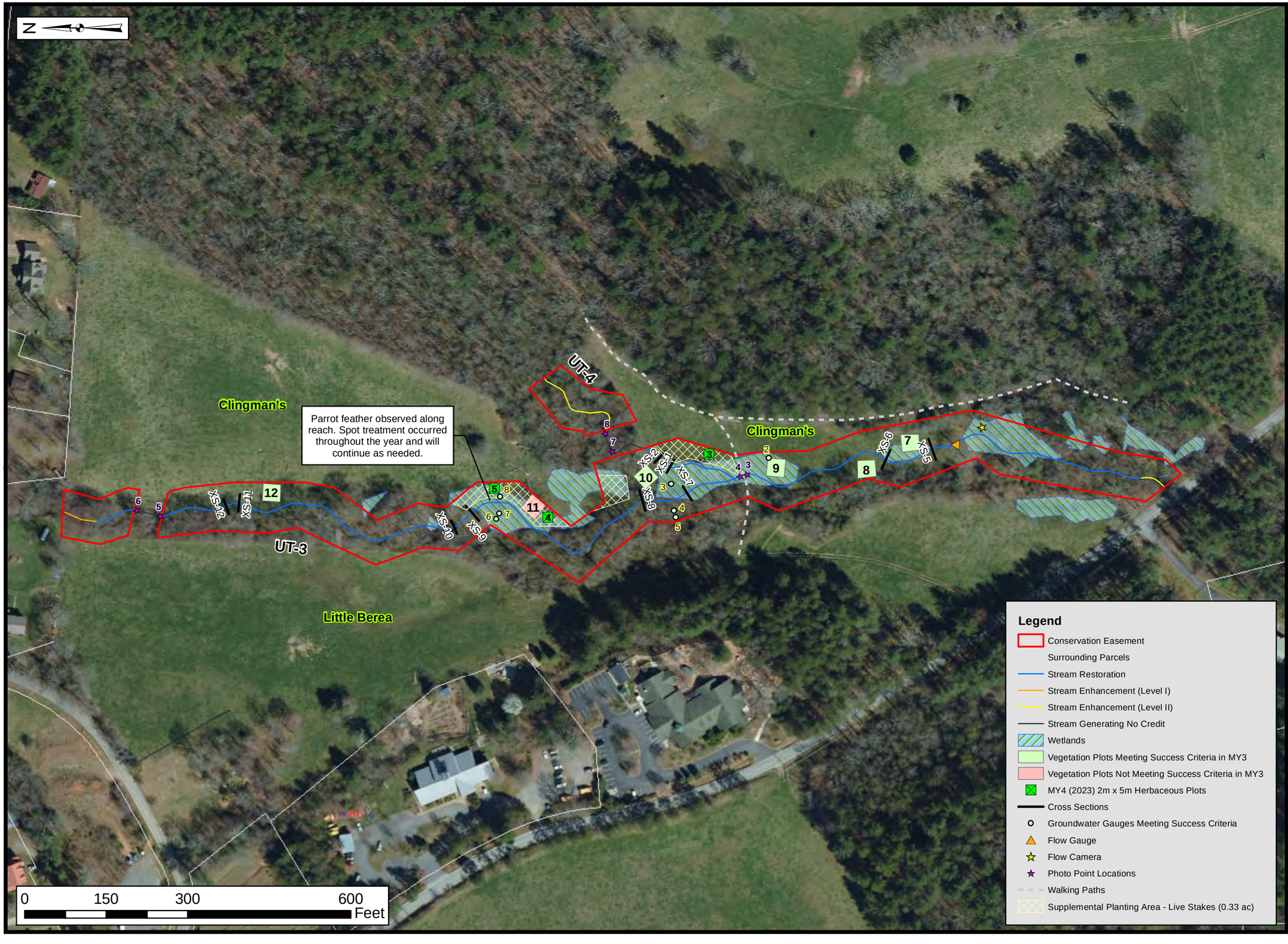
Date: NOV 2023

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

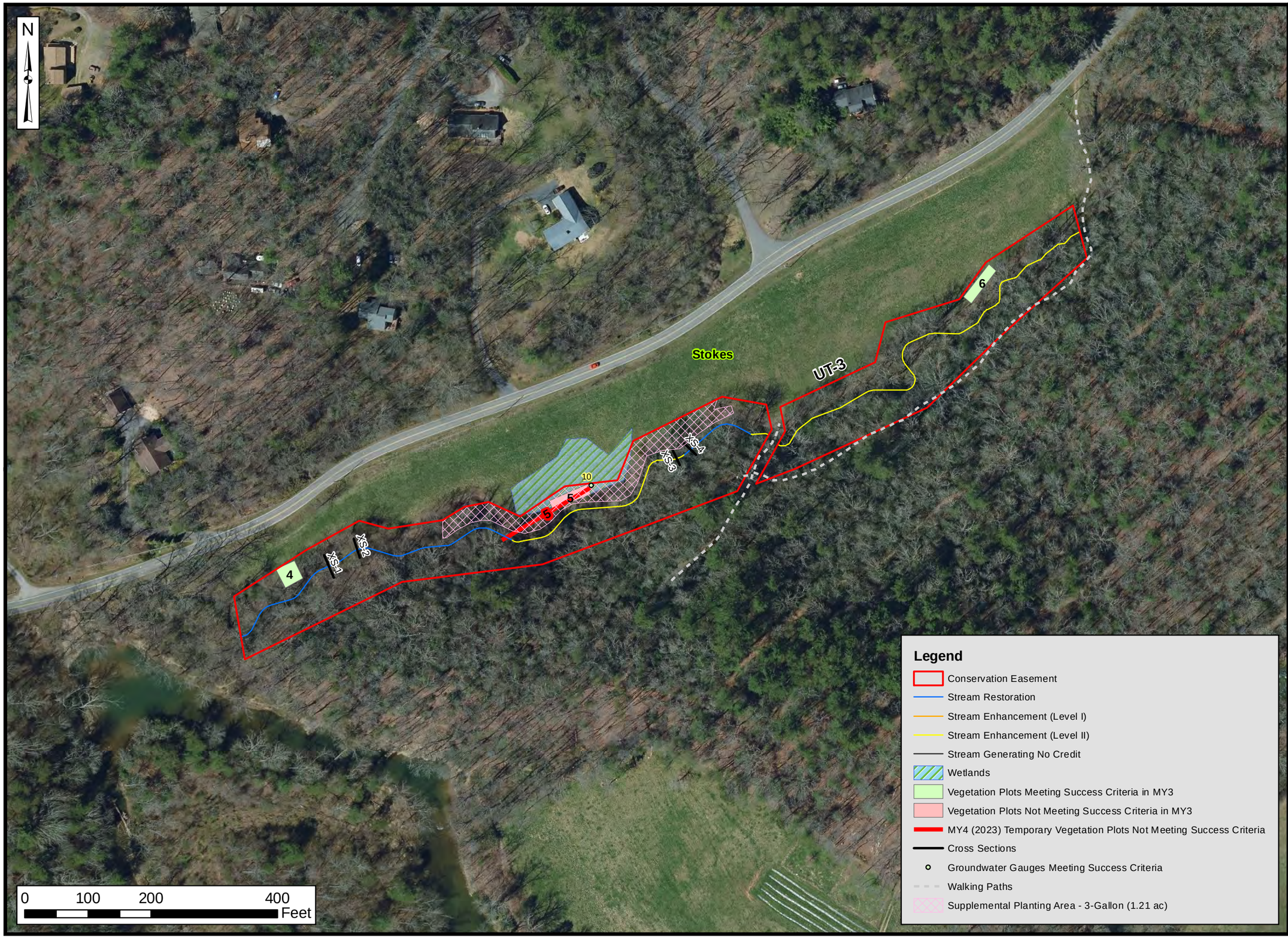
Date: NOV 2023

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: NOV 2023

Scale: 1:1700

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: NOV 2023

Scale: 1:1200

Project No.: 20-004

FIGURE

**2C**

Easement encroachment area (0.05 ac) will be planted and marked with horse tape in Q1 2024.

**Legend**

- Conservation Easement
- Stream Restoration
- Stream Enhancement (Level I)
- Stream Enhancement (Level II)
- Stream Generating No Credit
- Walking Paths
- Wetlands
- Vegetation Plots Meeting Success Criteria in MY3
- Vegetation Plots Not Meeting Success Criteria in MY3
- MY4 (2023) Temporary Vegetation Plots Meeting Success Criteria
- MY4 (2023) Temporary Vegetation Plots Not Meeting Success Criteria
- Cross Sections
- Groundwater Gauges Meeting Success Criteria
- Flow Gauge
- Flow Camera
- Photo Point Locations
- Supplemental Planting Area - 3-Gallon (1.21 ac)
- MY4 Observed River Cane Populations
- MY4 Observed Easement Encroachment Area

Forbat's Field
UT-8
Swannanoa River
Big Bottom
UT-7
S-Field
UT-6

0 250 500 1,000 Feet

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

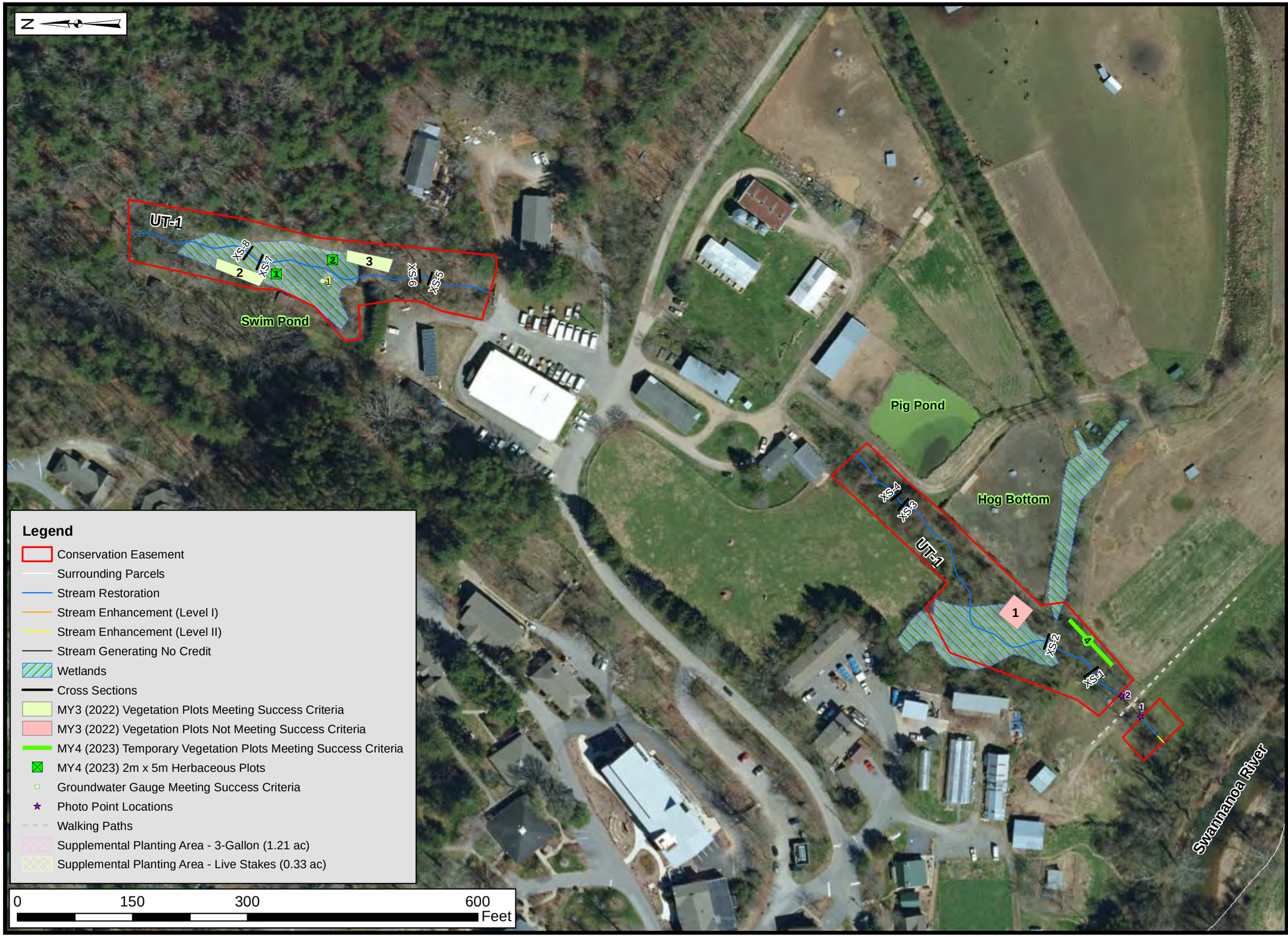
Date: NOV 2023

Scale: 1:2,500

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:

**06-2023 IRT SITE VISIT**

Drawn by: KRJ

Date: NOV 2023

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**
**Assessment Date** **2-Oct-23**

| 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**
**Assessment Date** **2-Oct-23**

| 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**
**Assessment Date** **2-Oct-23**

| 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**
**Assessment Date** **2-Oct-23**

| 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**
**Assessment Date** **2-Oct-23**

| 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**
**Assessment Date** **2-Oct-23**

| 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**
**Assessment Date** **2-Oct-23**

| 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**

**Assessment Date** 2-Oct-23

**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] | One small area of easement encroachment observed along UT8. Area will be planted and marked with horse tape in Q1 2024. | none | Green Crosshatch | 1 | 0.05 | 0.2% |

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

2 = The acreage within the easement boundaries.

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

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

## Appendix C
## Vegetation Data

Table 7. Planted Bare Root Woody Vegetation
Table 8A. Temporary Woody Vegetation Plot Data
Table 8B. Temporary Herbaceous Plot Data
Table 9. MY4 (2023/2024) Proposed Planting List
Soil Report for area near PVMP #25
Herbicide Logs for 2023 Treatments

**Table 7. MY0 Planted Bare Root Woody Vegetation**
**Warren Wilson College Stream Mitigation Site**

| Species – Scientific Name | Species – Common Name | Wetland Indicator Status | Total* |
|---|---|---|---|
| | | **Acres** | **19.64** |
| *Cephalanthus occidentalis* | Buttonbush | OBL | 50 |
| *Diospyros virginiana* | Common persimmon | FAC | 500 |
| *Liriodendron tulipifera* | Tulip poplar | FACU | 900 |
| *Betula nigra* | River birch | FACW | 2800 |
| *Fraxinus pennsylvanica* | Green ash | FACW | 3800 |
| *Cornus amomum* | Silky dogwood | FACW | 3900 |
| *Quercus alba* | White oak | FACU | 4200 |
| *Quercus nigra* | Water oak | FAC | 4200 |
| *Platanus occidentalis* | American Sycamore | FACW | 5600 |
| | | **TOTALS** | **25,950*** |

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

**Table 8A. MY4 Temporary Vegetation Plot Data**
**Warren Wilson College Restoration Site**

| Species | Common Name | T-1 | T-2 | T-3 | T-4 | T-5 |
|---|---|---|---|---|---|---|
| *Betula nigra* | River birch | | | 1 | 2 | |
| *Cornus amomum* | Silky dogwood | 7 | 1 | 1 | 2 | 1 |
| *Liriodendron tulipifera* | Tulip poplar | | | 1 | 2 | 2 |
| *Platanus occidentalis* | American sycamore | 4 | 1 | 6 | | |
| *Quercus alba* | White oak | | | 2 | 5 | |
| | Total Number of Stems | **11** | **2** | **11** | **11** | **3** |
| | Species count | 2 | 2 | 5 | 4 | 2 |
| | Stems per acre | **445** | **81** | **445** | **445** | **121** |
| | Average Height (ft) | 2.34 | 10.25 | 5.34 | 4.31 | 4.92 |

**Table 8B. MY4 Herbaceous Vegetation Plot Data**
**Warren Wilson College Stream Restoration Site**

| Plot # | Species Count | Success Criteria Met? [%] | Taxa Identified (Scientific Name) | Taxa Identified (Common Name) |
|---|---|---|---|---|
| **H1*** | 5 | Yes | *Carex* sp.<br>*Impatiens capensis*<br>*Polygonum spp.*<br>*Juncus effusus*<br>*Vernonia noveboracensis* | Sedge<br>Jewelweed<br>Knotweed<br>Soft rush<br>Ironweed |
| **H2*** | 5 | Yes | *Carex* sp.<br>*Impatiens capensis*<br>*Juncus effusus*<br>*Scirpus cyperinus*<br>*Verbena spp.* | Sedge<br>Jewelweed<br>Soft rush<br>Woolgrass<br>Vervain |
| **H3** | 7 | Yes | *Bidens spp.*<br>*Helianthus spp.*<br>*Impatiens capensis*<br>*Juncus effusus*<br>*Symphotricium spp.*<br>*Carex* sp.<br>*Vernonia noveboracensis* | Spanish Needles<br>Sunflower<br>Jewelweed<br>Soft rush<br>Aster<br>Sedge<br>Ironweed |
| **H4** | 5 | Yes | *Bidens spp.*<br>*Solidago spp.*<br>*Rudbeckia spp.*<br>*Juncus spp.*<br>*Vernonia novenoracensis* | Spanish needles<br>Goldenrod<br>Coneflower<br>Rush<br>Ironweed |
| **H5** | 4 | Yes | *Impatiens capensis*<br>*Juncus effusus*<br>*Polygonum spp.*<br>*Symphyotrichum spp* | Jewelweed<br>Soft rush<br>Knotweed<br>Aster |
| **Average** | 5.2 | Yes | | |

* Plot contained *Sambucus canadensis and Cornus amomum*

[%] Plot meets success criteria if it contains 4 or more unique herbaceous species.

**Table 9. MY4 (2023/2024) Proposed Planting List**
**Warren Wilson College Stream Mitigation Site**

| Vegetation Association | | Montane Alluvial Forest (3 Gallon) | | Live-stake Shrub Planting | | Total |
|---|---|---|---|---|---|---|
| | Acres | 1.21 | | 0.33 | | 1.54 |
| Species – Scientific Name | Wetland Indicator | # Planted | % of Total | # Planted | % of Total | # Planted |
| Northern red oak (*Quercus rubra*) | FACU | 100 | 25.00% | | | **100** |
| Persimmon (*Diospyros virginiana*) | FAC | 75 | 18.75% | | | **75** |
| Tag alder (*Alnus serrulata*) | FACU | 75 | 18.75% | | | **75** |
| Water oak (*Quercus nigra*) | FACW | 50 | 12.50% | | | **50** |
| White oak (*Quercus Alba*) | FACU | 50 | 12.50% | | | **50** |
| Yellow birch (*Betula alleghaniensis*)** | FACU | 50 | 12.50% | | | **50** |
| Black Willow (*Salix nigra*)* | OBL | | | 75 | 18.75% | **75** |
| Buttonbush (*Cephalanthus occidentalis*)* | OBL | | | 75 | 18.75% | **75** |
| Elderberry (*Sambucus* spp.)* | FACW | | | 75 | 18.75% | **75** |
| Ninebark (*Physocarpus opulfolius*)* | FAC | | | 75 | 18.75% | **75** |
| Silky dogwood (*Cornus amomum*)* | FACW | | | 100 | 25.00% | **100** |
| **Total:** | | **400** | **100%** | **400** | **100%** | **800** |

*Live stake material

**Possible supply shortage. If unavailable, we will supplement this species with one from the list above or the approved Mitigation Plan planting list.

Predictive

# Soil Report

Mehlich-3 Extraction

Links to Helpful Information

Client: Augustus Lehrman
Restoration Systems
1101 Haynes Street, suite 211
Raleigh, NC 27612

Sampled County : Buncombe
Client ID: 543891

Advisor:

Advisor ID:

Sampled: 07/05/2023 Received: 07/05/2023 Completed: 07/13/2023 Farm: WWC

**Sample ID:** samp1

**Lime History:**

| Recommendations: Crop | Lime (tons/acre) | Nutrients (lb/acre) N | $P_2O_5$ | $K_2O$ | Mg | S | Mn | Zn | Cu | B | More Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 - Hardwood, E | 0.0 | 0 | 60 | 30 | 0 | | | 0 | 0 | 0 | Note: 11 |
| 2 - Hardwood, M | 0.0 | 80-120 | 60 | 0 | 0 | | | 0 | 0 | 0 | Note: 11 |

**Test Results [units - W/V in g/cm$^3$; CEC and Na in meq/100 cm$^3$; $NO_3$-N in mg/dm$^3$]:** **Soil Class:** Mineral

| HM% | W/V | CEC | BS% | Ac | pH | P-I | K-I | Ca% | Mg% | S-I | Mn-I | Mn-Al1 | Mn-Al2 | Zn-I | Zn-Al | Cu-I | Na | ESP | SS-I | $NO_3$-N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.13 | 1.01 | 9.1 | 100 | 0.0 | 7.5 | 8 | 48 | 86 | 11 | 88 | 1053 | | | 141 | 141 | 232 | 0.1 | 1 | | |

**Sample ID:** samp2

**Lime History:**

| Recommendations: Crop | Lime (tons/acre) | Nutrients (lb/acre) N | $P_2O_5$ | $K_2O$ | Mg | S | Mn | Zn | Cu | B | More Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 - Hardwood, E | 0.0 | 0 | 60 | 30 | 0 | | | 0 | 0 | 0 | Note: 11 |
| 2 - Hardwood, M | 0.0 | 80-120 | 60 | 0 | 0 | | | 0 | 0 | 0 | Note: 11 |

**Test Results [units - W/V in g/cm$^3$; CEC and Na in meq/100 cm$^3$; $NO_3$-N in mg/dm$^3$]:** **Soil Class:** Mineral

| HM% | W/V | CEC | BS% | Ac | pH | P-I | K-I | Ca% | Mg% | S-I | Mn-I | Mn-Al1 | Mn-Al2 | Zn-I | Zn-Al | Cu-I | Na | ESP | SS-I | $NO_3$-N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.18 | 1.02 | 9.1 | 100 | 0.0 | 7.4 | 9 | 51 | 84 | 13 | 46 | 800 | | | 323 | 323 | 389 | 0.1 | 1 | | |

Reprogramming of the laboratory-information-management system that makes this report possible is being funded through a grant from the North Carolina Tobacco Trust Fund Commission.

Thank you for using agronomic services to manage nutrients and safeguard environmental quality.

- *Steve Troxler, Commissioner of Agriculture*

**Sample ID:** samp3

**Lime History:**

| **Recommendations:** Crop | Lime (tons/acre) | Nutrients (lb/acre) N | $P_2O_5$ | $K_2O$ | Mg | S | Mn | Zn | Cu | B | More Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 - Hardwood, E | 0.0 | 0 | 60 | 30 | 0 | | | 0 | 0 | 0 | Note: 11 |
| 2 - Hardwood, M | 0.0 | 80-120 | 60 | 0 | 0 | | | 0 | 0 | 0 | Note: 11 |

**Test Results [units - W/V in g/cm$^3$; CEC and Na in meq/100 cm$^3$; $NO_3$-N in mg/dm$^3$]:** **Soil Class:** Mineral

| HM% | W/V | CEC | BS% | Ac | pH | P-I | K-I | Ca% | Mg% | S-I | Mn-I | Mn-Al1 | Mn-Al2 | Zn-I | Zn-Al | Cu-I | Na | ESP | SS-I | $NO_3$-N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.22 | 0.99 | 9.0 | 99 | 0.1 | 7.3 | 7 | 55 | 83 | 13 | 25 | 781 | | | 172 | 172 | 397 | 0.0 | | | |

## Understanding the Soil Report: explanation of measurements, abbreviations and units

### Recommendations

Lime

If testing finds that soil pH is too low for the crop(s) indicated, a ***lime recommendation*** will be given in units of either ton/acre or lb/1000 sq ft. For best results, mix the lime into the top 6 to 8 inches of soil several months before planting. For no-till or established plantings where this is not possible, apply no more than 1 to 1.5 ton/acre (50 lb/1000 sq ft) at one time, even if the report recommends more. You can apply the rest in similar increments every six months until the full rate is applied. If MG is recommended and lime is needed, use dolomitric lime.

Fertilizer

Recommendations ***for field crops or other large areas*** are listed separately for each nutrient to be added (in units of lb/acre unless otherwise specified). Recommendations for N (and sometimes for B) are based on research/field studies for the crop being grown, not on soil test results. K-I and P-I values are based on test results and should be > 50. If they are not, follow the fertilizer recommendations given. If Mg is needed and no lime is recommended, 0-0-22 (11.5% Mg) is an excellent source; 175 to 250 lb per acre alone or in a fertilizer blend will usually satisfy crop needs, SS-I levels appear only on reports for greenhouse soil or problem samples.

Farmers and other commercial producers should pay special attention to ***micronutrient levels***. If *$*, *pH$*, *$pH*, *C* or *Z* notations appear on the soil report, refer to *$Note: Secondary Nutrients and Micronutrients*. In general, homeowners do not need to be concerned about micronutrients. Various crop notes also address lime fertilizer needs; visit ncagr.gov/agronomi/pubs.htm.

Recommendations ***for small areas, such as home lawns/gardens,*** are listed in units of lb/1000 sq ft . If you cannot find the exact fertilizer grade recommended on the report, visit *www.ncagr.gov/agronomi/obpart4.htm#fs* to find information that may help you choose a comparable alternate. For more information, read *A Homeowner's Guide to Fertilizer.*

### Test Results

The first seven values [soil class, HM%, W/V, CEC, BS%, Ac and pH] describe the soil and its degree of acidity. The remaining 16 [P-I, K-I, Ca%, Mg%, Mn-I, Mn-AI1, Mn-AI2, Zn-I, Zn-AI, Cu-I, S-I, SS-I, Na, ESP, SS-I, $NO_3$-N (not routinely available)] indicate levels of plant nutrients or other fertility measurement. Visit *www.ncagr.gov/agronomi/uyrst.htm*

### Report Abbreviations

| | |
|---|---|
| **Ac** | exchangeable acidity |
| **B** | boron |
| **BS%** | % CEC occupied by basic cations |
| **Ca%** | % CEC occupied by calcium |
| **CEC** | cation exchange capacity |
| **Cu-I** | copper index |
| **ESP** | exchangeable sodium percent |
| **HM%** | percent humic matter |
| **K-I** | potassium index |
| **$K_2O$** | potash |
| **Mg%** | % CEC occupied by magnesium |
| **MIN** | mineral soil class |
| **Mn** | manganese |
| **Mn-AI1** | Mn-availability index for crop 1 |
| **Mn-AI2** | Mn-availability index for crop 2 |
| **Mn-I** | manganese index |
| **M-O** | mineral-organic soil class |
| **N** | nitrogen |
| **Na** | sodium |
| **$NO_3$-N** | nitrate nitrogen |
| **ORG** | organic soil class |
| **pH** | current soil pH |
| **P-I** | phosphorus index |
| **$P_2O_5$** | phosphate |
| **S-I** | sulfur index |
| **SS-I** | soluble salt index |
| **W/V** | weight per volume |
| **Zn-AI** | zinc availability index |
| **Zn-I** | zinc index |

# Herbicide Application Record

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Client, Project Name: | Restoration Systems_Warren Wilson | | | | | | |
| Site Address: | 701 Warren Wilson Rd.<br>Swannanoa, NC 28778 | | | | | | |
| Category: | Riparian Habitat | | | | | | Other: |

## PRODUCT APPLIED and SITE CONDITIONS

| Date | Occurrence Site Name | Species controlled | Mix Code | Quantity of Mix Applied (GAL) | End Use Concentrate | Air Temp | Wind Speed | Wind Direct | Start Time | End Time | Equip. Code | MoA Code | Acres Treated & Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6/29/2023 | Warren Wilson | Chinese Privet, Multiflora Rose, Parrots Feather | 1 | 24 | 6% | 75°F | 3 MPH | E | 8:00 AM | 6:30 PM | B | i | ~3 AC |
| 6/29/2023 | Warren Wilson | Chinese Privet, Multiflora Rose, Parrots Feather | 2 | 24 | 4% | 75°F | 3 MPH | E | 8:00 AM | 6:30 PM | B | i | ~3 AC |
| 6/29/2023 | Warren Wilson | Parrots Feather | 3 | 4 | 1% | 75°F | 3 MPH | E | 8:00 AM | 6:30 PM | | | N/A |

## STAFF

| Employee Name | Pesticide License # | Hours | Comments | Employee Name | Pesticide License # | Hours | Comments |
|---|---|---|---|---|---|---|---|
| Michael Foster | NC#026-38079 | 10.5 | | | | | |
| Dana Willson | NC#032-9035 | 10.5 | | | | | |

## MATERIAL and EQUIPMENT

**Herbicide/Adjuvant Information**

| EPA Reg. No. | Brand Name | Manufacturer | Mix Code | Mix Description |
|---|---|---|---|---|
| 524-343 | Roundup Custom | Bayer | **1** | 6% Solution Roundup Custom |
| 81927-13 | Triclopyr 3 | Alligare | **2** | 4 % Solution Triclopyr 3 |
| 524-343 | Ecomazapyr 2SL | Alligare | **3** | 1% Imazapyr |
| | | | | |
| | | | | |

**Equipment Information**

| Equip. Code | Equipment Description | MoA Code | Mode of Application (MoA) |
|---|---|---|---|
| **A** | Engine Sprayer | **i** | Foliar |
| **B** | Backpack Sprayer | **ii** | Basal Bark |
| **C** | Wicking Device | **iii** | Hack-and-Squirt |
| **D** | Injector | **iv** | Aerial |
| **E** | | **v** | Stump Cut |

## ADDITIONAL DATA REQUESTED BY CLIENT

# Herbicide Application Record

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Client, Project Name: | Restoration Systems_Warren Wilson | | | | | | | |
| Site Address: | 701 Warren Wilson Rd.<br>Swannanoa, NC 28778 | | | | | | | |
| Category: | Riparian Habitat | | | | | | Other: | |

## PRODUCT APPLIED and SITE CONDITIONS

| Date | Occurrence Site Name | Species controlled | Mix Code | Quantity of Mix Applied | End Use Concentrate | Air Temp | Wind Speed | Wind Direct | Start Time | End Time | Equip. Code | MoA Code | Acres Treated & Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/20/2023 | Warren Wilson | Chinese Privet, Multiflora Rose, Japanese Knotweed | 1 | 12 GAL | 6% | 60°F | 3 MPH | NW | 8:00 AM | 4:30 PM | B | i | ~1 AC |
| 9/20/2023 | Warren Wilson | Chinese Privet, Multiflora Rose, Japanese Knotweed | 2 | 12 GAL | 4% | 60°F | 3 MPH | NW | 8:00 AM | 4:30 PM | B | i | ~1 AC |
| 9/20/2023 | Warren Wilson | Chinese Privet, Bradford Pear | 3 | 32 OZ | 50% | 60°F | 3 MPH | NW | 8:00 AM | 4:30 PM | D | iii | N/A |

## STAFF

| Employee Name | Pesticide License # | Hours | Comments | Employee Name | Pesticide License # | Hours | Comments |
|---|---|---|---|---|---|---|---|
| Michael Foster | NC#026-38079 | 8.5 | | | | | |
| William Bailey | | 8.5 | | | | | |

## MATERIAL and EQUIPMENT

### Herbicide/Adjuvant Information

| EPA Reg. No. | Brand Name | Manufacturer | Mix Code | Mix Description |
|---|---|---|---|---|
| 524-343 | Roundup Custom | Bayer | 1 | 6% Solution Roundup Custom |
| 81927-13 | Triclopyr 3 | Alligare | 2 | 4 % Solution Triclopyr 3 |
| 524-343 | Roundup Custom | Bayer | 3 | 50% solution Roundup Custom |
| | | | | |
| | | | | |

### Equipment Information

| Equip. Code | Equipment Description | MoA Code | Mode of Application (MoA) |
|---|---|---|---|
| A | Engine Sprayer | i | Foliar |
| B | Backpack Sprayer | ii | Basal Bark |
| C | Wicking Device | iii | Hack-and-Squirt |
| D | Injector | iv | Aerial |
| E | | v | Stump Cut |

## ADDITIONAL DATA REQUESTED BY CLIENT

## Appendix D
## MY3 Stream Geomorphology Data

Tables 10A-I. Baseline Stream Data Summary
Tables 11A-I. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Tables 12A-I. MY3 Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters-Cross-sections)
Tables 13A-I. MY3 Monitoring Data - Stream Reach Data Summary
MY3 Cross Section Plots

Table 10a. 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 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 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 10b. 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) $lb/f^2$ | | | | | 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 10c. 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) $lb/f^2$ | | | | | 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 10d. 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) $lb/f^2$ | | | | | 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 10e. 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) | | | | | No distinct repetitive pattern of riffles and pools due to staightening activities | | | | | | | | | | | | | | | | | | | | | 10.4 | 25.1 | 19.3 | 63.9 | 19.9 | 6.0 |
| Riffle Slope (ft/ft) | | | | | | | | | | | 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 10f. 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) $lb/f^2$ | | | | | 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 10g. 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) $lb/f^2$ | | | | | 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 10h. 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) $lb/f^2$ | | | | | 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 10i. 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) $lb/f^2$ | | | | | 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 11a. 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 11b. 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 11c. 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 11d. 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 11e. 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 11f. 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-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 11g. 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 11h. 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 11i. 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-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 12a. 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 | 12.2 | 12.6 | -- | | | 8.2 | 8.2 | 7.9 | 7.6 | -- | | | 9.2 | 9.3 | 10.0 | 10.7 | -- | | | 10.6 | 11.8 | 11.7 | 14.4 | -- | | |
| Floodprone Width (ft) | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | |
| Bankfull Mean Depth (ft) | 1.1 | 1.0 | 1.0 | 1.0 | -- | | | 1.0 | 1.0 | 1.0 | 1.1 | -- | | | 0.8 | 0.8 | 0.7 | 0.7 | -- | | | 0.9 | 0.8 | 0.8 | 0.7 | -- | | |
| Bankfull Max Depth (ft) | 2.1 | 1.9 | 2.0 | 2.0 | -- | | | 1.9 | 1.9 | 2.0 | 1.9 | -- | | | 1.4 | 1.5 | 1.6 | 1.7 | -- | | | 1.7 | 1.7 | 1.7 | 1.6 | -- | | |
| Low Bank Height (ft) | 2.1 | 1.9 | 1.9 | 1.9 | -- | | | 1.9 | 1.9 | 1.9 | 1.9 | -- | | | 1.4 | 1.5 | 1.7 | 1.6 | -- | | | 1.7 | 2.0 | 1.8 | 1.3 | -- | | |
| Bankfull Cross Sectional Area ($ft^2$) | 12.8 | 12.8 | 12.8 | 12.8 | -- | | | 8.3 | 8.3 | 8.3 | 8.3 | -- | | | 7.4 | 7.4 | 7.4 | 7.4 | -- | | | 9.4 | 9.4 | 9.4 | 9.4 | -- | | |
| Bankfull Width/Depth Ratio | 11.1 | 14.0 | 11.7 | 12.5 | -- | | | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 11.9 | 14.8 | 14.7 | 21.9 | -- | | |
| Bankfull Entrenchment Ratio | 8.4 | 7.5 | 8.2 | 7.9 | -- | | | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 9.5 | 8.5 | 8.5 | 7.0 | -- | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 0.9 | 1.0 | -- | | | 1.0 | 1.0 | 1.0 | 1.0 | -- | | | 1.0 | 1.0 | 1.1 | 1.0 | -- | | | 1.0 | 1.2 | 1.0 | 0.8 | -- | | |
| Cross Sectional Area between end pins ($ft^2$) | 46.9 | 42.4 | 43.2 | 44.2 | -- | | | 22.5 | 22.5 | 21.7 | 21.6 | -- | | | 23.2 | 23.4 | 23.3 | 22.7 | -- | | | 15.8 | 15.6 | 15.2 | 15.6 | -- | | |
| d50 (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**Table 12b. 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 | 9.2 | 9.6 | -- | | | 6.2 | 9.0 | 7.2 | 6.6 | -- | | | 10.0 | 11.8 | 13.9 | 13.4 | -- | | | 9.6 | 10.0 | 8.9 | 10.6 | -- | | |
| Floodprone Width (ft) | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | |
| Bankfull Mean Depth (ft) | 0.5 | 0.5 | 0.5 | 0.4 | -- | | | 0.6 | 0.4 | 0.5 | 0.6 | -- | | | 0.9 | 0.8 | 0.6 | 0.7 | -- | | | 0.7 | 0.7 | 0.7 | 0.6 | -- | | |
| Bankfull Max Depth (ft) | 0.8 | 1.0 | 1.0 | 1.1 | -- | | | 1.3 | 1.1 | 1.2 | 1.4 | -- | | | 2.3 | 1.8 | 1.8 | 1.7 | -- | | | 1.4 | 1.4 | 1.5 | 1.3 | -- | | |
| Low Bank Height (ft) | 0.8 | 1.0 | 1.0 | 1.2 | -- | | | 1.3 | 1.1 | 1.2 | 1.3 | -- | | | 2.3 | 1.8 | 1.7 | 1.3 | -- | | | 1.4 | 1.4 | 1.5 | 1.3 | -- | | |
| Bankfull Cross Sectional Area ($ft^2$) | 4.3 | 4.3 | 4.3 | 4.3 | -- | | | 3.8 | 3.8 | 3.8 | 3.8 | -- | | | 9.0 | 9.0 | 9.0 | 9.0 | -- | | | 6.6 | 6.6 | 6.6 | 6.6 | -- | | |
| Bankfull Width/Depth Ratio | 16.9 | 18.8 | 19.4 | 21.5 | -- | | | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 14.0 | 15.2 | 12.1 | 17.2 | -- | | |
| Bankfull Entrenchment Ratio | 11.8 | 11.1 | 10.9 | 10.4 | -- | | | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 10.4 | 10.0 | 11.2 | 9.4 | -- | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.1 | 1.1 | -- | | | 1.0 | 1.0 | 1.0 | 0.9 | -- | | | 1.0 | 1.0 | 1.0 | 0.8 | -- | | | 1.0 | 1.0 | 1.0 | 1.0 | -- | | |
| Cross Sectional Area between end pins ($ft^2$) | 11.6 | 13.5 | 14.1 | 12.6 | -- | | | 14.1 | 18.1 | 18.3 | 17.4 | -- | | | 17.1 | 13.6 | 15.6 | 15.0 | -- | | | 10.3 | 9.6 | 12.5 | 12.5 | -- | | |
| 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 12c. 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 | 31.9 | 32.0 | -- | | | 13.8 | 11.1 | 10.4 | 9.4 | -- | | | 14.5 | 21.0 | 21.6 | 17.2 | -- | | | 17.6 | 23.8 | 18.2 | 26.6 | -- | | | | | | | | | | |
| Floodprone Width (ft) | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 1.2 | 0.9 | 0.9 | 0.8 | -- | | | 1.0 | 1.5 | 1.6 | 1.8 | -- | | | 0.8 | 1.0 | 1.0 | 1.2 | -- | | | 0.9 | 0.7 | 0.9 | 0.6 | -- | | | | | | | | | | |
| Bankfull Max Depth (ft) | 2.1 | 2.0 | 2.0 | 2.1 | -- | | | 2.5 | 2.7 | 2.7 | 2.4 | -- | | | 2.6 | 2.3 | 2.4 | 2.4 | -- | | | 1.4 | 1.4 | 1.4 | 1.5 | -- | | | | | | | | | | |
| Low Bank Height (ft) | 2.1 | 2.0 | 2.0 | 2.0 | -- | | | 2.5 | 2.6 | 2.8 | 2.5 | -- | | | 2.6 | 2.3 | 2.3 | 2.3 | -- | | | 1.4 | 1.4 | 1.4 | 1.5 | -- | | | | | | | | | | |
| Bankfull Cross Sectional Area (ft²) | 27.2 | 27.2 | 27.2 | 27.2 | -- | | | 16.7 | 16.7 | 16.7 | 16.7 | -- | | | 21.3 | 21.3 | 21.3 | 21.3 | -- | | | 17.0 | 17.0 | 17.0 | 17.0 | -- | | | | | | | | | | |
| Bankfull Width/Depth Ratio | 20.2 | 36.7 | 37.4 | 37.7 | -- | | | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 18.1 | 33.3 | 19.4 | 41.5 | -- | | | | | | | | | | |
| Bankfull Entrenchment Ratio | 4.3 | 3.2 | 3.1 | 3.1 | -- | | | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 5.7 | 4.2 | 5.5 | 3.8 | -- | | | | | | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.0 | 1.0 | -- | | | 1.0 | 1.0 | 1.0 | 1.0 | -- | | | 1.0 | 1.0 | 1.0 | 1.0 | -- | | | 1.0 | 1.0 | 1.0 | 1.0 | -- | | | | | | | | | | |
| Cross Sectional Area between end pins (ft²) | 45.6 | 46.3 | 37.5 | 31.5 | -- | | | 31.1 | 31.9 | 43.5 | 42.4 | -- | | | 43.1 | 39.4 | 39.6 | 35.9 | -- | | | 39.2 | 38.1 | 35.3 | 38.7 | -- | | | | | | | | | | |
| d50 (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Cross Section 6 (Riffle) | | | | | | | Cross Section 7 (Pool) | | | | | | | Cross Section 8 (Riffle) | | | | | | | Cross Section 9 (Riffle) | | | | | | | Cross Section 10 (Pool) | | | | | | | |

## Table 12d. 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 | 12.8 | 13.5 | -- | | | 18.7 | 19.7 | 20.1 | 21.6 | -- | | | 14.2 | 24.8 | 21.1 | 17.9 | -- | | | 16.0 | 14.9 | 14.5 | 14.0 | -- | | | 16.9 | 27.7 | 24.4 | 29.3 | -- | | |
| Floodprone Width (ft) | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | |
| Bankfull Mean Depth (ft) | 1.3 | 1.4 | 1.5 | 1.4 | -- | | | 1.1 | 1.1 | 1.1 | 1.0 | -- | | | 1.0 | 0.5 | 0.6 | 0.8 | -- | | | 1.3 | 1.4 | 1.4 | 1.5 | -- | | | 1.0 | 0.6 | 0.7 | 0.6 | -- | | |
| Bankfull Max Depth (ft) | 2.2 | 2.4 | 2.7 | 2.6 | -- | | | 1.9 | 1.9 | 1.9 | 2.0 | -- | | | 1.8 | 1.4 | 1.7 | 1.8 | -- | | | 2.9 | 2.7 | 2.8 | 2.8 | -- | | | 1.6 | 1.5 | 1.6 | 1.6 | -- | | |
| Low Bank Height (ft) | 2.2 | 2.3 | 2.8 | 2.4 | -- | | | 1.9 | 1.9 | 2.0 | 1.8 | -- | | | 1.8 | 1.4 | 1.7 | 1.8 | -- | | | 2.9 | 2.7 | 3.1 | 2.5 | -- | | | 1.6 | 1.5 | 1.6 | 1.6 | -- | | |
| Bankfull Cross Sectional Area (ft²) | 19.1 | 19.1 | 19.1 | 19.1 | -- | | | 21.4 | 21.4 | 21.4 | 21.4 | -- | | | 13.6 | 13.6 | 13.6 | 13.6 | -- | | | 20.8 | 20.8 | 20.8 | 20.8 | -- | | | 16.4 | 16.4 | 16.4 | 16.4 | -- | | |
| Bankfull Width/Depth Ratio | NA | NA | NA | NA | -- | | | 16.3 | 18.1 | 19.0 | 21.9 | -- | | | 15.0 | 45.2 | 32.8 | 23.5 | -- | | | NA | NA | NA | NA | -- | | | 17.4 | 46.8 | 36.3 | 52.1 | -- | | |
| Bankfull Entrenchment Ratio | NA | NA | NA | NA | -- | | | 5.4 | 5.1 | 5.0 | 4.6 | -- | | | 7.0 | 4.0 | 4.7 | 5.6 | -- | | | NA | NA | NA | NA | -- | | | 5.9 | 3.6 | 4.1 | 3.4 | -- | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.0 | 0.9 | -- | | | 1.0 | 1.0 | 1.0 | 0.9 | -- | | | 1.0 | 1.0 | 1.0 | 1.0 | -- | | | 1.0 | 1.0 | 1.1 | 0.9 | -- | | | 1.0 | 1.0 | 1.0 | 1.0 | -- | | |
| Cross Sectional Area between end pins (ft²) | 61.5 | 66.1 | 66.6 | 61.0 | -- | | | 31.0 | 29.9 | 29.9 | 31.7 | -- | | | 29.5 | 23.1 | 21.4 | 22.4 | -- | | | 28.5 | 30.5 | 38.0 | 37.1 | -- | | | 28.5 | 22.9 | 21.0 | 23.6 | -- | | |
| 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 | 13.4 | 13.6 | -- | | | 20.7 | 22.9 | 24.7 | 26.4 | -- | | | 14.6 | 13.4 | 14.1 | 16.3 | -- | | | | | | | | | | | | | | | | | |
| Floodprone Width (ft) | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 1.0 | 1.1 | 1.2 | 1.2 | -- | | | 1.4 | 1.3 | 1.2 | 1.1 | -- | | | 1.1 | 1.2 | 1.1 | 1.0 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 2.5 | 2.7 | 3.0 | 3.0 | -- | | | 3.3 | 3.0 | 2.8 | 2.9 | -- | | | 1.9 | 2.5 | 2.2 | 2.2 | -- | | | | | | | | | | | | | | | | | |
| Low Bank Height (ft) | 2.5 | 2.7 | 3.0 | 2.9 | -- | | | 3.3 | 2.9 | 2.7 | 2.7 | -- | | | 1.9 | 2.5 | 2.3 | 2.2 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Cross Sectional Area (ft²) | 16.7 | 16.7 | 16.7 | 16.7 | -- | | | 28.8 | 28.8 | 28.8 | 28.8 | -- | | | 16.0 | 16.0 | 16.0 | 16.0 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Width/Depth Ratio | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 13.3 | 11.2 | 12.5 | 16.6 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Entrenchment Ratio | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 6.8 | 7.5 | 7.1 | 6.1 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 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 (ft²) | 29.3 | 25.4 | 30.2 | 27.8 | -- | | | 52.7 | 50.2 | 49.0 | 43.6 | -- | | | 36.8 | 37.4 | 40.8 | 36.5 | -- | | | | | | | | | | | | | | | | | |
| 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 12e. 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 | 11.0 | 11.4 | -- | | | 14.0 | 20.5 | 16.1 | 15.0 | -- | | |
| Floodprone Width (ft) | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | |
| Bankfull Mean Depth (ft) | 1.0 | 1.1 | 1.1 | 1.0 | -- | | | 1.0 | 0.6 | 0.8 | 0.9 | -- | | |
| Bankfull Max Depth (ft) | 1.9 | 1.9 | 1.9 | 2.1 | -- | | | 1.6 | 1.6 | 1.8 | 1.7 | -- | | |
| Low Bank Height (ft) | 1.9 | 1.9 | 2.1 | 2.1 | -- | | | 1.6 | 1.6 | 1.8 | 1.8 | -- | | |
| Bankfull Cross Sectional Area (ft²) | 11.8 | 11.8 | 11.8 | 11.8 | -- | | | 13.3 | 13.3 | 13.3 | 13.3 | -- | | |
| Bankfull Width/Depth Ratio | NA | NA | NA | NA | -- | | | 14.7 | 31.6 | 19.6 | 16.8 | -- | | |
| Bankfull Entrenchment Ratio | NA | NA | NA | NA | -- | | | 7.2 | 4.9 | 6.2 | 6.7 | -- | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.1 | 1.0 | -- | | | 1.0 | 1.0 | 1.0 | 1.1 | -- | | |
| Cross Sectional Area between end pins (ft²) | 21.1 | 21.6 | 22.9 | 22.3 | -- | | | 18.6 | 18.5 | 19.2 | 15.9 | -- | | |
| d50 (mm) | | | | | | | | | | | | | | |

**Table 12f. 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 | 11.1 | 12.1 | -- | | | 9.9 | 10.5 | 10.0 | 9.3 | -- | | | 8.6 | 9.0 | 9.0 | 12.3 | -- | | | 21.1 | 21.0 | 21.2 | 21.1 | -- | | | 7.8 | 8.4 | 7.4 | 5.6 | -- | | |
| Floodprone Width (ft) | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | |
| Bankfull Mean Depth (ft) | 1.4 | 1.3 | 1.4 | 1.3 | -- | | | 0.8 | 0.8 | 0.8 | 0.8 | -- | | | 0.9 | 0.8 | 0.8 | 0.6 | -- | | | 0.3 | 0.3 | 0.3 | 0.3 | -- | | | 1.1 | 1.0 | 1.2 | 1.6 | -- | | |
| Bankfull Max Depth (ft) | 2.6 | 2.6 | 2.5 | 2.6 | -- | | | 1.5 | 1.3 | 1.5 | 1.7 | -- | | | 1.5 | 1.6 | 1.6 | 1.7 | -- | | | 1.2 | 1.4 | 1.5 | 1.4 | -- | | | 1.8 | 1.9 | 1.9 | 2.1 | -- | | |
| Low Bank Height (ft) | 2.6 | 2.6 | 2.6 | 2.5 | -- | | | 1.5 | 1.3 | 1.5 | 1.8 | -- | | | 1.5 | 1.5 | 1.6 | 1.6 | -- | | | 1.2 | 1.4 | 1.3 | 1.3 | -- | | | 1.8 | 2.0 | 2.1 | 2.1 | -- | | |
| Bankfull Cross Sectional Area (ft²) | 15.3 | 15.3 | 15.3 | 15.3 | -- | | | 7.9 | 7.9 | 7.9 | 7.9 | -- | | | 7.4 | 7.4 | 7.4 | 7.4 | -- | | | 7.3 | 7.3 | 7.3 | 7.3 | -- | | | 8.7 | 8.7 | 8.7 | 8.7 | -- | | |
| Bankfull Width/Depth Ratio | NA | NA | NA | NA | -- | | | 12.5 | 14.0 | 12.8 | 11.0 | -- | | | NA | NA | NA | NA | -- | | | 61.0 | 60.4 | 61.2 | 60.6 | -- | | | NA | NA | NA | NA | -- | | |
| Bankfull Entrenchment Ratio | NA | NA | NA | NA | -- | | | 10.1 | 9.5 | 10.0 | 10.7 | -- | | | NA | NA | NA | NA | -- | | | 4.7 | 4.8 | 4.7 | 4.7 | -- | | | NA | NA | NA | NA | -- | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.0 | 1.0 | -- | | | 1.0 | 1.0 | 1.0 | 1.1 | -- | | | 1.0 | 0.9 | 1.0 | 1.0 | -- | | | 1.0 | 1.0 | 0.9 | 0.9 | -- | | | 1.0 | 1.1 | 1.1 | 1.0 | -- | | |
| Cross Sectional Area between end pins (ft²) | 22.2 | 23.7 | 23.7 | 24.4 | -- | | | 13.4 | 13.8 | 12.2 | 12.4 | -- | | | 10.7 | 11.2 | 9.4 | 8.0 | -- | | | 6.2 | 7.3 | 7.3 | 6.3 | -- | | | 19.7 | 20.9 | 22.2 | 17.6 | -- | | |
| 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 | 20.4 | 23.0 | -- | | |
| Floodprone Width (ft) | 100.0 | 100.0 | 100.0 | 100.0 | -- | | |
| Bankfull Mean Depth (ft) | 0.7 | 0.6 | 0.5 | 0.5 | -- | | |
| Bankfull Max Depth (ft) | 1.5 | 1.4 | 1.3 | 1.5 | -- | | |
| Low Bank Height (ft) | 1.5 | 1.3 | 1.1 | 1.5 | -- | | |
| Bankfull Cross Sectional Area (ft²) | 10.4 | 10.4 | 10.4 | 10.4 | -- | | |
| Bankfull Width/Depth Ratio | 19.8 | 32.2 | 39.9 | 51.1 | -- | | |
| Bankfull Entrenchment Ratio | 7.0 | 5.5 | 4.9 | 4.3 | -- | | |
| Bankfull Bank Height Ratio | 1.0 | 0.9 | 0.9 | 1.0 | -- | | |
| Cross Sectional Area between end pins (ft²) | 20.0 | 18.2 | 17.6 | 14.04 | -- | | |
| 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 12g. 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 | 13.5 | 12.9 | -- | | | 10.2 | 10.6 | 11.2 | 11.2 | -- | | | 11.5 | 13.9 | 13.5 | 14.5 | -- | | | 10.1 | 13.6 | 13.3 | 15.2 | -- | | | 9.5 | 12.7 | 10.1 | 10.7 | -- | | |
| Floodprone Width (ft) | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | |
| Bankfull Mean Depth (ft) | 0.9 | 0.7 | 0.6 | 0.6 | -- | | | 0.6 | 0.5 | 0.5 | 0.5 | -- | | | 0.9 | 0.7 | 0.7 | 0.7 | -- | | | 0.8 | 0.6 | 0.6 | 0.5 | -- | | | 0.9 | 0.6 | 0.8 | 0.8 | -- | | |
| Bankfull Max Depth (ft) | 1.7 | 1.6 | 1.3 | 1.3 | -- | | | 0.9 | 0.9 | 0.9 | 1.0 | -- | | | 1.7 | 1.3 | 1.4 | 1.6 | -- | | | 1.1 | 1.1 | 1.1 | 1.1 | -- | | | 1.3 | 1.3 | 1.4 | 1.4 | -- | | |
| Low Bank Height (ft) | 1.7 | 1.6 | 1.2 | 1.1 | -- | | | 0.9 | 0.9 | 1.0 | 0.9 | -- | | | 1.7 | 1.2 | 1.6 | 1.6 | -- | | | 1.1 | 1.1 | 1.1 | 1.0 | -- | | | 1.3 | 1.3 | 1.4 | 1.4 | -- | | |
| Bankfull Cross Sectional Area ($ft^2$) | 8.3 | 8.3 | 8.3 | 8.3 | -- | | | 5.6 | 5.6 | 5.6 | 5.6 | -- | | | 9.8 | 9.8 | 9.8 | 9.8 | -- | | | 8.0 | 8.0 | 8.0 | 8.0 | -- | | | 8.1 | 8.1 | 8.1 | 8.1 | -- | | |
| Bankfull Width/Depth Ratio | NA | NA | NA | NA | -- | | | 18.3 | 20.1 | 22.1 | 22.6 | -- | | | NA | NA | NA | NA | -- | | | 12.6 | 23.1 | 22.1 | 29.0 | -- | | | 11.1 | 19.9 | 12.4 | 14.3 | -- | | |
| Bankfull Entrenchment Ratio | NA | NA | NA | NA | -- | | | 9.8 | 9.4 | 9.0 | 8.9 | -- | | | NA | NA | NA | NA | -- | | | 9.9 | 7.4 | 7.5 | 6.6 | -- | | | 10.5 | 7.9 | 9.9 | 9.3 | -- | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 0.9 | 0.8 | -- | | | 1.0 | 1.0 | 1.1 | 0.9 | -- | | | 1.0 | 0.9 | 1.1 | 1.0 | -- | | | 1.0 | 1.0 | 0.9 | 0.9 | -- | | | 1.0 | 1.0 | 1.0 | 1.0 | -- | | |
| Cross Sectional Area between end pins ($ft^2$) | 19.4 | 17.5 | 18.8 | 22.6 | -- | | | 14.3 | 15.1 | 15.8 | 14.5 | -- | | | 25.8 | 25.3 | 25.6 | 24.2 | -- | | | 16.6 | 17.5 | 18.5 | 16.6 | -- | | | 12.8 | 12.9 | 12.5 | 12.0 | -- | | |
| 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 | 11.4 | 12.8 | -- | | | 13.2 | 13.2 | 16.6 | 16.4 | -- | | | 11.7 | 13.2 | 15.1 | 14.4 | -- | | | | | | | | | | | | | | | | |
| Floodprone Width (ft) | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | | | | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.9 | 0.6 | 0.7 | 0.7 | -- | | | 0.8 | 0.8 | 0.7 | 0.7 | -- | | | 0.5 | 0.5 | 0.4 | 0.4 | -- | | | | | | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.5 | 1.4 | 1.5 | 1.5 | -- | | | 1.8 | 1.7 | 1.7 | 1.7 | -- | | | 1.0 | 1.0 | 0.9 | 1.1 | -- | | | | | | | | | | | | | | | | |
| Low Bank Height (ft) | 1.5 | 1.3 | 1.6 | 1.5 | -- | | | 1.8 | 1.6 | 1.7 | 1.7 | -- | | | 1.0 | 1.1 | 0.9 | 1.0 | -- | | | | | | | | | | | | | | | | |
| Bankfull Cross Sectional Area ($ft^2$) | 8.4 | 8.4 | 8.4 | 8.4 | -- | | | 11.1 | 11.1 | 11.1 | 11.1 | -- | | | 6.3 | 6.3 | 6.3 | 6.3 | -- | | | | | | | | | | | | | | | | |
| Bankfull Width/Depth Ratio | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 22.0 | 27.7 | 36.2 | 32.7 | -- | | | | | | | | | | | | | | | | |
| Bankfull Entrenchment Ratio | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 8.5 | 7.6 | 6.6 | 7.0 | -- | | | | | | | | | | | | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 0.9 | 1.1 | 1.0 | -- | | | 1.0 | 0.9 | 1.0 | 1.0 | -- | | | 1.0 | 1.1 | 1.0 | 0.9 | -- | | | | | | | | | | | | | | | | |
| Cross Sectional Area between end pins ($ft^2$) | 18.5 | 16.9 | 17.9 | 18.3 | -- | | | 26.5 | 26.5 | 26.7 | 29.6 | -- | | | 17.4 | 15.5 | 21.2 | 17.6 | -- | | | | | | | | | | | | | | | | |
| 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 12h. 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 | 14.3 | 13.7 | -- | | | 14.2 | 18.4 | 18.5 | 18.6 | -- | | | 13.2 | 14.7 | 14.6 | 13.2 | -- | | | 11.4 | 12.6 | 11.9 | 12.5 | -- | | | 11.6 | 12.2 | 12.1 | 11.1 | -- | | |
| Floodprone Width (ft) | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | |
| Bankfull Mean Depth (ft) | 0.8 | 0.7 | 0.8 | 0.8 | -- | | | 1.3 | 1.0 | 1.0 | 1.0 | -- | | | 0.8 | 0.7 | 0.7 | 0.8 | -- | | | 1.1 | 1.0 | 1.1 | 1.0 | -- | | | 0.6 | 0.6 | 0.6 | 0.6 | -- | | |
| Bankfull Max Depth (ft) | 1.3 | 1.3 | 1.3 | 1.4 | -- | | | 2.1 | 2.2 | 1.9 | 2.0 | -- | | | 1.3 | 1.2 | 1.2 | 1.2 | -- | | | 1.8 | 1.8 | 1.8 | 1.8 | -- | | | 1.1 | 1.1 | 1.3 | 1.2 | -- | | |
| Low Bank Height (ft) | 1.3 | 1.3 | 1.4 | 1.3 | -- | | | 2.1 | 2.2 | 1.8 | 1.9 | -- | | | 1.3 | 1.2 | 1.1 | 1.2 | -- | | | 1.8 | 1.9 | 1.9 | 1.8 | -- | | | 1.1 | 1.2 | 1.3 | 1.3 | -- | | |
| Bankfull Cross Sectional Area ($ft^2$) | 10.7 | 10.7 | 10.7 | 10.7 | -- | | | 18.2 | 18.2 | 18.2 | 18.2 | -- | | | 9.9 | 9.9 | 9.9 | 9.9 | -- | | | 13.0 | 12.6 | 13.0 | 13.0 | -- | | | 7.2 | 7.2 | 7.2 | 7.2 | -- | | |
| Bankfull Width/Depth Ratio | 15.5 | 21.3 | 19.0 | 17.6 | -- | | | NA | NA | NA | NA | -- | | | 17.5 | 21.8 | 21.5 | 17.5 | -- | | | NA | NA | NA | NA | -- | | | 18.5 | 20.7 | 20.2 | 17.2 | -- | | |
| Bankfull Entrenchment Ratio | 7.8 | 6.6 | 7.0 | 7.3 | -- | | | NA | NA | NA | NA | -- | | | 7.6 | 6.8 | 6.9 | 7.6 | -- | | | NA | NA | NA | NA | -- | | | 8.6 | 8.2 | 8.3 | 9.0 | -- | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.0 | 0.9 | -- | | | 1.0 | 1.0 | 0.9 | 0.9 | -- | | | 1.0 | 1.0 | 0.9 | 1.0 | -- | | | 1.0 | 1.1 | 1.0 | 1.0 | -- | | | 1.0 | 1.1 | 1.1 | 1.0 | -- | | |
| Cross Sectional Area between end pins ($ft^2$) | 18.6 | 18.6 | 19.5 | 18.3 | -- | | | 34.1 | 28.0 | 28.4 | 26.5 | -- | | | 20.9 | 18.6 | 19.6 | 19.6 | -- | | | 23.6 | 25.9 | 24.5 | 25.3 | -- | | | 20.3 | 19.9 | 19.8 | 21.0 | -- | | |
| 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 | 10.6 | 11.5 | -- | | | 9.1 | 11.4 | 10.0 | 10.2 | -- | | | 10.1 | 10.1 | 10.5 | 9.5 | -- | | | | | | | | | | | | | | | | | |
| Floodprone Width (ft) | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 1.2 | 1.0 | 1.0 | 0.9 | -- | | | 1.3 | 1.0 | 1.2 | 1.1 | -- | | | 0.5 | 0.5 | 0.5 | 0.5 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.9 | 1.9 | 2.0 | 2.1 | -- | | | 2.0 | 1.9 | 2.0 | 2.3 | -- | | | 0.8 | 1.0 | 0.9 | 1.0 | -- | | | | | | | | | | | | | | | | | |
| Low Bank Height (ft) | 1.9 | 1.8 | 1.9 | 2.1 | -- | | | 2.0 | 1.8 | 2.1 | 2.3 | -- | | | 0.8 | 1.2 | 1.0 | 0.9 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Cross Sectional Area ($ft^2$) | 10.7 | 10.7 | 10.7 | 10.7 | -- | | | 11.6 | 11.6 | 11.6 | 11.6 | -- | | | 5.2 | 5.2 | 5.2 | 5.2 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Width/Depth Ratio | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 19.6 | 19.6 | 21.2 | 17.6 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Entrenchment Ratio | NA | NA | NA | NA | -- | | | NA | NA | NA | NA | -- | | | 9.9 | 9.9 | 9.5 | 10.5 | -- | | | | | | | | | | | | | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 0.9 | 1.0 | 1.0 | -- | | | 1.0 | 0.9 | 1.1 | 1.0 | -- | | | 1.0 | 1.2 | 1.1 | 0.9 | -- | | | | | | | | | | | | | | | | | |
| Cross Sectional Area between end pins ($ft^2$) | 17.1 | 16.7 | 15.4 | 15.6 | -- | | | 21.0 | 18.5 | 20.5 | 20.3 | -- | | | 11.2 | 15.2 | 13.2 | 14.0 | -- | | | | | | | | | | | | | | | | | |
| 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 12i. 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 | 12.2 | 14.0 | -- | | | 11.4 | 13.4 | 14.0 | 15.1 | -- | | | 12.1 | 12.9 | 10.4 | 12.3 | -- | | | 10.2 | 11.0 | 11.5 | 13.5 | -- | | | 10.3 | 10.3 | 11.2 | 11.3 | -- | | |
| Floodprone Width (ft) | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | | NA | NA | NA | NA | -- | | | 100.0 | 100.0 | 100.0 | 100.0 | -- | | |
| Bankfull Mean Depth (ft) | 0.7 | 0.7 | 1.0 | 0.7 | -- | | | 1.2 | 1.0 | 1.0 | 0.9 | -- | | | 0.7 | 0.6 | 0.8 | 0.7 | -- | | | 0.9 | 0.8 | 0.8 | 0.7 | -- | | | 0.6 | 0.6 | 0.6 | 0.6 | -- | | |
| Bankfull Max Depth (ft) | 1.7 | 1.3 | 2.0 | 1.5 | -- | | | 2.0 | 1.9 | 1.9 | 1.8 | -- | | | 1.4 | 1.4 | 1.5 | 1.4 | -- | | | 1.7 | 1.6 | 1.7 | 1.7 | -- | | | 1.2 | 1.2 | 1.0 | 1.1 | -- | | |
| Low Bank Height (ft) | 1.7 | 1.5 | 1.9 | 1.5 | -- | | | 2.0 | 1.9 | 1.7 | 1.7 | -- | | | 1.4 | 1.5 | 1.5 | 1.3 | -- | | | 1.7 | 1.6 | 1.7 | 1.7 | -- | | | 1.2 | 1.3 | 1.0 | 1.2 | -- | | |
| Bankfull Cross Sectional Area ($ft^2$) | 10.2 | 10.2 | 10.2 | 10.2 | -- | | | 13.9 | 13.9 | 13.9 | 13.9 | -- | | | 8.3 | 8.3 | 8.3 | 8.3 | -- | | | 9.1 | 9.1 | 9.1 | 9.1 | -- | | | 6.4 | 6.4 | 6.4 | 6.4 | -- | | |
| Bankfull Width/Depth Ratio | 18.3 | 22.7 | 11.7 | 19.1 | -- | | | NA | NA | NA | NA | -- | | | 17.7 | 20.0 | 13.0 | 18.4 | -- | | | NA | NA | NA | NA | -- | | | 16.6 | 16.6 | 19.4 | 19.9 | -- | | |
| Bankfull Entrenchment Ratio | 7.3 | 6.6 | 8.2 | 7.2 | -- | | | NA | NA | NA | NA | -- | | | 8.2 | 7.8 | 9.6 | 8.1 | -- | | | NA | NA | NA | NA | -- | | | 9.7 | 9.7 | 8.9 | 8.8 | -- | | |
| Bankfull Bank Height Ratio | 1.0 | 1.2 | 0.9 | 1.0 | -- | | | 1.0 | 1.0 | 0.9 | 1.0 | -- | | | 1.0 | 1.1 | 1.0 | 0.9 | -- | | | 1.0 | 1.0 | 1.0 | 1.0 | -- | | | 1.0 | 1.1 | 1.1 | 1.1 | -- | | |
| Cross Sectional Area between end pins ($ft^2$) | 31.1 | 30.5 | 29.6 | 30.8 | -- | | | 38.2 | 32.0 | 35.3 | 36.1 | -- | | | 18.8 | 19.6 | 18.9 | 19.7 | -- | | | 19.8 | 20.6 | 19.2 | 19.3 | -- | | | 13.5 | 12.2 | 12.6 | 14.2 | -- | | |
| 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 | 13.9 | 14.0 | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Floodprone Width (ft) | NA | NA | NA | NA | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.8 | 0.9 | 0.9 | 0.9 | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.9 | 1.8 | 1.8 | 1.9 | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Bank Height (ft) | 1.9 | 1.8 | 1.9 | 1.8 | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Cross Sectional Area ($ft^2$) | 13.1 | 13.1 | 13.1 | 13.1 | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width/Depth Ratio | NA | NA | NA | NA | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Entrenchment Ratio | NA | NA | NA | NA | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.0 | 0.9 | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cross Sectional Area between end pins ($ft^2$) | 25.0 | 24.6 | 26.6 | 25.8 | -- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 13a. 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- 5 | | | | | | MY- 7 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 11.73 | 11.98 | 11.98 | 12.24 | | 2 | 12.6 | 13.5 | 13.5 | 14.4 | | 2 | | | | | | | | | | | | |
| Floodprone Width (ft) | 100 | 100 | 100 | 100 | | 2 | 100 | 100 | 100 | 100 | | 2 | 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 | 0.8 | 0.924 | 0.924 | 1.048 | | 2 | 0.7 | 0.85 | 0.85 | 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 | 1.741 | 1.893 | 1.893 | 2.044 | | 2 | 1.6 | 1.8 | 1.8 | 2 | | 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 | 9.4 | 11.1 | 11.1 | 12.8 | | 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 | 11.68 | 13.17 | 13.17 | 14.65 | | 2 | 12.5 | 17.2 | 17.2 | 21.9 | | 2 | | | | | | | | | | | | |
| Entrenchment Ratio | 8.416 | 8.944 | 8.944 | 9.472 | | 2 | 7.5 | 8 | 8 | 8.5 | | 2 | 8.173 | 8.349 | 8.349 | 8.525 | | 2 | 7 | 7.45 | 7.45 | 7.9 | | 2 | | | | | | | | | | | | |
| [1]Bank Height Ratio | **1** | **1** | **1** | **1** | | **2** | **1** | **1.1** | **1.1** | **1.2** | | **2** | **0.9** | **0.977** | **0.977** | **1.0** | | **2** | **0.8** | **0.9** | **0.9** | **1** | | **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 | | | | | | | | | | | | | | | Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 13b. 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- 5 | | | | | | MY- 7 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 8.924 | 9.041 | 9.041 | 9.158 | | 2 | 9.6 | 10.1 | 10.1 | 10.6 | | | | | | | | | | | | | | |
| Floodprone Width (ft) | 100 | 100 | 100 | 100 | | 2 | 100 | 100 | 100 | 100 | | 2 | 100 | 100 | 100 | 100 | | 2 | 100 | 100 | 100 | 100 | | | | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.503 | 0.593 | 0.593 | 0.684 | | 2 | 0.5 | 0.6 | 0.6 | 0.7 | | 2 | 0.472 | 0.604 | 0.604 | 0.736 | | 2 | 0.4 | 0.5 | 0.5 | 0.6 | | | | | | | | | | | | | | |
| [1]Bankfull Max Depth (ft) | 0.831 | 1.111 | 1.111 | 1.391 | | 2 | 1 | 1.2 | 1.2 | 1.4 | | 2 | 0.966 | 1.236 | 1.236 | 1.507 | | 2 | 1.1 | 1.2 | 1.2 | 1.3 | | | | | | | | | | | | | | |
| Bankfull Cross Sectional Area ($ft^2$) | 4.276 | 5.421 | 5.421 | 6.566 | | 2 | 4.3 | 5.5 | 5.5 | 6.6 | | 2 | 4.3 | 5.45 | 5.45 | 6.6 | | 2 | 4.3 | 5.45 | 5.45 | 6.6 | | | | | | | | | | | | | | |
| Width/Depth Ratio | 14.05 | 15.47 | 15.47 | 16.9 | | 2 | 15.2 | 17 | 17 | 18.8 | | 2 | 12.13 | 15.76 | 15.76 | 19.39 | | 2 | 17.2 | 19.35 | 19.35 | 21.5 | | | | | | | | | | | | | | |
| Entrenchment Ratio | 10.41 | 11.09 | 11.09 | 11.76 | | 2 | 2.8 | 6.4 | 6.4 | 10 | | 2 | 10.92 | 11.06 | 11.06 | 11.21 | | 2 | 9.4 | 9.9 | 9.9 | 10.4 | | | | | | | | | | | | | | |
| [1]Bank Height Ratio | **1** | **1** | **1** | **1** | | **2** | **1** | **1** | **1** | **1** | | **2** | **1.0** | **1.0** | **1.0** | **1.1** | | **2** | **1** | **1.05** | **1.05** | **1.1** | | | | | | | | | | | | | | |
| **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 13c. 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- 5 | | | | | | MY- 7 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 17.01 | 17.01 | 23.46 | | 2 | 23.5 | 23.7 | 23.7 | 23.8 | | 2 | 18.16 | 25.03 | 25.03 | 31.91 | | 2 | 26.6 | 29.3 | 29.3 | 32 | | 2 | | | | | | | | | | | | |
| Floodprone Width (ft) | 100 | 100 | 100 | 100 | | 2 | 100 | 100 | 100 | 100 | | 2 | 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 | 0.854 | 0.894 | 0.894 | 0.935 | | 2 | 0.6 | 0.7 | 0.7 | 0.8 | | 2 | | | | | | | | | | | | |
| [1]Bankfull Max Depth (ft) | 1.703 | 1.899 | 1.899 | 2.094 | | 2 | 1.4 | 1.8 | 1.8 | 2.1 | | 2 | 1.436 | 1.712 | 1.712 | 1.987 | | 2 | 1.5 | 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 | 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 | 19.43 | 28.4 | 28.4 | 37.37 | | 2 | 37.7 | 39.6 | 39.6 | 41.5 | | 2 | | | | | | | | | | | | |
| Entrenchment Ratio | 4.262 | 6.867 | 6.867 | 9.472 | | 2 | 4.2 | 4.2 | 4.2 | 4.3 | | 2 | 3.134 | 4.32 | 4.32 | 5.507 | | 2 | 3.1 | 3.45 | 3.45 | 3.8 | | 2 | | | | | | | | | | | | |
| [1]Bank Height Ratio | **1** | **1** | **1** | **1** | | **2** | **1** | **1** | **1** | **1** | | **2** | **1.0** | **1.0** | **1.0** | **1.0** | | **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 13d. 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- 5 | | | | | | MY- 7 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 6.28 | 4 | 14.12 | 19.93 | 20.65 | 24.39 | 4.3 | 4 | 16.3 | 21.28 | 19.75 | 29.3 | 5.79 | 4 | | | | | | | | | | | | |
| Floodprone Width (ft) | 100 | 100 | 100 | 100 | 0 | 4 | 100 | 100 | 100 | 100 | 0 | 4 | 100 | 100 | 100 | 100 | 0 | 4 | 100 | 100 | 100 | 100 | 0 | 4 | | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.951 | 1.041 | 1.033 | 1.146 | 0.095 | 4 | 0.5 | 0.6 | 0.6 | 1.2 | 0.35 | 4 | 0.645 | 0.88 | 0.866 | 1.131 | 0.26 | 4 | 0.6 | 0.85 | 0.9 | 1 | 0.19 | 4 | | | | | | | | | | | | |
| [1]Bankfull Max Depth (ft) | 1.611 | 1.793 | 1.83 | 1.903 | 0.131 | 4 | 1 | 1.5 | 1.5 | 2.5 | 0.5 | 4 | 1.573 | 1.85 | 1.823 | 2.208 | 0.26 | 4 | 1.6 | 1.9 | 1.9 | 2.2 | 0.26 | 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 | 3.28 | 4 | 13.6 | 16.85 | 16.2 | 21.4 | 3.28 | 4 | 13.6 | 16.85 | 16.2 | 21.4 | 3.28 | 4 | | | | | | | | | | | | |
| Width/Depth Ratio | 13.34 | 15.5 | 15.63 | 17.38 | 1.739 | 4 | 11.2 | 17 | 17 | 46.8 | 18.33 | 4 | 12.48 | 25.15 | 25.91 | 36.31 | 11.26 | 4 | 16.6 | 28.53 | 22.7 | 52.1 | 15.99 | 4 | | | | | | | | | | | | |
| Entrenchment Ratio | 5.356 | 6.286 | 6.384 | 7.02 | 0.783 | 4 | 2.8 | 5.5 | 5.5 | 10 | 1.75 | 4 | 4.101 | 5.23 | 4.846 | 7.081 | 1.3 | 4 | 3.4 | 4.93 | 5.1 | 6.1 | 1.19 | 4 | | | | | | | | | | | | |
| [1]Bank Height Ratio | **1** | **1** | **1** | **1** | **0** | **4** | **1** | **1** | **1** | **1** | **0** | **4** | **1.0** | **1** | **1.0** | **1.0** | **0.0** | **4** | **0.9** | **0.975** | **1** | **1** | **0.05** | **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 13e. 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- 5 | | | | | | MY- 7 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 16.13 | 16.13 | 16.13 | 16.13 | | 1 | 14.98 | 14.98 | 14.98 | 14.98 | | 1 | | | | | | | | | | | | |
| Floodprone Width (ft) | 100 | 100 | 100 | 100 | | 1 | 100 | 100 | 100 | 100 | | 1 | 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 | 0.824 | 0.824 | 0.824 | 0.824 | | 1 | 0.891 | 0.891 | 0.891 | 0.891 | | 1 | | | | | | | | | | | | |
| [1]Bankfull Max Depth (ft) | 1.613 | 1.613 | 1.613 | 1.613 | | 1 | 1.6 | 1.6 | 1.6 | 1.6 | | 1 | 1.77 | 1.77 | 1.77 | 1.77 | | 1 | 1.688 | 1.688 | 1.688 | 1.688 | | 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 | 13.3 | 13.3 | 13.3 | 13.3 | | 1 | 13.34 | 13.34 | 13.34 | 13.34 | | 1 | | | | | | | | | | | | |
| Width/Depth Ratio | 14.67 | 14.67 | 14.67 | 14.67 | | 1 | 31.6 | 31.6 | 31.6 | 31.6 | | 1 | 19.59 | 19.59 | 19.59 | 19.59 | | 1 | 16.83 | 16.83 | 16.83 | 16.83 | | 1 | | | | | | | | | | | | |
| Entrenchment Ratio | 7.158 | 7.158 | 7.158 | 7.158 | | 1 | 4.9 | 4.9 | 4.9 | 4.9 | | 1 | 6.198 | 6.198 | 6.198 | 6.198 | | 1 | 6.673 | 6.673 | 6.673 | 6.673 | | 1 | | | | | | | | | | | | |
| [1]Bank Height Ratio | **1** | **1** | **1** | **1** | | **1** | **1** | **1** | **1** | **1** | | **1** | **1.0** | **1.0** | **1.0** | **1.0** | | **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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 13f. 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- 5 | | | | | | MY- 7 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 10.03 | 17.2 | 20.4 | 21.18 | | 3 | 9.3 | 17.8 | 21.1 | 23 | | 3 | | | | | | | | | | | | |
| Floodprone Width (ft) | 100 | 100 | 100 | 100 | | 3 | 100 | 100 | 100 | 100 | | 3 | 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 | 0.346 | 0.53 | 0.511 | 0.784 | | 3 | 0.3 | 0.53 | 0.5 | 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 | 1.293 | 1.43 | 1.469 | 1.512 | | 3 | 1.4 | 1.53 | 1.5 | 1.7 | | 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 | 7.3 | 8.53 | 7.9 | 10.4 | | 3 | 7.3 | 8.53 | 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 | 12.79 | 37.97 | 39.91 | 61.23 | | 3 | 11 | 40.9 | 51.1 | 60.6 | | 3 | | | | | | | | | | | | |
| Entrenchment Ratio | 6.966 | 10.26 | 10.08 | 13.72 | | 3 | 1.9 | 2.2 | 2.2 | 3.8 | | 3 | 4.721 | 6.53 | 4.902 | 9.968 | | 3 | 4.3 | 6.57 | 4.7 | 10.7 | | 3 | | | | | | | | | | | | |
| [1]Bank Height Ratio | **1** | **1** | **1** | **1** | | **3** | **1** | **0.9** | **0.9** | **1** | | **3** | **0.9** | **0.93** | **0.9** | **1.0** | | **3** | **0.9** | **1** | **1** | **1.1** | | **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 13g. 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- 5 | | | | | | MY- 7 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 1.34 | 4 | 10.05 | 12.43 | 12.24 | 15.07 | 2.22 | 4 | 10.7 | 12.88 | 12.8 | 15.2 | 2.26 | 4 | | | | | | | | | | | | |
| Floodprone Width (ft) | 100 | 100 | 100 | 100 | 0 | 4 | 100 | 100 | 100 | 100 | 0 | 4 | 100 | 100 | 100 | 100 | 0 | 4 | 100 | 100 | 100 | 100 | 0 | 4 | | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.533 | 0.686 | 0.676 | 0.857 | 0.166 | 4 | 0.5 | 0.6 | 0.6 | 0.6 | 0.06 | 4 | 0.417 | 0.58 | 0.554 | 0.808 | 0.17 | 4 | 0.4 | 0.55 | 0.5 | 0.8 | 0.17 | 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 | 0.17 | 4 | 0.926 | 1.075 | 1.04 | 1.416 | 0.24 | 4 | 1 | 1.15 | 1.1 | 1.4 | 0.17 | 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 | 1.25 | 4 | 5.6 | 7 | 7.15 | 8.1 | 1.25 | 4 | 5.6 | 7 | 7.15 | 8.1 | 1.25 | 4 | | | | | | | | | | | | |
| Width/Depth Ratio | 11.06 | 16.01 | 15.47 | 22.04 | 5.078 | 4 | 19.9 | 21.6 | 21.6 | 27.7 | 3.64 | 4 | 12.44 | 23.2 | 22.1 | 36.16 | 9.8 | 4 | 14.3 | 24.65 | 25.8 | 32.7 | 8.06 | 4 | | | | | | | | | | | | |
| Entrenchment Ratio | 8.519 | 9.707 | 9.882 | 10.54 | 0.852 | 4 | 2 | 7.5 | 7.5 | 9.4 | 0.91 | 4 | 6.637 | 8.25 | 8.233 | 9.946 | 1.48 | 4 | 6.6 | 7.95 | 7.95 | 9.3 | 1.35 | 4 | | | | | | | | | | | | |
| [1]Bank Height Ratio | **1** | **1** | **1** | **1** | **0** | **4** | **1** | **1** | **1** | **1** | **0.05** | **4** | **0.9** | **1** | **1.0** | **1.1** | **0.1** | **4** | **0.9** | **0.925** | **0.9** | **1** | **0.05** | **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 13h. 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- 5 | | | | | | MY- 7 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 2.33 | 4 | 10.48 | 12.88 | 13.18 | 14.58 | 1.936 | 4 | 9.5 | 11.88 | 12.15 | 13.7 | 1.943 | 4 | | | | | | | | | | | | |
| Floodprone Width (ft) | 100 | 100 | 100 | 100 | 0 | 4 | 100 | 100 | 100 | 100 | 0 | 4 | 100 | 100 | 100 | 100 | 0 | 4 | 100 | 100 | 100 | 100 | 0 | 4 | | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.515 | 0.681 | 0.69 | 0.83 | 0.139 | 4 | 0.5 | 0.6 | 0.6 | 0.7 | 0.096 | 4 | 0.495 | 0.65 | 0.638 | 0.75 | 0.129 | 4 | 0.5 | 0.675 | 0.7 | 0.8 | 0.15 | 4 | | | | | | | | | | | | |
| [1]Bankfull Max Depth (ft) | 0.82 | 1.123 | 1.163 | 1.345 | 0.235 | 4 | 1 | 1.2 | 1.2 | 1.3 | 0.129 | 4 | 0.934 | 1.175 | 1.213 | 1.319 | 0.189 | 4 | 1 | 1.2 | 1.2 | 1.4 | 0.163 | 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 | 2.525 | 4 | 5.2 | 8.25 | 8.55 | 10.7 | 2.525 | 4 | 5.2 | 8.25 | 8.55 | 10.7 | 2.53 | 4 | | | | | | | | | | | | |
| Width/Depth Ratio | 15.52 | 17.76 | 17.95 | 19.61 | 1.734 | 4 | 19.6 | 21 | 21 | 21.8 | 0.947 | 4 | 19.02 | 20.48 | 20.7 | 21.51 | 1.13 | 4 | 17.2 | 17.48 | 17.55 | 17.6 | 0.189 | 4 | | | | | | | | | | | | |
| Entrenchment Ratio | 7.602 | 8.481 | 8.207 | 9.908 | 1.056 | 4 | 0.7 | 1.5 | 1.5 | 2 | 1.53 | 4 | 6.857 | 7.925 | 7.639 | 9.541 | 1.2 | 4 | 7.3 | 8.6 | 8.3 | 10.5 | 1.47 | 4 | | | | | | | | | | | | |
| [1]Bank Height Ratio | **1** | **1** | **1** | **1** | **0** | **4** | **1** | **1** | **1** | **1.2** | **0.096** | **4** | **0.9** | **1.025** | **1.0** | **1.1** | **0.096** | **4** | **0.9** | **0.95** | **0.95** | **1** | **0.058** | **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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 13i. 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- 5 | | | | | | MY- 7 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | 10.38 | 11.27 | 11.18 | 14.53 | | 3 | 11.3 | 12.53 | 12.3 | 14 | | 3 | | | | | | | | | | | | |
| Floodprone Width (ft) | 100 | 100 | 100 | 100 | | 3 | 100 | 100 | 100 | 100 | | 3 | 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 | 0.576 | 0.8 | 0.702 | 0.799 | | 3 | 0.6 | 0.667 | 0.7 | 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 | 1.206 | 1.5 | 1.457 | 1.625 | | 3 | 1.1 | 1.33 | 1.4 | 1.5 | | 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 | 6.4 | 8.3 | 8.3 | 10.2 | | 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 | 12.99 | 14.7 | 19.43 | 20.7 | | 3 | 18.4 | 19.13 | 19.1 | 19.9 | | 3 | | | | | | | | | | | | |
| Entrenchment Ratio | 7.32 | 8.413 | 8.244 | 9.676 | | 3 | 1.6 | 1.9 | 1.9 | 2.2 | | 3 | 6.883 | 8.9 | 8.943 | 9.638 | | 3 | 7.2 | 8.033 | 8.1 | 8.8 | | 3 | | | | | | | | | | | | |
| [1]Bank Height Ratio | **1** | **1** | **1** | **1** | | **3** | **1.1** | **1.1** | **1.1** | **1.2** | | **3** | **0.9** | **1** | **1.0** | **1.0** | | **3** | **0.9** | **1** | **1** | **1.1** | | **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

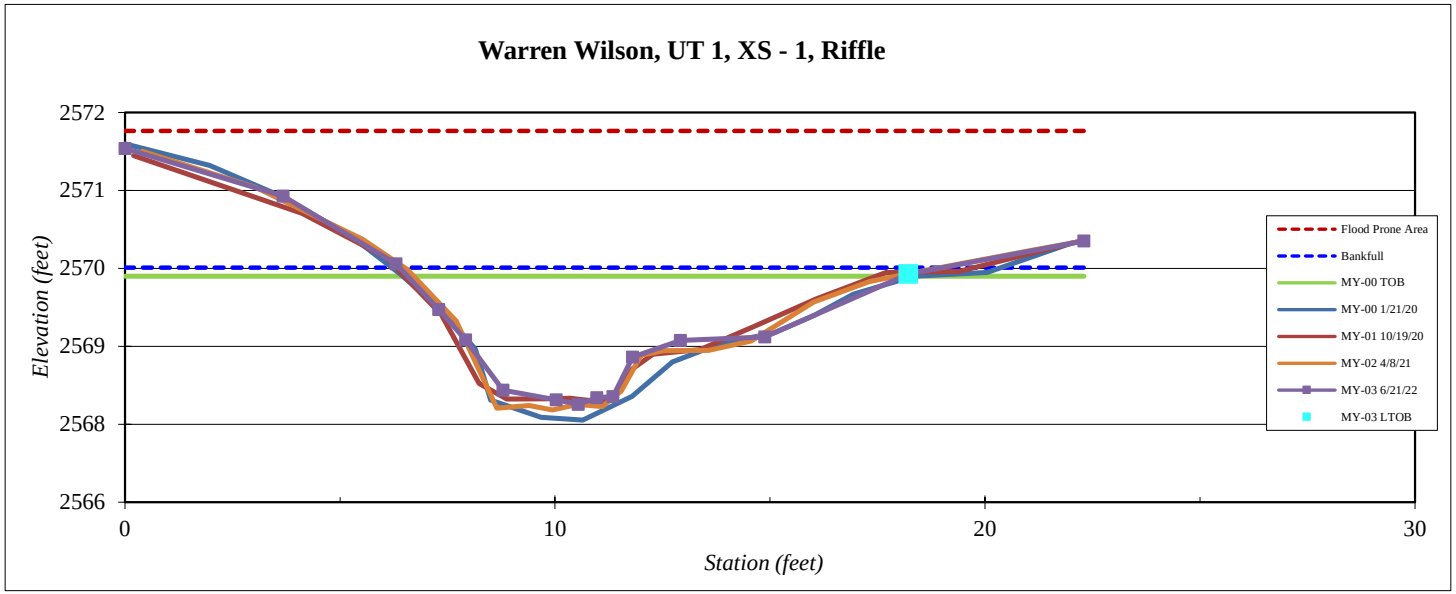
Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual 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:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2571.6 |
| 3.7 | 2570.9 |
| 6.3 | 2569.9 |
| 7.3 | 2569.3 |
| 7.9 | 2568.8 |
| 8.8 | 2568.1 |
| 10.0 | 2567.9 |
| 10.5 | 2567.9 |
| 11.0 | 2568.0 |
| 11.3 | 2568.0 |
| 11.8 | 2568.6 |
| 12.9 | 2568.8 |
| 14.9 | 2568.9 |
| 18.2 | 2569.8 |
| 22.3 | 2570.2 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2569.9 |
| **Bankfull Cross-Sectional Area:** | 12.8 |
| **Bankfull Width:** | 12.6 |
| **Flood Prone Area Elevation:** | 2571.8 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 2.0 |
| **Low Bank Height:** | 1.9 |
| **Mean Depth at Bankfull:** | 1.0 |
| **W / D Ratio:** | 12.5 |
| **Entrenchment Ratio:** | 7.9 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Cb 4 |

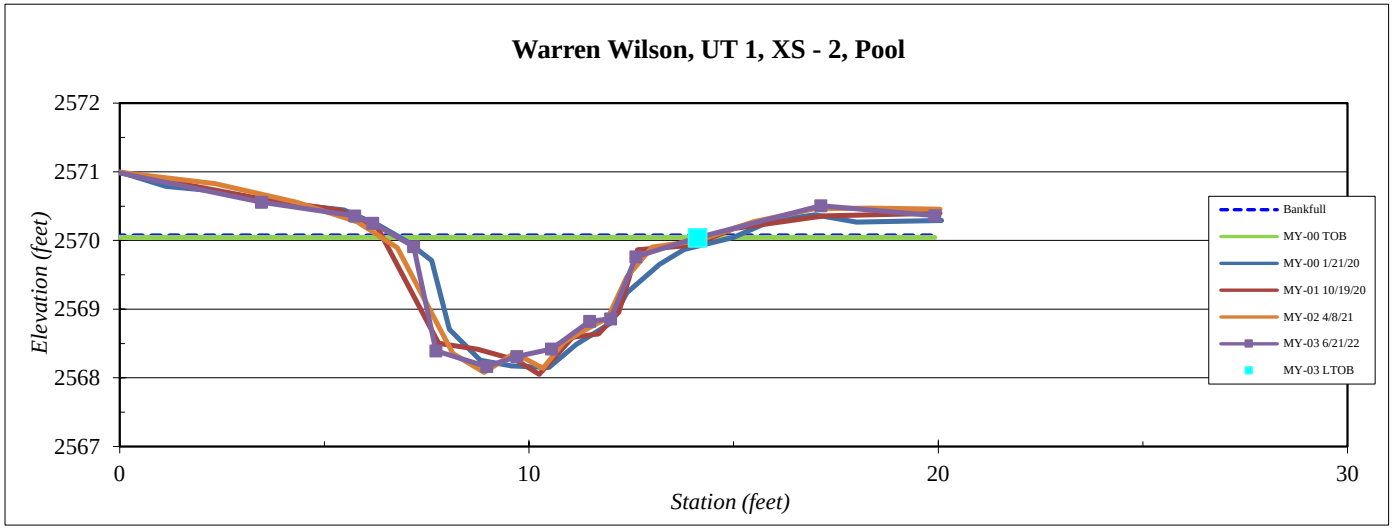


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 2, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.1 | 2571.0 |
| 3.5 | 2570.6 |
| 5.7 | 2570.4 |
| 6.2 | 2570.3 |
| 7.2 | 2569.9 |
| 7.7 | 2568.4 |
| 9.0 | 2568.2 |
| 9.7 | 2568.3 |
| 10.5 | 2568.4 |
| 11.5 | 2568.8 |
| 12.0 | 2568.9 |
| 12.6 | 2569.8 |
| 14.1 | 2570.0 |
| 17.1 | 2570.5 |
| 19.9 | 2570.4 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2570.1 |
| **Bankfull Cross-Sectional Area:** | 8.3 |
| **Bankfull Width:** | 7.6 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.0 |
| **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 |

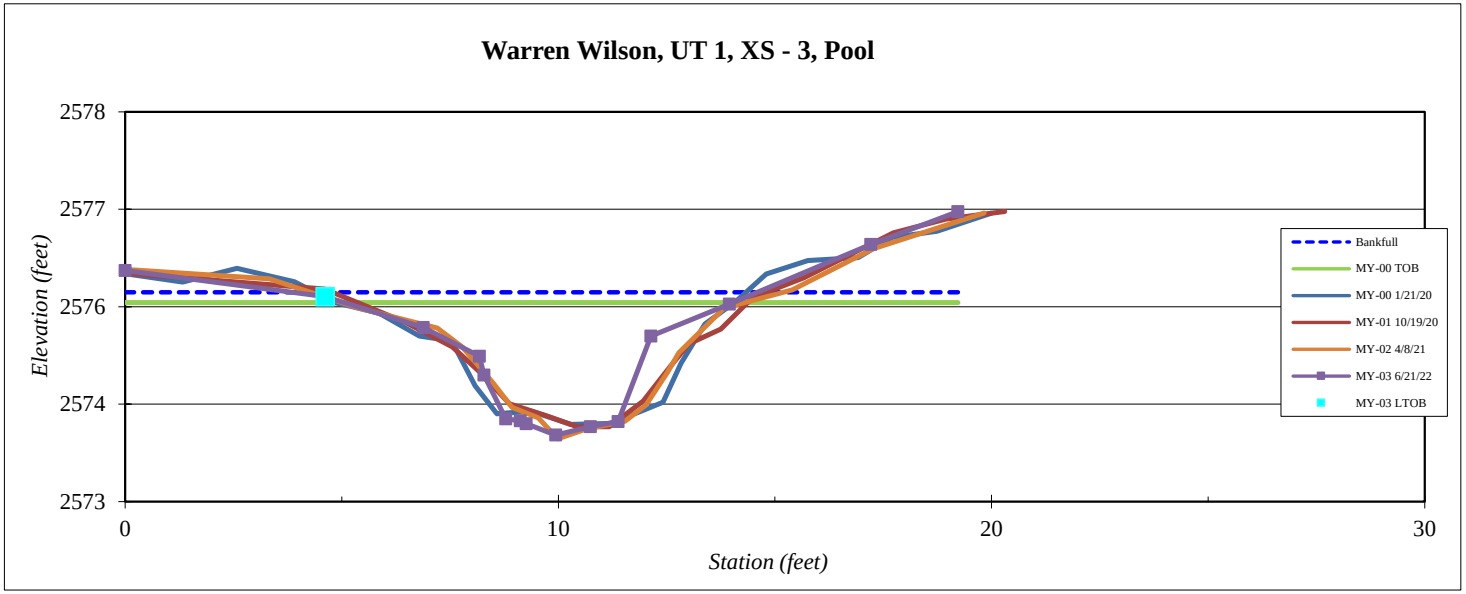


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 3, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2575.9 |
| 4.6 | 2575.6 |
| 6.9 | 2575.3 |
| 8.2 | 2574.9 |
| 8.3 | 2574.7 |
| 8.8 | 2574.2 |
| 9.1 | 2574.2 |
| 9.3 | 2574.1 |
| 9.9 | 2574.0 |
| 10.7 | 2574.1 |
| 11.4 | 2574.2 |
| 12.1 | 2575.2 |
| 14.0 | 2575.5 |
| 17.2 | 2576.2 |
| 19.2 | 2576.6 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 2575.7 |
| **Bankfull Cross-Sectional Area:** | 7.4 |
| **Bankfull Width:** | 10.7 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.7 |
| **Low Bank Height:** | 1.6 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Cb 4 |

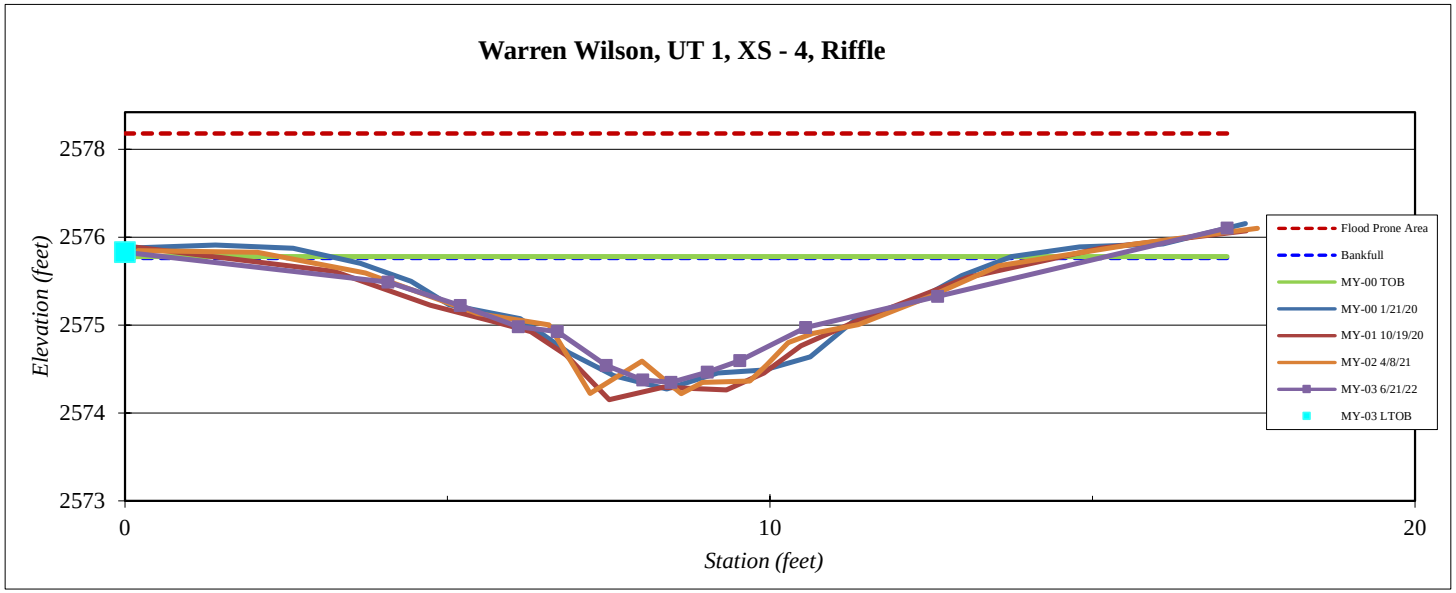


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS -4, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2576.2 |
| 4.1 | 2575.8 |
| 5.2 | 2575.5 |
| 6.1 | 2575.2 |
| 6.7 | 2575.2 |
| 7.5 | 2574.7 |
| 8.0 | 2574.6 |
| 8.5 | 2574.5 |
| 9.0 | 2574.7 |
| 9.5 | 2574.8 |
| 10.6 | 2575.2 |
| 12.6 | 2575.6 |
| 17.1 | 2576.5 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2576.1 |
| **Bankfull Cross-Sectional Area:** | 9.4 |
| **Bankfull Width:** | 14.4 |
| **Flood Prone Area Elevation:** | 2577.7 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.6 |
| **Low Bank Height:** | 1.7 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | 21.9 |
| **Entrenchment Ratio:** | 7.0 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Cb 4 |

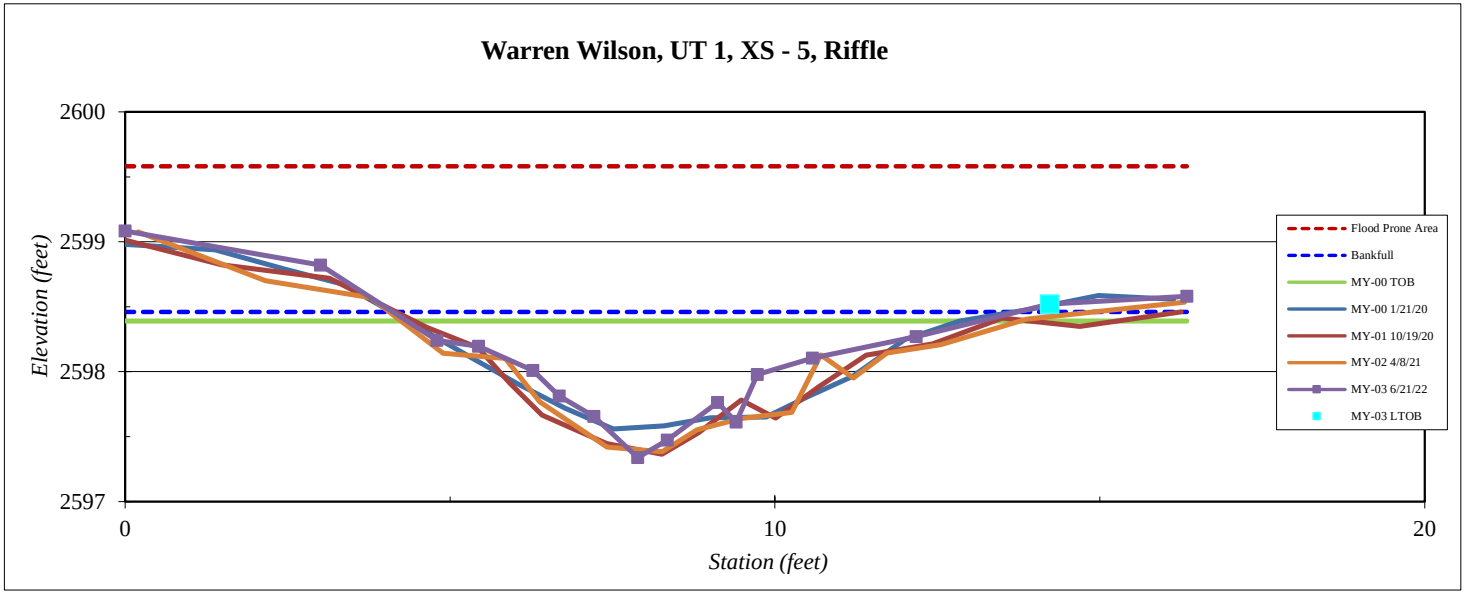


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 5, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2599.1 |
| 3.0 | 2598.8 |
| 4.8 | 2598.2 |
| 5.4 | 2598.2 |
| 6.3 | 2598.0 |
| 6.7 | 2597.8 |
| 7.2 | 2597.7 |
| 7.9 | 2597.3 |
| 8.3 | 2597.5 |
| 9.1 | 2597.8 |
| 9.4 | 2597.6 |
| 9.7 | 2598.0 |
| 10.6 | 2598.1 |
| 12.2 | 2598.3 |
| 14.2 | 2598.5 |
| 16.3 | 2598.6 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2598.5 |
| **Bankfull Cross-Sectional Area:** | 4.3 |
| **Bankfull Width:** | 9.6 |
| **Flood Prone Area Elevation:** | 2599.6 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.1 |
| **Low Bank Height:** | 1.2 |
| **Mean Depth at Bankfull:** | 0.4 |
| **W / D Ratio:** | 21.5 |
| **Entrenchment Ratio:** | 10.4 |
| **Bank Height Ratio:** | 1.1 |

| | |
|---|---|
| **Stream Type** | Cb 4 |

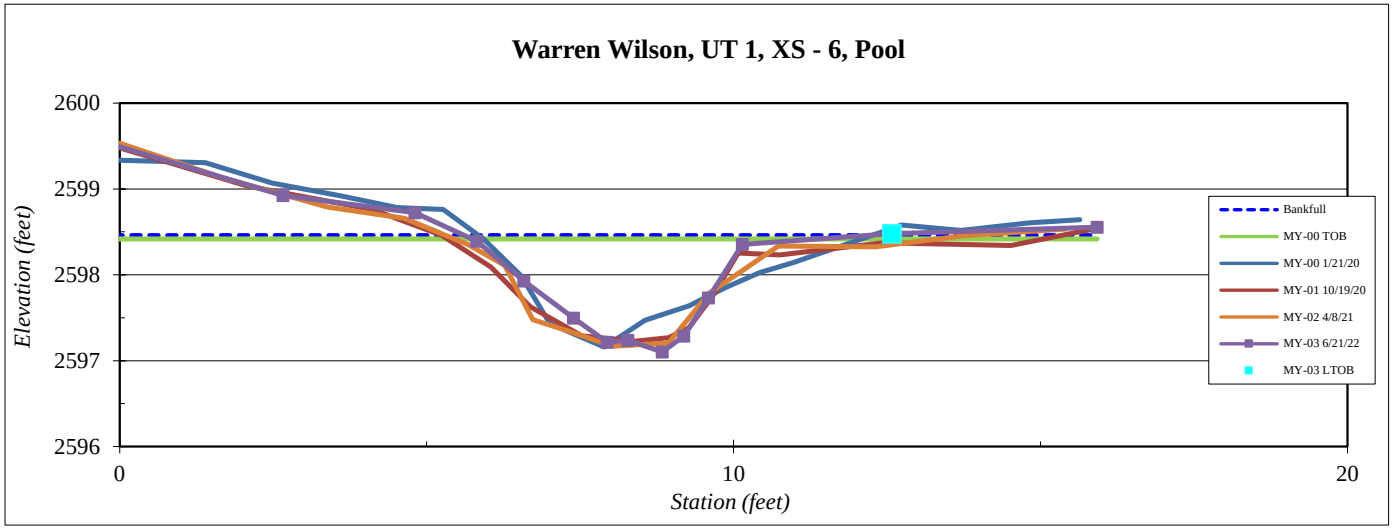


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 6, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.1 | 2599.5 |
| 2.7 | 2598.9 |
| 4.8 | 2598.7 |
| 5.8 | 2598.4 |
| 6.6 | 2597.9 |
| 7.4 | 2597.5 |
| 7.9 | 2597.2 |
| 8.3 | 2597.2 |
| 8.8 | 2597.1 |
| 9.2 | 2597.3 |
| 9.6 | 2597.7 |
| 10.1 | 2598.4 |
| 12.6 | 2598.5 |
| 15.9 | 2598.6 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2598.5 |
| **Bankfull Cross-Sectional Area:** | 3.8 |
| **Bankfull Width:** | 6.6 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.4 |
| **Low Bank Height:** | 1.4 |
| **Mean Depth at Bankfull:** | 0.6 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Cb 4 |

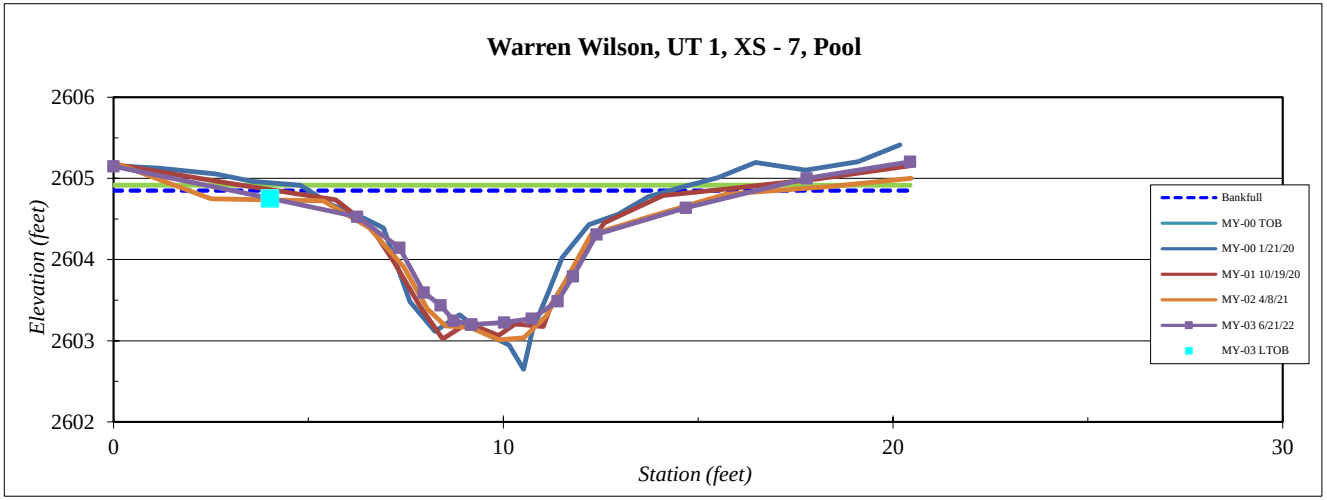


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 7, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2605.2 |
| 4.0 | 2604.8 |
| 6.3 | 2604.5 |
| 7.3 | 2604.1 |
| 8.0 | 2603.6 |
| 8.4 | 2603.4 |
| 8.7 | 2603.2 |
| 9.2 | 2603.2 |
| 9.2 | 2603.2 |
| 10.0 | 2603.2 |
| 10.7 | 2603.3 |
| 11.4 | 2603.5 |
| 11.8 | 2603.8 |
| 12.4 | 2604.3 |
| 14.7 | 2604.6 |
| 17.8 | 2605.0 |
| 20.4 | 2605.2 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 2604.9 |
| **Bankfull Cross-Sectional Area:** | 9.0 |
| **Bankfull Width:** | 13.4 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.7 |
| **Low Bank Height:** | 1.6 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Cb 4 |

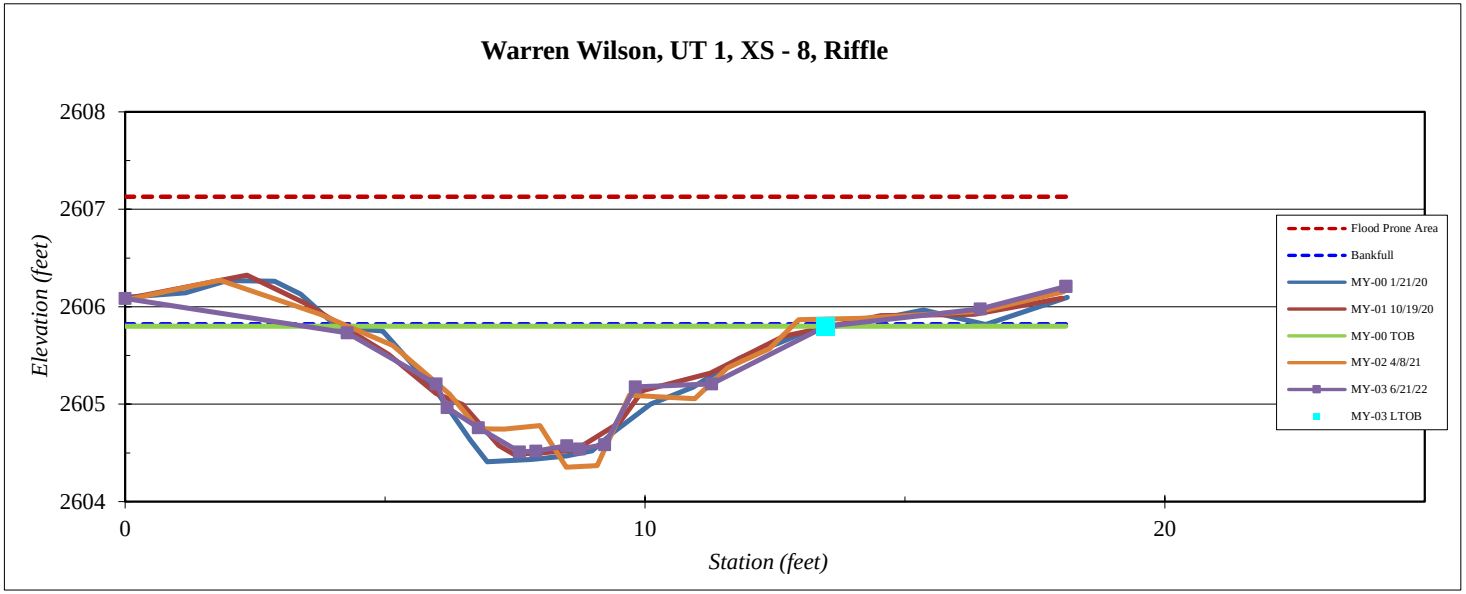


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 8, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2606.1 |
| 4.3 | 2605.7 |
| 6.0 | 2605.2 |
| 6.2 | 2605.0 |
| 6.8 | 2604.8 |
| 7.6 | 2604.5 |
| 7.9 | 2604.5 |
| 8.5 | 2604.6 |
| 8.7 | 2604.5 |
| 9.2 | 2604.6 |
| 9.8 | 2605.2 |
| 11.3 | 2605.2 |
| 13.5 | 2605.8 |
| 16.4 | 2606.0 |
| 18.1 | 2606.2 |
| 18.1 | 2606.2 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2605.8 |
| **Bankfull Cross-Sectional Area:** | 6.6 |
| **Bankfull Width:** | 10.6 |
| **Flood Prone Area Elevation:** | 2607.1 |
| **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:** | 17.2 |
| **Entrenchment Ratio:** | 9.4 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Cb 4 |

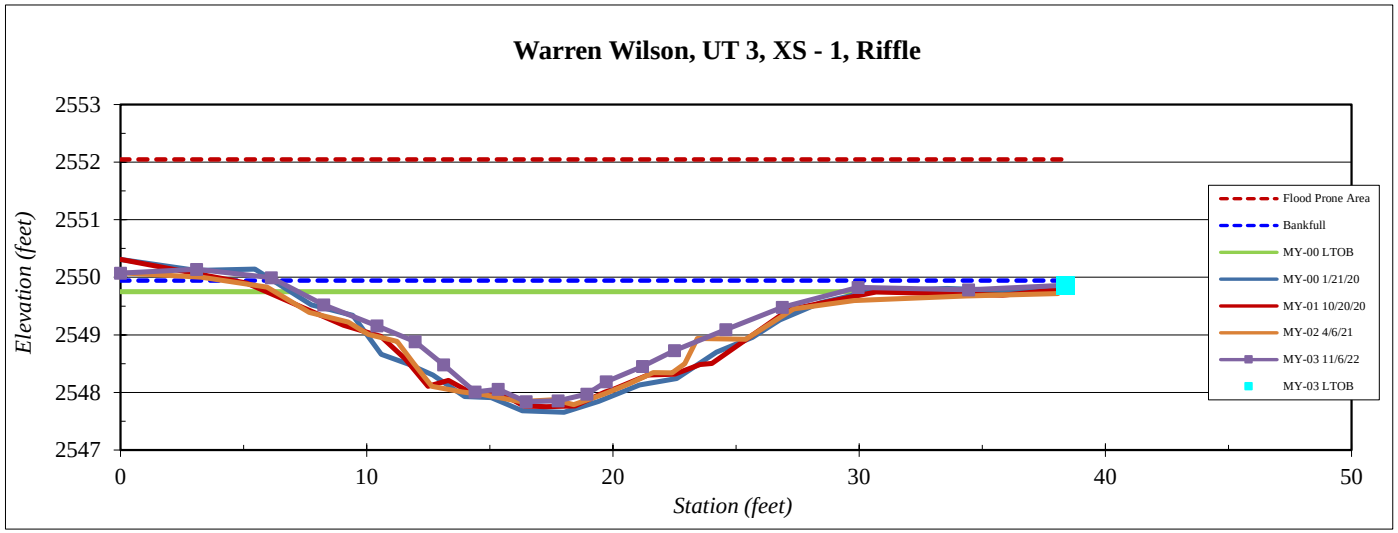


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 1, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2550.1 |
| 3.1 | 2550.1 |
| 6.1 | 2550.0 |
| 8.3 | 2549.5 |
| 10.4 | 2549.2 |
| 12.0 | 2548.9 |
| 13.1 | 2548.5 |
| 14.4 | 2548.0 |
| 15.3 | 2548.1 |
| 16.5 | 2547.8 |
| 17.8 | 2547.9 |
| 18.9 | 2548.0 |
| 19.7 | 2548.2 |
| 21.2 | 2548.5 |
| 22.5 | 2548.7 |
| 24.6 | 2549.1 |
| 26.9 | 2549.5 |
| 30.0 | 2549.8 |
| 34.4 | 2549.8 |
| 38.4 | 2549.9 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2549.9 |
| **Bankfull Cross-Sectional Area:** | 27.2 |
| **Bankfull Width:** | 32.0 |
| **Flood Prone Area Elevation:** | 2552.0 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 2.1 |
| **Low Bank Height:** | 2.0 |
| **Mean Depth at Bankfull:** | 0.8 |
| **W / D Ratio:** | 37.7 |
| **Entrenchment Ratio:** | 3.1 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

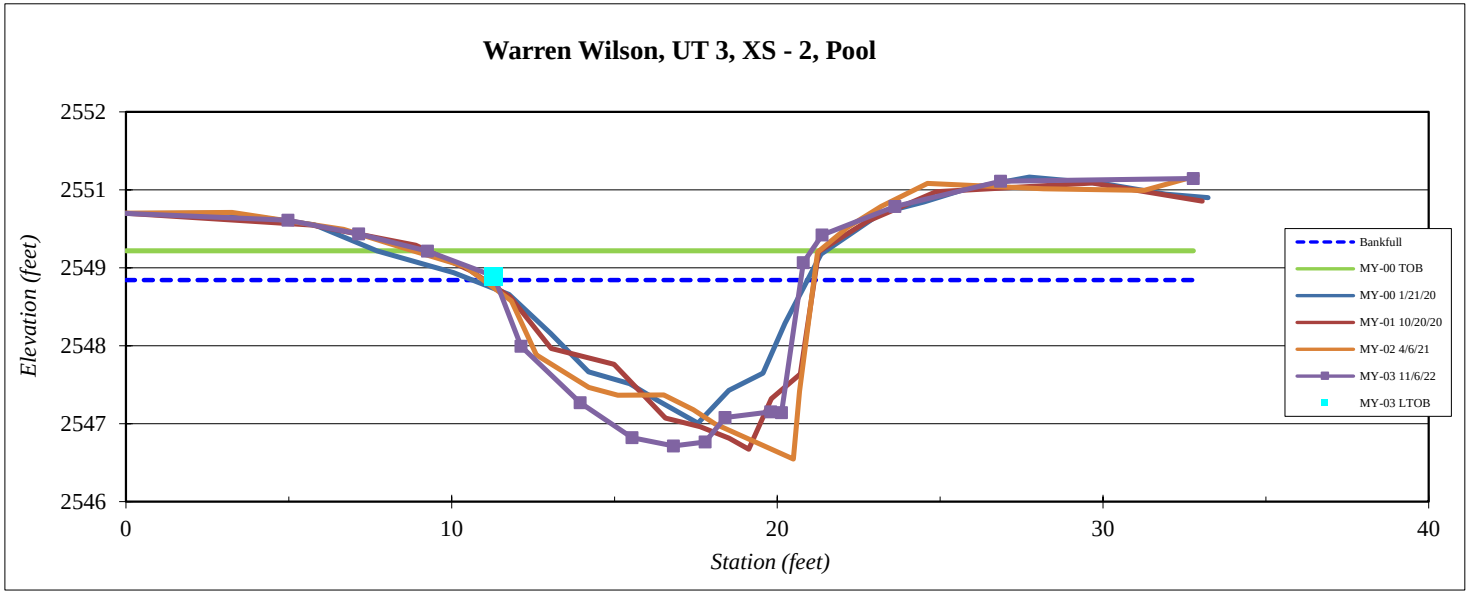


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 2, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.3 | 2550.3 |
| 5.0 | 2550.2 |
| 7.1 | 2550.0 |
| 9.3 | 2549.7 |
| 11.3 | 2549.4 |
| 12.1 | 2548.4 |
| 13.9 | 2547.5 |
| 15.5 | 2547.0 |
| 16.8 | 2546.9 |
| 17.8 | 2547.0 |
| 18.4 | 2547.3 |
| 19.8 | 2547.4 |
| 20.1 | 2547.4 |
| 20.8 | 2549.6 |
| 21.4 | 2550.0 |
| 23.6 | 2550.4 |
| 26.9 | 2550.8 |
| 32.8 | 2550.8 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 2549.3 |
| **Bankfull Cross-Sectional Area:** | 16.7 |
| **Bankfull Width:** | 9.4 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.4 |
| **Low Bank Height:** | 2.5 |
| **Mean Depth at Bankfull:** | 1.8 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

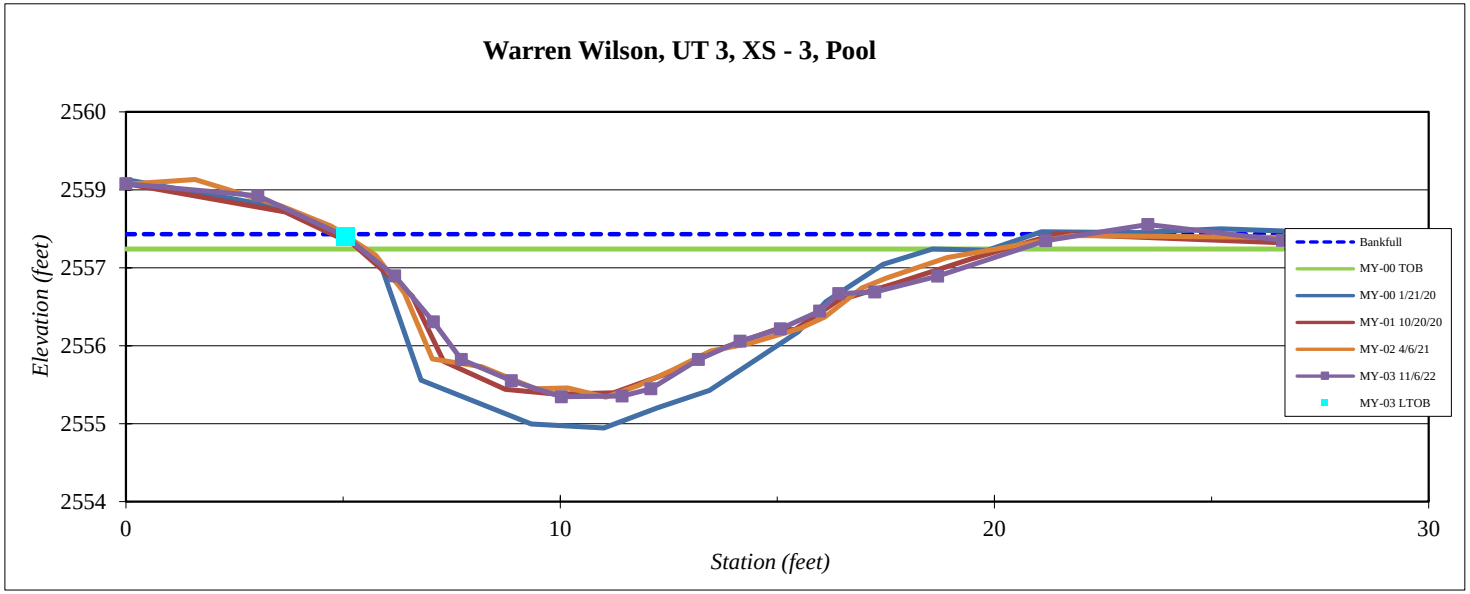


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT3, XS - 3, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2558.6 |
| 3.0 | 2558.5 |
| 5.1 | 2557.9 |
| 6.2 | 2557.3 |
| 7.1 | 2556.6 |
| 7.7 | 2556.1 |
| 8.9 | 2555.8 |
| 10.0 | 2555.5 |
| 11.4 | 2555.6 |
| 12.1 | 2555.7 |
| 13.2 | 2556.1 |
| 14.1 | 2556.3 |
| 15.1 | 2556.5 |
| 16.0 | 2556.8 |
| 16.4 | 2557.0 |
| 17.2 | 2557.1 |
| 18.7 | 2557.3 |
| 21.2 | 2557.8 |
| 23.5 | 2558.04 |
| 26.6 | 2557.81 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2557.9 |
| **Bankfull Cross-Sectional Area:** | 21.3 |
| **Bankfull Width:** | 17.2 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.4 |
| **Low Bank Height:** | 2.3 |
| **Mean Depth at Bankfull:** | 1.2 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

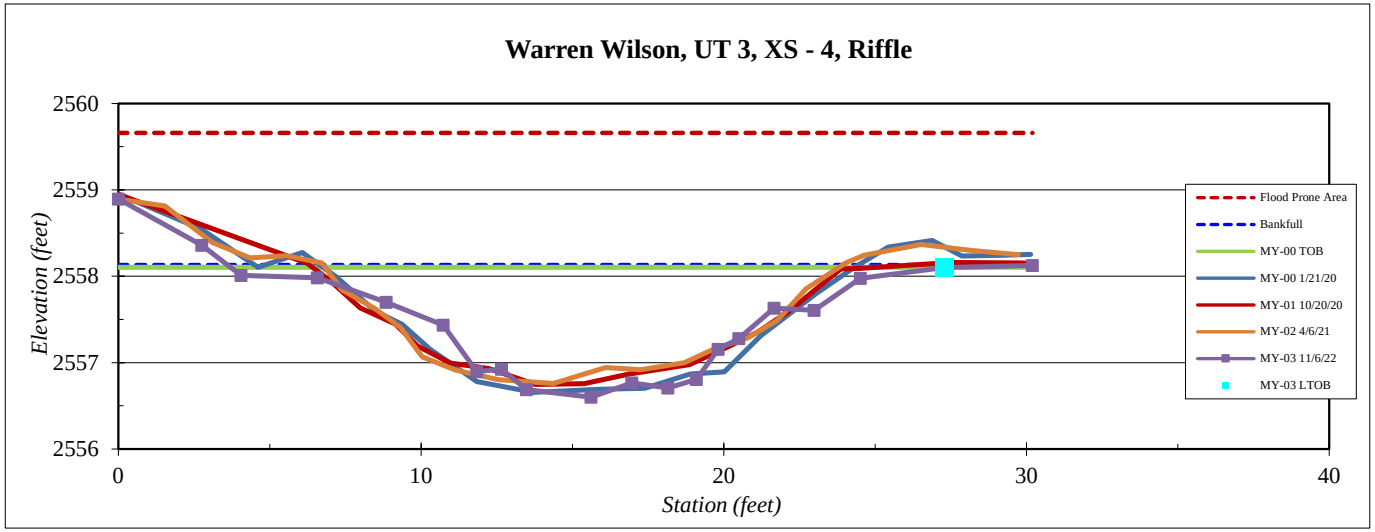


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 4, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2558.9 |
| 2.8 | 2558.4 |
| 4.1 | 2558.0 |
| 6.6 | 2558.0 |
| 8.8 | 2557.7 |
| 10.7 | 2557.4 |
| 11.8 | 2556.9 |
| 12.7 | 2556.9 |
| 13.5 | 2556.7 |
| 15.6 | 2556.6 |
| 17.0 | 2556.8 |
| 18.2 | 2556.7 |
| 19.1 | 2556.8 |
| 19.8 | 2557.2 |
| 20.5 | 2557.3 |
| 21.7 | 2557.6 |
| 23.0 | 2557.6 |
| 24.5 | 2558.0 |
| 27.3 | 2558.1 |
| 30.2 | 2558.1 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2558.1 |
| **Bankfull Cross-Sectional Area:** | 17.0 |
| **Bankfull Width:** | 26.6 |
| **Flood Prone Area Elevation:** | 2559.7 |
| **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:** | 41.5 |
| **Entrenchment Ratio:** | 3.8 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

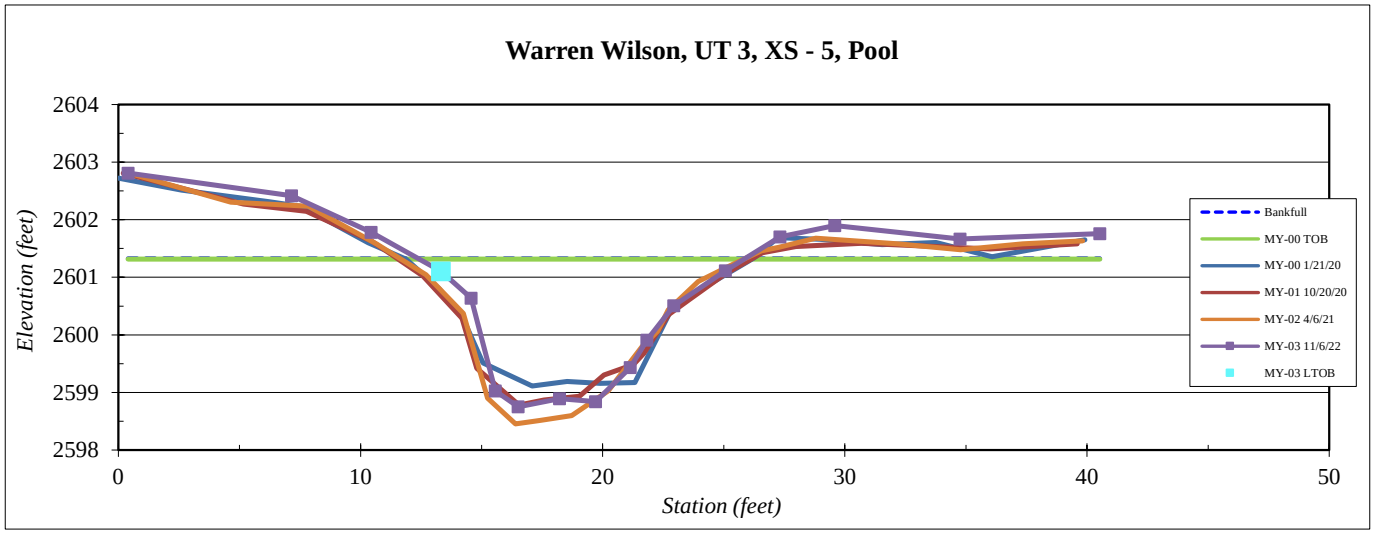


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 5, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.4 | 2602.8 |
| 7.1 | 2602.4 |
| 10.4 | 2601.8 |
| 13.3 | 2601.1 |
| 14.6 | 2600.6 |
| 15.6 | 2599.0 |
| 16.5 | 2598.8 |
| 18.2 | 2598.9 |
| 19.7 | 2598.8 |
| 21.1 | 2599.4 |
| 21.8 | 2599.9 |
| 22.9 | 2600.5 |
| 25.1 | 2601.1 |
| 27.3 | 2601.7 |
| 29.6 | 2601.9 |
| 34.8 | 2601.7 |
| 40.5 | 2601.8 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 2601.3 |
| **Bankfull Cross-Sectional Area:** | 19.1 |
| **Bankfull Width:** | 13.5 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.6 |
| **Low Bank Height:** | 2.4 |
| **Mean Depth at Bankfull:** | 1.4 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

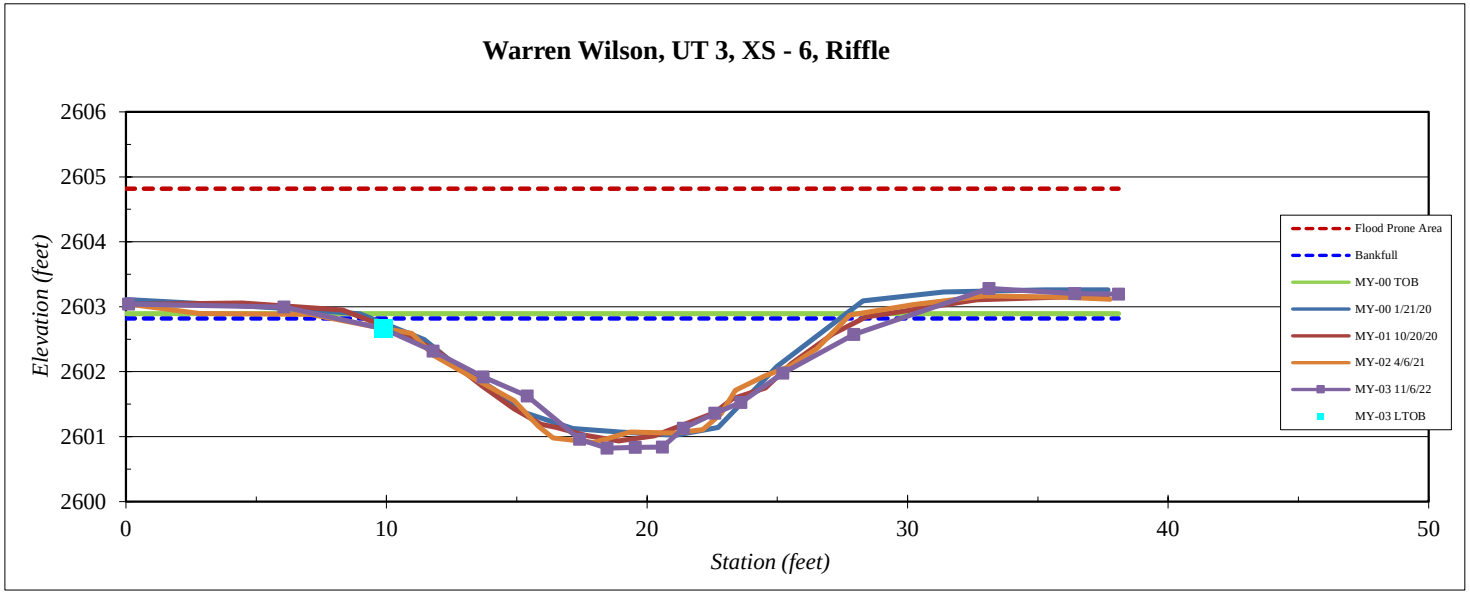


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 6, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.1 | 2603.0 |
| 6.1 | 2603.0 |
| 9.9 | 2602.7 |
| 11.8 | 2602.3 |
| 13.7 | 2601.9 |
| 15.4 | 2601.6 |
| 17.4 | 2601.0 |
| 18.5 | 2600.8 |
| 19.6 | 2600.8 |
| 20.6 | 2600.8 |
| 21.4 | 2601.1 |
| 22.6 | 2601.4 |
| 23.6 | 2601.5 |
| 25.2 | 2602.0 |
| 27.9 | 2602.6 |
| 33.1 | 2603.3 |
| 36.4 | 2603.2 |
| 38.1 | 2603.2 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 2602.8 |
| **Bankfull Cross-Sectional Area:** | 21.4 |
| **Bankfull Width:** | 21.6 |
| **Flood Prone Area Elevation:** | 2604.8 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 2.0 |
| **Low Bank Height:** | 1.8 |
| **Mean Depth at Bankfull:** | 1.0 |
| **W / D Ratio:** | 21.9 |
| **Entrenchment Ratio:** | 4.6 |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

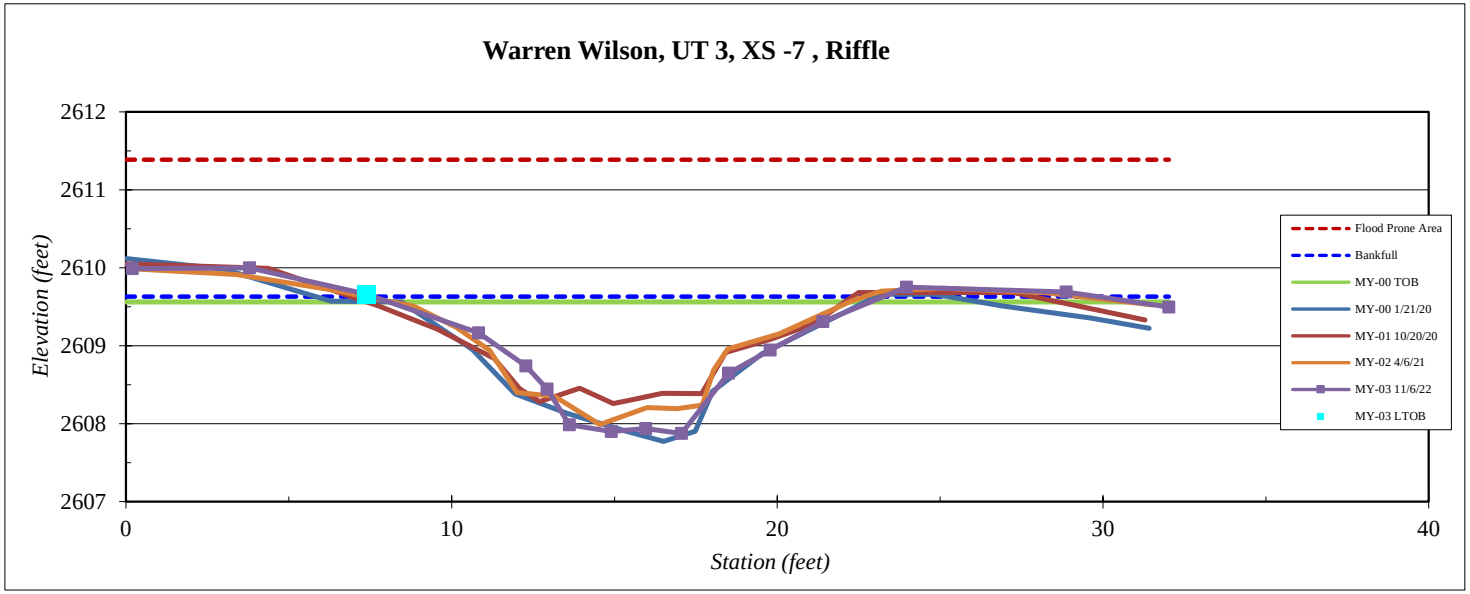


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 7, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.2 | 2610.0 |
| 3.8 | 2610.0 |
| 7.4 | 2609.7 |
| 10.8 | 2609.2 |
| 12.3 | 2608.7 |
| 12.9 | 2608.4 |
| 13.6 | 2608.0 |
| 14.9 | 2607.9 |
| 16.0 | 2607.9 |
| 17.1 | 2607.9 |
| 18.5 | 2608.6 |
| 19.8 | 2608.9 |
| 21.4 | 2609.3 |
| 24.0 | 2609.8 |
| 28.9 | 2609.7 |
| 32.0 | 2609.5 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2609.6 |
| **Bankfull Cross-Sectional Area:** | 13.6 |
| **Bankfull Width:** | 17.9 |
| **Flood Prone Area Elevation:** | 2611.4 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.8 |
| **Low Bank Height:** | 1.8 |
| **Mean Depth at Bankfull:** | 0.8 |
| **W / D Ratio:** | 23.5 |
| **Entrenchment Ratio:** | 5.6 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

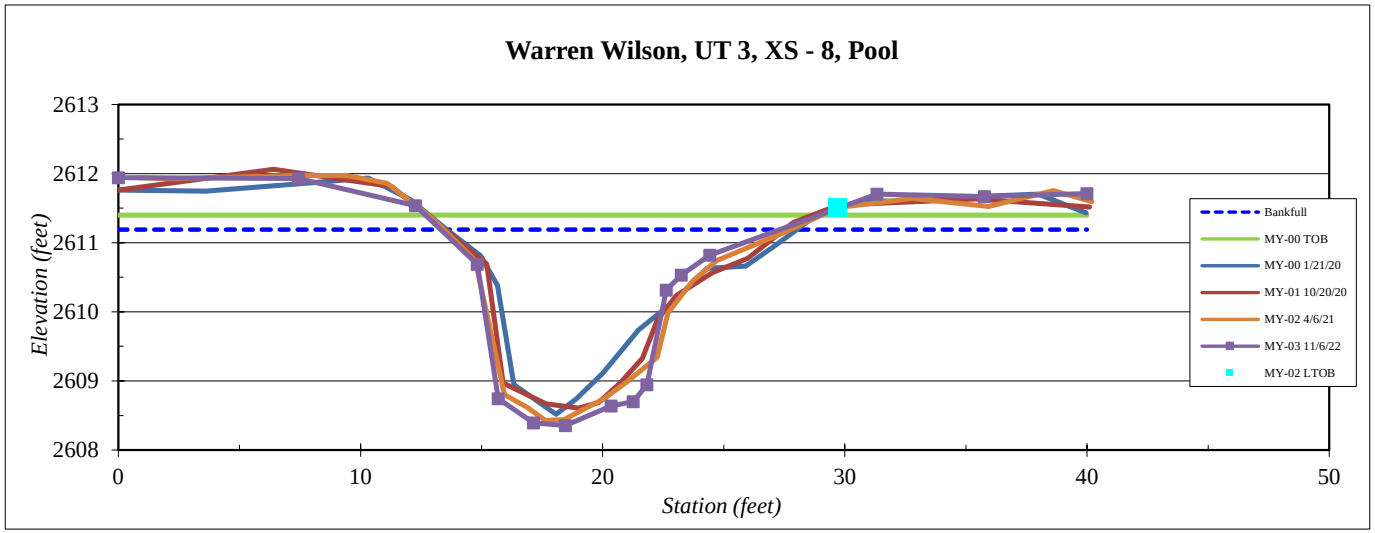


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 8, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2611.9 |
| 7.4 | 2611.9 |
| 12.3 | 2611.5 |
| 14.8 | 2610.7 |
| 15.7 | 2608.7 |
| 17.1 | 2608.4 |
| 18.5 | 2608.4 |
| 20.3 | 2608.6 |
| 21.3 | 2608.7 |
| 21.8 | 2608.9 |
| 22.6 | 2610.3 |
| 23.2 | 2610.5 |
| 24.4 | 2610.8 |
| 31.3 | 2611.7 |
| 35.8 | 2611.7 |
| 40.0 | 2611.7 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2611.2 |
| **Bankfull Cross-Sectional Area:** | 20.8 |
| **Bankfull Width:** | 14.0 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.8 |
| **Low Bank Height:** | 2.5 |
| **Mean Depth at Bankfull:** | 1.5 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

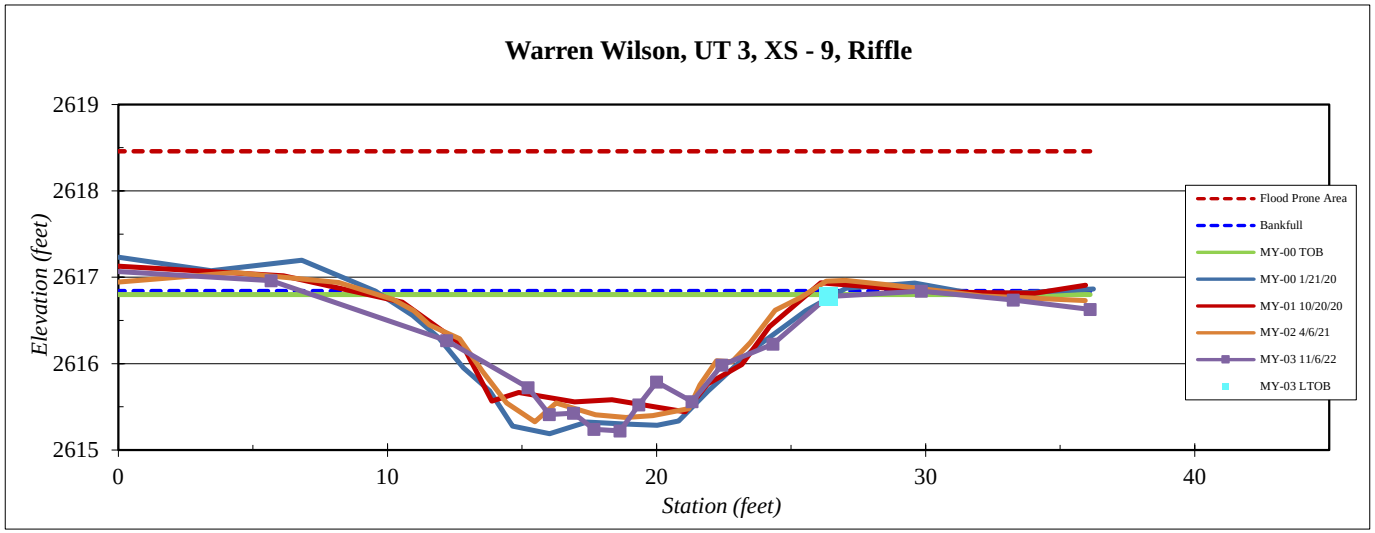


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 9, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.1 | 2617.1 |
| 5.7 | 2617.0 |
| 12.2 | 2616.3 |
| 15.2 | 2615.7 |
| 16.0 | 2615.4 |
| 16.9 | 2615.4 |
| 17.7 | 2615.2 |
| 18.6 | 2615.2 |
| 19.3 | 2615.5 |
| 20.0 | 2615.8 |
| 21.3 | 2615.6 |
| 22.4 | 2616.0 |
| 24.3 | 2616.2 |
| 26.4 | 2616.8 |
| 29.8 | 2616.8 |
| 33.3 | 2616.7 |
| 36.1 | 2616.6 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2616.8 |
| **Bankfull Cross-Sectional Area:** | 16.4 |
| **Bankfull Width:** | 29.3 |
| **Flood Prone Area Elevation:** | 2618.5 |
| **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:** | 52.1 |
| **Entrenchment Ratio:** | 3.4 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

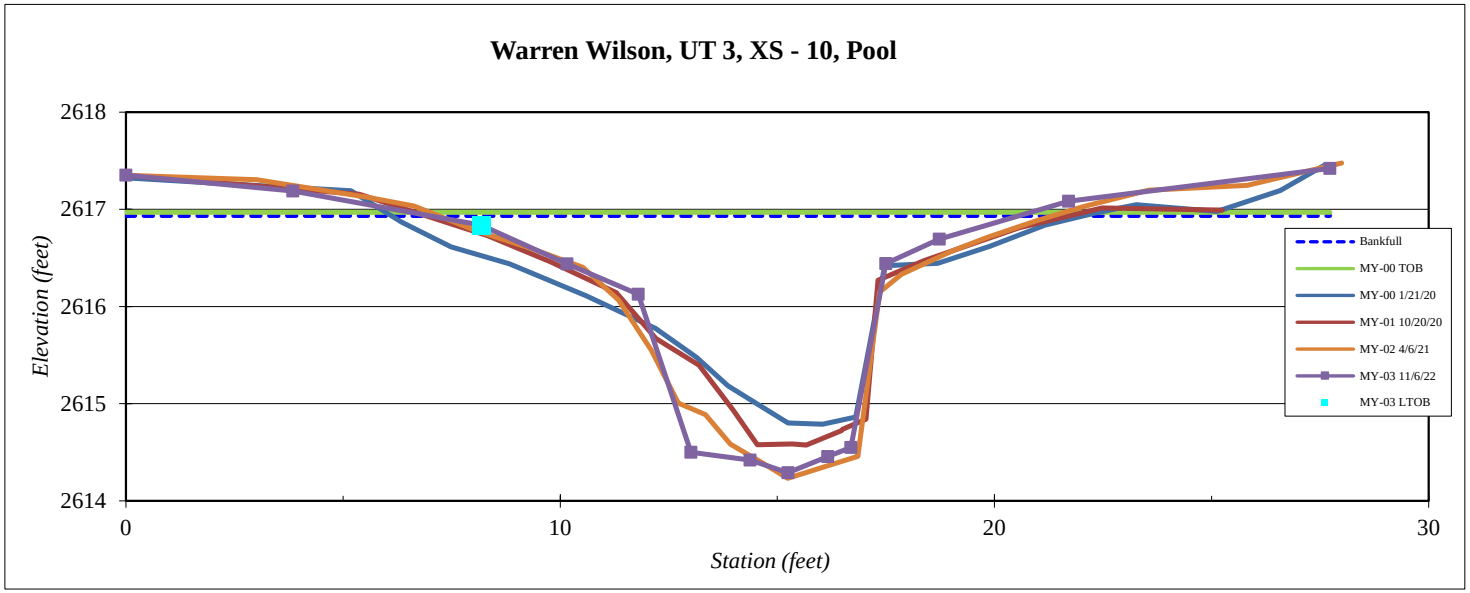


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 10, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2617.7 |
| 3.8 | 2617.5 |
| 8.2 | 2617.2 |
| 10.2 | 2616.7 |
| 11.8 | 2616.3 |
| 13.0 | 2614.5 |
| 14.4 | 2614.4 |
| 15.2 | 2614.3 |
| 16.2 | 2614.5 |
| 16.7 | 2614.6 |
| 17.5 | 2616.7 |
| 18.7 | 2617.0 |
| 21.7 | 2617.4 |
| 27.7 | 2617.8 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2617.3 |
| **Bankfull Cross-Sectional Area:** | 16.7 |
| **Bankfull Width:** | 13.6 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 3.0 |
| **Low Bank Height:** | 2.9 |
| **Mean Depth at Bankfull:** | 1.2 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

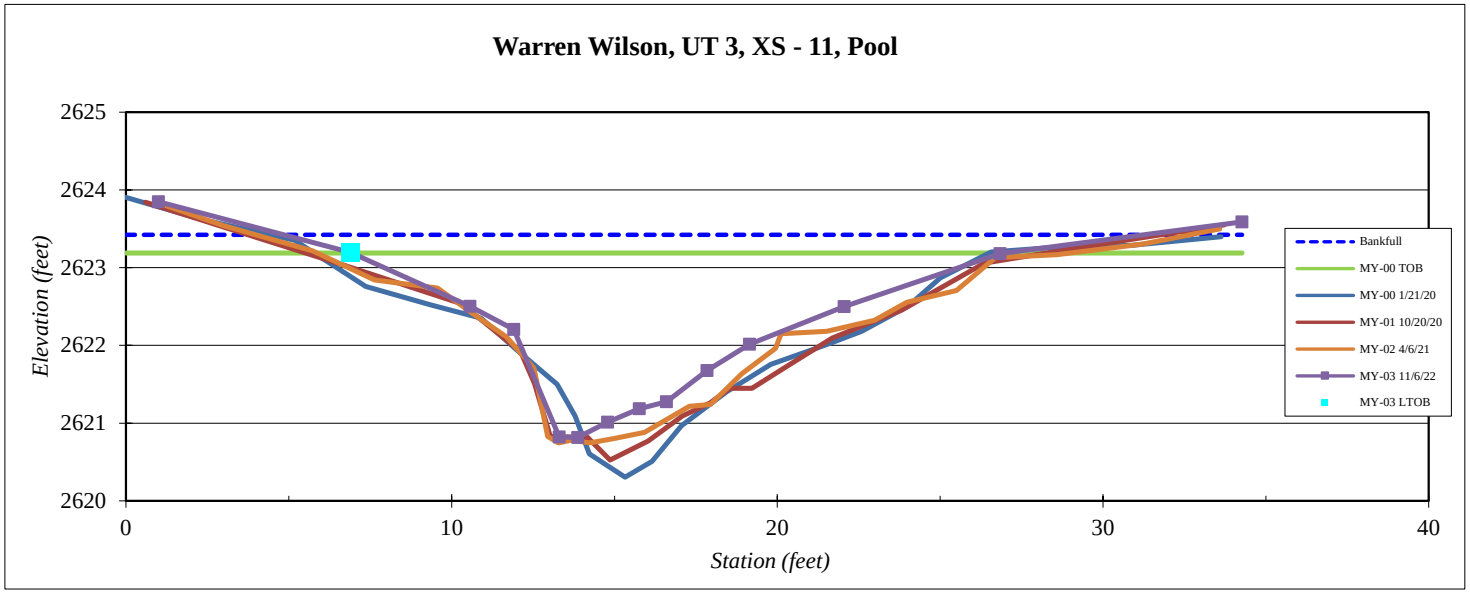


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 11, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 1.0 | 2623.9 |
| 6.9 | 2623.2 |
| 10.6 | 2622.4 |
| 11.9 | 2622.1 |
| 13.3 | 2620.5 |
| 13.9 | 2620.5 |
| 14.8 | 2620.7 |
| 15.8 | 2620.9 |
| 16.6 | 2621.0 |
| 17.8 | 2621.5 |
| 19.1 | 2621.9 |
| 22.1 | 2622.4 |
| 26.8 | 2623.2 |
| 34.3 | 2623.7 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2623.5 |
| **Bankfull Cross-Sectional Area:** | 28.8 |
| **Bankfull Width:** | 26.4 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.9 |
| **Low Bank Height:** | 2.7 |
| **Mean Depth at Bankfull:** | 1.1 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

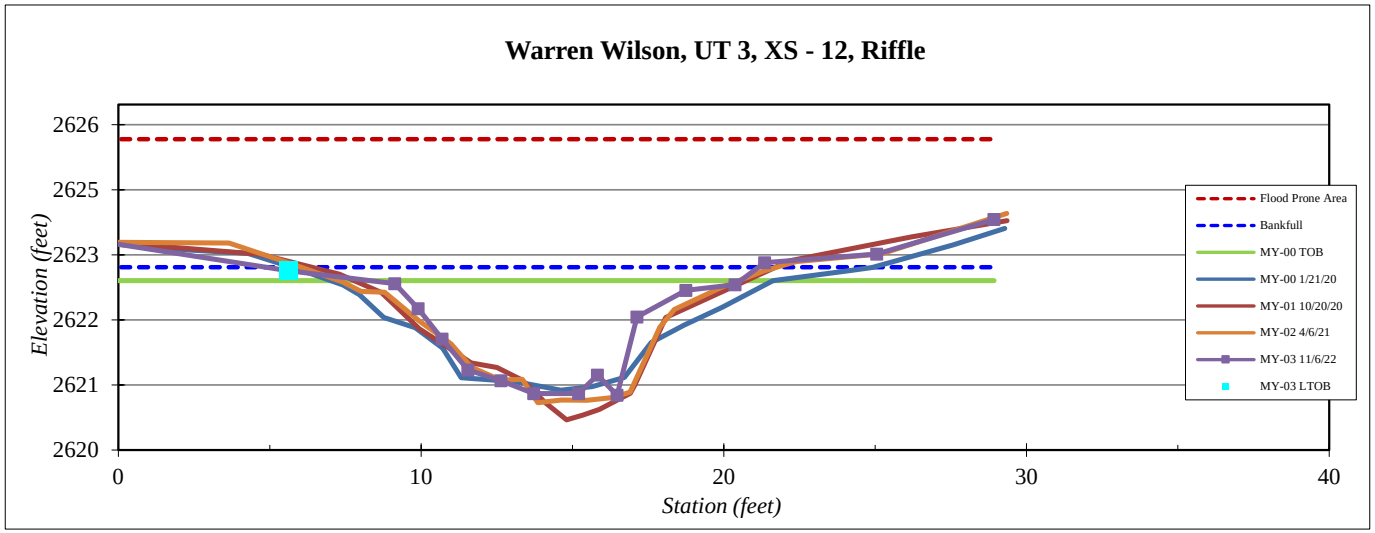


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 12, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.5 | 2623.6 |
| 5.6 | 2623.1 |
| 9.1 | 2622.9 |
| 9.9 | 2622.5 |
| 10.7 | 2621.9 |
| 11.5 | 2621.4 |
| 12.6 | 2621.2 |
| 13.7 | 2621.0 |
| 15.2 | 2621.0 |
| 15.8 | 2621.3 |
| 16.5 | 2621.0 |
| 17.1 | 2622.3 |
| 18.7 | 2622.8 |
| 20.4 | 2622.9 |
| 21.4 | 2623.3 |
| 25.1 | 2623.4 |
| 28.9 | 2624.0 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 2623.2 |
| **Bankfull Cross-Sectional Area:** | 16.0 |
| **Bankfull Width:** | 16.3 |
| **Flood Prone Area Elevation:** | 2625.4 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 2.2 |
| **Low Bank Height:** | 2.2 |
| **Mean Depth at Bankfull:** | 1.0 |
| **W / D Ratio:** | 16.6 |
| **Entrenchment Ratio:** | 6.1 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

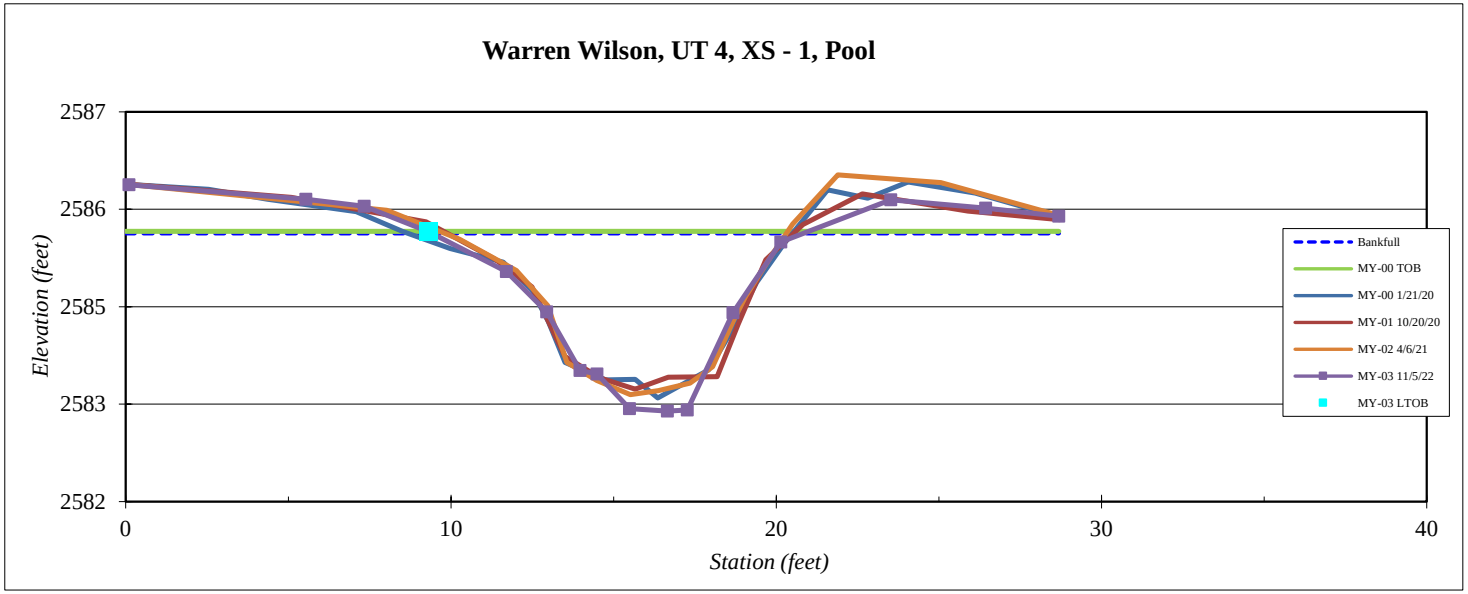


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 4, XS - 1, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.1 | 2586.0 |
| 5.5 | 2585.8 |
| 7.3 | 2585.7 |
| 9.3 | 2585.4 |
| 11.7 | 2585.0 |
| 12.9 | 2584.5 |
| 14.0 | 2583.8 |
| 14.5 | 2583.8 |
| 15.5 | 2583.4 |
| 16.7 | 2583.3 |
| 17.3 | 2583.3 |
| 18.7 | 2584.5 |
| 20.1 | 2585.3 |
| 23.5 | 2585.8 |
| 26.4 | 2585.7 |
| 28.7 | 2585.6 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 2585.4 |
| **Bankfull Cross-Sectional Area:** | 11.8 |
| **Bankfull Width:** | 11.4 |
| **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** | C 4 |

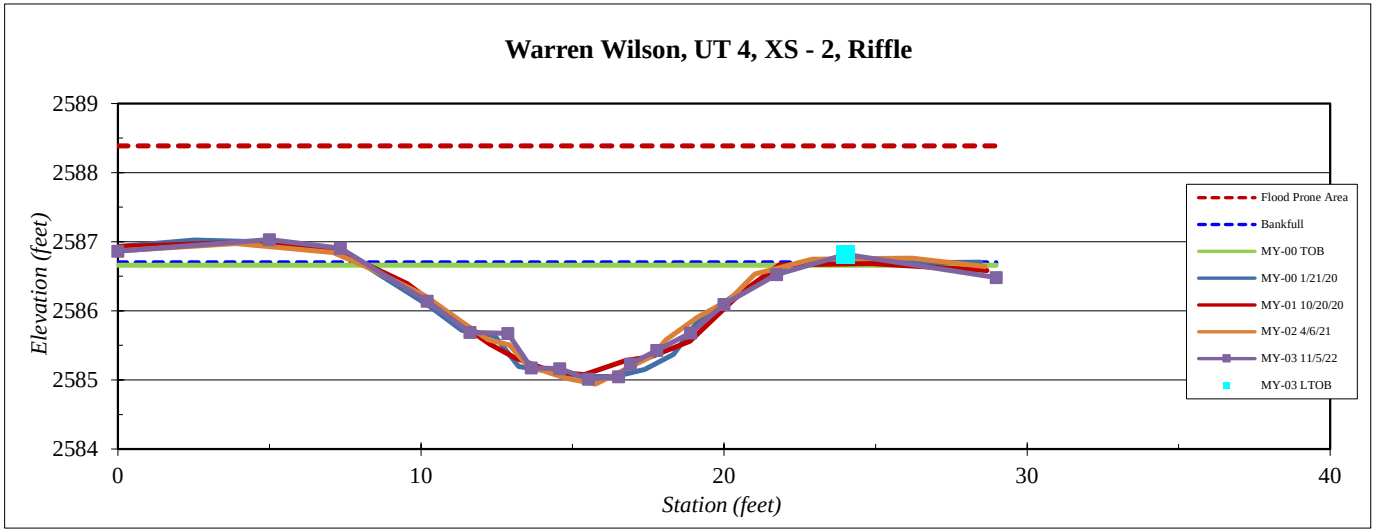


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 4, XS - 2, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 2586.9 |
| 5.0 | 2587.0 |
| 7.3 | 2586.9 |
| 10.2 | 2586.1 |
| 11.6 | 2585.7 |
| 12.9 | 2585.7 |
| 13.6 | 2585.2 |
| 14.6 | 2585.2 |
| 15.5 | 2585.0 |
| 16.5 | 2585.0 |
| 16.9 | 2585.2 |
| 17.8 | 2585.4 |
| 18.9 | 2585.7 |
| 20.0 | 2586.1 |
| 21.7 | 2586.5 |
| 24.0 | 2586.8 |
| 29.0 | 2586.5 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 2586.7 |
| **Bankfull Cross-Sectional Area:** | 13.3 |
| **Bankfull Width:** | 15.0 |
| **Flood Prone Area Elevation:** | 2588.4 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.7 |
| **Low Bank Height:** | 1.8 |
| **Mean Depth at Bankfull:** | 0.9 |
| **W / D Ratio:** | 16.8 |
| **Entrenchment Ratio:** | 6.7 |
| **Bank Height Ratio:** | 1.1 |

| | |
|---|---|
| **Stream Type** | C 4 |

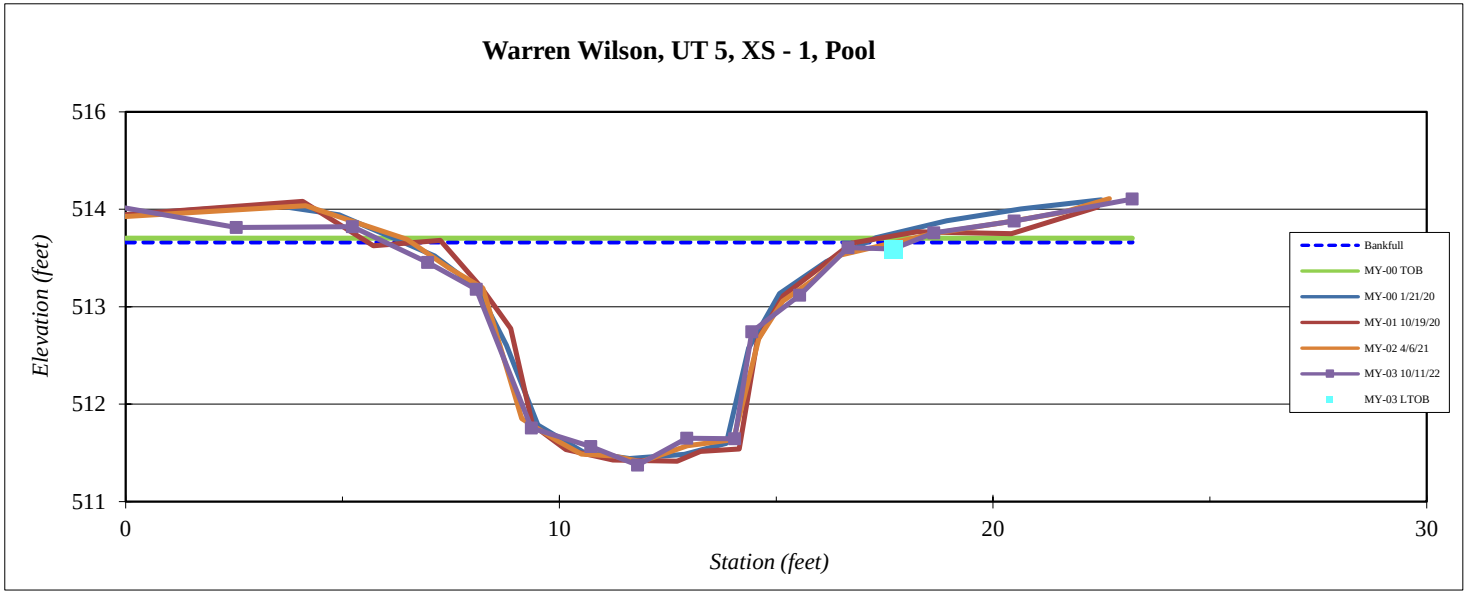


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 1, Pool |
| **Feature** | Pool |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.2 | 514.5 |
| 2.5 | 514.2 |
| 5.2 | 514.2 |
| 7.0 | 513.8 |
| 8.1 | 513.5 |
| 9.4 | 511.9 |
| 10.7 | 511.7 |
| 11.8 | 511.5 |
| 12.9 | 511.8 |
| 14.0 | 511.8 |
| 14.4 | 513.0 |
| 15.5 | 513.4 |
| 16.7 | 514.0 |
| 17.7 | 514.0 |
| 18.6 | 514.1 |
| 20.5 | 514.3 |
| 23.2 | 514.5 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 514.0 |
| **Bankfull Cross-Sectional Area:** | 15.3 |
| **Bankfull Width:** | 12.1 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.6 |
| **Low Bank Height:** | 2.5 |
| **Mean Depth at Bankfull:** | 1.3 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

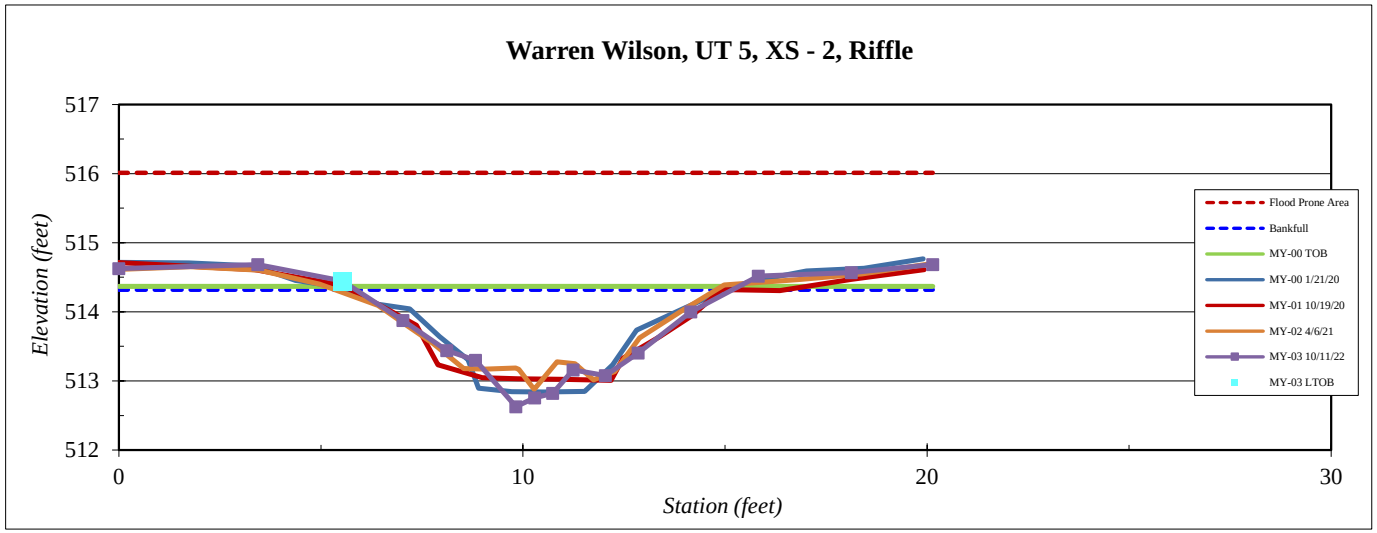


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 2, Riffle |
| **Feature** | Riffle |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 514.6 |
| 3.4 | 514.7 |
| 5.5 | 514.4 |
| 7.0 | 513.9 |
| 8.1 | 513.4 |
| 8.8 | 513.3 |
| 9.8 | 512.6 |
| 10.3 | 512.8 |
| 10.7 | 512.8 |
| 11.2 | 513.2 |
| 12.0 | 513.1 |
| 12.9 | 513.4 |
| 14.2 | 514.0 |
| 15.8 | 514.5 |
| 18.1 | 514.6 |
| 20.1 | 514.7 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 514.3 |
| **Bankfull Cross-Sectional Area:** | 7.9 |
| **Bankfull Width:** | 9.3 |
| **Flood Prone Area Elevation:** | 516.0 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.7 |
| **Low Bank Height:** | 1.8 |
| **Mean Depth at Bankfull:** | 0.8 |
| **W / D Ratio:** | 11.0 |
| **Entrenchment Ratio:** | 10.7 |
| **Bank Height Ratio:** | 1.1 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

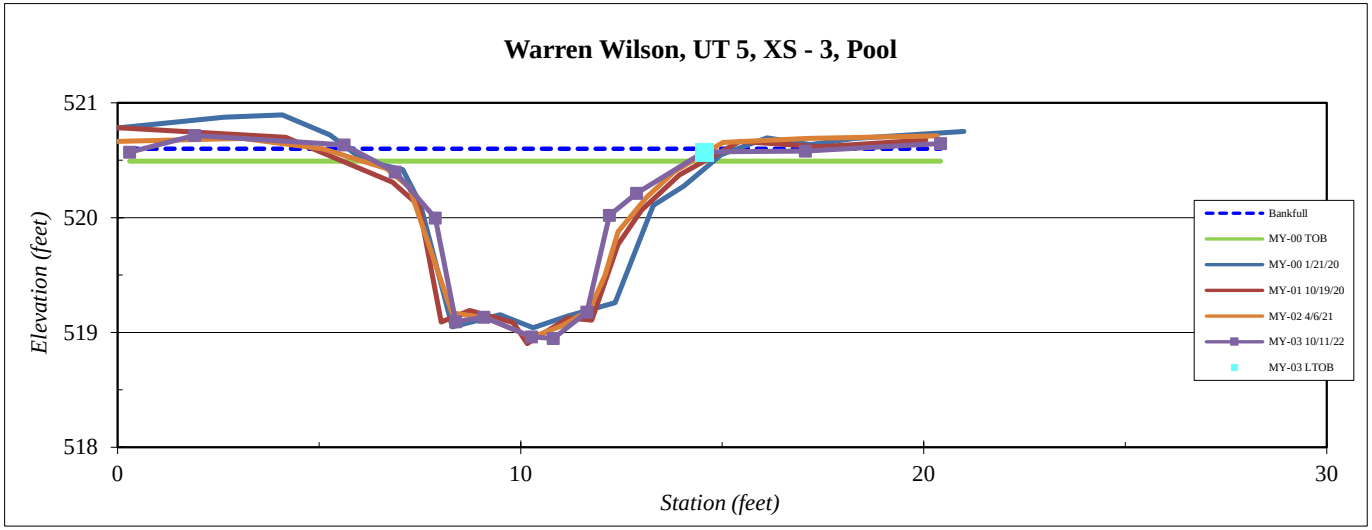


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 3, Pool |
| **Feature** | Pool |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.3 | 520.6 |
| 1.9 | 520.7 |
| 5.6 | 520.6 |
| 6.9 | 520.4 |
| 7.9 | 520.0 |
| 8.4 | 519.1 |
| 9.1 | 519.1 |
| 10.3 | 519.0 |
| 10.8 | 518.9 |
| 11.6 | 519.2 |
| 12.2 | 520.0 |
| 12.9 | 520.2 |
| 14.6 | 520.6 |
| 17.1 | 520.6 |
| 20.4 | 520.6 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 520.6 |
| **Bankfull Cross-Sectional Area:** | 7.4 |
| **Bankfull Width:** | 12.3 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.7 |
| **Low Bank Height:** | 1.6 |
| **Mean Depth at Bankfull:** | 0.6 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

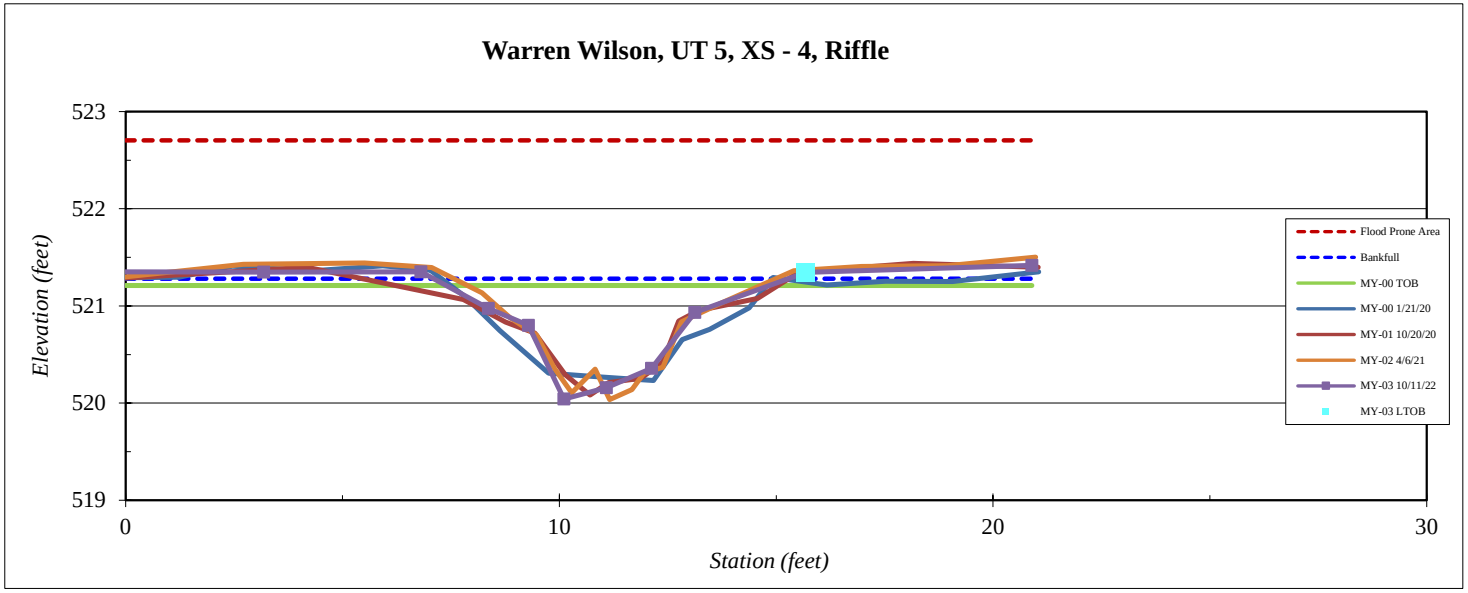


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 4, Riffle |
| **Feature** | Riffle |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.2 | 521.3 |
| 3.2 | 521.3 |
| 6.8 | 521.4 |
| 8.4 | 521.0 |
| 9.3 | 520.8 |
| 10.1 | 520.0 |
| 11.1 | 520.2 |
| 12.1 | 520.4 |
| 13.1 | 520.9 |
| 15.7 | 521.3 |
| 20.9 | 521.4 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 521.3 |
| **Bankfull Cross-Sectional Area:** | 7.3 |
| **Bankfull Width:** | 21.1 |
| **Flood Prone Area Elevation:** | 522.7 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.4 |
| **Low Bank Height:** | 1.3 |
| **Mean Depth at Bankfull:** | 0.3 |
| **W / D Ratio:** | 60.6 |
| **Entrenchment Ratio:** | 4.7 |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

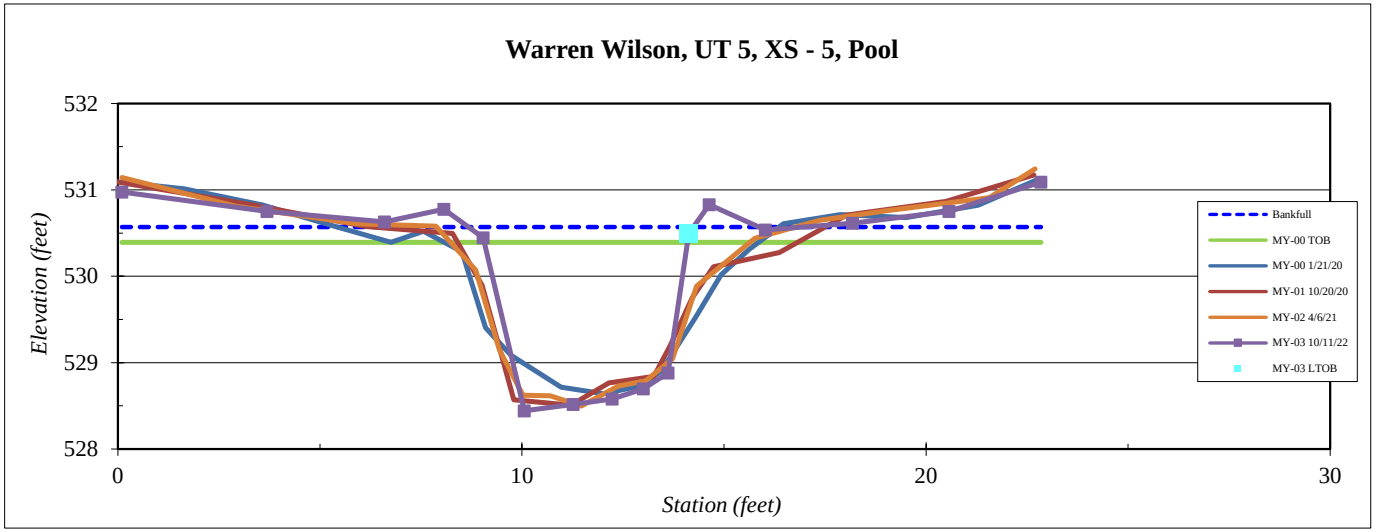


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 5, Pool |
| **Feature** | Pool |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.1 | 531.0 |
| 3.7 | 530.8 |
| 6.6 | 530.6 |
| 8.1 | 530.8 |
| 9.0 | 530.4 |
| 10.1 | 528.4 |
| 11.3 | 528.5 |
| 12.2 | 528.6 |
| 13.0 | 528.7 |
| 13.6 | 528.9 |
| 14.1 | 530.5 |
| 14.6 | 530.8 |
| 16.0 | 530.5 |
| 18.2 | 530.6 |
| 20.6 | 530.8 |
| 22.8 | 531.1 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 530.6 |
| **Bankfull Cross-Sectional Area:** | 8.7 |
| **Bankfull Width:** | 6.7 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.1 |
| **Low Bank Height:** | 2.1 |
| **Mean Depth at Bankfull:** | 1.3 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

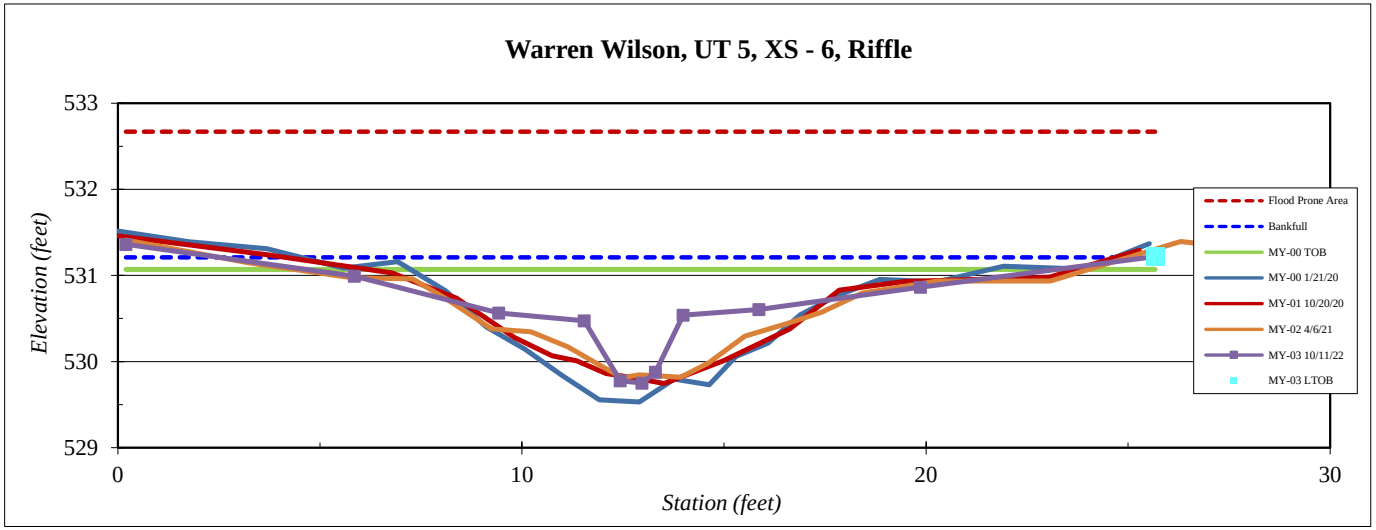


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS -6, Riffle |
| **Feature** | Riffle |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.2 | 531.4 |
| 5.9 | 531.0 |
| 9.4 | 530.6 |
| 11.5 | 530.5 |
| 12.4 | 529.8 |
| 13.0 | 529.8 |
| 13.3 | 529.9 |
| 14.0 | 530.5 |
| 15.9 | 530.6 |
| 19.9 | 530.9 |
| 25.7 | 531.2 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 531.2 |
| **Bankfull Cross-Sectional Area:** | 10.4 |
| **Bankfull Width:** | 23.0 |
| **Flood Prone Area Elevation:** | 532.7 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.5 |
| **Low Bank Height:** | 1.5 |
| **Mean Depth at Bankfull:** | 0.5 |
| **W / D Ratio:** | 51.1 |
| **Entrenchment Ratio:** | 4.3 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

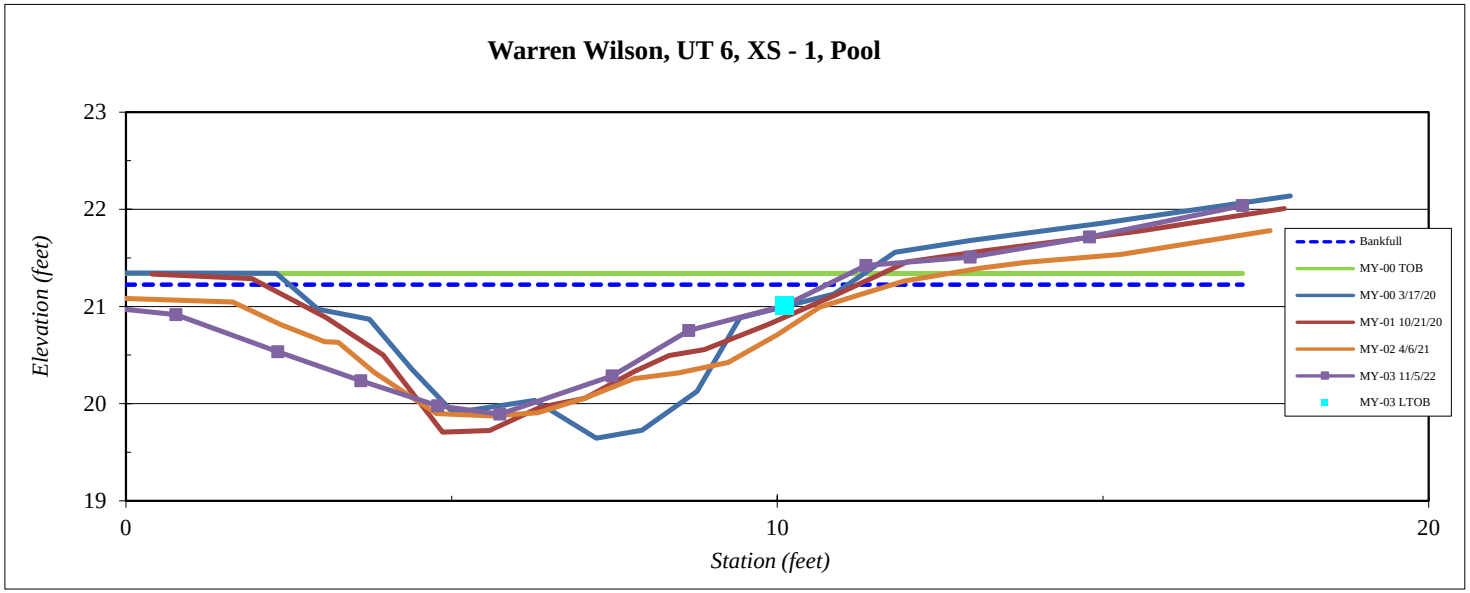


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS - 1, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -4.2 | 21.6 |
| -1.1 | 21.0 |
| 0.8 | 20.9 |
| 2.3 | 20.5 |
| 3.6 | 20.2 |
| 4.8 | 20.0 |
| 5.7 | 19.9 |
| 7.5 | 20.3 |
| 8.6 | 20.8 |
| 10.1 | 21.0 |
| 11.4 | 21.4 |
| 13.0 | 21.5 |
| 14.8 | 21.7 |
| 17.1 | 22.0 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 21.2 |
| **Bankfull Cross-Sectional Area:** | 8.3 |
| **Bankfull Width:** | 12.9 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.3 |
| **Low Bank Height:** | 1.1 |
| **Mean Depth at Bankfull:** | 0.6 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 0.8 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

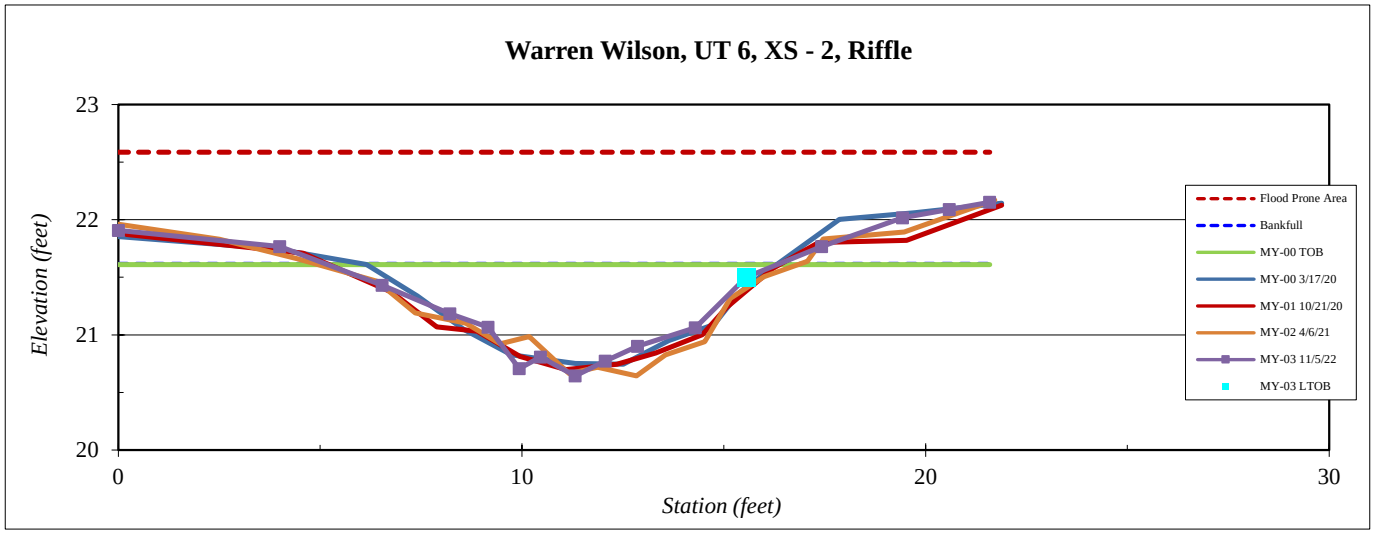


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS -2, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 21.9 |
| 4.0 | 21.8 |
| 6.5 | 21.4 |
| 8.2 | 21.2 |
| 9.2 | 21.1 |
| 9.9 | 20.7 |
| 10.5 | 20.8 |
| 11.3 | 20.6 |
| 12.1 | 20.8 |
| 12.9 | 20.9 |
| 14.3 | 21.1 |
| 15.6 | 21.5 |
| 17.4 | 21.8 |
| 19.4 | 22.0 |
| 20.6 | 22.1 |
| 21.6 | 22.2 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 21.6 |
| **Bankfull Cross-Sectional Area:** | 5.6 |
| **Bankfull Width:** | 11.2 |
| **Flood Prone Area Elevation:** | 22.6 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.0 |
| **Low Bank Height:** | 0.9 |
| **Mean Depth at Bankfull:** | 0.5 |
| **W / D Ratio:** | 22.6 |
| **Entrenchment Ratio:** | 8.9 |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

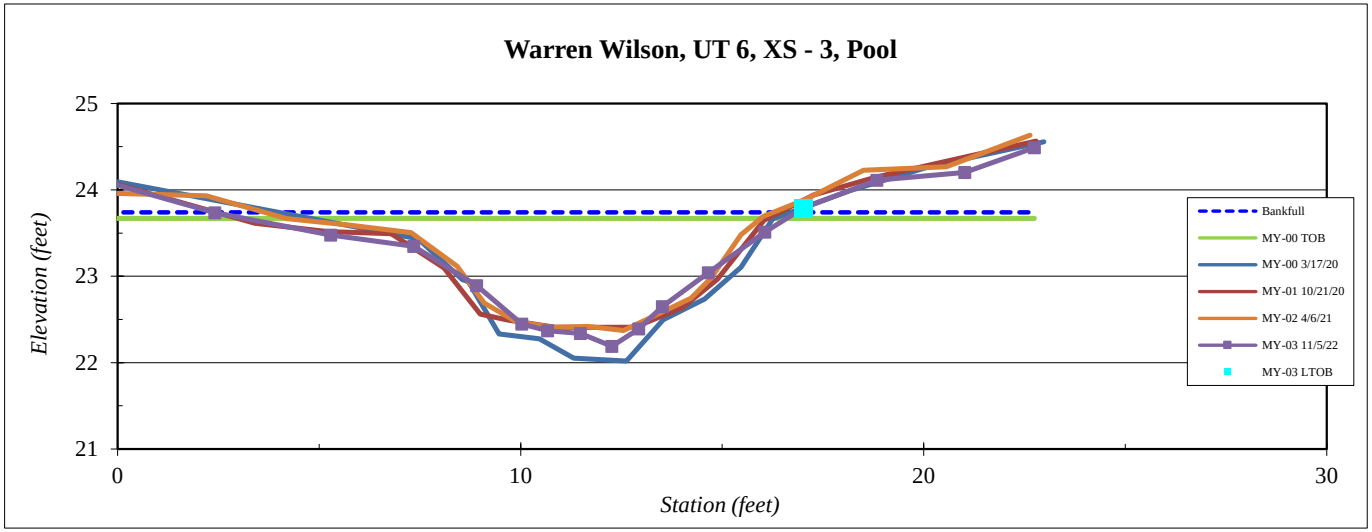


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS - 3, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.3 | 24.1 |
| 2.4 | 23.7 |
| 5.3 | 23.5 |
| 7.3 | 23.3 |
| 8.9 | 22.9 |
| 10.0 | 22.4 |
| 10.7 | 22.4 |
| 11.5 | 22.3 |
| 12.3 | 22.2 |
| 12.9 | 22.4 |
| 13.5 | 22.6 |
| 14.7 | 23.0 |
| 16.1 | 23.5 |
| 17.0 | 23.8 |
| 18.8 | 24.1 |
| 21.0 | 24.2 |
| 22.7 | 24.5 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 23.7 |
| **Bankfull Cross-Sectional Area:** | 9.8 |
| **Bankfull Width:** | 14.5 |
| **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 |

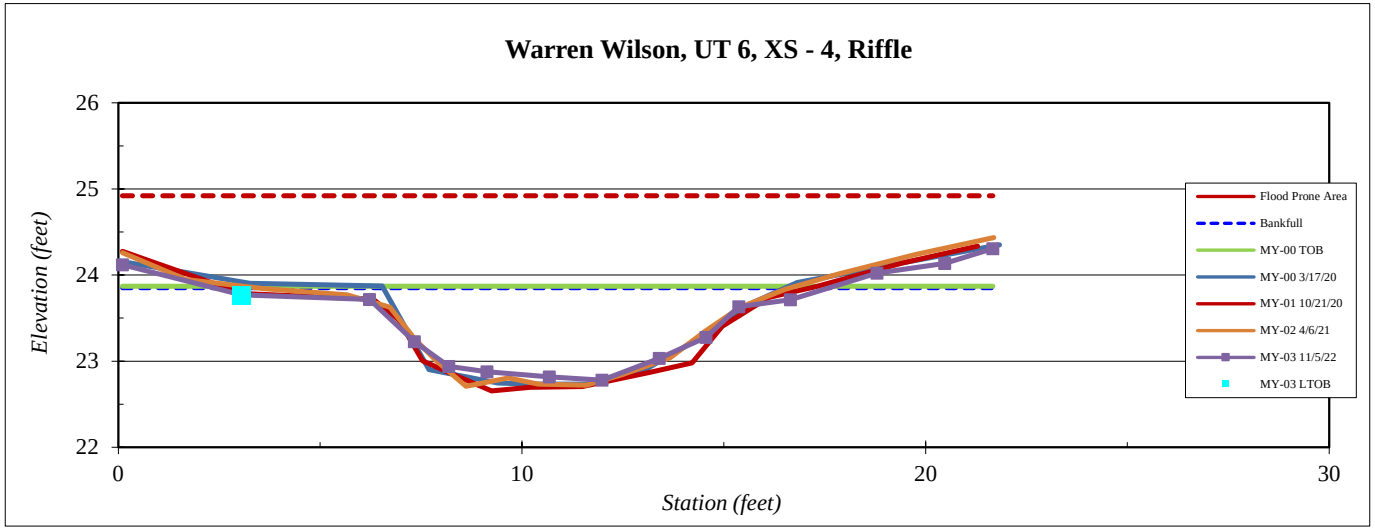


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS -4, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.1 | 24.1 |
| 3.1 | 23.8 |
| 6.2 | 23.7 |
| 7.3 | 23.2 |
| 8.2 | 22.9 |
| 9.1 | 22.9 |
| 10.7 | 22.8 |
| 12.0 | 22.8 |
| 13.4 | 23.0 |
| 14.6 | 23.3 |
| 15.4 | 23.6 |
| 16.7 | 23.7 |
| 18.8 | 24.0 |
| 20.5 | 24.1 |
| 21.7 | 24.3 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 23.9 |
| **Bankfull Cross-Sectional Area:** | 8.0 |
| **Bankfull Width:** | 15.2 |
| **Flood Prone Area Elevation:** | 24.9 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.1 |
| **Low Bank Height:** | 1.0 |
| **Mean Depth at Bankfull:** | 0.5 |
| **W / D Ratio:** | 29.0 |
| **Entrenchment Ratio:** | 6.6 |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

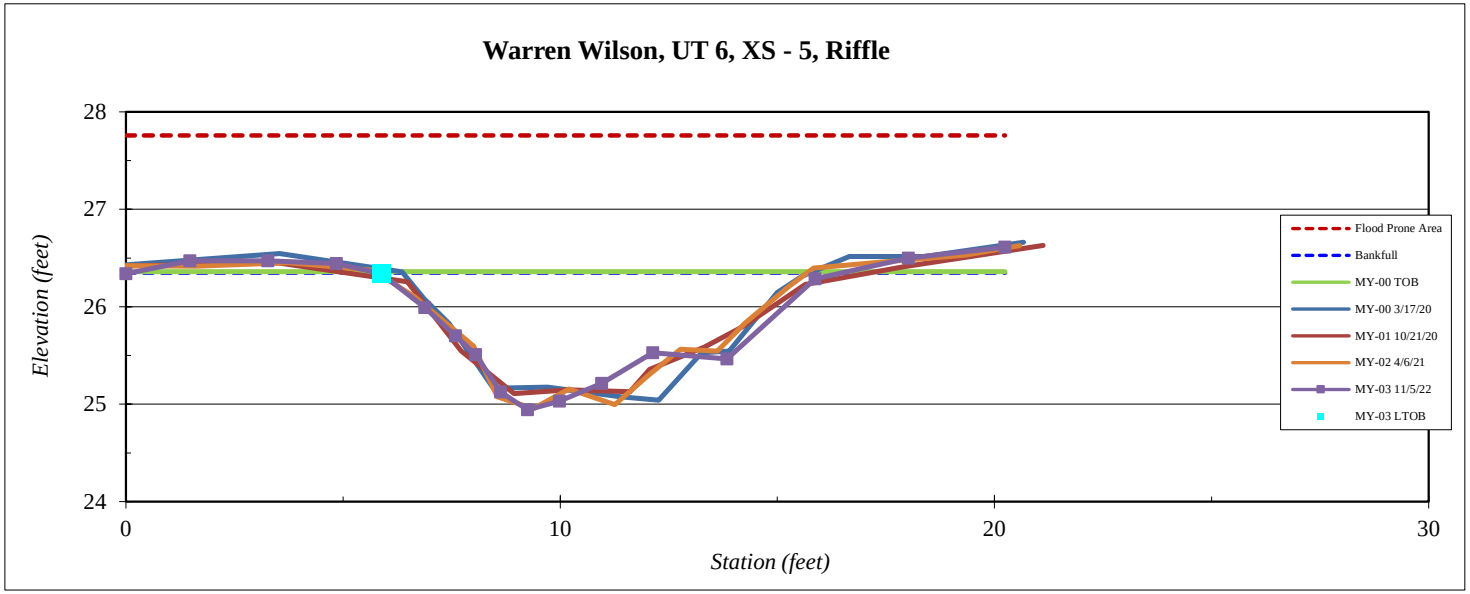


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS -5, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 26.3 |
| 1.5 | 26.5 |
| 3.3 | 26.5 |
| 4.8 | 26.4 |
| 5.9 | 26.3 |
| 6.9 | 26.0 |
| 7.6 | 25.7 |
| 8.1 | 25.5 |
| 8.6 | 25.1 |
| 9.2 | 24.9 |
| 10.0 | 25.0 |
| 11.0 | 25.2 |
| 12.1 | 25.5 |
| 13.8 | 25.5 |
| 15.9 | 26.3 |
| 18.0 | 26.5 |
| 20.2 | 26.6 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 26.4 |
| **Bankfull Cross-Sectional Area:** | 8.1 |
| **Bankfull Width:** | 10.7 |
| **Flood Prone Area Elevation:** | 27.8 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.4 |
| **Low Bank Height:** | 1.4 |
| **Mean Depth at Bankfull:** | 0.8 |
| **W / D Ratio:** | 14.3 |
| **Entrenchment Ratio:** | 9.3 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

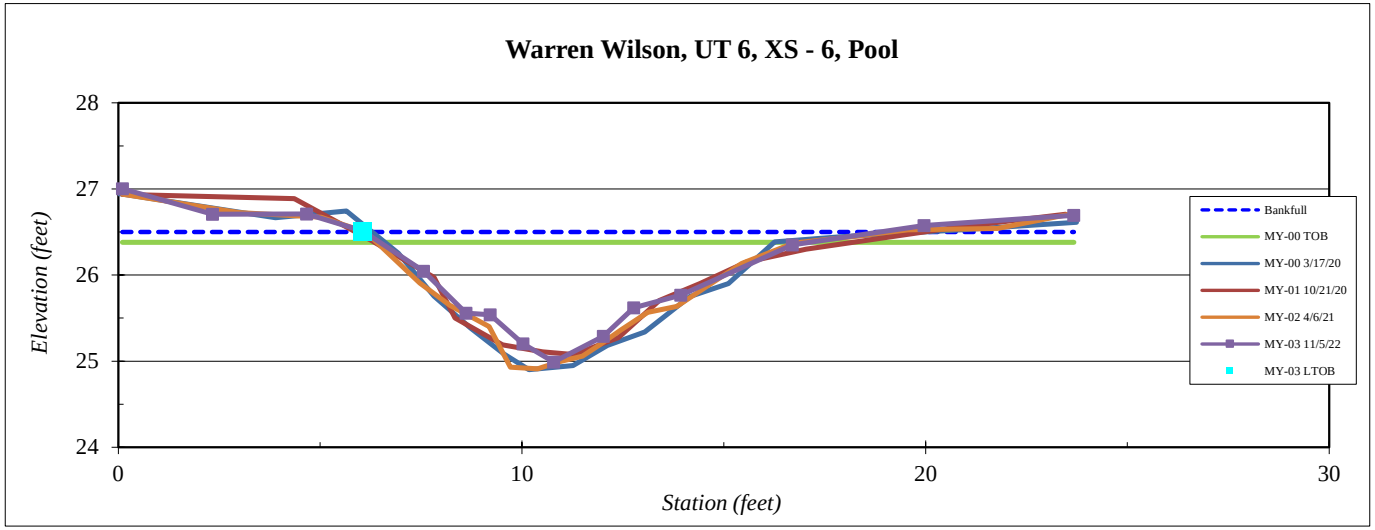


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS - 6, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.1 | 27.0 |
| 2.3 | 26.7 |
| 4.7 | 26.7 |
| 6.1 | 26.5 |
| 7.6 | 26.0 |
| 8.6 | 25.6 |
| 9.2 | 25.5 |
| 10.0 | 25.2 |
| 10.8 | 25.0 |
| 12.0 | 25.3 |
| 12.8 | 25.6 |
| 13.9 | 25.8 |
| 16.7 | 26.4 |
| 20.0 | 26.6 |
| 23.7 | 26.7 |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation:** | 26.5 |
| **Bankfull Cross-Sectional Area:** | 8.4 |
| **Bankfull Width:** | 12.8 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.5 |
| **Low Bank Height:** | 1.5 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

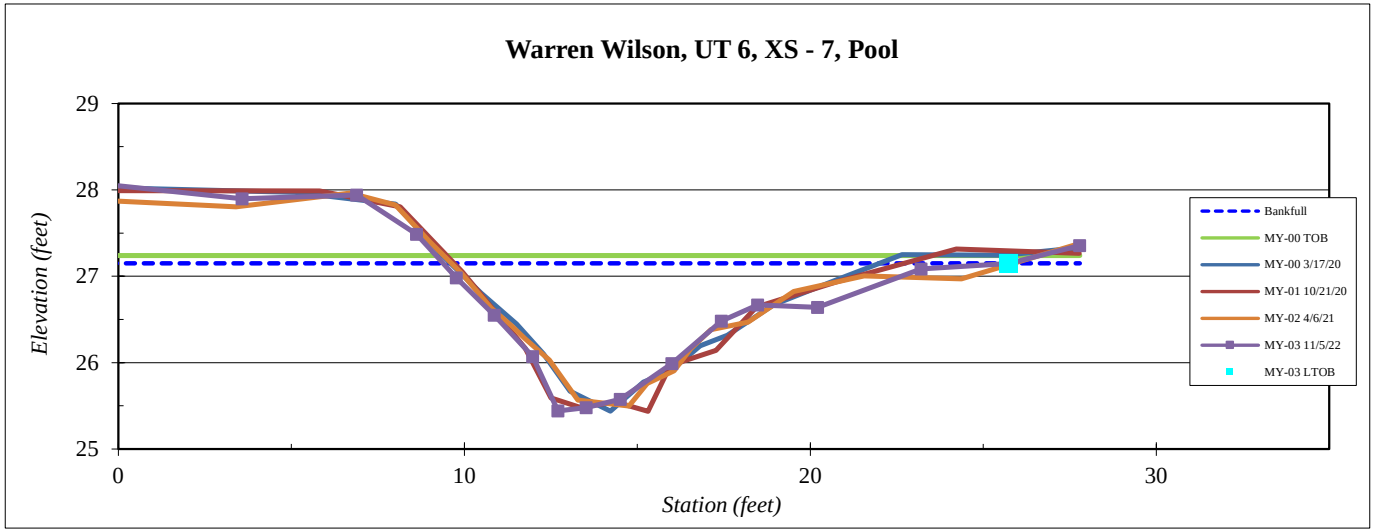


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS - 7, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.3 | 28.1 |
| 3.6 | 27.9 |
| 6.9 | 27.9 |
| 8.6 | 27.5 |
| 9.8 | 27.0 |
| 10.9 | 26.5 |
| 12.0 | 26.1 |
| 12.7 | 25.4 |
| 13.5 | 25.5 |
| 14.5 | 25.6 |
| 16.0 | 26.0 |
| 17.4 | 26.5 |
| 18.5 | 26.7 |
| 20.2 | 26.6 |
| 23.2 | 27.1 |
| 25.7 | 27.1 |
| 27.8 | 27.4 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 27.2 |
| **Bankfull Cross-Sectional Area:** | 11.1 |
| **Bankfull Width:** | 16.4 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.7 |
| **Low Bank Height:** | 1.7 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

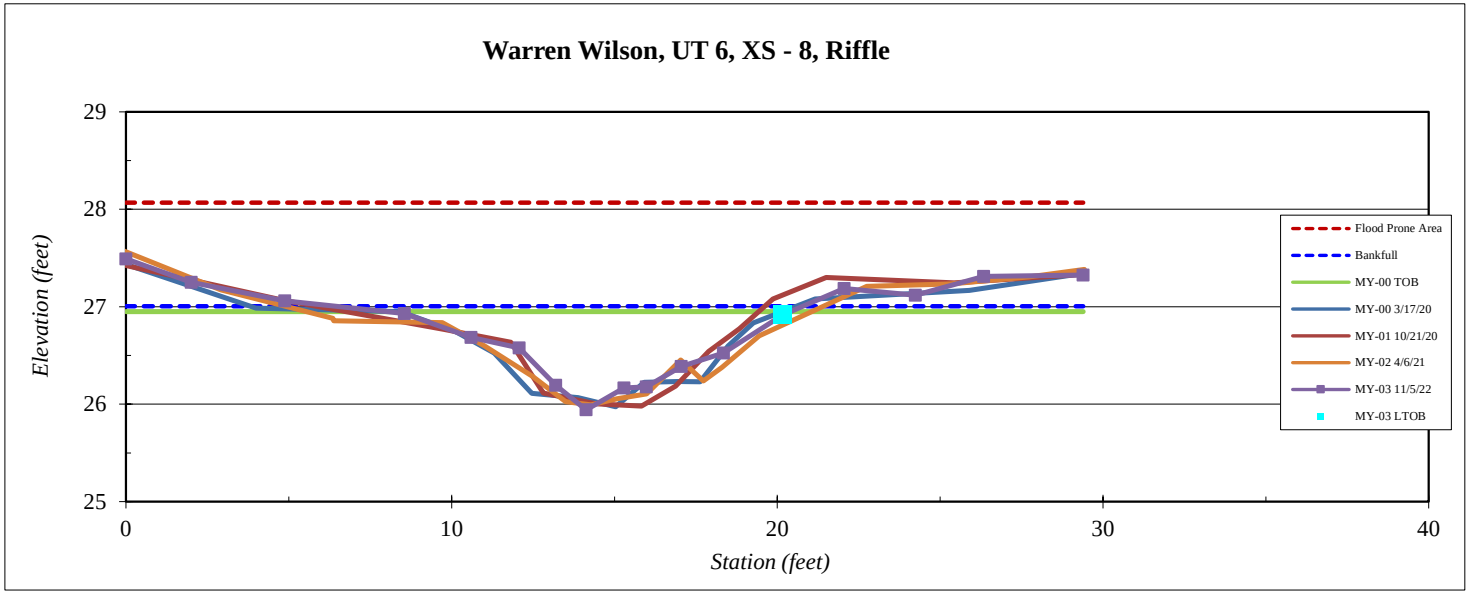


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS -8, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 27.5 |
| 2.0 | 27.2 |
| 4.9 | 27.1 |
| 8.6 | 26.9 |
| 10.6 | 26.7 |
| 12.1 | 26.6 |
| 13.2 | 26.2 |
| 14.1 | 25.9 |
| 15.3 | 26.2 |
| 16.0 | 26.2 |
| 17.1 | 26.4 |
| 18.3 | 26.5 |
| 20.2 | 26.9 |
| 22.1 | 27.2 |
| 24.2 | 27.1 |
| 26.3 | 27.3 |
| 29.4 | 27.3 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 27.0 |
| **Bankfull Cross-Sectional Area:** | 6.3 |
| **Bankfull Width:** | 14.4 |
| **Flood Prone Area Elevation:** | 28.1 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.1 |
| **Low Bank Height:** | 1.0 |
| **Mean Depth at Bankfull:** | 0.4 |
| **W / D Ratio:** | 32.7 |
| **Entrenchment Ratio:** | 7.0 |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Ce 4 |

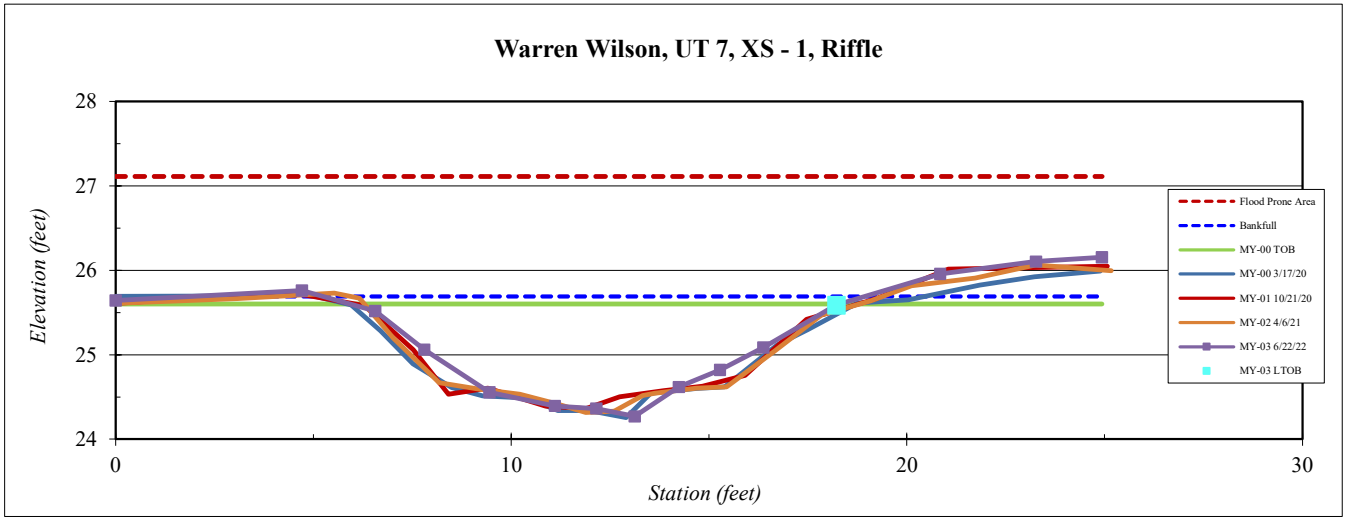


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS -1, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 25.6 |
| 4.7 | 25.8 |
| 6.6 | 25.5 |
| 7.8 | 25.1 |
| 9.5 | 24.6 |
| 11.1 | 24.4 |
| 12.2 | 24.4 |
| 13.1 | 24.3 |
| 14.2 | 24.6 |
| 15.3 | 24.8 |
| 16.4 | 25.1 |
| 18.2 | 25.6 |
| 20.8 | 26.0 |
| 23.3 | 26.1 |
| 24.9 | 26.2 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 25.7 |
| **Bankfull Cross-Sectional Area:** | 10.7 |
| **Bankfull Width:** | 13.7 |
| **Flood Prone Area Elevation:** | 27.1 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.4 |
| **Low Bank Height:** | 1.3 |
| **Mean Depth at Bankfull:** | 0.8 |
| **W / D Ratio:** | 17.6 |
| **Entrenchment Ratio:** | 7.3 |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Eb 4 |

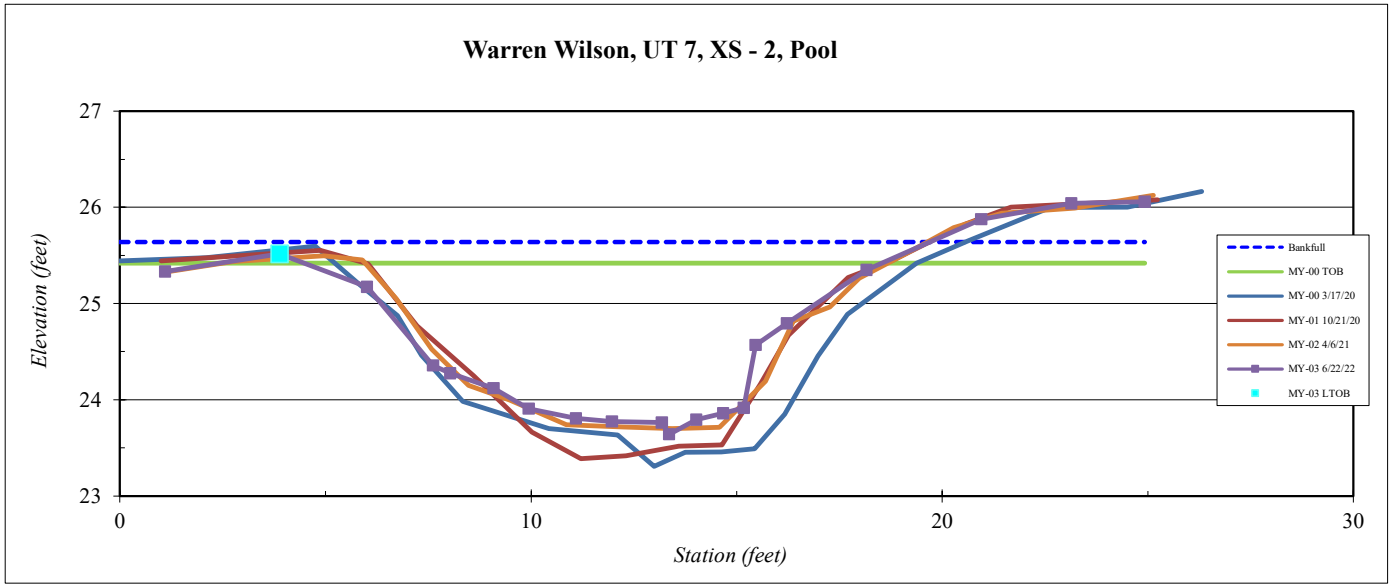


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS - 2, Pool |
| **Feature** | Pool |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 1.1 | 25.3 |
| 3.9 | 25.5 |
| 6.0 | 25.2 |
| 7.6 | 24.4 |
| 8.0 | 24.3 |
| 9.1 | 24.1 |
| 9.9 | 23.9 |
| 11.1 | 23.8 |
| 12.0 | 23.8 |
| 13.2 | 23.8 |
| 13.4 | 23.6 |
| 14.0 | 23.8 |
| 14.7 | 23.9 |
| 15.2 | 23.9 |
| 15.5 | 24.6 |
| 16.2 | 24.8 |
| 18.2 | 25.3 |
| 20.9 | 25.9 |
| 23.1 | 26.0 |
| 24.9 | 26.1 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 25.6 |
| **Bankfull Cross-Sectional Area:** | 18.2 |
| **Bankfull Width:** | 18.6 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.0 |
| **Low Bank Height:** | 1.9 |
| **Mean Depth at Bankfull:** | 1.0 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Eb 4 |

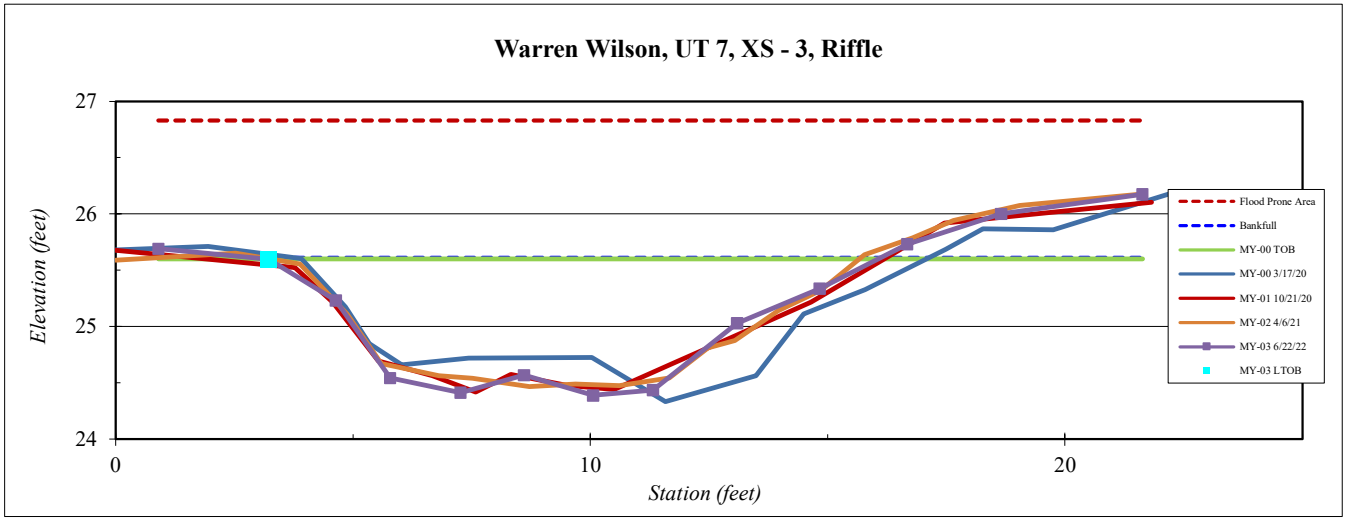


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS -3, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.9 | 25.7 |
| 3.2 | 25.6 |
| 4.6 | 25.2 |
| 5.8 | 24.5 |
| 7.3 | 24.4 |
| 8.6 | 24.6 |
| 10.1 | 24.4 |
| 11.3 | 24.4 |
| 13.1 | 25.0 |
| 14.8 | 25.3 |
| 16.7 | 25.7 |
| 18.7 | 26.0 |
| 21.6 | 26.2 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 25.6 |
| **Bankfull Cross-Sectional Area:** | 9.9 |
| **Bankfull Width:** | 13.2 |
| **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:** | 0.8 |
| **W / D Ratio:** | 17.5 |
| **Entrenchment Ratio:** | 7.6 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Eb 4 |

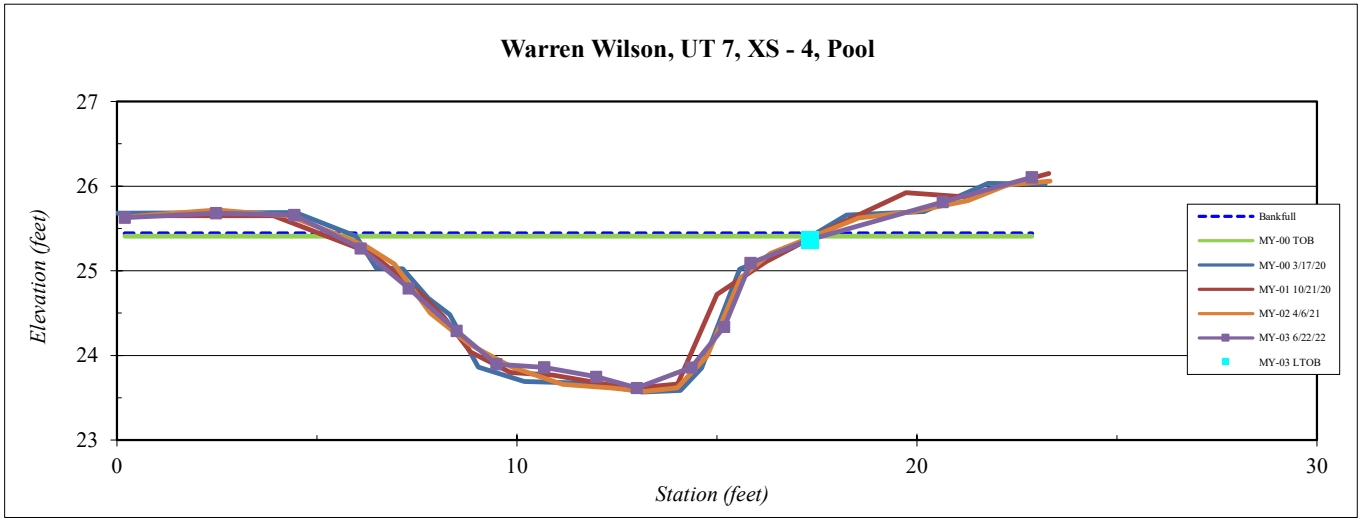


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS - 4, Pool |
| **Feature** | Pool |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.2 | 25.6 |
| 2.5 | 25.7 |
| 4.4 | 25.7 |
| 6.1 | 25.3 |
| 7.3 | 24.8 |
| 8.5 | 24.3 |
| 9.5 | 23.9 |
| 10.7 | 23.9 |
| 12.0 | 23.7 |
| 13.0 | 23.6 |
| 14.4 | 23.9 |
| 15.2 | 24.3 |
| 15.8 | 25.1 |
| 17.3 | 25.4 |
| 20.6 | 25.8 |
| 22.9 | 26.1 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 25.4 |
| **Bankfull Cross-Sectional Area:** | 13.0 |
| **Bankfull Width:** | 12.5 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.8 |
| **Low Bank Height:** | 1.8 |
| **Mean Depth at Bankfull:** | 1.0 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Eb 4 |

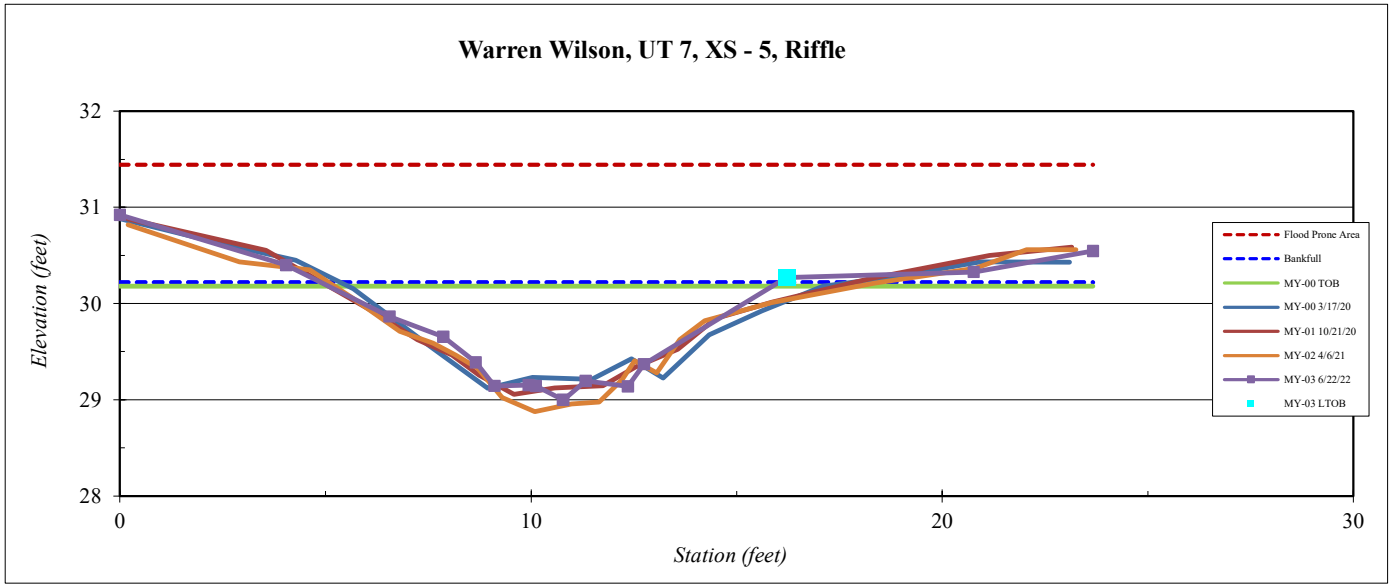


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS -5, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 30.9 |
| 4.0 | 30.4 |
| 6.6 | 29.9 |
| 7.9 | 29.7 |
| 8.7 | 29.4 |
| 9.1 | 29.1 |
| 9.9 | 29.2 |
| 10.1 | 29.1 |
| 10.8 | 29.0 |
| 10.8 | 29.0 |
| 11.3 | 29.2 |
| 12.4 | 29.1 |
| 12.7 | 29.4 |
| 16.2 | 30.3 |
| 20.8 | 30.3 |
| 23.7 | 30.5 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 30.2 |
| **Bankfull Cross-Sectional Area:** | 7.2 |
| **Bankfull Width:** | 11.1 |
| **Flood Prone Area Elevation:** | 31.4 |
| **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:** | 17.2 |
| **Entrenchment Ratio:** | 9.0 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Eb 4 |

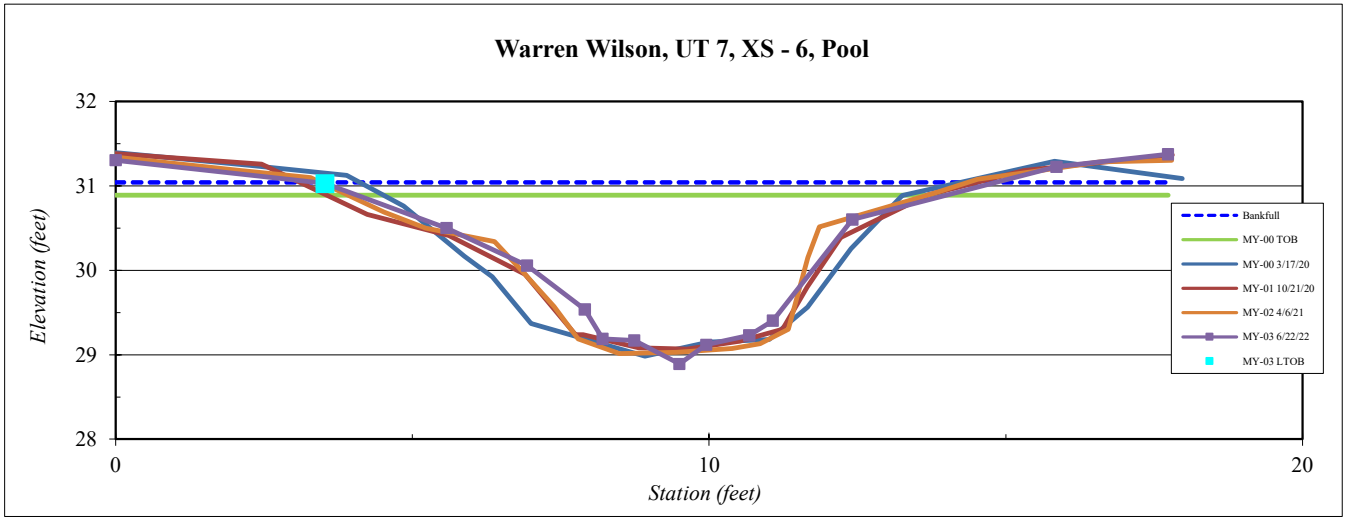


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS - 6, Pool |
| **Feature** | Pool |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 31.3 |
| 3.5 | 31.0 |
| 5.6 | 30.5 |
| 6.9 | 30.1 |
| 7.9 | 29.5 |
| 8.2 | 29.2 |
| 8.7 | 29.2 |
| 9.5 | 28.9 |
| 10.0 | 29.1 |
| 10.7 | 29.2 |
| 11.1 | 29.4 |
| 12.4 | 30.6 |
| 15.9 | 31.2 |
| 17.7 | 31.4 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 31.0 |
| **Bankfull Cross-Sectional Area:** | 10.7 |
| **Bankfull Width:** | 11.5 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.1 |
| **Low Bank Height:** | 2.1 |
| **Mean Depth at Bankfull:** | 0.9 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Eb 4 |

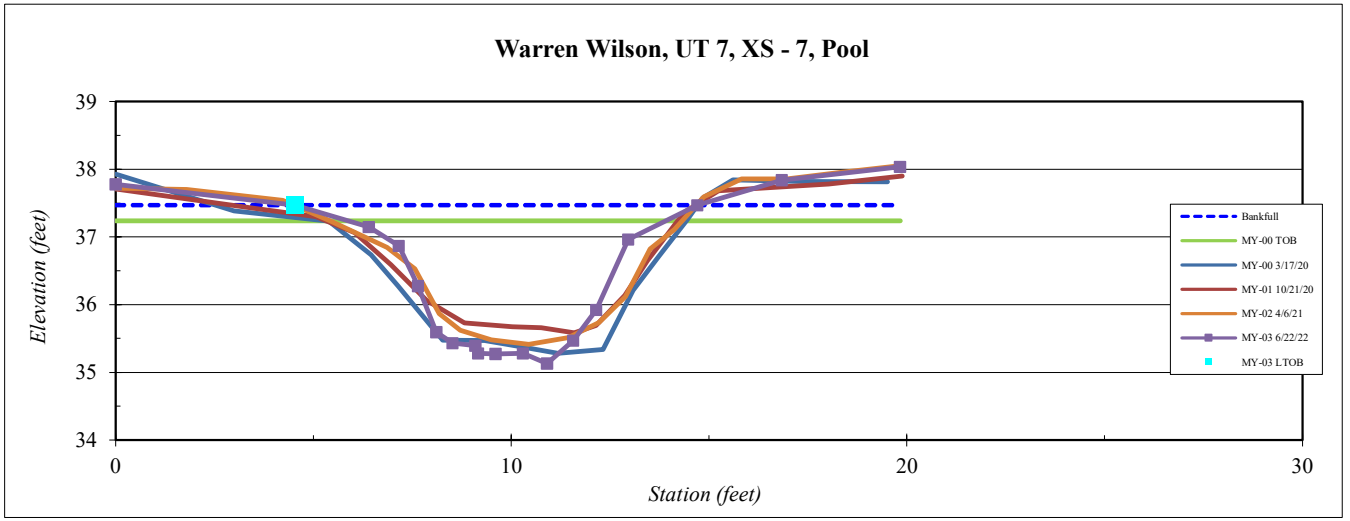


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS - 7, Pool |
| **Feature** | Pool |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 37.8 |
| 4.5 | 37.5 |
| 6.4 | 37.1 |
| 7.2 | 36.9 |
| 7.6 | 36.3 |
| 8.1 | 35.6 |
| 8.5 | 35.4 |
| 9.1 | 35.4 |
| 9.2 | 35.3 |
| 9.6 | 35.3 |
| 10.3 | 35.3 |
| 10.9 | 35.1 |
| 11.6 | 35.5 |
| 12.1 | 35.9 |
| 13.0 | 37.0 |
| 14.7 | 37.5 |
| 16.8 | 37.8 |
| 19.8 | 38.0 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 37.5 |
| **Bankfull Cross-Sectional Area:** | 11.6 |
| **Bankfull Width:** | 10.2 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 2.3 |
| **Low Bank Height:** | 2.3 |
| **Mean Depth at Bankfull:** | 1.1 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | Eb 4 |

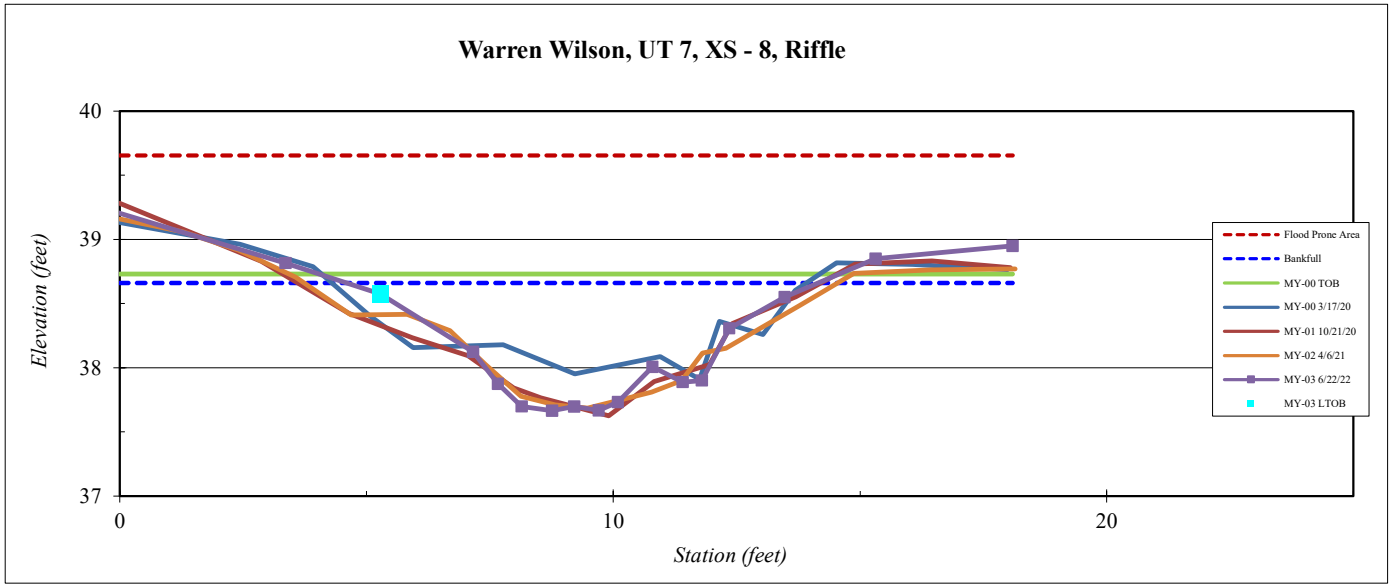


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS -8, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.5 | 39.3 |
| 3.4 | 38.8 |
| 5.3 | 38.6 |
| 7.2 | 38.1 |
| 7.7 | 37.9 |
| 8.1 | 37.7 |
| 8.8 | 37.7 |
| 9.2 | 37.7 |
| 9.7 | 37.7 |
| 10.1 | 37.7 |
| 10.8 | 38.0 |
| 11.4 | 37.9 |
| 11.8 | 37.9 |
| 12.3 | 38.3 |
| 13.5 | 38.6 |
| 15.3 | 38.9 |
| 18.1 | 38.9 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 38.7 |
| **Bankfull Cross-Sectional Area:** | 5.2 |
| **Bankfull Width:** | 9.5 |
| **Flood Prone Area Elevation:** | 39.7 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.0 |
| **Low Bank Height:** | 0.9 |
| **Mean Depth at Bankfull:** | 0.5 |
| **W / D Ratio:** | 17.6 |
| **Entrenchment Ratio:** | 10.5 |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | Eb 4 |

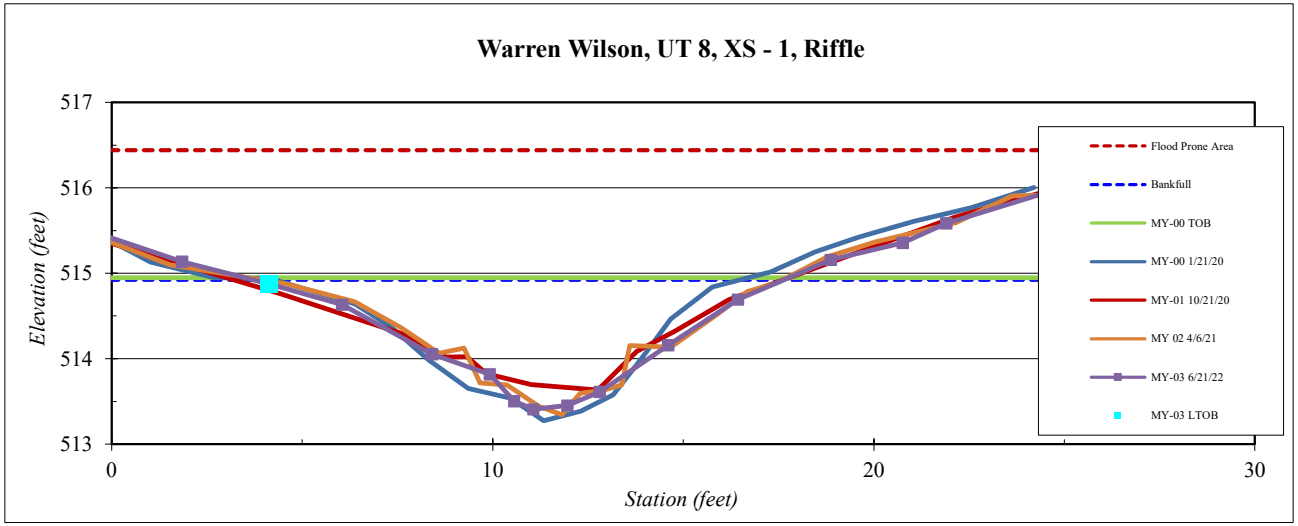


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS -1, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -0.5 | 515.5 |
| 1.9 | 515.1 |
| 4.1 | 514.9 |
| 6.1 | 514.6 |
| 8.4 | 514.1 |
| 9.9 | 513.8 |
| 10.6 | 513.5 |
| 11.1 | 513.4 |
| 12.0 | 513.5 |
| 12.8 | 513.6 |
| 14.6 | 514.2 |
| 16.4 | 514.7 |
| 18.9 | 515.2 |
| 20.8 | 515.4 |
| 21.9 | 515.6 |
| 24.5 | 515.9 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 514.9 |
| **Bankfull Cross-Sectional Area:** | 10.2 |
| **Bankfull Width:** | 14.0 |
| **Flood Prone Area Elevation:** | 516.4 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.5 |
| **Low Bank Height:** | 1.5 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | 19.1 |
| **Entrenchment Ratio:** | 7.2 |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | C 4 |

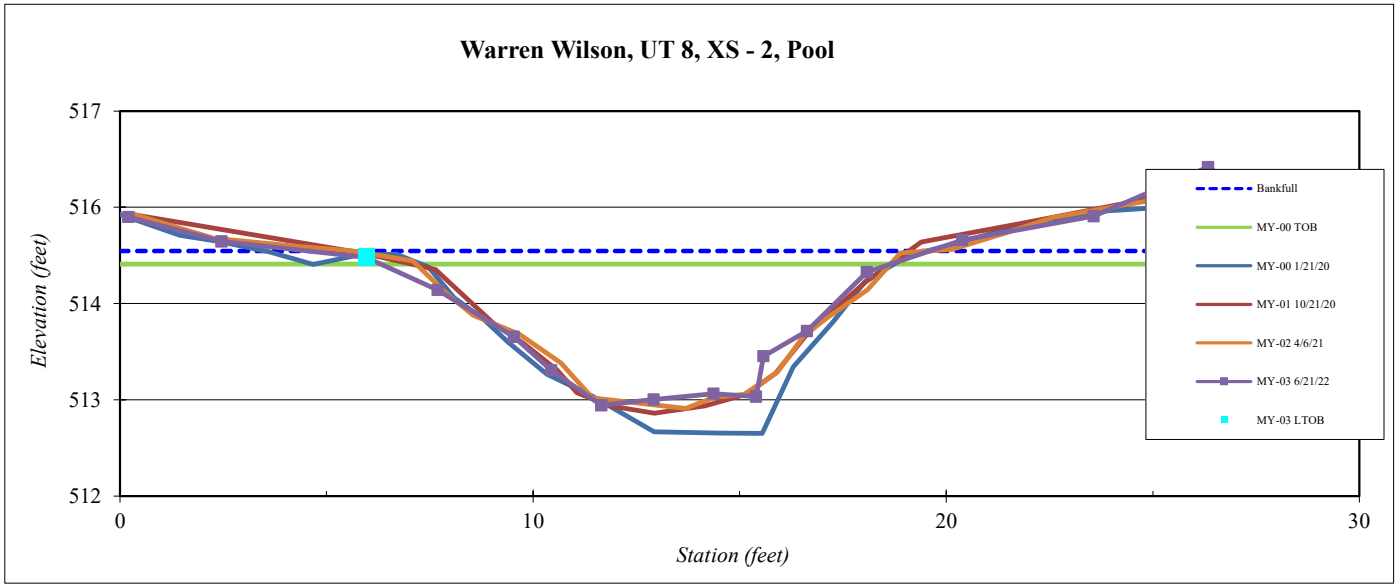


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS - 2, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.2 | 515.4 |
| 2.5 | 515.2 |
| 6.0 | 515.0 |
| 7.7 | 514.6 |
| 9.5 | 514.0 |
| 10.4 | 513.6 |
| 11.7 | 513.2 |
| 12.9 | 513.3 |
| 14.4 | 513.4 |
| 15.4 | 513.3 |
| 15.6 | 513.8 |
| 16.6 | 514.1 |
| 18.1 | 514.8 |
| 20.4 | 515.2 |
| 23.6 | 515.4 |
| 26.3 | 516.0 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 515.0 |
| **Bankfull Cross-Sectional Area:** | 13.9 |
| **Bankfull Width:** | 15.1 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.8 |
| **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** | C 4 |

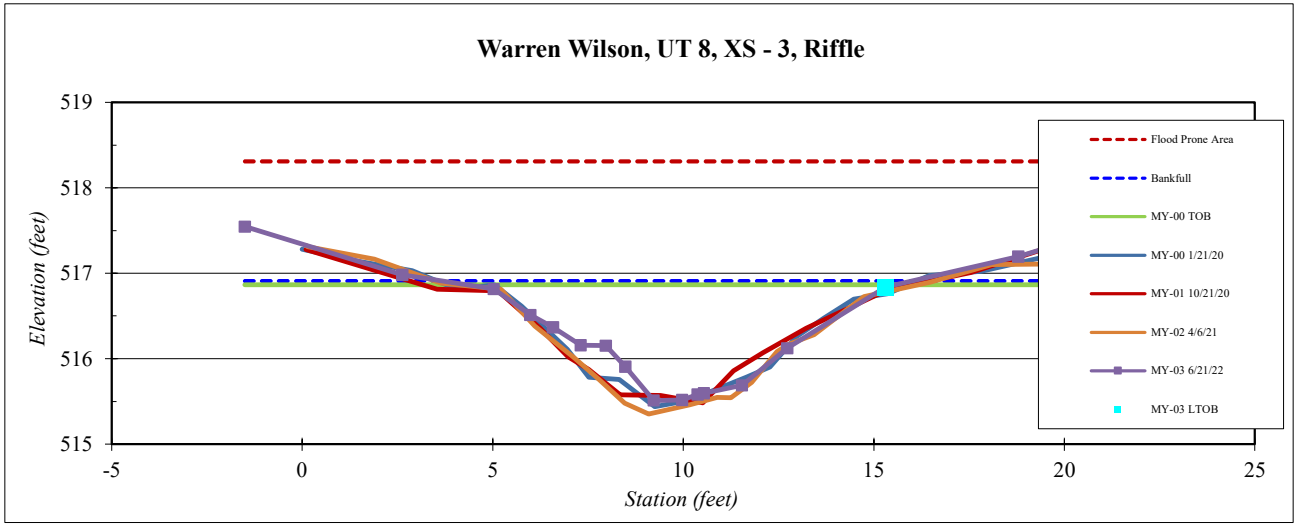


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS - 3, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| -1.5 | 517.5 |
| 2.6 | 517.0 |
| 5.0 | 516.8 |
| 6.0 | 516.5 |
| 6.6 | 516.4 |
| 7.3 | 516.2 |
| 8.0 | 516.2 |
| 8.5 | 515.9 |
| 9.2 | 515.5 |
| 10.0 | 515.5 |
| 10.4 | 515.6 |
| 10.5 | 515.6 |
| 11.5 | 515.7 |
| 12.7 | 516.1 |
| 15.3 | 516.8 |
| 18.8 | 517.2 |
| 20.1 | 517.4 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 516.9 |
| **Bankfull Cross-Sectional Area:** | 8.3 |
| **Bankfull Width:** | 12.3 |
| **Flood Prone Area Elevation:** | 518.3 |
| **Flood Prone Width:** | 100.0 |
| **Max Depth at Bankfull:** | 1.4 |
| **Low Bank Height:** | 1.3 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | 18.4 |
| **Entrenchment Ratio:** | 8.1 |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | C 4 |

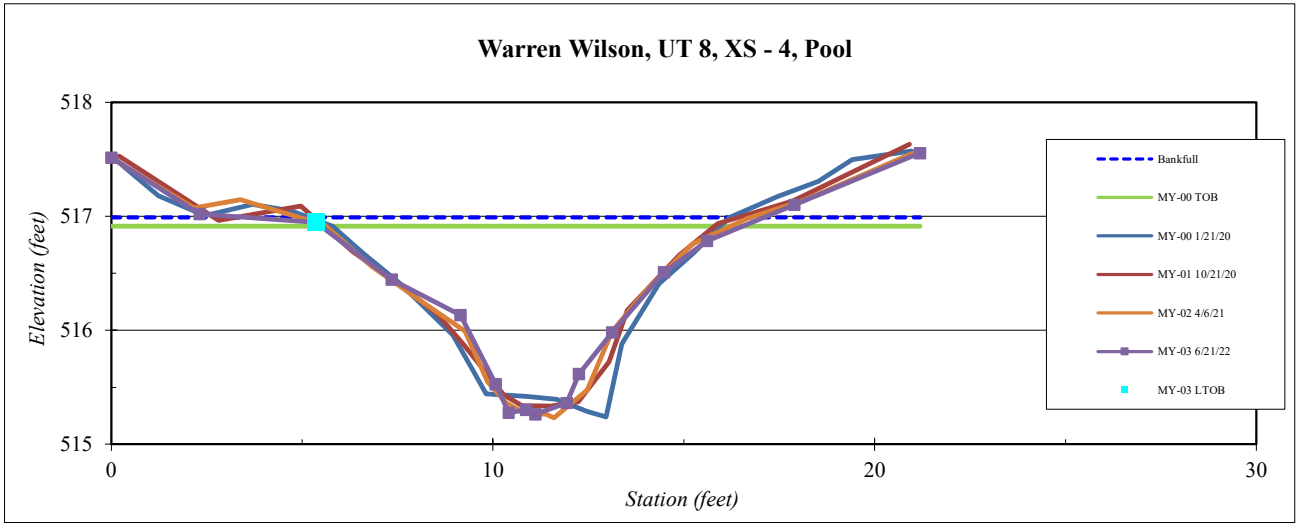


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS - 4, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 517.5 |
| 2.3 | 517.0 |
| 5.4 | 516.9 |
| 7.3 | 516.4 |
| 9.2 | 516.1 |
| 10.1 | 515.5 |
| 10.4 | 515.3 |
| 10.9 | 515.3 |
| 11.1 | 515.3 |
| 11.9 | 515.4 |
| 12.2 | 515.6 |
| 13.1 | 516.0 |
| 14.5 | 516.5 |
| 15.6 | 516.8 |
| 17.9 | 517.1 |
| 21.2 | 517.6 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 517.0 |
| **Bankfull Cross-Sectional Area:** | 9.1 |
| **Bankfull Width:** | 13.5 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.7 |
| **Low Bank Height:** | 1.7 |
| **Mean Depth at Bankfull:** | 0.7 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 1.0 |

| | |
|---|---|
| **Stream Type** | C 4 |

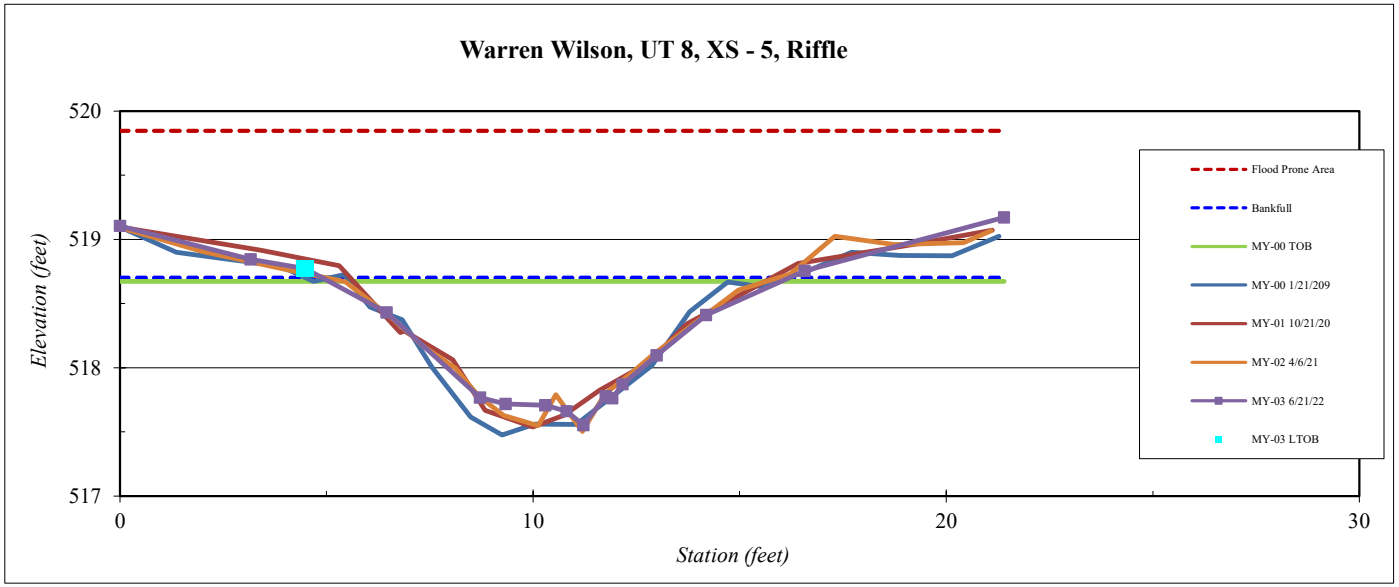


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS -5, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 519.1 |
| 3.2 | 518.8 |
| 4.5 | 518.8 |
| 6.5 | 518.4 |
| 8.7 | 517.8 |
| 9.3 | 517.7 |
| 10.3 | 517.7 |
| 10.8 | 517.7 |
| 11.2 | 517.6 |
| 11.8 | 517.8 |
| 11.9 | 517.8 |
| 12.2 | 517.9 |
| 13.0 | 518.1 |
| 14.2 | 518.4 |
| 16.6 | 518.8 |
| 21.4 | 519.2 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 518.7 |
| **Bankfull Cross-Sectional Area:** | 6.4 |
| **Bankfull Width:** | 11.3 |
| **Flood Prone Area Elevation:** | 519.8 |
| **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:** | 19.9 |
| **Entrenchment Ratio:** | 8.8 |
| **Bank Height Ratio:** | 1.1 |

| | |
|---|---|
| **Stream Type** | C 4 |

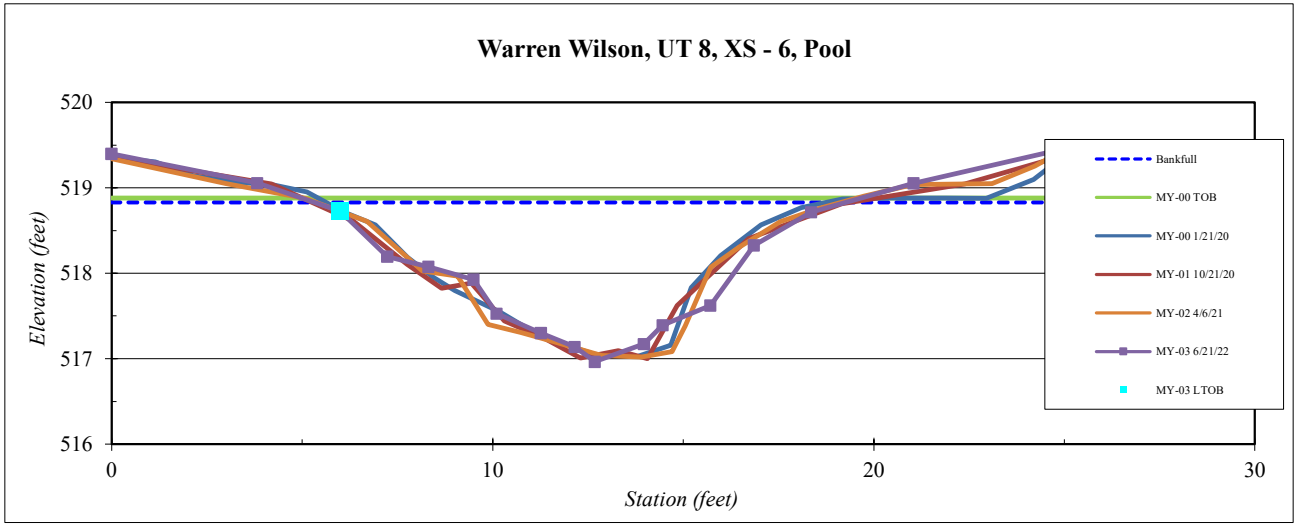


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS - 6, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| Station | Elevation |
|---|---|
| 0.0 | 519.4 |
| 3.8 | 519.1 |
| 6.0 | 518.7 |
| 7.2 | 518.2 |
| 8.3 | 518.1 |
| 9.5 | 517.9 |
| 10.1 | 517.5 |
| 11.3 | 517.3 |
| 12.1 | 517.1 |
| 12.7 | 517.0 |
| 14.0 | 517.2 |
| 14.5 | 517.4 |
| 15.7 | 517.6 |
| 16.9 | 518.3 |
| 18.4 | 518.7 |
| 21.0 | 519.1 |
| 25.3 | 519.5 |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation:** | 518.8 |
| **Bankfull Cross-Sectional Area:** | 13.1 |
| **Bankfull Width:** | 14.0 |
| **Flood Prone Area Elevation:** | NA |
| **Flood Prone Width:** | NA |
| **Max Depth at Bankfull:** | 1.9 |
| **Low Bank Height:** | 1.8 |
| **Mean Depth at Bankfull:** | 0.9 |
| **W / D Ratio:** | NA |
| **Entrenchment Ratio:** | NA |
| **Bank Height Ratio:** | 0.9 |

| | |
|---|---|
| **Stream Type** | C 4 |



## Appendix E
## Hydrology Data

Tables 14A-C Channel Evidence
Stream Flow Gauge Graphs
Table 15. Verification of Bankfull Events
Table 16A-B. Groundwater Hydrology Data
Groundwater Gauge Graphs

**Table 14A. 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 | 173 | N/A** | 178 | | | |
| Presence of litter and debris (wracking) | Yes | Yes | Yes | Yes | | | |
| Leaf litter disturbed or washed away | Yes | Yes | Yes | Yes | | | |
| Matted, bent, or absence of vegetation (herbaceous or otherwise) | Yes | Yes | Yes | Yes | | | |
| Sediment deposition and/or scour indicating sediment transport | Yes | Yes | Yes | Yes | | | |
| Water staining due to continual presence of water | Yes | Yes | Yes | Yes | | | |
| Formation of channel bed and banks | Yes | Yes | Yes | Yes | | | |
| Sediment sorting within the primary path of flow | Yes | Yes | Yes | Yes | | | |
| Sediment shelving or a natural line impressed on the banks | Yes | Yes | Yes | Yes | | | |
| Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes) | Yes | Yes | Yes | Yes | | | |
| Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems | Yes | Yes | Yes | Yes | | | |
| Exposure of woody plant roots within the primary path of flow | No | No | No | No | | | |
| Other: | | | | | | | |

** All three flow gauges failed during the 2022 season, and data was not able to be recovered from them. These flow gauges were replaced prior to year 4 (2023).

**Table 14B. 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* | 198 | N/A** | 190 | | | |
| Presence of litter and debris (wracking) | Yes | Yes | Yes | Yes | | | |
| Leaf litter disturbed or washed away | Yes | Yes | Yes | Yes | | | |
| Matted, bent, or absence of vegetation (herbaceous or otherwise) | Yes | Yes | Yes | Yes | | | |
| Sediment deposition and/or scour indicating sediment transport | Yes | Yes | Yes | Yes | | | |
| Water staining due to continual presence of water | Yes | Yes | Yes | Yes | | | |
| Formation of channel bed and banks | Yes | Yes | Yes | Yes | | | |
| Sediment sorting within the primary path of flow | Yes | Yes | Yes | Yes | | | |
| Sediment shelving or a natural line impressed on the banks | Yes | Yes | Yes | Yes | | | |
| Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes) | Yes | Yes | Yes | Yes | | | |
| Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems | Yes | Yes | Yes | Yes | | | |
| Exposure of woody plant roots within the primary path of flow | No | No | No | No | | | |
| Other: | | | | | | | |

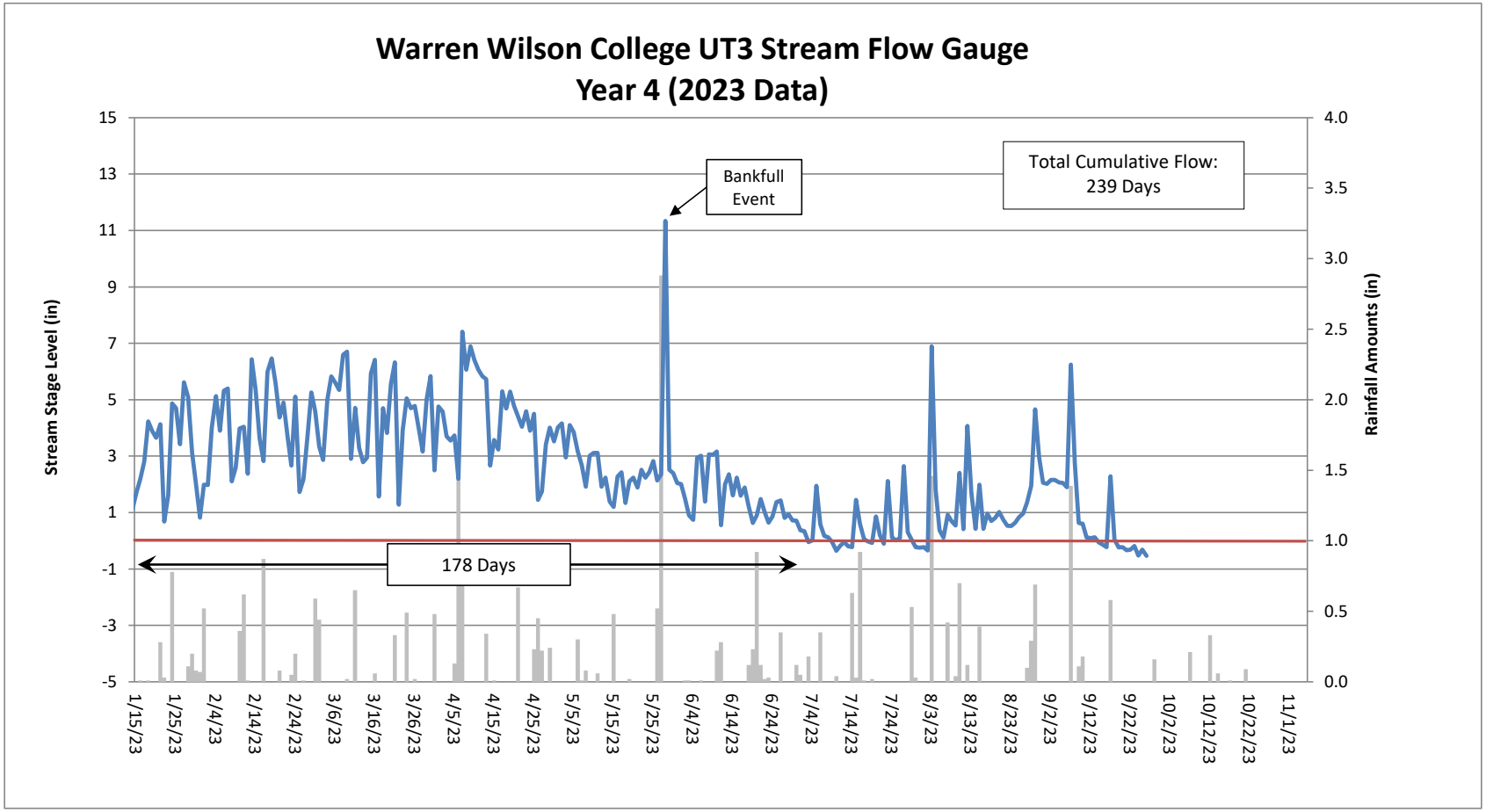
*The gauge was installed August 1, 2020. Based on precipitation data, adjacent groundwater gauge data (Gauge 9), and other Site stream gauge data, it is expected to have flowed consecutively for much of the year 1 (2020) monitoring period.

** All three flow gauges failed during the 2022 season, and data was not able to be recovered from them. These flow gauges were replaced prior to year 4 (2023).

**Table 14C. 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 | 161 | N/A** | 163 | | | |
| Presence of litter and debris (wracking) | Yes | Yes | Yes | Yes | | | |
| Leaf litter disturbed or washed away | Yes | Yes | Yes | Yes | | | |
| Matted, bent, or absence of vegetation (herbaceous or otherwise) | Yes | Yes | Yes | Yes | | | |
| Sediment deposition and/or scour indicating sediment transport | Yes | Yes | Yes | Yes | | | |
| Water staining due to continual presence of water | Yes | Yes | Yes | Yes | | | |
| Formation of channel bed and banks | Yes | Yes | Yes | Yes | | | |
| Sediment sorting within the primary path of flow | Yes | Yes | Yes | Yes | | | |
| Sediment shelving or a natural line impressed on the banks | Yes | Yes | Yes | Yes | | | |
| Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes) | Yes | Yes | Yes | Yes | | | |
| Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems | Yes | Yes | Yes | Yes | | | |
| Exposure of woody plant roots within the primary path of flow | No | No | No | No | | | |
| Other: | | | | | | | |

** All three flow gauges failed during the 2022 season, and data was not able to be recovered from them. These flow gauges were replaced prior to year 4 (2023).


Warren Wilson College UT3 Stream Flow Gauge
Year 4 (2023 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Bankfull Event
Total Cumulative Flow: 239 Days
178 Days
15
13
11
9
7
5
3
1
-1
-3
-5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/15/23
1/25/23
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2/14/23
2/24/23
3/6/23
3/16/23
3/26/23
4/5/23
4/15/23
4/25/23
5/5/23
5/15/23
5/25/23
6/4/23
6/14/23
6/24/23
7/4/23
7/14/23
7/24/23
8/3/23
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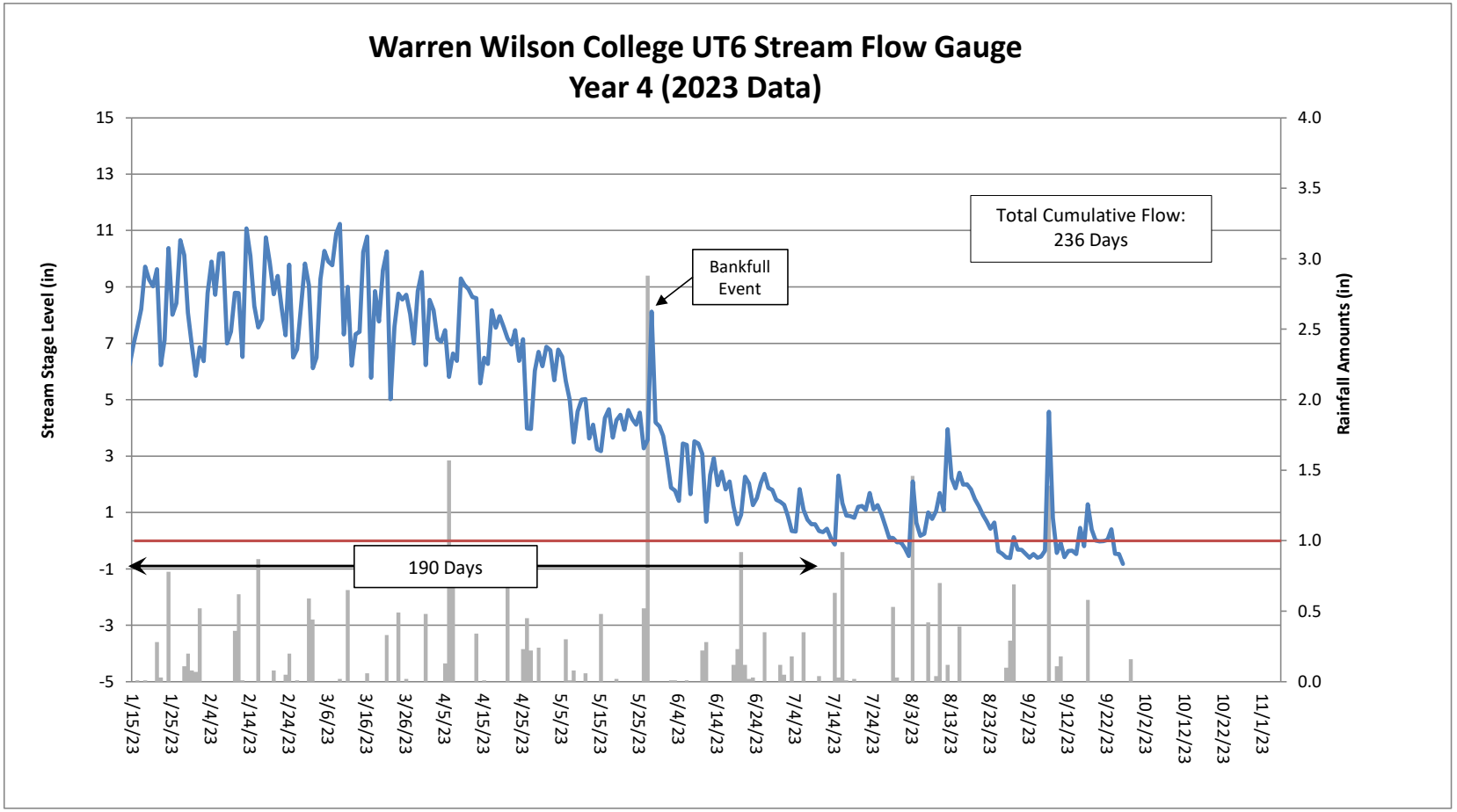
10/22/23
11/1/23


Warren Wilson College UT6 Stream Flow Gauge
Year 4 (2023 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Total Cumulative Flow:
236 Days
Bankfull
Event
190 Days
15
13
11
9
7
5
3
1
-1
-3
-5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/15/23
1/25/23
2/4/23
2/14/23
2/24/23
3/6/23
3/16/23
3/26/23
4/5/23
4/15/23
4/25/23
5/5/23
5/15/23
5/25/23
6/4/23
6/14/23
6/24/23
7/4/23
7/14/23
7/24/23
8/3/23
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10/22/23
11/1/23

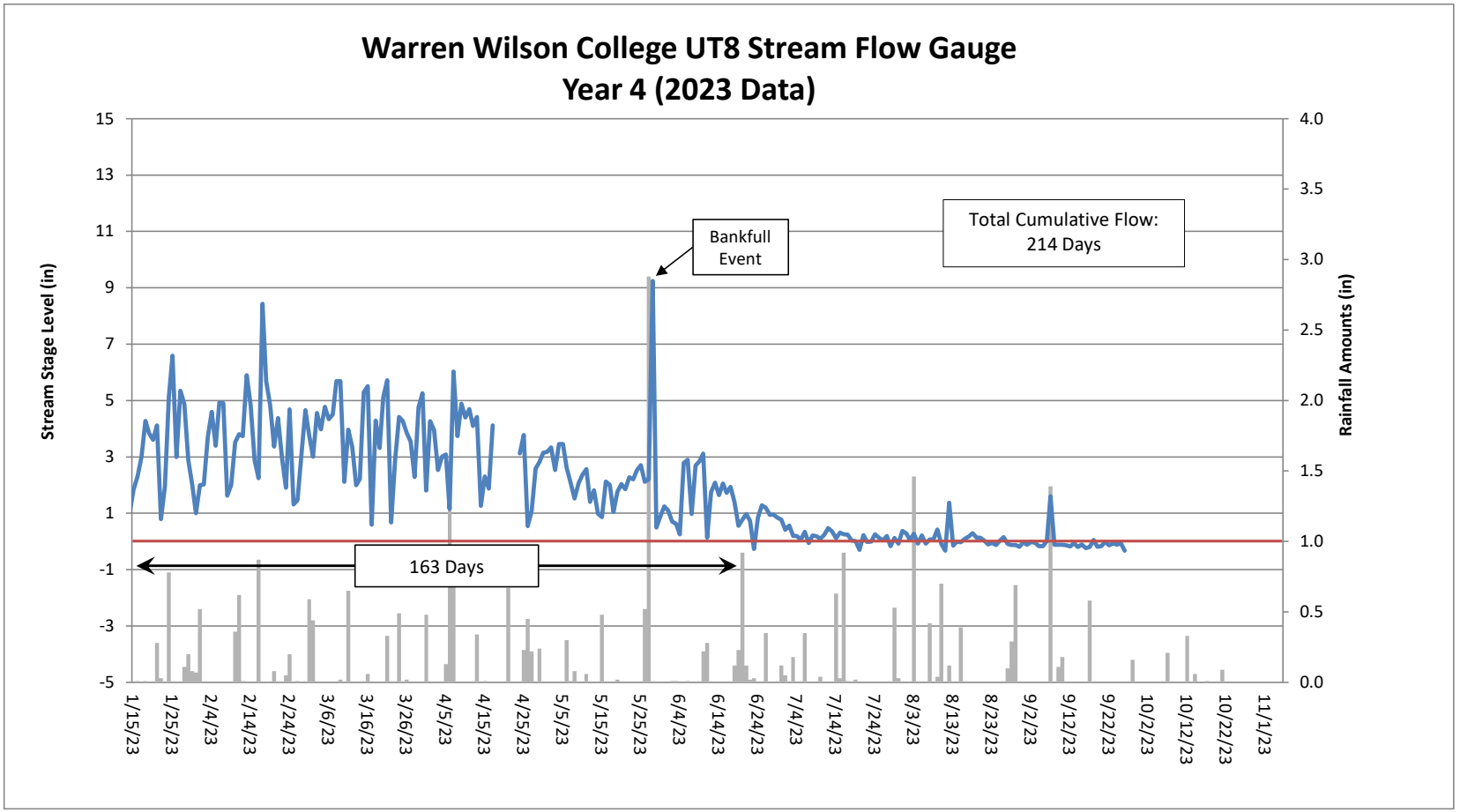

Warren Wilson College UT8 Stream Flow Gauge
Year 4 (2023 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Bankfull Event
Total Cumulative Flow: 214 Days
163 Days
15
13
11
9
7
5
3
1
-1
-3
-5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/15/23
1/25/23
2/4/23
2/14/23
2/24/23
3/6/23
3/16/23
3/26/23
4/5/23
4/15/23
4/25/23
5/5/23
5/15/23
5/25/23
6/4/23
6/14/23
6/24/23
7/4/23
7/14/23
7/24/23
8/3/23
8/13/23
8/23/23
9/2/23
9/12/23
9/22/23
10/2/23
10/12/23
10/22/23
11/1/23

**Table 15. Verification of Bankfull Events**

| Date of Data Collection | Date of Occurrence | Method | Photo (if available) | Monitoring Year |
|---|---|---|---|---|
| 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 | MY1 |
| 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 | MY1 |
| January 26, 2021 | January 26, 2021 | Wrack and laid-back vegetation were observed outside the TOB of UT6 after 0.5 inches of rain was documented January 26, 2021 at an onsite rain gauge. | 3 | MY2 |
| April 6, 2021 | March 31, 2021 | Wrack and laid-back vegetation were observed outside the TOB of UT7 after 1.09 inches of rain was documented March 31, 2021 at an onsite rain gauge. | 4 | MY2 |
| October 13, 2022 | September 6, 2022 | Wrack and laid-back vegetation were observed along the TOB of UT3, UT5, and UT8 after 2.22 inches of rain was documented September 5-6, 2022 at an onsite rain gauge. | 5, 6, 7 | MY3 |
| September 26, 2023 | May 28, 2023 | Stream gauges on UT3, UT6, and UT8 indicated a bankfull event occurred after 2.88 inches of rain was recorded at an onsite rain gauge. | - | MY4 |

Photo 1: UT8 at bankfull stage.
Photo taken 5/20/2020, MY1


Photo 2: Wrack and laid-back vegetation outside the TOB of UT3 after a bankfull event.
Photo taken 11/4/2020, MY1

Photo 3: Wrack and laid-back vegetation outside the TOB of UT6 after a bankfull event. Photo taken 1/26/21, MY2


Photo 4: Wrack and laid-back vegetation outside the TOB of UT7 after a bankfull event. Photo taken 4/6/21, MY2

Photo 5: Wrack and laid-back vegetation outside the TOB of UT3 after a bankfull event. Photo taken 10/13/22, MY3

Photo 6: Wrack and laid-back vegetation along the TOB of UT5 after a bankfull event. Photo taken 10/13/22, MY3

Photo 7: Wrack and laid-back vegetation along the TOB of UT8 after a bankfull event.
Photo taken 10/13/22, MY3

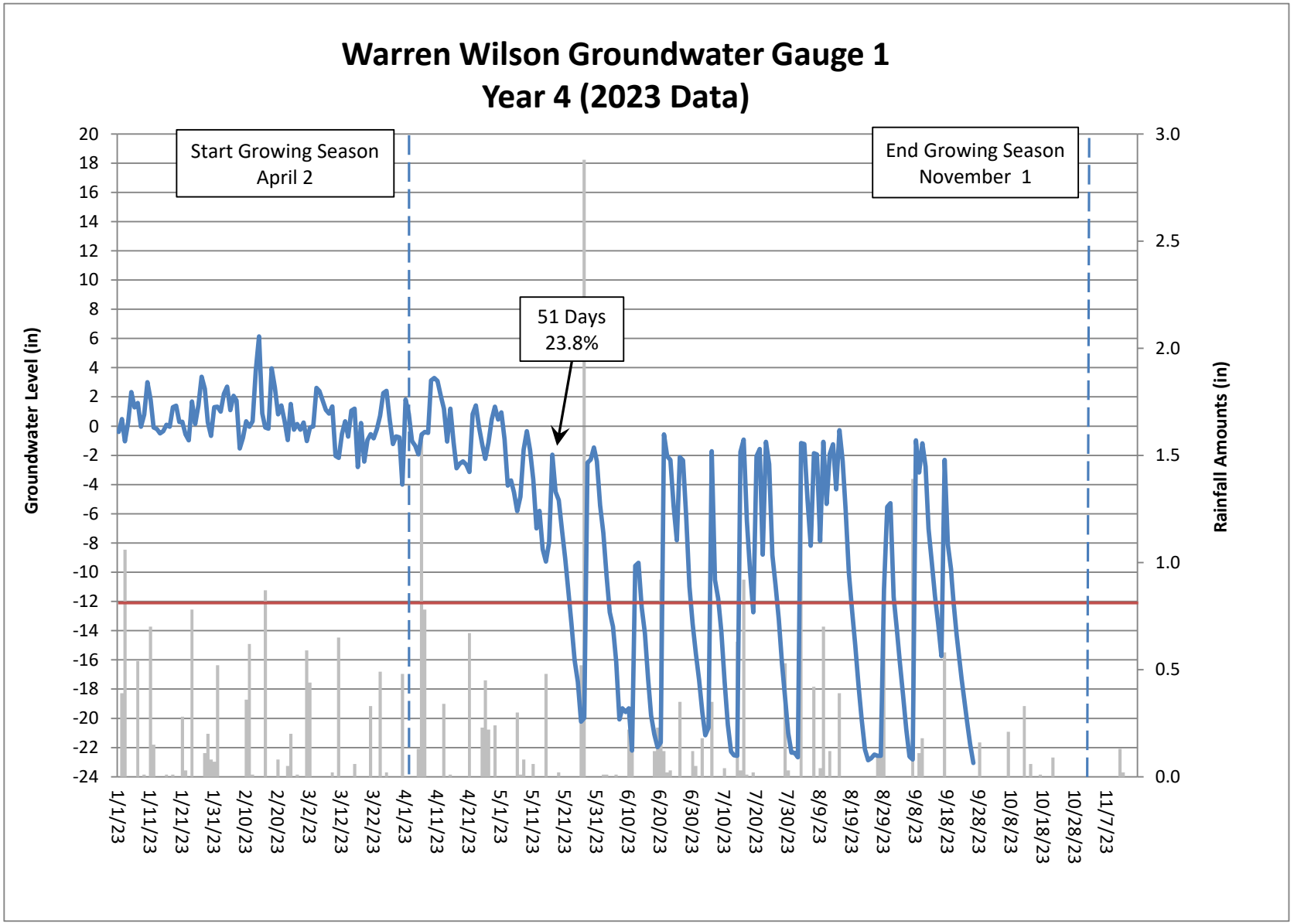
**Table 16A. Groundwater Hydrology Data: Mitigation Success (UT-3B, Little Berea/Clingman's)**

| Gauge | Typical Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Year 1 (2020) | Year 2 (2021) | Year 3 (2022) | Year 4 (2023) | Year 5 (2024) | Year 6 (2025) | Year 7 (2026) |
| 3 | Yes/127 days (55.0%) | Yes/198 days (89.6%) | Yes/193 days (89.8%) | Yes/178 days (83.2%) | | | |
| 4 | Yes/32 days (13.9%) | Yes/198 days (89.6%) | Yes/193 days (89.8%) | Yes/178 days (83.2%) | | | |
| 5 | Yes/174 days (75.3%) | Yes/198 days (89.6%) | Yes/193 days (89.8%) | Yes/178 days (83.2%) | | | |
| 6 | Yes/93 days (40.3%) | Yes/198 days (89.6%) | Yes/193 days (89.8%) | Yes/178 days (83.2%) | | | |
| 7 | Yes/72 days (31.2%) | Yes/198 days (89.6%) | Yes/193 days (89.8%) | Yes/178 days (83.2%) | | | |
| 8 | Yes/231 days (100%) | Yes/198 days (89.6%) | Yes/101 days (47.0%) | Yes/100 days (46.7%) | | | |

**Table 16B. Groundwater Hydrology Data: Potential Wetland Loss Monitoring Areas**

| Gauge | Typical Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Year 1 (2020) | Year 2 (2021) | Year 3 (2022) | Year 4 (2023) | Year 5 (2024) | Year 6 (2025) | Year 7 (2026) |
| 1 | Yes/37 days (16.0%) | Yes/198 days (89.6%) | Yes/46 days (21.4%) | Yes/51 days (23.8%) | | | |
| 2 | Yes/61 days (26.4%) | Yes/198 days (89.6%) | Yes/194 days (90.2%) | Yes/93 days (43.5%) | | | |
| 9 | Yes/175 days (75.8%) | Yes/198 days (89.6%) | Yes/193 days (89.8%) | Yes/178 days (83.2%) | | | |
| 10 | No*/9 days (3.9%) | Yes/61 days (27.6%) | Yes/26 days (12.1%) | Yes/34 days (15.9%) | | | |

*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 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
51 Days
23.8%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
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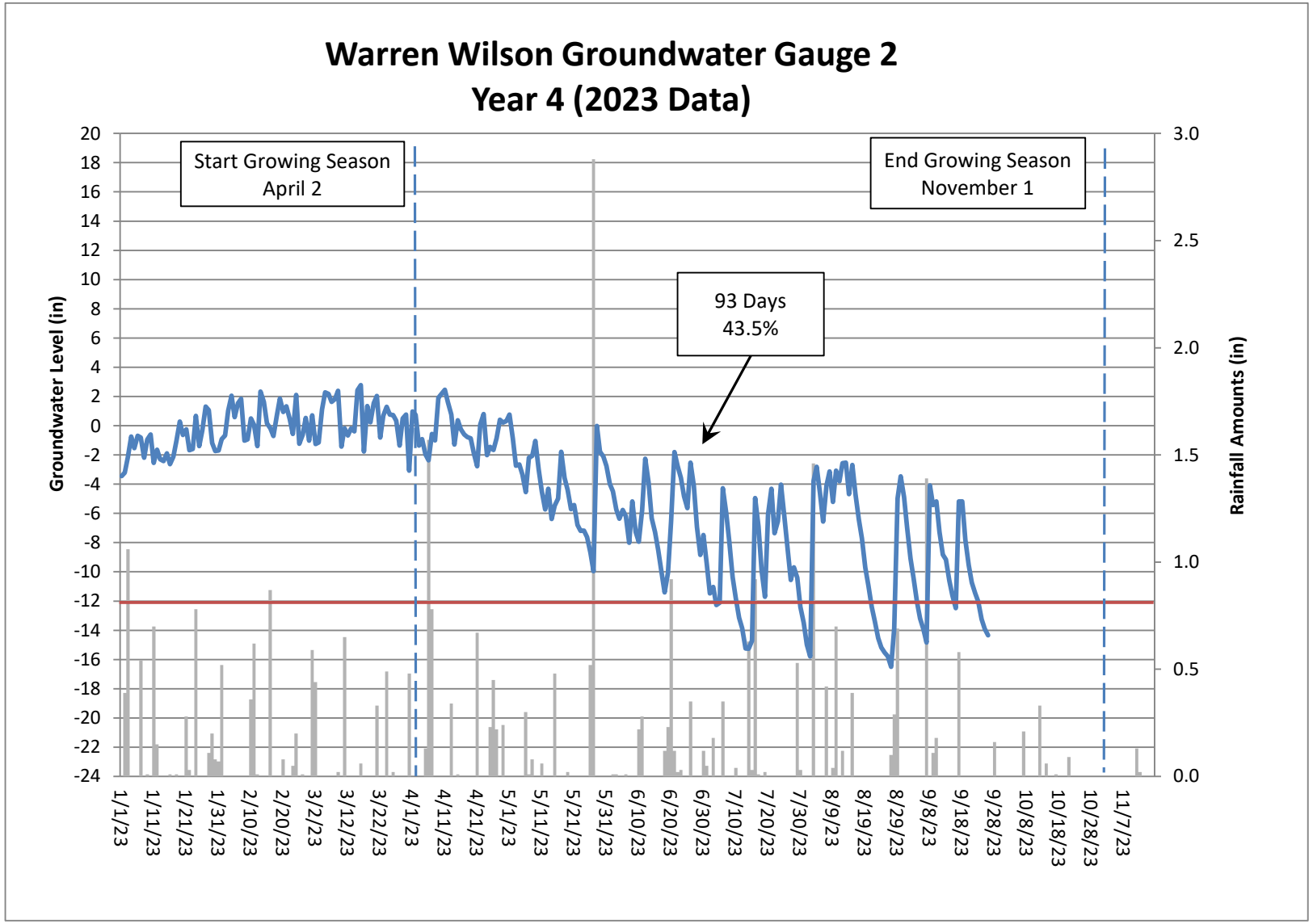
10/18/23
10/28/23
11/7/23


Warren Wilson Groundwater Gauge 2
Year 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
93 Days
43.5%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
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9/18/23
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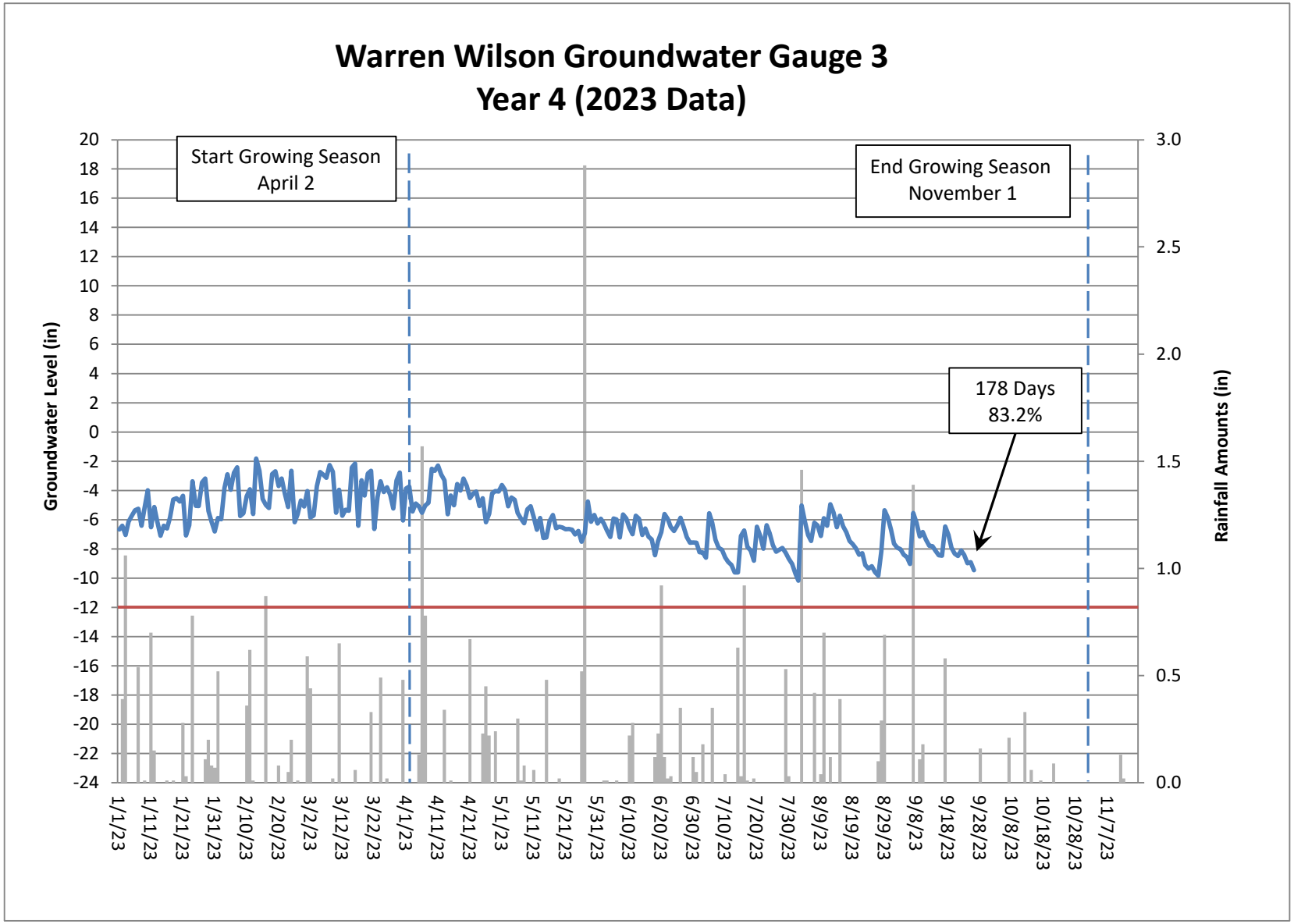
10/18/23
10/28/23
11/7/23


Warren Wilson Groundwater Gauge 3
Year 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
178 Days
83.2%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
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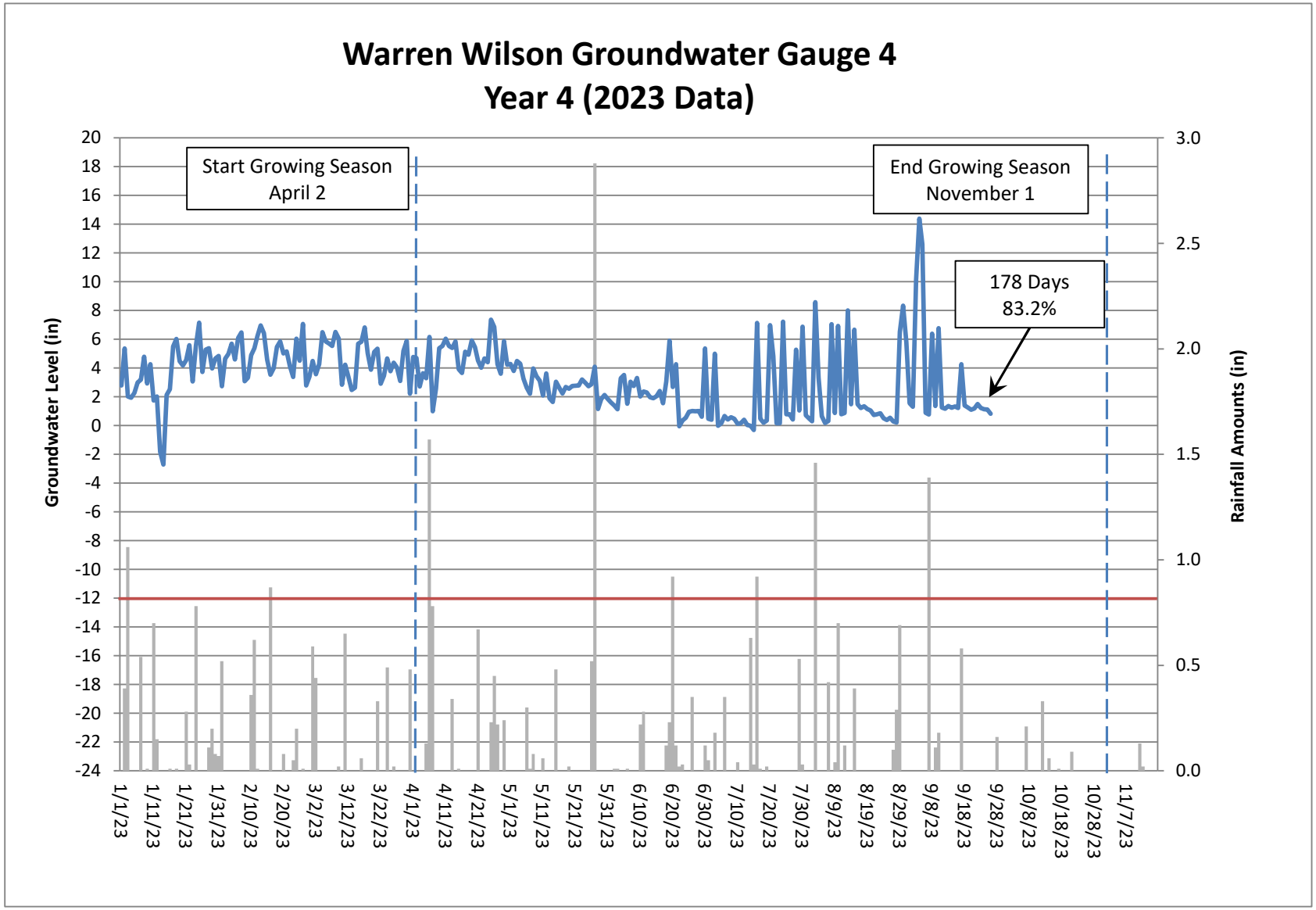
10/8/23
10/18/23
10/28/23
11/7/23


Warren Wilson Groundwater Gauge 4
Year 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
178 Days
83.2%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
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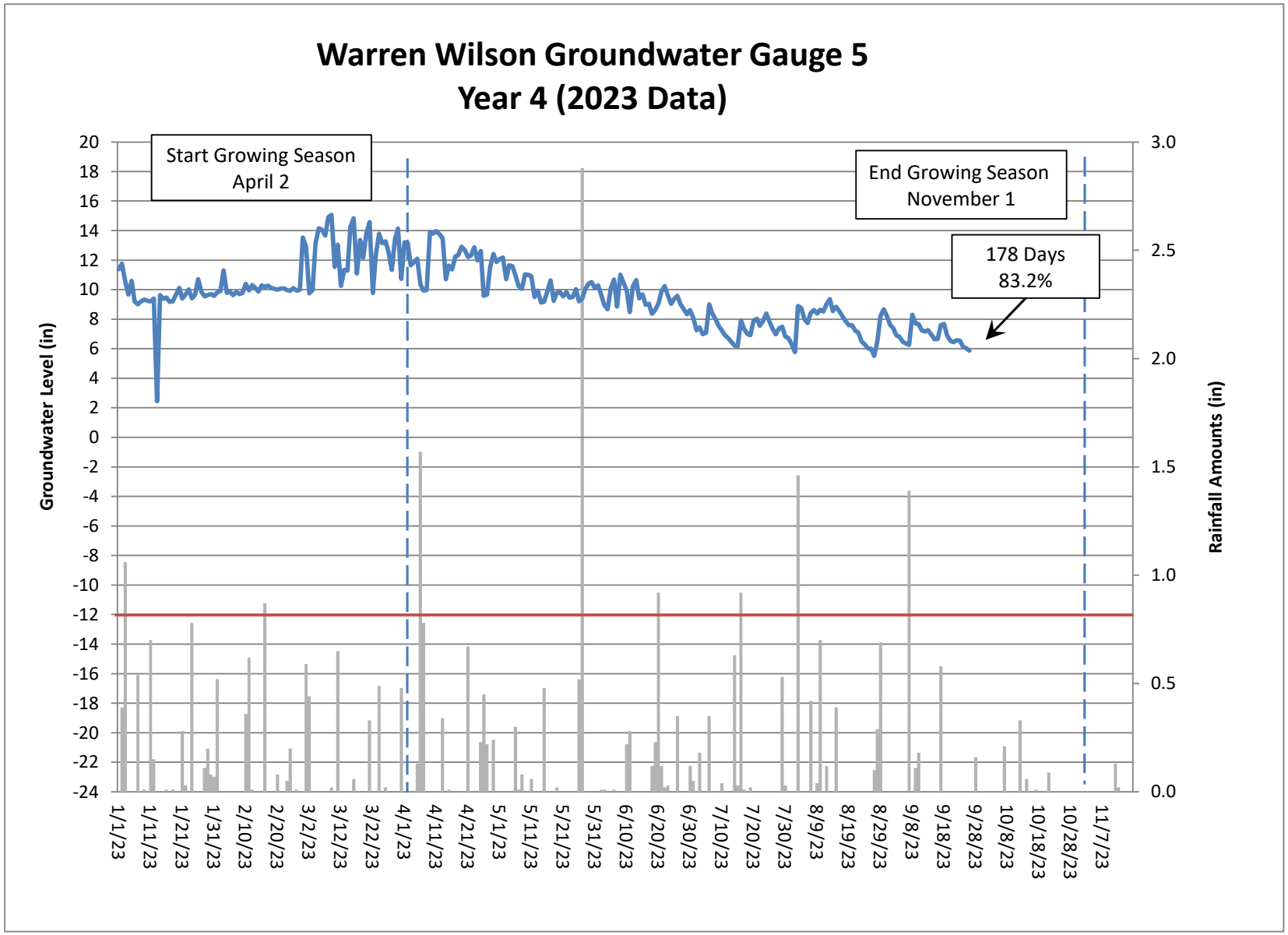
11/7/23


Warren Wilson Groundwater Gauge 5
Year 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
178 Days
83.2%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
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0.0
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4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
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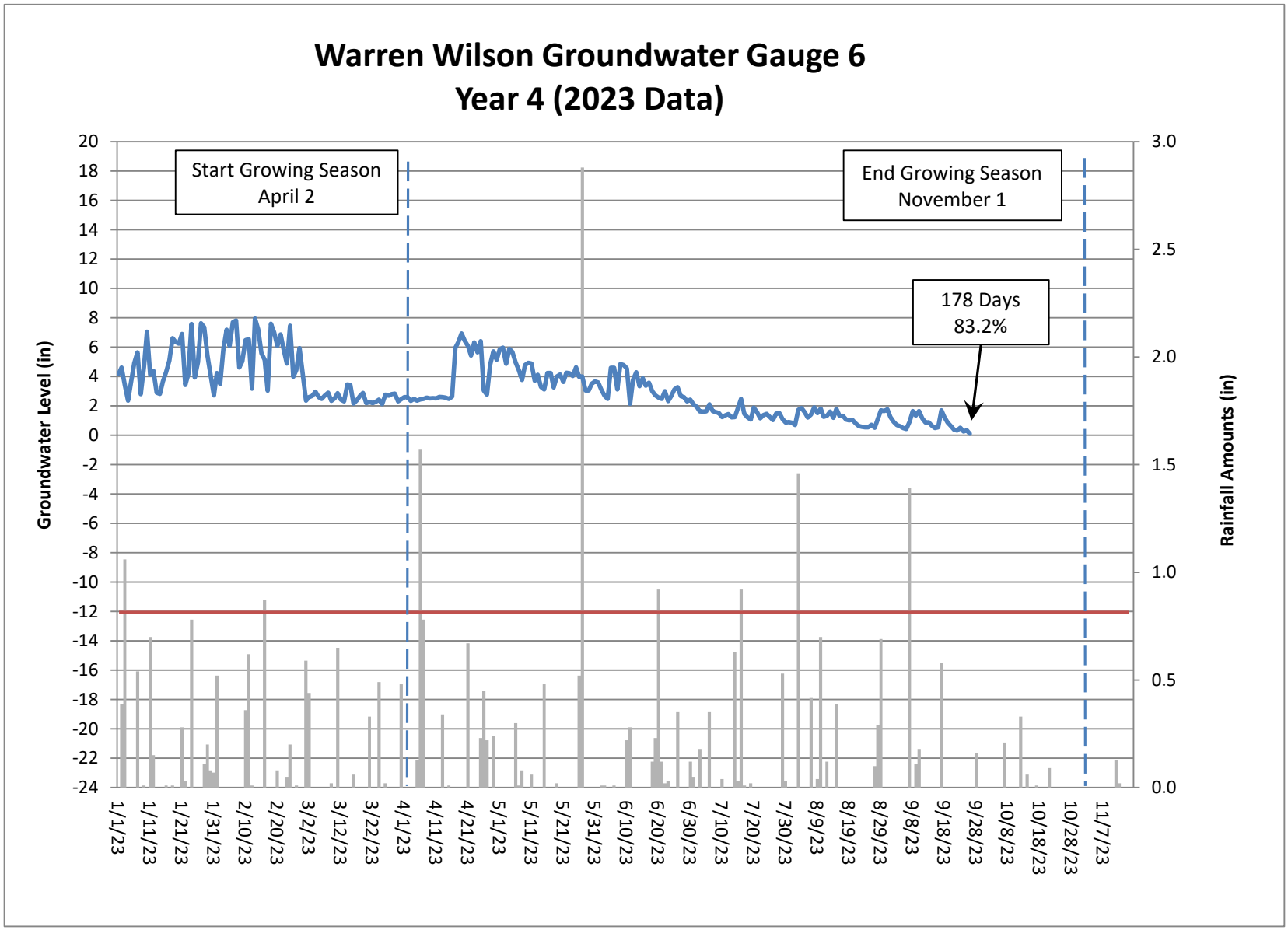
10/28/23
11/7/23


Warren Wilson Groundwater Gauge 6
Year 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
178 Days
83.2%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
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1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
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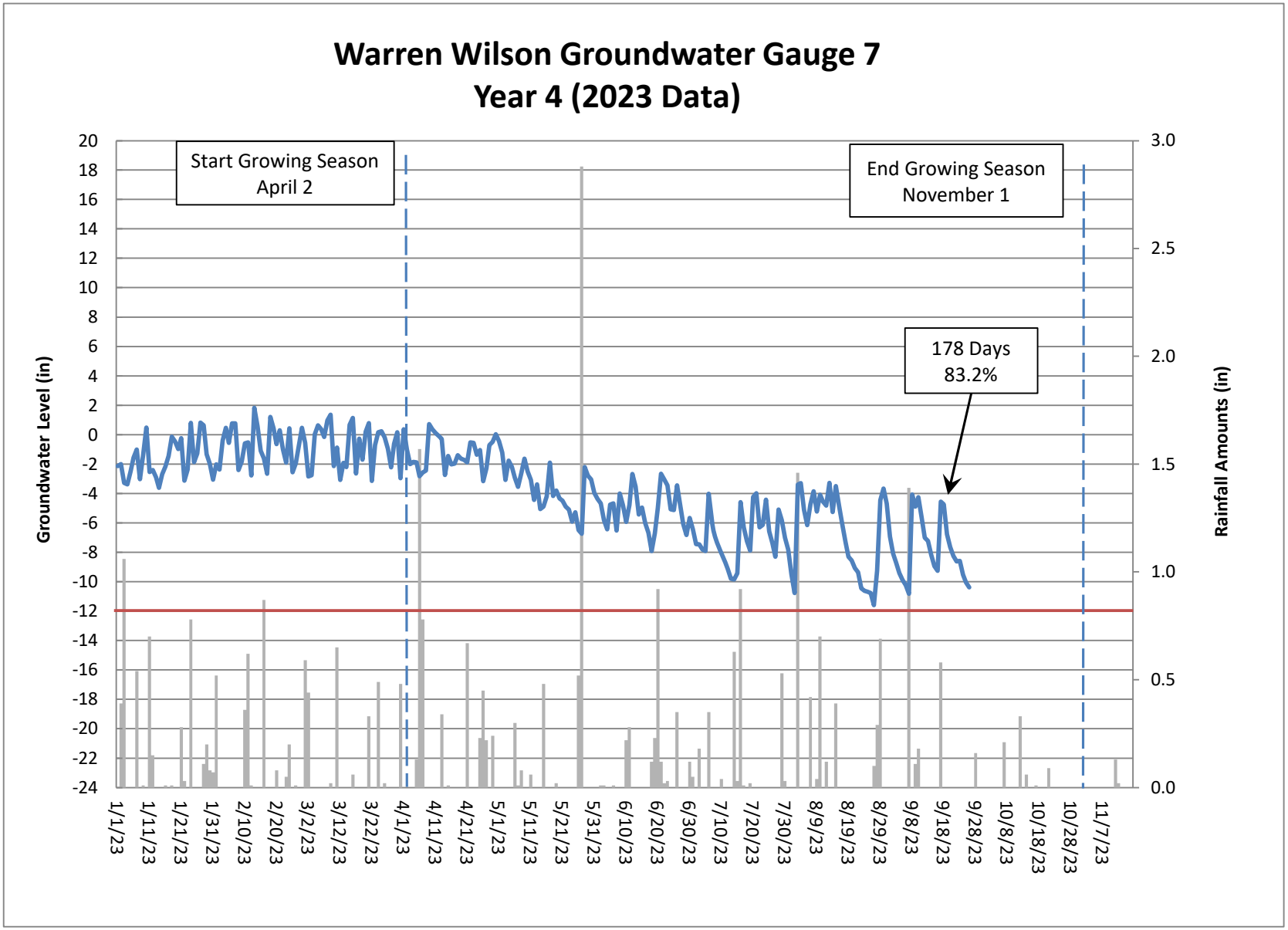
11/7/23


Warren Wilson Groundwater Gauge 7
Year 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
178 Days
83.2%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
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1/11/23
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2/20/23
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3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
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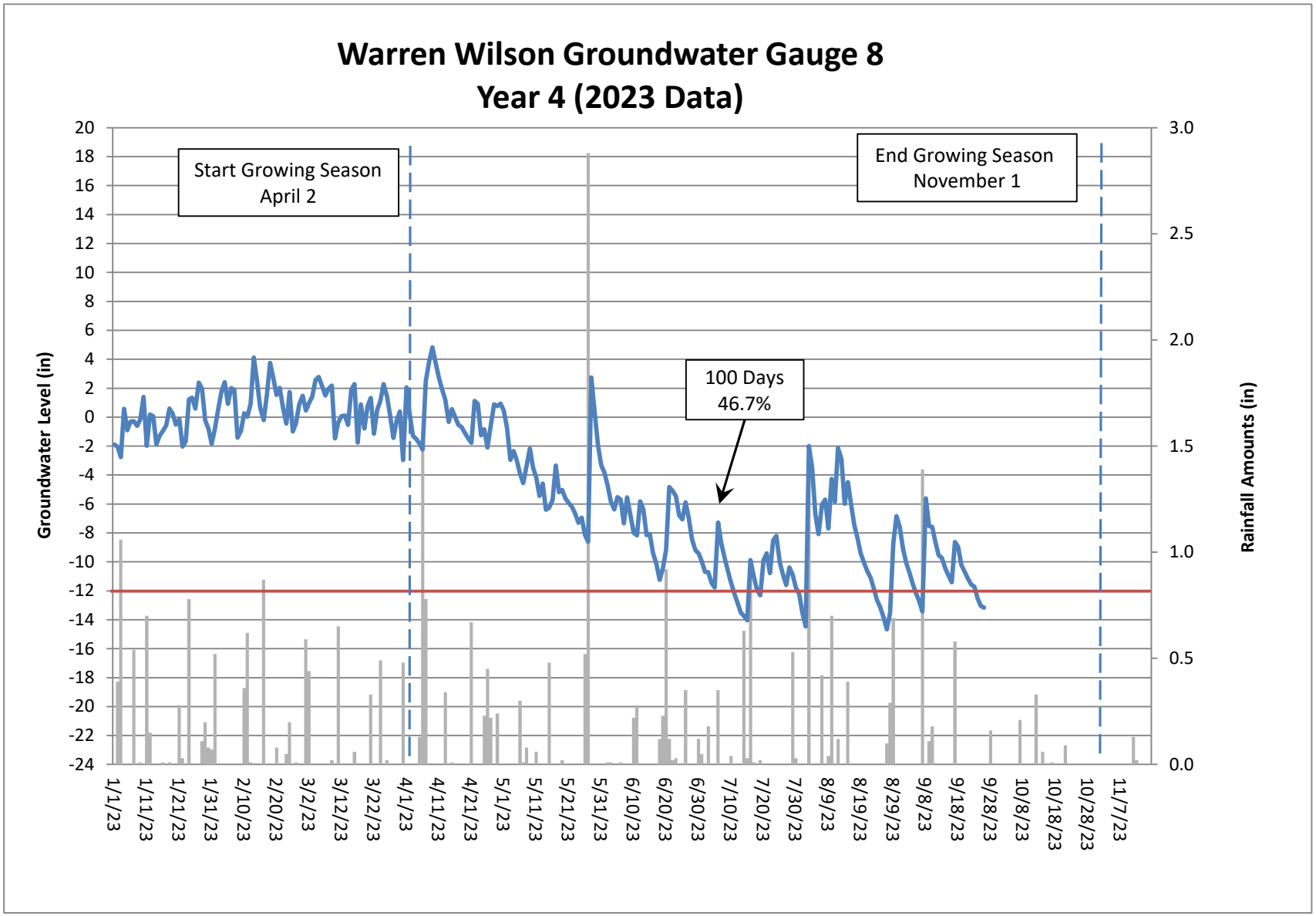
11/7/23


Warren Wilson Groundwater Gauge 8
Year 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
100 Days
46.7%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
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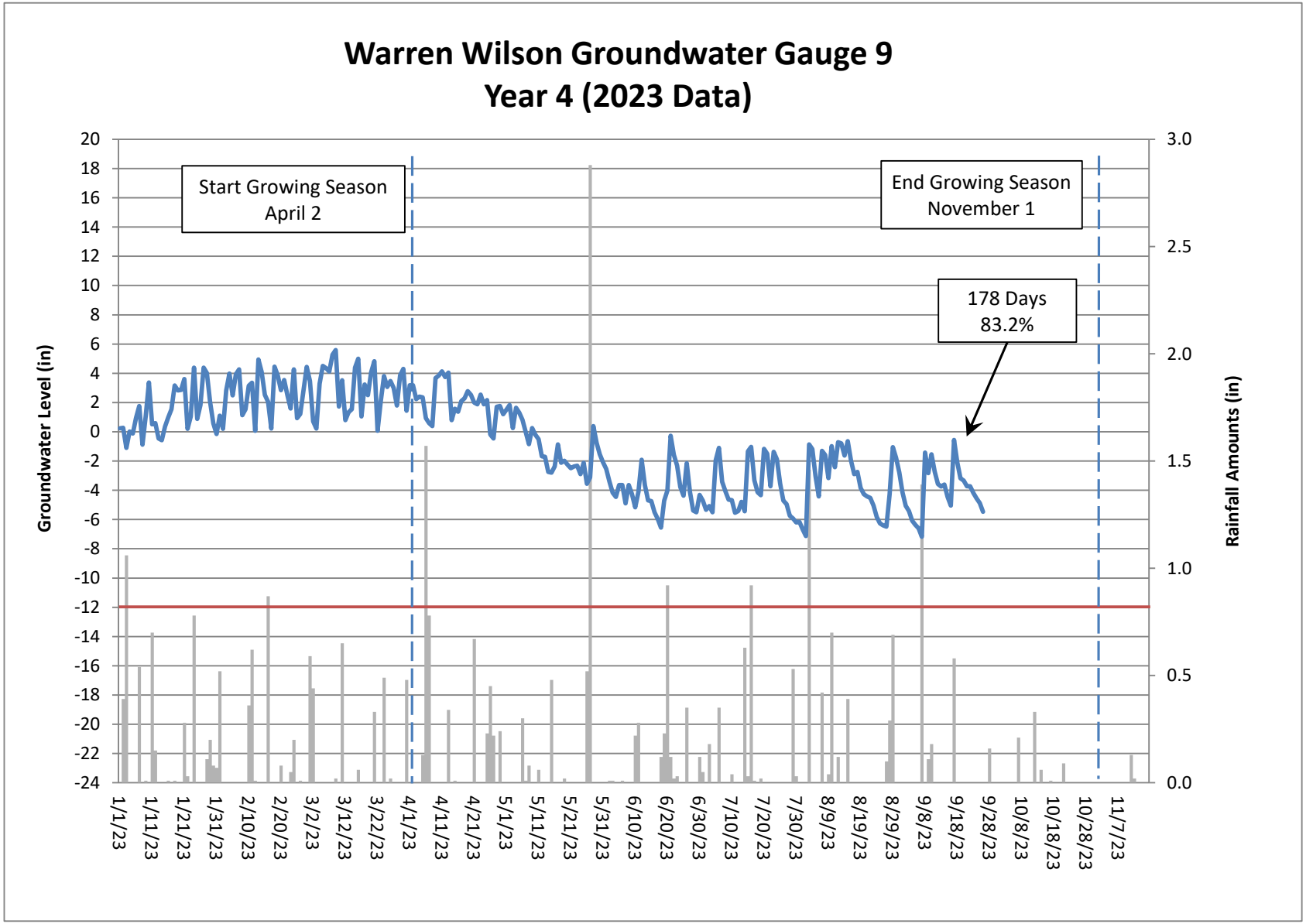
11/7/23


Warren Wilson Groundwater Gauge 9
Year 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
178 Days
83.2%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
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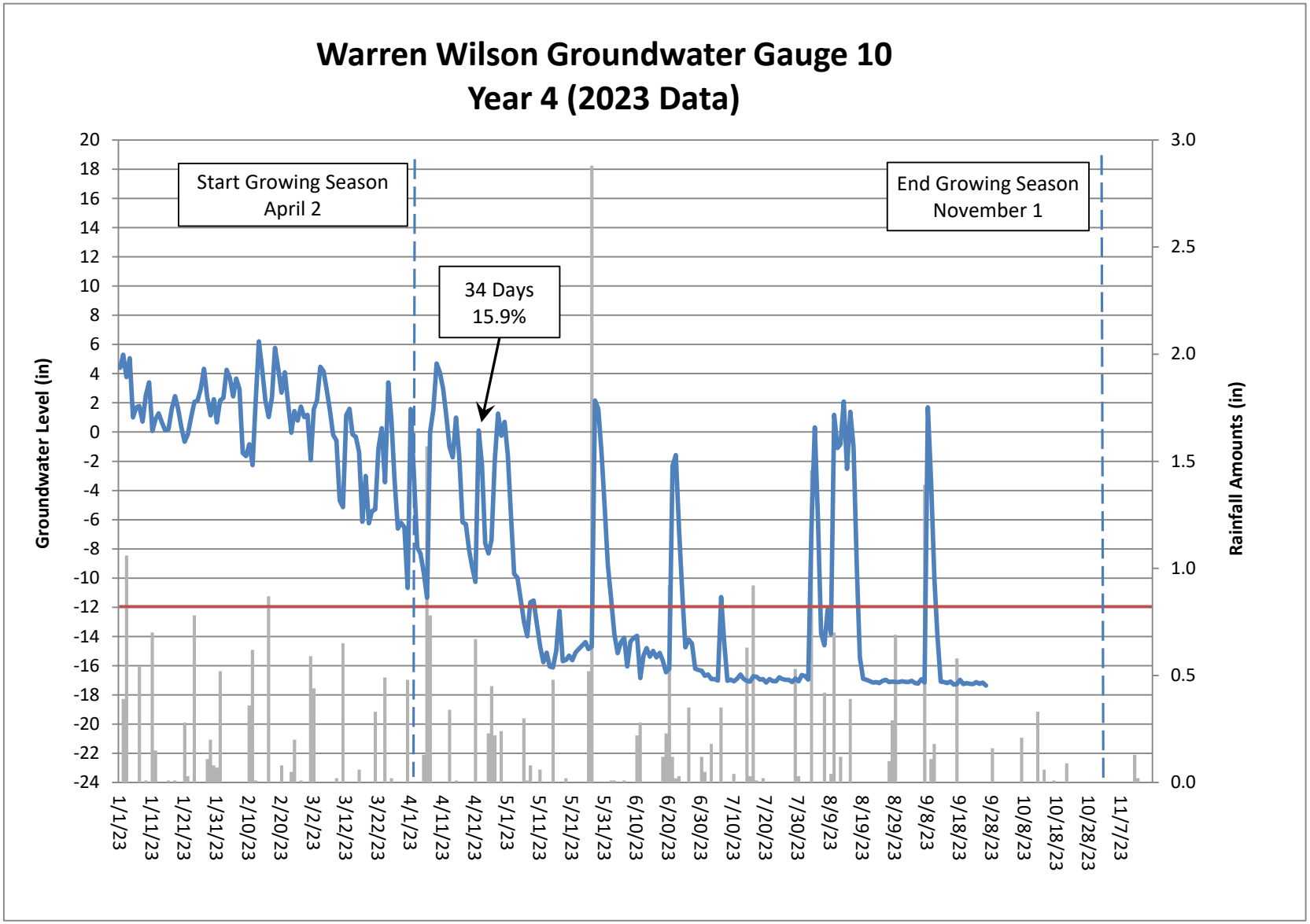
10/28/23
11/7/23


Warren Wilson Groundwater Gauge 10
Year 4 (2023 Data)
Start Growing Season
April 2
End Growing Season
November 1
34 Days
15.9%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
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7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23

## Appendix F
## Preconstruction Wetland Hydrology Data

Figure 3. Preconstruction Gauge Locations
Table 17. Preconstruction Groundwater Gauge Data Summary
Tables 18. Preconstruction vs Postconstruction Gauge Analysis


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 17. 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.

**Table 18. Groundwater Hydrology Data: Mitigation Success (UT-3B, Little Berea/ Clingman's)**

| MY1-7 Gauge # (Precon Gauge #)* | Preconstruction Data Hydroperiod – Max Consecutive Days (%) | | | Postconstruction Data Hydroperiod - Max Consecutive Days (%) % Improvement from Preconstruction | | | |
|---|---|---|---|---|---|---|---|
| | 2018 | 2019 | Average Hydroperiod % | Year 1 (2020) | Year 2 (2021) | Year 3 (2022) | Year 4 (2023) |
| 3 (2A) | NA | 48 days (22 %) | 22.0% | 127 days (55.0%) +33.0% | 198 days (89.6%) +67.6% | 193 days (89.8%) +67.8% | 178 days (83.2%) +61.2% |
| 4^ (2B) | 20 days (9.3 %) | 0 days (0 %) | 9.3% | 32 days (13.9%) +4.6%* | 198 days (89.6%) +80.3% | 193 days (89.8%) +80.5% | 178 days (83.2%) +61.2% |
| 5^ (2C) | 12 days (5.6 %) | 50 days (23 %) | 14.3% | 174 days (75.3%) +61% | 198 days (89.6%) +75.3% | 193 days (89.8%) +75.5% | 178 days (83.2%) +61.2% |
| 6 (3C) | 4 days (1.9 %) | 3 days (1.4 %) | 1.7% | 93 days (40.3%) +38.7% | 198 days (89.6%) +88.0% | 193 days (89.8%) +88.2% | 178 days (83.2%) +61.2% |
| 7 (3B) | 117 days (54.7%) | 140 days (65 %) | 59.9% | 72 days (31.2%) -28.7%* | 198 days (89.6%) +29.8% | 193 days (89.8%) +30.0% | 178 days (83.2%) +61.2% |
| 8 (3A) | 24 days (11.2 %) | 124 days (58 %) | 34.6% | 231 days (100%) +65.4% | 198 days (89.6%) +55.0% | 101 days (47.0%) +12.4% | 100 days (46.7%) +12.1% |
| 2 (1A) | 21 days (9.8 %) | 57 days (27 %) | 18.4% | 61 days (26.4%) +8.0% | 198 days (89.6%) +71.2% | 194 days (90.2%) +71.8% | 93 days (43.5%) +25.1% |
| 2 (1B) | 9 days (4.2 %) | 50 days (23 %) | 13.6% | 61 days (26.4%) +12.8% | 198 days (89.6%) +76.0% | 194 days (90.2%) +76.6% | 93 days (43.5%) +29.9% |
| 2 (1C) | 3 days (1.4 %) | 3 days (1.4 %) | 1.4% | 61 days (26.4%) +25.0% | 198 days (89.6%) +88.2% | 194 days (90.2%) +88.8% | 93 days (43.5%) +42.1% |

^ Gauges 4 and 5 were installed in areas outside of jurisdictional wetland areas delineated during site planning. These gauges demonstrated a gain of wetland area and function when compared to preconstruction conditions.

* Hydroperiod in this area did not improve from preconstruction conditions likely because the channel was relocated closer to the gauge location, providing a small drainage effect that did not exist prior to construction. However, the hydroperiods in these areas represent high-functioning wetland systems.

# Appendix G
# Site Photo Log

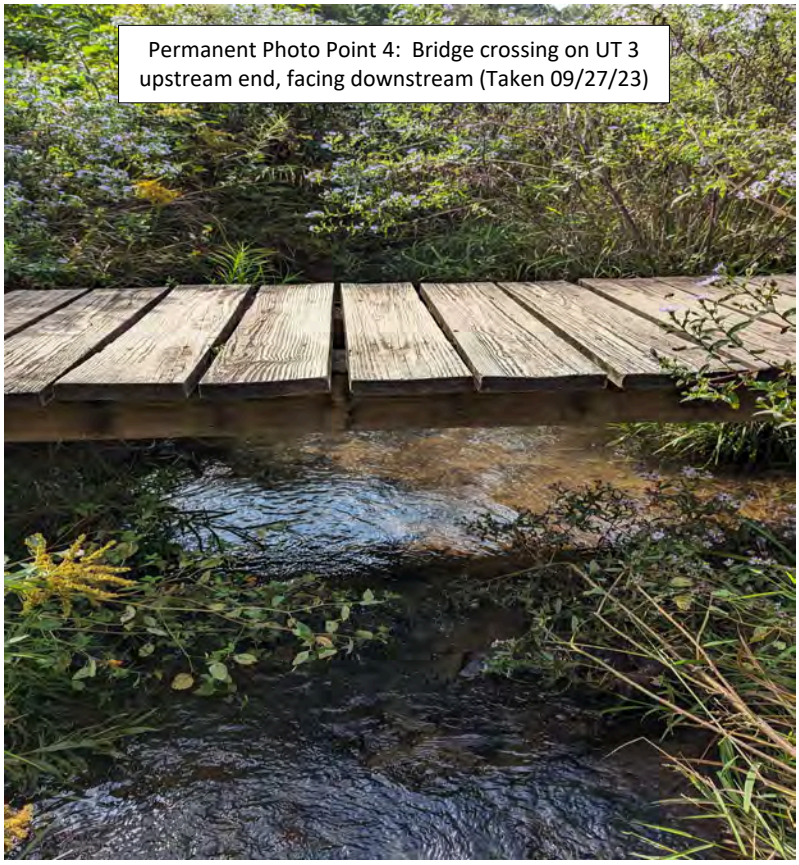
**Warren Wilson College**
**MY-04 (2023) Photo Log**

Permanent Photo Point 1: Downstream culvert on UT 1 downstream end, facing upstream (Taken 09/27/2023)

Permanent Photo Point 2: Downstream culvert on UT 1 upstream end, facing downstream (Taken 09/27/23)

**Warren Wilson College**
**MY-04 (2023) Photo Log**

Permanent Photo Point 3: Bridge crossing on UT 3 downstream end, facing upstream (Taken 09/27/23)



Permanent Photo Point 4: Bridge crossing on UT 3 upstream end, facing downstream (Taken 09/27/23)

**Warren Wilson College**
**MY-04 (2023) Photo Log**


Permanent Photo Point 5: Upstream culvert on UT 3 downstream end, facing upstream (Taken 9/26/23)

Permanent Photo Point 6: Upstream culvert on UT 3 upstream end, facing downstream (Taken 9/26/23)

**Warren Wilson College**
**MY-04 (2023) Photo Log**

Permanent Photo Point 7: Culvert on UT 4 downstream end, facing upstream (Taken 10/2023)

Permanent Photo Point 8: Culvert on UT 4 upstream end, facing downstream (Taken 10/2023)

**Warren Wilson College**
**MY-04 (2023) Photo Log**

Permanent Photo Point 9: Bridge crossing on UT 5 downstream end, facing upstream (Taken 10/2023)

Permanent Photo Point 10: Bridge crossing on UT 5 upstream end, facing downstream (Taken 10/2023)

**Warren Wilson College**
**MY-04 (2023) Photo Log**

Permanent Photo Point 11: Crossing on lower UT 6 downstream end, facing upstream (Taken 09/27/23)

Permanent Photo Point 12: Crossing on lower UT 6 upstream end, facing downstream (Taken 9/27/23)

**Warren Wilson College**
**MY-04 (2023) Photo Log**


Permanent Photo Point 13: Crossing on middle UT 6 downstream end, facing upstream (Taken 9/27/23)


Permanent Photo Point 14: Crossing on middle UT 6 upstream end, facing downstream (Taken 09/27/23)

**Warren Wilson College**
**MY-04 (2023) Photo Log**

Permanent Photo Point 15: Crossing on lower UT 7 downstream end, facing upstream (Taken 09/27/23)

Permanent Photo Point 16: Crossing on lower UT 7 upstream end, facing downstream (Taken 09/27/23)

**Warren Wilson College**
**MY-04 (2023) Photo Log**

Permanent Photo Point 17: Crossing on upper UT 7 downstream end, facing upstream (Taken 09/27/23)

Permanent Photo Point 18: Crossing on upper UT 7 upstream end, facing downstream (Taken 09/27/23)

**Warren Wilson College**
**MY-04 (2023) Photo Log**

Permanent Photo Point 19: Footbridge crossing on UT 8 downstream end, facing upstream (Taken 9/27/23)

Permanent Photo Point 20: Footbridge crossing on UT 8 upstream end, facing downstream (Taken 9/27/23)

**Warren Wilson College**
**MY-04 (2023) Photo Log**

Photo 21: Vegetation along UT 3 Stokes (Taken Sept 2023)

Photo 22: Wetland mosaic along UT3 Clingmans (Sept 2023)

Photo 22: CE boundary upper UT 6 (Sept 2023)

Photo 23: River cane along lower UT6 near XS-1/XS-2 left bank (Taken Sept 2023)

Photo 24: River cane along UT6 right bank, looking towards Swannanoa River.(Sept 2023)

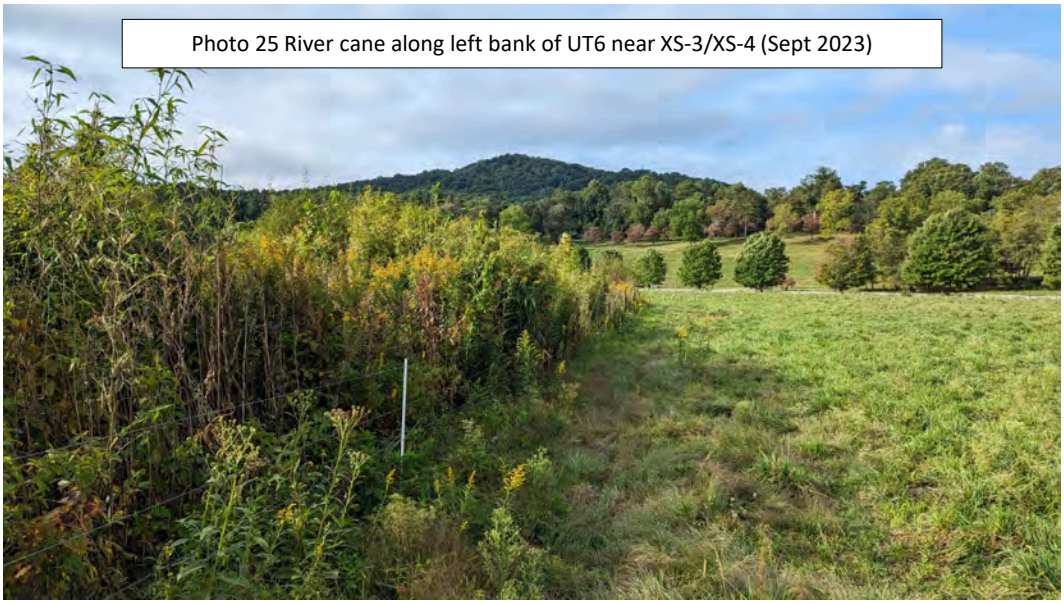


Photo 25 River cane along left bank of UT6 near XS-3/XS-4 (Sept 2023)

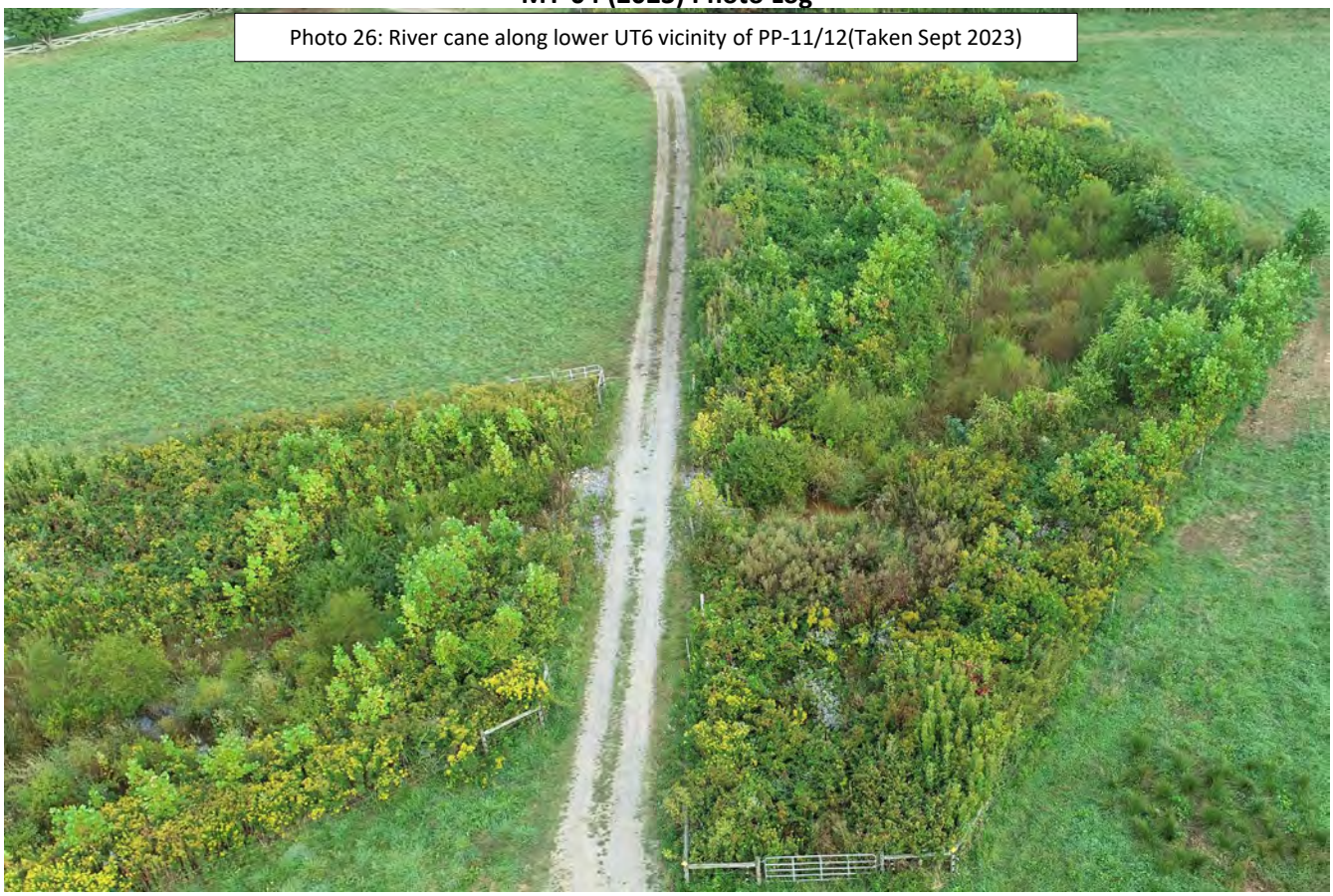


Photo 26: River cane along lower UT6 vicinity of PP-11/12(Taken Sept 2023)

Photo 27 River cane a lower UT6 and Swanannoa River (Sept 2023)

Photo 28: River cane transplants along UT6 (March 2020)

Photo 29 Moving river cane during construction (January 2020)

# Appendix H
# 2023 IRT Site Visit Notes

Restoration Systems, LLC
1101 Haynes St. Suite 211
Raleigh, North Carolina
Ph: (919) 755-9490
Fx: (919) 755-9492

June 29, 2023

Paul Wiesner
Western Regional Supervisor
NC Department of Environmental Quality - Division of Mitigation Services
*paul.wiesner@deq.nc.gov*

**Subject: Warren Wilson College, MY4 (2023) IRT Site Visit Notes**
DMS project # 100019
USACE Action ID No. SAW-2017-01557 / NCDWR No. 20171158

On June 23, 2023, Restoration Systems (RS) held an on-site meeting with regulatory agencies to review and discuss the Warren Wilson College (WWC) Mitigation Site (Site) and the need/possibility of a supplemental/diversity planting effort to be conducted during the dormant season of 2023/2024. Below is a list of attendees and site visit notes, accompanied by a proposed planting effort.

**Attendees:**

USACE:
- Steve Kichefski
- Erin Davis

NC DWR:
- Maria Polizzi
- Mac Haupt

NC WRC
- Andrea Leslie

NC DMS:
- Paul Wiesner
- Kelly Phillips

Restoration Systems:
- Raymond Holz
- Josh Merritt
- Gus Lehrman

Axiom Environmental:
- Grant Lewis
- Phillip Perkinson

Anchor QEA of NC
- Robert Cork

**Site Visit Notes:**

UT 1:
- No issues with stream bank stability or formation through the former pond.
- IRT was supportive of the current vegetation condition but requested herbaceous vegetation monitoring plots during MY4 (2023)
- RS will perform two (2) 2-meter x 5-meter herbaceous vegetation surveys as shown in the attached figure set.

UT1 - Lower (Permanent Vegetation Monitoring Plot # 1):
- There were no issues with vegetation in and around the permanent vegetation monitoring plot (PVMP) #1, as both planted and natural recruits are performing well.
- Along the left easement edge under the existing tree canopy, just below PVMP #1, RS was suggested to conduct a random vegetation transect to determine how plant stems are doing. RS will do so this monitoring year, and upon review of the data, it may be appropriate to plant live-stake shrubs to improve species diversity.

UT 8 - (Permanent Vegetation Monitoring Plot # 25):
- It was agreed by all attendees that a diversity planting with 3-gallon containers was appropriate for the area. RS will pre-determine where containerized pots will go and treat the herbaceous vegetation before planting to reduce the possibility of overtopping and herbaceous competition.
- RS has developed a proposed planting list (page 3), which consists of some species not approved in the Mitigation Plan but included to aid in the Site's species diversity. Upon Agency review of the planting list, RS will secure the planting material.

Lower UT 8:
- The area has herbaceous coverage; however, the species diversity is noticeably different from the area around PVMP #25. The IRT requested RS perform soil samples, which RS will do.
- Based on the soil samples, RS may apply fertilization and/or lime to the area during the dormant season of 2023/2024.

- It was agreed by all attendees that a diversity planting with 3-gallon containers was appropriate for the area. RS will pre-determine where containerized pots will go and treat the herbaceous vegetation before planting to reduce the possibility of overtopping and herbaceous competition.
- RS has developed a proposed planting list (page 3), which consists of some species not approved in the Mitigation Plan but included to aid in the Site's species diversity. Upon Agency review of the planting list, RS will secure the planting material.

UT 3 (Little Berea)

- The IRT observed the development of riparian wetlands along UT 3, near PVMP 9, 10, and 11.
- The IRT agreed that the current scrub-shrub habitat is fine in these wet areas; however, a live-stake shrub diversity planting was recommended.
- RS has developed a proposed planting list (page 3), which lists proposed species for planting during the 2023/2024 dormant season. Upon Agency review of the planting list, RS will secure the planting material.
- RS will also perform three (3) 2-meter x 5-meter herbaceous vegetation surveys, as shown in the attached figure set, to supplement the vegetation monitoring effort in these areas. This data will be included in the MY4 (2023) Monitoring Report and will be conducted again during the MY6 (2025) monitoring period.
- Before the IRT Site visit, RS walked Upper UT 3 to evaluate the current extent of Parrot-Feather (*Myriophyllum aquaticum*) within the channel. Great progress has been made to control the extent of Parrot-Feather via herbicide treatments during MY1-3. RS observed and took the IRT to a small patch between UT 3 cross sections 9 and 10. Treatment of the species will continue throughout the reach as needed. However, channel shading and previous treatments have drastically reduced the extent of Parrot-Feather within the channel.

UT 3 (Stokes)

- UT 3, Stokes Field, was not visited by the IRT during the site visit. However, based on conversations with the IRT on Lower UT 8, RS' 2023 observations, and the MY3 (2022) vegetation data, RS plans to complete a supplemental 3-gallon container planting effort in and around PVMP #5.
- RS has developed a proposed planting list (page 3), which consists of some species not approved in the Mitigation Plan but included to aid in the Site's species diversity. Upon Agency review of the planting list, RS will secure the planting material.
- RS will also conduct a random vegetation transect around PVMP #5.

Rivercane:

- Areas of River cane transplant were observed by the IRT around UT6B.
- The IRT had no issues with the amount of Rivercane nor its current potential to outcompete planted vegetation.
- RS will add a narrative to the MY4 (2023) monitoring report (and all future monitoring reports) to discuss the Rivercane transplant effort, the current condition of the Rivercane, and lessons learned, i.e., what worked best, what we would change, etc. In addition, RS will map the extent of Rivercane on the MY4 (2023) CCPV Figure. During future monitoring years, RS will survey the Rivercane to document its growth and update each monitoring year's CCPV accordingly.

General Notes:

- Beaver Activity
  - Beavers were trapped during the spring and early summer of 2023 at the outfall of UT8 and UT7. The IRT reviewed these areas and noted minimal damage to planted vegetation along the stream corridors. Trapping stopped in May 2023, and RS will remove the dams in June. RS will continue to monitor beaver activity.
- Conservation Easement Boundary
  - No encroachments into the easement were observed during the site visit. RS acknowledges DMS' current effort to provide additional easement marking on all mitigation sites. RS will complete a total easement review and marking effort during the summer of 2023 and will notify DMS once completed. This effort will be focused on additional signage along fencing and within forested areas. Painting of trees along the conservation easement will also occur within forested areas.

A proposed 2023/2024 planting list and historical Site vegetation tables (approved Mitigation Plan and As Built) are provided on the following pages.

**WWC – MY4 (2023/2024) Proposed Planting List**

| Vegetation Association | | Montane Alluvial Forest (3 Gallon) | | Live-stake Shrub Planting | | Total |
|---|---|---|---|---|---|---|
| | Acres | 1.21 | | 0.33 | | 1.54 |
| Species | Wetland Indicator | # planted | % of total | # planted | % of total | # planted |
| Northern red oak (*Quercus rubra)* | FACU | 100 | 25.00% | | | **100** |
| Persimmon (*Diospyros virgininia)* | FAC | 75 | 18.75% | | | **75** |
| Tag alder (*Alnus serrulata*) | FACU | 75 | 18.75% | | | **75** |
| Water oak (*Quercus nigra)* | FACW | 50 | 12.50% | | | **50** |
| White oak (*Quercus Alba)* | FACU | 50 | 12.50% | | | **50** |
| Yellow birch (*Betula alleghaniensis*)** | FACU | 50 | 12.50% | | | **50** |
| Black Willow (*Salix nigra)** | OBL | | | 75 | 18.75% | **75** |
| Buttonbush (*Cephalanthus occidentalis*)* | OBL | | | 75 | 18.75% | **75** |
| Elderberry (*Sambucus spp.)** | FACW | | | 75 | 18.75% | **75** |
| Ninebark (*Physocarpus opulfolius)** | FAC | | | 75 | 18.75% | **75** |
| Silky dogwood (*Cornus amomum*)* | FACW | | | 100 | 25.00% | **100** |
| **Total:** | | **400** | **100%** | **400** | **100** | **800** |

*Live stake material

**Possible supply shortage. If unavailable, we will supplement this species with one from the list above or the approved Mitigation Plan planting list.

**WWC – Mitigation Plan Planting List**

**Table 16**
**Planting Plan**

| Vegetation Association | Montane Alluvial Forest* | | Stream-side Assemblage** | | Marsh Treatment Wetland** | | TOTAL |
|---|---|---|---|---|---|---|---|
| Area (acres) | 12.29 | | 7.25 | | 0.1 | | 19.64 |
| Species | # planted* | % of total | # planted** | % of total | # planted** | % of total | # planted |
| River birch (*Betula nigra*) | 836 | 10 | 1,972 | 10 | -- | -- | 2,808 |
| Ironwood (*Carpinus caroliniana*) | 418 | 5 | -- | -- | -- | -- | 418 |
| Buttonbush (*Cephalanthus occidentalis*) | -- | -- | -- | -- | 54 | 20 | 54 |
| Sweet pepperbush (*Clethra alnifolia*) | -- | -- | -- | -- | 41 | 15 | 41 |
| Silky dogwood (*Cornus amomum*) | 836 | 10 | 2,958 | 15 | 54 | 20 | 3,848 |
| Persimmon (*Diospyros virginiana*) | 418 | 5 | -- | -- | -- | -- | 418 |
| Green ash (*Fraxinus pennsylvanica*) | 836 | 10 | 2,958 | 15 | -- | -- | 3,794 |
| Tulip poplar (*Liriodendron tulipifera*) | 836 | 10 | -- | -- | -- | -- | 836 |
| Sycamore (*Platanus occidentalis*) | 1,671 | 20 | 3,944 | 20 | -- | -- | 5,615 |
| Black willow (*Salix nigra*) | -- | -- | 1,972 | 10 | 27 | 10 | 1,999 |
| White oak (*Quercus alba*) | 1,254 | 15 | 2,958 | 15 | -- | -- | 4,212 |
| Water oak (*Quercus nigra*) | 1,254 | 15 | 2,958 | 15 | -- | -- | 4,212 |
| Elderberry (*Sambucus canadensis*) | -- | -- | -- | -- | 41 | 15 | 41 |
| Blueberry (*Vaccinium corymbosum*) | -- | -- | -- | -- | 27 | 10 | 27 |
| Possumhaw (*Viburnum nudum*) | -- | -- | -- | -- | 27 | 10 | 27 |
| TOTAL | 8,357 | 100 | 19,720 | 100 | 272 | 100 | 28,349 |

Note:
* Planted at a density of 680 stems/acre
** Planted at a density of 2,720 stems/acre

**WWC – As-Built Planting List**

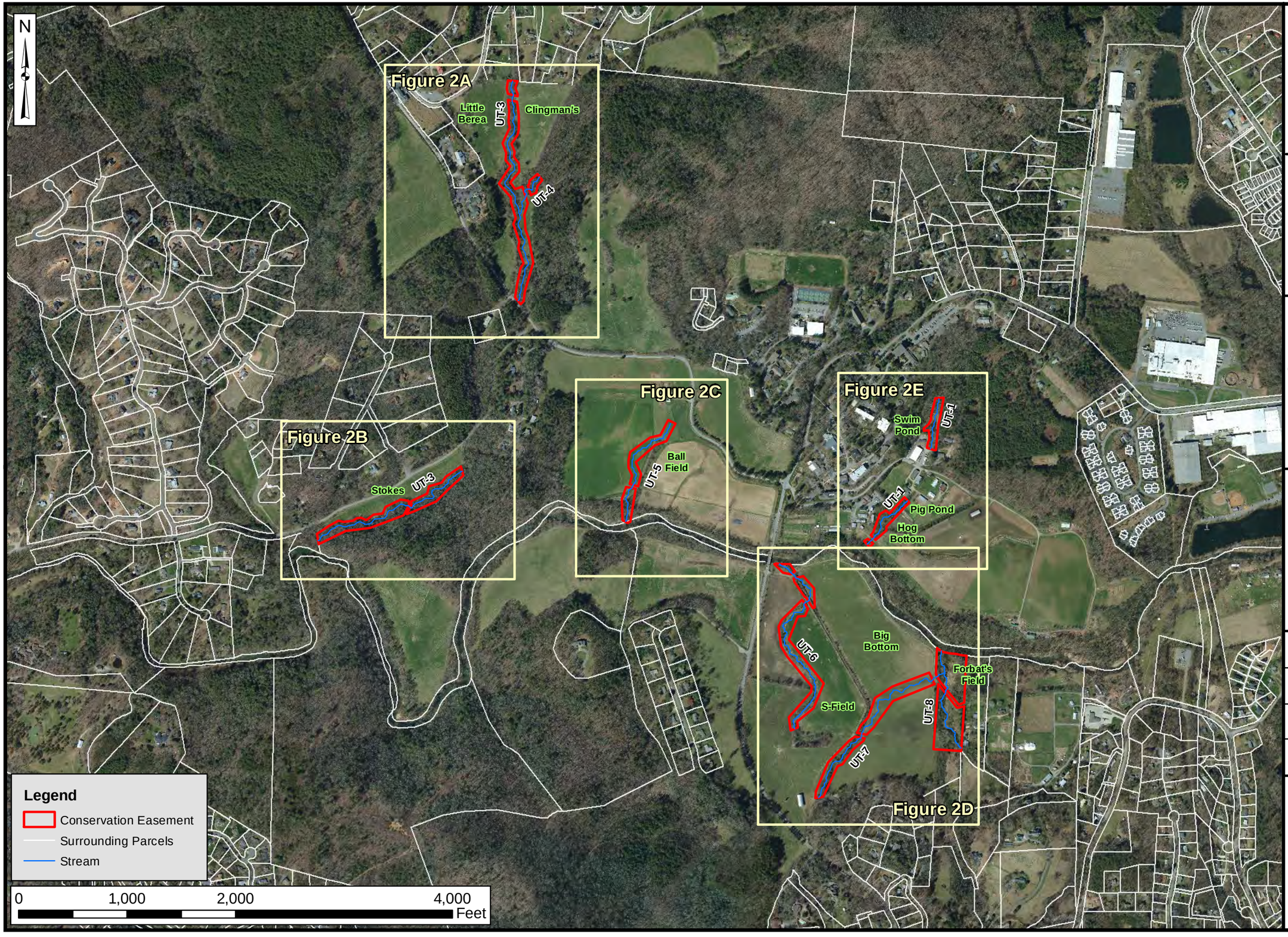
**Table 5. Planted Bare Root Woody Vegetation**
**Warren Wilson College Stream Mitigation Site**

| 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.

Attachments:

- CCPV figure set with MY3(2022) monitoring efforts and 2024 supplemental vegetation survey efforts and replanting areas.




Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

**WARREN WILSON COLLEGE STREAM MITIGATION SITE**

Buncombe County, NC

Title:

**06-2023 IRT SITE VISIT**

Drawn by: KRJ

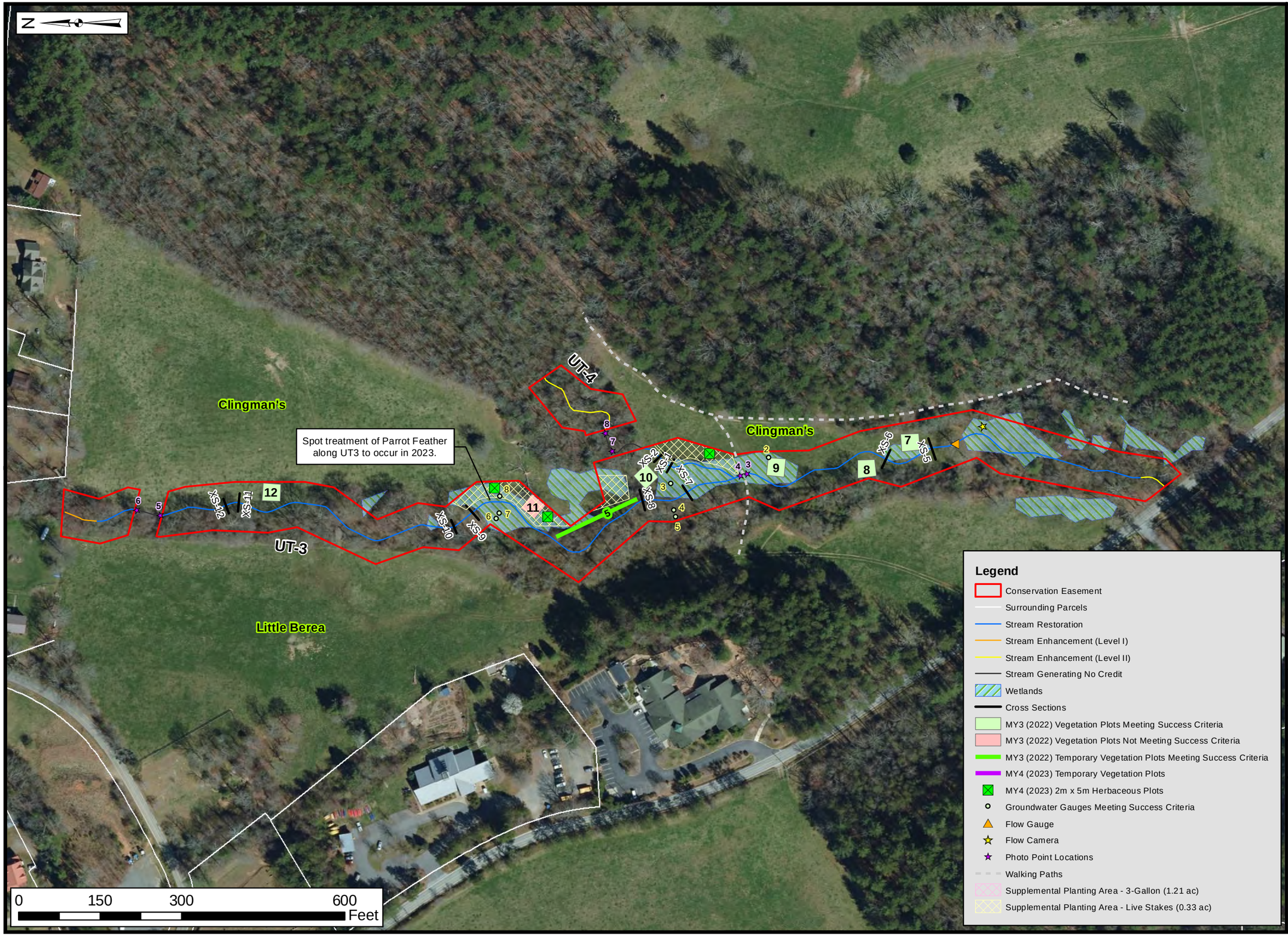
Date: JUN 2023

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:

**06-2023 IRT SITE VISIT**

Drawn by: KRJ

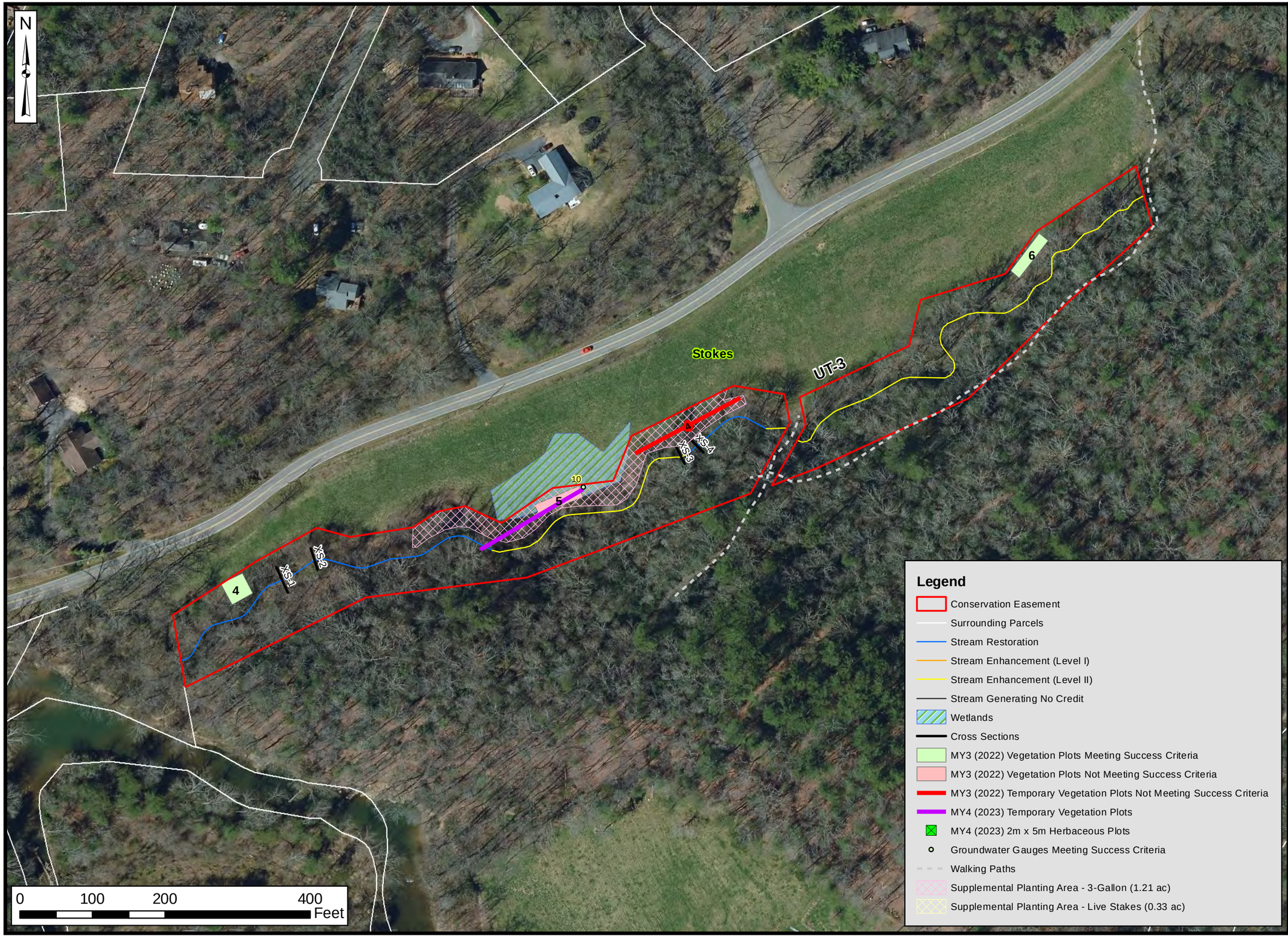
Date: JUN 2023

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:

**06-2023 IRT SITE VISIT**

Drawn by: KRJ

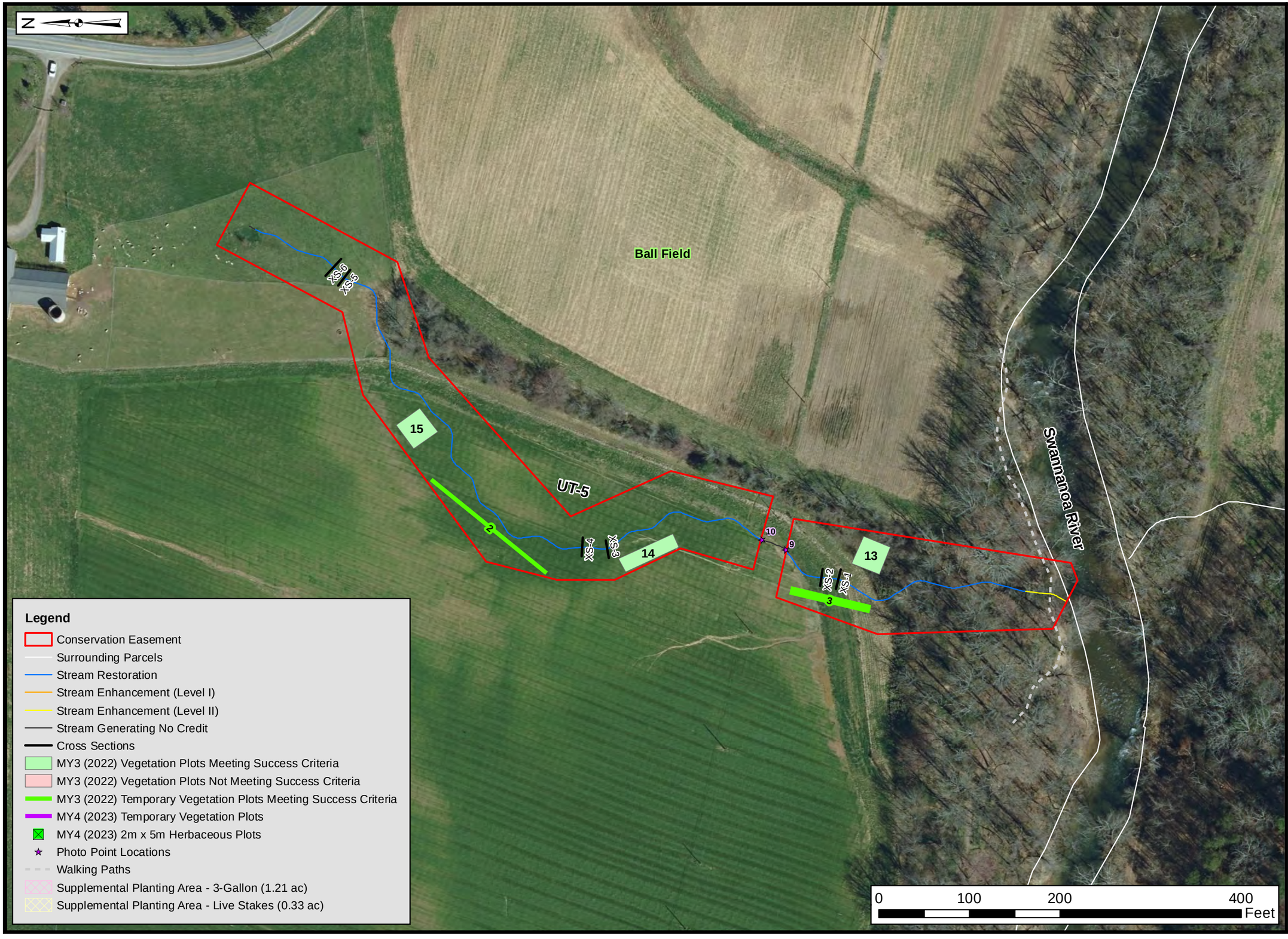
Date: JUN 2023

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:

**06-2023 IRT SITE VISIT**

Drawn by: KRJ

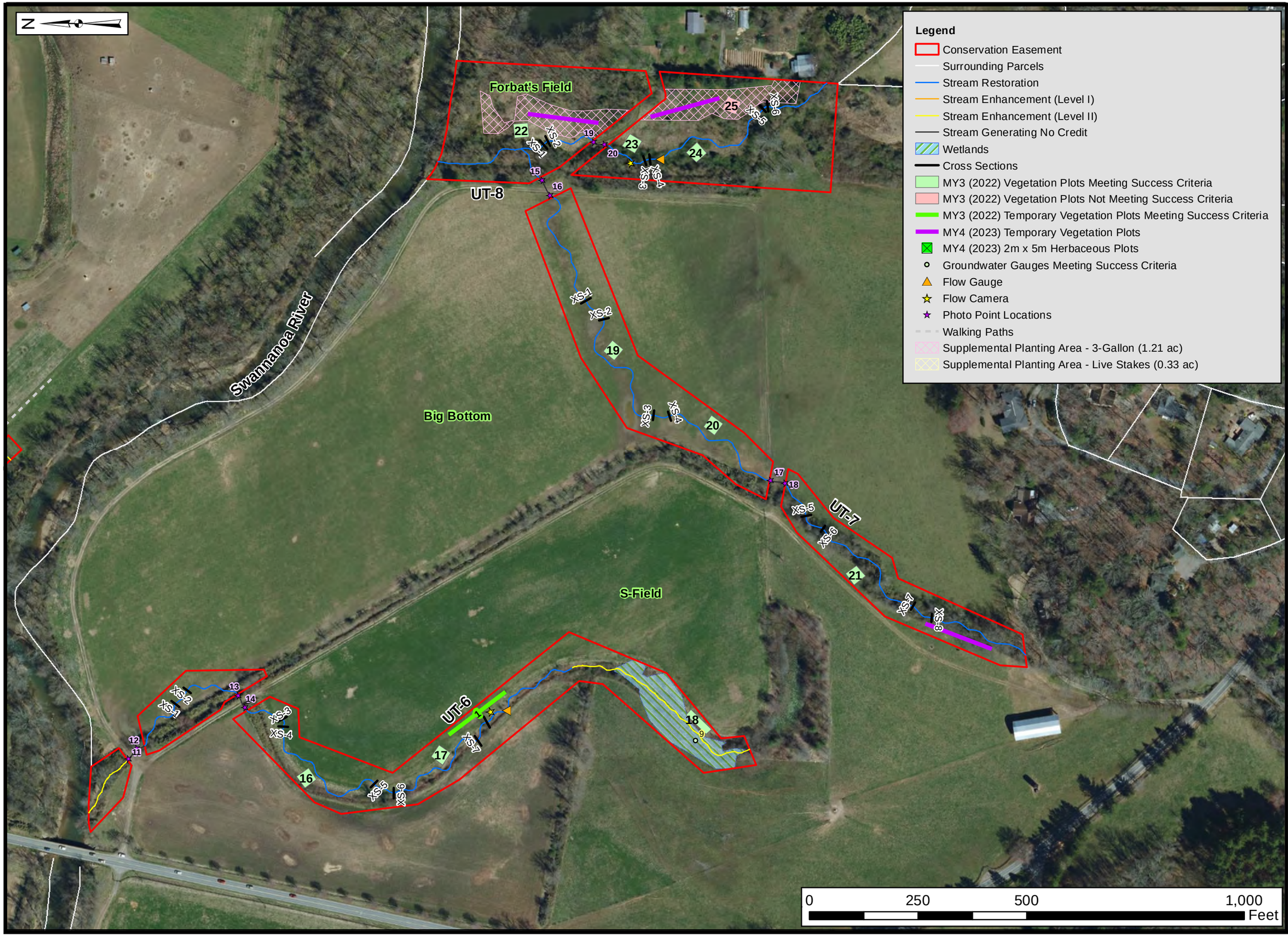
Date: JUN 2023

Scale: 1:1200

Project No.: 20-004

FIGURE

**2C**




Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

**WARREN WILSON COLLEGE STREAM MITIGATION SITE**

Buncombe County, NC

Title:

**06-2023 IRT SITE VISIT**

Drawn by: KRJ

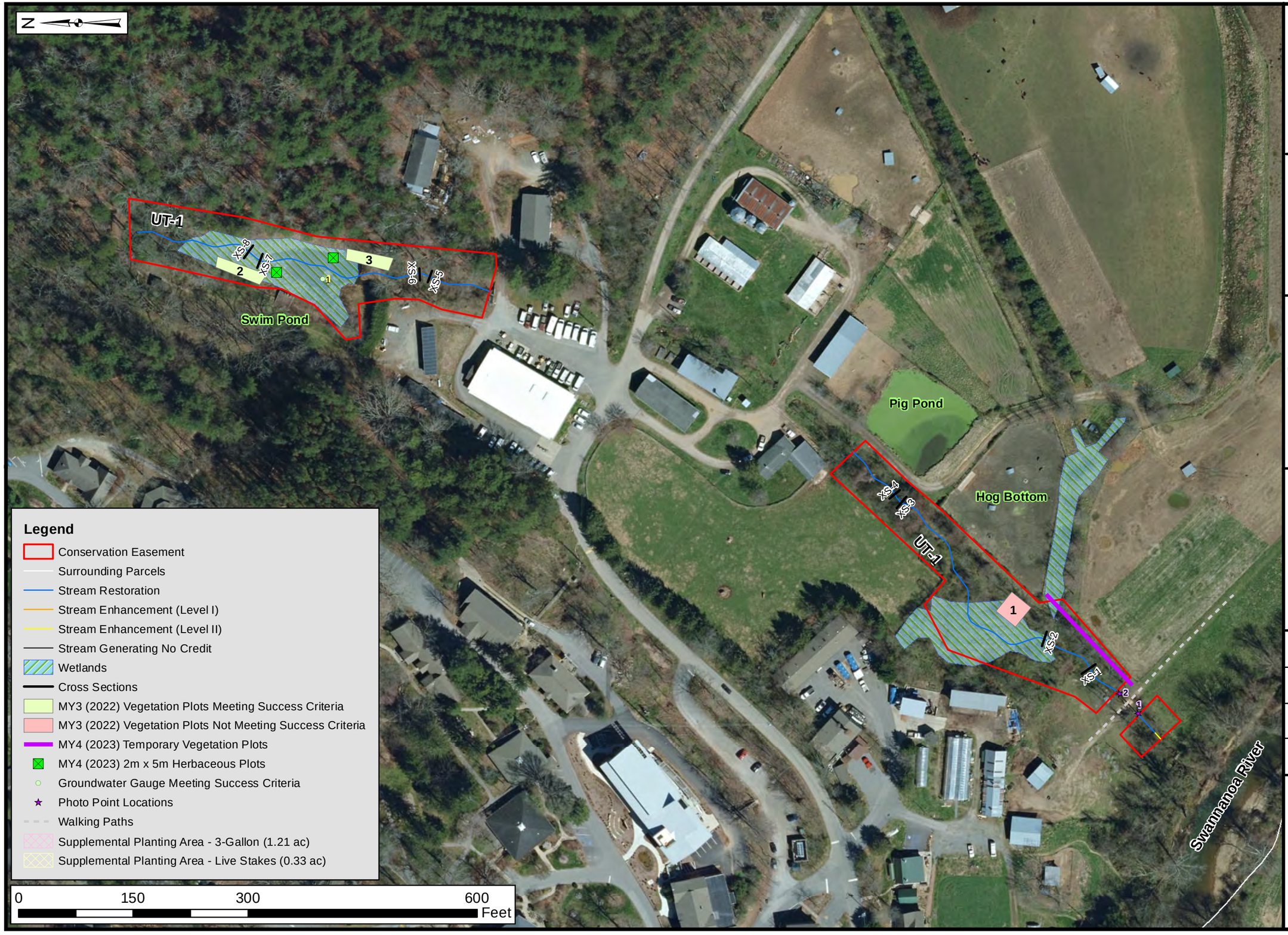
Date: JUN 2023

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:

**06-2023 IRT SITE VISIT**

Drawn by: KRJ

Date: JUN 2023

Scale: 1:1400

Project No.: 20-004

FIGURE

**2E**