# FINAL
# MONITORING REPORT (MY3)

## WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, North Carolina

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

French Broad River Basin
Cataloging Unit 06010105

Data Collection: January - October 2022
Submission: February 2023

**Prepared for**:

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

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

**Response to Monitoring Year 3 (2022) DMS Comments**

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. DMS notes from the April 20, 2022 IRT credit release meeting are as follows:

*The IRT noted that four vegetation plots did not meet the vegetation success criteria. The IRT noted that vegetation plot 25 showed some higher-than-normal tree mortality. Restoration Systems (RS) reported that vegetation plot 11 likely failed as it is located in a wet area. The IRT recommended adding some wet tolerant species if supplemental planting is completed on the site. The IRT also asked that RS look at vegetation diversity and address it accordingly if a supplemental planting effort is planned for the site in the future.*
Response: Understood – RS requests a site visit with the IRT in early 2023 to discuss this area and several other topics noted in the 2022 IRT credit release meeting notes; wetland monitoring, vegetation development, and invasive species treatments.

*Invasives on the site were discussed. The IRT asked about the Parrot Feather reported on the site. The Parrot Feather was located on UT3 near VP 8 and will be treated through project closeout. Erin Davis (DWR) recommended that Parrot Feather be called out in the CCPV maps in future monitoring reports.*
Response: Parrot feather and other areas of invasives species concern are depicted on this year's CCPV.

*Kim Isenhour (USACE) noted that the growing season should remain consistent per the IRT approved mitigation plan.*
Response: The MY3 2022 growing season is consistent with the approved mitigation plan, and is based on the NRCS growing season of April 2 to November 1.

*RS requested that wetland gauge monitoring stop on the site as the wetland wells have been successful with no wetland credits being generated as part of the project. The IRT asked for additional wetland gauge monitoring in MY3(2022) and then a request from RS that wetland gauge monitoring stop at the 2023 credit release meeting.*
Response: To be discussed during the credit release meeting – **PLEASE SEE PRE-CONSTRUCTION WETLAND GAUGE DATA VS POST-CONSTRUCTION GAUGE DATA ANALYSIS (TABLE 19, APPENDIX F).**

*The IRT asked about fescue treatment during construction and requested potential fescue ring sprays on the site. RS noted that they utilized sod mats during construction that included fescue. RS does not believe these areas of fescue are an issue on the site.*
Response: Though present, RS still does not believe fescue is a concern currently or moving forward.

*Kim Isenhour (USACE) asked that a note be added in future monitoring reports noting that all failed equipment has been repaired on the site.*
Response: Understood.

*Kim Isenhour (USACE) asked about River Cane on the site. RS noted that the River Cane is doing well and is successful on the tributaries that flow into the Swannanoa river. The IRT asked for drone footage in the River Cane area/s (if possible) with the MY3(2022) submittal. The IRT indicated that they would like to see the site later in 2022 (if possible) but noted that credit could be released as proposed for MY2 (2021).*
Response: We apologize that photos of River Cane did not make it into the MY3 Photo Log – RS will acquire photos before the credit release meeting and will be prepared to show them at that time.

Please review the notes and confirm that all the requests, IRT questions and full delivery provider commitments from the 2022 credit release meeting have been addressed and included in the final MY3 (2022) report.
Response: RS has responded and updated the report as necessary.

2. Please ensure that project monitoring equipment is checked prior to the start of the growing season and at least quarterly thereafter to confirm that it is functioning properly and collecting data through the full growing season/ monitoring year.
Response: All monitoring equipment will be checked for functionality before the growing season and periodically throughout the growing season.

**Report**

3. Section 1.2 Project Background: "The Warren Wilson College Stream Mitigation Site (hereafter referred to as the "Site") encompasses a 25.3-acre easement (pending easement modification) along cold-water, unnamed tributaries (UTs) to the Swannanoa River." The easement modification was completed and recorded in 2021. Please review, QA/QC and update the report text accordingly.
Response: The document was updated to remove all mention of the "pending easement modification."

4. Section 1.2 Project Background: "Results of preconstruction gauge data, included in Table 12 (Appendix F)". This should be updated to Table 18. Please review, QA/QC and update the report text accordingly.
Response: The reference to preconstruction gauge data was updated to Table 18 (Appendix F).

5. Section 1.3 Project Components and Structure: "The log sill was constructed as designed and is holding grade. These changes are depicted on the Asbuilt Plan Sheets (Appendix E)." Asbuilt Plan Sheets are not available in Appendix E in the MY3 (2022) report. Additionally, it is not necessary to discuss construction deviations in MY3. The MY3 report can reference the project's final MY0/ Record Drawing report which is available on the DMS website. Please review, QA/QC and update the report accordingly.
Response: The discussion of construction deviations was removed from Section 1.3.

6. Section 1.4 Success Criteria & Section 2.1 Monitoring: Please also reference the project's final IRT approved mitigation plan as it is the document that established the project's final success criteria. Please confirm that the success criteria reported in the MY3 (2022) report is the same as the IRT approved mitigation plan.
Response: References to the IRT-approved detailed mitigation plan were added to sections 1.4 and 2.1. The success criteria detailed in the MY3 (2022) are the same as those established in the mitigation plan.

7. Section 2.1 Monitoring: In the report text, please discuss any project maintenance activities (invasive treatment, supplemental planting, beaver removal, etc.) that took place in MY3 (2022). As an example, CCPV Sheet 21 indicates; Parrot feather observed along reach. Spot treatment occurred throughout the year and will continue as needed. This and additional invasive treatment and maintenance activities should be discussed in the report text.
Response: A discussion of the 2022 invasive treatments was added to the "Vegetation Summary" in Section 2.1. These were the only site maintenance activities that took place during MY3 (2022).

8. Section 2.1 Monitoring – Wetland Summary: Per IRT comments during the 2022 IRT Credit Release meeting, DMS recommends using the Buncombe County soil survey start/end dates for the remainder of wetland monitoring conducted on the site. DMS understands that RS will request termination of the groundwater well monitoring at the 2023 IRT credit release meeting.
Response: Noted. If wetland hydrology monitoring continues through the 2023 growing season, the Buncombe County soil survey start/end dates will be used to determine growing season.

9. Section 2.1 Monitoring – Vegetation Summary: Please also discuss the five (5) random vegetation plots installed on the site and summarize the results in the report text.
Response: A discussion of the five vegetation transects was added to the "Vegetation Summary" in Section 2.1.

10. Section 2.1 Monitoring – Vegetation Summary: Based on the MY3 (2022) fixed and random plot results, is any supplemental planting warranted or planned in MY4 (2023). Please discuss and update the report text accordingly. In the report text, please also discuss the MY3 status of the rivercane planted/ transplanted as part of project implementation.
    Response: Currently, RS is not planning additional planting. Vegetation plots 1, 5, 11, and did not meet success criteria in 2022. However, plots 1 and 5 easily meet success criteria when taking natural recruits into consideration. A temporary transect was done adjacent to plot 11 and met success criteria with 445 stems/acre.

    Plot 11 is in a wetland area adjacent to Gauge 8 that was meeting wetland success for 101 consecutive days, which likely caused the mortality of several less wet-tolerant species. However, RS does not believe this to be a negative, and believe the habitat within the area of plot 11 is appropriate. This is an area RS wishes to discuss with the IRT in the field.

    Both plots 11 and 25 had no mortality between year 2 (2021) and year 3 (2022).

11. Table 1 – Mitigation Assets and Components: The project credits in the summary portion of the table are in the "Riparian Wetland" column. Please review, QA/QC and update the table accordingly.
    Response: The cold water column was moved under the "Stream" section of the table.

12. Table 2 - Project Activity and Reporting History: Please include all project maintenance activities (invasive treatment, supplemental planting, beaver removal, etc.) in the table.
    Response: Table 2 was updated to include all project maintenance activities.

13. Table 5 - Visual Stream Morphology Stability Assessment: Please confirm that the project streams, banks and engineered structures are 100% stable and 100% preforming as intended as reported in the Table 5.
    Response: No areas of concern were observed during MY3 monitoring, and all streams, banks, and engineered structures are 100% stable and performing as intended.

14. Table 7. Planted Bare Root Woody Vegetation: Please include the species common name and the wetland indicator status for the species in the planted species list.
    Response: Common names and indicator statuses were added to Table 7.

15. Cross Section (Warren Wilson, UT 1, XS - 7, Pool): Please review and include highlighted survey & points for MY3 (2022).
    Response: The MY3 cross section data line and points were added to the UT 1 XS-7 plot.

16. Table 16. Verification of Bankfull Events: Please include an additional column noting the monitoring year associated with the reported bankfull event.
    Response: A column was added to table 16 indicating the monitoring year during which each bankfull event occurred.

17. Appendix G – Site Photo Log: In the photo captions, please provide dates that the photos were taken. DMS recommends including the photo locations on the CCPV map or a separate map in Appendix G.
    Response: The crossing photos are the only permanent photo points other than cross-section and vegetation plot photos. A shapefile was created to show their locations on the CCPV. The 4 additional photos in the photo log were meant to provide a general overview of site vegetation and easement boundary conditions. The quantity and location of additional photos will likely change from year to year, and therefore, their locations were not added to the CCPV. Additionally, dates have been added to all photo captions in the photo log.

**Digital Support File Comments:**

18. No photo points were indicated on the CCPV map and no photos were submitted in the digital support files. Please verify that no photo points are required per the IRT approved mitigation plan.
    Response: The only photo points required by the IRT approved mitigation plan are at cross-sections and vegetation plots, which were included in the digital submittal. However, the IRT recently requested that photos

be taken upstream and downstream of each piped/bridged crossing as part of annual monitoring. Those photo points have been included in the digital submittal as well.

19. The digital data submission is missing the following components:
    a. Asset Table – There was no asset table in the digital submission. Please include it in the final digital submittal.

    Response: An excel file containing Tables 1-4 was added to the digital submittal.

    b. Project Activity Table - There was no project activity table in the digital submission. Please include it in the final digital submittal.

    Response: An excel file containing Tables 1-4 was added to the digital submittal.

    c. Two polygons were indicated as invasive problem areas in the CCPV and in the visual vegetation assessment table; no vegetation problem area polygons were submitted. Please submit the polygons in the final digital submittal.

    Response: A shapefile for the MY3 invasive species polygons was added to the digital submittal.

## WWC Year 3, 2022 Monitoring Summary

**General Notes**

- No encroachment was identified in Year 3.

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

**Streams**

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

- Stream Monitoring gauges malfunctioned in 2022. These gauges will be replaced and, in a manner, consistent with the standard stream gauge installation typically provided by DMS and the USACE to Restoration Systems – See Exhibit A, Methods 1 – 3 for installation of a pressure transducers for stream restoration below immediately following this monitoring summary.

**Wetlands**

- Wetland hydrology has improved from preconstruction and year 1 (2020) conditions. All gauges were saturated/inundated for greater than 10 percent of the year 3 (2022) growing season, with gauges 2-7 and 9 being inundated for approximately 90% of the growing season (Table 17A-B, Appendix E). No wetland mitigation credit is being generated.

- At the April 2022 DMS/IRT monitoring review meeting, it was discussed that upon favorable MY3 (2022) monitoring data, wetland monitoring associated with UT-3 may be ended. RS will continue to plan for monitoring wetlands in 2023 but is requesting termination of this monitoring effort.

**Vegetation**

- Measurements of the 25 permanent vegetation plots resulted in an average of 539 stems/acre excluding livestakes. All plots met success criteria except plots 1, 5, 11, and 25 (Tables 8-10, Appendix C). Vegetation plots 1, 5, 11, and did not meet success criteria in 2022. However, plots 1 and 5 easily meet success criteria when taking natural recruits into consideration. A temporary transect was done adjacent to plot 11 and met success criteria with 445 stems/acre.

- Plot 11 is in a wetland area adjacent to Gauge 8 that was meeting wetland success for 101 consecutive days, which likely caused the mortality of several less wet-tolerant species. However, RS does not believe this to be a negative, and believe the habitat within the area of plot 11 is appropriate. This is an area RS wishes to discuss with the IRT in the field.

- Both plots 11 and 25 had no mortality between year 2 (2021) and year 3 (2022).

- Year 3 (2022) vegetation measurements also included 5 random sampling transects. Measurements of all 30 plots resulted in a sitewide average of 525 planted stems/acre excluding livestakes.

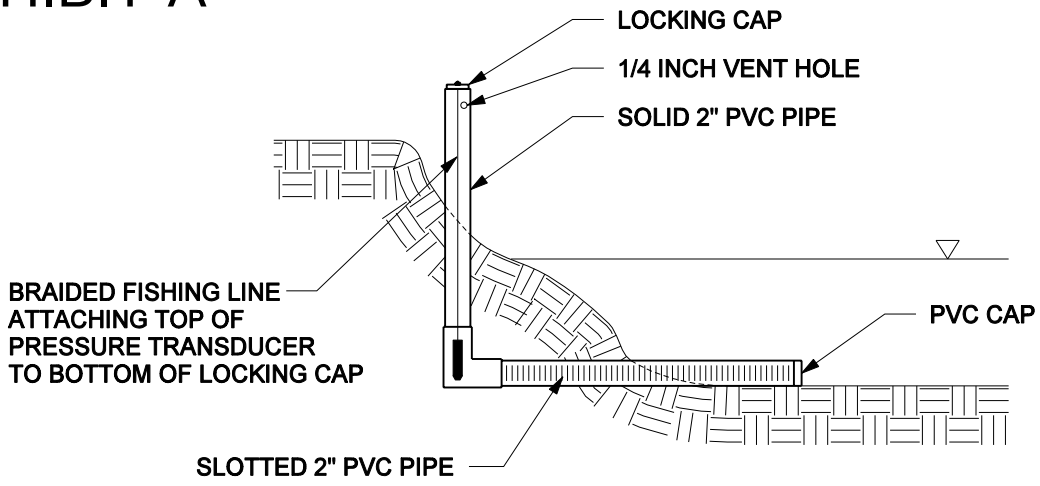
**Site Maintenance Report (2022)**

| Invasive Species Work | Maintenance work |
|---|---|
| 06/27/2022 – 06/28-2022<br>Parrot Feather, Multiflora rose, Privet, Chinese Bittersweet, Cattail, Johnson Grass, Air Potato, Japanese Knotweed<br><br>09/15/2022<br>Chinese Bittersweet, Air Potato, Multiflora rose, Parrot feather, Privet, Cattail | N/A |

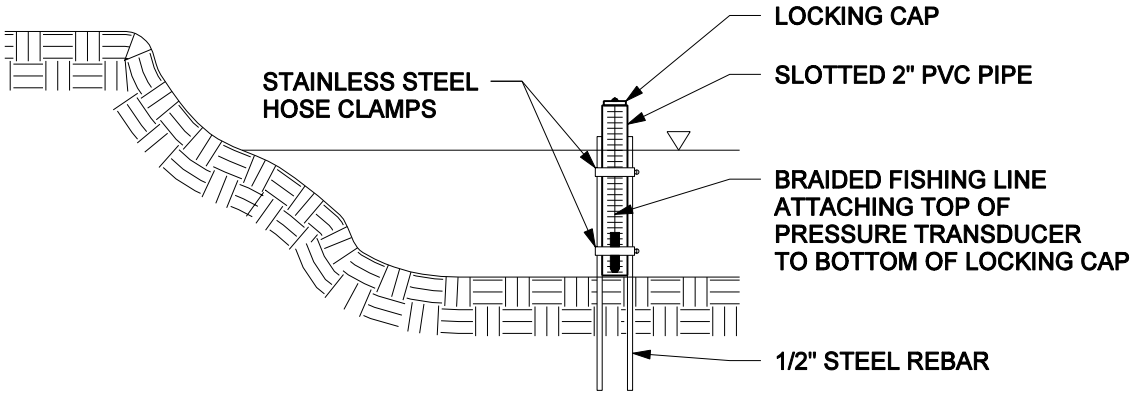
**Site Permitting/Monitoring Activity and Reporting History**

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

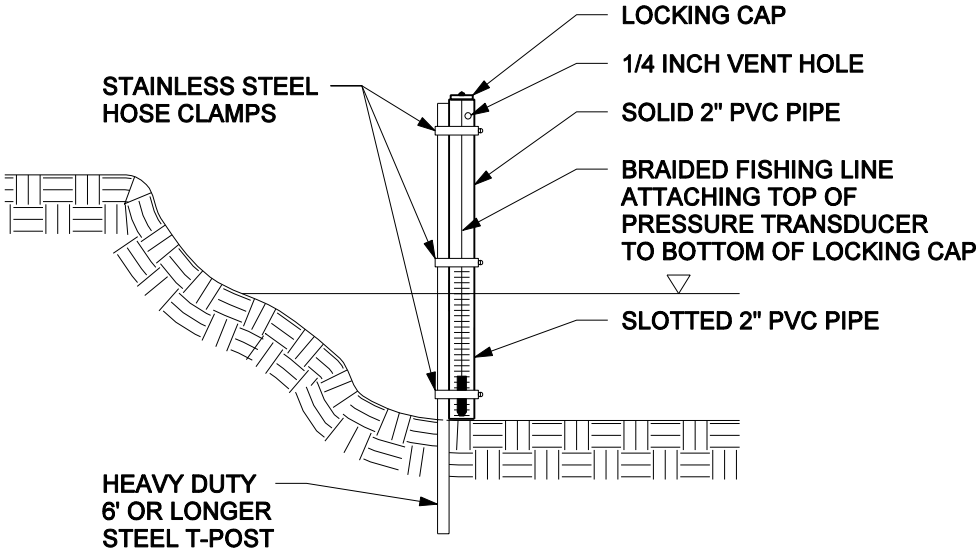
# EXHIBIT-A




METHOD 1




METHOD 2




METHOD 3

# FINAL
# MONITORING REPORT (MY3)

## WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, North Carolina

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

French Broad River Basin
Cataloging Unit 06010105

Data Collection: January - October 2022
Submission: February 2023

**Prepared for:**

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

**Prepared by**:


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

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

## TABLE OF CONTENTS



## APPENDICES

## 1.0 PROJECT SUMMARY

Restoration Systems, LLC (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 1).

**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<br>• | • 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 1200 acres, and the Site is part of an actively managed farm and forest system on the Warren Wilson College property that includes livestock management areas, pastureland, agricultural row crops, and a sustainably managed forest. The Site is located approximately 2 miles west of Swannanoa and 5 miles east of Asheville in Buncombe County, North Carolina (Figure 1, Appendix A).

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

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

Results of preconstruction gauge data, included in Table 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 9220 linear feet of perennial stream channel by constructing stable streams in the historic floodplain location and elevation.
- Enhanced (Level I) 62 linear feet of stream by installing in-stream structures, providing proper channel dimension and appropriate floodplain width, reducing shear on eroding banks, controlling invasive species within the riparian area, and planting with native riparian vegetation.
- Enhanced (Level II) 1974 linear feet of stream channel by removing current land use practices, controlling invasive species within the riparian area, and planting native vegetation.

Additional activities that occurred at the Site included the following.

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

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 no less than 2.2 for E- and C-type channels at any measured riffle cross-section.<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>• Areas of dense river cane (canebrakes) are a natural niche habitat within the Swannanoa River floodplain that contribute native habitat for endangered species. River cane may outcompete woody seedlings during the initial establishment of vegetation. Within the Swannanoa floodplain (UT-6, UT-7, and UT-8), the presence of canebrakes may supersede the vegetative success criteria for planted stems per acre.<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 planting list for the site; natural recruits not on the planting list may be considered by the IRT on a case-by-case basis. |

## 2.0 METHODS

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

**Monitoring Schedule**

| Resource | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|
| Streams | 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 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. |

**Monitoring Summary (Continued)**

| Vegetation Parameters | | | | |
|---|---|---|---|---|
| **Parameter** | **Method** | **Schedule/ Frequency** | **Number/Extent** | **Data Collected/Reported** |
| Vegetation establishment and vigor | Permanent vegetation plots 0.0247 acre (100 square meters) in size; *CVS-EEP Protocol for Recording Vegetation*, *Version 4.2* (Lee et al. 2008) | As-built, Years 1, 2, 3, 5, and 7 | 25 plots spread across the Site | Species, height, planted vs. volunteer, stems/acre |
| | Annual random vegetation plots, 0.0247 acre (100 square meters) in size | As-built, Years 1, 2, 3, 5, and 7 | Number of randomly selected plots to be determined each year. as needed | Species |

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

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

**Stream Summary**

All streams are functioning as designed, and no stream areas of concern were observed during year 3 (2022) monitoring. Stream morphology data is available in Appendix D.

All three flow gauges failed during the 2022 season, and data was not able to be recovered. The flow gauges were replaced with Onset U-20 gauges on December 2, 2022, and no additional malfunctions are expected. Visual inspection shows strong evidence of channel formation and water flow was observed in all Site streams during year 3 (2022) (Tables 15A-C, Appendix E).

**Wetland Summary**

**Summary of Monitoring Period/Hydrology Success Criteria by Year**

| Year | Soil Temperatures/Date Bud Burst Documented | Monitoring Period Used for Determining Success | 10 Percent of Monitoring Period |
|---|---|---|---|
| 2020 (Year 1) | March 16, 2020* | March 16-November 1 (231 days) | 23 days |
| 2021 (Year 2) | April 6, 2021** | April 6-November 12 (221 days) | 22 days |
| 2022 (Year 3) | April 2, 2022^ | April 2-November 1 (215 days) | 22 days |

*Based on observed/documented bud burst and data collected from a soil temperature data logger located on the Site.

** 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 (Appendix E). However, to be consistent with the approved mitigation plan, the Buncombe County soil survey start/end dates are used for year 3 (2022).

Overall, based on groundwater gauge data, wetland hydrology has improved from preconstruction and year 1 (2020) conditions. All gauges were saturated/inundated for greater than 10 percent of the year 3 (2022) growing season, with gauges 2-7 and 9 were inundated for approximately 90% of the growing season (Table 17A-B, Appendix E).

**Vegetation Summary**

During quantitative vegetation sampling, 25 sample plots (10-meter by 10-meter) were installed within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation*, *Version 4.2* (Lee et al. 2008). Year 3 (2022) vegetation measurements occurred in July 2022 and included 5 additional random sample plots (one 25-meter by 4-meter and four 50-meter by 2-meter). Measurements of all 30 plots resulted in an average of 525 planted stems/acre excluding livestakes. Additionally, all individual plots met success criteria except plots 1, 5, 11, 25, and random plot 4 (Tables 8-10, Appendix C). Vegetation plots 1, 5, 11, and did not meet success criteria in 2022. However, plots 1 and 5 easily meet success criteria when taking natural recruits into consideration. A temporary transect was done adjacent to plot 11 and met success criteria with 445 stems/acre. Plot 11 is in a wetland area adjacent to Gauge 8 that was meeting wetland success for 101 consecutive days, which likely caused the mortality of several less wet-tolerant species. However, RS does not believe this to be a negative, and believe the habitat within the area of plot 11 is appropriate. This is an area RS wishes to discuss with the IRT in the field. Both plots 11 and 25 had no mortality between year 2 (2021) and year 3 (2022).

During year (2022) monitoring, parrot feather (*Myriophyllum aquaticum*) was observed spread throughout the upper reach of UT-3 (Figure 2A, Appendix B). Additionally, multiflora rose (*Rosa multiflora*), Chinese privet (*Ligustrum sinense*), Chinese bittersweet (*Celastrus orbiculatus*), cattail (*Typha* spp.), Johnson grass (*Sorghum halepense*), air potato (*Dioscorea bulbifera*), and Japanese knotweed (*Reynoutria japonica*) were observed elsewhere throughout the Site but were especially dense along UT-8 (Figure 2D, Appendix B). All invasives were treated on June 27-28 and September 15, 2022, and will continue to be treated as necessary.

## 3.0 REFERENCES


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

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

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

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

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

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

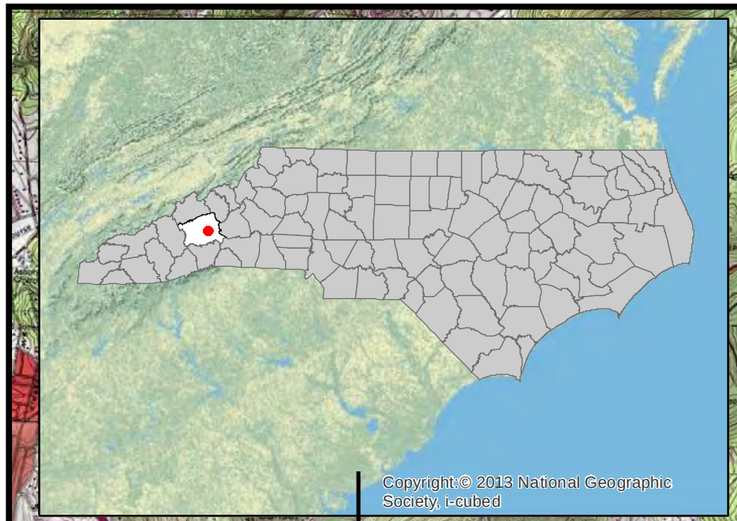
Simon A, Hupp CR. 1986. Geomorphic and Vegetative Recovery Processes Along Modified Tennessee Streams: An Interdisciplinary Approach to Disturbed Fluvial Systems. Forest Hydrology and Watershed Management. IAHS-AISH Publ.167.

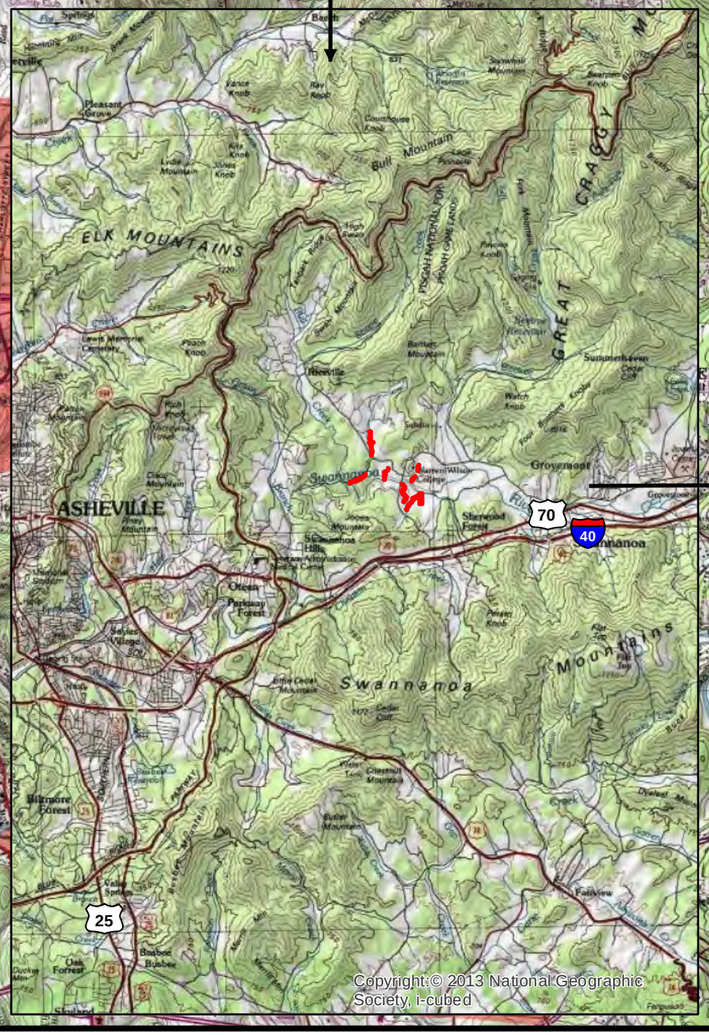
United States Department of Agriculture (USDA). 2016. Web Soil Survey (online). Available: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx [August 2016].

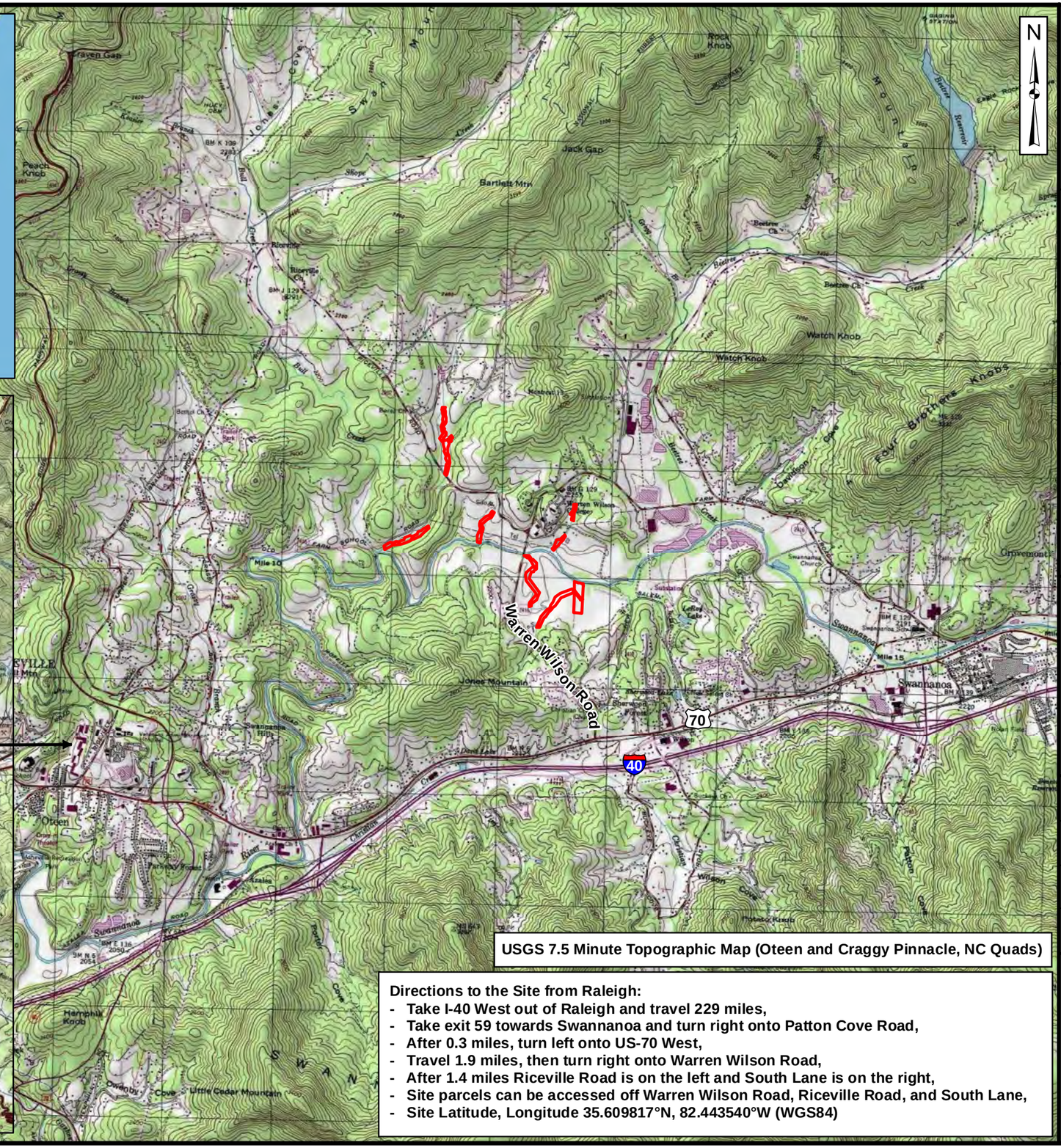
United States Department of Agriculture (USDA), 2009. Soil Survey for Buncombe County North Carolina. US Department of Agriculture. Available at: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/north_carolina/buncombeNC2009/Buncombe_NC.pdf [June 7, 2016].

United States Department of Agriculture (USDA). 2021. Natural Resources Conservation Service National Weather and Climate Center. AgACIS Climate Data. Asheville WETS Station (online). Available: http://agacis.rcc-acis.org

**Appendix A – Background Map and Tables**




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

**Directions to the Site from Raleigh:**

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

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

**WARREN WILSON COLLEGE STREAM MITIGATION SITE**

Buncombe County, NC

Title:

**SITE LOCATION**

Drawn by: KRJ

Date: APR 2020

Scale: 1:40000

Project No.: 20-004

FIGURE

**1**

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

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

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

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

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

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

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

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

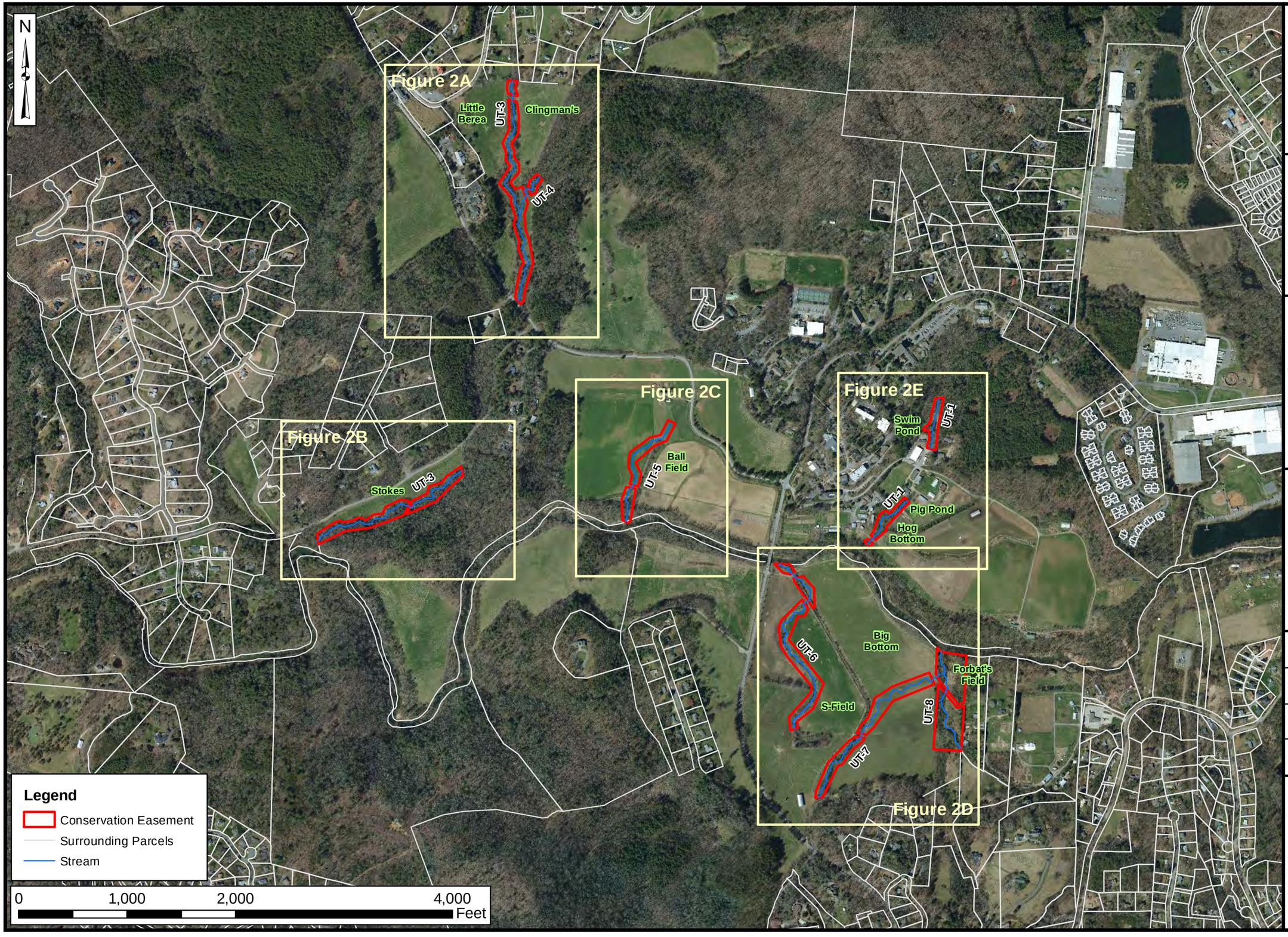
| | |
|---|---|
| **Full Delivery Provider**<br>Restoration Systems<br>1101 Haynes Street, Suite 211<br>Raleigh, North Carolina 27604<br>Worth Creech<br>919-755-9490 | **As-built Monitoring Provider**<br>Axiom Environmental, Inc.<br>218 Snow Avenue<br>Raleigh, NC 27603<br>Grant Lewis<br>919-215-1693 |
| **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
Vegetation Plot Photographs




Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

**WARREN WILSON COLLEGE STREAM MITIGATION SITE**

Buncombe County, NC

Title:

**CURRENT CONDITIONS PLAN VIEW**

Drawn by: CML

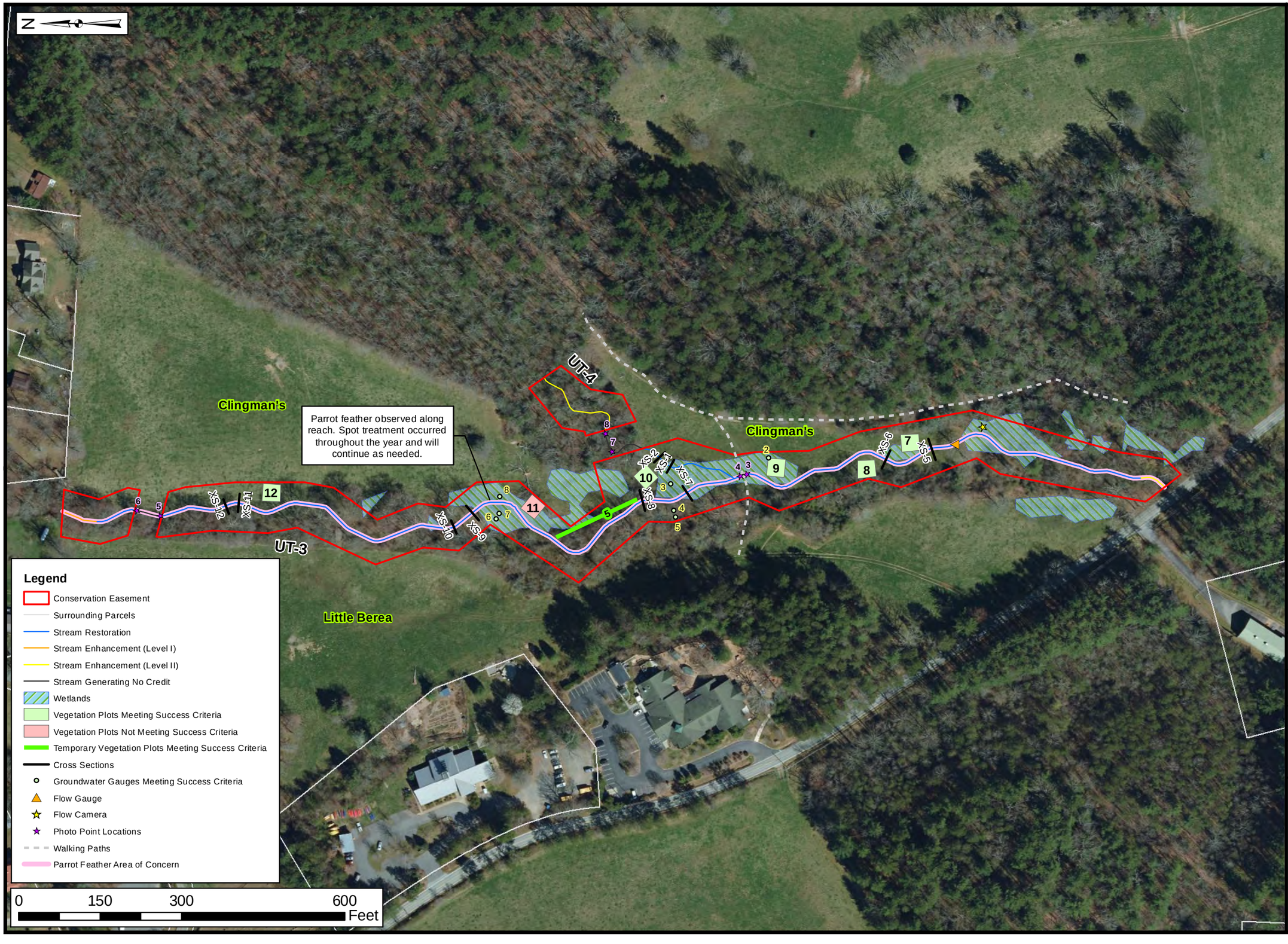
Date: NOV 2022

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: CML

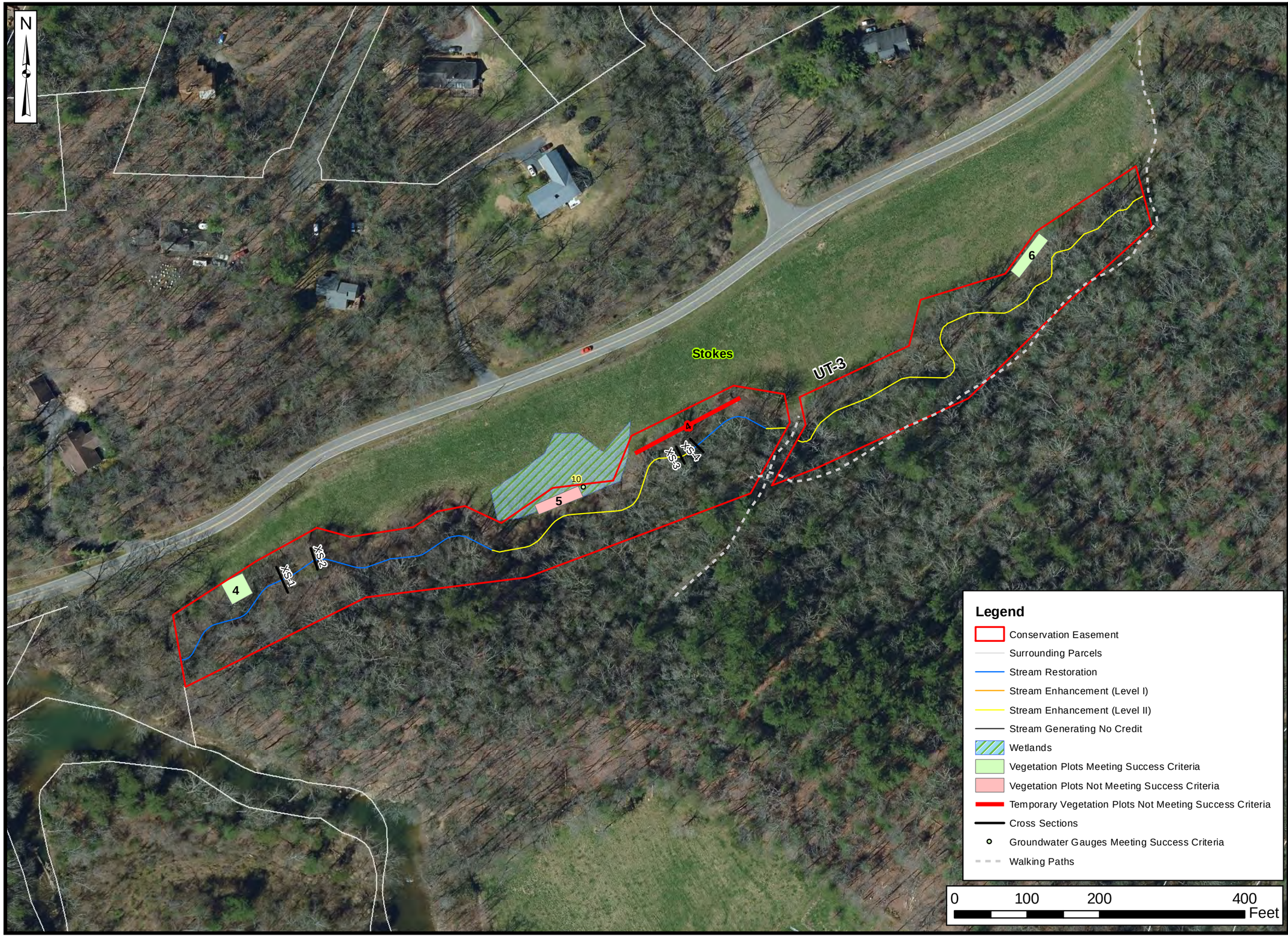
Date: NOV 2022

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: CML

Date: NOV 2022

Scale: 1:1500

Project No.: 20-004

FIGURE

**2B**


Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

**WARREN WILSON COLLEGE STREAM MITIGATION SITE**

Buncombe County, NC

Title:

**CURRENT CONDITIONS PLAN VIEW**

Drawn by: CML

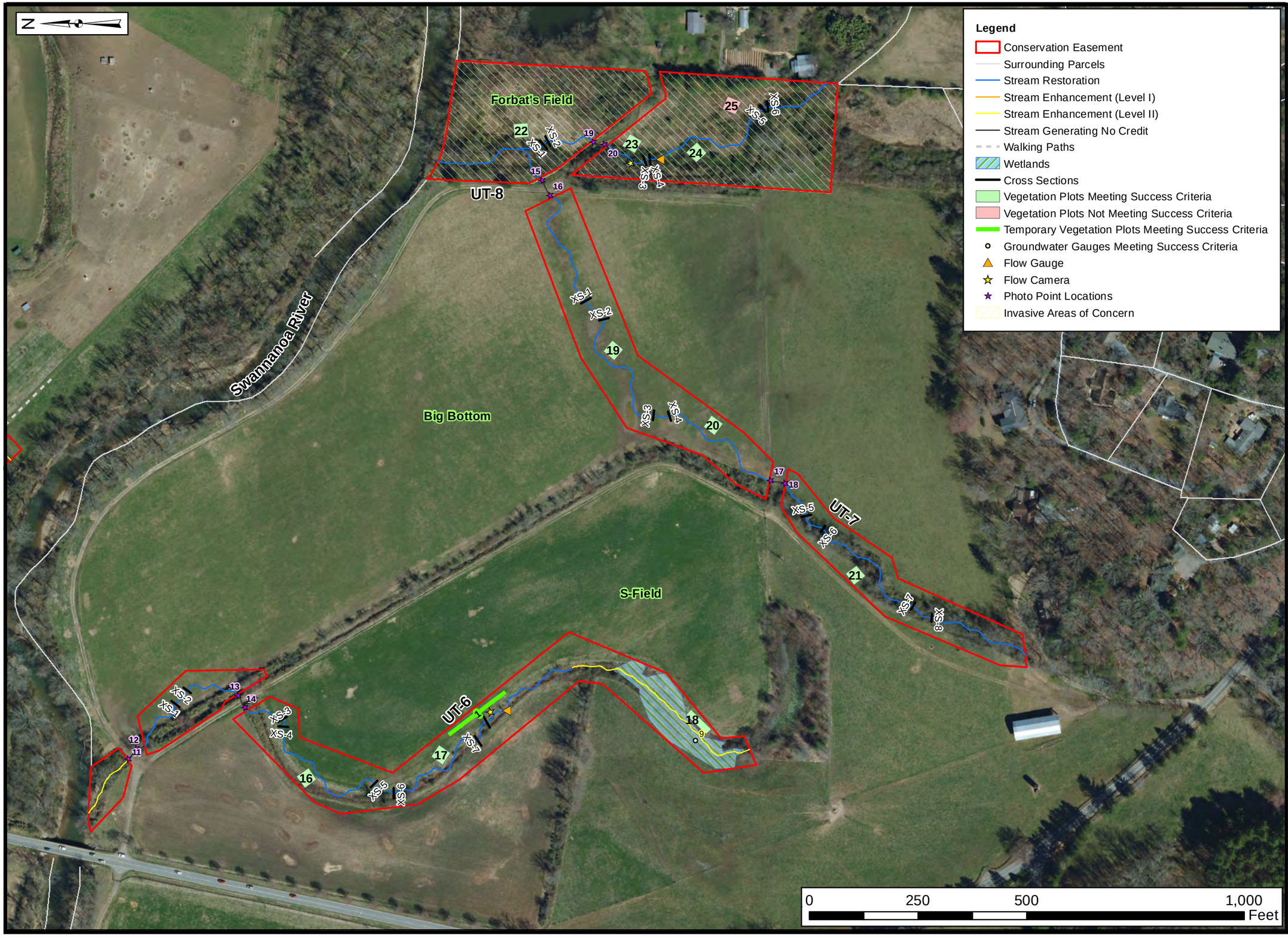
Date: NOV 2022

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:

**CURRENT CONDITIONS PLAN VIEW**

Drawn by: CML

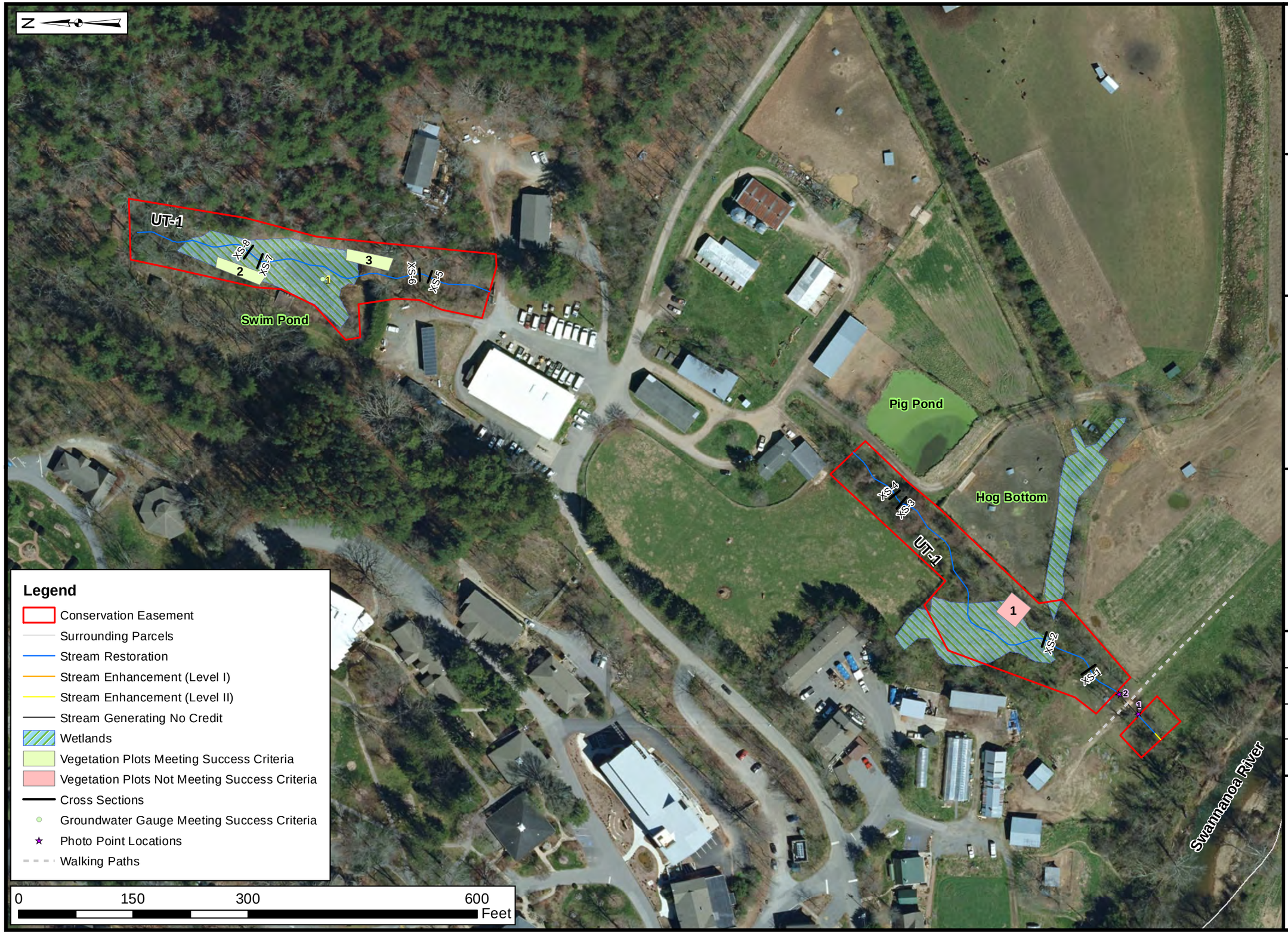
Date: NOV 2022

Scale: 1:2500

Project No.: 20-004

FIGURE

**2D**




Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS LLC

Project:

**WARREN WILSON COLLEGE STREAM MITIGATION SITE**

Buncombe County, NC

Title:

**CURRENT CONDITIONS PLAN VIEW**

Drawn by: CML

Date: NOV 2022

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** **20-Oct-22**

| 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** **20-Oct-22**

| 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** **20-Oct-22**

| 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** **20-Oct-22**

| 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** **20-Oct-22**

| 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** **20-Oct-22**

| 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** **20-Oct-22**

| 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** 20-Oct-22

**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 | yellow hatching | 2 | 5.01 | 19.8% |
| | | | | | | |
| 5. Easement Encroachment Areas[3] | None | none | none | 0 | 0.00 | 0.0% |

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

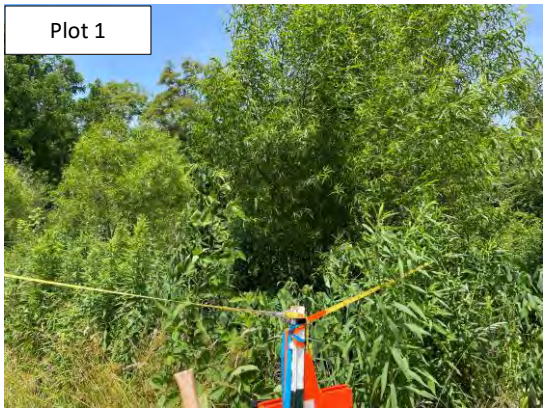
2 = The acreage within the easement boundaries.

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

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

**Warren Wilson College Site**
**MY3 (2022) Vegetation Monitoring Photographs (taken June 2022)**

Plot 1



Plot 2

Plot 3

Plot 4

Plot 5

Plot 6

Plot 7

Plot 8

**Alliance Headwaters Site**
**MY3 (2022) Vegetation Monitoring Photographs (taken June 2022)**

Plot 9

Plot 10

Plot 11

Plot 12

Plot 13

Plot 14

Plot 15

Plot 16

**Warren Wilson College Site**

**MY3 (2022) Vegetation Monitoring Photographs (taken June 2022 except Plot 24, taken November 2022)**

Plot 17

Plot 18

Plot 19

Plot 20

Plot 21

Plot 22

Plot 23

Plot 24

**Warren Wilson College Site**
**MY3 (2022) Vegetation Monitoring Photographs (taken June 2022)**

Plot 25

Transect 1

Transect 2

Transect 3

Transect 4

Transect 5

**Appendix C – Vegetation Data**

**Table 7. 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 8. Total Stems by Plot and Species**
**Project Code 20004. Project Name: WWC**

| | | | Current Plot Data (MY3 2022) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 20004-01-0001 | | | 20004-01-0002 | | | 20004-01-0003 | | | 20004-01-0004 | | | 20004-01-0005 | | | 20004-01-0006 | | | 20004-01-0007 | | | 20004-01-0008 | | | 20004-01-0009 | | | 20004-01-0010 | | |
| Scientific Name | Common Name | Species Type | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T |
| Acer rubrum | red maple | Tree | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Betula nigra | river birch | Tree | 1 | 1 | 1 | | | | 11 | 11 | 11 | 12 | 12 | 12 | | | | 2 | 2 | 2 | 5 | 5 | 5 | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Carya | hickory | Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Celtis occidentalis | common hackberry | Tree | | | | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalanthus occidentalis | common buttonbush | Shrub | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cornus amomum | silky dogwood | Shrub | | | | 7 | 7 | 8 | 12 | 12 | 13 | | | | 3 | 3 | 5 | | | | 6 | 6 | 6 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 |
| Diospyros virginiana | common persimmon | Tree | | | | 1 | 1 | 1 | | | | | | | | | | | | | 3 | 3 | 3 | | | | 2 | 2 | 2 | 1 | 1 | 1 |
| Fraxinus pennsylvanica | green ash | Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Liriodendron tulipifera | tuliptree | Tree | | | | | | | | | 15 | | | | 3 | 3 | 3 | | | 4 | | | | | | | | | | | |
| Platanus occidentalis | American sycamore | Tree | | | 7 | 3 | 3 | 3 | 3 | 3 | 24 | 3 | 3 | 24 | | | 2 | 1 | 1 | 1 | 5 | 5 | 55 | 9 | 9 | 9 | | | | 3 | 3 | 3 |
| Prunus serotina | black cherry | Tree | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Quercus | oak | Tree | 2 | 2 | 2 | 1 | 1 | 1 | | | | | | | | | | 1 | 1 | 1 | | | | | | | 1 | 1 | 1 | | | |
| Quercus alba | white oak | Tree | 2 | 2 | 2 | | | | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 10 | 10 | 10 | 4 | 4 | 4 | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| Quercus nigra | water oak | Tree | | | | | | | | | | 2 | 2 | 2 | | | | | | | 2 | 2 | 2 | | | | | | | | | |
| Quercus rubra | northern red oak | Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Robinia | locust | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Salix nigra | black willow | Tree | | | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Unknown | | Shrub or Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wisteria frutescens | American wisteria | Vine | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wisteria sinensis | Chinese wisteria | Exotic | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | **Stem count** | 5 | 5 | 22 | 13 | 13 | 14 | 28 | 28 | 65 | 19 | 19 | 40 | 7 | 7 | 11 | 14 | 14 | 18 | 25 | 25 | 75 | 10 | 10 | 10 | 9 | 9 | 9 | 11 | 11 | 11 |
| | | **size (ares)** | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | |
| | | **size (ACRES)** | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | |
| | | **Species count** | 3 | 3 | 7 | 5 | 5 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 5 | 6 | 6 | 6 | 2 | 2 | 2 | 5 | 5 | 5 | 5 | 5 | 5 |
| | | **Stems per ACRE** | 202.3 | 202.3 | 890.3 | 526.1 | 526.1 | 566.6 | 1133 | 1133 | 2630 | 768.9 | 768.9 | 1619 | 283.3 | 283.3 | 445.2 | 566.6 | 566.6 | 728.4 | 1012 | 1012 | 3035 | 404.7 | 404.7 | 404.7 | 364.2 | 364.2 | 364.2 | 445.2 | 445.2 | 445.2 |

**Color for Density**

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes

P-all = Planting including livestakes

T = All planted and natural recruits including livestakes

T includes natural recruits

**Table 8. Total Stems by Plot and Species (continued)**
**Project Code 20004. Project Name: WWC**

| | | | Current Plot Data (MY3 2022) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 20004-01-0011 | | | 20004-01-0012 | | | 20004-01-0013 | | | 20004-01-0014 | | | 20004-01-0015 | | | 20004-01-0016 | | | 20004-01-0017 | | | 20004-01-0018 | | | 20004-01-0019 | | | 20004-01-0020 | | |
| Scientific Name | Common Name | Species Type | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T |
| Acer rubrum | red maple | Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Betula nigra | river birch | Tree | 4 | 4 | 4 | 3 | 3 | 3 | 1 | 1 | 1 | | | | | | | 3 | 3 | 3 | 6 | 6 | 6 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 |
| Carya | hickory | Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Celtis occidentalis | common hackberry | Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalanthus occidentalis | common buttonbush | Shrub | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cornus amomum | silky dogwood | Shrub | | | | 2 | 2 | 2 | | | | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 1 | 1 | 1 | | | | 2 | 2 | 2 |
| Diospyros virginiana | common persimmon | Tree | | | | | | | 1 | 1 | 1 | | | | | | | | | | | | | | | | 3 | 3 | 3 | | | |
| Fraxinus pennsylvanica | green ash | Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Liriodendron tulipifera | tuliptree | Tree | | | | | | | 3 | 3 | 3 | | | | 1 | 1 | 1 | | | | | | | | | | | | | | |
| Platanus occidentalis | American sycamore | Tree | | | | 3 | 3 | 3 | 3 | 3 | 4 | 15 | 15 | 15 | 13 | 13 | 13 | 7 | 7 | 21 | 2 | 2 | 2 | 1 | 1 | 1 | 11 | 11 | 11 | 8 | 8 | 8 |
| Prunus serotina | black cherry | Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Quercus | oak | Tree | | | | | | | | | | | | | 1 | 1 | 1 | 4 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | | | | 1 | 1 | 1 |
| Quercus alba | white oak | Tree | | | | 1 | 1 | 1 | | | | | | | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | | | | | | | 1 | 1 | 1 |
| Quercus nigra | water oak | Tree | | | | 5 | 5 | 5 | | | | | | | 1 | 1 | 1 | | | | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | |
| Quercus rubra | northern red oak | Tree | | | | | | | | | | | | | | | | | | | 2 | 2 | 2 | | | | | | | | | |
| Robinia | locust | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Salix nigra | black willow | Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Unknown | | Shrub or Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wisteria frutescens | American wisteria | Vine | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wisteria sinensis | Chinese wisteria | Exotic | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | **Stem count** | 4 | 4 | 4 | 14 | 14 | 14 | 8 | 8 | 9 | 17 | 17 | 17 | 20 | 20 | 20 | 19 | 19 | 33 | 18 | 18 | 18 | 8 | 8 | 8 | 17 | 17 | 17 | 14 | 14 | 14 |
| | | **size (ares)** | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | |
| | | **size (ACRES)** | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | |
| | | **Species count** | 1 | 1 | 1 | 5 | 5 | 5 | 4 | 4 | 4 | 2 | 2 | 2 | 6 | 6 | 6 | 5 | 5 | 5 | 7 | 7 | 7 | 5 | 5 | 5 | 3 | 3 | 3 | 5 | 5 | 5 |
| | | **Stems per ACRE** | 161.9 | 161.9 | 161.9 | 566.6 | 566.6 | 566.6 | 323.7 | 323.7 | 364.2 | 688 | 688 | 688 | 809.4 | 809.4 | 809.4 | 768.9 | 768.9 | 1335 | 728.4 | 728.4 | 728.4 | 323.7 | 323.7 | 323.7 | 688 | 688 | 688 | 566.6 | 566.6 | 566.6 |

**Color for Density**

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes

P-all = Planting including livestakes

T = All planted and natural recruits including livestakes

T includes natural recruits

**Table 8. Total Stems by Plot and Species (continued)**
**Project Code 20004. Project Name: WWC**

| | | | Current Plot Data (MY3 2022) | | | | | | | | | | | | | | | Annual Means | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 20004-01-0021 | | | 20004-01-0022 | | | 20004-01-0023 | | | 20004-01-0024 | | | 20004-01-0025 | | | MY3 (2022) | | | MY2 (2021) | | | MY1 (2020) | | | MY0 (2020) | | |
| Scientific Name | Common Name | Species Type | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T |
| Acer rubrum | red maple | Tree | | | | | | | | | | | | | | | | | | 5 | | | 4 | | | | | | |
| Betula nigra | river birch | Tree | 5 | 5 | 5 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 72 | 72 | 72 | 71 | 71 | 71 | 75 | 75 | 75 | 77 | 77 | 77 |
| Carya | hickory | Tree | | | | | | | | | | | | | | | | | | | | | 2 | | | | | | |
| Celtis occidentalis | common hackberry | Tree | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |
| Cephalanthus occidentalis | common buttonbush | Shrub | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 |
| Cornus amomum | silky dogwood | Shrub | | | | 5 | 5 | 5 | 1 | 1 | 1 | 6 | 6 | 6 | 1 | 1 | 1 | 66 | 66 | 70 | 64 | 64 | 64 | 70 | 70 | 70 | 75 | 75 | 75 |
| Diospyros virginiana | common persimmon | Tree | | | | | | | | | | 2 | 2 | 2 | | | | 13 | 13 | 13 | 15 | 15 | 15 | 16 | 16 | 16 | 22 | 22 | 22 |
| Fraxinus pennsylvanica | green ash | Tree | 1 | 1 | 1 | | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Liriodendron tulipifera | tuliptree | Tree | | | | | | | 1 | 1 | 1 | | | | | | | 8 | 8 | 27 | 8 | 8 | 14 | 16 | 16 | 16 | 18 | 18 | 18 |
| Platanus occidentalis | American sycamore | Tree | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 3 | | | | 1 | 1 | 1 | 104 | 104 | 220 | 103 | 103 | 436 | 116 | 116 | 134 | 115 | 115 | 115 |
| Prunus serotina | black cherry | Tree | | | | | | | | | | | | | | | | | | 1 | | | 1 | | | | | | |
| Quercus | oak | Tree | | | | | | | | | | 1 | 1 | 1 | | | | 14 | 14 | 14 | 25 | 25 | 25 | 64 | 64 | 64 | 93 | 93 | 93 |
| Quercus alba | white oak | Tree | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | | | | 2 | 2 | 2 | 38 | 38 | 38 | 33 | 33 | 33 | 37 | 37 | 37 | 35 | 35 | 35 |
| Quercus nigra | water oak | Tree | | | | | | | | | | 1 | 1 | 1 | | | | 14 | 14 | 14 | 12 | 12 | 12 | 25 | 25 | 25 | 29 | 29 | 29 |
| Quercus rubra | northern red oak | Tree | | | | | | | | | | | | | | | | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | | | |
| Robinia | locust | | | | | | | | | | | | | | | | | | | | | | 3 | | | | | | |
| Salix nigra | black willow | Tree | | | | | | | | | | | | | | | | | | 4 | | | 4 | | | | | | |
| Unknown | | Shrub or Tree | | | | | | | | | | | | | | | | | | | | | | | | | 5 | 5 | 5 |
| Wisteria frutescens | American wisteria | Vine | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | | | |
| Wisteria sinensis | Chinese wisteria | Exotic | | | | | | | | | | | | | | | | | | | | | | 3 | 3 | 3 | | | |
| | | **Stem count** | 14 | 14 | 14 | 13 | 13 | 13 | 9 | 9 | 9 | 11 | 11 | 11 | 6 | 6 | 6 | 333 | 333 | 482 | 335 | 335 | 689 | 427 | 427 | 445 | 471 | 471 | 471 |
| | | **size (ares)** | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 25 | | | 25 | | | 25 | | | 25 | | |
| | | **size (ACRES)** | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.62 | | | 0.62 | | | 0.62 | | | 0.62 | | |
| | | **Species count** | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 11 | 11 | 14 | 11 | 11 | 16 | 13 | 13 | 13 | 11 | 11 | 11 |
| | | **Stems per ACRE** | 566.6 | 566.6 | 566.6 | 526.1 | 526.1 | 526.1 | 364.2 | 364.2 | 364.2 | 445.2 | 445.2 | 445.2 | 242.8 | 242.8 | 242.8 | 539 | 539 | 780.2 | 542.3 | 542.3 | 1115 | 691.2 | 691.2 | 720.3 | 762.4 | 762.4 | 762.4 |

**Color for Density**

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes

P-all = Planting including livestakes

T = All planted and natural recruits including livestakes

T includes natural recruits

**Table 9. MY3 Temporary Vegetation Plot Data**
**Warren Wilson College Restoration Site**

| Species | Common Name | T-1 (82°) | T-2 (240°) | T-3 (82°) | T-4 (284°) | T-5 (167°) |
|---|---|---|---|---|---|---|
| *Betula nigra* | River birch | | | | | 3 |
| *Liriodendron tulipifera* | Tulip poplar | | 4 | | | |
| *Nyssa sylvatica* | Black gum | | | | | |
| *Diospyros virginiana* | Common persimmon | | 6 | | | |
| *Quercus alba* | White oak | 2 | | 3 | | 1 |
| *Platanus occidentalis* | American sycamore | 8 | 3 | 4 | 5 | |
| *Quercus phellos* | Willow oak | | | | | 2 |
| *Fraxinus pennsylvanica* | Green Ash | | | 1 | | |
| *Cornus amomum* | Silky dogwood | 1 | 3 | 4 | 1 | 5 |
| **Total Number of Stems** | Stem Count | **11** | **16** | **12** | **6** | **11** |
| | Size (Ares) | 1 | 1 | 1 | 1 | 1 |
| | Size (Acres) | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| | Species count | 6 | 5 | 6 | 6 | 6 |
| **Stems/Acre** | Stems per acre | 445 | 647 | 486 | 243 | 445 |

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

| Plot # | Planted Stems/Acre | Success Criteria Met? |
|---|---|---|
| **1** | 202 | No |
| **2** | 526 | Yes |
| **3** | 1133 | Yes |
| **4** | 769 | Yes |
| **5** | 283 | No |
| **6** | 567 | Yes |
| **7** | 1012 | Yes |
| **8** | 405 | Yes |
| **9** | 364 | Yes |
| **10** | 445 | Yes |
| **11** | 162 | No |
| **12** | 567 | Yes |
| **13** | 324 | Yes |
| **14** | 688 | Yes |
| **15** | 809 | Yes |
| **16** | 769 | Yes |
| **17** | 728 | Yes |
| **18** | 324 | Yes |
| **19** | 688 | Yes |
| **20** | 567 | Yes |
| **21** | 567 | Yes |
| **22** | 526 | Yes |
| **23** | 364 | Yes |
| **24** | 445 | Yes |
| **25** | 243 | No |
| **T-1** | 445 | Yes |
| **T-2** | 647 | Yes |
| **T-3** | 486 | Yes |
| **T-4** | 243 | No |
| **T-5** | 445 | Yes |
| **Average Planted Stems/Acre Across Permanent & Temporary Plots** | **525** | **Yes** |

**Appendix D – Stream Geomorphology Data**

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

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

| Parameter | Gauge[2] | Regional Curve | | | Pre-Existing Condition | | | | | | UT4 Reference Data | | | | | | Chemtronics Reference Data | | | | | | Design | | | Monitoring Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 11b. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Upper (436 feet)

| Parameter | Gauge[2] | Regional Curve | | | Pre-Existing Condition | | | | | | UT4 Reference Data | | | | | | Chemtronics Reference Data | | | | | | Design | | | Monitoring Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LL | UL | Eq. | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Med | Max | Min | Mean | Med | Max | SD[5] | n |
| **Dimension and Substrate - Riffle Only** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | | | | | 2.6 | 10.9 | | 19.3 | | | 5.1 | 6.8 | | 9.4 | | | 11.3 | 14.0 | | 15.8 | | | 9.2 | 10.0 | 10.7 | 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 11c. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Lower (873 feet)

| Parameter | Gauge[2] | Regional Curve | | | Pre-Existing Condition | | | | | | UT4 Reference Data | | | | | | Chemtronics Reference Data | | | | | | Design | | | Monitoring Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LL | UL | Eq. | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Med | Max | Min | Mean | Med | Max | SD[5] | n |
| **Dimension and Substrate - Riffle Only** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | | | | | 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 11d. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Upper (1995 feet)

| Parameter | Gauge[2] | Regional Curve | | | Pre-Existing Condition | | | | | | UT4 Reference Data | | | | | | Chemtronics Reference Data | | | | | | Design | | | Monitoring Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LL | UL | Eq. | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Med | Max | Min | Mean | Med | Max | SD[5] | n |
| **Dimension and Substrate - Riffle Only** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | | | | | 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 11e. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 4 (278 feet)

| Parameter | Gauge[2] | Regional Curve | | | Pre-Existing Condition | | | | | | UT4 Reference Data | | | | | | Chemtronics Reference Data | | | | | | Design | | | Monitoring Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LL | UL | Eq. | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Med | Max | Min | Mean | Med | Max | SD[5] | n |
| **Dimension and Substrate - Riffle Only** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | | | | | | | | | | | 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 11f. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 5 (1024 feet)

| Parameter | Gauge[2] | Regional Curve | | | Pre-Existing Condition | | | | | | UT4 Reference Data | | | | | | Chemtronics Reference Data | | | | | | Design | | | Monitoring Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LL | UL | Eq. | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Med | Max | Min | Mean | Med | Max | SD[5] | n |
| **Dimension and Substrate - Riffle Only** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | | | | | 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 11g. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 6 (1265 feet)

| Parameter | Gauge[2] | Regional Curve | | | Pre-Existing Condition | | | | | | UT4 Reference Data | | | | | | Chemtronics Reference Data | | | | | | Design | | | Monitoring Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LL | UL | Eq. | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Med | Max | Min | Mean | Med | Max | SD[5] | n |
| **Dimension and Substrate - Riffle Only** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | | | | | 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 11h. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 7 (1844 feet)

| Parameter | Gauge[2] | Regional Curve | | | Pre-Existing Condition | | | | | | UT4 Reference Data | | | | | | Chemtronics Reference Data | | | | | | Design | | | Monitoring Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LL | UL | Eq. | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Med | Max | Min | Mean | Med | Max | SD[5] | n |
| **Dimension and Substrate - Riffle Only** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | | | | | 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 11i. Baseline Stream Data Summary
Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 8 (760 feet)

| Parameter | Gauge[2] | Regional Curve | | | Pre-Existing Condition | | | | | | UT4 Reference Data | | | | | | Chemtronics Reference Data | | | | | | Design | | | Monitoring Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle Only** | | LL | UL | Eq. | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Mean | Med | Max | SD[5] | n | Min | Med | Max | Min | Mean | Med | Max | SD[5] | n |
| Bankfull Width (ft) | | | | | 5.6 | 6.8 | | 9.4 | | | 5.1 | 6.8 | | 9.4 | | | 11.3 | 14.0 | | 15.8 | | | 6.6 | 7.1 | 7.6 | 10.3 | 12.0 | 12.1 | 13.7 | | 3.0 |
| Floodprone Width (ft) | | | | | 11.0 | 12.0 | | 19.0 | | | 15.0 | 20.0 | | 28.0 | | | 16.5 | 19.0 | | 25.0 | | | 25.0 | 50.0 | 75.0 | 100.0 | 100.0 | 100.0 | 100.0 | | 3.0 |
| Bankfull Mean Depth (ft) | | | | | 0.4 | 0.5 | | 0.6 | | | 0.8 | 0.9 | | 1.0 | | | 0.4 | 0.6 | | 1.2 | | | 0.5 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 | 0.7 | | 3.0 |
| [1]Bankfull Max Depth (ft) | | | | | 0.6 | 0.8 | | 0.9 | | | 1.3 | 1.4 | | 1.5 | | | 1.7 | 1.8 | | 2.0 | | | 0.6 | 0.8 | 0.9 | 1.2 | 1.4 | 1.4 | 1.7 | | 3.0 |
| Bankfull Cross Sectional Area ($ft^2$) | | | | | 3.6 | 3.6 | | 3.6 | | | 6.2 | 6.2 | | 6.2 | | | 16.7 | 16.7 | | 16.7 | | | 3.6 | 3.6 | 3.6 | 6.4 | 8.3 | 8.3 | 10.2 | | 3.0 |
| Width/Depth Ratio | | | | | 8.7 | 12.8 | | 24.5 | | | 5.1 | 7.6 | | 11.8 | | | 8.1 | 12.0 | | 14.8 | | | 12.0 | 14.0 | 16.0 | 16.6 | 17.5 | 17.7 | 18.3 | | 3.0 |
| Entrenchment Ratio | | | | | 1.8 | 2.0 | | 2.0 | | | 2.7 | 2.9 | | 3.0 | | | 16.5 | 19.0 | | 22.0 | | | 3.8 | 7.0 | 9.9 | 7.3 | 8.4 | 8.2 | 9.7 | | 3.0 |
| [1]Bank Height Ratio | | | | | **2.3** | **2.7** | | **3.8** | | | **1.0** | **1.0** | | **1.0** | | | **1.0** | **1.0** | | **1.0** | | | **1.0** | **1.0** | **1.3** | **1.0** | **1.0** | **1.0** | **1.0** | | **3.0** |
| **Profile** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | No distinct repetitive pattern of riffles and pools due to staightening activities | | | | | | | | | | | | | | | | | | | | | 7.8 | 15.9 | 13.8 | 32.4 | 7.2 | 27.0 |
| Riffle Slope (ft/ft) | | | | | | | | | | | 0.0090 | 0.0400 | | 0.0754 | | | 0.0156 | 0.0228 | | 0.0468 | | | 0.0144 | 0.0231 | 0.0433 | 0.0002 | 0.0098 | 0.0101 | 0.0231 | 0.0056 | 27.0 |
| Pool Length (ft) | | | | | | | | | | | | | | | | | | | | | | | | | | 6.8 | 12.2 | 12.4 | 19.9 | 2.6 | 27.0 |
| Pool Max depth (ft) | | | | | | | | | | | 2.0 | 2.3 | | 2.6 | | | 1.9 | 2.1 | | 2.3 | | | 0.7 | 1.0 | 1.0 | | | | | | |
| Pool Spacing (ft) | | | | | | | | | | | 27.3 | 37.1 | | 45.8 | | | 28.8 | 50.7 | | 70.7 | | | 21.3 | 28.4 | 49.7 | 24.1 | 32.2 | 30.6 | 48.2 | 6.9 | 26.0 |
| **Pattern** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | | | | | No distinct repetitive pattern of riffles and pools due to staightening activities | | | | | | 15.4 | 19.0 | | 25.2 | | | 13.4 | 14.7 | | 16.6 | | | 10.6 | 21.3 | 28.4 | 10.6 | | 21.3 | 28.4 | | |
| Radius of Curvature (ft) | | | | | | | | | | | 8.7 | 15.8 | | 29.4 | | | 0.8 | 2.2 | | 3.3 | | | 14.2 | 21.3 | 28.4 | 14.2 | | 21.3 | 28.4 | | |
| Rc:Bankfull width (ft/ft) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Meander Wavelength (ft) | | | | | | | | | | | 56.5 | 63.8 | | 76.0 | | | 59.8 | 96.3 | | 117.2 | | | 42.6 | 63.9 | 85.2 | 42.6 | | 64.0 | 85.2 | | |
| Meander Width Ratio | | | | | | | | | | | 2.3 | 2.8 | | 3.7 | | | 1.0 | 1.1 | | 1.2 | | | 1.5 | 3.0 | 4.0 | 1.5 | | 3.0 | 4.0 | | |
| **Transport parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reach Shear Stress (competency) $lb/f^2$ | | | | | 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 12a. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)**
**Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Lower (572 feet)**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Footnotes 2,3** - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary.
The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions.
ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design measurements), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-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 12g. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)**
**Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 6 (1265 feet)**

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

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

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

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

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

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

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

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

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

**Footnotes 2,3** - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary.
The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions.
ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design measurements), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-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 13a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)**
**Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Lower (572 feet)**

| | Cross Section 1 (Riffle) | | | | | | | Cross Section 2 (Pool) | | | | | | | Cross Section 3 (Pool) | | | | | | | Cross Section 4 (Riffle) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Based on fixed baseline bankfull elevation[1]** | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| **Record elevation (datum) used** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 11.9 | 13.4 | 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 13b. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)**
**Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Upper (436 feet)**

| | Cross Section 5 (Riffle) | | | | | | | Cross Section 6 (Pool) | | | | | | | Cross Section 7 (Pool) | | | | | | | Cross Section 8 (Riffle) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Based on fixed baseline bankfull elevation[1]** | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| **Record elevation (datum) used** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 8.5 | 9.0 | 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 13c. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
## Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Lower (873 feet)

| | Cross Section 1 (Riffle) | | | | | | | Cross Section 2 (Pool) | | | | | | | Cross Section 3 (Pool) | | | | | | | Cross Section 4 (Riffle) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Based on fixed baseline bankfull elevation[1]** | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | | | | | | | |
| **Record elevation (datum) used** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 23.5 | 31.6 | 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 ($ft^2$) | 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 ($ft^2$) | 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 13d. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
## Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Upper (1995 feet)

| | Cross Section 5 (Pool) | | | | | | | Cross Section 6 (Riffle) | | | | | | | Cross Section 7 (Riffle) | | | | | | | Cross Section 8 (Pool) | | | | | | | Cross Section 9 (Riffle) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Based on fixed baseline bankfull elevation[1]** | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| **Record elevation (datum) used** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 14.3 | 13.9 | 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 ($ft^2$) | 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 ($ft^2$) | 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 ($ft^2$) | 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 ($ft^2$) | 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 13e. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
## Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 4 (278 feet)

| | Cross Section 1 (Pool) | | | | | | | Cross Section 2 (Riffle) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Based on fixed baseline bankfull elevation[1]** | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| **Record elevation (datum) used** | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 12.0 | 11.0 | 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 ($ft^2$) | 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 ($ft^2$) | 21.1 | 21.6 | 22.9 | 22.3 | | | | 18.6 | 18.5 | 19.2 | 15.9 | | | |
| d50 (mm) | | | | | | | | | | | | | | |

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

| | Cross Section 1 (Pool) | | | | | | | Cross Section 2 (Riffle) | | | | | | | Cross Section 3 (Pool) | | | | | | | Cross Section 4 (Riffle) | | | | | | | Cross Section 5 (Pool) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Based on fixed baseline bankfull elevation[1]** | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| **Record elevation (datum) used** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 11.1 | 11.7 | 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 ($ft^2$) | 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 ($ft^2$) | 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 ($ft^2$) | 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 ($ft^2$) | 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 13g. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)**
**Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 6 (1265 feet)**

| | Cross Section 1 (Pool) | | | | | | | Cross Section 2 (Riffle) | | | | | | | Cross Section 3 (Pool) | | | | | | | Cross Section 4 (Riffle) | | | | | | | Cross Section 5 (Riffle) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Based on fixed baseline bankfull elevation[1]** | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| **Record elevation (datum) used** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 9.0 | 11.2 | 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 13h. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
## Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 7 (1844 feet)

| | Cross Section 1 (Riffle) | | | | | | | Cross Section 2 (Pool) | | | | | | | Cross Section 3 (Riffle) | | | | | | | Cross Section 4 (Pool) | | | | | | | Cross Section 5 (Riffle) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Based on fixed baseline bankfull elevation[1]** | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| **Record elevation (datum) used** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 12.9 | 15.1 | 14.3 | 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 13i. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)**
**Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 8 (760 feet)**

| | Cross Section 1 (Riffle) | | | | | | | Cross Section 2 (Pool) | | | | | | | Cross Section 3 (Riffle) | | | | | | | Cross Section 4 (Pool) | | | | | | | Cross Section 5 (Riffle) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Based on fixed baseline bankfull elevation[1]** | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| **Record elevation (datum) used** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 13.7 | 15.2 | 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 14a. Monitoring Data - Stream Reach Data Summary
### Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 1 Lower (572 feet)

| Parameter | Baseline | | | | | | MY-1 | | | | | | MY-2 | | | | | | MY- 3 | | | | | | MY- 4 | | | | | | MY- 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle only** | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n |
| Bankfull Width (ft) | 10.56 | 11.22 | 11.22 | 11.88 | | 2 | 11.8 | 11.1 | 11.1 | 12.8 | | 2 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rc:Bankfull width (ft/ft) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Meander Wavelength (ft) | 59.82 | | 84.7 | 119.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Meander Width Ratio | 1.5 | | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rosgen Classification | Cb 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Thalweg length (ft) | 601 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sinuosity (ft) | 1.05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water Surface Slope (Channel) (ft/ft) | 0.0163 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BF slope (ft/ft) | ------ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [3]Ri% / Ru% / P% / G% / S% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [3]SC% / Sa% / G% / C% / B% / Be% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [3]d16 / d35 / d50 / d84 / d95 / | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [2]% of Reach with Eroding Banks | **0** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Stability or Habitat Metric | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Biological or Other | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

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

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

| Parameter | Baseline | | | | | | MY-1 | | | | | | MY-2 | | | | | | MY- 3 | | | | | | MY- 4 | | | | | | MY- 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle only** | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n |
| Bankfull Width (ft) | 8.5 | 9.052 | 9.052 | 9.603 | | 2 | 9 | 9.5 | 9.5 | 10 | | 2 | 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 14c. Monitoring Data - Stream Reach Data Summary
## Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 3 Lower (873 feet)

| Parameter | Baseline | | | | | | MY-1 | | | | | | MY-2 | | | | | | MY- 3 | | | | | | MY- 4 | | | | | | MY- 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle only** | Min | Mean | Med | Max | SD[4] | Mean | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n |
| Bankfull Width (ft) | 10.56 | 17.01 | 17.01 | 23.46 | | 2 | 23.5 | 23.7 | 23.7 | 23.8 | | 2 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

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

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

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

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

## Table 14d. Monitoring Data - Stream Reach Data Summary

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

| Parameter | Baseline | | | | | | MY-1 | | | | | | MY-2 | | | | | | MY- 3 | | | | | | MY- 4 | | | | | | MY- 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle only** | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n |
| Bankfull Width (ft) | 14.25 | 16.1 | 15.75 | 18.67 | 2.069 | 4 | 9 | 11.7 | 11.7 | 27.7 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

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

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

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

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

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

| Parameter | Baseline | | | | | | MY-1 | | | | | | MY-2 | | | | | | MY- 3 | | | | | | MY- 4 | | | | | | MY- 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle only** | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n |
| Bankfull Width (ft) | 13.97 | 13.97 | 13.97 | 13.97 | | 1 | 20.5 | 20.5 | 20.5 | 20.5 | | 1 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rosgen Classification | C 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Thalweg length (ft) | 292 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sinuosity (ft) | 1.05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water Surface Slope (Channel) (ft/ft) | 0.0235 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BF slope (ft/ft) | ------ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [3]Ri% / Ru% / P% / G% / S% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [3]SC% / Sa% / G% / C% / B% / Be% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [3]d16 / d35 / d50 / d84 / d95 / | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [2]% of Reach with Eroding Banks | **0** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Stability or Habitat Metric | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Biological or Other | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

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

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

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

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

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

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

| Parameter | Baseline | | | | | | MY-1 | | | | | | MY-2 | | | | | | MY- 3 | | | | | | MY- 4 | | | | | | MY- 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle only** | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n |
| Bankfull Width (ft) | 7.288 | 10.52 | 9.918 | 14.36 | | 3 | 10.5 | 18.3 | 18.3 | 21 | | 3 | 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 14g. Monitoring Data - Stream Reach Data Summary
## Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 6 (1265 feet)

| Parameter | Baseline | | | | | | MY-1 | | | | | | MY-2 | | | | | | MY- 3 | | | | | | MY- 4 | | | | | | MY- 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle only** | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n |
| Bankfull Width (ft) | 9.483 | 10.37 | 10.12 | 11.74 | 0.964 | 4 | 10.6 | 13 | 13 | 13.6 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

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

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

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

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

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

| Parameter | Baseline | | | | | | MY-1 | | | | | | MY-2 | | | | | | MY- 3 | | | | | | MY- 4 | | | | | | MY- 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle only** | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n |
| Bankfull Width (ft) | 10.09 | 11.92 | 12.22 | 13.15 | 1.402 | 4 | 10.1 | 13.5 | 13.5 | 15.1 | 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 14i. Monitoring Data - Stream Reach Data Summary
## Project Name/Number (Warren Wilson/100019) Segment/Reach: UT 8 (760 feet)

| Parameter | Baseline | | | | | | MY-1 | | | | | | MY-2 | | | | | | MY- 3 | | | | | | MY- 4 | | | | | | MY- 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate - Riffle only** | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n | Min | Mean | Med | Max | SD[4] | n |
| Bankfull Width (ft) | 10.34 | 12.04 | 12.13 | 13.66 | | 3 | 10.3 | 12.9 | 12.9 | 15.2 | | 3 | 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

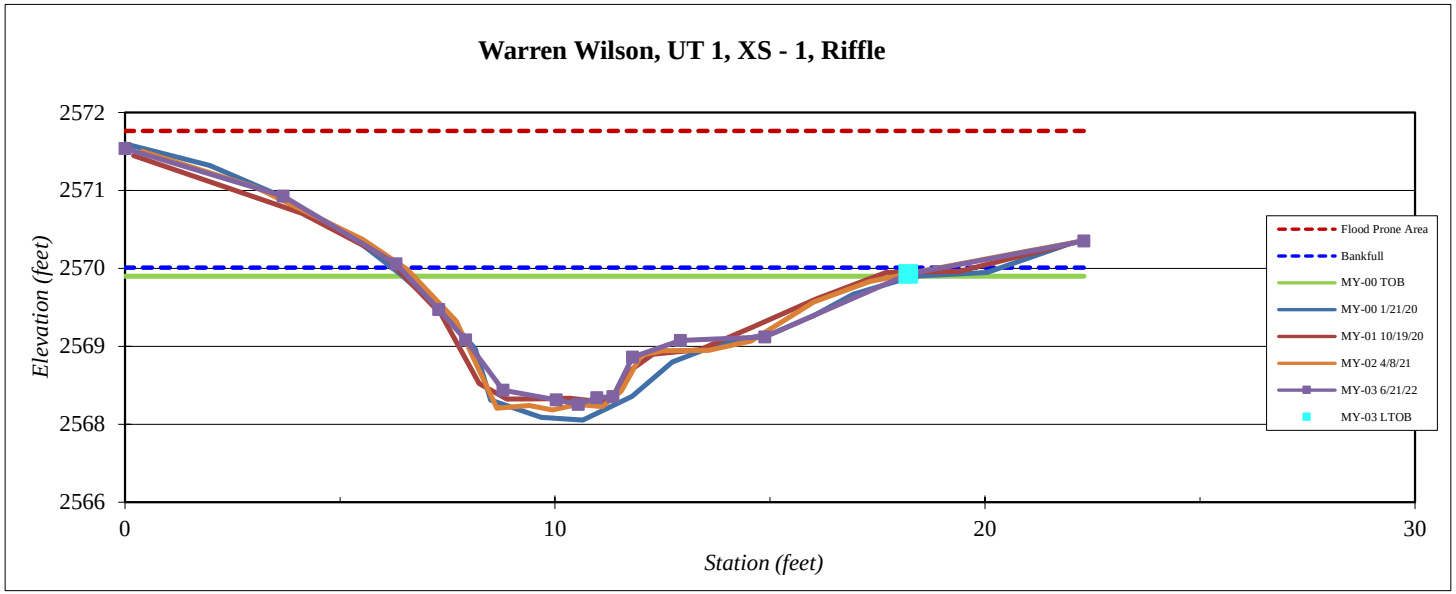
4. = Of value/needed only if the n exceeds 3

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

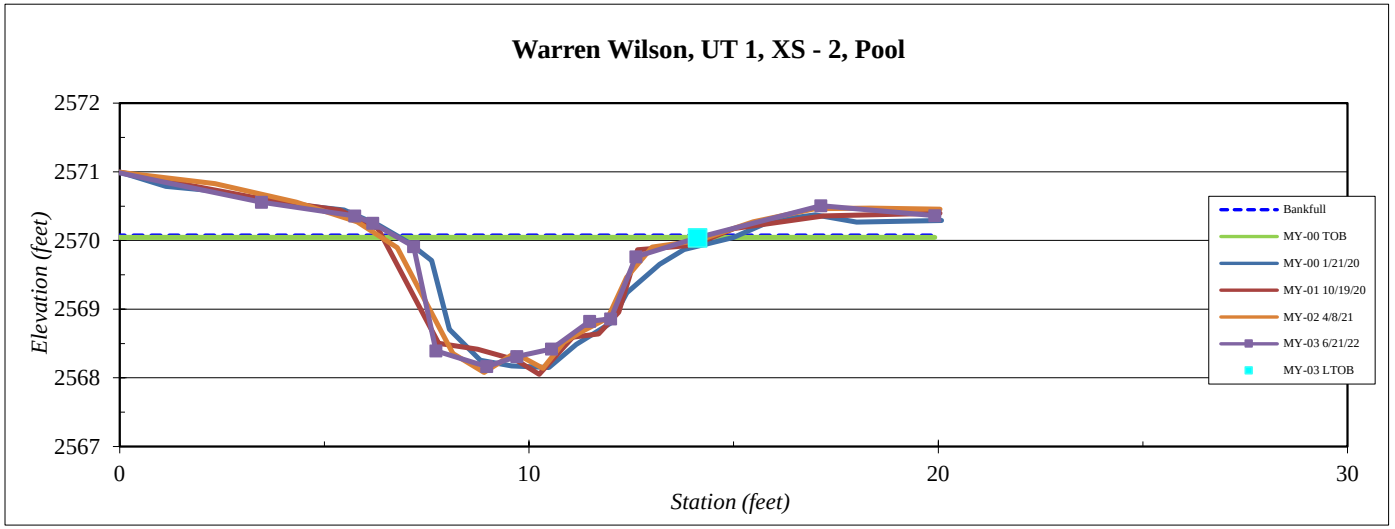


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 2, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

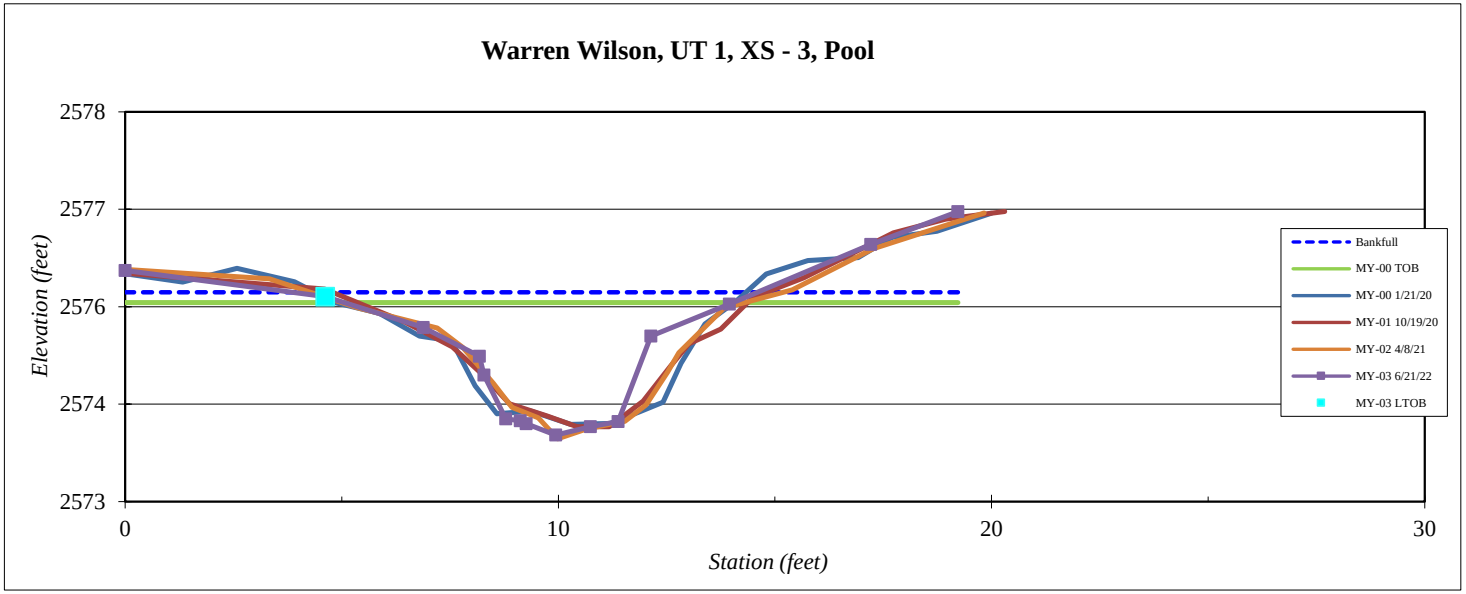


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 3, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

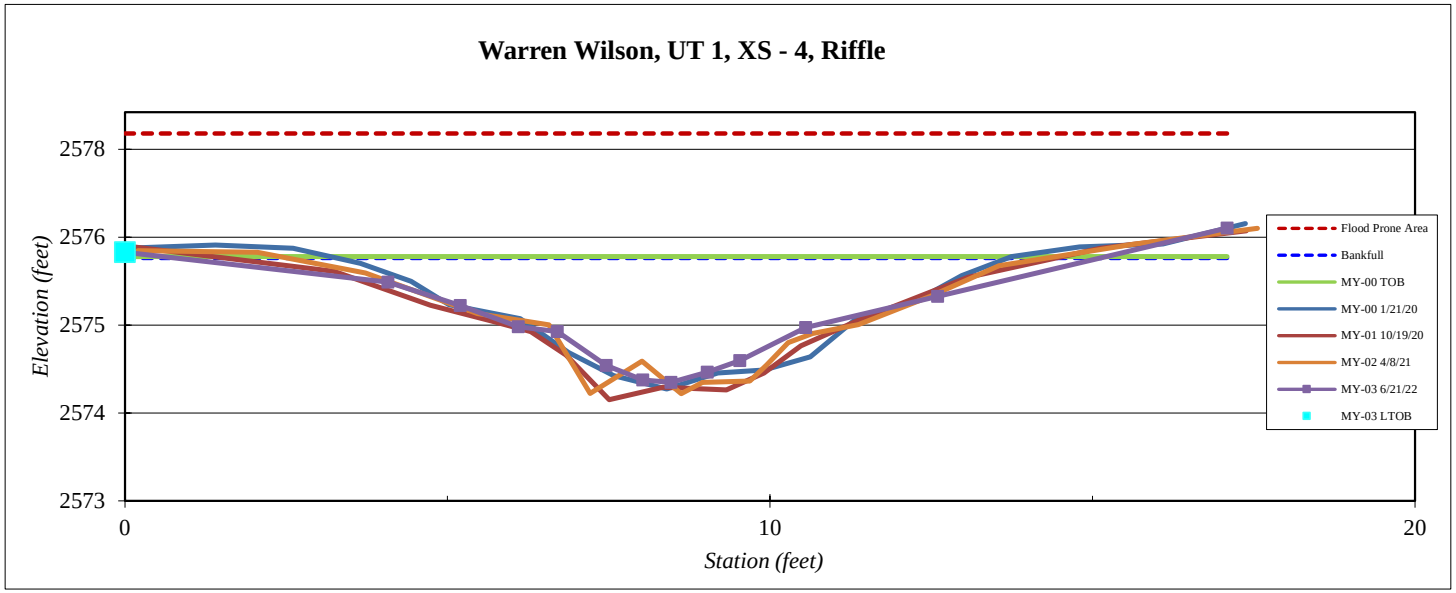


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS -4, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

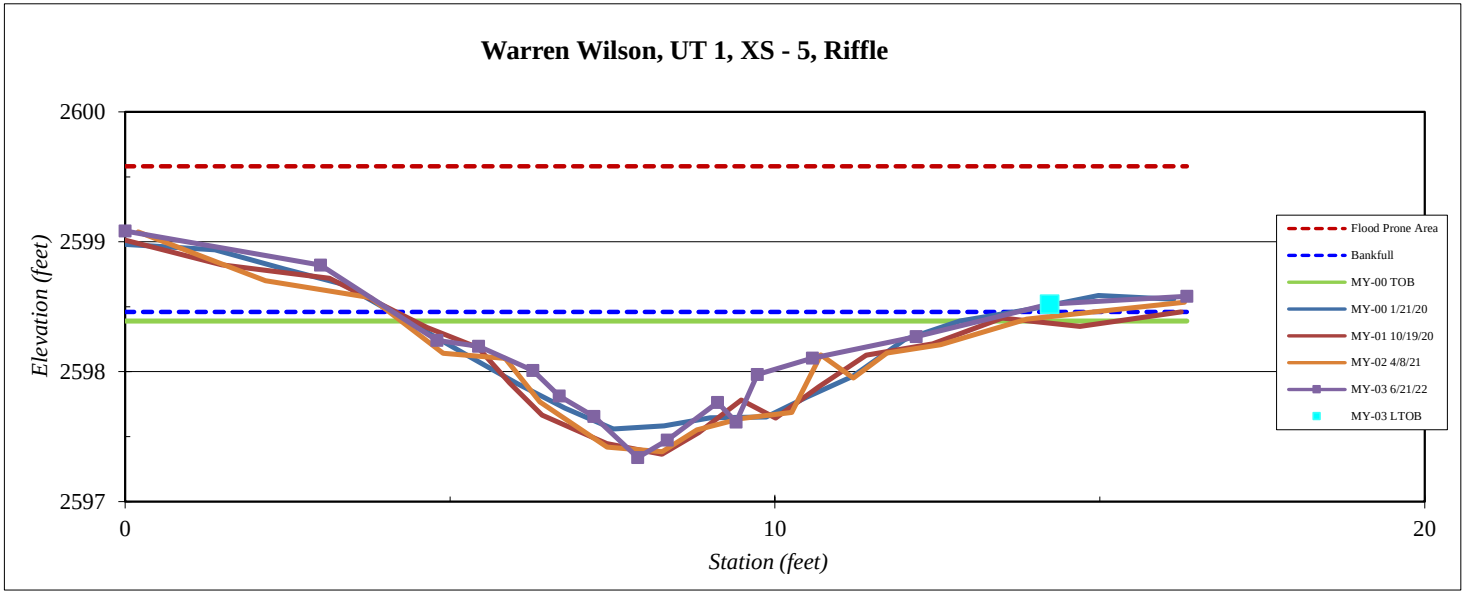


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 5, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

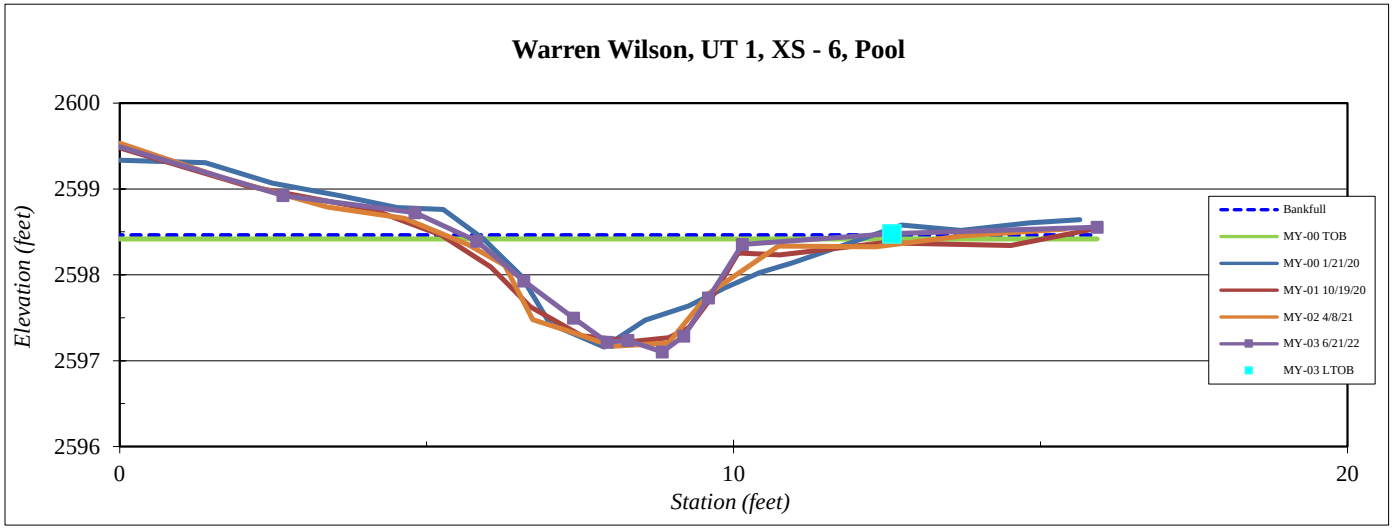


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 6, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

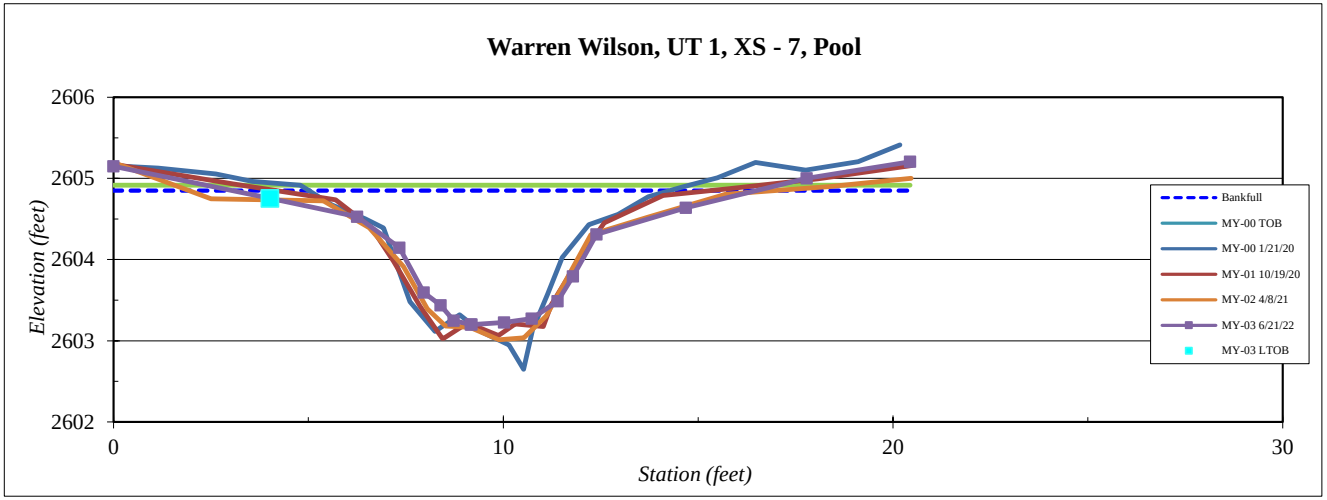


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 7, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

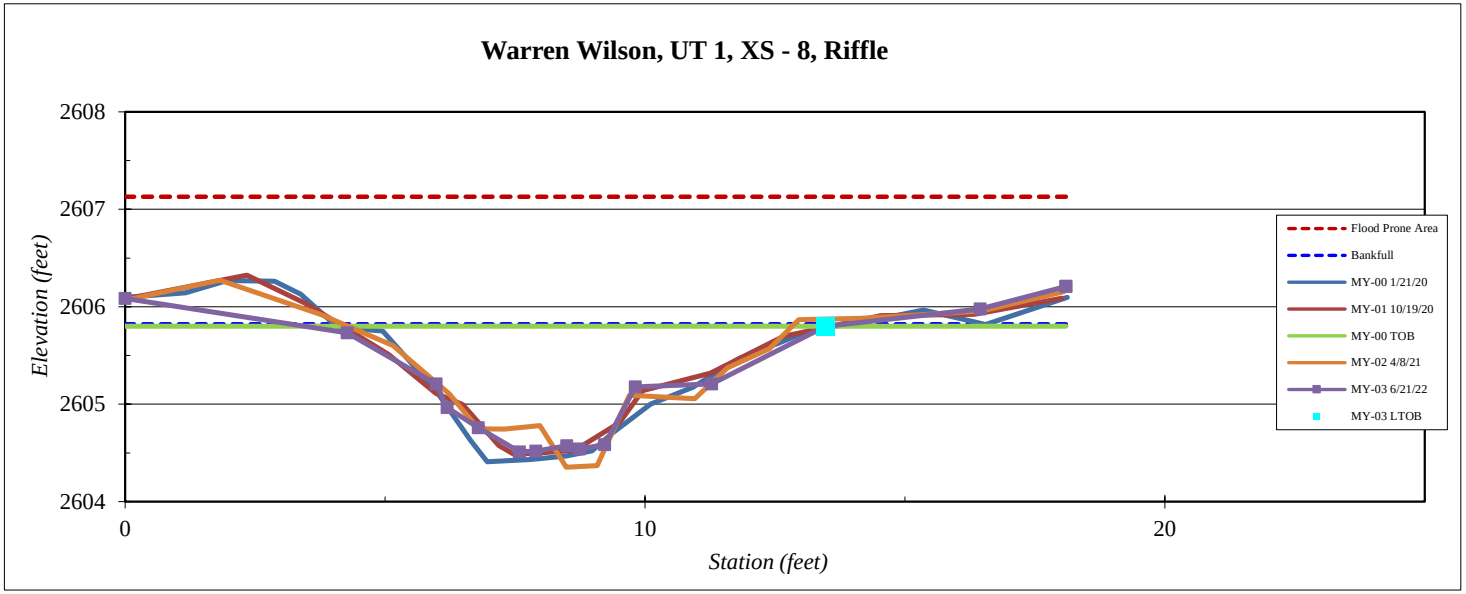


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 1, XS - 8, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

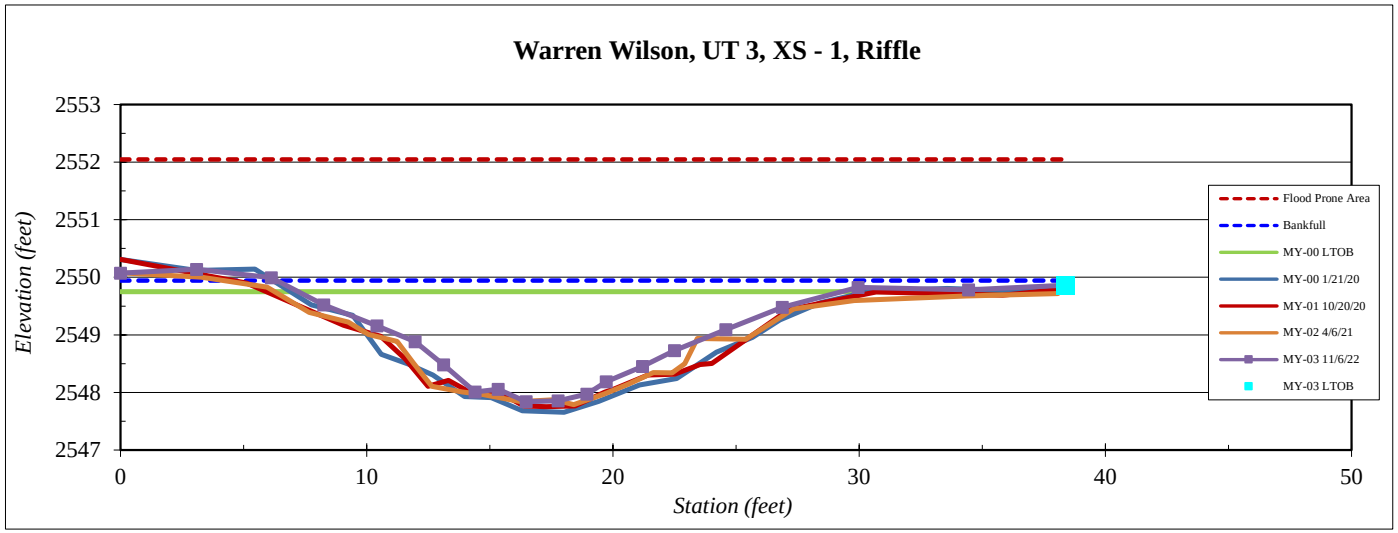


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 1, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

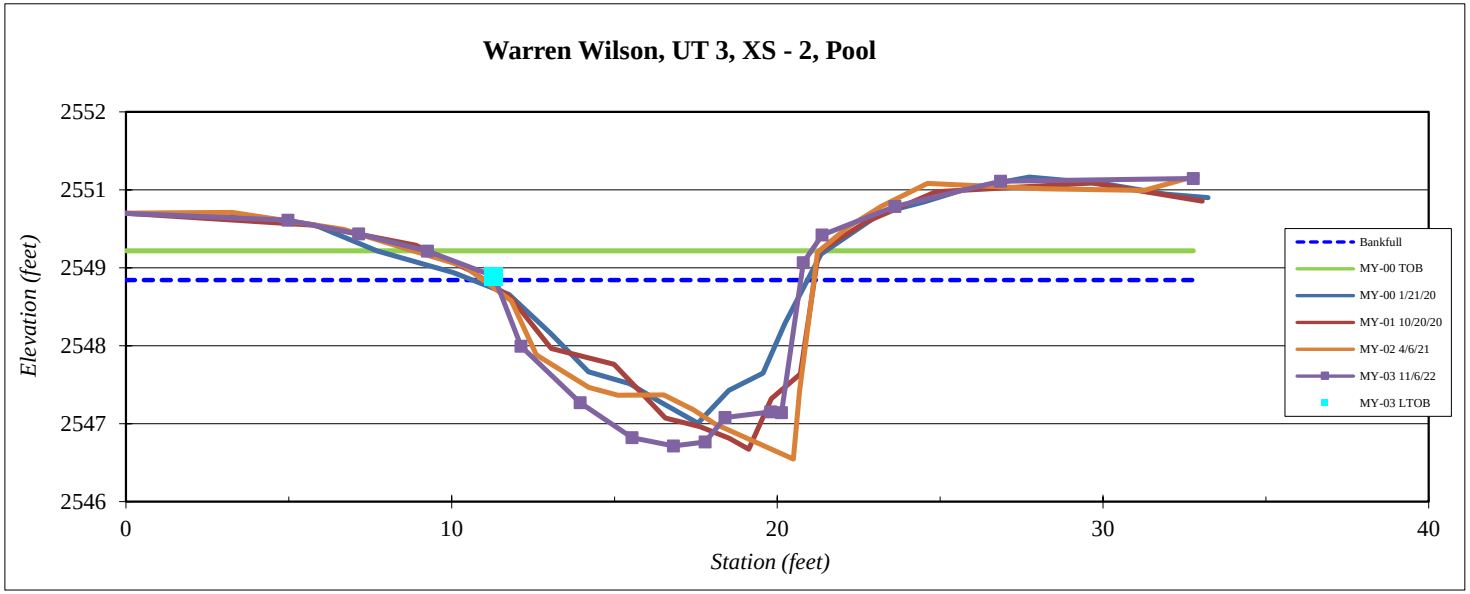


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 2, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

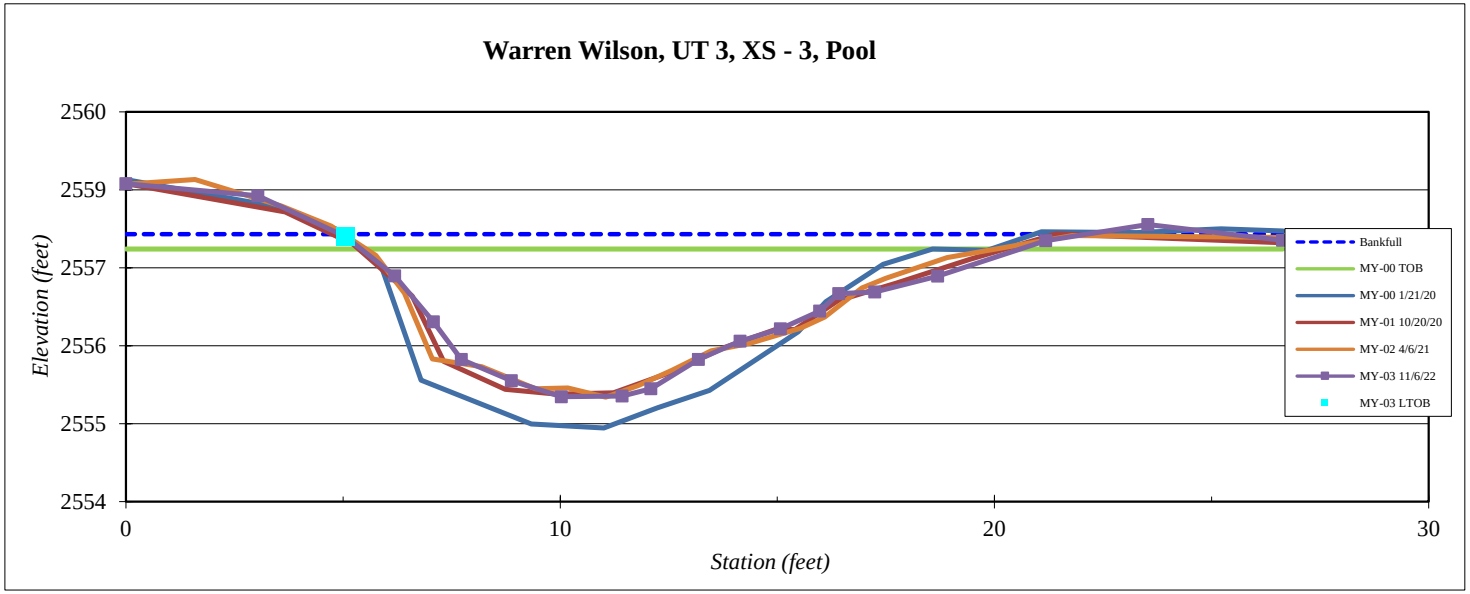


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT3, XS - 3, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

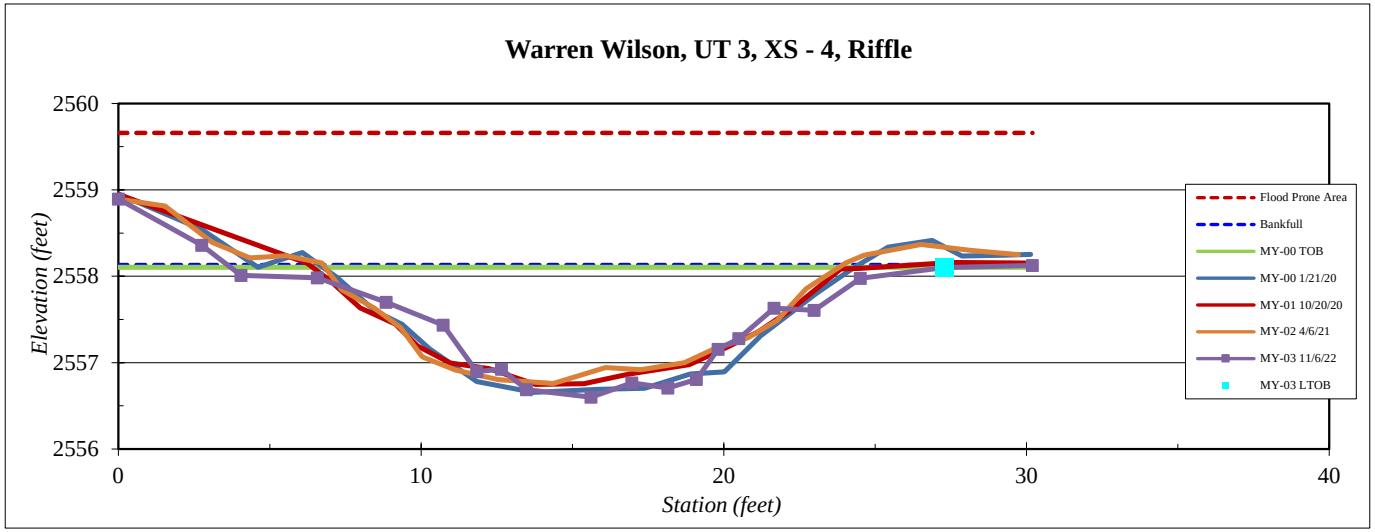


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 4, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

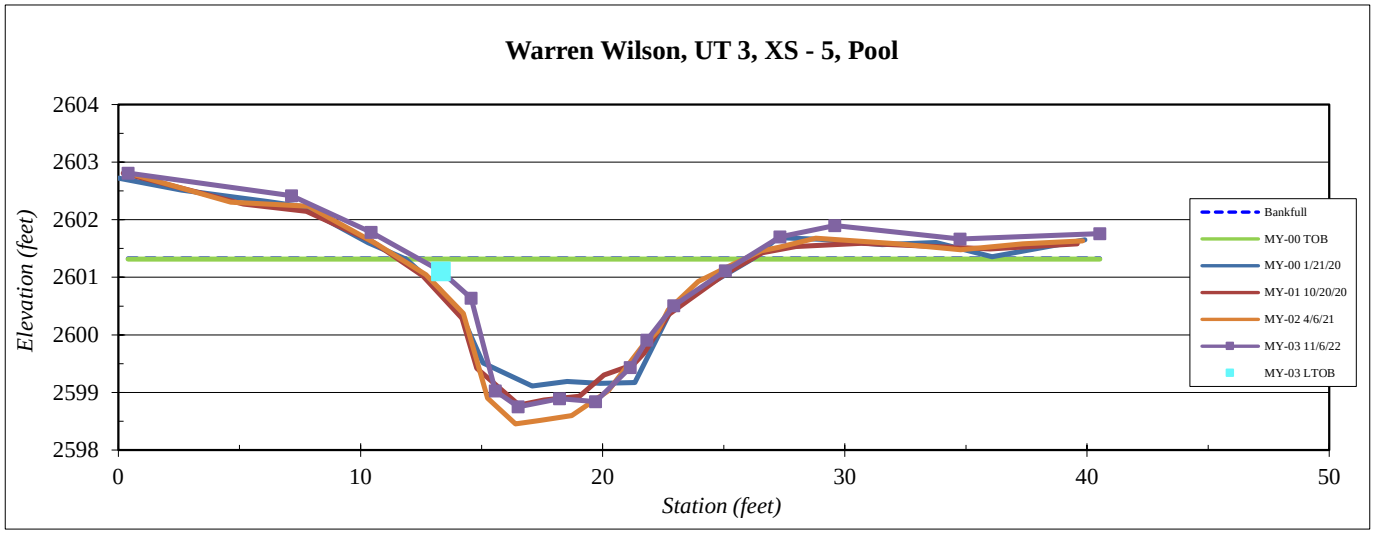


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 5, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

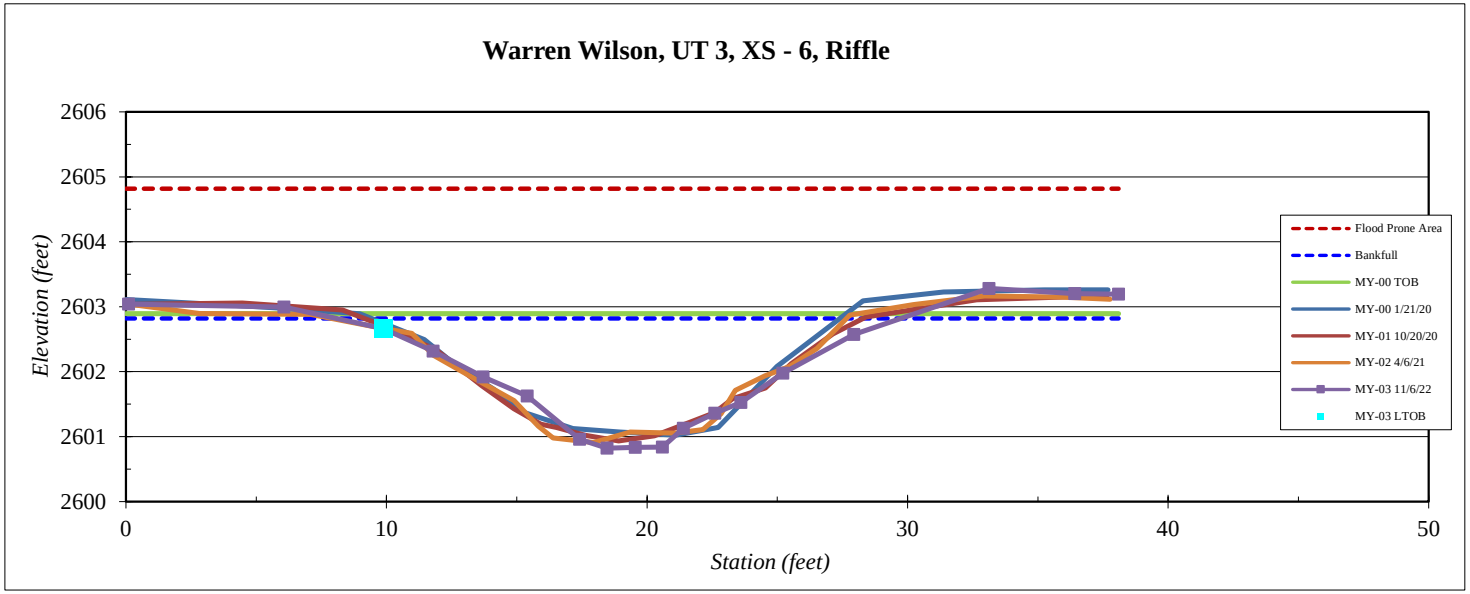


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 6, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

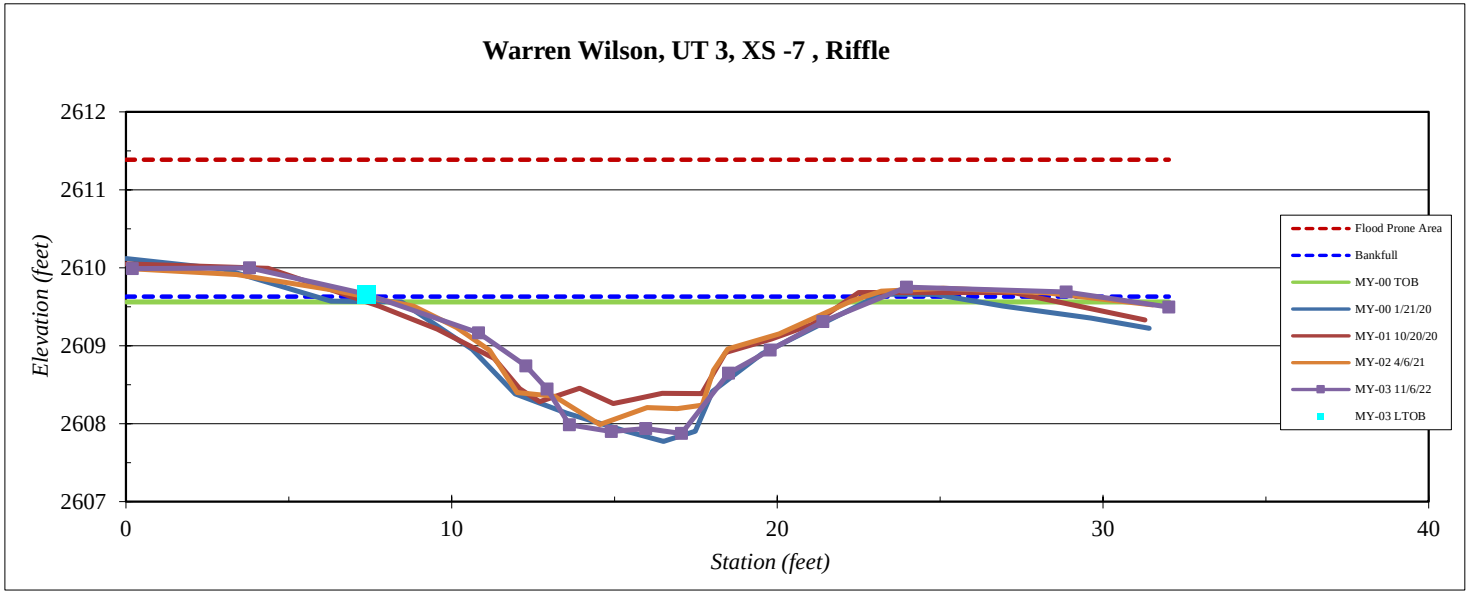


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 7, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

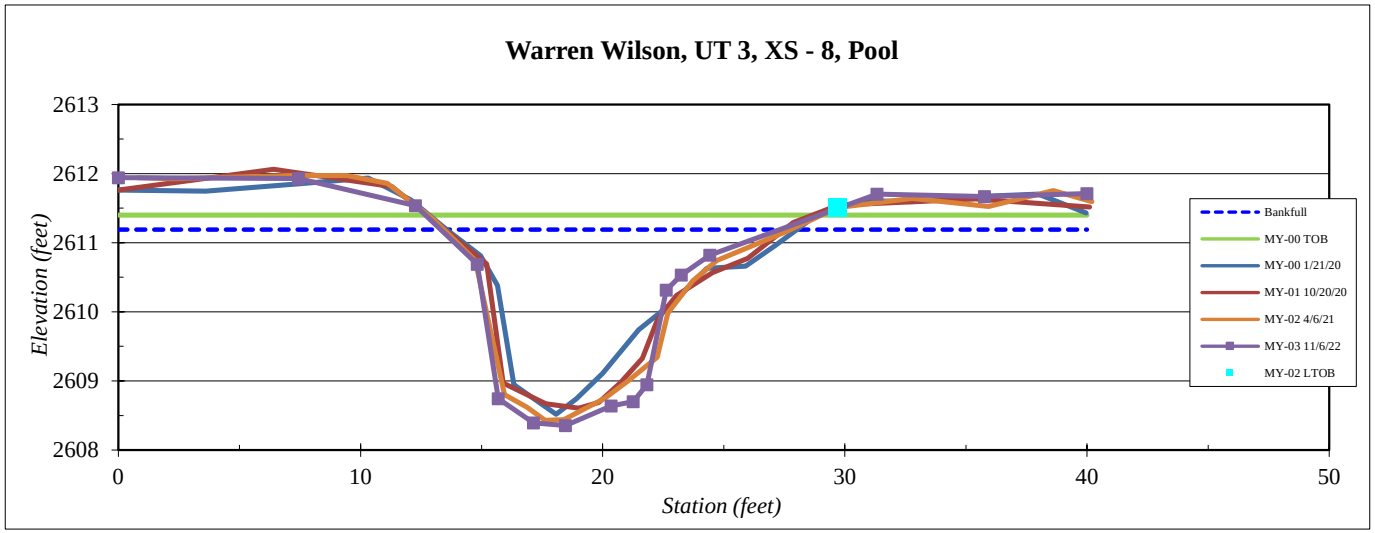


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 8, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

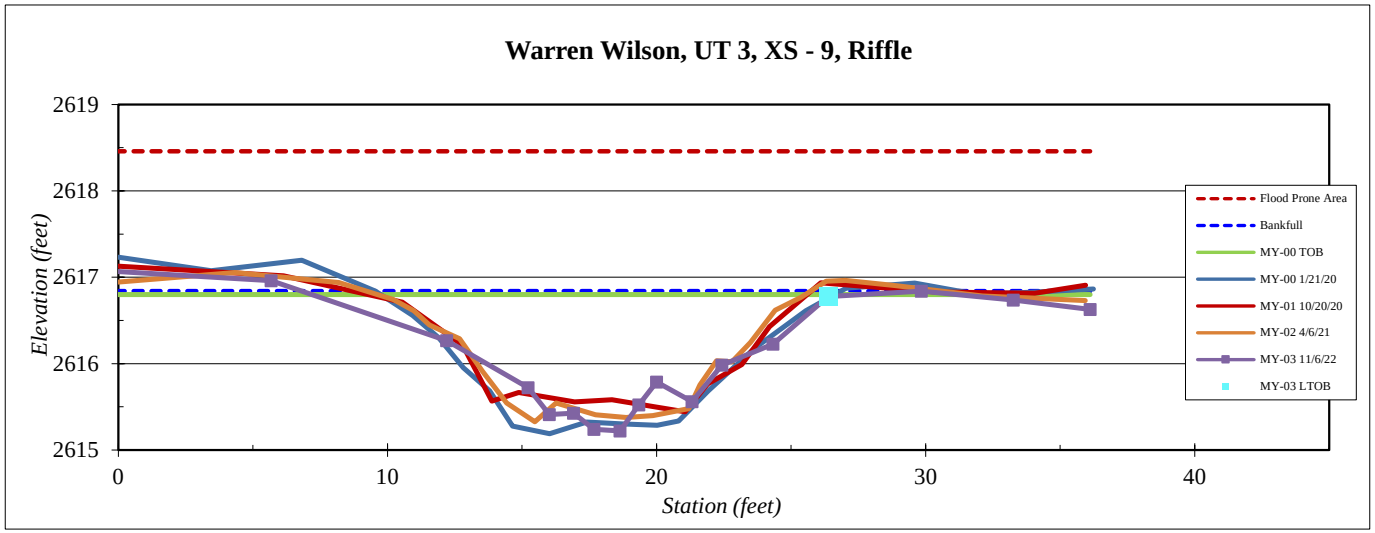


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 9, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

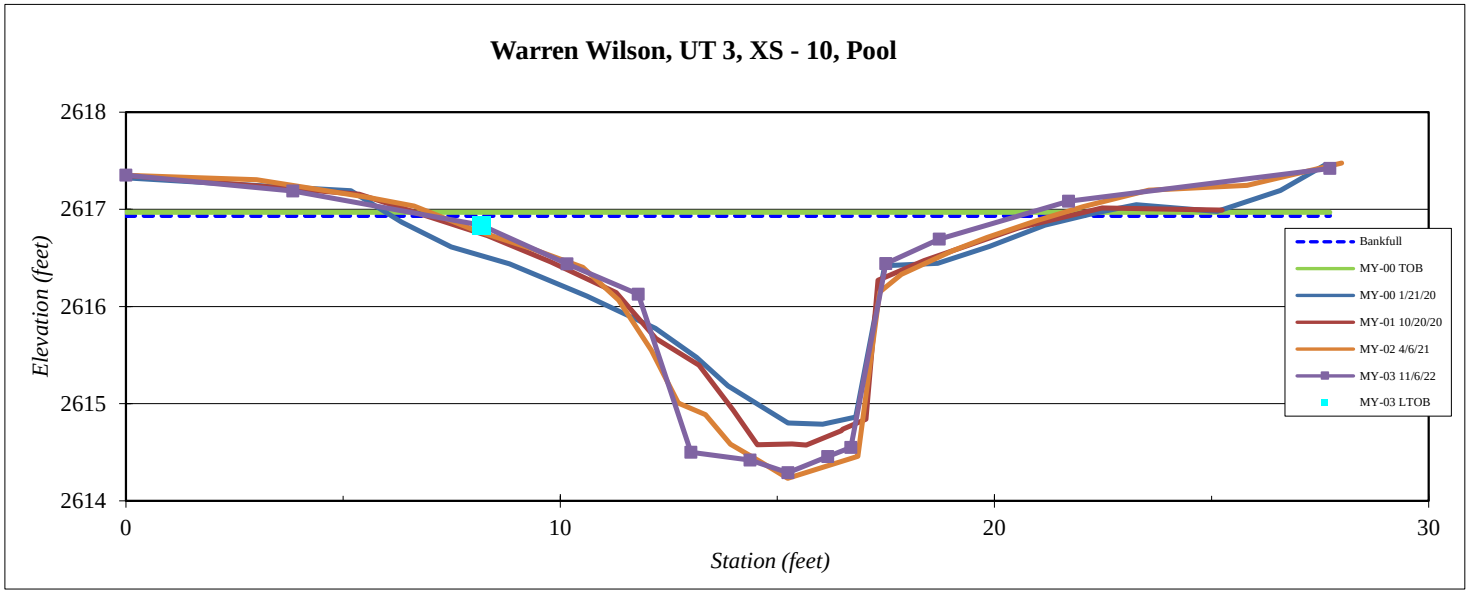


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 10, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

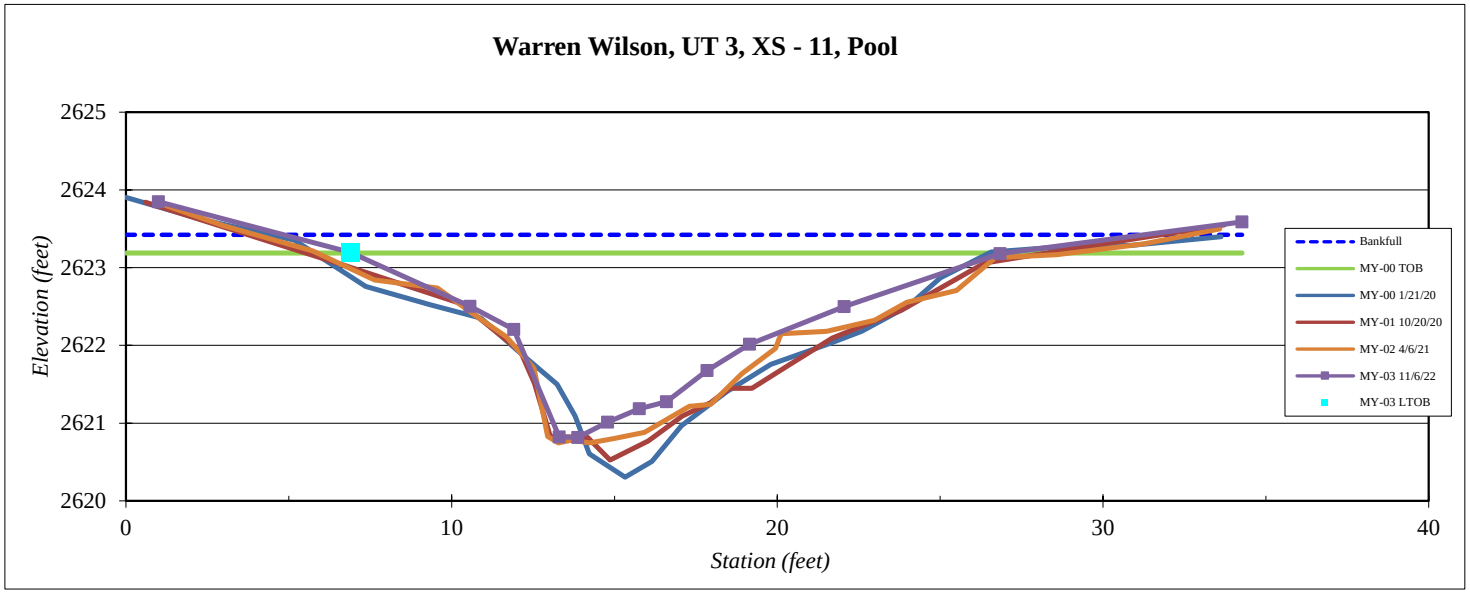


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 11, Pool |
| **Feature** | Pool |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

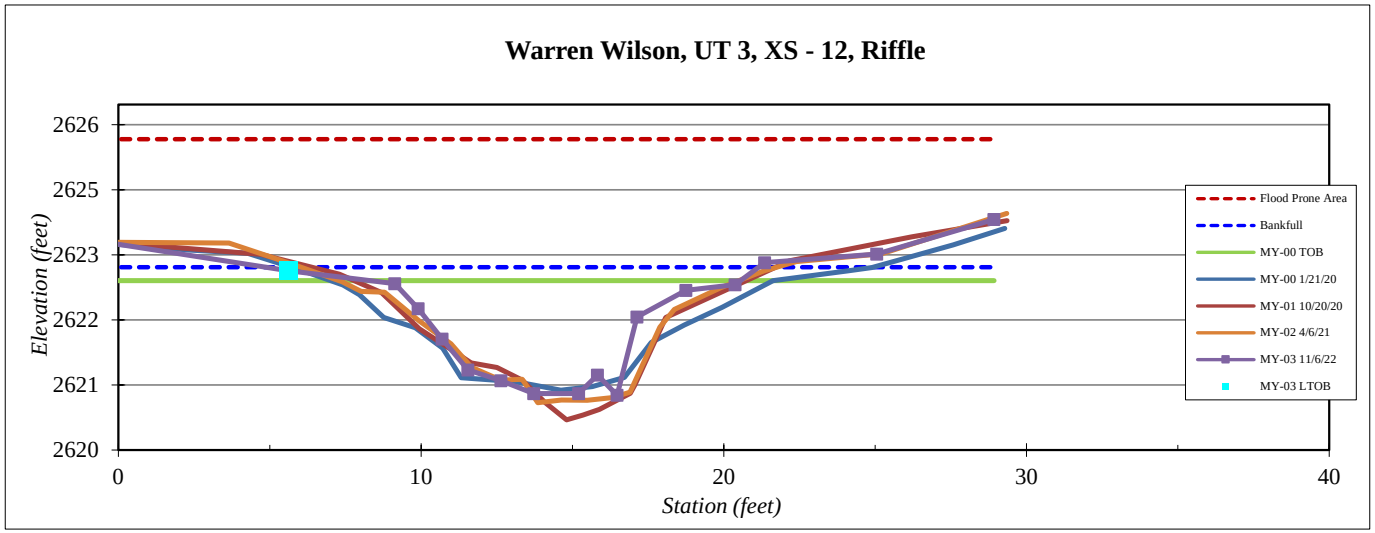


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 3, XS - 12, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/6/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

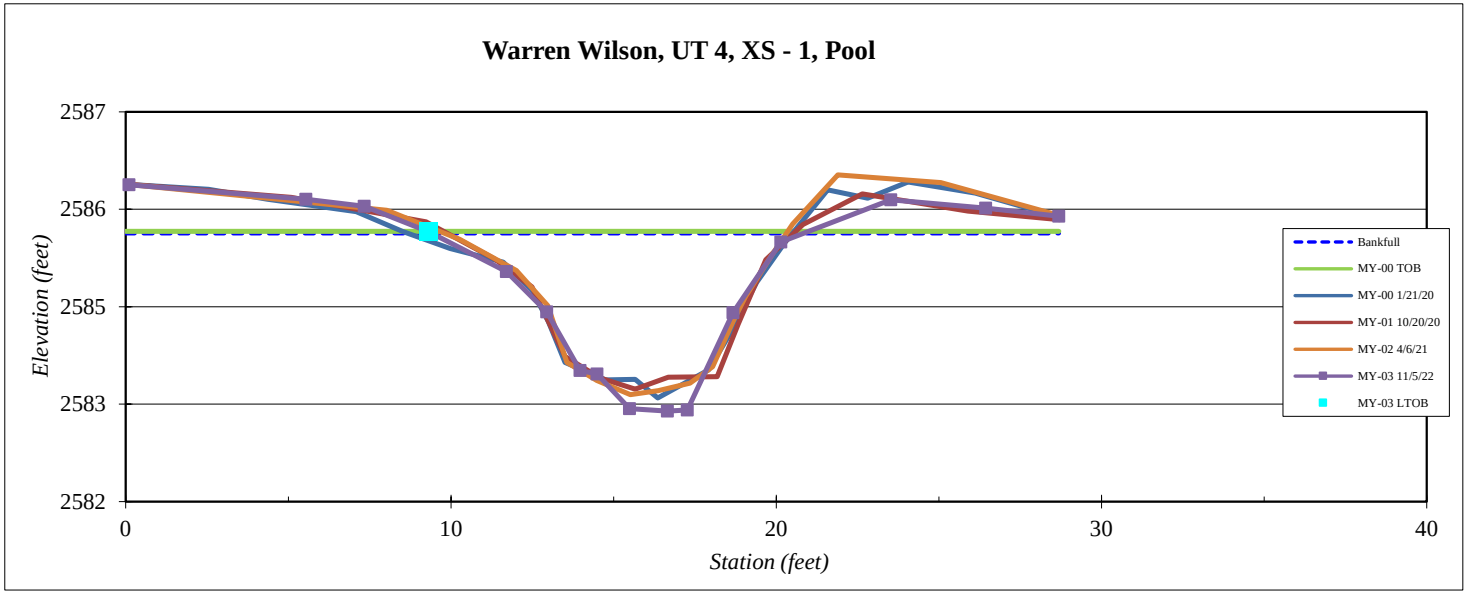


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 4, XS - 1, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

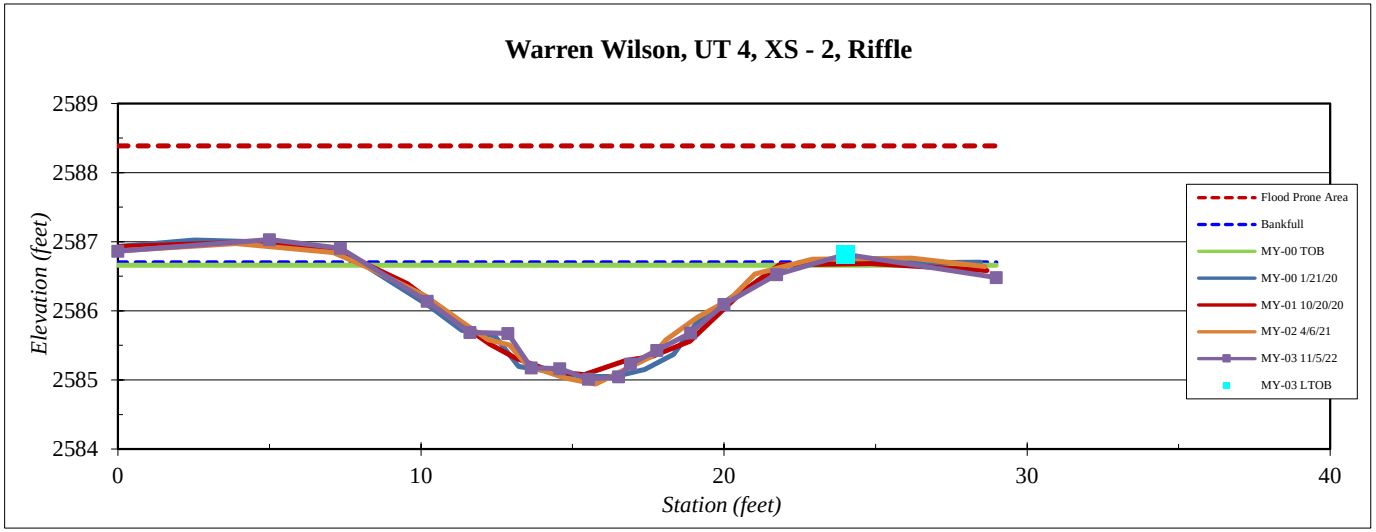


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 4, XS - 2, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

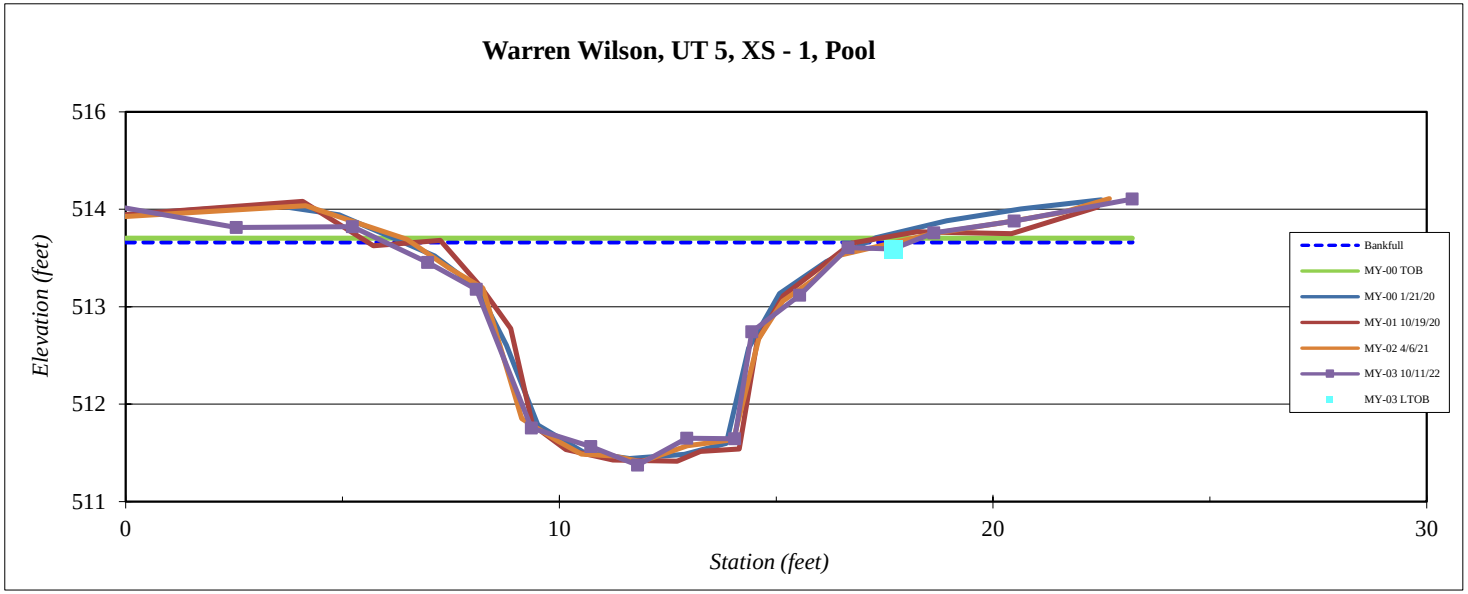


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 1, Pool |
| **Feature** | Pool |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

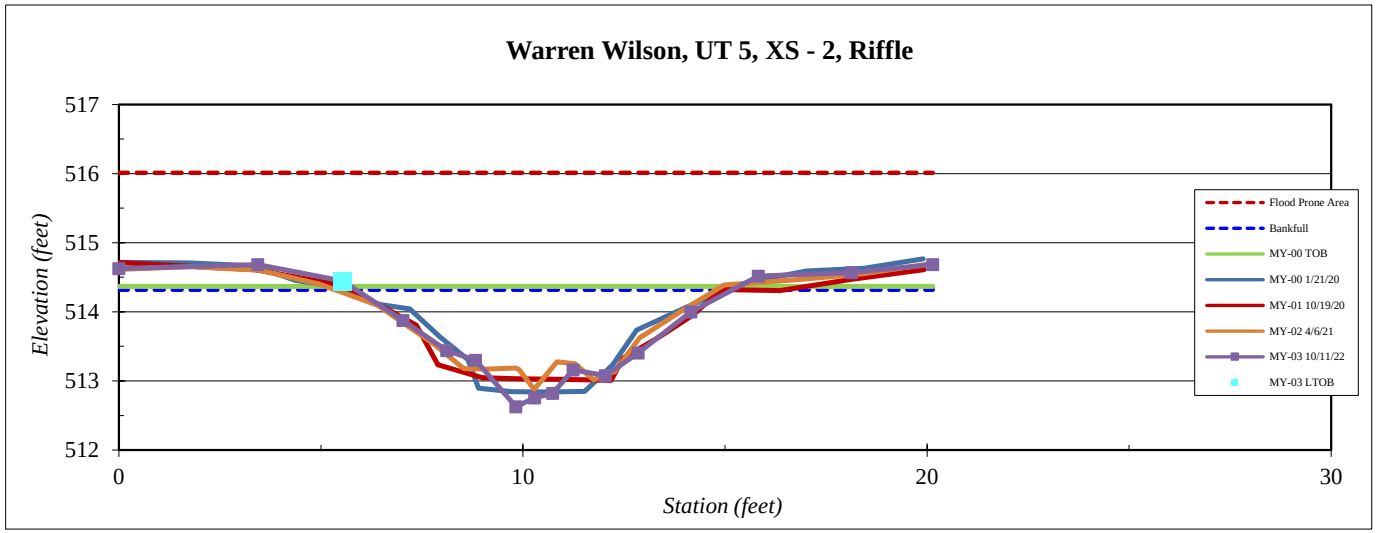


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 2, Riffle |
| **Feature** | Riffle |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

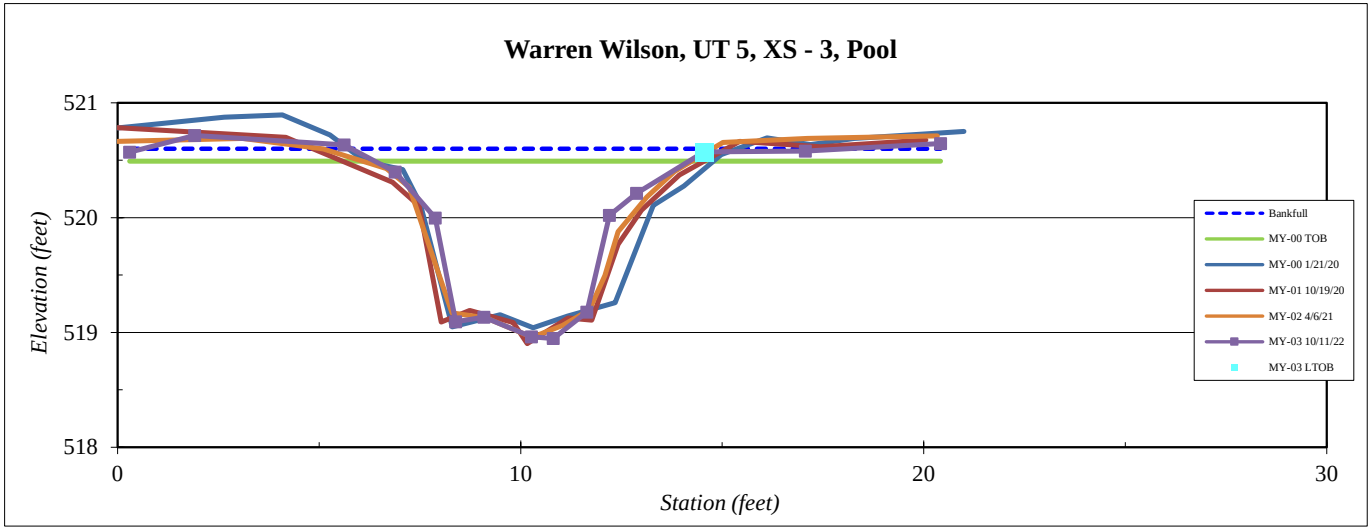


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 3, Pool |
| **Feature** | Pool |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

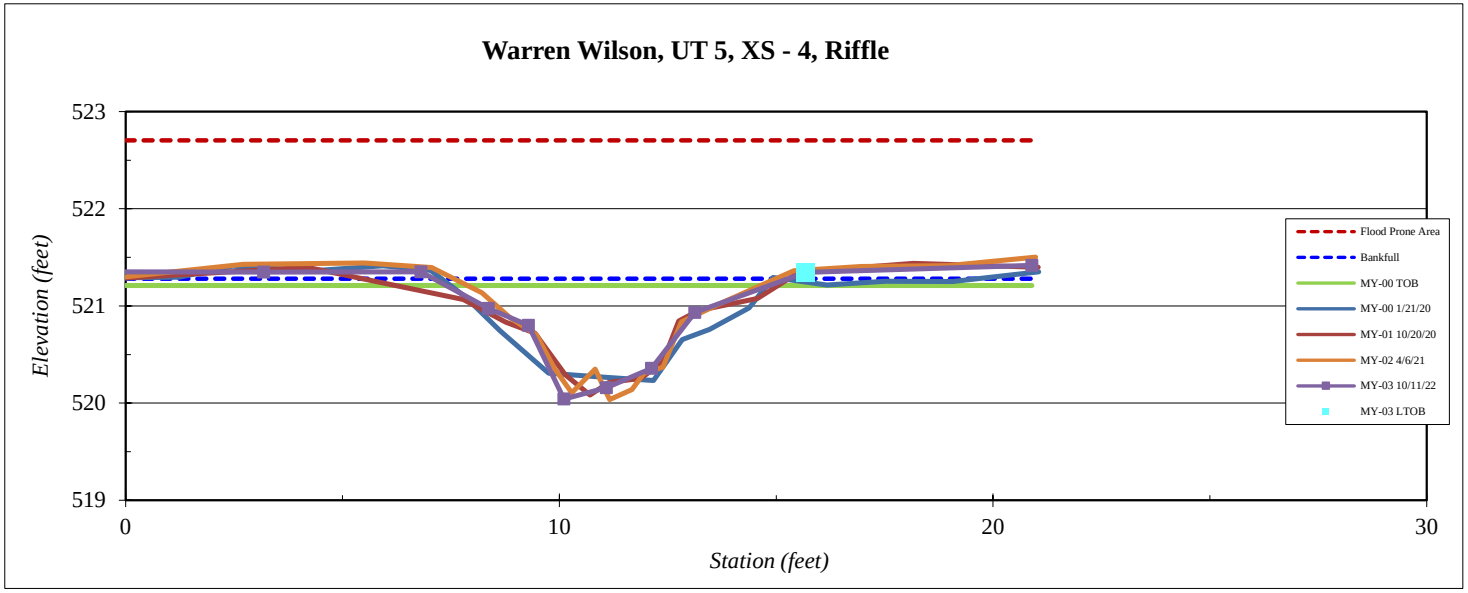


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 4, Riffle |
| **Feature** | Riffle |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

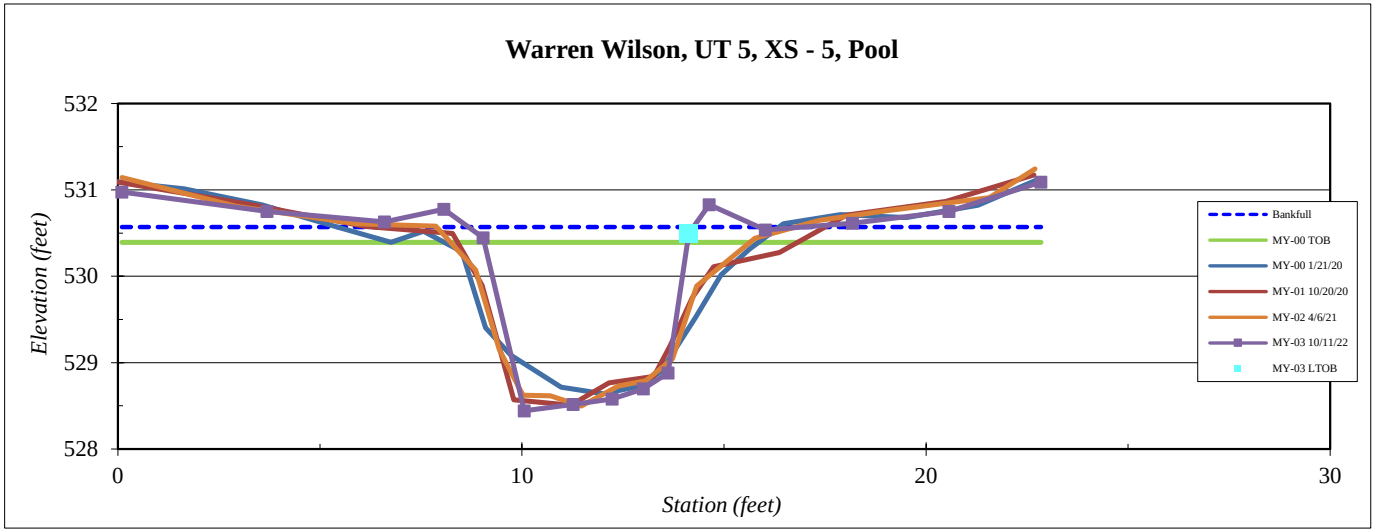


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS - 5, Pool |
| **Feature** | Pool |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

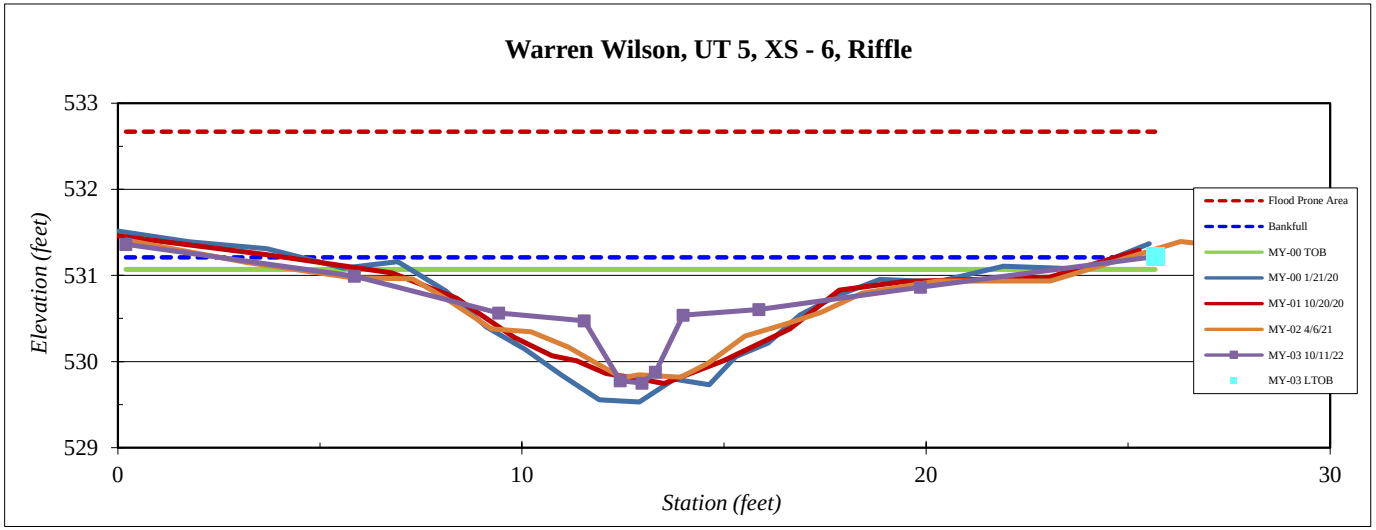


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 5, XS -6, Riffle |
| **Feature** | Riffle |
| **Date:** | 10/11/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

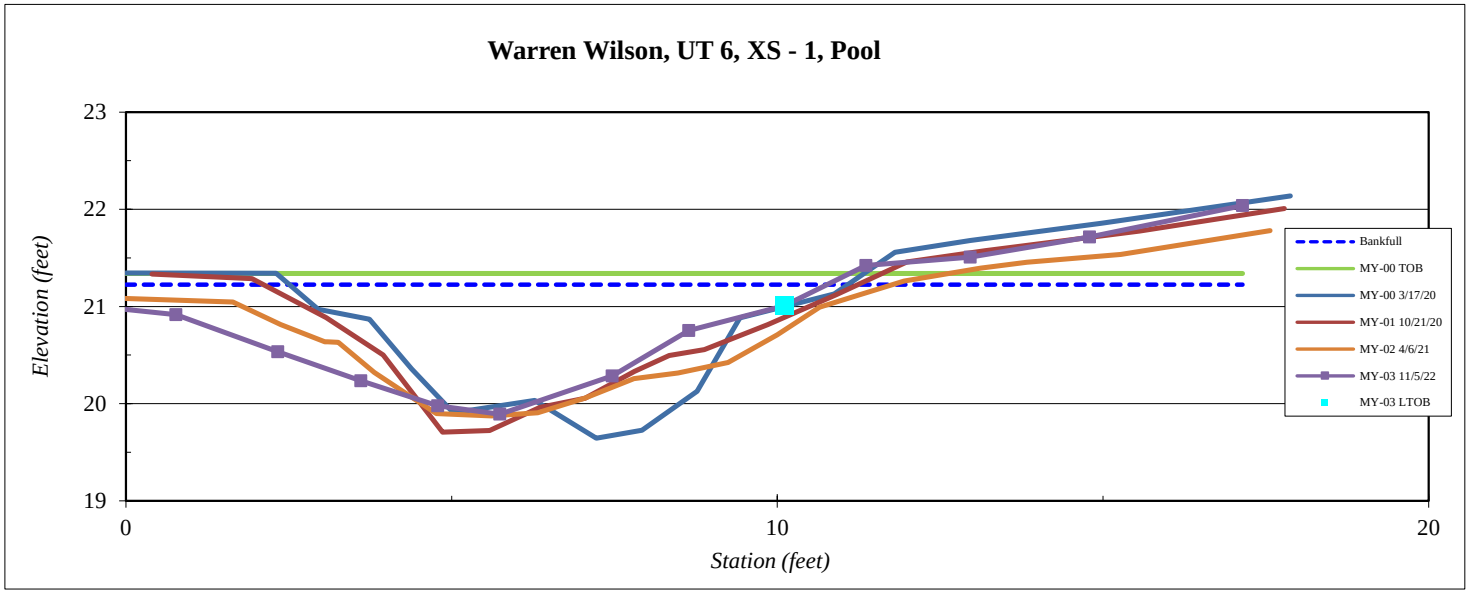


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS - 1, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

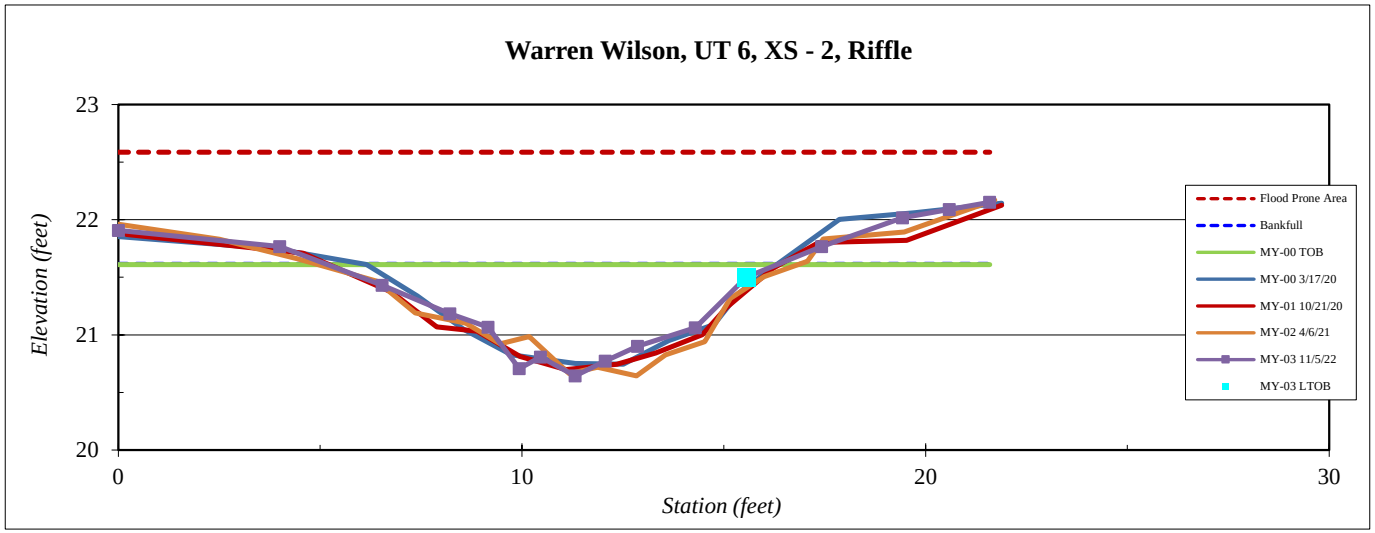


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS -2, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

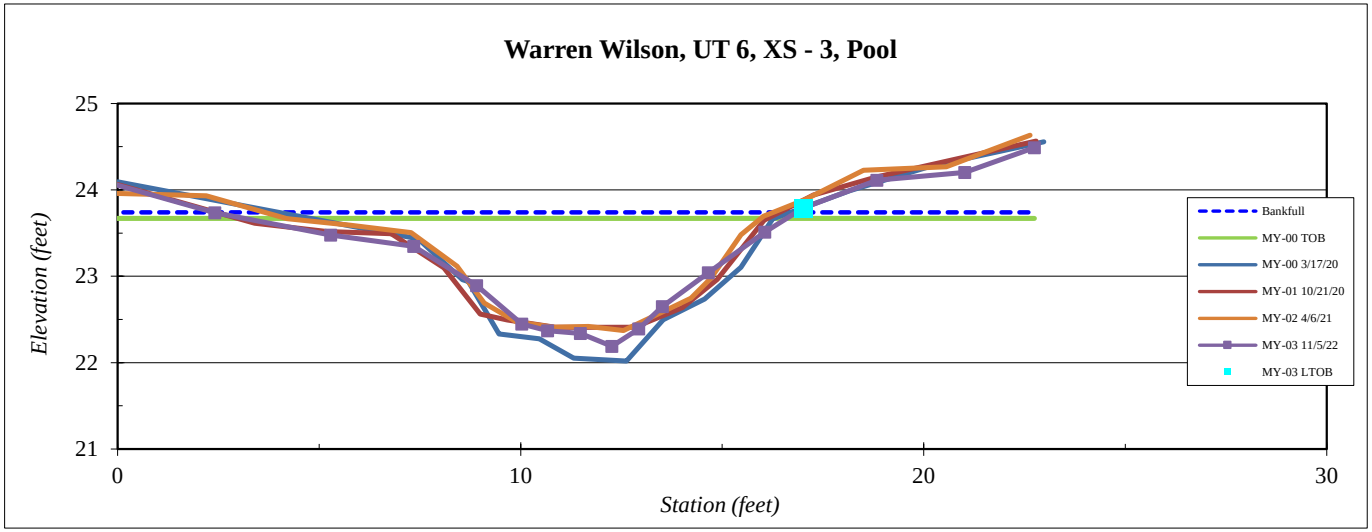


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS - 3, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

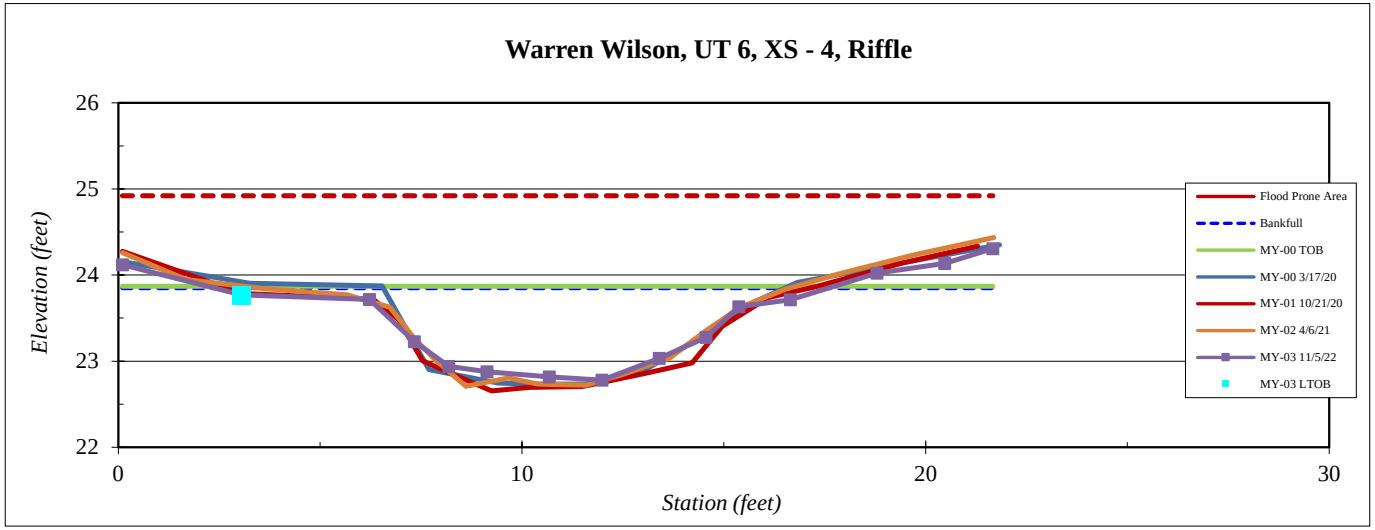


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS -4, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

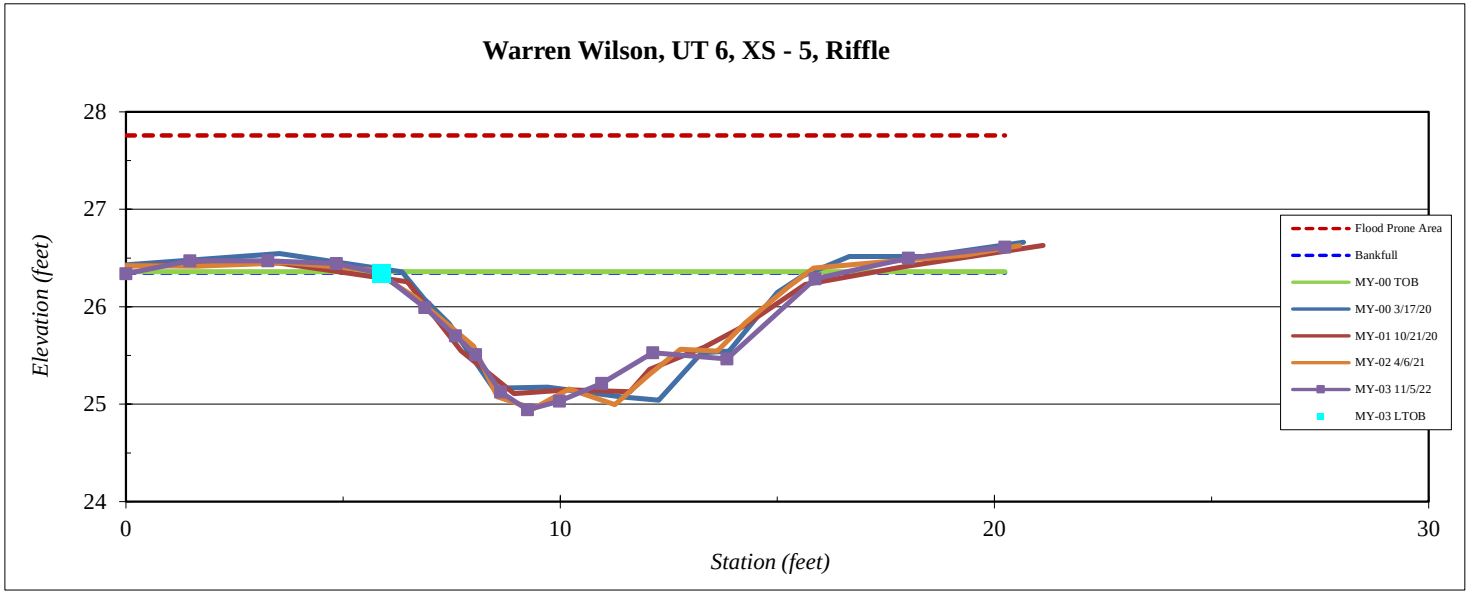


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS -5, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

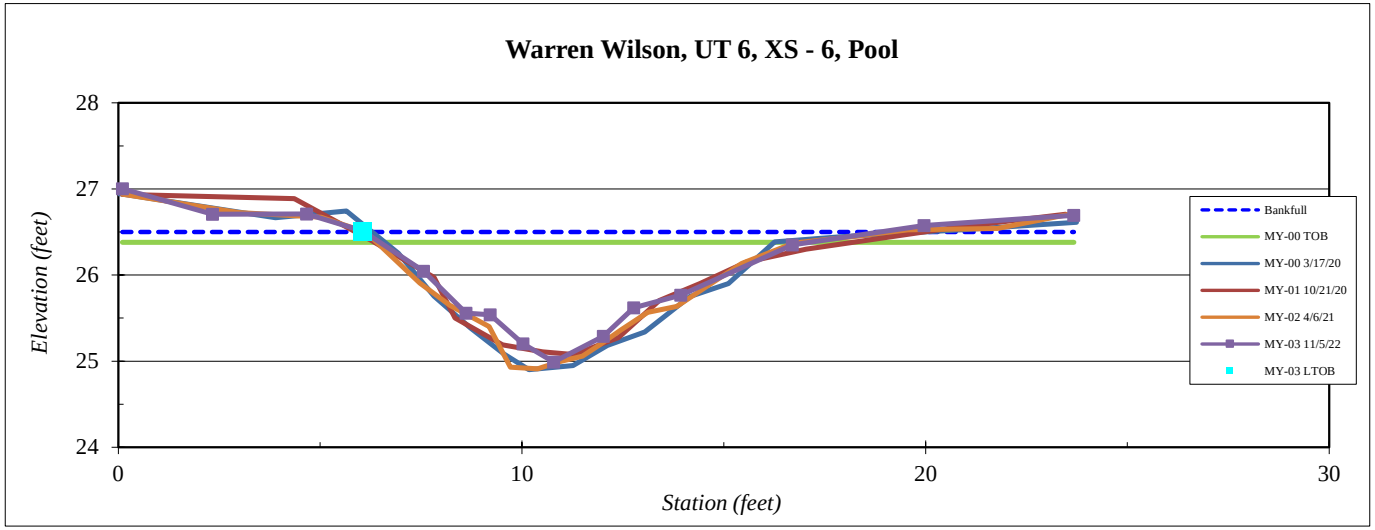


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS - 6, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

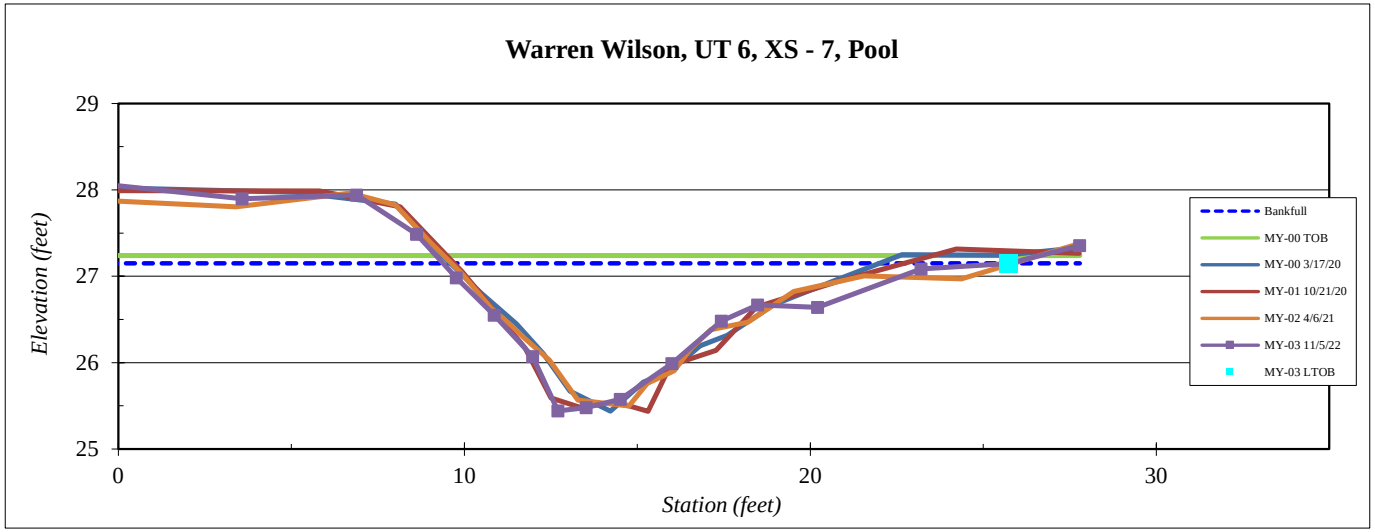


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS - 7, Pool |
| **Feature** | Pool |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

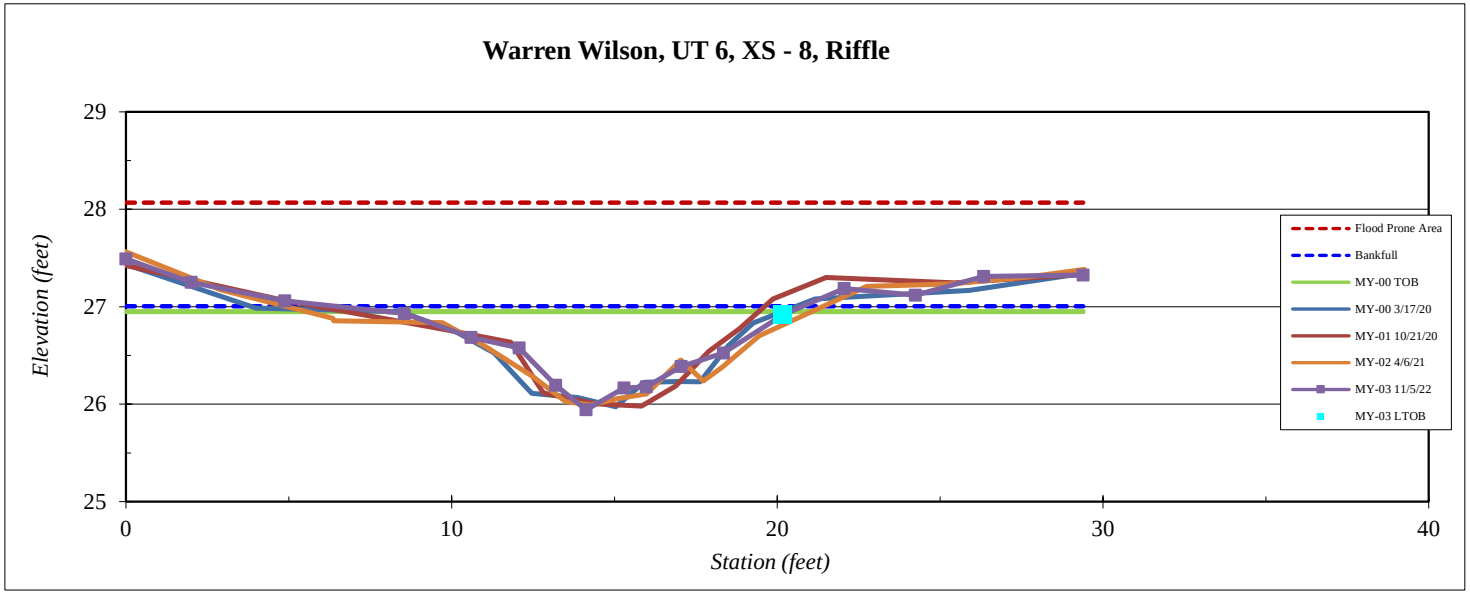


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 6, XS -8, Riffle |
| **Feature** | Riffle |
| **Date:** | 11/5/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

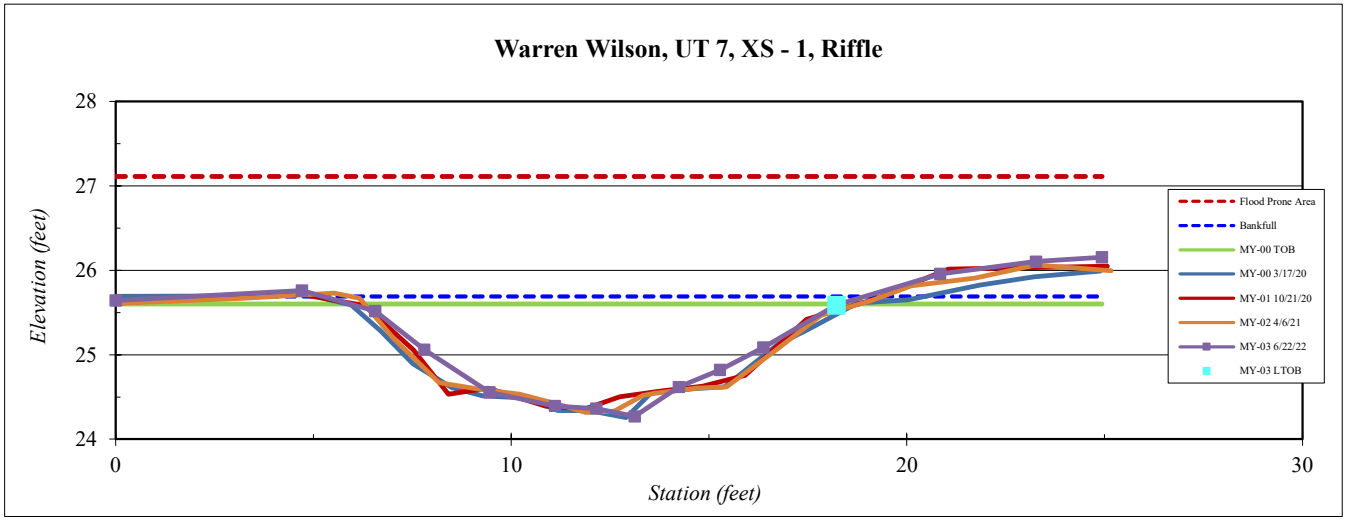


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS -1, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

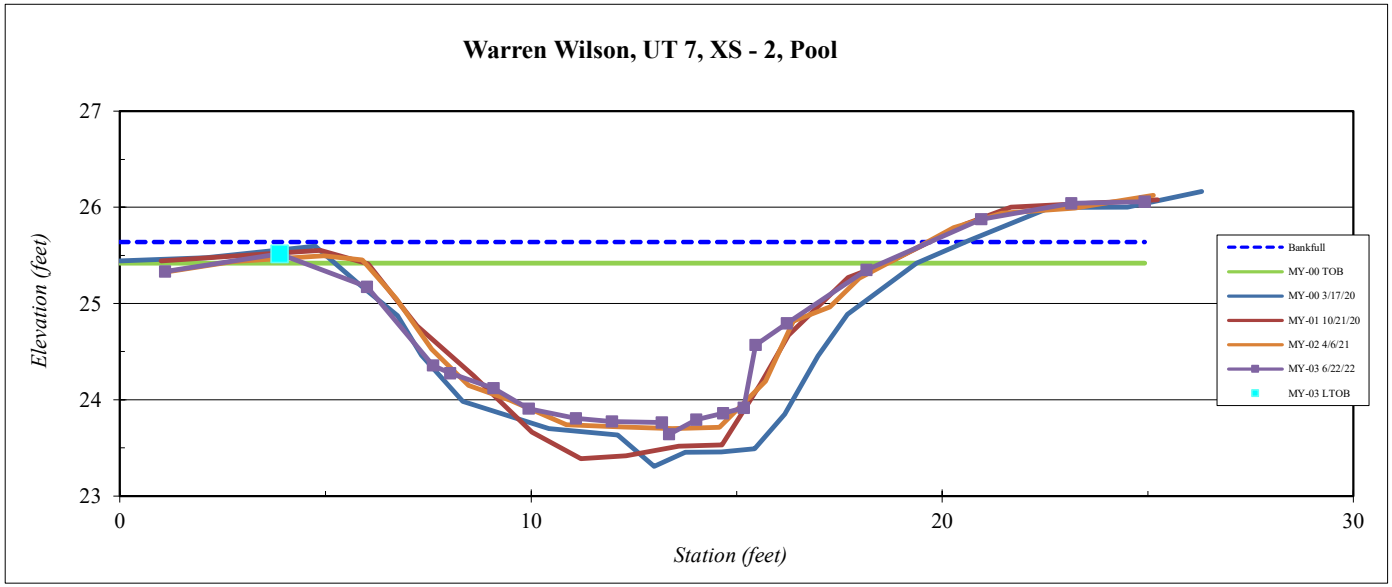


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS - 2, Pool |
| **Feature** | Pool |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

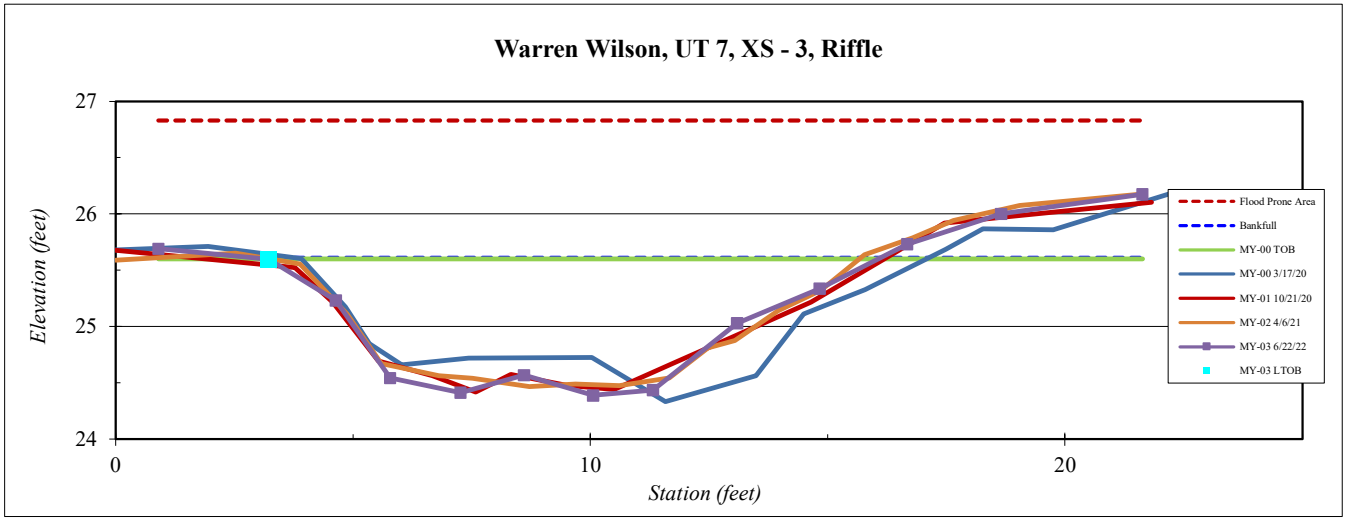


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS -3, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

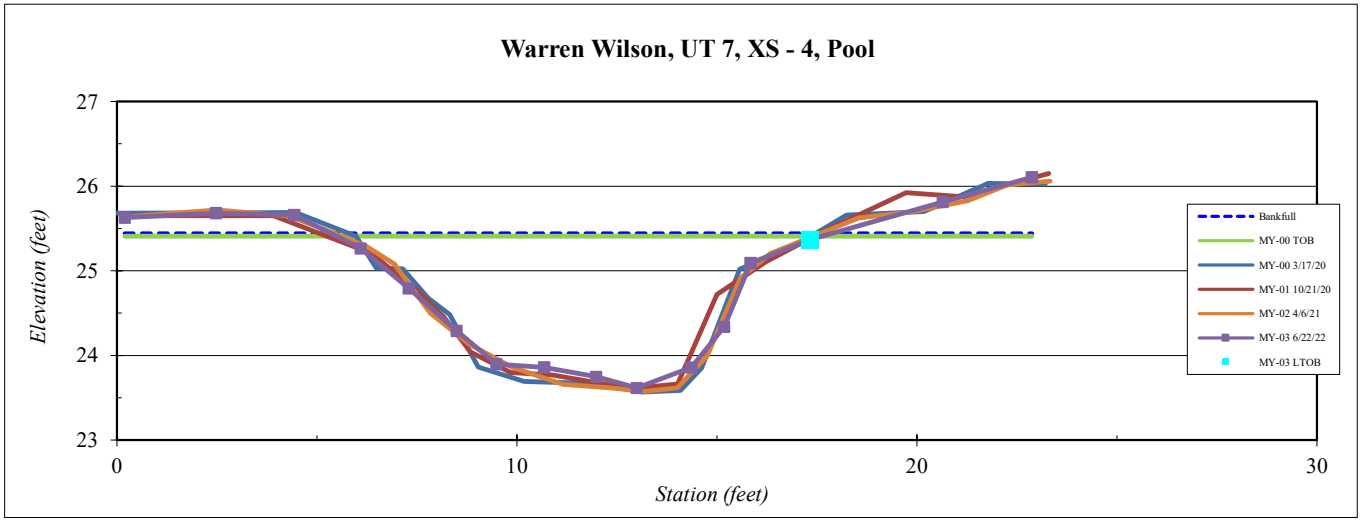


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS - 4, Pool |
| **Feature** | Pool |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

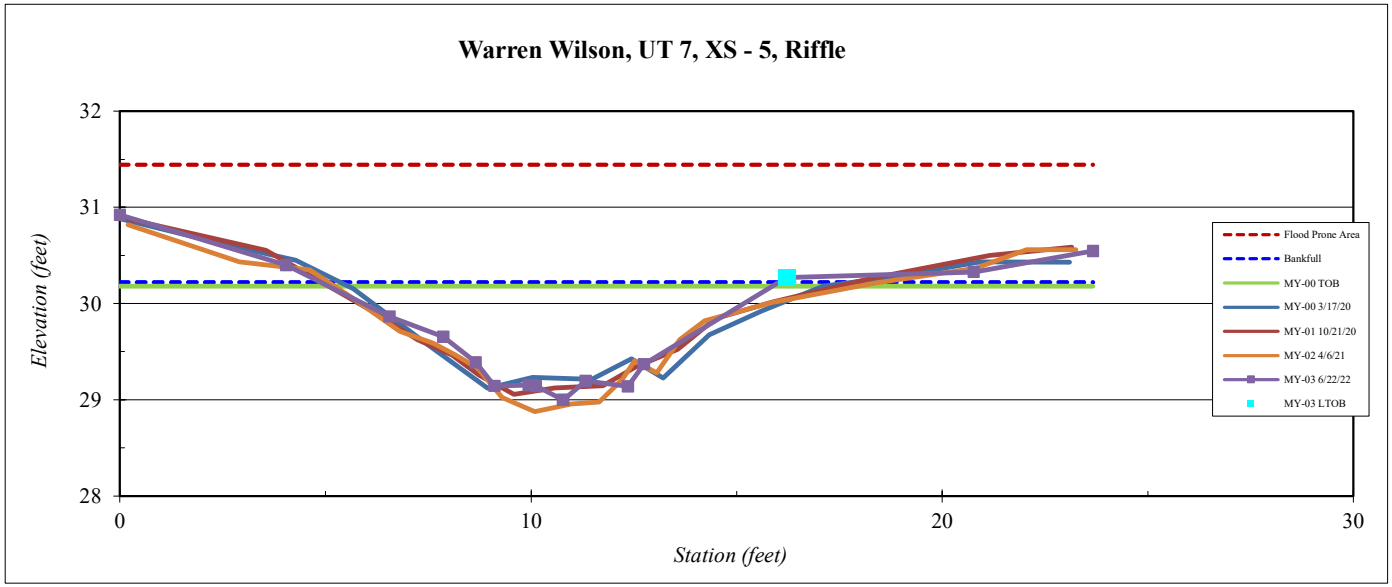


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS -5, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

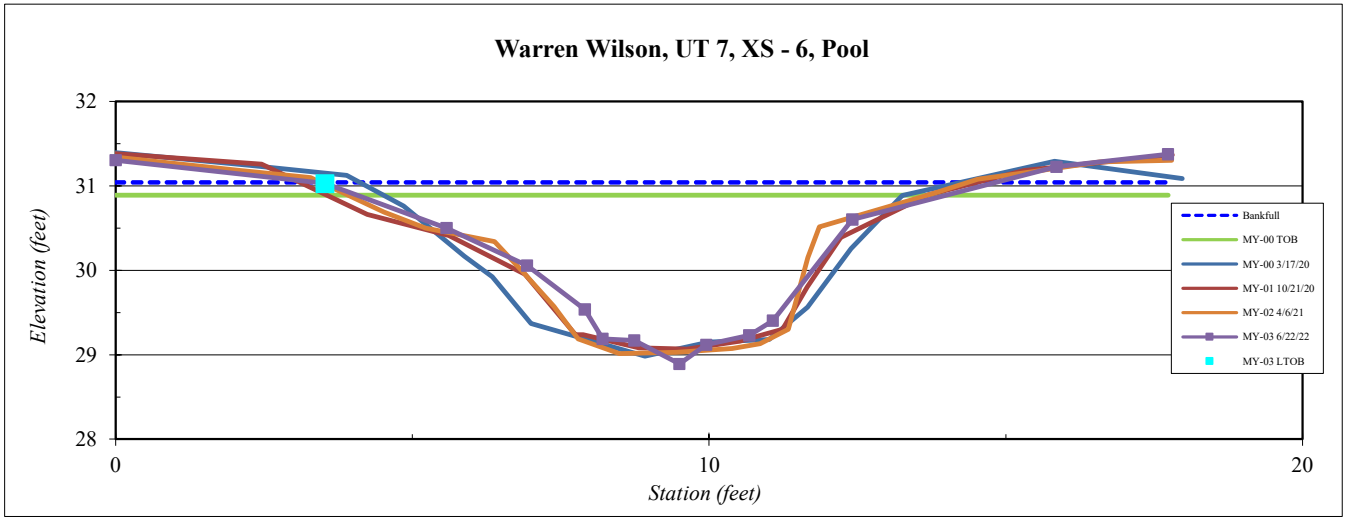


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS - 6, Pool |
| **Feature** | Pool |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

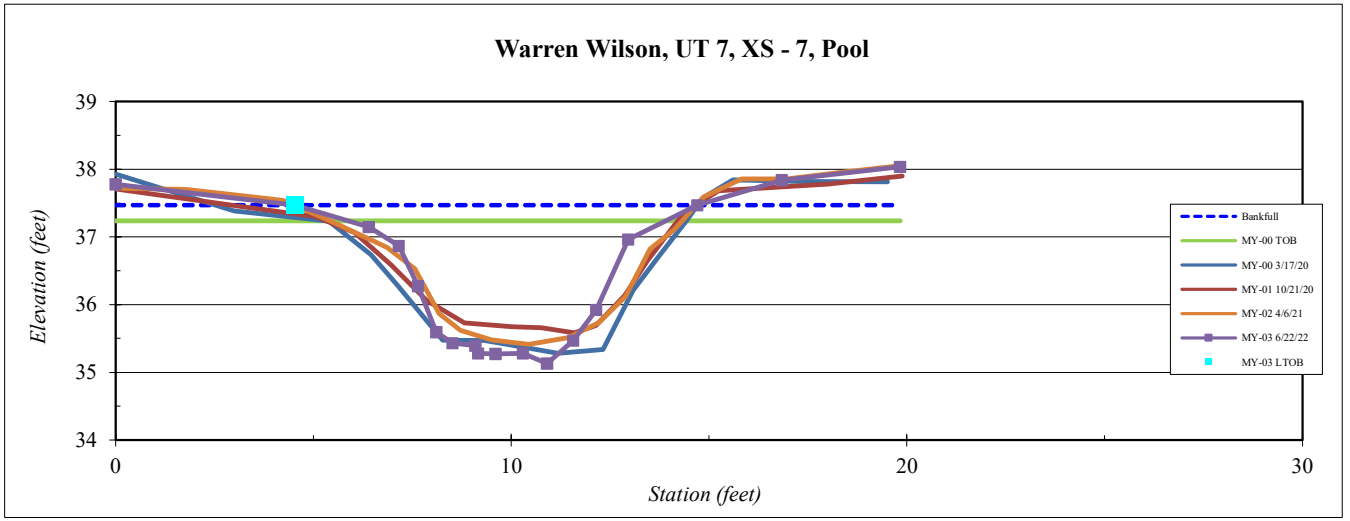


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS - 7, Pool |
| **Feature** | Pool |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

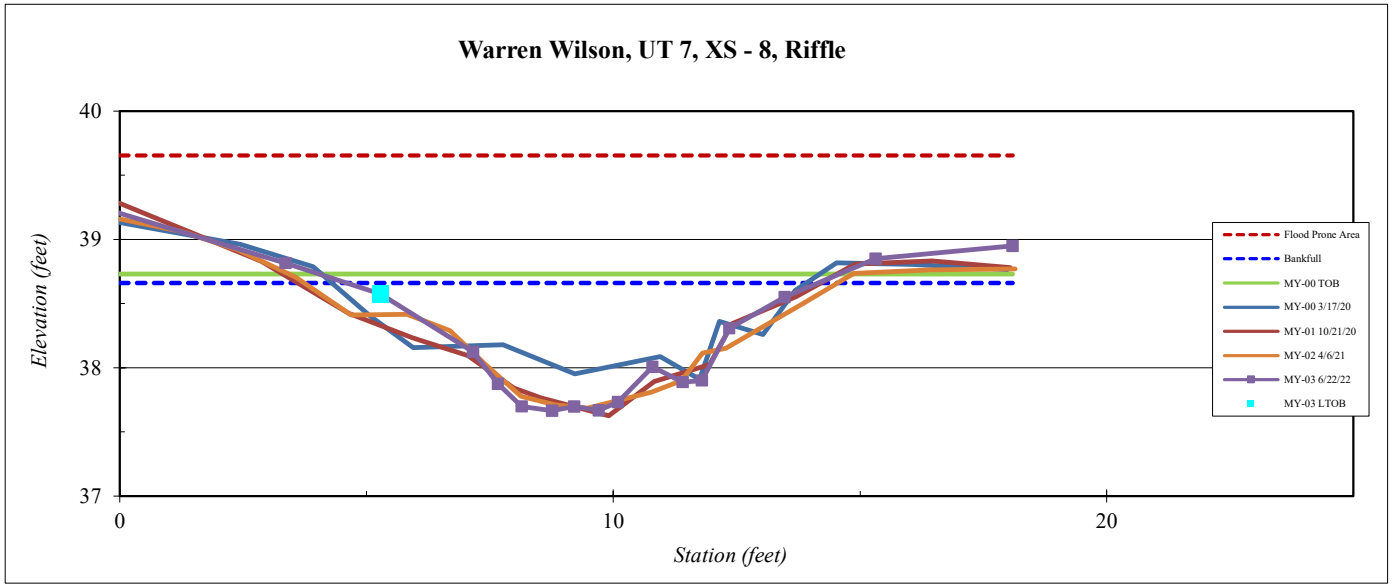


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 7, XS -8, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/22/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

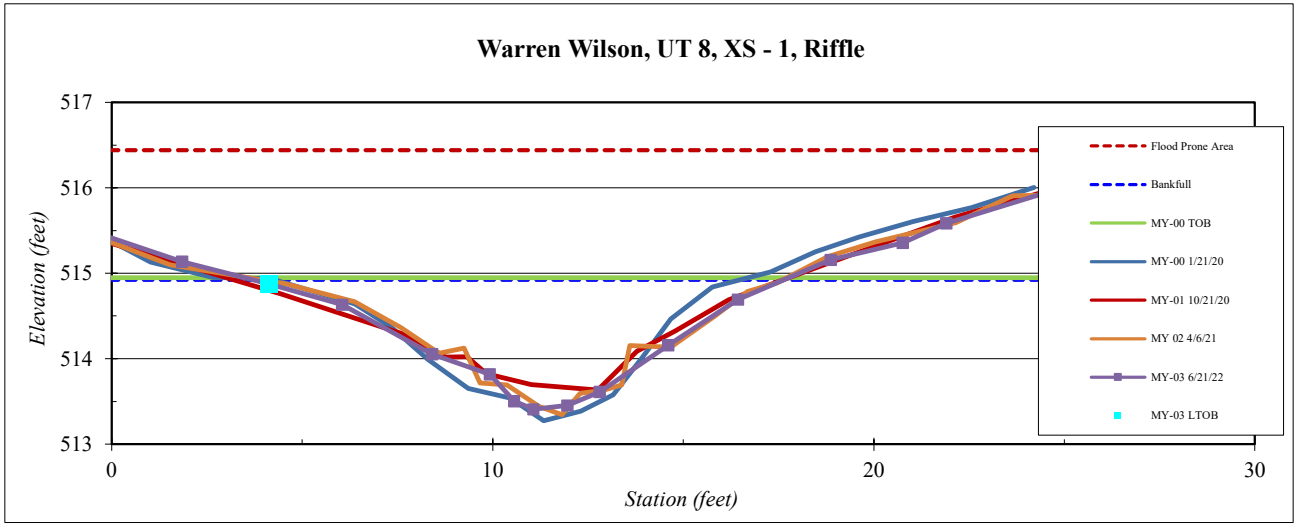


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS -1, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

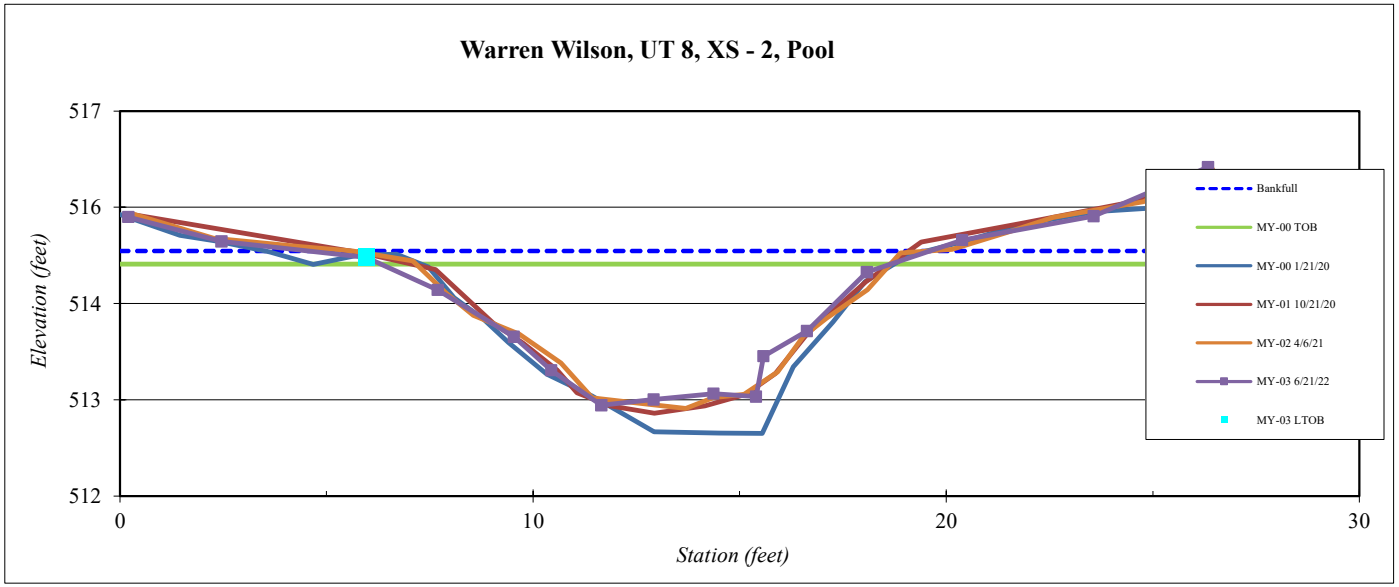


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS - 2, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

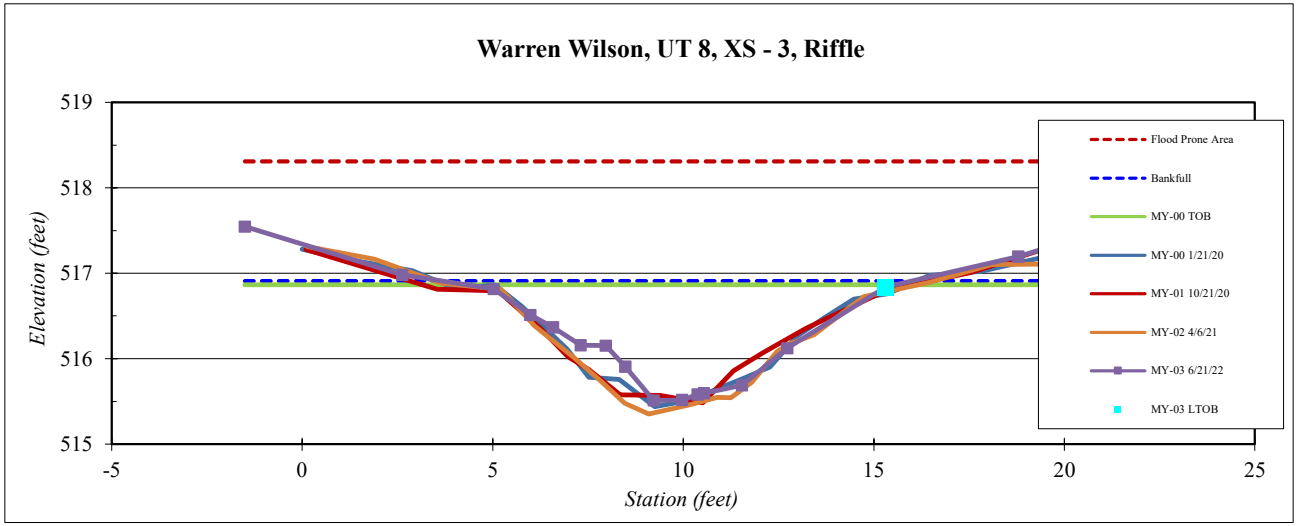


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS - 3, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

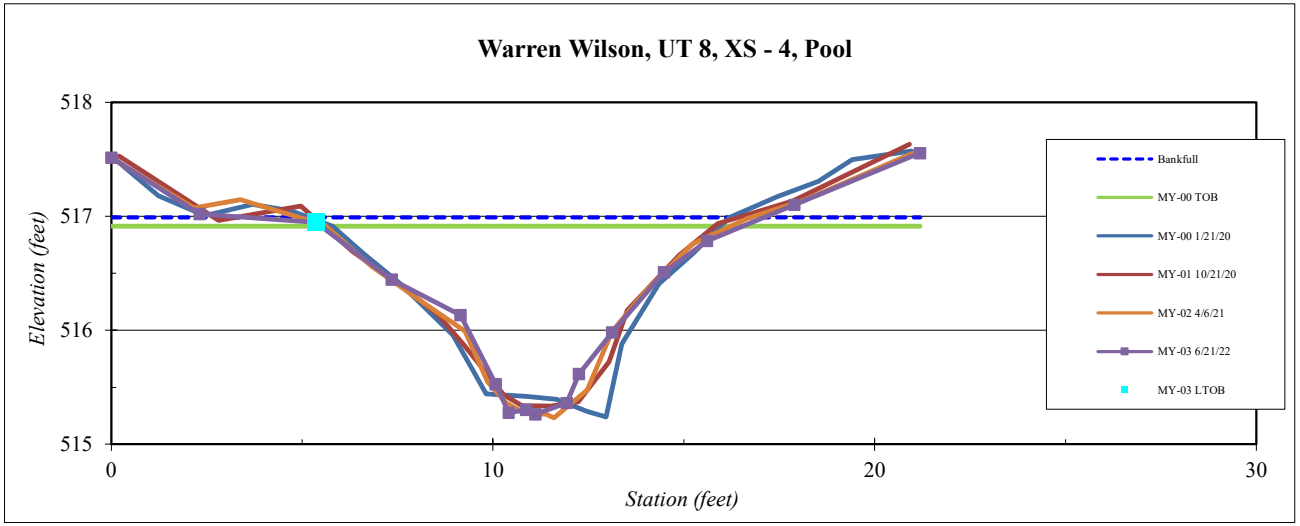


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS - 4, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

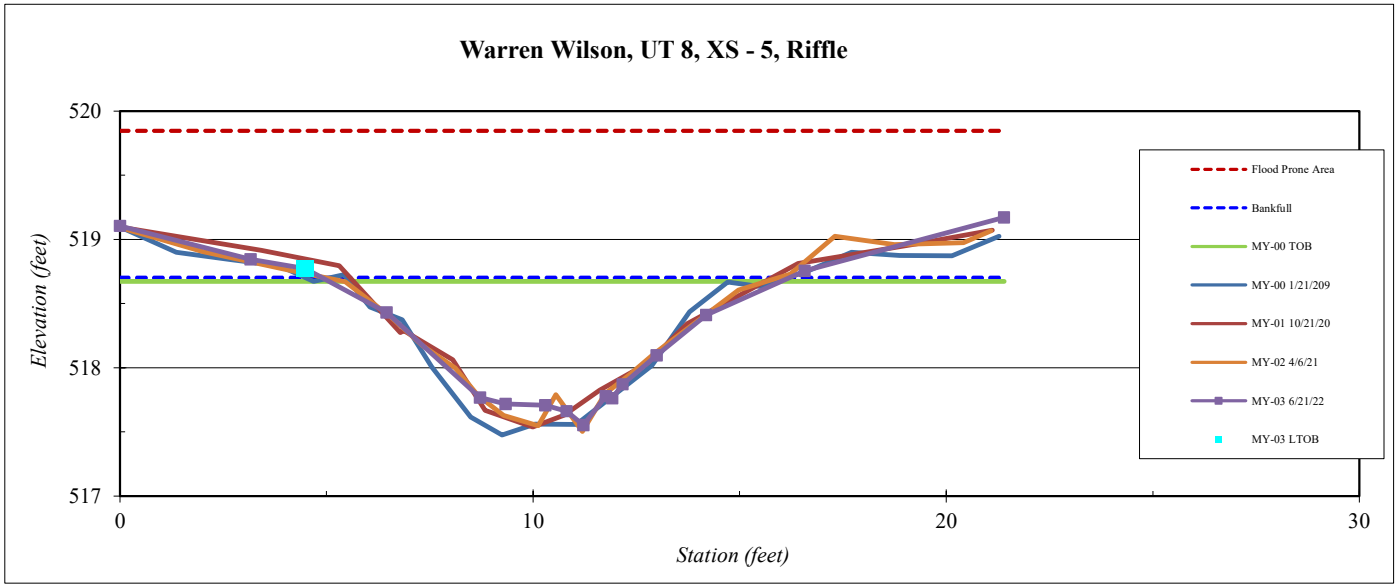


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS -5, Riffle |
| **Feature** | Riffle |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 |

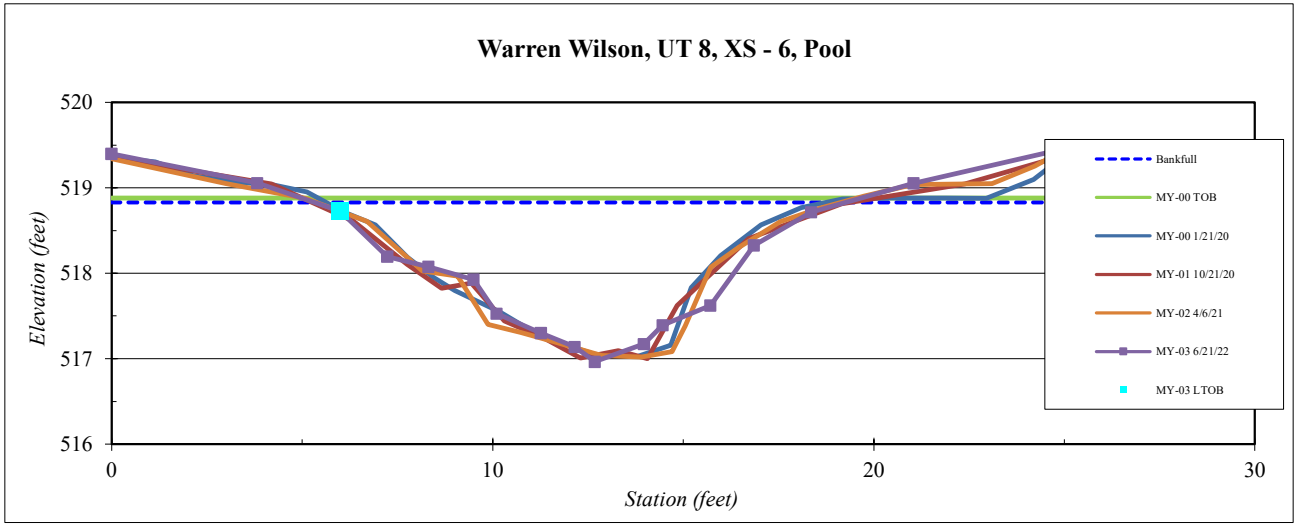


| | |
|---|---|
| **Site** | Warren Wilson |
| **Watershed:** | French Broad, 06010105 |
| **XS ID** | UT 8, XS - 6, Pool |
| **Feature** | Pool |
| **Date:** | 6/21/2022 |
| **Field Crew:** | Perkinson, Adams, D. Lewis |

| 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 15A-C Channel Evidence
Table 16. Verification of Bankfull Events
Table 17A-B. Groundwater Hydrology Data
Groundwater Gauge Graphs
Figure E-1. Year 3 (2022) Soil Temperature Data

**Table 15A. UT3 Channel Evidence**

| UT3 Channel Evidence | Year 1 (2020) | Year 2 (2021) | Year 3 (2022) | Year 4 (2023) | Year 5 (2024) | Year 6 (2025) | Year 7 (2026) |
|---|---|---|---|---|---|---|---|
| Max consecutive days channel flow | 159 | 173 | N/A** | | | | |
| Presence of litter and debris (wracking) | Yes | Yes | Yes | | | | |
| Leaf litter disturbed or washed away | Yes | Yes | Yes | | | | |
| Matted, bent, or absence of vegetation (herbaceous or otherwise) | Yes | Yes | Yes | | | | |
| Sediment deposition and/or scour indicating sediment transport | Yes | Yes | Yes | | | | |
| Water staining due to continual presence of water | Yes | Yes | Yes | | | | |
| Formation of channel bed and banks | Yes | Yes | Yes | | | | |
| Sediment sorting within the primary path of flow | Yes | Yes | Yes | | | | |
| Sediment shelving or a natural line impressed on the banks | 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 | | | | |
| Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems | Yes | Yes | Yes | | | | |
| Exposure of woody plant roots within the primary path of flow | 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 will be replaced prior to year 4 (2023).

**Table 15B. UT6 Channel Evidence**

| UT6 Channel Evidence | Year 1 (2020) | Year 2 (2021) | Year 3 (2022) | Year 4 (2023) | Year 5 (2024) | Year 6 (2025) | Year 7 (2026) |
|---|---|---|---|---|---|---|---|
| Max consecutive days channel flow | 33* | 198 | N/A** | | | | |
| Presence of litter and debris (wracking) | Yes | Yes | Yes | | | | |
| Leaf litter disturbed or washed away | Yes | Yes | Yes | | | | |
| Matted, bent, or absence of vegetation (herbaceous or otherwise) | Yes | Yes | Yes | | | | |
| Sediment deposition and/or scour indicating sediment transport | Yes | Yes | Yes | | | | |
| Water staining due to continual presence of water | Yes | Yes | Yes | | | | |
| Formation of channel bed and banks | Yes | Yes | Yes | | | | |
| Sediment sorting within the primary path of flow | Yes | Yes | Yes | | | | |
| Sediment shelving or a natural line impressed on the banks | 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 | | | | |
| Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems | Yes | Yes | Yes | | | | |
| Exposure of woody plant roots within the primary path of flow | 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 will be replaced prior to year 4 (2023).

**Table 15C. UT8 Channel Evidence**

| UT8 Channel Evidence | Year 1 (2020) | Year 2 (2021) | Year 3 (2022) | Year 4 (2023) | Year 5 (2024) | Year 6 (2025) | Year 7 (2026) |
|---|---|---|---|---|---|---|---|
| Max consecutive days channel flow | 241 | 161 | N/A** | | | | |
| Presence of litter and debris (wracking) | Yes | Yes | Yes | | | | |
| Leaf litter disturbed or washed away | Yes | Yes | Yes | | | | |
| Matted, bent, or absence of vegetation (herbaceous or otherwise) | Yes | Yes | Yes | | | | |
| Sediment deposition and/or scour indicating sediment transport | Yes | Yes | Yes | | | | |
| Water staining due to continual presence of water | Yes | Yes | Yes | | | | |
| Formation of channel bed and banks | Yes | Yes | Yes | | | | |
| Sediment sorting within the primary path of flow | Yes | Yes | Yes | | | | |
| Sediment shelving or a natural line impressed on the banks | 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 | | | | |
| Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems | Yes | Yes | Yes | | | | |
| Exposure of woody plant roots within the primary path of flow | 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 will be replaced prior to year 4 (2023).

## Table 16. 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 |

Photo 1: UT8 at bankfull stage.

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

Photo 3: Wrack and laid-back vegetation outside the TOB of UT6 after a bankfull event.

Photo 4: Wrack and laid-back vegetation outside the TOB of UT7 after a bankfull event.


Photo 5: Wrack and laid-back vegetation outside the TOB of UT3 after a bankfull event.

Photo 6: Wrack and laid-back vegetation along the TOB of UT5 after a bankfull event.

Photo 7: Wrack and laid-back vegetation along the TOB of UT8 after a bankfull event.

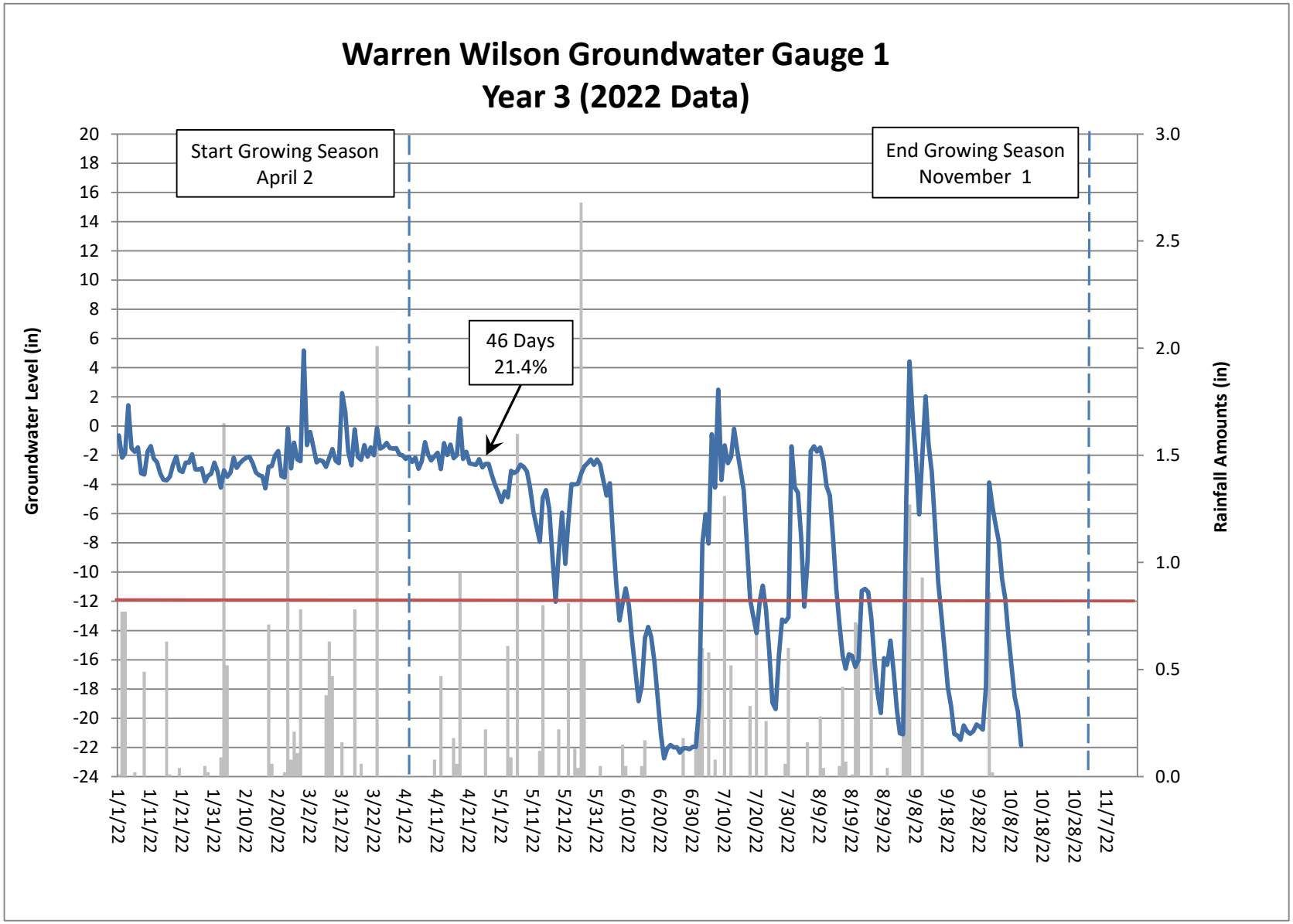
## Table 17A. Groundwater Hydrology Data: Mitigation Success (UT-3B, Little Berea/ Clingman's)

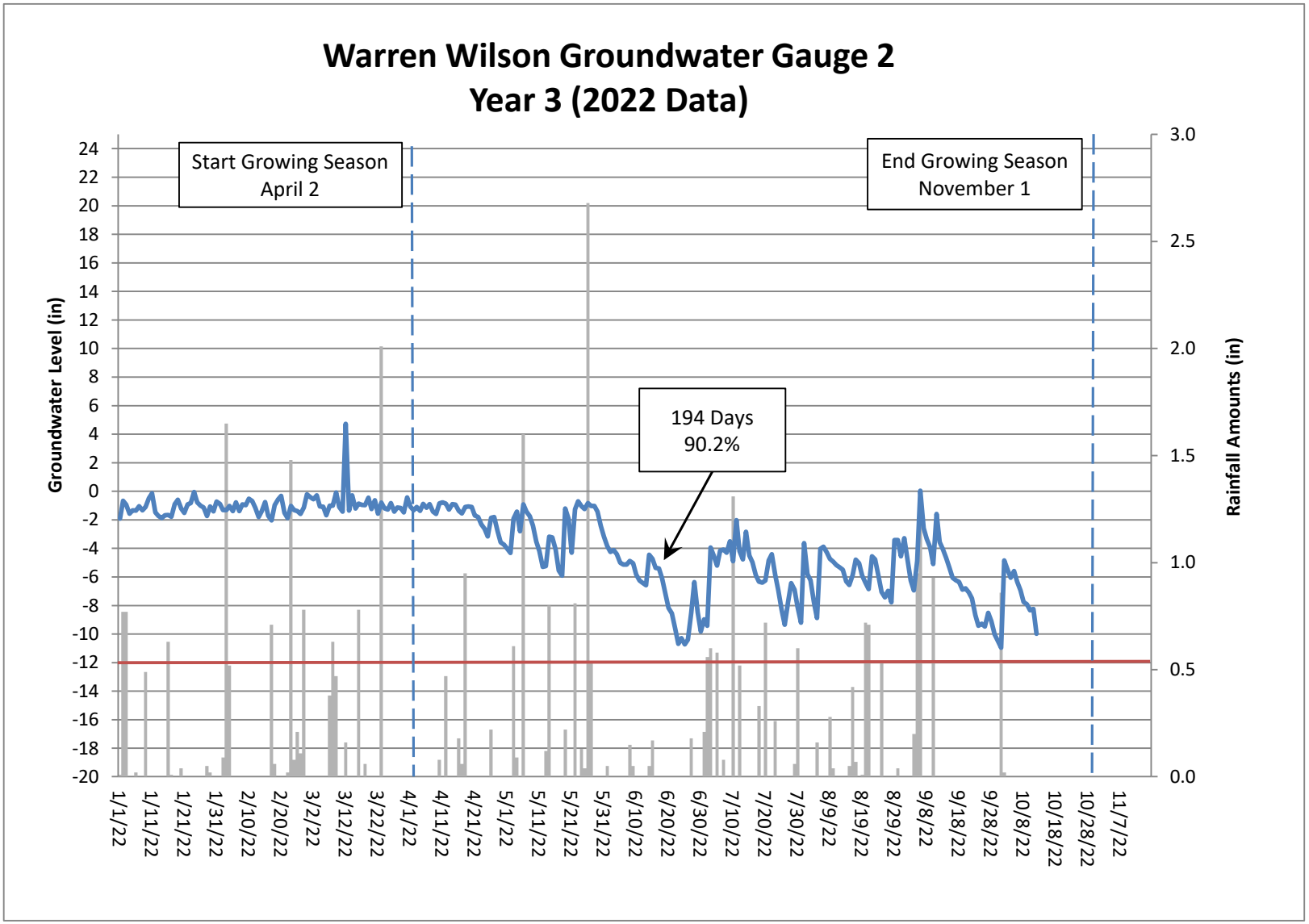
| Gauge | Typical Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Year 1 (2020) | Year 2 (2021) | Year 3 (2022) | Year 4 (2023) | Year 5 (2024) | Year 6 (2025) | Year 7 (2026) |
| 3 | Yes/127 days (55.0%) | Yes/198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

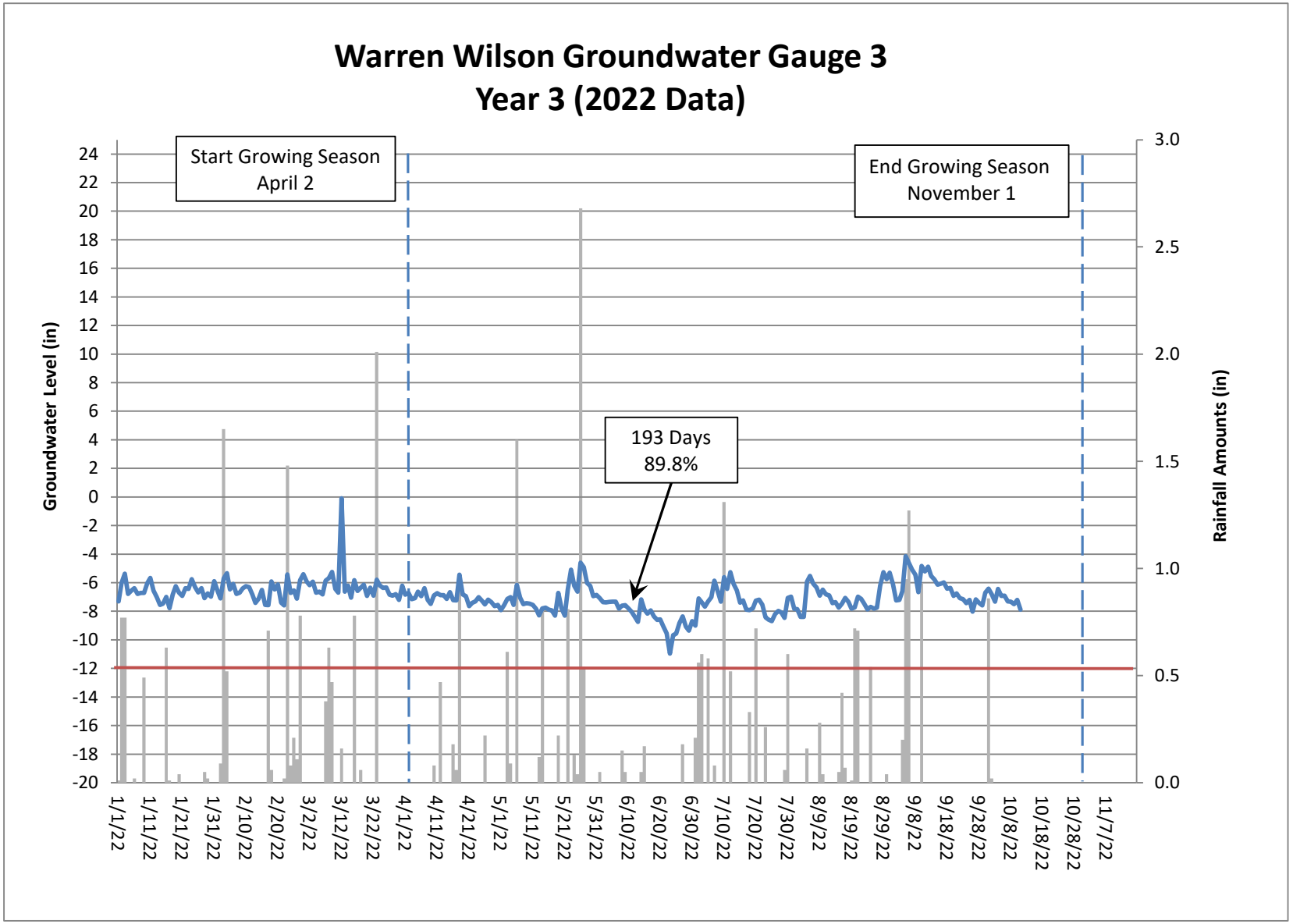
## Table 17B. Groundwater Hydrology Data: Potential Wetland Loss Monitoring Areas

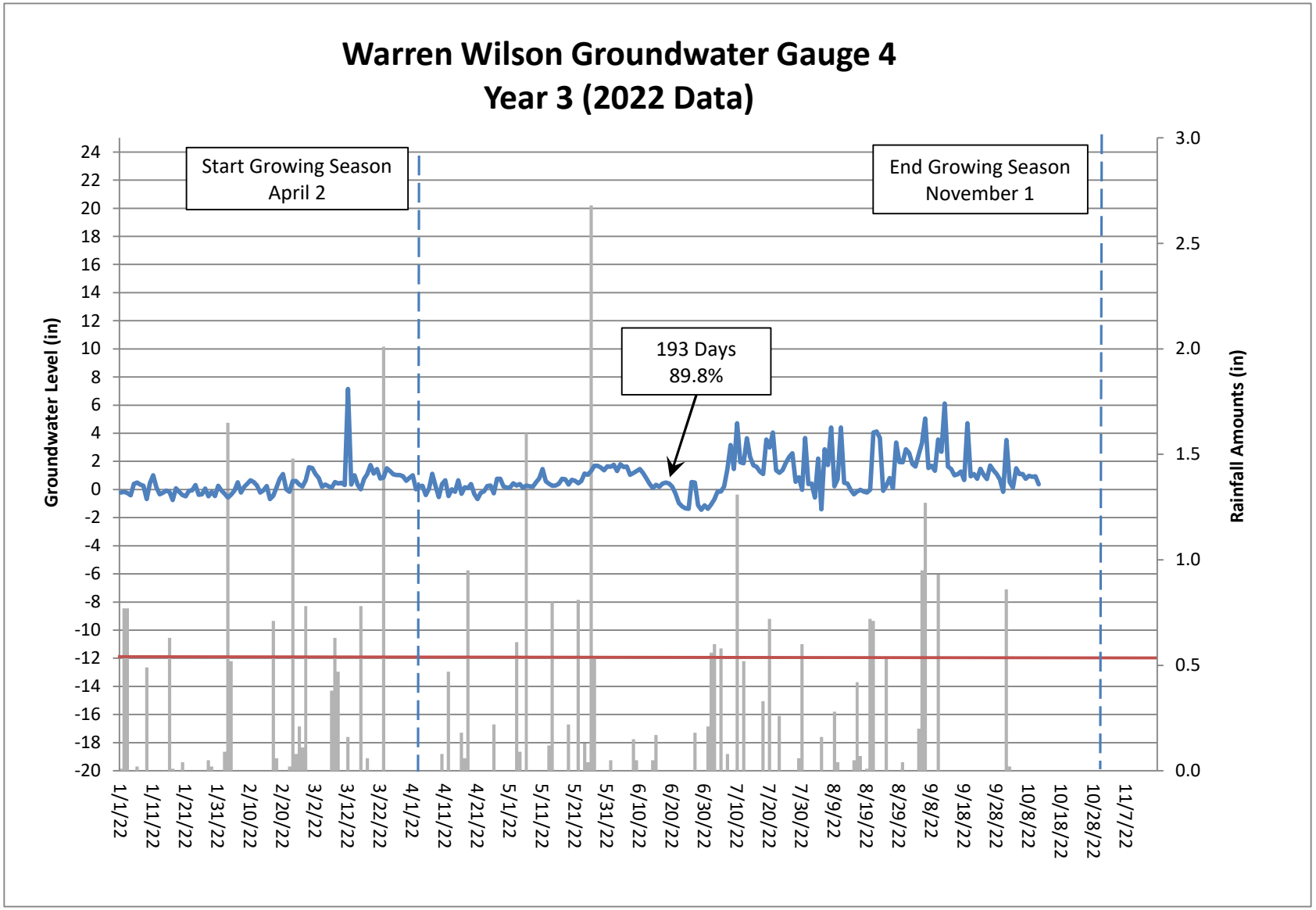
| Gauge | Typical Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Year 1 (2020) | Year 2 (2021) | Year 3 (2022) | Year 4 (2023) | Year 5 (2024) | Year 6 (2025) | Year 7 (2026) |
| 1 | Yes/37 days (16.0%) | Yes/198 days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

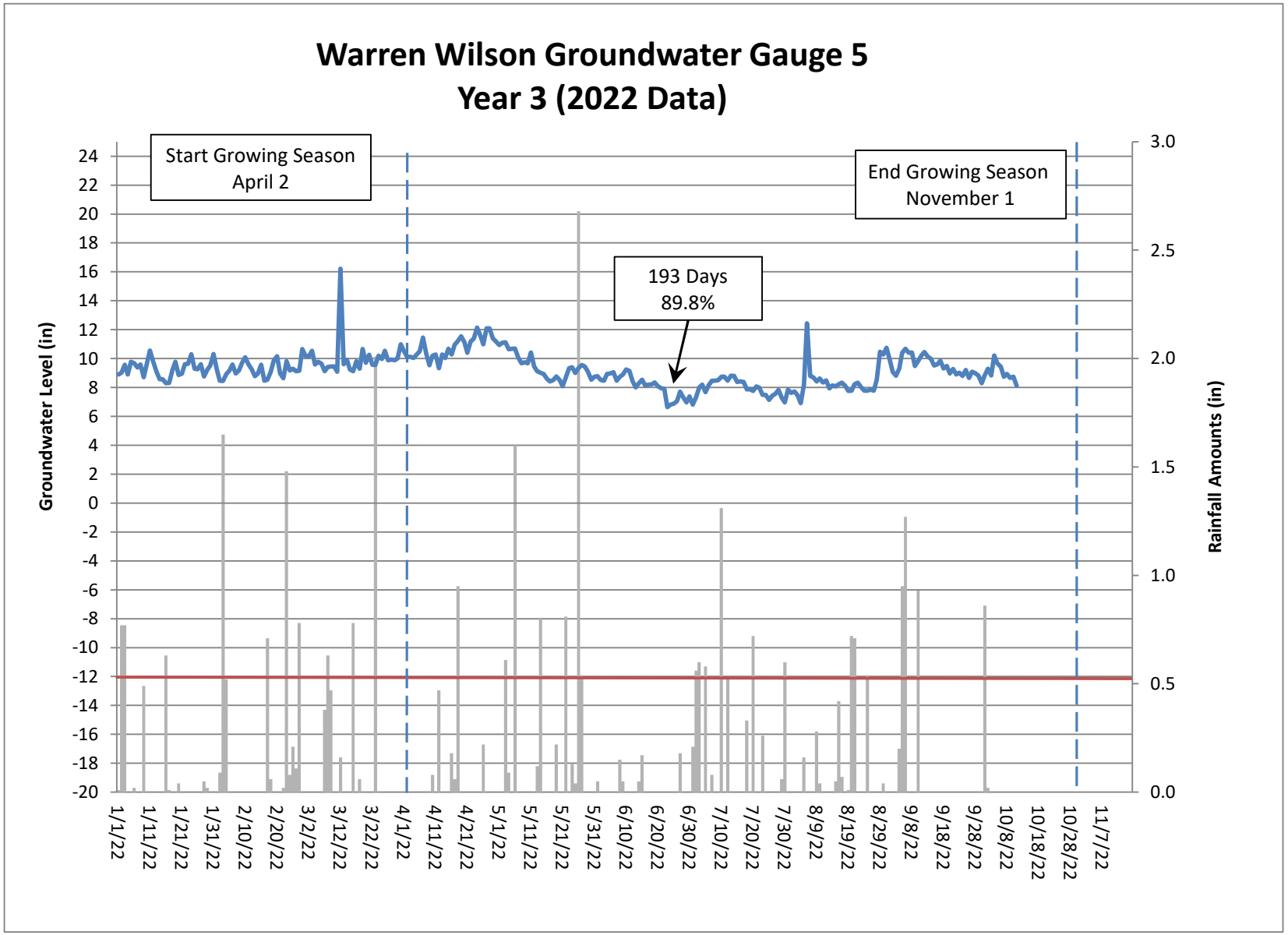
*Gauge was not installed until August 1, 2020. It is expected to have exceeded typical wetland success criteria had it been installed earlier in the growing season.

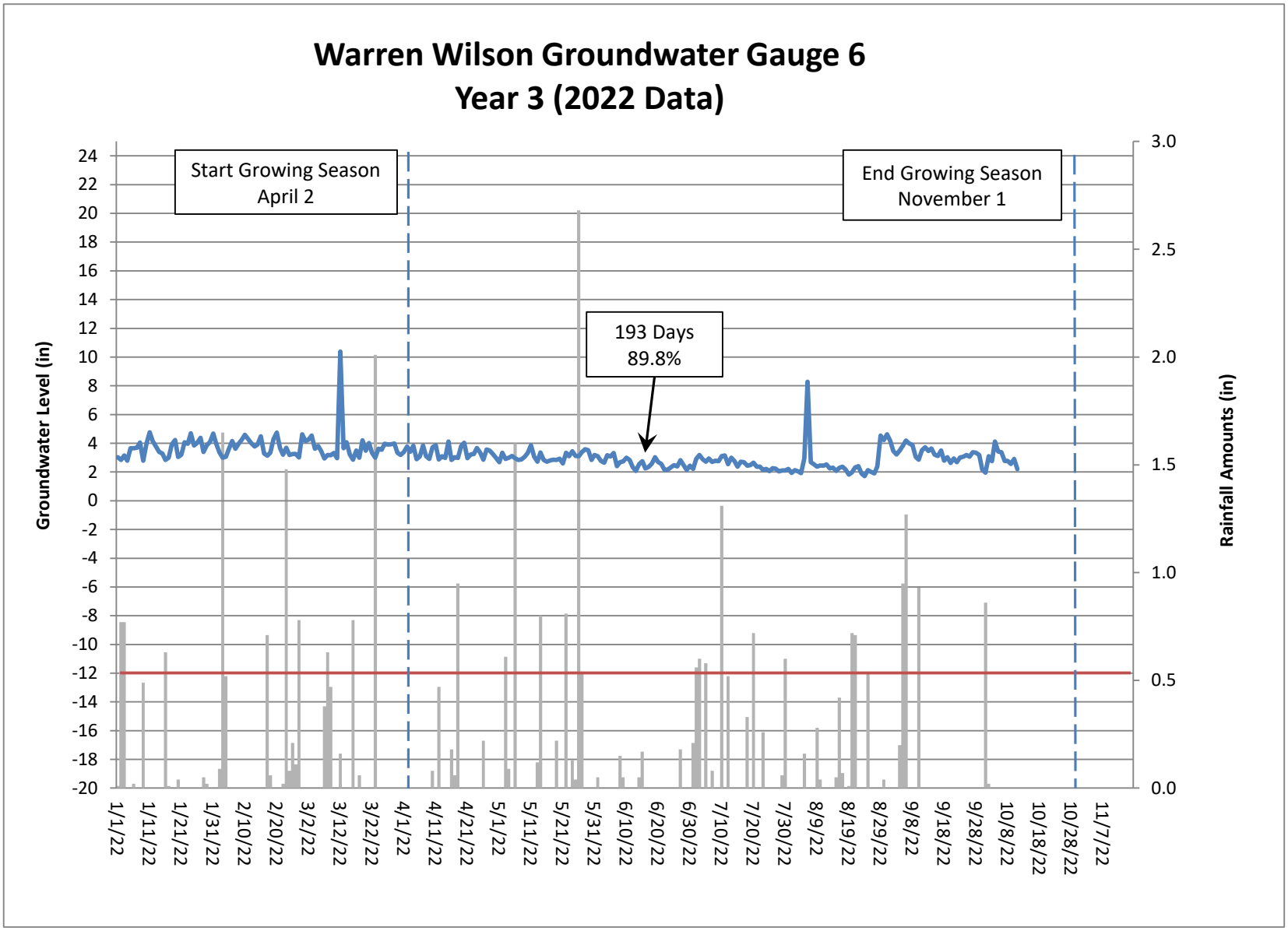

Warren Wilson Groundwater Gauge 1
Year 3 (2022 Data)
Start Growing Season
April 2
End Growing Season
November 1
46 Days
21.4%
Groundwater Level (in)
Rainfall Amounts (in)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22


Warren Wilson Groundwater Gauge 2
Year 3 (2022 Data)
Start Growing Season
April 2
End Growing Season
November 1
194 Days
90.2%
Groundwater Level (in)
Rainfall Amounts (in)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22

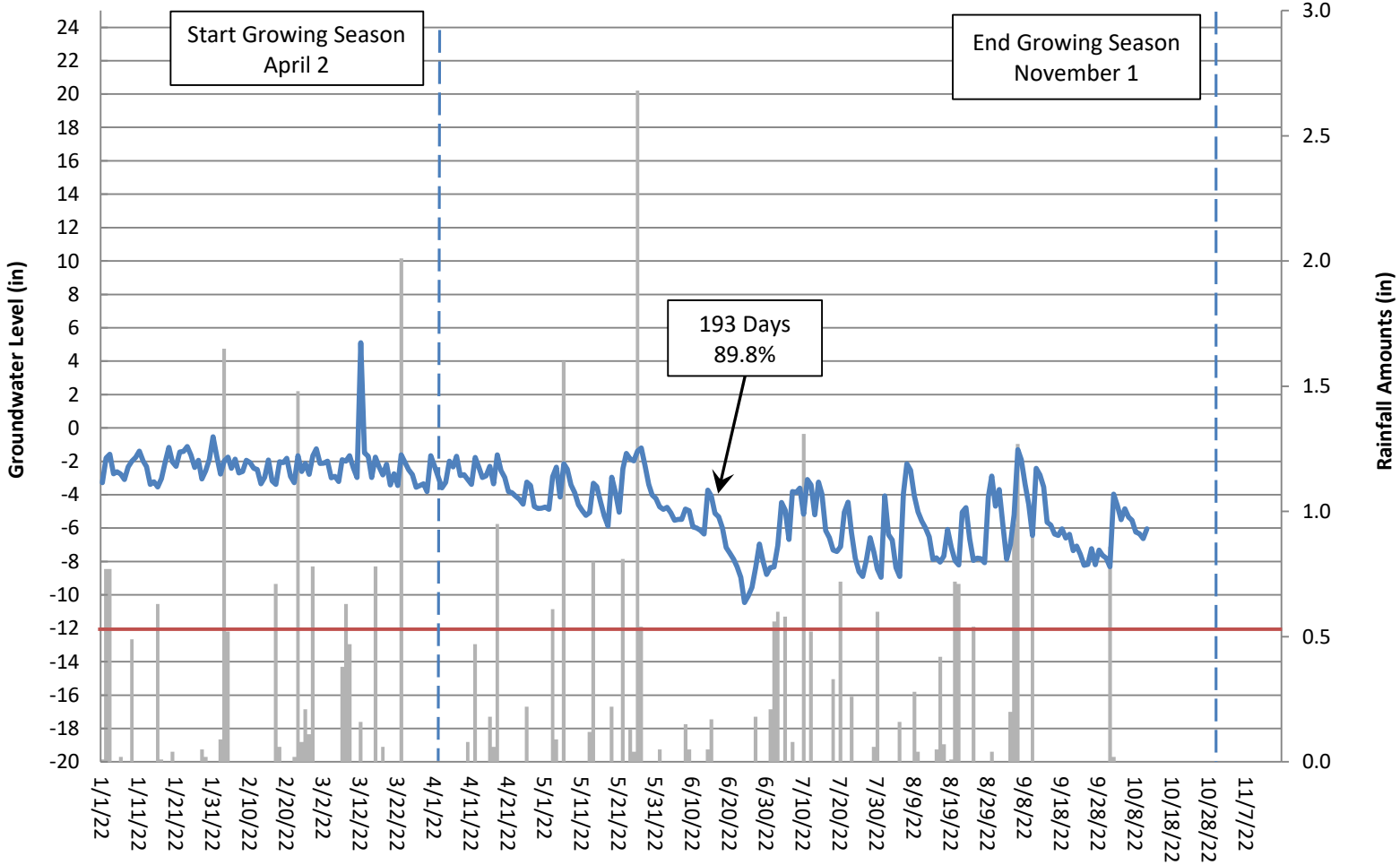

Warren Wilson Groundwater Gauge 3
Year 3 (2022 Data)
Start Growing Season
April 2
End Growing Season
November 1
193 Days
89.8%
Groundwater Level (in)
Rainfall Amounts (in)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22

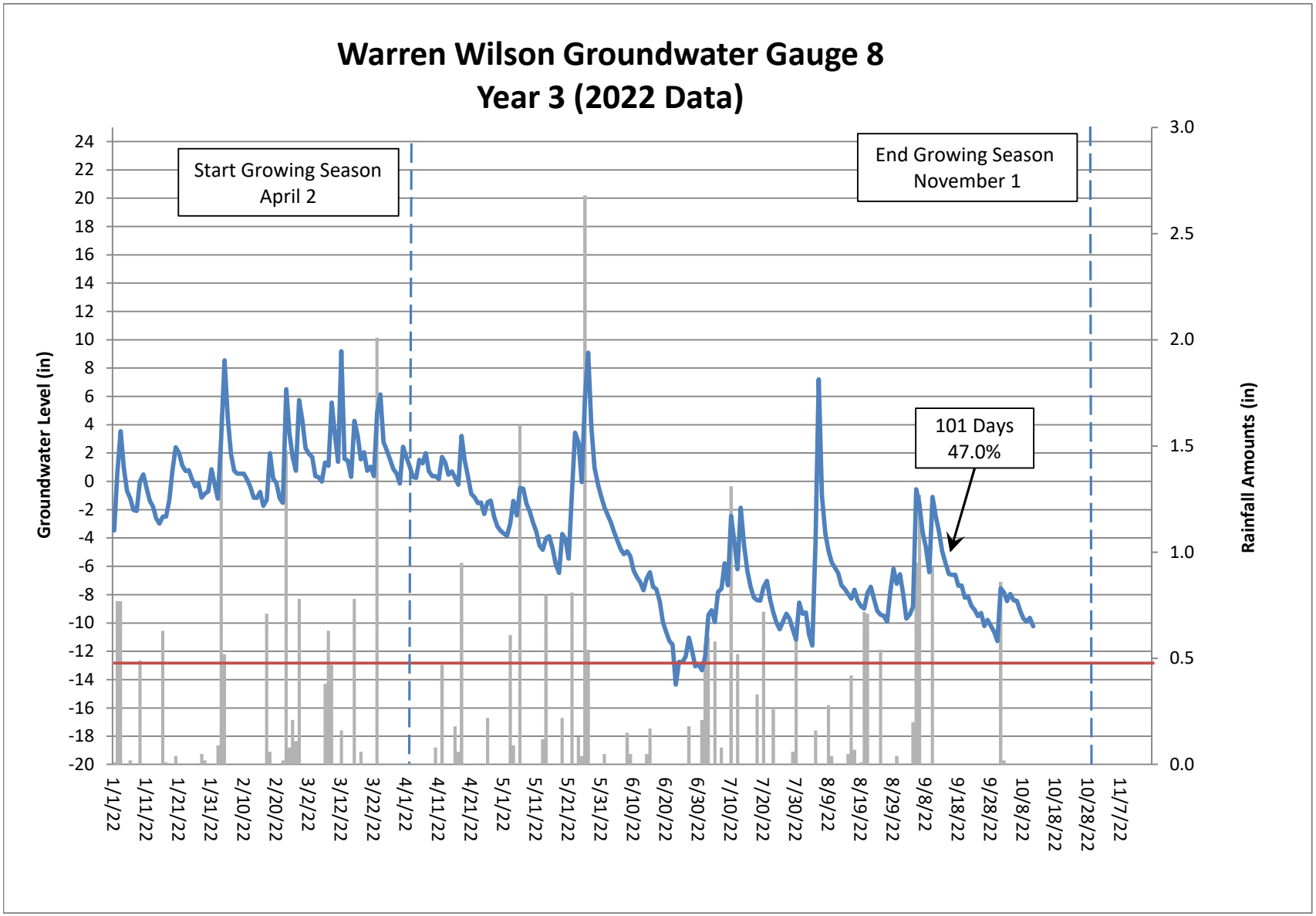

Warren Wilson Groundwater Gauge 4
Year 3 (2022 Data)
Start Growing Season
April 2
End Growing Season
November 1
193 Days
89.8%
Groundwater Level (in)
Rainfall Amounts (in)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22

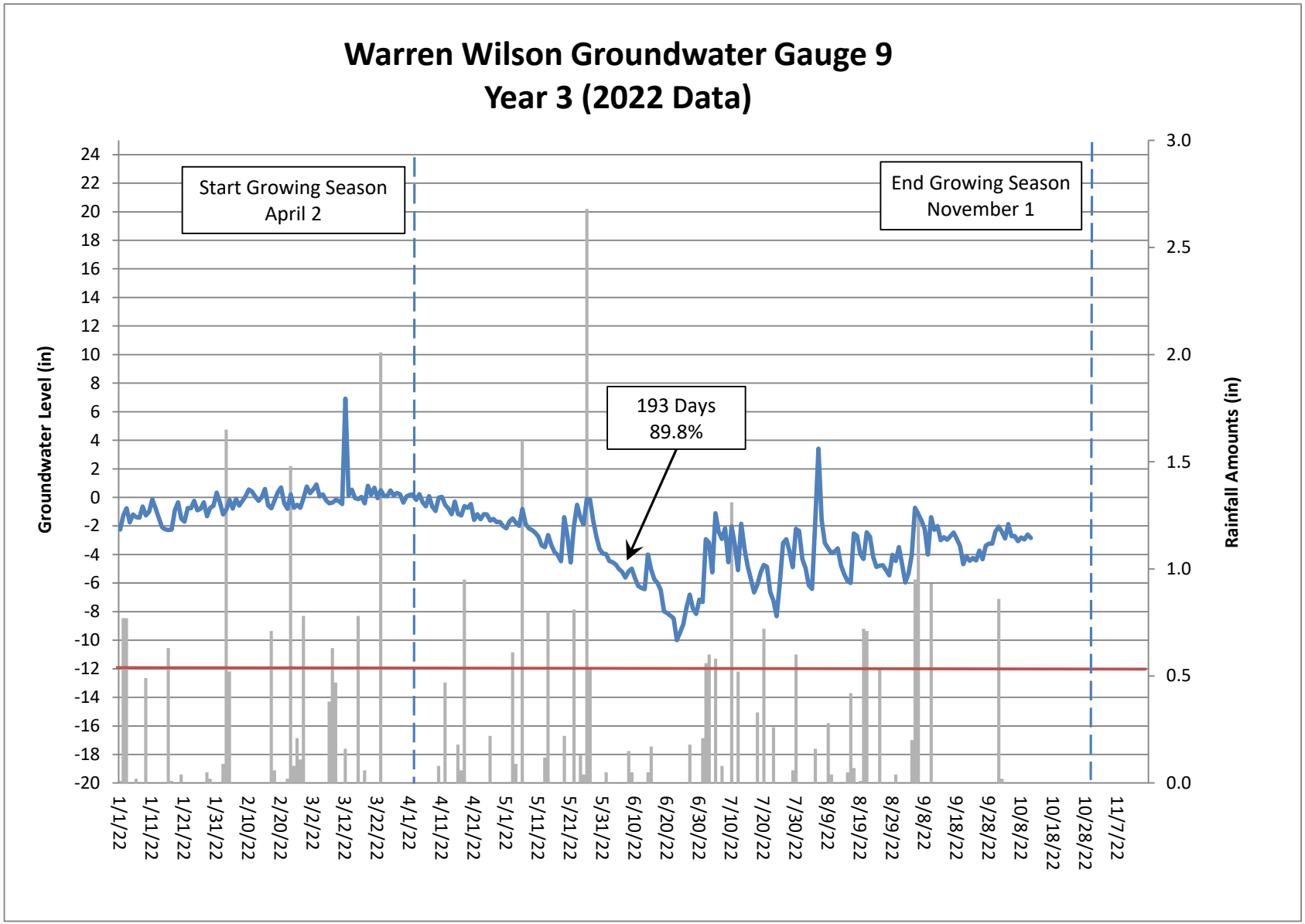

Warren Wilson Groundwater Gauge 5
Year 3 (2022 Data)
Start Growing Season
April 2
End Growing Season
November 1
193 Days
89.8%
Groundwater Level (in)
Rainfall Amounts (in)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22

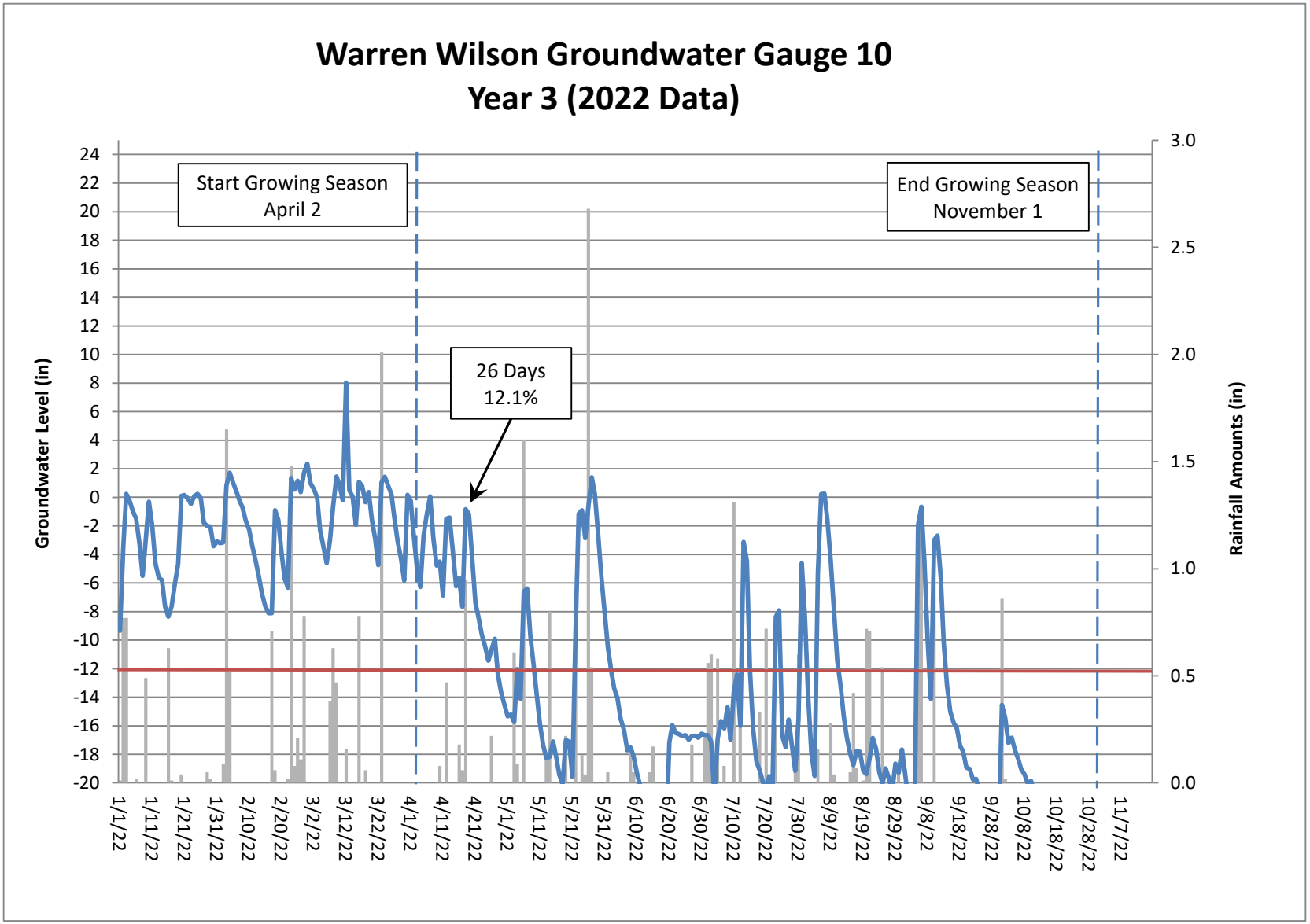

Warren Wilson Groundwater Gauge 6
Year 3 (2022 Data)
Start Growing Season
April 2
End Growing Season
November 1
193 Days
89.8%
Groundwater Level (in)
Rainfall Amounts (in)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22

# Warren Wilson Groundwater Gauge 7
# Year 3 (2022 Data)

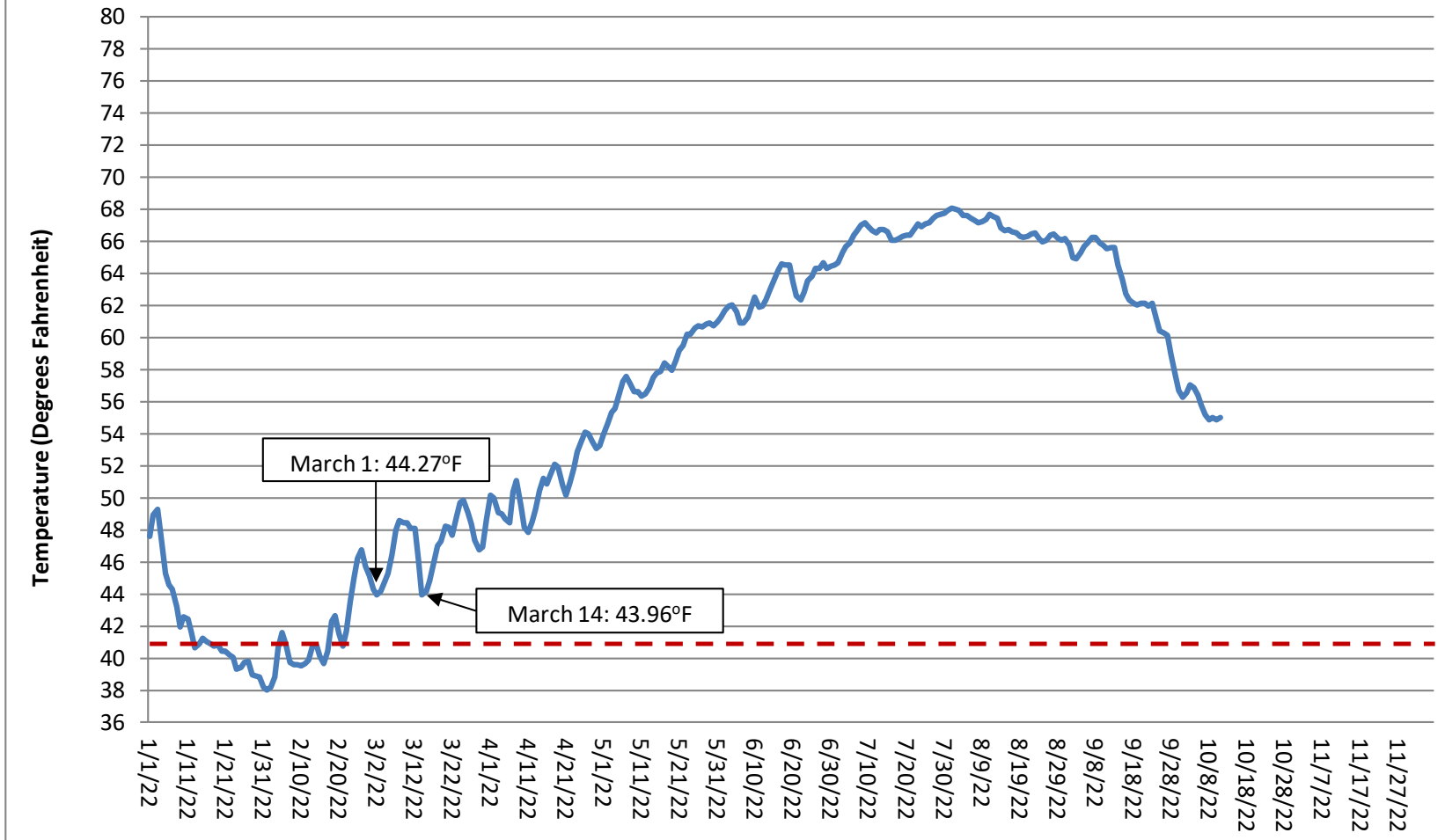



Warren Wilson Groundwater Gauge 8
Year 3 (2022 Data)
Start Growing Season
April 2
End Growing Season
November 1
101 Days
47.0%
Groundwater Level (in)
Rainfall Amounts (in)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22


Warren Wilson Groundwater Gauge 9
Year 3 (2022 Data)
Start Growing Season
April 2
End Growing Season
November 1
193 Days
89.8%
Groundwater Level (in)
Rainfall Amounts (in)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22


Warren Wilson Groundwater Gauge 10
Year 3 (2022 Data)
Start Growing Season
April 2
End Growing Season
November 1
26 Days
12.1%
Groundwater Level (in)
Rainfall Amounts (in)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22

# Figure E-1. Year 3 (2022) Soil Temperature Data



**Appendix F – Preconstruction Wetland Hydrology Data**


Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

**WARREN WILSON COLLEGE STREAM MITIGATION SITE**

Buncombe County, NC

Title:

**PRE-CONSTRUCTION GAUGE LOCATIONS**

Drawn by: KRJ

Date: Jul 2020

Scale: 1:2000

Project No.: 20-004

FIGURE

**3**

**Table 18. Preconstruction Groundwater Gauge Data Summary**

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

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

**Table 19.**

**WWC - Pre-construction Wetland Gauge Data vs Post-construction Gauge Data**

**Criteria**

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.

| Pre-Construction - Max Consecutive Days | | | | Post-Construction - Max Consecutive Days | | | | | Percent Improvement | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| Gauge | 2018 | 2019 | Avg. | Gauge | MY1 (2020) | MY2 (2021) | MY3 (2022) | Avg. | | |
| **1A** | 21 | 57 | 39 | | | | | | | |
| **1B** | 9 | 50 | 29.5 | **2** | 61 | 198 | 194 | 151 | 287% | Percent improvement is based on Gauge 1A average of 39 consecutive days |
| **1C** | 3 | 3 | 3 | | | | | | | |
| **2A** | NA | 48 | 48 | **3** | 61 | 198 | 194 | 151 | 214% | |
| **2B** | 20 | 0 | 20 | **4** | 32 | 198 | 193 | 141 | 605% | Post-Construction gauges are location +/- 150' down stream from pre-construction gauges |
| **2C** | 12 | 50 | 31 | **5** | 174 | 198 | 193 | 188 | 506% | |
| **3A** | 24 | 124 | 74 | **8** | 231 | 198 | 101 | 177 | 139% | |
| **3B** | 117 | 140 | 128.5 | **7** | 72 | 198 | 193 | 154 | 20% | Post-Construction gauges are location in approximately the same location as pre-construction gauges |
| **3C** | 4 | 3 | 3.5 | **6** | 93 | 198 | 193 | 161 | 4500% | |

| Pre-Construction - % Hydroperiod | | | | Post-Construction - % Hydroperiod | | | | | Improvement of Hydroperiod % | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| Gauge | 2018 | 2019 | Avg. | Gauge | MY1 (2020) | MY2 (2021) | MY3 (2022) | Avg. | | |
| **1A** | 9.8% | 27.0% | 18.4% | | | | | | | |
| **1B** | 4.2% | 23.0% | 13.6% | **2** | 26.4% | 89.6% | 90.2% | 68.7% | 50.3% | Increase in % hydroperiod is based on Gauge 1A average of 18.4% |
| **1C** | 1.4% | 1.4% | 1.4% | | | | | | | |
| **2A** | NA | 22.0% | 22.0% | **3** | 55.0% | 89.6% | 89.8% | 78.1% | 56.1% | |
| **2B** | 9.3% | 0.0% | 9.3% | **4** | 13.9% | 89.6% | 89.8% | 64.4% | 55.1% | Post-Construction gauges are location +/- 150' down stream from pre-construction gauges |
| **2C** | 5.6% | 23.0% | 14.3% | **5** | 75.3% | 89.6% | 89.8% | 84.9% | 70.6% | |
| **3A** | 11.2% | 58.0% | 34.6% | **8** | 100.0% | 89.6% | 47.0% | 78.9% | 44.3% | |
| **3B** | 54.7% | 65.0% | 59.9% | **7** | 31.2% | 89.6% | 89.8% | 70.2% | 10.4% | Post-Construction gauges are location in approximately the same location as pre-construction gauges |
| **3C** | 1.9% | 1.4% | 1.7% | **6** | 40.3% | 89.6% | 89.8% | 73.2% | 71.6% | |

**Appendix G – Site Photo Log**

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 1: Downstream culvert on UT 1 downstream end, facing upstream (Taken 10/11/22)

Permanent Photo Point 2: Downstream culvert on UT 1 upstream end, facing downstream (Taken 10/11/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 3: Bridge crossing on UT 3 downstream end, facing upstream (Taken 11/5/22)

Permanent Photo Point 4: Bridge crossing on UT 3 upstream end, facing downstream (Taken 11/5/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 5: Upstream culvert on UT 3 downstream end, facing upstream (Taken 11/5/22)

Permanent Photo Point 6: Upstream culvert on UT 3 upstream end, facing downstream (Taken 11/5/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 7: Culvert on UT 4 downstream end, facing upstream (Taken 10/11/22)

Permanent Photo Point 8: Culvert on UT 4 upstream end, facing downstream (Taken 10/11/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 9: Bridge crossing on UT 5 downstream end, facing upstream (Taken 10/11/22)

Permanent Photo Point 10: Bridge crossing on UT 5 upstream end, facing downstream (Taken 10/11/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 11: Crossing on lower UT 6 downstream end, facing upstream (Taken 11/5/22)

Permanent Photo Point 12: Crossing on lower UT 6 upstream end, facing downstream (Taken 11/5/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 13: Crossing on middle UT 6 downstream end, facing upstream (Taken 11/5/22)

Permanent Photo Point 14: Crossing on middle UT 6 upstream end, facing downstream (Taken 11/5/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 15: Crossing on lower UT 7 downstream end, facing upstream (Taken 11/5/22)

Permanent Photo Point 16: Crossing on lower UT 7 upstream end, facing downstream (Taken 11/5/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 17: Crossing on upper UT 7 downstream end, facing upstream (Taken 11/5/22)

Permanent Photo Point 18: Crossing on upper UT 7 upstream end, facing downstream (Taken 11/5/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Permanent Photo Point 19: Footbridge crossing on UT 8 downstream end, facing upstream (Taken 10/11/22)

Permanent Photo Point 20: Footbridge crossing on UT 8 upstream end, facing downstream (Taken 10/11/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Photo 21: Vegetation along UT 1 (Taken 10/11/22)

Photo 22: Vegetation along UT 1 (Taken 10/11/22)

**Warren Wilson College**
**MY-03 (2022) Photo Log**

Photo 23: Edge of easement near UT 1 (Taken 10/11/22)

Photo 24: Edge of easement near UT 3 (Taken 10/11/22)