

# **Monitoring Report**

**FINAL**

Harrell Stream and Wetland Mitigation Site

Monitoring Year 4 (2023)

NCDMS Project No. 100005

NCDMS Contract No. 007006

DWR# 20161077

USACE Action ID: SAW-2016-02202

Jackson County, North Carolina

Data Collected: April 2023 thru Nov 2023

Date Submitted: February 2024



Submitted to:

NCDEQ-Division of Mitigation Services  
1652 Mail Service Center Raleigh N C 27699-1652

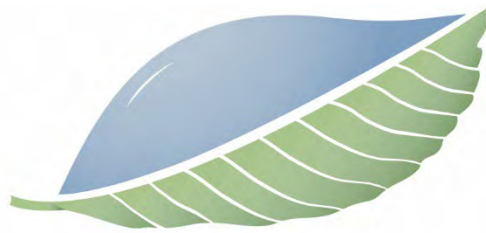
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Prepared for:



14 O'Henry Avenue, Suite 206  
Asheville, NC 28801

Prepared by:



EQUINOX

*balance through proper planning*

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Paul Wiesner  
Western Regional Supervisor  
NCDEQ-DMS  
Asheville Regional Office  
2090 U.S. 70 Highway

Subject: RE: Draft Monitoring Year 4 (MY4) Report for  
the Harrell Stream and Wetland Site  
Little Tennessee River Basin – CU# 06010203– Jackson County DMS  
Project ID No. 100005  
Contract # 007006

Mr. Weisner

On January 26, 2024 EWS received the comments on the Draft Monitoring Year 4 (MY4) Report for the Harrell Stream and Wetland Site from the NCDEQ – Division of Mitigation Services (DMS). Below are the comments and EWS responses in **(Red)**.

The report establishes the MY4 (2023) conditions at the project site. Anticipated mitigation on the site includes 1,790 linear feet of stream restoration; 640 linear feet of stream preservation; 3.31 acres of wetland Re-Establishment (1:1 mitigation ratio); 0.22 acres of wetland Rehabilitation (1:1 mitigation ratio) for a total of 1,854 Stream Mitigation Units (SMUs) and 3,530 Wetland Mitigation Units (WMUs). The following are our comments on the draft report and digital support files:

**General:** DMS notes from the April 17, 2023, IRT credit release meeting are as follows: *The IRT visited the site in 2021. The vegetation on the site was discussed and the IRT requested that plant diversity be considered in any potential future replant efforts. EWS noted that the area near VP4 is wet and causing some planted stem mortality. EWS believes volunteers will continue to diversify the site and noted that livestock were not counted in the vegetation plot data. Beaver dams were discussed; the culvert at Caney Fork Road has been a continual beaver dam removal area. EWS will continue to remove beavers and treat invasives during the entire monitoring term. EWS has installed additional groundwater monitoring wells on the site and the results will be included in the MY4(2023) report. EWS will continue to report soil development with soil profiles collected adjacent to any failing groundwater monitoring wells. The IRT agreed to release the MY3(2022) credits as proposed but noted that MY4(2023) would be a critical year and wetland credits may not be released unless the monitoring data supports the success of the site. The project encroachments were discussed. EWS has met with the current landowner, and they have added signage and supplementally planted the encroachment areas with containerized plant stock. The site is currently for sale and EWS will discuss the conservation easement restrictions with the new landowner accordingly. The IRT requested vegetation transects and documentation in the MY4(2023) report indicating that the supplemental planted encroachment areas have been successfully addressed.*

Please review the notes and confirm that all the requests, IRT questions and full delivery provider commitments from the 2023 credit release meeting have been addressed and included in the final MY4 (2023) report. **Yes, with the exception of moving a segment of residential fence and replanting the**

**linear mowing encroachment along the southern boundary of the residential yard.**

**General:** The MY3(2022) EWS comment responses note; “*Yes, supplemental groundwater gages are to be added to MW4 features.*” Were any groundwater wells added in MY4(2023) to further delineate wetland areas of concern? Please discuss in the report text and update the report and CCPV maps accordingly. **Added and updated**

**General:** 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. **Acknowledged**

**General:** Please confirm that the EWS address on the report cover does not need to be updated. **Updated**

**General/ Section 1.5 Project Performance & Appendix D:** In the report text, please explain that per the IRT approved mitigation plan, cross section (riffle & pool) monitoring was not required in MY4 (2023). **Added** Please also add a note to the Appendix D cover sheet noting that cross section (riffle & pool) monitoring was not required in MY4 (2023). **Added**

**Section 1.5.1 Vegetation:** In the report text, please report the monitoring results of the two (2) random vegetation plots (RVPs). **Added.**

**Section 1.5.1 Vegetation:** Is any supplemental planting proposed in MY5 (2024) in the vicinity of the encroachment area adjacent to the fence line, the low stem density area shown on the CCPV map, or Vegetation Plot 4 (202 stems/acre)? Please update the report text accordingly. **Report text updated regarding plans for supplemental planting in MY5 (2024).**

**Section 1.5.3 Hydrology:** In the report text, please review, confirm and note that the site has fully met the stream bankfull success criteria established in the IRT approved mitigation plan (four bankfull events or greater, in separate years). **Added**

**Section 1.5.3 Hydrology & CCPV Map:** “*Based upon the past performance of groundwater wells 5 and 7 approximately 0.75 WMU’s remains “At Risk” within the project.*” Please review and confirm that 0.75 WMUs are considered “at risk” based on the monitoring year 4 (2023) data collected. Please show the “at risk” wetland credit area on the MY4 (2023) CCPV map. **Updated.**

**General:** In the report text, please confirm that EW Solutions conducted a full project site boundary inspection at the end of the MY4 (2023) growing season. Please report the results of the boundary inspection and confirm that no current easement encroachments were observed. Please also report the integrity of the boundary marking and confirm that it currently meets the required DMS specifications. **Compliant as of October 26, 2023.** DMS completed a property boundary assessment on the Harrell

Stream and Wetland site on 11/30/2022 (MY3) and identified the following. In the comment response letter and report text, please confirm that all of the issues identified in MY3 (2022) have been fully addressed and resolved: **Yes, with the exception of moving the fence and finalizing repairs of the linear encroachment along the residential yard.**

11/30/2022 (MY3) DMS Identified Action Items:

- Due to mowing encroachments and difficulty seeing the boundary in the field, the low-visibility marking should be upgraded. Recommend blazing trees with paint and notifying the landowner of the boundary location. **A letter detailing the conditions of the conservation easement was mailed to the current owner in December 2023. The letter included a copy of the recorded deed of conservation easement.** Supplemental signs and posts have already been installed but installation of additional markings should be considered. **Additional blaze, and signs were installed during the April 2023 boundary inspection. A map of the easement boundary was provided to the owner for future reference in addition to providing the Deed of Conservation Easement.**
- Mowed areas will require re-planting in accordance with the approved mitigation plan and IRT coordination. **Replanting was conducted using size appropriate species, at year appropriate density, drawn from the approved mitigation plan.**
- Repair damaged and improperly fastened signs. **Compliant as of October 26, 2023.**
- Remove the plastic and metal spring piping from the conservation easement. **Residual water supply infrastructure was dismantled and removed from the easement on May 24, 2023. Additional man-made materials will be removed when observed.**
- All loose posts should be driven more firmly into the ground. **Compliant as of October 26, 2023.**
- DMS noted that the property is currently for sale. It is critical that the conservation easement information is relayed to potential property owners and the eventual new property owner. **A letter detailing the conditions of the conservation easement was mailed to the current owner in December 2023. The letter included a copy of the recorded deed of conservation easement.** Please contact me directly with the new property owner's contact information once determined. Additional coordination will also be required with the DMS property group. **Will be advised when sold.**

**Digital Support File Comments:**

- None

Please provide an electronic comment response letter addressing the DMS comments received. This



comment response letter should also be included in the FINAL MY4 (2023) report after the report cover.

Please submit two (2) final report hard copies and an electronic copy on a USB drive to my attention at the address below (DEQ Asheville Regional Office). Please include all updated MY4 (2023) digital support files on the USB drive. The final electronic monitoring report with all attachments should be named: *Harrell\_100005\_MY4\_2023.pdf*

If you have any questions, please contact me at any time at (828) 273-1673 or email me at [paul.wiesner@ncdenr.gov](mailto:paul.wiesner@ncdenr.gov).

**.....END DMS COMMENTS.....**

Sincerely,

A handwritten signature in black ink that reads 'David Tuch'. The signature is written in a cursive style with a long horizontal stroke extending from the end of the name.

David Tuch  
Managing Partner  
EW Solutions  
14 O'Henry Avenue, Suite 206  
Asheville, NC 28801



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## **1.0 PROJECT SUMMARY**

### **1.1. Project Setting and Background**

The Harrell Stream and Wetland Mitigation Site (Harrell Mitigation Site) is located in the Little Tennessee River (CU 06010203). The Harrell Mitigation Site also lies within the lower portion of the Eastern Little Tennessee River Basin (HUC 06010203010060) watershed which is identified as a Targeted Local Watershed (TLW) according to the 2008 Little Tennessee River Basin Restoration Priorities (RBRP) Plan. Project work at the Harrell Site was completed in early September 2019, and included construction, monitoring feature installation, and boundary marking; bare root and live stake installation occurred in mid-January 2020. Through the project work, a total of 1,756 linear feet of stream were restored, 640 linear feet were preserved, 0.22 acres of wetland were rehabilitated, and 3.31 acres of wetland were re-established. The Harrell Mitigation Site is expected to generate a total of 1,854 SMU's and 3.53 WMU's. Refer to Table 1 for the project components and mitigation credit information and Figure 2 for the Project Asset Map.

Historic land use at the Harrell Mitigation Site consisted of silvicultural logging and agricultural use for at least 40 years, according to historic aerial photos. Historic agricultural practices, relocation of the channel, and berm construction along the right descending bank of Harrell Creek had functionally removed the stream's connectivity with the floodplain and adjacent wetlands, resulting in highly degraded wetland function. Two poorly functioning culverts have also degraded the ecological connectivity of the stream at the headwaters of the Harrell Mitigation Site. The lack of deep-rooted vegetation and unstable channel characteristics have contributed to the degradation of the streambanks on both sides of the project. Ecological function has been restored to the existing streams, wetlands, and riparian corridor by returning the existing stream and wetlands to a stable condition. The relocation of Harrell Creek to the historic floodplain and removal of the berm has restored proper floodplain connectivity and improved wetland hydrology. The restoration of the upper reach addressed a perched culvert, removed a second pipe crossing, and corrected erosion issues from an existing logging road through the installation of stormwater control devices. At the downstream end of Harrell Creek, the profile of the channel was raised, and proper channel dimensions were restored. Additional measures that promoted functional uplift included stabilizing and revegetating stream banks and adjacent disturbed areas, restoring floodplain connectivity and wetland hydrology, reestablishing wooded riparian areas. These measures contribute to reduced downstream sediment and nutrient loads, as well as improving aquatic and terrestrial habitat.

This project is protected by an 8.45-acre conservation easement and is located approximately 2.8 miles southeast of Cullowhee, NC in Jackson County at 35.300553° N, -83.133689° W. The Harrell Mitigation Site is bounded by former agricultural land and mountainous woodlands.

### **1.2. Project Goals and Objectives**

The project goals address stressors identified in the TLW and priority sub-watershed, as outlined in the Final Mitigation Plan, and include:

- Provide a network of streams with natural, stable forms that support proper stream functions;
- Improve groundwater hydrology to support recovery of native riparian vegetation;
- Reduce sediment inputs from eroding stream banks to reduce fine sediment loads and percentage of fines in the bed-material load;
- Restore proper sediment transport to support channel stability and bedform diversity;
- Improve substrate quality to facilitate hyporheic flow and support aquatic communities;
- Improve quantity, quality, and diversity of habitats to support healthy aquatic communities;

- Reduce pollutant inputs to the project streams (fecal coliform, nitrogen, phosphorus) to restore a balance to proper nutrient cycles;
- Improve riparian vegetation community to provide temperature regulation of the stream, provide a future source of organic inputs, and aid in long-term channel bank stability;
- Restore areas of former riparian wetlands so that the hydrology and soils will support wetland vegetative communities and wildlife;
- Improve landscape connectivity that allows space for biotic and abiotic processes and provides a source and sink for natural populations; and,
- Prevent the site from future impacts of development and agricultural issues.

The following objectives are proposed for accomplishing the above listed goals as outlined in the Final Mitigation Plan:

- Construct stream channels that will maintain proper dimension, pattern, and profile;
- Construct streams with proper bankfull to floodplain relationship;
- Construct streams that provide naturally stable dimensions and stabilize constructed banks with appropriate bioengineering;
- Construct streams that maintain an appropriate sediment transport balance with the sediment that is supplied by the watershed so that the overall stream profile neither aggrades nor degrades over time;
- Create and improve stream bedform diversity by constructing pools of varied depths and riffles of varied slopes;
- Construct stable riffles that provide an improved diversity of bed material clast and a reduction in fines relative to existing conditions;
- Construct in-stream habitat features from native material to provide diversity of habitat;
- Provide a buffer from agricultural activities and row crops;
- Plant native climax tree species and understory species in the riparian zone;
- Reconstruct stream channels that are properly connected to the riparian wetlands;
- Re-grade topography to eliminate ditches and drainage features;
- Plant native wetland tree and shrub species; and,
- Establish a conservation easement that provides a minimum buffer from future activities in the adjacent watershed and ensure aquatic organism passage by correcting perched culverts or removing other barriers within the easement.

### **1.3. Project Performance Standards**

The stream restoration performance standards for the project will follow accepted and approved criteria based on the Final Mitigation Plan for the Harrell Mitigation Site (2019). Performance standards conform with the performance criteria provided in The Harrell Site Mitigation Plan which references the DMS Stream and Wetland Mitigation Plan Template and Guidance (October 2015), the Annual Monitoring Template (April 2015), and the Closeout Report Template (v2.1 March 2015). Performance criteria will be evaluated throughout the seven-year monitoring period.

<b>Harrell Mitigation Site Performance Standards</b>		
<b>Objective</b>	<b>Performance Standard</b>	<b>Monitoring Approach</b>
Construct stream channels that will maintain proper dimension, pattern and profile	<ul style="list-style-type: none"> <li>· Riffle section W/D ratios should remain within the range of the appropriate stream type.</li> <li>· BHR should not exceed 1.2. BHR should not change more than 10% in any given monitoring interval. Changes that do occur should indicate a trend toward stability.</li> <li>· Entrenchment Ratios should be <math>\geq 2.2</math> for C/E channels and <math>\geq 1.4</math> for B Channels.</li> <li>· Document continuous surface flow in tributaries for at least 30 consecutive days in each year</li> </ul>	<p>Survey of select cross sections and visual assessment.</p> <p>Continuous stage recorders</p>
Construct streams with proper bankfull to floodplain relationship	Four bankfull events or greater, in separate years, will be documented during the monitoring period	Crest gauges, continuous stage recorders, and debris lines.
Construct streams that provide naturally stable dimensions and stabilize constructed banks with appropriate bioengineering	Channel banks should generally remain stable. Where bank migration does occur, it should not exceed 20% of the bankfull width.	Visual assessment and bank pin monitoring as necessary.
Construct streams that maintain an appropriate sediment transport balance with the sediment that is supplied by the watershed so that the overall stream profile neither aggrades nor degrades over time.	Profile adjustments should not indicate significant aggradation or degradation. BHR requirements as stated above.	Resurvey of longitudinal profile if visual assessment indicates potential instability.
Create and improve stream bedform diversity by constructing pools of varied depths and riffles of varied slopes	Profile should maintain a diversity of depths expressed in riffle/pool forms.	Visual assessment
Construct stable riffles that provide an improved diversity of bed material clast and a reduction in fines relative to existing conditions	Substrate material should progress towards or maintain coarser material in riffles and runs with finer material present in pools and glides.	Pebble count measurements at surveyed cross sections
Construct in-stream habitat features from native material to provide a diversity of habitats	In-stream habitat structures should remain intact and functional.	Visual assessment
Provide a buffer from agricultural activities and row crops	Record conservation easement prior to implementation.	None
Plant native climax tree species and understory species in the riparian zone	Minimum of 320 stems/ac present at MY-3. Minimum of 260 stems/ac present at MY-5. Minimum of 210 stems/ac present at MY-7.	Vegetation plots

Objective	Performance Standard	Monitoring Approach
Reconstruct stream channels that are properly connected to the riparian wetlands	Groundwater elevation within 12 inches of the ground surface for 12% of the growing season.	Groundwater monitoring gauges
Re-grade topography to eliminate ditches and drainage features	Groundwater elevation within 12 inches of the ground surface for 12% of the growing season.	Groundwater monitoring gauges
Plant native wetland tree and shrub species	Minimum of 320 stems/ac present at MY-3. Minimum of 260 stems/ac present at MY-5. Minimum of 210 stems/ac present at MY-7.	Vegetation plots
Establish a conservation easement that provides a minimum buffer from future activities in the adjacent watershed.	Record conservation easement prior to implementation.	None

## 1.4. Mitigation Components

The Harrell Mitigation Site is anticipated to generate 1,854 SMUs and 3.53 WMUs. Refer to Figure 2 for the project component/ asset map for a visual description of the project assets and Table 1 for project components and mitigation credit information for the Harrell Site. These credits are based on the IRT approved Harrell Mitigation Plan.

## 1.5. Project Performance

Monitoring data was collected from April 18<sup>th</sup>, 2023, to November 24<sup>th</sup>, 2023. Monitoring activities included visual assessment of Harrell Creek, the conservation easement, collection of images at eight permanent photo stations, inventory of five permanent vegetation monitoring plots, two random vegetation plots, maintenance of nine groundwater monitoring wells, and one continuous stage recorder.

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

### 1.5.1. Vegetation

A supplemental planting was conducted on March 2, 2023 in two areas impacted by a mowing encroachment during MY3. One-gallon plantings were installed along the northern portion of the easement adjacent to Wetland B. A second area located along the northwestern easement boundary near vegetation plot #5 was planted during this effort. Refer to Appendix A, CCPV for the supplemental planting area. A table of species and material type can be found in Appendix F.

Visual assessment of vegetation outside of the monitoring plots (Appendix B – Table 6) indicates that both the herbaceous vegetation and planted stems were becoming established throughout much of the project. Planted stems have been slow to establish in the wetter areas of the site but are doing well in the more upland portions.

Monitoring of the permanent vegetation plots (n = 5) and random vegetation plots (n=2) was completed in September 2023. Summary tables and photographs associated with MY4 vegetation monitoring are located in Appendix B and Appendix C. A total of ten (9) species of planted stems and one (1) volunteer species was documented within the plots. Planted stem densities among the five fixed plots ranged from 202 to 810 planted stems per acre. Woody stems continue to struggle within Vegetation plot #4 due to the level of saturation and herbaceous competition. With the exception of areas previously identified as low stem density, the remainder of the site is performing adequately.

Two Random Vegetation Plots (RVP) were sampled during MY4. Random plots were located along Reach 1B and Reach 1C. RVP 6R and 7R were targeted within encroachment areas (Table 7a and 7b, Appendix C). Stem densities among those temporary plots were 486 and 324 stems/acre respectively. Stem densities and survival will continue to be monitored in future years.

Invasive species have been documented at the site, with overall low abundance. These areas were initially treated during MY1 and MY2 with a follow-up treatment occurring on June 28, 2022. The primary species documented at the Harrell Site include Chinese Privet (*Ligustrum sinensis*), Multiflora Rose (*Rosa multiflora*), Asiatic bittersweet (*Celastrus orbiculatus*), and Japanese Honeysuckle (*Lonicera japonica*) along the fringes. Invasive species populations will continue to be monitored and treated throughout subsequent monitoring years. Details on invasive species density and area can be found in Table 6, the CCPV, Appendix B, Table 7a and 7b, Appendix C).

Three areas of easement encroachment were documented during MY3. Brush clearing and bushhogging was conducted along a northern boundary of the easement. These activities impacted two areas within the easement both at the uppermost and lowermost extents of Reach C along the northern edge of the easement. The third area was located along the fence line south of the private residence. In this area a ~6 ft wide grassy buffer has been maintained along the fence line and has impacted a narrow swath of the easement. The property owner has been advised of the need to relocate the fence line. EWS will realign the fence during the winter 2023/24 to provide sufficient setback for mowing and fence line maintenance (Table 6, the CCPV, Problem area photos, Appendix B). Following the encroachments additional signage was installed. Replanting of two of the easement violations and residual bare areas was conducted on March 2, 2023. Supplemental planting of the encroachment along the fence line is planned for MY5. No additional supplemental planting is planned for the low stem density area depicted on the CCPV or in the vicinity of VP4 in MY5.

The property is currently for sale and the current owner and realtor have been advised to expressly state the conditions and restrictions of the property with respect to the conservation easement and any potential buyers. A registered letter was sent to the landowner which included the easement document and explanation of restrictions and acceptable uses.

### **1.5.2. Stream Geomorphology**

Visual assessment of the stream channel was performed to document signs of instability, such as beaver activity, eroding banks, structural instability, or excessive sedimentation. No areas of instability were identified during MY4. Monitoring of the NCDOT culvert at the bottom of the project area will be ongoing and has been conducted by both NCDOT and Equinox Staff.

No cross-section surveys were conducted during MY4 as outlined in the IRT Approved Mitigation Plan. Survey data from MY0-MY3 were provided for contextual purposes.

One beaver dam was identified during MY4. This dam was located just outside of the easement at the Caney Fork Rd culvert. This dam was removed in April, 2023 following trapping efforts in late March 2023. Beaver have been an intermittent problem in Reach D since project completion. EWS has an active agreement with Aphis for beaver management. The site will continue to be monitored for beaver activity. No other areas of instability were noted in previous monitoring years.

### **1.5.3.Hydrology**

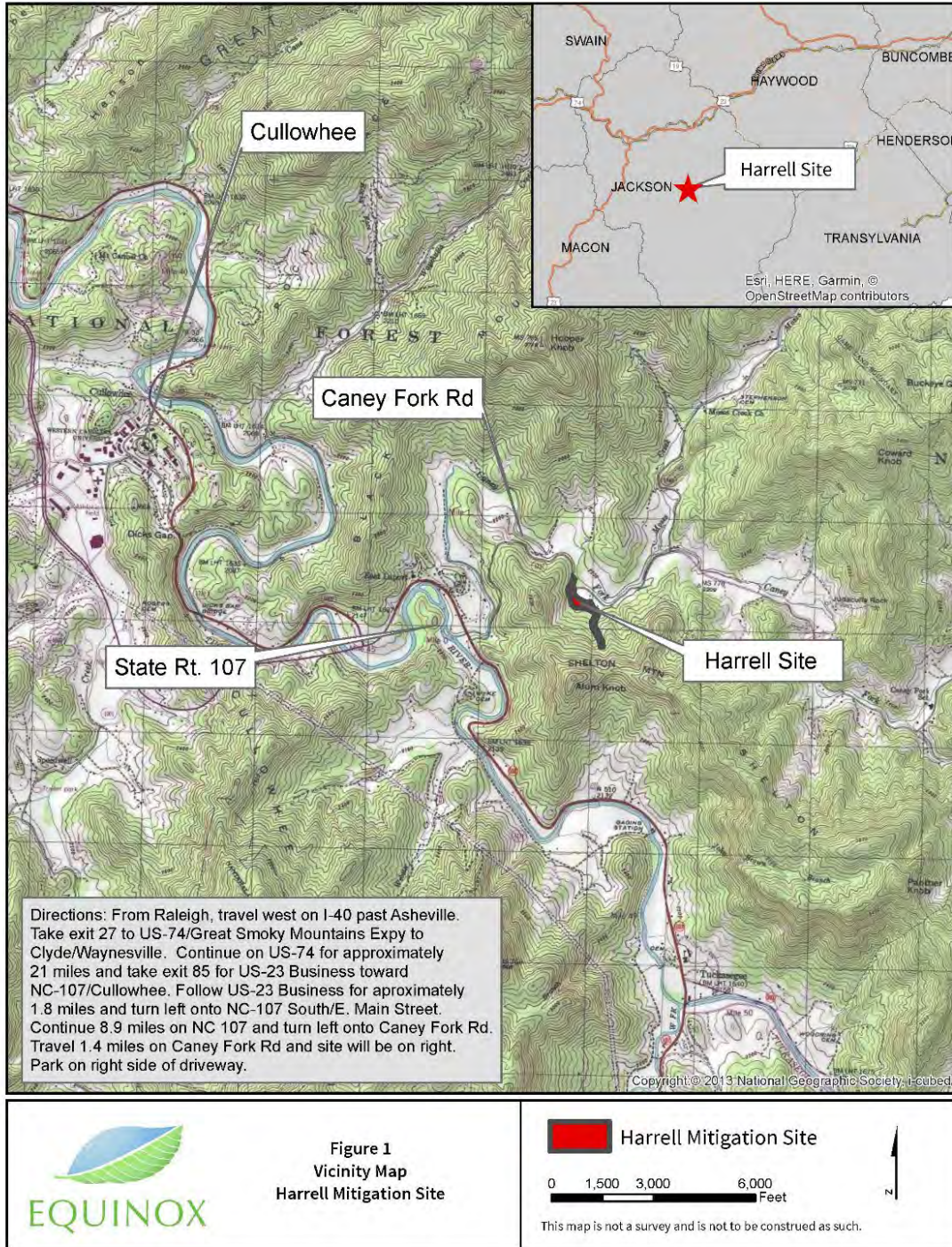
Since project construction completion, twenty-three bankfull events have been documented at the Harrell Mitigation Site across all monitoring years. The site has met the bankfull performance criteria of four bankfull events in two separate years, as outlined in the Approved Mitigation Plan. The suspected dates and associated precipitation records can be found in Table 10, Appendix E.

Three groundwater wells, #1, 5, and 7, failed to meet the success criteria during MY4. Monitoring well #1 fell short of the performance criteria at 8%. Monitoring wells #5 and #7 were well below performance thresholds at 2%. Similarly, supplemental monitoring wells also failed to meet the 12% standard during MY4. The region had been experiencing moderate to extreme drought conditions during MY4 (Drought.gov). Based upon the past performance of groundwater wells 5 and 7 approximately 0.75 WMU's remain "At Risk" within the project (CCPV and Appendix E).

Groundwater gage graphics and supporting tables can be found in Appendix E. At the suggestion of the IRT and DMS, supplemental soil profiles will be conducted in MY5 and MY7 to capture any changes in wetland soil indicators. (1, 2, 5, and 7).



## 1.6. Vicinity Map



## **2.0 REFERENCES**

Harrelson, Cheryl C., Rawlins, C. L., Potyondy, John, P., (1994) Stream Channel Reference Sites: An illustrated guide to field technique.

Kee Mapping and Survey. 2019. As-Built Survey of Harrell Creek Restoration Project. Prepared for EW Solutions.

Lee, Michael T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation, Version 4.2 (<http://cvs.bio.unc.edu/methods.htm>).

National Integrated Drought Information System., (Drought.gov), Accessed December 5, 2022. <https://www.drought.gov/states/north-carolina/county/Jackson>

NCDENR. 2017. DMS Stream and Wetland Mitigation Annual Monitoring Template (June 2017).

NCDENR. 2021. DMS Veg Table Production Tool, Version 8/23/2021. Retrieved from [https://ncdms.shinyapps.io/Veg\\_Table\\_Tool/](https://ncdms.shinyapps.io/Veg_Table_Tool/).

Stantec Consulting, Inc. 2019. Final Mitigation Plan – Harrell Mitigation Site. Prepared for North Carolina Department of Environmental Quality, Division of Mitigation Services. DMS Project No. 100005.

# Appendix A

## Background Tables

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**Table 1. Project Mitigation Assets and Components  
Harrell Mitigation Site**

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)	As-Built Centerline Footage or Acreage^	Comments
Reach 1A	654	640	Cold	P	NA	10.0	640	
Reach 1B	286	273	Cold	R	PI	1.0	273	Less 38' for crossing and outlet protection. Less than 30' buffer for 41 LF
Reach 1C	1,265	1,268	Cold	R	PI	1.0	1,189	0.026 ac impact to Wetland B
Reach 1D	223	249	Cold	R	P1	1.0	294	Less 13' for ROW Less than 30' buffer for 32 LF 0.008 ac impact to Wetland A
Wetland A	1.59	1.58	RNR	Re (Pres)		0.0	1.58	Existing wetland will be protected 0.008 ac impact to Wetland A for stream construction
Wetland A	1.59	0.26	RNR	R(Re-est)		1.0	0.26	Area of the existing channel within the wetland was filled and replanted
Wetland B	0.24	0.22	RNR	R (Rehab)		1.0	0.22	0.026 ac impact to Wetland B for stream construction
Wetland C	-	3.05	RNR	R (Re-Est)		1.0	3.05	

^ Based on centerline calculations from the as-built survey, accounts for breaks in conservation easement and utility right-of-ways.

**Project Credits**

Restoration Level	Stream			Riparian Wetland		Non-Rip	Coastal
	Warm	Cool	Cold	Riverine	Non-Riv	Wetland	Marsh
Restoration	-	-	1790	-	-	-	-
Re-establishment				-	3.31	-	-
Rehabilitation				-	0.22	-	-
Enhancement				-	-	-	-
Enhancement I	-	-	-				
Enhancement II	-	-	-				
Creation				-	-	-	-
Preservation	-	-	64	-	-	-	-
<b>Total Credits</b> <sup>*</sup>	-	-	<b>1,854</b>	-	<b>3.53</b>	-	-

<sup>\*</sup> Project credits reflect the sum of credits outlined in the IRT approved mitigation plan. Mitigation plan credits account for breaks in conservation easements and are based on centerline design stream stationing and taken from the IRT approved mitigation plan. Mitigation plan credits are the same as the IRT approved mitigation plan.

\* Wetland A will be protected but is not generating wetland credit due to the 100% Restoration credit requirement in RFP 16-008611

**Table 2. Project Activity and Reporting History  
Harrell Mitigation Site**

<b>Activity or Report</b>	<b>Data Collection Complete</b>	<b>Completion or Delivery</b>
Mitigation Plan	Dec - 2018	Jan - 2019
Mitigation Plan Addendum	-	-
Final Design - Construction Plans	-	June - 2019
Construction	-	Aug - 2019
Temporary S&E Mix Applied	-	Aug - 2019
Permanent Seed Mix Applied	-	Aug - 2019
Bare Root and Live Stake Plantings	-	Jan - 2020
Baseline Monitoring Document (Year 0 Monitoring - Baseline)	Jan - 2020	Feb - 2020
Stream Assessment	Jan - 2020	
Vegetation Assessment	Jan - 2020	
Year 1 Monitoring	-	Dec-2020
Initial Site Assessment	April-2020	
Stream Assessment	Sept - 2020	
Vegetation Assessment	Sept - 2020	
Invasive Vegetation Treatments		Nov-2020
Year 2 Monitoring	-	Dec-2021
Supplemental vegetation planting	Feb-2021	
Initial Site Assessment	April-2021	
Stream Assessment	Sept - 2021	
Vegetation Assessment	Oct - 2021	
Invasive Vegetation Treatments	-	June - 2021
Year 3 Monitoring		
Supplemental vegetation planting	Feb - 2022	-
Initial Site Assessment	Mar - 2022	April - 2022
Invasive Vegetation Treatments	-	June - 2022
Stream Assessment	Sept - 2022	Jan - 2023
Vegetation Assessment	Sept - 2022	
Beaver Management	-	Jun - 2022
	-	Nov - 2022
Year 4 Monitoring		
Supplemental vegetation planting	Mar - 2023	-
Initial Site Assessment	Apr - 2023	May - 2023
Stream Assessment	Oct - 2023	Dec - 2023
Vegetation Assessment	Sept - 2023	
Beaver Management	-	Apr - 2023

**Table 3. Project Contacts  
Harrell Mitigation Site**

<b>Prime Contractor</b>	<p align="center">EW Solutions 14 O'Henry Avenue, Suite 206 Asheville, NC 28801 David Tuch (828) 253-6856</p>
<b>Designer</b>	<p align="center">Stantec Consulting, Inc 56 College Street, Suite 201 Asheville, North Carolina 28801 Grant Ginn (828) 449-1930</p>
<b>Construction Contractor</b>	<p align="center">Penland Contracting, Inc 300 NP&amp;L Loop Franklin, NC 28734 Lewis Penland (828) 421-1753</p>
<b>Seeding Contractor</b>	<p align="center">Penland Contracting, Inc 300 NP&amp;L Loop Franklin, NC 28734 Lewis Penland (828) 421-1753</p>
<b>Planting Contractor</b>	<p align="center">Equinox 37 Haywood St. Asheville, North Carolina 28801 Owen Carson (828) 253-6856</p>
<b>As-built Surveys</b>	<p align="center">Kee Mapping 88 Central Ave. Asheville, NC 28801 Brad Kee (828) 575-9021</p>
<b>Seeding Mix Source</b>	<p align="center">Hancock Farm &amp; Seed 18724 Hancock Farm Rd Dade City, Fl 333523 (352) 567-6971</p>
<b>Live Stakes</b>	<p align="center">Mellow Marsh Farms 1312 Woody Store Road Siler City, NC 27344 (919) 742-1200</p>
<b>Monitoring Performers (MY1-MY4)- 2020-2023</b>	<p align="center">Equinox 14 O'Henry Avenue, Suite 206 Asheville, North Carolina 28801 Owen Carson (828) 253-6856 ext. 204 Danvey Walsh (828) 253-6856 ext.201</p>

**Table 4. Project Baseline Information and Attributes**

Table 4. Project Baseline Information and Attributes				
Project Information				
Project Name	Harrell Stream and Wetland Mitigation Site			
County	Jackson			
Project Area (acres)	8.45			
Project Coordinates (latitude and longitude)	35.300533° N, -83.133689° W			
Project Thermal Regime	Cold			
Project Watershed Summary Information				
Physiographic Province	Blue Ridge Mountains			
River Basin	Little Tennessee			
USGS Hydrologic Unit 8-digit	6010203	USGS Hydrologic Unit 14-digit	06010203010060	
DWR Sub-basin	04-04-02			
Project Drainage Area (acres)	102.0			
Project Drainage Area Percentage of Impervious Area	< 1%			
CGIA Land Use Classification	Agricultural			
Reach Summary Information				
Parameters	Reach 1A	Reach 1B	Reach 1C	Reach 1D
Length of Reach (linear feet)	640	273	1,268	249
Valley Confinement (Rosgen)	II	II	VII	VII
Drainage area (miles <sup>2</sup> )	0.05	0.07	0.16	0.17
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Perennial
NCDWR Water Quality Classification	C	C	C	C
Stream Classification (existing)	A & B	G	E & F	E
Stream Classification (proposed)	A	B4	E4	E4
FEMA classification	-	-	-	-
Wetland Summary Information				
Parameters	Wetland A	Wetland B	Wetland C	
Size of Wetland (acres)	1.58	0.22	3.05	
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian	Riparian	Riparian	
Mapped Soil Series	NkA	NkA	NkA	
Drainage class	poorly	poorly	poorly	
Soil Hydric Status	Hydric	Hydric	Hydric	
Source of Hydrology	Groundwater	Groundwater	Groundwater	
Hydrologic Impairment	Agriculture/ Ditching	Agriculture/ Ditching	Agriculture/ Ditching	
Native vegetation community	Swamp-Forest Bog	Swamp-Forest Bog	Swamp-Forest Bog	
Percent composition of exotic invasive vegetation	15%	15%	1%	
Regulatory Considerations				
Regulation	Applicable?	Resolved?	Supporting Documentation	
Waters of the United States – Section 404	Yes	Yes	404 Permit #SAW-2016-02202	
Waters of the United States – Section 401	Yes	Yes	401 Permit #20161077	
Endangered Species Act	Yes	Yes	FFHWA Categorical Exclusion (CE)/ERTR	
Historic Preservation Act	No	N/A	FFHWA Categorical Exclusion (CE)/ERTR	
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A	
FEMA Floodplain Compliance	Yes	Yes	FEMA Floodplain Requirements Checklist (Jan-2019) Jackson County, NC Floodplain Development Permit #2019-F187	
Essential Fisheries Habitat	No	N/A	N/A	

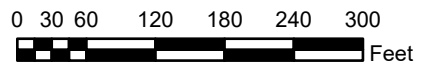


Appendix B  
Visual Assessment Data




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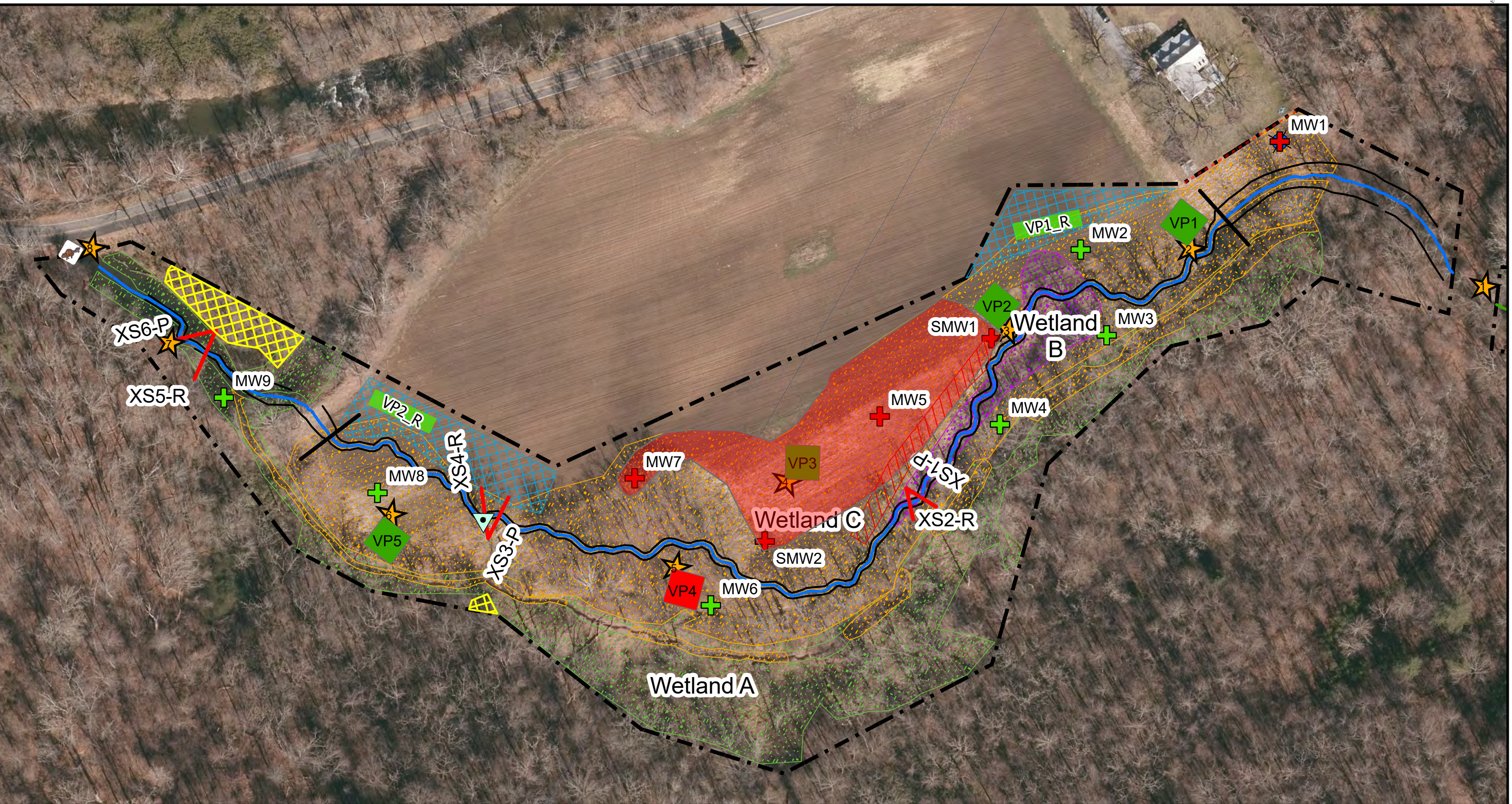
Project Assets  
 Harrell Mitigation Site  
 Jackson County, NC



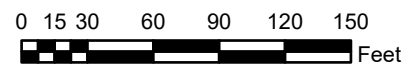
-  Conservation Easement Boundary
- Wetlands**
-  Reestablishment
-  Rehabilitation
-  Preservation (No Credit)

- Streams**
-  Preservation
-  Restoration
-  Reach Breaks





MY4 CCPV  
 Harrell Mitigation Site  
 Jackson County, NC  
 December 2023



Conservation Easement Boundary

**Monitoring**

- Continuous Stage Recorder
- Cross-Section

- Rain Gauge
- Photopoints

Low Stem Density

- Groundwater Gauge Not Meeting Criteria
- Groundwater Gauge Meeting Criteria

Invasive Vegetation

**Wetlands**

- Reestablishment
- Rehabilitation
- Preservation (No Credit)
- At Risk Wetland Area

**Streams**

- Preservation
- Restoration
- Reach Breaks
- Encroachment Areas

**Monitoring**

- Supplemental Planting
- Beaver Dam



**Table 5. Visual Stream Morphology Stability Assessment  
Harrell Mitigation Site - Harrell Reach 1A - Preservation  
Assessed Length 640 feet (April 18th and October 26, 2023)**

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
<b>1. Bank</b>	<b>1. Scoured / Eroding</b>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	<b>2. Undercut</b>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	<b>3. Mass Wasting</b>	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
<b>Totals</b>					0	0	100%	N/A	N/A	N/A
<b>3. Engineered Structures</b>	<b>1. Overall Integrity</b>	Structures physically intact with no dislodged boulders or logs.					100%			
	<b>2. Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.					100%			
	<b>2a. Piping</b>	Structures lacking any substantial flow underneath sills or arms.					100%			
	<b>3. Bank Protection</b>	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.					100%			
	<b>4. Habitat</b>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.					100%			

N/A - Item does not apply.

**Table 5 Visual Stream Morphology Stability Assessment  
Harrell Mitigation Site - Harrell Reach 1B - Restoration P1  
Assessed Length 286 feet (April 18th and October 26, 2023)**

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
<b>1. Bank</b>	<b>1. Scoured / Eroding</b>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	<b>2. Undercut</b>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	<b>3. Mass Wasting</b>	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
<b>Totals</b>					0	0	100%	N/A	N/A	N/A
<b>2. Engineered Structures</b>	<b>1. Overall Integrity</b>	Structures physically intact with no dislodged boulders or logs.	15	15			100%			
	<b>2. Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.	15	15			100%			
	<b>2a. Piping</b>	Structures lacking any substantial flow underneath sills or arms.	15	15			100%			
	<b>3. Bank Protection</b>	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	15	15			100%			
	<b>4. Habitat</b>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	15	15			100%			

N/A - Item does not apply.

**Table 5 cont'd. Visual Stream Morphology Stability Assessment  
Harrell Mitigation Site - Harrell Reach 1C - Restoration P1  
Assessed Length 1268 feet (April 18th and October 26, 2023)**

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
<b>1. Bank</b>	<b>1. Scoured / Eroding</b>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	<b>2. Undercut</b>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	<b>3. Mass Wasting</b>	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
<b>Totals</b>					0	0	100%	N/A	N/A	N/A
<b>2. Engineered Structures</b>	<b>1. Overall Integrity</b>	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	<b>2. Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.	9	9			100%			
	<b>2a. Piping</b>	Structures lacking any substantial flow underneath sills or arms.	9	9			100%			
	<b>3. Bank Protection</b>	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	9	9			100%			
	<b>4. Habitat</b>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	9	9			100%			

N/A - Item does not apply.

**Table 5 cont'd. Visual Stream Morphology Stability Assessment  
Harrell Mitigation Site - Harrell Reach 1D - Restoration P1  
Assessed Length 223 feet (April 18th and October 26, 2023)**

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
<b>1. Bank</b>	<b>1. Scoured / Eroding</b>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	<b>2. Undercut</b>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	<b>3. Mass Wasting</b>	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
<b>Totals</b>					0	0	100%	N/A	N/A	N/A
<b>2. Engineered Structures</b>	<b>1. Overall Integrity</b>	Structures physically intact with no dislodged boulders or logs.					100%			
	<b>2. Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	<b>2a. Piping</b>	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	<b>3. Bank Protection</b>	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	3	3			100%			
	<b>4. Habitat</b>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	3	3			100%			

N/A - Item does not apply.



Table 6. Vegetation Condition Assessment Harrell Mitigation Site							
Planted Acreage: 4.46 (Assessed April 18 and Oct 26, 2023)							
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage	
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	n/a	0	0	0.00%	
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres		1	0.09	2.02%	
				<b>Total</b>	1	0.09	2.02%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	n/a	0	0	0.00%	
				<b>Cumulative Total</b>	1	0.09	2.02%
Easement Acreage: 8.43							
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage	
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale). Low Density	1000 SF		2	0.11	1.27%	
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none		1	0.01	0.12%	

## Vegetation Plot Photos



Vegetation Monitoring Plot 1



Vegetation Monitoring Plot 2



Vegetation Monitoring Plot 3



Vegetation Monitoring Plot 4



Vegetation Monitoring Plot 5

## Permanent Photo Stations



Photo point #1a, facing upstream at Reach 1A.



Photo point #1b, facing stormwater control measure adjacent to the Reach 1A boundary.



Photo point #1c, facing downstream at Reach 1B.



Photo point #1d, facing downstream at Reach 1B channel.



Photo point #1e facing upstream at Reach 1A/B culvert.



Photo point #1f facing upstream through the Reach 1A/B culvert.



Photo point #1 supplemental, facing downstream from Reach 1B.



Photo point #2a, facing upstream towards, Reach 1B.





Photo point #2b, facing downstream, Reach 1C and Wetland B.



Photo point #2c, Reach 1C channel.



Photo point #3a, facing upstream, Reach 1C and Wetland B



Photo point #3b, facing downstream, Reach 1C and Wetland 1C.



Photo point #3c supplemental, facing upstream Reach 1C channel.



Photo point #4a, facing upstream, Reach 1C and Wetland C.



Photo point #4b, facing downstream, Reach 1C and Wetland C.



Photo point #4c, facing downstream, Reach 1C channel.



Photo point #5a, facing upstream, Reach 1C and Wetland C.



Photo point #5b, facing downstream, Reach 1C and Wetland C.



Photo point #5c, facing upstream, Reach 1C channel.



Photo point #6a, facing upstream, Reach 1C and Wetland C.



Photo point #6b, facing downstream. Reach 1C and Wetland C.



Photo point #6c, facing upstream from XS3, Reach 1C channel.



Photo point #7a, facing upstream from XS 5, Reach 1D.



Photo point #7b, facing downstream from XS 5, Reach 1D.





Photo point #8a, facing upstream from Caney Fork Road, Reach 1D.



Photo point #8b, facing downstream Caney Fork Road culvert, Reach 1D.

Problem Area Photos



Beaverdam at Caney Fork Rd Culvert



Replanted Easement Violation (Mowing) Station 103+00 to 105+50



Replanted Easement Violation (Mowing) Station 103+00 to 105+50



Replanted easement violation Station 113+00 to 115+00, US.



Replanted easement violation Station 113+00 to 115+00, US.



Replanted easement violation, Station 113+00 to 115+00, DS.



Replanted easement violation, Station 113+00 to 115+00, DS.



Easement Violation (Mowing) along to be realigned residential fence line.



Easement Violation (Mowing) along to-be realigned residential fence line.

# Appendix C

## Vegetation Plot Data

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Planted Acreage	4.46
Date of Initial Plant	2020-01-15
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	2023-09-22
Date of Current Survey	2023-09-22
Plot size (ACRES)	0.0247

**Table 7a. Harrell Stream & Wetland Mitigation Site (100005) Vegetation Plot Table**

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F		Veg Plot 6 R	Veg Plot 7 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total
Species Included in Approved Mitigation Plan	<i>Alnus serrulata</i>	hazel alder	Tree	OBL	5	5	2	2	1	1	1	1	6	6	2	1
	<i>Betula nigra</i>	river birch	Tree	FACW		1							2	2	1	
	<i>Cephalanthus occidentalis</i>	common buttonbush	Shrub	OBL					2	2	2	2	1	1	3	
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW	2	2	3	3	3	3	1	1	1	1	3	2
	<i>Fraxinus pennsylvanica</i>	green ash	Tree	FACW	2	2	3	3	3	3	1	1	1	1	1	
	<i>Lindera benzoin</i>	northern spicebush	Tree	FAC	1	1									1	
	<i>Liriodendron tulipifera</i>	tuliptree	Tree	FACU					1						1	
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW				1								5
	<i>Salix nigra</i>	black willow	Tree	OBL	2	2	2	2		2			3	9		1
Sum	Performance Standard				12	13	10	11	9	12	5	5	14	20	12	9
Post Mitigation Plan Species	<i>Oxydendrum arboreum</i>	<i>sourwood</i>	<i>Shrub</i>	<i>UPL</i>											3	
Sum	Proposed Standard				12	13	10	11	9	12	5	5	14	20	12	9
Mitigation Plan Performance Standard	Current Year Stem Count					13		11		12		5		20	12	9
	Stems/Acre					526		445		486		202		810	486	324
	Species Count					6		5		6		4		6	7	4
	Dominant Species Composition (%)					38		27		25		40		45	20	56
	Average Plot Height (ft.)					4		4		4		4		3	2	3
% Invasives					0		0		0		0		0	0	0	
Post Mitigation Plan Performance Standard	Current Year Stem Count					13		11		12		5		20	12	9
	Stems/Acre					526		445		486		202		810	486	324
	Species Count					6		5		6		4		6	7	4
	Dominant Species Composition (%)					38		27		25		40		45	20	56
	Average Plot Height (ft.)					4		4		4		4		3	2	3
% Invasives					0		0		0		0		0	0	0	

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded), species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

**Table 7b. Harrell Stream & Wetland Mitigation Site (100005) Vegetation Performance Standards Summary Table.**

Vegetation Performance Standards Summary Table												
	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 4	526	4	6	0	445	4	5	0	486	4	6	0
Monitoring Year 3	486	3	5	0	405	3	4	0	526	3	6	0
Monitoring Year 2	486	2	5	0	405	3	4	17	405	2	4	0
Monitoring Year 1	445	2	6	0	526	2	6	0	405	2	4	0
Monitoring Year 0	486	2	6	0	526	2	6	0	445	2	4	0
	Veg Plot 4 F				Veg Plot 5 F				Veg Plot Group 6 R			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 4	202	4	4	0	810	3	6	0	486	2	7	0
Monitoring Year 3	283	3	5	0	648	2	6	0				
Monitoring Year 2	445	2	7	0	526	2	6	0				
Monitoring Year 1	202	2	3	0	769	1	7	0				
Monitoring Year 0	1052	2	9	0	972	2	7	0				
	Veg Plot Group 7 R											
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives								
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 4	324	3	4	0								
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0												

\*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

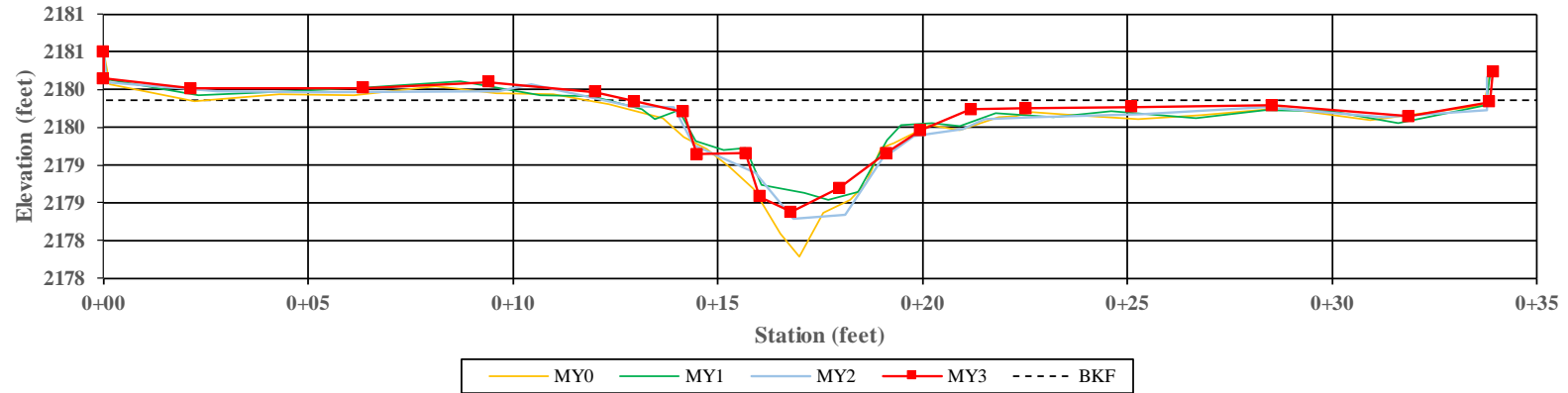
Appendix D  
Stream Measurement and Geomorphology Data  
Cross-section monitoring not required during MY4

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**Project Name:** Harrell Stream & Wetland  
**Reach Name:** Harrell Creek Reach 1C

**XS Number:** 1  
**XS Type:** Pool

**Station:** 107+75



CHANNEL DIMENSIONS SUMMARY		MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)		9.6	20.4	11.0	8.4	-	-	-	-
Floodprone Width (ft)		50.0	50.0	50.0	50.0	-	-	-	-
Bankfull Mean Depth (ft)		0.6	0.3	0.6	0.7	-	-	-	-
Bankfull Max Depth (ft)		1.9	1.2	1.5	1.5	-	-	-	-
Bankfull Cross-Sectional Area (ft <sup>2</sup> )		6.0	6.0	6.0	6.0	-	-	-	-
Width/Depth Ratio		15.2	69.1	19.9	11.8	-	-	-	-
Entrenchment Ratio		5.2	2.5	4.6	6.0	-	-	-	-
Bank Height Ratio		1.0	0.9	0.9	0.9	-	-	-	-



Left Descending Bank

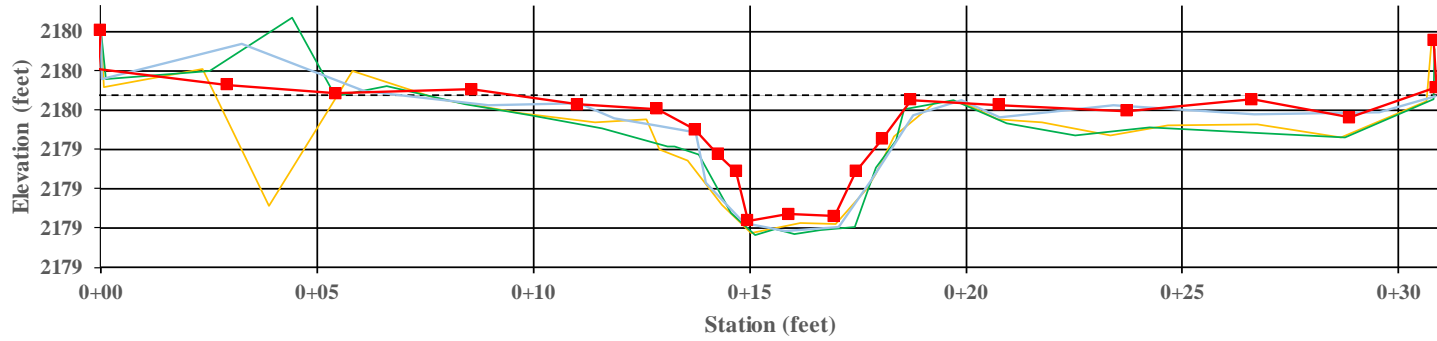


Right Descending Bank

**Project Name:** Harrell Stream & Wetland  
**Reach Name:** Harrell Creek Reach 1C

**XS Number:** 2  
**XS Type:** Riffle

**Station:** 107+88



CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	6.2	6.8	6.9	7.0	-	-	-	-
Floodprone Width (ft)	50.0	50.0	50.0	50.0	-	-	-	-
Bankfull Mean Depth (ft)	0.6	0.5	0.5	0.5	-	-	-	-
Bankfull Max Depth (ft)	0.9	0.9	0.9	1.0	-	-	-	-
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	3.4	3.4	3.4	3.4	-	-	-	-
Width/Depth Ratio	11.2	13.7	14.1	14.5	-	-	-	-
Entrenchment Ratio	8.1	7.4	7.2	7.1	-	-	-	-
Bank Height Ratio	1.1	1.2	1.1	1.0	-	-	-	-



Left Descending Bank

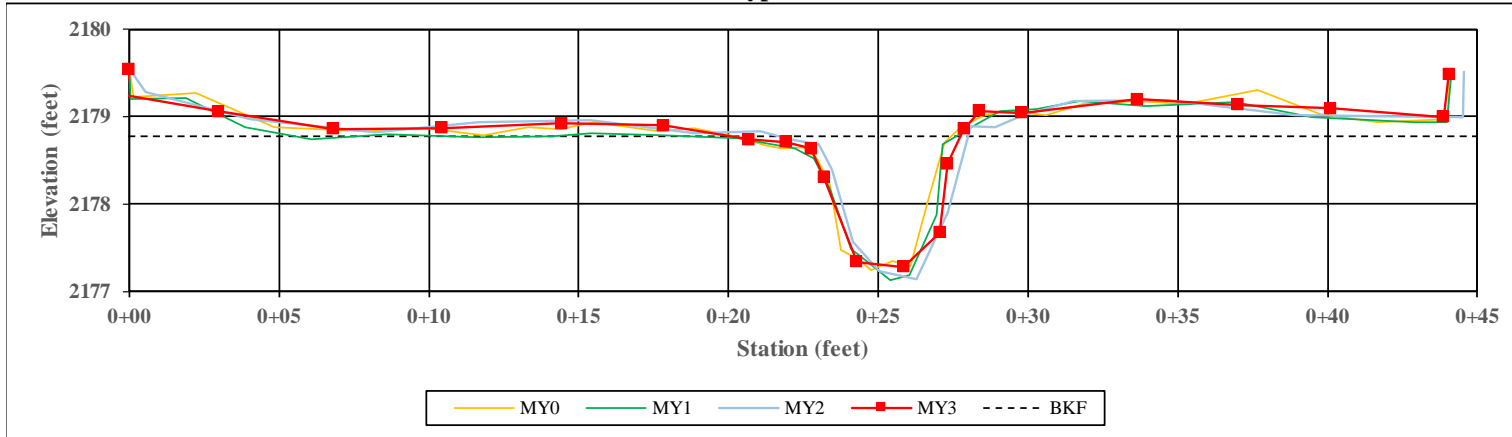


Right Descending Bank

**Project Name:** Harrell Stream & Wetland  
**Reach Name:** Harrell Creek Reach 1C

**XS Number:** 3  
**XS Type:** Pool

**Station:** 112+76



CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	5.2	6.8	5.3	5.4	-	-	-	-
Floodprone Width (ft)	50.0	50.0	50.0	50.0	-	-	-	-
Bankfull Mean Depth (ft)	1.0	0.8	1.0	1.0	-	-	-	-
Bankfull Max Depth (ft)	1.6	1.6	1.6	1.5	-	-	-	-
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	5.3	5.3	5.3	5.3	-	-	-	-
Width/Depth Ratio	5.1	8.8	5.2	5.4	-	-	-	-
Entrenchment Ratio	9.6	7.4	9.5	9.3	-	-	-	-
Bank Height Ratio	1.1	1.0	1.0	0.9	-	-	-	-



Left Descending Bank

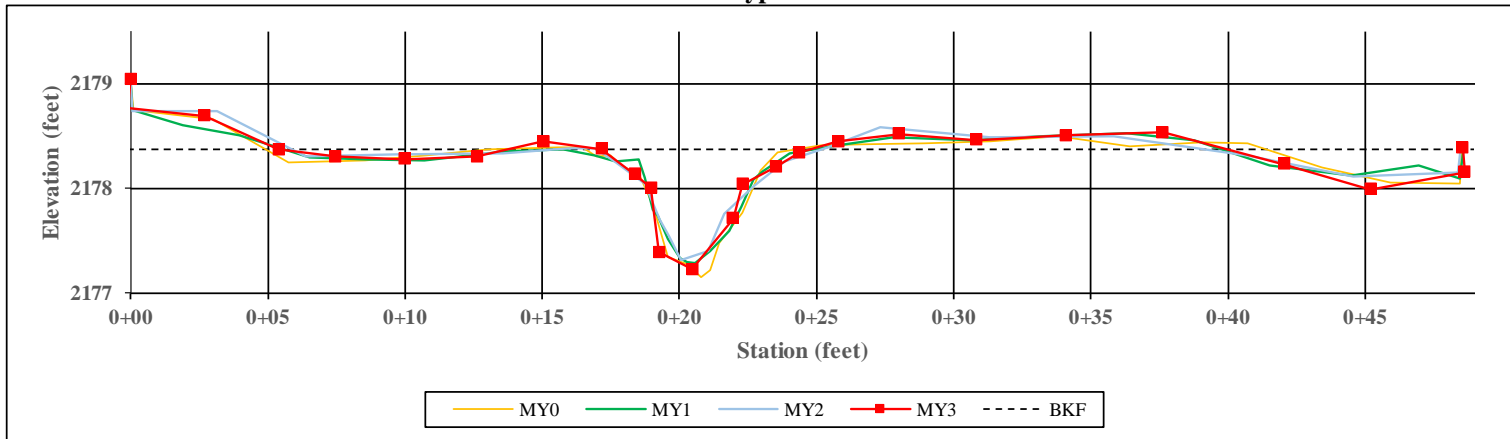


Upstream

**Project Name:** Harrell Stream & Wetland  
**Reach Name:** Harrell Creek Reach 1C

**XS Number:** 4  
**XS Type:** Riffle

**Station:** 112+90



CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	6.8	7.1	6.9	6.0	-	-	-	-
Floodprone Width (ft)	50.0	50.0	50.0	50.0	-	-	-	-
Bankfull Mean Depth (ft)	0.5	0.5	0.5	0.6	-	-	-	-
Bankfull Max Depth (ft)	1.2	1.1	1.1	1.1	-	-	-	-
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	3.6	3.6	3.6	3.6	-	-	-	-
Width/Depth Ratio	12.6	14.2	13.4	10.1	-	-	-	-
Entrenchment Ratio	14.8	7.0	7.2	8.3	-	-	-	-
Bank Height Ratio	1.0	1.0	1.0	1.0	-	-	-	-



Left Descending Bank



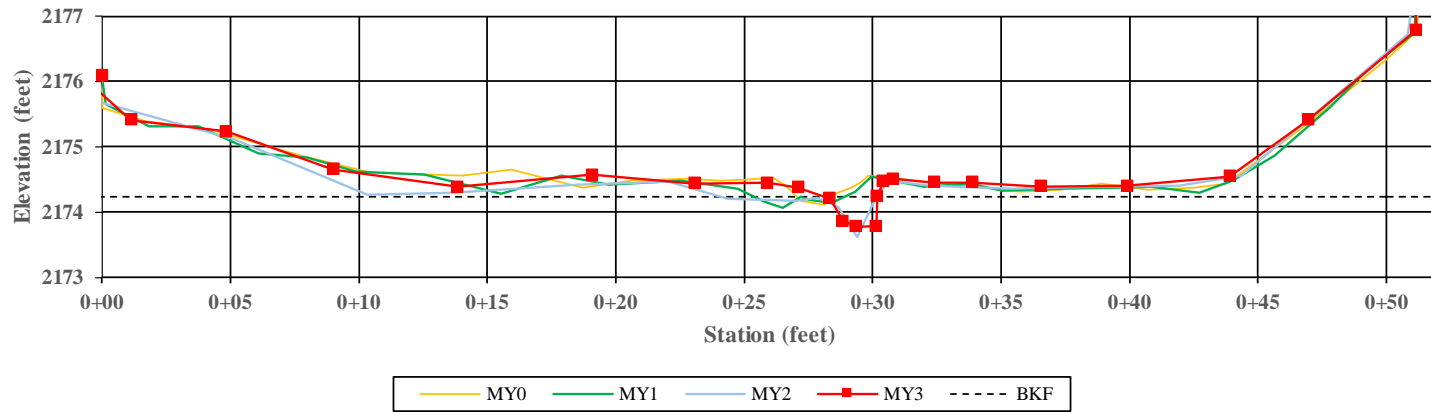
Right Descending Bank



**Project Name:** Harrell Stream & Wetland  
**Reach Name:** Harrell Creek Reach 1D

**XS Number:** 5  
**XS Type:** Riffle

**Station:** 116+36



CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Width (ft)	2.5	4.4	5.8	1.8	-	-	-	-
Floodprone Width (ft)	33.4	33.4	33.4	33.4	-	-	-	-
Bankfull Mean Depth (ft)	0.3	0.2	0.1	0.4	-	-	-	-
Bankfull Max Depth (ft)	0.4	0.3	0.6	0.5	-	-	-	-
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	0.7	0.7	0.7	0.7	-	-	-	-
Width/Depth Ratio	8.6	29.6	46.4	4.9	-	-	-	-
Entrenchment Ratio	13.2	7.5	5.8	18.5	-	-	-	-
Bank Height Ratio	1.0	1.1	1.4	1.0	-	-	-	-



Left Descending Bank

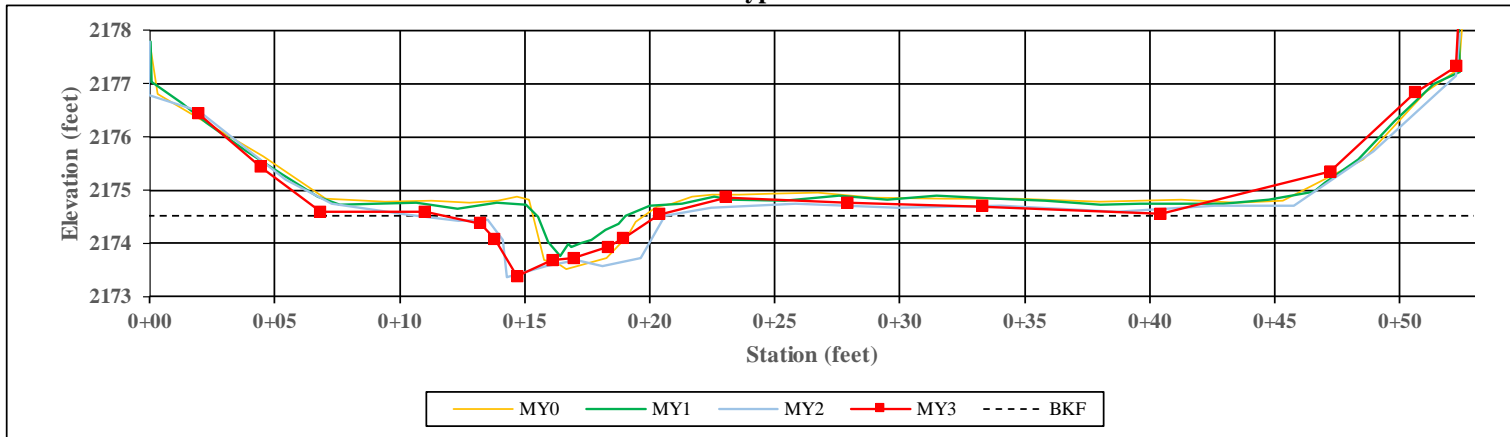


Right Descending Bank

**Project Name:** Harrell Stream & Wetland  
**Reach Name:** Harrell Creek Reach 1D

**XS Number:** 6  
**XS Type:** Pool

**Station:** 116+65



CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	6.1	20.0	5.5	7.1	-	-	-	-
Floodprone Width (ft)	38.3	38.3	38.3	38.3	-	-	-	-
Bankfull Mean Depth (ft)	0.7	0.2	0.8	0.6	-	-	-	-
Bankfull Max Depth (ft)	1.3	1.1	1.0	1.1	-	-	-	-
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	4.5	4.5	4.5	4.5	-	-	-	-
Width/Depth Ratio	8.3	89.9	6.8	11.0	-	-	-	-
Entrenchment Ratio	6.3	1.9	6.9	5.4	-	-	-	-
Bank Height Ratio	1.0	0.9	1.0	1.1	-	-	-	-



Left Descending Bank



Upstream



**Table 8. Baseline Stream Data Summary  
Harrell Mitigation Site - Harrell Creek Reach 1D (294 feet)**

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
	LL	UL	Eq.	Min	Mean	Med	Max	SD	N	Min	Mean	Med	Max	SD	N	Min	Mean	Max	Min	Mean	Med	Max	SD	N
<b>Dimension &amp; Substrate - Riffle</b>																								
Bankfull Width (ft)	-	-	-	2.9	-	-	2.9	-	1	6.3	8.5	-	10.7	-	-	-	4.2	-	2.5	-	-	2.5	0.0	1
Floodprone Width (ft)	-	-	-	35.0	-	-	35.0	-	1	25.0	32.2	-	40	-	-	-	>50	-	33.4	-	-	33.4	0.0	1
Bankfull Mean Depth (ft)	-	-	-	0.7	-	-	0.7	-	1	-	-	-	-	-	-	-	1.6	-	0.3	-	-	0.3	0.0	1
Bankfull Max Depth (ft)	-	-	-	1.0	-	-	1.0	-	1	1.2	1.4	-	1.6	-	-	-	2.3	-	0.4	-	-	0.4	0.0	1
Bankfull Cross Sectional Area (ft <sup>2</sup> )				2.4	-	-	2.4	-	1	8.8	8.8	-	10	-	-	-	2.8	-	0.7	-	-	0.7	0.0	1
Width/Depth Ratio	-	-	-	3.5	-	-	3.5	-	1	5.2	8.4	-	10.5	-	-	-	6.1	-	8.6	-	-	8.6	0.0	1
Entrenchment Ratio	-	-	-	12.1	-	-	12.1	-	1	2.5	3.5	-	3.8	-	-	-	8.4	-	13.2	-	-	13.2	0.0	1
Bank Height Ratio	-	-	-	1.0	-	-	1.0	-	1	0.8	1.0	-	1.1	-	-	-	1.0	-	1.0	-	-	1.0	0.0	1
d50 (mm)	-	-	-	-	-	-	-	-	-	-	13.0	-	-	-	-	-	-	-	1.2	-	-	1.2	0	1
<b>Profile</b>																								
Riffle Length (ft)	-	-	-	-	-	-	-	-	-	4.0	6.6	-	10.0	-	-	4.0	6.6	-	10.0	-	-	27.0	7.2	35
Riffle Slope (ft/ft)	-	-	-	-	-	-	-	-	-	0.9	2.2	-	4.0	-	-	0.9	2.2	-	4.0	-	-	0.97	0.03	35
Pool Length (ft)	-	-	-	-	-	-	-	-	-	3.0	15.2	-	23.0	-	-	3.0	15.2	-	23.0	-	-	48.5	23.3	2
Pool Max Depth (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	0.2	2
Pool Spacing (ft)	-	-	-	-	-	-	-	-	-	0.8	1.6	-	2.5	-	-	0.8	1.6	-	2.5	-	-	72.0	n/a	1
<b>Pattern</b>																								
Channel Belt Width (ft)	-	-	-	-	-	-	-	-	-	20.0	33.0	-	53.0	-	-	-	-	-	53.0	-	-	15.4	1.1	3
Radius of Curvature (ft)	-	-	-	-	-	-	-	-	-	7.5	11.2	-	15.0	-	-	-	18.0	-	15.0	-	-	22.0	0.2	2
Rc: Bankfull Width (ft/ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.8	0.1	2
Meander Wavelength (ft)	-	-	-	-	-	-	-	-	-	25.0	41.0	-	56.0	-	-	-	-	-	56.0	-	-	102.9	19.7	5
Meander Width Ratio	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.1	-	-	-	-	6.2	0.4	2
<b>Substrate, Bed and Transport Parameters</b>																								
Reach Shear Stress (Competency) lb/ft <sup>2</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Max Part Size (mm) Mobilized at Bankfull	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stream Power (Transport Capacity) W/m <sup>2</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Additional Reach Parameters</b>																								
Drainage Area (mi <sup>2</sup> )	-	-	-	-	-	-	0.17	-	-	-	-	-	0.25	-	-	-	0.17	-	-	-	-	0.17	-	-
Rosgen Classification	-	-	-	-	-	-	E	-	-	-	-	-	E:F	-	-	-	E4	-	-	-	-	E4	-	-
Bankfull Velocity (fps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bankfull Discharge (cfs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-	-	-
Valley Length (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275	-
Channel Thalweg Length (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	294	-
Sinuosity	-	-	-	-	-	-	-	-	-	-	-	-	1.63	-	-	-	1.06	-	-	-	-	1.07	-	-
Water Surface Slope (ft/ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	-	-	-	-	0.005	-	-
Bankfull Slope (ft/ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	-	-	-	-	0.006	-	-
Bankfull Floodplain Area (acres)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% of Reach with Eroding Banks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Stability or Habitat Metric	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biological or Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

^ Channel Centerline (ft): Based on stream centerline stationing from design stream stationing; accounts for breaks in conservation easement and utility right-of-ways.

- Information unavailable.

Non-Applicable.

**Table 9a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)**  
**Harrell Mitigation Site**

	Cross Section 1 (Pool) Harrell Creek Reach 1C								Cross Section 2 (Riffle) Harrell Creek Reach 1C								Cross Section 3 (Pool) Harrell Creek Reach 1C							
<b>Dimension</b>	<b>Base</b>	<b>MY1</b>	<b>MY2</b>	<b>MY3</b>	<b>MY4</b>	<b>MY5</b>	<b>MY6</b>	<b>MY7</b>	<b>Base</b>	<b>MY1</b>	<b>MY2</b>	<b>MY3</b>	<b>MY4</b>	<b>MY5</b>	<b>MY6</b>	<b>MY7</b>	<b>Base</b>	<b>MY1</b>	<b>MY2</b>	<b>MY3</b>	<b>MY4</b>	<b>MY5</b>	<b>MY6</b>	<b>MY7</b>
Record Elevation (datum) Used	2179.7	2179.8	2179.7	2179.9					2179.6	2179.6	2179.7	2179.8					2178.4	2178.3	2178.3	2178.3				
Low Bank Height Elevation (datum) Used	2179.7	2179.7	2179.6	2179.7					2179.8	2179.8	2179.8	2179.8					2178.6	2178.3	2178.3	2178.2				
Bankfull Width (ft)	9.6	20.4	11.0	8.4					6.2	6.8	6.9	7.0					5.2	6.8	5.3	5.4				
Floodprone Width (ft)	50.0	50.0	50.0	50.0					50.0	50.0	50.0	50.0					50.0	50.0	50.0	50.0				
Bankfull Mean Depth (ft)	0.6	0.3	0.6	0.7					0.6	0.5	0.5	0.5					1.0	0.8	1.0	1.0				
Bankfull Max Depth (ft)	1.9	1.2	1.5	1.5					0.9	0.9	0.9	1.0					1.6	1.6	1.6	1.5				
Bankfull Cross Sectional Area (ft <sup>2</sup> )	6.0	6.0	6.0	6.0					3.4	3.4	3.4	3.4					5.3	5.3	5.3	5.3				
Bankfull Width/Depth Ratio	15.2	69.1	19.9	11.8					11.2	13.7	14.1	14.5					5.1	8.8	5.2	5.4				
Bankfull Entrenchment Ratio	5.2	2.5	4.6	6.0					8.1	7.4	7.2	7.1					9.6	7.4	9.5	9.3				
Bankfull Bank Height Ratio	1.0	0.9	0.9	0.9					1.1	1.2	1.1	1.0					1.1	1.0	1.0	0.9				
Low Top of Bank Depth (ft)	1.9	1.1	1.3	1.3					1.0	1.0	1.0	1.0					1.8	1.6	1.7	1.4				
	Cross Section 4 (Riffle) Harrell Creek Reach 1C								Cross Section 5 (Riffle) Harrell Creek Reach 1D								Cross Section 6 (Pool) Harrell Creek Reach 1D							
<b>Dimension</b>	<b>Base</b>	<b>MY1</b>	<b>MY2</b>	<b>MY3</b>	<b>MY4</b>	<b>MY5</b>	<b>MY6</b>	<b>MY7</b>	<b>Base</b>	<b>MY1</b>	<b>MY2</b>	<b>MY3</b>	<b>MY4</b>	<b>MY5</b>	<b>MY6</b>	<b>MY7</b>	<b>Base</b>	<b>MY1</b>	<b>MY2</b>	<b>MY3</b>	<b>MY4</b>	<b>MY5</b>	<b>MY6</b>	<b>MY7</b>
Record Elevation (datum) Used	2178.3	2178.4	2178.4	2178.4					2174.5	2174.3	2174.2	2174.2					2174.3	2174.4	2173.9	2174.0				
Low Bank Height Elevation (datum) Used	2178.3	2178.4	2178.4	2178.4					2174.5	2174.4	2174.5	2174.2					2174.3	2174.3	2173.9	2174.1				
Bankfull Width (ft)	6.8	7.1	6.9	6.0					2.5	4.4	5.8	0.4					6.1	20.0	5.5	7.1				
Floodprone Width (ft)	50.0	50.0	50.0	50.0					33.4	33.4	33.4	33.4					38.3	38.3	38.3	38.3				
Bankfull Mean Depth (ft)	0.5	0.5	0.5	0.6					0.3	0.2	0.1	0.4					0.7	0.2	0.8	0.6				
Bankfull Max Depth (ft)	1.2	1.1	1.1	1.1					0.4	0.3	0.6	0.5					1.3	1.1	1.0	1.1				
Bankfull Cross Sectional Area (ft <sup>2</sup> )	3.6	3.6	3.6	3.6					0.7	0.7	0.7	0.7					4.5	4.5	4.5	4.5				
Bankfull Width/Depth Ratio	12.6	14.2	13.4	10.1					8.6	29.6	46.4	4.9					8.3	89.9	6.8	11.0				
Bankfull Entrenchment Ratio	14.8	7.0	7.2	8.3					13.2	7.5	5.8	18.5					6.3	1.9	6.9	5.4				
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0					1.0	1.1	1.4	1.0					1.0	0.9	1.0	1.1				
Low Top of Bank Depth (ft)	1.2	1.1	1.1	1.2					0.4	0.3	0.8	0.4					1.3	1.0	1.1	1.2				

- Information Unavailable

N/A - Information does not apply.



# Appendix E

## Hydrologic Data

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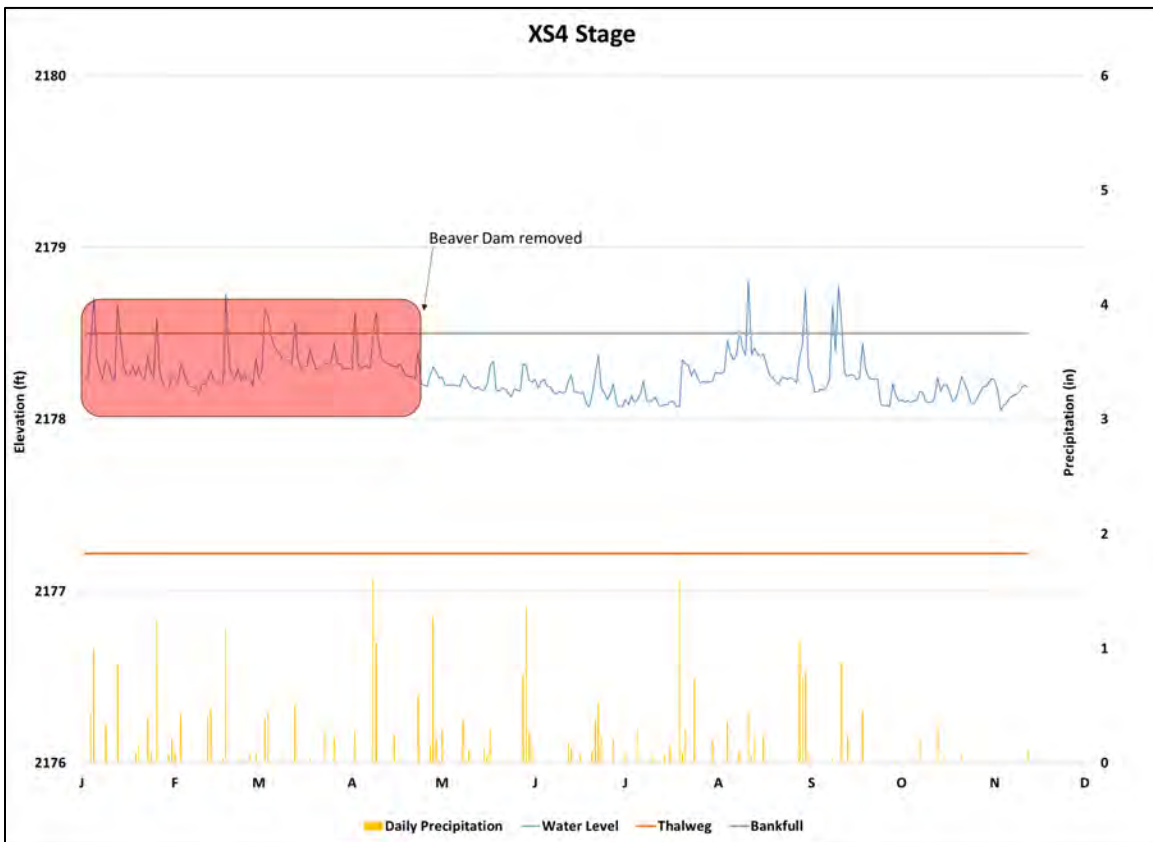
**Table 10. Verification of Bankfull Events  
Harrell Creek Mitigation Project**

Reach 1					
Date of Data Collection	Date of Occurrence	Method	Feet Above Bankfull Elevation	Photo # (if available)	Monitoring Year
4/1/2020	2/6/2020	Stage Recorder	0.43	n/a	MY1
4/1/2020	2/11/2020	Stage Recorder	< 0.1	n/a	
4/1/2020	2/13/2020	Stage Recorder	0.2	n/a	
4/1/2020	3/25/2020	Stage Recorder	0.23	n/a	
9/10/2020	4/13/2020	Stage Recorder	0.42	n/a	
9/10/2020	6/14 - 6/15/2020	Stage Recorder	0.39	n/a	
9/10/2020	7/1 & 7/3/2020	Stage Recorder	0.38	n/a	
9/10/2020	7/20, 7/22, and 7/24/2020	*Stage Recorder	Unknown	n/a	
9/10/2020	7/28/2020	Stage Recorder	0.27	n/a	
9/10/2020	8/21-8/22/2020	Wrack Lines	0.35	n/a	
9/29/2021	1/1/2021	Stage Recorder	0.14	n/a	MY2
9/29/2021	2/18/2021	Stage Recorder	0.11	n/a	
9/29/2021	3/1/2021	Stage Recorder	0.09	n/a	
9/29/2021	3/25/2021	Stage Recorder	0.24	n/a	
9/29/2021	3/31/2021	Stage Recorder	0.07	n/a	
9/29/2021	5/4/2021	+Stage Recorder	0.16	n/a	
6/30/2022	3/31/2022	Stage Recorder	0.21	n/a	MY3
6/30/2022	4/5/2022	Stage Recorder	0.10	n/a	
6/30/2022	*5/23/2022-5/26/2022	Stage Recorder	0.50	n/a	
11/30/2022	11/30/2022	Stage Recorder	< 0.1	n/a	
11/23/2023	8/11/2023	Stage Recorder	0.30	n/a	MY4
11/23/2023	8/30/2023	Stage Recorder	0.25	n/a	
11/23/2023	9/10/2023	Stage Recorder	0.27	n/a	

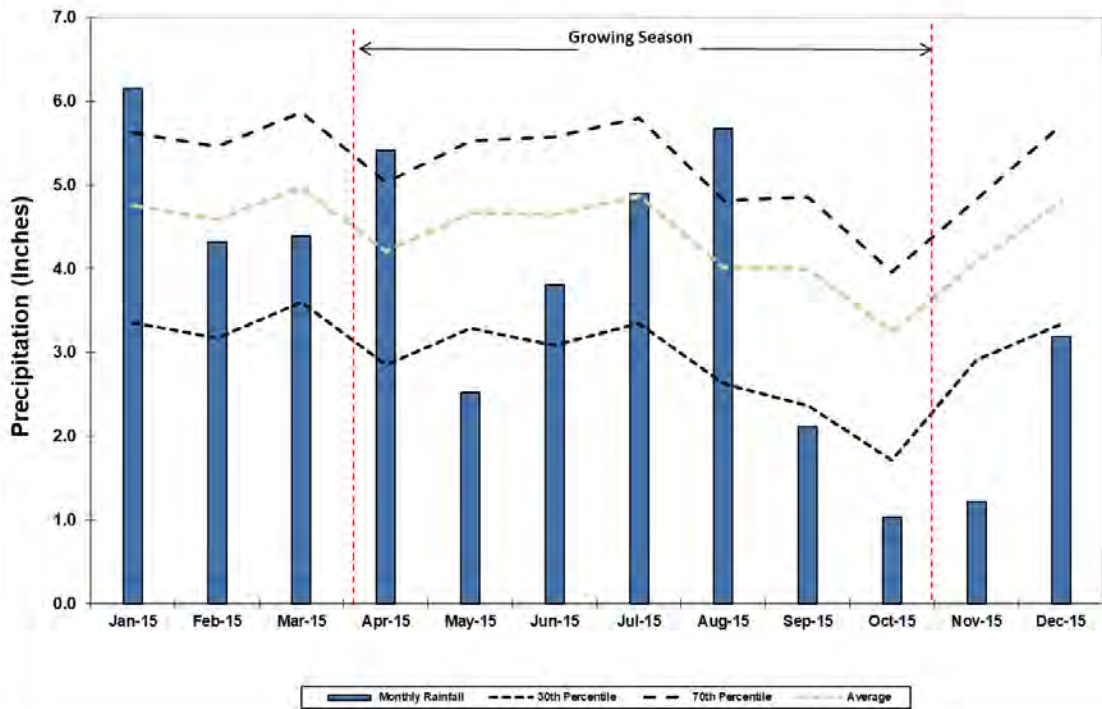
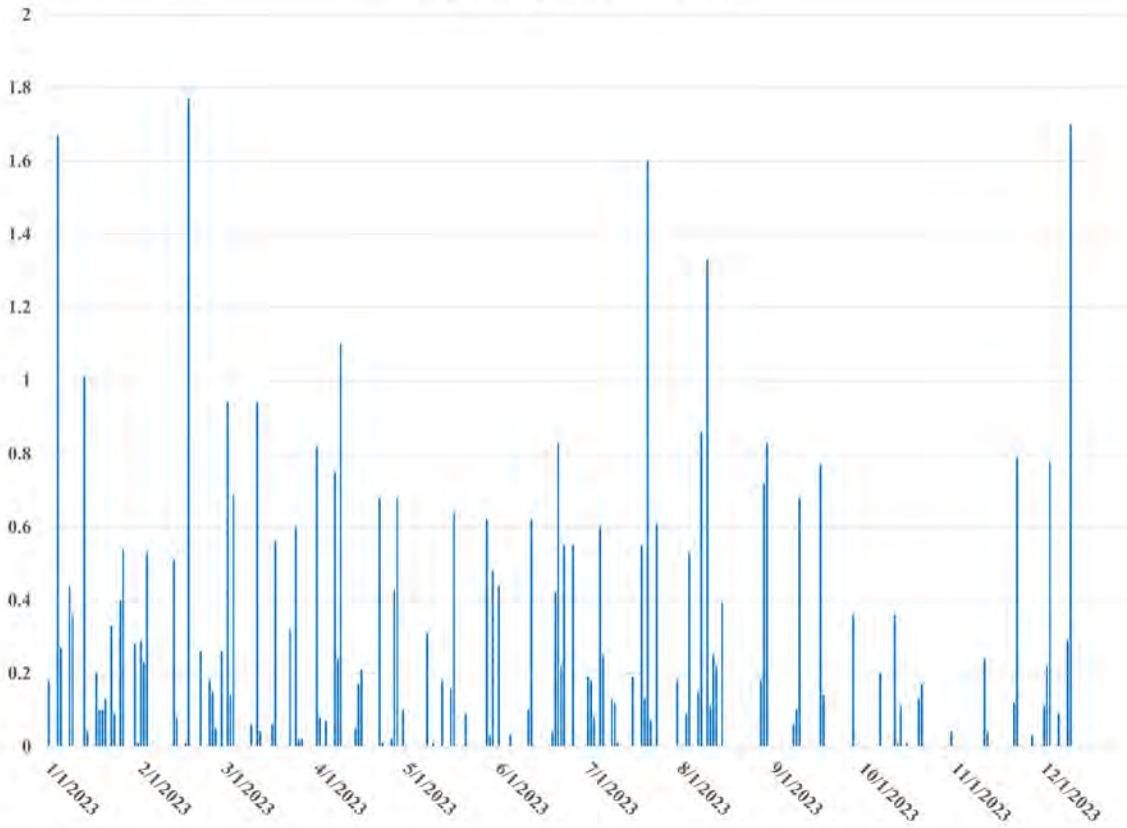
\* Crest Gage recorded abnormally high bankfull event relative to rainfall. True event elevation undetermined.

+ Stage recorder failed on May 6, 2021.

• Near-continuous bankfull recorded over a four day rain event (6.12 inches)

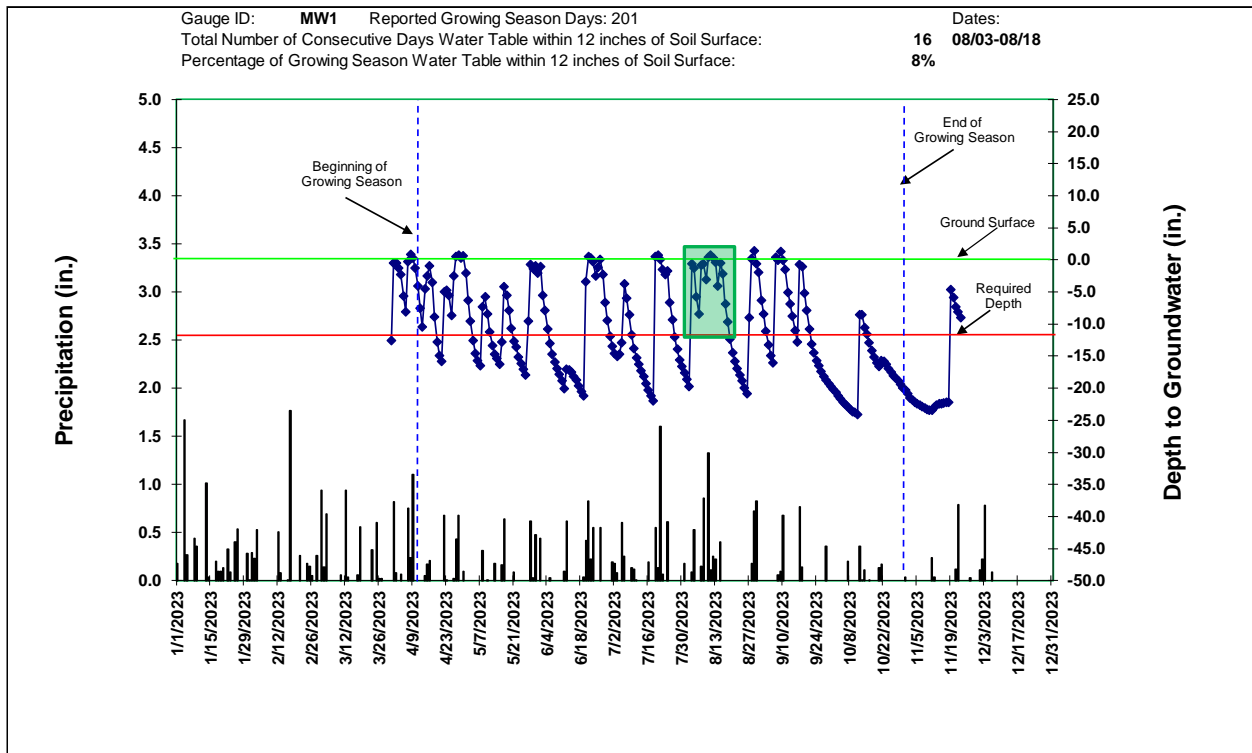


Daily Precipitation (inches)



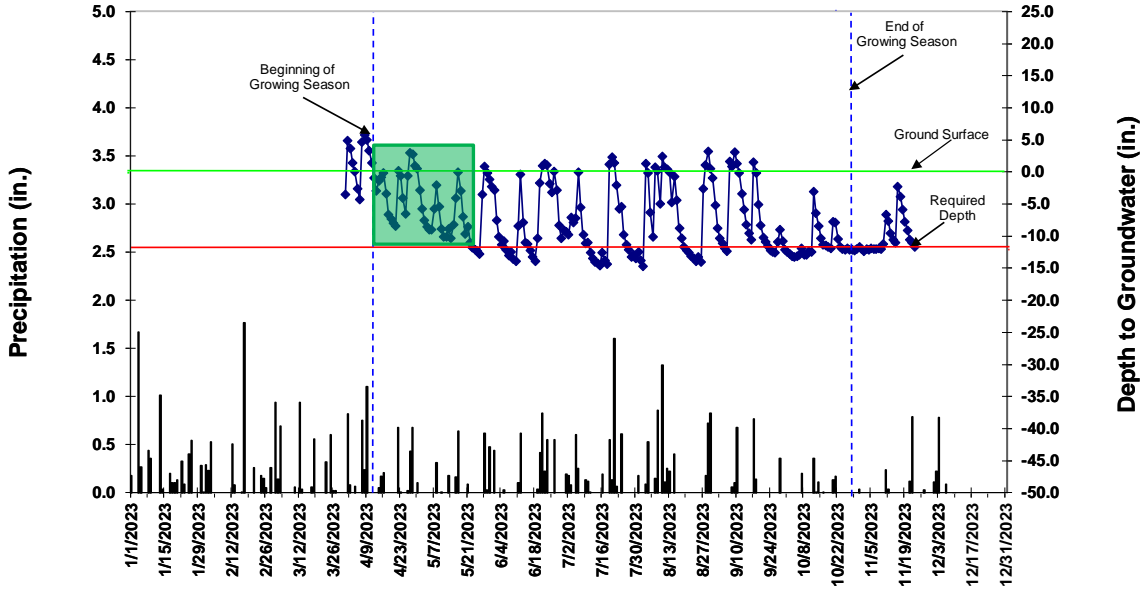
Monitoring Gauge	Performance Standard: 12 %						
	WETS Station: Cullowhee, NC						
	Growing Season: 4/11 to 10/28 (201 days)						
Max. Consecutive Hydroperiod (%)							
	MY-1 (2020)	MY-2 (2021)	MY-3 (2022)	MY-4 (2024)	MY-5 (2025)	MY-6 (2026)	MY-7 (2027)
MW-1	22	11	10	8	-	-	-
MW-2	17	12	9	21	-	-	-
MW-3	24	50	47	47	-	-	-
MW-4	71	85	100	100	-	-	-
MW-5	3	5	3	2	-	-	-
MW-6	76	85	84	100	-	-	-
MW-7	3	5	3	2	-	-	-
MW-8	51	13*	79	28	-	-	-
MW-9	100	85	100	100	-	-	-
SMW-1	-	-	-	3	-	-	-
SMW-2	-	-	-	2	-	-	-
Meets	Fails to meet						

\*Gauge failed to reset after deployment, MY2 results are reflective of the period after reset.



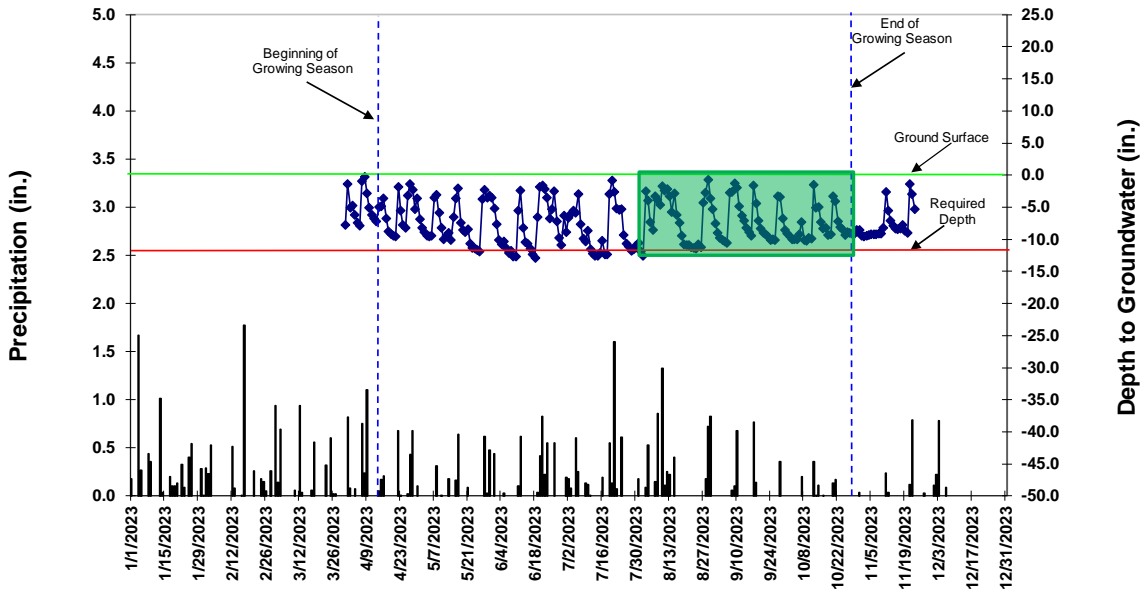
Gauge ID: **MW2** Reported Growing Season Days: 201  
Total Number of Consecutive Days Water Table within 12 inches of Soil Surface:  
Percentage of Growing Season Water Table within 12 inches of Soil Surface:

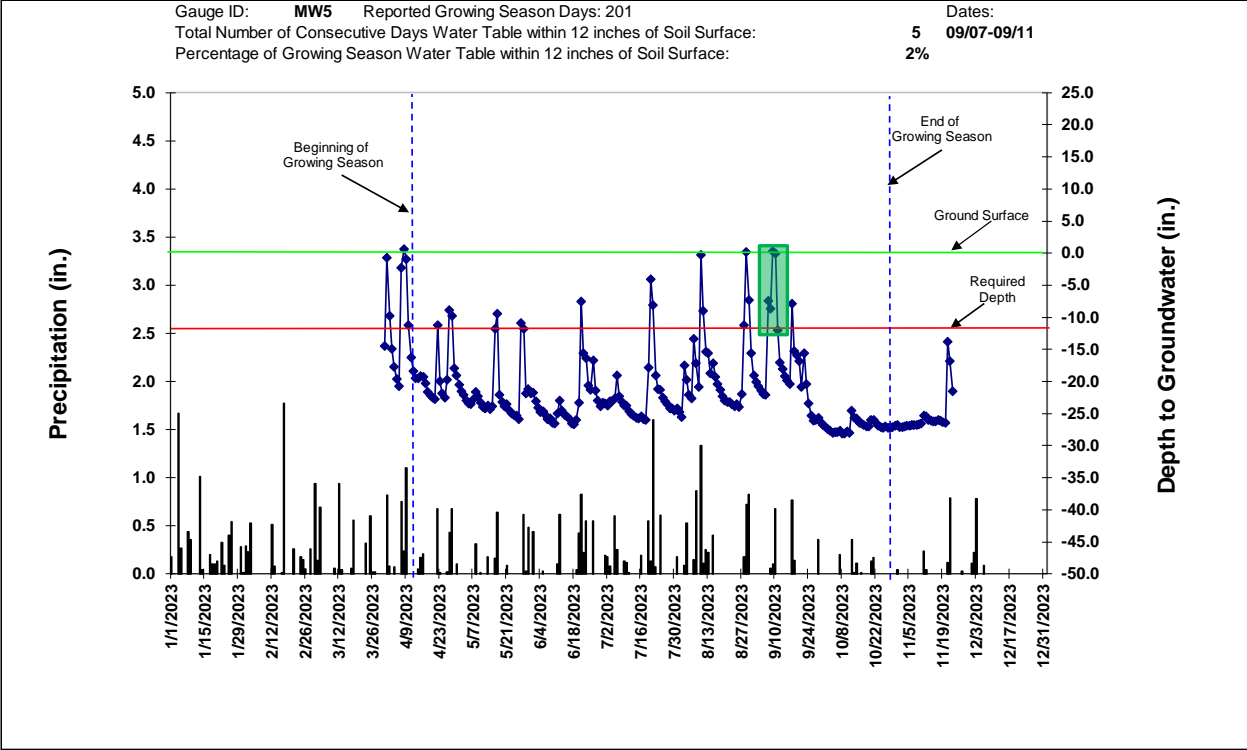
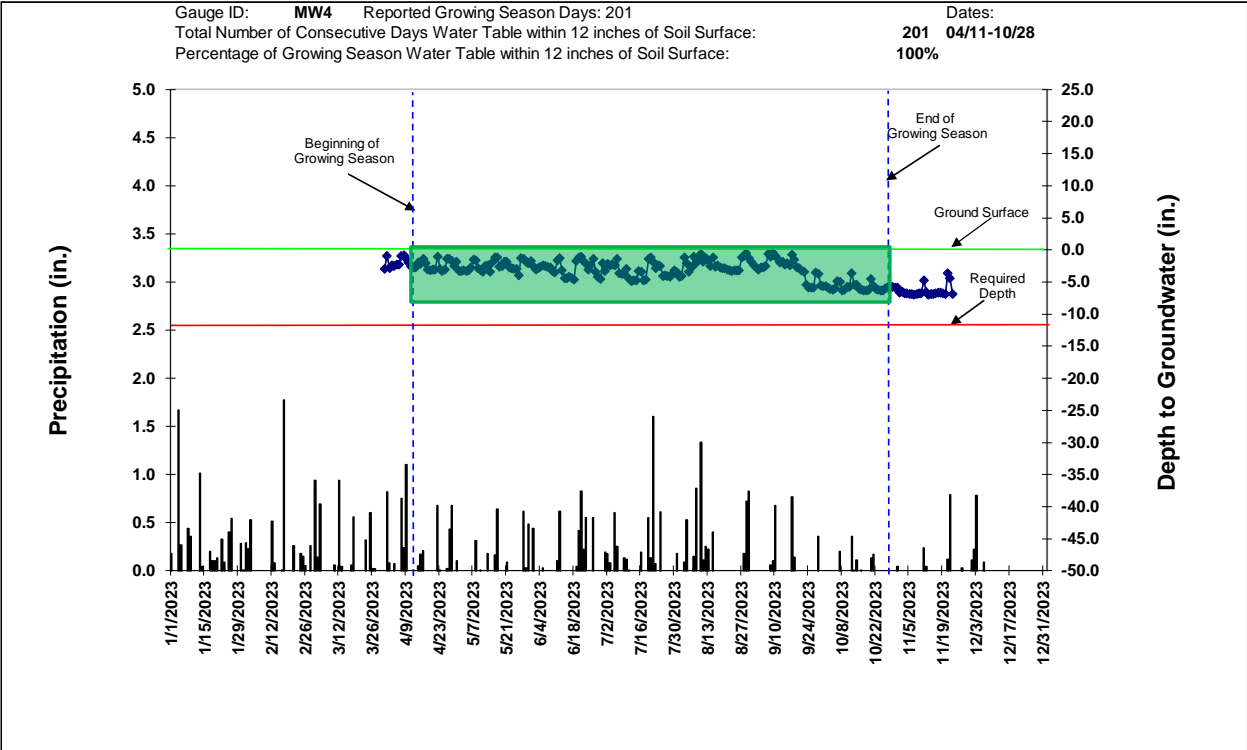
Dates: **43 04/11-05/23**  
**21%**

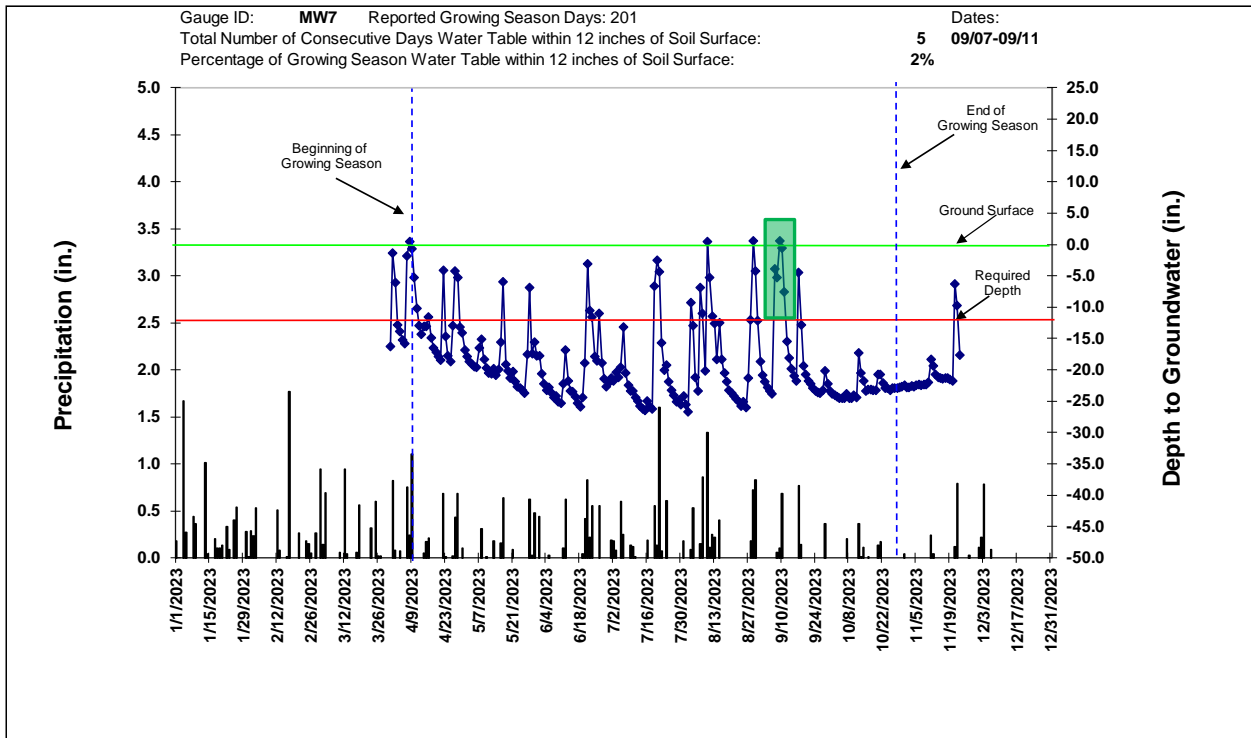
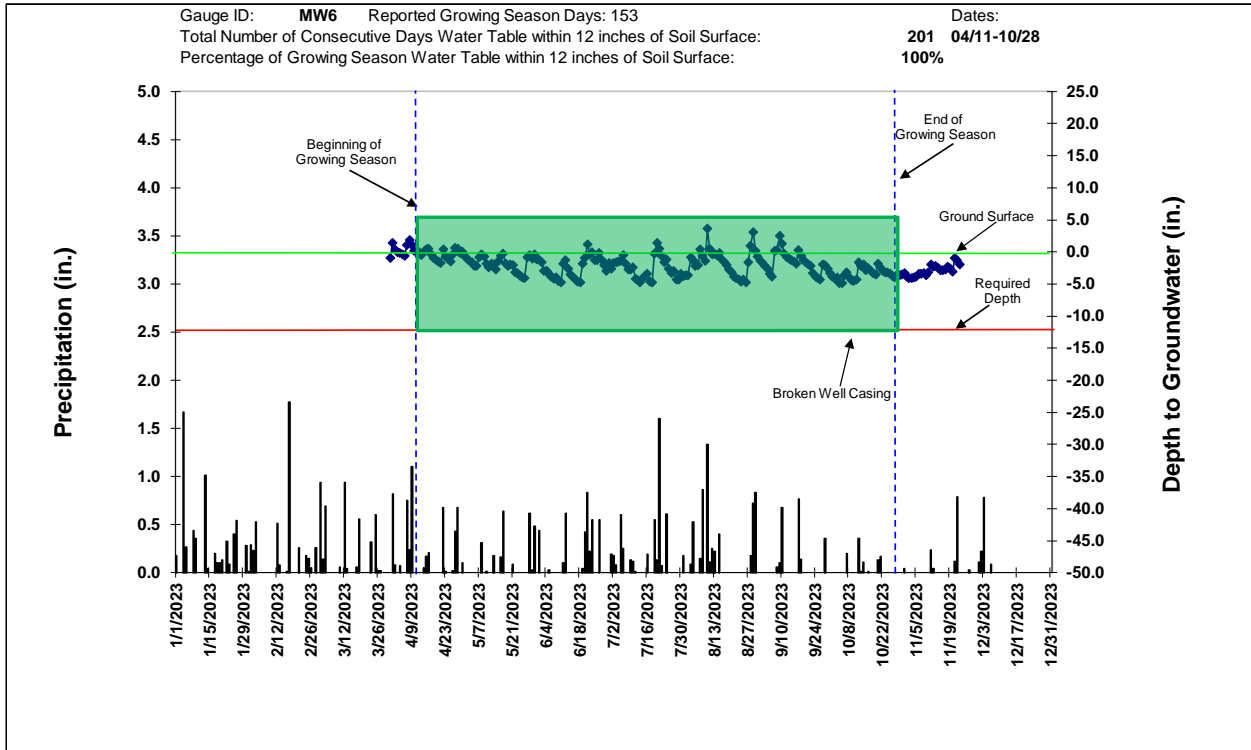


Gauge ID: **MW3** Reported Growing Season Days: 201  
Total Number of Consecutive Days Water Table within 12 inches of Soil Surface:  
Percentage of Growing Season Water Table within 12 inches of Soil Surface:

Dates: **95 07/26-10/28**  
**47%**

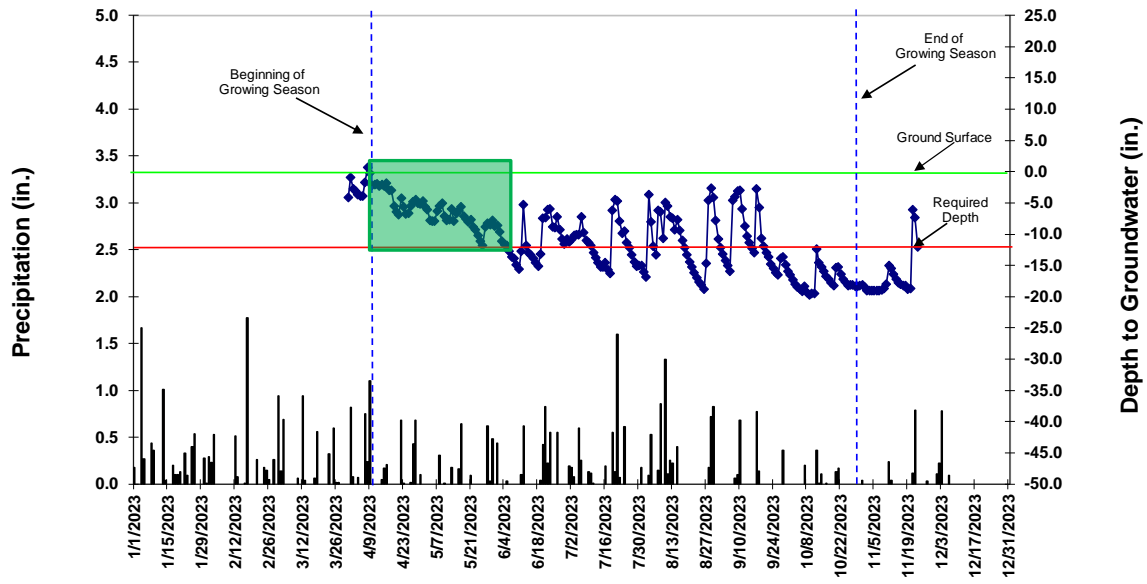






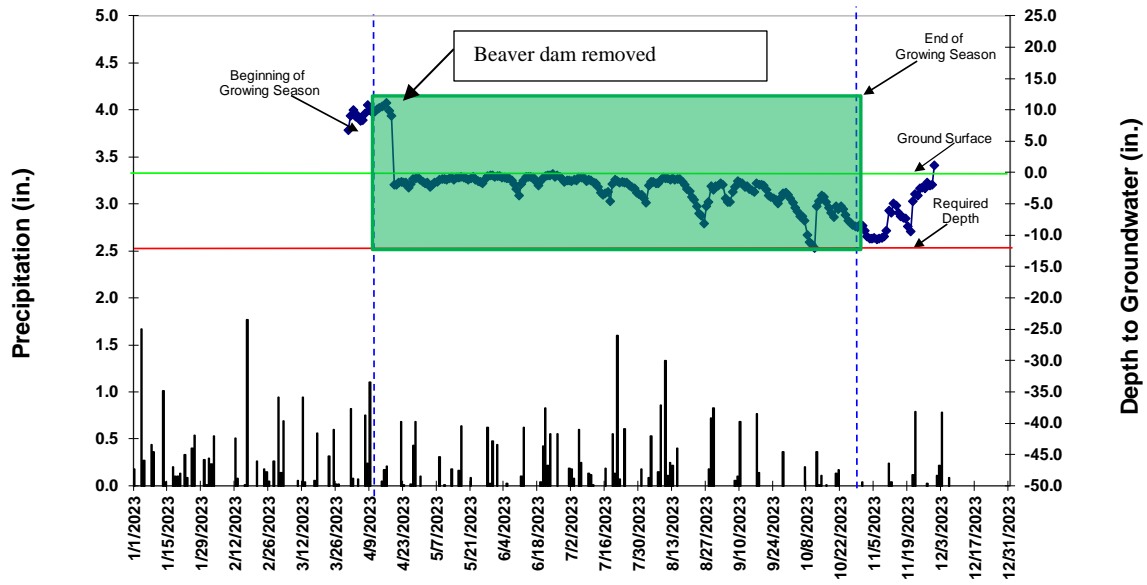
Gauge ID: **MW8** Reported Growing Season Days: 201  
Total Number of Consecutive Days Water Table within 12 inches of Soil Surface:  
Percentage of Growing Season Water Table within 12 inches of Soil Surface:

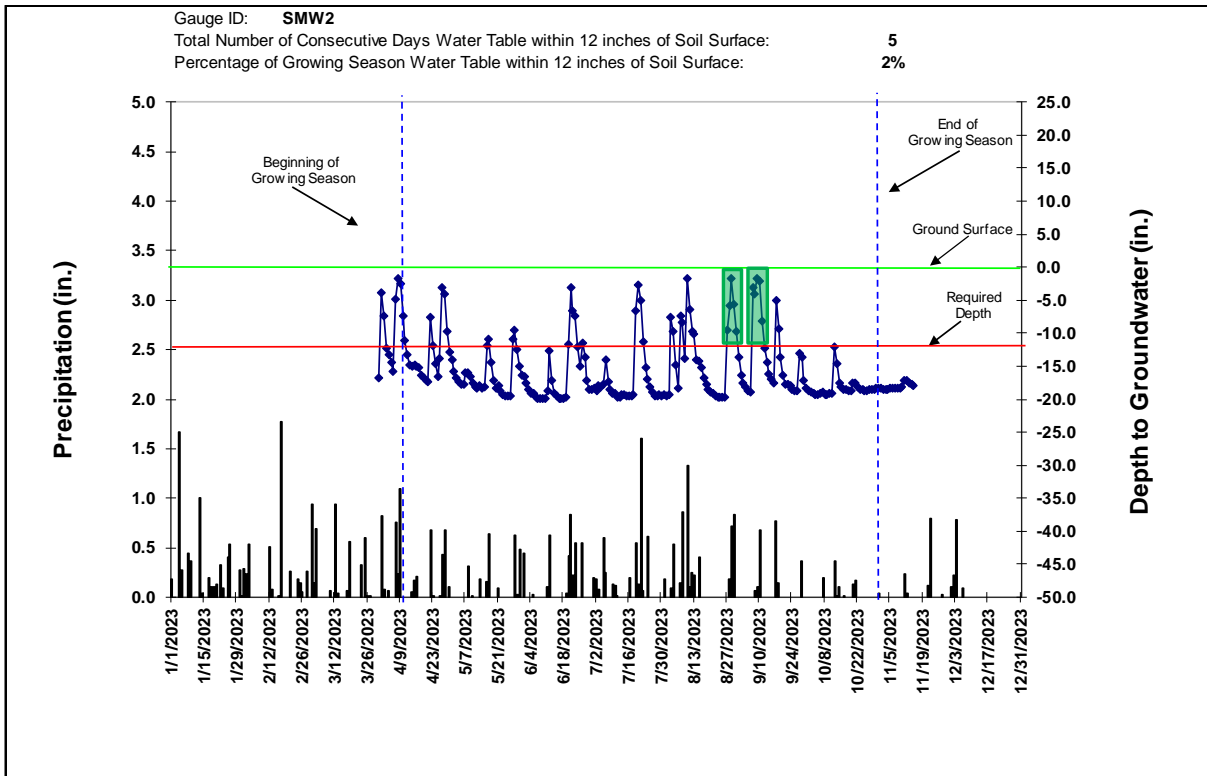
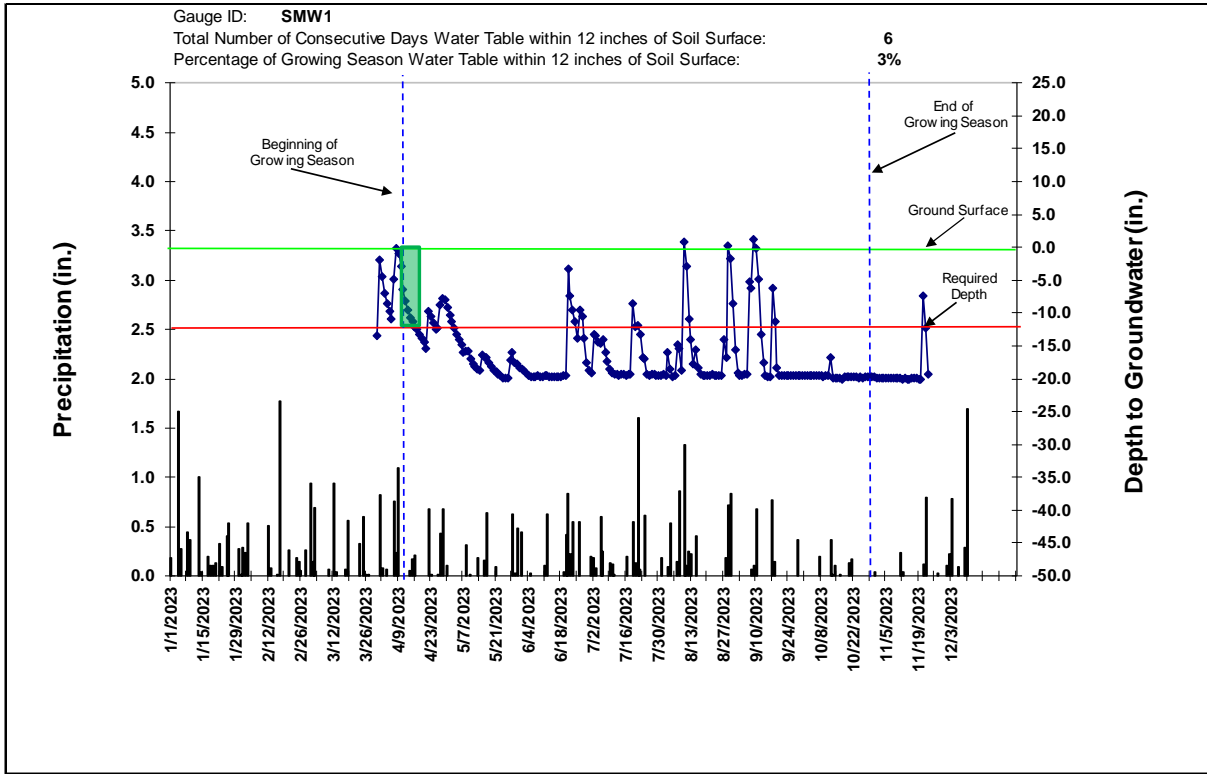
Dates:  
**56 04/11-06/05**  
**28%**



Gauge ID: **MW9** Reported Growing Season Days: 201  
Total Number of Consecutive Days Water Table within 12 inches of Soil Surface:  
Percentage of Growing Season Water Table within 12 inches of Soil Surface:

Dates:  
**201 04/11-10/28**  
**100%**







Appendix F  
MY4 Supplemental Information

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MY4 Supplemental Planting Summary				
Scientific Name	Common Name	Material	Number	Indicator Status
<i>Alnus serrulata</i>	Tag alder	1g	16	OBL
<i>Swida amomum</i>	Silky dogwood	1g	16	FACW
<i>Platanus occidentalis</i>	Sycamore	1g	16	FACW
<i>Cephalanthus occidentalis</i>	Button Bush	1g	16	OBL
<i>Sambucus canadensis</i>	Elderberry	1g	16	FAC
<i>Lindera benzoin</i>	Spicebush	1g	20	FAC

\* Supplemental planting was conducted on March 2, 2023 in areas of mowing encroachment at the Reach B/C transition and at the Reach C/D transition.

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