MONITORING YEAR 7 ANNUAL/CLOSEOUT REPORT

Final

HENRY FORK MITIGATION SITE

Catawba County, NC
DEQ Contract No. 005782
DMS Project No. 96306
USACE No. 2014-00538
DWR No. 20140193

Catawba River Basin
HUC 03050103 Expanded Service Area

Data Collection Period: January – November 2022
Draft Submission Date: November 30, 2022
Final Submission Date: January 17, 2023

PREPARED FOR:

NC Department of Environmental Quality
Division of Mitigation Services
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January 17, 2023

Mr. Matthew Reid
Western Project Manager
Division of Mitigation Services - Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

RE: **Response to MY7 Draft Report Comments**
Henry Fork Mitigation Project
DMS Project # 96306
Contract Number 005782
RFP Number 16-005298
Catawba River Basin – CU# 03050103 Expanded Service Area
Catawba County, North Carolina

Dear Mr. Reid:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services (DMS) comments from the Draft Monitoring Year 7 report for the Henry Fork Mitigation Project. DMS' comments are noted below in **bold**. Wildlands' responses to those comments are noted in *italics*.

DMS comment: As noted in the report, Henry Fork will be presented to the IRT for regulatory closeout in 2023. Thank you for presenting the closeout summary framing the project for closeout and including the additional vegetation table.

Wildlands' response: You're welcome.

DMS comment: On August 4, 2022, WEI, DMS and DEQ Stewardship Program met onsite for the purpose of viewing the site and receiving acceptance to transfer for Long Term Stewardship. Two items were identified on site that will need to be resolved prior to the site being accepted into the program. Please provide updates on the following two items:

1. **Cement blocks were placed within the conservation easement on UT1B near VP2. Blocks must be removed from inside the easement.**
    - **Resolution required by Stewardship: Please submit georeferenced photo documenting removal of blocks from the easement area.**
2. **Discontinue access through trail utilized by Disc Golf Course.**
    - **Resolution required by Stewardship: Submit georeferenced photos to document physical barrier to the trail has been established on both ends of trail. Physical barriers may include t-posts/u-channels with signage, logs placed across the trail, fencing, etc. Please include correspondence from Disc Golf Course acknowledging discontinued use of trail.**

Wildlands' response: A photolog documenting the resolution of the two items identified by DEQ Stewardship has been added to Appendix 2 and the georeferenced photos have been added to the electronic support files. See below for specific updates to each item:

1. *The cement blocks have been removed from the easement.*
2. *A physical barrier by means of posts, fencing, and signage has been added to each end of the path to remind people not to cross through the easement. Wildlands has verbally communicated with the disc golf course, and they have cooperated to discontinue use of the path. Wildlands will aim to provide written correspondence by the time of closeout.*

DMS comment: Conservation Easement: Report indicates footpath was discontinued. WEI has worked to revegetate the path by reseeding and adding soil amendments. As noted above, in order for the site to be approved for long term stewardship transfer, additional actions will need to occur for stewardship to be confident that the trail has been abandoned and is no longer in use. Has the disc golf course modified the hole that plays over the conservation easement that required the path?

Wildlands' response: The disc golf course has discontinued use of the hole that played over the conservation easement so that there is no longer a need for the path.

DMS comment: Recommend revising "approved narrow footpath" to "narrow footpath". The conservation easement does not allow for the construction or maintenance of trails or commercial uses within the conservation easement as noted in Section II Grantor Reserved Uses and Restricted Activities portion of the conservation easement document. The trail has never been approved for the commercial use of the frisbee golf course.

Wildlands' response: The sentence has been revised to "narrow footpath".

Digital Files Review

DMS comment: No comments

Wildlands' response: Noted.

Enclosed please find two (2) hard copies and one (1) electronic copy on USB of the Final Monitoring Report. Please contact me at 828-545-3865 if you have any questions.

Sincerely,

Jake McLean
Project Manager
jmclean@wildlandseng.com

EXECUTIVE SUMMARY

Wildlands Engineering Inc. (Wildlands) implemented a full delivery project at the Henry Fork Mitigation Site (Site) for the North Carolina Division of Mitigation Services (DMS) to restore 3,057 linear feet (LF) of perennial streams, enhance 2,626 LF of intermittent streams, enhance 0.68 acres of existing wetlands, rehabilitate 0.25 acres of existing wetlands, and re-establish 3.71 acres of wetlands in Catawba County, NC. The Site is expected to generate 4,807.667 stream mitigation units (SMUs) and 4.222 wetland mitigation units (WMUs) (Table 1). The Site is located near the City of Hickory in Catawba County, NC, in the Catawba River Basin eight-digit Cataloging Unit (CU) 03050102 and the 14-digit Hydrologic Unit Code (HUC) 03050102010030 (Figure 1).

The project's compensatory mitigation credits will be used in accordance with the In-Lieu Fee (ILF) Program Instrument dated July 28, 2010, the expanded service area as defined under the September 12, 2006 PACG memorandum, and/or DMS acceptance and regulatory permit conditions associated with DMS ILF requirements. Hydrologic Unit Code (HUC) 03050102010030, Lower Henry Fork, was identified as a Targeted Local Watershed (TLW) in the DMS 2007 Catawba River Basin Restoration Priority (RBRP) Plan. The project streams consist of four unnamed tributaries (UTs) to the Henry Fork River on the site of a former golf course, referred to herein as UT1, UT2, UT1A, and UT1B (Figure 2). The project also consists of several wetland restoration components, as well as buffer planting along Henry Fork. The project watershed consists of agricultural, forested, and residential land uses.

The project goals established in the Mitigation Plan (Wildlands, 2015) were completed with careful consideration of goals and objectives that were described in the RBRP and to meet DMS mitigation needs while maximizing the ecological and water quality uplift within the watershed. The established project goals include:

- Permanently protect the project site from harmful uses;
- Correct modifications to streams, wetlands, and buffers;
- Improve and re-establish hydrology and function of previously cleared wetlands;
- Reduce current erosion and sedimentation;
- Reduce nutrient inputs to streams and wetlands and downstream water bodies;
- Improve instream habitat; and
- Provide and improve terrestrial habitat and native floodplain forest.

The Site construction and as-built surveys were completed between November 2015 and March 2016. Monitoring Year (MY) 7 assessments and site visits were completed between January and November 2022.

This is the seventh and final monitoring year (MY7) as established in the Mitigation Plan (Wildlands, 2015). The Site will be presented to the NC IRT for regulatory closeout in 2023. Overall, the Site has met the required stream, hydrology, and vegetation success criteria for MY7 with only minimal exceptions in stem height, as described below. All restored and enhanced streams are stable and functioning as designed with cross-section dimensions exhibiting minimal adjustments compared to as-built. The Site met the final bankfull performance criteria in MY4, and all project streams recorded at least one bankfull event in MY7. The two intermittent streams (UT1A and UT2) met the 30 consecutive day flow requirement in MY7 and have consistently done so for the past five monitoring years (MY3 – MY7). The average planted stem density for the Site is 577 stems per acre with all vegetation plots exceeding the final density criteria of 210 stems per acre. The average stem height for the Site is 8.5 feet and is on track to meet the final height requirement of 10 feet in the closeout year. Fourteen of the fifteen groundwater monitoring gages (GWG) installed on the Site met or exceeded the hydrologic success criteria for MY7. Throughout the post-construction monitoring period, apart from GWG 8, all remaining

GWGs have individually met hydrologic success criteria for a majority of the monitoring years. The MY7 visual assessments revealed minor areas of concern which included pockets of invasive plant species, areas of low stem growth, and beaver activity. These areas will continue to be monitored and adaptive management will be performed as needed through closeout.

HENRY FORK MITIGATION SITE

Monitoring Year 7 Annual/Closeout Report

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APPENDICES

Section 1: PROJECT OVERVIEW

The Henry Fork Mitigation Site (Site) is located near the City of Hickory in Catawba County, NC, in the Catawba River Basin eight-digit Cataloging Unit (CU) 03050102 and the 14-digit Hydrologic Unit Code (HUC) 03050102010030 (Figure 1). Access to the Site is via Mountain View Road, approximately one mile southwest of Hickory, North Carolina. Situated in the Inner Piedmont Belt of the Piedmont Physiographic Province (USGS, 1998), the project watershed consists of agricultural, forested, and residential land uses. The drainage area for the Site is 178 acres (0.28 square miles).

The project streams consist of four unnamed tributaries (UTs) to the Henry Fork River on the site of a former golf course, referred to herein as UT1, UT2, UT1A, and UT1B. Stream restoration reaches included UT1 (Reach 1 and 2) and UT1B, together comprising 3,057 linear feet (LF) of perennial stream channel. Stream enhancement reaches included UT1A and UT2, together totaling 2,626 LF. Stream enhancement activities for UT1A and UT2 were the same as restoration reaches; however, the tributaries are intermittent and were credited as enhancement. The riparian areas of the tributaries and a 100-foot-wide buffer along the project side of Henry Fork, were planted with native vegetation to improve habitat and protect water quality. Wetland components included enhancement of 0.68 acres of existing wetlands, rehabilitation of 0.25 acres of existing wetlands and re-establishment of 3.71 acres of wetlands.

Construction activities were completed by Land Mechanic Designs, Inc. in March 2016. Planting and seeding activities were completed by Bruton Natural Systems, Inc. in March 2016. A conservation easement has been recorded and is in place on 48.06 acres (Deed Book 03247, Page Number 0476-0488) within a tract owned by WEI-Henry Fork, LLC. The project is expected to generate 4,807.667 Stream Mitigation Units (SMUs) and 4.222 Wetland Mitigation Units (WMUs). Annual monitoring has been conducted for seven years. Close-out is anticipated to commence in 2023 given the success criteria are met. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

Directions and a map of the Site are provided in Figure 1 and project components are illustrated for the Site in Figure 2.

1.1 Project Goals and Objectives

The Site will help meet the goals for the watershed outlined in the RBRP and provide numerous ecological benefits within the Catawba River Basin. While many of these benefits are limited to the Henry Fork project area, others, such as pollutant removal, reduced sediment loading, and improved aquatic and terrestrial habitat, have farther-reaching effects. Expected improvements to water quality and ecological processes are outlined below as project goals and objectives. These project goals established were completed with careful consideration of goals and objectives that were described in the RBRP and to meet the DMS mitigation needs while maximizing the ecological and water quality uplift within the watershed.

The following project specific goals established in the Mitigation Plan (Wildlands, 2015) include:

- Permanently protect the project site from harmful uses; and
- Correct modifications to streams, wetlands and buffers;
- Improve and re-establish hydrology and function of previously cleared wetlands;
- Reduce current erosion and sedimentation;
- Reduce nutrient inputs to streams and wetlands, and to downstream water bodies;
- Improve instream habitat; and

- Provide and improve terrestrial habitat and native floodplain forest.

The project goals were addressed through the following project objectives:

- Decommissioning the existing golf course and establishing a conservation easement on the Site will eliminate direct chemical fertilizer, pesticide, and herbicide inputs;
- Resizing and realigning channels to address stream dredging and ditching. Planting native woody species in riparian zones which have been maintained through mowing. By correcting these prior modifications, the channels and floodplains will provide a suite of hydrologic and biological function;
- Restoring appropriate stream dimensions and juxtaposition of streams and wetlands on the landscape. Wetlands will be enhanced through more frequent overbank flooding, and by reducing the drawdown effect that current ditched channels have on wetland hydrology; thereby, enhancing wetland connectivity to the local water table. The project will extend existing wetland zones into adjacent areas and support wetland functions;
- Removing historic overburden to uncover relic hydric soils. Roughen wetland re-establishment. Restore streams for wetland benefit. Each of these will bring local water table elevations closer to the ground surface. Create overbank flooding and depressional storage for overland and overbank flow retention. Decrease direct runoff, and increase infiltration;
- Planting a native vegetation community on the Site to revegetate the riparian buffers and wetlands. Conduct soil restoration through topsoil harvesting and reapplication and leaf litter harvesting and application from adjacent forested areas. This will return functions associated with buffers and forested floodplains, as well as enhance soil productivity and bring native biological activity and seed into the disturbed areas;
- Constructing diverse and stable channel form with varied stream bedform and installing habitat features, along with removing culverts. These will allow aquatic habitat quality and connectivity enhancement; and
- Placing a portion of the right bank Henry Fork floodplain under a conservation easement, and planting all stream buffers and wetlands with native species. Creating a 100-foot wide corridor of wooded riparian buffer along that top right bank area and re-establishing native plant communities and habitat connectivity within Site to adjoining natural areas along the river corridor.

1.2 Monitoring Year 7 Data Assessment

Annual monitoring was conducted between January and November 2022 to assess the condition of the project. The stream, vegetation, and hydrologic success criteria for the Site follows the approved success criteria presented in the Henry Fork Mitigation Plan (Wildlands, 2015).

1.2.1 Stream Assessment

Morphological surveys for MY7 were conducted in March 2022. Throughout the Site, the cross-section (XS) survey results indicate that channel dimensions are stable and continuing to perform with minimal adjustments compared to as-built. Some reduction in cross-sectional area is present in XS4 along UT1 Reach 1 and XS8 along UT1A but is not considered to be an area of concern since depths are being maintained and the reaches are still functioning as single thread channels. The reduction in max pool depth at XS2 along UT1 Reach 1, observed in previous years, has stabilized in MY7. Riffle cross-section 10 along UT1B experienced an apparent increase in both bed and bank elevations due to alluvial deposition but dimensions remain similar to prior years and is not considered an area of concern. Please refer to Appendix 4 for the cross-section plots and morphology tables.

Based on a DMS Technical Workgroup memo from 10/19/2021 and concurrence by the DMS project manager received on 10/27/2021, pebble count collection is no longer required for MY1 through MY7 unless requested by the IRT. Therefore, pebble counts were not conducted during MY7. A copy of the DMS Technical Workgroup Memo and the email confirmation from the DMS project manager are found in Appendix 4.

1.2.2 Stream Hydrology Assessment

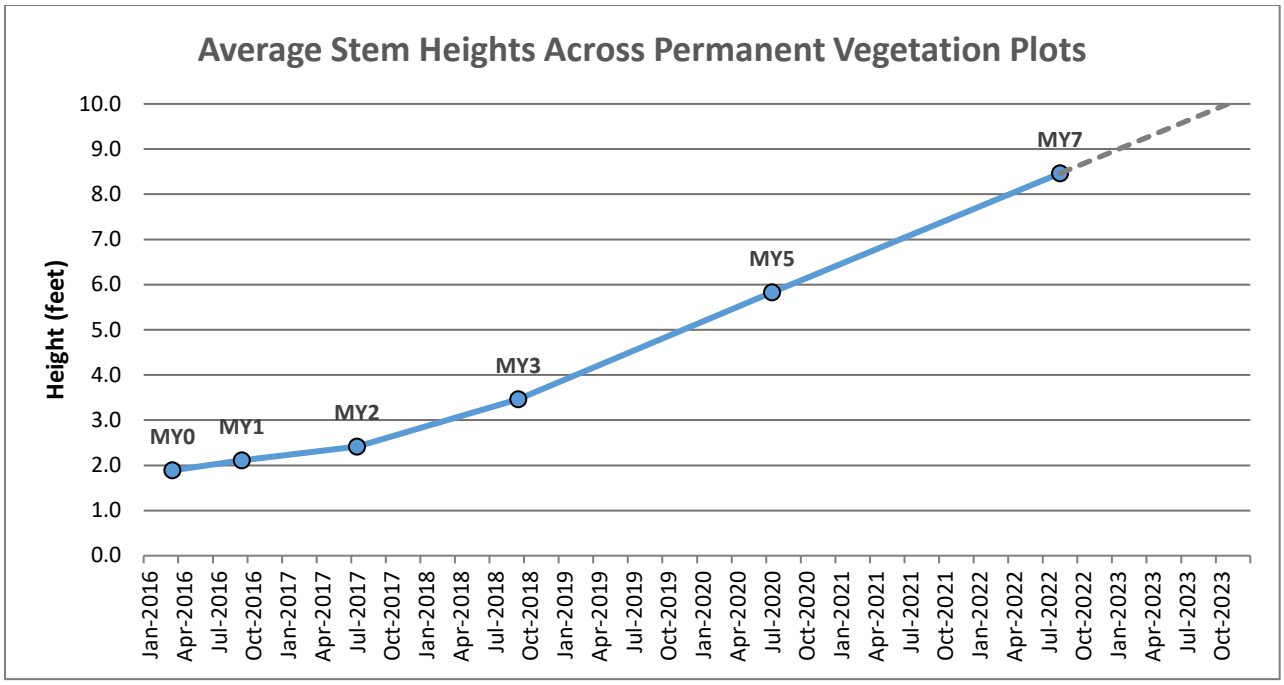
At the end of the seven-year monitoring period, two or more bankfull events must have occurred in separate years within the restoration reaches. The bankfull performance standard was met for the project in MY4. During MY7, all stream reaches recorded multiple bankfull events.

In addition to monitoring bankfull events, intermittent streams (UT1A and UT2) must demonstrate a minimum of 30 consecutive days of flow during periods of normal rainfall. In MY7, UT1A and UT2 both exceeded the success criteria for stream flow with 158 and 124 days documented, respectively. The presence of baseflow was also observed on these reaches during site visits; thereby, confirming the recorded stream gage data. UT1A and UT2 have consistently exceeded the flow success criteria for the past 5 monitoring years (MY3 – MY7). Please refer to CCPV Figures 3.0-3.2 in Appendix 2 for stream gage locations and Appendix 5 for hydrology summary data and plots.

1.2.3 Vegetative Assessment

A total of 15 permanent vegetation plots (VPs) were established during baseline monitoring within the project easement area using standard 10 by 10 meter plots. Vegetation plots are monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008). The final vegetative performance standard is the survival of 210 planted stems per acre in the planted riparian and wetland corridor at the end of the required seven-year monitoring period. In addition, planted vegetation must average 10 feet in height in each plot at the end of the seven-year monitoring period.

The MY7 vegetation survey was completed in August 2022 and resulted in an average stem density of 577 planted stems per acre. All 15 permanent vegetation plots (100%) are exceeding the final density standard of 210 stems per acre. The MY7 average stem height for all VPs is approximately 8.5 feet. Currently, 4 VPs have individually met or exceeded the height requirement of 10 feet and 5 VPs have nearly met the requirement with average heights ranging from 8.8 to 9.6 feet. As shown in the plot below, at the current growth rate the Site is projected to meet an average height of 10 feet by the closeout year (2023).



The permanent vegetation plots with the lowest average stem heights include VP 6, 7, and 11. Though stunted growth is present in these plots, over 68% of the monitored stems in VP 6, 7, and 11 reported health scores (vigor) of 3 or 4, indicating that those stems are healthy and likely to survive. These vegetation plots are located within or near wetland re-establishment areas and saturated/poor soil conditions have been deterring some stem growth. See Section 1.2.5 for discussion on areas of low height/vigor.

A wetland addendum letter was submitted to DMS on October 6, 2020 to identify potential wetland areas created by the project within the Site. Please refer to the MY6 annual report for the wetland addendum letter (Wildlands, 2022). In MY6, three wetland vegetation plots (WP) were installed within the potential wetland areas to evaluate stem density, species diversity, and height to determine if the potential wetland areas are meeting the vegetation success criteria for the Site. The MY7 assessment of the WPs was completed in October 2022 and resulted in an average stem density of 580 stems per acre and average height of 6.7 feet. All WPs are exceeding the final vegetative density performance standard for the Site.

During the 2022 Credit Release Meeting, the IRT requested that a transect plot (TP) be used to evaluate the planted stems between VP3 and VP4 to provide additional vegetation data for the planted buffer along UT1 Reach 1. Results from the transect plot (TP1) indicate that planted stems are healthy and the plot's average height (7.6 feet) is within a foot of the average stem height for the Site (8.5 feet). Three additional transect plots (TP2, TP3, TP4) were collected to evaluate stem density, species diversity, and height for areas mapped as low stem height/vigor. The three additional transect plots were found to exceed the final stem density requirement with an appropriate diversity of planted species. All transect plots were established using 100 square meter circular plots. See Section 1.2.5 for further discussion on areas of low stem height/vigor.

Please refer to Appendix 2 for vegetation plot photographs, CCPV Figures 3.0-3.2 for vegetation plot locations, and Appendix 3 for vegetation data tables.

1.2.4 Wetland Assessment

Following construction, groundwater gages (GWGs) were distributed so the data collected would provide a reasonable indication of groundwater levels throughout the wetland components on the Site. A groundwater gage was also established in an adjacent reference wetland for comparison. A barotroll logger is used to calibrate groundwater gage pressure based on local atmospheric pressure. In February and March 2019 (MY4), six additional GWGs were added to the Site. Three of the gages (GWG 10 – 12) were installed to better define the wetland re-establishment area within the right floodplain of UT1 Reach 2. The remaining three gages (GWG 13 – 15) were installed in locations adjacent to wetland enhancement areas to provide groundwater data to support the potential expansion of these wetland areas. A WETS growing season is not available for Catawba County and instead, the Burke County growing season (March 20 to November 11) is being used as criteria for hydrologic success. The growing season is defined by historic weather data collected at the Hickory Regional Airport in Burke County, approximately 3 miles as the crow flies from the Site. The final performance standard established for wetland hydrology is a free groundwater surface within 12 inches of the ground surface for 20 consecutive days (8.5%) of the defined growing season under typical precipitation conditions. All monitoring gages were downloaded quarterly and maintained as needed. Rainfall data is collected from an existing NC CRONOS station (Hickory 4.8 SW, NC).

Of the 15 GWGs, 14 met the success criteria for MY7 with the percentage of consecutive days of the growing season ranging from 12% to 100%. GWG 5 and GWG 13 achieved the success criteria for 100% of the growing season with plots showing similar hydroperiods and indicating comparable groundwater hydrology in those areas. The remainder of the GWG hydroperiods were largely analogous to the reference gage. GWG 8 did not meet the success criteria for MY7 with a measured maximum of six consecutive days (3%) during the growing season. See Section 1.2.5 for discussion about the wetland area potentially at risk represented by GWG 8. Throughout the monitoring period, apart from GWG 8, the remaining GWGs have met success criteria for a majority of the monitoring years. Monthly rainfall data in 2022 indicated higher than normal rainfall amounts in May, July, August, and October. Lower than normal rainfall occurred in June. Please refer to the CCPV Figures 3.0-3.2 in Appendix 2 for groundwater gage locations and Appendix 5 for groundwater hydrology summary data and plots.

1.2.5 Areas of Concern and Adaptive Management Activities

Vegetation

MY7 visual assessments reveal that more than 99% of the conservation easement is unaffected by invasive species populations. Invasive species treatments occurred in February, March, August, and September 2022, and focused on small areas of Japanese honeysuckle (*Lonicera japonica*), multiflora rose (*Rosa multiflora*), and Chinese privet (*Ligustrum sinense*) within the buffer and in-stream invasive exotic vegetation including creeping primrose (*Ludwigia peploides*) and Asian spiderwort (*Murdannia keisak*) within UT1A and UT2. Specific effort was made to eliminate a small patch of kudzu (*Pueraria montana*) found along the Henry Fork River planted buffer. In addition to the invasive species treatments, patches of the native loblolly pine (*Pinus taeda*) along UT1 Reach 1 and UT1B were thinned to reduce competition with planted slower growing species. Populations of multiflora rose, Chinese privet, creeping primrose, Asian spiderwort, loblolly pine, and kudzu have been reduced by treatments to levels below the mapping threshold, therefore are not depicted on the CCPV Figures 3.0-3.2. Isolated pockets of invasive species will continue to be treated through closeout.

MY7 visual assessments show that woody vegetation has become well established on at about 95.8% of the planted riparian areas. Previously identified areas of low stem vigor/height along the floodplains of UT1 Reach 2 and UT2 are improving and lessening in size and severity. These areas are represented by VP6-7, VP11, and TP2-4. In July 2022, soil amendments and microbes were added to these areas to

improve stem growth. Furthermore, desired volunteer species including river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), tag alder (*Alnus serrulata*), and cottonwood (*Populus deltoides*) are naturally starting to flourish in these areas.

Streams

The on-site intermittent streams (UT1A and UT2) that received full restoration approach but are credited at a reduced enhancement ratio (1:1.5), have continued to maintain single channel morphology functionality and woody stems have become well established along the banks. Flow is visible in the photo points established along these channels (PP18-19 along UT1A, and PP20-25 along UT2) which verifies the continuous flow documented by the stream gages. Moreover, cross-section surveys along UT1A (XS7-8) and UT2 (XS11-14) demonstrate that these streams are maintaining stable bankfull dimensions. Please refer to Appendix 2 for stream photo points, Appendix 4 for cross-section plots, and Appendix 5 for stream gage plots.

Bank repairs were previously completed in MY5 along UT1 near station 106+00 and 124+75, and in MY6 along UT1 near station 124+25. Visual assessments in MY7 reveal that these repair areas continue to appear stable and are functioning as designed.

A few beaver dams were removed in the spring 2022 throughout the lower portion of UT1 Reach 2. Prolonged periods of inundation were not observed or recorded by stream gages on the Site in MY7 which suggests beaver activity has significantly decreased. Refer to Appendix 5 for the UT1 Reach 2 stream gage plot. The less frequent beaver impoundments have permitted regular flow of tributaries (UT1A and UT2) into UT1, thus allowing floodplain vegetation to continue to become established in previously inundated areas. Due to beaver activity, a small gully formed along the right floodplain of UT1 Reach 2 below the wetland enhancement area. In spring 2022, matting, livestakes, and seed were added to this area and vegetation has become well established which has stabilized the area. Beaver activity will continue to be monitored and managed until closeout.

Wetland Addendum

As stated in Section 1.2.4, three additional groundwater gages (GWG 13 – 15) were installed in February and March 2019 before the start of the MY4 growing season, to document groundwater hydrology for additional potential wetland areas. In September 2020, Wildlands staff determined that approximately 0.051 acres of the wetland re-establishment area, represented by GWG 8, is at risk of not meeting success criteria for wetland hydrology. A wetland addendum letter was submitted to DMS on October 6, 2020 to identify additional potential wetland areas that have been created by the project and formally request the inclusion of these created wetland areas for credit to offset those identified as at risk. Additionally, Wildlands has supplementally planted the potential wetland areas with appropriate woody stems and established additional wetland monitoring plots (WPs) within these areas to determine if performance standards are being met. The GWGs located in the potential wetland areas have met criteria every year since they were installed, and the WPs are exceeding the final density standard for vegetation. Per the DMS credit release meeting in May 2021, a decision regarding the potential wetland areas will be made during the next IRT field review of the Site. Please refer to the MY6 annual report for the wetland addendum letter and subsequent IRT comments (Wildlands, 2022). In this report refer to CCPV Figures 3.0-3.2 in Appendix 2 for potential wetland locations, and Table 9e in Appendix 3 for vegetative monitoring plot results.

Conservation Easement

There has been a narrow footpath through the easement near vegetation plot 5 for the purpose of frisbee golf that Wildlands has allowed on a conditional basis and is set to discontinue by the time of closeout. This has continued to be monitored to ensure that it does not violate easement terms or

threaten stream assets. In MY7, upkeep of the footpath was discontinued, and Wildlands has worked to revegetate the path by reseeding and adding soil amendments. No conservation easement encroachments were observed in MY7. The Site boundary and prior problem areas will continue to be monitored for easement enforcement.

Quarterly site visits will continue to be conducted until closeout to monitor and address areas of concern. If necessary, adaptive management will be implemented to improve the conditions of the Site. Please refer to Appendix 2 for CCPV Figures 3.0-3.2 for mapped areas of concern.

1.3 Monitoring Year 7 Summary

This is the seventh and final monitoring year (MY7) as established in the Mitigation Plan (Wildlands, 2015). The Site will be presented to the NC IRT for regulatory closeout in 2023. Overall, the Site has met the required stream, hydrology, and vegetation success criteria for MY7 with only minimal exceptions in stem height, as described below. All restored and enhanced streams are stable and functioning as designed with cross-section dimensions exhibiting minimal adjustments compared to as-built. The Site met the final bankfull performance criteria in MY4, and all project streams recorded at least one bankfull event in MY7. The two intermittent streams (UT1A and UT2) met the 30 consecutive day flow requirement in MY7 and have consistently done so for the past five monitoring years (MY3 – MY7). The average planted stem density for the Site is 577 stems per acre with all vegetation plots exceeding the final density criteria of 210 stems per acre. The average stem height for the Site is 8.5 feet and is on track to meet the final height requirement of 10 feet in the closeout year. Fourteen of the fifteen groundwater monitoring gages installed on the Site met or exceeded the hydrologic success criteria for MY7. Throughout the post-construction monitoring period, apart from GWG 8, all remaining GWGs have individually met hydrologic success criteria for a majority of the monitoring years. The MY7 visual assessments revealed minor areas of concern which included pockets of invasive plant species, areas of low stem growth, and beaver activity. These areas will continue to be monitored and adaptive management will be performed as needed through closeout.

Summary information and data related to the performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Mitigation Plan documents available on the DMS website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

Section 2: METHODOLOGY

Geomorphic data were collected following the standards outlined in The Stream Channel Reference Site: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in the Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). All Integrated Current Condition Mapping was recorded using either a Trimble or Topcon handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcGIS. Crest gages were installed in surveyed riffle cross sections and monitored quarterly. Hydrologic monitoring instrument installation and monitoring methods are in accordance with the United States Army Corps of Engineers (USACE, 2003) standards. Vegetation monitoring protocols followed the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008).

Section 3: REFERENCES

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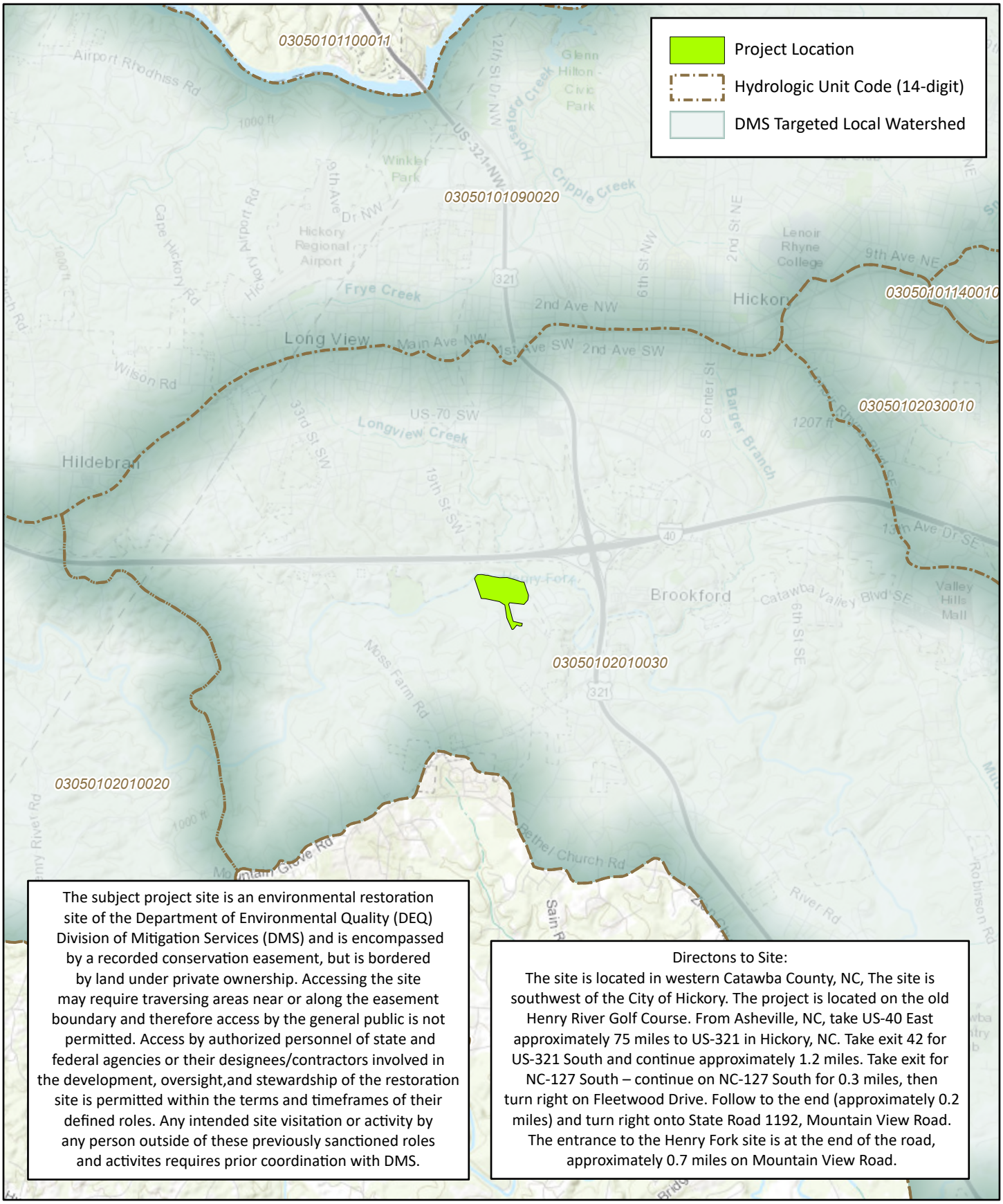
Wildlands Engineering, Inc (2022). Henry Fork Mitigation Site Monitoring Year 6 Annual Report. NCDMS, Raleigh, NC.

APPENDIX 1. General Figures and Tables



The subject project site is an environmental restoration site of the Department of Environmental Quality (DEQ) Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight,and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activites requires prior coordination with DMS.

Directons to Site:
The site is located in western Catawba County, NC, The site is southwest of the City of Hickory. The project is located on the old Henry River Golf Course. From Asheville, NC, take US-40 East approximately 75 miles to US-321 in Hickory, NC. Take exit 42 for US-321 South and continue approximately 1.2 miles. Take exit for NC-127 South – continue on NC-127 South for 0.3 miles, then turn right on Fleetwood Drive. Follow to the end (approximately 0.2 miles) and turn right onto State Road 1192, Mountain View Road. The entrance to the Henry Fork site is at the end of the road, approximately 0.7 miles on Mountain View Road.

WILDLANDS ENGINEERING

0 0.5 1 Miles

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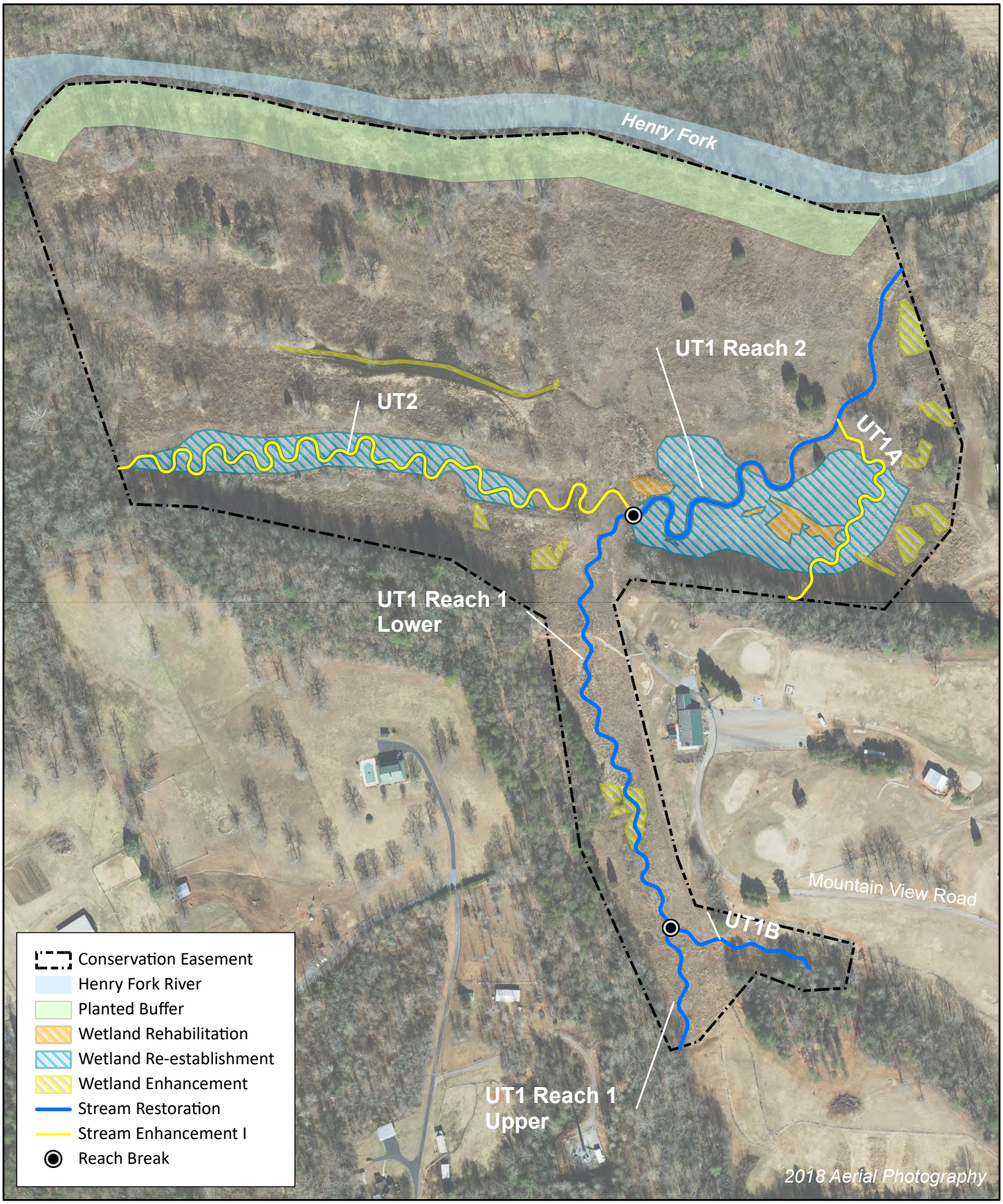
Figure 1 Vicinity Map
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022
Catawba County, NC



WILDLANDS ENGINEERING

Figure 2 Project Component/Asset Map
Henry fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Catawba County, NC

Table 1. Project Components and Mitigation Credits

Henry Fork Mitigation Site
DMS Project No.96306
Monitoring Year 7 - 2022

MITIGATION CREDITS									
	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	4,807.667	N/A	3.880	0.342	N/A	N/A	N/A	N/A	N/A

PROJECT COMPONENTS							
Reach ID	Proposed Stationing/ Location*	Existing Footage/ Acreage	Approach	Restoration (R) or Restoration Equivalent	Restoration Footage/Acreage*	Mitigation Ratio	Credits (SMU/WMU)*
STREAMS							
UT1 Reach 1 Upper	100+00 to 103+02	1,392	P1	Restoration	302	1:1	302.000
UT1 Reach 1 Lower	103+02 to 114+71		P1	Restoration	1,169	1:1	1,169.000
UT1 Reach 2	114+71 to 126+99	1,499	P1/P2	Restoration	1,228	1:1	1,228.000
UT1A	180+00 to 186+57	353	P1	Enhancement	657	1.5:1	438.000
UT1B	150+00 to 153+58	478	P1	Restoration	358	1:1	358.000
UT2	200+00 to 219+69	1,915	P1	Enhancement	1,969	1.5:1	1,312.667
WETLANDS							
Wetland 1	Floodplain near UT1 Reach 2	N/A	Planting, hydrologic improvement	Re-establishment	2.48	1:1	2.480
Wetland 2	Floodplain near UT2	N/A	Planting, hydrologic improvement	Re-establishment	1.23	1:1	1.230
Wetland A	Floodplain between UT1 Reach 2 and UT1A	0.18	Planting, hydrologic improvement	Rehabilitation	0.18	1.5:1	0.120
Wetland B	Floodplain between UT1 Reach 2 and UT1A	0.01	Planting, hydrologic improvement	Rehabilitation	0.013	1.5:1	0.009
Wetland C	Floodplain between UT1 Reach 2 and UT1A	0.003	Planting, hydrologic improvement	Rehabilitation	0.003	1.5:1	0.002
Wetland G	Floodplain near UT1A	0.02	Planting	Enhancement	0.02	2:1	0.009
Wetland H	East hillslope near UT1A	0.06	Planting	Enhancement	0.06	2:1	0.028
Wetland I	East hillslope near UT1A	0.08	Planting	Enhancement	0.08	2:1	0.039
Wetland J	East hillslope near UT1 Reach 2	0.04	Planting	Enhancement	0.04	2:1	0.018
Wetland K	East hillslope near UT1 Reach 2	0.06	Planting	Enhancement	0.06	2:1	0.028
Wetland M	East hillslope near UT1 Reach 2	0.13	Planting	Enhancement	0.13	2:1	0.065
Wetland N	Floodplain towards river from UT2	0.08	Planting	Enhancement	0.08	2:1	0.042
Wetland P	Floodplain upslope of UT2	0.02	Planting	Enhancement	0.02	2:1	0.012
Wetland Q	Floodplain upslope of UT2	0.07	Planting	Enhancement	0.07	2:1	0.035
Wetland R	Floodplain in footprint of Pond 3 near head of UT1 Reach 2	0.06	Significant improvement to wetland functions	Rehabilitation	0.06	1.5:1	0.039
Wetland S	UT1 Reach 1 Valley (Pond 1)	0.16	Planting	Enhancement	0.13	2:1	0.066

COMPONENT SUMMATION					
Restoration Level	Stream (LF)	Riparian Wetland (acres)	Non-Riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
Restoration	3,057	N/A	N/A	N/A	N/A
Enhancement I	2,626	N/A	N/A	N/A	N/A
Wetland Re-Establishment	N/A	3.71	N/A	N/A	N/A
Wetland Rehabilitation	N/A	0.25	N/A	N/A	N/A
Wetland Enhancement	N/A	0.68	N/A	N/A	N/A
Preservation	N/A	N/A	N/A	N/A	N/A

* Stream credit calculations were originally calculated along the as-built thalweg and updated to be calculated along stream ceneterlines for Monitoring Year 2 after discussions with NC IRT.

Table 2. Project Activity and Reporting History

Henry Fork Mitigation Site
DMS Project No.96306
Monitoring Year 7 - 2022

Activity or Report		Data Collection Complete	Completion or Scheduled Delivery
Mitigation Plan		August 2015	September 2015
Final Design - Construction Plans		October 2015	October 2015
Construction		November 2015 - March 2016	March 2016
Temporary S&E mix applied to entire project area[1]		March 2016	March 2016
Permanent seed mix applied to reach/segments[1]		March 2016	March 2016
Bare root and live stake plantings for reach/segments		March 2016	March 2016
Baseline Monitoring Document (Year 0)	Stream Survey	March 2016	May 2016
	Vegetation Survey	March 2016	
Year 1 Monitoring	Stream Survey	October 2016	December 2016
	Vegetation Survey	September 2016	
Year 1 Beaver dam removal on UT1 Reach 2		May-September 2016	
Year 1 Invasive Species Treatment		June & July 2016	
Year 2 Monitoring	Stream Survey	April 2017	December 2017
	Vegetation Survey	July 2017	
Year 2 Invasive Species Treatment		August 2017	
Year 3 Monitoring	Stream Survey	April 2018	November 2018
	Vegetation Survey	September 2018	
Year 3 Invasive Species Treatment		June & August 2018	
Year 4 Monitoring	Stream Survey	N/A	November 2019
	Vegetation Survey	N/A	
Year 4 Beaver dam removal on UT1 Reach 2		March 2019 - November 2019	
Year 4 Bank Repair on UT1 Reach 1		August 2019	
Year 4 Invasive Species Treatment		October 2019	
Year 5 Bank Repair on UT1 Reach 2		January 2020	November 2020
Year 5 Beaver Maintenance		February 2020	
Year 5 Supplemental Planting		March 2020	
Year 5 Monitoring	Stream Survey	June 2020	
	Vegetation Survey	July 2020	
Year 5 Invasive Species Treatment		July & September 2020	
Year 6 Monitoring	Stream Survey	N/A	November 2021
	Vegetation Survey	N/A	
Year 6 Supplemental Planting in wetland addendum areas		March 2021	
Year 6 Invasive Species Treatment		March, June & July 2021	
Year 6 Beaver Treatment		July 2021	
Year 6 Bank Repair on UT1 Reach 2		October 2021	
Year 7 Monitoring	Stream Survey	March 2022	November 2022
	Vegetation Survey	August 2022	
Year 7 Beaver Treatment		Spring 2022	
Year 7 Soil Amendments		July 2022	
Year 7 Invasive Species Treatment		February - March, August - September 2022	

[1]Seed and mulch is added as each section of construction is completed.
N/A - Not applicable

Table 3. Project Contact Table

Henry Fork Stream Mitigation Site
DMS Project No.96306
Monitoring Year 7 - 2022

Designer Jake McLean, PE	**Wildlands Engineering, Inc.** 167-B Haywood Rd. Asheville, NC 28806 828.774.5547
Construction Contractor	**Land Mechanics Designs, Inc.** 780 Landmark road Willow Spring, NC 27592
Planting Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seeding Contractor	**Land Mechanics Designs, Inc.** 780 Landmark road Willow Spring, NC 27592
Seed Mix Sources	**Green Resource, LLC**
Nursery Stock Suppliers **Bare Roots** **Live Stakes** **Plugs**	 **Dykes and Son Nursery** **Bruton Natural Systems, Inc** **Wetland Plants, Inc.**
Monitoring Performers	**Wildlands Engineering, Inc.**
Monitoring, POC	Kristi Suggs 704.332.7754, ext. 110

Table 4. Project Information and Attributes

Henry Fork Mitigation Site
DMS Project No.96306
Monitoring Year 7 - 2022

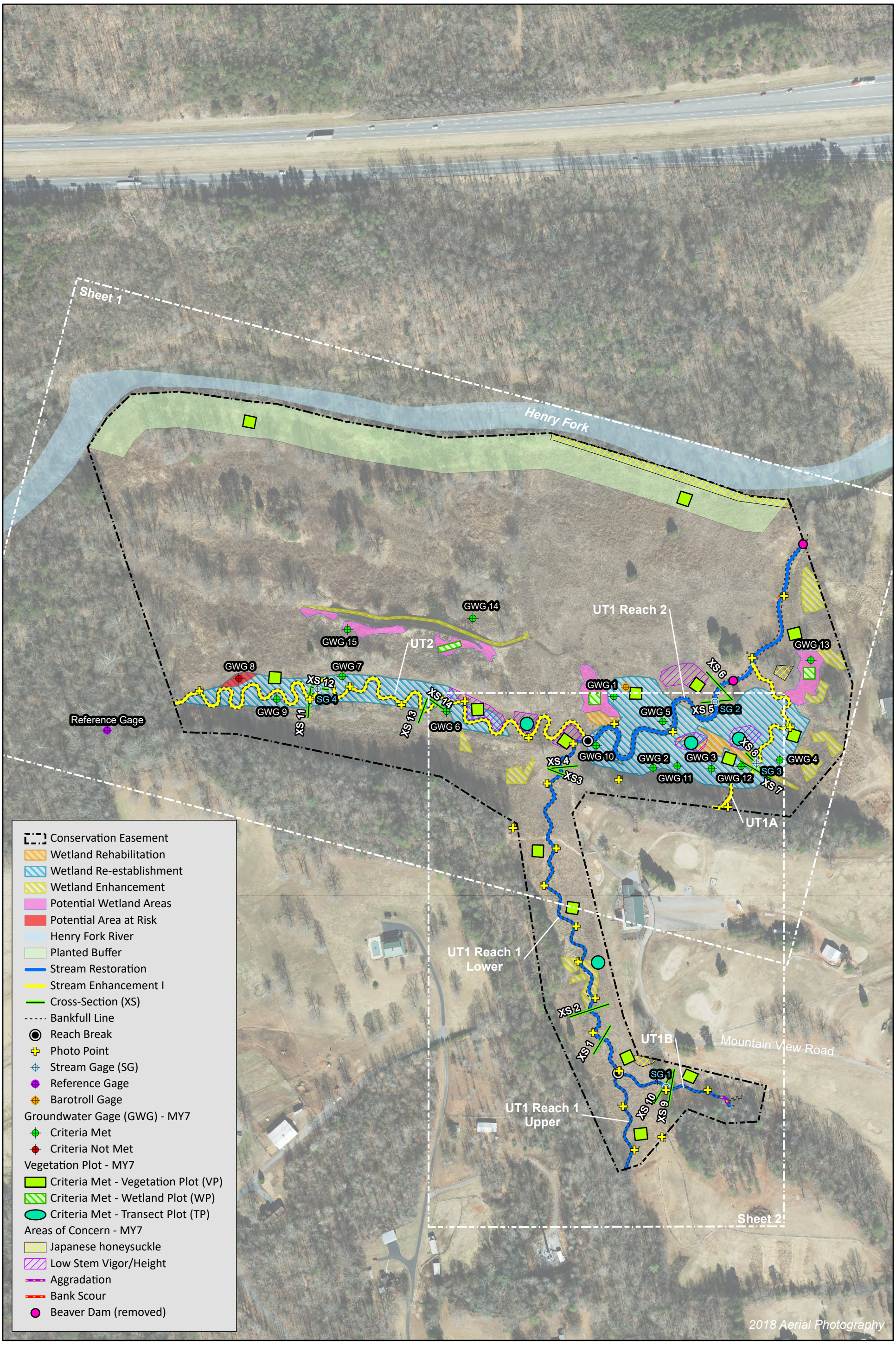
PROJECT INFORMATION	
Project Name	Henry Fork Mitigation Site
County	Catawba County
Project Area (acres)	48.06
Project Coordinates (latitude and longitude)	35°42'12.98"N, 81°21'53.20"W
PROJECT WATERSHED SUMMARY INFORMATION	
Physiographic Province	Inner Piedmont
River Basin	Catawba
USGS Hydrologic Unit 8-digit	03050102 (Expanded Service Area for 03050103)
USGS Hydrologic Unit 14-digit	03050102010030
DWR Sub-basin	03-08-35
Project Drainage Area (acres)	178
Project Drainage Area Percentage of Impervious Area	5%
CGIA Land Use Classification	39% - Herbaceous/Pasture, 36% - Forested, 25% - Developed, >1% - Water

REACH SUMMARY INFORMATION					
Parameters	**UT1 Reach 1**	**UT1 Reach 2**	**UT1A**	**UT1B**	**UT2**
Length of Reach (linear feet) - Post-Restoration	1,497	1,232	658	358	1,969
Drainage Area (acres)	106	129	23	31	49
NCDWR Stream Identification Score	39.5	32.5	27.25	31.25	27
NCDWR Water Quality Classification	C				
Morphological Desription (stream type)	P	P	I	P	I
Evolutionary Trend (Simon's Model) - Pre-Restoration	III	IV/V	IV/V	III	IV/V
Underlying Mapped Soils	Codorus loam, Dan River loam, Hatboro Loam, Poplar Forest gravelly sandy loam 2-6% slopes, and Woolwine-Fairview complex				
Drainage Class	---	---	---	---	---
Soil Hydric Status	---	---	---	---	---
Slope	0.024-0.056	0.0043-0.017	0.0095-0.016	0.015-0.077	0.0032
FEMA Classification	N/A*				
Native Vegetation Community	Piedmont Alluvial Forest				
Percent Composition Exotic Invasive Vegetation -Post-Restoration	0%				

REGULATORY CONSIDERATIONS			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	Yes	PCN prepared	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885.
Waters of the United States - Section 401	Yes	PCN prepared	
Division of Land Quality (Dam Safety)	N/A	N/A	N/A
Endangered Species Act	Yes	Yes	Henry Fork Mitigation Plan; Wildlands determined "no effect" on Catawba County listed endangered species. June 5, 2015 email correspondence from USFWS stated "not likely to adversely affect" northern long-eared bat.
Historic Preservation Act	Yes	Yes	No historic resources were found to be impacted (letter from SHPO dated 3/24/2014)
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes*	No impact application was prepared for local review. No post-project activities required.	Floodplain development permit issued by Catawba County.
Essential Fisheries Habitat	No	N/A	N/A

*The project site reaches do not have regulated floodplain mapping, but are located within the Henry Fork floodplain.

APPENDIX 2. Visual Assessment Data



WILDLANDS ENGINEERING

0 250 500 Feet

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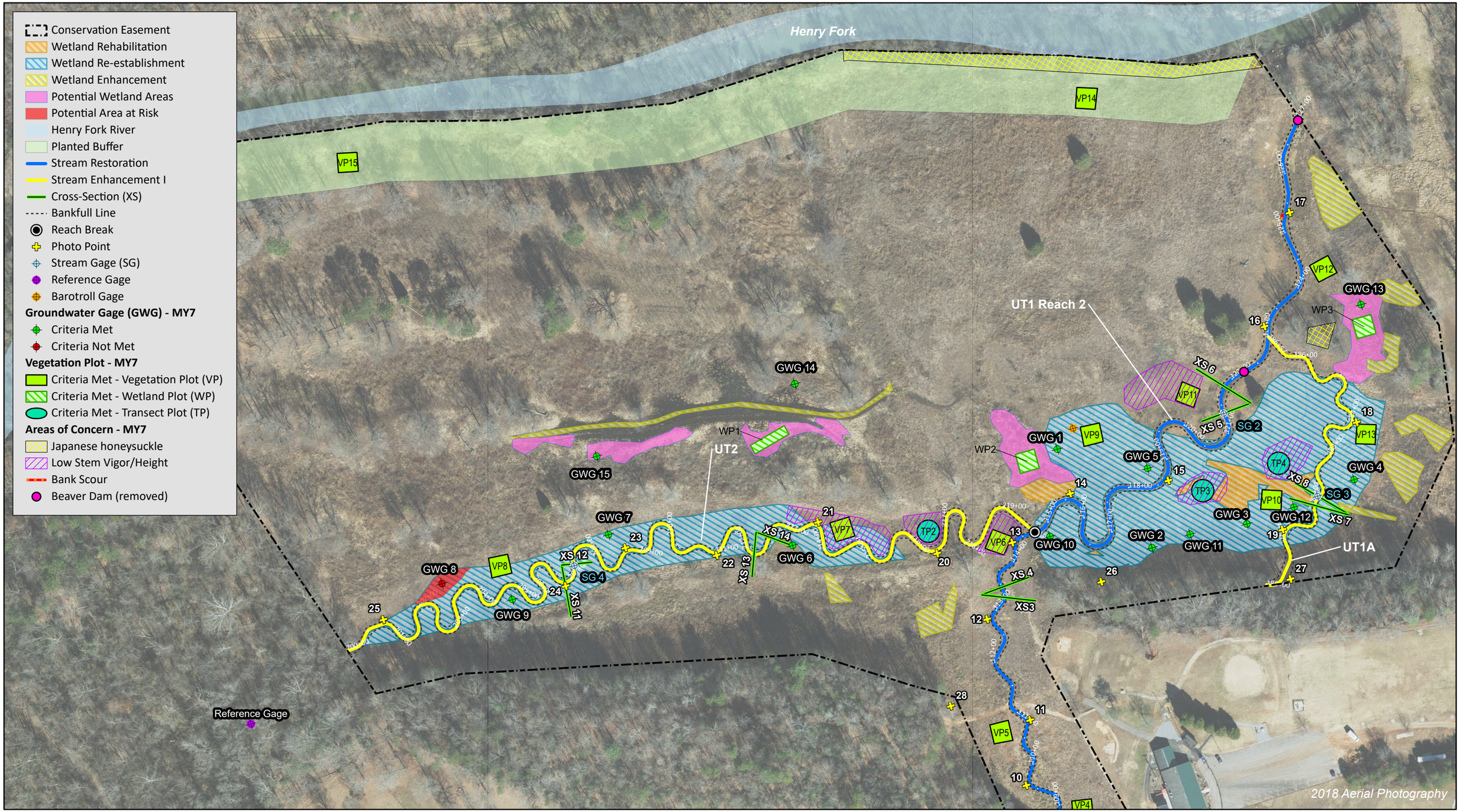
Figure 3.0 Current Condition Plan View (KEY)
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

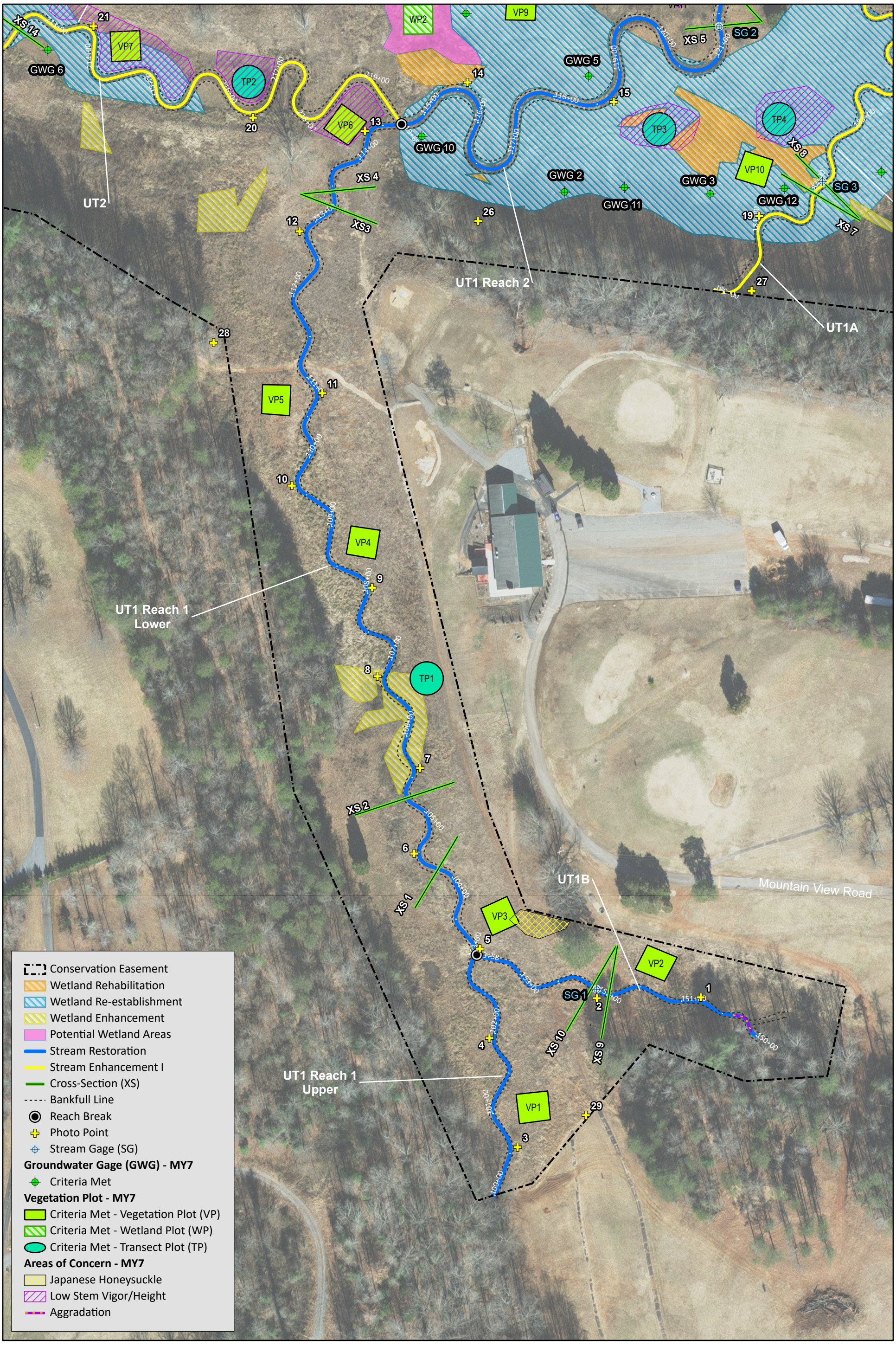
Catawba County, NC



0 150 300 Feet

Figure 3.1 Current Condition Plan View (Sheet 1)
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Catawba County, NC



WILDLANDS ENGINEERING

0 100 200 Feet

N

Figure 3.2 Current Condition Plan View (Sheet 2)
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Catawba County, NC

Table 5a. Visual Stream Morphology Stability Assessment Table

Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Date Last Assessed: **10/27/2022**
UT1 Reach 1 **1,497 LF**

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	39	39			100%			
	3. Meander Pool Condition	Depth Sufficient	33	33			100%			
		Length Appropriate	33	33			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	33	33			100%			
		Thalweg centering at downstream of meander bend (Glide)	33	33			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	81	81			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	70	70			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	81	81			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	81	81			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	46	46			100%			

[1]Excludes constructed shallows since they are evaluated in section 1.

Table 5b. Visual Stream Morphology Stability Assessment Table
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Date Last Assessed: **10/27/2022**
UT1 Reach 2 **1,232 LF**

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	14	14			100%			
	3. Meander Pool Condition	Depth Sufficient	15	15			100%			
		Length Appropriate	15	15			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	15	15			100%			
		Thalweg centering at downstream of meander bend (Glide)	15	15			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			1	10	99.6%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	1	10	99.6%	n/a	n/a	n/a
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	12	12			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	9	9			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	9	9			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	12	12			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	6	6			100%			

[1]Excludes constructed shallows since they are evaluated in section 1.

Table 5c. Visual Stream Morphology Stability Assessment Table

Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Date Last Assessed: **10/27/2022**
UT1A **658 LF**

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	14	14			100%			
	3. Meander Pool Condition	Depth Sufficient	13	13			100%			
		Length Appropriate	13	13			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	13	13			100%			
		Thalweg centering at downstream of meander bend (Glide)	13	13			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	6	6			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	6	6			100%			

[1]Excludes constructed shallows since they are evaluated in section 1.

Table 5d. Visual Stream Morphology Stability Assessment Table

Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Date Last Assessed: **10/27/2022**
UT1B **358 LF**

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			1	31	92%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	10	11			91%			
	3. Meander Pool Condition	Depth Sufficient	7	8			88%			
		Length Appropriate	8	8			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	8	8			100%			
		Thalweg centering at downstream of meander bend (Glide)	8	8			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	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.	24	24			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%.	27	27			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	12	12			100%			

[1]Excludes constructed shallows since they are evaluated in section 1.

Table 5e. Visual Stream Morphology Stability Assessment Table

Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Date Last Assessed: **10/27/2022**
UT2 **1,969 LF**

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	35	35			100%			
	3. Meander Pool Condition	Depth Sufficient	32	32			100%			
		Length Appropriate	32	32			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	32	32			100%			
		Thalweg centering at downstream of meander bend (Glide)	32	32			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	3	3			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	3	3			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 6. Vegetation Condition Assessment Table
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Date Last Assessed: 10/27/2022
Planted Acreage **15**

Vegetation Category	Definitions	Mapping Threshold (Ac)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	0	0.00	0.00%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0.00	0.00%
		Total	**0**	**0.00**	**0.0%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.1	6	0.61	4.2%
		Cumulative Total	**6**	**0.61**	**4.2%**

Easement Acreage **48**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale).	1,000	3	0.42	0.9%
Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale).	none	0	0	0.0%

Stream Photographs
MY0 - MY7

	
Photo Point 1 – looking upstream UT1B *(03/16/2016)*	**Photo Point 1** – view upstream UT1B *(03/18/2022)*
	
Photo Point 1 – looking downstream UT1B *(03/16/2016)*	**Photo Point 1** – view downstream UT1B *(03/18/2022)*
	
Photo Point 2 – looking upstream UT1B *(03/16/2016)*	**Photo Point 2** – view upstream UT1B *(03/18/2022)*

	
Photo Point 2 – looking downstream UT1B *(03/16/2016)*	**Photo Point 2** – view downstream UT1B *(03/18/2022)*
	
Photo Point 3 – looking upstream UT1 R1 Upper *(03/16/2016)*	**Photo Point 3** – view upstream UT1 R1 Upper *(03/18/2022)*
	
Photo Point 3 – looking downstream UT1 R1 Upper (*03/16/2016)*	**Photo Point 3** – view downstream UT1 R1 Upper (0*3/18/2022)*

	
Photo Point 4 – looking upstream UT1 R1 Upper *(03/16/2016)*	**Photo Point 4** – view upstream UT1 R1 Upper *(03/18/2022)*
	
Photo Point 4 – looking downstream UT1 R1 Upper *(03/16/2016)*	**Photo Point 4** – view downstream UT1 R1 Upper *(03/18/2022)*
	
Photo Point 5 – looking upstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 5** – view upstream UT1 R1 Lower *(03/18/2022)*

	
Photo Point 5 – looking downstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 5** – view downstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 5 – looking upstream of UT1B *(03/16/2016)*	**Photo Point 5** – view upstream of UT1B *(03/18/2022)*
	
Photo Point 6 – looking upstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 6** – view upstream UT1 R1 Lower *(03/18/2022)*

	
Photo Point 6 – looking downstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 6** – view downstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 7 – looking upstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 7** – view upstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 7 – looking downstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 7** – view downstream UT1 R1 Lower *(03/18/2022)*

	
Photo Point 8 – looking upstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 8** – view upstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 8 – looking downstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 8** – view downstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 9 – looking upstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 9** – view upstream UT1 R1 Lower *(03/18/2022)*

	
Photo Point 9 – looking downstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 9** – view downstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 10 – looking upstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 10** – view upstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 10 –looking downstream UT1 R1 Lower (*03/16/2016)*	**Photo Point 10** –view downstream UT1 R1 Lower *(03/18/2022)*

	
Photo Point 11 – looking upstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 11** – view upstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 11 –looking downstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 11** –view downstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 12 – looking upstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 12** – view upstream UT1 R1 Lower *(03/18/2022)*

	
Photo Point 12 –looking downstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 12** –view downstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 13 – looking upstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 13** – view upstream UT1 R1 Lower *(03/18/2022)*
	
Photo Point 13 –looking downstream UT1 R1 Lower *(03/16/2016)*	**Photo Point 13** –view downstream UT1 R1 Lower *(03/18/2022)*

	
Photo Point 14 – looking upstream UT1 R2 *(03/16/2016)*	**Photo Point 14** – view upstream UT1 R2 *(03/18/2022)*
	
Photo Point 14 – looking downstream UT1 R2 *(03/16/2016)*	**Photo Point 14** – view downstream UT1 R2 *(03/18/2022)*
	
Photo Point 15 – looking upstream UT1 R2 *(03/16/2016)*	**Photo Point 15** – view upstream UT1 R2 *(03/18/2022)*

	
Photo Point 15 – looking downstream UT1 R2 *(03/16/2016)*	**Photo Point 15** – view downstream UT1 R2 *(03/18/2022)*
	
Photo Point 16 – looking upstream UT1 R2 *(03/16/2016)*	**Photo Point 16** – view upstream UT1 R2 *(03/18/2022)*
	
Photo Point 16 – looking downstream UT1 R2 *(03/16/2016)*	**Photo Point 16** – view downstream UT1 R2 *(03/18/2022)*

	
Photo Point 17 – looking upstream UT1 R2 *(03/16/2016)*	**Photo Point 17** – view upstream UT1 R2 *(03/18/2022)*
	
Photo Point 17 – looking downstream UT1 R2 *(03/16/2016)*	**Photo Point 17** – view downstream UT1 R2 *(03/18/2022)*
	
Photo Point 18 – looking upstream UT1A *(03/16/2016)*	**Photo Point 18** – view upstream UT1A *(03/18/2022)*

	
Photo Point 18 – looking downstream UT1A *(03/16/2016)*	**Photo Point 18** – view downstream UT1A *(03/18/2022)*
	
Photo Point 19 – looking upstream UT1A *(03/16/2016)*	**Photo Point 19** – view upstream UT1A *(03/18/2022)*
	
Photo Point 19 – looking downstream UT1A *(03/16/2016)*	**Photo Point 19** – view downstream UT1A *(03/18/2022)*

	
Photo Point 20 – looking upstream UT2 *(03/16/2016)*	**Photo Point 20** – view upstream UT2 *(03/18/2022)*
	
Photo Point 20 – looking downstream UT2 *(03/16/2016)*	**Photo Point 20** – view downstream UT2 *(03/18/2022)*
	
Photo Point 21 – looking upstream UT2 *(03/16/2016)*	**Photo Point 21** – view upstream UT2 *(03/18/2022)*

	
Photo Point 21 – looking downstream UT2 *(03/16/2016)*	**Photo Point 21** – view downstream UT2 *(03/18/2022)*
	
Photo Point 22 – looking upstream UT2 *(03/16/2016)*	**Photo Point 22** – view upstream UT2 *(03/18/2022)*
	
Photo Point 22 – looking downstream UT2 *(03/16/2016)*	**Photo Point 22** – view downstream UT2 *(03/18/2022)*

	
Photo Point 23 – looking upstream UT2 *(03/16/2016)*	**Photo Point 23** – view upstream UT2 *(03/18/2022)*
	
Photo Point 23 – looking downstream UT2 *(03/16/2016)*	**Photo Point 23** – view downstream UT2 *(03/18/2022)*
	
Photo Point 24 – looking upstream UT2 *(03/16/2016)*	**Photo Point 24** – view upstream UT2 *(03/18/2022)*

	
Photo Point 24 – looking downstream UT2 *(03/16/2016)*	**Photo Point 24** – view downstream UT2 *(03/18/2022)*
	
Photo Point 25 – looking upstream UT2 *(03/16/2016)*	**Photo Point 25** – view upstream UT2 *(03/18/2022)*
	
Photo Point 25 – looking downstream UT2 *(03/16/2016)*	**Photo Point 25** – view downstream UT2 *(03/18/2022)*

	
Photo Point 26 – looking upstream UT1 R2 *(03/16/2016)*	**Photo Point 26** – view upstream UT1 R2 *(03/18/2022)*
	
Photo Point 26 – looking downstream UT1 R2 *(03/16/2016)*	**Photo Point 26** – view downstream UT1 R2 *(03/18/2022)*
	
Photo Point 26 – looking UT1 R2 floodplain *(03/16/2016)*	**Photo Point 26** – UT1 R2 floodplain overview *(03/18/2022)*

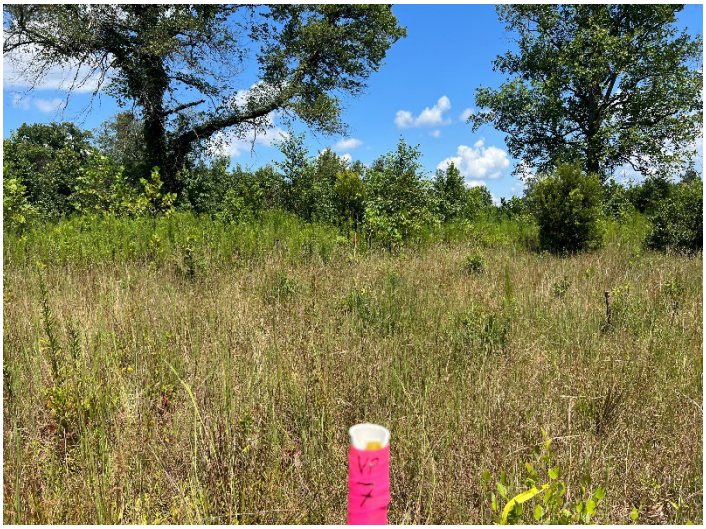
	
Photo Point 27 – looking upstream UT1 R2 floodplain *(03/16/2016)*	**Photo Point 27** – view upstream UT1 R2 floodplain *(03/18/2022)*
	
Photo Point 27 – looking downstream UT1 R2 floodplain (*3/16/2016)*	**Photo Point 27** – view downstream UT1 R2 floodplain*(3/18/2022)*
	
Photo Point 28 – UT1 R1 Lower floodplain overview *(03/16/2016)*	**Photo Point 28** – UT1 R1 Lower floodplain overview *(03/18/2022)*

	
Photo Point 28 – UT2 floodplain overview *(03/16/2016)*	**Photo Point 28** – UT2 floodplain overview *(03/18/2022)*
	
Photo Point 29 – UT1 R1 Upper floodplain overview *(03/16/2016)*	**Photo Point 29** – UT1 R1 Upper floodplain overview *(03/18/2022)*

Vegetation Plot Photographs
MY0 – MY7

	
Vegetation Plot 1 – MY0 *(03/31/2016)*	**Vegetation Plot 1** – MY7 *(08/29/2022)*
	
Vegetation Plot 2 – MY0 *(03/31/2016)*	**Vegetation Plot 2** – MY7 *(08/29/2022)*
	
Vegetation Plot 3 – MY0 *(03/31/2016)*	**Vegetation Plot 3 –** MY7 *(08/29/2022)*

	
Vegetation Plot 4 – MY0 *(03/31/2016)*	**Vegetation Plot 4 –** MY7 *(08/29/2022)*
	
Vegetation Plot 5 – MY0 *(03/31/2016)*	**Vegetation Plot 5 –** MY7 *(08/29/2022)*
	
Vegetation Plot 6 – MY0 *(03/31/2016)*	**Vegetation Plot 6 –** MY7 *(08/29/2022)*

	
Vegetation Plot 7 – MY0 *(03/31/2016)*	**Vegetation Plot 7 –** MY7 *(08/29/2022)*
	
Vegetation Plot 8 – MY0 *(03/31/2016)*	**Vegetation Plot 8 –** MY7 *(08/29/2022)*
	
Vegetation Plot 9 – MY0 *(04/01/2016)*	**Vegetation Plot 9 –** MY7 *(08/29/2022)*

	
Vegetation Plot 10 – MY0 *(04/01/2016)*	**Vegetation Plot 10 –** MY7 *(08/30/2022)*
	
Vegetation Plot 11 – MY0 *(04/01/2016)*	**Vegetation Plot 11 –** MY7 *(08/30/2022)*
	
Vegetation Plot 12 – MY0 *(04/01/2016)*	**Vegetation Plot 12 –** MY7 *(08/30/2022)*

	
Vegetation Plot 13 – MY0 *(04/01/2016)*	**Vegetation Plot 13 –** MY7 *(08/30/2022)*
	
Vegetation Plot 14 – MY0 *(03/31/2016)*	**Vegetation Plot 14 –** MY7 *(08/30/2022)*
	
Vegetation Plot 15 – MY0 *(03/31/2016)*	**Vegetation Plot 15** – MY7 *(08/30/2022)*

Wetland Vegetation Plot Photographs
MY7

Wetland Vegetation Plot 1 - *(10/27/2022)*

Wetland Vegetation Plot 2 - *(08/29/2022)*

Wetland Vegetation Plot 3 - *(08/29/2022)*

Transect Plot Photographs
MY7

	
Transect Plot 1 - *(08/29/2022)*	**Transect Plot 2** - *(08/29/2022)*
	
Transect Plot 3 - *(08/30/2022)*	**Transect Plot 4** - *(08/30/2022)*

Resolved DEQ Stewardship Action Items
MY7

Action Item 1: Cement blocks removed from the easement on UT1B near VP2 - *(01/06/2023)*

Action Item 2: Physical barrier to the path on both sides of the easement - *(01/10/2023)*

APPENDIX 3. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Plot	MY7 Density Criteria Met (Y/N)	Tract Mean
1	Y	100%
2	Y	
3	Y	
4	Y	
5	Y	
6	Y	
7	Y	
8	Y	
9	Y	
10	Y	
11	Y	
12	Y	
13	Y	
14	Y	
15	Y	

Table 8. CVS Vegetation Plot Metadata
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Report Prepared By	Mimi Caddell
Date Prepared	10/17/2022
Database Name	cvs-eep-entrytool-v2.5.0 HENRY FORK MY7.mdb
Database Location	L:\Active Projects\005-02143 Henry Fork AVL\Monitoring\Monitoring Year 7-2022\Vegetation Assessment
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Project Planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Project Total Stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and Spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	96306
project Name	Henry Fork Mitigation Site
Description	Stream and Wetland Mitigation
Required Plots (calculated)	15
Sampled Plots	15

Table 9a. Planted and Total Stem Counts - Permanent Vegetation Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

Current Plot Data (MY7 2022)																	
Scientific Name	**Common Name**	**Species Type**	**96306-WEI-0001**			**96306-WEI-0002**			**96306-WEI-0003**			**96306-WEI-0004**			**96306-WEI-0005**		
			PnoLS	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	Box Elder	Tree															
Acer rubrum	Red Maple	Tree			2			3			1			15			22
Alnus serrulata	Tag Alder	Shrub Tree															2
Betula nigra	River Birch	Tree	1	1	1				4	4	4	4	4	4	5	5	5
Celtis laevigata	Sugarberry	Shrub Tree															
Diospyros virginiana	American Persimmon	Tree	6	6	6	4	4	6	1	1	1	2	2	2	2	2	2
Fraxinus pennsylvanica	Green Ash	Tree				6	6	6	3	3	3	6	6	6	1	1	2
Juglans nigra	Black Walnut	Tree															
Liquidambar styraciflua	Sweet Gum	Tree						9			13			9			1
Liriodendron tulipifera	Tulip Poplar	Tree			1			1									
Morella cerifera	Common Wax-myrtle	Shrub Tree															
Nyssa sylvatica	Black Gum	Tree															
Pinus rigida	Pitch Pine	Tree															
Pinus taeda	Loblolly Pine	Tree															1
Platanus occidentalis	Sycamore	Tree	1	1	1	1	1	1	2	2	2	4	4	6	4	4	18
Populus deltoides	Cottonwood	Tree															
Prunus serotina	Black Cherry	Shrub Tree															5
Quercus lyrata	Overcup Oak	Tree															
Quercus michauxii	Swamp Chestnut Oak	Tree															
Quercus phellos	Willow Oak	Tree	4	4	4	4	4	4	5	5	5				1	1	1
Rhus aromatica	Fragrant Sumac	Shrub															
Rhus copallinum	Winged Sumac	Shrub Tree						2									
Rhus glabra	Smooth Sumac	Shrub Tree			3			16									
Salix	Willow	Shrub Tree															
Salix nigra	Black Willow	Tree															
Salix sericea	Silky Willow	Shrub Tree															
Ulmus americana	American Elm	Tree															
Viburnum dentatum	Arrow-wood	Shrub Tree															
		Stem count	12	12	18	15	15	48	15	15	29	16	16	42	13	13	59
		size (ares)		1			1			1			1			1	
		size (ACRES)		0.02471			0.02471			0.02471			0.02471			0.02471	
		Species count	4	4	7	4	4	9	5	5	7	4	4	6	5	5	10
		Stems per ACRE	486	486	728	607	607	1943	607	607	1174	648	648	1700	526	526	2388

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%

Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes

P-all: Number of planted stems including live stakes

T: Total stems

Table 9b. Planted and Total Stem Counts - Permanent Vegetation Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

Current Plot Data (MY7 2022)																	
Scientific Name	**Common Name**	**Species Type**	**96306-WEI-0006**			**96306-WEI-0007**			**96306-WEI-0008**			**96306-WEI-0009**			**96306-WEI-0010**		
			PnoLS	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	Box Elder	Tree															
Acer rubrum	Red Maple	Tree	3	3	4			5			6	4	4	19			25
Alnus serrulata	Tag Alder	Shrub Tree			5			3						10	3	3	13
Betula nigra	River Birch	Tree	2	2	2	3	3	12	3	3	7	3	3	10	4	4	4
Celtis laevigata	Sugarberry	Shrub Tree															
Diospyros virginiana	American Persimmon	Tree							1	1	1				1	1	2
Fraxinus pennsylvanica	Green Ash	Tree	3	3	3	6	6	6	6	6	6				3	3	3
Juglans nigra	Black Walnut	Tree															
Liquidambar styraciflua	Sweet Gum	Tree			14			6			16			8			12
Liriodendron tulipifera	Tulip Poplar	Tree															
Morella cerifera	Common Wax-myrtle	Shrub Tree									2						
Nyssa sylvatica	Black Gum	Tree															
Pinus rigida	Pitch Pine	Tree															
Pinus taeda	Loblolly Pine	Tree									1						
Platanus occidentalis	Sycamore	Tree	3	3	5	1	1	1	3	3	66	3	3	33	2	2	17
Populus deltoides	Cottonwood	Tree												5			
Prunus serotina	Black Cherry	Shrub Tree															
Quercus lyrata	Overcup Oak	Tree															
Quercus michauxii	Swamp Chestnut Oak	Tree	3	3	3	3	3	3	1	1	1	3	3	3	4	4	4
Quercus phellos	Willow Oak	Tree				1	1	1	2	2	3	2	2	2	2	2	2
Rhus aromatica	Fragrant Sumac	Shrub															
Rhus copallinum	Winged Sumac	Shrub Tree															
Rhus glabra	Smooth Sumac	Shrub Tree															
Salix	Willow	Shrub Tree															
Salix nigra	Black Willow	Tree			1			1									
Salix sericea	Silky Willow	Shrub Tree															
Ulmus americana	American Elm	Tree															
Viburnum dentatum	Arrow-wood	Shrub Tree				1	1	1									
		Stem count	14	14	37	15	15	39	16	16	109	15	15	90	19	19	82
		size (ares)		1			1			1			1			1	
		size (ACRES)		0.02471			0.02471			0.02471			0.02471			0.02471	
		Species count	5	5	8	6	6	10	6	6	10	5	5	8	7	7	9
		Stems per ACRE	567	567	1497	607	607	1578	648	648	4411	607	607	3642	769	769	3318

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%

Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes

P-all: Number of planted stems including live stakes

T: Total stems

Table 9c. Planted and Total Stem Counts - Permanent Vegetation Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

Current Plot Data (MY7 2022)																	
Scientific Name	**Common Name**	**Species Type**	**96306-WEI-0011**			**96306-WEI-0012**			**96306-WEI-0013**			**96306-WEI-0014**			**96306-WEI-0015**		
			PnoLS	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	Box Elder	Tree						3									29
Acer rubrum	Red Maple	Tree	3	3	3			35			2	1	1	4			
Alnus serrulata	Tag Alder	Shrub Tree	1	1	23			3									
Betula nigra	River Birch	Tree	1	1	1	2	2	20	2	2	10	1	1	1	1	1	1
Celtis laevigata	Sugarberry	Shrub Tree															
Diospyros virginiana	American Persimmon	Tree	2	2	2	3	3	3	5	5	5	1	1	1	4	4	4
Fraxinus pennsylvanica	Green Ash	Tree				5	5	5	1	1	1	2	2	2			
Juglans nigra	Black Walnut	Tree												2			1
Liquidambar styraciflua	Sweet Gum	Tree			2			4									77
Liriodendron tulipifera	Tulip Poplar	Tree						2						2			17
Morella cerifera	Common Wax-myrtle	Shrub Tree															
Nyssa sylvatica	Black Gum	Tree															
Pinus rigida	Pitch Pine	Tree															
Pinus taeda	Loblolly Pine	Tree															
Platanus occidentalis	Sycamore	Tree	2	2	2	6	6	18	2	2	2	5	5	5	7	7	7
Populus deltoides	Cottonwood	Tree															
Prunus serotina	Black Cherry	Shrub Tree															
Quercus lyrata	Overcup Oak	Tree															
Quercus michauxii	Swamp Chestnut Oak	Tree	2	2	2							1	1	1			
Quercus phellos	Willow Oak	Tree				1	1	1	3	3	3						
Rhus aromatica	Fragrant Sumac	Shrub															
Rhus copallinum	Winged Sumac	Shrub Tree															
Rhus glabra	Smooth Sumac	Shrub Tree															
Salix	Willow	Shrub Tree															
Salix nigra	Black Willow	Tree			1												
Salix sericea	Silky Willow	Shrub Tree															
Ulmus americana	American Elm	Tree															
Viburnum dentatum	Arrow-wood	Shrub Tree															
		Stem count	11	11	36	17	17	94	13	13	23	11	11	18	12	12	136
		size (ares)		1			1			1			1			1	
		size (ACRES)		0.02471			0.02471			0.02471			0.02471			0.02471	
		Species count	6	6	8	5	5	10	5	5	6	6	6	8	3	3	7
		Stems per ACRE	445	445	1457	688	688	3804	526	526	931	445	445	728	486	486	5504

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%

Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes

P-all: Number of planted stems including live stakes

T: Total stems

Table 9d. Planted and Total Stem Counts - Permanent Vegetation Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

Annual Means																				
Scientific Name	**Common Name**	**Species Type**	**MY7 (8/2022)**			**MY5 (8/2020)**			**MY3 (9/2018)**			**MY2 (7/2017)**			**MY1 (9/2016)**			**MY0 (3/2016)**		
			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 negundo	Box Elder	Tree			32			14			16			19			20			12
Acer rubrum	Red Maple	Tree	11	11	146	11	11	34	12	12	17	12	12	100	12	12	22	13	13	13
Alnus serrulata	Tag Alder	Shrub Tree	4	4	59			8			7			8			1			
Betula nigra	River Birch	Tree	36	36	82	34	34	73	34	34	45	34	34	52	35	35	35	37	37	37
Celtis laevigata	Sugarberry	Shrub Tree															1			
Diospyros virginiana	American Persimmon	Tree	32	32	35	31	31	31	32	32	32	32	32	32	32	32	32	32	32	32
Fraxinus pennsylvanica	Green Ash	Tree	42	42	43	46	46	46	49	49	49	51	51	51	52	52	52	57	57	57
Juglans nigra	Black Walnut	Tree			3						3			1						
Liquidambar styraciflua	Sweet Gum	Tree			171			26			31			10			17			5
Liriodendron tulipifera	Tulip Poplar	Tree			23			16			30			2			7			2
Morella cerifera	Common Wax-myrtle	Shrub Tree			2															
Nyssa sylvatica	Black Gum	Tree																		2
Pinus rigida	Pitch Pine	Tree						5												
Pinus taeda	Loblolly Pine	Tree			2															
Platanus occidentalis	Sycamore	Tree	46	46	184	42	42	160	43	43	271	44	44	460	44	44	108	57	57	57
Populus deltoides	Cottonwood	Tree			5			11			10			19			7			
Prunus serotina	Black Cherry	Shrub Tree			5															
Quercus lyrata	Overcup Oak	Tree									1									
Quercus michauxii	Swamp Chestnut Oak	Tree	17	17	17	19	19	19	20	20	20	20	20	21	20	20	20	20	20	20
Quercus phellos	Willow Oak	Tree	25	25	26	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27
Rhus aromatica	Fragrant Sumac	Shrub						7			8									
Rhus copallinum	Winged Sumac	Shrub Tree			2															
Rhus glabra	Smooth Sumac	Shrub Tree			19															
Salix	Willow	Shrub Tree						3												
Salix nigra	Black Willow	Tree			3												1			
Salix sericea	Silky Willow	Shrub Tree												1						
Ulmus americana	American Elm	Tree						1												
Viburnum dentatum	Arrow-wood	Shrub Tree	1	1	1															
		Stem count	214	214	860	209	209	481	217	217	567	220	220	803	222	222	350	243	243	264
		size (ares)	15			15			15			15			15			15		
		size (ACRES)	0.3707			0.3707			0.3707			0.3707			0.3707			0.3707		
		Species count	9	9	20	7	7	16	7	7	15	7	7	14	7	7	14	7	7	11
		Stems per ACRE	577	577	2320	564	564	1298	585	585	1530	594	594	2166	599	599	944	656	656	712

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%

Volunteer species included in total

Table 9e. Planted and Total Stem Counts - Wetland Vegetation Plots
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Wetland Vegetation Plots

Current Plot Data (MY7 2022)								
Scientific Name	**Common Name**	**Species Type**	**Wetland Status**	**Wetland Plot 1**	**Wetland Plot 2**	**Wetland Plot 3**	**MY7 (2022) Mean**	**MY6 (2021) Mean**
				T	**T**	**T**		**T**
Acer negundo	Box Elder	Tree	FAC	3	2		5	5
Acer rubrum	Red Maple	Tree	FAC	6		1	7	4
Alnus serrulata	Tag Alder	Shrub Tree	OBL		1	5	6	6
Betula nigra	River Birch	Tree	FACW		1	2	3	6
Platanus occidentalis	Sycamore	Tree	FACW		7		7	7
Populus deltoides	Cottonwood	Tree	FAC	3	1		4	3
Quercus phellos	Willow Oak	Tree	FAC		1		1	1
Salix nigra	Black Willow	Tree	OBL		6	4	10	8
			Stem count	12	19	12	43	40
			size (ares)	1	1	1	3	3
			size (ACRES)	0.02471	0.02471	0.02471	0.07413	0.07413
			Species count	3	7	4	8	8
			Stems per ACRE	486	769	486	580	540
			Average Stem Height (ft)	7.4	6.7	5.9	6.7	4.3

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%
Volunteer species included in total

T: Total stems

Table 9f. Planted and Total Stem Counts - Additional Transect Plots
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Additional Transect Plots

Current Plot Data (MY7 2022)							
Scientific Name	**Common Name**	**Species Type**	**Transect 1**	**Transect 2**	**Transect 3**	**Transect 4**	**MY7 (2022) Mean**
			T	**T**	**T**		**T**
Acer rubrum	Red Maple	Tree			3	4	7
Alnus serrulata	Tag Alder	Shrub Tree		2	5	4	11
Betula nigra	River Birch	Tree		4	2	3	9
Diospyros virginiana	Persimmon	Tree	1			2	3
Fraxinus pennsylvanica	Green Ash	Tree	1				1
Platanus occidentalis	Sycamore	Tree	4	6	1	3	14
Quercus michauxii	Cottonwood	Tree	1	1			2
Quercus phellos	Willow Oak	Tree	1	1		1	3
Salix nigra	Black Willow	Tree			1	2	3
		Stem count	8	14	12	19	53
		size (ares)	1	1	1	1	4
		size (ACRES)	0.02471	0.02471	0.02471	0.02471	0.09884
		Species count	5	5	5	7	9
		Stems per ACRE	324	567	486	769	536
		Average Stem Height (ft)	7.6	4.1	2.8	2.4	4.2

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%
Volunteer species included in total

T: Total stems

Table 9g. Planted Stem Average Heights
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Average Stem Height (ft) by Plot						
	MY0	**MY1**	**MY2**	**MY3**	**MY5**	**MY7**
Permanent Plot 1	1.6	1.7	2.1	3.7	7.3	8.9
Permanent Plot 2	1.9	2.1	2.6	4.5	8.2	10.0
Permanent Plot 3	2.0	1.9	2.1	3.7	8.2	12.7
Permanent Plot 4	2.0	2.3	2.6	3.0	4.8	6.8
Permanent Plot 5	1.9	2.0	2.4	3.5	4.6	4.8
Permanent Plot 6	2.0	2.1	2.2	2.6	3.1	3.5
Permanent Plot 7	1.8	2.0	2.0	2.0	2.0	2.3
Permanent Plot 8	1.8	1.9	1.9	2.2	3.0	4.8
Permanent Plot 9	1.9	2.4	3.0	4.3	7.1	11.5
Permanent Plot 10	1.8	2.4	2.7	3.4	5.5	9.6
Permanent Plot 11	2.0	2.0	1.8	1.5	2.4	2.2
Permanent Plot 12	2.0	2.6	2.9	3.6	5.8	8.8
Permanent Plot 13	1.7	2.1	2.7	3.9	7.0	9.5
Permanent Plot 14	2.0	2.0	2.6	6.4	12.3	22.8
Permanent Plot 15	2.0	2.2	2.5	3.8	6.1	8.8
Permanent Plot Site Average	**1.9**	**2.1**	**2.4**	**3.5**	**5.8**	**8.5**

Table 9h. Stems Per Plot Across All Years
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Plot	MY7 (2022)			MY5 (2020)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)		
	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac
Permanent Plot 1	12	18	728	14	16	648	14	16	648	14	14	567	14	14	567	16	16	648
Permanent Plot 2	15	48	1,943	16	27	1,093	16	21	850	16	17	688	16	17	688	18	18	728
Permanent Plot 3	15	29	1,174	15	23	931	15	17	688	15	15	607	16	16	648	16	16	648
Permanent Plot 4	16	42	1,700	16	26	1,052	16	16	648	16	17	688	16	16	648	16	16	648
Permanent Plot 5	13	59	2,388	11	45	1,821	12	35	1,416	12	31	1,255	12	32	1,295	16	16	648
Permanent Plot 6	14	37	1,497	13	21	850	14	24	971	16	39	1,578	16	16	648	16	16	648
Permanent Plot 7	15	39	1,578	14	21	850	14	17	688	14	129	5,221	14	14	567	15	15	607
Permanent Plot 8	16	109	4,411	14	61	2,469	14	96	3,885	14	65	2,631	14	21	850	16	16	648
Permanent Plot 9	15	90	3,642	15	57	2,307	15	131	5,301	15	111	4,492	15	46	1,862	16	16	648
Permanent Plot 10	19	82	3,318	16	35	1,416	16	28	1,133	16	218	8,822	16	18	728	17	17	688
Permanent Plot 11	11	36	1,457	11	11	445	16	17	688	17	46	1,862	17	39	1,578	17	17	688
Permanent Plot 12	17	94	3,804	16	56	2,266	15	25	1,012	15	29	1,174	16	16	648	16	16	648
Permanent Plot 13	13	23	931	12	12	486	13	14	567	13	14	567	13	13	526	16	16	648
Permanent Plot 14	11	18	728	13	19	769	13	18	728	13	14	567	13	13	526	16	16	648
Permanent Plot 15	12	136	5,504	13	51	2,064	14	92	3,723	14	44	1,781	14	59	2,388	16	37	1,497

APPENDIX 4. Morphological Summary Data and Plots

Table 10a. Baseline Stream Data Summary

Henry Fork Mitigation Site
DMS Project No.96306
Monitoring Year 7 - 2022

Henry Fork-UT1 Reach 2, UT1A and UT2

	PRE-RESTORATION CONDITION						DESIGN						AS-BUILT/BASELINE					
Parameter	**UT1 Reach 2**		**UT1A**		**UT2**		**UT1 Reach 2**		**UT1A**		**UT2**		**UT1 Reach 2**		**UT1A**		**UT2**	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Upper**	**Lower**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Reference Cross Section Number	**XS9**		**XS8**		**XS5,XS6**													
Dimension and Substrate - Riffle																		
Bankfull Width (ft)	9.4		12.5		15.2	16.3	10.1		6.2		7.5		10.5		6.6		5.65	
Floodprone Width (ft)	17.9		23.1		18	19.8	23	46	150	200	60	110	96.7+		31.4		81.3	149.8+
Bankfull Mean Depth	0.7		0.2		0.5	0.5	0.82		0.51		0.58		0.9		0.40		0.85	
Bankfull Max Depth	1.4		0.7		0.6	0.6	1.30		0.85		0.95		1.5		0.80		1.2	
Bankfull Cross-sectional Area (ft^2)	6.1		2.8		7.5	7.8	8.3		3.2		4.4		9.7		2.5		4.6	
Width/Depth Ratio	14.4		56.0		30.7	34.4	12.3		12.1		12.9		11.4		17.0		7.2	
Entrenchment Ratio	1.9		1.8		1.2	1.2	2.3	4.6	24.2	32.37	8.0	14.7	9.2+		4.8		15.9	20.3
Bank Height Ratio	2.7		1.9		2.9	7.5	1.0		1.0		1.0		1.0		1.0		1.1	
D50 (mm)	5.3/N/A		0.28/0.34		SC/0.04		N/A		0.34		0.04		Silt/Clay					
Riffle Length (ft)							---		---		---		23.3	51.9	10.8	32.9	3.45	52.3
Riffle Slope (ft/ft)	0.4	1.7	6.7		N/A^2		0.002	0.0080	0.005	0.0210	0.0020	0.0080	0.0000	0.0230	0.0010	0.0395	0.0000	0.0144
Pool Length (ft)							---		---		---		15.4	83.1	10.2	47.5	10.28	60.9
Pool Max Depth (ft)	N/A^2		N/A^2		N/A^2		1.3	2.5	0.8	1.5	0.0	1.8	2.2	3.5	0.9	2.6	1.6	2.6
Pool Spacing (ft)	38.1		N/A^2		N/A^2		20	86	12	53	15	68	49	136	29	53	28	87
Pool Volume (ft^3)																		
Pattern																		
Channel Beltwidth (ft)	N/A^2		N/A^2		N/A^2		8	83	8	37	9	58	7	84	7	36	8	59
Radius of Curvature (ft)	N/A^2		N/A^2		N/A^2		25	51	13	25	14	24	25	58	9	25	13	24
Rc:Bankfull Width (ft/ft)	N/A^2		N/A^2		N/A^2		19.2	39.2	15.3	29.4	14.7	25.3	2.4	5.5	1.4	3.8	2.3	4.2
Meander Length (ft)	N/A^2		N/A^2		N/A^2		120	210	63	100	65	156	123	210	61	100	63	158
Meander Width Ratio	N/A^2		N/A^2		N/A^2		92.3	161.5	74.1	117.6	68.4	164.2	11.7	20.0	9.2	15.2	11.2	28.0
Substrate, Bed and Transport Parameters																		
Ri%/Ru%/P%/G%/S%																		
SC%/Sa%/G%/C%/B%/Be%																		
d16/d35/d50/d84/d95/d100	SC/0.18/2.8/38/62/128-180		SC/SC/SC/SC/0.25/4.0/11.3-16		SC/SC/SC/SC/SC/8.0/45-64													
Reach Shear Stress (Competency) lb/ft^2	0.8-1.6		0.7		0.18-0.25+[4]		0.06		0.13		0.05		0.00	0.11	0.13		0.07	0.07
Max part size (mm) mobilized at bankfull																		
Stream Power (Capacity) W/m^2																		
Additional Reach Parameters																		
Drainage Area (SM)	0.2		0.036		0.077		0.24-0.28		0.04		0.08		0.24-0.28		0.04		0.08	
Watershed Impervious Cover Estimate (%)	5.3%		6.1%		2.4%		5.3%		6.1%		2.4%		5.3%		6.1%		2.4%	
Rosgen Classification	Modified B4c[3]		Modified B6c[3]		Modified F6[3]		C6		C6		C6		C6		C6		C6	
Bankfull Velocity (fps)	3.0		2.2		1.3	1.5	1.7		2.0		1.2		1		1.4		0.8	1.0
Bankfull Discharge (cfs)	18.3		6.1		10.2		14		6		5		13		4		4.0	6.7
Q-NFF regression (2-yr)	---		---		---													
Q-USGS extrapolation (1.2-yr)	61		19		29													
Q-Mannings	18.3		6.1		10.2		14		6		5		13		4		4.0	6.7
Valley Length (ft)	---		---		---		---		---		---		922		415		1,174	
Channel Thalweg Length (ft)	1,499*		353		1,915		1,228		657		1,969		1,232		658		1,969	
Sinuosity	1.5[5]		1.05		1.03		1.39		1.06		1.65		1.3		1.6		1.7	
Water Surface Slope ($ft/ft)^2$	---		---		---		0.0016	0.0018	0.0037	0.0043	0.0016	0.0019	0.0023		0.0063		0.0018	
Bankfull Slope (ft/ft)	---		---		---		0.0016	0.0018	0.0037	0.0043	0.0016	0.0019	0.0037		0.0060		0.0015	

SC: Silt/Clay <0.062 mm diameter particles
(---): Data was not provided
N/A: Not Applicable

[1] Min and max values may appear backwards for ratios. When this is the case, ratio values have been left in the column associated with a particular cross section.

[2] Due to the highly manipulated condition of the streams resulting in ditched streams with little profile diversity, no profile or pattern data was assessed on UT1A, UT2, UT1 Reach 2, and UT1B.

[3] The Rosgen classification system is for natural streams and project streams have been heavily manipulated. These classifications are for illustrative purposes only.

[4] The 25-year event was the largest event modeled; it does not fill the channel

[5] Sinuosity on UT1 Reach 2 is calculated by drawing a valley length line that follows the proposed valley; the existing valley is poorly defined

*Does not include last 150' to tie-in to Henry Fork.

Table 10b. Baseline Stream Data Summary

Henry Fork Mitigation Site
DMS Project No.96306
Monitoring Year 7 - 2022

Henry Fork-UT1 Reach 1 and UT1B

	PRE-RESTORATION CONDITION				DESIGN				AS-BUILT/BASELINE			
Parameter	**UT1 Reach 1**		**UT1B**		**UT1 Reach 1**		**UT1B**		**UT1 Reach 1**		**UT1B**	
	Min	**Max**	**Min**	**Max**	**Upper**	**Lower**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Reference Cross Section Number	**XS3,XS4**		**XS1,XS2**									
Dimension and Substrate - Riffle												
Bankfull Width (ft)	3.2	3.3	2.7	3.1	6.0	7.0	5.5		6.9	7.3	5.4	
Floodprone Width (ft)	6.7	11.4	17.5	19.8	15	20(40[3])	10	15	51.3	118.3+	13.2	
Bankfull Mean Depth	0.6	0.7	0.6	0.7	0.40	0.49	0.4		0.4	0.5	0.4	
Bankfull Max Depth	0.7	1.0	0.7	0.9	1.3		0.55		0.75		0.6	
Bankfull Cross-sectional Area (ft^2)	1.8	2.1	1.9	2	2.4	3.4	2.1		2.9	3.5	2.2	
Width/Depth Ratio	5.1	5.7	3.7	5.1	12.3		14.7		15.8		37.7	
Entrenchment Ratio	2.0	3.6	1.7	2.5	2.5	2.9 (5.7[3])	1.8	2.7	7.0	17.1+	6.9	
Bank Height Ratio	1.0	3.1	1.7	2.2	1.0		1.0		1.0		1.0	
D50 (mm)	16/8.3		6.9/5.3		8.3		5.3		17.1		11.0	
Profile												
Riffle Length (ft)					---		---		8.0	47.3	11.3	41.2
Riffle Slope (ft/ft)	0.041	0.21	N/A[2]		0.056	0.092	0.067	0.110	0.0142	0.0987	0.0259	0.0978
Pool Length (ft)					---		---		4.3	33.4	5.6	20.0
Pool Max Depth (ft)	N/A[2]		N/A[2]		0.6	1.5	0.7	1.3	0.9	2.8	0.5	2.2
Pool Spacing (ft)	10.4	20.5	N/A[2]		12	35	11	28	10	60	7	43
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	N/A[2]		N/A[2]		6	28	5	21	10	26	4	19
Radius of Curvature (ft)	N/A[2]		N/A[2]		14	30	10	18	8	31	8	32
Rc:Bankfull Width (ft/ft)	N/A[2]		N/A[2]		2.3	4.3	1.8	3.3	1.2	4.5	1.5	5.9
Meander Length (ft)	N/A[2]		N/A[2]		52	104	46	92	56	104	48	90
Meander Width Ratio	N/A[2]		N/A[2]		9	15	8	17	8	15	9	17
Substrate, Bed and Transport Parameters												
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	SC/0.18/2.80/38/62/128-180		FS/SC/SC/0.14/8.9/45/128-180									
Reach Shear Stress (Competency) lb/ft^2	2.3-3.1		1.3-2.4		1.0-1.2		0.91		0.87		1.32	
Max part size (mm) mobilized at bankfull												
Stream Power (Capacity) W/m^2												
Additional Reach Parameters												
Drainage Area (SM)	0.17		0.048		0.07-0.17		0.048		0.07-0.17		0.048	
Watershed Impervious Cover Estimate (%)	5.9%		7.9%		5.9%		7.9%		5.9%		7.9%	
Rosgen Classification	Modified Low W/D B4a / E4b[4]		Modified B5a / E5b[4]		B4a	B4a (C4b[5])	B4a[6]		B4a		B4a	
Bankfull Velocity (fps)	4.8	5.3	3.8	4.1	4.6	4.1	4.3		2.6	3.9	3.9	
Bankfull Discharge (cfs)	8.5	11.4	8		10	15	9		7.6	12.6	8.7	
Q-NFF regression (2-yr)	---		---									
Q-USGS extrapolation (1.2-yr)	30		24									
Q-Mannings	8.5	11.4	8		10	15	9		7.6	12.6	8.7	
Valley Length (ft)	---		---		---		---		1,271		338	
Channel Thalweg Length (ft)	1,392		478		1,471		358		1,497		358	
Sinuosity	1.0		1.1		1.11	1.16	1.30		1.2		1.1	
Water Surface Slope (ft/ft)[2]	---		---		0.0477	0.0527	0.0500	0.0565	0.0369		0.0598	
Bankfull Slope (ft/ft)	---		---		0.0477	0.0527	0.0500	0.0565	0.0241	0.0612	0.0602	

SC: Silt/Clay <0.062 mm diameter particles
FS: Fine Sand 0.125-0.250mm diameter particles
(---): Data was not provided
N/A: Not Applicable

[1] Min and max values may appear backwards for ratios. When this is the case, ratio values have been left in the column associated with a particular cross section.

[2] Due to the highly manipulated condition of the streams resulting in ditched streams with little profile diversity, no profile or pattern data was assessed on UT1A, UT2, UT1 Reach 2, and UT1B.

[3] UT1 Reach 1 (Lower) is a hybrid reach that goes through what is presently a pond and then drops rapidly down what is presently a dam embankment and drop to master stream floodplain. Through the pond, slopes and floodprone width is more typical of a C.

[4]The Rosgen classification system is for natural streams and project streams have been heavily manipulated. These classifications are for illustrative purposes only.

[5]UT1 Reach 1 (Lower) is a hybrid reach that goes through what is presently a pond and then drops rapidly down what is presently a dam embankment and drop to master stream floodplain. Through the pond, slopes and floodprone width is more typical of a C.

[6]UT1B is classified in existing conditions as a sand bed stream. This is thought to be reflective of manipulation (impoundment and channelization resulting in a less steep stream). The restored stream, with slopes exceeding 2% grade throughout the reach, will be a gravel dominated stream, and is classified as such.

Table 10c. Baseline Stream Data Summary

Henry Fork Mitigation Site
DMS Project No.96306
Monitoring Year 7 - 2022

	REFERENCE REACH DATA																	
Parameter	**UT to Catawba River Reach 1**		**UT to Catawba River Reach 2**		**UT to Lyle Creek**		**Vile Preserve**		**UT to South Crowders**		**Group Camp Tributary**		**UT to Gap Branch**		**Upstream UT1 to Henry Fork**	
	Min[1]	**Max[1]**	**Min[1]**	**Max[1]**	**Min[1]**	**Max[1]**	**Min[1]**	**Max[1]**	**Min[1]**	**Max[1]**	**Min[1]**	**Max[1]**	**Min[1]**	**Max[1]**	**Min[1]**	**Max[1]**
Reference Cross Section Number	**XS2**	**XS3**	**XS4**		**XS1**	**XS3**	**XS1**	**XS3**	**XS1**	**XS2**	**XS3**	**XS4**	**XS2**		**XS1**	**XS2**
Dimension and Substrate - Riffle																
Bankfull Width (ft)	12.4	9.7	12.3		8.6	7.0	6.2	5.7	6.1	8.4	4.4	4.2	6.2		3.2	7.7
Floodprone Width (ft)	79	52	53		48.9	45.2	200+	200+	25.5	31.2	8.6	10.6	20.9		6.3	13
Bankfull Mean Depth	1.4	1.2	1.1		0.5	0.5	0.8	0.8	1.1	1.0	0.8	0.8	0.6		0.6	0.5
Bankfull Max Depth	1.7	1.7	1.7		1.1	1.0	1.3	1.4	1.4	1.4	1.0	1.2	1.0		0.8	0.7
Bankfull Cross-sectional Area (ft^2)	17.6	11.4	13.2		4.1	3.5	5.3	4.5	6.4	8.7	3.6	3.4	3.8		1.9	3.6
Width/Depth Ratio	8.7	8.2	11.5		18.3	13.9	7.4	7.2	5.7	8.2	5.5	5.2	10.1		5.2	16.4
Entrenchment Ratio	5.8+		5.8+		2.5+		30+		4.2	3.7	1.9	2.5	3.4		2.0	1.7
Bank Height Ratio	1.0		1.0		1.0		1.0		1.6	1.0	1.0	1.0	1.0		1.0	1.3
D50 (mm)	1.8		75.9		0.2		0.4		19.7		0.3		19.0		34.0	
Profile																
Riffle Length (ft)	---		---		---		---		---		---		---		---	
Riffle Slope (ft/ft)	0.0114	0.0605	0.0142	0.3451	0.0055	0.0597	0.0063		0.0202	0.0664	0.0105	0.1218	0.0110	0.1400	0.0500	0.0700
Pool Length (ft)	---		---		---		---		---		---		---		---	
Pool Max Depth (ft)	2.5		N/A		1.3		1.4		1.3	3.0	1.8	2.8	1.5		N/A	
Pool Spacing (ft)	31	60	19	46	15	28	44.8		28	63	9	58	18	27	14	25
Pool Volume (ft^3)	---		---		----		----		----		----		----		----	
Pattern																
Channel Beltwidth (ft)	55		23		21		19		81		15.5	16.5	N/A		N/A	
Radius of Curvature (ft)	31	56	29	52	19	32	27	50	9	20	8.0	11.8	N/A		N/A	
Rc:Bankfull Width (ft/ft)	2.8	5.1	2.4	4.2	2.2	4.6	4.4	8.8	1.5	2.4	1.9	2.7	N/A		N/A	
Meander Length (ft)	65	107	52	79	39	44	29	45	45	72	31	34	N/A		N/A	
Meander Width Ratio	4.4	5.7	1.8		2.4	3.0	3.1	4.2	9.6	13.3	3.6	3.8	N/A		N/A	
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100	0.3/0.4/1.8/12.8/25/90		.5/29.8/75.9/170.8/332.0/>2048.		-/0.1/0.2/0.5/4.0/8.0		0.2/0.3/0.4/0.9/2/-		0.8/12.1/19.7/49.5/75.9/180.0		SC/0.1/0.3/16.0/55.6/128.0		0.4/8/19.0/102.3/256.0/>2048		2.8/16/34/64/101/128-180	
Reach Shear Stress (Competency) lb/ft^2																
Max part size (mm) mobilized at bankfull																
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	1.60		1.60		0.25		1.09		0.22		0.10		0.04		0.05	
Watershed Impervious Cover Estimate (%)	---		---		---		---		---		---		---		---	
Rosgen Classification	E5		E3b/C3b		C5		E5		E4		E5b		Slightly entrenched B4a/A4		B4a	
Bankfull Velocity (fps)	3.9	3.5	6.3		2	2.1	3.3	3.2	3.3	4.4	3.6	3.4	5.0		5.4	3.8
Bankfull Discharge (cfs)	58		83		8		16		25		12		19		12	
Q-NFF regression (2-yr)																
Q-USGS extrapolation (1.2-yr)																
Q-Mannings																
Valley Length (ft)	---		---		---		---		---		---		---		---	
Channel Thalweg Length (ft)	---		---		---		---		---		---		---		---	
Sinuosity	1.2		1.1		1.1		1.1		2.2		1.6		N/A		1.1	
Water Surface Slope $(ft/ft)^2$	---		---		---		---		---		---		---		---	
Bankfull Slope (ft/ft)	---		---		---		---		---		---		---		---	

SC: Silt/Clay <0.062 mm diameter particles
FS: Fine Sand 0.125-0.250mm diameter particles
(---): Data was not provided
N/A: Not Applicable

[1] Min and max values may appear backwards for ratios. When this is the case, ratio values have been left in the column associated with a particular cross section.

Table 11a. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)

Henry Fork Mitigation Site

DMS Project No.96306

Monitoring Year 7 - 2022

UT1 Reach 1 & UT1 Reach 2

	Cross-Section 1, UT1 Reach 1 (Riffle)								Cross-Section 2, UT1 Reach 1 (Pool)								Cross-Section 3, UT1 Reach 1 (Pool)							
Dimension and Substrate[1]	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation (ft)[1]	906.1	906.1	906.1	906.1		906.2		906.3	901.9	901.9	901.9	901.9		901.8		901.9	878.3	878.3	878.3	878.2		878.1		878.3
Low Bank Elevation	906.1	906.1	906.1	906.2		906.2		906.3	901.9	901.9	901.9	901.9		901.8		901.9	878.3	878.3	878.3	878.2		878.1		878.3
Bankfull Width (ft)	7.3	6.8	7.1	7.8		5.5		5.9	8.8	9.6	10.9	11.3		12.2		11.1	7.8	7.7	9.6	10.0		8.8		10.9
Floodprone Width (ft)[2]	51	51	52	55		55		55	---	---	---	---		---		---	---	---	---	---		---		---
Bankfull Mean Depth (ft)	0.5	0.4	0.5	0.5	N/A	0.6	N/A	0.6	1.2	1.0	0.9	0.7	N/A	0.4	N/A	0.4	1.2	1.0	0.9	0.9	N/A	0.9	N/A	0.9
Bankfull Max Depth (ft)	0.7	0.7	0.8	1.1		1.2		1.2	2.2	1.7	1.8	1.5		1.1		1.1	2.2	1.8	1.8	2.0		2.4		2.5
Bankfull Cross-Sectional Area (ft^2)	3.5	2.9	3.3	4.3		3.4		3.4	10.7	9.5	10.0	8.0		5.1		5.0	9.1	8.1	8.8	9.0		8.1		10.2
Bankfull Width/Depth Ratio	15.4	15.7	15.0	14.3		8.8		10.3	---	---	---	---		---		---	---	---	---	---		---		---
Bankfull Entrenchment Ratio	7.0	7.5	7.3	7.0		10.1		9.4	---	---	---	---		---		---	---	---	---	---		---		---
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.1		1.0		1.0	---	---	---	---		---		---	---	---	---	---		---		---
	Cross-Section 4, UT1 Reach 1 (Riffle)								**Cross-Section 5, UT1 Reach 2 (Riffle)**								**Cross-Section 6, UT1 Reach 2 (Pool)**							
Dimension and Substrate[1]	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation (ft)[1]	877.6	877.6	877.6	877.5		877.7		877.9	873.5	873.5	873.5	873.4		873.6		873.6	872.7	872.7	872.7	872.8		872.8		872.8
Low Bank Elevation	877.6	877.6	877.6	877.5		877.6		877.7	873.5	873.5	873.5	873.5		873.5		873.5	872.7	872.7	872.7	872.8		872.8		872.8
Bankfull Width (ft)	6.9	7.4	7.6	6.9		4.9		3.9	10.5	11.1	10.9	11.2		10.6		10.1	8.8	8.8	9.2	10.7		9.8		10.1
Floodprone Width (ft)[2]	118+	118+	118+	60+		60+		62+	97+	97+	97+	75+		73+		73+	---	---	---	---		---		---
Bankfull Mean Depth (ft)	0.4	0.4	0.4	0.4	N/A	0.4	N/A	0.5	0.9	0.9	0.9	0.9	N/A	0.8	N/A	0.9	1.0	0.8	0.7	0.8	N/A	0.8	N/A	0.8
Bankfull Max Depth (ft)	0.8	0.7	0.7	0.7		0.8		0.8	1.5	1.5	1.5	1.6		1.6		1.6	1.8	1.4	1.3	1.5		1.3		1.4
Bankfull Cross-Sectional Area (ft^2)	2.9	3.2	3.1	2.8		1.9		1.8	9.7	10.1	9.3	10.1		8.7		9.1	8.8	7.2	6.8	8.4		7.8		8.2
Bankfull Width/Depth Ratio	16.2	17.1	18.7	16.8		12.7		8.4	11.4	12.1	12.7	12.4		12.8		11.3	---	---	---	---		---		---
Bankfull Entrenchment Ratio	17.1+	16.0+	15.5+	8.6+		12.2+		15.8+	9.2+	8.7+	8.9+	6.7+		6.9+		7.2+	---	---	---	---		---		---
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0		0.8		0.8	1.0	1.0	1.0	1.0		0.9		1.0	---	---	---	---		---		---

[1]Prior to MY3, bankfull dimensions were calculated using a fixed bankfull elevation. For MY3 through MY7 bankfull elevation and channel cross-section dimensions are calculated using a fixed Abkf as described in the Standard Measurement of the BHR Monitoring Parameter provided by NCIRT and NCDMS (9/2018).

[2] Floodprone width in MY3 through MY7 is based on the width of the cross-section, in lieu of assuming the width across the floodplain as was done in previous monitoring years.

Table 11b. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)
Henry Fork Mitigation Site
DMS Project No.96306
Monitoring Year 7 - 2022

UT1A, UT1B, & UT2

	Cross-Section 7, UT1A (Pool)								Cross-Section 8, UT1A (Riffle)								Cross-Section 9, UT1B (Pool)								Cross-Section 10, UT1B (Riffle)							
Dimension and Substrate[1]	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation (ft)[1]	874.9	874.9	874.9	874.8		875.2		875.2	875.0	875.0	875.0	874.9		875.2		875.4	922.9	922.9	922.9	923.1		923.0		923.1	922.1	922.1	922.1	922.2		922.3		922.7
Low Bank Elevation	874.9	874.9	874.9	874.8		875.2		875.2	875.0	875.0	875.0	874.9		875.0		875.1	922.9	922.9	922.9	923.1		923.0		923.1	922.1	922.1	922.1	922.2		922.3		922.7
Bankfull Width (ft)	5.6	5.8	4.5	4.2		5.0		3.5	6.6	6.3	7.7	6.5		4.9		4.1	5.5	5.9	6.9	8.3		6.9		8.0	5.4	5.9	4.3	6.5		5.7		5.5
Floodprone Width (ft)[2]	---	---	---	---		---		---	31+	81+	79+	85+		86+		84+	---	---	---	---		---		---	38	56	54	56		60		63
Bankfull Mean Depth (ft)	0.4	0.4	0.3	0.4	N/A	0.3	N/A	0.5	0.4	0.4	0.3	0.4	N/A	0.3	N/A	0.4	0.9	0.7	0.6	0.7	N/A	0.7	N/A	0.7	0.4	0.3	0.2	0.4	N/A	0.3	N/A	0.4
Bankfull Max Depth (ft)	0.7	1.0	0.7	0.8		0.8		0.9	0.8	0.6	0.6	0.8		0.8		0.8	1.4	1.2	1.0	1.4		1.3		1.4	0.6	0.5	0.3	0.6		0.6		0.7
Bankfull Cross-Sectional Area (ft^2)	2.0	2.3	1.5	1.7		1.6		1.7	2.5	2.3	2.4	2.4		1.6		1.5	5.0	4.2	4.0	5.6		4.5		5.2	2.2	2.0	1.0	2.5		2.0		2.3
Bankfull Width/Depth Ratio	---	---	---	---		---		---	17.0	17.3	24.9	17.9		15.4		11.1	---	---	---	---		---		---	13.2	17.3	19.6	17.0		16.3		13.2
Bankfull Entrenchment Ratio	---	---	---	---		---		---	4.8+	12.8+	10.3+	13.1+		17.5+		20.7+	---	---	---	---		---		---	6.9	9.4	12.5	8.6		10.6		11.4
Bankfull Bank Height Ratio	---	---	---	---		---		---	1.0	1.0	1.0	1.0		0.8		0.8	---	---	---	---		---		---	1.0	1.0	1.0	1.1		0.9		1.0
	Cross-Section 11, UT2 (Pool)								**Cross-Section 12, UT2 (Riffle)**								**Cross-Section 13, UT2 (Pool)**								**Cross-Section 14, UT2 (Riffle)**							
Dimension and Substrate[1]	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation (ft)[1]	876.0	876.0	876.0	876.0		876.0		876.1	876.0	876.0	876.0	876.0		876.1		876.2	875.1	875.1	875.1	875.0		875.0		875.0	875.2	875.2	875.2	875.2		875.2		875.3
Low Bank Elevation	876.0	876.0	876.0	876.0		876.0		876.1	876.0	876.0	876.0	876.0		876.0		876.1	875.1	875.1	875.1	875.0		875.0		875.0	875.2	875.2	875.2	875.3		875.1		875.2
Bankfull Width (ft)	10.2	11.5	11.1	10.8		10.9		11.4	8.1	9.1	8.6	8.0		8.3		8.4	7.8	8.2	10.0	12.0		10.9		10.2	7.4	6.9	7.5	8.5		8.0		7.7
Floodprone Width (ft)[2]	---	---	---	---		---		---	81+	51+	51+	51+		51+		51+	---	---	---	---		---		---	150+	150+	150+	59+		59+		59+
Bankfull Mean Depth (ft)	0.8	0.8	0.9	0.8	N/A	0.7	N/A	0.7	0.7	0.6	0.7	0.7	N/A	0.6	N/A	0.6	1.1	1.0	0.9	0.8	N/A	0.7	N/A	0.7	0.6	0.5	0.6	0.6	N/A	0.4	N/A	0.5
Bankfull Max Depth (ft)	1.9	1.6	1.7	1.7		1.6		1.6	1.4	1.4	1.5	1.3		1.3		1.2	1.9	1.6	1.7	1.8		1.5		1.4	1.0	1.0	1.1	1.2		0.9		0.8
Bankfull Cross-Sectional Area (ft^2)	8.6	9.5	9.7	8.5		8.0		8.1	5.7	5.5	6.0	5.3		4.9		4.8	8.8	8.1	9.4	8.0		8.0		7.1	4.2	3.8	4.4	4.8		3.1		3.6
Bankfull Width/Depth Ratio	---	---	---	---		---		---	11.5	15.0	12.3	12.1		14.2		14.7	---	---	---	---		---		---	12.9	12.7	12.6	14.8		20.4		16.3
Bankfull Entrenchment Ratio	---	---	---	---		---		---	10.1+	5.6+	5.9+	6.3+		6.1+		6.0+	---	---	---	---		---		---	20.3+	21.8+	20.1+	7.0+		7.4+		7.7+
Bankfull Bank Height Ratio	---	---	---	---		---		---	1.0	1.0	1.0	1.0		0.9		0.9	---	---	---	---		---		---	1.0	1.0	0.9	1.1		0.9		0.9

[1]Prior to MY3, bankfull dimensions were calculated using a fixed bankfull elevation. For MY3 through MY7 bankfull elevation and channel cross-section dimensions are calculated using a fixed Abkf as described in the Standard Measurement of the BHR Monitoring Parameter provided by NCIRT and NCDMS (9/2018).

[2] Floodprone width in MY3 through MY7 is based on the width of the cross-section, in lieu of assuming the width across the floodplain as was done in previous monitoring years.

Table 12a. Monitoring - Stream Reach Data Summary
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

UT1 Reach 1

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																
Bankfull Width (ft)	6.9	7.3	6.8	7.4	7.1	7.6	6.9	7.8			4.9	5.5			3.9	5.9
Floodprone Width (ft)	51	118+	51	118+	52	118+	55	60+			55	60+			55	62+
Bankfull Mean Depth	0.4	0.5	0.4	0.4	0.4	0.5	0.4	0.5			0.4	0.6			0.5	0.6
Bankfull Max Depth	0.75		0.7		0.7	0.8	0.7	1.1	N/A		0.8	1.2			0.8	1.2
Bankfull Cross Sectional Area (ft^2)	2.9	3.5	2.9	3.2	3.1	3.3	2.8	4.3			1.9	3.4	N/A		1.8	3.4
Width/Depth Ratio	15.8		15.7	17.1	15.0	18.7	14.3	16.8			8.8	12.7			8.4	10.3
Entrenchment Ratio	7.0	17.1+	7.5+	16.0+	7.3+	15.5+	7.0	8.6+			10.1	12.2+			9.4	15.8+
Bank Height Ratio	1.0		1.0		1.0		1.0	1.1			0.8	1.0			0.8	1.0
D50 (mm)	35.9	37.9	56.1	87.0	87.3	93.6	73.0	104.7	66.2	88.3	47.7	68.5			N/A	
Profile																
Shallow Length (ft)	8.0	47.3														
Shallow Slope (ft/ft)	0.0142	0.0987														
Pool Length (ft)	4.3	33.4														
Pool Max Depth (ft)	0.9	2.8														
Pool Spacing (ft)	10	60														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	10	26														
Radius of Curvature (ft)	8	31														
Rc:Bankfull Width (ft/ft)	1.2	4.5														
Meander Wave Length (ft)	56	104														
Meander Width Ratio	8	15														
Additional Reach Parameters																
Rosgen Classification	B4a															
Channel Thalweg Length (ft)	1,497															
Sinuosity (ft)	1.2															
Water Surface Slope (ft/ft)	0.0369															
Bankfull Slope (ft/ft)	0.0241	0.0612														
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		N/A		0%		0%		0%	

Table 12b. Monitoring - Stream Reach Data Summary
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

UT1 Reach 2

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																
Bankfull Width (ft)	10.5		11.1		10.9		11.2				10.6				10.1	
Floodprone Width (ft)	97+		97+		97+		75+				73+				73+	
Bankfull Mean Depth	0.9		0.9		0.9		0.9				0.8				0.9	
Bankfull Max Depth	1.5		1.5		1.5		1.6				1.6		N/A		1.6	
Bankfull Cross Sectional Area (ft^2)	9.7		10.1		9.3		10.1		N/A		8.7				9.1	
Width/Depth Ratio	11.4		12.1		12.7		12.4				12.8				11.3	
Entrenchment Ratio	9.2+		8.7+		8.9+		6.7+				6.9+				7.2+	
Bank Height Ratio	1.0		1.0		1.0		1.0				0.9				1.0	
D50 (mm)	Silt/Clay															
Profile																
Riffle Length (ft)	23.3	51.9														
Riffle Slope (ft/ft)	0.0000	0.0230														
Pool Length (ft)	15.4	83.1														
Pool Max Depth (ft)	2.2	3.5														
Pool Spacing (ft)	49	136														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	7	84														
Radius of Curvature (ft)	25	58														
Rc:Bankfull Width (ft/ft)	2.4	5.5														
Meander Wave Length (ft)	123	210														
Meander Width Ratio	11.7	20.0														
Additional Reach Parameters																
Rosgen Classification	C6															
Channel Thalweg Length (ft)	1,232															
Sinuosity (ft)	1.3															
Water Surface Slope (ft/ft)	0.0023															
Bankfull Slope (ft/ft)	0.0037															
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		N/A		0%		N/A		0.8%	

Table 12c. Monitoring - Stream Reach Data Summary
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

UT1A

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																
Bankfull Width (ft)	6.6		6.3		7.7		6.5		N/A		4.9		N/A		4.1	
Floodprone Width (ft)	31+		81+		79+		85+				86+				84+	
Bankfull Mean Depth	0.4		0.4		0.3		0.4				0.3				0.4	
Bankfull Max Depth	0.8		0.6		0.6		0.8				0.8				0.8	
Bankfull Cross Sectional Area (ft^2)	2.5		2.3		2.4		2.4				1.6				1.5	
Width/Depth Ratio	17.0		17.3		24.9		17.9				15.4				11.1	
Entrenchment Ratio	4.8		31.9+		10.3+		13.1+				17.5+				20.7+	
Bank Height Ratio	1.0		1.0		1.0		1.0				0.8				0.8	
D50 (mm)																
Profile																
Riffle Length (ft)	10.8	32.9														
Riffle Slope (ft/ft)	0.0010	0.0395														
Pool Length (ft)	10.2	47.5														
Pool Max Depth (ft)	0.9	2.6														
Pool Spacing (ft)	29	53														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	7	36														
Radius of Curvature (ft)	9	25														
Rc:Bankfull Width (ft/ft)	1.4	3.8														
Meander Wave Length (ft)	61	100														
Meander Width Ratio	9.2	15.2														
Additional Reach Parameters																
Rosgen Classification	C6															
Channel Thalweg Length (ft)	658															
Sinuosity (ft)	1.6															
Water Surface Slope (ft/ft)	0.0063															
Bankfull Slope (ft/ft)	0.0060															
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		N/A		0%		0%		0%	

Table 12d. Monitoring - Stream Reach Data Summary
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

UT1B

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																
Bankfull Width (ft)	5.4		5.9		4.3		6.5				5.7				5.5	
Floodprone Width (ft)	38		56		54		56				60				63	
Bankfull Mean Depth	0.4		0.3		0.2		0.4				0.3				0.4	
Bankfull Max Depth	0.6		0.5		0.3		0.6		N/A		0.6				0.7	
Bankfull Cross Sectional Area (ft^2)	2.2		2.0		1.0		2.5				2.0		N/A		2.3	
Width/Depth Ratio	13.2		17.3		19.6		17.0				16.3				13.2	
Entrenchment Ratio	6.9		9.4		12.5		8.6				10.6				11.4	
Bank Height Ratio	1.0		1.0		1.0		1.1				0.9				1.0	
D50 (mm)	11.0		40.2		69.0		68.5		23.3		47.7				N/A	
Profile																
Shallow Length (ft)	11.3	41.2														
Shallow Slope (ft/ft)	0.0259	0.0978														
Pool Length (ft)	5.6	20.0														
Pool Max Depth (ft)	0.5	2.2														
Pool Spacing (ft)	7	43														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	4	19														
Radius of Curvature (ft)	8	32														
Rc:Bankfull Width (ft/ft)	1.5	5.9														
Meander Wave Length (ft)	48	90														
Meander Width Ratio	9	17														
Additional Reach Parameters																
Rosgen Classification	B4a															
Channel Thalweg Length (ft)	358															
Sinuosity (ft)	1.1															
Water Surface Slope (ft/ft)	0.0598															
Bankfull Slope (ft/ft)	0.0602															
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		N/A		0%		0%		0%	

Table 12e. Monitoring - Stream Reach Data Summary
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

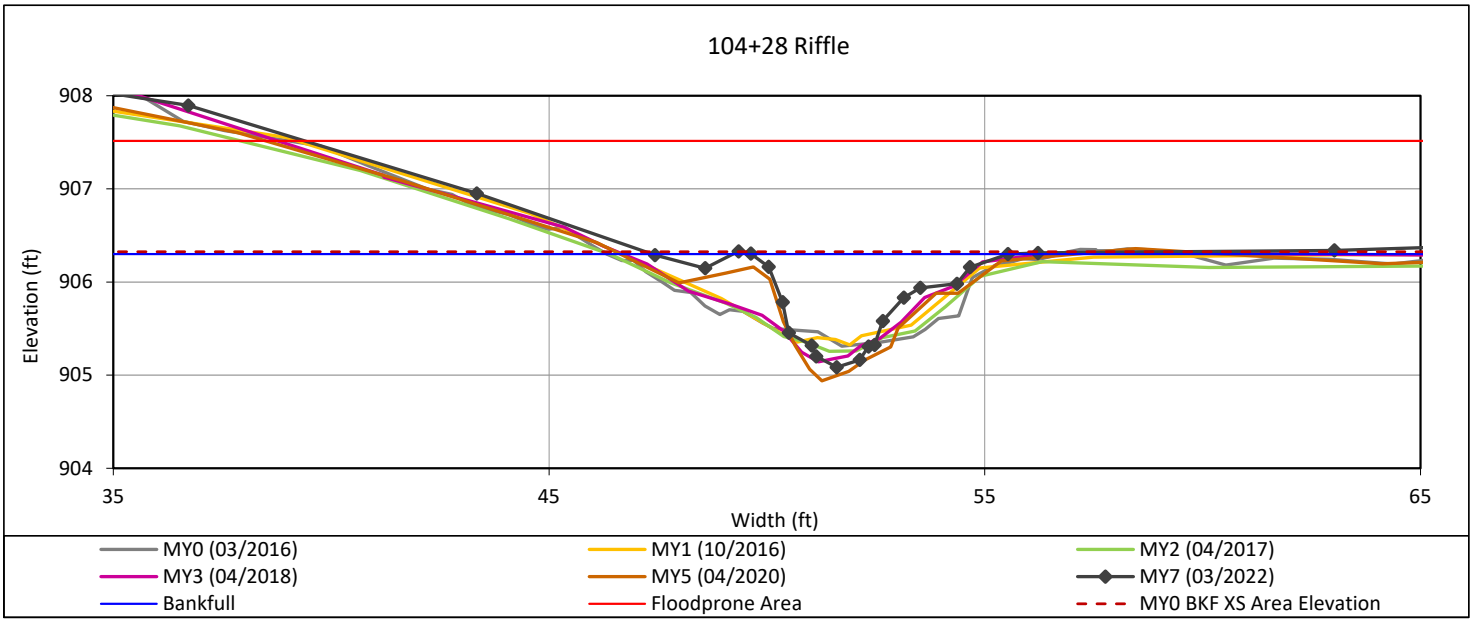
UT2

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																
Bankfull Width (ft)	7.4	8.1	6.9	9.1	7.5	8.6	8.0	8.5			8.0	8.3			7.7	8.4
Floodprone Width (ft)	81	150+	51+	150+	51+	150+	51+	59+			51+	59+			51+	59+
Bankfull Mean Depth	0.6	0.7	0.5	0.6	0.6	0.7	0.6	0.7			0.4	0.6			0.5	0.6
Bankfull Max Depth	1.0	1.4	1.0	1.4	1.1	1.5	1.2	1.3			0.9	1.3			0.8	1.2
Bankfull Cross Sectional Area (ft^2)	4.2	5.7	3.8	5.5	4.4	6.0	4.8	5.3	N/A		3.1	4.9	N/A		3.6	4.8
Width/Depth Ratio	11.5	12.9	12.7	15.0	12.3	12.6	12.1	14.8			14.2	20.4			14.7	16.3
Entrenchment Ratio	10.1	29.0+	5.6+	21.8+	5.9+	20.1+	6.3+	7.0+			6.1+	7.4+			6.0+	7.7+
Bank Height Ratio	1.0		1.0		0.9	1.0	1.0	1.1			0.9				0.9	
D50 (mm)																
Profile																
Riffle Length (ft)	3.45	52.29														
Riffle Slope (ft/ft)	0.0000	0.0144														
Pool Length (ft)	10.28	60.9														
Pool Max Depth (ft)	1.6	2.6														
Pool Spacing (ft)	28	87														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	8	59														
Radius of Curvature (ft)	13	24														
Rc:Bankfull Width (ft/ft)	2.3	4.2														
Meander Wave Length (ft)	63	158														
Meander Width Ratio	11.2	28.0														
Additional Reach Parameters																
Rosgen Classification	C6															
Channel Thalweg Length (ft)	1,969															
Sinuosity (ft)	1.7															
Water Surface Slope (ft/ft)	0.0018															
Bankfull Slope (ft/ft)	0.0015															
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		N/A		0%		0%		0%	

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 1-UT1 R1



Bankfull Dimensions	
3.4	x-section area (ft.sq.)
5.9	width (ft)
0.6	mean depth (ft)
1.2	max depth (ft)
6.7	wetted perimeter (ft)
0.5	hydraulic radius (ft)
10.3	width-depth ratio
55.4	W flood prone area (ft)
9.4	entrenchment ratio
1.0	low bank height ratio

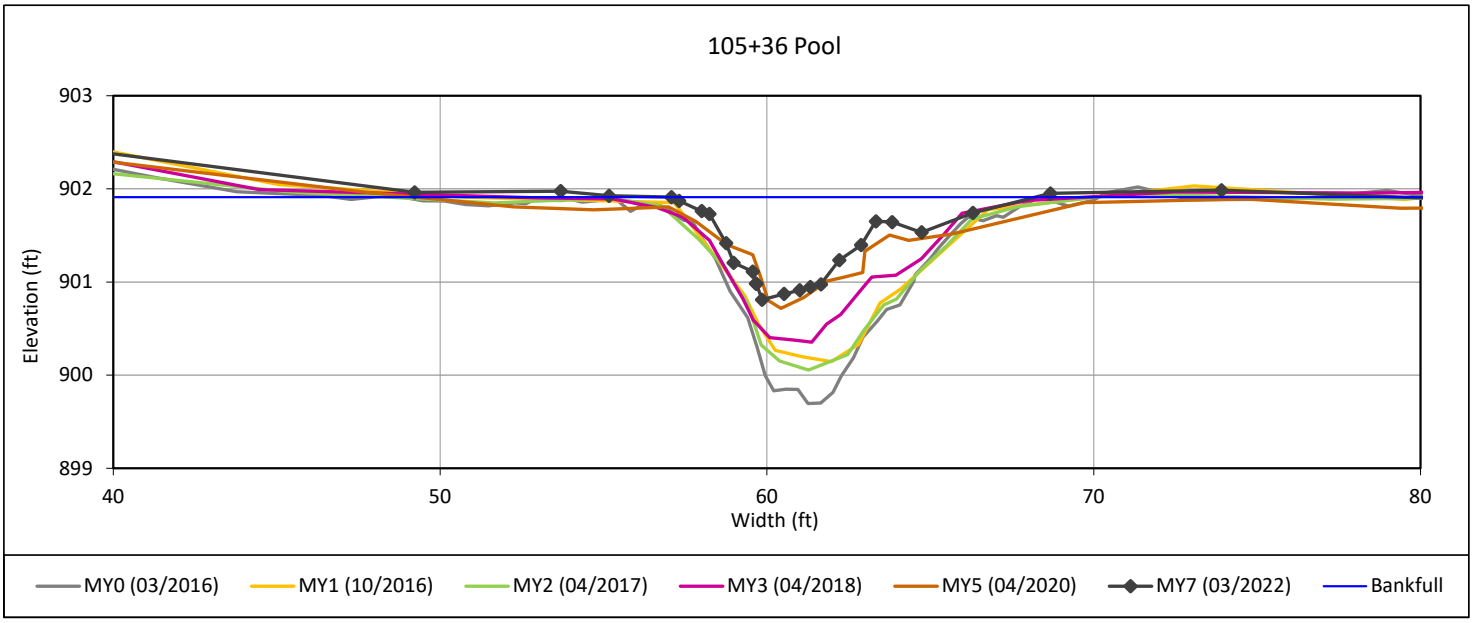
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 2-UT1 R1



Bankfull Dimensions	
5.0	x-section area (ft.sq.)
11.1	width (ft)
0.4	mean depth (ft)
1.1	max depth (ft)
11.6	wetted perimeter (ft)
0.4	hydraulic radius (ft)
24.8	width-depth ratio

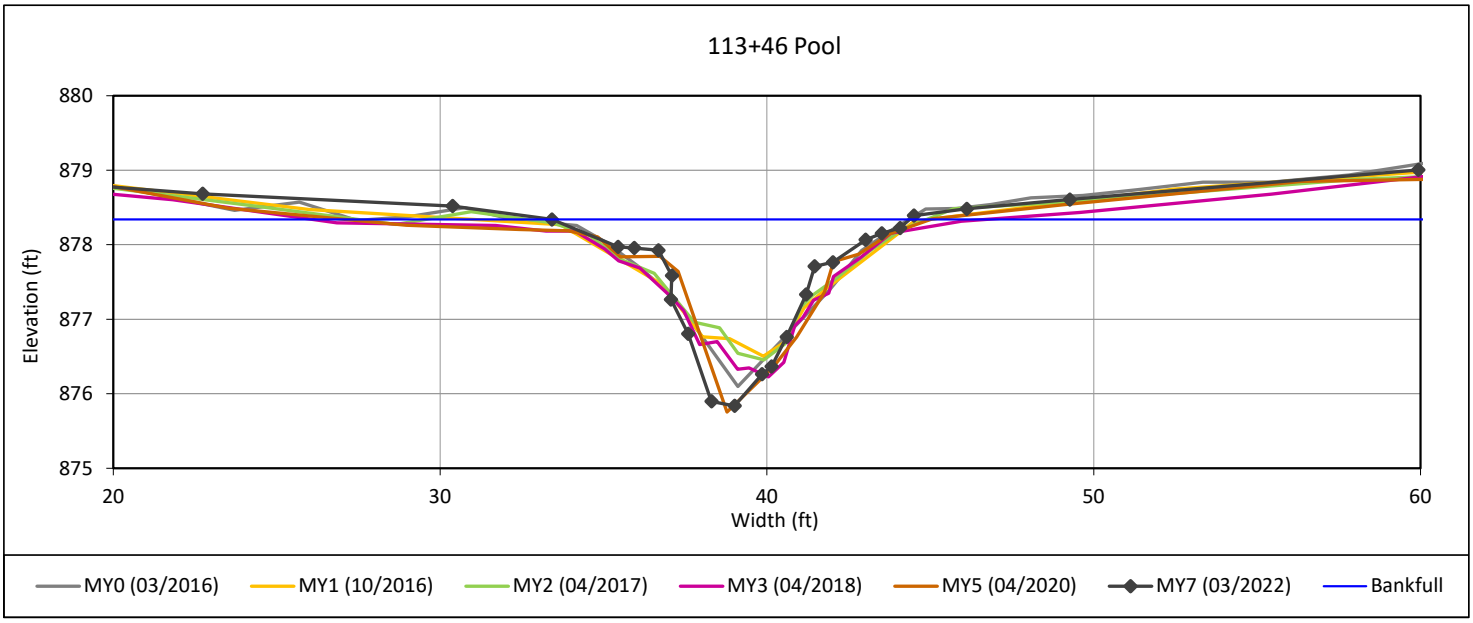
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 3-UT1 R1



Bankfull Dimensions	
10.2	x-section area (ft.sq.)
10.9	width (ft)
0.9	mean depth (ft)
2.5	max depth (ft)
12.8	wetted perimeter (ft)
0.8	hydraulic radius (ft)
11.7	width-depth ratio

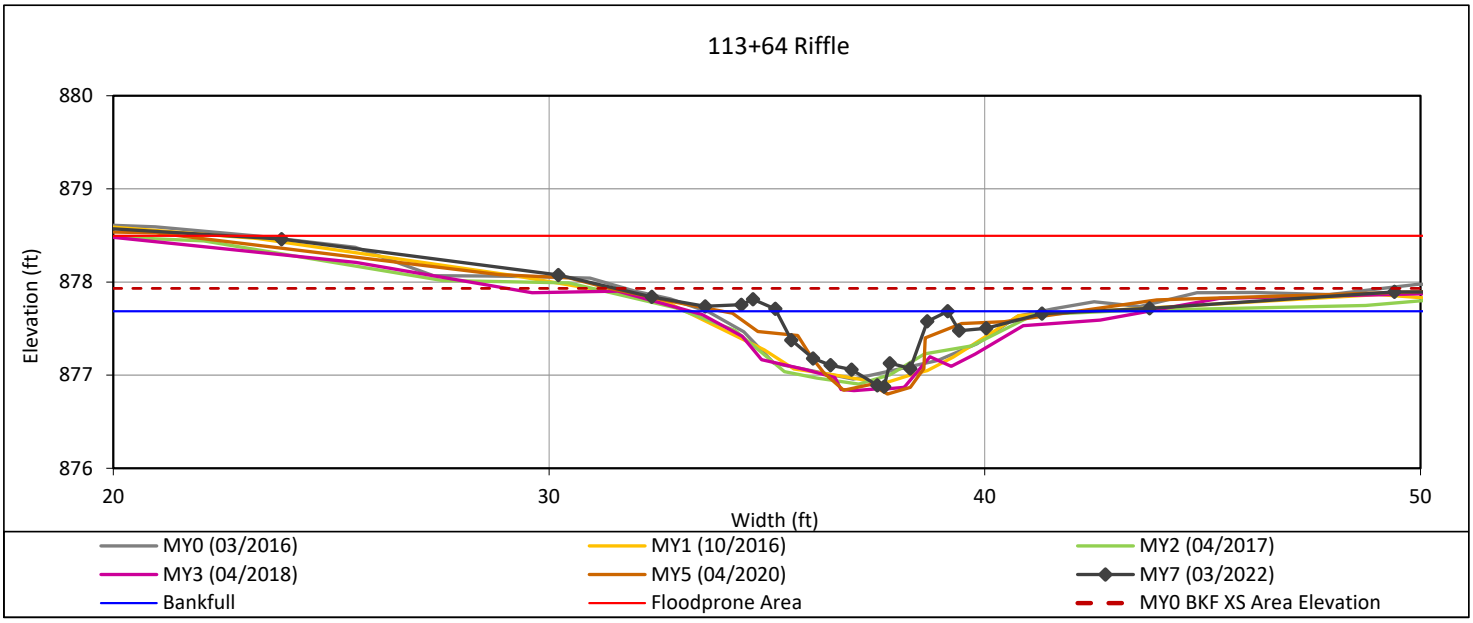
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

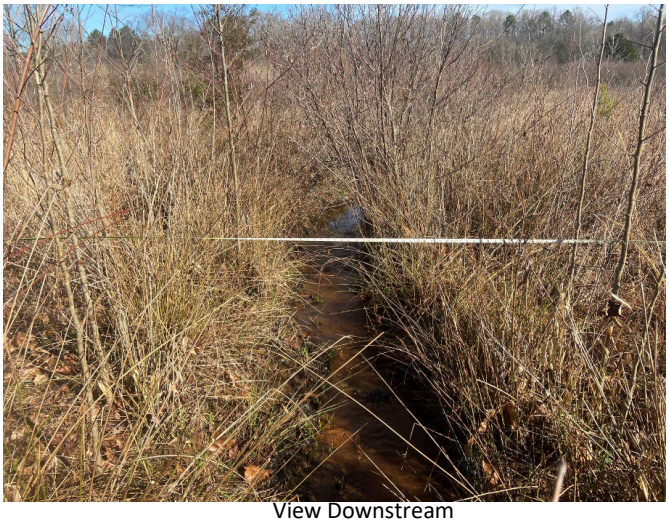
Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross Section 4-UT1 R1



Bankfull Dimensions	
1.8	x-section area (ft.sq.)
3.9	width (ft)
0.5	mean depth (ft)
0.8	max depth (ft)
4.5	wetted perimeter (ft)
0.4	hydraulic radius (ft)
8.4	width-depth ratio
62.2	W flood prone area (ft)
15.8	entrenchment ratio
0.8	low bank height ratio

Survey Date: 03/2022
Field Crew: Wildlands Engineering

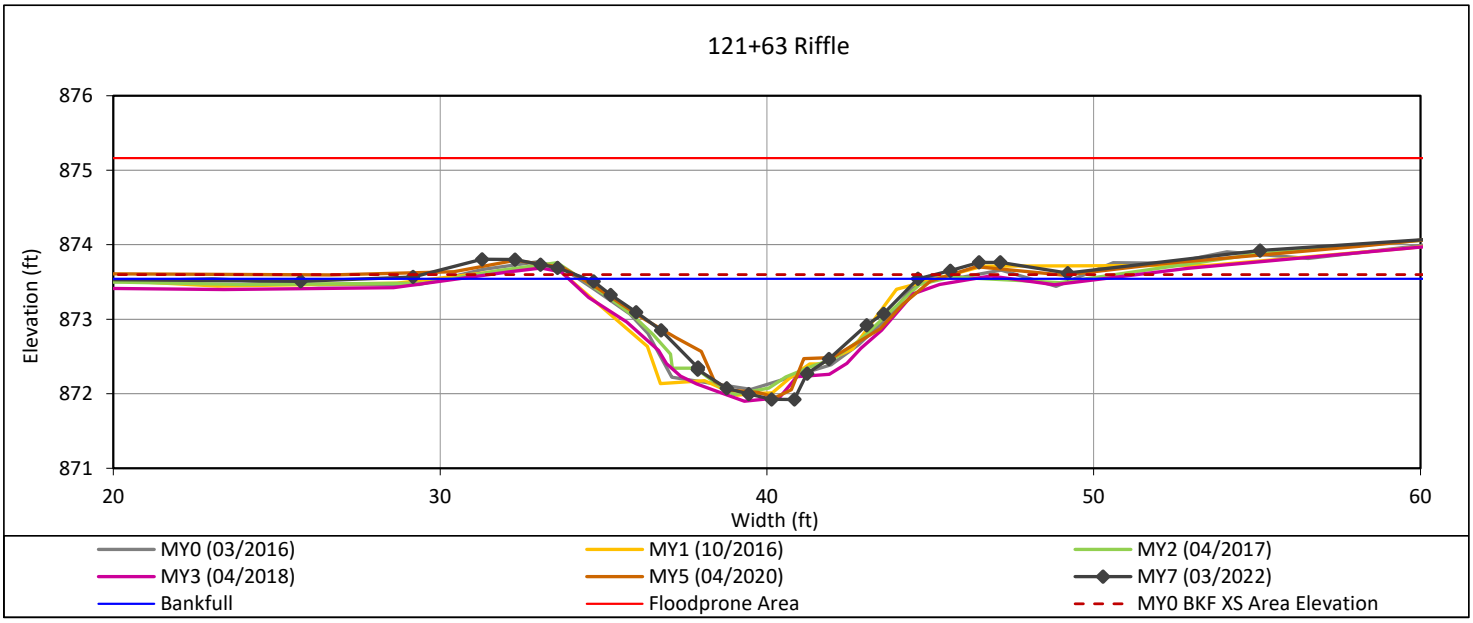


View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 5-UT1 R2



Bankfull Dimensions	
9.1	x-section area (ft.sq.)
10.1	width (ft)
0.9	mean depth (ft)
1.6	max depth (ft)
10.8	wetted perimeter (ft)
0.8	hydraulic radius (ft)
11.3	width-depth ratio
73.3	W flood prone area (ft)
7.2	entrenchment ratio
1.0	low bank height ratio

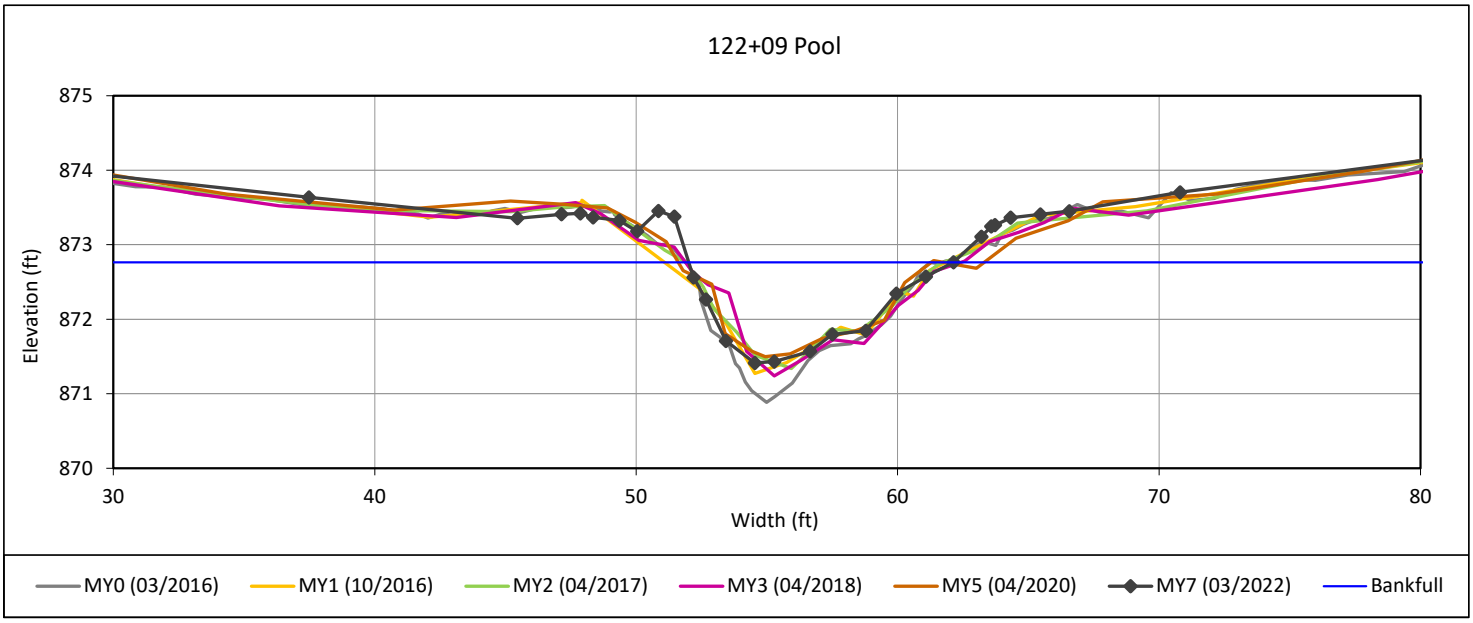
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 6-UT1 R2



Bankfull Dimensions	
8.2	x-section area (ft.sq.)
10.1	width (ft)
0.8	mean depth (ft)
1.4	max depth (ft)
10.7	wetted perimeter (ft)
0.8	hydraulic radius (ft)
12.5	width-depth ratio

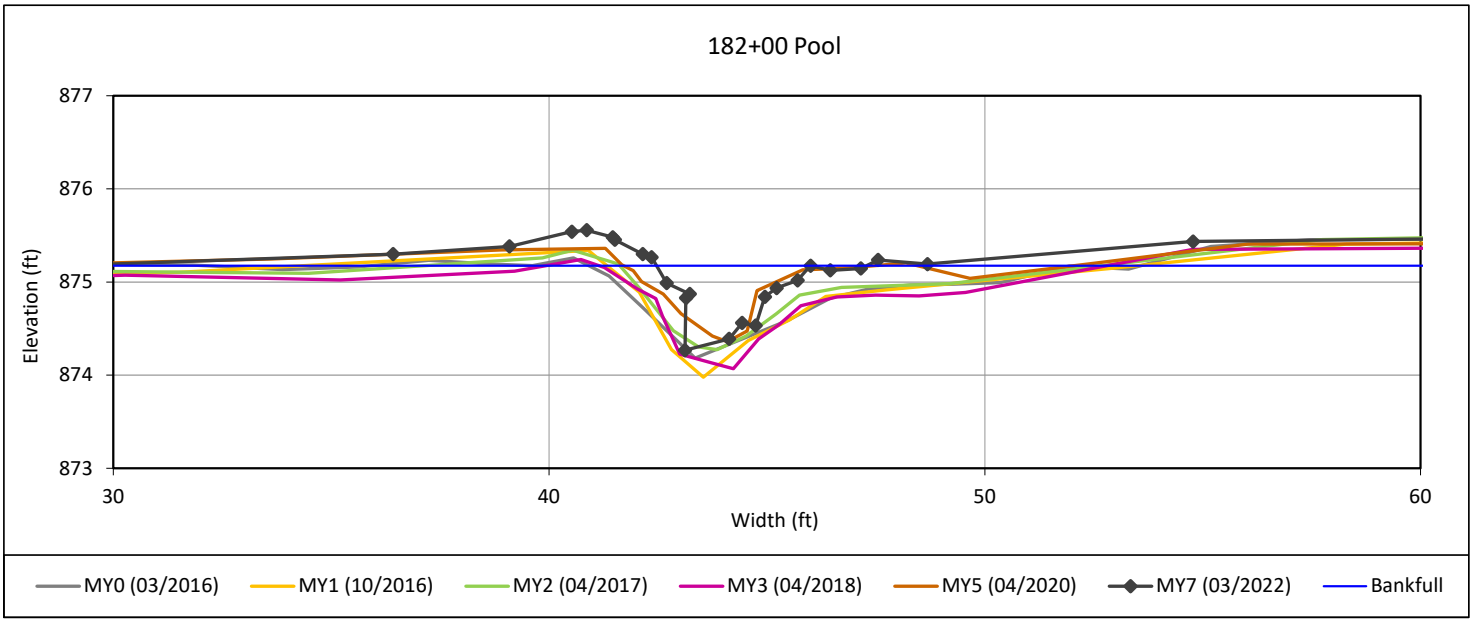
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 7-UT1A



Bankfull Dimensions	
1.7	x-section area (ft.sq.)
3.5	width (ft)
0.5	mean depth (ft)
0.9	max depth (ft)
4.7	wetted perimeter (ft)
0.4	hydraulic radius (ft)
7.5	width-depth ratio

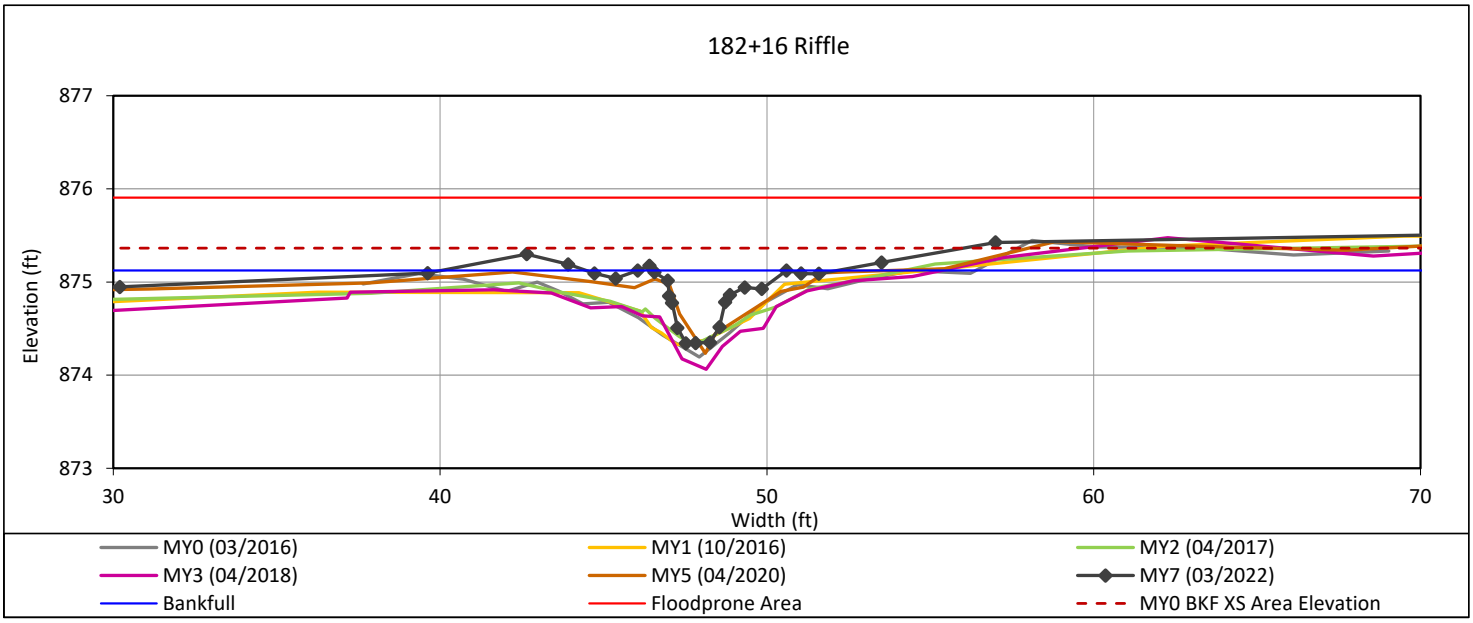
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 8-UT1A



Bankfull Dimensions	
1.5	x-section area (ft.sq.)
4.1	width (ft)
0.4	mean depth (ft)
0.8	max depth (ft)
4.7	wetted perimeter (ft)
0.3	hydraulic radius (ft)
11.1	width-depth ratio
84.3	W flood prone area (ft)
20.7	entrenchment ratio
0.8	low bank height ratio

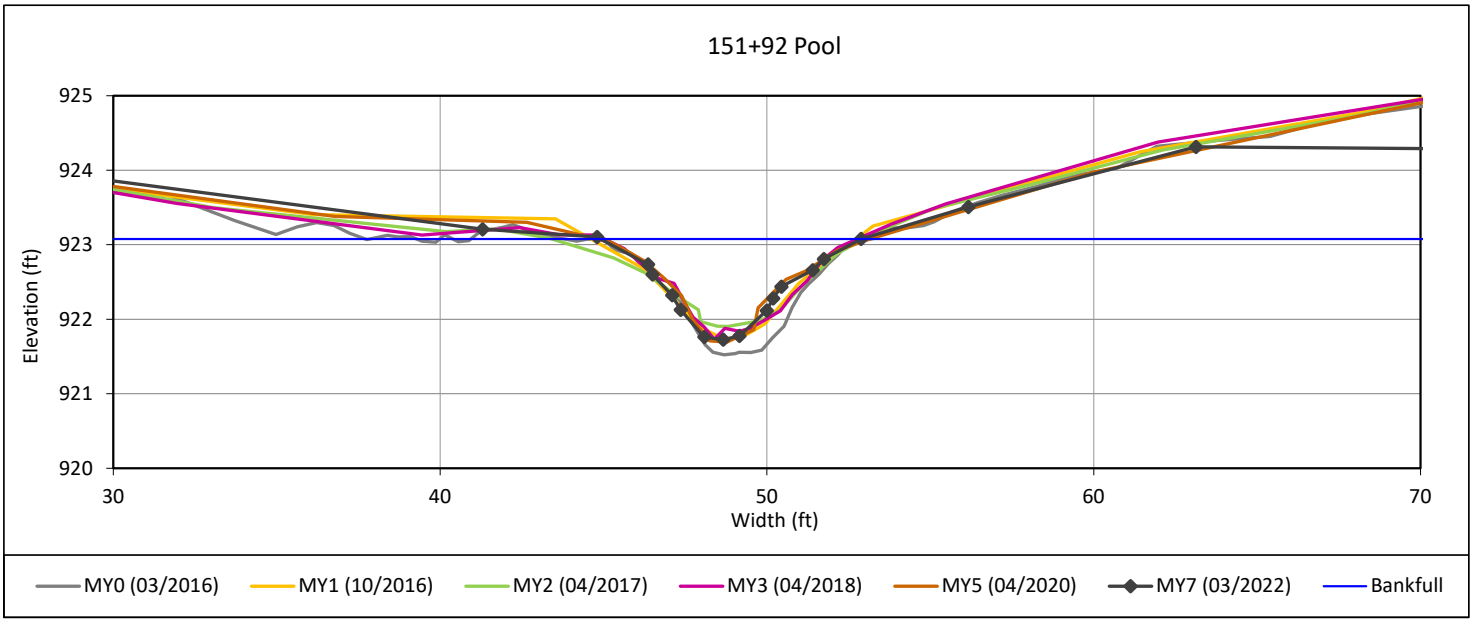
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 9-UT1B



Bankfull Dimensions	
5.2	x-section area (ft.sq.)
8.0	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
8.5	wetted perimeter (ft)
0.6	hydraulic radius (ft)
12.2	width-depth ratio

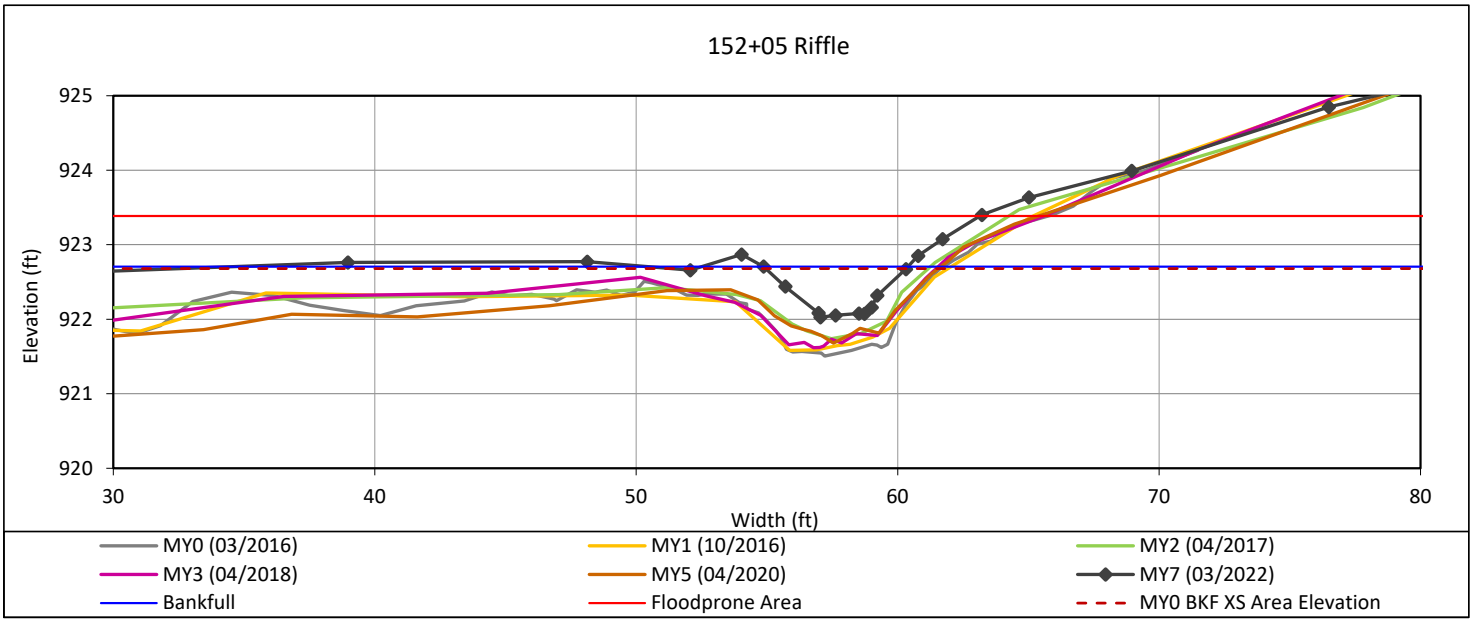
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 10-UT1B



Bankfull Dimensions	
2.3	x-section area (ft.sq.)
5.5	width (ft)
0.4	mean depth (ft)
0.7	max depth (ft)
5.8	wetted perimeter (ft)
0.4	hydraulic radius (ft)
13.2	width-depth ratio
63.2	W flood prone area (ft)
11.4	entrenchment ratio
1.0	low bank height ratio

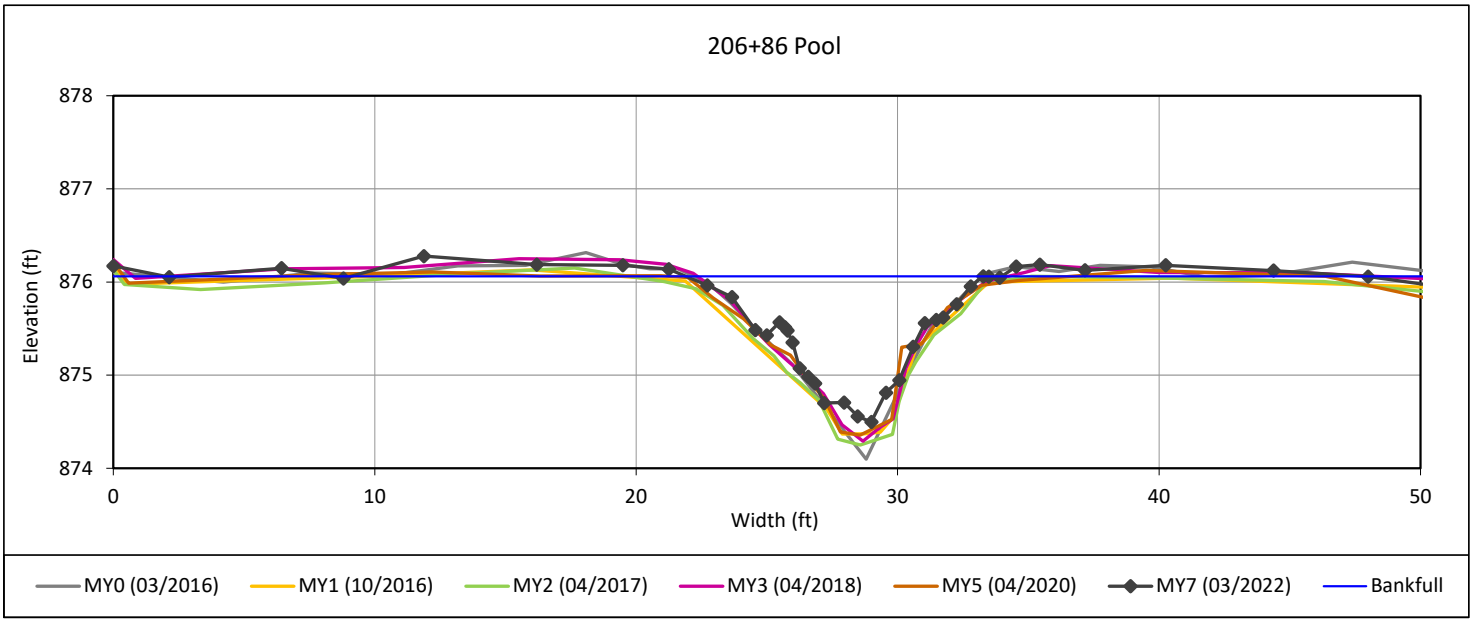
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 11-UT2



Bankfull Dimensions	
8.1	x-section area (ft.sq.)
11.4	width (ft)
0.7	mean depth (ft)
1.6	max depth (ft)
12.1	wetted perimeter (ft)
0.7	hydraulic radius (ft)
16.0	width-depth ratio

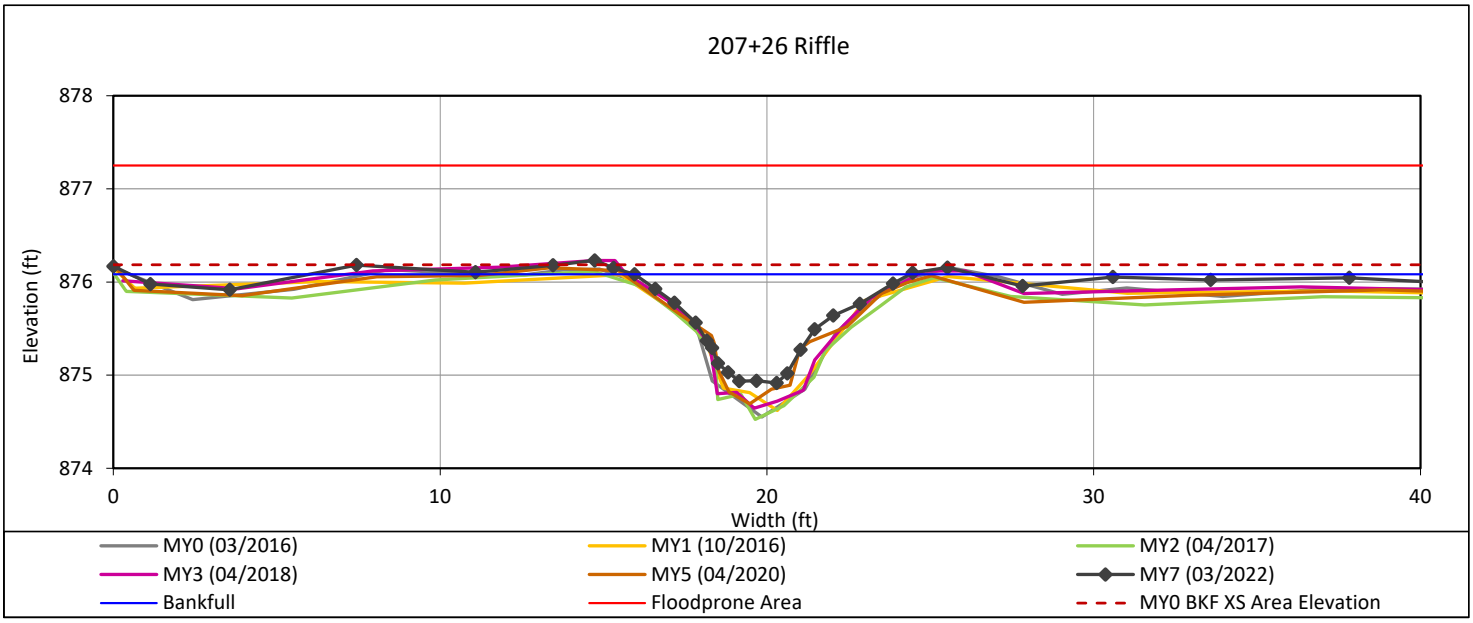
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 12-UT2



Bankfull Dimensions	
4.8	x-section area (ft.sq.)
8.4	width (ft)
0.6	mean depth (ft)
1.2	max depth (ft)
8.9	wetted perimeter (ft)
0.5	hydraulic radius (ft)
14.7	width-depth ratio
50.8	W flood prone area (ft)
6.0	entrenchment ratio
0.9	low bank height ratio

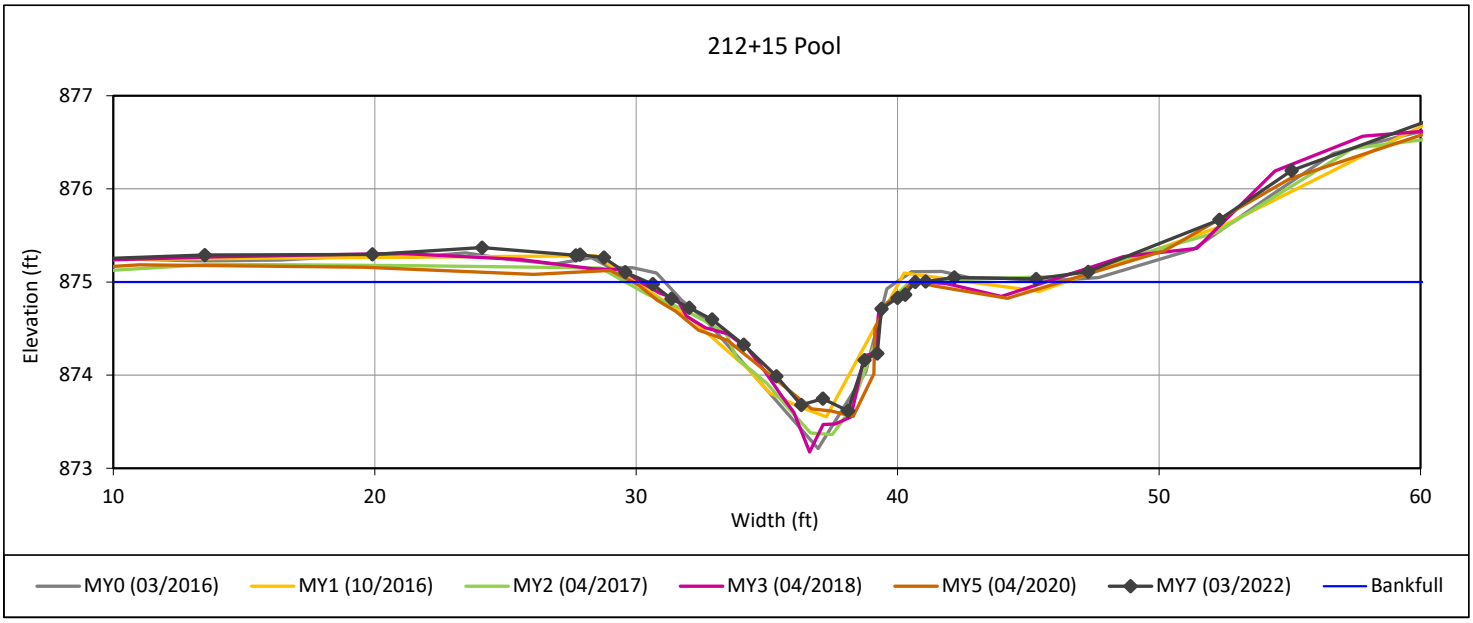
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 13-UT2



Bankfull Dimensions	
7.1	x-section area (ft.sq.)
10.2	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
11.0	wetted perimeter (ft)
0.6	hydraulic radius (ft)
14.8	width-depth ratio

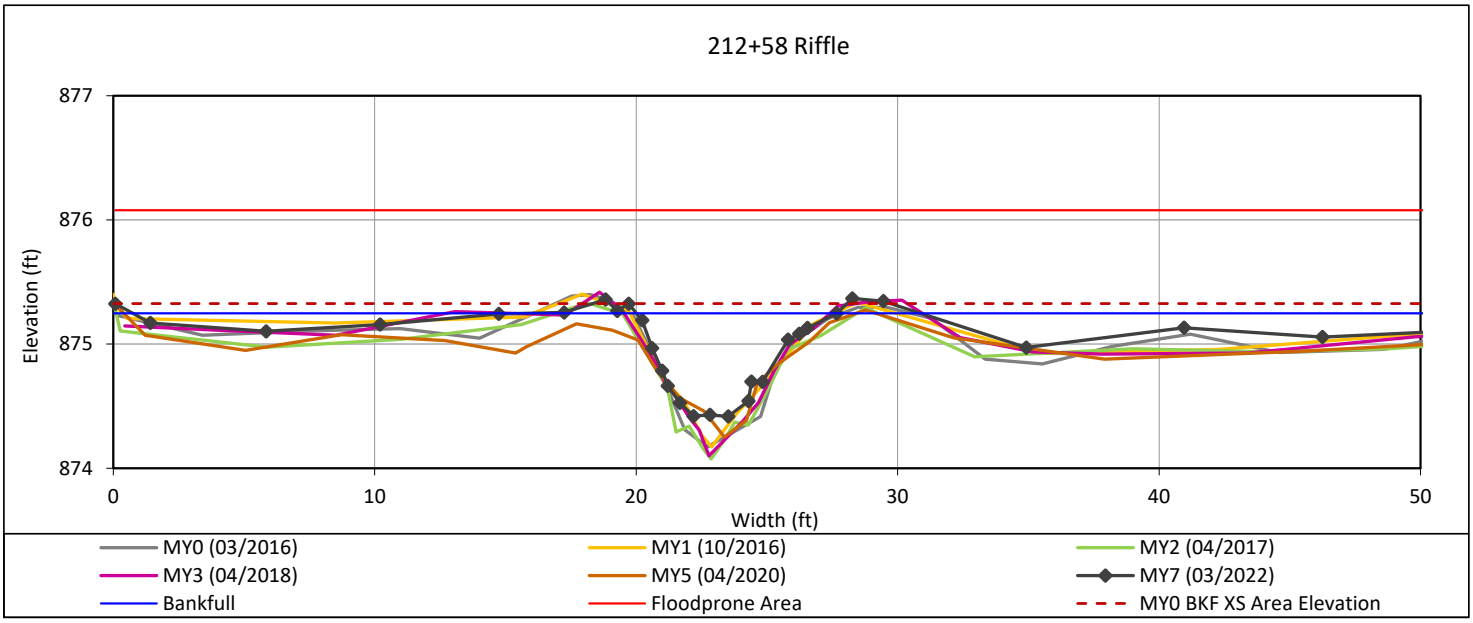
Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Henry Fork Mitigation Site
NCDMS Project No. 96306
Monitoring Year 7 - 2022

Cross-Section 14-UT2



Bankfull Dimensions	
3.6	x-section area (ft.sq.)
7.7	width (ft)
0.5	mean depth (ft)
0.8	max depth (ft)
8.0	wetted perimeter (ft)
0.4	hydraulic radius (ft)
16.3	width-depth ratio
59.3	W flood prone area (ft)
7.7	entrenchment ratio
0.9	low bank height ratio

Survey Date: 03/2022
Field Crew: Wildlands Engineering

View Downstream

To: DMS Technical Workgroup, DMS operations staff

From: Periann Russell, Division of Mitigation Services (DMS)

RE: Pebble count data requirements

Date: October 19, 2021

The DMS Technical Work Group met September 29, 2021 to discuss Interagency Review Team (IRT) and DMS requirements for collecting pebble count data as part of monitoring (MY0-MYx). Agreement was reached between all attending parties that pebble count data will not be required during the monitoring period for all future projects.

Sediment data and particle distribution will still be required for the mitigation plan as part of the proposed design explanation and justification.

Pebble counts and/or particle distributions currently being conducted by providers for annual monitoring may be discontinued at the discretion of the DMS project manager. If particle distribution was listed as a performance standard in the project mitigation plan, the provider is required to communicate the intent to cease data collection with the DMS project manager. The absence of pebble count data in future monitoring reports where pebble count data was listed as part of monitoring in the mitigation plan must be documented in the monitoring report. The September 29, 2021 Technical Work Group meeting may be cited as the source of the new policy.

The IRT reserves the right to request pebble count data/particle distributions if deemed necessary during the monitoring period.

Kristi Suggs

From: Reid, Matthew <matthew.reid@ncdenr.gov>
Sent: Wednesday, October 27, 2021 1:26 PM
To: Kristi Suggs
Cc: Mimi Caddell
Subject: RE: [External] FW: Pebble Count Data Requirements

I am absolutely OK with not doing pebble counts anymore!

As stated in the memo, please add a statement in the monitoring reports citing the policy.

Thanks!

Matthew Reid
Project Manager – Western Region
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-231-7912 Mobile
matthew.reid@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Dr
Suite 102
Asheville, NC 28801

From: Kristi Suggs [mailto:ksuggs@wildlandseng.com]
Sent: Wednesday, October 27, 2021 1:24 PM
To: Reid, Matthew <matthew.reid@ncdenr.gov>
Cc: Mimi Caddell <mcaddell@wildlandseng.com>
Subject: [External] FW: Pebble Count Data Requirements

Matthew,

Jason Lorch in our Raleigh Office forwarded this meeting memo to me. It says that conducting pebble counts for DMS monitoring (MY0 – MY7) projects is no longer needed as long as it has been okayed by the DMS PM. Moving forward, are you going to allow us to stop doing them on your projects? If so, will DBB projects be treated the same? Please let me know. Thank you!

Kristi

Kristi Suggs | *Senior Environmental Scientist*
O: 704.332.7754 x110 **M**: 704.579.4828

Wildlands Engineering, Inc.
1430 S. Mint St, Suite 104
Charlotte, NC 28203

From: Jason Lorch <jlorch@wildlandseng.com>
Sent: Monday, October 25, 2021 9:05 AM
To: Kristi Suggs <ksuggs@wildlandseng.com>
Subject: FW: Pebble Count Data Requirements

FYI!

Jason Lorch, GISP | *Senior Environmental Scientist*
O: 919.851.9986 x107 **M**: 919.413.1214

Wildlands Engineering, Inc.
312 West Millbrook Road, Suite 225
Raleigh, NC 27609

From: Russell, Periann <periann.russell@ncdenr.gov>
Sent: Thursday, October 21, 2021 10:05 AM
To: King, Scott <Scott.King@mbakerintl.com>; Catherine Manner <catherine@waterlandsolutions.com>; Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>; adam.spiller@kci.com; Brad Breslow <bbreslow@res.us>; Davis, Erin B <erin.davis@ncdenr.gov>; gginn@wolfcreekeng.com; grant lewis <glewis@axiomenvironmental.org>; Jeff Keaton <jkeaton@wildlandseng.com>; katie mckeithan <Katie.McKeithan@mbakerintl.com>; Kayne Van Stell <kayne@waterlandsolutions.com>; Kevin Tweedy <ktweedy@eprusa.net>; Reid, Matthew <matthew.reid@ncdenr.gov>; Ryan Smith <rsmith@lmgroup.net>; Melia, Gregory <gregory.melia@ncdenr.gov>; Allen, Melonie <melonie.allen@ncdenr.gov>; Famularo, Joseph T <Joseph.Famularo@ncdenr.gov>; Rich@mogmit.com; Bryan Dick <Bryan.Dick@freese.com>; Ryan Medric <rmedric@res.us>; Kim Browning <Kimberly.D.Browning@usace.army.mil>; Kayne Van Stell <kayne@waterlandsolutions.com>; Worth Creech <worth@restorationsystems.com>; Jason Lorch <jlorch@wildlandseng.com>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Wiesner, Paul <paul.wiesner@ncdenr.gov>; Tsomides, Harry <harry.tsomides@ncdenr.gov>; Reid, Matthew <matthew.reid@ncdenr.gov>; Dow, Jeremiah J <jeremiah.dow@ncdenr.gov>; Horton, Jeffrey <jeffrey.horton@ncdenr.gov>; Ullman, Kirsten J <Kirsten.Ullman@NCDENR.gov>; Ackerman, Anjie <anjie.ackerman@ncdenr.gov>; Blackwell, Jamie D <james.blackwell@ncdenr.gov>; Xu, Lin <lin.xu@ncdenr.gov>; Mir, Danielle <Danielle.Mir@ncdenr.gov>; Corson, Kristie <kristie.corson@ncdenr.gov>; Russell, Periann <periann.russell@ncdenr.gov>; Sparks, Kimberly L <Kim.sparks@ncdenr.gov>
Subject: Pebble Count Data Requirements

Please review the attached memo documenting the agreed upon policy for pebble count data requirements.
Please reply (me only) to this email if accept that this memo represents (or misrepresents) our discussion on Sept 29.
Thank you.

Periann Russell
Geomorphologist
Division of Mitigation Services, Science and Analysis
NC Department of Environmental Quality

919 707 8306 office
919 208 1426 mobile
periann.russell@ncdenr.gov

Mailing: 1652 Mail Service Center Raleigh, NC 27699-1652
Physical: 217 West Jones Street Raleigh, NC 27603

APPENDIX 5. Hydrology Summary Data and Plots

Table 13a. Verification of Bankfull Events
Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Reach	MY	Date of Occurrence	Method
UT1 Reach 2 - SG2	MY2	4/24/2017	Crest & Stream Gage
		10/8/2017	
	MY3	2/7/2018	Stream Gage
		4/25/2018	
		5/29/2018	
		9/16/2018	
		10/11/2018	
		10/26/2018	
	MY4	6/9/2019	
		10/31/2019	
	MY5	5/21/2020	
		6/19/2020	
		8/15/2020	
		9/2/2020	
		9/17/2020	
		9/25/2020	
		10/11/2020	
		11/12/2020	
	MY6	2/15/2021	
		3/25/2021	
		8/17/2021	
	MY7	3/24/2022	
		5/23/2022	
		7/8/2022	
		7/30/2022	
		8/6/2022	
UT1A - SG3	MY1	Unknown	Crest Gage
	MY2	4/24/2017	Crest & Stream Gage
		10/8/2017	
	MY3	10/11/2018	Stream Gage
	MY4	6/9/2019	
		10/31/2019	
	MY5	4/13/2020	
		6/19/2020	
		8/15/2020	
		11/12/2020	
	MY6	3/26/2021	
		8/17/2021	
	MY7	5/23/2022	
		6/26/2022	
		7/8/2022	
		7/30/2022	
		8/6/2022	

Table 13b. Verification of Bankfull Events

Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

Reach	MY	Date of Occurrence	Method
UT1B - SG1	MY2	10/8/2017	Crest & Stream Gage
	MY4	6/9/2019	Stream Gage
		8/24/2019	
		10/31/2019	
	MY5	6/19/2020	
		8/15/2020	
		11/12/2020	
	MY6	3/25/2021	
	MY7	7/8/2022	
		7/30/2022	
UT2 - SG4	MY2	4/24/2017	Crest & Stream Gage
	MY3	2/7/2018	Stream Gage
		5/29/2018	
	MY4	6/9/2019	
		10/31/2019	
	MY5	1/12/2020	
		1/24/2020	
		3/25/2020	
		4/30/2020	
		5/21/2020	
		6/19/2020	
		8/15/2020	
		9/2/2020	
		9/18/2020	
		9/25/2020	
		10/11/2020	
		11/12/2020	
	MY6	1/28/2021	
		1/31/2021	
		2/12/2021 - 2/18/2021[1]	
		2/26/2021	
		3/18/2021	
		3/26/2021	
		3/31/2021	
		5/3/2021	
		8/17/2021	
	MY7	3/23/2022	
		4/18/2022	
		5/24/2022	
		7/8/2022	
		7/30/2022	
		8/6/2022	
		9/6/2022	

[1]Multiple bankfull events recorded

Table 14. Wetland Gage Attainment Summary

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

Summary of Groundwater Gage Results for Monitoring Years 1 through 7							
Gage	Success Criteria Achieved[2]/Max Consecutive Days During Growing Season[1] (Percentage)						
	Year 1 (2016)	Year 2 (2017)	Year 3 (2018)	Year 4 (2019)	Year 5 (2020)	Year 6 (2021)	Year 7 (2022)
Reference	No/18 Days (8%)	Yes/59 Days (25%)	Yes/79 Days (34%)	Yes/61 Days (26%)	Yes/63 Days (27%)	Yes/59 Days (25%)	Yes/40 Days (17%)
GWG 1	No/0 Days (0%)	Yes/23 Days (10%)	Yes/48 Days (20%)	Yes/42 Days (18%)	Yes/27 Days (11%)	Yes/30 Days (13%)	Yes/29 Days (12%)
GWG 2	Yes/ 29 Days (12.3%)	No/7 Days (3%)	No/12 Days (5%)	Yes/39 Days (17%)	Yes/49 Days (21%)	Yes/33 Days (14%)	Yes/36 Days (15%)
GWG 3 [4]	Yes/236 Days (100%)	No/3 Days (1%)	No/5 Days (2%)	Yes/35 Days (15%)	Yes/49 Days (21%)	Yes/31 Days (13%)	Yes/36 Days (15%)
GWG 4	No/3 Days (1.3%)	Yes/25 Days (11%)	Yes/46 Days (20%)	Yes/68 Days (29%)	Yes/64 Days (27%)	No/14 Days (6%)	Yes/37 Days (16%)
GWG 5 [3]	N/A	Yes/189 Days (80%)	Yes/102 Days (43%)	Yes/237 Days (100%)	Yes/202 Days (85%)	Yes/237 Days (100%)	Yes/237 Days (100%)
GWG 6	Yes/79 Days (33.5%)	Yes/89 Days (38%)	Yes/96 Days (41%)	Yes/76 Days (32%)	Yes/116 Days (49%)	Yes/65 Days (27%)	Yes/76 Days (32%)
GWG 7	No/7 Days (3.0%)	Yes/21 Days (9%)	Yes/44 Days (19%)	Yes/44 Days (19%)	Yes/89 Days (38%)	Yes/31 Days (13%)	Yes/37 Days (16%)
GWG 8	No/1 Days (0.4%)	No/14 Days (6%)	No/11 Days (5%)	No/19 Days (8%)	No/14 Days (6%)	No/18 Days (8%)	No/6 Days (3%)
GWG 9 [3]	N/A	No/13 Days (6%)	Yes/20 Days (9%)	Yes/68 Days (29%)	Yes/90 Days (38%)	Yes/65 Days (27%)	Yes/44 Days (19%)
GWG 10 [5]	N/A	N/A	N/A	Yes/236 Days (100%)	Yes/202 Days (85%)	Yes/237 Days (100%)	Yes/237 Days (100%)
GWG 11 [5]	N/A	N/A	N/A	Yes/61 Days (26%)	Yes/113 Days (48%)	Yes/63 Days (27%)	Yes/42 Days (18%)
GWG 12 [5]	N/A	N/A	N/A	Yes/36 Days (15%)	Yes/61 Days (26%)	Yes/30 Days (13%)	Yes/36 Days (15%)
GWG 13 [5]	N/A	N/A	N/A	Yes/236 Days (100%)	Yes/202 Days (85%)	Yes/237 Days (100%)	Yes/138 Days (59%)
GWG 14 [6]	N/A	N/A	N/A	Yes/67 Days (28%)	Yes/89 Days (38%)	Yes/41 Days (17%)	Yes/45 Days (19%)
GWG 15 [6]	N/A	N/A	N/A	Yes/45 Days (19%)	Yes/89 Days (38%)	Yes/33 Days (14%)	Yes/41 Days (17%)

N/A, not applicable

[1]Growing season dates March 20 - November 11

[2]Success criteria is 20 consecutive days (8.5%) of the growing season.

[3]GWGs 5 and 9 were installed on April 7, 2017.

[4]GWG 3 was relocated in January 2017.

[5]GWGs 10 -13 were installed on February 20, 2019.

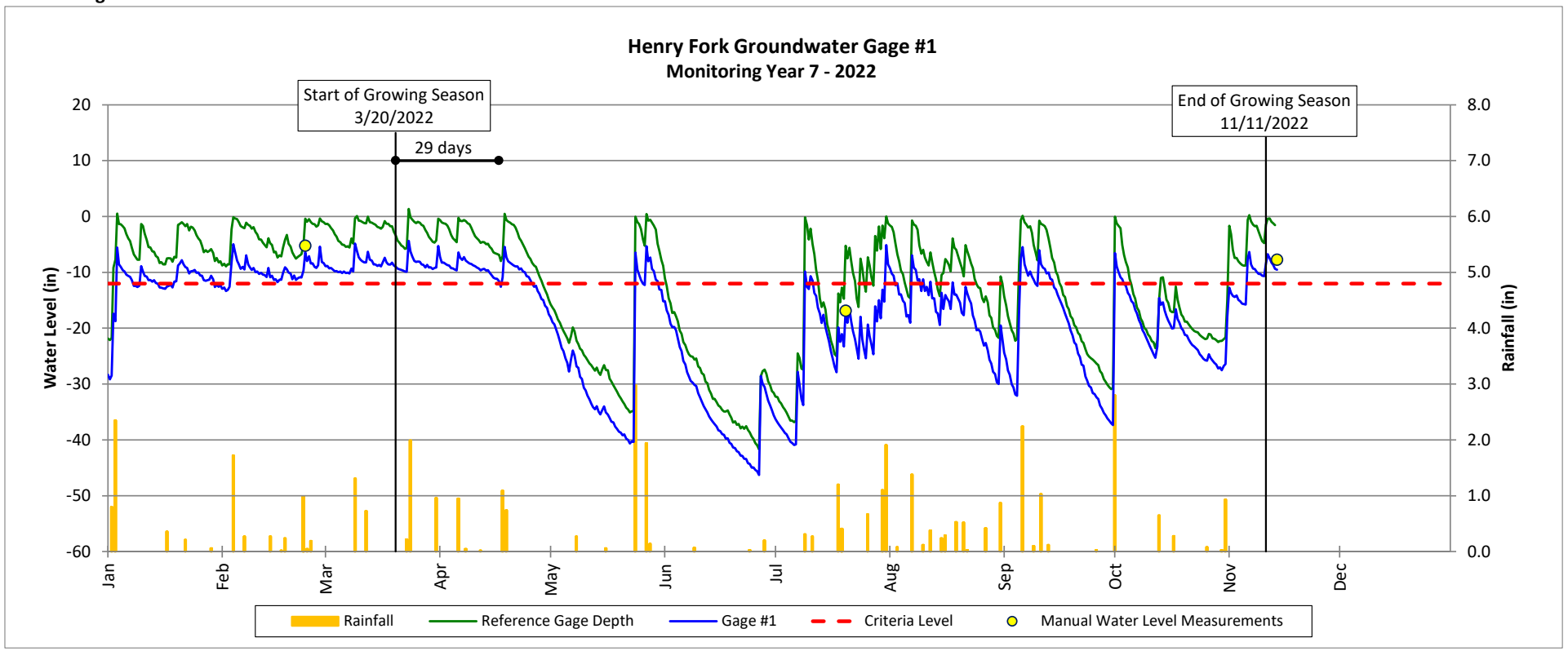
[6]GWGs 14-15 were installed on March 7, 2019.

Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

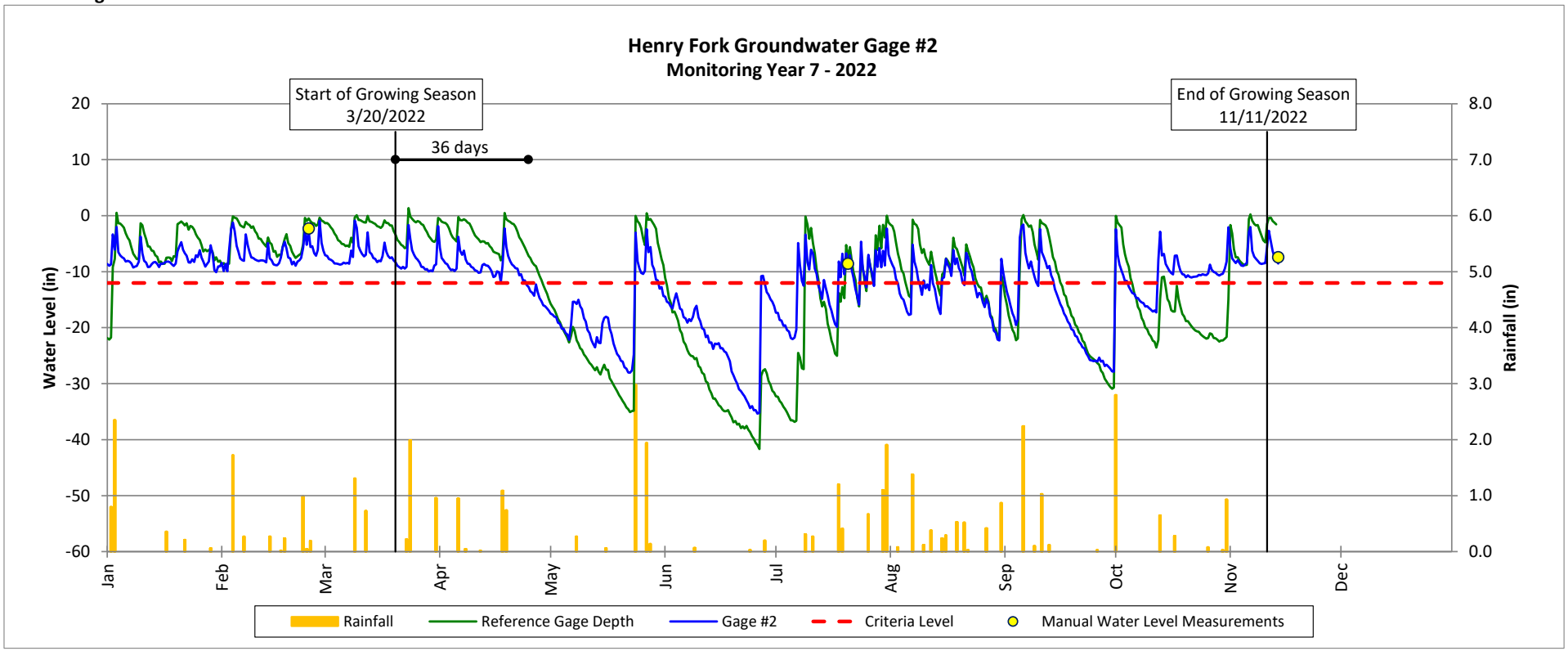


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

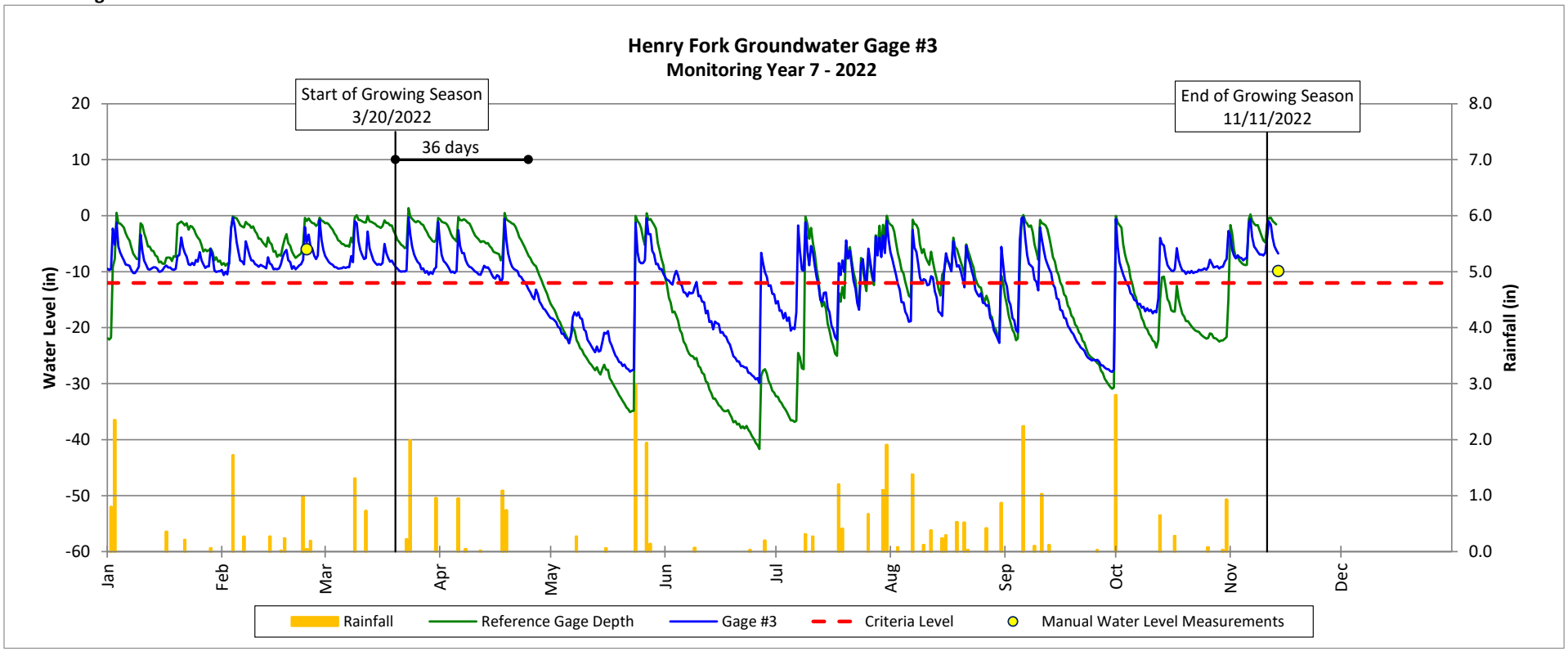


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

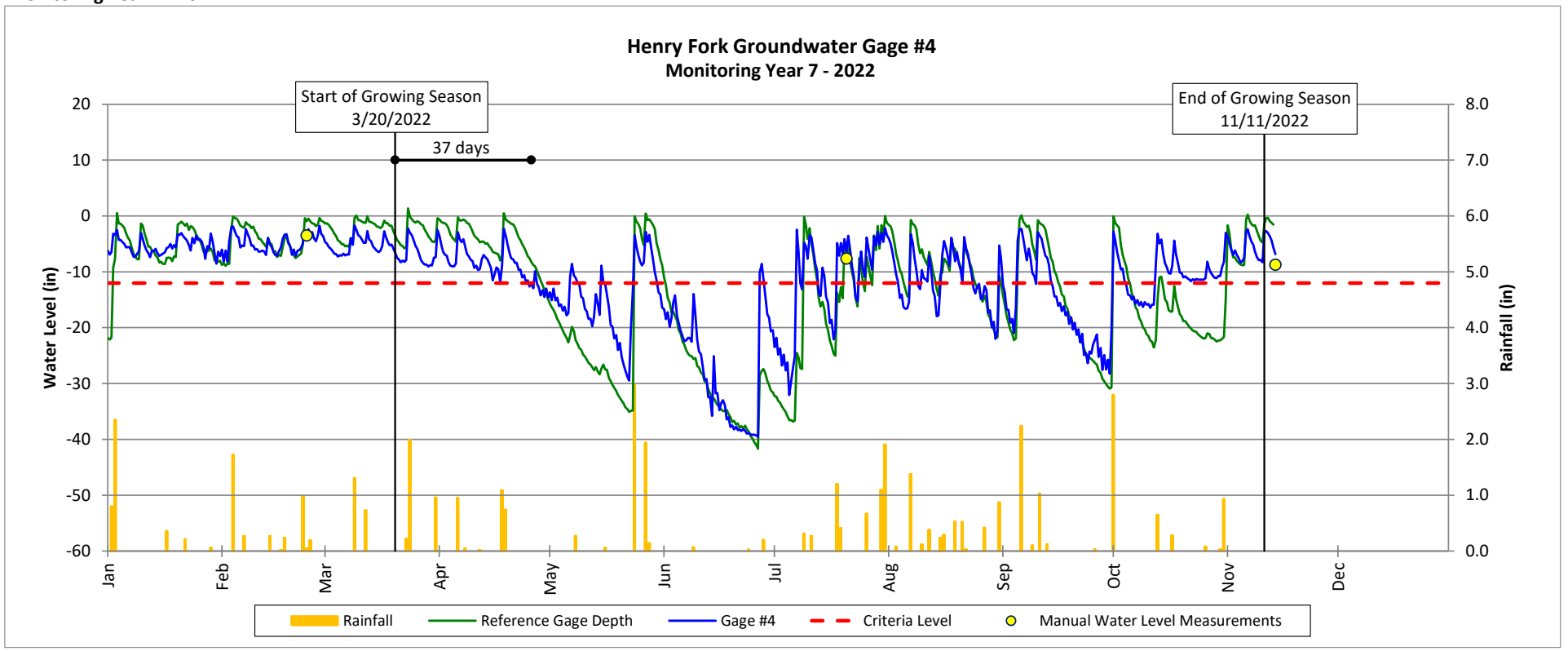


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

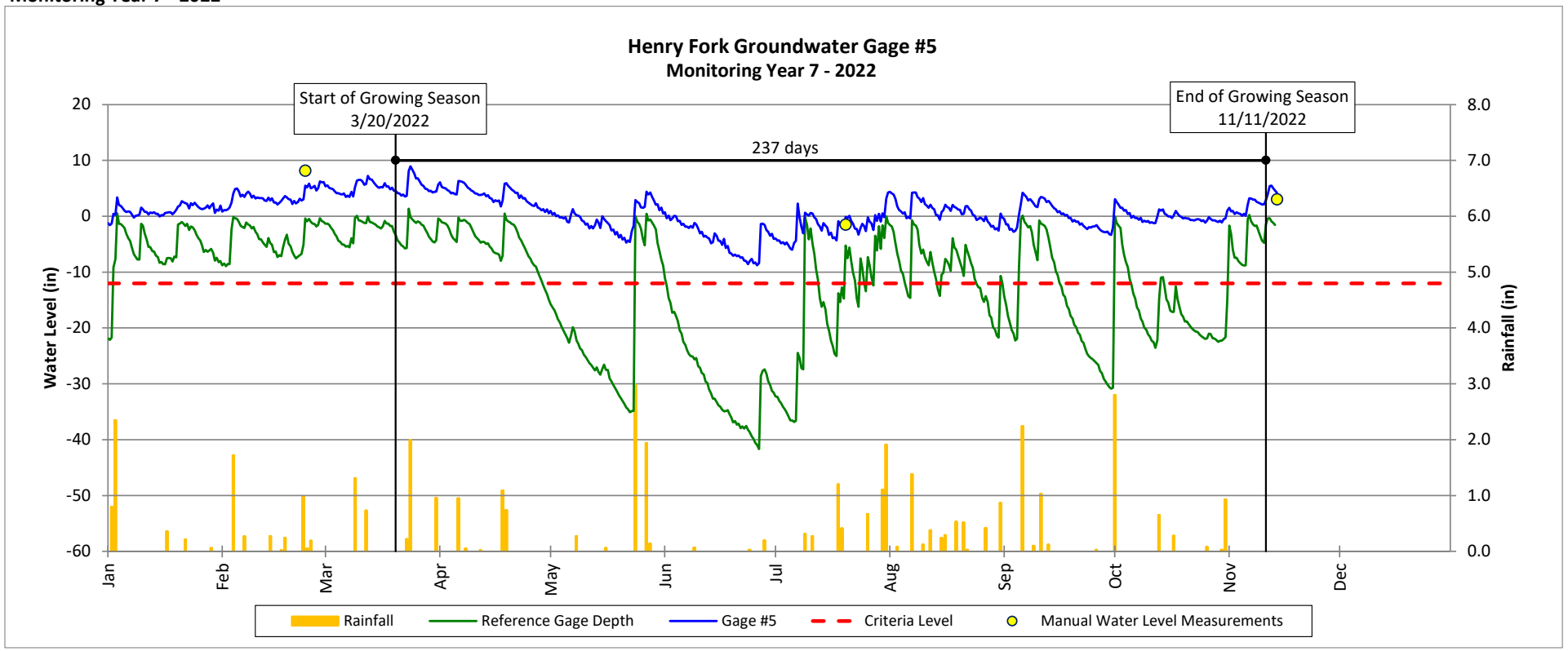


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

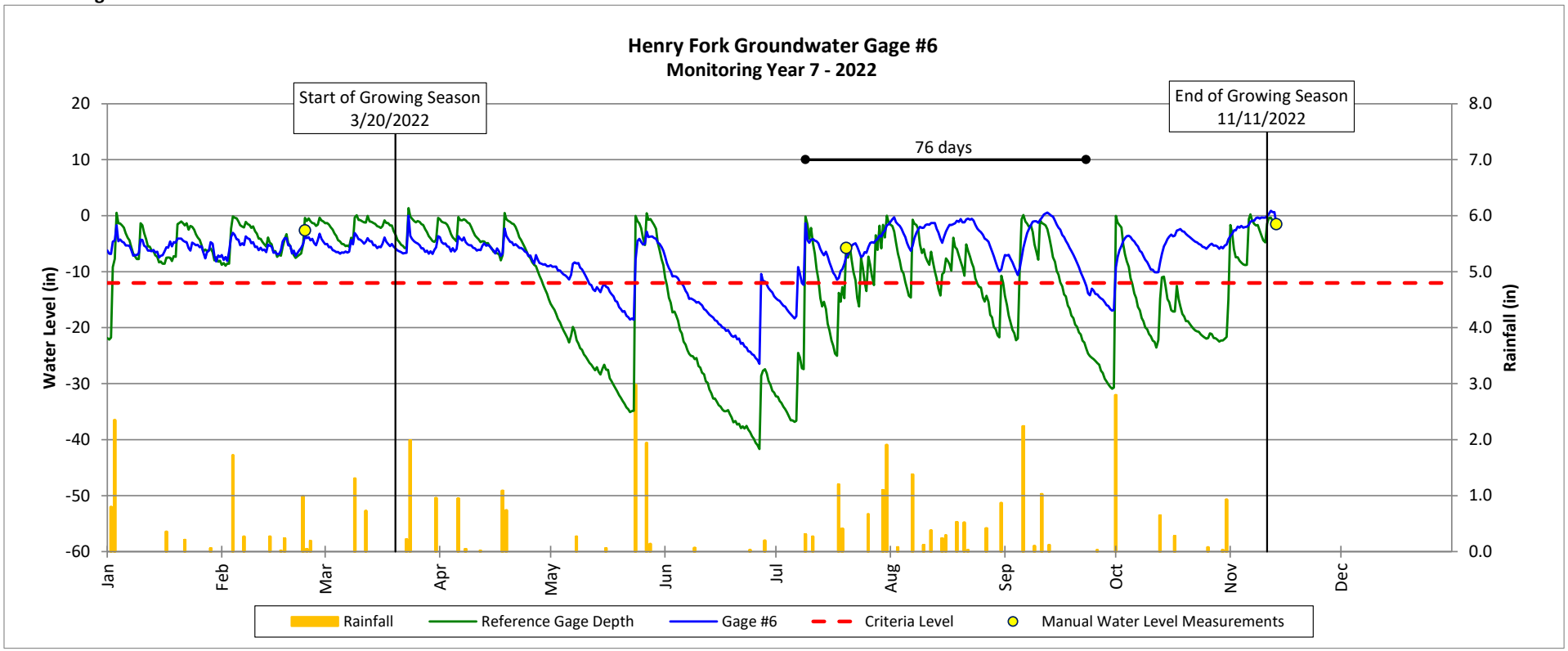


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

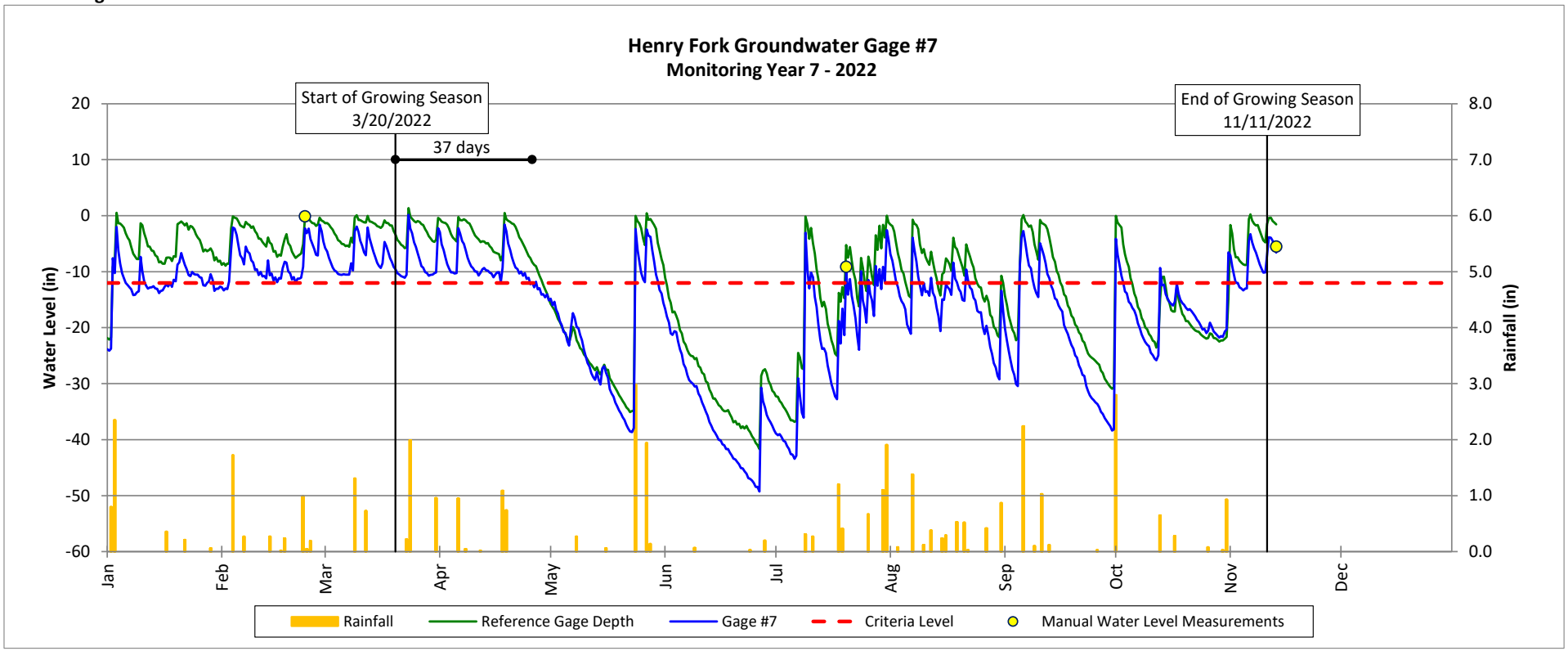


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

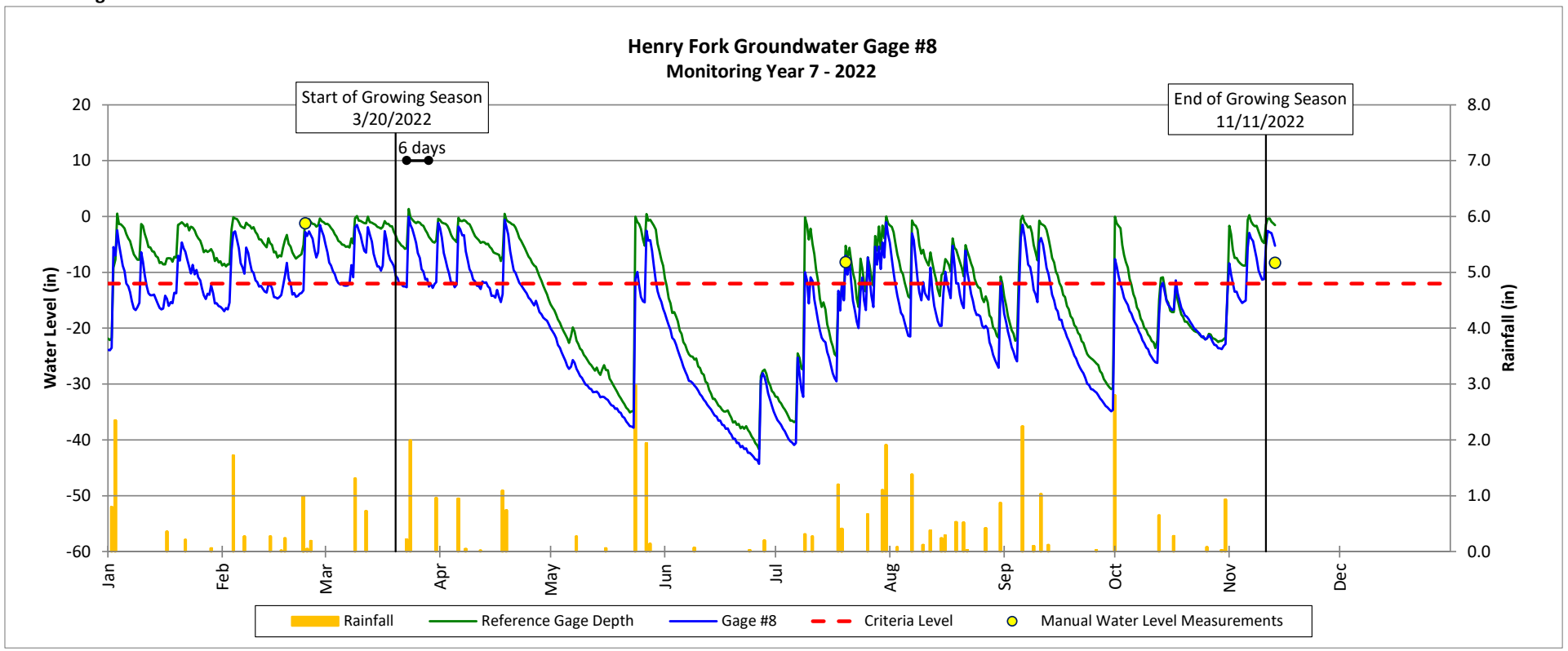


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

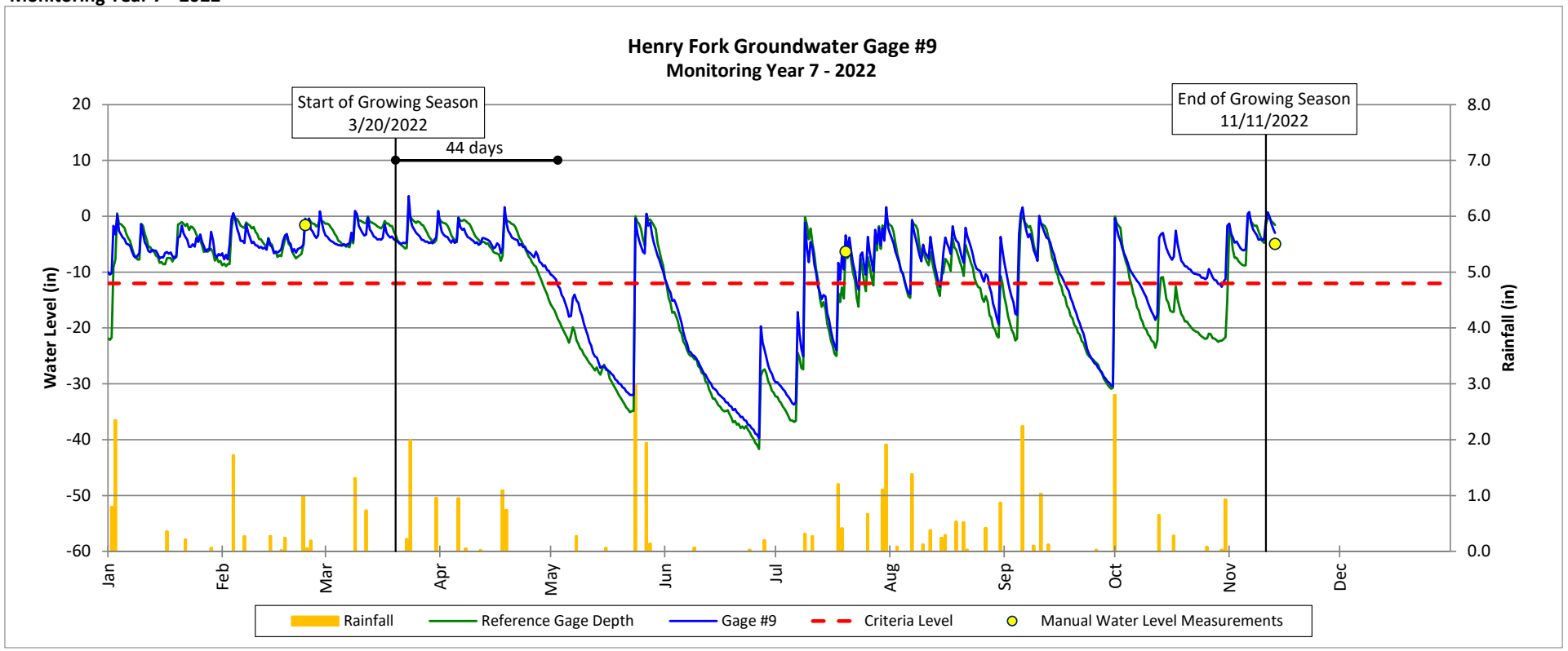


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

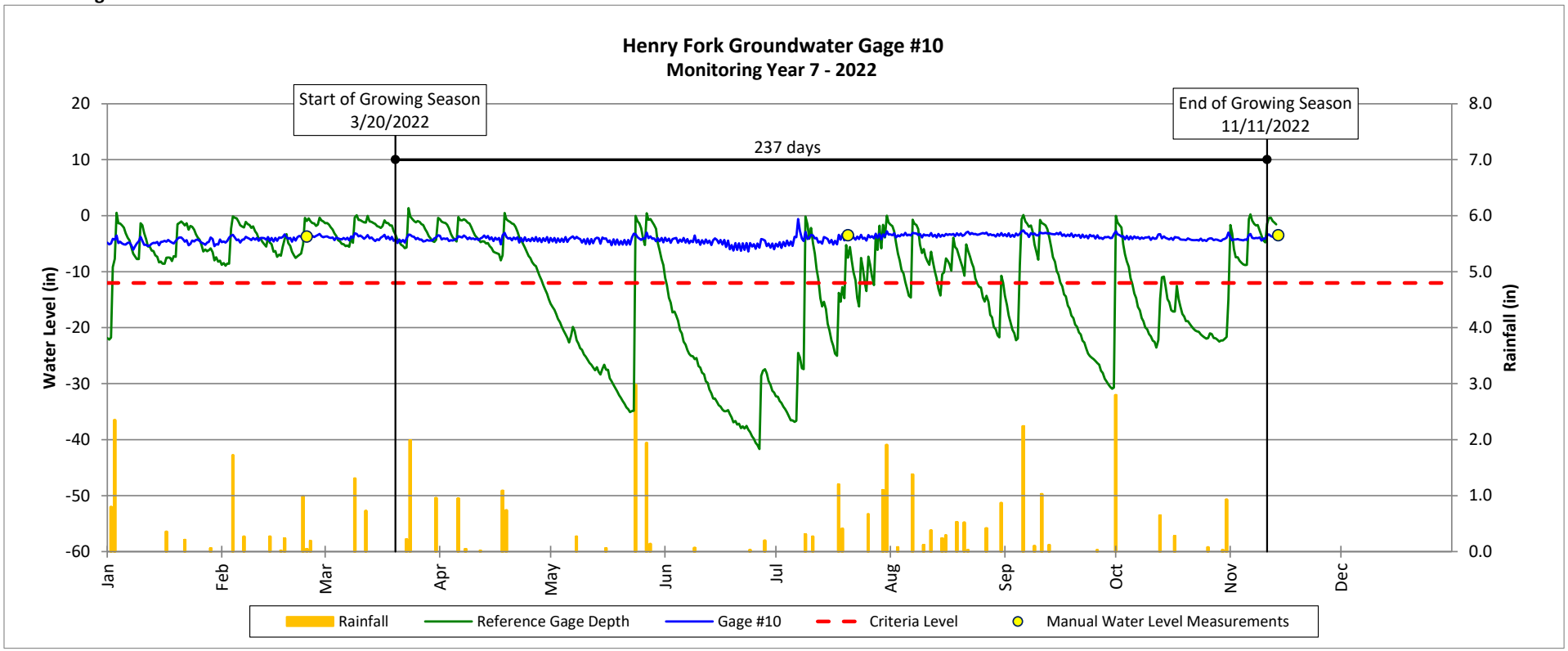


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

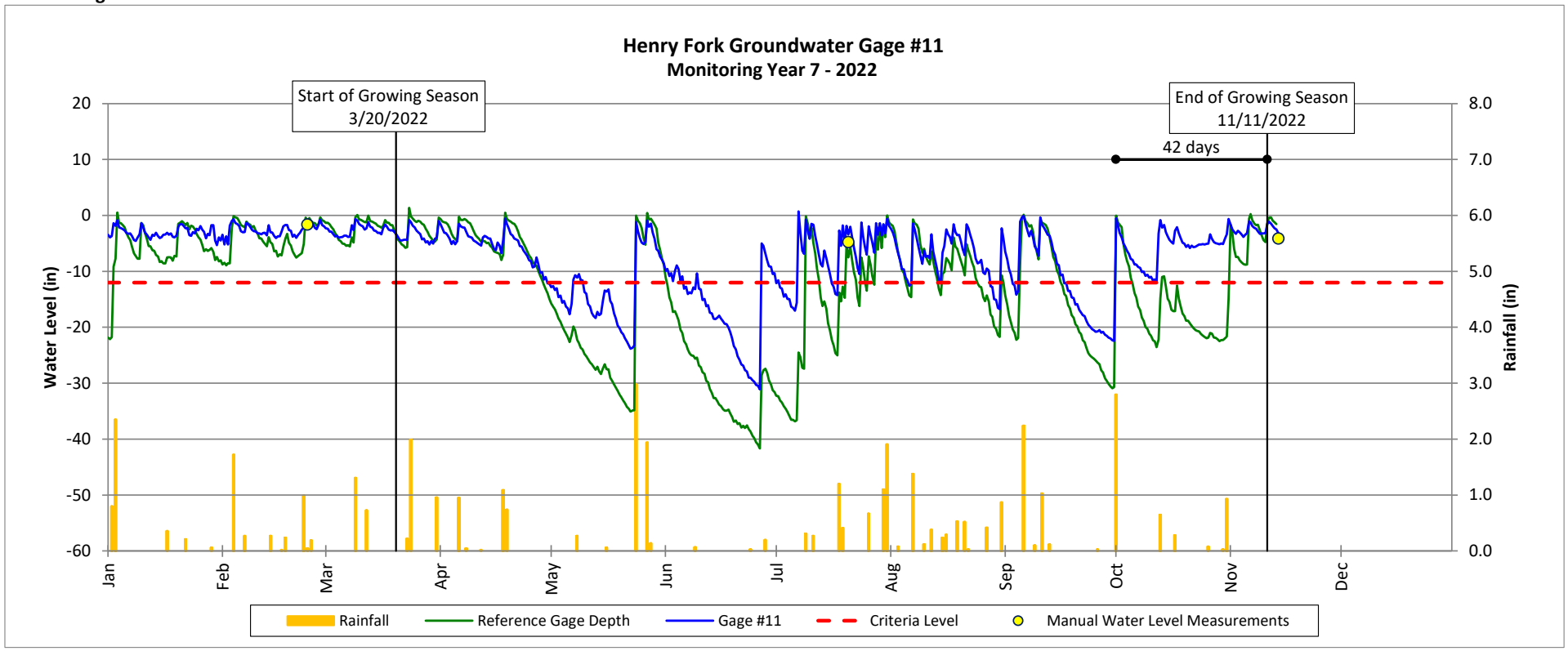


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

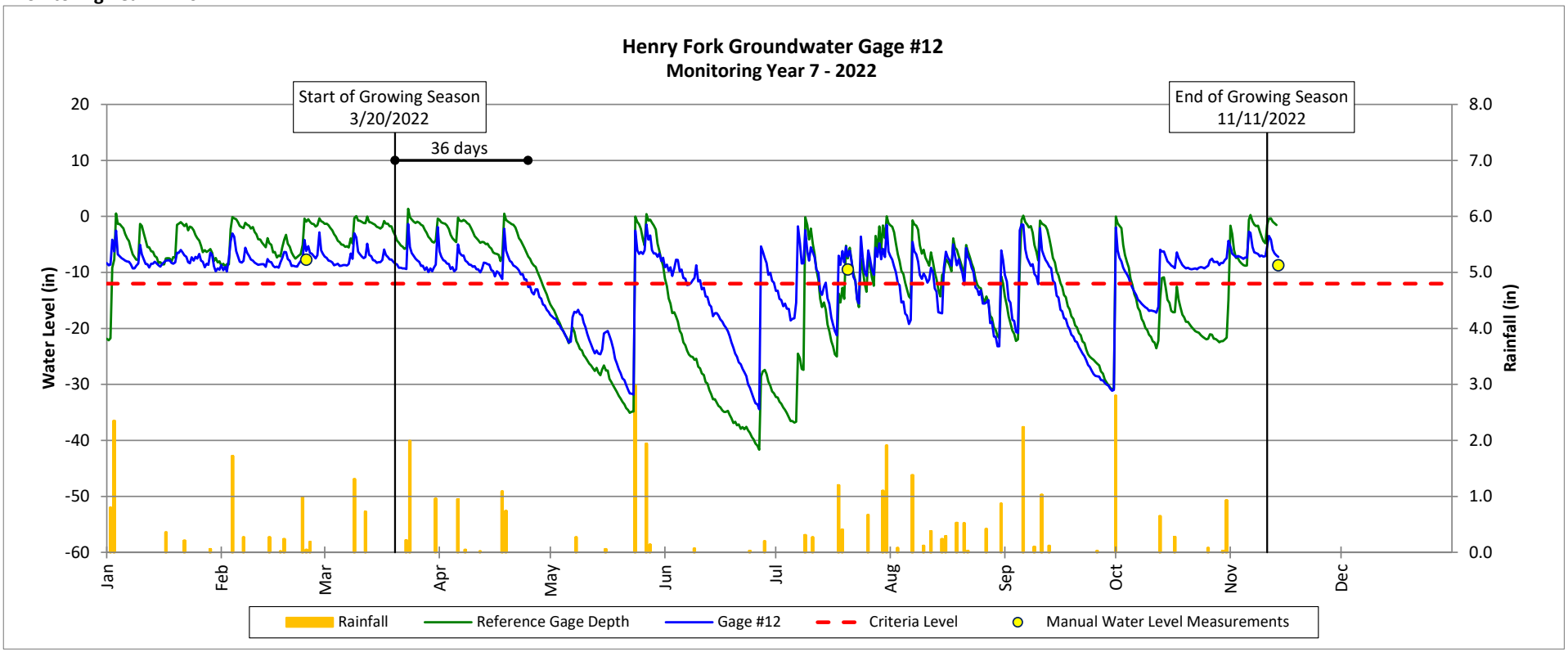


Groundwater Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022



Groundwater Gage Plots

Henry Fork Mitigation Site

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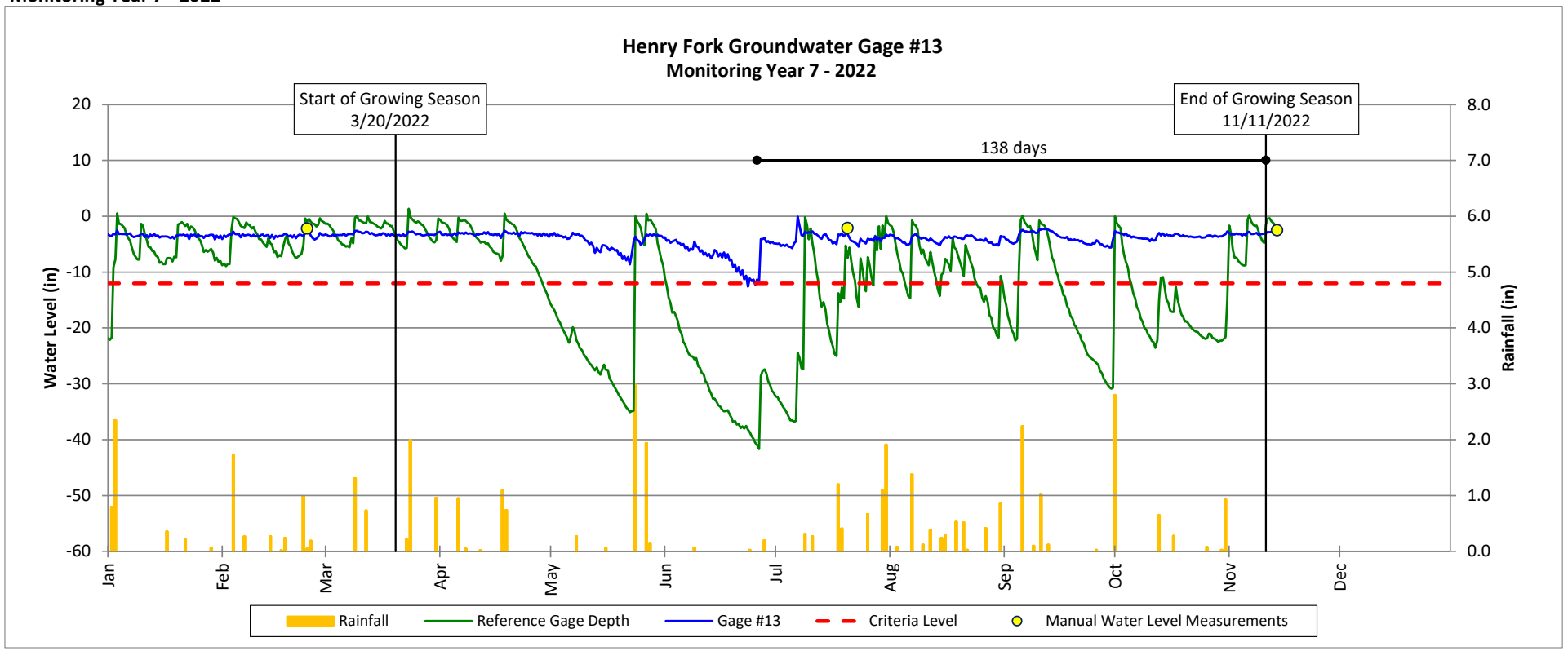
Monitoring Year 7 - 2022



Groundwater Gage Plots

Henry Fork Mitigation Site

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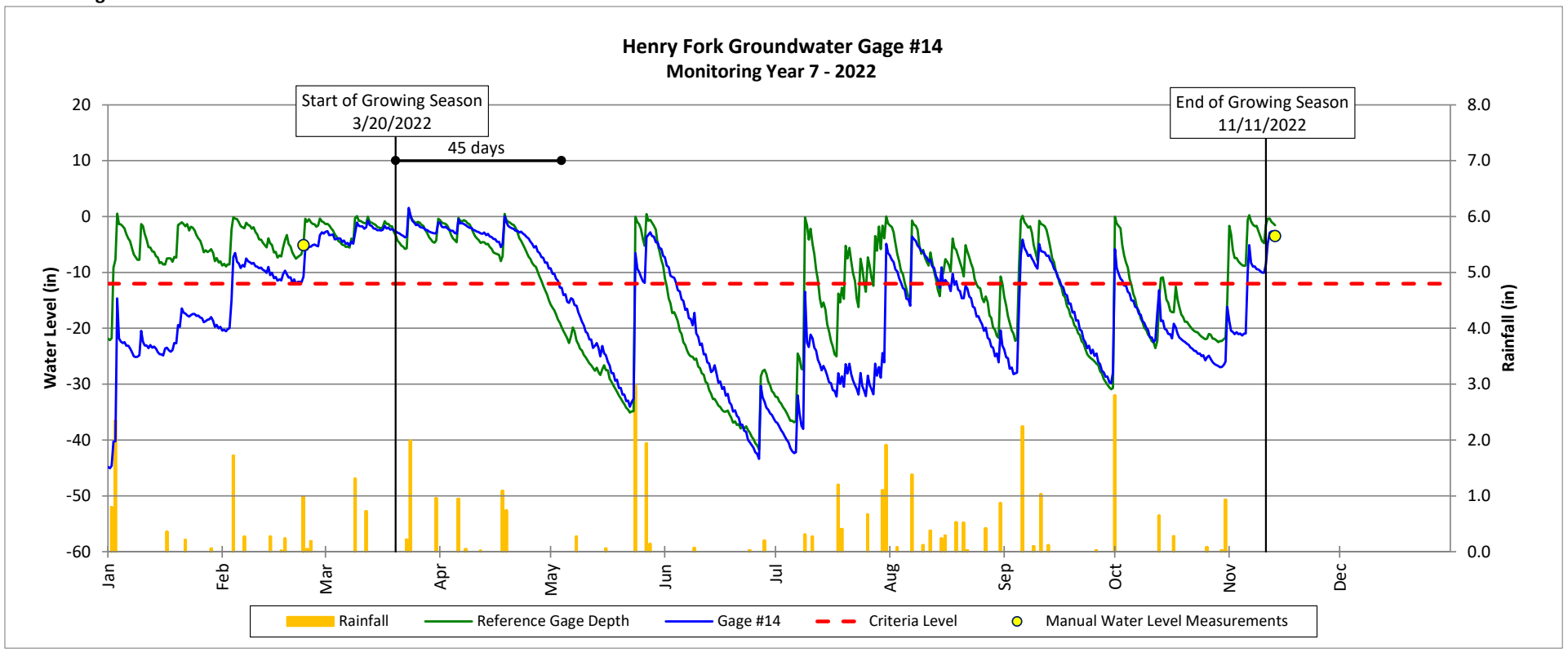
Monitoring Year 7 - 2022

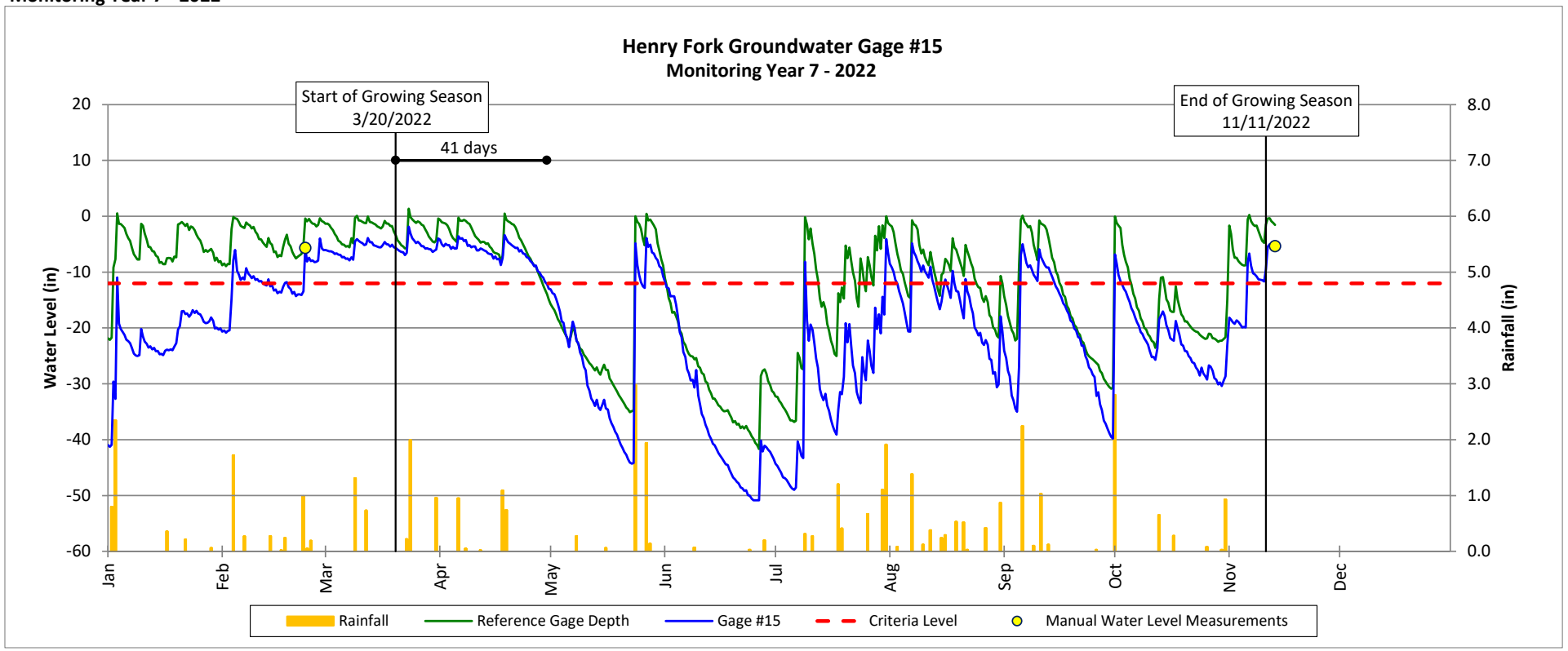


Groundwater Gage Plots

Henry Fork Mitigation Site

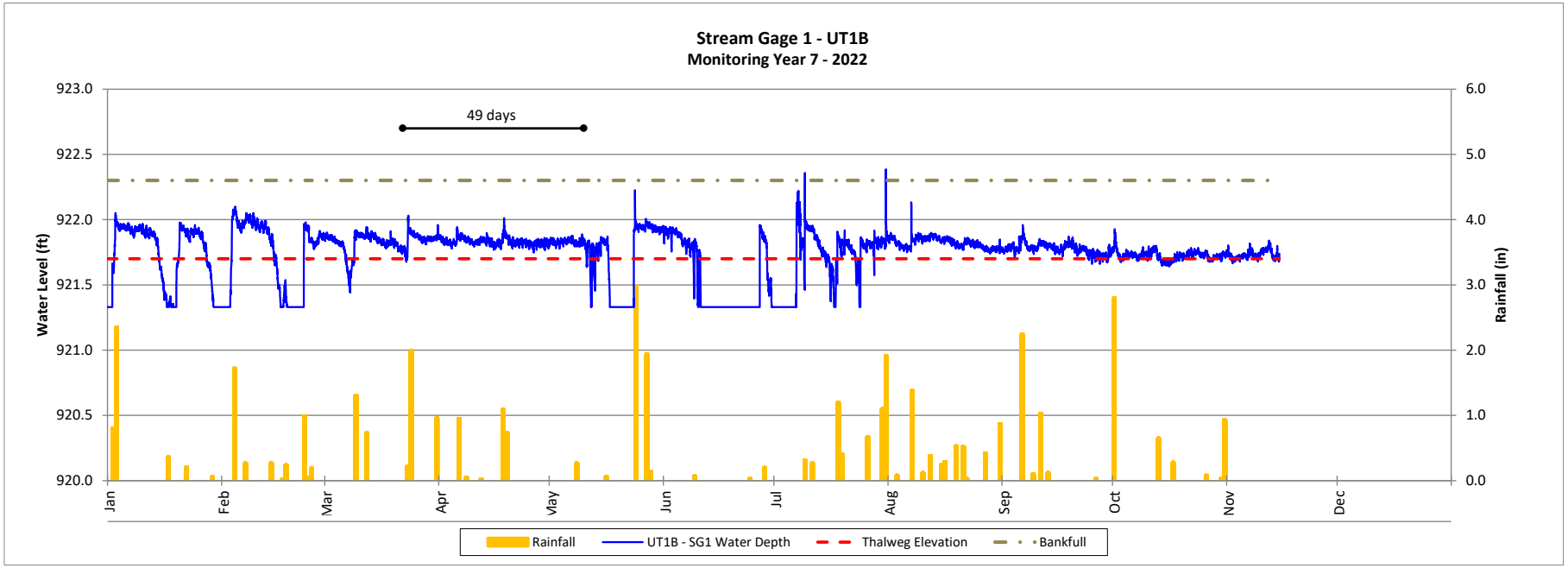
DMS Project No. 96306

Monitoring Year 7 - 2022



Stream Gage Plots

Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022

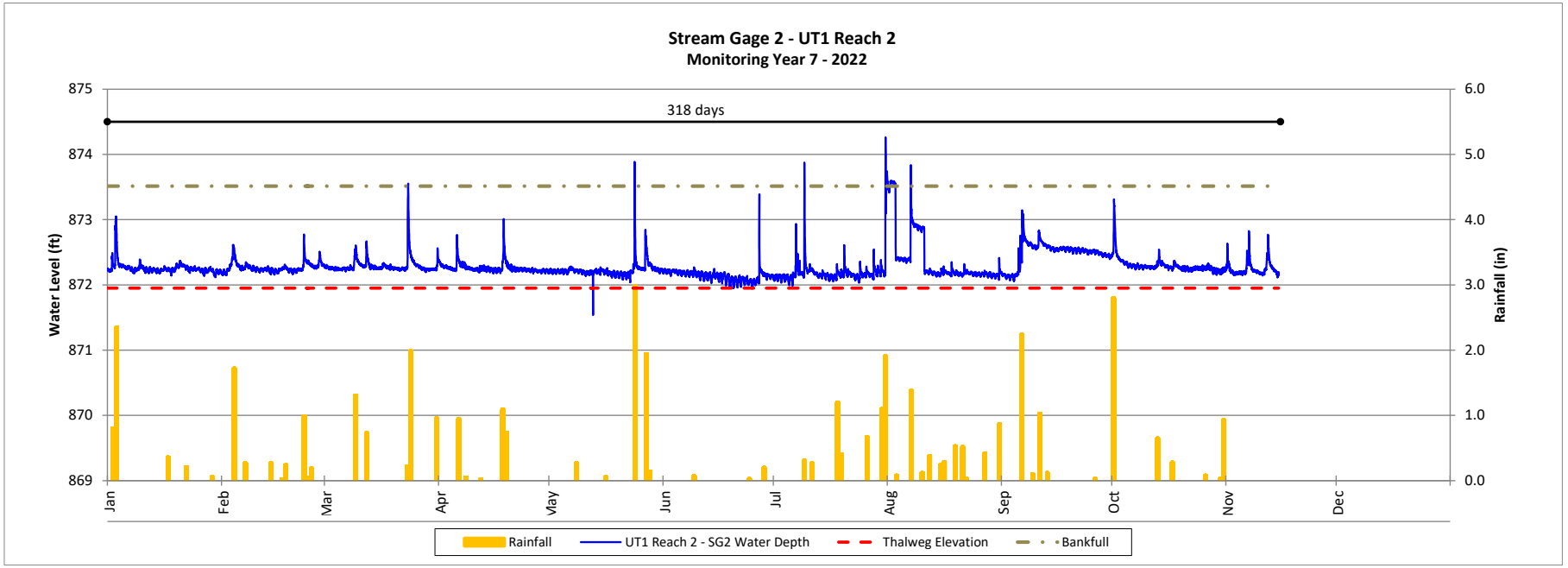


Stream Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

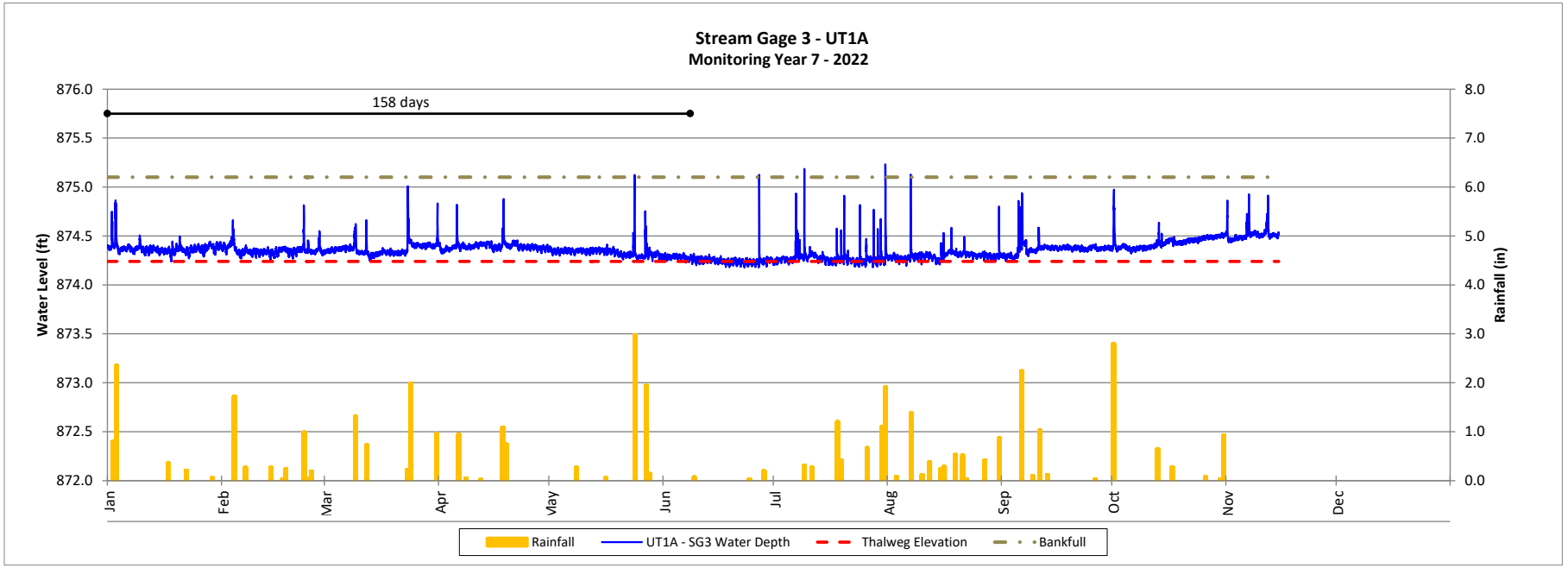


Stream Gage Plots

Henry Fork Mitigation Site

DMS Project No. 96306

Monitoring Year 7 - 2022

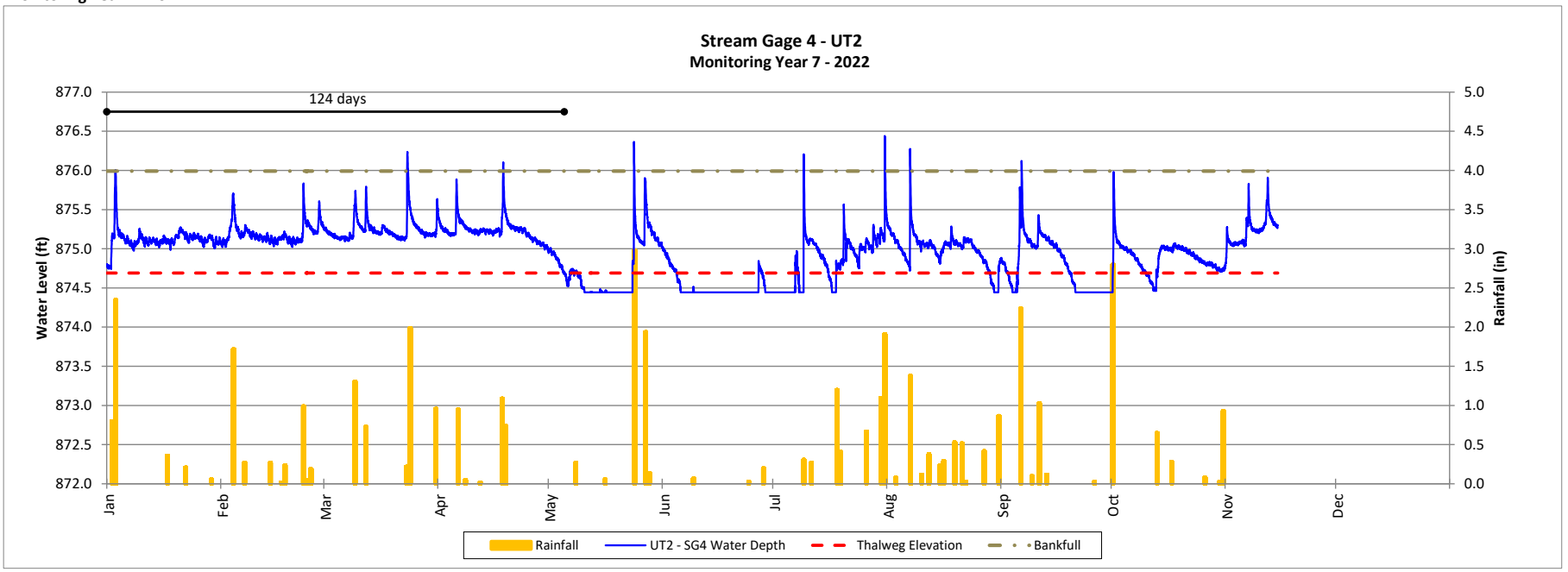


Stream Gage Plots

Henry Fork Mitigation Site

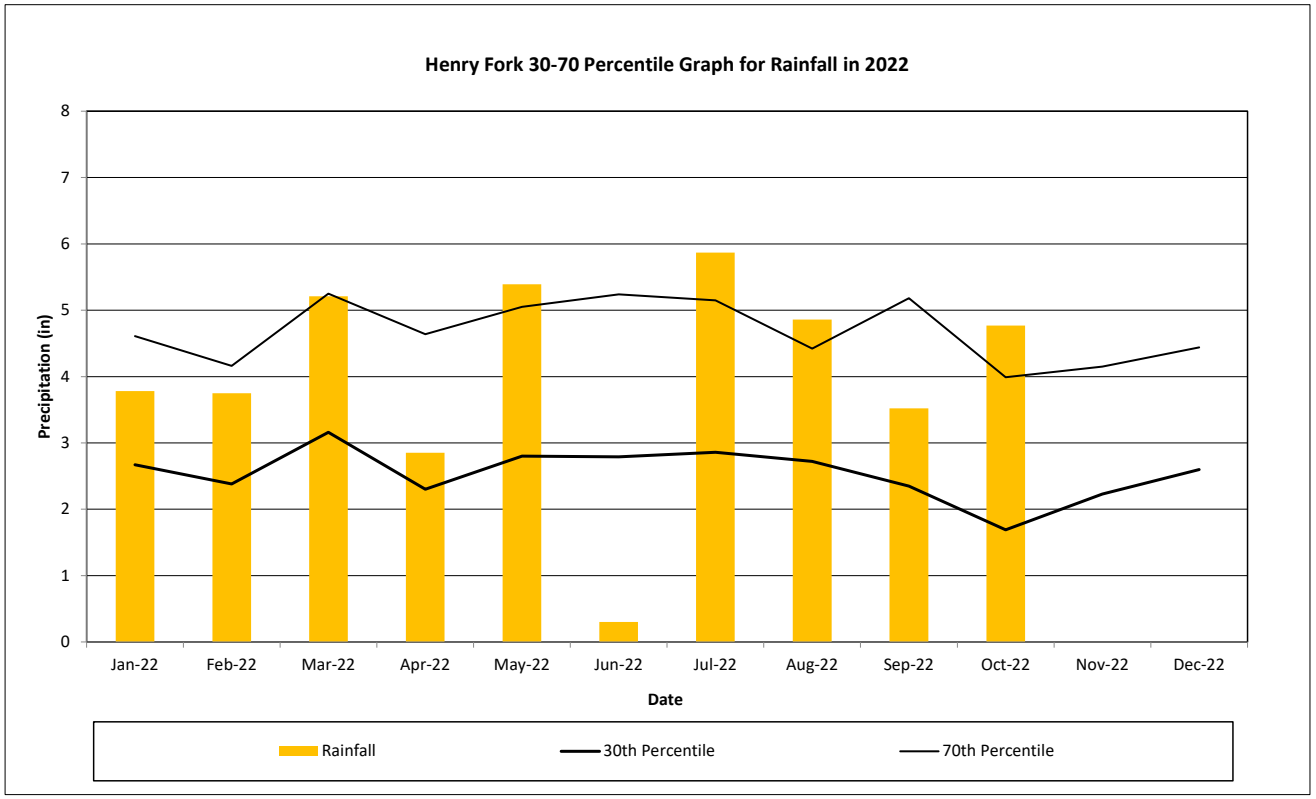
DMS Project No. 96306

Monitoring Year 7 - 2022



Monthly Rainfall Data

Henry Fork Mitigation Site
DMS Project No. 96306
Monitoring Year 7 - 2022



[1] 2022 rainfall collected by NC CRONOS Station Hickory 4.8 SW, NC

[2] 30th and 70th percentile rainfall data collected from WETS station Conover Oxford Shoal, NC