MY2 (2023) FINAL MONITORING REPORT

Bull Chute Stream and Riparian Wetland Mitigation Site

Randolph County, NC
Yadkin River Basin
Cataloging Unit 03040103

DMS Project ID No. 100137
Full Delivery Contract No. 7878-01
RFP #16-007878 (Issued: 5/6/2019)
USACE Action ID No. SAW-2020-00049
DWR Project No. 20200021

Data Collection: January - November 2023
Submission: January 2024

Prepared for:

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

Mitigation Services
ENVIRONMENTAL QUALITY

January 17, 2024

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

Re: Bull Chute – MY-2 Report (DMS Project No. 100137)
Response to Comments

Dear Mr. Reid,

Please find below the response to comments on the Bull Chute MY-2 Report provided by DMS, dated January 4, 2024:

1) General: The MY2 monitoring summary included behind the cover page is a nice addition to the report. Thank you for providing this brief summary of the 2023 monitoring activities.
Re: Noted, thank you.

2) 3.1 Stream Assessment: Please include additional information regarding bankfull events. Please list which monitored reaches recorded bankfull events and which ones did not. Please briefly discuss the malfunction/replacement of the UT4 gauge.
Re: A summary of reaches that recorded bankfull events as well as a gauge malfunction summary were added to Section 3.1.

3) 3.1 Stream Assessment: Please include additional information regarding bankfull events. Please list which monitored reaches recorded bankfull events and which ones did not. Please briefly discuss the malfunction/replacement of the UT4 gauge.
Re: A summary of reaches that recorded bankfull events as well as a gauge malfunction summary were added to Section 3.1.

4) 3.1 Stream Assessment: Please include additional information regarding the malfunction/ replacement of the UT3 and UT4a flow gauges.
Re: A gauge malfunction summary was added to Section 3.1.

5) 3.2 Hydrology Assessment: Recommend revising discussion regarding Gauge 3 in this section. The hydrology data submitted with the draft report shows that Gauge 3 dropped below 12" for 14 days in April. The report indicates there were only 4 days below in April. I recognize that there was a 4 day period in April (4/3-4/6) below 12"

that prevented the success criteria from being met. Revising the discussion for clarity would be helpful.
Re: The discussion of Gauge 3 has been revised to reflect the correct water levels in April.

6) 3.3 Vegetative Assessment: Section states that no vegetation areas of concern were identified in MY2. However, there is a low stem density area near VP19 that will receive supplemental planting and soil amendments this winter. Please revise this section and include a short discussion of this area and planned remediation work.
Re: A brief discussion regarding the area of low stem density near VP19 has been added to Section 3.3.

7) 3.3 Vegetative Assessment: Include short discussion about invasive species treatment that occurred in October 2023. Please add Invasive Treatment to Table 14.
Re: Invasive species treatment that took place in October 2023 included Chinese privet and multiflora rose along UT1, UT2, UT3, and UT4. This information has been added to Table 14.

8) During the 2022 Credit Release Meeting, the IRT requested that vegetation diversity be considered during species selection if supplemental planting occurs. Please consider this when the low stem density area is planted.
Re: Vegetation diversity will be considered during species selection when supplemental planting occurs. A statement indicating this was added to the supplemental planting discussion in Section 3.3.

9) Please include an update in the MY3 report regarding the supplemental planting. Please include species, quantities, type (bare root, container, etc), and planting area size. Also, please make sure that species selected are from the approved Mitigation Plan.
Re: Information regarding the proposed 2024 supplemental planting will be included in the MY3 monitoring report. Species will be selected from the approved Mitigation Plan with vegetation diversity taken into consideration.

10) Please include an update in the MY3 report regarding the action items identified during the boundary inspection that was conducted in November 2023. If the action items have been completed prior to submitting the MY2 final report, please update this report.
Re: A summary of the November 2023 boundary inspection is located in Section 3.4 Monitoring Year 2 Summary. The action items are also listed and have not yet been completed. Completion information will be included in the MY3 report.

11) CCPV – Recommend including the low stem density area near VP19 on the CCPV and updated Table 5 to reflect this area.
Re: The CCPV has been updated to show the low stem density area near VP19 and Table 5 has been updated to reflect this area.

12) Crest Gauge graphs were not included in the hard copy draft. Please make sure final hard copies include all pages when submitted.
Re: Crest gauge graphs are included in this submission. Apologies for the oversight.

13) Table 11: Recommend adding a column for "Monitoring Year" to Table 11 to make it easier to see when events occurred.
Re: A column for "Monitoring Year" has been added to Table 11.

14) Bankfull Events: Recommend either only including bankfull photos from the current year or updating the photo label to show MY1, MY2, MY3, etc.
Re: The bankfull event photo labels have been updated to show MY1 and MY2.

15) Bankfull Events: Photo 5 indicates a bankfull event on UT4, but the description of the event in Table 11 does not mention UT4. UT4 gauge data experienced a malfunction on the date of the photo (Feb. 12, 2023), but the photo can be used to document the event. Recommend revising table to clearly show which tributaries met the bankfull standard for each event.
Re: A sentence has been added to the Feb. 12, 2023 bankfull event description in Table 11 that indicates bankfull events were documented via trail cameras on both UT3 and UT4 on this date. This information was also included in the bankfull summary in section 3.1.

16) Table 14: Please add two lines below MY1 and MY2 Monitoring Reports for Vegetation Survey and Stream Survey and include dates that data collection occurred for each entry. Table 14 in the MY1 Final Report included this, but the MY2 does not.
Re: Lines have been added to Table 14 that show dates of data collection for Vegetation and Stream Surveys.

Digital Deliverable Review:

17) No comments. Please submit updated files based on comments above.

Re: Noted. The digital files have been updated based on above comment responses.

Please do not hesitate to contact me with questions at 919-624-6901.

Sincerely,

Kevin Yates

Bull Chute MY2, 2023 Monitoring Summary

General Notes

- No encroachment was identified in Year 2 (2023).
- No evidence of nuisance animal activity (i.e., heavy deer browsing, beaver activated, etc.) was observed.

Streams

- All streams within the Site are stable and functioning as designed. No stream areas of concern were identified during MY2 (2023). Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table (Table 4A-I) and Stream Photographs and Appendix C for Stream Geomorphology Data.
- Three bankfull events were documented during MY2 (2023) for a total of 6 bankfull events during the 2 monitoring years (Table 11, Appendix D).
- All Site tributaries showed evidence of channel formation during MY2 (2023), with each stream flow gauge documenting greater than 30 consecutive days of flow (Tables 13A-F and Flow Gauge Graphs, Appendix D).

Wetlands

- Seven of the 10 groundwater monitoring gauges met success criteria during MY2 (2023) (Appendix D).

MY2 (2023) Groundwater Hydrology Data

Gauge	12% Hydroperiod Success Criteria Achieved - Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2022)	Year 2 (2023)	Year 3 (2024)	Year 4 (2025)	Year 5 (2026)	Year 6 (2027)	Year 7 (2028)
1	No 1 day (0.4%)	No 2 days (0.8%)					
2	Yes 62 days (25.4%)	Yes 48 days (20.5%)					
3	No 19 days (7.8%)	No 11 days (4.7%)					
4	No 7 days (2.9%)	No 5 days (2.1%)					
5	Yes 124 days (50.8%)	Yes 136 days (58.1%)					
6	Yes 63 days (25.8%)	Yes 131 days (56.0%)					
7	Yes 64 days (26.2%)	Yes 49 days (20.9%)					
8	Yes 63 days (25.8%)	Yes 54 days (23.1%)					
9	Yes 45 days (18.4%)	Yes 221 days (94.4%)					
10	Yes 33 days (13.5%)	Yes 221 days (94.4%)					

Vegetation

- Vegetation monitoring resulted in a sitewide stem density average of 609 planted stems per acre, above the interim requirement of 320 stems per acre required at MY3. All 21 fixed vegetation plots and 10 temporary plots met the interim success criteria (Appendix B).
- There is an area of stunted vegetation within Plot 19 and directly adjacent to Plot 19 (~ 0.10-acre), likely due to previous construction activities at this location. Clearwater is planning to add soil amendments and supplemental planting in this area in January/February 2024.

Site Monitoring Activity and Reporting History

Project Millstones	Stream Monitoring Complete	Vegetation Monitoring Complete	Wetland Monitoring	Data Analysis Complete	Completion or Delivery
Construction Earthwork	--	--	--	--	March 8, 2022
Planting	--	--	--	--	March 18, 2022
As-Built Documentation	May 11, 2022	April 4, 2022	--	May 2022	June 2022
Year 1 Monitoring	November 9, 2022	August 30, 2022	Jan. – Nov. 2022	November 2022	January 2023
Year 2 Monitoring	June 16, 2023	August 24, 2023	Jan. – Nov. 2023	November 2023	January 2024

Site Maintenance Report (2023)

Invasive Species Work	Maintenance work
Chinese privet and multiflora rose along UT1, UT2, UT3, and UT4 were sprayed with herbicide using backpack sprayers in October 2023.	Clearwater will be adding soil amendments and supplemental planting in and around Plot 19 (~0.10-acre) in Jan./Feb. 2024.

MY2 (2023) FINAL MONITORING REPORT

Bull Chute Stream and Riparian Wetland Mitigation Site

Randolph County, NC
Yadkin River Basin
Cataloging Unit 03040103

DMS Project ID No. 100137
Full Delivery Contract No. 7878-01
RFP #16-007878 (Issued: 5/6/2019)
USACE Action ID No. SAW-2020-00049
DWR Project No. 20200021

Data Collection: January - November 2023
Submission: January 2024

Prepared For:

Mitigation Services
ENVIRONMENTAL QUALITY

CLEARWATER MITIGATION
SOLUTIONS

And

Axiom Environmental, Inc.

Clearwater Mitigation Solutions
604 Macon Place
Raleigh, North Carolina
Contact: Kevin Yates
Phone: 919-624-6901

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

TABLE OF CONTENTS

APPENDICES

1.0 PROJECT SUMMARY

Clearwater Mitigation Solutions has established the North Carolina Division of Mitigation Services (NCDMS) Bull Chute Stream & Wetland Mitigation Site (hereafter referred to as the "Site"). The Site includes Unnamed Tributaries (UTs) to Caraway Creek in the Southern Outer Piedmont ecoregion of North Carolina. The Site is located in the Yadkin River Basin, cataloguing unit 03040103 and Targeted Local Watershed and Local Watershed Plan Area (Caraway Creek) 03040103050040 and North Carolina Division of Water Resources (NCDWR) subbasin number 03-08-38. Site watersheds range from approximately 0.008 of a square mile (5.4 acres) on UT2 to 0.19 of a square mile (120.9 acres) at the Site's outfall.

1.1 Project Background, Components, and Structure

Located in Randolph County, less than one-mile northwest of New Market and 4.5 miles northwest of Randleman, the Site encompasses 31.7 acres. Restoration activities within the Site included the construction of meandering, E/C-type stream channel resulting in 6974 linear feet of Priority I stream restoration, 617 linear feet of stream enhancement (Level I), 833 linear feet of stream enhancement (Level II), 450 linear feet of stream enhancement (Level II with an adjusted ratio), 3.13 acres of riparian wetland re-establishment, 0.114 acres of riparian wetland rehabilitation, and 1.462 acre of riparian wetland enhancement. The site is expected to provide 7742.933 warm water stream credits and 3.937 riparian wetland credits by closeout (Table 1, page 2). A conservation easement was granted to the State of North Carolina and recorded at the Randolph County Register of Deeds on April 9, 2021.

Prior to construction, the Site was characterized by disturbed forest and livestock pasture. Site design was completed in May 2021. Construction started on September 6, 2021 and ended within a final walkthrough on March 8, 2022. The Site was planted on March 18, 2022. Completed project activities, reporting history, completion dates, and project contacts are summarized in Tables 14-15 (Appendix E).

Table 1. Bull Chute Mitigation Site (ID-100137) Project Mitigation Quantities and Credits

Project Segment	Original Mitigation Plan Ft/Ac	As-Built Ft/Ac	Original Mitigation Category	Original Restoration Level	Original Mitigation Ratio (X:1)	Credits		Comments
Stream								
UT 1 Reach A	173	187	Warm	EII	2.50000	69.200		
UT 1 Reach B	468	456	Warm	EI	1.50000	312.000		
UT 1 Reach C	68	68	Warm	EII	2.50000	27.200		
UT 1 Reach D	149	149	Warm	EI	1.50000	99.333		
UT 1 Reach E	2164	2168	Warm	R	1.00000	2,164.000		
UT 2	592	592	Warm	EII	2.50000	236.800		
UT 3 Reach A	418	423	Warm	R	1.00000	418.000		
UT 3 Reach B	306	303	Warm	EII*	7.50000	40.800		
UT 3 Reach C	1137	1119	Warm	R	1.00000	1,137.000		
UT 4A	410	402	Warm	R	1.00000	410.000		
UT 4B	295	290	Warm	R	1.00000	295.000		
UT 4C	180	175	Warm	No Credit	0.00000	0.000		
UT 4	2482	2492	Warm	R	1.00000	2,482.000		Approx. 30 lf (approx. sta. 10+11 to 10+41) was realigned during construction to avoid damaging mature trees. This resulted in an increase of stream restoration footage along this reach at MY0. However, no change to crediting is proposed for MY0.
UT 5A	37	36	Warm	No Credit	0.00000	0.000		
UT 5B	38	38	Warm	R	1.00000	38.000		
UT 6	121	130	Warm	No Credit	0.00000	0.000		
UT 7	68	77	Warm	EII*	5.00000	13.600		
					Total:	**7,742.933**		
Wetland								
Wetland Reestablish	--	3.13	R	REE	1.00000	3.130		
Wetland Rehabilitation	0.114	0.114	R	RH	1.50000	0.076		
Wetland Enhancement	1.462	1.462	R	E	2.00000	0.731		
					Total:	**3.937**		

Project Credits

	Stream			Riparian	Non-Rip	Coastal
Restoration Level	Warm	Cool	Cold	Wetland	Wetland	Marsh
Restoration	6,944.000	0.000	0.000	0.000	0.000	0.000
Re-establishment				3.130	0.000	0.000
Rehabilitation				0.076	0.000	0.000
Enhancement				0.731	0.000	0.000
Enhancement I	411.333	0.000	0.000			
Enhancement II	333.200	0.000	0.000			
Enhancement II*	54.400	0.000	0.000			
Creation				0.000	0.000	0.000
Preservation	0.000	0.000	0.000	0.000	0.000	
Totals	**7,742.933**			**3.937**		

*Enhancement Level II with an adjusted ratio (based on IRT comment and review).

Total Stream Credit **7,742.933**
Total Wetland Credit **3.937**

Wetland Mitigation Category

CM	Coastal Marsh
R	Riparian
NR	Non-Riparian

Restoration Level

HQP	High Quality Preservation
P	Preservation
E	Wetland Enhancement - Veg and Hydro
EII	Stream Enhancement II
EI	Stream Enhancement I
C	Wetland Creation
RH	Wetland Rehabilitation - Veg and Hydro
REE	Wetland Re-establishment Veg and Hydro
R	Restoration

Table 2. Summary: Goals, Performance, and Results

Goals	Objectives	Success Criteria
(1) HYDROLOGY		
• Minimize downstream flooding to the maximum extent possible.	• Construct new channel at historic floodplain elevation to restore overbank flows • Plant woody riparian buffer • Deep rip floodplain soils to reduce compaction and increase soil surface roughness • Protect riparian buffers with a perpetual conservation easement • Construct channels with proper pattern, dimension, and longitudinal profile	• BHR not to exceed 1.2 • Document four overbank events in separate monitoring years • Continuous intermittent surface flow for at least 30 days • Livestock excluded from the easement • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded
• Increase stream stability within the Site so that channels are neither aggrading nor degrading.	• Construct channels with proper pattern, dimension, and longitudinal profile • Remove livestock from the property • Construct stable channels with appropriate substrate • Upgrade existing piped channel crossings and install piped crossings at existing forded crossings • Stabilize stream banks • Plant woody riparian buffer	• Cross-section measurements indicate a stable channel with appropriate substrate • Visual documentation of stable channels and structures • BHR not to exceed 1.2 • < 10% change in BHR in any given year • Livestock excluded from the easement • Attain Vegetation Success Criteria
(1) WATER QUALITY		
• Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters.	• Remove agricultural livestock and reduce agricultural land/inputs • Install marsh treatment areas • Plant woody riparian buffer • Restore/enhance jurisdictional wetlands adjacent to Site streams • Provide surface roughness and reduce compaction through deep ripping/plowing • Restore overbank flooding by constructing channels at historic floodplain elevation	• Livestock excluded from the easement • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria
(1) HABITAT		
• Improve instream and stream-side habitat.	• Construct stable channels with appropriate substrate • Plant woody riparian buffer to provide organic matter and shade • Construct new channel at historic floodplain elevation to restore overbank flows • Protect riparian buffers with a perpetual conservation easement • Restore/enhance jurisdictional wetlands adjacent to Site streams • Stabilize stream banks • Install in-stream structures	• Cross-section measurement indicate a stable channel with appropriate substrate • Visual documentation of stable channels and in-stream structures. • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded

1.2 Success Criteria

Monitoring and success criteria for stream restoration should relate to project goals and objectives identified from on-site NC SAM and NC WAM data collection. From a mitigation perspective, several of the goals and objectives are assumed to be functionally elevated by restoration activities without direct measurement. Other goals and objectives will be considered successful upon achieving success criteria. The following summarizes Site annual success criteria.

Success Criteria

Streams
• All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05. • Continuous surface flow in intermittent streams must be documented each year for a minimum of 30 consecutive days. • Bank height ratio (BHR) cannot exceed 1.2 at any measured cross-section. • BHR at any measure riffle cross-section should not change by more than 10% from baseline condition during any given monitoring period. • The stream project shall remain stable and all other performance standards shall be met through four separate bankfull events, occurring in separate years, during the monitoring years 1-7.
Wetland Hydrology
• Saturation or inundation, measured annually, within the upper 12 inches of the soil surface for, at a minimum, 12 percent of the growing season*, during average climatic conditions.
Vegetation
• Within planted portions of the site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 5; and a minimum of 210 stems per acre must be present at year 7. • Trees must average 7 feet in height at year 5, and 10 feet in height at year 7 in each plot. • Planted and volunteer stems are counted, provided they are included in the approved planting list for the site; natural recruits not on the planting list may be considered by the IRT on a case-by-case basis. • Any volunteer species on the approved planting list must be established for at least 2 years to count towards success and will be subject to the average height standard.

*In accordance with IRT request after submittal of the MY0 report, the growing season for this site will be based on the latest 30-year WETS data (Station Asheboro 2 W, NC) and is defined as March 18 to November 16.

2.0 PROJECT MONITORING – METHODS

Monitoring will be conducted in accordance with 2016 NCIRT Guidelines. Monitoring will be conducted by Axiom Environmental, Inc based on the schedule below. A summary of monitoring is outlined in Section 3.1. Annual monitoring reports will be submitted to the NCDMS by Restoration Systems no later than December 1 of each monitoring year data is collected.

Monitoring Schedule

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

2.1 Monitoring

The monitoring parameters are summarized in the following table.

Monitoring Summary

Stream Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Stream Profile	Full longitudinal survey	As-built (unless otherwise required)	All restored stream channels	Graphic and tabular data.
Stream Dimension	Cross-sections	Years 1, 2, 3, 5, and 7	Total of 26 cross-sections on restored channels	Graphic and tabular data.
Channel Stability	Visual Assessments	Yearly	All restored stream channels	Areas of concern will be depicted on a plan view figure with a written assessment and photograph of the area included in the report.
	Additional Cross-sections	Yearly	Only if instability is documented during monitoring	Graphic and tabular data.
Stream Hydrology	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	6 surface water gauges on UT 1, UT 2, UT 3, UT 4A, UT 4B, and UT 7	Surface water data for each monitoring period
Bankfull Events	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	3 crest gauges on UT 1, UT 3, and UT 4	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through monitoring period	Periodic Site visits throughout the year.	Visual evidence, photo documentation, and/or rain data.
Wetland Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Wetland Restoration	Groundwater gauges	Years 1, 2, 3, 4, 5, 6, and 7 throughout the year with the growing season defined as March 18-November 16*	10 gauges spread throughout restored wetlands	Groundwater and rain data for each monitoring period
Vegetation Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Vegetation establishment and vigor	Permanent vegetation plots 0.0247 acre (100 square meters) in size; *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008)	As-built, Years 1, 2, 3, 5, and 7	21 plots spread across the Site	Species, height, planted vs. volunteer, stems/acre
	Annual random vegetation plots, 0.0247 acre (100 square meters) in size	As-built, Years 1, 2, 3, 5, and 7	10 plots randomly selected each year	Species and height

*In accordance with IRT request after submittal of the MY0 report, the growing season for this site will be based on the latest 30-year WETS data (Station Asheboro 2 W, NC, 1992-2022) and is defined as March 18 to November 16 (244 days). Soil temperature and bud burst documentation will not be required to verify growing season start dates.

Note: Photo points will be taken at all cross sections and at vegetation plot origin points. In addition, photo points will be located at all culverts and crossings.

3.0 MONITORING YEAR 2 – DATA ASSESSMENT

Annual monitoring and site visits were conducted between January and November 2023 to assess the condition of the project. Stream, wetland, and vegetation criteria for the Site follow the approved success criteria presented in the Mitigation Plan and summarized in Section 1.2; monitoring methods are detailed in Section 2.0.

3.1 Stream Assessment

Morphological surveys for MY2 were conducted on June 16, 2023. All streams within the Site are stable and functioning as designed. Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table (Table 4A-I) and Stream Photographs. Refer to Appendix C for Stream Geomorphology Data. No stream areas of concern were identified during MY2 (2023).

Three bankfull events were documented during MY2 (2023) for a total of 6 bankfull events during the 2 monitoring years (Table 11, Appendix D).

Bankfull Events by Tributary – MY2 (2023)

- UT1 – 3 total bankfull events were recorded; February 12, April 8, and July 8, 2023 (all via crest gauge).
- UT3 – 2 total bankfull events were recorded; February 12 (via time-lapse trail camera) and July 8, 2023 (via crest gauge).
- UT4 – 1 bankfull event was recorded; February 12, 2023 (via time-lapse trail camera). See below for description of the UT4 crest gauge malfunction.

Additionally, all Site tributaries showed evidence of channel formation during MY2 (2023), with each stream flow gauge documenting greater than 30 consecutive days of flow (Tables 13A-F and Flow Gauge Graphs, Appendix D).

Gauge Malfunction Summary – MY2 (2023)

UT4 crest gauge data was initially collected for MY2 on April 17, 2023, however a shuttle failure occurred, resulting in the loss of data up to this date. The gauge remained in working order thereafter, but over the course of year 2 (2023) monitoring, the crest gauge showed a continued upward trend in water level. This looks significantly different than the overall trend of other crest gauges and seems indicative of a pressure sensor malfunction. The gauge will be replaced early in the MY3 monitoring year to ensure accurate documentation of MY3 bankfull events on this reach.

The flow gauge on UT3 malfunctioned starting on April 18, 2023, resulting in a loss of data. The gauge was replaced when this was discovered on May 26, 2023, and the gauge continued working the rest of the year. The flow gauge on UT4A also malfunctioned starting on January 27, 2023, in which water levels were reading sporadically and incorrectly. The gauge was relaunched when the issue was discovered on April 17, 2023, and read properly the rest of the year.

3.2 Hydrology Assessment

Seven of the 10 groundwater monitoring gauges met success criteria during MY2 (2023). The area surrounding gauge 1 is characterized by hydrophytic vegetation and surface hydrology, but gauge data are not indicative of this. Clearwater proposes to reinstall a new gauge prior to MY3 (2024) monitoring.

Gauge 3 read above 12" for 9 days, followed by 4 days below 12" in April, then another 11 days above 12". This gauge would have met success criteria had it not been for the 4 days below 12" in April. With normal to high rainfall, this gauge is expected to exceed the 10% hydroperiod. Gauge 4 was installed in a non-credit-generating area to monitor the possible formation of wetlands after the removal of drain tile upstream of the UT-1 origin. It has not yet met success criteria but will continue to be monitored during subsequent years. See groundwater gauge data in Appendix D.

3.3 Vegetative Assessment

The MY2 (2023) vegetative survey was completed on August 24, 2023. Vegetation monitoring resulted in a sitewide stem density average of 609 planted stems per acre, above the interim requirement of 320 stems per acre required at MY3. All 21 fixed vegetation plots and 10 temporary plots met the interim success criteria. Please refer to Appendix A for Vegetation Plot Photographs and the Vegetation Condition Assessment Table, and Appendix B for MY2 Vegetation Plot Data.

There is an area of stunted vegetation within and directly adjacent to Plot 19 (~ 0.20-acre), likely due to poor soil from previous construction activities at this location. Clearwater is planning to add soil amendments and perform a supplemental planting in this area in January/February 2024. Vegetation diversity will be considered at the request of the IRT, and species will be chosen from the list on the approved mitigation plan. The area of low stem density is depicted on Figure 1 (Appendix A). A summary of the replanting effort, including species, quantities, type (bare root, containerized, etc.), and planting area size will be included in the MY3 (2024) monitoring report.

Additionally, Chinese privet and multiflora rose along UT1, UT2, UT3, and UT4 were sprayed with herbicide using backpack sprayers in October 2023. These areas will continue to be monitored during subsequent monitoring years and may be retreated if necessary.

3.4 Monitoring Year 2 Summary

Overall, the Site looks good, is performing as intended, and is on track to meet success criteria. All vegetation plots are on track to exceed the MY3 interim requirement of 320 planted stems per acre, wetlands are trending toward success, and all streams within the Site are stable and are meeting project goals.

A boundary inspection of the Site was conducted by NCDMS Property Specialist, Mr. Kelly Phillips on November 16, 2023. The NCDMS boundary inspection report is in Appendix F. During the site inspection there were no easement encroachments identified nor observed during MY2. The

cattle exclusion fencing is still intact along the entire perimeter of the conservation easement boundary. There is a portion of a fallen tree across the fence on UT3, that will be removed. All easement corners are marked with appropriately stamped aluminum caps atop #5 rebar. The corners were generally well marked with appropriate conservation easement signs. Several corners were missing a sign, and there were some areas of more than 200-ft without a sign, as identified in a .kmz provided by Mr. Phillips. Action items to properly identify the boundary and bring it back into compliance will be conducted in January/February 2024, and are as follows:

- Install witness signs/posts at each unmarked corner.
- Install in-line marking at a frequency of 200' spacing or less. Shorter segments should have the signs installed equidistant from the corners, but signs must be installed at a spacing no greater than 200'.
- Remove fallen tree from the exclusion fencing in the north central section of the site (UT3).

Table 3. Project Attribute Table									
Project Name	Bull Chute Stream and Riparian Wetland Mitigation Site								
County	Randolph County, North Carolina								
Project Area (acres)	31.7								
Project Coordinates (latitude and longitude decimal degrees)	35.8325, -79.8879								
Project Watershed Summary Information									
Physiographic Province	Southern Outer Piedmont								
River Basin	Yadkin								
USGS Hydrologic Unit 8-digit	3040103050040								
DWR Sub-basin	03-07-09								
Project Drainage Area (acres)	218.5								
Project Drainage Area Percentage of Impervious Area	<2%								
Land Use Classification	Managed Herbaceous Cover & Hardwood Swamps								
Reach Summary Information									
Parameters	**UT 1**	**UT 2**	**UT 3**	**UT 4**	**UT 4A/B**	**UT 4C**	**UT 5**	**UT 6**	**UT 7**
Pre-project length (feet)	3022	592	1861	2482	705	180	75	121	68
Post-project (feet)	3149	592	1907	2558	693	175	75	130	77
Valley confinement (Confined, moderately confined,	A, C	A, C	A, C	A, C	A, C	A, C	A, C	A, C	A, C
Drainage area (acres)	97.6	48.1	48.1	120.9	10.2/8.9	8.3	12.5	5.4	16
Perennial, Intermittent, Ephemeral	Int/Per	Int	Int/Per	Per	Int	Int	Int	Int	Int
NCDWR Water Quality Classification	C								
Dominant Stream Classification (existing)	G5	---	G5	Fg/G5	Eg/Cf5	---	---	---	---
Dominant Stream Classification (proposed)	Ce 3/4	---	Ce 3/4	Ce 3/4	Ce 3/4	Ce 3/4	Ce 3/4	---	Ce 3/4
Dominant Evolutionary class (Simon) if applicable	IV	IV	IV	IV	IV	III	III	III	III
Wetland Summary Information									
Parameters	**Wetlands**								
Pre-project (acres)	3.130 acre drained & 1.576 acre degraded								
Post-project (acres)	3.206 restored & 0.731 enhanced								
Wetland Type (non-riparian, riparian)	Riparian riverine								
Mapped Soil Series	Mecklenburg, Wynott-Enon Complex, and field identified Wehadkee Variant								
Soil Hydric Status	Non-hydric, Non-hydric, and Hydric								

Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	Yes	Section 404 Permit
Water of the United States - Section 401	Yes	Yes	Section 401
Endangered Species Act	Yes	Yes	CE Document
Historic Preservation Act	Yes	Yes	CE Document
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

4.0 REFERENCES

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

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

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

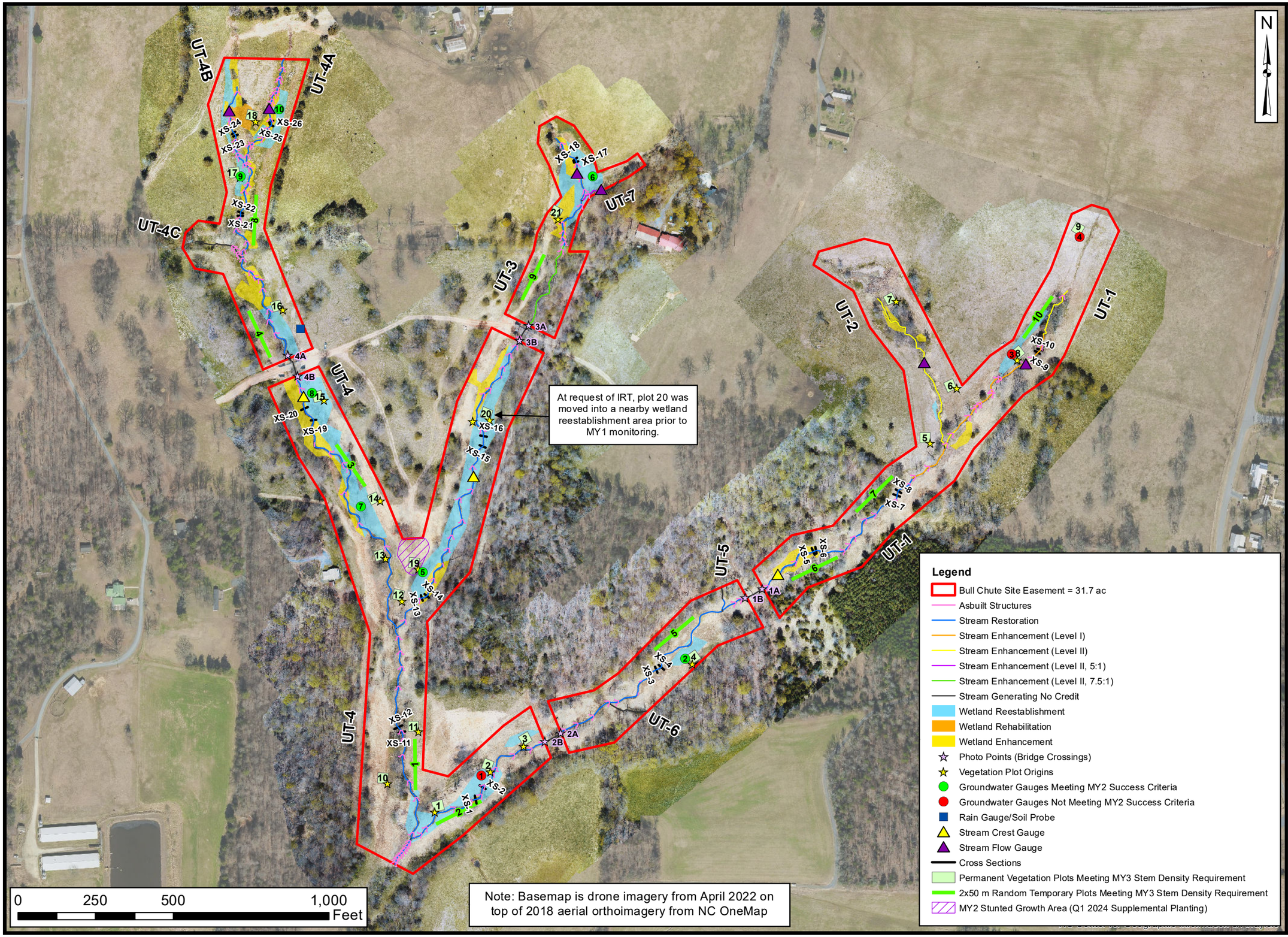
North Carolina Wetland Functional Assessment Team. (NC WFAT 2010). N.C. Wetland Assessment Method (NC WAM) User Manual. Version 4.1.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology (Publisher). Pagosa Springs, Colorado.

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

APPENDIX A
Visual Assessment Data

Figure 1. Current Conditions Plan View
Tables 4A-I. Stream Visual Stability Assessment
Table 5. Visual Vegetation Assessment
Vegetation Plot Photographs
Site Photo Log



Axiom Environmental, Inc.

Prepared for:

Clearwater Mitigation Solutions

Project:

BULL CHUTE MITIGATION SITE

Randolph County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

Date: JAN 2024

Scale: 1:3500

Project No.: 20-006

FIGURE

1

Table 4A. Visual Stream Stability Assessment

Reach UT 1

Assessed Stream Length 3149 Survey Date: November 9, 2023

Assessed Bank Length 6298

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	46	46		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	46	46		100%

Table 4B. Visual Stream Stability Assessment

Reach UT 2

Assessed Stream Length 592 Survey Date: November 9, 2023

Assessed Bank Length 1184

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	0	0		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	0	0		100%

Table 4C. Visual Stream Stability Assessment

Reach UT 3

Assessed Stream Length 1907 Survey Date: November 9, 2023

Assessed Bank Length 3814

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	30	30		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	30	30		100%

Table 4D. Visual Stream Stability Assessment

Reach UT 4

Assessed Stream Length 2558 Survey Date: November 9, 2023

Assessed Bank Length 5116

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	27	27		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	27	27		100%

Table 4E. Visual Stream Stability Assessment

Reach UT 4A

Assessed Stream Length 401 Survey Date: November 9, 2023

Assessed Bank Length 802

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	17	17		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	17	17		100%

Table 4F. Visual Stream Stability Assessment

Reach UT 4B

Assessed Stream Length 290 Survey Date: November 9, 2023

Assessed Bank Length 580

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	10	10		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	10	10		100%

Table 4G. Visual Stream Stability Assessment

Reach UT 4C

Assessed Stream Length 175 Survey Date: November 9, 2023

Assessed Bank Length 350

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	4	4		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	4	4		100%

Table 4H. Visual Stream Stability Assessment

Reach UT 5

Assessed Stream Length 75 Survey Date: November 9, 2023

Assessed Bank Length 150

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	0	0		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	0	0		100%

Table 4I. Visual Stream Stability Assessment

Reach UT 7

Assessed Stream Length 77 Survey Date: November 9, 2023

Assessed Bank Length 154

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	1	1		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	1	1		100%

Table 5. Visual Vegetation Assessment

Planted acreage **28.5**

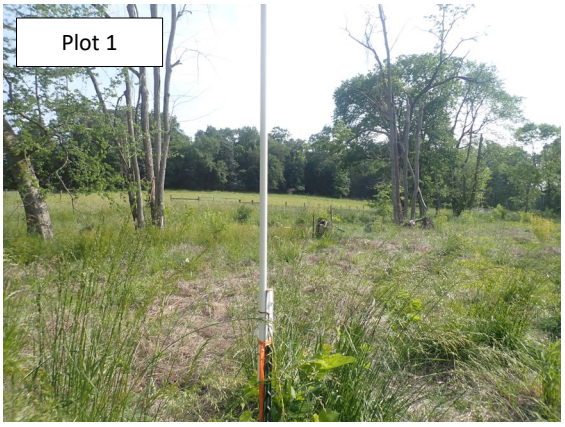
Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.10 acres	0.00	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10acres	0.00	0.0%
	Total		0.00	0.0%
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10 acres	0.20	0.7%
	Cumulative Total		0.20	0.7%

Easement Acreage **31.7**

Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Invasives may occur outside of planted areas and within the easement and will therefore be calculated against the total easement acreage. Include species with the potential to directly outcompete native, young, woody stems in the short-term or community structure for existing communities. Species included in summation above should be identified in report summary.	0.10 acres	0.00	0.0%
Easement Encroachment Areas	Encroachment may be point, line, or polygon. Encroachment to be mapped consists of any violation of restrictions specified in the conservation easement. Common encroachments are mowing, cattle access, vehicular access. Encroachment has no threshold value as will need to be addressed regardless of impact area.	none	0 Encroachments noted	

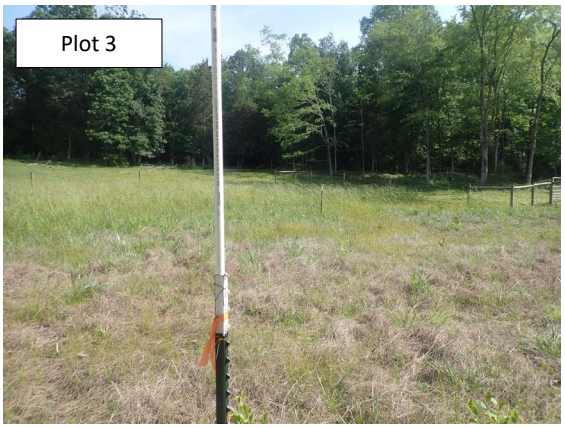
Bull Chute Mitigation Site
MY2 (2023) Vegetation Monitoring Photographs (Taken August 24, 2023)

Plot 1



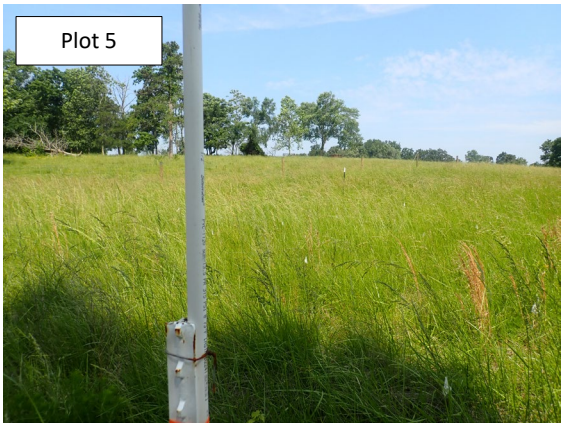
Plot 2

Plot 3

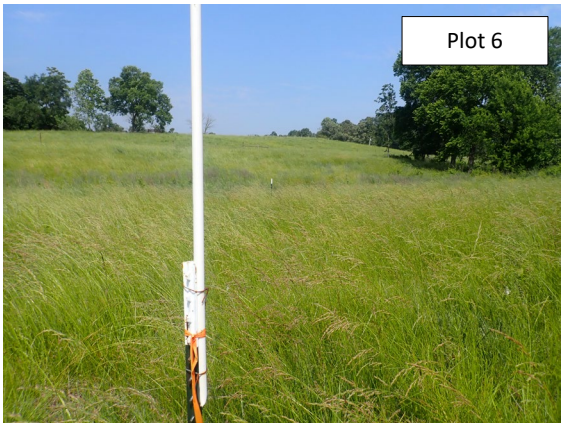


Plot 4

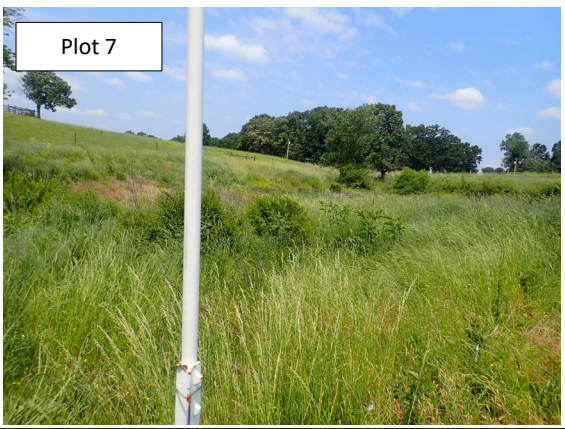
Plot 5



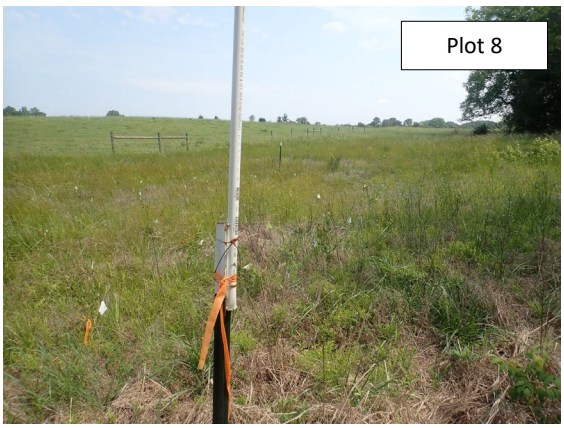
Plot 6



Plot 7

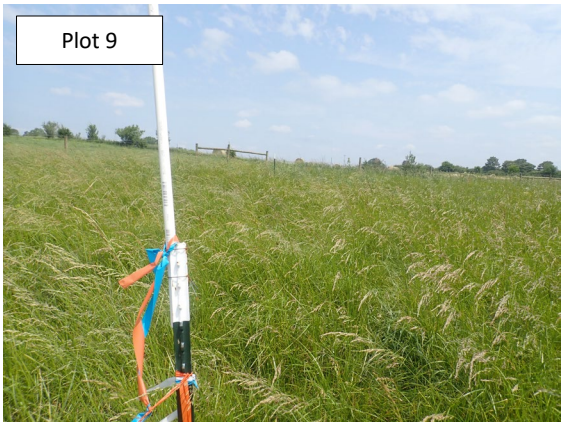


Plot 8



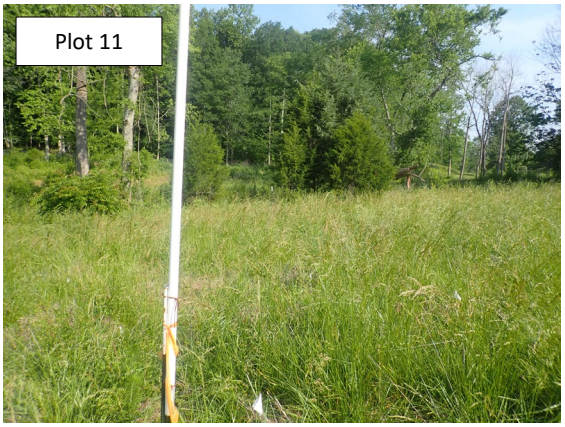
Bull Chute Mitigation Site
MY2 (2023) Vegetation Monitoring Photographs (Taken August 24, 2023)

Plot 9

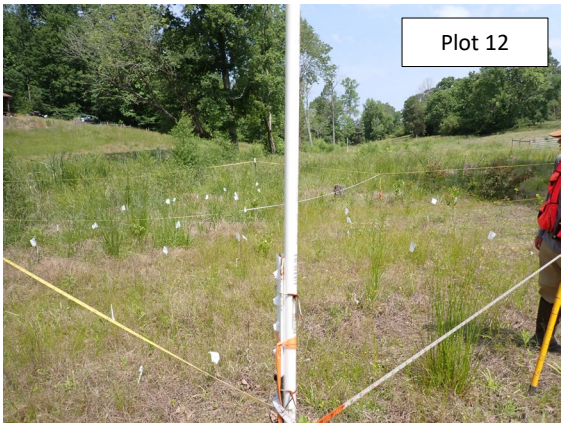


Plot 10

Plot 11

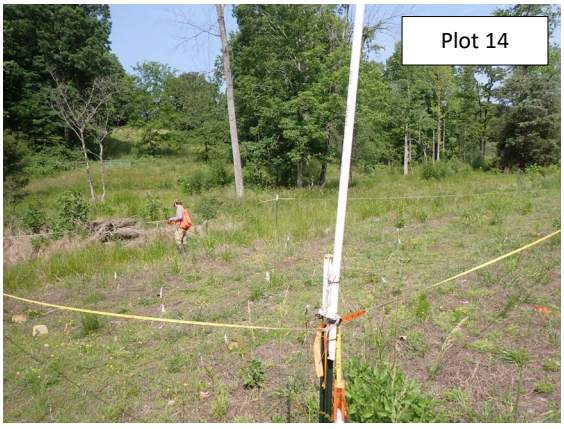


Plot 12

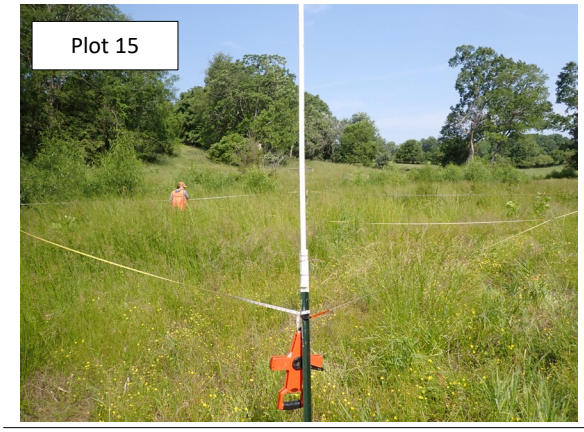


Plot 13

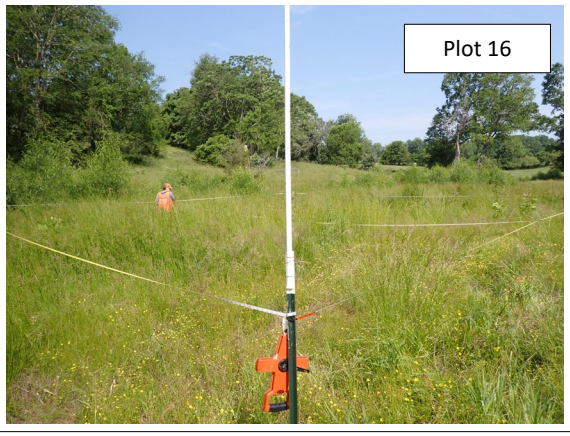
Plot 14



Plot 15

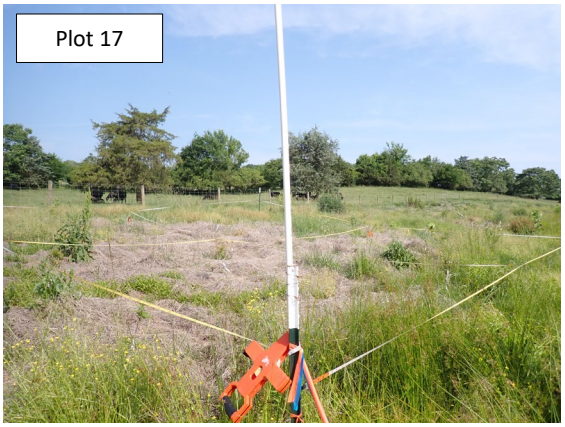


Plot 16

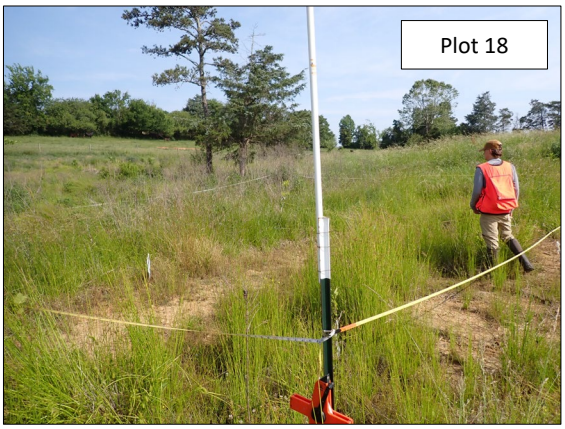


Bull Chute Mitigation Site
MY2 (2023) Vegetation Monitoring Photographs (Taken August 24, 2023)

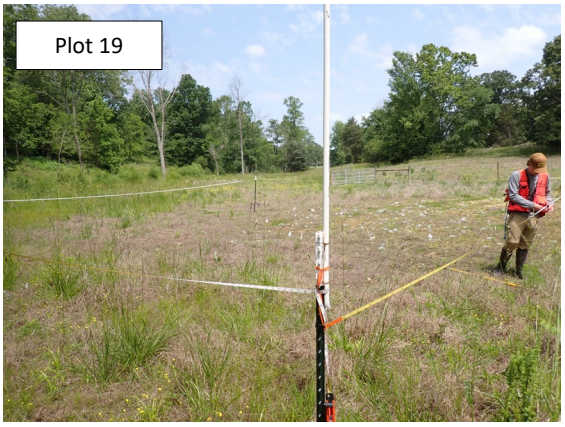
Plot 17



Plot 18



Plot 19



Plot 20

Plot 21

Bull Chute Mitigation Site
MY2 (2023) Site Photo Log

Photo Point 1A: UT-1 Upper Crossing, Upstream End Facing Downstream

Photo Point 1B: UT-1 Upper Crossing, Downstream End Facing Upstream

Bull Chute Mitigation Site
MY2 (2023) Site Photo Log

Photo Point 2A: UT-1 Lower Crossing, Upstream End Facing Downstream

Photo Point 2B: UT-1 Lower Crossing, Downstream End Facing Upstream

Bull Chute Mitigation Site
MY2 (2023) Site Photo Log

Photo Point 3A: UT-3 Crossing,
Upstream End Facing Downstream

Photo Point 3B: UT-3 Crossing,
Downstream End Facing Upstream

Bull Chute Mitigation Site
MY2 (2023) Site Photo Log

Photo Point 4A: UT-4 Crossing,
Upstream End Facing Downstream

Photo Point 4B: UT-4 Crossing,
Downstream End Facing Upstream

Appendix B
Vegetation Data

Table 6A. Planted Bare-Root Woody Vegetation
Table 6B. Permanent Seed Mix
Table 7. Vegetation Plot Counts and Densities
Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool

Table 6A. Planted Bare Root Woody Vegetation
Bull Chute Stream and Riparian Wetland Mitigation Site

Species	Wetland Indicator	Total
Acres		**28.5**
Tag Alder (*Alnus serrulata*)	OBL	2,500
River Birch (*Betula nigra*)	FACW	4,000
Redbud (*Cercis canadensis*)	FACU	600
Mockernut Hickory (*Carya tomentosa*)	FACU	200
Silky dogwood (*Cornus amomum*)	FACW	5,000
Common Persimmon (*Diospyros virginiana*)	FAC	420
Tuliptree (*Liriodendron tulipifera*)	FACU	1,700
Black Gum (*Nyssa sylvatica*)	FAC	600
Sycamore (*Platanus occidentalis*)	FACW	5,500
Water Oak (*Quercus nigra*)	FAC	5,500
Willow Oak (*Quercus phellos*)	FAC	4,000
Black Willow (*Salix nigra*)	OBL	1,600
TOTALS		**31,620**
Average Stems/Acre		**1,110**

Table 6B. Permanent Seed Mix
Bull Chute Stream and Riparian Wetland Mitigation Site

Species	Wetland Indicator	Percent of Total Mix
Redtop (*Agrostis gigantea*)	FACW	10%
VA Wild Rye (*Elymus virginicus*)	FACW	15%
Switchgrass (*Panicum virgatum*)	FAC	15%
Eastern Gammagrass (*Tripsacum dactyloides*)	FAC	5%
PA Smartweed (*Polygonum pensylvanicum*)	FACW	5%
Little Bluestem (*Schizachyrium scoparium*)	FACU	5%
Soft Rush (*Juncus effusus*)	FACW	5%
Bur Marigold (*Bidens cernua*)	OBL	10%
Lance-leaved Tickseed (*Coreopsis lanceolata*)	FACU	10%
Deertongue (*Dichanthelium clandestinum*)	FAC	10%
Big Bluestem (*Andropogon gerardii*)	FAC	5%
Indiangrass (*Sorghastrum nutans*)	FACU	5%
TOTAL		**100%**

Table 7. Planted Vegetation Totals
Bull Chute Stream and Riparian Wetland Mitigation Site

Plot #	Planted Stems/Acre	Success Criteria Met?
1	1133	Yes
2	729	Yes
3	567	Yes
4	526	Yes
5	850	Yes
6	769	Yes
7	769	Yes
8	1336	Yes
9	486	Yes
10	405	Yes
11	405	Yes
12	1376	Yes
13	769	Yes
14	486	Yes
15	972	Yes
16	688	Yes
17	567	Yes
18	445	Yes
19	405	Yes
20*	891	Yes
21	405	Yes
Transect 1 (2x50 m)	526	Yes
Transect 2 (2x50 m)	607	Yes
Transect 3 (2x50 m)	445	Yes
Transect 4 (2x50 m)	769	Yes
Transect 5 (2x50 m)	486	Yes
Transect 6 (2x50 m)	769	Yes
Transect 7 (2x50 m)	364	Yes
Transect 8 (2x50 m)	769	Yes
Transect 9 (4x25 m)	486	Yes
Transect 10 (4x25 m)	850	Yes
Average Planted Stems/Acre	**679**	**Yes**

*At request of IRT, plot 20 was moved into a nearby wetland reestablishment area prior to MY1 monitoring.

Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool

Planted Acreage	28.5
Date of Initial Plant	2022-03-18
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	2023-08-24
Date of Current Survey	2023-08-24
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F		Veg Plot 6 F		Veg Plot 7 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	hazel alder	Tree	OBL					11	11	1	1						
	Betula nigra	river birch	Tree	FACW			2	2			2	2					21	21
	Carpinus caroliniana	American hornbeam	Tree	FAC														
	Cercis canadensis	eastern redbud	Tree	FACU											1	1	1	1
	Cornus amomum	silky dogwood	Shrub	FACW	20	20	1	1	1	1	6	6						
	Diospyros virginiana	common persimmon	Tree	FAC											2	2		
	Fraxinus pennsylvanica	green ash	Tree	FACW			1	1										
	Liriodendron tulipifera	tuliptree	Tree	FACU							2	2	7	7	1	1		
	Nyssa sylvatica	blackgum	Tree	FAC														
	Platanus occidentalis	American sycamore	Tree	FACW	8	8	3	3					3	3	6	6		
	Quercus lyrata	overcup oak	Tree	OBL														
	Quercus michauxii	swamp chestnut oak	Tree	FACW									1	1				
	Quercus nigra	water oak	Tree	FAC	3	3	6	6	4	4	1	1	1	1	3	3		
	Quercus pagoda	cherrybark oak	Tree	FACW														
	Quercus phellos	willow oak	Tree	FAC	1	1	5	5	1	1	1	1					2	2
	Quercus sp.												9	9	6	6	1	1
	Ulmus americana	American elm	Tree	FACW													2	2
Sum	Performance Standard				32	32	18	18	17	17	13	13	21	21	19	19	27	27
Mitigation Plan Performance Standard	Current Year Stem Count					32		18		17		13		21		19		27
	Stems/Acre					1133		729		567		526		850		769		769
	Species Count					4		6		4		6		5		6		5
	Dominant Species Composition (%)					62		33		65		46		43		32		78
	Average Plot Height (ft.)					2		1		2		2		2		2		2
	% Invasives					0		0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					32		18		17		13		21		19		27
	Stems/Acre					1133		729		567		526		850		769		769
	Species Count					4		6		4		6		5		6		5
	Dominant Species Composition (%)					62		33		65		46		43		32		78
	Average Plot Height (ft.)					2		1		2		2		2		2		2
	% Invasives					0		0		0		0		0		0		0

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

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

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

Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool (continued)

Planted Acreage	28.5
Date of Initial Plant	2022-03-18
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	2023-08-24
Date of Current Survey	2023-08-24
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 F		Veg Plot 11 F		Veg Plot 12 F		Veg Plot 13 F		Veg Plot 14 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	hazel alder	Tree	OBL							1	1	4	4				
	Betula nigra	river birch	Tree	FACW	8	8	2	2					3	3	1	1	6	6
	Carpinus caroliniana	American hornbeam	Tree	FAC														
	Cercis canadensis	eastern redbud	Tree	FACU														
	Cornus amomum	silky dogwood	Shrub	FACW					5	5	12	12	14	14	5	5	5	5
	Diospyros virginiana	common persimmon	Tree	FAC	3	3									1	1		
	Fraxinus pennsylvanica	green ash	Tree	FACW														
	Liriodendron tulipifera	tuliptree	Tree	FACU	3	3	2	2					2	2			1	1
	Nyssa sylvatica	blackgum	Tree	FAC														
	Platanus occidentalis	American sycamore	Tree	FACW	7	7	4	4	1	1			4	4	6	6		
	Quercus lyrata	overcup oak	Tree	OBL														
	Quercus michauxii	swamp chestnut oak	Tree	FACW														
	Quercus nigra	water oak	Tree	FAC			1	1	1	1	2	2	4	4	5	5		
	Quercus pagoda	cherrybark oak	Tree	FACW	1	1												
	Quercus phellos	willow oak	Tree	FAC	5	5	1	1	3	3			2	2	1	1		
	Quercus sp.				6	6	2	2					1	1				
	Ulmus americana	American elm	Tree	FACW														
Sum	Performance Standard				33	33	12	12	10	10	15	15	34	34	19	19	12	12
Mitigation Plan Performance Standard	Current Year Stem Count					33		12		10		15		34		19		12
	Stems/Acre					1336		486		405		405		1376		769		486
	Species Count					7		6		4		3		8		6		3
	Dominant Species Composition (%)					24		33		50		80		41		32		50
	Average Plot Height (ft.)					2		2		2		2		2		22		2
	% Invasives					0		0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					33		12		10		15		34		19		12
	Stems/Acre					1336		486		405		405		1376		769		486
	Species Count					7		6		4		3		8		6		3
	Dominant Species Composition (%)					24		33		50		80		41		32		50
	Average Plot Height (ft.)					2		2		2		2		2		22		2
	% Invasives					0		0		0		0		0		0		0

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

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

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

Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool (continued)

Planted Acreage	28.5
Date of Initial Plant	2022-03-18
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	2023-08-24
Date of Current Survey	2023-08-24
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 15 F		Veg Plot 16 F		Veg Plot 17 F		Veg Plot 18 F		Veg Plot 19 F		Veg Plot 20 F		Veg Plot 21 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	hazel alder	Tree	OBL									1	1	2	2		
	Betula nigra	river birch	Tree	FACW			1	1	2	2								
	Carpinus caroliniana	American hornbeam	Tree	FAC														
	Cercis canadensis	eastern redbud	Tree	FACU														
	Cornus amomum	silky dogwood	Shrub	FACW	11	11	4	4					3	3	3	3		
	Diospyros virginiana	common persimmon	Tree	FAC	2	2												
	Fraxinus pennsylvanica	green ash	Tree	FACW														
	Liriodendron tulipifera	tuliptree	Tree	FACU					1	1	1	1			7	7		
	Nyssa sylvatica	blackgum	Tree	FAC													2	2
	Platanus occidentalis	American sycamore	Tree	FACW	1	1	7	7	6	6	4	4			10	10	5	5
	Quercus lyrata	overcup oak	Tree	OBL														
	Quercus michauxii	swamp chestnut oak	Tree	FACW														
	Quercus nigra	water oak	Tree	FAC	5	5			2	2								
	Quercus pagoda	cherrybark oak	Tree	FACW														
	Quercus phellos	willow oak	Tree	FAC	4	4	4	4	3	3	4	4	3	3				
	Quercus sp.				1	1	1	1			2	2	3	3			2	2
	Ulmus americana	American elm	Tree	FACW													1	1
Sum	Performance Standard				24	24	17	17	14	14	11	11	10	10	22	22	10	10
Mitigation Plan Performance Standard	Current Year Stem Count					24		17		14		11		10		22		10
	Stems/Acre					972		688		567		445		405		891		405
	Species Count					6		5		5		4		4		4		4
	Dominant Species Composition (%)					46		41		43		36		30		45		50
	Average Plot Height (ft.)					2		2		2		2		1		4		3
	% Invasives					0		0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					24		17		14		11		10		22		10
	Stems/Acre					972		688		567		445		405		891		405
	Species Count					6		5		5		4		4		4		4
	Dominant Species Composition (%)					46		41		43		36		30		45		50
	Average Plot Height (ft.)					2		2		2		2		1		4		3
	% Invasives					0		0		0		0		0		0		0

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

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

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

Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool (continued)

Planted Acreage	28.5
Date of Initial Plant	2022-03-18
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	2023-08-24
Date of Current Survey	2023-08-24
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 R Total	Veg Plot 2 R Total	Veg Plot 3 R Total	Veg Plot 4 R Total	Veg Plot 5 R Total	Veg Plot 6 R Total	Veg Plot 7 R Total	Veg Plot 8 R Total	Veg Plot 9 R Total	Veg Plot 10 R Total
Species Included in Approved Mitigation Plan	Alnus serrulata	hazel alder	Tree	OBL				4		2		2		
	Betula nigra	river birch	Tree	FACW					3	2		5	2	
	Carpinus caroliniana	American hornbeam	Tree	FAC	1		1							
	Cercis canadensis	eastern redbud	Tree	FACU										
	Cornus amomum	silky dogwood	Shrub	FACW		1		1	2	1	4			
	Diospyros virginiana	common persimmon	Tree	FAC							1			
	Fraxinus pennsylvanica	green ash	Tree	FACW	2				1					
	Liriodendron tulipifera	tuliptree	Tree	FACU	4	1			2	6	1		2	1
	Nyssa sylvatica	blackgum	Tree	FAC										
	Platanus occidentalis	American sycamore	Tree	FACW	3	6	7	5	1		1	6	5	5
	Quercus lyrata	overcup oak	Tree	OBL	1									
	Quercus michauxii	swamp chestnut oak	Tree	FACW										
	Quercus nigra	water oak	Tree	FAC	2	2		3	1	3	2	1	2	
	Quercus pagoda	cherrybark oak	Tree	FACW										4
	Quercus phellos	willow oak	Tree	FAC		2	4	5	2	4		5	1	3
	Quercus sp.													
	Ulmus americana	American elm	Tree	FACW		3		1		1				8
Sum	Performance Standard				13	15	12	19	12	19	9	19	12	21
Mitigation Plan Performance Standard	Current Year Stem Count				13	15	12	19	12	19	9	19	12	21
	Stems/Acre				526	607	445	769	486	769	364	769	486	850
	Species Count				6	6	3	6	7	7	5	5	5	5
	Dominant Species Composition (%)				31	40	58	26	25	32	44	32	42	38
	Average Plot Height (ft.)				2	2	22	2	2	2	1	2	2	2
	% Invasives				0	0	0	0	0	0	0	0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count				13	15	12	19	12	19	9	19	12	21
	Stems/Acre				526	607	445	769	486	769	364	769	486	850
	Species Count				6	6	3	6	7	7	5	5	5	5
	Dominant Species Composition (%)				31	40	58	26	25	32	44	32	42	38
	Average Plot Height (ft.)				2	2	22	2	2	2	1	2	2	2
	% Invasives				0	0	0	0	0	0	0	0	0	0

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

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

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

Appendix C
Stream Geomorphology Data

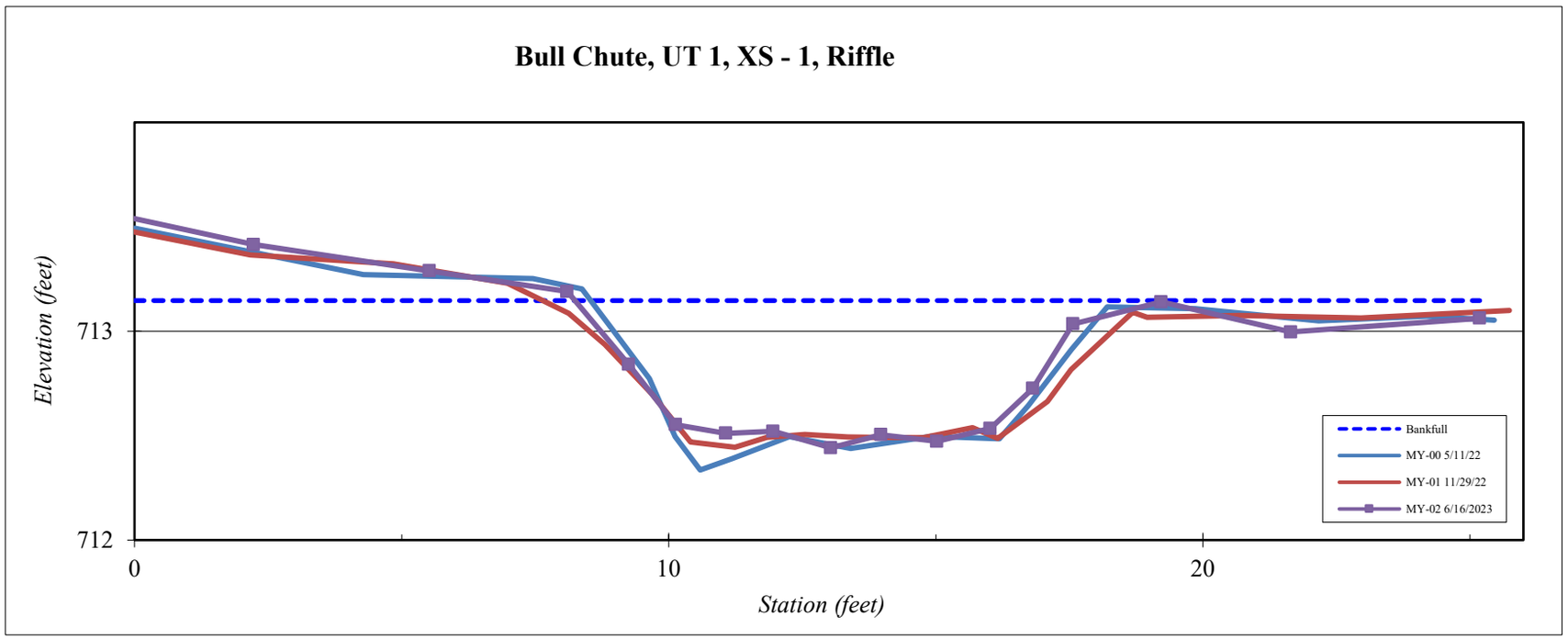
Cross-Sections with Annual Overlays
Table 9A-F. Baseline Stream Data Summary Tables
Table 10A-E. Cross-Section Morphology Monitoring Summary

Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -1
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
-0.5	714.0
2.2	713.9
5.5	713.7
8.1	713.6
9.3	713.2
10.1	712.9
11.1	712.9
12.0	712.9
13.0	712.8
14.0	712.8
15.0	712.8
16.0	712.9
16.8	713.1
17.6	713.4
19.2	713.6
21.6	713.4
25.2	713.5

SUMMARY DATA	
Bankfull Elevation:	713.57
Bank Height Ratio:	0.99
Thalweg Elevation:	712.78
LTOB Elevation:	713.57
LTOB Max Depth:	0.79
LTOB Cross Sectional Area:	5.7

Stream Type	E/C 4

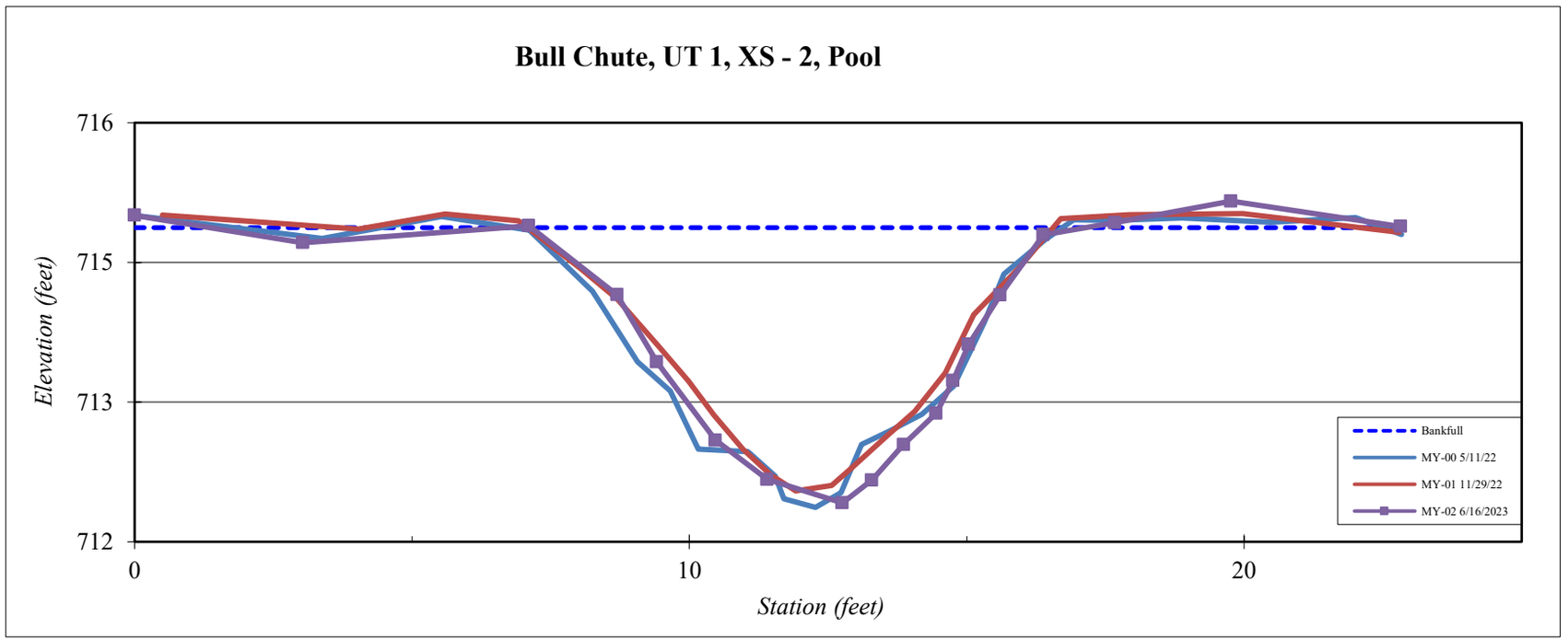


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -2
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.0	714.9
3.0	714.7
7.1	714.8
8.7	714.3
9.4	713.7
10.5	713.1
11.4	712.8
12.8	712.6
13.3	712.8
13.9	713.1
14.4	713.3
14.8	713.6
15.0	713.9
15.6	714.3
16.4	714.8
17.7	714.9
19.8	715.0
22.8	714.8

SUMMARY DATA	
Bankfull Elevation:	714.82
Bank Height Ratio:	0.97
Thalweg Elevation:	712.59
LTOB Elevation:	714.76
LTOB Max Depth:	2.17
LTOB Cross Sectional Area:	11.2

Stream Type	E/C 4

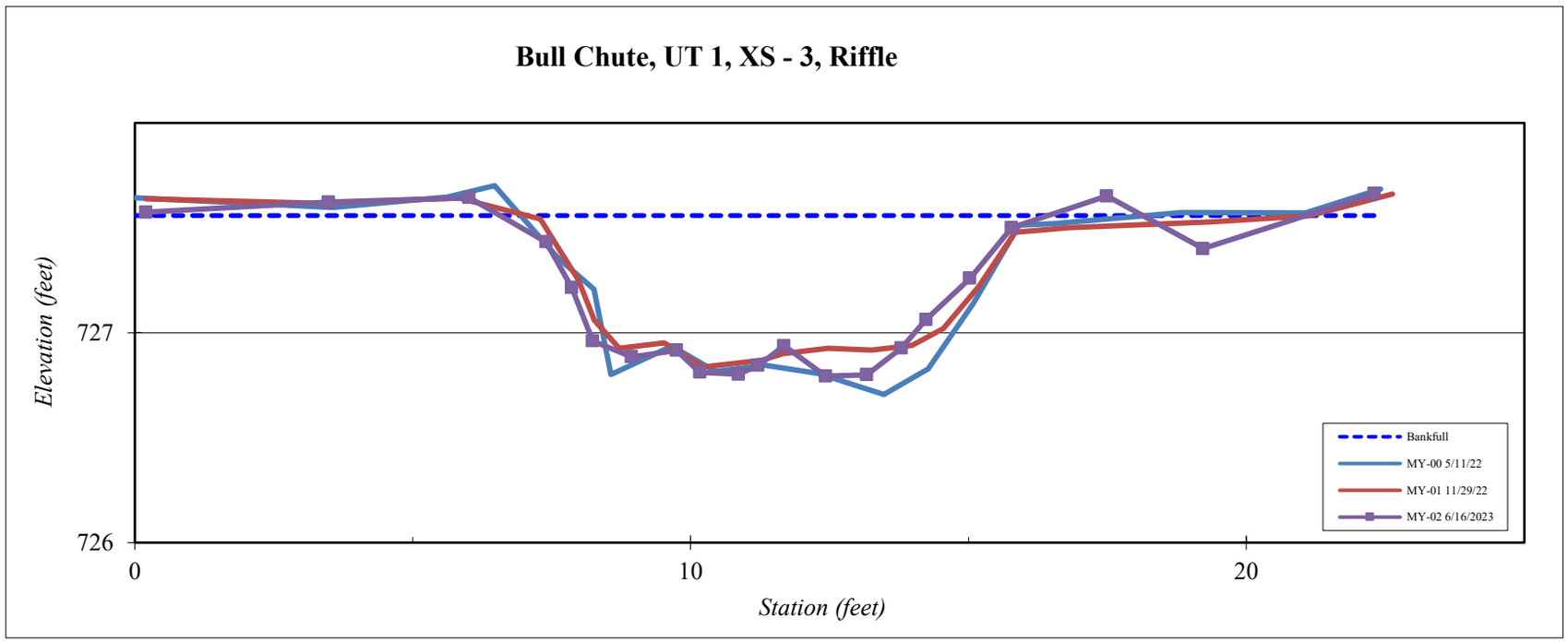


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -3
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.2	727.6
3.5	727.7
6.0	727.7
7.4	727.5
7.9	727.2
8.2	726.9
8.9	726.8
9.7	726.9
10.2	726.8
10.9	726.8
11.2	726.8
11.7	726.9
12.4	726.7
13.2	726.7
13.8	726.9
14.2	727.0
15.0	727.3
15.8	727.5
17.5	727.7
19.2	727.4
22.3	727.72

SUMMARY DATA	
Bankfull Elevation:	727.61
Bank Height Ratio:	0.92
Thalweg Elevation:	726.74
LTOB Elevation:	727.54
LTOB Max Depth:	0.80
LTOB Cross Sectional Area:	5.0

Stream Type	E/C 4

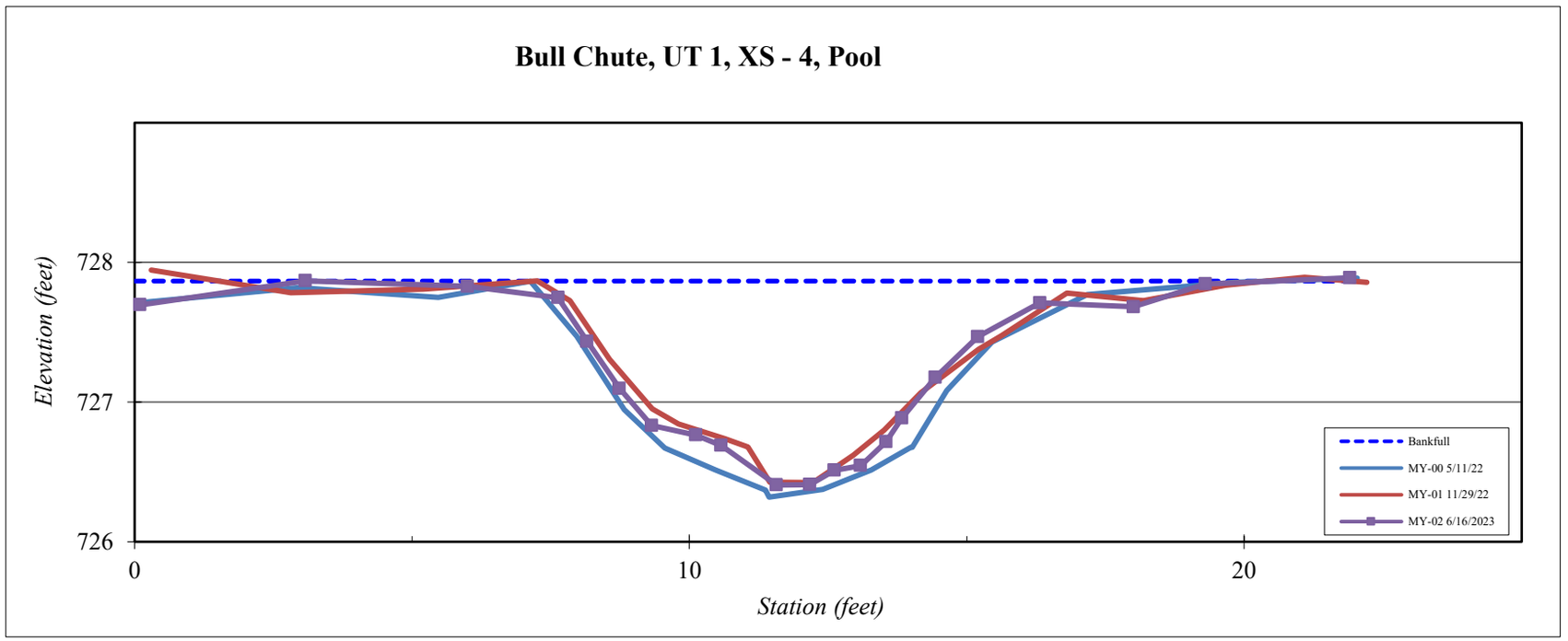


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -4
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.1	727.8
3.1	728.0
6.0	727.9
7.6	727.8
8.2	727.5
8.7	727.1
9.3	726.8
10.1	726.7
10.6	726.6
11.6	726.3
12.2	726.3
12.6	726.4
13.1	726.5
13.5	726.7
13.8	726.8
14.4	727.2
15.2	727.5
16.3	727.8
18.0	727.7
19.3	727.9
21.9	727.98

SUMMARY DATA	
Bankfull Elevation:	727.95
Bank Height Ratio:	0.92
Thalweg Elevation:	726.30
LTOB Elevation:	727.82
LTOB Max Depth:	1.52
LTOB Cross Sectional Area:	7.9

Stream Type	E/C 4

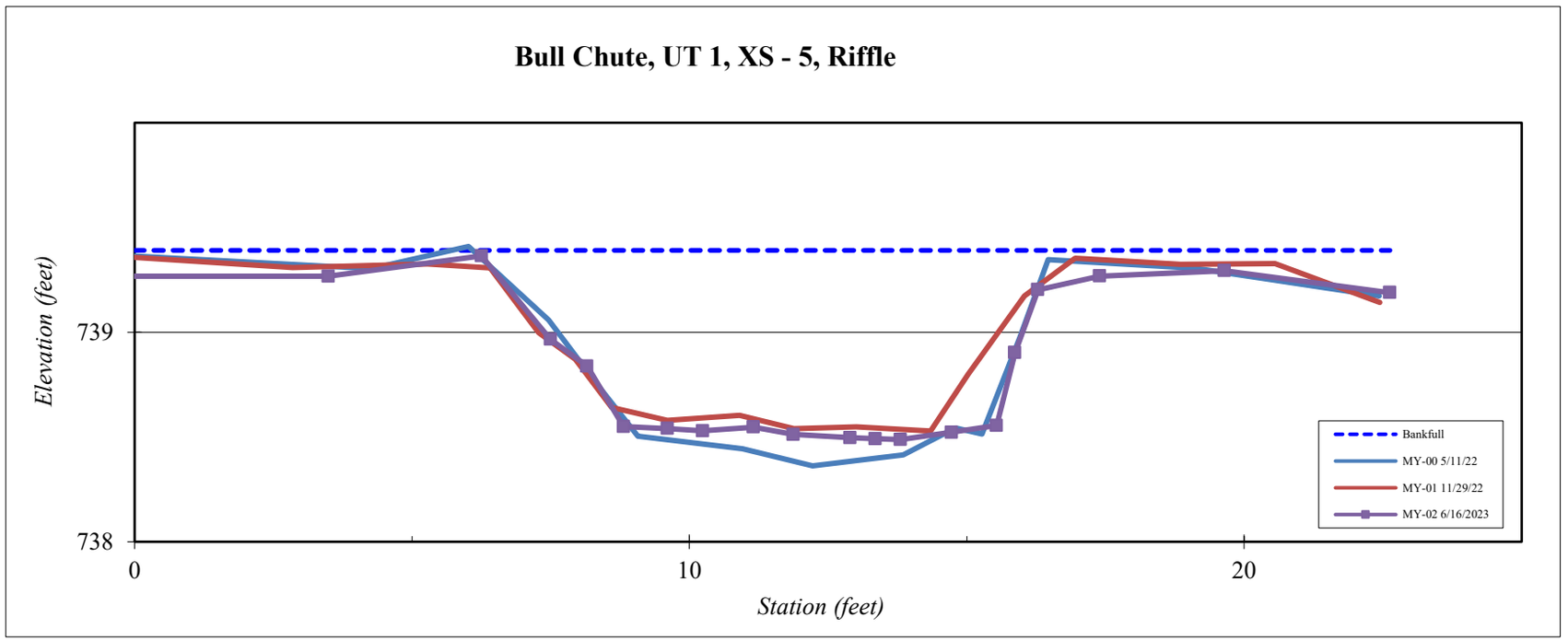


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -5
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
-0.3	739.7
3.5	739.7
6.3	739.8
7.5	739.4
8.2	739.2
8.8	738.9
9.6	738.9
10.2	738.9
11.2	738.9
11.9	738.9
12.9	738.8
13.4	738.8
13.8	738.8
14.7	738.9
15.5	738.9
15.9	739.3
16.3	739.6
17.4	739.7
19.6	739.7
22.6	739.6

SUMMARY DATA	
Bankfull Elevation:	739.85
Bank Height Ratio:	0.79
Thalweg Elevation:	738.83
LTOB Elevation:	739.64
LTOB Max Depth:	0.81
LTOB Cross Sectional Area:	6.1

Stream Type	E/C 4

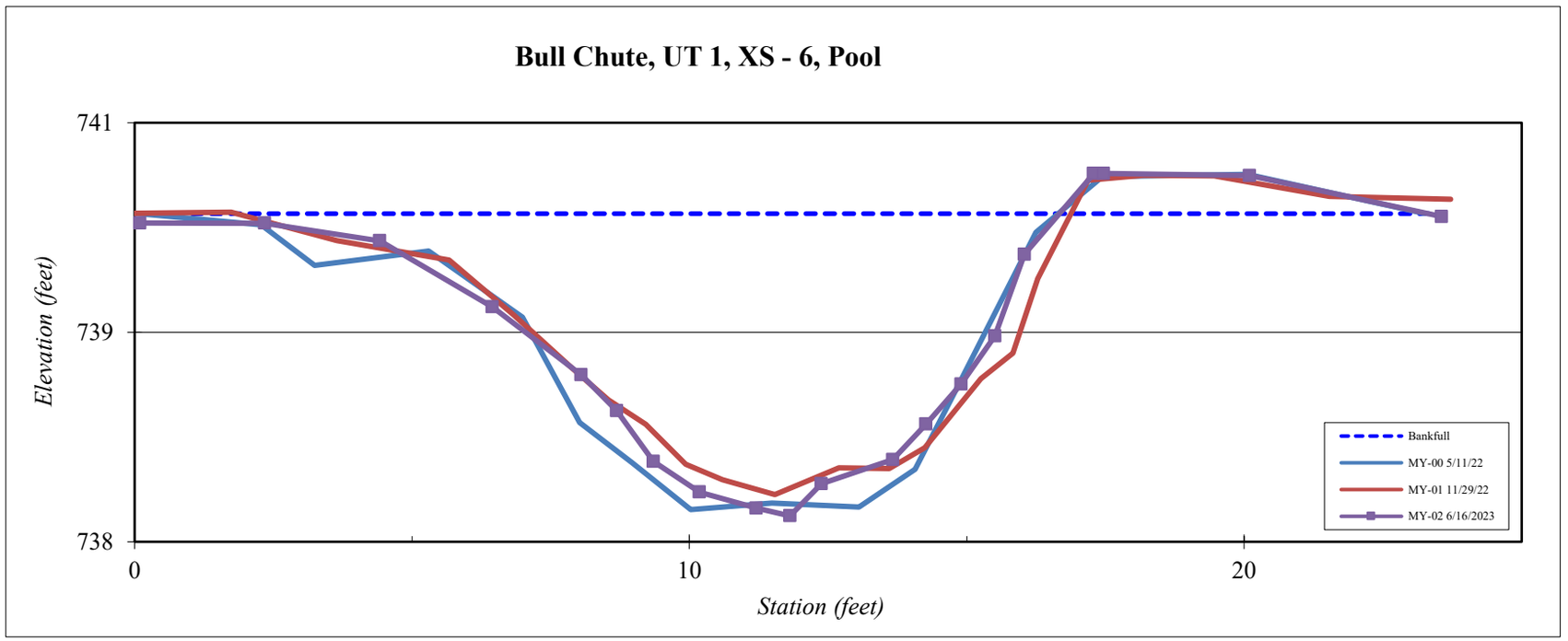


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -6
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.0	740.1
2.2	740.0
4.3	740.0
6.4	739.6
8.0	739.2
8.6	739.0
9.2	738.8
10.1	738.6
11.1	738.5
11.7	738.5
12.3	738.6
13.6	738.8
14.2	739.0
14.8	739.2
15.4	739.4
15.9	739.9
17.2	740.3
17.4	740.3
20.0	740.3
23.5	740.1

SUMMARY DATA	
Bankfull Elevation:	740.05
Bank Height Ratio:	0.97
Thalweg Elevation:	738.42
LTOB Elevation:	740.00
LTOB Max Depth:	1.58
LTOB Cross Sectional Area:	11.2

Stream Type	E/C 4

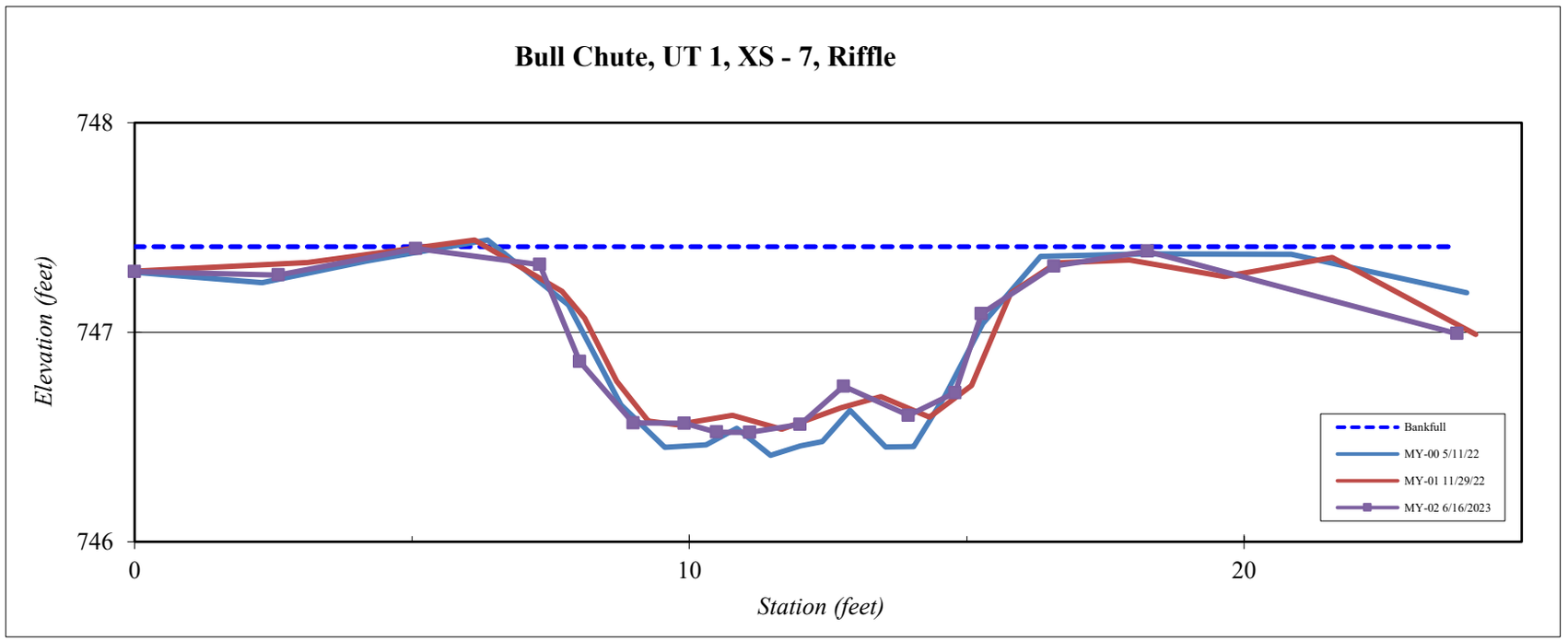


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -7
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.0	747.7
2.6	747.6
5.1	747.8
7.3	747.7
8.0	747.2
9.0	746.8
9.9	746.8
10.5	746.8
11.1	746.8
12.0	746.8
12.8	747.0
13.9	746.9
14.8	747.0
15.3	747.4
16.6	747.7
18.3	747.8
23.8	747.3

SUMMARY DATA	
Bankfull Elevation:	747.79
Bank Height Ratio:	0.90
Thalweg Elevation:	746.79
LTOB Elevation:	747.68
LTOB Max Depth:	0.90
LTOB Cross Sectional Area:	5.9

Stream Type	E/C 4

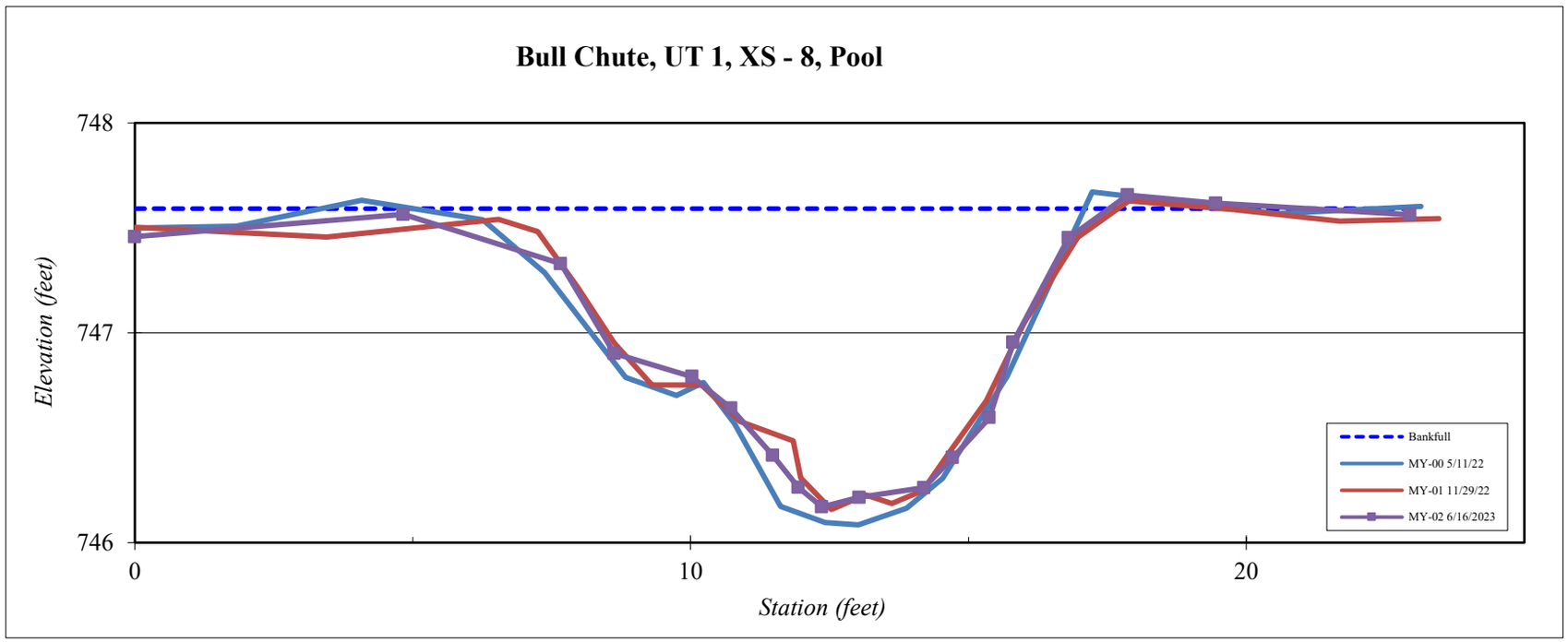


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -8
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.0	747.8
4.8	748.0
7.7	747.7
8.6	747.2
10.0	747.1
10.7	746.9
11.5	746.7
11.9	746.5
12.4	746.4
13.0	746.4
14.2	746.5
14.7	746.7
15.4	746.9
15.8	747.3
16.8	747.8
17.9	748.1
19.4	748.0
22.9	748.0

SUMMARY DATA	
Bankfull Elevation:	747.99
Bank Height Ratio:	0.98
Thalweg Elevation:	746.39
LTOB Elevation:	747.96
LTOB Max Depth:	1.58
LTOB Cross Sectional Area:	10.0

Stream Type	E/C 4

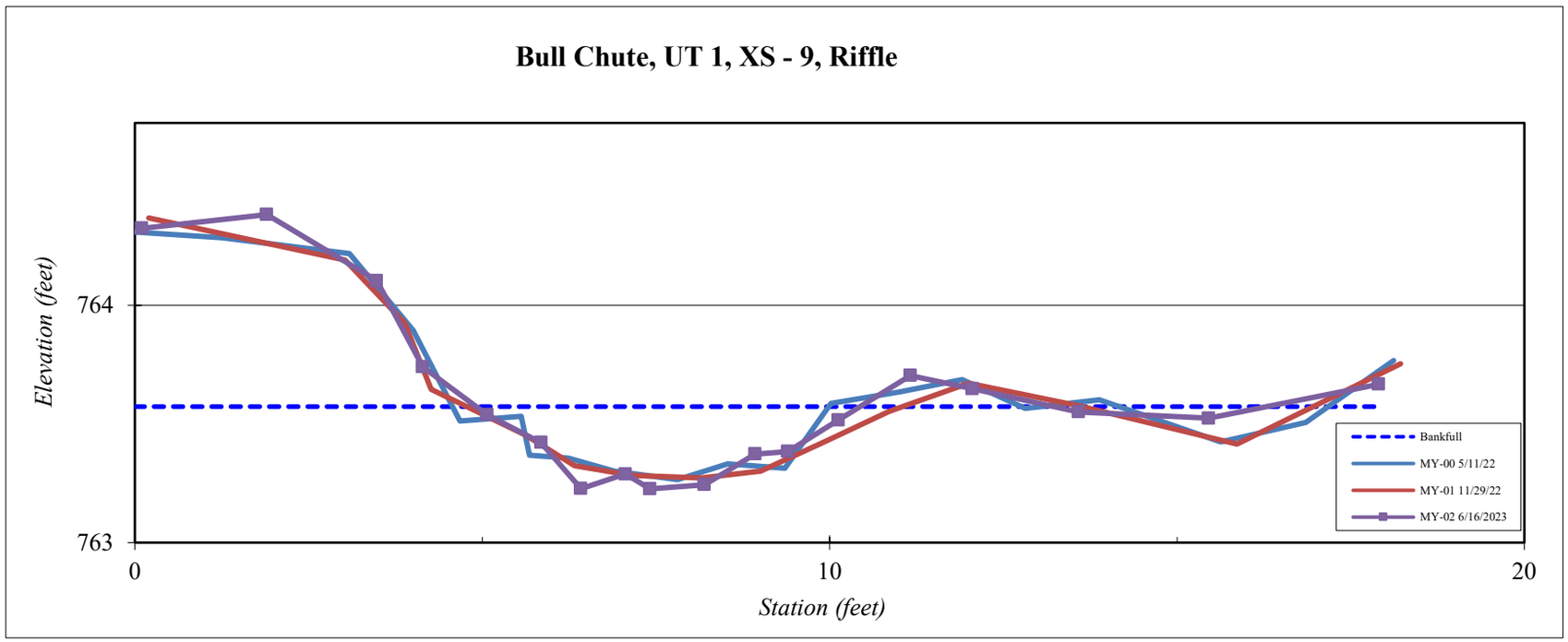


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -9
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.1	764.5
1.9	764.6
3.5	764.2
4.1	763.8
5.1	763.6
5.8	763.5
6.4	763.3
7.1	763.3
7.4	763.3
8.2	763.3
8.9	763.4
9.4	763.4
10.1	763.6
11.2	763.8
12.1	763.7
13.6	763.6
15.5	763.6
17.9	763.8

SUMMARY DATA	
Bankfull Elevation:	763.65
Bank Height Ratio:	0.90
Thalweg Elevation:	763.26
LTOB Elevation:	763.61
LTOB Max Depth:	0.35
LTOB Cross Sectional Area:	1.1

Stream Type	E/C 4

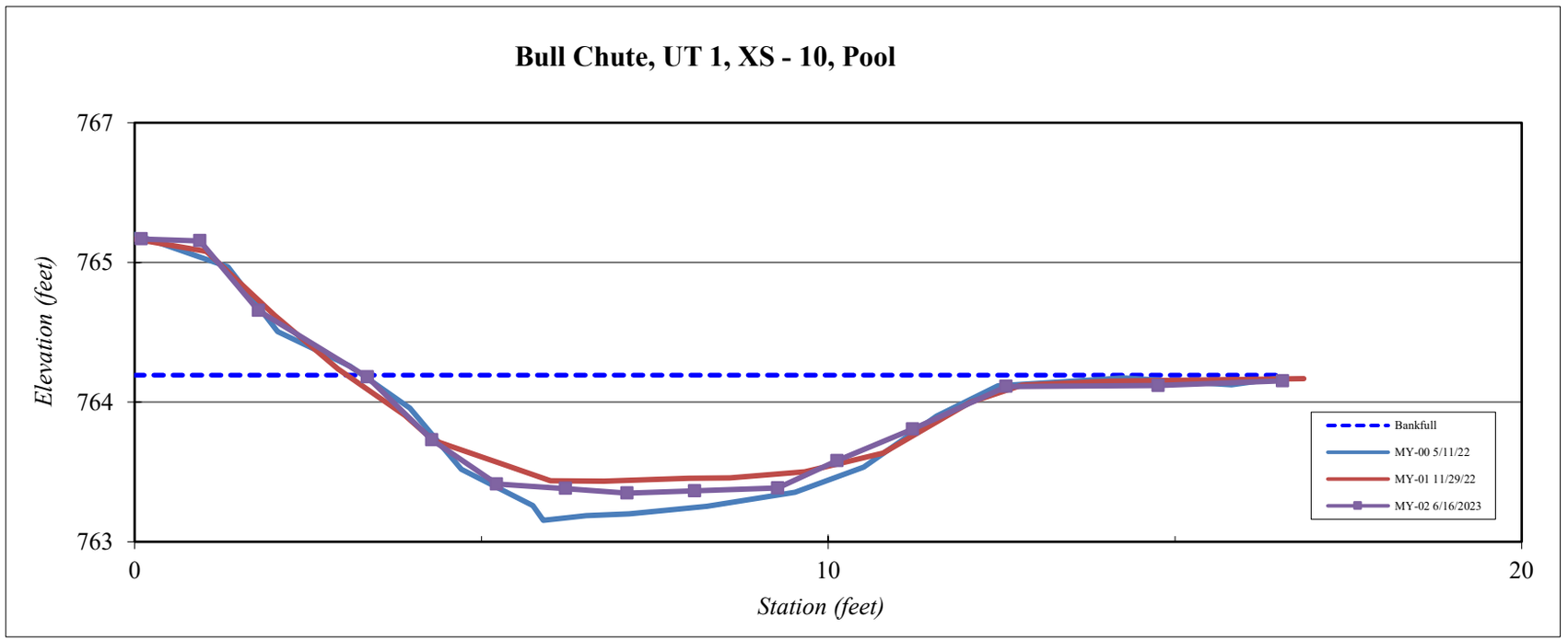


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT1, XS -10
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.1	765.6
0.9	765.6
1.8	765.0
3.4	764.5
4.3	764.0
5.2	763.6
6.2	763.6
7.1	763.5
8.1	763.6
9.3	763.6
10.1	763.8
11.2	764.1
12.6	764.4
14.8	764.4
16.6	764.5

SUMMARY DATA	
Bankfull Elevation:	764.50
Bank Height Ratio:	0.90
Thalweg Elevation:	763.55
LTOB Elevation:	764.41
LTOB Max Depth:	0.86
LTOB Cross Sectional Area:	5.5

Stream Type	E/C 4

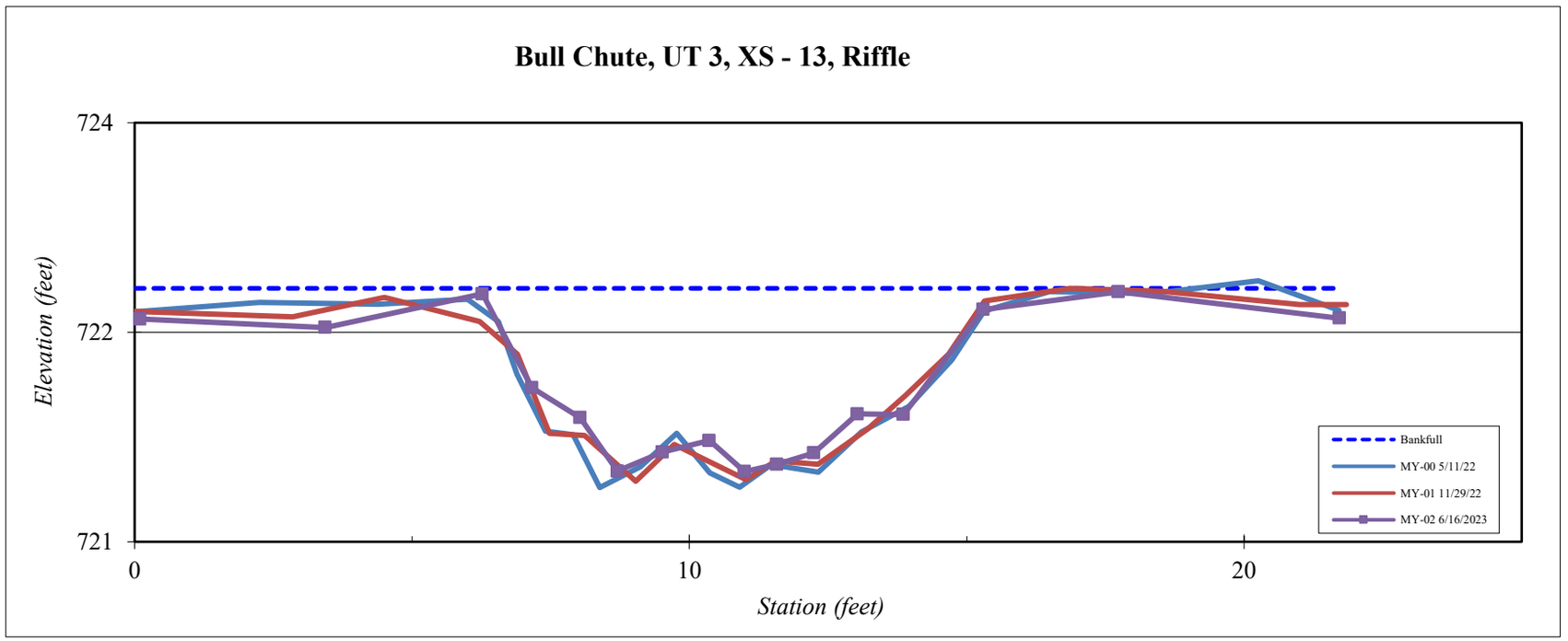


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT3, XS -13
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.1	722.5
3.4	722.5
6.3	722.7
7.2	722.2
8.0	722.0
8.7	721.7
9.5	721.8
10.4	721.9
11.0	721.7
11.6	721.7
12.2	721.8
13.0	722.0
13.9	722.0
15.3	722.6
17.7	722.7
21.7	722.5

SUMMARY DATA	
Bankfull Elevation:	722.69
Bank Height Ratio:	0.88
Thalweg Elevation:	721.70
LTOB Elevation:	722.58
LTOB Max Depth:	0.88
LTOB Cross Sectional Area:	5.3

Stream Type	E/C 4

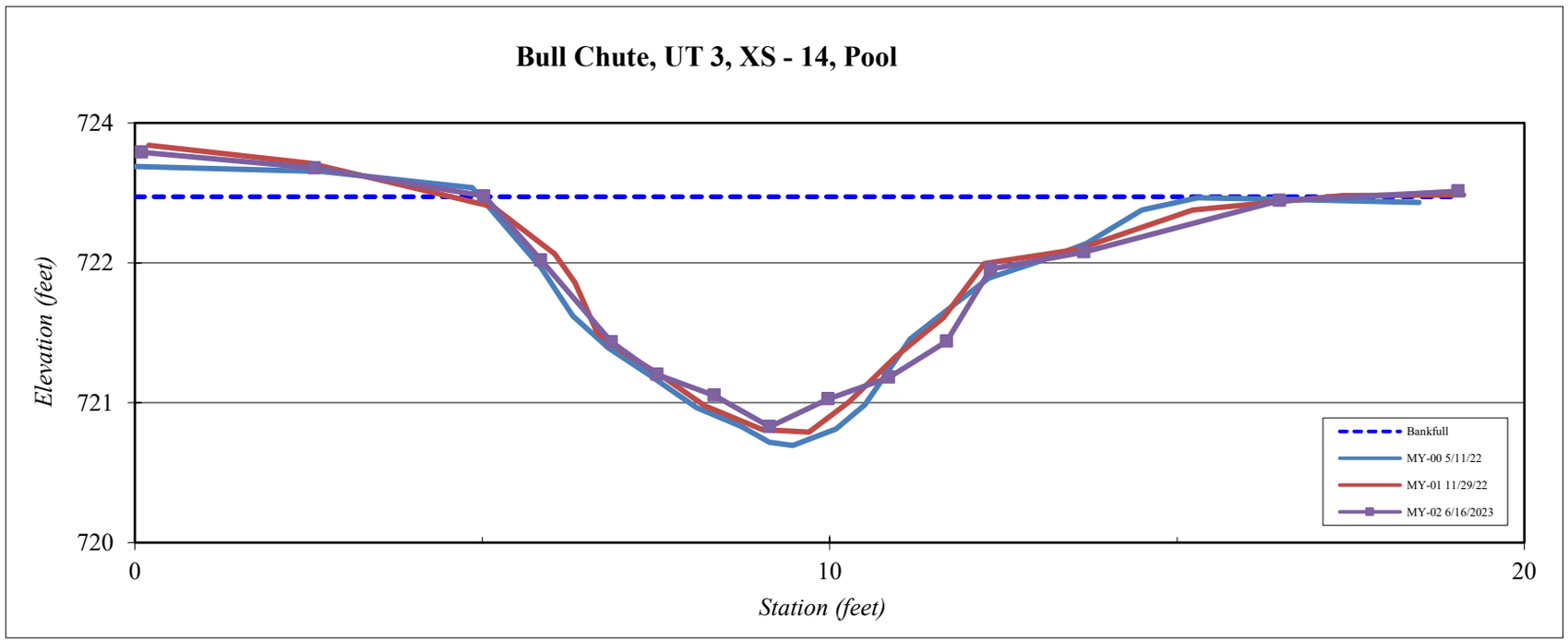


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT3, XS -14
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.1	723.3
2.6	723.2
5.0	723.0
5.8	722.5
6.9	721.8
7.5	721.6
8.3	721.4
9.1	721.1
10.0	721.4
10.9	721.5
11.7	721.8
12.3	722.4
13.7	722.5
16.5	723.0
19.0	723.0

SUMMARY DATA	
Bankfull Elevation:	722.99
Bank Height Ratio:	0.98
Thalweg Elevation:	721.13
LTOB Elevation:	722.96
LTOB Max Depth:	1.83
LTOB Cross Sectional Area:	10.0

Stream Type	E/C 4

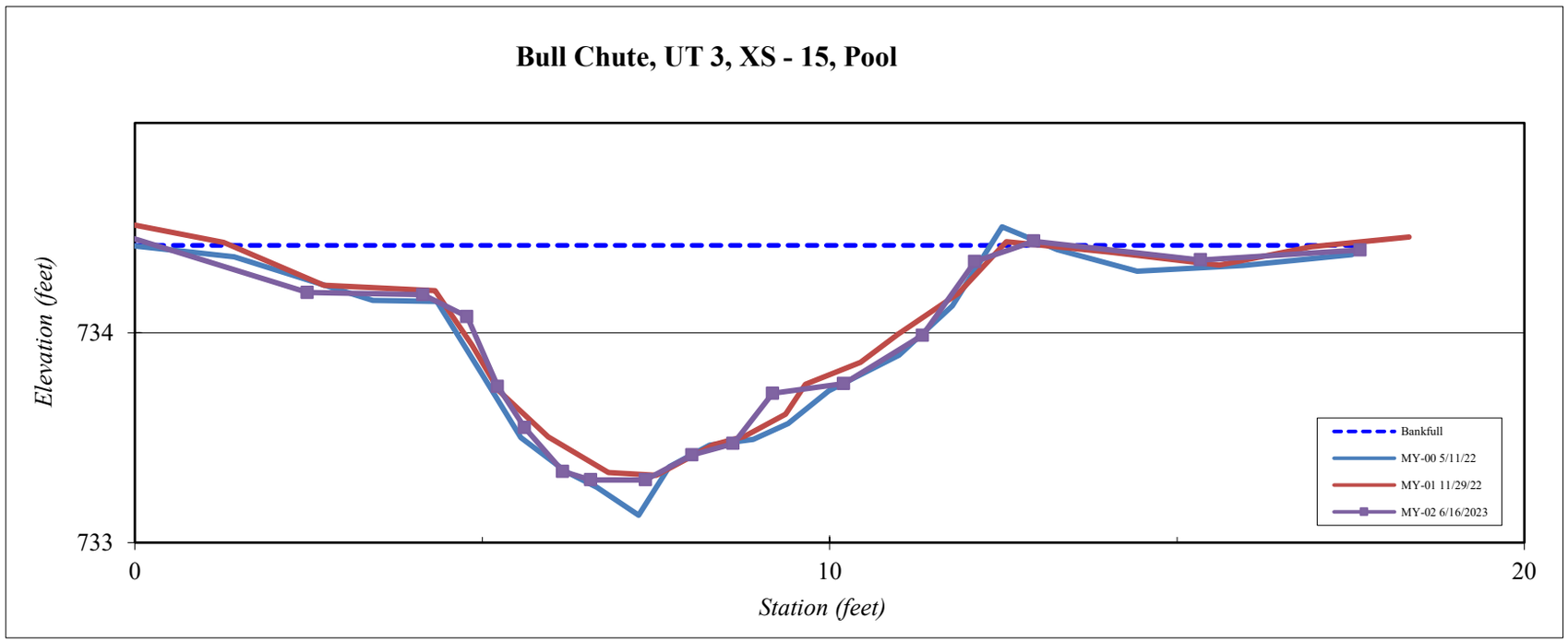


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT3, XS -15
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
-0.2	734.3
2.5	734.0
4.1	734.0
4.8	733.8
5.2	733.5
5.6	733.2
6.2	733.0
6.6	733.0
7.4	733.0
8.0	733.1
8.6	733.2
9.2	733.4
10.2	733.5
11.3	733.7
12.1	734.1
12.9	734.3
15.3	734.2
17.6	734.2

SUMMARY DATA	
Bankfull Elevation:	734.23
Bank Height Ratio:	0.80
Thalweg Elevation:	732.97
LTOB Elevation:	733.98
LTOB Max Depth:	1.01
LTOB Cross Sectional Area:	4.6

Stream Type	E/C 4

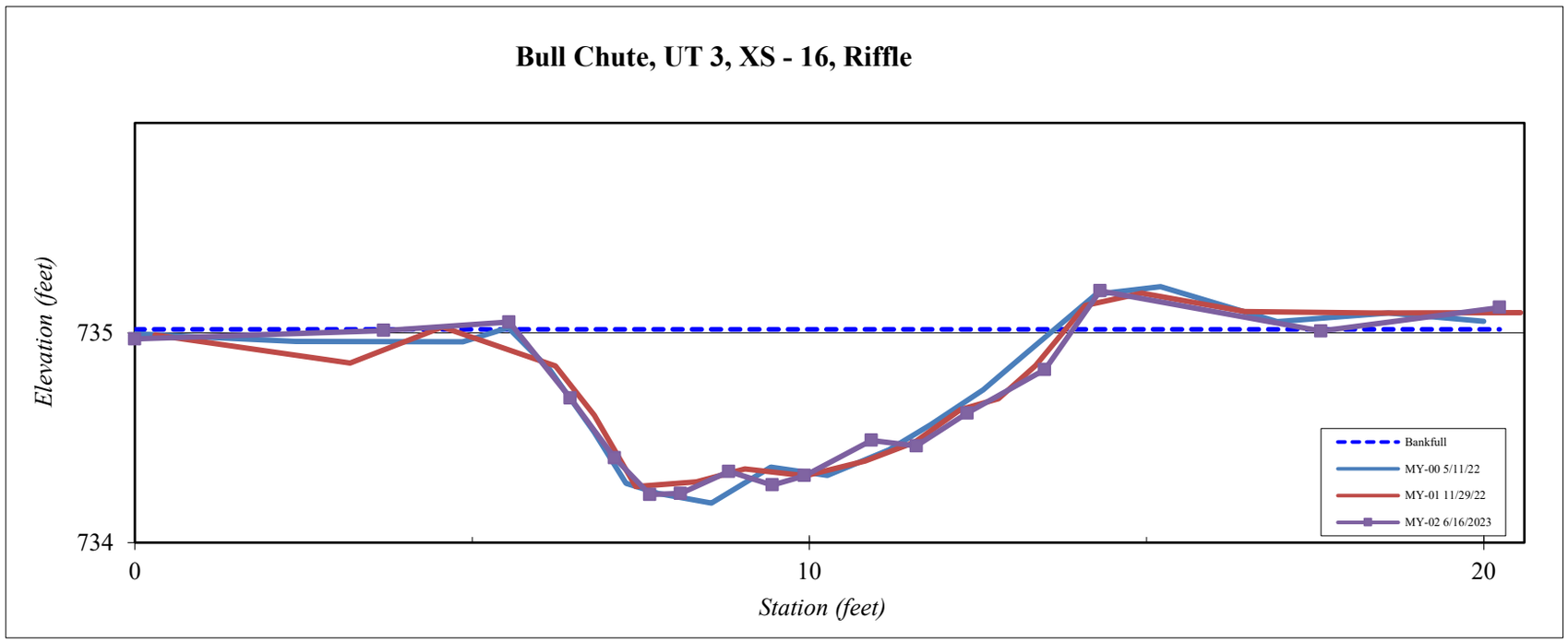


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT3, XS -16
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.0	734.9
3.7	734.9
5.5	734.9
6.5	734.5
7.1	734.2
7.6	734.0
8.1	734.0
8.8	734.1
9.5	734.1
9.9	734.1
10.9	734.3
11.6	734.3
12.3	734.5
13.5	734.7
14.3	735.1
17.6	734.9
20.2	735.0

SUMMARY DATA	
Bankfull Elevation:	734.91
Bank Height Ratio:	1.04
Thalweg Elevation:	734.02
LTOB Elevation:	734.95
LTOB Max Depth:	0.93
LTOB Cross Sectional Area:	5.1

Stream Type	E/C 4

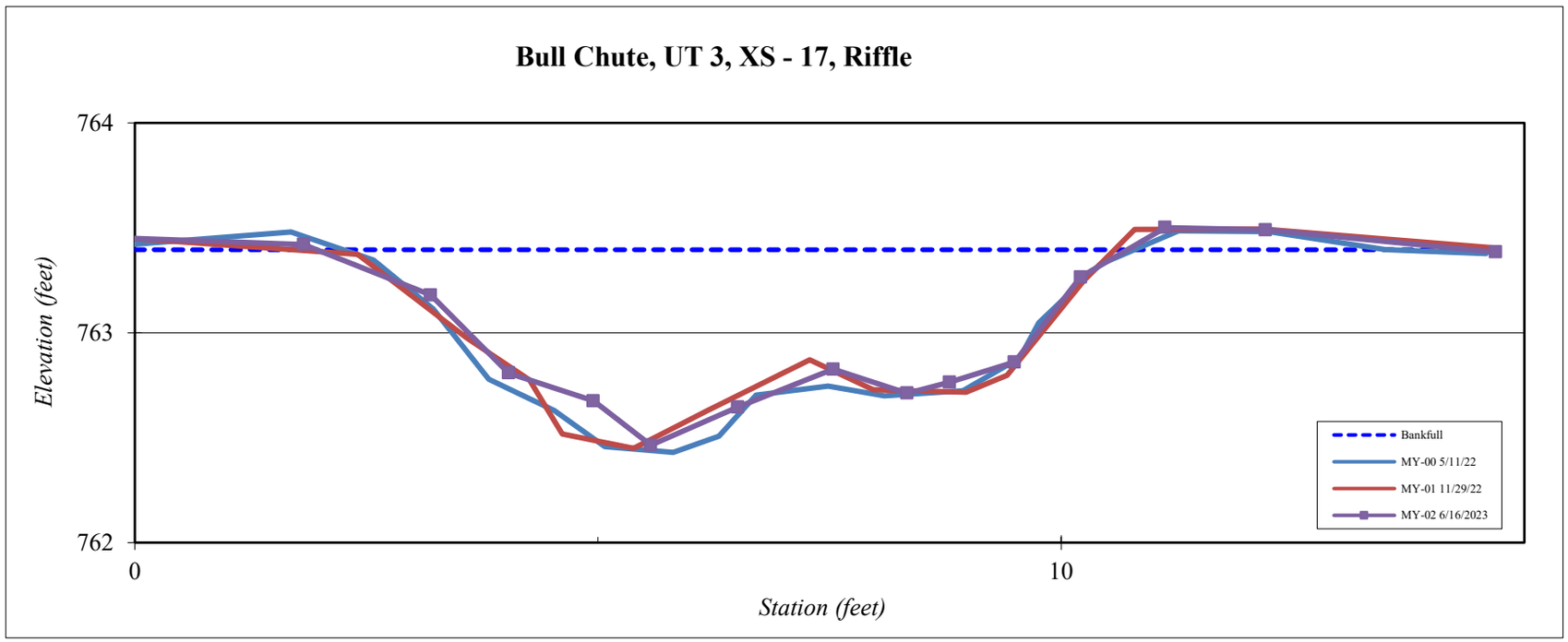


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT3, XS -17
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
-0.2	763.7
1.8	763.6
3.2	763.4
4.0	762.9
5.0	762.8
5.6	762.5
6.5	762.8
7.5	763.0
8.3	762.8
8.8	762.9
9.5	763.0
10.2	763.5
11.1	763.7
12.2	763.7
14.7	763.6

SUMMARY DATA	
Bankfull Elevation:	763.60
Bank Height Ratio:	1.03
Thalweg Elevation:	762.55
LTOB Elevation:	763.63
LTOB Max Depth:	1.08
LTOB Cross Sectional Area:	5.4

Stream Type	E/C 4

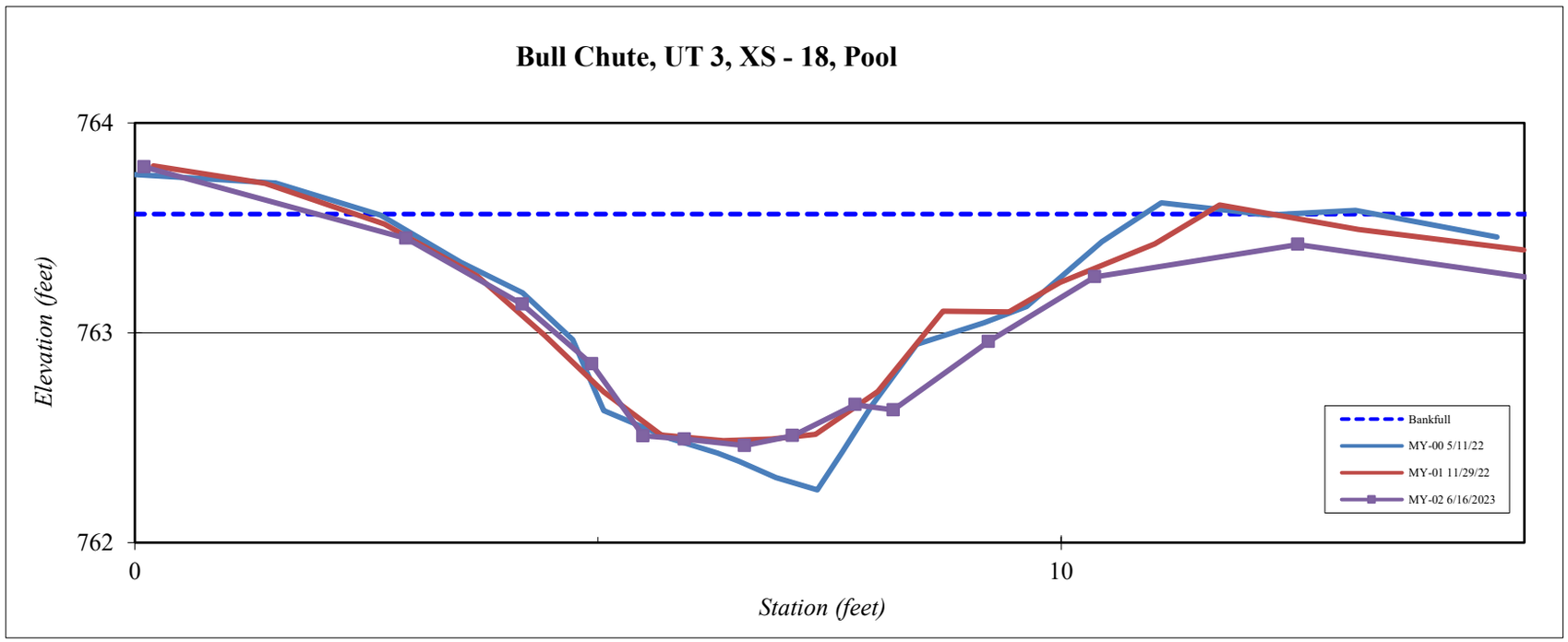


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT3, XS -18
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.1	764.0
2.9	763.7
4.2	763.3
4.9	763.0
5.5	762.6
5.9	762.6
6.6	762.5
7.1	762.6
7.8	762.8
8.2	762.7
9.2	763.1
10.4	763.5
12.6	763.6
15.1	763.5

SUMMARY DATA	
Bankfull Elevation:	763.79
Bank Height Ratio:	0.87
Thalweg Elevation:	762.55
LTOB Elevation:	763.63
LTOB Max Depth:	1.08
LTOB Cross Sectional Area:	5.0

Stream Type	E/C 4

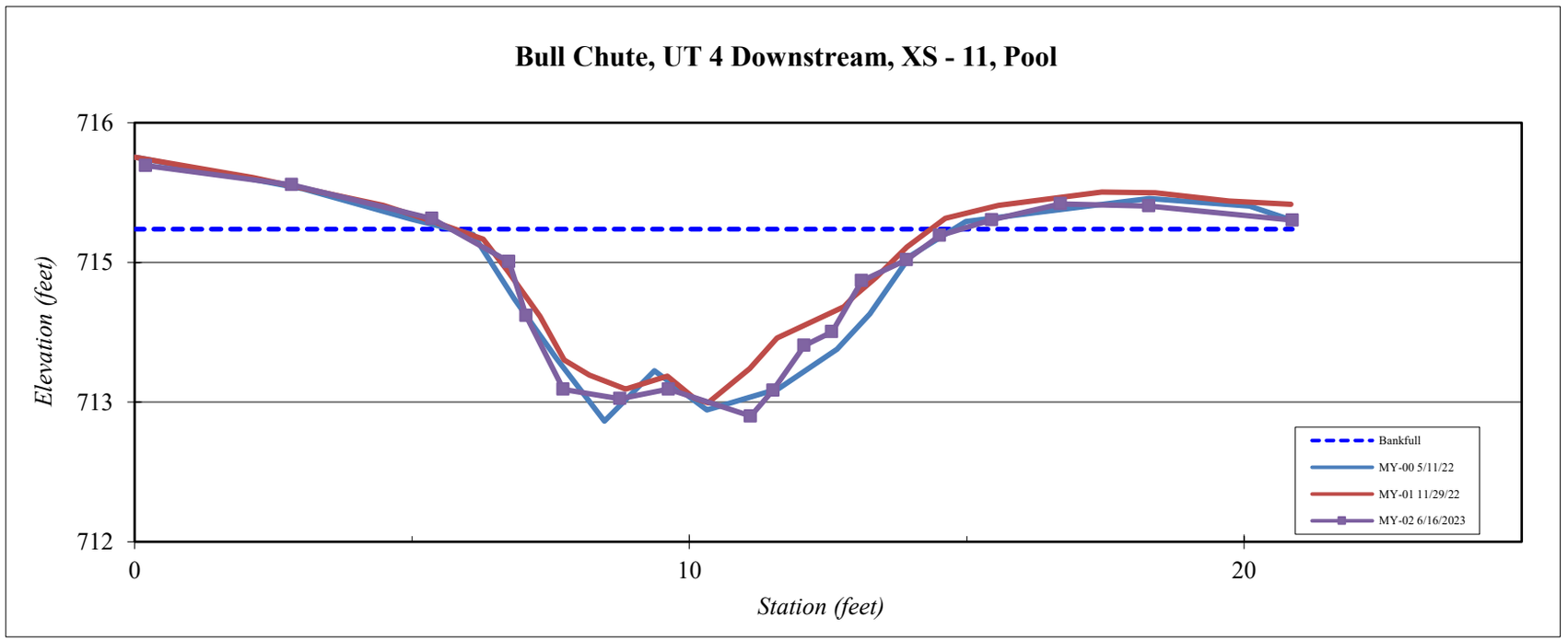


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT 4 Downstream, XS -11
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.2	715.3
2.8	715.2
5.4	714.9
6.7	714.5
7.1	714.1
7.7	713.5
8.7	713.4
9.6	713.5
11.1	713.3
11.5	713.5
12.1	713.9
12.6	714.0
13.1	714.4
13.9	714.6
14.5	714.8
15.5	714.9
16.7	715.0
18.3	715.0
20.9	714.9

SUMMARY DATA	
Bankfull Elevation:	714.81
Bank Height Ratio:	1.05
Thalweg Elevation:	713.29
LTOB Elevation:	714.88
LTOB Max Depth:	1.59
LTOB Cross Sectional Area:	8.6

Stream Type	E/C 4

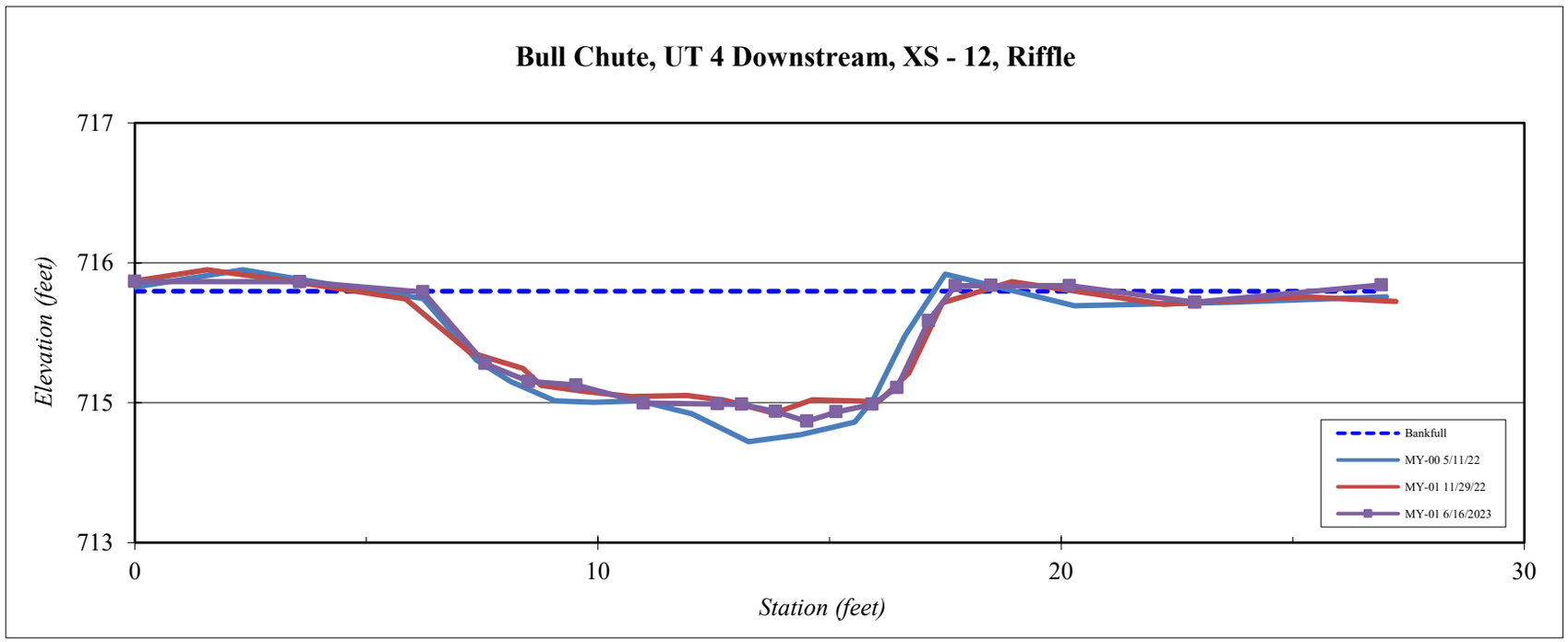


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT4, XS -12
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.0	715.5
3.6	715.5
6.2	715.4
7.6	714.9
8.5	714.7
9.5	714.7
11.0	714.5
12.6	714.5
13.1	714.5
13.8	714.5
14.5	714.4
15.1	714.5
15.9	714.5
16.5	714.7
17.1	715.2
17.7	715.5
18.5	715.5
20.2	715.5
22.9	715.4
26.9	715.5

SUMMARY DATA	
Bankfull Elevation:	715.44
Bank Height Ratio:	0.99
Thalweg Elevation:	714.39
LTOB Elevation:	715.43
LTOB Max Depth:	1.05
LTOB Cross Sectional Area:	8.4

Stream Type	E/C 4

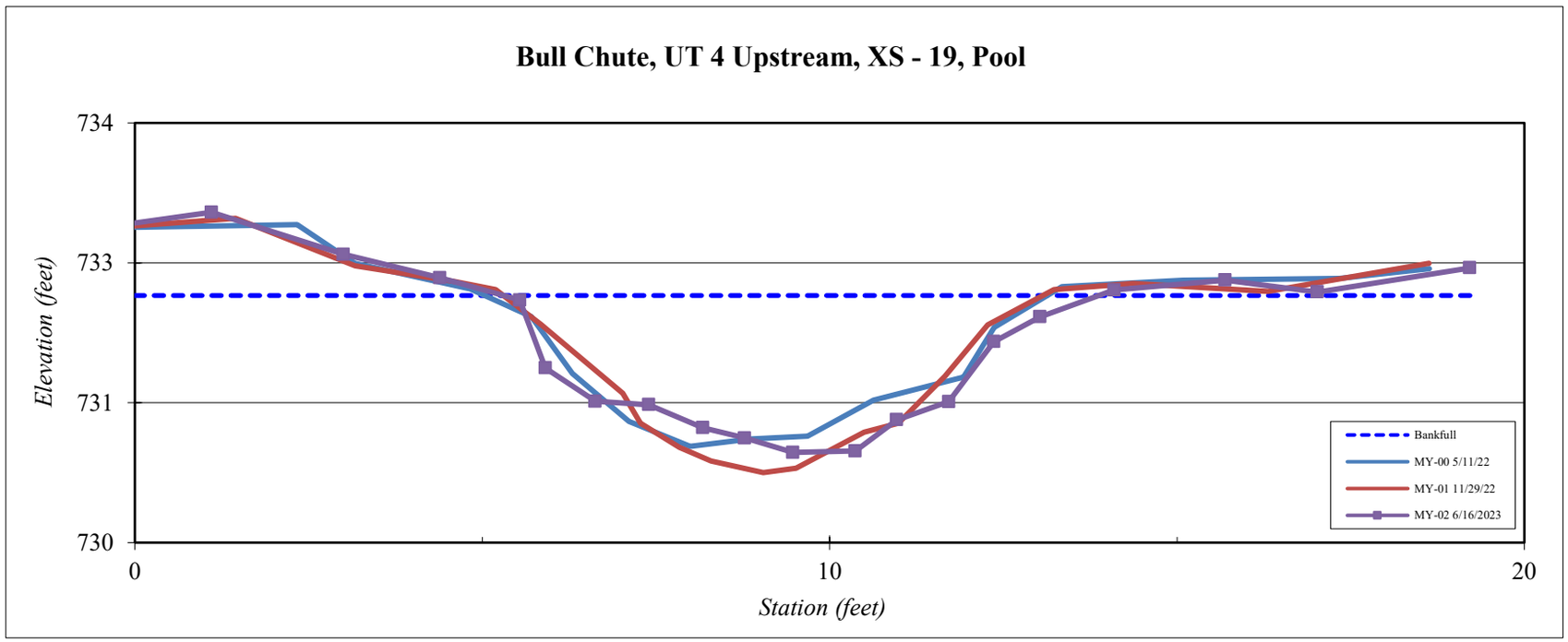


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT4 Upstream, XS -19
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
-0.4	732.9
1.1	733.0
3.0	732.7
4.4	732.5
5.5	732.3
5.9	731.8
6.6	731.5
7.4	731.5
8.2	731.3
8.8	731.2
9.5	731.1
10.4	731.1
11.0	731.4
11.7	731.5
12.4	732.0
13.0	732.2
14.1	732.4
15.7	732.5
17.0	732.4
19.2	732.6

SUMMARY DATA	
Bankfull Elevation:	732.36
Bank Height Ratio:	0.97
Thalweg Elevation:	731.10
LTOB Elevation:	732.33
LTOB Max Depth:	1.23
LTOB Cross Sectional Area:	6.4

Stream Type	E/C 4

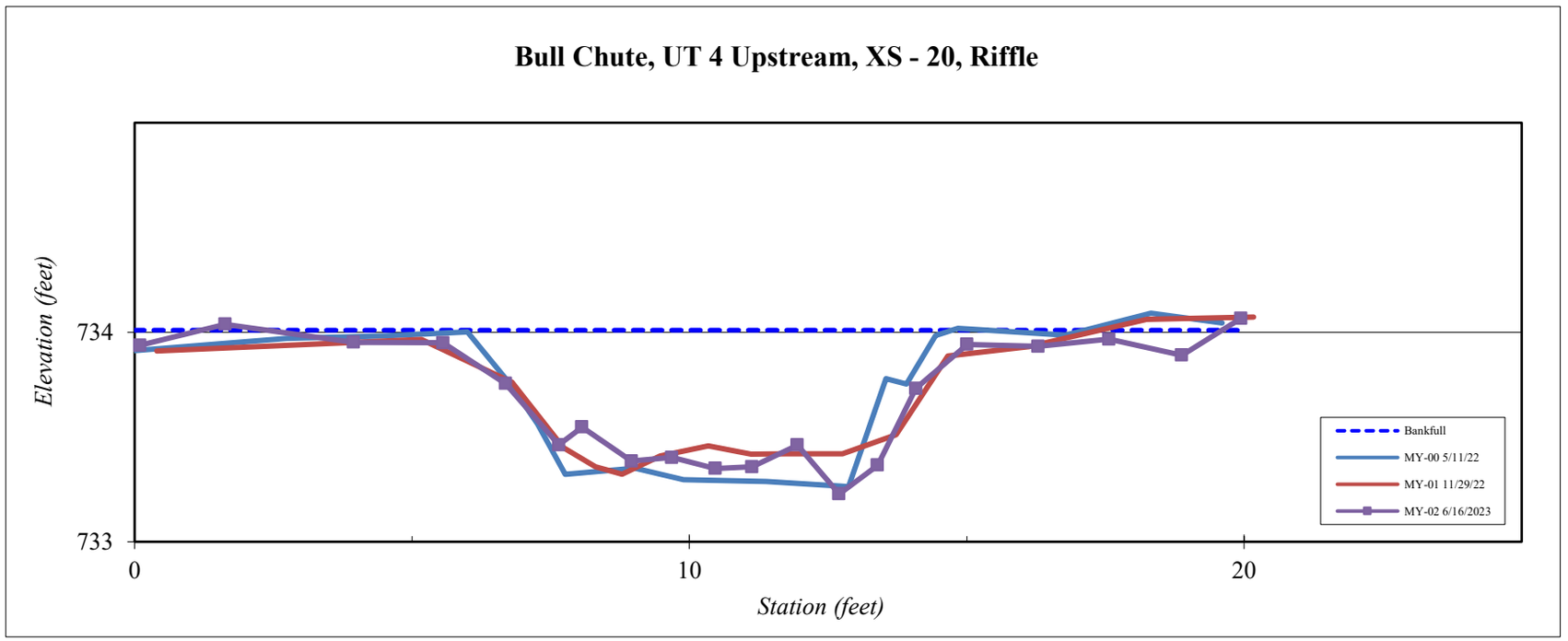


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT4 Upstream, XS -20
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.1	733.7
1.6	733.8
3.9	733.7
5.6	733.7
6.7	733.5
7.6	733.2
8.1	733.2
9.0	733.1
9.7	733.1
10.5	733.0
11.1	733.0
11.9	733.1
12.7	732.9
13.4	733.0
14.1	733.5
15.0	733.7
16.3	733.7
17.6	733.7
18.9	733.6
19.9	733.8

SUMMARY DATA	
Bankfull Elevation:	733.77
Bank Height Ratio:	0.91
Thalweg Elevation:	732.89
LTOB Elevation:	733.69
LTOB Max Depth:	0.81
LTOB Cross Sectional Area:	4.5

Stream Type	E/C 4

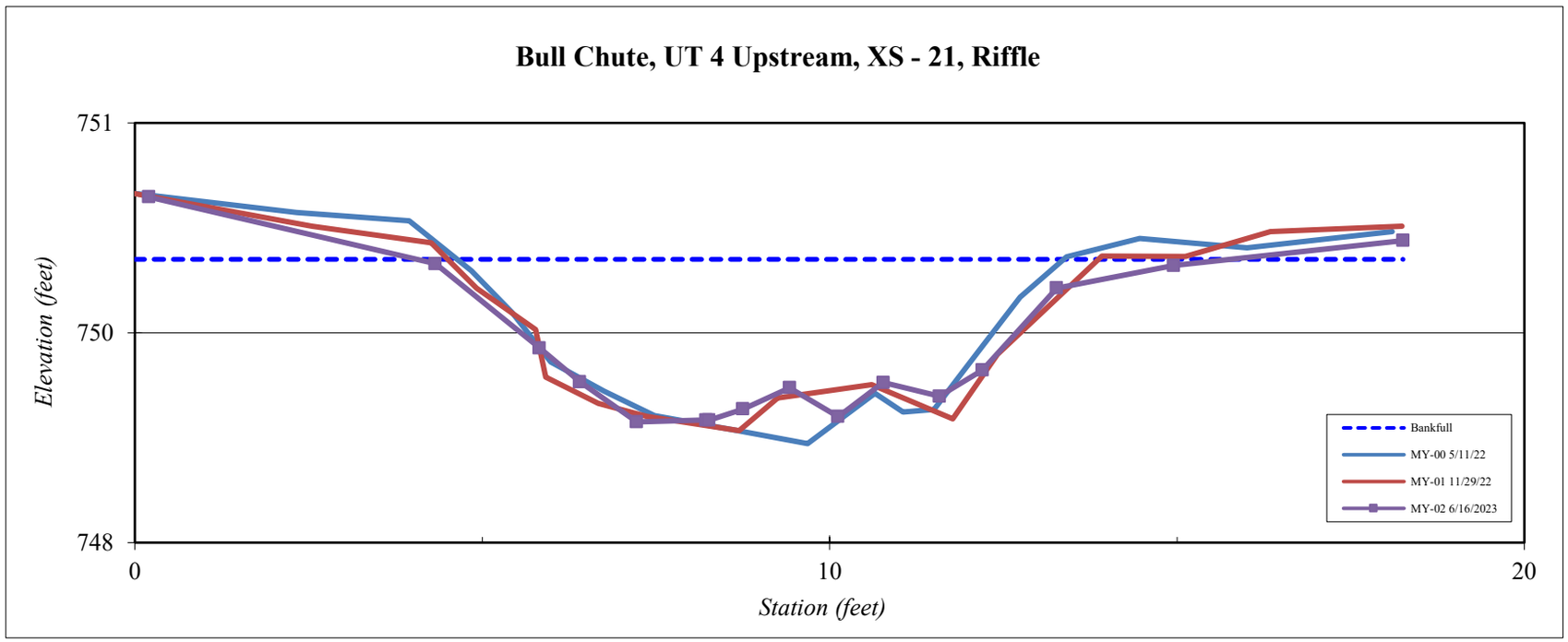


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT4 Upstream, XS -21
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.2	750.3
4.3	750.0
5.8	749.5
6.4	749.3
7.2	749.1
8.2	749.1
8.3	749.1
8.8	749.2
9.4	749.3
10.1	749.1
10.8	749.3
11.6	749.2
12.2	749.4
13.3	749.8
15.0	749.9
18.3	750.1

SUMMARY DATA	
Bankfull Elevation:	749.98
Bank Height Ratio:	0.96
Thalweg Elevation:	749.11
LTOB Elevation:	749.95
LTOB Max Depth:	0.84
LTOB Cross Sectional Area:	5.4

Stream Type	E/C 4

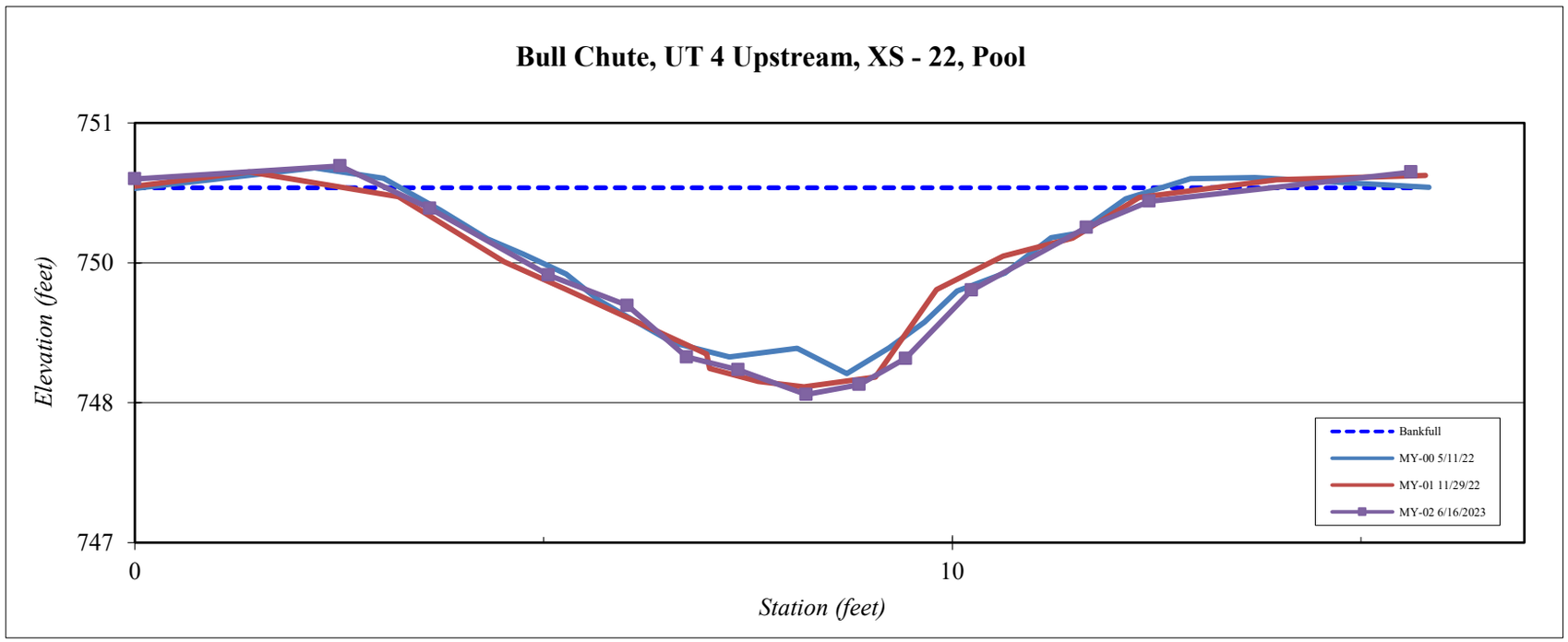


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT4 Upstream, XS -22
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.0	750.3
2.5	750.4
3.6	750.0
5.1	749.5
6.0	749.2
6.8	748.8
7.4	748.7
8.2	748.5
8.9	748.6
9.4	748.8
10.2	749.4
11.6	749.9
12.4	750.1
15.6	750.3

SUMMARY DATA	
Bankfull Elevation:	750.19
Bank Height Ratio:	0.93
Thalweg Elevation:	748.52
LTOB Elevation:	750.08
LTOB Max Depth:	1.56
LTOB Cross Sectional Area:	7.3

Stream Type	E/C 4

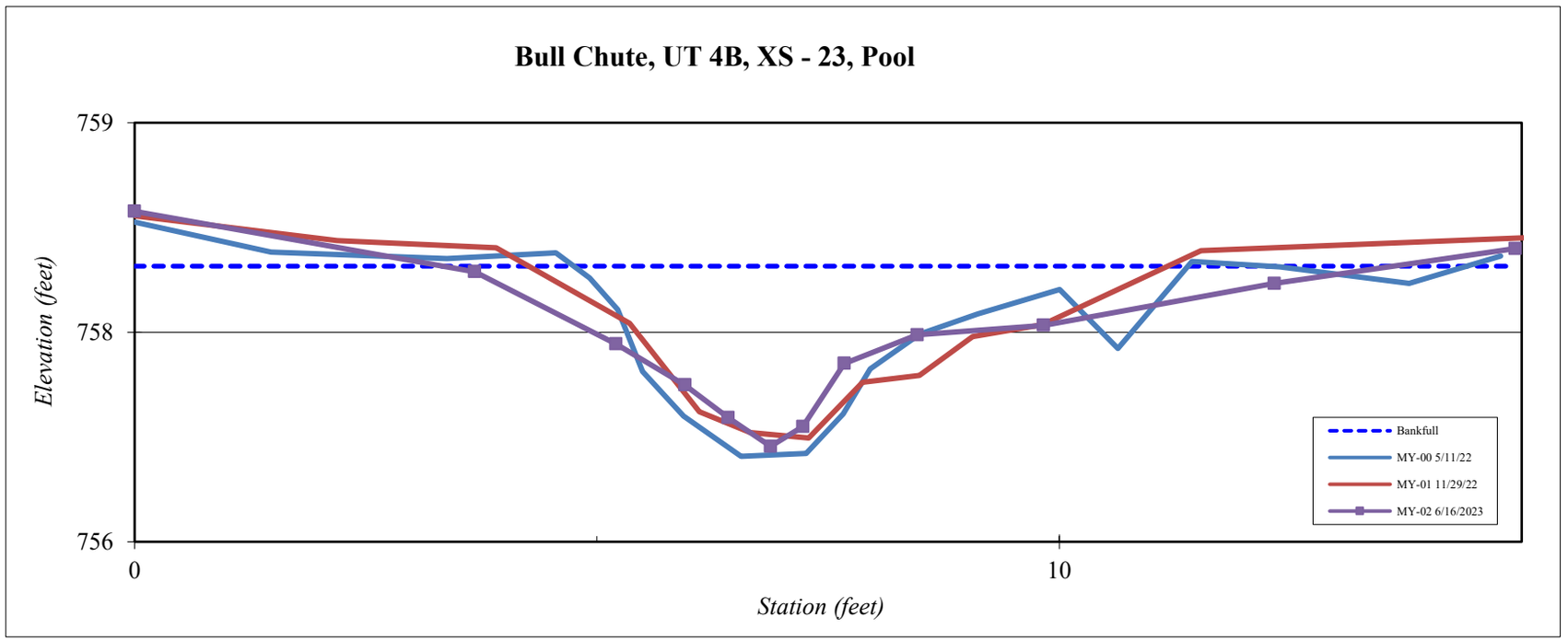


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT4B, XS -23
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.0	758.2
3.7	757.8
5.2	757.4
6.0	757.2
6.4	757.0
6.9	756.9
7.2	757.0
7.7	757.3
8.5	757.5
9.8	757.5
12.3	757.8
14.9	758.0

SUMMARY DATA	
Bankfull Elevation:	757.86
Bank Height Ratio:	0.90
Thalweg Elevation:	756.89
LTOB Elevation:	757.76
LTOB Max Depth:	0.88
LTOB Cross Sectional Area:	2.7

Stream Type	E/C 4

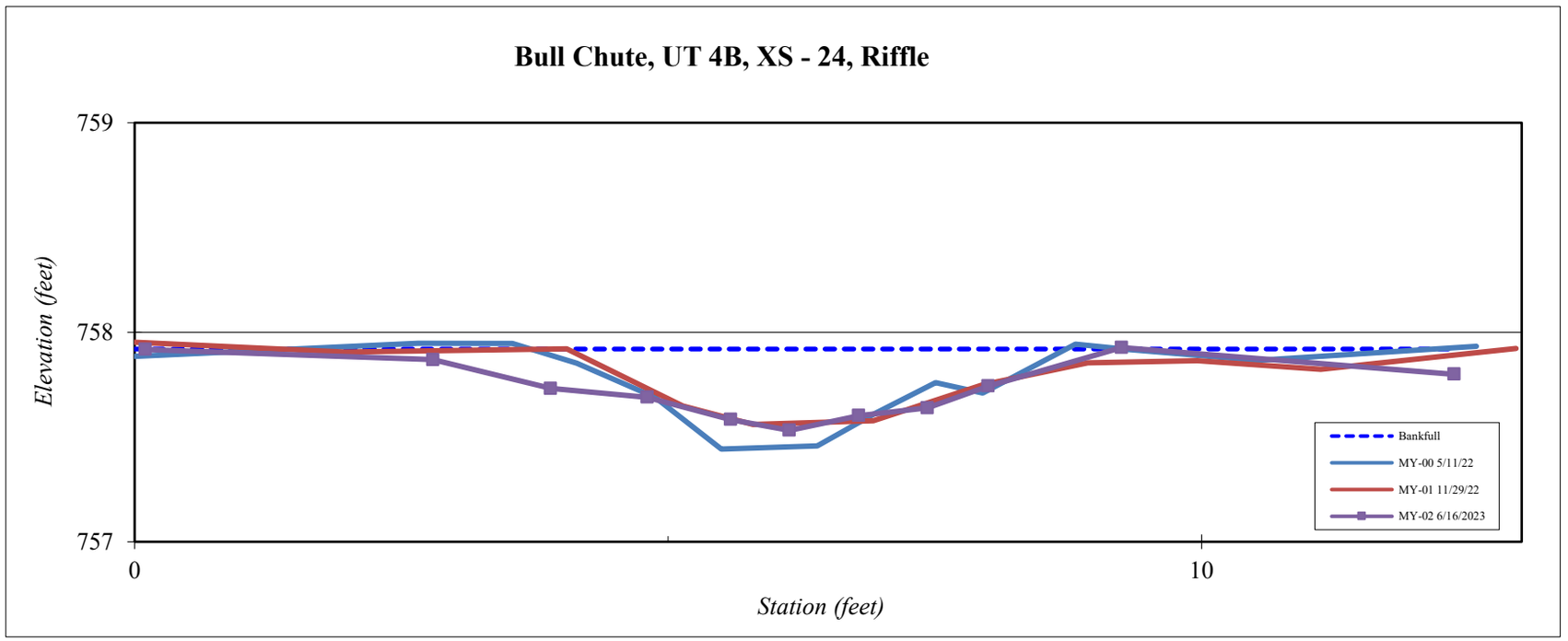


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT4B, XS -24
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.1	758.0
2.8	758.0
3.9	757.8
4.8	757.8
5.6	757.7
6.1	757.6
6.8	757.7
7.4	757.7
8.0	757.8
9.3	758.0
12.4	757.9

SUMMARY DATA	
Bankfull Elevation:	758.04
Bank Height Ratio:	0.87
Thalweg Elevation:	757.60
LTOB Elevation:	757.98
LTOB Max Depth:	0.38
LTOB Cross Sectional Area:	1.2

Stream Type	E/C 4

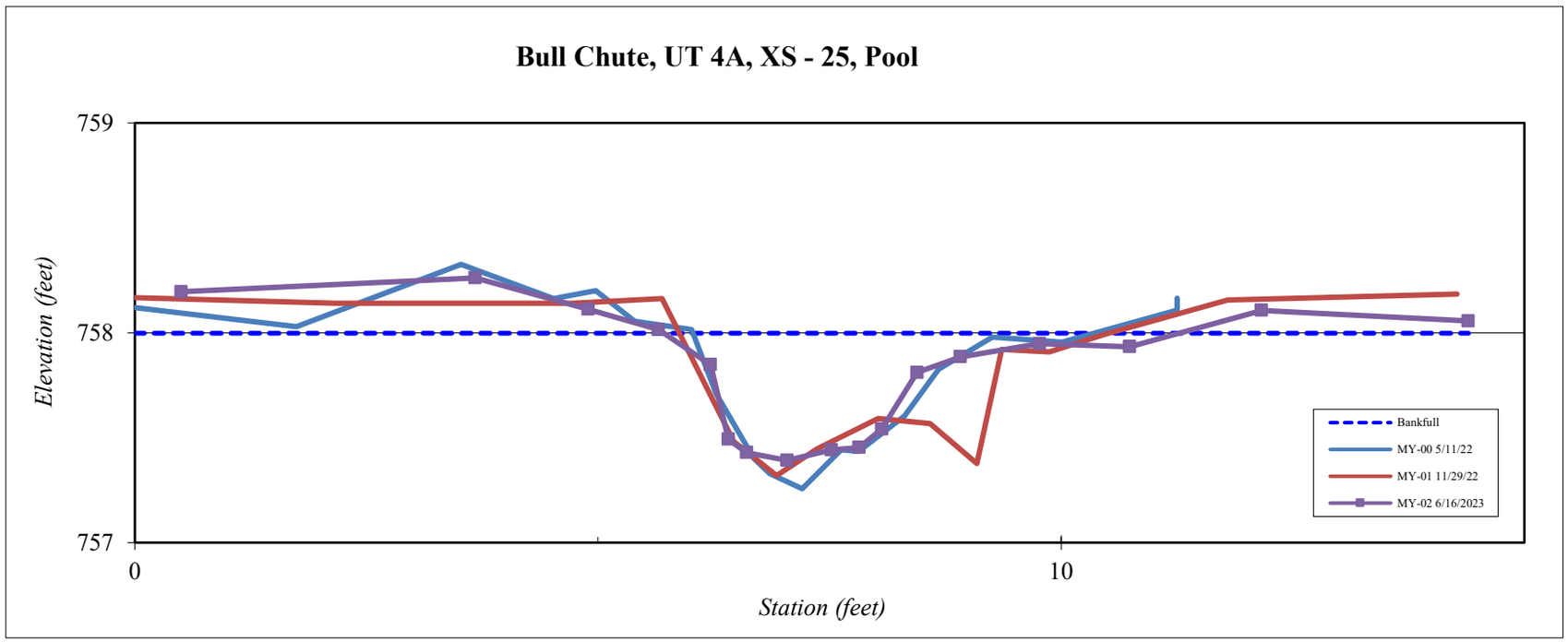


Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT4A, XS -25
Feature	Pool
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.5	758.4
3.7	758.4
4.9	758.3
5.7	758.1
6.2	758.0
6.4	757.6
6.6	757.5
7.0	757.4
7.5	757.5
7.8	757.5
8.1	757.6
8.4	757.9
8.9	758.0
9.8	758.1
10.7	758.1
12.2	758.3
14.4	758.2

SUMMARY DATA	
Bankfull Elevation:	758.13
Bank Height Ratio:	0.92
Thalweg Elevation:	757.44
LTOB Elevation:	758.07
LTOB Max Depth:	0.63
LTOB Cross Sectional Area:	1.2

Stream Type	E/C 4



Site	Bull Chute Site
Watershed:	Yadkin River Basin, 03040103
XS ID	UT4A, XS -26
Feature	Riffle
Date:	6/16/2023
Field Crew:	Perkinson, Smith, Flemming, Lance

Station	Elevation
0.1	758.7
3.5	758.6
5.4	758.6
6.8	758.3
7.5	758.3
8.3	758.2
8.8	758.0
9.0	758.0
9.6	758.2
10.1	758.4
11.0	758.5
12.3	758.4
16.0	758.2

SUMMARY DATA	
Bankfull Elevation:	758.60
Bank Height Ratio:	0.77
Thalweg Elevation:	757.97
LTOB Elevation:	758.45
LTOB Max Depth:	0.48
LTOB Cross Sectional Area:	0.9

Stream Type	E/C 4

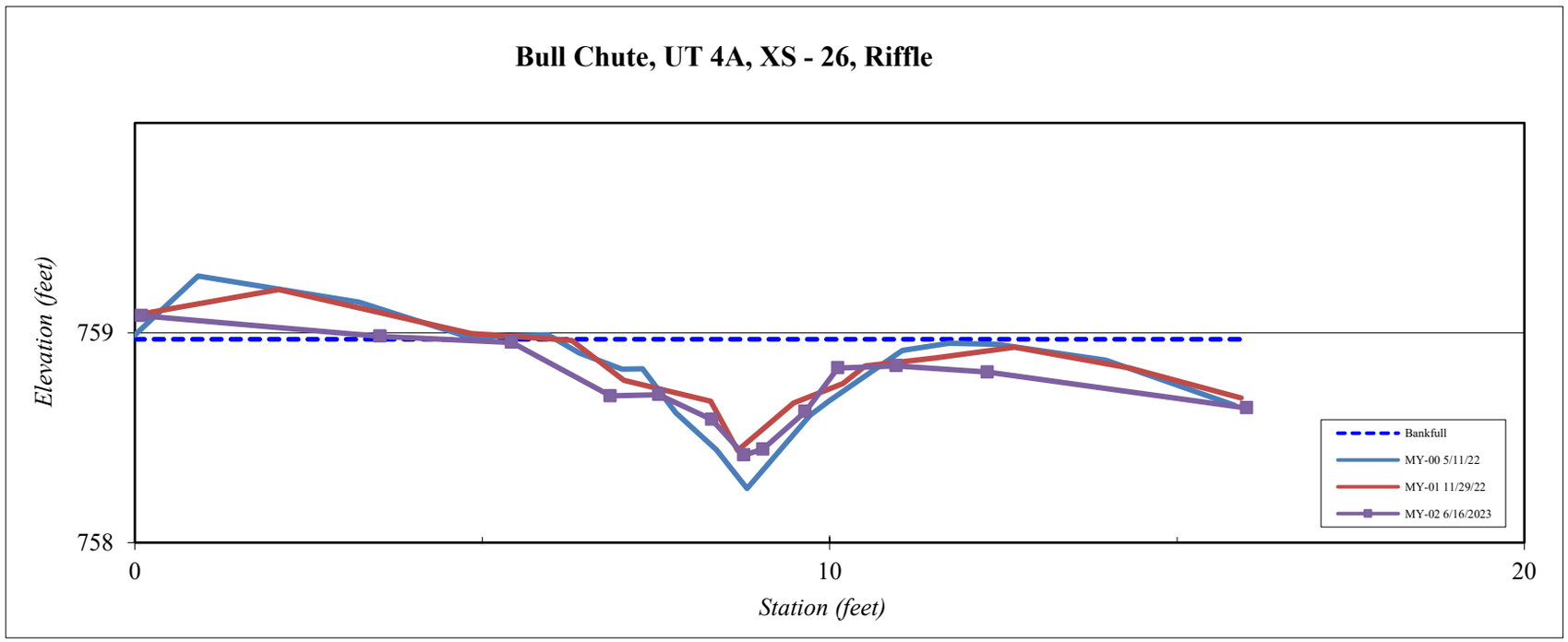


Table 9A. Baseline Stream Data Summary
Bull Chute - UT 1

Parameter	Pre-Existing Condition (applicaple)					Design		Monitoring Baseline (MY0)		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	5.6		8.5	16		8.5	9.8	5.5	10.2	5
Floodprone Width (ft)	10		14	100		50	150	25	100	5
Bankfull Mean Depth (ft)	0.4		0.7	1.1		0.6	0.7	0.2	0.8	5
Bankfull Max Depth (ft)	0.6		1.1	1.4		0.8	1.1	0.4	1.1	5
Bankfull Cross Sectional Area (ft^2)	6		6	6		6	6	1.3	8.1	5
Width/Depth Ratio	5.1		12.1	40		12	16	12.8	22.9	5
Entrenchment Ratio	1.1		1.4	15.9		5.9	15.3	4.6	11.4	5
Bank Height Ratio	**1.3**		**2.8**	**5**		**1**	**1.3**	**1**	**1**	5
Max part size (mm) mobilized at bankfull										
Rosgen Classification	G 5					Ce 3/4		Ce 4		
Bankfull Discharge (cfs)	22.9					22.9		22.9		
Sinuosity (ft)	1.03					1.15		1.15		
Water Surface Slope (Channel) (ft/ft)	0.0211					0.0189		0.0197		
Other										

Table 9B. Baseline Stream Data Summary
Bull Chute - UT 3

Parameter	Pre-Existing Condition (applicaple)					Design		Monitoring Baseline (MY0)		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	3.3		5.1	7.1		6.7	7.7	8.0	10.0	2
Floodprone Width (ft)	7		9	50		50	100	75	75	2
Bankfull Mean Depth (ft)	0.5		0.7	1.1		0.5	0.6	0.6	0.6	2
Bankfull Max Depth (ft)	0.8		1	1.7		0.6	0.8	0.9	1.0	2
Bankfull Cross Sectional Area (ft^2)	3.7		3.7	3.7		3.7	3.7	4.8	6.4	2
Width/Depth Ratio	3		7.3	13.5		12	16	12.4	15.6	2
Entrenchment Ratio	1.1		1.5	13.5		7.5	13	7.5	9.4	2
Bank Height Ratio	**1.5**		**2.5**	**4**		**1**	**1.3**	1	1	**2**
Max part size (mm) mobilized at bankfull										
Rosgen Classification	G 5					Ce 3/4		Ce 4		
Bankfull Discharge (cfs)	13.7					13.7		13.7		
Sinuosity (ft)	1.02					1.15		1.15		
Water Surface Slope (Channel) (ft/ft)	0.0254					0.0225		0.0199		
Other										

Table 9C. Baseline Stream Data Summary
Bull Chute - UT 4 Upstream

Parameter	Pre-Existing Condition (applicaple)					Design		Monitoring Baseline (MY0)		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	5		8.3	10.4		7.2	8.3	8.5	8.9	2
Floodprone Width (ft)	6		11	24		50	100	75.0	75.0	2
Bankfull Mean Depth (ft)	0.4		0.6	0.9		0.5	0.6	0.6	0.6	2
Bankfull Max Depth (ft)	0.5		1.1	1.2		0.7	0.9	0.8	1.0	2
Bankfull Cross Sectional Area (ft^2)	4.3		4.3	4.3		4.3	4.3	5.1	5.8	2
Width/Depth Ratio	5.6		15.4	26		12	16	13.7	14.1	2
Entrenchment Ratio	1.1		1.3	2.6		7	12.1	8.4	8.8	2
Bank Height Ratio	**2.5**		**3.1**	**5.4**		**1**	**1.3**	1.0	1.0	**2**
Max part size (mm) mobilized at bankfull										
Rosgen Classification	Fg 5					Ce 3/4		Ce 4		
Bankfull Discharge (cfs)	16.1					16.1		16.1		
Sinuosity (ft)	1.06					1.15		1.15		
Water Surface Slope (Channel) (ft/ft)	0.212					0.0196		0.0182		
Other										

Table 9D. Baseline Stream Data Summary
Bull Chute - UT 4 Downstream

Parameter	Pre-Existing Condition (applicaple)					Design		Monitoring Baseline (MY0)		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	7.8		9.2	10		9.1	10.5	11.0	11.0	1
Floodprone Width (ft)	9		11	14		50	150	100.0	100.0	1
Bankfull Mean Depth (ft)	0.7		0.8	0.9		0.7	0.8	0.8	0.8	1
Bankfull Max Depth (ft)	0.9		1	1.1		0.8	1.1	1.2	1.2	1
Bankfull Cross Sectional Area (ft^2)	6.9		6.9	6.9		6.9	6.9	8.5	8.5	1
Width/Depth Ratio	6.8		9.7	12.6		12	16	14.0	14.0	1
Entrenchment Ratio	1.1		1.2	1.4		5.5	14.3	9.1	9.1	1
Bank Height Ratio	**4.7**		**5.3**	**5.9**		**1**	**1.3**	1.0	1.0	**1**
Max part size (mm) mobilized at bankfull										
Rosgen Classification	G 5					Ce 3/4		Ce 4		
Bankfull Discharge (cfs)	26.7					26.7		26.7		
Sinuosity (ft)	1.02					1.15		1.15		
Water Surface Slope (Channel) (ft/ft)	0.0165					0.0146		0.01484		
Other										

Table 9E. Baseline Stream Data Summary
Bull Chute - UT 4A

Parameter	Pre-Existing Condition (applicaple)					Design		Monitoring Baseline (MY0)		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	2.3		3.3	4.5		3.9	4.6	4.7	4.7	1
Floodprone Width (ft)	6		8	12		20	50	35	35	1
Bankfull Mean Depth (ft)	0.3		0.4	0.5		0.3	0.3	0.3	0.3	1
Bankfull Max Depth (ft)	0.6		0.6	0.9		0.4	0.5	0.7	0.7	1
Bankfull Cross Sectional Area (ft^2)	1.3		1.3	1.3		1.3	1.3	1.4	1.4	1
Width/Depth Ratio	4.6		8.3	15		12	16	15.5	15.5	1
Entrenchment Ratio	1.3		3.5	3.6		5.1	11	7.5	7.5	1
Bank Height Ratio	**1.7**		**3**	**3.9**		**1**	**1.3**	**1**	**1**	1
Max part size (mm) mobilized at bankfull										
Rosgen Classification	Eg 5					Ce 3/4		Ce 4		
Bankfull Discharge (cfs)	4.3					4.3		4.3		
Sinuosity (ft)	1.02					1.1		1.1		
Water Surface Slope (Channel) (ft/ft)	0.0444					0.0336		0.0356		
Other										

Table 9F. Baseline Stream Data Summary
Bull Chute - UT 4B

Parameter	Pre-Existing Condition (applicaple)					Design		Monitoring Baseline (MY0)		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	3.1		5	6.9		3.9	4.6	5.3	5.3	1
Floodprone Width (ft)	9		14	18		20	50	35	35	1
Bankfull Mean Depth (ft)	0.2		0.3	0.4		0.3	0.3	0.3	0.3	1
Bankfull Max Depth (ft)	0.3		0.6	0.8		0.4	0.5	0.6	0.6	1
Bankfull Cross Sectional Area (ft^2)	1.2		1.2	1.2		1.3	1.3	1.6	1.6	1
Width/Depth Ratio	7.8		21.1	34.5		12	16	17.5	17.5	1
Entrenchment Ratio	1.3		3.6	5.8		5.1	11	6.6	6.6	1
Bank Height Ratio	**1.3**		**4.3**	**7.3**		**1**	**1.3**	1	1	1
Max part size (mm) mobilized at bankfull										
Rosgen Classification	Cf 5					Ce 3/4		Ce 4		
Bankfull Discharge (cfs)	4.3					4.3		4.3		
Sinuosity (ft)	1.03					1.1		1.1		
Water Surface Slope (Channel) (ft/ft)	0.0359					0.0336		0.034		
Other										

Table 10A. Monitoring Data - Cross Section Morphology Monitoring Summary

(Bull Chute/ DMS:100137) UT 1

	UT 1 - Cross Section 1 (Riffle)							UT 1 - Cross Section 2 (Pool)							UT 1 - Cross Section 3 (Riffle)							UT 1 - Cross Section 4 (Pool)							UT 1 - Cross Section 5 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	713.54	713.53	713.57					714.80	714.91	714.82					727.56	727.61	727.61					727.84	727.98	727.95					739.80	739.86	739.85				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	0.97	0.99					1.00	1.01	0.97					1.00	0.97	0.92					1.00	0.99	0.92					1.00	0.95	0.79				
Thalweg Elevation	712.66	712.78	712.78					712.56	712.69	712.59					726.64	726.79	726.74					726.21	726.32	726.30					738.69	738.88	738.83				
LTOB[2] Elevation	713.54	713.50	713.57					714.80	714.92	714.76					727.56	727.59	727.54					727.84	727.96	727.82					739.80	739.81	739.64				
LTOB[2] Max Depth (ft)	0.88	0.73	0.79					2.24	2.24	2.17					0.91	0.80	0.80					1.64	1.63	1.52					1.11	0.93	0.81				
LTOB[2] Cross Sectional Area (ft^2)	5.7	5.48	5.66					11.7	11.83	11.17					5.5	5.27	4.96					9.4	9.07	7.92					8.1	7.29	6.12				

	UT 1 - Cross Section 6 (Pool)							UT 1 - Cross Section 7 (Riffle)							UT 1 - Cross Section 8 (Pool)							UT 1 - Cross Section 9 (Riffle)							UT 1 - Cross Section 10 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	739.99	740.05	740.05					747.73	747.79	747.79					747.94	748.03	747.99					763.66	763.64	763.65					764.42	764.51	764.50				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.00	0.97					1.00	0.90	0.90					1.00	0.94	0.98					1.00	0.95	0.90					1.00	0.96	0.90				
Thalweg Elevation	738.45	738.54	738.42					746.66	746.80	746.79					746.29	746.37	746.39					763.30	763.31	763.26					763.33	763.64	763.55				
LTOB[2] Elevation	739.99	740.06	740.00					747.73	747.70	747.68					747.94	747.94	747.96					763.66	763.63	763.61					764.42	764.47	764.41				
LTOB[2] Max Depth (ft)	1.54	1.52	1.58					1.07	0.90	0.90					1.65	1.56	1.58					0.36	0.32	0.35					1.09	0.83	0.86				
LTOB[2] Cross Sectional Area (ft^2)	12.0	12.05	11.22					6.9	5.95	5.91					10.3	9.34	9.96					1.3	1.23	1.12					6.3	5.78	5.49				

Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area							
Bank Height Ratio_Based on AB Bankfull[1] Area							
Thalweg Elevation							
LTOB[2] Elevation							
LTOB[2] Max Depth (ft)							
LTOB[2] Cross Sectional Area (ft^2)							

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - **Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

2 - **LTOB Area and Max depth -** These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Table 10B. Monitoring Data - Cross Section Morphology Monitoring Summary

(Bull Chute/ DMS:100137) UT 3

	UT 3 - Cross Section 13 (Riffle)							UT 3 - Cross Section 14 (Pool)							UT 3 - Cross Section 15 (Pool)							UT 3 - Cross Section 16 (Riffle)							UT 3 - Cross Section 17 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	722.63	722.64	722.69					722.98	723.01	722.99					734.17	734.23	734.23					734.92	734.91	734.91					763.55	763.58	763.60				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.00	0.88					1.00	1.00	0.98					1.00	1.01	0.80					1.00	1.01	1.04					0.98	1.00	1.03				
Thalweg Elevation	721.62	721.65	721.70					720.98	721.08	721.13					732.78	732.99	732.97					733.97	734.06	734.02					762.51	762.53	762.55				
LTOB[2] Elevation	722.63	722.64	722.58					722.98	723.00	722.96					734.17	734.25	733.98					734.92	734.92	734.95					763.52	763.58	763.63				
LTOB[2] Max Depth (ft)	1.02	0.99	0.88					2.00	1.92	1.83					1.39	1.26	1.01					0.95	0.86	0.93					1.01	1.05	1.08				
LTOB[2] Cross Sectional Area (ft^2)	6.3	6.36	5.32					10.4	10.26	10.04					7.0	7.10	4.60					4.74	4.80	5.07					4.94	5.09	5.37				

	UT 3 - Cross Section 18 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	763.85	763.86	763.79				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	0.98	0.87				
Thalweg Elevation	762.31	762.57	762.55				
LTOB[2] Elevation	763.85	763.84	763.63				
LTOB[2] Max Depth (ft)	1.55	1.27	1.08				
LTOB[2] Cross Sectional Area (ft^2)	6.58	6.40	5.03				

Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area							
Bank Height Ratio_Based on AB Bankfull[1] Area							
Thalweg Elevation							
LTOB[2] Elevation							
LTOB[2] Max Depth (ft)							
LTOB[2] Cross Sectional Area (ft^2)							

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - **Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

2 - **LTOB Area and Max depth -** These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Table 10C. Monitoring Data - Cross Section Morphology Monitoring Summary

(Bull Chute/ DMS:100137) UT 4

	UT 4 - Cross Section 11 (Pool)							UT 4 - Cross Section 12 (Riffle)							UT 4 - Cross Section 19 (Pool)							UT 4 - Cross Section 20 (Riffle)							UT 4 - Cross Section 21 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	714.76	714.92	714.81					715.38	715.44	715.44					732.43	732.39	732.36					733.76	733.76	733.77					750.00	749.98	749.98				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.05	1.05					1.00	1.07	0.99					1.00	1.01	0.97					1.00	0.94	0.91					1.00	1.02	0.96				
Thalweg Elevation	713.25	713.40	713.29					714.22	714.45	714.39					731.14	730.93	731.10					732.93	732.99	732.89					748.99	749.06	749.11				
LTOB[2] Elevation	714.76	715.00	714.88					715.38	715.52	715.43		`			732.43	732.41	732.33					733.76	733.72	733.69		`			750.00	750.00	749.95		`		
LTOB[2] Max Depth (ft)	1.51	1.60	1.59					1.16	1.06	1.05					1.29	1.48	1.23					0.84	0.73	0.81					1.00	0.94	0.84				
LTOB[2] Cross Sectional Area (ft^2)	7.9	8.71	8.63					8.5	9.59	8.44					6.7	6.88	6.42					5.2	4.68	4.47					5.7	5.88	5.37				

	UT 4 - Cross Section 22 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	750.27	750.20	750.19				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.03	0.93				
Thalweg Elevation	748.69	748.58	748.52				
LTOB[2] Elevation	750.27	750.26	750.08		`		
LTOB[2] Max Depth (ft)	1.58	1.68	1.56				
LTOB[2] Cross Sectional Area (ft^2)	8.3	8.90	7.28				

Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area							
Bank Height Ratio_Based on AB Bankfull[1] Area							
Thalweg Elevation							
LTOB[2] Elevation							
LTOB[2] Max Depth (ft)							
LTOB[2] Cross Sectional Area (ft^2)							

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - **Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

2 - **LTOB Area and Max depth -** These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Table 10D. Monitoring Data - Cross Section Morphology Monitoring Summary

(Bull Chute/ DMS:100137) UT 4A

	UT 4A - Cross Section 25 (Pool)							UT 4A - Cross Section 26 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	758.11	758.02	758.13					758.57	758.62	758.60				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.03	0.92					1.00	0.89	0.77				
Thalweg Elevation	757.29	757.36	757.44					757.79	758.00	757.97				
LTOB[2] Elevation	758.11	758.04	758.07					758.57	758.55	758.45		`		
LTOB[2] Max Depth (ft)	0.82	0.68	0.63					0.78	0.56	0.48				
LTOB[2] Cross Sectional Area (ft^2)	1.5	1.52	1.24					1.6	1.19	0.93				
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area														
Bank Height Ratio_Based on AB Bankfull[1] Area														
Thalweg Elevation														
LTOB[2] Elevation														
LTOB[2] Max Depth (ft)														
LTOB[2] Cross Sectional Area (ft^2)														
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area														
Bank Height Ratio_Based on AB Bankfull[1] Area														
Thalweg Elevation														
LTOB[2] Elevation														
LTOB[2] Max Depth (ft)														
LTOB[2] Cross Sectional Area (ft^2)														

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - **Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

2 - **LTOB Area and Max depth -** These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Table 10E. Monitoring Data - Cross Section Morphology Monitoring Summary

(Bull Chute/ DMS:100137) UT 4B

	UT 4B - Cross Section 23 (Pool)							UT 4B - Cross Section 24 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	757.88	757.89	757.86					758.07	758.04	758.04				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.05	0.90					0.52	1.00	0.87				
Thalweg Elevation	756.83	756.93	756.89					757.50	757.63	757.60				
LTOB[2] Elevation	757.88	757.94	757.76					758.07	758.04	757.98				
LTOB[2] Max Depth (ft)	1.05	1.01	0.88					0.57	0.41	0.38				
LTOB[2] Cross Sectional Area (ft^2)	3.4	3.80	2.66					1.6	1.56	1.22				
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area														
Bank Height Ratio_Based on AB Bankfull[1] Area														
Thalweg Elevation														
LTOB[2] Elevation														
LTOB[2] Max Depth (ft)														
LTOB[2] Cross Sectional Area (ft^2)														
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area														
Bank Height Ratio_Based on AB Bankfull[1] Area														
Thalweg Elevation														
LTOB[2] Elevation														
LTOB[2] Max Depth (ft)														
LTOB[2] Cross Sectional Area (ft^2)														

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - **Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

2 - **LTOB Area and Max depth -** These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Appendix D
Hydrologic Data

Table 11. Verification of Bankfull Events
Table 12. Groundwater Hydrology Data
Groundwater Gauge Graphs
Tables 13A-F. Channel Evidence
Surface Water Gauge Graphs
Figure D1. 30/70 Percentile Graph for Rainfall

Table 11. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Monitoring Year	Method	Photo (if available)
May 23, 2022	May 23, 2022	MY1	Crest gauges on UT-1, UT-3, and UT-4 documented a bankfull event, with crests of 17 inches, 12 inches, and 14.5 inches respectively after 1.88 inches of rain were captured at an onsite rain gauge.	--
September 30, 2022	September 30, 2022	MY1	Crest gauges on UT-1, UT-3, and UT-4 documented a bankfull event, with crests of 16 inches, 13 inches, and 10 inches respectively after 2.48 inches of rain were captured at an onsite rain gauge as a result of tropical storm Ian.	--
November 29, 2022	November 27, 2022	MY1	Wrack and laid-back vegetation were observed along the top of bank and floodplain of all Site reaches after 1.49 inches of rain were captured at an onsite rain gauge.	1, 2, 3
February 12, 2023	February 12, 2023	MY2	Crest gauge on UT-1 documented a bankfull event, with a crest of 13 inches after 1.78 inches of rain were captured at an onsite rain gauge. The event was also documented on UT-3 and UT-4 by time-lapse trail cameras.	4, 5
April 8, 2023	April 8, 2023	MY2	Crest gauge on UT-1 documented a bankfull event with a crest of 13 inches after 3.10 inches of rain were recorded by an onsite rain gauge the days leading up to the event.	--
July 8, 2023	July 8, 2023	MY2	Crest gauges on UT-1 and UT-3 documented a bankfull event with crests of 17 inches and 12 inches respectively after 2.91 inches of rain were recorded by an onsite rain gauge the days leading up to the event.	--

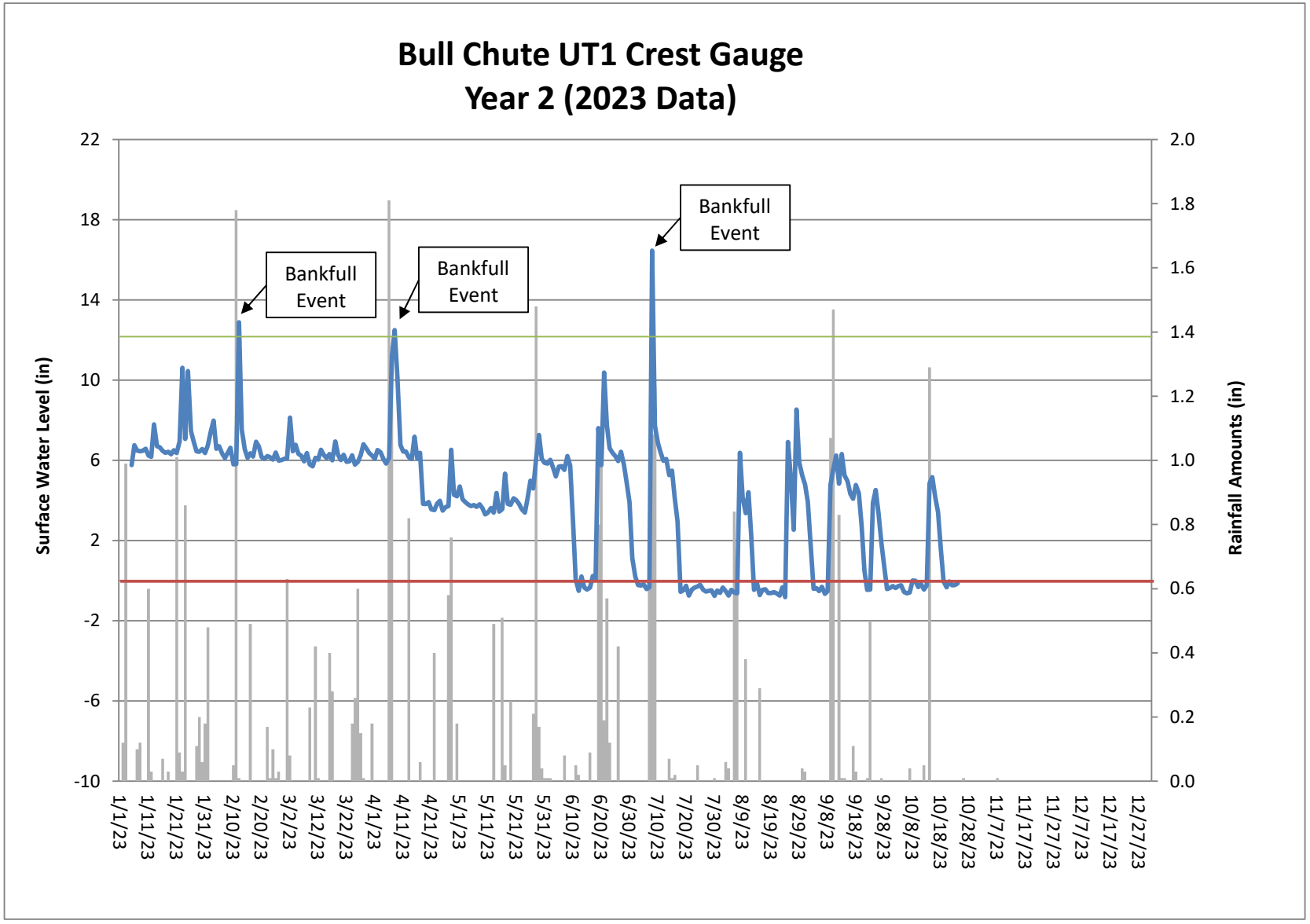
Photo 1: Bankfull event documented on UT-2 (MY1)

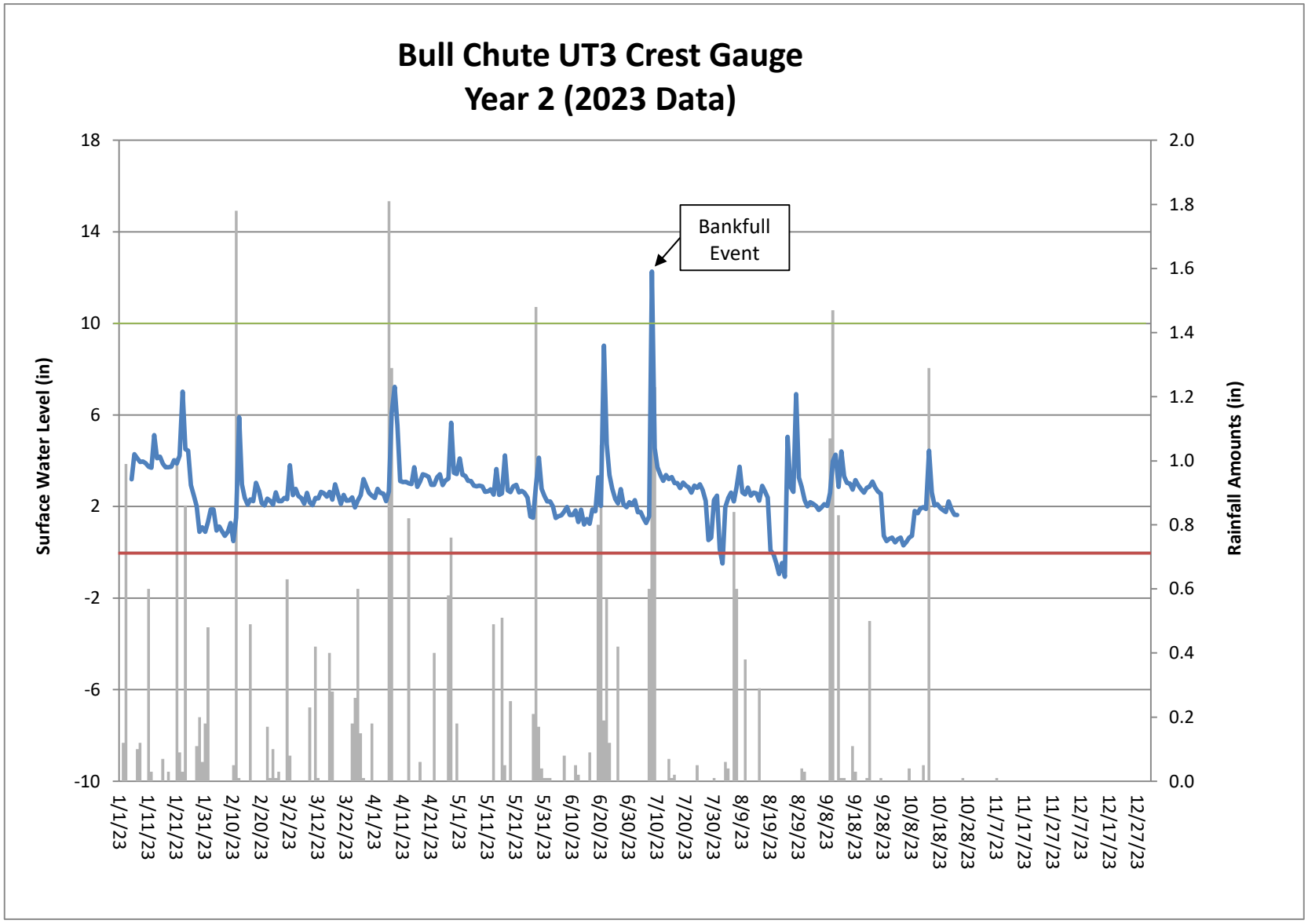
Photo 2: Bankfull Event Documented on UT-3 (MY1)

Photo 3: Bankfull Event Documented on UT-4 (MY1)

Photo 4: Bankfull Event Documented on UT-3 (MY2)

Photo 5: Bankfull Event Documented on UT-4 (MY2)


Bull Chute UT1 Crest Gauge
Year 2 (2023 Data)
Surface Water Level (in)
Rainfall Amounts (in)
Bankfull Event
Bankfull Event
Bankfull Event
22
18
14
10
6
2
-2
-6
-10
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute UT3 Crest Gauge
Year 2 (2023 Data)
Surface Water Level (in)
Rainfall Amounts (in)
Bankfull Event
18
14
10
6
2
-2
-6
-10
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23

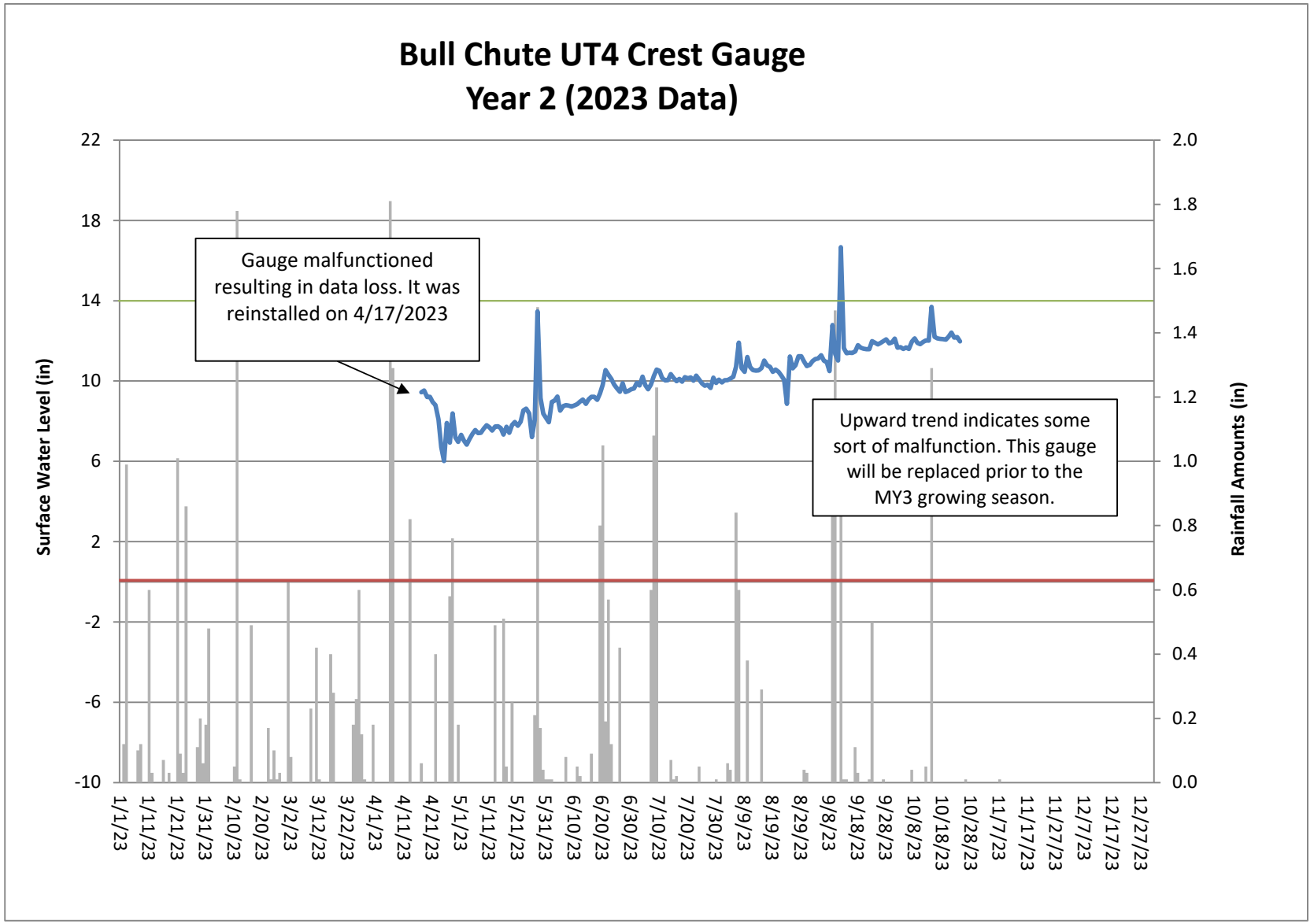
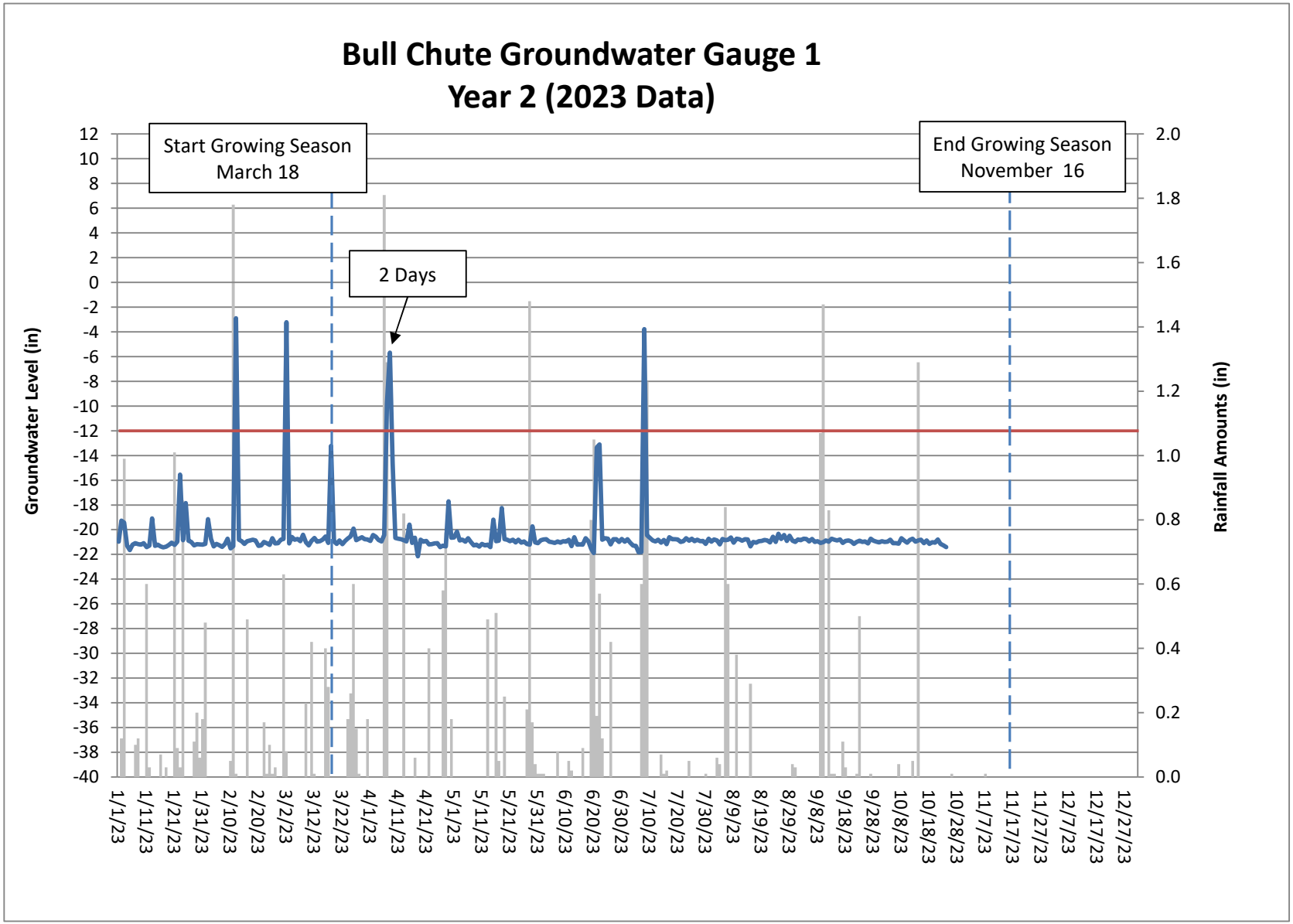
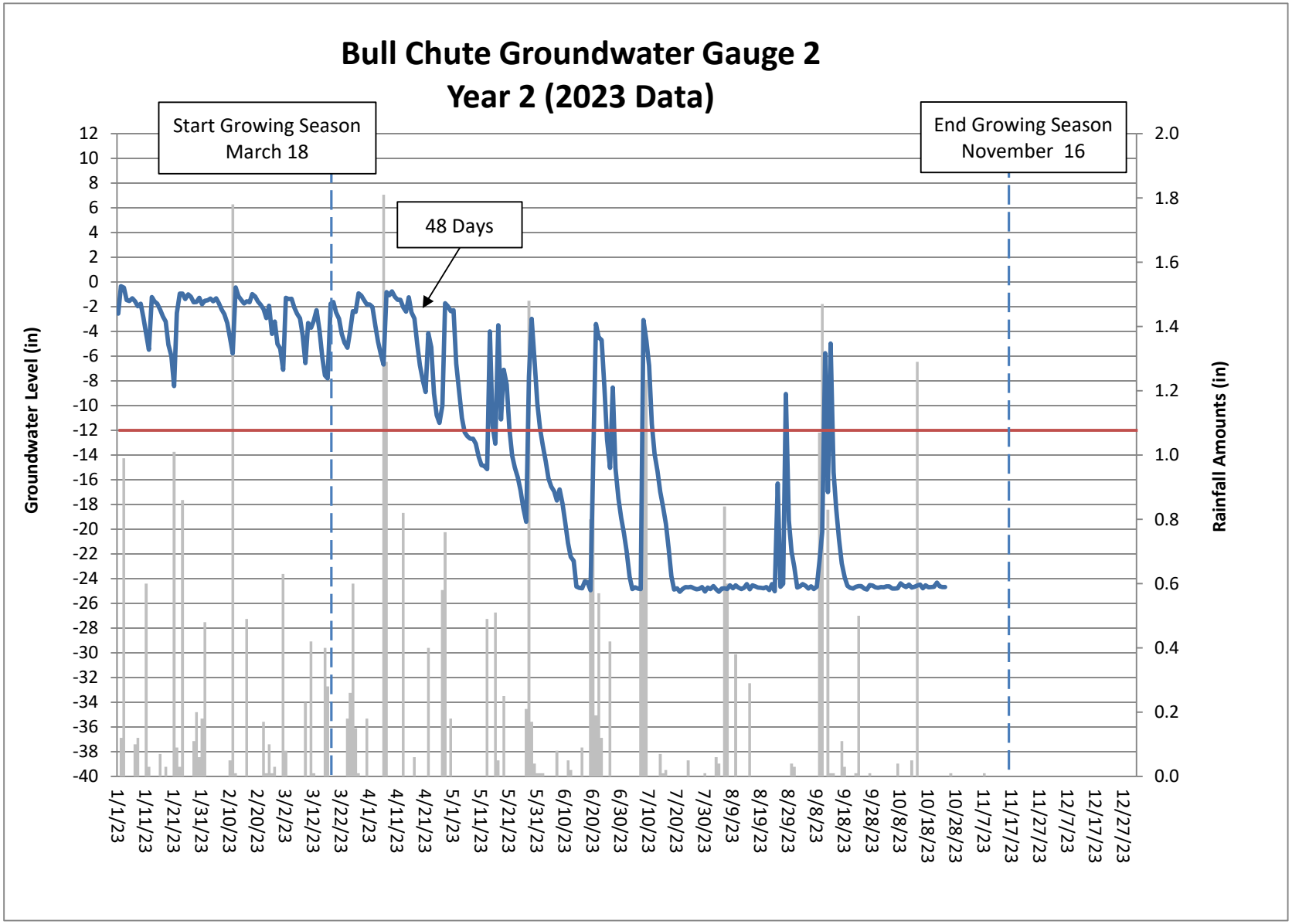
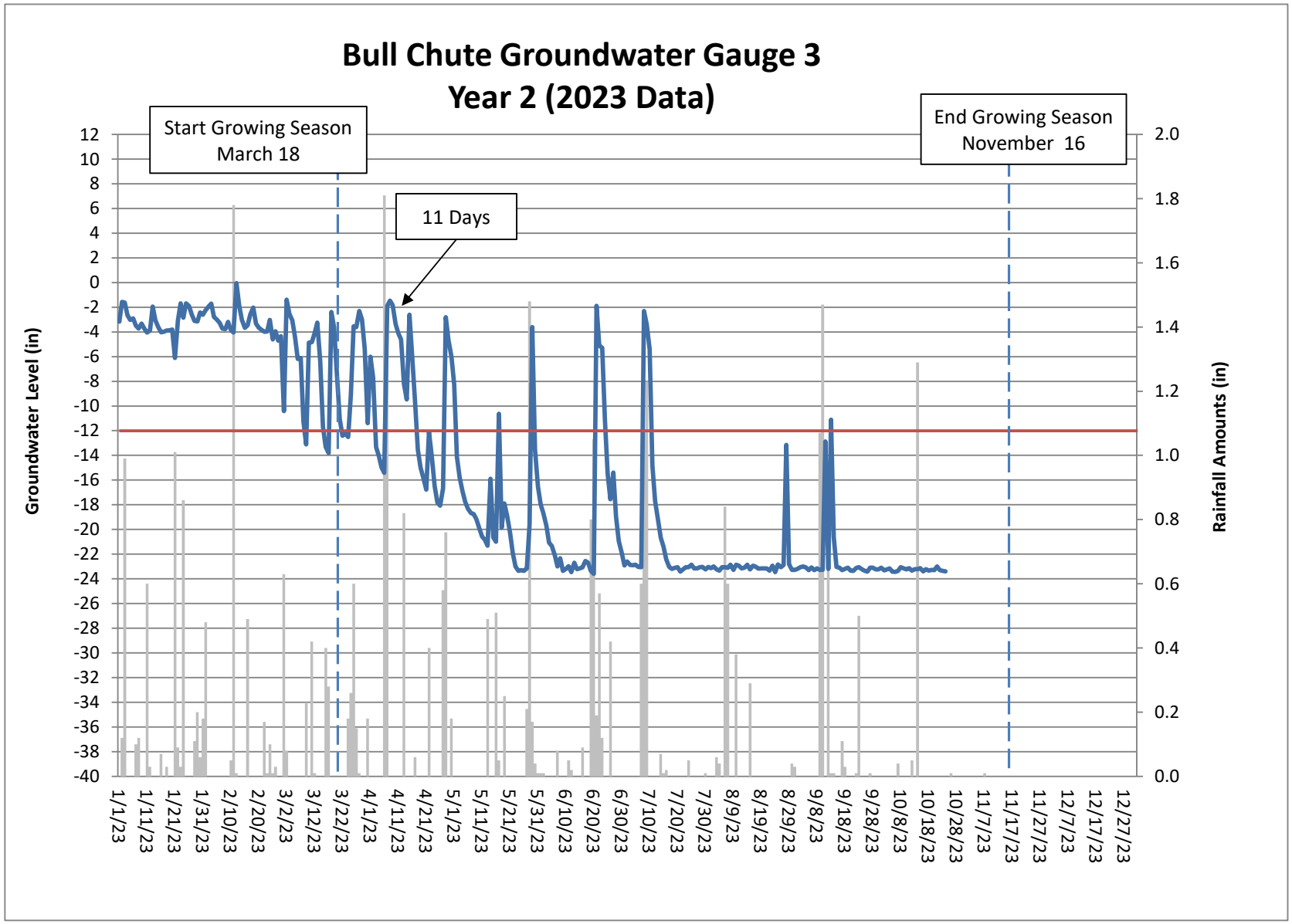

Bull Chute UT4 Crest Gauge
Year 2 (2023 Data)
Surface Water Level (in)
Rainfall Amounts (in)
22
18
14
10
6
2
-2
-6
-10
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Gauge malfunctioned resulting in data loss. It was reinstalled on 4/17/2023
Upward trend indicates some sort of malfunction. This gauge will be replaced prior to the MY3 growing season.
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23

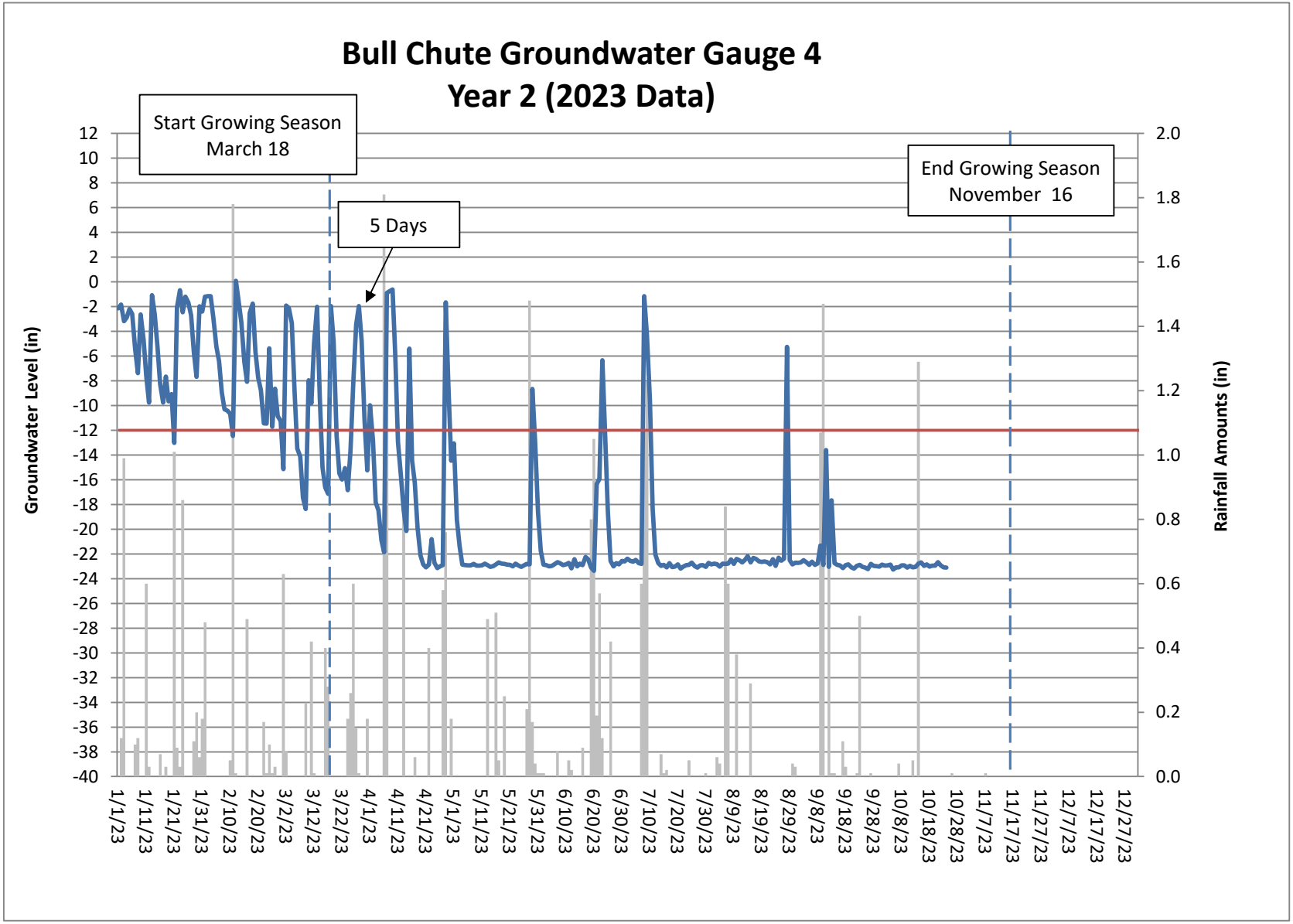
Table 12. Groundwater Hydrology Data
Summary of Monitoring Period/Hydrology Success Criteria by Year

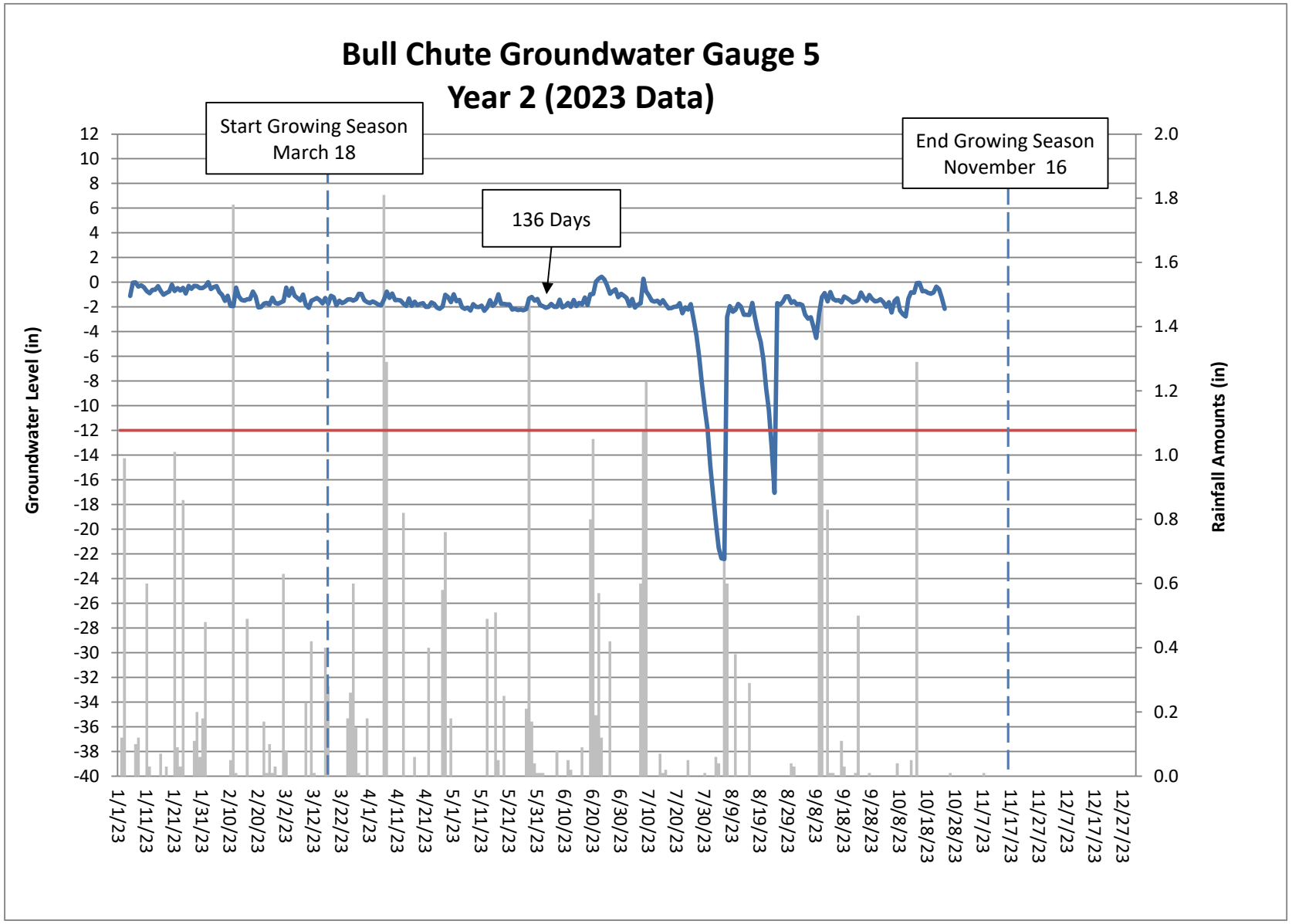
Gauge	12% Hydroperiod Success Criteria Achieved - Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2022)	Year 2 (2023)	Year 3 (2024)	Year 4 (2025)	Year 5 (2026)	Year 6 (2027)	Year 7 (2028)
1	No 1 day (0.4%)	No 2 days (0.8%)					
2	Yes 62 days (25.4%)	Yes 48 days (20.5%)					
3	No 19 days (7.8%)	No 11 days (4.7%)					
4	No 7 days (2.9%)	No 5 days (2.1%)					
5	Yes 124 days (50.8%)	Yes 136 days (58.1%)					
6	Yes 63 days (25.8%)	Yes 131 days (56.0%)					
7	Yes 64 days (26.2%)	Yes 49 days (20.9%)					
8	Yes 63 days (25.8%)	Yes 54 days (23.1%)					
9	Yes 45 days (18.4%)	Yes 221 days (94.4%)					
10	Yes 33 days (13.5%)	Yes 221 days (94.4%)					

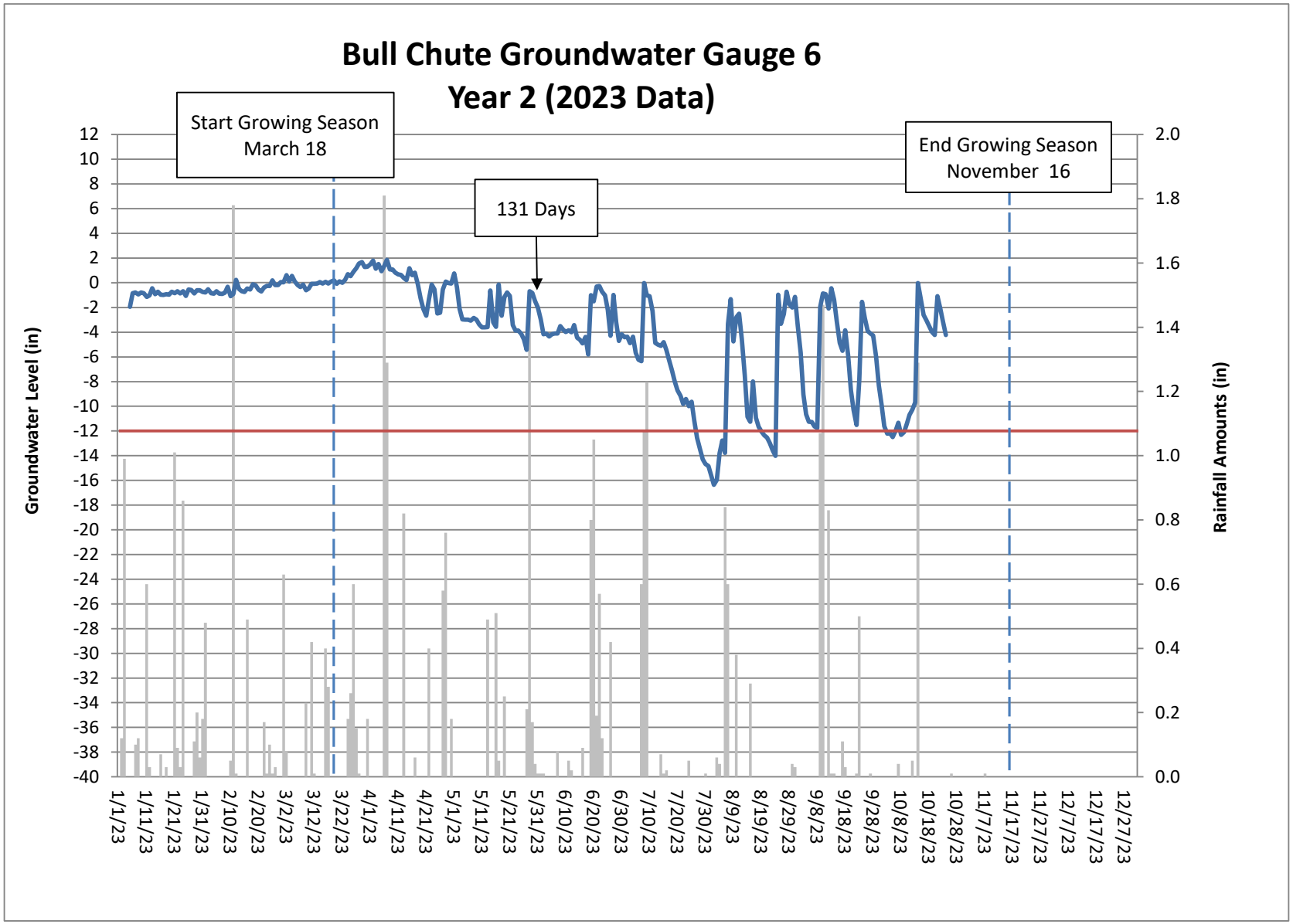

Bull Chute Groundwater Gauge 1
Year 2 (2023 Data)
Start Growing Season
March 18
End Growing Season
November 16
2 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23

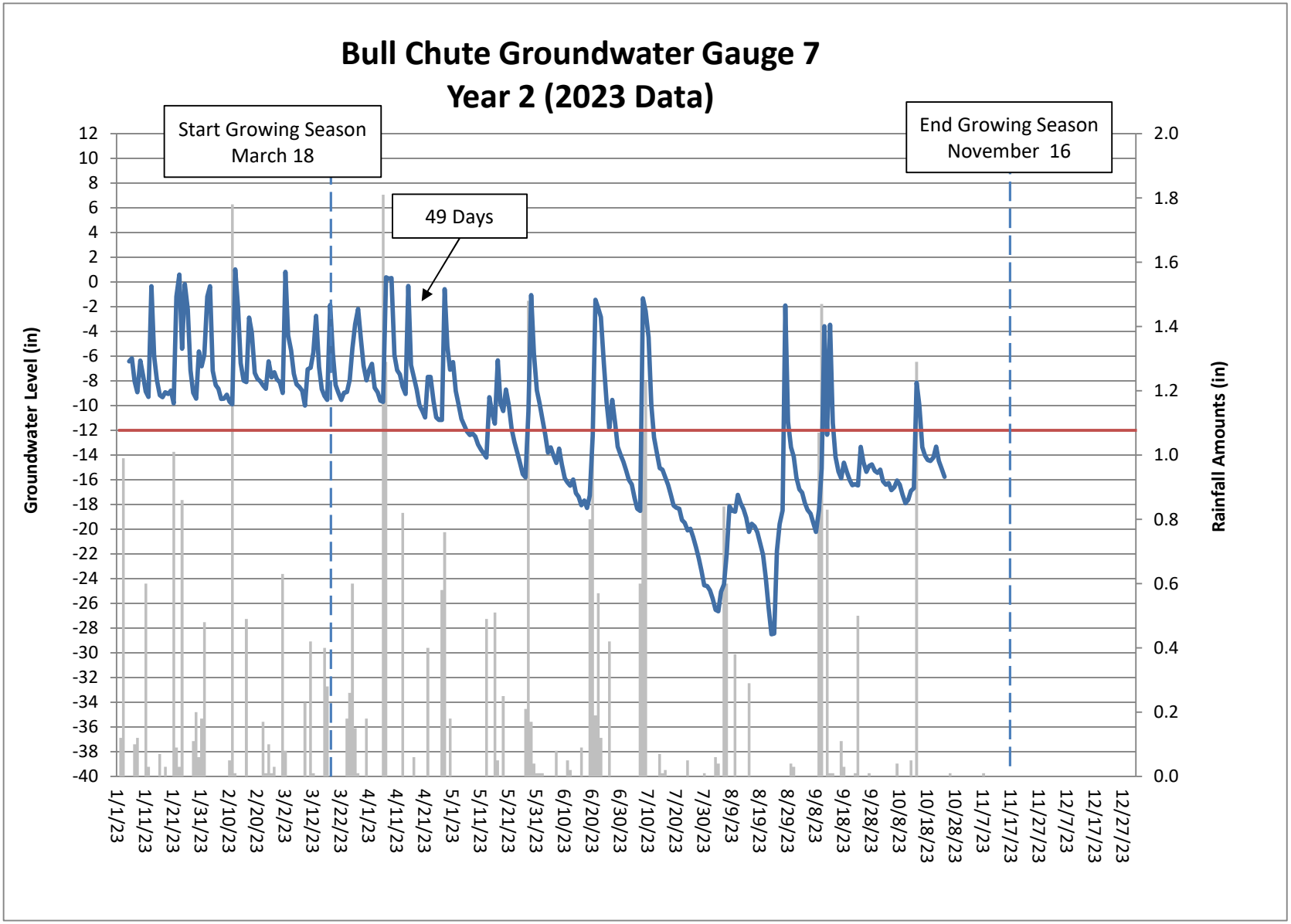

Bull Chute Groundwater Gauge 2
Year 2 (2023 Data)
Start Growing Season
March 18
End Growing Season
November 16
48 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23

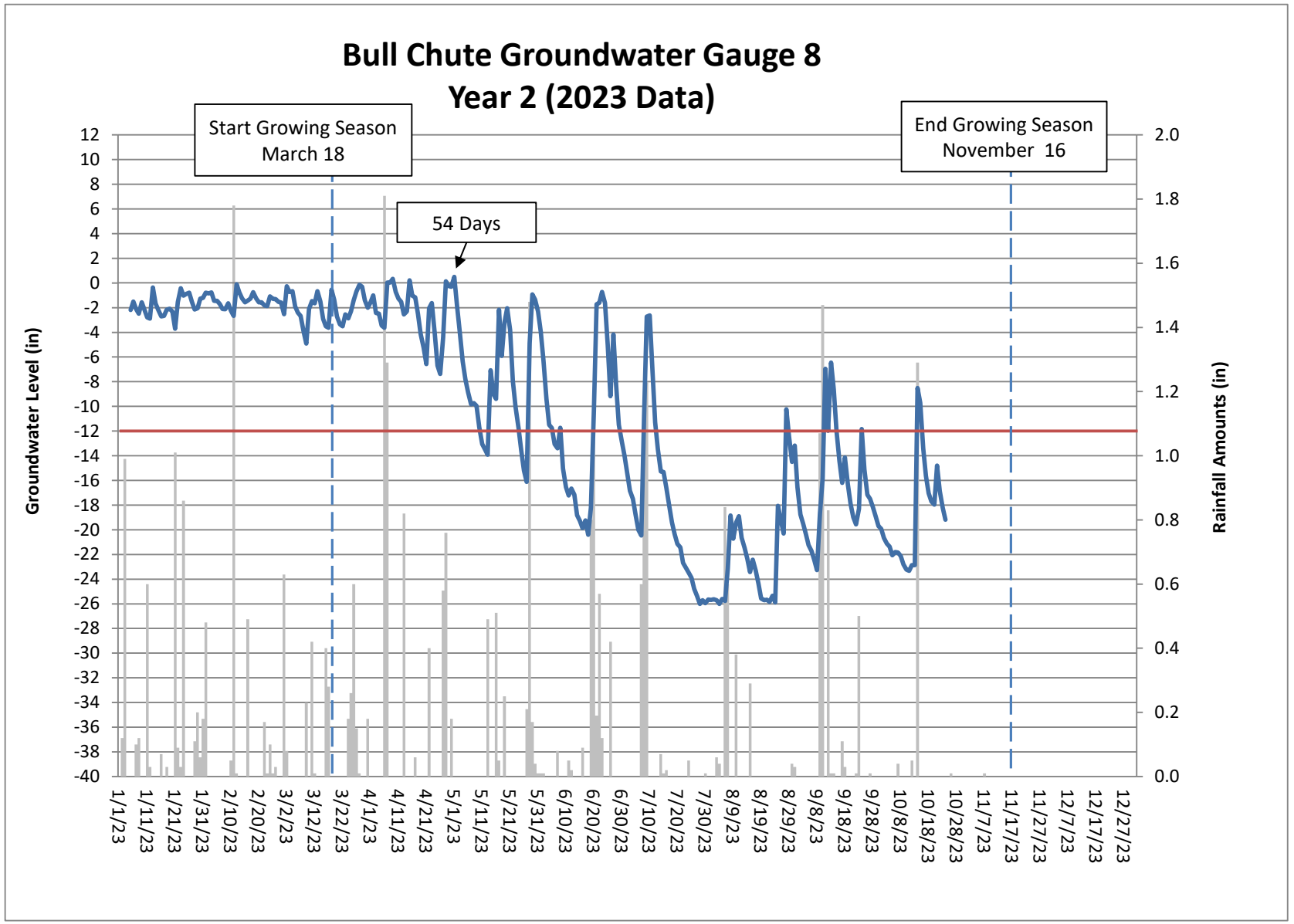

Bull Chute Groundwater Gauge 3
Year 2 (2023 Data)
Start Growing Season
March 18
End Growing Season
November 16
11 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23

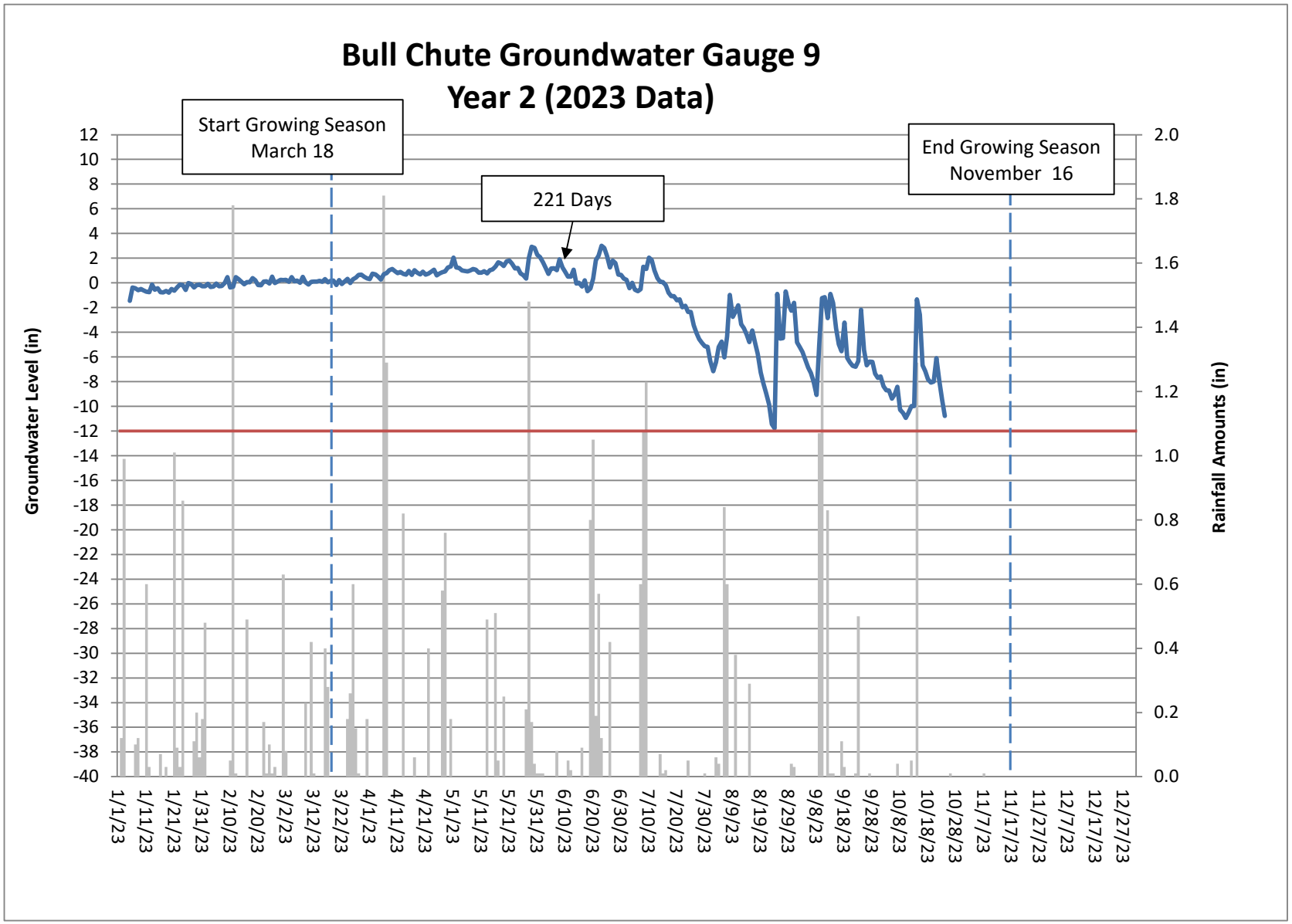

Bull Chute Groundwater Gauge 4
Year 2 (2023 Data)
Start Growing Season
March 18
5 Days
End Growing Season
November 16
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute Groundwater Gauge 5
Year 2 (2023 Data)
Start Growing Season
March 18
End Growing Season
November 16
136 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute Groundwater Gauge 6
Year 2 (2023 Data)
Start Growing Season
March 18
131 Days
End Growing Season
November 16
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute Groundwater Gauge 7
Year 2 (2023 Data)
Start Growing Season
March 18
End Growing Season
November 16
49 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute Groundwater Gauge 8
Year 2 (2023 Data)
Start Growing Season
March 18
End Growing Season
November 16
54 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute Groundwater Gauge 9
Year 2 (2023 Data)
Start Growing Season
March 18
221 Days
End Growing Season
November 16
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23

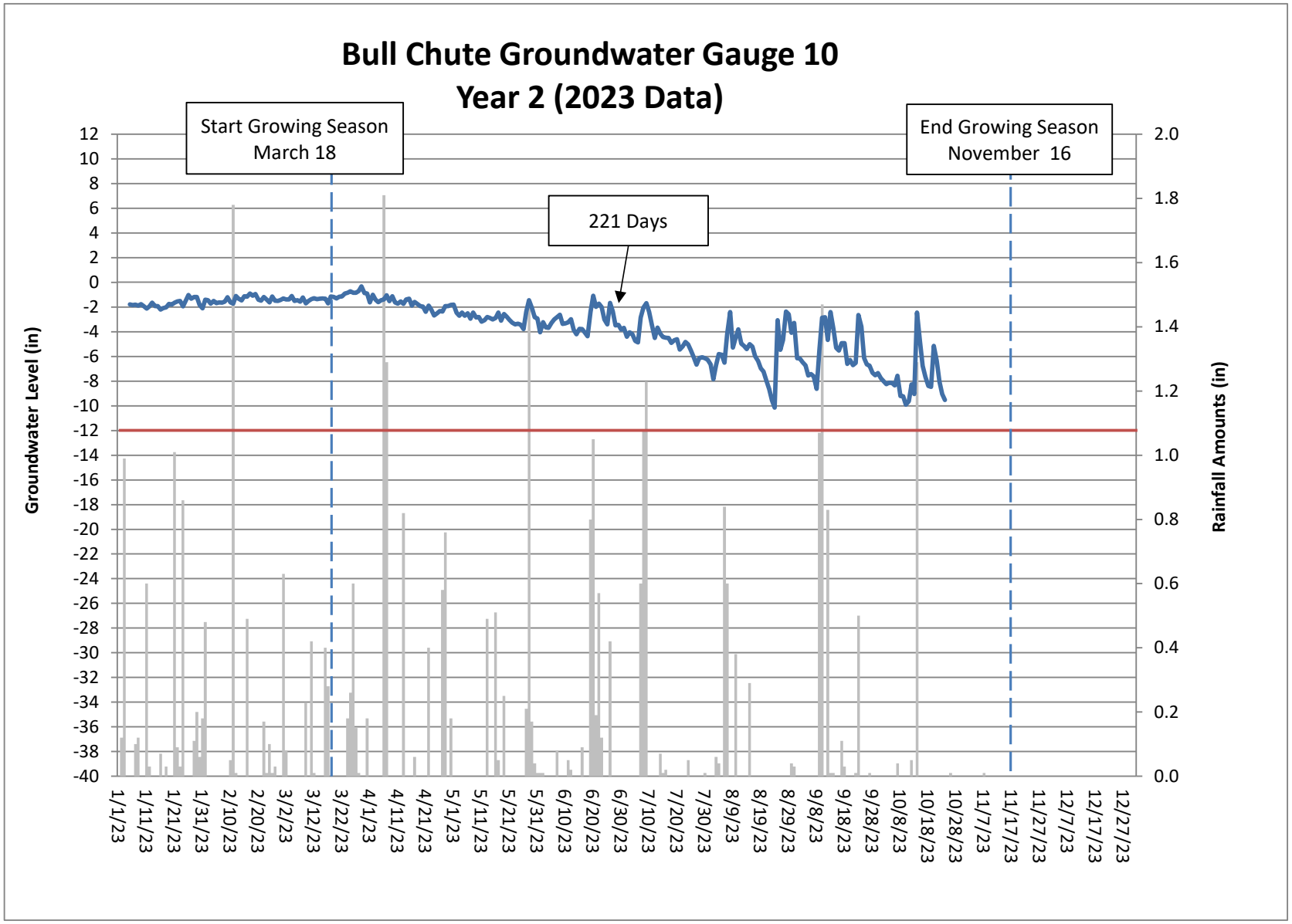

Bull Chute Groundwater Gauge 10
Year 2 (2023 Data)
Start Growing Season
March 18
End Growing Season
November 16
221 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23

Table 13A. UT-1 Channel Evidence

UT-1 Upstream Channel Evidence	Year 1 (2022)	Year 2 (2023)
Max consecutive days channel flow	105	125
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

Table 13B. UT-2 Channel Evidence

UT-2 Channel Evidence	Year 1 (2022)	Year 2 (2023)
Max consecutive days channel flow	124	204
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

Table 13C. UT-3 Channel Evidence

UT-1 Upstream Channel Evidence	Year 1 (2022)	Year 2 (2023)
Max consecutive days channel flow	239	107
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

Table 13D. UT-7 Channel Evidence

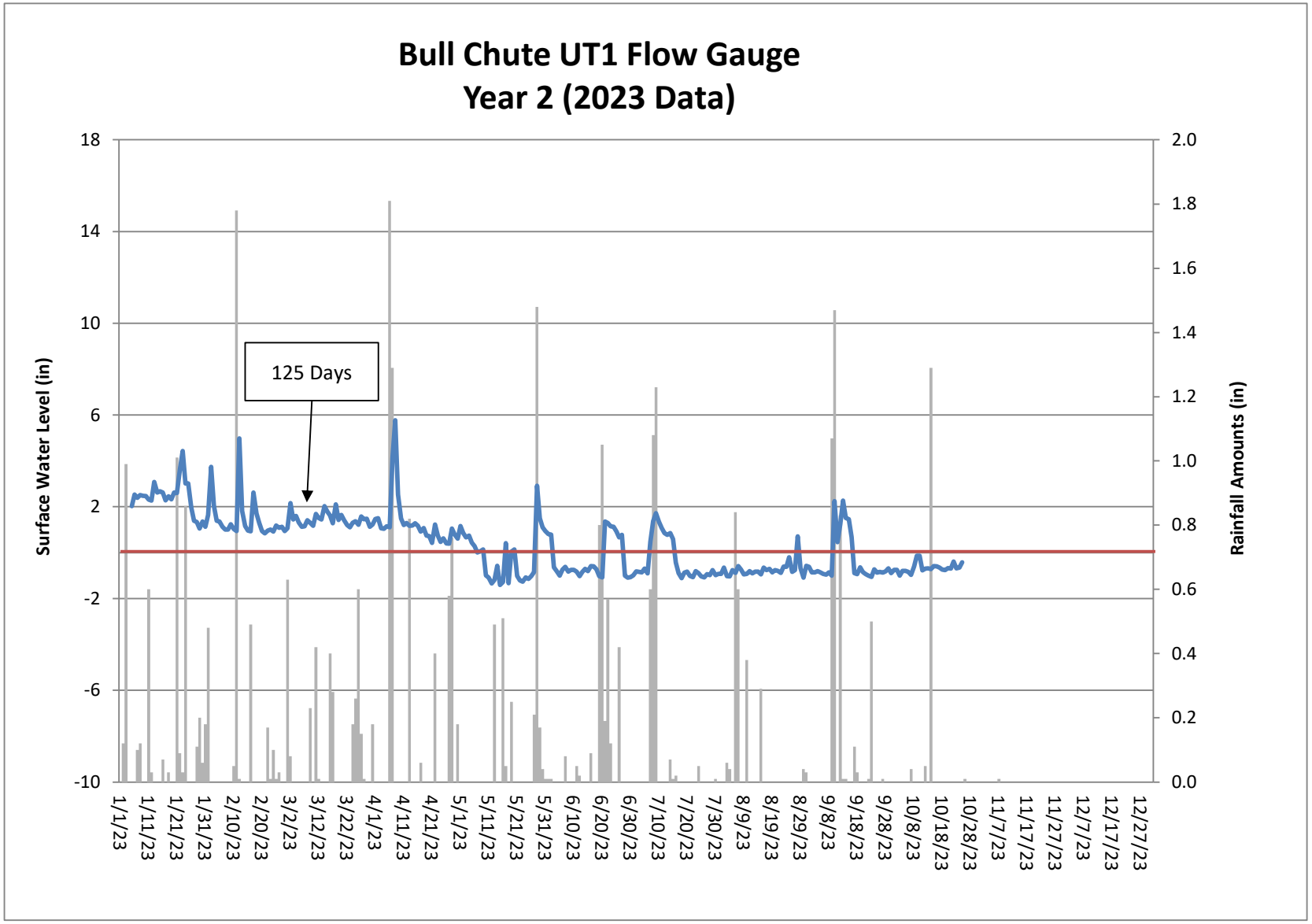
UT-2 Channel Evidence	Year 1 (2022)	Year 2 (2023)
Max consecutive days channel flow	124	293
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

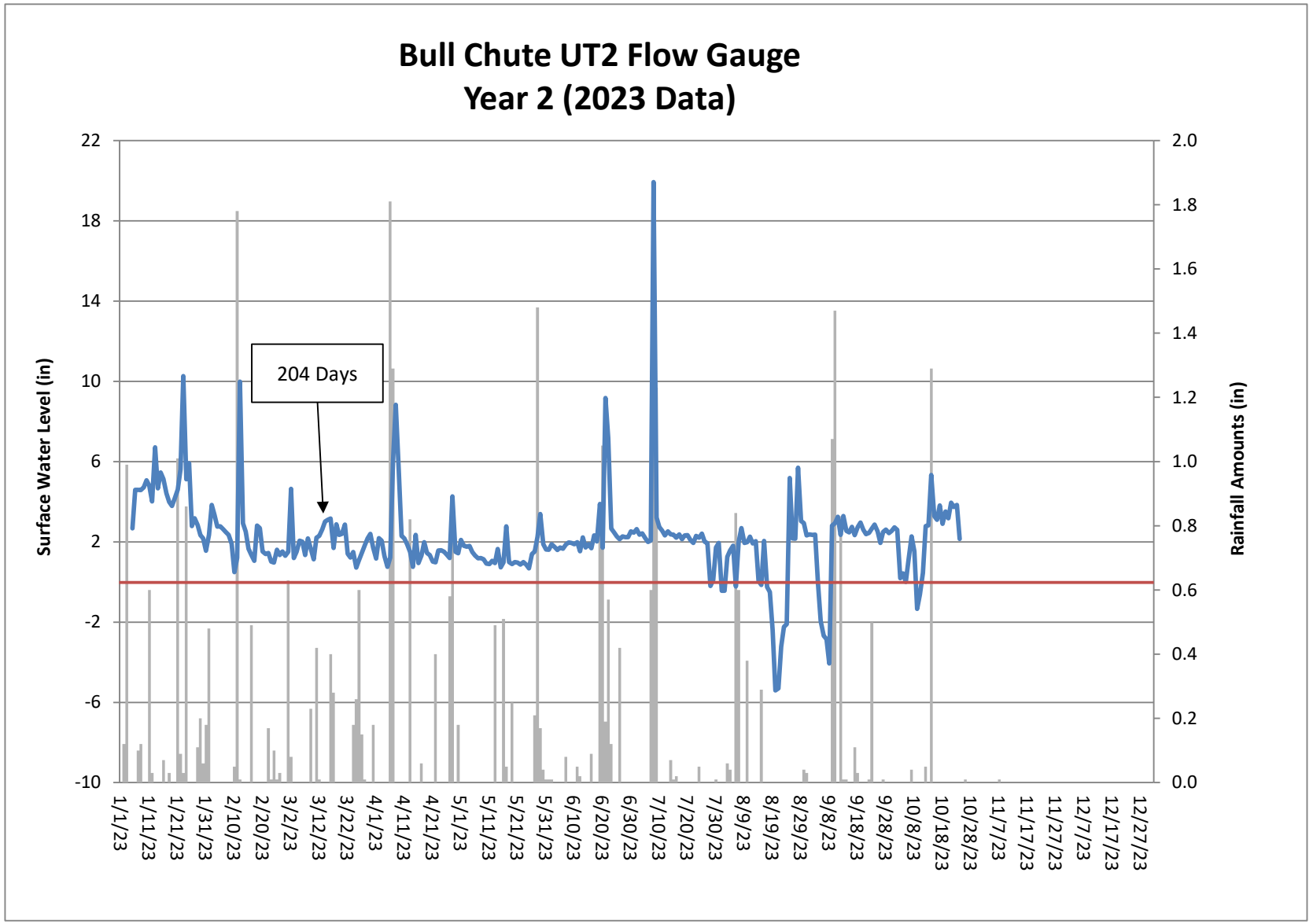
Table 13E. UT-4A Channel Evidence

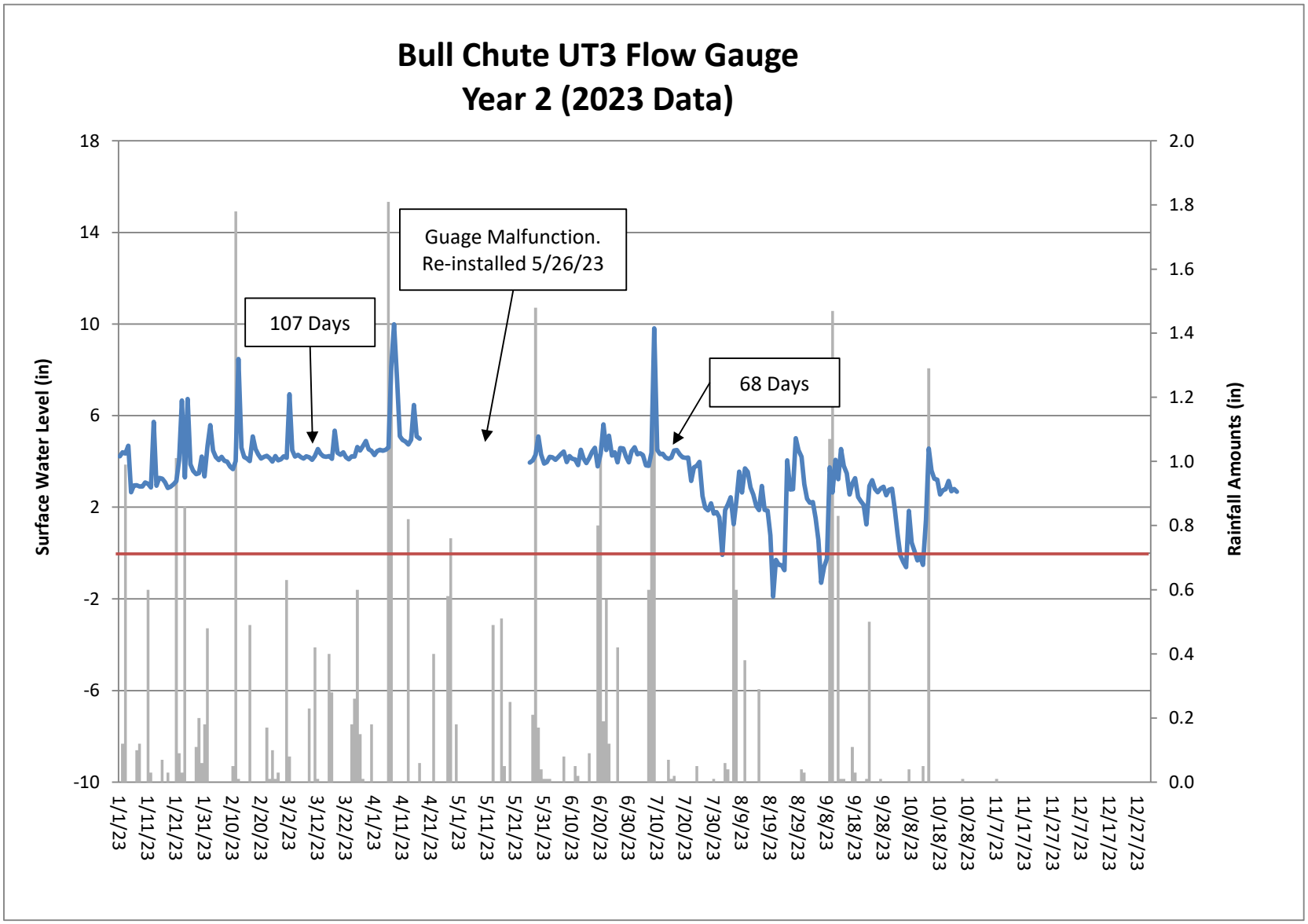
UT-1 Upstream Channel Evidence	Year 1 (2022)	Year 2 (2023)
Max consecutive days channel flow	239	163
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

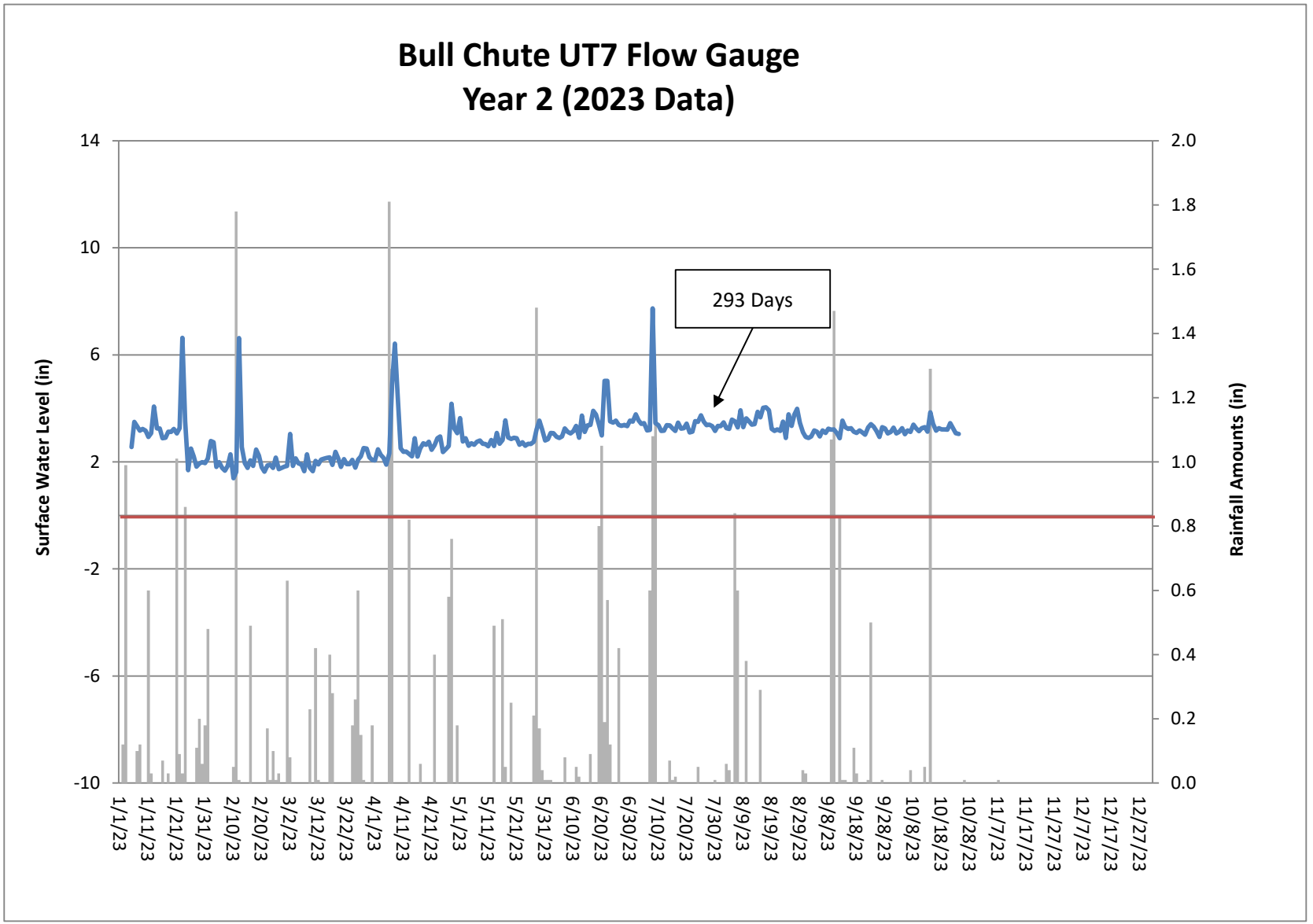
Table 13F. UT-4B Channel Evidence

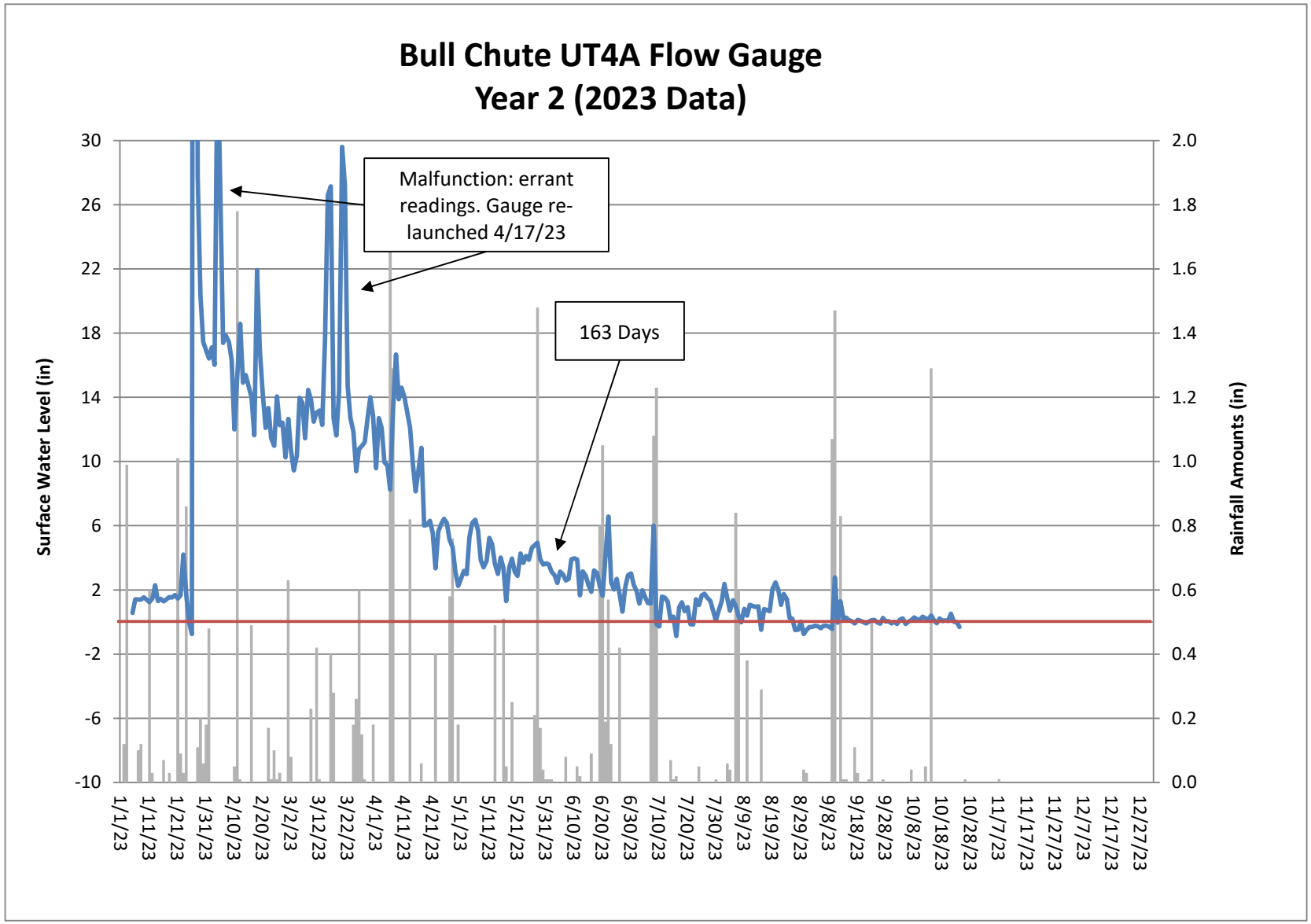
UT-2 Channel Evidence	Year 1 (2022)	Year 2 (2023)
Max consecutive days channel flow	239	293
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		


Bull Chute UT1 Flow Gauge
Year 2 (2023 Data)
Surface Water Level (in)
Rainfall Amounts (in)
125 Days
18
14
10
6
2
-2
-6
-10
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute UT2 Flow Gauge
Year 2 (2023 Data)
Surface Water Level (in)
Rainfall Amounts (in)
204 Days
22
18
14
10
6
2
-2
-6
-10
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute UT3 Flow Gauge
Year 2 (2023 Data)
Surface Water Level (in)
Rainfall Amounts (in)
18
14
10
6
2
-2
-6
-10
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Guage Malfunction.
Re-installed 5/26/23
107 Days
68 Days
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute UT7 Flow Gauge
Year 2 (2023 Data)
Surface Water Level (in)
Rainfall Amounts (in)
293 Days
14
10
6
2
-2
-6
-10
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Bull Chute UT4A Flow Gauge
Year 2 (2023 Data)
Surface Water Level (in)
Rainfall Amounts (in)
Malfunction: errant readings. Gauge re-launched 4/17/23
163 Days
30
26
22
18
14
10
6
2
-2
-6
-10
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23

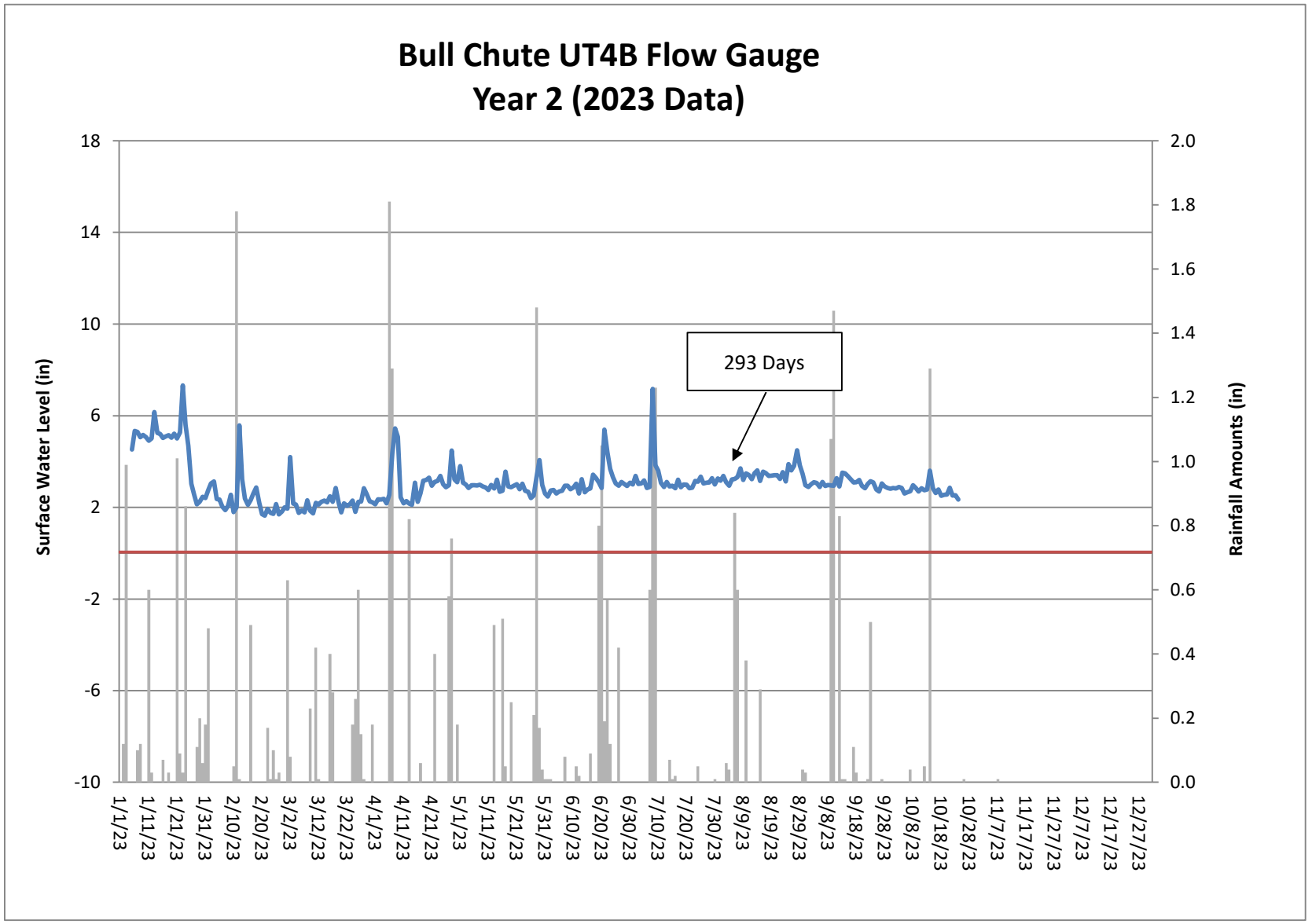
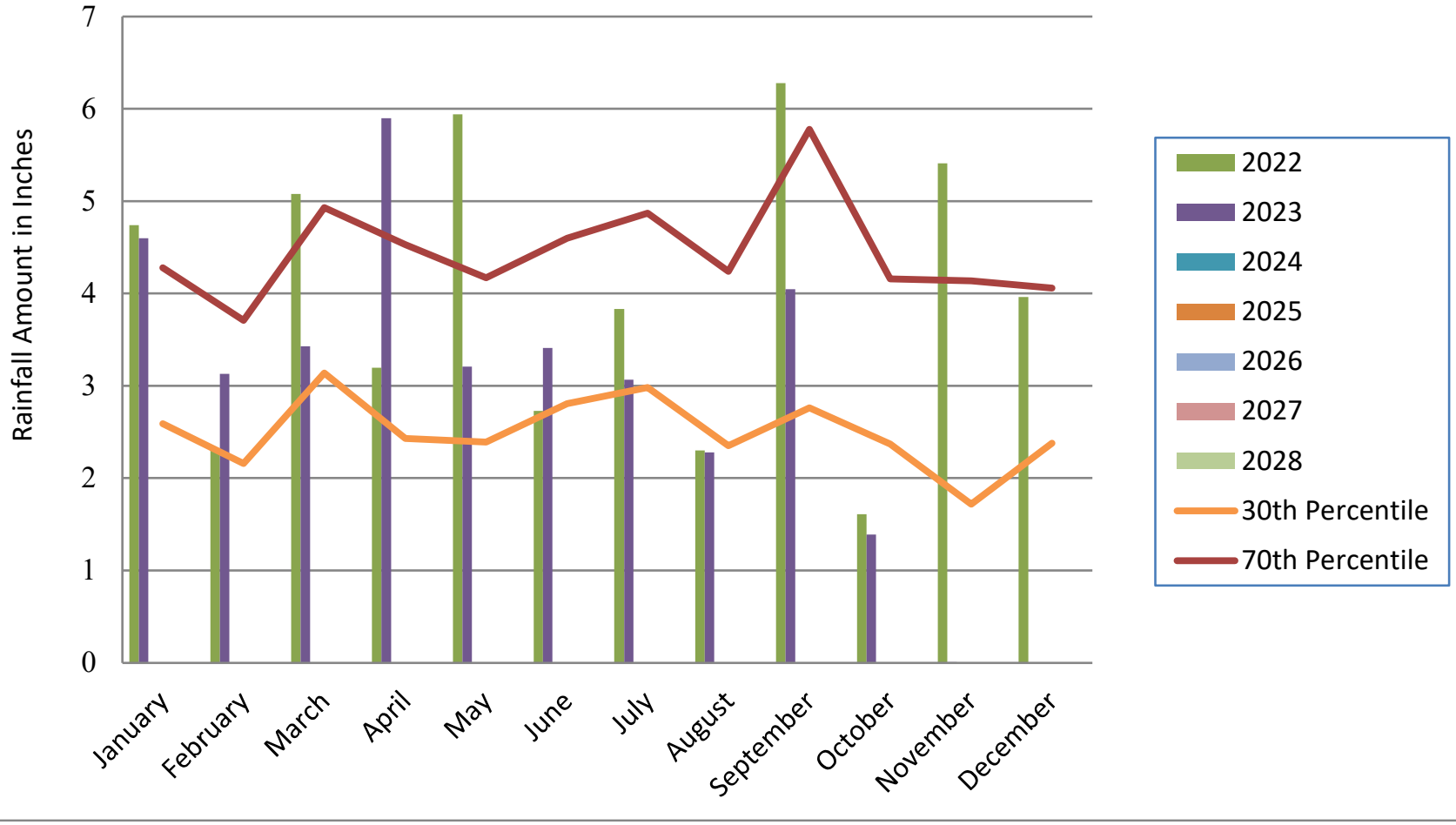

Bull Chute UT4B Flow Gauge
Year 2 (2023 Data)
Surface Water Level (in)
Rainfall Amounts (in)
293 Days
18
14
10
6
2
-2
-6
-10
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23

Figure D1: Bull Chute
30-70 Percentile Graph for Rainfall

Current year data from onsite rain gauge
30-70th percentile data from WETS Station: Randleman, NC (1992-2022)



Appendix E
Project Timeline and Contact Info

Table 14. Project Timeline
Table 15. Project Contacts

Table 14. Project Timeline

Activity or Deliverable	Data Collection Complete	Task Completion or Deliverable Submission
Project Instituted	NA	Nov-19
Mitigation Plan Approved	NA	13-May-21
Construction (Grading) Completed	NA	8-Mar-22
Planting Completed	NA	18-Mar-22
As-built Survey Completed	Jun-22	Jun-22
MY-0 Baseline Report	May-22	Jul-22
MY-1 Vegetation Survey	30-Aug-22	N/A
MY-1 Stream Survey	29-Nov-22	N/A
MY-1 Monitoring Report	Nov-22	Jan-23
MY-2 Vegetation Survey	16-Jun-23	N/A
MY-2 Stream Survey	24-Aug-23	N/A
MY-2 Invasive Treatment - Chinese privet, multiflora rose	N/A	Oct-23
MY-2 Monitoring Report	Nov-23	Jan-24
Remediation Items (e.g. beaver removal, supplements, repairs etc.)		
Encroachment		

Table 15. Project Contacts

Bull Chute/100137	
Provider	Clearwater Mitigation Solutions 604 Macon Pl. Raleigh, NC 27609
Mitigation Provider POC	Kevin Yates 919-624-6901
Designer	Axiom Environmental, Inc. 218 Snow Ave Raleigh, NC 27603
Primary project design POC	Grant Lewis 919-215-1693
Construction Contractor	KBS Earthworks, Inc. 5616 Coble Church Rd Julian, NC 27283
	Kory Strader 336-362-0289

Appendix F
Boundary Inspection Report – MY2

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
MARC RECKTENWALD
Director

NORTH CAROLINA
Environmental Quality

November 17, 2023

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

Subject: Boundary Inspection Report – MY2
Bull Chute, Randolph County, NC; DMS ID No. 100137

Matthew,

The MY2 boundary inspection was conducted by DMS on November 16, 2023. The inspection was conducted in accordance with the DMS Property Checklist which included an office review and a site visit to document site conditions. The entire easement boundary was inspected during the site visit to validate easement integrity and identify any potential issues on the site. This report summarizes those inspection results.

Office Review:
- The plat clearly depicted the conservation easement and numbered corners.
- No encroachments were noted in the MY1 report.
- Aerial photography did not indicate any areas of concern.

Field Inspection:
- The easement corners were monumented with stamped aluminum caps. Multiple caps were confirmed and #5 rebar was present at the newly installed corner locations.
- The site corners were generally well marked, two signs were commonly installed at gated entrances. Some of the corner monuments lacked a witness post with conservation easement signs as shown on the attached kmz.
- In-line marking was generally deficient where multiple line segments with an excess of 200’ sign spacing were noted.
- One witness post was missing, and one was located too far from the monument.
- A downed tree was resting across the fence in the north central portion of the site.

Action Items
- Install witness signs/posts at each unmarked corner.
- Install in-line marking at a frequency of 200’ spacing or less. Shorter segments should have the signs installed equidistant from the corners, but signs must be installed at a spacing no greater than 200’.
- Remove fallen tree from the exclusion fencing in the north central section of the site.

Let me know if you have any questions or need additional information.

Sincerely,
Kelly Phillips

Property Specialist
NCDEQ-DMS
610 East Center Avenue, Suite 301
Mooresville, NC 28115
Cell: (919) 723-7565

cc: R:\EEP PROJECT LIBRARY FILES\PROJECT DELIVERABLES(REPORTS)\FD PROJECTS\Bull Chute Site_7878-01 (#100137)\4_T2_Cons_Ease\DMS Easement Inspections