FINAL MONITORING REPORT
2020 (Year 2)

HERON STREAM AND WETLAND MITIGATION SITE

Alamance County, North Carolina

DMS Project ID No. 100014
Full Delivery Contract No. 7192
USACE Action ID No. SAW-2017-01471
DWR No. 17-0290
RFP No. 16-006990

Cape Fear River Basin
Cataloging Unit 03030002

Data Collection: January 2020 – October 2020
Submission: January 2021

Prepared for:

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

January 2021

Mitigation Project Name	**Heron Stream & Wetland Mitigation Site**	**USACE Action ID**	**2017-01471**
DMS ID	**100014**	**DWR Permit**	**2017-0920**
River Basin	**Cape Fear**	**Date Project Instituted**	**5/22/2017**
Cataloging Unit	**03030002**	**Date Prepared**	**4/20/2020**
County	**Alamance**	**Stream/Wet. Service Area**	**Cape Fear 03030002**

Todd J Tugwell 9/21/2020

Signature & Date of Official Approving Credit Release

1 - For NCDMS, no credits are released during the first milestone

2 - For NCDMS projects, the initial credit release milestone occurs when the as-built report (baseline monitoring report) has been approved by the NCIRT and posted to the NCDMS Portal, provided the following criteria have been met:

1) Approved of Final Mitigation Plan
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan.
4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met.

Credit Release Milestone	**Warm Stream Credits**						
Project Credits	**Scheduled Releases %**	**Proposed Releases %**	**Proposed Released #**	**Not Approved # Releases**	**Approved Credits**	**Anticipated Release Year**	**Actual Release Date**
1 - Site Establishment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2 - Year 0 / As-Built	30.00%	30.00%	1,588.000	0.000	1,588.000	2019	6/3/2019
3 - Year 1 Monitoring	10.00%	10.00%	529.333	0.000	529.333	2020	4/20/2020
4 - Year 2 Monitoring	10.00%					2022	
5 - Year 3 Monitoring	10.00%					2022	
6 - Year 4 Monitoring	5.00%					2023	
7 - Year 5 Monitoring	10.00%					2024	
8 - Year 6 Monitoring	5.00%					2025	
9 - Year 7 Monitoring	10.00%					2026	
Stream Bankfull Standard	10.00%						
			Totals		2,117.333		

Total Gross Credits	5,293.334
Total Unrealized Credits to Date	0.000
Total Released Credits to Date	2,117.333
Total Percentage Released	40.00%
Remaining Unreleased Credits	3,176.001

Credit Release Milestone	**Riparian Credits**						
Project Credits	**Scheduled Releases %**	**Proposed Releases %**	**Proposed Released #**	**Not Approved # Releases**	**Approved Credits**	**Anticipated Release Year**	**Actual Release Date**
1 - Site Establishment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2 - Year 0 / As-Built	30.00%	30.00%	0.197	0.000	0.197	2019	6/3/2019
3 - Year 1 Monitoring	10.00%	10.00%	0.065	0.000	0.065	2020	4/20/2020
4 - Year 2 Monitoring	10.00%					2022	
5 - Year 3 Monitoring	15.00%					2022	
6 - Year 4 Monitoring	5.00%					2023	
7 - Year 5 Monitoring	15.00%					2024	
8 - Year 6 Monitoring	5.00%					2025	
9 - Year 7 Monitoring	10.00%					2026	
Stream Bankfull Standard	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Totals		0.262		

Total Gross Credits	0.655
Total Unrealized Credits to Date	0.000
Total Released Credits to Date	0.262
Total Percentage Released	40.00%
Remaining Unreleased Credits	0.393

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County	**Alamance**	**Stream/Wet. Service Area**	**Cape Fear 03030002**

Notes

Contingencies (if any)

Project Quantities

Mitigation Type	Restoration Type	Physical Quantity
Warm Stream	Restoration	4,068.000
Warm Stream	Enhancement I	1,184.000
Warm Stream	Enhancement II	1,090.000
Riparian	Restoration	0.350
Riparian	Enhancement	0.610

Debits

							Stream Restoration Credits	Riparian Restoration	Riparian Restoration Equivalent Credits
Beginning Balance (mitigation credits)							**5,293.334**	**0.350**	**0.305**
Released Credits							**2,117.330**	**0.140**	**0.122**
Unrealized Credits							**0.000**	**0.000**	**0.000**
Owning Program	**Req. Id**	**TIP #**	**Project Name**	**USACE Permit #**	**DWR Permit #**	**DCM Permit #**			
Statewide Stream & Wetland ILF Program	REQ-002700		Green Hope Crossing SD	2014-00268	2014-0059		17.862		
Statewide Stream & Wetland ILF Program	REQ-003319		East Alamance Quarry	2005-21057-201	2005-0688		256.966		
Statewide Stream & Wetland ILF Program	REQ-003343		Lake Townsend Dam Replacement	2007-00895-241	2007-0410		1.849		
Statewide Stream & Wetland ILF Program	REQ-004409	U-2524BA U-2524BB	DOT - Greensboro Western Loop	2002-21216	2001-1318		55.789		
Statewide Stream & Wetland ILF Program	REQ-005559		Legend Oaks Lots 3-5	2009-00106	2005-1986		2.930		
Statewide Stream & Wetland ILF Program	REQ-006376		Greenmoor Subdivision	2013-00656	2015-0609		273.000		
Statewide Stream & Wetland ILF Program	REQ-006404		Brickhaven and Sanford Mines	2014-02254	2015-0041		979.604		
Statewide Stream & Wetland ILF Program	REQ-003605		Villages at Reedy Fork	2003-20436	2003-0056			0.099	

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Debits

Owning Program	**Req. Id**	**TIP #**	**Project Name**	**USACE Permit #**	**DWR Permit #**	**DCM Permit #**	**Stream Restoration Credits**	**Riparian Restoration**	**Riparian Restoration Equivalent Credits**
Statewide Stream & Wetland ILF Program	REQ-004030	I-2402A I-2402B I-2402D	DOT - I-85 Greensboro Bypass	1995-02886	1998-0349			0.005	
Statewide Stream & Wetland ILF Program	REQ-004098	U-2406	DOT - Elon College Bypass	1995-01526	1999-0930			0.001	
Statewide Stream & Wetland ILF Program	REQ-004030	I-2402A I-2402B I-2402D	DOT - I-85 Greensboro Bypass	1995-02886	1998-0349				0.092
Total Credits Debited							**979.604**	**0.105**	**0.092**
Remaining Available balance (Released credits)							**529.333**	**0.035**	**0.030**
Remaining balance (Unreleased credits)							**3,705.334**	**0.210**	**0.183**

NCDMS comment responses:

1. Please describe how RS expects to achieve vegetative success for the 3 plots that are not currently meeting. Describe if these are isolated areas, and if RS expects volunteers to make up for the deficiencies there. Also, the MP shows 4 random plots; please ensure that there are 4 plots in MY3 and that they located nearby the vegetation plots in that are not meeting to demonstrate if low vigor is or is not an issue.
   RS performed visual assessments of the areas surrounding the unsuccessful plots and determined that the areas around Plots 2, 3 and 4 would benefit from a light supplemental planting to ensure future success. Low stem density within plot 6 appears isolated, and supplemental planting will not be necessary. The areas of poor growth rates or vigor were added to Figure 2A and Table 6, and the 2021 supplemental planting plan is described in the "Vegetation Summary" section of the report. Additionally, during MY3, 4 transects will be measured in the vicinities of plots that were not meeting success criteria in MY2.

2. Check BHRs on table 13 compared to summary data with picture. It appears that XS 1, 9, 25 may not match. QAQC all BHR and other numbers here. Describe what is going on in the system near XS 26 and 27.
   All bank height ratios on Table 13 now match the cross-section plots. Notes were added to cross-sections 26 and 27 explaining that the degradation on XS-26 (UT6) and aggradation on XS-27 (UT7) appear stable and are not cause for concern at this time. They will be monitored closely during subsequent years to ensure no remedial action is needed.

Digital Review-

- Please ensure that the Bank Height Ratio is being calculated using the bankfull elevation that generates the MY0 cross sectional area within the MY2 channel. It is this bankfull elevation that is used to determine max depth at bankfull for the denominator, whereas the current MY's low bank height is used in the numerator.
  All cross-sections were double checked to ensure that bank height ratio is being calculated using the bankfull elevation that generates the MY0 cross sectional area within the MY2 channel, as described above.

Heron Year 2, 2020 Monitoring Summary

General Notes

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

Streams

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

Wetlands

- Six of six groundwater gauges met success for the Year 2 (2020) monitoring period. Wetland hydrology data is in Appendix E.

Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2019)	**Year 2 (2020)**	**Year 3 (2021)**	**Year 4 (2022)**	**Year 5 (2023)**	**Year 6 (2024)**	**Year 7 (2025)**
1	Yes 33 days (15.8%)	Yes 23 days (9.8%)					
2	Yes 26 days (12.4%)	Yes 27 days (11.5%)					
3	Yes 35 days (16.7%)	Yes 28 days (12.0%)					
4	Yes 69 days (33.0%)	Yes 51 days (21.8%)					
5	Yes 52 days (24.9%)	Yes 45 days (19.2%)					
6	Yes 54 days (25.8%)	Yes 46 days (19.7%)					

Vegetation Summary

Measurements of all 16 plots resulted in an average of 372 planted stems/acre excluding livestakes. Additionally, all plots met success criteria except permanent plots 3, 4, and 6 (Tables 8-10, Appendix C). These plots are in areas of dense fescue and will be treated.

Site Permitting/Monitoring Activity and Reporting History

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Technical Proposal (RFP No. 16-006990)	January 11, 2017	January 11, 2017
Institution Date (NCDMS Contract No. 100014)	--	May 22, 2017
404 Permit	--	October 10, 2018
Mitigation Plan	--	July 2018
Construction Plans	--	July 17, 2018
Site Construction	--	November 27, 2018-February 11, 2019
Planting	--	February 21, 2019
As-built Baseline Stream Data Collection	February 25-26, 2019	--
As-built Baseline Vegetation Data Collection	February 25, 2019	--
As-built Baseline Monitoring (MY0)	February-March 2019	May 2019
Monitoring Year 1 (2019) Stream Data Collection	August 13-14, 2019	--
Monitoring Year 1 (2019) Vegetation Data Collection	September 30, 2019	--
Monitoring Year 1 (MY1)	March-October 2019	November 2019
Monitoring Year 2 (2020) Stream Data Collection	May 16-24, 2020	--
Monitoring Year 2 (2020) Vegetation Data Collection	July 1-6, 2020	--
Monitoring Year 2 (MY2)	March-October 2020	January 2021

Site Maintenance Report (2020)

Invasive Species Work	Maintenance work
6-12-2020 Privet, Rose, Tree-of-Heaven, Microstegium, Johnson Grass	None

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January 2021

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APPENDICES

1.0 PROJECT SUMMARY

Restoration Systems, LLC has established the North Carolina Division of Mitigation Services (NCDMS) Heron Stream and Wetland Restoration Site (Site).

1.1 Project Goals & Objectives

Project goals were based on the *Cape Fear River Basin Restoration Priorities* (RBRP) report (NCEEP 2009) and on-site preconstruction data collection of channel morphology and function observed during field investigations. The Site is located within Targeted Local Watershed (TLW) 03030002050050. The RBRP report documents benthic ratings vary between "Fair" and "Good-Fair" possibly due to cattle, dairy, and poultry operations. The project is not located in a Regional or Local Watershed Planning Area; however, RBRP goals addressed by project activities are as follows with Site specific information following the RBRP goals in parenthesis.

1. Reduce and control sediment inputs (sediment input reduction of 67.3 tons/year);
2. Reduce and manage nutrient inputs (livestock removed from streams, elimination of fertilizer application, installation of marsh treatment areas; and a direct reduction of 893.2 pounds of nitrogen and 47.0 pounds of phosphorus per year);

Site specific mitigation goals and objectives were developed through the use of North Carolina Stream Assessment Method (NC SAM) and North Carolina Wetland Assessment Method (NC WAM) analyses of preconstruction and reference stream systems at the Site (NC SFAT 2015 and NC WFAT 2010) (see Table 1).

Table 1. Stream/Wetland Targeted Functions, Goals, and Objectives

Targeted Functions	Goals	Objectives	Compatibility of Success Criteria
(1) HYDROLOGY			
(2) Flood Flow (Floodplain Access) (3) Streamside Area Attenuation (4) Floodplain Access (4) Wooded Riparian Buffer (4) Microtopography	• Attenuate flood flow across the Site. • Minimize downstream flooding to the maximum extent possible. • Connect streams to functioning wetland systems.	• Construct new channel at historic floodplain elevation to restore overbank flows and restore jurisdictional wetlands • Plant woody riparian buffer • Remove livestock • Deep rip floodplain soils to reduce compaction and increase soil surface roughness • Protect riparian buffers with a perpetual conservation easement	• BHR not to exceed 1.2 • Document four overbank events in separate monitoring years • Livestock excluded from the easement • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded
(3) Stream Stability (4) Channel Stability (4) Sediment Transport	• 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 • Construct stable channels with cobble/gravel substrate • Plant woody riparian buffer	• Cross-section measurements indicate a stable channel with cobble/gravel substrate • Visual documentation of stable channels and structures • BHR not to exceed 1.2 • ER of 1.4 or greater • < 10% change in BHR and ER in any given year • Livestock excluded from the easement • Attain Vegetation Success Criteria
(1) WATER QUALITY			
(2) Streamside Area Vegetation (3) Upland Pollutant Filtration (3) Thermoregulation (2) Indicators of Stressors Wetland Particulate Change Wetland Physical Change	• Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters.	• Remove 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 through deep ripping/plowing • Restore overbank flooding by establishing proper channel dynamics • Cessation of municipal land application	• Livestock excluded from the easement • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria
(1) HABITAT			
(2) In-stream Habitat (3) Substrate (3) Stream Stability (3) In-Stream Habitat (2) Stream-side Habitat (3) Stream-side Habitat (3) Thermoregulation Wetland Landscape Patch Structure Wetland Vegetation Composition	• Improve instream and stream-side habitat.	• Construct stable channels with cobble/gravel substrate • Plant woody riparian buffer to provide organic matter and shade • Construct new channel at historic floodplain elevation to restore overbank flows and plant woody riparian buffer • Protect riparian buffers with a perpetual conservation easement • Restore/enhance jurisdictional wetlands adjacent to Site streams	• Cross-section measurement indicate a stable channel with cobble/gravel substrate • Visual documentation of stable channels and in-stream structures. • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded

1.2 Project Background

The Heron Stream and Wetland Mitigation Site (hereafter referred to as the "Site") encompasses a 17.64-acre easement along warm water, unnamed tributaries to Pine Hill Branch and unnamed tributaries to South Fork Cane Creek. The Site is located approximately 4 miles southeast of Snow Camp and 4.5 miles north of Silk Hope in southern Alamance County near the Chatham County line (Figure 1, Appendix A).

Prior to construction, Site land use consisted of disturbed forest and agricultural land used for livestock grazing and hay production. Livestock had unrestricted access to Site streams, which had been cleared, dredged of cobble substrate, straightened, trampled by livestock, eroded vertically and laterally, and received extensive sediment and nutrient inputs from stream banks and adjacent pastures. Approximately 62 percent of the stream channel had been degraded contributing to sediment export from the Site resulting from mechanical processes such as livestock hoof shear. In addition, streamside wetlands were cleared and drained by channel downcutting and land uses. Preconstruction Site conditions resulted in degraded water quality, a loss of aquatic habitat, reduced nutrient and sediment retention, and unstable channel characteristics (loss of horizontal flow vectors that maintain pools and an increase in erosive forces to channel bed and banks). Site restoration activities restored riffle-pool morphology, aided in energy dissipation, increased aquatic habitat, stabilized channel banks, and greatly reduced sediment loss from channel banks.

1.3 Project Components and Structure

Proposed Site restoration activities generated 5293 Stream Mitigation Units (SMUs) and 0.66 Wetland Mitigation Units (WMUs) as the result of the following.

- 4068 linear feet of Priority I stream restoration
- 1184 linear feet of stream enhancement (Level I)
- 1090 linear feet of stream enhancement (Level II)
- 0.35 acre of riparian wetland restoration
- 0.61 acre of riparian wetland enhancement

Additional activities that occurred at the Site included the following.

- Installation of six marsh treatment areas throughout the Site.
- Fencing the entire conservation easement by leaving some pre-existing fencing, removing fencing, and installing additional fencing.
- Planting 12.05 acres of the Site with 15,625 stems (planted species and densities by zone are included in Table 7 [Appendix C]).

Deviations from the construction plans included realignment of UT 1B (adding 20 linear feet to the alignment) due to conflicts with a gas line crossing. The realignment resulted in the reduction of a log vane and alterations to pipe configurations within the crossing. Gas line realignment also affected the length of UT 2 in its lower reaches (shortening the Restoration reach). UT 2 also has minor deviations in the enhancement II reach due to profile elevation alterations to tie to the invert of UT 1B. These profile alterations were included in construction plans, but not included in table updates of the detailed plan. Profile alterations resulted in the Enhancement (level II)/Restoration initiation point migrating upstream, and thus the length of the Enhancement (Level II) reach (UT 2A) decreased by 39 feet, and the length of the restoration reach (UT 2B) increased by 17 feet.

Minor easement deviations after construction plan development resulted in some stationing changes, most notable at the upper reaches of UT 1A (adding 5 linear feet to the alignment) and UT 8A & UT 8B (reducing the alignments by a total of 4 linear feet). The easement variations also affected channel lengths across gas lines, which do not generate mitigation credit. Eight log cross-vanes were not constructed due to contact with bed rock, or conflicts with the gas line. In addition, a marsh treatment area was added to the right bank of UT 6 at a draw that was concentrating surface drainage and scouring the valley walls. No other deviations of significance occurred between construction plans and the as-built condition. In addition, no issues have arisen since construction occurred.

Site design was completed in July 2018. Construction started on November 27, 2018 and ended within a final walkthrough on February 11, 2019. The Site was planted on February 21, 2019. Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 1-4 (Appendix A).

1.4 Success Criteria

Project success criteria have been established per the October 24, 2016 NC Interagency Review Team *Wilmington District Stream and Wetland Compensatory Mitigation Update*. Monitoring and success criteria relate to project goals and objectives. From a mitigation perspective, several of the goals and objectives are assumed to be functionally elevated by restoration activities without direct measurement. Other goals and objectives will be considered successful upon achieving success criteria. The following table summarizes Site success criteria.

Success Criteria

Streams
• All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05. • Continuous surface flow must be documented each year for at least 30 consecutive days. Surface water monitoring gauges will be installed in the upper third of all intermittent channels, unless otherwise requested by the IRT. • Bank height ratio (BHR) cannot exceed 1.2 at any measured cross-section. • Entrenchment ratio (ER) must be no less than 2.2 for E- and C-type channels at any measured riffle cross-section. Note: B-type channels may have an ER less than 1.4. • BHR and ER 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 within the upper 12 inches of the soil surface for, at a minimum, 10 percent of the growing season, during average climatic conditions. Note: Soil temperature for growing season establishment will be measured daily utilizing a continuous monitoring soil probe. Soil temperature will be measured from mid-February through the end of April (at a minimum).
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.

2.0 METHODS

Monitoring requirements and success criteria outlined in this plan follow the October 24, 2016 NC Interagency Review Team *Wilmington District Stream and Wetland Compensatory Mitigation Update*. Monitoring will be conducted by Axiom Environmental, Inc. Annual monitoring reports of the data collected will be submitted to the NCDMS by Restoration Systems no later than December 31 of each monitoring year data is collected. The monitoring schedule is summarized in the following table.

Monitoring Schedule

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Streams							
Wetlands							
Vegetation							
Macroinvertebrates							
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 37 cross-sections on restored channels	Graphic and tabular data.
Channel Stability	Visual Assessments	Yearly	All restored stream channels	Areas of concern to be depicted on a plan view figure with a written assessment and photograph of the area included in the report.
	Additional Cross-sections	Yearly	Only if instability is documented during monitoring	Graphic and tabular data.
Stream Hydrology	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	Total of 10 surface water gauges	Surface water data for each monitoring period as depicted in Figures 10A-10D.
Bankfull Events	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	Total of 10 surface water gauges: One gauge on UT1, 2, 3, 6 and 8. Two gauges on UT 5. Three gauges on UT 7	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through monitoring period	All restored stream channels	Visual evidence, photo documentation, and/or rain data.
Benthic Macroinvertebrates	"Qual 4" method described in *Standard Operating Procedures for Collection and Analysis of Benthic Macroinvertebrates, Version 5.0* (NCDWR 2016)	Pre-construction, Years 3, 5, and 7 during the "index period" referenced in *Small Streams Biocriteria Development* (NCDWQ 2009)	2 stations (one at the lower end of UT1 and one at the lower end of UT5)	Results* will be presented on a site-by-site basis and to include a list of taxa collected, an enumeration of *Ephemeroptera, Plecoptera,* and *Tricopetera* taxa as well as Biotic Index.
Wetland Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Wetland Restoration	Groundwater gauges	As-built, Years 1, 2, 3, 4, 5, 6, and 7 throughout the year with the growing season defined as March 1-October 22	6 gauges spread throughout restored wetlands	Soil temperature at the beginning of each monitoring period to verify the start of the growing season, 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	14 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	4 plots randomly selected each year	Species and height

*Benthic Macroinvertebrate sampling data will not be tied to success criteria; however, the data may be used as a tool to observe positive gains to in-stream habitat

Stream Summary

All streams are functioning as designed, and no stream areas of concern were observed during year 2 (2020) monitoring. Stream morphology data is available in Appendix D.

Wetland Summary

Summary of Monitoring Period/Hydrology Success Criteria by Year

Year	Soil Temperatures/Date Bud Burst Documented	Monitoring Period Used for Determining Success	10 Percent of Monitoring Period
2019 (Year 1)	March 28, 2019*	March 28-October 22 (209 days)	21 days
2020 (Year 2)	March 2, 2020*	March 2-October 22 (234 days)	23 days

*Based on data collected from a soil temperature data logger located on the Site.

All six groundwater gauges met success criteria for the year 2 (2020) monitoring period (Appendix E).

Vegetation Summary

During quantitative vegetation sampling, 14 sample plots (10-meter by 10-meter) were installed within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation*, *Version 4.2* (Lee et al. 2008). Year 2 (2020) measurements also included two random sample plots (25-meter by 4-meter). Measurements of all 16 plots resulted in an average of 372 planted stems/acre excluding livestakes. Additionally, all plots met success criteria except permanent plots 3, 4, and 6 (Tables 8-10, Appendix C).

A visual assessment of areas containing unsuccessful plots indicated two areas of poor growth rates or vigor due to competition from dense fescue: one in the vicinity of Plots 2 and 4 (0.87 acres) and another in the vicinity of Plot 3 (0.48 acres). These areas are depicted on Figure 2A (Appendix B). RS plans to treat fescue and supplementally plant these areas during the 2021 dormant season. Planting will occur at a rate of approximately 330 stems per acre and will include bare-root stems of river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), tulip poplar (*Liriodendron tulipifera*), red bud (*Cercis canadensis*), sycamore (*Platanus occidentalis*), white oak (*Quercus alba*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), and red oak (*Quercus rubra*). Additionally, plot 6 was 3 stems shy of meeting success criteria; however, visual assessments indicate that low stem density in this area appears isolated and a temporary vegetation transect in its vicinity easily met success criteria.

3.0 REFERENCES

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Appendix A
Background Tables

Table 1. Project Components and Mitigation Units
Table 2. Project Activity and Reporting History
Table 3. Project Contacts Table
Table 4. Project Attributes Table

Table 1. Project Components and Mitigation Credits: Heron Restoration Site

Reach ID	Stream Stationing/ Wetland Type	Existing Footage/ Acreage	Mitigation Plan Footage/ Acreage	Restoration Footage/ Acreage	Restoration Level	Restoration or Restoration Equivalent	Mitigation Ratio	Mitigation Credits	Comment
UT 1A	(-)0+05 to 04+70	475	470	475	Enhancement (Level I)	475	1.5:1	317	
UT 1B	04+70 to 13+26	753	836	856	Restoration	856-57= 799	1:1	799	57 lf of UT1 is located outside of the conservation easement and therefore is not generating credit
UT 2A	00+00 to 03+04	304	343	304	Enhancement (Level II)	304	2.5:1	122	
UT 2B	03+04 to 03+67	19	46	63	Restoration	63	1:1	63	
UT 3	00+00 to 02+79	269	279	279	Restoration	279	1:1	279	
UT 4	00+00 to 04+50	485	450	450	Restoration	450	1:1	450	
UT 5A	00+00 to 09+52	422	952	952	Restoration	952-52= 900	1:1	900	52 lf of UT5 is located outside of the conservation easement and therefore is not generating credit
UT 5B	09+52 to 14+90	538	538	538	Enhancement (Level II)	538	2.5:1	215	
UT 6	00+00 to 07+81	683	781	781	Restoration	781	1:1	781	
UT 7A	00+00 to 02+32	0	232	232	Restoration	232-41= 191	1:1	191	41 lf of the UT7 restoration reach is located outside of the conservation easement and therefore is not generating credit
UT 7B	02+32 to 09+96	764	764	764	Enhancement (Level I)	764-55= 709	1.5:1	473	55 lf of the UT7 enhancement reach is located outside of the conservation easement and therefore is not generating credit
UT8A	00+04 to 06+09	549	607	605	Restoration	605	1:1	605	
UT 8B	06+09 to 08+57	248	250	248	Enhancement (Level II)	248	2.5:1	99	
Wetland R	Riparian Riverine	--	0.35	0.35	Restoration	0.35	1:1	0.35	Wetland Restoration
Wetland E	Riparian Riverine	0.61	0.61	0.61	Enhancement	0.61	2:1	0.31	Wetland Enhancement

Table 1. Project Components and Mitigation Credits: Heron Restoration Site (continued)

Length & Area Summations by Mitigation Category		
Restoration Level	**Stream (linear footage)**	**Riparian Wetland (acreage)**
Restoration	4068*	0.35
Enhancement (Level I)	1184**	--
Enhancement (Level II)	1090	--
Enhancement	--	0.61

*An additional 150 linear feet of stream restoration is located outside of the conservation easement and is therefore not included in this total or in mitigation credit calculations.

**An additional 55 linear feet of stream enhancement (level I) is located outside of the conservation easement and is therefore not included in this total or in mitigation credit calculations.

Overall Assets Summary	
Asset Category	**Overall Credits**
Stream	5293
Riparian Riverine Wetland	0.66

Table 2. Project Activity and Reporting History: Heron Restoration Site

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Technical Proposal (RFP No. 16-006990)	January 11, 2017	January 11, 2017
Institution Date (NCDMS Contract No. 100014)	--	May 22, 2017
404 Permit	--	October 10, 2018
Mitigation Plan	--	July 2018
Construction Plans	--	July 17, 2018
Site Construction	--	November 27, 2018-February 11, 2019
Planting	--	February 21, 2019
As-built Baseline Stream Data Collection	February 25-26, 2019	--
As-built Baseline Vegetation Data Collection	February 25, 2019	--
As-built Baseline Monitoring (MY0)	February-March 2019	May 2019
Monitoring Year 1 (2019) Stream Data Collection	August 13-14, 2019	--
Monitoring Year 1 (2019) Vegetation Data Collection	September 30, 2019	--
Monitoring Year 1 (MY1)	March-October 2019	November 2019
Monitoring Year 2 (2020) Stream Data Collection	May 16-24, 2020	--
Monitoring Year 2 (2020) Vegetation Data Collection	July 1-6, 2020	--
Monitoring Year 2 (MY2)	March-October 2020	November 2020

Table 3. Project Contacts Table: Heron Restoration Site

Full Delivery Provider Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 Worth Creech 919-755-9490	**Construction Contractor** Land Mechanic Designs 780 Landmark Road Willow Spring, NC 27592 Lloyd Glover 919-639-6132
Designer Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis 919-215-1693	**Planting Contractor** Carolina Silvics, Inc. 908 Indian Trail Road Edenton, NC 27932 Mary-Margaret McKinney 252-482-8491
Construction Plans and Sediment and Erosion Control Plans Sungate Design Group, PA 915 Jones Franklin Road Raleigh, NC 27606 Joshua G. Dalton, PE 919-859-2243	**As-built Surveyor** K2 Design Group 5688 US Highway 70 East Goldsboro, NC 27534 John Rudolph 919-751-0075
	Baseline & Monitoring Data Collection Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis 919-215-1693

Table 4. Project Attribute Table: Heron Restoration Site

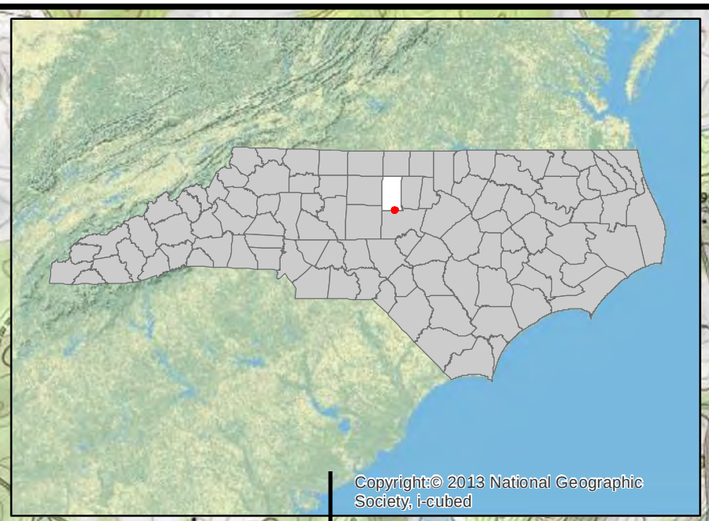
Project Information	
Project Name	Heron Restoration Site
Project County	Alamance County, North Carolina
Project Area (acres)	17.64
Project Coordinates (latitude & latitude)	35.853955ºN, -79.363458ºW
Planted Area (acres)	12.05
Project Watershed Summary Information	
Physiographic Province	Piedmont
Project River Basin	Cape Fear
USGS HUC for Project (14-digit)	03030002050050
NCDWR Sub-basin for Project	03-06-04
Project Drainage Area (acres)	14 to 96
Percentage of Project Drainage Area that is Impervious	<2%
CGIA Land Use Classification	Managed Herbaceous Cover & Mixed Upland Hardwoods

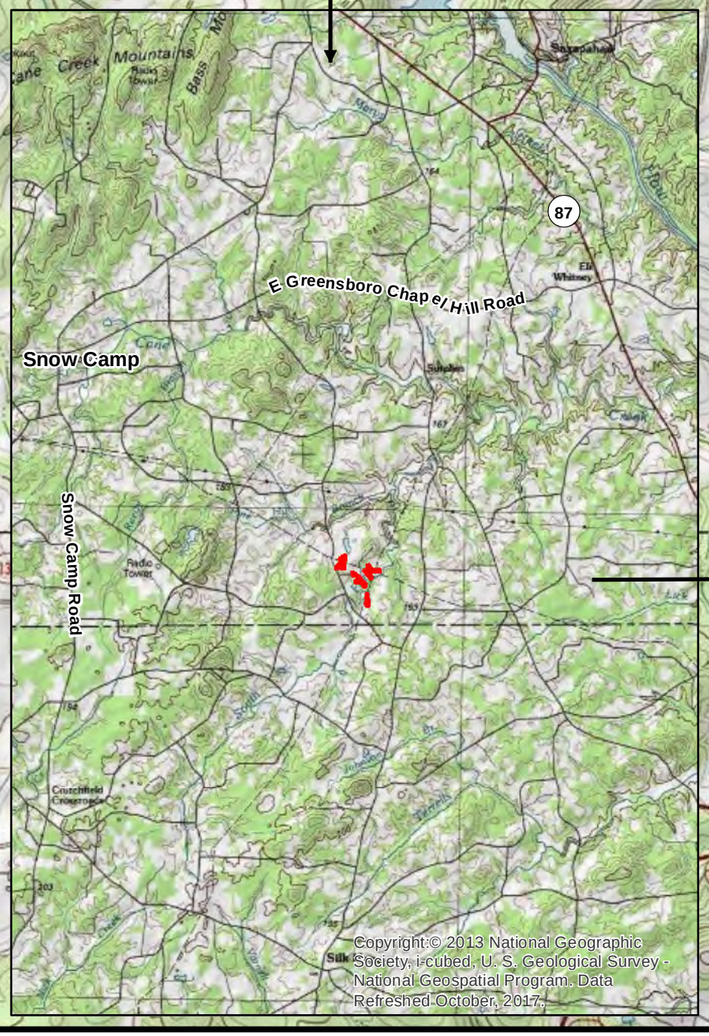
Table 4. Project Attribute Table: Heron Restoration Site (Continued)

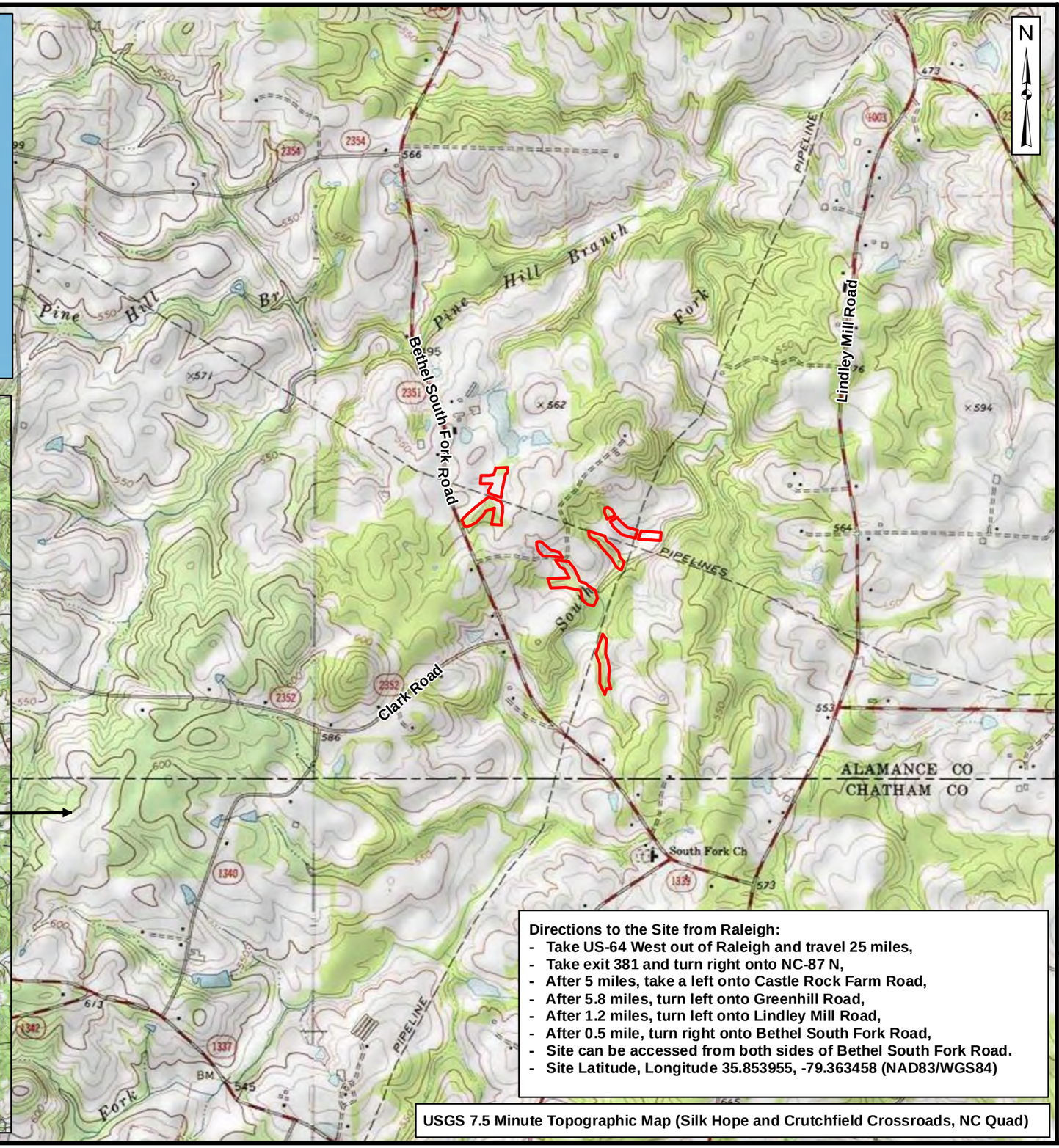
Reach Summary Information								
Parameters	**UT1**	**UT2**	**UT 3**	**UT4**	**UT 5**	**UT6**	**UT 7**	**UT 8**
Length of reach (linear feet)	1155	363	269	485	907	683	202	1221
Valley Classification & Confinement	Alluvial, confined							
Drainage Area (acres)	96.4	7.1	11.7	17.2	38.1	14.1	20.9	30.8
NCDWR Stream ID Score	30.5	22.5	28.5	33.5	27.5	23.5	24.5	27.5
Perennial, Intermittent, Ephemeral	Perennial	Intermittent	Perennial/ Intermittent	Perennial	Perennial/ Intermittent	Perennial/ Intermittent	Intermittent	Perennial
NCDWR Water Quality Classification	WS-V, NSW							
Existing Morphological Description (Rosgen 1996)	Cg5	Gf5	Cg5	Eg5	Eg5	Cg5	Cg5	Eg5
Proposed Stream Classification (Rosgen 1996)	C/E 4	Gf 5	C/E 4	C/E 4	C/E 4	C/E 4	Eb4	C/E 4
Existing Evolutionary Stage (Simon and Hupp 1986)	III/IV	I/III/IV	III/IV	II/III	II/III	III/IV	III/IV	II/III
Underlying Mapped Soils	Alamance silt loam, Georgeville silt loam, Goldston slaty silt loam, Herndon silt loam, Orange silt loam, Worsham sandy loam, Local Alluvial Land,							
Drainage Class	Well-drained, well-drained, well-drained, well-drained, well drained, poorly-drained, poorly-drained							
Hydric Soil Status	Nonhydric, nonhydric, nonhydric, nonhydric, nonhydric, hydric, hydric, respectively							
Valley Slope	0.0074	0.0270	0.0222	0.0244	0.0358	0.0300	0.0255	0.0218
FEMA Classification	NA							
Native Vegetation Community	Piedmont Alluvial Forest/Dry-Mesic Oak-Hickory Forest							
Watershed Land Use/Land Cover (Site)	43% forest,55% agricultural land, <2% low density residential/impervious surface							
Watershed Land Use/Land Cover (Cedarock Reference Channel)	65% forest, 30% agricultural land, <5% low density residential/impervious surface							
Percent Composition of Exotic Invasive Vegetation	<5%							

Appendix B
Visual Assessment Data

Figure 1. Project Location
Figure 2, 2A-D. Current Conditions Plan View
Tables 5A-5H. Visual Stream Morphology Stability Assessment
Table 6. Vegetation Condition Assessment
Vegetation Plot Photographs







Directions to the Site from Raleigh:
- **Take US-64 West out of Raleigh and travel 25 miles,**
- **Take exit 381 and turn right onto NC-87 N,**
- **After 5 miles, take a left onto Castle Rock Farm Road,**
- **After 5.8 miles, turn left onto Greenhill Road,**
- **After 1.2 miles, turn left onto Lindley Mill Road,**
- **After 0.5 mile, turn right onto Bethel South Fork Road,**
- **Site can be accessed from both sides of Bethel South Fork Road.**
- **Site Latitude, Longitude 35.853955, -79.363458 (NAD83/WGS84)**

USGS 7.5 Minute Topographic Map (Silk Hope and Crutchfield Crossroads, NC Quad)

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

HERON STREAM AND WETLAND MITIGATION SITE

Alamance County, NC

Title:

PROJECT LOCATION

Drawn by: KRJ

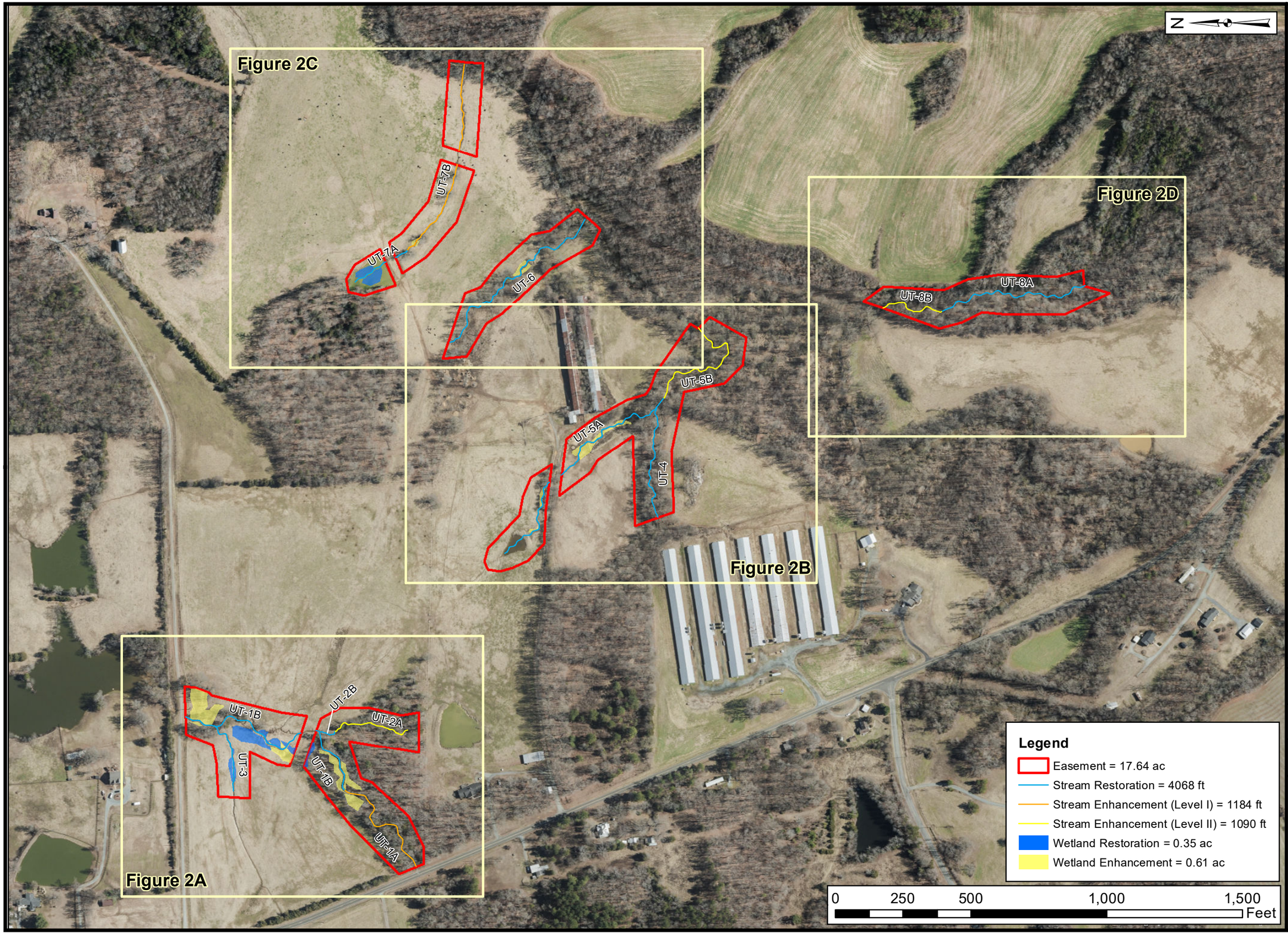
Date: DEC 2017

Scale: 1:20000

Project No.: 17-008

FIGURE

1



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

HERON STREAM AND WETLAND MITIGATION SITE

Alamance County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

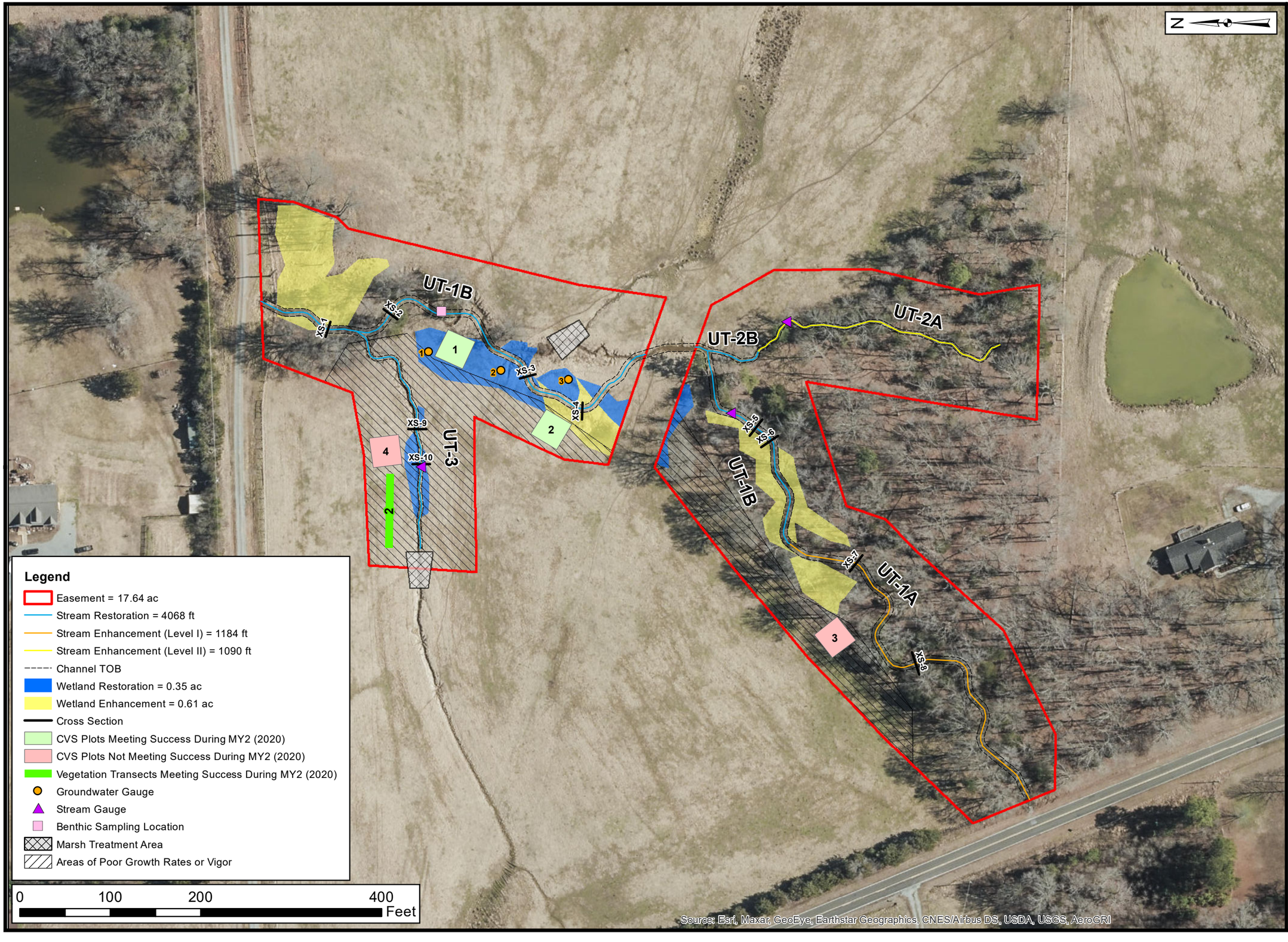
Date: JAN 2021

Scale: 1:4000

Project No.: 17-008

FIGURE

2



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

HERON STREAM AND WETLAND MITIGATION SITE

Alamance County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

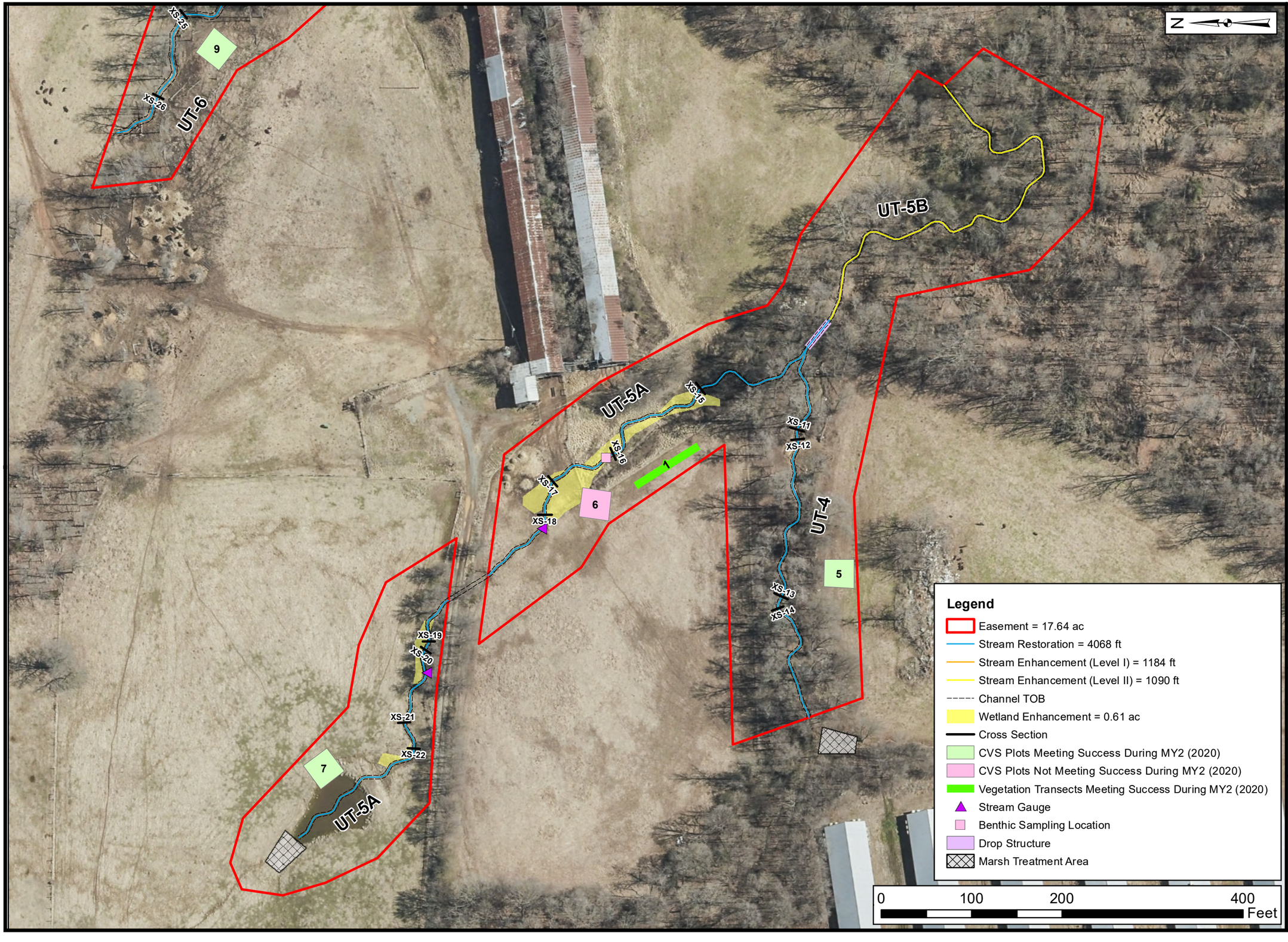
Date: JAN 2021

Scale: 1:1200

Project No.: 17-008

FIGURE

2A



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

HERON STREAM AND WETLAND MITIGATION SITE

Alamance County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

Date: JAN 2021

Scale: 1:1200

Project No.: 17-008

FIGURE

2B

Legend

- Easement = 17.64 ac
- Stream Restoration = 4068 ft
- Stream Enhancement (Level I) = 1184 ft
- Stream Enhancement (Level II) = 1090 ft
- Channel TOB
- Wetland Restoration = 0.35 ac
- Wetland Enhancement = 0.61 ac
- Cross Section
- CVS Plots Meeting Success During MY2 (2020)
- Groundwater Gauge
- Stream Gauge
- Rain Gauge and Soil Temperature Gauge
- Drop Structure
- Marsh Treatment Area

N

UT-7B

UT-7A

UT-6

XS-27
XS-28
XS-29
XS-30
XS-31
XS-32
XS-33
XS-23
XS-24
XS-25
XS-26

10
11
12
8
9
6
5
4

0 125 250 500 Feet

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

HERON STREAM AND WETLAND MITIGATION SITE

Alamance County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

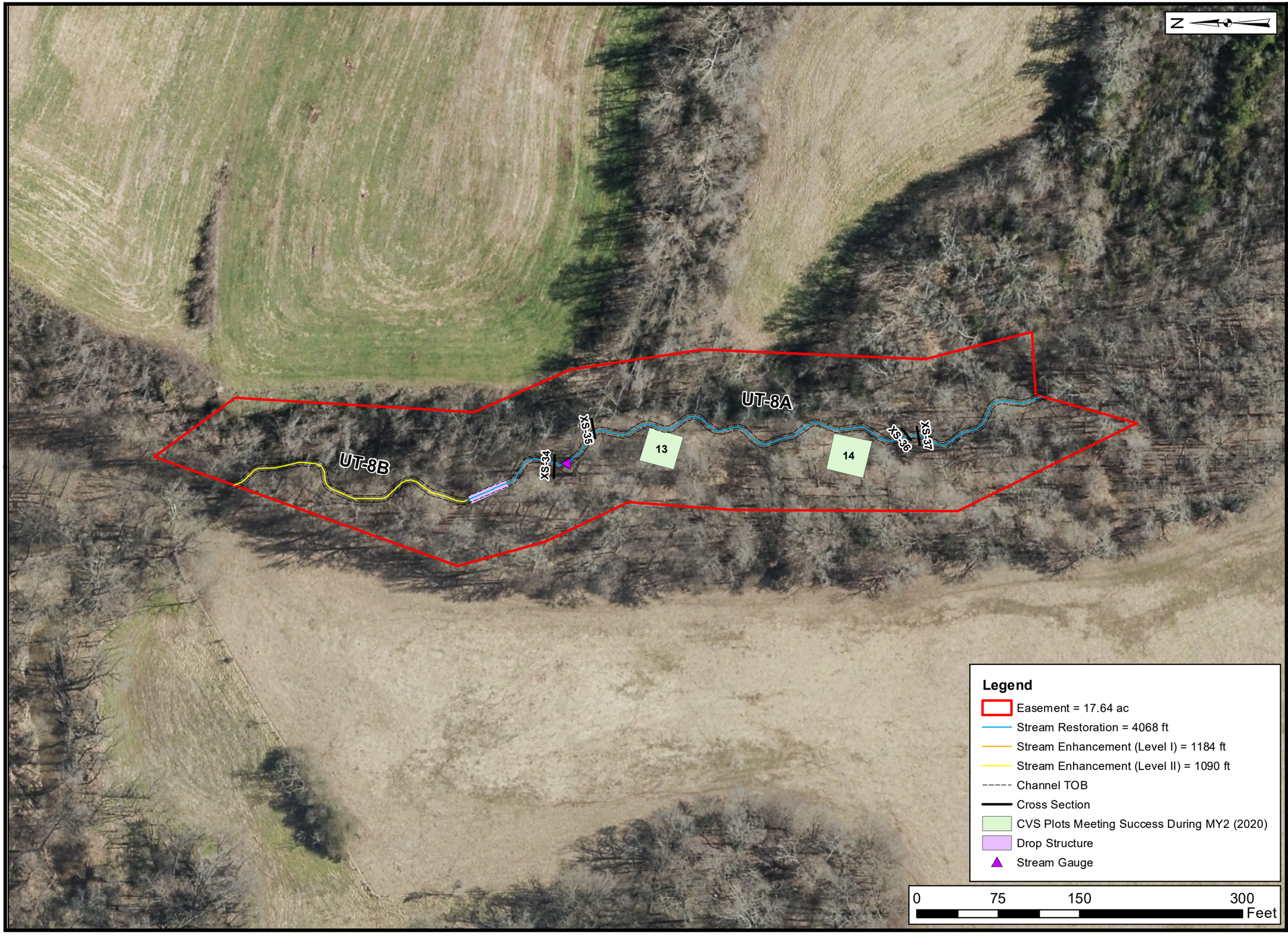
Date: JAN 2021

Scale: 1:1400

Project No.: 17-008

FIGURE

2C



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

HERON STREAM AND WETLAND MITIGATION SITE

Alamance County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

Date: JAN 2021

Scale: 1:1000

Project No.: 17-008

FIGURE

2D

Table 5A **Visual Stream Morphology Stability Assessment**
Reach ID **Heron UT-1**
Assessed Length **1331**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	35	35			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	34	34			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	34	34			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	34	34			100%			
		2. Thalweg centering at downstream of meander (Glide)	34	34			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	15	15			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	15	15			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	15	15			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	15	15			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	15	15			100%			

Table 5B **Visual Stream Morphology Stability Assessment**
Reach ID Heron UT-2
Assessed Length 63

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	3	3			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	3	3			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	3	3			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	3	3			100%			
		2. Thalweg centering at downstream of meander (Glide)	3	3			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	0	0			NA			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	0	0			NA			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	0	0			NA			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	0	0			NA			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	0	0			NA			

Table 5C **Visual Stream Morphology Stability Assessment**
Reach ID **Heron UT-3**
Assessed Length **279**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	14	14			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	13	13			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	13	13			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	13	13			100%			
		2. Thalweg centering at downstream of meander (Glide)	13	13			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	5	5			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	5	5			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	5	5			100%			

Table 5D **Visual Stream Morphology Stability Assessment**
Reach ID **Heron UT-4**
Assessed Length **450**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	22	22			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	21	21			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	21	21			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	21	21			100%			
		2. Thalweg centering at downstream of meander (Glide)	21	21			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	10	10			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	10	10			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	10	10			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	10	10			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	10	10			100%			

Table 5E **Visual Stream Morphology Stability Assessment**
Reach ID **Heron UT-5**
Assessed Length **952**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	44	44			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	43	43			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	43	43			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	43	43			100%			
		2. Thalweg centering at downstream of meander (Glide)	43	43			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	25	25			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	25	25			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	25	25			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	25	25			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	25	25			100%			

Table 5F **Visual Stream Morphology Stability Assessment**
Reach ID **Heron UT-6**
Assessed Length **781**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	34	34			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	33	33			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	33	33			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	33	33			100%			
		2. Thalweg centering at downstream of meander (Glide)	33	33			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	8	8			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	8	8			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	8	8			100%			

Table 5G **Visual Stream Morphology Stability Assessment**
Reach ID **Heron UT-7**
Assessed Length **996**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	44	44			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	44	44			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	44	44			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	44	44			100%			
		2. Thalweg centering at downstream of meander (Glide)	44	44			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	19	19			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	19	19			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	19	19			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	19	19			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	19	19			100%			

Table 5H **Visual Stream Morphology Stability Assessment**
Reach ID **Heron UT-8**
Assessed Length **605**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	24	24			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	23	23			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	23	23			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	23	23			100%			
		2. Thalweg centering at downstream of meander (Glide)	23	23			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	9	9			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	9	9			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	9	9			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	9	9			100%			

Table 6 — Vegetation Condition Assessment

Heron

Planted Acreage[1] **12.05**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	None	0.1 acres	none	0	0.00	0.0%
2. Low Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
2B. Low Planted Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Planted stems appear stunted or are dying due to competition from dense fescue.	0.25 acres	black hatched polygons	2	1.35	11.2%
			Cumulative Total	2	1.35	11.2%

Easement Acreage[2] **17.64**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	None	1000 SF	none	0	0.00	0.0%
5. Easement Encroachment Areas[3]	None	none	none	0	0.00	0.0%

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

2 = The acreage within the easement boundaries.

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

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

Heron
MY-02 (2020) Vegetation Monitoring Photographs
Taken July 2020

Plot 1

Plot 2

Plot 3

Plot 4

Plot 5

Plot 6

Heron
MY-02 (2020) Vegetation Monitoring Photographs
Taken July 2020

Plot 7

Plot 8

Plot 9

Plot 10

Plot 11

Plot 12

Heron
MY-02 (2020) Vegetation Monitoring Photographs
Taken July 2020

Plot 13 –taken November 2020

Plot 14

Appendix C
Vegetation Data

Table 7. Planted Bare Root Woody Vegetation
Table 8. Total Stems by Plot and Species
Table 9. Temporary Vegetation Plot Data
Table 10. Planted Vegetation Totals

Table 7. Planted Bare Root Woody Vegetation: Heron Restoration Site

Species	Total*
Acres	**12.05**
Alnus serrulata	500
Asimina triloba	100
Betula nigra	400
Carpinus caroliniana	800
Cephalanthus occidentalis	25
Cercis canadensis	500
Cornus amomum	2500
Diospyros virginiana	350
Fraxinus americana	100
Fraxinus pennsylvanica	2500
Liriodendron tulipifera	125
Nyssa sylvatia	500
Platanus occidentalis	2400
Quercus lyrate	900
Quercus nigra	2000
Quercus phellos	1900
Sambucus canadensis	25
TOTALS	**15,625***
Average Stems/Acre	**1297**

*Live stakes of *Salix nigra* were planted, but are not included in this table.

Table 8. Total Stems by Plot and Species
Project Code 17.008. Project Name: Heron Stream and Wetland

			Current Plot Data (MY2 2020)																												
			17.008-01-0001			17.008-01-0002			17.008-01-0003			17.008-01-0004			17.008-01-0005			17.008-01-0006			17.008-01-0007			17.008-01-0008			17.008-01-0009			17.008-01-0010		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree																					7								
Alnus serrulata	hazel alder	Shrub																													
Asimina triloba	pawpaw	Tree																						1	1	1				1	1	1
Betula nigra	river birch	Tree																												1	1	1
Carpinus caroliniana	American hornbeam	Tree	1	1	1	1	1	1				5	5	5																		
Cephalanthus occidentalis	common buttonbush	Shrub																														
Cercis canadensis	eastern redbud	Tree	1	1	1	3	3	3													2	2	2	2	2	2						
Cornus amomum	silky dogwood	Shrub																						1	1	1						
Diospyros virginiana	common persimmon	Tree	7	7	7													2	2	2	2	2	2				1	1	1			
Fraxinus americana	white ash	Tree																									3	3	3			
Fraxinus pennsylvanica	green ash	Tree													2	2	2	3	3	3							1	1	1			
Liquidambar styraciflua	sweetgum	Tree																														
Liriodendron tulipifera	tuliptree	Tree																														
Nyssa sylvatica	blackgum	Tree	1	1	1	1	1	1	1	1	1										1	1	1				1	1	1	1	1	1
Platanus occidentalis	American sycamore	Tree	1	1	1				2	2	2				5	5	5							1	1	1				2	2	2
Populus deltoides	eastern cottonwood	Tree																														
Quercus	oak	Tree							3	3	3				1	1	1							1	1	1	3	3	3			
Quercus lyrata	overcup oak	Tree																									1	1	1			
Quercus nigra	water oak	Tree				3	3	3				1	1	1	1	1	1				1	1	1	2	2	2	1	1	1	1	1	1
Quercus pagoda	cherrybark oak	Tree							1	1	1																					
Quercus phellos	willow oak	Tree	1	1	1																3	3	3							3	3	3
Quercus rubra	northern red oak	Tree																			1	1	1				1	1	1			
Sambucus canadensis	Common Elderberry	Shrub																														
Ulmus americana	American elm	Tree																														
Ulmus rubra	slippery elm	Tree																														
Unknown		Shrub or Tree																														
		Stem count	12	12	12	8	8	8	7	7	7	6	6	6	9	9	9	5	5	5	10	10	17	8	8	8	12	12	12	9	9	9
		size (ares)	1			1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	6	6	6	4	4	4	4	4	4	2	2	2	4	4	4	2	2	2	6	6	7	6	6	6	8	8	8	6	6	6
		Stems per ACRE	485.6	485.6	485.6	323.7	323.7	323.7	283.3	283.3	283.3	242.8	242.8	242.8	364.2	364.2	364.2	202.3	202.3	202.3	404.7	404.7	688	323.7	323.7	323.7	485.6	485.6	485.6	364.2	364.2	364.2

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

Table 8. Total Stems by Plot and Species (continued)
Project Code 17.008. Project Name: Heron Stream and Wetland

			Current Plot Data (MY2 2020)												Annual Means								
			17.008-01-0011			17.008-01-0012			17.008-01-0013			17.008-01-0014			MY2 (2020)			MY1 (2019)			MY0 (2019)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree															7			4			
Alnus serrulata	hazel alder	Shrub	1	1	1										1	1	1	1	1	1	4	4	4
Asimina triloba	pawpaw	Tree													2	2	2	14	14	14	21	21	21
Betula nigra	river birch	Tree							2	2	2				3	3	3	4	4	4	2	2	2
Carpinus caroliniana	American hornbeam	Tree	1	1	1										8	8	8	7	7	7	13	13	13
Cephalanthus occidentalis	common buttonbush	Shrub																			1	1	1
Cercis canadensis	eastern redbud	Tree										1	1	1	9	9	9	10	10	10	10	10	10
Cornus amomum	silky dogwood	Shrub	3	3	3	2	2	2							6	6	6	5	5	5	6	6	6
Diospyros virginiana	common persimmon	Tree									3	1	1	1	13	13	16	13	13	15	19	19	19
Fraxinus americana	white ash	Tree	2	2	2										5	5	5	3	3	3	5	5	5
Fraxinus pennsylvanica	green ash	Tree	2	2	2	4	4	4							12	12	12	13	13	13	15	15	15
Liquidambar styraciflua	sweetgum	Tree																		3			
Liriodendron tulipifera	tuliptree	Tree										1	1	1	1	1	1	1	1	1	2	2	2
Nyssa sylvatica	blackgum	Tree	2	2	2				4	4	4				12	12	12	13	13	13	10	10	10
Platanus occidentalis	American sycamore	Tree	2	2	2	1	1	1	2	2	3				16	16	17	15	15	17	11	11	11
Populus deltoides	eastern cottonwood	Tree									6						6			4			
Quercus	oak	Tree				2	2	2							10	10	10	13	13	13	31	31	31
Quercus lyrata	overcup oak	Tree													1	1	1	5	5	5	8	8	8
Quercus nigra	water oak	Tree							1	1	1	2	2	2	13	13	13	18	18	18	19	19	19
Quercus pagoda	cherrybark oak	Tree													1	1	1						
Quercus phellos	willow oak	Tree				1	1	1				5	5	5	13	13	13	12	12	12	11	11	11
Quercus rubra	northern red oak	Tree													2	2	2	3	3	3	1	1	1
Sambucus canadensis	Common Elderberry	Shrub																1	1	1	2	2	2
Ulmus americana	American elm	Tree									10			1			11						
Ulmus rubra	slippery elm	Tree																		9			
Unknown		Shrub or Tree																1	1	1	5	5	5
		Stem count	13	13	13	10	10	10	9	9	29	10	10	11	128	128	156	152	152	176	196	196	196
		size (ares)	1			1			1			1			14			14			14		
		size (ACRES)	0.02			0.02			0.02			0.02			0.35			0.35			0.35		
		Species count	7	7	7	5	5	5	4	4	7	5	5	6	18	18	21	19	19	23	20	20	20
		Stems per ACRE	526.1	526.1	526.1	404.7	404.7	404.7	364.2	364.2	1174	404.7	404.7	445.2	370	370	450.9	439.4	439.4	508.7	566.6	566.6	566.6

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

Table 9. Temporary Vegetation Plot Data: Heron Restoration Site

Species	25m x 4m Temporary Plot (Bearing)	
	T-1 (150°)	T-2 (275°)
Carpinus caroliniana		3
Cercis canadensis	1	
Diospyros virginiana	1	
Fraxinus pennsylvanica	3	
Liriodendron tulipifera		2
Platanus occidentalis	2	4
Quercus rubra		2
Ulmus americana	1	
Total Stems	**8**	**11**
Total Stems/Acre	**324**	**445**

Table 10. Planted Vegetation Totals: Heron Restoration Site

Plot #	MY2 Planted Stems/Acre	Success Criteria Met?
1	485	Yes
2	323	Yes
3	283	No
4	242	No
5	364	Yes
6	202	No
7	404	Yes
8	323	Yes
9	485	Yes
10	364	Yes
11	526	Yes
12	405	Yes
13	364	Yes
14	405	Yes
T-1	324	Yes
T-2	445	Yes
Average Planted Stems/Acre	**372**	**Yes**

Appendix D
Stream Geomorphology Data

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

Table 11a. Baseline Stream Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 1 (856 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Cedarock Park Ref			Causey Ref			Design			Monitoring Baseline					
		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Dimension and Substrate - Riffle Only																									
Bankfull Width (ft)					4.7	8.5		11.1			8	8.1	12.1	10.7	11	11.3	7.8	8.4	9	8.3	11		13		4
Floodprone Width (ft)					13	20		30			15	18	25	122	131	140	10	75	100	25	100		100		4
Bankfull Mean Depth (ft)					0.5	0.7		1.1			0.8	0.8	1	1.3	1.4	1.4	0.6	0.6	0.7	0.4	0.5		0.6		4
[1]Bankfull Max Depth (ft)					0.8	1.1		2			1.1	1.4	1.4	1.9	2	2	0.7	0.8	1	0.6	0.8		1.1		4
Bankfull Cross Sectional Area (ft^2)						5.1						8			14.7		5.1	5.1	5.1	3.7	5.4		7.2		4
Width/Depth Ratio					4.3	14.6		22			8	10.1	15.1	8	9	9	12	14	16	17.4	18.7		36.7		4
Entrenchment Ratio					1.6	2.5		4.3			1.9	2.1	2.2	11	12	13	5.1	8.9	11.1	3	8.3		9.3		4
[1]Bank Height Ratio					1.4	1.9		2.5			1.0	1.8			1.4		1.0	1.0	1.3	1.0	1.0		1.0		4
Profile																									
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.															2.7	19	16	53	11	31
Riffle Slope (ft/ft)											0.01	0.0316	0.0576	0.002	0.01	0.012	0.007	0.009	0.01	0	0.013	0.012	0.048	0.01	31
Pool Length (ft)																				6	23	20	80	12.9	34
Pool Max depth (ft)											1.5	1.8	2.1		2.7		0.8	1.1	1.3	1.5	1.6		2.1		4
Pool Spacing (ft)											25	37	69	22	44	81	25	34	68	25	34		68		34
Pattern																									
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.						20	23	38	17	30	36	25	34	68	25	34		68		
Radius of Curvature (ft)											11	16	27	9	31	113	17	25	85	17	25		85		
Rc:Bankfull width (ft/ft)											1.4	2	3.3	0.8	2.8	10.3	2	3	10	2	3		10		
Meander Wavelength (ft)											44	68	116	10	63	91	51	72	101	51	72		101		
Meander Width Ratio											2.4	2.8	4.7	1.5	2.7	3.5	3	4	6	3	4		6		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					0.61												0.19			0.24					
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Cg 5						Eb 4			E5			E/C 4			C 4					
Bankfull Velocity (fps)					3.8												3.8			3.6					
Bankfull Discharge (cfs)					19.3																				
Valley length (ft)					1067																				
Channel Thalweg length (ft)					1433												856			856					
Sinuosity (ft)					1.3						1.2			1.46			1.3			1.3					
Water Surface Slope (Channel) (ft/ft)					0.0057						0.0258			0.0053			0.0057			0.0087					
BF slope (ft/ft)																									
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks					61						0			0											
Channel Stability or Habitat Metric																									
Biological or Other																									

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

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11b. Baseline Stream Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 3 (279 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Cedarock Park Ref			Causey Ref			Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					3.2	4.5		5.9			8	8.1	12.1	10.7	11	11.3	4.1	4.4	4.7	7.7	7.7		7.7		1
Floodprone Width (ft)					9	14		21			15	18	25	122	131	140	20	40	60	18	18		18		1
Bankfull Mean Depth (ft)					0.2	0.3		0.4			0.8	0.8	1	1.3	1.4	1.4	0.3	0.3	0.3	0.6	0.6		0.6		1
[1]Bankfull Max Depth (ft)					0.5	0.6		0.7			1.1	1.4	1.4	1.9	2	2	0.4	0.4	0.5	1	1		1		1
Bankfull Cross Sectional Area (ft^2)						1.4						8			14.7		1.4	1.4	1.4	4.5	4.5		4.5		1
Width/Depth Ratio					8	17.4		29.5			8	10.1	15.1	8	9	9	12	14	16	13.2	13.2		13.2		1
Entrenchment Ratio					1.4	2.2		3.8			1.9	2.1	2.2	11	12	13	4.9	9	12.7	2.3	2.3		2.3		1
[1]Bank Height Ratio					1.7	2.2		2.4			1.0	1.8			1.4		1.0	1.0	1.3	1.0	1.0		1.0		1
Profile																									
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.															4	11	10	19	4.3	14
Riffle Slope (ft/ft)											0.01	0.0316	0.0576	0.002	0.01	0.012	0.023	0.031	0.035	0.011	0.029	0.027	0.736	0.017	14
Pool Length (ft)																				4	9	8	21	4.9	13
Pool Max depth (ft)											1.5	1.8	2.1		2.7		0.4	0.6	0.7	1	1	1	1	0	1
Pool Spacing (ft)											25	37	69	22	44	81	13	18	35	13	18		35		14
Pattern																									
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.						20	23	38	17	30	36	13	18	27	13	18		27		
Radius of Curvature (ft)											11	16	27	9	31	113	9	13	44	9	13		44		
Rc:Bankfull width (ft/ft)											1.4	2	3.3	0.8	2.8	10.3	2	3	10	2	3		10		
Meander Wavelength (ft)											44	68	116	10	63	91	26	37	53	26	37		53		
Meander Width Ratio											2.4	2.8	4.7	1.5	2.7	3.5	3	4	6	3	4		6		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					1.42												0.34			0.56					
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Cg 5						Eb 4			E5			E/C 4			C 4					
Bankfull Velocity (fps)					3.6												3.6			1.1					
Bankfull Discharge (cfs)					5																				
Valley length (ft)					229																				
Channel Thalweg length (ft)					247												279			279					
Sinuosity (ft)					1.07						1.2			1.46			1.15			1.15					
Water Surface Slope (Channel) (ft/ft)					0.0207						0.0258			0.0053			0.0193			0.0176					
BF slope (ft/ft)																									
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks					100						0			0											
Channel Stability or Habitat Metric																									
Biological or Other																									

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

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11c. Baseline Stream Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 4 (450 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Cedarock Park Ref			Causey Ref			Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					3.1	3.8		4.9			8	8.1	12.1	10.7	11	11.3	4.6	5	5.4	6.5	7.3		8		2
Floodprone Width (ft)					6	15		30			15	18	25	122	131	140	25	50	75	40	40		40		2
Bankfull Mean Depth (ft)					0.4	0.5		0.6			0.8	0.8	1	1.3	1.4	1.4	0.3	0.4	0.4	0.3	0.4		0.5		2
[1]Bankfull Max Depth (ft)					0.7	0.8		0.9			1.1	1.4	1.4	1.9	2	2	0.4	0.5	0.6	0.5	0.7		0.8		2
Bankfull Cross Sectional Area (ft^2)						2						8			14.7		1.8	1.8	1.8	2.2	3		3.7		2
Width/Depth Ratio					5.2	7.7		12.3			8	10.1	15.1	8	9	9	12	14	16	17.3	18.3		19.2		2
Entrenchment Ratio					1.3	3.9		6.1			1.9	2.1	2.2	11	12	13	5.4	10	14	5	5.6		6.2		2
[1]Bank Height Ratio					1.3	2.3		4.0			1.0	1.8			1.4		1.0	1.0	1.3	1.0	1.0		1.0		2
Profile																									
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.															4	9	9	20	3.5	23
Riffle Slope (ft/ft)											0.01	0.0316	0.0576	0.002	0.01	0.012	0.037	0.05	0.056	0	0.021	0.017	0.061	0.014	23
Pool Length (ft)																				4	10	10	18	3.5	22
Pool Max depth (ft)											1.5	1.8	2.1		2.7		0.5	0.7	0.8	1.1	1.3		1.4		2
Pool Spacing (ft)											25	37	69	22	44	81	15	20	40	15	20		40		22
Pattern																									
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.						20	23	38	17	30	36	15	20	30	15	20		30		
Radius of Curvature (ft)											11	16	27	9	31	113	10	15	50	10	15		50		
Rc:Bankfull width (ft/ft)											1.4	2	3.3	0.8	2.8	10.3	2	3	10	2	3		10		
Meander Wavelength (ft)											44	68	116	10	63	91	30	43	60	30	43		60		
Meander Width Ratio											2.4	2.8	4.7	1.5	2.7	3.5	3	4	6	3	4		6		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					2.79												0.6			0.59					
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Eg 5						Eb 4			E5			E/C 4			C 4					
Bankfull Velocity (fps)					3.7												4			2.4					
Bankfull Discharge (cfs)					7.3																				
Valley length (ft)					391																				
Channel Thalweg length (ft)					428												450			450					
Sinuosity (ft)					1.09						1.2			1.46			1.15			1.15					
Water Surface Slope (Channel) (ft/ft)					0.0283						0.0258			0.0053			0.3111			0.0254					
BF slope (ft/ft)																									
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks					56						0			0											
Channel Stability or Habitat Metric																									
Biological or Other																									

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

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11d. Baseline Stream Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 5 (952 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Cedarock Park Ref			Causey Ref			Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					2.5	3.7		6			8	8.1	12.1	10.7	11	11.3	4.6	5	5.4	4.9	6.9		8.1		4
Floodprone Width (ft)					4	12		30			15	18	25	122	131	140	25	50	75	40	40		40		4
Bankfull Mean Depth (ft)					0.3	0.5		0.6			0.8	0.8	1	1.3	1.4	1.4	0.3	0.4	0.4	0.3	0.4		0.5		4
[1]Bankfull Max Depth (ft)					0.5	0.8		0.9			1.1	1.4	1.4	1.9	2	2	0.4	0.5	0.6	0.5	0.7		0.8		4
Bankfull Cross Sectional Area (ft^2)						1.6						8			14.7		1.8	1.8	1.8	1.9	2.4		3.7		4
Width/Depth Ratio					3.6	8.8		20			8	10.1	15.1	8	9	9	12	14	16	12.6	18.3		20.9		4
Entrenchment Ratio					1.4	3.1		7.3			1.9	2.1	2.2	11	12	13	5.4	10	14	4.9	5.9		8.2		4
[1]Bank Height Ratio					1.3	1.5		2.0			1.0	1.8			1.4		1.0	1.0	1.3	1.0	1.0		1.0		4
Profile																									
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.															3	11	9	49	8.4	41
Riffle Slope (ft/ft)											0.01	0.0316	0.0576	0.002	0.01	0.012	0.037	0.05	0.056	0.004	0.028	0.027	0.051	0.01	41
Pool Length (ft)																				4	12	10	59	8.5	41
Pool Max depth (ft)											1.5	1.8	2.1		2.7		0.5	0.7	0.8	0.8	1		1.1		4
Pool Spacing (ft)											25	37	69	22	44	81	15	20	40	15	20		40		41
Pattern																									
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.						20	23	38	17	30	36	15	20	30	15	20		30		
Radius of Curvature (ft)											11	16	27	9	31	113	10	15	50	10	15		50		
Rc:Bankfull width (ft/ft)											1.4	2	3.3	0.8	2.8	10.3	2	3	10	2	3		10		
Meander Wavelength (ft)											44	68	116	10	63	91	30	43	60	30	43		60		
Meander Width Ratio											2.4	2.8	4.7	1.5	2.7	3.5	3	4	6	3	4		6		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					2.79												0.6			0.5					
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Eg 5						Eb 4			E5			E/C 4			E/C 4					
Bankfull Velocity (fps)					3.9												4			2.3					
Bankfull Discharge (cfs)					5.5																				
Valley length (ft)					579																				
Channel Thalweg length (ft)					605												952			952					
Sinuosity (ft)					1.04						1.2			1.46			1.15			1.15					
Water Surface Slope (Channel) (ft/ft)					0.0372						0.0258			0.0053			0.3111			0.0256					
BF slope (ft/ft)																									
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks					50						0			0											
Channel Stability or Habitat Metric																									
Biological or Other																									

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

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11e. Baseline Stream Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 6 (781 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Cedarock Park Ref			Causey Ref			Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					4.6	6.4		9.6			8	8.1	12.1	10.7	11	11.3	4.2	4.6	4.9	6.1	6.5		6.8		2
Floodprone Width (ft)					7	16		46			15	18	25	122	131	140	25	50	75	40	40		40		2
Bankfull Mean Depth (ft)					0.2	0.3		0.3			0.8	0.8	1	1.3	1.4	1.4	0.3	0.3	0.4	0.4	0.4		0.5		2
[1]Bankfull Max Depth (ft)					0.4	0.5		0.8			1.1	1.4	1.4	1.9	2	2	0.4	0.5	0.5	0.6	0.8		0.9		2
Bankfull Cross Sectional Area (ft^2)						1.5						8			14.7		1.5	1.5	1.5	2.2	2.9		3.5		2
Width/Depth Ratio					15.3	26.7		48			8	10.1	15.1	8	9	9	12	14	16	13.2	15.1		16.9		2
Entrenchment Ratio					1.1	2.4		4.8			1.9	2.1	2.2	11	12	13	5.9	10.9	15.3	5.9	6.2		6.6		2
[1]Bank Height Ratio					3.7	5.0		7.5			1.0	1.8			1.4		1.0	1.0	1.3	1.0	1.0		1.0		2
Profile																									
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.															2	10	7	47	8.8	33
Riffle Slope (ft/ft)											0.01	0.0316	0.0576	0.002	0.01	0.012	0.031	0.042	0.047	0.001	0.028	0.024	0.126	0.021	33
Pool Length (ft)																				4	12	12	18	3.7	33
Pool Max depth (ft)											1.5	1.8	2.1		2.7		0.4	0.6	0.7	1	1.2		1.3		2
Pool Spacing (ft)											25	37	69	22	44	81	13.7	18.3	36.7	14	18		37		33
Pattern																									
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.						20	23	38	17	30	36	13.7	18.3	36.7	14	18		37		
Radius of Curvature (ft)											11	16	27	9	31	113	9	14	46	9	14		46		
Rc:Bankfull width (ft/ft)											1.4	2	3.3	0.8	2.8	10.3	2	3	10	2	3		10		
Meander Wavelength (ft)											44	68	116	10	63	91	27	39	55	27	39		55		
Meander Width Ratio											2.4	2.8	4.7	1.5	2.7	3.5	3	4	6	3	4		6		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					14.18												0.47			0.56					
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Cg 5						Eb 4			E5			E/C 4			C 4					
Bankfull Velocity (fps)					3.5												3.5			1.8					
Bankfull Discharge (cfs)					5.2																				
Valley length (ft)					486																				
Channel Thalweg length (ft)					522												781			781					
Sinuosity (ft)					1.07						1.2			1.46			1.15			1.15					
Water Surface Slope (Channel) (ft/ft)					0.028						0.0258			0.0053			0.0261			0.0225					
BF slope (ft/ft)																									
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks					68						0			0											
Channel Stability or Habitat Metric																									
Biological or Other																									

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

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11f. Baseline Stream Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 7 (232 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Cedarock Park Ref			Causey Ref			Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					4.1	5.3		6.7			8	8.1	12.1	10.7	11	11.3	4.9	5.3	5.7	6.2	6.6		7.8		4
Floodprone Width (ft)					7	13		29			15	18	25	122	131	140	25	50	75	10	20		20		4
Bankfull Mean Depth (ft)					0.3	0.4		0.5			0.8	0.8	1	1.3	1.4	1.4	0.4	0.4	0.4	0.3	0.4		0.5		4
[1]Bankfull Max Depth (ft)					0.4	0.6		0.8			1.1	1.4	1.4	1.9	2	2	0.5	0.5	0.6	0.5	0.6		0.7		4
Bankfull Cross Sectional Area (ft^2)						2						8			14.7		2	2	2	1.8	2.7		3.3		4
Width/Depth Ratio					8.2	14.5		22.3			8	10.1	15.1	8	9	9	12	14	16	12.8	18.5		24.2		4
Entrenchment Ratio					1.7	2.4		5.2			1.9	2.1	2.2	11	12	13	5	9	13	1.6	2.8		3.1		4
[1]Bank Height Ratio					1.8	2.5		4.1			1.0	1.8			1.4		1.0	1.0	1.3	1.0	1.0		1.0		4
Profile																									
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.															3	13	10	75	13	42
Riffle Slope (ft/ft)											0.01	0.0316	0.0576	0.002	0.01	0.012	0.027	0.036	0.04	0.006	0.029	0.029	0.056	0.011	42
Pool Length (ft)																				3	9	9	14	2.6	41
Pool Max depth (ft)											1.5	1.8	2.1		2.7		1.3	1.9	2.1	1	1.1		1.5		3
Pool Spacing (ft)											25	37	69	22	44	81	16	21	42	16	21		42		42
Pattern																									
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.						20	23	38	17	30	36	16	21	32	16	21		32		
Radius of Curvature (ft)											11	16	27	9	31	113	10	16	53	10	16		53		
Rc:Bankfull width (ft/ft)											1.4	2	3.3	0.8	2.8	10.3	2	3	10	2	3		10		
Meander Wavelength (ft)											44	68	116	10	63	91	31	45	64	31	45		64		
Meander Width Ratio											2.4	2.8	4.7	1.5	2.7	3.5	3	4	6	3	4		6		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					2.36												0.45			0.61					
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Cg 5						Eb 4			E5			Eb 4			Cb 4					
Bankfull Velocity (fps)					3.5												3.5			2.6					
Bankfull Discharge (cfs)					7																				
Valley length (ft)					755																				
Channel Thalweg length (ft)					778												232			232					
Sinuosity (ft)					1.03						1.2			1.46			1.15			1.15					
Water Surface Slope (Channel) (ft/ft)					0.0248						0.0258			0.0053			0.0222			0.0268					
BF slope (ft/ft)																									
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks					76						0			0											
Channel Stability or Habitat Metric																									
Biological or Other																									

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

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11g. Baseline Stream Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 8 (605 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Cedarock Park Ref			Causey Ref			Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					4.2	5.1		6.1			8	8.1	12.1	10.7	11	11.3	5.5	5.9	6.3	6.5	7.9		9.3		2
Floodprone Width (ft)					5	15		30			15	18	25	122	131	140	25	50	75	20	30		40		2
Bankfull Mean Depth (ft)					0.4	0.5		0.6			0.8	0.8	1	1.3	1.4	1.4	0.4	0.4	0.5	0.4	0.4		0.4		2
[1]Bankfull Max Depth (ft)					0.6	0.8		1			1.1	1.4	1.4	1.9	2	2	0.5	0.6	0.7	0.7	0.7		0.7		2
Bankfull Cross Sectional Area (ft^2)						2.5						8			14.7		2.5	2.5	2.5	2.6	3.2		3.7		2
Width/Depth Ratio					7	11.3		15.3			8	10.1	15.1	8	9	9	12	14	16	16.3	19.8		23.4		2
Entrenchment Ratio					1.1	2.7		4.9			1.9	2.1	2.2	11	12	13	4.6	8.5	11.9	2.2	4.2		6.2		2
[1]Bank Height Ratio					1.4	2.3		3.7			1.0	1.8			1.4		1.0	1.0	1.3	1.0	1.0		1.0		2
Profile																									
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.															5	11	11	19	3.4	23
Riffle Slope (ft/ft)											0.01	0.0316	0.0576	0.002	0.01	0.012	0.023	0.03	0.034	0.007	0.02	0.017	0.041	0.009	23
Pool Length (ft)																				6	15	15	24	4.8	23
Pool Max depth (ft)											1.5	1.8	2.1		2.7		0.5	0.8	0.9	0.9	1.3		1.6		2
Pool Spacing (ft)											25	37	69	22	44	81	17	24	47	17	24		47		23
Pattern																									
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.						20	23	38	17	30	36	17	24	36	17	24		36		
Radius of Curvature (ft)											11	16	27	9	31	113	11	18	59	11	18		59		
Rc:Bankfull width (ft/ft)											1.4	2	3.3	0.8	2.8	10.3	2	3	10	2	3		10		
Meander Wavelength (ft)											44	68	116	10	63	91	35	50	71	35	50		71		
Meander Width Ratio											2.4	2.8	4.7	1.5	2.7	3.5	3	4	6	3	4		6		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					1.85												0.44			0.32					
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Eg 5						Eb 4			E5			E/C 4			C 4					
Bankfull Velocity (fps)					3.6												3.6			2.8					
Bankfull Discharge (cfs)					9.1																				
Valley length (ft)					520																				
Channel Thalweg length (ft)					543												605			605					
Sinuosity (ft)					1.04						1.2			1.46			1.15			1.15					
Water Surface Slope (Channel) (ft/ft)					0.0218						0.0258			0.0053			0.019			0.0138					
BF slope (ft/ft)																									
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks					80						0			0											
Channel Stability or Habitat Metric																									
Biological or Other																									

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

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 12a. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Heron/100014) - Segment/Reach: UT 1 (856 feet)

Parameter	Pre-Existing Condition							Cedarock Reference Reach Data							Causey Reference Reach Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						60	13	14	13				43	19	19	19			
[1]SC% / Sa% / G% / C% / B% / Be%								9	22	39	18	11			4	54	28	11	1	2															
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)								0.12	4.1	9.8	161	2568			0.32	0.5	0.9	24	116																
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10		29	71						33			66						50	50													25	75			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0		14	43	43				66		33						100													100						

Shaded cells indicate that these will typically not be filled in.
1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates
3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

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

Table 12b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Heron/100014) - Segment/Reach: UT 3 (279 feet)

Parameter	Pre-Existing Condition							Cedarock Reference Reach Data							Causey Reference Reach Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						74	8	9	8				55	15	15	15			
[1]SC% / Sa% / G% / C% / B% / Be%								9	22	39	18	11			4	54	28	11	1	2															
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)								0.12	4.1	9.8	161	2568			0.32	0.5	0.9	24	116																
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10	33	33	33						33			66						50	50													100				
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0			33	66				66		33						100													100						

Shaded cells indicate that these will typically not be filled in.
1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates
3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

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

Table 12c. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Heron/100014) - Segment/Reach: UT 4 (450 feet)

Parameter	Pre-Existing Condition							Cedarock Reference Reach Data							Causey Reference Reach Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						63	12	13	12				48	17	18	17			
[1]SC% / Sa% / G% / C% / B% / Be%								9	22	39	18	11			4	54	28	11	1	2															
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)								0.12	4.1	9.8	161	2568			0.32	0.5	0.9	24	116																
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10		25	25	50					33			66						50	50													100			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0		25	25	50				66		33						100													100						

Shaded cells indicate that these will typically not be filled in.
1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates
3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

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

Table 12d. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Heron/100014) - Segment/Reach: UT 5 (952 feet)

Parameter	Pre-Existing Condition							Cedarock Reference Reach Data							Causey Reference Reach Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						58	14	14	14				50	17	17	16			
[1]SC% / Sa% / G% / C% / B% / Be%								9	22	39	18	11			4	54	28	11	1	2																
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)								0.12	4.1	9.8	161	2568			0.32	0.5	0.9	24	116																	
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10	20	20	40	20					33			66						50	50														100			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0		20	20	60				66		33						100													100						

Shaded cells indicate that these will typically not be filled in.
1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates
3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

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

Table 12e. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Heron/100014) - Segment/Reach: UT 6 (781 feet)

Parameter	Pre-Existing Condition							Cedarock Reference Reach Data							Causey Reference Reach Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						64	12	12	12				46	18	18	18			
[1]SC% / Sa% / G% / C% / B% / Be%								9	22	39	18	11			4	54	28	11	1	2																
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)								0.12	4.1	9.8	161	2568			0.32	0.5	0.9	24	116																	
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10	40	20	20	20					33			66						50	50														100			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0				100				66		33						100													100						

Shaded cells indicate that these will typically not be filled in.
1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates
3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

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

Table 12f. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Heron/100014) - Segment/Reach: UT 7 (232 feet)

Parameter	Pre-Existing Condition							Cedarock Reference Reach Data							Causey Reference Reach Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						76	7	8	7				60	13	14	13			
[1]SC% / Sa% / G% / C% / B% / Be%								9	22	39	18	11			4	54	28	11	1	2																
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)								0.12	4.1	9.8	161	2568			0.32	0.5	0.9	24	116																	
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10		57	29	14					33			66						50	50												25	75			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0			29	71				66		33						100													100						

Shaded cells indicate that these will typically not be filled in.
1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates
3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

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

Table 12g. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Project Name/Number (Heron/100014) - Segment/Reach: UT 8 (605 feet)

Parameter	Pre-Existing Condition							Cedarock Reference Reach Data							Causey Reference Reach Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						60	13	14	13				41	20	20	19			
[1]SC% / Sa% / G% / C% / B% / Be%								9	22	39	18	11			4	54	28	11	1	2															
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)								0.12	4.1	9.8	161	2568			0.32	0.5	0.9	24	116																
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10	25	25	50						33			66						50	50												50	50			
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0		50		50				66		33						100													100						

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

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

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

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

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

Table 13a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Heron/100014) Segment/Reach: UT 1 (856 feet)

	Cross Section 1 (Pool)							Cross Section 2 (Riffle)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)							Cross Section 5 (Riffle)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																				
Bankfull Width (ft)	9.2	8.5	8.5					10.7	14.7	15.3					13.0	14.4	17.7					8.9	9.7	9.1					8.3	9.0	10.7				
Floodprone Width (ft)	NA	NA	NA					100	100	100					100	100	100					NA	NA	NA					25	25	25				
Bankfull Mean Depth (ft)	1.1	1.2	1.2					0.6	0.4	0.4					0.4	0.3	0.3					0.8	0.7	0.7					0.4	0.4	0.3				
Bankfull Max Depth (ft)	2.1	2.2	2.2					0.9	0.8	0.9					0.7	0.7	0.7					1.6	1.6	1.5					0.6	0.6	0.7				
Bankfull Cross Sectional Area (ft^2)	10.5	10.5	10.5					6.1	6.1	6.1					4.6	4.6	4.6					6.8	6.8	6.8					3.7	3.7	3.7				
Bankfull Width/Depth Ratio	NA	NA	NA					18.8	35.4	38.4					36.7	45.1	68.1					NA	NA	NA					18.6	21.9	30.9				
Bankfull Entrenchment Ratio	NA	NA	NA					9.3	6.8	6.5					7.7	6.9	5.6					NA	NA	NA					3.0	2.8	2.3				
Low Bank Height (ft)	2.1	2.2	2.1					0.9	0.7	0.9					0.7	0.7	0.7					1.6	1.6	1.5					0.6	0.6	0.7				
Bankfull Bank Height Ratio*	1.00	1.00	0.95					1.00	0.88	1.00					1.00	1.00	1.00					1.00	1.00	1.00					1.00	1.00	1.00				
Cross Sectional Area between end pins (ft^2)																																				
d50 (mm)																																				
	Cross Section 6 (Pool)							**Cross Section 7 (Pool)**							**Cross Section 8 (Riffle)**																							
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+															
Record elevation (datum) used																																				
Bankfull Width (ft)	12.8	13.2	15.7					9.6	10.4	10.5					11.2	12.0	11.4																			
Floodprone Width (ft)	NA	NA	NA					NA	NA	NA					100	100	100																			
Bankfull Mean Depth (ft)	0.7	0.7	0.6					0.8	0.8	0.8					0.6	0.6	0.6																			
Bankfull Max Depth (ft)	1.6	1.7	1.6					1.5	1.7	1.5					1.1	1.0	1.1																			
Bankfull Cross Sectional Area (ft^2)	9.4	9.4	9.4					8.0	8.0	8.0					7.2	7.2	7.2																			
Bankfull Width/Depth Ratio	NA	NA	NA					NA	NA	NA					17.4	20.0	18.1																			
Bankfull Entrenchment Ratio	NA	NA	NA					NA	NA	NA					8.9	8.3	8.8																			
Low Bank Height (ft)	1.6	1.7	1.6					1.5	1.7	1.5					1.1	1.0	1.1																			
Bankfull Bank Height Ratio*	1.00	1.00	1.00					1.00	1.00	1.00					1.00	1.00	1.00																			
Cross Sectional Area between end pins (ft^2)																																				
d50 (mm)																																				

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

*Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document produced by the technical industry work group consisting of the NCIRT, NCDMS, and Industry Practitioners in NC (9/2018).

Table 13b. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Heron/100014) Segment/Reach: UT 3 (279 feet)

	Cross Section 9 (Pool)							Cross Section 10 (Riffle)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used														
Bankfull Width (ft)	4.2	5.6	5.8					7.7	7.0	7.0				
Floodprone Width (ft)	NA	NA	NA					18	18	18				
Bankfull Mean Depth (ft)	0.7	0.5	0.5					0.6	0.6	0.6				
Bankfull Max Depth (ft)	1.0	0.8	0.8					1.0	1.1	1.0				
Bankfull Cross Sectional Area (ft^2)	2.9	2.9	2.9					4.5	4.5	4.5				
Bankfull Width/Depth Ratio	NA	NA	NA					13.2	10.9	10.9				
Bankfull Entrenchment Ratio	NA	NA	NA					2.3	2.6	2.6				
Low Bank Height (ft)	1.0	0.3	0.3					1.0	1.1	1.0				
Bankfull Bank Height Ratio*	1.00	0.38	0.38					1.00	1.00	1.00				
Cross Sectional Area between end pins (ft^2)														
d50 (mm)														
Based on fixed baseline bankfull elevation[1]														
Record elevation (datum) used														
Bankfull Width (ft)														
Floodprone Width (ft)														
Bankfull Mean Depth (ft)														
Bankfull Max Depth (ft)														
Bankfull Cross Sectional Area (ft^2)														
Bankfull Width/Depth Ratio														
Bankfull Entrenchment Ratio														
Low Bank Height (ft)														
Bankfull Bank Height Ratio*														
Cross Sectional Area between end pins (ft^2)														
d50 (mm)														

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

*Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document produced by the technical industry work group consisting of the NCIRT, NCDMS, and Industry Practitioners in NC (9/2018).

Table 13c. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Heron/100014) Segment/Reach: UT 4 (450 feet)

	Cross Section 11 (Pool)							Cross Section 12 (Riffle)							Cross Section 13 (Riffle)							Cross Section 14 (Pool)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																												
Bankfull Width (ft)	6.0	7.9	9.4					6.5	7.4	10.6					8.0	7.9	11.3					9.1	11.0	10.9				
Floodprone Width (ft)	NA	NA	NA					40	40	40					40	40	40					NA	NA	NA				
Bankfull Mean Depth (ft)	0.8	0.6	0.5					0.3	0.3	0.2					0.5	0.4	0.3					0.7	0.6	0.6				
Bankfull Max Depth (ft)	1.1	1.1	1.3					0.5	0.6	0.5					0.8	0.8	0.8					1.4	1.4	1.4				
Bankfull Cross Sectional Area (ft^2)	4.8	4.8	4.8					2.2	2.2	2.2					3.7	3.5	3.5					6.8	6.8	6.8				
Bankfull Width/Depth Ratio	NA	NA	NA					19.2	24.9	51.1					17.3	17.8	36.5					NA	NA	NA				
Bankfull Entrenchment Ratio	NA	NA	NA					6.2	5.4	3.8					5.0	5.1	3.5					NA	NA	NA				
Low Bank Height (ft)	1.1	0.9	1.3					0.5	0.5	0.5					0.8	0.8	0.8					1.4	1.4	1.4				
Bankfull Bank Height Ratio*	1.00	0.82	1.00					1.00	0.83	1.00					1.00	1.00	1.00					1.00	1.00	1.00				
Cross Sectional Area between end pins (ft^2)																												
d50 (mm)																												
Based on fixed baseline bankfull elevation[1]																												
Record elevation (datum) used																												
Bankfull Width (ft)																												
Floodprone Width (ft)																												
Bankfull Mean Depth (ft)																												
Bankfull Max Depth (ft)																												
Bankfull Cross Sectional Area (ft^2)																												
Bankfull Width/Depth Ratio																												
Bankfull Entrenchment Ratio																												
Low Bank Height (ft)																												
Bankfull Bank Height Ratio*																												
Cross Sectional Area between end pins (ft^2)																												
d50 (mm)																												

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

*Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document produced by the technical industry work group consisting of the NCIRT, NCDMS, and Industry Practitioners in NC (9/2018).

Table 13d. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Heron/100014) Segment/Reach: UT 5 (952 feet)

	Cross Section 15 (Pool)							Cross Section 16 (Riffle)							Cross Section 17 (Pool)							Cross Section 18 (Riffle)							Cross Section 19 (Pool)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																				
Bankfull Width (ft)	4.7	9.4	8.7					6.3	5.7	9.4					5.4	5.7	5.9					8.1	9.2	12.2					7.8	8.7	11.4				
Floodprone Width (ft)	NA	NA	NA					40	40	40					NA	NA	NA					40	40	40					NA	NA	NA				
Bankfull Mean Depth (ft)	0.5	0.3	0.3					0.3	0.3	0.2					0.6	0.6	0.6					0.5	0.4	0.3					0.4	0.4	0.3				
Bankfull Max Depth (ft)	0.8	0.5	0.6					0.5	0.6	0.6					1.1	1.2	1.3					0.8	0.7	0.8					0.9	0.8	0.7				
Bankfull Cross Sectional Area (ft^2)	2.4	2.4	2.4					1.9	1.9	1.9					3.4	3.4	3.4					3.7	3.7	3.7					3.3	3.3	3.3				
Bankfull Width/Depth Ratio	NA	NA	NA					20.9	17.1	46.5					NA	NA	NA					17.7	22.9	40.2					NA	NA	NA				
Bankfull Entrenchment Ratio	NA	NA	NA					6.3	7.0	4.3					NA	NA	NA					4.9	4.3	3.3					NA	NA	NA				
Low Bank Height (ft)	0.8	0.5	0.6					0.5	0.6	0.6					1.1	1.2	1.3					0.8	0.6	0.8					0.9	0.8	0.7				
Bankfull Bank Height Ratio*	1.00	1.00	1.00					1.00	1.00	1.00					1.00	1.00	1.00					1.00	0.86	1.00					1.00	1.00	1.00				
Cross Sectional Area between end pins (ft^2)																																				
d50 (mm)																																				
	Cross Section 20 (Riffle)							Cross Section 21 (Pool)							Cross Section 22 (Riffle)																							
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+															
Record elevation (datum) used																																				
Bankfull Width (ft)	4.9	6.2	5.3					5.0	5.8	5.8					7.4	7.2	8.5																			
Floodprone Width (ft)	40	40	40					NA	NA	NA					40	40	40																			
Bankfull Mean Depth (ft)	0.4	0.3	0.4					0.6	0.5	0.5					0.4	0.4	0.3																			
Bankfull Max Depth (ft)	0.6	0.6	0.6					1.1	1.0	1.1					0.7	0.8	0.7																			
Bankfull Cross Sectional Area (ft^2)	1.9	1.9	1.9					3.1	3.1	3.1					2.9	2.9	2.9																			
Bankfull Width/Depth Ratio	12.6	20.2	14.8					NA	NA	NA					18.9	17.9	24.9																			
Bankfull Entrenchment Ratio	8.2	6.5	7.5					NA	NA	NA					5.4	5.6	4.7																			
Low Bank Height (ft)	0.6	0.6	0.6					1.1	1.0	1.1					0.7	0.8	0.7																			
Bankfull Bank Height Ratio*	1.00	1.00	1.00					1.00	1.00	1.00					1.00	1.00	1.00																			
Cross Sectional Area between end pins (ft^2)																																				
d50 (mm)																																				

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

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Table 13e. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Heron/100014) Segment/Reach: UT 6 (781 feet)

	Cross Section 23 (Pool)							Cross Section 24 (Riffle)							Cross Section 25 (Pool)							Cross Section 26 (Riffle)													
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+							
Record elevation (datum) used																																			
Bankfull Width (ft)	5.6	5.7	6.4					6.1	5.8	5.7					5.2	10.0	10.3					6.8	4.7	4.8											
Floodprone Width (ft)	NA	NA	NA					40	40	40					NA	NA	NA					40	40	40											
Bankfull Mean Depth (ft)	0.6	0.6	0.6					0.4	0.4	0.4					0.6	0.3	0.3					0.5	0.7	0.7											
Bankfull Max Depth (ft)	1.0	0.9	1.0					0.6	0.5	0.6					1.3	0.8	0.8					0.9	1.0	1.2											
Bankfull Cross Sectional Area (ft^2)	3.6	3.6	3.6					2.2	2.2	2.2					3.2	3.2	3.2					3.5	3.5	3.5											
Bankfull Width/Depth Ratio	NA	NA	NA					16.9	15.3	14.8					NA	NA	NA					13.2	6.3	6.6											
Bankfull Entrenchment Ratio	NA	NA	NA					6.6	6.9	7.0					NA	NA	NA					5.9	8.5	8.3											
Low Bank Height (ft)	1.0	0.9	1.0					0.6	0.7	0.6					1.3	0.6	0.7					0.9	1.4	1.5											
Bankfull Bank Height Ratio*	1.00	1.00	1.00					1.00	1.40	1.00					1.00	0.75	0.88					1.00	1.40	1.25											
Cross Sectional Area between end pins (ft^2)																																			
d50 (mm)																																			
Based on fixed baseline bankfull elevation[1]																																			
Record elevation (datum) used																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft^2)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Low Bank Height (ft)																																			
Bankfull Bank Height Ratio*																																			
Cross Sectional Area between end pins (ft^2)																																			
d50 (mm)																																			

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

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Table 13f. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Heron/100014) Segment/Reach: UT 7 (232 feet)

	Cross Section 27 (Pool)							Cross Section 28 (Riffle)							Cross Section 29 (Pool)							Cross Section 30 (Riffle)							Cross Section 31 (Pool)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																			
Bankfull Width (ft)	7.1	11.4	12.4					7.8	6.9	7.5					4.1	4.1	4.1					6.2	5.6	6.3					5.3	6.1	5.8				
Floodprone Width (ft)	NA	NA	NA					20	20	20					NA	NA	NA					10	11	11					NA	NA	NA				
Bankfull Mean Depth (ft)	0.9	0.6	0.5					0.4	0.4	0.4					0.8	0.8	0.8					0.4	0.4	0.4					0.6	0.5	0.5				
Bankfull Max Depth (ft)	1.5	1.1	0.9					0.6	1.1	0.9					1.1	1.3	1.2					0.5	0.5	0.5					1.0	0.7	0.7				
Bankfull Cross Sectional Area (ft^2)	6.3	6.3	6.3					3.0	3.0	3.0					3.4	3.4	3.4					2.3	2.3	2.3					3.0	3.0	3.0				
Bankfull Width/Depth Ratio	NA	NA	NA					20.3	15.9	18.8					NA	NA	NA					16.7	13.6	17.3					NA	NA	NA				
Bankfull Entrenchment Ratio	NA	NA	NA					2.6	2.9	2.7					NA	NA	NA					1.6	2.0	1.7					NA	NA	NA				
Low Bank Height (ft)	1.5	0.8	0.8					0.6	1.1	0.9					1.1	1.2	1.2					0.5	0.5	0.5					1.0	0.6	0.8				
Bankfull Bank Height Ratio*	1.00	0.73	0.89					1.00	1.00	1.00					1.00	0.92	1.00					1.00	1.00	1.00					1.00	0.86	1.14				
Cross Sectional Area between end pins (ft^2)																																			
d50 (mm)																																			
	Cross Section 32 (Riffle)							Cross Section 33 (Riffle)																													
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+																					
Record elevation (datum) used																																			
Bankfull Width (ft)	6.5	7.6	7.9					6.6	5.8	6.2																									
Floodprone Width (ft)	20	20	20					20	20	20																									
Bankfull Mean Depth (ft)	0.5	0.4	0.4					0.3	0.3	0.3																									
Bankfull Max Depth (ft)	0.7	0.8	0.8					0.5	0.6	0.6																									
Bankfull Cross Sectional Area (ft^2)	3.3	3.3	3.3					1.8	1.8	1.8																									
Bankfull Width/Depth Ratio	12.8	17.5	18.9					24.2	18.7	21.4																									
Bankfull Entrenchment Ratio	3.1	2.6	2.5					3.0	3.4	3.2																									
Low Bank Height (ft)	0.7	0.8	0.8					0.5	0.5	0.7																									
Bankfull Bank Height Ratio*	1.00	1.00	1.00					1.00	0.83	1.17																									
Cross Sectional Area between end pins (ft^2)																																			
d50 (mm)																																			

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

*Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document produced by the technical industry work group consisting of the NCIRT, NCDMS, and Industry Practitioners in NC (9/2018).

Table 13g. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Heron/100014) Segment/Reach: UT 8 (605 feet)

	Cross Section 34 (Riffle)							Cross Section 35 (Pool)							Cross Section 36 (Riffle)							Cross Section 37 (Pool)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																												
Bankfull Width (ft)	6.5	5.2	4.8					7.5	6.9	7.1					9.3	9.0	9.3					9.5	8.7	10.5				
Floodprone Width (ft)	40	40	40					NA	NA	NA					20	20	20					NA	NA	NA				
Bankfull Mean Depth (ft)	0.4	0.5	0.5					0.5	0.6	0.6					0.4	0.4	0.4					0.8	0.8	0.7				
Bankfull Max Depth (ft)	0.7	0.7	0.8					0.9	1.0	0.9					0.7	0.7	0.8					1.6	1.6	1.6				
Bankfull Cross Sectional Area (ft^2)	2.6	2.6	2.6					4.1	4.1	4.1					3.7	3.7	3.7					7.2	7.2	7.2				
Bankfull Width/Depth Ratio	16.3	10.4	8.9					NA	NA	NA					23.4	21.9	23.4					NA	NA	NA				
Bankfull Entrenchment Ratio	6.2	7.7	8.3					NA	NA	NA					2.2	2.2	2.2					NA	NA	NA				
Low Bank Height (ft)	0.7	0.8	0.8					0.9	1.0	0.9					0.7	0.7	0.8					1.6	1.6	1.6				
Bankfull Bank Height Ratio*	1.00	1.14	1.00					1.00	1.00	1.00					1.00	1.00	1.00					1.00	1.00	1.00				
Cross Sectional Area between end pins (ft^2)																												
d50 (mm)																												
Based on fixed baseline bankfull elevation[1]																												
Record elevation (datum) used																												
Bankfull Width (ft)																												
Floodprone Width (ft)																												
Bankfull Mean Depth (ft)																												
Bankfull Max Depth (ft)																												
Bankfull Cross Sectional Area (ft^2)																												
Bankfull Width/Depth Ratio																												
Bankfull Entrenchment Ratio																												
Low Bank Height (ft)																												
Bankfull Bank Height Ratio*																												
Cross Sectional Area between end pins (ft^2)																												
d50 (mm)																												

1 = Widths and depths for annual measurements will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

*Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document produced by the technical industry work group consisting of the NCIRT, NCDMS, and Industry Practitioners in NC (9/2018).

Exhibit Table 14a. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 1 (856 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	8.3	11		13		4	9	13.2		14.7		4	10.7	13.4		17.7		4																		
Floodprone Width (ft)	25	100		100		4	25	100		100		4	25	100		100		4																		
Bankfull Mean Depth (ft)	0.4	0.5		0.6		4	0.3	0.4		0.6		4	0.26	0.37		0.63		4																		
[1]Bankfull Max Depth (ft)	0.6	0.8		1.1		4	0.6	0.8		1		4	0.7	0.8		1.1		4																		
Bankfull Cross Sectional Area (ft^2)	3.7	5.4		7.2		4	3.7	5.4		7.2		4	3.7	5.4		7.2		4																		
Width/Depth Ratio	17.4	18.7		36.7		4	20	28.7		45.1		4	18.1	34.7		68.1		4																		
Entrenchment Ratio	3	8.3		9.3		4	2.8	6.9		8.3		4	2.34	6.09		8.77		4																		
Low Bank Height (ft)	0.6	0.8		1.1		4	0.6	0.7		1		4	0.7	0.8		1.1		4																		
[1]Bank Height Ratio	1.0	1.0		1.0		4	0.9	1		1		4	1.0	1.0		1.0		4																		
Profile																																				
Riffle Length (ft)	2.7	19	16	53	11	31																														
Riffle Slope (ft/ft)	0	0.01	0.01	0.05	0.01	31																														
Pool Length (ft)	6	23	20	80	12.9	34																														
Pool Max depth (ft)	1.5	1.6		2.1		4																														
Pool Spacing (ft)	25	34		68		34																														
Pattern																																				
Channel Beltwidth (ft)	25	34		68																																
Radius of Curvature (ft)	17	25		85																																
Rc:Bankfull width (ft/ft)	2	3		10																																
Meander Wavelength (ft)	51	72		101																																
Meander Width Ratio	3	4		6																																
Additional Reach Parameters																																				
Rosgen Classification	C 4																																			
Channel Thalweg length (ft)	856																																			
Sinuosity (ft)	1.3																																			
Water Surface Slope (Channel) (ft/ft)	0.0087																																			
BF slope (ft/ft)																																				
[3]Ri% / Ru% / P% / G% / S%	43	19	19	19																																
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	0																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14b. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 3 (279 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	7.7	7.7		7.7		1	7	7		7		1	7	7		7		1																		
Floodprone Width (ft)	18	18		18		1	18	18		18		1	18	18		18		1																		
Bankfull Mean Depth (ft)	0.6	0.6		0.6		1	0.6	0.6		0.6		1	0.6	0.6		0.6		1																		
[1]Bankfull Max Depth (ft)	1	1		1		1	1.1	1.1		1.1		1	1	1		1		1																		
Bankfull Cross Sectional Area (ft^2)	4.5	4.5		4.5		1	4.5	4.5		4.5		1	4.5	4.5		4.5		1																		
Width/Depth Ratio	13.2	13.2		13.2		1	10.9	10.9		10.9		1	10.9	10.9		10.9		1																		
Entrenchment Ratio	2.3	2.3		2.3		1	2.6	2.6		2.6		1	2.6		2.6			1																		
Low Bank Height (ft)	1	1		1		1	1.1	1.1		1.1		1	1	1		1		1																		
[1]Bank Height Ratio	1.0	1.0		1.0		1	1	1.0		1.0		1	1	1.0		1.0		1																		
Profile																																				
Riffle Length (ft)	4	11	10	19	4.3	14																														
Riffle Slope (ft/ft)	0.01	0.03	0.03	0.74	0.02	14																														
Pool Length (ft)	4	9	8	21	4.9	13																														
Pool Max depth (ft)	1	1	1	1	0	1																														
Pool Spacing (ft)	13	18		35		14																														
Pattern																																				
Channel Beltwidth (ft)	13	18		27																																
Radius of Curvature (ft)	9	13		44																																
Rc:Bankfull width (ft/ft)	2	3		10																																
Meander Wavelength (ft)	26	37		53																																
Meander Width Ratio	3	4		6																																
Additional Reach Parameters																																				
Rosgen Classification	C 4																																			
Channel Thalweg length (ft)	279																																			
Sinuosity (ft)	1.15																																			
Water Surface Slope (Channel) (ft/ft)	0.0176																																			
BF slope (ft/ft)																																				
[3]Ri% / Ru% / P% / G% / S%	55	15	15	15																																
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	0																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14c. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 4 (450 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	6.5	7.3		8		2	7.4	7.7		7.9		2	10.6	11		11.3		2																		
Floodprone Width (ft)	40	40		40		2	40	40		40		2	40	40		40		2																		
Bankfull Mean Depth (ft)	0.3	0.4		0.5		2	0.3	0.4		0.4		2	0.2	0.3		0.3		2																		
[1]Bankfull Max Depth (ft)	0.5	0.7		0.8		2	0.6	0.7		0.8		2	0.5	0.7		0.8		2																		
Bankfull Cross Sectional Area (ft^2)	2.2	3		3.7		2	2.2	2.9		3.5		2	2.2	2.9		3.5		2																		
Width/Depth Ratio	17.3	18.3		19.2		2	17.8	21.4		24.9		2	36.5	43.8		51.1		2																		
Entrenchment Ratio	5	5.6		6.2		2	5.1	5.2		5.4		2	3.5	3.7		3.8		2																		
Low Bank Height (ft)	0.5	0.7		0.8		2	0.5	0.7		0.8		2	0.5	0.7		0.8		2																		
[1]Bank Height Ratio	1.0	1.0		1.0		2	0.8	0.9		1		2	1.0	1.0		1.0		2																		
Profile																																				
Riffle Length (ft)	4	9	9	20	3.5	23																														
Riffle Slope (ft/ft)	0	0.02	0.02	0.06	0.01	23																														
Pool Length (ft)	4	10	10	18	3.5	22																														
Pool Max depth (ft)	1.1	1.3		1.4		2																														
Pool Spacing (ft)	15	20		40		22																														
Pattern																																				
Channel Beltwidth (ft)	15	20		30																																
Radius of Curvature (ft)	10	15		50																																
Rc:Bankfull width (ft/ft)	2	3		10																																
Meander Wavelength (ft)	30	43		60																																
Meander Width Ratio	3	4		6																																
Additional Reach Parameters																																				
Rosgen Classification	C 4																																			
Channel Thalweg length (ft)	450																																			
Sinuosity (ft)	1.15																																			
Water Surface Slope (Channel) (ft/ft)	0.0195																																			
BF slope (ft/ft)																																				
[3]Ri% / Ru% / P% / G% / S%	48	17	18	17																																
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	0																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14d. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 5 (952 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	4.9	6.9		8.1		4	5.7	6.7		9.2		4	5.3	9		12.2		4																		
Floodprone Width (ft)	40	40		40		4	40	40		40		4	40	40		40		4																		
Bankfull Mean Depth (ft)	0.3	0.4		0.5		4	0.3	0.4		0.4		4	0.2	0.3		0.4		4																		
[1]Bankfull Max Depth (ft)	0.5	0.7		0.8		4	0.6	0.7		0.8		4	0.6	0.7		0.8		4																		
Bankfull Cross Sectional Area (ft^2)	1.9	2.4		3.7		4	1.9	2.4		3.7		4	1.9	2.4		3.7		4																		
Width/Depth Ratio	12.6	18.3		20.9		4	17.1	19.1		22.9		4	14.8	32.6		46.5		4																		
Entrenchment Ratio	4.9	5.9		8.2		4	4.3	6.0		7.0		4	3.3	4.5		7.5		4																		
Low Bank Height (ft)	0.5	0.7		0.8		4	0.6	0.6		0.8		4	0.6	0.6		0.7		4																		
[1]Bank Height Ratio	1.0	1.0		1.0		4	0.9	1.0		1.0		4	1	0.8		1		4																		
Profile																																				
Riffle Length (ft)	3	11	9	49	8.4	41																														
Riffle Slope (ft/ft)	0	0.03	0.03	0.05	0.01	41																														
Pool Length (ft)	4	12	10	59	8.5	41																														
Pool Max depth (ft)	0.8	1		1.1		4																														
Pool Spacing (ft)	15	20		40		41																														
Pattern																																				
Channel Beltwidth (ft)	15	20		30																																
Radius of Curvature (ft)	10	15		50																																
Rc:Bankfull width (ft/ft)	2	3		10																																
Meander Wavelength (ft)	30	43		60																																
Meander Width Ratio	3	4		6																																
Additional Reach Parameters																																				
Rosgen Classification	E/C 4																																			
Channel Thalweg length (ft)	952																																			
Sinuosity (ft)	1.15																																			
Water Surface Slope (Channel) (ft/ft)	0.0256																																			
BF slope (ft/ft)																																				
[3]Ri% / Ru% / P% / G% / S%	50	17	17	16																																
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	0																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14e. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 6 (781 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	6.1	6.5		6.8		2	4.7	5.3		5.8		2	4.8	5.3		5.7		2																		
Floodprone Width (ft)	40	40		40		2	40	40		40		2	40	40		40		2																		
Bankfull Mean Depth (ft)	0.4	0.4		0.5		2	0.4	0.6		0.7		2	0.4	0.6		0.7		2																		
[1]Bankfull Max Depth (ft)	0.6	0.8		0.9		2	0.5	0.8		1		2	0.6	0.9		1.2		2																		
Bankfull Cross Sectional Area (ft^2)	2.2	2.9		3.5		2	2.2	2.9		3.5		2	2.2	2.9		3.5		2																		
Width/Depth Ratio	13.2	15.1		16.9		2	6.3	10.8		15.3		2	6.6	10.7		14.8		2																		
Entrenchment Ratio	5.9	6.2		6.6		2	6.9	7.7		8.5		2	7	7.7		8.3		2																		
Low Bank Height (ft)	0.6	0.8		0.9		2	0.7	1.1		1.4		2	0.7	1.1		1.5		2																		
[1]Bank Height Ratio	1.0	1.0		1.0		2	1.4	1.4		1.4		2	1.1	1.2		1.3		2																		
Profile																																				
Riffle Length (ft)	2	10	7	47	8.8	33																														
Riffle Slope (ft/ft)	0	0.03	0.02	0.13	0.02	33																														
Pool Length (ft)	4	12	12	18	3.7	33																														
Pool Max depth (ft)	1	1.2		1.3		2																														
Pool Spacing (ft)	14	18		37		33																														
Pattern																																				
Channel Beltwidth (ft)	14	18		37																																
Radius of Curvature (ft)	9	14		46																																
Rc:Bankfull width (ft/ft)	2	3		10																																
Meander Wavelength (ft)	27	39		55																																
Meander Width Ratio	3	4		6																																
Additional Reach Parameters																																				
Rosgen Classification	C 4																																			
Channel Thalweg length (ft)	781																																			
Sinuosity (ft)	1.15																																			
Water Surface Slope (Channel) (ft/ft)	0.0225																																			
BF slope (ft/ft)																																				
[3]Ri% / Ru% / P% / G% / S%	46	18	18	18																																
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	0																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14f. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 7 (232 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	6.2	6.6		7.8		4	5.6	6.4		7.6		4	6.2	6.9		7.9		4																		
Floodprone Width (ft)	10	20		20		4	11	20		20		4	11	20		20		4																		
Bankfull Mean Depth (ft)	0.3	0.4		0.5		4	0.3	0.4		0.4		4	0.3	0.4		0.4		4																		
[1]Bankfull Max Depth (ft)	0.5	0.6		0.7		4	0.5	0.7		1.1		4	0.5	0.7		0.9		4																		
Bankfull Cross Sectional Area (ft^2)	1.8	2.7		3.3		4	1.8	2.7		3.3		4	1.8	2.7		3.3		4																		
Width/Depth Ratio	12.8	18.5		24.2		4	13.6	16.7		18.7		4	17.3	18.8		21.4		4																		
Entrenchment Ratio	1.6	2.8		3.1		4	2	2.8		3.4		4	1.7	2.6		3.2		4																		
Low Bank Height (ft)	0.5	0.6		0.7		4	0.5	0.7		1.1		4	0.5	0.7		0.9		4																		
[1]Bank Height Ratio	1.0	1.0		1.0		4	0.8	1		1		4	1.0	1.0		1.0		4																		
Profile																																				
Riffle Length (ft)	3	13	10	75	13	42																														
Riffle Slope (ft/ft)	0.01	0.03	0.03	0.06	0.01	42																														
Pool Length (ft)	3	9	9	14	2.6	41																														
Pool Max depth (ft)	1	1.1		1.5		3																														
Pool Spacing (ft)	16	21		42		42																														
Pattern																																				
Channel Beltwidth (ft)	16	21		32																																
Radius of Curvature (ft)	10	16		53																																
Rc:Bankfull width (ft/ft)	2	3		10																																
Meander Wavelength (ft)	31	45		64																																
Meander Width Ratio	3	4		6																																
Additional Reach Parameters																																				
Rosgen Classification	Cb 4																																			
Channel Thalweg length (ft)	232																																			
Sinuosity (ft)	1.15																																			
Water Surface Slope (Channel) (ft/ft)	0.0268																																			
BF slope (ft/ft)																																				
[3]Ri% / Ru% / P% / G% / S%	60	13	14	13																																
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	**0**																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14g. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Heron/100014) - Segment/Reach: UT 8 (605 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	6.5	7.9		9.3		2	5.2	7.1		9		2	4.8	7.1		9.3		2																		
Floodprone Width (ft)	20	30		40		2	20	30		40		2	20	30		40		2																		
Bankfull Mean Depth (ft)	0.4	0.4		0.4		2	0.4	0.5		0.5		2	0.4	0.5		0.5		2																		
[1]Bankfull Max Depth (ft)	0.7	0.7		0.7		2	0.7	0.7		0.7		2	0.8	0.8		0.8		2																		
Bankfull Cross Sectional Area (ft^2)	2.6	3.2		3.7		2	2.6	3.2		3.7		2	2.6	3.2		3.7		2																		
Width/Depth Ratio	16.3	19.8		23.4		2	10.4	16.1		21.9		2	8.9	16.1		23.4		2																		
Entrenchment Ratio	2.2	4.2		6.2		2	2.2	5		7.7		2	2.2	5.2		8.3		2																		
Low Bank Height (ft)	0.7	0.7		0.7		2	0.7	0.8		0.8		2	0.8	0.8		0.8		2																		
[1]Bank Height Ratio	1.0	1.0		1.0		2	1	1.1		1.1		2	1.0	1.0		1.0		2																		
Profile																																				
Riffle Length (ft)	5	11	11	19	3.4	23																														
Riffle Slope (ft/ft)	0.01	0.02	0.02	0.04	0.01	23																														
Pool Length (ft)	6	15	15	24	4.8	23																														
Pool Max depth (ft)	0.9	1.3		1.6		2																														
Pool Spacing (ft)	17	24		47		23																														
Pattern																																				
Channel Beltwidth (ft)	17	24		36																																
Radius of Curvature (ft)	11	18		59																																
Rc:Bankfull width (ft/ft)	2	3		10																																
Meander Wavelength (ft)	35	50		71																																
Meander Width Ratio	3	4		6																																
Additional Reach Parameters																																				
Rosgen Classification	C 4																																			
Channel Thalweg length (ft)	605																																			
Sinuosity (ft)	1.15																																			
Water Surface Slope (Channel) (ft/ft)	0.0138																																			
BF slope (ft/ft)																																				
[3]Ri% / Ru% / P% / G% / S%	41	20	20	19																																
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks	0																																			
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

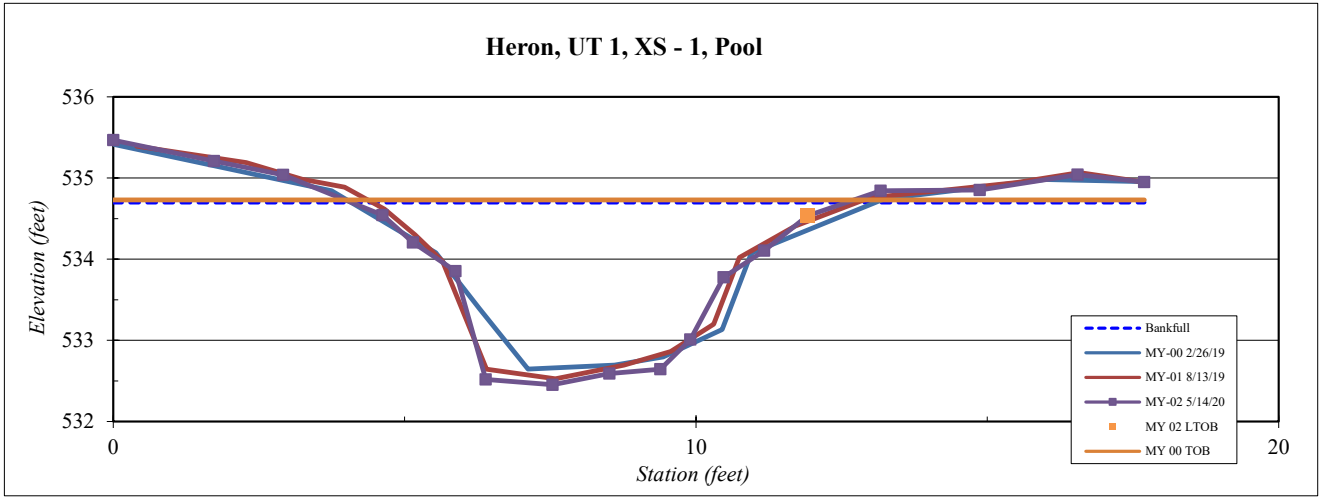
Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual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

Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 1, Pool
Feature	Pool
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	535.5
1.7	535.2
2.9	535.0
4.6	534.5
5.1	534.2
5.9	533.9
6.4	532.5
7.5	532.5
8.5	532.6
9.4	532.6
9.9	533.0
10.5	533.8
11.2	534.1
11.9	534.5
13.2	534.8
14.9	534.9
16.6	535.0
17.7	535.0

SUMMARY DATA	
Bankfull Elevation:	534.7
LTOB Elevation:	534.6
Bankfull Cross-Sectional Area:	10.5
Bankfull Width:	8.5
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.2
Low Bank Height:	2.1
Mean Depth at Bankfull:	1.2
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.95

Stream Type	C/E

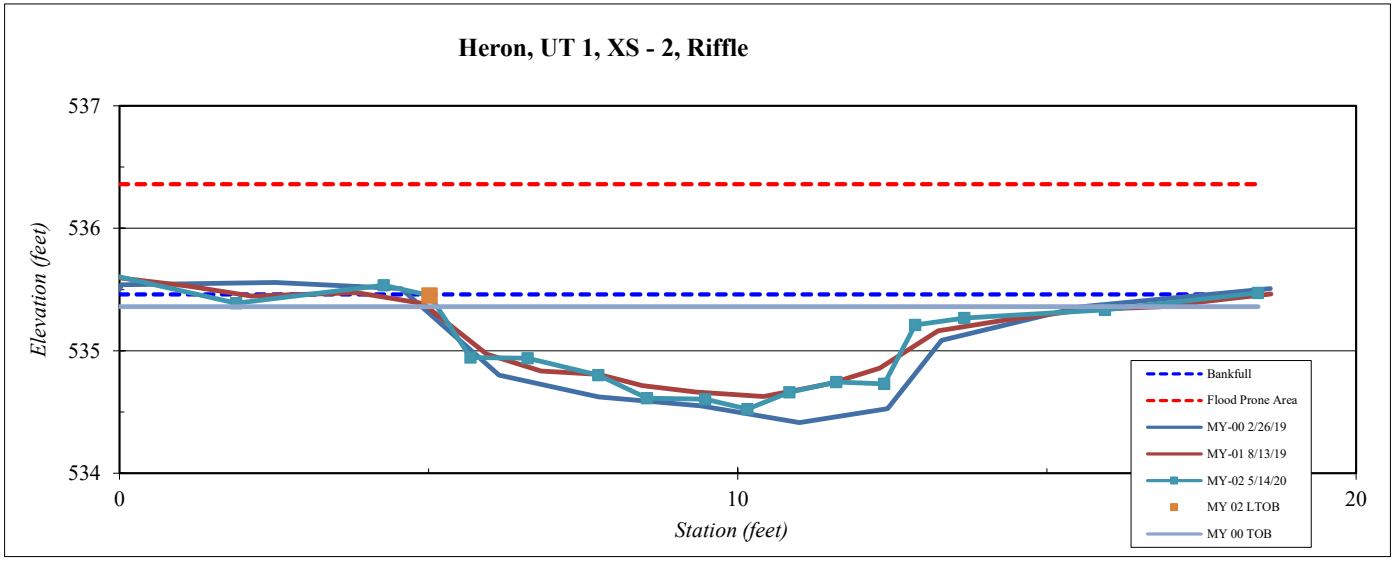


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 2, Riffle
Feature	Riffle
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
-0.4	535.65
1.9	535.39
4.3	535.54
5.0	535.45
5.7	534.95
6.6	534.94
7.7	534.80
8.5	534.61
9.5	534.60
10.2	534.52
10.8	534.66
11.6	534.74
12.4	534.73
12.9	535.21
13.7	535.27
15.9	535.33
18.4	535.47

SUMMARY DATA	
Bankfull Elevation:	535.5
LTOB Elevation:	535.5
Bankfull Cross-Sectional Area:	6.1
Bankfull Width:	15.3
Flood Prone Area Elevation:	536.4
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.9
Low Bank Height:	0.9
Mean Depth at Bankfull:	0.4
W / D Ratio:	38.4
Entrenchment Ratio:	6.5
Bank Height Ratio:	1.00

Stream Type	C/E

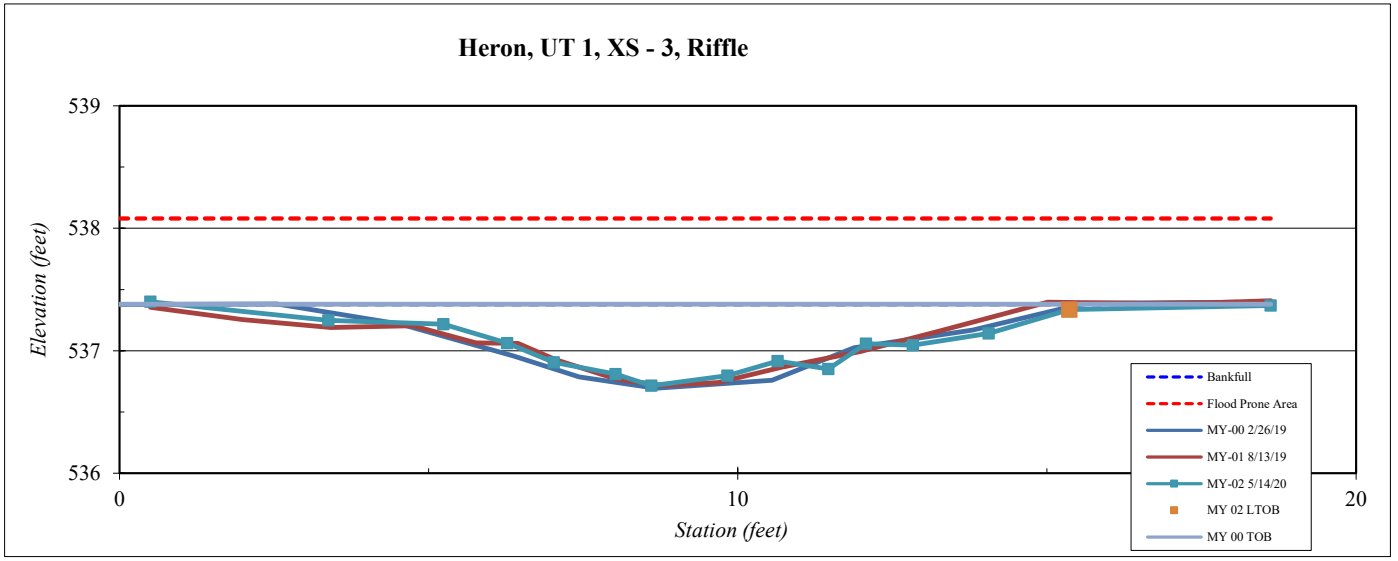


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 3, Riffle
Feature	Riffle
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.5	537.40
3.4	537.25
5.2	537.22
6.3	537.06
7.0	536.91
8.0	536.81
8.6	536.71
9.8	536.80
10.6	536.92
11.5	536.85
12.1	537.06
12.8	537.05
14.1	537.14
15.4	537.34
18.6	537.37

SUMMARY DATA	
Bankfull Elevation:	537.4
LTOB Elevation:	537.4
Bankfull Cross-Sectional Area:	4.6
Bankfull Width:	17.7
Flood Prone Area Elevation:	538.1
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.7
Low Bank Height:	0.7
Mean Depth at Bankfull:	0.3
W / D Ratio:	68.1
Entrenchment Ratio:	5.6
Bank Height Ratio:	1.00

Stream Type	C/E

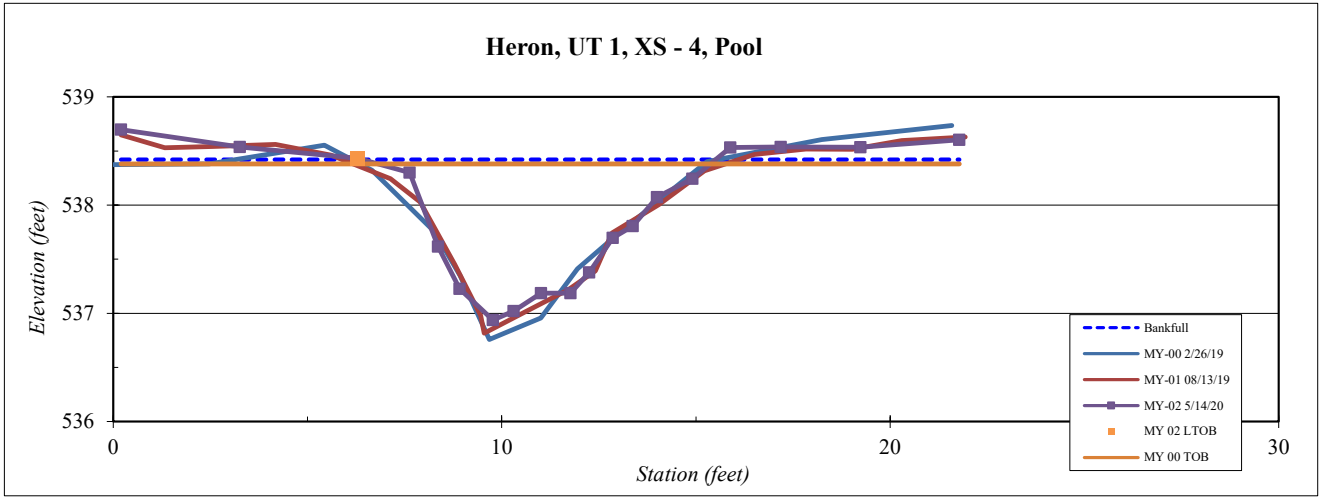


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 4, Pool
Feature	Pool
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.2	538.7
3.3	538.5
6.3	538.4
7.6	538.3
8.4	537.6
8.9	537.2
9.8	536.9
10.3	537.0
11.0	537.2
11.8	537.2
12.3	537.4
12.9	537.7
13.4	537.8
14.0	538.1
14.9	538.2
15.9	538.5
17.2	538.5
19.2	538.5
21.8	538.6

SUMMARY DATA	
Bankfull Elevation:	538.4
LTOB Elevation:	538.4
Bankfull Cross-Sectional Area:	6.8
Bankfull Width:	9.1
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.5
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.7
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

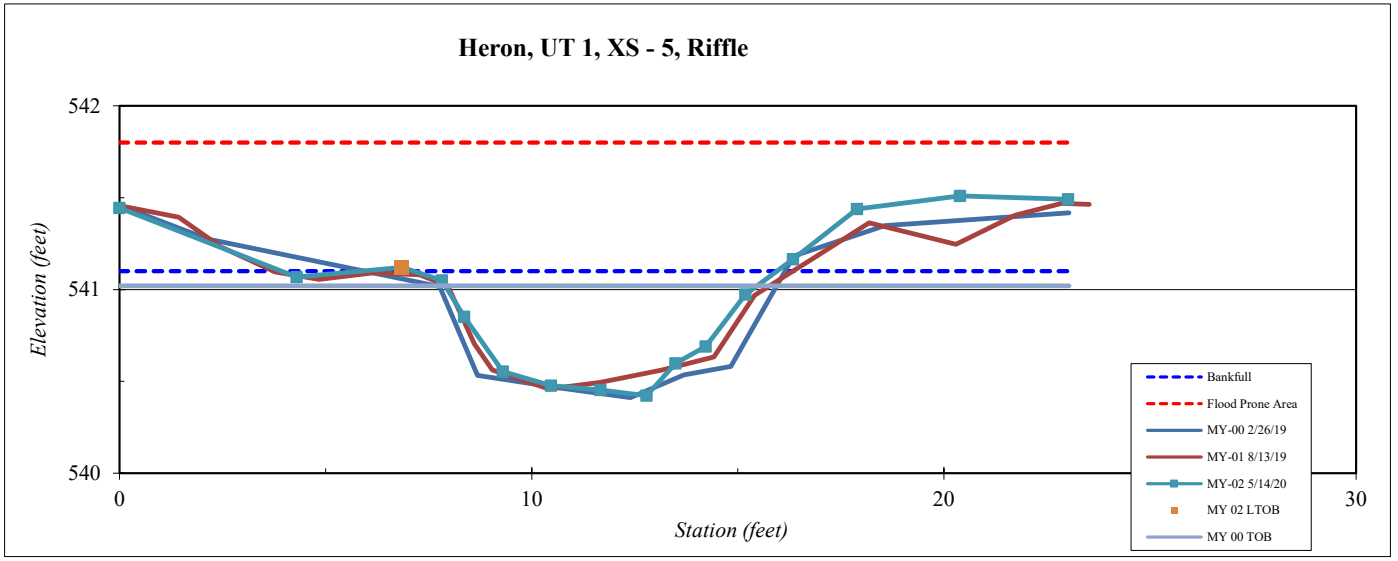


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 5, Riffle
Feature	Riffle
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	541.44
4.3	541.07
6.9	541.12
7.8	541.05
8.4	540.85
9.3	540.55
10.5	540.48
11.7	540.45
12.8	540.42
13.5	540.60
14.2	540.69
15.2	540.97
16.3	541.17
17.9	541.44
20.4	541.51
23.0	541.49

SUMMARY DATA	
Bankfull Elevation:	541.1
LTOB Elevation:	541.1
Bankfull Cross-Sectional Area:	3.7
Bankfull Width:	10.7
Flood Prone Area Elevation:	541.8
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.7
Low Bank Height:	0.7
Mean Depth at Bankfull:	0.3
W / D Ratio:	30.9
Entrenchment Ratio:	2.3
Bank Height Ratio:	1.00

Stream Type	C/E

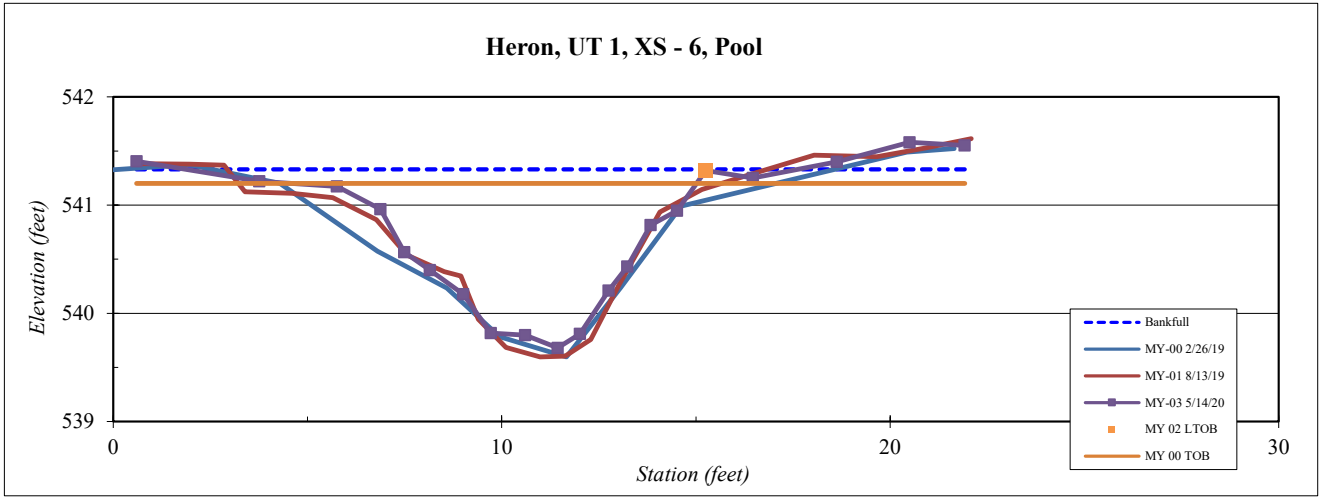


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 6, Pool
Feature	Pool
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.6	541.4
3.8	541.2
5.8	541.2
6.9	541.0
7.5	540.6
8.2	540.4
9.0	540.2
9.7	539.8
10.6	539.8
11.4	539.7
12.0	539.8
12.8	540.2
13.2	540.4
13.8	540.8
14.5	540.9
15.3	541.3
16.5	541.3
18.6	541.4
20.5	541.6
21.9	541.6

SUMMARY DATA	
Bankfull Elevation:	541.3
LTOB Elevation:	541.3
Bankfull Cross-Sectional Area:	9.4
Bankfull Width:	15.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.6
Low Bank Height:	1.6
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

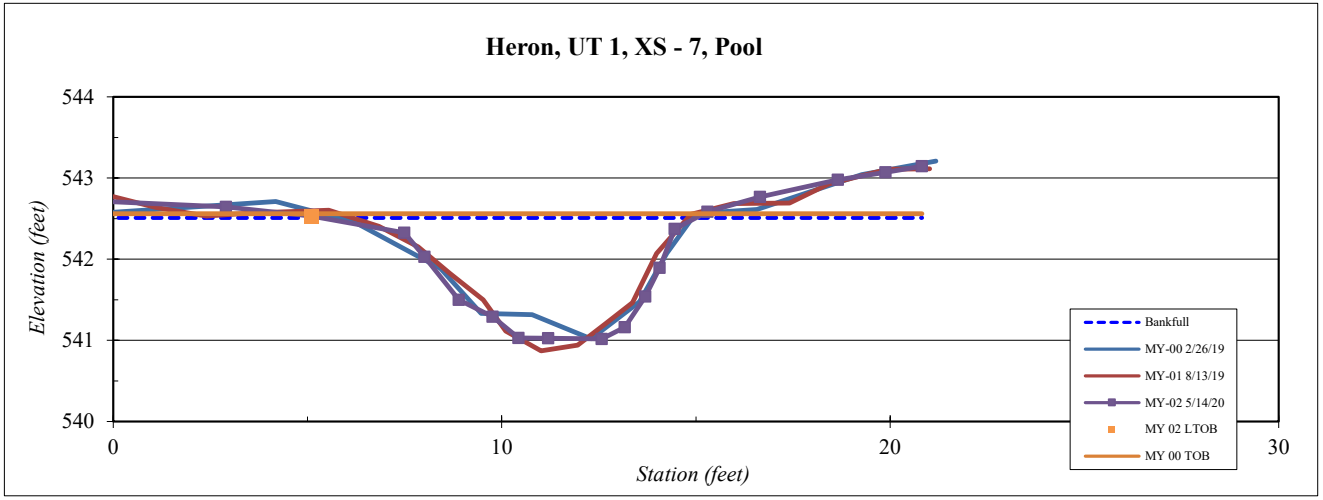


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 7, Pool
Feature	Pool
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
-0.3	542.7
2.9	542.6
5.1	542.5
7.5	542.3
8.0	542.0
8.9	541.5
9.8	541.3
10.4	541.0
11.2	541.0
12.6	541.0
13.2	541.2
13.7	541.5
14.1	541.9
14.5	542.4
15.3	542.6
16.6	542.8
18.7	543.0
19.9	543.1
20.8	543.1

SUMMARY DATA	
Bankfull Elevation:	542.5
LTOB Elevation:	542.6
Bankfull Cross-Sectional Area:	8.0
Bankfull Width:	9.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.5
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

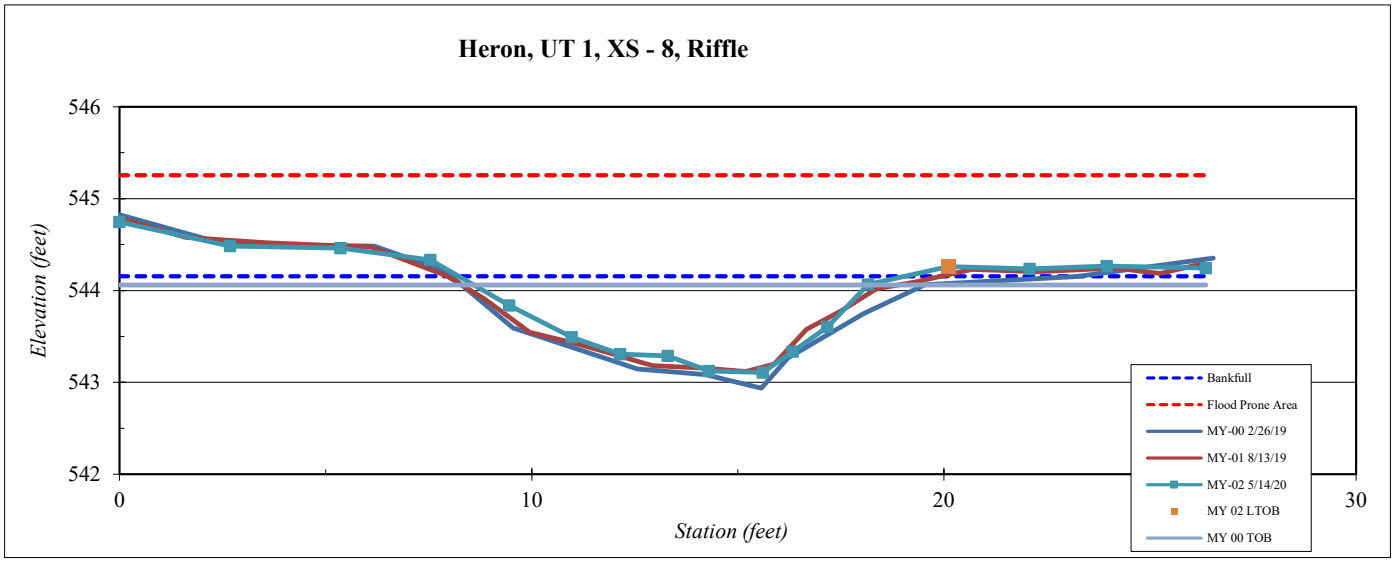


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 1, XS - 8, Riffle
Feature	Riffle
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	544.75
2.7	544.48
5.4	544.46
7.5	544.33
9.5	543.84
11.0	543.49
12.1	543.31
13.3	543.29
14.3	543.12
15.6	543.11
16.3	543.33
17.2	543.60
18.2	544.07
20.1	544.26
22.1	544.24
24.0	544.27
26.4	544.25

SUMMARY DATA	
Bankfull Elevation:	544.2
LTOB Elevation:	544.2
Bankfull Cross-Sectional Area:	7.2
Bankfull Width:	11.4
Flood Prone Area Elevation:	545.3
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.1
Low Bank Height:	1.1
Mean Depth at Bankfull:	0.6
W / D Ratio:	18.1
Entrenchment Ratio:	8.8
Bank Height Ratio:	1.00

Stream Type	C/E

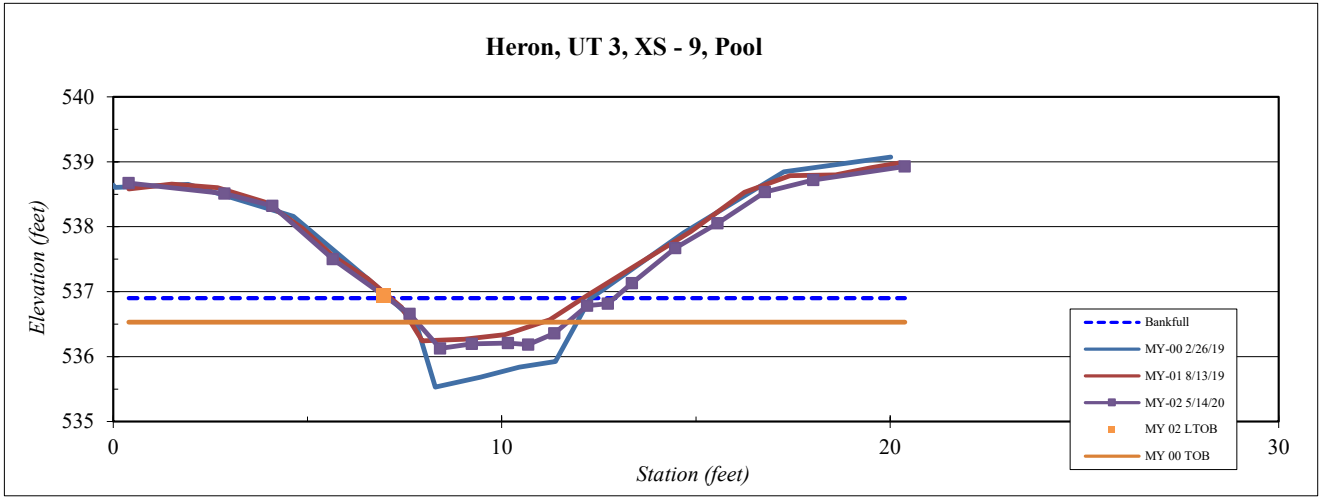


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 3, XS - 9, Pool
Feature	Pool
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.4	538.7
2.9	538.5
4.1	538.3
5.7	537.5
7.0	536.9
7.6	536.7
8.4	536.1
9.2	536.2
10.2	536.2
10.7	536.2
11.4	536.4
12.2	536.8
12.7	536.8
13.4	537.1
14.5	537.7
15.6	538.1
16.8	538.5
18.0	538.7
20.4	538.9

SUMMARY DATA	
Bankfull Elevation:	536.9
LTOB Elevation:	537.0
Bankfull Cross-Sectional Area:	2.9
Bankfull Width:	5.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.8
Low Bank Height:	0.3
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.38

Stream Type	C/E

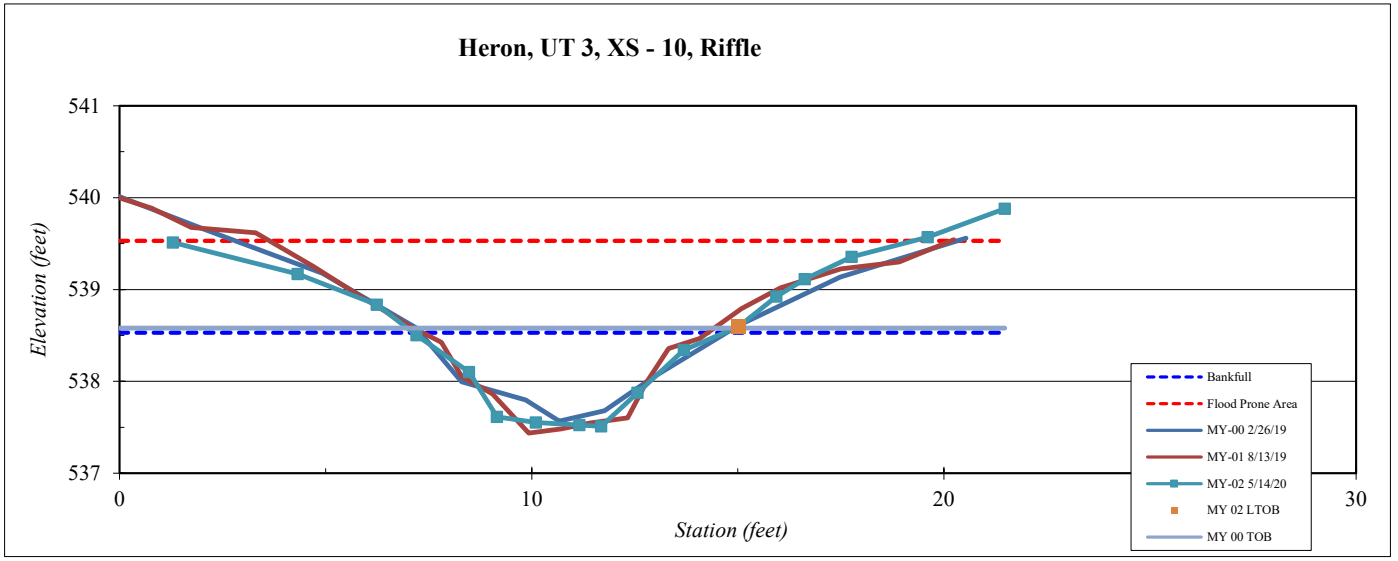


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 3, XS - 10, Riffle
Feature	Riffle
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
1.3	539.51
4.3	539.17
6.2	538.83
7.2	538.50
8.5	538.10
9.2	537.61
10.1	537.55
11.2	537.53
11.7	537.51
12.6	537.87
13.7	538.34
15.0	538.60
15.9	538.92
16.6	539.11
17.8	539.36
19.6	539.57
21.5	539.88

SUMMARY DATA	
Bankfull Elevation:	538.5
LTOB Elevation:	538.5
Bankfull Cross-Sectional Area:	4.5
Bankfull Width:	7.5
Flood Prone Area Elevation:	539.5
Flood Prone Width:	18.0
Max Depth at Bankfull:	1.0
Low Bank Height:	1.0
Mean Depth at Bankfull:	0.6
W / D Ratio:	12.5
Entrenchment Ratio:	2.4
Bank Height Ratio:	1.00

Stream Type	C/E

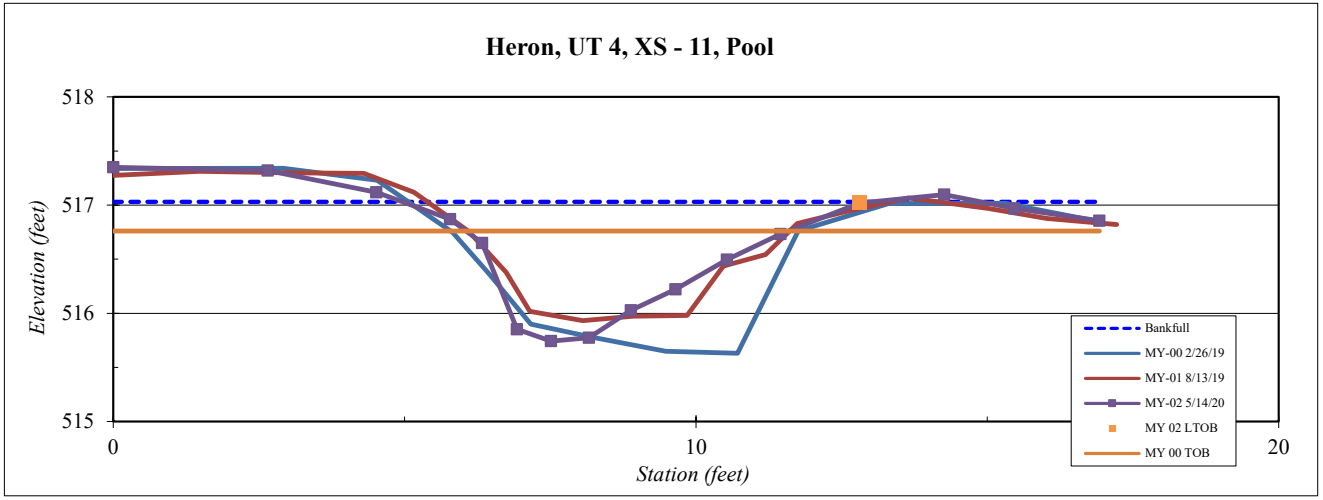


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 11, Pool
Feature	Pool
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	517.3
2.7	517.3
4.5	517.1
5.8	516.9
6.3	516.7
6.9	515.9
7.5	515.7
8.2	515.8
8.9	516.0
9.7	516.2
10.5	516.5
11.5	516.7
12.8	517.0
14.3	517.1
15.5	517.0
16.9	516.9

SUMMARY DATA	
Bankfull Elevation:	517.0
LTOB Elevation:	517.1
Bankfull Cross-Sectional Area:	4.8
Bankfull Width:	9.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.3
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

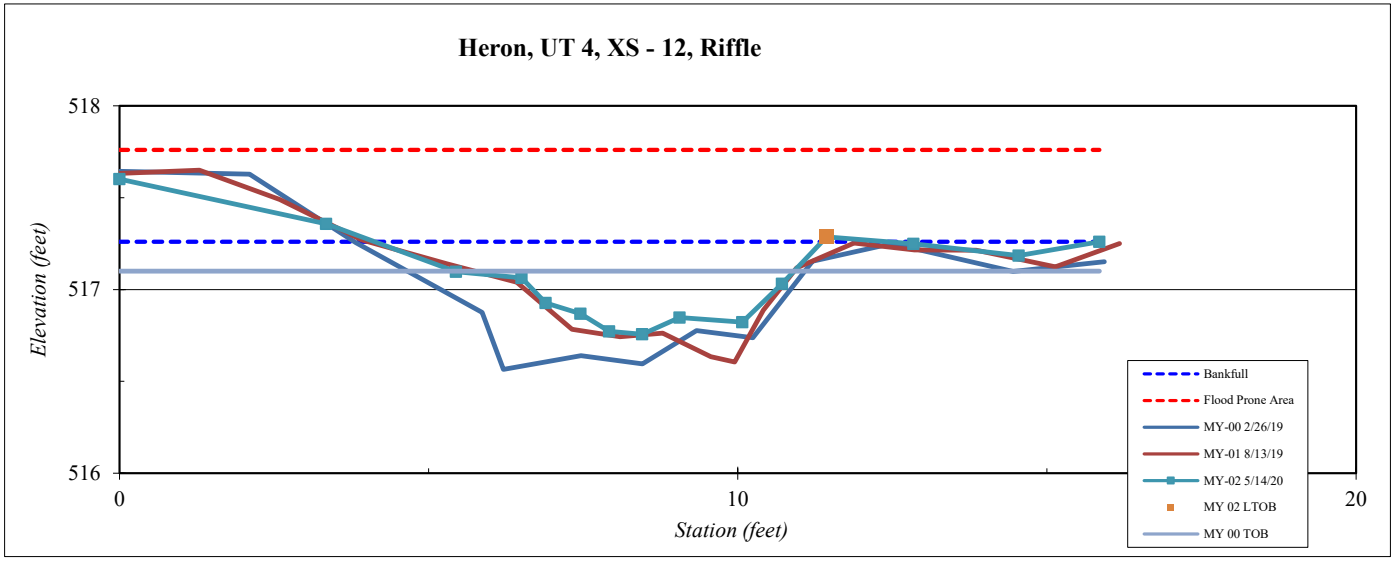


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 12, Riffle
Feature	Riffle
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	517.60
3.3	517.36
5.4	517.10
6.5	517.06
6.9	516.93
7.5	516.87
7.9	516.77
8.5	516.76
9.1	516.85
10.1	516.82
10.7	517.03
11.4	517.29
12.8	517.25
14.5	517.19
15.8	517.26

SUMMARY DATA	
Bankfull Elevation:	517.3
LTOB Elevation:	517.3
Bankfull Cross-Sectional Area:	2.2
Bankfull Width:	10.6
Flood Prone Area Elevation:	517.8
Flood Prone Width:	40.0
Max Depth at Bankfull:	0.5
Low Bank Height:	0.5
Mean Depth at Bankfull:	0.2
W / D Ratio:	51.1
Entrenchment Ratio:	3.8
Bank Height Ratio:	1.00

Stream Type	C/E

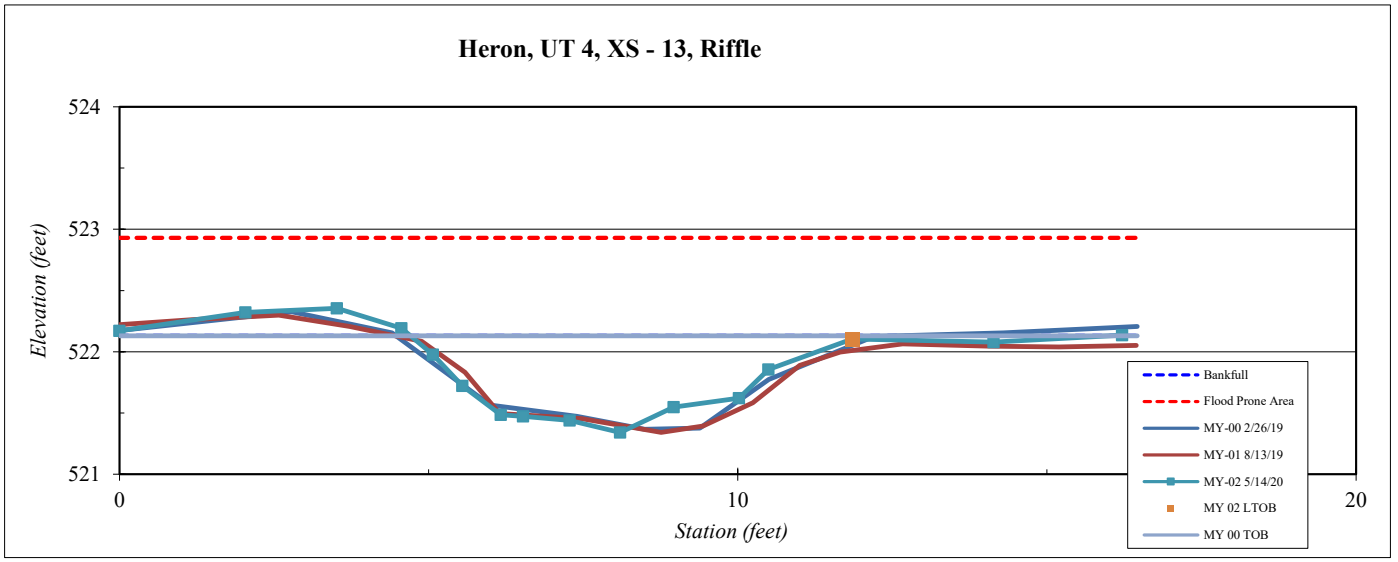


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 13, Riffle
Feature	Riffle
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	522.17
2.0	522.32
3.5	522.35
4.6	522.19
5.1	521.98
5.5	521.72
6.2	521.49
6.5	521.47
7.3	521.44
8.1	521.34
9.0	521.55
10.0	521.62
10.5	521.86
11.8	522.10
14.1	522.08
16.2	522.14

SUMMARY DATA	
Bankfull Elevation:	522.1
LTOB Elevation:	522.1
Bankfull Cross-Sectional Area:	3.5
Bankfull Width:	11.3
Flood Prone Area Elevation:	522.9
Flood Prone Width:	40.0
Max Depth at Bankfull:	0.8
Low Bank Height:	0.8
Mean Depth at Bankfull:	0.3
W / D Ratio:	36.5
Entrenchment Ratio:	3.5
Bank Height Ratio:	1.00

Stream Type	C/E

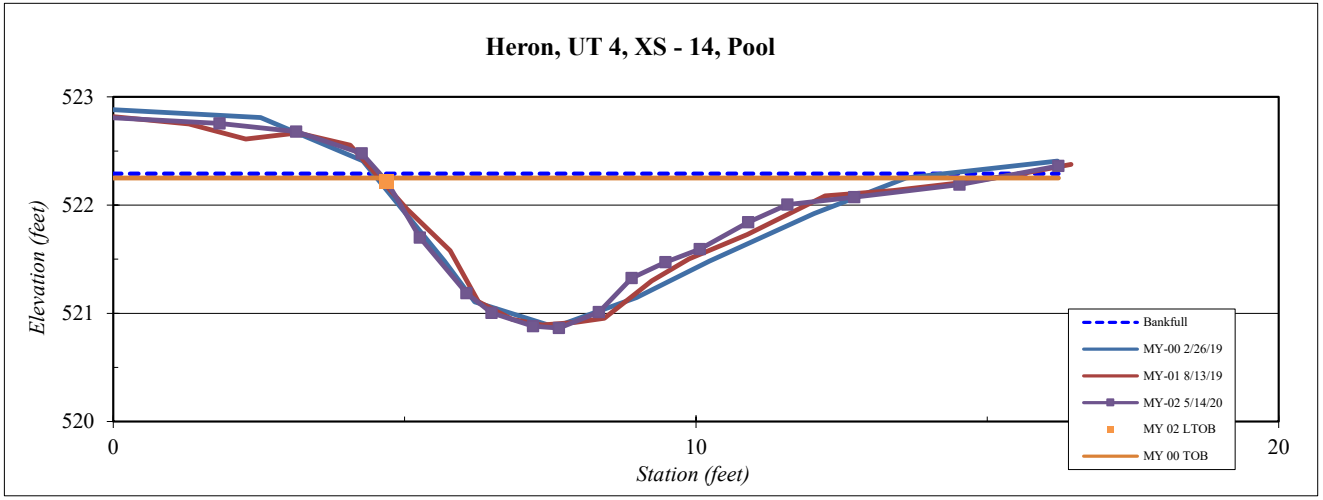


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 4, XS - 14, Pool
Feature	Pool
Date:	5/14/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
-0.3	522.8
1.8	522.8
3.1	522.7
4.3	522.5
4.7	522.2
5.3	521.7
6.1	521.2
6.5	521.0
7.2	520.9
7.6	520.9
8.3	521.0
8.9	521.3
9.5	521.5
10.1	521.6
10.9	521.8
11.6	522.0
12.7	522.1
14.5	522.2
16.2	522.4

SUMMARY DATA	
Bankfull Elevation:	522.3
LTOB Elevation:	522.3
Bankfull Cross-Sectional Area:	6.8
Bankfull Width:	10.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.4
Low Bank Height:	1.4
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

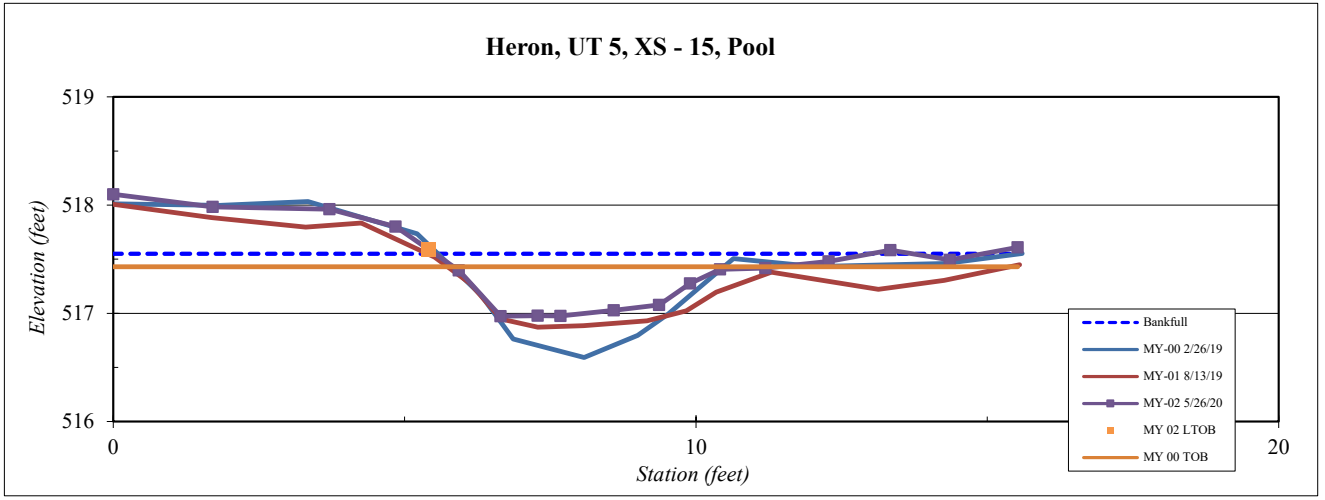


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 5, XS - 15, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	518.1
1.7	518.0
3.7	518.0
4.8	517.8
5.4	517.6
5.9	517.4
6.6	517.0
7.3	517.0
7.7	517.0
8.6	517.0
9.4	517.1
9.9	517.3
10.4	517.4
11.2	517.4
12.3	517.5
13.3	517.6
14.4	517.5
15.5	517.6

SUMMARY DATA	
Bankfull Elevation:	517.6
LTOB Elevation:	517.6
Bankfull Cross-Sectional Area:	2.4
Bankfull Width:	8.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.6
Low Bank Height:	0.6
Mean Depth at Bankfull:	0.3
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

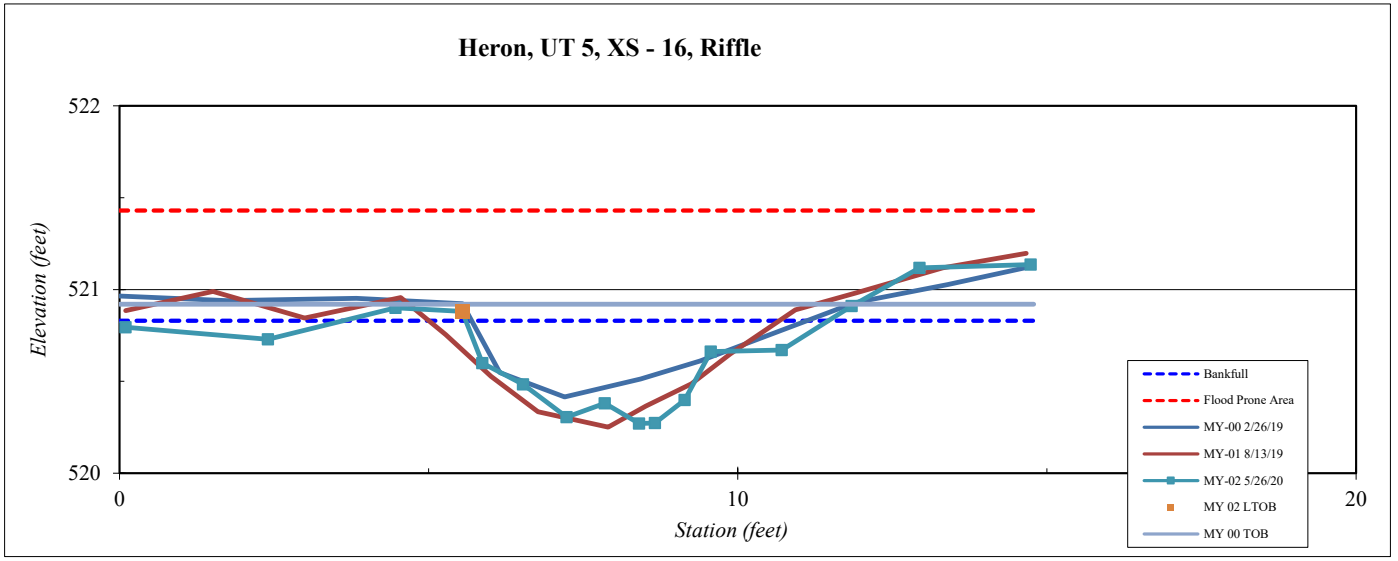


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 5, XS - 16, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.1	520.79
2.4	520.73
4.5	520.90
5.5	520.88
5.9	520.60
6.5	520.48
7.2	520.31
7.8	520.38
8.4	520.27
8.7	520.27
9.1	520.40
9.6	520.66
10.7	520.67
11.8	520.91
12.9	521.12
14.7	521.14

SUMMARY DATA	
Bankfull Elevation:	520.8
LTOB Elevation:	520.9
Bankfull Cross-Sectional Area:	2.1
Bankfull Width:	9.4
Flood Prone Area Elevation:	521.4
Flood Prone Width:	40.0
Max Depth at Bankfull:	0.6
Low Bank Height:	0.6
Mean Depth at Bankfull:	0.2
W / D Ratio:	42.1
Entrenchment Ratio:	4.3
Bank Height Ratio:	1.00

Stream Type	C/E

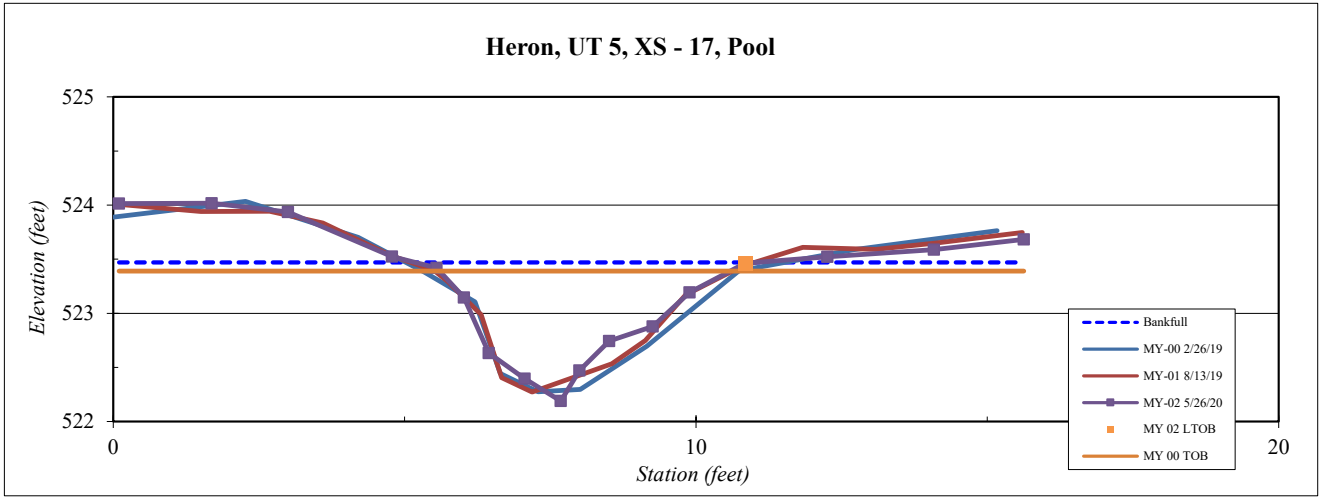


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 5, XS - 17, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.1	524.0
1.7	524.0
3.0	523.9
4.8	523.5
5.6	523.4
6.0	523.1
6.4	522.6
7.1	522.4
7.7	522.2
8.0	522.5
8.5	522.7
9.3	522.9
9.9	523.2
10.8	523.5
12.3	523.5
14.1	523.6
15.6	523.7

SUMMARY DATA	
Bankfull Elevation:	523.5
LTOB Elevation:	523.5
Bankfull Cross-Sectional Area:	3.4
Bankfull Width:	5.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.3
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

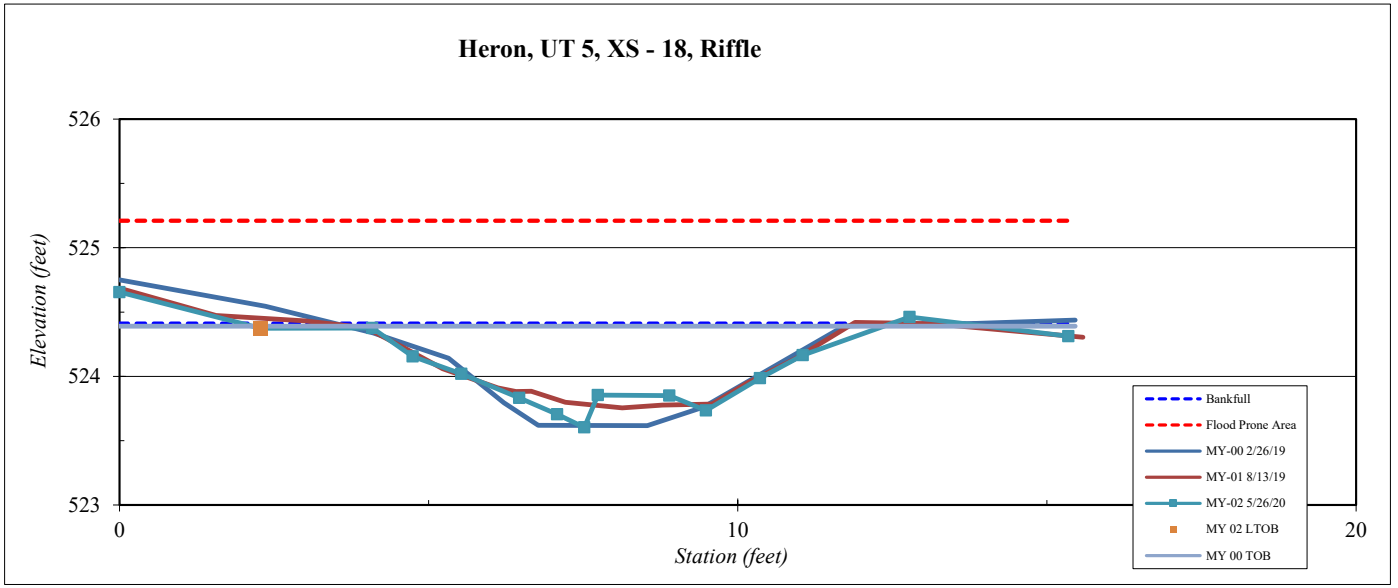


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 5, XS - 18, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	524.66
2.3	524.37
4.1	524.37
4.7	524.16
5.5	524.02
6.5	523.83
7.1	523.70
7.5	523.60
7.7	523.85
8.9	523.85
9.5	523.74
10.4	523.99
11.1	524.16
12.8	524.46
15.3	524.31

SUMMARY DATA	
Bankfull Elevation:	524.4
LTOB Elevation:	524.4
Bankfull Cross-Sectional Area:	3.7
Bankfull Width:	12.2
Flood Prone Area Elevation:	525.2
Flood Prone Width:	40.0
Max Depth at Bankfull:	0.8
Low Bank Height:	0.8
Mean Depth at Bankfull:	0.3
W / D Ratio:	40.2
Entrenchment Ratio:	3.3
Bank Height Ratio:	1.00

Stream Type	C/E

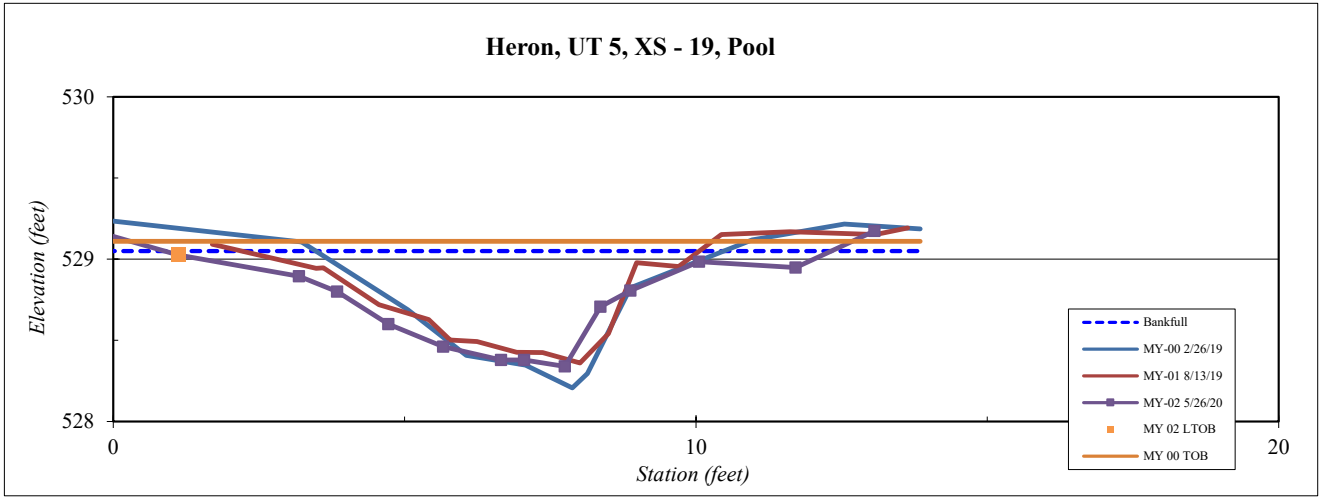


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 5, XS - 19, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
-1.0	529.2
1.1	529.0
3.2	528.9
3.8	528.8
4.7	528.6
5.7	528.5
6.7	528.4
7.0	528.4
7.7	528.3
8.4	528.7
8.9	528.8
10.1	529.0
11.7	528.9
13.1	529.2

SUMMARY DATA	
Bankfull Elevation:	529.1
LTOB Elevation:	529.0
Bankfull Cross-Sectional Area:	3.3
Bankfull Width:	11.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.7
Low Bank Height:	0.7
Mean Depth at Bankfull:	0.3
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

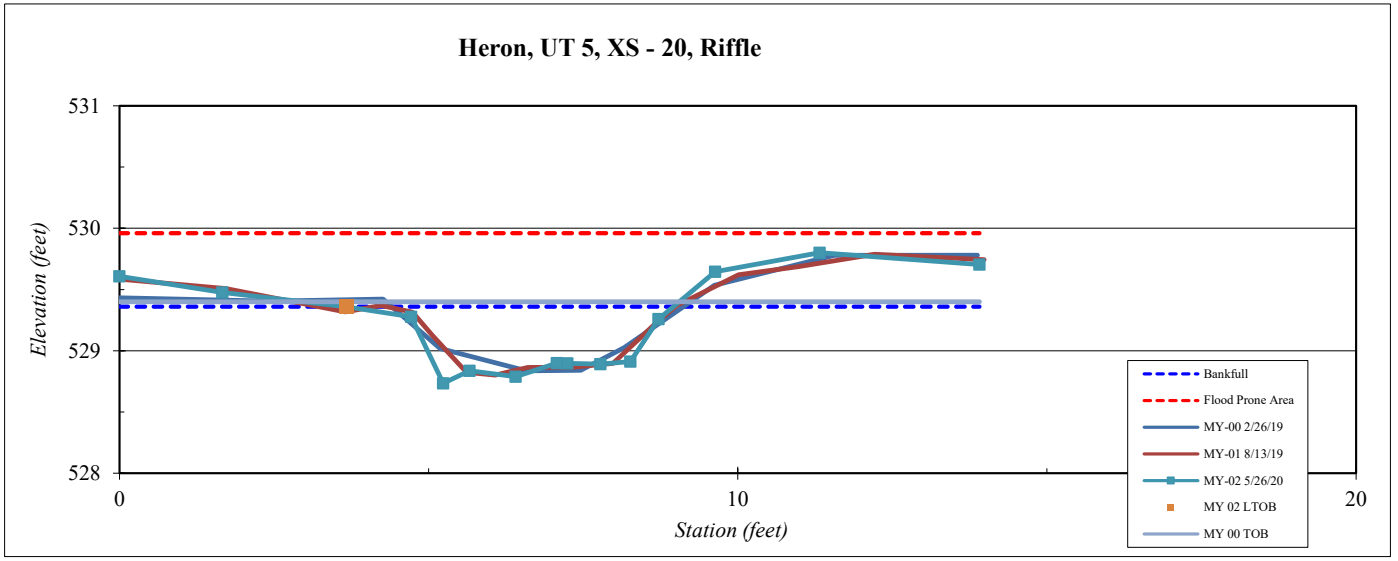


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 5, XS - 20, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	529.61
1.7	529.48
3.7	529.36
4.7	529.28
5.2	528.73
5.7	528.84
6.4	528.79
7.1	528.90
7.2	528.90
7.8	528.89
8.3	528.91
8.7	529.26
9.6	529.65
11.3	529.80
13.9	529.70

SUMMARY DATA	
Bankfull Elevation:	529.4
LTOB Elevation:	529.4
Bankfull Cross-Sectional Area:	1.9
Bankfull Width:	5.3
Flood Prone Area Elevation:	530.0
Flood Prone Width:	40.0
Max Depth at Bankfull:	0.6
Low Bank Height:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	14.8
Entrenchment Ratio:	7.5
Bank Height Ratio:	1.00

Stream Type	C/E

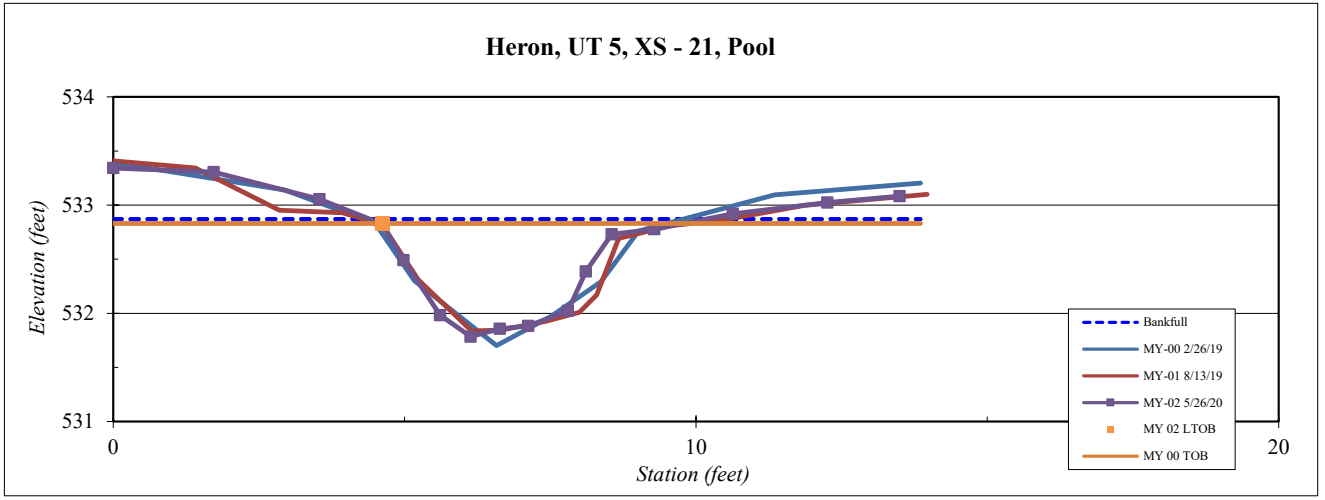


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 5, XS - 21, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	533.3
1.7	533.3
3.5	533.1
4.6	532.8
5.0	532.5
5.6	532.0
6.1	531.8
6.6	531.9
7.1	531.9
7.8	532.0
8.1	532.4
8.6	532.7
9.3	532.8
10.6	532.9
12.3	533.0
13.5	533.1

SUMMARY DATA	
Bankfull Elevation:	532.9
LTOB Elevation:	532.9
Bankfull Cross-Sectional Area:	3.1
Bankfull Width:	5.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.1
Low Bank Height:	1.1
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

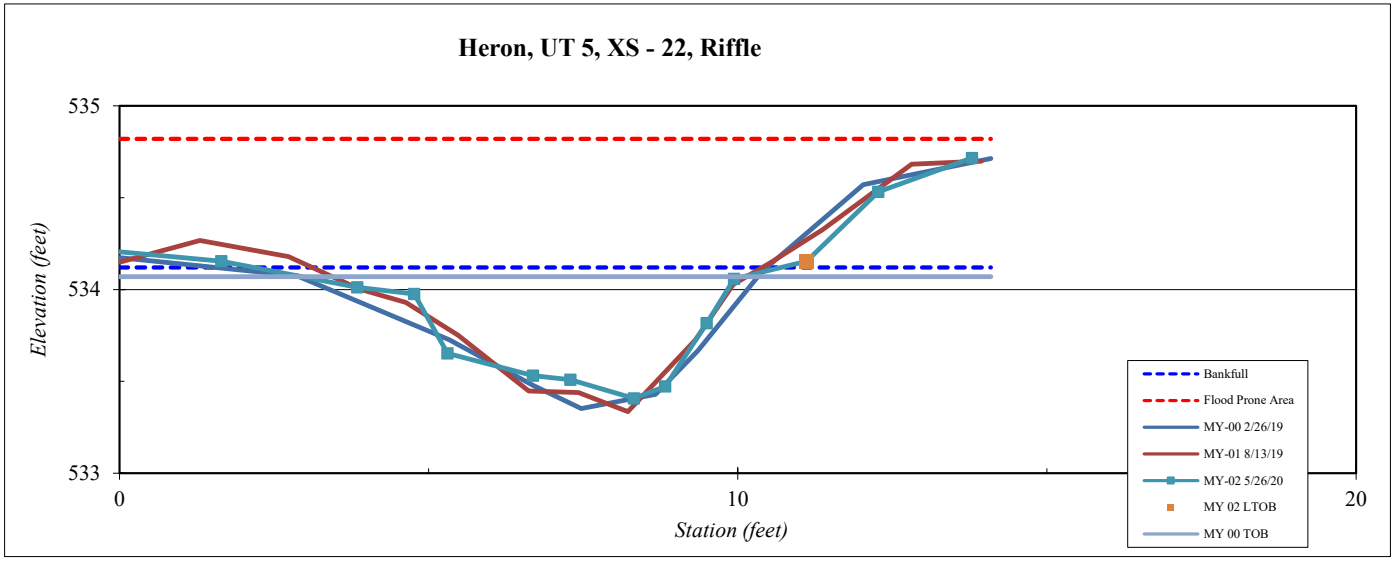


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 5, XS - 22, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
-0.1	534.21
1.6	534.15
3.8	534.01
4.8	533.98
5.3	533.65
6.7	533.53
7.3	533.51
8.3	533.41
8.8	533.47
9.5	533.82
9.9	534.06
11.1	534.15
12.3	534.53
13.8	534.72

SUMMARY DATA	
Bankfull Elevation:	534.1
LTOB Elevation:	534.2
Bankfull Cross-Sectional Area:	2.9
Bankfull Width:	8.5
Flood Prone Area Elevation:	534.8
Flood Prone Width:	40.0
Max Depth at Bankfull:	0.7
Low Bank Height:	0.7
Mean Depth at Bankfull:	0.3
W / D Ratio:	24.9
Entrenchment Ratio:	4.7
Bank Height Ratio:	1.00

Stream Type	C/E

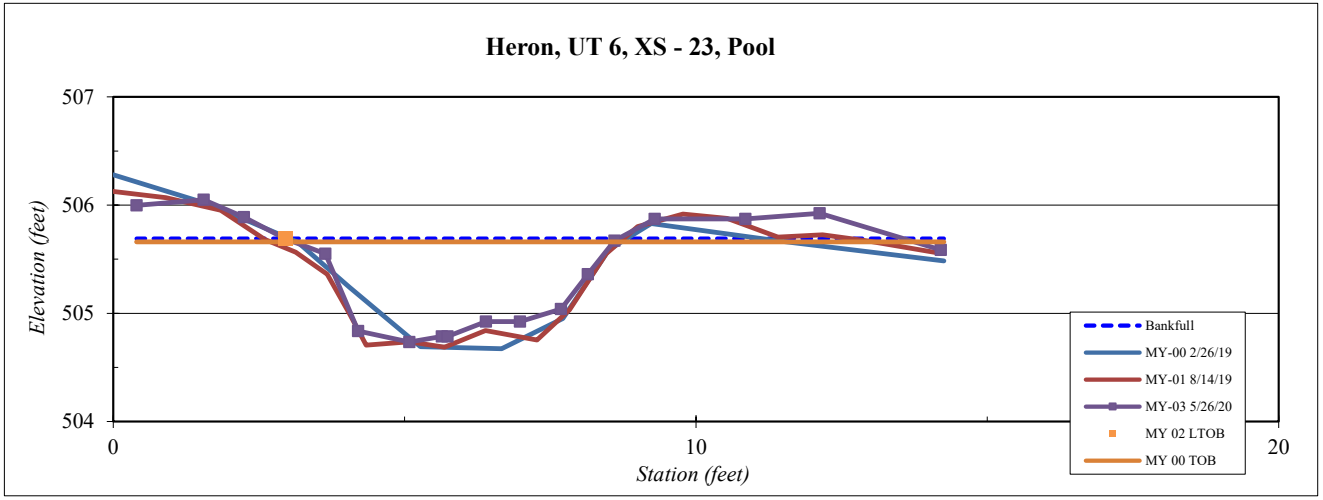


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 6, XS - 23, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.4	506.0
1.6	506.0
2.2	505.9
3.0	505.7
3.6	505.6
4.2	504.8
5.1	504.7
5.6	504.8
5.7	504.8
6.4	504.9
7.0	504.9
7.7	505.0
8.1	505.4
8.6	505.7
9.3	505.9
10.9	505.9
12.1	505.9
14.2	505.6

SUMMARY DATA	
Bankfull Elevation:	505.7
LTOB Elevation:	505.7
Bankfull Cross-Sectional Area:	3.6
Bankfull Width:	6.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.0
Low Bank Height:	1.0
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

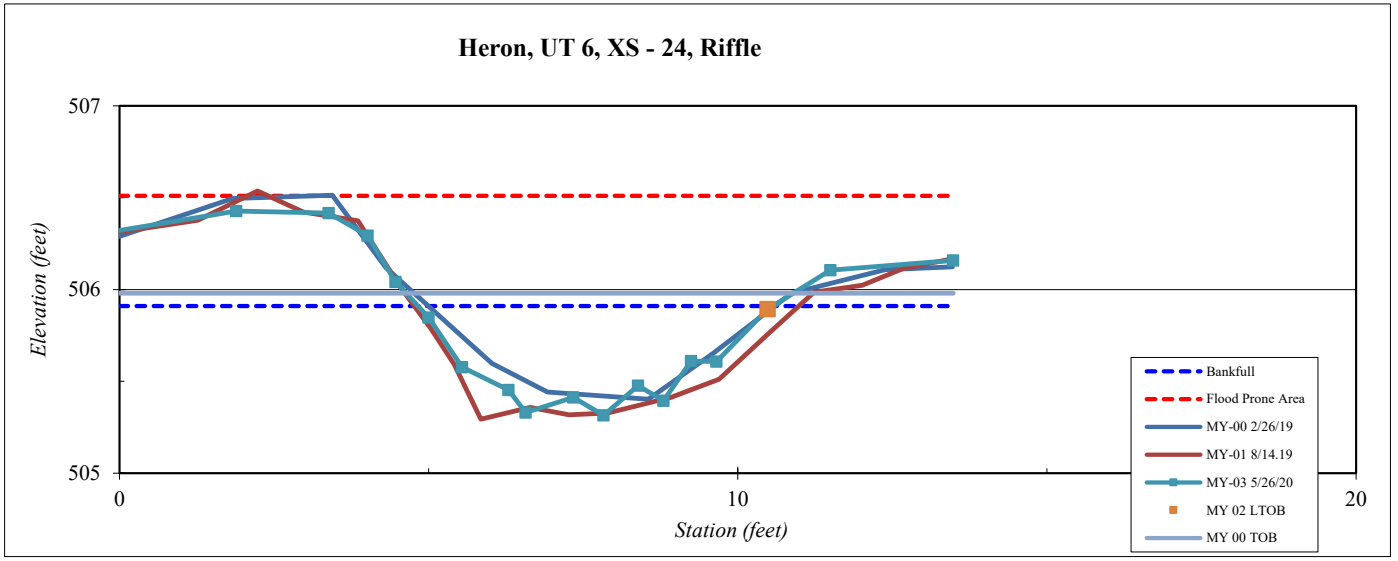


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 6, XS - 24, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
-0.3	506.30
1.9	506.43
3.4	506.42
4.0	506.29
4.5	506.04
5.0	505.85
5.5	505.58
6.3	505.45
6.6	505.33
7.3	505.41
7.8	505.32
8.4	505.48
8.8	505.40
9.2	505.61
9.7	505.61
10.5	505.89
11.5	506.11
13.5	506.16

SUMMARY DATA	
Bankfull Elevation:	505.9
LTOB Elevation:	505.9
Bankfull Cross-Sectional Area:	2.2
Bankfull Width:	5.7
Flood Prone Area Elevation:	506.5
Flood Prone Width:	40.0
Max Depth at Bankfull:	0.6
Low Bank Height:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	14.8
Entrenchment Ratio:	7.0
Bank Height Ratio:	1.00

Stream Type	C/E

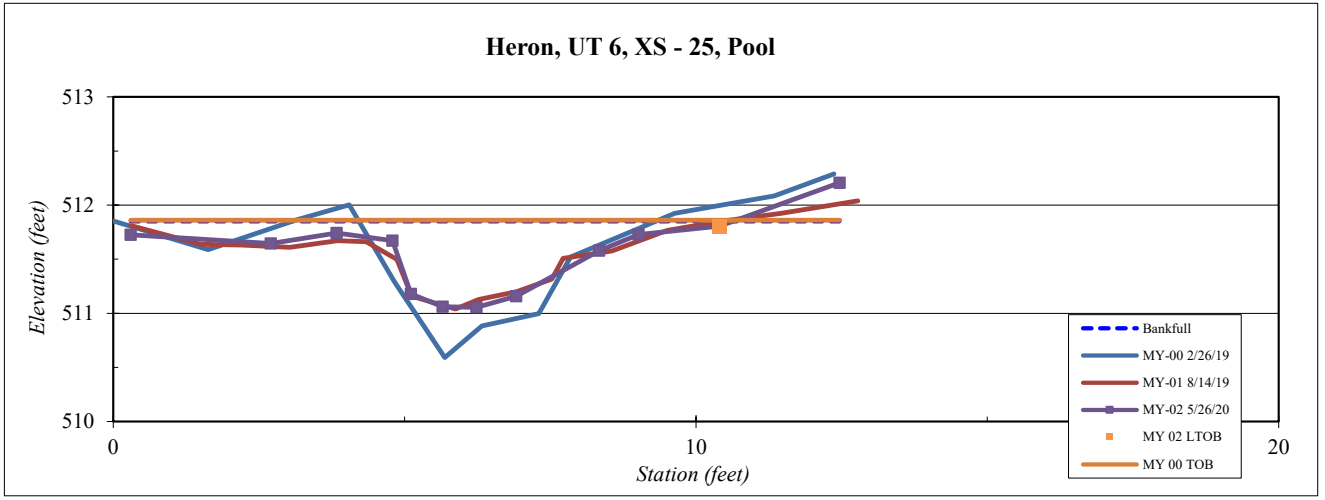


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 6, XS - 25, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.3	511.7
2.7	511.6
3.8	511.7
4.8	511.7
5.1	511.2
5.7	511.1
6.2	511.1
6.9	511.2
8.3	511.6
9.0	511.7
10.4	511.8
12.5	512.2

SUMMARY DATA	
Bankfull Elevation:	511.9
LTOB Elevation:	511.8
Bankfull Cross-Sectional Area:	3.2
Bankfull Width:	10.3
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.8
Low Bank Height:	0.7
Mean Depth at Bankfull:	0.3
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.88

Stream Type	C/E

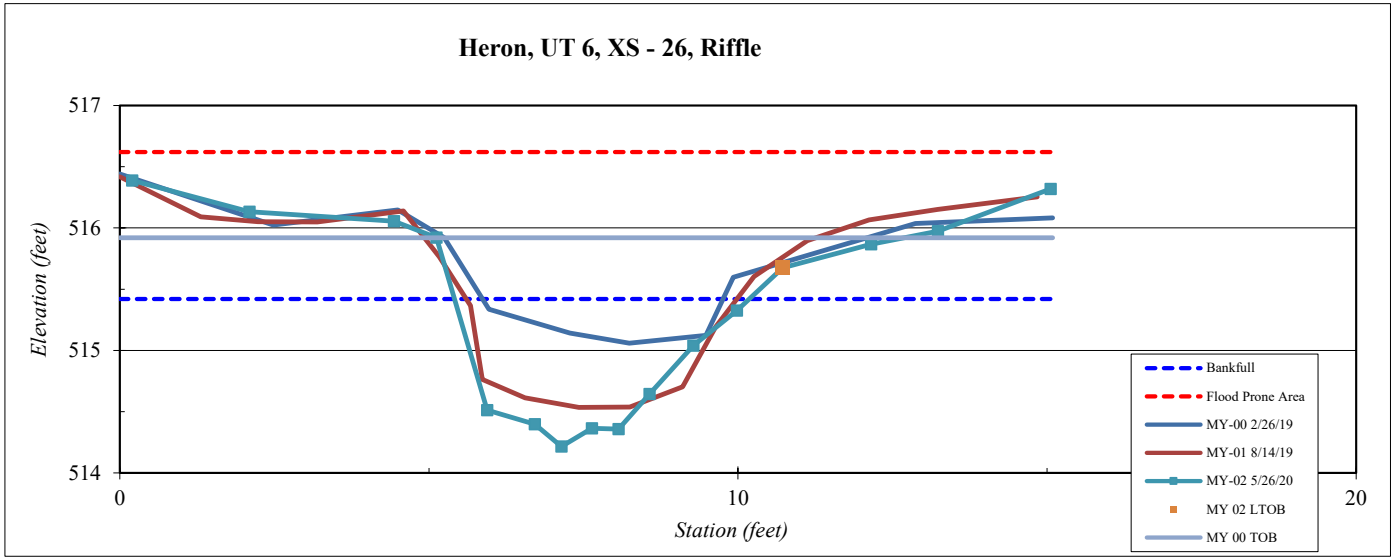


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 6, XS - 26, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.2	516.39
2.1	516.13
4.4	516.06
5.1	515.92
5.9	514.51
6.7	514.40
7.1	514.22
7.6	514.36
8.1	514.36
8.6	514.64
9.3	515.04
10.0	515.33
10.7	515.68
12.2	515.87
13.2	515.97
15.1	516.32

SUMMARY DATA	
Bankfull Elevation:	515.4
LTOB Elevation:	515.7
Bankfull Cross-Sectional Area:	3.5
Bankfull Width:	4.8
Flood Prone Area Elevation:	516.6
Flood Prone Width:	40.0
Max Depth at Bankfull:	1.2
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.7
W / D Ratio:	6.6
Entrenchment Ratio:	8.3
Bank Height Ratio:	1.25

Stream Type	C/E



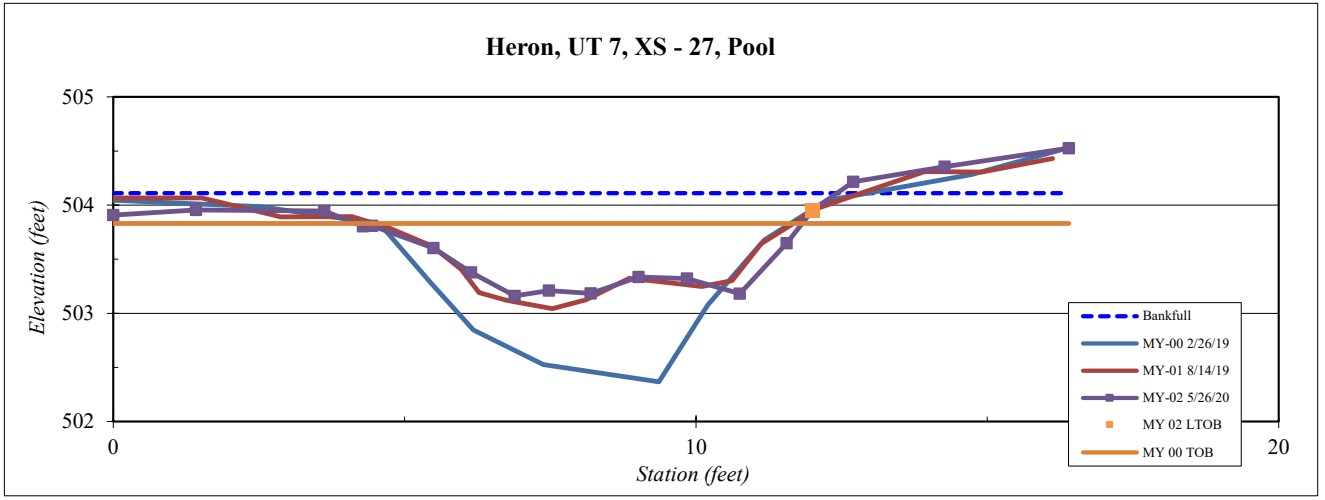
Note: Riffle degradation is natural and does not appear to pose a threat to overall stream stability. This area will be closely monitored during subsequent monitoring years.

Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 7, XS - 27, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	503.9
1.4	504.0
3.6	503.9
4.3	503.8
4.4	503.8
5.5	503.6
6.1	503.4
6.9	503.2
7.5	503.2
8.2	503.2
9.0	503.3
9.8	503.3
10.8	503.2
11.6	503.6
12.0	504.0
12.7	504.2
14.3	504.4
16.4	504.5

SUMMARY DATA	
Bankfull Elevation:	504.1
LTOB Elevation:	504.0
Bankfull Cross-Sectional Area:	6.3
Bankfull Width:	12.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.9
Low Bank Height:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.89

Stream Type	C/E



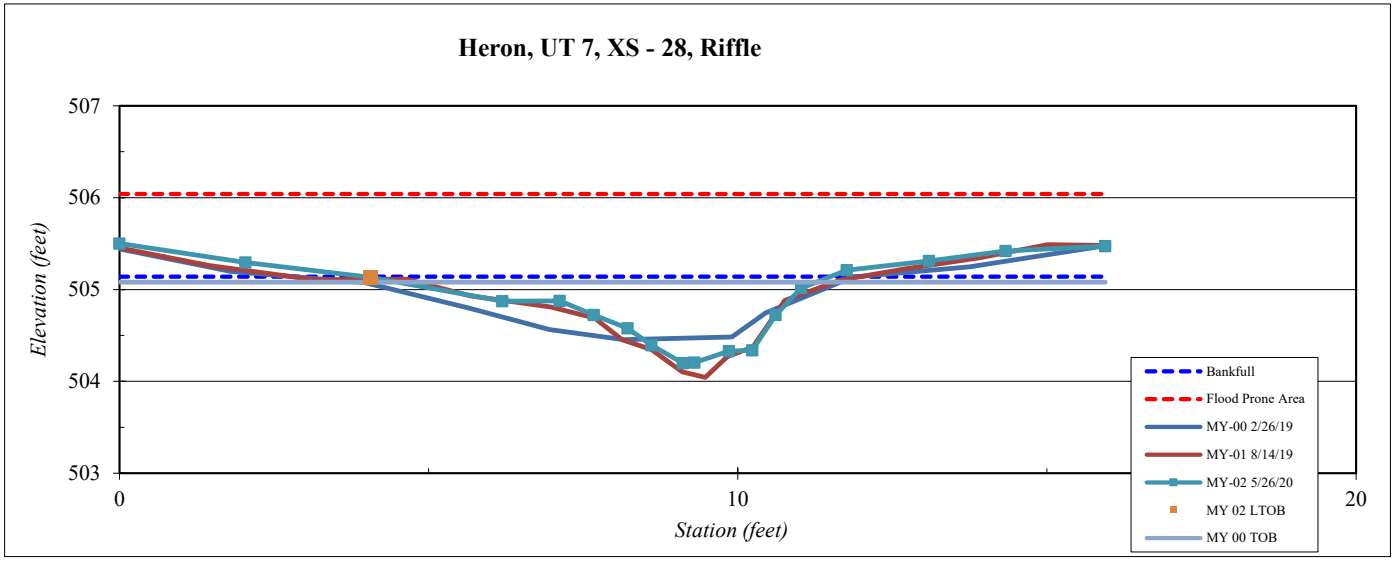
Note: Sediment deposition in pool appears natural and is not expected to lead to instability.

Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 7, XS - 28, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	505.50
2.0	505.29
4.1	505.13
6.2	504.87
7.1	504.87
7.7	504.72
8.2	504.58
8.6	504.39
9.1	504.20
9.3	504.20
9.9	504.33
10.2	504.34
10.6	504.72
11.0	505.01
11.8	505.21
13.1	505.31
14.3	505.42
15.9	505.47

SUMMARY DATA	
Bankfull Elevation:	505.1
LTOB Elevation:	505.1
Bankfull Cross-Sectional Area:	3.0
Bankfull Width:	7.5
Flood Prone Area Elevation:	506.0
Flood Prone Width:	20.0
Max Depth at Bankfull:	0.9
Low Bank Height:	0.9
Mean Depth at Bankfull:	0.4
W / D Ratio:	18.8
Entrenchment Ratio:	2.7
Bank Height Ratio:	1.00

Stream Type	C/E

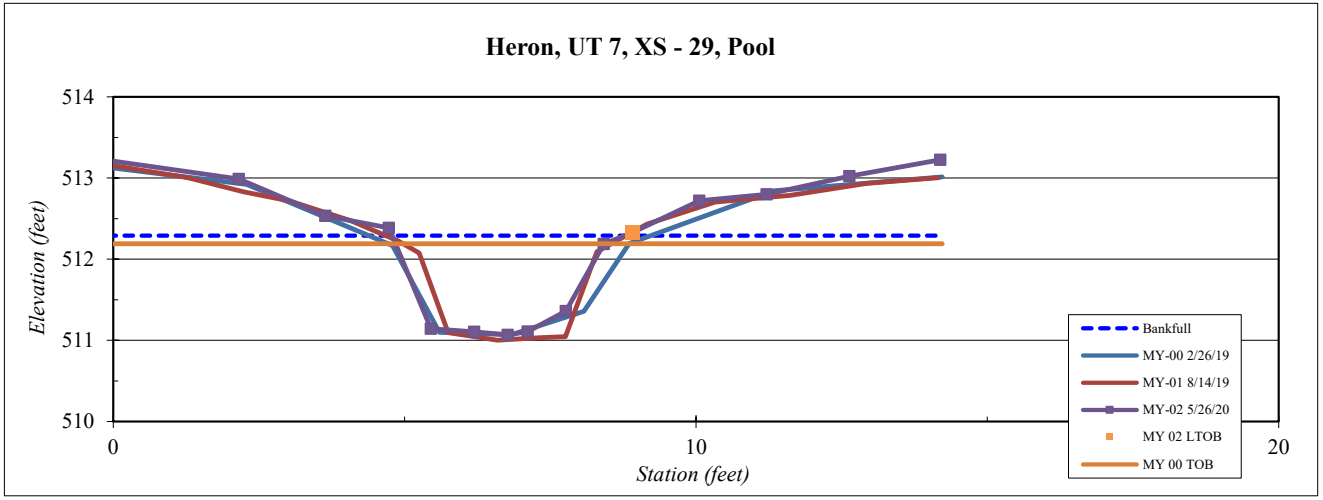


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 7, XS - 29, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
-0.1	513.2
2.2	513.0
3.6	512.5
4.7	512.4
5.5	511.1
6.2	511.1
6.8	511.1
7.1	511.1
7.8	511.4
8.4	512.2
8.9	512.3
10.1	512.7
11.2	512.8
12.6	513.0
14.2	513.2

SUMMARY DATA	
Bankfull Elevation:	512.3
LTOB Elevation:	512.2
Bankfull Cross-Sectional Area:	3.4
Bankfull Width:	4.0
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.2
Low Bank Height:	1.2
Mean Depth at Bankfull:	0.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

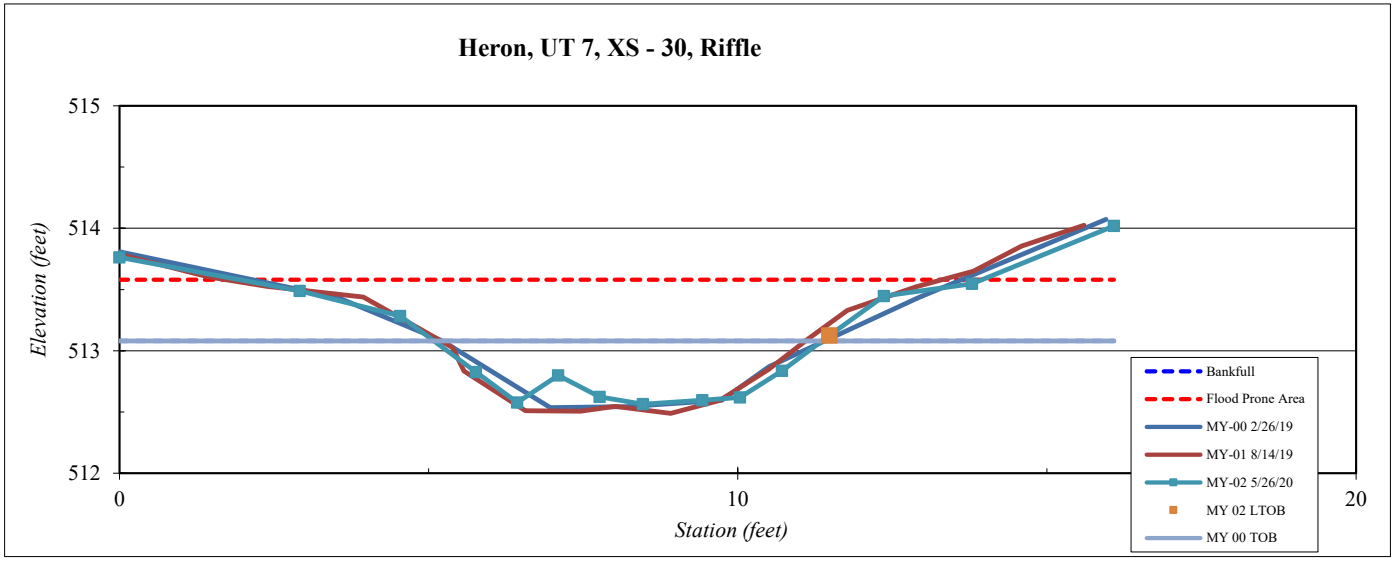


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 7, XS - 30, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	513.76
2.9	513.49
4.5	513.28
5.8	512.83
6.4	512.58
7.1	512.80
7.8	512.62
8.5	512.56
9.4	512.60
10.0	512.62
10.7	512.84
11.5	513.12
12.4	513.45
13.8	513.55
16.1	514.02

SUMMARY DATA	
Bankfull Elevation:	513.1
LTOB Elevation:	513.0
Bankfull Cross-Sectional Area:	2.3
Bankfull Width:	6.3
Flood Prone Area Elevation:	513.6
Flood Prone Width:	11.0
Max Depth at Bankfull:	0.5
Low Bank Height:	0.5
Mean Depth at Bankfull:	0.4
W / D Ratio:	17.3
Entrenchment Ratio:	1.7
Bank Height Ratio:	1.00

Stream Type	C/E

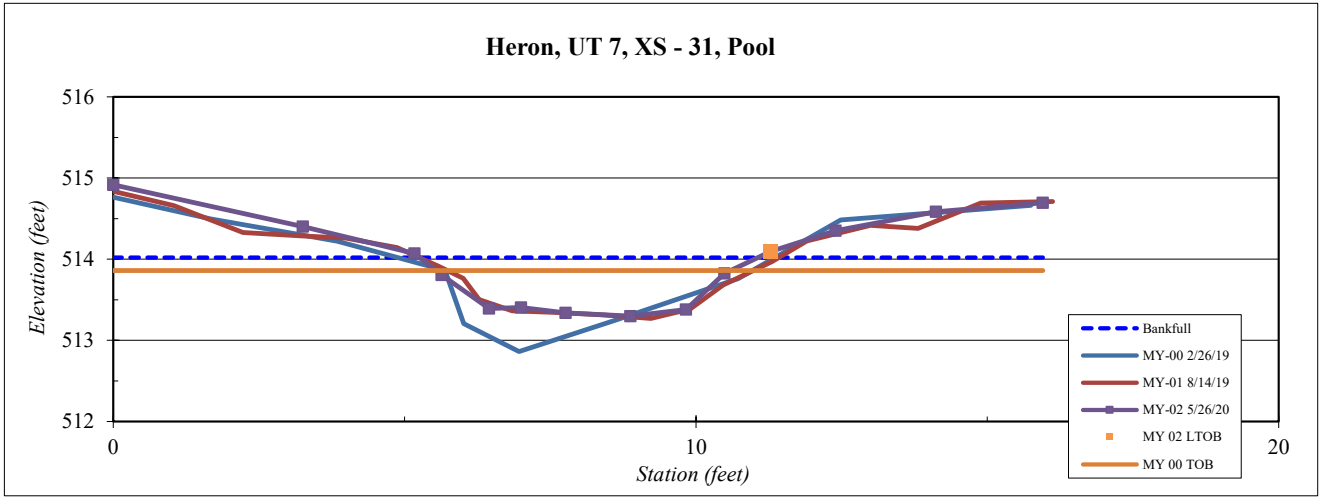


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 7, XS - 31, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	514.9
3.3	514.4
5.2	514.1
5.6	513.8
6.4	513.4
7.0	513.4
7.8	513.3
8.9	513.3
9.8	513.4
10.5	513.8
11.3	514.1
12.4	514.4
14.1	514.6
16.0	514.7

SUMMARY DATA	
Bankfull Elevation:	514.0
LTOB Elevation:	514.1
Bankfull Cross-Sectional Area:	3.0
Bankfull Width:	5.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.7
Low Bank Height:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.14

Stream Type	C/E

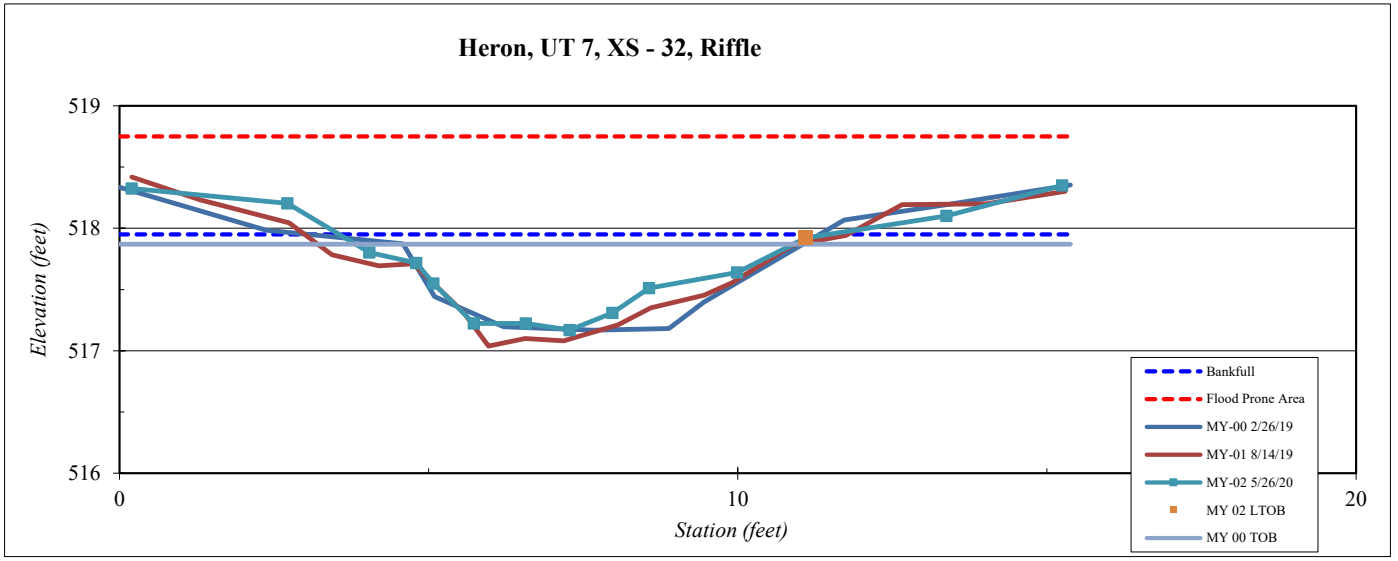


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 7, XS - 32, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.2	518.32
2.7	518.20
4.0	517.80
4.8	517.72
5.1	517.55
5.7	517.22
6.6	517.22
7.3	517.17
8.0	517.31
8.6	517.51
10.0	517.64
11.1	517.92
13.4	518.10
15.2	518.35

SUMMARY DATA	
Bankfull Elevation:	518.0
LTOB Elevation:	517.9
Bankfull Cross-Sectional Area:	3.3
Bankfull Width:	7.9
Flood Prone Area Elevation:	518.8
Flood Prone Width:	20.0
Max Depth at Bankfull:	0.8
Low Bank Height:	0.8
Mean Depth at Bankfull:	0.4
W / D Ratio:	18.9
Entrenchment Ratio:	2.5
Bank Height Ratio:	1.00

Stream Type	C/E

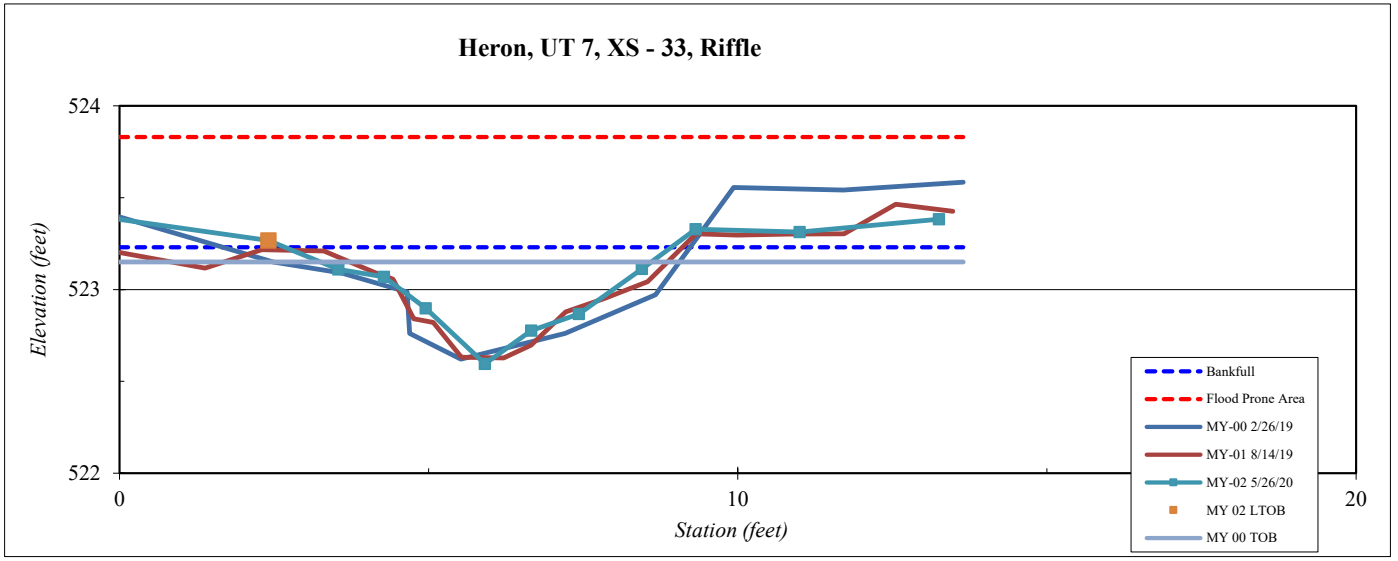


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 7, XS - 33, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
-0.2	523.39
-0.2	523.39
2.4	523.27
3.5	523.11
4.3	523.07
5.0	522.90
5.9	522.60
6.7	522.78
7.4	522.87
8.4	523.11
9.3	523.33
11.0	523.31
13.3	523.38

SUMMARY DATA	
Bankfull Elevation:	523.2
LTOB Elevation:	523.3
Bankfull Cross-Sectional Area:	1.8
Bankfull Width:	6.2
Flood Prone Area Elevation:	523.8
Flood Prone Width:	20.0
Max Depth at Bankfull:	0.6
Low Bank Height:	0.7
Mean Depth at Bankfull:	0.3
W / D Ratio:	21.4
Entrenchment Ratio:	3.2
Bank Height Ratio:	1.17

Stream Type	C/E

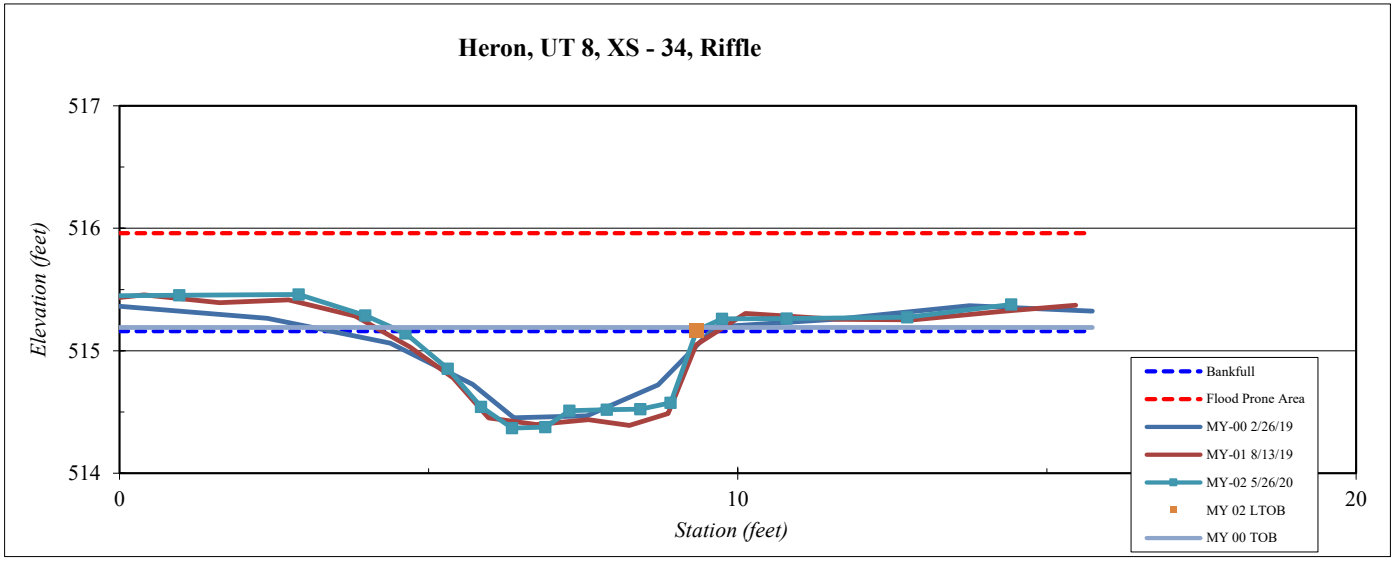


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 8, XS - 34, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
-1.2	515.45
1.0	515.45
2.9	515.46
4.0	515.29
4.6	515.14
5.3	514.85
5.8	514.54
6.3	514.37
6.9	514.38
7.3	514.51
7.9	514.52
8.4	514.52
8.9	514.57
9.3	515.17
9.7	515.26
10.8	515.26
12.7	515.27
14.4	515.38

SUMMARY DATA	
Bankfull Elevation:	515.2
LTOB Elevation:	515.2
Bankfull Cross-Sectional Area:	2.6
Bankfull Width:	4.8
Flood Prone Area Elevation:	516.0
Flood Prone Width:	40.0
Max Depth at Bankfull:	0.8
Low Bank Height:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	8.9
Entrenchment Ratio:	8.3
Bank Height Ratio:	1.00

Stream Type	C/E

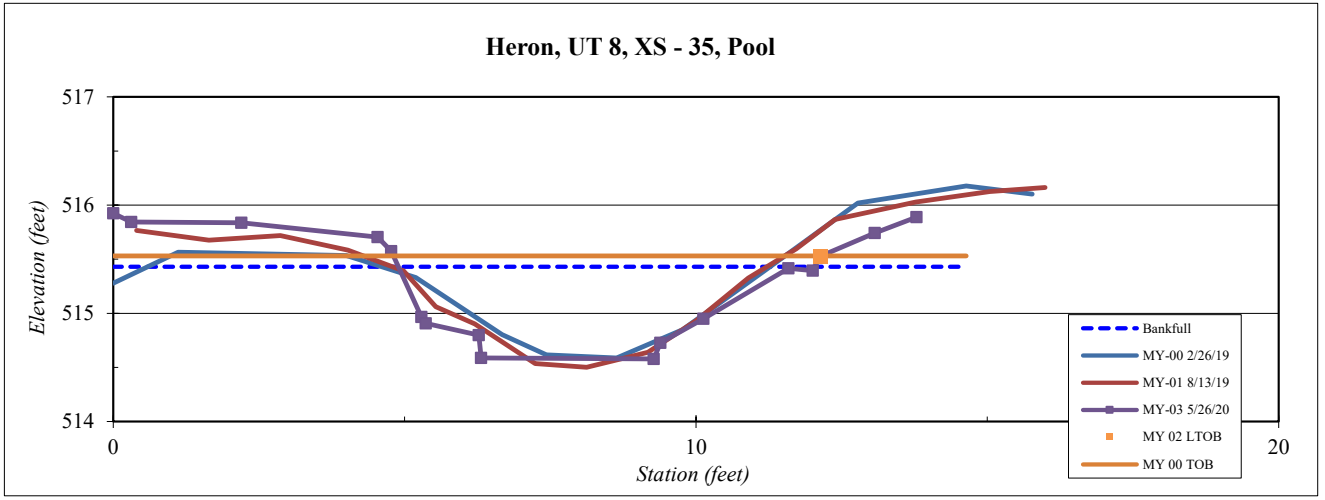


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 8, XS - 35, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	515.9
0.3	515.8
2.2	515.8
4.5	515.7
4.8	515.6
5.3	515.0
5.4	514.9
6.3	514.8
6.3	514.6
9.3	514.6
9.4	514.7
10.1	514.9
11.6	515.4
12.0	515.4
12.1	515.5
13.1	515.7
13.8	515.9

SUMMARY DATA	
Bankfull Elevation:	515.4
LTOB Elevation:	515.5
Bankfull Cross-Sectional Area:	4.1
Bankfull Width:	7.1
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.9
Low Bank Height:	0.9
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E

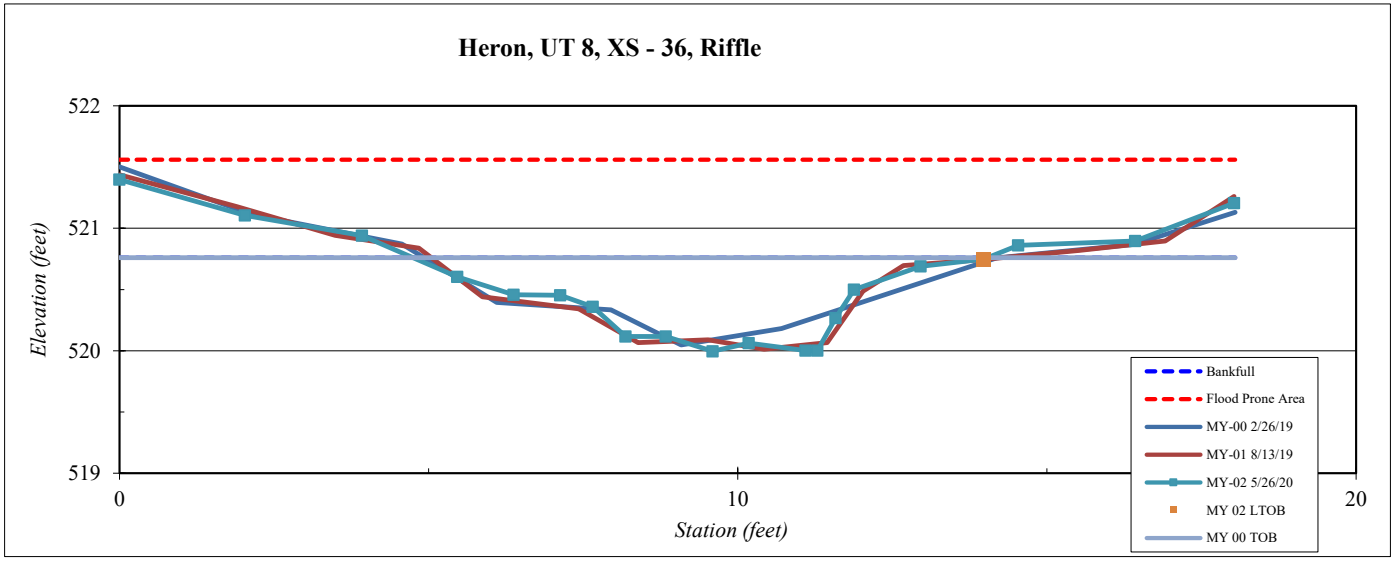


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 8, XS - 36, Riffle
Feature	Riffle
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	521.40
2.0	521.11
3.9	520.94
5.5	520.60
6.4	520.46
7.1	520.45
7.7	520.36
8.2	520.12
8.8	520.12
9.6	520.00
10.2	520.06
11.1	520.00
11.3	520.00
11.6	520.27
11.9	520.50
13.0	520.69
14.0	520.75
14.5	520.86
16.4	520.90
18.0	521.21

SUMMARY DATA	
Bankfull Elevation:	520.8
LTOB Elevation:	520.8
Bankfull Cross-Sectional Area:	3.7
Bankfull Width:	9.3
Flood Prone Area Elevation:	521.6
Flood Prone Width:	20.0
Max Depth at Bankfull:	0.8
Low Bank Height:	0.8
Mean Depth at Bankfull:	0.4
W / D Ratio:	23.4
Entrenchment Ratio:	2.2
Bank Height Ratio:	1.00

Stream Type	C/E

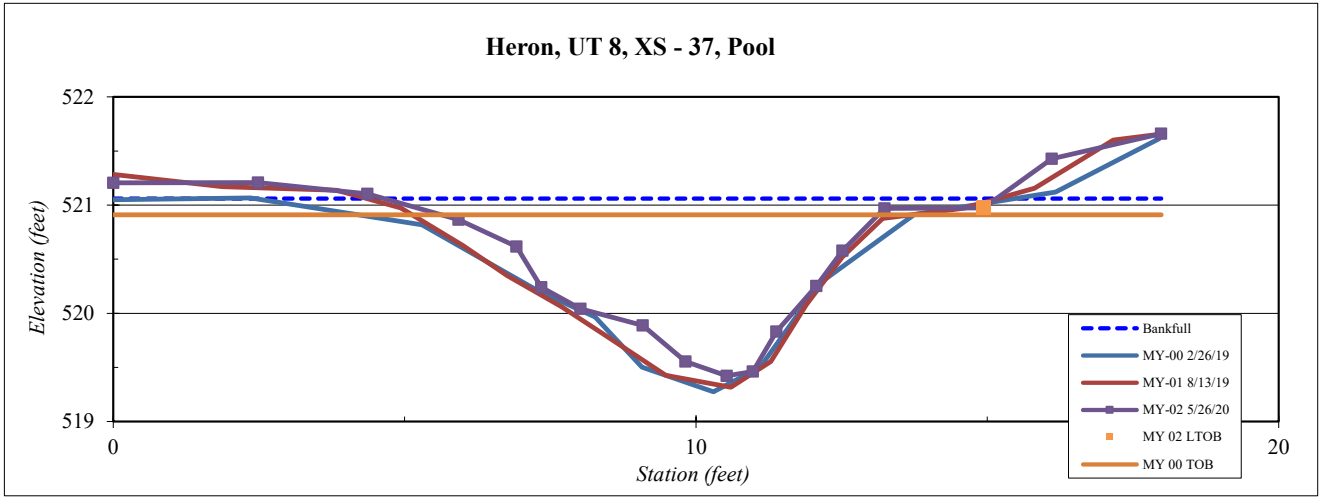


Site	Heron
Watershed:	Cape Fear, 0303002
XS ID	UT 8, XS - 37, Pool
Feature	Pool
Date:	5/26/2020
Field Crew:	Perkinson, Radecki

Station	Elevation
0.0	521.2
2.5	521.2
4.4	521.1
5.9	520.9
6.9	520.6
7.3	520.2
8.0	520.0
9.1	519.9
9.8	519.6
10.5	519.4
11.0	519.5
11.4	519.8
12.1	520.3
12.5	520.6
13.2	521.0
14.9	521.0
16.1	521.4
18.0	521.7

SUMMARY DATA	
Bankfull Elevation:	521.1
LTOB Elevation:	521.0
Bankfull Cross-Sectional Area:	7.2
Bankfull Width:	10.5
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.6
Low Bank Height:	1.6
Mean Depth at Bankfull:	0.7
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.00

Stream Type	C/E



Appendix E.
Hydrology Data

Table 15A.-15J. Channel Evidence
Stream Gauge Graphs
Table 16. Verification of Bankfull Events
Table 17. Groundwater Hydrology Data
Groundwater Gauge Graphs

Table 15A. UT1 Channel Evidence

UT1 Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	103	162
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 15B. UT2 Channel Evidence

UT2 Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	85	126
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 15C. UT3 Channel Evidence

UT3 Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	142	166
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 15D. UT5 Downstream Channel Evidence

UT5 Downstream Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	134	152
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 15E. UT5 Upstream Channel Evidence

UT5 Upstream Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	167	158
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 15F. UT6 Channel Evidence

UT6 Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	131	187
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 15G. UT7 Downstream Channel Evidence

UT7 Downstream Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	237	68
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 15H. UT7 Middle Channel Evidence

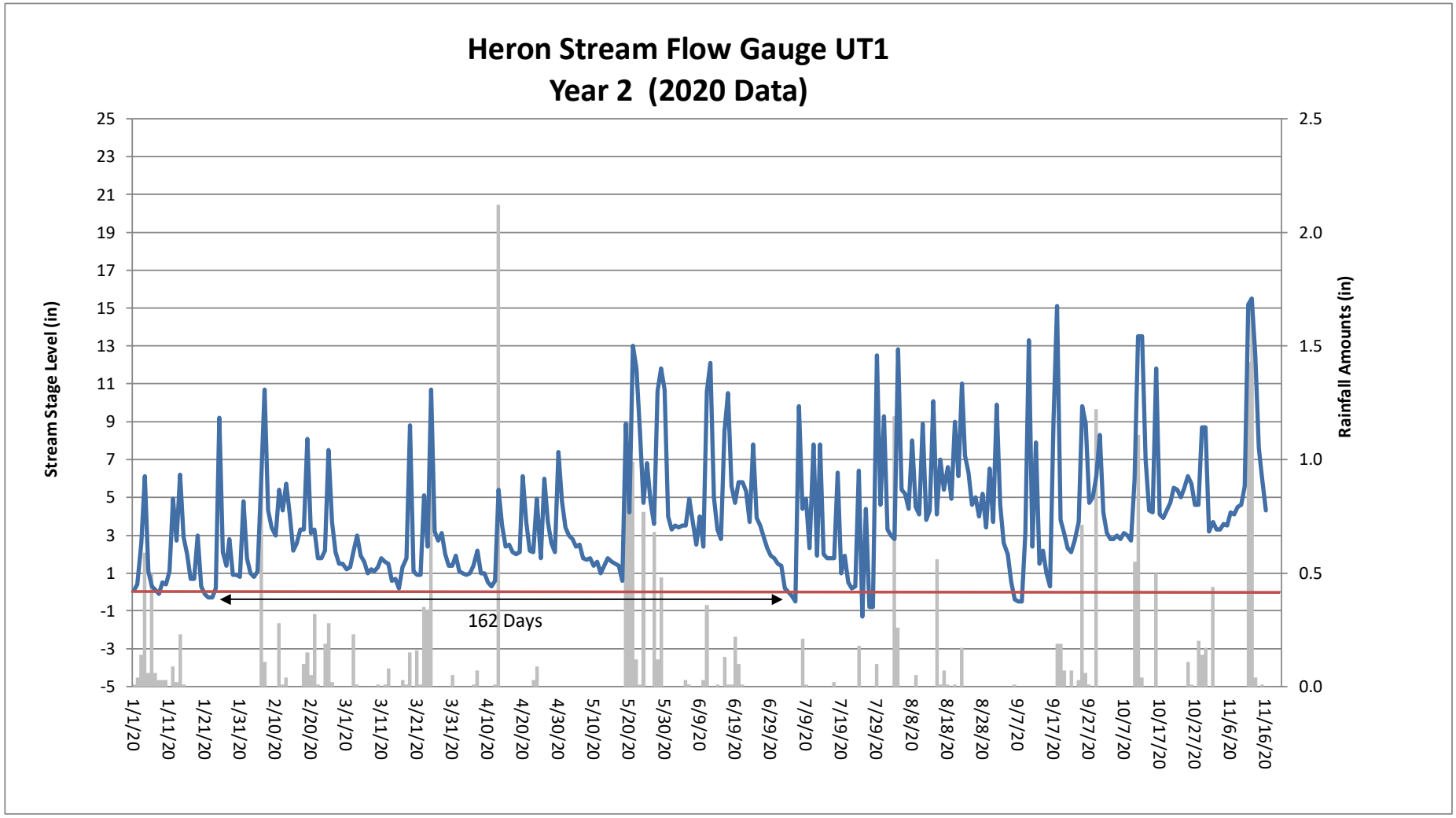
UT7 Middle Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	151	106
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating 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:		

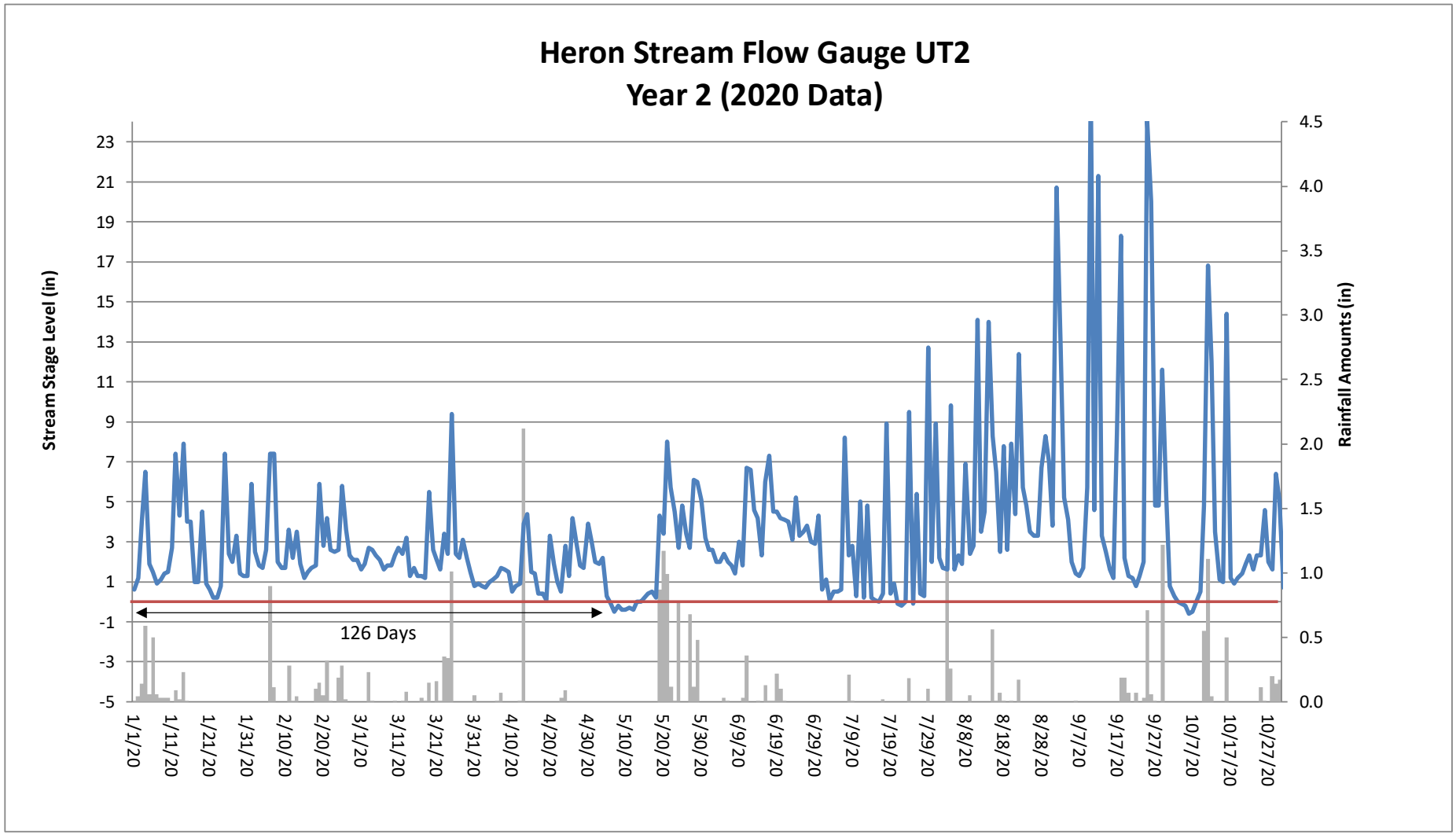
Table 15I. UT7 Upstream Channel Evidence

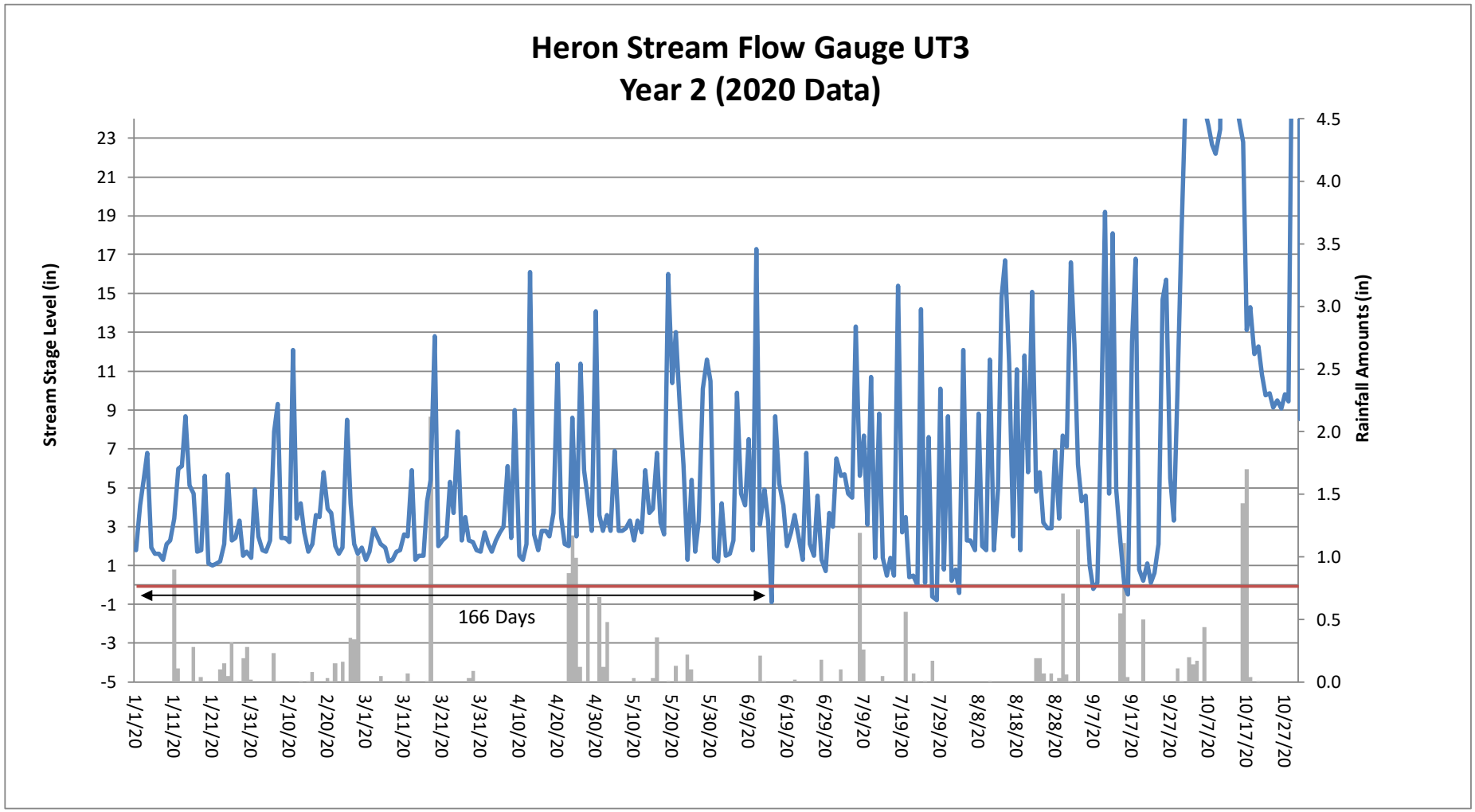
UT7 Upstream Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	237	248
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating 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:		

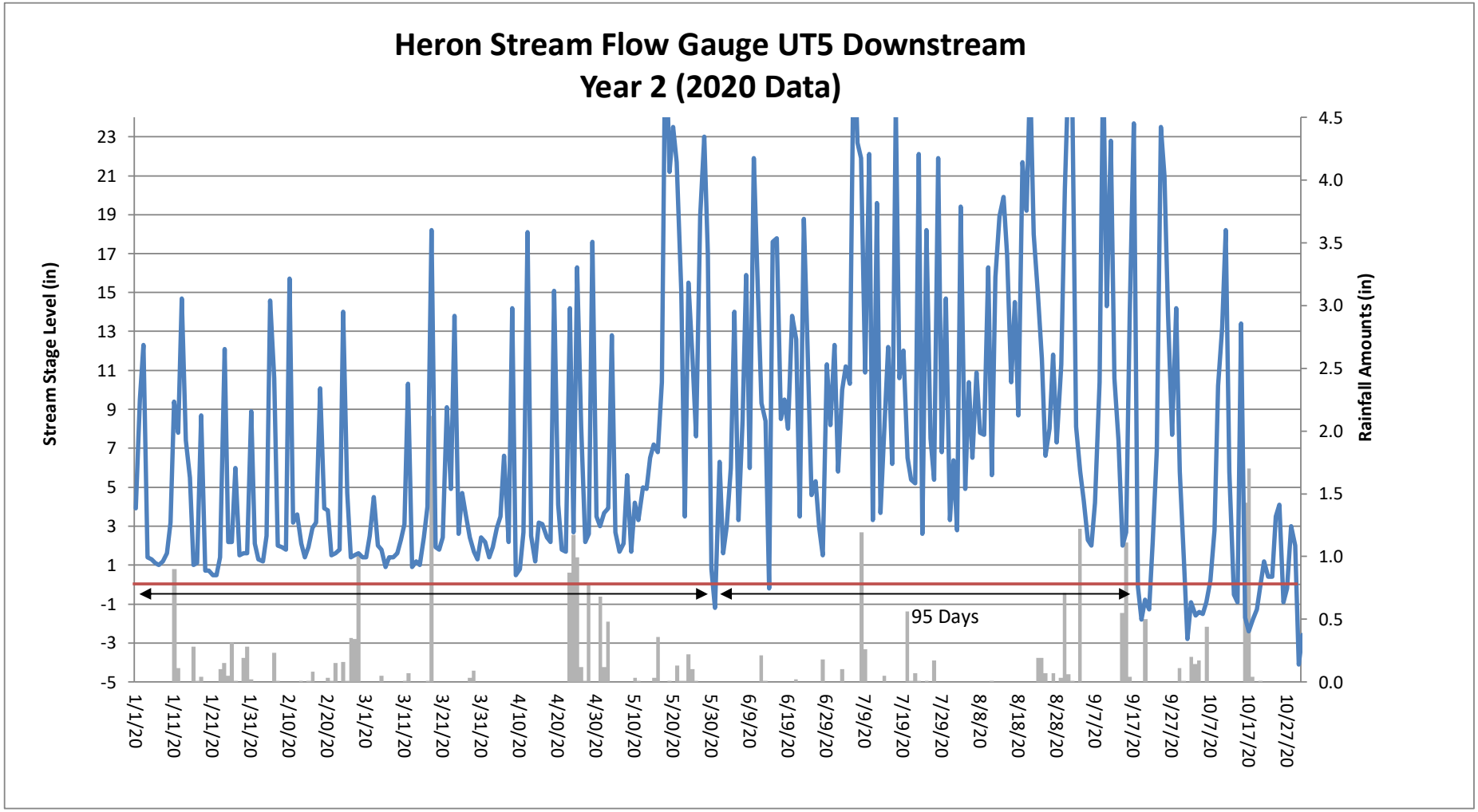
Table 15J. UT8 Channel Evidence

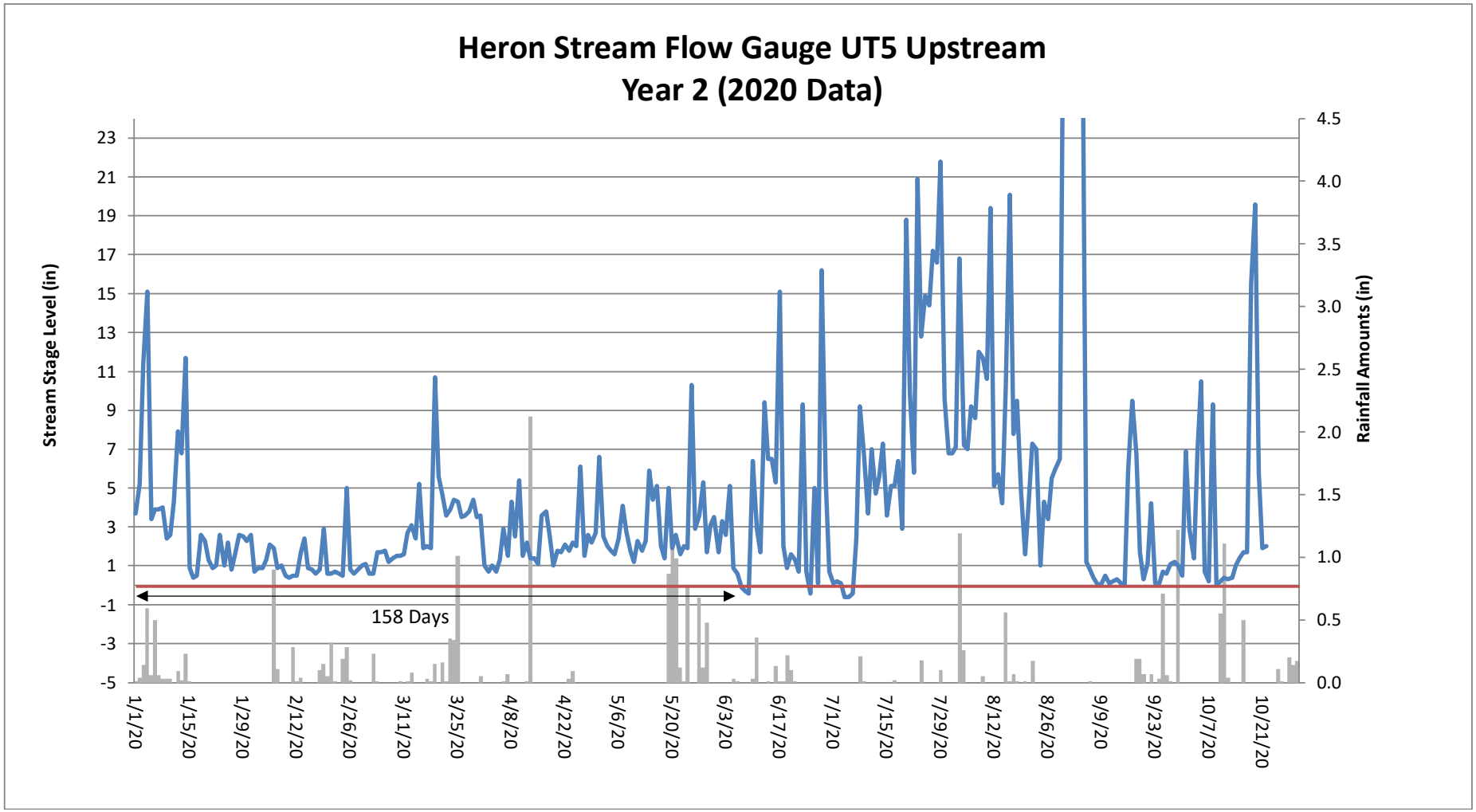
UT8 Downstream Channel Evidence	Year 1 (2019)	Year 2 (2020)
Max consecutive days channel flow	49	89
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating 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:		

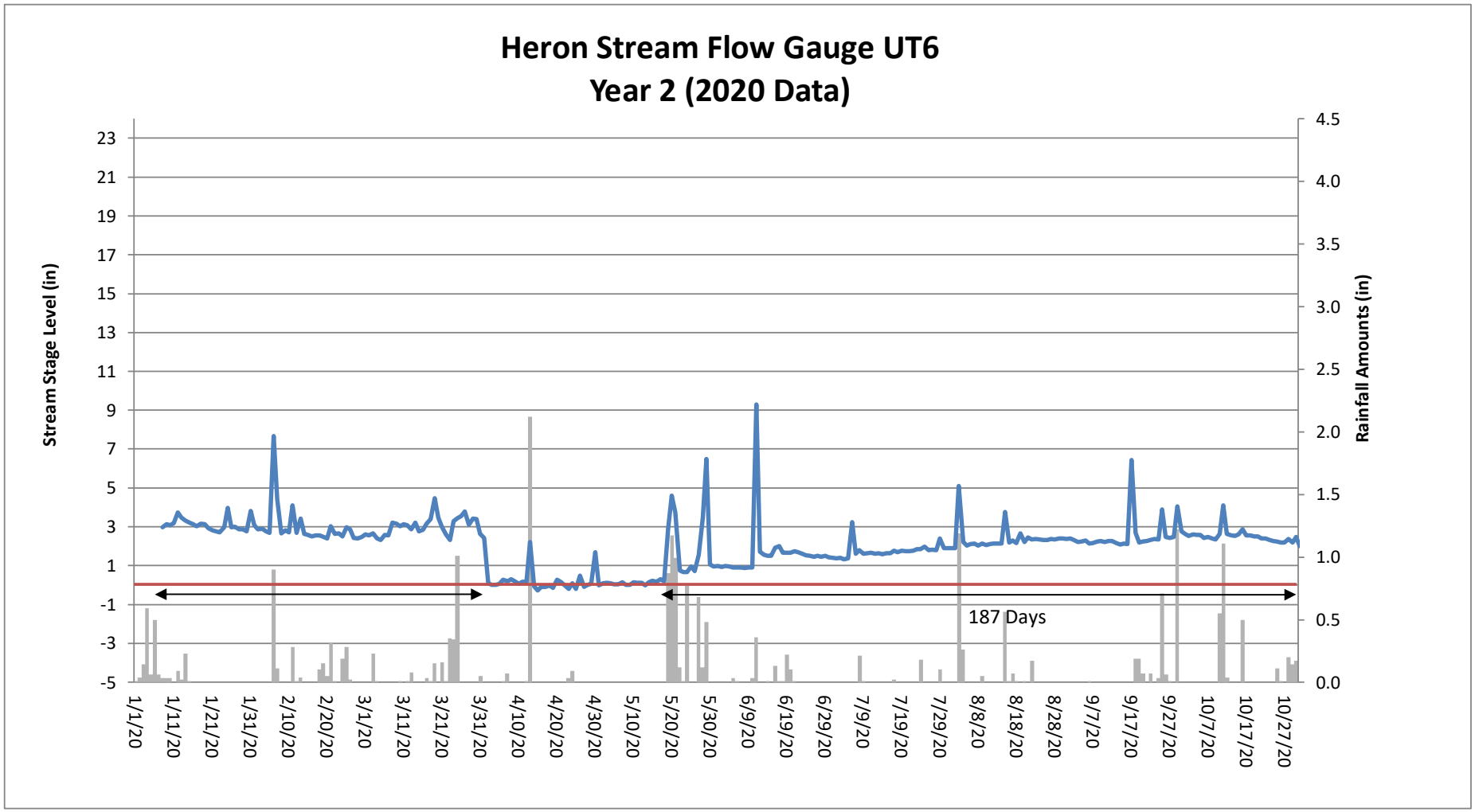

Heron Stream Flow Gauge UT1
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
2.5
2.0
1.5
1.0
0.5
0.0
162 Days
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20
11/6/20
11/16/20

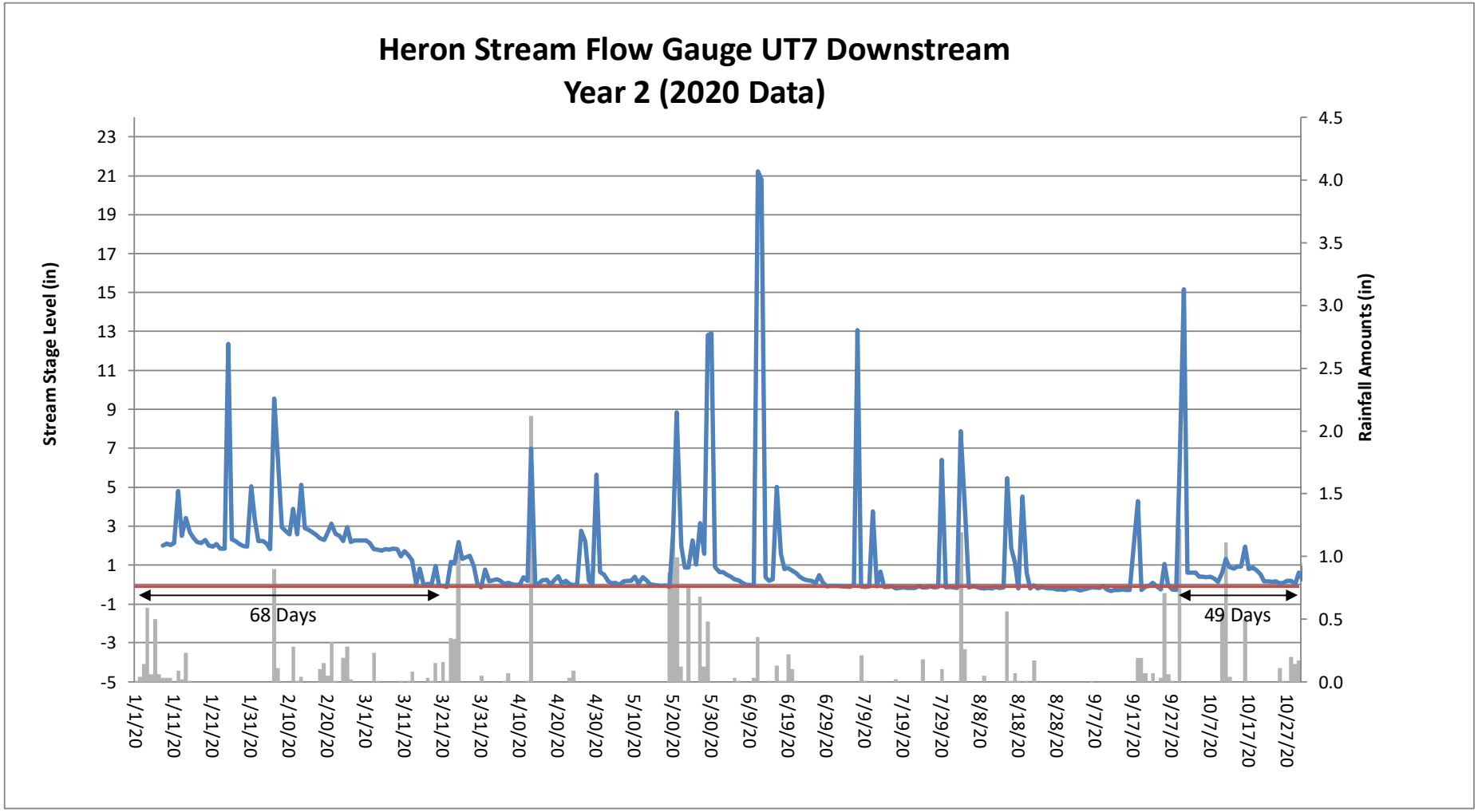

Heron Stream Flow Gauge UT2
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
126 Days
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20

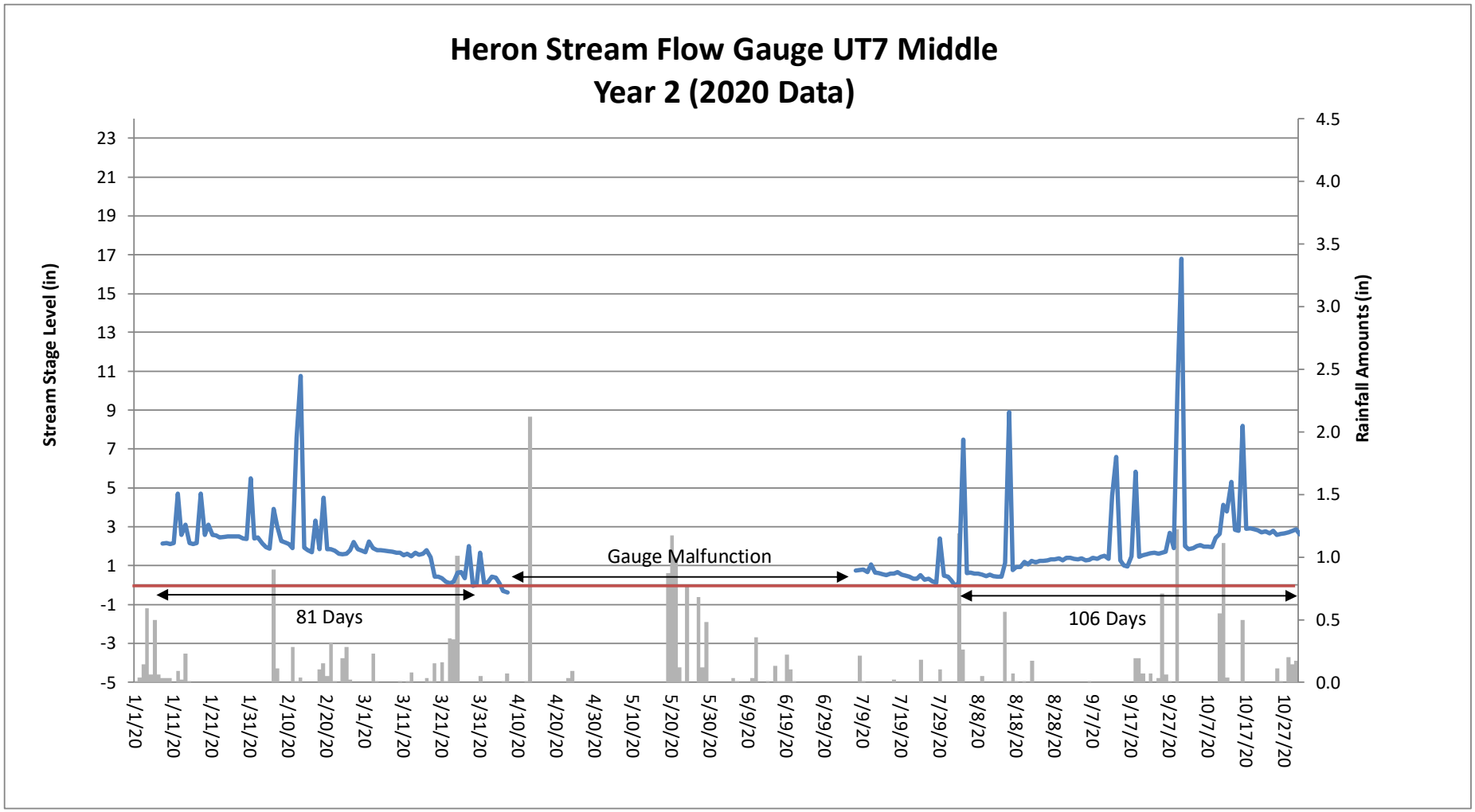

Heron Stream Flow Gauge UT3
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
166 Days
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20

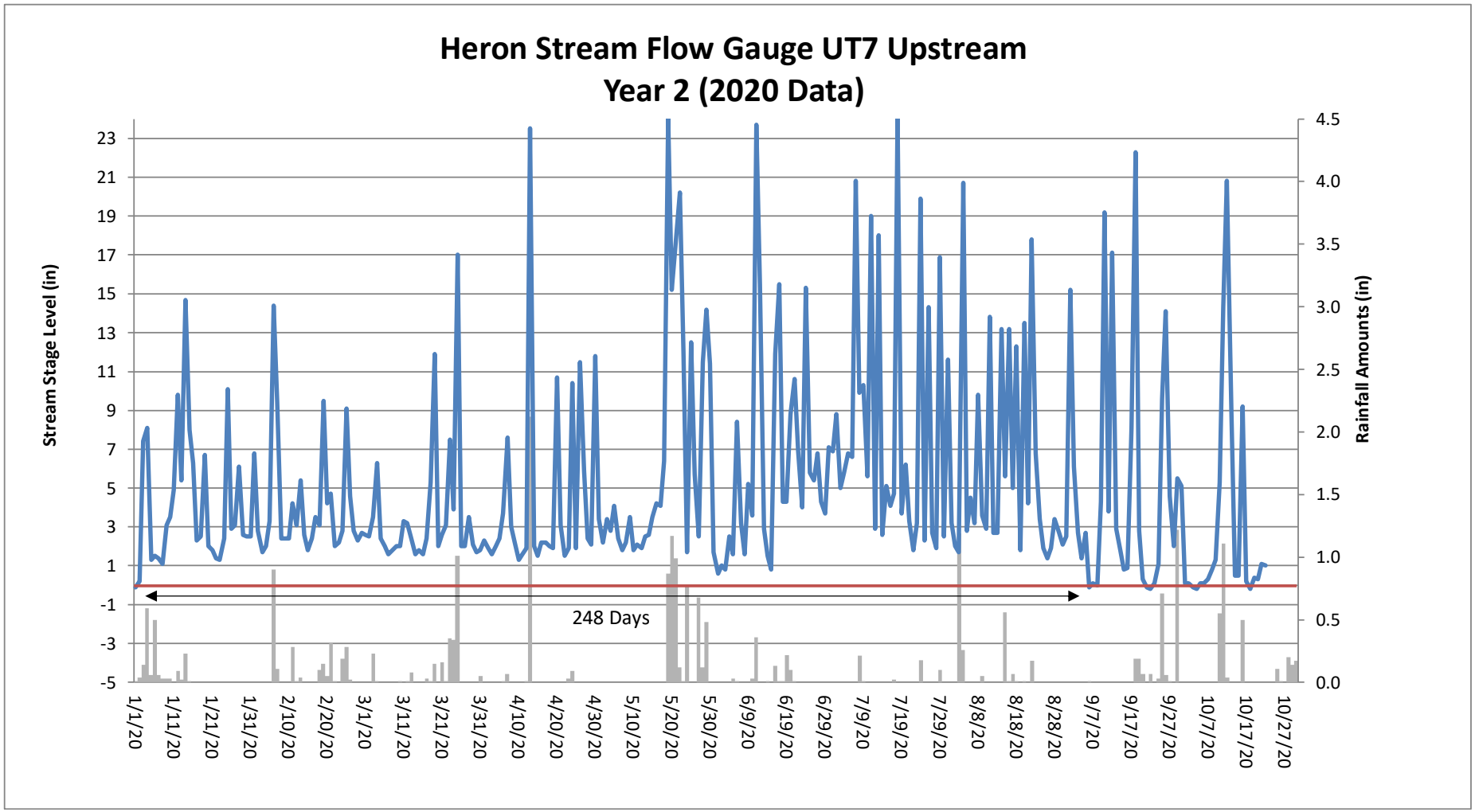

Heron Stream Flow Gauge UT5 Downstream
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
95 Days
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20


Heron Stream Flow Gauge UT5 Upstream
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
158 Days
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/15/20
1/29/20
2/12/20
2/26/20
3/11/20
3/25/20
4/8/20
4/22/20
5/6/20
5/20/20
6/3/20
6/17/20
7/1/20
7/15/20
7/29/20
8/12/20
8/26/20
9/9/20
9/23/20
10/7/20
10/21/20


Heron Stream Flow Gauge UT6
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
187 Days
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20


Heron Stream Flow Gauge UT7 Downstream
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
68 Days
49 Days
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20


Heron Stream Flow Gauge UT7 Middle
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20
Gauge Malfunction
81 Days
106 Days


Heron Stream Flow Gauge UT7 Upstream
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
248 Days
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20

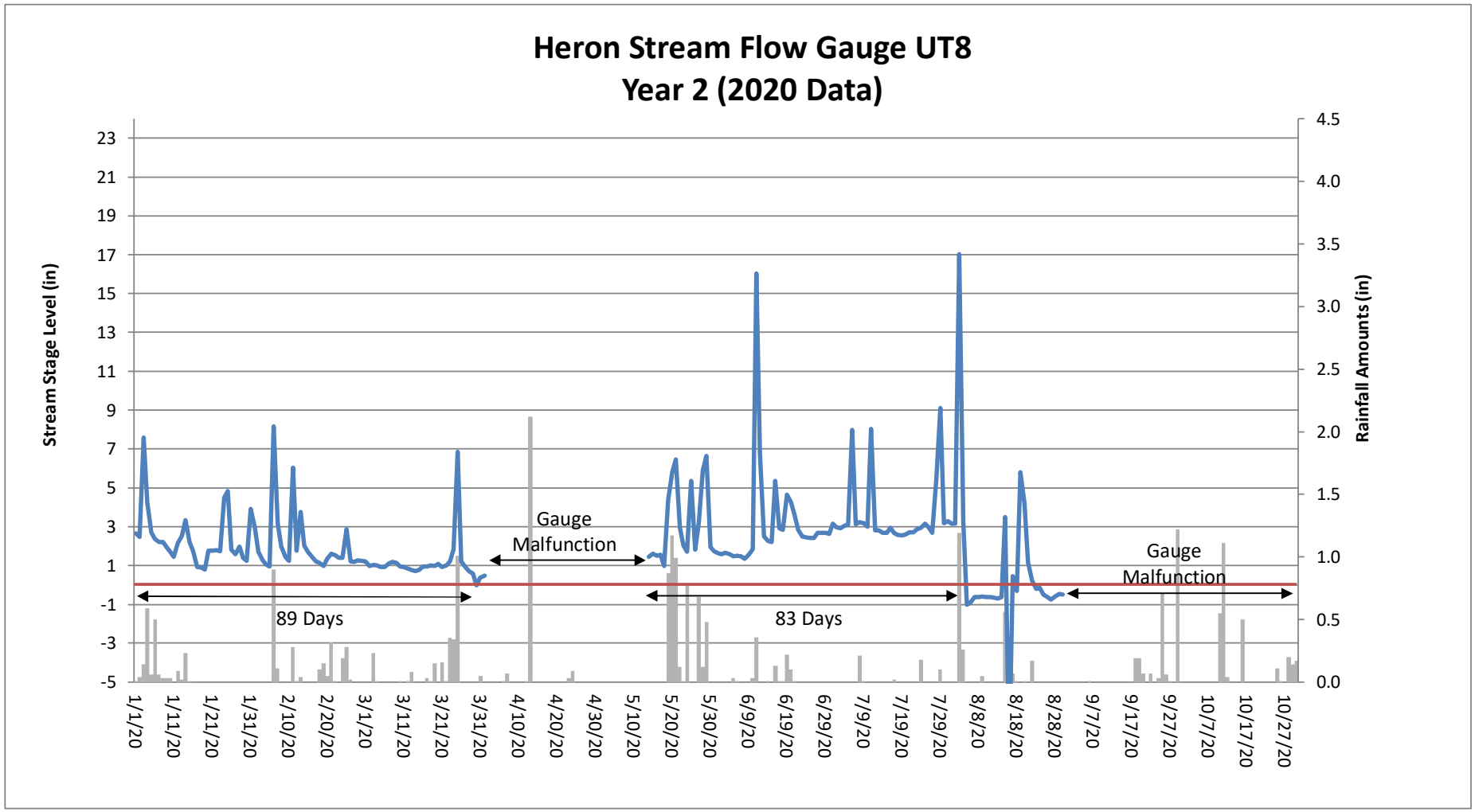

Heron Stream Flow Gauge UT8
Year 2 (2020 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/11/20
1/21/20
1/31/20
2/10/20
2/20/20
3/1/20
3/11/20
3/21/20
3/31/20
4/10/20
4/20/20
4/30/20
5/10/20
5/20/20
5/30/20
6/9/20
6/19/20
6/29/20
7/9/20
7/19/20
7/29/20
8/8/20
8/18/20
8/28/20
9/7/20
9/17/20
9/27/20
10/7/20
10/17/20
10/27/20
89 Days
Gauge Malfunction
83 Days
Gauge Malfunction

Table 16. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
August 26, 2019	July 7, 2019	Stream gauge data indicates a bankfull event occurred after 4.06 inches of rain was documented on July 7, 2019 at an onsite rain gauge	--
August 26, 2019	August 22, 2019	A bankfull event likely occurred after 7.16 inches of rain was documented between August 20-22, 2019 at an onsite rain gauge	--
July 1, 2020	May 21, 2020	Wrack and laid-back vegetation were observed on the TOB of UT4 after 3.03 inches of rain was documented between May 19 and 21, 2020 at an onsite rain gauge.	1
November 16, 2020	November 12, 2020	Wrack and laid-back vegetation were observed on the TOB of UT1 after 3.13 inches of rain was documented between November 11 and 12, 2020 at an onsite rain gauge.	2

Photo 1: Wrack and laid-back vegetation along the TOB of UT4 after a bankfull event.

Photo 2: Wrack and laid-back vegetation along the TOB of UT1 after a bankfull event.

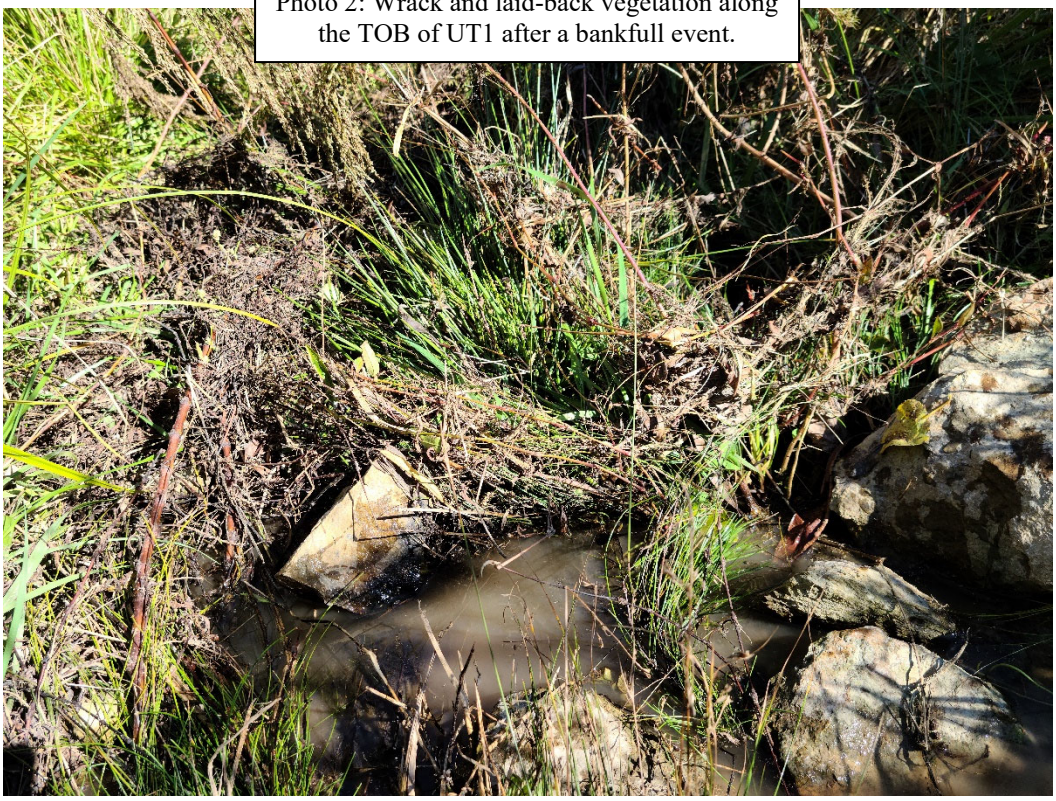
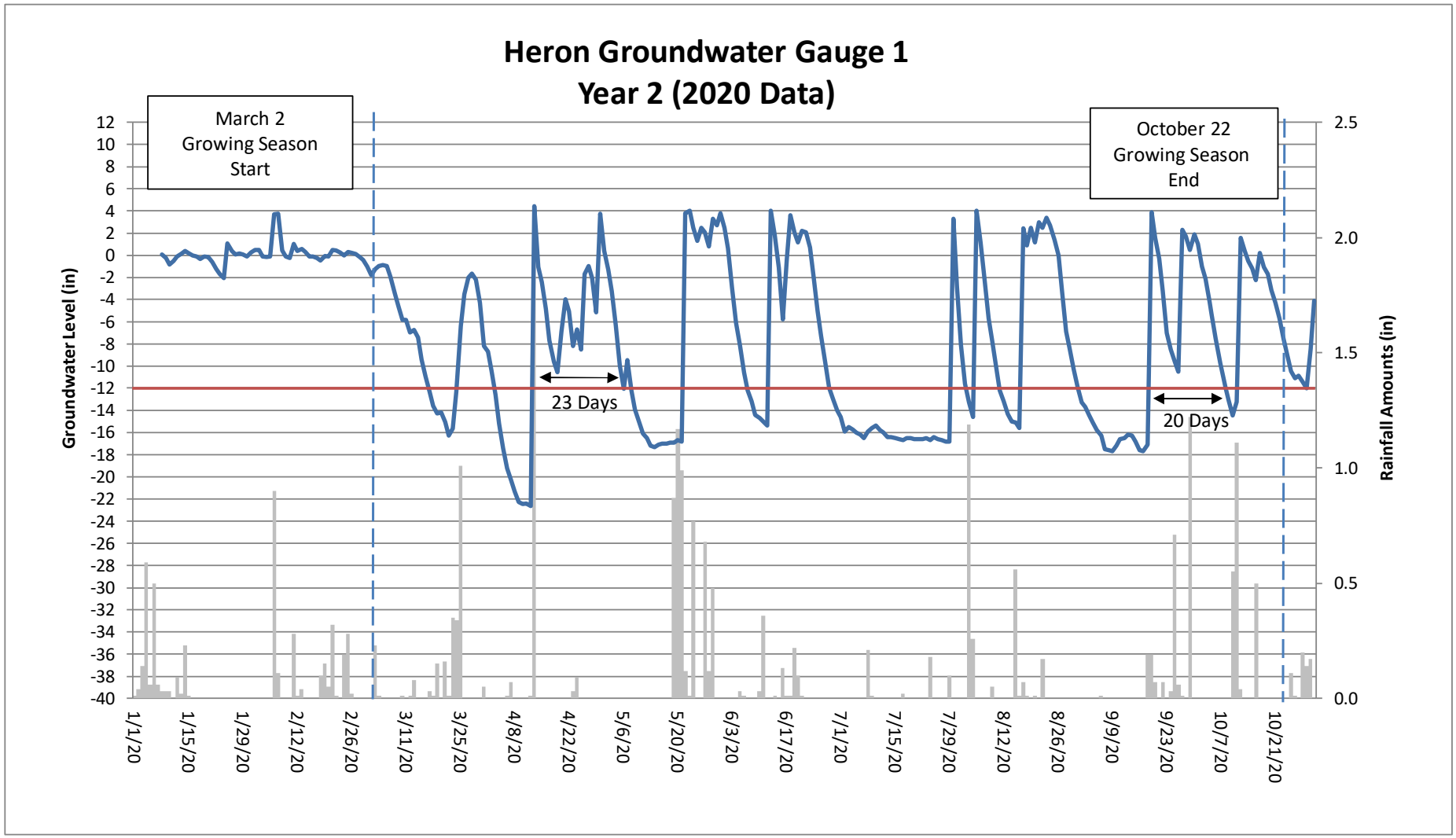
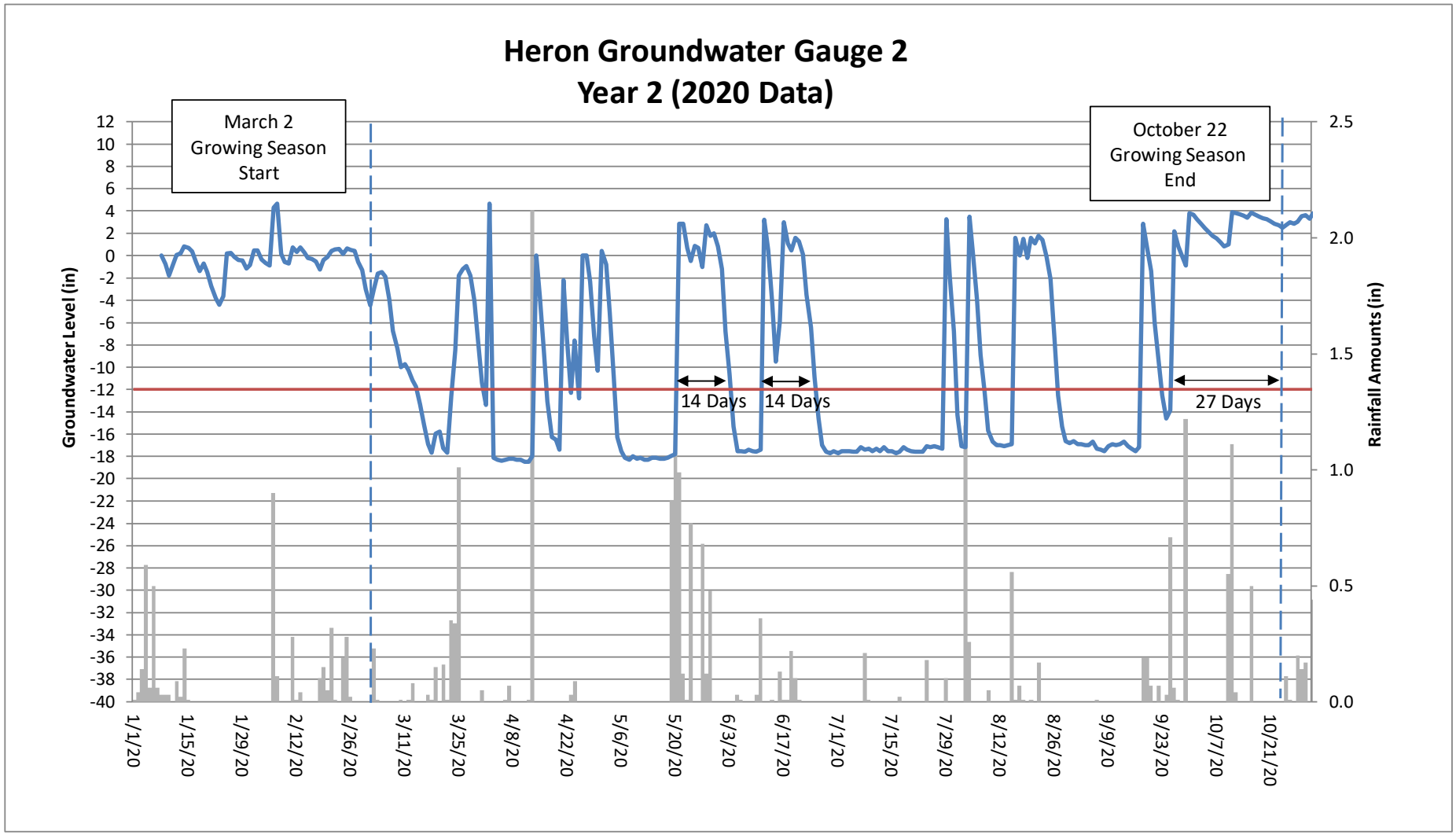
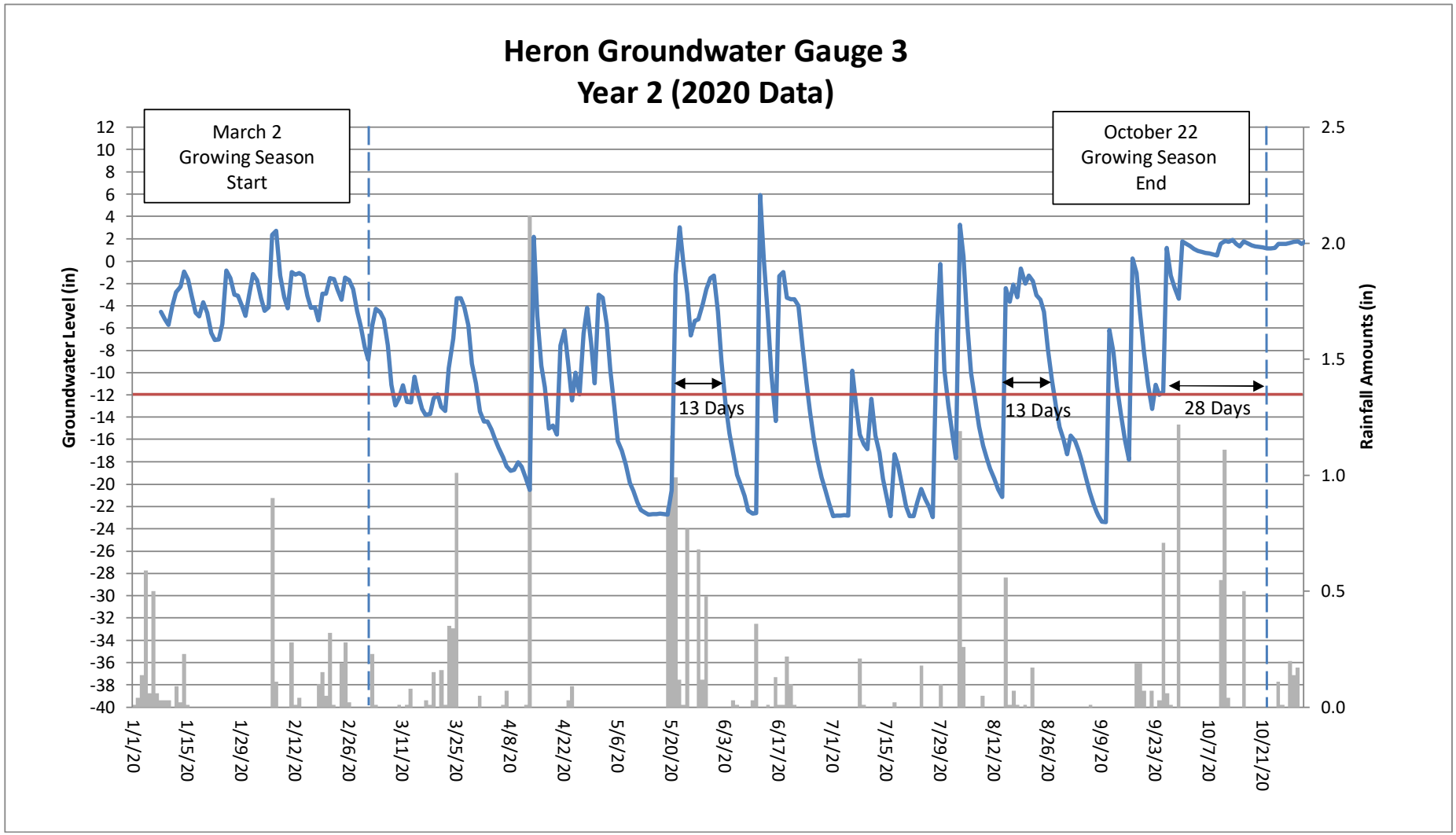


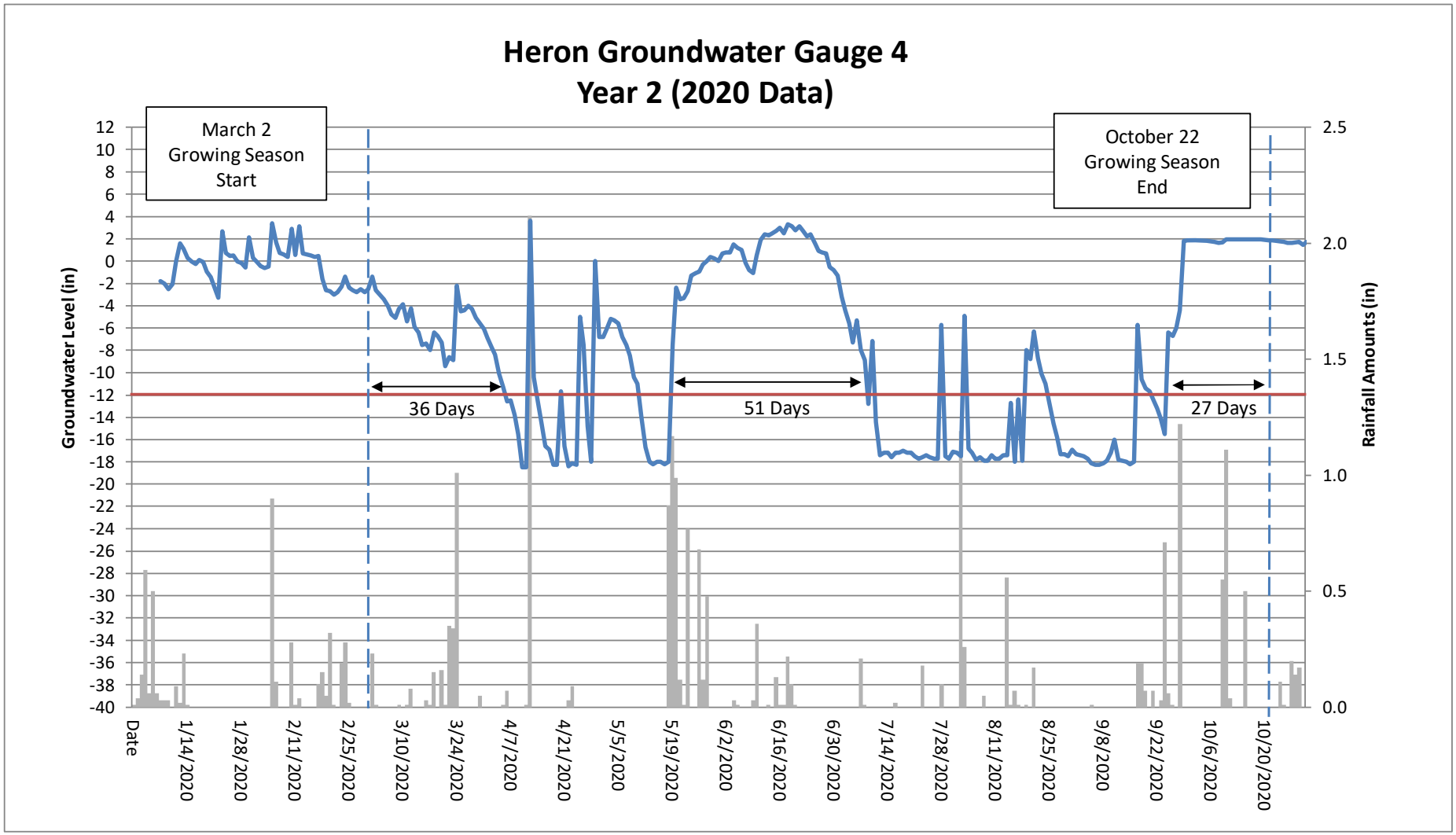
Table 17. Groundwater Hydrology Data

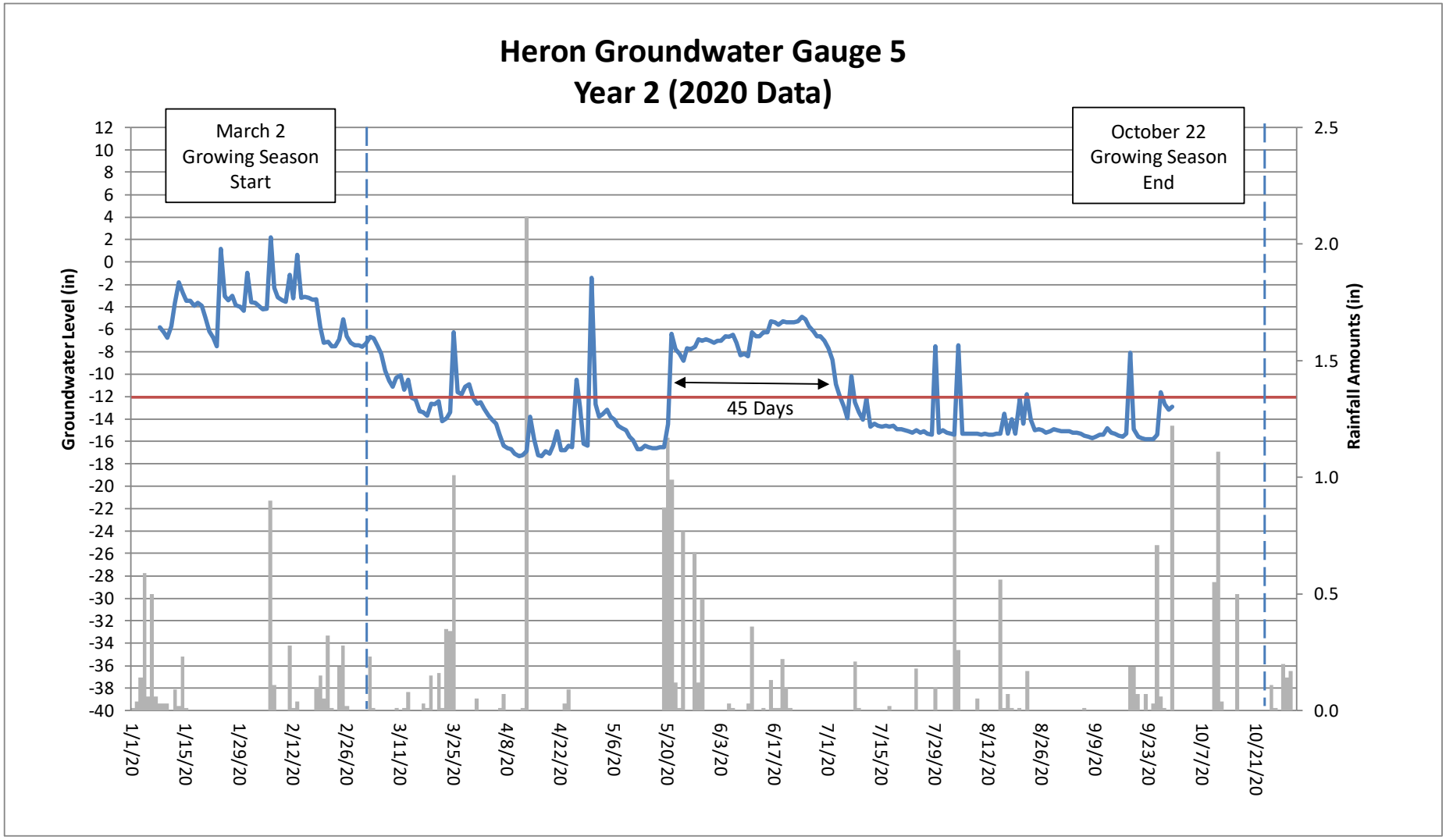
Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2019)	**Year 2 (2020)**	**Year 3 (2021)**	**Year 4 (2022)**	**Year 5 (2023)**	**Year 6 (2024)**	**Year 7 (2025)**
1	Yes 33 days (15.8%)	Yes 23 days (9.8%)					
2	Yes 26 days (12.4%)	Yes 27 days (11.5%)					
3	Yes 35 days (16.7%)	Yes 28 days (12.0%)					
4	Yes 69 days (33.0%)	Yes 51 days (21.8%)					
5	Yes 52 days (24.9%)	Yes 45 days (19.2%)					
6	Yes 54 days (25.8%)	Yes 46 days (19.7%)					

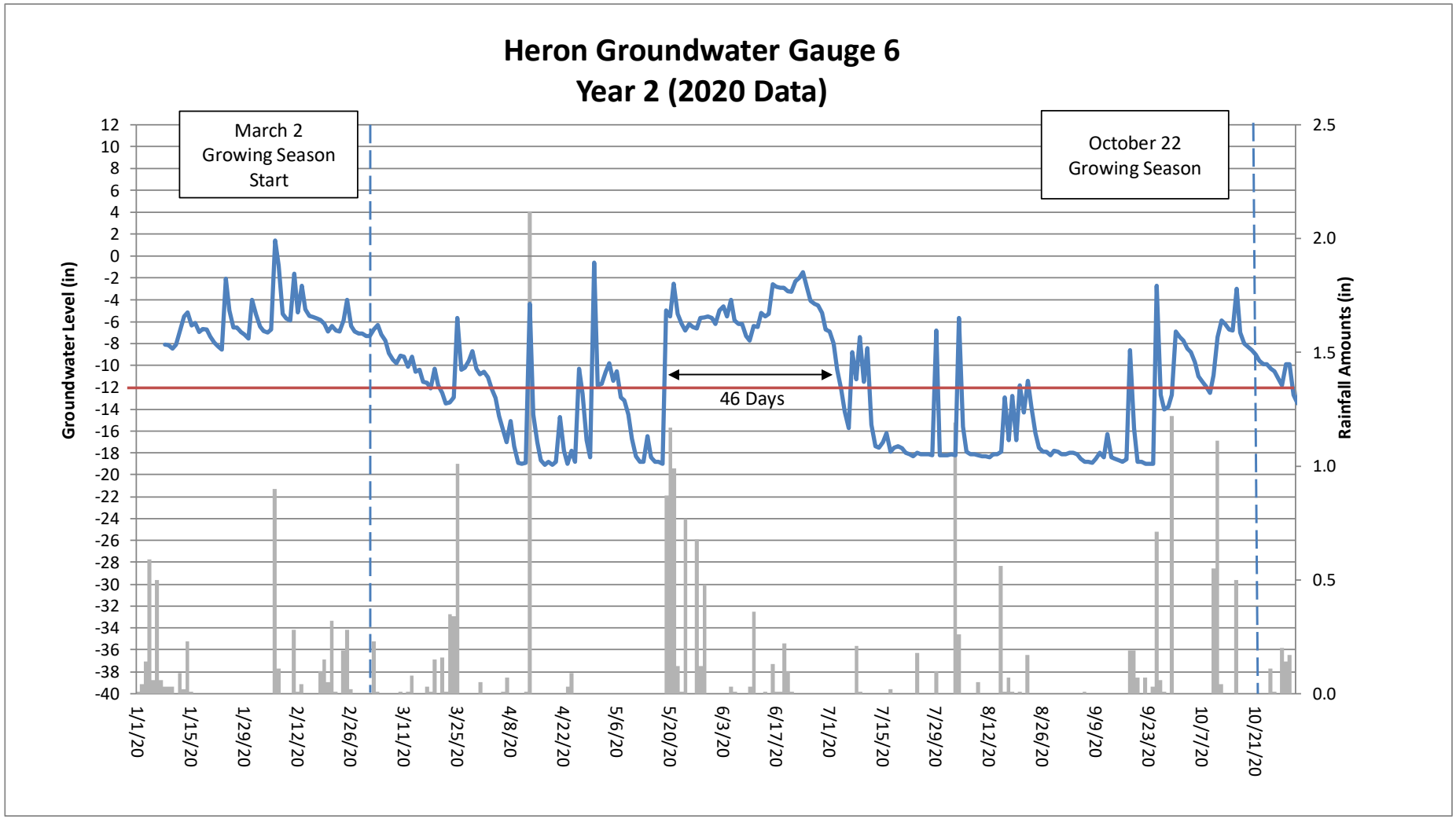

Heron Groundwater Gauge 1
Year 2 (2020 Data)
March 2
Growing Season
Start
October 22
Growing Season
End
23 Days
20 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/15/20
1/29/20
2/12/20
2/26/20
3/11/20
3/25/20
4/8/20
4/22/20
5/6/20
5/20/20
6/3/20
6/17/20
7/1/20
7/15/20
7/29/20
8/12/20
8/26/20
9/9/20
9/23/20
10/7/20
10/21/20


Heron Groundwater Gauge 2
Year 2 (2020 Data)
March 2
Growing Season
Start
October 22
Growing Season
End
14 Days
14 Days
27 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
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/15/20
1/29/20
2/12/20
2/26/20
3/11/20
3/25/20
4/8/20
4/22/20
5/6/20
5/20/20
6/3/20
6/17/20
7/1/20
7/15/20
7/29/20
8/12/20
8/26/20
9/9/20
9/23/20
10/7/20
10/21/20


Heron Groundwater Gauge 3
Year 2 (2020 Data)
March 2
Growing Season
Start
October 22
Growing Season
End
13 Days
13 Days
28 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
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/15/20
1/29/20
2/12/20
2/26/20
3/11/20
3/25/20
4/8/20
4/22/20
5/6/20
5/20/20
6/3/20
6/17/20
7/1/20
7/15/20
7/29/20
8/12/20
8/26/20
9/9/20
9/23/20
10/7/20
10/21/20


Heron Groundwater Gauge 4
Year 2 (2020 Data)
March 2
Growing Season
Start
October 22
Growing Season
End
36 Days
51 Days
27 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
2.5
2.0
1.5
1.0
0.5
0.0
Date
1/14/2020
1/28/2020
2/11/2020
2/25/2020
3/10/2020
3/24/2020
4/7/2020
4/21/2020
5/5/2020
5/19/2020
6/2/2020
6/16/2020
6/30/2020
7/14/2020
7/28/2020
8/11/2020
8/25/2020
9/8/2020
9/22/2020
10/6/2020
10/20/2020


Heron Groundwater Gauge 5
Year 2 (2020 Data)
March 2
Growing Season
Start
October 22
Growing Season
End
45 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
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/15/20
1/29/20
2/12/20
2/26/20
3/11/20
3/25/20
4/8/20
4/22/20
5/6/20
5/20/20
6/3/20
6/17/20
7/1/20
7/15/20
7/29/20
8/12/20
8/26/20
9/9/20
9/23/20
10/7/20
10/21/20


Heron Groundwater Gauge 6
Year 2 (2020 Data)
March 2
Growing Season
Start
October 22
Growing Season
46 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
2.5
2.0
1.5
1.0
0.5
0.0
1/1/20
1/15/20
1/29/20
2/12/20
2/26/20
3/11/20
3/25/20
4/8/20
4/22/20
5/6/20
5/20/20
6/3/20
6/17/20
7/1/20
7/15/20
7/29/20
8/12/20
8/26/20
9/9/20
9/23/20
10/7/20
10/21/20