

MY1 FINAL MONITORING REPORT

Cool Run Stream and Riparian Wetland Mitigation Site

Brunswick County, NC

Lumber River Basin

Cataloging Unit 03040207

DMS Project ID No. 100142

Full Delivery Contract No. 20190201-01

USACE Action ID No. SAW-2020-01428

DWR Project No. 20200712

RFP #16-20190201 (Issued: 7/16/2019)

Data Collection: October 11-13, 2023

Submission: February 2024



Prepared for:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
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CLEARWATER MITIGATION

S O L U T I O N S

February 29, 2024

Mr. Jeremiah Dow
NCDEQ Division of Mitigation Services
217 W. Jones Street, Suite 3000
Raleigh, NC 27603

**Re: Cool Run Response to DMS Comments on MY1 Report
DMS Project No. 100142, DMS Contract 20190201-01
USACE Action ID No. SAW-2020-01428, DWR Project No. 20200712**

Dear Mr. Dow,

Please find below the response to comments on the Cool Run Mitigation Plan provided by DMS dated February 2, 2024:

1. Section 1.2 Success Criteria footnote says that for Year 1, the success criteria will be measured from March 1 to Nov. 30th, but also states that hydrologic improvements were not completed until April 6 and hydrograph data does not start until April 25. Please clarify. Is your MY1 success based on the consecutive days you would have needed if hydrology were being collected at March 1, even though data collection doesn't start until April 25 (this is fine, just looking for clarification)?

Re: Section 1.2 success criteria was clarified by distinguishing monitoring periods for Year 1 and remainder of monitoring period. Data collection dates for hydrology and vegetation monitoring were also distinguished for MY1. MY1 success is based on the portion of the growing season beginning with normal rainfall conditions after gauge installation, May 5 through November 30 (or 210 days). Vegetation for MY1 was monitored in the fall of 2023 and planted on April 6. MY2 hydrology will be monitored from February 1 through November 30.

2. Section 2.0 – says record drawings are included. Please remove any reference to inclusion of Record Drawings and please remove the record drawings (Appendix F) from this report and all future monitoring reports.

Re: Record drawings have been removed from the report in addition to any text referencing the drawings.

3. Please remove Section 3.1. An entire section with one sentence saying see Table 4 is unnecessary.

Re: Section 3.1 has been removed.

4. Section 3.0 – remove reference to Section 3.1.

Re: Statement referencing 3.1 has been removed.



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5. Section 4.0 – Says monitoring methods are detailed in Section 3.0, but there are no methods discussed in Section 3.0. Refer to Table 4 here.

Re: Section 3.0 now references Table 4 for monitoring parameters. In addition, Section 4.0 also references Table 4.

6. Table 5 – Doesn't need the last 3 columns nor the 5% wetland criteria column. Simply report whether the gauges met the success criteria as proposed in the approved mitigation plan. Please color code the cells or text green/red to indicate meeting or not meeting in the 12% Success Criteria column for quick reference. Keep in mind that this Table will need to summarize attainment of success criteria for all years as monitoring progresses so overall trends can be easily observed by reviewers. Please use a version of this Table such as the example in the DMS template, or I am happy to provide other examples.

Re: Table 5 has been edited to include only the percentage for MY1 success criteria. Cells have been color coded to ease the interpretation of success criteria. In subsequent reports we will continue to include corresponding year's hydrology analysis to the table.

7. Section 4.2.2 – states that S2 maintained flow for the entire monitoring period and S1 maintained flow for the majority. Please reference the streams when discussing gauges, i.e., “Cool Run (S1) maintained flow...” Please state the actual number of consecutive days of flow instead of simply saying majority. Include a table summarizing flow that can be updated each year (can be in an Appendix). This table only needs to show the gauges with a flow requirement and the number of consecutive days of flow each monitoring year.

Re: Section 4.2.2 now clearly identifies streams with the addition of “Cool Run” or “UT1” when referencing stream gauges. These labels have also been included in Table 6. When stating consecutive days of flow actual numbers are mentioned rather than adjectives such as majority. An additional table, “Table 7. Summary of Year 1 Stream Flow”, was added to summarize the stream flow data in a tabular format. Additional years will be added as monitoring continues.

8. Section 4.3 – may want to add statement about ongoing sweet gum thinning that started in MY1. Was there any other invasive management following as-built?

Re: Sweet gum thinning efforts, herbicide applications, and additional hack and squirt applications were further described in Section 4.3.

9. Section 4.4 – Please add a sentence here stating that whatever the final growing season is determined to be in MY2, that those dates will be held constant for the remainder of monitoring.

Re: In Section 4.4, MY1 growing season was described. A statement clarifying that when a growing season is agreed upon, those dates will remain the standard throughout the site's monitoring was added.



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10. Section 4.5 – Sentence reads “Stream flow as documented throughout the majority of the year.” Please correct.

Re: The statement was corrected to read “Stream flow was present in Cool Run for 190 days and UT1 for 219 days.”

11. Figure 1

- a. S1 is not labeled.
- b. Please include the streams in the Legend with associated credit ratios.
- c. Plot 11 is in planting Zone 1, but is color coded like a Zone 2 plot that had less than 324 stems per acre. More distinct symbology differentiating between plots in each planting Zone is recommended.

Re: S1 has been labeled. Streams have been included in the legend along with their associated credit ratios. A table in the top right corner of the figure also displays footage/acreage and associated credits. Plot 11 symbology was altered to reflect its correct planting zone, Zone 1. Symbology for Planting Zone 1 remains a square. Symbology for Zone 2 was changed to a pentagon. Green reflects successful permanent plots while orange reflects permanent plots that did not meet the success criteria. Blue symbolizes random plots.

12. During the MY0 site visit it was requested that random veg plots be placed in rehab areas without veg plots and P2 areas. This was not done in MY1. Please place random plots in these areas in MY2.

Re: A note was placed within our system to ensure random veg plots are placed within rehab areas for MY2.

13. Appendix A – is documenting evidence of senescence with trees along a four lane highway an appropriate location? Generally, these trees are more stressed due to herbicides in the soil from roadside treatments among other potential stressors.

Re: Photos documenting senescence displaying a four-lane highway are not an exact representation of the mitigation site. But they do represent a general depiction of Brunswick County. A four-lane highway does pose additional stressors that would not be present within a mitigation site. But one could assume that if trees within this area are exposed to additional stressors and display incomplete abscission, trees in an environment lacking those stressors would retain their leaves for a longer period as they have a higher quality environment.

14. Appendix C

- a. Recommend removing BHR calculations on pool cross sections.
- b. Please ensure cross section graphs have lines for both Bankfull Elevation Based on MY0 Cross Sectional Area and current LTOB (which is what I believe is currently shown on the graph)



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c. It is observed that virtually all cross sections have identical elevations for “Bankfull Elevation (ft) - Based on As Built - Bankfull Area” and “Low Top of Bank Elevation.” With the obvious aggradation and change in cross sectional area, these numbers would not be identical and BHRs would not all be 1.00. We would expect many, or most, of the BHRs to be <1 (ex. 0.92, 0.80, etc.). Please recalculate “Bankfull Elevation (ft) - Based on As Built - Bankfull Area” and BHRs correctly. Please visit the following link for further guidance or reach out to discuss. <https://www.deq.nc.gov/mitigation-services/document-management-library/guidance-and-template-documents/monitoring-channel-change-dms-mitigation-projects/open>

d. While XS-2 displays obvious aggradation, is it accurate that it lost approx. 2/3 of its cross-sectional area?

Re: Bank height ratios for pool cross sections have been removed. Lines representing bankfull elevations based on MY0 Cross Sectional Area and Current LTOB is now displayed on cross sectional graphs. Bank height ratios have been recalculated for all riffles. Values now reflect the correct BHRs and are less than 1.00. Based on the revised cross-sections, XS-2 has lost approximately 40% of its cross-sectional area.

15. GW Gauge hydrographs – showing 3 gauges on each graph can be confusing. Would recommend trying to fit each year’s graph onto one page and include only one gauge per graph. Indicate which gauge, or gauges, are being shown in the title at the top of each page. It is also useful to call out on the graph where the longest period of consecutive days of meeting success is located, with the number of days and percent of growing season displayed.

Re: Your recommendation was applied and hydrographs now reflect a singular gauge per graph along with an entire monitoring period. The title along with the legend displays the respective gauge with the longest period of consecutive days meeting success criteria called out. Next to the call out, in the legend, the number of days and percent of growing season is listed.

16. On the stream gauge hydrographs, please indicate clearly which project stream is associated with each gauge.

Re: Stream gauge hydrographs now clearly indicate which project stream they are associated with.

17. What is the purpose of the stream gauge graphs that only show April 30th, Aug. 3 – 5, July 6, etc.? Overbank events can be seen (and if difficult to see, called out) on the condensed graphs that show a larger portion of the year. A better use of space would be to have a separate graph for each stream gauge.



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Re: Stream gauge graphs that depict only a specific range of dates represent overbank events. More specifically, these graphs depict hourly stream data rather than daily stream data depicted at a consistent time of 7:00 AM. When condensing hourly stream data to a singular period, overbank events can be eliminated if an event occurred for less than 24 hours. In this case, if hourly periods were not called out, the event that occurred on April 30th would not be noticed. Daily stream data during this period shows both S1 and UT1 do not reach the top of bank if only interpreting data at 7:00 AM. In addition, if an annual hourly graph was displayed, the data depicted would be rather confusing to interpret. Hourly data is selected only for periods where overbank events occurred to minimize data displayed and ease interpretation.

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

Sincerely,

Kevin Yates

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Prepared By:



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1.0 PROJECT SUMMARY

Clearwater Mitigation Services has established the North Carolina Division of Mitigation Services (NCDMS) Cool Run Stream & Wetland Mitigation Site (hereafter referred to as the “Site”). The Site encompasses 25.6 acres of floodplain forest and agricultural fields along Cool Run and an Unnamed Tributary (UT) to Cool Run located within the Carolina Flatwoods of the Middle Atlantic Coastal Plain Ecoregion (63h). The Site is located within a **Targeted Local Watershed** of the Upper Shallotte River 14-digit HUC (03040207020060) of the Lumber River basin. Stream and wetland mitigation areas are located along Cool Run and a UT to Cool Run within North Carolina Division of Water Resources [NCDWR] subbasin number 03-07-59. Site watersheds range from approximately 3.10 square miles (1,985 acres) along Cool Run to approximately 0.2 of a square mile (125 acres) along UT1.

1.1 Project Background, Components, and Structure

The site is located in Brunswick County, approximately 5.5-miles West of Shallotte, NC. Restoration activities within the Site included the construction of meandering, E/C-type stream channel resulting in 2,024 linear feet of Priority I stream restoration, 603 linear feet of Priority II stream restoration, 14.108 acres of riparian wetland re-establishment, 1.433 acres of riparian wetland rehabilitation, 1.201 acre of riparian wetland enhancement, and 0.492 acre of riparian wetland preservation. The site is expected to provide 2,422.667 warm water stream credits and 15.512 riparian wetland credits by closeout (Table 1). A conservation easement was granted to the State of North Carolina and recorded at the Brunswick County Register of Deeds on February 12, 2021.

Prior to site construction, the site was characterized by disturbed forest that was previously utilized for agriculture and silviculture dating back to the 1950’s. Based on historical aerial photography, Cool Run appears to have been relocated and channelized in the late 1950’s. These photographs also depict the channelization of UT1 prior to 1956. Historically, logging and additional modifications have been documented throughout the floodplain for the past several decades. The most recent logging event occurred between 2016 and 2018. Site design was completed in June 2022. Construction began in December 2022, and ended with a final walkthrough on April 19, 2023. The site was planted on April 6, 2023. Completed project activities, reporting history, completion dates, and project contacts are summarized in Tables 11-12 (Appendix E).

Table 1. Cool Run Restoration Site (ID-100142) Project Components and Mitigation Credits

Project Segment	Mitigation Plan Footage/Acreage	As-Built Footage/Acreage	Mitigation Category	Restoration Level	Mitigation Ratio	Mitigation Credits	Comment
Stream							
Cool Run Upstream 1	592	603	Warm	R*	1.500	394.667	
Cool Run Upstream 2	427	406	Warm	R	1.000	427.000	
Cool Run Downstream	1000	1008	Warm	R	1.000	1000.000	
UT 1	601	610	Warm	R	1.000	601.000	
					Total:	2,422.667	
Wetland							
Wetland Reestablish	14.108	14.108	NA	Reestablishment	1.000	14.108	
Wetland Rehabilitation	1.433	1.433	NA	Rehabilitation	1.500	0.955	
Wetland Enhancement	1.201	1.201	NA	Enhancement	3.000	0.400	
Wetland Preservation	0.492	0.492	NA	Preservation	10.000	0.049	
					Total:	15.512	

*Cool Run Upstream 1 is Restoration with an adjusted ratio (based on IRT comment and review)

Project Credits

	Stream			Riparian Wetland		Non-riparian wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Nonriverine		
Restoration	2,422.667	--	--	--	--	--	--
Re-establishment	--	--	--	14.108	--	--	--
Rehabilitation	--	--	--	0.955	--	--	--
Enhancement	--	--	--	0.400	--	--	--
Enhancement I	--	--	--	--	--	--	--
Enhancement II	--	--	--	--	--	--	--
Enhancement II*	--	--	--	--	--	--	--
Preservation	--	--	--	0.049	--	--	--
Totals	2,422.667	--	--	15.512	--	--	--

Table 2. Summary: Goals & Performance

Goals	Objectives	Success Criteria
(1) HYDROLOGY		
<ul style="list-style-type: none"> Minimize downstream flooding to the maximum extent possible. 	<ul style="list-style-type: none"> Construct new channel at historic floodplain elevation to restore overbank flows Plant woody riparian buffer Protect riparian buffers with a perpetual conservation easement Construct channels with proper pattern, dimension, and longitudinal profile 	<ul style="list-style-type: none"> BHR not to exceed 1.2 Document four overbank events in separate monitoring years Document a minimum of 30 consecutive days of flow on UT1 Attain Wetland Hydrology Success Criteria Attain Vegetation Success Criteria Conservation Easement recorded
<ul style="list-style-type: none"> Increase stream stability within the Site so that channels are neither aggrading nor degrading. 	<ul style="list-style-type: none"> Construct channels with proper pattern, dimension, and longitudinal profile Cease row crop production within and immediately adjacent to Site wetlands and streams Construct stable channels Stabilize stream banks Plant woody riparian buffer 	<ul style="list-style-type: none"> Cross-section measurements indicate a stable channel Visual documentation of stable channels and structures BHR not to exceed 1.2 < 10% change in BHR in any given year Attain Vegetation Success Criteria
(1) WATER QUALITY		
<ul style="list-style-type: none"> Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters. 	<ul style="list-style-type: none"> Reduce agricultural land/inputs Plant woody riparian buffer Restore/enhance jurisdictional wetlands adjacent to Site streams Provide surface roughness and reduce compaction through deep ripping/plowing Restore overbank flooding by constructing channels at historic floodplain elevation 	<ul style="list-style-type: none"> Attain Wetland Hydrology Success Criteria Attain Vegetation Success Criteria
(1) HABITAT		
<ul style="list-style-type: none"> Improve instream and stream-side habitat. 	<ul style="list-style-type: none"> Construct stable channels with appropriate substrate Plant woody riparian buffer to provide organic matter and shade Construct new channel at historic floodplain elevation to restore overbank flows Protect riparian buffers with a perpetual conservation easement Restore/enhance jurisdictional wetlands adjacent to Site streams Stabilize stream banks Install in-stream structures 	<ul style="list-style-type: none"> Cross-section measurement indicate a stable channel Visual documentation of stable channels and in-stream structures. Attain Wetland Hydrology Success Criteria Attain Vegetation Success Criteria Conservation Easement recorded

Table 3. Project Attribute Table

Table 3. Project Attribute Table			
Project Name	Cool Run Stream and Riparian Wetland Mitigation Site		
County	Brunswick County, North Carolina		
Project Area (acres)	25.6		
Project Coordinates (latitude and longitude decimal degrees)	33.970904, -78.472509		
Project Watershed Summary Information			
Physiographic Province	Middle Atlantic Coastal Plain		
River Basin	Lumber		
USGS Hydrologic Unit 14-digit	03040207020060		
DWR Sub-basin	03-07-59		
Project Drainage Area (acres)	1,074		
Project Drainage Area Percentage of Impervious Area	<2%		
Land Use Classification	87% forested; 11% agricultural; <2% residential		
Reach Summary Information			
Parameters	Cool Run Upstream of UT1 confluence	Cool Run Downstream of UT1 confluence	UT 1
Pre-project length (feet)	1158	776	335
Post-project (feet)	1009	1008	610
Valley confinement (Confined, Unconfined)	A, UC	A, UC	A, UC
Drainage area (acres)	911	1074	125
Perennial, Intermittent, Ephemeral	Per	Per	Int
NCDWR Water Quality Classification	C, Sw	C, Sw	C, SW
Dominant Stream Classification (existing)	E/G 5	Eg 5	Eg 5
Dominant Stream Classification (proposed)	C 5	C 5	C 5
Dominant Evolutionary class (Simon) if applicable	II	II	II
Wetland Summary Information			
Parameters	Wetlands		
Pre-project (acres)	3.33 acres		
Post-project (acres)	17.2 acres		
Wetland Type (non-riparian, riparian)	Riparian riverine		
Mapped Soil Series	Muckalee, Lynchburg, Baymeade, Goldsboro, Rains, Lumbee		
Soil Hydric Status	Non-hydric and Hydric		
Regulatory Considerations			
Parameters	Applicable?	Resolved?	Supporting Docs?
Water of the United States - Section 404	Yes	Yes	Section 404 Permit
Water of the United States - Section 401	Yes	Yes	Section 401 Permit
Endangered Species Act	Yes	Yes	CE Document
Historic Preservation Act	Yes	Yes	CE Document
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

1.2 Success Criteria

Monitoring and success criteria for stream restoration should relate to project goals and objectives identified from on-site NC SAM and NC WAM data collection in addition to guidelines set forth in the 2016 Mitigation Rule. From a mitigation perspective, several of the goals and objectives are assumed to be functionally elevated by restoration activities without direct measurement. Other goals and objectives will be considered successful upon achieving success criteria. The following summarizes the site success criteria developed for the project.

Success Criteria

Streams
<ul style="list-style-type: none"> 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. Bank height ratio (BHR) cannot exceed 1.2 at any measured cross-section. BHR at any measure riffle cross-section should not change by more than 10% from baseline condition during any given monitoring period. The stream project shall remain stable and all other performance standards shall be met through four separate bankfull events, occurring in separate years, during the monitoring years 1-7.
Wetland Hydrology
<p>Saturation or inundation within the upper 12 inches of the soil surface for, at a minimum, 12 percent of the growing season (36 days)^{1,2}, during normal climatic conditions.</p>
Vegetation
<ul style="list-style-type: none"> Within planted portions of the site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 5; and a minimum of 210 stems per acre must be present at year 7. Trees must average 7 feet in height at year 5, and 10 feet in height at year 7 in each plot. Planted and volunteer stems are counted, provided they are included in the approved planting list for the site; natural recruits not on the planting list may be considered by the IRT on a case-by-case basis. Any volunteer species on the approved planting list must be established for at least 2 years to count towards success and will be subject to the average height standard.

1) Growing season for this site is to start no earlier than February 1 and range through November 30 as verified by soil temperature and above ground growth and development of vascular plants per the approved mitigation plan. Photo documentation of >50% leaf fall of dominant tree species will be recorded in combination with soil temperature probe data to document end of growing season. MY2-MY7 growing seasons will be measured from February 1 – November 30th of each year and will be supported by recorded soil temperature probe data and supplemented with photographic evidence of above ground growth and development of vascular plants (i.e. emergence of herbaceous plants from the ground; appearance of new growth from vegetative crowns; coleoptile/cotyledon emergence from seed; bud burst on woody plants (2 or more species); emergence or elongation of leaves of woody plants; or emergence or opening of flowers). The growing season has begun and is on-going if either of these conditions is met. The beginning of the growing season will be indicated by whichever condition occurs earlier, and the end of the growing season will be indicated by whichever condition persists later.

2) Growing season metrics for MY01 utilized the date range May 5th through November 30th due to the construction completion date of April 6, 2023 and installation of monitoring devices.

Construction started in December 2022 and ended with a final walkthrough on April 19, 2023. The Site was planted on April 6, 2023. As-built and MY0 data collection occurred between April and May 2023.

In general, no significant issues arose during the construction of the Site. Upon completion of the as-built it was noted that a cross-vane was installed in a slightly different location than proposed in the construction plans. However, in consultation with the project engineer, it is unlikely that the installed location will affect the stability and success of the project. The proposed location of the structure and as-built location are currently stable. This location will continue to be monitored and will be addressed in subsequent monitoring reports.

3.0 PROJECT MONITORING - METHODS

Monitoring will be conducted in accordance with 2016 NCIRT Guidelines. Monitoring will be conducted by Davey Resource Group, Inc. based on the schedule below. Annual monitoring reports will be submitted to the NCDMS by Clearwater Mitigation Solutions no later than December 31 of each monitoring year data is collected. Monitoring parameters are summarized in Table 4.

Monitoring Schedule

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

4.0 MONITORING YEAR 1 – DATA ASSESSMENT

Site visits were conducted through October 11-13 to collect annual monitoring data for the project. Stream, wetland, and vegetation monitoring for the Site follow the approved success criteria presented in the Mitigation Plan and summarized in Section 1.3; monitoring methods are detailed in Table 4.

4.1 Stream Assessment

Geomorphology surveys for MY1 were conducted on October 13, 2023. It is important to note that deviations in cross sectional areas over the course of the monitoring year are expected due to normal scour and deposition of low gradient sand and bed systems. Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table. Refer to Appendix C for Stream Geomorphology Data.

While stream banks remain stable, cross-sectional data indicates both Cool Run stream and UT1 have experienced aggradation over the past monitoring year. This can be attributed to the 5-7 inches of rain the site received within 24 hours from Hurricane Idalia in August 2023. It is likely that sediment deposited during the heavy rain events will move through the system during the following monitoring period as the stream system reaches equilibrium.

Visual observation of the stream banks for both Cool Run and UT1 revealed no areas of concern during MY1 monitoring year.

Table 4. 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 10 cross-sections on restored channels	Graphic and tabular data.
Channel Stability	Visual Assessments	Yearly	All restored stream channels	Areas of concern will be depicted on a plan view figure with a written assessment and photograph of the area included in the report.
	Additional Cross-sections	Yearly	Only if instability is documented during monitoring	Graphic and tabular data.
Bankfull Events	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	1 stream gauge on Cool Run; 1 stream gauge on UT1	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through monitoring period	Periodic Site visits throughout the year.	Visual evidence, photo documentation, and/or rain data.
Wetland Parameters				
Parameter	Method	Schedule/Frequency	Number/Extent	Data Collected/Reported
Wetland Restoration	Groundwater gauges	Years 1, 2, 3, 4, 5, 6, and 7 throughout the year with the growing season. ¹	17 gauges spread throughout restored wetlands; two reference gauges at reference wetland site	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; <i>CVS-EEP Protocol for Recording Vegetation, Version 4.2</i> (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	3 plots randomly selected each year	Species and height

¹Growing season for this site is to start no earlier than February 1 and range through November 30 as verified by soil temperature and bud burst

Note: Photo stations will be taken at all cross sections and at vegetation plot origin points. In addition, photos will be collected across the Site to document a range of different areas.

4.2 Hydrology Assessment

4.2.1 Groundwater Gauges

Seventeen groundwater monitoring gauges were installed throughout the site's wetlands. Wells that exceeded or met the defined 12% wetland success criteria included wells 3, 4, 5, 7, 14, and 15. These wells consecutively met success criteria for periods ranging from 26 to 63 days. A remaining portion of the wells met 5% wetland hydrology (minimum criteria for a jurisdictional wetland) throughout the growing season and narrowly missed the 12% success criteria. Wells 1, 8, 12, 13, and 16 were short of 12% by 1.5, 0.1, 0.6, 0.1, and 0.1 percent respectively. Eleven wells throughout the site demonstrated at least 5% of wetland hydrology throughout the growing season. The reference gauge located offsite in a stream valley was impacted by beaver behavior throughout the monitoring period. Some data was retrieved but may be deemed inadequate for the purpose of reference wetland conditions. The gauge will be relocated for the following monitoring period to Ev Henwood Nature Park in a reference undisturbed stream valley. The remaining wells, 2, 6, 9, 10, 11, and 17 fell short of meeting the defined 12% success criteria and the 5% minimum wetland criteria. Their performance could be attributed to the inability to capture the entire growing season. In total, due to a delayed gauge deployment, 83 days were un-monitored from February 1 through April 25. This critical early growing season is typically the wettest portion of the growing season. The Antecedent Precipitation Tool characterized this time as mostly normal or dry conditions. In contrast, 21% of the data captured was described as "wetter than normal conditions". Therefore, only 79% of the captured data could be used to determine success criteria. The additional precipitation and data captured during this period could contribute to future success. Future monitoring of the complete growing season will determine whether elevation and soil type may have contributed to the inability of some gauges to meet success criteria. Please refer to Table 5 for summary of hydrologic monitoring and Appendix D for the respective hydrographs, gauge locations, elevations, and soil profiles.

Table 5. Summary of 2023 Hydrologic Monitoring

Well Number	Longest Number of Consecutive Days Meeting Wetland Hydrology Criteria * (in growing season)	Dates of Longest Number of Consecutive Days Meeting Wetland Hydrology Criteria	Percentage of Growing Season	12% Success Criteria (MY1)
1	22	July 30 – Aug 20	10.5	No
2	10	Aug 4 - 13	4.8	No
3	41	May 5 – June 14	19.5	Yes
4	43	May 5 – June 16	20.5	Yes
5	63	Sept 29 – Nov 11	30.0	Yes
6	5	Aug 5 – Aug 9	2.4	No
7	26	July 30 – Aug 24	12.4	Yes
8	25	July 30 – Aug 23	11.9	No
9	1	-	0.5	No
10	1	-	0.5	No
11	8	Aug 5 – Aug 12	3.8	No
12	24	July 30 – Aug 22	11.4	No
13	25	July 30 – Aug 23	11.9	No
14	50	May 5 – June 23	23.8	Yes
15	63	Sept 29 – Nov 30	30.0	Yes
16	25	July 30 – Aug 23	11.9	No
17	1	-	0.5	No
Ref	50	May 5 – June 23	23.8	Yes

*Includes only normal conditions and drier than normal conditions according to the Antecedent Precipitation Tool (APT)

*Percentages were calculated only from available data collected during the growing season, May 5, 2023 – November 30, 2023

*Observed growing season from February 1, 2023 – November 30, 2023. Hydrology success criteria measured from May 5, 2023 – November 30, 2023

*Reference gauge data was affected by beavers in MY01 and is being relocated.

*Reference Gauge data was only collected from April 25 to August 8, prior to beaver impacts.

4.2.2 Bankfull Events

Bankfull events were monitored throughout 2023. Cool Run (S1) experienced three separate bankfull events throughout the year: one event in April, one in August, and one in September. The longest event occurred from August 30 to September 3 for a total of 5 consecutive days. UT1 (S2) experienced the most bankfull events throughout 2023 accumulating a total of 7 events. Bankfull events were more frequent and prolonged in September compared to other months. UT1 (S2) longest event occurred from August 30 to September 2. The bankfull events during August 30 to September 3 were a result of Hurricane Idalia. The UT1 (S2) maintained flow for the entire monitoring period, April 25 through November 30. Cool Run (S1) maintained flow for 190 consecutive days, April 25 to November 1. A brief dry period occurred between November 2 to November 11, 9 days. Flow resumed after November 11. Please refer to Table 6 for a summary of bankfull monitoring.

Table 6. Summary of Year 1 Bankfull Event Monitoring (2023)

Gauge Number	Total Number of Bankfull Events	Longest Number of Consecutive Days During Bankfull Event	Dates of Bankfull Events (2023)	3-Day Antecedent Rainfall (Inches)
S1 (Cool Run)	3	5	April 30	0.32
			Aug 4 – 5	0.56
			Aug 30 – Sept 3	2.75
S2 (UT1)	7	4	April 30	0.32
			July 6	0.48
			Aug 4 – 5	0.56
			Aug 30 – Sept 2	2.75
			Sept 13	0.18
			Sept 23	0.01
Nov 22	0.94			

Table 7. Summary of Year 1 Stream Flow (2023)

Gauge Number	Longest Number of Consecutive Days with Flow	Dates of Longest Number of Consecutive Days with Flow	Percentage of Analysis Period (MY1)
S1 (Cool Run)	190	April 25 – October 31	87%
S2 (UT1)	219	April 25 – November 30	100%

*Percentages were calculated only from available data collected during the growing season, April 25, 2023 – November 30, 2023

*Observed growing season from February 1, 2023 – November 30, 2023. Hydrology success criteria measured from April 25, 2023

4.3 Vegetative Assessment

The MY1 vegetative survey was completed on October 11 and 13, 2023. Vegetation monitoring resulted in a sitewide stem density average of 540 planted stems per acre, above the interim requirement of 320 stems per acre required at MY3. An average of 4 species was documented throughout the site. All 14 fixed vegetation plots and 3 random plots met the interim success criteria. Plot 11 averaged 324 stems per acre. Although they currently meet the designated success criteria, future supplemental planting may be required in this area. Sweet gum thinning occurred throughout MY1. Herbicide was applied throughout the site on October 13. Additional hack and squirt efforts were conducted throughout the year on larger Sweet Gum trees from the drop structure to UT1. Species count ranged from three to seven species per plot. Plots 1, 7, 9, and 13 possessed the lowest species count with three documented species while Plot 6 possessed the most with seven documented species. Overall, planting zone 1 and planting zone 2 had an average species count of four species. Please refer to Appendix A for Vegetation Plot Photographs and the Vegetation Condition Assessment Table, and Appendix B for Vegetation Plot Data.

4.4 Growing Season Determination

Growing season metrics for MY01 utilized the date range May 5th through November 30th due to the construction completion date of April 6, 2023 and installation of monitoring devices. Photographic documentation of incomplete abscission and suitable soil temperatures were documented to support this claim. Soil temperatures distinguishing the growing season are temperatures at 12 inches in depth and equal to 41° Fahrenheit as defined by the Regional Supplement provided by the Corps of Engineers. Soil temperatures documented throughout the year never fell below 55.9° Fahrenheit. The lowest temperature occurred on November 30th. Growing season will continue to be monitored in Year 2. Collected data will capture soil temperature and bud burst to support claims distinguishing the beginning of the growing season. Dates agreed upon for the MY02 growing season will be the definitive growing season parameters for the remainder of monitoring. Please refer to Appendix A for photo documentation of deciduous tree leaf retention and Appendix D for soil temperature.

4.5 Monitoring Year 1 Summary

In summary, the site stream banks have remained stable and are performing as intended. However, the stream channels have experienced aggradation over the monitoring period, attributed to a hurricane event that moved through the area in August 2023. Most wells throughout the site documented successful wetland hydrology or narrowly missed the success criteria. By capturing the entire growing season in future monitoring years, successful wetland hydrology for all gauges may be met. Stream flow was present in Cool Run for 190 days and UT1 for 219 days. In addition, multiple bankfull events were captured in both reaches. The site averaged 519 stems per acre, on track for the defined 320 stems per acre necessary for success in Year 3. All plots maintained an average greater than 320 stems per acre. However, Plots 3 and

11 may need future supplementation to ensure their current average, 324 stems per acre, continues to meet success criteria.

5.0 REFERENCES

- Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.
- North Carolina Division of Mitigation Services (NCDMS). 2014. Stream and Wetland Mitigation Monitoring Guidelines. North Carolina Department of Environmental Quality, Raleigh, North Carolina.
- North Carolina Stream Functional Assessment Team. (NC SFAT 2015). N.C. Stream Assessment Method (NC SAM) User Manual. Version 2.1.
- North Carolina Wetland Functional Assessment Team. (NC WFAT 2010). N.C. Wetland Assessment Method (NC WAM) User Manual. Version 4.1.

APPENDIX A

Visual Assessment Data

Figure 1. Current Conditions Plan View
Tables 8A-B. Stream Visual Stability
Assessment Table 9. Visual Vegetation
Assessment Vegetation Plot Photographs
Permanent Photo Points
Growing Season Documentation Photos

Project Segment	As-Built Footage/Acreage	Mitigation Ratio	Mitigation Credits
Stream			
Cool Run Upstream 1	603	1.5	394.667
Cool Run Upstream 2	406	1	427
Cool Run Downstream	1008	1	1000
UT1	610	1	601
		Total:	2,442.67
Wetland			
Wetland Reestablish	14.108	1	14.108
Wetland Rehabilitation	1.433	1.5	0.955
Wetland Enhancement	1.201	3	0.4
Wetland Preservation	0.492	10	0.049
		Total:	15.512

DAVEY 
Resource Group
 3805 Wrightsville Avenue
 Wilmington, NC 28403
 (910) 452-0001

Prepared for:
**CLEARWATER
 MITIGATION
 SOLUTIONS**

Project:
**COOL RUN
 MITIGATION SITE**

Brunswick County, NC

Title:
**Current Conditions
 Plan View Map
 (MY1)**

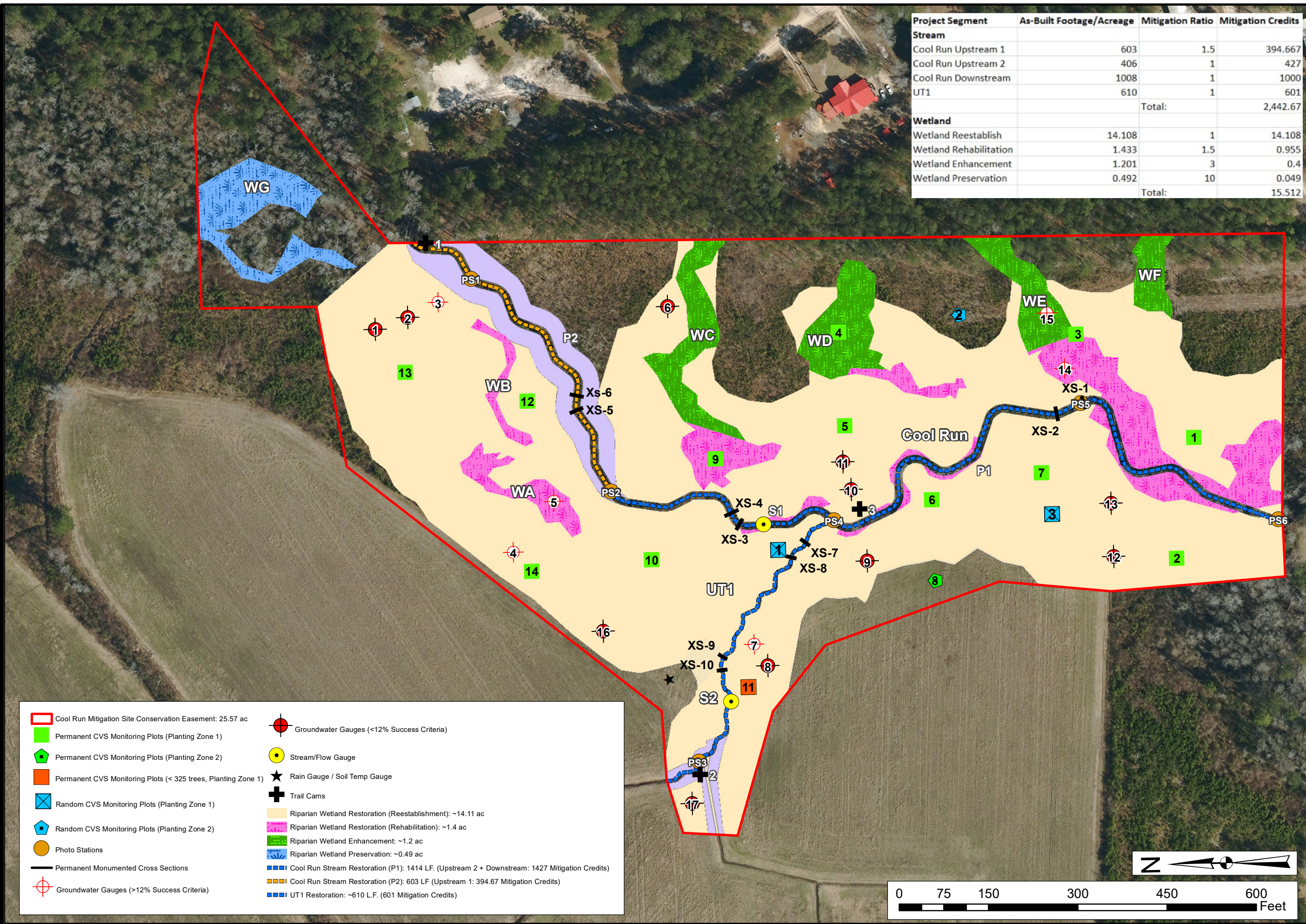
Drawn by:
 WAF/SH

Date:
 11/7/2023

Scale:
 1:1800

Project No.:
 DRGNCW20.248

**FIGURE
 1**



Cool Run Mitigation Site Conservation Easement: 25.57 ac	Groundwater Gauges (<12% Success Criteria)
Permanent CVS Monitoring Plots (Planting Zone 1)	Stream/Flow Gauge
Permanent CVS Monitoring Plots (Planting Zone 2)	Rain Gauge / Soil Temp Gauge
Permanent CVS Monitoring Plots (< 325 trees, Planting Zone 1)	Trail Cams
Random CVS Monitoring Plots (Planting Zone 1)	Riparian Wetland Restoration (Reestablishment): ~14.11 ac
Random CVS Monitoring Plots (Planting Zone 2)	Riparian Wetland Restoration (Rehabilitation): ~1.4 ac
Photo Stations	Riparian Wetland Enhancement: ~1.2 ac
Permanent Monumented Cross Sections	Riparian Wetland Preservation: ~0.49 ac
Groundwater Gauges (>12% Success Criteria)	Cool Run Stream Restoration (P1): 1414 LF. (Upstream 2 + Downstream: 1427 Mitigation Credits)
	Cool Run Stream Restoration (P2): 603 LF. (Upstream 1: 394.67 Mitigation Credits)
	UT1 Restoration: ~610 L.F. (601 Mitigation Credits)

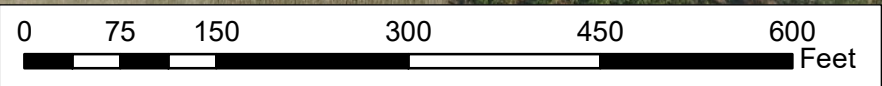


Table 8A. Visual Stream Stability Assessment

Reach Cool Run

Assessed Stream Length 2,019

Assessed Bank Length 4,038

Date Assessed 10/13/2023

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	Surface Scour/Bare Bank	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6		100%
	Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in DMS monitoring guidance document)	6	6		100%

Table 8B. Visual Stream Stability Assessment

Reach UT1
 Assessed Stream Length 601
 Assessed Bank Length 1,202
 Date Assessed 10/13/2023

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	Surface Scour/Bare Bank	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	13	13		100%
	Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in DMS monitoring guidance document)	13	13		100%

Table 9. Visual Vegetation Assessment

Planted acreage 22.71

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

Easement Acreage 31.7

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

APPENDIX A. VEG PLOT PHOTOS (MY1 2023)



(1) Plot 1



(2) Plot 2



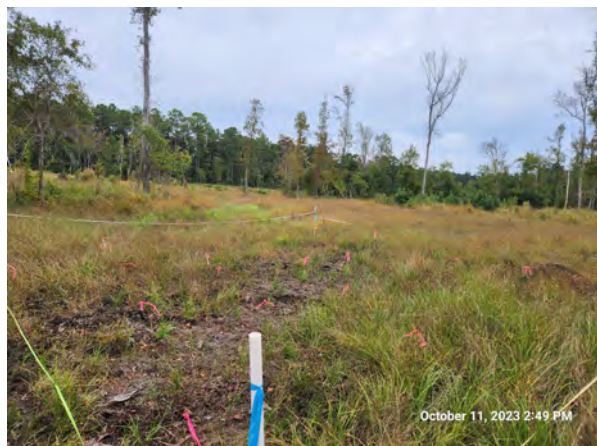
(3) Plot 3



(4) Plot 4



(5) Plot 5



(6) Plot 6

APPENDIX A. VEG PLOT PHOTOS (MY1 2023)



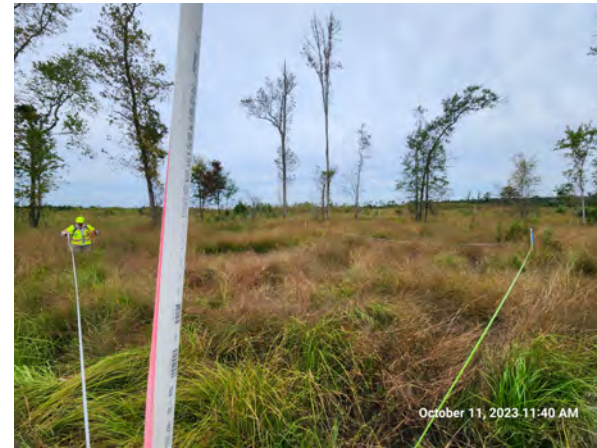
(7) Plot 7



(8) Plot 8



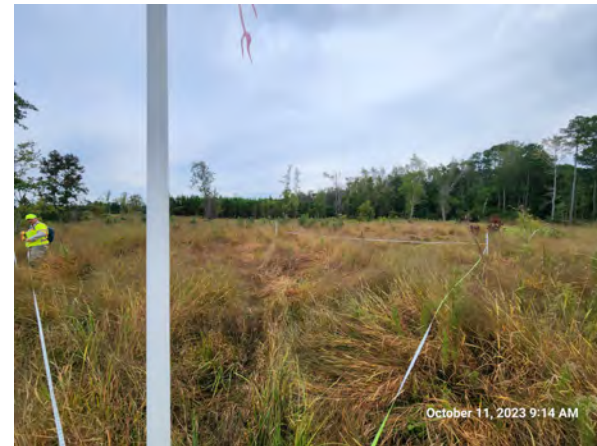
(9) Plot 9



(10) Plot 10



(11) Plot 11



(12) Plot 12

APPENDIX A. VEG PLOT PHOTOS (MY1 2023)



(13) Plot 13



(14) Plot 14

APPENDIX A. SITE PHOTOS – EXISTING CONDITIONS (MY1 – 2023)



(1) PS1 (looking southwest - downstream)



(2) PS1 (looking northeast towards CE boundary)



(3) PS2 (looking northeast along Cool Run)



(4) PS2 (looking west along Cool Run)



(5) PS3 (looking east along UT1)



(6) PS3 (looking west towards CE Boundary)

APPENDIX A. SITE PHOTOS – EXISTING CONDITIONS (MY1 – 2023)



(7) PS4 (looking south at confluence Of Cool Run and UT1)



(8) PS4 (looking northwest)



(9) PS5 (looking south)



(10) PS5 (looking northwest)



(11) PS6 (looking north)



(12) PS6 (looking south towards CE Boundary)

APPENDIX A. Foliage PHOTOS (MY1 2023)



*Photos were captured November 8, 2023 in Brunswick County

APPENDIX A. Foliage PHOTOS (MY1 2023)



* Photos were captured November 28, 2023 in Brunswick County

Appendix B Vegetation Data

Table 10A. Planted Bare-Root Woody Vegetation

Table 10B. Permanent Seed Mix

Table 11. Vegetation Plot Counts and Densities

Table 12A-D. Vegetation Plot Data Table from Vegetation Data
Entry Tool

**Table 10A. Planted Bare Root Woody Vegetation
Cool Run Stream and Riparian Wetland Mitigation**

Vegetation Association	Wetland Indicator Status	Coastal Plain Small Stream Swamp* (Zone 1)		Coastal Plain Small Stream Swamp* (Zone 2)		Stream-side Assemblage**		TOTAL
Area (acres)		15.48		5.10		2.13		22.71
Species		# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
Tag alder (<i>Alnus serrulata</i>)	FACW		--		--	515	20	515
Black willow (<i>Salix nigra</i>)***	OBL		--		--	515	20	515
Ironwood (<i>Carpinus caroliniana</i>)	FAC	526	5		--	260	10	786
River birch (<i>Betula nigra</i>)	FACW		--	350	10	260	10	610
Silky dogwood (<i>Cornus amomum</i>)***	FACW		--		--	515	20	515
Atlantic white cedar (<i>Chamaecyparis thyoides</i>)	FACW		--	350	10		--	350
Sycamore (<i>Platanus occidentalis</i>)	FACW		--	695	20		--	695
Bald cypress (<i>Taxodium distichum</i>)	OBL	2,632	25		--	515	20	3,147
Swamp chestnut oak (<i>Quercus michauxii</i>)	FACW	1,580	15	695	20		--	2,275
Swamp tupelo (<i>Nyssa biflora</i>)	OBL	2,105	20		--		--	2,105
Laurel oak (<i>Quercus laurifolia</i>)	FACW	2,105	20	695	20		--	2,800
Overcup oak (<i>Quercus lyrata</i>)	OBL	1,055	10		--		--	1,055
American elm (<i>Ulmus americana</i>)	FAC		--	350	10		--	350
Water oak (<i>Quercus nigra</i>)	FACW	526	5	350	10		--	876
TOTAL		10,529	100	3,485	100	2,580	100	16,594

* Planted at a density of 680 stems/acre.

** Planted at a density of 1210 stems/acre.

*** Live Stake

**Table 10B. Permanent Seed Mix
Cool Run Stream and Riparian Wetland Mitigation Site**

March 1 – October 31						
Species	Common Name	Wetland Indicator Status	Unit Type	Stratum	% of Total	lbs per Acre
<i>Carex vulpinoidea</i>	Fox sedge	FACW	S	Herb	15	35
<i>Andropogon gerardii</i>	Big bluestem	FAC	S	Herb	15	35
<i>Elymus virgatum</i>	Virginia wildrye	FAC	S	Herb	15	35
<i>Panicum virgatum</i>	Switchgrass	FAC	S	Herb	15	35
<i>Juncus effusus</i>	Soft rush	OBL	S	Herb	20	35
<i>Dichanthelium clandestinum</i>	Deertongue	FACW	S	Herb	20	35
				Total	100	

**Table 11. Planted Vegetation Totals
Cool Run Stream and Riparian Wetland Mitigation Site**

Plot #	Planted Stems/Acre	Success Criteria Met?
1	405	Yes
2	486	Yes
3	445	Yes
4	567	Yes
5	486	Yes
6	850	Yes
7	607	Yes
8	607	Yes
9	607	Yes
10	445	Yes
11	324	Yes
12	445	Yes
13	607	Yes
14	728	Yes
Random Plot (R1)	526	Yes
Random Plot (R2)	607	Yes
Random Plot (R3)	445	Yes
Average Planted Stems/Acre	540	Yes

Table 12A

Planted Acreage	22.71
Date of Initial Plant	2023-04-20
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	NA
Date of Current Survey	2023-10-11
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Alnus serrulata</i>	hazel alder	Tree	FACW										
	<i>Betula nigra</i>	river birch	Tree	FACW										
	<i>Carpinus caroliniana</i>	American hornbeam	Tree	FAC			1	1						
	<i>Chamaecyparis thyoides</i>	Atlantic white cedar	Tree	OBL							3	3		
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW										
	<i>Nyssa aquatica</i>	water tupelo	Tree	OBL										
	<i>Nyssa biflora</i>	swamp tupelo	Tree	OBL			2	2	1	1	2	2		
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW										
	<i>Quercus laurifolia</i>	laurel oak	Tree	FACW	3	3	5	5	1	1	4	4	6	6
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW	4	4	1	1	1	1	2	2	1	1
	<i>Quercus nigra</i>	water oak	Tree	FAC									1	1
<i>Salix nigra</i>	black willow	Tree	OBL											
<i>Taxodium distichum</i>	bald cypress	Tree	OBL	3	3	3	3	8	8	3	3	4	4	
Sum	Performance Standard				10	10	12	12	11	11	14	14	12	12
Mitigation Plan Performance Standard	Current Year Stem Count					10		12		11		14		12
	Stems/Acre					405		486		445		567		486
	Species Count					3		5		4		5		4
	Dominant Species Composition (%)					40		42		73		29		50
	Average Plot Height (ft.)					2		26		16		2		2
	% Invasives					0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					10		12		11		14		12
	Stems/Acre					405		486		445		567		486
	Species Count					3		5		4		5		4
	Dominant Species Composition (%)					40		42		73		29		50
	Average Plot Height (ft.)					2		26		16		2		2
	% Invasives					0		0		0		0		0

- 1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
- 2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
- 3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 12B

Planted Acreage	22.71
Date of Initial Plant	2023-04-20
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	NA
Date of Current Survey	2023-10-11
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 6 F		Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Alnus serrulata</i>	hazel alder	Tree	FACW	6	6								
	<i>Betula nigra</i>	river birch	Tree	FACW	1	1								
	<i>Carpinus caroliniana</i>	American hornbeam	Tree	FAC										
	<i>Chamaecyparis thyoides</i>	Atlantic white cedar	Tree	OBL					4	4				
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW	4	4								
	<i>Nyssa aquatica</i>	water tupelo	Tree	OBL										
	<i>Nyssa biflora</i>	swamp tupelo	Tree	OBL	4	4	4	4			7	7	1	1
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW					1	1			1	1
	<i>Quercus laurifolia</i>	laurel oak	Tree	FACW	1	1	2	2	4	4	4	4	5	5
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW					6	6				
	<i>Quercus nigra</i>	water oak	Tree	FAC										
<i>Salix nigra</i>	black willow	Tree	OBL	3	3									
<i>Taxodium distichum</i>	bald cypress	Tree	OBL	2	2	9	9			4	4	4	4	
Sum	Performance Standard				21	21	15	15	15	15	15	15	11	11
Mitigation Plan Performance Standard	Current Year Stem Count					21		15		15		15		11
	Stems/Acre					850		607		607		607		445
	Species Count					7		3		4		3		4
	Dominant Species Composition (%)					29		60		40		47		45
	Average Plot Height (ft.)					2		2		2		2		2
	% Invasives					0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					21		15		15		15		11
	Stems/Acre					850		607		607		607		445
	Species Count					7		3		4		3		4
	Dominant Species Composition (%)					29		60		40		47		45
	Average Plot Height (ft.)					2		2		2		2		2
	% Invasives					0		0		0		0		0

- 1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
- 2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded), species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
- 3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 12C

Planted Acreage	22.71
Date of Initial Plant	2023-04-20
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	NA
Date of Current Survey	2023-10-11
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 11 F		Veg Plot 12 F		Veg Plot 13 F		Veg Plot 14 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Alnus serrulata</i>	hazel alder	Tree	FACW								
	<i>Betula nigra</i>	river birch	Tree	FACW								
	<i>Carpinus caroliniana</i>	American hornbeam	Tree	FAC	2	2						
	<i>Chamaecyparis thyoides</i>	Atlantic white cedar	Tree	OBL								
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW								
	<i>Nyssa aquatica</i>	water tupelo	Tree	OBL								
	<i>Nyssa biflora</i>	swamp tupelo	Tree	OBL	2	2	5	5			1	1
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW								
	<i>Quercus laurifolia</i>	laurel oak	Tree	FACW	3	3	4	4	6	6	1	1
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW			1	1	3	3	6	6
	<i>Quercus nigra</i>	water oak	Tree	FAC								
<i>Salix nigra</i>	black willow	Tree	OBL									
<i>Taxodium distichum</i>	bald cypress	Tree	OBL	1	1	1	1	6	6	10	10	
Sum	Performance Standard				8	8	11	11	15	15	18	18
Mitigation Plan Performance Standard	Current Year Stem Count					8		11		15		18
	Stems/Acre					324		445		607		728
	Species Count					4		4		3		4
	Dominant Species Composition (%)					38		45		40		56
	Average Plot Height (ft.)					2		2		2		2
	% Invasives					0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					8		11		15		18
	Stems/Acre					324		445		607		728
	Species Count					4		4		3		4
	Dominant Species Composition (%)					38		45		40		56
	Average Plot Height (ft.)					2		2		2		2
	% Invasives					0		0		0		0

- 1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
- 2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded), species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
- 3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 12D

Planted Acreage	22.71
Date of Initial Plant	2023-04-20
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	NA
Date of Current Survey	2023-10-11
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 R	Veg Plot 2 R	Veg Plot 3 R
					Total	Total	Total
Species Included in Approved Mitigation Plan	<i>Alnus serrulata</i>	hazel alder	Tree	FACW	7		
	<i>Betula nigra</i>	river birch	Tree	FACW			
	<i>Carpinus caroliniana</i>	American hornbeam	Tree	FAC			
	<i>Chamaecyparis thyoides</i>	Atlantic white cedar	Tree	OBL		3	
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW			
	<i>Nyssa aquatica</i>	water tupelo	Tree	OBL			1
	<i>Nyssa biflora</i>	swamp tupelo	Tree	OBL	1		1
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW			
	<i>Quercus laurifolia</i>	laurel oak	Tree	FACW		8	2
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW		4	1
	<i>Quercus nigra</i>	water oak	Tree	FAC			
	<i>Salix nigra</i>	black willow	Tree	OBL			
<i>Taxodium distichum</i>	bald cypress	Tree	OBL	5		6	
Sum	Performance Standard				13	15	11
Mitigation Plan Performance Standard	Current Year Stem Count				13	15	11
	Stems/Acre				526	607	445
	Species Count				3	3	5
	Dominant Species Composition (%)				54	53	55
	Average Plot Height (ft.)				2	2	2
	% Invasives				0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count				13	15	11
	Stems/Acre				526	607	445
	Species Count				3	3	5
	Dominant Species Composition (%)				54	53	55
	Average Plot Height (ft.)				2	2	2
	% Invasives				0	0	0

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

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

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

Appendix C

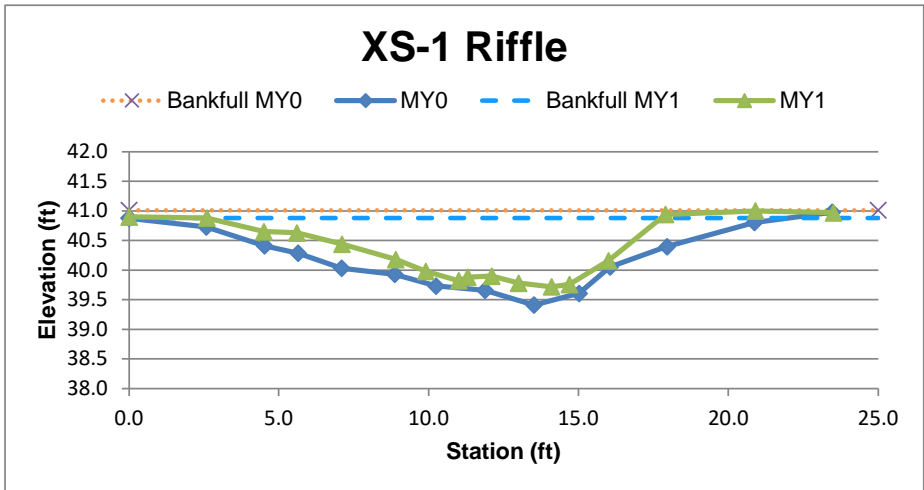
Stream Geomorphology Data

Cross-Sections with Annual Overlays

Table 13. Baseline Stream Data Summary Tables

Table 14A-B. Cross-Section Morphology Monitoring Summary

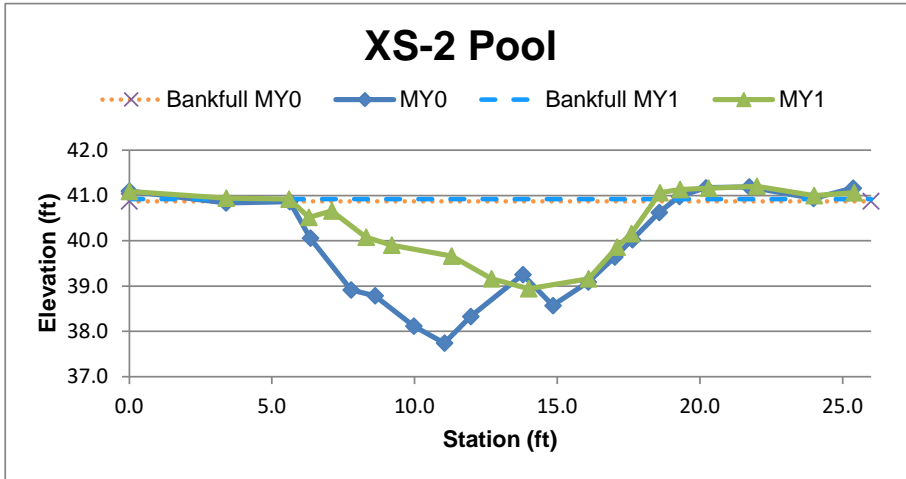
River Basin	Lumber River Basin
Watershed	3040207
XS ID	Cool Run, XS1, Pool
Feature	Riffle
Date	10/13/2023
Field Crew	TMW & WF



Dimensions	Cross Section 1 (Pool)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	40.73	41.01	--	--		
Bank Height Ratio	1.00	0.90	--	--		
Thalweg Elevation	39.41	39.72				
Low Top Of Bank Elevation	40.73	40.88				
Low Top of Bank Max Depth (ft)	1.32	1.16				
Low Top Of Bank Cross Sectional Area (ft ²)	11.89	9.70				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

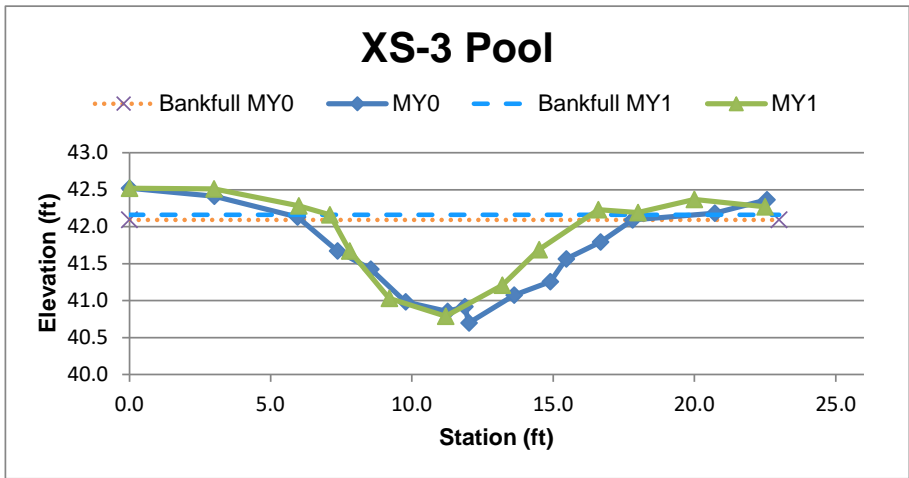
River Basin	Lumber River Basin
Watershed	03040207
XS ID	Cool Run, XS2, Riffle
Feature	Pool
Date	10/13/2023
Field Crew	TMW & WF



Dimensions	Cross Section 1 (Riffle)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	--	--	--	--		
Bank Height Ratio	--	--	--	--		
Thalweg Elevation	37.74	38.94				
Low Top Of Bank Elevation	40.87	40.92				
Low Top of Bank Max Depth (ft)	3.13	1.93				
Low Top Of Bank Cross Sectional Area (ft ²)	24.00	14.33				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

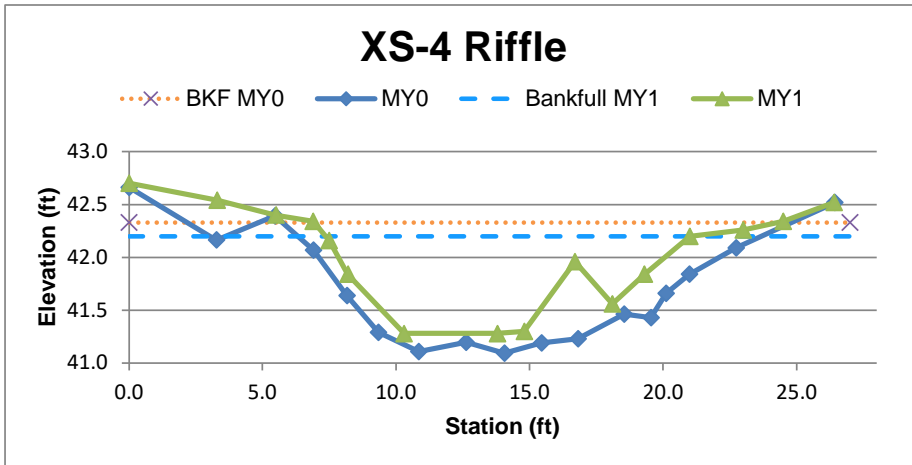
River Basin	Lumber River Basin
Watershed	03040207
XS ID	Cool Run, XS3, Pool
Feature	Pool
Date	10/13/2023
Field Crew	TMW & WF



Dimensions	Cross Section 1 (Riffle)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	--	--	--	--		
Bank Height Ratio	--	--	--	--		
Thalweg Elevation	40.70	40.79				
Low Top Of Bank Elevation	42.09	42.16				
Low Top of Bank Max Depth (ft)	1.39	1.37				
Low Top Of Bank Cross Sectional Area (ft ²)	8.80	7.48				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

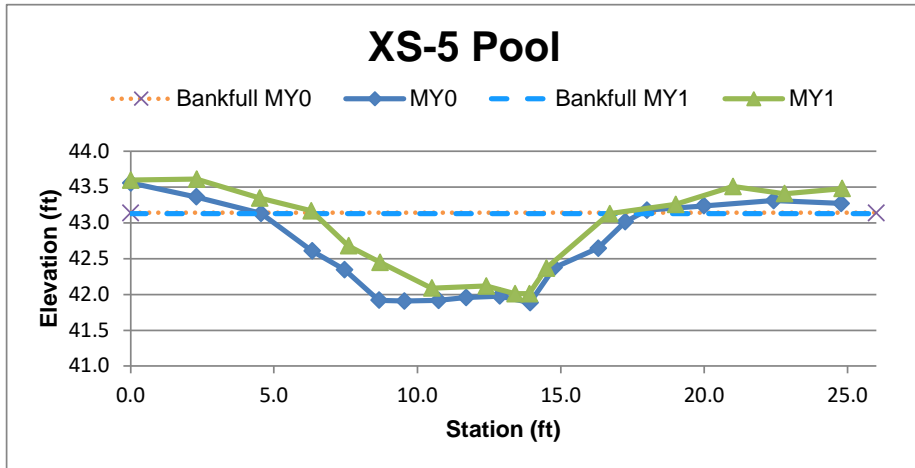
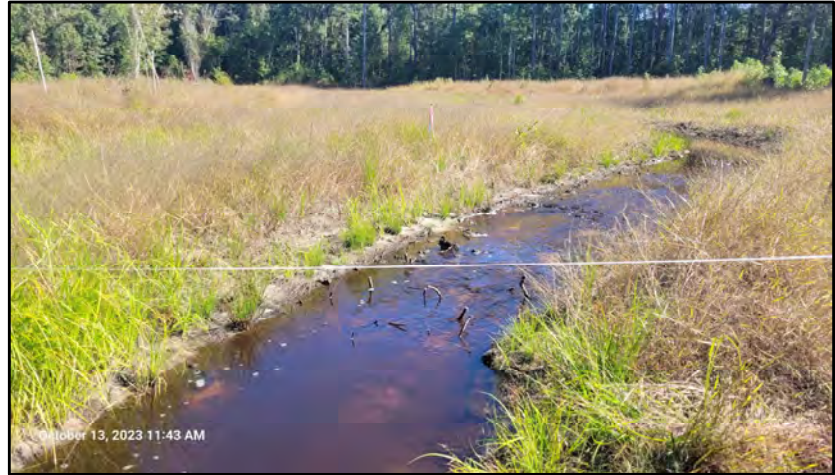
River Basin	Lumber River Basin
Watershed	03040207
XS ID	Cool Run, XS4, Riffle
Feature	Riffle
Date	10/13/2023
Field Crew	TMW & WF



Dimensions	Cross Section 1 (Riffle)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	42.07	42.33	--	--		
Bank Height Ratio	1.00	0.88	--	--		
Thalweg Elevation	41.10	41.28				
Low Top Of Bank Elevation	42.07	42.20				
Low Top of Bank Max Depth (ft)	0.97	0.92				
Low Top Of Bank Cross Sectional Area (ft ²)	10.30	8.22				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

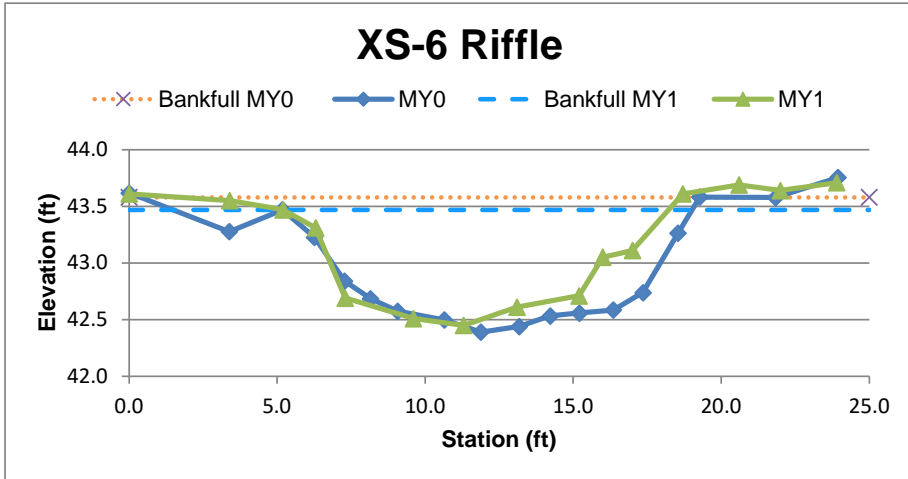
River Basin	Lumber River Basin
Watershed	03040207
XS ID	Cool Run, XS5, Pool
Feature	Pool
Date	10/13/2023
Field Crew	TMW & WF



Dimensions	Cross Section 1 (Riffle)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	--	--	--	--		
Bank Height Ratio	--	--	--	--		
Thalweg Elevation	41.88	42.01				
Low Top Of Bank Elevation	43.14	43.13				
Low Top of Bank Max Depth (ft)	1.26	1.12				
Low Top Of Bank Cross Sectional Area (ft ²)	10.90	7.41				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

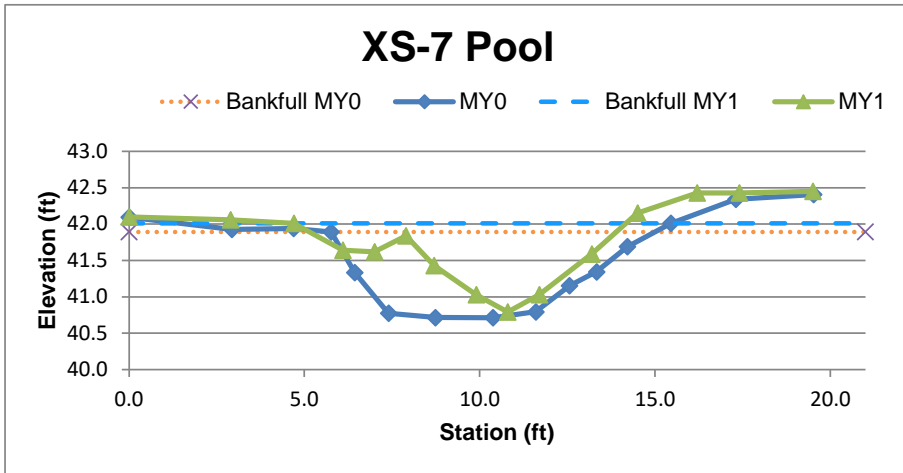
River Basin	Lumber River Basin
Watershed	03040207
XS ID	Cool Run, XS6, Riffle
Feature	Riffle
Date	10/13/2023
Field Crew	TMW & WF



Dimensions	Cross Section 1 (Riffle)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	43.47	43.58	--	--		
Bank Height Ratio	1.00	0.90	--	--		
Thalweg Elevation	42.39	42.45				
Low Top Of Bank Elevation	43.47	43.47				
Low Top of Bank Max Depth (ft)	1.08	1.02				
Low Top Of Bank Cross Sectional Area (ft ²)	10.40	8.72				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

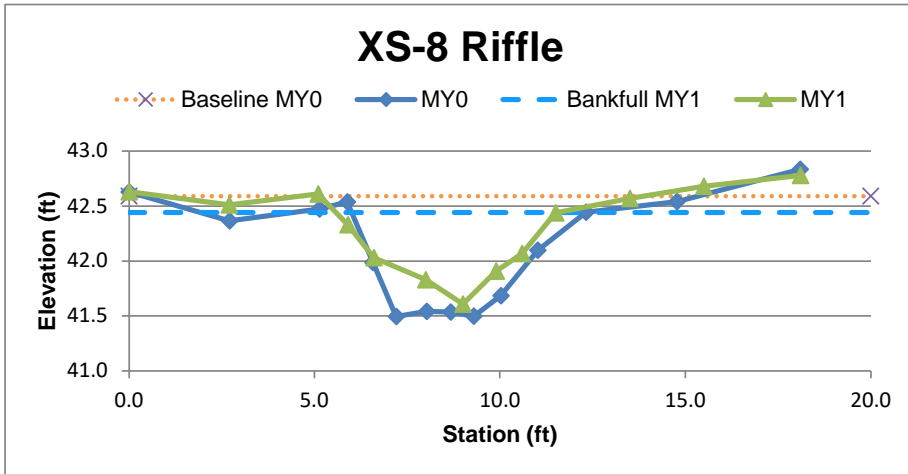
River Basin	Lumber River Basin
Watershed	03040207
XS ID	UT1, XS7, Pool
Feature	Pool
Date	10/13/2023
Field Crew	TMW &WF



Dimensions	Cross Section 1 (Riffle)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	--	--		--		
Bank Height Ratio	--	--	--	--		
Thalweg Elevation	40.71	40.79				
Low Top Of Bank Elevation	41.89	42.01				
Low Top of Bank Max Depth (ft)	1.18	1.22				
Low Top Of Bank Cross Sectional Area (ft ²)	7.70	5.32				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

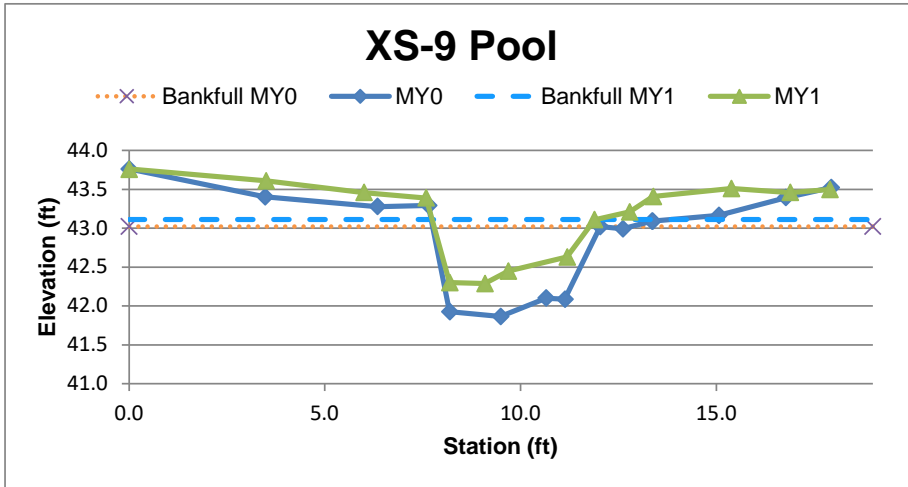
River Basin	Lumber River Basin
Watershed	03040207
XS ID	UT1, XS8, Riffle
Feature	Riffle
Date	10/13/2023
Field Crew	TMW & WF



Dimensions	Cross Section 1 (Riffle)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	42.44	42.59	--	--		
Bank Height Ratio	1.00	0.85	--	--		
Thalweg Elevation	41.49	41.61				
Low Top Of Bank Elevation	42.44	42.44				
Low Top of Bank Max Depth (ft)	0.95	0.83				
Low Top Of Bank Cross Sectional Area (ft ²)	3.90	2.73				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

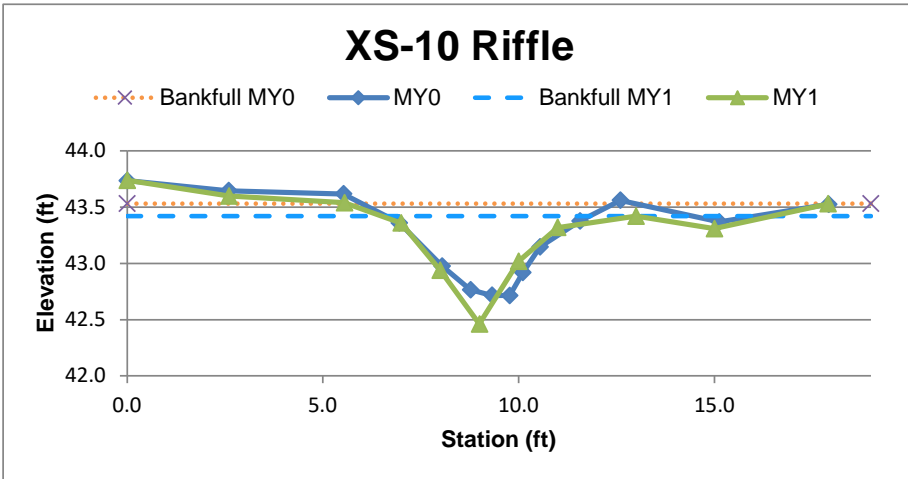
River Basin	Lumber River Basin
Watershed	03040207
XS ID	UT1, XS9, Pool
Feature	Pool
Date	45212
Field Crew	TMW & WF



Dimensions	Cross Section 1 (Riffle)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	--	--	--	--		
Bank Height Ratio	--	--	--	--		
Thalweg Elevation	41.86	42.29				
Low Top Of Bank Elevation	43.02	43.11				
Low Top of Bank Max Depth (ft)	1.16	0.82				
Low Top Of Bank Cross Sectional Area (ft ²)	3.80	2.02				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

River Basin	Lumber River Basin
Watershed	03040207
XS ID	UT1, XS10, Riffle
Feature	Riffle
Date	10/13/2023
Field Crew	TMW & WF



Dimensions	Cross Section 1 (Riffle)					
	Base	MY1	MY2	MY3	MY4	MY5
Bankfull Elevation (ft) - Based on As Built-Bankfull Area	43.56	43.53	--	--		
Bank Height Ratio	1.00	0.90	--	--		
Thalweg Elevation	42.72	42.46				
Low Top Of Bank Elevation	43.56	43.42				
Low Top of Bank Max Depth (ft)	0.84	0.96				
Low Top Of Bank Cross Sectional Area (ft ²)	2.80	2.03				

Bankfull elevation adjusted to current monitoring year's low top of bank elevation

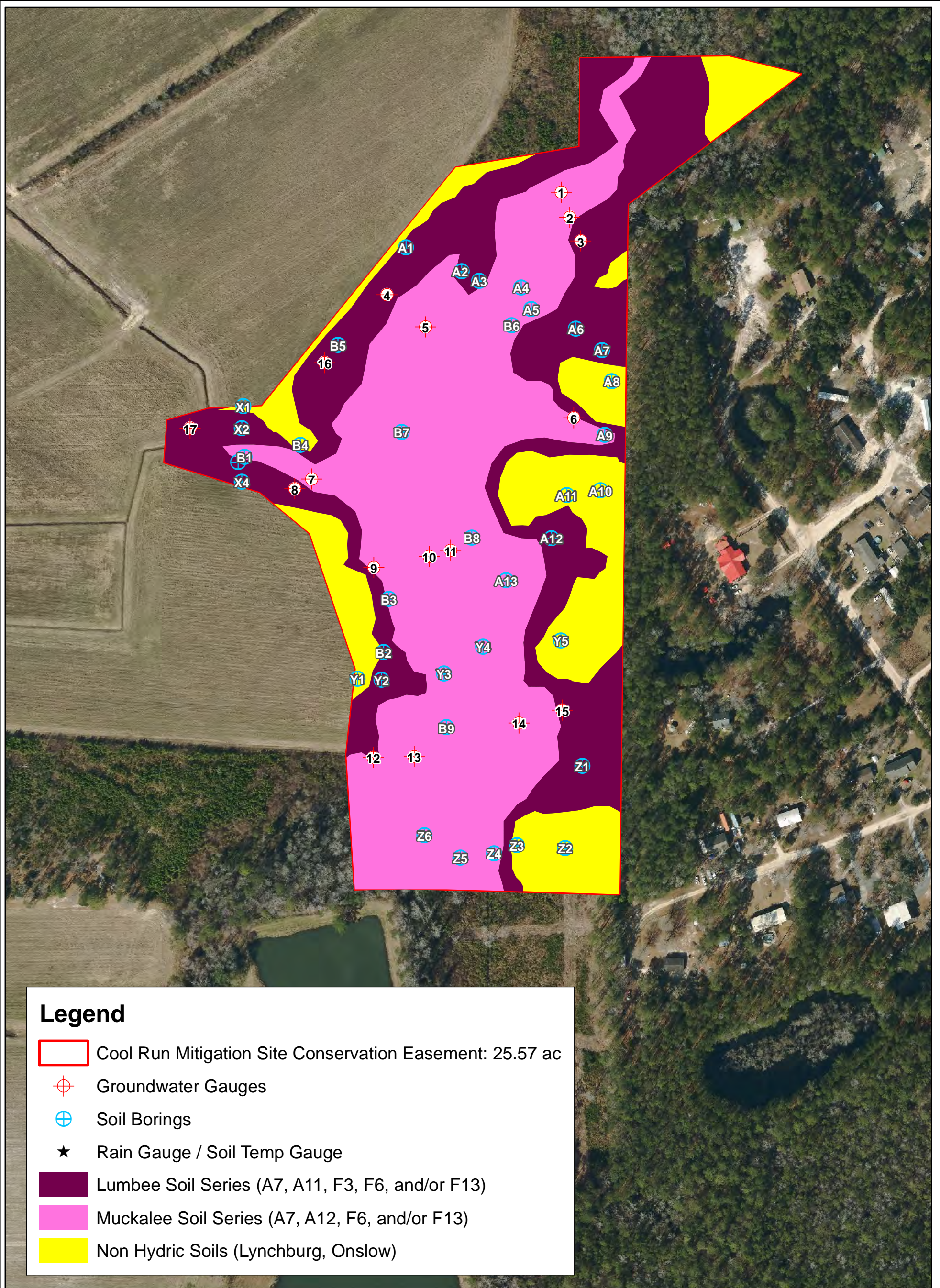
Table 13. Monitoring Year 1 Stream Data Summary

Cool Run - Cool Run / DMS: 100142 - Cool Run Upstream, UT 1													
Cool Run Upstream													
Parameter	Pre-Existing Condition (applicable)					Design		Monitoring Baseline (MY0)			Monitoring (MY1)		
	Min	Mean	Med	Max	n	Min	Max	Min	Max		Min	Max	n
Riffle Only													
Bankfull Width (ft)	6.10	7.00		7.80		13.40	14.80	13.80	19.90		13.05	15.15	
Floodprone Width (ft)	11.00	12.00		12.00		50.00	150.00	100.00	100.00		100.00	100.00	
Bankfull Mean Depth (ft)	1.40	1.60		1.70		0.70	0.80	0.80	0.80		0.60	0.67	
Bankfull Max Depth (ft)	1.80	1.90		2.00		0.90	1.20	1.10	1.30		0.92	1.16	
Bankfull Cross Sectional Area (ft ²)	10.50	10.50		10.50		10.50	10.50	10.40	16.10		8.22	9.70	
Width/Depth Ratio	3.60	4.60		5.60		12.00	16.00	18.30	24.60		19.43	23.67	
Entrenchment Ratio	1.50	1.70		1.80		3.70	10.10	5.64	7.20		6.60	7.68	
Bank Height Ratio	1.80	1.80		1.90		1.00	1.10	1.00	1.30		0.85	0.90	
Max part size (mm) mobilized at bankfull													
Rosgen Classification	E/G 5					C5		C5			C5		
Bankfull Discharge (cfs)	9.9					9.9		9.9			9.9		
Sinuosity (ft)	1.04					1.3		1.3			1.3		
Water Surface Slope (Channel) (ft/ft)	0.0025					0.002		0.002			0.002		
UT1													
Parameter	Pre-Existing Condition (applicable)					Design		Monitoring Baseline (MY0)			Monitoring (MY1)		
	Min	Mean	Med	Max	n	Min	Max	Min	Max	n	Min	Max	n
Riffle Only													
Bankfull Width (ft)	3.1	3.2		3.9		5.40	6.20	6.30	6.80		5.91	6.49	
Floodprone Width (ft)	5.00	6.00		9.00		25.00	75.00	50.00	50.00		50.00	50.00	
Bankfull Mean Depth (ft)	0.6	0.8		0.8		0.4	0.4	0.40	0.60		0.31	0.46	
Bankfull Max Depth (ft)	0.8	1.1		1.2		0.50	0.70	0.80	0.90		0.83	0.96	
Bankfull Cross Sectional Area (ft ²)	2.4	2.4		2.4		2.40	2.40	2.80	3.90		2.03	2.73	
Width/Depth Ratio	3.9	4.3		6.5		12.00	16.00	10.30	16.60		12.85	20.94	
Entrenchment Ratio	1.3	1.9		2.7		4.70	12.10	7.40	7.90		7.70	8.45	
Bank Height Ratio	2.90	3.90		4.30		1.00	1.30	0.80	0.90		0.88	0.90	
Max part size (mm) mobilized at bankfull													
Rosgen Classification	Eg 5					C5		C5			C5		
Bankfull Discharge (cfs)	2.2					2.2		2.2			2.2		
Sinuosity (ft)	1.02					1.2		1.2			1.2		
Water Surface Slope (Channel) (ft/ft)	0.0101					0.0086		0.0086			0.0086		

Appendix D
Hydrologic Data
Groundwater Gauges & Soil Profiles

Figure 2. Soil Borings and Groundwater Gauges
Soil Profiles

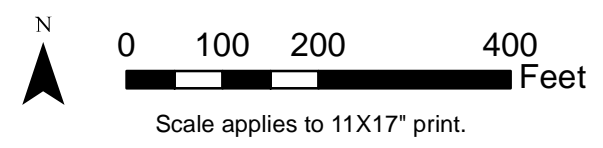
Table 15. Groundwater Gauge Elevations and Soil Types
Hydrographs



Legend

- Cool Run Mitigation Site Conservation Easement: 25.57 ac
- ⊕ Groundwater Gauges
- ⊕ Soil Borings
- ★ Rain Gauge / Soil Temp Gauge
- Lumbee Soil Series (A7, A11, F3, F6, and/or F13)
- Muckalee Soil Series (A7, A12, F6, and/or F13)
- Non Hydric Soils (Lynchburg, Onslow)


L:\ECOSYSTEM SERVICES\2020 ECOSYSTEM SERVICES FILES\LMG20.248 ---
 Cool Run Mitigation Bank, CMS\Monitoring\MY1 Monitoring\Appendices\Appendix D_Hydrologic Data
 Boundaries are approximate and not meant to be absolute.
 Map Source: 2020 NC OneMap



Cool Run Mitigation Site
 Brunswick County, NC
 Map Date: December 2023
 DRGNCW20.248

DAVEY
Resource Group
 3805 Wrightsville Avenue
 Wilmington, NC 28403
 (910) 452-0001

Figure 2. Soil Borings and Groundwater Gauges

Project Site: Cool Run Stream Site		Date: 8/7/2019					
County: Brunswick		Job#: LMG19.196					
Location: Grissittown		State: NC					
Soil Series: Muckalee		Data Point: SB-1					
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	42"	SHWT:	<6"				
Slope:	2-3%	Landscape:	drainageway (filled/ditched)				
Elevation:	~45 MSL	Drainage:	Very poorly drained				
Permeability:	Moderate						
Vegetation: Corn stalks, panic grass, edge of field							
Hydric Soil Indicator(s):		F13					
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Fill	0-10	10YR 3/3		SL	gr	fr, ns, np	Colluvium from past farming
Ab	10-28	10YR 2/1		SL	gr	fr, ss, np	High O.M. not Mucky
Cg1	28-44	10YR 4/1	10YR 3/6	SCL/LS	MA	fr, ss, sp	25% Distinct Concentrations
							Thin CoLS strata
Cg2	44-54+	2.5Y 5/2	2.5Y 5/6	CoLS/SL	MA	vfr, ns, np	10% distinct concentrations
			2.5Y 6/1				15% distinct depletions
							Thin SL strata
Comments:				Described By:		Nick Howell - LSS #1294	
adjacent to agricultural ditch, fill from past farming activities. Interbedded strata in deeper sediment indicative of higher order stream sediment.							



Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Lynchburg	Data Point:	SB-2

Soil Classification: Fine-loamy, siliceous, semiactive, thermic Aeric Paleaquults

OWT:	>36"	SHWT:	21"	Slope:	2-3%	Landscape:	stream terrace
Elevation:	~45 MSL	Drainage:	Somewhat poorly	Permeability:	Moderate		
Vegetation:	Corn stalks, panic grass, edge of field						


Hydric Soil Indicator(s): None


Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Fill	0-5	10YR 4/3		LS	gr	vfr, ns, np	Colluvium from past farming
A	5-12	10YR 5/2	10YR 6/1	LS	gr	vfr, ns, np	20% distinct depletions
Bw	12-16	10YR 4/4		LS	gr	vfr, ns, np	
E	16-21	10YR 6/4		LS	gr	vfr, ns, np	
Bt	21-36	10YR 6/4	10YR 5/8	SL/SCL	sbk	fr, ss, np	20% prominent concentration
			10YR 6/2				20% distinct depletions

Comments: edge of field above drainage ditch and stream floodplain/valley

Described By: Nick Howell - LSS #1294



Project Site: Cool Run Stream Site		Date: 8/7/2019					
County: Brunswick		Job#: LMG19.196					
Location: Grissittown		State: NC					
Soil Series: Muckalee		Data Point: SB-1					
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	45"	SHWT:	<6"				
Elevation:	~43 MSL	Slope:	2-3%				
Vegetation:	Corn stalks, panic grass, edge of field		Landscape: drainageway (filled/ditched)				
Drainage:	Very poorly drained		Permeability: Moderate				
Hydric Soil Indicator(s):		S7					
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Fill	0-9	10YR 3/3		SL	gr	fr, ns, np	Colluvium from past farming
Ab	9-18	10YR 2/1		LS	gr	fr, ss, np	High O.M. not Mucky
Cg1	18-28	10YR 4/2	10YR 5/6	LS/SL	MA	fr, ss, sp	20% prominent concentration
			2.5Y 6/2				10% distinct depletions
							Thin SL strata
Cg2	28-54+	2.5Y 4/2	2.5Y 5/2	LS/SCL	MA	vfr, ns, np	15% Faint depletions
			2.5Y 3/1				10% distinct om concentration
							Thin SCL Strata
Comments:		Described By: Nick Howell - LSS #1294					
adjacent to agricultural ditch, fill from past farming activities. Interbedded strata in deeper sediment indicative of higher order stream sediment.							

Project Site: Cool Run Stream Site		Date: 8/7/2019					
County: Brunswick		Job#: LMG19.196					
Location: Grissittown		State: NC					
Soil Series: Lynchburg		Data Point: SB-4					
Soil Classification: Fine-loamy, siliceous, semiactive, thermic Aeric Paleaquults							
OWT:	>36"	SHWT:	20"				
Slope:	2-3%	Landscape:	stream terrace				
Elevation:	~45 MSL	Drainage:	Somewhat poorly				
Permeability:	Moderate						
Vegetation:	Corn stalks, panic grass, edge of field						
Hydric Soil Indicator(s):	None						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-11	10YR 3/3		LS	gr	vfr, ns, np	
E	11-20	10YR 6/4		LS	gr	vfr, ns, np	
Bt	20-36	10YR 5/6	10YR 6/4	SCL/LS	sbk	fr, ss, np	20% distinct depletions
			10YR 5/8				5% faint concentrations
			10YR 6/2				15% prominent depletions
							LS strata on ped faces
Comments:		Described By:					
edge of field above topo break into old stream floodplain		Nick Howell - LSS #1294					
							

Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Lu : Lumbee	Data Point:	SB-5

Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults

OWT:	34"	SHWT:	<12"	Slope:	2-3%	Landscape:	toe slope
Elevation:	~48 MSL	Drainage:	poorly drained	Permeability:	Moderate		
Vegetation:	Corn stalks, panic grass, edge of field						

Hydric Soil Indicator(s): F3

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes	
A	0-6	2.5Y 3/1		SL	gr	vfr, ns, np		
Btg1	6-26	2.5Y 5/2	10YR 5/6	SCL	sbk	fr, ss, sp	25% prominent concentration	
			7.5YR 5/8				5% prominent concentrations	
Btg2	26-42+	2.5Y 6/2	5Y 6/2	SCL/LS	sbk	fr, ss, sp	10% distinct depletions	
			2.5Y 5/6				Thin LS strata	25% distinct concentrations
			10YR 5/6				10% prominent concentration	

Comments: Described By: Nick Howell - LSS #1294

Footslope above floodplain, quick transition into flood plain soils





Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Muckalee	Data Point:	SB-6

Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents

OWT:	40"	SHWT:	<6"	Slope:	1-2%	Landscape:	flood plain
Elevation:	~43 MSL	Drainage:	Very poorly drained	Permeability:	Moderate		
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						

Hydric Soil Indicator(s): A7, F13, F3

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-8	10YR 3/1		MuL	gr	fr, ss, np	
Cg1	8-23	10YR 4/2	10YR 3/6	SL	MA	fr, ns, np	20% distinct concentrations
Cg2	23-42+	2.5Y 5/2	2.5Y 5/6	LS/SCL	MA	fr, ns, np	20% distinct concentrations
			2.5Y 6/1				10% distinct depletions
							Interbedded layers LS/SCL

Comments: Stressed drainage due to proximity to drainage ditch. **Described By:** Nick Howell - LSS #1294





Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Muckalee	Data Point:	SB-7

Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents

OWT:	17"	SHWT:	<6"	Slope:	0-1%	Landscape:	flood plain
Elevation:	~43 MSL	Drainage:	Very poorly drained	Permeability:	Moderate to slow		
Vegetation:	Dog fennel, loblolly pine, muscidine, bushy bluesteam, blackberry, beauty berry, panic grass						


Hydric Soil Indicator(s): A2, A9, F13, A12


Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Oa	0-10	10YR 3/1		Muck	MA	fr, ss, np	
Cg	10-13	2.5Y 5/2		SL	sbk	fr, ns, np	
Oab	13-17	10YR 3/2		Muck	MA	fr, ss, np	
Ab	17-28	10YR 3/1		MuSL	sbk	fr, ss, np	
C'g	28-42+	2.5Y 4/2		SCL	Co sbk	fr, ms, sp	

Comments: upper floodplain topography, stressed FAC vegetation present

Described By: Nick Howell - LSS #1294



Project Site:	Cool Run Stream Site		Date:	8/7/2019			
County:	Brunswick		Job#:	LMG19.196			
Location:	Grissittown		State:	NC			
Soil Series:	Muckalee		Data Point:	SB-8			
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	18"	SHWT:	<6"	Slope:	0-1%	Landscape:	flood plain
Elevation:	~42 MSL		Drainage:	Very poorly drained		Permeability:	Moderate to slow
Vegetation:	Dog fennel, loblolly pine, muscidine, bushy bluesteam, blackberry, beauty berry, panic grass						
Hydric Soil Indicator(s):	A2, A9, F13, A12						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Oa	0-12	10YR 3/1		Muck	MA	Fr, ss, np	
A	12-33	10YR 4/2		MuSL	SBK	fr, ss, np	
Cg	33-42+	2.5Y 4/2	10YR 5/6	SCL	VCoSBK	fr, ms, sp	10% prominent concentration
Comments:			Described By:		Nick Howell - LSS #1294		
upper floodplain topography, stressed FAC vegetation present							

Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Muckalee	Data Point:	SB-9				
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	8"	SHWT:	<6"	Slope:	0-1%	Landscape:	flood plain
Elevation:	~42 MSL	Drainage:	Very poorly drained	Permeability:	Moderate		
Vegetation:	gallberry, muscudine, loblolly pine, sweetgum, beauty berry, dog fennel, black berry, panic grass						
Hydric Soil Indicator(s):	A2, A9, F13, A12						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Oa	0-13	10YR 3/1		Muck	MA	fr, ss, np	
A	13-28	2.5Y 4/1		MuSL	SBK	fr, ss, np	
Cg	28-42+	2.5Y 5/2	2.5Y 6/1	SCL/LS	MA	fr, ss, np	15% faint depletions
			2.5Y 4/1	Interbedded SCL/LS sediment			15% distinct om concentration
Comments:				Described By:		Nick Howell - LSS #1294	
upper floodplain topography, stressed FAC vegetation present							



Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Lu: Lumbee	Data Point:	SB-A1

Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults

OWT:	36"	SHWT:	<15"	Slope:	2-3%	Landscape:	concave, linear
Elevation:	~45 MSL	Drainage:	poorly drained	Permeability:	Moderate		
Vegetation:	Dog fennel, loblolly pine, muscidine, bushy bluesteam, blackberry, beauty berry, panic grass						

Hydric Soil Indicator(s): S7, A7

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-5	10YR 3/1		LS	gr	vfr, ns, np	High O.M. not Mucky, 75% coated
AE	5-8	10YR 4/2		S	gr	vfr, ns, np	High O.M. not Mucky
Bw	8-15	10YR 3/2		LS	sbk	vfr, ns, np	
Ebg	15-30	10YR 6/2	10YR 5/6	sl	sbk	vfr, ns, np	
Btg	30-48+	10YR 6/2	10YR 5/6	SCL	sbk	fr, ss, sp	20% distinct concentrations


Comments: w0, Ra soil **Described By:** Nick Howell - LSS #1294


w0, Ra soil





Project Site:	Cool Run Stream Site		Date:	8/7/2019			
County:	Brunswick		Job#:	LMG19.196			
Location:	Grissittown		State:	NC			
Soil Series:	Lu: Lumbee		Data Point:	SB-A2			
Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults							
OWT:	24"	SHWT:	<6"	Slope:	0-1%	Landscape:	depression, concave
Elevation:	~45 MSL		Drainage:	Very poorly drained		Permeability:	Moderate
Vegetation:	Dog fennel, loblolly pine, muscidine, bushy bluesteam, blackberry, beauty berry, panic grass						
Hydric Soil Indicator(s):	A7, F13, F3						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-9	10YR 2/1		Mu SCL	sbk	fr, ss, np	
EB	9-16	2.5Y 5/2	10YR 5/8	SCL	sbk	fr, ss, sp	20% concentrations
Btg/E	16-23	2.5Y 6/2	10YR 5/8	SCL/SL	sbk	fr, ss, sp	15% concentrations
			10YR 5/4				20% depletions
Btg2/E	23-36+	2.5Y 6/2	10YR 3/2	SCL/LS	sbk	fr, ss, sp	5% concentrations
			2.5Y 6/1				25% depletions
Comments:			Described By:	Nick Howell - LSS #1294			

Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Muckalee	Data Point:	SB-A3				
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	30"	SHWT:	<6"	Slope:	0-1%	Landscape:	depression, concave
Elevation:	~45 MSL	Drainage:	Very poorly drained		Permeability:	Moderate	
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	A12, F13						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Oa	0-7	10YR 3/1		Mu	gr	vfr, ss, np	dry
A	7-12	10YR 3/6		Mu LS	gr	vfr, ss, np	tanic staining
Btg	12-24	10YR 5/2		SL	sbk	fr, ns, np	
Btg2	24-36	10YR 5/2	10YR 3/6	SCL	sbk	fr, ss, sp	15% concentrations
Comments:			Described By:		Nick Howell - LSS #1294		
							

Project Site:	Cool Run Stream Site		Date:	8/7/2019			
County:	Brunswick		Job#:	LMG19.196			
Location:	Grissittown		State:	NC			
Soil Series:	Muckalee		Data Point:	SB-A4			
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	~12"	SHWT:	<6"	Slope:	0-1%	Landscape:	old stream channel, concave
Elevation:	~45 MSL	Drainage:	Very poorly drained		Permeability:	Moderate	
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	A12, F13						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A1	0-6	10YR 3/1		Mu SL	gr	fr, ss, np	
A2	6-15	10YR 3/1		Mu SL	gr	fr, ss, np	
Btg	15-24	10YR 4/2	10YR 5/3	SCL	sbk	fr, ss, np	LS pockets strata
Comments:			Described By:		Nick Howell - LSS #1294		
							



Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Muckalee	Data Point:	SB-A5				
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	12"	SHWT:	<6"	Slope:	0-1%	Landscape:	drained floodplain
Elevation:	~45 MSL	Drainage:	Very poorly drained			Permeability:	Moderate
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	A11, F13						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Oa	0-7	N 2/0		Mu	gr	fr, ss, np	
AB	7-15	10YR 3/3		Mu SL	gr	fr, ss, np	tanic staining
Btg1	15-28	10YR 4/2		SL	sbk	fr, ns, np	
Btg2/Cg	28-36	2.5Y 5/2	10YR 6/1	SCL/LS	sbk	fr, ss, np	25% depletions
Cg	36-42+	10YR 6/1		LS	lo	fr, ns, np	
Comments:				Described By:	Nick Howell - LSS #1294		



Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Lu: Lumbee	Data Point:	SB-A6


Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents


OWT:	>42"	SHWT:	6"	Slope:	0-1%	Landscape:	linear
Elevation:	~45 MSL	Drainage:	Very poorly drained	Permeability:	Moderate		
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						


Hydric Soil Indicator(s):

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-6	10YR 3/1	10YR 3/6	SL	gr	fr, ns, np	15% concentrations
Btg1	6-21	2.5Y 5/2	10YR 5/8	SCL	sbk	fr, ss, sp	25% concentrations
Btg2	21-42	2.5Y 6/2	10YR 3/8	SCL	sbk	fr, ss, sp	15% concentrations
			10YR 5/6				20% concentrations

Comments: Described By: Nick Howell - LSS #1294


Project Site:	Cool Run Stream Site		Date:	8/7/2019			
County:	Brunswick		Job#:	LMG19.196			
Location:	Grissittown		State:	NC			
Soil Series:	Lu: Lumbee		Data Point:	SB-A7			
Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults							
OWT:	> 30"	SHWT:	5"	Slope:	1-2%	Landscape:	topographic low
Elevation:	~45 MSL		Drainage:	Very poorly drained		Permeability:	Moderate
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	F3						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-5	10YR 3/1		SL	gr	fr, ns, np	
Btg1	5-16	10YR 6/2	10YR 5/6	SCL	sbk	fr, ss, np	20% concentrations
			10YR 5/8				15% concentrations
Btg2	16-30	10YR 3/3	10YR 5/6	SCL	sbk	fr, ss, sp	25% concentrations
			10YR 5/8				10% concentrations
Comments:			Described By:		Nick Howell - LSS #1294		
							

Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Lynchburg	Data Point:	SB-A8				
Soil Classification: Fine-loamy, siliceous, semiactive, thermic Aeric Paleaquults							
OWT:	> 24"	SHWT:	15"	Slope:	1-2%	Landscape:	hillslope
Elevation:	~45 MSL	Drainage:	somewhat poorly drained		Permeability:	Moderate	
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):							
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-4	10YR 3/1		SL	gr	fr, ns, np	
EB	4-15	10YR 5/4		SL	sbk	fr, ns, np	
Bt	15-24+	10YR 5/4	10YR 6/2	SCL	sbk	fr, ss, np	
			10YR 5/8				
Comments:		Described By:		Nick Howell - LSS #1294			
							

Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Muckalee	Data Point:	SB-A9				
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	> 21"	SHWT:	8"	Slope:	0-1%	Landscape:	low drain way
Elevation:	~45 MSL	Drainage:	Very poorly drained			Permeability:	Moderate
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	A13, F3						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-8	10YR 2/1		SCL	gr	fr, ss, sp	
Btg1	8-21	2.5Y 5/2	10YR 5/6	SCL	sbk	fr, ss, sp	10% concentrations
Btg2	21-30+	5Y 6/1	10YR 5/6	SCL	sbk	fr, ss, sp	25% concentrations
Comments:				Described By:		Nick Howell - LSS #1294	
							



Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Onslow	Data Point:	SB-A10				
Soil Classification: Fine-loamy, siliceous, semiactive, thermic Spodic Paleudults							
OWT:	> 30"	SHWT:	>30"	Slope:	2-3%	Landscape:	onslow hilltop, convex, convex
Elevation:	~45 MSL	Drainage:	somewhat poorly drained		Permeability:	Moderate	
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):							
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-6	10YR 5/1		S	gr	vfr, ns, np	
E	6-11	10YR 6/1		S	gr	vfr, ns, np	
Bw	11-13	10YR 3/4		LS	gr	vfr, ns, np	
E'	13-18	10YR 5/3	2.5Y 5/6	S	gr	vfr, ns, np	25% concentrations
2Bt	18-30	7.5YR 5/4	10YR 6/3	CL	sbk	fi, ns, np	20% depletions
Comments:				Described By:		Nick Howell - LSS #1294	

Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Onslow	Data Point:	SB-A11				
Soil Classification: Fine-loamy, siliceous, semiactive, thermic Spodic Paleudults							
OWT:	28"	SHWT:	<6"	Slope:	0%	Landscape:	concave floodplain
Elevation:	~45 MSL	Drainage:	Very poorly drained		Permeability:	Moderate	
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):							
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-6	10YR 3/1		S	gr	vfr, ns, np	90% coated
Eg	6-9	10YR 5/1		S	gr	vfr, ns, np	
Bw	9-13	10YR 3/2	10YR 6/2	LS	gr	vfr, ns, np	20% depletions
E'g	13-19	10YR 6/2	10YR 5/3	LS	gr	vfr, ns, np	25% depletions
B'tg	19-34+	2.5Y 5/2	10YR 5/6	SCL	sbk	fr, ss, sp	20% concentrations
			10YR 5/8				10% concentrations
Comments:				Described By:		Nick Howell - LSS #1294	
							



Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Lumbee	Data Point:	SB-A12

Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults


OWT:	12"	SHWT:	<6"	Slope:	0%	Landscape:	concave drain
Elevation:	~45 MSL	Drainage:	Very poorly drained	Permeability:	Moderate		
Vegetation: Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel							
Hydric Soil Indicator(s):		A7					

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-10	N 2/0		Mu SCL	ma	fr, ss, sp	
EB	10-19	2.5Y 4/2		SL	sbk	fr, ss, np	
Btg	19-26+	2.5Y 5/2		SCL	sbk	fr, ss, sp	

Comments: **Described By:** Nick Howell - LSS #1294

(Empty space for handwritten comments)



Project Site:		Cool Run Stream Site		Date:		8/7/2019	
County:		Brunswick		Job#:		LMG19.196	
Location:		Grissittown		State:		NC	
Soil Series:		Muckalee		Data Point:		SB-A13	
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	28"	SHWT:	<6"	Slope:	0%	Landscape:	floodplain, concave
Elevation:	~45 MSL	Drainage:	Very poorly drained		Permeability:	Moderate	
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	F6, A7						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Oa	0-9	N 2/0		Mu	gr	fr, ss, np	
A	9-20	10YR 2/1	10YR 3/6	Mu L	sbk	fr, ss, np	10% concentrations
Cg	20-42+	2.5Y 4/2	10YR 3/6	SCL	sbk	fr, ss, sp	5% concentrations
			2.5Y 6/2				20% depletions
Comments:				Described By:		Nick Howell - LSS #1294	
							



Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Lynchburg	Data Point:	SB-x1

Soil Classification: Fine-loamy, siliceous, semiactive, thermic Aeric Paleaquults

OWT:	>34"	SHWT:	20"	Slope:	0-1%	Landscape:	linear
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Elevation:	~45 MSL	Drainage:	poorly drained	Permeability:	Moderate
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Vegetation: Corn stalks, panic grass, edge of field

Hydric Soil Indicator(s):

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-7	10YR 3/1		LS	gr	vfr, ns, np	
E	7-13	10YR 3/4		LS	gr	vfr, ns, np	
Bt1	13-20	10YR 5/6		SCL	sbk	fr, ss, sp	
Bt2	20-34+	10YR 5/4	10YR 5/8	SCL	sbk	fr, ss, sp	25% concentrations
			7.5YR 5/8				25% concentrations
			10YR 6/2				15% depletions

Comments:	Described By: Nick Howell - LSS #1294
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Project Site:		Cool Run Stream Site		Date:		8/7/2019	
County:		Brunswick		Job#:		LMG19.196	
Location:		Grissittown		State:		NC	
Soil Series:		Lumbee		Data Point:		SB-x2	
Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults							
OWT:	>48"	SHWT:	11"	Slope:	0-1%	Landscape:	linear
Elevation:	~>45 MSL	Drainage:	Very poorly drained		Permeability:	Moderate	
Vegetation:	Corn stalks, panic grass, edge of field						
Hydric Soil Indicator(s):	F6, F3						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
fill	0-11						mixed sandy & loamy fill
A	11-18	10YR 2/1	10YR 3/6	SL	sbk/gr	fr, ns, np	15% concentrations
Bg1	18-37	10YR 6/2	10YR 3/6	SL	sbk	fr, ns, np	15% concentrations
			10YR 3/1				15% concentrations
Btg2	37-48+	10YR 4/2	10YR 5/6	SCL	sbk	fr, ss, sp	25% concentrations
			10YR 5/8				15% depletions
Comments:				Described By:		Nick Howell - LSS #1294	
							



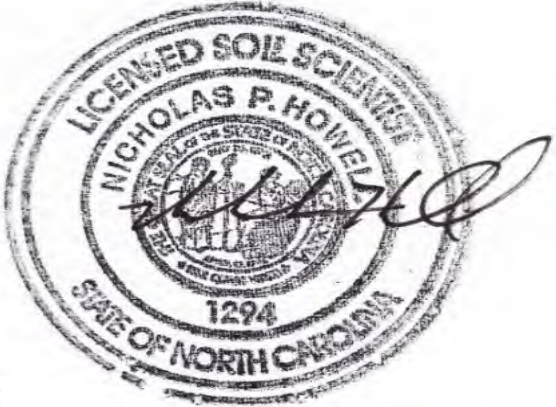
Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Lumbree	Data Point:	SB-x3

Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults

OWT:	39"	SHWT:	<6"	Slope:	0-1%	Landscape:	linear, filled zero order stream
Elevation:	~45 MSL	Drainage:	Very poorly drained	Permeability:	Moderate		
Vegetation:	Corn stalks, panic grass, edge of field						
Hydric Soil Indicator(s):	A7, F13						

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
fill	0-13						mixed sandy & loamy fill
A1	13-31	N 2/0		Mu SL	gr	fr, ss, np	
A2	31-37	10YR 2/1	10YR 3/6	SL	gr	fr, ss, np	35% weak concentrations
Btg	37-43	10YR 4/1		SCL	sbk	fr, ss, np	
B/C	43-48+	10YR 4/2	10YR 6/1	SL/LS	sbk	fr, ns, np	25% depletions

Comments: _____ **Described By:** Nick Howell - LSS #1294

Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Lumbee	Data Point:	SB-x4				
Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults							
OWT:	>48"	SHWT:	<6"	Slope:	1-2%	Landscape:	filled zero order stream
Elevation:	~45 MSL	Drainage:	Very poorly drained			Permeability:	Moderate
Vegetation:	Corn stalks, panic grass, edge of field						
Hydric Soil Indicator(s):	A11						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
fill	0-11						mixed sandy & loamy fill
A	11-15	10YR 2/1		SL	gr	fr, ns, np	
Btg1	15-29	10YR 4/2	10YR 5/6	SCL	sbk	fr, ss, np	25% concentrations
Btg2	29-40	2.5Y 6/1	10YR 5/4	SCL / SL	sbk	fr, ss, np	20% concentrations
			10YR 5/6				10% concentrations
B/C	40-48+	2.5Y 6/1	2.5Y 5/6	SL / LS	sbk	vfr, ns, np	20% concentrations
Comments:				Described By:		Nick Howell - LSS #1294	
							

Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Lynchburg	Data Point:	SB-y1

Soil Classification: Fine-loamy, siliceous, semiactive, thermic Aeric Paleaquults


OWT:	> 30"	SHWT:	>30"	Slope:	1-2%	Landscape:	footslope/toeslope
Elevation:	~45 MSL	Drainage:	somewhat poorly drained	Permeability:	Moderate		
Vegetation:	Corn stalks, panic grass, edge of field						


Hydric Soil Indicator(s):

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-7	10YR 3/3		LS	gr	vrf, ns, np	
AE	7-12	10YR 4/4		LS	gr	vfr, ns, np	
Bt	12-30+	7.5YR 4/6	10YR 5/6	CL	sbk	fi, ns, np	15% concentrations
			10YR 6/4				10% concentrations

Comments:	Described By:	Nick Howell - LSS #1294
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Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Lumbee	Data Point:	SB-y2				
Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults							
OWT:	> 50"	SHWT:	26"	Slope:	1-2%	Landscape:	toeslope
Elevation:	~45 MSL	Drainage:	poorly drained		Permeability:	Moderate	
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	S5						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
fill	0-20						sandy fill
A	20-26	10YR 3/1		LS	gr	vfr, ns, np	uncoated, drained
ABg	26-30	10YR 3/3	10YR 3/6	LS	gr	vfr, ns, np	15% concentrations
Btg1	30-39	10YR 5/2	10YR 5/8	SCL	sbk	fr, ss, sp	25% concentrations
			10YR 3/4				35% depletions
Btg2	39-50+	10YR 6/2	10YR 5/8	SCL	sbk	fr, ss, sp	25% concentrations
			10YR 6/4				35% depletions
Comments:		Described By:		Nick Howell - LSS #1294			
							

Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Muckalee	Data Point:	SB-y3				
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	36"	SHWT:	<6"	Slope:	0%	Landscape:	floodplain
Elevation:	~45 MSL	Drainage:	Very poorly drained		Permeability:	Moderate	
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	A7, F6						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Oa1	0-8	N 2/0		Mu	gr	fr, ss, np	
Oa2	8-23	10YR 2/1		Mu	ma	fr, ss, np	
A	23-33	10YR 3/1	10YR 3/6	Mu L	sbk	fr, ss, sp	10% concentrations
Btg	33-42+	2.5Y 3/2		SCL	sbk	fr, ss, sp	
Comments:		Described By:		Nick Howell - LSS #1294			
							




Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Muckalee	Data Point:	SB-y4


Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents

OWT:	30"	SHWT:	<6"	Slope:	0%	Landscape:	floodplain
Elevation:	~45 MSL	Drainage:	Very poorly drained	Permeability:	Moderate		
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	F6, A7						

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Oa	0-11	N 2/0		Mu	gr	fr, ss, np	
A	11-26	10YR 2/1	10YR 3/6	Mu L	sbk	fr, ss, np	10% concentrations
Btg	26-42+	2.5Y 4/2	10YR 3/6	SCL	sbk	fr, ss, sp	5% concentrations
			2.5Y 6/2				20% depletions

Comments:	Described By: Nick Howell - LSS #1294

Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Onslow	Data Point:	SB-y5				
Soil Classification: Fine-loamy, siliceous, semiactive, thermic Spodic Paleudults							
OWT:	>36"	SHWT:	11"	Slope:	1-2%	Landscape:	side slope
Elevation:	~45 MSL	Drainage:	Very poorly drained		Permeability:	Moderate	
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):							
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-5	10YR 5/1		S	gr	vfr, ns, np	
E	5-8	10YR 5/1		S	gr	vfr, ns, np	
Bw	8-11	10YR 3/3		LS	gr	vfr, ns, np	
E'	11-21	10YR 5/3	10YR 3/4	LS	gr	vfr, ns, np	25% concentrations
			10YR 5/1				10% depletions
Btg	21-36+	10YR 4/2		SL	sbk	vfr, ns, np	
Comments:			Described By:		Nick Howell - LSS #1294		
							

Project Site:	Cool Run Stream Site		Date:	8/7/2019			
County:	Brunswick		Job#:	LMG19.196			
Location:	Grissittown		State:	NC			
Soil Series:	Lumbee		Data Point:	SB-z1			
Soil Classification: Fine-loamy over sandy or sandy-skeletal, siliceous, subactive, thermic Typic Endoaquults							
OWT:	>30"	SHWT:	<6"	Slope:	0-1%	Landscape:	footslope
Elevation:	~45 MSL		Drainage:	Very poorly drained		Permeability:	Moderate
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	F3						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-5	10YR 4/2	10YR 3/6	SL	sbk	fr, ss, np	10% concentrations
Btg1	5-13	10YR 5/2	10YR 5/6	CL	sbk	fi, ns, np	25% concentrations
Btg2	13-30	5Y 6/2	10YR 5/6	CL	sbk	fi, vs, vp	25% concentrations
Comments:			Described By:		Nick Howell - LSS #1294		
							



Project Site:	Cool Run Stream Site	Date:	8/7/2019
County:	Brunswick	Job#:	LMG19.196
Location:	Grissittown	State:	NC
Soil Series:	Onslow	Data Point:	SB-z2

Soil Classification: Fine-loamy, siliceous, semiactive, thermic Spodic Paleudults

OWT:	>34"	SHWT:	>34"	Slope:	1-2%	Landscape:	hillslope
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Elevation:	~45 MSL	Drainage:	somewhat poorly drained	Permeability:	Moderate
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Vegetation: Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel

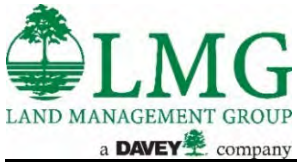
Hydric Soil Indicator(s):

Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-4	10YR 5/1		S	gr	vfr, ns, np	
Bw	4-8	10YR 3/3		LS	gr	vfr, ns, np	
E	8-19	10YR 6/3	10YR 3/6	S	gr	vfr, ns, np	15% concentrations
			10YR 6/2				10% depletions
Bt	19-34+	10YR 5/6		SCL	sbk	fr, ss, sp	

Comments: **Described By:** Nick Howell - LSS #1294



Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Onslow	Data Point:	SB-z3				
Soil Classification: Fine-loamy, siliceous, semiactive, thermic Spodic Paleudults							
OWT:	>36"	SHWT:	22"	Slope:	1-2%	Landscape:	hilltop
Elevation:	~45 MSL	Drainage:	somewhat poorly drained			Permeability:	Moderate
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):							
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-7	10YR5/2		S	gr	vfr, ns, np	
E	7-12	10YR 5/1		S	gr	vfr, ns, np	
Bw	12-22	10YR 3/2		LS	gr	vfr, ns, np	
Eg	22-27	10YR 6/2	2.5Y 5/6	LS	sbk	fr, ns, np	20% concentrations
Btg	27-36+	2.5Y 5/2	10YR 5/6	SCL	sbk	fr, ss, sp	30% concentrations
Comments:				Described By:		Nick Howell - LSS #1294	
							



Project Site:	Cool Run Stream Site			Date:	8/7/2019		
County:	Brunswick			Job#:	LMG19.196		
Location:	Grissittown			State:	NC		
Soil Series:	Muckalee			Data Point:	SB-z4		
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	>36"	SHWT:	<6"	Slope:	1-2%	Landscape:	footslope
Elevation:	~45 MSL		Drainage:	Very poorly drained		Permeability:	Moderate
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	S7						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-6	10YR 3/1		LS	gr	vfr, ns, np	90% coated grains
Eg	6-9	2.5Y 4/2		LS	gr	vfr, ns, np	
Bh	9-21	10YR 3/1		LS	sbk	vfr, ns, np	
Bg	21-34	2.5Y 4/2		LS	sbk	fr, ns, np	
Btg	34-42+	2.5Y 5/2	2.5Y 6/2	SCL/ LS	sbk	fr, ns, np	20% depletions
Comments:				Described By:		Nick Howell - LSS #1294	
drained							



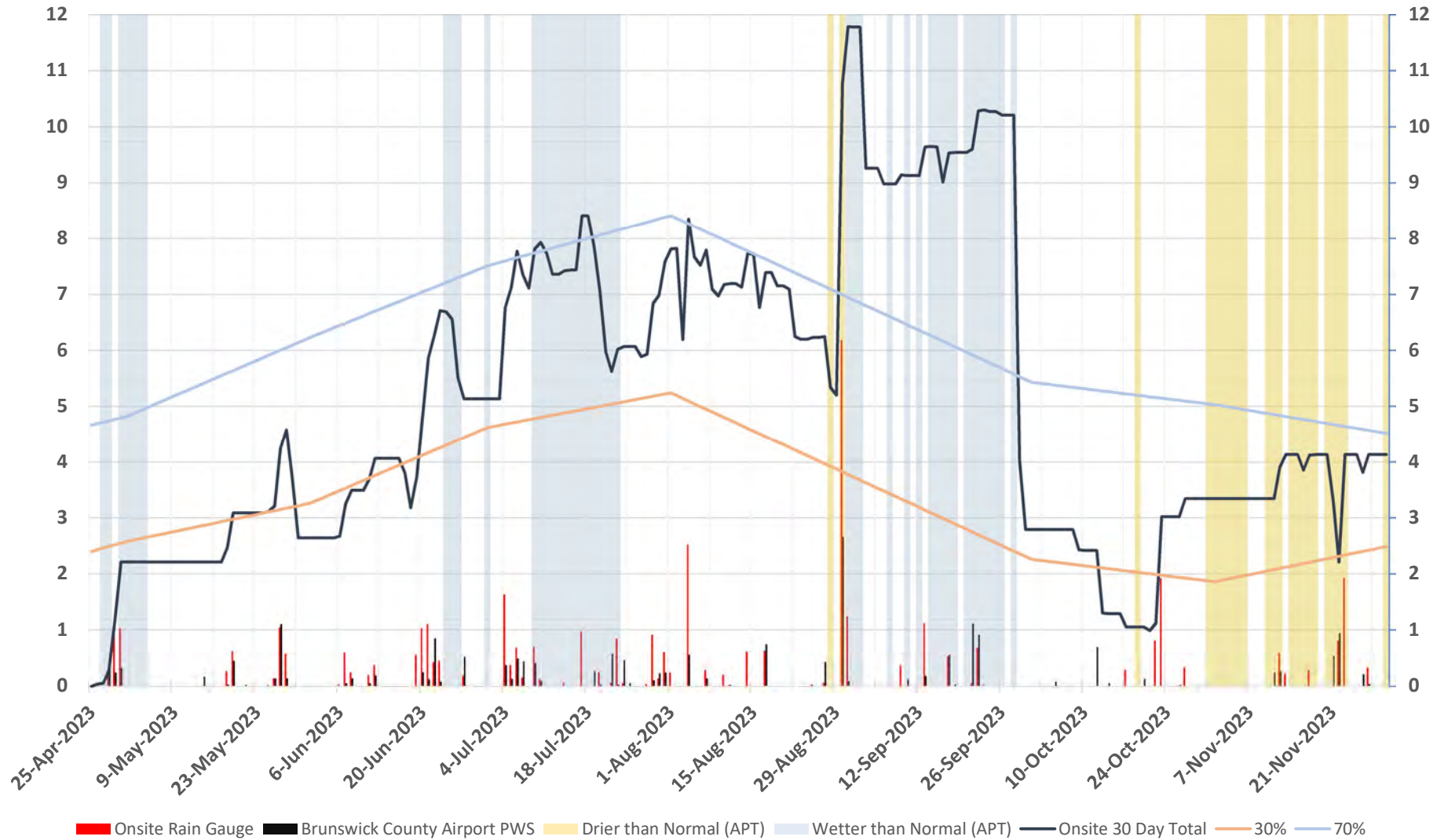
Project Site:	Cool Run Stream Site		Date:	8/7/2019			
County:	Brunswick		Job#:	LMG19.196			
Location:	Grissittown		State:	NC			
Soil Series:	Muckalee		Data Point:	SB-z5			
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	24"	SHWT:	<6"	Slope:	0%	Landscape:	toe slope
Elevation:	~45 MSL		Drainage:	Very poorly drained		Permeability:	Moderate
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	F6, F13						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
A	0-15	2.5Y 3/1	10YR 3/6	Mu SL	sbk	fr, ss, np	25% concentrations
Cg	15-36	10YR 5/2	10YR 3/1	LS	ma	fr, ns, np	interbedded depletions
			10YR 4/2				interbedded depletions
Comments:			Described By:		Nick Howell - LSS #1294		
drained							

Project Site:	Cool Run Stream Site	Date:	8/7/2019				
County:	Brunswick	Job#:	LMG19.196				
Location:	Grissittown	State:	NC				
Soil Series:	Mu: Muckalee	Data Point:	SB-z6				
Soil Classification: Coarse-loamy, siliceous, superactive, nonacid, thermic Typic Fluvaquents							
OWT:	18"	SHWT:	<6"	Slope:	0%	Landscape:	floodplain
Elevation:	~45 MSL	Drainage:	Very poorly drained			Permeability:	Moderate
Vegetation:	Sweetgum, Loblolly Pine, Blackberry, Panic grass, Dogfennel						
Hydric Soil Indicator(s):	f13						
Horizon	Depth (in)	Matrix	Mottles	Texture	Structure	Consistence	Notes
Oa	0-8	N 2/0		Mu	gr	fr, ss, np	
A	8-21	10YR 2/1		Mu LS	sbk	fr, ss, np	
Cg	21-27+	2.5Y 3/1	2.5Y 6/2	LS	ma	vfr, ns, np	Stratified Layers
Comments:				Described By:		Nick Howell - LSS #1294	
drained							

Table 15. Groundwater Gauge Elevations and Soil Types

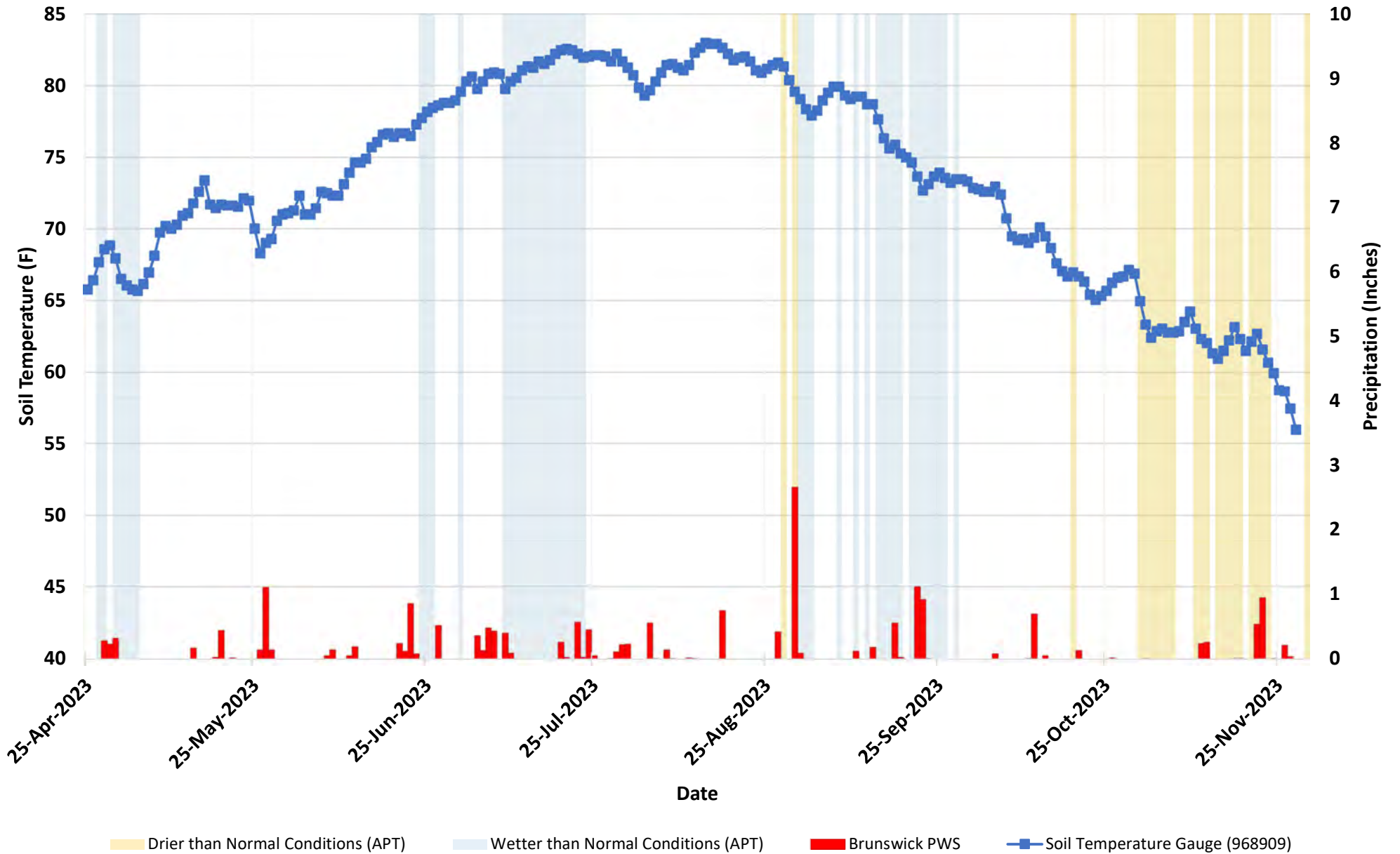
Gauge ID	Elevation (ft)	Soil Type
1	44.40	Muckalee
2	44.41	Muckalee
3	43.95	Lumbee
4	45.66	Lumbee
5	42.63	Muckalee
6	46.13	Muckalee
7	44.20	Muckalee
8	44.70	Lumbee
9	43.98	Muckalee
10	42.75	Muckalee
11	42.31	Muckalee
12	41.62	Muckalee
13	41.29	Muckalee
14	40.78	Muckalee
15	42.83	Lumbee
16	46.39	Lumbee
17	45.97	Lumbee

30 day Precipitation Assessment



Precipitation data obtained from: Onsite Rain Gauge and Comparison Station Brunswick County Airport PWS (www.wunderground.com)
30% and 70% precipitation normals obtained from: WETS Station LONGWOOD, NC8113 1991-2020 (wcc.nrcs.usda.gov)

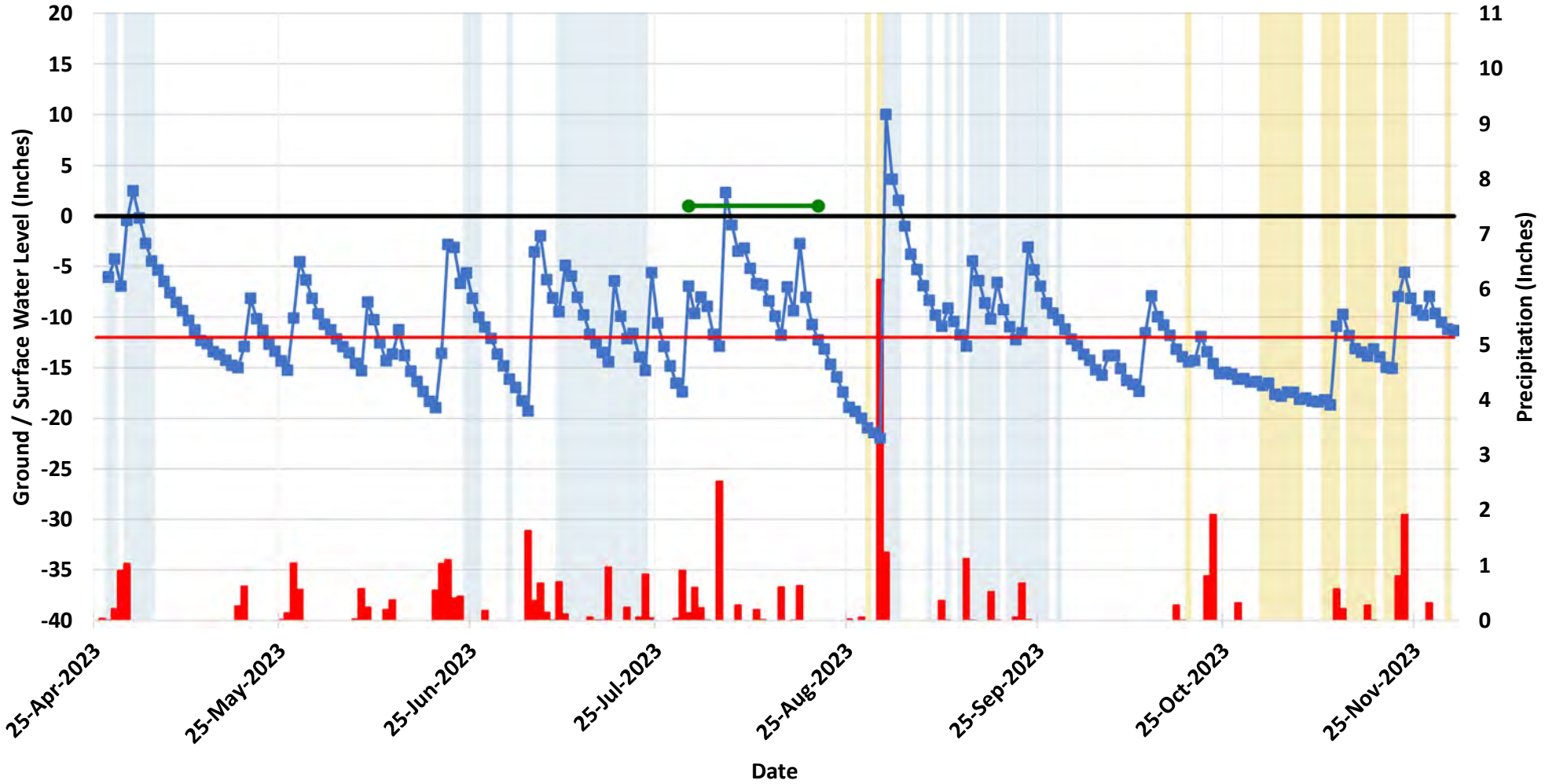
Soil Temperature



■ Drier than Normal Conditions (APT) ■ Wetter than Normal Conditions (APT) ■ Brunswick PWS ■ Soil Temperature Gauge (968909)



Gauge 1 - Hydrology Assessment



Yellow shaded area: Drier than Normal Conditions (APT)

Light blue shaded area: Wetter than Normal Conditions (APT)

Red bar: Onsite Rainfall

Blue line with square: Well 1 (768822)

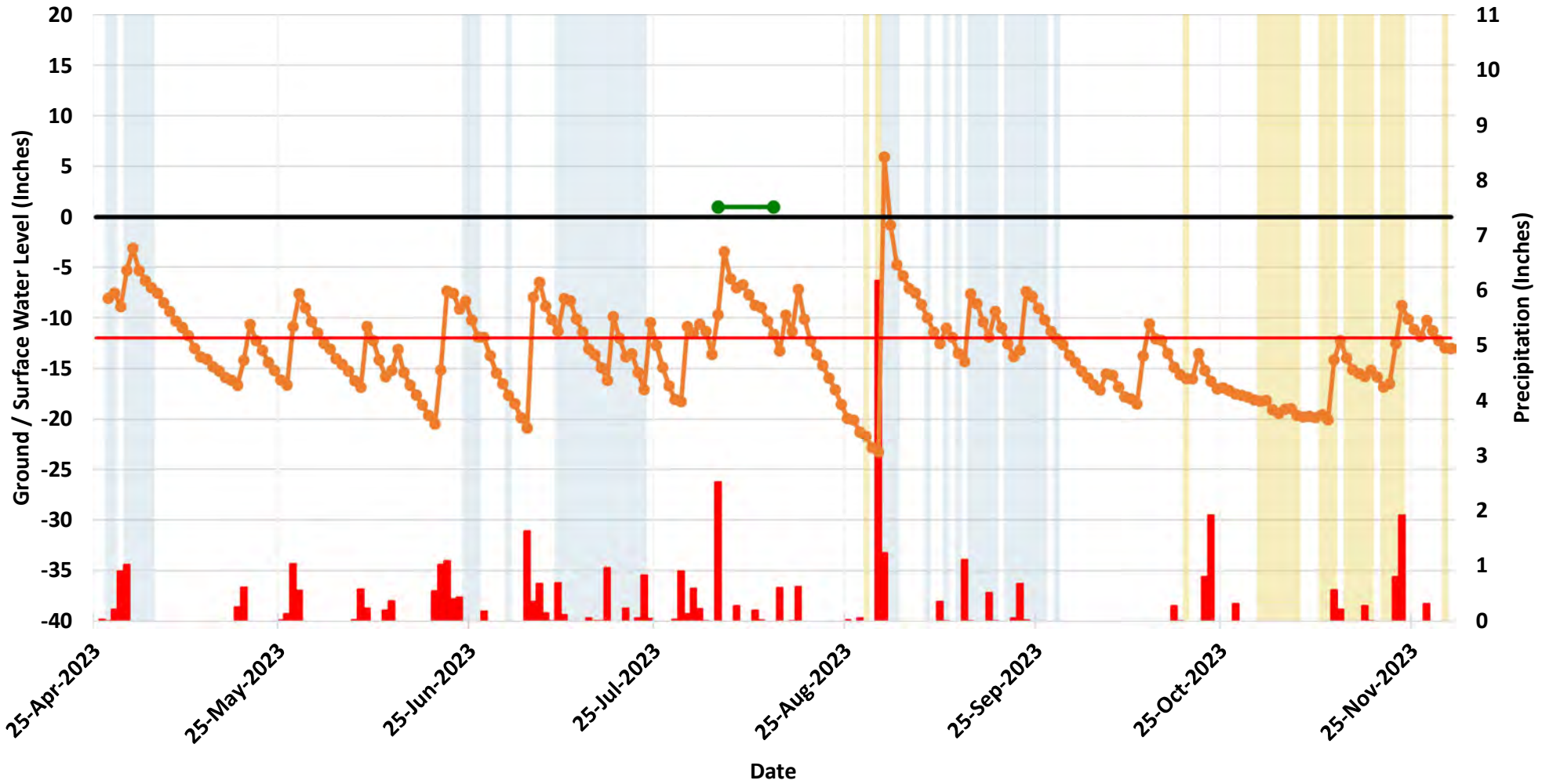
Black line: 0" Ground Surface

Red line: -12" Threshold

Green line with circles: Gauge 1 Consecutive Days Meeting Wetland Criteria 22 Days, 10.5 % of Growing Season

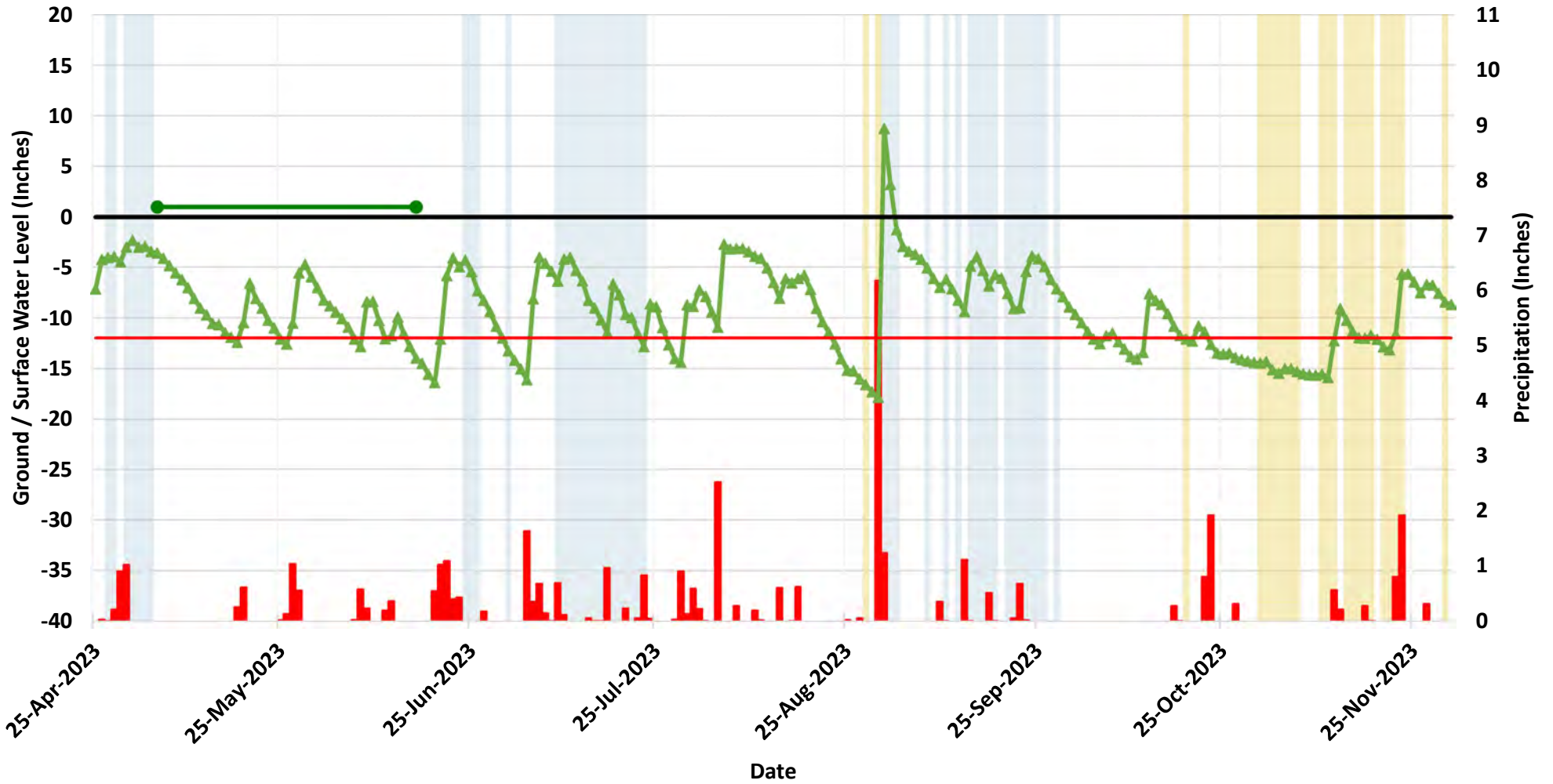


Gauge 2 - Hydrology Assessment



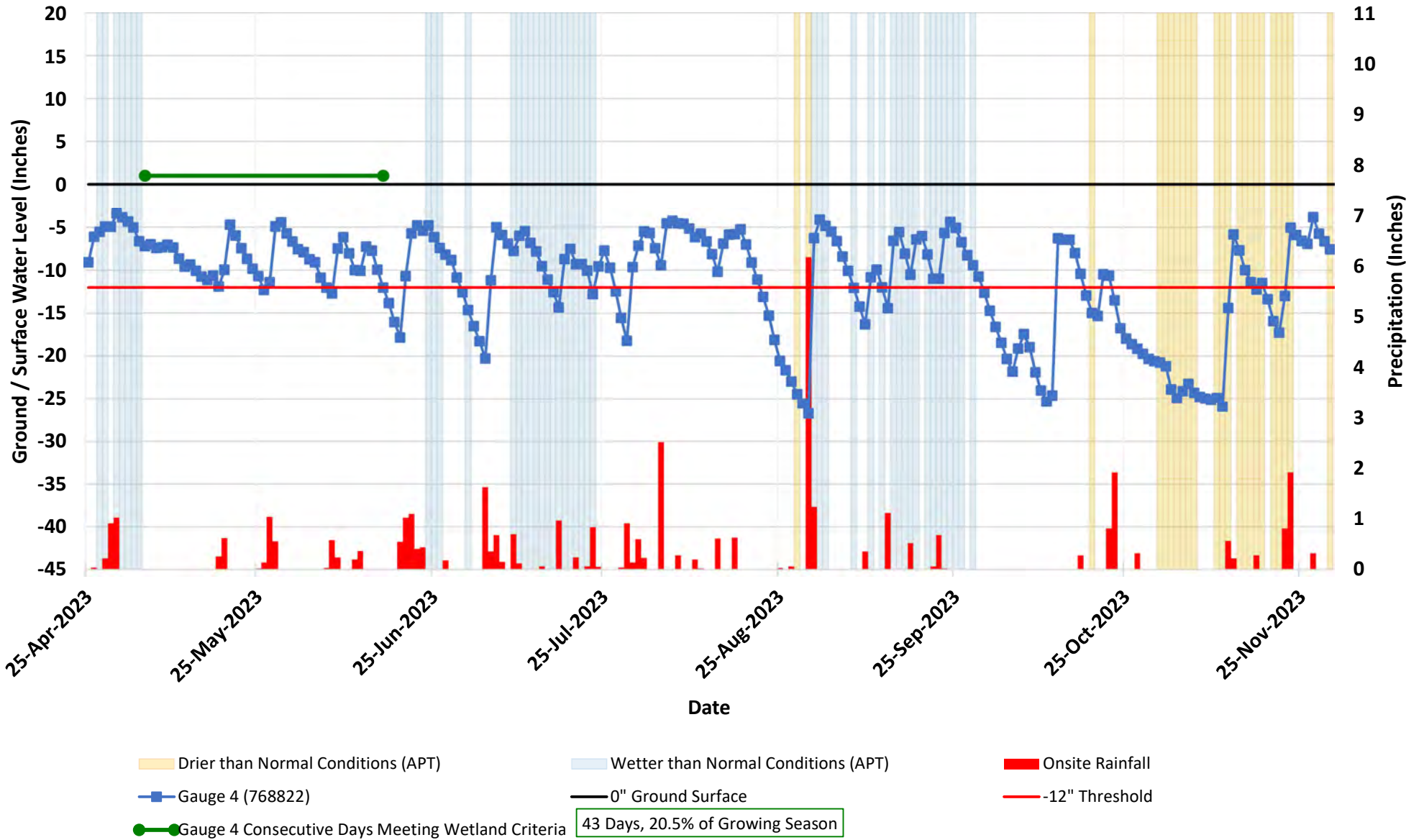
- Well 2 (768797)
- 0" Ground Surface
- 12" Threshold
- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- Gauge 2 Consecutive Days Meeting Wetland Criteria: 10 Days, 4.8% of Growing Season

Gauge 3 - Hydrology Assessment

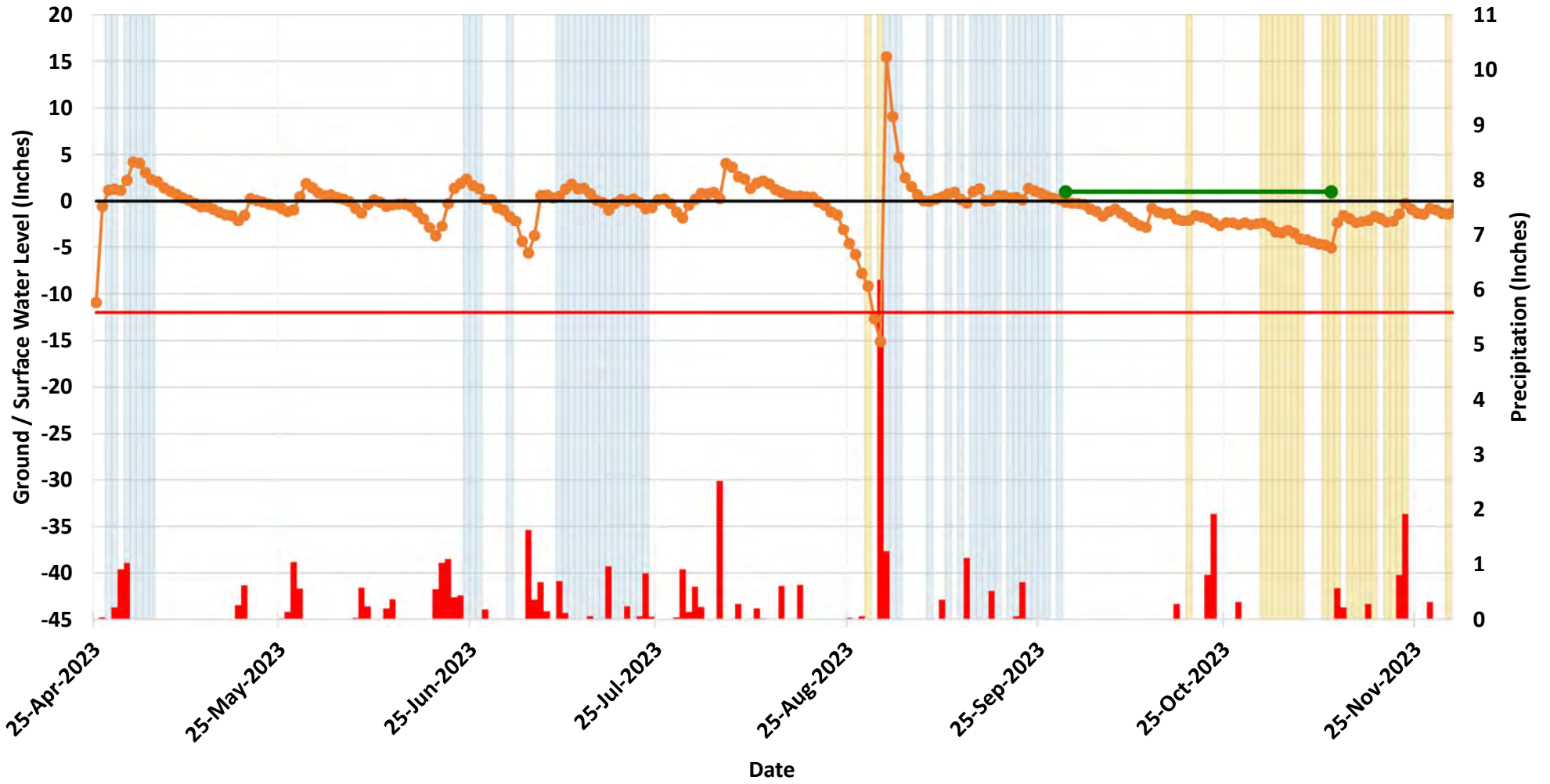


- Well 3 (766822)
- Gauge 3 Consecutive Days Meeting Wetland Criteria
- 41 Days, 19.5% of Growing Season
- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- 0" Ground Surface
- 12" Threshold

Gauge 4 - Hydrology Assessment

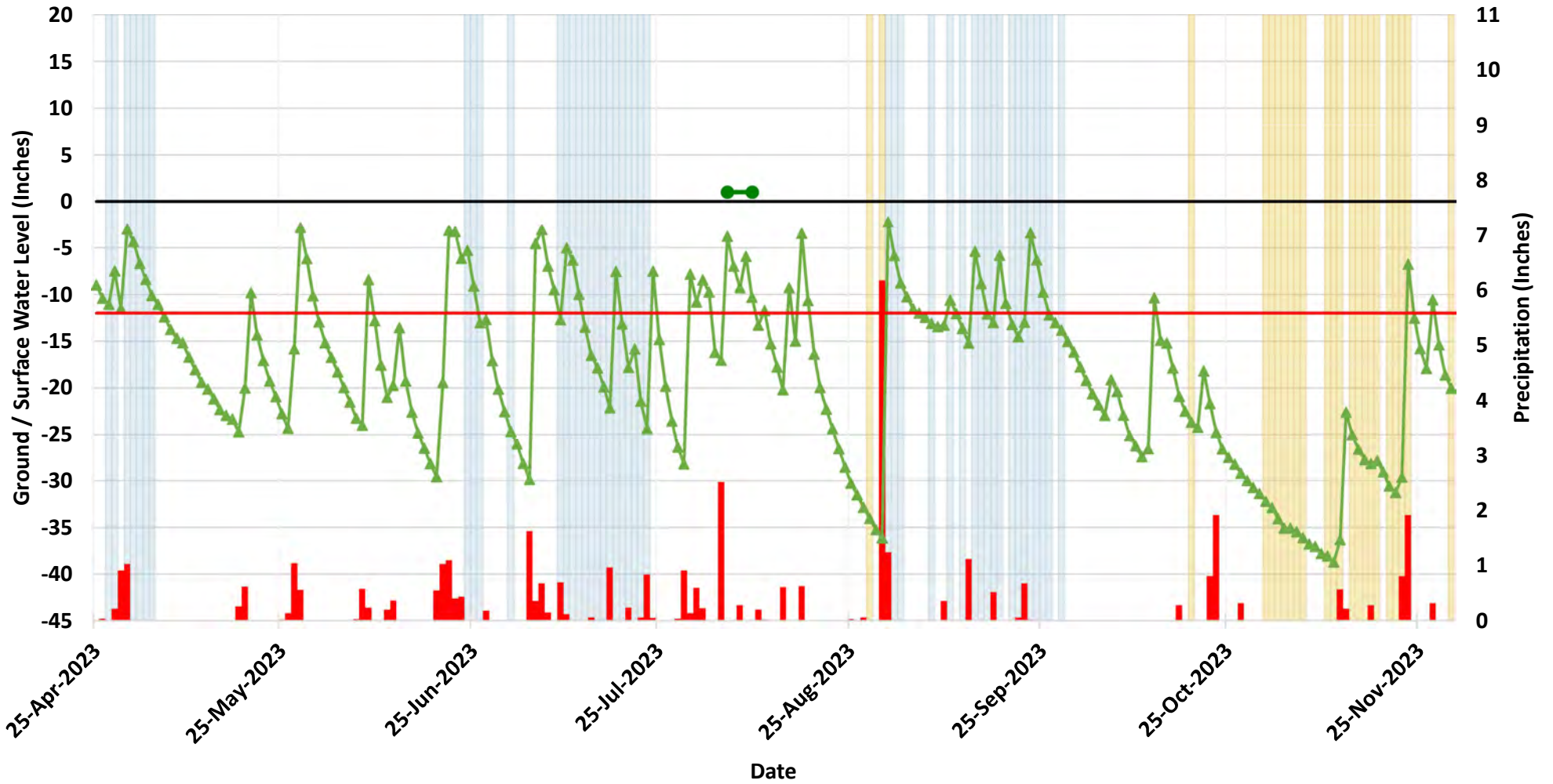


Gauge 5 - Hydrology Assessment



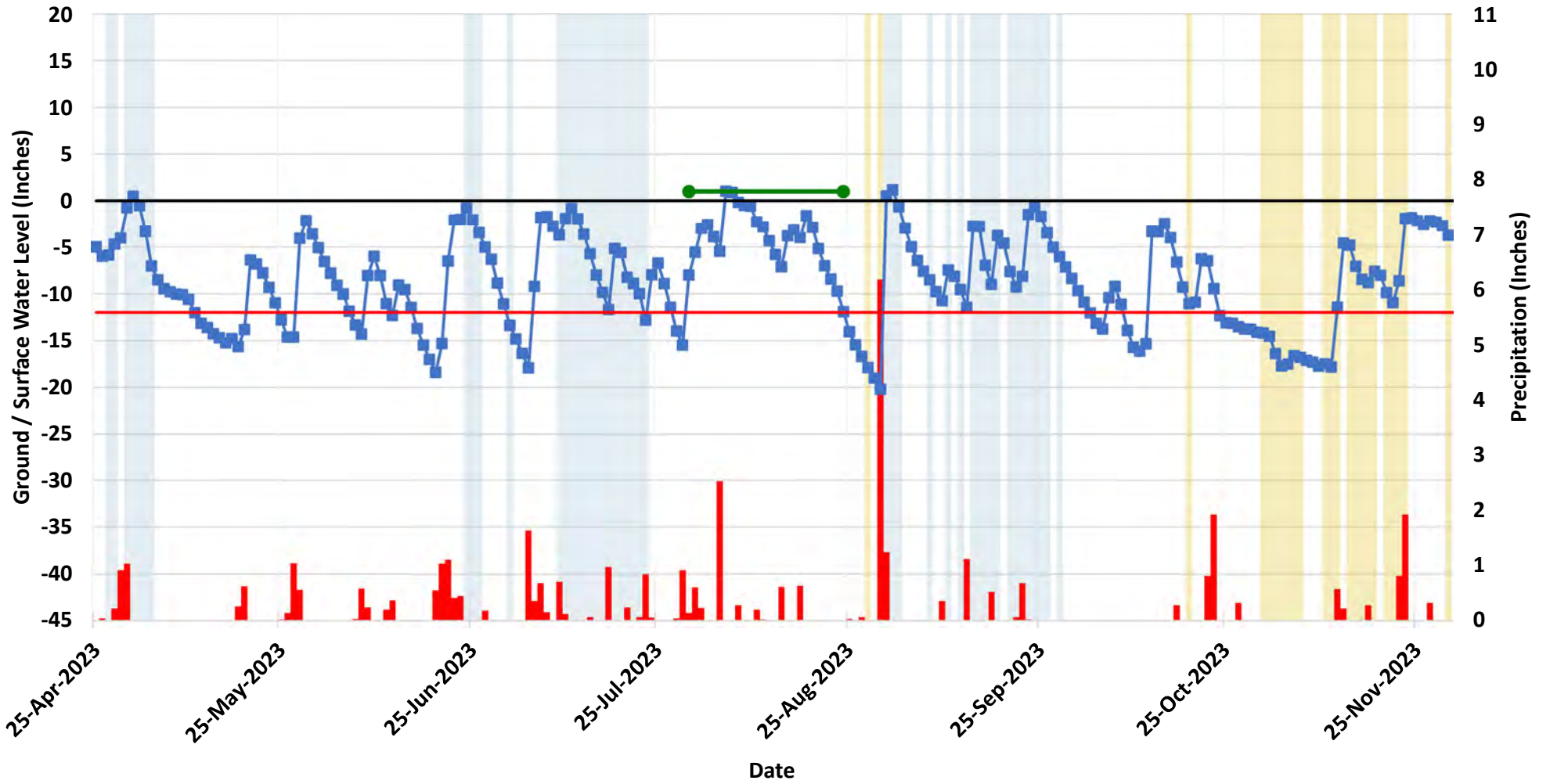
- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- Gauge 5 (768797)
- 0" Ground Surface
- 12" Threshold
- Gauge 5 Consecutive Days Meeting Wetland Criteria **63 Days, 30% of Growing Season**

Gauge 6 - Hydrology Assessment



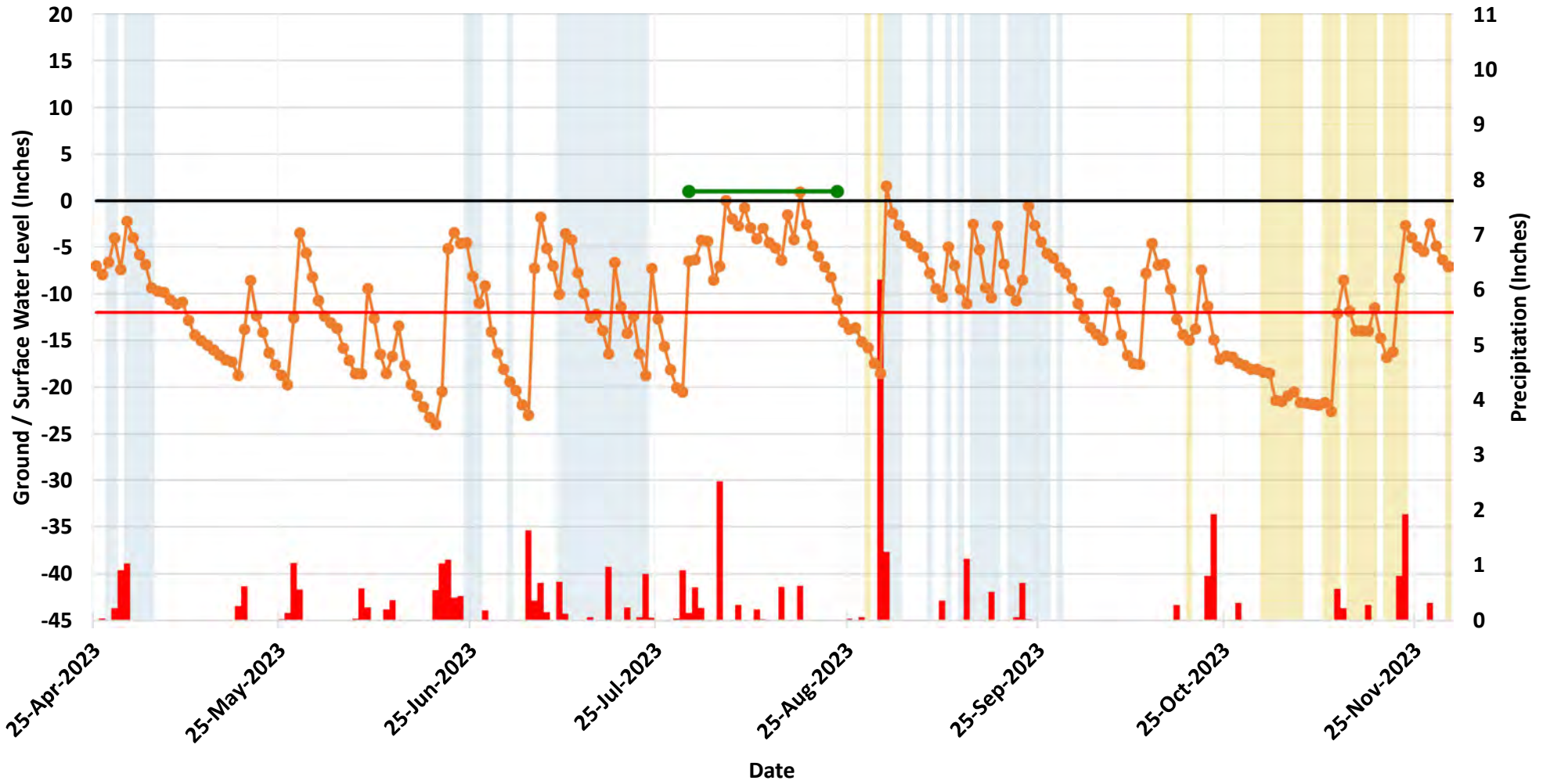
- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- ▲ Gauge 6 (766822)
- 0" Ground Surface
- -12" Threshold
- Gauge 6 Consecutive Days Meeting Wetland Criteria 5 Days, 2.4% of Growing Season

Gauge 7 - Hydrology Assessment



- Wetter than Normal Conditions (APT)
- Drier than Normal Conditions (APT)
- Gauge 7 (767055)
- 0" Ground Surface
- Onsite Rainfall
- 12" Threshold
- Gauge 7 Consecutive Days Meeting Wetland Criteria: 26 Days, 12.4% of Growing Season

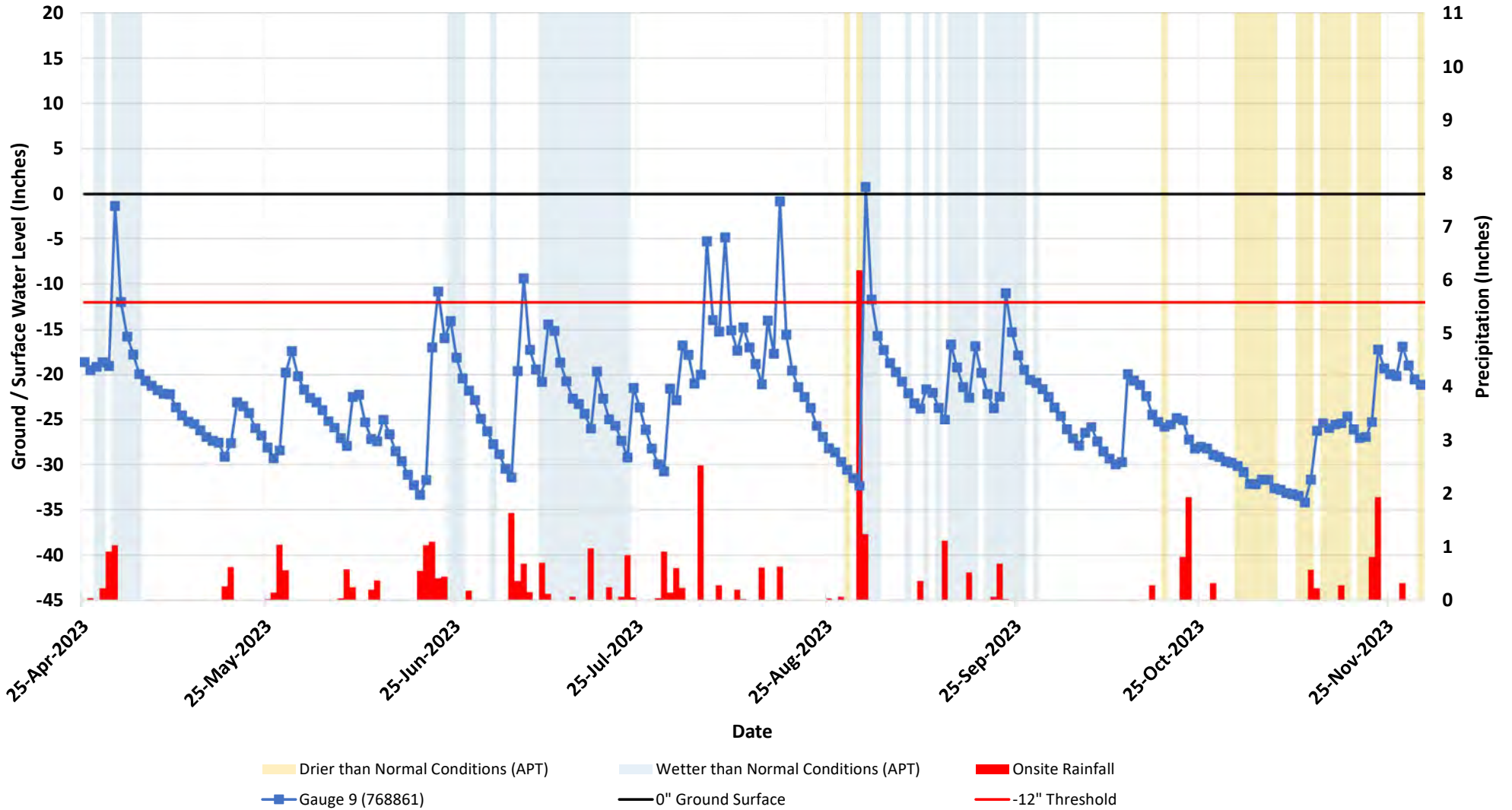
Gauge 8 - Hydrology Assessment



- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- Gauge 8 (768856)
- 0" Ground Surface
- -12" Threshold
- Gauge 8 Consecutive Days Meeting Wetland Criteria

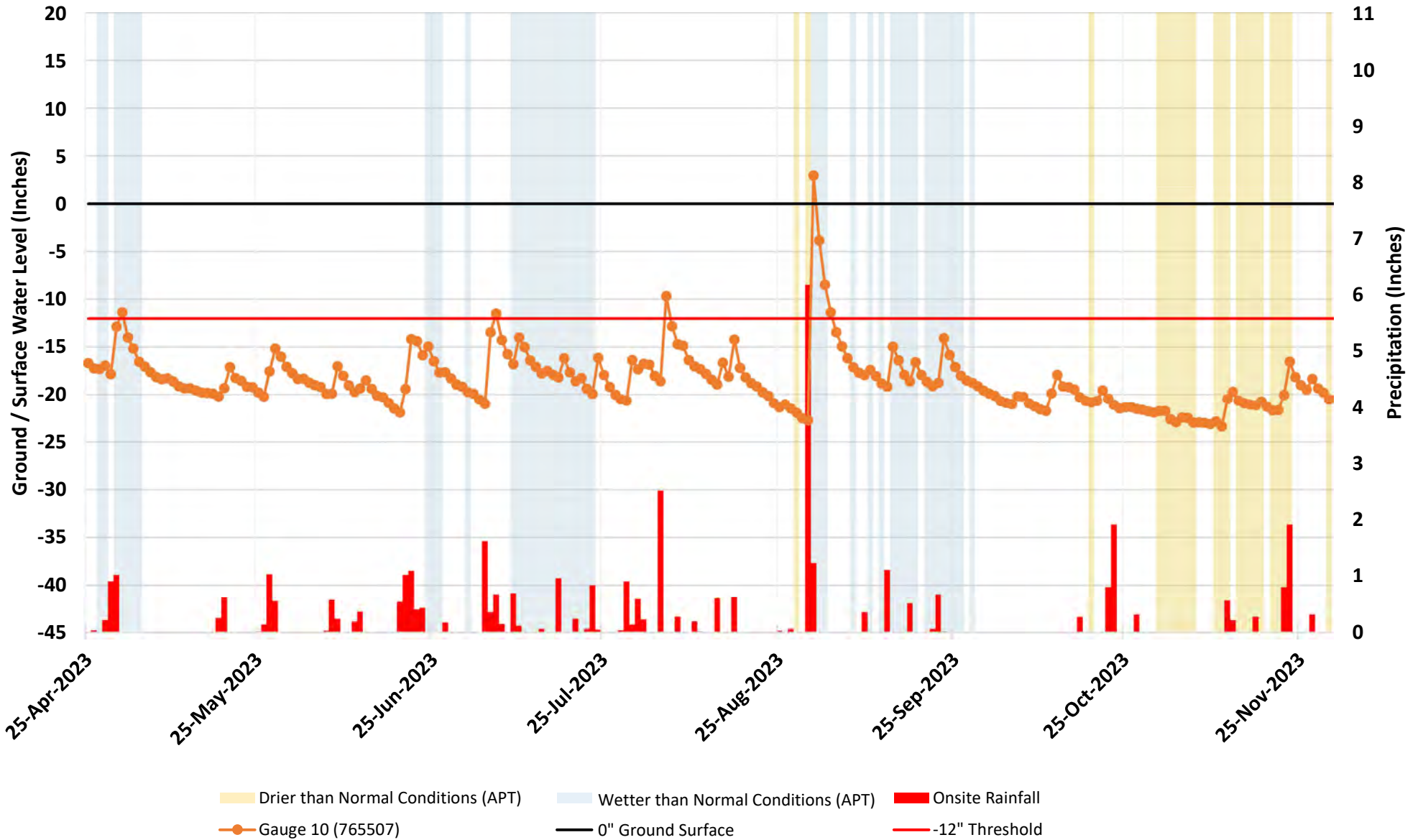
25 Days, 11.9% of Growing Season

Gauge 9 - Hydrology Assessment



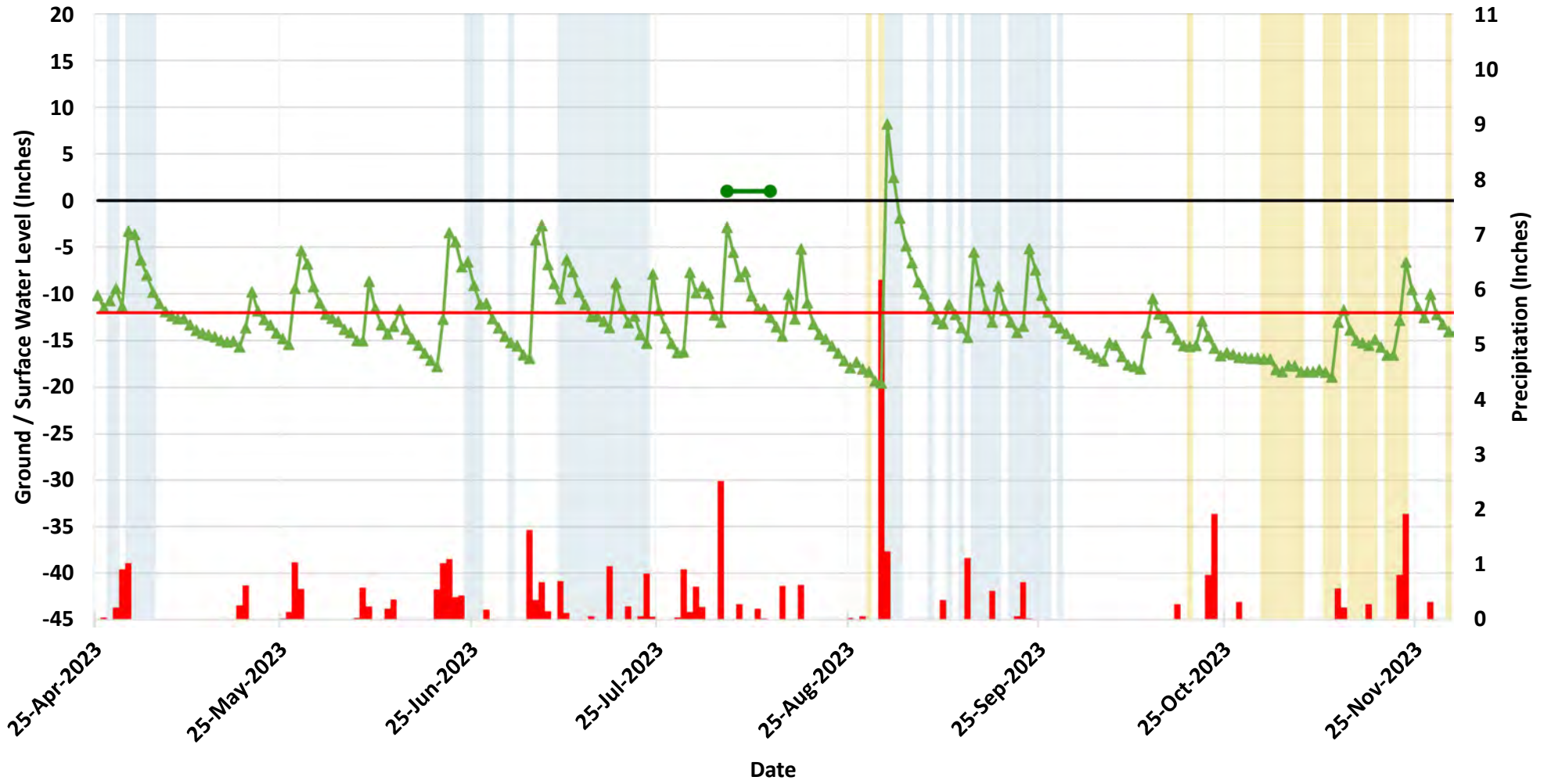
1 Consecutive Day Meeting Wetland Criteria, 0.5% of Growing Season

Gauge 10 - Hydrology Assessment



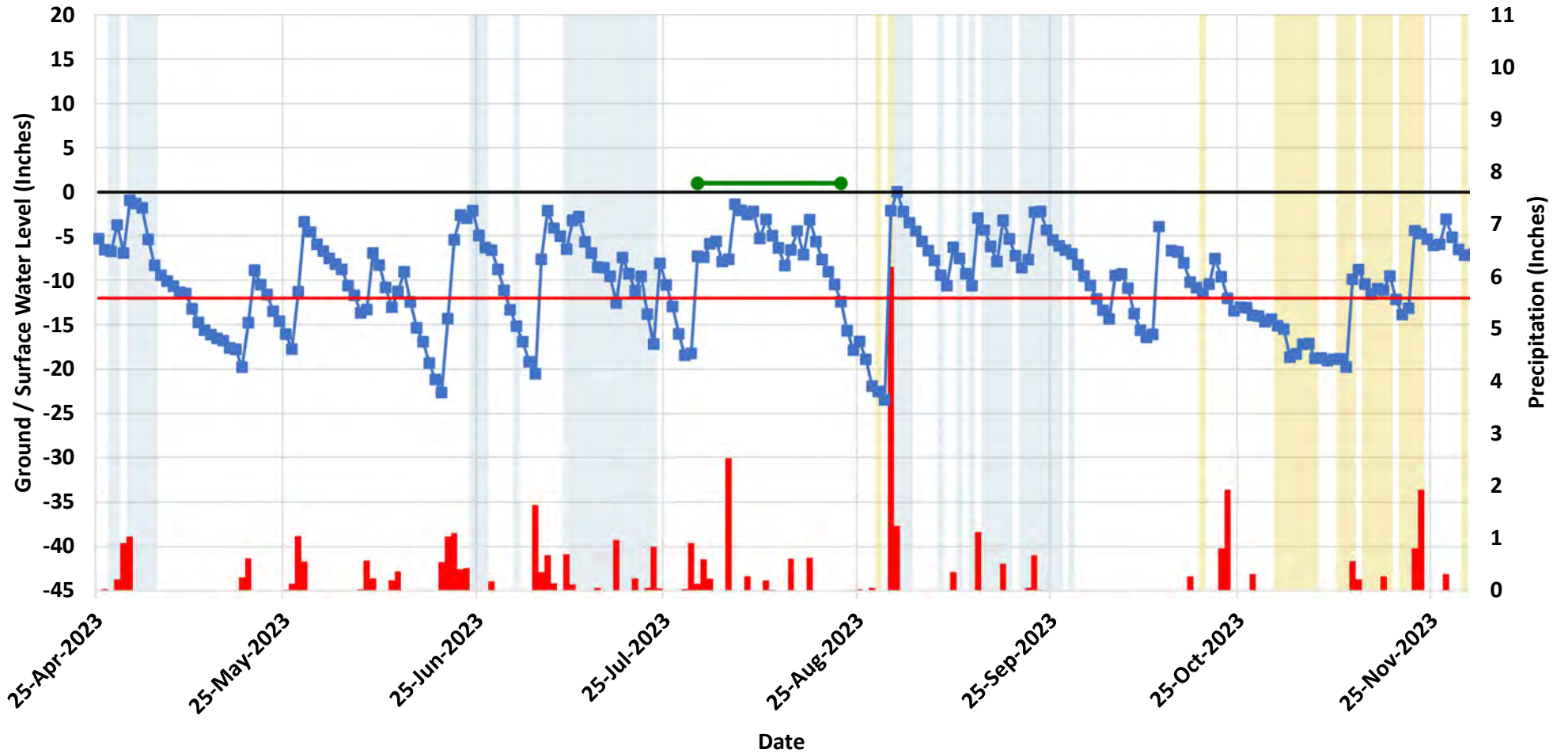
1 Consecutive Day Meeting Wetland Criteria, 0.5% of Growing Season

Gauge 11 - Hydrology Assessment



- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- Gauge 11 (767706)
- 0" Ground Surface
- 12" Threshold
- Gauge 11 Consecutively Meeting Wetland Criteria 8 Days, 3.8% of Growing Season

Gauge 12 - Hydrology Assessment

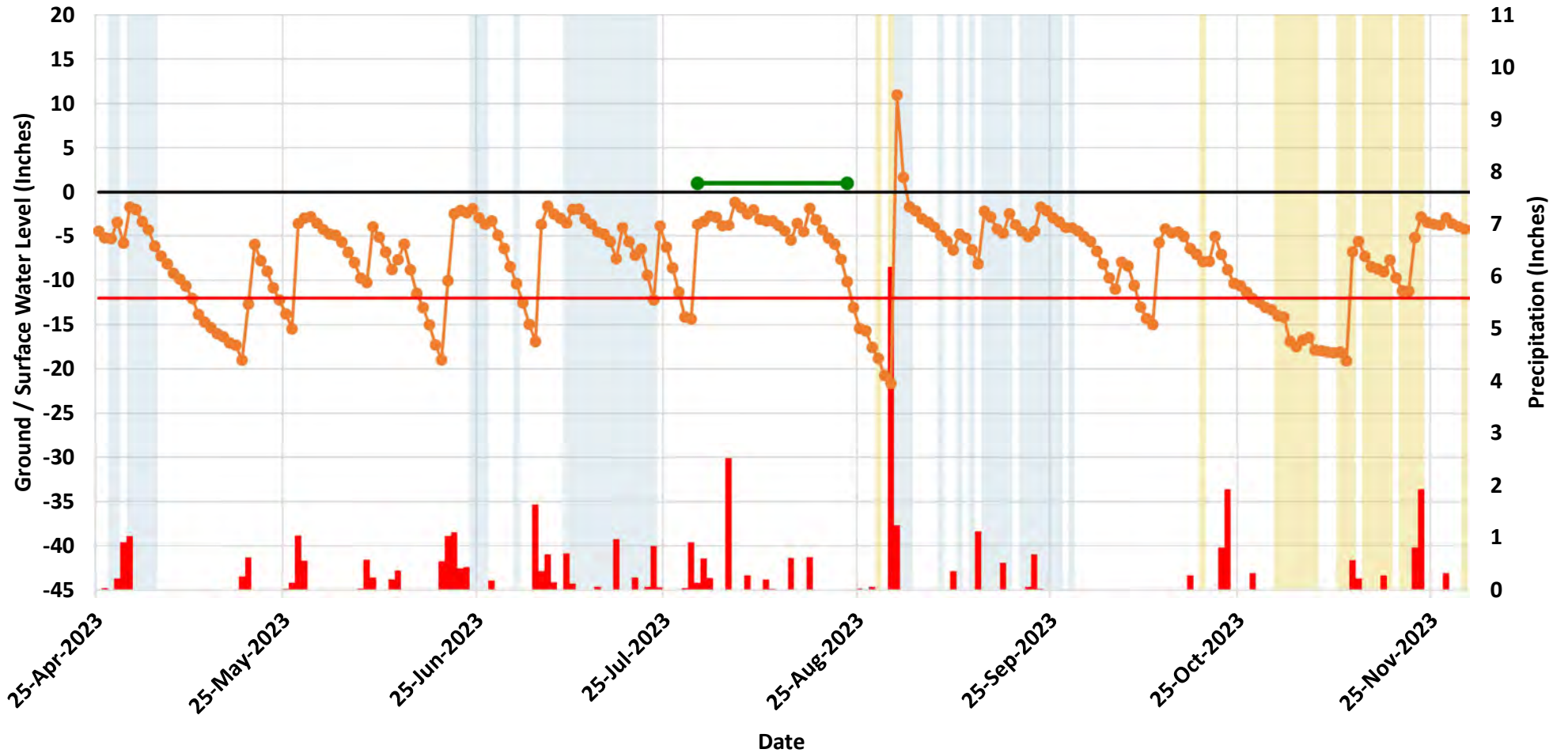


- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- Gauge 12 (768854)
- 0" Ground Surface
- -12" Threshold
- Gauge 12 Consecutive Days Meeting Wetland Criteria 24 Days, 11.4% of Growing Season

Cool Run Mitigation Bank (DRGNCW20.248)

Gauge12 - InSitu RuggedTROLL 100 - April 25, 2023 to November 30, 2023 - One reading per day at 7:00 am

Gauge 13 - Hydrology Assessment

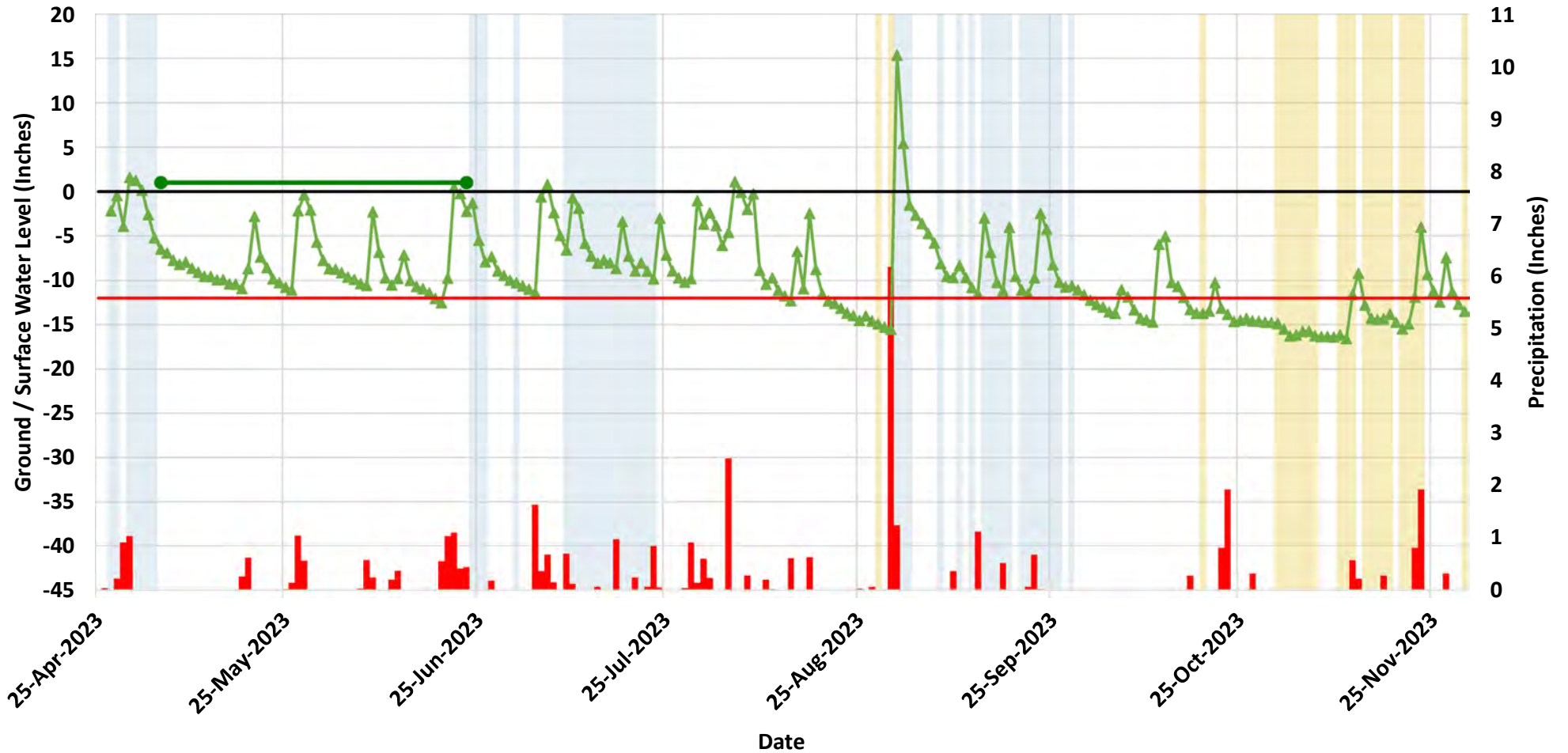


- Drier than Normal Conditions (APT)
 - Wetter than Normal Conditions (APT)
 - Onsite Rainfall
 - Gauge 13 (765536)
 - 0" Ground Surface
 - -12" Threshold
 - Gauge 13 Consecutive Days Meeting Wetland Criteria
- 25 Days, 11.9% of Growing Season

Cool Run Mitigation Bank (DRGNCW20.248)

Gauge 13 - InSitu RuggedTROLL 100 - August 1, 2023 to December 31, 2023 - One reading per day at 7:00 am

Gauge 14 - Hydrology Assessment

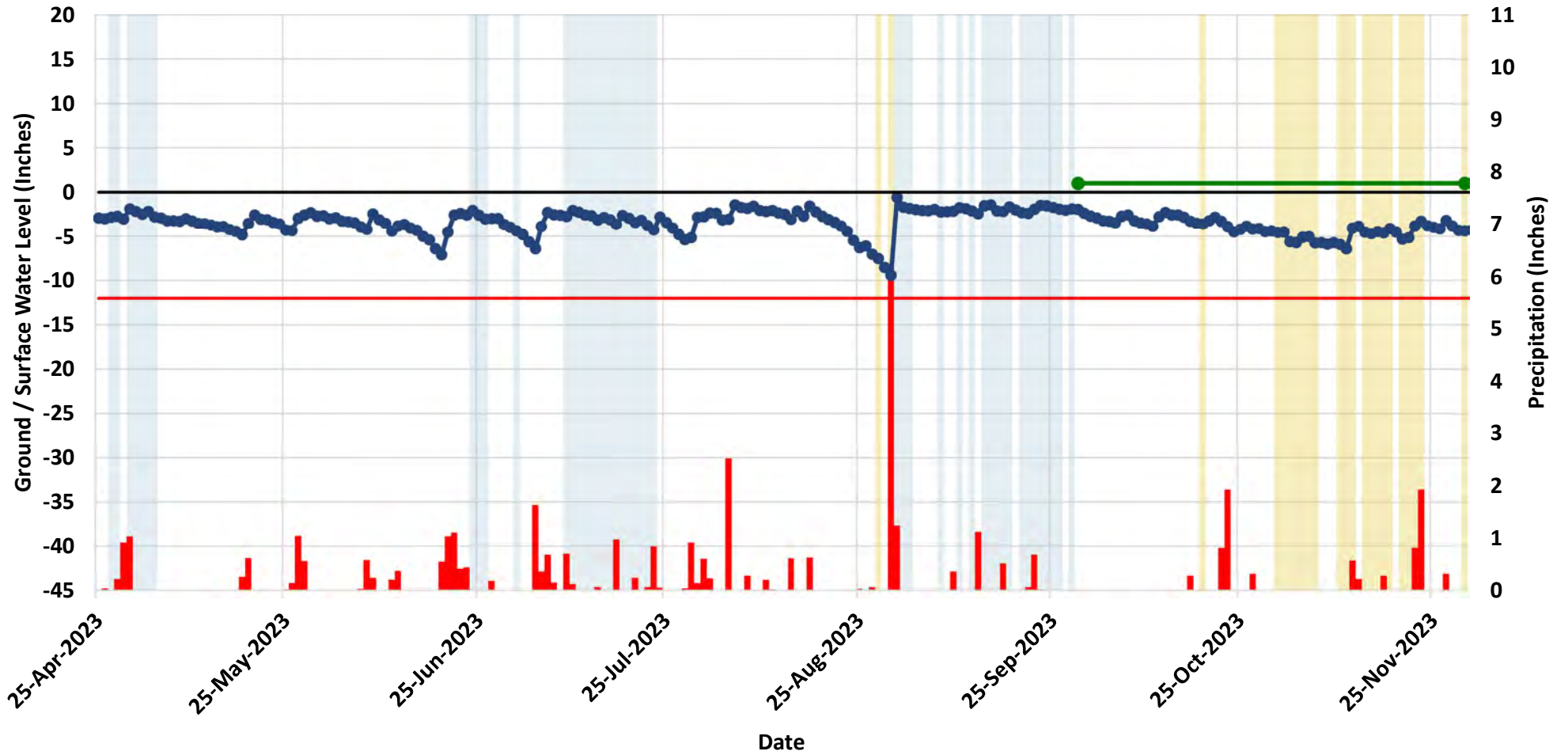


- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- Gauge 14 (768851)
- 0" Ground Surface
- 12" Threshold
- Gauge 14 Consecutive Days Meeting Wetland Criteria 50 Days, 23.8% of Growing Season

Cool Run Mitigation Bank (DRGNCW20.248)

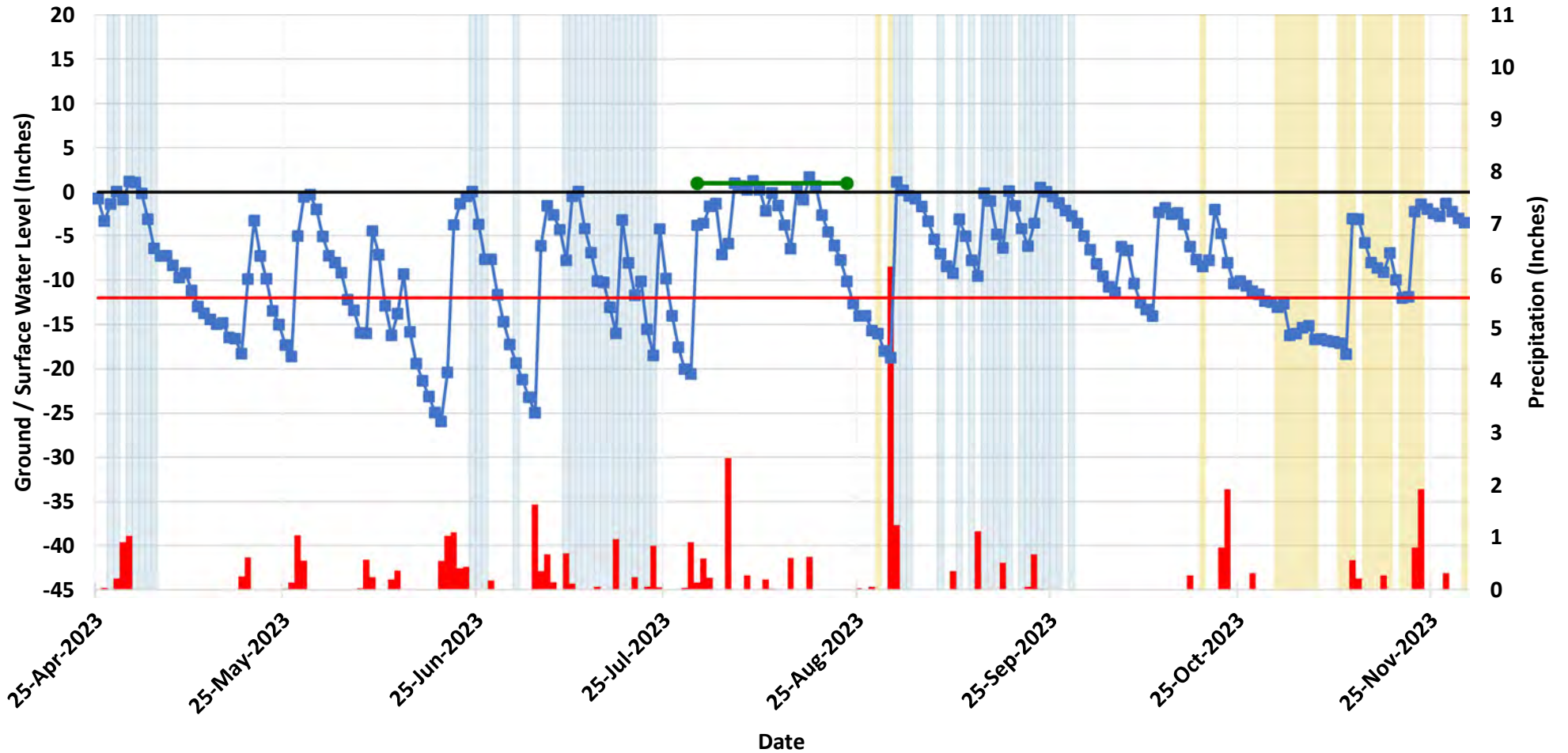
Gauge 14 - InSitu RuggedTROLL 100 - April 25, 2023 to November 30, 2023 - One reading per day at 7:00 am

Gauge 15 - Hydrology Assessment



- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- Gauge 15 (768845)
- 0" Ground Surface
- -12" Threshold
- Gauge 15 Consecutive Days Meeting Wetland Criteria 63 Days, 30% of Growing Season

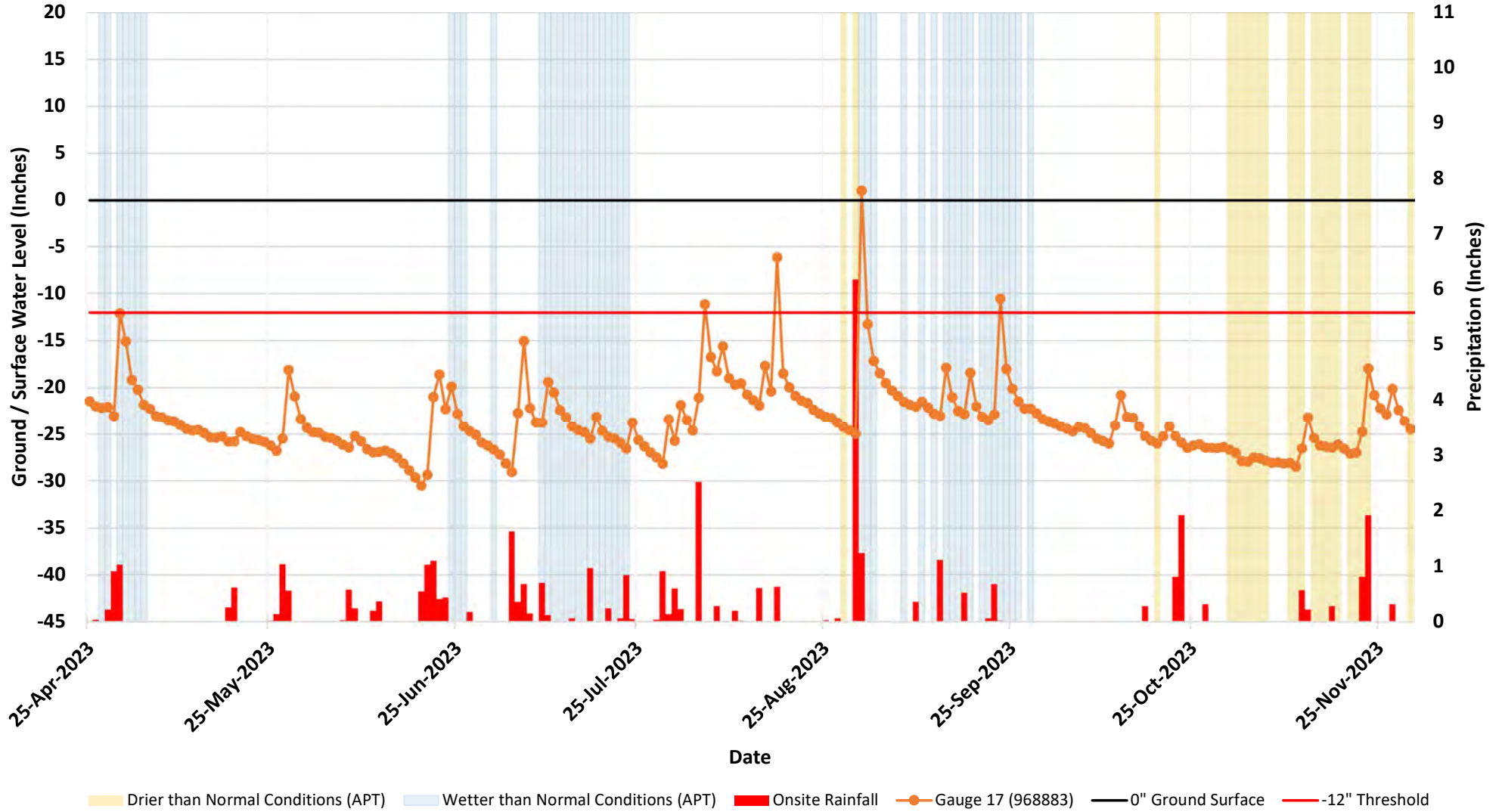
Gauge 16 - Hydrology Assessment



- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- 0" Ground Surface
- 12" Threshold
- Gauge 16 Consecutive Days Meeting Wetland Criteria

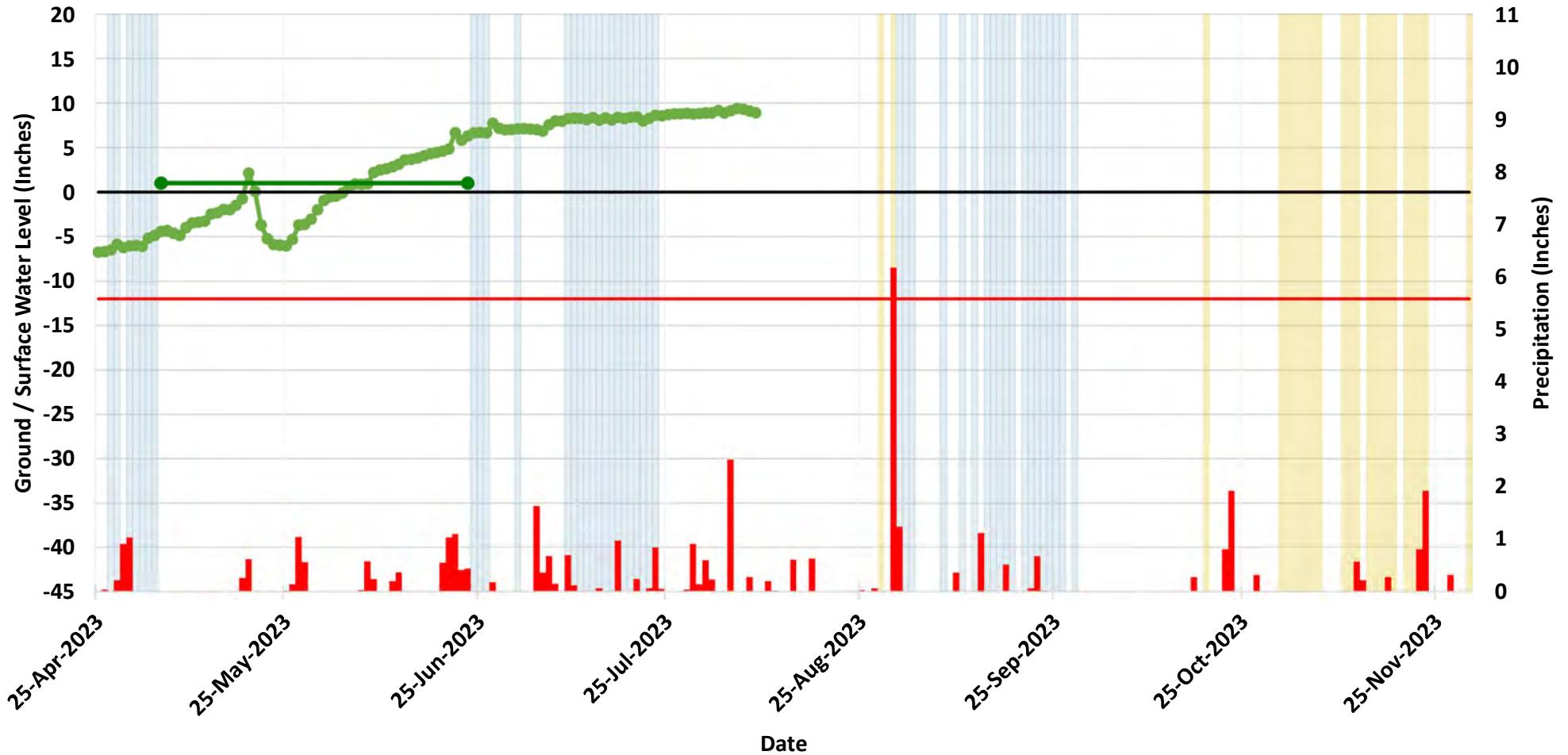
25 Days, 11.9% of Growing Season

Gauge 17 - Hydrology Assessment



1 Day Meeting Wetland Success Criteria, 0.5% of Growing Season

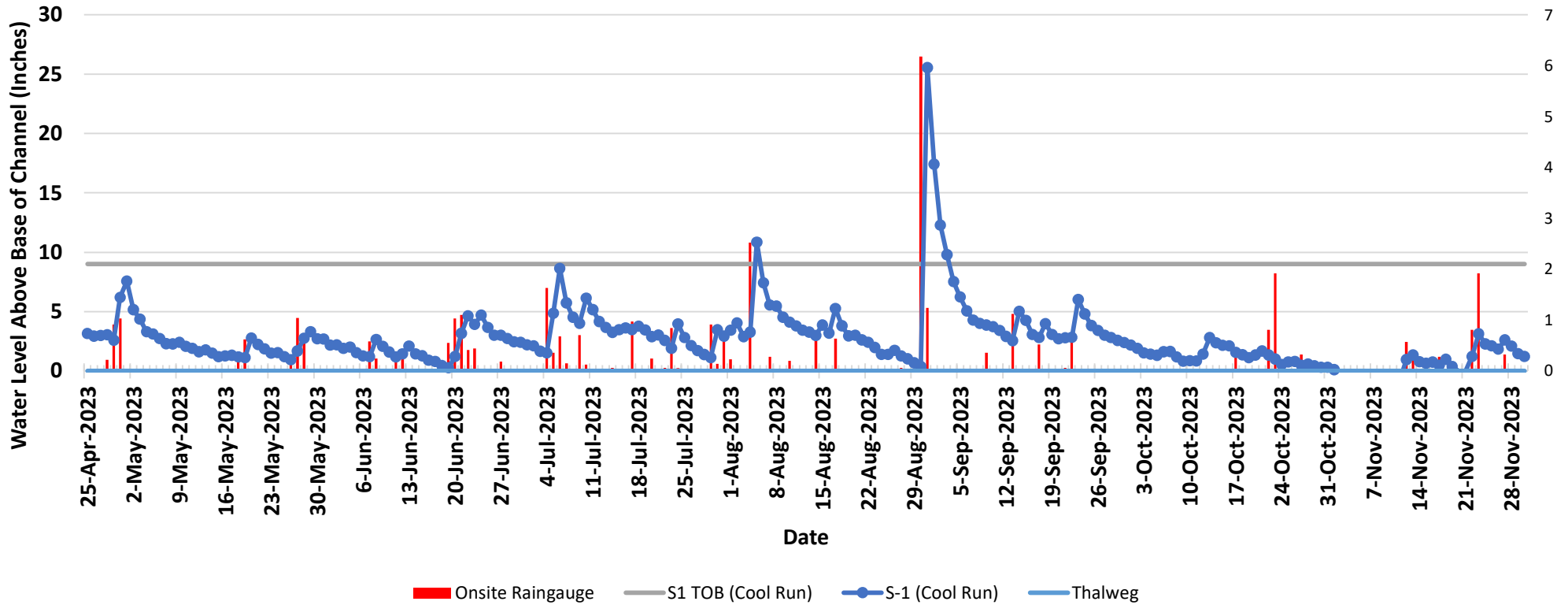
Gauge Reference - Hydrology Assessment



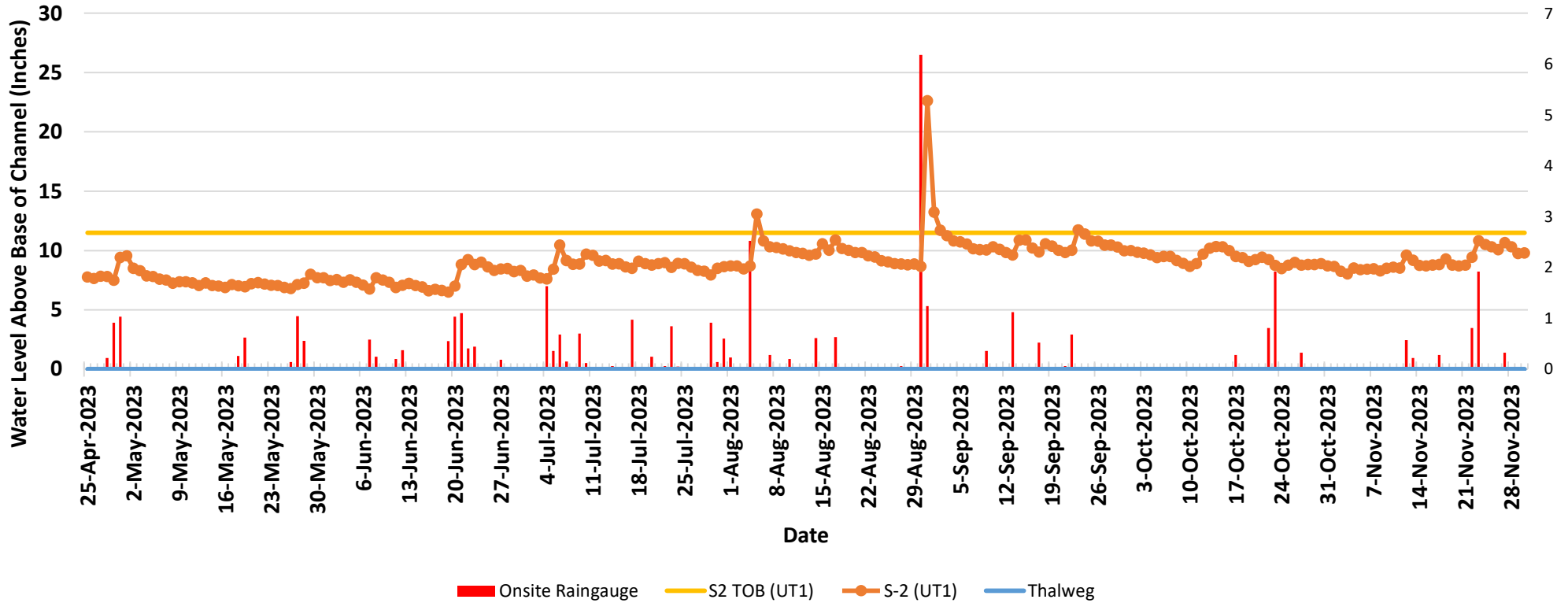
- Drier than Normal Conditions (APT)
- Wetter than Normal Conditions (APT)
- Onsite Rainfall
- CR-REF
- 0" Ground Surface
- -12" Threshold
- Ref Gauge Consecutive Days Meeting Wetland Criteria

50 Days, 23.8% of Growing Season

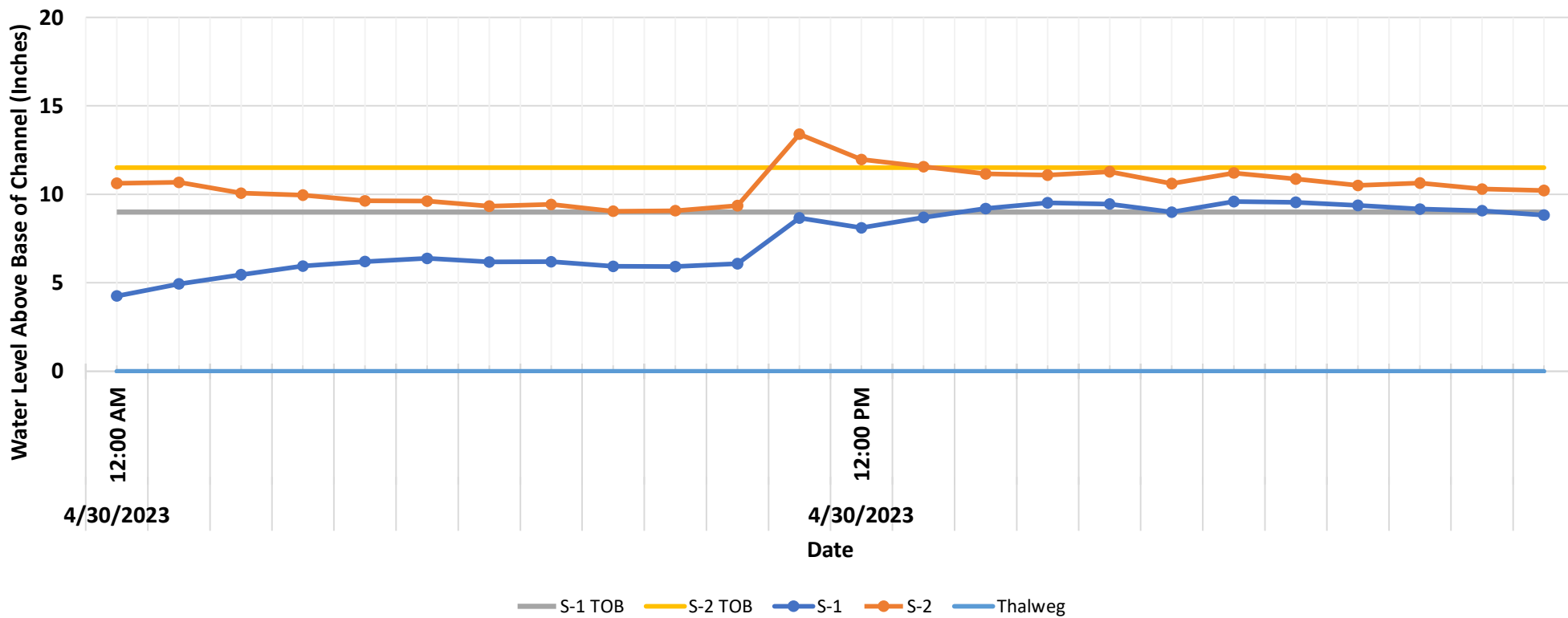
Cool Run Daily Hydrology Assessment



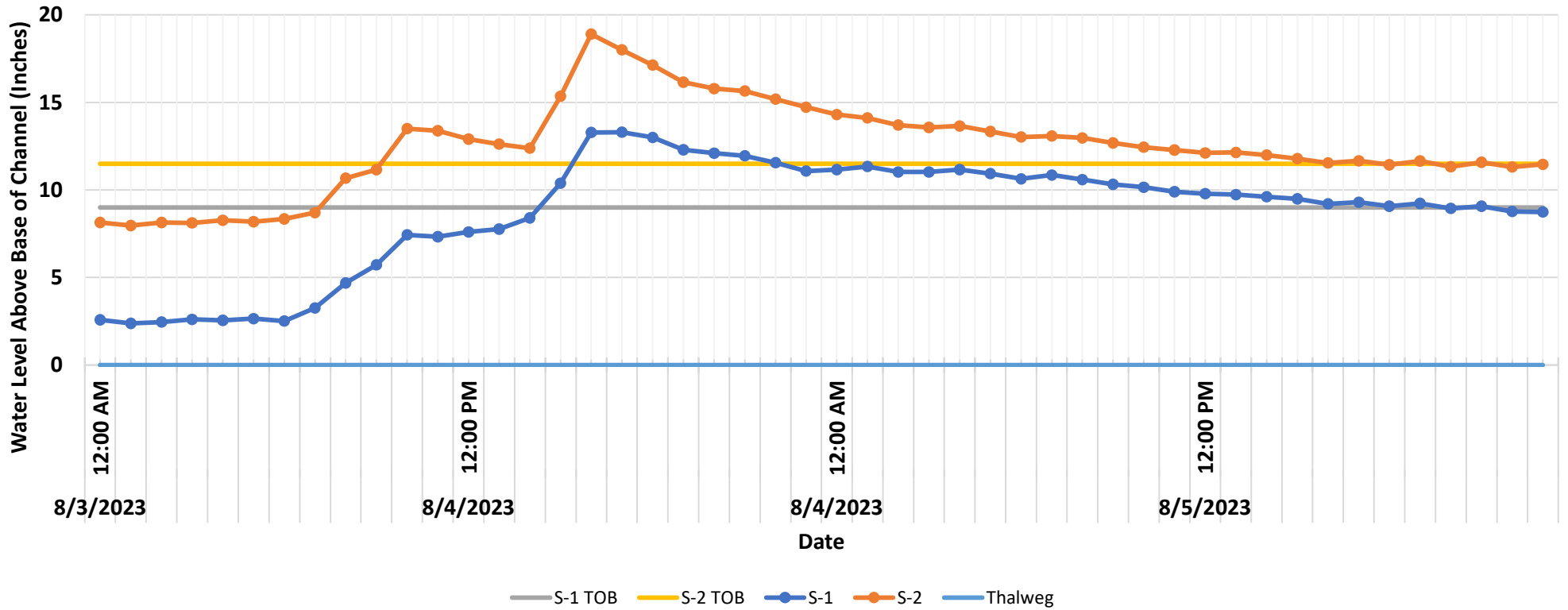
UT1 Daily Hydrology Assessment



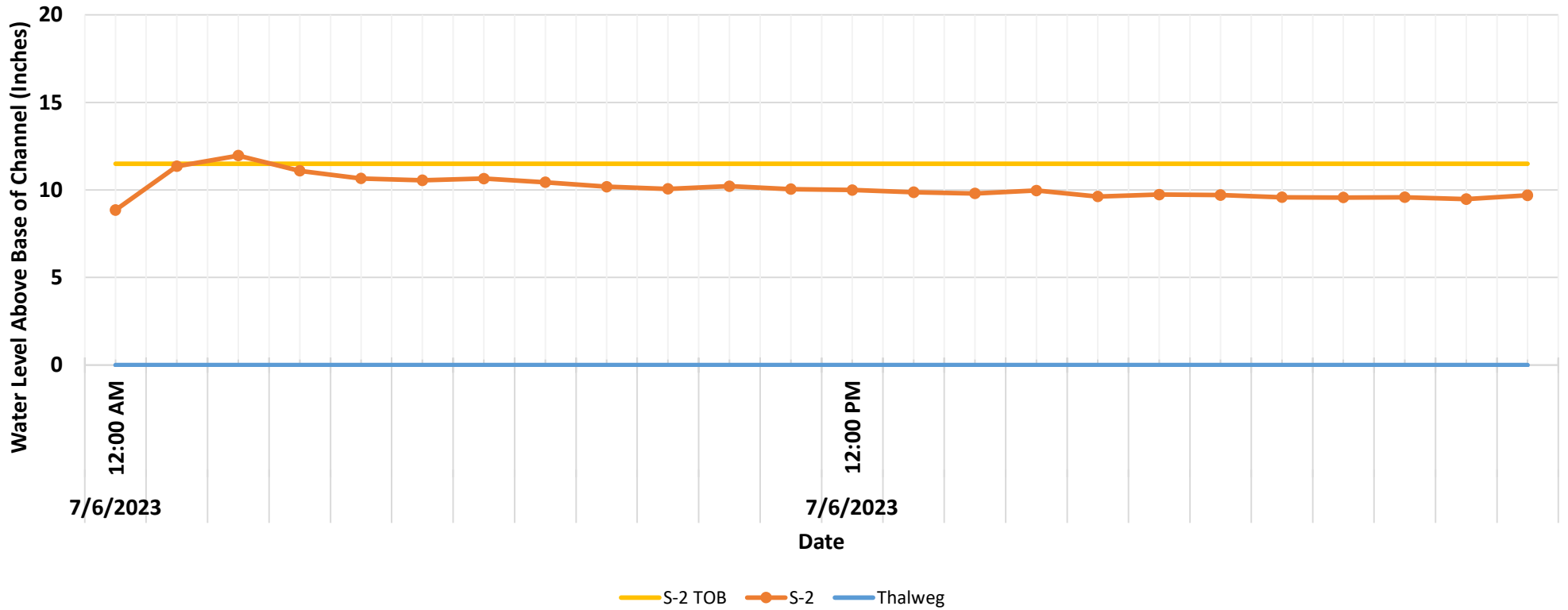
Hydrology Assessment



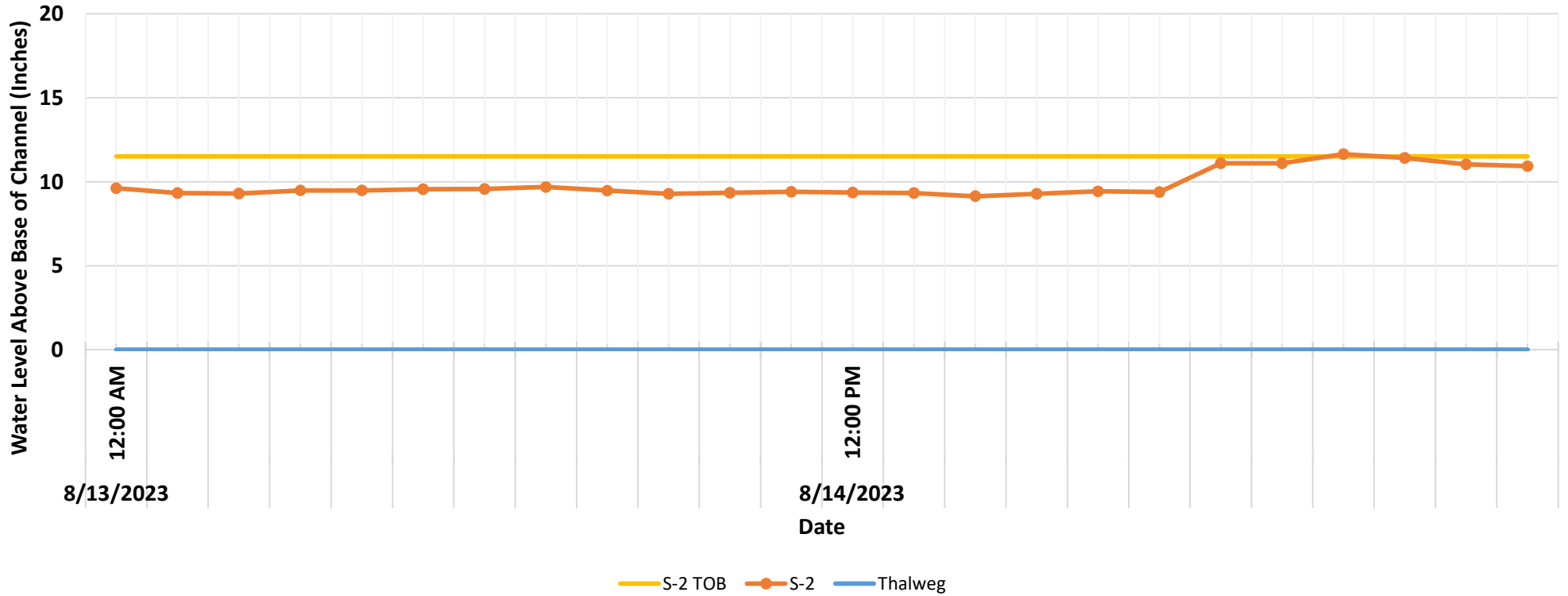
Hydrology Assessment



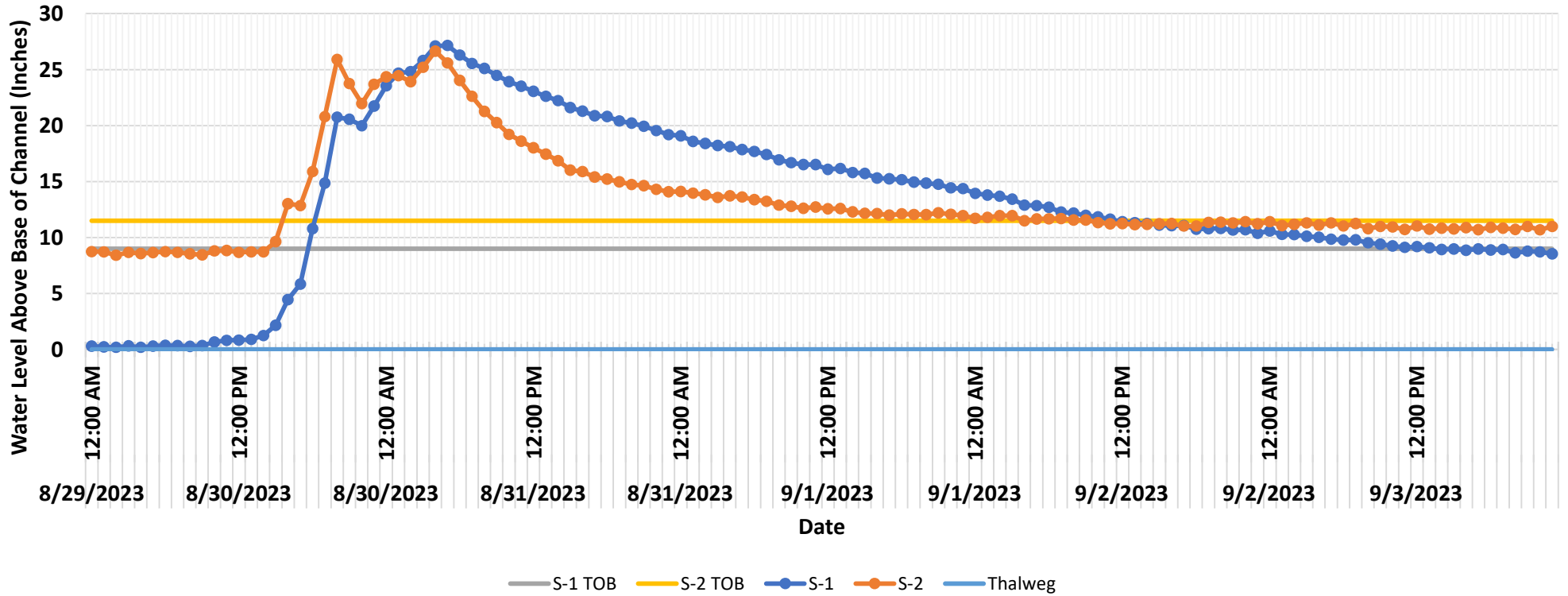
Hydrology Assessment



Hydrology Assessment



Hydrology Assessment



Appendix E Project Timeline and Contact Info

Table 16. Project Timeline

Table 17. Project Contacts

Table 16. Project Timeline

Activity or Deliverable	Data Collection Complete	Task Completion or Deliverable Submission
Project Instituted	NA	Jul-20
Mitigation Plan Approved	NA	12-July-22
Construction (Grading) Completed	NA	06-Apr-23
Planting Completed	NA	06-Apr-23
As-built Survey Completed	May-23	Jun-23
MY-0 Baseline Report	June-23	Jun-23
MY1+ Monitoring Reports	October-23	December-23
Remediation Items (e.g. beaver removal, supplements, repairs etc.)		
Encroachment		

Table 17. Project Contacts

Cool Run Site/100142	
Provider	Clearwater Mitigation Solutions 604 Macon PL Raleigh, NC 27609
Mitigation Provider POC	Kevin Yates 919-624-6901
Stream Designer	Axiom Environmental, Inc. 218 Snow Ave Raleigh, NC 27603
Primary project design POC	Grant Lewis 919-215-1693
Wetland Designer	Davey Resource Group 3805 Wrightsville Avenue, Suite 15 Wilmington, NC 28403
Primary project design POC	Wes Fryar 910-471-0018
Monitoring Performers	Davey Resource Group 3805 Wrightsville Avenue, Suite 15 Wilmington, NC 28403
Stream Monitoring POC	Davey Resource Group 3805 Wrightsville Avenue, Suite 15 Wilmington, NC 28403 Wes Fryar (910) 471-0018
Vegetation Monitoring POC	Davey Resource Group 3805 Wrightsville Avenue, Suite 15 Wilmington, NC 28403 Wes Fryar (910) 471-0018