Annual Monitoring Report

Monitoring Year 7 of 7

FINAL

Cochran Branch Stream and Wetland Restoration Site

NCDMS Contract No.: 004947

NCDMS Project No.: 95720

USACE Permit Action ID: SAW-2013-00280

DWR Project No.: 13-0188

Macon County, NC

Data Collection Complete: October 2021

Prepared for:

Division of Mitigation Services

North Carolina Department of Environment and Natural Resources
1652 Mail Service Center
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December 2021

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December 13, 2021

Paul Wiesner
NC DEQ Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

RE: Cochran Branch Stream and Wetland Restoration Site: MY7 Monitoring Report (NCDMS ID 95720)

Listed below are comments provided by DMS on November 22, 2021 regarding the Cochran Branch Stream and Wetland Restoration Site: Year 7 Monitoring Report and RES' responses.

On November 10, 2021, the Division of Mitigation Services (DMS) received the DRAFT Monitoring Year 7/ closeout report for the Cochran Branch Stream and Wetland Restoration Site from Resource Environmental Solutions, LLC (RES). The report establishes the year 7 monitoring and proposed closeout conditions at the project site.

Anticipated mitigation on the site includes 1,783 linear feet of stream restoration; 3.42 acres of wetland re-establishment; 0.82 acres of wetland re-habilitation; and 0.11 acres of wetland enhancement for a total of 1,783 Stream Mitigation Units (SMUs) (R); 4.240 Wetland Mitigation Units (WMUs) (R); and 0.055 WMUs (RE). The following are our comments on the DRAFT report:

General: In the report text, please briefly discuss the January 26, 2021 IRT site visit to the Cochran Branch site. The IRT site visit and discussion primarily focused on Parrish Branch.
This has been added to Section 1.4.

Section 1.3. Project Setting and Background: In this section, please also note that RES reverted to the mitigation plan (proposed) SMUs for the project. Wetland credits remained unchanged from the mitigation plan to MY0. Total project assets to be requested at closeout are 1,783.000 SMUs (cold) & 4.295 WMUs (riparian).
Done.

1.4.1. Vegetation: The report text notes that a total of 11 species were documented within the vegetation plots. The MY7 annual means (table 9) reports more than 11 species identified. Please review and update accordingly.
Red maple, tuliptree, and American sycamore are repeated on Table 9 so the total is not accurate.

Appendix C – Vegetation Plot Data: Please provide the DMS closeout vegetation table in the final report. This table was included in the final digital support files but was not included in the draft report.
Done.

Table 14. Verification of Bankfull Events: The last column in the table is labeled "Photo #" but it appears to be associated with the applicable monitoring year. Please review and correct. The bankfull event in 2021 should be reported as MY7.
There was no photo documentation of the bankfull event in MY7. The monitoring year in the other rows refer to which report the photos of that bankfull event are in.

Digital Support File Comments:

• Please include figures displaying the stage recorder data that was submitted in the CochranB_2021 Well Data workbook.
Done.

• Were the stage recorders mentioned above placed in the same location as the cork crest gauges? Section 2.0 indicates that the cork crest gauges remained on site. If these stage recorders were located away from the cork crest gauges, please submit features representing their locations and include these in the CCPV.
The stage recorders were installed at the same location as the cork crest gauges.

• Please review the cross-section calculations and ensure that the Omit BKF boxes are checked for points that exist outside of the main channel and have an elevation lower than the current MY's Low Bank Height elevation. This must be done before adjusting the Bankfull elevation to determine the bankfull elevation that achieves the MY0 cross sectional area.
Done.

• Please submit the workbook used to calculate metrics other than the BHR. Ensure that the omit BKF boxes are checked as needed in this workbook as well and update reported data if necessary.
Done.

• Please include the data used to create the substrate composition figures.
Done.

Cochran Branch
Macon County, North Carolina
DMS Project ID 95720

Little Tennessee River Basin
HUC 06010202040020

Prepared by:

Resource Environmental Solutions, LLC
3600 Glenwood Avenue, Suite 100
Raleigh, NC 27612
919-209-1061

Contents

1.0 PROJECT SUMMARY

1.1. Goals and Objectives

The overall goals address the stressors identified in the TLW and include the following:

- Improve water quality within the restored channel reaches and downstream watercourses by reducing sediment and nutrient inputs and increasing dissolved oxygen levels
- Improve local aquatic and terrestrial ecological function through increased stream shading, habitat complexity, and availability of organic/woody material
- Improve aquatic and benthic habitat and associated streambed form
- Improve site hydrology, wetland functions, and attenuation of flood flows
- Provide riparian area and wetland restoration with a native plant community
- Protect the site from future land impacts

The specific project objectives that are intended to target the above goals include the following:

- Implement Priority I and II restoration of 1,783 feet of stream and rehabilitation/re-establishment of 4.35 acres of wetlands
- Implement appropriate changes in dimension, pattern and/or profile to establish geomorphically stable conditions within the project reaches
- Modify degraded stream channels to enable proper sediment transport capacity and improved streambed form
- Integrate in-stream structures and native bank vegetation
- Re-grade the floodplain to remove drainage ditches, spoil berms, and overburden soil
- Plant native woody and herbaceous riparian vegetation within a minimum width of 30 feet from the edge of the restored channels and throughout the restored wetland area
- Eradicate invasive, exotic or undesirable plant species
- Install livestock exclusion fencing
- Establish a permanent conservation easement

1.2. Success Criteria

1.2.1. Morphological Parameters and Channel Stability

Restored and enhanced streams are in compliance with the standards set forth in the USACE 2003 Stream Mitigation Guidelines and the "Ecosystem Enhancement Program Monitoring Requirements and Performance Standards for Stream and Wetland Mitigation" dated November 7, 2011. Restored and enhanced streams should demonstrate morphologic stability to be considered successful. Stability does not equate to an absence of change, but rather to sustainable rates of change or stable patterns of variation. Restored streams often demonstrate some level of initial adjustment in the several months that follow construction and some change/variation subsequent to that is also to be expected. However, the observed change should not be unidirectional such that it represents a robust trend. If some trend is evident, it should be very modest or indicate migration to a stable form.

> **Dimension -** Cross-section measurements should indicate little change from the as-built cross-sections. If changes do occur, they will be evaluated to determine whether the adjustments are associated with increased stability or whether they indicate movement towards an unstable condition.
>
> **Pattern and Profile -** Visual inspection of the pattern and profile should indicate stability with little deviation from as-built conditions for the restored stream. Pool depths may vary from year to year, but the majority should maintain depths sufficient to be observed as distinct features. The pools should maintain their depth with flatter water surface slopes,

while the riffles should remain shallower and steeper. Pattern and profile measurements will not be collected unless conditions seem to indicate that a detectable and detrimental change appears to have occurred.

Substrate - Calculated D_{50} and D_{84} values should indicate coarser size class distributions of bed materials in riffles and finer size class distributions in pools. The majority of riffle pebble counts should indicate maintenance or coarsening of substrate size class distributions. Generally, it is anticipated that the bed material will coarsen over time.

Sediment Transport - Depositional features should be consistent with a stable stream that is effectively managing its sediment load. Point bar and inner berm features, if present, should develop without excessive encroachment of the channel. Isolated development of robust (i.e. comprised of coarse material and/or vegetated actively diverting flow) mid-channel or lateral bars will be acceptable. Likewise, development of a higher number of mid-channel or lateral bars that are minor in terms of their permanency such that profile measurements do not indicate systemic aggradation will be acceptable, but trends in the development of robust mid-channel or alternating bar features will be considered a destabilizing condition and may require intervention or have success implications.

1.2.2. Surface Water Hydrology

Monitoring of stream surface water stages should indicate recurrence of bankfull flow on average every 1 to 2 years. At a minimum, throughout the monitoring period, the surface water stage should achieve bankfull or greater elevations at least twice. The bankfull events must occur during separate monitoring years.

1.2.3. Groundwater Hydrology

The USACE defines minimum hydrology for jurisdictional wetlands to be saturation within 12 inches of the surface for at least 5% of the growing season if soils and vegetation meet jurisdictional criteria. Given that hydric soils are present throughout the restoration area but that wetland vegetation will be newly established, it is reasonable to set the minimum hydrology threshold slightly above the jurisdictional minimum threshold. As such, the minimum performance standard is set to provide saturated soils within 12 inches of the surface for at least eight percent (8%) of the growing season under average climatic conditions. The reference wetland site used up through 2017 was the NCDMS Cat Creek Stream and Wetland Restoration Site – NCDMS Project # 71 – located east of Franklin in Macon County, NC. In January 2018, RES made a site visit to Cat Creek to replace the wetland reference gauge, but it was determined that it was no longer a representative reference gauge due to its location in a beaver pond. Because of the continued success of the wetland gauges on the Cochran Branch Site (including those gauges outside of the wetland crediting area), RES deemed it unnecessary to find a new location for the reference gauge. The growing season for the site was based on the Natural Resource Conservation Service (NRCS) WETS dataset for Macon County (http://agacis.rcc-acis.org/37113/wets). The Macon County dataset is based on a site with elevations roughly the same as the project site. According to NRCS, the growing season for Macon County is defined to be the period with a 50% probability that the daily minimum temperature is higher than 28°F. At the project site, this period extends from April 16th to October 19th for a total of 187 days. Based on this, wetland hydrology success will be achieved if the water table is within 12 inches of the soil surface for one or more periods of at least 15 consecutive days during the growing season.

1.2.4. Vegetation

Riparian vegetation monitoring shall be conducted for a minimum of seven years to ensure that success criteria are met per USACE guidelines. Accordingly, success criteria will consist of a minimum survival of 260 planted stems per acre by the end of the Year 5 monitoring period and a minimum of 210 planted stems per acre at the end of Year 7. If monitoring indicates either that the specified survival rate is not being met or the development of detrimental conditions (i.e., invasive species, diseased vegetation), appropriate corrective actions will be developed and implemented. Additionally, planted vegetation must average 8 feet in height in each plot at year 7 (as defined in the USACE 2003). If this performance standard is met by year 5 and stem density is trending toward success (i.e., no less than 260 five-year old stems/acre) monitoring of vegetation on the site may be terminated provided written approval is given by the USACE in consultation with the North Carolina Interagency Review Team (NCIRT).

1.3. Project Setting and Background

The Cochran Branch Mitigation Project (The Site) is located approximately 6 miles northwest of Franklin, North Carolina at latitude 35°12'52" N and longitude 83°29'20" W. The Site encompasses approximately 10 acres of agricultural land and consists of two streams, Cochran Branch and Parrish Branch, along with 4.35 acres of wetlands on the Cochran Branch floodplain. The Site lies within the Little Tennessee River Watershed N.C. Division of Water Resources (DWR) sub-basin 04-04-01 and local HUC 06010202040020. The project is located within the NCDMS Iotla Creek targeted local watershed (TLW) and within the Franklin to Fontana local watershed plan (LWP). Cochran Branch drains to Burningtown Creek approximately 0.5 miles downstream of the project. Burningtown Creek is classified as B;Tr by NCDEQ.

Following 2016 monitoring the NCIRT requested a review of the differential between the Approved Mitigation Plan and Baseline Monitoring Report. The table below details the discrepancies by reach. The cause of increased baseline SMUs is survey methodology (thalweg vs. centerline) as well as construction field adjustments. The Mitigation Plan lengths were based on centerline. Wetland credits are unchanged from Mitigation Plan to Baseline Monitoring Report. RES reverted to the Mitigation Plan (proposed) SMUs. Wetland credits remained unchanged from the Mitigation Plan to MY0. Total project assets to be requested at closeout are 1,783.000 Cold SMUs and 4.295 Riparian WMUs.

Reach	Mitigation Type*	Proposed Length (LF)	Mitigation Ratio	Proposed SMUs	Baseline SMUs
Cochran Branch	P1 Restoration	1,387	1:1	1,387	1,418
Parrish Branch	P1 Restoration	396	1:1	396	402
	Total	**1,783**		**1,783**	**1,820**

*P1=Priority 1

**The contracted amount of credits for this Site was 1,756 SMUs

1.4. Project Performance

Monitoring Year 7 (MY7) data was completed in October 2021. Monitoring activities included visual assessment of all reaches and the surrounding easement, collection of images at eight permanent photo stations, and inventory of eight permanent vegetation monitoring plots. Monitoring activities also included stream monitoring consisting of the nine cross-sections and five pebble counts. On January 26, 2021, RES and DMS met with IRT on-site. The purpose of the site visit was to observe Parrish Branch during the winter. At the time of the site visit Parrish Branch was flowing in a single thread for the majority of the reach. Conservation easement signage was assessed, and no repairs were deemed necessary ensuring that the site is properly marked for closeout. DEQ stewardship visited the project in

October 2021 and requested the removal of an old livestock feeder which was left in the easement. RES will remove this feeder prior to closeout. The Site has met all stream, wetland, and vegetation success criteria and is recommended for closeout.

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

1.4.1. Vegetation

Visual assessment of vegetation outside of the monitoring plots (**Appendix B; Table 6**) indicates that the herbaceous vegetation is becoming well established throughout the project. Treatments of Chinese privet (*Ligustrum sinense*) and multiflora rose (*Rosa multiflora*) have been effective along the boundary of the easement. A few multiflora rose patches were treated throughout the easement in July 2020.

Monitoring of the eight permanent vegetation plots was completed in October 2021. Summary tables and photographs associated with MY7 monitoring are located in Appendix C. MY7 monitoring data indicates that seven of the eight plots met final success criteria of 210 planted stems per acre. Plot 7 had 202 planted stems per acre, but with volunteer red maple (*Acer rubrum)* present, the total stems per acre reached 243. Planted stem densities among plots ranged from 202 to 607 planted stems per acre with an annual mean of 379 planted stems per acre across all plots. A total of 11 species were documented within the plots. The average tree height observed was 7.3 feet. Some of the wetland area plots (especially Plot 7) are showing below average stem counts and heights for MY7. RES believes this is due to the short growing season and year-round high-water table which is more conducive to mountain bog and fen community.

1.4.2. Stream Geomorphology

Visual assessment of the stream channel was performed to document signs of instability, such as eroding banks, structural instability, or excessive sedimentation. In April 2019 and July 2020, RES treated the vegetation in Parrish Branch with aquatic safe herbicide. The goal was to remove the wetland vegetation that was growing in the channel and causing aggradation. Per IRT request, RES did not treat the vegetation in the stream in MY7. During the October field work and on all cross-section plots (**Appendix D**), it was apparent that the herbicidal treatment of the vegetation in Parrish Branch in previous years was effective. RES also heavily livestaked the banks of the reach in 2020 to further discourage channel vegetation growth. Parrish Branch visual assessments and cross section plots continue to exhibit that this reach is no longer a problem area in MY7.

Geomorphic data for MY7 was collected in October 2021. Summary tables and cross-section plots related to stream morphology are located in Appendix D. For the Cochran Branch (1B) reach, cross-sectional overlays showed minimal dimensional change between MY5 and MY7 data collection efforts. As for Parrish Branch, between MY6 and MY7, it appears that aggradation has decreased and channel formation has improved for XS7, 8, and 9 since the additional work done in MY5 (**Appendix B; Table 11a**). In MY7, all measurements are based on fixed baseline cross sectional area; therefore, bankfull elevation was adjusted for each cross-section to achieve a cross-sectional area equivalent to the reported baseline cross-sectional area. None of the riffle cross sections exceeded a 1.2 BHR.

Substrate monitoring was performed during MY7. Pebble count d50 was medium gravel for Cochran Branch, and silt/sand for Parrish Branch.

The bank pin arrays indicate that no erosion is taking place in the meanders during MY7 (**Appendix D; Table 12**).

1.4.3. Groundwater and Stream Hydrology

During MY7, eight of the eight groundwater monitoring wells met the eight percent hydroperiod success criteria (**Appendix E; Table 16**). All well hydroperiods were 100 percent of the growing season, with the exception of groundwater well one (GW-1), which had a hydroperiod of 53 percent of the growing season.

One bankfull event was observed in MY7. The crest gauge on Cochran Branch recorded an event that was 1.04 feet above the top of bank. Hydrology data can be found in **Appendix E**.

2.0 METHODS

This report presents the results of the Monitoring Year 7 (MY7) visual, hydrologic, morphological, and vegetation data. Permanent photo station photos were collected in October 2021. Additional photos of vegetation or stream problem areas were taken as needed.

Geomorphic measurements were taken during low flow conditions using a Topcon GTS-312 Total Station. Three-dimensional coordinates associated with cross-section data was collected in the field and geo-referenced (NAD83 State Plane feet FIPS 3200). Morphological data was collected at 9 cross-sections. Survey data was imported into CAD, ArcGIS®, and Microsoft Excel® for data processing and analysis. Channel substrate was characterized using a Wolman Pebble Count as outlined in Harrelson et al. (1994) and processed using Microsoft Excel.

Vegetation success is being monitored at eight permanent monitoring plots. Vegetation monitoring follows the CVS-EEP Level 2 Protocol for Recording Vegetation, version 4.2 (Lee et al. 2008) and includes analysis of species composition and density of planted species. Data is processed using the CVS data entry tool. In the field, the four corners of each plot were permanently marked with rebar and photos of each plot taken from the origin each monitoring year.

Precipitation data was collected using an Onset HOBO Data Logging Rain Gauge. Groundwater for hydrologic success of restored wetlands was monitored using eight HOBO U20 Water Level Loggers. An additional logger was installed on site, above ground, for use as a barometric reference. Data loggers collected depth to groundwater daily and all data were processed using HOBOware and analyzed using Microsoft Excel. Bankfull events were documented with two crest gauges, one each being located on Cochran Branch and Parrish Branch. During quarterly visits to the site, the height of the corkline was recorded.

3.0 REFERENCES

Environmental Banc & Exchange, LLC. 2014. Cochran Branch, Final Mitigation Plan, Macon County, North Carolina. NCEEP Project No. 95720

Harrelson, Cheryl, C. Rawlins and J. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Gen. Tech. Rep. RM-245. Rocky Mountain Forest and Range Experiment Station. USDA Forest Service. Fort Collins, Colorado

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. http://cvs.bio.unc.edu/methods.htm; accessed November 2008.

USACE (U.S. Army Corps of Engineers). 2003. Stream Mitigation Guidelines. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, North Carolina Wildlife Resources Commission, North Carolina Department of Environment and Natural Resources-Division of Water Quality. Wilmington District.

Appendix A
General Tables and Figures

Table 1. Project Components and Mitigation Credits
Cochran Stream and Wetland Restoration Project
Mitigation Credits

	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	**1,783**		**4.240**	**0.055**			-	-	-

Project Components

Project Component -or- Reach ID	Stationing/Location	Existing Footage/Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage or Acreage[1]	Mitigation Ratio
Cochran Branch	100+60 - 115+05	1,332	PI	R	1,387	1:1
Parrish Branch	200+15 - 204+11	232	PII	R	396	1:1
Wetland Area 1		-	Re-Est.	R	3.33	1:1
Wetland Area 1		0.88	Re-Hab.	R	0.82	1:1
Wetland Area 2		0.11	Enh.	RE	0.11	2:1
Wetland Area 3		-	Re-Est.	R	0.09	1:1

Component Summation

Restoration Level	Stream[1] (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	1,783	-	4.24	-	-	-
Enhancement	-	-	0.11	-	-	-
Enhancement I	-		-	-	-	-
Enhancement II	-	-	-	-	-	-
Creation	-	-	-	-	-	-
Preservation	-	-	-	-	-	-
Preservation	-	-	-	-	-	-

BMP Elements

Element[2]	Location	Purpose/Function	Notes
FB	Entire Site	Protect Stream	

[1]Restoration footage accounts for no credits in crossings, exclusions, and powerline ROWs.

[2]BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer

Note: Stream credit calculations were originally calculated along the as-built thalweg. Based on the April 3, 2017 IRT Credit Release Meeting, these stream credits have been reverted back to the amounts in the IRT approved mitigation plan.

Table 2. Project Activity and Reporting History Cochran Stream and Wetland Restoration Project		
Activity or Report	**Data Collection Complete**	**Completion or Delivery**
Mitigation Plan	Aug - 2014	Sept - 2014
Final Design - Construction Plans	Oct - 2014	Oct - 2014
Construction	N/A	May - 2015
Permanent Seed Mix Applied	May - 2015	May - 2015
Live Stake and Bare Root Plantings	May - 2015	May - 2015
Baseline Monitoring Document (Year 0 Monitoring - Baseline)	Jun - 2015	Aug - 2015
Invasive-Exotic Vegetation Treatment	-	Jun - 2015
Year 1 Monitoring	Dec - 2015	Jan - 2016
Invasive-Exotic Vegetation Treatment	-	Feb - 2016
Invasive-Exotic Vegetation Treatment	-	Jun - 2016
Year 2 Monitoring	Mar - 2016	Nov - 2016
Year 3 Monitoring	Stream: Oct - 2017 Vegetation: Oct - 2017	Jan - 2018
Invasive-Exotic Vegetation Treatment	-	July - 2018
Year 4 Monitoring	Stream: Oct - 2018 Vegetation: Oct - 2018	Jan - 2019
Parrish Branch Channel Vegetation Treatment & Buffer Planting	-	April - 2019
Year 5 Monitoring	Stream: Oct - 2019 Vegetation: Oct - 2019	Jan - 2020
Parrish Branch Supplemental Livestaking	-	Jul - 2020
Channel Vegetation & Invasive-Exotic Vegetation Treatment	-	Jul - 2020
Year 6 Monitoring	Stream: Oct - 2019 Vegetation: Oct - 2019	Nov - 2020
Year 7 Monitoring	Stream: Oct - 2021 Vegetation: Oct - 2021	Nov - 2021

Table 3. Project Contacts	
Cochran Stream and Wetland Restoration Project	
Prime Contractor	Resource Environmental Solutions, LLC 3600 Glenwood Ave, Suite 100 Raleigh, North Carolina 27612 Daniel Ingram (919) 209-1056
Designer	Wolf Creek Engineering 12 1/2 Wall Street Suite C Asheville, North Carolina 28801 S. Grant Ginn (828) 449-1930
Construction Contractor	Northstate Environmental 2889 Lowery Street Winston Salem, North Carolina 27101 Darrell Westmoreland (336) 725-2010
Seeding Contractor	Northstate Environmental 2889 Lowery Street Winston Salem, North Carolina 27101 Darrell Westmoreland (336) 725-2010
Planting Contractor	Resource Environmental Solutions, LLC 3600 Glenwood Ave, Suite 100 Raleigh, North Carolina 27612 David Godley (919) 209-1053
As-built Surveys	Kee Mapping and Surveying PO Box 2566 Asheville, North Carolina 28802 Phillip B. Key (828) 575-9021
Seeding Mix Source	Northstate Environmental 2889 Lowery Street Winston Salem, North Carolina 27101 Darrell Westmoreland (336) 725-2010
Bare Root Seedlings	Arborgen 5594 Higway 38 South Blenheim, SC 29516 (843)528-9669
	North Carolina Foresty Claridge Nursery 762 Claridge Nursery Road Goldsboro, North Carolina 27530 (919) 731-7988
Live Stakes	Foggy Mountain Nursery 2251 Ed Little Road Creston, North Carolina 28643 (336) 384-5323
Monitoring Performers (MY0-MY2) 2015 - 2016	Equinox Environmental 37 Haywood St. Asheville, North Carolina 28802 Drew Alderman (828) 253-6856
Monitoring Performers (MY3+) 2017+	Resource Environmental Solutions, LLC 3600 Glenwood Ave, Suite 100 Raleigh, North Carolina 27612 Ryan Medric (919) 741-6268
Exotic Invasive Vegetation Treatment Contractor	Resource Environmental Solutions, LLC 3600 Glenwood Ave, Suite 100 Raleigh, North Carolina 27612 Brian Hockett (919) 209-1061

Table 4. Project Baseline Information and Attributes

Project Information

Project Name	Cochran Branch
County	Macon County
Project Area (acres)	10.06
Project Coordinates (latitude and longitude)	35°12'52.03" N, 83°29'20.10" W

Project Watershed Summary Information

Physiographic Province		Blue Ridge	
River Basin		Little Tennessee	
USGS Hydrologic Unit 8-digit	06010203	USGS Hydrologic Unit 14-Digit	6010202040020
DWQ Sub-basin		40-04-01	
Project Drainage Area (acres)		811	
Project Drainage Area Percentage of Impervious Area		<5%	
CGIA Land Use Classification		2.01.03 Hay and Pasture Land	

Reach Summary Information

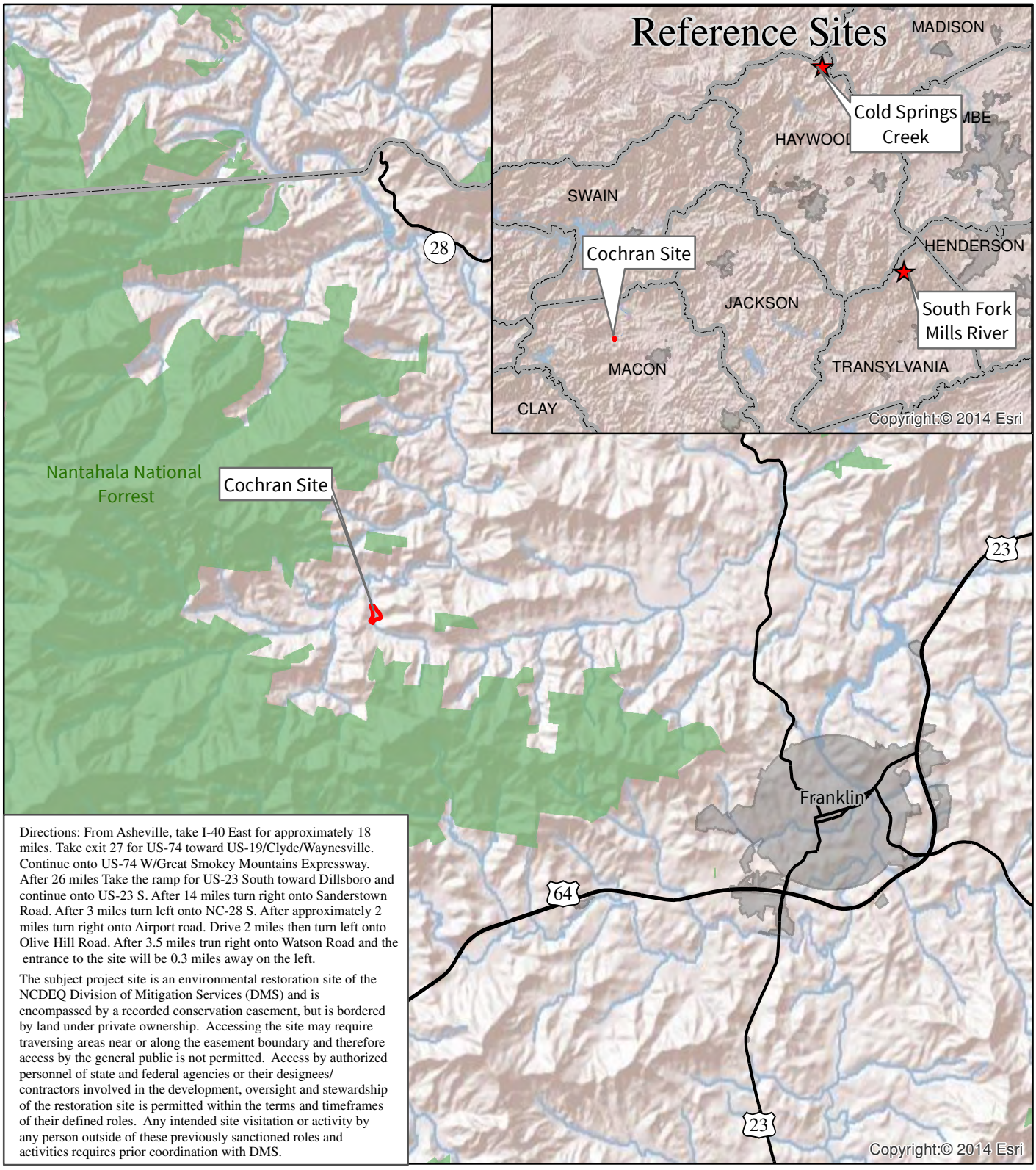
Parameters	Cochran Branch	Parrish Branch			
Length of reach (linear feet)	1332	232			
Valley classification (Rosgen)	II	II			
Drainage area	1.25	0.11			
NCDWQ stream identification score	48	40			
NCDWQ Water Quality Classification	B, Tr	B, Tr			
Morphological Description (stream type) (Rosgen)	G4	G4			
Evolutionary trend (Rosgen)	G→ F → C → E	G→ F → B			
Underlying mapped soils	NkA	NkA, ScC			
Drainage class	Verry Poorly Drained	Very Poorly Drained, Mod Well Drained			
Soil Hydric status	Hydric	Hydric, Non-Hydric			
Slope	0.7%	4.2%			
FEMA classification	N/A	N/A			
Native vegetation community	Agricultural	Agricultural			
Percent composition of exotic invasive vegetation	6%	0%			

Wetland Summary Information

Parameters	A	B	C	D	E
Area (Acres)	4.24	0.11			
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Non-Riverine	Riparian Non-Riverine			
Mapped Soil Series	NkA	NkA			
Drainage class	Verry Poorly Drained	Verry Poorly Drained			
Soil Hydric Status	Hydric	Hydric			
Source of Hydrology	Groundwater	Groundwater			
Previous Hydrologic Impairment	Dredging/Ditching	Dredging/Ditching			
Native vegetation community	Montane Alluvial Forest	Montane Alluvial Forest			
Percent composition of exotic invasive vegetation	0%	0%			

Regulatory Considerations

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States – Section 404	Yes	Yes	PCN 27 (SAW-2013-00280)
Waters of the United States – Section 401	Yes	Yes	401 Certification (DWR#-13-0188)
Endangered Species Act	No	Yes	ERTR
Historic Preservation Act	No	Yes	ERTR
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	
FEMA Floodplain Compliance	N/A	N/A	
Essential Fisheries Habitat	N/A	N./A	



Directions: From Asheville, take I-40 East for approximately 18 miles. Take exit 27 for US-74 toward US-19/Clyde/Waynesville. Continue onto US-74 W/Great Smokey Mountains Expressway. After 26 miles Take the ramp for US-23 South toward Dillsboro and continue onto US-23 S. After 14 miles turn right onto Sanderstown Road. After 3 miles turn left onto NC-28 S. After approximately 2 miles turn right onto Airport road. Drive 2 miles then turn left onto Olive Hill Road. After 3.5 miles trun right onto Watson Road and the entrance to the site will be 0.3 miles away on the left.

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

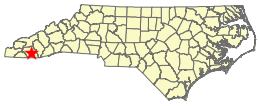


Figure 1: Vicinity Map

Cochran Branch

Project No. 95720

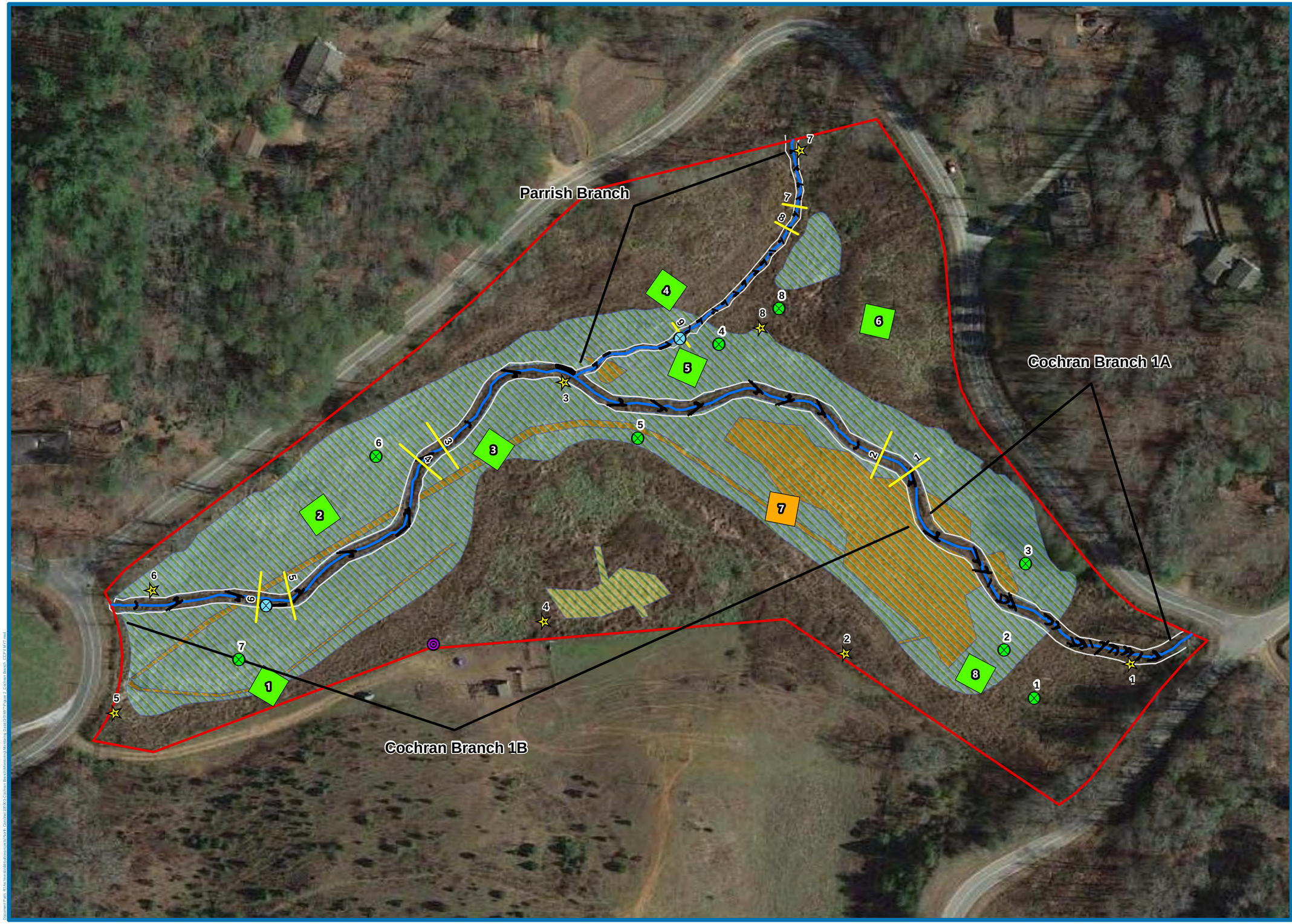
Macon County, North Carolina

Notes: Conservation Easement from Key Mapping & Survey, P.A.

Miles

0 1.5 3

Appendix B
Visual Assessment Data



res

N E S W

0 50 100

Feet

1 inch = 100 feet

Figure 2

Cochran Branch Stream Restoration Project MY7 2021

Current Conditions Plan View

Date: 11/10/2021	Drawn by: RTM

LEGEND

- Conservation Easement

Wetland Mitigation

- Enhancement
- Re-establishment
- Re-habilitation

Vegetation Plot

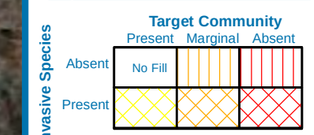
- >210 stems/acre
- <210 stems/acre

- Stream Restoration
- Top of Bank
- Structure
- Cross Section
- Photo Station
- Rain Gauge
- Crest Gauge

Well Hydroperiod

- >8%

Vegetation Condition Assessment



Document Path: R:\Active\ncdot\projects\north_Carolina\30923 Cochran Branch\Monitoring\Mapping Data\DSM\FFigure 2_Cochran Branch_CCPv1MY7.mxd

Table 5. Visual Stream Morphology Stability Assessment
Cochran Stream and Wetland Restoration Project - Cochran Branch
Assessed Length 1,418 feet | Date Assessed: 10/21/2021

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

Table 5 Cont'd. Visual Stream Morphology Stability Assessment
Cochran Stream and Wetland Restoration Project - Parrish Branch
Assessed Length 402 feet | Date Assessed: 10/21/2021

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run Units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	22	22			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth≥ 1.6).	22	22			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	22	22			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	22	22			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	22	22			100%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	19	19			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	19	19			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	19	19			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence doesNOT exceed 15%.	19	19			100%			
	4. Habitat	Pool forming structures maintaining~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	19	19			100%			

Table 6. Vegetation Condition Assessment
Cochran Stream and Wetland Restoration Project
Date Assessed: 10/21/2021

Planted Acreage : 10.05

Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	N/A	0	0.00	0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	N/A	0	0.00	0%
		Totals	0	0.00	0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	N/A	0	0.00	0%
		Cumulative Totals	0	0.00	0%

Easement Acreage : 10.05

Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	N/A	0	0.00	0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	N/A	0	0.00	0%

N/A - Item does not apply.

Cochran Branch MY7 2021 Photo Station Photos

Cochran Branch Reach 1a – Permanent Photo Station 1
Station 101+33 – Downstream
October 21, 2021

Cochran Branch Reach 1a – Permanent Photo Station 1
Station 101+33 – Upstream
October 21, 2021

Cochran Branch MY7 2021 Photo Station Photos

Cochran Branch – Permanent Photo Station 2
East 95°
October 21, 2021

Cochran Branch – Permanent Photo Station 3
Station 108+87 – Upstream
October 21, 2021

Cochran Branch MY7 2021 Photo Station Photos

Parrish Branch – Permanent Photo Station 3
Station 108+87 – Downstream
October 21, 2021

Cochran Branch – Permanent Photo Station 4
South Southeast 160°
October 21, 2021

Cochran Branch MY7 2021 Photo Station Photos

Cochran Branch – Permanent Photo Station 5
Southeast 150°
October 21, 2021

Cochran Branch – Permanent Photo Station 6
Station 114+62 – Upstream 186°
October 21, 2021

Cochran Branch MY7 2021 Photo Station Photos

Parrish Branch – Permanent Photo Station 7
Station 200+25 – Downstream
October 21, 2021

Parrish Branch – Permanent Photo Station 8
Southwest 225°
October 21, 2021

Cochran Branch MY7 2021 Vegetation Plot Photos

Cochran - Vegetation Monitoring Plot 1
October 21, 2021

Cochran - Vegetation Monitoring Plot 2
October 21, 2021

Cochran Branch MY7 2021 Vegetation Plot Photos

Cochran - Vegetation Monitoring Plot 3
October 21, 2021

Cochran - Vegetation Monitoring Plot 4
October 21, 2021

Cochran Branch MY7 2021 Vegetation Plot Photos

Cochran - Vegetation Monitoring Plot 5
October 21, 2021

Cochran - Vegetation Monitoring Plot 6
October 21, 2021

Cochran Branch MY7 2021 Vegetation Plot Photos

Cochran - Vegetation Monitoring Plot 7
October 21, 2021

Cochran - Vegetation Monitoring Plot 8
October 21, 2021

Appendix C
Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment Summary

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Planted Stem Height (ft)
1	243	0	243	Yes	**7.2**
2	607	0	607	Yes	6.2
3	324	0	324	Yes	**6.2**
4	405	526	931	Yes	4.6
5	526	40	567	Yes	**8.0**
6	405	0	405	Yes	16.6
7	202	40	243	No	**5.1**
8	324	243	567	Yes	2.3
Project Avg	379	**106**	**486**	Yes	**7.3**

Table 8: CVS Vegetation Plot Metadata Cochran Branch Stream and Wetland Restoration Site	
Report Prepared By	Emily Ulman
Date Prepared	10/29/2021
database name	Cochran_MY7_2021.mdb
database location	R:\Archives\Olddropboxprojects\North Carolina\100903-Cochran Branch\Monitoring\Monitoring Data\MY7_2021\Vegetation
computer name	D4V0KGH2
file size	61,156 KB
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY	
Project Code	95720
project Name	Cochran Branch Stream and Wetland
Description	
River Basin	Little Tennessee
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	8

Table 9. Planted Total Stem Counts (Species by Plot)

Cochran Branch			Current Plot Data (MY7 2021)																							Annual Means					
			95720-01-0001			95720-01-0002			95720-01-0003			95720-01-0004			95720-01-0005			95720-01-0006			95720-01-0007			95720-01-0008			MY7 (2021)			MY6 (2020)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree																					1			6			7		
Acer rubrum var. rubrum	red maple	Tree	1	1	1																						1	1	1	1	1	1
Alnus	alder	Shrub																														
Alnus serrulata	hazel alder	Shrub				3	3	3						5			1										3	3	9	3	3	3
Betula nigra	river birch	Tree	1	1	1	2	2	2							2	2	2				1	1	1				6	6	6	6	6	6
Cephalanthus occidentali	common buttonbush	Shrub							1	1	1																1	1	1	1	1	1
Diospyros virginiana	common persimmon	Tree																						5	5	5	5	5	5	6	6	6
Fraxinus pennsylvanica	green ash	Tree																														
Liriodendron tulipifera	tuliptree	Tree												8				1	1	1							1	1	9	1	1	1
Liriodendron tulipifera va	Tulip-tree, Yellow Po	Tree										3	3	3				8	8	8							11	11	11	11	11	11
Nyssa sylvatica	blackgum	Tree																														
Platanus occidentalis	American sycamore	Tree																1	1	1							1	1	1	1	1	1
Platanus occidentalis var.	Sycamore, Plane-tree	Tree	2	2	2	9	9	9	4	4	4	6	6	6	10	10	10				4	4	4				35	35	35	37	37	37
Quercus	oak	Tree																														
Quercus alba	white oak	Tree																						1	1	1	1	1	1	2	2	2
Quercus michauxii	swamp chestnut oak	Tree	1	1	1				2	2	2				1	1	1							1	1	1	5	5	5	6	6	6
Quercus nigra	water oak	Tree																														
Quercus phellos	willow oak	Tree	1	1	1							1	1	1										1	1	1	3	3	3	6	6	6
Quercus rubra var. rubra	northern red oak	Tree																														
Salix nigra	black willow	Tree				1	1	1	1	1	1																2	2	2	2	2	2
Sambucus canadensis	Common Elderberry	Shrub																														
Unknown		Shrub or Tree																														
		Stem count	6	6	6	15	15	15	8	8	8	10	10	23	13	13	14	10	10	10	5	5	6	8	8	14	75	75	96	83	83	83
		size (ares)	1			1			1			1			1			1			1			1			8			8		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.20			0.20		
		Species count	5	5	5	4	4	4	4	4	4	3	3	5	3	3	4	3	3	3	2	2	3	4	4	5	13	13	14	13	13	13
		Stems per ACRE	243	243	243	607	607	607	324	324	324	405	405	931	526	526	567	405	405	405	202	202	243	324	324	567	379	379	486	420	420	420

[1]PnoLS: No livestakes included in tally; P-all: All planted stems included in tally; T: Total stems including recruitment.

Table 9. Planted Total Stem Counts (Species by Plot)

Cochran Branch			Annual Means																	
			MY5 (2019)			MY4 (2018)			MY3 (2017)			MY2 (2016)			MY1 (2015)			MY0 (2015)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree			2						3									
Acer rubrum var. rubrum	red maple	Tree	1	1	1	1	1	1	1	1	1	1	1	7	1	1	1	4	4	4
Alnus	alder	Shrub						5												
Alnus serrulata	hazel alder	Shrub	3	3	8						3			4						
Betula nigra	river birch	Tree	6	6	6	6	6	6	8	8	8	12	12	12	14	14	14	16	16	16
Cephalanthus occidentali	common buttonbush	Shrub	1	1	1	1	1	7				1	1	1						
Diospyros virginiana	common persimmon	Tree	7	7	7	6	6	6	7	7	7	8	8	8						
Fraxinus pennsylvanica	green ash	Tree													1	1	1	2	2	2
Liriodendron tulipifera	tuliptree	Tree	1	1	1			3												
Liriodendron tulipifera va	Tulip-tree, Yellow Po	Tree	11	11	11	13	13	13	13	13	13	6	6	6	10	10	10	27	27	27
Nyssa sylvatica	blackgum	Tree										1	1	1						
Platanus occidentalis	American sycamore	Tree	1	1	1															
Platanus occidentalis var.	Sycamore, Plane-tre	Tree	37	37	37	38	38	38	36	36	36	39	39	39	45	45	45	48	48	48
Quercus	oak	Tree				1	1	1	1	1	1	2	2	2	23	23	23	38	38	38
Quercus alba	white oak	Tree	2	2	2	3	3	3	4	4	4	4	4	4						
Quercus michauxii	swamp chestnut oak	Tree	7	7	7	9	9	9	9	9	9	13	13	13	9	9	9	11	11	11
Quercus nigra	water oak	Tree							1	1	1	1	1	1	3	3	3			
Quercus phellos	willow oak	Tree	7	7	7	10	10	10	13	13	13	19	19	19	9	9	9	8	8	8
Quercus rubra var. rubra	northern red oak	Tree																1	1	1
Salix nigra	black willow	Tree	2	2	2			4			4			7			4			
Sambucus canadensis	Common Elderberry	Shrub												2						
Unknown		Shrub or Tree																1	1	1
Stem count			86	86	93	88	88	106	93	93	103	107	107	126	115	115	119	156	156	156
size (ares)			8			8			8			8			8			8		
size (ACRES)			0.20			0.20			0.20			0.20			0.20			0.20		
Species count			13	13	14	10	10	13	10	10	13	12	12	15	9	9	10	10	10	10
Stems per ACRE			435	435	470	445	445	536	470	470	521	541	541	637	582	582	602	789	789	789

[1]PnoLS: No livestakes included in tally; P-all: All planted stems included in tally; T: Total stems including recruitment.

Cochran Branch (95720)
Stems Per Plot Across All Years

	MY7 -2021			MY6 - 2020			MY5 - 2019			MY4 - 2018			MY3 - 2017			MY2 - 2016			MY1 - 2015			MY0 - 2015		
Plot	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac
1	6	6	243	7	7	283	7	7	283	7	8	324	8	12	486	13	18	728	15	18	728	21	21	850
2	15	15	607	17	17	688	17	17	688	14	18	728	16	19	769	17	17	688	17	17	688	19	19	769
3	8	8	324	8	8	324	8	8	324	8	9	364	8	8	324	11	12	486	11	11	445	21	21	850
4	10	23	931	11	11	445	11	15	607	12	17	688	12	12	486	16	19	769	19	19	769	20	20	809
5	13	14	567	13	13	526	13	13	526	14	14	567	14	14	567	17	18	728	18	18	728	21	21	850
6	10	10	405	11	11	445	11	11	445	10	12	486	10	12	486	3	6	243	3	3	121	16	16	647
7	5	6	243	6	6	243	9	9	364	13	13	526	12	12	486	16	16	647	17	17	688	21	21	850
8	8	14	567	10	10	405	10	11	445	10	10	405	13	13	526	14	14	567	15	15	607	17	17	688

Appendix D
Stream Geomorphology Data

Table 10. Baseline Stream Data Summary
Cochran Stream and Wetland Restoration Project - Cochran Branch 1a (379 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline[1]					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	18.9	9.0	10.0	10.0	11.0	1.4	2	23.4	24.7	-	24.7	-	-	-	14.7	-	-	-	-	-	-	-
Floodprone Width (ft)				12.0	18.5	18.5	25.0	9.2	2	43.0	48.0	-	52.0	-	-	-	-	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	-	-	1.3	0.9	1.0	1.0	1.1	0.1	2	1.3	1.4	-	1.5	-	-	-	0.9	-	-	-	-	-	-	-
Bankfull Max Depth (ft)				1.2	1.3	1.3	1.5	0.2	2	1.8	1.8	-	2.2	-	-	-	1.13	-	-	-	-	-	-	-
Bankfull Cross Sectional Area (ft^2)	21.5			9.6	9.8	9.8	10.0	0.3	2	33.4	33.4	-	34.6	-	-	-	12.7	-	-	-	-	-	-	-
Width/Depth Ratio				8.4	10.3	10.3	12.1	2.6	2	15.8	18.3	-	18.4	-	-	-	17.0	-	-	-	-	-	-	-
Entrenchment Ratio				1.3	1.8	1.8	2.3	0.7	2	1.7	1.9	-	2.1	-	-	-	5.4	-	-	-	-	-	-	-
Bank Height Ratio				0.9	1.5	1.5	2.0	0.8	2	1.0	1.2	-	1.3	-	-	-	-	-	-	-	-	-	-	-
d50 (mm)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	20.0	29.0	-	40.0	-	-	-	-	-	10.9	20.4	18.8	31.7	8.6	7
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.015	0.023	-	0.028	-	-	0.009	0.017	0.025	0.007	0.017	0.021	0.025	0.007	7
Pool Length (ft)				-	-	-	-	-	-	6.0	18.0	-	42.0	-	-	-	-	-	5.3	10.7	8.7	21.6	5.5	7
Pool Max Depth (ft)				-	-	-	-	-	-	2.3	2.3	-	2.3	-	-	-	-	-	2.0	2.4	2.4	3.1	0.4	6
Pool Spacing (ft)				-	-	-	-	-	-	51.0	87.0	-	113.0	-	-	34.1	45.4	56.8	36.2	48.6	47.6	62.2	9.6	6
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	43.0	-	-	-	-	18.7	24.9	31.2	17.1	27	28.7	33.4	7.4	4
Radius of Curvature (ft)				-	-	-	-	-	-	44.0	75.0	-	103.0	-	-	25.0	31.0	37.0	24.0	37.6	43.9	44.8	11.8	3
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	2.6	3.0	3.0	0.8	3
Meander Wavelength (ft)				-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	73.9	92.8	92.4	116	19.2	5
Meander Width Ratio				-	-	-	-	-	-	-	1.7	-	-	-	-	-	1.5	-	1.2	1.8	2.0	2.3	0.5	4
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%				-						-									42%/ 28%/ 22%/ 7%/ 0%					
SC% / Sa% / G% / C% / B% / Be%				- / 56% / - / - / - / -						1% / 10% / 48% / 41% / 0% / 1%														
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)				3 / 4 / 6 / 11 / 14 / - / -						5.2 / 22 / 45 / 130 / 190 / - / -														
Reach Shear Stress (Competency) lb/ft^2				-						1.947						0.47			-					
Max Part Size (mm) Mobilized at Bankfull				-						91						45			-					
Stream Power (Transport Capacity) W/m^2				-						-						1.6								
Additional Reach Parameters																								
Drainage Area (mi^2)				1.11						2.77														
Impervious Cover Estimate (%)				-						-														
Rosgen Classification				G						B4						B4			B					
Bankfull Velocity (fps)	-			-						4.5						3.5								
Bankfull Discharge (cfs)	-			-						123.0						66.0								
Valley Length (ft)				-						380						321								
Channel Thalweg Length (ft)				-						400						337			379					
Sinuosity				-						1.10						1.05			1.18					
Water Surface Slope (ft/ft)				-						-						0.035			0.033					
Bankfull Slope (ft/ft)				-						-						0.035			0.033					
Bankfull Floodplain Area (acres)				-						-						-								
Proportion Over Wide (%)				-						-														
Entrenchment Class (ER Range)				-						-														
Incision Class (BHR Range)				-						-														
BEHI				20.6						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

[1]Reach less than 500 feet and restricted to visual assessment; no cross-sections located in this reach

- Information unavailable.

Non-Applicable.

Table 10 Cont'd. Baseline Stream Data Summary
Cochran Stream and Wetland Restoration Project - Cochran Branch 1b (1,101 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)			18.9	7.0	7.9	7.5	9.5	1.2	4	12.0	14.4	-	16.5	-	-	-	14.7	-	14.6	16.6	17.3	17.8	1.77	3
Floodprone Width (ft)				15.0	16.8	16.0	20.0	2.2	4	60.0	72.5	-	72.5	-	-	-	-	-	135.0	168.5	173.5	197.0	31.3	3
Bankfull Mean Depth (ft)	-	-	1.3	1.2	1.3	1.3	1.5	0.2	4	-	-	-	-	-	-	-	0.9	-	0.8	0.8	0.8	1.0	0.11	3
Bankfull Max Depth (ft)				1.5	1.7	1.7	1.8	0.2	4	19	2.3	-	3.3	-	-	-	1.13	-	1.0	1.2	1.1	1.5	0.24	3
Bankfull Cross Sectional Area (ft^2)	21.5			8.3	10.5	10.9	12.1	1.6	4	18.2	25.9	-	35.9	-	-	-	12.7	-	11.0	13.7	13.6	16.6	2.78	3
Width/Depth Ratio				4.7	6.0	5.6	8.1	1.5	4	7.1	8.2	-	10.0	-	-	-	17.0	-	18.1	20.3	19.2	23.4	2.8	3
Entrenchment Ratio				1.7	2.2	2.2	2.5	0.3	4	4.3	4.9	-	5.5	-	-	-	11.5	-	9.3	10.1	10.0	11.0	0.85	3
Bank Height Ratio				1.5	1.9	2.0	2.2	0.3	4	0.7	1.1	-	1.6	-	-	-	-	-	1.0	1.0	1.0	1.0	0	3
d50 (mm)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	62.6	82.0	-	101.4	-	-	-	-	-	12.4	29.5	33.6	47.0	11.6	17
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.006	0.006	-	0.007	-	-	0.006	0.008	0.009	0.001	0.006	0.006	0.017	0.004	17
Pool Length (ft)				-	-	-	-	-	-	13.4	45.1	-	80.3	-	-	-	-	-	16.2	24.1	24.2	31.0	4.6	17
Pool Max Depth (ft)				-	-	-	-	-	-	0.4	0.5	-	0.6	-	-	-	-	-	2.3	3.1	3.0	4.2	0.5	17
Pool Spacing (ft)				-	-	-	-	-	-	67.9	84.9	-	101.9	-	-	62.3	74.8	87.3	38.0	60.2	59.5	86.8	15.6	17
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	24.9	49.9	62.3	17.2	33.9	29.0	64.0	13.9	11
Radius of Curvature (ft)				-	-	-	-	-	-	-	-	-	-	-	-	19.0	25.0	31.0	22.5	29.1	27.4	36.6	5.2	7
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	1.8	1.7	2.2	0.3	7
Meander Wavelength (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38.1	130.8	136.9	249.7	58.2	12
Meander Width Ratio				-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	-	1.0	2.0	1.7	3.9	0.8	11
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%				-						-									50% / 3%/ 39%/ 8%/ 0%					
SC% / Sa% / G% / C% / B% / Be%				- / 30% / - / - / - / -						- / 9% / - / - / - / - / -														
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)				4 / 8 / 11 / 22 / 29 / - / -						7 / 26 / 54 / 68 / 70 / - / -														
Reach Shear Stress (Competency) lb/ft^2				-						-						0.42			-					
Max Part Size (mm) Mobilized at Bankfull				-						-						45			-					
Stream Power (Transport Capacity) W/m^2				-						-						1.3								
Additional Reach Parameters																								
Drainage Area (mi^2)				1.20						0.72														
Impervious Cover Estimate (%)				-						-														
Rosgen Classification				G						E4						C4			C					
Bankfull Velocity (fps)	-			-						-						-								
Bankfull Discharge (cfs)	-			-						-						66.0								
Valley Length (ft)				-						-						989								
Channel Thalweg Length (ft)				-						416.7						1,088			1,101					
Sinuosity				-						-						1.1			1.12					
Water Surface Slope (ft/ft)				-						-						0.0085			0.0076					
Bankfull Slope (ft/ft)				-						-						-			0.0068					
Bankfull Floodplain Area (acres)				-						-						-								
Proportion Over Wide (%)				-						-														
Entrenchment Class (ER Range)				-						-														
Incision Class (BHR Range)				-						-														
BEHI				25.7						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

- Information unavailable.

Non-Applicable.

Table 10 Cont'd. Baseline Stream Data Summary
Cochran Stream and Wetland Restoration Project - Parrish Branch (402 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			As-Built / Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	7.4	3.5	4.1	4.1	4.7	0.8	2	23.4	24.7	-	24.7	-	-	-	5.4	-	4.4	5.2	5.2	5.9	1.06	2
Floodprone Width (ft)				8.0	8.0	8.0	8.0	0.0	2	43.0	48	-	52.0	-	-	-	-	-	14.2	19.1	19.1	24.0	6.93	2
Bankfull Mean Depth (ft)	-	-	0.6	0.4	0.5	0.5	0.5	0.1	2	1.3	1.35	-	1.5	-	-	-	0.4	-	0.4	0.4	0.4	0.4	0.03	2
Bankfull Max Depth (ft)				0.6	0.7	0.7	0.8	0.1	2	1.8	1.8	-	2.2	-	-	-	0.57	-	0.6	0.6	0.6	0.6	0.01	2
Bankfull Cross Sectional Area (ft^2)	4.0			1.4	1.9	1.9	2.3	0.6	2	33.4	33.4	-	34.6	-	-	-	2.2	-	1.8	2.0	2.0	2.1	0.23	2
Width/Depth Ratio				8.5	9.0	9.0	9.5	0.7	2	15.8	18.3	-	18.4	-	-	-	13.4	-	10.9	13.8	13.8	16.6	3.99	2
Entrenchment Ratio				1.6	2.0	2.0	2.3	0.5	2	1.7	1.9	-	2.1	-	-	-	5.6	-	3.2	3.6	3.6	4.0	0.57	2
Bank Height Ratio				2.3	6.2	6.2	10.0	5.4	2	1.0	1.2	-	1.3	-	-	-	-	-	1.0	1.0	1.0	1.0	0	2
d50 (mm)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	20.0	29.0	-	40.0	-	-	-	-	-	6.1	10.0	9.8	15.5	2.3	22
Riffle Slope (ft/ft)				-	-	-	-	-	-	0.015	0.023	-	0.028	-	-	0.017	0.026	0.035	0.001	0.025	0.023	0.047	0.013	22
Pool Length (ft)				-	-	-	-	-	-	6.0	18.0	-	42.0	-	-	-	-	-	1.7	5.0	4.5	10.2	2.0	22
Pool Max Depth (ft)				-	-	-	-	-	-	2.3	2.3	-	2.3	-	-	-	-	-	1.1	1.5	1.5	1.9	0.2	22
Pool Spacing (ft)				-	-	-	-	-	-	51.0	87.0	-	113.0	-	-	12.4	16.5	20.7	13.5	17.2	15.5	25.2	3.4	21
Pattern																								
Channel Belt Width (ft)				-	-	-	-	-	-	-	43.0	-	-	-	-	6.4	8.5	10.6	6.9	9.9	9.8	12.6	1.4	14
Radius of Curvature (ft)				-	-	-	-	-	-	44.0	75.0	-	103.0	-	-	9.0	11.0	13.0	5.8	9.5	8.9	15.3	3.2	8
Rc: Bankfull Width (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1	1.8	1.7	2.9	0.6	8
Meander Wavelength (ft)				-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	29.1	32.1	31.4	39.7	2.7	15
Meander Width Ratio				-	-	-	-	-	-	-	1.7	-	-	-	-	-	2.8	-	1.3	1.9	1.9	2.4	0.3	14
Substrate, Bed and Transport Parameters																								
Ri% / Ru% / P% / G% / S%				-						-									59%/ 0%/ 29%/ 5%/ 7%					
SC% / Sa% / G% / C% / B% / Be%				-						1% / 10% / 48% / 41% / 0% / 1%														
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)				-						5.2 / 22 / 45 / 130 / 190 / - / -														
Reach Shear Stress (Competency) lb/ft^2				-						1.947						0.47			-					
Max Part Size (mm) Mobilized at Bankfull				-						91						45			-					
Stream Power (Transport Capacity) W/m^2				-						-						-								
Additional Reach Parameters																								
Drainage Area (mi^2)				0.10						2.77														
Impervious Cover Estimate (%)				-						-														
Rosgen Classification				G						B4						B4			B					
Bankfull Velocity (fps)	-			-						4.5						-								
Bankfull Discharge (cfs)	-			-						123.0						9.0								
Valley Length (ft)				-						380.0						375								
Channel Thalweg Length (ft)				-						400.0						394			402					
Sinuosity				-						1.1						1.05			1.07					
Water Surface Slope (ft/ft)				-						-						0.033			0.025					
Bankfull Slope (ft/ft)				-						-						-			0.029					
Bankfull Floodplain Area (acres)				-						-						-								
Proportion Over Wide (%)				-						-														
Entrenchment Class (ER Range)				-						-														
Incision Class (BHR Range)				-						-														
BEHI				26.6						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

- Information unavailable.

Non-Applicable.

Table 11a. Baseline Morphology & Hydraulic Monitoring Summary
Cochran Stream and Wetland Restoration Project

	Cross-Section 1 (Pool) Cochran Banch							Cross-Section 2 (Riffle) Cochran Branch							Cross-Section 3 (Riffle) Cochran Branch							Cross-Section 4 (Pool) Cochran Branch							Cross-Section 5 (Pool) Cochran Branch						
Dimension	**Base**	**MY1**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation (ft) - Based on AB-XSA[1]	2,156.1	2,156.1	2,156.1	2,156.6	N/A	N/A	N/A	2,155.8	2,155.8	2,155.8	2,156.1	2,156.2	N/A	2,156.9	2,152.1	2,152.1	2,152.1	2,152.2	2,152.3	N/A	2,152.4	2,151.9	2,151.9	2,151.9	2,151.9	N/A	N/A	N/A	2,149.9	2,149.9	2,149.9	2,149.8	N/A	N/A	N/A
Bankfull Width (ft)[1]	16.7	16.8	20.6	36.3	N/A	N/A	N/A	17.3	17.1	16.9	23.4	25.4	N/A	8.8	14.6	15.4	15.3	19.3	19.6	N/A	13.6	16.2	17.4	16.8	15.3	N/A	N/A	N/A	17.0	17.3	16.8	14.0	N/A	N/A	N/A
Floodprone Width (ft)[1]	>217.0	>217.0	>52.5	>52.6	N/A	N/A	N/A	>173.5	>173.5	>54.7	>54.6	>54.6	N/A	>54.6	>135.0	>135	>59.7	>59.6	>59.7	N/A	>59.5	>217.5	>217.5	>59.0	>59.0	N/A	N/A	N/A	>236.5	>236.5	>52.9	>52.8	N/A	N/A	N/A
Bankfull Mean Depth (ft)	1.6	1.1	0.9	0.8	-	N/A	-	1.0	0.9	0.8	0.7	-	N/A	-	0.8	0.7	0.7	0.6	-	N/A	-	1.9	1.8	1.9	2.0	-	N/A	-	1.5	1.5	1.5	1.8	-	N/A	-
Bankfull Max Depth (ft)[2]	3.1	2.6	2.3	2.7	1.9	N/A	2.8	1.5	1.4	1.4	1.8	1.6	N/A	1.7	1.0	1.1	1.1	1.2	0.9	N/A	1.3	3.5	4.3	4.2	4.1	3.9	N/A	3.1	3.3	3.4	3.1	3.5	3.6	N/A	4.3
Bankfull Cross Sectional Area (ft2)[2]	27.5	19.2	19.5	27.5	9.7	N/A	17.6	16.6	15.2	14.0	16.6	10.2	N/A	8.9	11.0	11.3	10.8	11.0	5.7	N/A	8.7	31.0	31.3	32.7	31.0	25.2	N/A	24.5	25.4	26.4	25.2	25.4	24.5	N/A	30.5
Bankfull Width/Depth Ratio	10.2	14.7	21.8	48.0	-	N/A	-	18.1	19.2	20.4	33.0	-	N/A	-	19.2	20.8	21.6	33.9	-	N/A	-	8.5	9.7	8.6	7.6	-	N/A	-	11.4	11.4	11.2	7.7	-	N/A	-
Bankfull Entrenchment Ratio[1]	>13	>12.9	N/A	N/A	N/A	N/A	N/A	>10	>10.2	>3.2	>2.3	>2.2	N/A	>6.2	>9.3	>8.8	>3.9	>3.1	>3	N/A	>4.4	>13.4	>12.5	N/A	N/A	N/A	N/A	N/A	>13.9	>13.7	N/A	N/A	N/A	N/A	N/A
Bankfull Bank Height Ratio[1]	1.0	1.0	N/A	N/A	N/A	N/A	N/A	1.0	1.0	0.9	<1.0	<1	N/A	<1	1.0	1.0	1.1	<1.0	<1	N/A	<1	1.0	1.0	N/A	N/A	N/A	N/A	N/A	1.0	1.0	N/A	N/A	N/A	N/A	N/A
d50 (mm)	-	N/A	N/A	N/A	-	N/A	-	-	1.4	26	6.7	6.6	N/A	12	-	28.0	28	7.4	7.7	N/A	6.7	-	N/A	N/A	N/A	-	N/A	-	-	N/A	N/A	N/A	-	N/A	-

	Cross-Section 6 (Riffle) Cochran Branch							Cross-Section 7 (Riffle) Parrish Branch							Cross-Section 8 (Pool) Parrish Branch							Cross-Section 9 (Riffle) Parrish Branch						
Dimension	**Base**	**MY1**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation (ft) - Based on AB-XSA[1]	2149.7	2149.7	2149.7	2149.9	2150.0	N/A	2150.3	2160.2	2160.2	2160.2	2160.7	2160.9	2161.2	2160.8	2159.8	2159.8	2159.8	2160.0	N/A	2162.3	N/A	2154.6	2154.6	2154.6	2155.0	2155.1	2155.5	2,155.6
Bankfull Width (ft)[1]	17.8	17.9	15.6	20.6	25.3	N/A	10.6	4.4	4.5	3.7	10.5	15.6	2.1	2.8	6.8	7.2	8.0	10.9	N/A	2.0	N/A	5.9	6.6	5.8	8.6	4.7	3.9	3.5
Floodprone Width (ft)[1]	>197.0	>197.0	>54.5	>54.5	>54.5	N/A	>54.3	>14.2	>14.2	11.9	24	>26.5	>26.4	>26.5	>93.7	>93.7	>28.2	>28.1	N/A	N/A	N/A	>24.0	>24.0	>29.3	>31.8	>31.5	>32.1	>32.1
Bankfull Mean Depth (ft)	0.8	0.8	0.8	0.7	-	N/A	-	0.4	0.4	0.2	0.2	-	-	-	0.8	0.8	0.6	0.5	-	-	-	0.4	0.3	0.3	0.2	-	-	-
Bankfull Max Depth (ft)[2]	1.1	1.2	1.2	1.5	0.7	N/A	1.4	0.6	0.7	0.4	0.3	0.4	0.6	1.1	1.8	2.0	1.9	1.0	0.3	0.7	0.7	0.6	0.6	0.6	0.8	0.8	0.3	0.6
Bankfull Cross Sectional Area (ft2)[2]	13.6	13.6	12.1	13.6	7.0	N/A	9.3	1.8	2.0	0.6	1.8	0.5	1.0	1.6	5.2	5.5	5.0	5.2	1.1	0.7	0.9	2.1	2.0	2.0	2.1	2.6	0.5	0.9
Bankfull Width/Depth Ratio	23.4	23.4	20.2	31.1	-	N/A	-	10.9	10.4	23.6	62.5	-	-	-	9.0	9.6	12.7	22.8	-	-	-	16.6	21.7	17.0	35.7	-	-	-
Bankfull Entrenchment Ratio[1]	>11.0	>11.0	>3.5	>2.7	>2.2	N/A	>5.1	>3.2	>3.1	3.2	2.3	>1.7	>12.6	>9.3	>13.7	>12.9	N/A	N/A	N/A	N/A	N/A	>4.0	>3.7	>5.1	>3.7	>6.7	>8.3	>9.2
Bankfull Bank Height Ratio[1]	1.0	1.0	1.0	<1.0	<1	N/A	<1	1.0	1.0	1.0	<1.0	<1	0.6	1.0	1.0	1.0	N/A	N/A	N/A	N/A	N/A	1.0	1.0	0.9	1.0	1.1	0.4	<1
d50 (mm)	-	11.0	24	0.62	12	N/A	4.5	-	4.3	1.6	0.062	1.4	-	0.45	-	N/A	N/A	N/A	-	-	-	-	3.9	3.2	0.062	1.4	-	0.062

N/A - Item does not apply.

- Information Unavailable

Note: Starting in MY5, the parameters denoted with [1] were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with [2] were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 11b. Monitoring Data - Stream Reach Data Summary
Cochran Stream and Wetland Restoration Project - Cochran 1b (1,101 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	14.6	16.6	17.3	17.8	1.8	3	15.4	16.8	17.1	17.9	1.3	3	-	-	-	-	-	-	15.3	15.9	15.6	16.9	0.9	3	19.3	21.1	20.6	23.4	2.1	3	19.6	23.4	25.3	25.4	3.3	3	-	-	-	-	-	-	8.80	11.70	12.70	13.60	2.55	3.00
Floodprone Width (ft)[1]	135.0	168.5	173.5	197.0	31.3	3	135.0	168.5	173.5	197.0	31.3	3	-	-	-	-	-	-	54.5	56.3	54.7	59.7	2.9	3	>54.5	>56.2	>54.6	>59.6	2.9	3	54.5	56.3	54.6	59.7	3.0	3	-	-	-	-	-	-	54.30	56.13	54.60	59.50	2.92	3.00
Bankfull Mean Depth (ft)	0.8	0.8	0.8	1.0	0.1	3	0.7	0.8	0.8	0.9	0.1	3	-	-	-	-	-	-	0.7	0.8	0.8	0.8	0.1	3	0.6	0.7	0.7	0.7	0.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bankfull Max Depth (ft)[2]	1.0	1.2	1.1	1.5	0.2	3	1.1	1.2	1.2	1.4	0.2	3	-	-	-	-	-	-	1.1	1.2	1.2	1.4	0.2	3	1.2	1.5	1.5	1.8	0.3	3	0.7	1.1	0.9	1.6	0.5	3	-	-	-	-	-	-	1.30	1.47	1.40	1.70	0.21	3.00
Bankfull Cross Sectional Area (ft2)[2]	11.0	13.7	13.6	16.6	2.8	3	11.3	13.4	13.6	15.2	2.0	3	-	-	-	-	-	-	10.8	12.3	12.1	14.0	1.6	3	11.0	13.7	13.6	16.6	2.8	3	5.7	7.6	7.0	10.2	2.3	3	-	-	-	-	-	-	8.70	8.97	8.90	9.30	0.31	3.00
Bankfull Width/Depth Ratio	18.1	20.3	19.2	23.4	2.8	3	19.2	21.1	20.8	23.4	2.1	3	-	-	-	-	-	-	20.2	20.7	20.4	21.6	0.8	3	31.1	32.7	33.0	33.9	1.4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bankfull Entrenchment Ratio[3]	9.3	10.1	10.0	11.0	0.9	3	8.8	10.0	10.2	11.0	1.1	3	-	-	-	-	-	-	3.2	3.5	3.5	3.9	0.4	3	>2.3	>2.7	>2.7	>3.1	0.4	3	2.2	2.5	2.2	3.0	0.5	3	-	-	-	-	-	-	3.20	4.60	4.40	6.20	1.51	3.00
Bankfull Bank Height Ratio[3]	1.0	1.0	1.0	1.0	0.0	3	1.0	1.0	1.0	1.0	0.0	3	-	-	-	-	-	-	0.9	1.0	1.0	1.1	0.1	3	<1.0	<1.0	<1.0	<1.0	0.0	3	1.0	1.0	1.0	1.0	0.0	3	-	-	-	-	-	-	1.00	1.00	1.00	1.00	0.00	3.00
Profile																																															
Riffle Length (ft)	12.4	29.5	33.6	47.0	11.6	17																																									
Riffle Slope (ft/ft)	0.001	0.006	0.006	0.017	0.004	17																																									
Pool Length (ft)	16.2	24.1	24.2	31.0	4.6	17																																									
Pool Max Depth (ft)	2.3	3.1	3.0	4.2	0.5	17																																									
Pool Spacing (ft)	38.0	60.2	59.5	86.8	15.6	17																																									
Pattern																																															
Channel Belt Width (ft)	17.2	33.9	29.0	64.0	13.9	11																																									
Radius of Curvature (ft)	22.5	29.1	27.4	36.6	5.2	7																																									
Rc: Bankfull Width (ft/ft)	1.36	1.8	1.65	2.20	0.3	7																																									
Meander Wavelength (ft)	38.1	130.8	136.9	249.7	58.2	12																																									
Meander Width Ratio	1.0	2.0	1.7	3.9	0.8	11																																									
Additional Reach Parameters																																															
Rosgen Classification	C																																														
Channel Thalweg Length (ft)	1,101																																														
Sinuosity (ft)	1.12																																														
Water Surface Slope (Channel) (ft/ft)	0.0076																																														
Bankfull Slope (ft/ft)	0.0068																																														
Ri% / Ru% / P% / G% / S%	50%	3%	39%	8%	0%																																									

- Information Unavailable

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Table 11b cont'd. Monitoring Data - Stream Reach Data Summary
Cochran Stream and Wetland Restoration Project - Parrish Branch (402 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5						MY - 6						MY - 7					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)[1]	4.4	5.2	5.2	5.9	1.1	2	4.5	5.6	5.6	6.6	1.5	2	-	-	-	-	-	-	3.7	4.8	4.8	5.8	1.5	2	8.6	9.6	9.6	10.5	1.3	2	4.7	10.2	10.2	15.6	7.7	2	2.10	3.00	3.00	3.90	1.30	2.00	3.20	3.35	3.35	3.50	0.21	2.00
Floodprone Width (ft)[1]	14.2	19.1	19.1	24.0	6.9	2	14.2	19.1	19.1	24.0	6.9	2	-	-	-	-	-	-	11.9	20.6	20.6	29.3	12.3	2	24.0	>27.9	>27.9	>31.8	5.5	2	26.5	29.0	29.0	31.5	3.5	2	26.40	29.30	29.30	4.00	4.00	2.00	26.50	29.30	29.30	32.10	3.96	2.00
Bankfull Mean Depth (ft)[1]	0.4	0.4	0.4	0.4	0.0	2	0.3	0.4	0.4	0.4	0.1	2	-	-	-	-	-	-	0.2	0.3	0.3	0.3	0.1	2	0.2	0.2	0.2	0.2	0.0	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bankfull Max Depth (ft)[2]	0.6	0.6	0.6	0.6	0.0	2	0.6	0.7	0.7	0.7	0.1	2	-	-	-	-	-	-	0.4	0.5	0.5	0.6	0.1	2	0.3	0.6	0.6	0.8	0.4	2	0.4	0.6	0.6	0.8	0.3	2	0.30	0.50	0.50	0.20	0.20	2.00	0.60	0.85	0.85	1.10	0.35	2.00
Bankfull Cross Sectional Area (ft2)[2]	1.8	2.0	2.0	2.1	0.2	2	2.0	2.0	2.0	2.0	0.0	2	-	-	-	-	-	-	0.6	1.3	1.3	2.0	1.0	2	1.8	2.0	2.0	2.1	0.2	2	0.5	1.6	1.6	2.6	1.5	2	0.50	0.80	0.80	0.40	0.40	2.00	0.90	1.25	1.25	1.60	0.49	2.00
Bankfull Width/Depth Ratio	10.9	13.8	13.8	16.6	4.0	2	10.4	16.1	16.1	21.7	8.0	2	-	-	-	-	-	-	17.0	20.3	20.3	23.6	4.7	2	35.7	49.1	49.1	62.5	19.0	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bankfull Entrenchment Ratio[3]	3.2	3.6	3.6	4.0	0.6	2	3.1	3.4	3.4	3.7	0.4	2	-	-	-	-	-	-	3.2	4.2	4.2	5.1	1.3	2	2.3	>3	>3	>3.7	1.0	2	1.7	4.2	4.2	6.7	3.5	2	8.30	10.50	10.50	3.00	3.00	2.00	8.20	8.70	8.70	9.20	0.71	2.00
Bankfull Bank Height Ratio[3]	1.0	1.0	1.0	1.0	0.0	2	1.0	1.0	1.0	1.0	0.0	2	-	-	-	-	-	-	0.9	1.0	1.0	1.0	0.1	2	<1.0	<1.0	<1.0	1.0	0.0	2	1.0	1.1	1.1	1.1	0.1	2	0.40	0.50	0.50	0.60	0.10	2.00	1.00	1.00	1.00	1.00	0.00	2.00
Profile																																															
Riffle Length (ft)	6.1	10.0	9.8	15.5	2.3	22																																									
Riffle Slope (ft/ft)	0.00	0.025	0.023	0.047	0.013	22																																									
Pool Length (ft)	1.7	5.0	4.5	10.2	2.0	22																																									
Pool Max Depth (ft)	1.1	1.5	1.5	1.9	0.2	22																																									
Pool Spacing (ft)	13.5	17.2	15.5	25.2	3.4	21																																									
Pattern																																															
Channel Belt Width (ft)	6.9	9.9	9.8	12.6	1.4	14																																									
Radius of Curvature (ft)	5.8	9.5	8.9	15.3	3.2	8																																									
Rc: Bankfull Width (ft/ft)	1.1	1.8	1.7	2.9	0.6	8																																									
Meander Wavelength (ft)	29.1	32.1	31.4	39.7	2.7	15																																									
Meander Width Ratio	1.3	1.9	1.9	2.4	0.3	14																																									
Additional Reach Parameters																																															
Rosgen Classification	B																																														
Channel Thalweg Length (ft)	402																																														
Sinuosity (ft)	1.07																																														
Water Surface Slope (Channel) (ft/ft)	0.025																																														
Bankfull Slope (ft/ft)	0.029																																														
Ri% / Ru% / P% / G% / S%	59%	0%	29%	5%	7%																																									

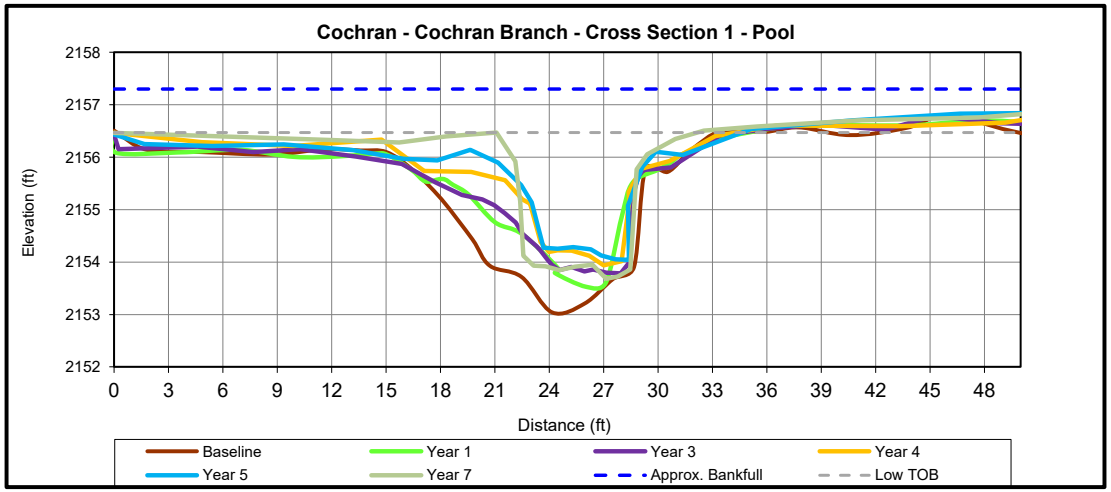
- Information Unavailable

N/A - Information does not apply.

Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step

Upstream

Downstream

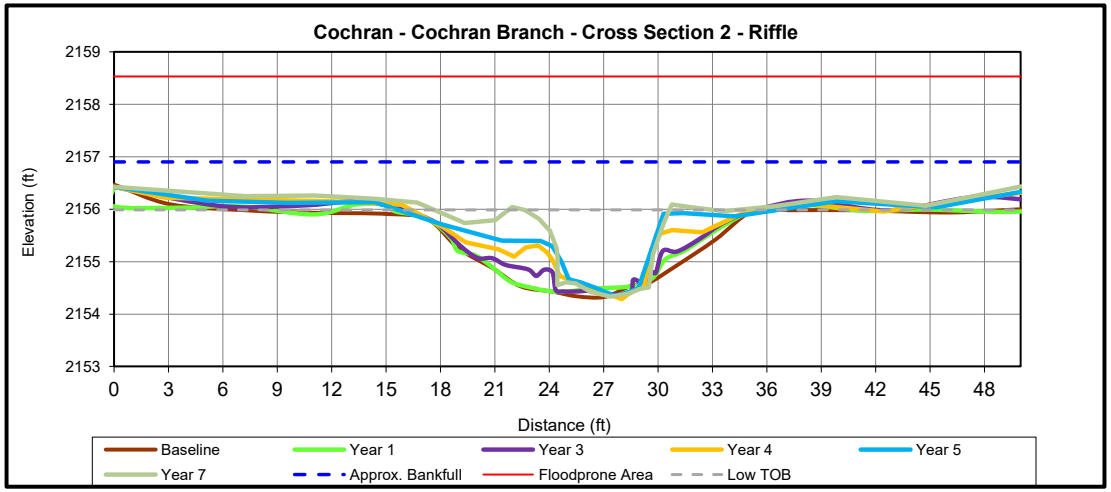


	Cross Section 1 (Pool)							
Dimension	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Elevation (ft) - Based on AB-XSA[1]	2156.1	2156.1	-	2156.1	2156.6	N/A	N/A	N/A
Bankfull Width (ft)[1]	16.7	16.8	-	20.6	36.3	N/A	N/A	N/A
Floodprone Width (ft)[1]	>217.0	>217.0	-	>52.5	>52.6	N/A	N/A	N/A
Bankfull Mean Depth (ft)	1.6	1.1	-	0.9	0.8	-	N/A	-
Bankfull Max Depth (ft)[2]	3.1	2.6	-	2.3	2.7	1.9	N/A	2.8
Bankfull Cross Sectional Area (ft2)[2]	27.5	19.2	-	19.5	27.5	9.7	N/A	17.6
Bankfull Width/Depth Ratio	10.2	14.7	-	21.8	48.0	-	N/A	-
Bankfull Entrenchment Ratio[1]	>13.0	>12.9	-	N/A	N/A	N/A	N/A	N/A
Bankfull Bank Height Ratio[1]	1.0	1.0	-	N/A	N/A	N/A	N/A	N/A

Note: Starting in MY5, the parameters denoted with 1 were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with 2 were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

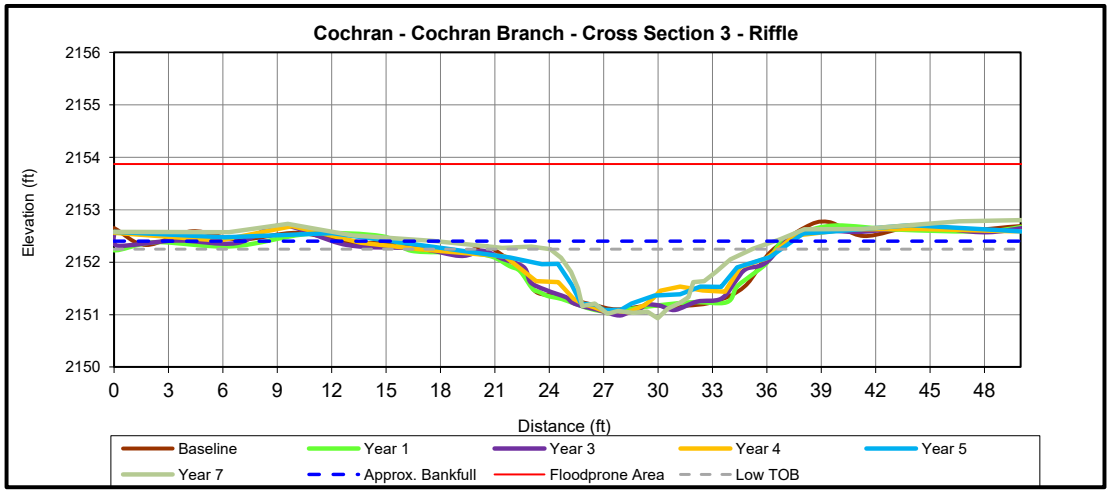


	Cross Section 2 (Riffle)							
Dimension	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Elevation (ft) - Based on AB-XSA[1]	2155.8	2155.8	-	2155.8	2156.1	2156.2	N/A	2156.9
Bankfull Width (ft)[1]	17.3	17.1	-	16.9	23.4	25.4	N/A	8.8
Floodprone Width (ft)[1]	>173.5	>173.5	-	>54.7	>54.6	>54.6	N/A	>54.6
Bankfull Mean Depth (ft)	1.0	0.9	-	0.8	0.7	-	N/A	-
Bankfull Max Depth (ft)[2]	1.5	1.4	-	1.4	1.8	1.6	N/A	1.7
Bankfull Cross Sectional Area (ft2)[2]	16.6	15.2	-	14.0	16.6	10.2	N/A	8.9
Bankfull Width/Depth Ratio	18.1	19.2	-	20.4	33.0	-	N/A	-
Bankfull Entrenchment Ratio[1]	>10.0	>10.2	-	>3.2	>2.3	>2.2	N/A	>6.2
Bankfull Bank Height Ratio[1]	1.0	1.0	-	0.9	<1.0	<1	N/A	<1

Note: Starting in MY5, the parameters denoted with 1 were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with 2 were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

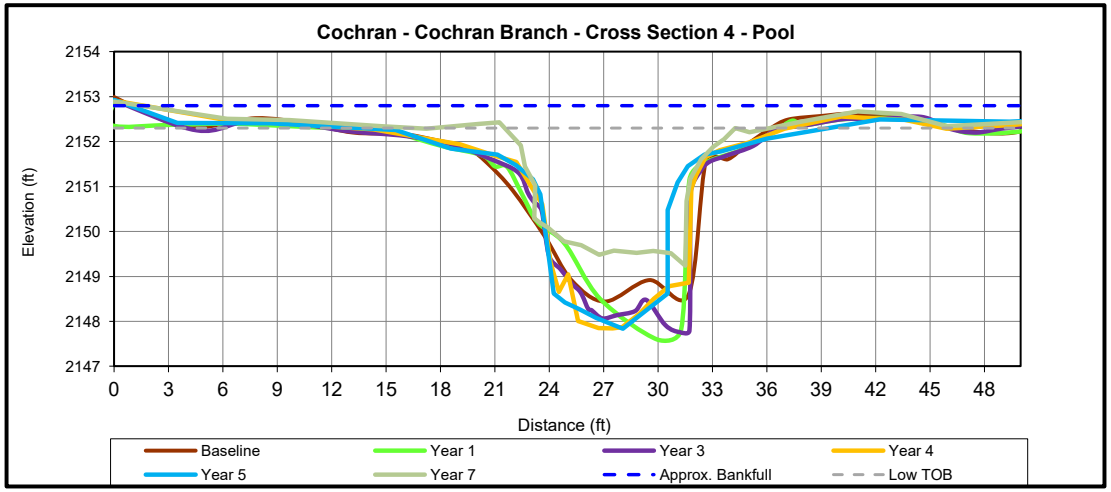


	Cross Section 3 (Riffle)							
Dimension	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Elevation (ft) - Based on AB-XSA[1]	2152.1	2152.1	-	2152.1	2152.2	2152.3	N/A	2152.4
Bankfull Width (ft)[1]	14.6	15.4	-	15.3	19.3	19.6	N/A	13.6
Floodprone Width (ft)[1]	>135.0	>135	-	>59.7	>59.6	>59.7	N/A	>59.5
Bankfull Mean Depth (ft)	0.8	0.7	-	0.7	0.6	-	N/A	-
Bankfull Max Depth (ft)[2]	1.0	1.1	-	1.1	1.2	0.9	N/A	1.3
Bankfull Cross Sectional Area (ft2)[2]	11.0	11.3	-	10.8	11.0	5.7	N/A	8.7
Bankfull Width/Depth Ratio	19.2	20.8	-	21.6	33.9	-	N/A	-
Bankfull Entrenchment Ratio[1]	>9.3	>8.8	-	>3.9	>3.1	>3	N/A	>4.4
Bankfull Bank Height Ratio[1]	1.0	1.0	-	1.1	<1.0	<1	N/A	<1

Note: Starting in MY5, the parameters denoted with 1 were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with 2 were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

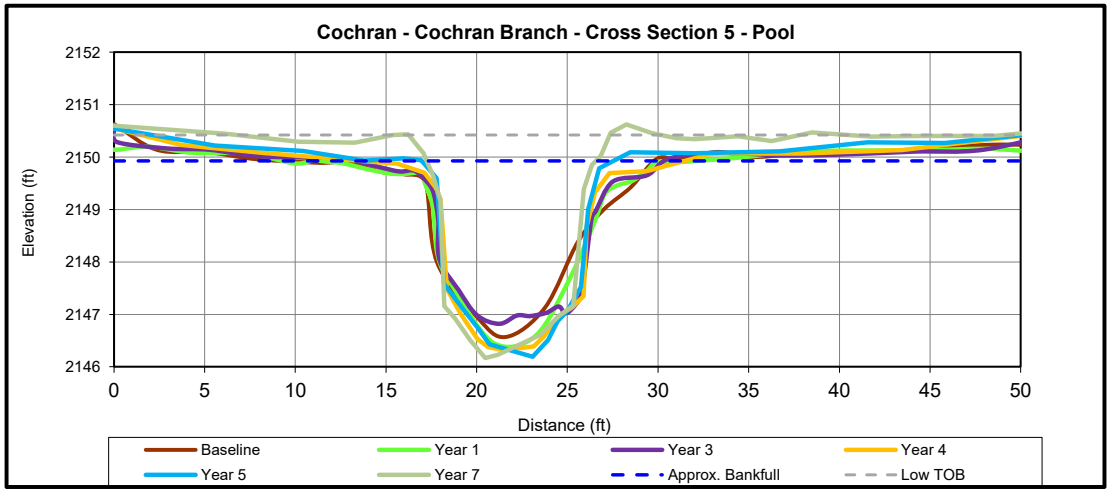


	Cross Section 4 (Pool)							
Dimension	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Elevation (ft) - Based on AB-XSA[1]	2151.9	2151.9	-	2151.9	2151.9	N/A	N/A	N/A
Bankfull Width (ft)[1]	16.2	17.4	-	16.8	15.3	N/A	N/A	N/A
Floodprone Width (ft)[1]	>217.5	>217.5	-	>59.0	>59.0	N/A	N/A	N/A
Bankfull Mean Depth (ft)	1.9	1.8	-	1.9	2.0	-	N/A	-
Bankfull Max Depth (ft)[2]	3.5	4.3	-	4.2	4.1	3.9	N/A	3.1
Bankfull Cross Sectional Area (ft2)[2]	31.0	31.3	-	32.7	31.0	25.2	N/A	24.6
Bankfull Width/Depth Ratio	8.5	9.7	-	8.6	7.6	-	N/A	-
Bankfull Entrenchment Ratio[1]	>13.4	>12.5	-	N/A	N/A	N/A	N/A	N/A
Bankfull Bank Height Ratio[1]	1.0	1.0	-	N/A	N/A	N/A	N/A	N/A

Note: Starting in MY5, the parameters denoted with 1 were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with 2 were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

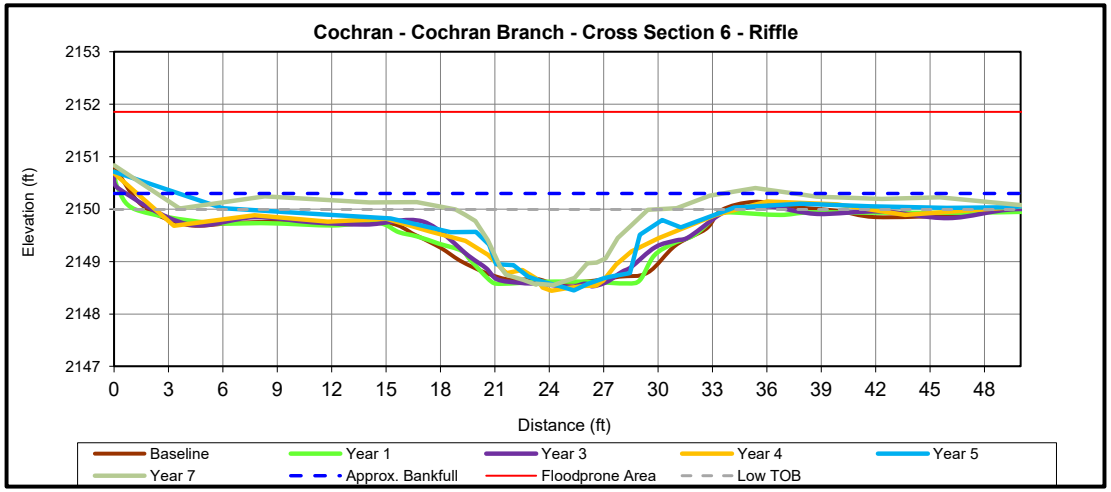


	Cross Section 5 (Pool)							
Dimension	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Elevation (ft) - Based on AB-XSA[1]	2149.9	2149.9	-	2149.9	2149.8	N/A	N/A	N/A
Bankfull Width (ft)[1]	17.0	17.3	-	16.8	14.0	N/A	N/A	N/A
Floodprone Width (ft)[1]	>236.5	>236.5	-	>52.9	>52.8	N/A	N/A	N/A
Bankfull Mean Depth (ft)	1.5	1.5	-	1.5	1.8	-	N/A	-
Bankfull Max Depth (ft)[2]	3.3	3.4	-	3.1	3.5	3.6	N/A	4.3
Bankfull Cross Sectional Area (ft2)[2]	25.4	26.4	-	25.2	25.4	24.5	N/A	30.5
Bankfull Width/Depth Ratio	11.4	11.4	-	11.2	7.7	-	N/A	-
Bankfull Entrenchment Ratio[1]	>13.9	>13.7	-	N/A	N/A	N/A	N/A	N/A
Bankfull Bank Height Ratio[1]	1.0	1.0	-	N/A	N/A	N/A	N/A	N/A

Note: Starting in MY5, the parameters denoted with 1 were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with 2 were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

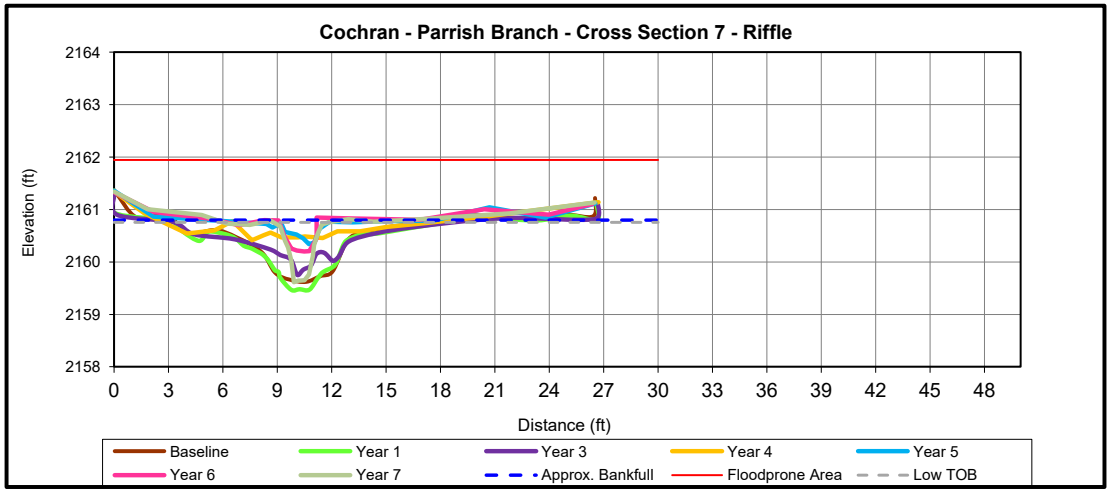


	Cross Section 6 (Riffle)							
Dimension	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Elevation (ft) - Based on AB-XSA[1]	2149.7	2149.7	-	2149.7	2149.9	2150.0	N/A	2150.3
Bankfull Width (ft)[1]	17.8	17.9	-	15.6	20.6	25.3	N/A	10.6
Floodprone Width (ft)[1]	>197.0	>197.0	-	>54.5	>54.5	>54.5	N/A	>54.3
Bankfull Mean Depth (ft)	0.8	0.8	-	0.8	0.7	-	N/A	-
Bankfull Max Depth (ft)[2]	1.1	1.2	-	1.2	1.5	0.7	N/A	1.4
Bankfull Cross Sectional Area (ft2)[2]	13.6	13.6	-	12.1	13.6	7.0	N/A	9.3
Bankfull Width/Depth Ratio	23.4	23.4	-	20.2	31.1	-	N/A	-
Bankfull Entrenchment Ratio[1]	>11.0	>11.0	-	>3.5	>2.7	>2.2	N/A	>5.1
Bankfull Bank Height Ratio[1]	1.0	1.0	-	1.0	<1.0	<1	N/A	<1

Note: Starting in MY5, the parameters denoted with 1 were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with 2 were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

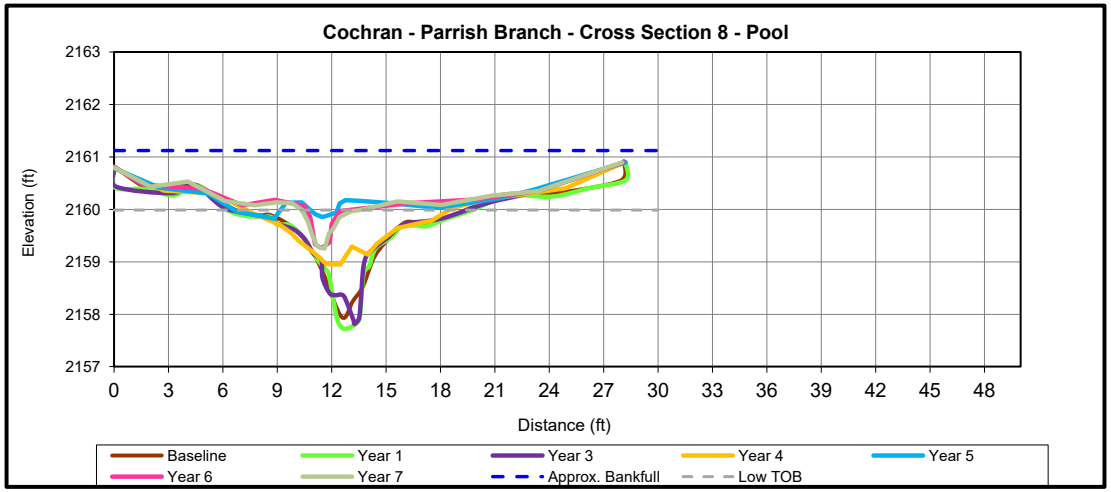


	Cross Section 7 (Riffle)							
Dimension	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Elevation (ft) - Based on AB-XSA[1]	2160.2	2160.2	-	2160.2	2160.7	2160.9	2161.2	2160.8
Bankfull Width (ft)[1]	4.4	4.5	-	3.7	10.5	15.6	2.1	2.8
Floodprone Width (ft)[1]	>14.2	>14.2	-	11.9	24.0	>26.5	>26.4	>26.5
Bankfull Mean Depth (ft)	0.4	0.4	-	0.2	0.2	-	-	-
Bankfull Max Depth (ft)[2]	0.6	0.7	-	0.4	0.3	0.4	0.6	1.1
Bankfull Cross Sectional Area (ft2)[2]	1.8	2.0	-	0.6	1.8	0.5	1.0	1.6
Bankfull Width/Depth Ratio	10.9	10.4	-	23.6	62.5	-	-	-
Bankfull Entrenchment Ratio[1]	>3.2	>3.1	-	3.2	2.3	>1.7	>12.6	>9.3
Bankfull Bank Height Ratio[1]	1.0	1.0	-	1.0	<1.0	<1	0.6	<1

Note: Starting in MY5, the parameters denoted with 1 were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with 2 were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream

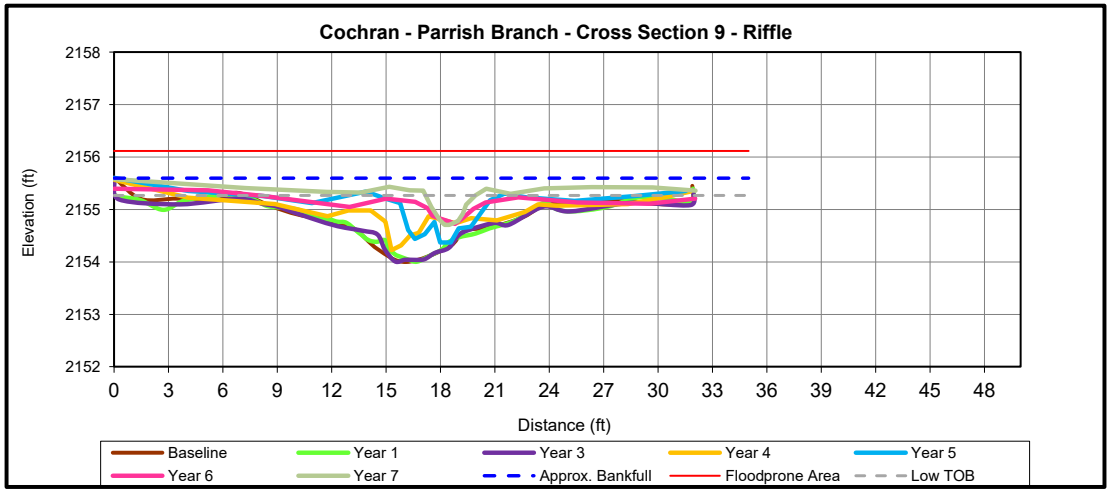


	Cross Section 8 (Pool)							
Dimension	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Elevation (ft) - Based on AB-XSA[1]	2159.8	2159.8	-	2159.8	2160.0	N/A	2162.3	N/A
Bankfull Width (ft)[1]	6.8	7.2	-	8.0	10.9	N/A	2.0	N/A
Floodprone Width (ft)[1]	>93.7	>93.7	-	>28.2	>28.1	N/A	N/A	N/A
Bankfull Mean Depth (ft)	0.8	0.8	-	0.6	0.5	-	-	-
Bankfull Max Depth (ft)[2]	1.8	2.0	-	1.9	1.0	0.3	0.7	0.7
Bankfull Cross Sectional Area (ft2)[2]	5.2	5.5	-	5.0	5.2	1.1	0.7	0.9
Bankfull Width/Depth Ratio	9.0	9.6	-	12.7	22.8	-	-	-
Bankfull Entrenchment Ratio[1]	>13.7	>12.9	-	N/A	N/A	N/A	N/A	N/A
Bankfull Bank Height Ratio[1]	1.0	1.0	-	N/A	N/A	N/A	N/A	N/A

Note: Starting in MY5, the parameters denoted with 1 were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with 2 were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Upstream

Downstream



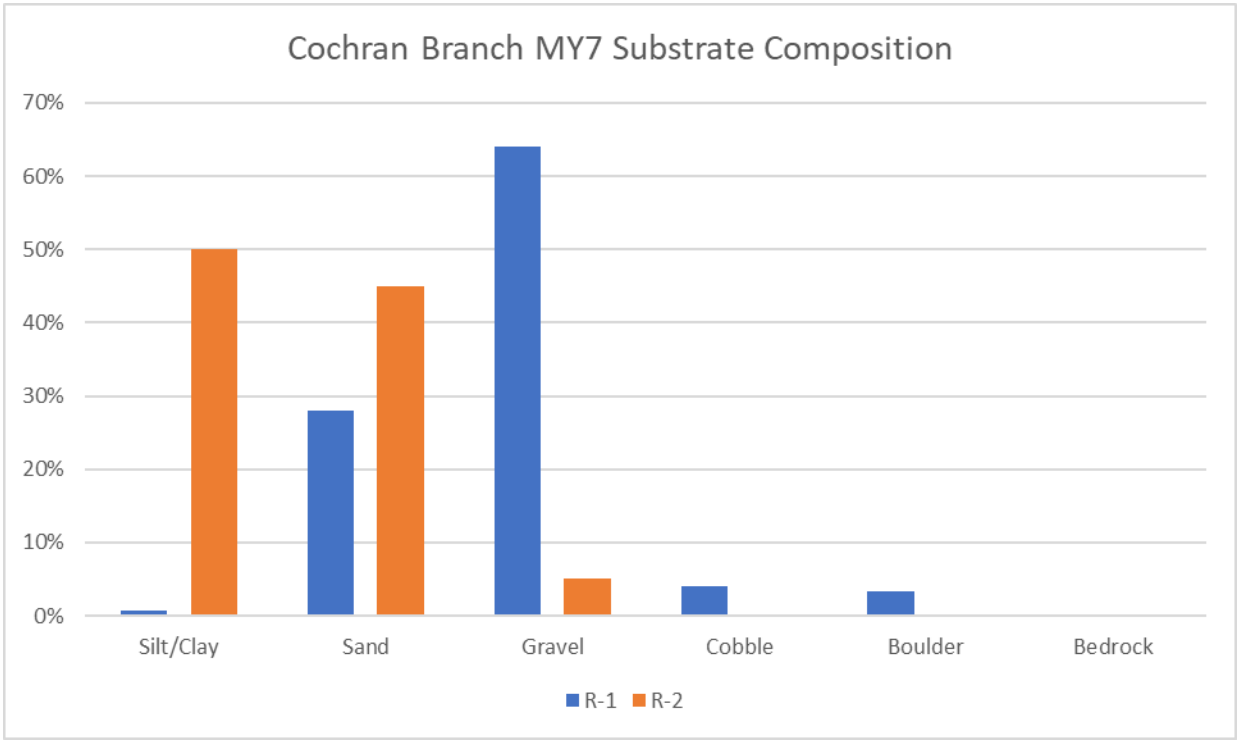
	Cross Section 9 (Riffle)							
Dimension	Base	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankfull Elevation (ft) - Based on AB-XSA[1]	2154.6	2154.6	-	2154.6	2155.0	2155.1	2155.5	2155.6
Bankfull Width (ft)[1]	5.9	6.6	-	5.8	8.6	4.7	3.9	3.5
Floodprone Width (ft)[1]	>24.0	>24.0	-	>29.3	>31.8	>31.5	>32.1	>32.1
Bankfull Mean Depth (ft)	0.4	0.3	-	0.3	0.2	-	-	-
Bankfull Max Depth (ft)[2]	0.6	0.6	-	0.6	0.8	0.8	0.3	0.6
Bankfull Cross Sectional Area (ft2)[2]	2.1	2.0	-	2.0	2.1	2.6	0.5	0.9
Bankfull Width/Depth Ratio	16.6	21.7	-	17.0	35.7	-	-	-
Bankfull Entrenchment Ratio[1]	>4.0	>3.7	-	>5.1	>3.7	>6.7	>8.3	>9.2
Bankfull Bank Height Ratio[1]	1.0	1.0	-	0.9	1.0	1.1	0.4	<1

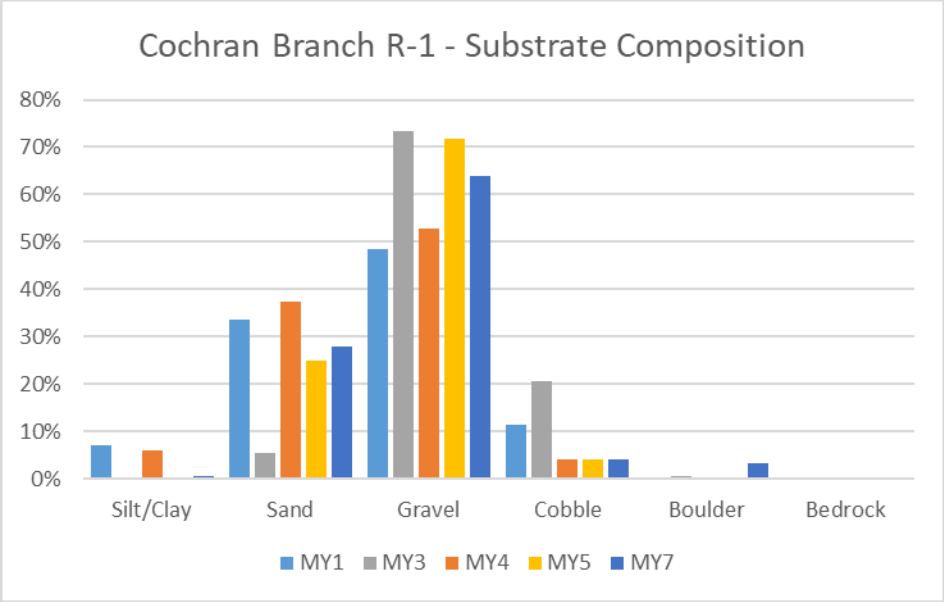
Note: Starting in MY5, the parameters denoted with 1 were calculated using the as-built cross sectional area as the basis for adjusting the bankfull elevation and the parameters denoted with 2 were calculated using the current years low top of bank as the bankfull elevation. These changes reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT, and industry mitigation providers.

Table 12. Pebble Count Data Summary

Stream Reach	MY1 - 2015		MY3 - 2017		MY4 - 2018		MY5 - 2019		MY7 - 2021	
	Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count	
	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)	D_{50} (mm)	D_{84} (mm)
R-1	13.5	4.1	26.0	2.4	4.9	0.1	7.7	28.3	7.7	28.3
R-2	46.3	22.5	64.7	10.0	15.7	0.1	0.3	1.8	0.3	0.5

MY7 Stream Reach Substrate Composition




Cochran Branch R-1 - Substrate Composition
80%
70%
60%
50%
40%
30%
20%
10%
0%
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
MY1
MY3
MY4
MY5
MY7

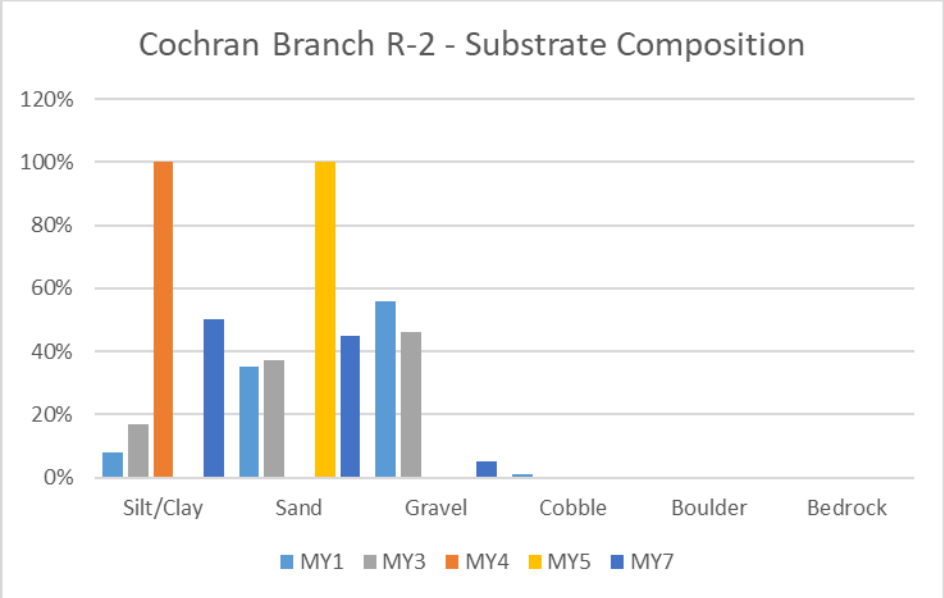

Cochran Branch R-2 - Substrate Composition
120%
100%
80%
60%
40%
20%
0%
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock
MY1
MY3
MY4
MY5
MY7

Table 13. Cochran Bank Pin Array Summary

Bank Pin Location	Position	Year 1 Reading (mm)	Year 3 Reading (mm)	Year 4 Reading (mm)	Year 5 Reading (mm)	Year 7 Reading (mm)
Cross Section 1	Upstream	0.0	0.0	0.0	0.0	0.0
	At Cross Section	0.0	1.0	0.0	0.0	0.0
	Downstream	0.0	2.0	0.0	0.0	0.0
Cross Section 4	Upstream	0.0	3.0	0.0	0.0	0.0
	At Cross Section	0.0	4.0	0.0	0.0	0.0
	Downstream	0.0	5.0	0.0	0.0	0.0
Cross Section 8	Upstream	0.0	6.0	0.0	0.0	0.0
	At Cross Section	0.0	7.0	0.0	0.0	0.0
	Downstream	0.0	8.0	0.0	0.0	0.0

- Geomorphological data was not collected in MY2

Appendix E
Hydrology Data

Table 14. Verification of Bankfull Events

Date of Data Collection	Estimated Date of Occurrence	Method	Maximum Bankfull Height (ft)	Photo #
Cochran Branch				
12/29/2015	12/24/2015	Crest Gauge	0.86	MY1
3/24/2016	2/3/2016	Crest Gauge	0.68	MY2
8/17/2016	7/15/2016	Crest Gauge	0.58	MY2
10/3/2017	5/21/2017	Crest Gauge	0.92	MY3
10/27/2020	4/12/2020	Crest Gauge	1.92	MY6
10/7/2021	10/7/2021	Transducer	1.04	NA
Parrish Branch				
4/17/2017	4/3/2017	Crest Gauge	0.60	MY3
4/17/2017	2/28/2017	Crest Gauge	0.38	MY3
10/3/2017	5/21/2017	Crest Gauge	0.79	MY3
10/3/2018	8/1/2018	Crest Gauge	1.08	MY4
10/27/2020	4/12/2020	Crest Gauge	1.33	MY6

Note: Crest gauges malfunctioned in MY5 2019 therefore no bankfull events were recorded

Table 15. 2021 Rainfall Summary

Month	Average	Normal Limits		Franklin Station
		30 Percent	70 Percent	
January	5.18	3.78	6.10	3.93
February	4.32	2.94	5.16	5.70
March	5.05	3.60	5.97	8.54
April	4.82	3.64	5.62	2.45
May	4.19	2.90	4.99	5.54
June	4.64	3.32	5.48	3.76
July	4.61	3.33	5.44	3.52
August	4.49	3.21	5.31	7.20
September	4.37	2.74	5.28	3.81
October	2.94	1.26	3.58	6.21
November	4.26	2.70	5.13	---
December	5.49	4.04	6.44	---
Total	54.36	37.46	64.50	50.66
Above Normal Limits	Below Normal Limits			

Notes:

CRONOS Database - Franklin (313228)

Table 16. Wetland Hydrology Attainment Data

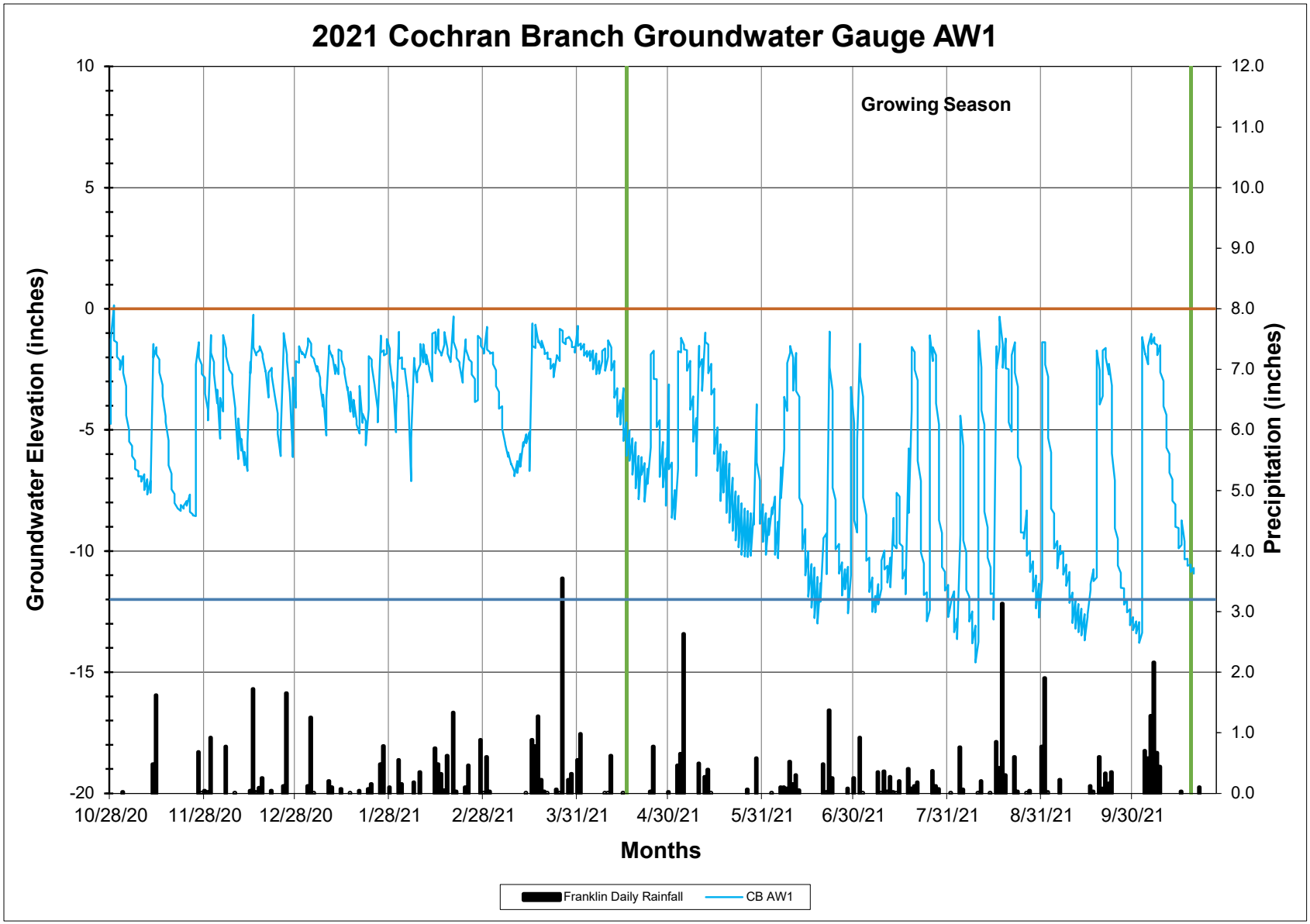
Summary of Groundwater Monitoring Results Cochran Stream & Wetland Restoration Site							
Gauge ID	Success Criteria Achieved/ Max Consecutive Days During Growing Season Percent						
	Year 1[1] (2015)	Year 2 (2016)	Year 3 (2017)	Year 4 (2018)	Year 5 (2019)	Year 6[3] (2020)	Year 7 (2021)
GW-1[2]	Yes/ 18 10%	Yes/ 40 21.4%	No/2 1%	Gauge malfunction	Yes/ 104.5 56%	Yes/ 143.5 77%	Yes/ 99.5 53%
GW-2	Yes/ 132 71%	Yes/ 187 100%	Yes/ 171.5 92%	Gauge malfunction	Yes/ 187 100%	Yes/ 143.5 77%	Yes/ 187 100%
GW-3	Yes/ 132 71%	Yes/ 187 100%	Yes/ 171 91%	Gauge malfunction	Yes/ 187 100%	Yes/ 143.5 77%	Yes/ 187 100%
GW-4	Yes/ 132 71%	Yes/ 187 100%	Yes/ 171.5 92%	Yes/ 170 91%	Yes/ 187 100%	Yes/ 143.5 77%	Yes/ 187 100%
GW-5	Yes/ 132 71%	Yes/ 187 100%	Yes/ 171.5 92%	Yes/ 169.5 91%	Yes/ 187 100%	Yes/ 143.5 77%	Yes/ 187 100%
GW-6	Yes/ 132 71%	Yes/ 187 100%	Yes/ 171.5 92%	Yes/ 169.5 91%	Yes/ 187 100%	Yes/ 143.5 77%	Yes/ 187 100%
GW-7	Yes/ 132 71%	Yes/ 187 100%	Yes/ 171.5 92%	Yes/ 169.5 91%	Yes/ 187 100%	Yes/ 143.5 77%	Yes/ 187 100%
GW-8[2]	Yes/ 132 71%	Yes/ 187 100%	Yes/ 171.5 92%	Yes/ 169.5 91%	Yes/ 187 100%	Yes/ 143.5 77%	Yes/ 187 100%

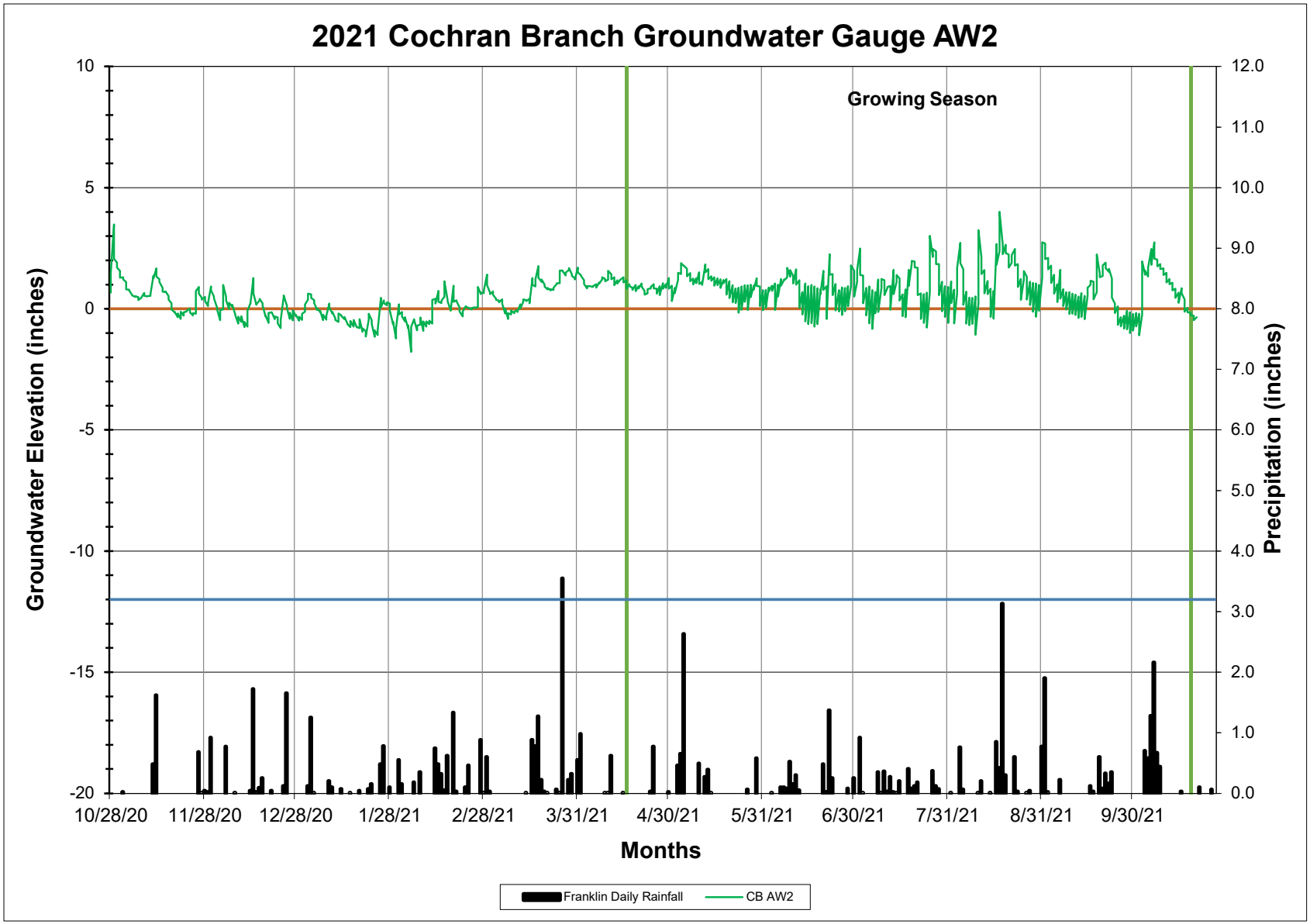
Hydrology Success Criteria = 8%; Growing season = April 16 - October 19 (187 days)

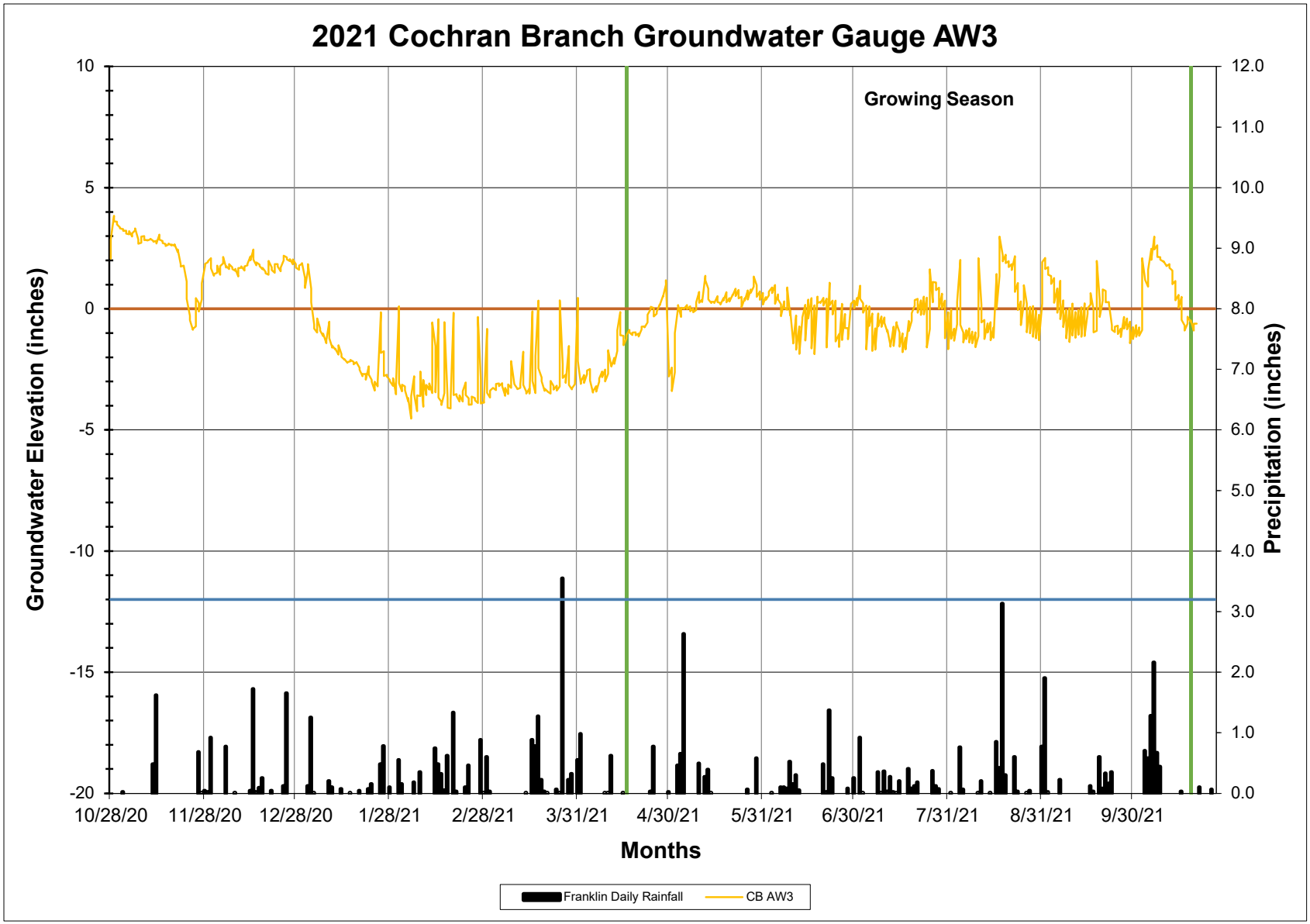
[1]Max consecutive days during growing season limited to 132 days due to shortened growing season. Percent based on full 187 day growing season

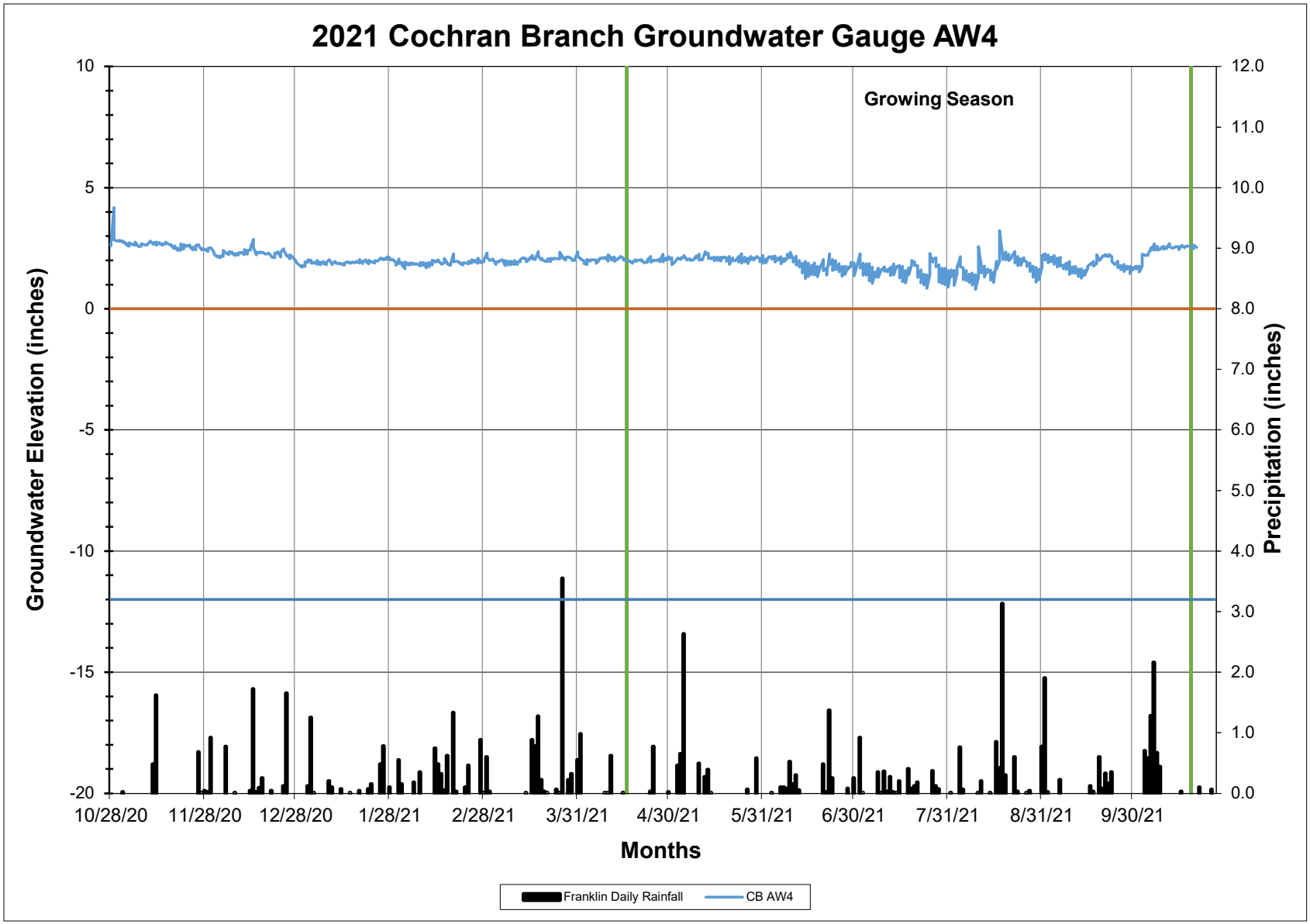
[2]Located outside of wetland crediting area

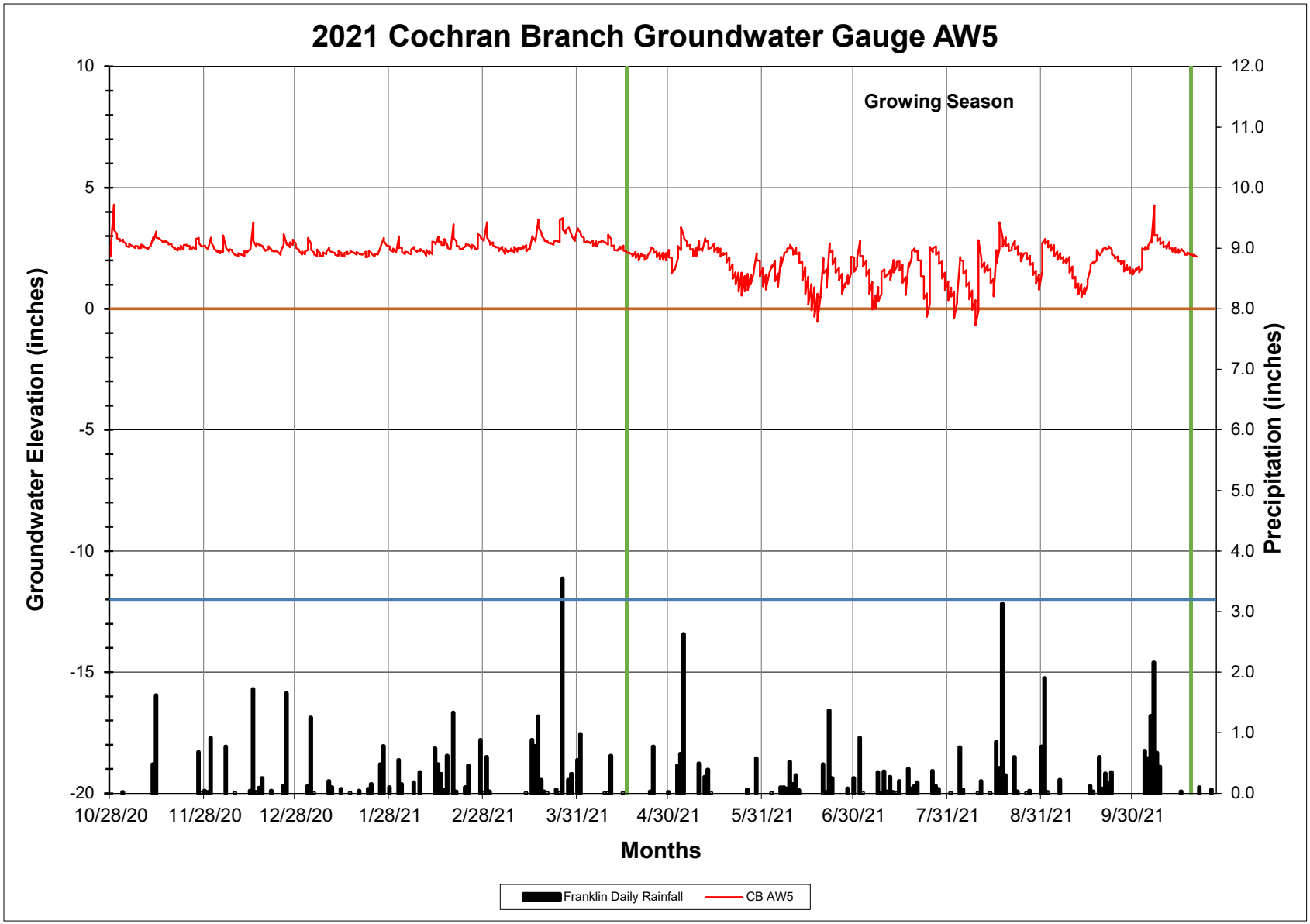
[3]Max consecutive days during growsing season limited to 144 days due to barometric pressure gauge failure. Percent based on full 187 day growing season

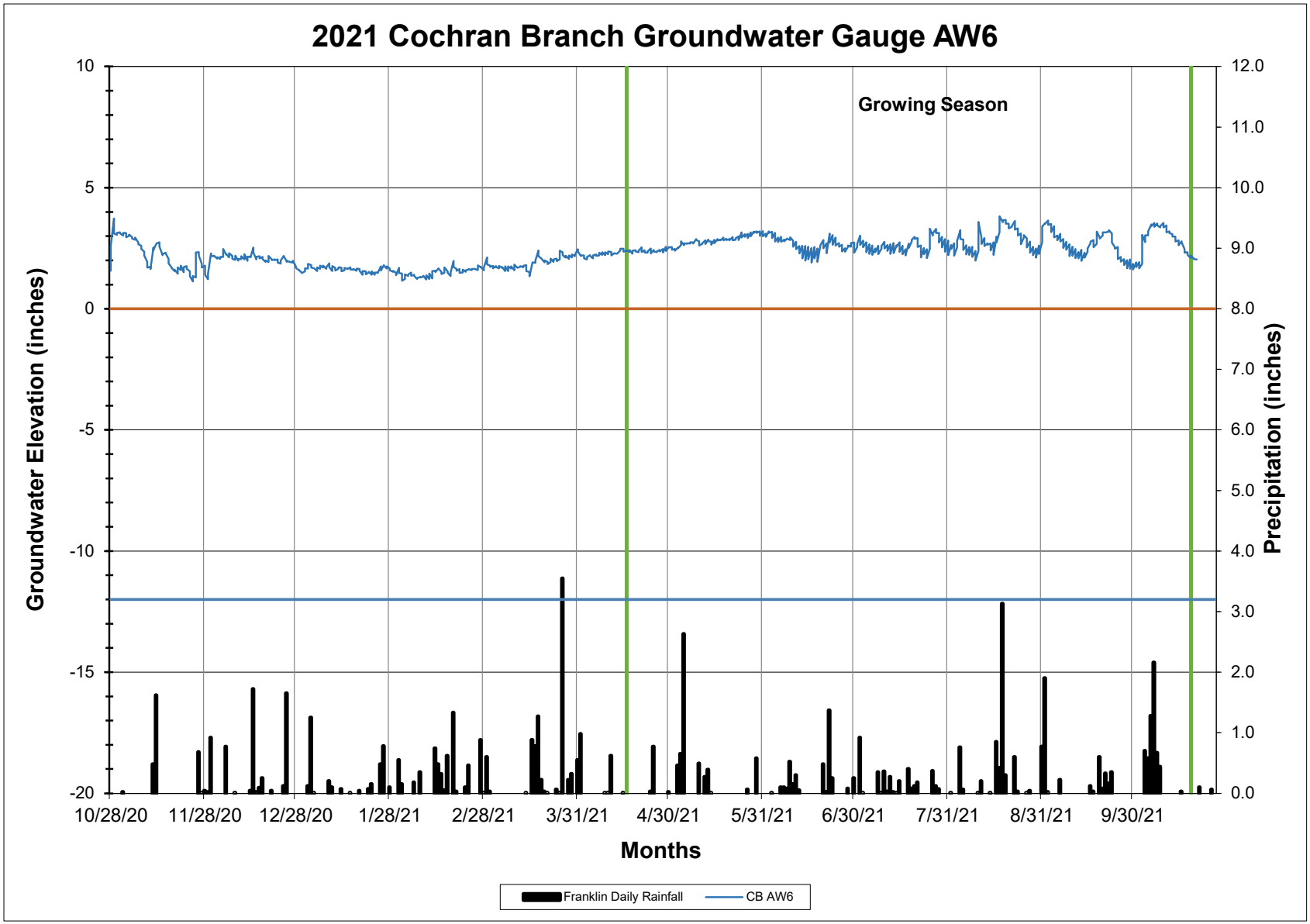

2021 Cochran Branch Groundwater Gauge AW1
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
10
5
0
-5
-10
-15
-20
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
10/28/20
11/28/20
12/28/20
1/28/21
2/28/21
3/31/21
4/30/21
5/31/21
6/30/21
7/31/21
8/31/21
9/30/21
Franklin Daily Rainfall
CB AW1

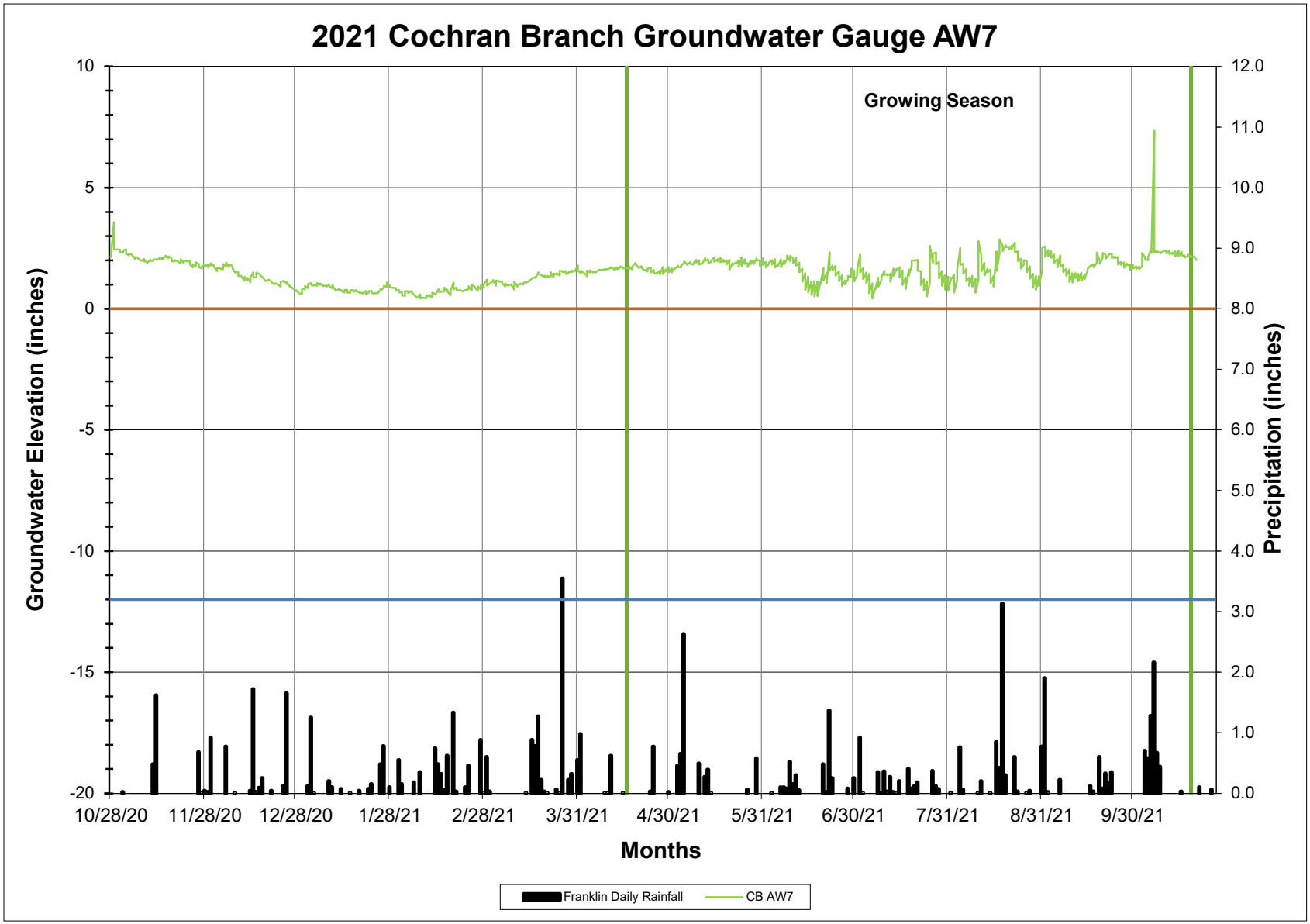

2021 Cochran Branch Groundwater Gauge AW2
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
10
5
0
-5
-10
-15
-20
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
10/28/20
11/28/20
12/28/20
1/28/21
2/28/21
3/31/21
4/30/21
5/31/21
6/30/21
7/31/21
8/31/21
9/30/21
Franklin Daily Rainfall
CB AW2

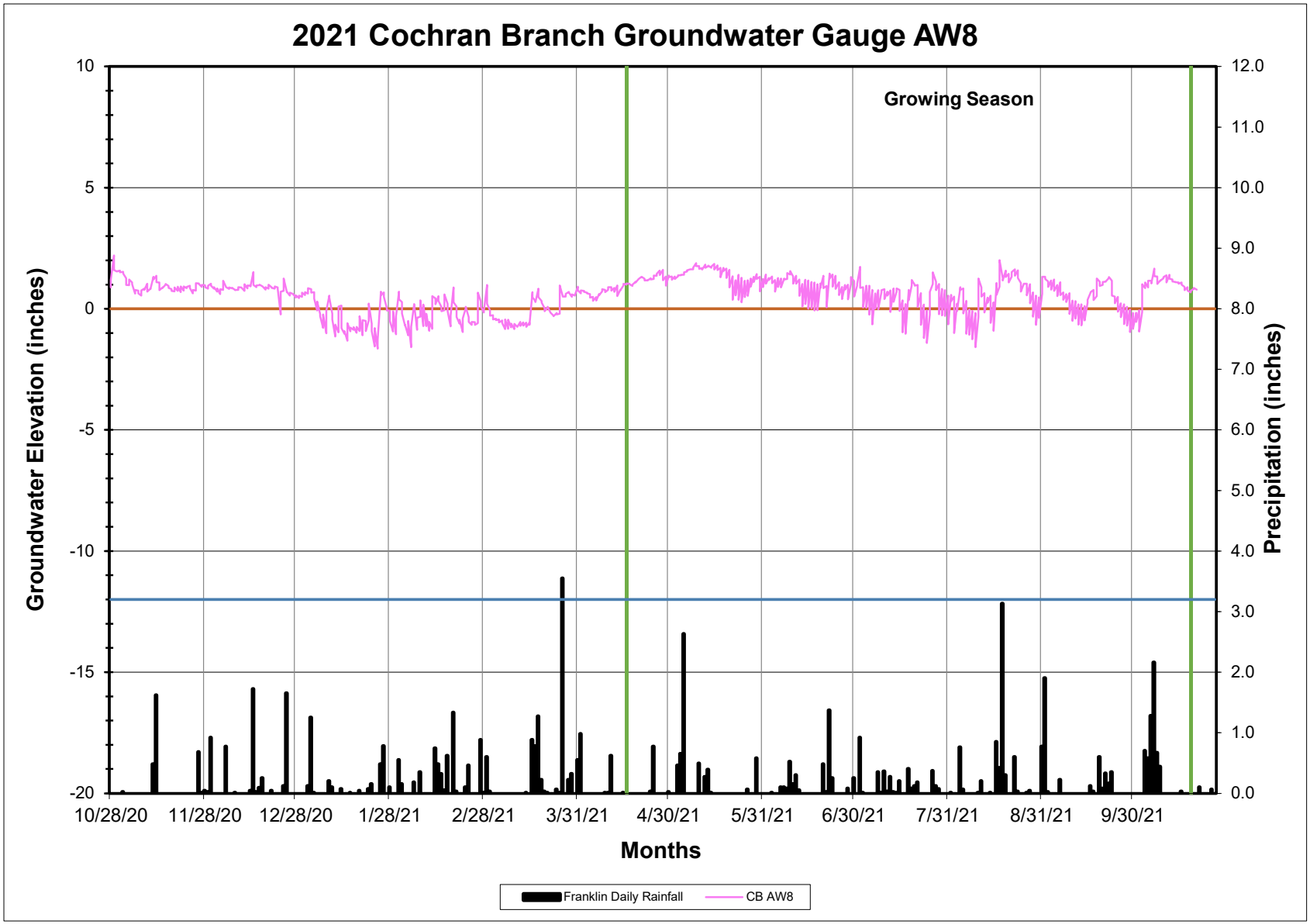

2021 Cochran Branch Groundwater Gauge AW3
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
10
5
0
-5
-10
-15
-20
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
10/28/20
11/28/20
12/28/20
1/28/21
2/28/21
3/31/21
4/30/21
5/31/21
6/30/21
7/31/21
8/31/21
9/30/21
Franklin Daily Rainfall
CB AW3

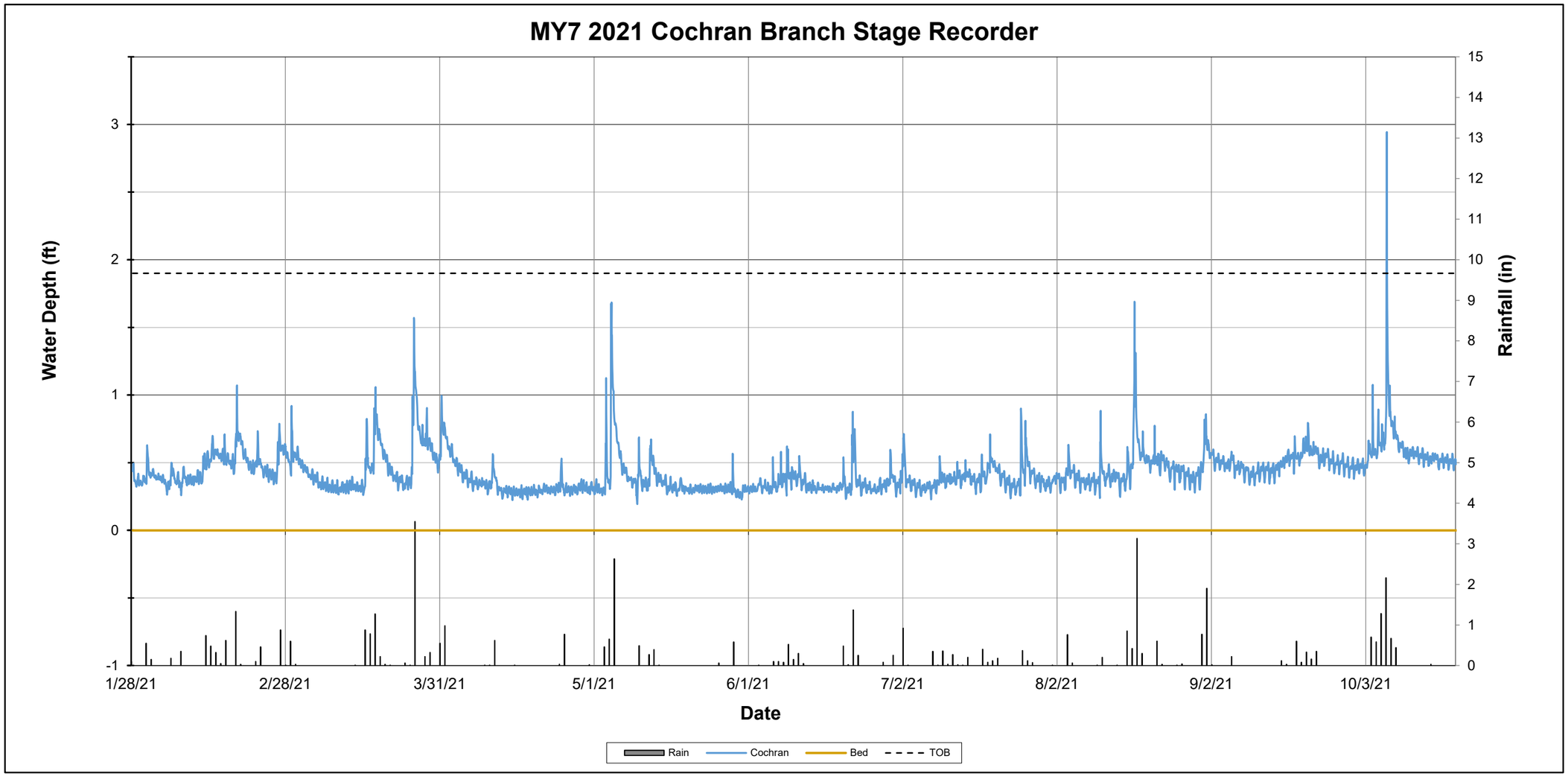

2021 Cochran Branch Groundwater Gauge AW4
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
10
5
0
-5
-10
-15
-20
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
10/28/20
11/28/20
12/28/20
1/28/21
2/28/21
3/31/21
4/30/21
5/31/21
6/30/21
7/31/21
8/31/21
9/30/21
Franklin Daily Rainfall
CB AW4

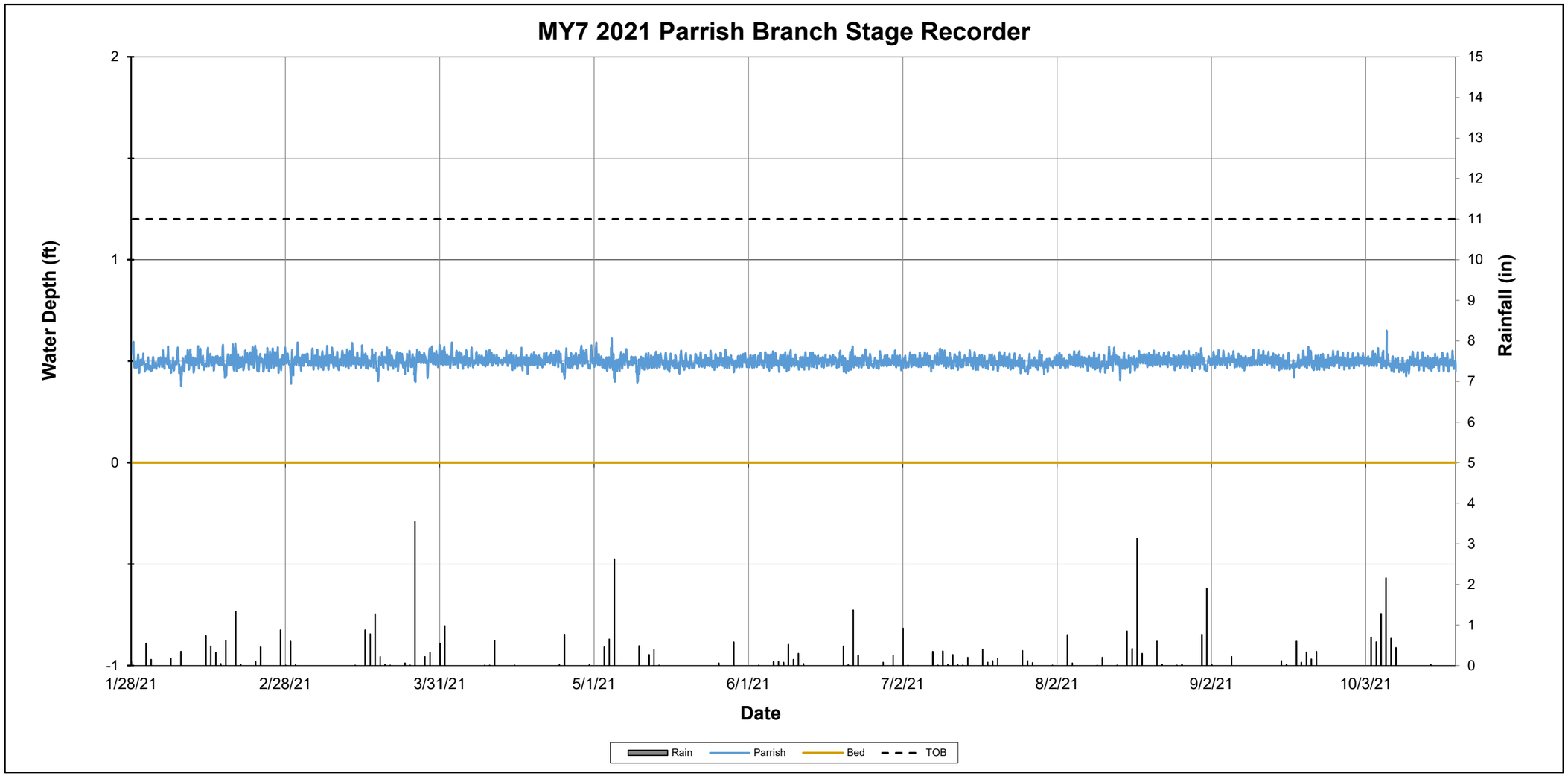

2021 Cochran Branch Groundwater Gauge AW5
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
10
5
0
-5
-10
-15
-20
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
10/28/20
11/28/20
12/28/20
1/28/21
2/28/21
3/31/21
4/30/21
5/31/21
6/30/21
7/31/21
8/31/21
9/30/21
Franklin Daily Rainfall
CB AW5


2021 Cochran Branch Groundwater Gauge AW6
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
10
5
0
-5
-10
-15
-20
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
10/28/20
11/28/20
12/28/20
1/28/21
2/28/21
3/31/21
4/30/21
5/31/21
6/30/21
7/31/21
8/31/21
9/30/21
Franklin Daily Rainfall
CB AW6


2021 Cochran Branch Groundwater Gauge AW7
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
10
5
0
-5
-10
-15
-20
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
10/28/20
11/28/20
12/28/20
1/28/21
2/28/21
3/31/21
4/30/21
5/31/21
6/30/21
7/31/21
8/31/21
9/30/21
Franklin Daily Rainfall
CB AW7


2021 Cochran Branch Groundwater Gauge AW8
Growing Season
Groundwater Elevation (inches)
Precipitation (inches)
Months
10
5
0
-5
-10
-15
-20
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
10/28/20
11/28/20
12/28/20
1/28/21
2/28/21
3/31/21
4/30/21
5/31/21
6/30/21
7/31/21
8/31/21
9/30/21
Franklin Daily Rainfall
CB AW8


MY7 2021 Cochran Branch Stage Recorder
Water Depth (ft)
Rainfall (in)
3
2
1
0
-1
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1/28/21
2/28/21
3/31/21
5/1/21
6/1/21
7/2/21
8/2/21
9/2/21
10/3/21
Date
Rain
Cochran
Bed
TOB


MY7 2021 Parrish Branch Stage Recorder
Water Depth (ft)
Rainfall (in)
2
1
0
-1
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1/28/21
2/28/21
3/31/21
5/1/21
6/1/21
7/2/21
8/2/21
9/2/21
10/3/21
Date
Rain
Parrish
Bed
TOB