

FINAL
MONITORING REPORT (MY2)

ALLIANCE HEADWATERS MITIGATION SITE

Johnston County, North Carolina

NCDEQ Contract No. 6832

DWR ID No. 20160405

DMS ID No. 97086

USACE Action ID No. SAW-2016-00882

RFP No. 16-006477

Neuse River Basin

HUC 03020201

Data Collection: January - October 2021

Submission: December 2021



Prepared for:

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



Response to Monitoring Year 2 (2021) DMS Comments

Alliance Headwaters Stream and Wetland Mitigation Site (DMS #97086)
Neuse River Basin 03020201, Johnston County
Contract No. 6832

Comments Received (Black Text) & Responses (Blue Text)

Report

1. Please revise the report to reflect the growing season established in the Mitigation Plan. Growing season approved in the Mitigation Plan is March 1-November 4 with the March 1 date supported by soil temperature readings above 41 degrees. The direction to use dates from Mitigation Plan was confirmed in a recent e-mail from the IRT.
[The growing season was updated to March 1-November 4 to reflect the approved methods described in the mitigation plan.](#)
2. You may omit table 13 in this and future reports.
[Table 13 was omitted from the report and subsequent tables were renumbered.](#)

Electronic Deliverables:

1. Please be sure that BHR is consistently being calculated after the areas outside of the main channel are excluded. For example, UT2-XS1 would only have a BHR of 0.82 if the areas outside of the main channel were included in determining the bankfull elevation that achieves the as built cross sectional area. In other instances (e.g. UT4-XS2) it is clear that those areas outside of the main channel were excluded. Please review these calculations and verify that the same procedure was used throughout.
[All cross-sections were checked and edited if deemed necessary to exclude the areas outside of the channel when calculating bankfull elevation. Cross-section figures and morphology tables were updated accordingly.](#)
2. Please submit the soil temperature data.
[The raw soil temperature data is included in the hydrology folder of the digital submittal.](#)
3. Please update Table D to reflect the number of groundwater gauges currently on site.
[Table D was updated accordingly.](#)

Alliance Headwaters -- Year 2 (2021) Monitoring Summary

General Notes

- No encroachment was identified in Year 2 (2021)
- No evidence of nuisance animal activity (i.e., heavy deer browsing, beaver activated, etc.) was observed.

Streams

- Stream monitoring measurements indicate minimal changes in the cross-sections as compared to as-built data. The channel geometry compares favorably with the proposed conditions outlined in the Detailed Restoration Plan and as constructed.
- Across the Site, all in-stream structures are intact and functioning as designed. No stream areas of concern were identified during year 2 (2021) monitoring. Tables for Year 2 (2021) data and annual quantitative assessments are included in Appendix D.
- All seven flow gauges recorded continuous flow for more than the 30-days. Flow periods ranged from 97 to 201 consecutive days (Appendix E).
- One bankfull event was documented during Year 2 (2021) monitoring for a total of three bankfull events to date, with events occurring in each of the 2 monitoring years (Table 16, Appendix E).

Wetlands

- Twenty-seven of the thirty-five groundwater gauges met success criteria. Across the Site, the development of herbaceous hydrophytic species is abundant.

Due to equipment malfunctions and general wetland hydrology failure during Year 1 (2021), the original twenty-nine groundwater gauges were replaced with a standard Onset HOB0 pressure-based water level data loggers in January 2021. Also, six additional wetland gauges were installed in areas of the Site RS felt needed additional data points (near GW19, near vegetation plot 31, near GW 7, at the upstream portion of UT 2, and across UT 1 from GW 11-12). New gauge locations are depicted on Figures 2A-B (Appendix B).

Vegetation

- Thirty of the 32 fixed vegetation monitoring plots met success in Year 2 with an average of 506 planted stems/acre. Additionally, 17 of 18 random transects met success with an average of 643 stems/acre. No areas of vegetation concern were identified in year 2.

Site Maintenance Report (2021)

Invasive Species Work	Maintenance work
8/17/21 Cattail	None

Site Monitoring Activity and Reporting History

Project Millstones	Stream Monitoring Complete	Vegetation Monitoring Complete	Wetland Monitoring	Data Analysis Complete	Completion or Delivery
Construction Earthwork	--	--	--	--	July 31, 2019
Planting	--	--	--	--	January 16, 2020
As-Built Documentation	Dec. 11-16, 2020	Jan. 16-17, 2020	--	January 2020	March 2020
Year 1 Monitoring	July 23, 2020	July 27-28, 2020	Jan. – Nov. 2020	November 2020	January 2021
Year 2 Monitoring	March 10, 2021	July 6, 2021	Jan. – Nov. 2021	November 2021	December 2021

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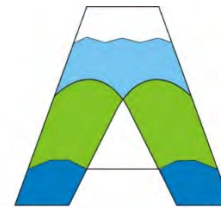
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1.0 PROJECT SUMMARY

Restoration Systems, LLC has established the North Carolina Division of Mitigation Services (NCDMS) Alliance Headwaters Mitigation Site (Site).

1.1 Project Goals & Objectives

Project goals and associated objectives are summarized in Table A.

Table A: Summary of Goals and Objectives for the Alliance Headwaters Mitigation Project

Goals	Objectives	Pre-construction Functional Status	Post-construction Functional Status
Goals Specific to the Neuse River and Hannah Creek Watershed Discussed in the RBRP (NCDMS 2010 and 2015) and Neuse River Basinwide Plan (NCDWQ 2009)			
Remove Direct Nutrient Inputs from Agricultural Lands	<ul style="list-style-type: none"> Restoration and enhancement of minimum 50-foot riparian buffers along all Project reaches Protection of riparian buffers with a perpetual conservation easement Reducing the amount of land in active row crop agriculture Decreasing drainage to restore wetlands, promoting higher water table conditions, and denitrification 	Not Functioning	Functioning
Remove Direct Sediment Inputs from Agricultural Lands	<ul style="list-style-type: none"> Restoration of stabilized headwater stream systems Restoration of wetlands and riparian buffers to filter runoff Increase the distance between active farming operations and receiving waters Stabilization of gullies and ditches 	Not Functioning	Functioning
Additional Benefits to Hannah Creek Significant Natural Heritage Area			
Improved Aquatic Habitats	<ul style="list-style-type: none"> Restoration of appropriate bed form diversity, headwater stream/wetland form, and in-stream structures to provide suitable habitat Restoration of self-sustaining stream/wetland headwaters Restoration of riparian buffer vegetation to provide organic matter and shade 	Not Functioning	Functioning
Improved Connectivity	<ul style="list-style-type: none"> Restore connectivity to historic remnant channel features. Improved aquatic connectivity to Hannah Creek 	Not Functioning	Functioning

1.2 Project Background

The Alliance Headwaters Mitigation Site (Site) is in Johnston County, approximately six miles southeast of Four Oaks and one mile east of US 701 (Figure 1, Appendix A). The Project is located within the NC Division of Mitigation Services (DMS) targeted watershed for the Neuse River Basin Hydrologic Unit (HU) 03020201150020 and the NC Division of Water Resources (NCDWR) subbasin 03-04-04.

A review of historic aerials of the Site, and adjacent parcels, taken in 1939, 1965, 1971, 1988, and 2005, revealed that while agriculture was prevalent in the area, much of the Site was not converted to agricultural uses until after 1997/1998. Additional aerial photographs from Google Earth show that before construction, the project site had been manipulated for agricultural production numerous times between

1997/1998 and 2019. The channelization of perimeter ditches to carry stream flow served to undermine the hydrologic connection between the headwaters of UT3 and UT4 (located in the forested sections of the Site) from their downstream channels. In addition, two small impoundments were excavated on the historical flow paths of UT1 and UT3 during this time. The Site has existed in its pre-construction condition since approximately 2005.

Current land use near the Site is predominately agriculture (crop and livestock production) and silviculture. While the Site is near (< 6 miles) to two major interstates (I-95 and I-40), there are no foreseeable signs of impending land use changes or development pressure that would impact the Project's watershed. The conservation easement will eliminate the potential for future development and/or agricultural use in the floodplain areas of the restored streams.

1.3 Project Components and Structure

Proposed Site restoration activities generated 6029 Stream Mitigation Units (SMUs) and 39.4 riverine Wetland Mitigation Units (WMUs) within a 71.7-acre conservation easement as the result of the following.

- Restoration of 6,529 linear feet of stream channels that have been straightened and channelized for agricultural purposes
- Restoration of 32.6 acres of drained hydric soil to riparian riverine wetlands as the result of stream restoration activities and ditch plugging
- Areas of potential wetland riparian riverine restoration total approximately 7.0 acres of drained soils with hydric inclusions
- Enhancement of 0.38 acres of jurisdictional riparian headwater forest through stream realignment activities and supplemental wetland plantings
- Creation of 1.99 acres of riparian riverine wetlands in areas of drained hydric soil requiring bench excavation
- Preservation of 16.39 acres of jurisdictional riparian riverine wetlands located within forested headwater systems

Additional activities that occurred at the Site included the following.

- Planting 49.9 acres of the Site with 35,200 stems (planted species and densities by zone are included in Table 7 [Appendix C])
- Application of permanent seed mix across 49.9 acres of the Site and temporary seed mix consisting of grain rye, millet, clover, and turnip

Site design was completed in October 2018. Construction started on May 13, 2019, and ended within a final walkthrough on July 31, 2019. The Site was planted on January 16, 2020. Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 1-4 (Appendix A).

1.4 Success Criteria

Performance criteria outlined in the *NCDMS Mitigation Plan Template* (ver. 10/2015), and *US Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District* (October 24, 2016), will be followed and are briefly outlined below. Monitoring data collected on the Site will include reference photos, plant survival analyses, channel stability analyses, wetland hydrological analysis, and biological data if specifically required by permit conditions.

Monitoring will be conducted for seven years, unless the USACE, in consultation with the Interagency Review Team (IRT), agrees that monitoring may be terminated early. Early closure will only be provided through written approval from the USACE in consultation with the IRT. Annual monitoring reports will be submitted to the NCDMS by RS no later than November 30 of each monitoring year.

Table B: Success Criteria

Streams
<ul style="list-style-type: none"> • All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05. • A continuous surface flow must be documented each year for at least 30 consecutive days. • Bank height ratio (BHR) cannot exceed 1.2 for a majority of measured cross sections on a given reach. • Entrenchment ratio (ER) must be 2.2 or above for a majority of measured riffle cross-sections on a given reach. • BHR and ER should not change by more than 10% in any given year for a majority of a given reach. • Must document the occurrence of at least 4 bankfull events in separate years during the monitoring period.
Wetland Hydrology
<ul style="list-style-type: none"> • Saturation or inundation within the upper 12 inches of the soil surface for, at a minimum, 10 percent of the growing season during average climatic conditions. Note: Soil temperature for growing season establishment will be determined using a continuously logging soil probe installed at the rain gauge. Soil temperature will be measured from mid-February through the end of April (at a minimum).
Vegetation
<ul style="list-style-type: none"> • Within planted portions of the Site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 5; and a minimum of 210 stems per acre must be present at year 7. • Trees must average 7 feet in height at year 5 and 10 feet in height at year 7. • Planted and volunteer stems are counted, provided they are included in the approved planting list for the Site. • Any single species can only account for 50% of the required stems per monitoring plot.

2.0 METHODS

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

Table C: Monitoring Schedule

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

2.1 Monitoring

The monitoring parameters are summarized in Table D.

Stream Summary

All streams are functioning as designed, and no stream areas of concern were observed during year 2 (2021) monitoring. Stream morphology data is available in Appendix D.

Wetland Summary

Summary of Monitoring Period/Hydrology Success Criteria by Year

Year	Soil Temperatures/Date Bud Burst Documented	Monitoring Period Used for Determining Success	10 Percent of Monitoring Period
2020 (Year 1)	March 2, 2020*	March 2-November 4 (248 days)	25 days
2021 (Year 2)	March 1, 2021*	March 1-November 4 (249 days)	25 days

*Based on observed/documentated bud burst and data collected from a soil temperature data logger located on the Site.

Twenty-seven of the thirty-five groundwater gauges met success criteria for the year 2 (2021) monitoring period (Appendix E). Across the Site, the development of herbaceous hydrophytic species is abundant.

Due to equipment malfunctions and general wetland hydrology failure during Year 1 (2021), the original twenty-nine groundwater gauges were replaced with a standard Onset HOB0 pressure-based water level data loggers in January 2021. Also, six additional wetland gauges were installed in areas of the Site RS felt needed additional data points (near GW19, near vegetation plot 31, near GW 7, at the upstream portion of UT 2, and across UT 1 from GW 11-12). New gauge locations are depicted on Figures 2A-B (Appendix B). In general, on-site observations indicate wetland re-establishment is trending towards achieving success criteria.

Vegetation Summary

During quantitative vegetation sampling, 32 sample plots (10-meter by 10-meter) were installed within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). Year 2 (2021) measurements also included 18 random sample plots (a mix of 50-meter by 2-meter and 25-meter by 4-meter). Measurements of all 50 plots resulted in an average of 555 planted stems/acre excluding livestakes. Additionally, 30 of the 32 permanent plots and 17 of the 18 temporary transects met success criteria. Plots 28 and 29 were each one stem shy of meeting success criteria. Planted stem mortality in these plots is likely due to localized seasonal inundation of these areas. A temporary transect in the vicinity of these plots (Transect 11) met success criteria with 567 stems/acre. Transect 15 was 3 stems shy of meeting success criteria. This is likely due to dense herbaceous competition in this area. Permanent plots 14 and 16 are located on either side of this transect, and they both met success criteria with 809 and 567 stems per acre respectively. Year 2 (2021) vegetation data is summarized in Tables 8-11 (Appendix C).

Table D: Monitoring Summary

Stream Parameters				
Parameter	Method	Schedule/Frequency	Number/Extent	Data Collected/Reported
Stream Profile	Full longitudinal survey	As-built (unless otherwise required)	All restored stream channels	Graphic and tabular data.
Stream Dimension	Cross-sections	Years 1, 2, 3, 5, and 7	Total of 16 cross-sections on restored channels	Graphic and tabular data.
Channel Stability	Visual Assessments	Yearly	All restored stream channels	Areas of concern to be depicted on a plan view figure with a written assessment and photograph of the area included in the report.
	Additional Cross-sections	Yearly	Only if instability is documented during monitoring	Graphic and tabular data.
Stream Hydrology	Continuous monitoring of surface water gauges and/or trail camera	Continuous recording through the monitoring period	Total of 7 surface water gauges: One gauge on UT1 – R2, UT1 – R3, UT1A, UT2, UT3 – R1, UT3 – R2, and UT4	Surface water data for each monitoring period as depicted in Figures 2A-2B.
Bankfull Events	Continuous monitoring of surface water gauges and/or trail camera	Continuous recording through the monitoring period	Total of 7 surface water gauges: One gauge on UT1 – R2, UT1 – R3, UT1A, UT2, UT3 – R1, UT3 – R2, and UT4	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through the monitoring period	All restored stream channels	Visual evidence, photo documentation, and/or rain data.
Wetland Parameters				
Parameter	Method	Schedule/Frequency	Number/Extent	Data Collected/Reported
Wetland Hydrology	Groundwater gauges	Years 1, 2, 3, 4, 5, 6, and 7 throughout the year, with the growing season defined as March 1-November 4	35 gauges spread throughout restored wetlands and 1 reference gauge within the wetland preservation area	Soil temperature at the beginning of each monitoring period to verify the start of the growing season, groundwater and rain data for each monitoring period
Vegetation Parameters				
Parameter	Method	Schedule/Frequency	Number/Extent	Data Collected/Reported
Vegetation establishment and vigor	Permanent vegetation plots 0.0247 acre (100 square meters) in size; <i>CVS-EEP Protocol for Recording Vegetation, Version 4.2</i> (Lee et al. 2008)	As-built, Years 1, 2, 3, 5, and 7	32 plots spread across the Site	Species, height, planted vs. volunteer, stems/acre
	Annual random vegetation plots, 0.0247 acre (100 square meters) in size	As-built, Years 1, 2, 3, 5, and 7	18 plots randomly selected each year	Species and height

3.0 REFERENCES

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APPENDIX A: BACKGROUND TABLES AND MAP

Figure 1. Site Location

Table 1. Project Components and Mitigation Units

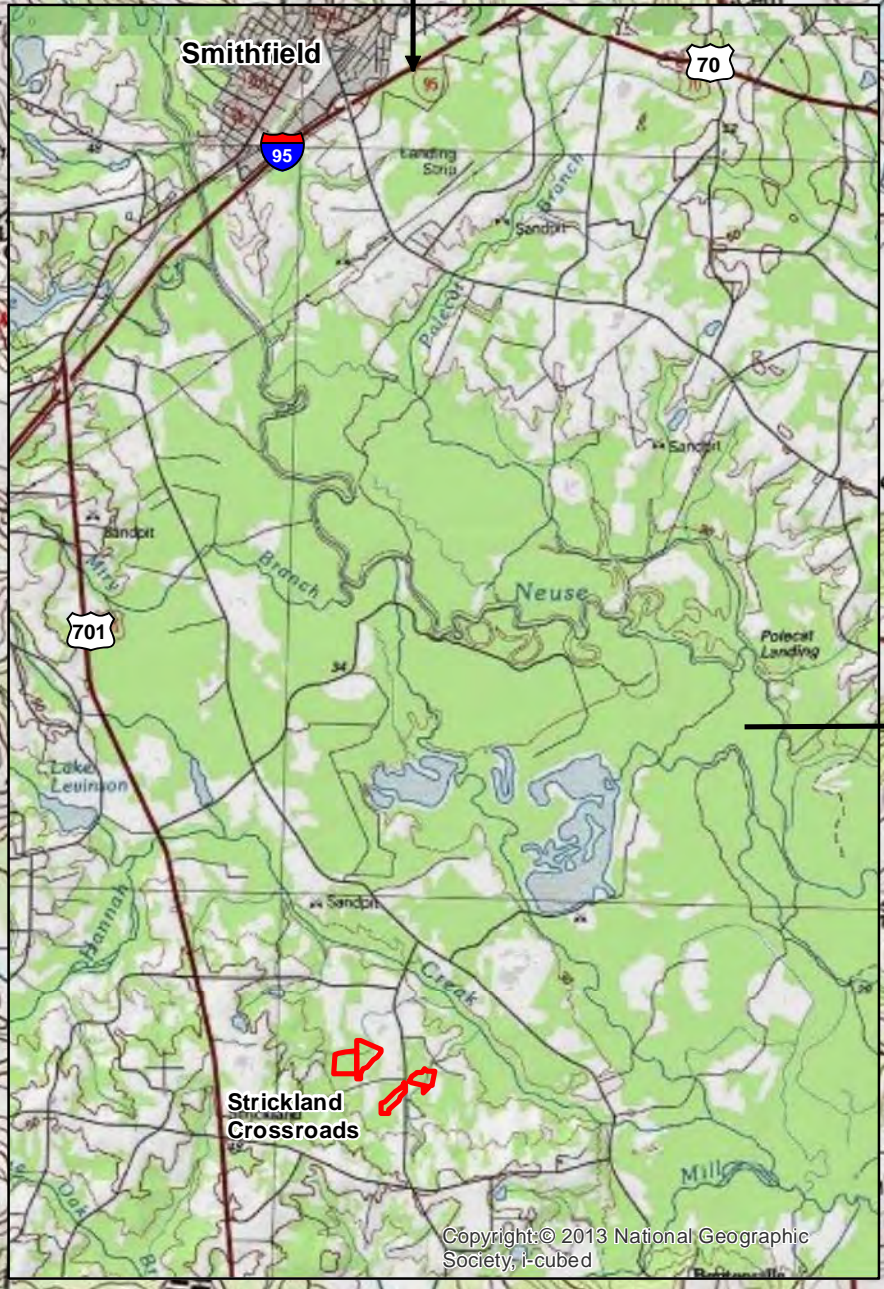
Table 2. Project Activity and Reporting History

Table 3. Project Contacts Table

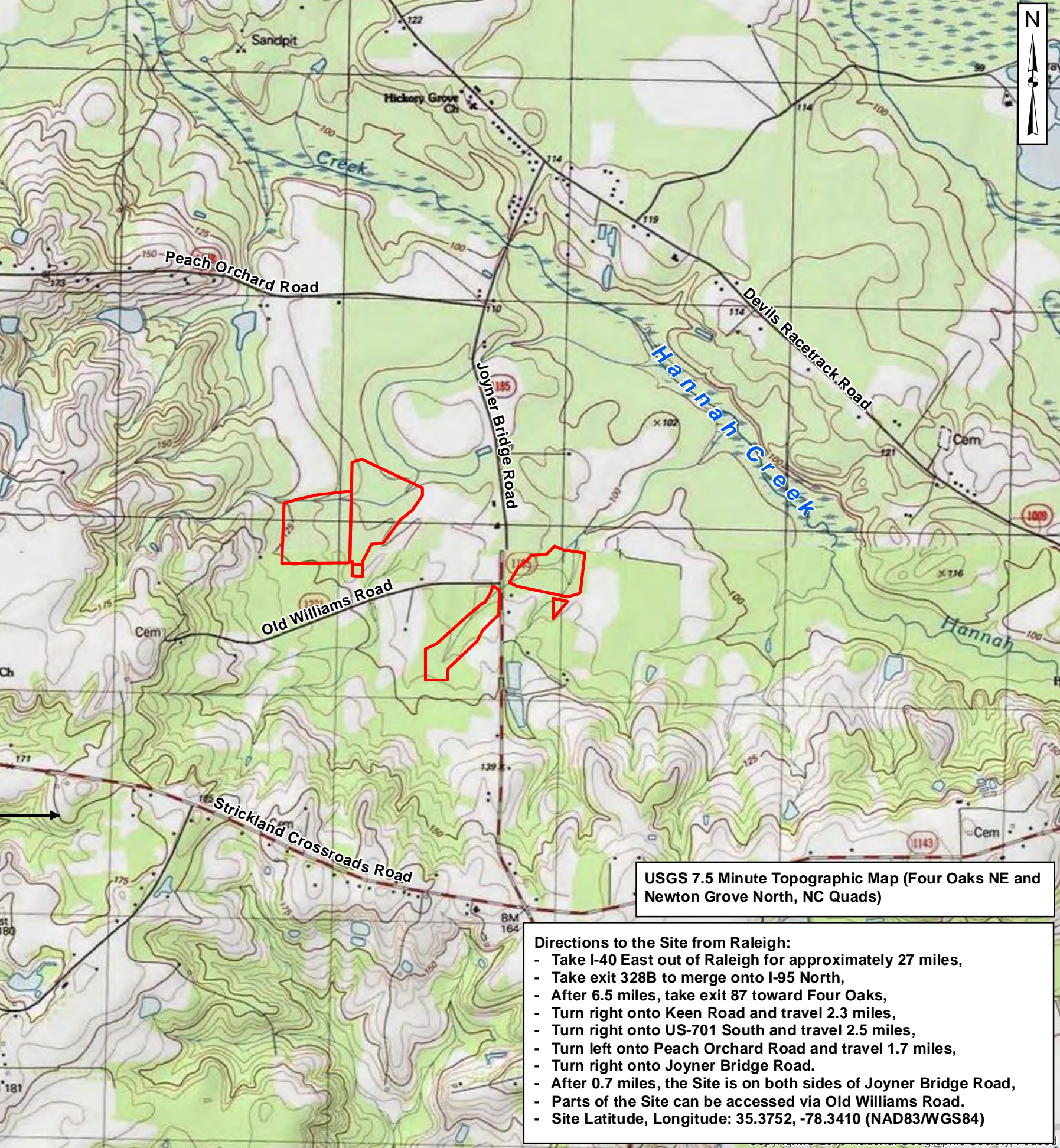
Table 4. Project Attributes Table



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USGS 7.5 Minute Topographic Map (Four Oaks NE and Newton Grove North, NC Quads)

- Directions to the Site from Raleigh:**
- Take I-40 East out of Raleigh for approximately 27 miles,
 - Take exit 328B to merge onto I-95 North,
 - After 6.5 miles, take exit 87 toward Four Oaks,
 - Turn right onto Keen Road and travel 2.3 miles,
 - Turn right onto US-701 South and travel 2.5 miles,
 - Turn left onto Peach Orchard Road and travel 1.7 miles,
 - Turn right onto Joyner Bridge Road.
 - After 0.7 miles, the Site is on both sides of Joyner Bridge Road,
 - Parts of the Site can be accessed via Old Williams Road.
 - Site Latitude, Longitude: 35.3752, -78.3410 (NAD83/WGS84)



Prepared for:
ALLIANCE HEADWATERS MITIGATION SITE
 Johnston County, NC

Title:
SITE LOCATION

Drawn by: KRJ/CLF

Date: AUG 2017

Scale: 1:20,000

Project No.: 17-002

FIGURE 1

**Table 1. Project Components and Mitigation Credits
Alliance Headwaters Restoration Site**

Reach ID	Stream Stationing/ Wetland Type	Existing Footage/ Acreage	Mitigation Plan Footage/ Acreage	Restoration Footage/ Acreage	Restoration Level	Restoration or Restoration Equivalent	Mitigation Ratio	Mitigation Credits	Comment
UT 1A	10+00 to 10+87	--	87	87	Restoration	87	1:1	87	
UT 1 Reach 1	10+00 to 16+71	4761	671	671	Restoration	671	1:1	671	
UT 1 Reach 2	16+71 to 30+33		1362	1362	Restoration	1362-70= 1292	1:1	1292	70 feet is outside of the easement and is therefore non- credit generating.
UT 1 Reach 3	10+00 to 24+63		1463	1463	Restoration	1463-149= 1314	1.3:1	1011	149 feet is outside of the easement and is therefore non- credit generating.
UT 2	10+00 to 19+97	<1	997	997	Restoration	997-146= 851	1.3:1	655	146 feet either does not have proper buffer width or is outside of the easement and is therefore non-credit generating.
UT 3 Reach 1	10+00 to 16+39	3313	639	639	Restoration	639	1:1	639	
UT 3 Reach 2	16+39 to 29+15		1276	1276	Restoration	1276-132= 1144	1:1	1144	132 feet is outside of the easement and is therefore non- credit generating.
UT 4	10+00 to 15+31	1142	531	531	Restoration	531	1:1	531	
Wetland R1	Riparian Riverine	0	7.11	7.108	Restoration	7.108	1:1	7.108	Wetland Restoration
Wetland R2	Riparian Riverine	0	6.97	6.973	Restoration	6.973	1.3:1	5.364	Wetland Restoration
Wetland R3	Riparian Riverine	0	18.47	18.473	Restoration	18.473	1:1	18.473	Wetland Restoration
Wetland R4	Riparian Riverine	0	0.29	0.285	Restoration	0.285	1:1	0.285	Wetland Restoration
Wetland R5	Riparian Riverine	0	0.95	0.950	Restoration	0.950	1:1	0.950	Wetland Restoration
Wetland R6	Riparian Riverine	0	0.90	0.896	Restoration	0.896	1:1	0.896	Wetland Restoration
Wetland R7	Riparian Riverine	0	0.28	0.284	Restoration	0.284	1:1	0.284	Wetland Restoration

Table 1. Project Components and Mitigation Credits (continued)
Alliance Headwaters Restoration Site

Reach ID	Stream Stationing/ Wetland Type	Existing Footage/ Acreage	Mitigation Plan Footage/ Acreage	Restoration Footage/ Acreage	Restoration Level	Restoration or Restoration Equivalent	Mitigation Ratio	Mitigation Credits	Comment
Wetland R8	Riparian Riverine	0	1.47	1.472	Restoration	1.472	1.3:1	1.132	Wetland Restoration
Wetland R9	Riparian Riverine	0	0.87	0.867	Restoration	0.867	1.3:1	0.667	Wetland Restoration
Wetland R10	Riparian Riverine	0	1.11	1.105	Restoration	1.105	1:1	1.105	Wetland Restoration
Wetland R11	Riparian Riverine	0	0.97	0.970	Restoration	0.970	1:1	0.970	Wetland Restoration
Wetland R12	Riparian Riverine	0	0.17	0.170	Restoration	0.170	1:1	0.170	Wetland Restoration
Wetland E1	Riparian Riverine	0.38	0.38	0.384	Enhancement	0.384	3.25:1	0.118	Wetland Enhancement
Wetland C1	Riparian Riverine	0	0.54	0.540	Creation	0.540	10:1	0.054	Wetland Creation
Wetland C2	Riparian Riverine	0	0.55	0.546	Creation	0.546	13:1	0.042	Wetland Creation
Wetland C3	Riparian Riverine	0	0.90	0.901	Creation	0.901	10:1	0.090	Wetland Creation
Wetland P1	Riparian Riverine	16.39	16.39	16.392	Preservation	16.392	10:1	1.639	Wetland Preservation

Length & Area Summations by Mitigation Category		
Restoration Level	Stream (linear footage)	Riparian Wetland (acreage)
Restoration	6529*	39.553
Enhancement	--	0.384
Creation	--	1.987
Preservation	--	16.392

Overall Assets Summary	
Asset Category	Overall Credits
Stream	6029.384
Riparian Riverine Wetland	39.354

*An additional 497 linear feet of stream restoration is located outside of the conservation easement and is therefore not included in this total or in mitigation credit calculations.

**Table 2. Project Activity and Reporting History
Alliance Headwaters Restoration Site**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Technical Proposal (RFP No. 16-006477)	October 15, 2015	October 28, 2015
Institution Date (NCDMS Contract No. 6832)	--	March 21, 2016
404 Permit	--	December 3, 2018
Mitigation Plan	--	October 12, 2018
Construction Plans	--	October 12, 2018
Site Construction	--	May 13, 2019-July 31, 2019
Planting	--	January 16, 2020
As-built Baseline Stream Data Collection	December 11-16, 2019	--
As-built Baseline Vegetation Data Collection	January 16-17, 2020	--
As-built Baseline Monitoring (MY0)	October 2019 – January 2020	March 2020
Monitoring Year 1 (2020) Stream Data Collection	July 23, 2020	--
Monitoring Year 1 (2020) Vegetation Data Collection	July 27-28, 2020	--
Monitoring Year 1 (MY1)	January-November 2020	January 2021
Monitoring Year 2 (2021) Stream Data Collection	March 10, 2021	--
Monitoring Year 2 (2021) Vegetation Data Collection	July 6, 2021	--
Monitoring Year 2 (MY2)	January-November, 2021	December 2021

Table 3. Project Contacts Table
Alliance Headwaters Mitigation Site

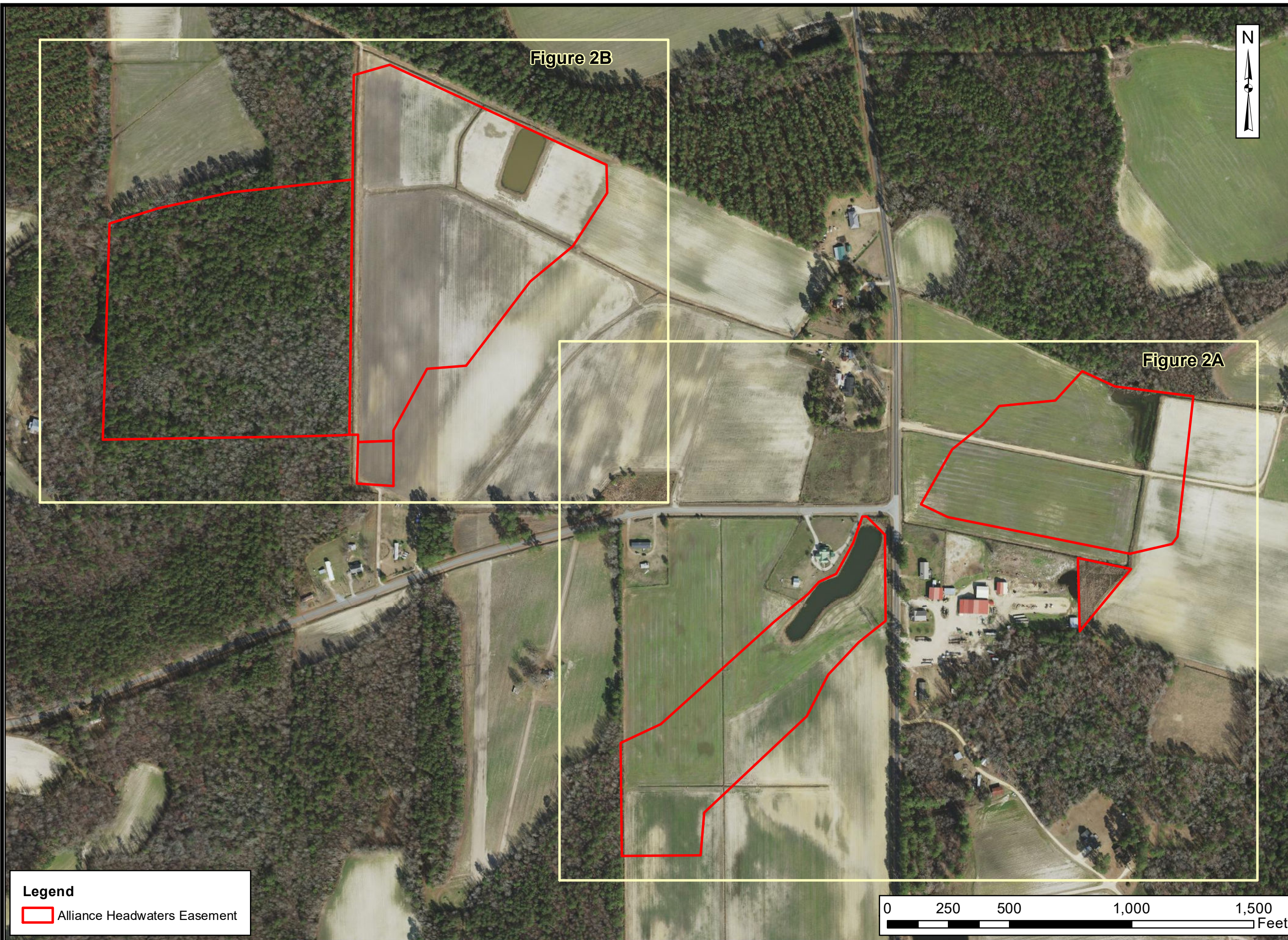
<p>Full Delivery Provider Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 Worth Creech 919-755-9490</p>	<p>Construction Contractor Land Mechanic Designs 780 Landmark Road Willow Spring, NC 27592 Lloyd Glover 919-639-6132</p>
<p>Designer, Construction Plans, and Sediment/Erosion Control Plans Ecosystem Planning & Restoration 1150 SE Maynard Road, Suite 140 Cary, NC 27511 Kevin Tweedy, PE 919-999-0262</p>	<p>Planting Contractor Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 Josh Merritt 919-755-9490</p>
<p>As-built Surveyor K2 Design Group 5688 US Highway 70 East Goldsboro, NC 27534 John Rudolph 919-751-0075</p>	<p>Baseline & Monitoring Data Collection Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis 919-215-1693</p>

**Table 4. Project Attribute Table
Alliance Headwaters Mitigation Site**

Project Information					
Project Name	Alliance Headwaters Mitigation Site				
Project County	Johnston County, North Carolina				
Project Area (acres)	71.7				
Project Coordinates (latitude & longitude)	35.372028°N, 78.340514°W				
Planted area (acres)	49.9				
Project Watershed Summary Information					
Physiographic Province	Coastal Plain				
Project River Basin	Neuse				
USGS HUC for Project (14-digit)	03020201150020				
NCDWR Sub-basin for Project	03-04-04				
Project Drainage Area (acres)	132 to 546				
Percentage of Project Drainage Area that is Impervious	<2%				
CGIA Land Use Classification	Agriculture & Forested/Scrubland				
Reach Summary Information					
Parameters	UT1	UT1A	UT2	UT 3	UT4
Length of reach (linear feet)	3495	87	997	1915	531
Valley Classification & Confinement	Alluvial, unconfined				
Drainage Area (acres)	546	6.4	147	354	132
NCDWR Stream ID Score	Blue Line	NA	Blue Line	27.25	27.25
Perennial, Intermittent, Ephemeral	Perennial	Intermittent	Perennial	Perennial/ Intermittent	Perennial/ Intermittent
NCDWR Water Quality Classification	C, NSW				
Proposed Stream Classification (Rosgen 1996)	C5	C5	C5	C5	C5
Underlying Mapped Soils	Leaf silt loam				
Drainage Class	Poorly-drained				
Hydric Soil Status	Hydric				
FEMA Classification	NA				
Native Vegetation Community	Coastal Plain Small Stream Swamp				
Watershed Land Use/Land Cover (Site)	31% forest, 67% agricultural land, <2% low density residential/impervious surface				
Percent Composition of Exotic Invasive Vegetation	<2%				

APPENDIX B: VISUAL ASSESSMENT DATA

Figures 2 & 2A-2B. Current Conditions Plan View
Tables 5A-5H. Visual Stream Morphology Stability Assessment
Table 6. Vegetation Condition Assessment
Vegetation Plot Photographs



Axiom Environmental, Inc.

Prepared for:



Project:

**ALLIANCE
HEADWATERS
STREAM
AND WETLAND
MITIGATION SITE**

Wayne County, NC

Title:

**CURRENT
CONDITIONS
PLAN VIEW**

Drawn by:

KRJ

Date:

NOV 2021

Scale:

1:4500


Project No.:

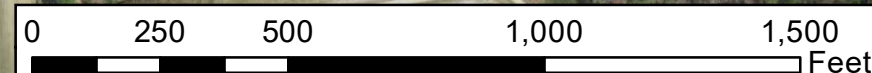
18-035

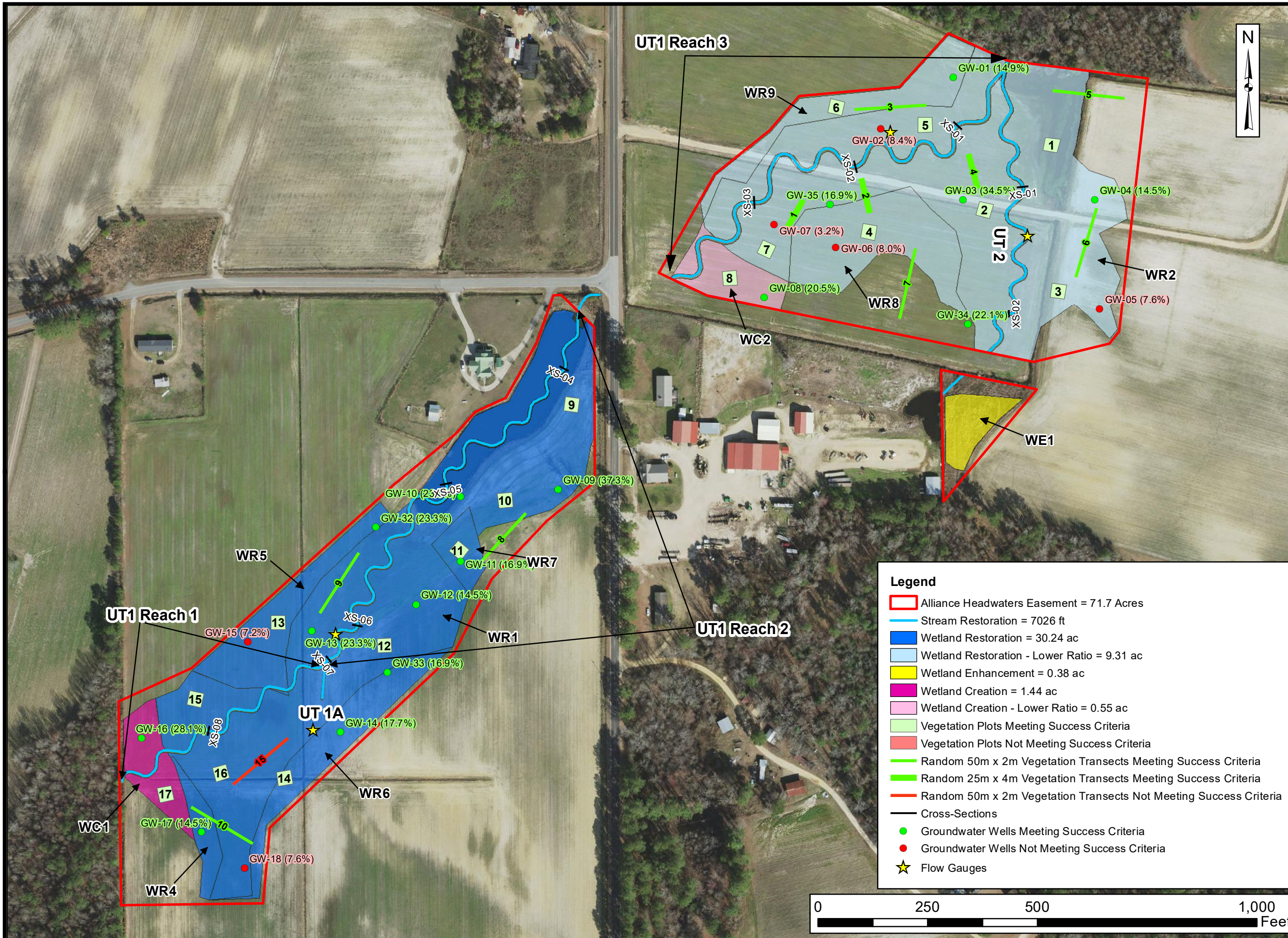
FIGURE

2

Legend

 Alliance Headwaters Easement





Prepared for:
ALLIANCE HEADWATERS STREAM AND WETLAND MITIGATION SITE

Johnston County, NC

CURRENT CONDITIONS PLAN VIEW

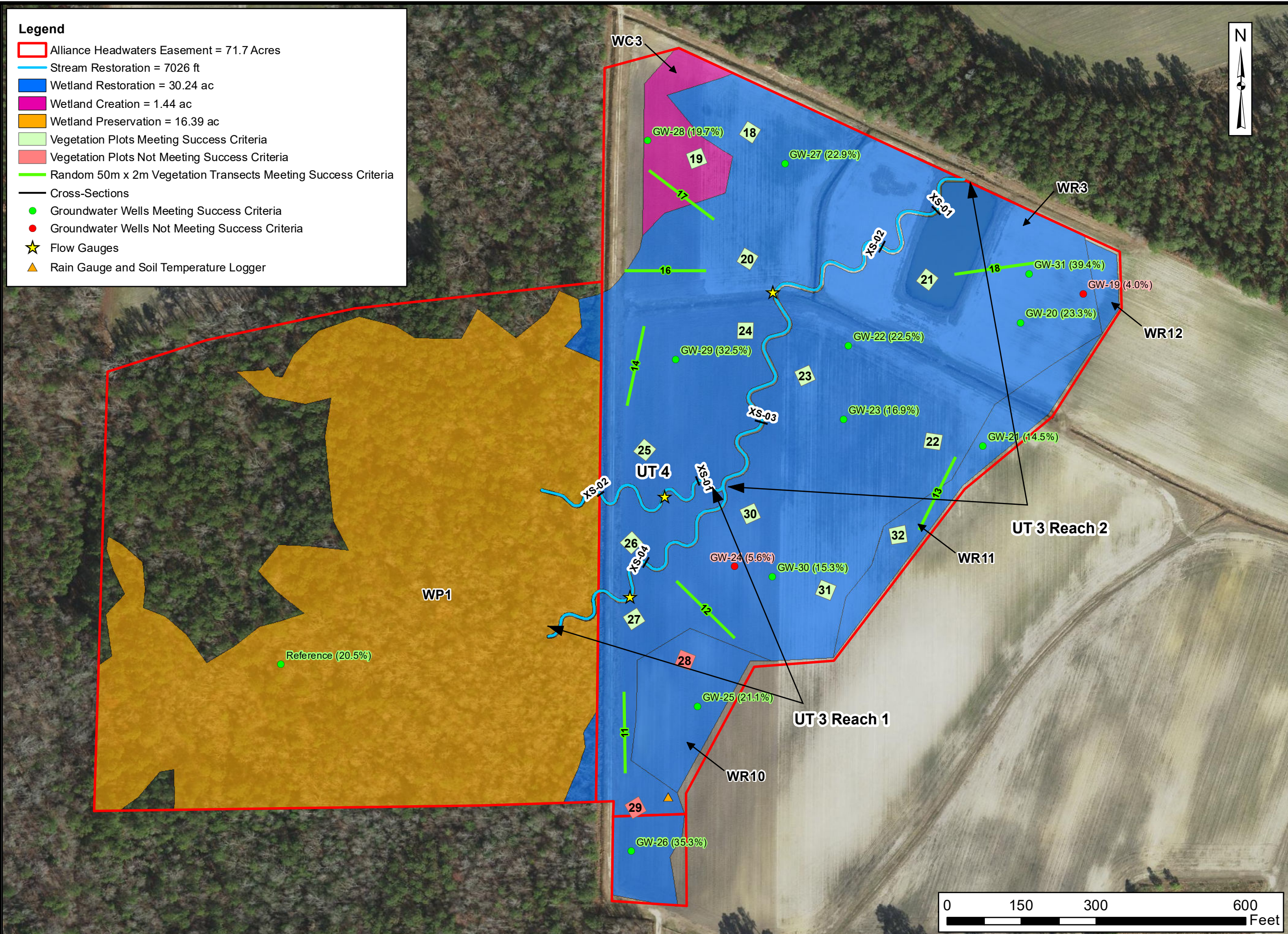
Drawn by: KRJ

Date: Nov 2021

Scale: 1:2500

Project No.: 18-035

FIGURE 2A



Legend

- Alliance Headwaters Easement = 71.7 Acres
- Stream Restoration = 7026 ft
- Wetland Restoration = 30.24 ac
- Wetland Creation = 1.44 ac
- Wetland Preservation = 16.39 ac
- Vegetation Plots Meeting Success Criteria
- Vegetation Plots Not Meeting Success Criteria
- Random 50m x 2m Vegetation Transects Meeting Success Criteria
- Cross-Sections
- Groundwater Wells Meeting Success Criteria
- Groundwater Wells Not Meeting Success Criteria
- ★ Flow Gauges
- ▲ Rain Gauge and Soil Temperature Logger



Project:
ALLIANCE HEADWATERS STREAM AND WETLAND MITIGATION SITE
 Johnston County, NC

Title:
CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ
 Date: Nov 2021
 Scale: 1:2200
 Project No.: 18-035

FIGURE
2B

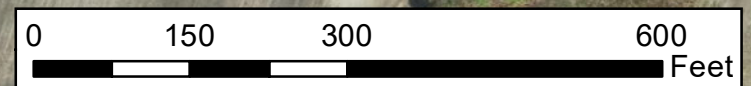


Table 5A
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Alliance UT-1 Reach 1
 671

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

Table 5B
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Alliance UT-1 Reach 2
 1373

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	27	27			100%			
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	28	28			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	28	28			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	28	28			100%			
		2. Thalweg centering at downstream of meander (Glide)	28	28			100%			
	Totals									
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
Totals										
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	25	25			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	25	25			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	25	25			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	25	25			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	25	25			100%			

Table 5C
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Alliance UT-1 Reach 3
 1451

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	20	20			100%			
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	19	19			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	19	19			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	19	19			100%			
		2. Thalweg centering at downstream of meander (Glide)	19	19			100%			
	Totals									
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
Totals										
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	18	18			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	18	18			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	18	18			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	18	18			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	18	18			100%			

Table 5D
Reach ID
Assessed Length

Visual Stream Morphology Stability Assessment
Alliance UT-1A
87

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

Table 5E
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Alliance UT-2
 997

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

Table 5F
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Alliance UT-3 Reach 1
 639

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	11	11			100%			
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	11	11			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	11	11			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	11	11			100%			
		2. Thalweg centering at downstream of meander (Glide)	11	11			100%			
Totals										
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
Totals										
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	11	11			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	11	11			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	11	11			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	11	11			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	11	11			100%			

Table 5G
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Alliance UT-3 Reach 2
 1276

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	19	19			100%			
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	19	19			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	19	19			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	19	19			100%			
		2. Thalweg centering at downstream of meander (Glide)	19	19			100%			
	Totals									
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
Totals										
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	18	18			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	18	18			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	18	18			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	18	18			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	18	18			100%			

Table 5H
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Alliance UT-4
 531

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

Table 6

Vegetation Condition Assessment

Alliance Headwaters

Planted Acreage¹ 49.9

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	None	0.1 acres	none	0	0.00	0.0%
2. Low Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
2B. Low Planted Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	None	0.25 acres	none	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%

Easement Acreage² 71.7

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

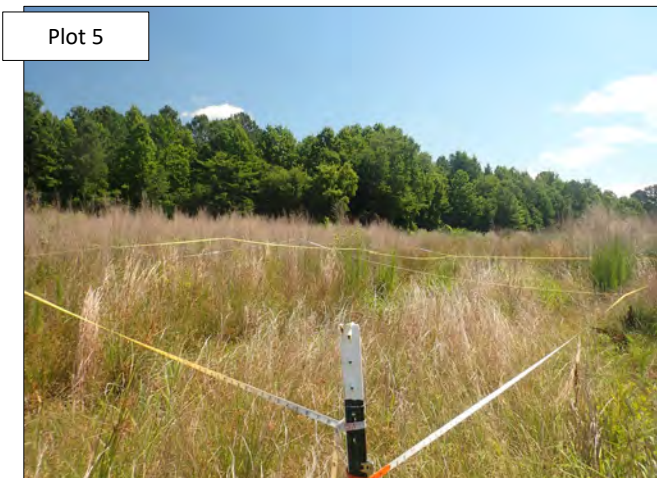
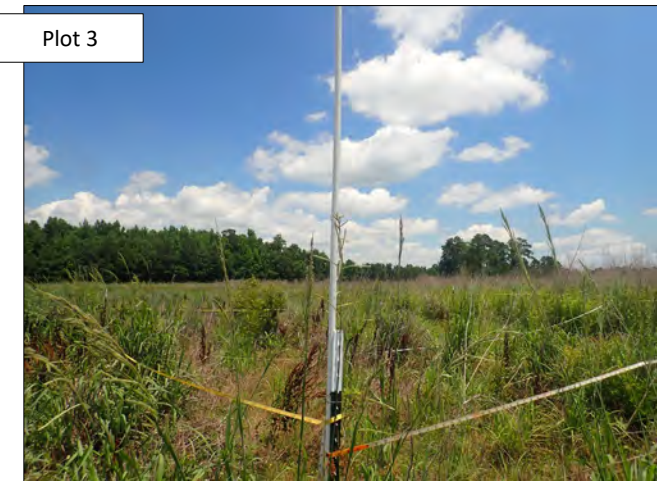
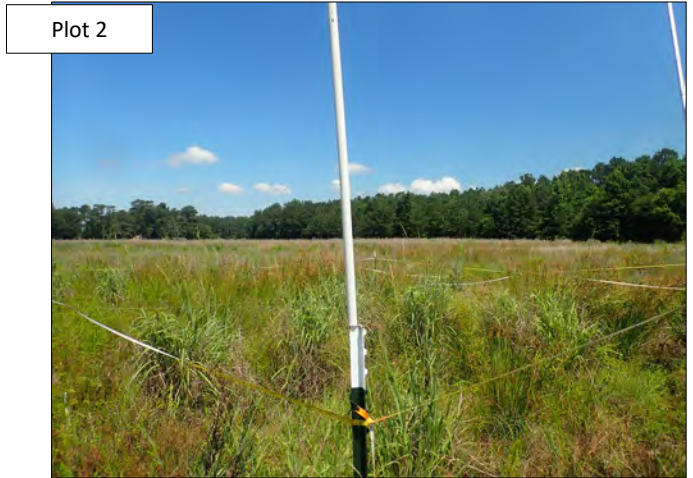
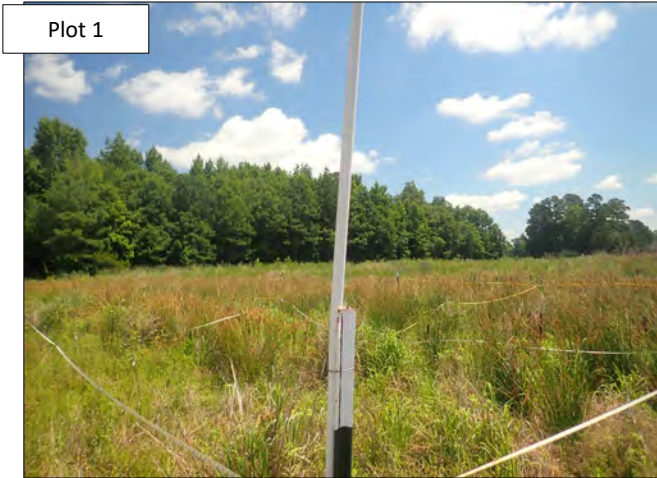
1 = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project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

2 = The acreage within the easement boundaries.

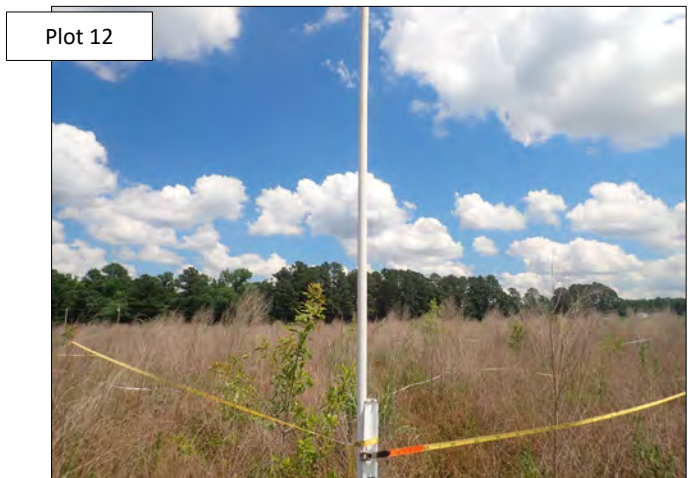
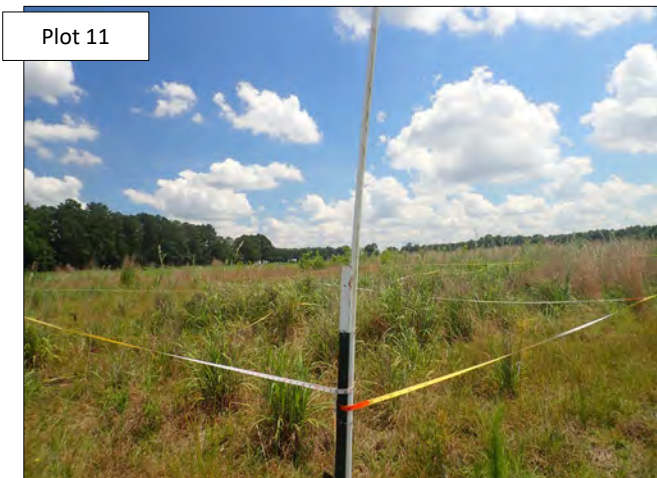
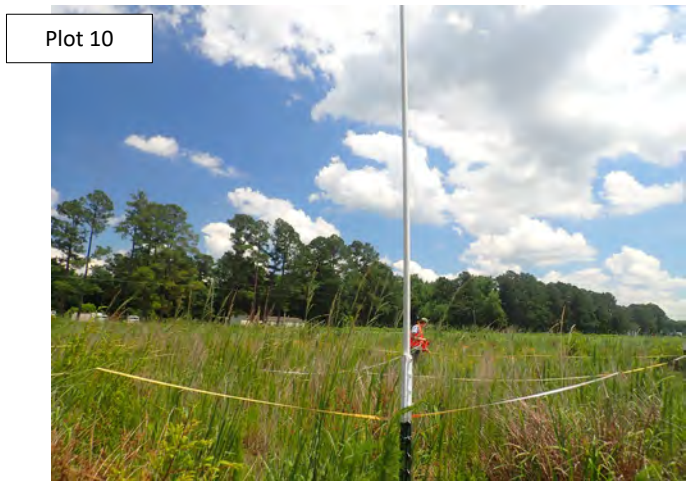
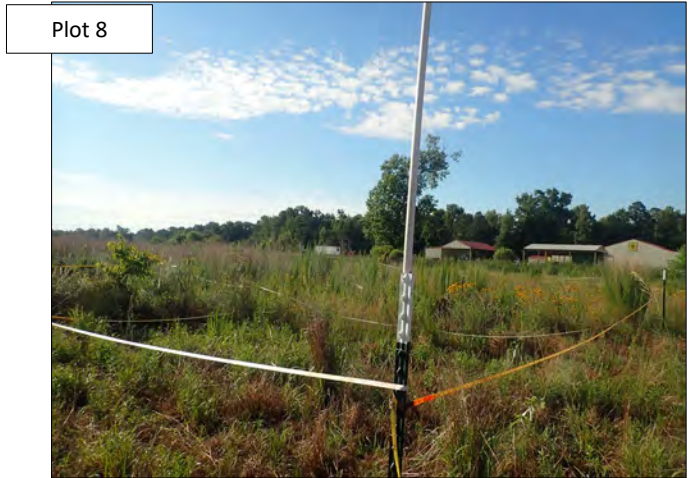
3 = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e.,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

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

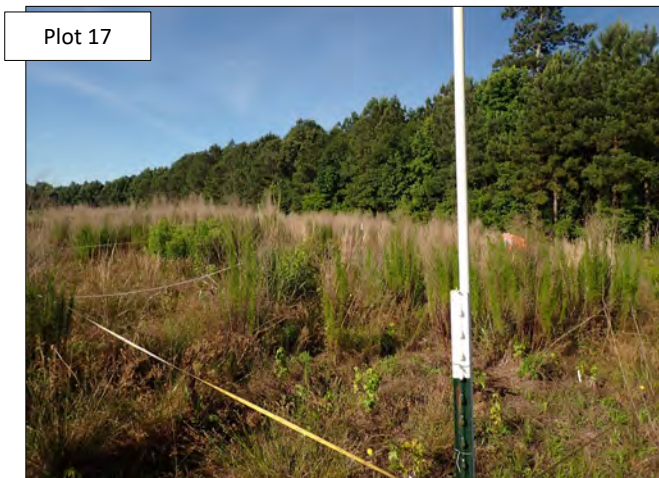
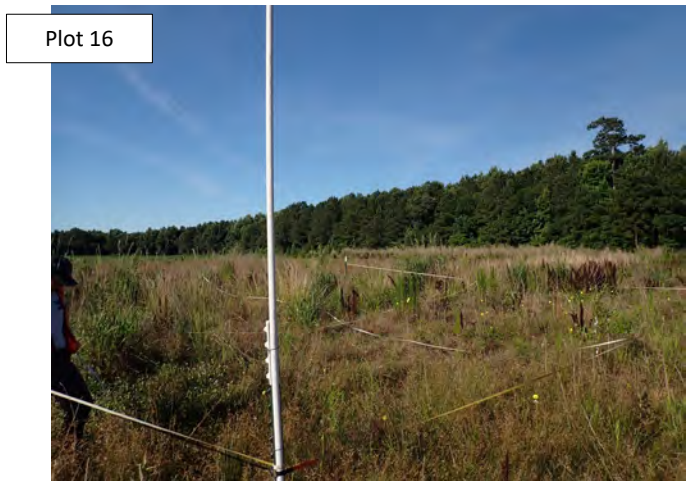
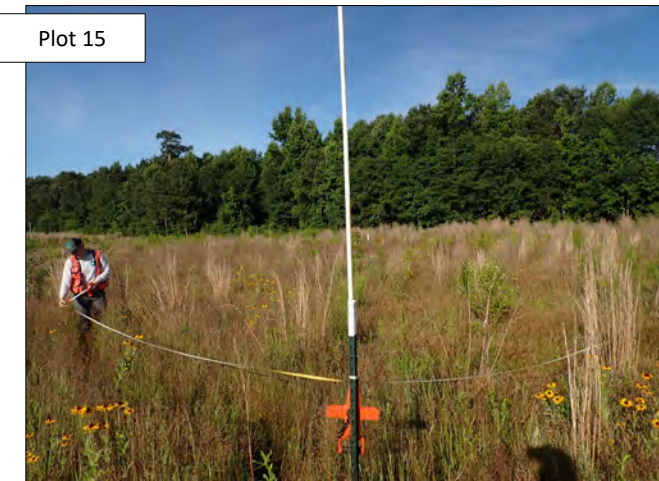
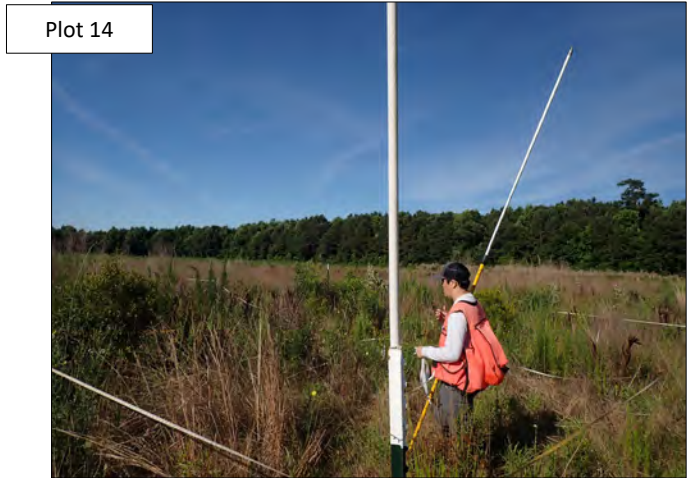
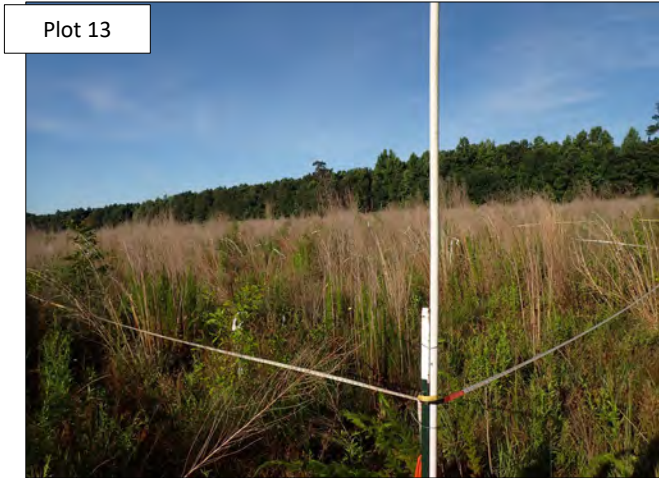
Alliance Headwaters
MY-02 (2021) Vegetation Monitoring Photographs
Taken July 2021



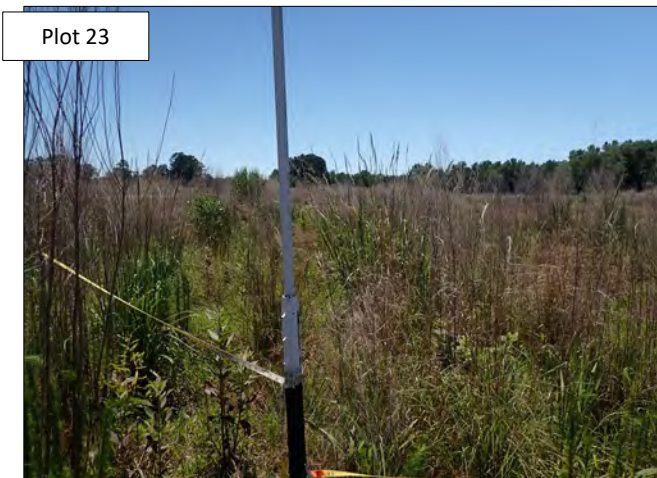
**Alliance Headwaters
MY-02 (2021) Vegetation Monitoring Photographs (continued)
Taken July 2021**



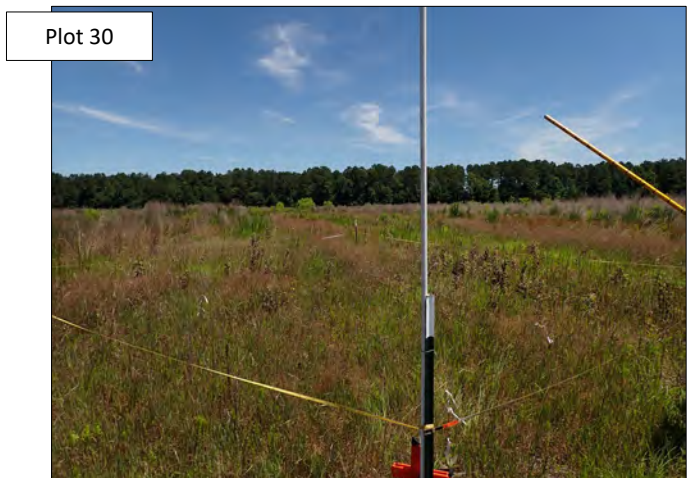
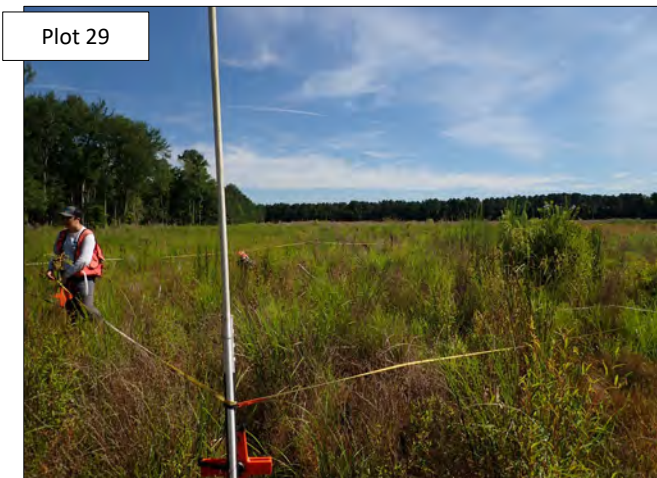
**Alliance Headwaters
MY-02 (2021) Vegetation Monitoring Photographs (continued)
Taken July 2021**



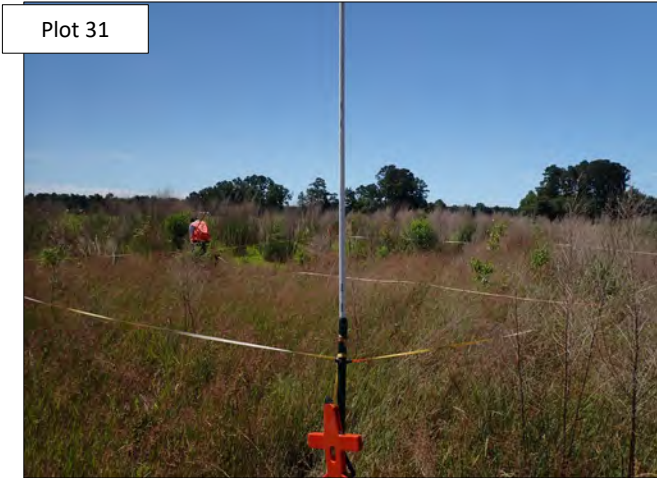
**Alliance Headwaters
MY-02 (2021) Vegetation Monitoring Photographs (continued)
Taken July 2021**



**Alliance Headwaters
MY-02 (2021) Vegetation Monitoring Photographs (continued)
Taken July 2021**



**Alliance Headwaters
MY-02 (2021) Vegetation Monitoring Photographs (continued)
Taken July 2021**



APPENDIX C: VEGETATION DATA

Table 7. Planted Bare Root Woody Vegetation

Table 8. Total Stems by Plot and Species

Table 9. Temporary Vegetation Plot Data

Table 10. MY2 Planted Vegetation Totals

Table 11. MY2 Temporary Vegetation Plot Planted Vegetation Totals

**Table 7. Planted Bare Root Woody Vegetation
Alliance Headwaters Mitigation Site**

Species	Upland Planting	Riparian Planting	Total Stems
<i>Betula Nigra</i>	0	2,900	2,900
<i>Morella cerifera</i>	0	1,300	1,300
<i>Carpinus caroliniana</i>	300	0	300
<i>Diospyros virginiana</i>	100	0	100
<i>Liriodendron tulipifera</i>	500	2,800	3,300
<i>Magnolia virginiana</i>	0	1,600	1,600
<i>Morus rubra</i>	100	0	100
<i>Nyssa sylvatica</i>	700	300	1,000
<i>Persea palustris</i>	0	800	800
<i>Prunus serotina</i>	400	0	400
<i>Quercus alba</i>	800	0	800
<i>Quercus bicolor</i>	0	500	500
<i>Quercus laurifolia</i>	0	2,000	2,000
<i>Quercus shumardii</i>	0	200	200
<i>Quercus lyrata</i>	0	4,200	4,200
<i>Quercus michauxii</i>	800	3,900	4,700
<i>Quercus pagoda</i>	650	3,050	3,700
<i>Taxodium distichum</i>	0	4,500	4,500
<i>Ulmus americana</i>	0	2,800	2,800
	4,350	30,850	35,200

*Some species planted on-site were not included in the mitigation plan, including *Morella cerifera*, *Morus rubra*, *Quercus bicolor*, and *Quercus shumardii*. These were determined to be viable substitutions that were made based on bare-root stem availability at the time of site planting.

Table 8. Planted Stems by Plot and Species (continued)
 CVS Project Code 18035. Project Name: Alliance Headwaters

Scientific Name	Common Name	Species Type	Current Plot Data (MY2 2021)																								Annual Means																																
			18035-01-0025			18035-01-0026			18035-01-0027			18035-01-0028			18035-01-0029			18035-01-0030			18035-01-0031			18035-01-0032			MY2 (2021)			MY1 (2020)			MY0 (2020)																										
			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	PnoLS	P-all	T	PnoLS	P-all	T																					
Acer rubrum	red maple	Tree			3						4																														7																		
Baccharis halimifolia	eastern baccharis	Shrub									4																																	13															
Betula nigra	river birch	Tree																1	1	1																30	30	30	32	32	32	36	36	36															
Carpinus caroliniana	American hornbeam	Tree																			1	1	1													1	1	1	1	1	1	1	1	1															
Cornus amomum	silky dogwood	Shrub																																																	2	2	2						
Diospyros virginiana	common persimmon	Tree																																																	2	2	2						
Liquidambar styraciflua	sweetgum	Tree			9						14																																														40		
Liriodendron tulipifera	tuliptree	Tree	2	2	2																															12	12	12	16	16	16	26	26	26															
Magnolia virginiana	sweetbay	Tree													1	1	1																			13	13	13	16	16	16	28	28	28															
Morella cerifera	wax myrtle	shrub	1	1	1	2	2	2							2	2	2	1	1	1																23	23	23	25	25	25	29	29	29															
Nyssa	tupelo	Tree																																		1	1	1	3	3	3	3	3	3	3	3	3												
Nyssa sylvatica	blackgum	Tree																																		3	3	3	3	3	3	3	3	3	12	12	12												
Persea palustris	swamp bay	tree																			1	1	1													5	5	5	8	8	8	12	12	12															
Pinus taeda	loblolly pine	Tree																																																							8		
Prunus serotina	black cherry	Tree																																		4	4	4	4	4	4	4	4	4	5	5	5												
Quercus	oak	Tree							1	1	1	1	1	1				2	2	2																53	53	53	74	74	74	101	101	101															
Quercus alba	white oak	Tree																																		4	4	4	6	6	6	2	2	2															
Quercus bicolor	swamp white oak	Tree	1	1	1	1	1	1	1	1	1																									10	10	10	3	3	3	2	2	2															
Quercus lyrata	overcup oak	Tree																2	2	2																9	9	9	9	9	9	13	13	13															
Quercus michauxii	swamp chestnut oak	Tree	2	2	2							1	1	1													1	1	1	48	48	48	36	36	36	36	36	36	10	10	10																		
Quercus nigra	water oak	Tree				1	1	1	1	1	1										6	6	6	6	6	6				37	37	37	31	31	31	18	18	18																					
Quercus pagoda	cherrybark oak	Tree				6	6	6	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1							37	37	37	32	32	32	34	34	34																					
Quercus phellos	willow oak	Tree																																		4	4	4	3	3	3																		
Taxodium distichum	bald cypress	Tree	2	2	2				2	2	2	3	3	3	2	2	2										1	1	1	68	68	68	61	61	61	61	61	61	60	60	60																		
Ulmus americana	American elm	Tree							4	4	4							2	2	2	1	1	1	2	2	2				36	36	36	34	34	34	21	21	21																					
Unknown		Shrub or Tree																																		2	2	2	2	2	2	4	4	4															
		Stem count	8	8	20	10	10	10	10	10	32	7	7	7	7	7	7	9	9	9	10	10	11	10	10	10	400	400	468	399	399	399	420	420	420																								
		size (ares)	1			1			1			1			1			1			1			32			32			32																													
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.79			0.79			0.79																													
		Species count	5	5	7	4	4	4	6	6	9	4	4	4	4	4	4	6	6	6	5	5	6	4	4	4	20	20	24	20	20	20	20	20	20																								
		Stems per ACRE	323.7	323.7	809.4	404.7	404.7	404.7	404.7	404.7	1295	283.3	283.3	283.3	283.3	283.3	283.3	364.2	364.2	364.2	404.7	404.7	445.2	404.7	404.7	404.7	505.9	505.9	591.9	504.6	504.6	504.6	531.1	531.1	531.1																								

Color for Density
 Exceeds requirements by 10%
 Exceeds requirements, but by less than 10%
 Fails to meet requirements, by less than 10%
 Fails to meet requirements by more than 10%
 PnoLS = Planted excluding livestakes
 P-all = Planted including livestakes
 T = All planted and natural recruits including livestakes
 T includes natural recruits

Table 9. MY2 Temporary Vegetation Plot Data
Alliance Headwaters Restoration Site

Species	T-1 (51°)	T-2 (8°)	T-3 (°)	T-4 (160°)	T-5 (110°)	T-6 (210°)	T-7 (28°)
<i>Betula nigra</i>	5	2	1		2	7	
<i>Liriodendron tulipifera</i>				1			
<i>Magnolia virginiana</i>					3	2	
<i>Morella cerifera</i>				3		1	1
<i>Nyssa Spp.</i>					1		
<i>Persea palustris</i>							
<i>Quercus spp.</i>	3	10	2		6	2	4
<i>Quercus alba</i>			3		1		
<i>Quercus lyrata</i>							
<i>Quercus michauxii</i>		3	10	2	2		3
<i>Quercus nigra</i>		1	2	1		2	
<i>Quercus pagoda</i>	3			2	2	2	1
<i>Taxodium distichum</i>	1	2		3			2
<i>Quercus rubra</i>							4
<i>Diospyros virginiana</i>							2
<i>Ulmus americana</i>	1				1	2	
<i>Prunus serotina</i>			5		1		
Total Number of Stems	13	18	23	12	19	18	17
Stems/Acre	526	728	931	486	769	728	688

Table 9. Temporary Vegetation Plot Data (continued)
Alliance Headwaters Restoration Site

Species	T-8 (235°)	T-9 (°)	T-10 (129°)	T-11 (343°)	T-12 (141°)	T-13 (45°)	T-14 (241°)
<i>Betula nigra</i>	1		4	1	1	3	5
<i>Liriodendron tulipifera</i>			1				
<i>Magnolia virginiana</i>					3	2	
<i>Morella cerifera</i>		1					1
<i>Nyssa sylvatica</i>							2
<i>Persea palustris</i>							
<i>Quercus spp.</i>	8	3	3	1	3		
<i>Quercus alba</i>			1				1
<i>Quercus lyrata</i>		3					3
<i>Quercus michauxii</i>			6		1	1	
<i>Quercus nigra</i>		1	1			2	
<i>Quercus pagoda</i>		6		2			1
<i>Taxodium distichum</i>	2	14	2	9	6	3	2
<i>Quercus phellos</i>		1					
<i>Quercus bicolor</i>				1	1	1	1
<i>Quercus rubra</i>	4	2					
<i>Carpinus caroliniana</i>						1	
<i>Diospyros virginiana</i>							
<i>Ulmus americana</i>					1		1
<i>Prunus serotina</i>							
Total Number of Stems	15	31	18	14	16	13	17
Stems/Acre	607	1255	728	567	647	526	688

Table 9. Temporary Vegetation Plot Data (continued)
Alliance Headwaters Restoration Site

Species	T-15 (2°)	T-16 (102°)	T-17 (3°)	T-18 (95°)
<i>Betula nigra</i>	1	2	4	
<i>Liriodendron tulipifera</i>				
<i>Magnolia virginiana</i>	1	3	2	
<i>Morella cerifera</i>		1	2	
<i>Nyssa Spp.</i>				
<i>Persea palustris</i>				
<i>Quercus spp.</i>			1	
<i>Quercus alba</i>				
<i>Quercus lyrata</i>	1		2	
<i>Quercus michauxii</i>			1	
<i>Quercus nigra</i>		1		2
<i>Quercus pagoda</i>			1	1
<i>Taxodium distichum</i>	1	3	1	6
<i>Quercus phellos</i>				
<i>Quercus bicolor</i>		1	1	2
<i>Quercus rubra</i>				
<i>Carpinus caroliniana</i>				
<i>Diospyros virginiana</i>				
<i>Ulmus americana</i>	1			
<i>Prunus serotina</i>				
Total Number of Stems	5	11	15	11
Stems/Acre	202	445	607	445

**Table 10. MY2 Planted Vegetation Totals
Alliance Headwaters Mitigation Site**

Plot #	Planted Stems/Acre	Success Criteria Met?
1	607	Yes
2	445	Yes
3	1012	Yes
4	648	Yes
5	567	Yes
6	648	Yes
7	769	Yes
8	405	Yes
9	567	Yes
10	445	Yes
11	486	Yes
12	445	Yes
13	445	Yes
14	809	Yes
15	364	Yes
16	567	Yes
17	809	Yes
18	567	Yes
19	405	Yes
20	364	Yes
21	405	Yes
22	567	Yes
23	607	Yes
24	364	Yes
25	324	Yes
26	405	Yes
27	405	Yes
28	283	No
29	283	No
30	364	Yes
31	405	Yes
32	405	Yes
Average Planted Stems/Acre	506	Yes

**Table 11. MY2 Temporary Vegetation Plot Planted Vegetation Totals
Alliance Headwaters Mitigation Site**

Transect#	Planted Stems/Acre	Success Criteria Met?
T-1	526	Yes
T-2	728	Yes
T-3	931	Yes
T-4	486	Yes
T-5	769	Yes
T-6	728	Yes
T-7	688	Yes
T-8	607	Yes
T-9	1255	Yes
T-10	728	Yes
T-11	567	Yes
T-12	647	Yes
T-13	526	Yes
T-14	688	Yes
T-15	202	No
T-16	445	Yes
T-17	607	Yes
T-18	445	Yes
Average Planted Stems/Acre	643	Yes

APPENDIX D: STREAM GEOMORPHOLOGY DATA

Tables 12A-12E. Baseline Stream Data Summary

Tables 13A-13D. Monitoring Data-Dimensional Morphology Summary
(Dimensional Parameters-Cross-sections)

Tables 14A-14E. Monitoring Data-Stream Reach Data Summary
Cross-Section Plots

Table 12a. Baseline Stream Data Summary
 Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT1/Reach 1&2 (2033 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition							Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline											
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n							
Dimension and Substrate - Riffle Only																																			
Bankfull Width (ft)					8.4	13.3		24			9.7			7.4			6.5			6.5 - 7.5			7.1	Mean	7.9	8.6		2							
Floodprone Width (ft)					100	100		100												100			100	Mean	100	100		2							
Bankfull Mean Depth (ft)					1.43	1.68		2.25			0.8			0.82			0.6			0.50 - 0.70			0.5	Mean	0.5	0.5		2							
¹ Bankfull Max Depth (ft)											0.75 - 1.00			0.75 - 1.00			0.75 - 1.00			0.60 - 0.71			0.9	Mean	1	1.1		2							
Bankfull Cross Sectional Area (ft ²)					12.9	22.2		42			8			6.1			3.8			3.0 - 4.0			3.6	Mean	4	4.4		2							
Width/Depth Ratio											12			9			10			14			14	Mean	15.6	17.2		2							
Entrenchment Ratio					1.3	1.65		2			> 3.0			> 3.0			> 3.0			6.9 - 10.2			11.6	Mean	12.9	14.1		2							
¹ Bank Height Ratio					2.7	3.0		3.3			1.0 - 1.2			1.0 - 1.2			1.0 - 1.2			1.0			1.0	Mean	1.0	1.0		2							
Profile																																			
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.														7.0 - 30.0			9	Mean	28.6	28.45	49.5	10.7	35							
Riffle Slope (ft/ft)																						0.000	Mean	0.010	0.009	0.021	0.007	13							
Pool Length (ft)																									4.3	Mean	10.9	9.14	39.8	7.5	27				
Pool Max depth (ft)																									1.7	Mean	1.8	2	3						
Pool Spacing (ft)																									25.3	Mean	49.8	50.71	89.2	14.7	35				
Pattern																																			
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																														
Radius of Curvature (ft)										1.5 - 2.8			2.9 - 6.4			1.2 - 2.3																			
Rc:Bankfull width (ft/ft)																																			
Meander Wavelength (ft)																																			
Meander Width Ratio										1.4 - 2.1			2.1 - 6.6			5.4 - 8.2																			
Transport parameters																																			
Reach Shear Stress (competency) lb/ft ²																																			
Max part size (mm) mobilized at bankfull																																			
Stream Power (transport capacity) W/m ²																																			
Additional Reach Parameters																																			
Rosgen Classification					Incised B5c					C5/E5			E5			E5/C5			C5			C5													
Bankfull Velocity (fps)																			1.4 - 2.1			1.4 - 2.1													
Bankfull Discharge (cfs)																			4.2 - 8.4																
Valley length (ft)																																			
Channel Thalweg length (ft)																			2033			2033													
Sinuosity (ft)					1					1.22 - 1.59			1.22 - 1.59			1.22 - 1.59			1.26 - 1.29			1.26 - 1.29													
Water Surface Slope (Channel) (ft/ft)					0.007					0.0027 - 0.0088			0.0027 - 0.0088			0.0027 - 0.0088			0.0026 - 0.0049			0.0049													
BF slope (ft/ft)																																			
³ Bankfull Floodplain Area (acres)																																			
⁴ % of Reach with Eroding Banks																																			
Channel Stability or Habitat Metric																																			
Biological or Other																																			

Shaded cells indicate that these will typically not be filled in.
 1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).
 3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.
 4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 12b. Baseline Stream Data Summary
 Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT1/Reach 3 (1463 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition							Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline												
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD ⁴	n								
Dimension and Substrate - Riffle Only																																				
Bankfull Width (ft)					5	6		7																												
Floodprone Width (ft)					100	100		100																												
Bankfull Mean Depth (ft)																																				
¹ Bankfull Max Depth (ft)					0.6	0.7		0.8																												
Bankfull Cross Sectional Area (ft ²)					1	1.75		2.5																												
Width/Depth Ratio					6.6	8.6		10.6																												
Entrenchment Ratio					1.3	1.65		2																												
¹ Bank Height Ratio					2.7	3.0		3.3																												
Profile																																				
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																															
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
Pattern																																				
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																															
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Transport parameters																																				
Reach Shear Stress (competency) lb/ft ²																																				
Max part size (mm) mobilized at bankfull																																				
Stream Power (transport capacity) W/m ²																																				
Additional Reach Parameters																																				
Rosgen Classification					Incised B5c							C5/E5			E5			E5/C5			C5			C5												
Bankfull Velocity (fps)																																				
Bankfull Discharge (cfs)																																				
Valley length (ft)																																				
Channel Thalweg length (ft)																																				
Sinuosity (ft)																																				
Water Surface Slope (Channel) (ft/ft)																																				
BF slope (ft/ft)																																				
³ Bankfull Floodplain Area (acres)																																				
⁴ % of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).
 3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.
 4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 12c. Baseline Stream Data Summary
 Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT2 (996.7 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition							Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline											
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n							
Dimension and Substrate - Riffle Only																																			
Bankfull Width (ft)					5	6		7																											
Floodprone Width (ft)					100	100		100																											
Bankfull Mean Depth (ft)																																			
¹ Bankfull Max Depth (ft)					0.6	0.7		0.8																											
Bankfull Cross Sectional Area (ft ²)					1	1.75		2.5																											
Width/Depth Ratio					6.6	8.6		10.6																											
Entrenchment Ratio					1.3	1.65		2																											
¹ Bank Height Ratio					2.7	3.0		3.3																											
Profile																																			
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																														
Riffle Slope (ft/ft)																																			
Pool Length (ft)																																			
Pool Max depth (ft)																																			
Pool Spacing (ft)																																			
Pattern																																			
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																														
Radius of Curvature (ft)																																			
Rc:Bankfull width (ft/ft)																																			
Meander Wavelength (ft)																																			
Meander Width Ratio																																			
Transport parameters																																			
Reach Shear Stress (competency) lb/ft ²																																			
Max part size (mm) mobilized at bankfull																																			
Stream Power (transport capacity) W/m ²																																			
Additional Reach Parameters																																			
Rosgen Classification					G5							C5/E5			E5			E5/C5			C5			C5											
Bankfull Velocity (fps)																																			
Bankfull Discharge (cfs)																																			
Valley length (ft)																																			
Channel Thalweg length (ft)																																			
Sinuosity (ft)					1							1.22 - 1.59			1.22 - 1.59			1.22 - 1.59			1.22			1.22											
Water Surface Slope (Channel) (ft/ft)					0.004							0.0027 - 0.0088			0.0027 - 0.0088			0.0027 - 0.0088			0.0049			0.0031											
BF slope (ft/ft)																																			
³ Bankfull Floodplain Area (acres)																																			
⁴ % of Reach with Eroding Banks																																			
Channel Stability or Habitat Metric																																			
Biological or Other																																			

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).
 3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.
 4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 12d. Baseline Stream Data Summary
 Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT3 (1914.8 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition							Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline											
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n							
Dimension and Substrate - Riffle Only																																			
Bankfull Width (ft)					5	6		7																											
Floodprone Width (ft)					100	100		100																											
Bankfull Mean Depth (ft)																																			
¹ Bankfull Max Depth (ft)					0.6	0.7		0.8																											
Bankfull Cross Sectional Area (ft ²)					1	1.75		2.5																											
Width/Depth Ratio					6.6	8.6		10.6																											
Entrenchment Ratio					1.3	1.65		2																											
¹ Bank Height Ratio					2.7	3.0		3.3																											
Profile																																			
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																														
Riffle Slope (ft/ft)																																			
Pool Length (ft)																																			
Pool Max depth (ft)																																			
Pool Spacing (ft)																																			
Pattern																																			
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																														
Radius of Curvature (ft)																																			
Rc:Bankfull width (ft/ft)																																			
Meander Wavelength (ft)																																			
Meander Width Ratio																																			
Transport parameters																																			
Reach Shear Stress (competency) lb/ft ²																																			
Max part size (mm) mobilized at bankfull																																			
Stream Power (transport capacity) W/m ²																																			
Additional Reach Parameters																																			
Rosgen Classification					Incised B5c							C5/E5			E5			E5/C5			C5			C5											
Bankfull Velocity (fps)																																			
Bankfull Discharge (cfs)																																			
Valley length (ft)																																			
Channel Thalweg length (ft)																																			
Sinuosity (ft)																																			
Water Surface Slope (Channel) (ft/ft)																																			
BF slope (ft/ft)																																			
³ Bankfull Floodplain Area (acres)																																			
⁴ % of Reach with Eroding Banks																																			
Channel Stability or Habitat Metric																																			
Biological or Other																																			

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).
 3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.
 4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 12e. Baseline Stream Data Summary
 Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT4 (530.9 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition							Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline													
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n									
Dimension and Substrate - Riffle Only																																					
Bankfull Width (ft)					5	6		7																													
Floodprone Width (ft)					100	100		100																													
Bankfull Mean Depth (ft)																																					
¹ Bankfull Max Depth (ft)					0.6	0.7		0.8																													
Bankfull Cross Sectional Area (ft ²)					1	1.75		2.5																													
Width/Depth Ratio					6.6	8.6		10.6																													
Entrenchment Ratio					1.3	1.65		2																													
¹ Bank Height Ratio					2.7	3.0		3.3																													
Profile																																					
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																																
Riffle Slope (ft/ft)																																					
Pool Length (ft)																																					
Pool Max depth (ft)																																					
Pool Spacing (ft)																																					
Pattern																																					
Channel Beltwidth (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																																
Radius of Curvature (ft)																																					
Rc:Bankfull width (ft/ft)																																					
Meander Wavelength (ft)																																					
Meander Width Ratio																																					
Transport parameters																																					
Reach Shear Stress (competency) lb/ft ²																																					
Max part size (mm) mobilized at bankfull																																					
Stream Power (transport capacity) W/m ²																																					
Additional Reach Parameters																																					
Rosgen Classification																																					
Bankfull Velocity (fps)																																					
Bankfull Discharge (cfs)																																					
Valley length (ft)																																					
Channel Thalweg length (ft)																																					
Sinuosity (ft)																																					
Water Surface Slope (Channel) (ft/ft)																																					
BF slope (ft/ft)																																					
³ Bankfull Floodplain Area (acres)																																					
⁴ % of Reach with Eroding Banks																																					
Channel Stability or Habitat Metric																																					
Biological or Other																																					

¹ = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. ² = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).
³ Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.
⁴ = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; ⁵ Of value/needed only if the n exceeds 3

Table 13c. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT3 (1914.8 feet)

Based on fixed baseline bankfull elevation ¹	Cross Section 1 (Pool)							Cross Section 2 (Riffle)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																												
Bankfull Width (ft)	11.0	15.8	16.6					8.9	9.0	10.2					13.6	14.8	13.5					7.3	8.0	7.9				
Floodprone Width (ft)	NA	NA	NA					100	100	100					NA	NA	NA					100	100	100				
Bankfull Mean Depth (ft)	0.9	0.6	0.6					0.6	0.6	0.5					0.9	0.9	0.9					0.6	0.5	0.5				
Bankfull Max Depth (ft)	1.6	1.7	1.6					1.0	1.1	1.0					1.7	2.0	2.1					1.0	1.0	1.1				
Bankfull Cross Sectional Area (ft ²)	10.2	10.2	10.2					5.4	5.4	5.4					12.7	12.7	12.7					4.3	4.3	4.3				
Bankfull Width/Depth Ratio	NA	NA	NA					14.7	15.0	19.2					NA	NA	NA					12.4	14.9	14.4				
Bankfull Entrenchment Ratio	NA	NA	NA					11.2	11.1	9.8					NA	NA	NA					13.7	12.5	12.7				
Low Bank Height (ft)	1.6	1.7	1.6					1.0	1.1	1.1					1.7	2.0	1.8					1.0	1.0	1.0				
Bankfull Bank Height Ratio	1.00	1.00	0.98					1.00	1.00	1.14					1.00	1.00	0.88					1.00	1.00	0.92				
Cross Sectional Area between end pins (ft ²)	14.1	17.1	13.7					16.8	18.4	17.8					22.9	16.2	21.8					7.6	10.9	9.0				
d50 (mm)																												
Based on fixed baseline bankfull elevation ¹																												
Record elevation (datum) used																												
Bankfull Width (ft)																												
Floodprone Width (ft)																												
Bankfull Mean Depth (ft)																												
Bankfull Max Depth (ft)																												
Bankfull Cross Sectional Area (ft ²)																												
Bankfull Width/Depth Ratio																												
Bankfull Entrenchment Ratio																												
Low Bank Height (ft)																												
Bankfull Bank Height Ratio																												
Cross Sectional Area between end pins (ft ²)																												
d50 (mm)																												

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

Table 13d. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT4 (530.9 feet)

Based on fixed baseline bankfull elevation ¹	Cross Section 1 (Pool)							Cross Section 2 (Riffle)																				
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+														
Record elevation (datum) used																												
Bankfull Width (ft)	10.9	11.8	11.9					7.5	11.7	7.5																		
Floodprone Width (ft)	NA	NA	NA					100	100	100																		
Bankfull Mean Depth (ft)	0.7	0.7	0.7					0.5	0.3	0.5																		
Bankfull Max Depth (ft)	1.4	1.4	1.3					0.9	0.8	0.9																		
Bankfull Cross Sectional Area (ft ²)	7.9	7.9	7.9					3.8	3.8	3.8																		
Bankfull Width/Depth Ratio	NA	NA	NA					14.8	36.0	14.7																		
Bankfull Entrenchment Ratio	NA	NA	NA					13.3	8.5	13.4																		
Low Bank Height (ft)	1.4	1.4	1.3					0.9	0.8	0.8																		
Bankfull Bank Height Ratio	1.00	1.00	0.99					1.00	1.00	0.90																		
Cross Sectional Area between end pins (ft ²)	13.3	13.1	14.2					8.0	5.3	5.9																		
d50 (mm)																												
Based on fixed baseline bankfull elevation ¹																												
Record elevation (datum) used																												
Bankfull Width (ft)																												
Floodprone Width (ft)																												
Bankfull Mean Depth (ft)																												
Bankfull Max Depth (ft)																												
Bankfull Cross Sectional Area (ft ²)																												
Bankfull Width/Depth Ratio																												
Bankfull Entrenchment Ratio																												
Low Bank Height (ft)																												
Bankfull Bank Height Ratio																												
Cross Sectional Area between end pins (ft ²)																												
d50 (mm)																												

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

Exhibit Table 14a. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT1/Reach 1&2 (2033 feet)

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)	7.1		7.9	8.6		2	7		11.9	16.7		2	7.3	8.15		9		2																		
Floodprone Width (ft)	100		100	100		2	100		100	100		2	100	100		100		2																		
Bankfull Mean Depth (ft)	0.5		0.5	0.5		2	0.5		0.5	0.5		2	0.5	0.5		0.5		2																		
¹ Bankfull Max Depth (ft)	0.9		1	1.1		2	0.8		0.9	1		2	0.8	0.95		1.1		2																		
Bankfull Cross Sectional Area (ft ²)	3.6		4	4.4		2	3.6		4	4.4		2	3.6	4		4.4		2																		
Width/Depth Ratio	14		15.6	17.2		2	13.8		23.6	33.4		2	14.7	16.6		18.5		2																		
Entrenchment Ratio	11.6		12.9	14.1		2	6		10.1	14.3		2	11.1	12.45		13.8		2																		
Low Bank Height (ft)	0.9		1.0	1.1		2	0.8		0.9	1.0		2	0.9	1		1.1		2																		
¹ Bank Height Ratio	1.0		1.0	1.0		2	1.0		1.0	1.0		2	0.99	1.055		1.12		2																		
Profile																																				
Riffle Length (ft)	9	28.6	28.45	49.5	10.7	35																														
Riffle Slope (ft/ft)	1E-04	0.01	0.009	0.021	0.007	13																														
Pool Length (ft)	4.3	10.9	9.14	39.8	7.5	27																														
Pool Max depth (ft)	1.7		1.8	2		3																														
Pool Spacing (ft)	25.3	49.8	50.71	89.2	14.7	35																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification			C5																																	
Channel Thalweg length (ft)			2033																																	
Sinuosity (ft)			1.26 -1.29																																	
Water Surface Slope (Channel) (ft/ft)			0.0049																																	
BF slope (ft/ft)																																				
³ Ri% / Ru% / P% / G% / S%																																				
³ SC% / Sa% / G% / C% / B% / Be%																																				
³ d16 / d35 / d50 / d84 / d95 /																																				
² % of Reach with Eroding Banks			0																																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14b. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT1/Reach 3 (1463 feet)

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)	10.4		10.4	10.4		1	14.6		14.6	14.6		1	11.6			11.6		1																		
Floodprone Width (ft)	100		100	100		1	100		100	100		1	100			100		1																		
Bankfull Mean Depth (ft)	0.8		0.8	0.8		1	0.8		0.8	0.8		1	0.7			0.7		1																		
¹ Bankfull Max Depth (ft)	1.4		1.4	1.4		1	1.2		1.2	1.2		1	1.3			1.3		1																		
Bankfull Cross Sectional Area (ft ²)	8.4		8.4	8.4		1	8.4		8.4	8.4		1	8.4			8.4		1																		
Width/Depth Ratio	13		13	13		1	18.3		18.3	18.3		1	15.9			15.9		1																		
Entrenchment Ratio	9.6		9.6	9.6		1	6.8		6.8	6.8		1	8.6			8.6		1																		
Low Bank Height (ft)	1.4		1.4	1.4		1	1.3		1.3	1.3		1	1.3			1.3		1																		
¹ Bank Height Ratio	1.0		1.0	1.0		1	1.1		1.1	1.1		1	0.98			0.98		1																		
Profile																																				
Riffle Length (ft)	12.2	39.6	38.7	63.2	12.7	23																														
Riffle Slope (ft/ft)	8E-04	0.006	0.003	0.029	0.009	10																														
Pool Length (ft)	4.7	13	11.75	32	6.4	22																														
Pool Max depth (ft)	1.9	2.1	2.1	2.3		2																														
Pool Spacing (ft)	37.3	68	73.78	87.5	13.9	22																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification			C5																																	
Channel Thalweg length (ft)			1463																																	
Sinuosity (ft)			1.35																																	
Water Surface Slope (Channel) (ft/ft)			0.0028																																	
BF slope (ft/ft)																																				
³ Ri% / Ru% / P% / G% / S%																																				
³ SC% / Sa% / G% / C% / B% / Be%																																				
³ d16 / d35 / d50 / d84 / d95 /																																				
² % of Reach with Eroding Banks			0																																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14c. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT2 (996.7 feet)

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)	9.9		9.9	9.9		1	10.9		10.9	10.9		1	10.37		10.37	10.37		1																		
Floodprone Width (ft)	100		100	100		1	100		100	100		1	100		100	100		1																		
Bankfull Mean Depth (ft)	0.6		0.6	0.6		1	0.6		0.6	0.6		1	0.586		0.586	0.586		1																		
¹ Bankfull Max Depth (ft)	1.3		1.3	1.3		1	1.5		1.5	1.5		1	1.328		1.328	1.328		1																		
Bankfull Cross Sectional Area (ft ²)	6.1		6.1	6.1		1	6.1		6.1	6.1		1	6.1		6.1	6.1		1																		
Width/Depth Ratio	16.1		16.1	16.1		1	19.5		19.5	19.5		1	17.7		17.7	17.7		1																		
Entrenchment Ratio	10.1		10.1	10.1		1	9.2		9.2	9.2		1	9.6		9.6	9.6		1																		
Low Bank Height (ft)	1.3		1.3	1.3		1	1.5		1.5	1.5		1	1.34		1.34	1.34		1																		
¹ Bank Height Ratio	1.0		1.0	1.0		1	1.1		1.1	1.1		1	1.009		1.009	1.009		1																		
Profile																																				
Riffle Length (ft)	15.7	29.9	28.44	52.3	10.8	11																														
Riffle Slope (ft/ft)	0.00	0.014	0.00	0.014	0.00	8																														
Pool Length (ft)	2.4	14.2	12.38	28.4	7.4	17																														
Pool Max depth (ft)	1.6	1.6	1.6	1.6		1																														
Pool Spacing (ft)	34.5	55.6	54.92	73.1	10.7	16																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification			C5																																	
Channel Thalweg length (ft)			996.7																																	
Sinuosity (ft)			1.22																																	
Water Surface Slope (Channel) (ft/ft)			0.0031																																	
BF slope (ft/ft)																																				
³ Ri% / Ru% / P% / G% / S%																																				
³ SC% / Sa% / G% / C% / B% / Be%																																				
³ d16 / d35 / d50 / d84 / d95 /																																				
² % of Reach with Eroding Banks			0																																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14d. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT3 (1914.8 feet)

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)	7.3		8.1	8.9		2	8		8.5	9		2	7.872	9.031		10.19		2																		
Floodprone Width (ft)	100		100	100		2	100		100	100		2	100	100		100		2																		
Bankfull Mean Depth (ft)	0.6		0.6	0.6		2	0.5		0.6	0.6		2	0.53	0.54		0.55		2																		
¹ Bankfull Max Depth (ft)	1		1	1		2	1		1.1	1.1		2	0.98	1.045		1.11		2																		
Bankfull Cross Sectional Area (ft ²)	4.3		4.9	5.4		2	4.3		4.9	5.4		2	4.3	4.85		5.4		2																		
Width/Depth Ratio	12.4		13.5	14.7		2	14.9		15	15		2	14.41	16.82		19.23		2																		
Entrenchment Ratio	11.2		12.5	13.7		2	11.1		11.8	12.5		2	9.8	11.25		12.7		2																		
Low Bank Height (ft)	1.0		1.0	1.0		2	1.0		1.1	1.1		2	1.024	1.072		1.12		2																		
¹ Bank Height Ratio	1.0		1.0	1.0		2	1.0		1.0	1.0		2	0.921	1.03		1.138		2																		
Profile																																				
Riffle Length (ft)	22.1	39	35.67	60.9	10	29																														
Riffle Slope (ft/ft)	0.001	0.005	0.005	0.01	0.003	14																														
Pool Length (ft)	7	10.7	10.06	16.8	2.5	28																														
Pool Max depth (ft)	1.6	1.65	1.65	1.7		2																														
Pool Spacing (ft)	45.6	63	60.35	91.7	11.3	28																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification			C5																																	
Channel Thalweg length (ft)			1914.8																																	
Sinuosity (ft)			1.21 - 1.38																																	
Water Surface Slope (Channel) (ft/ft)			0.0033																																	
BF slope (ft/ft)																																				
³ Ri% / Ru% / P% / G% / S%																																				
³ SC% / Sa% / G% / C% / B% / Be%																																				
³ d16 / d35 / d50 / d84 / d95 /																																				
² % of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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 2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
 3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
 4. = Of value/needed only if the n exceeds 3

Exhibit Table 14e. Monitoring Data - Stream Reach Data Summary
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT4 (530.9 feet)

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)	7.5		7.5	7.5		1	11.7		11.7	11.7		1	7.5			7.5		1																		
Floodprone Width (ft)	100		100	100		1	100		100	100		1	100.0			100.0		1																		
Bankfull Mean Depth (ft)	0.5		0.5	0.5		1	0.3		0.3	0.3		1	0.5			0.5		1																		
¹ Bankfull Max Depth (ft)	0.9		0.9	0.9		1	0.8		0.8	0.8		1	0.9			0.9		1																		
Bankfull Cross Sectional Area (ft ²)	3.8		3.8	3.8		1	3.8		3.8	3.8		1	3.8			3.8		1																		
Width/Depth Ratio	14.8		14.8	14.8		1	36		36	36		1	14.7			14.7		1																		
Entrenchment Ratio	13.3		13.3	13.3		1	8.5		8.5	8.5		1	13.4			13.4		1																		
Low Bank Height (ft)	0.9		0.9	0.9		1	0.8		0.8	0.8		1	0.8			0.8		1																		
¹ Bank Height Ratio	1.0		1.0	1.0		1	1.0		1.0	1.0		1	0.9			0.9		1																		
Profile																																				
Riffle Length (ft)	17.4	36.6	31.69	74.4	16.6	9																														
Riffle Slope (ft/ft)	0.006	0.008	0.008	0.015	0.003	9																														
Pool Length (ft)	5.2	9.5	9.34	12.3	2.3	9																														
Pool Max depth (ft)	1.4	1.4	1.4	1.4		1																														
Pool Spacing (ft)	21.2	49.6	46.5	75.4	15.6	9																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification			C5																																	
Channel Thalweg length (ft)			530.9																																	
Sinuosity (ft)			1.36																																	
Water Surface Slope (Channel) (ft/ft)			0.0051																																	
BF slope (ft/ft)																																				
³ Ri% / Ru% / P% / G% / S%																																				
³ SC% / Sa% / G% / C% / B% / Be%																																				
³ d16 / d35 / d50 / d84 / d95 /																																				
² % of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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 2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
 3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
 4. = Of value/needed only if the n exceeds 3

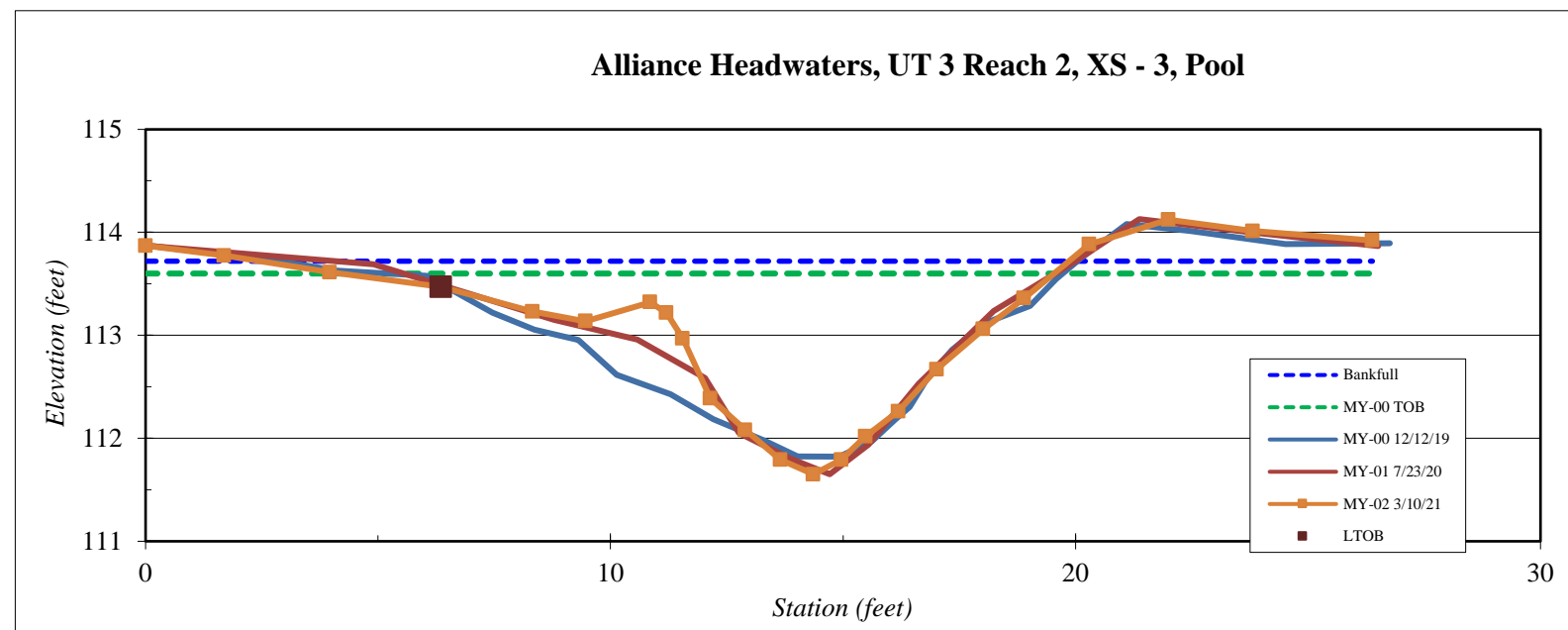
Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 3 Reach 2, XS - 3
Feature	Pool
Date:	3/10/2021
Field Crew:	Adams, Lawson, Perkinson



Station	Elevation
0.0	113.9
1.7	113.8
4.0	113.6
6.4	113.5
8.3	113.2
9.5	113.1
10.9	113.3
11.2	113.2
11.6	113.0
12.1	112.4
12.9	112.1
13.6	111.8
14.4	111.7
15.0	111.8
15.5	112.0
16.2	112.3
17.0	112.7
18.0	113.1
18.9	113.4
20.3	113.9
22.0	114.1
23.8	114.0
26.4	113.9

SUMMARY DATA	
Bankfull Elevation:	113.7
Bankfull Cross-Sectional Area:	12.7
Bankfull Width:	13.5
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.1
Low Bank Height:	1.8
Mean Depth at Bankfull:	0.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.88

Stream Type	C5
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APPENDIX E: HYDROLOGY DATA

Tables 15A-G. Channel Evidence
Stream Gauge Graphs
Table 16. Verification of Bankfull Events
Figure E1. 30/70 Percentile Graph for Rainfall
Soil Temp Graph
Table 17. Groundwater Hydrology Data
Groundwater Gauge Graphs

Table 15A. UT1 Downstream Channel Evidence

UT1 Downstream Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	201	119					
Presence of litter and debris (wracking)	Yes	Yes					
Leaf litter disturbed or washed away	Yes	Yes					
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes					
Sediment deposition and/or scour indicating sediment transport	Yes	Yes					
Water staining due to continual presence of water	Yes	Yes					
Formation of channel bed and banks	Yes	Yes					
Sediment sorting within the primary path of flow	Yes	Yes					
Sediment shelving or a natural line impressed on the banks	Yes	Yes					
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes					
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes					
Exposure of woody plant roots within the primary path of flow	No	No					
Other:							

Photo 1: UT1 Downstream Channel Evidence



Alliance Headwaters Stream Flow Gauge UT1 Downstream Year 2 (2021 Data)

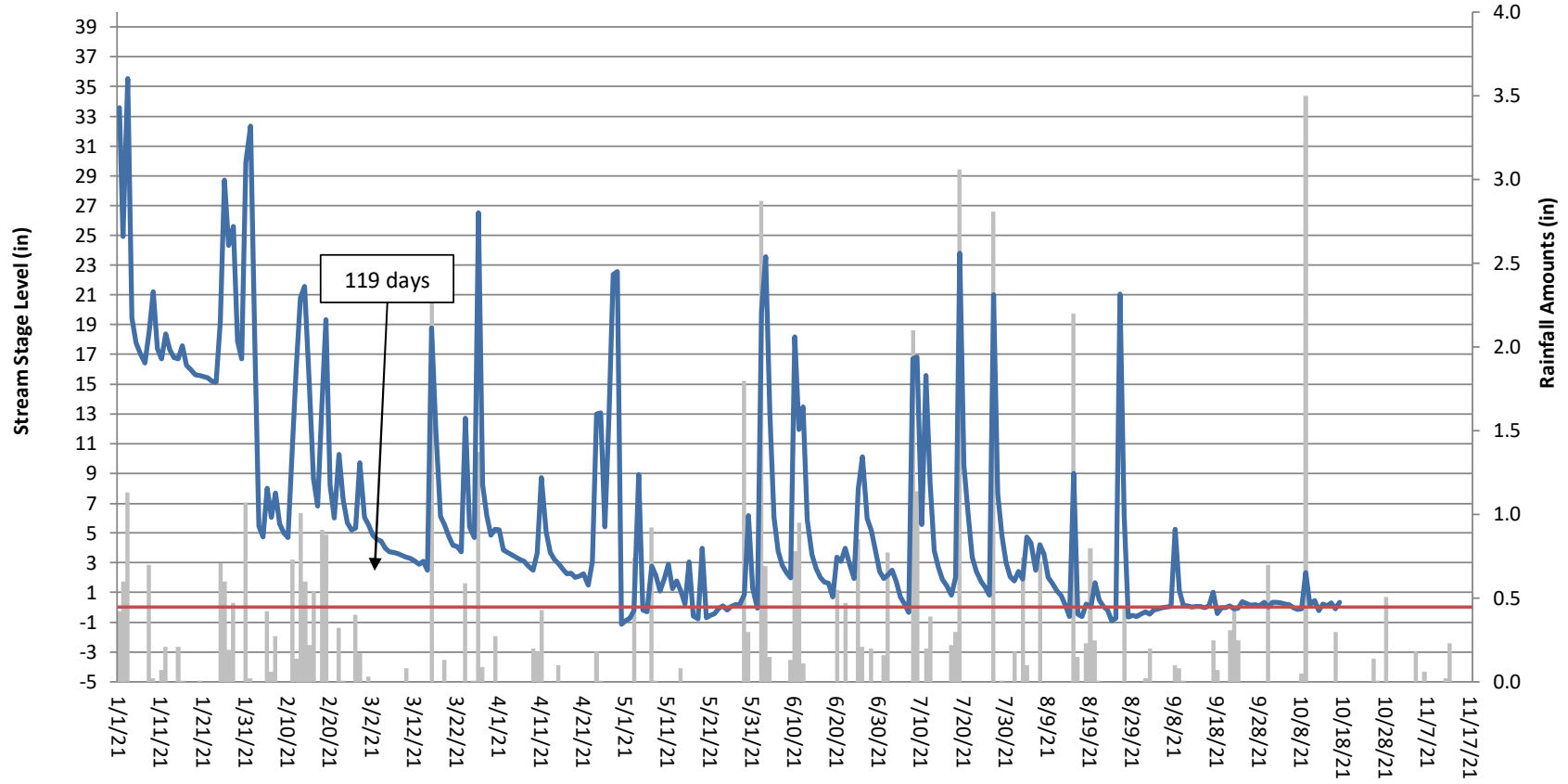


Table 15B. UT1 Upstream Channel Evidence

UT1 Upstream Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	190	160					
Presence of litter and debris (wracking)	Yes	Yes					
Leaf litter disturbed or washed away	Yes	Yes					
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes					
Sediment deposition and/or scour indicating sediment transport	Yes	Yes					
Water staining due to continual presence of water	Yes	Yes					
Formation of channel bed and banks	Yes	Yes					
Sediment sorting within the primary path of flow	Yes	Yes					
Sediment shelving or a natural line impressed on the banks	Yes	Yes					
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes					
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes					
Exposure of woody plant roots within the primary path of flow	No	No					
Other:							

Photo 2: UT1 Upstream Channel Evidence



Alliance Headwaters Stream Flow Gauge UT1 Upstream Year 2 (2021 Data)

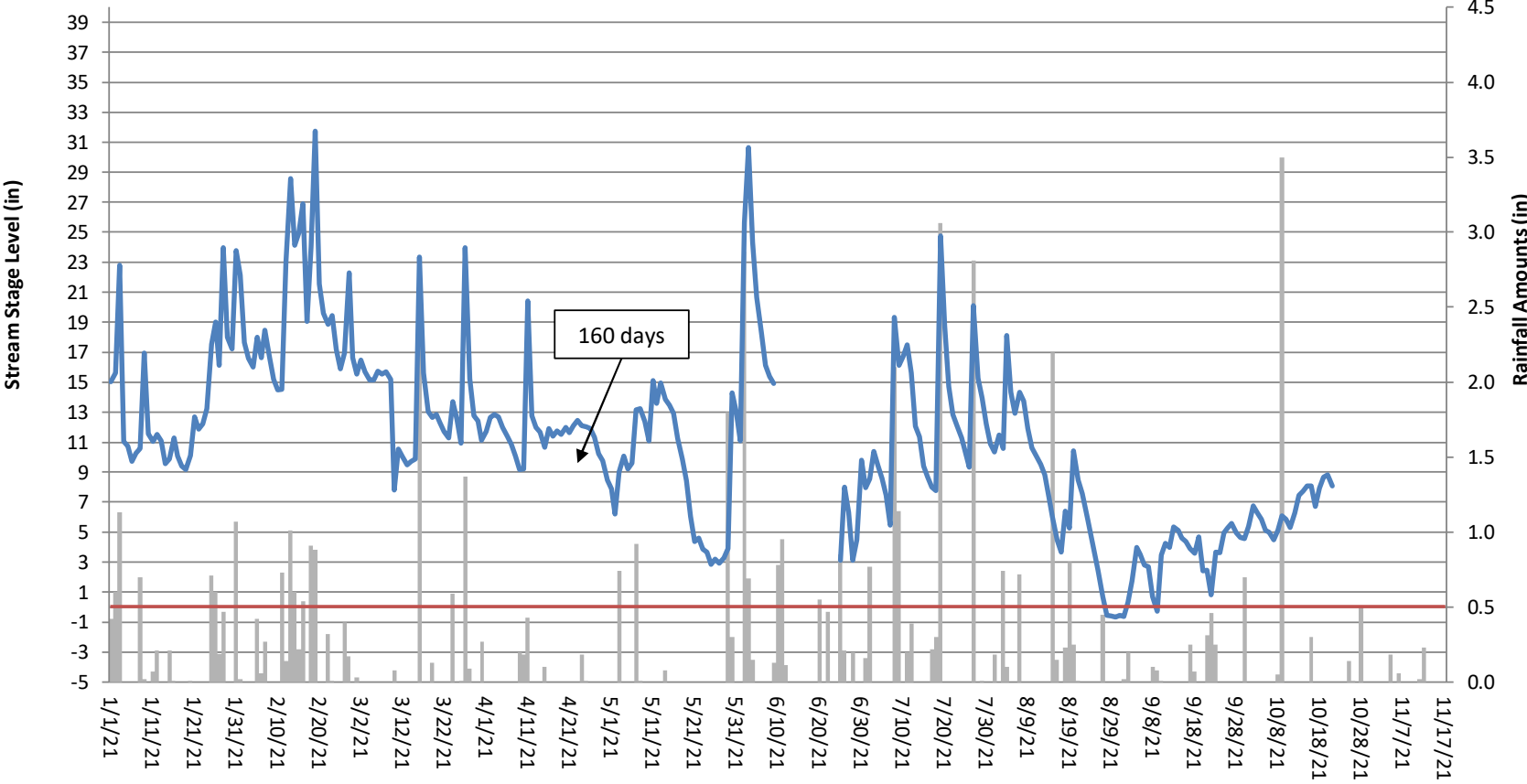


Table 15C. UT1A Channel Evidence

UT1A Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	97	73					
Presence of litter and debris (wracking)	Yes	Yes					
Leaf litter disturbed or washed away	Yes	Yes					
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes					
Sediment deposition and/or scour indicating sediment transport	Yes	Yes					
Water staining due to continual presence of water	Yes	Yes					
Formation of channel bed and banks	Yes	Yes					
Sediment sorting within the primary path of flow	Yes	Yes					
Sediment shelving or a natural line impressed on the banks	Yes	Yes					
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes					
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes					
Exposure of woody plant roots within the primary path of flow	No	No					
Other:							

Photo 3: UT1A Channel Evidence



Alliance Headwaters Stream Flow Gauge UT1A Year 2 (2021 Data)

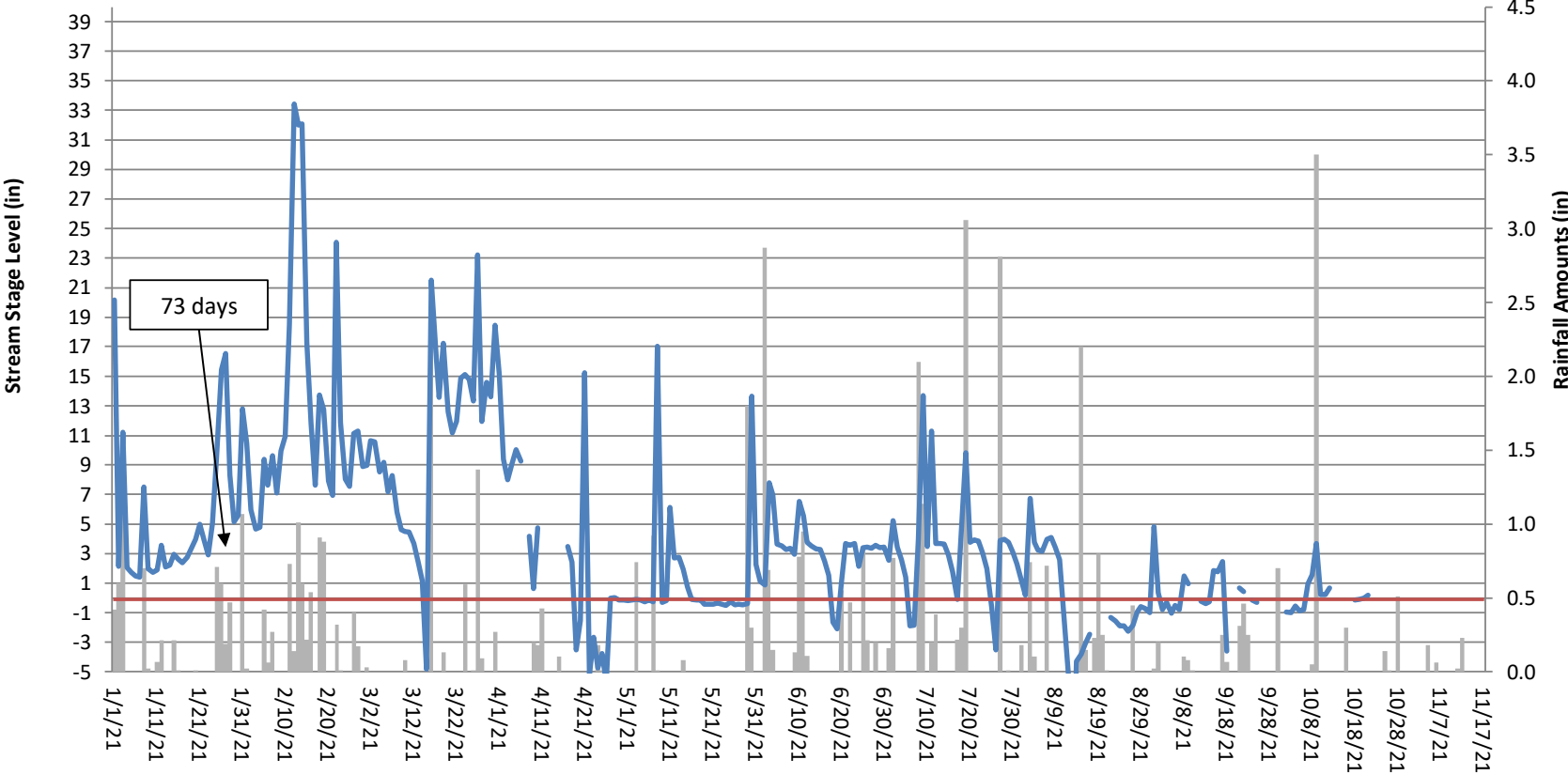


Table 15D. UT2 Channel Evidence

UT2 Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	199	125					
Presence of litter and debris (wracking)	Yes	Yes					
Leaf litter disturbed or washed away	Yes	Yes					
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes					
Sediment deposition and/or scour indicating sediment transport	Yes	Yes					
Water staining due to continual presence of water	Yes	Yes					
Formation of channel bed and banks	Yes	Yes					
Sediment sorting within the primary path of flow	Yes	Yes					
Sediment shelving or a natural line impressed on the banks	Yes	Yes					
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes					
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes					
Exposure of woody plant roots within the primary path of flow	No	No					
Other:							

Photo 4: UT2 Channel Evidence



Alliance Headwaters Stream Flow Gauge UT2 Year 2 (2021 Data)

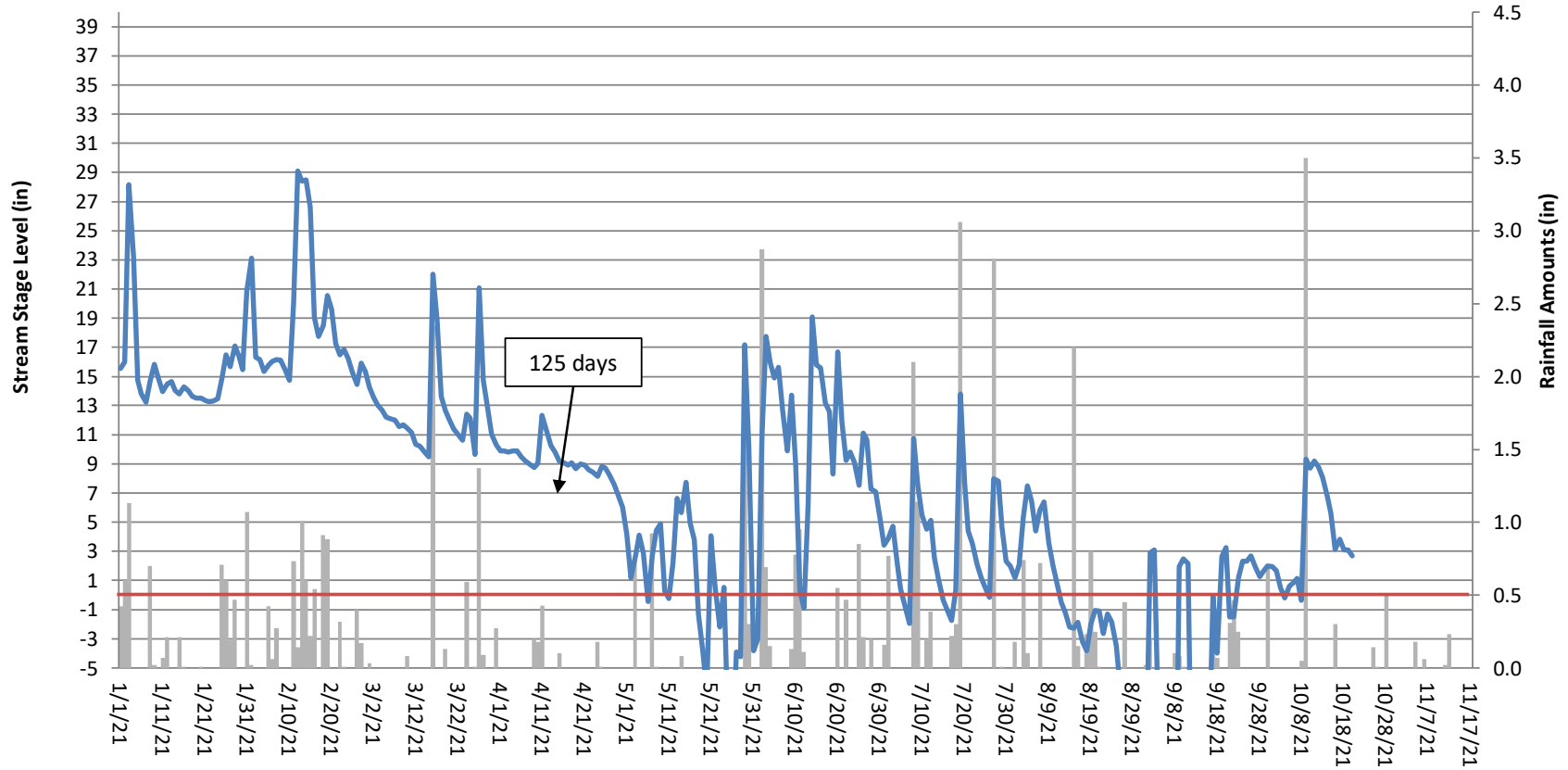


Table 15E. UT3 Downstream Channel Evidence

UT3 Downstream Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	119	234					
Presence of litter and debris (wracking)	Yes	Yes					
Leaf litter disturbed or washed away	Yes	Yes					
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes					
Sediment deposition and/or scour indicating sediment transport	Yes	Yes					
Water staining due to continual presence of water	Yes	Yes					
Formation of channel bed and banks	Yes	Yes					
Sediment sorting within the primary path of flow	Yes	Yes					
Sediment shelving or a natural line impressed on the banks	Yes	Yes					
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes					
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes					
Exposure of woody plant roots within the primary path of flow	No	No					
Other:							

Photo 5: UT3 Downstream Channel Evidence



Alliance Headwaters Stream Flow Gauge UT3 Downstream Year 2 (2021 Data)

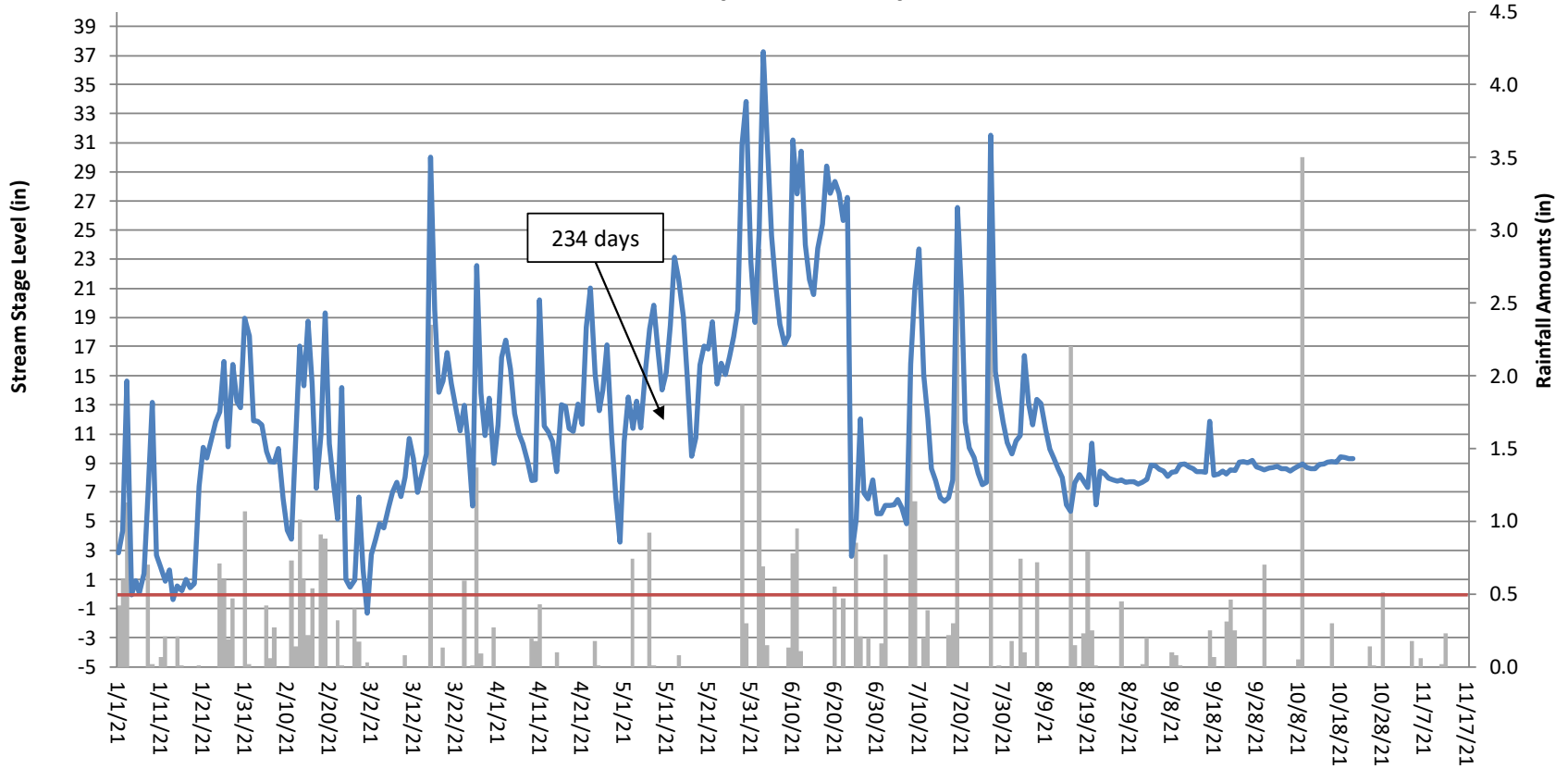


Table 15F. UT3 Upstream Channel Evidence

UT3 Upstream Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	136	127					
Presence of litter and debris (wracking)	Yes	Yes					
Leaf litter disturbed or washed away	Yes	Yes					
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes					
Sediment deposition and/or scour indicating sediment transport	Yes	Yes					
Water staining due to continual presence of water	Yes	Yes					
Formation of channel bed and banks	Yes	Yes					
Sediment sorting within the primary path of flow	Yes	Yes					
Sediment shelving or a natural line impressed on the banks	Yes	Yes					
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes					
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes					
Exposure of woody plant roots within the primary path of flow	No	No					
Other:							

Photo 6: UT3 Upstream Channel Evidence



Alliance Headwaters Stream Flow Gauge UT3 Upstream Year 2 (2021 Data)

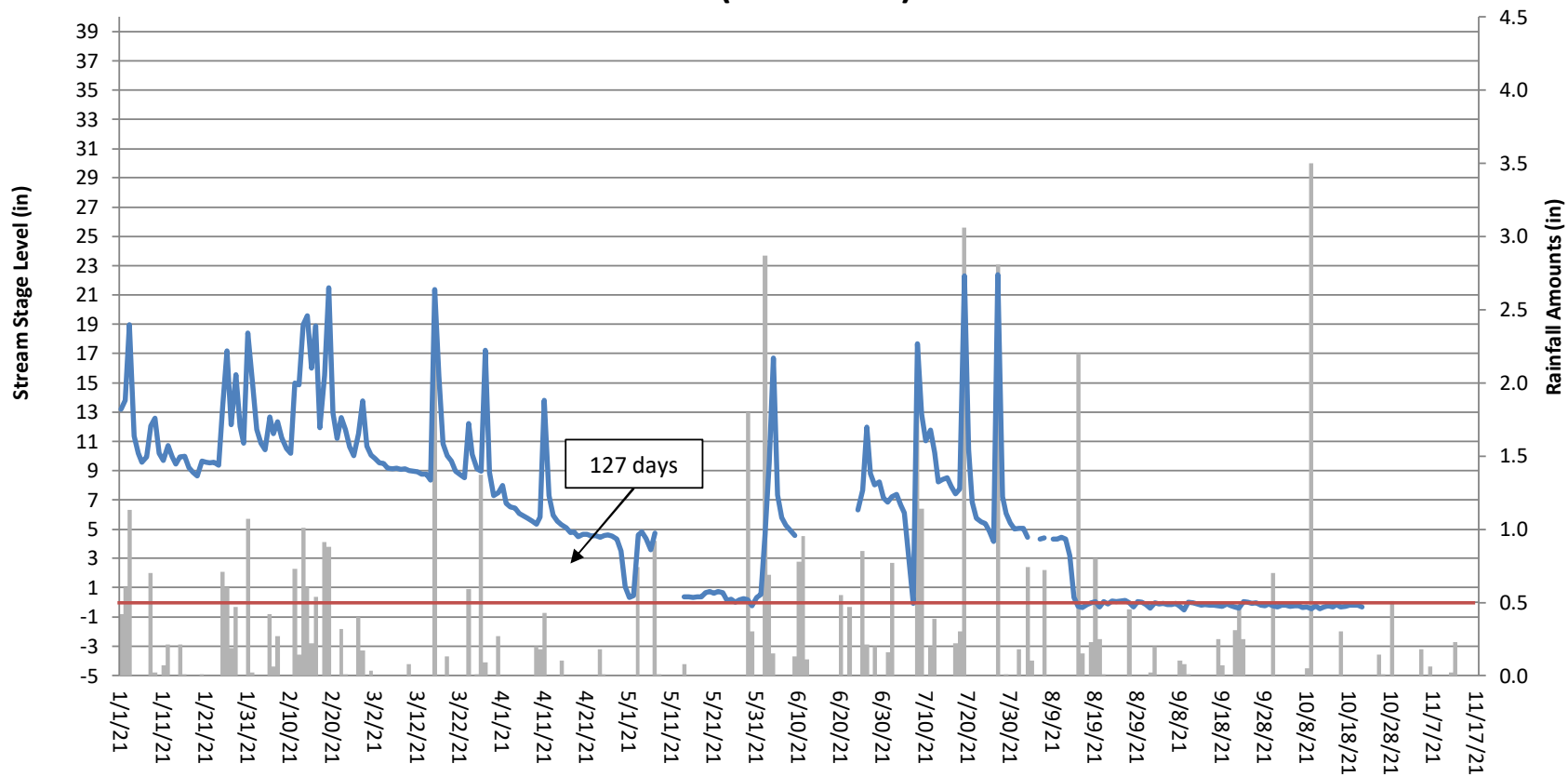
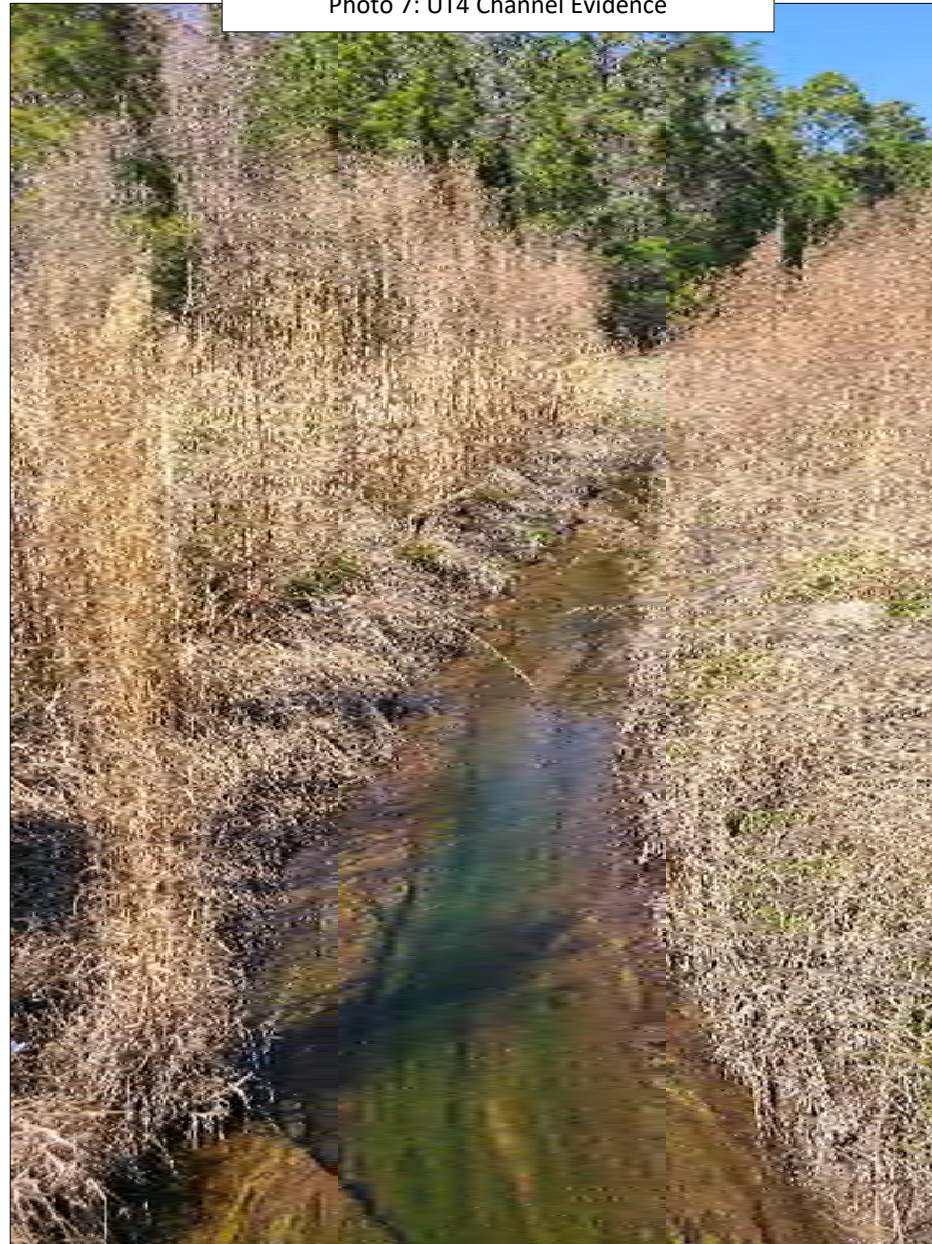


Table 15G. UT4 Channel Evidence

UT4 Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	130	228					
Presence of litter and debris (wracking)	Yes	Yes					
Leaf litter disturbed or washed away	Yes	Yes					
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes					
Sediment deposition and/or scour indicating sediment transport	Yes	Yes					
Water staining due to continual presence of water	Yes	Yes					
Formation of channel bed and banks	Yes	Yes					
Sediment sorting within the primary path of flow	Yes	Yes					
Sediment shelving or a natural line impressed on the banks	Yes	Yes					
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes					
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes					
Exposure of woody plant roots within the primary path of flow	No	No					
Other:							

Photo 7: UT4 Channel Evidence



Alliance Headwaters Stream Flow Gauge UT4 Year 2 (2021 Data)

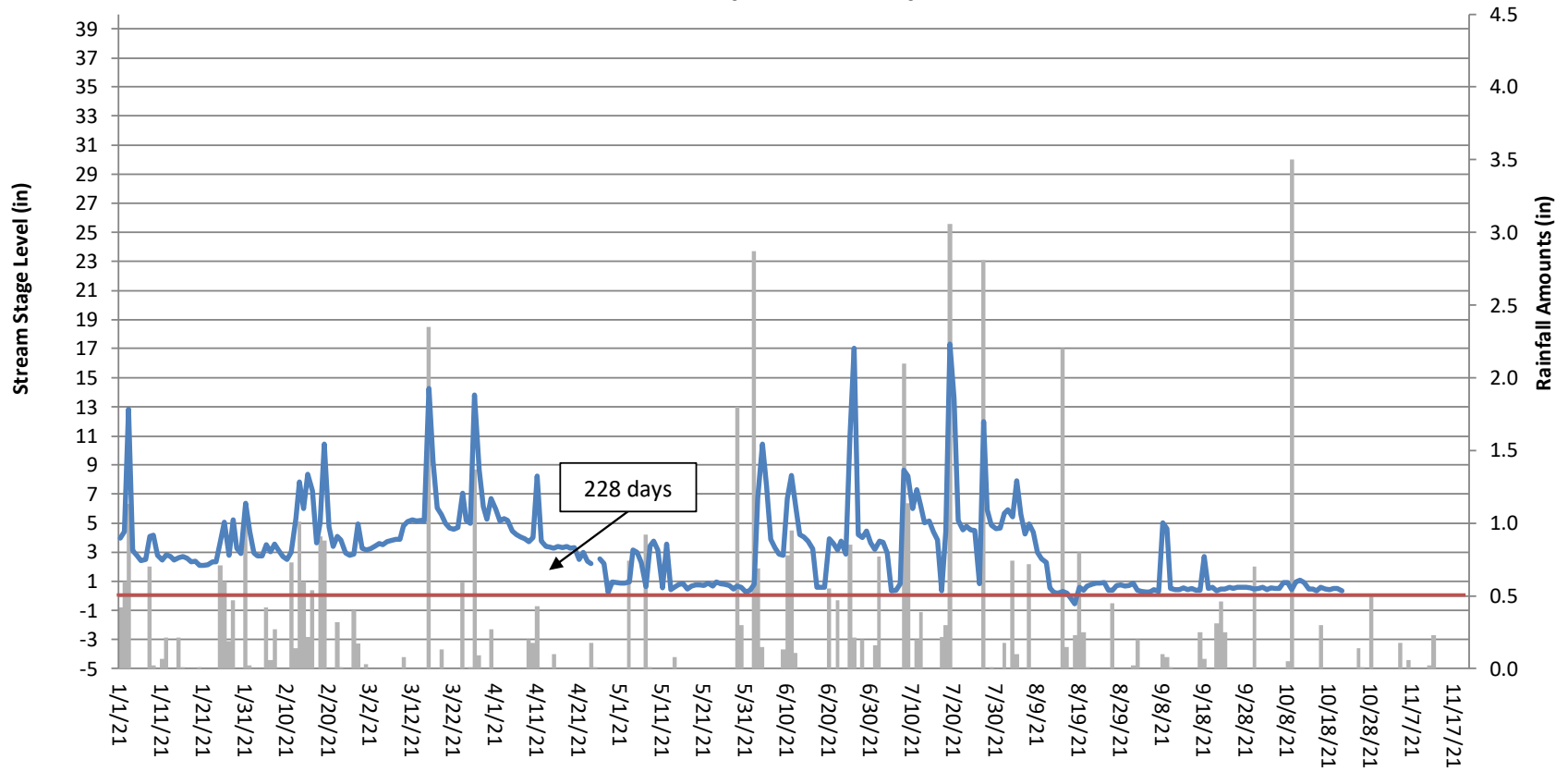


Table 16. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
April 30, 2020	April 30, 2020	Stream gauges and trail cameras captured a bankfull event at UT3 after 1.17 inches of rain was documented between April 30 and May 1, 2020 at an on-site rain gauge	1
November 19, 2020	November 12, 2020	Wrack and laid-back vegetation were observed outside the TOB of UT1 after 3.61 inches of rain was documented between November 12 and 13, 2020 at a nearby weather station.	2
March 16, 2021	March 16, 2021	Stream gauges and trail cameras captured a bankfull event on UT1, UT2, and UT3 after 2.35 inches of rain was documented on March 16, 2021 at an on-site rain gauge	3-5



Photo 9: Wrack and laid-back vegetation outside the TOB of UT1 after a bankfull event.



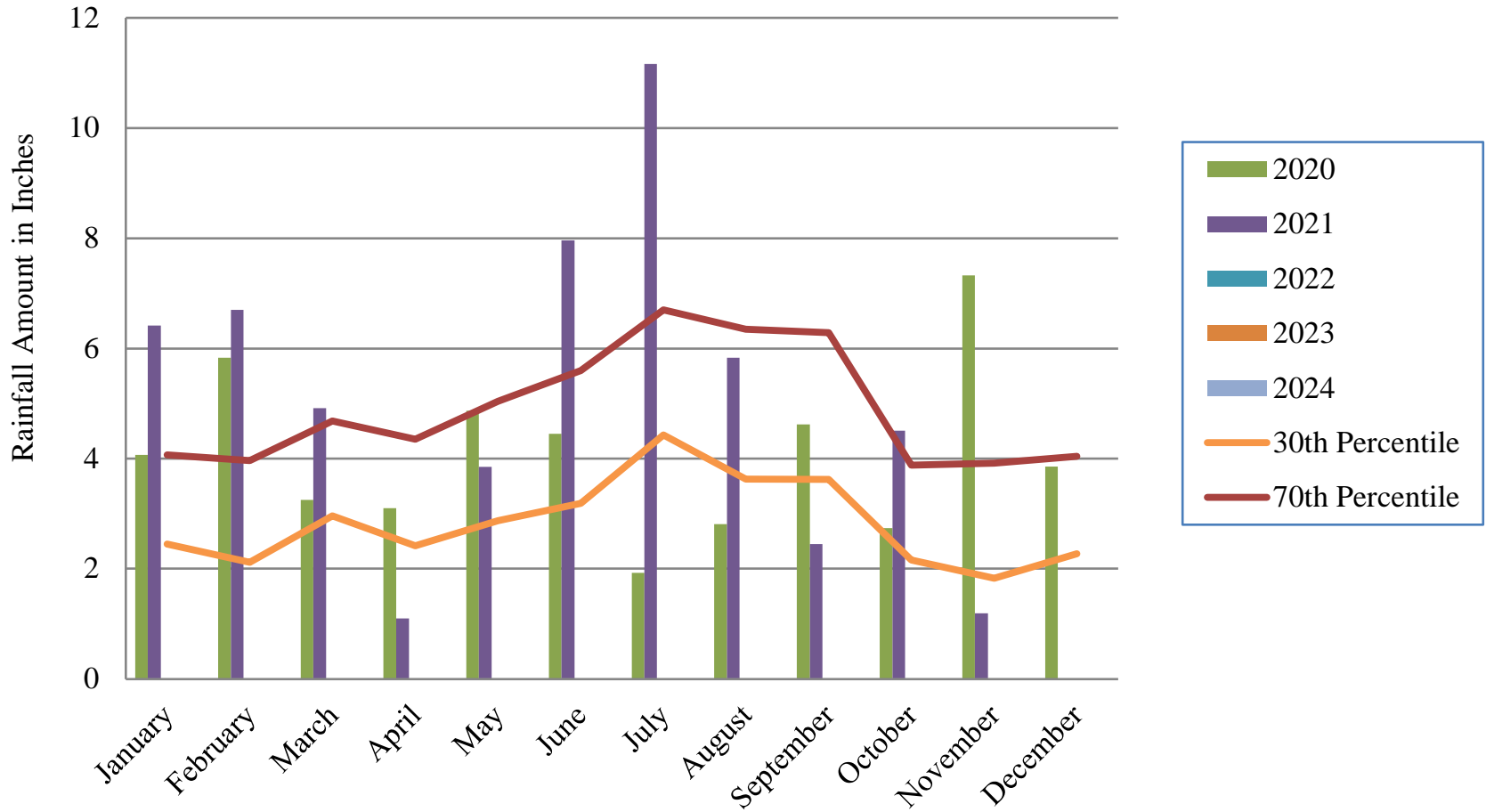
Photo 10: UT1 at bankfull stage.





Figure E1: Alliance Headwaters 30-70 Percentile Graph for Rainfall

Current year data from onsite rain gauge
30-70th percentile data from WETS Station: Smithfield, NC



Alliance Headwaters Soil Temperature Year 2 (2021 Data)

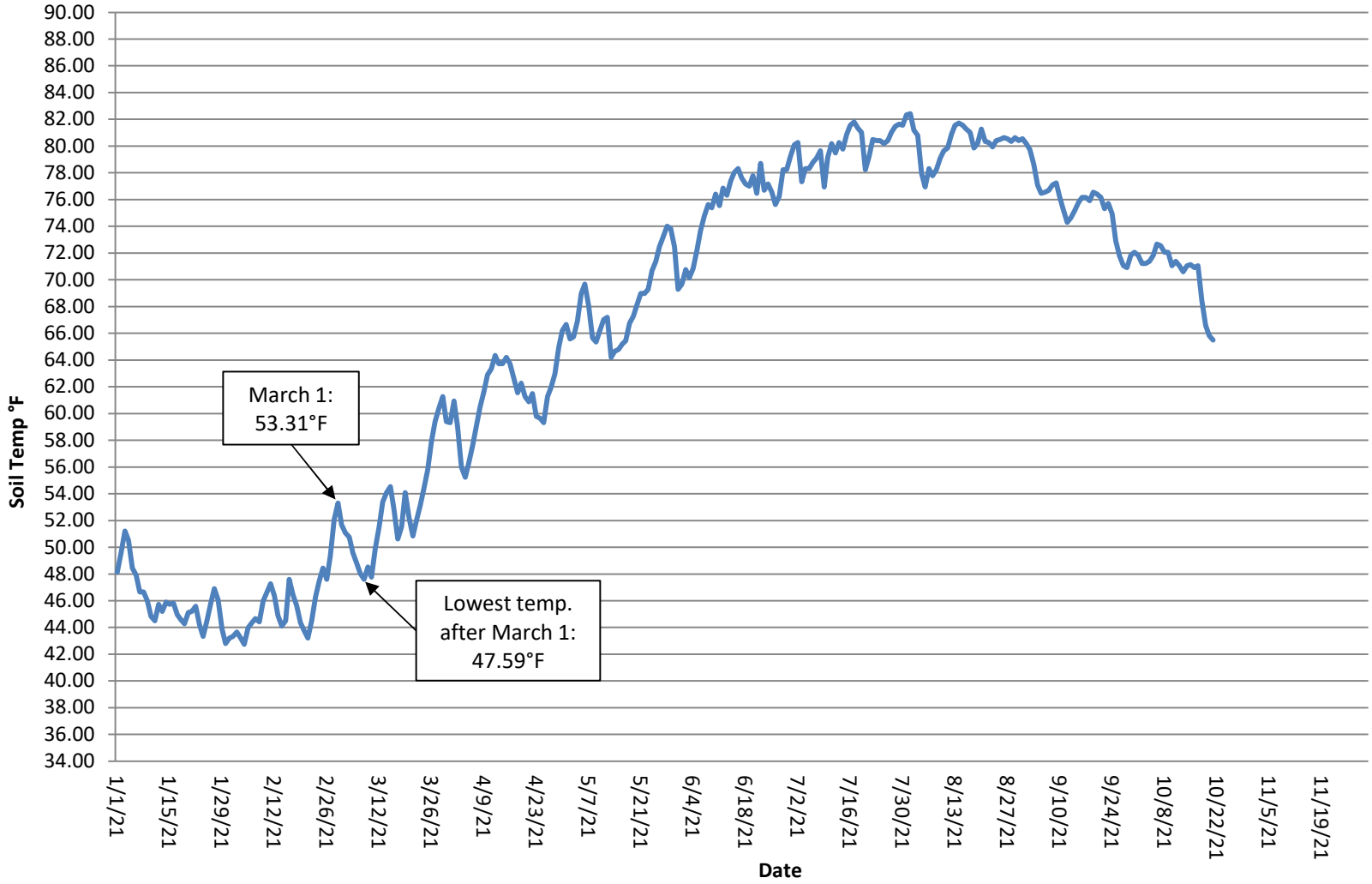


Table 17. Groundwater Hydrology Data

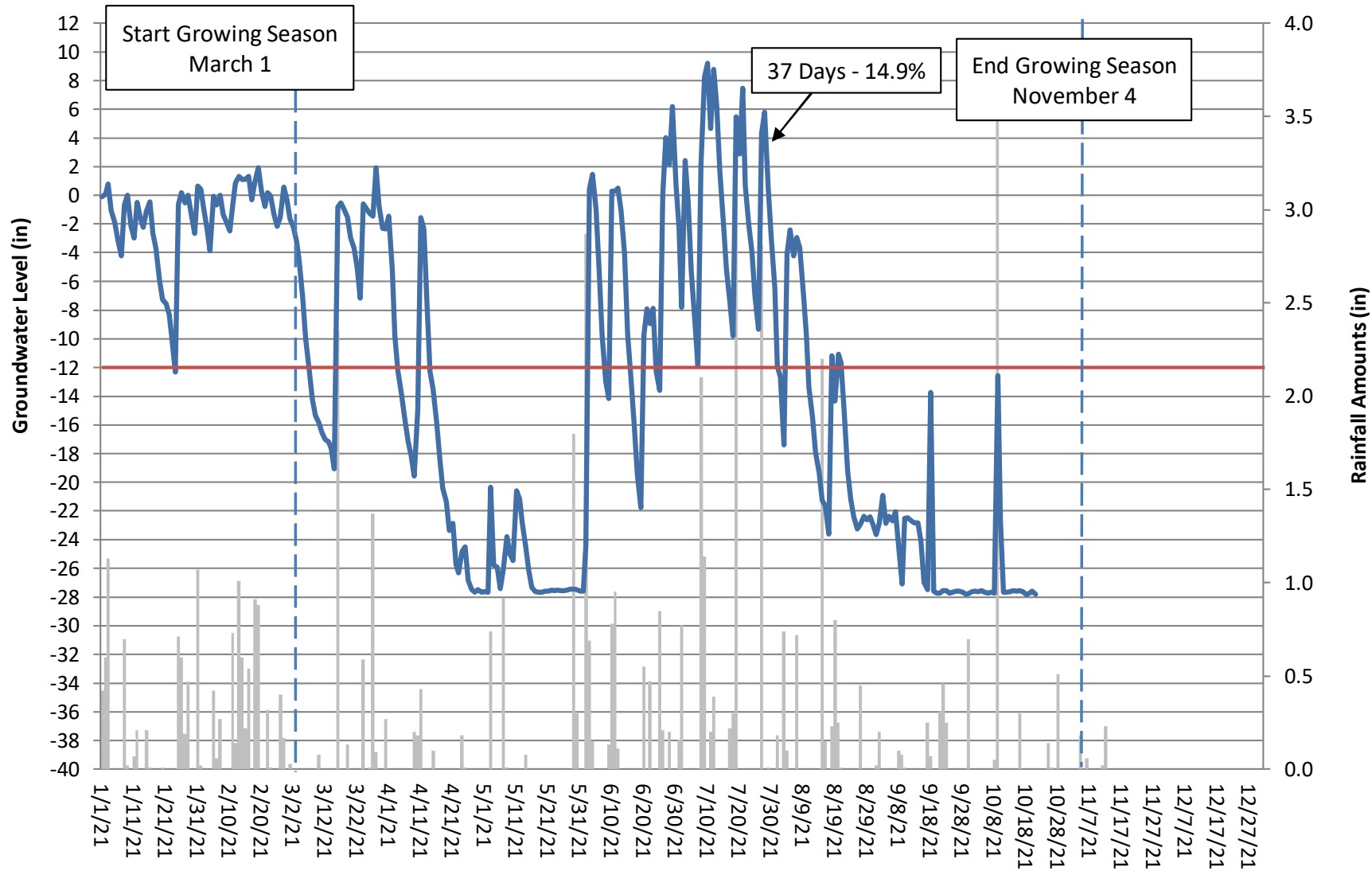
Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
1	No 9 days (3.6%)	Yes 37 days (14.9%)					
2	No 9 days (3.6%)	No 21 days (8.4%)					
3	Yes 55 days (22.2%)	Yes 86 days (34.5%)					
4	No 10 days (4.0%)	Yes 36 days (14.5%)					
5	Yes 29 days (11.7%)	No 19 days (7.6%)					
6	No 16 days (6.5%)	No 20 days (8.0%)					
7	No 7 days (2.8%)	No 8 days (3.2%)					
8	Yes 50 days (20.2%)	Yes 51 days (20.5%)					
9	Yes 75 days (32.7%)	Yes 93 days (37.3%)					
10	Yes 72 days (29.0%)	Yes 58 days (23.3%)					
11	Yes 64 days (25.8%)	Yes 42 days (16.9%)					
12	No 18 days (7.3%)	Yes 36 days (14.5%)					
13	No 20 days (8.1%)	Yes 58 days (23.3%)					
14	No 16 days (6.5%)	Yes 44 days (17.7%)					
15	No 13 days (5.2%)	No 18 days (7.2%)					
16	Yes 34 days (13.7%)	Yes 70 days (28.1%)					
17	No 19 days (7.7%)	Yes 36 days (14.5%)					
18	No 10 days (4.0%)	No 19 days (7.6%)					
19	No 8 days (3.2%)	No 10 days (4.0%)					

Table 17. Groundwater Hydrology Data (continued)

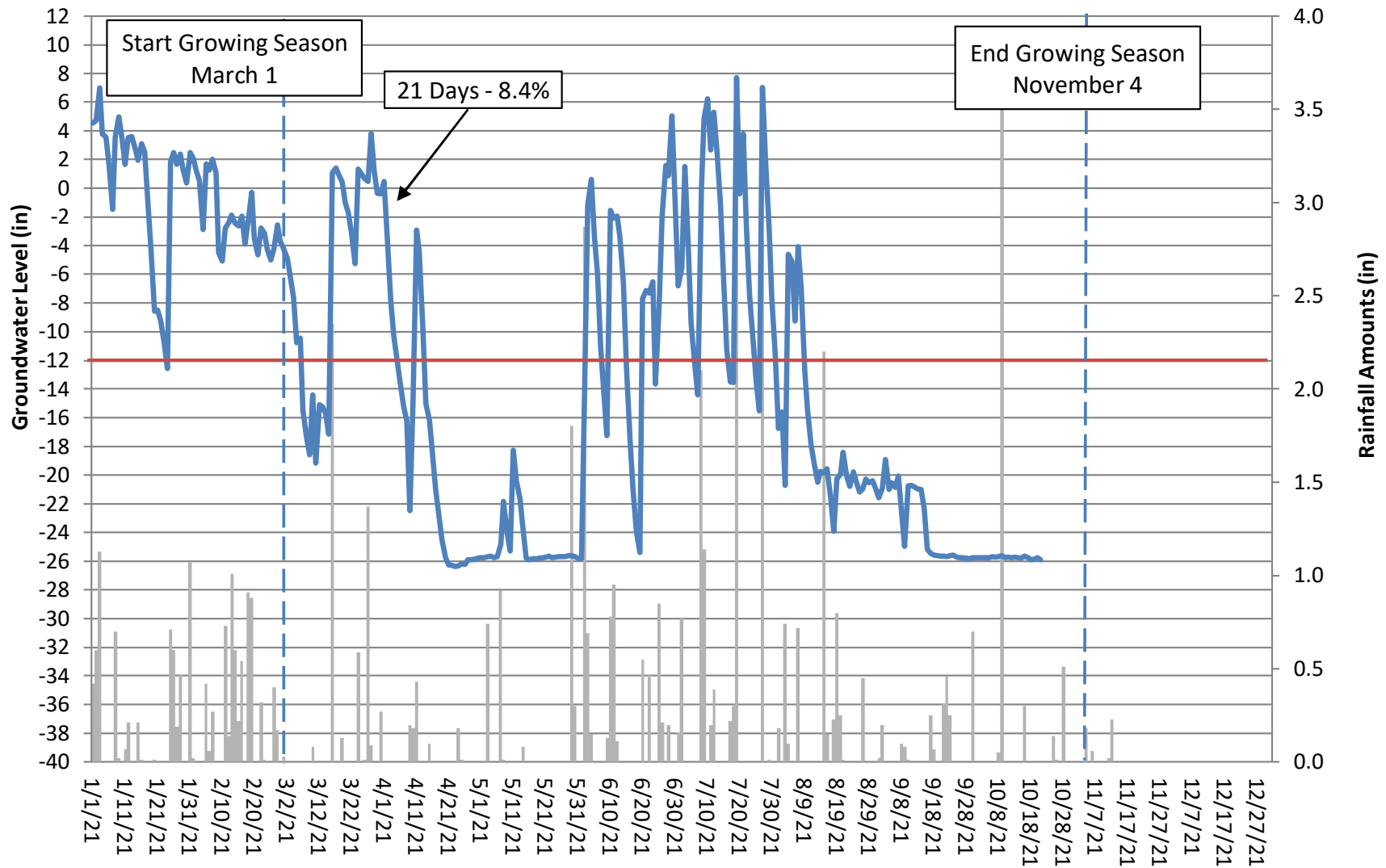
Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
20	Yes 36 days (14.5%)	Yes 58 days (23.3%)					
21	Yes 34 days (13.7%)	Yes 36 days (14.5%)					
22	Yes 69 days (27.8%)	Yes 56 days (22.5%)					
23	Yes 35 days (14.1%)	Yes 42 days (16.9%)					
24	No 5 days (2.0%)	No 14 days (5.6%)					
25	Yes 46 days (18.5%)	Yes 55 days (21.1%)					
26	Yes 167 days (67.3%)	Yes 88 days (35.3%)					
27	Yes 74 days (29.8%)	Yes 57 days (22.9%)					
28	Yes 45 days (18.1%)	Yes 49 days (19.7%)					
29	Yes 45 days (18.1%)	Yes 81 days (32.5%)					
30*	NA	Yes 38 days (15.3%)					
31*	NA	Yes 98 days (39.4%)					
32*	NA	Yes 58 days (23.3%)					
33*	NA	Yes 42 days (16.9%)					
34*	NA	Yes 55 days (22.1%)					
35*	NA	Yes 42 days (16.9%)					
Ref*	NA	Yes 51 days (20.5%)					

* Prior to the MY2 (2021 growing season, six additional wetland gauges were installed in areas of the Site RS felt needed additional data points (near GW19, near vegetation plot 31, near GW 7, at the upstream portion of UT 2, and across UT 1 from GW 11-12). Additionally, a reference groundwater gauge was installed in the wetland preservation area at the headwaters of UT 3 and 4.

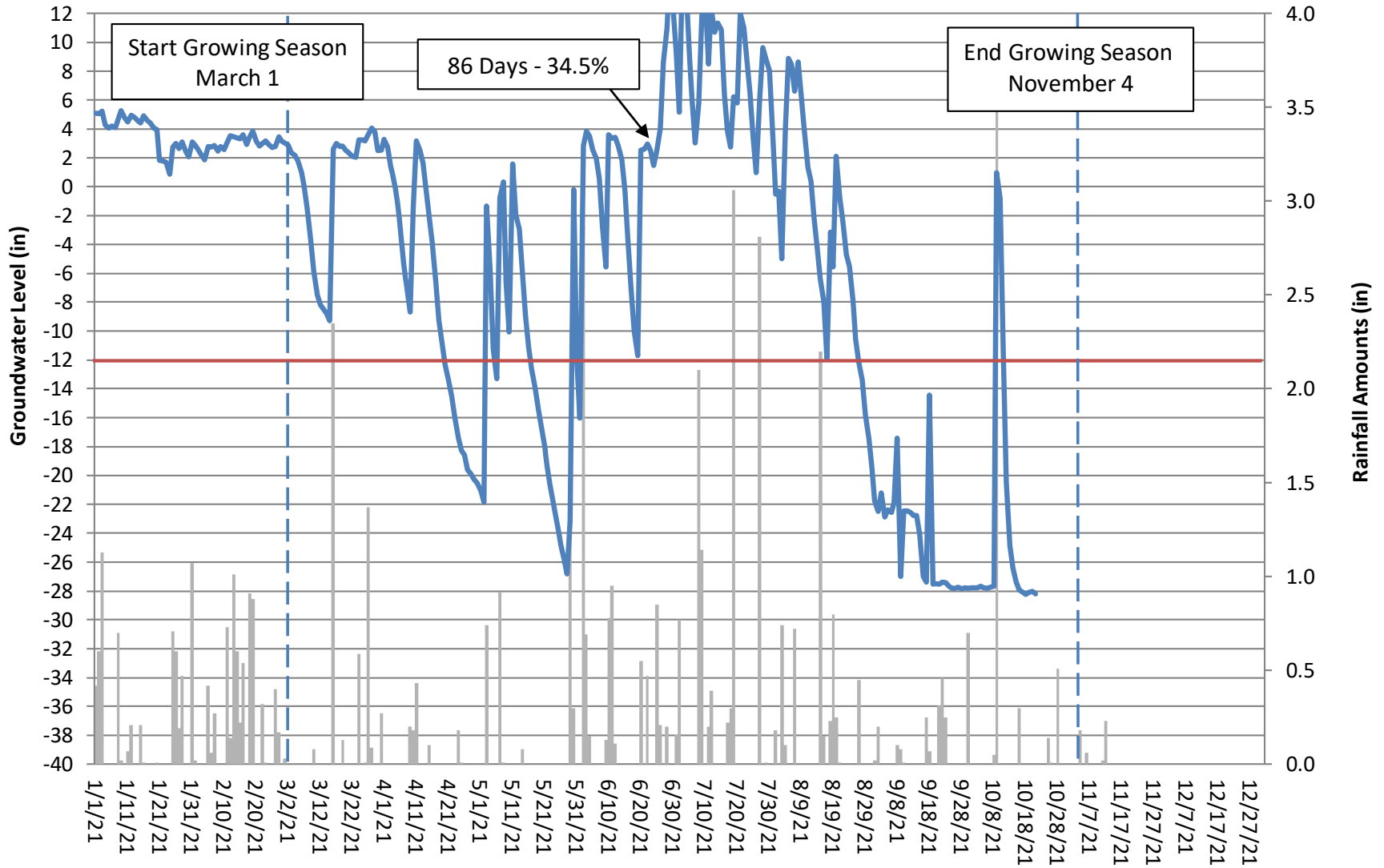
Alliance Headwaters Groundwater Gauge 1 Year 2 (2021 Data)



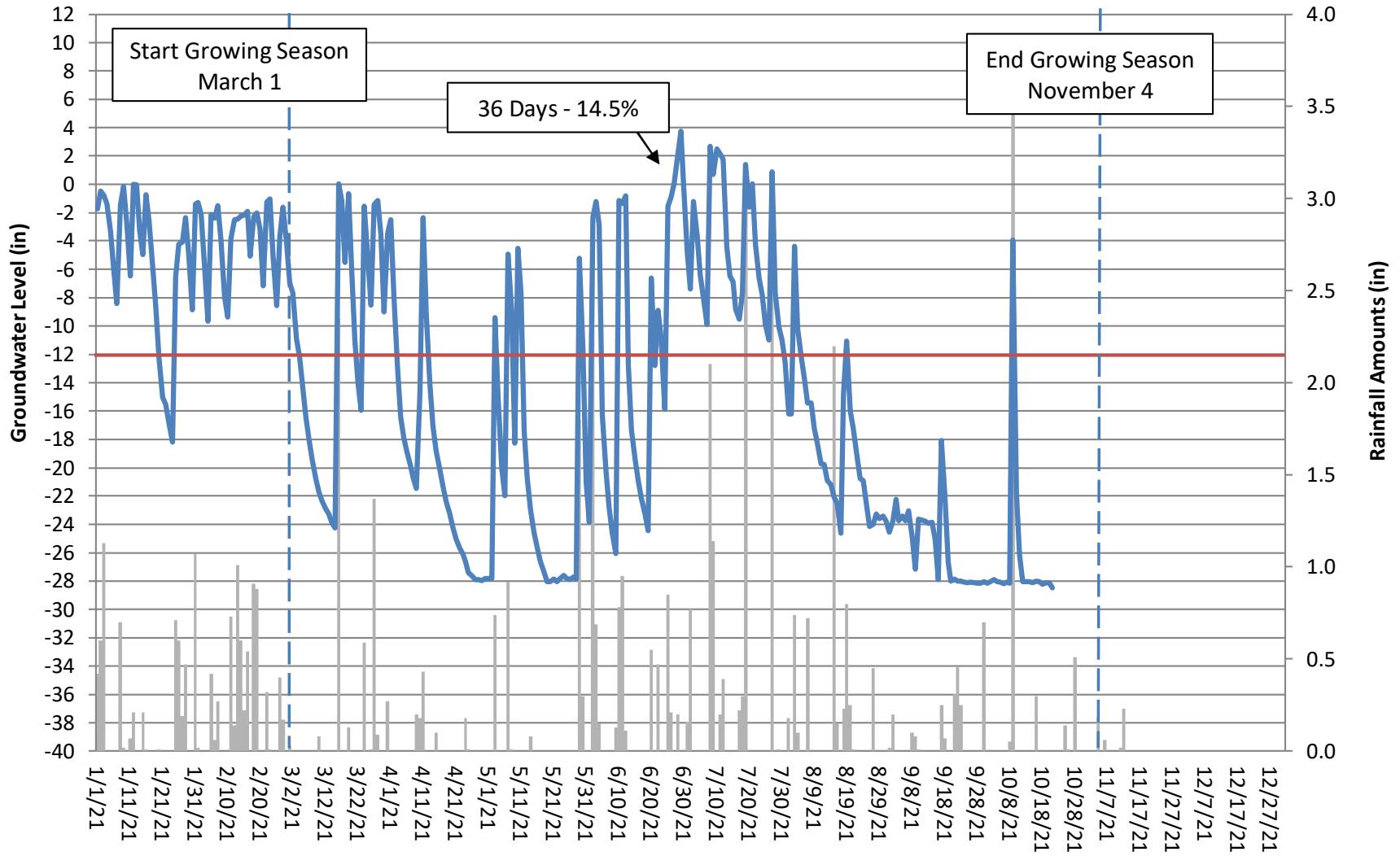
Alliance Headwaters Groundwater Gauge 2 Year 2 (2021 Data)



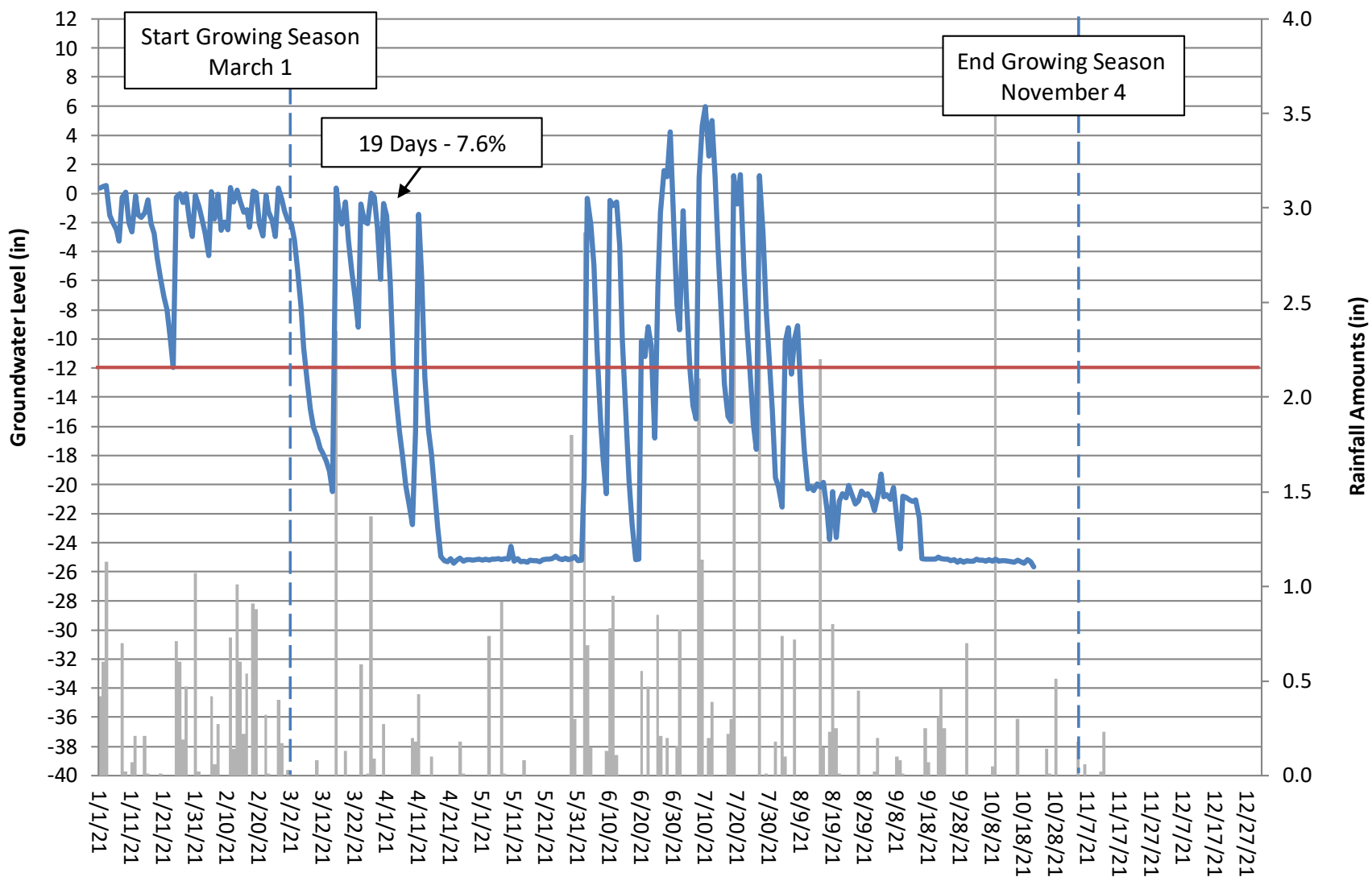
Alliance Headwaters Groundwater Gauge 3 Year 2 (2021 Data)



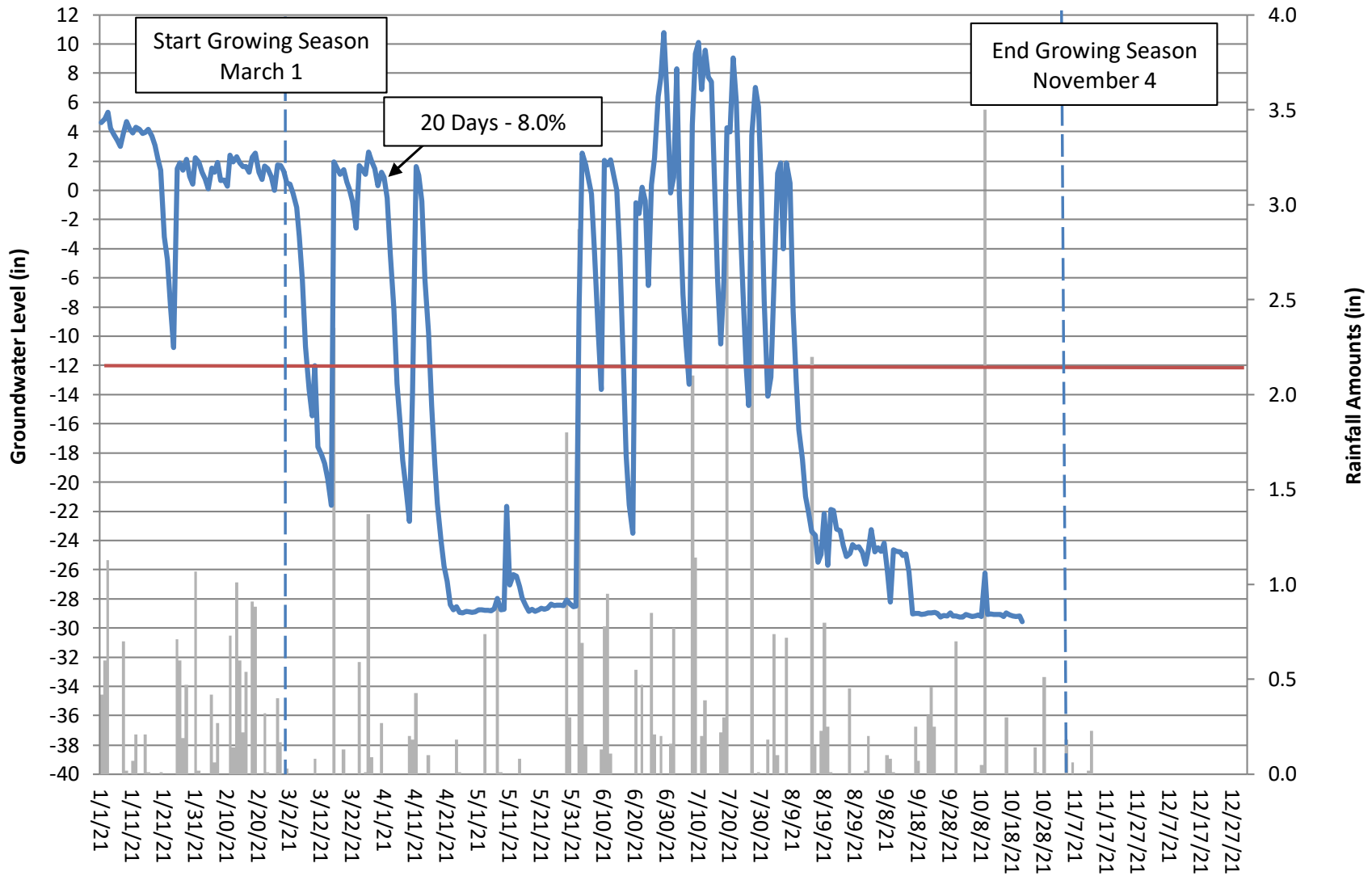
Alliance Headwaters Groundwater Gauge 4 Year 2 (2021 Data)



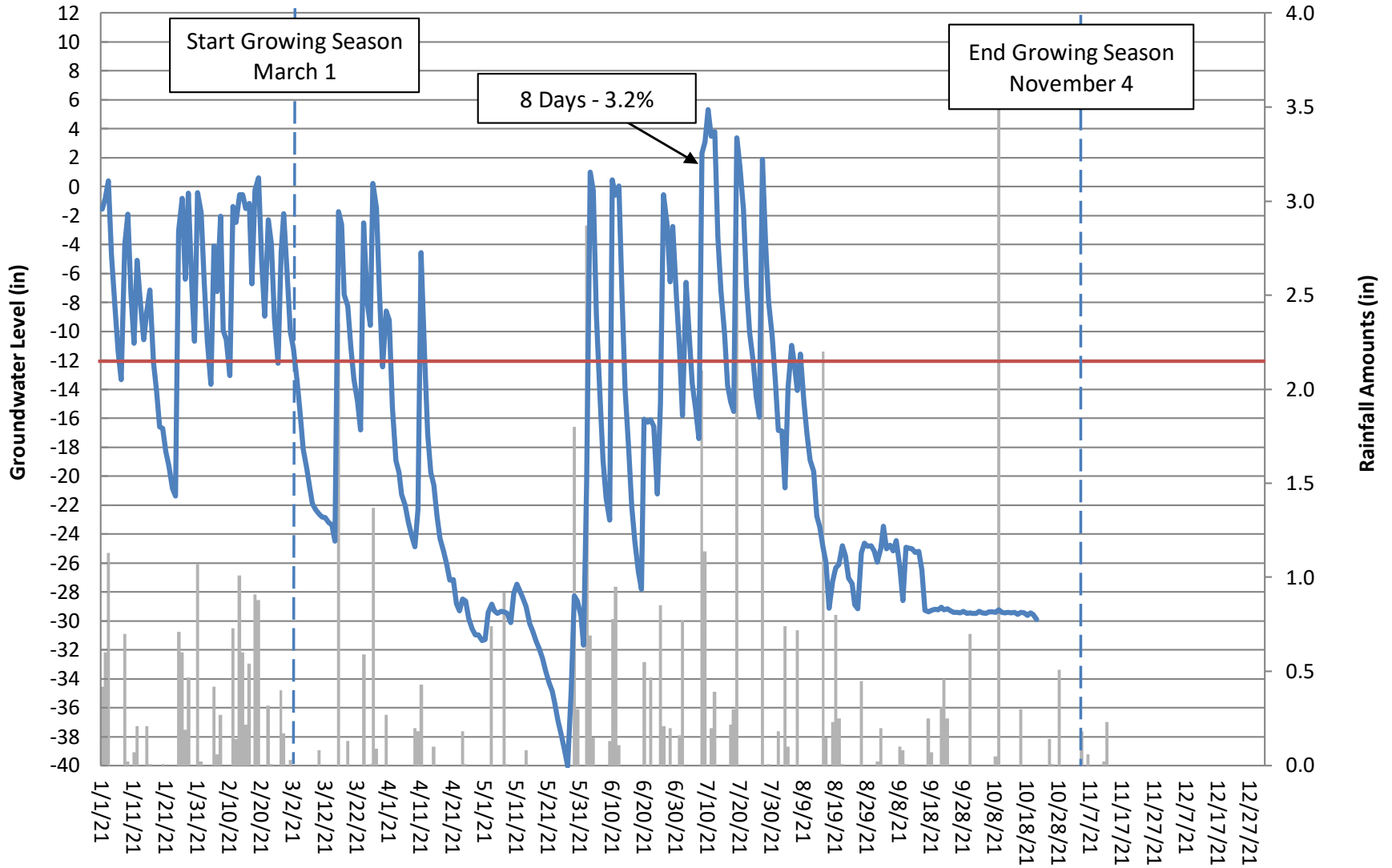
Alliance Headwaters Groundwater Gauge 5 Year 2 (2021 Data)



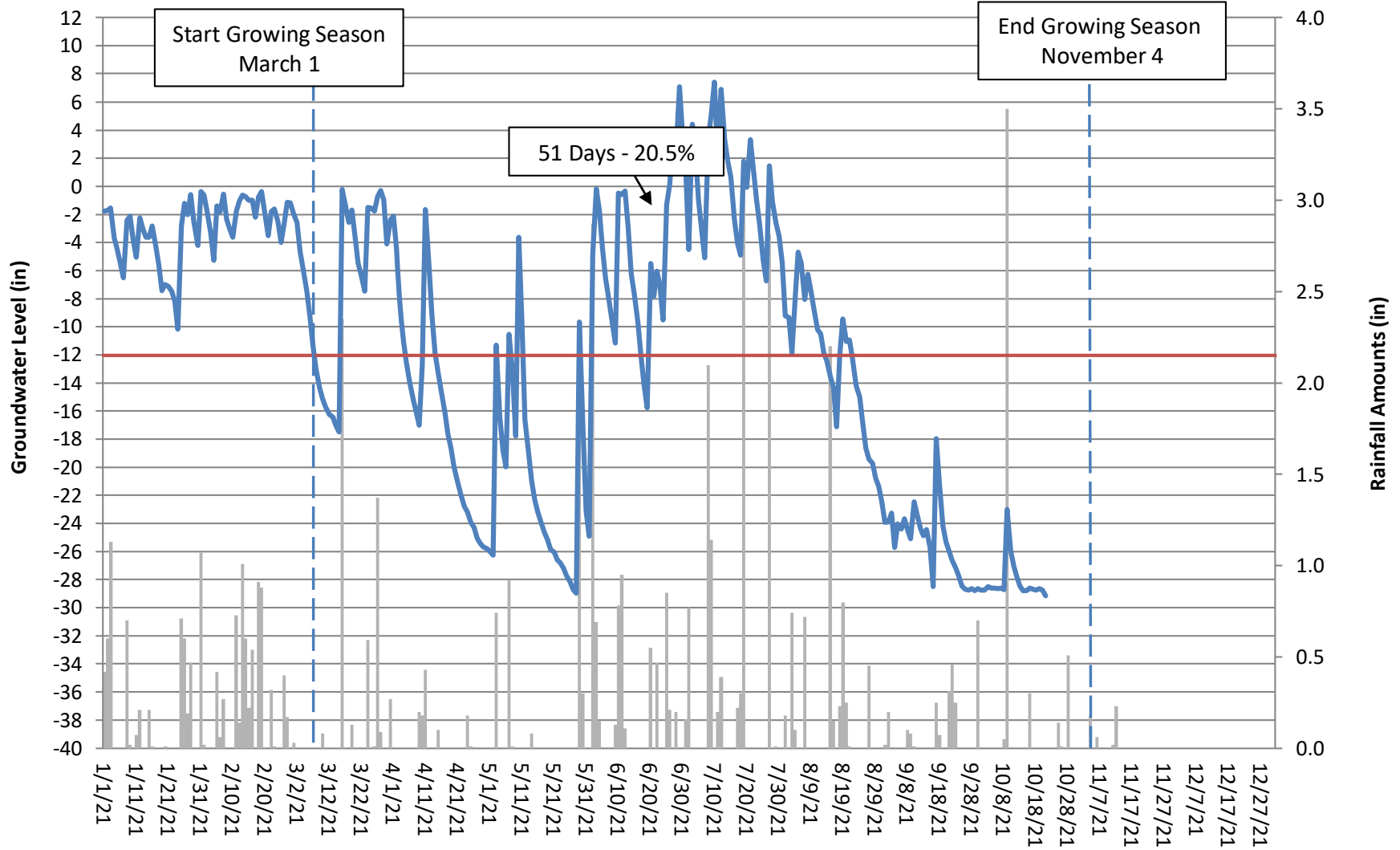
Alliance Headwaters Groundwater Gauge 6 Year 2 (2021 Data)



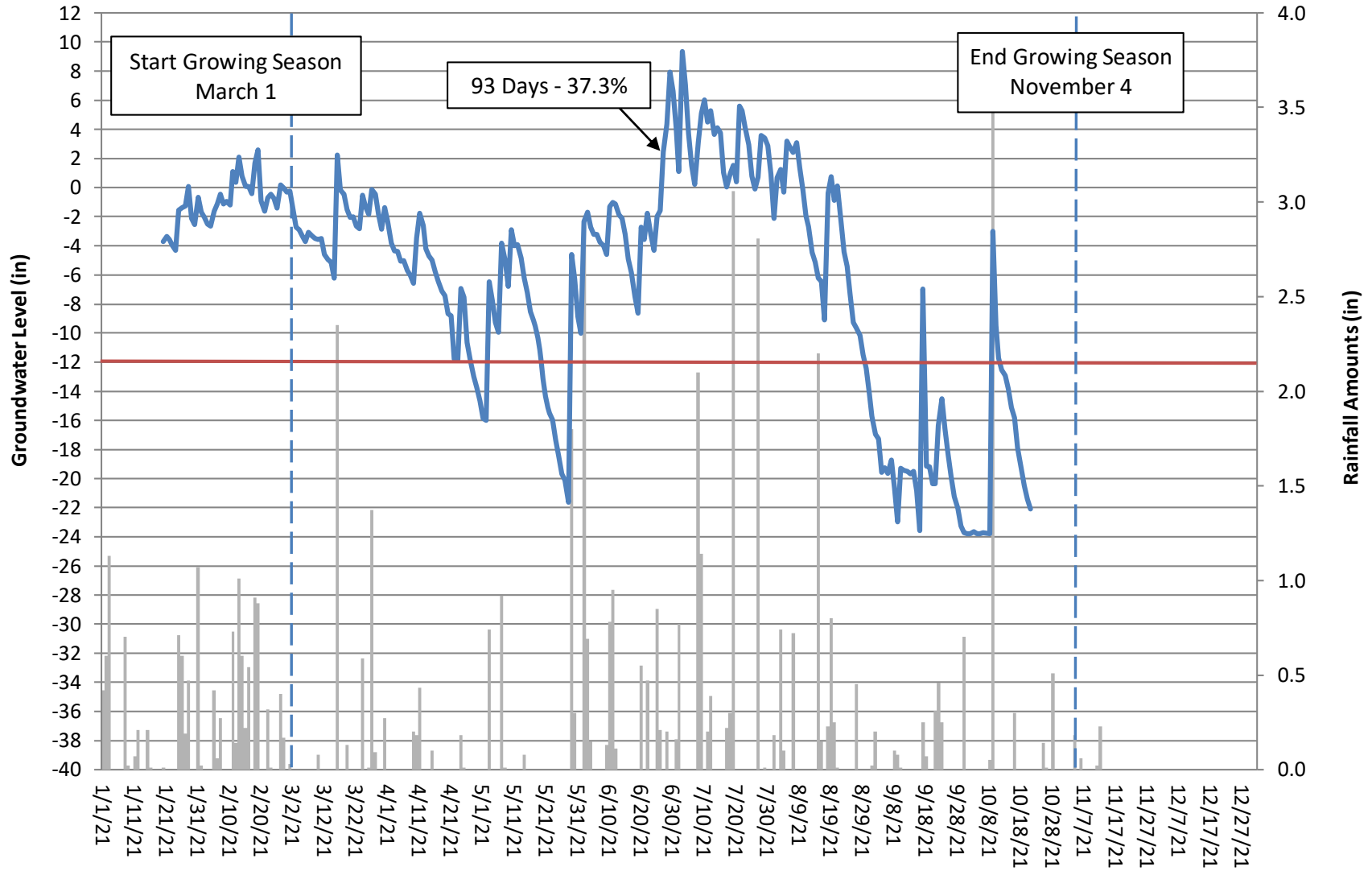
Alliance Headwaters Groundwater Gauge 7 Year 2 (2021 Data)



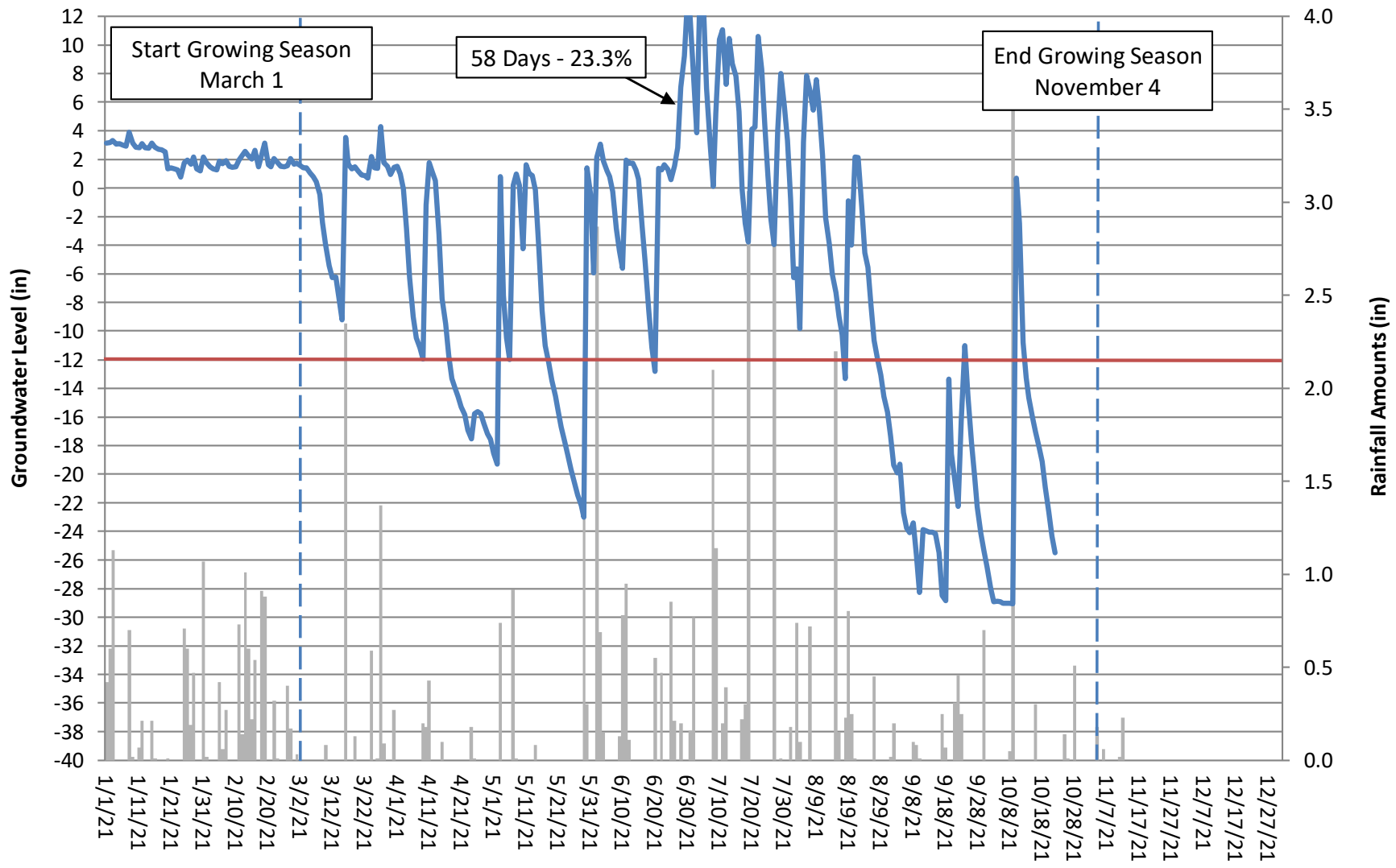
Alliance Headwaters Groundwater Gauge 8 Year 2 (2021 Data)



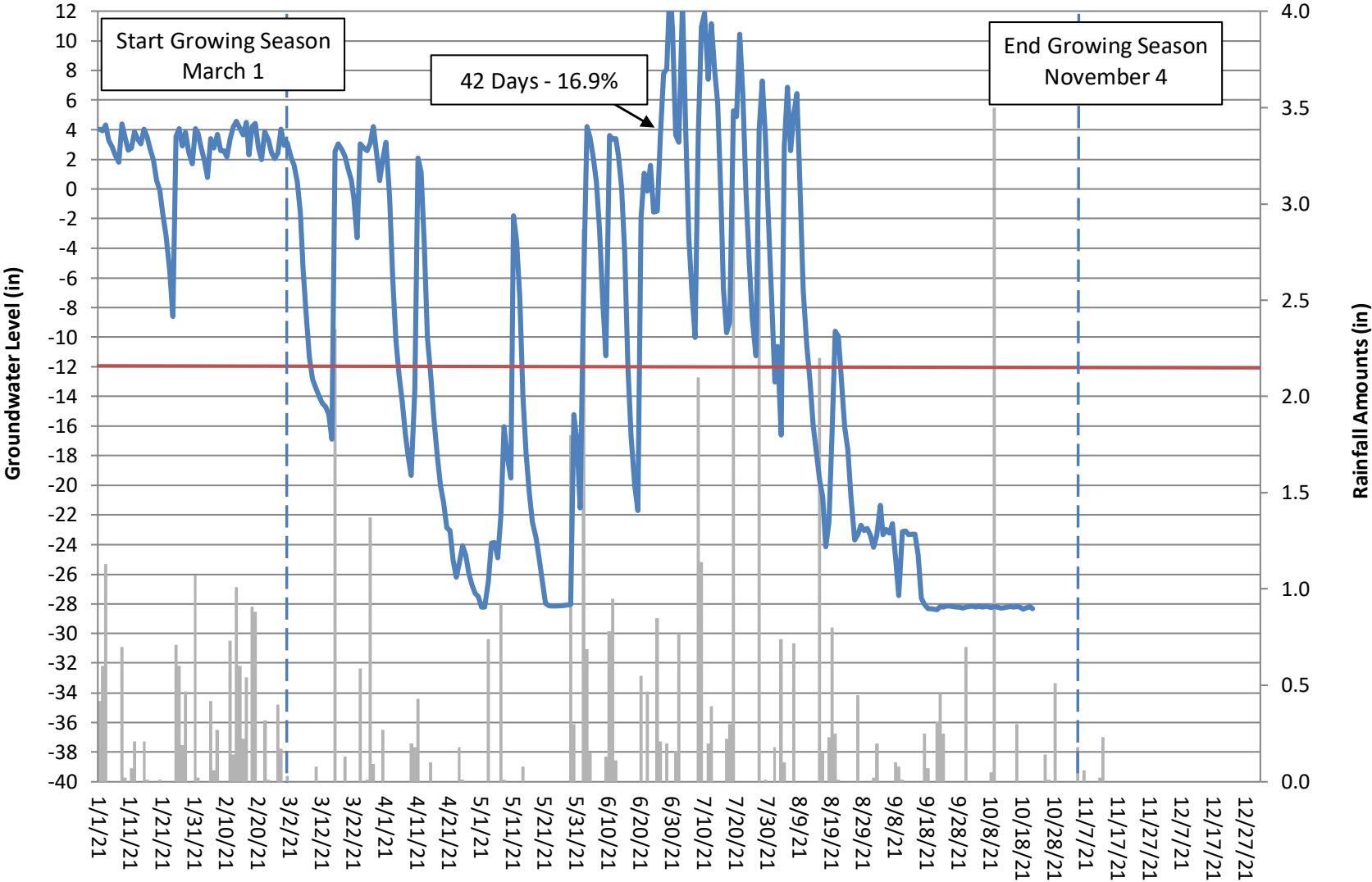
Alliance Headwaters Groundwater Gauge 9 Year 2 (2021 Data)



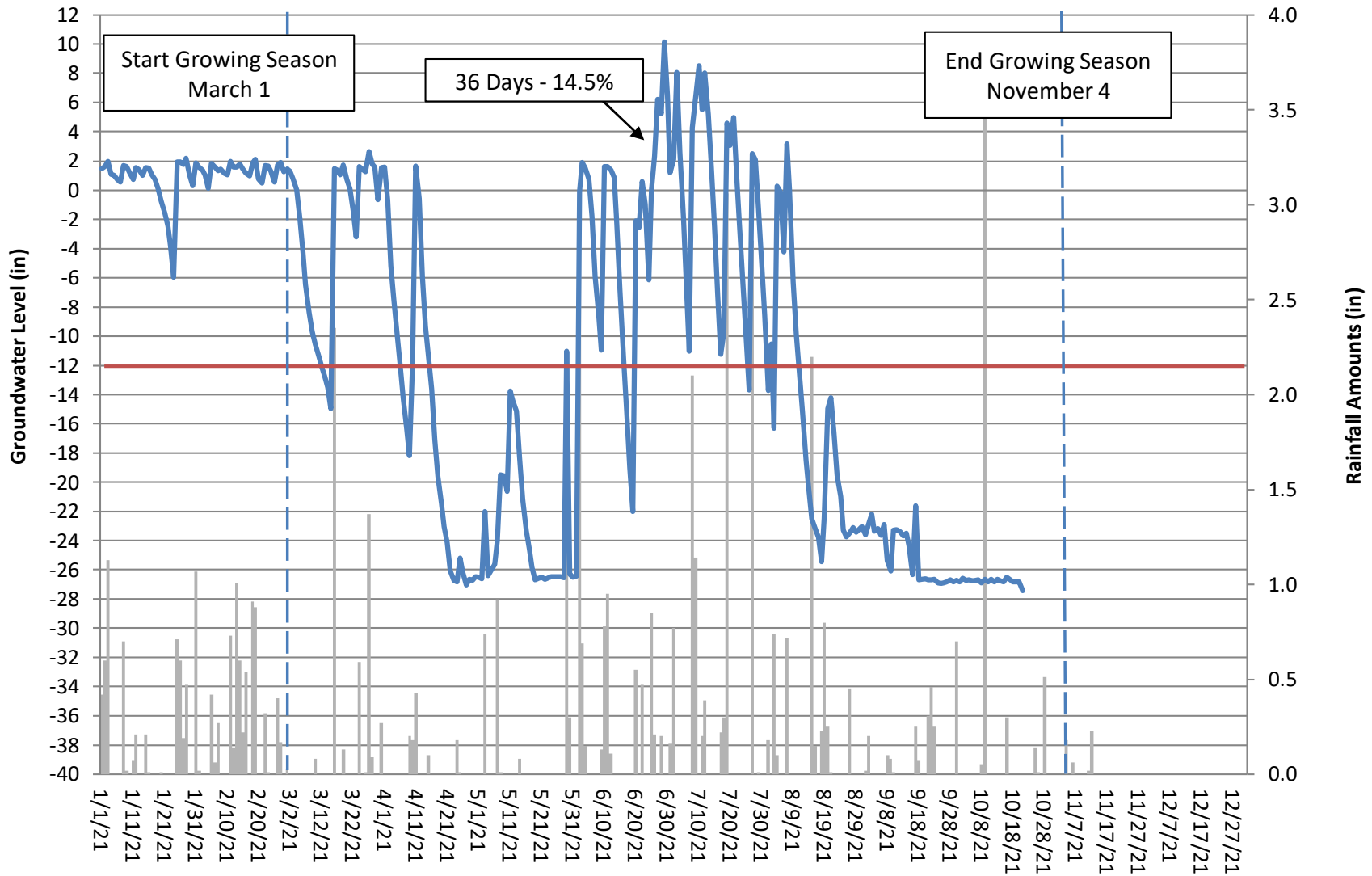
Alliance Headwaters Groundwater Gauge 10 Year 2 (2021 Data)



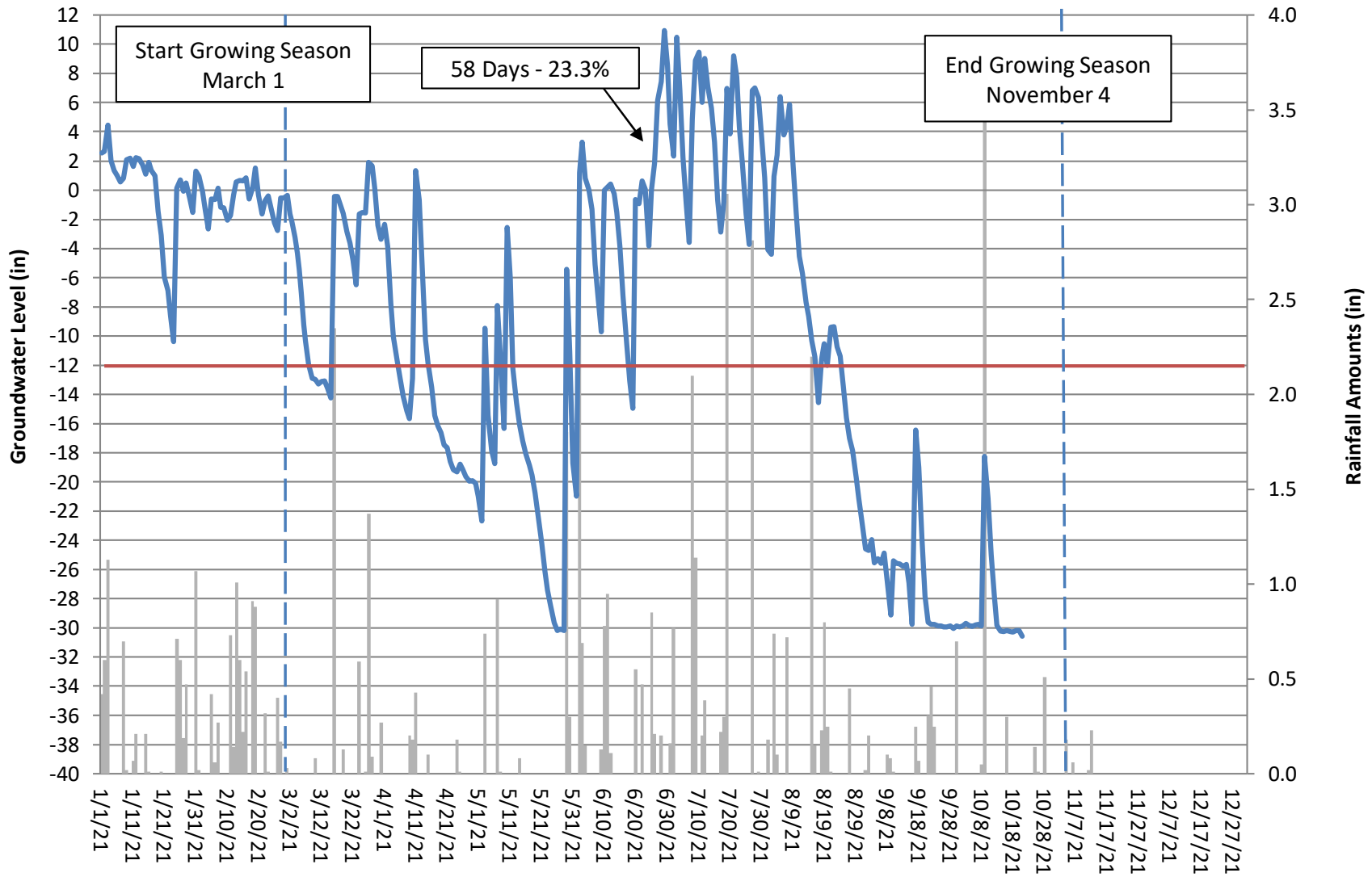
Alliance Headwaters Groundwater Gauge 11 Year 2 (2021 Data)



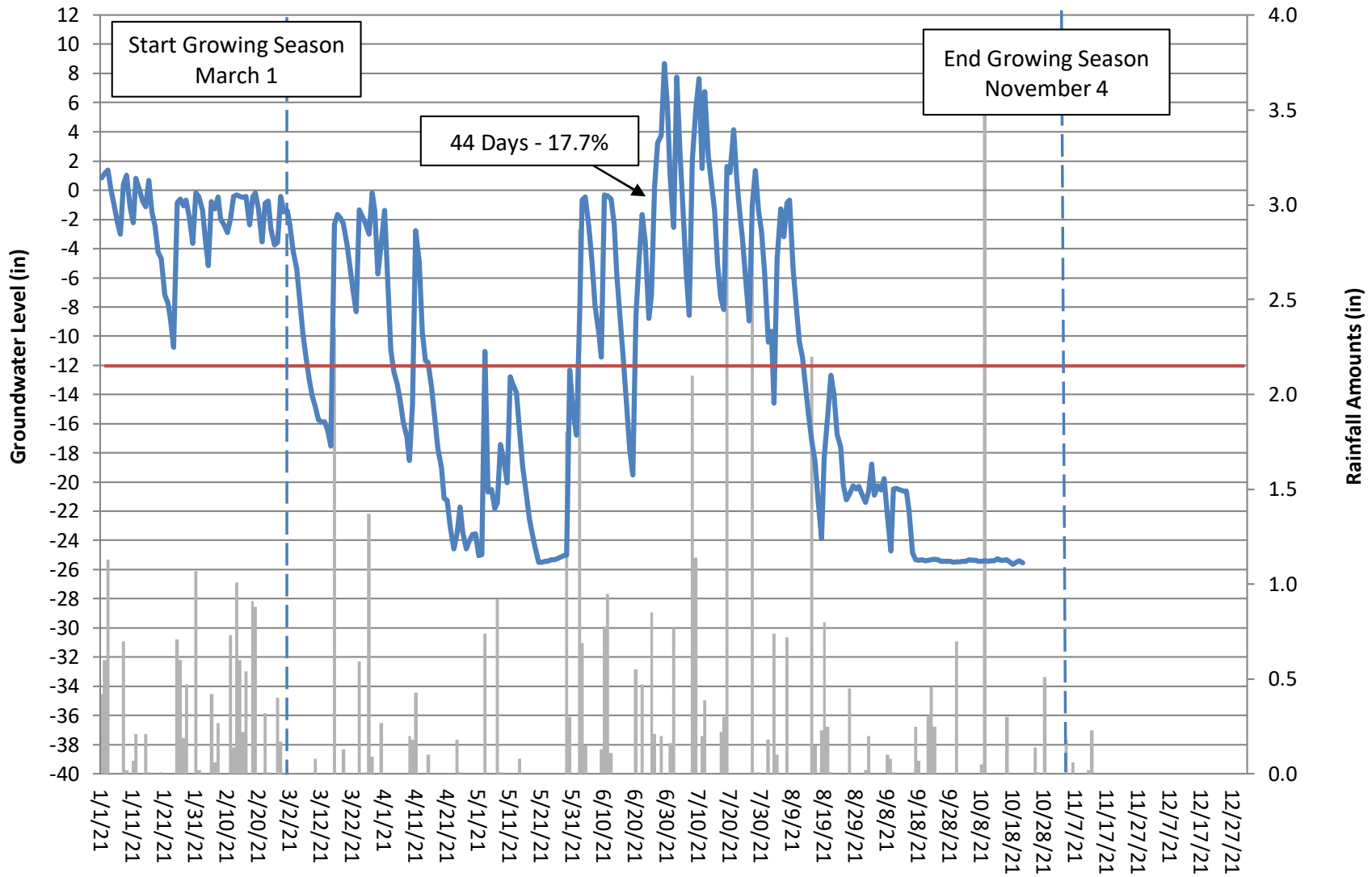
Alliance Headwaters Groundwater Gauge 12 Year 2 (2021 Data)



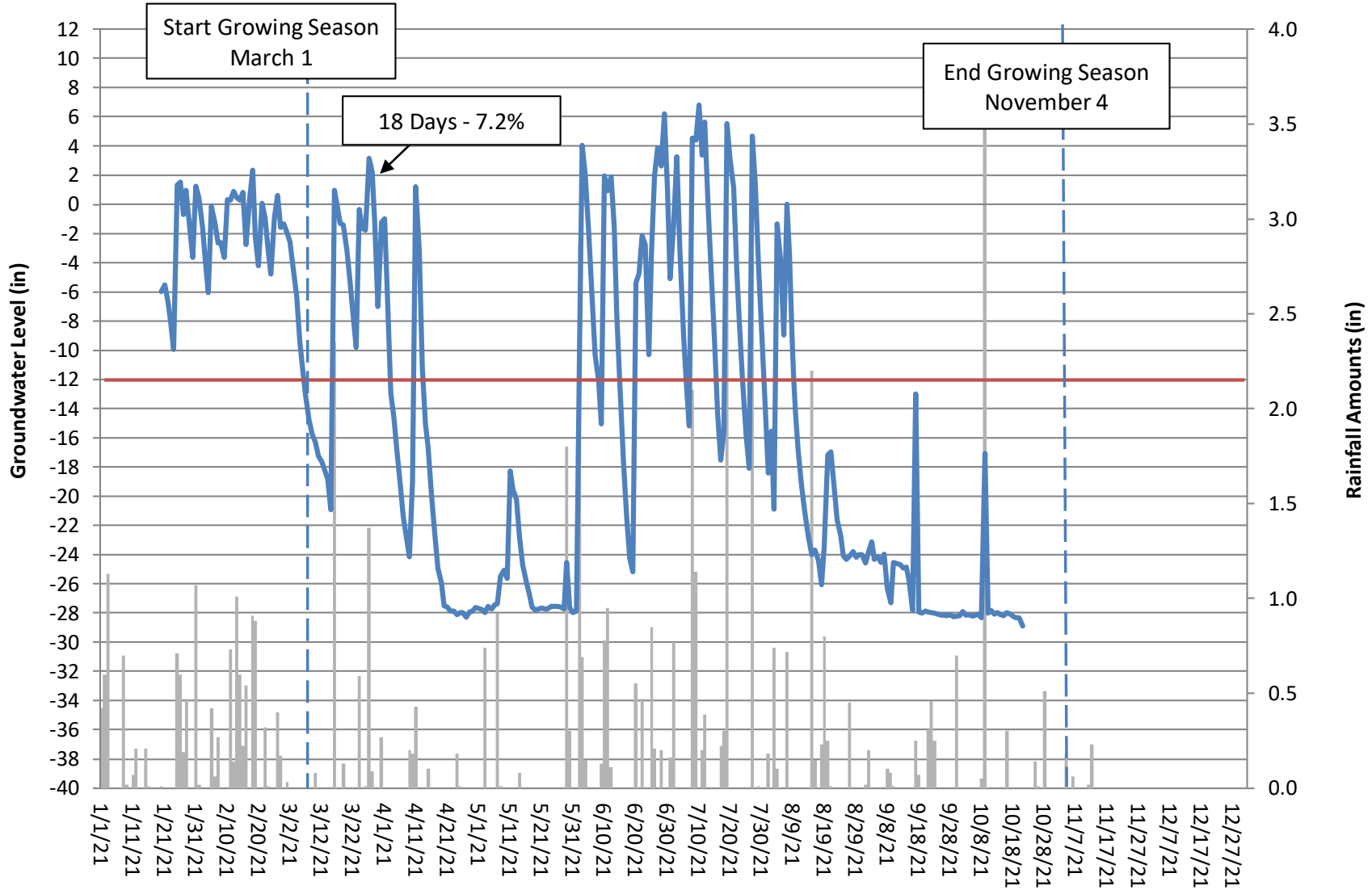
Alliance Headwaters Groundwater Gauge 13 Year 2 (2021 Data)



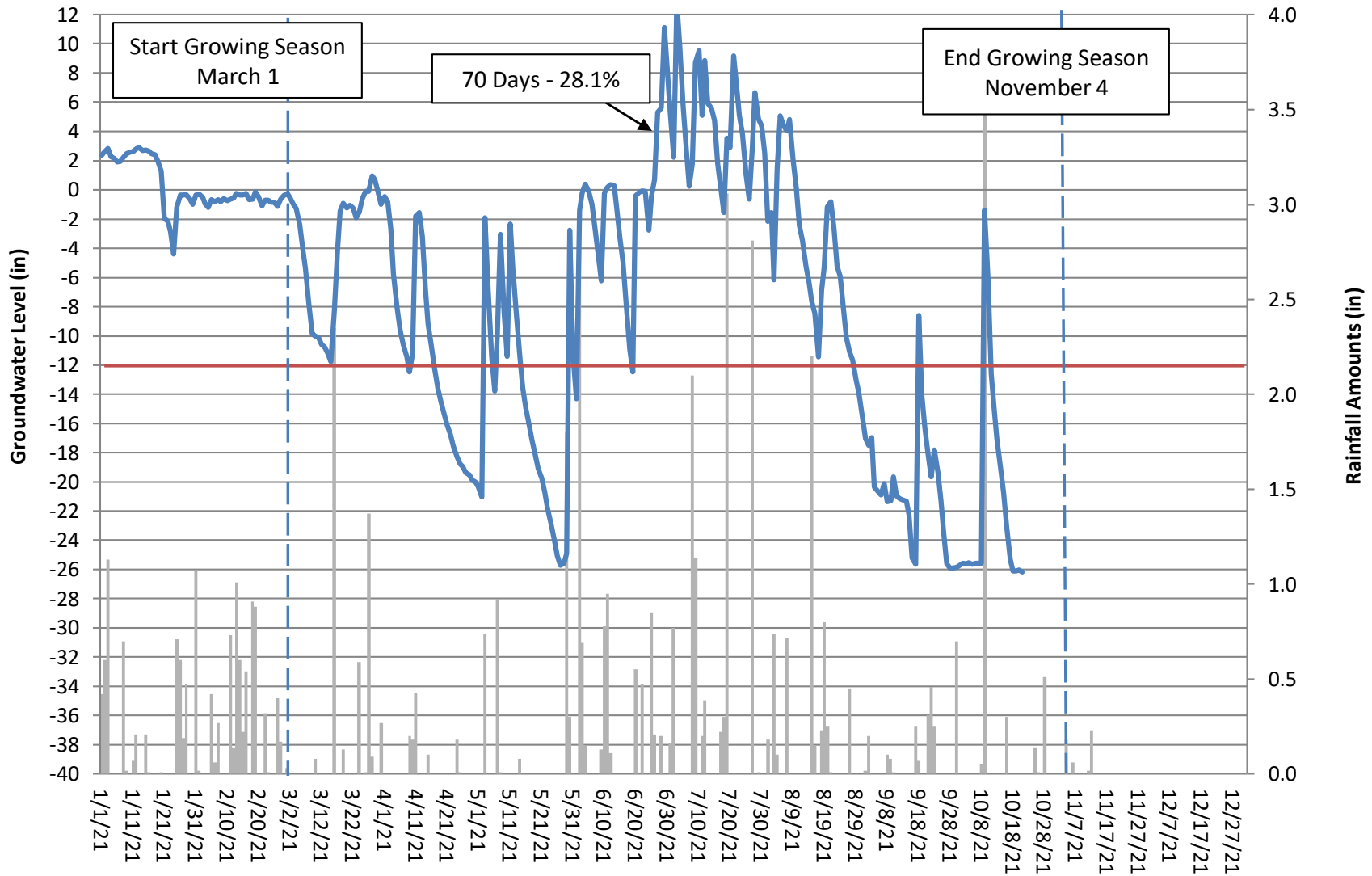
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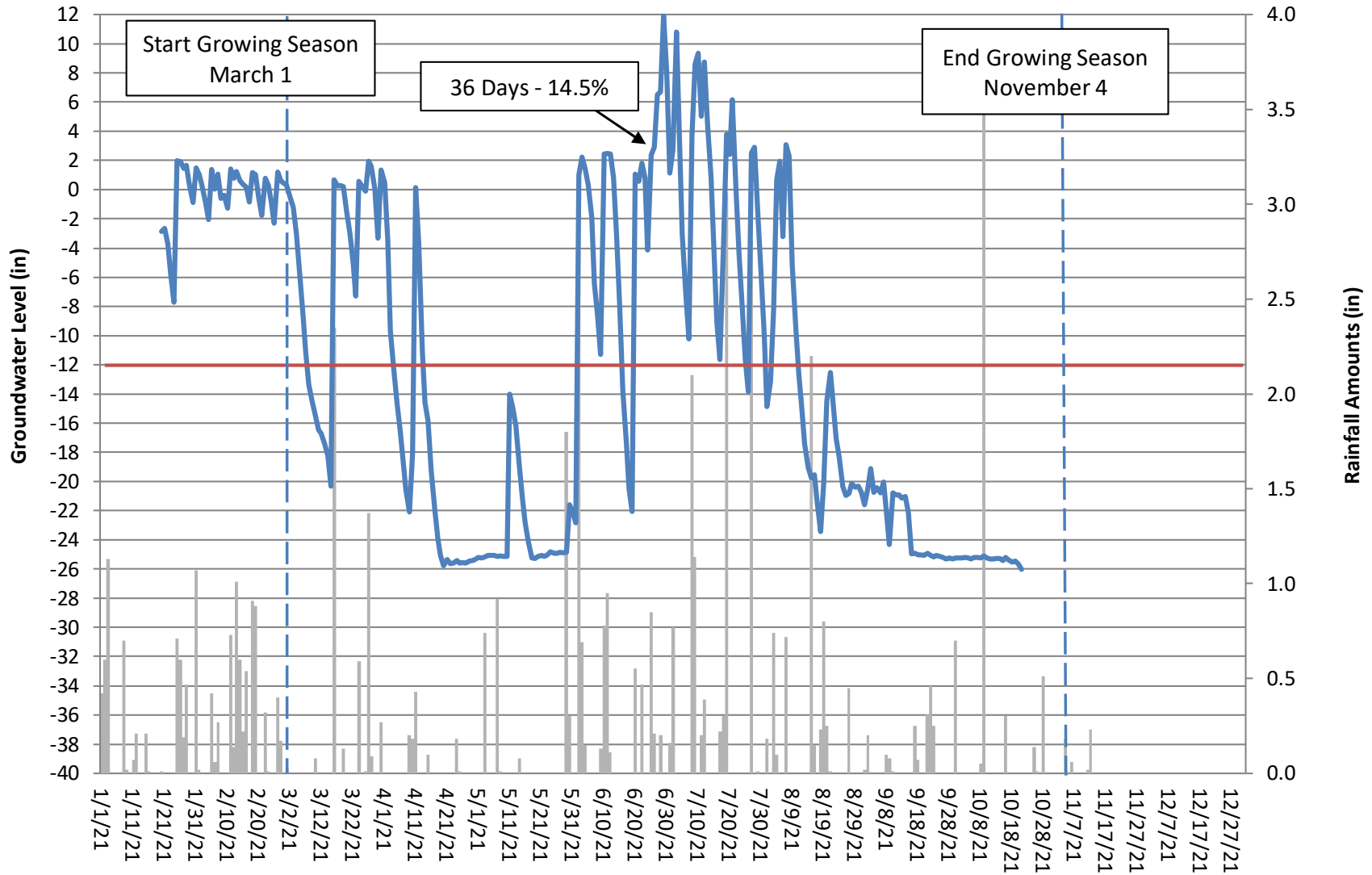
Alliance Headwaters Groundwater Gauge 15 Year 2 (2021 Data)



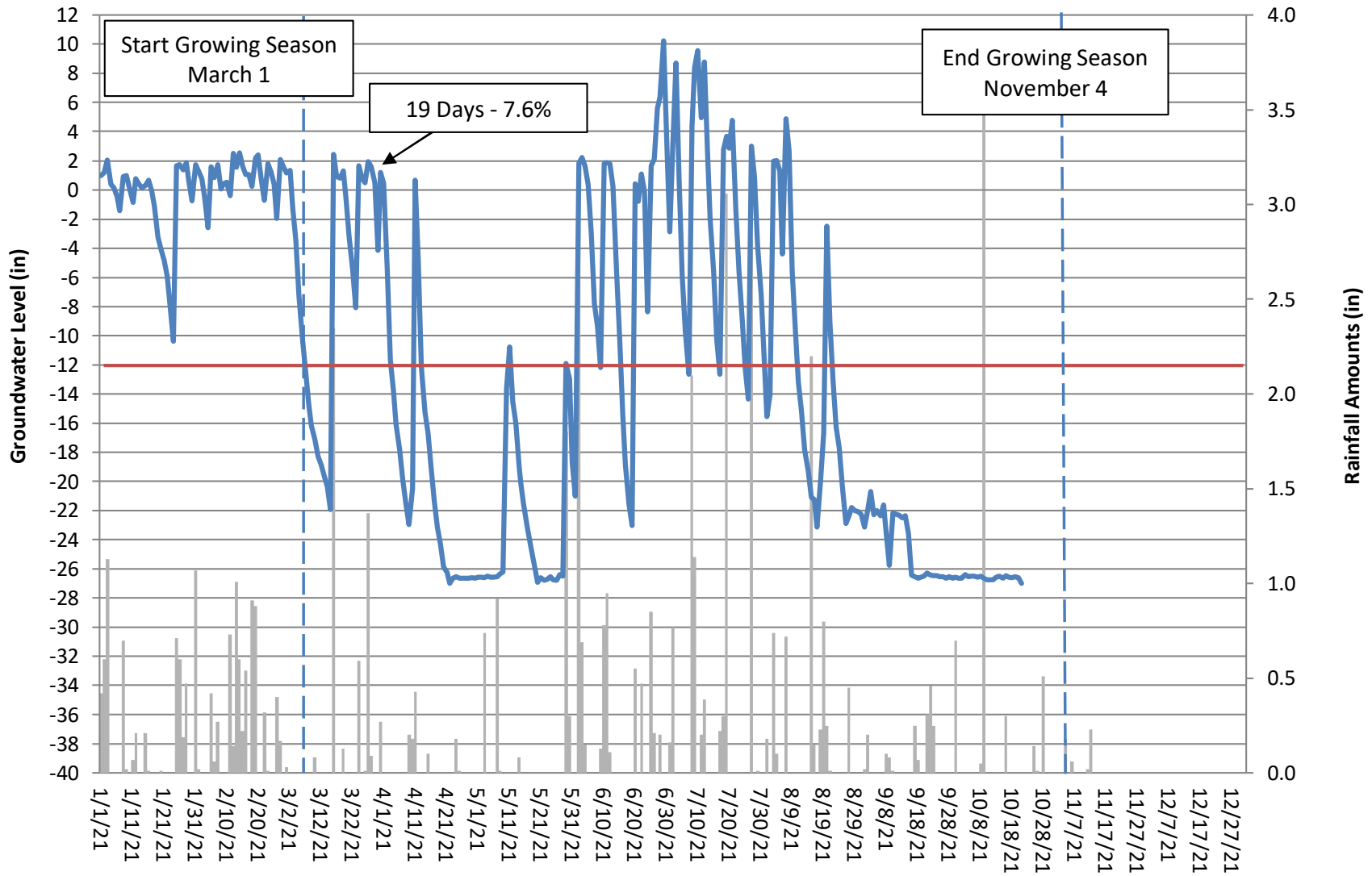
Alliance Headwaters Groundwater Gauge 16 Year 2 (2021 Data)



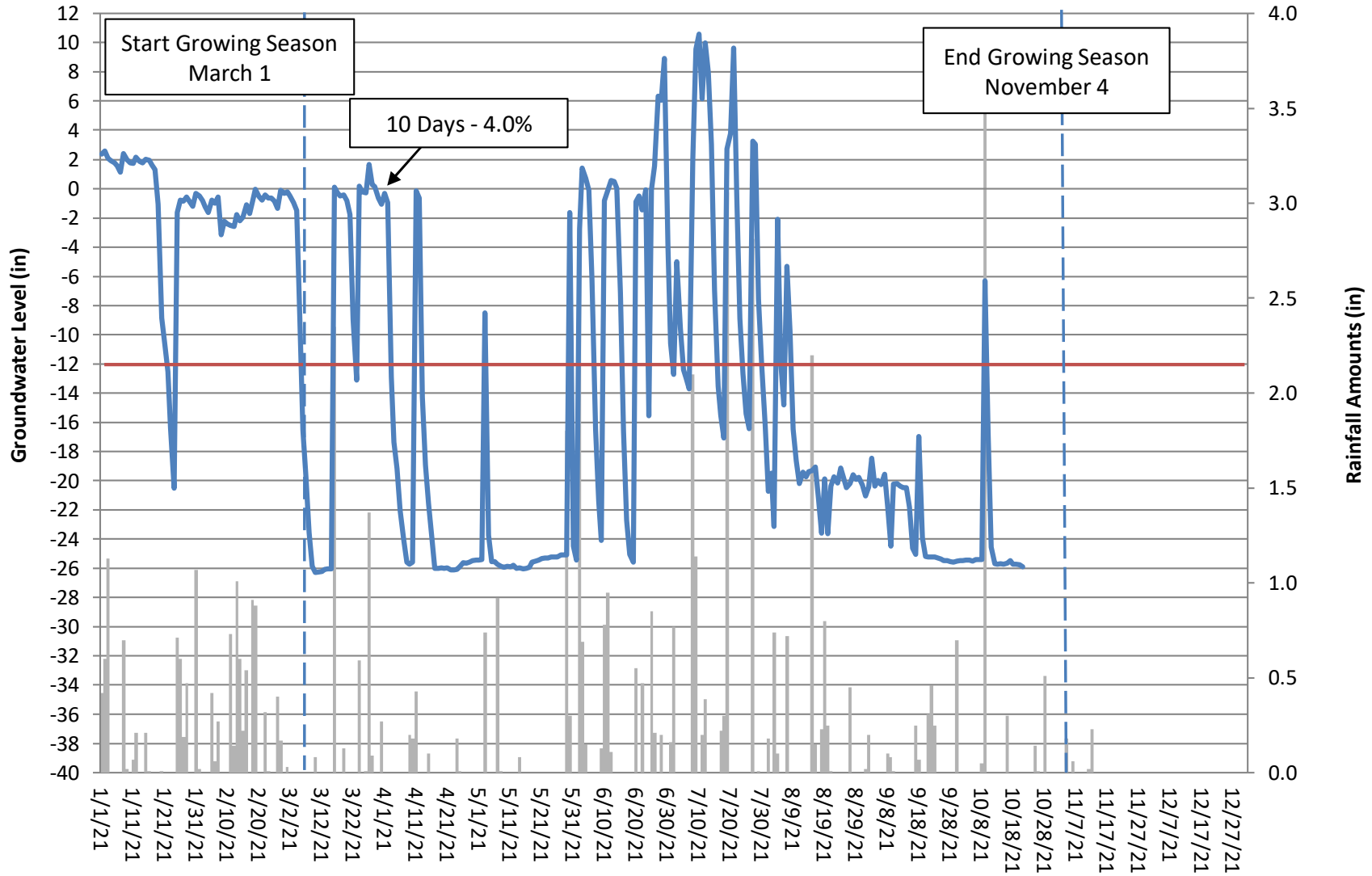
Alliance Headwaters Groundwater Gauge 17 Year 2 (2021 Data)



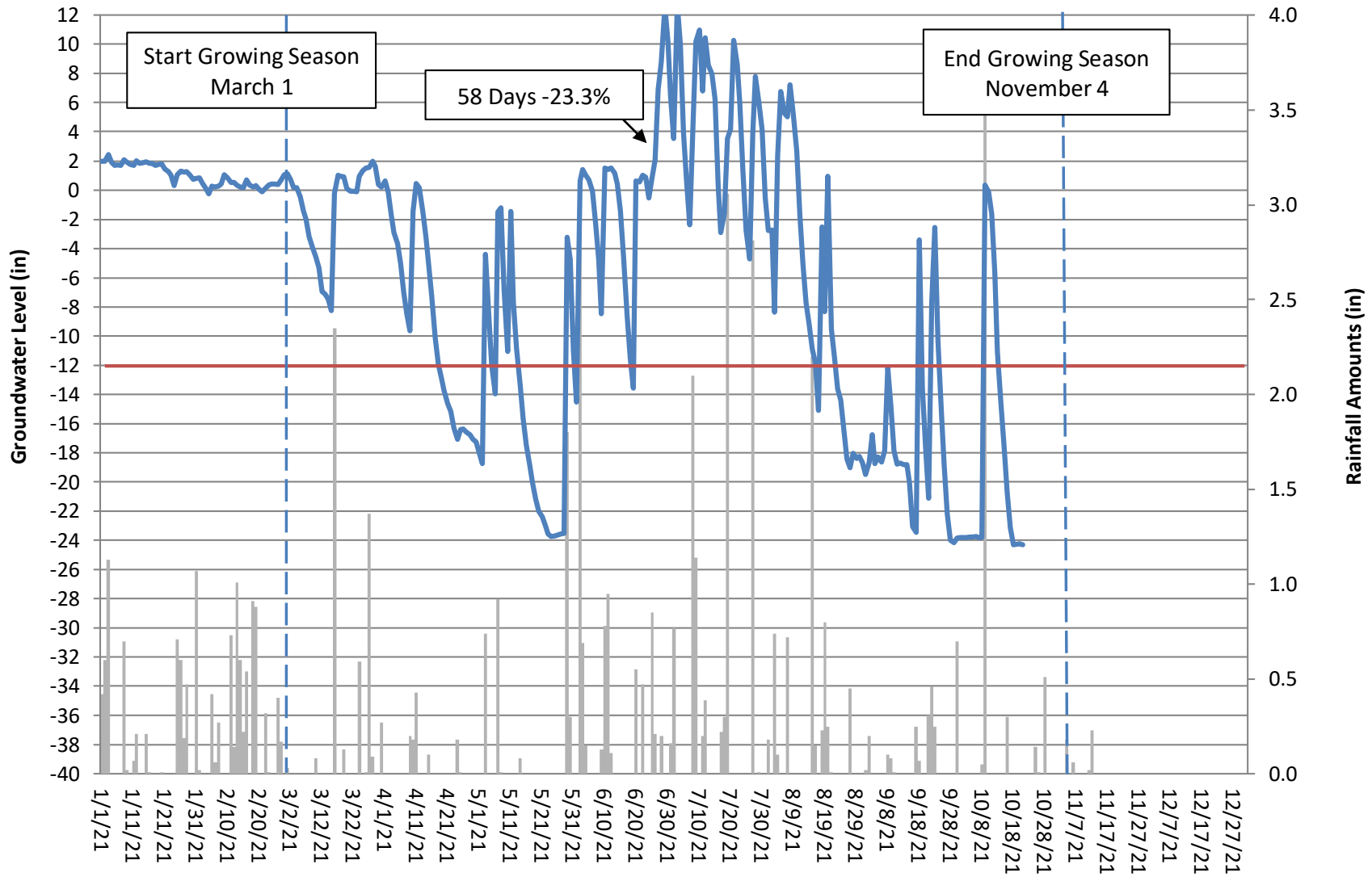
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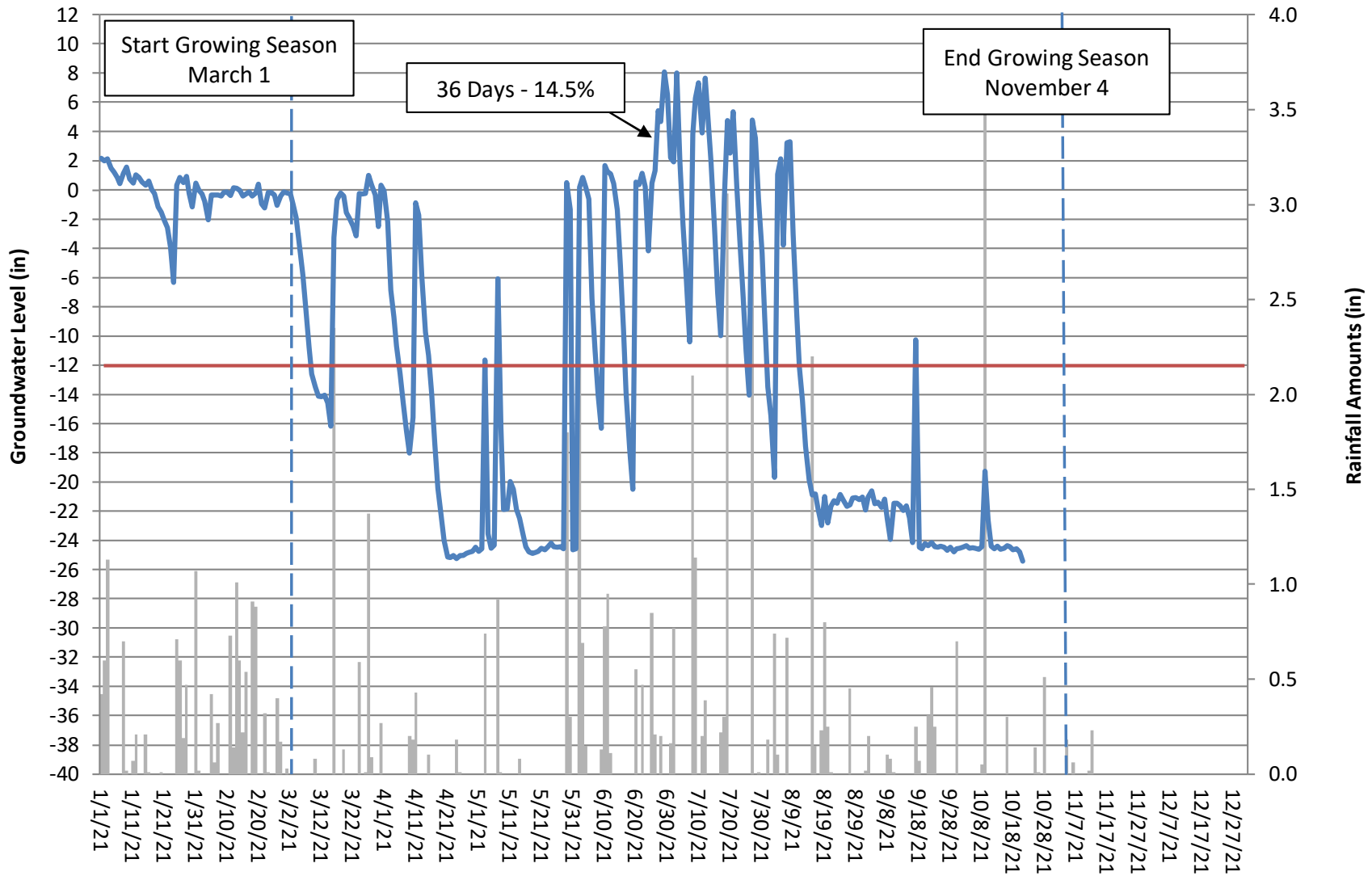
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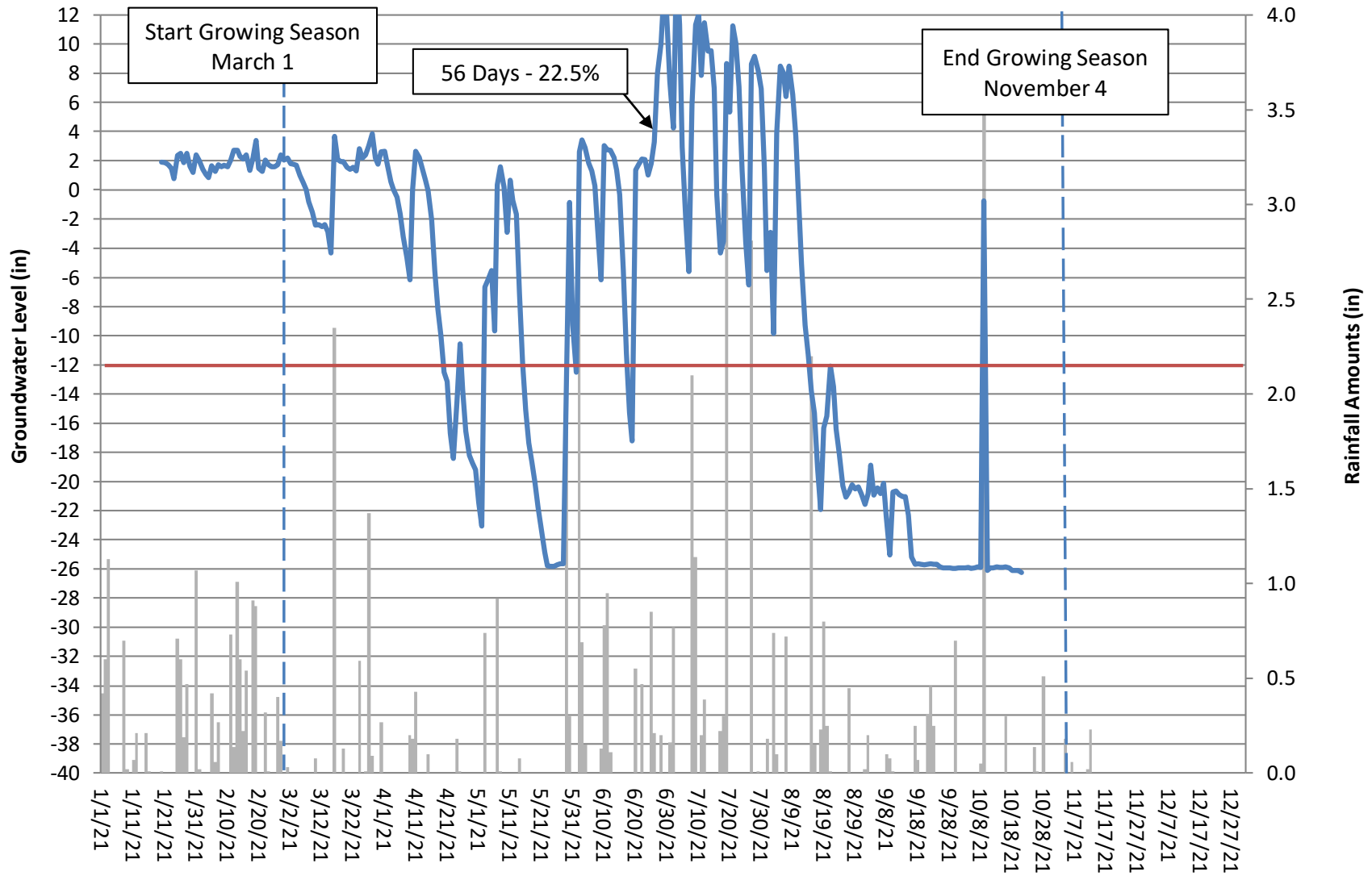
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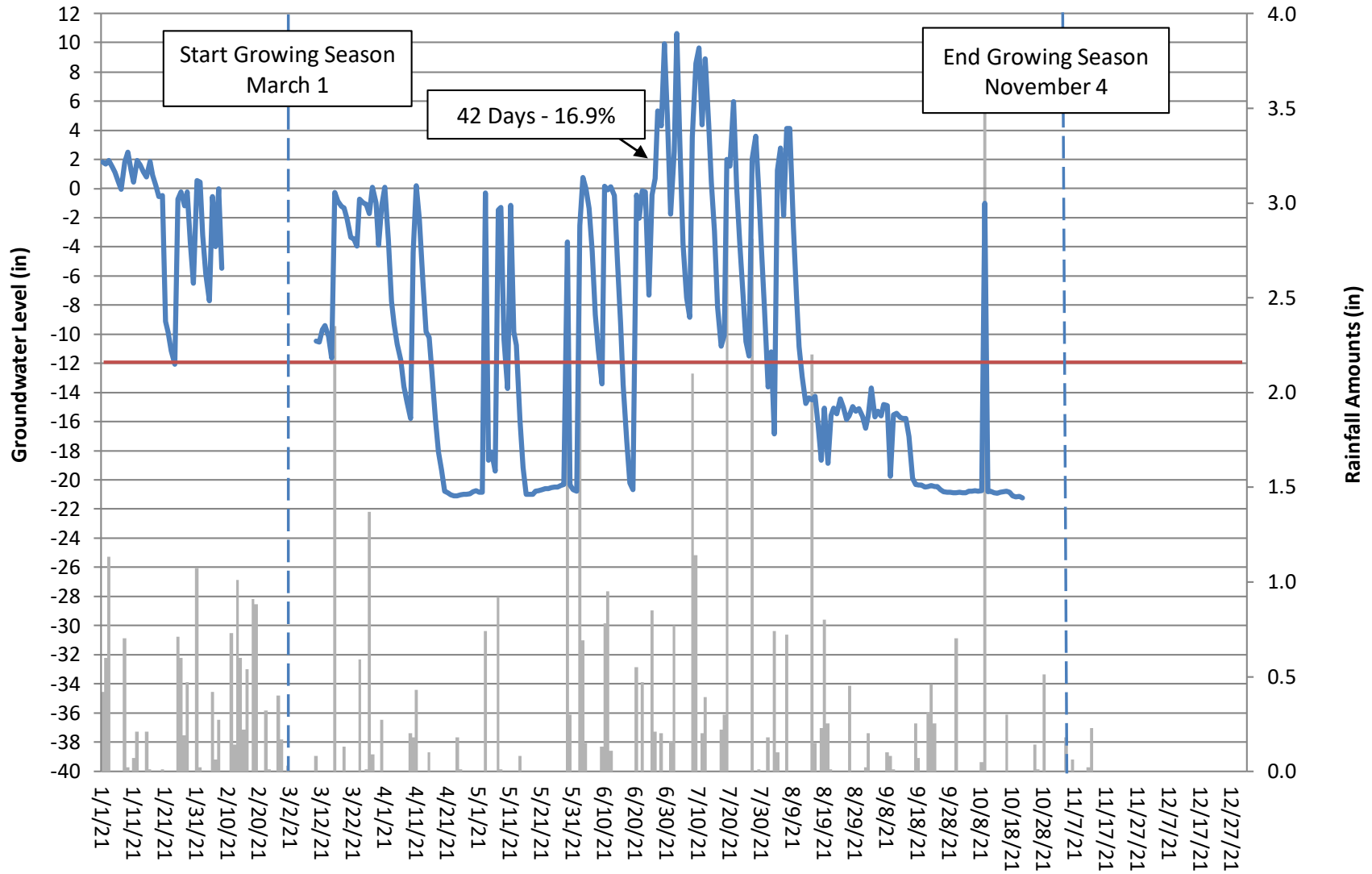
Alliance Headwaters Groundwater Gauge 21 Year 2 (2021 Data)



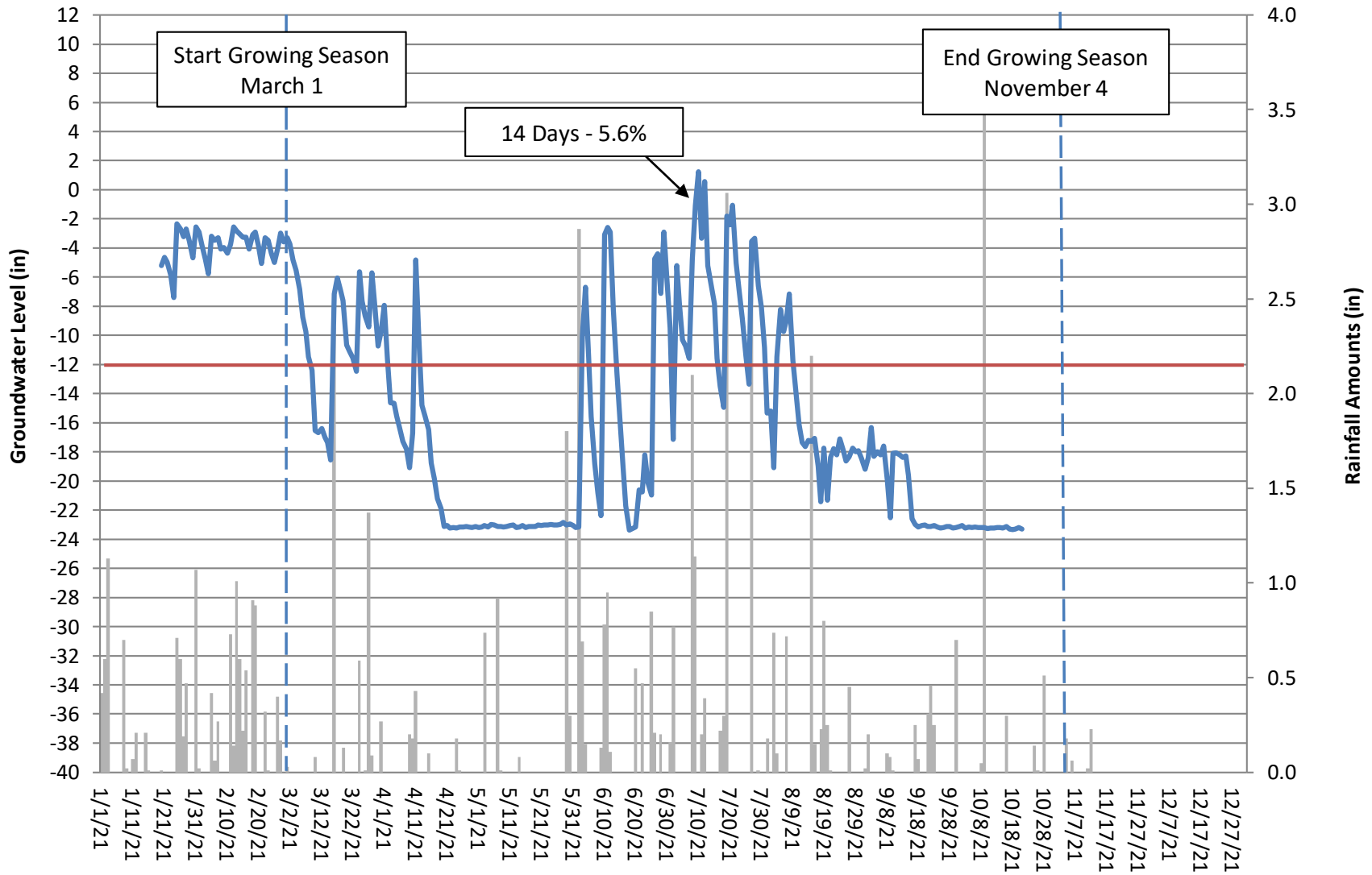
Alliance Headwaters Groundwater Gauge 22 Year 2 (2021 Data)



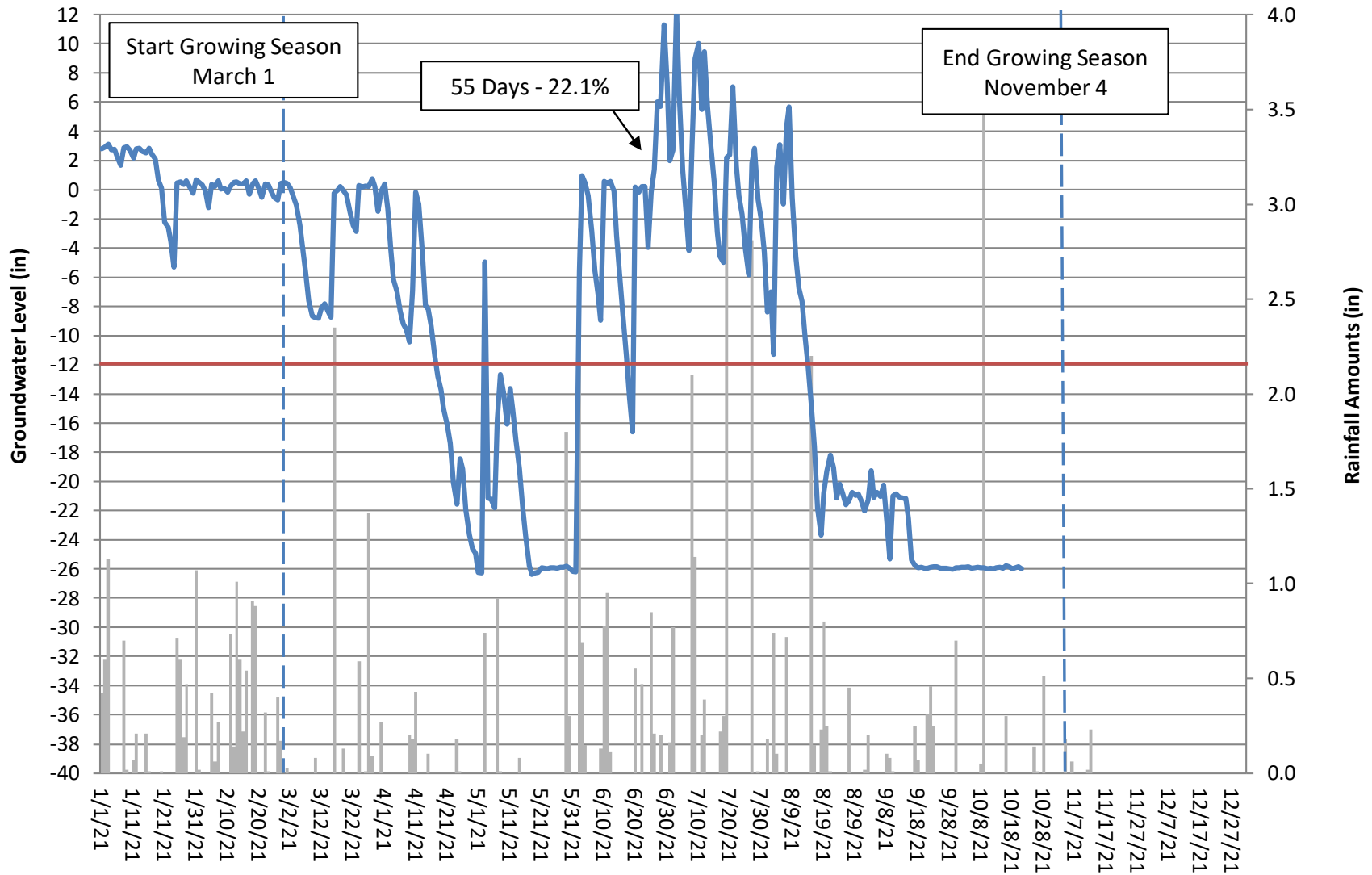
Alliance Headwaters Groundwater Gauge 23 Year 2 (2021 Data)



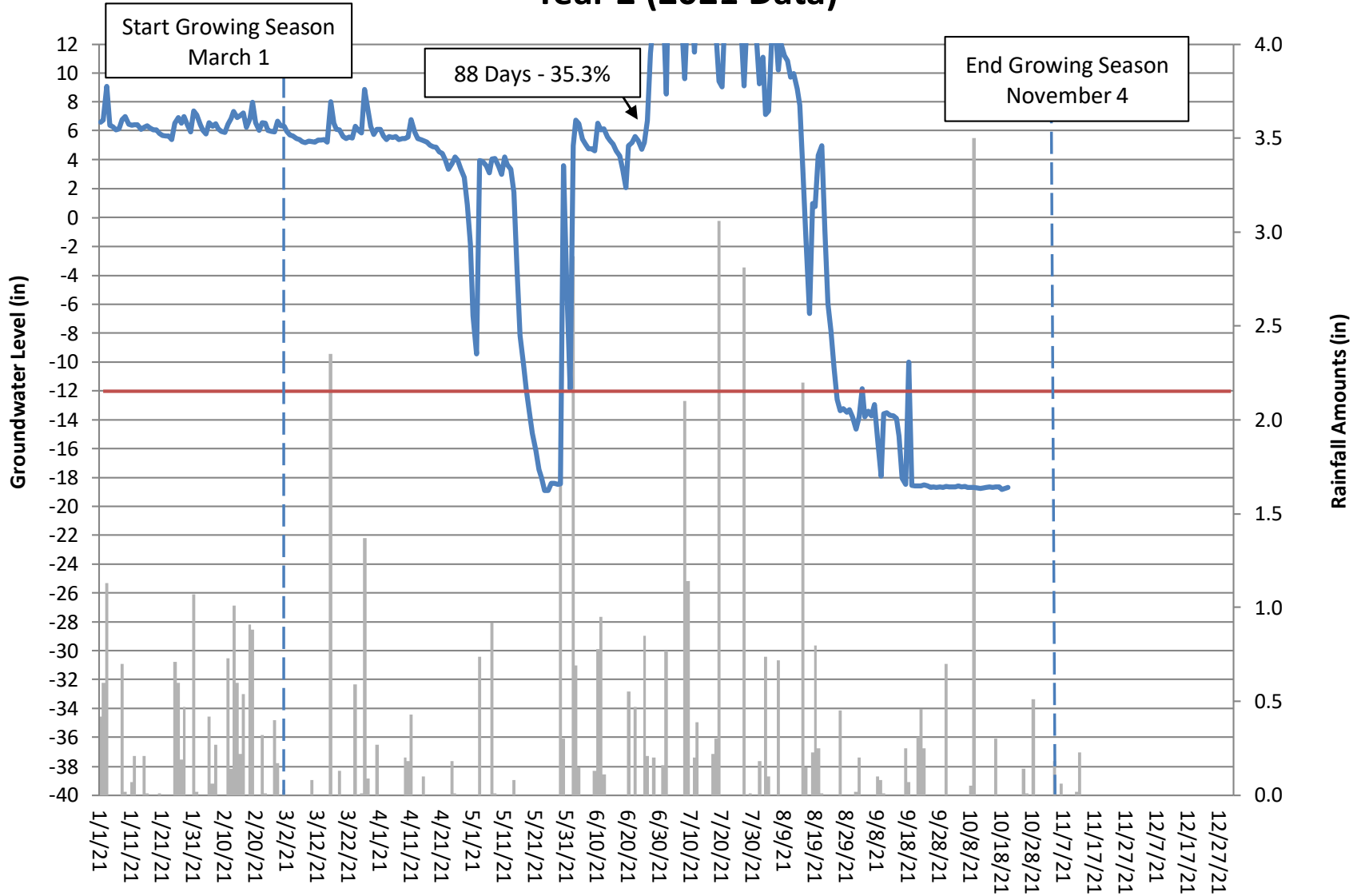
Alliance Headwaters Groundwater Gauge 24 Year 2 (2021 Data)



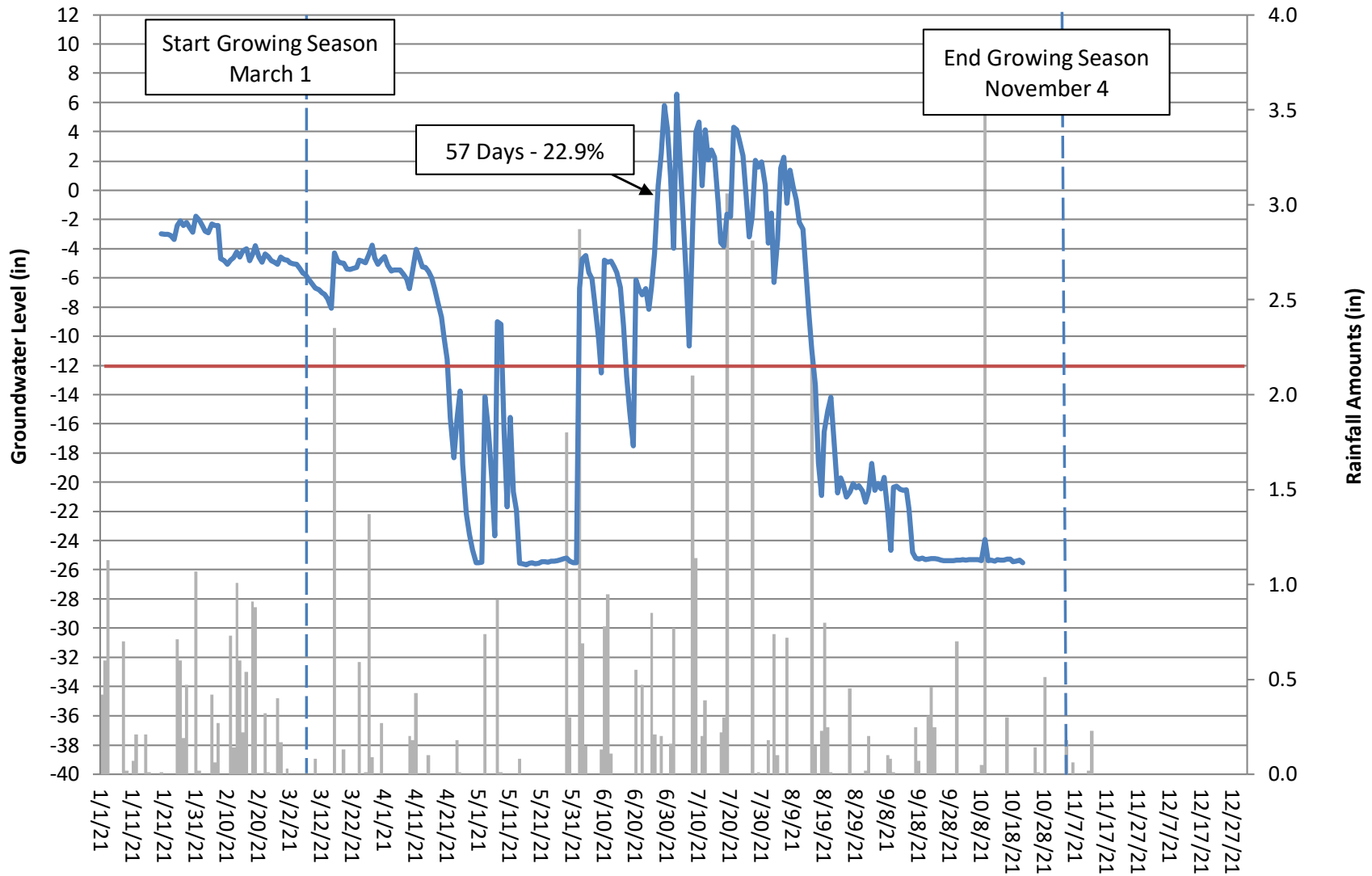
Alliance Headwaters Groundwater Gauge 25 Year 2 (2021 Data)



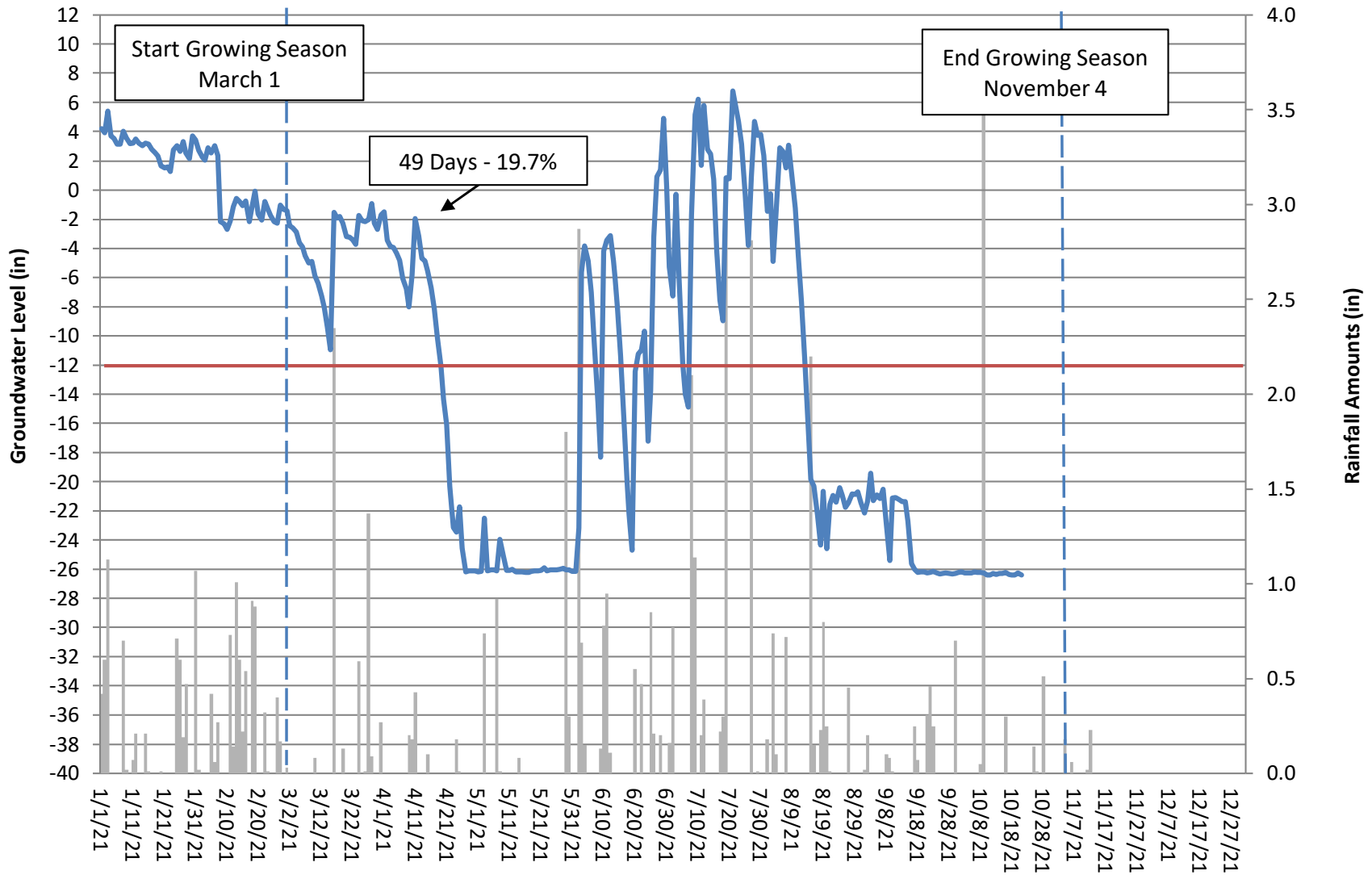
Alliance Headwaters Groundwater Gauge 26 Year 2 (2021 Data)



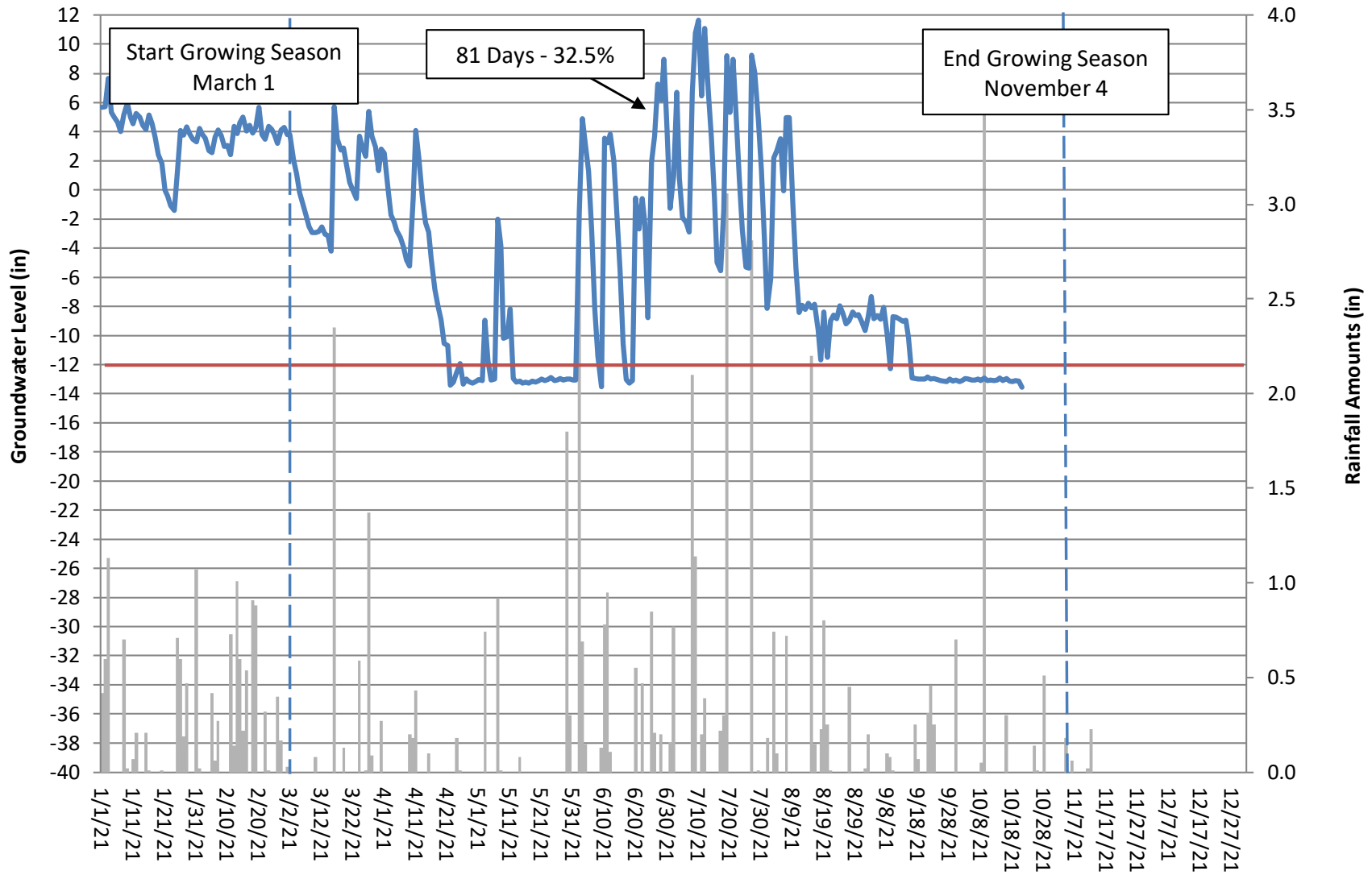
Alliance Headwaters Groundwater Gauge 27 Year 2 (2021 Data)



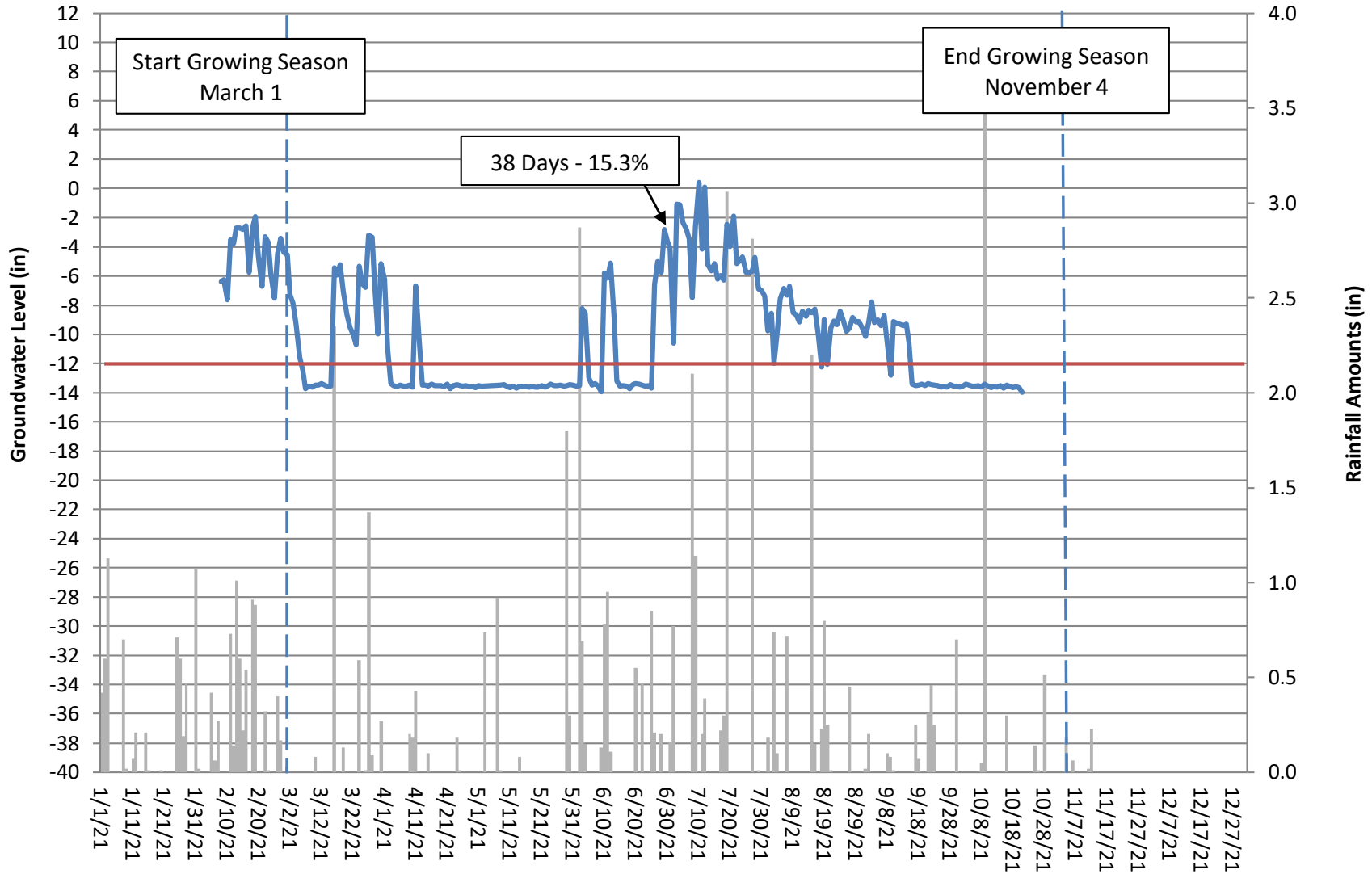
Alliance Headwaters Groundwater Gauge 28 Year 2 (2021 Data)



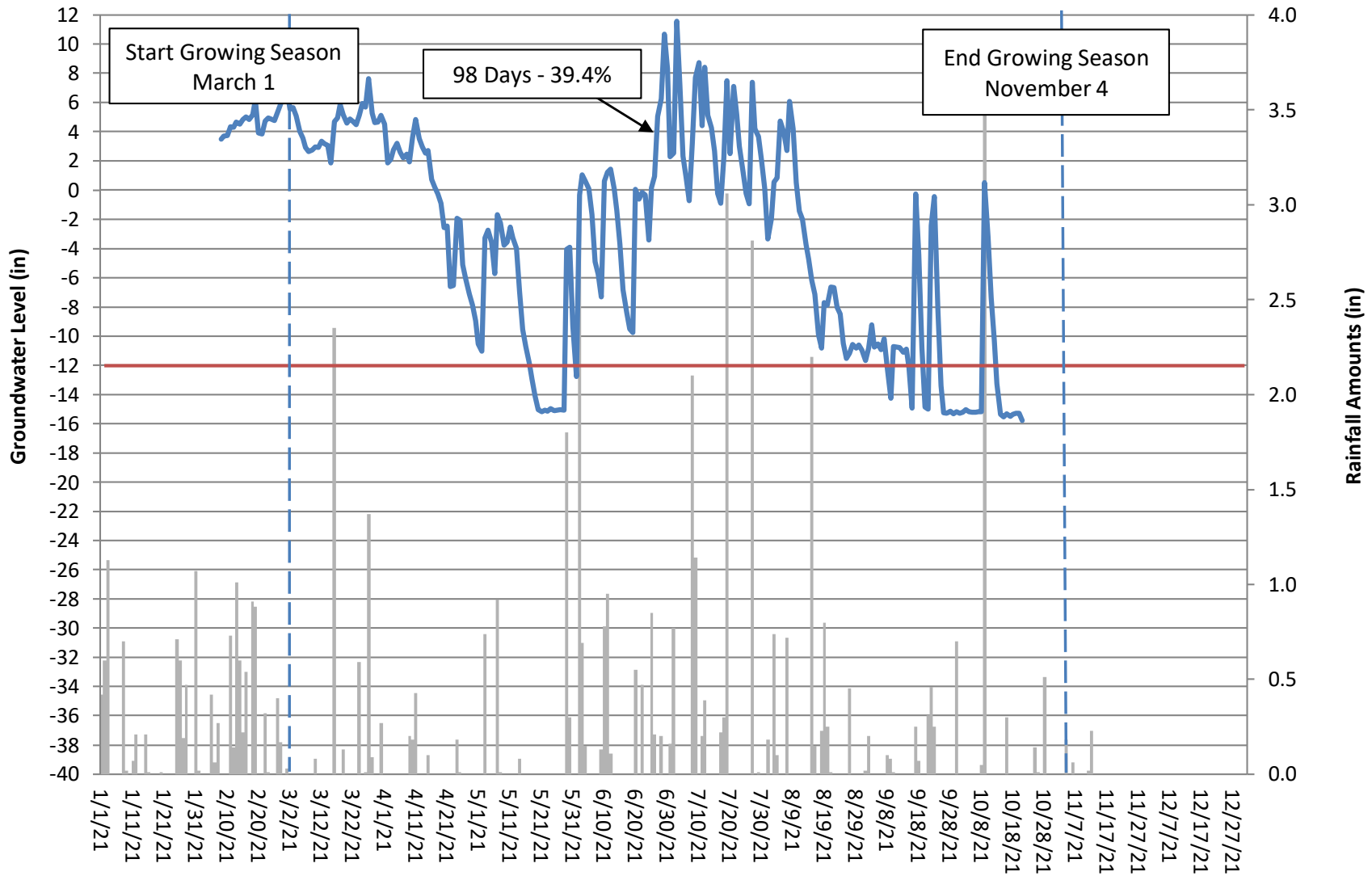
Alliance Headwaters Groundwater Gauge 29 Year 2 (2021 Data)



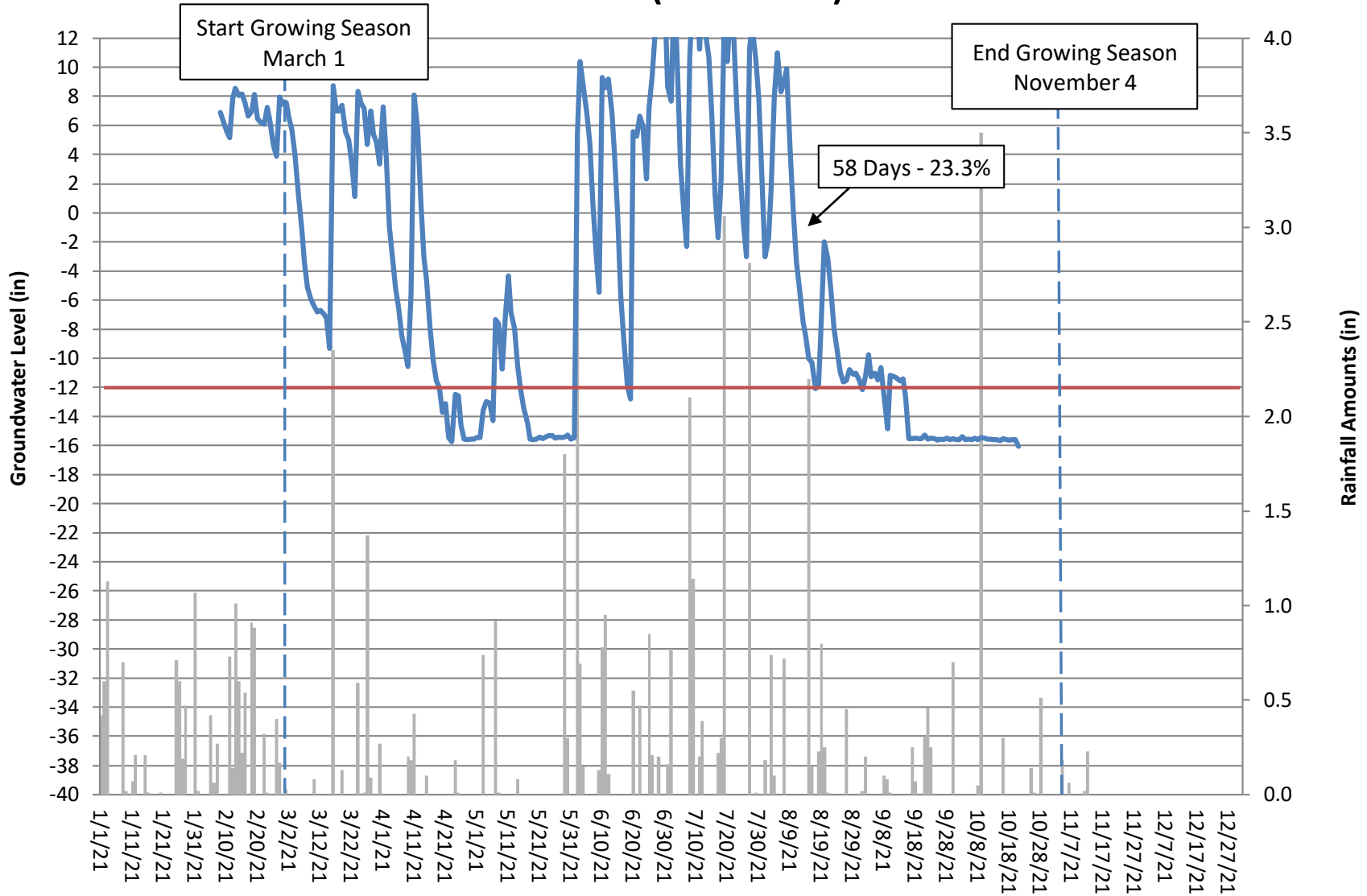
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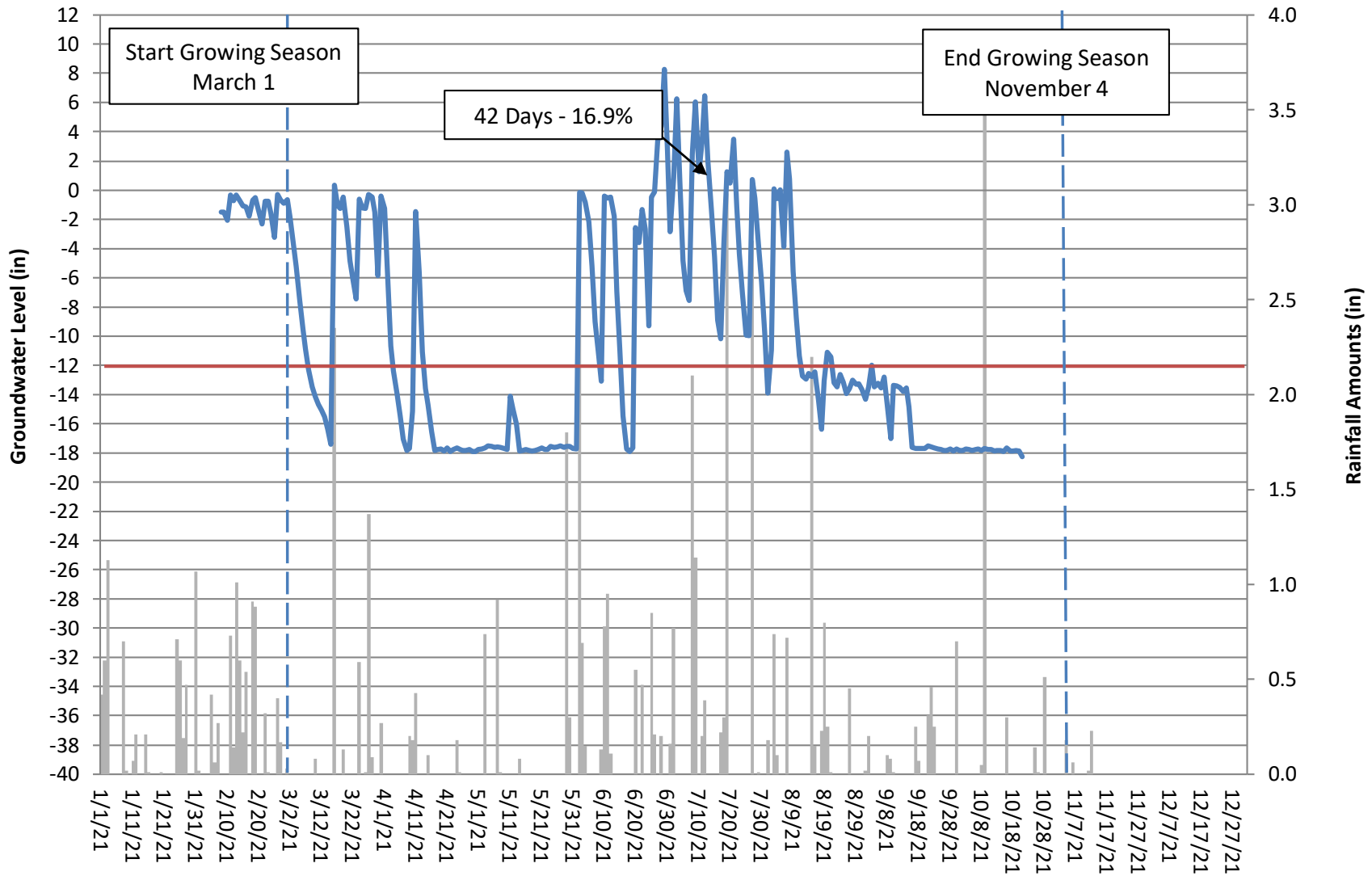
Alliance Headwaters Groundwater Gauge 31 Year 2 (2021 Data)



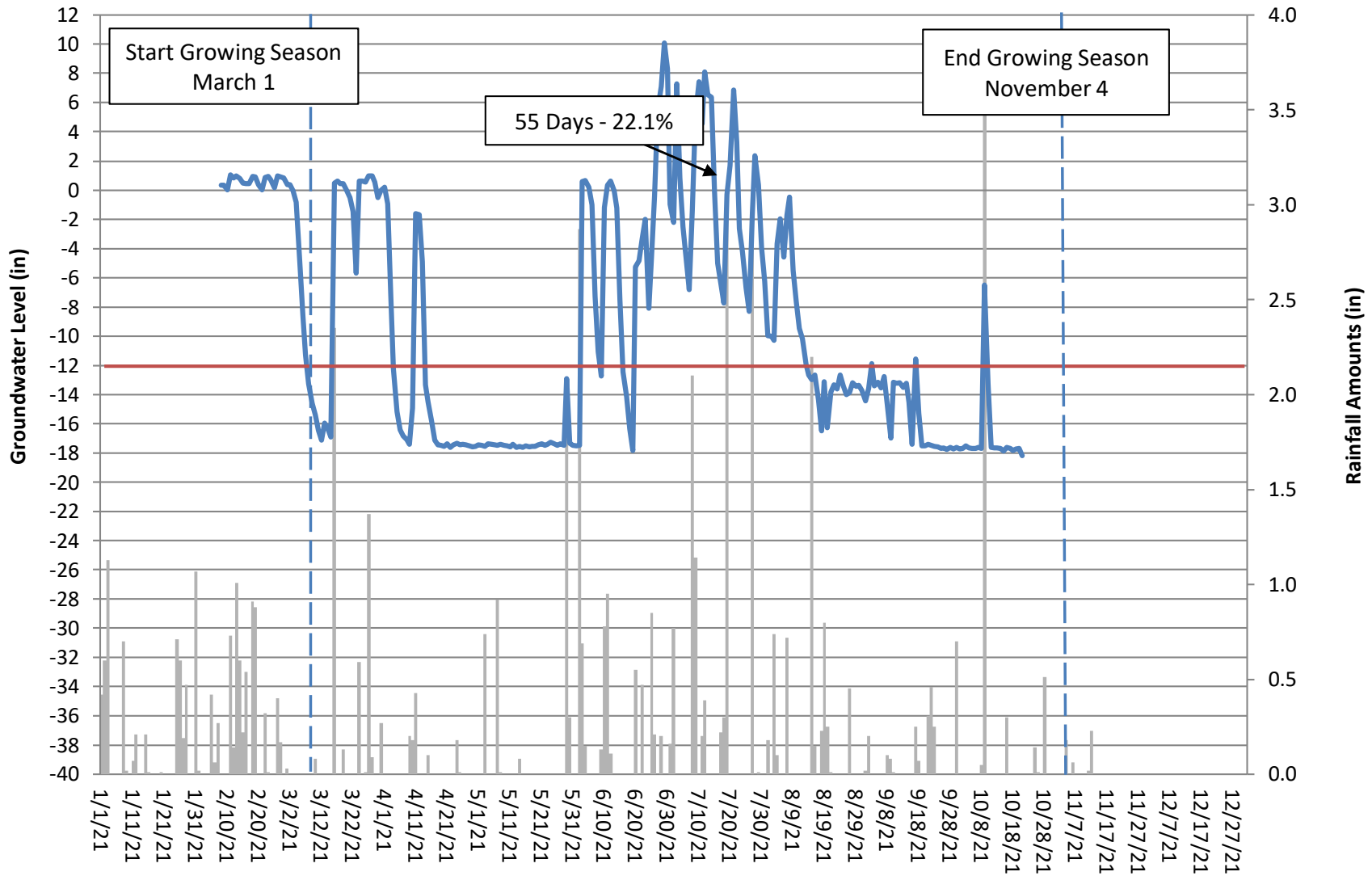
Alliance Headwaters Groundwater Gauge 32 Year 2 (2021 Data)



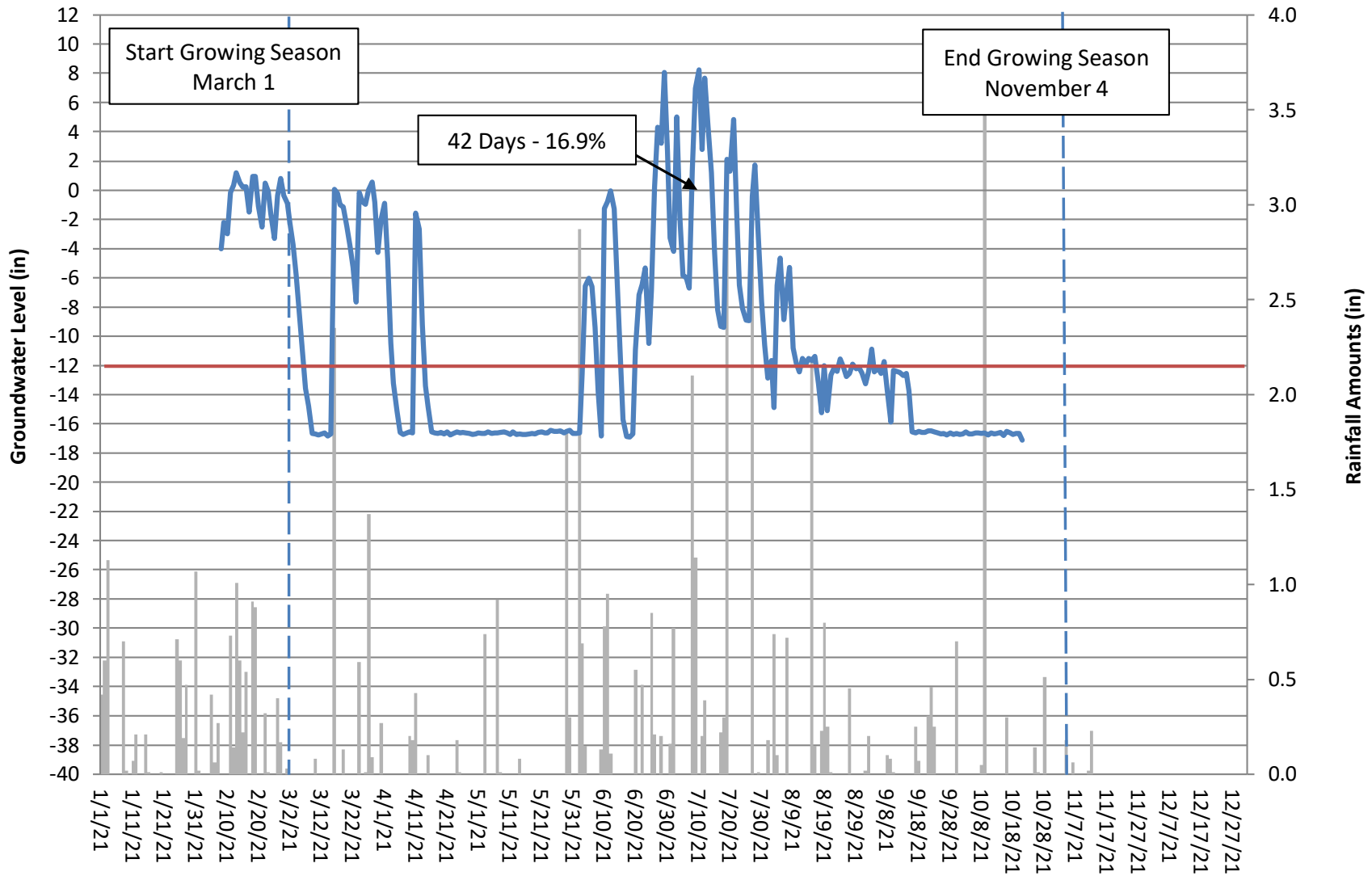
Alliance Headwaters Groundwater Gauge 33 Year 2 (2021 Data)



Alliance Headwaters Groundwater Gauge 34 Year 2 (2021 Data)



Alliance Headwaters Groundwater Gauge 35 Year 2 (2021 Data)



Alliance Headwaters Groundwater Reference Gauge Year 2 (2021 Data)

