MONITORING REPORT (MY4)

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 2023
Submission: February 2024

Prepared for:

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

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Response to Monitoring Year 4 (2023) 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 & Field Visit:

1. Due to the most recent groundwater data, have there been additional wetlands identified to be at risk? Please denote wetlands at risk in the asset table.
   Response: MY4 groundwater data has been assessed with relation to 2024 climatic conditions along with previous monitoring years' groundwater data including the on-site reference gauge. RS is preparing a mitigation plan addendum/amendment to propose additional wetland monitoring parameters and hydroperiod success criteria for the wetland assets. As a result, 9 wetland areas (1.755 acres) have been determined to be at risk and denoted on the asset table. Wetlands at risk have been separated into two categories "At-Risk of Credit Removal" and "At-Risk of Partial Credit Reduction" these areas have been added to the asset table.

2. CCPV – Please map the at-risk wetlands.
   Response: The wetlands at risk referenced in the response to comment 1 have been symbolized on the CCPV.

3. Table 11. Verification of Bankfull Events –
   a. Please verify that that UT2 had a bankfull event on March 16, 2021. Photo # 12 which is referenced is labeled as UT4.
      Response: The UT2 trail camera did not capture the event in progress, however, UT2 stream gauge data did capture the event. Therefore, this event was documented on UT1, UT2, UT3, and UT4. The table has been updated for clarity.

   b. List all tributaries that have met bankfull. It is recommended to add a new column on which tributaries have meet.
      Response: A column was added to Table 11 to indicate the tributary (or tributaries) where each bankfull event was documented.

Digital Comments:

1. The digital data submission is missing summary tables (tables 2, 10, 11, & 12 in PDF report submitted) and dedicated photo point photos if applicable, please submit missing components.
   Response: An excel file containing Tables 1-4 was added to a "Background Tables" folder and an excel file containing Tables 10-12 was added to the "Hydrology" folder in the digital submittal. No permanent photo points were established in the mitigation plan other than cross-sections and veg plot photos.

Alliance Headwaters -- Year 4 (2023) Monitoring Summary

General Notes

- No encroachment was identified in Year 4.
- No evidence of nuisance animal activity (i.e., beaver, heavy deer browsing, etc.) was observed.

Streams

- Stream measurements were not performed in Year 4 (2023), in accordance with the monitoring schedule.

- A visual assessment indicates that across the Site, all in-stream structures are intact and functioning as designed and that channel geometry compares favorably with the proposed conditions outlined in the Detailed Restoration Plan and as constructed. No stream areas of concern were identified during Year 4 (2023) monitoring. Tables for Year 3 (2022) data and annual quantitative assessments are included in Appendix D.

- All seven flow gauges recorded continuous flow for more than the 30-days. Recorded flow periods ranged from 63 to 143 consecutive days (Appendix E).

- Two bankfull events were documented in Year 4 (2023) monitoring. Six bankfull events have been recorded to date, with at least one occurring in all four monitoring years (Table 16, Appendix E).

Wetlands

- Thirteen of thirty-six groundwater gauges met success criteria for the Year 4 (2023) monitoring period (Appendix E). The on-site reference gauge met success criteria in Year 4 (2023), with a hydroperiod of 49 days (19.7%). Rainfall data indicate relatively dry conditions leading up to the start of the 2023 growing season: on-site precipitation was near or below the 30th percentile in January, February, March, and May, according to WETS data (Appendix E). However, across the Site, the development of herbaceous hydrophytic species remains abundant.
- Wetland At-Risk have been added to the asset table and CCPV with two designations ("At-Risk of Credit Removal" and "At-Risk of Partial Credit Reduction"). RS is preparing a Mitigation Plan Addendum/Amendment to discuss areas and propose a path forward.

Vegetation

- In accordance with the monitoring schedule, vegetation plot monitoring was not performed in Year 4 (2023). Woody vegetation continues to thrive across the Site, with stem heights reaching 10+ feet in some areas. No areas of vegetation concern were identified in Year 4 (2023).

Site Maintenance Report (2023)

Invasive Species Work	Maintenance work
05/12/2023 Pine thinning (UT1-Reach 3 and UT3-Reach 2) 08/28/2023 Cattail (sporadic locations across the Site)	07/31/23, 09/11/2023, 09/13/2023 Boundary visibility improvement

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
Year 3 Monitoring	May 19, 2022	June 29-July 1, 2022	Jan. – Nov. 2022	November 2022	February 2023
Year 4 monitoring	NA	NA	Jan. – Nov 2023	November 2023	December 2023

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APPENDICES

1.0 PROJECT SUMMARY

Restoration Systems, LLC (RS) 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	• 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	• 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	• 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	• 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.

The Site has existed in its pre-construction condition since approximately 2005. 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 undermined 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.

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

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

The Site's design was completed in October 2018. Construction started on May 13, 2019, and ended with 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 analyses, 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
• 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
• 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
• 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

Table D summarizes the monitoring parameters.

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	36 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

Table D: Monitoring Summary (Continued)

Vegetation Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Vegetation establishment and vigor	Permanent vegetation plots 0.0247 acre (100 square meters) in size; *CVS-EEP Protocol for Recording Vegetation*, *Version 4.2* (Lee et al. 2008)	As-built, Years 1, 2, 3, 5, and 7	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

Stream Summary

Stream measurements were not performed in Year 4 (2023), in accordance with the monitoring schedule. A visual assessment indicates that across the Site, all in-stream structures are intact and functioning as designed and that channel geometry compares favorably with the proposed conditions outlined in the Detailed Restoration Plan and as constructed. No stream areas of concern were identified during Year 4 (2023) monitoring. Tables for Year 3 (2022) data and annual quantitative assessments are included in Appendix D.

Prior to Year 4 (2023) monitoring, all seven (7) stream flow gauges were replaced and reinstalled according to DMS-provided protocol. The gauges are functioning properly with no issues or data loss. All seven flow gauges recorded continuous flow for more than the 30-days. Recorded flow periods ranged from 63 to 143 consecutive days (Appendix E).

Two bankfull events were documented in Year 4 (2023) monitoring. Six bankfull events have been recorded to date, with at least one occurring during all four monitoring years (Table 16, Appendix E).

Wetland Summary

Table E: 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
2022 (Year 3)	March 1, 2022*	March 1-November 4 (249 days)	25 days
2023 (Year 4)	March 1, 2023*	March 1-November 4 (249 days)	25 days

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

Thirteen of thirty-six groundwater gauges met success criteria for the Year 4 (2023) monitoring period (Appendix E). The on-site reference gauge met success criteria in Year 4 (2023), with a hydroperiod of 49 days (19.7%). Rainfall data indicate relatively dry conditions leading up to the start of the 2023 growing season: on-site precipitation was near or below the 30th percentile in January, February, March, and May, according to WETS data (Appendix E). However, across the Site, the development of herbaceous hydrophytic species remains abundant.

After evaluating four years of monitoring gauge data along with data from supplemental gauges added during monitoring RS is preparing a Mitigation Plan Addendum for the wetland assets. RS will submit the Addendum in January 2024 so that a path forward can be determined.

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). In accordance with the monitoring schedule, vegetation plot monitoring was not performed in Year 4 (2023). Woody vegetation continues to thrive across the Site, with stem heights reaching 10+ feet in some areas. No areas of vegetation concern were identified in year 4 (2023).

In response to easement encroachment observed during Year 3 (2022) along the northwest parcel boundary of UT1-Reach 3 (under 500 sq. ft.), WE1's southeastern easement boundary (under 0.10 acres), and the southeastern easement boundary along UT1-Reach 1 (0.331 acres), RS had easement boundaries re-surveyed and remarked. The effort included the replacement of several of the easement corner markers with 6-inch treated fence posts with new conservation easement signage. They also added 6-inch treated fence posts with new conservation easement signage to several long straight stretches of easement boundary. Additionally, the encroachment areas were planted with 50, 3-gallon potted trees. Planted species are listed in Table F below, and the location of planting is shown in Figure 2, Appendix B. Visual observations during Year 4 (2023) indicate that easement signage is intact, planted stems are vigorous, and no additional encroachment was observed.

Table F – November 2022 Encroachment Planting

Species	Count	Mitigation Plan Approved	Wetland Indicator Status
Bald Cypress (*Taxodium distichum*)	10	Yes	OBL
Black Cherry (*Prunus serotina*)	8	Yes	FACU
Persimmon (*Diospyros virginiana*)	8	Yes	FAC
Tulip Poplar (*Liriodendron tulipifera*)	8	Yes	FACU
Swamp Chestnut Oak (*Quercus michauxii*)	8	Yes	FACW
White Oak (*Quercus alba*)	8	Yes	FACU
Total =	**50**		

In the MY3 (2022) IRT site visit notes a random transect was to be included through the UT2 wetland enhancement area during MY4 (2023), this will be included in MY5 (2024) when vegetation monitoring resumes. Also, with regards to the MY3 (2022) IRT site visit notes a round of live stake planting is scheduled during the winter of 2023/2024 in areas where pines were removed along the stream banks.

3.0 REFERENCES

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

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

North Carolina Division of Water Quality (NCDWQ). 2005. Cape Fear River Basin wide Water Quality Plan. Available: https://files.nc.gov/ncdeq/Water%20Quality/Planning/BPU/BPU/Cape_Fear/Cape%20Fear%20Plans/2000%20Plan/CPF_2000.pdf

North Carolina Division of Water Resources (NCDWR). 2016. Standard Operating Procedures for Collection and Analysis of Benthic Macroinvertebrates (Version 5.0). (online). Available: https://files.nc.gov/ncdeq/Water%20Quality/Environmental%20Sciences/BAU/NCDWRMacroinvertebrate-SOP-February%202016_final.pdf

North Carolina Ecosystem Enhancement Program (NCEEP). 2009. Cape Fear River Basin Restoration Priorities 2009 (online). Available: https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed_Planning/Cape_Fear_River_Basin/RBRP%20CapeFear%202009%20Revised%20032013.pdf

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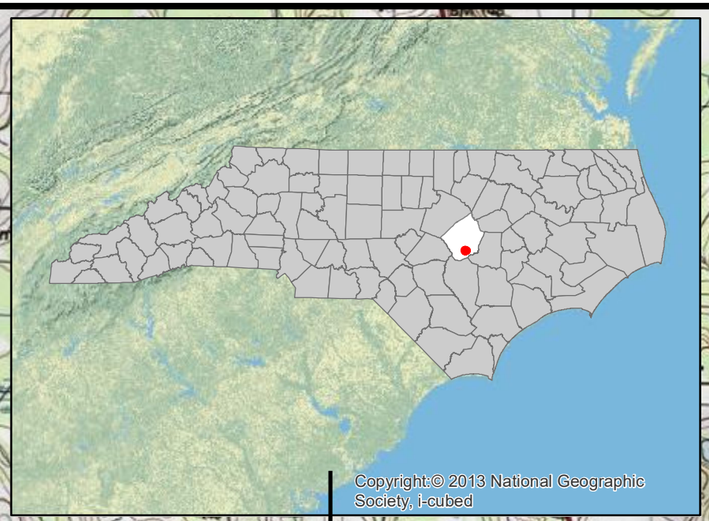
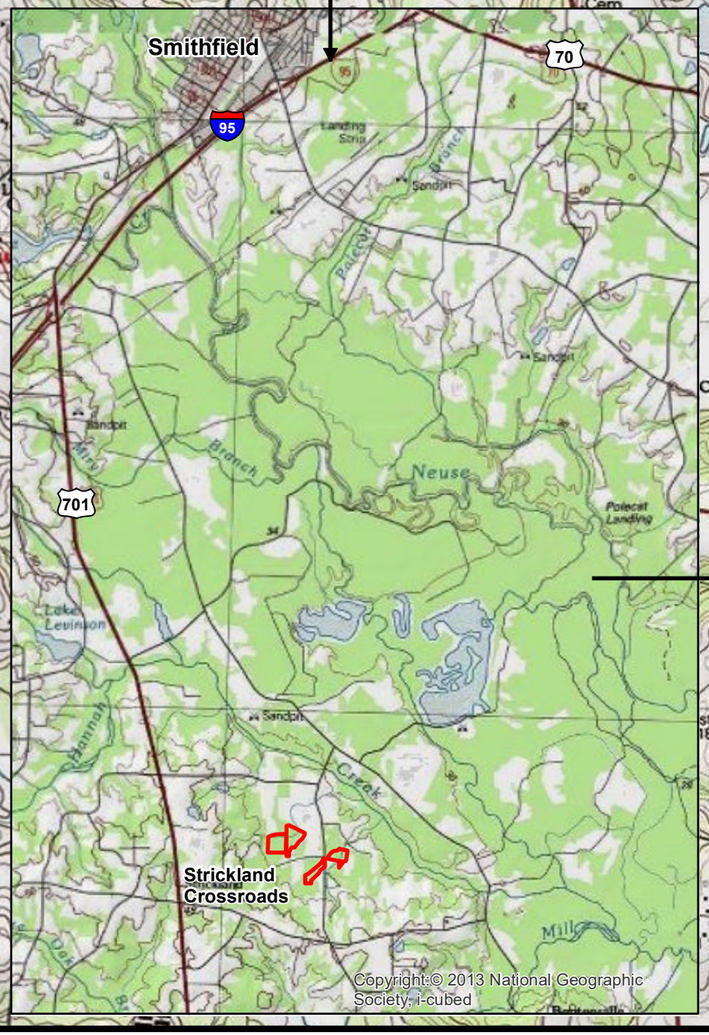
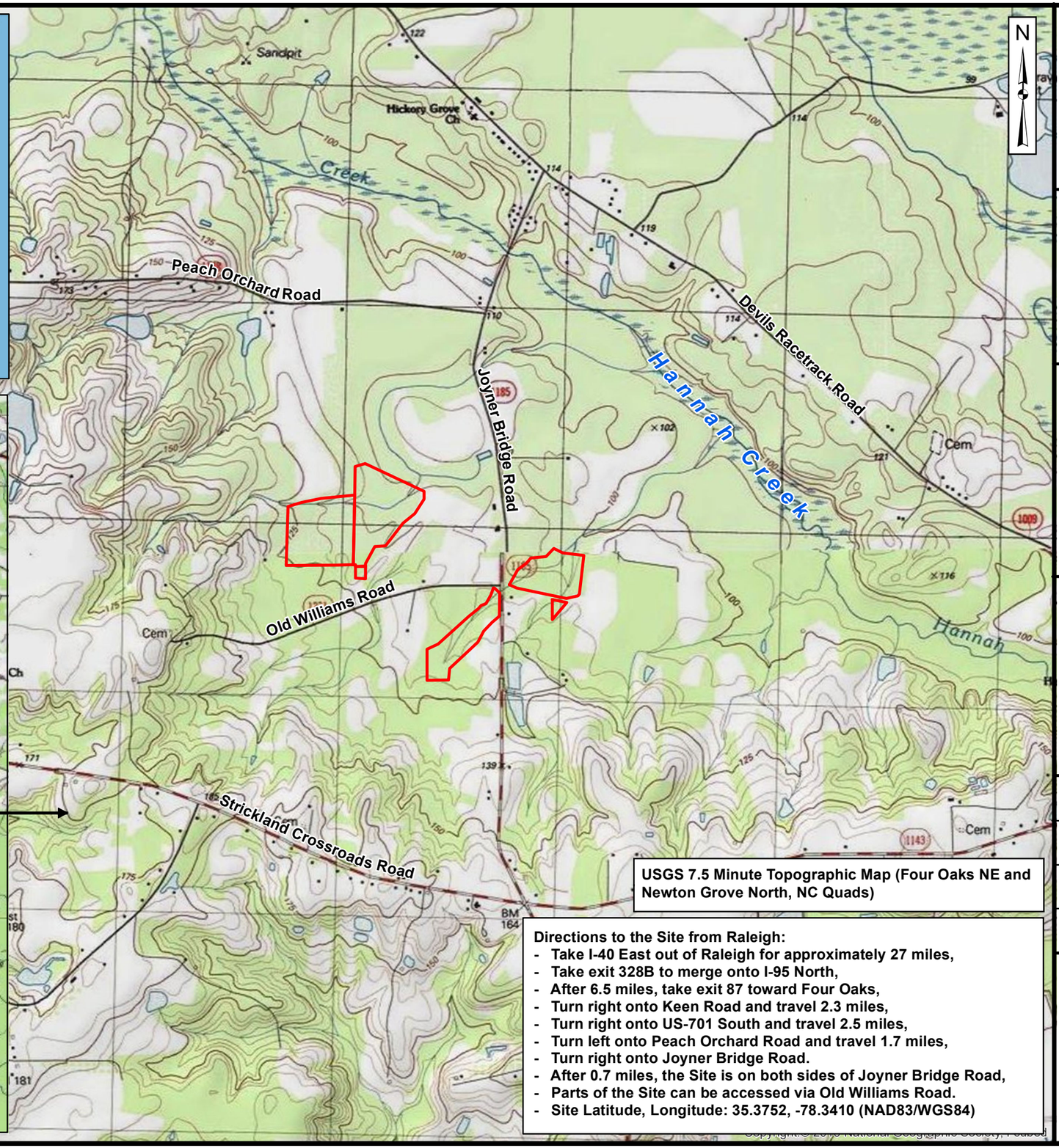
APPENDIX A: BACKGROUND TABLES AND MAP







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)**

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

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	Acreage At-Risk of Credit Removal	Acreage At-Risk of Partial Credit Reduction	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 to16+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	0.162	0.379	Restoration	6.973	1.3:1	5.364	Wetland Restoration
Wetland R3	Riparian Riverine	0	18.47	18.473	--	0.923	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	Acreage At-Risk of Credit Removal	Acreage At-Risk of Partial Credit Reduction	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	0.009	--	Restoration	0.867	1.3:1	0.667	Wetland Restoration
Wetland R10	Riparian Riverine	0	1.11	1.105	--	0.070	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	--	0.082	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	0.130	--	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

*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.

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

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
Monitoring Year 3 (2022) Stream Data Collection	May 19, 2022	--
Monitoring Year 3 (2022) Vegetation Data Collection	June, 2022	--
Monitoring Year 3 (MY3)	January-November, 2022	February 2023
Monitoring Year 4 (MY4)	January-November, 2023	February 2024

Table 3. Project Contacts Table
Alliance Headwaters Mitigation Site

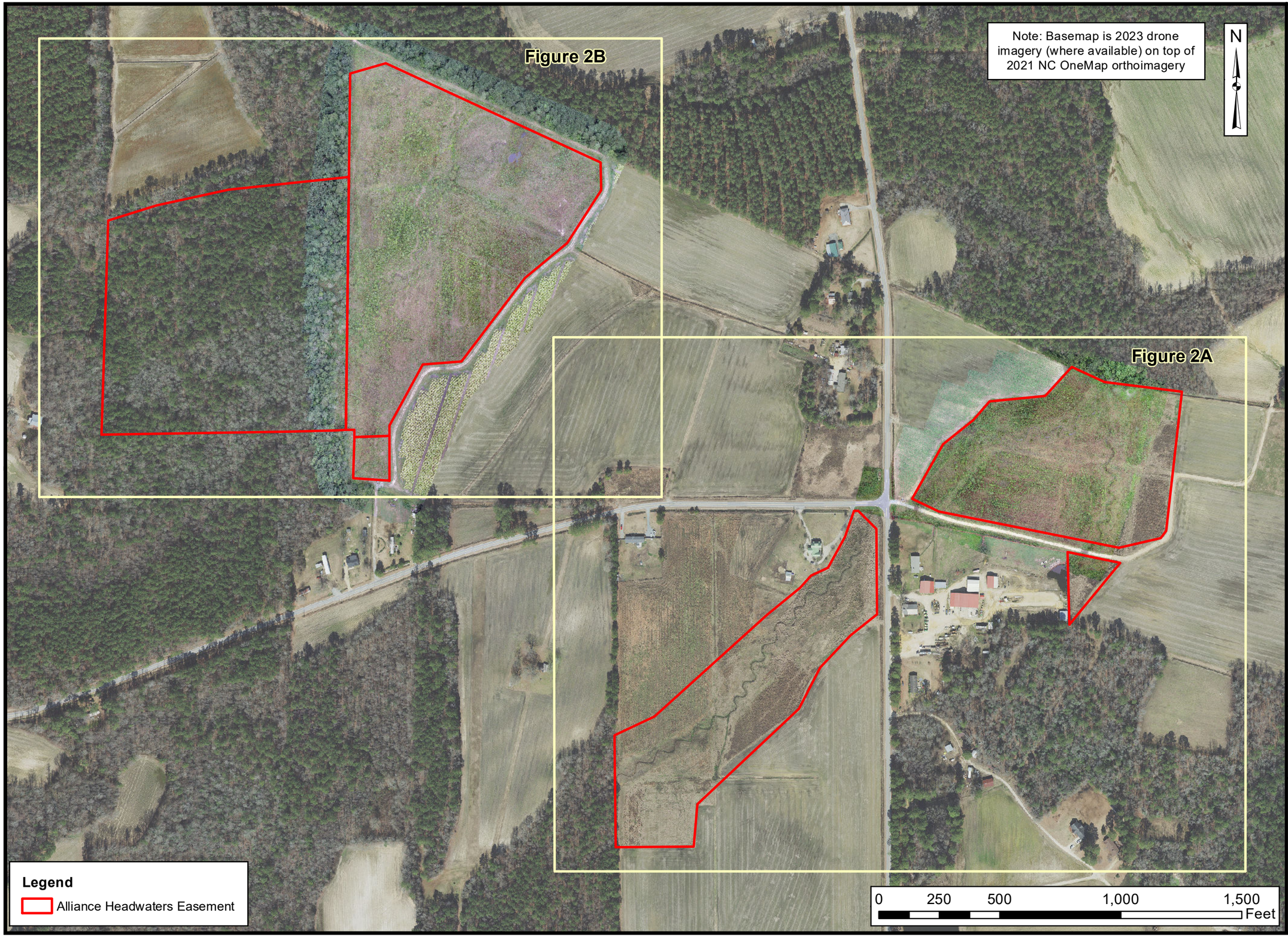
Full Delivery Provider Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 Worth Creech 919-755-9490	**Construction Contractor** Land Mechanic Designs 780 Landmark Road Willow Spring, NC 27592 Lloyd Glover 919-639-6132
Designer, Construction Plans, and Sediment/Erosion Control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

Table 4. Project Attribute Table
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 & latitude)	35.372028ºN, 78.340514ºW				
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



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

ALLIANCE HEADWATERS STREAM AND WETLAND MITIGATION SITE

Wayne County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

Date: NOV 2023

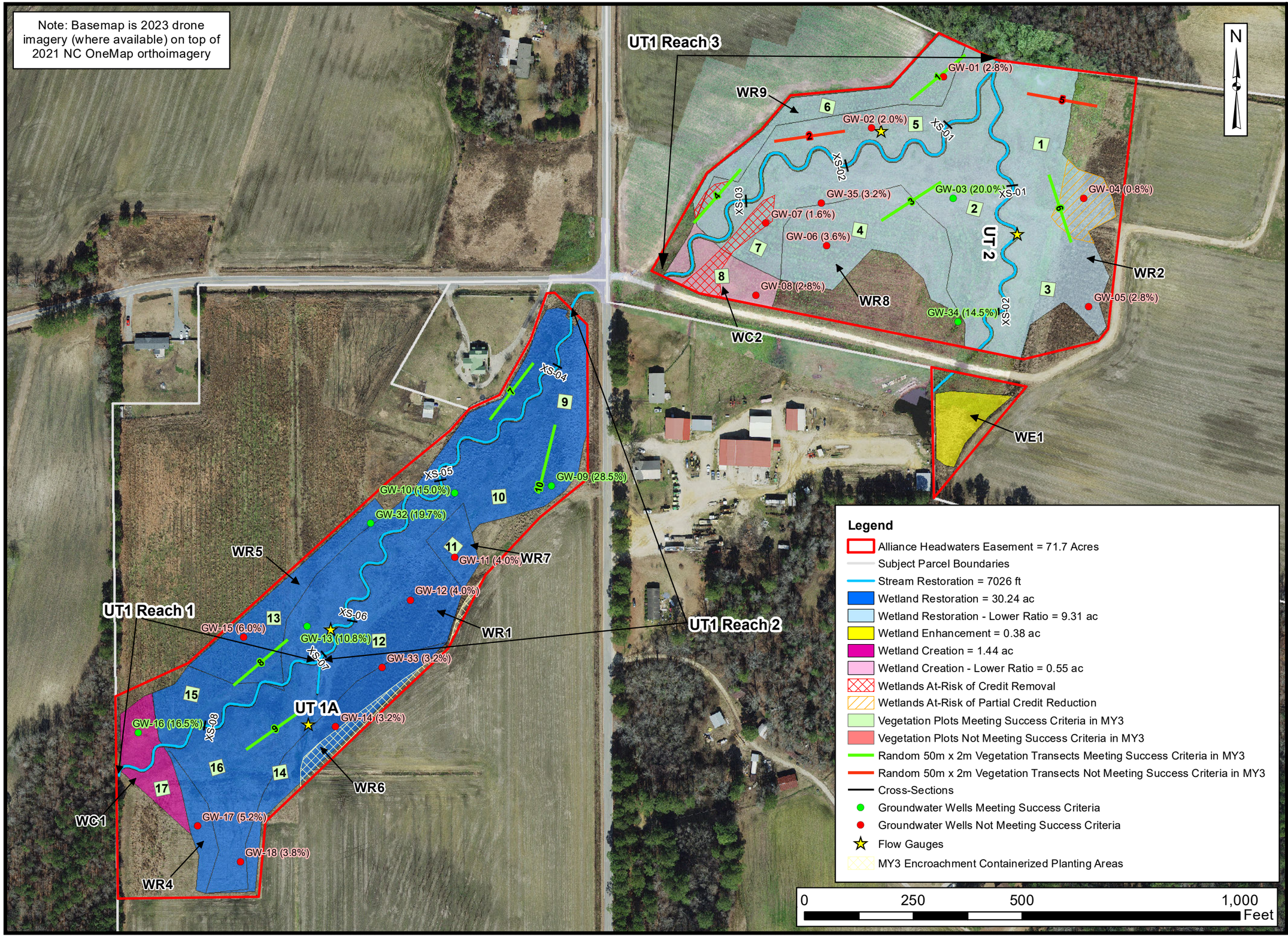
Scale: 1:4500

Project No.: 18-035

FIGURE

2

Note: Basemap is 2023 drone imagery (where available) on top of 2021 NC OneMap orthoimagery



Legend

- Alliance Headwaters Easement = 71.7 Acres
- Subject Parcel Boundaries
- Stream Restoration = 7026 ft
- Wetland Restoration = 30.24 ac
- Wetland Restoration - Lower Ratio = 9.31 ac
- Wetland Enhancement = 0.38 ac
- Wetland Creation = 1.44 ac
- Wetland Creation - Lower Ratio = 0.55 ac
- Wetlands At-Risk of Credit Removal
- Wetlands At-Risk of Partial Credit Reduction
- Vegetation Plots Meeting Success Criteria in MY3
- Vegetation Plots Not Meeting Success Criteria in MY3
- Random 50m x 2m Vegetation Transects Meeting Success Criteria in MY3
- Random 50m x 2m Vegetation Transects Not Meeting Success Criteria in MY3
- Cross-Sections
- Groundwater Wells Meeting Success Criteria
- Groundwater Wells Not Meeting Success Criteria
- Flow Gauges
- MY3 Encroachment Containerized Planting Areas

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

ALLIANCE HEADWATERS STREAM AND WETLAND MITIGATION SITE

Johnston County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

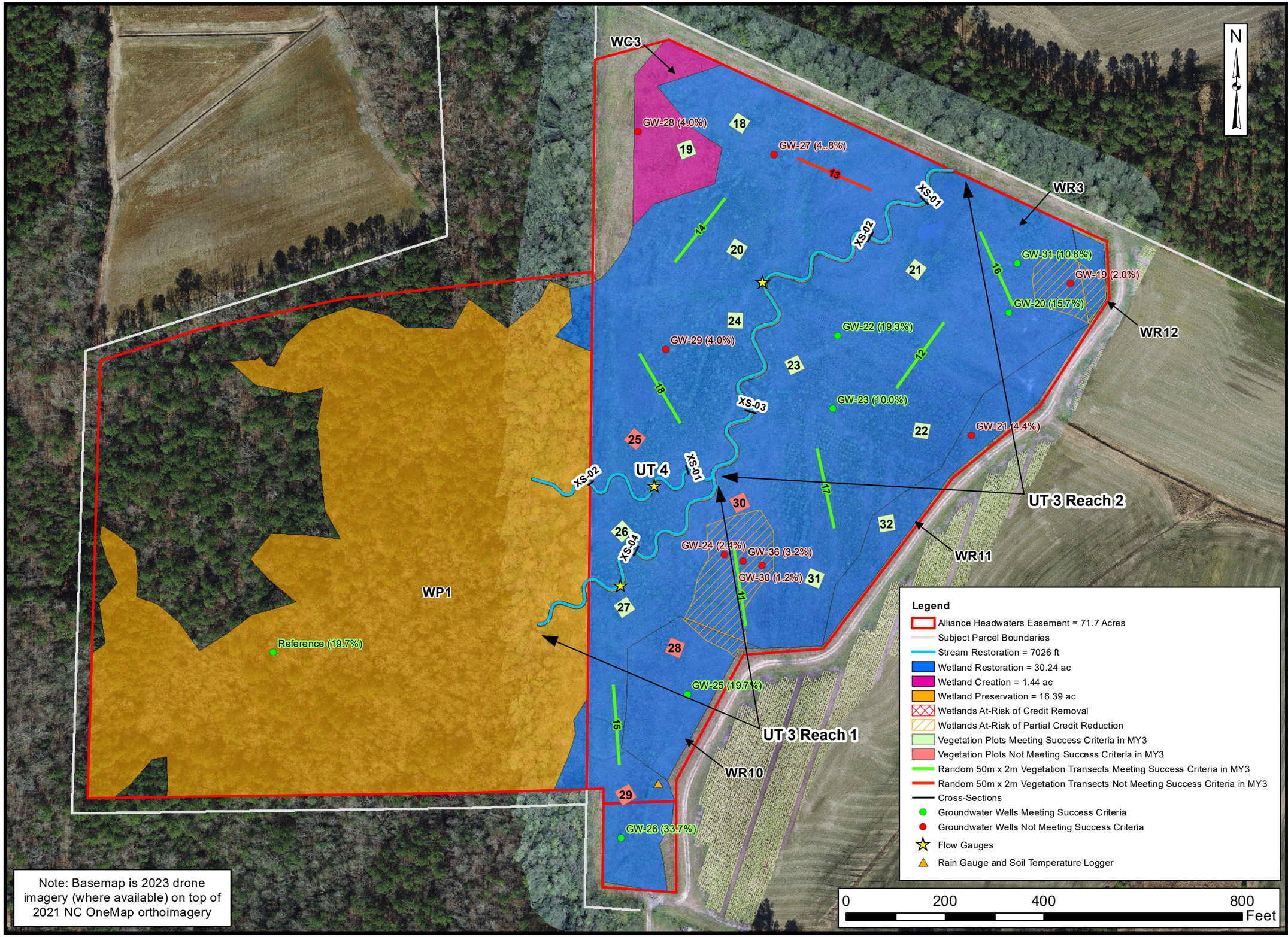
Date: NOV 2023

Scale: 1:2500

Project No.: 18-035

FIGURE

2A



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

ALLIANCE HEADWATERS STREAM AND WETLAND MITIGATION SITE

Johnston County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: KRJ

Date: NOV 2023

Scale: 1:2200

Project No.: 18-035

FIGURE

2B

Table 5A **Visual Stream Morphology Stability Assessment**
Reach ID **Alliance UT-1 Reach 1**
Assessed Length **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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	14	14			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	13	13			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	13	13			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	13	13			100%			
		2. Thalweg centering at downstream of meander (Glide)	13	13			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	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 not 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 ≥ 1.6 Rootwads/logs providing some cover at base-flow.	13	13			100%			

Table 5B **Visual Stream Morphology Stability Assessment**
Reach ID **Alliance UT-1 Reach 2**
Assessed Length **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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	27	27			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	28	28			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem 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%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	25	25			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	25	25			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	25	25			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	25	25			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	25	25			100%			

Table 5C **Visual Stream Morphology Stability Assessment**
Reach ID **Alliance UT-1 Reach 3**
Assessed Length **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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	20	20			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	19	19			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem 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%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	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 not 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 ≥ 1.6 Rootwads/logs providing some cover at base-flow.	18	18			100%			

Table 5D **Visual Stream Morphology Stability Assessment**
Reach ID **Alliance UT-1A**
Assessed Length **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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	3	3			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	2	2			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem 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%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	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 not 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 ≥ 1.6 Rootwads/logs providing some cover at base-flow.	2	2			100%			

Table 5E **Visual Stream Morphology Stability Assessment**
Reach ID **Alliance UT-2**
Assessed Length **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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	15	15			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	14	14			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem 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%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	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 not 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 ≥ 1.6 Rootwads/logs providing some cover at base-flow.	14	14			100%			

Table 5F **Visual Stream Morphology Stability Assessment**
Reach ID **Alliance UT-3 Reach 1**
Assessed Length **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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	11	11			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	11	11			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem 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%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	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 not 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 ≥ 1.6 Rootwads/logs providing some cover at base-flow.	11	11			100%			

Table 5G **Visual Stream Morphology Stability Assessment**
Reach ID **Alliance UT-3 Reach 2**
Assessed Length **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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	19	19			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	19	19			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem 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%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	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 not 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 ≥ 1.6 Rootwads/logs providing some cover at base-flow.	18	18			100%			

Table 5H **Visual Stream Morphology Stability Assessment**
Reach ID **Alliance UT-4**
Assessed Length **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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	9	9			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	9	9			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem 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%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	9	9			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	9	9			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	9	9			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	9	9			100%			

Table 6 Vegetation Condition Assessment

Alliance Headwaters

Planted Acreage[1] **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 Acreage[2] **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]	These areas were re-surveyed, signage was replaced, and a containerized planting was executed. No additional encroachment was observed in MY4 (2023).	none	yellow crosshatch	1	0.33	0.5%

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

2 = The acreage within the easement boundaries.

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

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

APPENDIX C: STREAM GEOMORPHOLOGY DATA

Tables 7A-7E. Baseline Stream Data Summary
Tables 8A-8D. Monitoring Data-Dimensional Morphology Summary
(Dimensional Parameters-Cross-sections)
Tables 9A-9E. Monitoring Data-Stream Reach Data Summary

Table 7a. 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					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					8.4	13.3		24				9.7			7.4			6.5			6.5 - 7.5			7.1		7.9	8.6		2
Floodprone Width (ft)					100	100		100													100			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		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		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		4	4.4		2
Width/Depth Ratio												12			9			10			14			14		15.6	17.2		2
Entrenchment Ratio					1.3	1.65		2				> 3.0			> 3.0			> 3.0			6.9 - 10.2			11.6		12.9	14.1		2
																								0.9		1	1.1		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		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	28.6	28.45	49.5	10.7	35
Riffle Slope (ft/ft)																								0.000	0.010	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)					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/f^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 7b. 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					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)					5	6		7				9.7			7.4			6.5			9.9		10.4		10.4	10.4		1
Floodprone Width (ft)					100	100		100													100		100		100	100		1
Bankfull Mean Depth (ft)												0.8			0.82			0.6			0.5 - 0.7		0.8		0.8	0.8		1
[1]Bankfull Max Depth (ft)					0.6	0.7		0.8				0.75 - 1.00			0.75 - 1.00			0.75 - 1.00			0.93		1.4		1.4	1.4		1
Bankfull Cross Sectional Area (ft^2)					1	1.75		2.5				8			6.1			3.8			7.0		8.4		8.4	8.4		1
Width/Depth Ratio					6.6	8.6		10.6				12			9			10			14		13		13	13		1
Entrenchment Ratio					1.3	1.65		2				> 3.0			> 3.0			> 3.0			6.7		9.6		9.6	9.6		1
																							1.4		1.4	1.4		1
[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		1.0	1.0		1
Profile																												
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																14.0 - 25.0		12.2	39.6	38.7	63.2	12.7	23
Riffle Slope (ft/ft)																							0.001	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)					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/f^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)																					1.5				1.5			
Bankfull Discharge (cfs)																					10.7							
Valley length (ft)																												
Channel Thalweg length (ft)																					1463				1463			
Sinuosity (ft)					1							1.22 - 1.59			1.22 - 1.59			1.22 - 1.59			1.35				1.35			
Water Surface Slope (Channel) (ft/ft)					0.026							0.0027 - 0.0088			0.0027 - 0.0088			0.0027 - 0.0088			0.0018				0.0028			
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 7c. 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					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					5	6		7				9.7			7.4			6.5			7.5		9.9		9.9	9.9		1
Floodprone Width (ft)					100	100		100													100		100		100	100		1
Bankfull Mean Depth (ft)												0.8			0.82			0.6			0.6		0.6		0.6	0.6		1
[1]Bankfull Max Depth (ft)					0.6	0.7		0.8				0.75 - 1.00			0.75 - 1.00			0.75 - 1.00			0.7		1.3		1.3	1.3		1
Bankfull Cross Sectional Area (ft^2)					1	1.75		2.5				8			6.1			3.8			4.0		6.1		6.1	6.1		1
Width/Depth Ratio					6.6	8.6		10.6				12			9			10			14		16.1		16.1	16.1		1
Entrenchment Ratio					1.3	1.65		2				> 3.0			> 3.0			> 3.0			5.6		10.1		10.1	10.1		1
																							1.3		1.3	1.3		1
[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		1.0	1.0		1
Profile																												
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																14.0 - 50.0		15.7	29.9	28.44	52.3	10.8	11
Riffle Slope (ft/ft)																							0.000	0.014	0.004	0.014	0.005	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)					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/f^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)																					2.1		2.1					
Bankfull Discharge (cfs)																					8.4							
Valley length (ft)																												
Channel Thalweg length (ft)																					997		997					
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 7d. 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					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					5	6		7				9.7			7.4			6.5			7.5 - 9.2		7.3		8.1	8.9		2
Floodprone Width (ft)					100	100		100													100		100		100	100		2
Bankfull Mean Depth (ft)												0.8			0.82			0.6			0.6 - 0.7		0.6		0.6	0.6		2
[1]Bankfull Max Depth (ft)					0.6	0.7		0.8				0.75 - 1.00			0.75 - 1.00			0.75 - 1.00			0.7 - 0.86		1		1	1		2
Bankfull Cross Sectional Area (ft^2)					1	1.75		2.5				8			6.1			3.8			4.0 - 6.0		4.3		4.9	5.4		2
Width/Depth Ratio					6.6	8.6		10.6				12			9			10			14		12.4		13.5	14.7		2
Entrenchment Ratio					1.3	1.65		2				> 3.0			> 3.0			> 3.0			4.3 - 5.3		11.2		12.5	13.7		2
																							1.0		1.0	1.0		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		1.0	1.0		2
Profile																												
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.																8.0 - 29.8		22.1	39	35.67	60.9	10	29
Riffle Slope (ft/ft)																							0.001	0.005	0.005	0.010	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)					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/f^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)																					1.9 - 2.6				1.9 - 2.6			
Bankfull Discharge (cfs)																					7.5 - 15.4							
Valley length (ft)																												
Channel Thalweg length (ft)																					1915				1915			
Sinuosity (ft)					1							1.22 - 1.59			1.22 - 1.59			1.22 - 1.59			1.21 - 1.38				1.21 - 1.38			
Water Surface Slope (Channel) (ft/ft)					0.003							0.0027 - 0.0088			0.0027 - 0.0088			0.0027 - 0.0088			0.0038 - 0.0040				0.0033			
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 7e. 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					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Max	Min	Mean	Max	Min	Med	Max	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					5	6		7				9.7			7.4			6.5			6.5		7.5		7.5	7.5		1
Floodprone Width (ft)					100	100		100													100		100		100	100		1
Bankfull Mean Depth (ft)												0.8			0.82			0.6			0.5		0.5		0.5	0.5		1
[1]Bankfull Max Depth (ft)					0.6	0.7		0.8				0.75 - 1.00			0.75 - 1.00			0.75 - 1.00			0.61		0.9		0.9	0.9		1
Bankfull Cross Sectional Area (ft^2)					1	1.75		2.5				8			6.1			3.8			3.0		3.8		3.8	3.8		1
Width/Depth Ratio					6.6	8.6		10.6				12			9			10			14		14.8		14.8	14.8		1
Entrenchment Ratio					1.3	1.65		2				> 3.0			> 3.0			> 3.0			6.2		13.3		13.3	13.3		1
																							0.9		0.9	0.9		1
[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		1.0	1.0		1
Profile																												
Riffle Length (ft)					No distinct repetitive pattern of riffles and pools due to straightening activities.															10.0 -11.0			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)					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/f^2																												
Max part size (mm) mobilized at bankfull																												
Stream Power (transport capacity) W/m^2																												
Additional Reach Parameters																												
Rosgen Classification												C5/E5			E5			E5/C5			C5				C5			
Bankfull Velocity (fps)																					2.1				2.1			
Bankfull Discharge (cfs)																					6.2							
Valley length (ft)																												
Channel Thalweg length (ft)																					531				531			
Sinuosity (ft)												1.22 - 1.59			1.22 - 1.59			1.22 - 1.59			1.36				1.36			
Water Surface Slope (Channel) (ft/ft)												0.0027 - 0.0088			0.0027 - 0.0088			0.0027 - 0.0088			0.0057				0.0051			
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 8a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT1/Reach 1,2,3 (3496 feet)

	Cross Section 1 (Pool)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)							Cross Section 5 (Riffle)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																																			
Bankfull Width (ft)	15.4	16.1	15.1	17.3				16.4	20.3	16.9	18.5				10.4	14.6	11.6	10.8				10.2	11.7	11.2	13.1				8.6	16.7	9.0	9.9			
Floodprone Width (ft)	NA	NA	NA	NA				NA	NA	NA	NA				100	100	100	100				NA	NA	NA	NA				100	100	100	100			
Bankfull Mean Depth (ft)	0.9	0.9	1.0	0.8				1.1	0.9	1.1	1.0				0.8	0.6	0.7	0.8				0.9	0.8	0.8	0.7				0.5	0.3	0.5	0.4			
Bankfull Max Depth (ft)	1.9	2.1	2.1	2.0				2.3	2.3	2.4	2.4				1.4	1.2	1.3	1.3				1.7	1.6	1.7	1.5				1.1	1.0	1.1	1.2			
Bankfull Cross Sectional Area (ft^2)	14.5	14.5	14.5	14.5				18.5	18.5	18.5	18.5				8.4	8.4	8.4	8.4				9.0	9.0	9.0	9.0				4.4	4.4	4.4	4.4			
Bankfull Width/Depth Ratio	NA	NA	NA	NA				NA	NA	NA	NA				12.9	25.4	15.9	13.8				NA	NA	NA	NA				16.8	63.4	18.5	22.3			
Bankfull Entrenchment Ratio	NA	NA	NA	NA				NA	NA	NA	NA				9.6	6.8	8.6	9.3				NA	NA	NA	NA				11.6	6.0	11.1	10.1			
Low Bank Height (ft)	1.9	2.2	2.1	2.0				2.3	2.4	2.4	2.5				1.4	1.3	1.3	1.3				1.7	1.8	1.8	1.5				1.1	1.0	1.1	1.1			
Bankfull Bank Height Ratio	1.00	1.05	1.04	0.97				1.00	1.04	1.02	1.07				1.00	1.08	0.98	0.96				1.00	1.13	1.04	0.97				1.00	1.00	0.99	0.97			
Cross Sectional Area between end pins (ft^2)	23.4	26.7	23.9	25.1				20.1	24.1	23.2	26.2				11.4	11.3	15.0	14.3				16.9	14.0	13.9	14.2				8.8	12.5	11.2	11.1			
d50 (mm)																																			
	Cross Section 6 (Pool)							**Cross Section 7 (Pool)**							**Cross Section 8 (Riffle)**																			
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+														
Record elevation (datum) used																																			
Bankfull Width (ft)	10.4	13.4	11.5	14.0				8.0	8.8	8.0	8.9				7.1	7.0	7.3	9.6																	
Floodprone Width (ft)	NA	NA	NA	NA				NA	NA	NA	NA				100	100	100.0	100.0																	
Bankfull Mean Depth (ft)	0.6	0.5	0.5	0.4				0.9	0.8	0.9	0.8				0.5	0.5	0.5	0.4																	
Bankfull Max Depth (ft)	2.0	1.2	1.2	1.3				1.8	1.8	1.7	1.7				0.9	0.8	0.8	0.8																	
Bankfull Cross Sectional Area (ft^2)	6.1	6.1	6.1	6.1				6.8	6.8	6.8	6.8				3.6	3.6	3.6	3.6																	
Bankfull Width/Depth Ratio	NA	NA	NA	NA				NA	NA	NA	NA				14.0	13.6	14.7	14.7																	
Bankfull Entrenchment Ratio	NA	NA	NA	NA				NA	NA	NA	NA				14.1	14.3	13.8	13.8																	
Low Bank Height (ft)	2.0	1.3	1.0	1.3				1.8	1.9	1.8	1.6				0.9	0.8	0.9	0.9																	
Bankfull Bank Height Ratio	1.0	1.08	0.90	0.98				1.0	1.06	1.07	0.97				1.0	1.00	1.12	1.03																	
Cross Sectional Area between end pins (ft^2)	12.8	12.4	10.5	10.4				11.7	11.2	11.5	11				6.1	4.8	7.2	5.7																	
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 8b. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT2 (996.7 feet)

	Cross Section 1 (Pool)							Cross Section 2 (Riffle)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used														
Bankfull Width (ft)	11.8	25.8	18.2	25.8				9.9	10.9	10.4	8.6			
Floodprone Width (ft)	NA	NA	NA	NA				100	100	100	100			
Bankfull Mean Depth (ft)	0.7	0.3	0.5	0.3				0.6	0.6	0.6	0.6			
Bankfull Max Depth (ft)	1.6	1.1	1.1	0.9				1.3	1.5	1.3	1.5			
Bankfull Cross Sectional Area (ft^2)	8.8	8.8	8.8	8.8				6.1	6.1	6.1	6.1			
Bankfull Width/Depth Ratio	NA	NA	NA	NA				16.1	19.5	17.7	17.7			
Bankfull Entrenchment Ratio	NA	NA	NA	NA				10.1	9.2	9.6	9.6			
Low Bank Height (ft)	1.6	1.0	0.9	0.9				1.3	1.6	1.3	1.6			
Bankfull Bank Height Ratio	1.00	0.91	0.80	0.93				1.00	1.07	1.01	1.07			
Cross Sectional Area between end pins (ft^2)	10.9	6.7	12.9	7.3				10.8	10.1	10.7	9.5			
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 8c. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT3 (1914.8 feet)

	Cross Section 1 (Pool)							Cross Section 2 (Riffle)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used																												
Bankfull Width (ft)	11.0	15.8	16.6	13.2				8.9	9.0	10.2	8.5				13.6	14.8	13.5	15.8				7.3	8.0	7.9	8.2			
Floodprone Width (ft)	NA	NA	NA	NA				100	100	100	100				NA	NA	NA	NA				100	100	100	100			
Bankfull Mean Depth (ft)	0.9	0.6	0.6	0.8				0.6	0.6	0.5	0.6				0.9	0.9	0.9	0.8				0.6	0.5	0.5	0.5			
Bankfull Max Depth (ft)	1.6	1.7	1.6	1.8				1.0	1.1	1.0	1.1				1.7	2.0	2.1	2.0				1.0	1.0	1.1	1.1			
Bankfull Cross Sectional Area (ft^2)	10.2	10.2	10.2	10.2				5.4	5.4	5.4	5.4				12.7	12.7	12.7	12.7				4.3	4.3	4.3	4.3			
Bankfull Width/Depth Ratio	NA	NA	NA	NA				14.7	15.0	19.2	13.4				NA	NA	NA	NA				12.4	14.9	14.4	15.5			
Bankfull Entrenchment Ratio	NA	NA	NA	NA				11.2	11.1	9.8	9.8				NA	NA	NA	NA				13.7	12.5	12.7	12.3			
Low Bank Height (ft)	1.6	1.7	1.6	1.8				1.0	1.1	1.1	1.2				1.7	2.0	1.8	1.9				1.0	1.0	1.0	1.2			
Bankfull Bank Height Ratio	1.00	1.00	0.98	1.02				1.00	1.00	1.14	1.09				1.00	1.00	0.88	0.98				1.00	1.00	0.92	1.02			
Cross Sectional Area between end pins (ft^2)	14.1	17.1	13.7	15.1				16.8	18.4	17.8	20.5				22.9	16.2	21.8	21.7				7.6	10.9	9.0	10.5			
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 8d. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT4 (530.9 feet)

	Cross Section 1 (Pool)							Cross Section 2 (Riffle)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used														
Bankfull Width (ft)	10.9	11.8	11.9	14.3				7.5	11.7	7.5	10.5			
Floodprone Width (ft)	NA	NA	NA	NA				100	100	100	100			
Bankfull Mean Depth (ft)	0.7	0.7	0.7	0.6				0.5	0.3	0.5	0.4			
Bankfull Max Depth (ft)	1.4	1.4	1.3	1.4				0.9	0.8	0.9	0.9			
Bankfull Cross Sectional Area (ft^2)	7.9	7.9	7.9	7.9				3.8	3.8	3.8	3.8			
Bankfull Width/Depth Ratio	NA	NA	NA	NA				14.8	36.0	14.7	29.0			
Bankfull Entrenchment Ratio	NA	NA	NA	NA				13.3	8.5	13.4	9.5			
Low Bank Height (ft)	1.4	1.4	1.3	1.5				0.9	0.8	0.8	0.9			
Bankfull Bank Height Ratio	1.00	1.00	0.99	1.06				1.00	1.00	0.90	0.96			
Cross Sectional Area between end pins (ft^2)	13.3	13.1	14.2	12.4				8.0	5.3	5.9	5.5			
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 9a. 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					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	7.1		7.9	8.6		2	7		11.9	16.7		2	7.3	8.15		9		2	9.6	9.75		9.9		2												
Floodprone Width (ft)	100		100	100		2	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	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	0.8	1		1.2		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	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	22.1	24		25.8		2												
Entrenchment Ratio	11.6		12.9	14.1		2	6		10.1	14.3		2	11.1	12.5		13.8		2	10.1	10.3		10.4		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	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	1.06		1.12		2	0.97	1.00		1.03		2												
Profile																																				
Riffle Length (ft)	9	28.6	28.5	49.5	10.7	35																														
Riffle Slope (ft/ft)	0	0.01	0.01	0.02	0.01	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	50.7	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 9b. 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					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	10.4		10.4	10.4		1	14.6		14.6	14.6		1	11.6			11.6		1	10.8			10.8		1												
Floodprone Width (ft)	100		100	100		1	100		100	100		1	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	0.8			0.8		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	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	8.4			8.4		1												
Width/Depth Ratio	13		13	13		1	18.3		18.3	18.3		1	15.9			15.9		1	13.7			13.7		1												
Entrenchment Ratio	9.6		9.6	9.6		1	6.8		6.8	6.8		1	8.6			8.6		1	9.3			9.3		1												
Low Bank Height (ft)	1.4		1.4	1.4		1	1.3		1.3	1.3		1	1.3			1.3		1	1.3			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	0.96			0.96		1												
Profile																																				
Riffle Length (ft)	12.2	39.6	38.7	63.2	12.7	23																														
Riffle Slope (ft/ft)	0	0.01	0	0.03	0.01	10																														
Pool Length (ft)	4.7	13	11.8	32	6.4	22																														
Pool Max depth (ft)	1.9	2.1	2.1	2.3		2																														
Pool Spacing (ft)	37.3	68	73.8	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 9c. 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					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	9.9		9.9	9.9		1	10.9		10.9	10.9		1	10.4			10.4		1	8.6			8.6		1												
Floodprone Width (ft)	100		100	100		1	100		100	100		1	100			100		1	100			100		1												
Bankfull Mean Depth (ft)	0.6		0.6	0.6		1	0.6		0.6	0.6		1	0.59			0.59		1	0.71			0.71		1												
[1]Bankfull Max Depth (ft)	1.3		1.3	1.3		1	1.5		1.5	1.5		1	1.33			1.33		1	1.45			1.45		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		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		1	12.2			12.2		1												
Entrenchment Ratio	10.1		10.1	10.1		1	9.2		9.2	9.2		1	9.6			9.6		1	11.6			11.6		1												
Low Bank Height (ft)	1.3		1.3	1.3		1	1.5		1.5	1.5		1	1.34			1.34		1	1.55			1.55		1												
[1]Bank Height Ratio	1.0		1.0	1.0		1	1.1		1.1	1.1		1	1.01			1.01		1	1.07			1.07		1												
Profile																																				
Riffle Length (ft)	15.7	29.9	28.4	52.3	10.8	11																														
Riffle Slope (ft/ft)	0.00	0.01	0.00	0.01	0.00	8																														
Pool Length (ft)	2.4	14.2	12.4	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	54.9	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

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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 9d. 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					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	7.3		8.1	8.9		2	8		8.5	9		2	7.87	9.03		10.2		2	8.2	8.35		8.5		2												
Floodprone Width (ft)	100		100	100		2	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	0.52	0.58		0.63		2												
[1]Bankfull Max Depth (ft)	1		1	1		2	1		1.1	1.1		2	0.98	1.05		1.11		2	1.13	1.13		1.14		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	4.3	4.85		5.4		2												
Width/Depth Ratio	12.4		13.5	14.7		2	14.9		15	15		2	14.4	16.8		19.2		2	13.4	14.5		15.6		2												
Entrenchment Ratio	11.2		12.5	13.7		2	11.1		11.8	12.5		2	9.8	11.3		12.7		2	11.8	12		12.3		2												
Low Bank Height (ft)	1.0		1.0	1.0		2	1.0		1.1	1.1		2	1.02	1.07		1.12		2	1.16	1.2		1.24		2												
[1]Bank Height Ratio	1.0		1.0	1.0		2	1.0		1.0	1.0		2	0.92	1.03		1.14		2	1.02	1.06		1.09		2												
Profile																																				
Riffle Length (ft)	22.1	39	35.7	60.9	10	29																														
Riffle Slope (ft/ft)	0	0.01	0	0.01	0	14																														
Pool Length (ft)	7	10.7	10.1	16.8	2.5	28																														
Pool Max depth (ft)	1.6	1.65	1.65	1.7		2																														
Pool Spacing (ft)	45.6	63	60.4	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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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 9e. 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					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	7.5		7.5	7.5		1	11.7		11.7	11.7		1	7.5			7.5		1	10.5			10.5		1												
Floodprone Width (ft)	100		100	100		1	100		100	100		1	100.0			100.0		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	0.4			0.4		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	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	3.8			3.8		1												
Width/Depth Ratio	14.8		14.8	14.8		1	36		36	36		1	14.7			14.7		1	29.2			29.2		1												
Entrenchment Ratio	13.3		13.3	13.3		1	8.5		8.5	8.5		1	13.4			13.4		1	9.5			9.5		1												
Low Bank Height (ft)	0.9		0.9	0.9		1	0.8		0.8	0.8		1	0.8			0.8		1	0.9			0.9		1												
[1]Bank Height Ratio	1.0		1.0	1.0		1	1.0		1.0	1.0		1	0.9			0.9		1	1.0			1.0		1												
Profile																																				
Riffle Length (ft)	17.4	36.6	31.7	74.4	16.6	9																														
Riffle Slope (ft/ft)	0.01	0.01	0.01	0.01	0	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																																				

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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

APPENDIX D: HYDROLOGY DATA

Tables 10A-G. Channel Evidence
Stream Gauge Graphs
Table 11. Verification of Bankfull Events
Figure E1. 30/70 Percentile Graph for Rainfall
Soil Temp Graph
Table 12. Groundwater Hydrology Data
Groundwater Gauge Graphs

Table 10A. 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	116	143			
Presence of litter and debris (wracking)	Yes	Yes	Yes	Yes			
Leaf litter disturbed or washed away	Yes	Yes	Yes	Yes			
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes	Yes			
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes	Yes			
Water staining due to continual presence of water	Yes	Yes	Yes	Yes			
Formation of channel bed and banks	Yes	Yes	Yes	Yes			
Sediment sorting within the primary path of flow	Yes	Yes	Yes	Yes			
Sediment shelving or a natural line impressed on the banks	Yes	Yes	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	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	Yes	Yes			
Exposure of woody plant roots within the primary path of flow	No	No	No	No			
Other:							

Photo 1: UT1 Downstream Channel Evidence

Table 10B. 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	186	132			
Presence of litter and debris (wracking)	Yes	Yes	Yes	Yes			
Leaf litter disturbed or washed away	Yes	Yes	Yes	Yes			
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes	Yes			
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes	Yes			
Water staining due to continual presence of water	Yes	Yes	Yes	Yes			
Formation of channel bed and banks	Yes	Yes	Yes	Yes			
Sediment sorting within the primary path of flow	Yes	Yes	Yes	Yes			
Sediment shelving or a natural line impressed on the banks	Yes	Yes	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	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	Yes	Yes			
Exposure of woody plant roots within the primary path of flow	No	No	No	No			
Other:							

Photo 2: UT1 Upstream Channel Evidence

Table 10C. 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	90	64			
Presence of litter and debris (wracking)	Yes	Yes	Yes	Yes			
Leaf litter disturbed or washed away	Yes	Yes	Yes	Yes			
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes	Yes			
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes	Yes			
Water staining due to continual presence of water	Yes	Yes	Yes	Yes			
Formation of channel bed and banks	Yes	Yes	Yes	Yes			
Sediment sorting within the primary path of flow	Yes	Yes	Yes	Yes			
Sediment shelving or a natural line impressed on the banks	Yes	Yes	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	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	Yes	Yes			
Exposure of woody plant roots within the primary path of flow	No	No	No	No			
Other:							

Photo 3: UT1A Channel Evidence

Table 10D. 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	110	77			
Presence of litter and debris (wracking)	Yes	Yes	Yes	Yes			
Leaf litter disturbed or washed away	Yes	Yes	Yes	Yes			
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes	Yes			
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes	Yes			
Water staining due to continual presence of water	Yes	Yes	Yes	Yes			
Formation of channel bed and banks	Yes	Yes	Yes	Yes			
Sediment sorting within the primary path of flow	Yes	Yes	Yes	Yes			
Sediment shelving or a natural line impressed on the banks	Yes	Yes	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	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	Yes	Yes			
Exposure of woody plant roots within the primary path of flow	No	No	No	No			
Other:							

Photo 4: UT2 Channel Evidence

Table 10E. 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	67	63			
Presence of litter and debris (wracking)	Yes	Yes	Yes	Yes			
Leaf litter disturbed or washed away	Yes	Yes	Yes	Yes			
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes	Yes			
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes	Yes			
Water staining due to continual presence of water	Yes	Yes	Yes	Yes			
Formation of channel bed and banks	Yes	Yes	Yes	Yes			
Sediment sorting within the primary path of flow	Yes	Yes	Yes	Yes			
Sediment shelving or a natural line impressed on the banks	Yes	Yes	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	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	Yes	Yes			
Exposure of woody plant roots within the primary path of flow	No	No	No	No			
Other:							

Photo 5: UT3 Downstream Channel Evidence

Table 10F. UT3 Upstream Channel Evidence

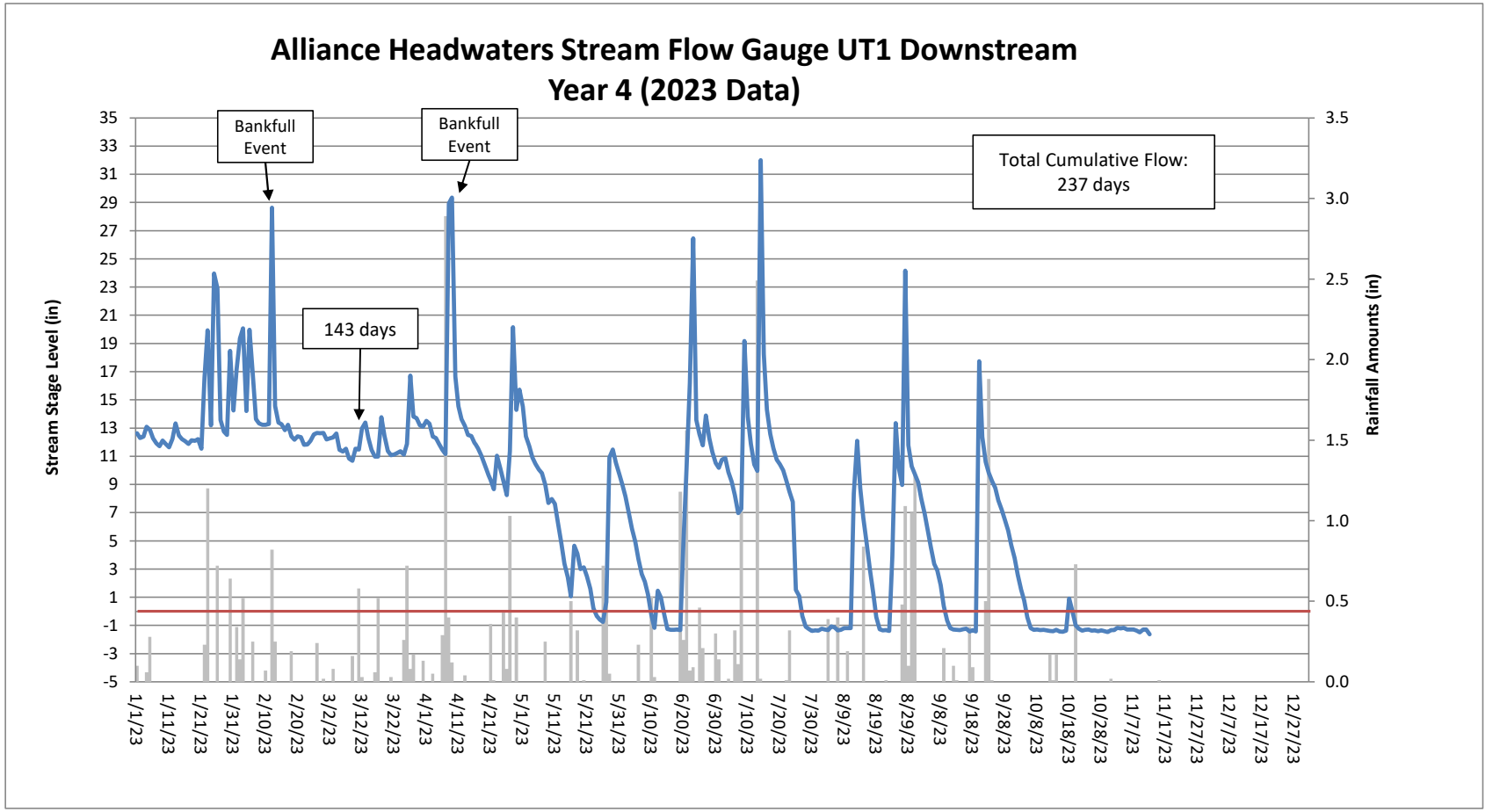
UT3 Upstream Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	136	127	96	93			
Presence of litter and debris (wracking)	Yes	Yes	Yes	Yes			
Leaf litter disturbed or washed away	Yes	Yes	Yes	Yes			
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes	Yes			
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes	Yes			
Water staining due to continual presence of water	Yes	Yes	Yes	Yes			
Formation of channel bed and banks	Yes	Yes	Yes	Yes			
Sediment sorting within the primary path of flow	Yes	Yes	Yes	Yes			
Sediment shelving or a natural line impressed on the banks	Yes	Yes	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	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	Yes	Yes			
Exposure of woody plant roots within the primary path of flow	No	No	No	No			
Other:							

Photo 6: UT3 Upstream Channel Evidence

Table 10G. 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	88	135			
Presence of litter and debris (wracking)	Yes	Yes	Yes	Yes			
Leaf litter disturbed or washed away	Yes	Yes	Yes	Yes			
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes	Yes			
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes	Yes			
Water staining due to continual presence of water	Yes	Yes	Yes	Yes			
Formation of channel bed and banks	Yes	Yes	Yes	Yes			
Sediment sorting within the primary path of flow	Yes	Yes	Yes	Yes			
Sediment shelving or a natural line impressed on the banks	Yes	Yes	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	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	Yes	Yes			
Exposure of woody plant roots within the primary path of flow	No	No	No	No			
Other:							

Photo 7: UT4 Channel Evidence


Alliance Headwaters Stream Flow Gauge UT1 Downstream
Year 4 (2023 Data)
Bankfull Event
Bankfull Event
143 days
Total Cumulative Flow: 237 days
Stream Stage Level (in)
Rainfall Amounts (in)
35
33
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
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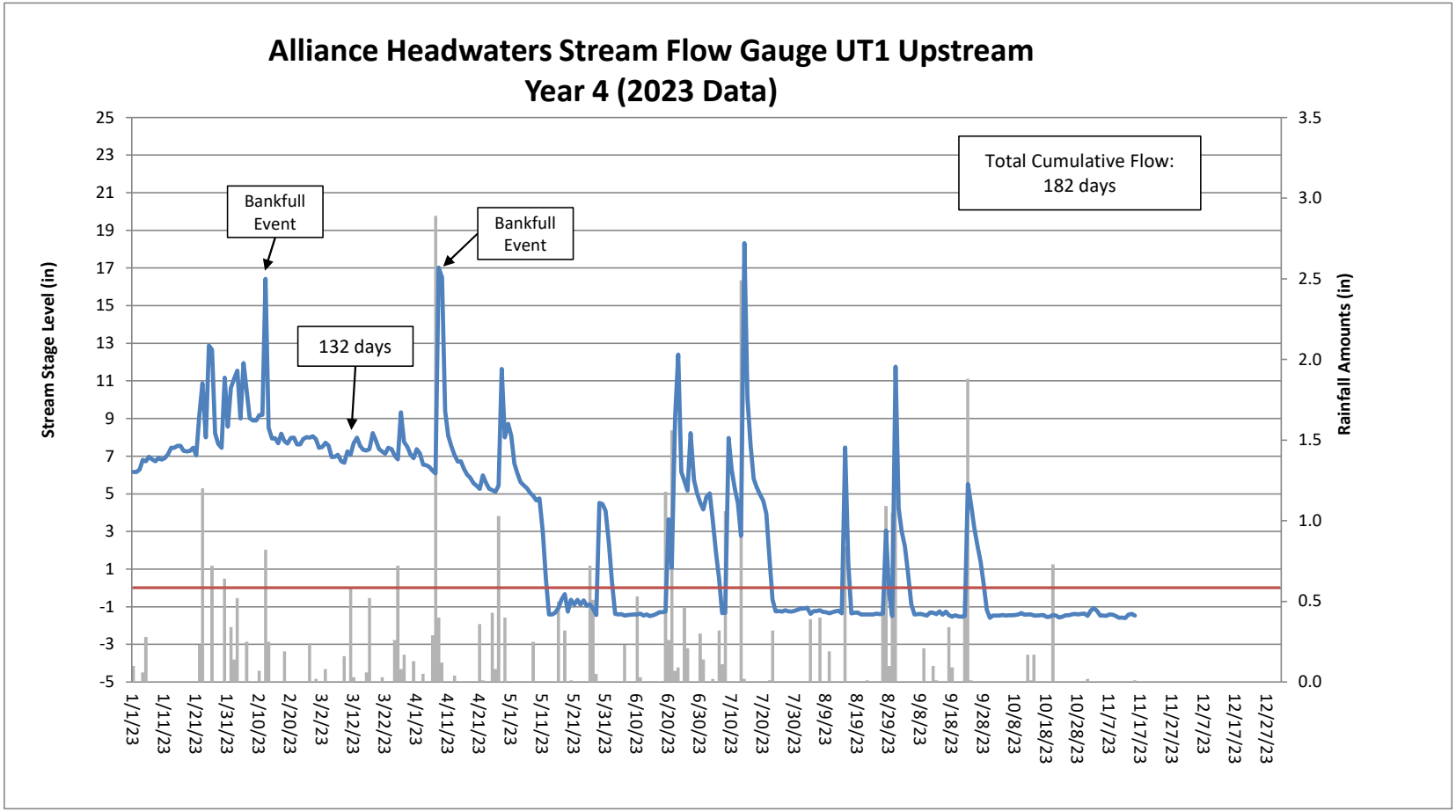
Alliance Headwaters Stream Flow Gauge UT1 Upstream
Year 4 (2023 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Total Cumulative Flow:
182 days
Bankfull Event
Bankfull Event
132 days
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
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3/12/23
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4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
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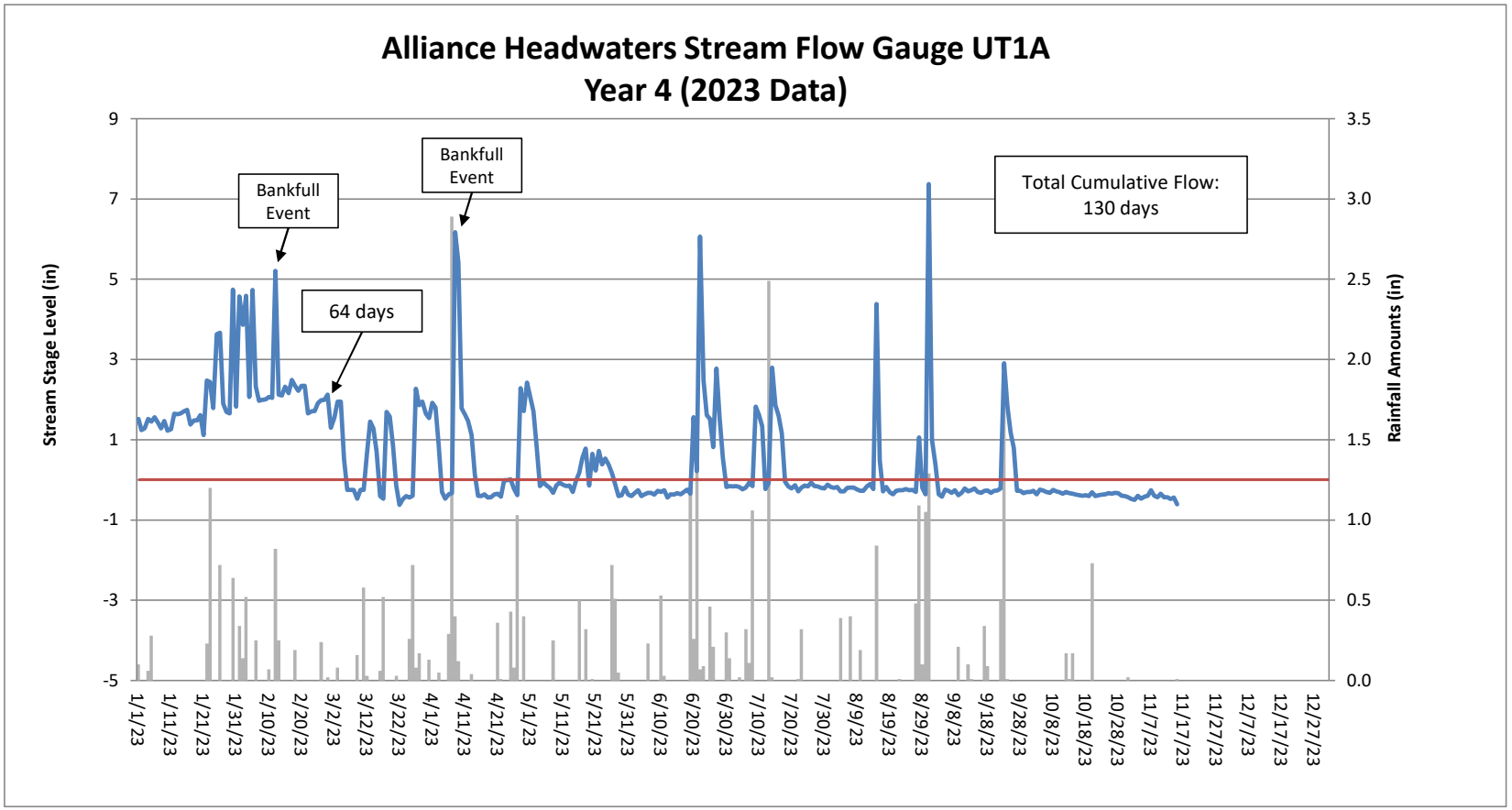
Alliance Headwaters Stream Flow Gauge UT1A
Year 4 (2023 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Bankfull Event
Bankfull Event
64 days
Total Cumulative Flow: 130 days
9
7
5
3
1
-1
-3
-5
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
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1/31/23
2/10/23
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3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
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7/10/23
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8/9/23
8/19/23
8/29/23
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9/18/23
9/28/23
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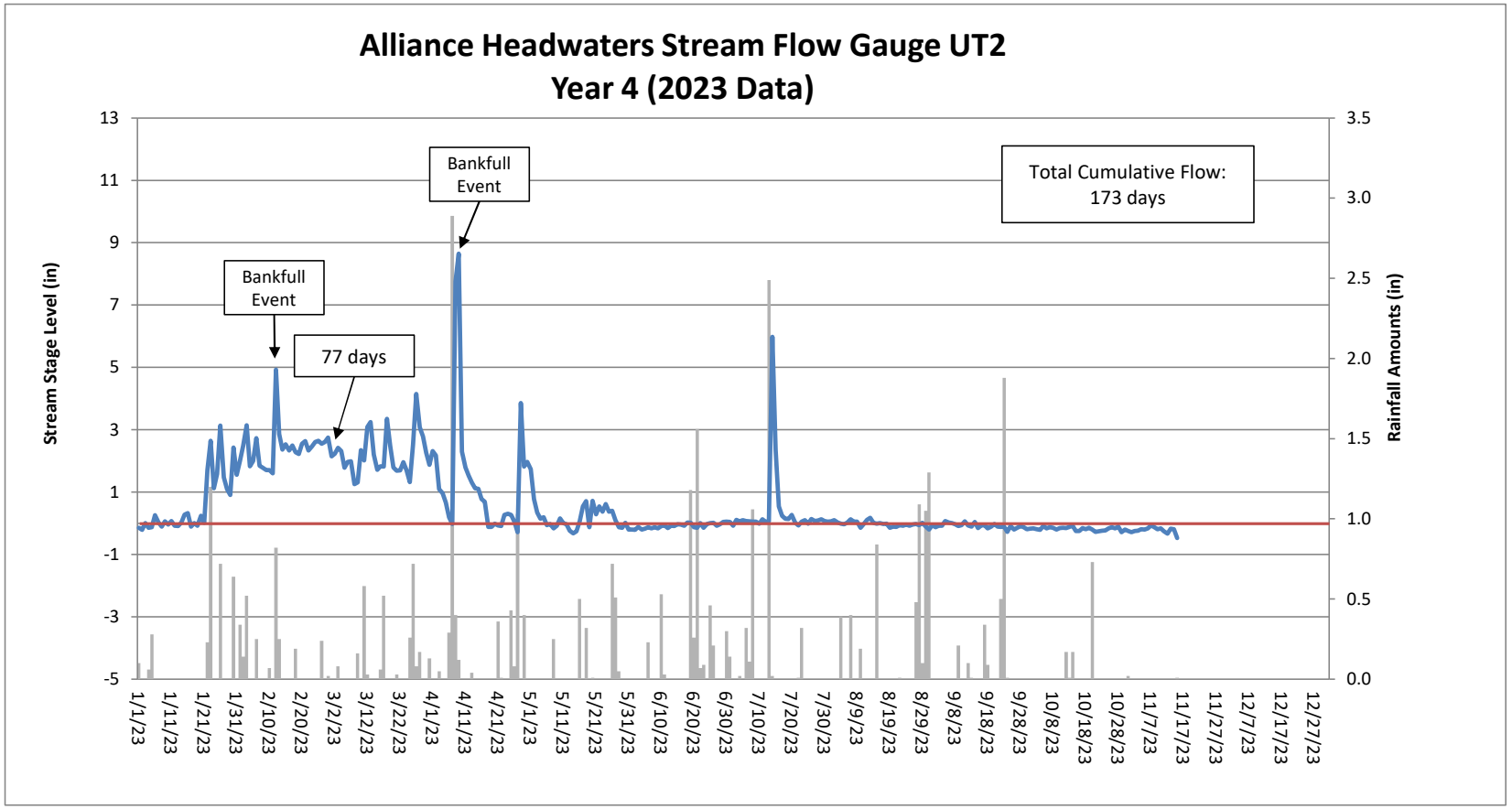
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Stream Flow Gauge UT2
Year 4 (2023 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Bankfull Event
Bankfull Event
77 days
Total Cumulative Flow: 173 days
13
11
9
7
5
3
1
-1
-3
-5
3.5
3.0
2.5
2.0
1.5
1.0
0.5
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1/1/23
1/11/23
1/21/23
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3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
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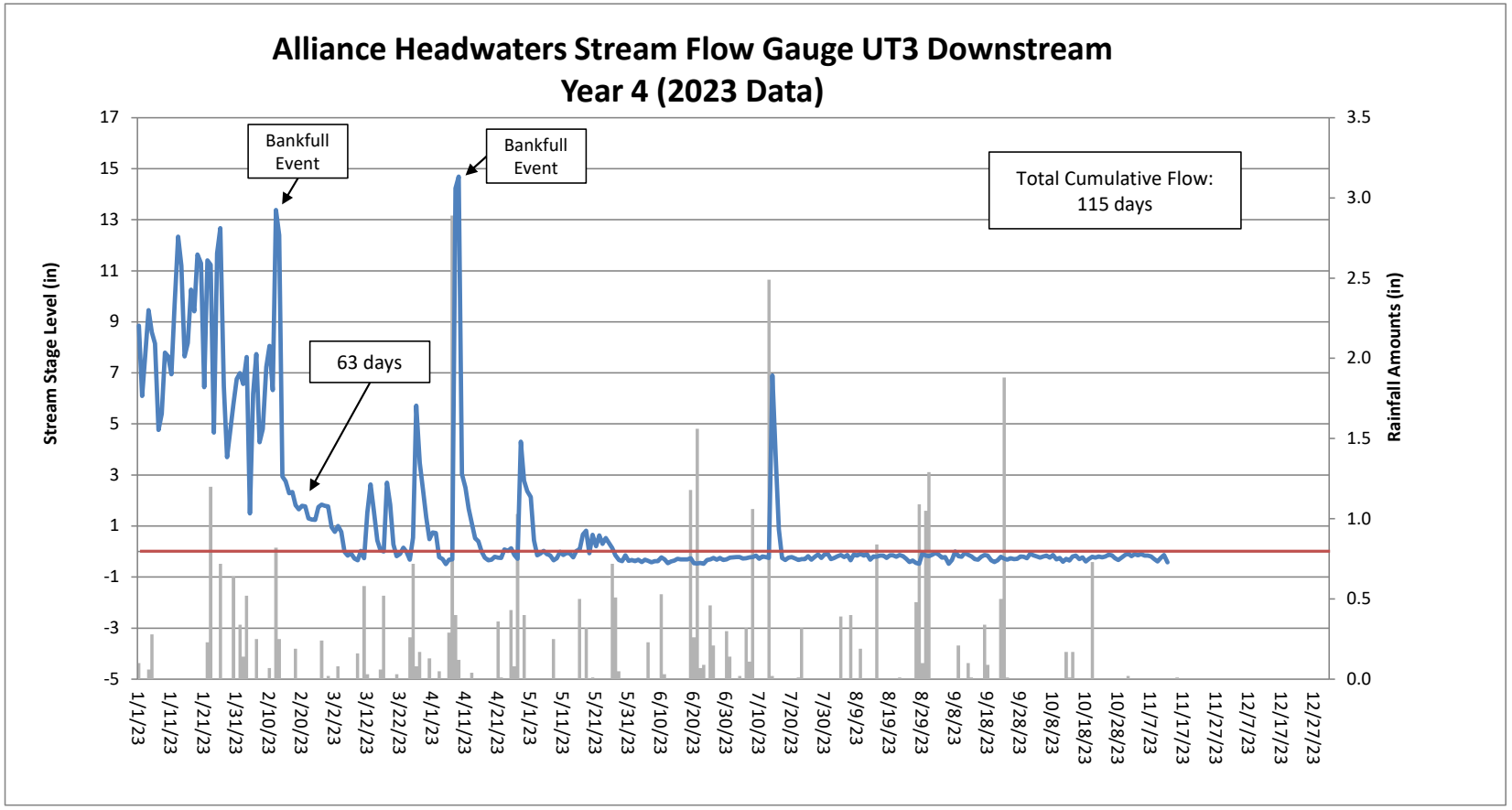
12/17/23
12/27/23


Alliance Headwaters Stream Flow Gauge UT3 Downstream
Year 4 (2023 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Bankfull Event
Bankfull Event
63 days
Total Cumulative Flow: 115 days
17
15
13
11
9
7
5
3
1
-1
-3
-5
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
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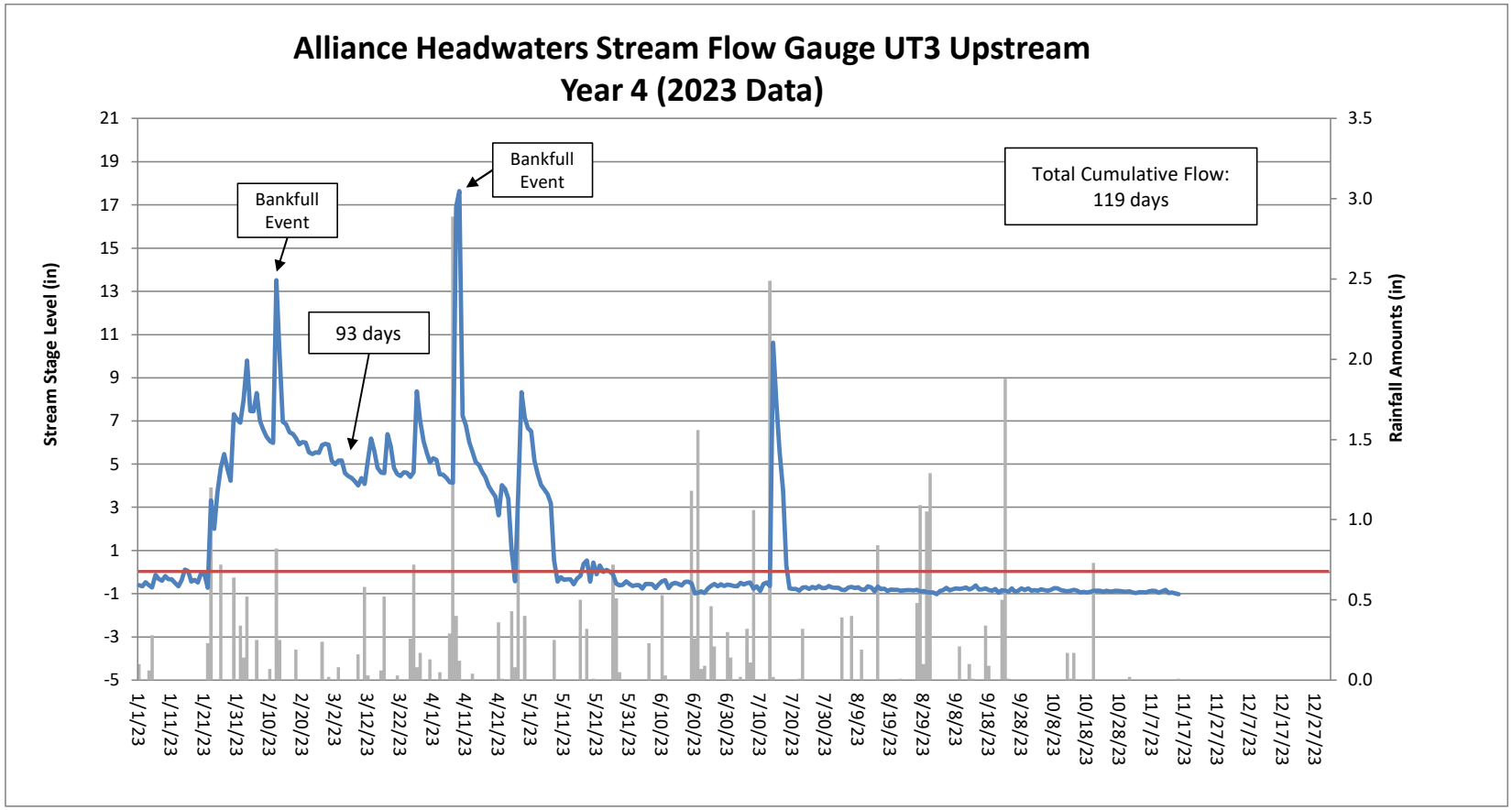
12/17/23
12/27/23


Alliance Headwaters Stream Flow Gauge UT3 Upstream
Year 4 (2023 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Bankfull Event
Bankfull Event
93 days
Total Cumulative Flow: 119 days
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
3.5
3.0
2.5
2.0
1.5
1.0
0.5
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1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
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4/1/23
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4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
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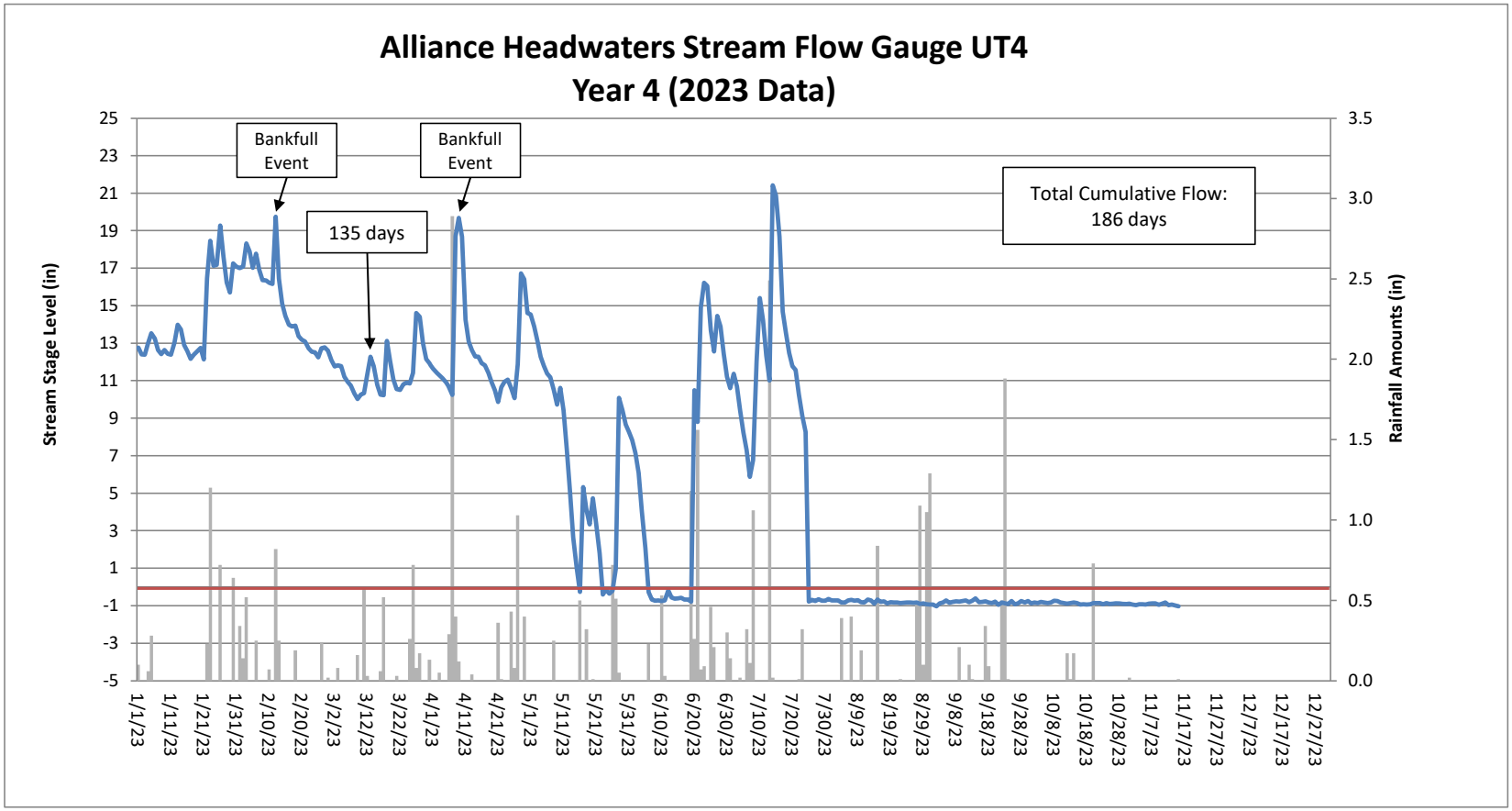
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Stream Flow Gauge UT4
Year 4 (2023 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Bankfull Event
Bankfull Event
135 days
Total Cumulative Flow: 186 days
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
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11/17/23
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12/7/23
12/17/23
12/27/23

Table 11. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Method	Tributaries	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.	UT3	8
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.	UT1	9
March 16, 2021	March 16, 2021	The UT1, UT2, UT3, and UT4 stream gauges and UT1, UT3, and UT4 trail cameras captured a bankfull event after 2.35 inches of rain was documented on March 16, 2021 at an on-site rain gauge	UT1, UT2, UT3, UT4	10-12
February 28, 2022	January 16, 2022	All stream gauges and the UT2 trail camera captured a bankfull event on all site streams after 1.37 inches of rain was documented at an on-site rain gauge.	UT1, UT1A, UT2, UT3, UT4	13
April 10, 2023	February 12, 2023	Bankfull event captured by all stream gauges and the UT2 camera after 0.82 and 0.25 inches of rain were recorded on the days leading up to this event by an on-site rain gauge.	UT1, UT1A, UT2, UT3, UT4	14
July 25, 2023	April 9, 2023	All stream gauges and the UT3 and UT4 cameras recorded a bankfull event after 2.89 inches of rain fell, as documented by an on-site rain gauge.	UT1, UT1A, UT2, UT3, UT4	15, 16

Photo 8: UT3 at bankfull stage.

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

Photo 10: UT1 at bankfull stage.

Photo 11: UT3 at bankfull stage.

Photo 12: UT4 at bankfull stage.

Photo 13: UT2 receding from an overnight bankfull event.

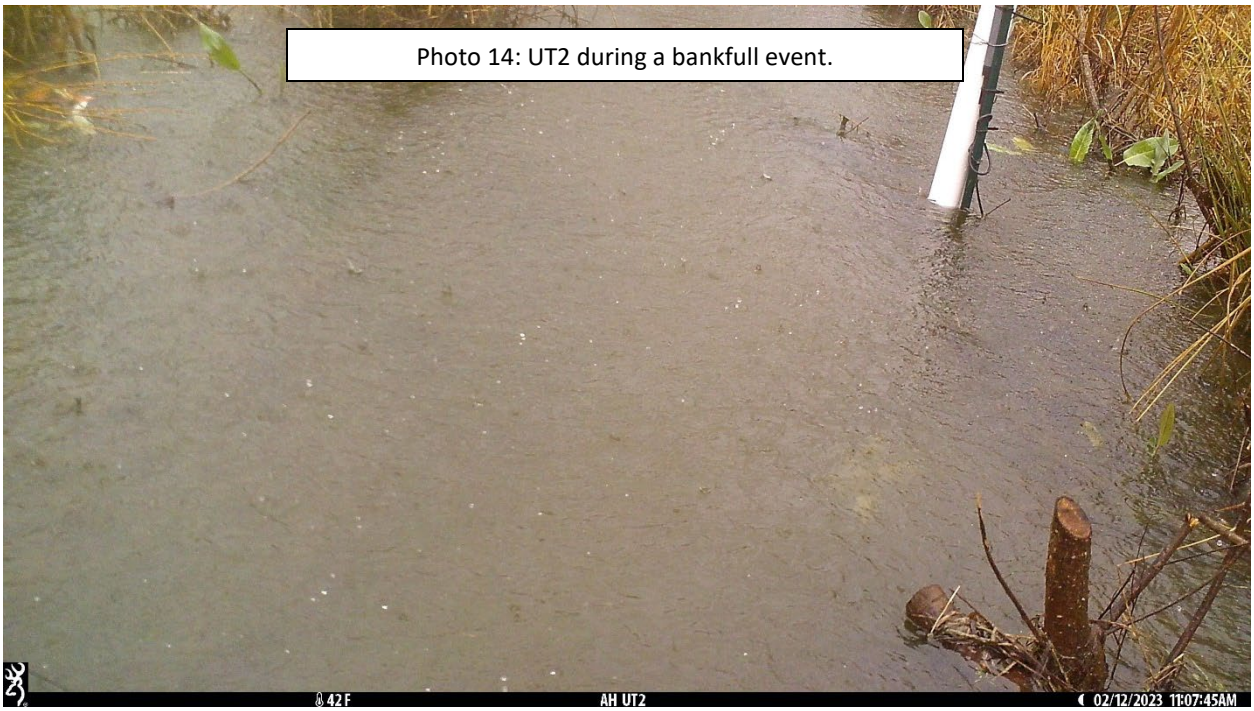


Photo 14: UT2 during a bankfull event.

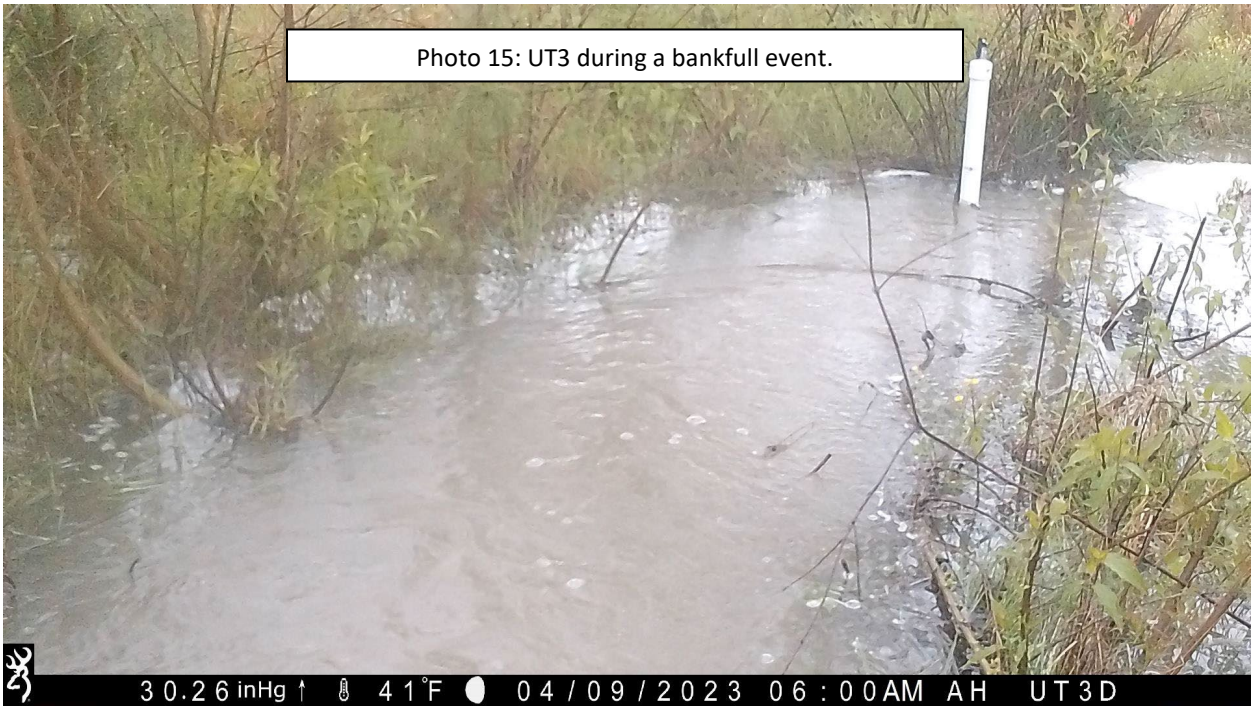


Photo 15: UT3 during a bankfull event.

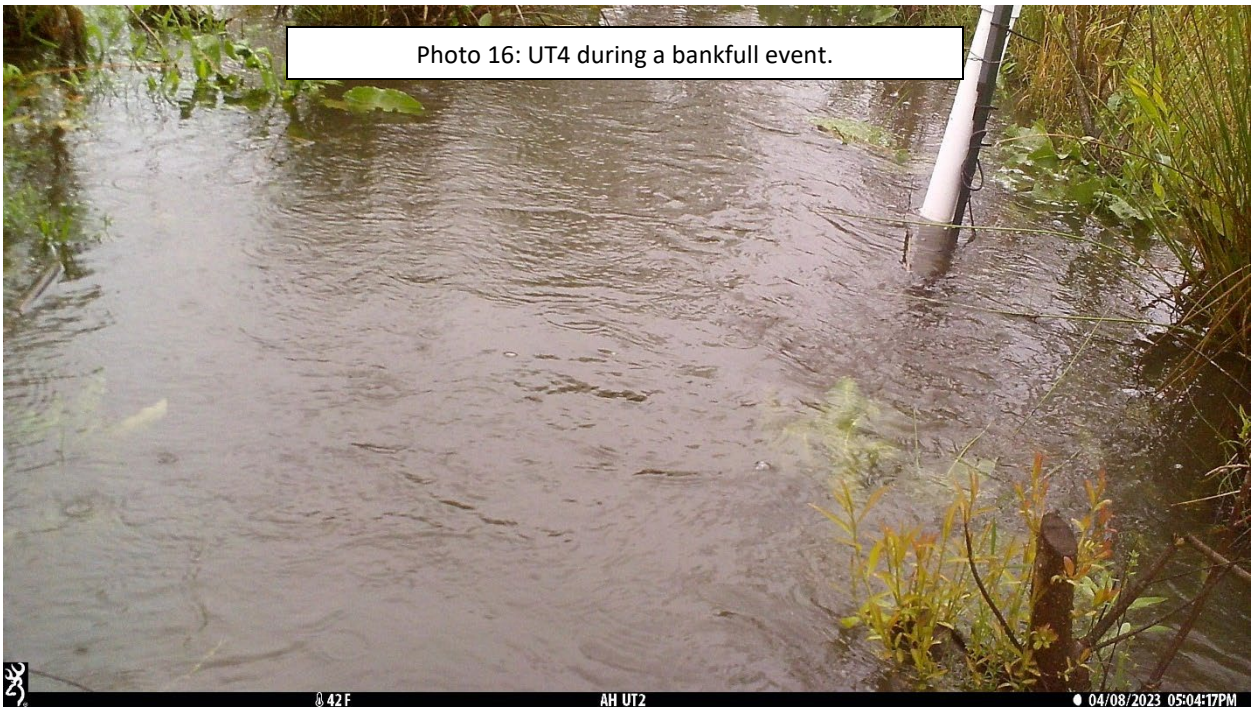
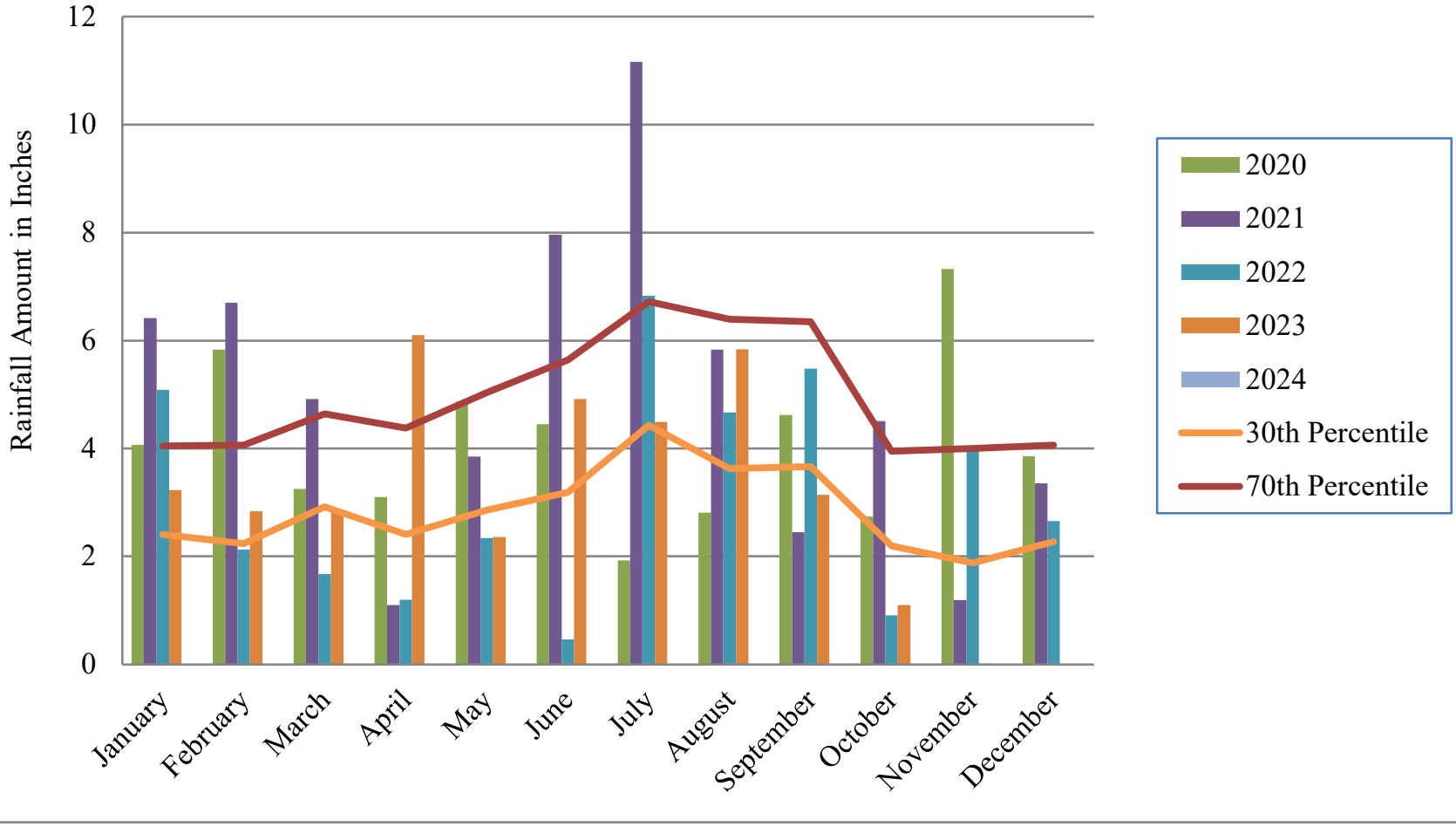


Photo 16: UT4 during a bankfull event.

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



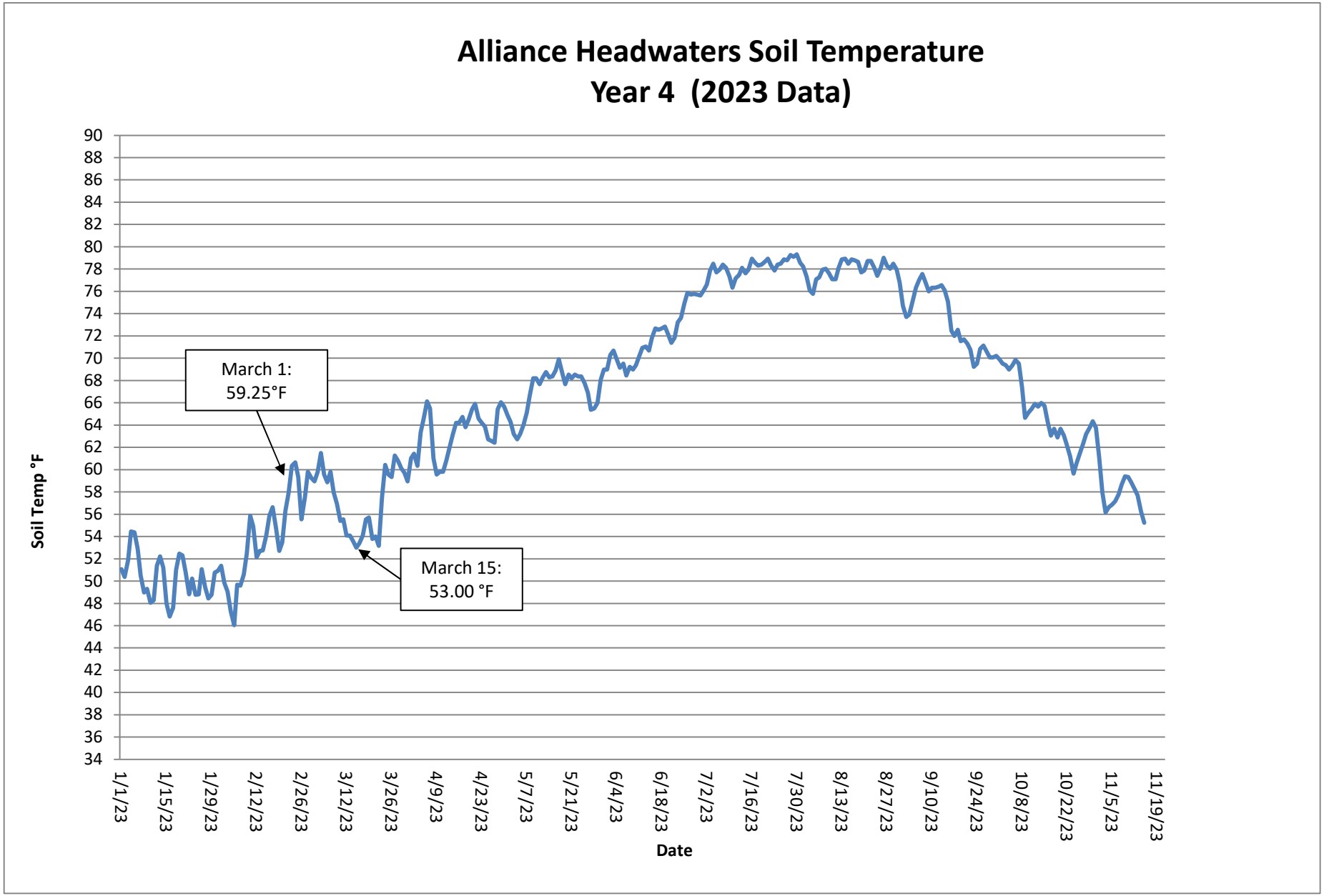

Alliance Headwaters Soil Temperature
Year 4 (2023 Data)
Soil Temp °F
90
88
86
84
82
80
78
76
74
72
70
68
66
64
62
60
58
56
54
52
50
48
46
44
42
40
38
36
34
March 1:
59.25°F
March 15:
53.00 °F
1/1/23
1/15/23
1/29/23
2/12/23
2/26/23
3/12/23
3/26/23
4/9/23
4/23/23
5/7/23
5/21/23
6/4/23
6/18/23
7/2/23
7/16/23
7/30/23
8/13/23
8/27/23
9/10/23
9/24/23
10/8/23
10/22/23
11/5/23
11/19/23
Date

Table 12. Groundwater Hydrology Data

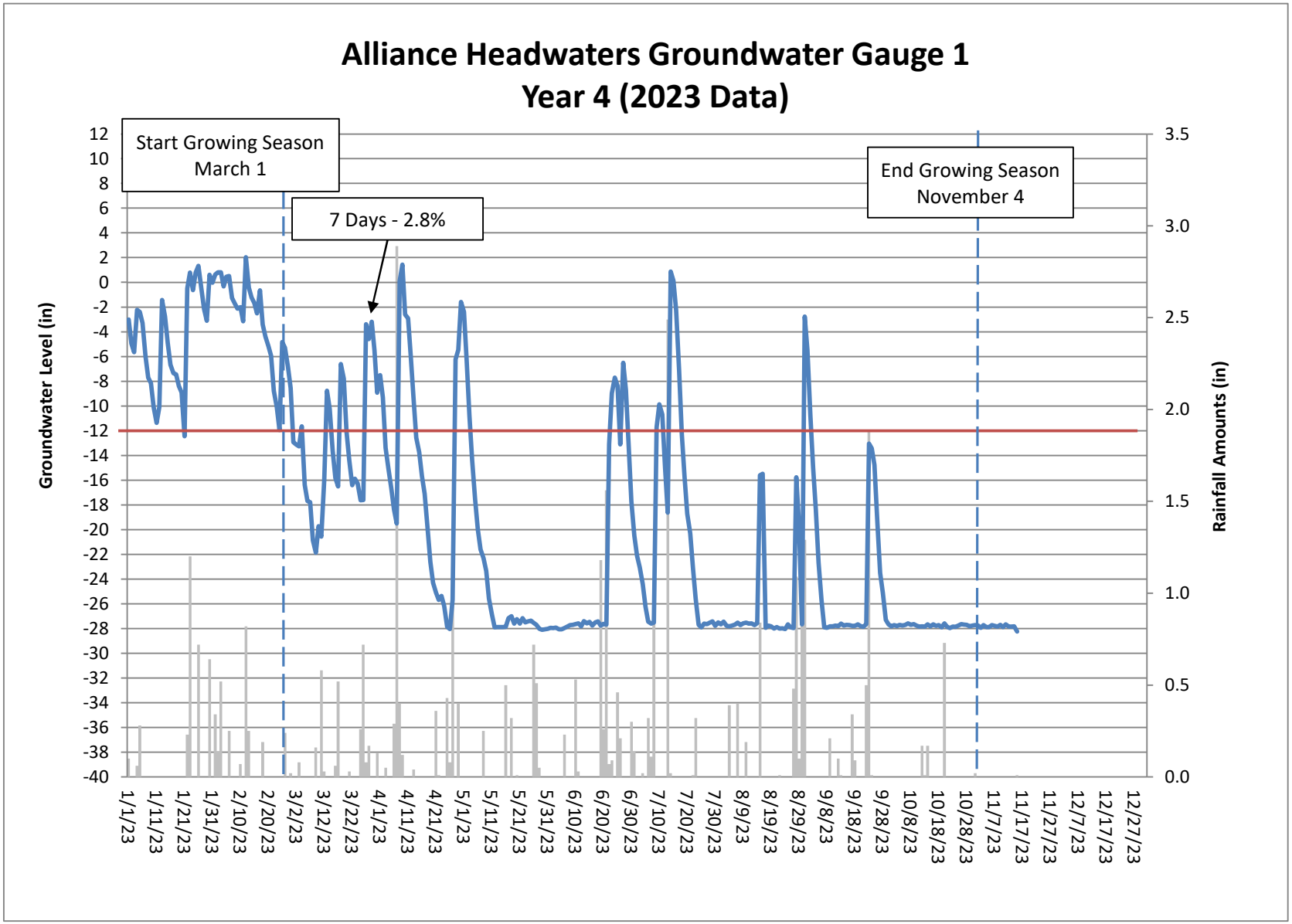
Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
1	No 9 days (3.6%)	Yes 37 days (14.9%)	No 12 days (4.8%)	No 7 days (2.8%)			
2	No 9 days (3.6%)	No 21 days (8.4%)	No 11 days (4.4%)	No 5 days (2.0%)			
3	Yes 55 days (22.2%)	Yes 86 days (34.5%)	Yes 28 days (11.2%)	Yes 49 days (20.0%)			
4	No 10 days (4.0%)	Yes 36 days (14.5%)	No 3 days (1.2%)	No 2 days (0.8%)			
5	Yes 29 days (11.7%)	No 19 days (7.6%)	No 11 days (4.4%)	No 7 days (2.8%)			
6	No 16 days (6.5%)	No 20 days (8.0%)	No 14 days (5.6%)	No 9 days (3.6%)			
7	No 7 days (2.8%)	No 8 days (3.2%)	No 4 days (1.6%)	No 4 days (1.6%)			
8	Yes 50 days (20.2%)	Yes 51 days (20.5%)	No 13 days (5.2%)	No 7 days (2.8%)			
9	Yes 75 days (32.7%)	Yes 93 days (37.3%)	Yes 45 days (18.1%)	Yes 71 days (28.5%)			
10	Yes 72 days (29.0%)	Yes 58 days (23.3%)	Yes 28 days (11.2%)	Yes 38 days (15.0%)			
11	Yes 64 days (25.8%)	Yes 42 days (16.9%)	No 13 days (5.2%)	No 10 days (4.0%)			
12	No 18 days (7.3%)	Yes 36 days (14.5%)	No 22 days (8.8%)	No 10 days (4.0%)			
13	No 20 days (8.1%)	Yes 58 days (23.3%)	No 21 days (8.4%)	Yes 27 days (10.8%)			
14	No 16 days (6.5%)	Yes 44 days (17.7%)	No 12 days (4.8%)	No 8 days (3.2%)			
15	No 13 days (5.2%)	No 18 days (7.2%)	No 21 days (8.4%)	No 15 days (6.0%)			
16	Yes 34 days (13.7%)	Yes 70 days (28.1%)	Yes 27 days (10.8%)	Yes 41 days (16.5%)			
17	No 19 days (7.7%)	Yes 36 days (14.5%)	No 13 days (5.2%)	No 13 days (5.2%)			
18	No 10 days (4.0%)	No 19 days (7.6%)	No 11 days (4.4%)	No 9 days (3.8%)			
19	No 8 days (3.2%)	No 10 days (4.0%)	No 4 days (1.6%)	No 5 days (2.0%)			

Table 12. 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%)	Yes 25 days (10.0%)	Yes 39 days (15.7%)			
21	Yes 34 days (13.7%)	Yes 36 days (14.5%)	No 22 days (8.8%)	No 11 days (4.4%)			
22	Yes 69 days (27.8%)	Yes 56 days (22.5%)	Yes 28 days (11.2%)	Yes 48 days (19.3%)			
23	Yes 35 days (14.1%)	Yes 42 days (16.9%)	Yes 25 days (10.0%)	Yes 25 days (10.0%)			
24	No 5 days (2.0%)	No 14 days (5.6%)	No 1 day (0.4%)	No 6 days (2.4%)			
25	Yes 46 days (18.5%)	Yes 55 days (21.1%)	Yes 27 days (10.8%)	Yes 49 days (19.7%)			
26	Yes 167 days (67.3%)	Yes 88 days (35.3%)	Yes 61 days (24.5%)	Yes 84 days (33.7%)			
27	Yes 74 days (29.8%)	Yes 57 days (22.9%)	No 13 days (5.2%)	No 12 days (4.8%)			
28	Yes 45 days (18.1%)	Yes 49 days (19.7%)	No 4 days (1.6%)	No 10 days (4.0%)			
29	Yes 45 days (18.1%)	Yes 81 days (32.5%)	Yes 12 days (4.8%)	No 10 days (4.0%)			
30*	NA	Yes 38 days (15.3%)	No 0 days (0.0%)	No 3 days (1.2%)			
31*	NA	Yes 98 days (39.4%)	Yes 44 days (17.7%)	Yes 27 days (10.8%)			
32*	NA	Yes 58 days (23.3%)	Yes 45 days (18.1%)	Yes 49 days (19.7%)			
33*	NA	Yes 42 days (16.9%)	No 13 days (5.2%)	No 8 days (3.2%)			
34*	NA	Yes 55 days (22.1%)	No 22 days (8.8%)	Yes 36 days (14.5%)			
35*	NA	Yes 42 days (16.9%)	No 13 days (5.2%)	No 8 days (3.2%)			
36**	NA	NA	NA	No 8 days (3.2%)			
Ref*	NA	Yes 51 days (20.5%)	No 15 days (6.0%)	Yes 49 days (19.7%)			

* 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.

**Prior to the MY4 (2023) growing season an additional wetland gauge was installed between gauges GW 24 and GW 30 to provide additional data for this area.


Alliance Headwaters Groundwater Gauge 1
Year 4 (2023 Data)
Start Growing Season
March 1
7 Days - 2.8%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
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9/18/23
9/28/23
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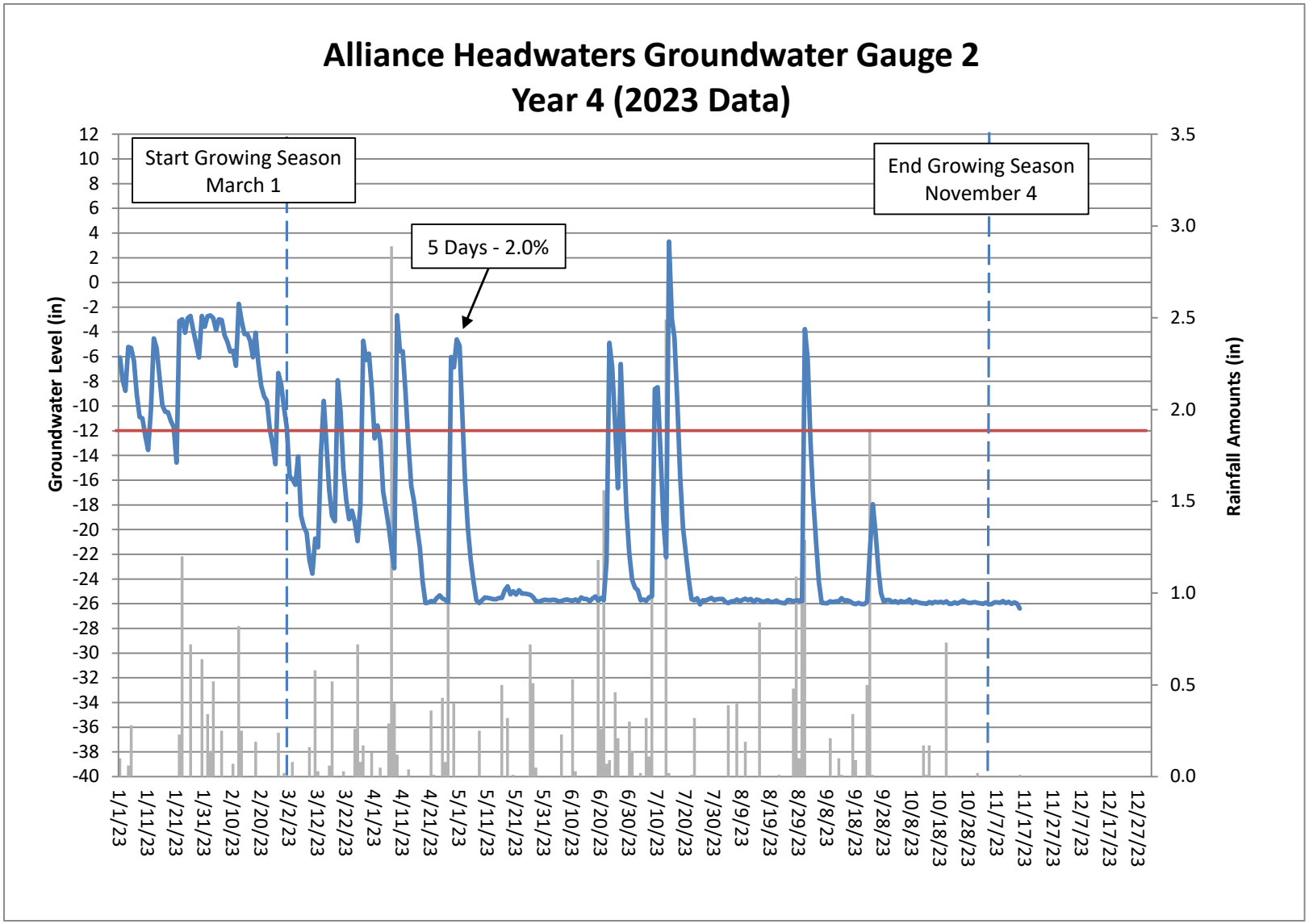
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 2
Year 4 (2023 Data)
Start Growing Season
March 1
End Growing Season
November 4
5 Days - 2.0%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
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4/11/23
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5/31/23
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8/19/23
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9/18/23
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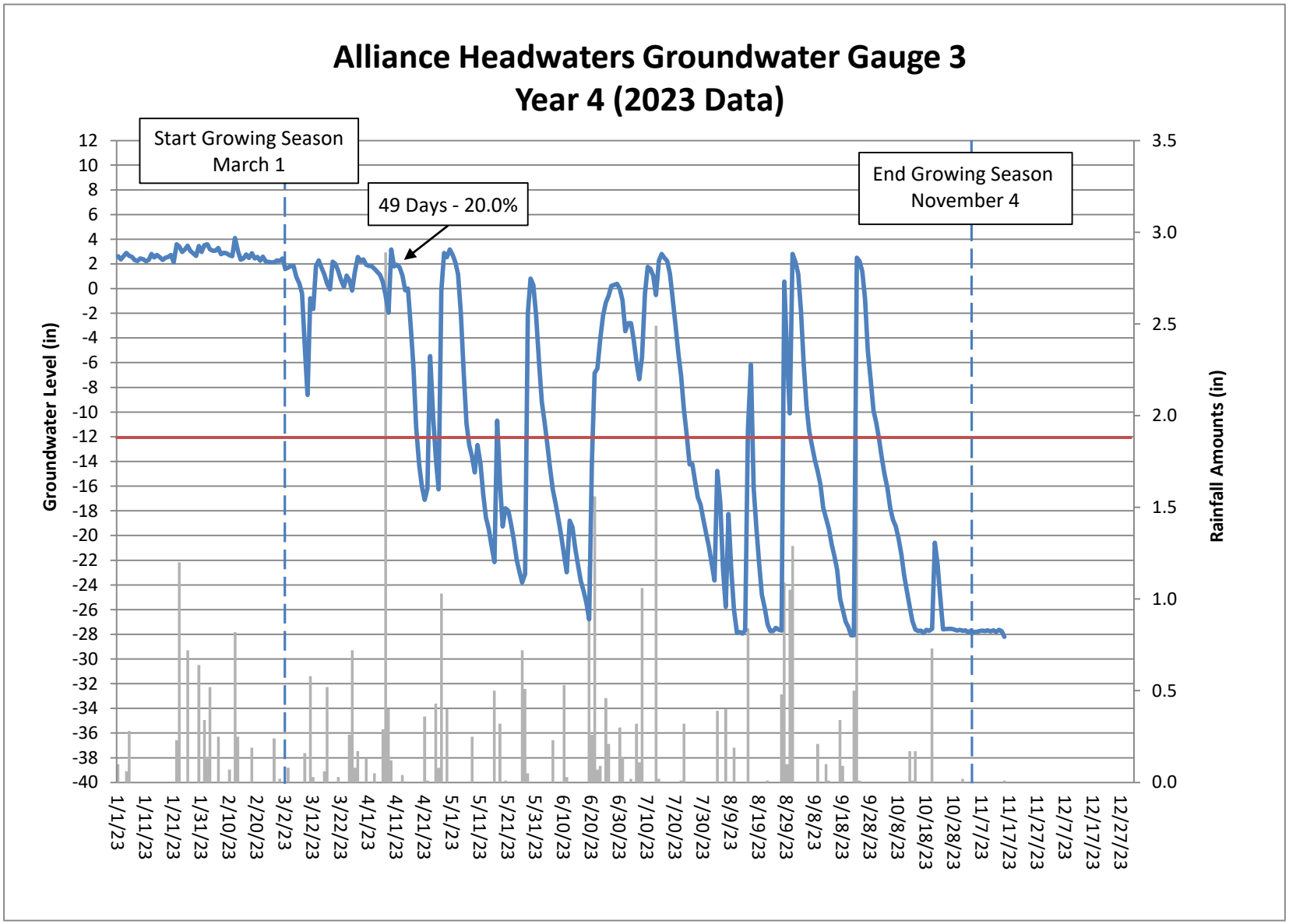
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 3
Year 4 (2023 Data)
Start Growing Season
March 1
49 Days - 20.0%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
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9/28/23
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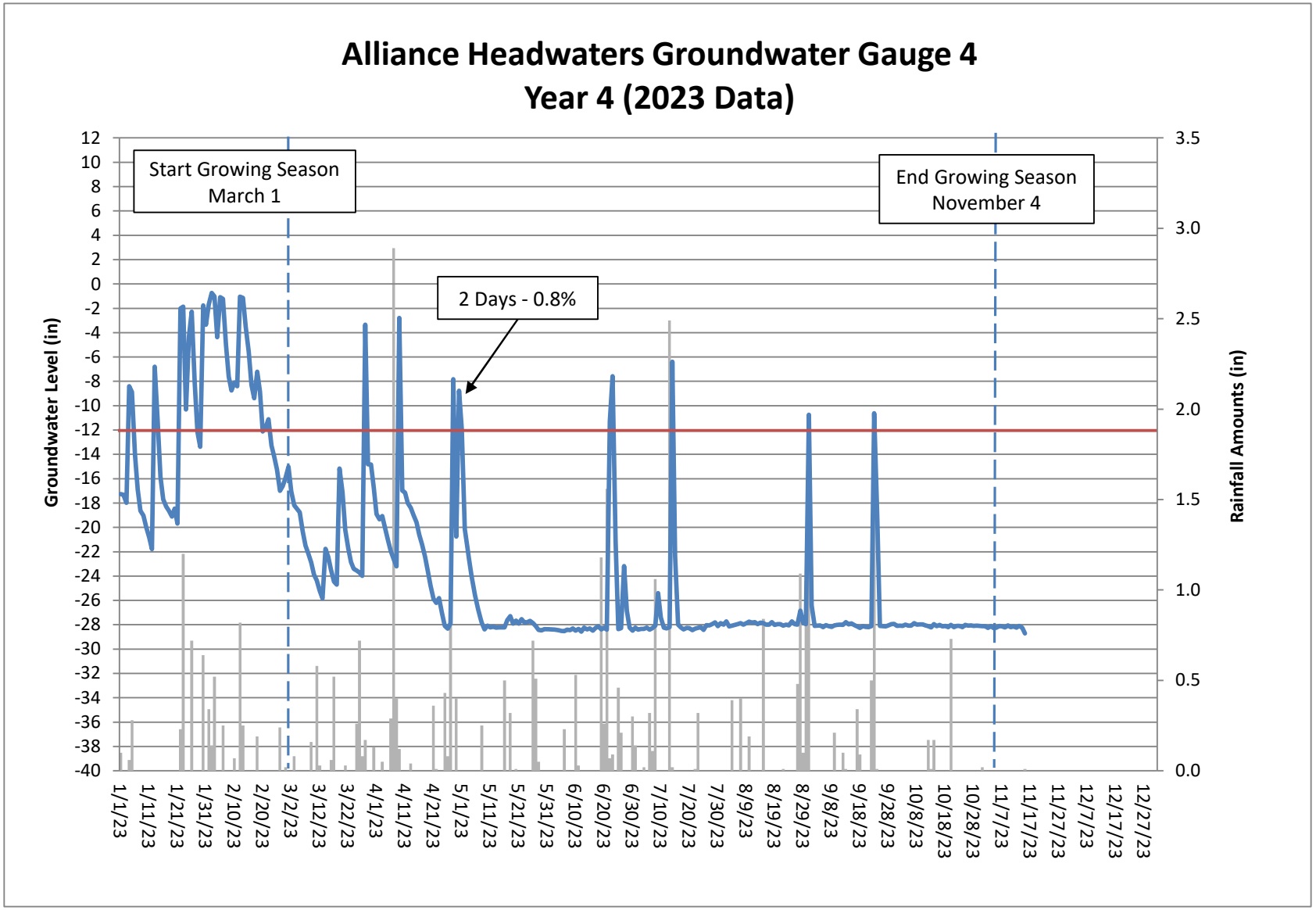
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 4
Year 4 (2023 Data)
Start Growing Season
March 1
End Growing Season
November 4
2 Days - 0.8%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
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1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
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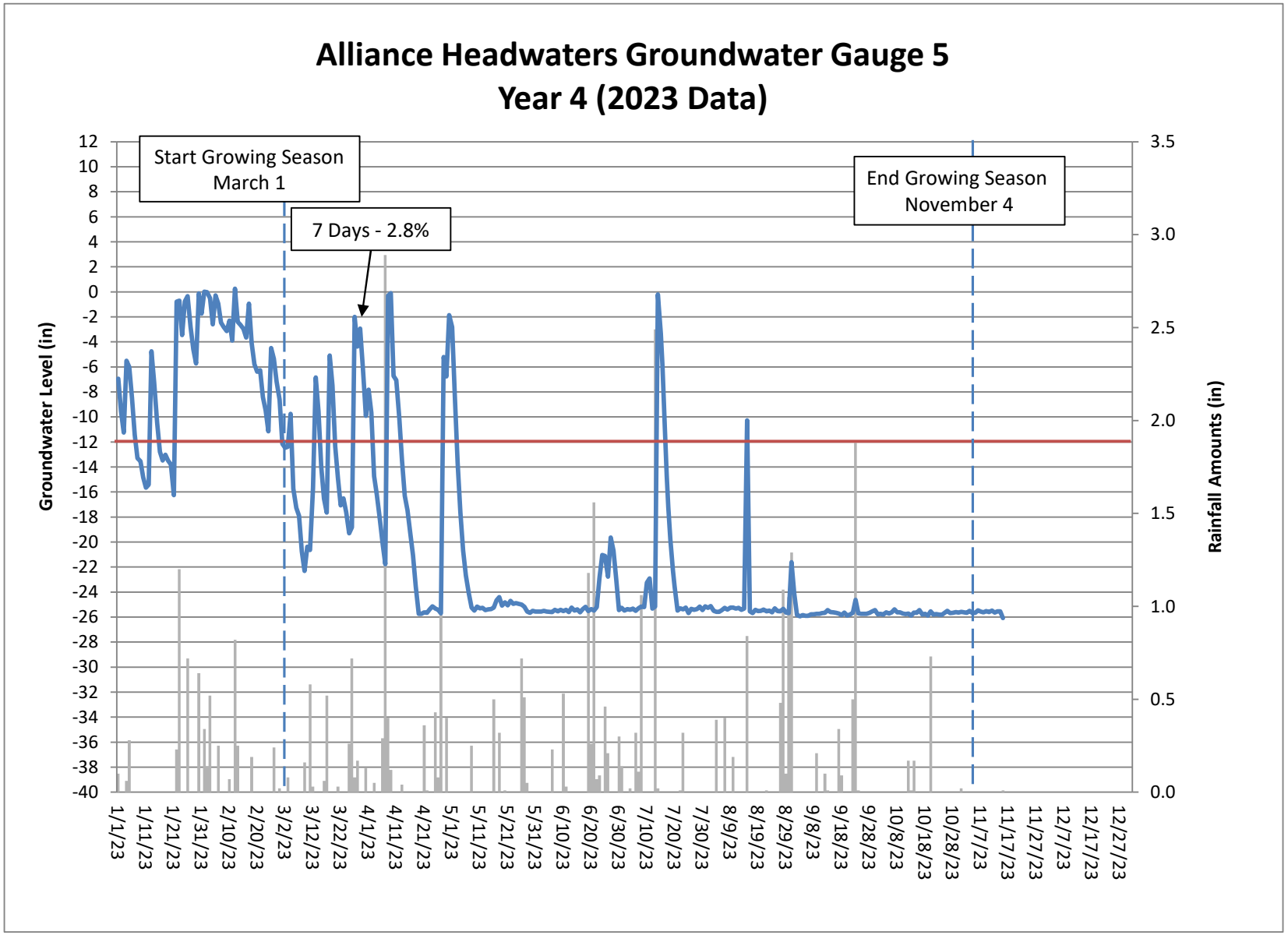
Alliance Headwaters Groundwater Gauge 5
Year 4 (2023 Data)
Start Growing Season
March 1
7 Days - 2.8%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
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1/1/23
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2/20/23
3/2/23
3/12/23
3/22/23
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4/11/23
4/21/23
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5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
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9/28/23
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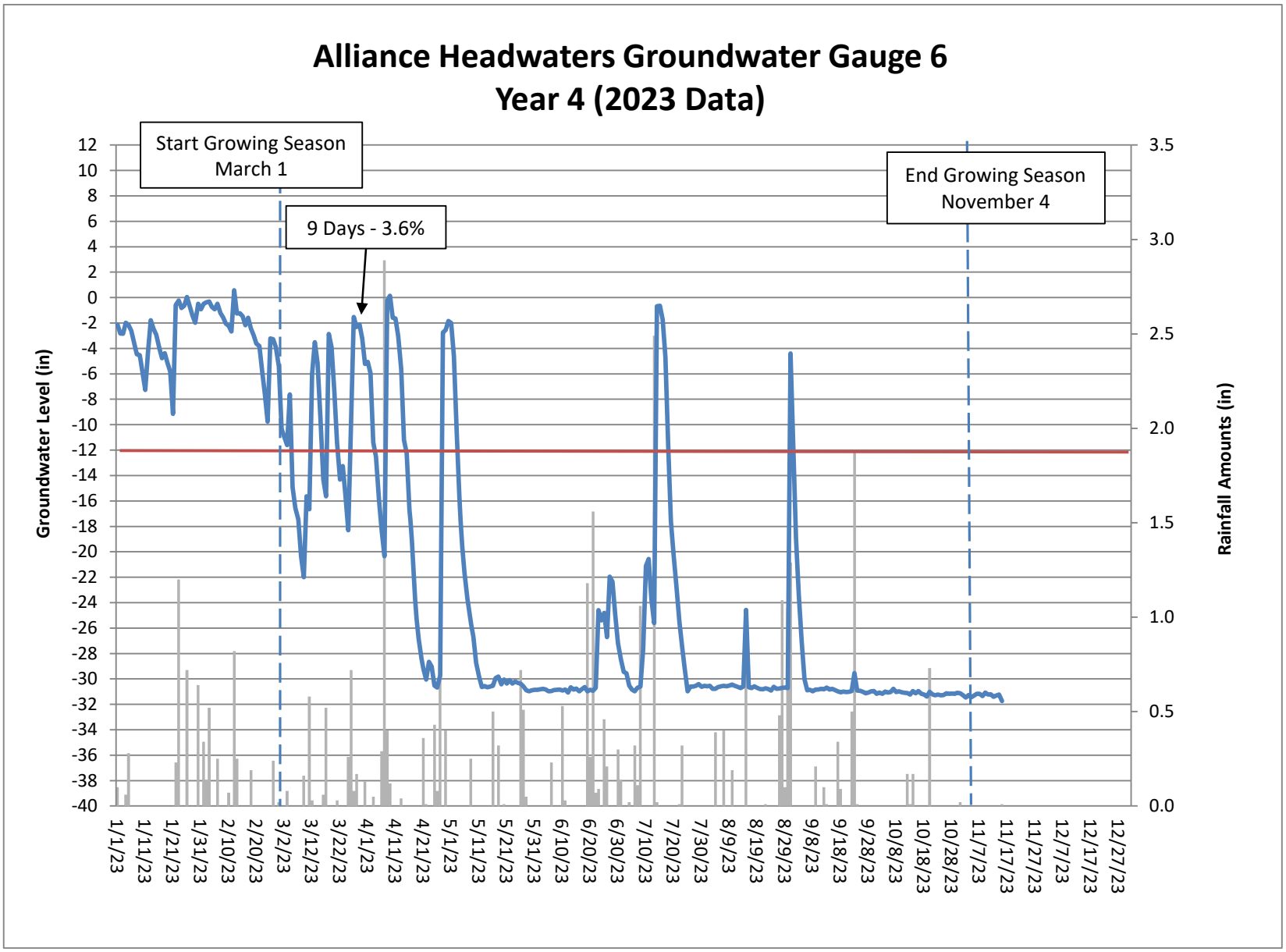
12/27/23


Alliance Headwaters Groundwater Gauge 6
Year 4 (2023 Data)
Start Growing Season
March 1
9 Days - 3.6%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
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1/1/23
1/11/23
1/21/23
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2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
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9/8/23
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9/28/23
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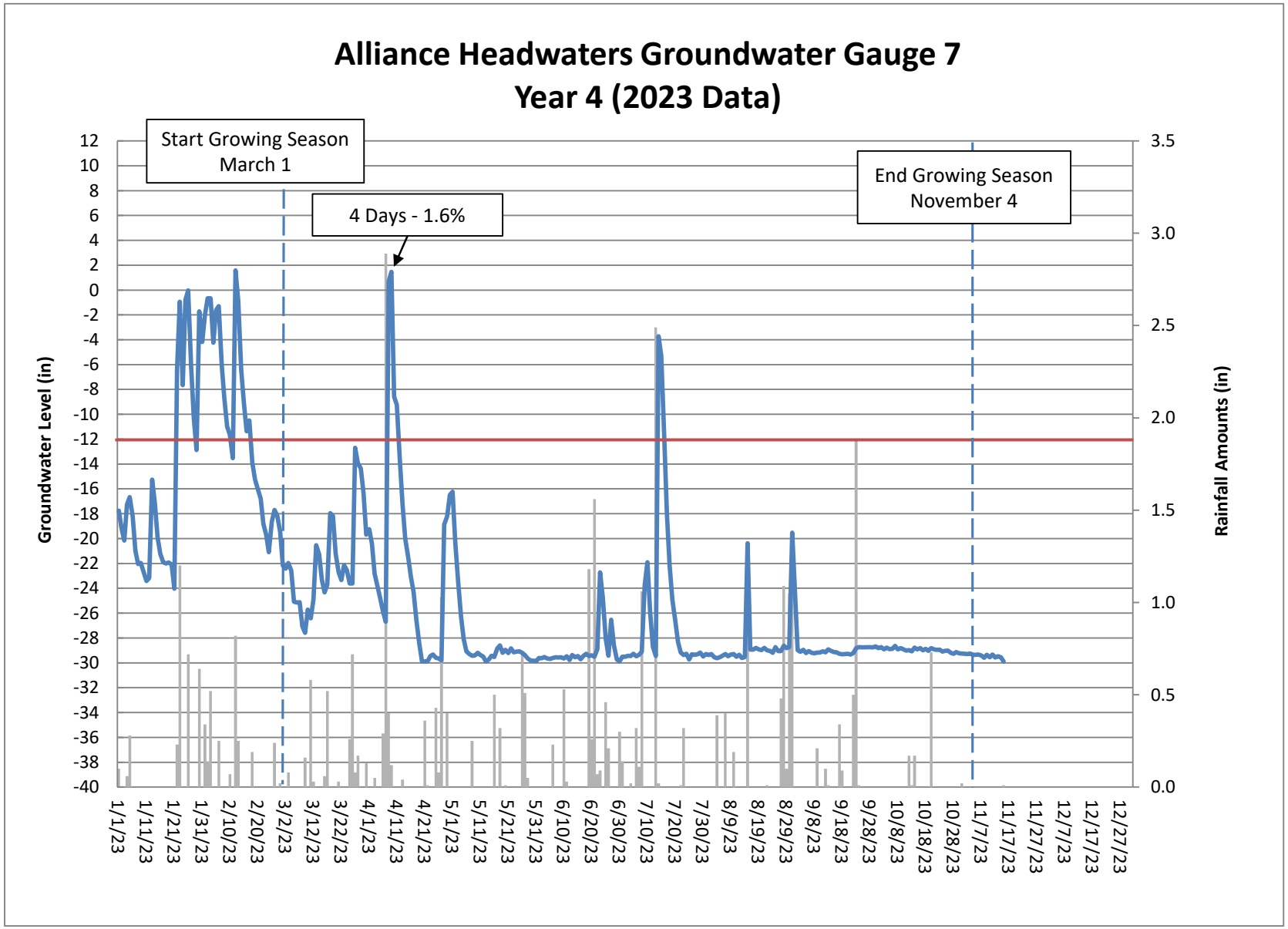
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 7
Year 4 (2023 Data)
Start Growing Season
March 1
4 Days - 1.6%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
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-28
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-32
-34
-36
-38
-40
3.5
3.0
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0.5
0.0
1/1/23
1/11/23
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2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
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6/20/23
6/30/23
7/10/23
7/20/23
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9/28/23
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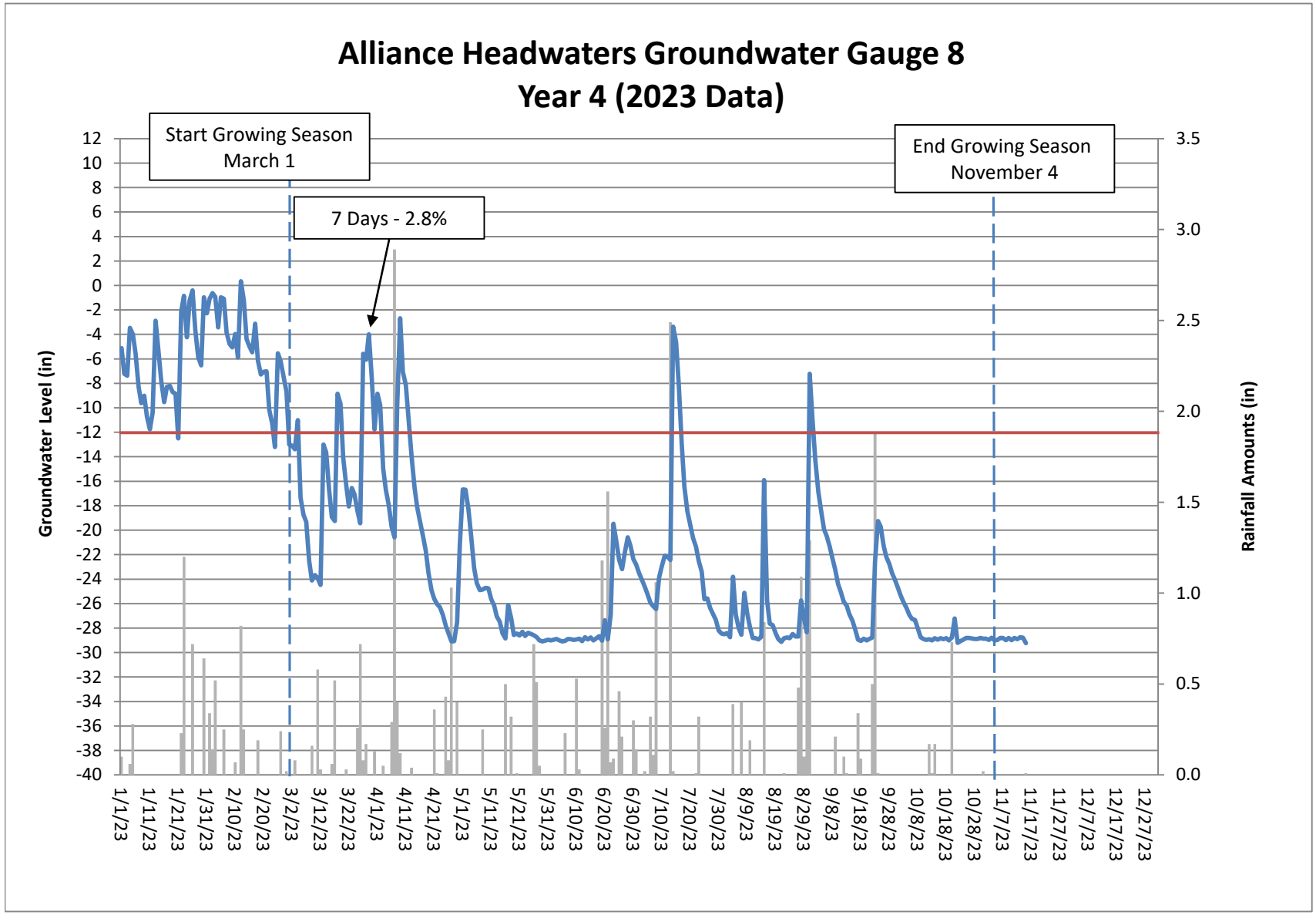
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 8
Year 4 (2023 Data)
Start Growing Season
March 1
End Growing Season
November 4
7 Days - 2.8%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
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-22
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-32
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-38
-40
3.5
3.0
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3/22/23
4/1/23
4/11/23
4/21/23
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5/21/23
5/31/23
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6/30/23
7/10/23
7/20/23
7/30/23
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8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
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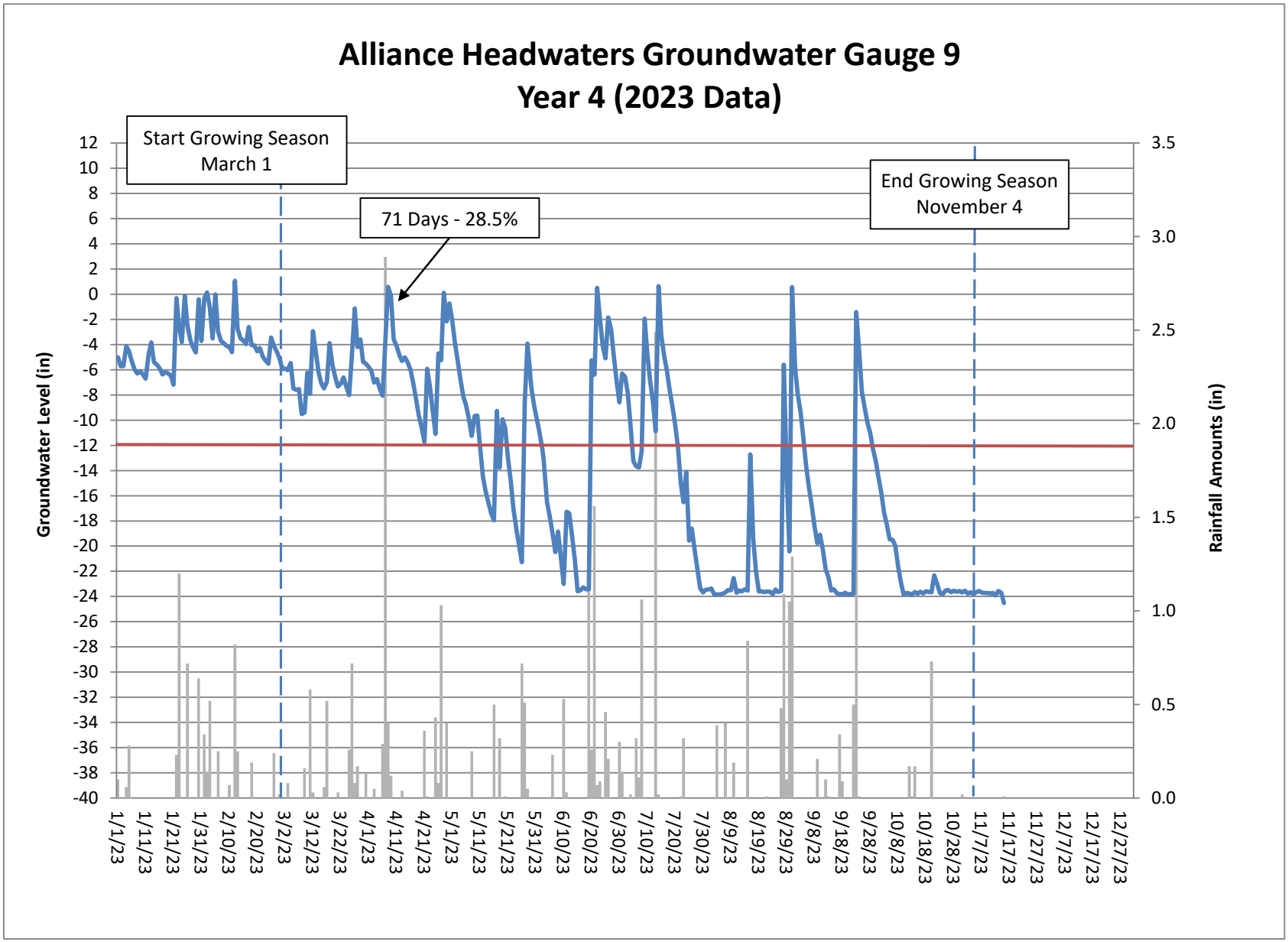
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 9
Year 4 (2023 Data)
Start Growing Season
March 1
71 Days - 28.5%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
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-2
-4
-6
-8
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-12
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-22
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-40
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3/22/23
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4/11/23
4/21/23
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7/10/23
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7/30/23
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9/28/23
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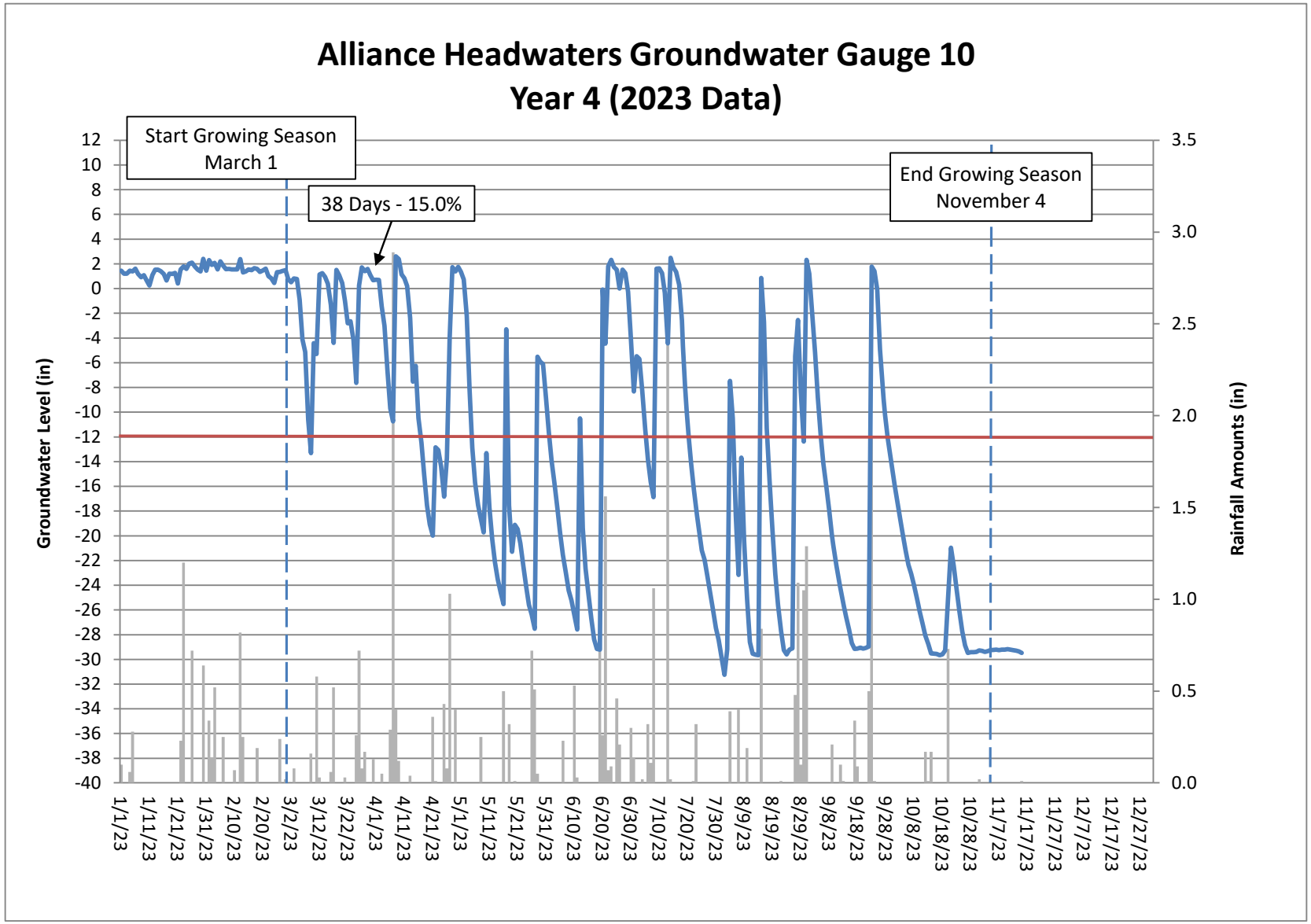
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 10
Year 4 (2023 Data)
Start Growing Season
March 1
38 Days - 15.0%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
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3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
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6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
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8/29/23
9/8/23
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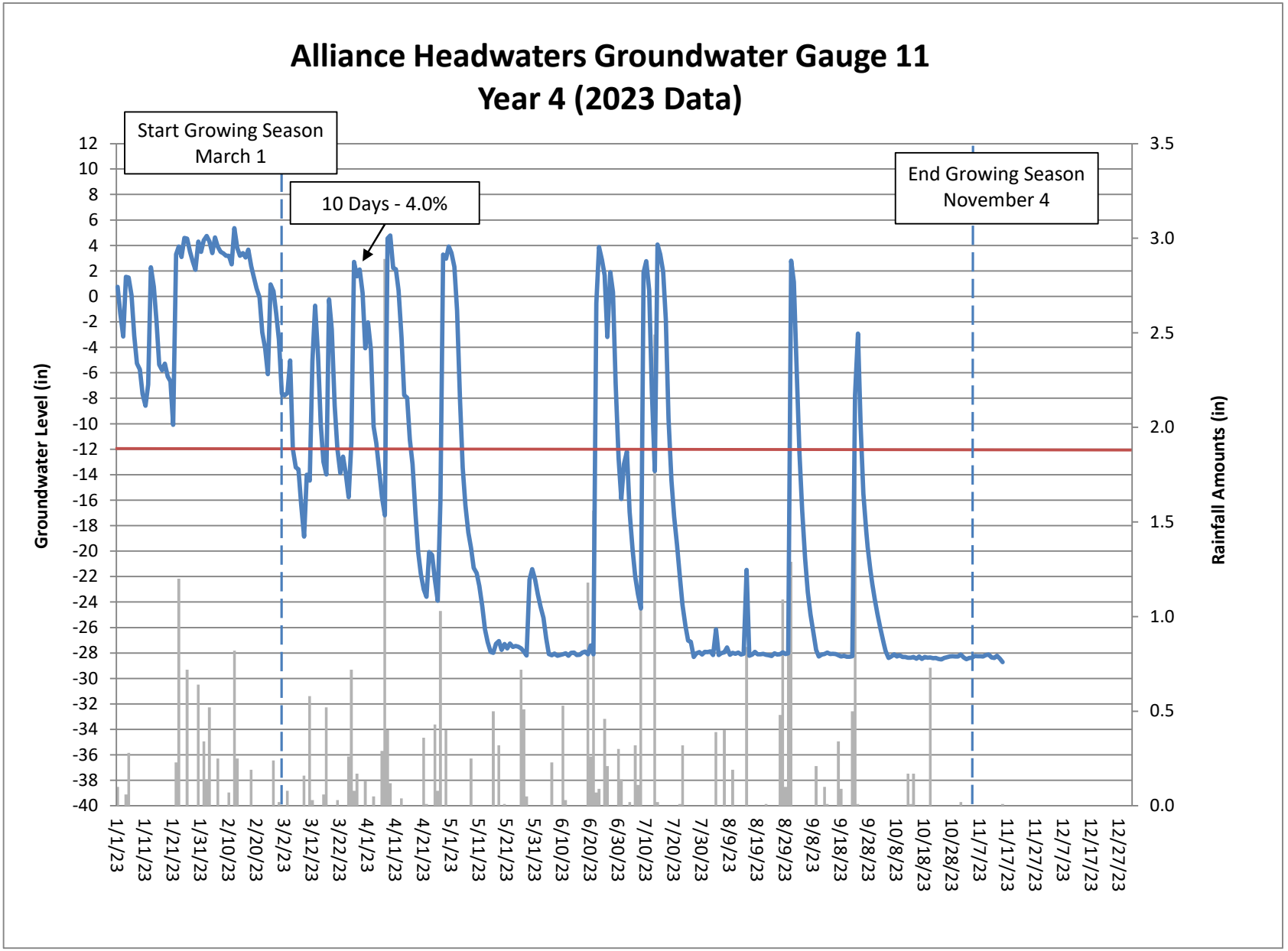
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 11
Year 4 (2023 Data)
Start Growing Season
March 1
10 Days - 4.0%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
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-12
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-16
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-20
-22
-24
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-32
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-36
-38
-40
3.5
3.0
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1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
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9/28/23
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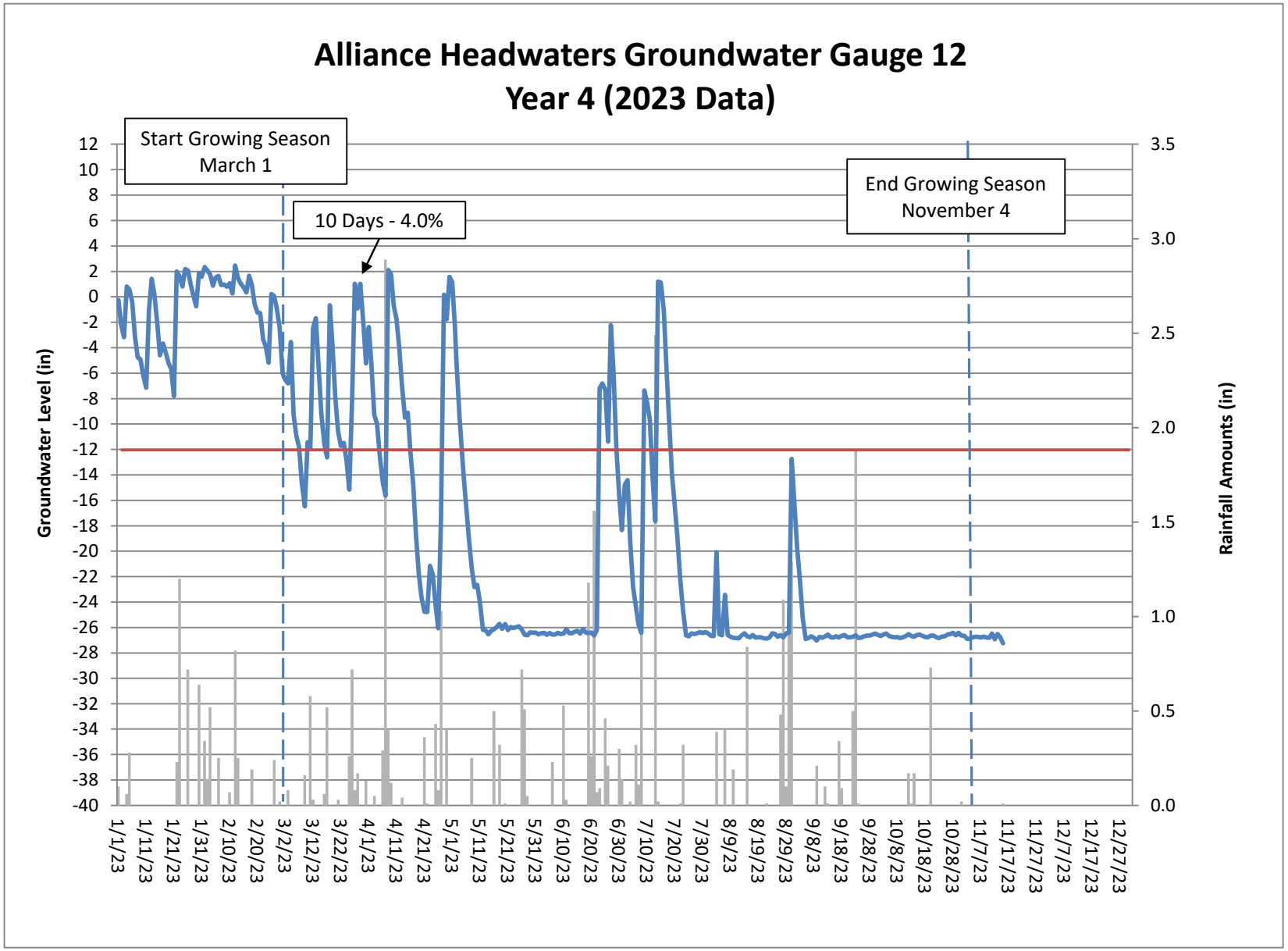
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 12
Year 4 (2023 Data)
Start Growing Season
March 1
10 Days - 4.0%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
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-30
-32
-34
-36
-38
-40
3.5
3.0
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1/1/23
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1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
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5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
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9/28/23
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10/28/23
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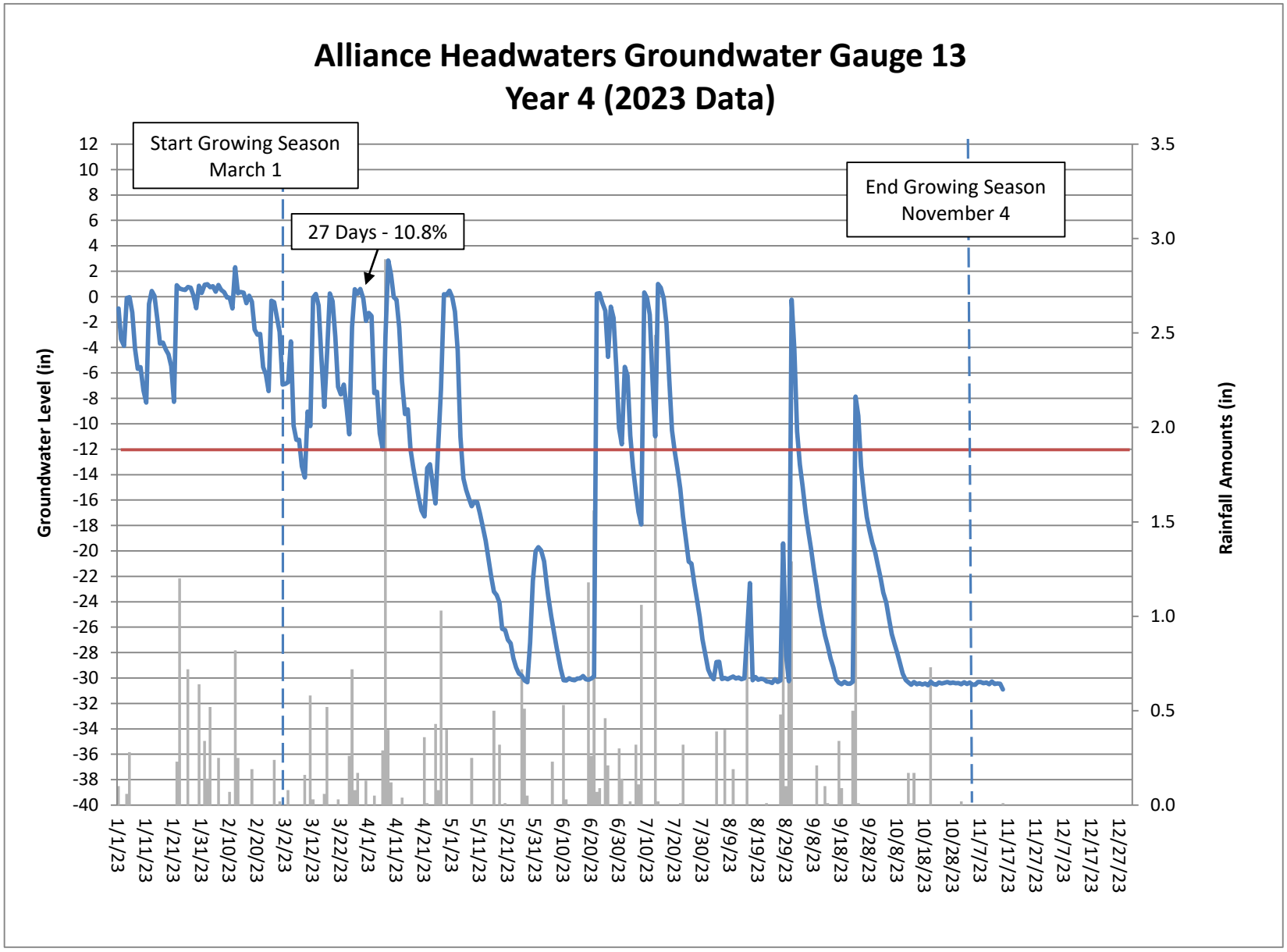
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 13
Year 4 (2023 Data)
Start Growing Season
March 1
27 Days - 10.8%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
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-22
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-40
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1/1/23
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1/21/23
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3/2/23
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7/30/23
8/9/23
8/19/23
8/29/23
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9/18/23
9/28/23
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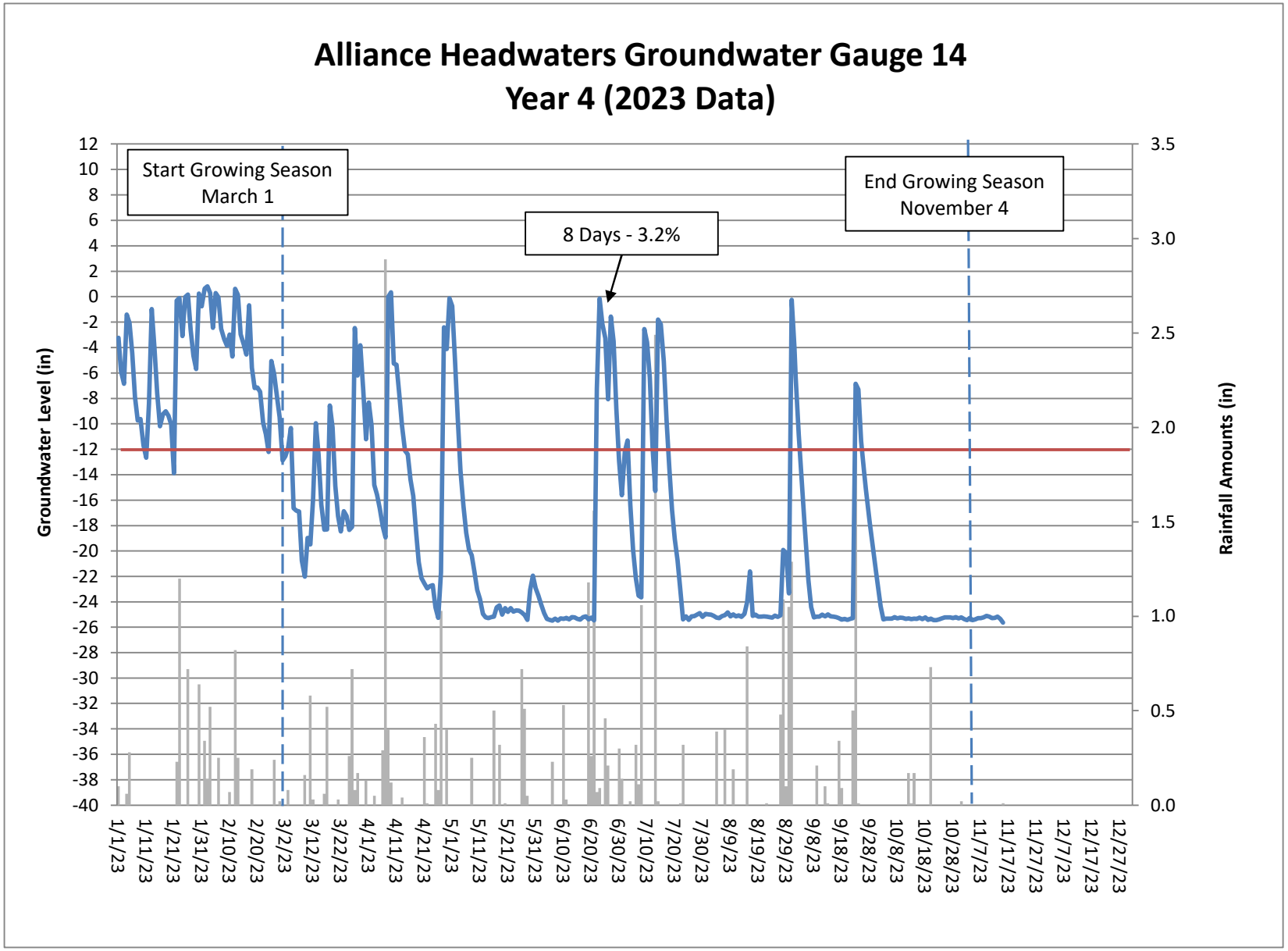
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 14
Year 4 (2023 Data)
Start Growing Season
March 1
8 Days - 3.2%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
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-18
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-22
-24
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-32
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-36
-38
-40
3.5
3.0
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1/1/23
1/11/23
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1/31/23
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2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
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6/20/23
6/30/23
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8/29/23
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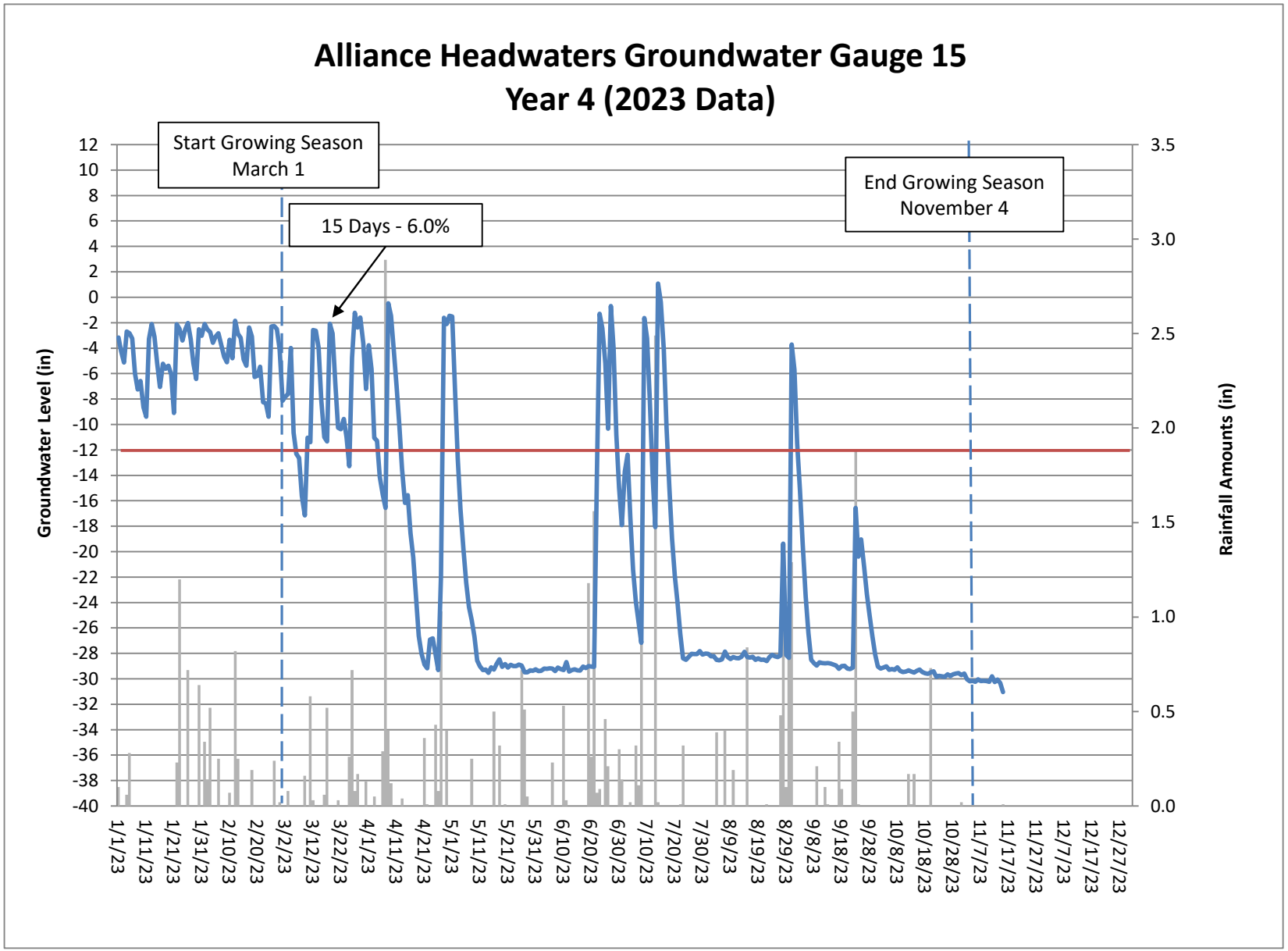
Alliance Headwaters Groundwater Gauge 15
Year 4 (2023 Data)
Start Growing Season
March 1
15 Days - 6.0%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
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-16
-18
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-22
-24
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-30
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3.0
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4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
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7/10/23
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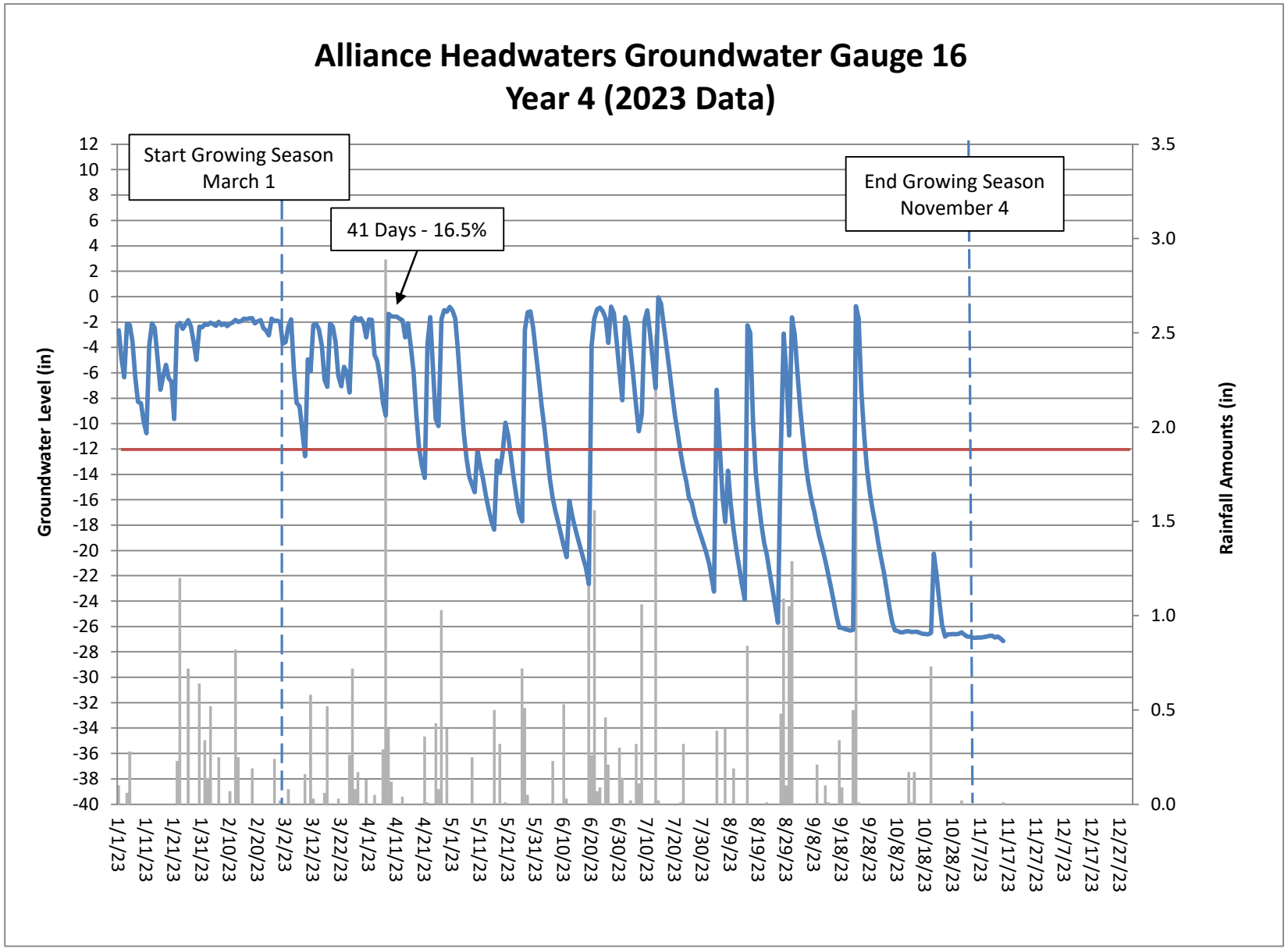
12/27/23


Alliance Headwaters Groundwater Gauge 16
Year 4 (2023 Data)
Start Growing Season
March 1
41 Days - 16.5%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
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-28
-30
-32
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-36
-38
-40
3.5
3.0
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1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
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8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
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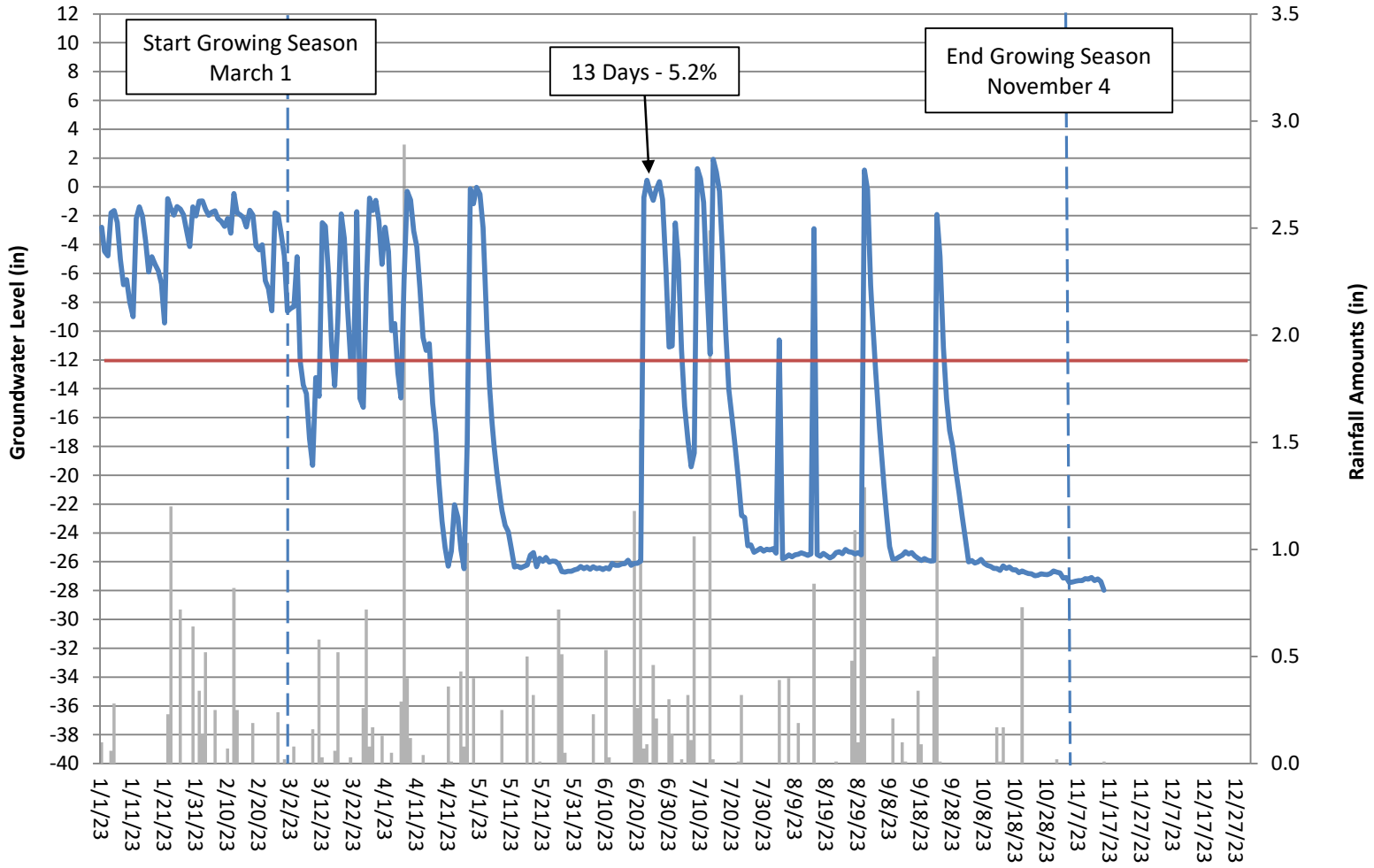
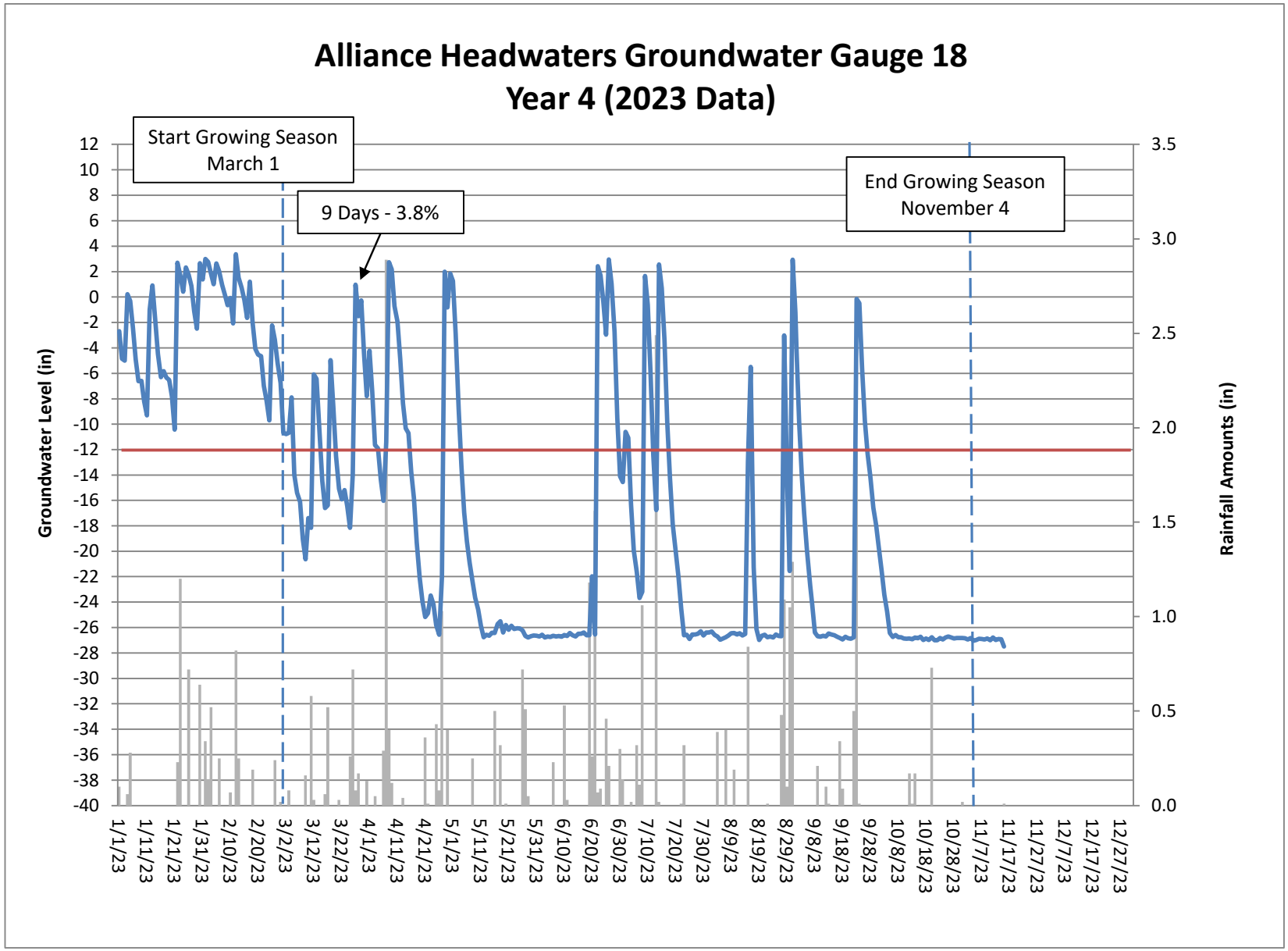
11/27/23
12/7/23
12/17/23
12/27/23

Alliance Headwaters Groundwater Gauge 17
Year 4 (2023 Data)




Alliance Headwaters Groundwater Gauge 18
Year 4 (2023 Data)
Start Growing Season
March 1
9 Days - 3.8%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
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-18
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-22
-24
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3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
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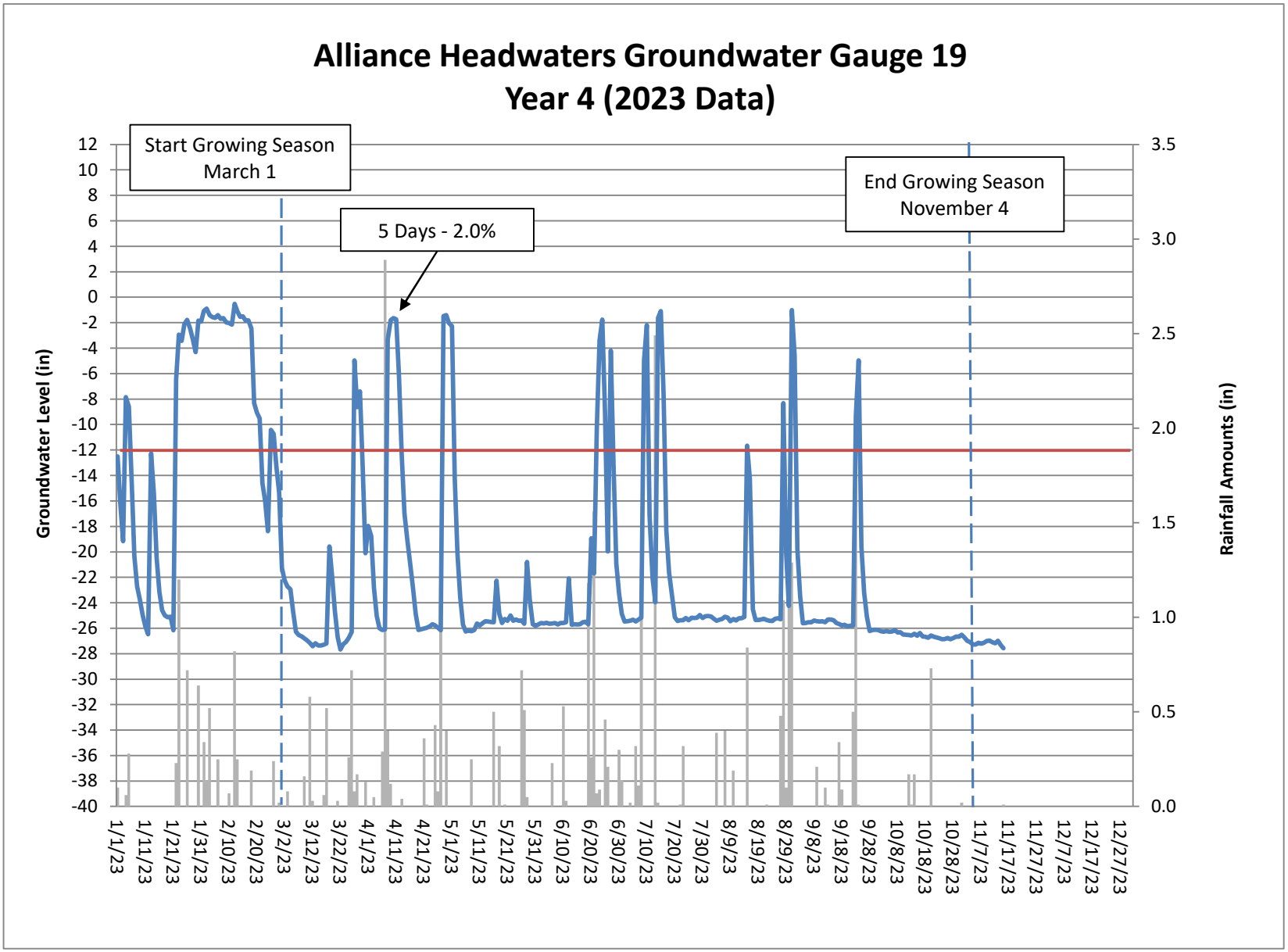
12/27/23


Alliance Headwaters Groundwater Gauge 19
Year 4 (2023 Data)
Start Growing Season
March 1
5 Days - 2.0%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
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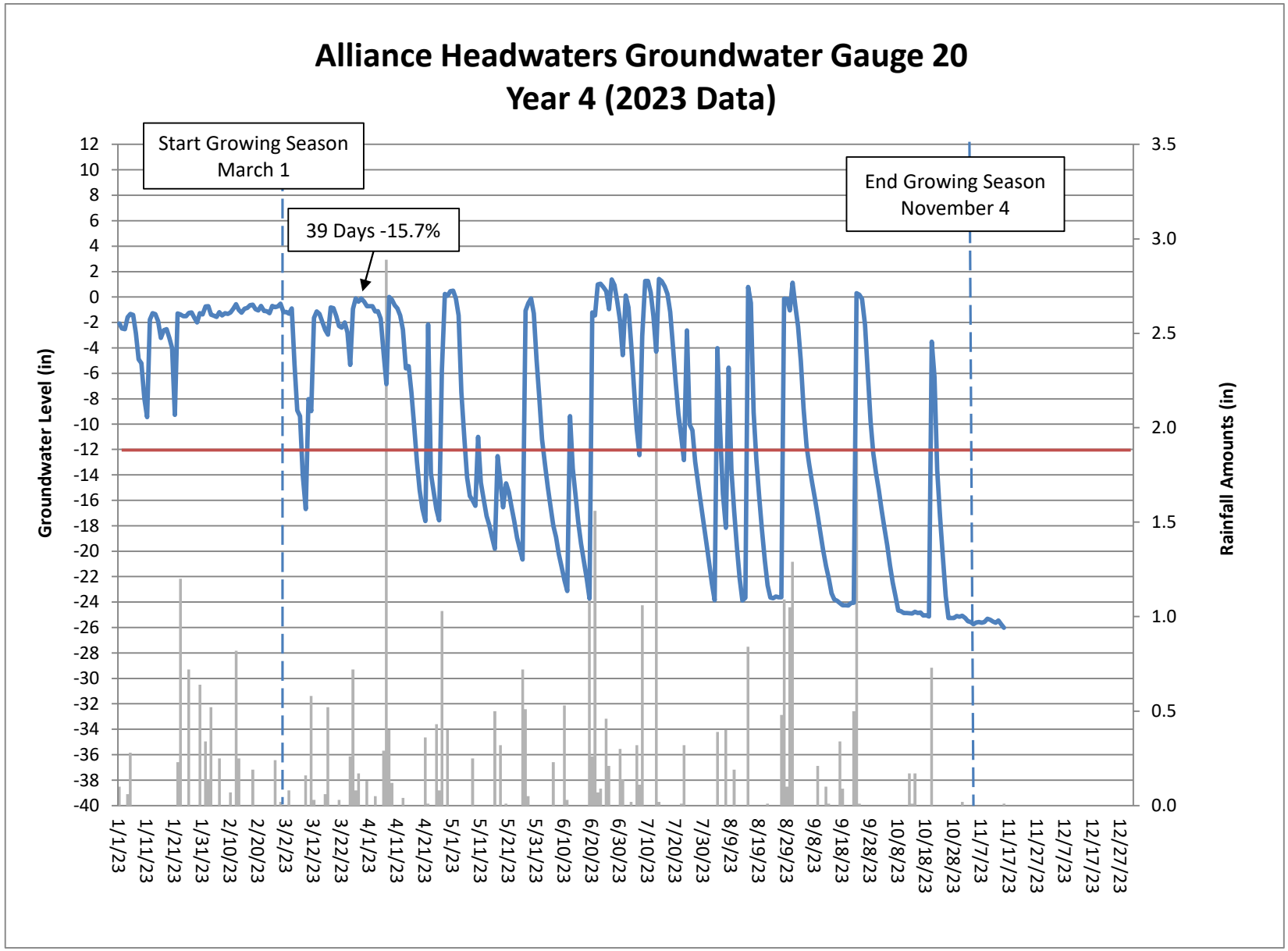
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 20
Year 4 (2023 Data)
Start Growing Season
March 1
39 Days -15.7%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
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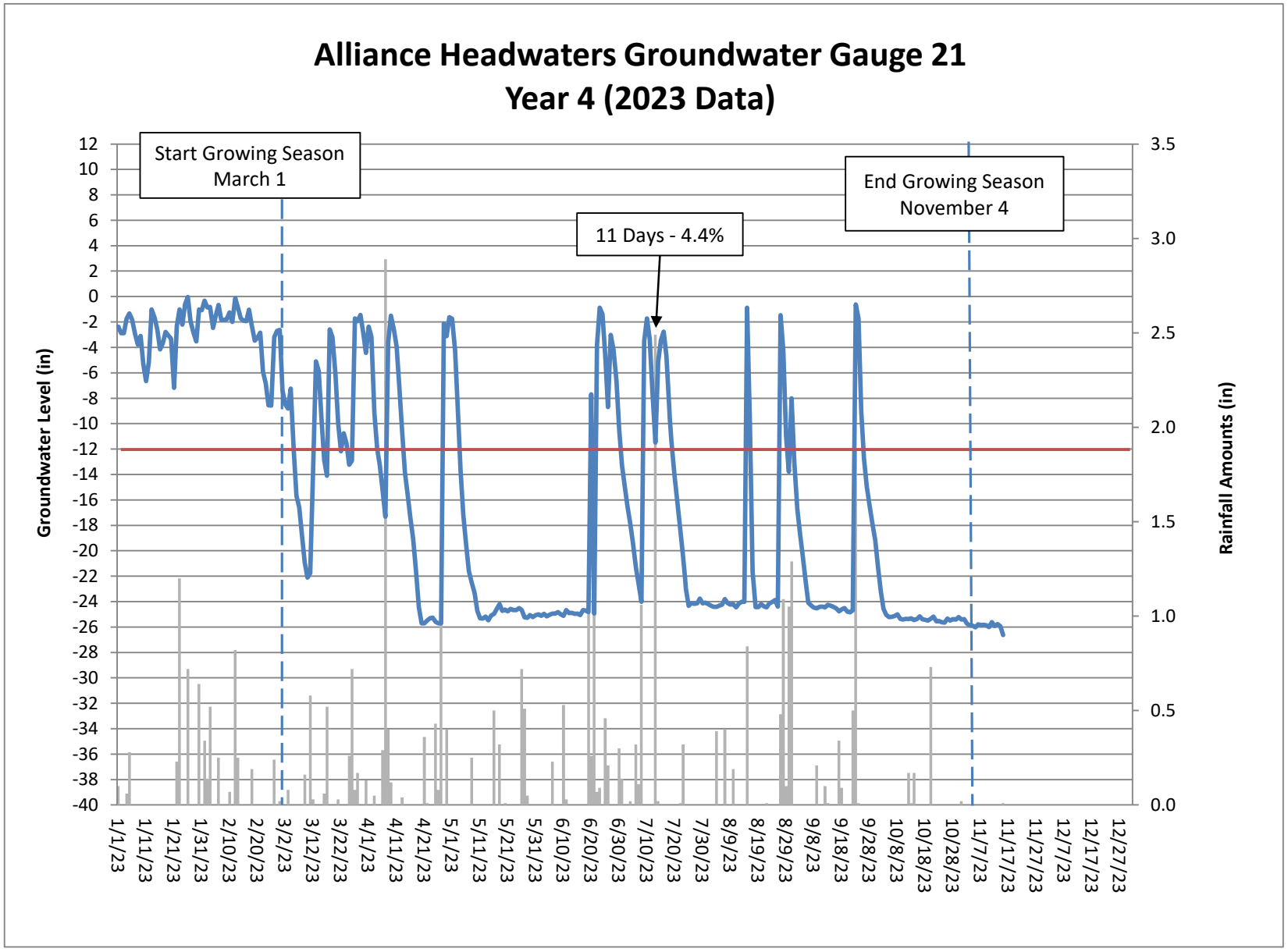
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 21
Year 4 (2023 Data)
Start Growing Season
March 1
11 Days - 4.4%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
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1/1/23
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1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
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9/28/23
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11/27/23
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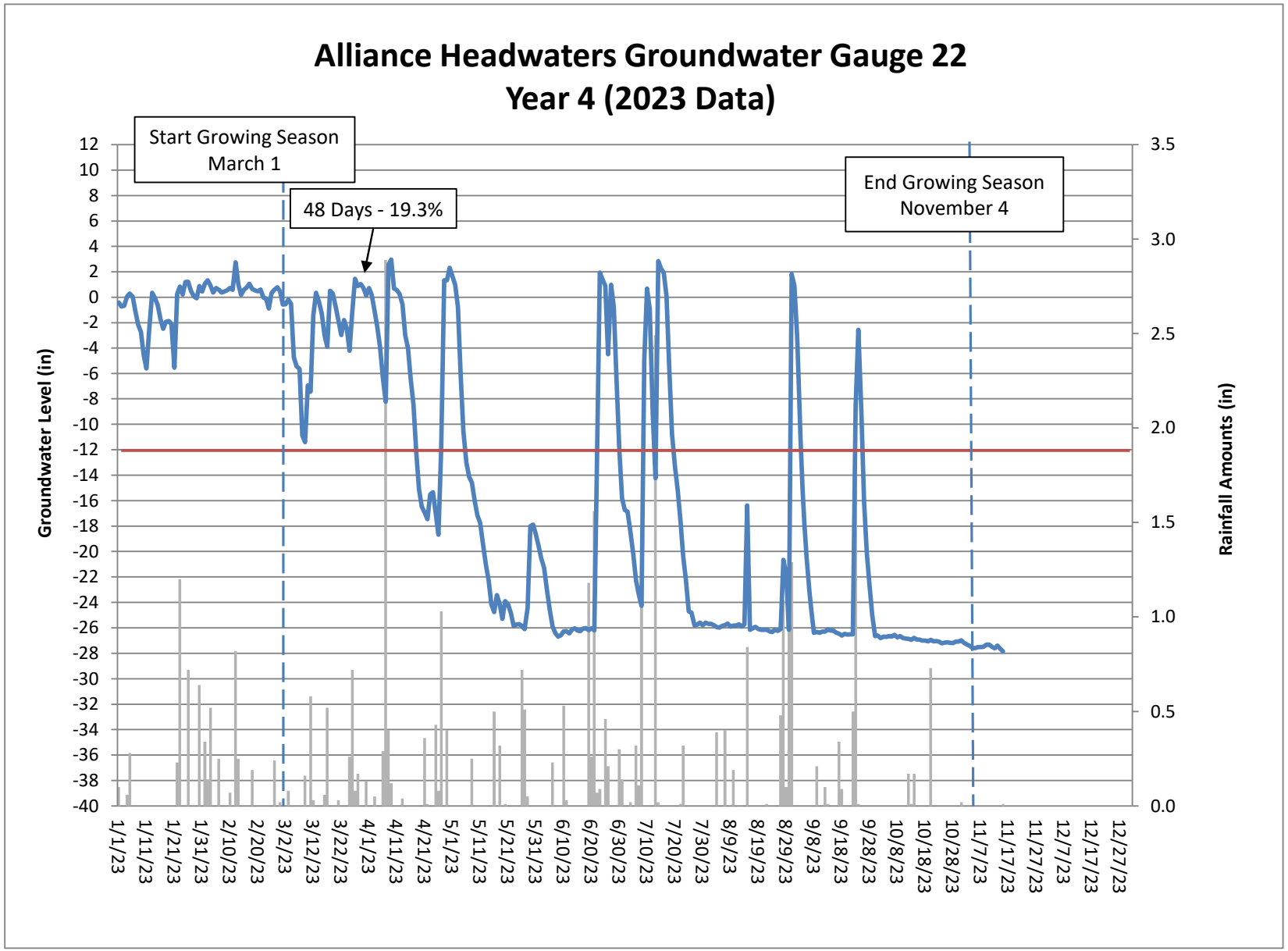
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 22
Year 4 (2023 Data)
Start Growing Season
March 1
48 Days - 19.3%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
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-28
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-32
-34
-36
-38
-40
3.5
3.0
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1/31/23
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3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
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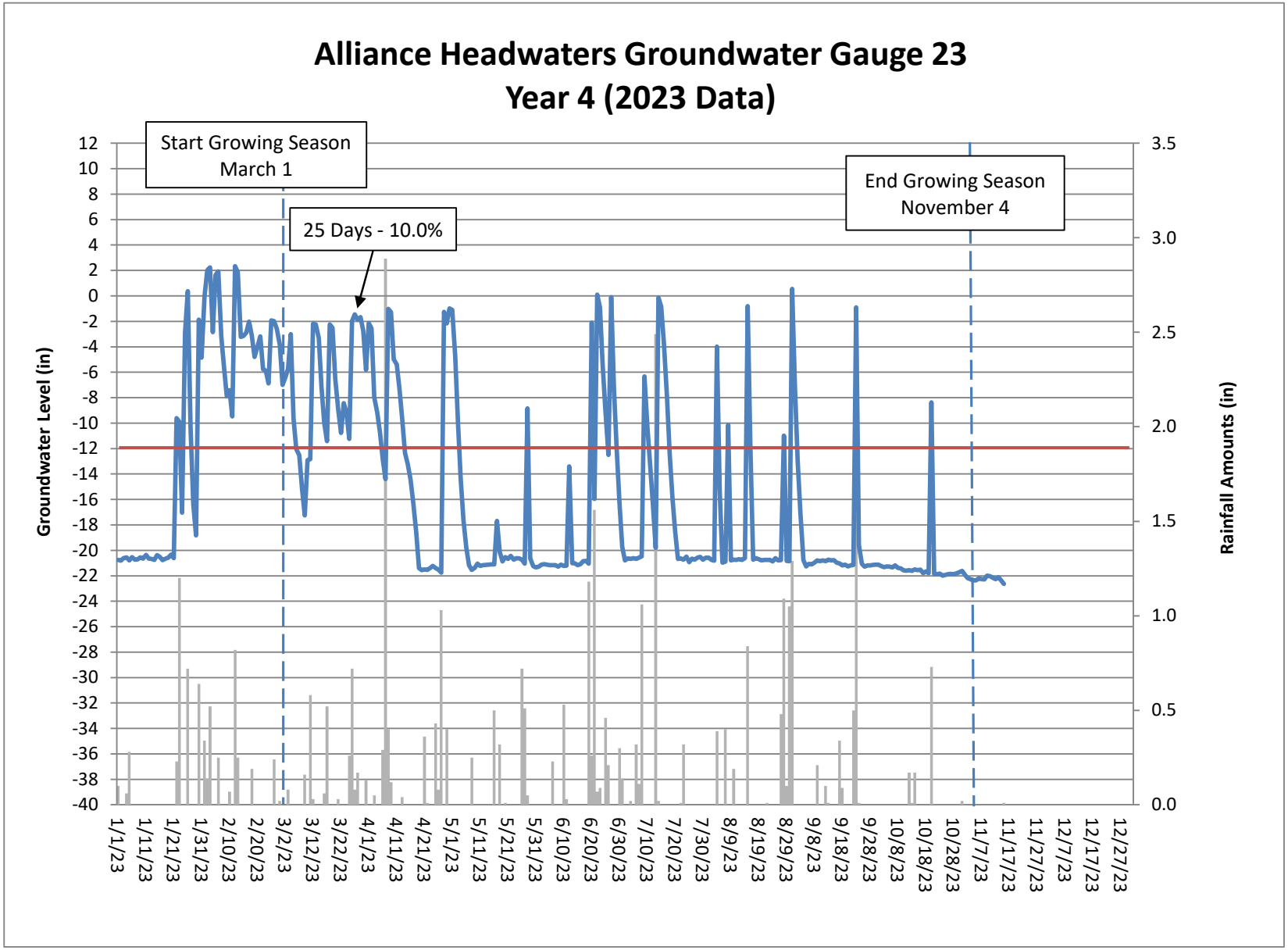
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 23
Year 4 (2023 Data)
Start Growing Season
March 1
End Growing Season
November 4
25 Days - 10.0%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
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-22
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-36
-38
-40
3.5
3.0
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0.5
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1/1/23
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1/31/23
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3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
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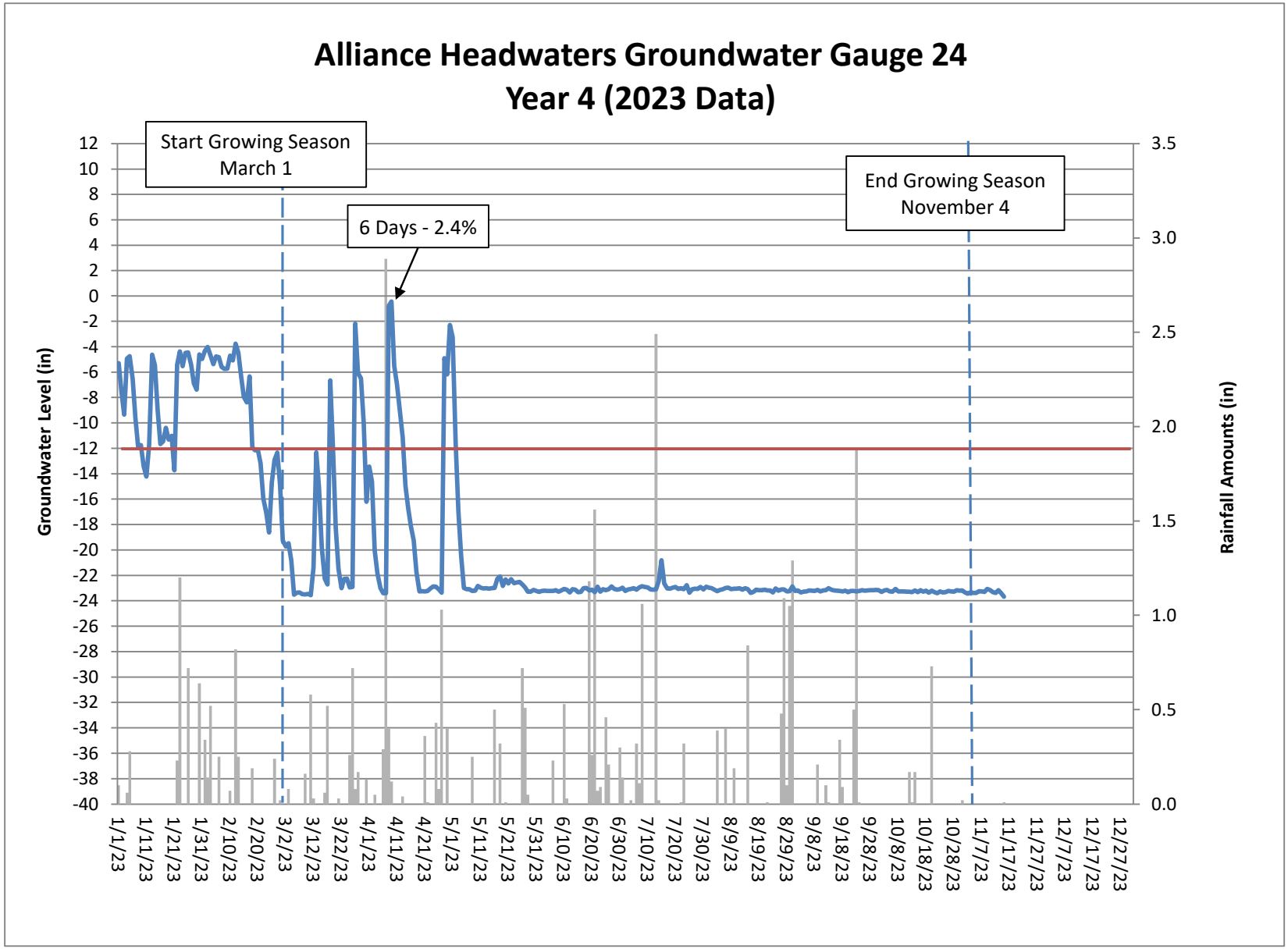
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 24
Year 4 (2023 Data)
Start Growing Season
March 1
End Growing Season
November 4
6 Days - 2.4%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
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-16
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-22
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-36
-38
-40
3.5
3.0
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3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
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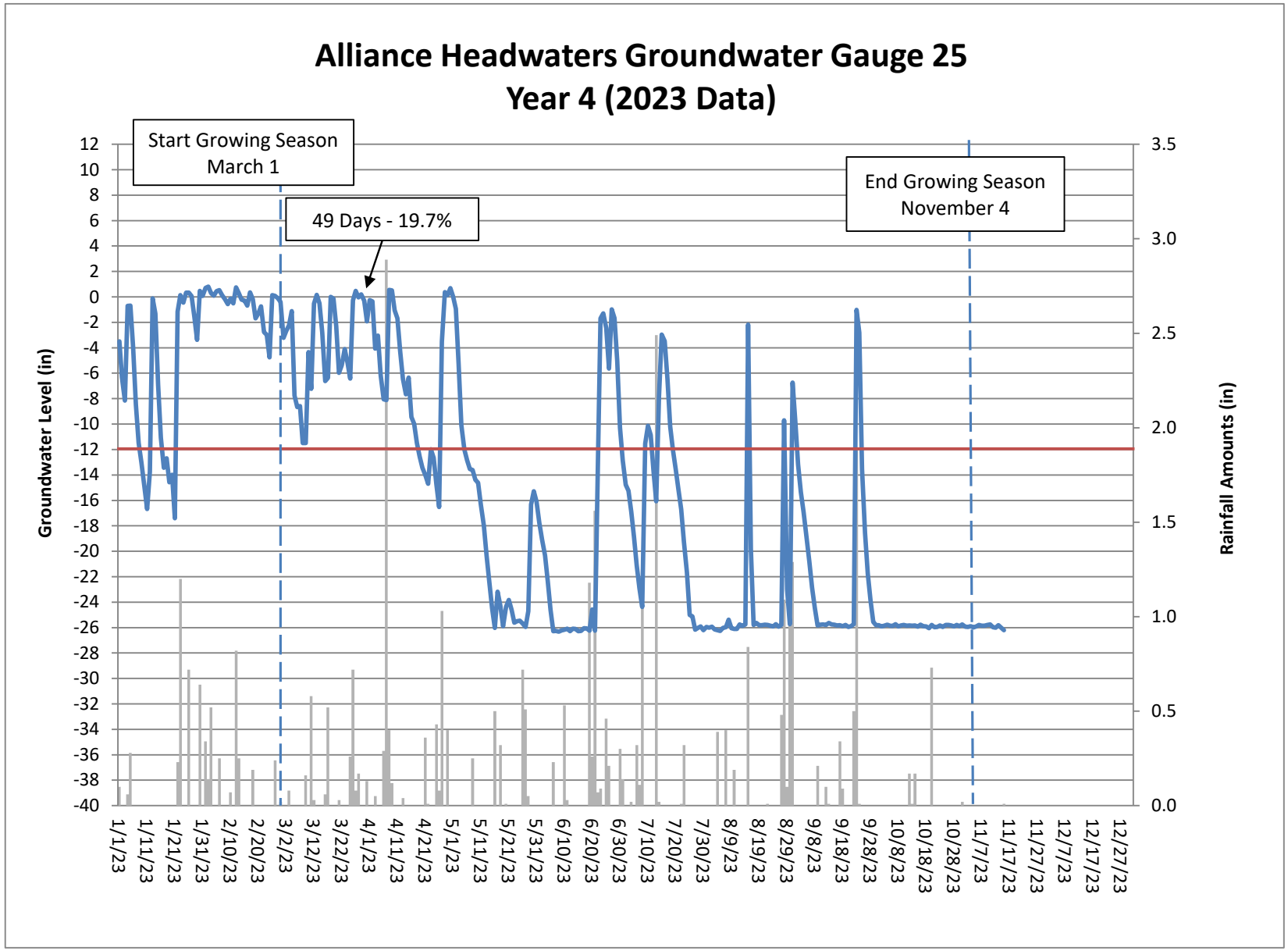
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 25
Year 4 (2023 Data)
Start Growing Season
March 1
49 Days - 19.7%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
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-30
-32
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-36
-38
-40
3.5
3.0
2.5
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1.0
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1/1/23
1/11/23
1/21/23
1/31/23
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2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
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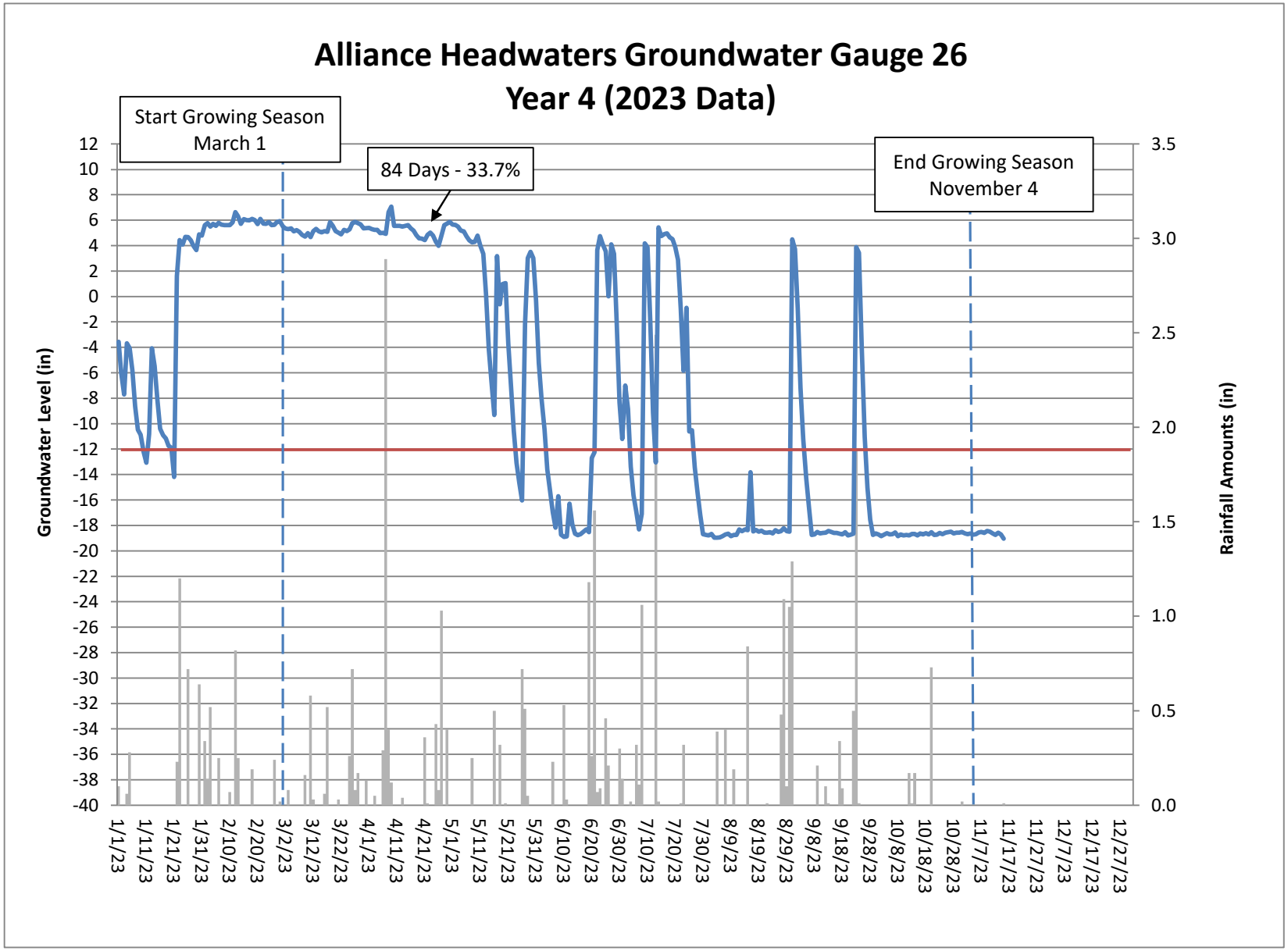
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 26
Year 4 (2023 Data)
Start Growing Season
March 1
84 Days - 33.7%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
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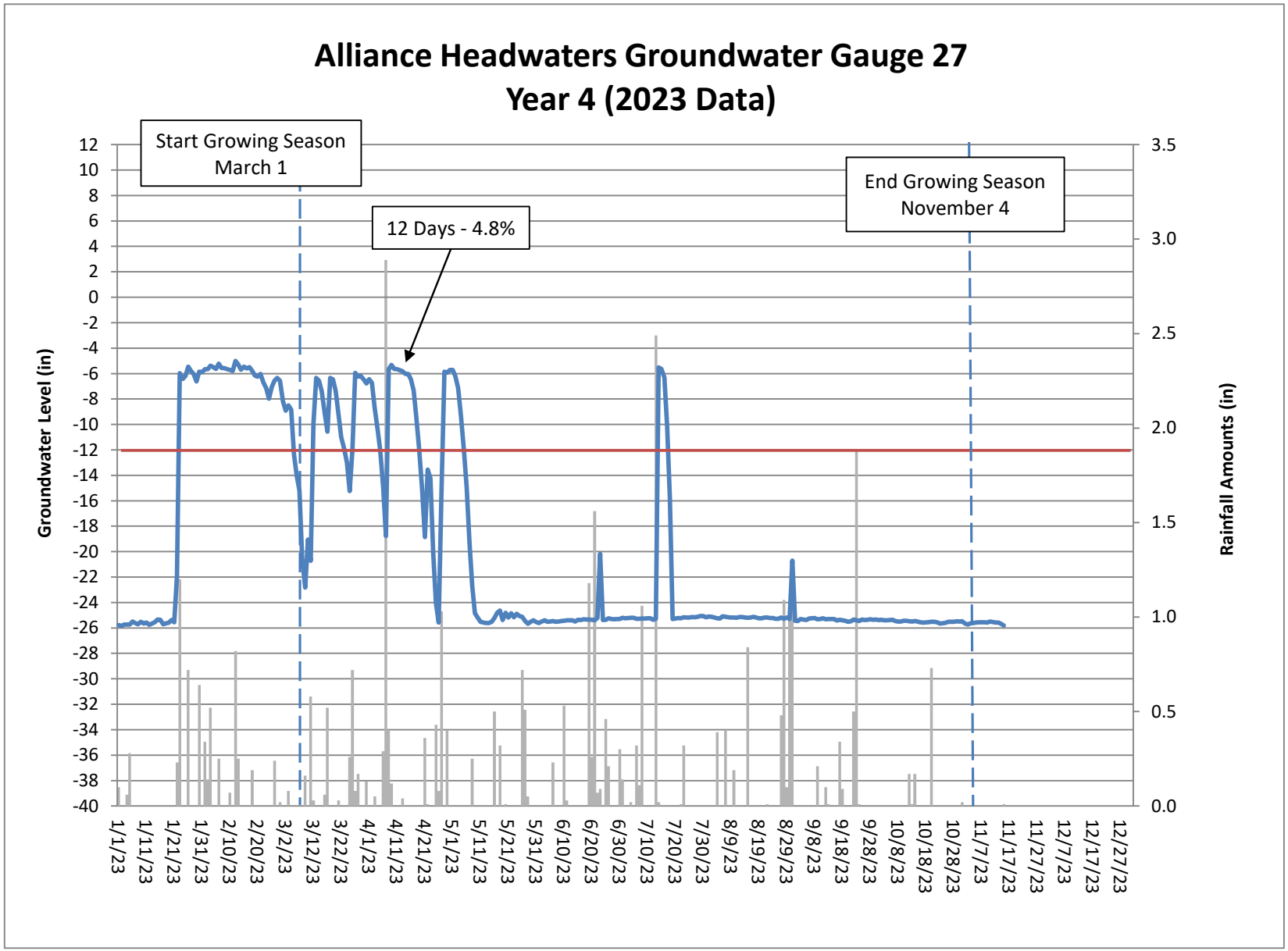
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
11/7/23
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 27
Year 4 (2023 Data)
Start Growing Season
March 1
End Growing Season
November 4
12 Days - 4.8%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
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0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
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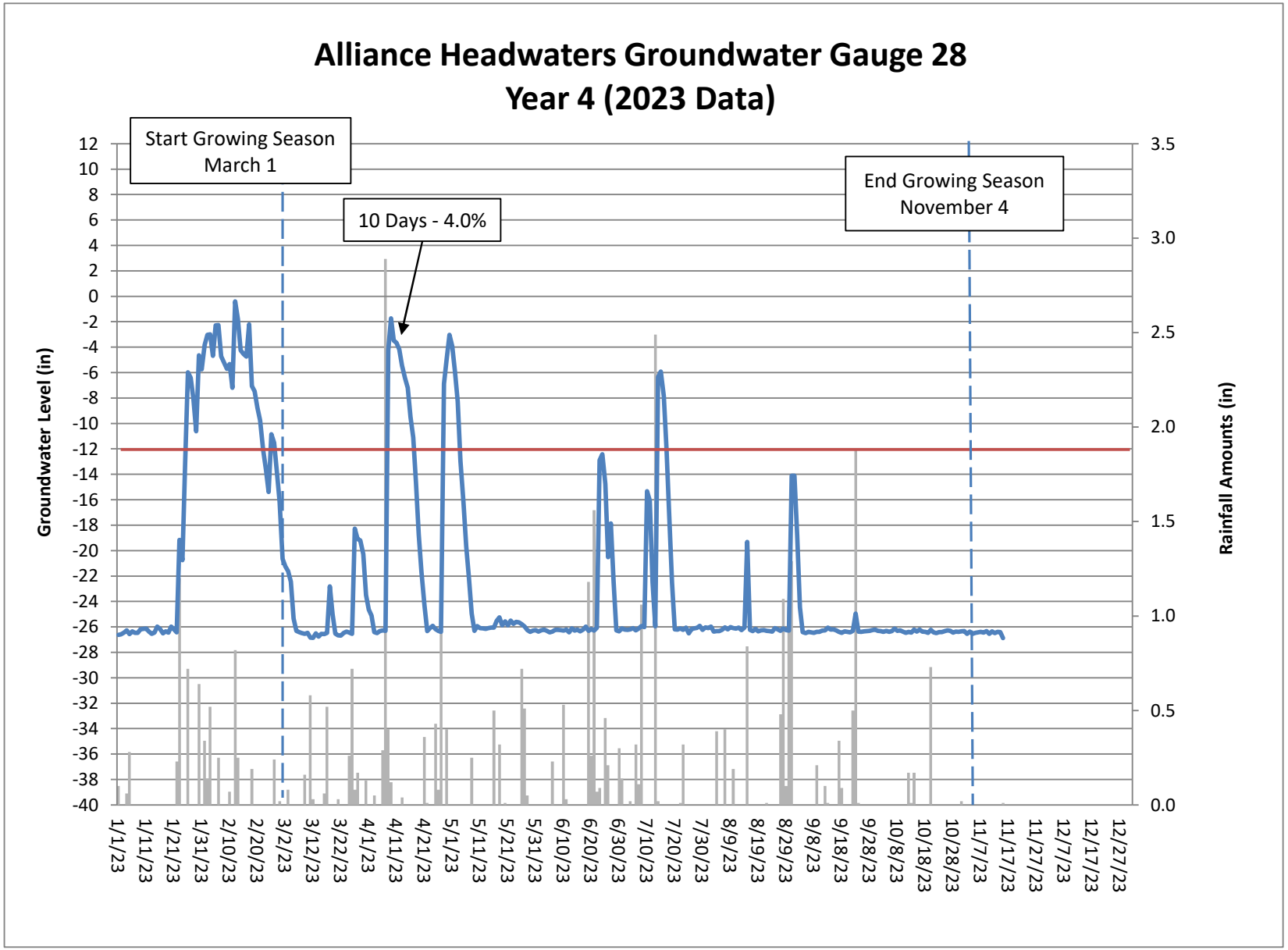
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 28
Year 4 (2023 Data)
Start Growing Season
March 1
10 Days - 4.0%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
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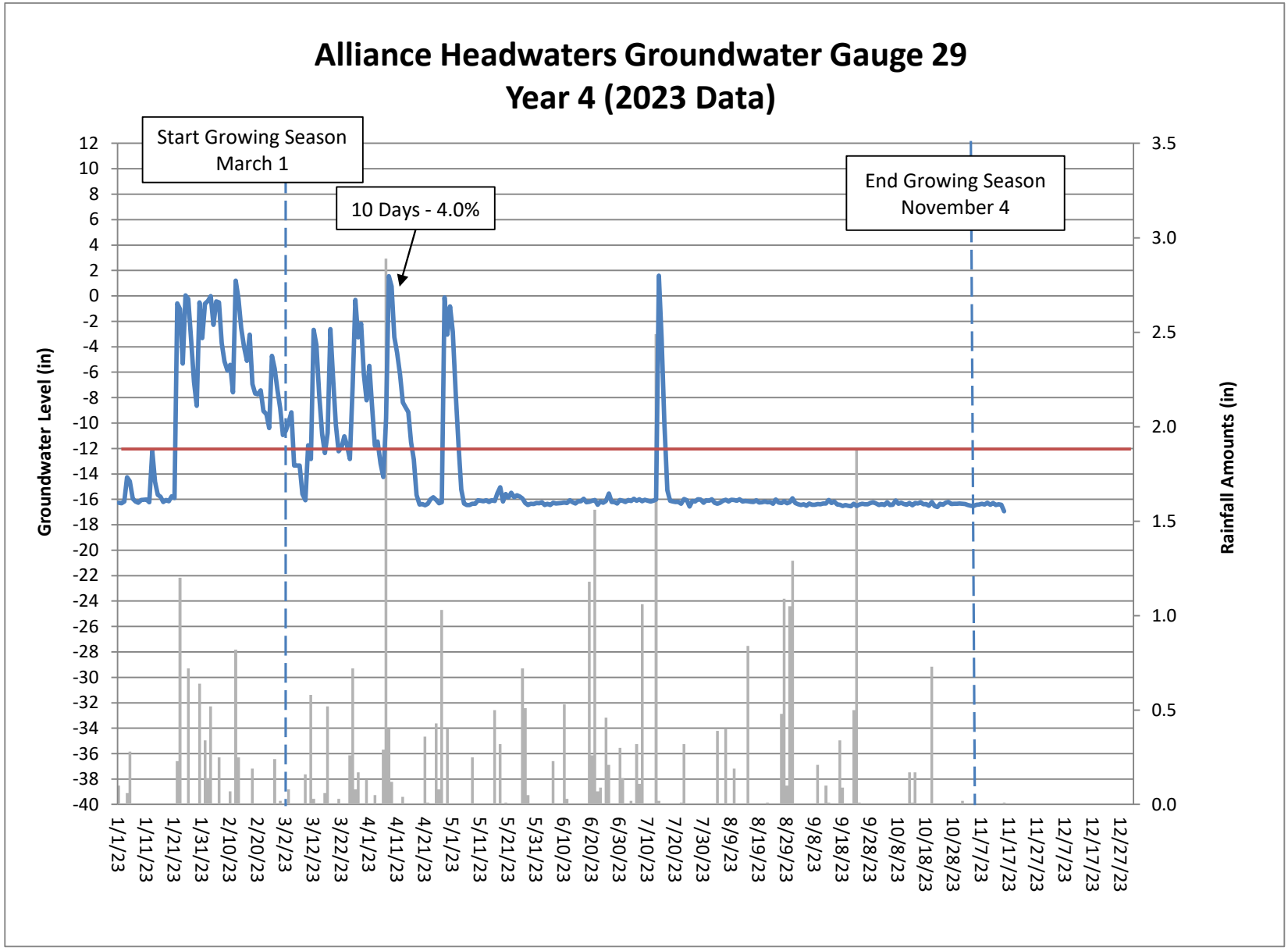
11/17/23
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 29
Year 4 (2023 Data)
Start Growing Season
March 1
10 Days - 4.0%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
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1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
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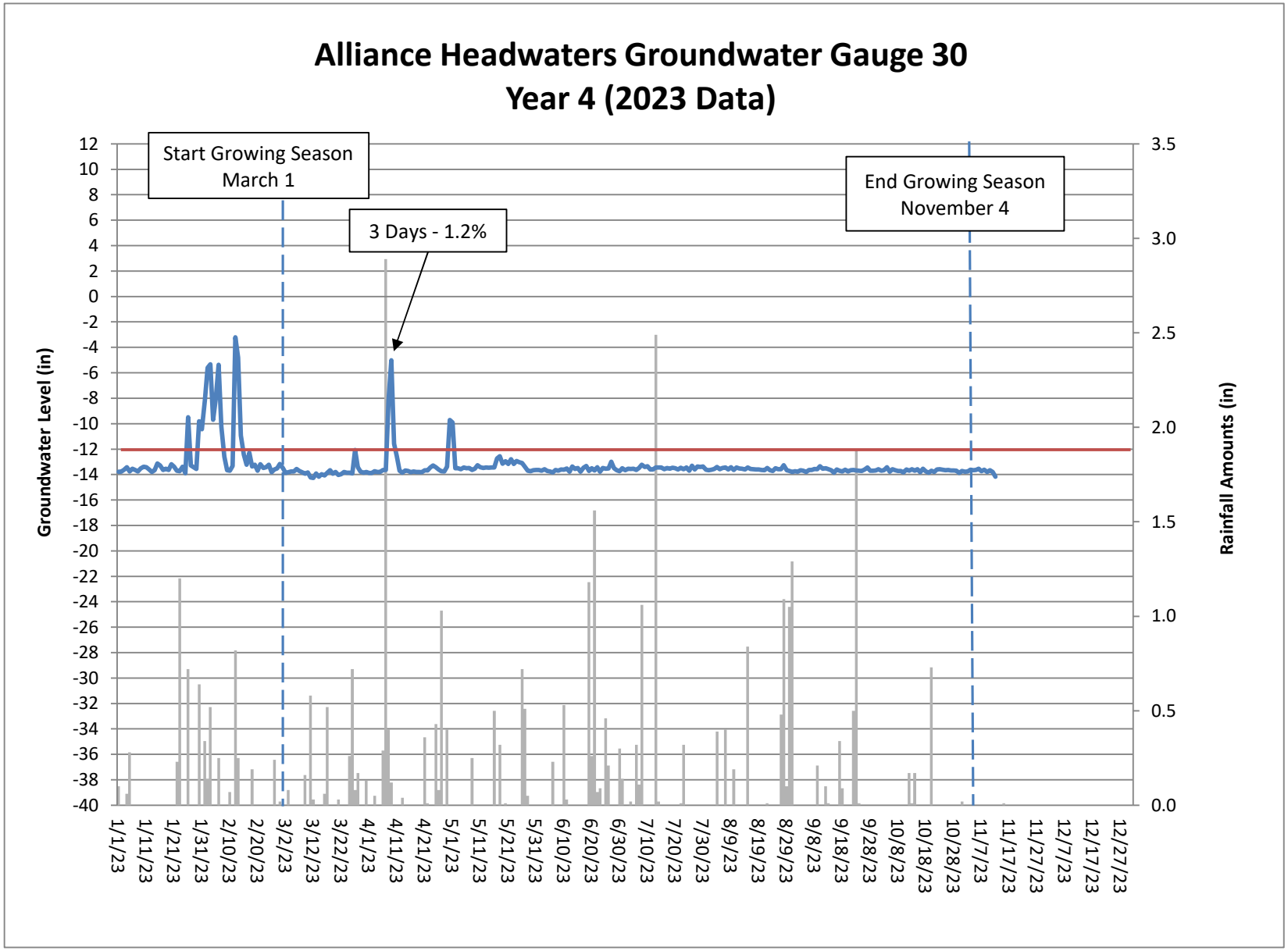
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 30
Year 4 (2023 Data)
Start Growing Season
March 1
3 Days - 1.2%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
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-32
-34
-36
-38
-40
3.5
3.0
2.5
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1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
3/2/23
3/12/23
3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
10/18/23
10/28/23
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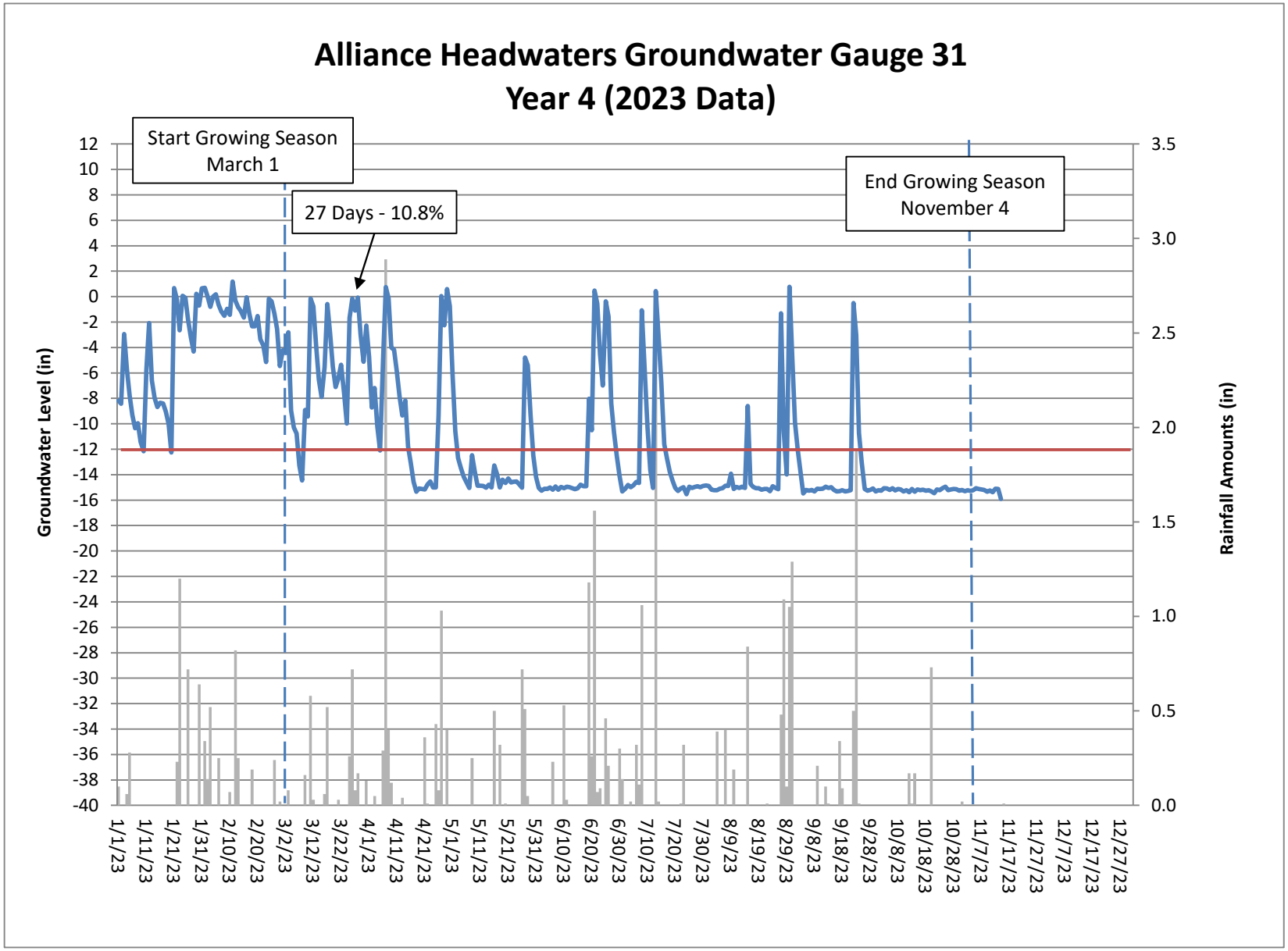
11/27/23
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 31
Year 4 (2023 Data)
Start Growing Season
March 1
27 Days - 10.8%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
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1/1/23
1/11/23
1/21/23
1/31/23
2/10/23
2/20/23
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3/22/23
4/1/23
4/11/23
4/21/23
5/1/23
5/11/23
5/21/23
5/31/23
6/10/23
6/20/23
6/30/23
7/10/23
7/20/23
7/30/23
8/9/23
8/19/23
8/29/23
9/8/23
9/18/23
9/28/23
10/8/23
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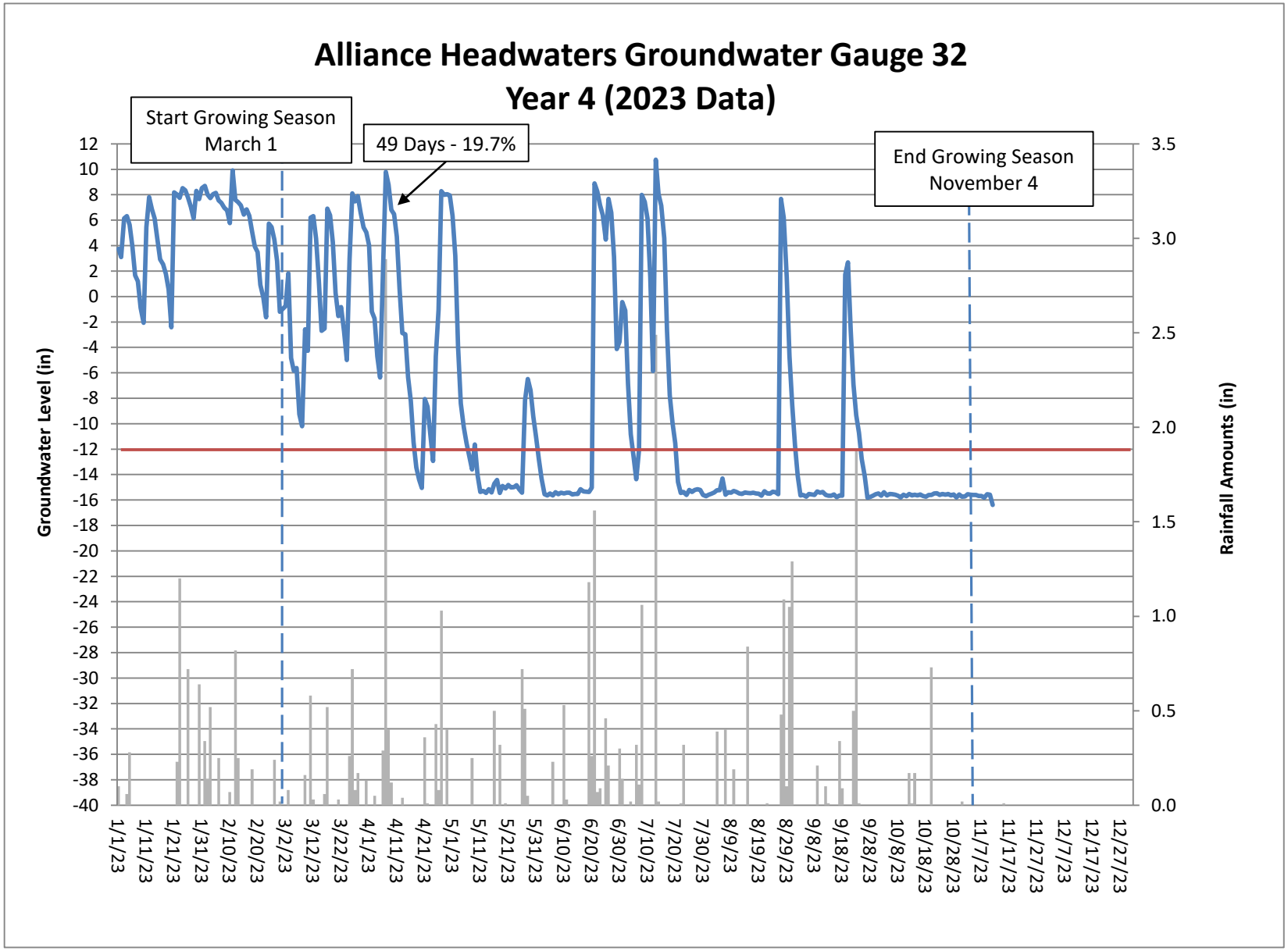
12/7/23
12/17/23
12/27/23


Alliance Headwaters Groundwater Gauge 32
Year 4 (2023 Data)
Start Growing Season
March 1
49 Days - 19.7%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
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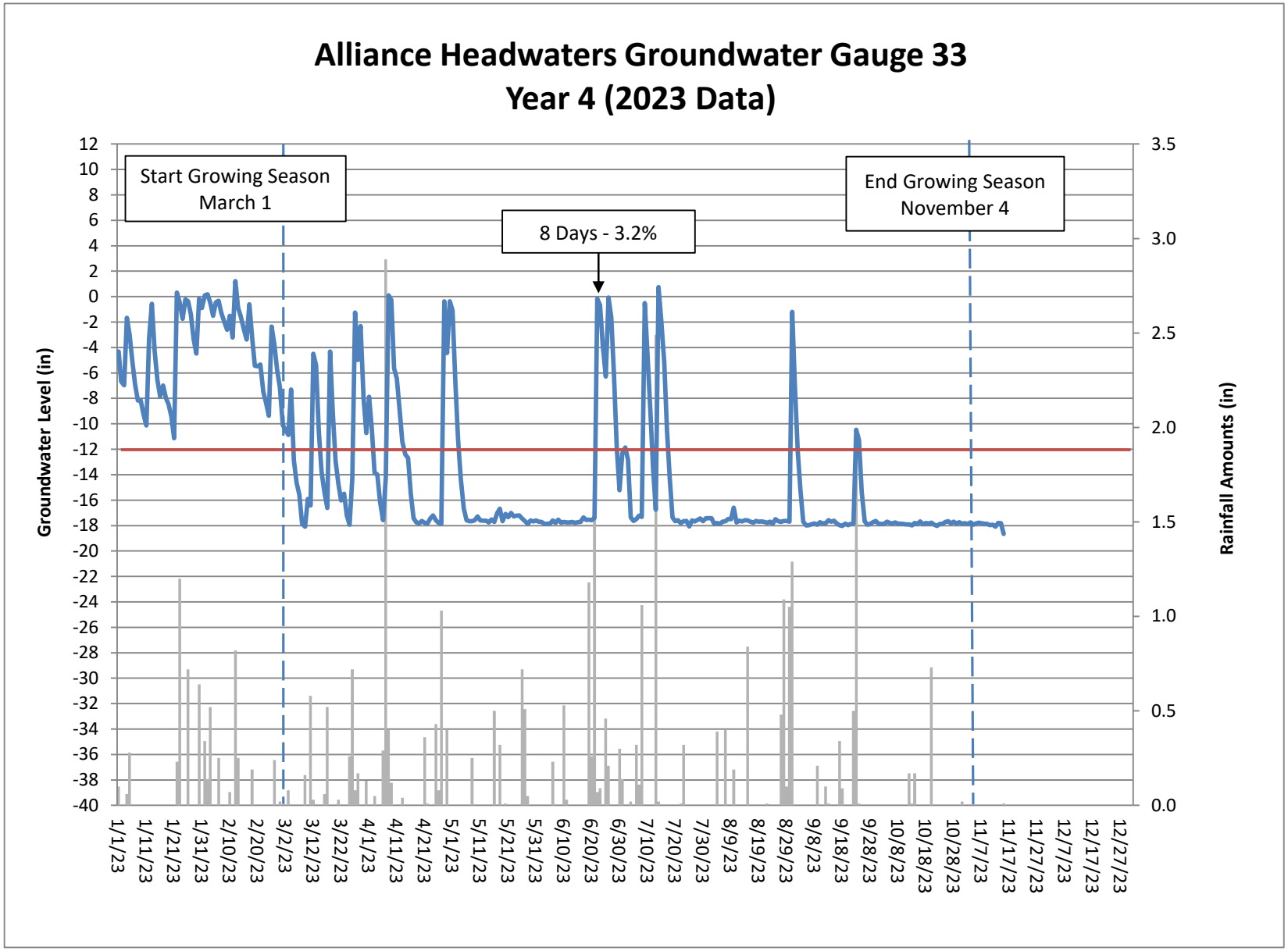
Alliance Headwaters Groundwater Gauge 33
Year 4 (2023 Data)
Start Growing Season
March 1
8 Days - 3.2%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
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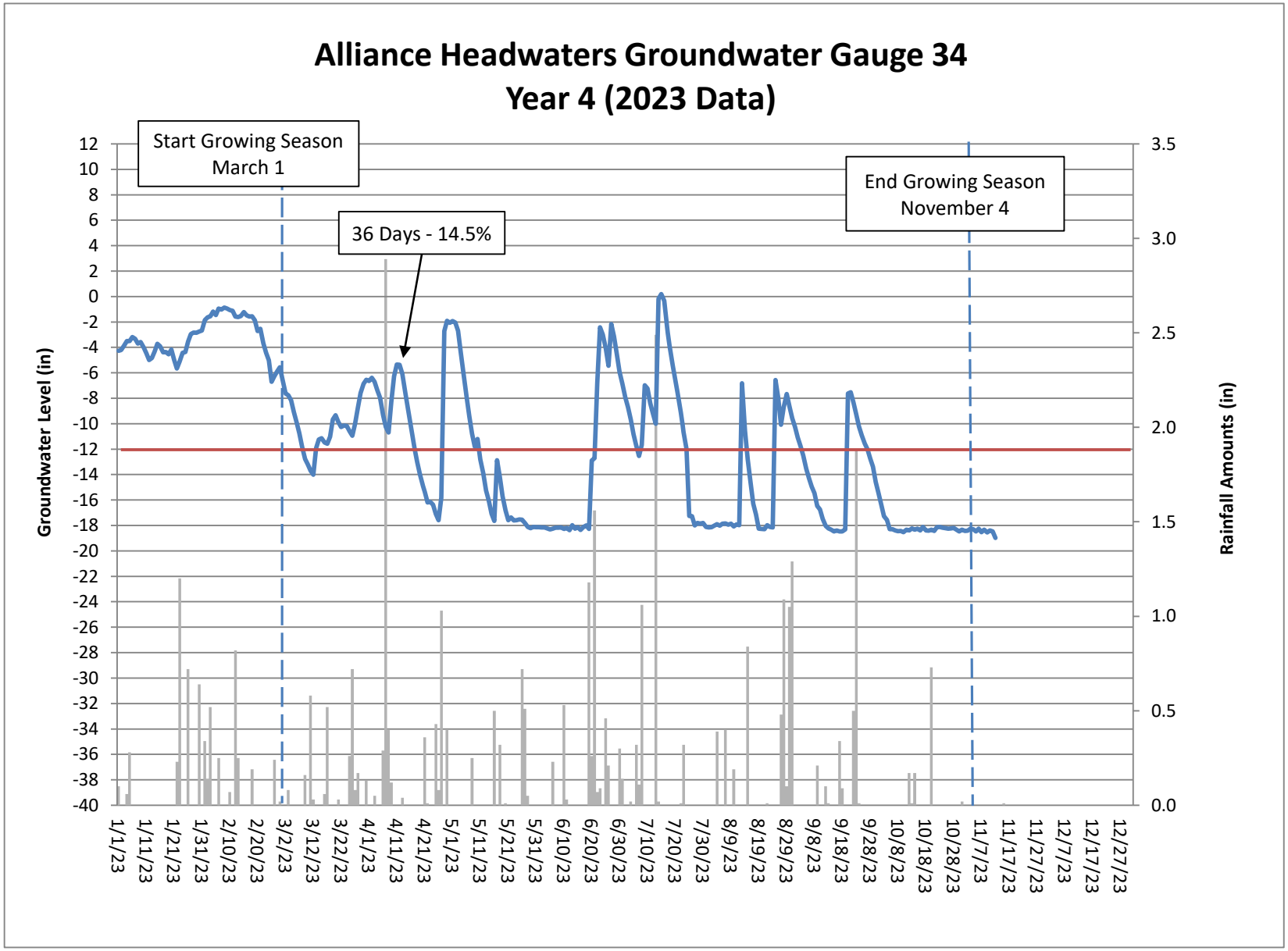
Alliance Headwaters Groundwater Gauge 34
Year 4 (2023 Data)
Start Growing Season
March 1
36 Days - 14.5%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
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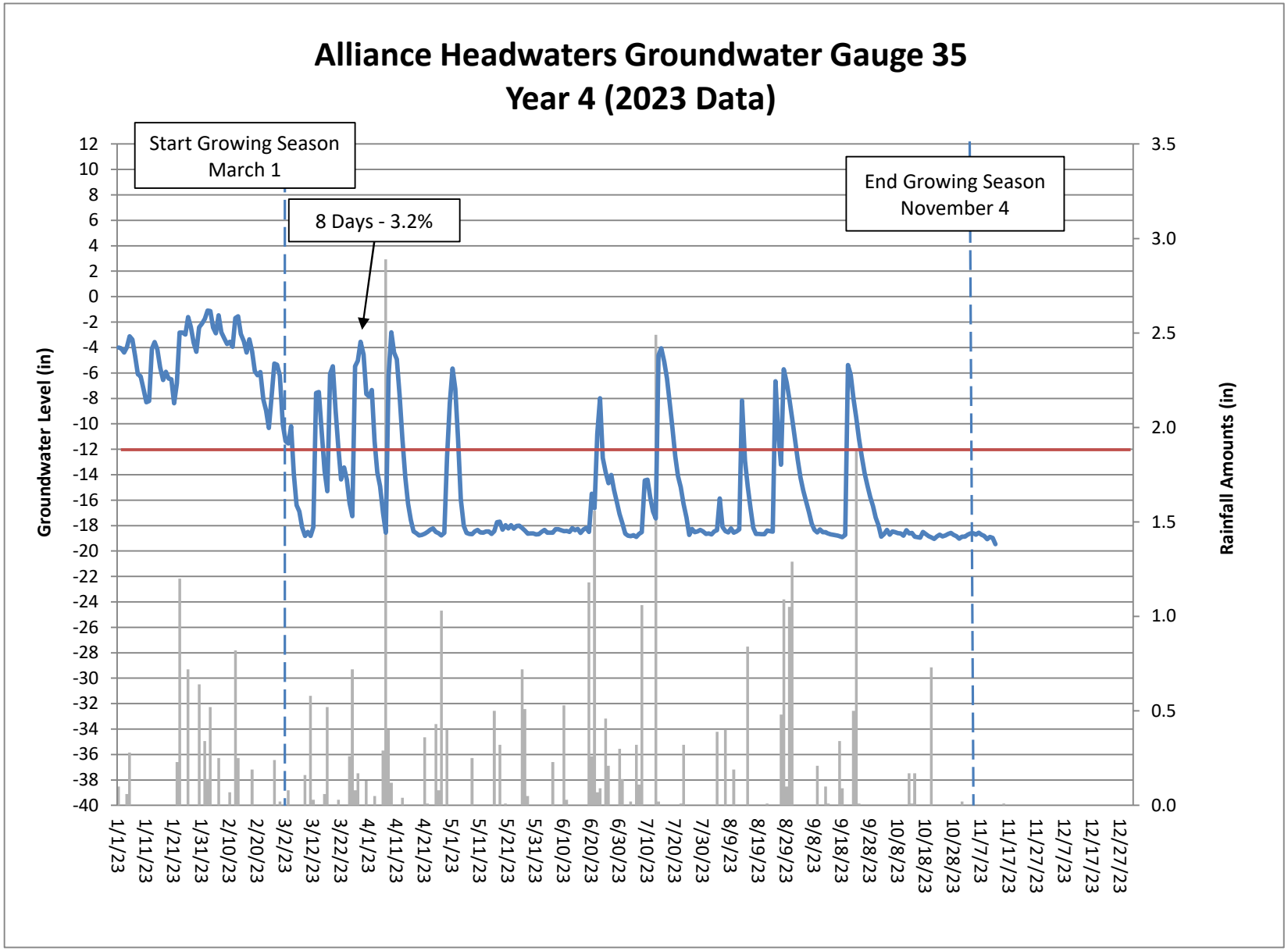
Alliance Headwaters Groundwater Gauge 35
Year 4 (2023 Data)
Start Growing Season
March 1
8 Days - 3.2%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
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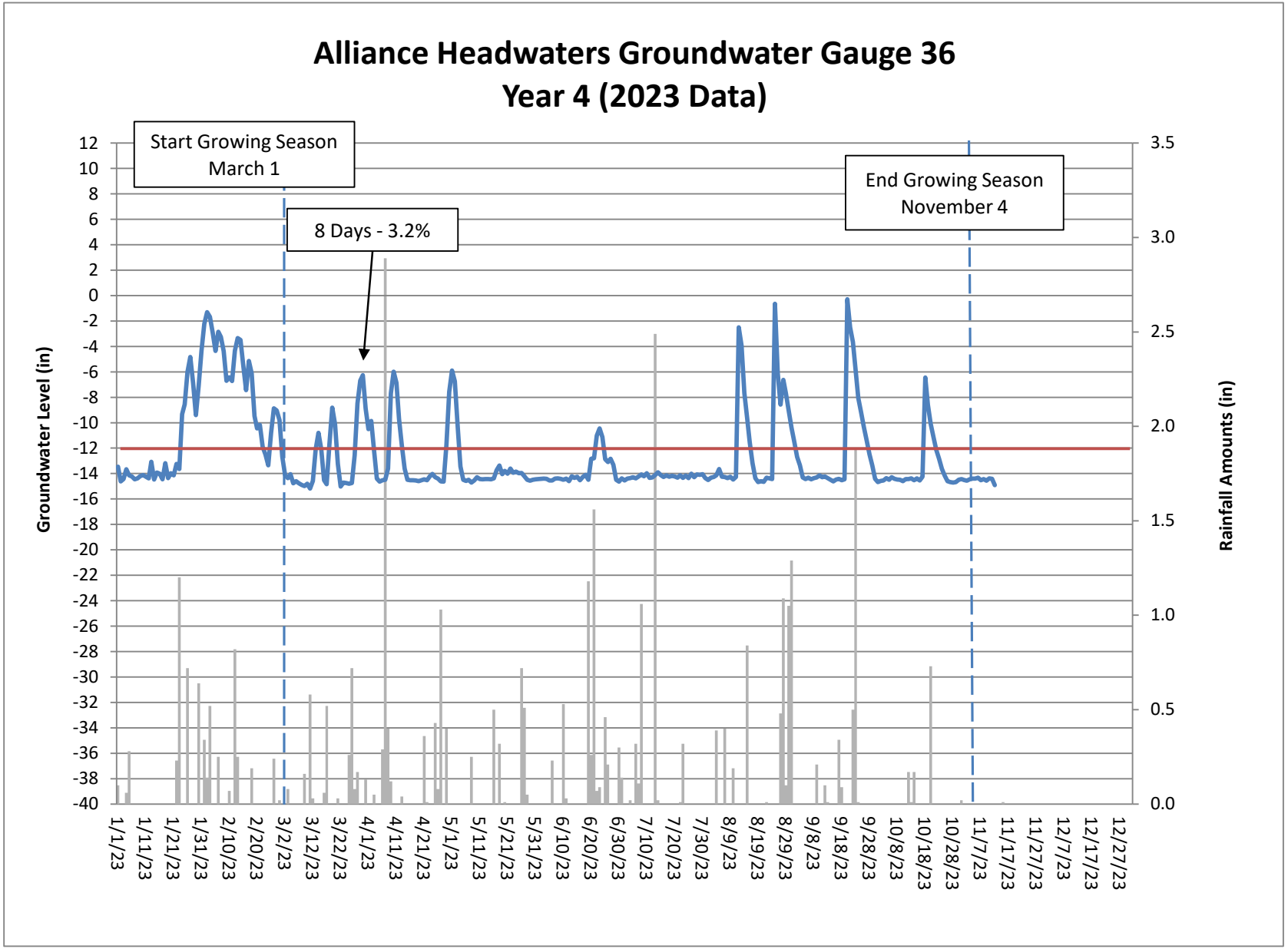
12/27/23


Alliance Headwaters Groundwater Gauge 36
Year 4 (2023 Data)
Start Growing Season
March 1
8 Days - 3.2%
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
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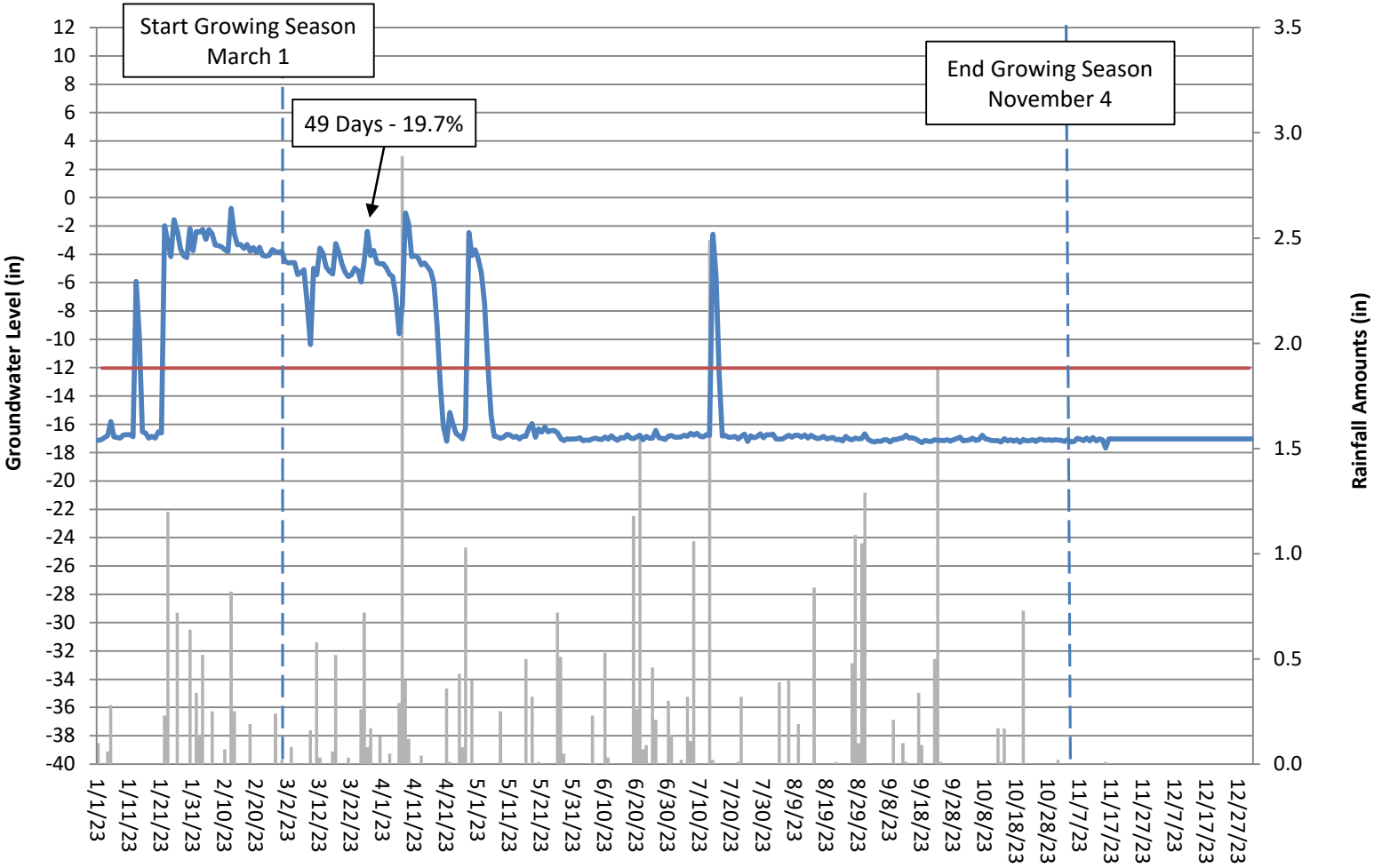
Alliance Headwaters Groundwater Reference Gauge
Year 4 (2023 Data)



APPENDIX E. SITE PHOTO LOG

Alliance Headwaters
MY-04 (2023) Photo Log

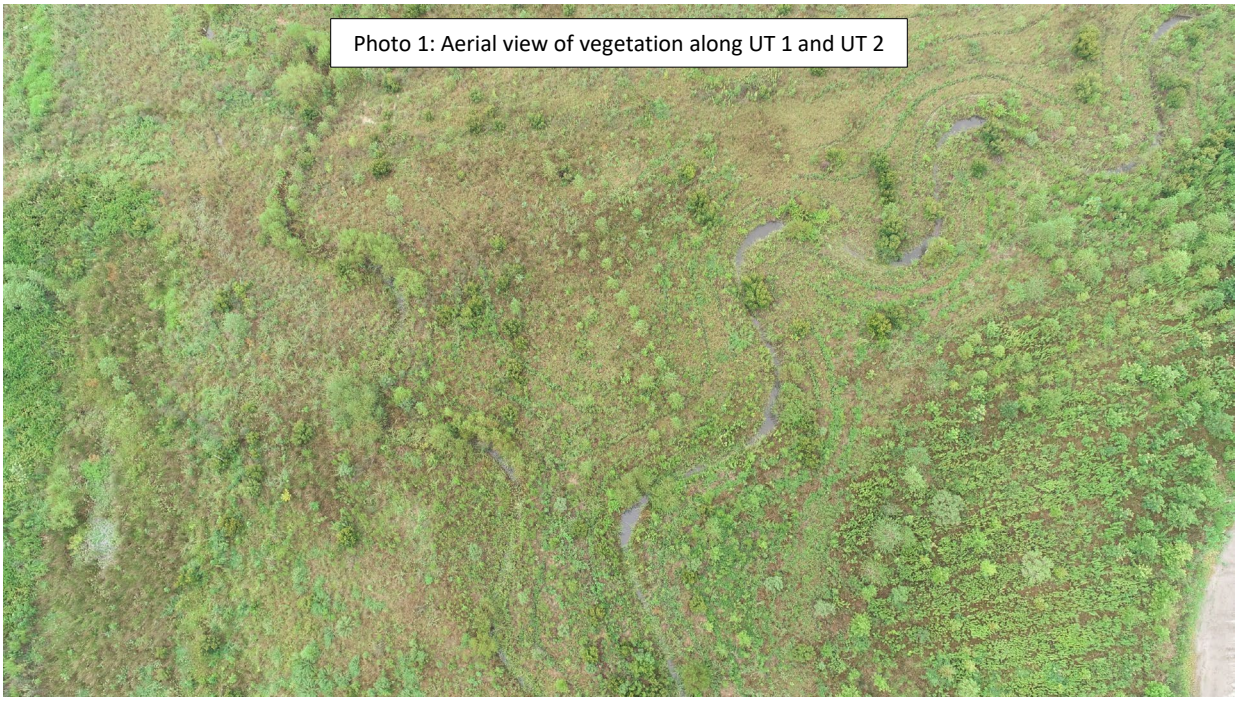


Photo 1: Aerial view of vegetation along UT 1 and UT 2

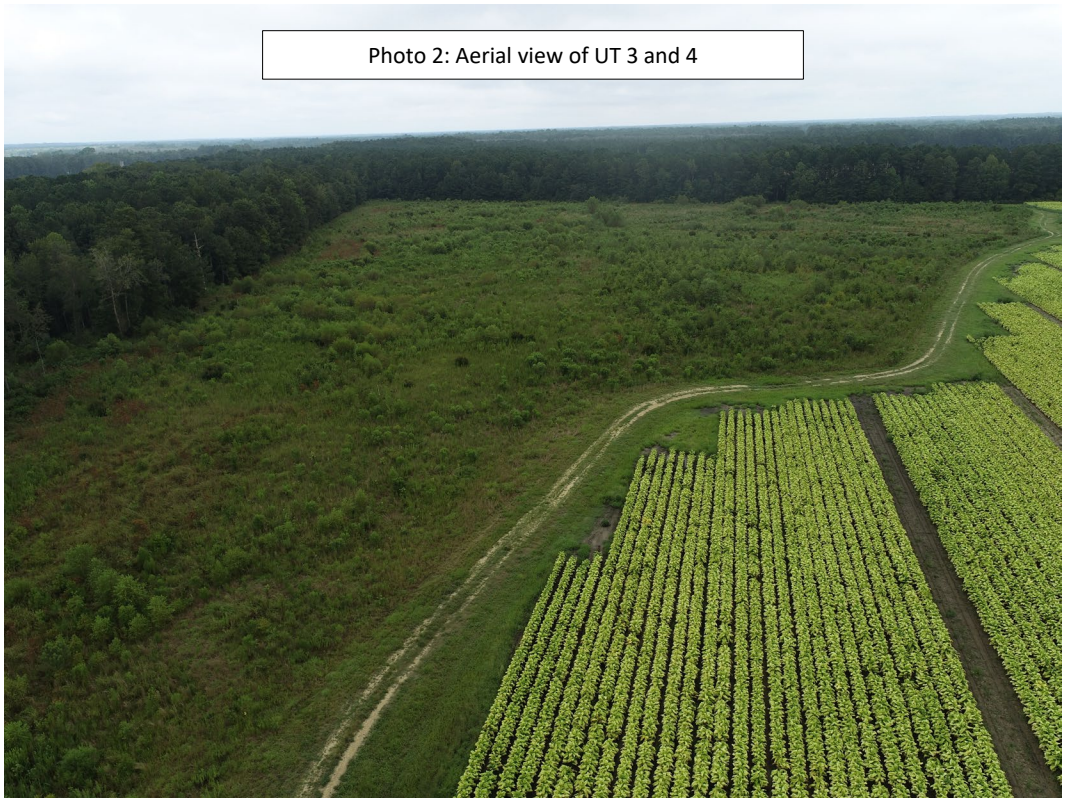


Photo 2: Aerial view of UT 3 and 4

Alliance Headwaters
MY-04 (2023) Photo Log

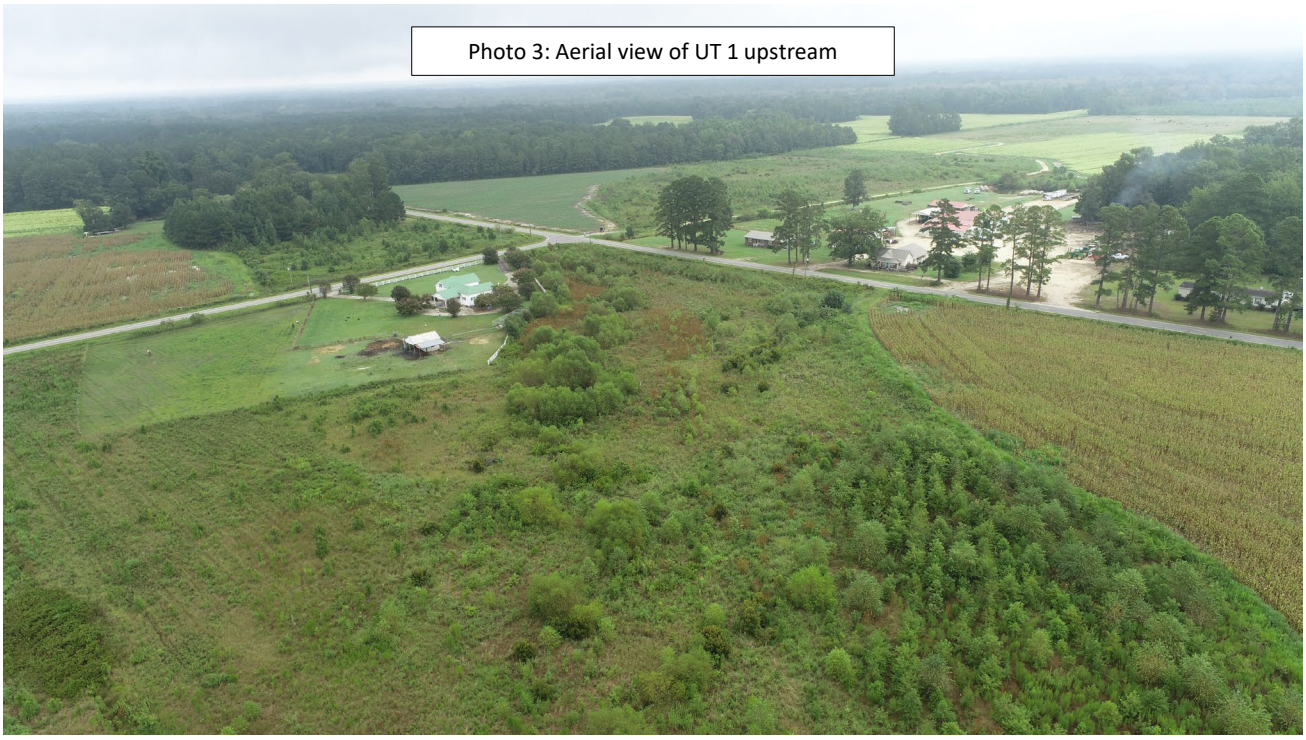


Photo 3: Aerial view of UT 1 upstream

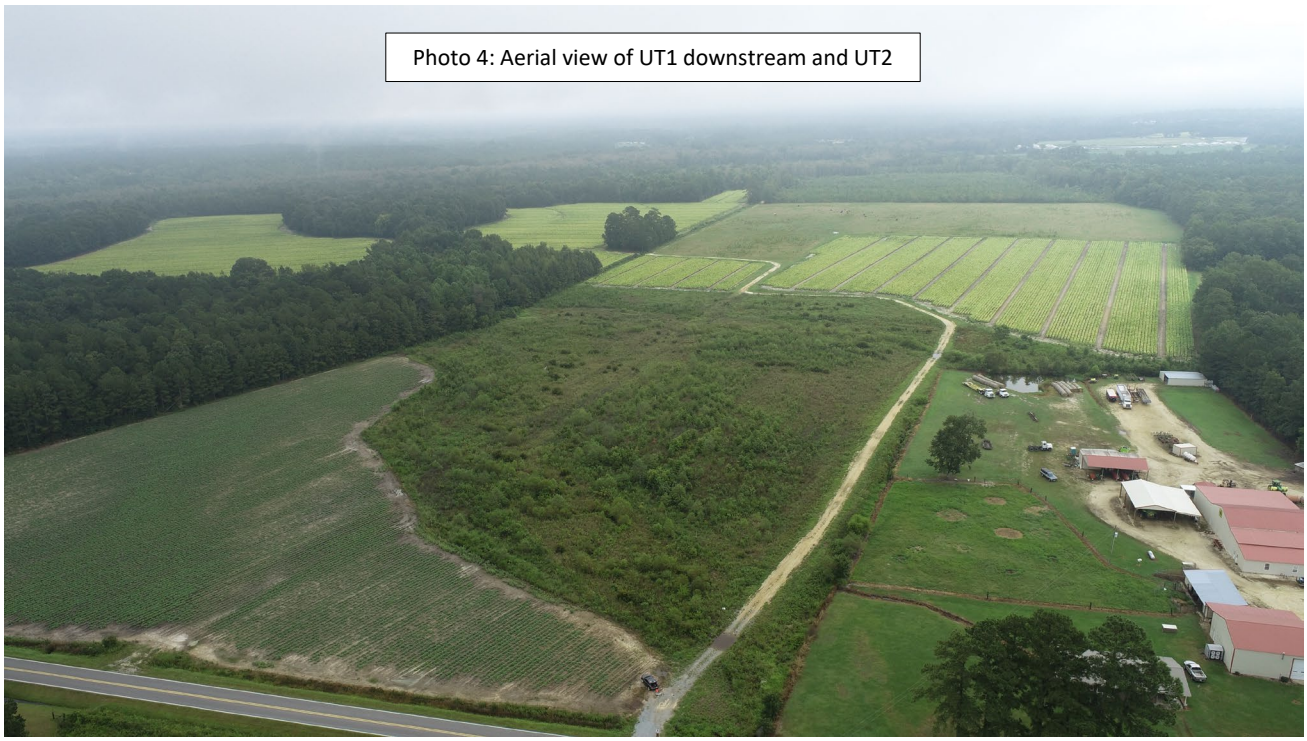


Photo 4: Aerial view of UT1 downstream and UT2

Alliance Headwaters
MY-04 (2023) Photo Log

Photo 5: Signage and posts at edge of easement

Photo 6: Aerial view of easement boundary and signage

Alliance Headwaters
MY-04 (2023) Photo Log

Photo 7: Crossing at edge of easement on UT-1, downstream

Photo 8: Crossing at edge of easement on UT-1, upstream

Alliance Headwaters
MY-04 (2023) Photo Log

Photo 9: UT-2 forded crossing, downstream

Photo 10: UT-2 forded crossing, upstream

Alliance Headwaters
MY-04 (2023) Photo Log

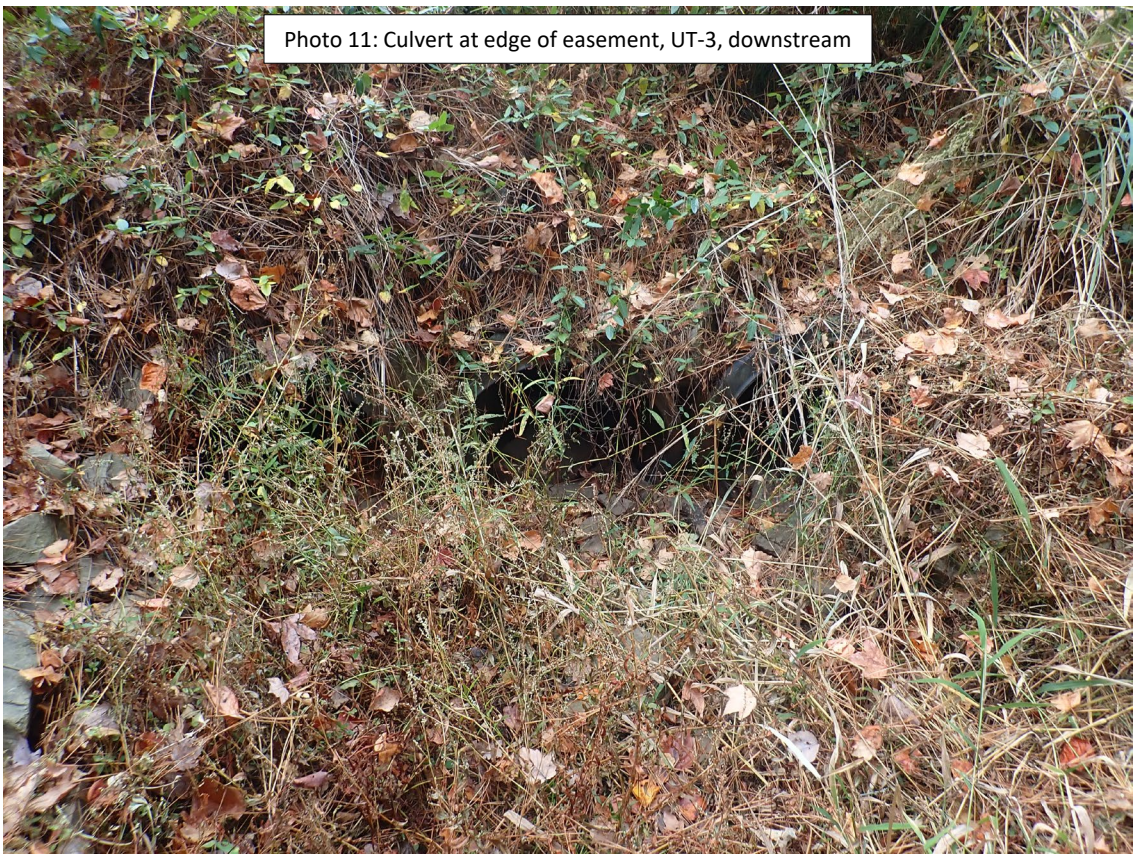


Photo 11: Culvert at edge of easement, UT-3, downstream

Photo 12: Culvert at edge of easement, UT-3, upstream

Alliance Headwaters
MY-04 (2023) Photo Log

Photo 13: Bud Burst of Betula nigra
Photo Taken 2/28/23

Photo 14: Bud Burst of Cornus amomum
Photo Taken 2/28/23

Alliance Headwaters
MY-04 (2023) Photo Log

Photo 15: Pine Thinning
Photo Taken 5/12/23

Photo 16: Pine Thinning
Photo Taken 5/12/23

APPENDIX F. IRT CORRESPONDENCE

2022-10-20. MY2 (2021) and MY3 (2022) IRT Site Visit Notes

Restoration Systems, LLC
1101 Haynes St. Suite 211
Raleigh, North Carolina
Ph: (919) 755-9490
Fx: (919) 755-9492

October 21, 2022

Lindsay Crocker
NC DEQ – Division of Mitigation Services
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

Subject: **MY2 (2021) and MY 3 (2022) IRT Site Visit**
Alliance Headwaters Stream & Riparian Riverine Wetland Mitigation Site
DMS Contract #: 6832; DMS Project ID: 95017; RFP # 16-006477
USACE Action ID No. SAW-2016-00882; DWR ID No. 20160405

MY2 (2021) and MY 3 (2022) IRT Site Visit: Site Visit Notes
On October 20, 2022, Restoration Systems (RS) held an on-site meeting with regulatory agencies to discuss the MY2 (2021) monitoring data and the MY 3 (2022) interim data for the Alliance Headwaters Mitigation Site. Below is a list of attendees and general site visit notes.

Attendees:

USACE:
- Todd Tugwell
- Casey Haywood

Restoration Systems:
- Raymond Holz
- Alex Baldwin

NC DWR:
- Erin Davis

Division of Mitigation Services:
- Lindsay Crocker

Site Visit Notes:

- RS will include a random vegetation transect through the UT 2 Wetland Enhancement Area during MY4 (2023).

- RS will ensure proper easement signage/marking along all Site's agriculture boundaries. This effort will include the southern easement boundary of the eastern tract along the gravel ag. road. This effort will consist of treated 6-inch fence posts at all easement corners and adequate marking every 200 feet with easement signage.

- RS will implement an initial treatment to pines throughout the easement in Q1 2023 – paying particular attention to pines on and along stream banks. RS will also plant live stakes in areas where pines are removed from the stream banks.

- Between groundwater gauges 24 and 30, RS will install a shorter/shallower groundwater gauge to see if the deeper gauges (24 and 30) have punctured through the restrictive soil layer.

- If 2022 photos are available that show the streams/site in a wetter condition, RS will provide them in the MY 3 (2022) monitoring Report.

- In the MY 3 (2022) monitoring report, RS will provide pictures of the improved road outlets. This includes the additional outlet constructed near groundwater gauge 19 – installed in August of 2022. The purpose of these outlets is to allow surface hydrology to enter the Site from adjacent agricultural fields.

- RS will perform groundwater gauge maintenance across the Site, ensuring bentonite caps are in place and level with the surrounding ground elevation.

- RS will review alternative approaches to monitoring stream flow and switch stream-flow gauges if appropriate.

Ray Holz

From: Haywood, Casey M CIV USARMY CEMVP (USA) <Casey.M.Haywood@usace.army.mil>
Sent: Monday, October 31, 2022 1:03 PM
To: Tugwell, Todd J CIV USARMY CESAW (USA); Davis, Erin B; Ray Holz
Cc: Crocker, Lindsay; Alex Baldwin
Subject: RE: [Non-DoD Source] RE: [External] Alliance Headwaters / MY2 (2021) and MY 3 (2022) IRT Site Visit / . SAW-2016-00882; DWR ID No. 20160405

Thanks Todd.

And thanks Ray, these look good to me also. Please reach out if you have any questions regarding the diagram for the flow gauge install.

Thanks,
Casey

Casey Haywood
Mitigation Specialist, Regulatory Division I U.S. Army Corps of Engineers
Work cell: (919) 750-7397

From: Tugwell, Todd J CIV USARMY CESAW (USA) <Todd.J.Tugwell@usace.army.mil>
Sent: Monday, October 31, 2022 12:39 PM
To: Davis, Erin B <erin.davis@ncdenr.gov>; Ray Holz <rholz@restorationsystems.com>; Haywood, Casey M CIV USARMY CEMVP (USA) <Casey.M.Haywood@usace.army.mil>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Alex Baldwin <abaldwin@restorationsystems.com>
Subject: RE: [Non-DoD Source] RE: [External] Alliance Headwaters / MY2 (2021) and MY 3 (2022) IRT Site Visit / . SAW-2016-00882; DWR ID No. 20160405

Ray, these look fine to me too.

Casey, I'm not sure if you received these due to your email snafu, so just sharing.

Thanks,
Todd

From: Davis, Erin B <erin.davis@ncdenr.gov>
Sent: Monday, October 31, 2022 12:15 PM
To: Ray Holz <rholz@restorationsystems.com>; Tugwell, Todd J CIV USARMY CESAW (USA) <Todd.J.Tugwell@usace.army.mil>; Haywood, Casey M CIV USARMY CEMVP (USA) <Casey.M.Haywood@usace.army.mil>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Alex Baldwin <abaldwin@restorationsystems.com>
Subject: [Non-DoD Source] RE: [External] Alliance Headwaters / MY2 (2021) and MY 3 (2022) IRT Site Visit / . SAW-2016-00882; DWR ID No. 20160405

Thanks for sending. I have no additional comments.

Much appreciated,

Erin B. Davis, PWS *(she/her/hers)*
Stream & Wetland Mitigation Coordinator
Division of Water Resources
NC Department of Environmental Quality

919-817-0360 cell
erin.davis@ncdenr.gov

From: Ray Holz <rholz@restorationsystems.com>
Sent: Friday, October 21, 2022 12:59 PM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>; Haywood, Casey M CIV USARMY CESAW (USA) <casey.m.haywood@usace.army.mil>; Davis, Erin B <erin.davis@ncdenr.gov>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Alex Baldwin <abaldwin@restorationsystems.com>
Subject: [External] Alliance Headwaters / MY2 (2021) and MY 3 (2022) IRT Site Visit / . SAW-2016-00882; DWR ID No. 20160405

Todd, Casey, and Erin –

Thank you for the time yesterday at Alliance. I feel that it was very productive on many fronts. I have attached a set of site visit notes for your review. Please send along any additional notes you would like added, and I will include all notes in the MY3 (2022) monitoring report.

Best,
RH

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Raymond J. Holz | Restoration Systems, LLC
1101 Haynes St. Suite 211 | Raleigh, NC 27604
tel: 919.334.9122 | cell: 919.604.9314 | fax: 919.755.9492
email: rholz@restorationsystems.com