FINAL
MONITORING REPORT (MY3)

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 2022
Submission: February 2023

Prepared for:

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

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

Response to Monitoring Year 3 (2022) DMS Comments
Alliance Headwaters Stream and Wetland Mitigation Site (DMS #97086)
Neuse River Basin 03020201, Johnston County
Contract No. 6832

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

Report:

1. Figure 3. Typo in title.
   Response: The title of Figure 3 was revised.

2. Vegetation narrative, Table 8 and Table 10 is written to show vegetative success based on 320 TPA planted at MY3, when the performance standard should be planted and volunteer (desirable spp). With this performance standard, there is only one permanent vegetation plot not meeting success by one stem (29). Suggest updating narrative and table 10 to reflect performance standard as written in MP and IRT guidance.
   Response: The report narrative and table 10 were updated to indicate that 31 of the 32 permanent plots met success criteria. When including desirable volunteer species, Site stem density increased to 465 stems/acre (502 stems/acre in permanent plots and 398 stems/acre in temporary plots).

Electronic Deliverables:

1. The cross sections as submitted do not comply with DMS data standards, each monitoring station must have a unique identify. The attribute table from the cross sections inserted below replicates cross section labels. Please resubmit cross section shape file with unique identifiers for each station.

FID	Shape *	Id	XS
0	Polyline	0	XS-01
1	Polyline	0	XS-02
2	Polyline	0	XS-01
3	Polyline	0	XS-02
4	Polyline	0	XS-03
5	Polyline	0	XS-04
6	Polyline	0	XS-05
7	Polyline	0	XS-06

   Response: The column labeled "XS" in the attribute table is used to label the CCPV figure. An additional column was added with full unique identifiers for each cross-section (i.e., "UT1 XS-01").

FID	Shape *	Id	XS	Cross_Sect
0	Polyline	0	XS-0	UT1 XS-01
1	Polyline	0	XS-0	UT1 XS-02
2	Polyline	0	XS-0	UT2 XS-01
3	Polyline	0	XS-0	UT2 XS-02
4	Polyline	0	XS-0	UT1 XS-03
5	Polyline	0	XS-0	UT1 XS-04
6	Polyline	0	XS-0	UT1 XS-05
7	Polyline	0	XS-0	UT1 XS-06

Alliance Headwaters -- Year 3 (2022) Monitoring Summary

General Notes

- The IRT conducted an MY2 (2021) and MY 3 (2022) IRT Site Visit on October 20, 2022. Site visit notes from the visit are included in Appendix G.
- Easement encroachment was observed during visual assessment site visits along the northwest parcel boundary of UT1-Reach 3 (all very minor and 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 k2 Design (project surveyor) re-survey the easement boundaries of UT1, Reaches 1-3, and WE1 in early November 2022. Easement marking and replanting of encroached areas with 3-gal. containerized trees were completed on November 10, 2022. A detailed report of 2022 maintenance work is provided in Section 2.2.

- No evidence of nuisance animal activity (i.e., heavy deer browsing, beaver activated, etc.) was observed.

Streams

- Stream monitoring measurements indicate minimal changes in the cross-sections as compared to as-built data. The channel geometry compares favorably with the proposed conditions outlined in the Detailed Restoration Plan and as constructed.

- Across the Site, all in-stream structures are intact and functioning as designed. No stream areas of concern were identified during year 3 (2022) 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 67 to 186 consecutive days (Appendix E).

- One bankfull event was documented in year 3 (2022) monitoring. Four bankfull events have been recorded to date, with one occurring during all three monitoring years (Table 16, Appendix E).

Wetlands

- Twelve of thirty-five groundwater gauges met success criteria for the year 3 (2022) monitoring period (Appendix E). The on-site reference gauge also failed to meet success criteria in year 3 (2022). Rainfall data indicate dry conditions for much of the year: precipitation was below the 30th percentile from February to June, according to WETS data (Appendix E). USGS drought monitoring indicates Johnston County was subject to periods of abnormally dry to moderate drought conditions dating back to September of 2021 and throughout much of 2022 (Graphic 1. USGS 2021-2022 Drought Conditions, Appendix E). Across the Site, the development of herbaceous hydrophytic species is abundant.

Vegetation

- Thirty-one of the thirty-two fixed vegetation monitoring plots met success in Year 3 with an average of 502 stems/acre. Additionally, 15 of 18 random transects met success with an average of 398 stems/acre. Woody vegetation continues to thrive across the Site, with stem heights reaching 10+ feet in places. Beyond the areas of encroachment, no areas of vegetation concern were identified in year 3 (2022).

Site Maintenance Report (2022)

Invasive Species Work	Maintenance work
06/01/2022 Cattail and Sweetgum (sporadic locations across the Site) 10/3/2022 Cattail, Sweetgum, and Lespedeza (sporadic locations across the Site)	See Section 2.1 – 2022 Maintenance

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			Jan. – Nov. 2022	November 2022	February 2023

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Prepared by:

Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, North Carolina 27604
Contact: Raymond Holz
919-755-9490 (phone)
919-755-9492 (fax)

And

Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603
Contact: Grant Lewis
919-215-1693 (phone)

TABLE OF CONTENTS

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

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

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

Additional activities that occurred at the Site included the following.

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

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	35 gauges spread throughout restored wetlands and 1 reference gauge within the wetland preservation area	Soil temperature at the beginning of each monitoring period to verify the start of the growing season, groundwater and rain data for each monitoring period

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

All streams are functioning as designed, and no stream areas of concern were observed during year 3 (2022) monitoring. Stream morphology data is available in Appendix D.

All seven flow gauges recorded continuous flow for more than the 30-days. Several stream gauges malfunctioned during the spring and summer of year 3 (2022). These gauges were relaunched/replaced as soon as the malfunction was discovered. As of November 2, 2022, all gauges have been repaired/replaced, are functioning correctly, and are recording stream flow measurements. Recorded flow periods ranged from 67 to 186 consecutive days (Appendix E).

One bankfull event was documented in year 3 (2022) monitoring. Four bankfull events have been recorded to date, with one occurring during all three 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

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

Twelve of thirty-five groundwater gauges met success criteria for the year 3 (2022) monitoring period (Appendix E). The on-site reference gauge also failed to meet success criteria in year 3 (2022). Rainfall data indicate dry conditions for much of the year: precipitation was below the 30th percentile from February to June, according to WETS data (Appendix E). USGS drought monitoring indicates Johnston County was subject to periods of abnormally dry to moderate drought conditions dating back to September of 2021 and throughout much of 2022 (Graphic 1. USGS 2021-2022 Drought Conditions, Appendix E). Across the Site, the development of herbaceous hydrophytic species is abundant.

Vegetation Summary

During quantitative vegetation sampling, 32 sample plots (10-meter by 10-meter) were installed within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation*, *Version 4.2* (Lee et al. 2008). Year 3 (2022) measurements also included 18 random sample plots (a mix of 50-meter by 2-meter and 25-meter by 4-meter). Measurements of all 50 plots resulted in an average of 465 stems/acre, excluding live stakes. Additionally, 31 of the 32 permanent plots and 15 of the 18 temporary transects met the success criteria. Plots 25, 28, 29, and 30 were each one stem shy of meeting success criteria based on planted stems alone, but when including naturally recruited stems of swamp chestnut oak (*Quercus michauxii*), a desirable species that was originally included in the Site planting plan, plots 25, 28, and 30 met success. Planted stem mortality in these plots is likely due to localized seasonal inundation of these areas. Three temporary transects in the vicinity of these plots (Transects 11, 15, 18) met success criteria, all with >400 stems/acre. Transects 2, 5, and 13 failed to meet the success criteria, which is likely due to dense herbaceous competition in the area. Permanent plots located adjacent to each of these transects met the success criteria. The year 3 (2022) vegetation data summaries are provided in Tables 8-11 of Appendix C.

2.2 2022 Maintenance & 2023 Monitoring Gauge Updates

All 2022 maintenance work is graphically depicted in Figure 3, Appendix B.

Surface Water Alterations (eastern easement boundary of UT3-Reach 1 and 2)

During the summer of 2022, RS added a surface water outlet along the agricultural road running adjacent to the southeastern easement boundary of UT3's Reaches 1 and 2. One outlet was added near GW-19, but cutting the ag. road down to match the adjacent ag. field and easement elevation. A temporary seed mix was applied, and containerized trees planted (Appendix F. Site Photos).

Agricultural Encroachment / Additional Signage:

Easement encroachment was observed during visual assessment site visits along the northwest parcel boundary of UT1-Reach 3 (all very minor and 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 k2 Design (project surveyor) re-survey the easement boundaries of UT1, Reaches 1-3, and WE1 in early November 2022. Following the survey effort, RS replaced several of the easement corner markers with 6-inch treated fence posts and new conservation easement signage. In addition, RS added 6-inch treated fence posts and new conservation easement signage to areas where long straight stretches of easement would benefit from additional marking; specifically areas of previous encroachment and the agricultural road along the southern easement boundary of UT1 Reach 3 and UT2 - (Appendix F. Site Photos).

Upon the completion of additional easement marking, 50, 3-gallon potted trees were planted within areas of encroachment – Table F. The location of planting is shown in Figure 3, Appendix B. Easement marking, and 3-gal. planting occurred on November 10, 2022 (Appendix F. Site Photos).

Table F – 2022-11 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**		

Replacement of Flow Gauges / Addition of Groundwater Gauges

During the IRT Site visit, conversations were had regarding the approach to documenting stream flow (See site visit notes Appendix G). After follow-up emails with Casey Haywood (USACE) and Lindsay Crocker (NCDMS) wherein alternative stream flow monitoring gauge assemblies were shared, RS plans to update the Sites seven (7) stream flow gauges to one of the several approaches provided.

3.0 REFERENCES

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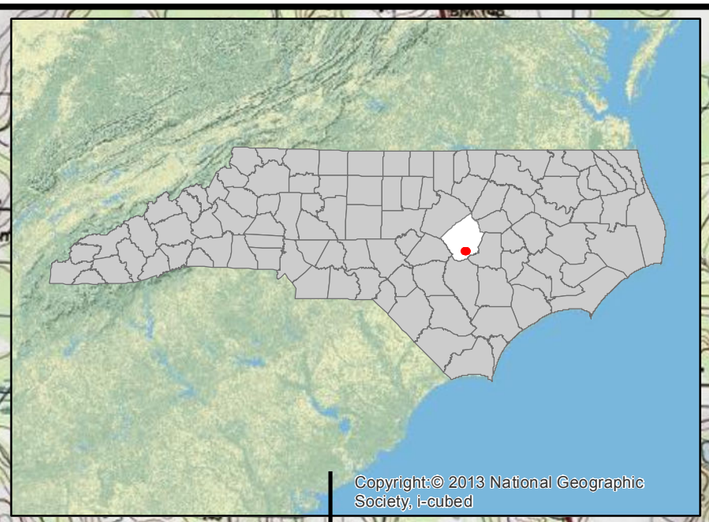
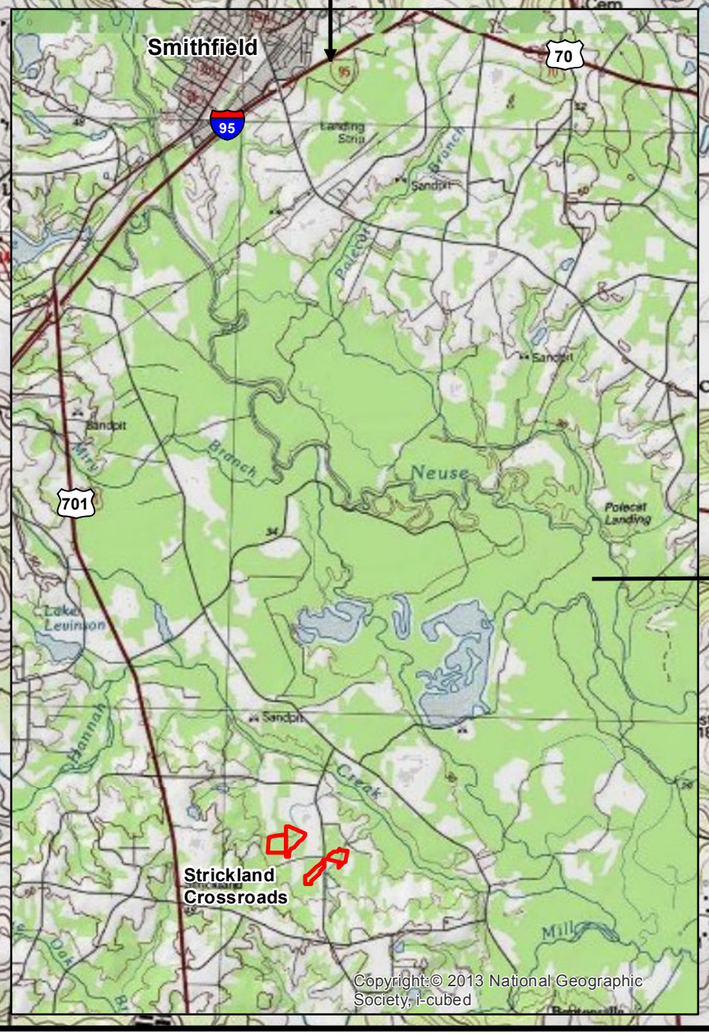
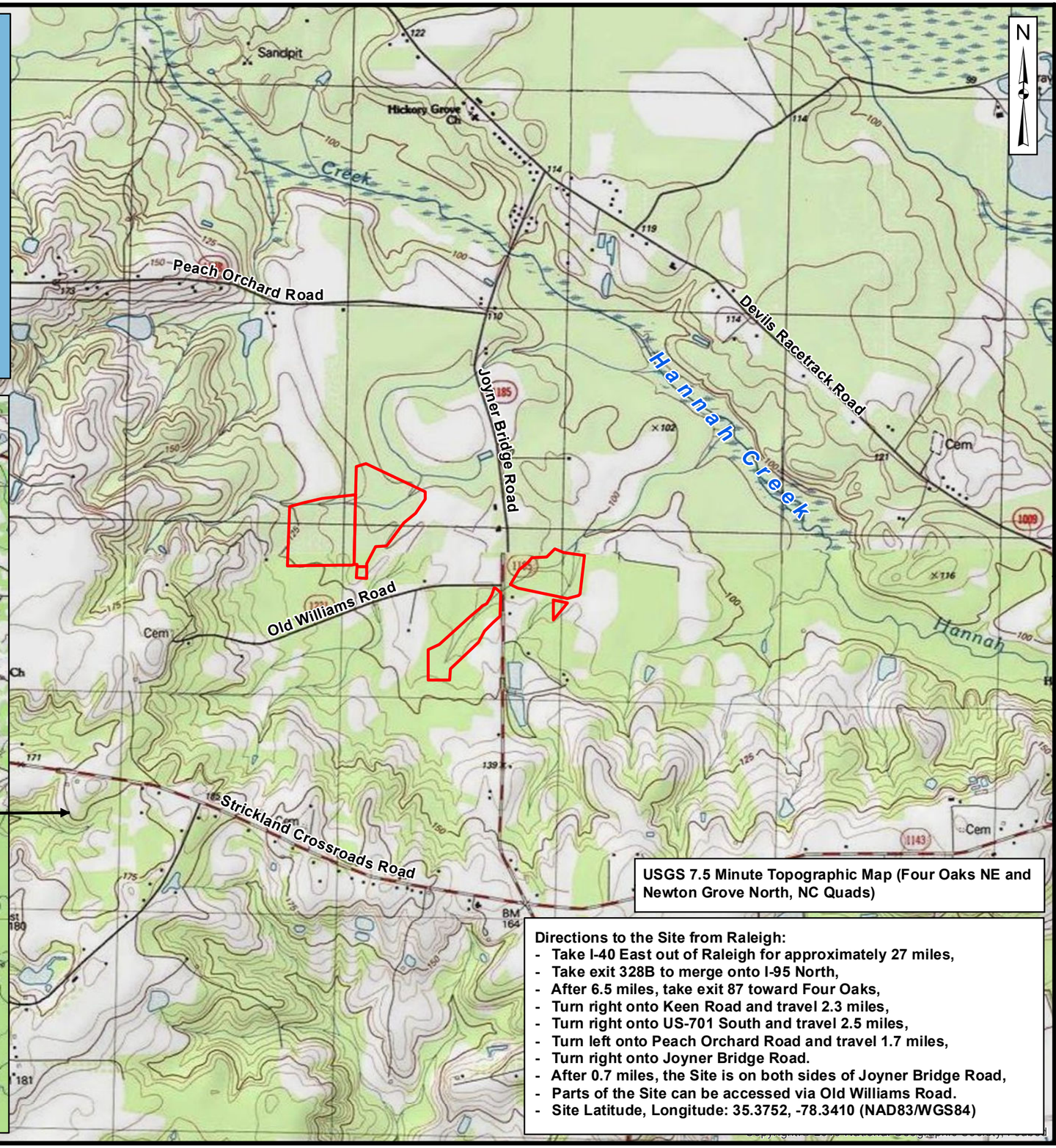
APPENDIX A: BACKGROUND TABLES AND MAP







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	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	Restoration	6.973	1.3:1	5.364	Wetland Restoration
Wetland R3	Riparian Riverine	0	18.47	18.473	Restoration	18.473	1:1	18.473	Wetland Restoration
Wetland R4	Riparian Riverine	0	0.29	0.285	Restoration	0.285	1:1	0.285	Wetland Restoration
Wetland R5	Riparian Riverine	0	0.95	0.950	Restoration	0.950	1:1	0.950	Wetland Restoration
Wetland R6	Riparian Riverine	0	0.90	0.896	Restoration	0.896	1:1	0.896	Wetland Restoration
Wetland R7	Riparian Riverine	0	0.28	0.284	Restoration	0.284	1:1	0.284	Wetland Restoration

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

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

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

*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

Table 3. Project Contacts Table
Alliance Headwaters Mitigation Site

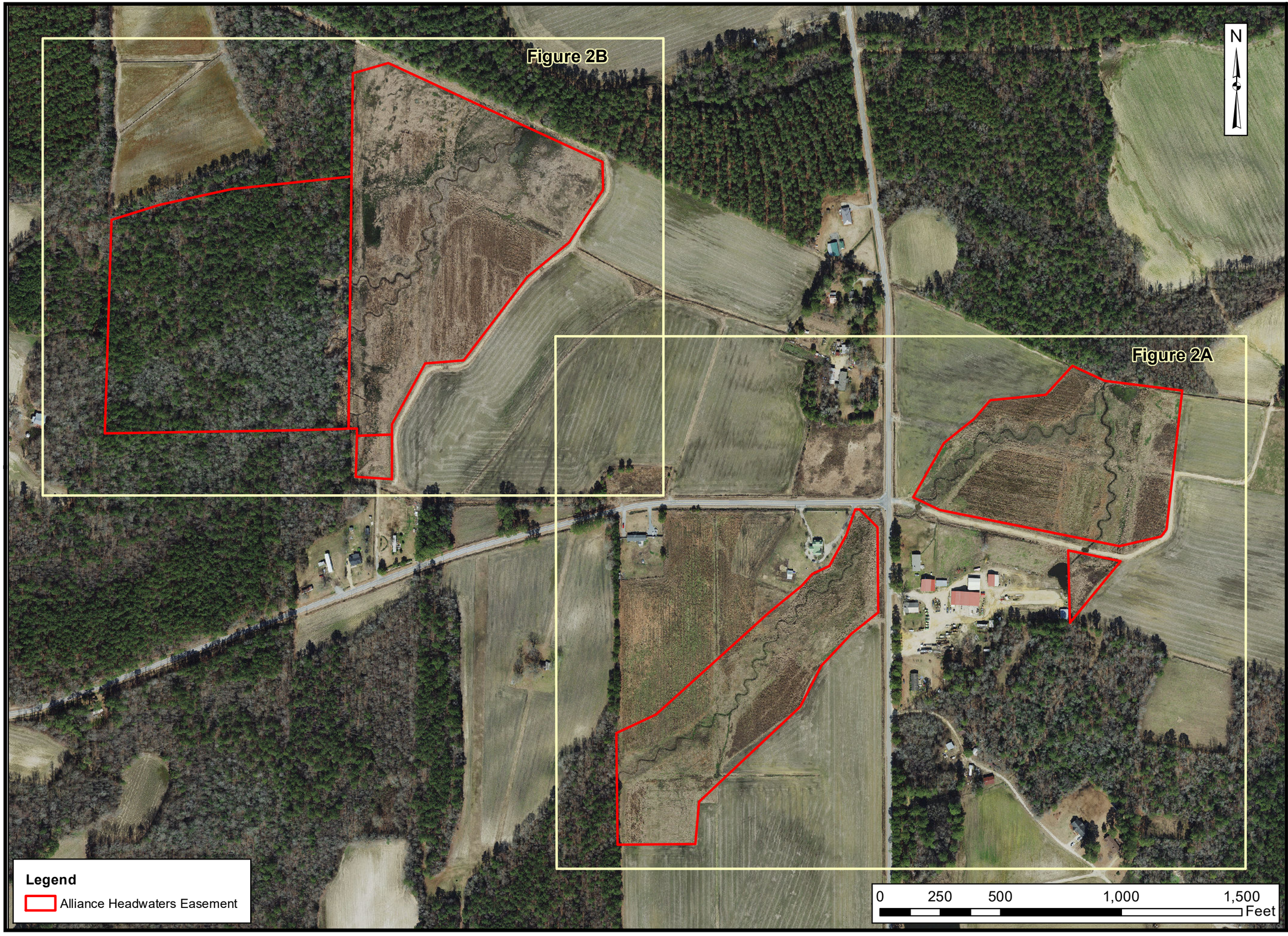
Full Delivery Provider Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 Worth Creech 919-755-9490	**Construction Contractor** Land Mechanic Designs 780 Landmark Road Willow Spring, NC 27592 Lloyd Glover 919-639-6132
Designer, Construction Plans, and Sediment/Erosion Control 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
Figure 3. 2022 Maintenance
Tables 5A-5H. Visual Stream Morphology Stability Assessment
Table 6. Vegetation Condition Assessment
Vegetation Plot Photographs



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

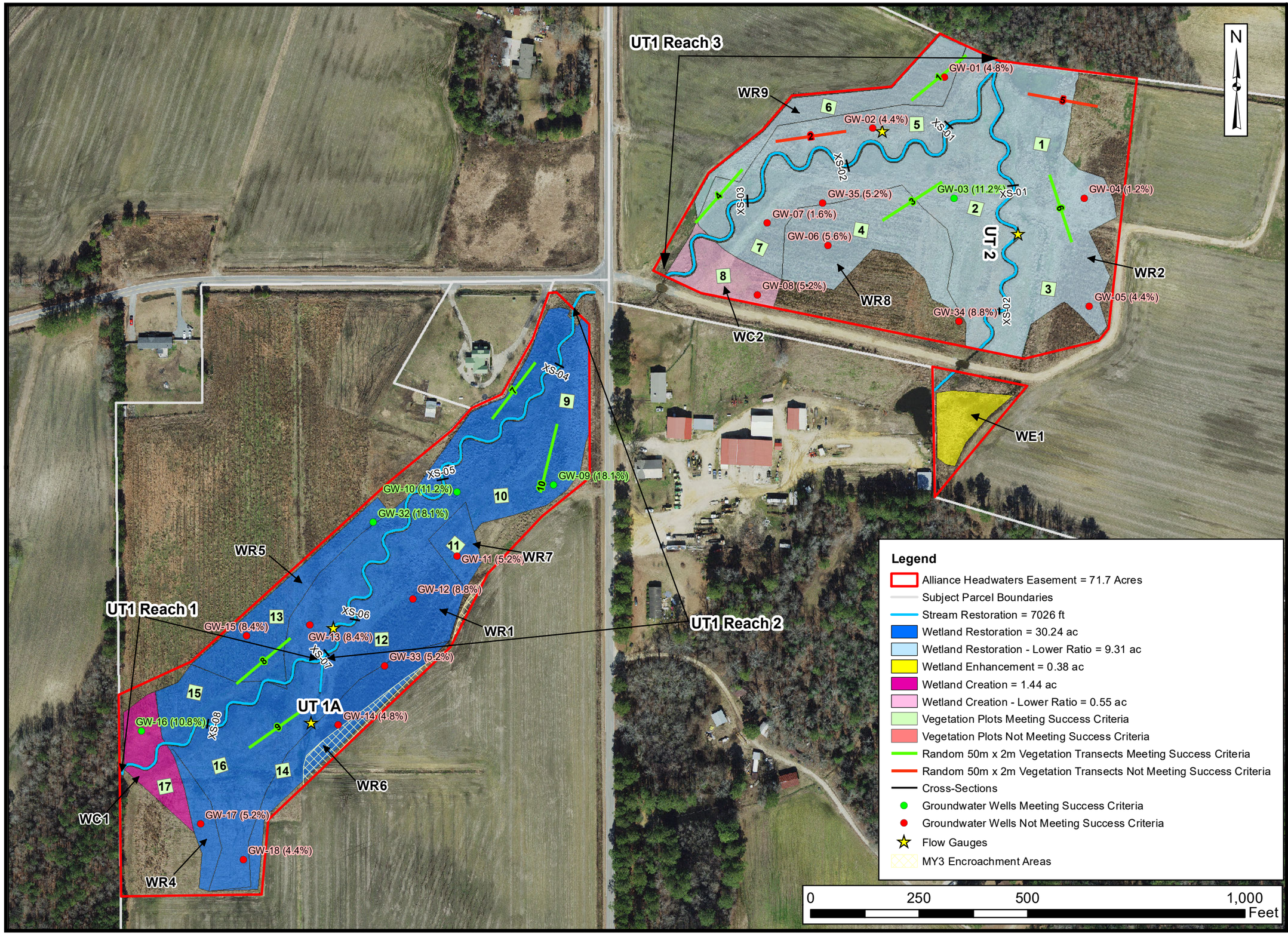
Date: Dec 2022

Scale: 1:4500

Project No.: 18-035

FIGURE

2



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

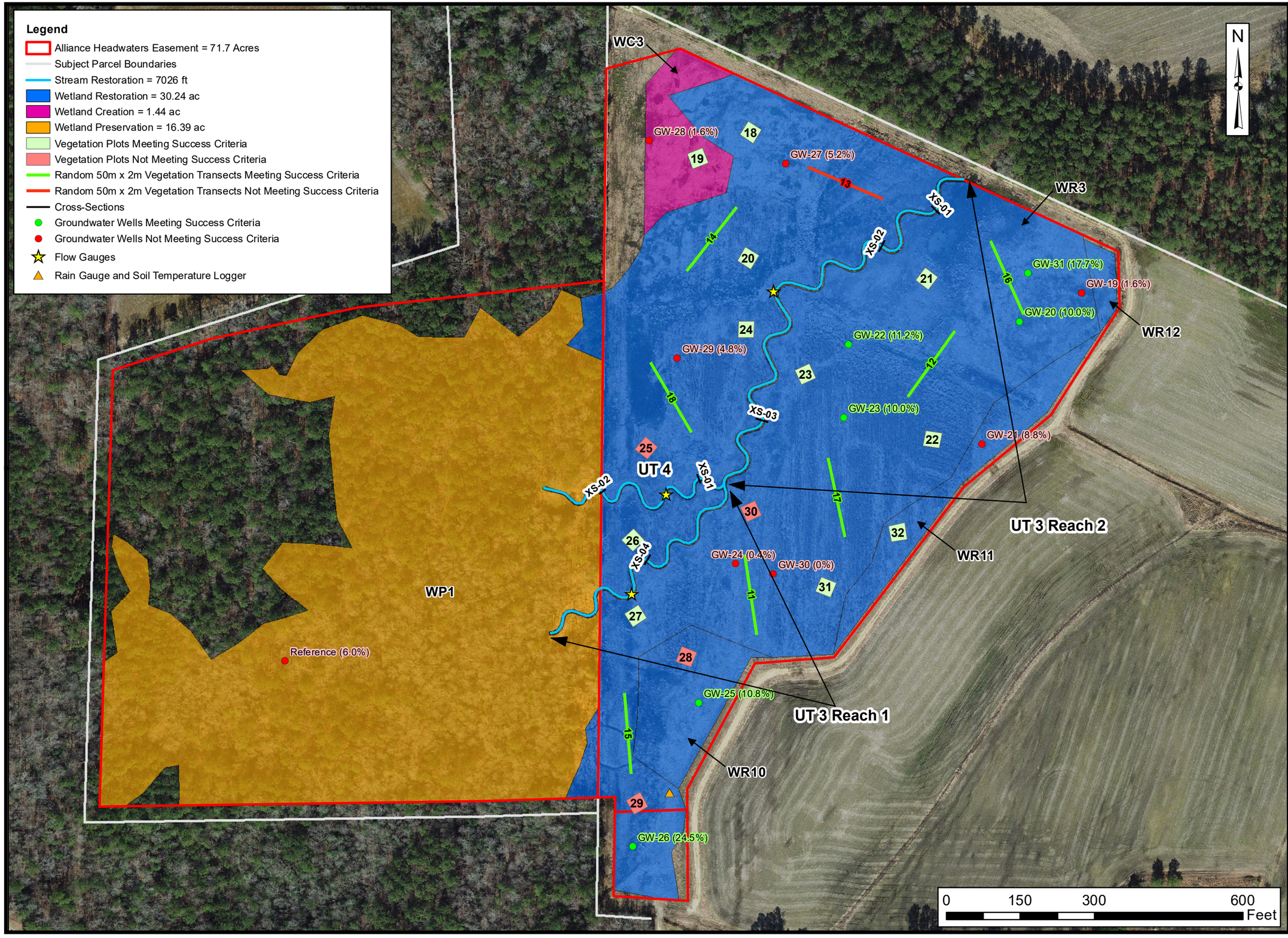
Date: Dec 2022

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: Dec 2022

Scale: 1:2200

Project No.: 18-035

FIGURE

2B

Surface Water Gauges
2023 - Replace Site-wide

Surface Water Alteration
2022 - cut made to soil path to allow runoff to enter the Site from the adjacent field, "surface water outlet" - Five, 3-gal. trees planted

Surface Water Alteration
2022 - Cleaning of exisitng surface water outlet

Ground Water Gauges
2023 - 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.

Surface Water Alteration
2022 - Cleaning of exisitng surface water outlet

Invasive Species
2023 - 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.

2022 - Enchrochment Planting (0.331 Acres)

Old Williams Road

Joyner Bridge Road

Legend

- Recorded Conservation Easement: 71.71 Acres
- 2022 Encroachment Area: 0.331 Acres
- 2022 Easement Survey and Marking Effort
- Flow Gauges
- Groundwater Wells
- CVS Plots
- Stream Restoration = 7026 ft
- Wetland Restoration
- Wetland Restoration - Lower Ratio
- Wetland Enhancement
- Wetland Creation
- Wetland Creation - Lower Ratio
- Wetland Preservation

Feet
0 275 550 1,100 1,650 2,200

N

RESTORATION SYSTEMS | LLC

Prepared for:

NC DEQ
Division of Enviromental Quality

Division of Mitigation Services

Project:

ALLIANCE HEADWATERS MITIGATION SITE

Chatham County

Title:

2022 & 2023 MAINTENANCE EFFORTS

Imagery: 2018 NC OneMap

Drawn by: RJH

Date: DEC 2022

Scale: 1:8,500

Project No.: DMS ID 97086

FIGURE

3

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]	None	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.

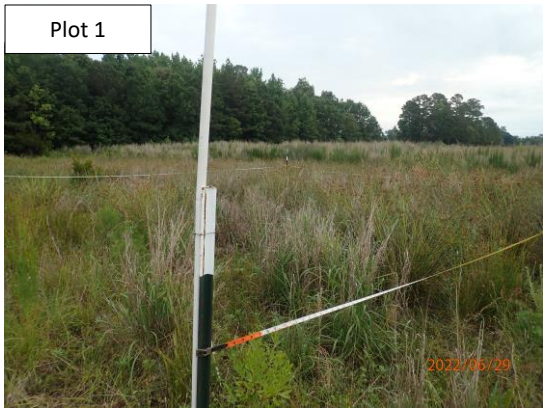
2 = The acreage within the easement boundaries.

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.

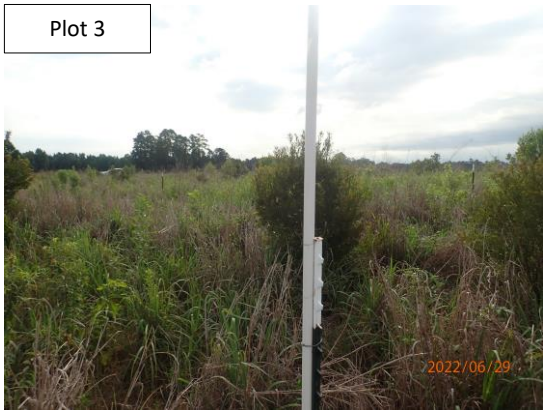
Alliance Headwaters Site
MY3 (2022) Vegetation Monitoring Photographs (taken June 2022)

Plot 1



Plot 2

Plot 3



Plot 4

Plot 5

Plot 6

Plot 7

Plot 8

Alliance Headwaters Site
MY3 (2022) Vegetation Monitoring Photographs (taken June 2022)

Plot 9

Plot 10

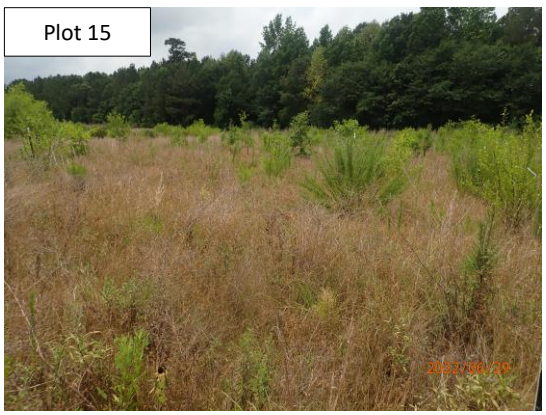
Plot 11

Plot 12

Plot 13

Plot 14

Plot 15



Plot 16

Alliance Headwaters Site
MY3 (2022) Vegetation Monitoring Photographs (taken June 2022)

Plot 17

Plot 18

Plot 19

Plot 20

Plot 21

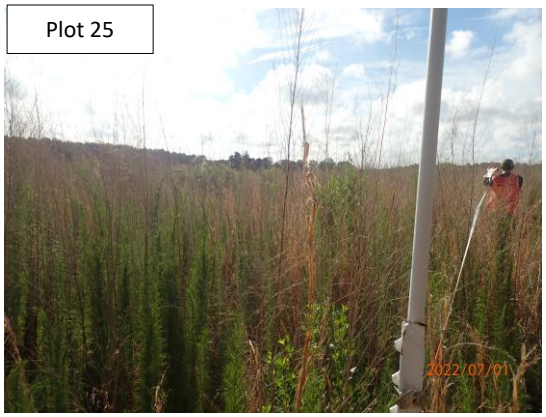
Plot 22

Plot 23

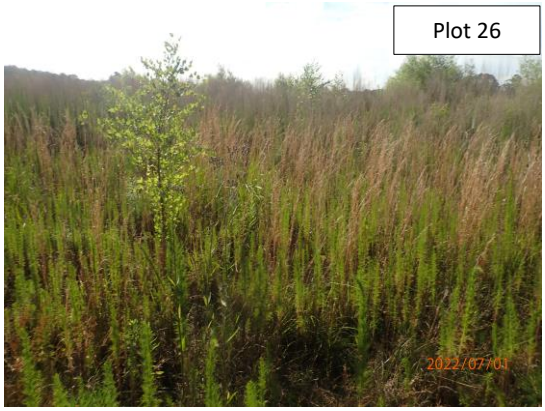
Plot 24

Alliance Headwaters Site
MY3 (2022) Vegetation Monitoring Photographs (taken June 2022)

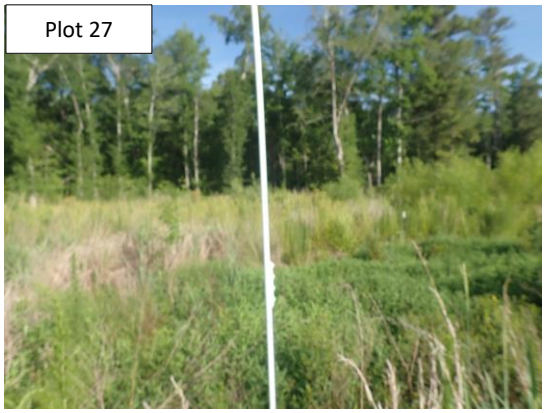
Plot 25



Plot 26



Plot 27



Plot 28

Plot 29

Plot 30

Plot 31

Plot 32

APPENDIX C: VEGETATION DATA

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

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

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

Table 8. Total Stems by Plot and Species
Project Code 18035. Project Name: Alliance Headwaters

			Current Plot Data (MY3 2022)																									
			18035-01-0001			18035-01-0002			18035-01-0003			18035-01-0004			18035-01-0005			18035-01-0006			18035-01-0007			18035-01-0008			18035-01-0009		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree																										
Baccharis halimifolia	eastern baccharis	Shrub																										
Betula nigra	river birch	Tree	1	1	1	4	4	4	1	1	1				2	2	2	3	3	3	2	2	2					
Carpinus caroliniana	American hornbeam	Tree																										
Cornus amomum	silky dogwood	Shrub																										
Diospyros virginiana	common persimmon	Tree																								1		
Liquidambar styraciflua	sweetgum	Tree																										
Liriodendron tulipifera	tuliptree	Tree							5	5	5															3	3	3
Magnolia virginiana	sweetbay	Tree	1	1	1	2	2	2																				
Morella cerifera	wax myrtle	shrub				1	1	1	3	3	3															1	1	1
Nyssa	tupelo	Tree																						1	1	1		
Nyssa sylvatica	blackgum	Tree																1	1	1								
Persea palustris	swamp bay	tree																								1	1	1
Pinus taeda	loblolly pine	Tree																										
Prunus serotina	black cherry	Tree																1	1	1								
Quercus	oak	Tree										1	1	1				1	1	1	8	8	8	1	1	1		
Quercus alba	white oak	Tree	1	1	1	1	1	1				4	4	4							1	1	1					
Quercus bicolor	swamp white oak	Tree																										
Quercus lyrata	overcup oak	Tree																								1	1	1
Quercus michauxii	swamp chestnut oak	Tree	4	4	4	1	1	1	1	1	1				2	2	2	2	2	2	6	6	6	5	5	5		
Quercus nigra	water oak	Tree										6	6	6				2	2	2							7	7	7
Quercus pagoda	cherrybark oak	Tree							2	2	2				1	1	1							1	1	1	1	1	1
Quercus phellos	willow oak	Tree				1	1	1										2	2	2							1	1	1
Quercus rubra	northern red oak	Tree																										
Taxodium distichum	bald cypress	Tree										5	5	5	8	8	8	3	3	3	2	2	2	1	1	2	1	1	1
Ulmus americana	American elm	Tree	6	6	6				12	12	12				1	1	1											
Unknown		Shrub or Tree																						1	1	1		
		Stem count	13	13	13	10	10	10	24	24	24	16	16	16	14	14	14	15	15	15	19	19	19	10	10	12	16	16	16
		size (ares)	1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	5	5	5	6	6	6	6	6	6	4	4	4	5	5	5	8	8	8	5	5	5	6	6	7	8	8	8
		Stems per ACRE	526.1	526.1	526.1	404.7	404.7	404.7	971.2	971.2	971.2	647.5	647.5	647.5	566.6	566.6	566.6	607	607	607	768.9	768.9	768.9	404.7	404.7	485.6	647.5	647.5	647.5

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes

P-all = Planting including livestakes

T = All planted and natural recruits including livestakes

T includes natural recruits

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

			Current Plot Data (MY3 2022)																								
			18035-01-0010			18035-01-0011			18035-01-0012			18035-01-0013			18035-01-0014			18035-01-0015			18035-01-0016			18035-01-0017			18035-01-0018		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree																										
Baccharis halimifolia	eastern baccharis	Shrub																										
Betula nigra	river birch	Tree										1	1	1	4	4	4	3	3	3	1	1	1					
Carpinus caroliniana	American hornbeam	Tree																										
Cornus amomum	silky dogwood	Shrub																										
Diospyros virginiana	common persimmon	Tree															1											
Liquidambar styraciflua	sweetgum	Tree																										
Liriodendron tulipifera	tuliptree	Tree	1	1	1										1	1	1											
Magnolia virginiana	sweetbay	Tree										1	1	1													1	1	1
Morella cerifera	wax myrtle	shrub	2	2	2										2	2	2							3	3	3	1	1	1
Nyssa	tupelo	Tree																										
Nyssa sylvatica	blackgum	Tree																			2	2	2					
Persea palustris	swamp bay	tree																										
Pinus taeda	loblolly pine	Tree																										
Prunus serotina	black cherry	Tree																										
Quercus	oak	Tree							2	2	2	2	2	2	2	2	2	2	2	2				3	3	3	1	1	1
Quercus alba	white oak	Tree										1	1	2				1	1	2									
Quercus bicolor	swamp white oak	Tree																			3	3	3						
Quercus lyrata	overcup oak	Tree																1	1	1				4	4	4			
Quercus michauxii	swamp chestnut oak	Tree	6	6	6	5	5	5				1	1	1	2	2	3				6	6	6	2	2	2	4	4	4
Quercus nigra	water oak	Tree							1	1	1	3	3	3				1	1	1	2	2	2						
Quercus pagoda	cherrybark oak	Tree				2	2	2	2	2	2	1	1	1	1	1	1							4	4	4	3	3	3
Quercus phellos	willow oak	Tree							1	1	1																		
Quercus rubra	northern red oak	Tree				1	1	1																					
Taxodium distichum	bald cypress	Tree	2	2	2	4	4	4	5	5	5	1	1	1	5	5	5	1	1	1									
Ulmus americana	American elm	Tree													1	1	1										4	4	5
Unknown		Shrub or Tree																											
		Stem count	11	11	11	12	12	12	11	11	11	11	11	12	18	18	20	9	9	10	14	14	14	16	16	16	14	14	15
		size (ares)	1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	4	4	4	4	4	4	5	5	5	8	8	8	8	8	9	6	6	6	5	5	5	5	5	5	6	6	6
		Stems per ACRE	445.2	445.2	445.2	485.6	485.6	485.6	445.2	445.2	445.2	445.2	445.2	485.6	728.4	728.4	809.4	364.2	364.2	404.7	566.6	566.6	566.6	647.5	647.5	647.5	566.6	566.6	607

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

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

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

			Current Plot Data (MY3 2022)																									
			18035-01-0019			18035-01-0020			18035-01-0021			18035-01-0022			18035-01-0023			18035-01-0024			18035-01-0025			18035-01-0026			18035-01-0027		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree																										
Baccharis halimifolia	eastern baccharis	Shrub																										
Betula nigra	river birch	Tree				5	5	5				2	2	2														
Carpinus caroliniana	American hornbeam	Tree																										
Cornus amomum	silky dogwood	Shrub																										
Diospyros virginiana	common persimmon	Tree																										
Liquidambar styraciflua	sweetgum	Tree																										
Liriodendron tulipifera	tuliptree	Tree																			1	1	1					
Magnolia virginiana	sweetbay	Tree				1	1	1										2	2	2								
Morella cerifera	wax myrtle	shrub	2	2	2							1	1	1							1	1	1	3	3	3		
Nyssa	tupelo	Tree																										
Nyssa sylvatica	blackgum	Tree																										
Persea palustris	swamp bay	tree																										
Pinus taeda	loblolly pine	Tree																										
Prunus serotina	black cherry	Tree																										
Quercus	oak	Tree				1	1	1				2	2	2	1	1	1											
Quercus alba	white oak	Tree																										
Quercus bicolor	swamp white oak	Tree																										
Quercus lyrata	overcup oak	Tree													1	1	1											
Quercus michauxii	swamp chestnut oak	Tree	2	2	2				1	1	1				1	1	1	1	1	1	3	3	4	1	1	1	1	1	1
Quercus nigra	water oak	Tree							2	2	2	1	1	2	4	4	4							1	1	1	1	1	1
Quercus pagoda	cherrybark oak	Tree	2	2	2	1	1	1	2	2	2	4	4	4	2	2	2	3	3	3				6	6	6	1	1	1
Quercus phellos	willow oak	Tree																										
Quercus rubra	northern red oak	Tree																										
Taxodium distichum	bald cypress	Tree	3	3	3	1	1	1	4	4	4	3	3	3	6	6	6	2	2	2	2	2	2				2	2	2
Ulmus americana	American elm	Tree	1	1	1							1	1	1													4	4	4
Unknown		Shrub or Tree																										
		Stem count	10	10	10	9	9	9	9	9	9	14	14	15	15	15	15	8	8	8	7	7	8	11	11	11	9	9	9
		size (ares)	1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	5	5	5	5	5	5	4	4	4	7	7	7	6	6	6	4	4	4	4	4	4	4	4	4	5	5	5
		Stems per ACRE	404.7	404.7	404.7	364.2	364.2	364.2	364.2	364.2	364.2	566.6	566.6	607	607	607	607	323.7	323.7	323.7	283.3	283.3	323.7	445.2	445.2	445.2	364.2	364.2	364.2

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

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

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

			Current Plot Data (MY3 2022)															Annual Means											
			18035-01-0028			18035-01-0029			18035-01-0030			18035-01-0031			18035-01-0032			MY3 (2022)			MY2 (2021)			MY1 (2020)			MY0 (2020)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree																					7						
Baccharis halimifolia	eastern baccharis	Shrub																					13						
Betula nigra	river birch	Tree							1	1	1							30	30	30	30	30	30	32	32	32	36	36	36
Carpinus caroliniana	American hornbeam	Tree										1	1	1				1	1	1	1	1	1	1	1	1			
Cornus amomum	silky dogwood	Shrub																									2	2	2
Diospyros virginiana	common persimmon	Tree																		2							2	2	2
Liquidambar styraciflua	sweetgum	Tree																					40						
Liriodendron tulipifera	tuliptree	Tree																11	11	11	12	12	12	16	16	16	26	26	26
Magnolia virginiana	sweetbay	Tree				1	1	1				1	1	1				10	10	10	13	13	13	16	16	16	28	28	28
Morella cerifera	wax myrtle	shrub				2	2	2	1	1	1							23	23	23	23	23	23	25	25	25	29	29	29
Nyssa	tupelo	Tree																1	1	1	1	1	1	3	3	3	3	3	3
Nyssa sylvatica	blackgum	Tree																3	3	3	3	3	3	3	3	3	12	12	12
Persea palustris	swamp bay	tree																1	1	1	5	5	5	8	8	8	12	12	12
Pinus taeda	loblolly pine	Tree																					8						
Prunus serotina	black cherry	Tree																1	1	1	4	4	4	4	4	4	5	5	5
Quercus	oak	Tree							2	2	2							29	29	29	53	53	53	74	74	74	101	101	101
Quercus alba	white oak	Tree																9	9	11	4	4	4	6	6	6	2	2	2
Quercus bicolor	swamp white oak	Tree																3	3	3	10	10	10	3	3	3	2	2	2
Quercus lyrata	overcup oak	Tree							1	1	1							8	8	8	9	9	9	9	9	9	13	13	13
Quercus michauxii	swamp chestnut oak	Tree	2	2	3						1			1	1	1	1	60	60	65	48	48	48	36	36	36	10	10	10
Quercus nigra	water oak	Tree										6	6	6	6	6	6	43	43	44	37	37	37	31	31	31	18	18	18
Quercus pagoda	cherrybark oak	Tree	2	2	2	2	2	2	1	1	1	1	1	1				45	45	45	37	37	37	32	32	32	34	34	34
Quercus phellos	willow oak	Tree																5	5	5	4	4	4	3	3	3			
Quercus rubra	northern red oak	Tree																1	1	1									
Taxodium distichum	bald cypress	Tree	3	3	3	2	2	2							1	1	1	67	67	68	68	68	68	61	61	61	60	60	60
Ulmus americana	American elm	Tree							1	1	1	1	1	1	2	2	2	34	34	35	36	36	36	34	34	34	21	21	21
Unknown		Shrub or Tree																1	1	1	2	2	2	2	2	2	4	4	4
		Stem count	7	7	8	7	7	7	7	7	8	10	10	11	10	10	10	386	386	398	400	400	468	399	399	399	420	420	420
		size (ares)	1			1			1			1			1			32			32			32			32		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.79			0.79			0.79			0.79		
		Species count	3	3	3	4	4	4	6	6	7	5	5	6	4	4	4	21	21	22	20	20	24	20	20	20	20	20	20
		Stems per ACRE	283.3	283.3	323.7	283.3	283.3	283.3	283.3	283.3	323.7	404.7	404.7	445.2	404.7	404.7	404.7	488.2	488.2	503.3	505.9	505.9	591.9	504.6	504.6	504.6	531.1	531.1	531.1

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes

P-all = Planting including livestakes

T = All planted and natural recruits including livestakes

T includes natural recruits

Table 9. MY3 Temporary Vegetation Plot Data
Alliance Headwaters Restoration Site

Species	T-1	T-2	T-3	T-4	T-5	T-6	T-7
Betula nigra		1		1		2	1
Carpinus caroliniana							
Liriodendron tulipifera				3			
Magnolia virginiana						1	
Morella cerifera					1	2	
Nyssa sylvatica						1	
Quercus alba						2	
Quercus bicolor							
Quercus lyrata							
Quercus michauxii			2	3			
Quercus nigra							
Quercus pagoda			4	2	3	2	
Quercus phellos	1						
Quercus sp.		1		1	1	2	1
Taxodium distichum	5	2	2	1	1		9
Ulmus americana	3		1		1	1	
Total Number of Stems	**9**	**4**	**9**	**11**	**7**	**13**	**11**
Stems/Acre	**364**	**162**	**364**	**445**	**283**	**526**	**445**

Table 9. MY3 Temporary Vegetation Plot Data (continued)
Alliance Headwaters Restoration Site

Species	T-8	T-9	T-10	T-11	T-12	T-13	T-14
Betula nigra	2			1	1	3	5
Carpinus caroliniana			3				
Liriodendron tulipifera							
Magnolia virginiana						2	
Morella cerifera					1		2
Nyssa sylvatica							
Quercus alba						1	
Quercus bicolor							
Quercus lyrata		2	3				
Quercus michauxii	3	3		2	2		3
Quercus nigra				1			
Quercus pagoda							1
Quercus phellos	3		1		2		
Quercus sp.			2	1	1		
Taxodium distichum	3	5	3	3	5		
Ulmus americana				2			
Total Number of Stems	**11**	**10**	**12**	**10**	**12**	**6**	**11**
Stems/Acre	**445**	**405**	**486**	**405**	**486**	**243**	**445**

Table 9. MY3 Temporary Vegetation Plot Data (continued)
Alliance Headwaters Restoration Site

Species	T-15	T-16	T-17	T-18
Betula nigra	1	4	3	3
Carpinus caroliniana				
Liriodendron tulipifera		1		
Magnolia virginiana			2	
Morella cerifera		2		
Nyssa sylvatica				2
Quercus alba				
Quercus bicolor		1		
Quercus lyrata				2
Quercus michauxii	3		1	
Quercus nigra			2	
Quercus pagoda				
Quercus phellos				
Quercus sp.	1			
Taxodium distichum	6	2	2	3
Ulmus americana				
Total Number of Stems	**11**	**10**	**10**	**10**
Stems/Acre	**445**	**405**	**405**	**405**

Table 10. MY3 Planted Vegetation Totals
Alliance Headwaters Mitigation Site

Plot #	Stems/Acre (Planted and Volunteer - Desirable Species)	Success Criteria Met?
1	526	Yes
2	405	Yes
3	971	Yes
4	648	Yes
5	567	Yes
6	607	Yes
7	769	Yes
8	486	Yes
9	648	Yes
10	445	Yes
11	486	Yes
12	445	Yes
13	486	Yes
14	809	Yes
15	405	Yes
16	567	Yes
17	648	Yes
18	607	Yes
19	405	Yes
20	364	Yes
21	364	Yes
22	607	Yes
23	607	Yes
24	324	Yes
25	324	Yes
26	445	Yes
27	364	Yes
28	324	Yes
29	283	No
30	324	Yes
31	405	Yes
32	405	Yes
Average Planted Stems/Acre	**502**	**Yes**

Table 11. MY3 Temporary Vegetation Plot Planted Vegetation Totals
Alliance Headwaters Mitigation Site

Transect#	Stems/Acre (Planted and Volunteer - Desirable Species)	Success Criteria Met?
T-1	364	Yes
T-2	162	No
T-3	364	Yes
T-4	445	Yes
T-5	283	No
T-6	526	Yes
T-7	445	Yes
T-8	445	Yes
T-9	405	Yes
T-10	486	Yes
T-11	405	Yes
T-12	486	Yes
T-13	243	No
T-14	445	Yes
T-15	445	Yes
T-16	405	Yes
T-17	405	Yes
T-18	405	Yes
Average Planted Stems/Acre	**398**	**Yes**

APPENDIX D: STREAM GEOMORPHOLOGY DATA

Tables 12A-12E. Baseline Stream Data Summary
Tables 13A-13D. Monitoring Data-Dimensional Morphology Summary
(Dimensional Parameters-Cross-sections)
Tables 14A-14E. Monitoring Data-Stream Reach Data Summary
Cross-Section Plots

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

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline					
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	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 12b. Baseline Stream Data Summary
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT1/Reach 3 (1463 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline					
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 12c. Baseline Stream Data Summary
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT2 (996.7 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline					
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 12d. Baseline Stream Data Summary
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT3 (1914.8 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline					
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 12e. Baseline Stream Data Summary
Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT4 (530.9 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Johanna Creek Ref			Still Creek Ref			Cole Property Ref			Design			Monitoring Baseline					
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 13a. 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 13b. 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 13c. 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 13d. 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 14a. Monitoring Data - Stream Reach Data Summary

Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT1/Reach 1&2 (2033 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
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	23.95		25.8		2												
Entrenchment Ratio	11.6		12.9	14.1		2	6		10.1	14.3		2	11.1	12.45		13.8		2	10.1	10.25		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	1.055		1.12		2	0.97	1.00		1.03		2												
Profile																																				
Riffle Length (ft)	9	28.6	28.45	49.5	10.7	35																														
Riffle Slope (ft/ft)	1E-04	0.01	0.009	0.021	0.007	13																														
Pool Length (ft)	4.3	10.9	9.14	39.8	7.5	27																														
Pool Max depth (ft)	1.7		1.8	2		3																														
Pool Spacing (ft)	25.3	49.8	50.71	89.2	14.7	35																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				

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

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																																				

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

Exhibit Table 14b. Monitoring Data - Stream Reach Data Summary

Project Name/Number (Alliance Headwaters/97086) - Segment/Reach: UT1/Reach 3 (1463 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
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)	8E-04	0.006	0.003	0.029	0.009	10																														
Pool Length (ft)	4.7	13	11.75	32	6.4	22																														
Pool Max depth (ft)	1.9	2.1	2.1	2.3		2																														
Pool Spacing (ft)	37.3	68	73.78	87.5	13.9	22																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				

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

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																																				

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

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.

2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table

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

4. = Of value/needed only if the n exceeds 3

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

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
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	10.37			10.37		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	0.586			0.586		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	1.328			1.328		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	1.009			1.009		1	1.07			1.07		1												
Profile																																				
Riffle Length (ft)	15.7	29.9	28.44	52.3	10.8	11																														
Riffle Slope (ft/ft)	0.00	0.014	0.00	0.014	0.00	8																														
Pool Length (ft)	2.4	14.2	12.38	28.4	7.4	17																														
Pool Max depth (ft)	1.6	1.6	1.6	1.6		1																														
Pool Spacing (ft)	34.5	55.6	54.92	73.1	10.7	16																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				

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

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																																				

Shaded cells indicate that these will typically not be filled in.
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2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

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

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
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	7.872	9.031		10.19		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	0.579		0.63		2												
[1]Bankfull Max Depth (ft)	1		1	1		2	1		1.1	1.1		2	0.98	1.045		1.11		2	1.13	1.135		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	14.41	16.82		19.23		2	13.42	14.48		15.55		2												
Entrenchment Ratio	11.2		12.5	13.7		2	11.1		11.8	12.5		2	9.8	11.25		12.7		2	11.8	12.01		12.3		2												
Low Bank Height (ft)	1.0		1.0	1.0		2	1.0		1.1	1.1		2	1.024	1.072		1.12		2	1.16	1.201		1.24		2												
[1]Bank Height Ratio	1.0		1.0	1.0		2	1.0		1.0	1.0		2	0.921	1.03		1.138		2	1.02	1.058		1.09		2												
Profile																																				
Riffle Length (ft)	22.1	39	35.67	60.9	10	29																														
Riffle Slope (ft/ft)	0.001	0.005	0.005	0.01	0.003	14																														
Pool Length (ft)	7	10.7	10.06	16.8	2.5	28																														
Pool Max depth (ft)	1.6	1.65	1.65	1.7		2																														
Pool Spacing (ft)	45.6	63	60.35	91.7	11.3	28																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				
Additional Reach Parameters																																				
Rosgen Classification	C5																																			
Channel Thalweg length (ft)	1914.8																																			
Sinuosity (ft)	1.21 - 1.38																																			
Water Surface Slope (Channel) (ft/ft)	0.0033																																			
BF slope (ft/ft)																																				
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

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

Exhibit Table 14e. Monitoring Data - Stream Reach Data Summary
Project Name/Number (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	31.69	74.4	16.6	9																														
Riffle Slope (ft/ft)	0.006	0.008	0.008	0.015	0.003	9																														
Pool Length (ft)	5.2	9.5	9.34	12.3	2.3	9																														
Pool Max depth (ft)	1.4	1.4	1.4	1.4		1																														
Pool Spacing (ft)	21.2	49.6	46.5	75.4	15.6	9																														
Pattern																																				
Channel Beltwidth (ft)																																				
Radius of Curvature (ft)																																				
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)																																				
Meander Width Ratio																																				

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

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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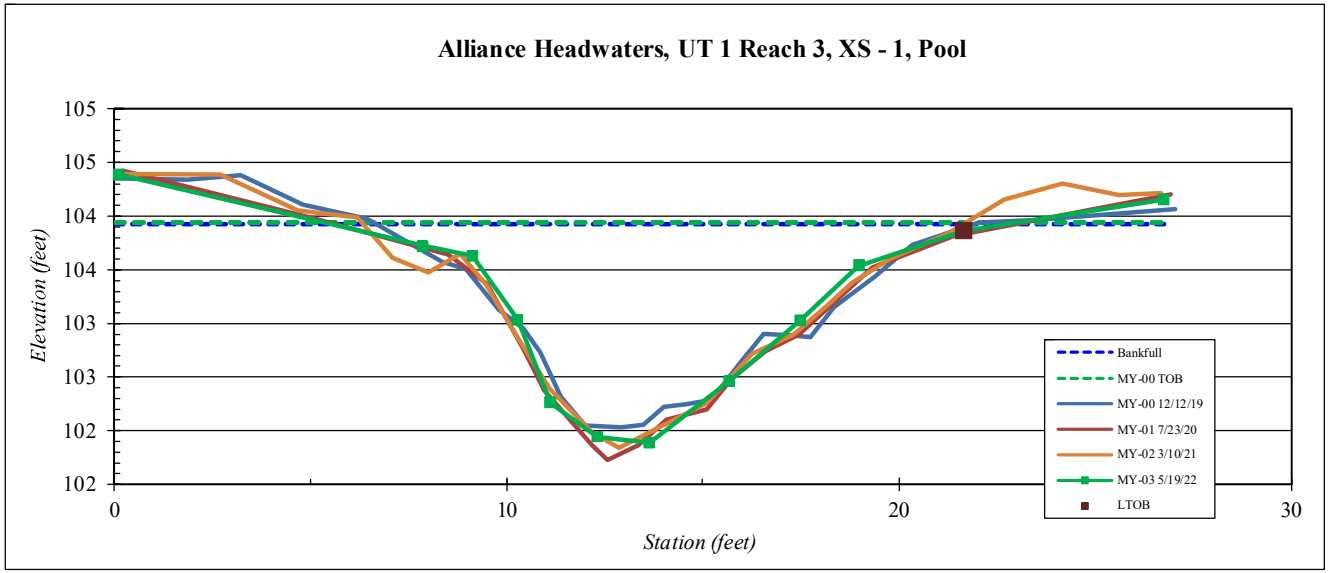
1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 1 Reach 3, XS - 1
Feature	Pool
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.1	104.39
7.9	103.72
9.1	103.63
10.3	103.04
11.1	102.26
12.3	101.94
13.6	101.89
15.7	102.46
17.5	103.03
19.0	103.54
21.7	103.86
26.8	104.15

SUMMARY DATA	
Bankfull Elevation:	103.9
Bankfull Cross-Sectional Area:	14.5
Bankfull Width:	17.3
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.0
Low Bank Height:	2.0
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.97

Stream Type	C5

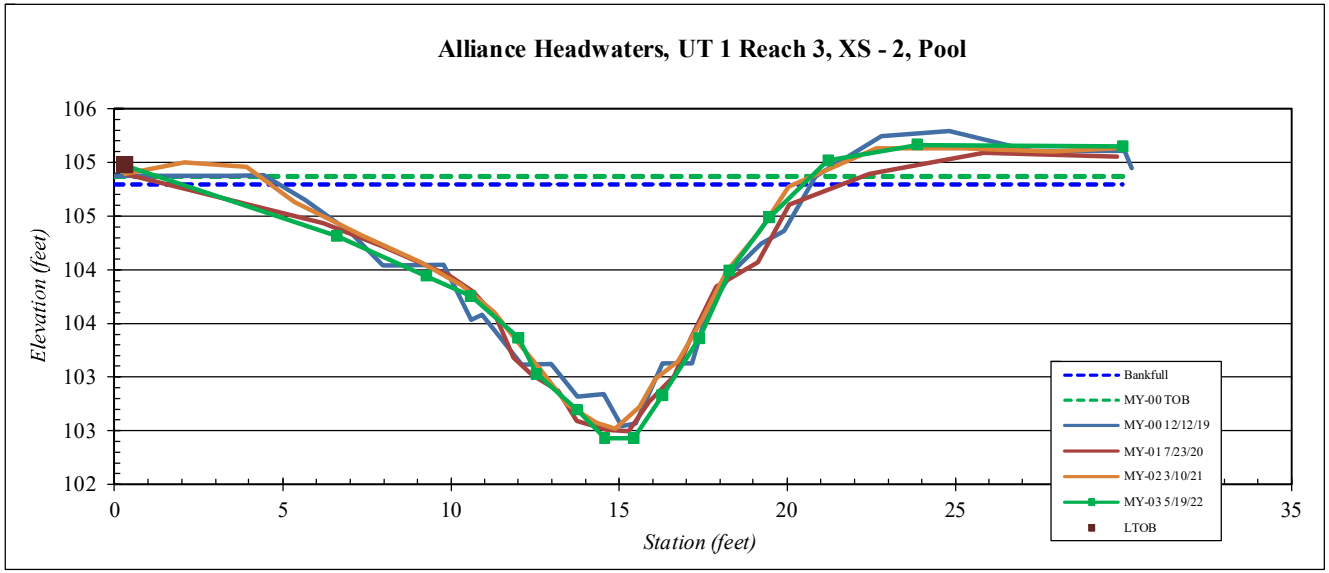


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 1 Reach 3, XS - 2
Feature	Pool
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.3	104.97
6.6	104.31
9.3	103.94
10.6	103.75
12.0	103.37
12.5	103.03
13.8	102.69
14.6	102.43
15.4	102.43
16.3	102.83
17.4	103.36
18.3	103.99
19.5	104.49
21.2	105.02
23.9	105.16
30.0	105.15

SUMMARY DATA	
Bankfull Elevation:	104.8
Bankfull Cross-Sectional Area:	18.5
Bankfull Width:	16.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.4
Low Bank Height:	2.5
Mean Depth at Bankfull:	1.1
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.07

Stream Type	C5

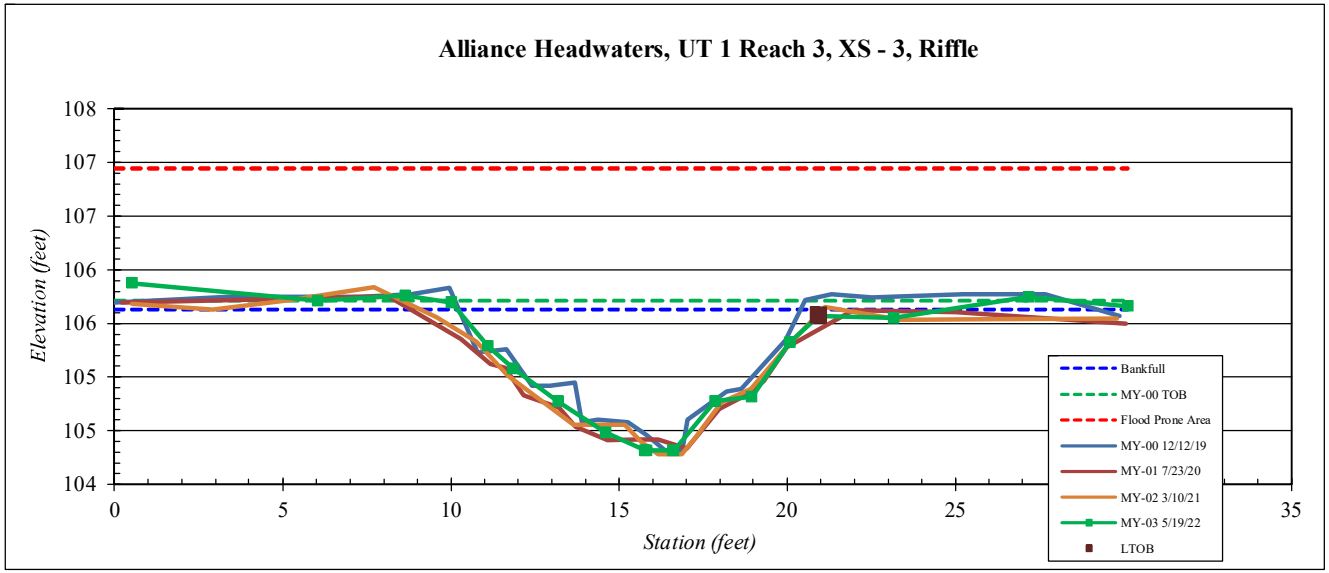


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 1 Reach 3, XS - 3
Feature	Riffle
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.5	105.88
6.0	105.71
8.6	105.76
10.0	105.70
11.1	105.28
11.9	105.08
13.2	104.77
14.6	104.48
15.8	104.32
15.8	104.32
16.6	104.32
17.8	104.78
18.9	104.82
20.1	105.33
20.9	105.57
23.2	105.55
27.2	105.75
30.1	105.66

SUMMARY DATA	
Bankfull Elevation:	105.6
Bankfull Cross-Sectional Area:	8.4
Bankfull Width:	10.8
Flood Prone Area Elevation:	106.9
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.3
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.8
W / D Ratio:	13.9
Entrenchment Ratio:	9.3
Bank Height Ratio:	0.96

Stream Type	C5

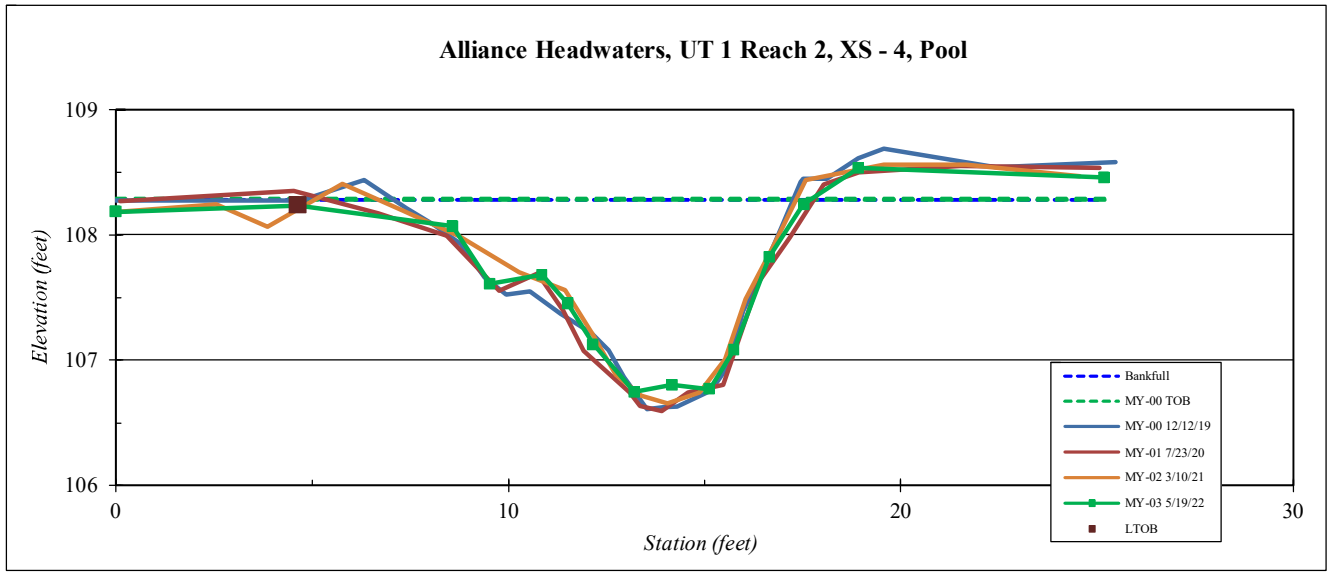


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 1 Reach 2, XS - 4
Feature	Pool
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.0	108.18
4.6	108.24
8.6	108.07
9.5	107.61
10.9	107.68
11.5	107.45
12.2	107.13
13.2	106.75
14.2	106.80
15.1	106.77
15.7	107.08
16.7	107.82
17.5	108.24
18.9	108.54
25.2	108.46

SUMMARY DATA	
Bankfull Elevation:	108.3
Bankfull Cross-Sectional Area:	9.0
Bankfull Width:	13.1
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.5
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.7
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.97

Stream Type	C5

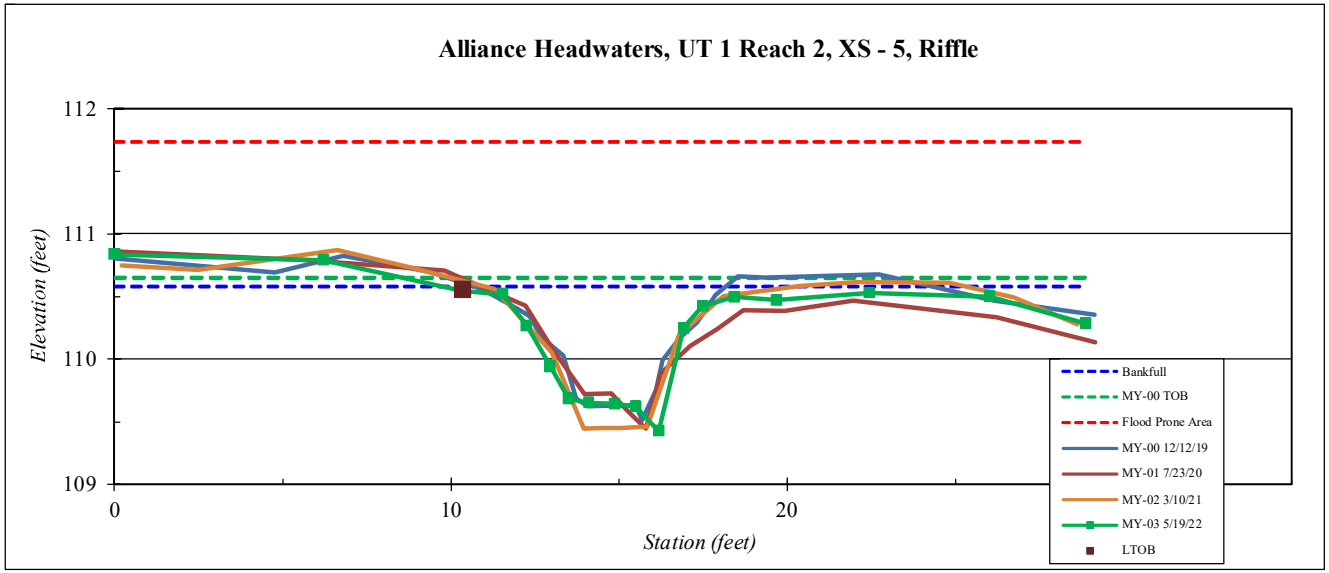


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 1 Reach 2, XS - 5
Feature	Riffle
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.0	110.84
6.2	110.79
10.4	110.55
11.5	110.52
12.3	110.27
13.0	109.94
13.5	109.69
14.1	109.65
14.9	109.65
15.5	109.62
16.2	109.42
16.9	110.25
17.5	110.42
18.4	110.50
19.7	110.47
22.4	110.53
26.0	110.50
28.9	110.28

SUMMARY DATA	
Bankfull Elevation:	110.6
Bankfull Cross-Sectional Area:	4.4
Bankfull Width:	9.9
Flood Prone Area Elevation:	111.7
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.2
Low Bank Height:	1.1
Mean Depth at Bankfull:	0.4
W / D Ratio:	22.3
Entrenchment Ratio:	10.1
Bank Height Ratio:	0.97

Stream Type	C5

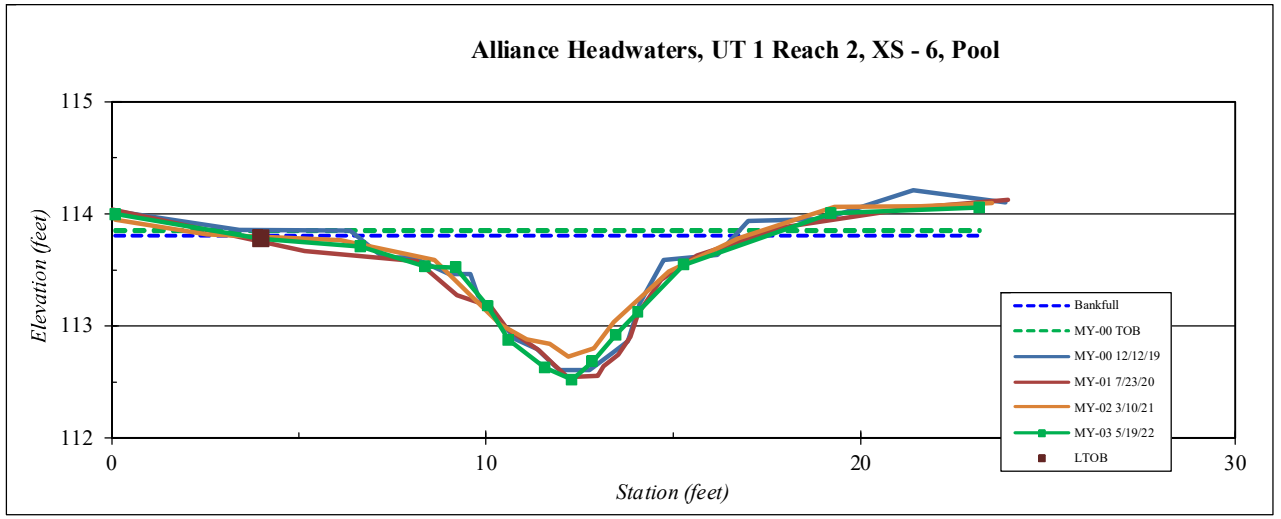


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 1 Reach 2, XS - 6
Feature	Pool
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.1	113.5
4.0	113.3
6.6	113.2
8.4	113.0
9.2	113.0
10.0	112.7
10.6	112.4
11.6	112.1
12.3	112.0
12.8	112.2
13.5	112.4
14.1	112.6
15.3	113.0
19.2	113.5
23.2	113.6

SUMMARY DATA	
Bankfull Elevation:	113.3
Bankfull Cross-Sectional Area:	6.1
Bankfull Width:	14.0
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.3
Low Bank Height:	1.3
Mean Depth at Bankfull:	0.4
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.98

Stream Type	C5

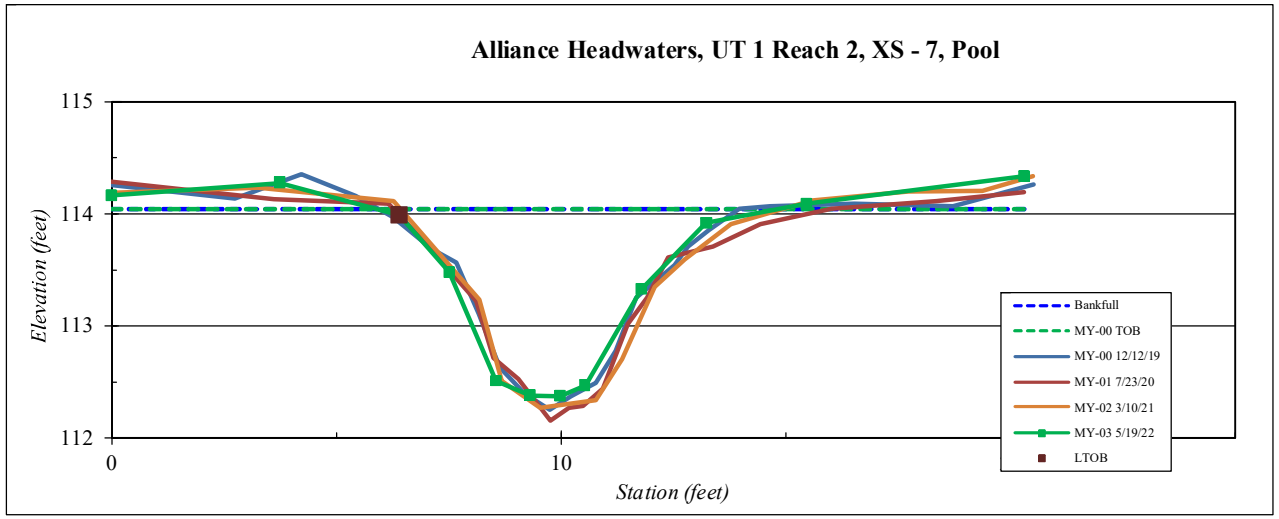


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 1 Reach 2, XS - 7
Feature	Pool
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.0	114.2
3.7	114.3
6.4	114.0
7.5	113.5
8.5	112.5
9.3	112.4
10.0	112.4
10.5	112.5
11.8	113.3
13.2	113.9
15.5	114.1
20.3	114.3

SUMMARY DATA	
Bankfull Elevation:	114.0
Bankfull Cross-Sectional Area:	6.8
Bankfull Width:	8.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.7
Low Bank Height:	1.6
Mean Depth at Bankfull:	0.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.97

Stream Type	C5

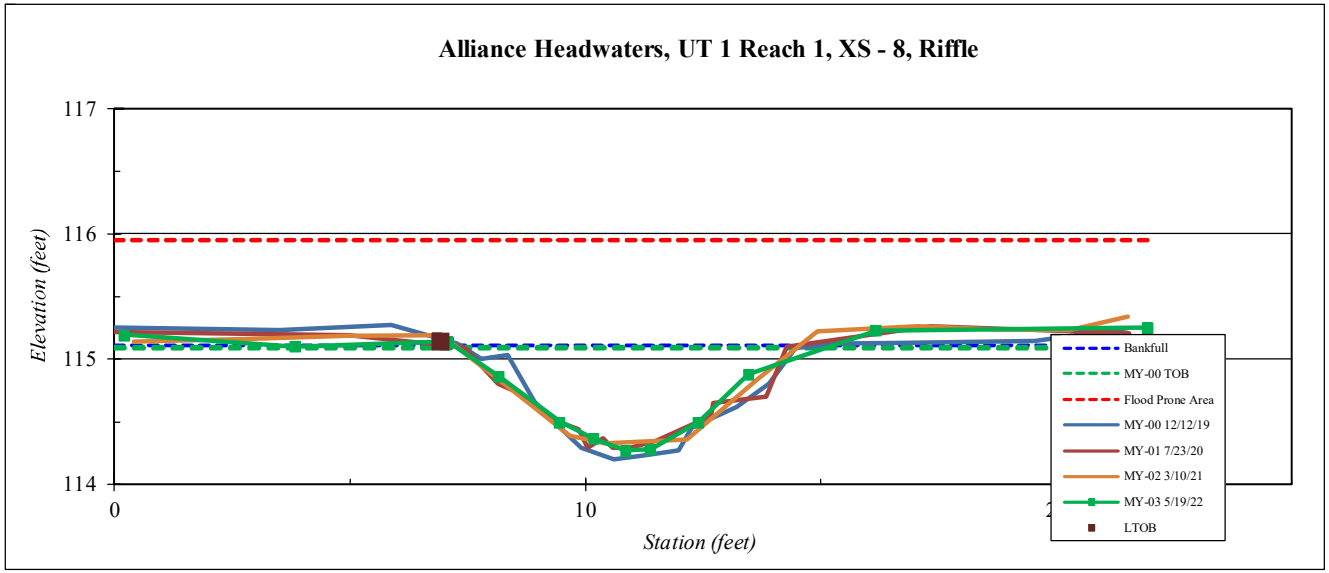


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 1 Reach 1, XS - 8
Feature	Riffle
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.2	115.19
3.8	115.10
6.9	115.13
7.1	115.13
8.2	114.86
9.5	114.49
10.2	114.36
10.9	114.27
11.4	114.28
12.4	114.49
13.5	114.87
16.2	115.22
21.9	115.25

SUMMARY DATA	
Bankfull Elevation:	115.1
Bankfull Cross-Sectional Area:	3.6
Bankfull Width:	9.6
Flood Prone Area Elevation:	116.0
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.8
Low Bank Height:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	19.4
Entrenchment Ratio:	10.4
Bank Height Ratio:	1.03

Stream Type	C5

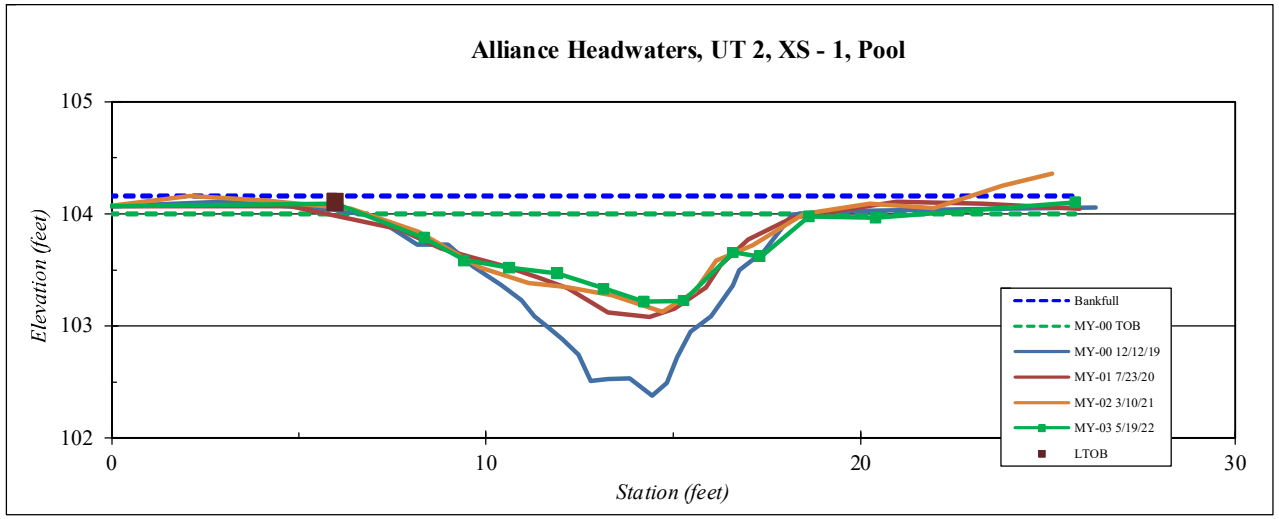


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 2, XS - 1
Feature	Pool
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
-0.1	104.1
6.0	104.1
8.3	103.8
9.4	103.6
10.6	103.5
11.9	103.5
13.1	103.3
14.2	103.2
15.3	103.2
16.6	103.7
17.3	103.6
18.6	104.0
20.4	104.0
25.7	104.1

SUMMARY DATA	
Bankfull Elevation:	104.2
Bankfull Cross-Sectional Area:	8.8
Bankfull Width:	19.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.9
Low Bank Height:	0.9
Mean Depth at Bankfull:	0.4
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.93

Stream Type	C5

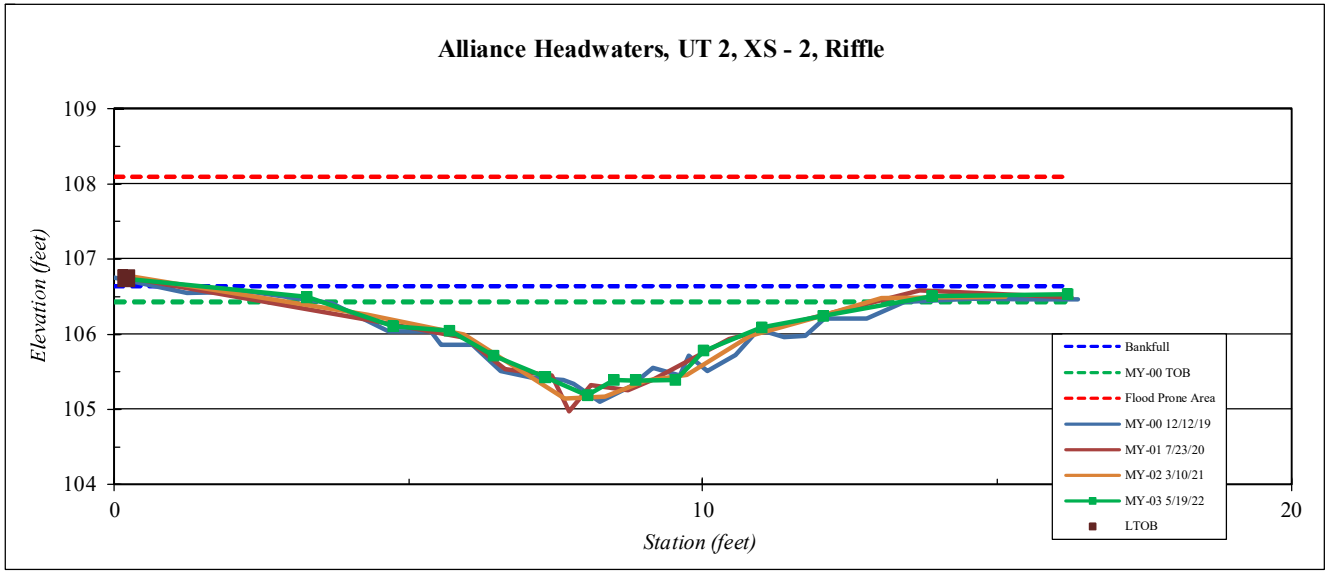


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 2, XS - 1
Feature	Riffle
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.2	106.7
3.3	106.5
4.7	106.1
5.7	106.0
6.4	105.7
7.3	105.4
8.0	105.2
8.5	105.4
8.8	105.4
9.5	105.4
10.0	105.8
11.0	106.1
12.0	106.2
13.9	106.5
16.2	106.5

SUMMARY DATA	
Bankfull Elevation:	106.6
Bankfull Cross-Sectional Area:	6.1
Bankfull Width:	8.6
Flood Prone Area Elevation:	108.1
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.5
Low Bank Height:	1.6
Mean Depth at Bankfull:	0.6
W / D Ratio:	14.7
Entrenchment Ratio:	11.6
Bank Height Ratio:	1.07

Stream Type	C5

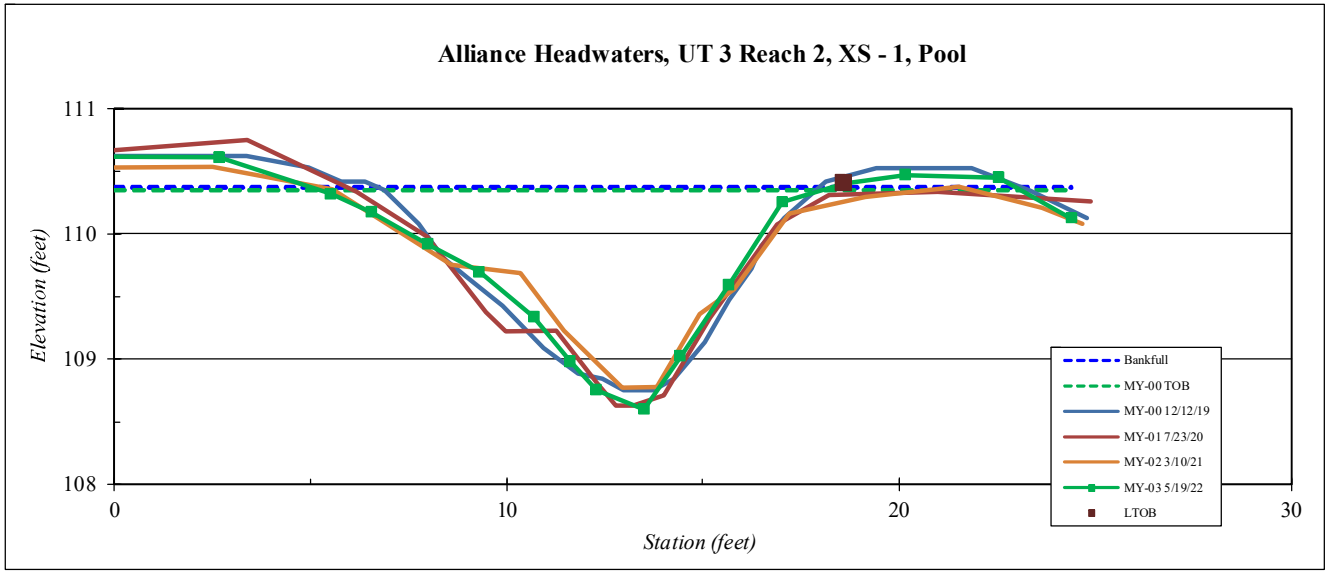


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 3 Reach 2, XS - 1
Feature	Pool
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
-0.5	110.6
2.7	110.6
5.5	110.3
6.5	110.2
8.0	109.9
9.3	109.7
10.7	109.3
11.6	109.0
12.3	108.8
13.5	108.6
14.4	109.0
15.7	109.6
17.0	110.3
18.6	110.4
20.2	110.5
22.5	110.4
24.4	110.1

SUMMARY DATA	
Bankfull Elevation:	110.4
Bankfull Cross-Sectional Area:	10.2
Bankfull Width:	13.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.8
Low Bank Height:	1.8
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.02

Stream Type	C5

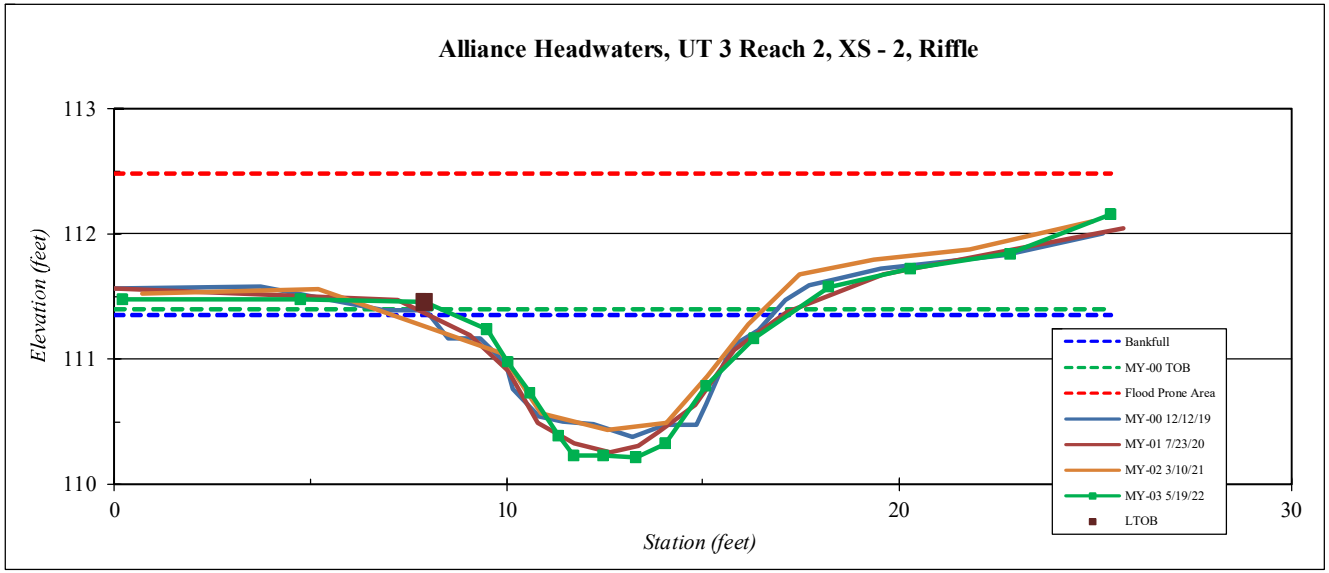


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 3 Reach 2, XS - 2
Feature	Riffle
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.2	111.5
4.7	111.5
7.9	111.5
9.5	111.2
10.0	111.0
10.6	110.7
11.3	110.4
11.7	110.2
12.5	110.2
13.3	110.2
14.0	110.3
15.1	110.8
16.3	111.2
18.2	111.6
20.3	111.7
22.8	111.8
25.4	112.2

SUMMARY DATA	
Bankfull Elevation:	111.4
Bankfull Cross-Sectional Area:	5.4
Bankfull Width:	8.5
Flood Prone Area Elevation:	112.5
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.1
Low Bank Height:	1.2
Mean Depth at Bankfull:	0.6
W / D Ratio:	13.4
Entrenchment Ratio:	11.8
Bank Height Ratio:	1.09

Stream Type	C5

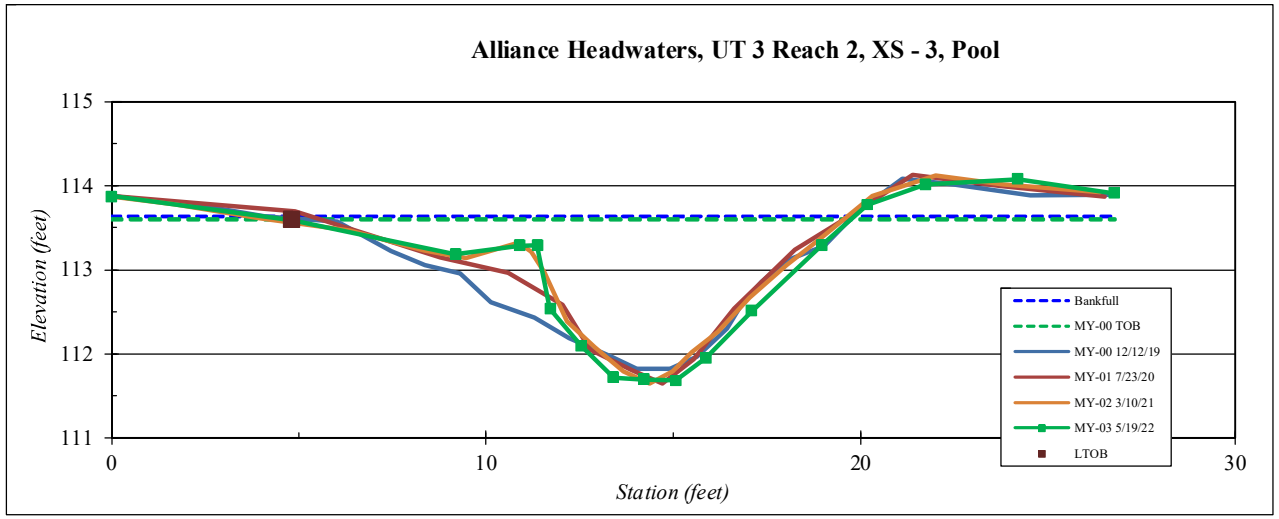


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 3 Reach 2, XS - 3
Feature	Pool
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.0	113.9
4.8	113.6
9.2	113.2
10.9	113.3
11.4	113.3
11.7	112.5
12.5	112.1
13.4	111.7
14.2	111.7
15.1	111.7
15.9	111.9
17.1	112.5
19.0	113.3
20.2	113.8
21.7	114.0
24.2	114.1
26.8	113.9

SUMMARY DATA	
Bankfull Elevation:	113.6
Bankfull Cross-Sectional Area:	12.7
Bankfull Width:	15.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.0
Low Bank Height:	1.9
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	0.98

Stream Type	C5

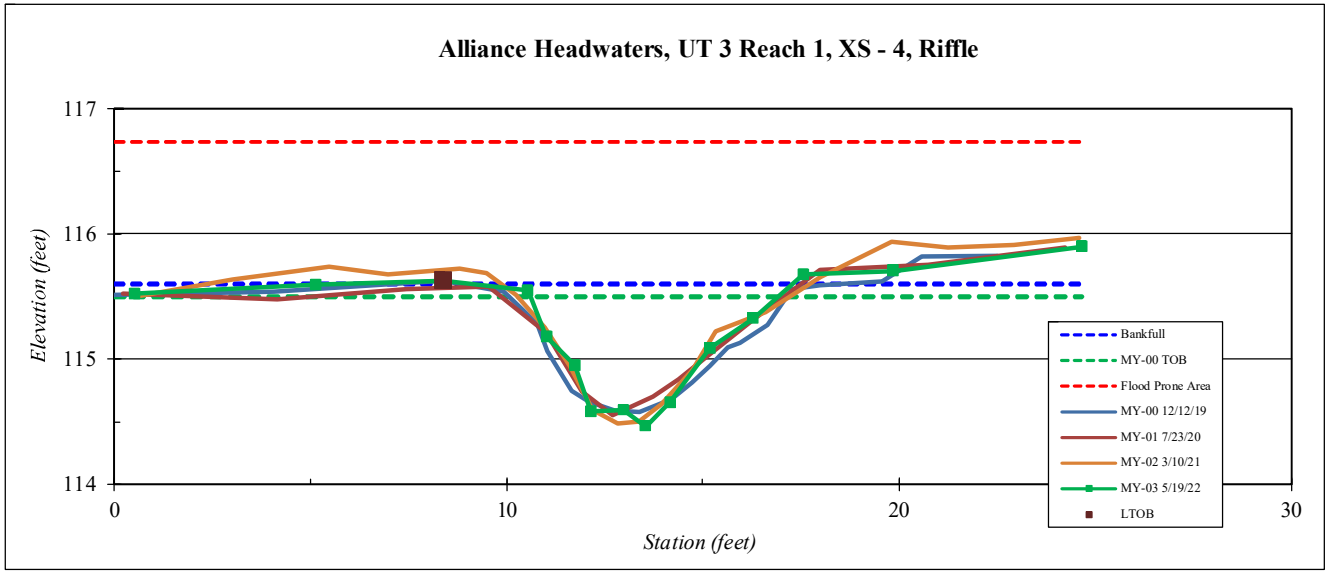


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 3 Reach 1, XS - 4
Feature	Riffle
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.5	115.5
5.1	115.6
8.4	115.6
10.5	115.5
11.0	115.2
11.7	115.0
12.1	114.6
13.0	114.6
13.5	114.5
14.2	114.7
15.2	115.1
16.3	115.3
17.6	115.7
19.8	115.7
24.7	115.9

SUMMARY DATA	
Bankfull Elevation:	115.6
Bankfull Cross-Sectional Area:	4.3
Bankfull Width:	8.2
Flood Prone Area Elevation:	116.7
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.1
Low Bank Height:	1.2
Mean Depth at Bankfull:	0.5
W / D Ratio:	15.3
Entrenchment Ratio:	12.3
Bank Height Ratio:	1.02

Stream Type	C5

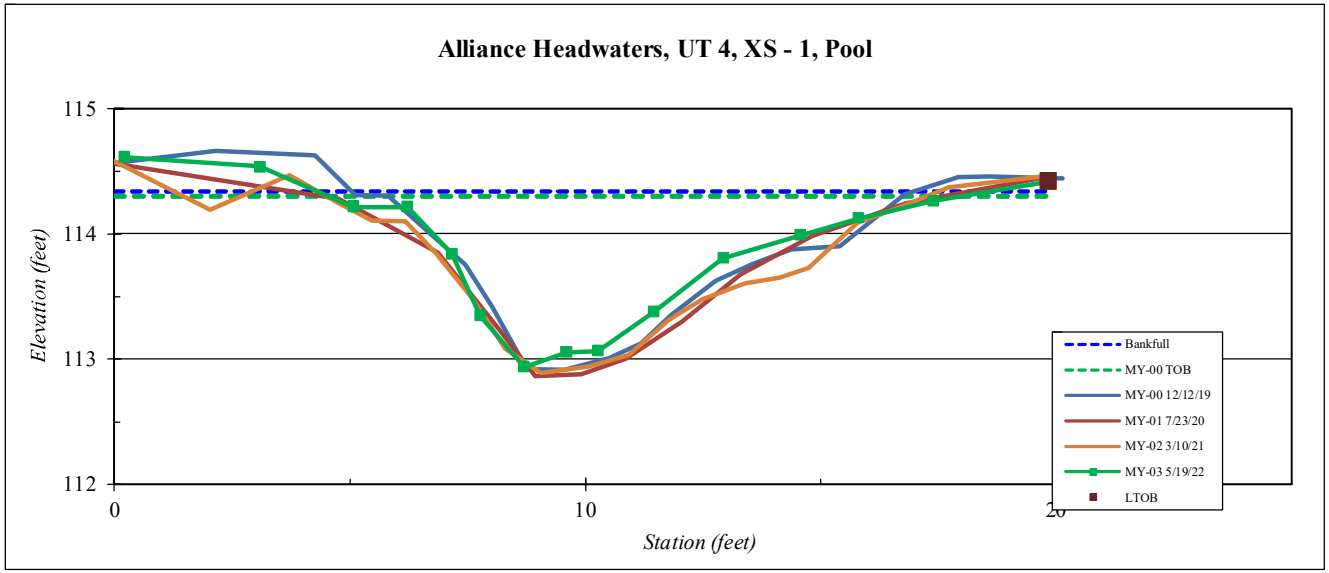


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 4, XS - 1
Feature	Pool
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.2	114.61
3.1	114.54
5.1	114.22
6.2	114.21
7.2	113.84
7.8	113.35
8.7	112.93
9.6	113.06
10.3	113.06
11.4	113.38
12.9	113.81
14.6	113.99
15.8	114.12
17.4	114.27
19.8	114.42

SUMMARY DATA	
Bankfull Elevation:	114.3
Bankfull Cross-Sectional Area:	7.9
Bankfull Width:	14.3
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.4
Low Bank Height:	1.5
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.06

Stream Type	C5

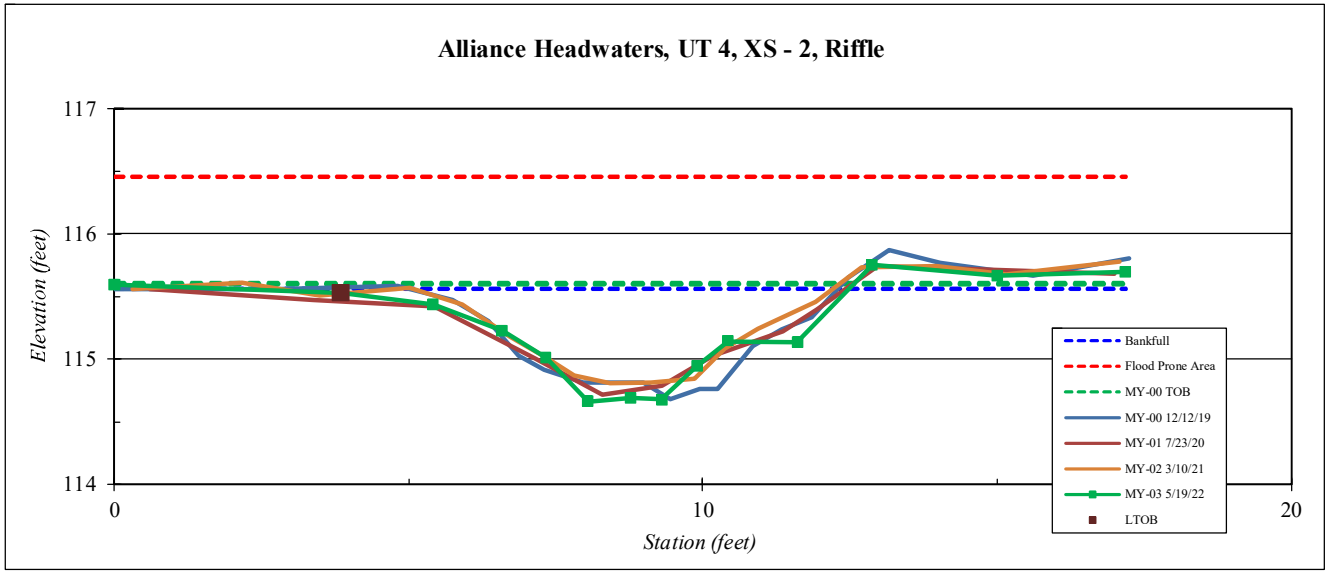


Site	Alliance Headwaters
Watershed:	Neuse River, 03020201
XS ID	UT 3, XS - 2
Feature	Riffle
Date:	5/19/2022
Field Crew:	Harris, Lewis

Station	Elevation
0.0	115.59
3.9	115.53
5.4	115.44
6.6	115.23
7.3	115.01
8.0	114.66
8.8	114.69
9.3	114.68
9.9	114.95
10.4	115.14
11.6	115.13
12.9	115.75
15.0	115.67
17.2	115.70

SUMMARY DATA	
Bankfull Elevation:	115.6
Bankfull Cross-Sectional Area:	3.8
Bankfull Width:	10.5
Flood Prone Area Elevation:	116.5
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.9
Low Bank Height:	0.9
Mean Depth at Bankfull:	0.4
W / D Ratio:	29.0
Entrenchment Ratio:	9.5
Bank Height Ratio:	0.96

Stream Type	C5



APPENDIX E: HYDROLOGY DATA

Tables 15A-G. Channel Evidence
Stream Gauge Graphs
Table 16. Verification of Bankfull Events
Figure E1. 30/70 Percentile Graph for Rainfall
Graphic 1. USGS 2021-2022 Drought Conditions
Soil Temp Graph
Table 17. Groundwater Hydrology Data
Groundwater Gauge Graphs

Table 15A. UT1 Downstream Channel Evidence

UT1 Downstream Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	201	119	116				
Presence of litter and debris (wracking)	Yes	Yes	Yes				
Leaf litter disturbed or washed away	Yes	Yes	Yes				
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes				
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes				
Water staining due to continual presence of water	Yes	Yes	Yes				
Formation of channel bed and banks	Yes	Yes	Yes				
Sediment sorting within the primary path of flow	Yes	Yes	Yes				
Sediment shelving or a natural line impressed on the banks	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				
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes	Yes				
Exposure of woody plant roots within the primary path of flow	No	No	No				
Other:							

Photo 1: UT1 Downstream Channel Evidence

Table 15B. UT1 Upstream Channel Evidence

UT1 Upstream Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	190	160	186				
Presence of litter and debris (wracking)	Yes	Yes	Yes				
Leaf litter disturbed or washed away	Yes	Yes	Yes				
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes				
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes				
Water staining due to continual presence of water	Yes	Yes	Yes				
Formation of channel bed and banks	Yes	Yes	Yes				
Sediment sorting within the primary path of flow	Yes	Yes	Yes				
Sediment shelving or a natural line impressed on the banks	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				
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes	Yes				
Exposure of woody plant roots within the primary path of flow	No	No	No				
Other:							

Photo 2: UT1 Upstream Channel Evidence

Table 15C. UT1A Channel Evidence

UT1A Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	97	73	90				
Presence of litter and debris (wracking)	Yes	Yes	Yes				
Leaf litter disturbed or washed away	Yes	Yes	Yes				
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes				
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes				
Water staining due to continual presence of water	Yes	Yes	Yes				
Formation of channel bed and banks	Yes	Yes	Yes				
Sediment sorting within the primary path of flow	Yes	Yes	Yes				
Sediment shelving or a natural line impressed on the banks	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				
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes	Yes				
Exposure of woody plant roots within the primary path of flow	No	No	No				
Other:							

Photo 3: UT1A Channel Evidence

Table 15D. UT2 Channel Evidence

UT2 Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	199	125	110				
Presence of litter and debris (wracking)	Yes	Yes	Yes				
Leaf litter disturbed or washed away	Yes	Yes	Yes				
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes				
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes				
Water staining due to continual presence of water	Yes	Yes	Yes				
Formation of channel bed and banks	Yes	Yes	Yes				
Sediment sorting within the primary path of flow	Yes	Yes	Yes				
Sediment shelving or a natural line impressed on the banks	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				
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes	Yes				
Exposure of woody plant roots within the primary path of flow	No	No	No				
Other:							

Photo 4: UT2 Channel Evidence

Table 15E. UT3 Downstream Channel Evidence

UT3 Downstream Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	119	234	67				
Presence of litter and debris (wracking)	Yes	Yes	Yes				
Leaf litter disturbed or washed away	Yes	Yes	Yes				
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes				
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes				
Water staining due to continual presence of water	Yes	Yes	Yes				
Formation of channel bed and banks	Yes	Yes	Yes				
Sediment sorting within the primary path of flow	Yes	Yes	Yes				
Sediment shelving or a natural line impressed on the banks	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				
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes	Yes				
Exposure of woody plant roots within the primary path of flow	No	No	No				
Other:							

Photo 5: UT3 Downstream Channel Evidence

Table 15F. UT3 Upstream Channel Evidence

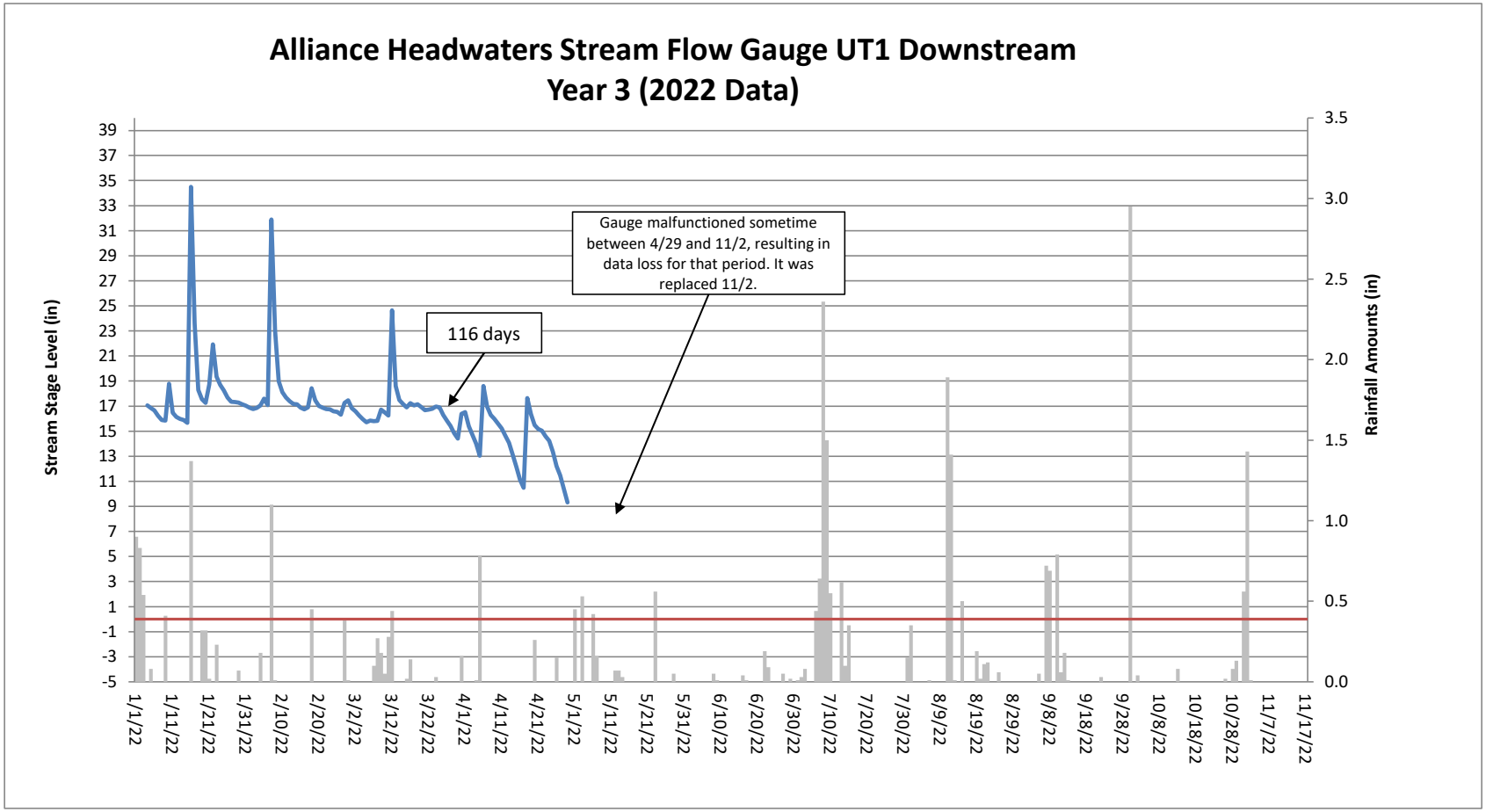
UT3 Upstream Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	136	127	96				
Presence of litter and debris (wracking)	Yes	Yes	Yes				
Leaf litter disturbed or washed away	Yes	Yes	Yes				
Matted, bent,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

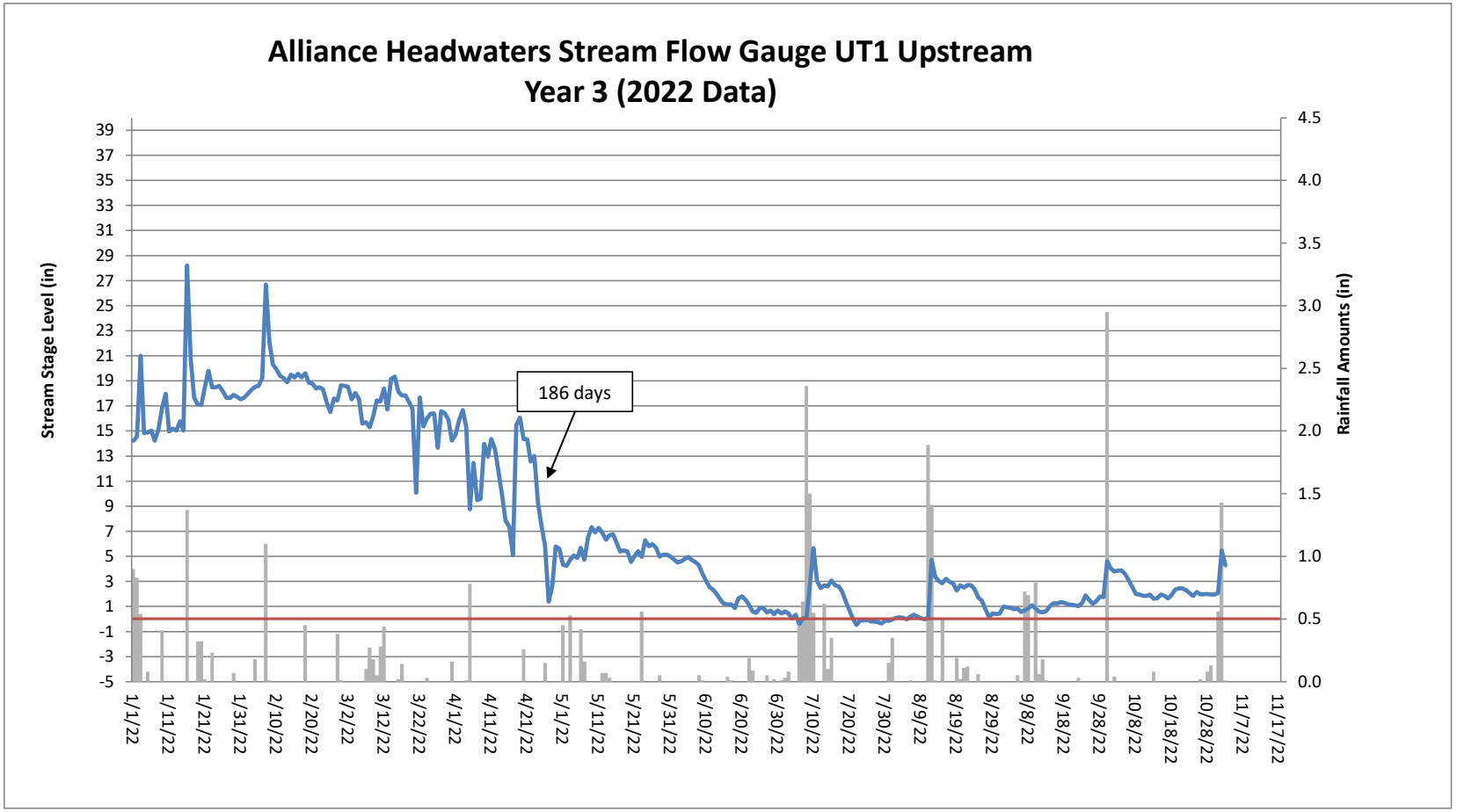
Photo 6: UT3 Upstream Channel Evidence

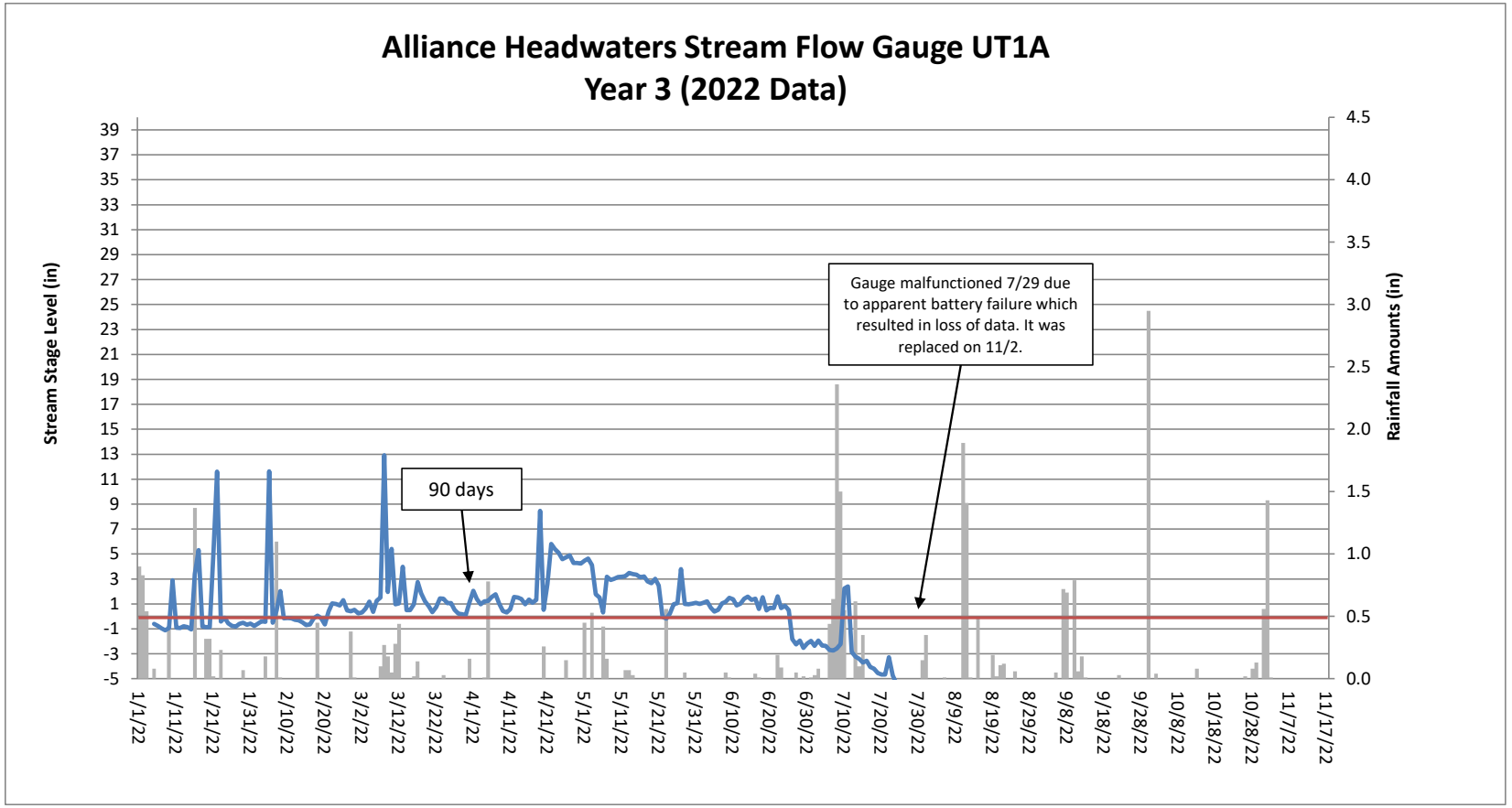
Table 15G. UT4 Channel Evidence

UT4 Channel Evidence	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Max consecutive days channel flow	130	228	88				
Presence of litter and debris (wracking)	Yes	Yes	Yes				
Leaf litter disturbed or washed away	Yes	Yes	Yes				
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes	Yes				
Sediment deposition and/or scour indicating sediment transport	Yes	Yes	Yes				
Water staining due to continual presence of water	Yes	Yes	Yes				
Formation of channel bed and banks	Yes	Yes	Yes				
Sediment sorting within the primary path of flow	Yes	Yes	Yes				
Sediment shelving or a natural line impressed on the banks	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				
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes	Yes				
Exposure of woody plant roots within the primary path of flow	No	No	No				
Other:							

Photo 7: UT4 Channel Evidence


Alliance Headwaters Stream Flow Gauge UT1 Downstream
Year 3 (2022 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Gauge malfunctioned sometime between 4/29 and 11/2, resulting in data loss for that period. It was replaced 11/2.
116 days
39
37
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
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22


Alliance Headwaters Stream Flow Gauge UT1 Upstream
Year 3 (2022 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
186 days
39
37
35
33
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22


Alliance Headwaters Stream Flow Gauge UT1A
Year 3 (2022 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
Gauge malfunctioned 7/29 due to apparent battery failure which resulted in loss of data. It was replaced on 11/2.
90 days
39
37
35
33
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
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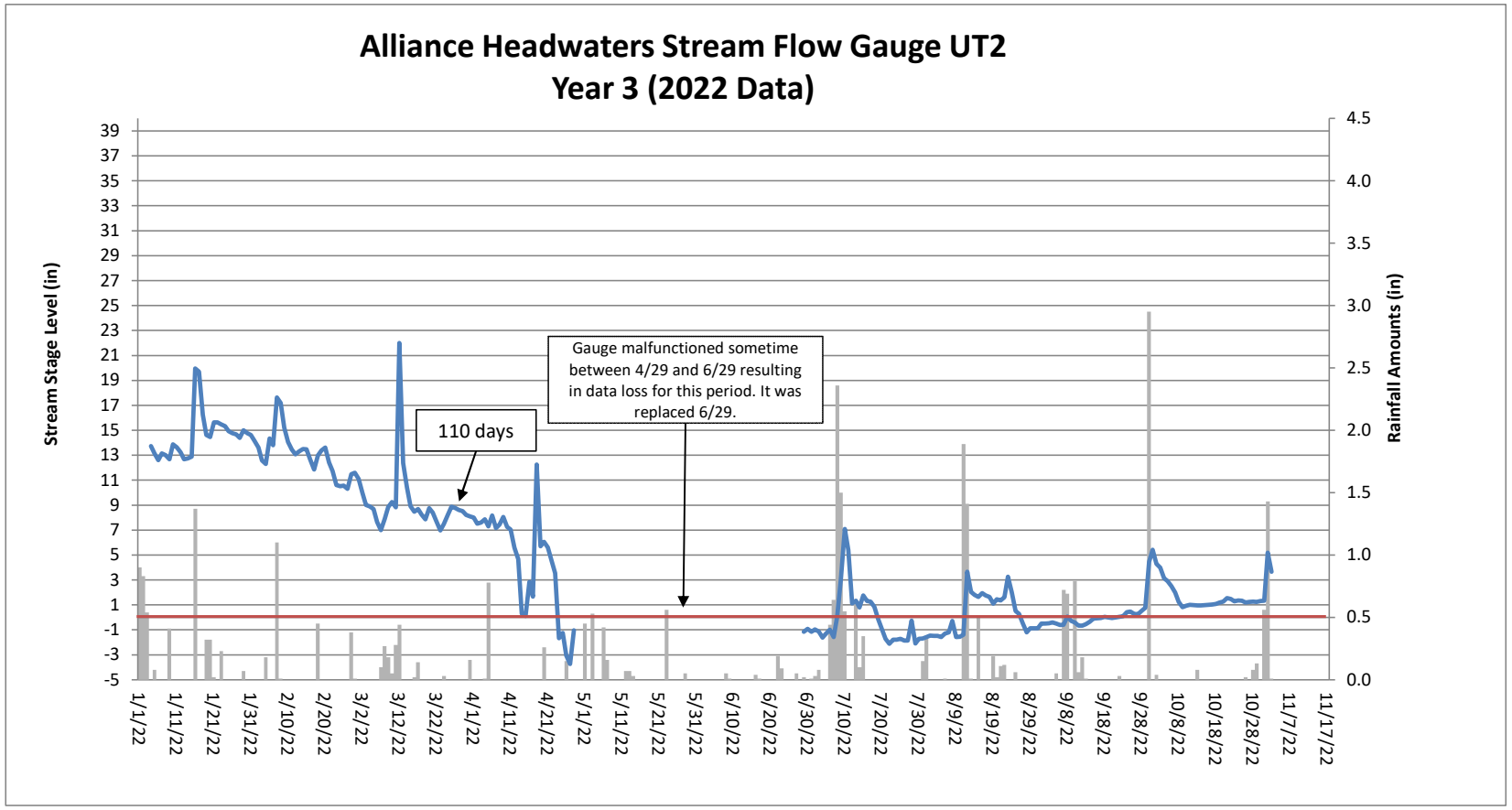
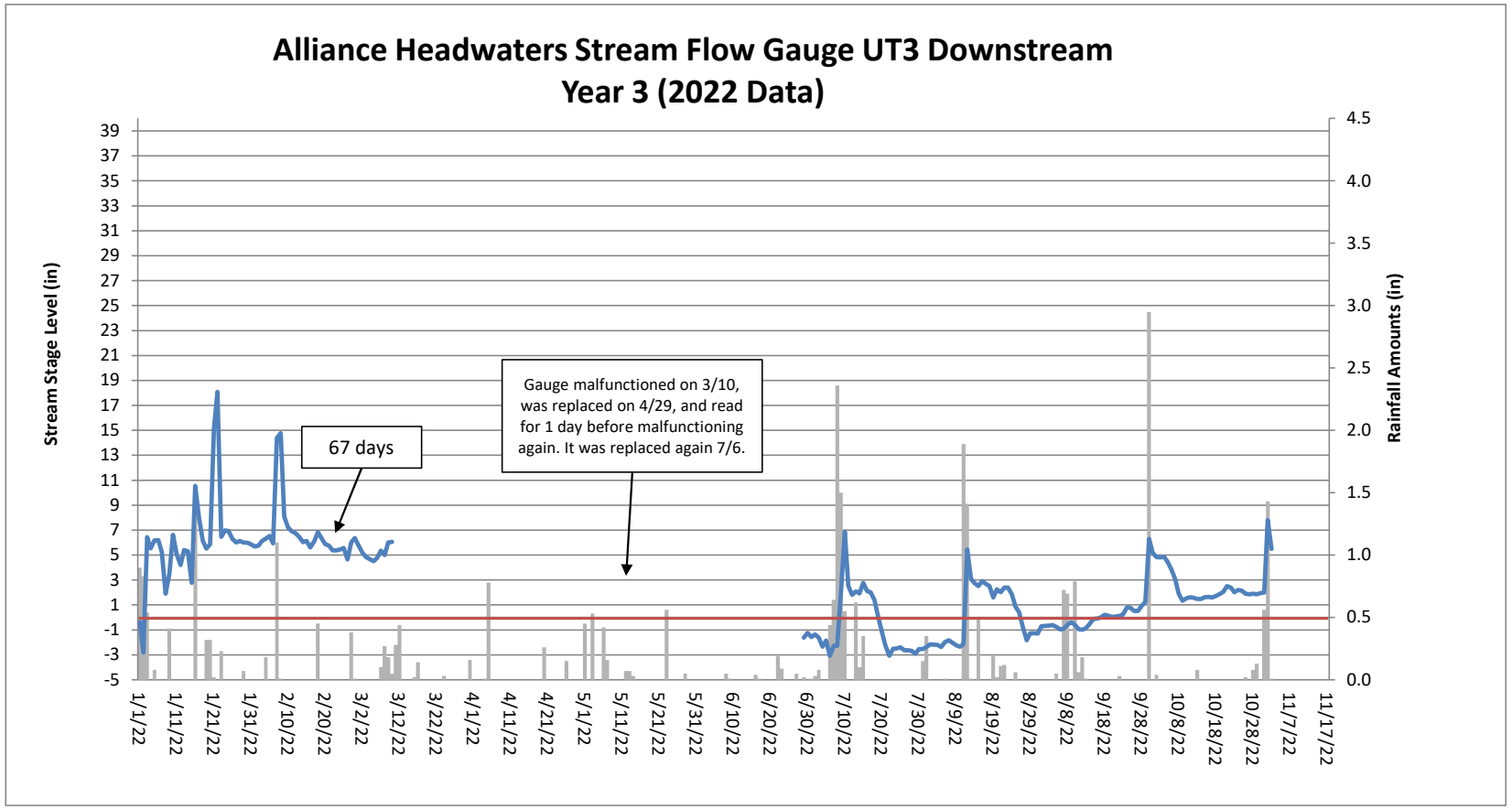
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22


Alliance Headwaters Stream Flow Gauge UT2
Year 3 (2022 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
39
37
35
33
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
110 days
Gauge malfunctioned sometime between 4/29 and 6/29 resulting in data loss for this period. It was replaced 6/29.
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22


Alliance Headwaters Stream Flow Gauge UT3 Downstream
Year 3 (2022 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
67 days
Gauge malfunctioned on 3/10, was replaced on 4/29, and read for 1 day before malfunctioning again. It was replaced again 7/6.
39
37
35
33
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
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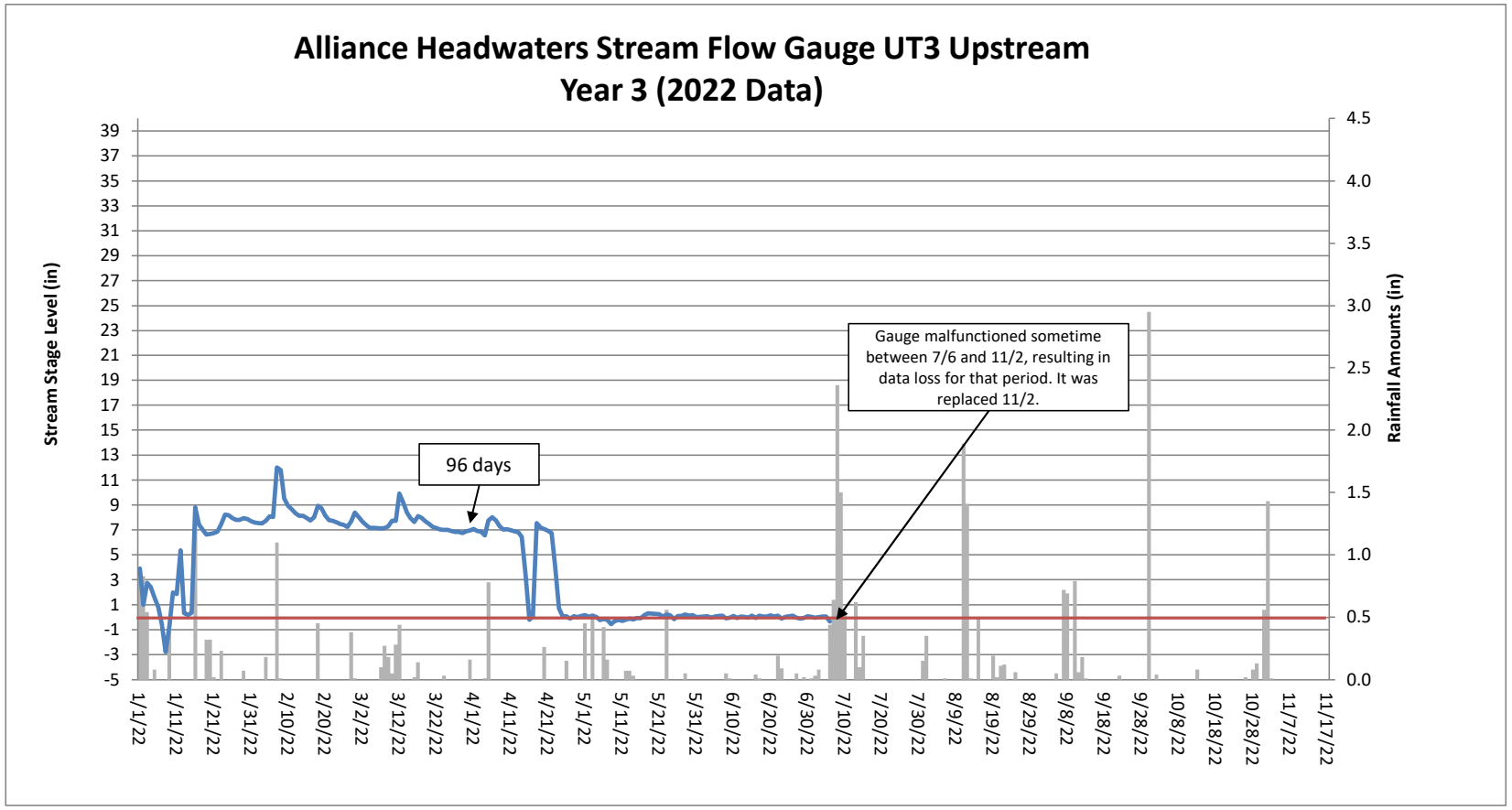
10/18/22
10/28/22
11/7/22
11/17/22


Alliance Headwaters Stream Flow Gauge UT3 Upstream
Year 3 (2022 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
96 days
Gauge malfunctioned sometime between 7/6 and 11/2, resulting in data loss for that period. It was replaced 11/2.
39
37
35
33
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22

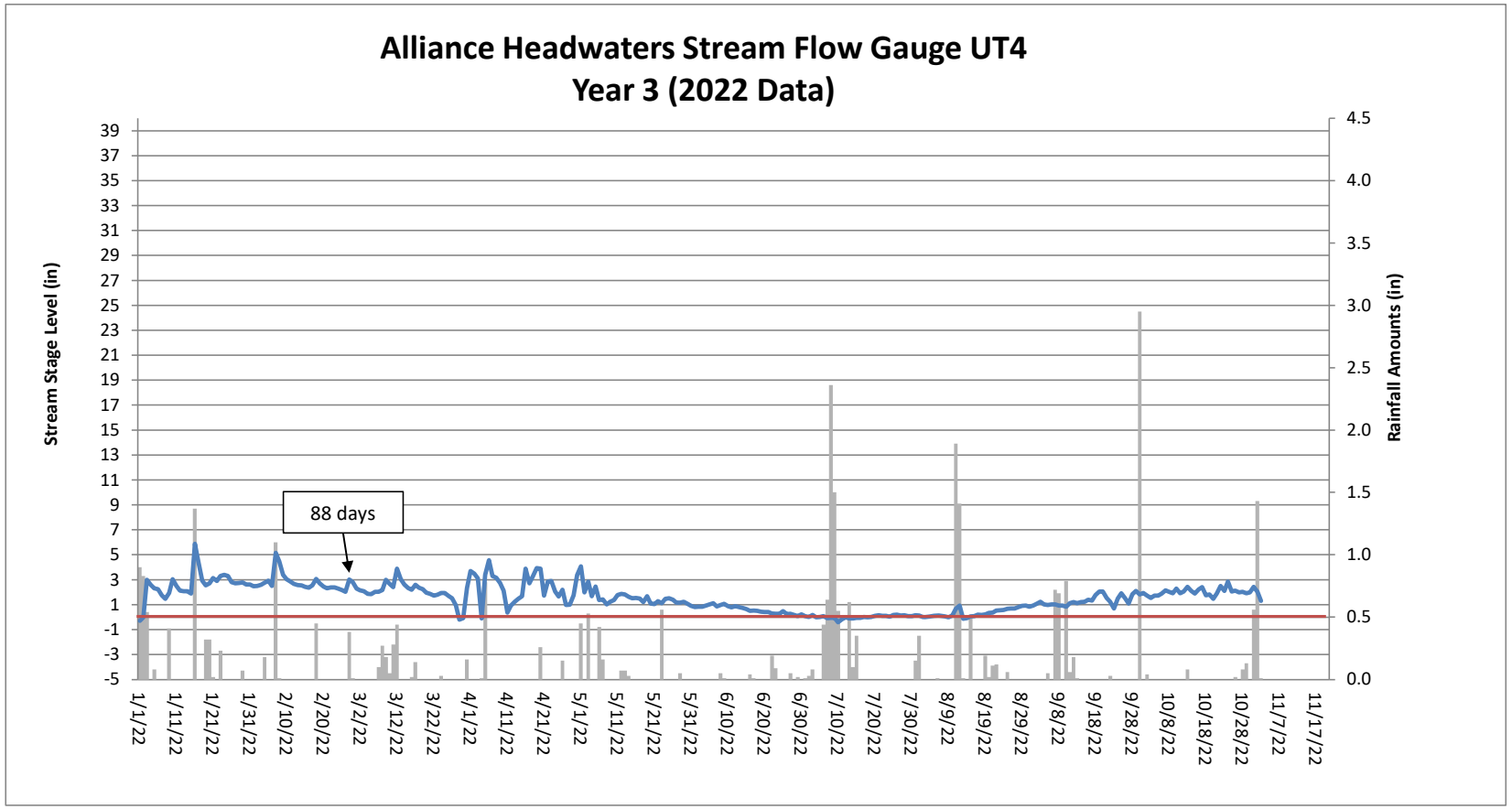

Alliance Headwaters Stream Flow Gauge UT4
Year 3 (2022 Data)
Stream Stage Level (in)
Rainfall Amounts (in)
88 days
39
37
35
33
31
29
27
25
23
21
19
17
15
13
11
9
7
5
3
1
-1
-3
-5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22

Table 16. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
April 30, 2020	April 30, 2020	Stream gauges and trail cameras captured a bankfull event at UT3 after 1.17 inches of rain was documented between April 30 and May 1, 2020 at an on-site rain gauge	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.	9
March 16, 2021	March 16, 2021	Stream gauges and trail cameras captured a bankfull event on UT1, UT2, and UT3 after 2.35 inches of rain was documented on March 16, 2021 at an on-site rain gauge	10-12
February 28, 2022	January 16, 2022	Stream gauges captured a bankfull event on all site streams after a 1.37 inch rain event, as documented by on-site rain gauge	13

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.

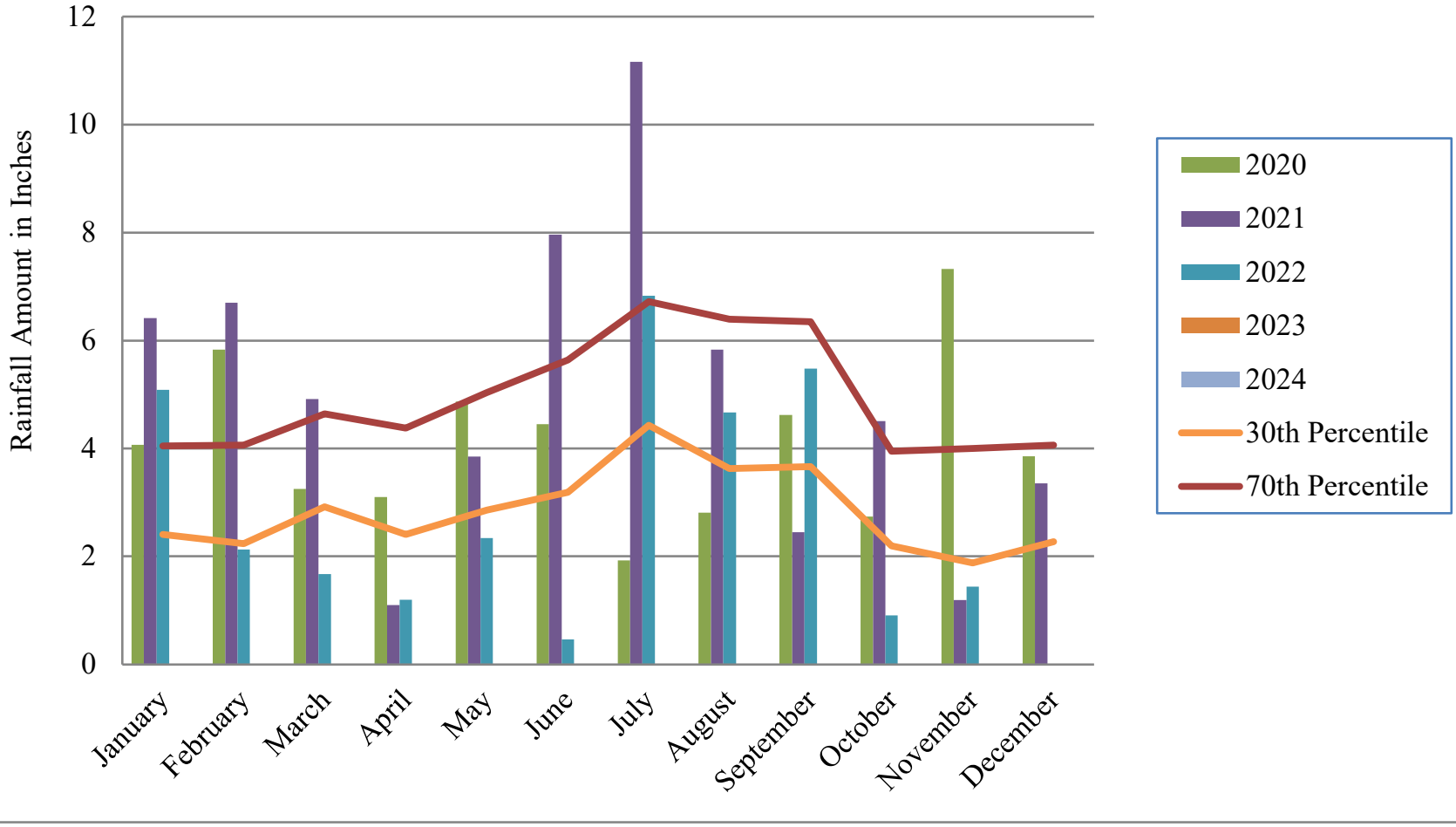
Photo 11: UT3 at bankfull stage.

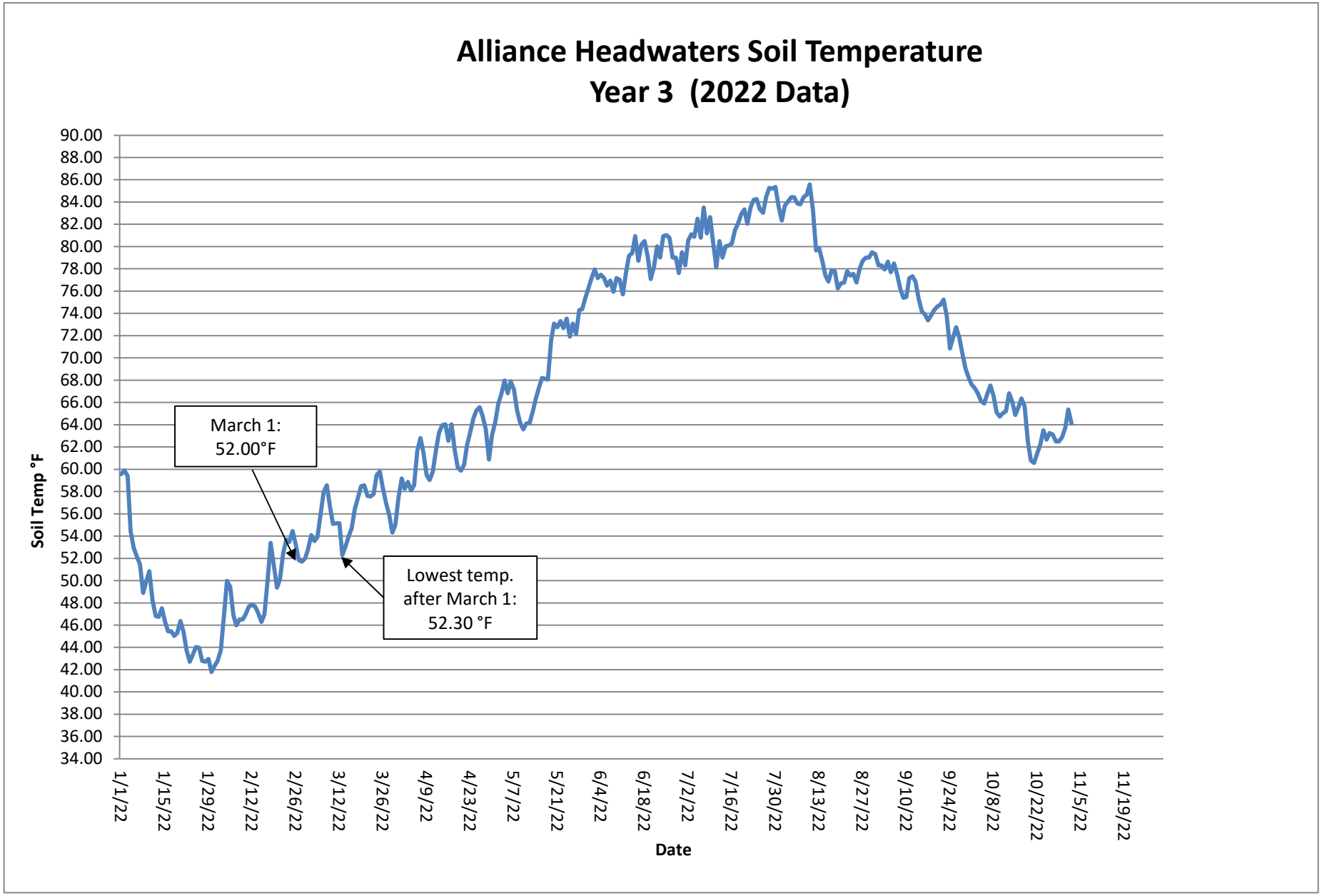
Photo 12: UT4 at bankfull stage.

Photo 13: UT2 receding from an overnight bankfull event.

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 3 (2022 Data)
Soil Temp °F
90.00
88.00
86.00
84.00
82.00
80.00
78.00
76.00
74.00
72.00
70.00
68.00
66.00
64.00
62.00
60.00
58.00
56.00
54.00
52.00
50.00
48.00
46.00
44.00
42.00
40.00
38.00
36.00
34.00
March 1:
52.00°F
Lowest temp.
after March 1:
52.30 °F
1/1/22
1/15/22
1/29/22
2/12/22
2/26/22
3/12/22
3/26/22
4/9/22
4/23/22
5/7/22
5/21/22
6/4/22
6/18/22
7/2/22
7/16/22
7/30/22
8/13/22
8/27/22
9/10/22
9/24/22
10/8/22
10/22/22
11/5/22
11/19/22
Date

USGS Drought Conditions - Johnston County - 2021-2022

Historical Conditions for Johnston County

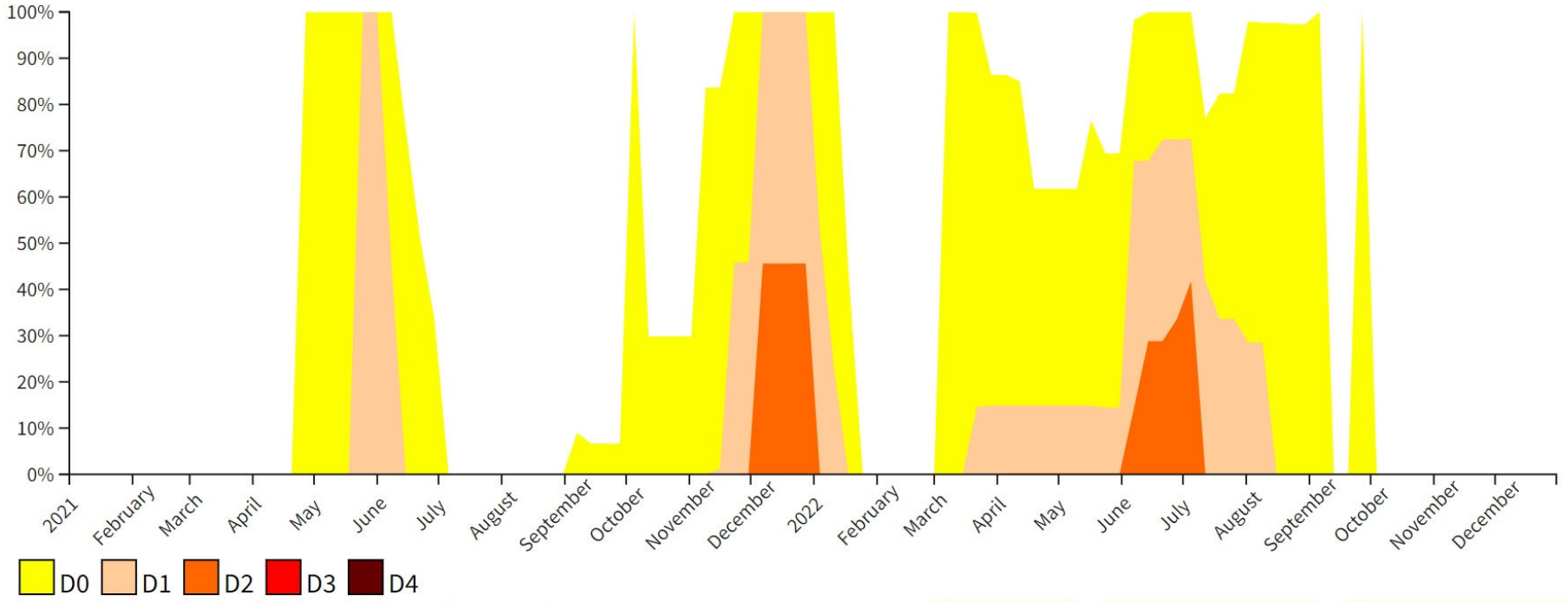
2000 - Present (Weekly) | 1895 - Present (Monthly) | 0 - 2017 (Yearly)

Explore Historical Maps

The U.S. Drought Monitor (USDM) is a national map released every Thursday, showing parts of the U.S. that are in drought. The USDM relies on drought experts to synthesize the best available data and work with local observers to interpret the information. The USDM also incorporates ground truthing and information about how drought is affecting people, via a network of more than 450 observers across the country, including state climatologists, National Weather Service staff, Extension agents, and hydrologists. Learn more.

Time Period (Years): 2021 to 2022 Update Graph Reset Graph

Latest Available Data:2022-10-11



Click or hover on legend boxes to interact with the graph.

Image Spreadsheet All Downloads

Abnormally dry (D0), moderate (D1), severe (D2), extreme (D3) and exceptional (D4)

https://www.drought.gov/states/north-carolina/county/Johnston

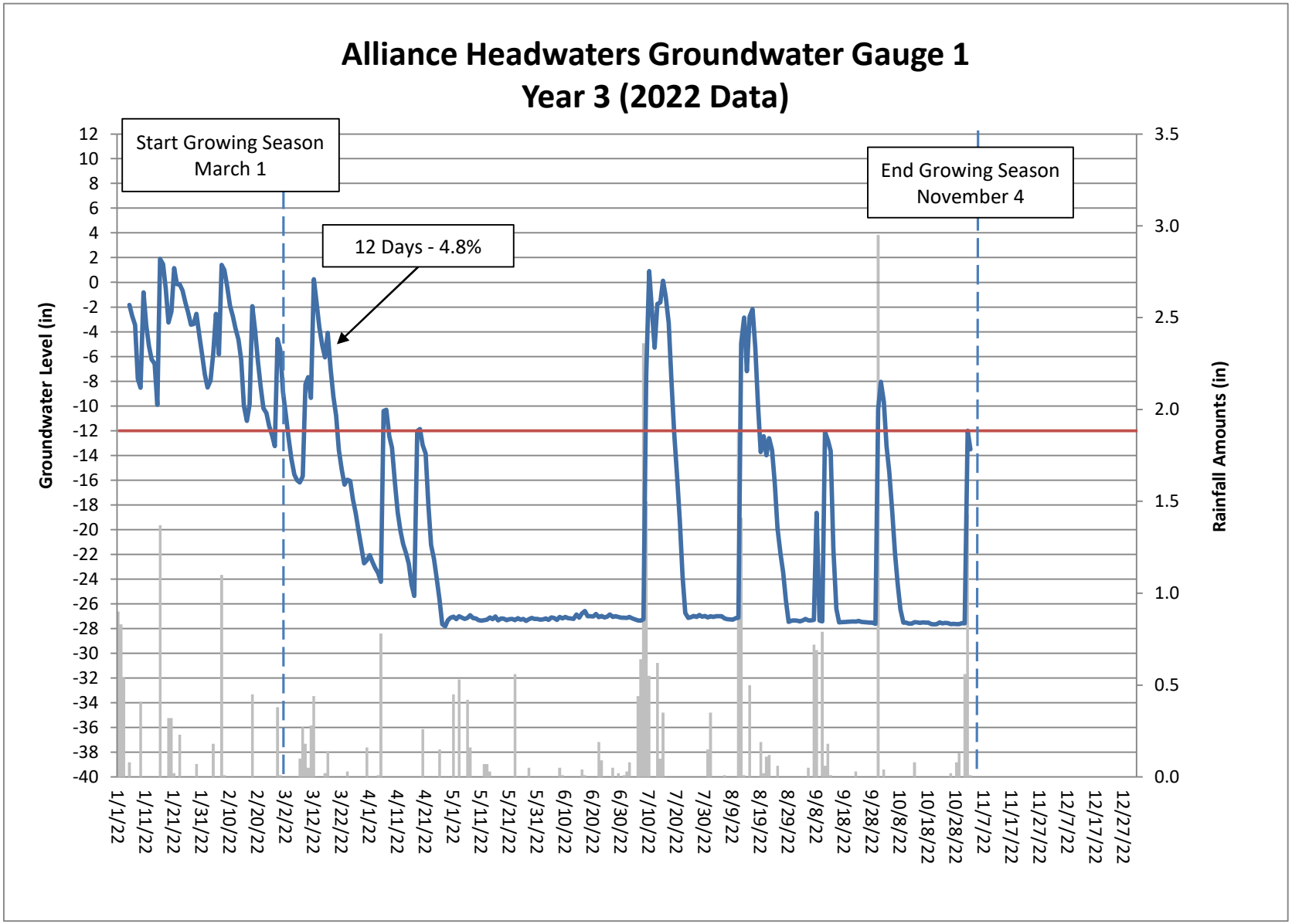
Table 17. Groundwater Hydrology Data

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

Table 17. Groundwater Hydrology Data (continued)

Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
20	Yes 36 days (14.5%)	Yes 58 days (23.3%)	Yes 25 days (10.0%)				
21	Yes 34 days (13.7%)	Yes 36 days (14.5%)	No 22 days (8.8%)				
22	Yes 69 days (27.8%)	Yes 56 days (22.5%)	Yes 28 days (11.2%)				
23	Yes 35 days (14.1%)	Yes 42 days (16.9%)	Yes 25 days (10.0%)				
24	No 5 days (2.0%)	No 14 days (5.6%)	No 1 day (0.4%)				
25	Yes 46 days (18.5%)	Yes 55 days (21.1%)	Yes 27 days (10.8%)				
26	Yes 167 days (67.3%)	Yes 88 days (35.3%)	Yes 61 days (24.5%)				
27	Yes 74 days (29.8%)	Yes 57 days (22.9%)	No 13 days (5.2%)				
28	Yes 45 days (18.1%)	Yes 49 days (19.7%)	No 4 days (1.6%)				
29	Yes 45 days (18.1%)	Yes 81 days (32.5%)	Yes 12 days (4.8%)				
30*	NA	Yes 38 days (15.3%)	No 0 days (0.0%)				
31*	NA	Yes 98 days (39.4%)	Yes 44 days (17.7%)				
32*	NA	Yes 58 days (23.3%)	Yes 45 days (18.1%)				
33*	NA	Yes 42 days (16.9%)	No 13 days (5.2%)				
34*	NA	Yes 55 days (22.1%)	No 22 days (8.8%)				
35*	NA	Yes 42 days (16.9%)	No 13 days (5.2%)				
Ref*	NA	Yes 51 days (20.5%)	No 15 days (6.0%)				

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


Alliance Headwaters Groundwater Gauge 1
Year 3 (2022 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
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
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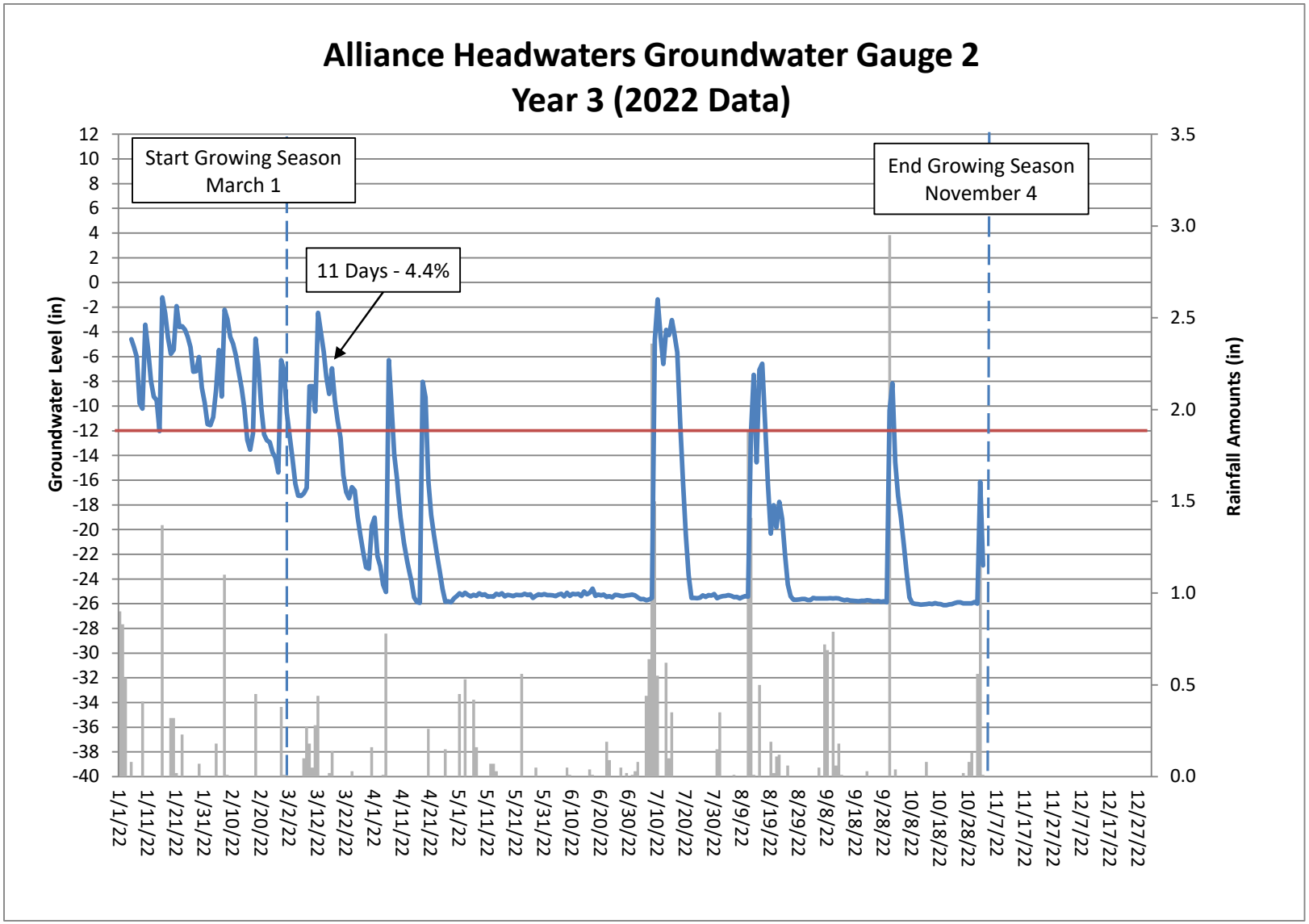
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 2
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
11 Days - 4.4%
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
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
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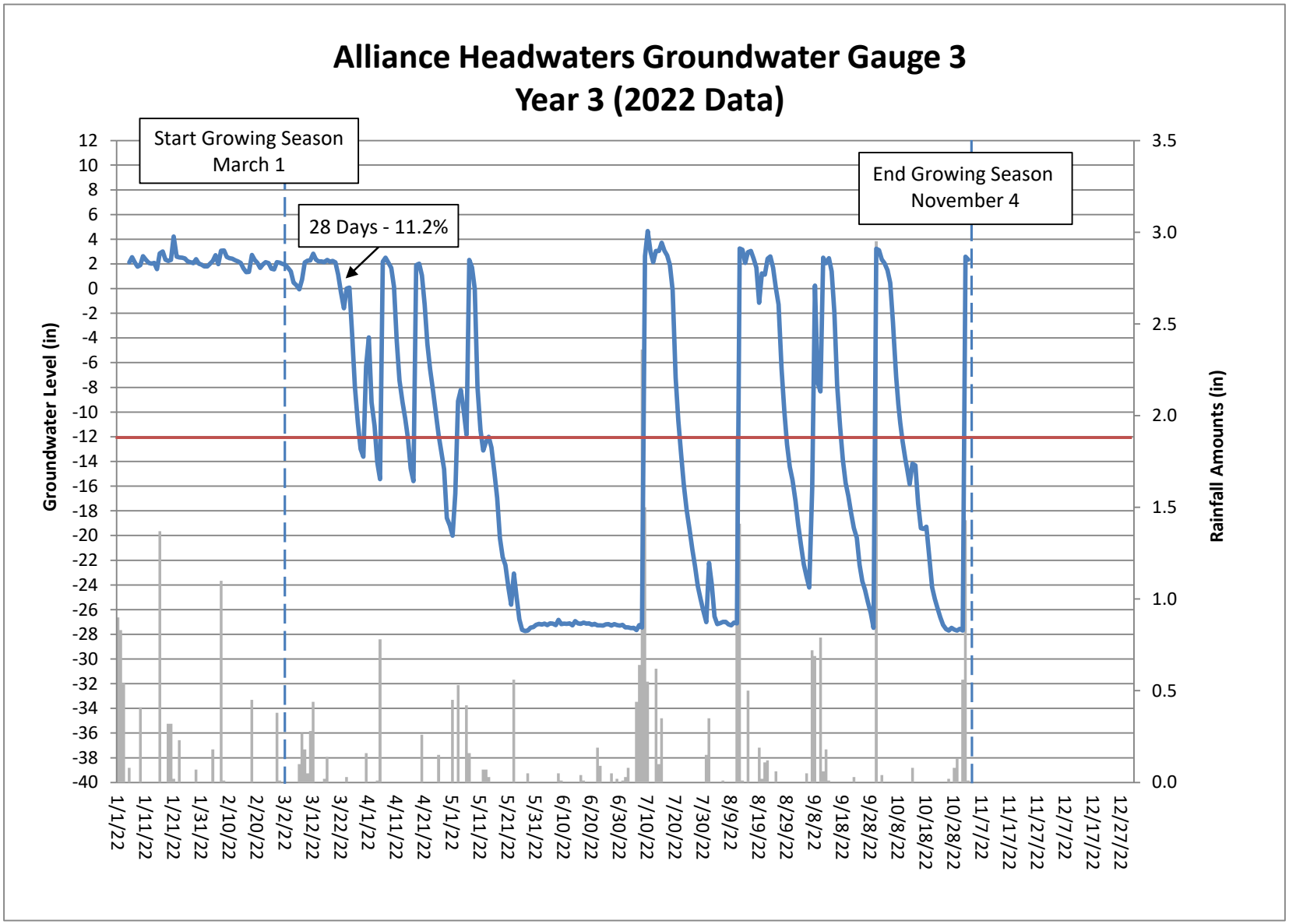
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 3
Year 3 (2022 Data)
Start Growing Season
March 1
28 Days - 11.2%
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
-30
-32
-34
-36
-38
-40
3.5
3.0
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1/31/22
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3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
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6/30/22
7/10/22
7/20/22
7/30/22
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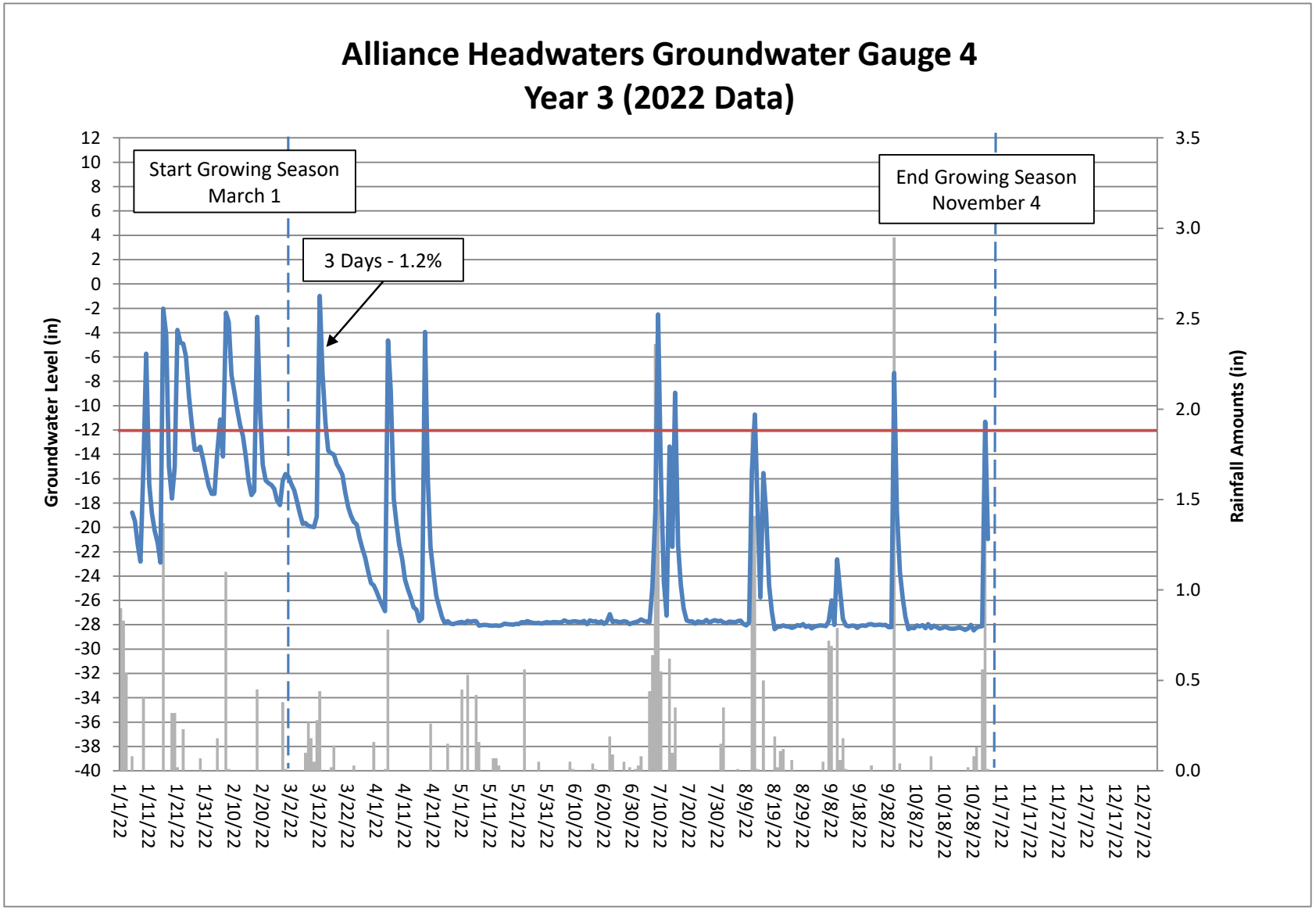
Alliance Headwaters Groundwater Gauge 4
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
3 Days - 1.2%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
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0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
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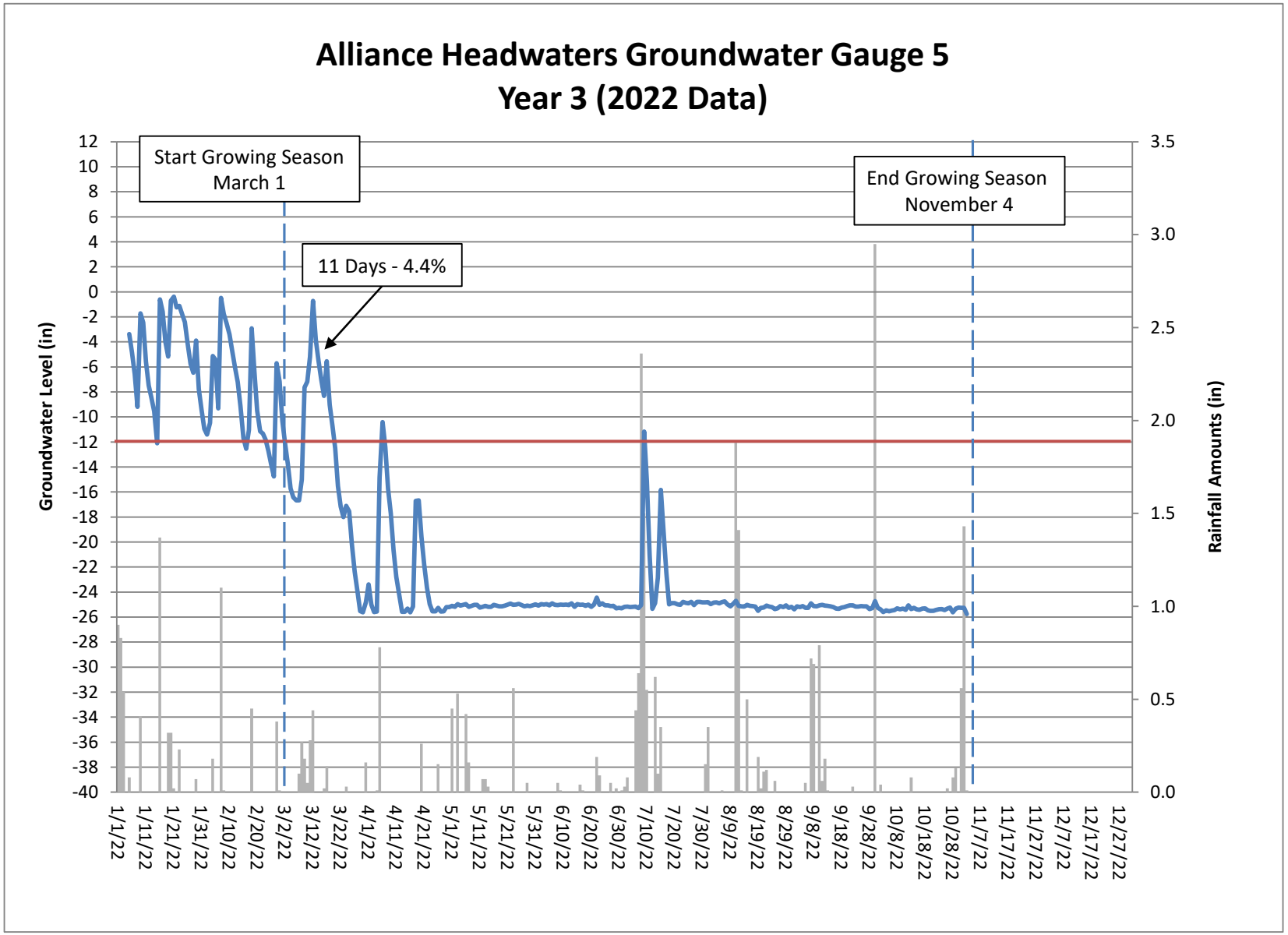
Alliance Headwaters Groundwater Gauge 5
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
11 Days - 4.4%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
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1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
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9/8/22
9/18/22
9/28/22
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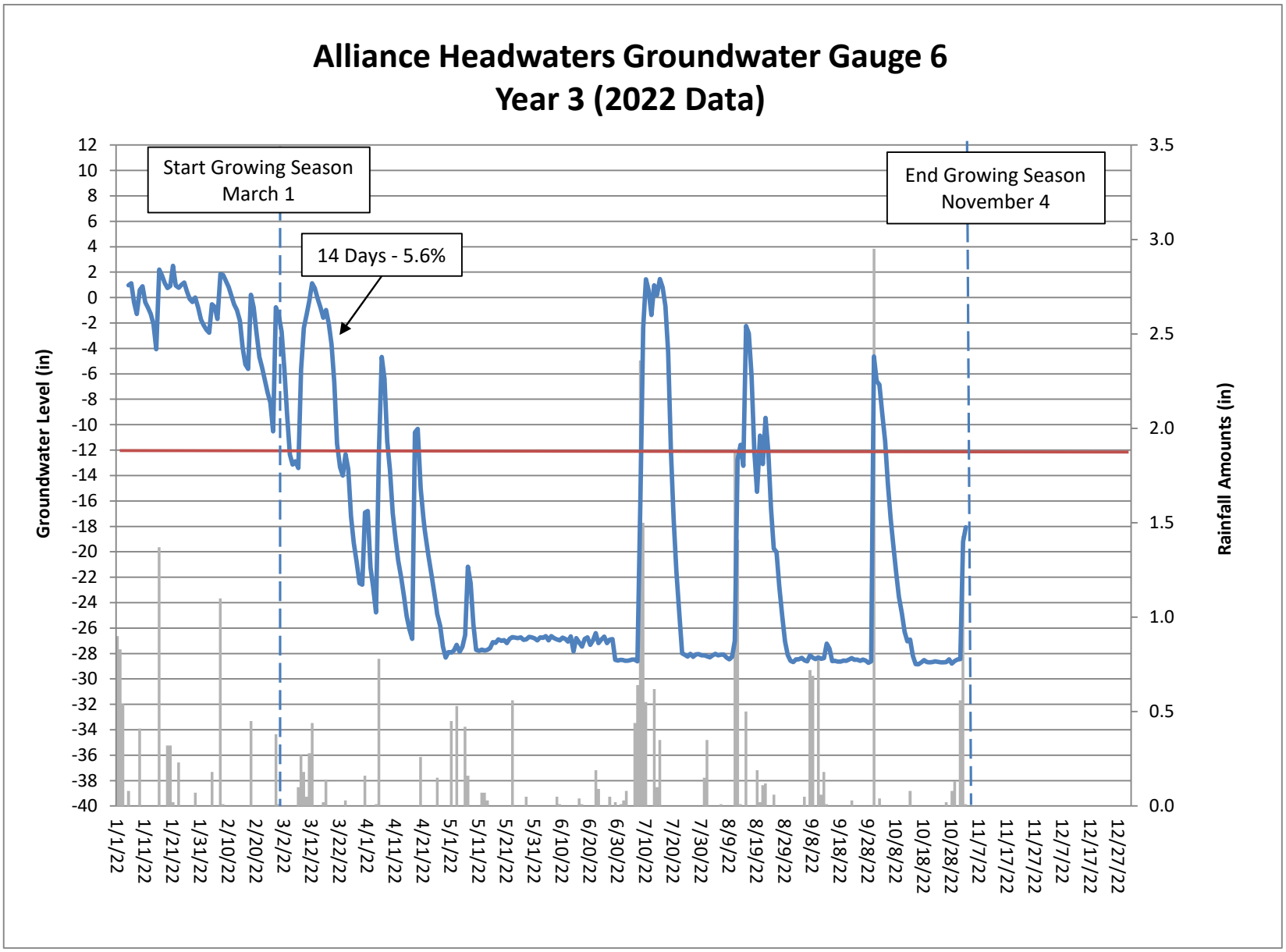
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 6
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
14 Days - 5.6%
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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1/1/22
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1/31/22
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3/12/22
3/22/22
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4/21/22
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7/10/22
7/20/22
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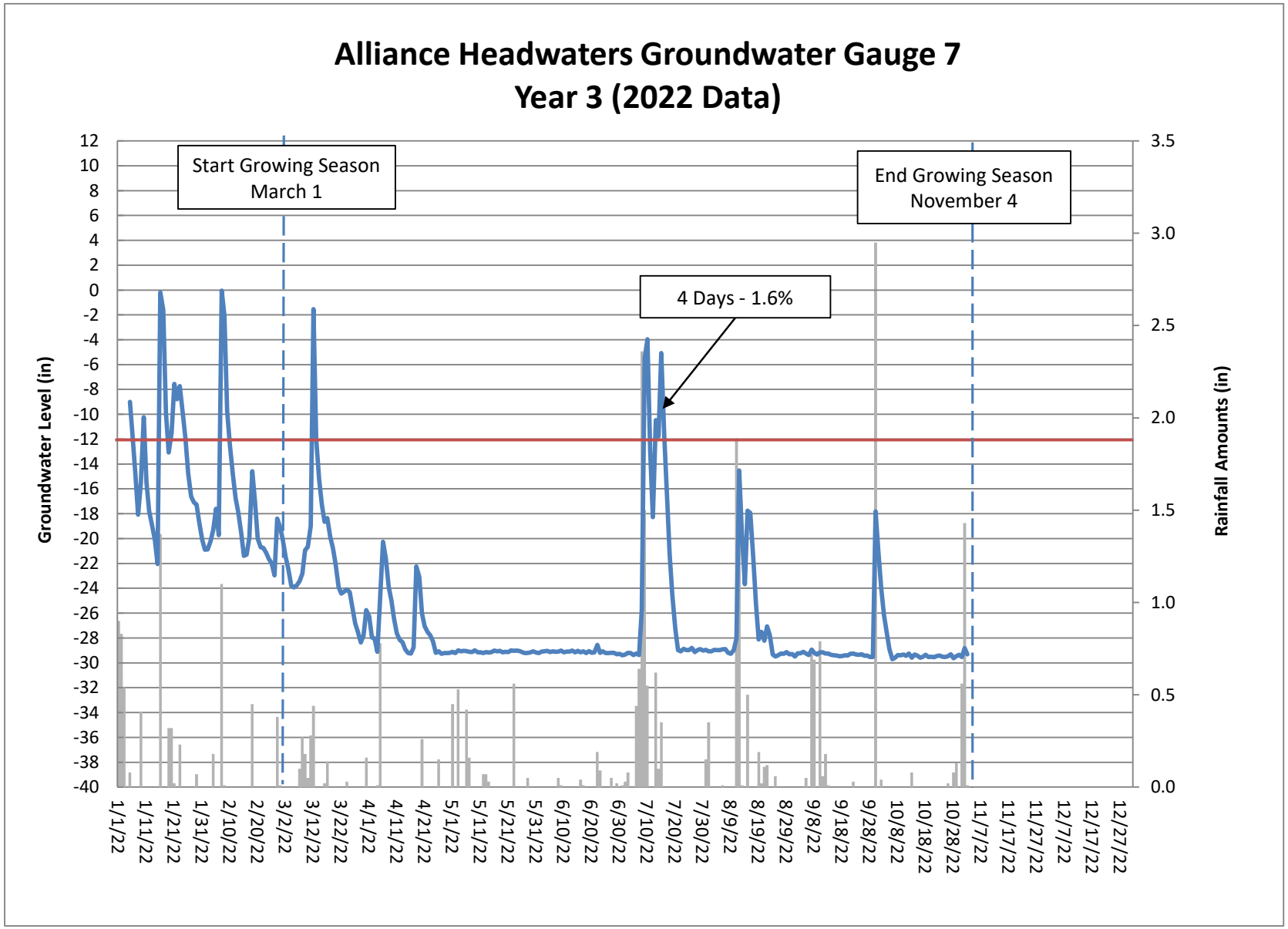
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 7
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
4 Days - 1.6%
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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-32
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-36
-38
-40
3.5
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1/1/22
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3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
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5/21/22
5/31/22
6/10/22
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7/10/22
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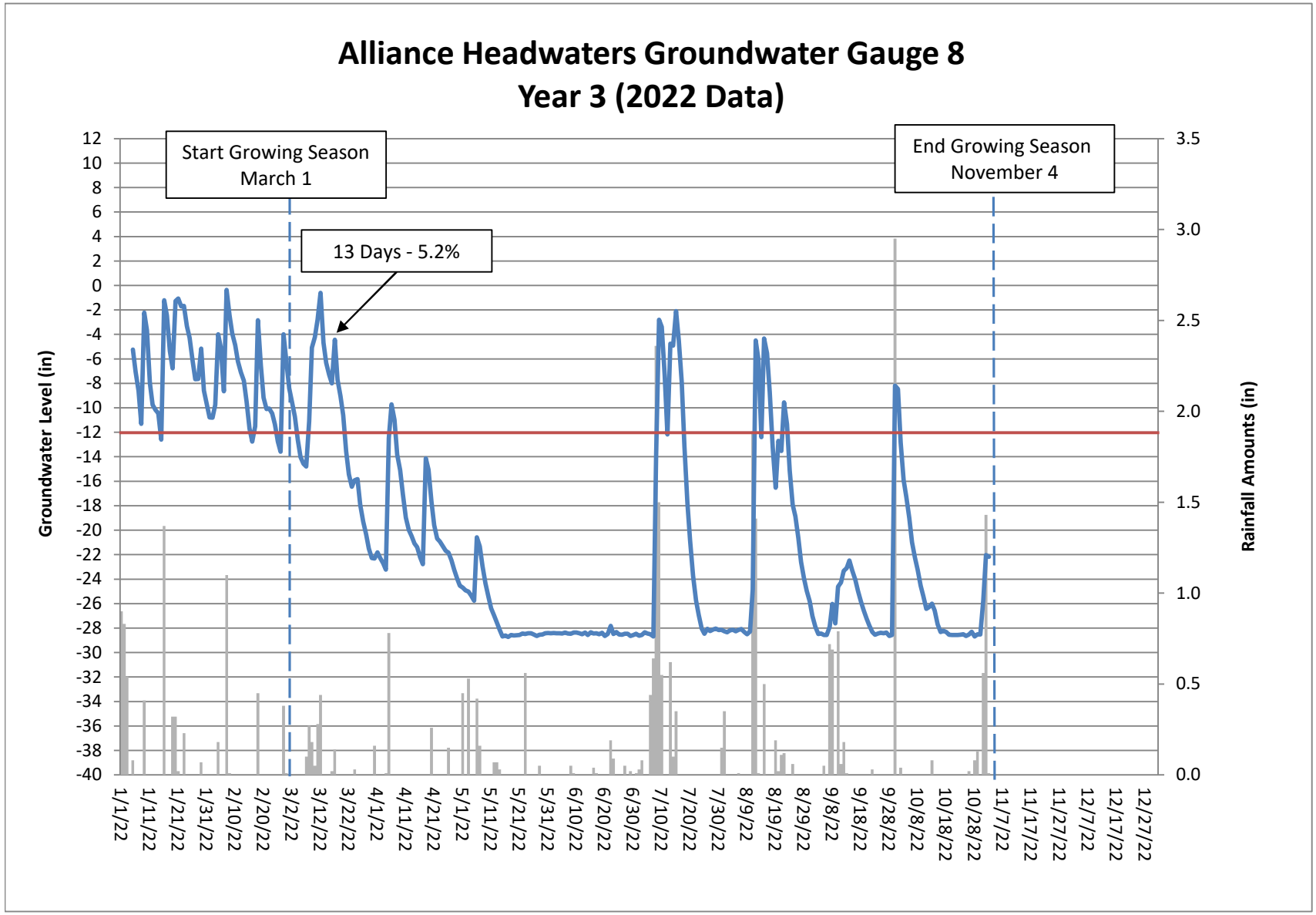
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 8
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
13 Days - 5.2%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
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-20
-22
-24
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3.5
3.0
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7/30/22
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9/8/22
9/18/22
9/28/22
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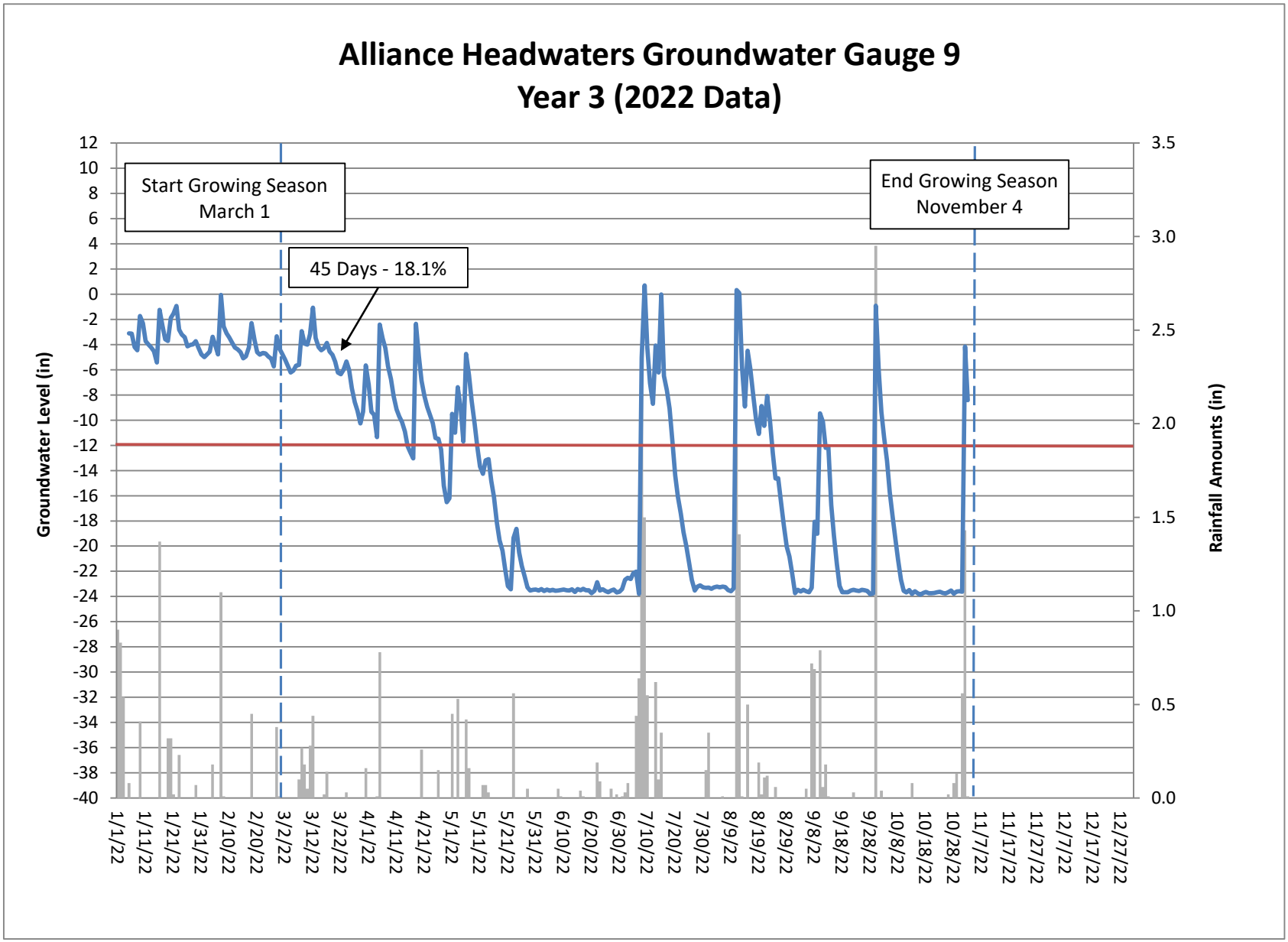
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 9
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
45 Days - 18.1%
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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-38
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3.5
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4/1/22
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4/21/22
5/1/22
5/11/22
5/21/22
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6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
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9/8/22
9/18/22
9/28/22
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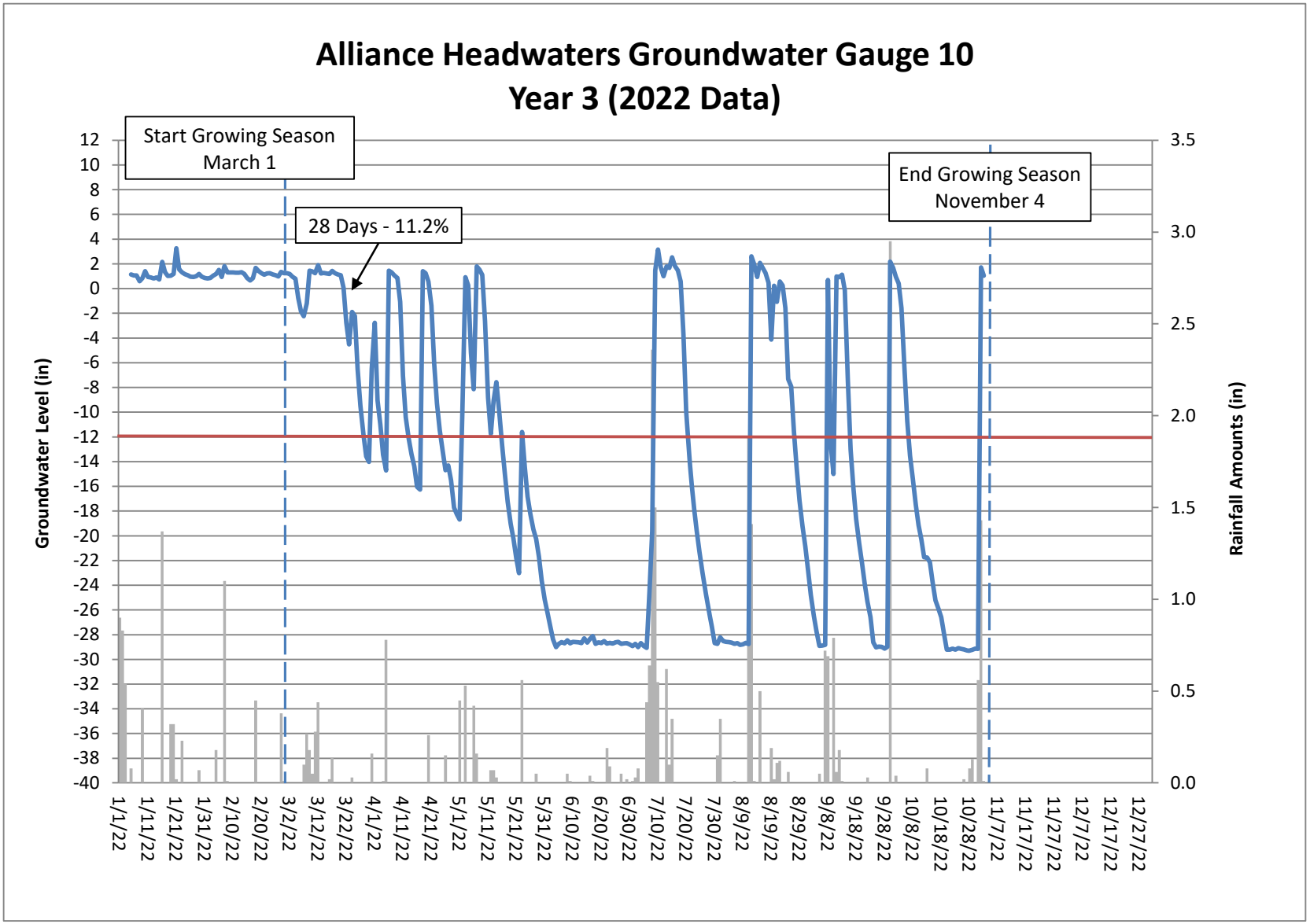
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 10
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
28 Days - 11.2%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
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-40
3.5
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4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
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6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
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8/29/22
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9/18/22
9/28/22
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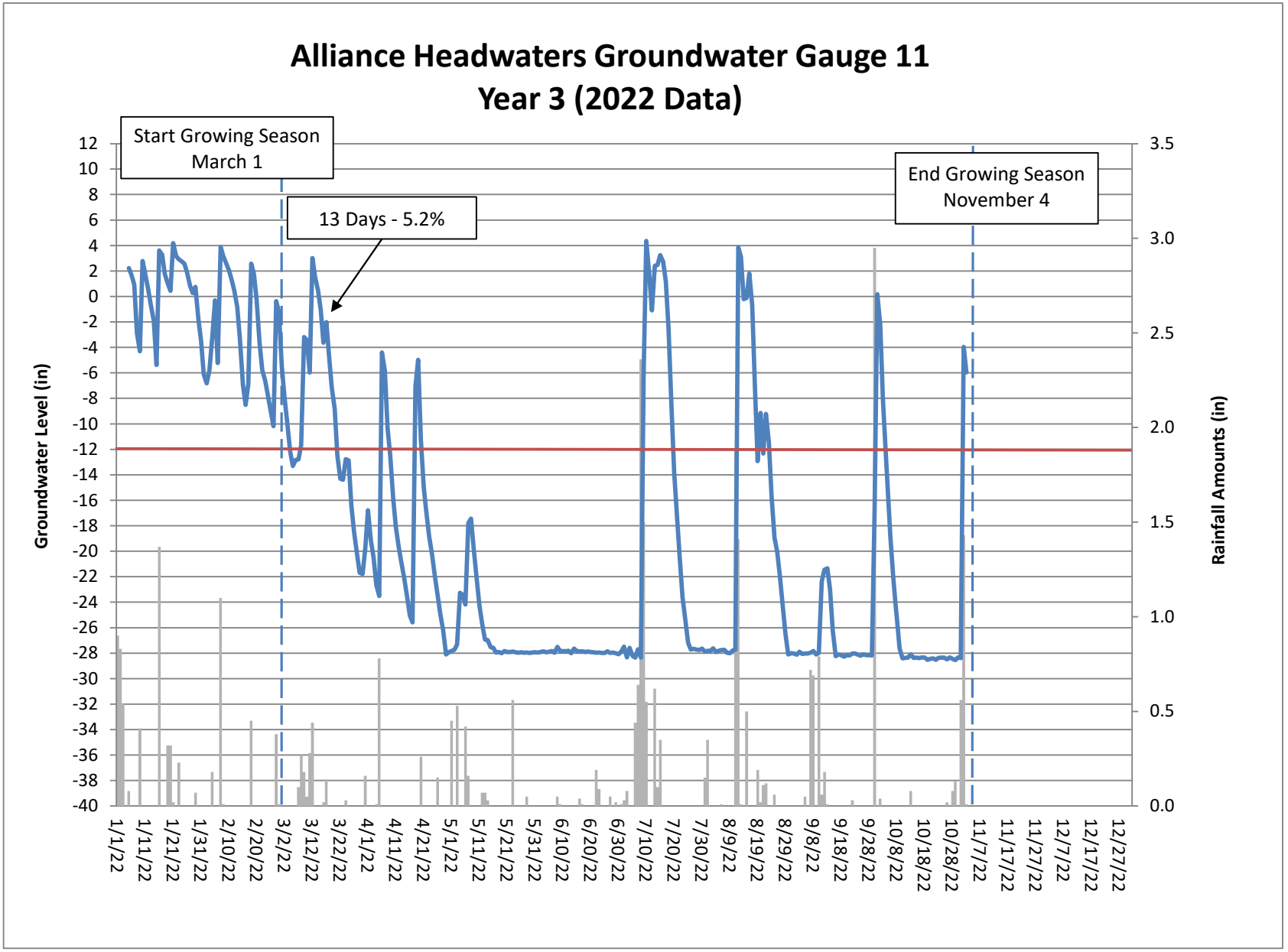
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 11
Year 3 (2022 Data)
Start Growing Season
March 1
13 Days - 5.2%
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
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-32
-34
-36
-38
-40
3.5
3.0
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1/1/22
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1/21/22
1/31/22
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3/12/22
3/22/22
4/1/22
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5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
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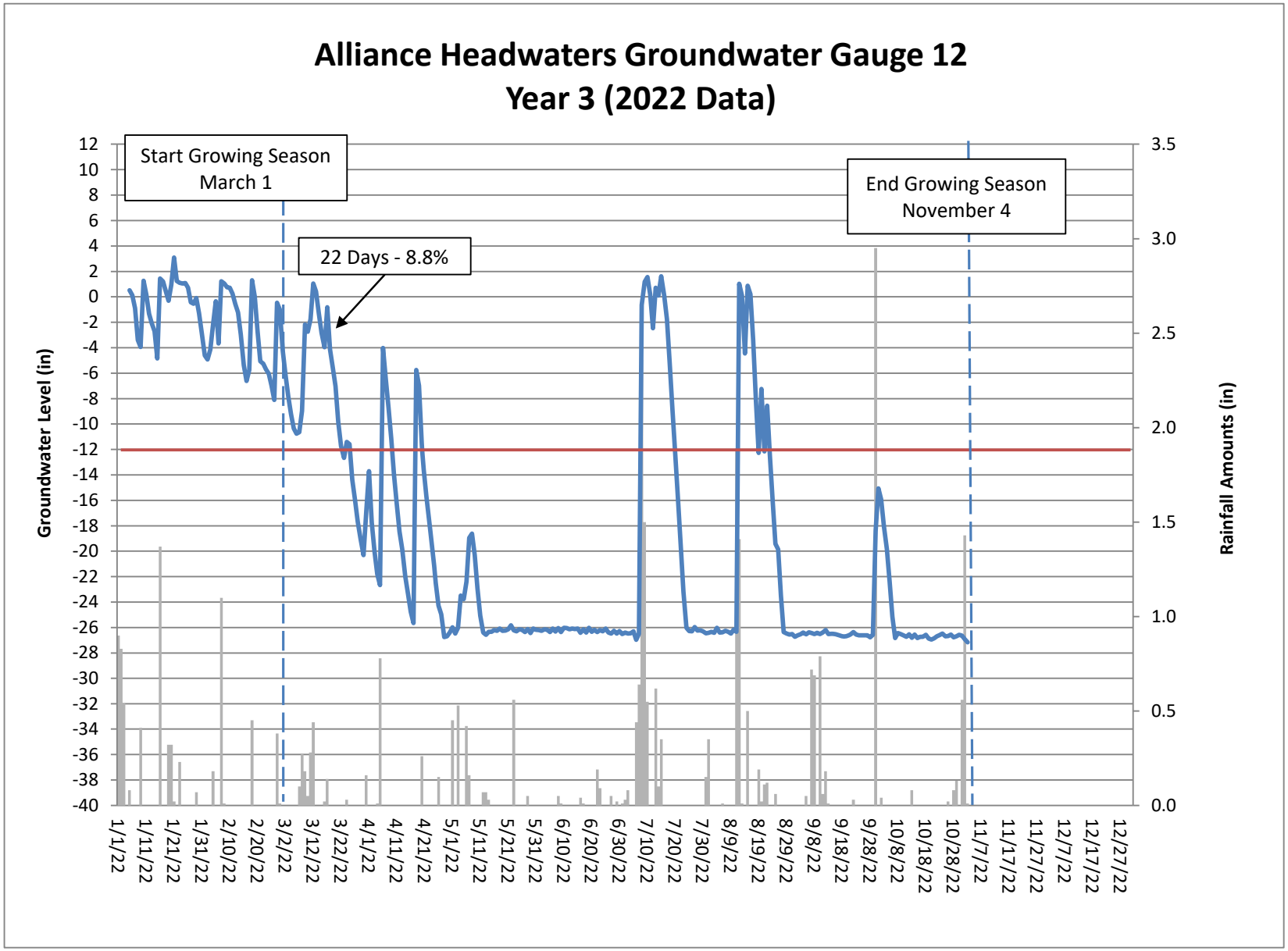
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 12
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
22 Days - 8.8%
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
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-32
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-36
-38
-40
3.5
3.0
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1/1/22
1/11/22
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7/10/22
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9/28/22
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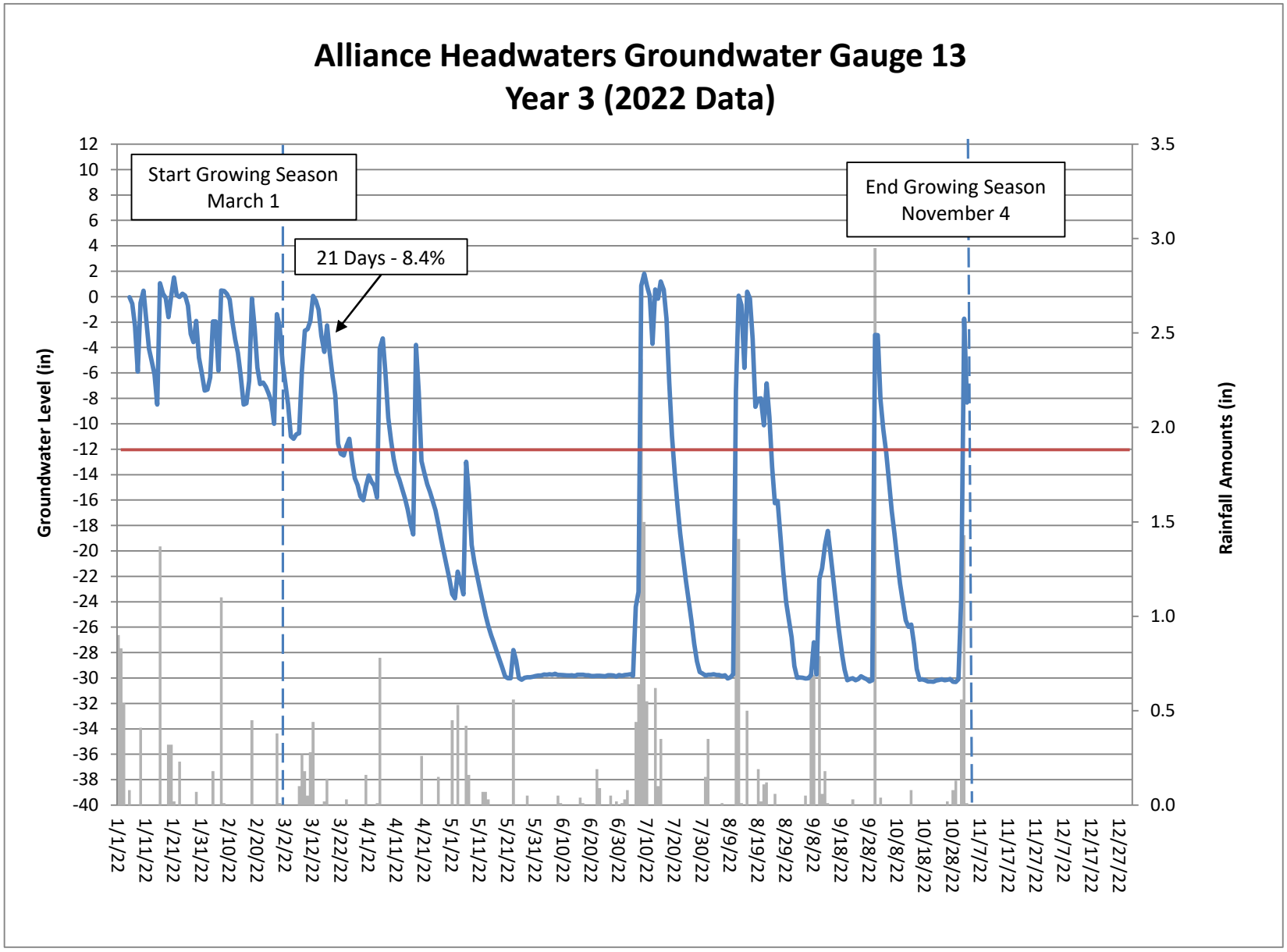
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 13
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
21 Days - 8.4%
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
-24
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-40
3.5
3.0
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1/1/22
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4/1/22
4/11/22
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5/31/22
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6/30/22
7/10/22
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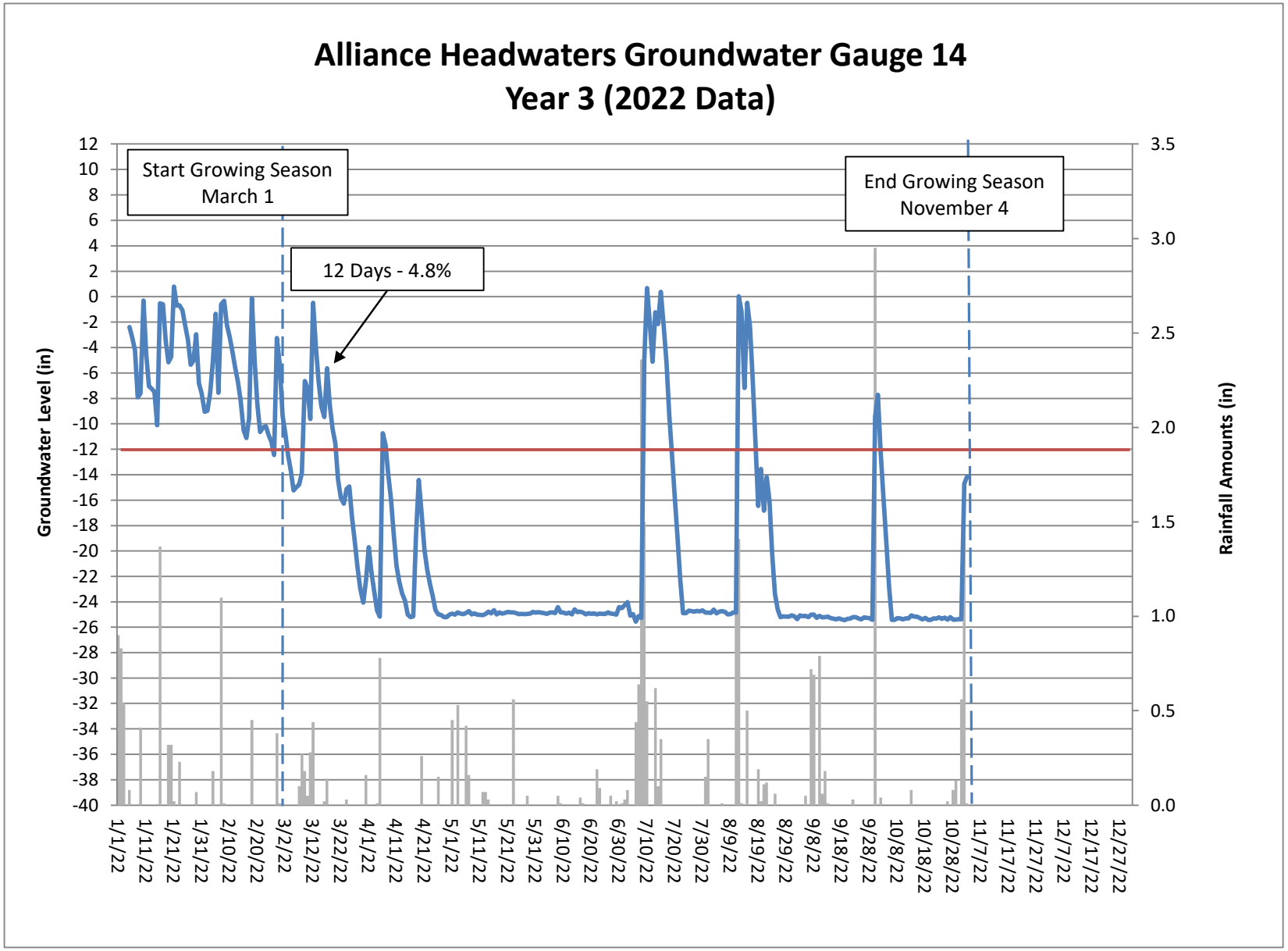
Alliance Headwaters Groundwater Gauge 14
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
12 Days - 4.8%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
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-40
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3.0
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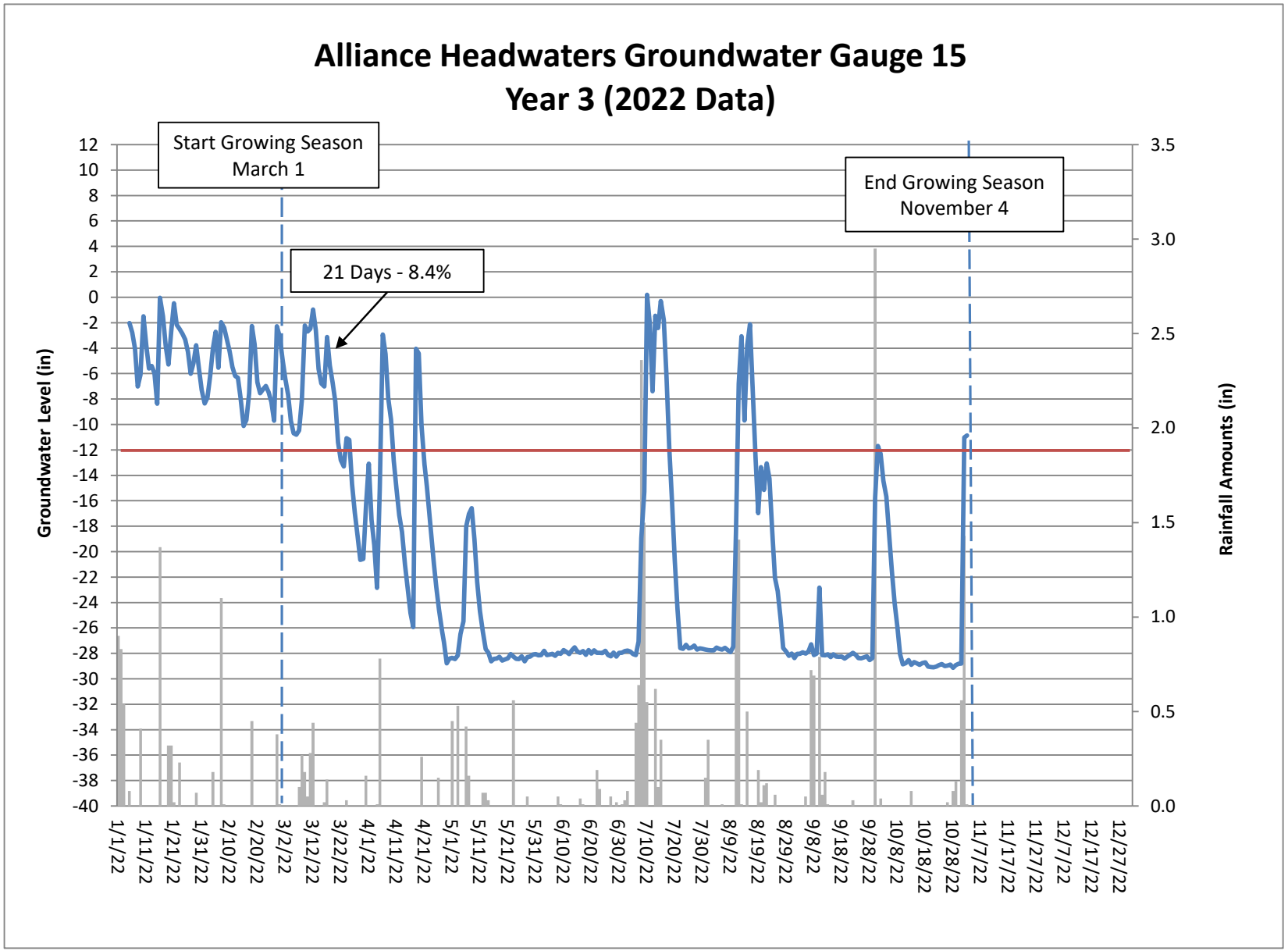
Alliance Headwaters Groundwater Gauge 15
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
21 Days - 8.4%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
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-22
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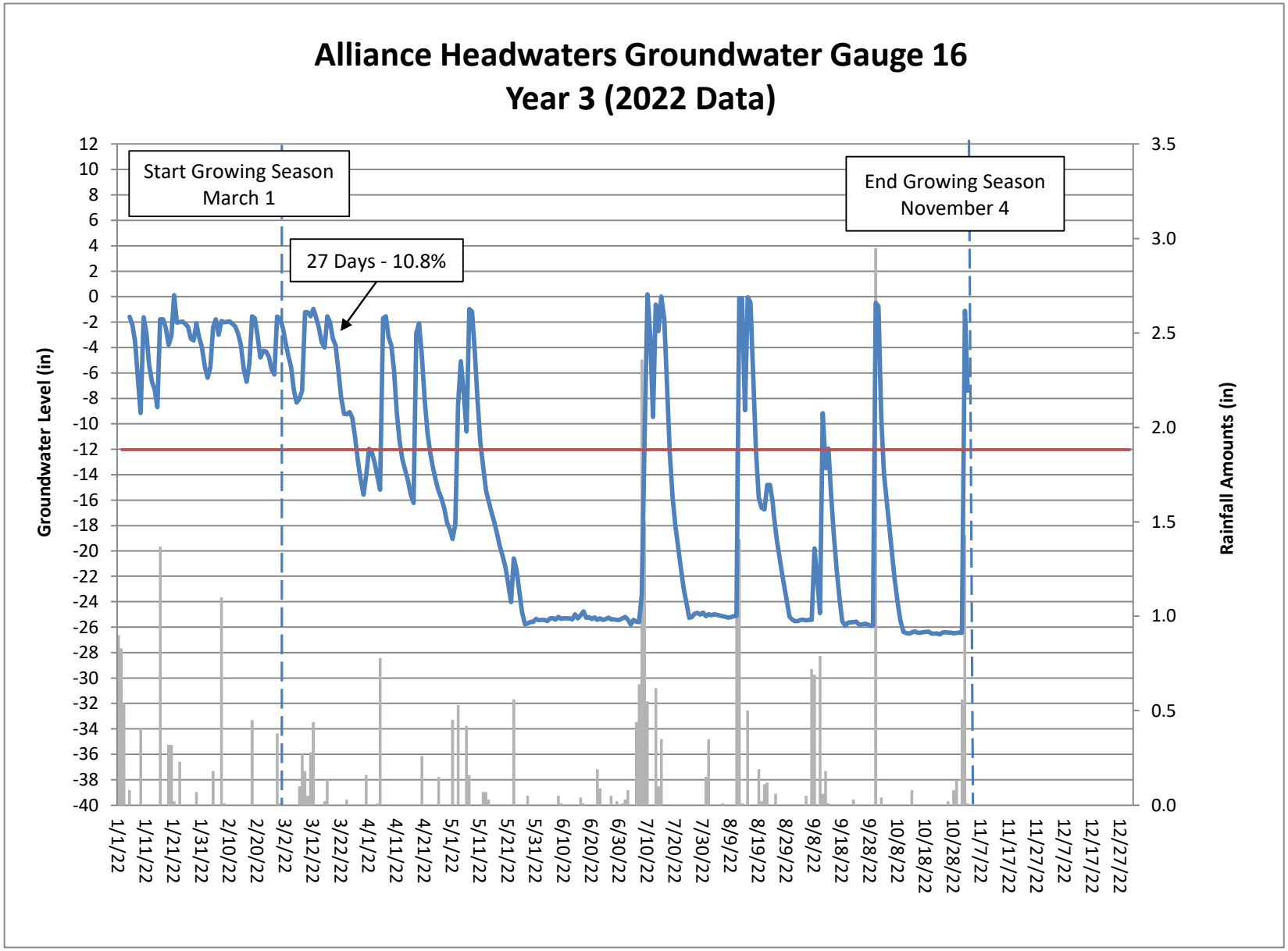
12/27/22


Alliance Headwaters Groundwater Gauge 16
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
27 Days - 10.8%
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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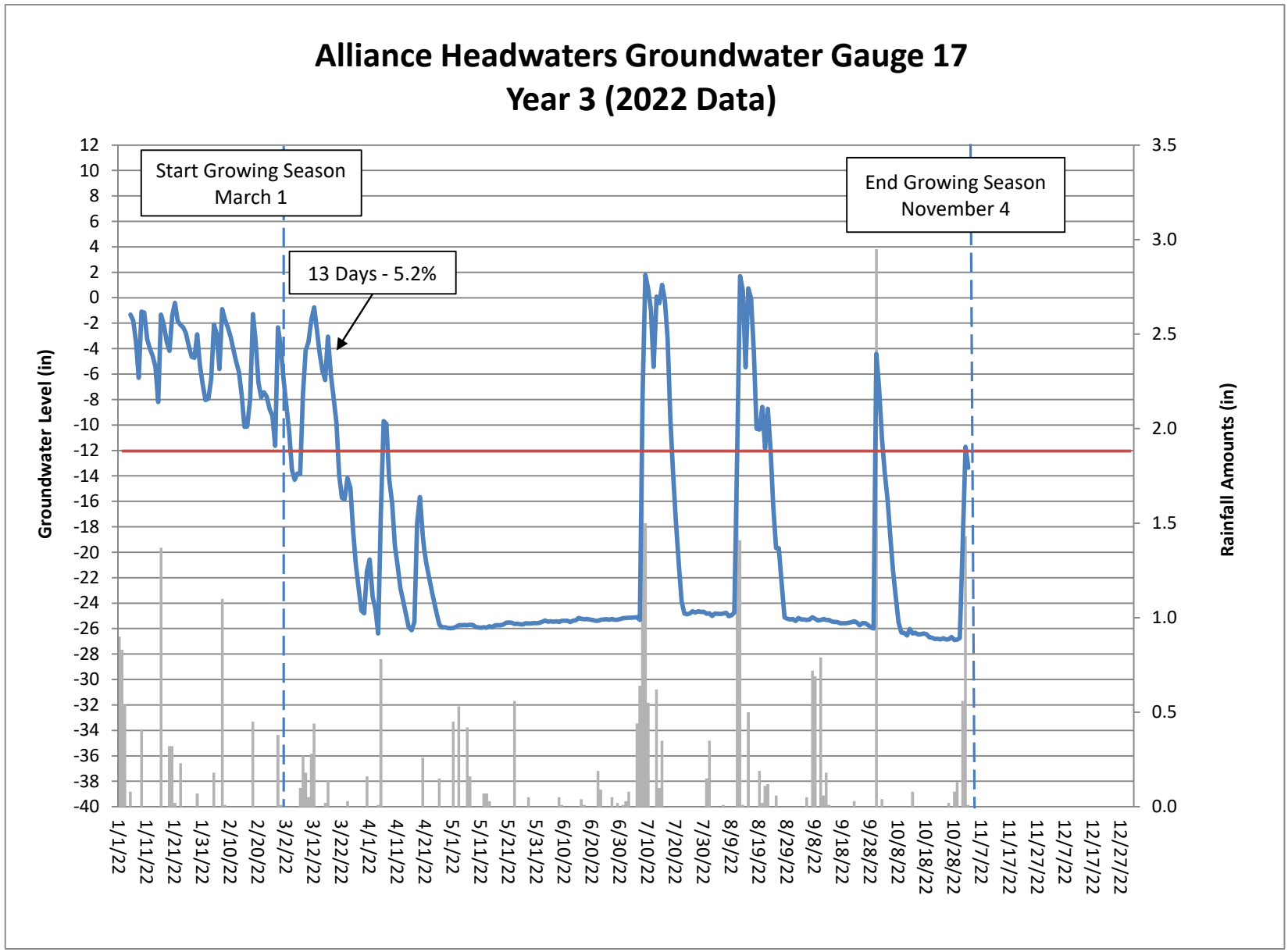
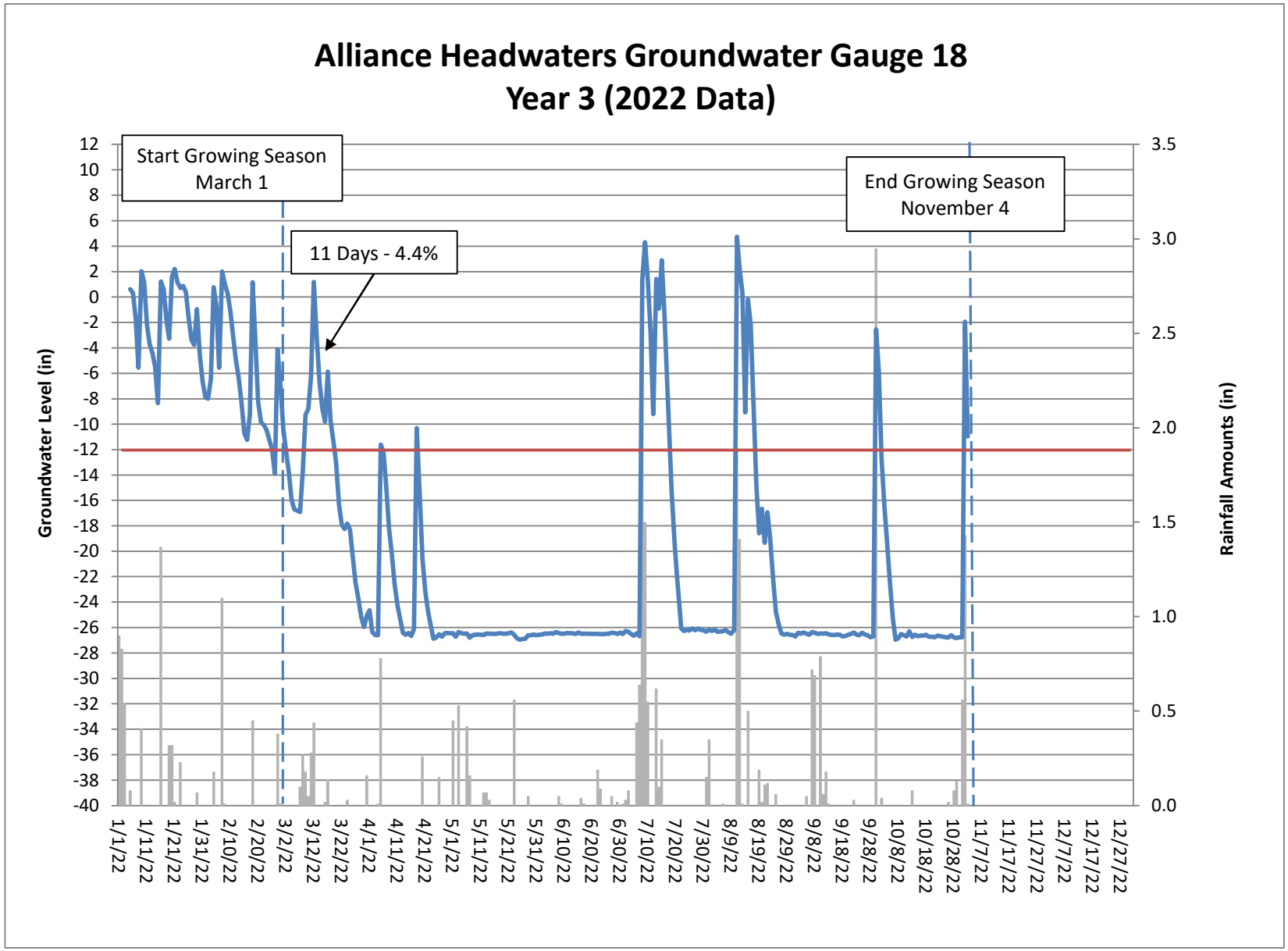
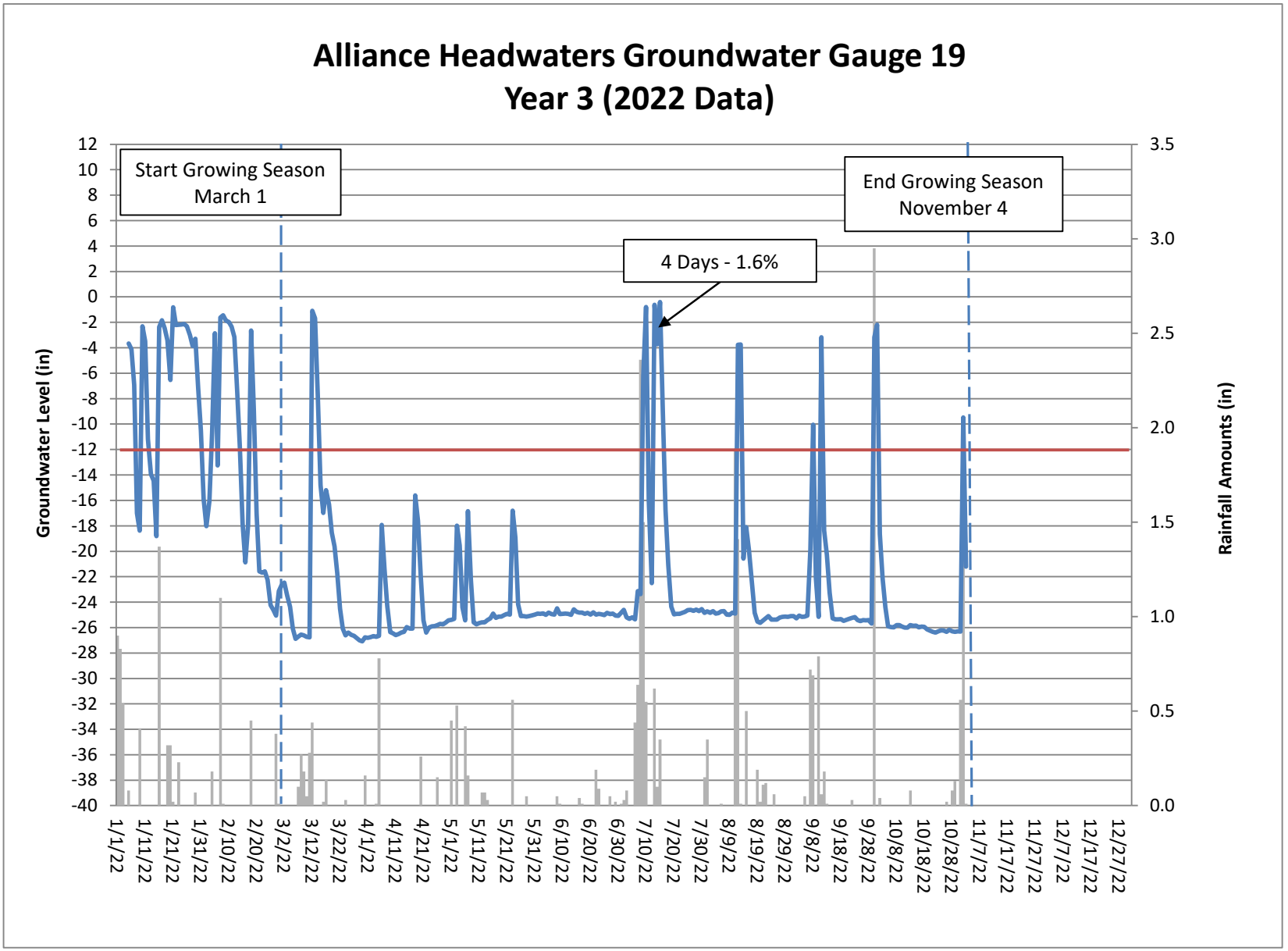
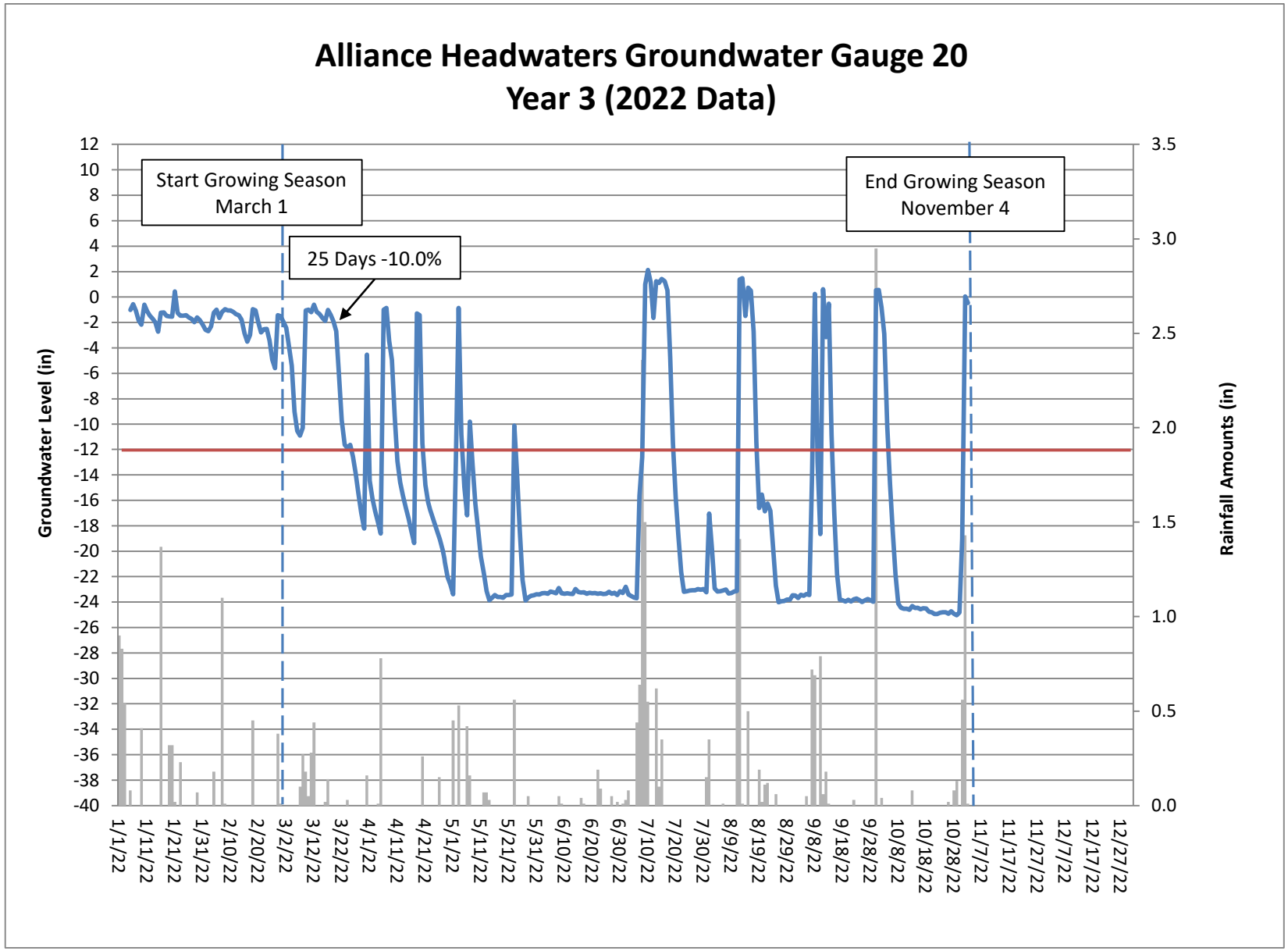
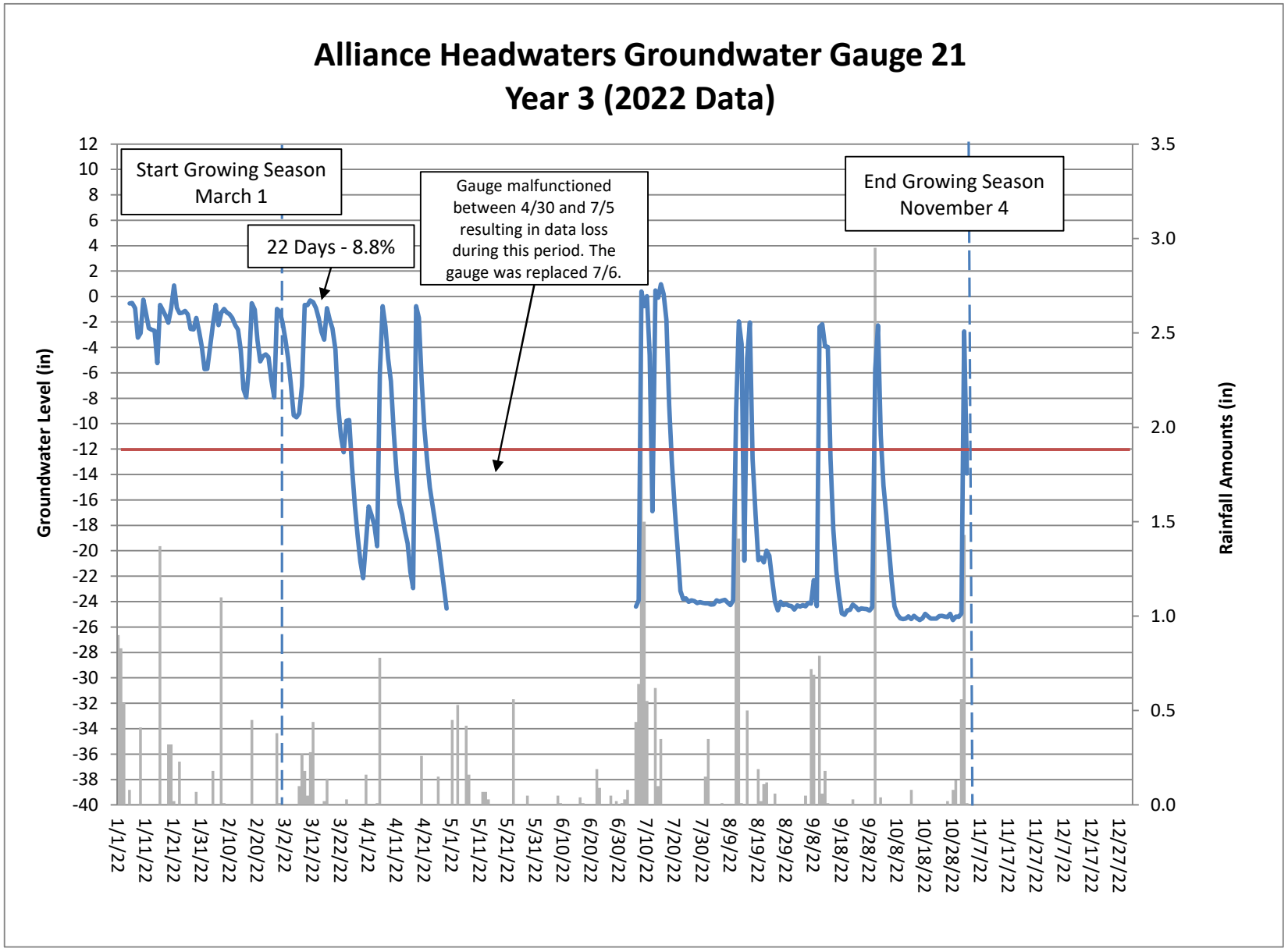
12/17/22
12/27/22

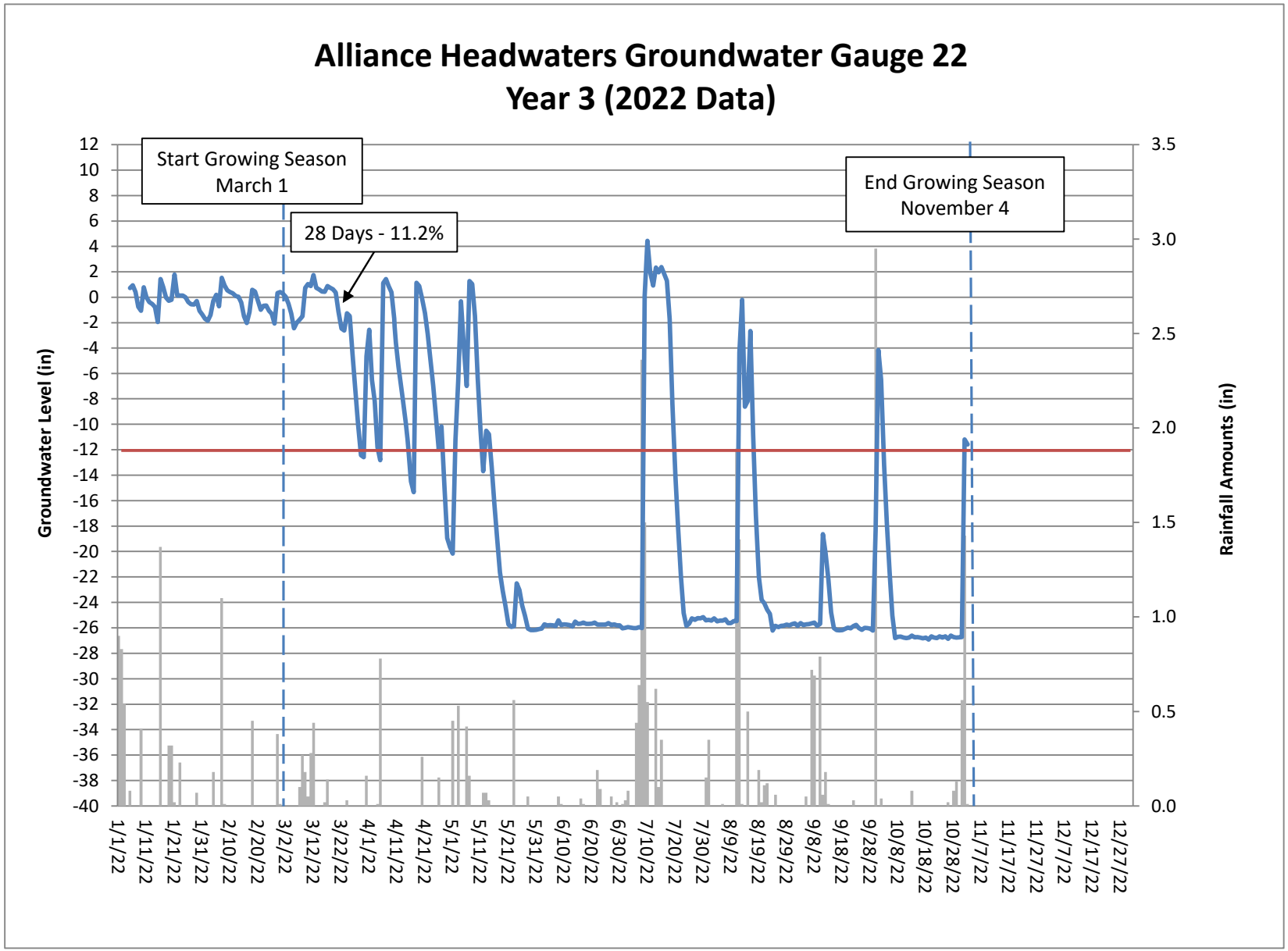

Alliance Headwaters Groundwater Gauge 17
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
13 Days - 5.2%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22

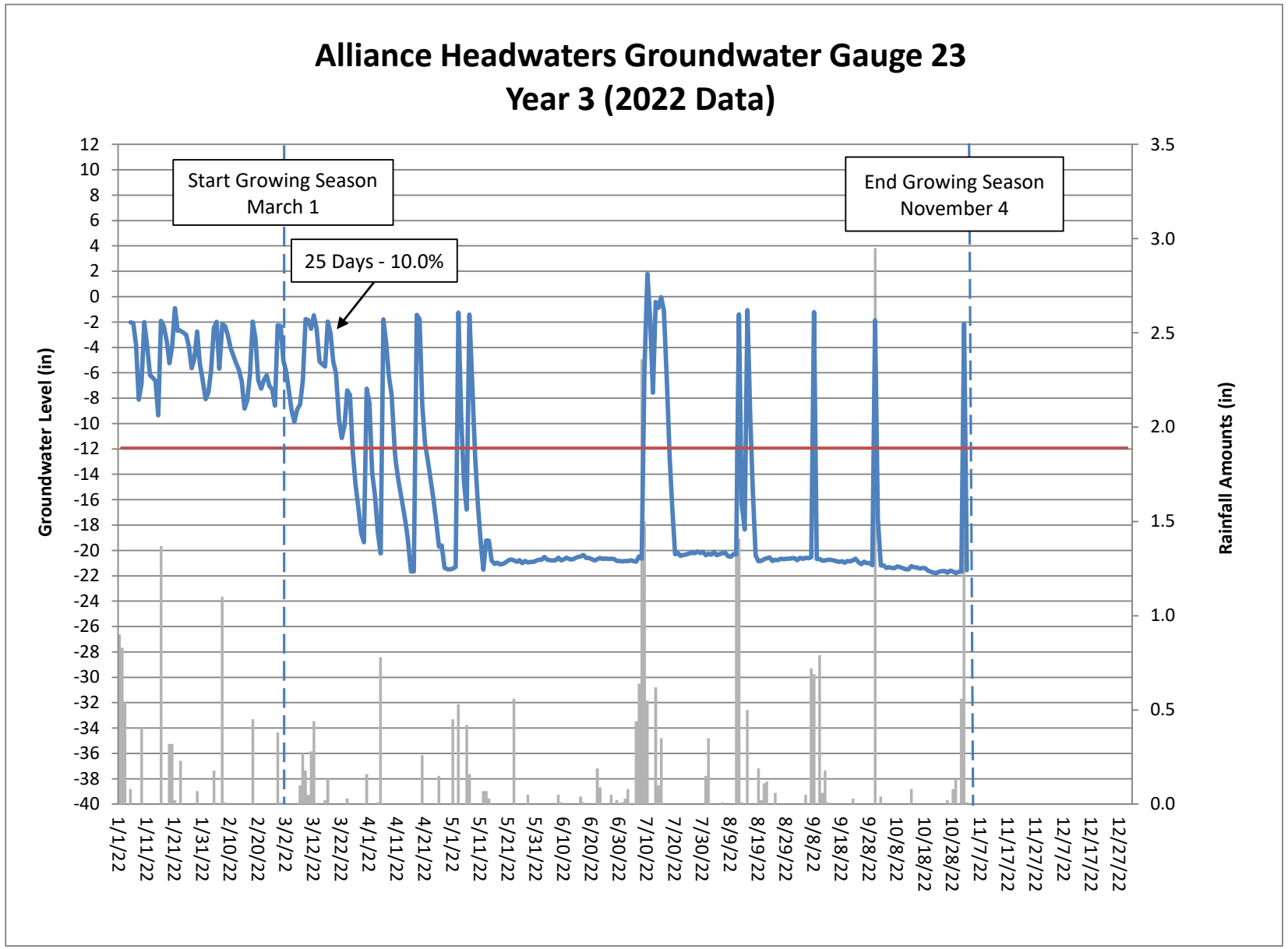

Alliance Headwaters Groundwater Gauge 18
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
11 Days - 4.4%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22

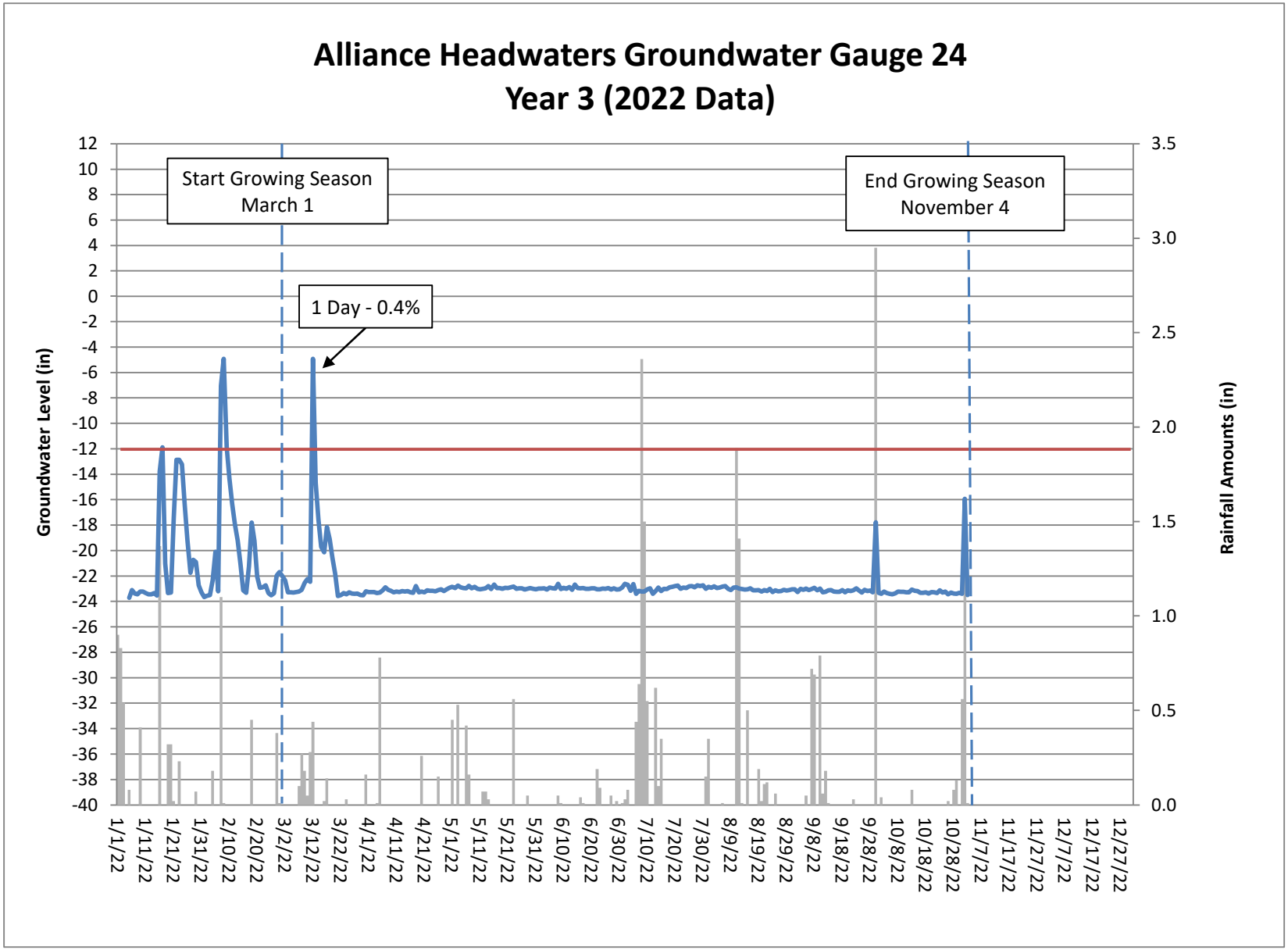

Alliance Headwaters Groundwater Gauge 19
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
4 Days - 1.6%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22

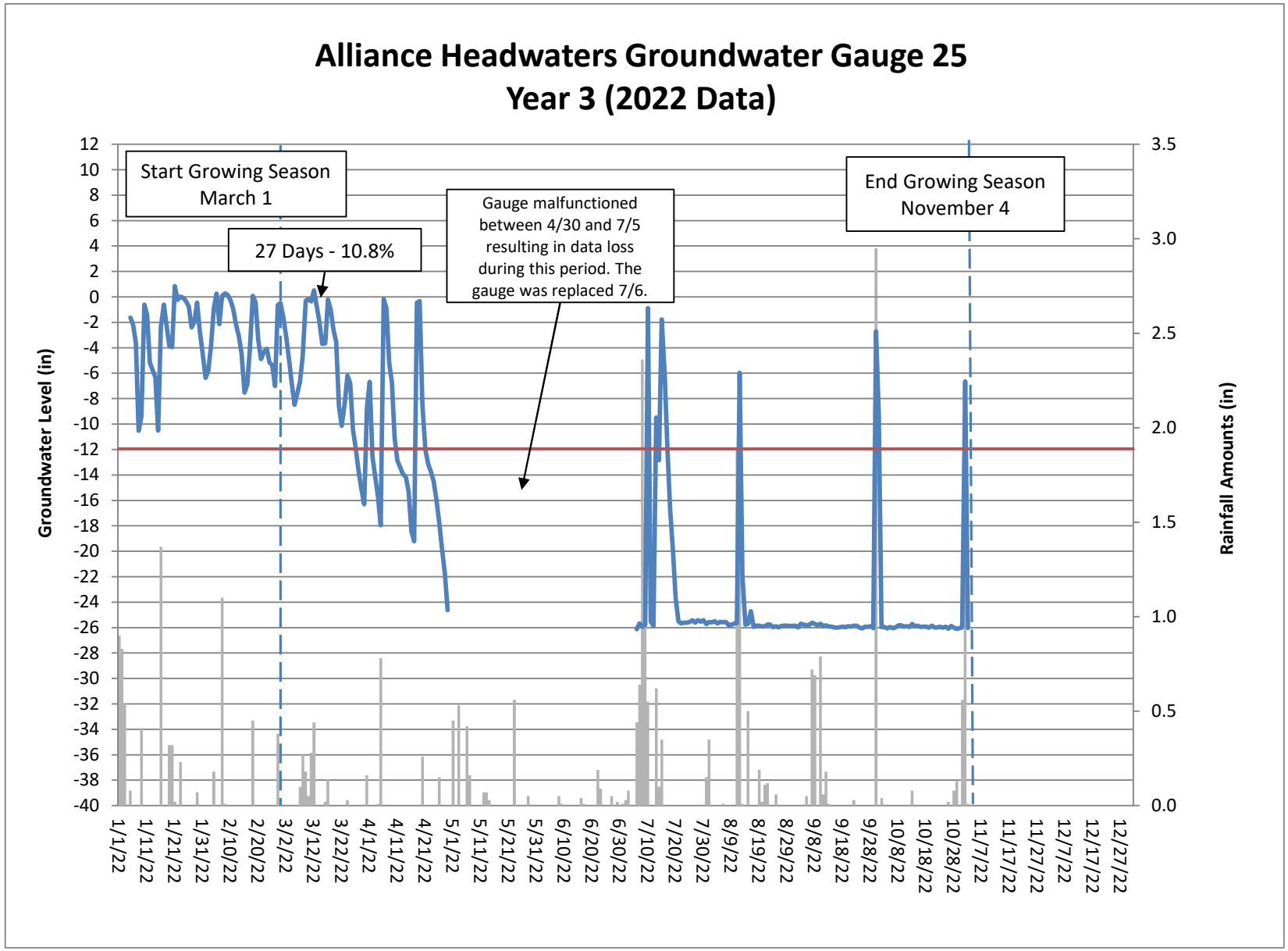

Alliance Headwaters Groundwater Gauge 20
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
25 Days -10.0%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22

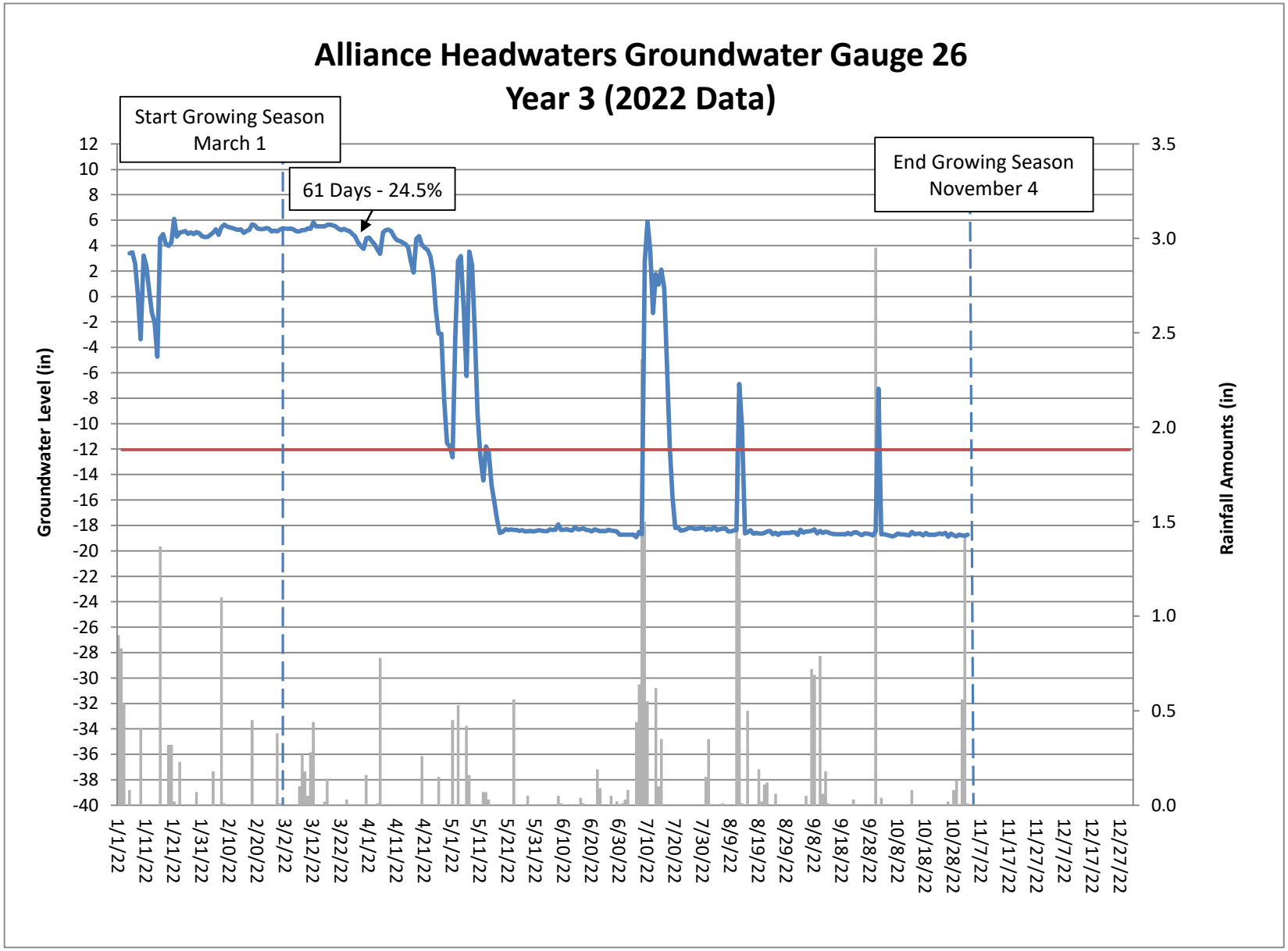

Alliance Headwaters Groundwater Gauge 21
Year 3 (2022 Data)
Start Growing Season
March 1
22 Days - 8.8%
Gauge malfunctioned between 4/30 and 7/5 resulting in data loss during this period. The gauge was replaced 7/6.
End Growing Season
November 4
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
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
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 22
Year 3 (2022 Data)
Start Growing Season
March 1
28 Days - 11.2%
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
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 23
Year 3 (2022 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
-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
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 24
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
1 Day - 0.4%
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
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 25
Year 3 (2022 Data)
Start Growing Season
March 1
27 Days - 10.8%
Gauge malfunctioned between 4/30 and 7/5 resulting in data loss during this period. The gauge was replaced 7/6.
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
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 26
Year 3 (2022 Data)
Start Growing Season
March 1
61 Days - 24.5%
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
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
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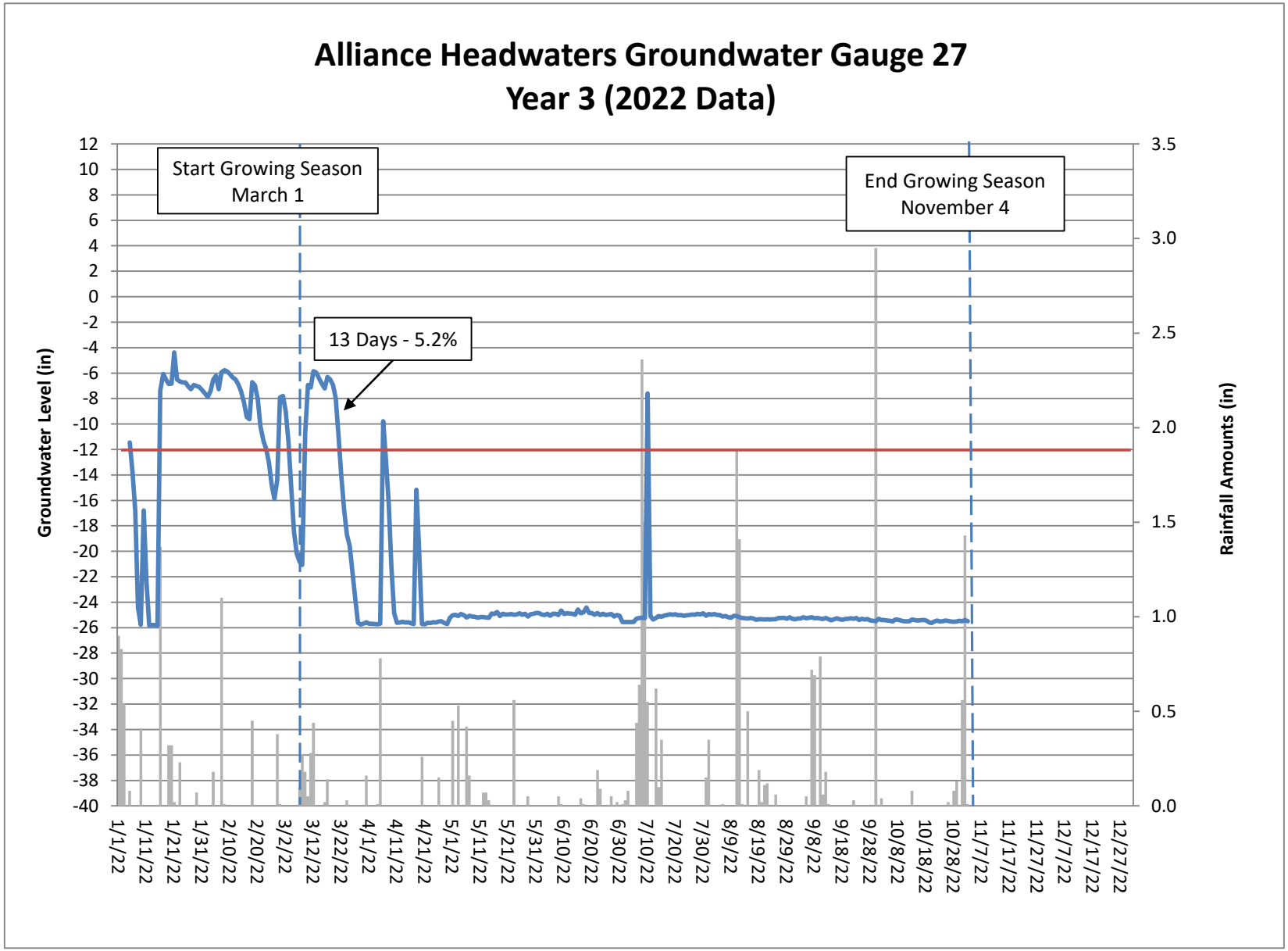
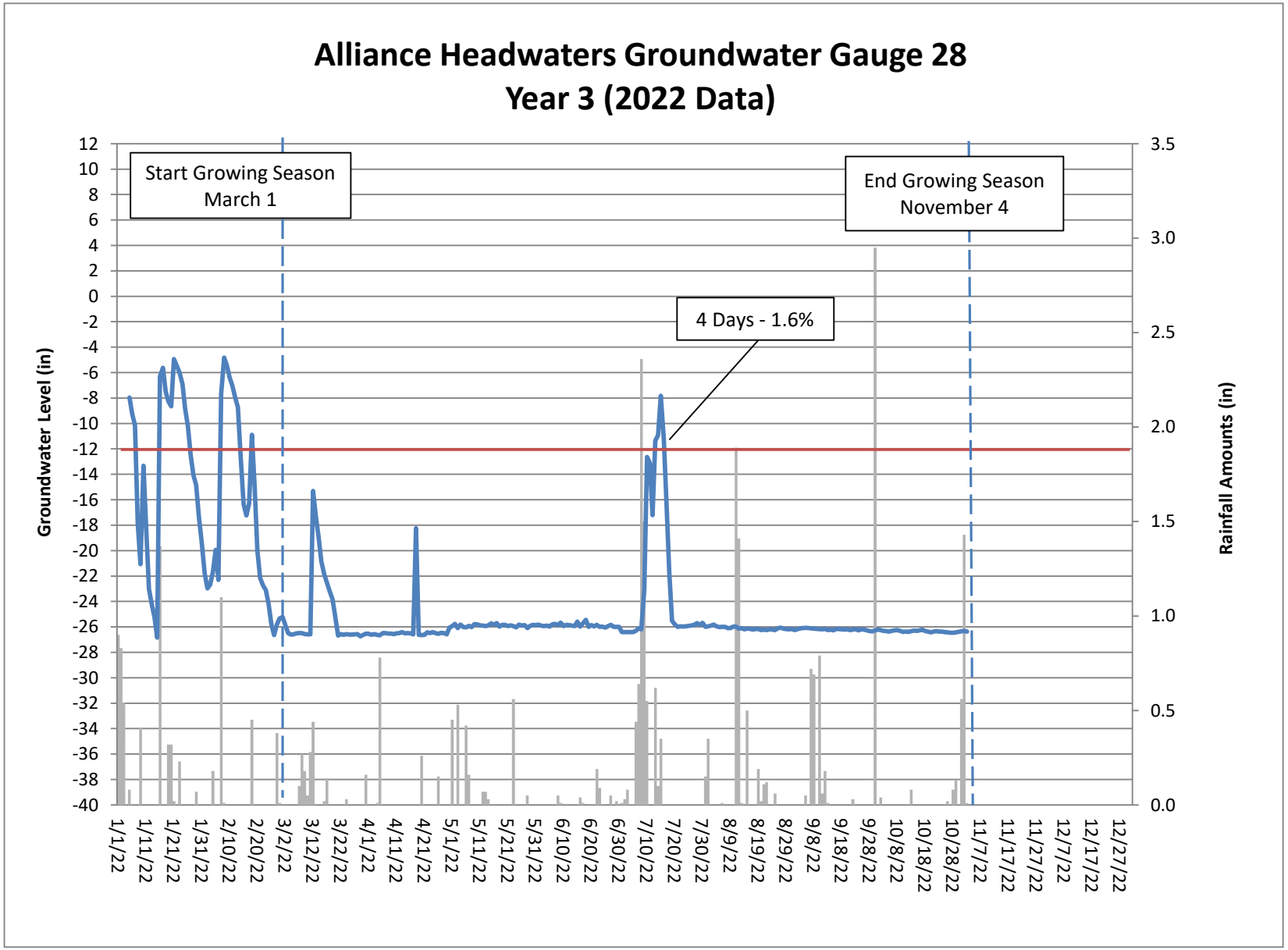
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 27
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
13 Days - 5.2%
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
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 28
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
4 Days - 1.6%
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
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
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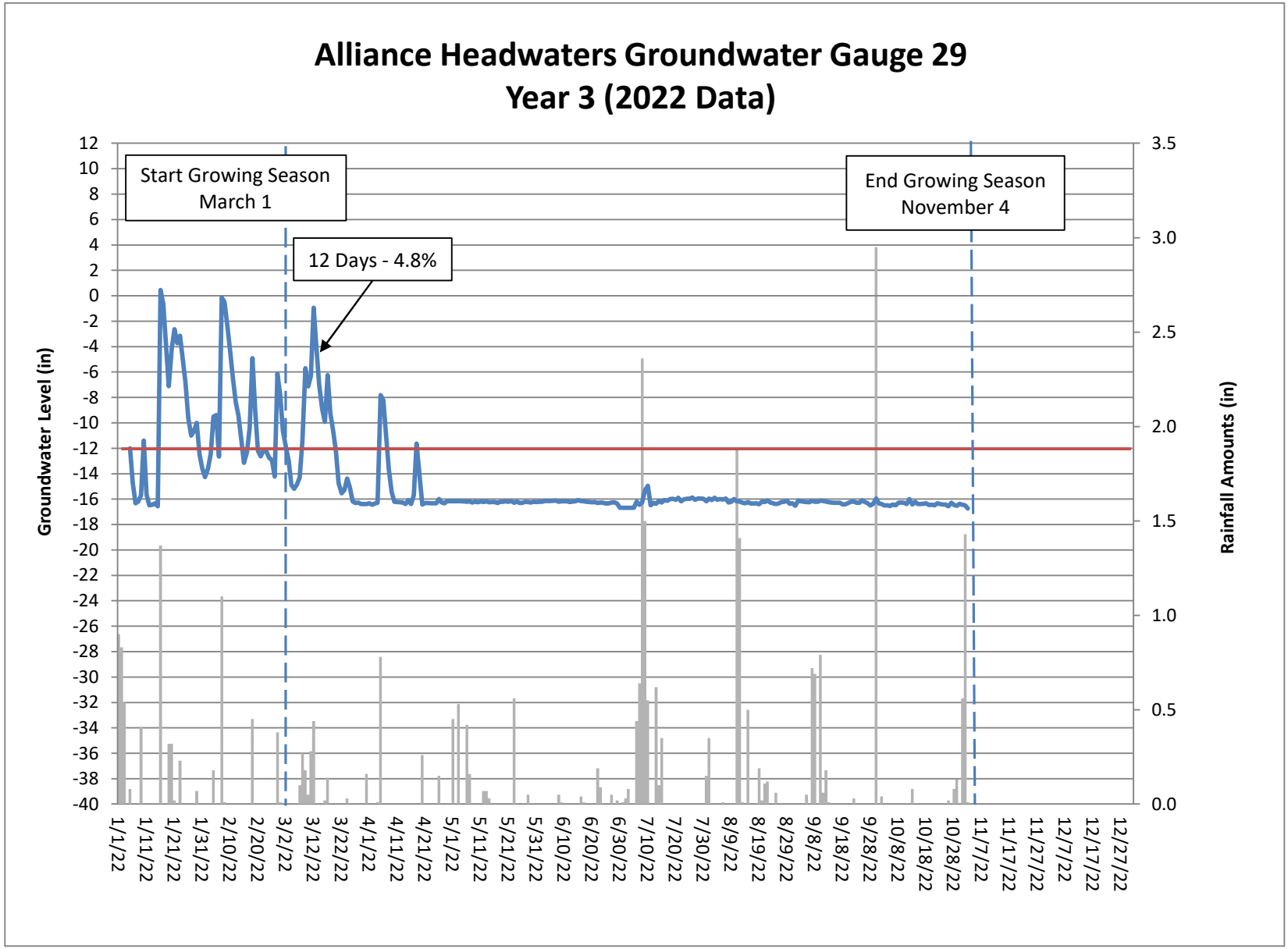
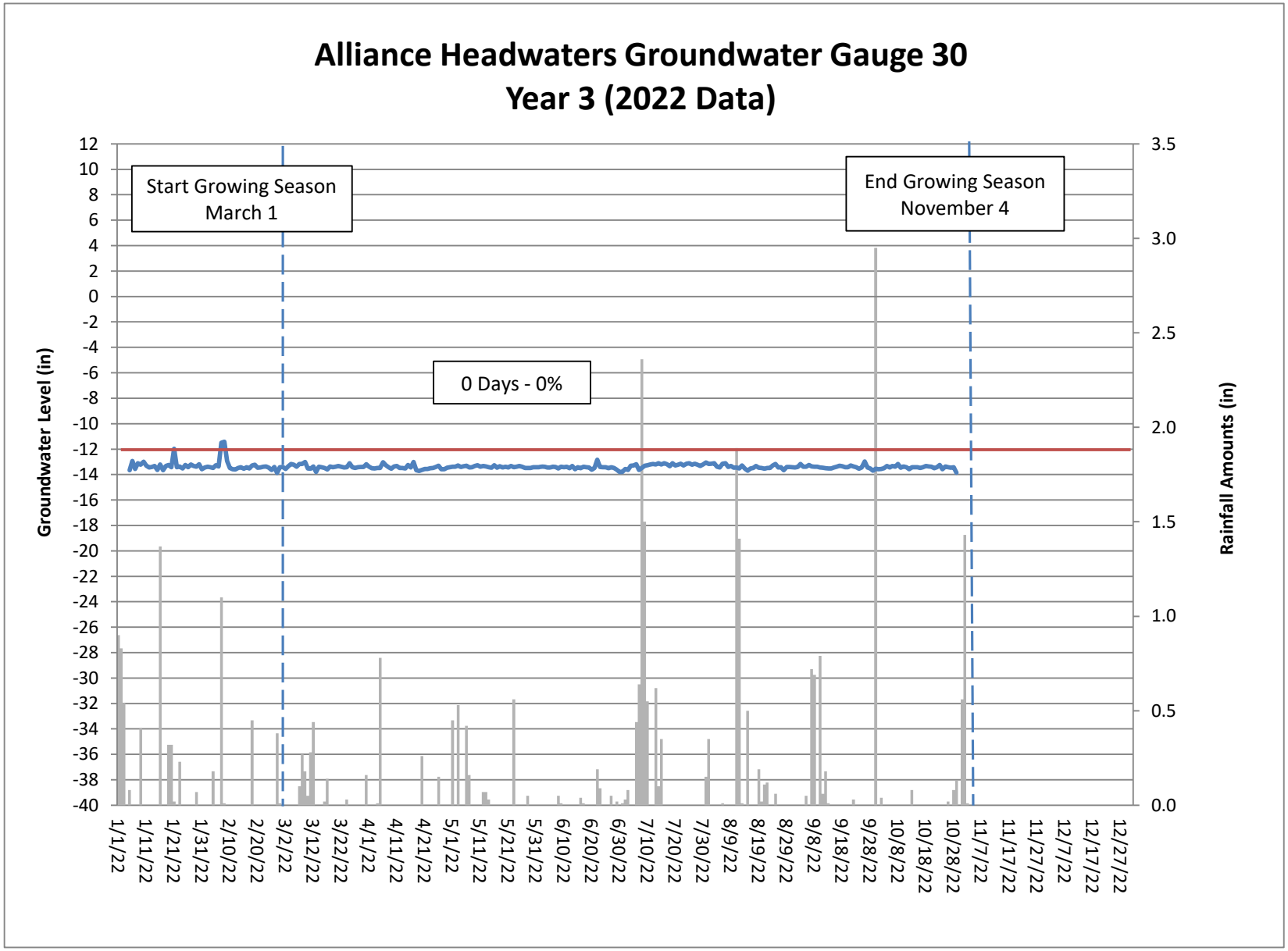
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 29
Year 3 (2022 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
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 30
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
0 Days - 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
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
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5/11/22
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7/10/22
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7/30/22
8/9/22
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9/28/22
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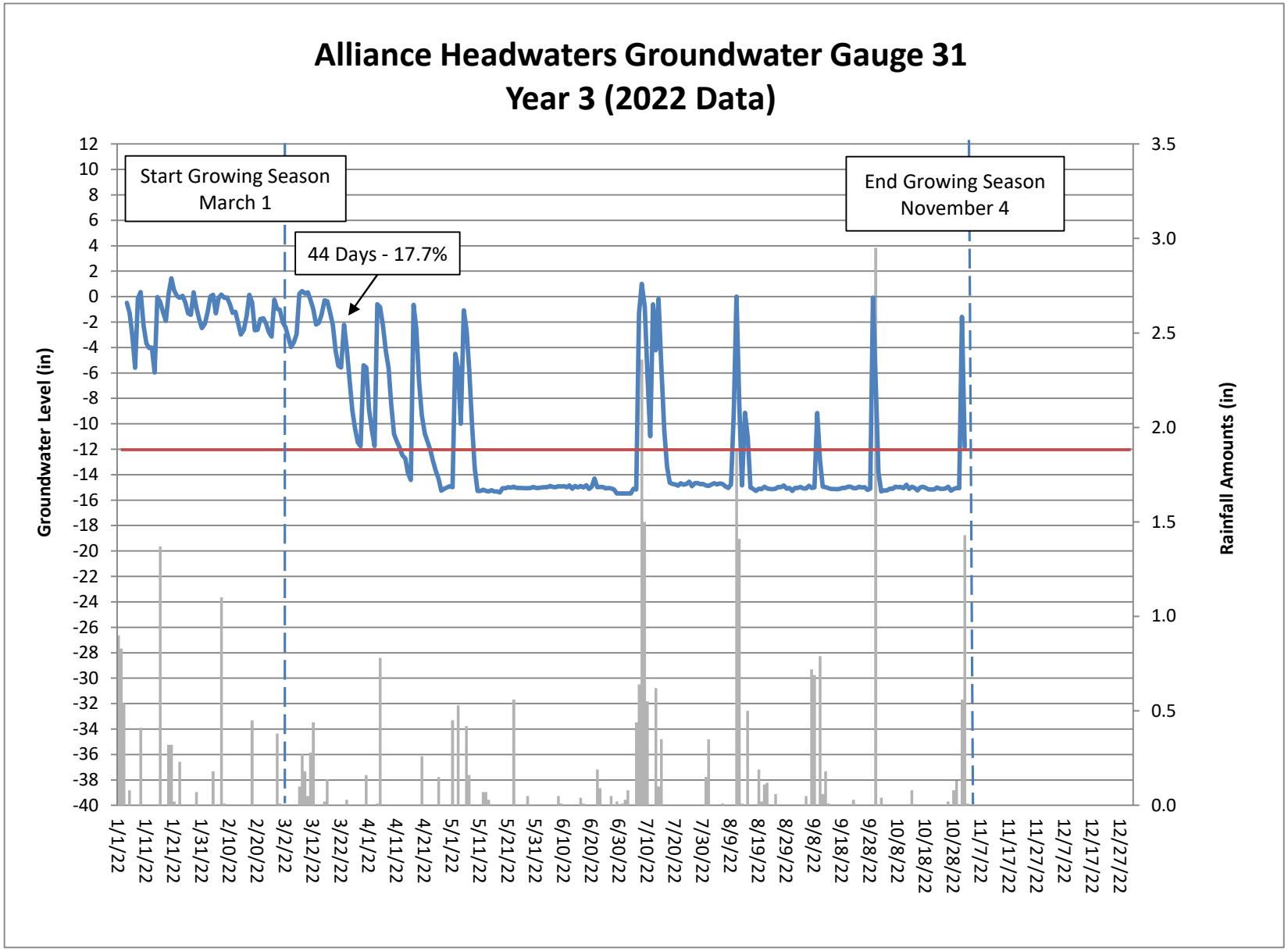
12/27/22


Alliance Headwaters Groundwater Gauge 31
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
44 Days - 17.7%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
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-24
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-32
-34
-36
-38
-40
3.5
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4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
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6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
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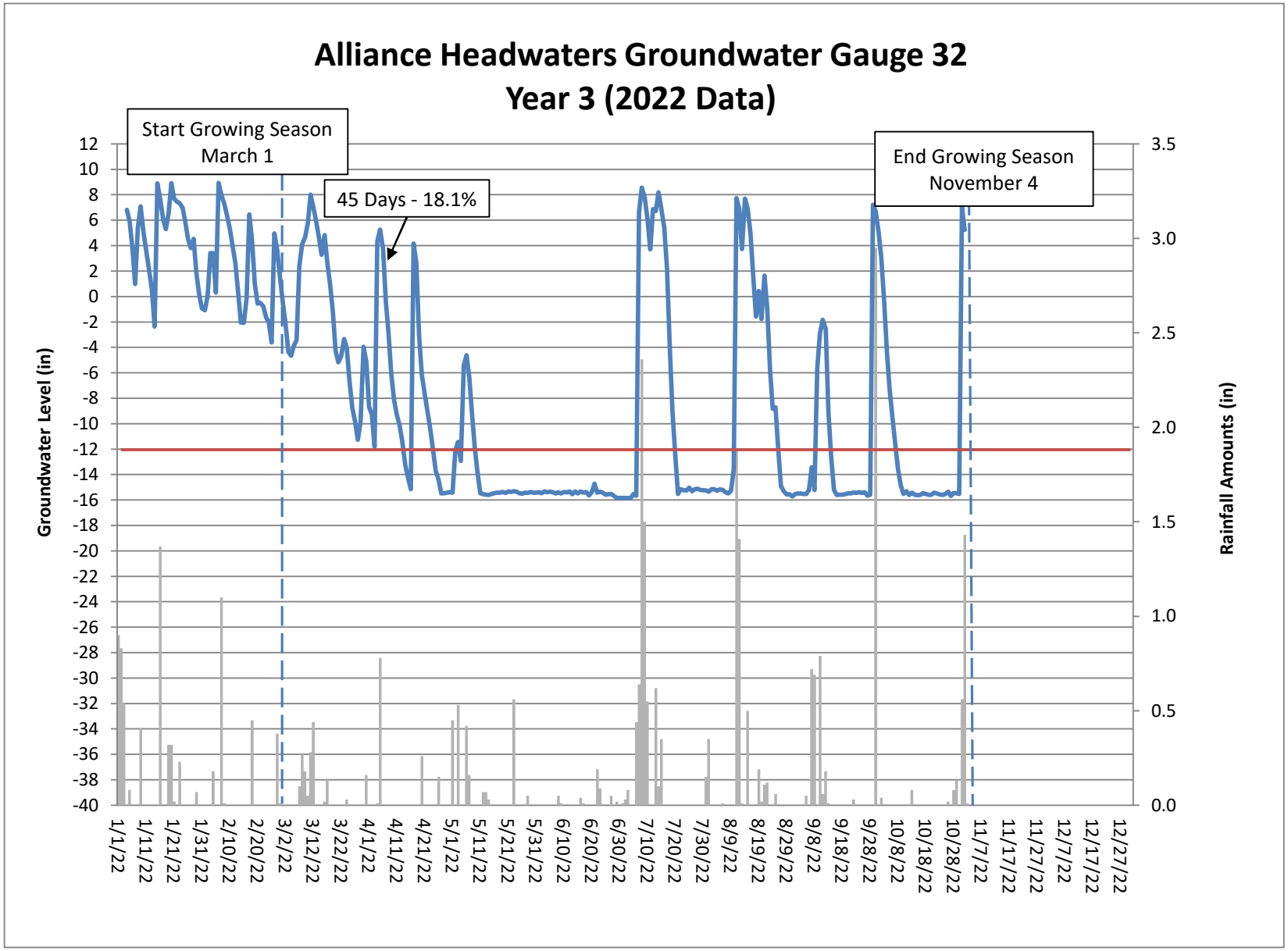
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 32
Year 3 (2022 Data)
Start Growing Season
March 1
45 Days - 18.1%
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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4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
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8/9/22
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8/29/22
9/8/22
9/18/22
9/28/22
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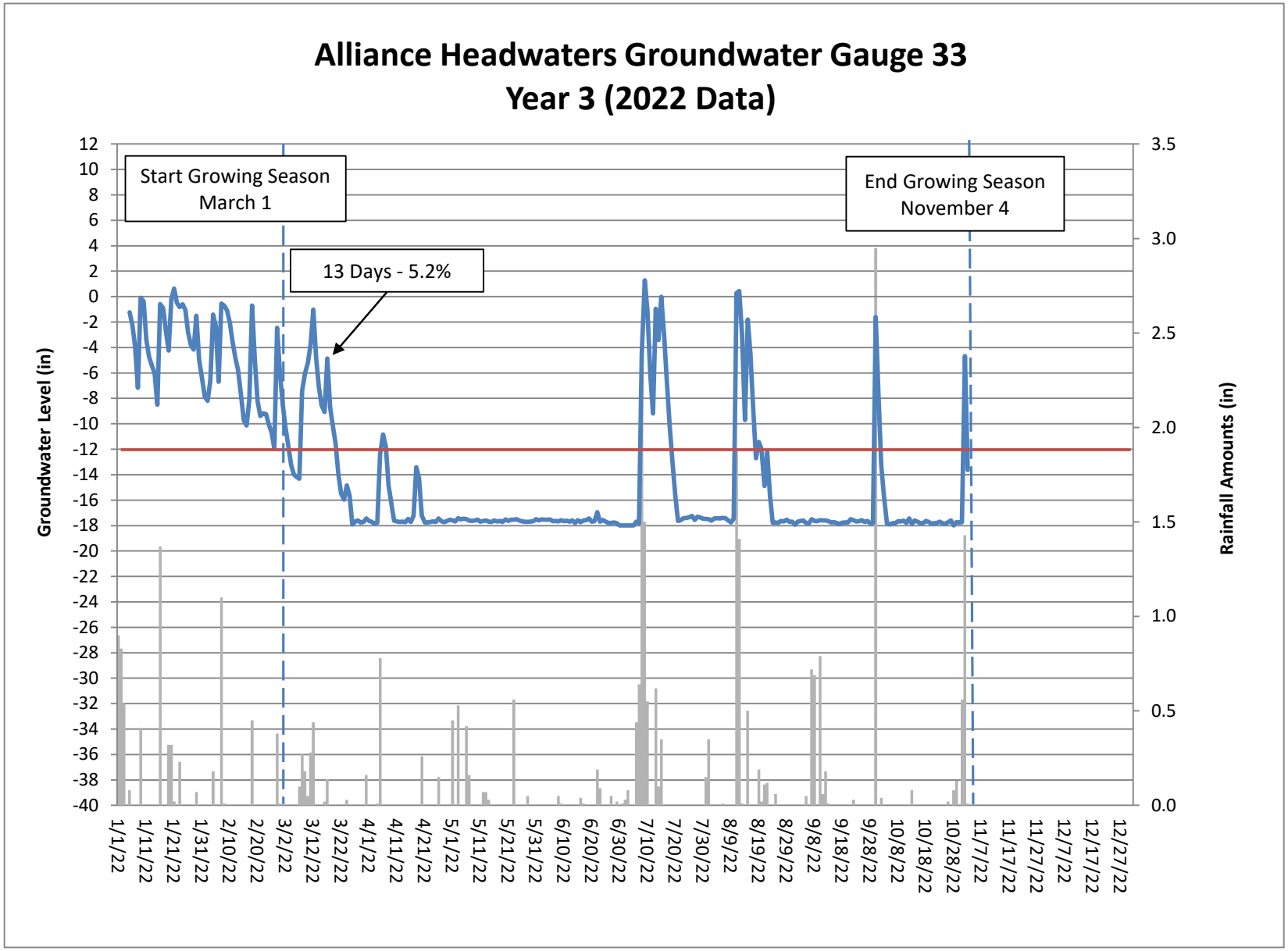
11/27/22
12/7/22
12/17/22
12/27/22


Alliance Headwaters Groundwater Gauge 33
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
13 Days - 5.2%
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
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1/11/22
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4/1/22
4/11/22
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5/1/22
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5/31/22
6/10/22
6/20/22
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7/10/22
7/20/22
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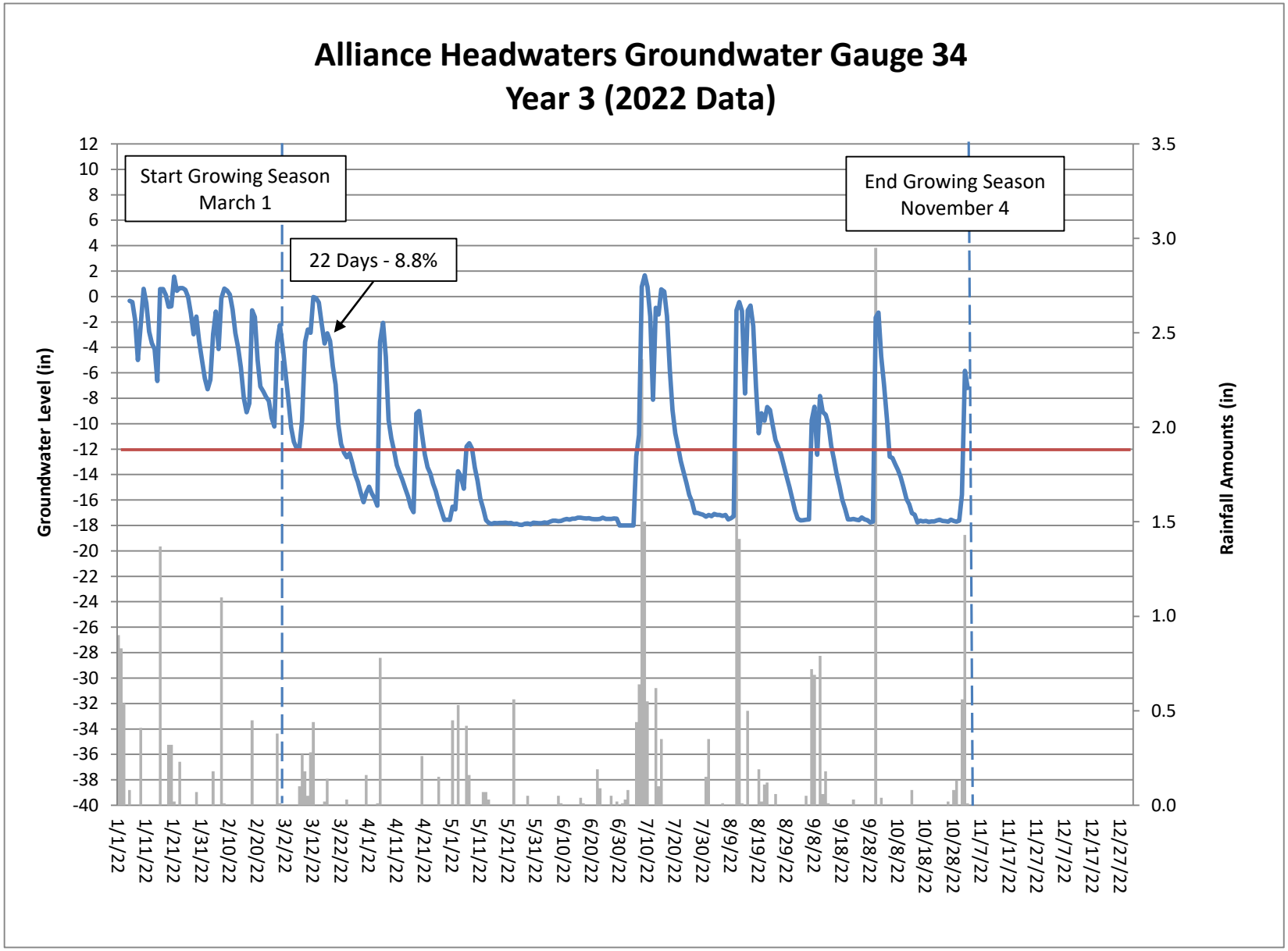
Alliance Headwaters Groundwater Gauge 34
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
22 Days - 8.8%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
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5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
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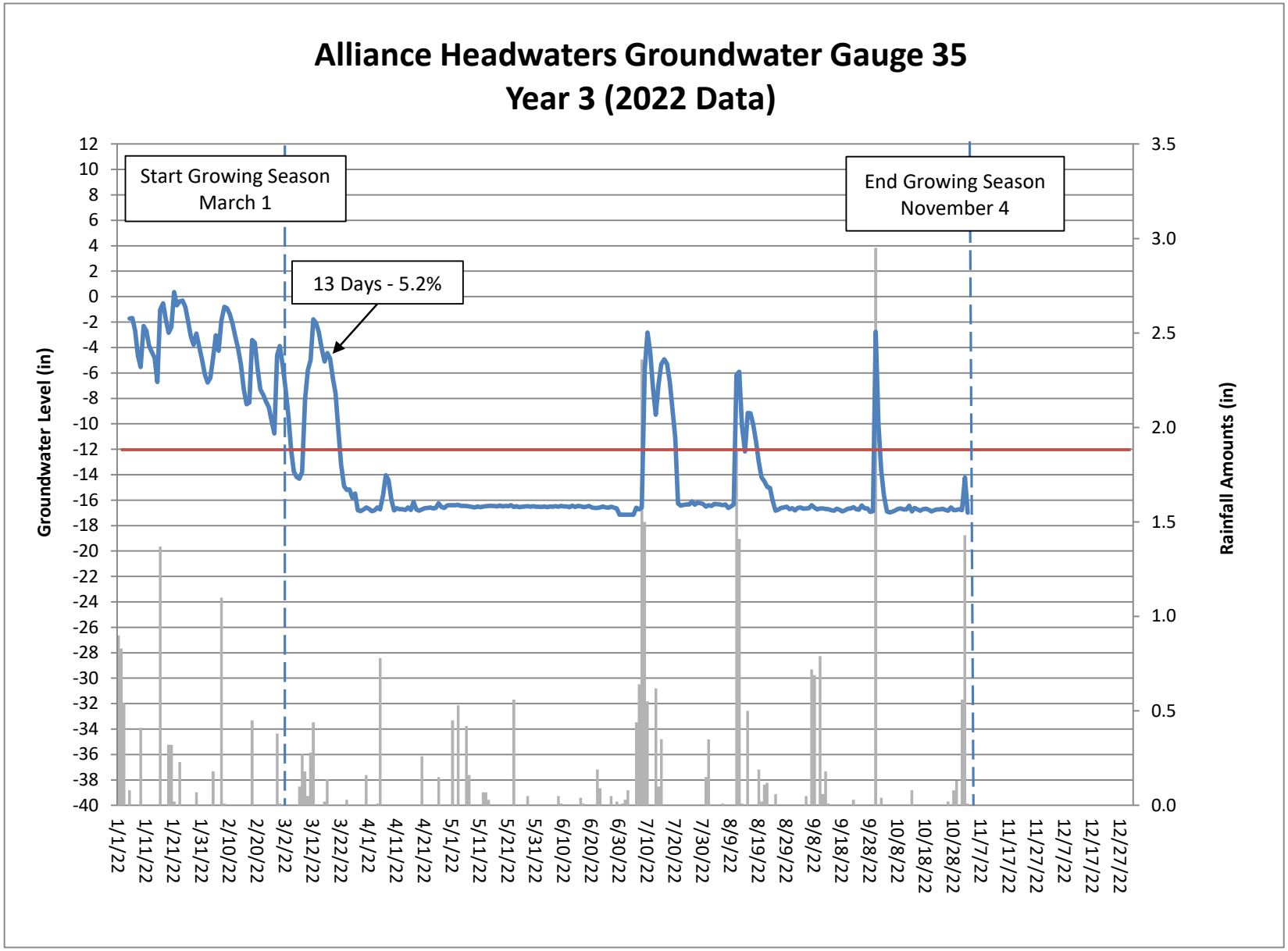
Alliance Headwaters Groundwater Gauge 35
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
13 Days - 5.2%
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
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9/18/22
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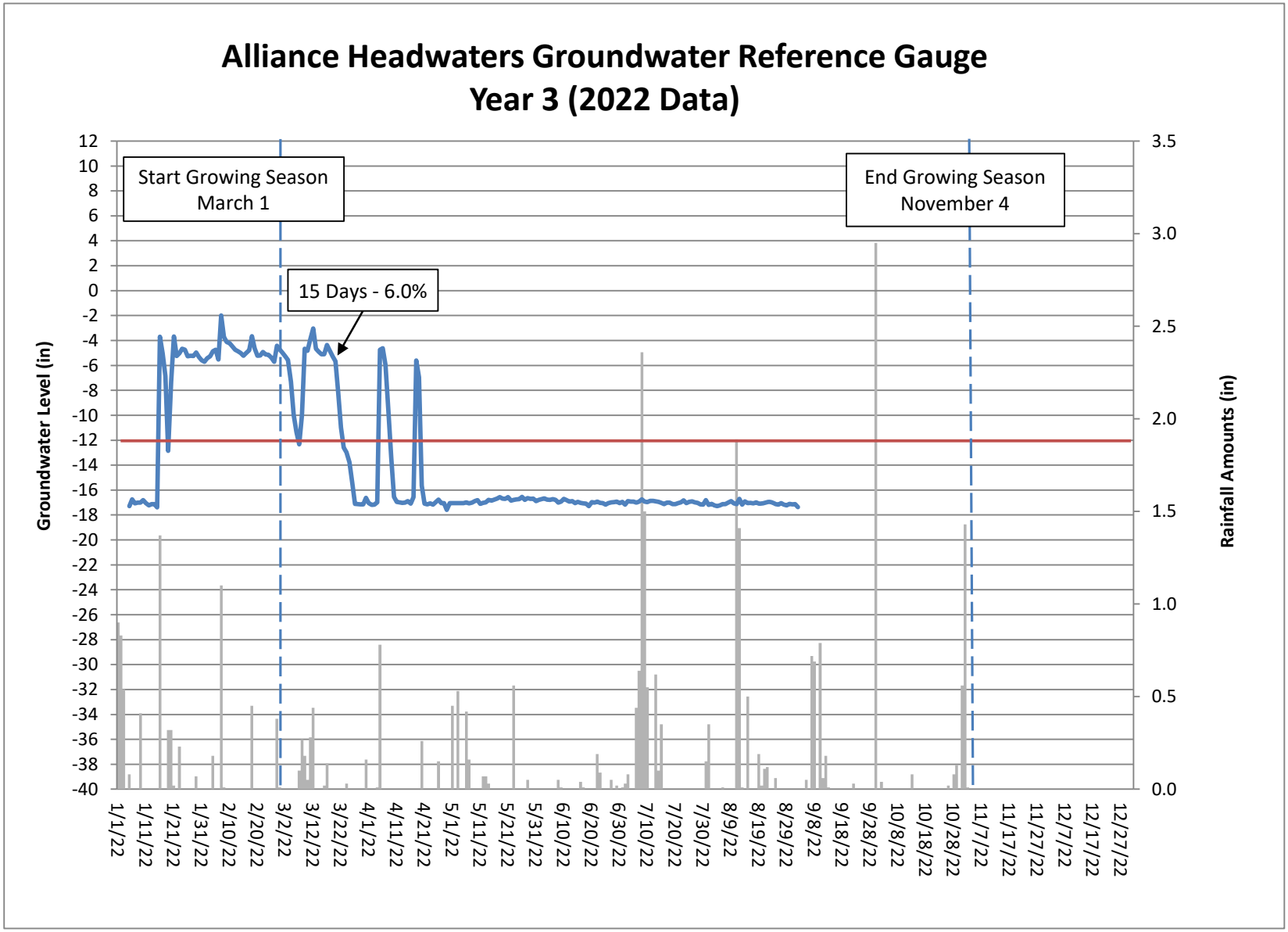
12/27/22


Alliance Headwaters Groundwater Reference Gauge
Year 3 (2022 Data)
Start Growing Season
March 1
End Growing Season
November 4
15 Days - 6.0%
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
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-32
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12/17/22
12/27/22

APPENDIX F. SITE PHOTO LOG

Alliance Headwaters
MY-03 (2022) Photo Log

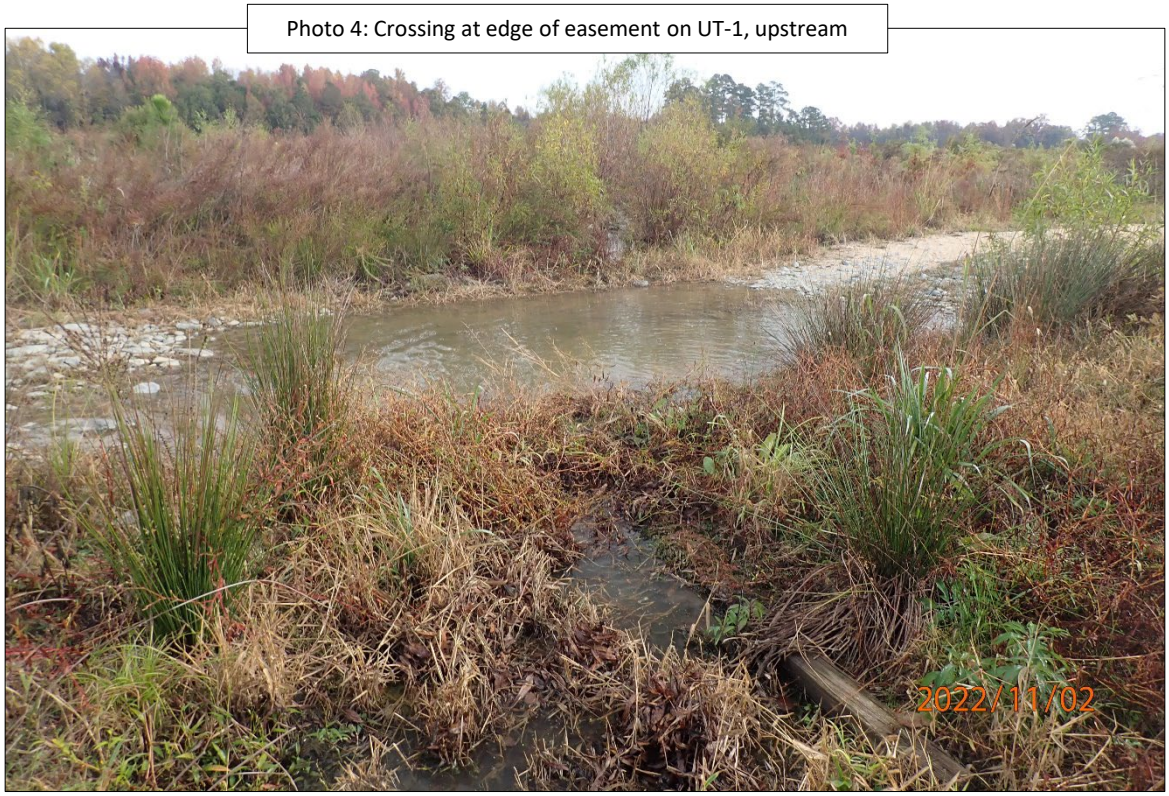
Photo 1: Vegetation along UT 3

Photo 2: Vegetation along UT 1

Alliance Headwaters
MY-03 (2022) Photo Log

Photo 3: Crossing at edge of easement on UT-1, downstream

Photo 4: Crossing at edge of easement on UT-1, upstream



Alliance Headwaters
MY-03 (2022) Photo Log

Photo 5: Culvert at edge of easement, UT-3

Photo 6: Edge of easement at downstream end of UT-3

Alliance Headwaters
MY-03 (2022) Photo Log

Photo 7: Bud Burst of Liriodendron tulipifera
Photo Taken 2/28/22

Photo 8: Bud Burst of Cephalanthus occidentalis
Photo Taken 2/28/22

Alliance Headwaters
MY-03 (2022) Photo Log

Photo 9: Wetland near UT1

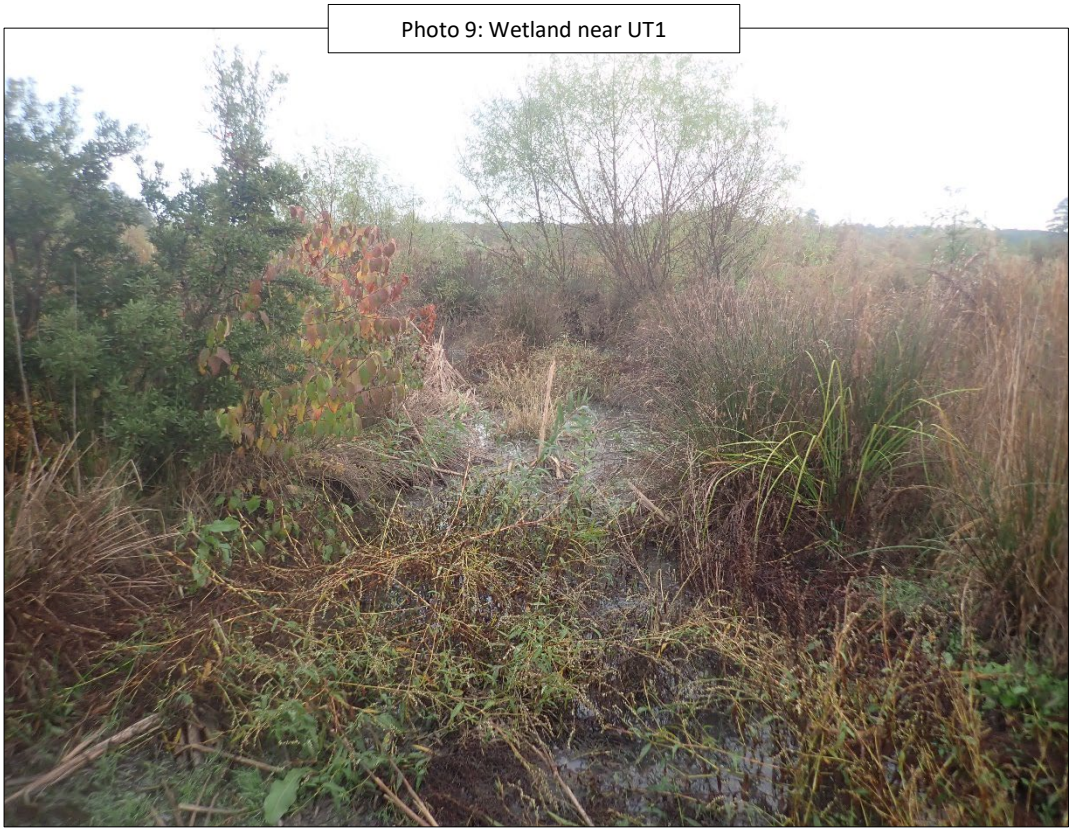


Photo 10: Crayfish Burrow in Wetland near UT2

Alliance Headwaters
MY-03 (2022) Photo Log

Photo 11: Surface Water Alteration added near GW 18 – Post 3 gal. planting

Photo 12: Surface Water Alteration added near GW 18 – Post 3 gal. planting

Alliance Headwaters
MY-03 (2022) Photo Log

Photo 13: Surface Water Alteration added near GW 18 – Post 3 gal. planting

Photo 14: Encroachment Area Replanting
UT1 Reach 1 and 2, southeast easement edge

Alliance Headwaters
MY-03 (2022) Photo Log

Photo 15: Encroachment Area Replanting
UT1 Reach 1 and 2, southeast easement edge

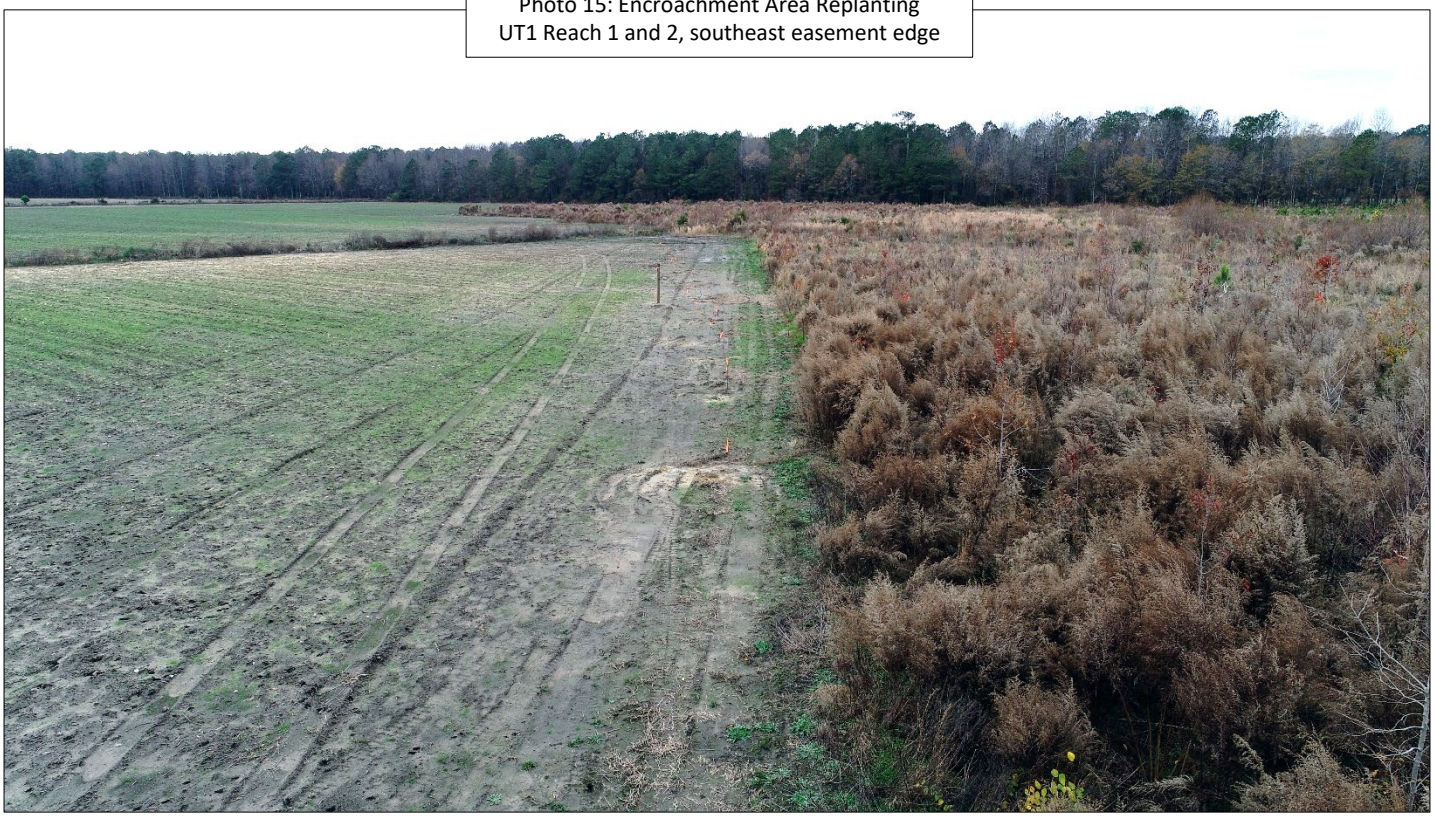
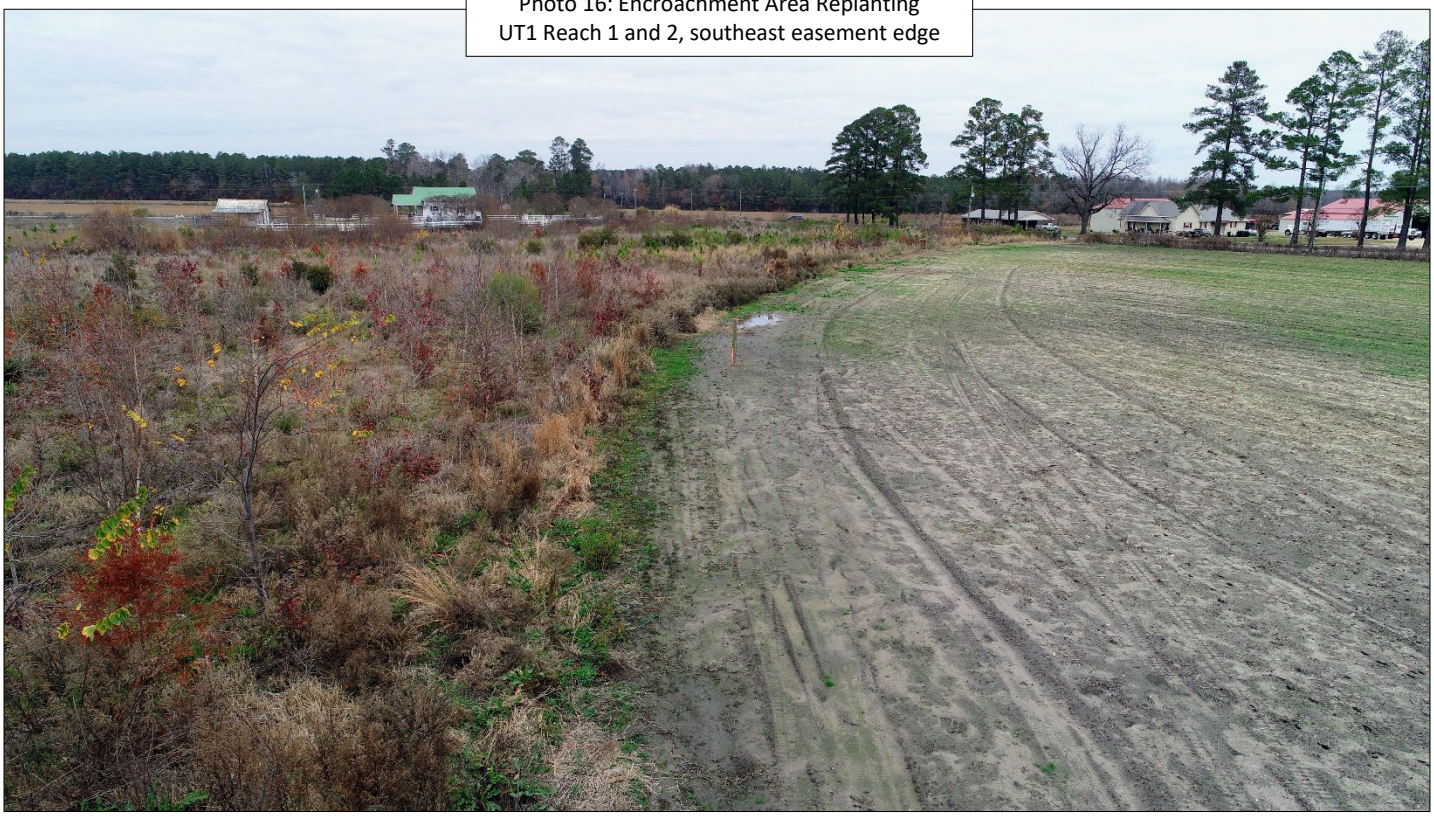


Photo 16: Encroachment Area Replanting
UT1 Reach 1 and 2, southeast easement edge



Alliance Headwaters
MY-03 (2022) Photo Log

Photo 17: Easement Marking
UT1 – Reach 2

Photo 18: Easement Marking
UT1 – Reach 3

Alliance Headwaters
MY-03 (2022) Photo Log

Photo 19: Easement Marking
UT1 – Reach 3

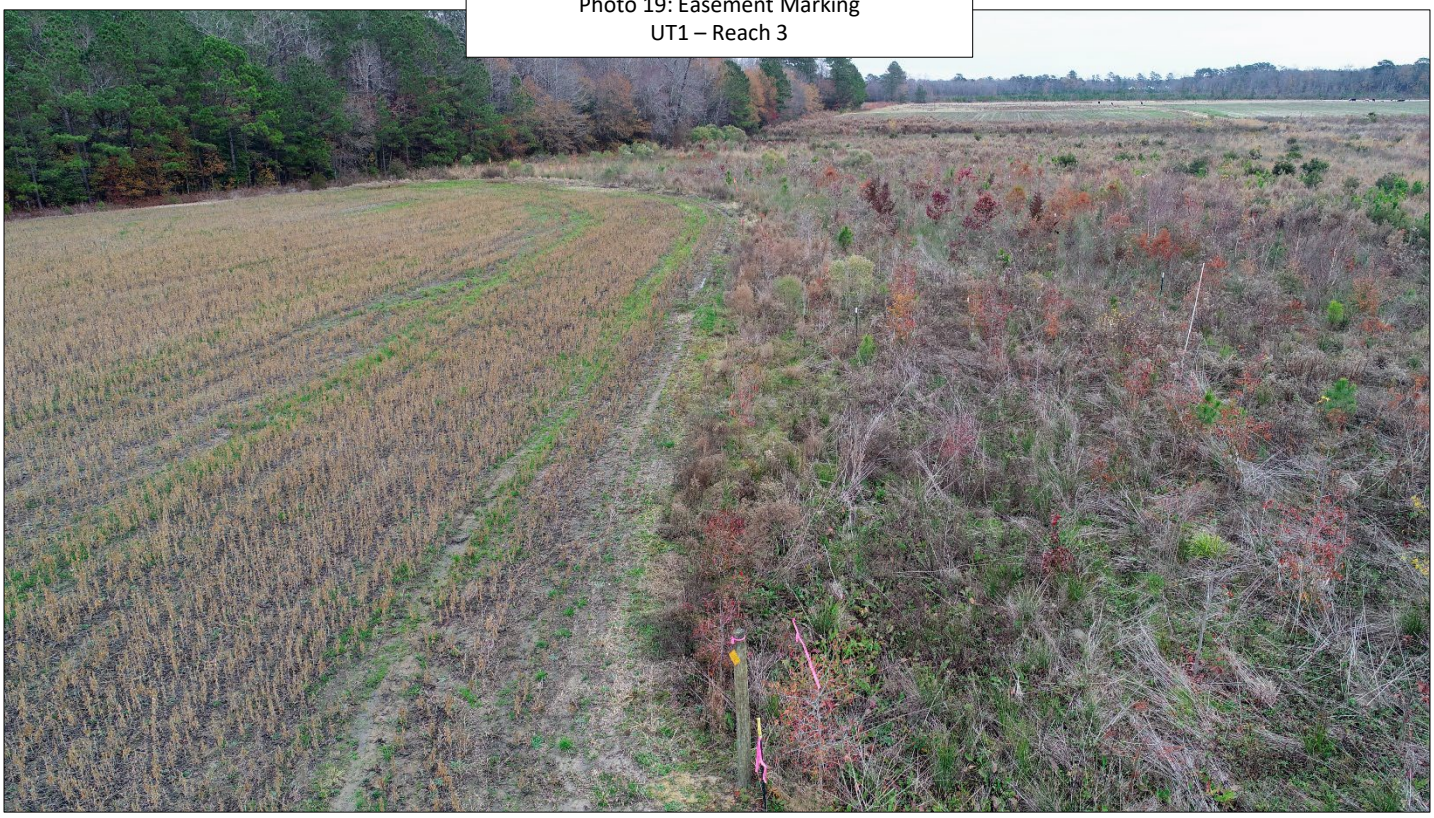
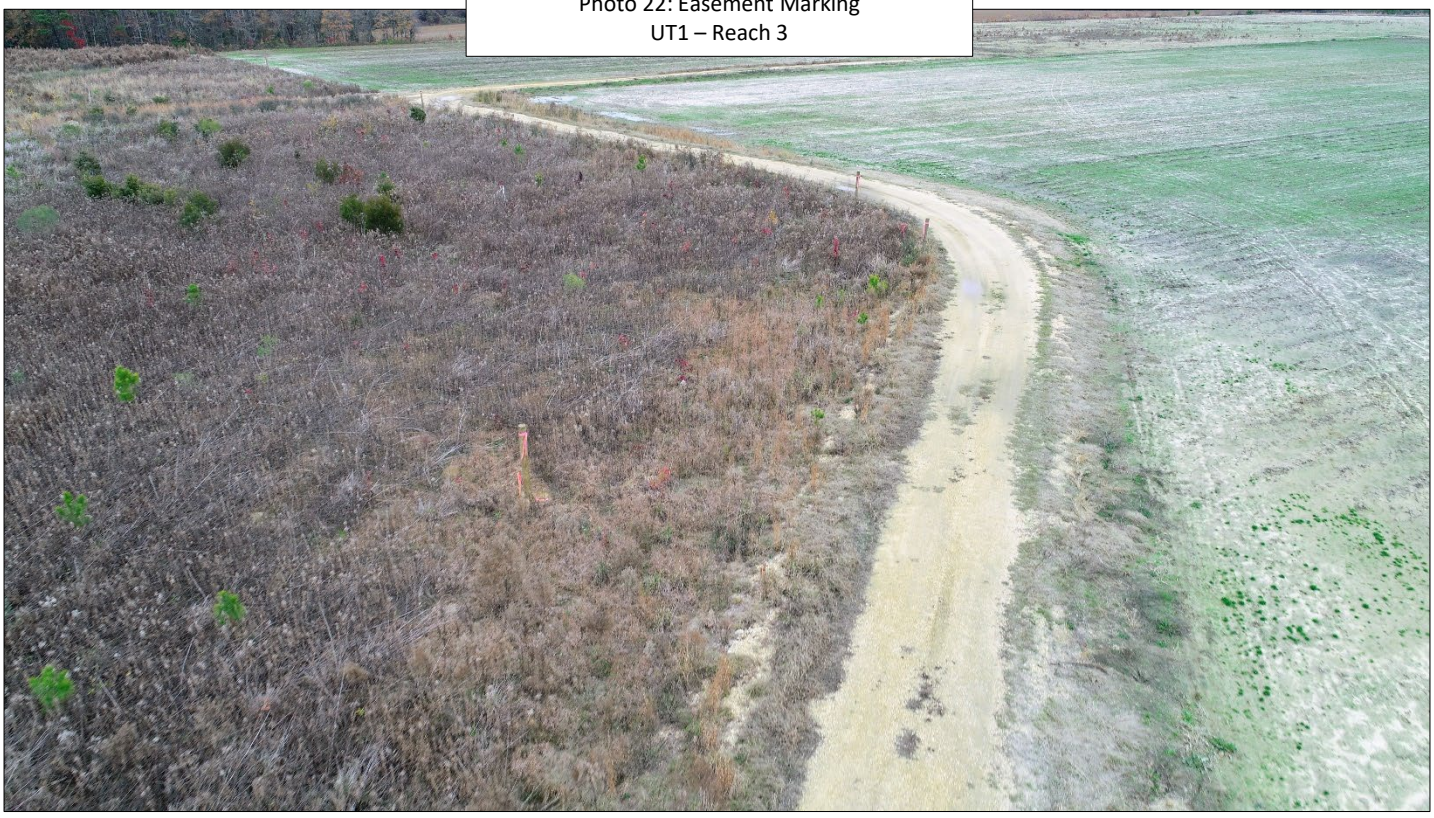


Photo 20: Easement Marking
UT1 – Reach 3

Alliance Headwaters
MY-03 (2022) Photo Log

Photo 21: Easement Marking
UT1 – Reach 3

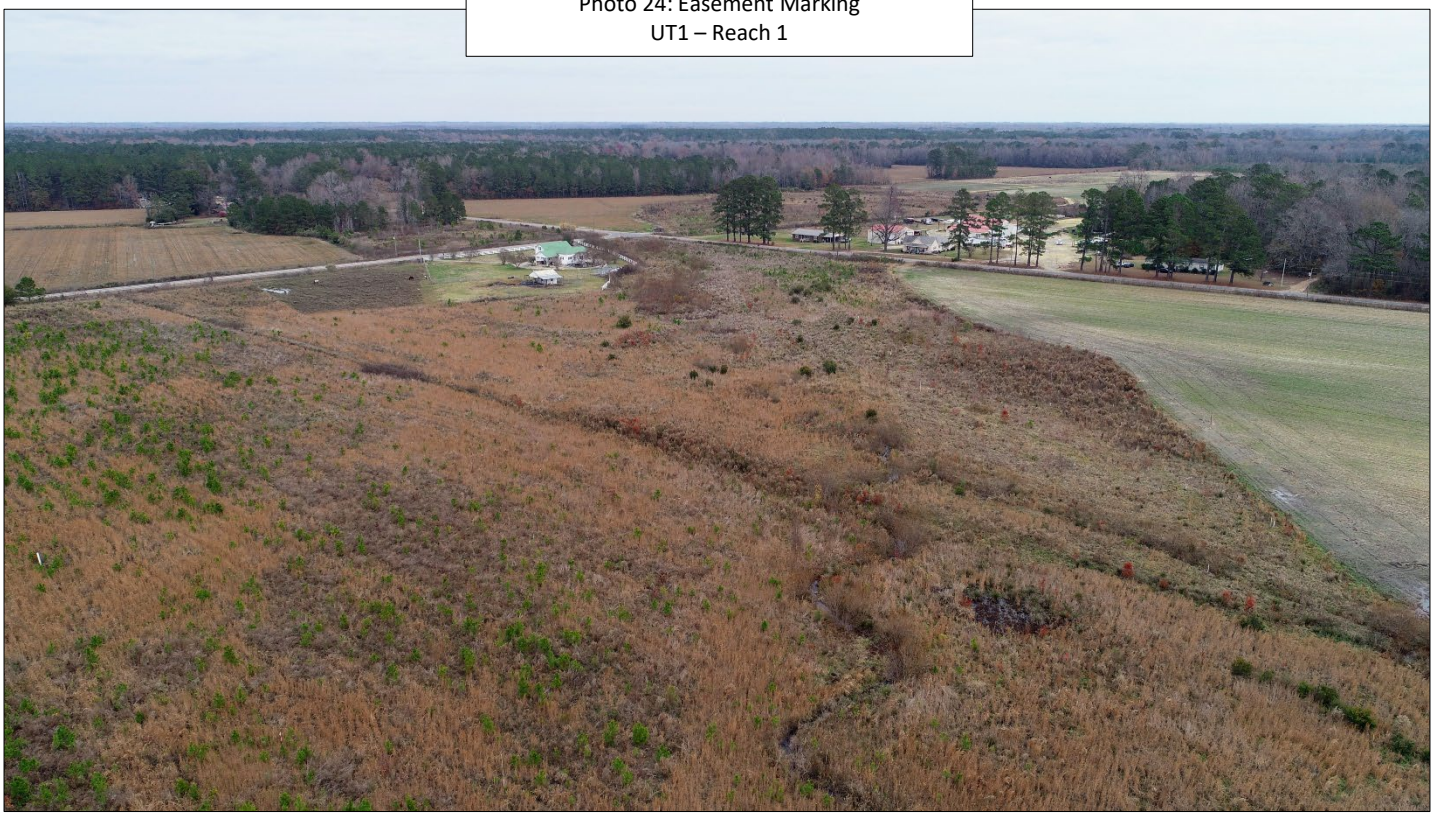
Photo 22: Easement Marking
UT1 – Reach 3



Alliance Headwaters
MY-03 (2022) Photo Log

Photo 23: UT1 – Reach 2

Photo 24: Easement Marking
UT1 – Reach 1



Alliance Headwaters
MY-03 (2022) Photo Log

Photo 25: UT1 – Reach 1 and UT1A Confluence

Photo 26: UT1 – Reach 3 and UT2

APPENDIX G. IRT CORRESPONDENCE

2022-10-20. MY2 (2021) and MY 3 (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