Fletcher-Meritor Site
(UT to Cane Creek) Stream and Wetland Restoration
Project No: 138

Monitoring Report Year 3 of 5

Henderson County, North Carolina

Prepared for:

North Carolina Department of Environmental Quality
Division of Mitigation Services
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1.0 EXECUTIVE SUMMARY

The Fletcher-Meritor Site Stream and Wetland Restoration Project, completed in May 2012, restored 3,575 linear feet of meandering C/E-type stream along an Unnamed Tributary (UT) to Cane Creek plus 648 linear feet of a first order tributary (Tributary) to the Main Stem as well as re-establish hydrology and hydrophytic vegetation to 6.7 acres of historical wetlands. This natural channel restoration consists of a Priority II restoration that includes a bankfull bench to allow for flood attenuation before reconnecting to the natural floodplain. The riparian buffer was planted with species representing an Alluvial Forest grading to a Bottomland Forest Community (Schafale and Weakley, 1990). This stream was preserved within the 20.3 acre conservation easement.

Efforts to restore or enhance wetlands on the project site included restoring topography, hydrology, and habitats of a natural wetland system by excavating overburden/berms and filling agricultural ditches to promote an increase in ground water elevation. Following excavation, removal of drain tiles and plugging of drainage ditches, the wetland areas were planted with native hardwoods.

The project goals and objectives are listed below.

Project Goals

- Improve local water quality by reestablishing stream stability and capacity to transport watershed flows and sediment load.
- Provide additional floodplain storage by increasing the capacity of the stream to mitigate flood flows.
- Restore aquatic and riparian habitat.
- Reducing non-point source sedimentation and nutrient inputs into the project reaches.

Project Objectives

- Restore/enhance approximately 4,223 linear feet to stable stream channel morphology, supported by instream habitat and grade/bank stabilization structures. Restoration and enhancement consists of restoring the channel pattern and profile and building a floodplain bench along the reaches.
- Reestablish hydrology and hydrophytic vegetation to 6.7 acres of historic wetlands by removing overburden/berms, plugging agricultural drainage ditches, and replanting with native grasses, shrubs and trees.
- Eliminate accelerated bank erosion by creating a bankfull bench, floodplain, and laying back slopes.
- Reestablish a native riparian buffer. Revegetation of the buffer was accomplished by planting tree and shrub species for alluvial and Bottomland Hardwood Communities.

The project has been divided into segments which include three stream reaches and four wetland areas:

- Upper Reach Main Stem– 1796 linear feet
- Lower Reach Main Stem– 1779 linear feet
- Tributary – 648 linear feet
- Wetland A – approximately 2.92 acres
- Wetland B – approximately 1.43 acres
- Wetland C – approximately 1.34 acres
- Wetland D – approximately 0.97 acres

The project site, which is protected by a 20.3-acre permanent conservation easement held by the State of North Carolina, is situated in Henderson County in the North Carolina Mountains Physiographic

Province. The project is located in the French Broad River Basin, USGS Hydrologic Unit Code (HUC) 06010105 and NCDWQ subbasin 04-03-02. Cane Creek is a North Carolina Class C stream that is listed on the 303(d) list as ecologically/biologically impaired upstream of US 25 (NCDWQ 2012). In addition, restored reaches drain lands with significant non-point source impacts to water quality from agriculture, industrial/commercial development, and historical clay strip mining. Land Use / Land Cover data indicates that more than 60 percent of the 1.1-square mile UT to Cane Creek watershed is currently pervious with the dominance of open fields/lawn/low-density residential lands, and about 40 percent is impervious commercial/institutional buildings/roads.

The vegetative success of the restoration site is based on criteria established in the USACE Stream Mitigation Guidelines (2003). Vegetation monitoring will be considered successful if a minimum of 260 planted stems/acre are surviving at the end of five years. The interim measure of vegetative success for the site will be the survival of a minimum of 320 planted stems/acre in year three. The Monitoring Year 3 (MY3) stem counts are located in Tables 7 and 9 in Appendix C. Currently, 14 of 17 vegetation plots are meeting the interim measures of success. Vegetation throughout the reach appears to be growing at acceptable rates and the mortality rate appears to be fairly low. The three plots that are not meeting interim success criteria include 2 along the tributary which may not have been planted at the appropriate density and the plot closest to the confluence with Cane Creek which has had backwater impacts numerous times over the monitoring years.

Numerous locations along the reaches have been noted as having sparse vegetation during previous monitoring events; however, these areas are much smaller than in previous years. These areas are illustrated on the Current Condition Plan View (CCPV) in Appendix B. In addition to these locations, a large area of cattails (*Typha latifolia*) is growing within the upper wetland area. The cattails are not posing problems to the reaches currently; however, this location provides a seed source and should be watched. Cattails have created issues when stands grow within streams by out-competing other riparian herbaceous species and creating potential areas for aggradation. One location of multiflora rose (*Rosa multiflora*) was noted near vegetation plot 9. No other invasive species were noted. This will be monitored in subsequent years due to the potential for invasives to develop.

During the March 2015 visit someone had removed the state combination lock to enter the site and a keyed lock was on the crossing. There were no issues with access during the May site review. There were some areas of encroachment during the visits; however, Division of Mitigation Services (DMS) has installed new signs on the site where farming activities were encroaching on the easement. In addition, during a visit to gather monitoring well data it was noted that a well had been destroyed due to vehicles driving over it along the western side of the tributary (within Wetland C area) at a farm access road that is not gated. The local group of model airplane enthusiasts continues to maintain the nearby grassed area and have been there often during our visits. A ditch which was cut in 2014 adjacent to the conservation easement near the proposed wetland on the Lower Reach appears to be draining the proposed wetland and may be an issue for maintaining hydrology at this location.

The reaches of the restoration project were observed to be in stable condition. The channel accesses its floodplain and evidence of bankfull events were observed during Year 3 monitoring. This evidence included the presence of wrack lines, sediment deposits, and the crest gauge. The substrate shows a gradual change to more coarse material in the upper and lower reaches although the tributary reach still has a hard clay substrate. This is expected as the tributary reach has little available to migrate into the system. Sediment transport analysis and shear stress fall within acceptable ranges and similar to those of the baseline condition.

Notable areas of concern occur on all project reaches. The greatest of these was the number of beaver dams on the Upper Reach and the structure failures along the Tributary Reach. The Upper Reach above the permanent crossing was ponded with only one riffle noted due to the beaver dams although during subsequent visits to the site several of the dams were breached. Also as noted in 2014, over half of the log structures along the Tributary Reach had been eroded or are completely undermined. These structures are still undermined or have erosion issues; however, water levels were higher during the monitoring event and it appeared water was going over every structure rather than under as noted in 2014. The substrate along the Tributary remains clay and there doesn't appear to be any larger size particles moving into the reach. The most likely cause of the structure issues was the heavy rains received between May and Dec 2013.

The Lower Reach also has an excavated ditch just outside the conservation easement which is currently draining the proposed wetland. The ditch appears to have been dug by the farmer to drain his fields. The wetland area is of concern as there is minimal hydrology reaching the site due to the ditch.

The last major area of concern is located at the permanent stream crossing near Sta. 24+00 on the Upper Reach. There is some past erosion at the access road culvert (and floodplain pipes); however, the beaver ponds upstream of the culverts continue to provide a source of debris that may obstruct the pipes and cause additional damage to this crossing. Evidence of past erosion along the upstream side of the crossing as well as scour on the downstream ends of the floodplain pipes still exist. In addition to the permanent crossing on the Upper Reach, the beaver activity on this reach appears to be impacting channel morphology, specifically in the loss of riffles and increased ponding of the majority of the reach.

Other areas of minor aggradation, erosion, or areas of sparse vegetation are noted in the tables, shown in the photos, and illustrated on the attached mapping. These areas do not appear to be negatively impacting the channel morphology at this time. Water clarity was slightly turbid to clear and water levels appeared to be slightly higher than the previous assessment. Some trash/debris was noted on the site including balls, cans, papers, etc. No construction equipment or materials were noted along the access roads during the assessment.

In the previous year (summer 2014) a temporary crossing was located on the Lower Reach for utility line installation. This has since been removed and stream repairs have been made to the areas that were eroding, the log structure was replaced, and plantings were installed in January 2015. Planting included 15 live stakes, 90 bare roots, and 30 pint containerized plants consisting of river birch (*Betula nigra*), red maple (*Acer rubrum*), willow oak (*Quercus phellos*), and sycamore (*Platanus occidentalis*). This area should be monitored for vegetation and structure stability.

Several factors have been determined to be worthy of future attention on the site. These include backwater effects from Cane Creek during large precipitation events, beaver monitoring due to presence, vegetation planted outside the planting window, and future plans by the Town that may impact the project area such as development of the park with multiple uses.

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting documentation formerly found in these reports can be found in the Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on DMS's website. All raw data supporting the tables and figures in the appendices is available from DMS upon request.

2.0 METHODOLOGY

Channel stability and vegetation survival were monitored on the project site. Post restoration monitoring will occur for a minimum of five years or until the success criteria are met. The monitoring assessment was completed using submeter accuracy GPS and Trimble VRS System on May 6, 7, and 8, 2015. This report details the results of Monitoring Year 3.

2.1 Morphometric Parameters and Channel Stability

2.1.1 Profile

The entire length of the reach was monitored by HDR using the VRS System. Multiple parameters were located including top of bank, thalweg, and water surface. In year 3, the upper reach was greatly impacted by beaver activity. New dams were observed at the very top of the reach and near the riffle cross section at 12+02. Breached dams and debris also contributed to water backing up in the reach. As a result, there is a significant absence of riffle features until downstream of the culverts at Sta. 23+50. The riffles observed however, matched well with values from previous years.

In the lower reach segment, similar measurements for riffles and pools were observed as compared to the previous year. Some aggradation was observed, as reported in the CCPV, but overall profile facets are remaining stable. Also of note is the removal of the aerial sewer crossing. Work on the sewer was complete prior to longitudinal profile monitoring.

The tributary profile shows similar measurements compared with Year 2 with the one exception being pool depth. Values for Year 3 show a noticeable increase in pool depth when compared to Year 2 and previous monitoring years.

Bankfull and water surface slopes remain consistent for the lower and tributary channel segments when compared to year 1, year 2, and baseline monitoring. The upper reach bankfull slope remains consistent with previous years but water surface slope shows some increase. This is most likely a product of the beaver activity causing water surface to change dramatically at dam locations and then stay flat through large sections of the reach.

2.1.2 Dimension

Nine cross sections were measured by HDR staff on May 6-8, 2014. The morphological data is presented in Tables 10 and 11 in Appendix D, along with the cross-sectional data. Riffles 1 and 3 in the upper reach remained consistent with the dimensions from the previous year. The same is true for cross section 2 (pool) in the upper reach with a slight decrease in cross sectional area from Year 2.

Permanent riffle and pool sections for the lower reach are performing well and have changed little from previous years in respect to dimensions. One item of note on riffle section 6 is a hole that has formed at the outer right side extent of the floodplain bench before sloping up to terrace height. For the tributary reach, the permanent riffles (XSC's 7&8) continue to show increasing depths from the previous year. Also, the bankfull widths have noticeably increased. The permanent pool section (XSC9) continues a trend of increasing depths.

2.1.3 Pattern

The pattern of the channel was obtained using VRS measurements. The location is illustrated on the current condition plan view map in Appendix B. No lateral movement in stream pattern was observed in Year 3 monitoring.

2.1.4 Substrate

Pebble counts were taken for Year 3 monitoring at permanent riffle cross sections on the upper and lower reaches. The Wolman Pebble count methodology was used to calculate the D50 and D84 to assess changes in particle size distributions. Pebble counts were not initially planned for this restoration and were not performed in baseline monitoring. However, due to significant presence of substrate seen during year 1 monitoring, counts were performed to compare with future years. Counts were not performed on the tributary reach due to the hard clay material making up the streambed.

The pebble counts from XSC1 remain similar to the previous year. Counts on XSC2 indicate in increase in D50 from Year 2, putting the section back into the fine gravel range.

The lower reach cross sections, XSC4 and XSC6, continue the trend of hardening. XSC4 shows a notable increase in D50 from Year2, moving from a medium to coarse gravel.

The pebble counts were taken at the same time as longitudinal and cross section data collection. On subsequent visits since data collection in May, increased beaver activity has been seen in areas that affect all four cross sections. If these areas stay dammed up, the pebble counts may be hard to get or show skewed values in future year monitoring.

2.1.5 Sediment Transport

Shear stress values were calculated using riffle cross section measurements obtained in year 3 monitoring. In Year 3 the shear stress values for the upper reach again showed the ability to easily move the D50 particle obtained from year 3 pebble counts (movable particle size predicted using Revised Shields Diagram, Rosgen, 2002). The predicted movable particle size for Upper Reach riffle sections were 17mm and 18mm, matched up with D50 values of 2.3mm and 3.2 mm, respectively. These results would indicate some degradation; however, little degradation was noticed in visual assessment. An increase in overall water surface slope factored in with the increase in predicted movable particle size. However, as noted in section 2.1.1 above, water surface slope on the upper reach is skewed due to beaver activity.

Lower Reach values for predicted movable particle size versus D50 from pebble counts are similar indicating stable conditions. For XSC4, the predicted movable particle size is 13mm compared to the observed D50 of 20mm. Riffle XSC6 has a predicted movable particle size of 12mm compared to an observed D50 of 19mm.

The tributary reach has much higher shear stress values mainly as a product of a high water surface slope. Predicted movable particle sizes, calculated at the two permanent riffles, indicate movable particle sizes of 38 to 42mm. The bed material, however, is made up of hard, sticky clay that does not seem to move during high flows. Also, over the monitoring period so far, there has been little evidence that sediment is being brought into the system from upstream. This makes sense given the land use in the tributary catchment. This lack of sediment supply along with flashy storm events has impacted in-stream

structures by lifting and transporting stream structure backfill material (No. 57 stone in particular). This backfill material bas been deposited on interior meander bends and other places along the reach.

2.1.6 Photo Documentation

Photos were taken at the 52 stream photo stations and 17 vegetation plots on March 24th and May 12-14, 2015. The locations of the photos stations and vegetation plots are noted on Figure 3 in Appendix B. The photos for monitoring year 3 are also provided in Appendix B.

2.2 Vegetation

The Carolina Vegetation Survey (CVS) Protocol Level 2 methodology was used to sample vegetation on May 7 and 8, 2015. Monitoring was conducted on seventeen vegetation plots (3 on the tributary, 7 on the main stem upper reach and 7 on the main stream lower reach). The 100-square meter CVS plots are permanently marked with galvanized metal pipe. The plots occur within the floodplain/riparian area with a few running upslope slightly.

According to the data collected, the average plant density among the 17 plots is 412 stems/acre with the range from 162 to 809 stems/acre. The highest plant density occurred in plot 4 with over 800 stems/acre. Currently, 14 of the plots are meeting the interim 3-year vegetation success criteria of 320 stems/acre. Year 3 monitoring data is provided in Appendix C. Vegetation throughout the reach appears to be growing at acceptable rates and the mortality rate appears to be fairly low. Herbaceous vegetation which has been noted as sparse during previous monitoring events appears to be filling in with the exception of a few locations noted on the CCPV. The three plots that are not meeting interim success criteria include 2 along the tributary which may not have been planted at the appropriate density and the plot closest to the confluence with Cane Creek which has had backwater impacts numerous times over the past couple of years.

2.3 Hydrology

Thirty-five groundwater wells were installed in June 2013 in the proposed wetland areas to document hydrology for the remaining years of monitoring. Several of the wells have not been fully operational since their installation. Two crest gauges were installed and indicated several bankfull events as well as evidence of bankfull events along the site in wrack lines.

Data from the groundwater monitoring stations showed 33 stations were in operation for a portion of the 2015 growing season. Well 29 was destroyed by a vehicle early in the growing season and Well 17 had been destroyed by a vehicle in a previous year. The data revealed that 28 of the 33 stations met the soil saturation criterion of groundwater being within 12 inches of the soil surface for at least 5 percent of the growing season (10 consecutive days). Several wells (3, 4, and 5) located in the proposed lower reach wetland area are not meeting the hydrology criteria; however, the adjacent landowner has excavated a nearby ditch which is potentially drawing down the water table. This could impact this proposed wetland as the newly excavated ditch is extremely close to the wetland and is at least a couple of feet deep. The other wells that were not meeting criteria were 22 and 28.

4.0 REFERENCES CITED

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Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation. Version 4.0. (http://cvs.bio.unc.edu/methods.htm.)

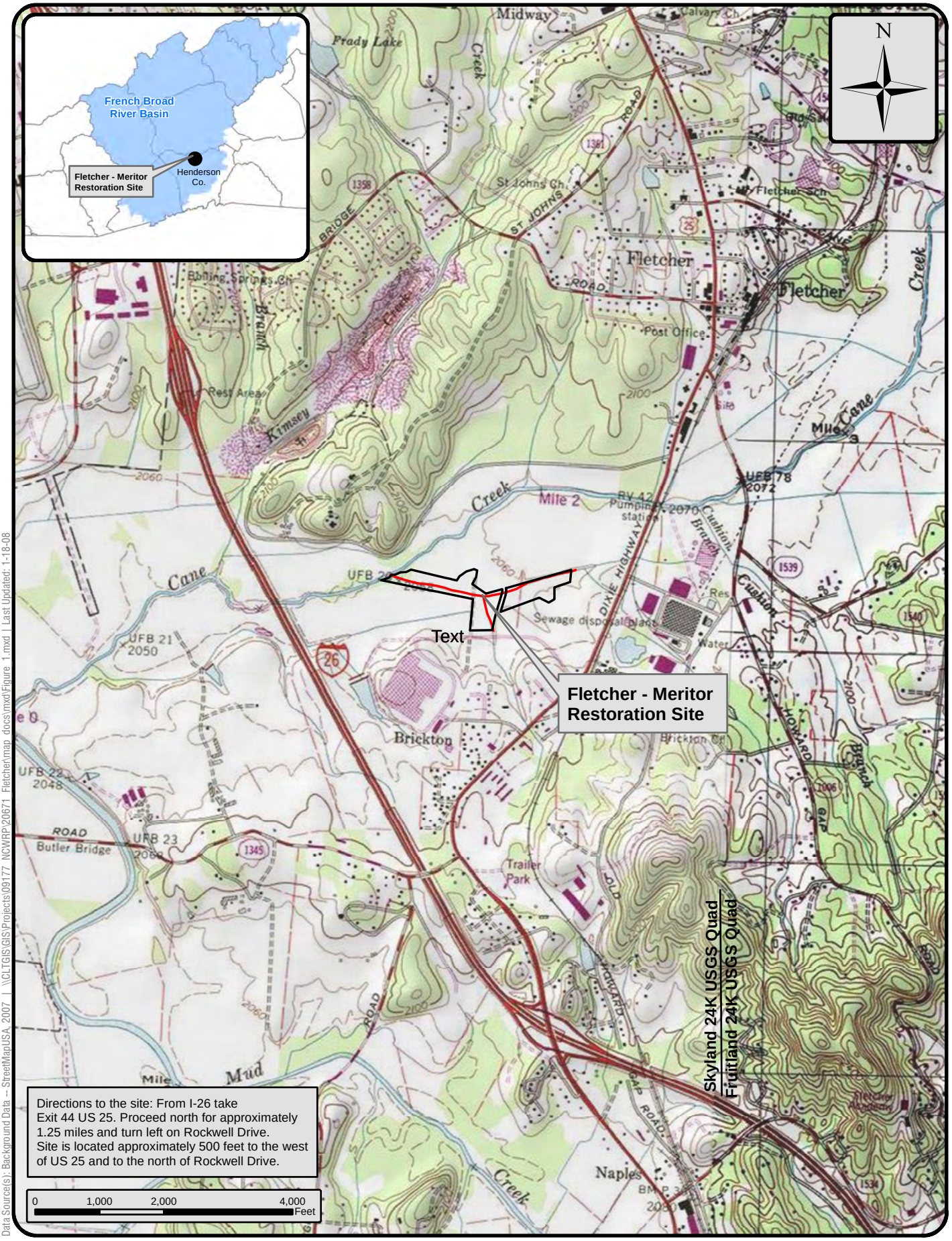
North Carolina Ecosystem Enhancement Program. 2011. Baseline Monitoring Document: Format, Data Requirements, and Content Guidance.

North Carolina Ecosystem Enhancement Program. 2013. Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration Monitoring Report Year 1 of 5.

U.S. Army Corps of Engineers, Wilmington District. 2003. Stream Mitigation Guidelines. North Carolina Division of Water Quality (DWQ), U.S. Environmental Protection Agency, Region IV (EPA), Natural Resources Conservation Service (NRCS) and the North Carolina Wildlife Resources Commission (WRC).

Appendix A

General Tables and Figures



Vicinity Map

Figure 1

Fletcher-Meritor Site (UT to Cane Creek) Year 3 Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138

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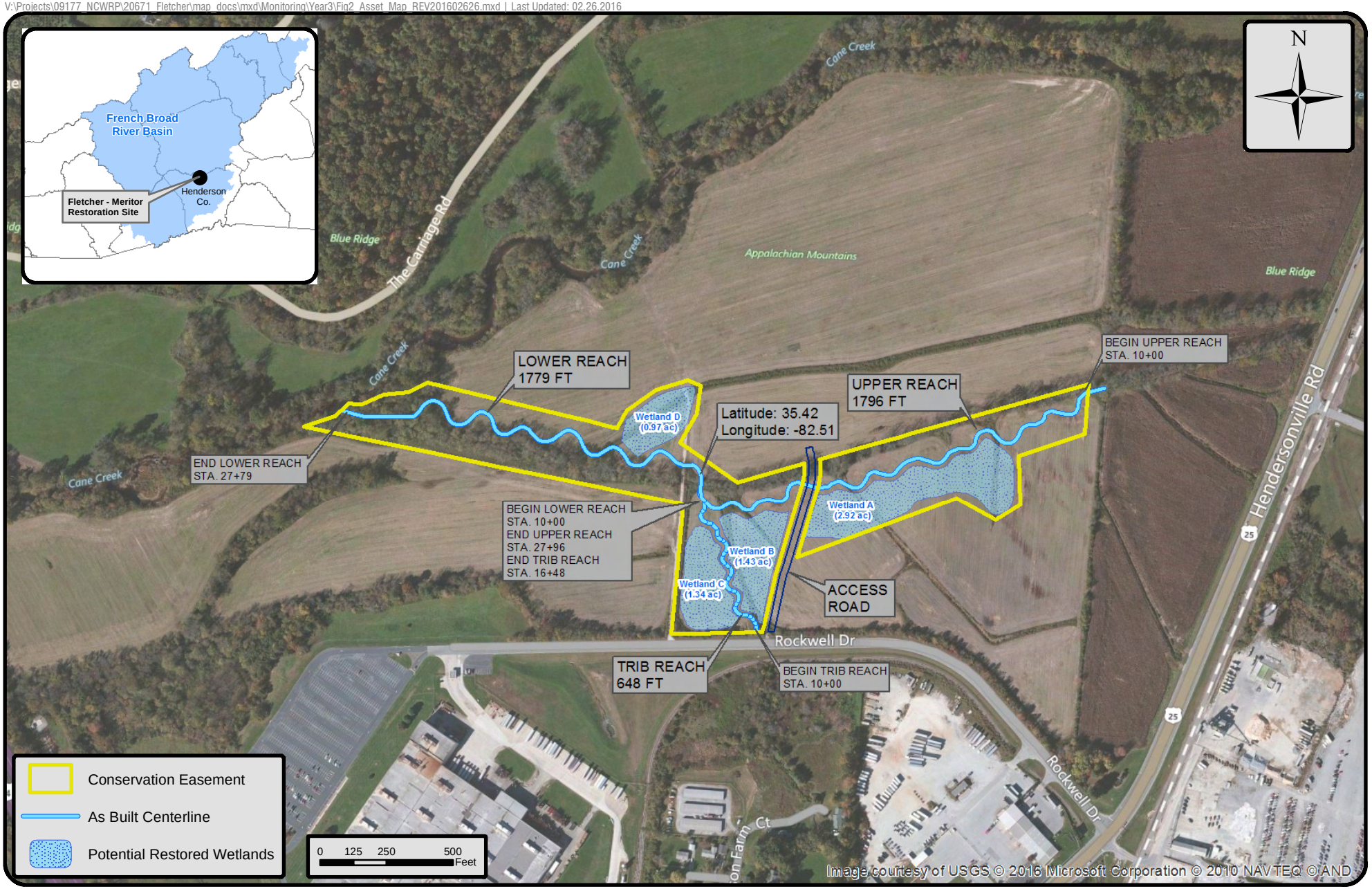


Asset Map

Figure 2

Fletcher-Meritor Site (UT to Cane Creek) Year 3 Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138

Table 1a. Project Components
Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138

Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Mitigation Ratio	Mitigation Units	BMP Elements	Comment
Main Steam Upper Reach	1520 lf	R	P2	1796 lf	10+00-28+38	1:1	1796		Fully restores pattern, dimension and profile by excavating a new channel with an adjoining floodplain bench that grades to the existing ground elevation in order to partial restore flood prone conditions. A 42 foot road crossing was installed on this reach.
Main Steam Lower Reach	1320 lf	R	P2	1779 lf	10+00-27+79	1:1	1769		Fully restores pattern, dimension and profile by excavating a new channel with an adjoining floodplain bench that grades to the existing ground elevation in order to partial restore flood prone conditions. A 20 foot utility easement crosses this restoration reach. SMUs were at 1/2 credit in the area of this crossing.
Tributary	550 lf	R	P2	648 lf	10+00-16+48	1:1	648		Fully restores pattern, dimension and profile by excavating a new channel with an adjoining floodplain bench that grades to the existing ground elevation in order to partial restore flood prone conditions.
Wetland A	0 acres (TBD)	R		2.92 acres		1:1	2.92		Restores topography, hydrology, and habitats of a natural wetland system by excavating new floodplains and filling agricultural ditches to promote an increase in ground water elevation.
Wetland B	0 acres (TBD)	R		1.43 acres		1:1	1.43		Restores topography, hydrology, and habitats of a natural wetland system by excavating new floodplains and filling agricultural ditches to promote an increase in ground water elevation.
Wetland C	0 acres (TBD)	R		1.34 acres		1:1	1.34		Restores topography, hydrology, and habitats of a natural wetland system by excavating new floodplains and filling agricultural ditches to promote an increase in ground water elevation.
Wetland D	0 acres (TBD)	R		0.97 acres		1:1	0.97		Restores topography, hydrology, and habitats of a natural wetland system by excavating new floodplains and filling agricultural ditches to promote an increase in ground water elevation.

Table 1b. Component Summations

Fletcher-Meritor Site(UT to Cane Creek) Stream and Wetland Restoration/Project No. 138

Restoration Level	Stream (lf)	Stream Mitigation Units (lf)	Riparian Wetland (Ac)		Planted Area (Ac)	Potential Buffer Area (sf)	Upland (Ac)	Total Conservation Area (Ac)	BMP
			Riverine	Non-Riverine					
Main Steam Upper Reach	1796	1796	0.0	0.0					
Main Steam Lower Reach	1779	1769	0.0	0.0					
Tributary	648	648	0.0	0.0					
Wetland A	0	0	2.92						
Wetland B	0	0	1.43						
Wetland C	0	0	1.34						
Wetland D	0	0	0.97						
Totals (Feet/Acres)	4,223	4,213	6.7		18.59			20.3	

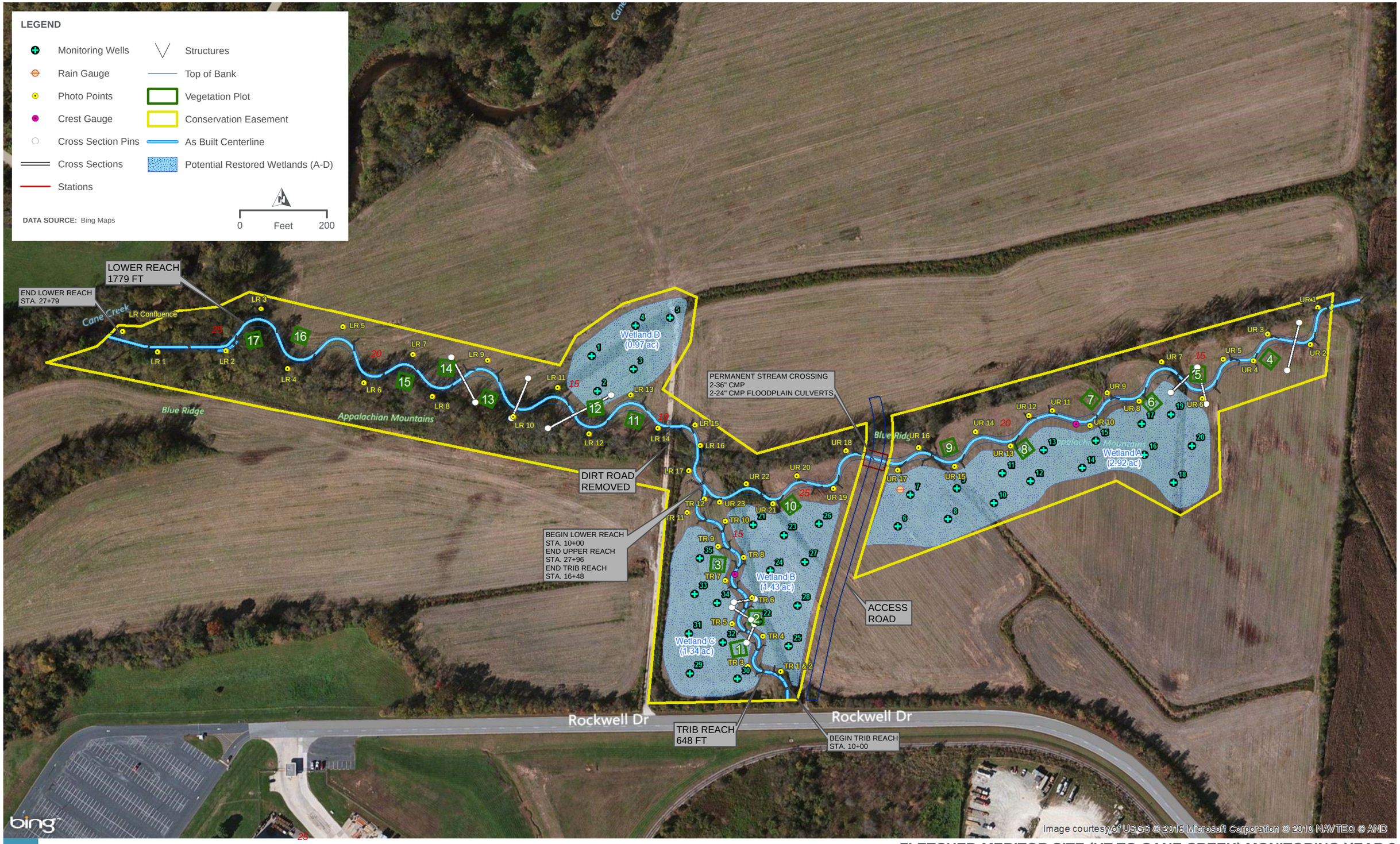
Table 2. Project Activity and Reporting History Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138		
Elapsed Time Since Grading Complete: 3 yrs 0 months		
Elapsed Time Since Planting Complete: 3 yrs 0 Months		
Number of Reporting Years: 3		
	Data Collection	Completion or
Activity or Deliverable	Complete	Delivery
Restoration Plan	December 2007	February 15, 2008
Final Design – Construction Plans	December 2007	May 2011
Construction/Grading	NA	May 2012
Temporary Seeding	NA	Dec. 2011-April 2012
Permanent Seeding	NA	April 2012
Planting (containerized, bare root)	NA	April 2012
Final Inspection	NA	June 2012
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	September 2012	May 2013
Year 1 Monitoring	May 2013	March 2014
Year 2 Monitoring	May 2014	August 2014
Utility Construction / Planting	Summer 2014	January 2015
Year 3 Monitoring	May 2015	January 2016
Year 4 Monitoring		
Year 5 Monitoring		

Table 3. Project Contacts Table Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138	
Designer	HDR Engineering Inc. of the Carolinas 3733 National Drive, Suite 207, Raleigh, NC 27612
Primary project design POC	Jonathan Henderson, PE (919) 785-1118
Construction Contractor	Buchanan and Sons, Inc. P.O. Box 123, Whittier, NC 28789
Construction contractor POC	Chris Buchanan, (828) 497-9720
Survey Contractor	Terminus Land Surveying, PLLC 28 Bessie Drive, Fletcher, NC 28724
Survey contractor POC	Christopher J. Gagne, (828) 551-8928
Planting Contractor	HARP, Inc. 301 McCullough Drive, 4th Floor, Charlotte, NC 28262
Planting contractor POC	Alan Peoples, (704) 841-2841
Seeding Contractor	Buchanan and Sons, Inc. P.O. Box 123, Whittier, NC 28789
Contractor point of contact	Chris Buchanan, (828) 497-9720
Seed Mix Sources	Protech Environmental, Charlotte, NC Phone: (704) 676-9788
Nursery Stock Suppliers	Cure Nursery, Pittsboro, NC - (919) 542-6186 Foggy Mountain Nursery LLC, Creston, NC - (336) 384-5323 Supertree Nursery, Blenheim, SC - (800) 222-1290 Habitat and Restoration Plants, Lexington, NC - (336) 362-6776 NC Division of Forest Resources, Greensboro, NC - (919) 731-7988 Little River Nursery, McMinnville, TN - (931) 668-8000 Virginia Department of Forestry, Crimora, VA - (540) 363-5732
Monitoring Performers - Baseline	HDR Engineering Inc. of the Carolinas 3733 National Drive, Suite 207, Raleigh, NC 27612 Vickie Miller, AICP, PWS (919) 232-6637
Stream Monitoring POC	Wyatt Yelverton, PE (919) 232-6623
Vegetation Monitoring POC	Vickie Miller, AICP, PWS (919) 232-6637
Wetland Monitoring POC	NA

Table 4. Project Attribute Table Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138							
Project County	Henderson						
Physiographic Region	Mountains						
Ecoregion	Blue Ridge (Broad Basins)						
Project River Basin	French Broad River Basin						
USGS HUC for Project (8 digit)	6010105						
NCDWQ Sub-basin for Project	04-03-02						
Within extent of EEP Watershed Plan?	No						
WRC Hab Class (Warm, Cool, Cold)	Warm						
% of project easement fenced or demarcated	100% marked with EEP easement signage						
Beaver activity observed during design phase?	No						
Restoration Component Attribute Table							
	Main Steam Upper Reach	Main Steam Lower Reach	Tributary	Wetland A	Wetland B	Wetland C	Wetland D
Drainage area (ac)	480	704	205	NA	NA	NA	NA
Stream order	2nd		1st	NA	NA	NA	NA
Restored length (feet or acreage)	1796	1779	648	2.92	1.43	1.34	0.97
Perennial or Intermittent				NA	NA	NA	NA
Watershed type (Rural, Urban, Developing etc.)	Devel.						
Watershed LULC Distribution (e.g.)							
Watershed impervious cover (%) (Commercial/Institutional Buildings/Roads)	38						
Forested	20						
Low Density Residential / Open Fields/ Lawns	28						
Medium-Density Residential	14						
NCDWQ AU/Index number	-						
NCDWQ classification	C			NA	NA	NA	NA
303d listed?	No			NA	NA	NA	NA
Upstream of a 303d listed segment?	Yes			NA	NA	NA	NA
Reasons for 303d listing or stressor	Biological Integrity (Benthos)			NA	NA	NA	NA
Total acreage of easement	20.3						
Total vegetated acreage within the easement	18.59						
Total planted acreage as part of the restoration	18.59						
Rosgen classification of pre-existing	Impaired Ditch	Impaired Ditch	Impaired Ditch	NA	NA	NA	NA
Rosgen classification of As-built	C/E4	C/E4	C/E4	NA	NA	NA	NA
Valley type	VIII	VIII	VIII	NA	NA	NA	NA
Valley slope	0.31%		0.15%	NA	NA	NA	NA
Valley side slope range (e.g. 2-3.%)	-	-		NA	NA	NA	NA
Valley toe slope range (e.g. 2-3.%)	-	-		NA	NA	NA	NA
Cowardin classification	NA			Palustrine	Palustrine	Palustrine	Palustrine
Trout waters designation	No			NA	NA	NA	NA
Species of concern, endangered etc.? (Y/N)	No						
Dominant soil series and characteristics							
Series	Comus	Codorus	Kinkora	Codorus / Kinkora	Kinkora	Kinkora	Comus / Kinkora
Depth	U	U	U	U	U	U	U
Clay%	U	U	U	U	U	U	U
K	U	U	U	U	U	U	U
T	U	U	U	U	U	U	U

Appendix B

Visual Assessment



FLETCHER-MERITOR SITE (UT TO CANE CREEK) MONITORING YEAR 3

CURRENT CONDITIONS PLAN VIEW

FIGURE 3A

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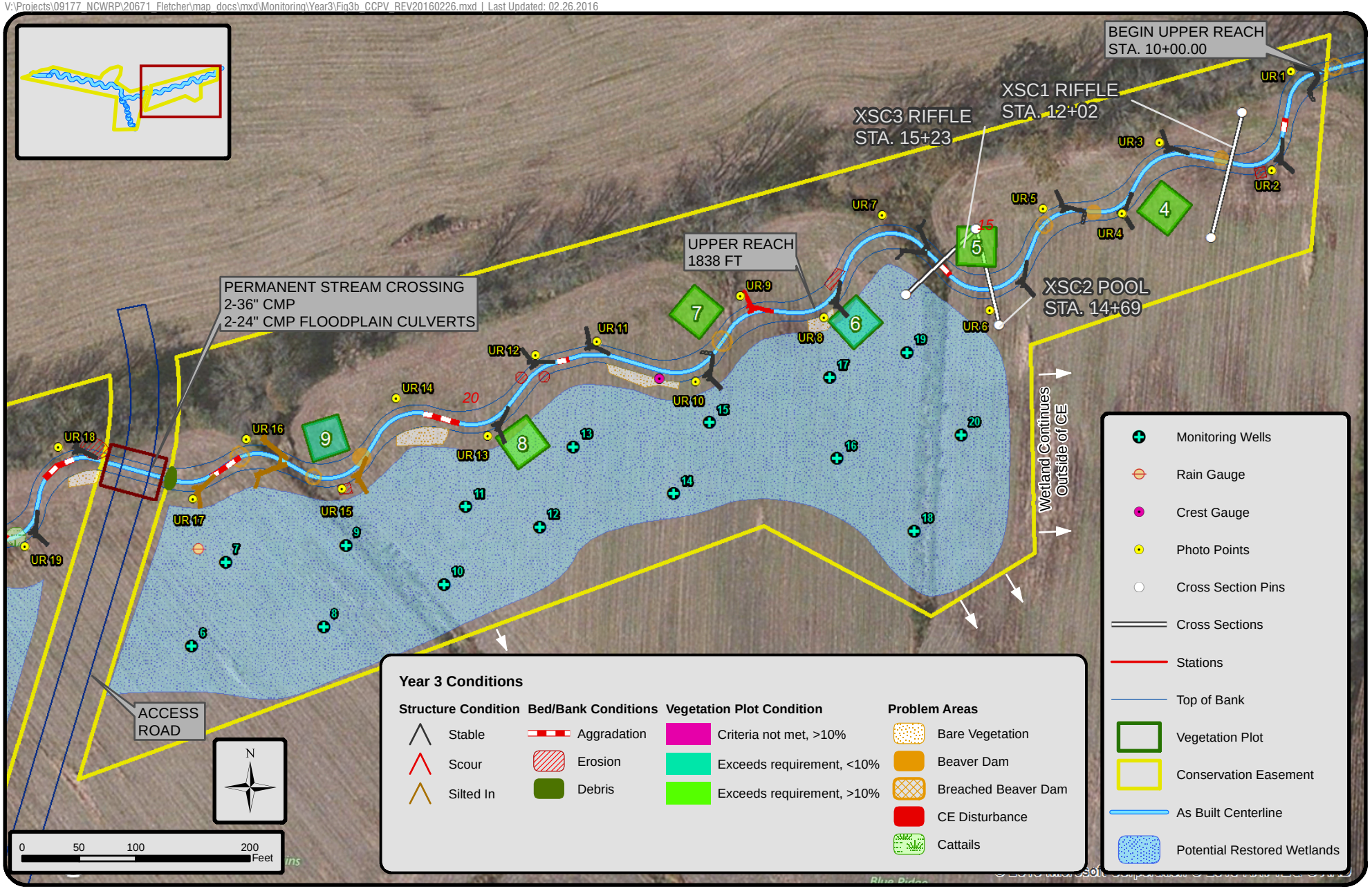
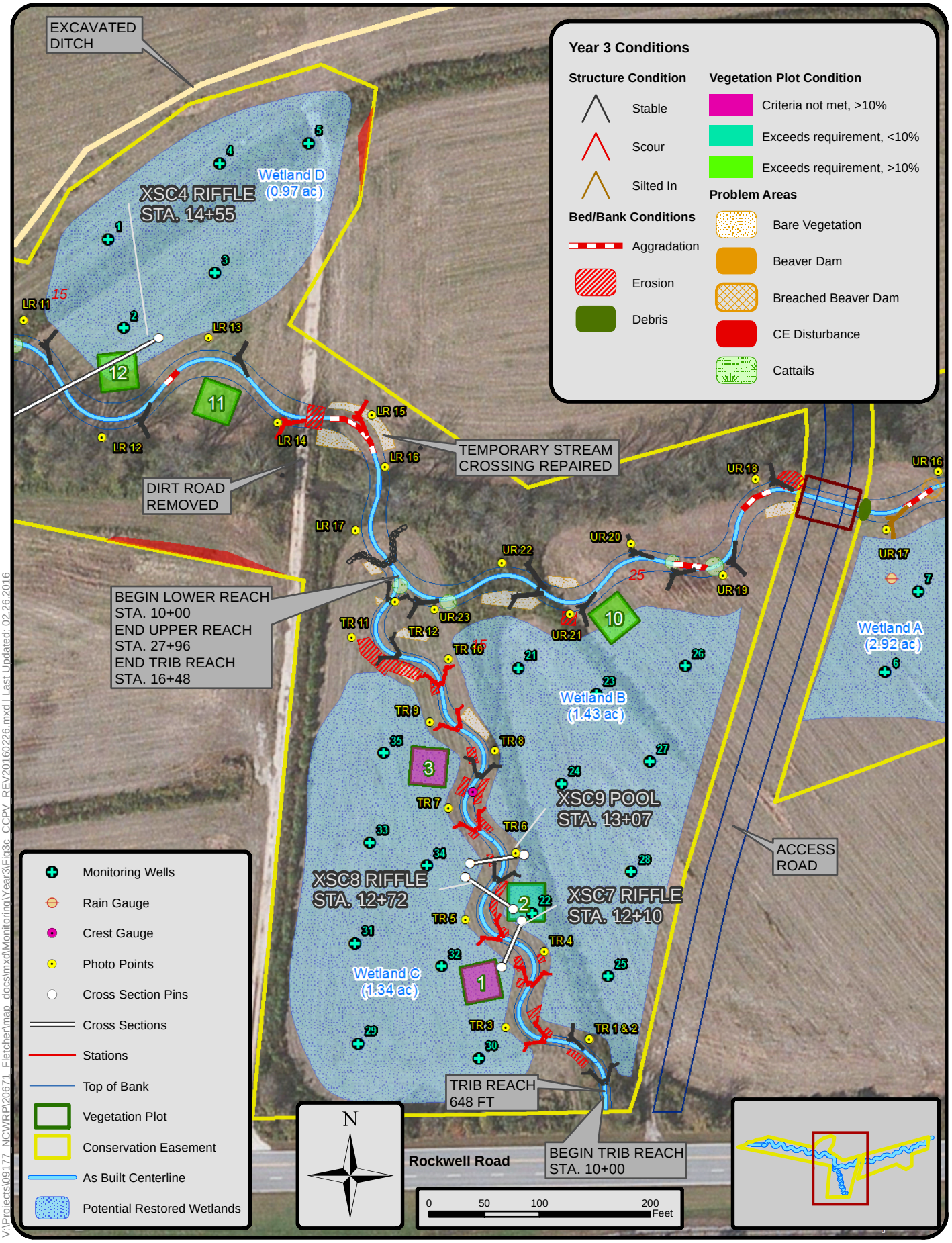


Current Conditions Plan View

Figure 3b

Fletcher-Meritor Site (UT to Cane Creek) Year 3 Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138



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Current Conditions Plan View

Figure 3c

Fletcher-Meritor Site (UT to Cane Creek) Year 3 Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138

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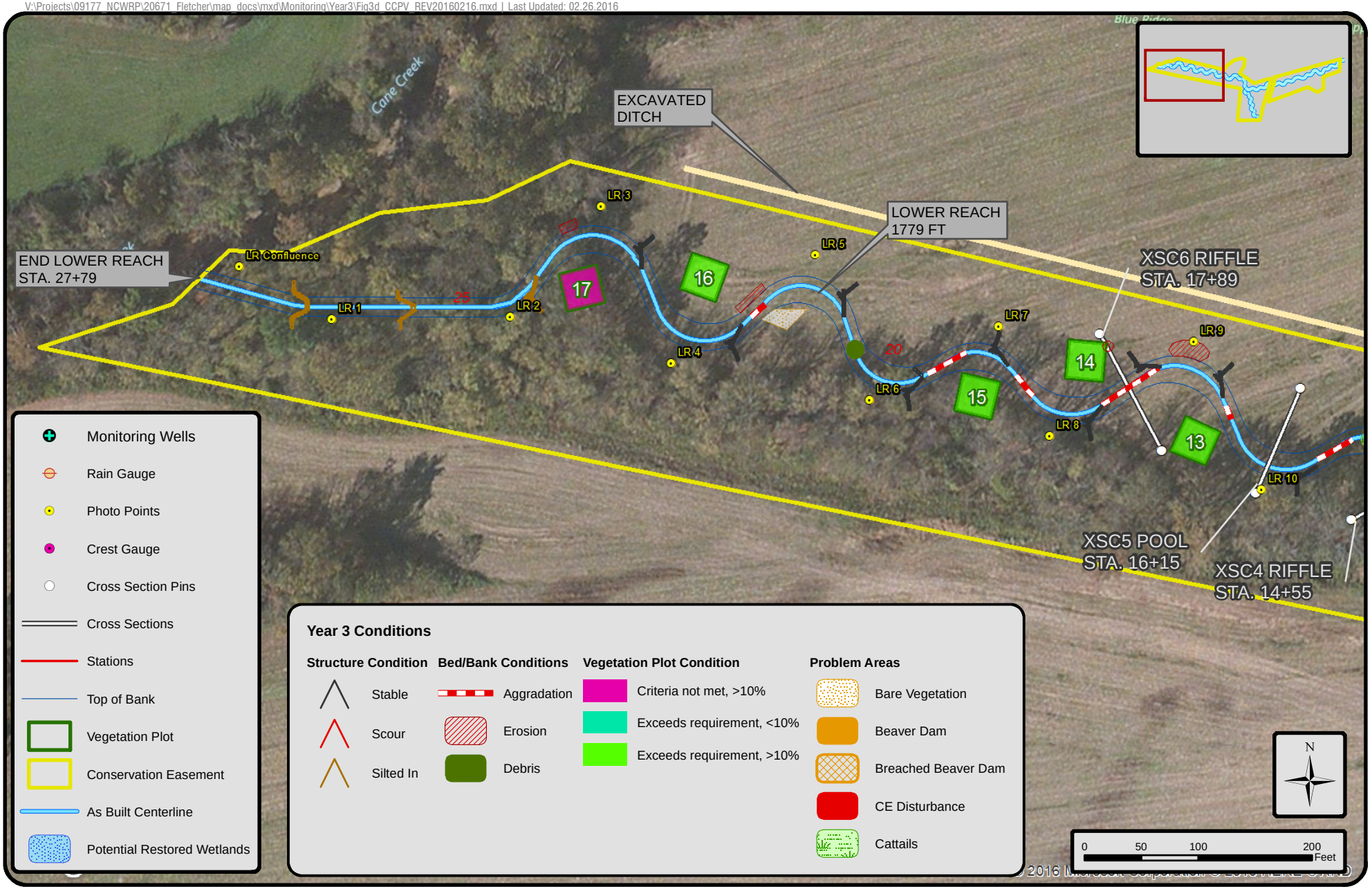

Current Conditions Plan View

Figure 3d

Fletcher-Meritor Site (UT to Cane Creek) Year 3 Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138

Table 5 **Visual Stream Morphology Stability Assessment**
Reach ID **Upper Reach**
Assessed Length **1796**

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)			7	157	91%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	**16**	**21**			76%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	**17**	**23**			74%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	**17**	**23**			74%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	**22**	**22**			100%			
		2. Thalweg centering at downstream of meander (Glide)	**21**	**21**			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			7	94	97%			97%
	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	7	94	97%	0	0	97%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	23	23			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	**6**	**6**			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	23	23			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	23	23			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	**6**	**6**			100%			

Table 5 **Visual Stream Morphology Stability Assessment**
Reach ID **Lower Reach**
Assessed Length **1779**

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)			8	258	85%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	**14**	**16**			88%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	**12**	**16**			75%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	**12**	**16**			75%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	**16**	**16**			100%			
		2. Thalweg centering at downstream of meander (Glide)	**16**	**16**			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			4	100	97%			97%
	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	4	100	97%	0	0	97%
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.	**4**	**4**			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	16	17			94%			
	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)	17	17			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	**4**	**4**			100%			

Table 5 **Visual Stream Morphology Stability Assessment**
Reach ID **Tributary**
Assessed Length **648**

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	**7**	**11**			64%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	**10**	**11**			91%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	**10**	**11**			91%			
	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			16	242	81%	0	0	81%
	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	16	242	81%	0	0	81%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	12	12			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	**9**	**11**			82%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	4	12			33%			
	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)	7	12			58%			
	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 6 Vegetation Condition Assessment

Planted Acreage[1] **18.59**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.001 ac.	Pattern and Color	14	0.11	0.6%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.001 ac.	Pattern and Color	3	0.06	0.3%
			Total	17	0.17	0.9%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.1 ac.	Pattern and Color	**0**	**0.00**	0.0%
			Cumulative Total	17	0.17	0.9%

Easement Acreage[2] **20.3**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	**1**	**0.01**	0.0%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

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

2 = The acreage within the easement boundaries.

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

4 = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern 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 EEP 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.

Upper Reach Photo Station 1 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 1 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 2 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 2 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 3 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 3 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 4 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 4 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 5 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 5 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 6 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 6 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 7 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 7 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 8 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 8 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 9 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 9 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 10 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 10 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 11 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 11 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 12 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 12 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 13 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 13 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 14 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 14 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 15 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 15 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 16 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 16 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 17 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 17 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 18 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 18 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 19 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 19 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 20 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 20 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 21 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 21 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 22 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 22 Upstream (3/23/2015 Year 3)

Upper Reach Photo Station 23 Downstream (3/23/2015 Year 3)

Upper Reach Photo Station 23 Upstream (3/23/2015 Year 3)

Confluence with Cane Creek (3/23/2015 Year 3)

Looking upstream of Confluence with Cane Creek (3/18/2015 Year 3)

Lower Reach Photo Station 1 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 1 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 2 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 2 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 3 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 3 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 4 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 4 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 5 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 5 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 6 Downstream (3/23/2015 Year 3)

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Lower Reach Photo Station 7 Downstream (3/23/2015 Year 3)

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Lower Reach Photo Station 8 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 8 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 9 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 9 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 10 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 10 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 11 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 11 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 12 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 12 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 13 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 13 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 14 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 14 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 15 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 15 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 16 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 16 Upstream (3/23/2015 Year 3)

Lower Reach Photo Station 17 Downstream (3/23/2015 Year 3)

Lower Reach Photo Station 17 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 1 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 1 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 2 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 2 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 3 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 3 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 4 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 4 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 5 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 5 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 6 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 6 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 7 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 7 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 8 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 8 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 9 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 9 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 10 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 10 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 11 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 11 Upstream (3/23/2015 Year 3)

Tributary Reach Photo Station 12 Downstream (3/23/2015 Year 3)

Tributary Reach Photo Station 12 Upstream (3/23/2015 Year 3)

Appendix C

Vegetation Plot Data

Fletcher-Meritor Site (#138)

Year 3 (07-May-2015)

Vegetation Plot Summary Information

Plot #	Riparian Buffer Stems[1]	Stream/ Wetland Stems[2]	Live Stakes	Invasives	Volunteers[3]	Total[4]	Unknown Growth Form
1	n/a	4	0	0	20	**30**	1
2	n/a	8	0	0	3	**18**	0
3	n/a	5	0	0	1	**6**	1
4	n/a	20	0	0	7	**27**	0
5	n/a	13	0	0	13	**27**	0
6	n/a	8	0	0	36	**44**	0
7	n/a	17	0	0	10	**27**	0
8	n/a	11	0	0	13	**24**	0
9	n/a	8	0	0	6	**14**	0
10	n/a	10	0	0	16	**26**	0
11	n/a	11	0	0	306	**317**	0
12	n/a	10	0	0	122	**132**	0
13	n/a	9	0	0	106	**115**	0
14	n/a	10	0	0	100	**110**	0
15	n/a	15	0	0	300	**315**	0
16	n/a	9	0	0	105	**114**	2
17	n/a	5	0	0	207	**212**	2

Wetland/Stream Vegetation Totals

(per acre)

Plot #	Stream/ Wetland Stems[2]	Volunteers[3]	Total[4]	Success Criteria Met?
1	162	809	1214	No
2	324	121	728	Yes, barely
3	202	40	243	No
4	809	283	1093	Yes
5	526	526	1093	Yes
6	324	1457	1781	Yes, barely
7	688	405	1093	Yes
8	445	526	971	Yes
9	324	243	567	Yes, barely
10	405	647	1052	Yes
11	445	12383	12829	Yes
12	405	4937	5342	Yes
13	364	4290	4654	Yes
14	405	4047	4452	Yes
15	607	12141	12748	Yes
16	364	4249	4613	Yes
17	202	8377	8579	No
Project Avg	**412**	**3264**	**3709**	**Yes**

Riparian Buffer Vegetation Totals

(per acre)

Plot #	Riparian Buffer Stems[1]	Success Criteria Met?
1	n/a	
2	n/a	
3	n/a	
4	n/a	
5	n/a	
6	n/a	
7	n/a	
8	n/a	
9	n/a	
10	n/a	
11	n/a	
12	n/a	
13	n/a	
14	n/a	
15	n/a	
16	n/a	
17	n/a	
Project Avg	**n/a**	

Stem Class	**characteristics**
[1]Buffer Stems	Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.
[2]Stream/ Wetland Stems	Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines
[3]Volunteers	Native woody stems. Not planted. No vines.
[4]Total	Planted + volunteer native woody stems. Includes live stakes. Excl. exotics. Excl. vines.

Report Prepared By	Vickie Miller
Date Prepared	8/19/2015 22:47

database name	cvs-eep-entrytool-v2.3.1 Fletcher Year 3.mdb
database location	C:\Users\vimiller\Desktop\Fletcher Veg Plots
computer name	RALE-12116343
file size	57147392

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------

Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.

PROJECT SUMMARY----------

Project Code	138
project Name	Fletcher-Meritor Site
Description	Wetland and Stream mitigation in Henderson County, NC.
River Basin	French Broad
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	17

EEP Project Code 138. Project Name: Fletcher-Meritor Site

Current Plot Data (MY3 20

Scientific Name	Common Name	Species Type	138-01-0001			138-01-0002			138-01-0003			138-01-0004			138-01-0005			138-01-0006			138-01-0007			138-01-0008			138-01-0009		
			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	maple	Tree																											
Acer negundo	boxelder	Tree							1	1	1				3	3	5				7	7	7			2	1	1	3
Acer rubrum	red maple	Tree										1	1	3	1	1	1			1						2			1
Alnus serrulata	hazel alder	Shrub																											
Betula nigra	river birch	Tree							1	1	1	6	6	10	2	2	3	1	1	1	2	2	2	4	4	4			
Cornus	dogwood	Shrub or Tree																											
Cornus amomum	silky dogwood	Shrub				2	2	2							2	2	2				1	1	1						
Fraxinus pennsylvanica	green ash	Tree	2	2	2	3	3	3	3	3	3	5	5	5				3	3	3	3	3	3	5	5	6	2	2	3
Juglans nigra	black walnut	Tree										3	3	3	3	3	3				2	2	2				1	1	1
Liriodendron tulipifera	tuliptree	Tree																											1
Platanus occidentalis	American sycamore	Tree	1	1	1	3	3	3				5	5	5	2	2	4	4	4	12	2	2	2	1	1	2	4	4	4
Populus	cottonwood										1																		
Populus deltoides	eastern cottonwood	Tree	1	1	1																								
Prunus serotina	black cherry	Tree																					2						
Salix nigra	black willow	Tree			1																			1	1	3			
Salix sericea	silky willow	Shrub																											
Sambucus canadensis	Common Elderberry	Shrub																											
Unknown		Shrub or Tree	5	5	24	7	7	10						1	1	1	9			27			8			5			1
Unknown Prunus/Ilex			1	1	1																								
Stem count			10	10	30	15	15	18	5	5	6	20	20	27	14	14	27	8	8	44	17	17	27	11	11	24	8	8	14
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	6	4	4	4	3	3	4	5	5	6	7	7	7	3	3	5	6	6	8	4	4	7	4	4	7
Stems per ACRE			404.7	404.7	1214	607	607	728.4	202.3	202.3	242.8	809.4	809.4	1093	566.6	566.6	1093	323.7	323.7	1781	688	688	1093	445.2	445.2	971.2	323.7	323.7	566.6

)15)																																			
																								Annual Means											
138-01-0010			138-01-0011			138-01-0012			138-01-0013			138-01-0014			138-01-0015			138-01-0016			138-01-0017			MY3 (2015)			MY2 (2014)			MY1 (2013)			MY0 (2012)		
PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
																													42						
			2	2	2	3	3	3			6							2	2	7	1	1	1	20	20	37	22	22	68	27	27	27	22	22	22
								2						1										2	2	11	2	2	30			9			
															1	1	1							1	1	1									
1	1	2	3	3	303	2	2	27	2	2	102	3	3	74	3	3	303	1	1	74	1	1	204	32	32	1110	31	31	1225	29	29	832	26	26	481
																											1	1	1						
			1	1	1	5	5	5	5	5	5	4	4	4	10	10	10	3	3	3	1	1	1	34	34	34	31	31	31	31	31	31	30	30	30
3	3	3	2	2	2			85				3	3	23						17	2	2	2	36	36	160	37	37	80	40	40	40	36	36	36
																							2	9	9	11	8	8	8	7	7	7	6	6	6
																										1			1						
5	5	5	3	3	9			5	2	2	2			1	1	1	1	3	3	11				36	36	67	34	34	75	33	33	59	35	35	70
																				2			2			5									
1	1	1																						2	2	2	1	1	1						
																										2									
														6										1	1	10	1	1	11						
																											2	2	2						
																																	1	1	1
		15						5						1										13	13	106	16	16	33	3	3	3	4	4	4
																								1	1	1									
10	10	26	11	11	317	10	10	132	9	9	115	10	10	110	15	15	315	9	9	114	5	5	212	187	187	1558	186	186	1608	170	170	1008	160	160	650
1			1			1			1			1			1			1			1			17			17			17			17		
0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.42			0.42			0.42			0.42		
4	4	5	5	5	5	3	3	7	3	3	4	3	3	7	4	4	4	4	4	6	4	4	6	12	12	15	12	12	14	7	7	8	8	8	8
404.7	404.7	1052	445.2	445.2	12829	404.7	404.7	5342	364.2	364.2	4654	404.7	404.7	4452	607	607	12748	364.2	364.2	4613	202.3	202.3	8579	445.2	445.2	3709	442.8	442.8	3828	404.7	404.7	2400	380.9	380.9	1547

Vegetation Plot 1 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 2 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 3 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 4 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 5 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 6 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 7 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 8 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 9 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 10 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 11 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 12 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 13 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 14 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 15 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 16 – 10m x 10m (5/07/2015 Year 3)

Vegetation Plot 17 – 10m x 10m (5/07/2015 Year 3)

Appendix D

Stream Assessment Data

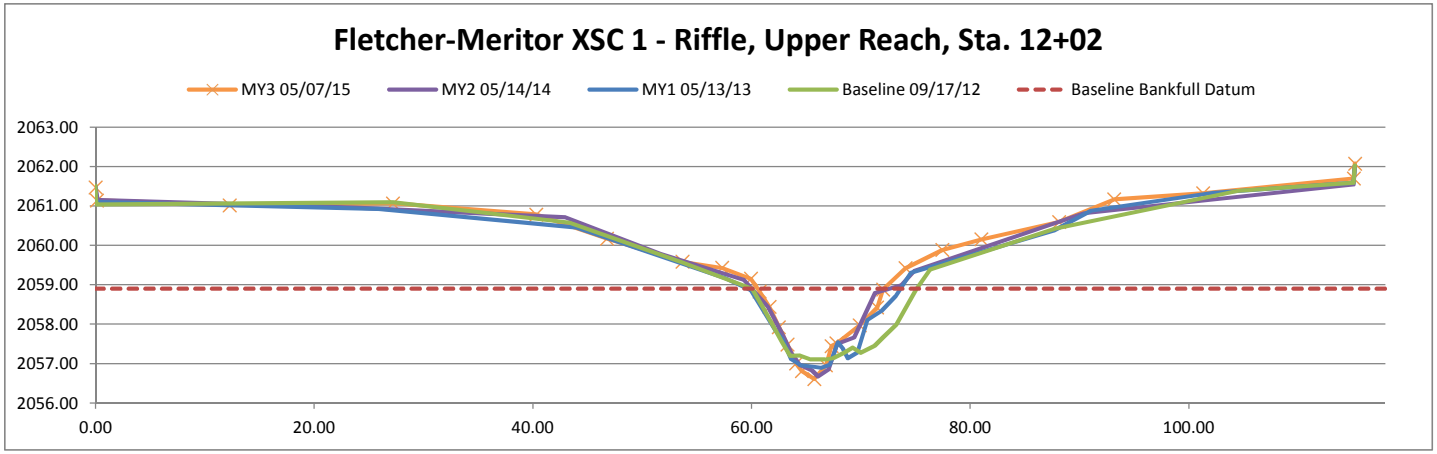
Station	Elevation
0.00	2061.47
0.13	2061.14
12.28	2061.01
27.20	2061.06
40.32	2060.78
46.78	2060.17
53.70	2059.58
57.31	2059.43
59.94	2059.15
60.73	2058.83
61.64	2058.44
62.51	2057.92
63.28	2057.48
64.07	2057.00
64.59	2056.81
65.74	2056.61
66.81	2056.96
67.32	2057.44
67.78	2057.51
69.90	2057.97
71.49	2058.42
72.04	2058.88
74.08	2059.42
77.44	2059.88
81.02	2060.15
88.14	2060.59
93.16	2061.17
101.32	2061.32
115.10	2061.70
115.21	2062.07

Reach	Fletcher-Meritor, Upper Reach
River Basin	French Broad
Cross Section ID	XSC-1, Riffle, Upper Reach, 12+02
Drainage Area (Sq Mi)	0.75
Date	5/7/2015
Observers	V. Miller, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2058.90
Bankfull Cross Sectional Area, ft^2	14.20
Bankfull Width, ft	11.60
Max Depth at Bankfull, ft	2.29
Mean Depth at Bankfull, ft	1.22
Width/Depth Ratio	9.48
Flood Prone Width, ft	94.40
Flood Prone Area Elevation, ft	2061.19
Entrenchment Ratio	8.14
Bank Height Ratio	0.99

Stream Type	C/E4

Sta. 12+02 Looking Downstream



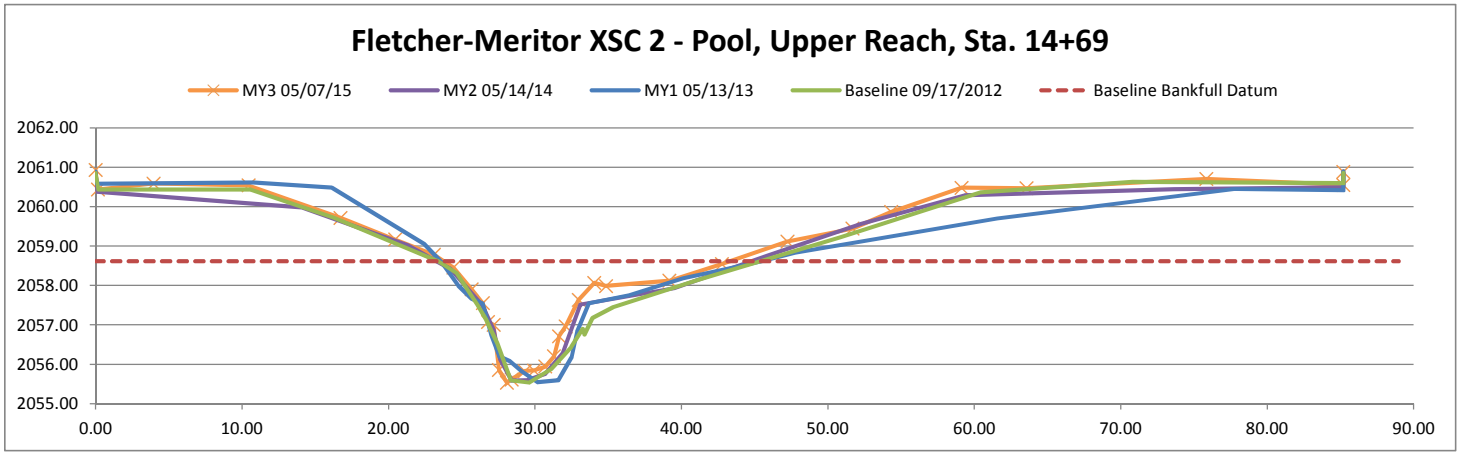
Station	Elevation
0.00	2060.93
0.16	2060.44
3.96	2060.59
10.44	2060.54
16.73	2059.71
20.45	2059.17
23.10	2058.78
24.43	2058.45
25.67	2057.90
26.44	2057.55
26.80	2057.08
27.18	2057.00
27.54	2055.85
28.09	2055.54
28.41	2055.62
29.30	2055.83
29.93	2055.84
30.71	2055.94
31.30	2056.20
31.65	2056.71
32.09	2056.96
32.99	2057.64
34.05	2058.07
34.86	2057.98
39.18	2058.12
42.77	2058.55
47.24	2059.11
51.68	2059.44
54.32	2059.87
59.12	2060.48
63.57	2060.47
75.83	2060.70
85.20	2060.55
85.20	2060.88

Reach	Fletcher-Meritor, Upper Reach
River Basin	French Broad
Cross Section ID	XSC-2, Pool, Upper Reach, 14+69
Drainage Area (Sq Mi)	0.75
Date	5/7/2015
Observers	V. Miller, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2058.61
Bankfull Cross Sectional Area, ft^2	21.00
Bankfull Width, ft	19.50
Max Depth at Bankfull, ft	3.08
Mean Depth at Bankfull, ft	1.08
Width/Depth Ratio	18.11
Flood Prone Width, ft	>86.00
Flood Prone Area Elevation, ft	2061.69
Entrenchment Ratio	>4.00
Bank Height Ratio	1.06

Stream Type	C/E4

Sta. 14+69 Looking Downstream



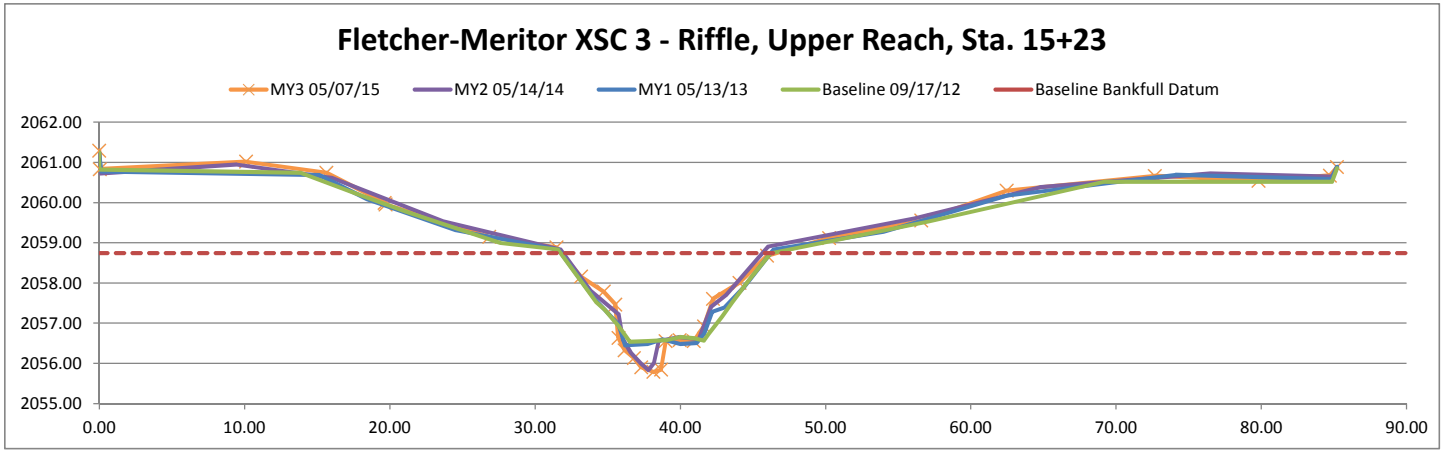
Station	Elevation
0.00	2061.29
0.05	2060.83
10.11	2061.02
15.63	2060.75
19.65	2059.99
19.70	2059.96
26.85	2059.15
31.47	2058.89
33.17	2058.16
34.72	2057.79
35.53	2057.46
35.74	2056.64
36.17	2056.33
36.80	2056.13
37.31	2055.91
38.15	2055.79
38.67	2055.84
38.99	2056.55
39.96	2056.58
40.92	2056.55
41.62	2056.92
42.25	2057.61
44.06	2058.01
45.97	2058.68
50.24	2059.12
56.58	2059.55
62.47	2060.30
72.66	2060.67
79.80	2060.54
84.70	2060.67
85.20	2060.88

Reach	Fletcher-Meritor, Upper Reach
River Basin	French Broad
Cross Section ID	XSC-3, Riffle, Upper Reach, 15+23
Drainage Area (Sq Mi)	0.75
Date	5/7/2015
Observers	V. Miller, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2058.74
Bankfull Cross Sectional Area, ft^2	20.50
Bankfull Width, ft	14.80
Max Depth at Bankfull, ft	2.95
Mean Depth at Bankfull, ft	1.39
Width/Depth Ratio	10.68
Flood Prone Width, ft	>86.00
Flood Prone Area Elevation, ft	2061.69
Entrenchment Ratio	>6.00
Bank Height Ratio	1.05

Stream Type	C/E4

Sta. 15+23, Looking Downstream



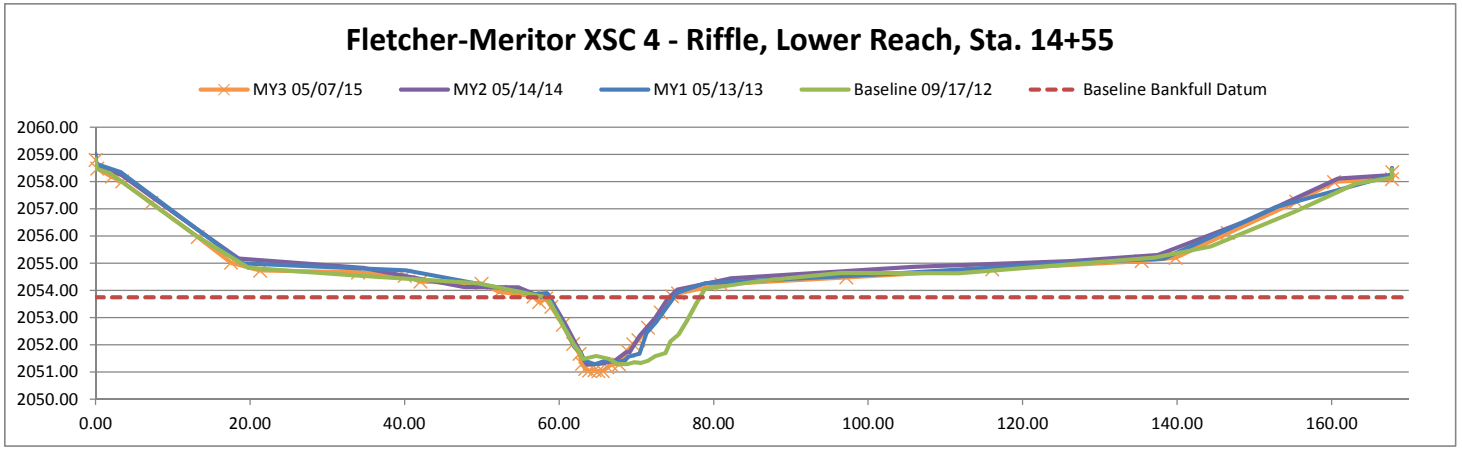
Station	Elevation
0.00	2058.79
0.20	2058.48
2.12	2058.18
3.44	2058.00
7.21	2057.22
13.21	2055.96
17.54	2055.02
21.29	2054.73
33.96	2054.65
40.01	2054.54
42.05	2054.32
49.94	2054.24
52.29	2053.94
56.69	2053.77
57.41	2053.57
58.33	2053.70
58.98	2053.39
60.46	2052.74
61.80	2052.02
62.64	2051.67
62.97	2051.29
63.36	2051.11
63.86	2051.05
64.57	2051.07
65.08	2051.03
65.66	2051.03
66.25	2051.17
66.69	2051.27
67.77	2051.27
68.85	2051.77
69.58	2052.02
70.25	2052.17
71.49	2052.63
73.15	2053.18
74.60	2053.79
75.40	2053.88
81.02	2054.22
97.17	2054.47
116.06	2054.77
135.42	2055.07
139.80	2055.20
146.56	2056.11
155.42	2057.26
160.31	2057.99
167.81	2058.09
167.84	2058.34

Reach	Fletcher-Meritor, Lower Reach
River Basin	French Broad
Cross Section ID	XSC-4 Riffle, Lower Reach, 14+55
Drainage Area (Sq Mi)	1.1
Date	5/7/2015
Observers	V. Miller, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2053.74
Bankfull Cross Sectional Area, ft^2	26.20
Bankfull Width, ft	17.70
Max Depth at Bankfull, ft	2.71
Mean Depth at Bankfull, ft	1.48
Width/Depth Ratio	11.96
Flood Prone Width, ft	138.30
Flood Prone Area Elevation, ft	2056.45
Entrenchment Ratio	7.81
Bank Height Ratio	0.99

Stream Type	C/E4

Sta. 14+55 Looking Downstream



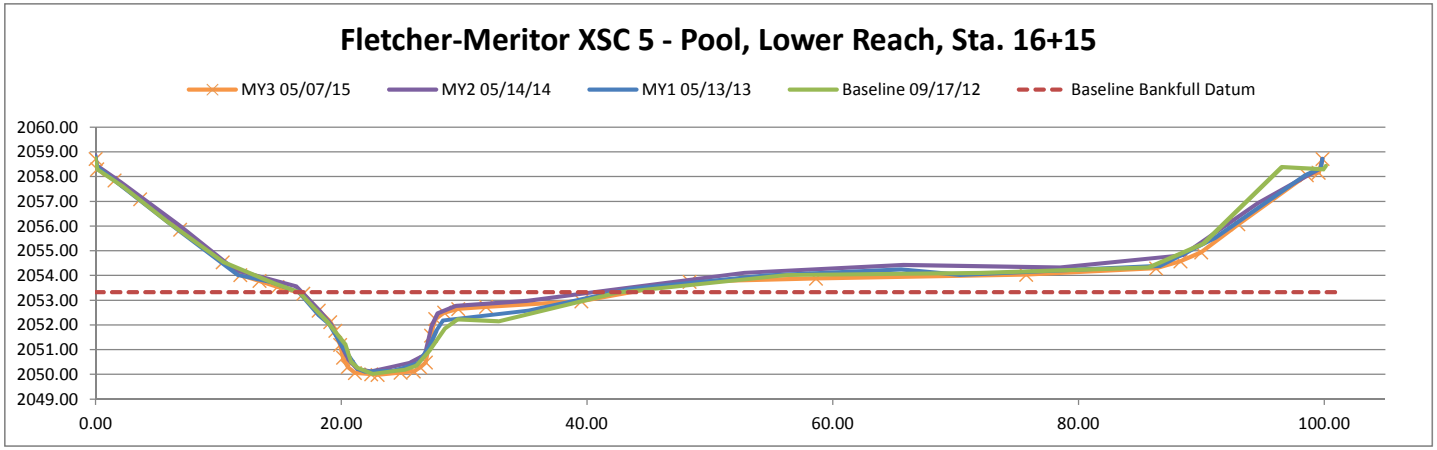
Station	Elevation
0.00	2058.71
0.15	2058.30
1.55	2057.85
3.62	2057.08
6.87	2055.85
10.35	2054.54
11.79	2054.01
13.35	2053.78
14.79	2053.54
16.91	2053.27
18.17	2052.58
19.11	2052.11
19.51	2051.76
19.90	2051.19
20.13	2050.67
20.54	2050.30
21.11	2050.06
22.42	2050.00
22.96	2049.98
24.84	2050.07
25.90	2050.12
26.42	2050.29
26.88	2050.49
27.29	2051.57
27.65	2052.25
28.37	2052.49
29.51	2052.64
31.77	2052.73
39.55	2052.95
48.34	2053.75
58.64	2053.87
75.75	2054.03
86.31	2054.29
88.29	2054.58
89.99	2054.93
93.00	2056.07
98.58	2058.05
99.56	2058.15
99.85	2058.72

Reach	Fletcher-Meritor, Lower Reach
River Basin	French Broad
Cross Section ID	XSC-5, Pool, Lower Reach, 16+15
Drainage Area (Sq Mi)	1.1
Date	5/7/2015
Observers	V. Miller, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2053.32
Bankfull Cross Sectional Area, ft^2	33.80
Bankfull Width, ft	27.10
Max Depth at Bankfull, ft	3.34
Mean Depth at Bankfull, ft	1.25
Width/Depth Ratio	21.73
Flood Prone Width, ft	84.90
Flood Prone Area Elevation, ft	2056.66
Entrenchment Ratio	3.13
Bank Height Ratio	0.98

Stream Type	C/E4

Sta. 16+15 Looking Downstream



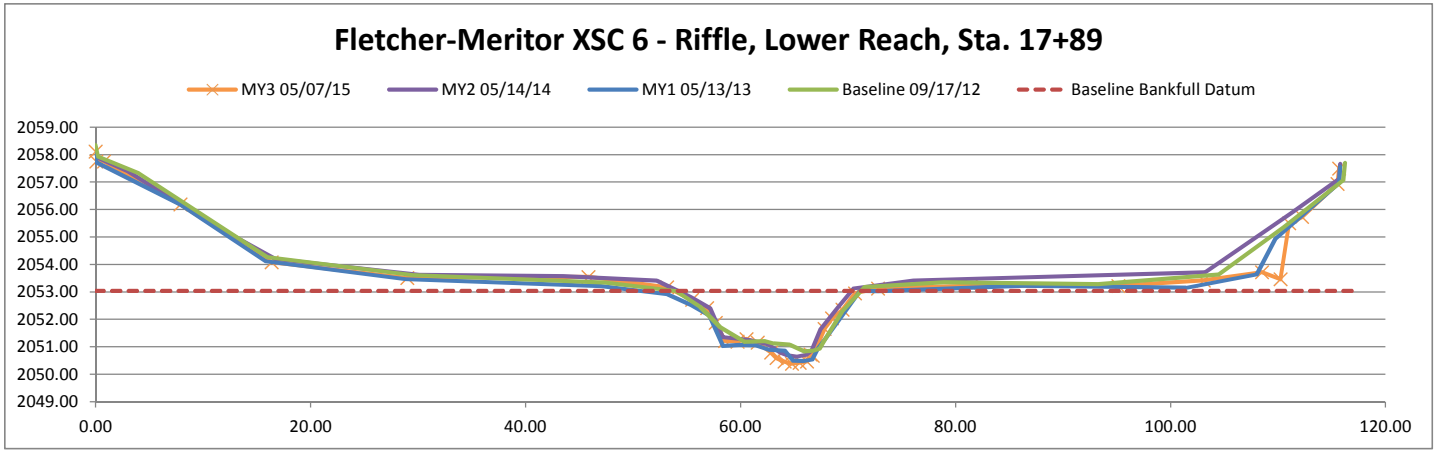
Station	Elevation
0.00	2058.11
0.08	2057.75
0.79	2057.75
7.89	2056.19
16.38	2054.07
28.99	2053.51
45.86	2053.54
53.17	2053.17
55.48	2052.72
56.90	2052.40
57.69	2051.87
58.56	2051.21
59.72	2051.19
60.55	2051.28
61.59	2051.14
62.84	2050.79
63.36	2050.59
64.08	2050.46
64.77	2050.38
65.49	2050.42
66.17	2050.46
66.51	2050.71
66.70	2050.67
67.81	2051.65
68.51	2052.04
69.48	2052.35
70.63	2052.95
72.78	2053.12
81.47	2053.22
95.14	2053.21
103.09	2053.41
108.50	2053.72
110.23	2053.46
111.04	2055.50
112.21	2055.73
115.52	2056.94
115.67	2057.49

Reach	Fletcher-Meritor, Lower Reach
River Basin	French Broad
Cross Section ID	XSC-6, Riffle, Lower Reach, 17+89
Drainage Area (Sq Mi)	1.1
Date	5/7/2015
Observers	V. Miller, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2053.03
Bankfull Cross Sectional Area, ft^2	25.00
Bankfull Width, ft	17.80
Max Depth at Bankfull, ft	2.65
Mean Depth at Bankfull, ft	1.40
Width/Depth Ratio	12.67
Flood Prone Width, ft	102.00
Flood Prone Area Elevation, ft	2055.68
Entrenchment Ratio	5.73
Bank Height Ratio	0.97

Stream Type	C/E4

Sta. 17+89 Looking Downstream



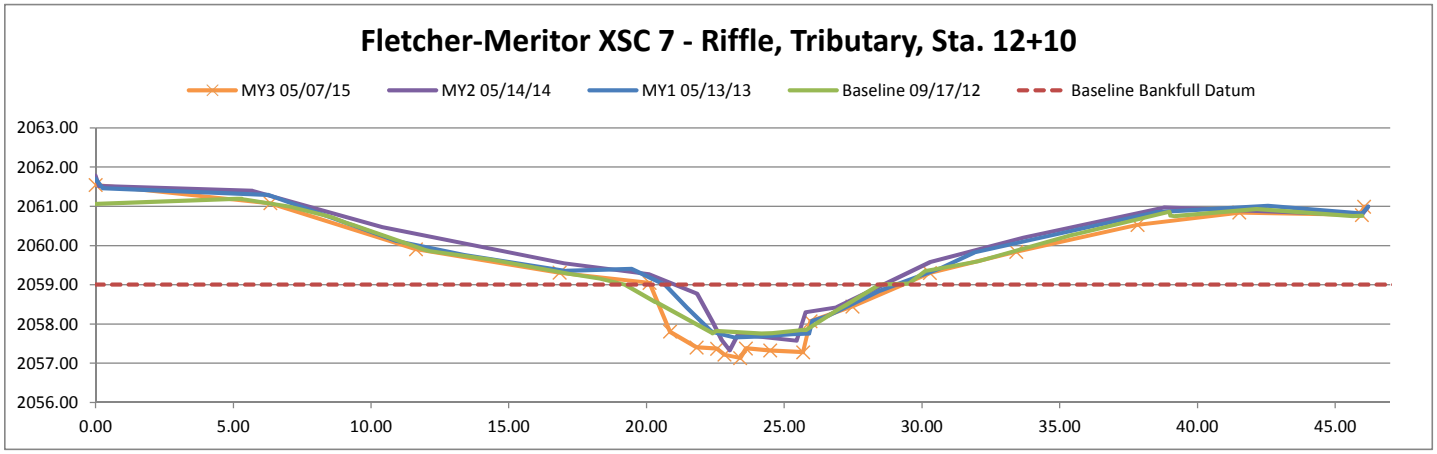
Station	Elevation
0.00	2061.55
6.35	2061.08
11.63	2059.91
16.85	2059.31
20.11	2059.05
20.85	2057.80
21.82	2057.40
22.56	2057.37
22.83	2057.22
23.40	2057.13
23.61	2057.37
24.49	2057.32
25.68	2057.28
25.95	2058.07
27.47	2058.45
30.29	2059.30
33.42	2059.84
37.82	2060.53
41.52	2060.84
45.96	2060.78
46.05	2060.99

Reach	Fletcher-Meritor, Tributary
River Basin	French Broad
Cross Section ID	XSC-7, Riffle, Tributary, 12+10
Drainage Area (Sq Mi)	0.32
Date	5/7/2015
Observers	V. Miller, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2059.00
Bankfull Cross Sectional Area, ft^2	10.30
Bankfull Width, ft	9.20
Max Depth at Bankfull, ft	1.87
Mean Depth at Bankfull, ft	1.12
Width/Depth Ratio	8.22
Flood Prone Width, ft	34.02
Flood Prone Area Elevation, ft	2060.87
Entrenchment Ratio	3.70
Bank Height Ratio	1.03

Stream Type	C/E4

Sta. 12+10 Looking Downstream



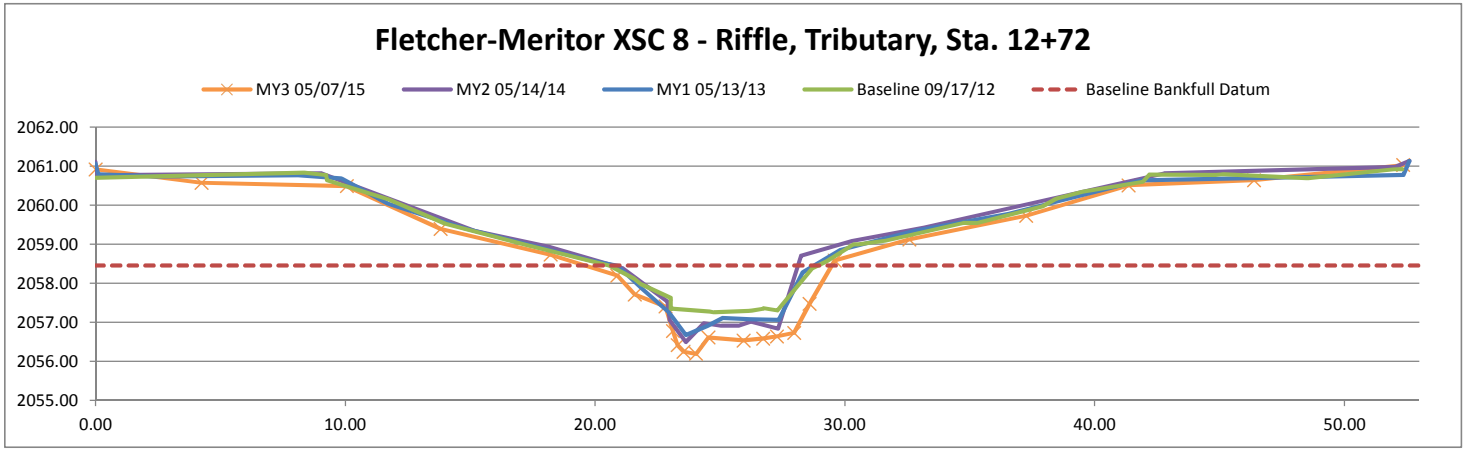
Station	Elevation
0.00	2060.92
4.24	2060.57
10.06	2060.48
13.81	2059.39
18.22	2058.73
20.89	2058.19
21.59	2057.71
22.82	2057.40
23.11	2056.78
23.30	2056.41
23.54	2056.25
24.04	2056.19
24.53	2056.61
25.94	2056.53
26.73	2056.58
27.27	2056.63
27.97	2056.73
28.58	2057.47
29.59	2058.58
32.58	2059.12
37.26	2059.73
41.36	2060.51
46.38	2060.64
52.34	2061.03

Reach	Fletcher-Meritor, Tributary
River Basin	French Broad
Cross Section ID	XSC-8, Riffle, Tributary, 12+72
Drainage Area (Sq Mi)	0.32
Date	5/7/2015
Observers	V. Miller, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2058.45
Bankfull Cross Sectional Area, ft^2	12.60
Bankfull Width, ft	9.90
Max Depth at Bankfull, ft	2.26
Mean Depth at Bankfull, ft	1.27
Width/Depth Ratio	7.78
Flood Prone Width, ft	45.00
Flood Prone Area Elevation, ft	2060.71
Entrenchment Ratio	4.55
Bank Height Ratio	0.89

Stream Type	C/E4

Sta. 12+72 Looking Downstream



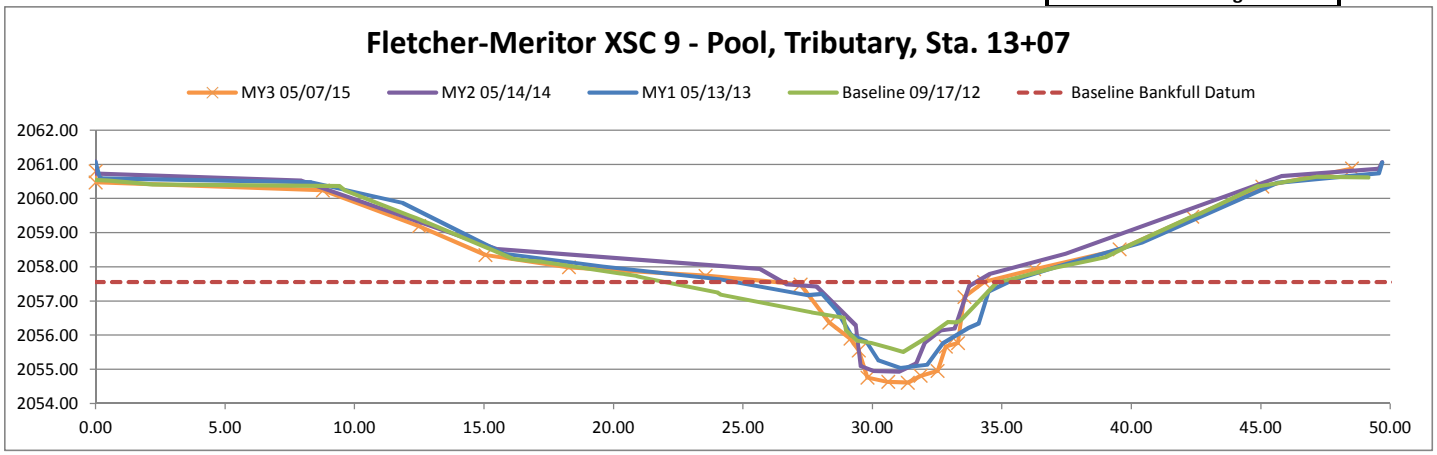
Station	Elevation
0.00	2060.79
0.00	2060.47
8.78	2060.24
12.49	2059.19
15.06	2058.34
18.28	2057.98
23.56	2057.74
27.22	2057.48
28.34	2056.37
29.15	2055.89
29.47	2055.55
29.81	2054.75
30.61	2054.63
31.37	2054.61
31.86	2054.81
32.52	2054.95
32.83	2055.67
33.30	2055.77
33.55	2057.12
34.31	2057.55
36.24	2057.93
39.55	2058.51
42.35	2059.46
45.05	2060.35
48.52	2060.88

Reach	Fletcher-Meritor, Tributary
River Basin	French Broad
Cross Section ID	XSC-9, Pool, Tributary, 13+07
Drainage Area (Sq Mi)	0.32
Date	5/7/2015
Observers	V. Miller, W. Yelverton

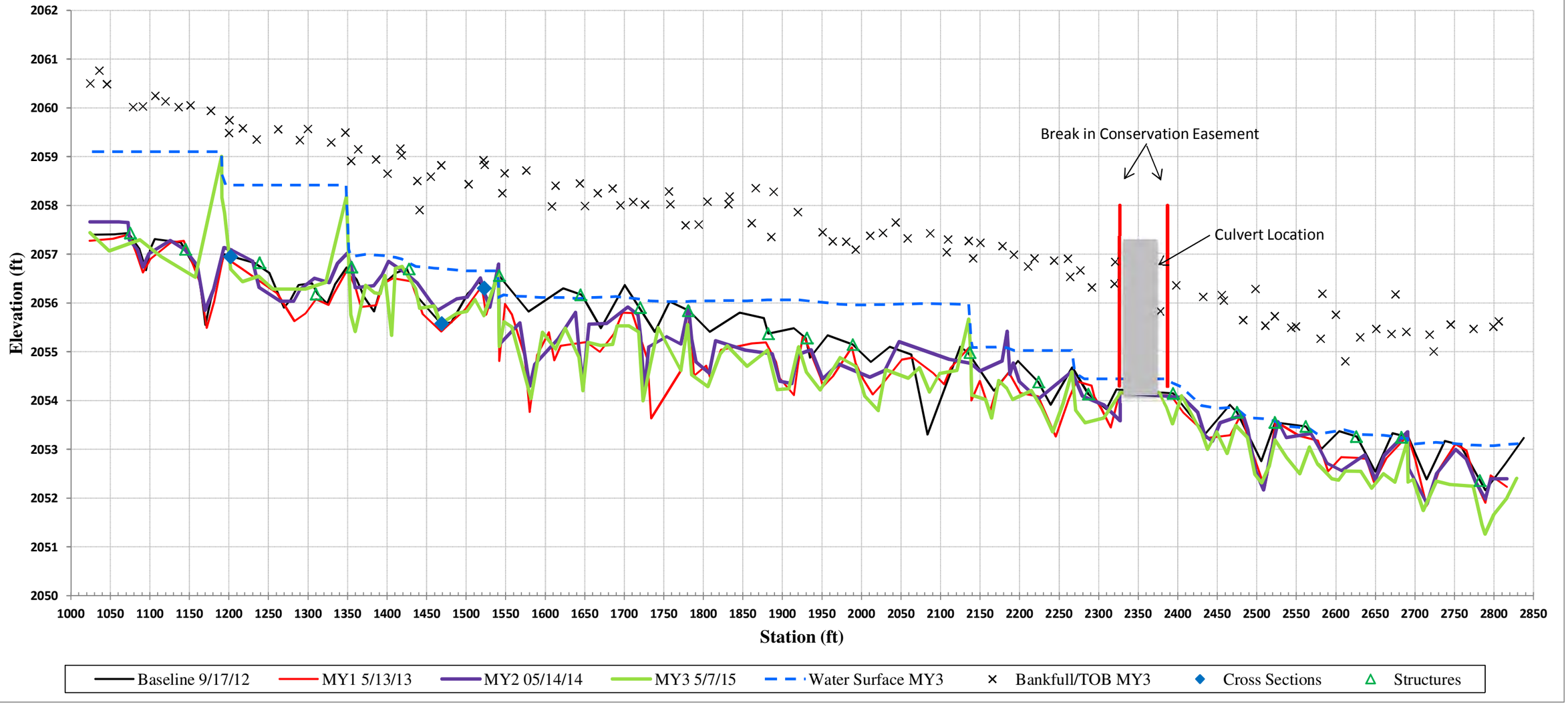
SUMMARY DATA	
Bankfull Elevation, ft	2057.55
Bankfull Cross Sectional Area, ft^2	13.00
Bankfull Width, ft	8.10
Max Depth at Bankfull, ft	2.94
Mean Depth at Bankfull, ft	1.60
Width/Depth Ratio	5.05
Flood Prone Width, ft	34.70
Flood Prone Area Elevation, ft	2060.49
Entrenchment Ratio	4.28
Bank Height Ratio	0.98

Stream Type	C/E4

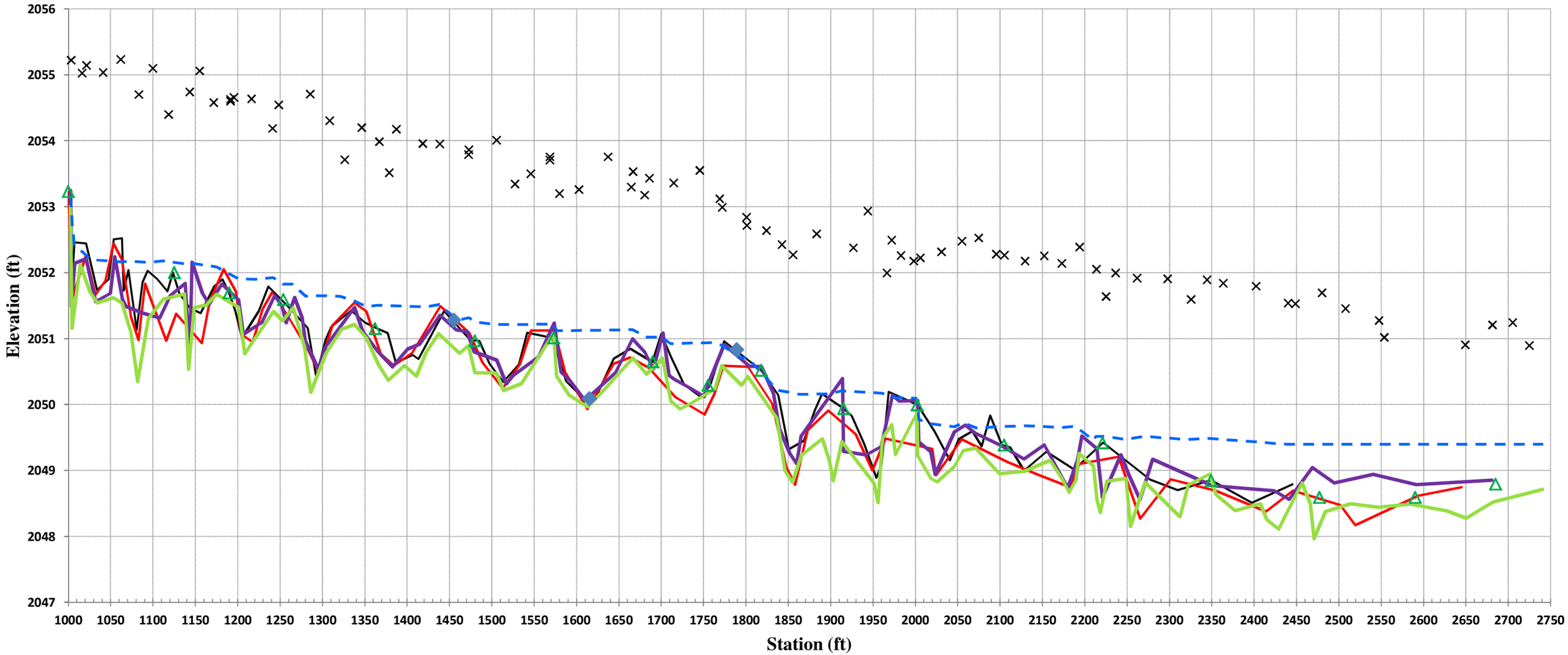
Sta. 13+07 Looking Upstream
Pool XSC in Foreground



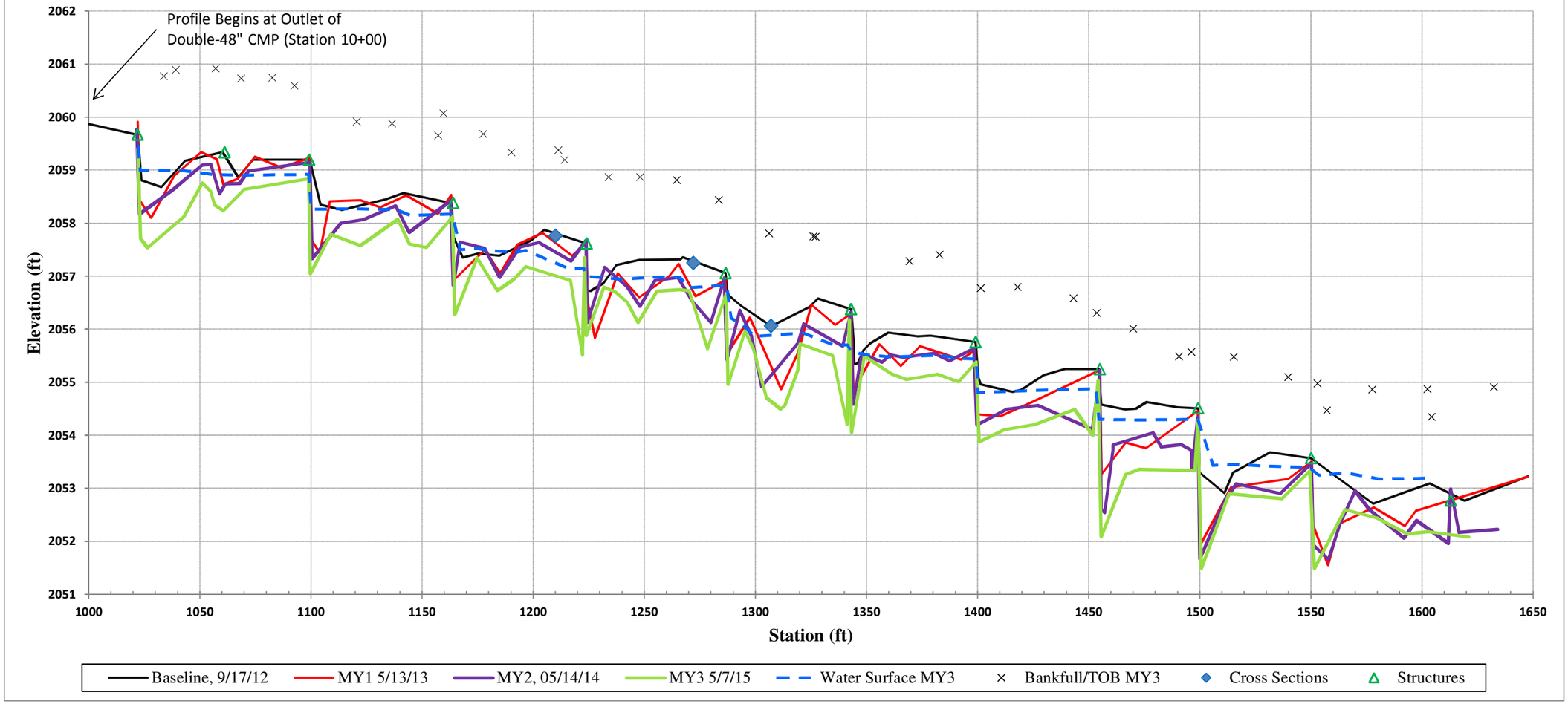
Longitudinal Profile
Fletcher - Upper Reach
Project Number - 138
Station 10+25.00 - 28+37.86



Longitudinal Profile
Fletcher - Lower Reach
Project Number - 138
Station 10+00.00 - 26+45.00



Longitudinal Profile
Fletcher - Tributary
Project Number - 138
Station 10+00.00 - 1647.65

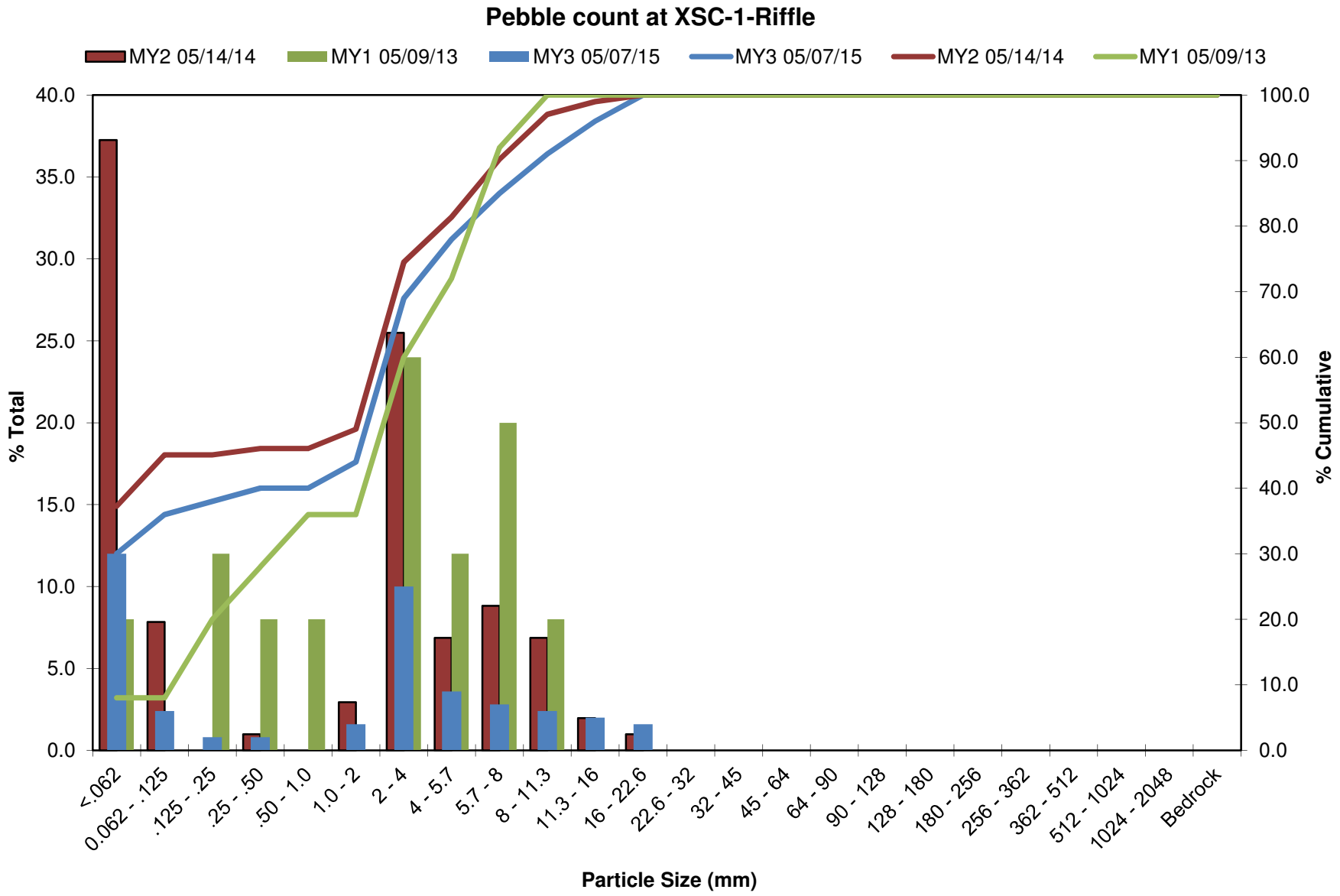


Fletcher - Upper Reach XSC-1 Riffle-Pebble Count

Location: STA 12+02

Inches	Particle	Millimeters		Count	%Total	% Cum.
	Silt/Clay	<.062	SILT/CLAY	30	30.0	30.0
	Very Fine	0.062 - .125	SAND	6	6.0	36.0
	Fine	.125 - .25		2	2.0	38.0
	Medium	.25 - .50		2	2.0	40.0
	Coarse	.50 - 1.0		0	0.0	40.0
.04 - .08	Very Coarse	1.0 - 2		4	4.0	44.0
.08 - .16	Very Fine	2 - 4	GRAVEL	25	25.0	69.0
.16 - .22	Fine	4 - 5.7		9	9.0	78.0
.22 - .31	Fine	5.7 - 8		7	7.0	85.0
.31 .44	Medium	8 - 11.3		6	6.0	91.0
.44 - .63	Medium	11.3 - 16		5	5.0	96.0
.63 - .89	Coarse	16 - 22.6		4	4.0	100.0
.89 - 1.26	Coarse	22.6 - 32		0	0.0	100.0
1.26 - 1.77	Very Coarse	32 - 45		0	0.0	100.0
1.77 - 2.5	Very Coarse	45 - 64		0	0.0	100.0
2.5 - 3.5	Small	64 - 90	COBBLE	0	0.0	100.0
3.5 - 5.0	Small	90 - 128		0	0.0	100.0
5.0 - 7.1	Large	128 - 180		0	0.0	100.0
7.1 - 10.1	Large	180 - 256		0	0.0	100.0
10.1 - 14.3	Small	256 - 362	BOULDER	0	0.0	100.0
14.3 - 20	Small	362 - 512		0	0.0	100.0
20 - 40	Medium	512 - 1024		0	0.0	100.0
40 - 80	Large - Very Lg	1024 - 2048		0	0.0	100.0
	Bedrock	Bedrock		0	0.0	100.0
			Total Counted	100		

Summary Data	MY3	MY2	MY1
D50	2.4	2.1	3
D84	7.7	6.5	7
D95	15	10	9

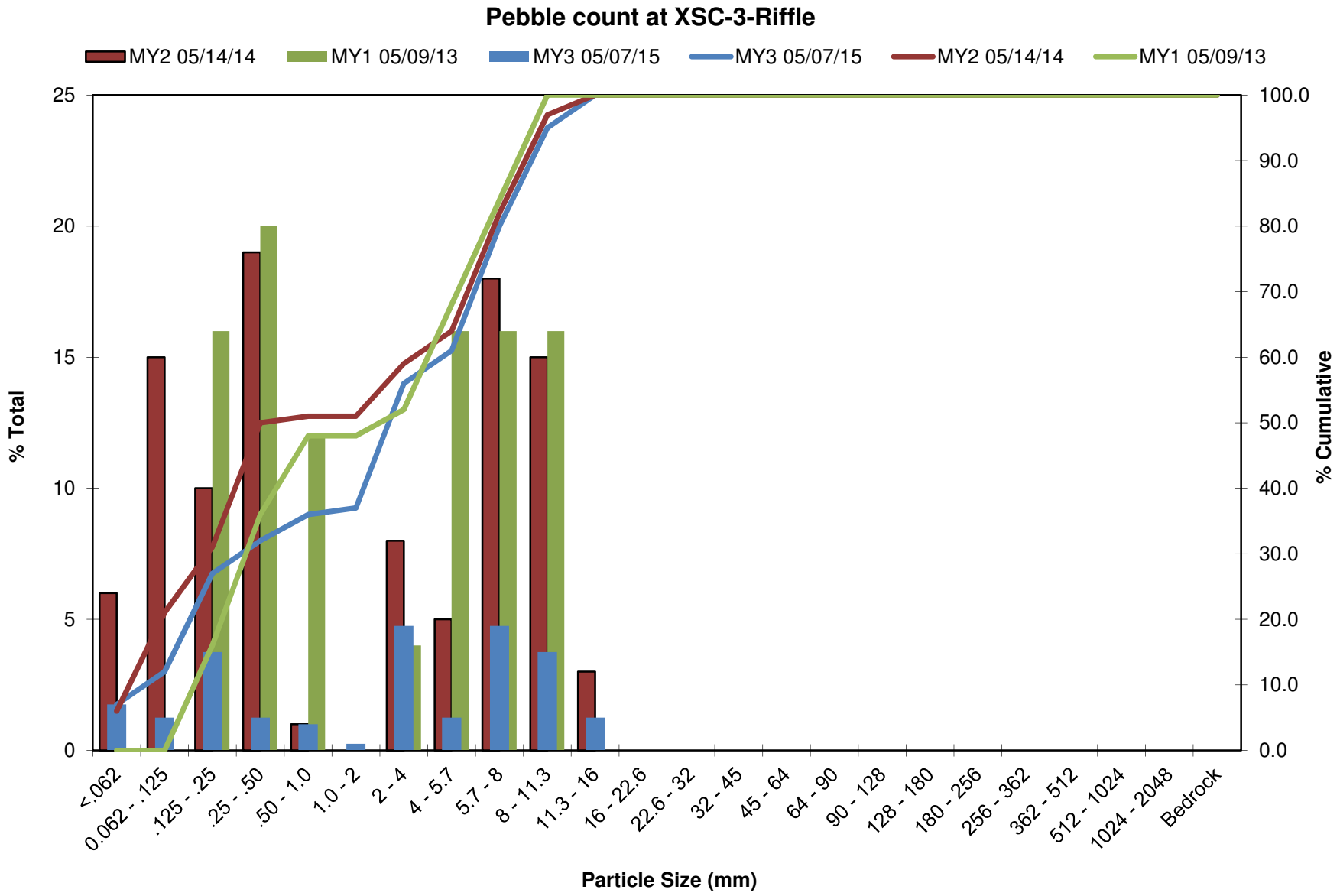

Pebble count at XSC-1-Riffle
MY2 05/14/14
MY1 05/09/13
MY3 05/07/15
MY3 05/07/15
MY2 05/14/14
MY1 05/09/13
% Total
% Cumulative
Particle Size (mm)
<.062
0.062 - .125
.125 - .25
.25 - .50
.50 - 1.0
1.0 - 2
2 - 4
4 - 5.7
5.7 - 8
8 - 11.3
11.3 - 16
16 - 22.6
22.6 - 32
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 1024
1024 - 2048
Bedrock

Fletcher -Upper Reach - XSC-3 Riffle Pebble Count

Location: STA 15+23

Inches	Particle	Millimeters		Count	%Total	% Cum.
	Silt/Clay	<.062	SILT/CLAY	7	7.0	7.0
	Very Fine	0.062 - .125	SAND	5	5.0	12.0
	Fine	.125 - .25		15	15.0	27.0
	Medium	.25 - .50		5	5.0	32.0
	Coarse	.50 - 1.0		4	4.0	36.0
.04 - .08	Very Coarse	1.0 - 2		1	1.0	37.0
.08 - .16	Very Fine	2 - 4	GRAVEL	19	19.0	56.0
.16 - .22	Fine	4 - 5.7		5	5.0	61.0
.22 - .31	Fine	5.7 - 8		19	19.0	80.0
.31 .44	Medium	8 - 11.3		15	15.0	95.0
.44 - .63	Medium	11.3 - 16		5	5.0	100.0
.63 - .89	Coarse	16 - 22.6		0	0.0	100.0
.89 - 1.26	Coarse	22.6 - 32		0	0.0	100.0
1.26 - 1.77	Very Coarse	32 - 45		0	0.0	100.0
1.77 - 2.5	Very Coarse	45 - 64		0	0.0	100.0
2.5 - 3.5	Small	64 - 90	COBBLE	0	0.0	100.0
3.5 - 5.0	Small	90 - 128		0	0.0	100.0
5.0 - 7.1	Large	128 - 180		0	0.0	100.0
7.1 - 10.1	Large	180 - 256		0	0.0	100.0
10.1 - 14.3	Small	256 - 362	BOULDER	0	0.0	100.0
14.3 - 20	Small	362 - 512		0	0.0	100.0
20 - 40	Medium	512 - 1024		0	0.0	100.0
40 - 80	Large - Very Lg	1024 - 2048		0	0.0	100.0
	Bedrock	Bedrock		0	0.0	100.0
			Total Counted	100		

Summary Data	MY3	MY2	MY1
D50	3.2	0.5	3
D84	8.7	8.3	8
D95	11	11	10

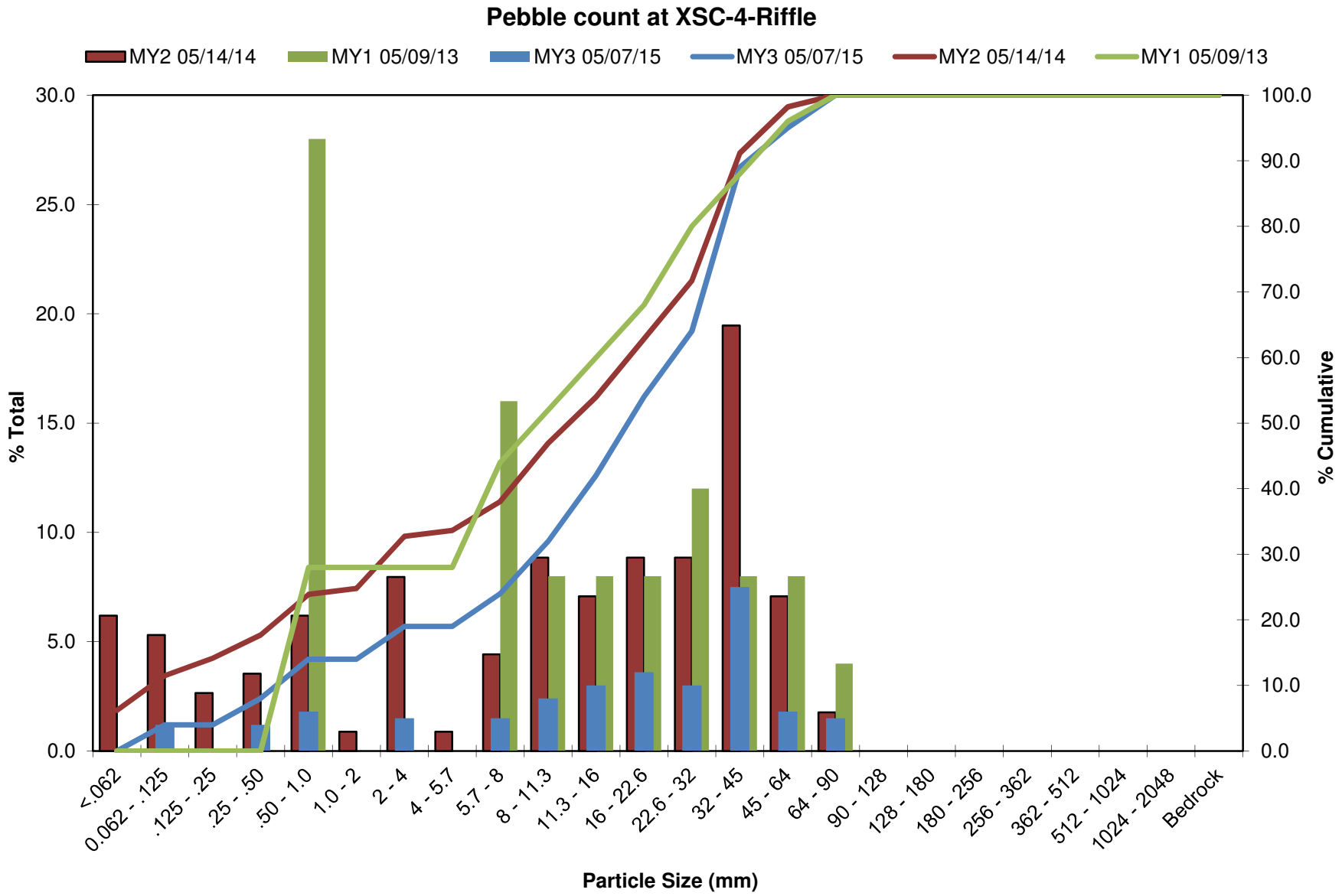

Pebble count at XSC-3-Riffle
MY2 05/14/14
MY1 05/09/13
MY3 05/07/15
MY3 05/07/15
MY2 05/14/14
MY1 05/09/13
% Total
% Cumulative
Particle Size (mm)
<.062
0.062 - .125
.125 - .25
.25 - .50
.50 - 1.0
1.0 - 2
2 - 4
4 - 5.7
5.7 - 8
8 - 11.3
11.3 - 16
16 - 22.6
22.6 - 32
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 1024
1024 - 2048
Bedrock

Fletcher -Lower Reach - XSC-4 Riffle Pebble Count

Location: STA 14+55

Inches	Particle	Millimeters		Count	%Total	% Cum.
	Silt/Clay	<.062	SILT/CLAY	0	0.0	0.0
	Very Fine	0.062 - .125	SAND	4	4.0	4.0
	Fine	.125 - .25		0	0.0	4.0
	Medium	.25 - .50		4	4.0	8.0
	Coarse	.50 - 1.0		6	6.0	14.0
.04 - .08	Very Coarse	1.0 - 2		0	0.0	14.0
.08 - .16	Very Fine	2 - 4	GRAVEL	5	5.0	19.0
.16 - .22	Fine	4 - 5.7		0	0.0	19.0
.22 - .31	Fine	5.7 - 8		5	5.0	24.0
.31 .44	Medium	8 - 11.3		8	8.0	32.0
.44 - .63	Medium	11.3 - 16		10	10.0	42.0
.63 - .89	Coarse	16 - 22.6		12	12.0	54.0
.89 - 1.26	Coarse	22.6 - 32		10	10.0	64.0
1.26 - 1.77	Very Coarse	32 - 45		25	25.0	89.0
1.77 - 2.5	Very Coarse	45 - 64		6	6.0	95.0
2.5 - 3.5	Small	64 - 90	COBBLE	5	5.0	100.0
3.5 - 5.0	Small	90 - 128		0	0.0	100.0
5.0 - 7.1	Large	128 - 180		0	0.0	100.0
7.1 - 10.1	Large	180 - 256		0	0.0	100.0
10.1 - 14.3	Small	256 - 362	BOULDER	0	0.0	100.0
14.3 - 20	Small	362 - 512		0	0.0	100.0
20 - 40	Medium	512 - 1024		0	0.0	100.0
40 - 80	Large - Very Lg	1024 - 2048		0	0.0	100.0
	Bedrock	Bedrock		0	0.0	100.0
			Total Counted	100		

Summary Data	MY3	MY2	MY1
D50	20	13	10
D84	42	40	38
D95	64	54	61


Pebble count at XSC-4-Riffle
MY2 05/14/14
MY1 05/09/13
MY3 05/07/15
MY3 05/07/15
MY2 05/14/14
MY1 05/09/13
% Total
% Cumulative
Particle Size (mm)
<.062
0.062 - .125
.125 - .25
.25 - .50
.50 - 1.0
1.0 - 2
2 - 4
4 - 5.7
5.7 - 8
8 - 11.3
11.3 - 16
16 - 22.6
22.6 - 32
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 1024
1024 - 2048
Bedrock

Fletcher -Lower Reach - XSC-6 Riffle Pebble Count

Location: STA 17+89

Inches	Particle	Millimeters		Count	%Total	% Cum.
	Silt/Clay	<.062	SILT/CLAY	1	1.0	1.0
	Very Fine	0.062 - .125	SAND	3	3.0	4.0
	Fine	.125 - .25		7	7.0	11.0
	Medium	.25 - .50		5	5.0	16.0
	Coarse	.50 - 1.0		0	0.0	16.0
.04 - .08	Very Coarse	1.0 - 2		0	0.0	16.0
.08 - .16	Very Fine	2 - 4	GRAVEL	5	5.0	21.0
.16 - .22	Fine	4 - 5.7		2	2.0	23.0
.22 - .31	Fine	5.7 - 8		1	1.0	24.0
.31 .44	Medium	8 - 11.3		8	8.0	32.0
.44 - .63	Medium	11.3 - 16		4	4.0	36.0
.63 - .89	Coarse	16 - 22.6		28	28.0	64.0
.89 - 1.26	Coarse	22.6 - 32		30	30.0	94.0
1.26 - 1.77	Very Coarse	32 - 45		6	6.0	100.0
1.77 - 2.5	Very Coarse	45 - 64		0	0.0	100.0
2.5 - 3.5	Small	64 - 90	COBBLE	0	0.0	100.0
3.5 - 5.0	Small	90 - 128		0	0.0	100.0
5.0 - 7.1	Large	128 - 180		0	0.0	100.0
7.1 - 10.1	Large	180 - 256		0	0.0	100.0
10.1 - 14.3	Small	256 - 362	BOULDER	0	0.0	100.0
14.3 - 20	Small	362 - 512		0	0.0	100.0
20 - 40	Medium	512 - 1024		0	0.0	100.0
40 - 80	Large - Very Lg	1024 - 2048		0	0.0	100.0
	Bedrock	Bedrock		0	0.0	100.0
			Total Counted	100		

Summary Data	MY3	MY2	MY1
D50	19	17	0.6
D84	28	26	16
D95	34	31	20

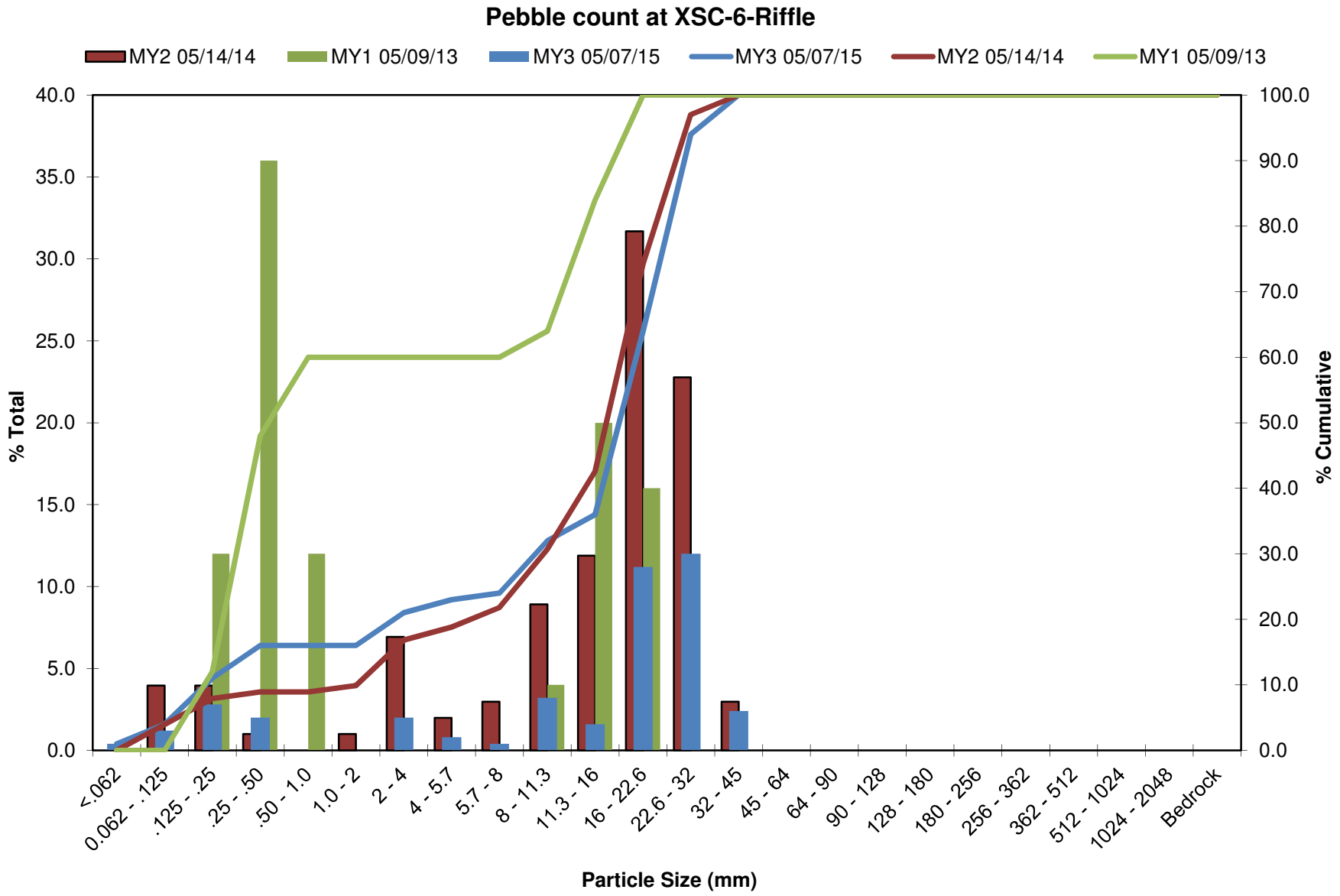

Pebble count at XSC-6-Riffle
MY2 05/14/14
MY1 05/09/13
MY3 05/07/15
MY3 05/07/15
MY2 05/14/14
MY1 05/09/13
% Total
% Cumulative
Particle Size (mm)
<.062
0.062 - .125
.125 - .25
.25 - .50
.50 - 1.0
1.0 - 2
2 - 4
4 - 5.7
5.7 - 8
8 - 11.3
11.3 - 16
16 - 22.6
22.6 - 32
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 1024
1024 - 2048
Bedrock

Exhibit Table 10a. Monitoring Data - Stream Reach Data Summary
Fletcher-Meritor (UT to Cane Creek) Stream and Wetland Restoration/Proj. No. 138 - Upper Reach (1838 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)	14.50	14.80		15.10		2	14.00	14.20		14.40		2	12.60	13.15		13.70		2	11.60	13.20		14.80		2												
Floodprone Width (ft)	53.00			>86.00		2	65.20			>86.00		2	>86.00			98.40		2	>86.00			94.40		2												
Bankfull Mean Depth (ft)	1.26	1.37		1.47		2	1.19	1.33		1.47		2	1.13	1.30		1.47		2	1.22	1.31		1.39		2												
[1]Bankfull Max Depth (ft)	1.80	2.00		2.20		2	2.01	2.15		2.29		2	2.23	2.57		2.91		2	2.29	2.62		2.95		2												
Bankfull Cross Sectional Area (ft^2)	19.10	20.20		21.30		2	16.70	18.95		21.20		2	14.20	17.15		20.10		2	14.20	14.50		14.80		2												
Width/Depth Ratio	9.87	10.91		11.94		2	9.78	10.76		11.74		2	9.34	10.26		11.18		2	9.48	10.08		10.68		2												
Entrenchment Ratio	3.50			>6.00		2	4.70			>6.00		2	>6.00			7.81		2	>6.00			8.14		2												
[1]Bank Height Ratio	1.00	1.00		1.00		2	0.99	1.01		1.03		2	0.95	0.99		1.03		2	0.99	1.02		1.05		**2**												
Profile																																				
Riffle Length (ft)	11.48	25.61	23.29	45.54	14.93	6	5.05	15.63	15.69	30.45	6.75	16	6.09	12.22	10.87	21.75	5.02	12	7.76	15.12	14.70	26.01	6.29	6												
Riffle Slope (ft/ft)	0.0025	0.0075	0.0040	0.0203	0.7100	6	0.0014	0.0069	0.0056	0.0143	0.0039	16	0.0027	0.0126	0.0092	0.0266	0.0087	12	0.0065	0.0150	0.0145	0.0264	0.0066	6												
Pool Length (ft)	14.20	28.75	21.87	63.10	18.63	6	16.08	26.33	26.06	45.58	7.52	22	18.83	37.53	32.47	72.47	17.89	12	11.42	27.82	28.01	42.64	9.34	14												
Pool Max depth (ft)	2.63	2.93	2.83	3.56	0.36	6	2.89	3.48	3.40	5.08	0.50	22	2.50	3.32	3.32	3.94	0.49	12	3.12	3.63	3.52	4.68	0.44	14												
Pool Spacing (ft)	61.00	70.58	68.71	89.47	21.50	5	48.97	72.69	72.45	139.12	20.52	18	54.28	96.85	92.86	153.10	30.88	10	54.52	72.12	71.04	88.50	10.68	10												
Pattern																																				
Channel Beltwidth (ft)	33.00	48.40	44.80	75.00	11.08	22																														
Radius of Curvature (ft)	30.00	37.70	40.00	40.00	4.30	22																														
Rc:Bankfull width (ft/ft)	2.03	2.55	2.70	2.70	0.29	22																														
Meander Wavelength (ft)	101.00	129.70	130.00	180.00	16.68	21																														
Meander Width Ratio	2.22	3.27	3.03	5.03	0.75	22																														

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	C/E4						C/E4						C/E4						C/E5																	
Channel Thalweg length (ft)	1838						1838						1838						1838																	
Sinuosity (ft)	1.18						1.18						1.18						1.18																	
Water Surface Slope (Channel) (ft/ft)	0.0025						0.0025						0.0027						0.0033																	
BF slope (ft/ft)	0.0027						0.0025						0.0028						0.0028																	
[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							4						3						3																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Exhibit Table 10b. Monitoring Data - Stream Reach Data Summary
Fletcher-Meritor (UT to Cane Creek) Stream and Wetland Restoration/Proj. No. 138 - Lower Reach (1779 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)	17.20	18.49		19.77		2	16.10	19.35		22.60		2	15.50	15.80		16.10		2	17.70	17.75		17.80		2												
Floodprone Width (ft)	97.90	117.63		137.36		2	101.50	117.20		132.80		2	98.50	115.50		132.50		2	102.00	120.15		138.30		2												
Bankfull Mean Depth (ft)	1.36	1.56		1.75		2	1.21	1.41		1.61		2	1.39	1.46		1.53		2	1.40	1.44		1.48		2												
[1]Bankfull Max Depth (ft)	2.20	2.34		2.47		2	2.46	2.51		2.56		2	2.39	2.43		2.47		2	2.65	2.68		2.71		2												
Bankfull Cross Sectional Area (ft^2)	23.40	28.95		34.50		2	26.00	26.65		27.30		2	22.40	23.05		23.70		2	25.00	25.60		26.20		2												
Width/Depth Ratio	11.32	11.99		12.65		2	9.97	14.34		18.71		2	10.14	10.86		11.57		2	11.96	12.32		12.67		2												
Entrenchment Ratio	5.69	6.32		6.95		2	4.50	6.35		8.20		2	6.12	7.34		8.55		2	5.73	6.77		7.81		2												
[1]Bank Height Ratio	1.00	1.00		1.00		2	1.00	1.02		1.04		2	1.04	1.05		1.05		2	0.97	0.98		0.99		**2**												
Profile																																				
Riffle Length (ft)	7.73	23.60	24.49	43.50	11.37	10	9.66	20.98	19.59	33.68	8.34	8	7.10	13.65	12.21	30.00	6.29	14	7.98	16.62	14.15	34.20	7.57	14												
Riffle Slope (ft/ft)	0.0035	0.0094	0.0094	0.0172	0.4000	10	0.0013	0.0099	0.0080	0.0309	0.0096	8	0.0036	0.0115	0.0090	0.0267	0.0070	14	0.0010	0.0087	0.0080	0.0142	0.0035	14												
Pool Length (ft)	22.25	37.41	38.04	56.23	11.18	10	16.53	36.61	37.07	57.69	11.80	12	19.43	39.46	42.71	64.25	14.61	10	11.13	31.06	25.58	62.56	17.33	14												
Pool Max depth (ft)	3.13	3.44	3.42	3.85	0.22	10	3.39	3.74	3.66	4.22	0.26	12	3.11	3.45	3.47	3.85	0.23	10	3.06	3.78	3.76	4.52	0.40	14												
Pool Spacing (ft)	44.30	74.46	82.61	90.34	16.55	7	53.27	90.62	89.29	130.65	23.89	12	75.37	102.42	94.74	139.50	26.67	8	34.23	84.98	74.46	139.12	36.67	12												
Pattern																																				
Channel Beltwidth (ft)	36.00	65.30	69.00	83.00	13.68	16																														
Radius of Curvature (ft)	35.00	42.20	45.00	45.00	3.64	16																														
Rc:Bankfull width (ft/ft)	1.89	2.28	2.43	2.43	0.20	16																														
Meander Wavelength (ft)	128.00	167.70	172.00	193.00	18.30	12																														
Meander Width Ratio	1.95	3.53	3.73	4.49	0.74	16																														
Additional Reach Parameters																																				
Rosgen Classification	C/E4						C/E4						C/E4						C/E5																	
Channel Thalweg length (ft)	1779						1779						1779						1779																	
Sinuosity (ft)	1.23						1.23						1.23						1.23																	
Water Surface Slope (Channel) (ft/ft)	0.0027						0.0022						0.0021						0.0021																	
BF slope (ft/ft)	0.0024						0.0026						0.0023						0.0025																	
[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							14						3						3																	
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

Exhibit Table 10c. Monitoring Data - Stream Reach Data Summary
Fletcher-Meritor (UT to Cane Creek) Stream and Wetland Restoration/Proj. No. 138 - Tributary (648 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)	8.33	8.79		9.24		2	7.90	8.15		8.40		2	7.40	7.50		7.60		2	9.20	9.55		9.90		2												
Floodprone Width (ft)	22.32	23.62		24.91		2	25.20	26.70		28.20		2	27.40	28.30		29.20		2	34.02	39.51		45.00		2												
Bankfull Mean Depth (ft)	0.82	0.83		0.83		2	0.86	0.96		1.06		2	0.80	0.98		1.15		2	1.12	1.20		1.27		2												
[1]Bankfull Max Depth (ft)	1.19	1.22		1.25		2	1.34	1.56		1.78		2	1.67	1.82		1.96		2	1.87	2.07		2.26		2												
Bankfull Cross Sectional Area (ft^2)	6.80	7.22		7.63		2	7.20	7.80		8.40		2	6.10	7.30		8.50		2	10.30	11.45		12.60		2												
Width/Depth Ratio	10.21	10.70		11.19		2	7.43	8.67		9.90		2	6.44	7.96		9.47		2	7.78	8.00		8.22		2												
Entrenchment Ratio	2.68	2.69		2.70		2	3.00	3.30		3.60		2	3.61	3.78		3.95		2	3.70	4.13		4.55		2												
[1]Bank Height Ratio	1.00	1.00		1.00		2	1.00	1.15		1.30		2	0.97	1.07		1.16		2	0.89	0.96		1.03		**2**												
Profile																																				
Riffle Length (ft)	13.84	18.32	18.80	21.90	2.89	9	7.12	11.92	11.85	18.65	4.00	7	4.10	8.67	6.61	17.57	5.14	7	3.68	7.60	4.76	20.13	6.22	8												
Riffle Slope (ft/ft)	0.0087	0.0142	0.0144	0.0220	0.5800	9	0.0043	0.0168	0.0164	0.0365	0.0110	6	0.0117	0.0223	0.0224	0.0307	0.0064	7	0.0048	0.0226	0.0168	0.0612	0.0199	8												
Pool Length (ft)	13.03	22.26	17.58	36.76	9.30	10	11.93	19.42	18.89	30.90	5.52	11	11.47	15.70	13.06	27.45	5.25	9	10.90	15.36	13.72	25.08	4.70	8												
Pool Max depth (ft)	1.45	1.89	1.93	2.40	0.32	10	2.38	2.88	2.90	3.39	0.39	8	2.31	2.81	2.72	3.44	0.37	9	2.69	3.28	3.24	4.22	0.54	9												
Pool Spacing (ft)	36.53	52.91	56.00	60.11	9.09	9	27.34	55.55	57.06	78.07	15.28	10	35.86	54.00	53.54	77.56	12.96	8	31.53	51.44	52.94	63.56	12.03	6												
Pattern																																				
Channel Beltwidth (ft)	26.00	39.20	38.00	55.00	8.33	10																														
Radius of Curvature (ft)	25.00	25.00	25.00	25.00	0.00	12																														
Rc:Bankfull width (ft/ft)	2.84	2.84	2.84	2.84	0.00	12																														
Meander Wavelength (ft)	77.00	92.90	96.00	102.00	8.63	10																														
Meander Width Ratio	2.96	4.46	4.32	6.26	0.95	10																														

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	C/E4						C/E4						C/E4						C/E5																	
Channel Thalweg length (ft)	648						648						648						648																	
Sinuosity (ft)	1.22						1.22						1.22						1.22																	
Water Surface Slope (Channel) (ft/ft)	0.0114						0.0118						0.0119						0.0112																	
BF slope (ft/ft)	0.0118						0.0120						0.0116						0.0116																	
[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							3						19						19																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

Fletcher-Meritor (UT to Cane Creek) Stream and Wetland Restoration/Proj. No. 138 - Upper Reach (1838 ft), Lower Reach (1779 ft), Tributary (648 ft)

	Cross Section 1 (Upper, Riffle)							Cross Section 2 (Upper, Pool)							Cross Section 3 (Upper, Riffle)							Cross Section 4 (Lower, Riffle)							Cross Section 5 (Lower, Pool)						
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	2058.90	2058.90	2058.90	2058.90				2058.61	2058.61	2058.61	2058.61				2058.74	2058.74	2058.74	2058.74				2053.74	2053.74	2053.74	2053.74				2053.32	2053.32	2053.32	2053.32			
Bankfull Width (ft)	15.10	14.00	12.60	11.60				21.90	21.90	21.40	19.50				14.50	14.40	13.70	14.80				19.77	16.10	15.50	17.70				26.16	25.70	23.60	27.10			
Floodprone Width (ft)	53.00	65.20	98.40	94.40				>86.00	>86.00	>86.00	>86.00				>86.00	>86.00	>86.00	>86.00				137.36	132.80	132.50	138.30				83.70	84.30	83.00	84.90			
Bankfull Mean Depth (ft)	1.26	1.19	1.13	1.22				1.25	1.18	1.17	1.08				1.47	1.47	1.47	1.39				1.75	1.61	1.53	1.48				1.45	1.38	1.23	1.25			
Bankfull Max Depth (ft)	1.80	2.01	2.23	2.29				3.10	3.07	3.03	3.08				2.20	2.29	2.91	2.95				2.47	2.46	2.47	2.71				3.31	3.22	3.19	3.34			
Bankfull Cross Sectional Area (ft^2)	19.10	16.70	14.20	14.20				27.40	25.80	25.10	21.00				21.30	21.20	20.10	20.50				34.50	26.00	23.70	26.20				37.88	35.50	29.00	33.80			
Bankfull Width/Depth Ratio	11.94	11.74	11.18	9.48				17.50	18.59	18.25	18.11				9.87	9.78	9.34	10.68				11.32	9.97	10.14	11.96				18.07	18.61	19.21	21.73			
Bankfull Entrenchment Ratio	3.50	4.70	7.81	8.14				>4.00	>4.00	>4.00	>4.00				>6.00	>6.00	>6.00	>6.00				6.95	8.20	8.55	7.81				3.20	3.30	3.52	3.13			
Bankfull Bank Height Ratio	1.00	0.99	0.95	0.99				1.00	1.15	0.94	1.06				1.00	1.03	1.03	1.05				1.00	1.04	1.05	0.99				1.00	1.00	1.08	0.98			
Based on current/developing bankfull feature[2]																																				
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																																				
Bankfull Bank Height Ratio																																				
Cross Sectional Area between end pins (ft^2)																																				
d50 (mm)																																				

	Cross Section 6 (Lower, Riffle)							Cross Section 7 (Tributary, Riffle)							Cross Section 8 (Tributary, Riffle)							Cross Section 9 (Tributary, Pool)													
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	2053.03	2053.03	2053.03	2053.03				2059.00	2059.00	2059.00	2059.00				2058.45	2058.45	2058.45	2058.45				2057.55	2057.55	2057.55	2057.55										
Bankfull Width (ft)	17.20	22.60	16.10	17.80				9.24	8.40	7.60	9.20				8.33	7.90	7.40	9.90				12.81	10.50	7.40	8.10										
Floodprone Width (ft)	97.90	101.50	98.50	102.00				24.91	25.20	27.40	34.02				22.32	28.20	29.20	45.00				25.89	31.00	32.60	34.70										
Bankfull Mean Depth (ft)	1.36	1.21	1.39	1.40				0.83	0.86	0.80	1.12				0.82	1.06	1.15	1.27				0.93	1.13	1.32	1.60										
Bankfull Max Depth (ft)	2.20	2.56	2.39	2.65				1.25	1.34	1.67	1.87				1.19	1.78	1.96	2.26				2.04	2.51	2.62	2.94										
Bankfull Cross Sectional Area (ft^2)	23.40	27.30	22.40	25.00				7.63	7.20	6.10	10.30				6.80	8.40	8.50	12.60				11.96	11.90	9.80	13.00										
Bankfull Width/Depth Ratio	12.65	18.71	11.57	12.67				11.19	9.90	9.47	8.22				12.21	7.43	6.44	7.78				13.71	9.26	5.59	5.05										
Bankfull Entrenchment Ratio	5.69	4.50	6.12	5.73				2.70	3.00	3.61	3.70				2.68	3.60	3.95	4.55				2.02	2.90	4.41	4.28										
Bankfull Bank Height Ratio	1.00	1.00	1.04	0.97				1.00	1.30	1.16	1.03				1.00	1.00	0.97	0.89				1.00	0.89	0.95	0.98										
Based on current/developing bankfull feature[2]																																				
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																																				
Bankfull Bank Height Ratio																																				
Cross Sectional Area between end pins (ft^2)																																				
d50 (mm)																																				

1 = Widths and depths for monitoring resurvey 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."

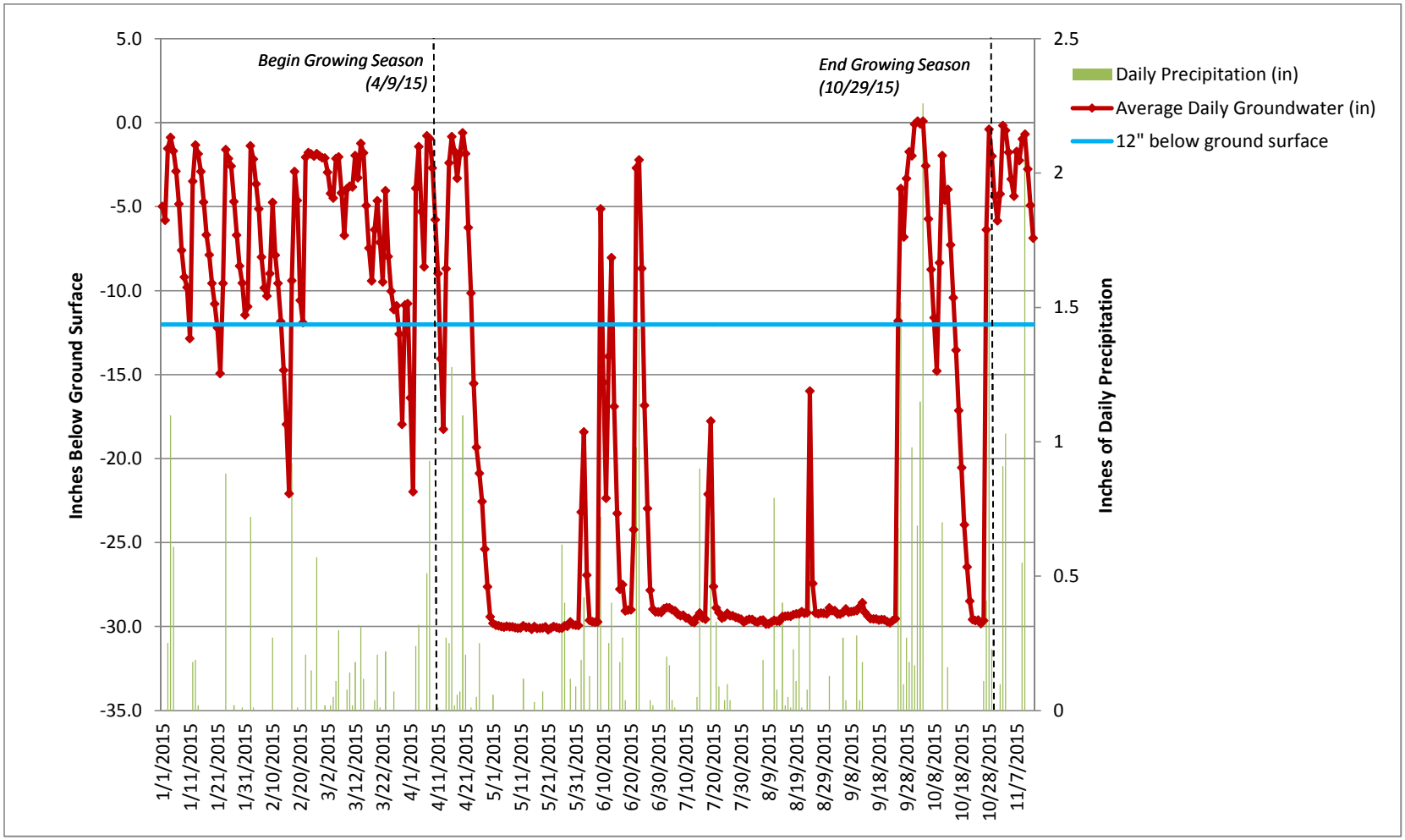
2 = Based on the elevation of any dominant depositional feature that develops and is observed at the time of survey. If the baseline datum remains the only significant depositional feature then these two sets of dimensional parameters will be equal, however, if another depositional feature of significance develops above or below the baseline bankfull datum then this should be tracked and quantified in these cells.

Appendix E

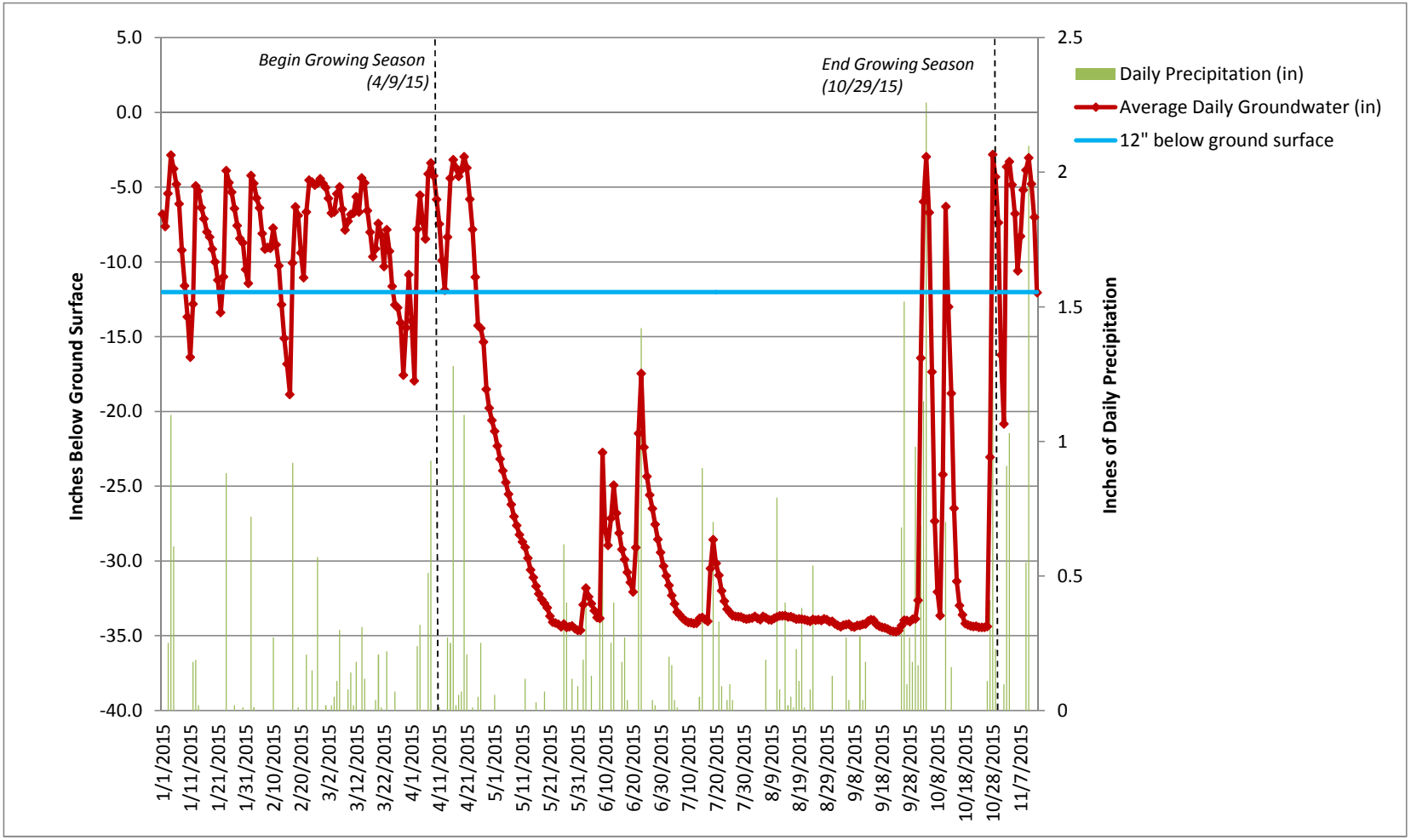
Hydrologic Data

Table 12. Verification of Bankfull Events			
Fletcher Meritor Site (UT to Cane Creek)/ 138 Segment/Reach: feet			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo**
9/18/2012	9/18/2012	Visual observation of bankfull event during monitoring	
5/7/2013	5/6/2013 - 5/7/2013	Visual observation of bankfull event during monitoring	
5/7/2013	Unknown	Stream gauges	
5/13/2014	Unknown	Stream gauges (3 events on the tributary reach and 2 on the main reach)	
5/7/2015	Unknown	Stream gauges and observation of bankfull event debris	See below

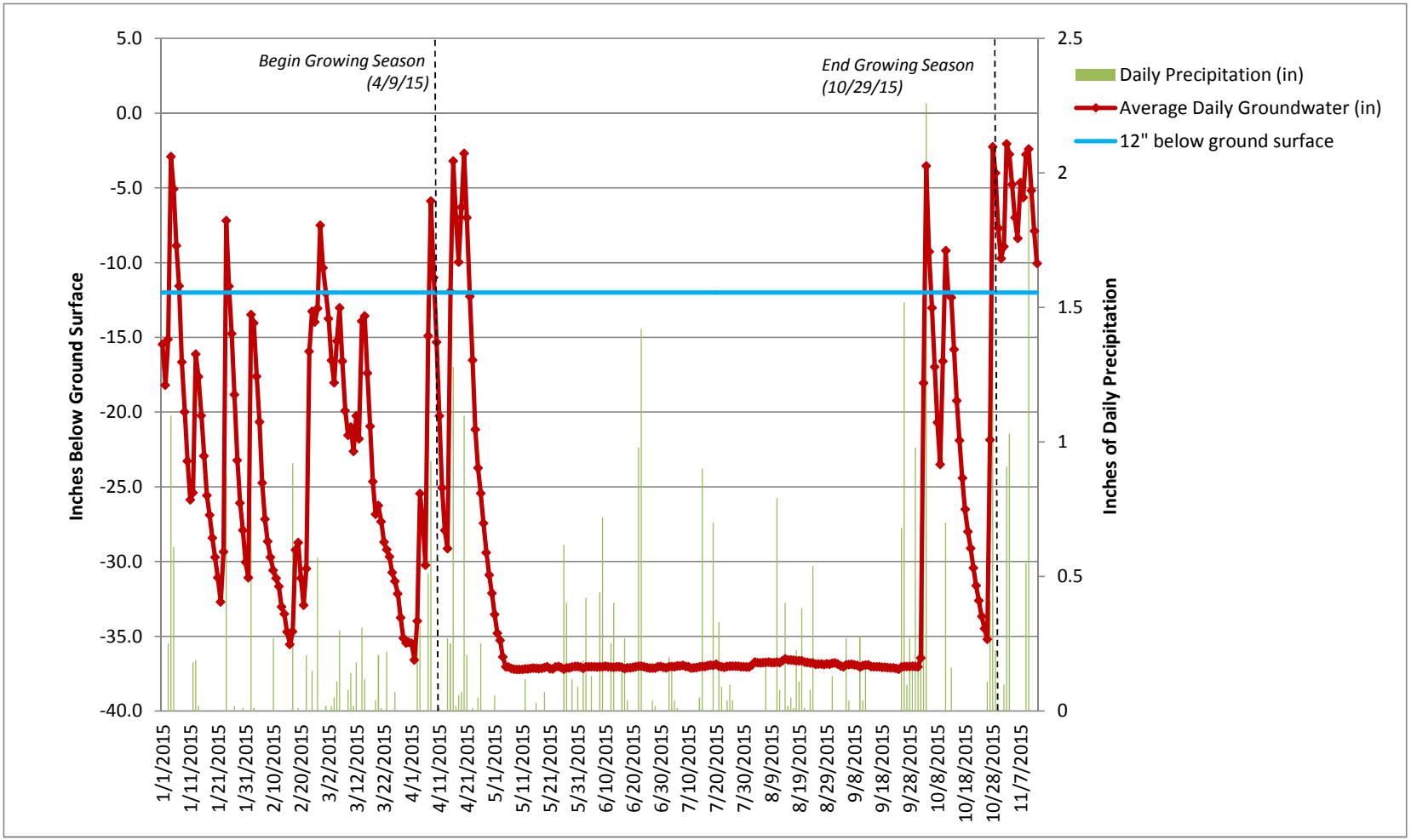
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	13D4CA2A
Gauge ID :	1



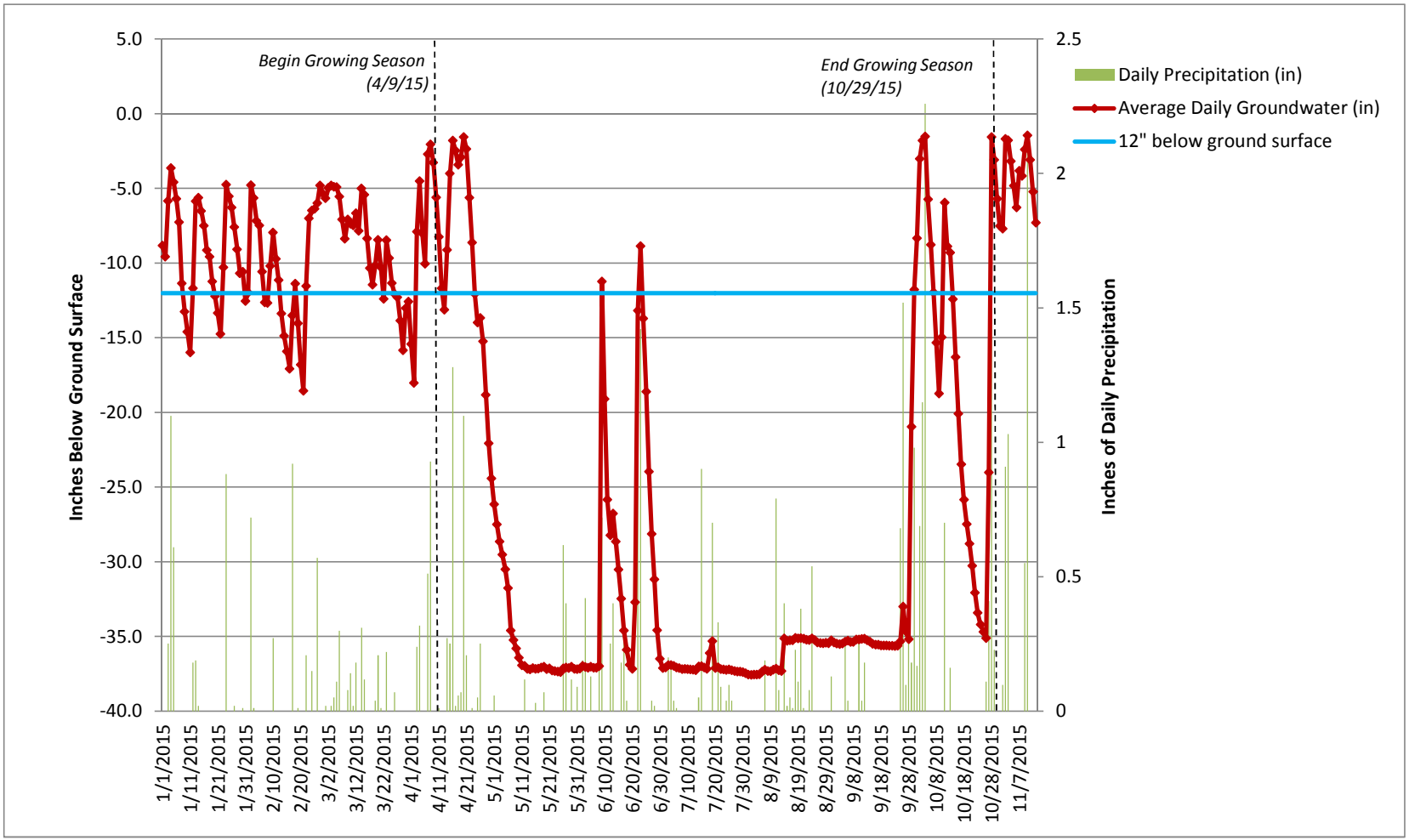
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	11311987
Gauge ID :	2



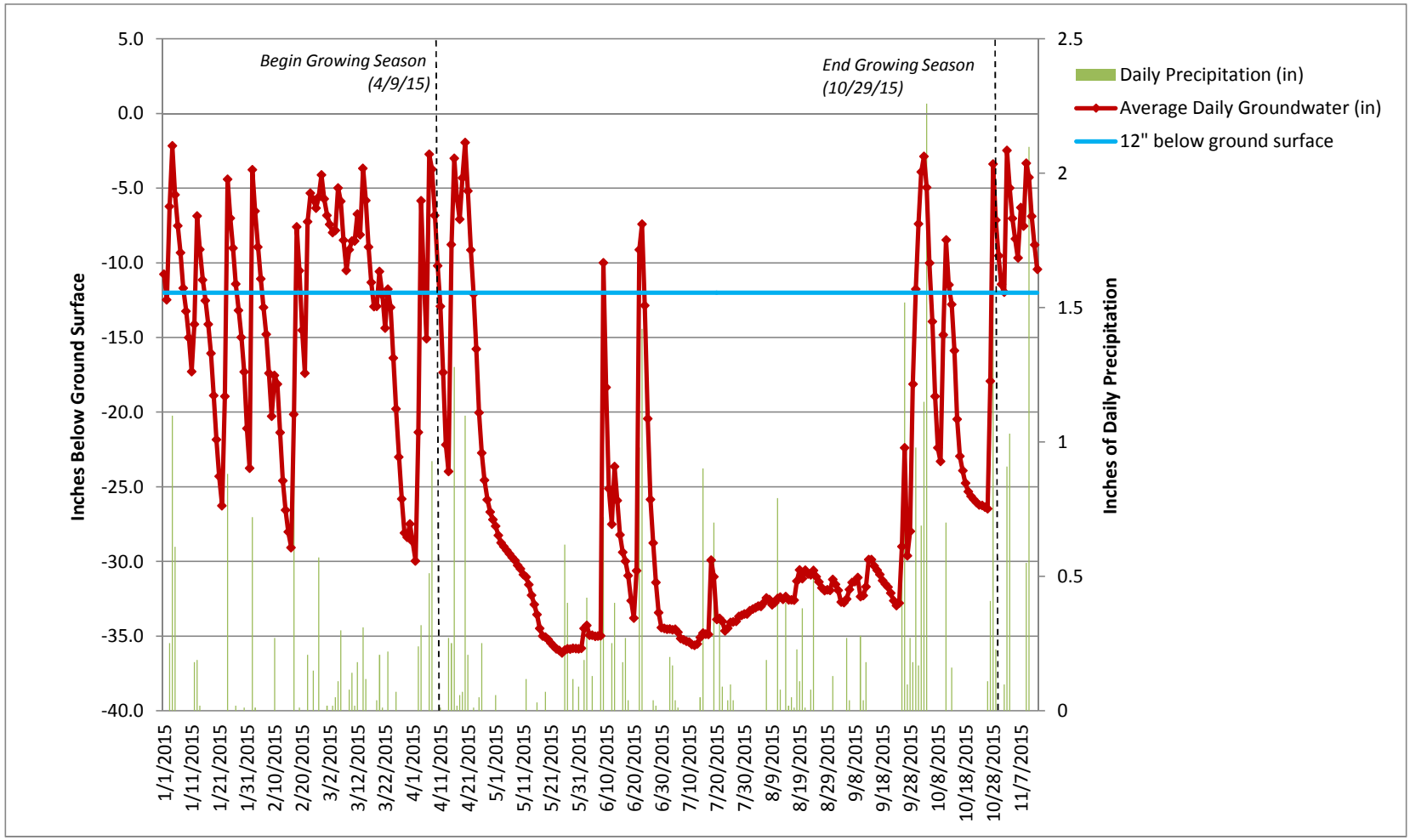
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	1130DD07
Gauge ID :	3



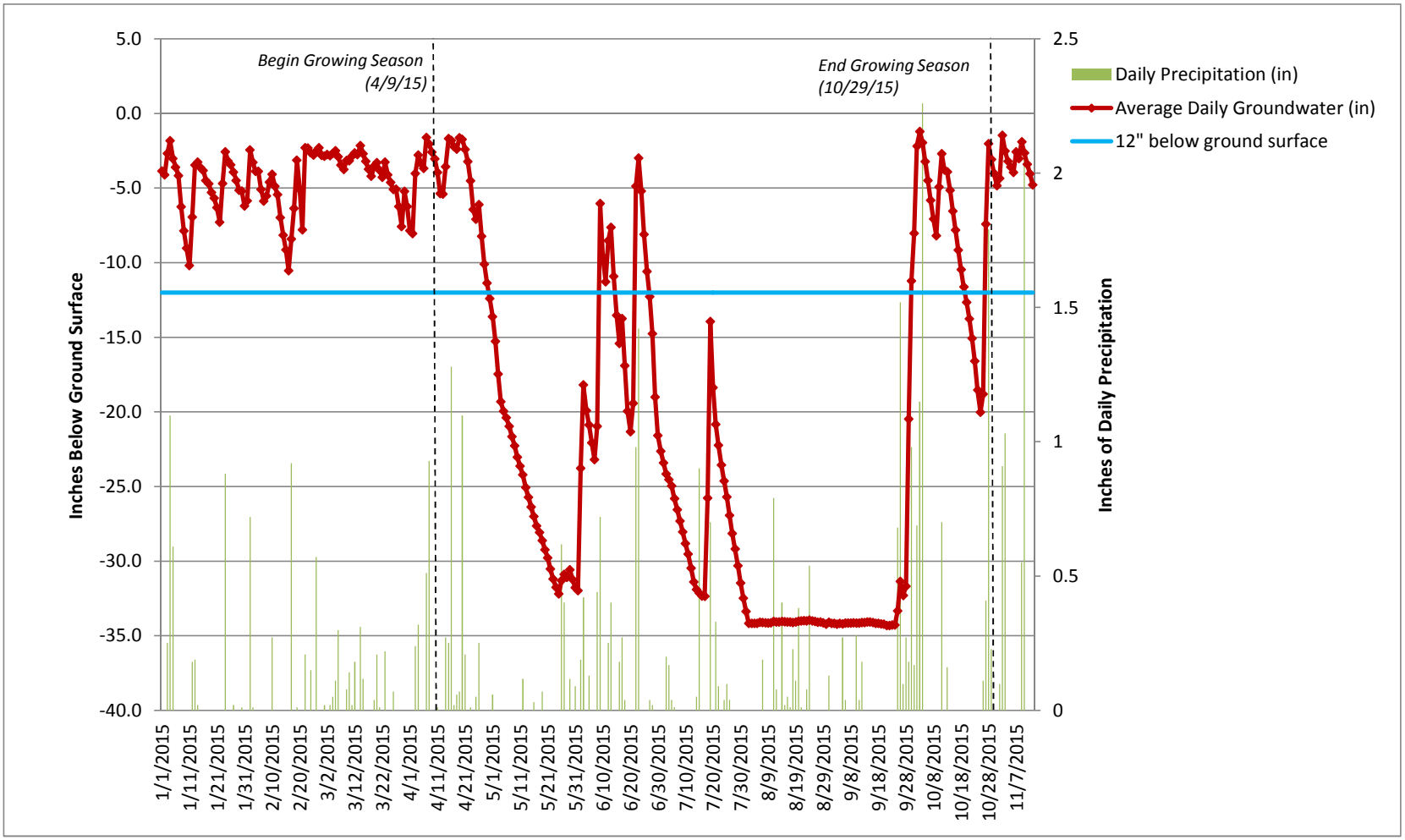
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	14E17875
Gauge ID :	4



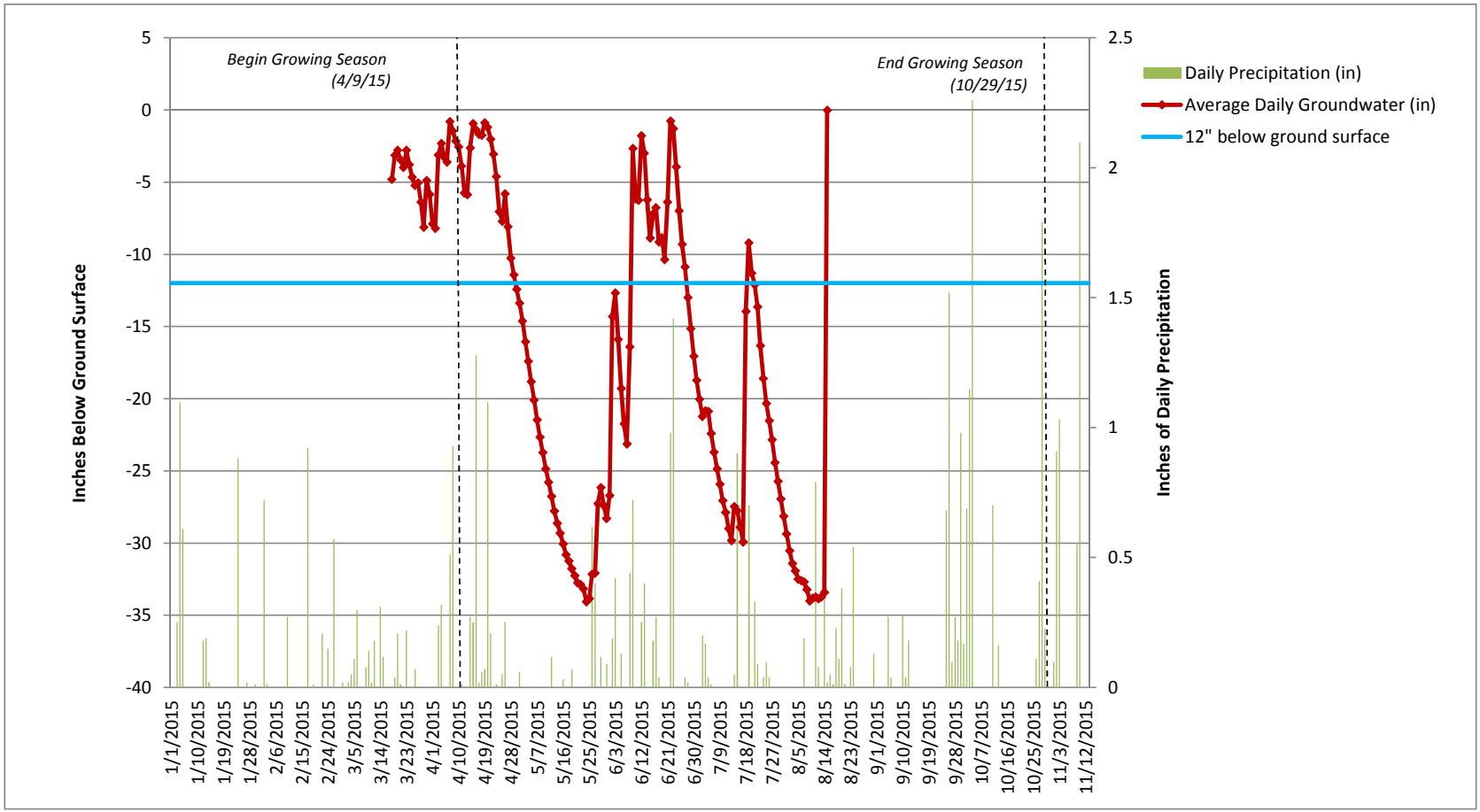
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	138BE816
Gauge ID :	5



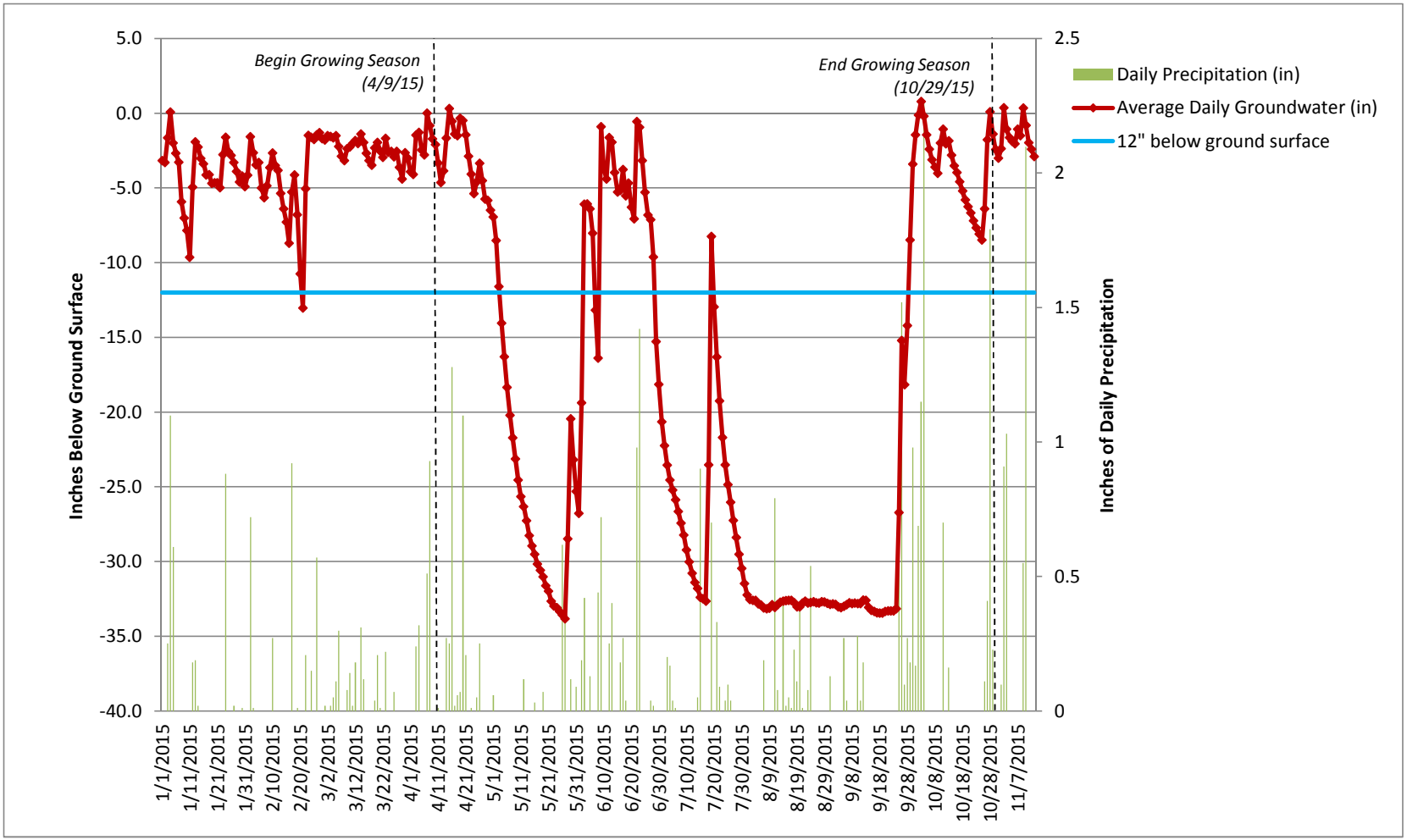
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	11313B57
Gauge ID :	6



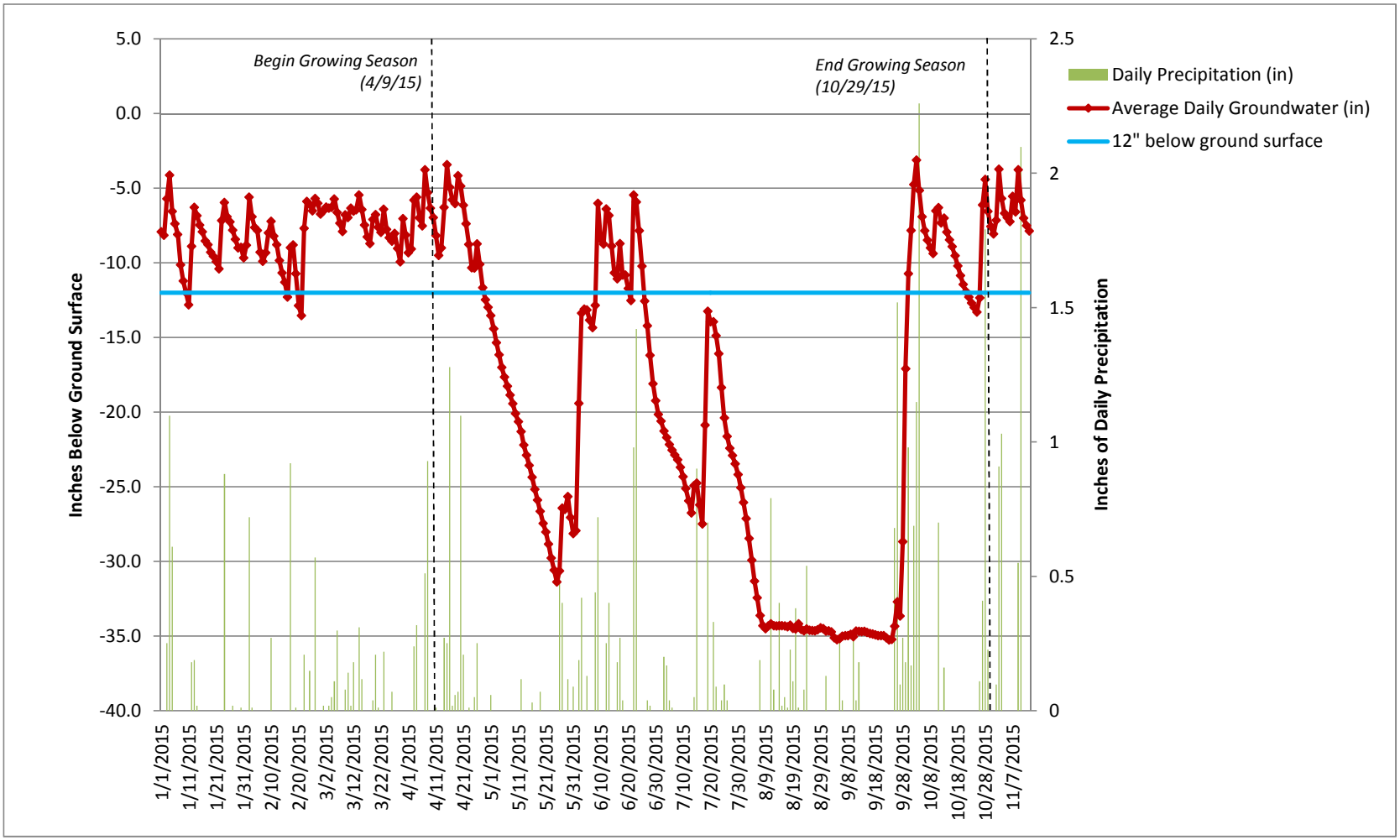
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	9BEBF83
Gauge ID :	7



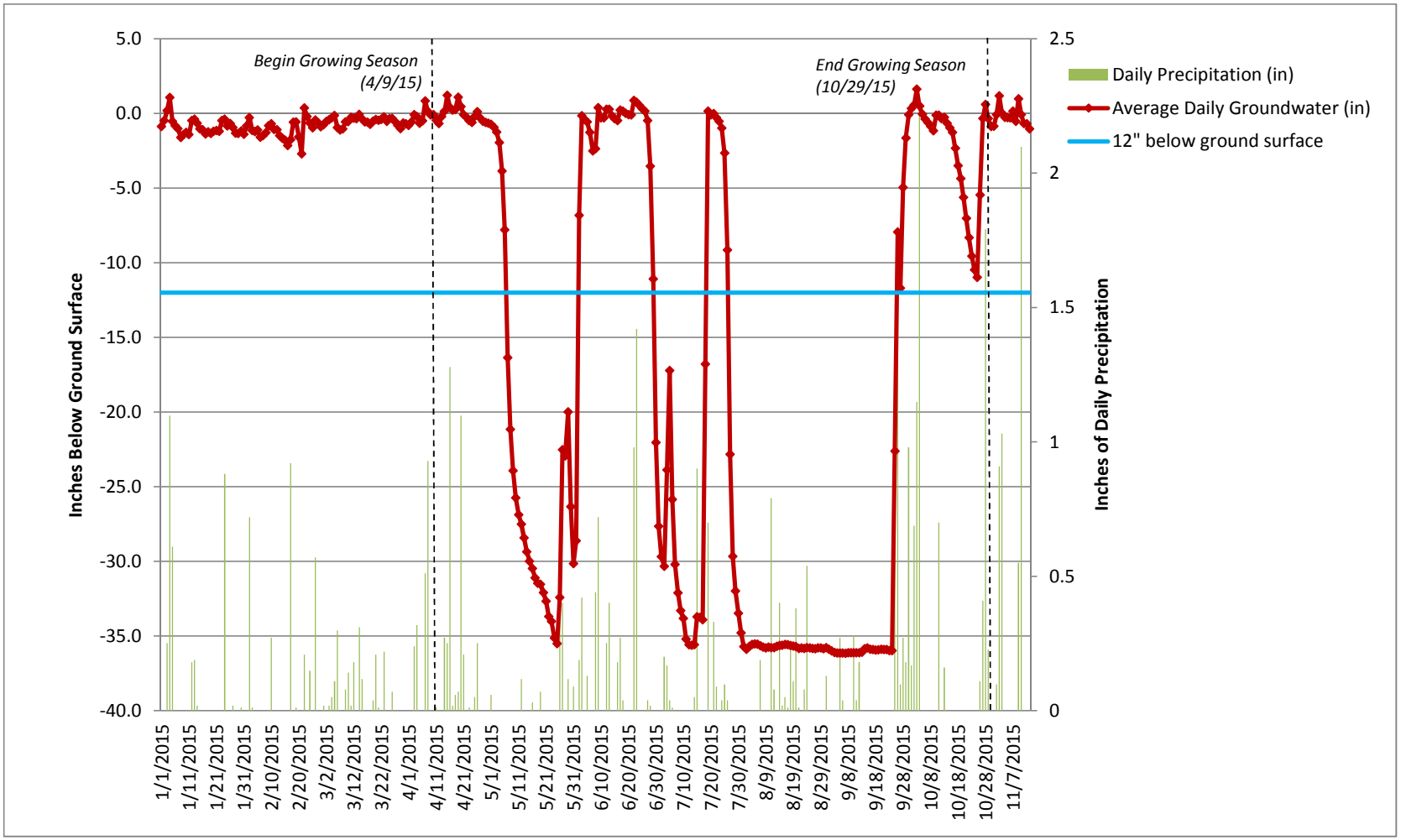
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	9BEBF83
Gauge ID :	8



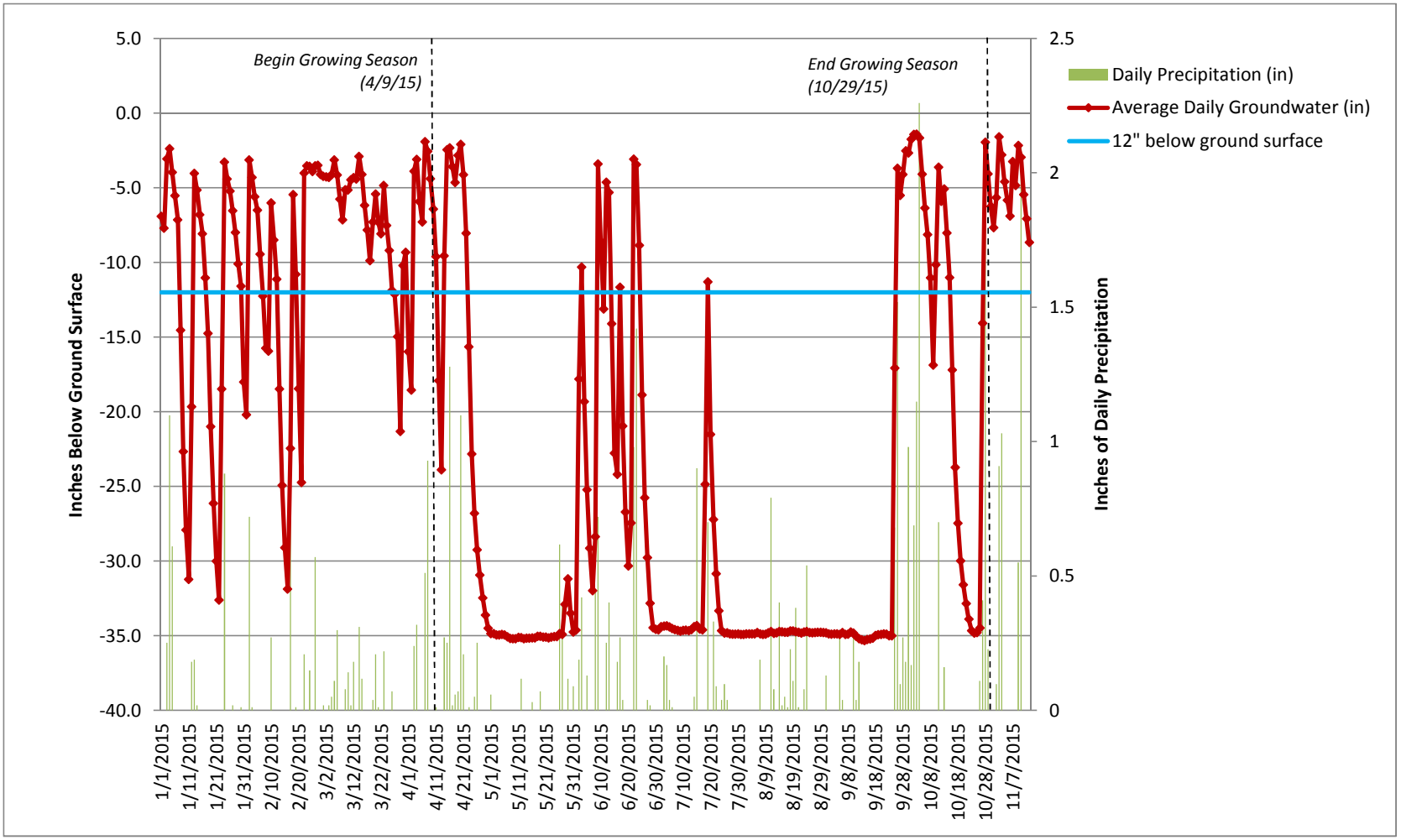
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	EBD106E
Gauge ID :	9



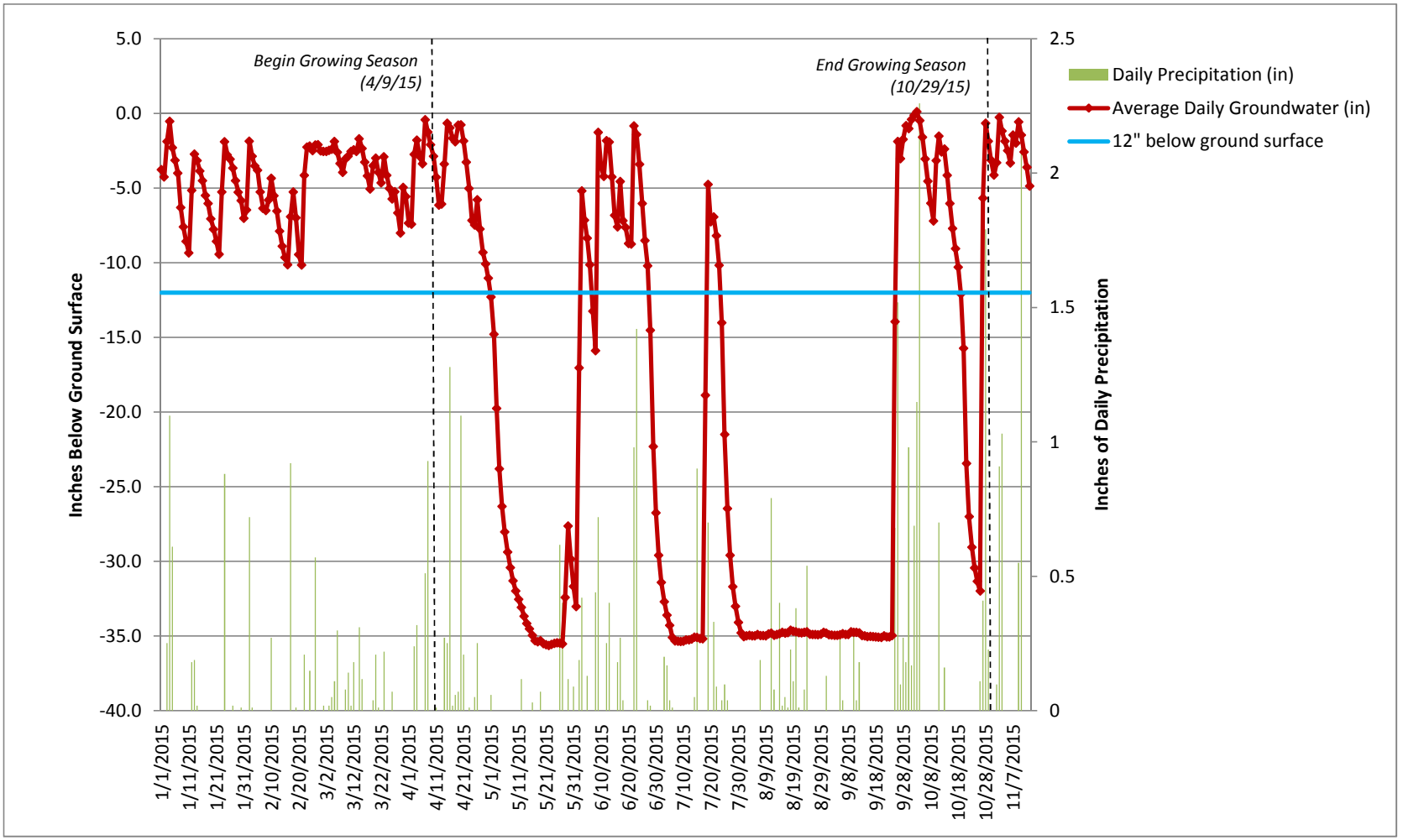
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	10FACBB4
Gauge ID :	10



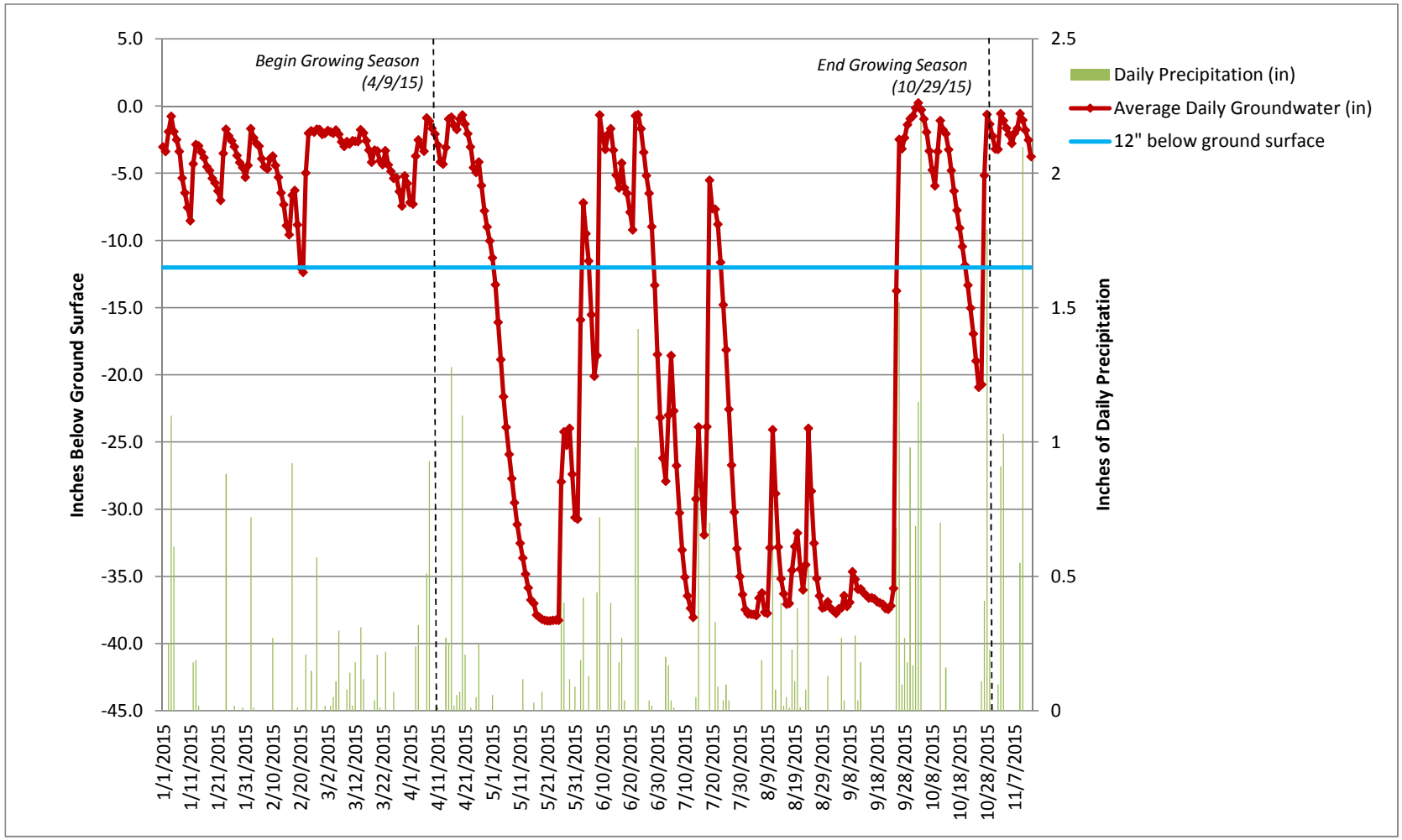
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	AB37304
Gauge ID :	11



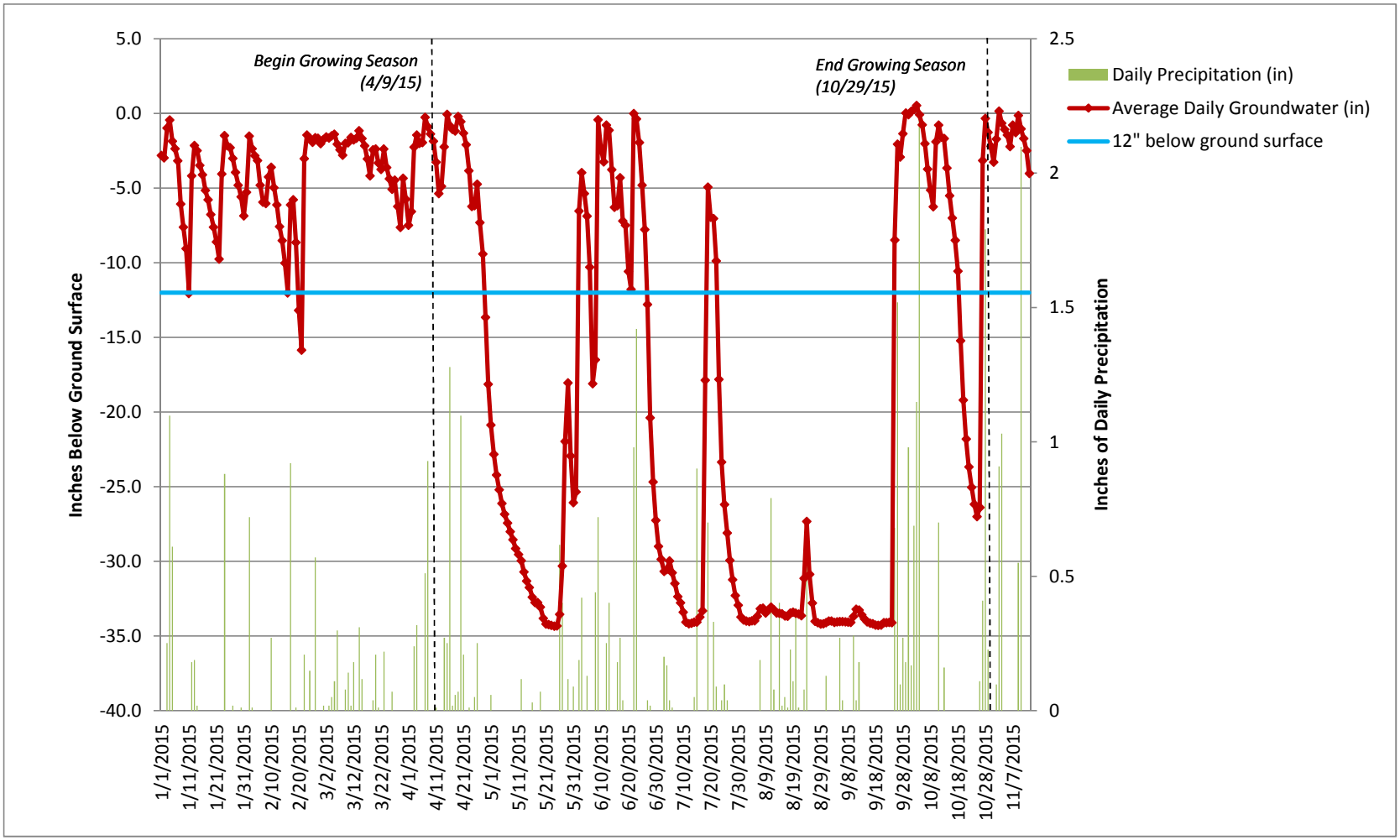
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	10FAA7C4
Gauge ID :	12



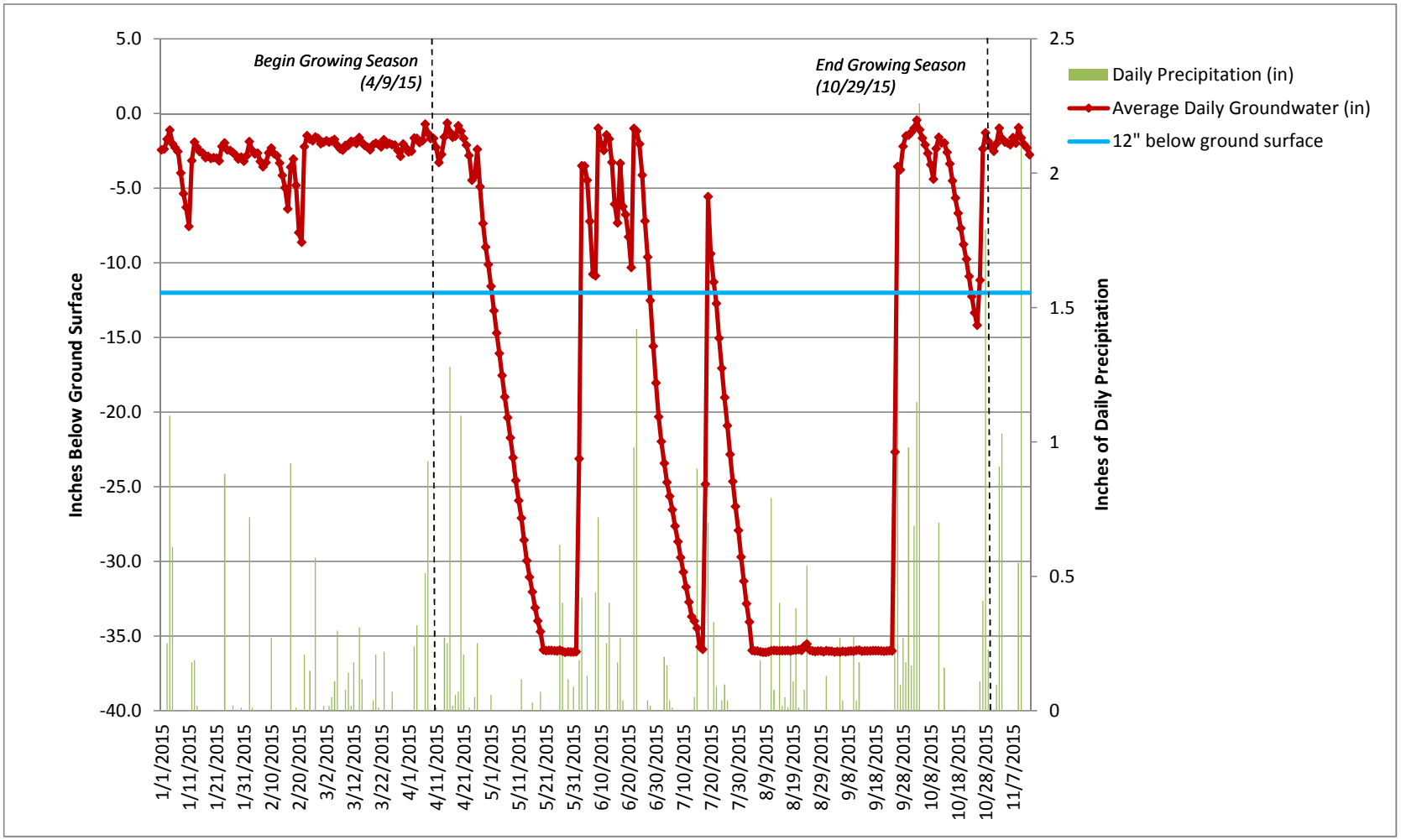
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	10FADD4C / A278DE1
Gauge ID :	13



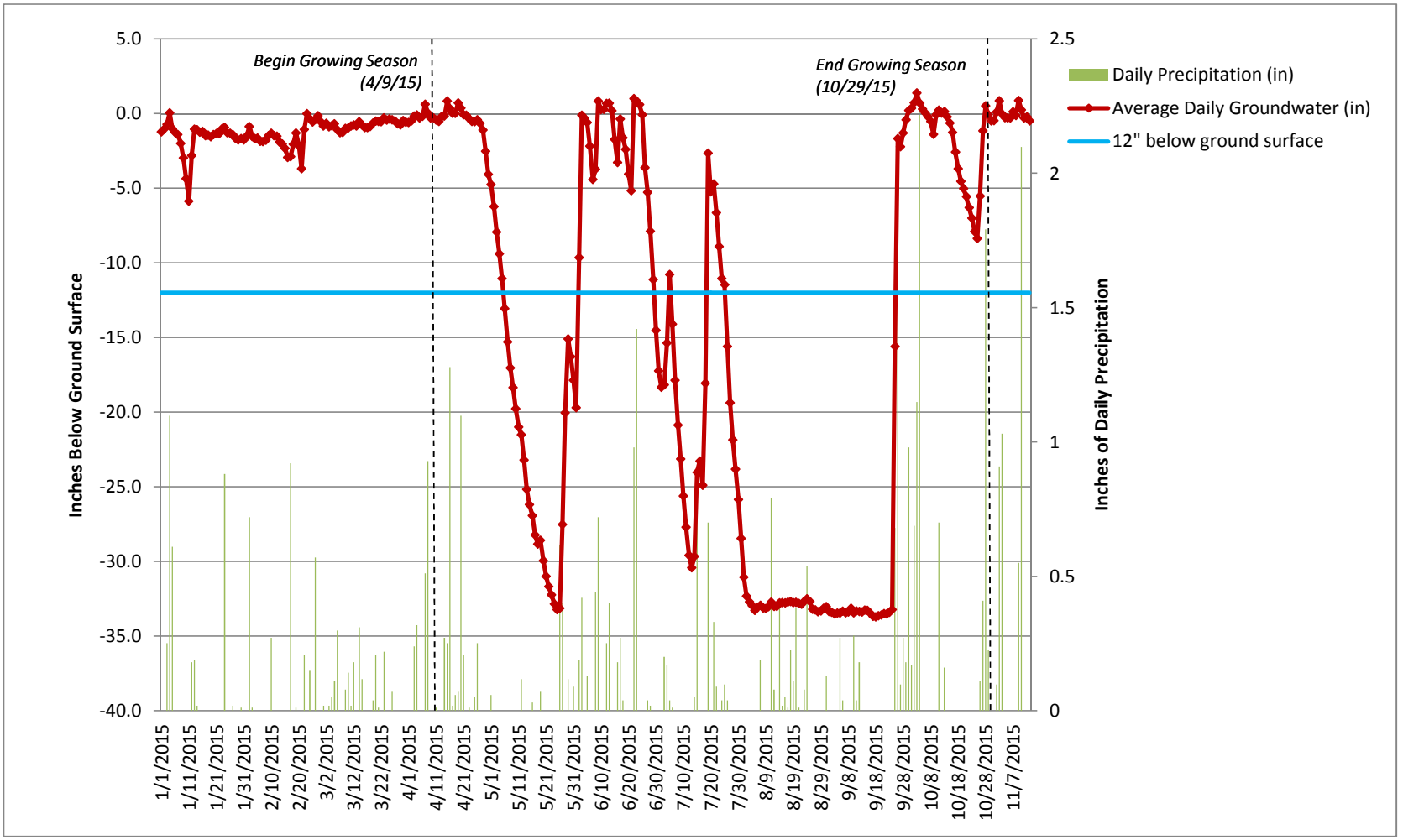
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	A28ABB0
Gauge ID :	14



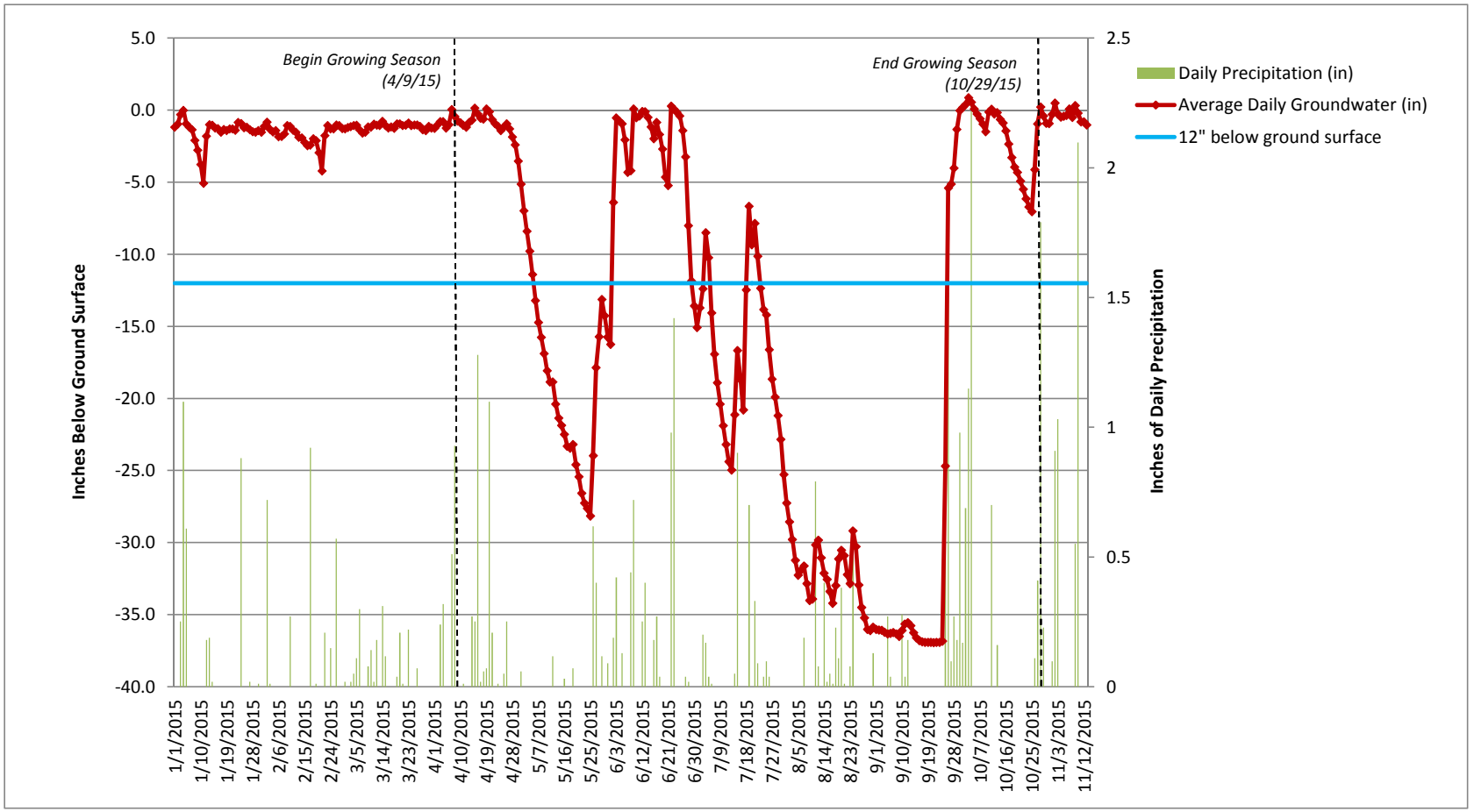
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	9DE54F2
Gauge ID :	15



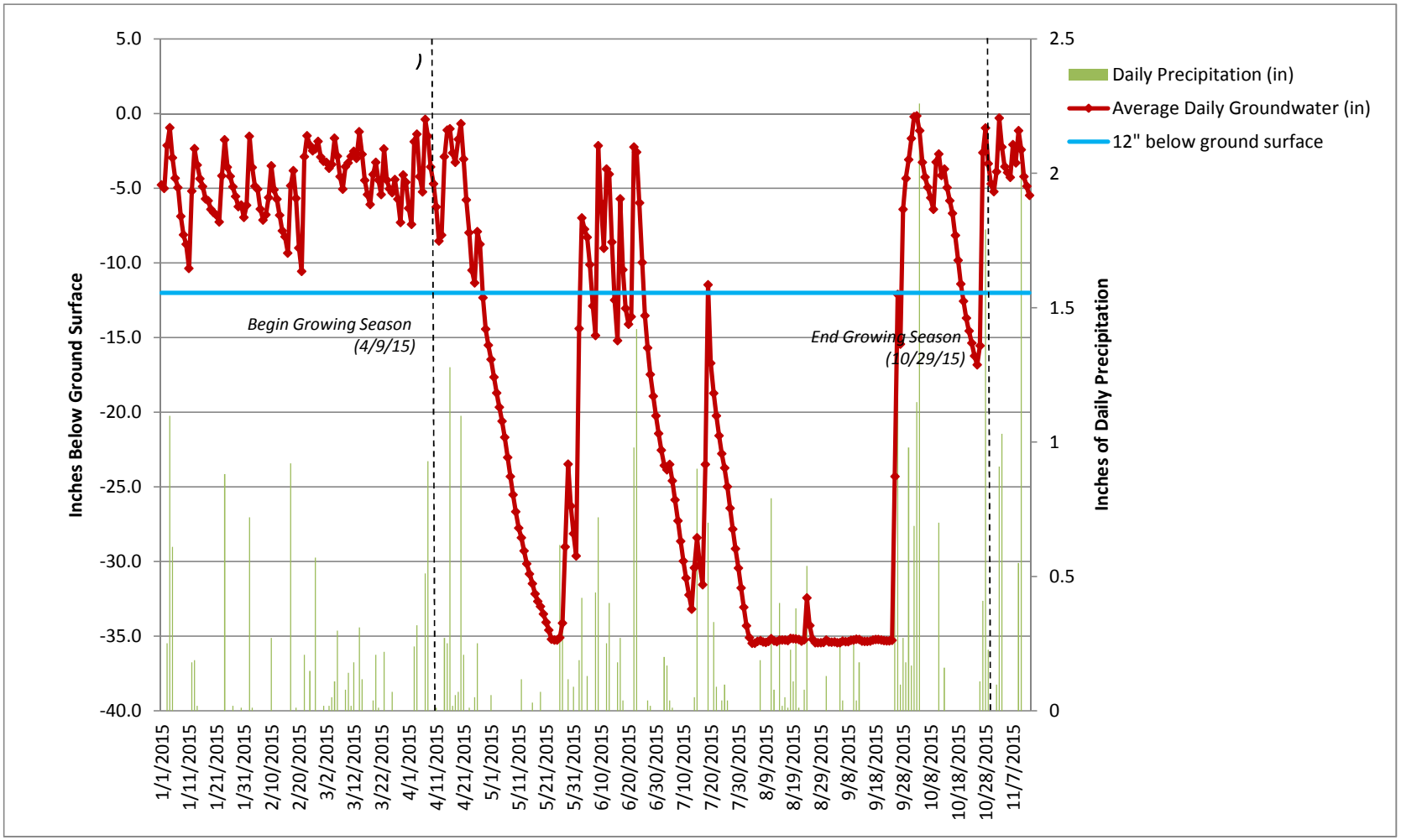
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	138BD91E / 1130EA33
Gauge ID :	16



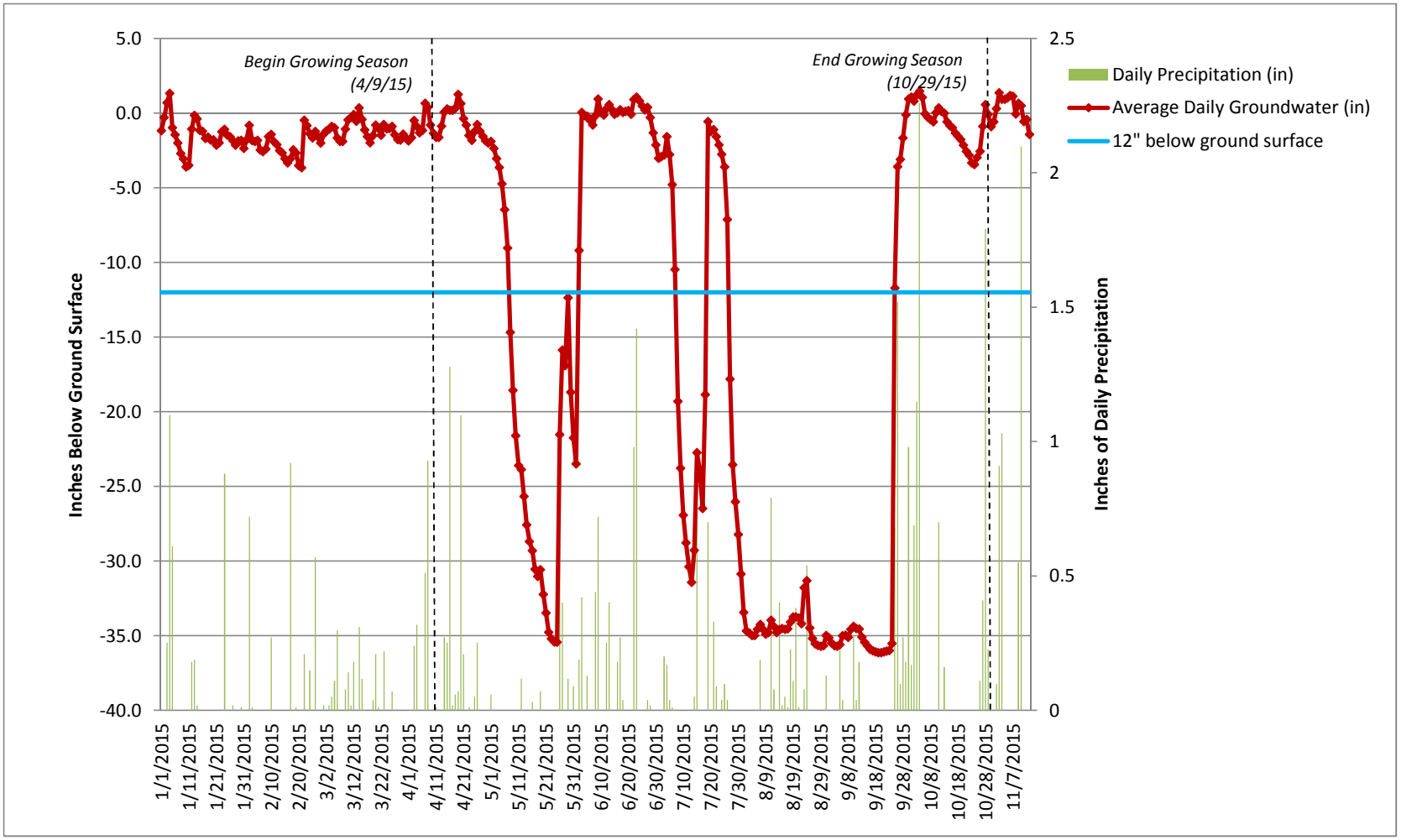
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	9BEBCFO
Gauge ID :	18



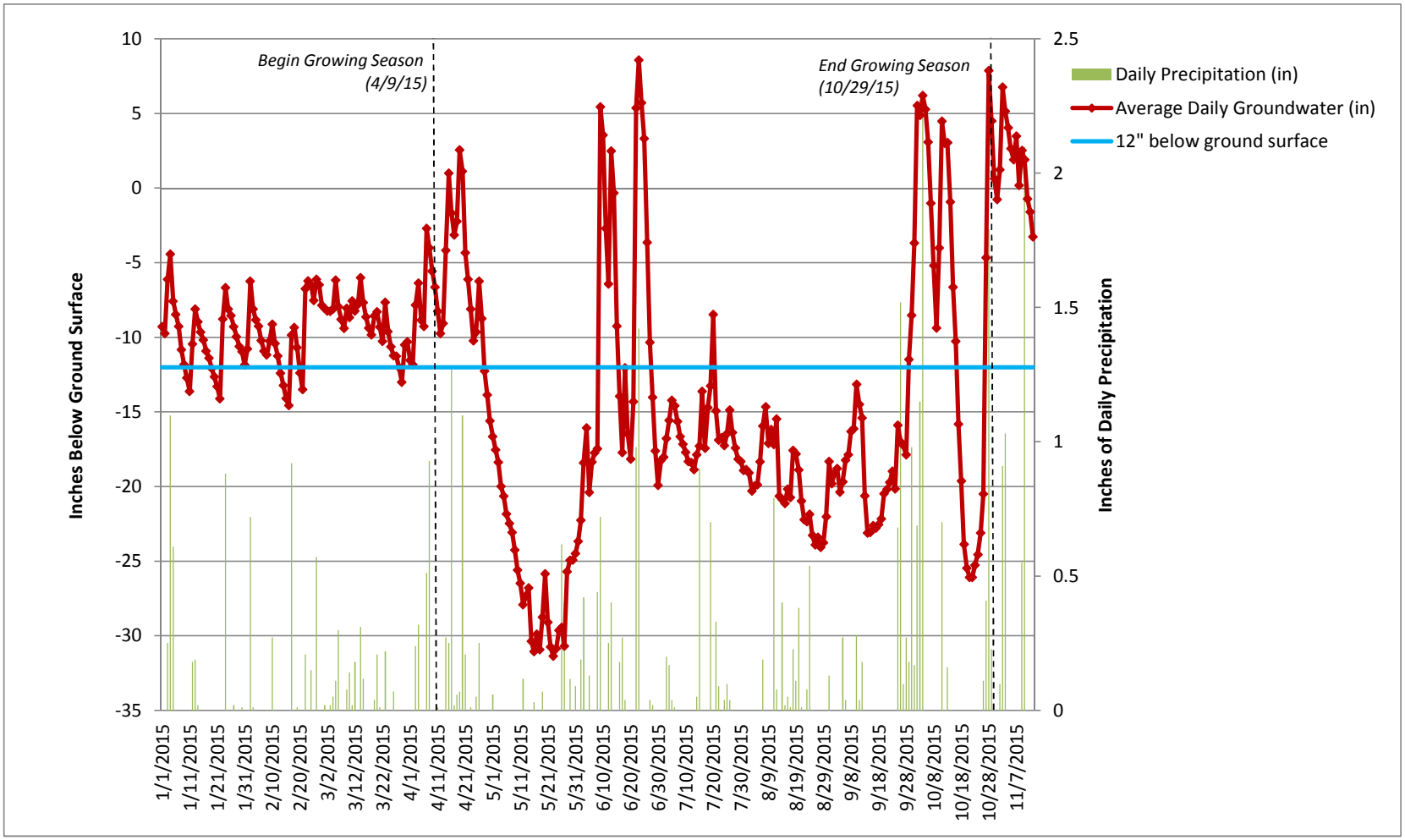
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	136ACA3C
Gauge ID :	19



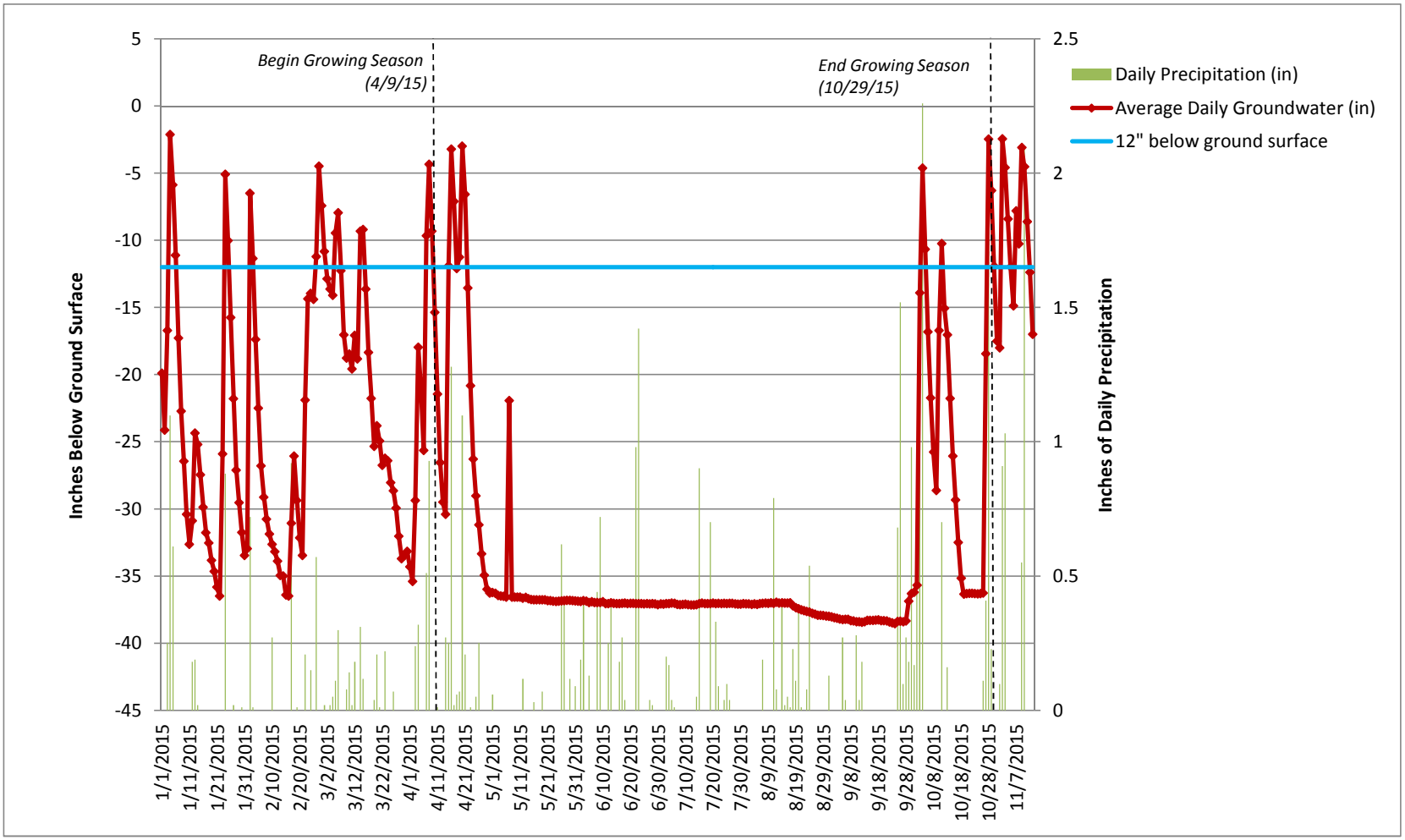
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	B651924
Gauge ID :	20



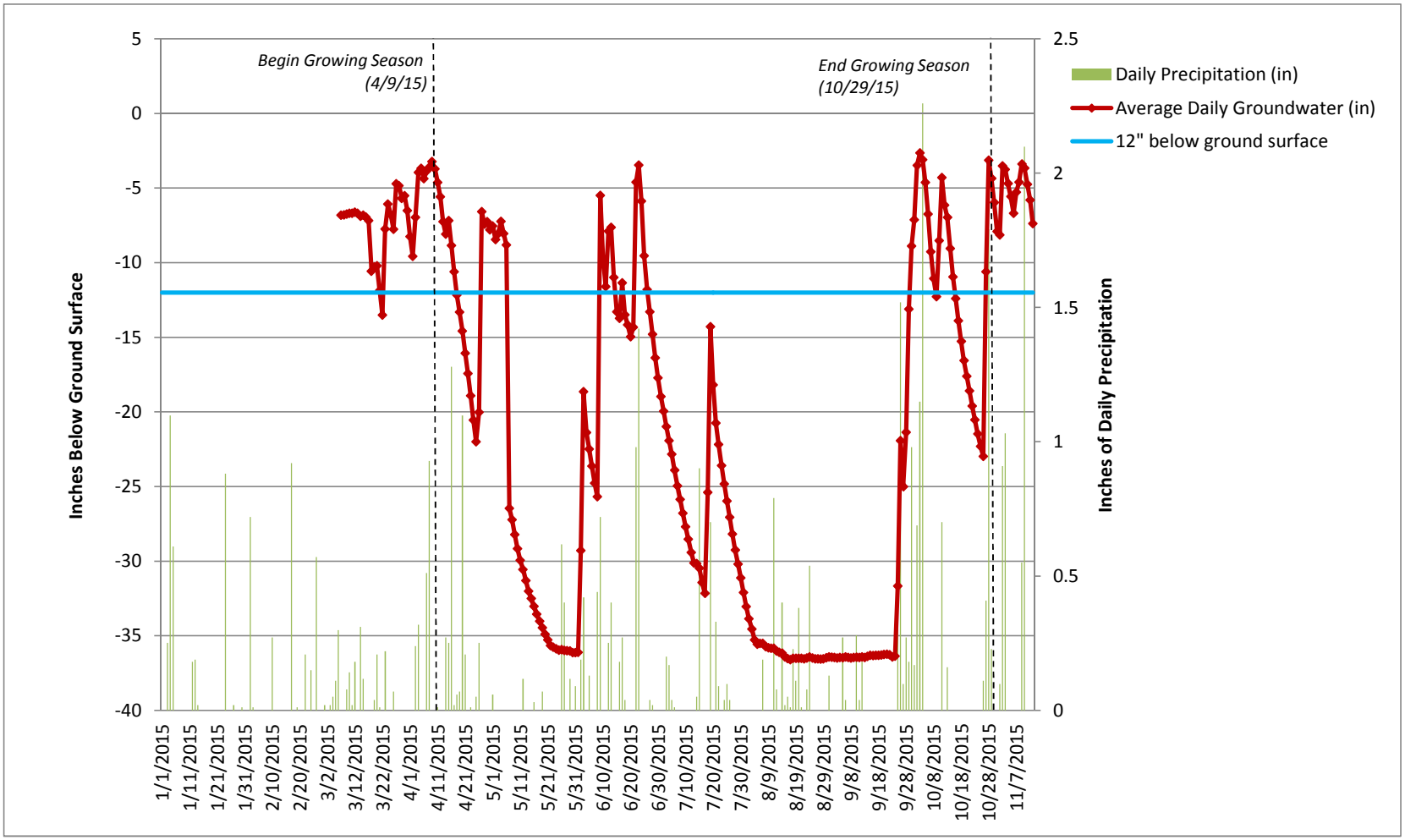
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	138BB5AA
Gauge ID :	21



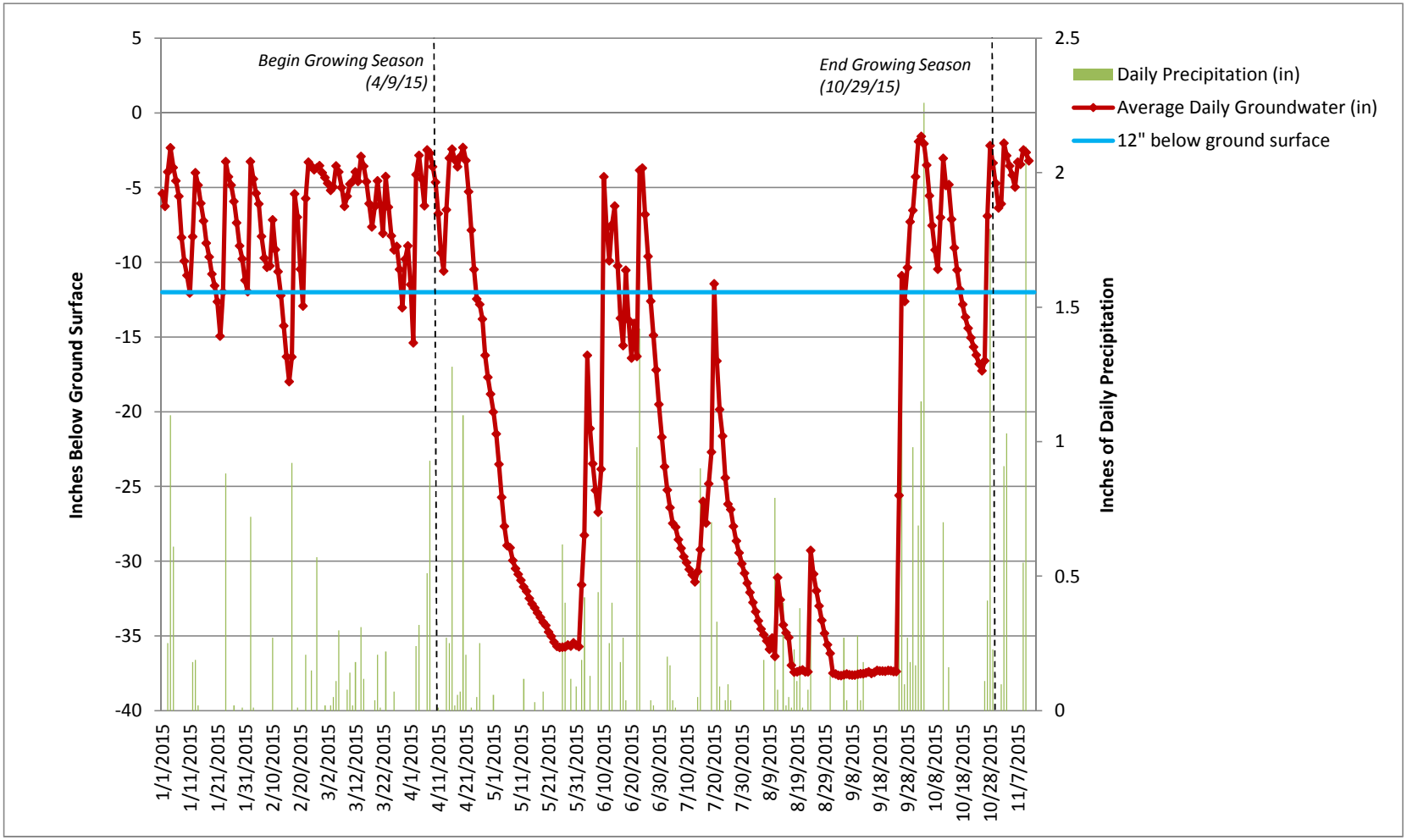
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	11312837
Gauge ID :	22



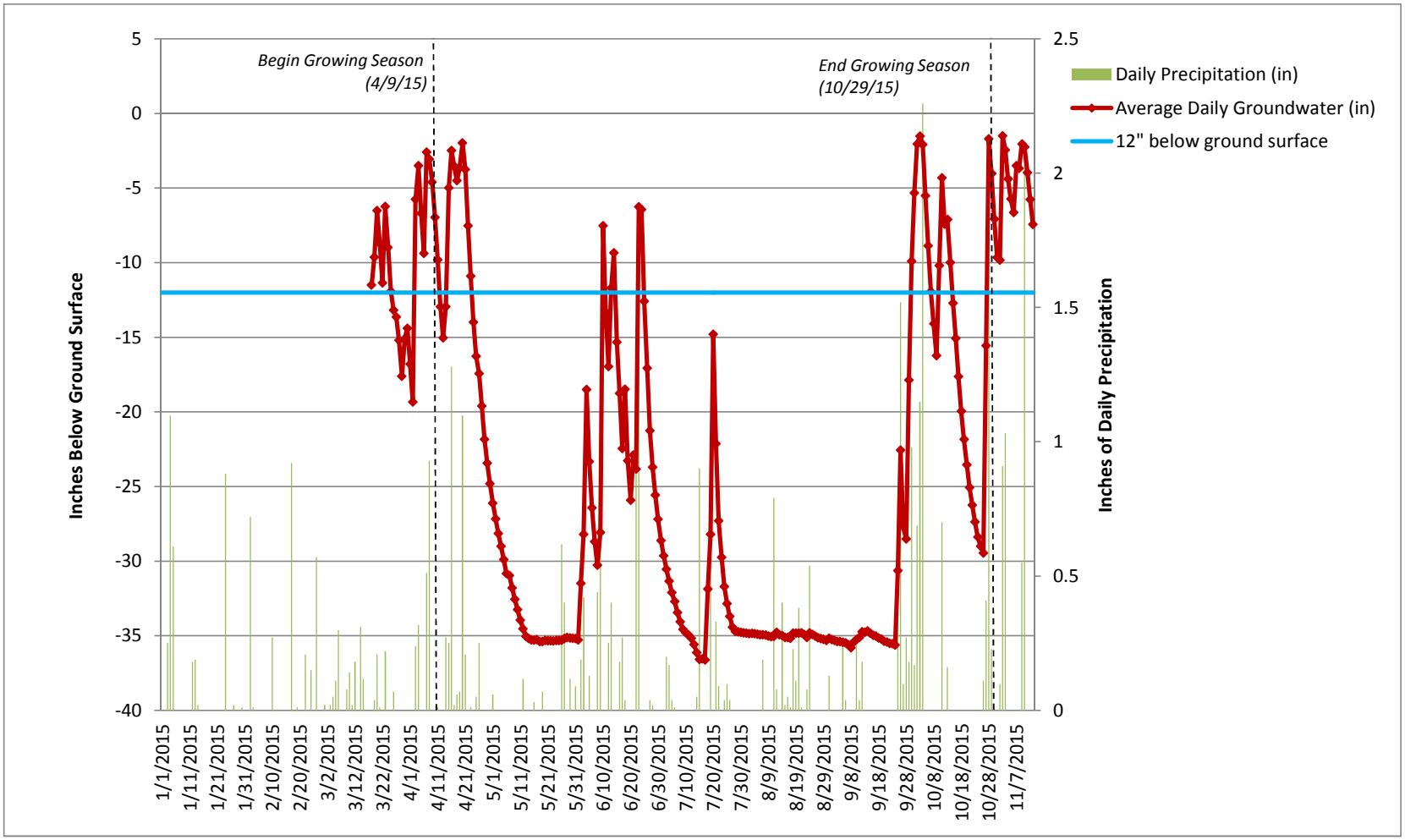
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	182727 / EDB96D7
Gauge ID :	23



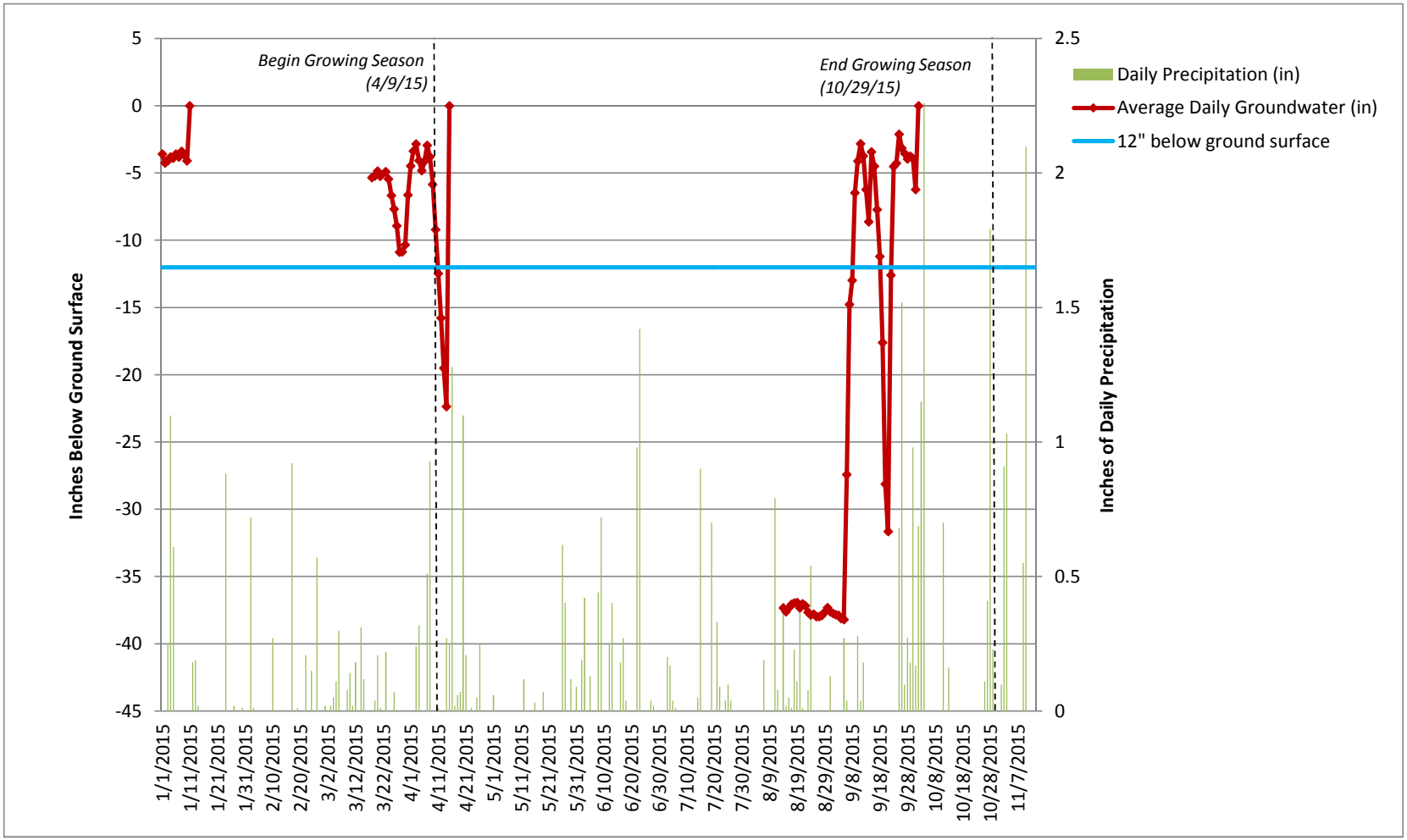
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	1314D206
Gauge ID :	24



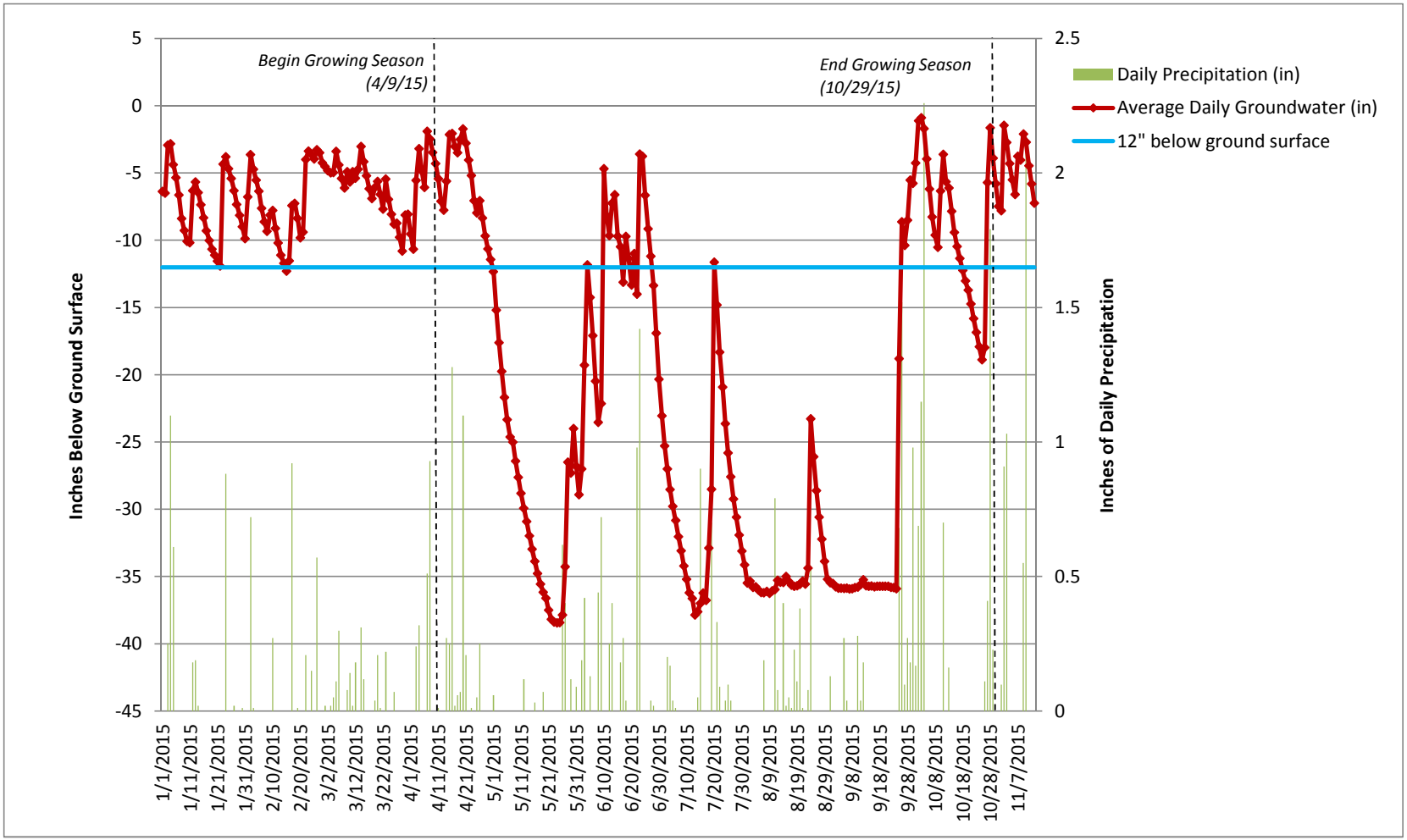
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	9BEBF22 / 13D4B149
Gauge ID :	25



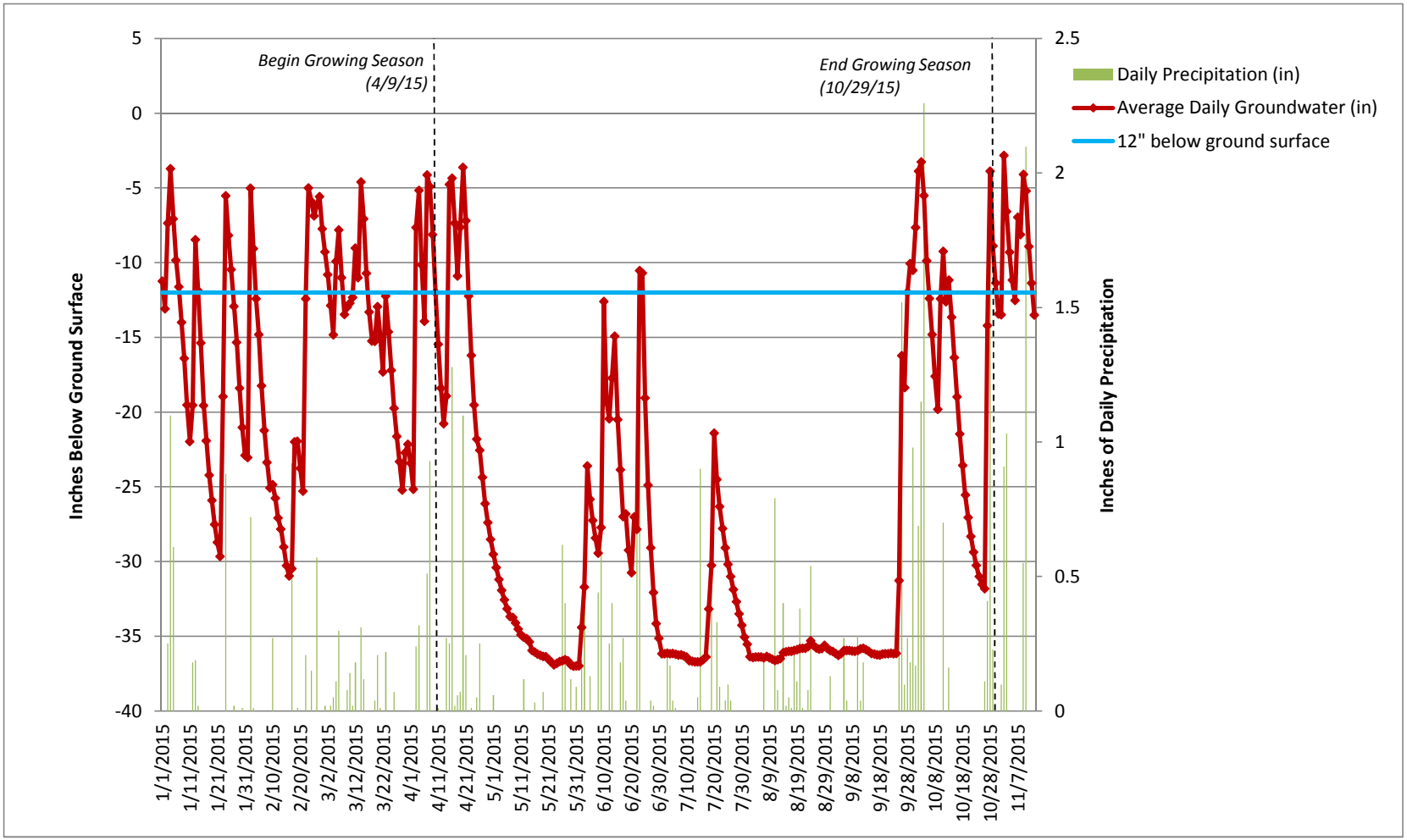
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	1314D1F1 / 1130FAA2
Gauge ID :	26



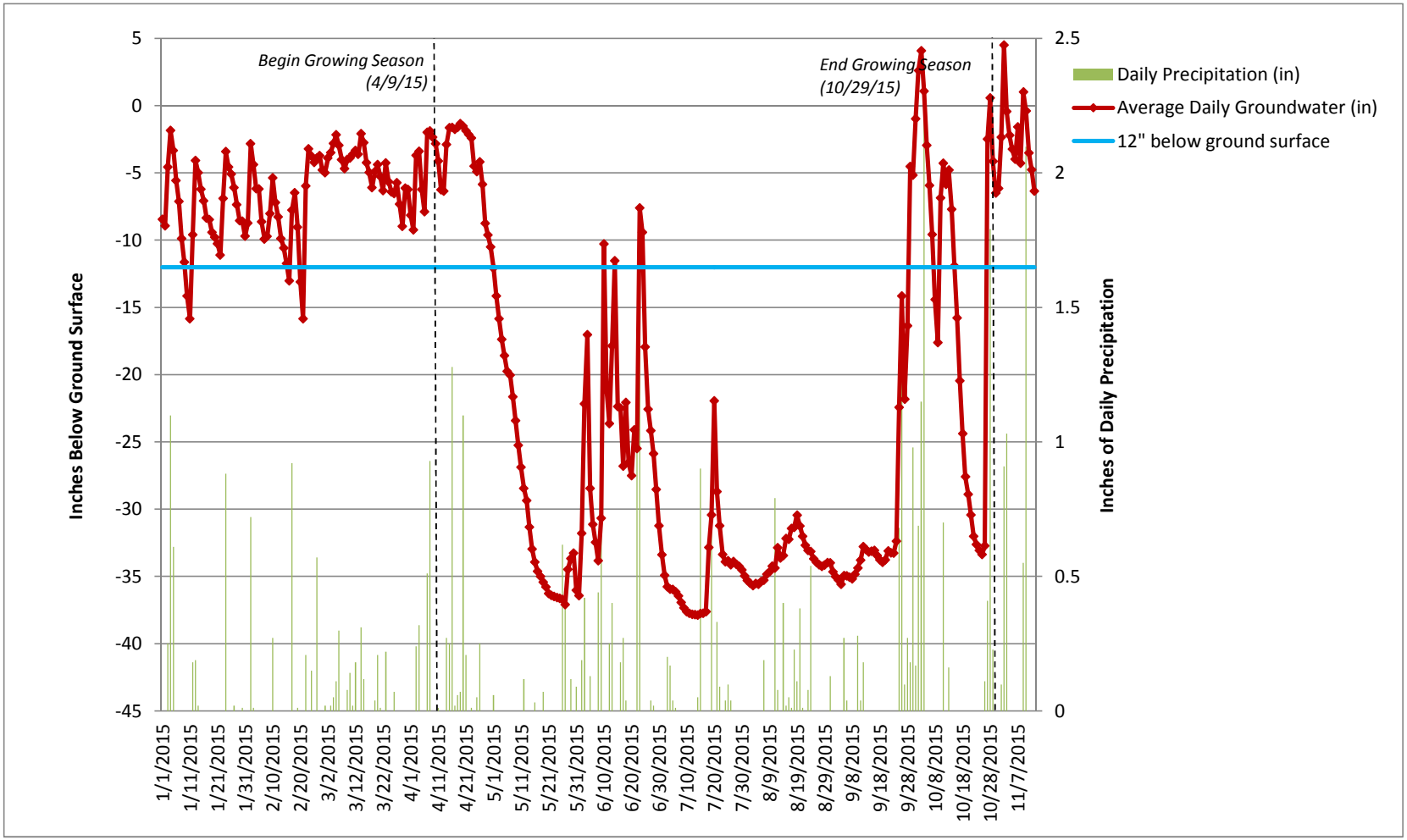
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	113118F8 / 14E1603B
Gauge ID :	27



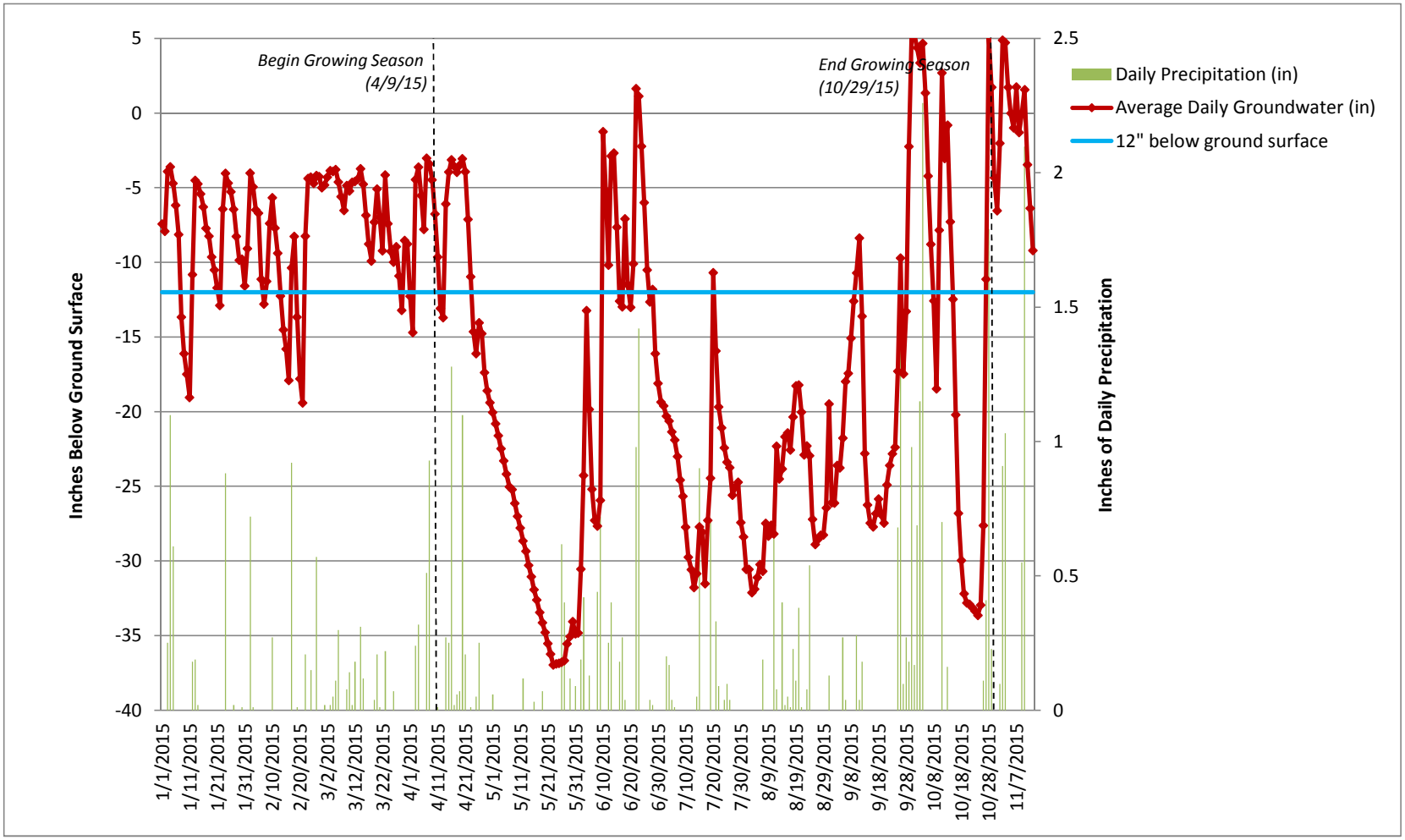
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	9BEA4DB / 9BEA426
Gauge ID :	28



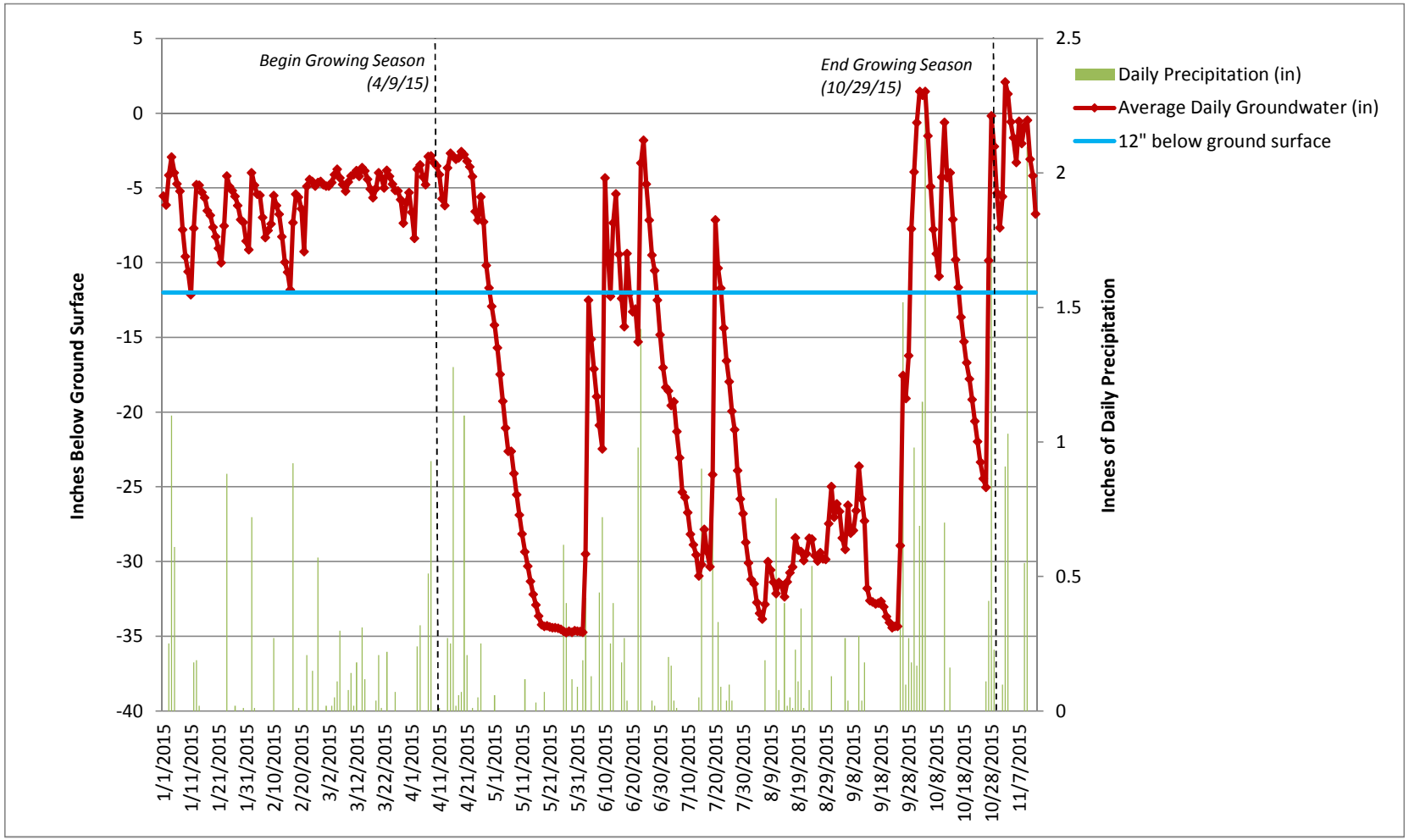
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	138BEO66
Gauge ID:	30



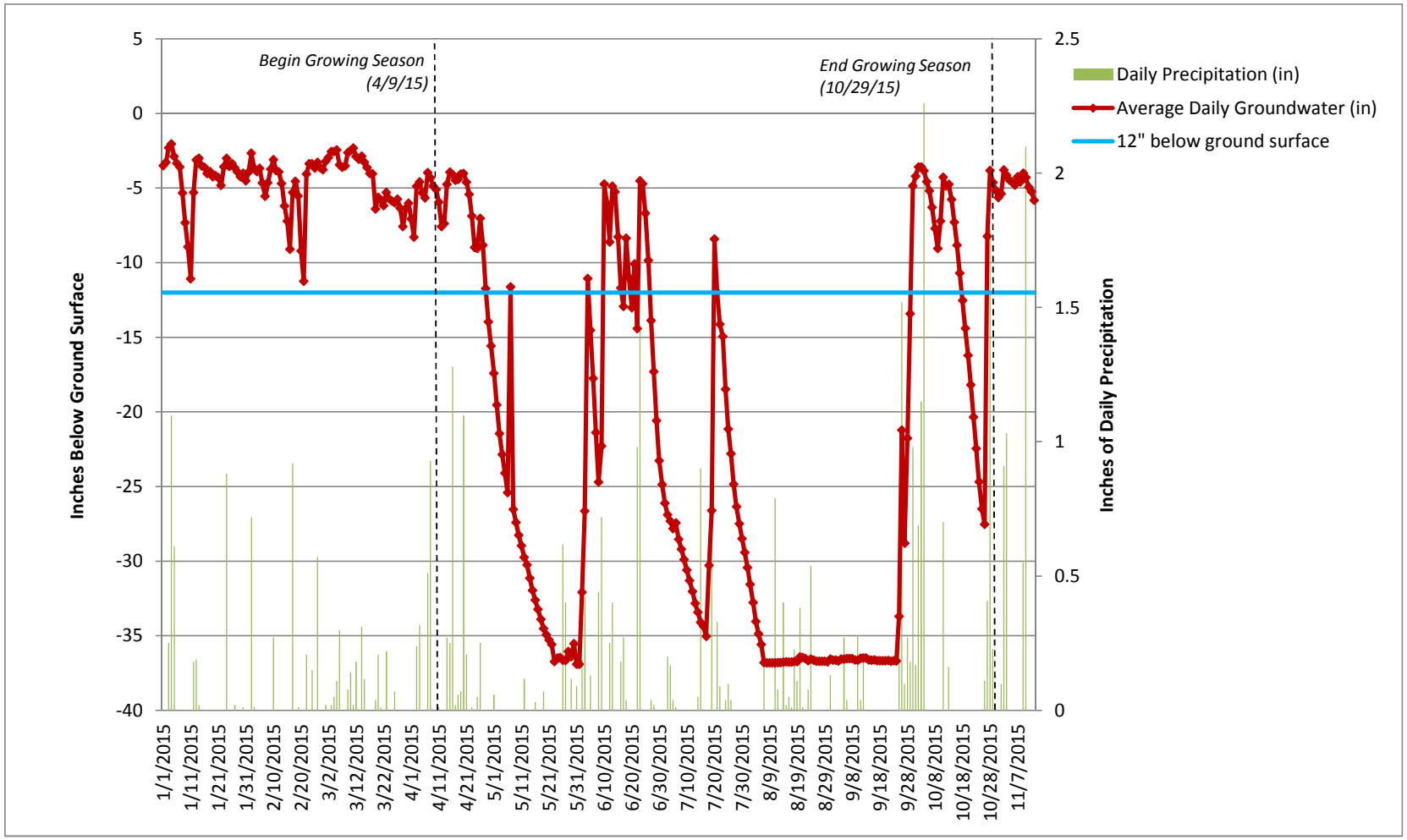
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	182724 / 13D4CFD5
Gauge ID:	31



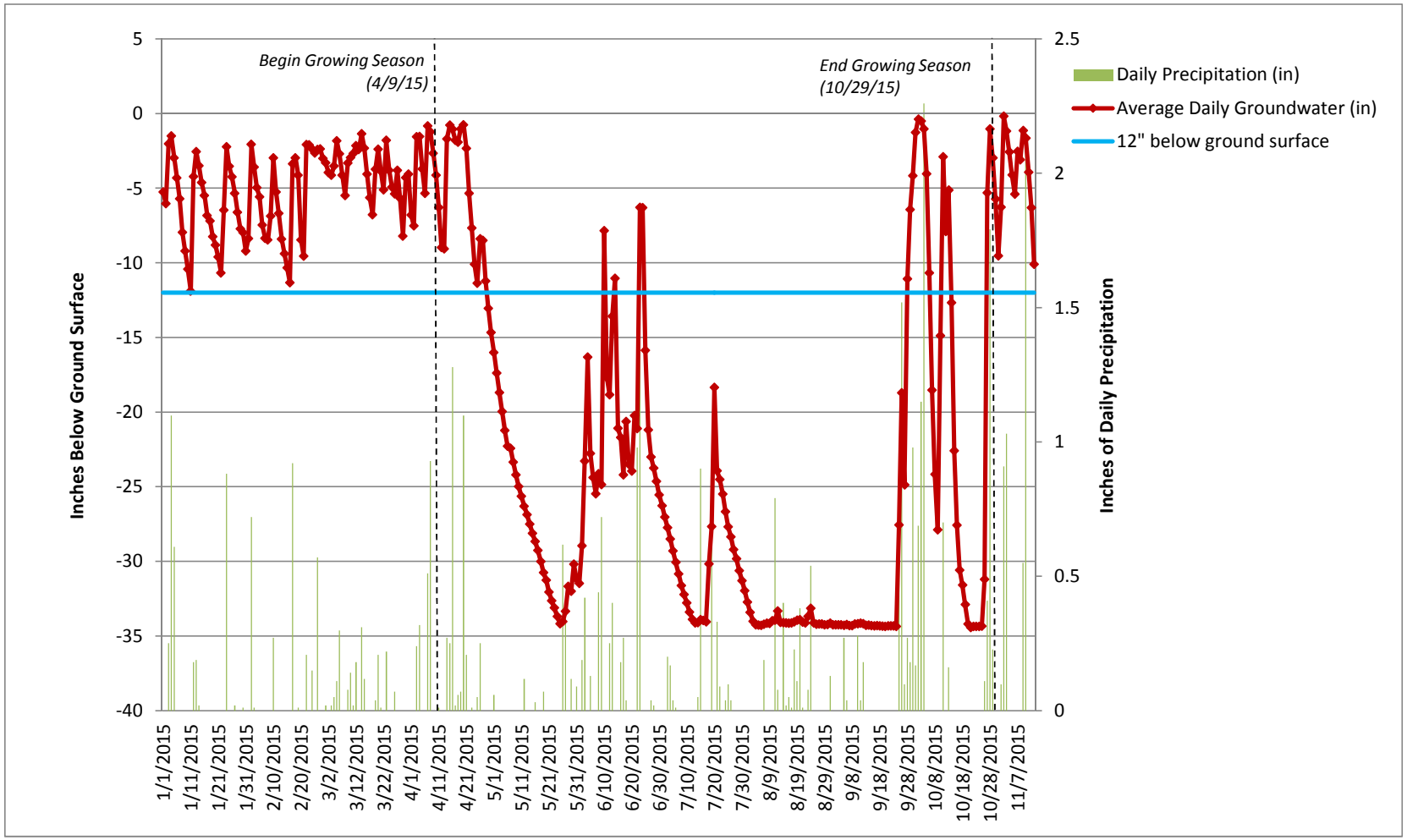
Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	EBDD9BO
Gauge ID:	32



Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	EBDCF48
Gauge ID:	33



Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	EBDB81A
Gauge ID:	34



Project:	Fletcher-Meritor
EEP Project ID:	138
Wetland Component:	Project Riparian Wetlands
Growing Season:	April 9-October 29
Units	Inches
Gauge Type	Groundwater
Serial #	174146 / 14E153D2
Gauge ID:	35