

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

Monitoring Report Year 2 of 5

Henderson County, North Carolina



Prepared for:



North Carolina Department of Environmental and Natural Resources
Ecosystem Enhancement Program
1601 Mail Service Center
Raleigh, NC 27699-1601

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1.0 EXECUTIVE SUMMARY

The Fletcher-Meritor Site Stream and Wetland Restoration Project, completed in May 2012, restored 3,617 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 4,288 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– 1838 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 2 (MY2) 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 past year.

Numerous locations were noted along the reaches as having sparse vegetation during the monitoring event. This could be due to climatic reasons as well as backwater effects and deposition on the floodplain. These areas are illustrated on the Current Condition Plan View (CCPV) in Appendix B. In addition to these locations, there is a large area of cattails (*Typha latifolia*) 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. No easement encroachments were noted on the project site although farming activities continue to occur in close proximity. Also, a nearby area has been grassed and maintained for a local group of model airplane enthusiasts.

The reaches of the restoration project were observed to be in stable condition. The channel's profile and cross-sections adjusted minimally from the baseline conditions. The channel accesses its floodplain and evidence of bankfull events were observed during Year 1 monitoring. This evidence included the presence of wrack lines, sediment deposits, the crest gauge, and actual event during monitoring. 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 is the number of structure failures along the Tributary reach. Currently over half of the log structures along the Tributary reach have been eroded or are completely undermined. The structures that appear to be stable are those which had been replaced/repared during construction and had larger rock used as backfill. The substrate along the reach 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 is the heavy rains received the previous year (between May and Dec 2013).

There is also a structure/bank failure along the lower reach at Station 21+85 which was noted the previous year. This area was described as having poor soils and matting was provided during construction to help

with stabilization. This area is subject to numerous backwater events from Cane Creek and in an area where vegetation plots are not meeting interim criteria.

Another area of potential concern occurs along the lower reach just below the aerial sewer line crossing and the temporary crossing for utility line installation. A large area of the stream bank is eroding where the temporary pipe was poorly placed. Sediment and erosion control on the temporary crossing is inadequate and has led to losses of gravel and soil into the stream. Following removal of the temporary crossing, it is likely that the structures in this location will need to be replaced/repared as well as stabilization, bank modifications, and replanting.

The lower reach has a newly 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 floodplain interceptor appeared to have broken down in the past at this proposed wetland; however, the potential down cutting and channel created through the wetland were less of a concern as there is minimal hydrology reaching the site with the newly created ditch.

The last major area of concern is located at the permanent stream crossing near Sta. 24+00 on the upper reach. Debris which had collected in front of the culverts including the floodplain pipes is no longer creating the blockage it was during Year 1; however, the beaver ponds upstream of the culverts continue to provide a source of debris that may obstruct the pipes and the current utility construction in this area may lead to additional damage of the reach. 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 having some impact on channel morphology, specifically in the loss of riffles.

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, ongoing utility construction, 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 EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP 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 total station on May 12, 13, and 14, 2014. This report details the results of Monitoring Year 2.

2.1 Morphometric Parameters and Channel Stability

2.1.1 Profile

The entire length of the reach was monitored by HDR using a total station. Multiple parameters were located including top of bank, thalweg, and water surface. The upper reach profile is generally stable in

year 2. The riffles still show a slight trend toward becoming shorter and steeper as was the case in year 1 monitoring. The pools in the upper reach are getting longer but maintaining similar pool depths to those observed in year 1. In year 2 monitoring there was an absence of both riffle and pool features in a large section influenced by beaver activity. This is clearly seen on the profile with a beaver dam located around station 21+90 with effects upstream reaching as far back as station 15+50 +/-.

In the lower reach segment, more riffles were observed in year 2 than compared to the previous year. This is likely due to a lower water level at time of year 2 monitoring. Riffle and pool features observed in this segment were similar to those observed in the previous monitoring year with little change. The pools in the lower reach are in good shape and maintaining lengths and depths.

The tributary profile shows riffles that are continuing to trend shorter and steeper. The pools are lengthening slightly but maintaining their depths compared to previous monitoring years.

Bankfull and water surface slopes remain consistent for all three channel segments when compared to year 1 and baseline monitoring.

2.1.2 Dimension

Nine cross sections were measured by HDR staff on May 12-14, 2014. The morphological data is presented in Tables 10 and 11 in Appendix D, along with the cross-sectional data. Riffle sections in the upper reach show some changes but dimensions are still within design parameters. The first riffle section (XSC1) shows some aggradation. The second riffle section (XSC3) has variables similar to previous years with the exception of max depth. The majority of the riffle has shifted upstream of the tape with the permanent section now located at the very end of riffle. The permanent pool (XSC2) in the upper reach looks good and is relatively unchanged.

Permanent riffle and pool sections for the lower reach are performing well and have changed little from previous years in respect to dimensions. For the tributary reach, the permanent riffles (XSC's 7&8) show increasing depths and constricting widths. The permanent pool section (XSC9) is increasingly losing the low-gradient shelf on the inside bend. The inside meander bend is being built up and constricting the bankfull width.

2.1.3 Pattern

The pattern of the channel was obtained using total station 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 2 monitoring.

2.1.4 Substrate

Pebble counts were taken for Year 2 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.

Small changes to D50 were observed in the two upper reach riffle sections. For XSC1, significantly more silt/clays were counted in year 2. However, there is still a good presence of fine and small gravels such

that the D50 stays within the fine gravel range. XSC 3 shows more fine material in year 2 than in year 1 resulting in a shift in D50 from very fine gravel to coarse sand.

Riffles in the lower reach segment are armoring with larger gravel material. XSC4 shows slightly more distribution of larger gravel material than in year 1. The D50 increased slightly but still stays within the medium gravel range. XSC6 shows a much greater increase in substrate size and distribution. The D50 increases from coarse sand in year 1 to coarse gravel in year 2.

2.1.5 Sediment Transport

Shear stress values were calculated using riffle cross section measurements obtained in year 2 monitoring. For the upper reach riffles, shear stresses were enough to easily move the D50 particle obtained from year 2 pebble counts (movable particle size predicted using Revised Shields Diagram, Rosgen, 2002). The predicted movable particle size for Upper Reach riffle sections were 13mm and 16mm, matched up with D50 values of 2.1mm and 0.5mm, respectively. These results would indicate some degradation; however, little degradation was noticed in visual assessment.

Lower Reach values for predicted movable particle size versus D50 from pebble counts are very similar indicating stable conditions. For XSC4, the predicted movable particle size is 14mm compared to the observed D50 of 13mm. Riffle XSC6 has a predicted movable particle size of 12mm compared to an observed D50 of 17mm.

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 has 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 May 12-14, 2014. The locations of the photos stations and vegetation plots are noted on Figure 3 in Appendix B. The photos for monitoring year 2 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 12 and 13, 2014. 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 402 stems/acre with the range from 162 to 728 stems/acre. The highest plant density occurred in plot 4 with over 700 stems/acre. Currently, 14 of the plots are meeting the interim 3-year vegetation success criteria of 320 stems/acre. Year 2 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 were not fully operational and were replaced in August 2014. 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 26 stations were in operation for a portion of the 2013-2014 growing season. The data revealed that 19 of the 26 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 (1, 2, 3, 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 three wells that were not meeting the hydrology criteria are 11, 22, and 29.

2.4 Other Parameters

Currently there are several activities occurring on or near the site that are of concern to the success of the stream and wetlands. The farmer who is managing the land outside the conservation easement has excavated a ditch near the proposed wetland area on the lower reach. In addition, farming activities are still occurring very close to the conservation easement. Monitoring to ensure there are no easement violations is warranted. Furthermore, the upper and lower reaches are being impacted by utility line work. A temporary crossing is being used on the lower reach which is causing issues with the stability of that reach. The permanent crossing on the upper reach is also being used for utility work but does not appear to be impacting the channel stability. The last potential easement issue was noted on the upper reach in which there was some vehicle damage to the monitoring wells. It was evident that someone had driven through a portion of the site. Speculation is that it could have been someone associated with the model plane airfield near the site.

3.0 REFERENCES CITED

HDR Engineering, Inc. 2008. Final Stream & Wetland Restoration Plan for the Fletcher-Meritor Site (UT to Cane Creek).

HDR Engineering, Inc. 2011. UT to Cane Creek Stream Restoration Final Plans (90%).

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>.)

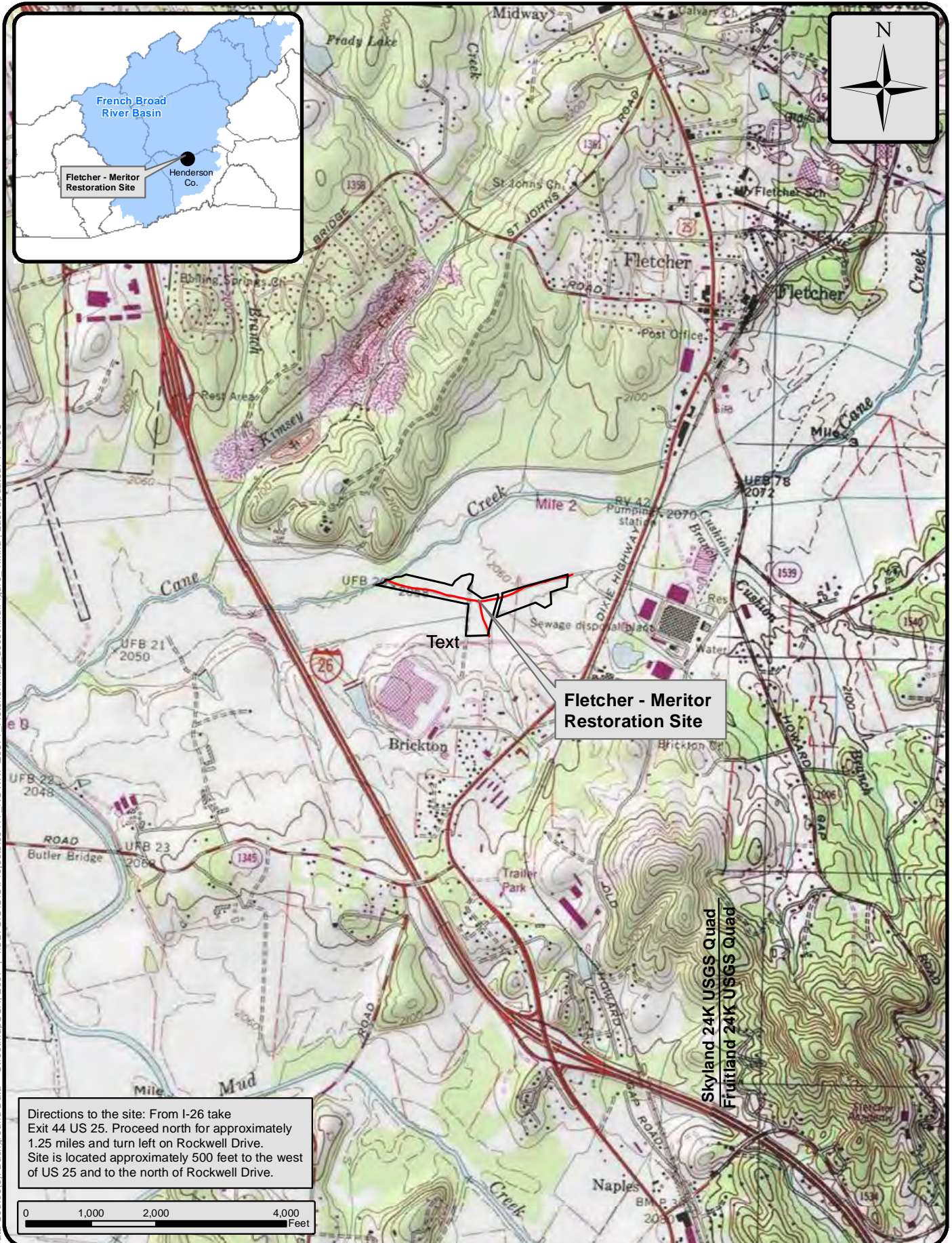
North Carolina Ecosystem Enhancement Program. 2011. Baseline Monitoring Document: Format, Data Requirements, and Content Guidance.

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).

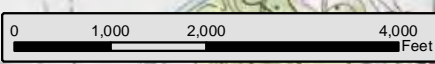
Appendix A

General Tables and Figures



Data Source(s): Background Data - StreetMapUSA, 2007 | NCLTGIS\GIS\Projects\09177 - NC\WRP\20671 - Fletcher\map_docs\mxd\Figure_1.mxd | Last Updated: 1-18-08

Directions to the site: From I-26 take Exit 44 US 25. Proceed north for approximately 1.25 miles and turn left on Rockwell Drive. Site is located approximately 500 feet to the west of US 25 and to the north of Rockwell Drive.



Vicinity Map
Figure 1

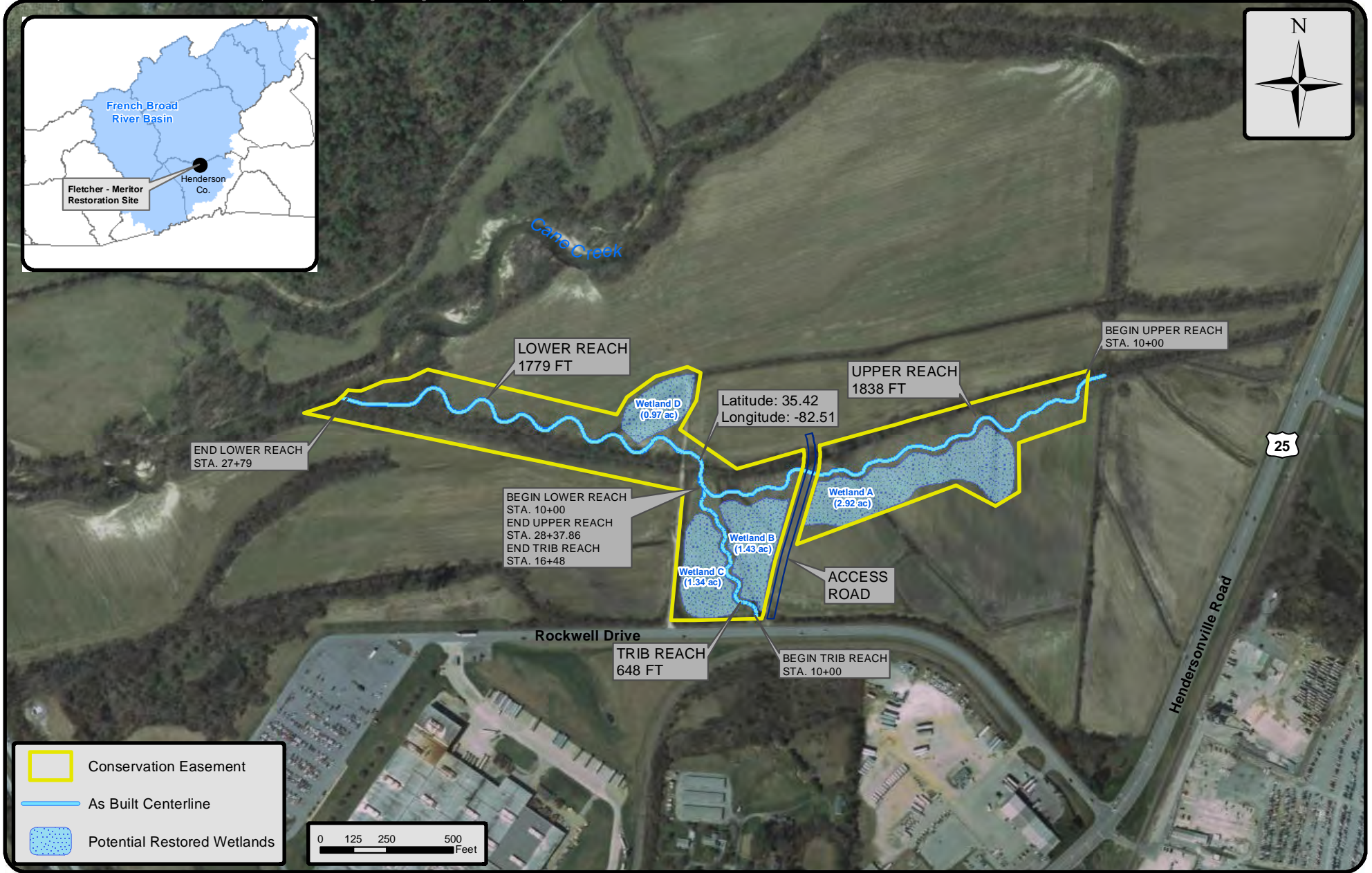


Table 1a. Project Components
Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138

| 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 | 1838 lf | 10+00-28+38 | 1:1 | 1838 | | 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. |
| Main Steam Lower Reach | 1320 lf | R | P2 | 1779 lf | 10+00-27+79 | 1:1 | 1779 | | 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. |
| 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 | 1838 | 1838 | 0.0 | 0.0 | | | | | |
| Main Steam Lower Reach | 1779 | 1779 | 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 | | | | | | |
| (Feet/Acres) | 4,265 | 4,265 | 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: 2 yrs 0 months

Elapsed Time Since Planting Complete: 2 yrs 0 Months

Number of Reporting Years: 2

| Activity or Deliverable | Data Collection | Completion or |
|---|-----------------|----------------------|
| | 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 |
| Year 3 Monitoring | | |
| Year 4 Monitoring | | |
| Year 5 Monitoring | | |

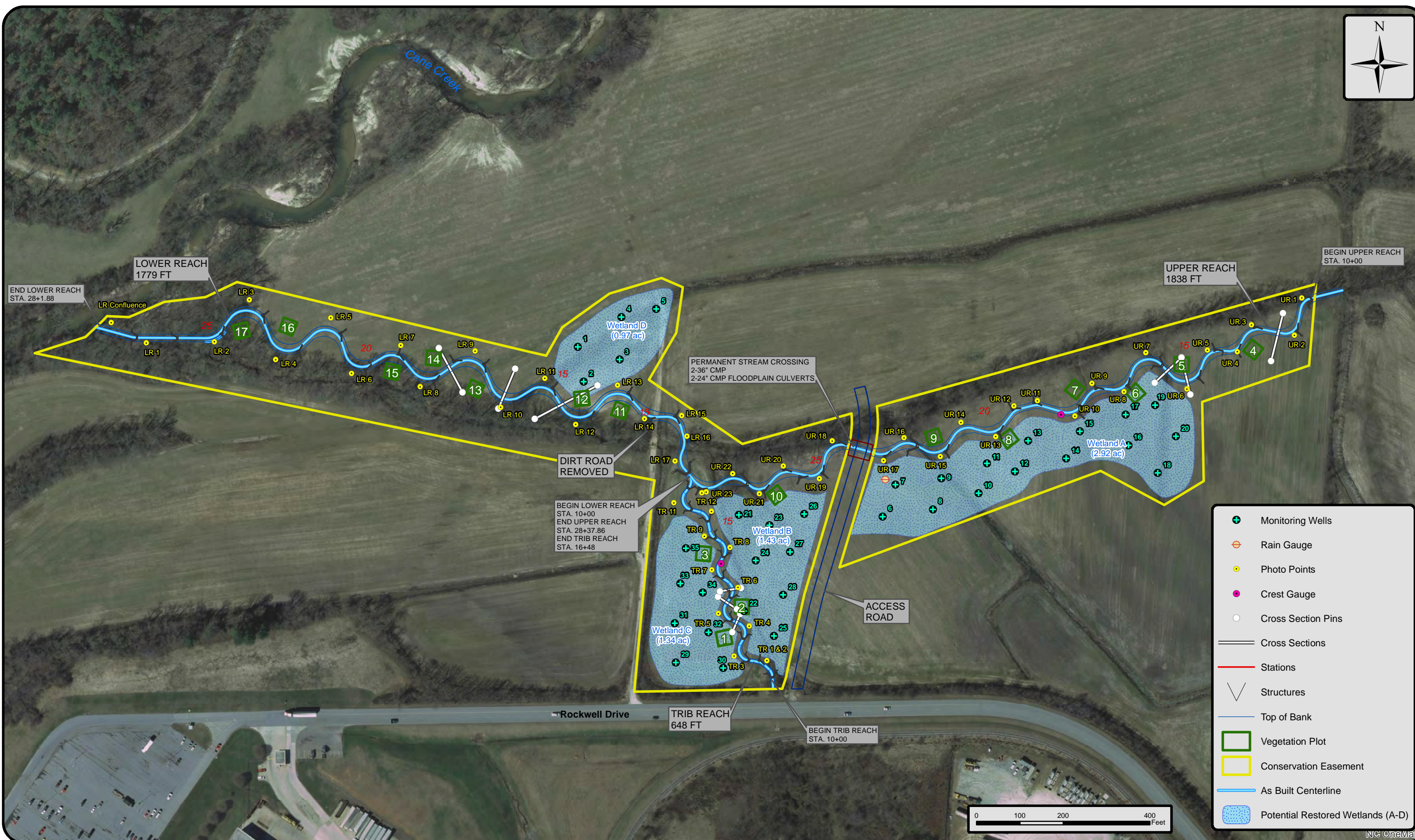
| Table 3. Project Contacts Table | |
|--|---|
| Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138 | |
| Designer | HDR Engineering Inc. of the Carolinas 3733 National Drive, Suite 207, Raleigh, NC 27612 |
| Primary project design POC | Jonathan Henderson, PE (919) 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

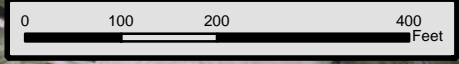
| Project County | Henderson | | | | | | |
|---|---------------------------------------|------------------------|----------------|-------------------|------------|------------|-----------------|
| Physiographic Region | Mountains | | | | | | |
| Ecoregion | Blue Ridge (Broad Basins) | | | | | | |
| Project 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) | 1838 | 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

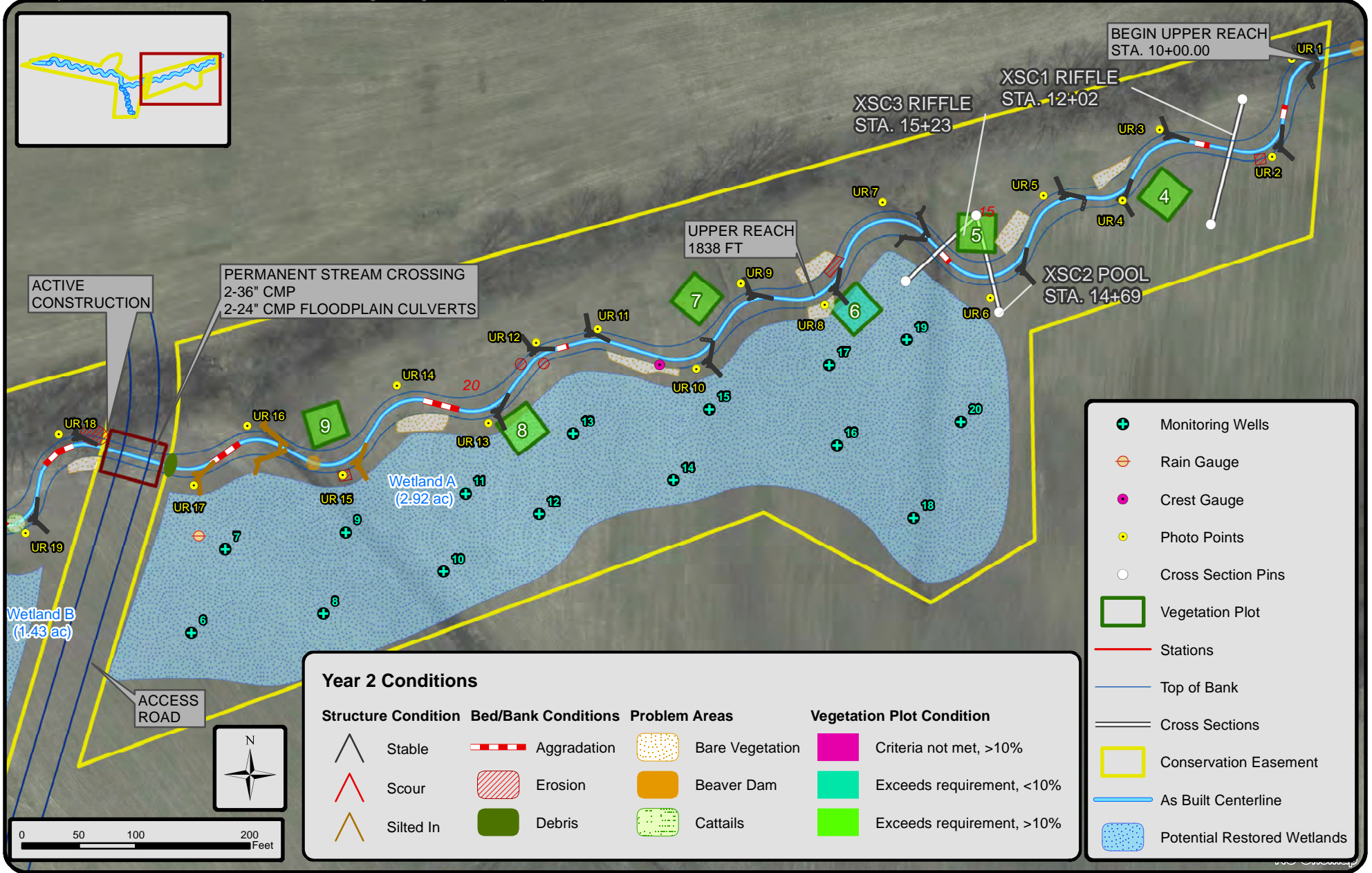
Visual Assessment



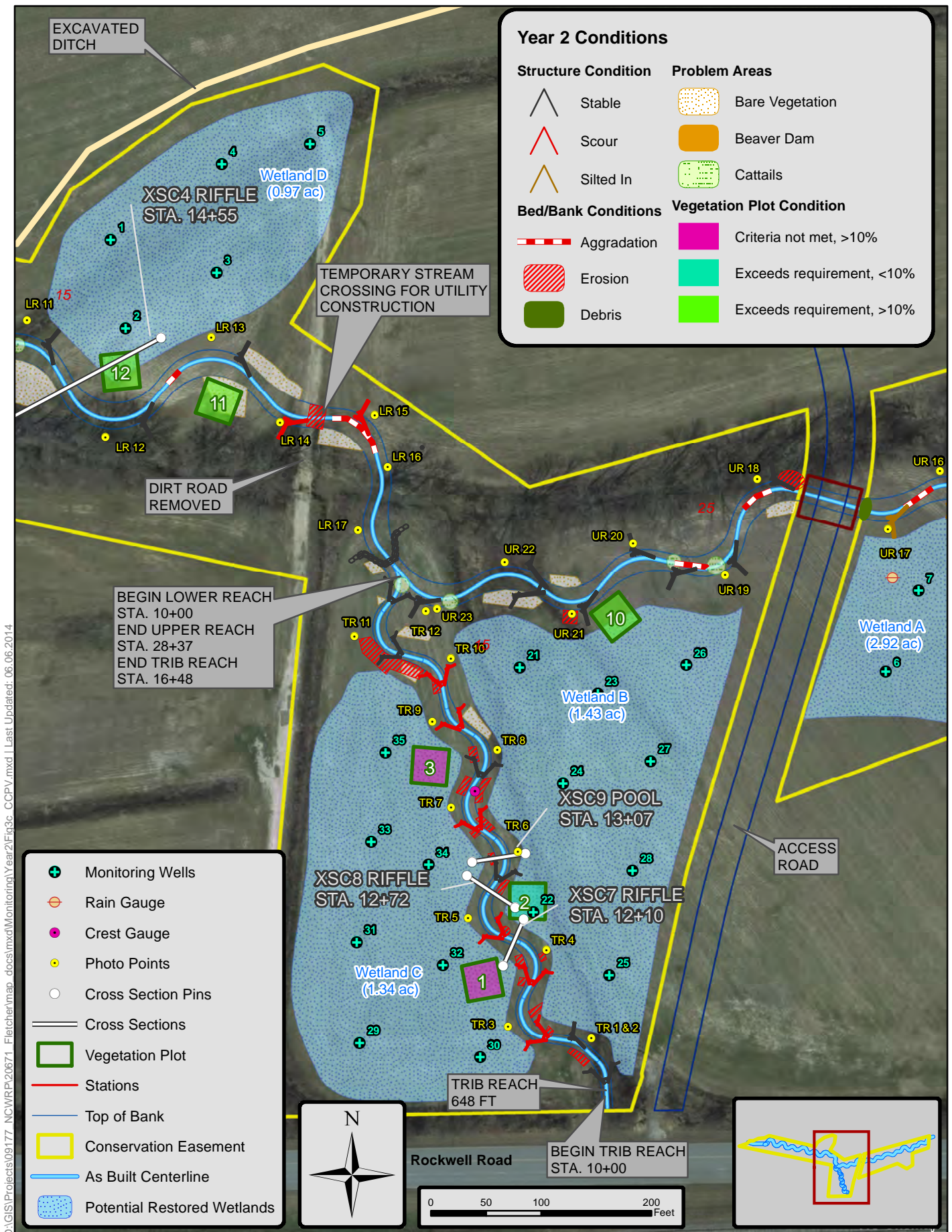
| | |
|--|-----------------------------------|
| | Monitoring Wells |
| | Rain Gauge |
| | Photo Points |
| | Crest Gauge |
| | Cross Section Pins |
| | Cross Sections |
| | Stations |
| | Structures |
| | Top of Bank |
| | Vegetation Plot |
| | Conservation Easement |
| | As Built Centerline |
| | Potential Restored Wetlands (A-D) |



Current Conditions Plan View
Figure 3a



Current Conditions Plan View
Figure 3b

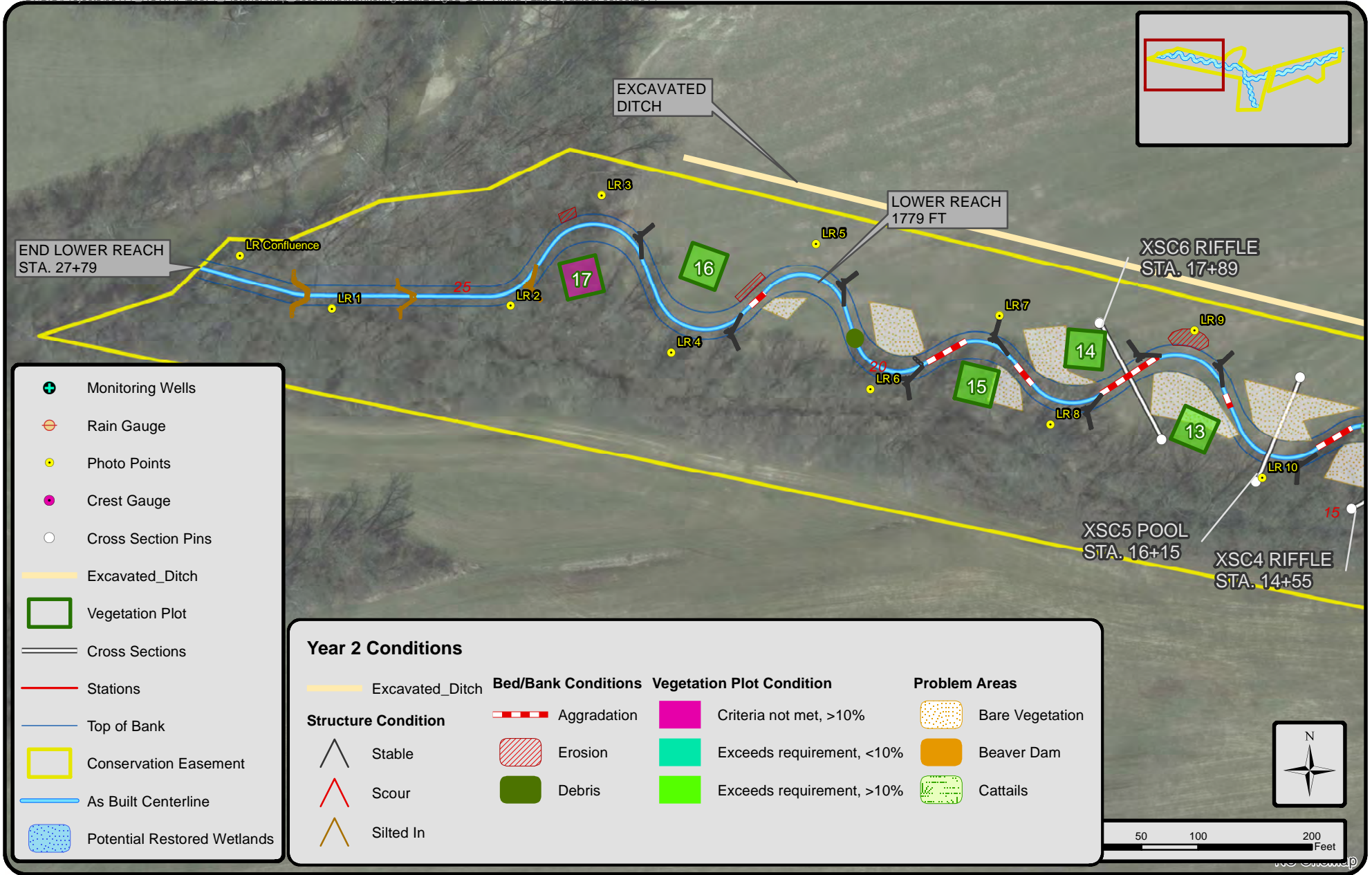


D:\GIS\Projects\091777_NCWRP\20671_Fletcher\map_docs\mxd\Monitoring\Year2\Fig3c_CCPV.mxd | Last Updated: 06.06.2014



Current Conditions Plan View

Figure 3c



Current Conditions Plan View

Figure 3d

Table 5
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Upper Reach
 1838

| Major Channel Category | Channel Sub-Category | Metric | Number Stable, Performing as Intended | Total Number in As-built | Number of Unstable Segments | Amount of Unstable Footage | % Stable, Performing as Intended | Number with Stabilizing Woody Vegetation | Footage with Stabilizing Woody Vegetation | Adjusted % for Stabilizing Woody Vegetation |
|--------------------------|--|---|---------------------------------------|--------------------------|-----------------------------|----------------------------|----------------------------------|--|---|---|
| 1. Bed | 1. Vertical Stability (Riffle and Run units) | 1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars) | | | 8 | 170 | 91% | | | |
| | | 2. <u>Degradation</u> - Evidence of downcutting | | | 0 | 0 | 100% | | | |
| | 2. Riffle Condition | 1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate | 16 | 21 | | 76% | | | | |
| | 3. Meander Pool Condition | 1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6) | 17 | 23 | | 74% | | | | |
| | | 2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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% | | | | | |
| | Totals | | | | | 7 | 94 | | | |
| 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% |
| 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 <u>not</u> 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 \geq 1.6 Rootwads/logs providing some cover at base-flow. | 6 | 6 | | | 100% | | | |

Table 5
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Lower Reach
 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars) | | | 8 | 258 | 85% | | | | | |
| | | 2. <u>Degradation</u> - Evidence of downcutting | | | 0 | 0 | 100% | | | | | |
| | 2. Riffle Condition | 1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate | 14 | 16 | | | 88% | | | | | |
| | | 3. Meander Pool Condition | 1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6) | 12 | | | 16 | | | | 75% | |
| | 2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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% | | | | | |
| | Totals | | | | | | 4 | | | | 100 | 97% |
| 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% | | | | |
| 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. | 17 | 17 | | | 100% | | | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document) | 17 | 17 | | | 100% | | | | | |
| | 4. Habitat | Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow. | 4 | 4 | | | 100% | | | | | |

Table 5
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Tributary
 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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars) | | | 0 | 0 | 100% | | | | |
| | | 2. <u>Degradation</u> - Evidence of downcutting | | | 0 | 0 | 100% | | | | |
| | 2. Riffle Condition | 1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate | 7 | 11 | | 64% | | | | | |
| | 3. Meander Pool Condition | 1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6) | 10 | 11 | | 91% | | | | | |
| | | 2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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% | | | | | | | |
| | | | | | Totals | 16 | 242 | 81% | 0 | 0 | 81% |
| 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 <u>not</u> 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 \geq 1.6 Rootwads/logs providing some cover at base-flow. | 11 | 11 | | | 100% | | | | |

Table 6

Vegetation Condition Assessment

Planted Acreage¹

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 | 24 | 0.44 | 2.4% |
| 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 | 0 | 0.00 | 0.0% |
| Total | | | | 24 | 0.44 | 2.4% |
| 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 | | | | 24 | 0.44 | 2.4% |

Easement Acreage²

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 | 0 | 0.00 | 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 species are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by 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 likely trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly early in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolizing invasives polygons, particularly for situations where the condition for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.



Upper Reach Photo Station 1 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 1 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 2 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 2 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 3 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 3 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 4 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 4 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 5 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 5 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 6 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 6 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 7 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 7 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 8 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 8 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 9 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 9 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 10 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 10 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 11 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 11 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 12 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 12 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 13 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 13 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 14 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 14 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 15 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 15 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 16 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 16 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 17 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 17 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 18 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 18 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 19 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 19 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 20 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 20 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 21 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 21 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 22 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 22 Upstream (5/12/2014 Year 2)



Upper Reach Photo Station 23 Downstream (5/12/2014 Year 2)



Upper Reach Photo Station 23 Upstream (5/12/2014 Year 2)



Confluence with Cane Creek (5/12/2014 Year 2)



Looking upstream of Confluence with Cane Creek (5/12/2014 Year 2)



Lower Reach Photo Station 1 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 1 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 2 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 2 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 3 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 3 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 4 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 4 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 5 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 5 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 6 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 6 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 7 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 7 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 8 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 8 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 9 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 9 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 10 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 10 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 11 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 11 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 12 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 12 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 13 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 13 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 14 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 14 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 15 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 15 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 16 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 16 Upstream (5/12/2014 Year 2)



Lower Reach Photo Station 17 Downstream (5/12/2014 Year 2)



Lower Reach Photo Station 17 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 1 & 2 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 1 & 2 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 3 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 3 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 4 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 4 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 5 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 5 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 6 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 6 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 7 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 7 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 8 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 8 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 9 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 9 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 10 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 10 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 11 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 11 Upstream (5/12/2014 Year 2)



Tributary Reach Photo Station 12 Downstream (5/12/2014 Year 2)



Tributary Reach Photo Station 12 Upstream (5/12/2014 Year 2)

Appendix C

Vegetation Plot Data

Fletcher-Meritor Site (#138)
Year 2 (12-May-2014 to 13-May-2014)
 Vegetation Plot Summary Information

| Plot # | Riparian Buffer Stems¹ | Stream/ Wetland Stems² | Live Stakes | Invasives | Volunteers³ | Total⁴ | Unknown Growth Form |
|---------------|--|--|--------------------|------------------|-------------------------------|--------------------------|------------------------------------|
| 1 | n/a | 4 | 0 | 0 | 0 | 10 | 0 |
| 2 | n/a | 8 | 0 | 0 | 0 | 16 | 0 |
| 3 | n/a | 5 | 0 | 0 | 0 | 5 | 0 |
| 4 | n/a | 18 | 0 | 0 | 0 | 18 | 0 |
| 5 | n/a | 12 | 0 | 0 | 6 | 20 | 0 |
| 6 | n/a | 8 | 0 | 0 | 8 | 16 | 0 |
| 7 | n/a | 14 | 0 | 0 | 5 | 20 | 0 |
| 8 | n/a | 11 | 0 | 0 | 0 | 11 | 0 |
| 9 | n/a | 9 | 0 | 0 | 11 | 20 | 0 |
| 10 | n/a | 10 | 0 | 0 | 11 | 21 | 0 |
| 11 | n/a | 11 | 0 | 0 | 412 | 423 | 0 |
| 12 | n/a | 10 | 0 | 0 | 49 | 59 | 0 |
| 13 | n/a | 9 | 0 | 0 | 99 | 108 | 0 |
| 14 | n/a | 11 | 0 | 0 | 108 | 119 | 0 |
| 15 | n/a | 14 | 0 | 0 | 235 | 249 | 0 |
| 16 | n/a | 9 | 0 | 0 | 154 | 163 | 0 |
| 17 | n/a | 6 | 0 | 0 | 324 | 330 | 0 |

Wetland/Stream Vegetation Totals

(per acre)

| Plot # | Stream/ Wetland Stems ² | Volunteers ³ | Total ⁴ | Success Criteria Met? |
|--------------------|--|-------------------------|--------------------|-----------------------------|
| 1 | 162 | 0 | 405 | No |
| 2 | 324 | 0 | 647 | Yes, barely |
| 3 | 202 | 0 | 202 | No |
| 4 | 728 | 0 | 728 | Yes |
| 5 | 486 | 243 | 809 | Yes |
| 6 | 324 | 324 | 647 | Yes, barely |
| 7 | 567 | 202 | 809 | Yes |
| 8 | 445 | 0 | 445 | Yes |
| 9 | 364 | 445 | 809 | Yes |
| 10 | 405 | 445 | 850 | Yes |
| 11 | 445 | 16673 | 17118 | Yes |
| 12 | 405 | 1983 | 2388 | Yes |
| 13 | 364 | 4006 | 4371 | Yes |
| 14 | 445 | 4371 | 4816 | Yes |
| 15 | 567 | 9510 | 10077 | Yes |
| 16 | 364 | 6232 | 6596 | Yes |
| 17 | 243 | 13112 | 13355 | No |
| Project Avg | 402 | 3385 | 3828 | 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

¹Buffer

Stems Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.

²Stream/
Wetland

Stems Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines

³Volunteers Native woody stems. Not planted. No vines.

⁴Total Planted + volunteer native woody stems. Includes live stakes. Excl. exotics. Excl. vines.

Report Prepared By Vickie Miller
Date Prepared 5/15/2014 21:56

database name cvs-eep-entrytool-v2.3.1 Fletcher Year 2.mdb
database location C:\Users\vimiller\Desktop
computer name RALE-12116343
file size 51904512

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

| Scientific Name | Common Name | Species Type | Cur | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|--------------------|---------------|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------|
| | | | 138-01-0001 | | | 138-01-0002 | | | 138-01-0003 | | | 138-01-0004 | | | 138-01-0005 | | | 138-01-0006 | | | 138-01-0007 | | | 138-01-0008 | | |
| | | | 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 | 3 | | | | 6 | 6 | 6 | | | | |
| Acer rubrum | red maple | Tree | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | 1 | | | | |
| Betula nigra | river birch | Tree | 1 | 1 | 1 | | | 1 | 1 | 1 | 6 | 6 | 6 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 4 | 4 | 4 | |
| Cornus | dogwood | Shrub or Tree | | | | | | | | | | | | 1 | 1 | 1 | | | | | | | | | | |
| Cornus amomum | silky dogwood | Shrub | | | | | | | | | | | | 1 | 1 | 1 | | | | 1 | 1 | 1 | | | | |
| Fraxinus pennsylvanica | green ash | Tree | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | | | | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 |
| Juglans nigra | black walnut | Tree | | | | | | | | | | 3 | 3 | 3 | 3 | 3 | 3 | | | | 1 | 1 | 1 | | | |
| Liriodendron tulipifera | tuliptree | Tree | | | | | | | | | | | | | | | | | | | | | | | | |
| Platanus occidentalis | American sycamore | Tree | 1 | 1 | 1 | 3 | 3 | 3 | | | | 4 | 4 | 4 | 2 | 2 | 8 | 4 | 4 | 5 | 1 | 1 | 2 | 1 | 1 | 1 |
| Populus deltoides | eastern cottonwood | Tree | | | | | | | | | | | | | | | | | | | | | | | | |
| Salix nigra | black willow | Tree | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | |
| Salix sericea | silky willow | Shrub | | | | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | |
| Sambucus canadensis | Common Elderberry | Shrub | | | | | | | | | | | | | | | | | | | | | | | | |
| Unknown | | Shrub or Tree | 6 | 6 | 6 | 8 | 8 | 8 | | | | | | 1 | 1 | 1 | | | 7 | 1 | 1 | 4 | | | | |
| Stem count | | | 10 | 10 | 10 | 16 | 16 | 16 | 5 | 5 | 5 | 18 | 18 | 18 | 14 | 14 | 20 | 8 | 8 | 16 | 15 | 15 | 20 | 11 | 11 | 11 |
| size (ares) | | | 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 | | |
| Species count | | | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 5 | 5 | 5 | 8 | 8 | 8 | 3 | 3 | 4 | 7 | 7 | 8 | 4 | 4 | 4 |
| Stems per ACRE | | | 404.7 | 404.7 | 404.7 | 647.5 | 647.5 | 647.5 | 202.3 | 202.3 | 202.3 | 728.4 | 728.4 | 728.4 | 566.6 | 566.6 | 809.4 | 323.7 | 323.7 | 647.5 | 607 | 607 | 809.4 | 445.2 | 445.2 | 445.2 |

rent Plot Data (MY2 2014)

| 138-01-0009 | | | 138-01-0010 | | | 138-01-0011 | | | 138-01-0012 | | | 138-01-0013 | | | 138-01-0014 | | | 138-01-0015 | | | 138-01-0016 | | | 138-01-0017 | | |
|-------------|-------|-------|-------------|-------|-------|-------------|-------|-------|-------------|-------|------|-------------|-------|------|-------------|-------|------|-------------|-------|-------|-------------|-------|------|-------------|-------|-------|
| 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 |
| | | | | | 6 | | | 3 | | | 2 | | | | | | 11 | | | 20 | | | | | | |
| 1 | 1 | 4 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | | | 6 | | | | | | | 2 | 2 | 29 | 3 | 3 | 13 |
| | | 3 | | | | | | | | | | | | 15 | | | | | | | | | 9 | | | |
| | | 3 | | | | 3 | 3 | 408 | 2 | 2 | 44 | 2 | 2 | 79 | 3 | 3 | 92 | 3 | 3 | 218 | 1 | 1 | 64 | | | 300 |
| | | | | | | 1 | 1 | 1 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 10 | 10 | 10 | 3 | 3 | 3 | 1 | 1 | 1 |
| 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | | | | | | | 4 | 4 | 4 | | | | | | 31 | 2 | 2 | 14 |
| 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 4 | 4 | 5 | 5 | 5 | 3 | 3 | 7 | | | 4 | 2 | 2 | 3 | | | 2 | 1 | 1 | 1 | 3 | 3 | 24 | | | 1 |
| | | | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 6 | | | | | | 3 | | | 1 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | | | 5 | | | | | | 1 | | | | | | | | | | | | | | | |
| 9 | 9 | 20 | 10 | 10 | 21 | 11 | 11 | 423 | 10 | 10 | 59 | 9 | 9 | 108 | 11 | 11 | 119 | 14 | 14 | 249 | 9 | 9 | 163 | 6 | 6 | 330 |
| 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | | | |
| 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | | | |
| 4 | 4 | 8 | 4 | 4 | 6 | 5 | 5 | 6 | 3 | 3 | 6 | 3 | 3 | 5 | 3 | 3 | 6 | 3 | 3 | 4 | 4 | 4 | 7 | 3 | 3 | 6 |
| 364.2 | 364.2 | 809.4 | 404.7 | 404.7 | 849.8 | 445.2 | 445.2 | 17118 | 404.7 | 404.7 | 2388 | 364.2 | 364.2 | 4371 | 445.2 | 445.2 | 4816 | 566.6 | 566.6 | 10077 | 364.2 | 364.2 | 6596 | 242.8 | 242.8 | 13355 |

| Annual Means | | | | | | | | |
|--------------|-------|------|------------|-------|------|------------|-------|------|
| MY2 (2014) | | | MY1 (2013) | | | MY0 (2012) | | |
| PnoLS | P-all | T | PnoLS | P-all | T | PnoLS | P-all | T |
| | | 42 | | | | | | |
| 22 | 22 | 68 | 27 | 27 | 27 | 22 | 22 | 22 |
| 2 | 2 | 30 | | | 9 | | | |
| 31 | 31 | 1225 | 29 | 29 | 832 | 26 | 26 | 481 |
| 1 | 1 | 1 | | | | | | |
| 31 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 30 |
| 37 | 37 | 80 | 40 | 40 | 40 | 36 | 36 | 36 |
| 8 | 8 | 8 | 7 | 7 | 7 | 6 | 6 | 6 |
| | | 1 | | | | | | |
| 34 | 34 | 75 | 33 | 33 | 59 | 35 | 35 | 70 |
| 1 | 1 | 1 | | | | | | |
| 1 | 1 | 11 | | | | | | |
| 2 | 2 | 2 | | | | | | |
| | | | | | | 1 | 1 | 1 |
| 16 | 16 | 33 | 3 | 3 | 3 | 4 | 4 | 4 |
| 186 | 186 | 1608 | 170 | 170 | 1008 | 160 | 160 | 650 |
| 17 | | | 17 | | | 17 | | |
| 0.42 | | | 0.42 | | | 0.42 | | |
| 12 | 12 | 14 | 7 | 7 | 8 | 8 | 8 | 8 |
| 442.8 | 442.8 | 3828 | 404.7 | 404.7 | 2400 | 380.9 | 380.9 | 1547 |



Vegetation Plot 1 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 2 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 3 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 4 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 5 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 6 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 7 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 8 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 9 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 10 – 10m x 10m (5/12/2014 Year 2)



Vegetation Plot 11 – 10m x 10m (5/13/2014 Year 2)



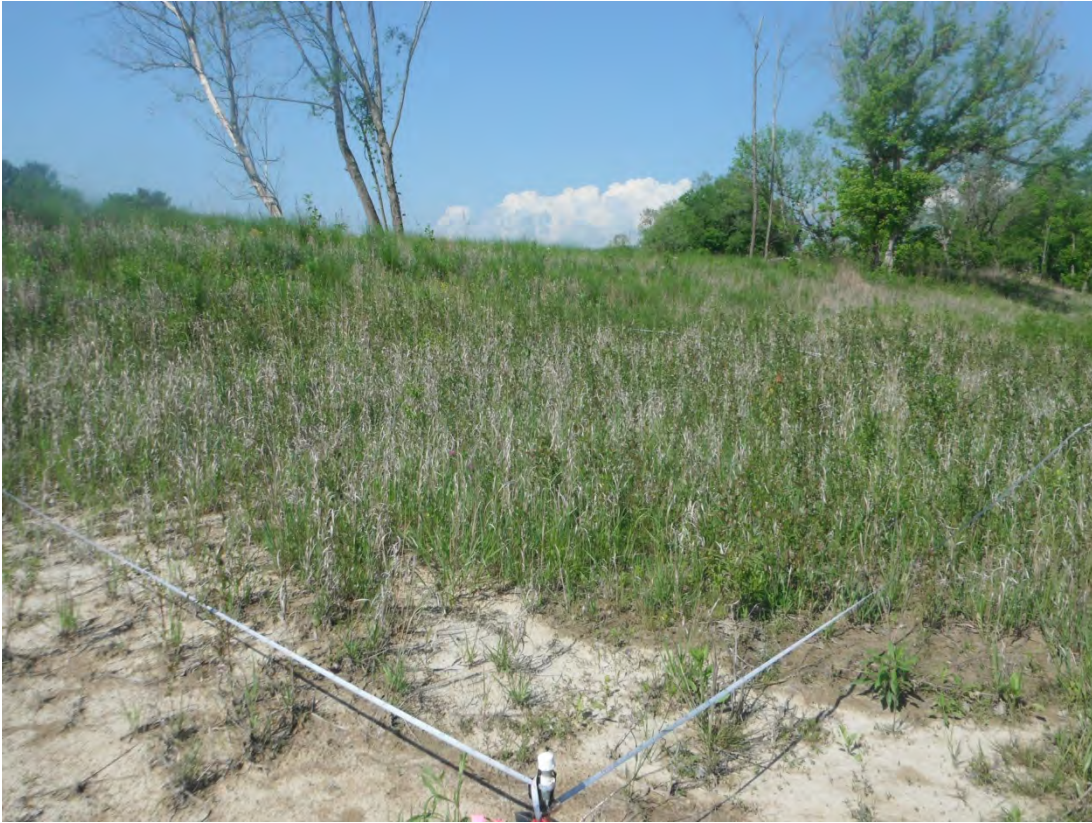
Vegetation Plot 12 – 10m x 10m (5/13/2014 Year 2)



Vegetation Plot 13 – 10m x 10m (5/13/2014 Year 2)



Vegetation Plot 14 – 10m x 10m (5/13/2014 Year 2)



Vegetation Plot 15 – 10m x 10m (5/13/2014 Year 2)



Vegetation Plot 16 – 10m x 10m (5/13/2014 Year 2)



Vegetation Plot 17 – 10m x 10m (5/13/2014 Year 2)

Appendix D

Stream Assessment Data

| Station | Elevation |
|---------|-----------|
| 0.00 | 2061.51 |
| 0.21 | 2061.15 |
| 23.84 | 2060.95 |
| 42.98 | 2060.71 |
| 51.68 | 2059.78 |
| 59.31 | 2059.12 |
| 61.51 | 2058.44 |
| 62.71 | 2057.80 |
| 63.63 | 2057.27 |
| 64.09 | 2057.09 |
| 64.39 | 2056.97 |
| 65.52 | 2056.82 |
| 66.09 | 2056.67 |
| 67.05 | 2056.85 |
| 67.85 | 2057.50 |
| 69.40 | 2057.66 |
| 71.30 | 2058.79 |
| 73.69 | 2058.99 |
| 74.90 | 2059.36 |
| 90.40 | 2060.81 |
| 115.10 | 2061.55 |
| 115.21 | 2062.00 |

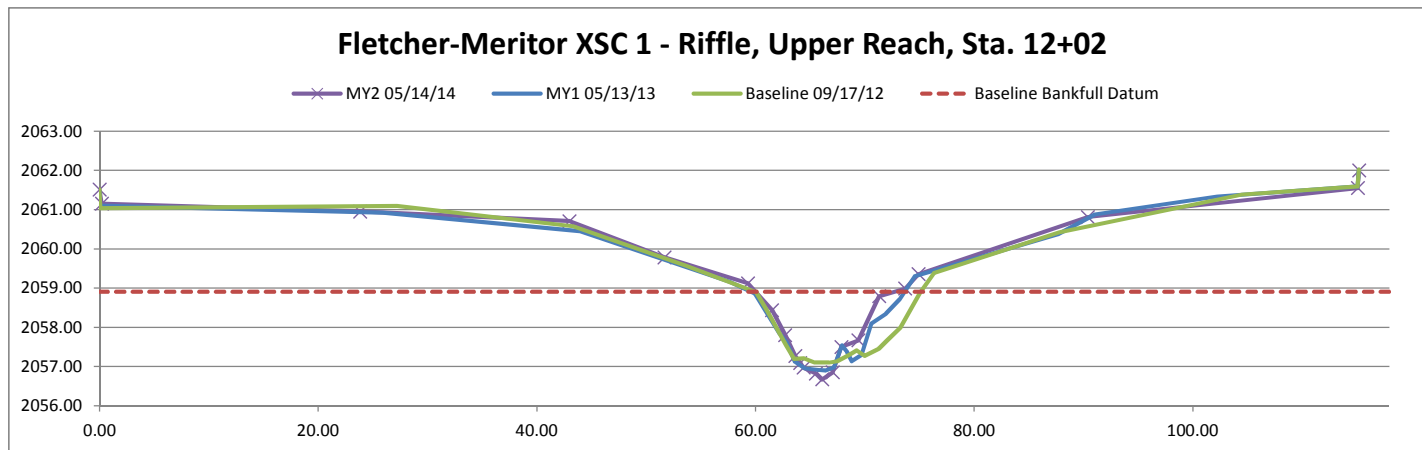
| | |
|------------------------------|-----------------------------------|
| Reach | Fletcher-Meritor, Upper Reach |
| River Basin | French Broad |
| Cross Section ID | XSC-1, Riffle, Upper Reach, 12+02 |
| Drainage Area (Sq Mi) | 0.75 |
| Date | 5/14/2014 |
| Observers | V. Miller, C. Myers, W. Yelverton |

| SUMMARY DATA | |
|--|---------|
| Bankfull Elevation, ft | 2058.90 |
| Bankfull Cross Sectional Area, ft² | 14.20 |
| Bankfull Width, ft | 12.60 |
| Max Depth at Bankfull, ft | 2.23 |
| Mean Depth at Bankfull, ft | 1.13 |
| Width/Depth Ratio | 11.18 |
| Flood Prone Width, ft | 98.40 |
| Flood Prone Area Elevation, ft | 2061.13 |
| Entrenchment Ratio | 7.81 |
| Bank Height Ratio | 0.95 |



Stream Type C/E4

Sta. 12+02 Looking Downstream



| Station | Elevation |
|---------|-----------|
| 0.00 | 2060.85 |
| 0.12 | 2060.37 |
| 14.12 | 2059.97 |
| 21.28 | 2059.02 |
| 24.24 | 2058.42 |
| 26.41 | 2057.49 |
| 27.19 | 2056.85 |
| 27.61 | 2056.13 |
| 28.43 | 2055.58 |
| 29.40 | 2055.59 |
| 30.70 | 2055.75 |
| 31.89 | 2056.28 |
| 33.09 | 2057.52 |
| 39.49 | 2057.93 |
| 45.87 | 2058.76 |
| 52.27 | 2059.56 |
| 59.34 | 2060.28 |
| 73.64 | 2060.44 |
| 85.20 | 2060.49 |
| 85.20 | 2060.85 |

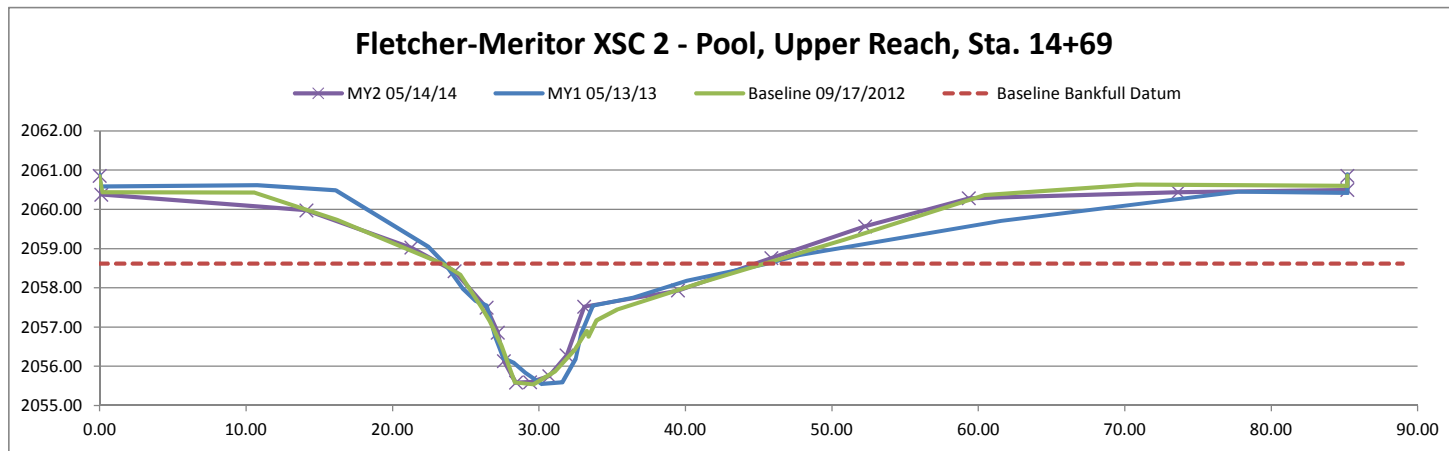
| | |
|------------------------------|-----------------------------------|
| Reach | Fletcher-Meritor, Upper Reach |
| River Basin | French Broad |
| Cross Section ID | XSC-2, Pool, Upper Reach, 14+69 |
| Drainage Area (Sq Mi) | 0.75 |
| Date | 5/14/2014 |
| Observers | V. Miller, C. Myers, W. Yelverton |

| SUMMARY DATA | |
|--|---------|
| Bankfull Elevation, ft | 2058.61 |
| Bankfull Cross Sectional Area, ft² | 25.10 |
| Bankfull Width, ft | 21.40 |
| Max Depth at Bankfull, ft | 3.03 |
| Mean Depth at Bankfull, ft | 1.17 |
| Width/Depth Ratio | 18.25 |
| Flood Prone Width, ft | >86.00 |
| Flood Prone Area Elevation, ft | 2061.64 |
| Entrenchment Ratio | >4.00 |
| Bank Height Ratio | 0.94 |



Stream Type C/E4

Sta. 14+69 Looking Downstream



| Station | Elevation |
|---------|-----------|
| 0.00 | 2061.24 |
| 0.12 | 2060.72 |
| 9.48 | 2060.94 |
| 16.00 | 2060.62 |
| 23.66 | 2059.54 |
| 31.74 | 2058.84 |
| 33.81 | 2057.80 |
| 35.76 | 2057.22 |
| 36.04 | 2056.60 |
| 36.59 | 2056.26 |
| 37.31 | 2055.99 |
| 37.81 | 2055.83 |
| 38.19 | 2056.01 |
| 38.52 | 2056.56 |
| 39.87 | 2056.65 |
| 41.27 | 2056.59 |
| 42.13 | 2057.41 |
| 43.15 | 2057.70 |
| 46.04 | 2058.91 |
| 56.11 | 2059.61 |
| 64.74 | 2060.38 |
| 76.51 | 2060.72 |
| 84.86 | 2060.64 |
| 85.20 | 2060.89 |

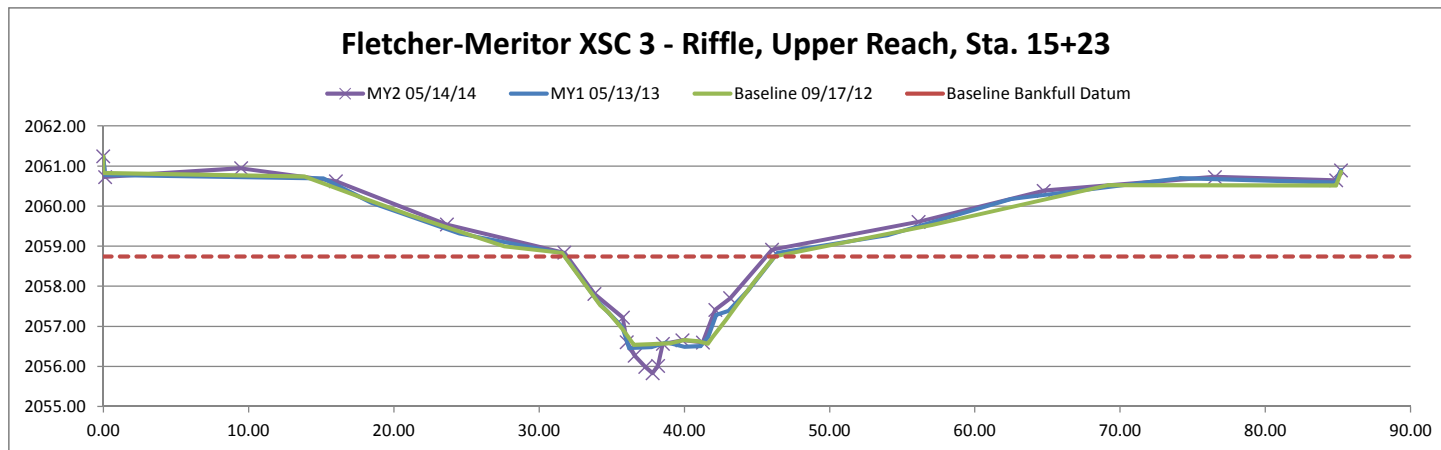
| | |
|------------------------------|-----------------------------------|
| Reach | Fletcher-Meritor, Upper Reach |
| River Basin | French Broad |
| Cross Section ID | XSC-3, Riffle, Upper Reach, 15+23 |
| Drainage Area (Sq Mi) | 0.75 |
| Date | 5/14/2014 |
| Observers | V. Miller, C. Myers, W. Yelverton |

| SUMMARY DATA | |
|--|---------|
| Bankfull Elevation, ft | 2058.74 |
| Bankfull Cross Sectional Area, ft² | 20.10 |
| Bankfull Width, ft | 13.70 |
| Max Depth at Bankfull, ft | 2.91 |
| Mean Depth at Bankfull, ft | 1.47 |
| Width/Depth Ratio | 9.34 |
| Flood Prone Width, ft | >86.00 |
| Flood Prone Area Elevation, ft | 2061.65 |
| Entrenchment Ratio | >6.00 |
| Bank Height Ratio | 1.03 |



Stream Type C/E4

Sta. 15+23, Looking Downstream



| Station | Elevation |
|---------|-----------|
| 0.00 | 2058.97 |
| 0.05 | 2058.60 |
| 3.40 | 2058.23 |
| 11.11 | 2056.66 |
| 18.57 | 2055.16 |
| 34.56 | 2054.82 |
| 47.77 | 2054.11 |
| 54.79 | 2054.10 |
| 57.65 | 2053.76 |
| 58.51 | 2053.87 |
| 60.93 | 2052.69 |
| 62.13 | 2052.05 |
| 62.45 | 2051.88 |
| 63.07 | 2051.53 |
| 63.60 | 2051.27 |
| 64.40 | 2051.28 |
| 65.53 | 2051.30 |
| 66.56 | 2051.38 |
| 67.08 | 2051.39 |
| 68.61 | 2051.72 |
| 69.12 | 2051.73 |
| 70.45 | 2052.34 |
| 72.43 | 2052.98 |
| 74.04 | 2053.69 |
| 75.32 | 2054.03 |
| 82.03 | 2054.44 |
| 105.77 | 2054.86 |
| 126.15 | 2055.06 |
| 137.44 | 2055.30 |
| 148.86 | 2056.54 |
| 160.77 | 2058.10 |
| 167.81 | 2058.23 |
| 167.84 | 2058.49 |

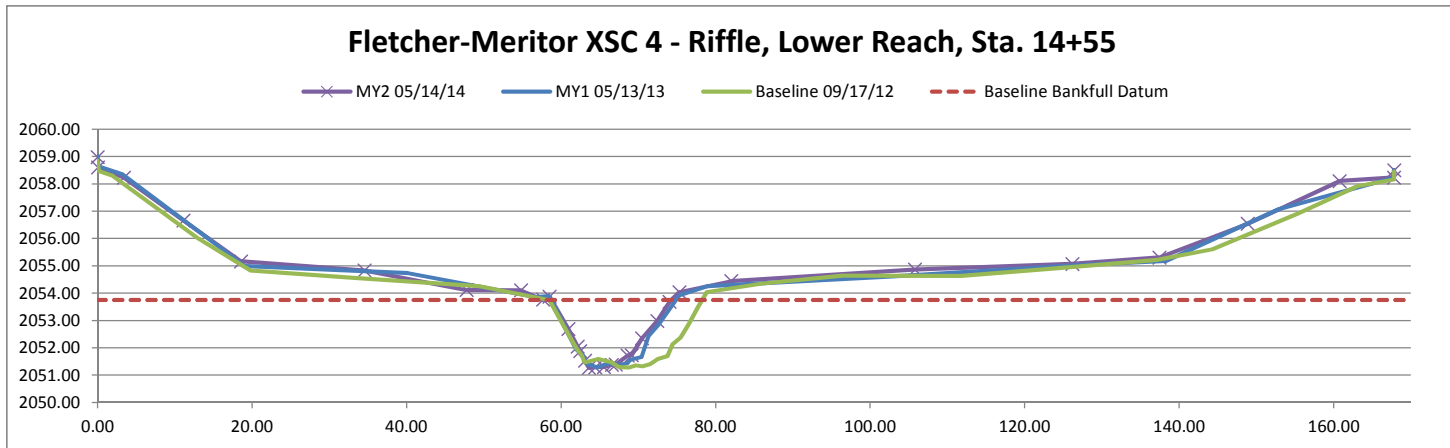
| | |
|------------------------------|-----------------------------------|
| Reach | Fletcher-Meritor, Lower Reach |
| River Basin | French Broad |
| Cross Section ID | XSC-4 Riffle, Lower Reach, 14+55 |
| Drainage Area (Sq Mi) | 1.1 |
| Date | 5/14/2014 |
| Observers | V. Miller, C. Myers, W. Yelverton |

| SUMMARY DATA | |
|--|---------|
| Bankfull Elevation, ft | 2053.74 |
| Bankfull Cross Sectional Area, ft² | 23.70 |
| Bankfull Width, ft | 15.50 |
| Max Depth at Bankfull, ft | 2.47 |
| Mean Depth at Bankfull, ft | 1.53 |
| Width/Depth Ratio | 10.14 |
| Flood Prone Width, ft | 132.50 |
| Flood Prone Area Elevation, ft | 2056.21 |
| Entrenchment Ratio | 8.55 |
| Bank Height Ratio | 1.05 |



Stream Type C/E4

Sta. 14+55 Looking Downstream



| Station | Elevation |
|---------|-----------|
| 0.00 | 2058.85 |
| 0.00 | 2058.49 |
| 2.03 | 2057.79 |
| 6.80 | 2056.04 |
| 11.36 | 2054.23 |
| 16.30 | 2053.57 |
| 18.20 | 2052.58 |
| 19.16 | 2052.02 |
| 20.11 | 2051.08 |
| 20.60 | 2050.59 |
| 21.31 | 2050.21 |
| 22.43 | 2050.13 |
| 23.15 | 2050.20 |
| 24.12 | 2050.30 |
| 25.61 | 2050.47 |
| 26.80 | 2050.79 |
| 27.35 | 2051.94 |
| 27.83 | 2052.46 |
| 29.31 | 2052.76 |
| 35.19 | 2052.97 |
| 41.84 | 2053.41 |
| 52.81 | 2054.11 |
| 65.75 | 2054.42 |
| 78.50 | 2054.31 |
| 88.50 | 2054.82 |
| 94.63 | 2056.93 |
| 99.73 | 2058.35 |
| 99.85 | 2058.72 |

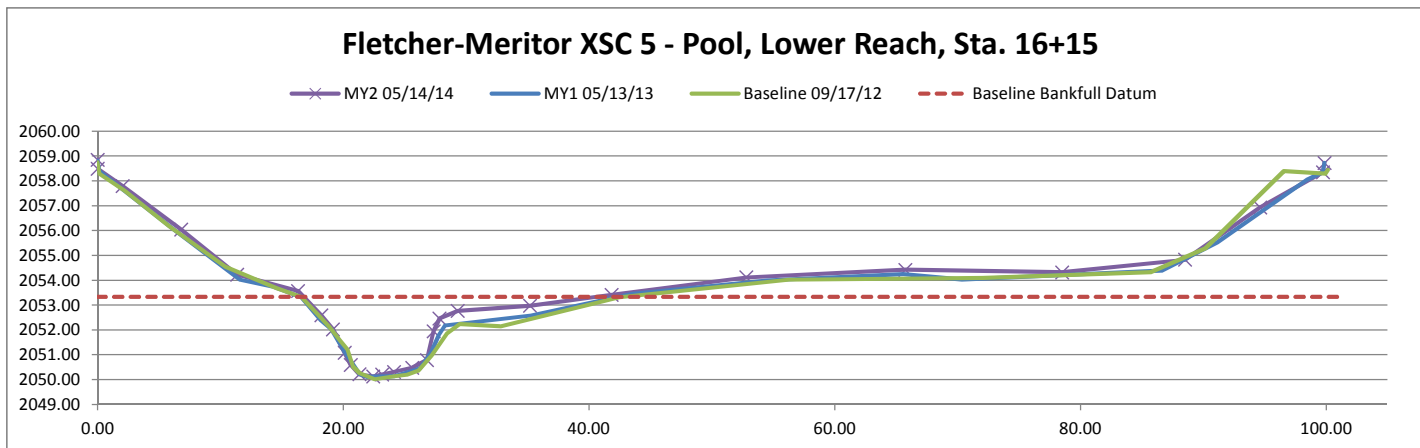
| | |
|------------------------------|-----------------------------------|
| Reach | Fletcher-Meritor, Lower Reach |
| River Basin | French Broad |
| Cross Section ID | XSC-5, Pool, Lower Reach, 16+15 |
| Drainage Area (Sq Mi) | 1.1 |
| Date | 5/14/2014 |
| Observers | V. Miller, C. Myers, W. Yelverton |

| SUMMARY DATA | |
|--|---------|
| Bankfull Elevation, ft | 2053.32 |
| Bankfull Cross Sectional Area, ft² | 29.00 |
| Bankfull Width, ft | 23.60 |
| Max Depth at Bankfull, ft | 3.19 |
| Mean Depth at Bankfull, ft | 1.23 |
| Width/Depth Ratio | 19.21 |
| Flood Prone Width, ft | 83.00 |
| Flood Prone Area Elevation, ft | 2056.51 |
| Entrenchment Ratio | 3.52 |
| Bank Height Ratio | 1.08 |



Stream Type C/E4

Sta. 16+15 Looking Downstream



| Station | Elevation |
|---------|-----------|
| 0.00 | 2058.28 |
| 0.00 | 2057.93 |
| 2.98 | 2057.40 |
| 11.10 | 2055.41 |
| 16.71 | 2054.19 |
| 30.08 | 2053.63 |
| 43.50 | 2053.56 |
| 52.24 | 2053.40 |
| 55.35 | 2052.81 |
| 57.17 | 2052.40 |
| 58.34 | 2051.35 |
| 60.85 | 2051.25 |
| 62.60 | 2051.08 |
| 63.67 | 2050.79 |
| 64.27 | 2050.70 |
| 65.25 | 2050.64 |
| 66.14 | 2050.71 |
| 66.61 | 2050.86 |
| 67.46 | 2051.64 |
| 68.96 | 2052.38 |
| 70.52 | 2053.13 |
| 76.09 | 2053.41 |
| 103.21 | 2053.70 |
| 111.19 | 2055.86 |
| 115.69 | 2057.12 |
| 115.79 | 2057.66 |

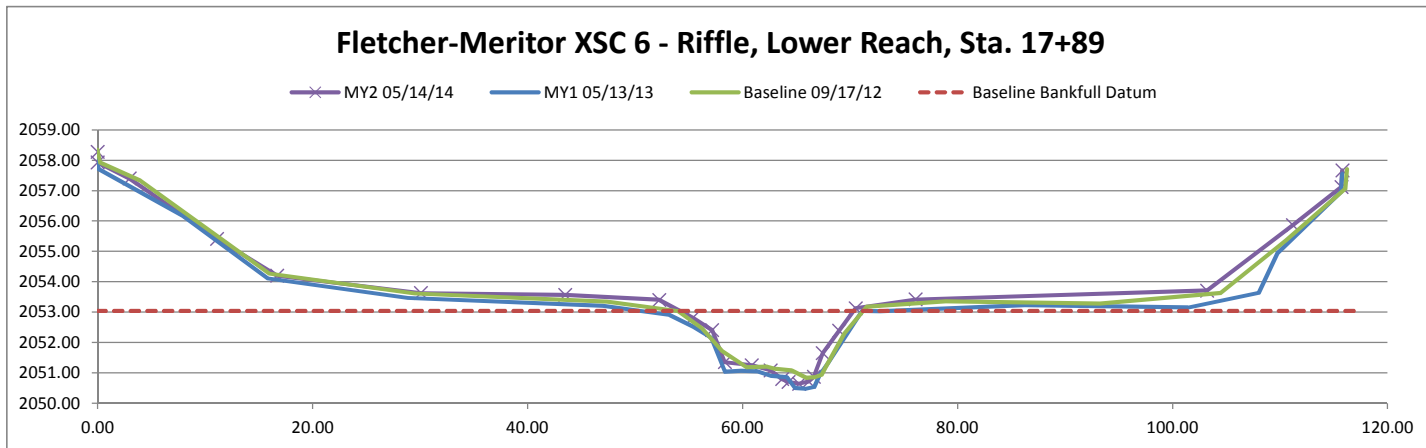
| | |
|------------------------------|-----------------------------------|
| Reach | Fletcher-Meritor, Lower Reach |
| River Basin | French Broad |
| Cross Section ID | XSC-6, Riffle, Lower Reach, 17+89 |
| Drainage Area (Sq Mi) | 1.1 |
| Date | 5/14/2014 |
| Observers | V. Miller, C. Myers, W. Yelverton |

| SUMMARY DATA | |
|--|---------|
| Bankfull Elevation, ft | 2053.03 |
| Bankfull Cross Sectional Area, ft² | 22.40 |
| Bankfull Width, ft | 16.10 |
| Max Depth at Bankfull, ft | 2.39 |
| Mean Depth at Bankfull, ft | 1.39 |
| Width/Depth Ratio | 11.57 |
| Flood Prone Width, ft | 98.50 |
| Flood Prone Area Elevation, ft | 2055.42 |
| Entrenchment Ratio | 6.12 |
| Bank Height Ratio | 1.04 |



Stream Type C/E4

Sta. 17+89 Looking Downstream



| Station | Elevation |
|---------|-----------|
| 0.00 | 2061.78 |
| 0.13 | 2061.51 |
| 5.70 | 2061.39 |
| 10.41 | 2060.47 |
| 17.00 | 2059.55 |
| 20.08 | 2059.27 |
| 21.84 | 2058.77 |
| 22.42 | 2058.03 |
| 22.73 | 2057.59 |
| 23.02 | 2057.33 |
| 23.32 | 2057.74 |
| 25.45 | 2057.58 |
| 25.78 | 2058.30 |
| 26.89 | 2058.42 |
| 30.31 | 2059.58 |
| 33.68 | 2060.20 |
| 38.77 | 2060.97 |
| 45.96 | 2060.78 |
| 46.20 | 2060.99 |

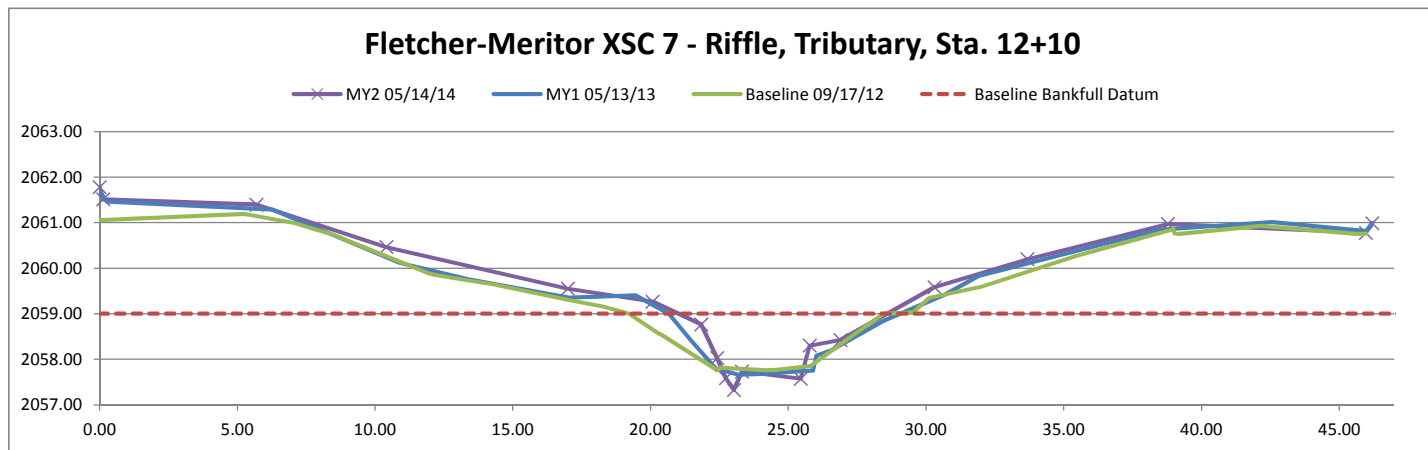
| | |
|------------------------------|-----------------------------------|
| Reach | Fletcher-Meritor, Tributary |
| River Basin | French Broad |
| Cross Section ID | XSC-7, Riffle, Tributary, 12+10 |
| Drainage Area (Sq Mi) | 0.32 |
| Date | 5/14/2014 |
| Observers | V. Miller, C. Myers, W. Yelverton |

| SUMMARY DATA | |
|--|---------|
| Bankfull Elevation, ft | 2059.00 |
| Bankfull Cross Sectional Area, ft² | 6.10 |
| Bankfull Width, ft | 7.60 |
| Max Depth at Bankfull, ft | 1.67 |
| Mean Depth at Bankfull, ft | 0.80 |
| Width/Depth Ratio | 9.47 |
| Flood Prone Width, ft | 27.40 |
| Flood Prone Area Elevation, ft | 2060.67 |
| Entrenchment Ratio | 3.61 |
| Bank Height Ratio | 1.16 |



Stream Type C/E4

Sta. 12+10 Looking Downstream



| Station | Elevation |
|---------|-----------|
| 0.00 | 2061.11 |
| 0.04 | 2060.76 |
| 9.05 | 2060.81 |
| 15.17 | 2059.34 |
| 18.16 | 2058.93 |
| 21.10 | 2058.39 |
| 22.89 | 2057.53 |
| 22.98 | 2057.06 |
| 23.63 | 2056.49 |
| 24.37 | 2056.98 |
| 25.04 | 2056.91 |
| 25.73 | 2056.91 |
| 26.24 | 2057.02 |
| 27.32 | 2056.83 |
| 28.25 | 2058.70 |
| 30.28 | 2059.08 |
| 33.16 | 2059.42 |
| 42.77 | 2060.81 |
| 52.02 | 2060.98 |
| 52.60 | 2061.13 |

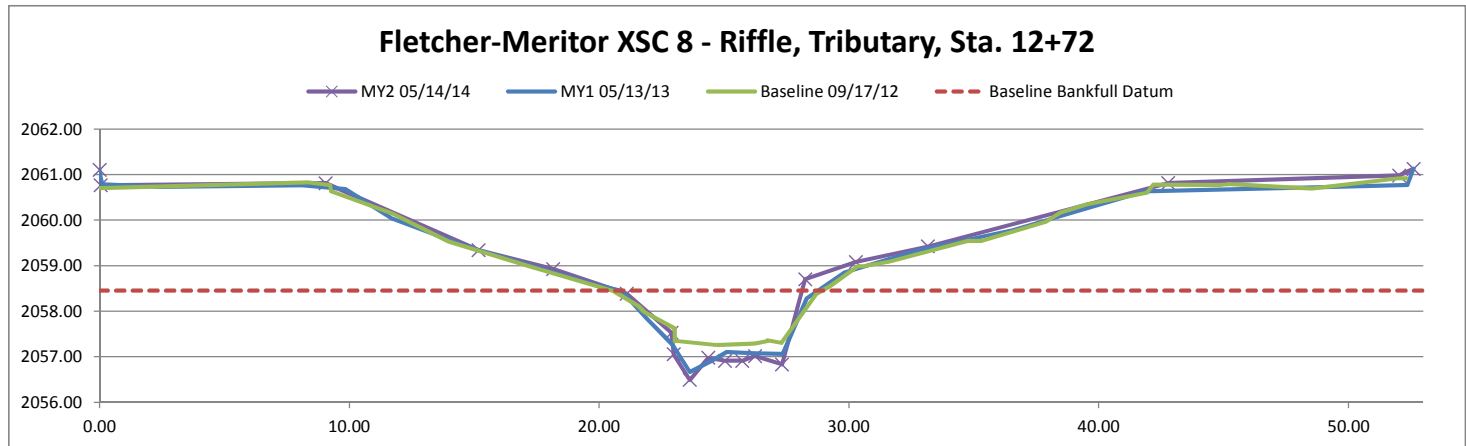
| | |
|------------------------------|-----------------------------------|
| Reach | Fletcher-Meritor, Tributary |
| River Basin | French Broad |
| Cross Section ID | XSC-8, Riffle, Tributary, 12+72 |
| Drainage Area (Sq Mi) | 0.32 |
| Date | 5/14/2014 |
| Observers | V. Miller, C. Myers, W. Yelverton |

| SUMMARY DATA | |
|--|---------|
| Bankfull Elevation, ft | 2058.45 |
| Bankfull Cross Sectional Area, ft² | 8.50 |
| Bankfull Width, ft | 7.40 |
| Max Depth at Bankfull, ft | 1.96 |
| Mean Depth at Bankfull, ft | 1.15 |
| Width/Depth Ratio | 6.44 |
| Flood Prone Width, ft | 29.20 |
| Flood Prone Area Elevation, ft | 2060.41 |
| Entrenchment Ratio | 3.95 |
| Bank Height Ratio | 0.97 |



Stream Type C/E4

Sta. 12+72 Looking Upstream



| Station | Elevation |
|---------|-----------|
| 0.00 | 2061.08 |
| 0.00 | 2060.73 |
| 7.96 | 2060.52 |
| 15.52 | 2058.51 |
| 25.67 | 2057.93 |
| 26.70 | 2057.49 |
| 27.85 | 2057.42 |
| 29.36 | 2056.28 |
| 29.55 | 2055.09 |
| 30.06 | 2054.95 |
| 31.02 | 2054.93 |
| 31.69 | 2055.17 |
| 32.03 | 2055.78 |
| 32.63 | 2056.13 |
| 33.18 | 2056.19 |
| 33.73 | 2057.44 |
| 34.54 | 2057.79 |
| 37.47 | 2058.38 |
| 45.78 | 2060.65 |
| 49.57 | 2060.87 |
| 49.69 | 2061.06 |

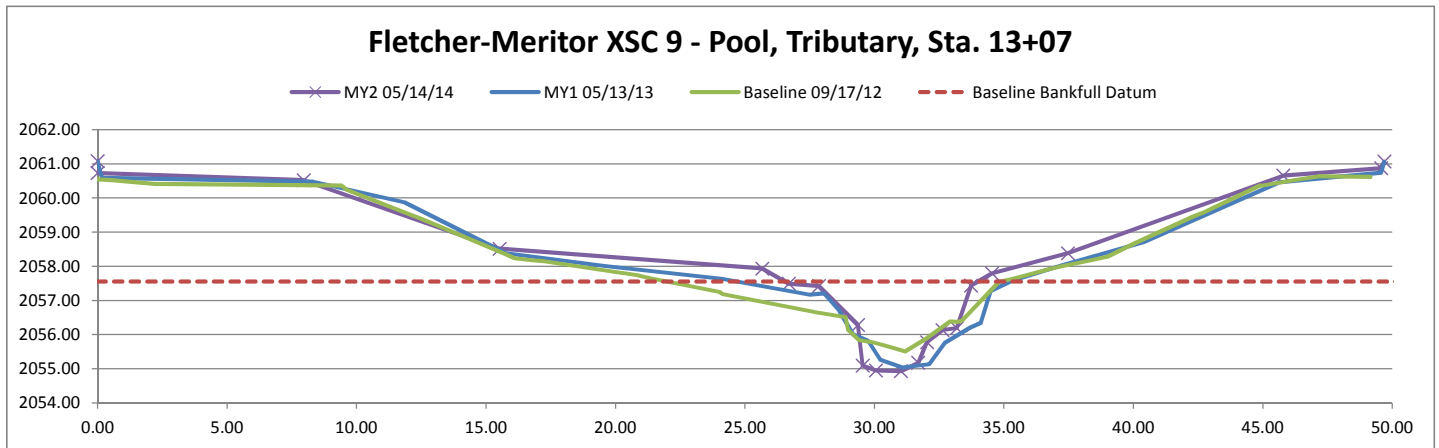
| | |
|------------------------------|-----------------------------------|
| Reach | Fletcher-Meritor, Tributary |
| River Basin | French Broad |
| Cross Section ID | XSC-9, Pool, Tributary, 13+07 |
| Drainage Area (Sq Mi) | 0.32 |
| Date | 5/14/2014 |
| Observers | V. Miller, C. Myers, W. Yelverton |

| SUMMARY DATA | |
|--|---------|
| Bankfull Elevation, ft | 2057.55 |
| Bankfull Cross Sectional Area, ft² | 9.80 |
| Bankfull Width, ft | 7.40 |
| Max Depth at Bankfull, ft | 2.62 |
| Mean Depth at Bankfull, ft | 1.32 |
| Width/Depth Ratio | 5.59 |
| Flood Prone Width, ft | 32.60 |
| Flood Prone Area Elevation, ft | 2060.17 |
| Entrenchment Ratio | 4.41 |
| Bank Height Ratio | 0.95 |

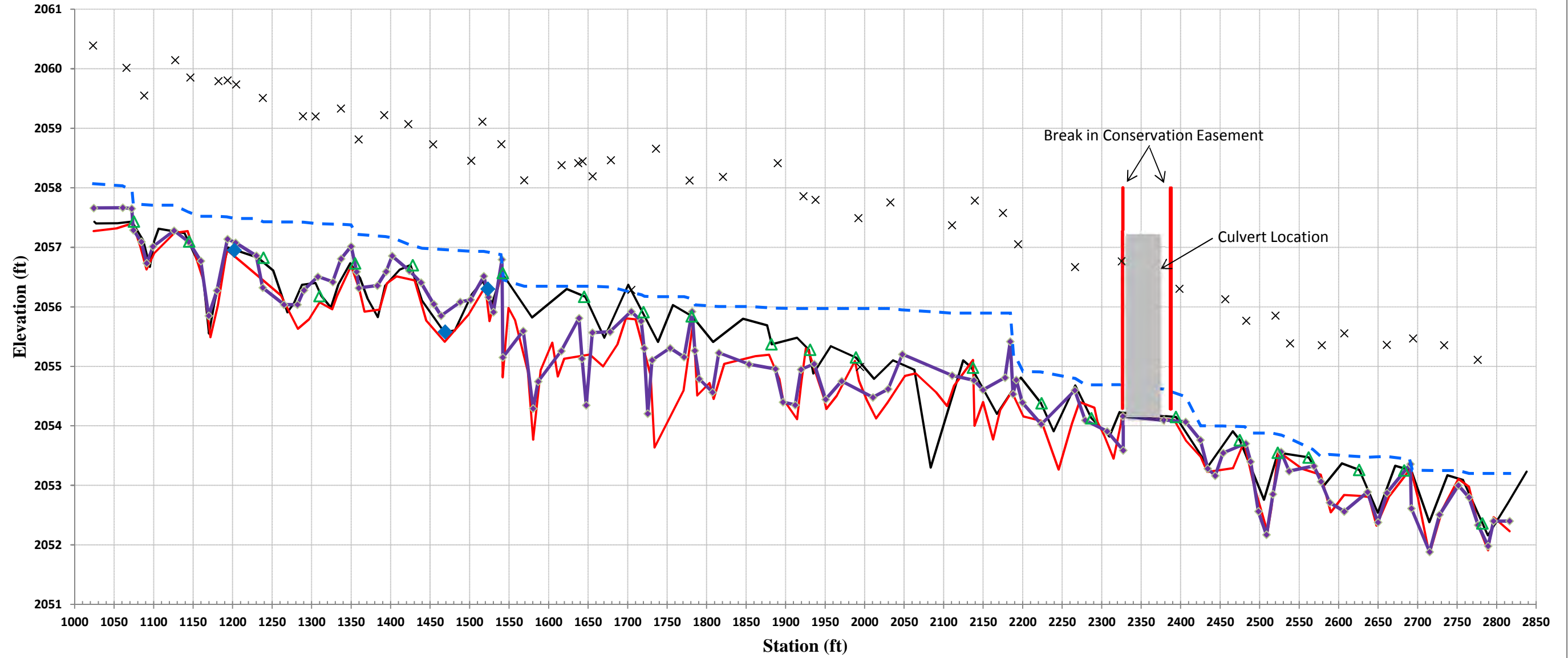


Stream Type C/E4

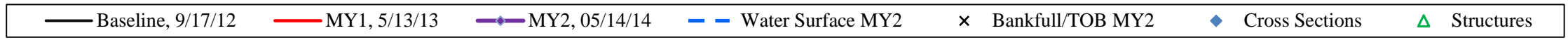
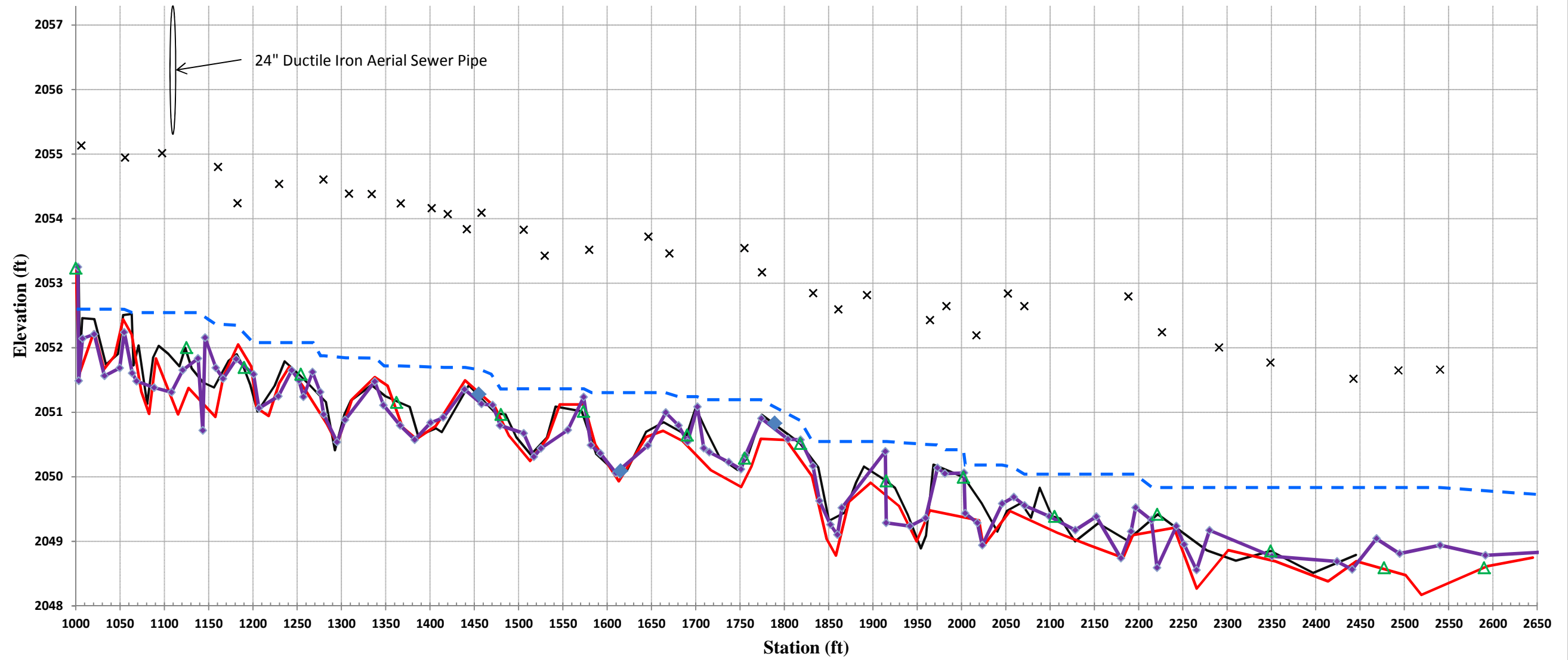
Sta. 13+07 Looking Downstream



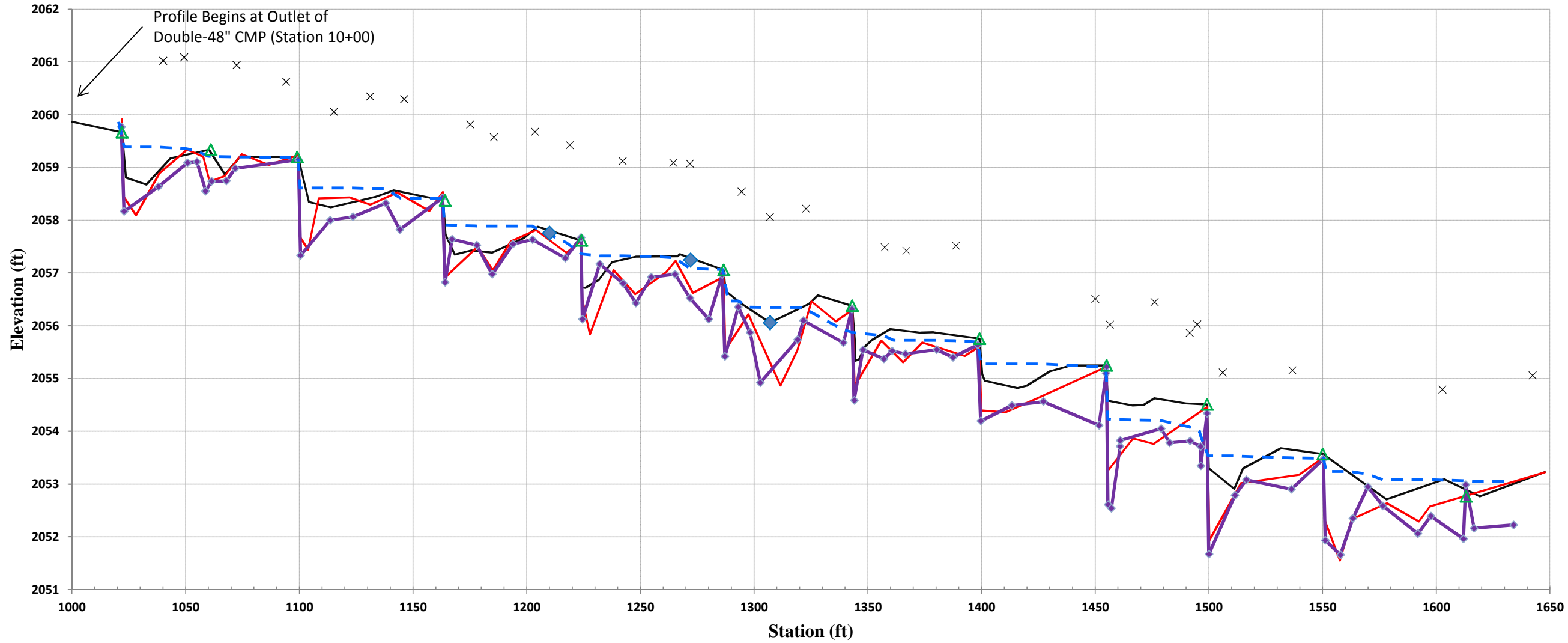
**Longitudinal Profile
Fletcher - Upper Reach
Project Number - 138
Station 10+25.00 - 28+37.86**



**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**



Baseline, 9/17/12
 MY1 5/13/13
 MY2, 05/14/14
 Water Surface MY2
 Bankfull/TOB MY2
 Cross Sections
 Structures

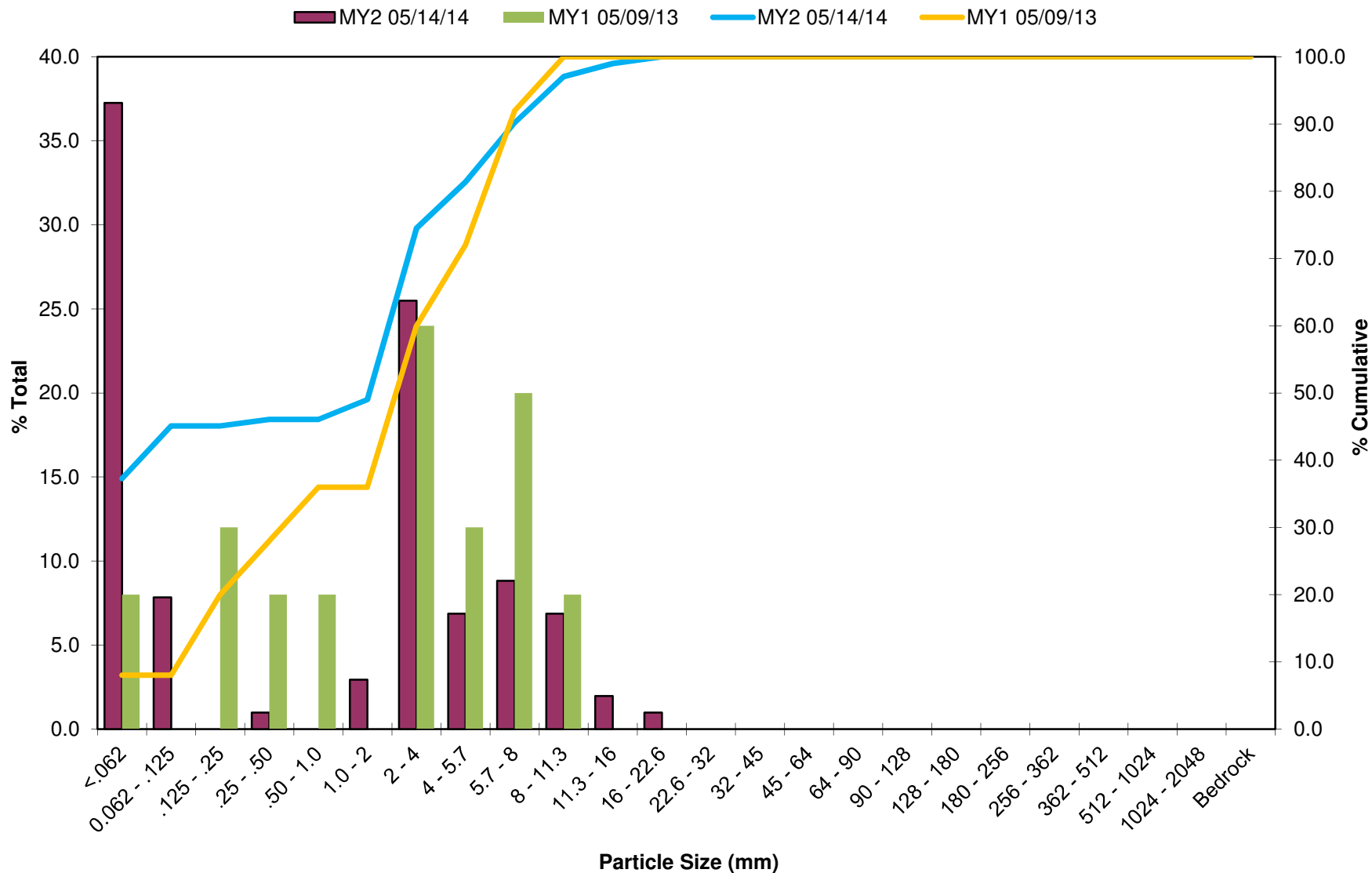
Fletcher - Upper Reach XSC-1 Riffle-Pebble Count

Location: STA 12+02

| Inches | Particle | Millimeters | | Count | %Total | % Cum. |
|----------------------|-----------------|--------------|---------------------------------|-------|--------|--------|
| | Silt/Clay | <.062 | SILT/CLAY | 38 | 37.3 | 37.3 |
| | Very Fine | 0.062 - .125 | S A N D | 8 | 7.8 | 45.1 |
| | Fine | .125 - .25 | | 0 | 0.0 | 45.1 |
| | Medium | .25 - .50 | | 1 | 1.0 | 46.1 |
| | Coarse | .50 - 1.0 | | 0 | 0.0 | 46.1 |
| .04 - .08 | Very Coarse | 1.0 - 2 | | 3 | 2.9 | 49.0 |
| .08 - .16 | Very Fine | 2 - 4 | G R A V E L | 26 | 25.5 | 74.5 |
| .16 - .22 | Fine | 4 - 5.7 | | 7 | 6.9 | 81.4 |
| .22 - .31 | Fine | 5.7 - 8 | | 9 | 8.8 | 90.2 |
| .31 - .44 | Medium | 8 - 11.3 | | 7 | 6.9 | 97.1 |
| .44 - .63 | Medium | 11.3 - 16 | | 2 | 2.0 | 99.0 |
| .63 - .89 | Coarse | 16 - 22.6 | | 1 | 1.0 | 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 | C O B B L E | 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 | B O U L D E R | 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 | | | | 102 | | |

| Summary Data | MY2 | MY1 |
|--------------|-----|-----|
| D50 | 2.1 | 3 |
| D84 | 6.5 | 7 |
| D95 | 10 | 9 |

Pebble count at XSC-1-Riffle



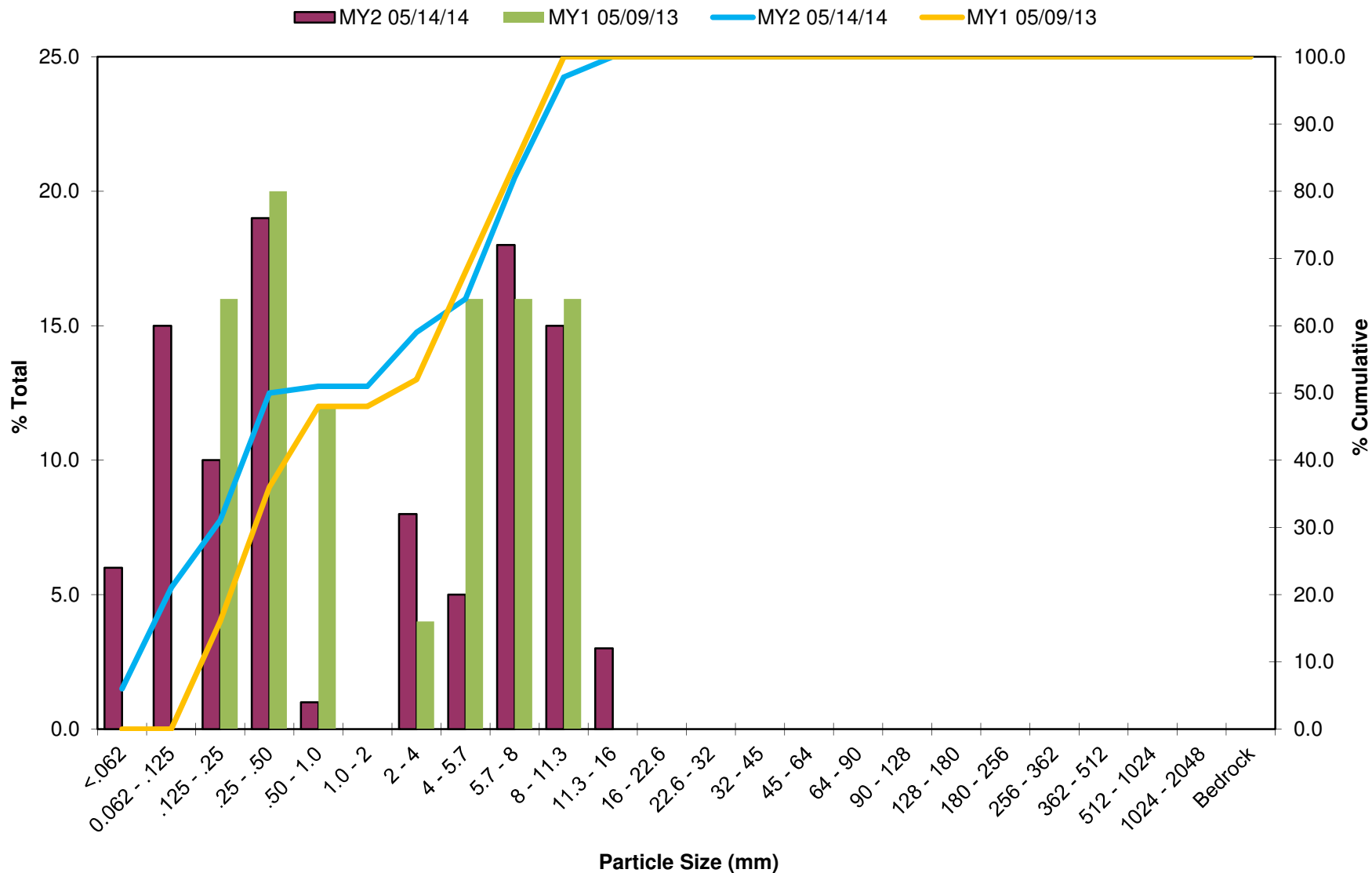
Fletcher -Upper Reach - XSC-3 Riffle Pebble Count

Location: STA 15+23

| Inches | Particle | Millimeters | | Count | %Total | % Cum. |
|----------------------|-----------------|--------------|---------------------------------|-------|--------|--------|
| | Silt/Clay | <.062 | SILT/CLAY | 6 | 6.0 | 6.0 |
| | Very Fine | 0.062 - .125 | S A N D | 15 | 15.0 | 21.0 |
| | Fine | .125 - .25 | | 10 | 10.0 | 31.0 |
| | Medium | .25 - .50 | | 19 | 19.0 | 50.0 |
| | Coarse | .50 - 1.0 | | 1 | 1.0 | 51.0 |
| .04 - .08 | Very Coarse | 1.0 - 2 | | 0 | 0.0 | 51.0 |
| .08 - .16 | Very Fine | 2 - 4 | G R A V E L | 8 | 8.0 | 59.0 |
| .16 - .22 | Fine | 4 - 5.7 | | 5 | 5.0 | 64.0 |
| .22 - .31 | Fine | 5.7 - 8 | | 18 | 18.0 | 82.0 |
| .31 - .44 | Medium | 8 - 11.3 | | 15 | 15.0 | 97.0 |
| .44 - .63 | Medium | 11.3 - 16 | | 3 | 3.0 | 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 | C O B B L E | 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 | B O U L D E R | 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 | MY2 | MY1 |
|--------------|-----|-----|
| D50 | 0.5 | 3 |
| D84 | 8.3 | 8 |
| D95 | 11 | 10 |

Pebble count at XSC-3-Riffle



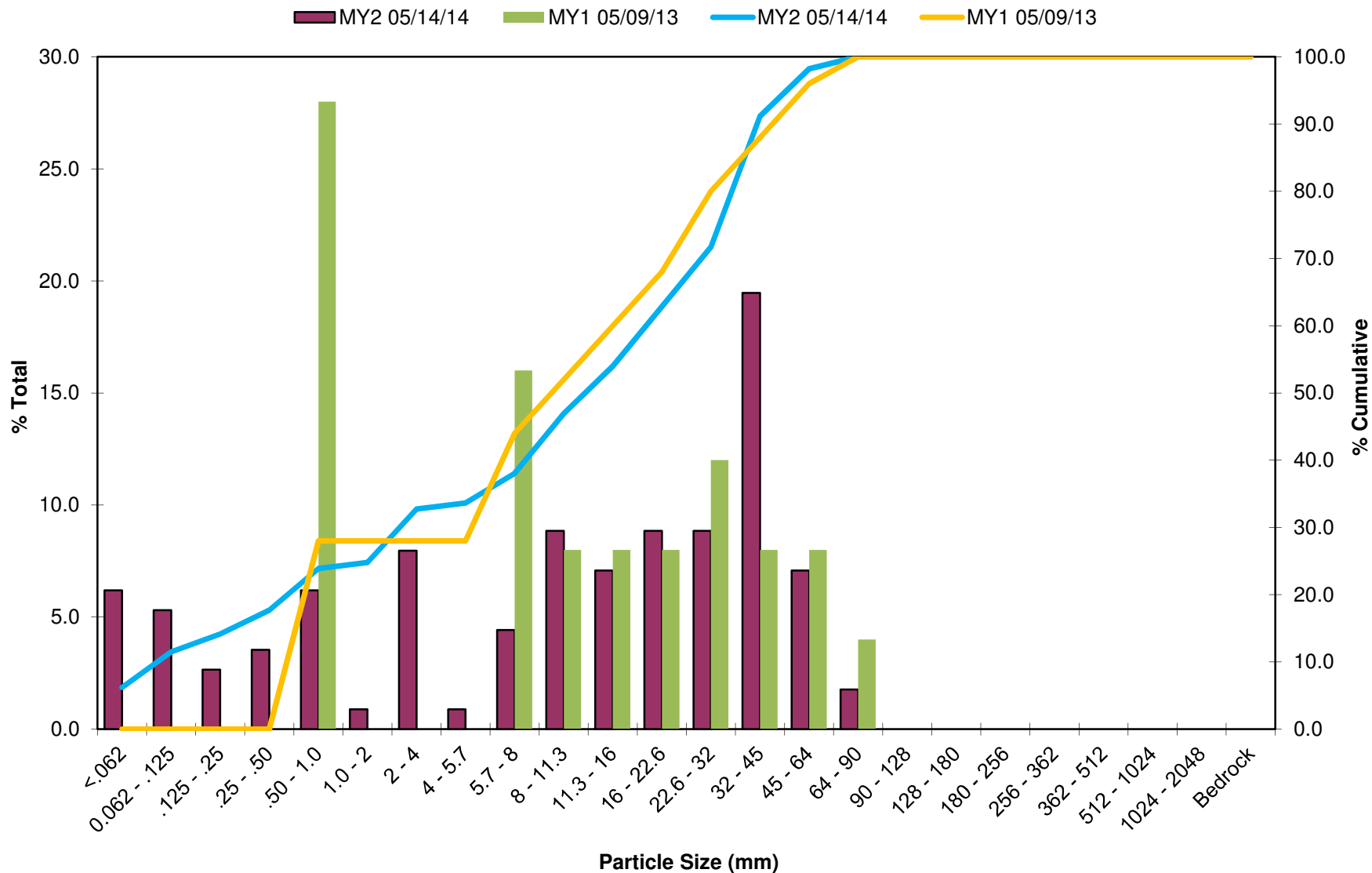
Fletcher -Lower Reach - XSC-4 Riffle Pebble Count

Location: STA 14+55

| Inches | Particle | Millimeters | | Count | %Total | % Cum. |
|----------------------|-----------------|--------------|---------------------------------|-------|--------|--------|
| | Silt/Clay | <.062 | SILT/CLAY | 7 | 6.2 | 6.2 |
| | Very Fine | 0.062 - .125 | S A N D | 6 | 5.3 | 11.5 |
| | Fine | .125 - .25 | | 3 | 2.7 | 14.2 |
| | Medium | .25 - .50 | | 4 | 3.5 | 17.7 |
| | Coarse | .50 - 1.0 | | 7 | 6.2 | 23.9 |
| .04 - .08 | Very Coarse | 1.0 - 2 | | 1 | 0.9 | 24.8 |
| .08 - .16 | Very Fine | 2 - 4 | G R A V E L | 9 | 8.0 | 32.7 |
| .16 - .22 | Fine | 4 - 5.7 | | 1 | 0.9 | 33.6 |
| .22 - .31 | Fine | 5.7 - 8 | | 5 | 4.4 | 38.1 |
| .31 .44 | Medium | 8 - 11.3 | | 10 | 8.8 | 46.9 |
| .44 - .63 | Medium | 11.3 - 16 | | 8 | 7.1 | 54.0 |
| .63 - .89 | Coarse | 16 - 22.6 | | 10 | 8.8 | 62.8 |
| .89 - 1.26 | Coarse | 22.6 - 32 | | 10 | 8.8 | 71.7 |
| 1.26 - 1.77 | Very Coarse | 32 - 45 | | 22 | 19.5 | 91.2 |
| 1.77 - 2.5 | Very Coarse | 45 - 64 | | 8 | 7.1 | 98.2 |
| 2.5 - 3.5 | Small | 64 - 90 | C O B B L E | 2 | 1.8 | 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 | B O U L D E R | 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 | | | | 113 | | |

| Summary Data | MY2 | MY1 |
|--------------|-----|-----|
| D50 | 13 | 10 |
| D84 | 40 | 38 |
| D95 | 54 | 61 |

Pebble count at XSC-4-Riffle



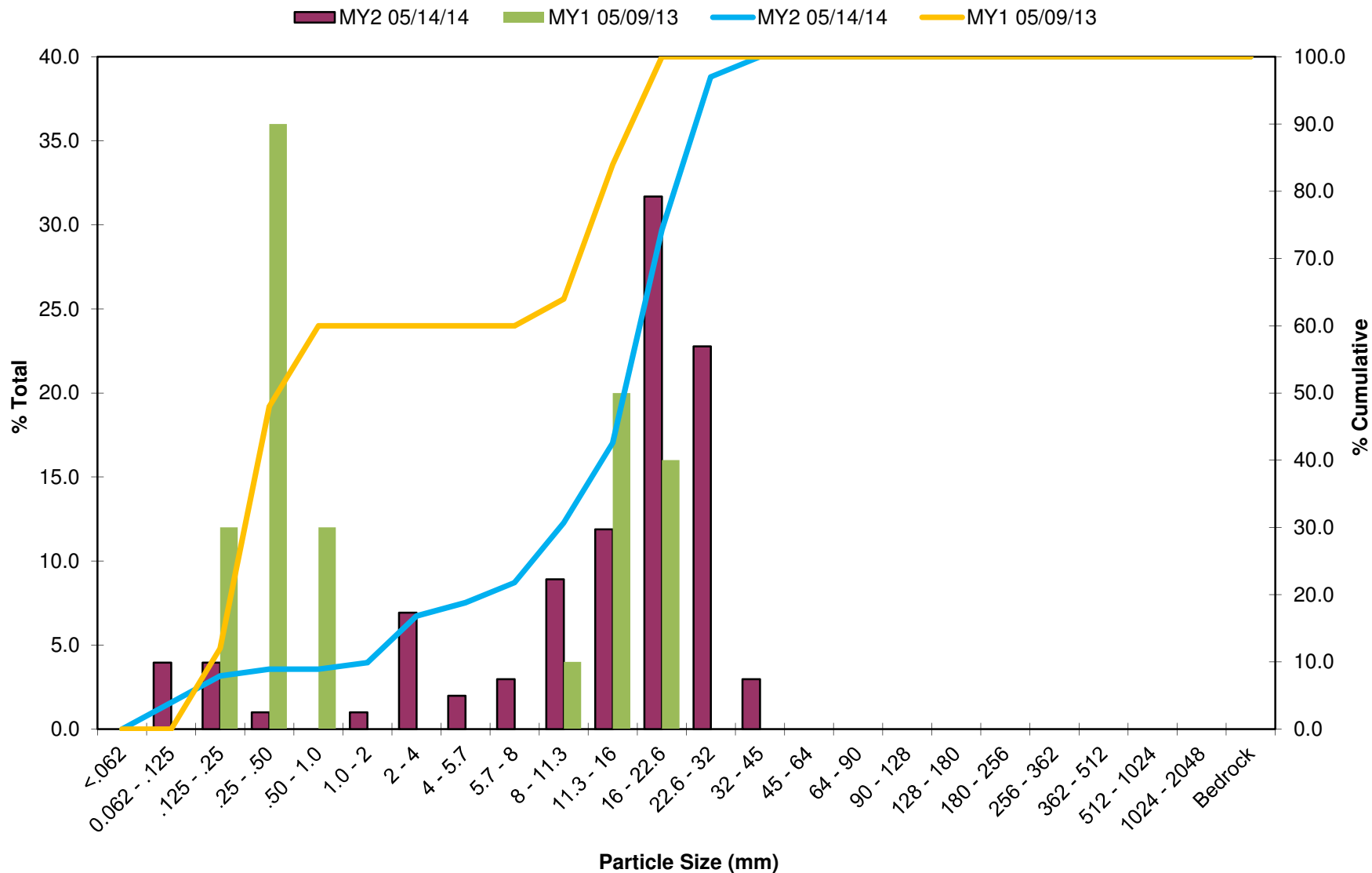
Fletcher -Lower Reach - XSC-6 Riffle Pebble Count

Location: STA 17+89

| Inches | Particle | Millimeters | | Count | %Total | % Cum. |
|----------------------|-----------------|--------------|---------------------------------|-------|--------|--------|
| | Silt/Clay | <.062 | SILT/CLAY | 0 | 0.0 | 0.0 |
| | Very Fine | 0.062 - .125 | S A N D | 4 | 4.0 | 4.0 |
| | Fine | .125 - .25 | | 4 | 4.0 | 7.9 |
| | Medium | .25 - .50 | | 1 | 1.0 | 8.9 |
| | Coarse | .50 - 1.0 | | 0 | 0.0 | 8.9 |
| .04 - .08 | Very Coarse | 1.0 - 2 | | 1 | 1.0 | 9.9 |
| .08 - .16 | Very Fine | 2 - 4 | G R A V E L | 7 | 6.9 | 16.8 |
| .16 - .22 | Fine | 4 - 5.7 | | 2 | 2.0 | 18.8 |
| .22 - .31 | Fine | 5.7 - 8 | | 3 | 3.0 | 21.8 |
| .31 .44 | Medium | 8 - 11.3 | | 9 | 8.9 | 30.7 |
| .44 - .63 | Medium | 11.3 - 16 | | 12 | 11.9 | 42.6 |
| .63 - .89 | Coarse | 16 - 22.6 | | 32 | 31.7 | 74.3 |
| .89 - 1.26 | Coarse | 22.6 - 32 | | 23 | 22.8 | 97.0 |
| 1.26 - 1.77 | Very Coarse | 32 - 45 | | 3 | 3.0 | 100.0 |
| 1.77 - 2.5 | Very Coarse | 45 - 64 | | 0 | 0.0 | 100.0 |
| 2.5 - 3.5 | Small | 64 - 90 | C O B B L E | 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 | B O U L D E R | 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 | | | | 101 | | |

| Summary Data | MY2 | MY1 |
|--------------|-----|-----|
| D50 | 17 | 0.6 |
| D84 | 26 | 16 |
| D95 | 31 | 20 |

Pebble count at XSC-6-Riffle



**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 | | | | | |
|--|----------|--------|--------|--------|-----------------|----|--------|--------|--------|--------|-----------------|----|--------|--------|--------|--------|-----------------|----|------|------|-----|-----|-----------------|---|------|------|-----|-----|-----------------|---|------|------|-----|-----|-----------------|---|
| | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n |
| Dimension and Substrate - Riffle only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 14.50 | 14.80 | | 15.10 | | 2 | 14.00 | 14.20 | | 14.40 | | 2 | 12.60 | 13.15 | | 13.70 | | 2 | | | | | | | | | | | | | | | | | | |
| Floodprone Width (ft) | 53.00 | | | >86.00 | | 2 | 65.20 | | | >86.00 | | 2 | >86.00 | | | 98.40 | | 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 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| Width/Depth Ratio | 9.87 | 10.91 | | 11.94 | | 2 | 9.78 | 10.76 | | 11.74 | | 2 | 9.34 | 10.26 | | 11.18 | | 2 | | | | | | | | | | | | | | | | | | |
| Entrenchment Ratio | 3.50 | | | >6.00 | | 2 | 4.70 | | | >6.00 | | 2 | >6.00 | | | 7.81 | | 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Additional Reach Parameters | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rosgen Classification | C/E4 | | | | | | C/E4 | | | | | | C/E4 | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Thalweg length (ft) | 1838 | | | | | | 1838 | | | | | | 1838 | | | | | | | | | | | | | | | | | | | | | | | |
| Sinuosity (ft) | 1.18 | | | | | | 1.18 | | | | | | 1.18 | | | | | | | | | | | | | | | | | | | | | | | |
| Water Surface Slope (Channel) (ft/ft) | 0.0025 | | | | | | 0.0025 | | | | | | 0.0027 | | | | | | | | | | | | | | | | | | | | | | | |
| BF slope (ft/ft) | 0.0027 | | | | | | 0.0025 | | | | | | 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 | | | | | | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 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 | | | | | |
|--|----------|--------|--------|--------|-----------------|----|--------|--------|--------|--------|-----------------|----|--------|--------|--------|--------|-----------------|----|------|------|-----|-----|-----------------|---|------|------|-----|-----|-----------------|---|------|------|-----|-----|-----------------|---|
| | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n |
| Dimension and Substrate - Riffle only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 17.20 | 18.49 | | 19.77 | | 2 | 16.10 | 19.35 | | 22.60 | | 2 | 15.50 | 15.80 | | 16.10 | | 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 | | | | | | | | | | | | | | | | | | |
| 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 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| Width/Depth Ratio | 11.32 | 11.99 | | 12.65 | | 2 | 9.97 | 14.34 | | 18.71 | | 2 | 10.14 | 10.86 | | 11.57 | | 2 | | | | | | | | | | | | | | | | | | |
| Entrenchment Ratio | 5.69 | 6.32 | | 6.95 | | 2 | 4.50 | 6.35 | | 8.20 | | 2 | 6.12 | 7.34 | | 8.55 | | 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Thalweg length (ft) | 1779 | | | | | | 1779 | | | | | | 1779 | | | | | | | | | | | | | | | | | | | | | | | |
| Sinuosity (ft) | 1.23 | | | | | | 1.23 | | | | | | 1.23 | | | | | | | | | | | | | | | | | | | | | | | |
| Water Surface Slope (Channel) (ft/ft) | 0.0027 | | | | | | 0.0022 | | | | | | 0.0021 | | | | | | | | | | | | | | | | | | | | | | | |
| BF slope (ft/ft) | 0.0024 | | | | | | 0.0026 | | | | | | 0.0023 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | 23 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | |
|--|----------|--------|--------|--------|-----------------|----|--------|--------|--------|--------|-----------------|----|--------|--------|--------|--------|-----------------|---|------|------|-----|-----|-----------------|---|------|------|-----|-----|-----------------|---|------|------|-----|-----|-----------------|---|--|--|
| | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | Min | Mean | Med | Max | SD ⁴ | n | | |
| Dimension and Substrate - Riffle only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 8.33 | 8.79 | | 9.24 | | 2 | 7.90 | 8.15 | | 8.40 | | 2 | 7.40 | 7.50 | | 7.60 | | 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 | | | | | | | | | | | | | | | | | | | | |
| 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 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 | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | |
| Width/Depth Ratio | 10.21 | 10.70 | | 11.19 | | 2 | 7.43 | 8.67 | | 9.90 | | 2 | 6.44 | 7.96 | | 9.47 | | 2 | | | | | | | | | | | | | | | | | | | | |
| Entrenchment Ratio | 2.68 | 2.69 | | 2.70 | | 2 | 3.00 | 3.30 | | 3.60 | | 2 | 3.61 | 3.78 | | 3.95 | | 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 | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Additional Reach Parameters | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rosgen Classification | C/E4 | | | | | | C/E4 | | | | | | C/E4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Thalweg length (ft) | 648 | | | | | | 648 | | | | | | 648 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sinuosity (ft) | 1.22 | | | | | | 1.22 | | | | | | 1.22 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water Surface Slope (Channel) (ft/ft) | 0.0114 | | | | | | 0.0118 | | | | | | 0.0119 | | | | | | | | | | | | | | | | | | | | | | | | | |
| BF slope (ft/ft) | 0.0118 | | | | | | 0.0120 | | | | | | 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 | | | | | | 45 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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

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 | | | | | 2058.61 | 2058.61 | 2058.61 | | | | | 2058.74 | 2058.74 | 2058.74 | | | | | 2053.74 | 2053.74 | 2053.74 | | | | | 2053.32 | 2053.32 | 2053.32 | | | | |
| Bankfull Width (ft) | 15.10 | 14.00 | 12.60 | | | | | 21.90 | 21.90 | 21.40 | | | | | 14.50 | 14.40 | 13.70 | | | | | 19.77 | 16.10 | 15.50 | | | | | 26.16 | 25.70 | 23.60 | | | | |
| Floodprone Width (ft) | 53.00 | 65.20 | 98.40 | | | | | >86.00 | >86.00 | >86.00 | | | | | >86.00 | >86.00 | >86.00 | | | | | 137.36 | 132.80 | 132.50 | | | | | 83.70 | 84.30 | 83.00 | | | | |
| Bankfull Mean Depth (ft) | 1.26 | 1.19 | 1.13 | | | | | 1.25 | 1.18 | 1.17 | | | | | 1.47 | 1.47 | 1.47 | | | | | 1.75 | 1.61 | 1.53 | | | | | 1.45 | 1.38 | 1.23 | | | | |
| Bankfull Max Depth (ft) | 1.80 | 2.01 | 2.23 | | | | | 3.10 | 3.07 | 3.03 | | | | | 2.20 | 2.29 | 2.91 | | | | | 2.47 | 2.46 | 2.47 | | | | | 3.31 | 3.22 | 3.19 | | | | |
| Bankfull Cross Sectional Area (ft ²) | 19.10 | 16.70 | 14.20 | | | | | 27.40 | 25.80 | 25.10 | | | | | 21.30 | 21.20 | 20.10 | | | | | 34.50 | 26.00 | 23.70 | | | | | 37.88 | 35.50 | 29.00 | | | | |
| Bankfull Width/Depth Ratio | 11.94 | 11.74 | 11.18 | | | | | 17.50 | 18.59 | 18.25 | | | | | 9.87 | 9.78 | 9.34 | | | | | 11.32 | 9.97 | 10.14 | | | | | 18.07 | 18.61 | 19.21 | | | | |
| Bankfull Entrenchment Ratio | 3.50 | 4.70 | 7.81 | | | | | >4.00 | >4.00 | >4.00 | | | | | >6.00 | >6.00 | >6.00 | | | | | 6.95 | 8.20 | 8.55 | | | | | 3.20 | 3.30 | 3.52 | | | | |
| Bankfull Bank Height Ratio | 1.00 | 0.99 | 0.95 | | | | | 1.00 | 1.15 | 0.94 | | | | | 1.00 | 1.03 | 1.03 | | | | | 1.00 | 1.04 | 1.05 | | | | | 1.00 | 1.00 | 1.08 | | | | |
| 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 | | | | | 2059.00 | 2059.00 | 2059.00 | | | | | 2058.45 | 2058.45 | 2058.45 | | | | | 2057.55 | 2057.55 | 2057.55 | | | | | | | | | | | |
| Bankfull Width (ft) | 17.20 | 22.60 | 16.10 | | | | | 9.24 | 8.40 | 7.60 | | | | | 8.33 | 7.90 | 7.40 | | | | | 12.81 | 10.50 | 7.40 | | | | | | | | | | | |
| Floodprone Width (ft) | 97.90 | 101.50 | 98.50 | | | | | 24.91 | 25.20 | 27.40 | | | | | 22.32 | 28.20 | 29.20 | | | | | 25.89 | 31.00 | 32.60 | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 1.36 | 1.21 | 1.39 | | | | | 0.83 | 0.86 | 0.80 | | | | | 0.82 | 1.06 | 1.15 | | | | | 0.93 | 1.13 | 1.32 | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 2.20 | 2.56 | 2.39 | | | | | 1.25 | 1.34 | 1.67 | | | | | 1.19 | 1.78 | 1.96 | | | | | 2.04 | 2.51 | 2.62 | | | | | | | | | | | |
| Bankfull Cross Sectional Area (ft ²) | 23.40 | 27.30 | 22.40 | | | | | 7.63 | 7.20 | 6.10 | | | | | 6.80 | 8.40 | 8.50 | | | | | 11.96 | 11.90 | 9.80 | | | | | | | | | | | |
| Bankfull Width/Depth Ratio | 12.65 | 18.71 | 11.57 | | | | | 11.19 | 9.90 | 9.47 | | | | | 12.21 | 7.43 | 6.44 | | | | | 13.71 | 9.26 | 5.59 | | | | | | | | | | | |
| Bankfull Entrenchment Ratio | 5.69 | 4.50 | 6.12 | | | | | 2.70 | 3.00 | 3.61 | | | | | 2.68 | 3.60 | 3.95 | | | | | 2.02 | 2.90 | 4.41 | | | | | | | | | | | |
| Bankfull Bank Height Ratio | 1.00 | 1.00 | 1.04 | | | | | 1.00 | 1.30 | 1.16 | | | | | 1.00 | 1.00 | 0.97 | | | | | 1.00 | 0.89 | 0.95 | | | | | | | | | | | |
| 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) | See attached |

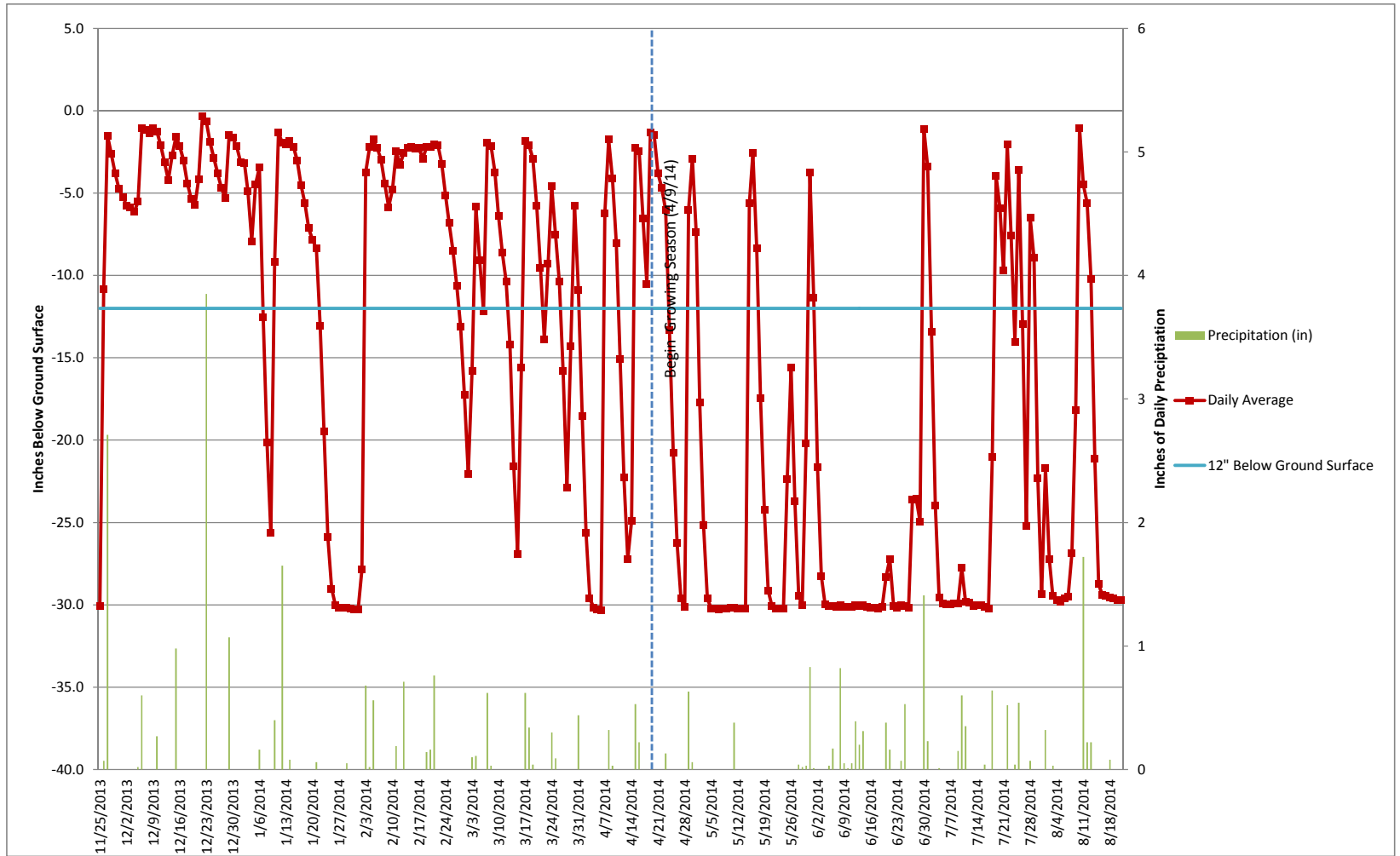


Tributary Gauge (May 2014)

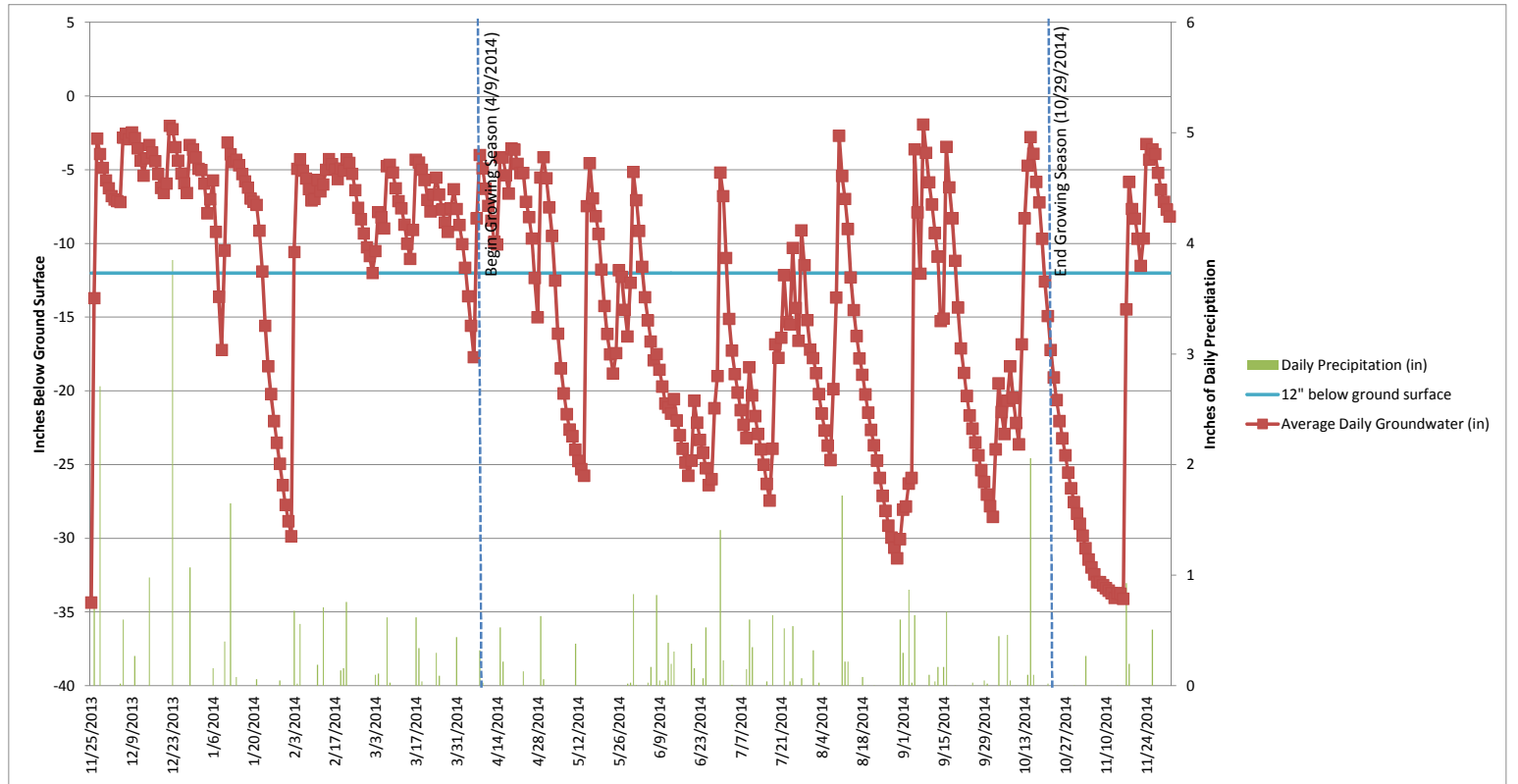


Main Stem Gauge (May 2014)

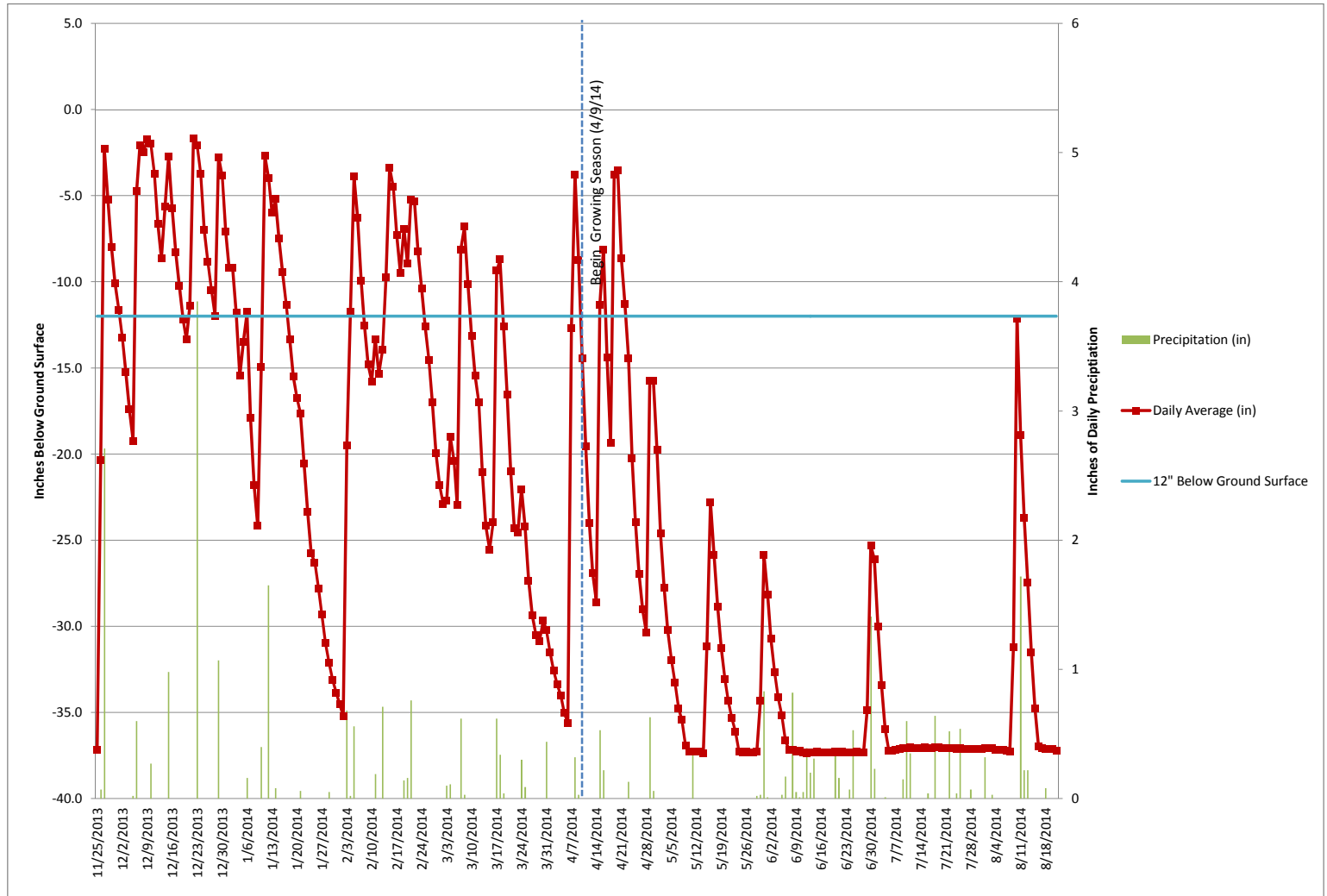
Ecotone Unit: Level Logger
Serial Number: 000013D4CA2A
Probe Number: 000013D4CA2A
Log Read: 8/21/2014
Fletcher-Meritor Well #1



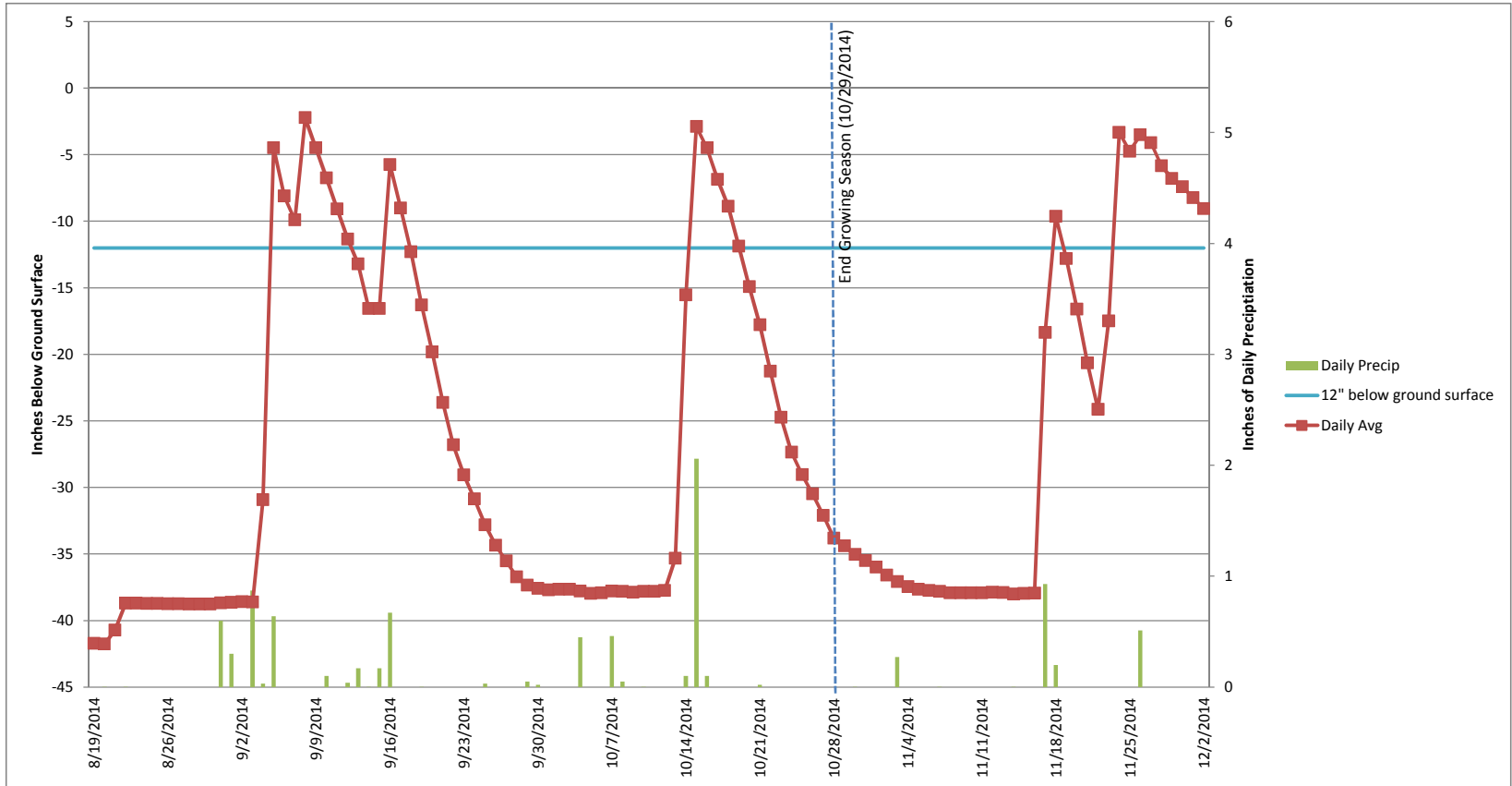
Ecotone Unit: Level Logger
Serial Number: 000011311987
Probe Number: 000011311987
Log Read: 12/2/2014 15:34:26
Fletcher-Meritor Well #2



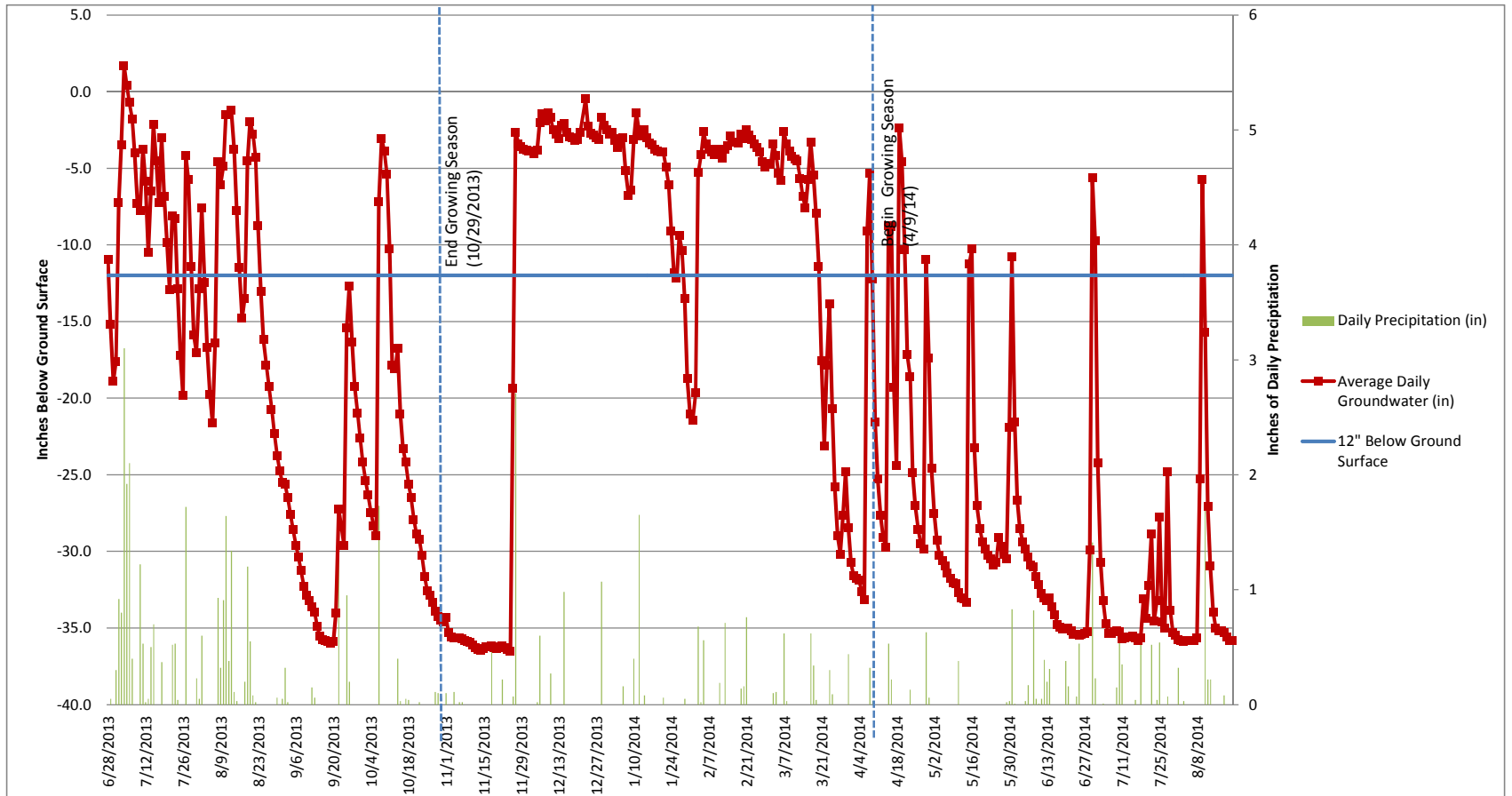
Ecotone Unit: Level Logger
Serial Number: 00001130DD07
Probe Number: 00001130DD07
Log Read: 8/21/2014
Fletcher-Meritor Well #3



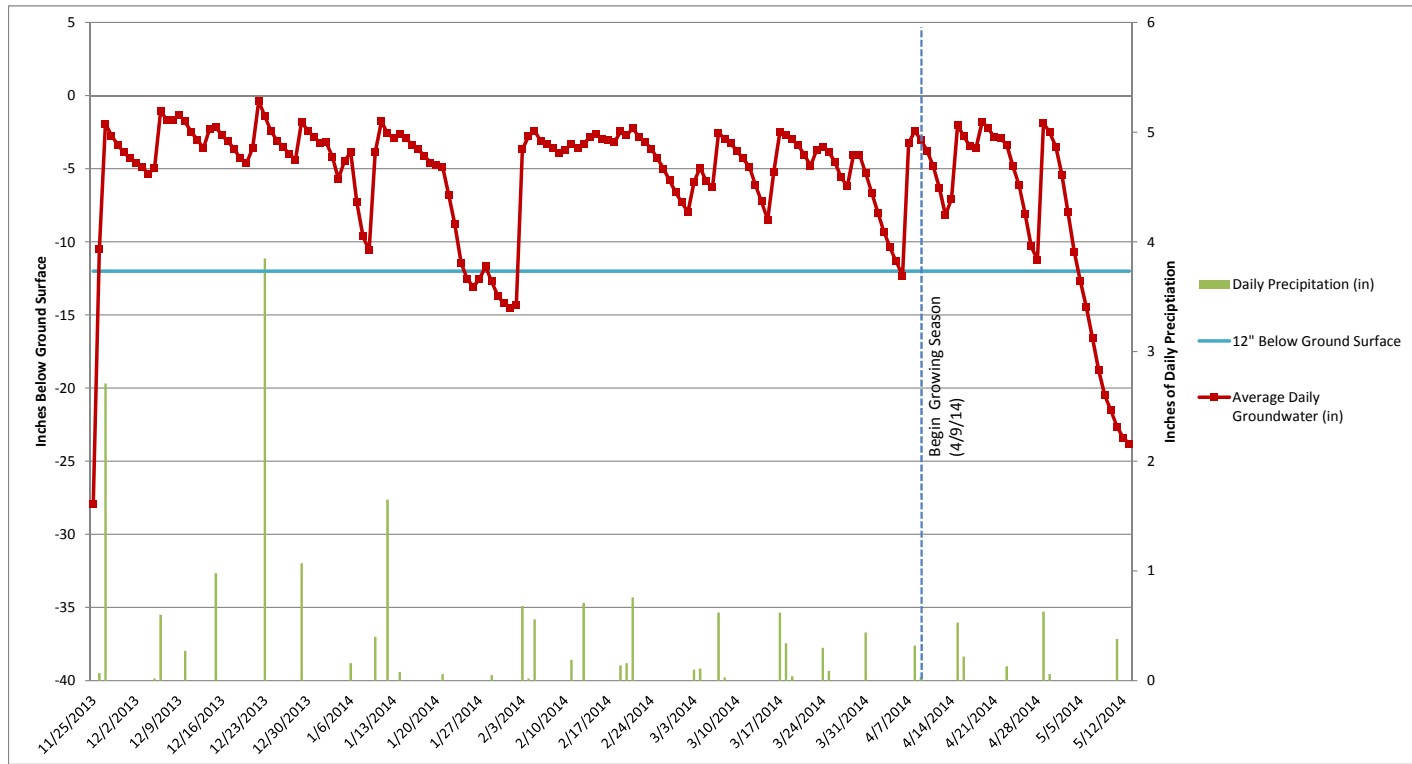
Ecotone Unit: Level Logger
Serial Number: 000014E17875
Probe Number: 000014E17875
Log Read: 12/2/2014 16:09:04
Fletcher-Meritor Well #4



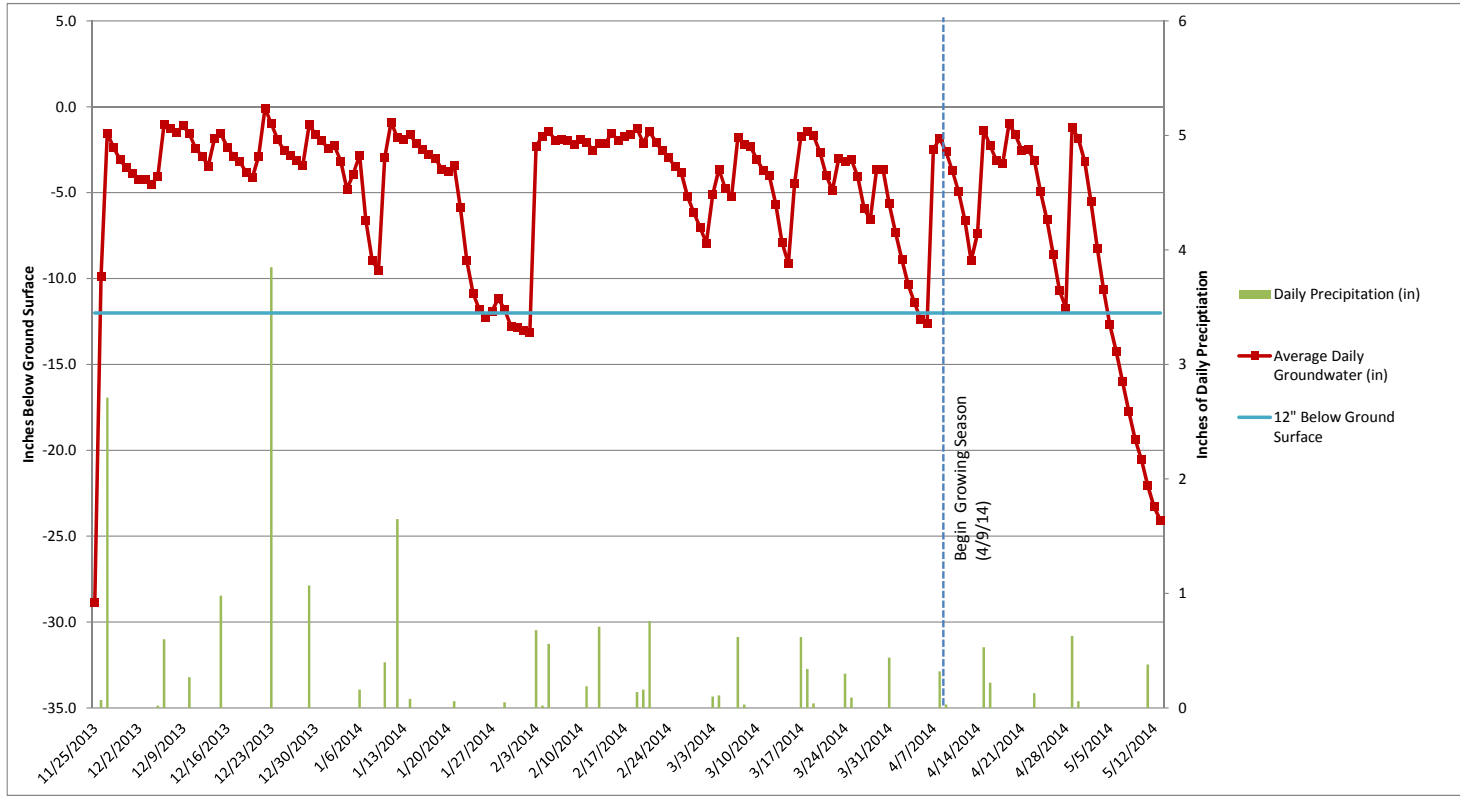
Ecotone Unit: Level Logger
Serial Number: 0000138BE816
Probe Number: 0000138BE816
Log Read: 8/21/2014 15:45:46
Fletcher-Meritor Well #5



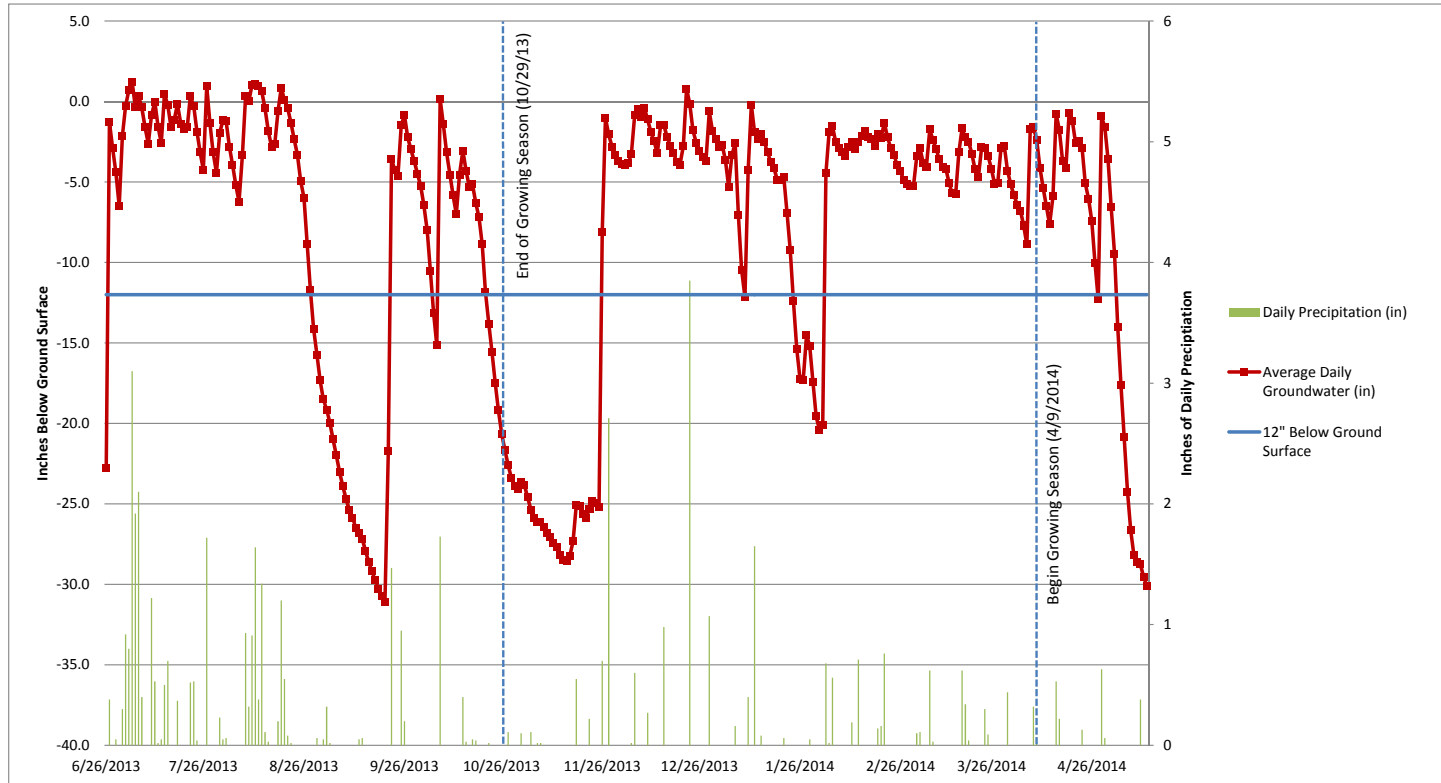
Ecotone Unit: Level Logger
Serial Number: 000011313B57
Probe Number: 000011313B57
Log Read: 5/13/2014 13:57:15
Fletcher-Meritor Well #6



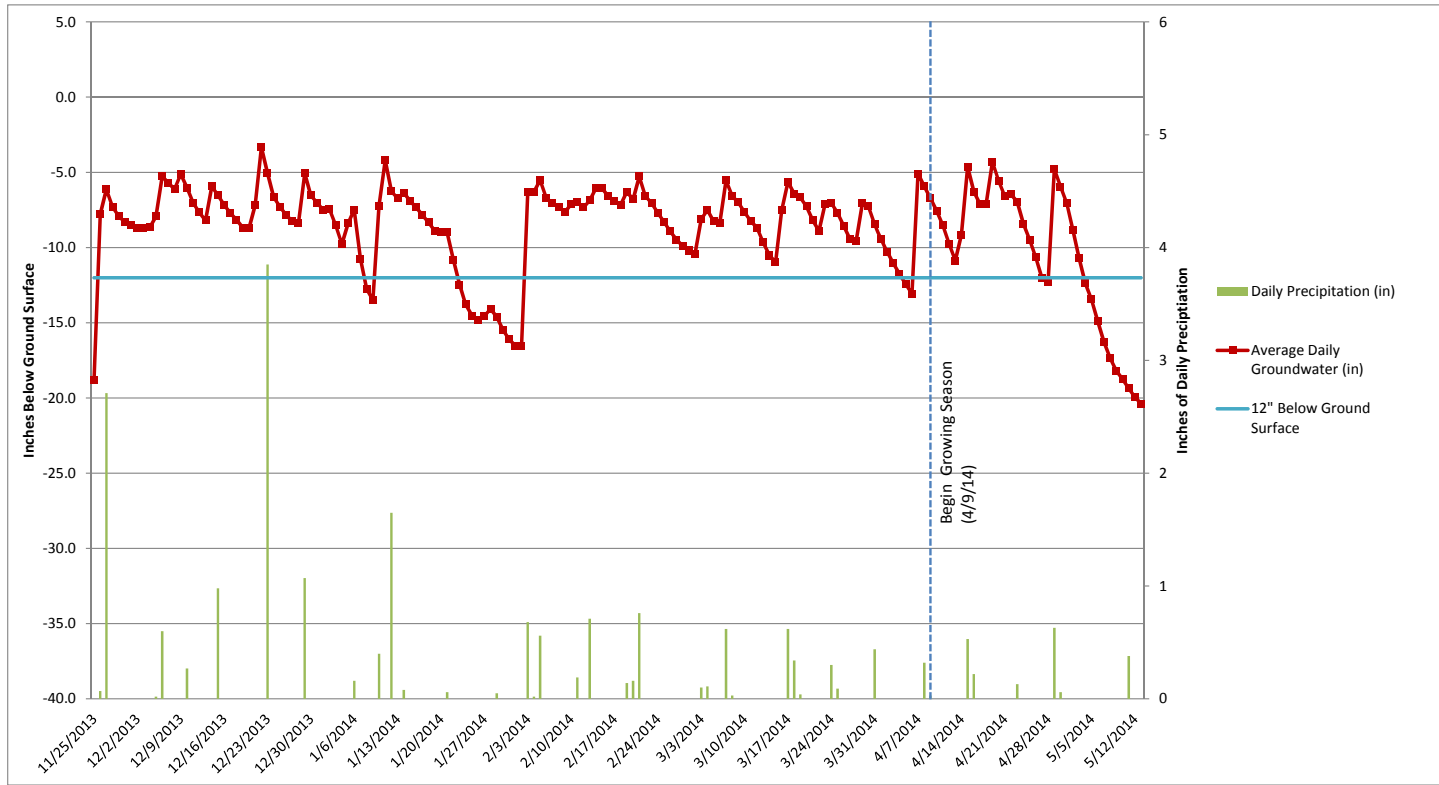
Ecotone Unit: Level Logger
Serial Number: 000009BEA475
Probe Number: 000001D33719
Log Read: 5/13/2014 13:55:51



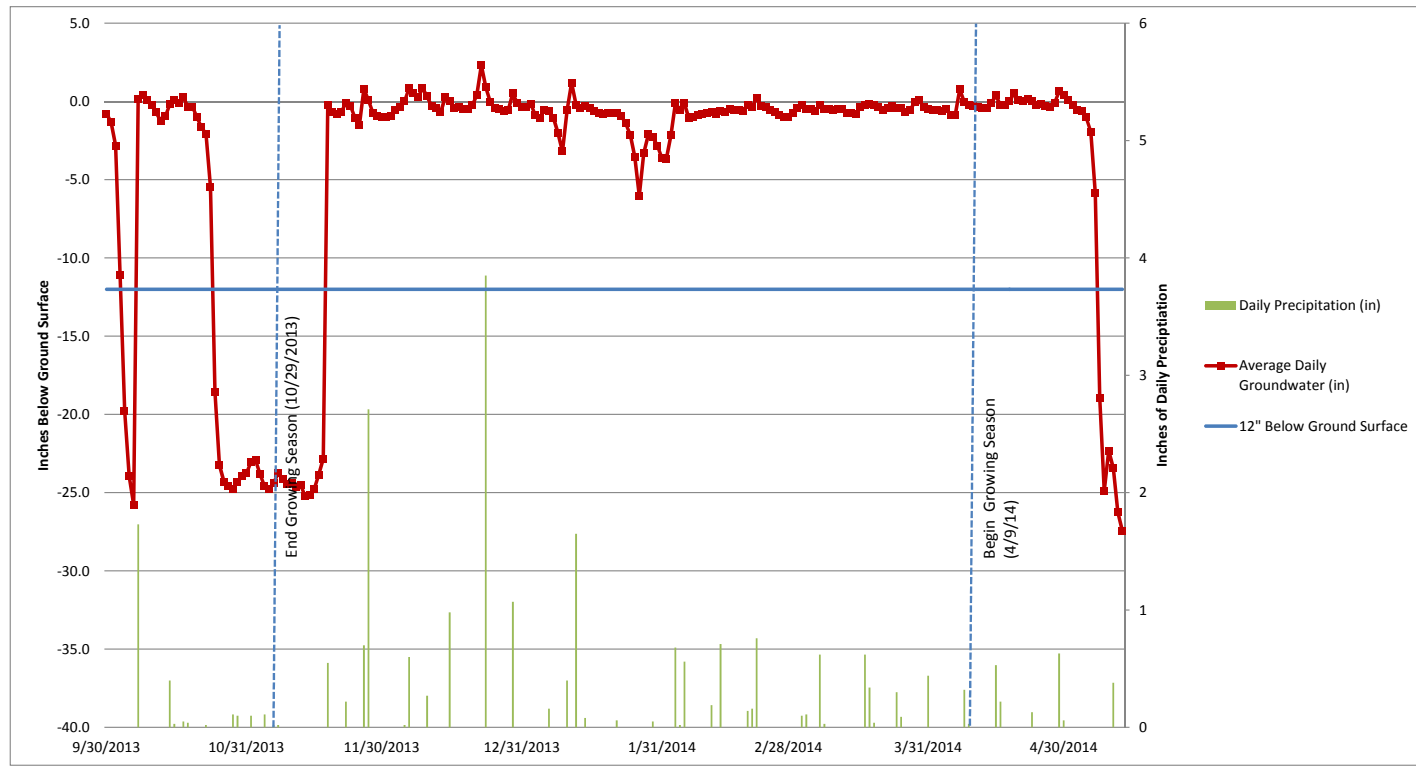
Ecotone Unit: Level Logger
Serial Number: 000009BEBF83
Probe Number: 000001305C6C
Log Read: 5/13/2014 13:58:50
Fletcher-Meritor Well #8



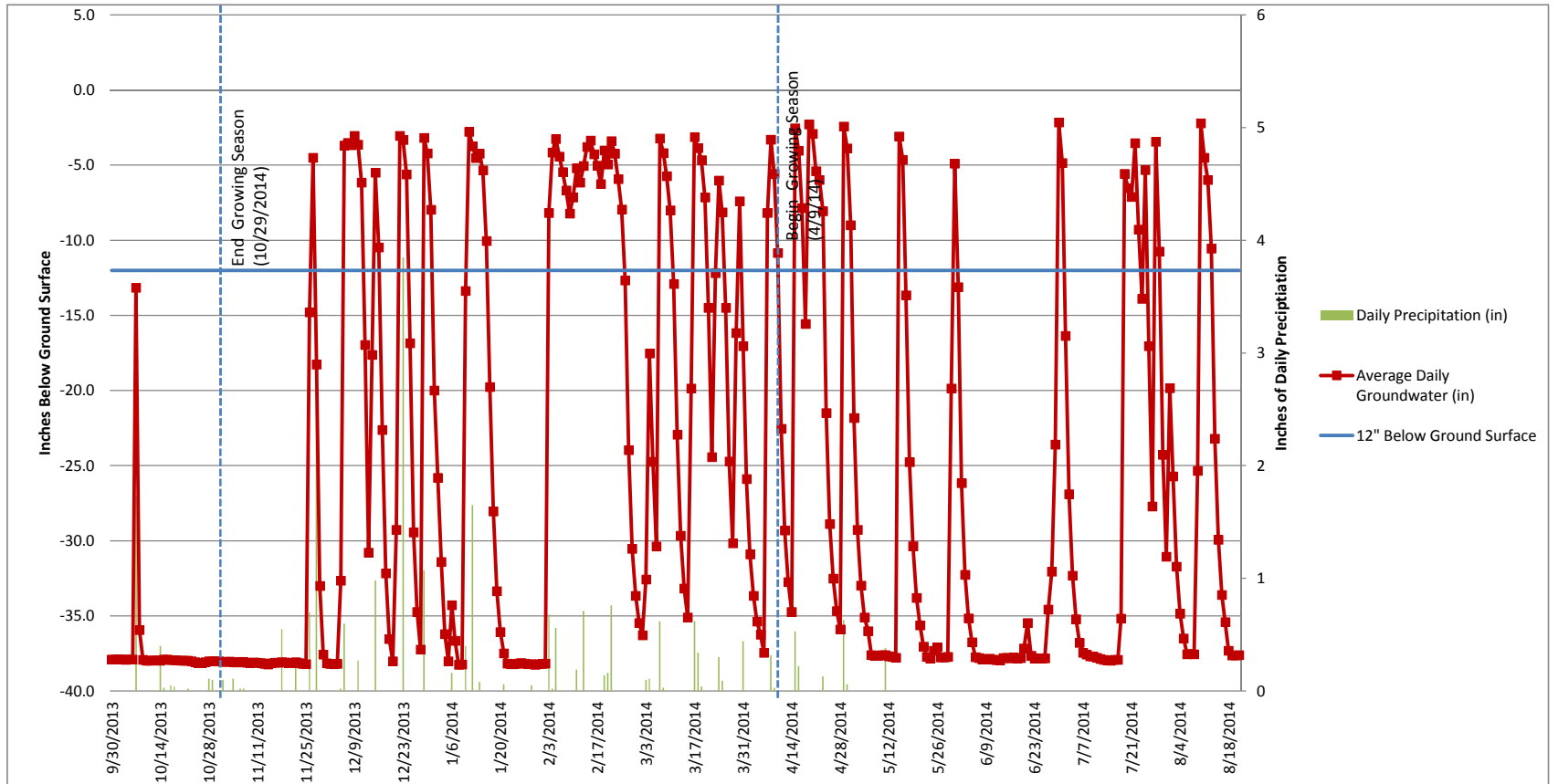
Ecotone Unit: Level Logger
Serial Number: 00000EBD106E
Probe Number: 00000EBD106E
Log Read: 5/13/2014 14:00:32
Fletcher-Meritor Well #9



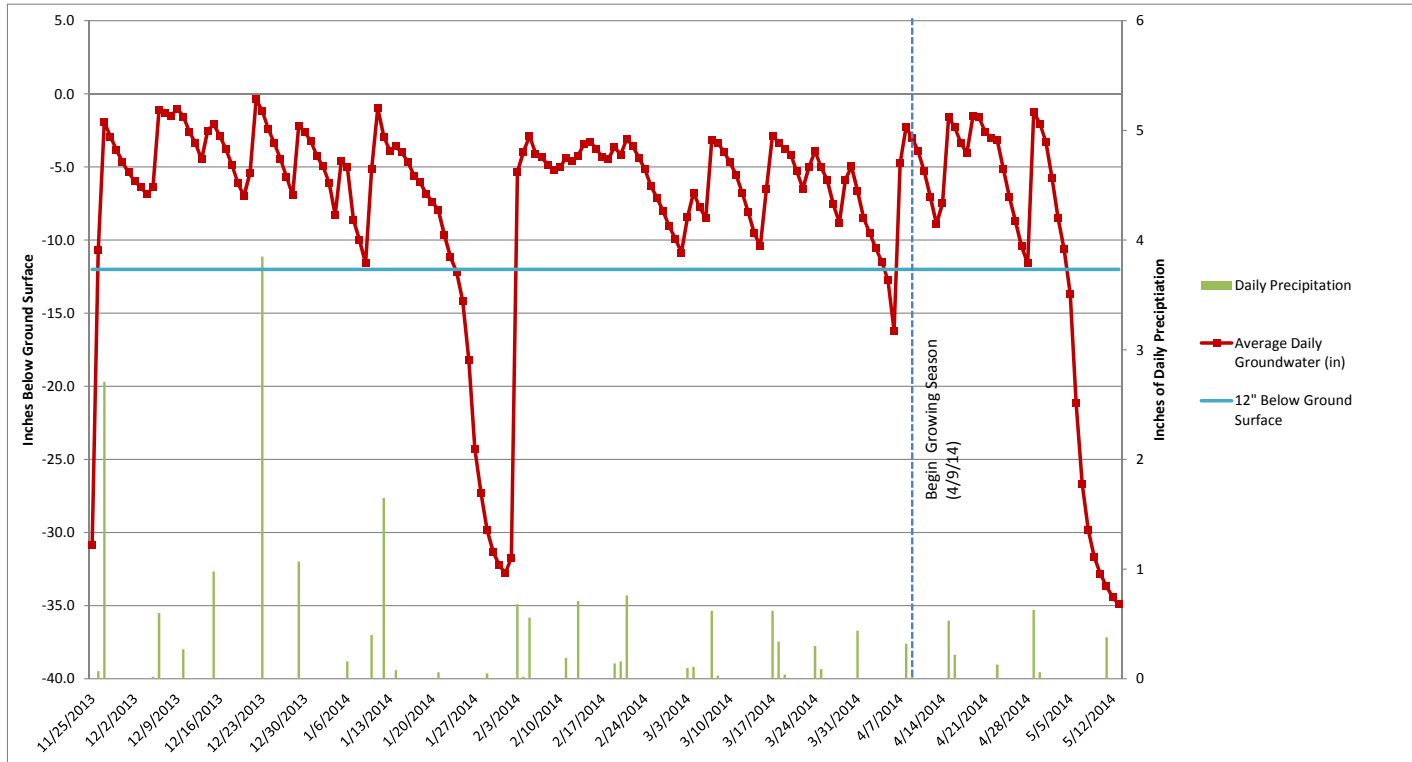
Ecotone Unit: Level Logger
Serial Number: 000010FACBB4
Probe Number: 000010FACBB4
Log Read: 5/13/2014 15:20:58
Fletcher-Meritor Well #10



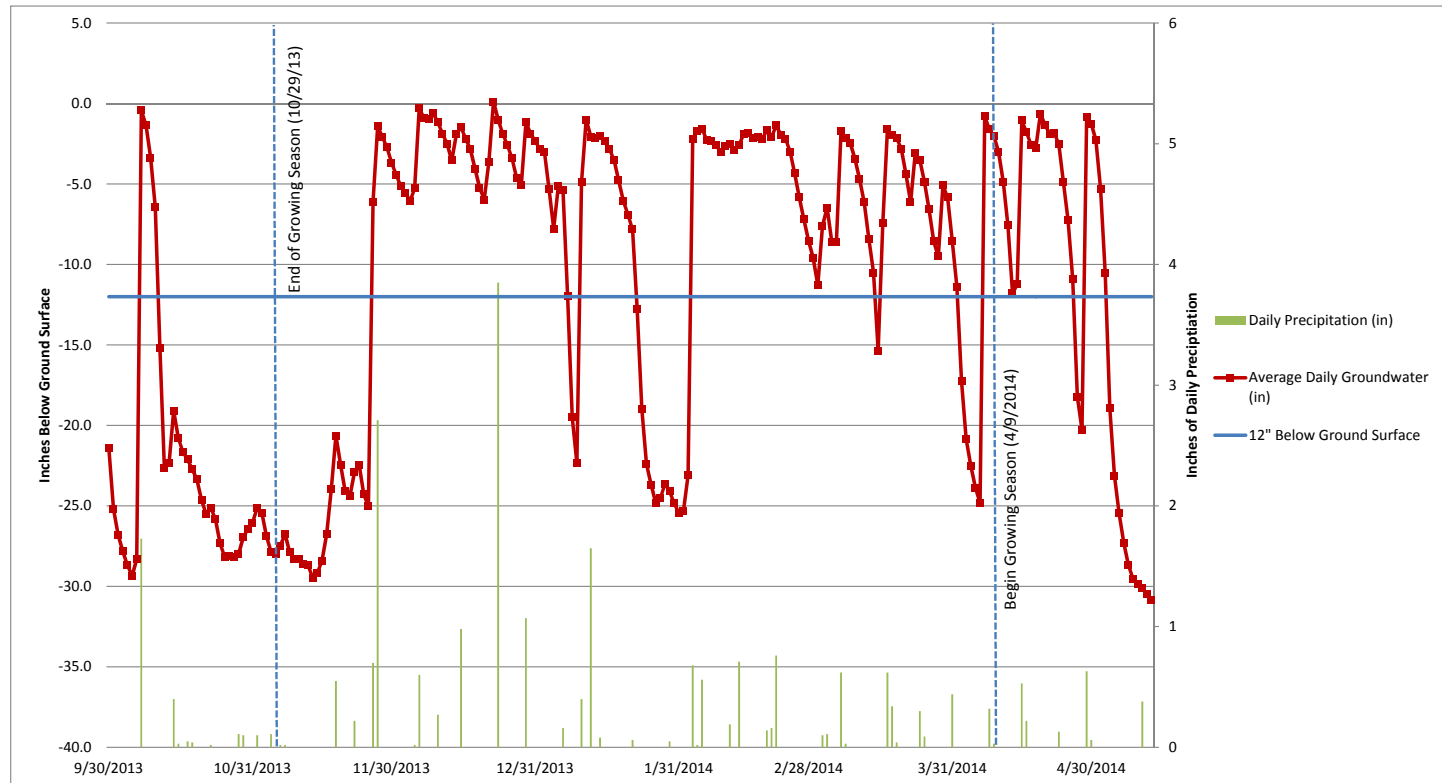
Ecotone Unit: Level Logger
Serial Number: 00000AB37304
Probe Number: 000001D32887
Log Read: 8/21/2014
Fletcher-Meritor Well #11



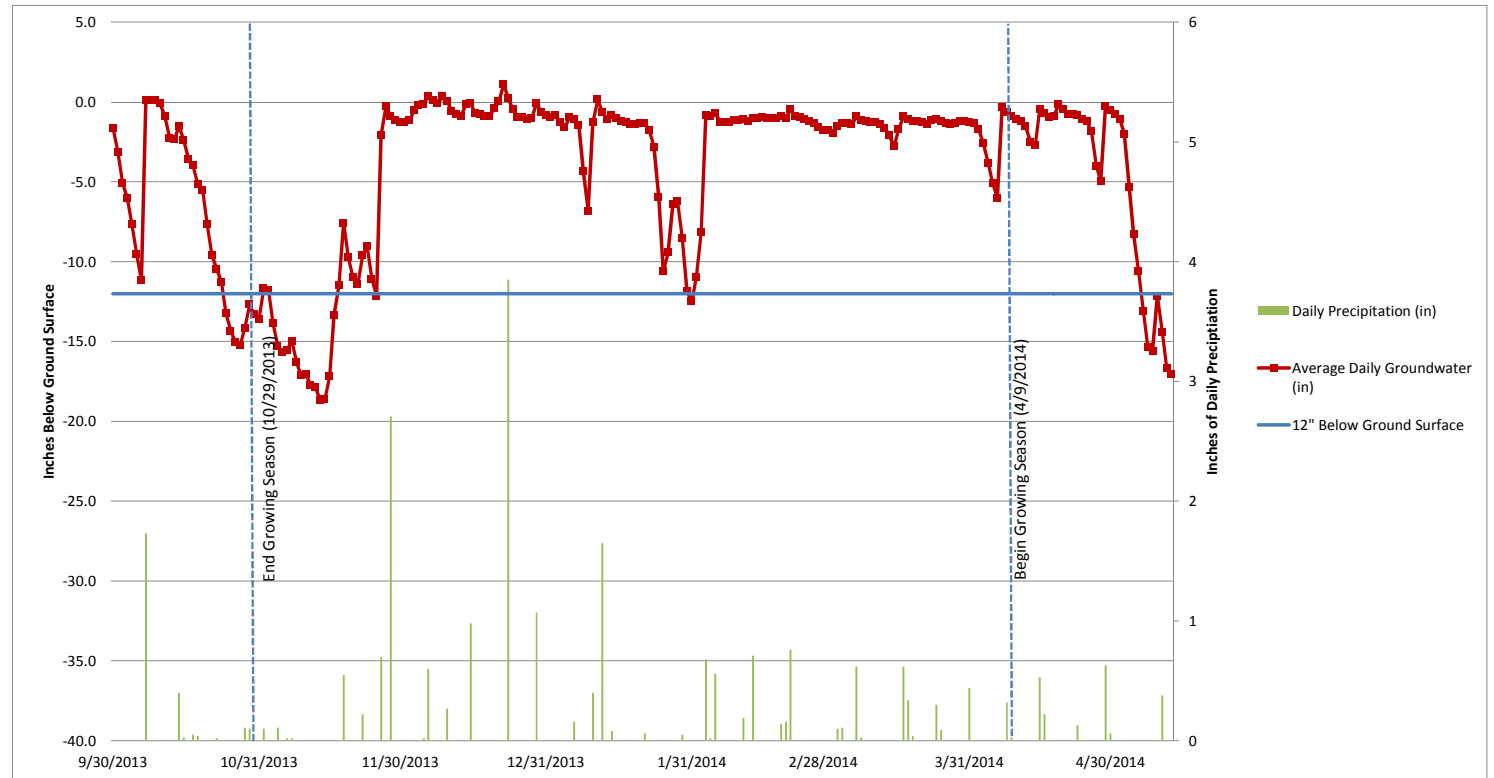
Ecotone Unit: Level Logger
Serial Number: 000010FAA7C4
Probe Number: 000010FAA7C4
Log Read: 5/13/2014 15:31:37
Fletcher-Meritor Well #12



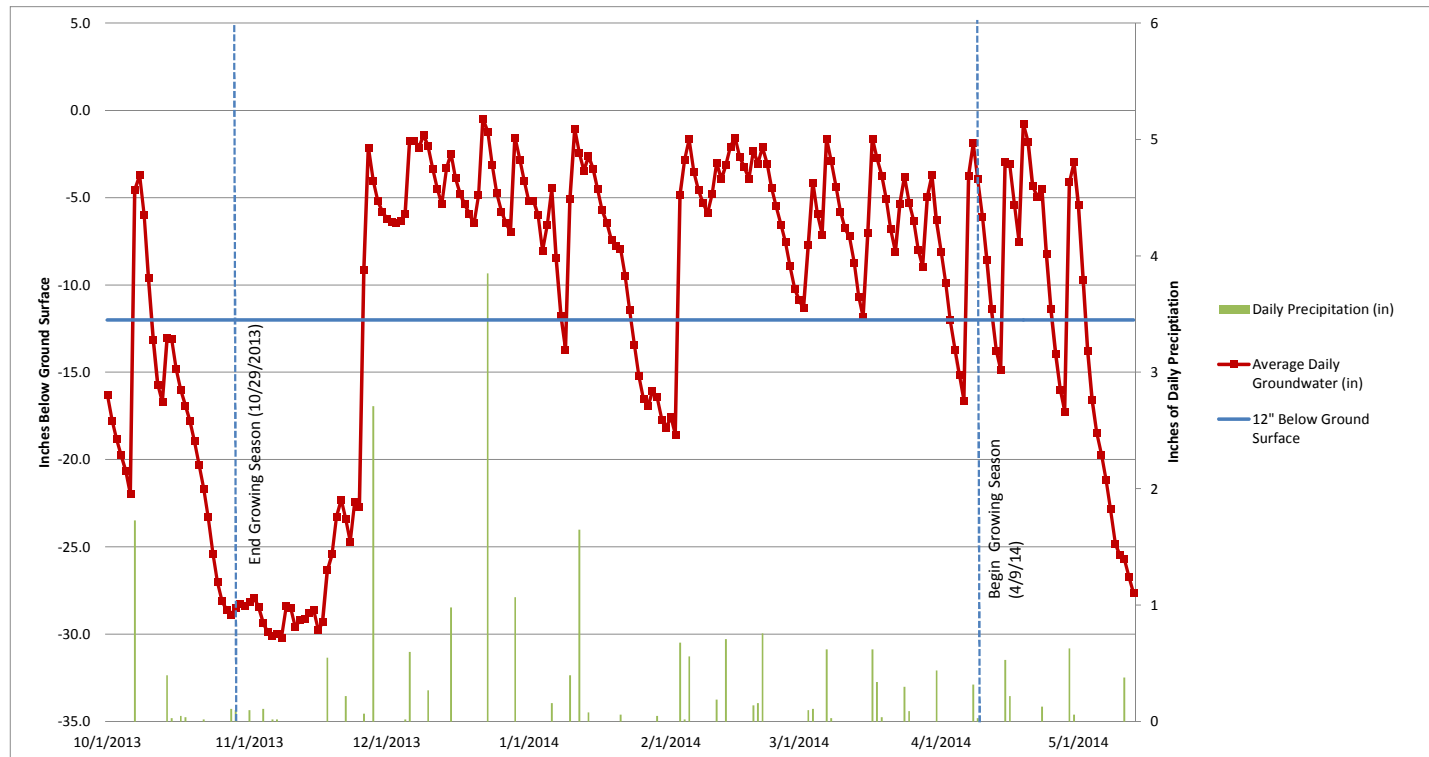
Ecotone Unit: Level Logger
Serial Number: 0000A28ABBO
Probe Number: 000001D36705
Log Read: 5/13/2014 15:35:14
Fletcher-Meritor Well #14



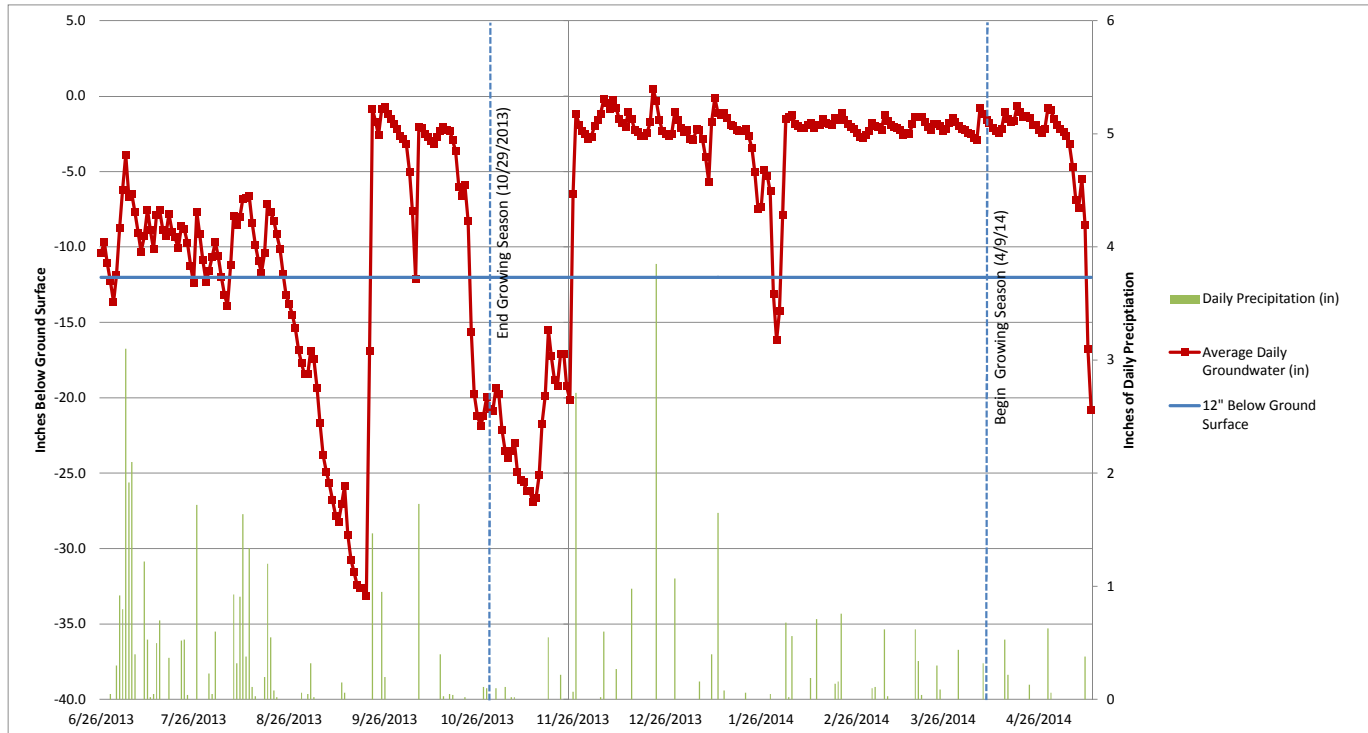
Ecotone Unit: Level Logger
Serial Number: 000009BEBCF0
Probe Number: 000001D332D4
Log Read: 5/13/2014 15:49:59
Fletcher-Meritor Well #18



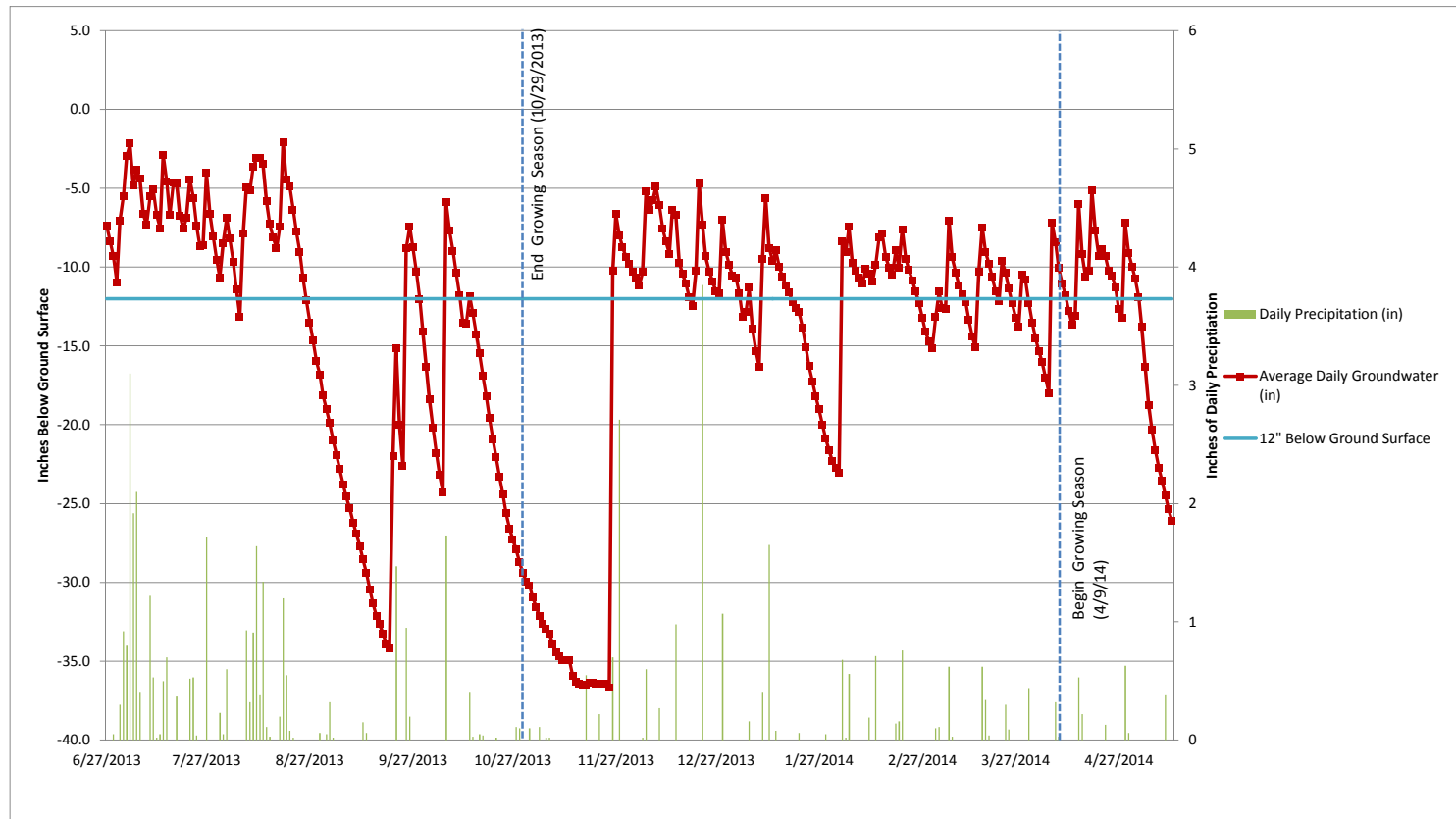
Ecotone Unit: Level Logger
Serial Number: 0000136ACA3C
Probe Number: 0000136ACA3C
Log Read: 5/13/2014 15:58:06
Fletcher-Meritor Well #19



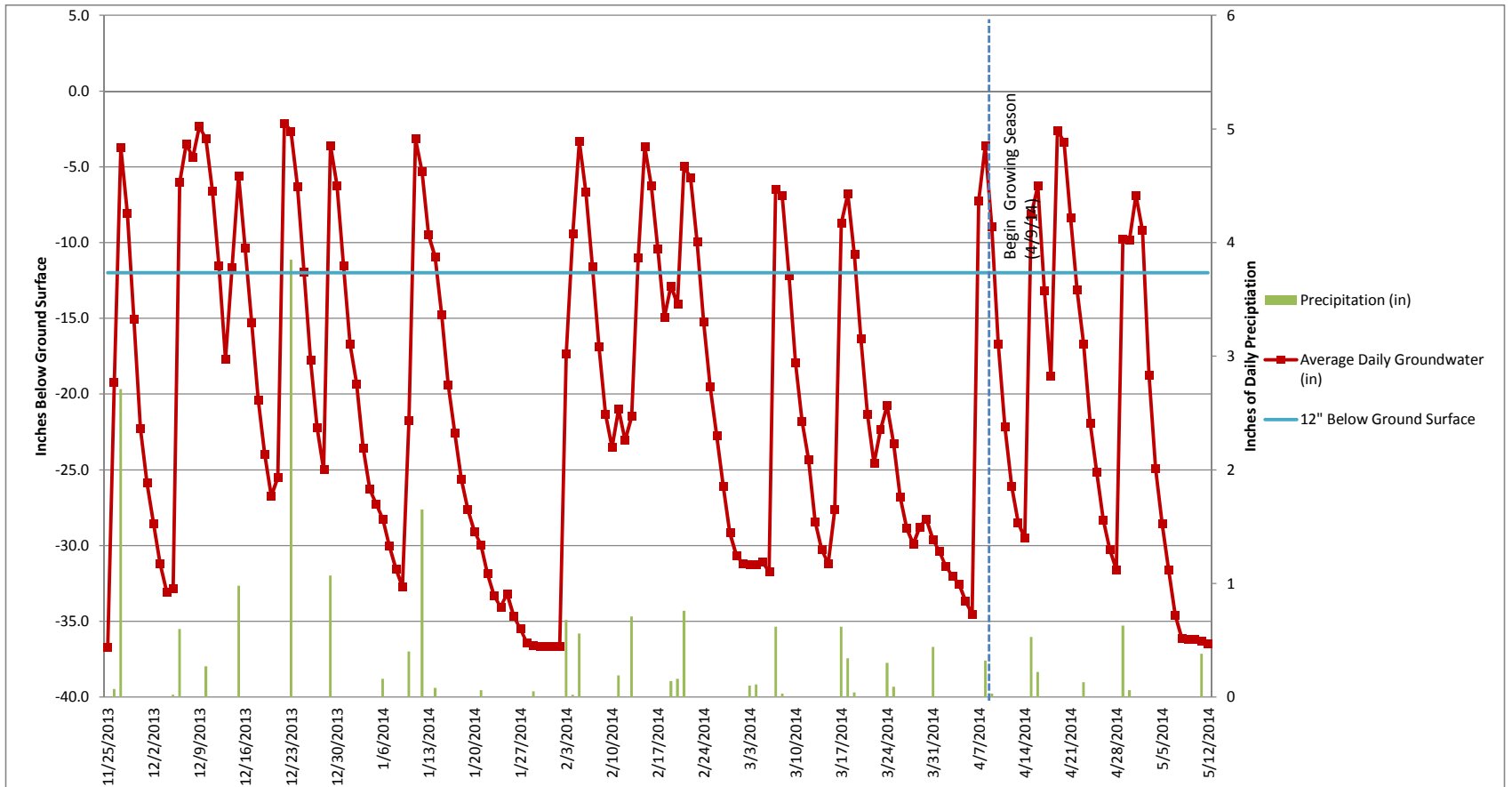
Ecotone Unit: Level Logger
Serial Number: 00000B651924
Probe Number: 000001D31E29
Log Read: 5/13/2014 15:56:06
Fletcher-Meritor Well #20



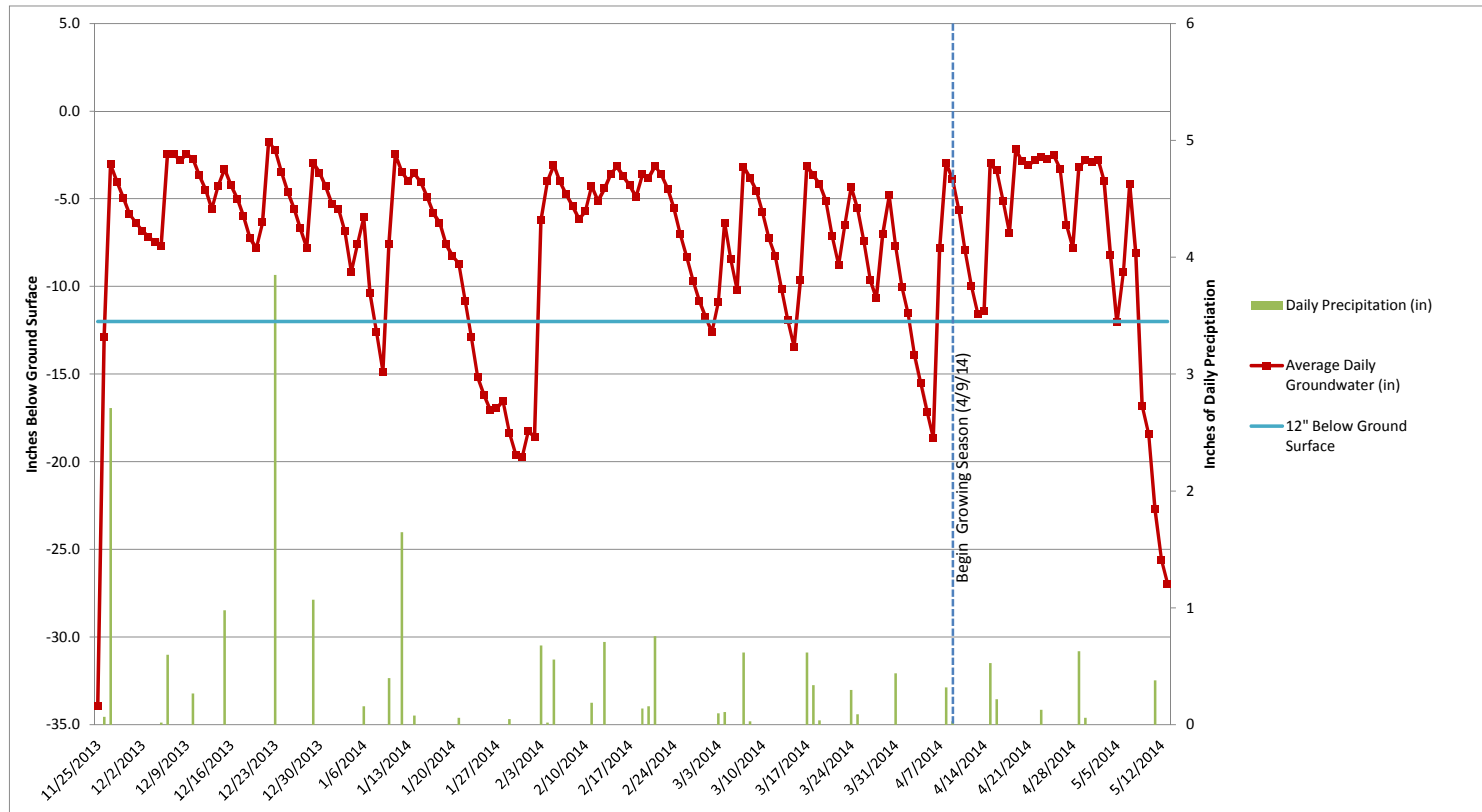
Ecotone Unit: Level Logger
Serial Number: 0000138BB5AA
Probe Number: 0000138BB5AA
Log Read: 5/13/2014 13:29:43



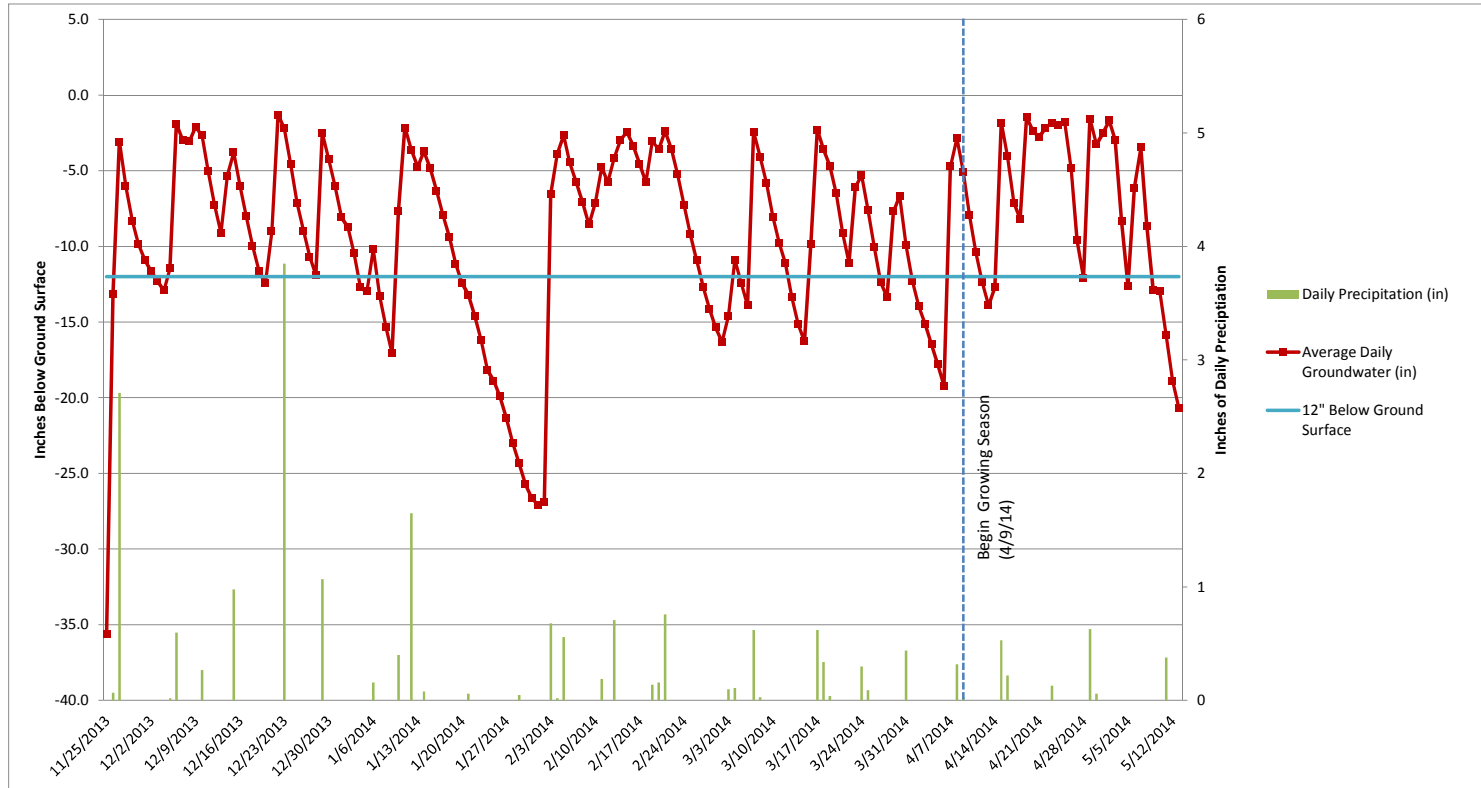
Ecotone Unit: Level Logger
Serial Number: 000011312837
Probe Number: 000011312837
Log Read: 5/13/2014 13:22:08
Fletcher-Meritor Well #22



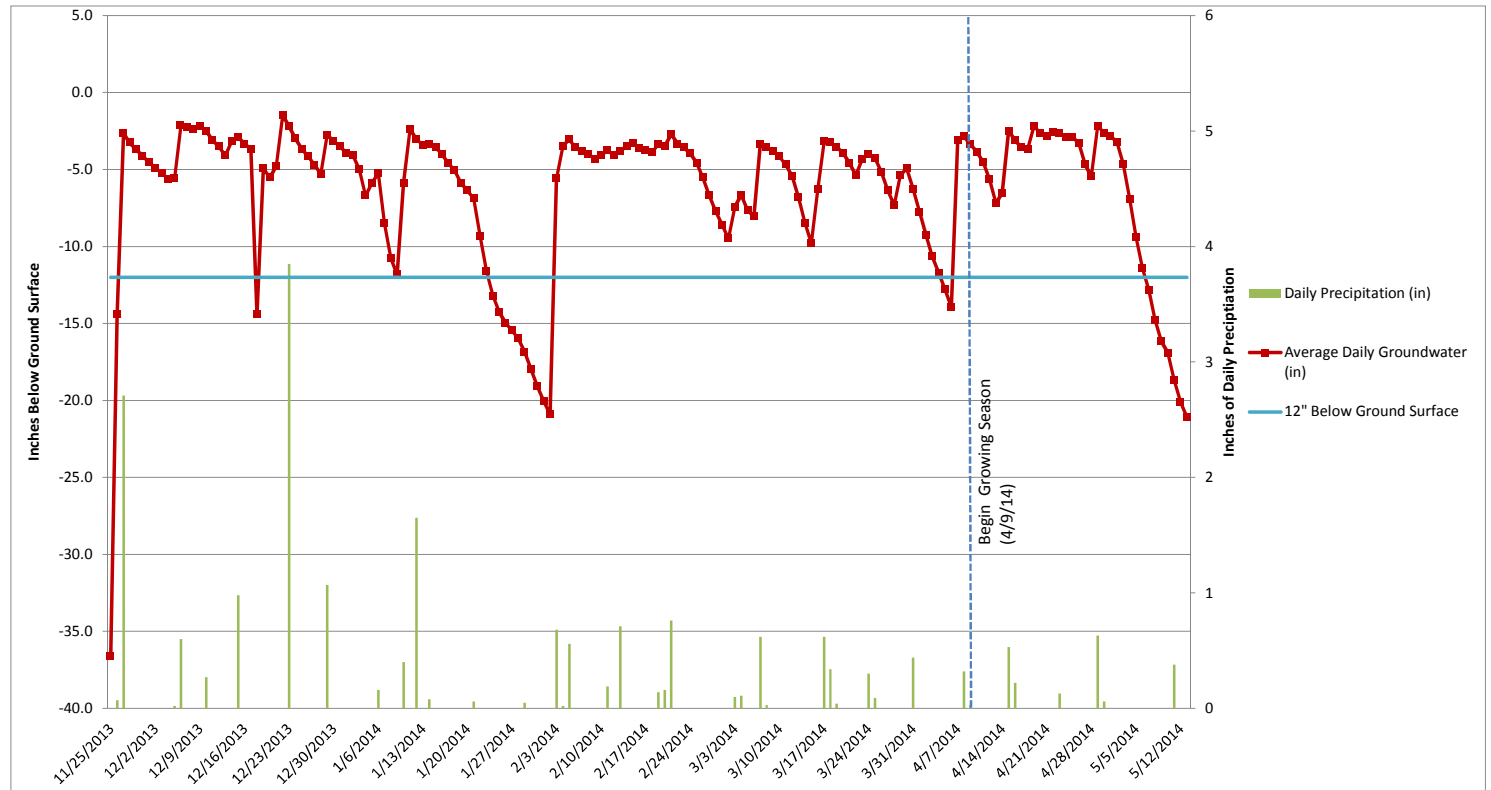
Ecotone Unit: Level Logger
Serial Number: 00001314D206
Probe Number: 00001314D206
Log Read: 5/13/2014 13:27:42
Fletcher-Meritor Well #24



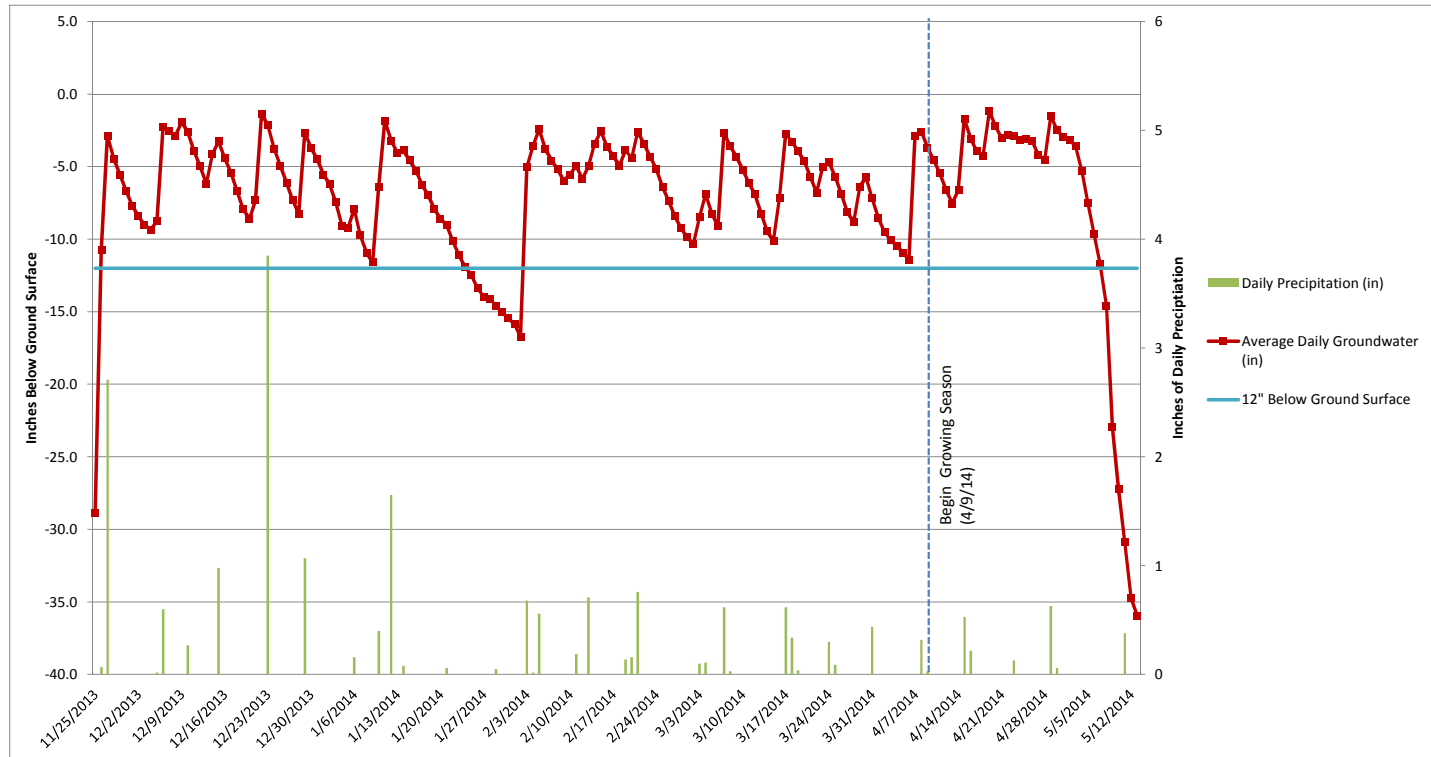
Ecotone Unit: Level Logger
Serial Number: 000009BEBF22
Probe Number: 000001304897
Log Read: 5/13/2014 13:20:24
Fletcher-Meritor Well #25



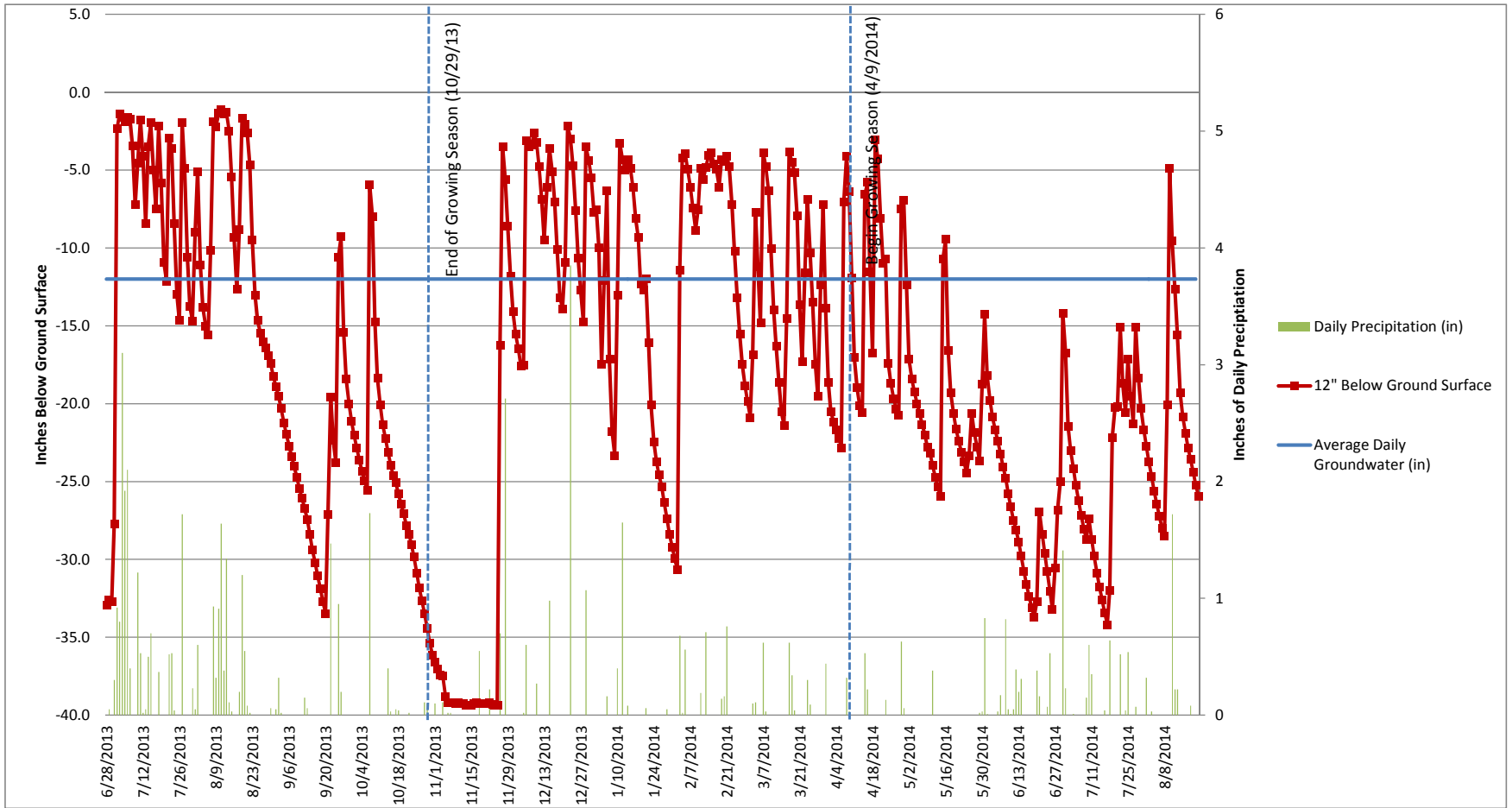
Ecotone Unit: Level Logger
Serial Number: 00001314D1F1
Probe Number: 00001314D1F1
Log Read: 5/13/2014 13:33:26
Fletcher-Meritor Well #26



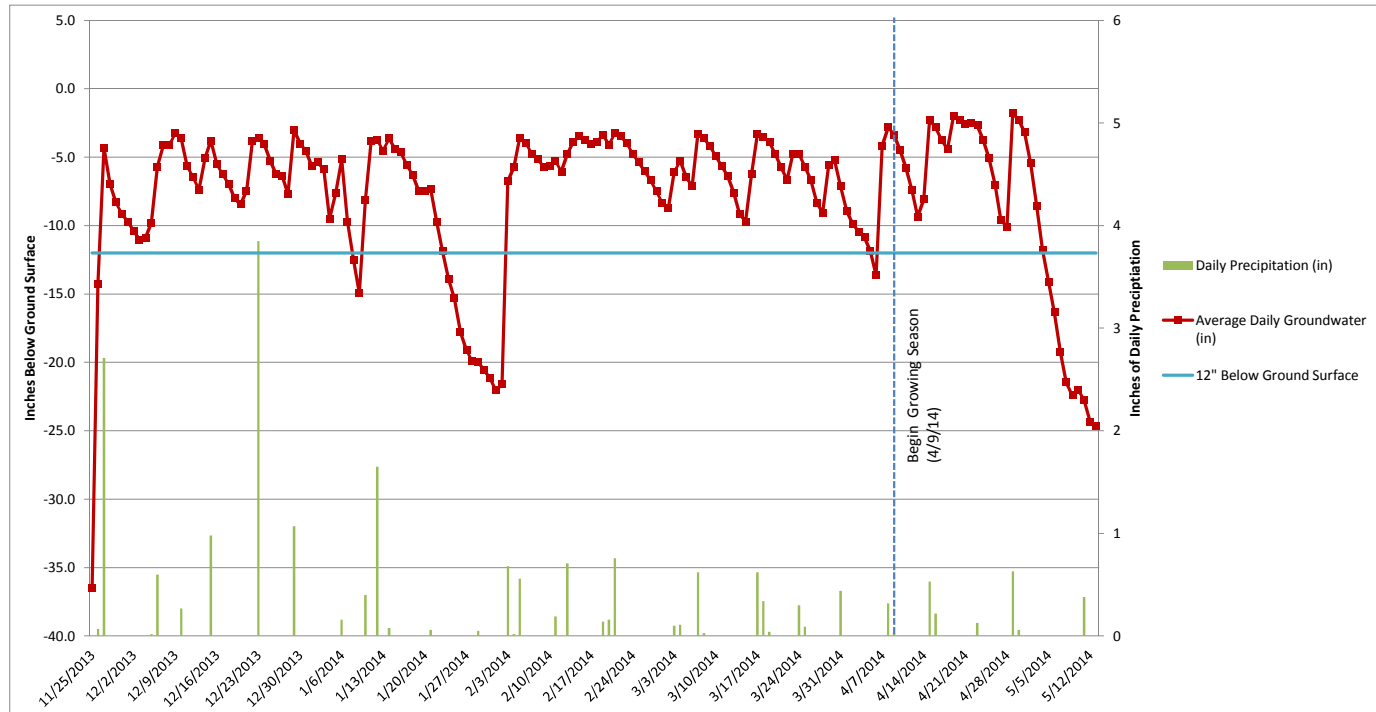
Ecotone Unit: Level Logger
Serial Number: 0000113118F8
Probe Number: 0000113118F8
Log Read: 5/13/2014 13:26:09
Fletcher-Meritor Well #27



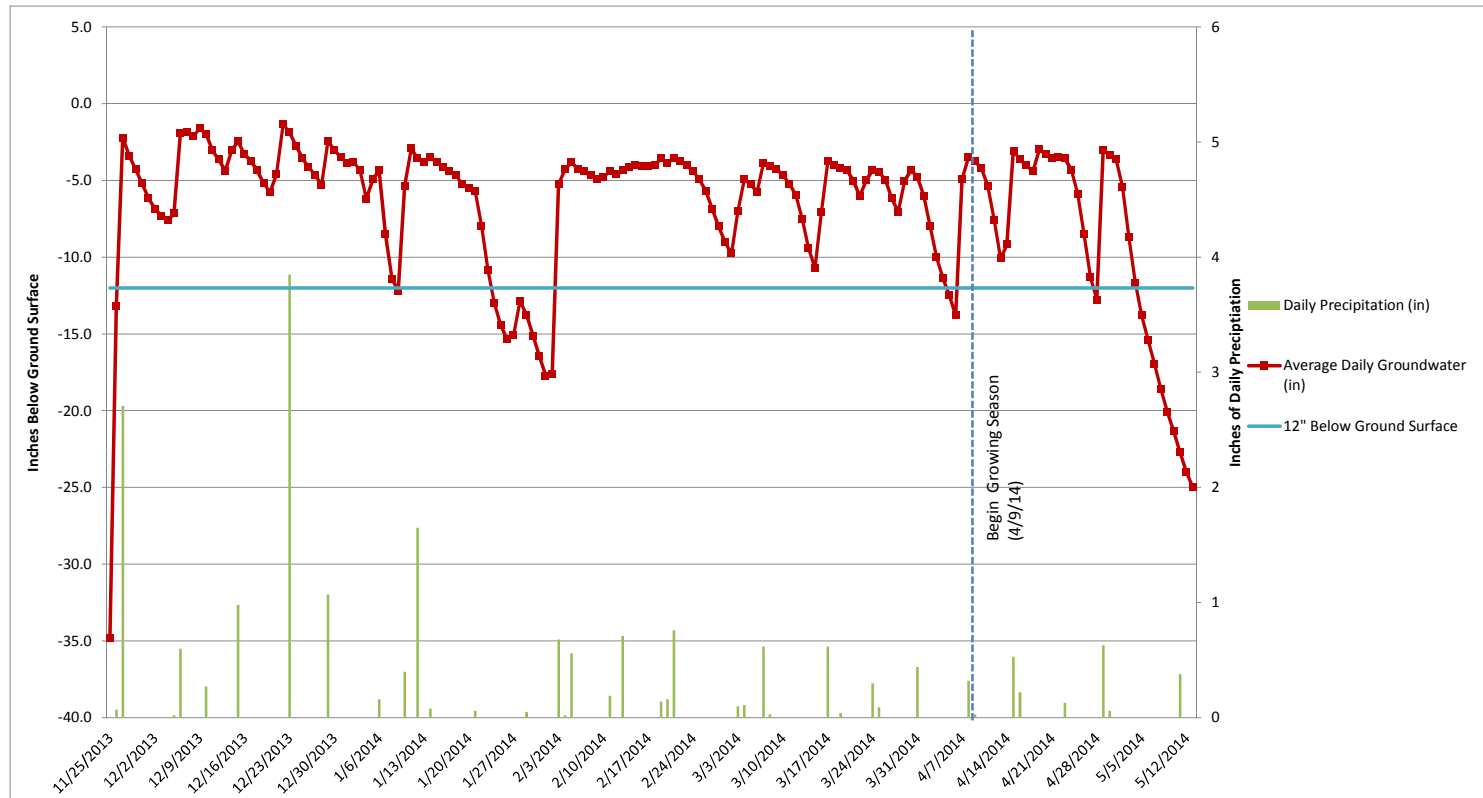
Ecotone Unit: Level Logger
Serial Number: 00009DE69AB
Probe Number: 000001303427
Log Read: 8/21/2014 17:02:50
Fletcher-Meritor Well #29



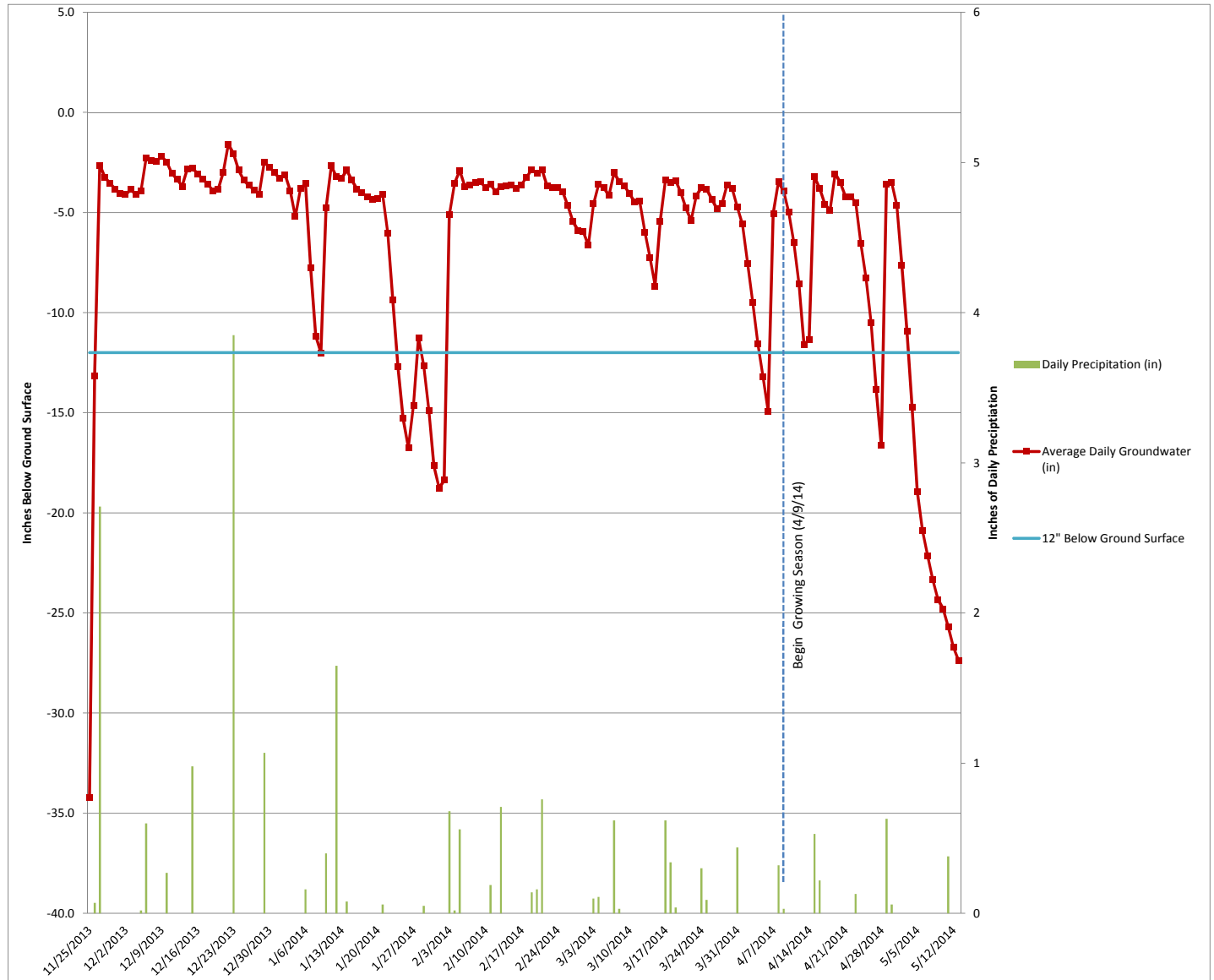
Ecotone Unit: Level Logger
Serial Number: 0000138BE066
Probe Number: 0000138BE066
Log Read: 5/13/2014 13:47:57
Fletcher-Meritor Well #30



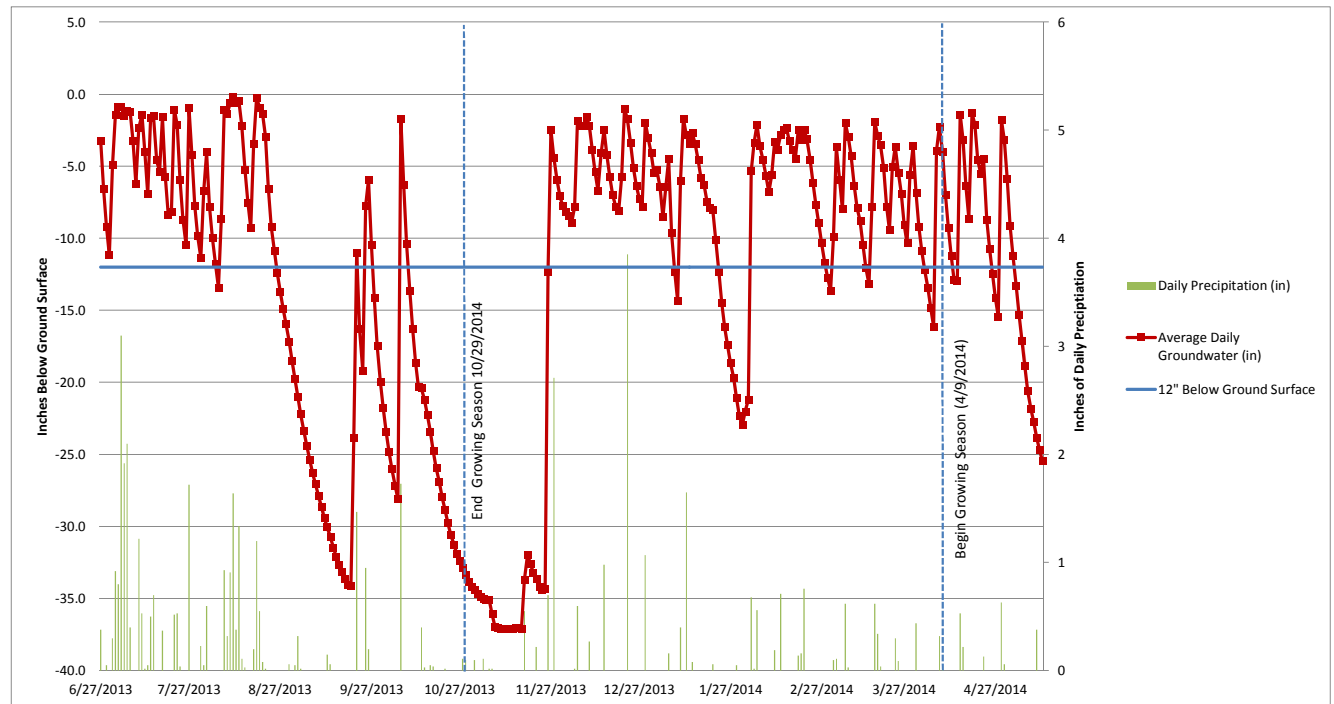
Ecotone Unit: Level Logger
Serial Number: 00000EBDD9B0
Probe Number: 00000EBDD9B0
Log Read: 5/13/2014 13:43:07
Fletcher-Meritor Well #32



Ecotone Unit: Level Logger
Serial Number: 00000EBDCF48
Probe Number: 00000EBDCF48
Log Read: 5/13/2014 13:39:20
Fletcher-Meritor Well #33



Ecotone Unit: Level Logger
Serial Number: 00000EBDB81A
Probe Number: 00000EBDB81A
Log Read: 5/13/2014 13:40:47
Fletcher-Meritor Well #34



| Well ID No. | Serial Number | New Serial Number | MY 1 | MY2 | MY3 | MY4 | MY5 |
|-------------|---------------|-------------------|------|-----|-----|-----|-----|
| 1 | 13D4CA2A | | | N | | | |
| 2 | 11311987 | | | N | | | |
| 3 | 1130DD07 | | | N | | | |
| 4 | * | 14E17875 | | | | | |
| 5 | 138BE816 | | Y | N | | | |
| 6 | 11313B57 | | | Y | | | |
| 7 | 9BEA475 | | | Y | | | |
| 8 | 9BEBF83 | | Y | Y | | | |
| 9 | EBD106E | | | Y | | | |
| 10 | 10FACBB4 | | Y | Y | | | |
| 11 | AB37304 | | N | N | | | |
| 12 | 10FAA7C4 | | | Y | | | |
| 13 | 10FADD4C | A278DE1 | | | | | |
| 14 | A28ABBO | | N | Y | | | |
| 15 | * | 9DE54F2 | | | | | |
| 16 | 138BD91E | 1130EA33 | | | | | |
| 17 | * | | | | | | |
| 18 | 9BEBFCFO | | Y | Y | | | |
| 19 | 136ACA3C | | | Y | | | |
| 20 | B651924 | | Y | Y | | | |
| 21 | 138BB5AA | | Y | Y | | | |
| 22 | 11312837 | | | N | | | |
| 23 | * | EDB96D7 | | | | | |
| 24 | 1314D206 | | | Y | | | |
| 25 | 9BEBF22 | | | Y | | | |
| 26 | 1314D1F1 | 1130FAA2 | | Y | | | |
| 27 | 113118F8 | 14E1603B | | Y | | | |
| 28 | * | 9BEA426 | | | | | |
| 29 | 9DE69AB | | Y | N | | | |
| 30 | 138BE066 | | | Y | | | |
| 31 | * | 13D4CFD5 | | | | | |
| 32 | EBDD9BO | | | Y | | | |
| 33 | EBDCF48 | | | Y | | | |
| 34 | EBDB81A | | Y | Y | | | |
| 35 | * | 14E153D2 | | | | | |

A blank cell indicates that there was not enough data to determine if the well was meeting the hydrology criteria.

N indicates that the well was not meeting the hydrology criteria.

Y indicates that the well was meeting the hydrology criteria.