

# **Little Beaver Creek (DMS #221)**

## **Stream and Wetland Restoration Site**

**2015 Annual Monitoring Report (MY5)**

**Wake County**

**Division of Mitigation Services Project No. 221**

**Design Firm: Earthtech**

**Construction Completed: February 2007**

**Construction Repairs Completed: May 2013**



**June 2015**

**Prepared for:**



**NCDENR/ Division of Mitigation Services (DMS)**

**1652 Mail Service Center**

**Raleigh, NC 27699-1652**

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## 1.0 EXECUTIVE SUMMARY

The Little Beaver Creek stream and wetland restoration project consists of 3,712 linear feet of stream restoration, 1,513 linear feet of stream preservation, and 2.4 acres of wetland restoration. Little Beaver Creek is located in Wake County southwest of Apex, North Carolina at the end of Olive Farm Road (SR 1178). Construction began in July 2005; due to Hurricane Katrina in August 2005 and contractual issues there was a delay in the completion of the construction until 2006, which prevented planting until the dormant 2006/2007. Tropical storm Alberto caused damage in June 2006, which required repair. Collectively, this caused planting to be delayed until February 2007 the official end of construction.

Between January 14 and May 6, 2013, spot repairs were made to approximately 400 linear feet of channel, riffles were installed, existing structures were adjusted through boulder removal, unwanted/invasive plants were treated, pine and sweet gum saplings were thinned within the outer 40 feet of the 50 foot stream buffer, and supplemental planting was conducted. For specific details about the repairs, please see the 2013 Supplemental Monitoring Report (Appendix F).

### 1.1 Goals and Objectives

The goals and objectives for the Little Beaver Creek (DMS #221) stream and wetland restoration are:

- | Goals  | Objectives   |
|--|--|
| <ul style="list-style-type: none"><li>• Improve water quality and reduce erosion</li><li>• Improve aquatic habitat</li><li>• Re-establish connectivity of the stream with its floodplain</li><li>• Restore characteristic natural plant communities/wildlife habitat and hydrologic regime to disturbed wetlands</li></ul> | <ul style="list-style-type: none"><li>• Implementation of stream stabilization techniques</li><li>• Improve aquatic habitat through the implementation of natural structures such as rootwads, rock vanes, woody debris, and the planting of a riparian buffer</li><li>• Provide aesthetic value, wildlife habitat, and bank stability through the creation or enhancement of a riparian zone with plantings</li><li>• Provide a stable stream channel that neither aggrades or degrades while maintaining its dimension, pattern, and profile, with the capacity to transport water and sediments</li></ul> |

### 1.2 Vegetative Assessment

The vegetation on site is intact with evidence of woody species recruitment throughout the conservation easement. As a result of the stream repairs in 2013, the conservation easement received supplemental plantings in March 2013. Re-grading only occurred in plots 8 and 10. A cut stump herbicidal treatment method was employed on the Loblolly Pine and Sweetgum saplings throughout the conservation easement starting 10 feet from the channel edge, altering plots 5, 7, 11, and 14 in MY4. All plots received supplemental plantings in MY4. VP 2 remained relatively intact and undisturbed with the exception of the supplemental plantings. Please see the *2013 Supplemental Monitoring Report* for more details.

Eight vegetation monitoring plots (VP 2, 5, 7, 8, 9, 10, 11, and 14) were surveyed for Monitoring Year 5 (MY5). Of these eight plots, 87.5% of the plots (VP 5, 7, 8, 9, 10, 11, and 14) are meeting the vegetation

success criteria; VP 2 is the only plot not meeting the success criteria, however with the additional volunteers the stem density far exceeded the planted stem success criterion. The average stems per acre for all eight monitoring plots, including natural and planted stems, is 12,581 (2,185-30,140) stems per acre; the average planted stems per acre for all eight monitoring plots, excluding live stakes, is 551 (121-1,244) stems per acre. Success criterion for planted woody species is 288 stems/acre after MY4. A mortality rate of ten percent will be allowed after MY5 (260 stems/acre). Currently the vegetation criteria are being met throughout the site with 577 planted stems/acre. Although sweetgum and pine were thinned in 2013, the seed bank within the valley for these species is apparently very large and many stems are growing on the site. However, this site is more diverse than earlier in its history and exhibits between 9 and 19 species per plot with 34 species noted site wide.

Similar to MY-04, multiflora rose (*Rosa multiflora*) is the only notable vegetation problem areas for MY5; several stems were observed throughout the conservation easement and are identified in the Current Conditions Plan View. Other Invasive exotics within the conservation easement include Tall Fescue (*Schedonurus arundinaceus*), Gill over the Ground (*Glechoma hederacea*), Japanese Honeysuckle (*Lonicera japonica*), and Japanese Stiltgrass (*Microstegium vimineum*). Although these species have been given different ranks of severity, the functionality of the project is not expected to be impaired significantly. It is likely that all of these species were present in and adjacent to the conservation easement previous to construction. For additional information relating to vegetation, see Appendix C.

### **1.3 Stream Assessment**

The project is divided into three separate reaches (Reach 1, Reach 2, and Reach 3) for the purposes of the design. Reach 1 and 2 consist of Priority 1 and 2 stream restoration. Tributaries were restored using Priority 1 restoration. Due to bedrock constraints, the restoration of Reach 3 below the road crossing was abandoned. This portion of Reach 3 (i.e. Reach 3b) is preserved within the permanent conservation easement.

The majority of Little Beaver Creek, Reach 1 (station 10+00-19+90), Reach 2 (19+90 to 23+50), and Reach 3 (23+50 to 38+00) are in stable condition with some isolated bank scour areas, three structure with some piping, and beaver activity. The portion of Little Beaver Creek below station 38+00 to the culvert at the end of the restored reach is stable and well vegetated. Two tributaries located on the project site tie into the north bank of Little Beaver Creek. Tributary 1 is exhibiting some very minor bank scour but remains in stable condition. Tributary 2 is very stable with vegetation that has established throughout the channel bed and banks.

Repairs to Little Beaver Creek were conducted between January 14 and May 6 2014. These repairs consisted of the following:

A description of stream bank and channel repairs is listed as follows by station.

1. Constructed riffle installed Station 23+86 to 24+12
2. Bank repair right 24+30 hole filled and matted
3. Bank repair right 24+52 to 24+78 graded and some rock added to toe after soil lost in a large rain event after construction.
4. Bank graded and brush toe added to right bank station 26+42 to 27+08. One boulder taken off structures at 27+55 and two boulders from structure at 27+75 used in the repair.
5. Bank re-graded 27+60 to 27+75 and two boulders removed from upstream structure.
6. Graded bank 27+95 to 28+18 right and removal of former beaver dam remnant debris.
7. Brush toe from 28+45 to 28+75 to repair large channel blow out bank left.

8. Class B stone added below structure at 28+80
9. Bank Rt. graded from 29+25 to 29+41 and 5 boulders added to the toe for reinforcement from structure at 29+45 where the boulders were removed.
10. Graded bank left from 29+58 to 29+72 and matted.
11. Constructed riffle added 29+92 to 30+26 and right bank graded and matted.
12. Graded bank left and matted 30+86 to 31+06
13. Graded bank right and rock toe added 31+33 to 31+53. Four boulders used removed from structure at 31+60.
14. Graded bank right with rock toe added 31+92 to 32+12. Three boulders used from structure at 32+00.
15. Proposed riffle at station 32+80 to 33+05 not constructed. The stream in this area had filled in with stone and had formed a riffle the banks in the area were stable. No work in this area was needed.
16. One boulder was removed from the structure at 33+60
17. Constructed riffle added 37+85 to 38+18. Broad and deep blow out area. Banks reconstructed and one large boulder and two small added from structure at 37+30 due to the riffle due the extreme depth of the void.
18. Graded bank at 39+02 – smaller riprap used for the rock at toe due to the presence of saprolite in the area.

In accordance with the Supplemental Monitoring Report, the 2014 MY4 and 2015 MY5 surveys were conducted utilizing the newly established survey control points.

#### ***1.4 Wetland Assessments***

Eight RDS groundwater gauges (2, 3, 4, 5, 6, 7, 8, & 9) are located within the conservation easement. Hydrologic restoration is considered successful if groundwater levels are within 12 inches of the surface at 12.5% of the growing season or for a hydroperiod comparable to the reference wetland. If the period of saturation is between 5-12.5% of the growing season, the presence of hydrophytic vegetation and hydric soils will be taken into consideration. By recommendation from EEP, these gauges were installed on June 25, 2008, to replace an older set of gauges. In January of 2010, four gauges (2, 3, 4, and 5) were relocated upstream to more appropriate locations. After completion of the MY3 report in spring 2010, monitoring was delayed due to various repair considerations. MY4 did not begin until the fall of 2013, near the end of the growing season. Five of the eight groundwater gauges (Gauge 3, 4, 5, 7, and 8) failed between the MY3 and MY4 monitoring (2009 to 2013) and were repaired during MY4 but resulted in some data gaps during this period. Wetland hydrology success criteria is met when the water table elevation is within 12 inches of the soil surface for at least 12.5 percent of the growing season. In MY5, only four gauges are meeting hydrological requirements: 3, 6, 7, and 8 (Table 13). A bankfull event was observed and recorded on January 12, 2014 (Table 12).

#### ***1.5 Annual Monitoring Summary***

Summary information/data related to the occurrences 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 information formerly found in these reports can be found in the mitigation plan and restoration plan documents available on EEPs website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

## 2.0 METHODOLOGY

Methodologies follow the current EEP monitoring report template (Version 1.5 - 06/08/12). Level II of the CVS –EEP Protocol for Recording Vegetation (Lee et al. 2008) was used for vegetation data collection. Photos were taken with a digital camera. A Trimble Geo XT handheld unit with sub-meter accuracy was used to collect monitoring feature locations and vegetation problem areas. Precipitation data were obtained from the State Climate Office of North Carolina (<http://www.nc-climate.ncsu.edu/services/request.php>) (State Climate Office of North Carolina 2012). Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas was the taxonomic standard used throughout vegetation data collection (Weakley 2012). Vegetation monitoring data was collected on August 21, 2014.

Stream monitoring was completed by utilizing total station survey along with Rosgen Level II techniques to determine stream stability and performance. The annual cross-sectional survey included points surveyed at breaks in slope, including bankfull, inner berm, edge of water, ground shot and thalweg, if the features were present. Longitudinal profile survey was conducted for the entire length of the restored channel for all stream reaches. Measurements included thalweg, water surface, and bankfull. Existing onsite benchmarks were used for survey control. The previous monitoring surveys did not utilize survey control and were manually adjusted. The 2015 MY5 monitoring survey was conducted utilizing survey control, but due to the manual adjustment of the previous data, the 2014 MY4 and 2015 MY5 data did not spatially match the previous monitoring efforts. The 2015 total station survey was supplemented with additional traditional level survey for cross sections T1, T2, 8, and portions of the longitudinal profile to maintain data integrity. Although the 2015 MY5 raw survey is coordinately correct, the data was adjusted to match the previous monitoring data. The adjustment was completed to maintain spatial congruency and does not affect the integrity or accuracy of the survey data. Photo monitoring was conducted by walking each stream reach and taking photos at each pre-determined photo point location using a digital camera. Stream monitoring was conducted on March 9 and 10, 2014.

## 3.0 REFERENCES

- Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation, Version 4.2 (<http://cvs.bio.unc.edu/methods.htm>)
- Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, CO.
- State Climate Office of North Carolina. 2015. Apex Station Precipitation Data (Jan 1, 2010 – May 5, 2015; Daily Totals). (<http://www.nc-climate.ncsu.edu/services/request.php>)
- Weakley, A.S. 2012. Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas. Working draft of November 2012. University of North Carolina Herbarium, North Carolina, Botanical Garden, University of North Carolina. 1015pp.

**Appendix A**  
**Project Vicinity Map and Background Tables**





**Table 1. Project Components Mitigation Credits**

| Little Beaver Creek /Project No. 221  |                               |                           |                         |                              |   |                                |                  |                          |                            |
|---|-------------------------------|---------------------------|-------------------------|------------------------------|---|--------------------------------|------------------|--------------------------|----------------------------|
| Mitigation Credits  |                               |                           |                         |                              |   |                                |                  |                          |                            |
|   | Stream                        |                           | Riparian Wetland        |                              | Non-Riparian Wetland                    |                                | Buffer           | Nitrogen Nutrient Offset | Phosphorus Nutrient Offset |
| Type  | R                             | RE                        | R                       | RE                           | R                                       | RE                             |                  |                          |                            |
| <b>Totals</b>   | 3712                          | 191                       | 2.4                     | -                            | -                                       | -                              | -                | -                        | -                          |
| Project Components  |                               |                           |                         |                              |   |                                |                  |                          |                            |
| Project Component –or – Reach ID  | Stationing/ Location          | Existing Footage/ Acreage | Approach (PI, PII, etc) |                              | Restoration–or – Restoration Equivalent | Restoration Footage or Acreage | Mitigation Ratio |                          |                            |
| Little Beaver Creek/Reach 1 & 2   | SEE CCPV                      | 2.4 acres                 | N/A                     |                              | 2.4 acres                               | 2.4 acres                      | 1:1              |                          |                            |
| Little Beaver Creek/Reach 1 & 2   | SEE CCPV                      | TBD                       | N/A                     |                              | TBD                                     | TBD                            | TBD              |                          |                            |
| Little Beaver Creek/Reach 1 & 2   | SEE CCPV                      | TBD                       | N/A                     |                              | TBD                                     | TBD                            | TBD              |                          |                            |
| Little Beaver Creek/Reach 1 & 2   | 10+00 to 19+91/19+91 to 33+00 | 2300 lf                   | P1 & PII                |                              | 2300 lf                                 | 2300 lf                        | 1:1              |                          |                            |
| Little Beaver Creek/Reach 3a  | 33+00 to 40+32                | 732 lf                    | PII                     |                              | 732 lf                                  | 732 lf                         | 1:1              |                          |                            |
| Little Beaver Creek/Reach 3b  | 48+00 to 63+13                | 1513lf                    | Preservation            |                              | Preservation                            | Preservation                   | 10:1             |                          |                            |
| Tributary 1   | 10+00 to 13+81                | 381 lf                    | PII                     |                              | 381 lf                                  | 381 lf                         | 1:1              |                          |                            |
| Tributary 2   | 10+00 to 12+06                | 206 lf                    | PII                     |                              | 206 lf                                  | 206 lf                         | 1:1              |                          |                            |
| Tributary 3   | 10+00 to 10+93                | 93 lf                     | PII                     |                              | 93                                      | 93 lf                          | 1:1              |                          |                            |
| Component Summation   |                               |                           |                         |                              |   |                                |                  |                          |                            |
| Restoration Level   | Stream (linear feet)          | Riparian Wetland (acres)  |                         | Non-Riparian Wetland (acres) | Buffer (square feet)                    | Upland (acres)                 |                  |                          |                            |
|   |                               | Riverine                  | Non-Riverine            |                              |   |                                |                  |                          |                            |
| <b>Restoration</b>  | 3712                          | 2.4                       |                         |                              |   |                                |                  |                          |                            |
| <b>Enhancement</b>  |                               |                           |                         |                              |   |                                |                  |                          |                            |
| <b>Enhancement I</b>  |                               |                           |                         |                              |   |                                |                  |                          |                            |
| <b>Enhancement II</b>   |                               |                           |                         |                              |   |                                |                  |                          |                            |
| <b>Creation</b>   |                               |                           |                         |                              |   |                                |                  |                          |                            |
| <b>Preservation</b>   | 1913                          |                           |                         |                              |   |                                |                  |                          |                            |
| <b>HQPreservation</b>   |                               |                           |                         |                              |   |                                |                  |                          |                            |
| BMP Elements  |                               |                           |                         |                              |   |                                |                  |                          |                            |
| Element   | Location                      | Purpose/Function          |                         | Notes                        |   |                                |                  |                          |                            |
|   |                               |                           |                         |                              |   |                                |                  |                          |                            |
|   |                               |                           |                         |                              |   |                                |                  |                          |                            |
|   |                               |                           |                         |                              |   |                                |                  |                          |                            |
| BMP Elements:<br>BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer |                               |                           |                         |                              |   |                                |                  |                          |                            |

**Table 2. Project Activity and Reporting History**

| <b>Little Beaver Creek Stream and Wetland Restoration Site-Project No. 221</b> |                                 |   |
|--|---------------------------------|---|
| <b>Activity or Reporting</b>   | <b>Data Collection Complete</b> | <b>Actual Completion Date</b>                         |
| Restoration Plan   | 2003                            | March 2003  |
| Final Design-90%   | 2005                            | 2005  |
| Primary Grading Complete   | 2005                            | November 2005   |
| Temporary S&E mix applied to entire project area                               | 2005                            | 2005  |
| Permanent seed mix applied to entire project area                              | 2005                            | 2005  |
| Tropical Storm Alberto   | June 2006                       |   |
| Storm Repairs  | Fall 2006                       |   |
| Containerized, B&B, and livestock planting                                     |                                 | February 2007   |
| Mitigation Plan/As-built (Year 0 Monitoring-baseline)                          | March 2006                      | Morphology – Fall 2006;<br>Vegetation - February 2007 |
| Year 1 Monitoring  | Fall 2007                       | November 2007   |
| Year 2 Monitoring  | Fall 2008                       | December 2008   |
| Year 3 Monitoring  | May 2010                        | May 2010  |
| Site Repairs   | NA                              | May 2013  |
| Supplemental Replanting  | NA                              | May 2013  |
| Year 4 Monitoring (Vegetation)   | October 2013                    | October 2013  |
| Year 4 Monitoring (Geomorphology Surveys)                                      | April 2014                      | April 2014  |
| Year 5 Monitoring (Vegetation)   | October 2014                    | October 2014  |
| Year 5 Monitoring (Geomorphology Surveys)                                      | April 2015                      | April 2015  |

**Table 3. Project Contact Table**

| <b>Little Beaver Creek Stream and Wetland Restoration Site-Project No. 221</b> |  |
|--|--|
| Designer POC   | Earth Tech 701 Corporate Center Drive Suite 475 Raleigh, NC 27607 Bill Jenkins PE (919) 854-6200 |
| Construction Contractor  | Envirocon, Inc. 651 Corporate Circle Suite 114 Golden, CO 80401 Verne Musser (303) 215-0187      |
| Planting Contractor POC  | Seal Brothers 131 West Cleve St. Mt. Airy, NC 27030 Brain Seal (336) 786-2263                    |
| Seeding Contractor POC   | Seal Brothers 131 West Cleve St. Mt. Airy, NC 27030 Brain Seal (336) 786-2263                    |
| Seed Mix Sources   | Evergreen Seeding 4792 Rawls Church Rd. Fuquay-Varina, NC 27526                                  |
| Nursery Stock Suppliers  | Mellow March Farm 1312 Woody Store Rd. Siler City, NC 27344 (919) 742-1200                       |
| Monitoring Performers  | The Catena Group 410-B Millstone Drive Hillsborough, NC 27278                                    |
| Stream Monitoring  | Rummel, Klepper & Kahl Consulting Engineers<br>900 Ridgefield Dr<br>Raleigh, NC 27609            |
| Vegetation Monitoring  | The Catena Group, 1000 Corporate Drive, Suite 101, Hillsborough, NC 27278                        |
| Wetland Monitoring   | The Catena Group, 1000 Corporate Drive, Suite 101, Hillsborough, NC 27278                        |

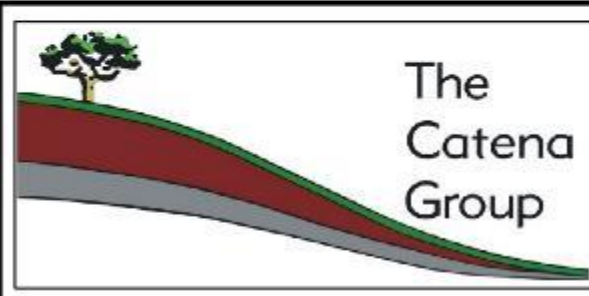
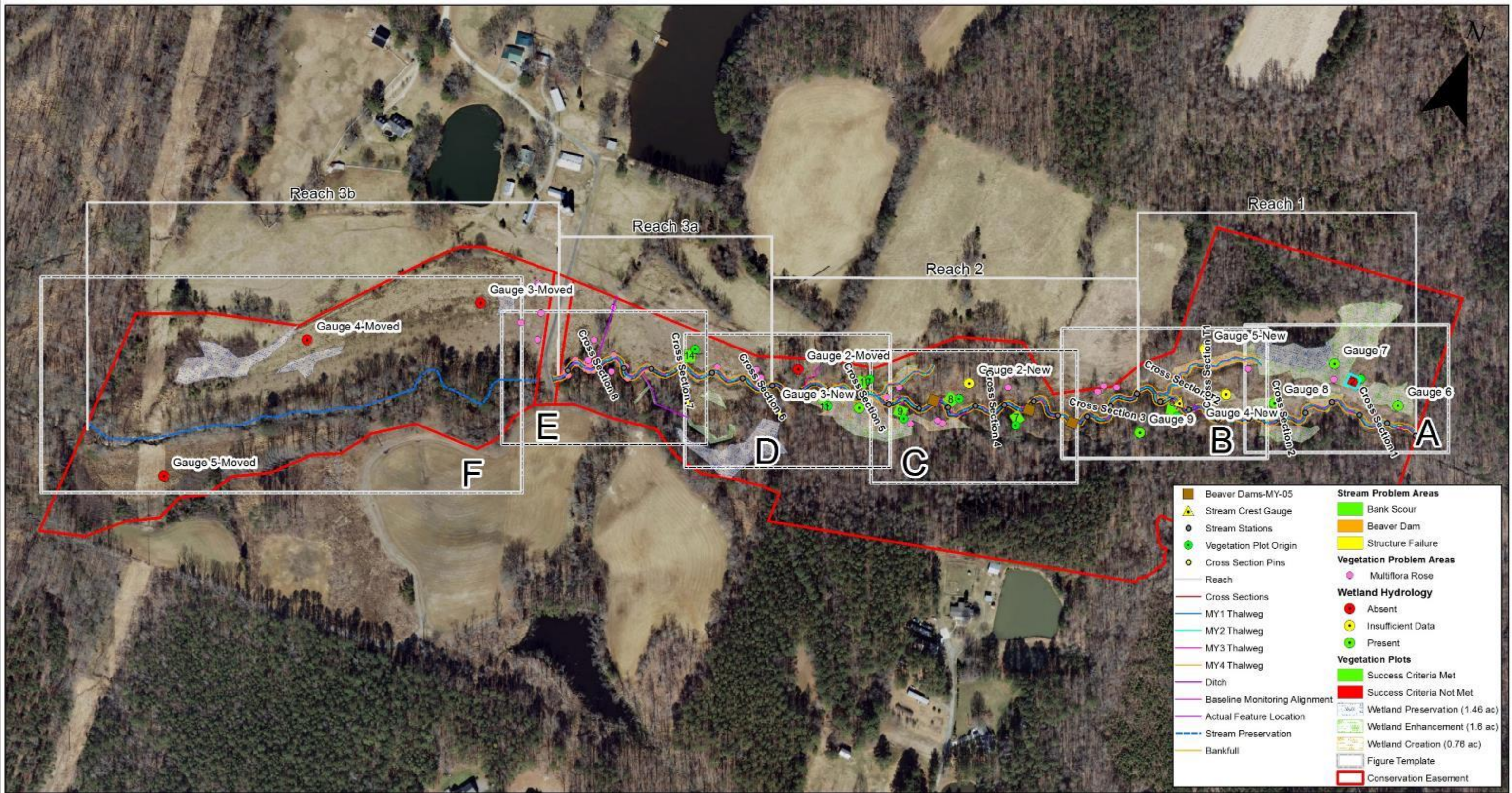
**Table 4. Project Baseline Information Attributes**

| <b>Little Beaver Creek Stream and Wetland Restoration Site-Project No. 221</b> |          |                                |                           |                           |                           |
|--|----------|--------------------------------|---------------------------|---------------------------|---------------------------|
| <b>Project Information</b>   |          |                                |                           |                           |                           |
| County   |          | Wake                           |                           |                           |                           |
| Project Area (acres)   |          | 52 ac                          |                           |                           |                           |
| Project Coordinates  |          | 35.695, -78.922                |                           |                           |                           |
| <b>Project Watershed Summary Information</b>                                   |          |                                |                           |                           |                           |
| Physiographic Province   |          | Piedmont                       |                           |                           |                           |
| River Basin  |          |                                |                           |                           |                           |
| USGS Hydrologic Unit 8-Digit   | 03030002 | USGS Hydrologic Unit 14-Digit  | 03030002060160            |                           |                           |
| NCDWQ Sub-basin for Project  |          | 030605                         |                           |                           |                           |
| Project Drainage Area (acres)  |          | Little Beaver Creek: 1.1 sq mi |                           |                           |                           |
| Project Drainage Area % of Impervious Area                                     |          | < 5%                           |                           |                           |                           |
| CGIA Land Use Classification   |          | 311, 323, 414, 422, 441        |                           |                           |                           |
| <b>Reach Summary Information</b>   |          |                                |                           |                           |                           |
| Parameters   |          | Reach 1                        | Reach 2                   | Reach 3a                  | Reach 3b                  |
| Length of reach (linear feet)  |          | 991                            | 1309                      | 732                       | 1490                      |
| Valley Classification  |          | Low Slope Alluvial Valley      | Low Slope Alluvial Valley | Low Slope Alluvial Valley | Low Slope Alluvial Valley |
| Drainage area (acres)  |          | 391                            | 527                       | 658                       | 695                       |
| NCDWQ Stream Identification Score  |          | NA                             | NA                        | NA                        | NA                        |
| NCDWQ Water Quality Classification   |          | WS-IV NSW                      | WS-IV NSW                 | WS-IV NSW                 | WS-IV NSW                 |
| Morphological Description (Stream Type)  |          | C4                             | C4                        | C4                        | C4                        |
| Evolutionary Trend   |          | NA                             | NA                        | NA                        | NA                        |
| Underlying Mapped Soils  |          | Wehadkee silt loam             | Wehadkee silt loam        | Wehadkee silt loam        | Wehadkee silt loam        |
| Drainage Class   |          | Poorly drained                 | Poorly drained            | Poorly drained            | Poorly drained            |
| Soil Hydric Status   |          | A                              | A                         | A                         | A                         |
| Slope  |          | 0.6%                           | 0.5%                      | 0.5%                      | 0.5%                      |
| FEMA Classification  |          | None                           | Zone AE                   | Zone AE                   | Zone AE                   |
| Native Vegetation Community  |          | Alluvial Forests               | Alluvial Forests          | Alluvial Forests          | Alluvial Forests          |
| Percent Composition of Exotic Vegetation                                       |          | <10%                           | <10%                      | <10%                      | <10%                      |

| <b>Wetland Summary Information</b>                              |                                      |           |                        |
|---|--------------------------------------|-----------|------------------------|
| Parameters  | Wetlands 1                           | Wetland 2 | Wetland 3              |
| Size of Wetland (acres)   | 2.4                                  |           |                        |
| Wetland Type (non-riparian, riparian riverine, or non-riparian) | Riparian                             |           |                        |
| Mapped Soil Series  | Wehadkee silt loam                   |           |                        |
| Drainage Class  | Poorly drained                       |           |                        |
| Soil Hydric Status  | Yes                                  |           |                        |
| Source of Hydrology   | Precipitation, flooding, water table |           |                        |
| Hydrologic Impairment   | Low Water table                      |           |                        |
| Native Vegetation Community                                     | Headwater Wetland Type               |           |                        |
| Percent Composition of Exotic Vegetation                        | 0                                    | 0         | 0                      |
| <b>Regulatory Considerations</b>                                |                                      |           |                        |
| Regulation  | Applicable?                          | Resolved? | Supporting Documents   |
| Waters of the US - Section 404                                  | Yes                                  | NA        | See Permit Application |
| Waters of the US - Section 401                                  | Yes                                  | NA        | See Permit Application |
| Endangered Species Act  | No                                   | NA        | NA                     |
| Historic Preservation Act                                       | No                                   | NA        | NA                     |
| CZMA/CAMA   | No                                   | NA        | NA                     |
| FEMA Floodplain Compliance                                      | Yes                                  | NA        | See Mitigation Plan    |
| Essential Fisheries Habitat                                     | No                                   | NA        | NA                     |

## **Appendix B.**

### **Visual Assessment Data**



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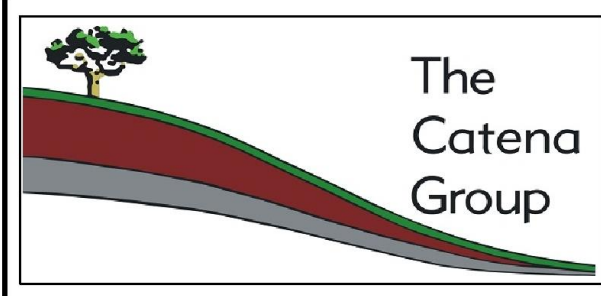
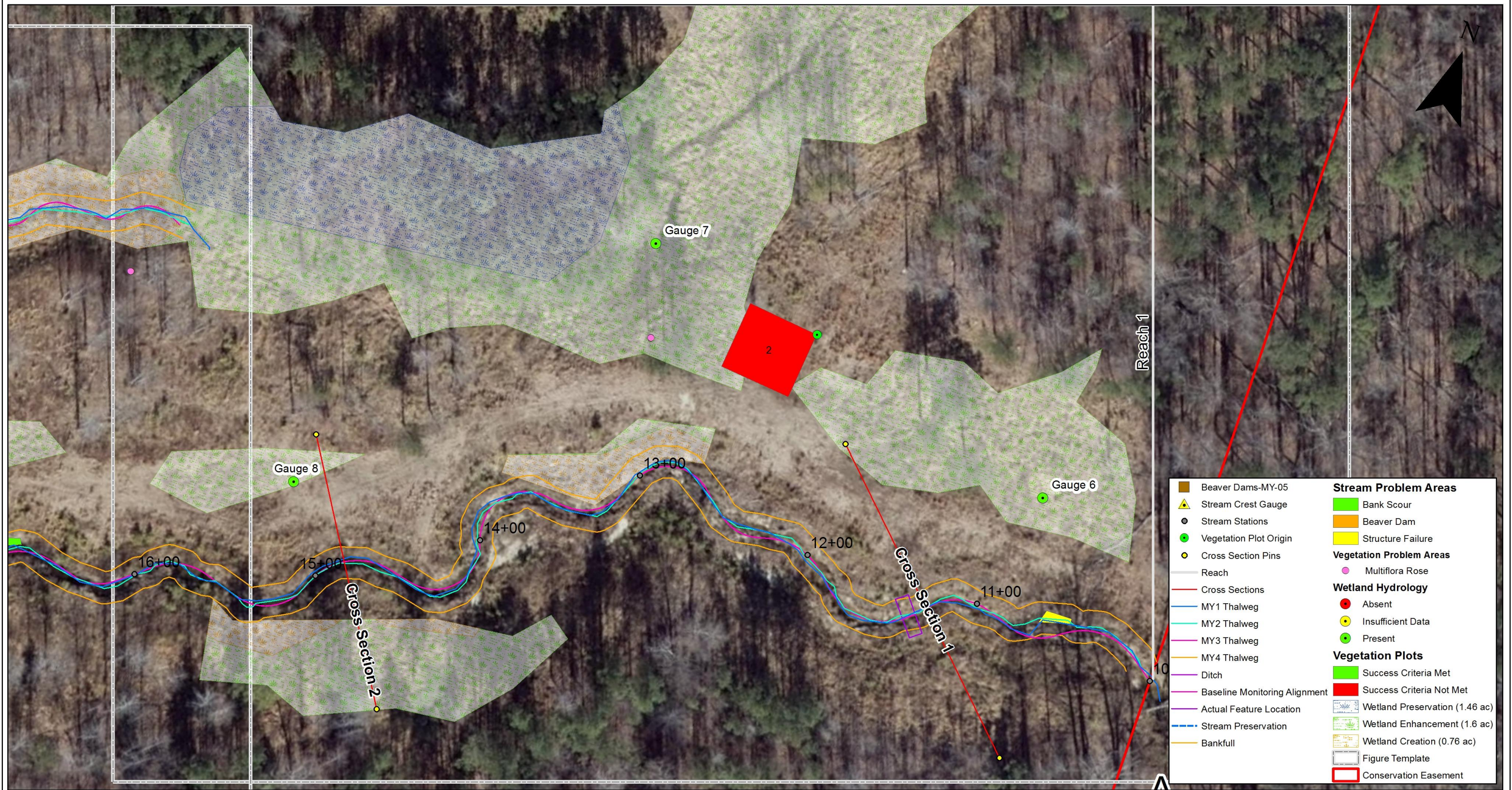
**Little Beaver Creek  
Stream and Wetland Restoration**  
MY-05 Current Conditions Plan View  
Wake County, North Carolina

0 200 400 Feet

EEP Project No.: 221  
Date: May 2015

**Figure Key**





NCDENR  
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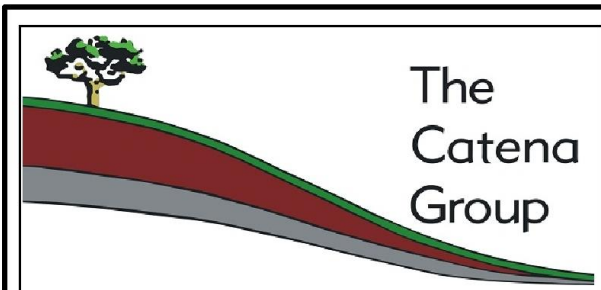
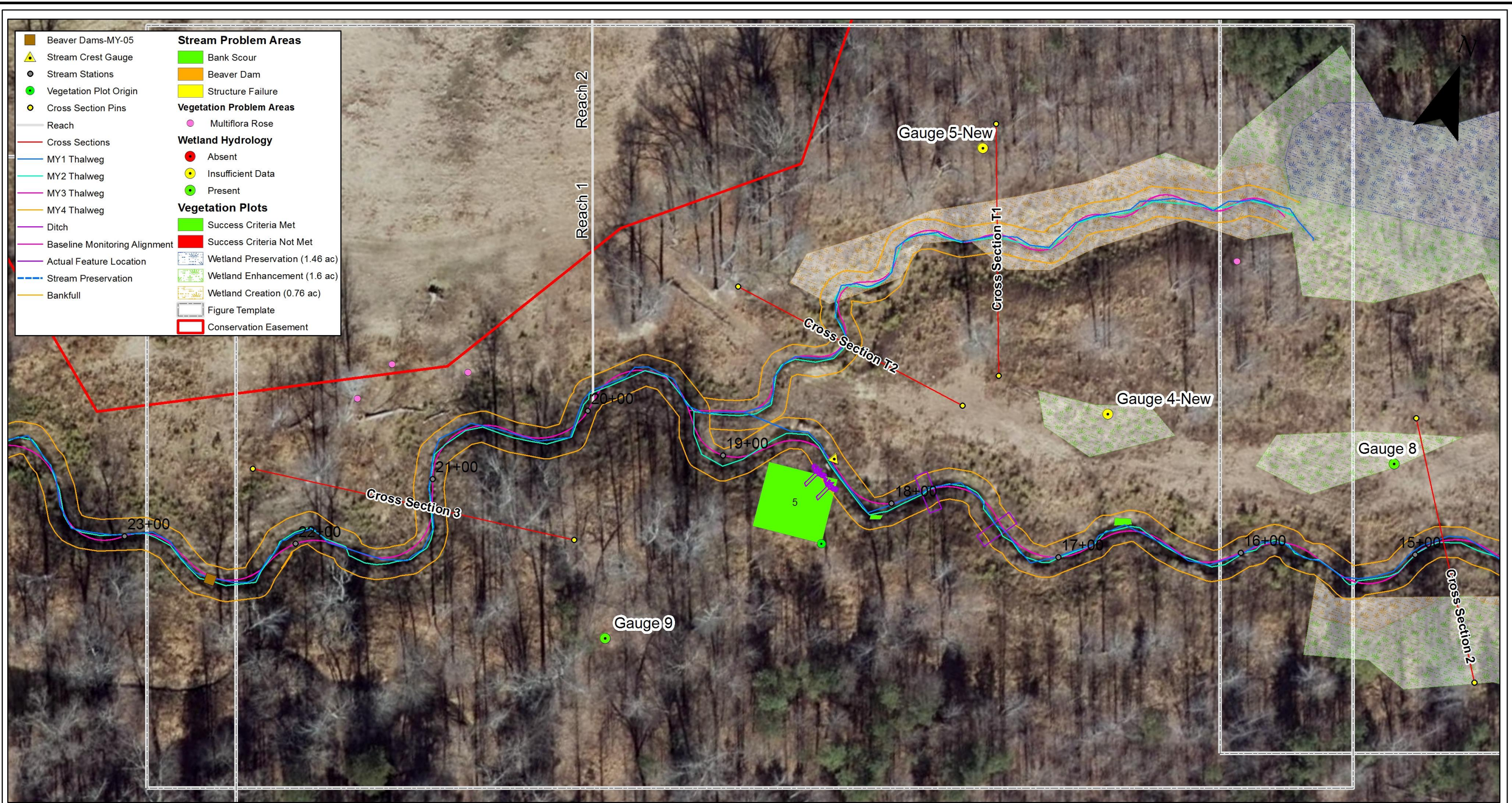
### Little Beaver Creek Stream and Wetland Restoration

MY-05 Current Conditions Plan View  
Wake County, North Carolina

0 30 60 Feet

EEP Project No.: 221  
Date: May 2015

Figure  
**A**



NCDENR  
Division of  
Mitigation Services

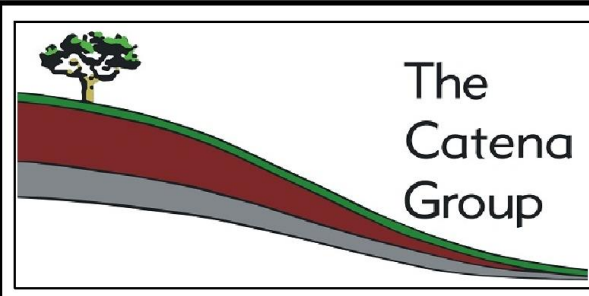
**Little Beaver Creek  
Stream and Wetland Restoration**  
MY-05 Current Conditions Plan View  
Wake County, North Carolina

0 30 60 Feet

EEP Project No.:  
221

Date:  
May 2105

Figure  
**B**



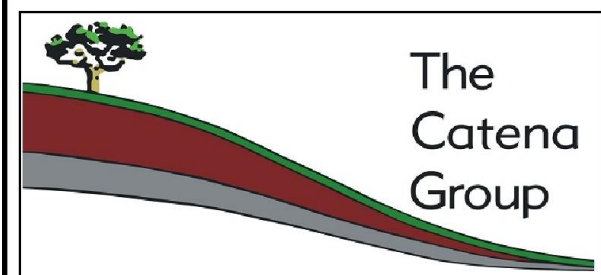
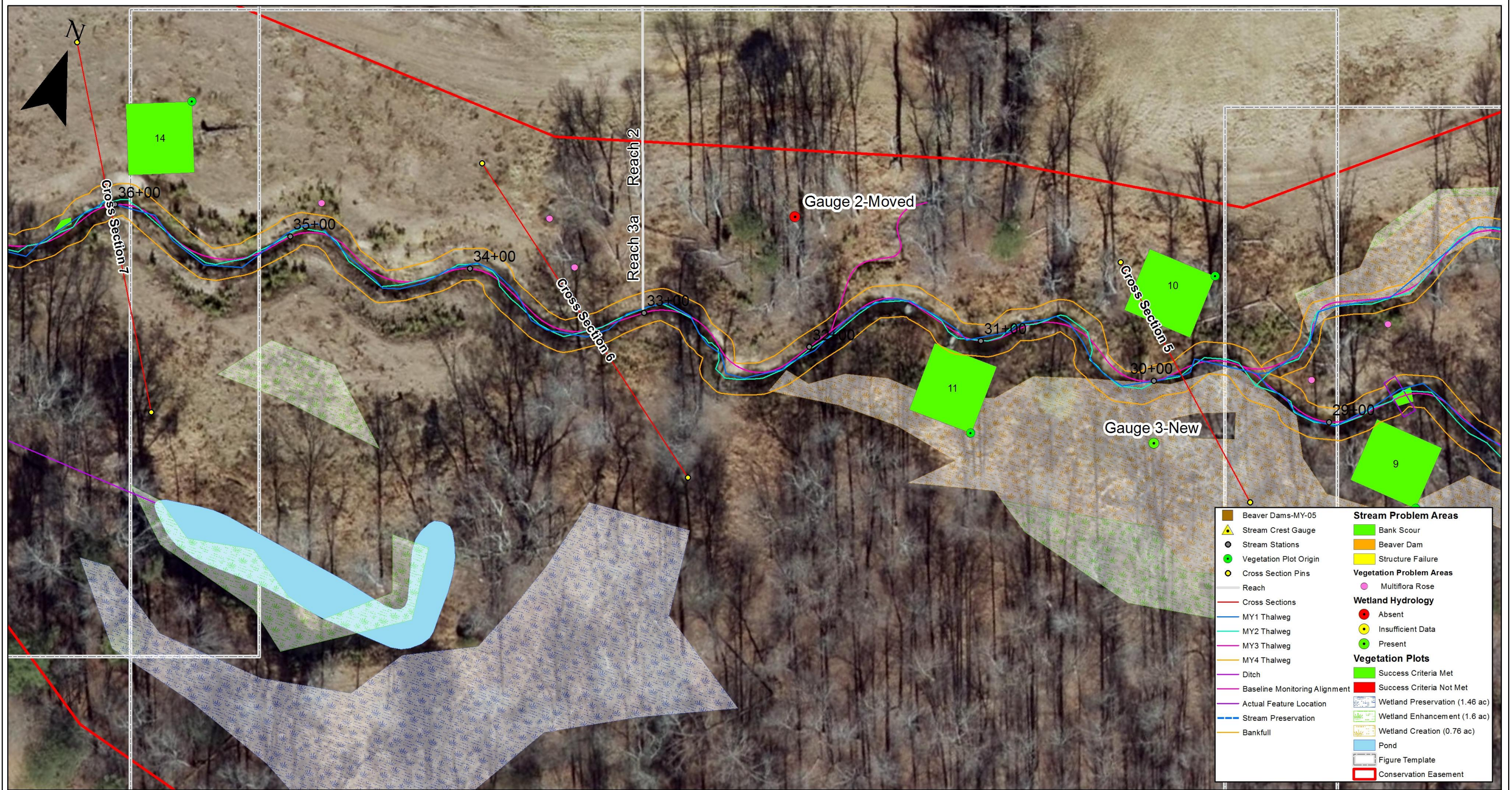
NCDENR  
Division of  
Mitigation Services

**Little Beaver Creek  
Stream and Wetland Restoration**  
MY-05 Current Conditions Plan View  
Wake County, North Carolina

0 30 60 Feet

EEP Project No.: 221  
Date: May 2015

Figure  
**C**



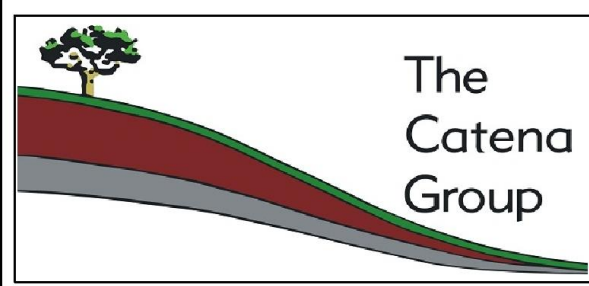
NCDENR  
Division of  
Mitigation Services

**Little Beaver Creek  
Stream and Wetland Restoration**  
MY-05 Current Conditions Plan View  
Wake County, North Carolina

0 30 60 Feet

EEP Project No.: 221  
Date: May 2015

Figure  
**D**



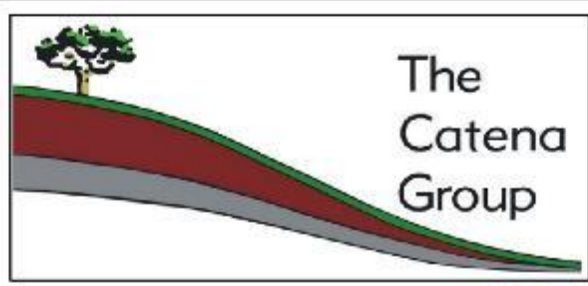
NCDENR  
Division of  
Mitigation Services

**Little Beaver Creek  
Stream and Wetland Restoration**  
MY-05 Current Conditions Plan View  
Wake County, North Carolina

0 30 60 Feet

EEP Project No.: 221  
Date: May 2015

Figure  
**E**



NCDENR  
Division of  
Mitigation Services

**Little Beaver Creek  
Stream and Wetland Restoration**  
MY-05 Current Conditions Plan View  
Wake County, North Carolina

0 45 90 Feet  
EEP Project No.: 221  
Date: May 2015

Figure  
**F**

**Table 5. Visual Stream Morphological Stability Assessment**  
**Reach ID – 1, 2, 3A**  
**Assessed Length – 3032 LF**

| 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 | % Performing as Intended | Number with Stabilizing Woody Vegetation | Footage with Stabilizing Woody Vegetation | Adjusted % for Stabilizing Woody Vegetation |
|---|--|---|---------------------------------------|--------------------------|-----------------------------|----------------------------|--------------------------|--|---|---|
| <b>1. Bed</b>                                 | 1. Vertical Stability (Riffle and Run Units) | 1. Sediment Deposition  |                                       |                          | 0                           | 0                          | 100%                     |  |   |   |
|   |  | 2. Degradation  |                                       |                          | 0                           | 0                          | 100%                     |  |   |   |
|   | 2. Riffle Condition                          | 1. Texture/Substrate  | 58                                    | 64                       |                             |                            | 91%                      |  |   |   |
|   | 3. Meander Pool Condition                    | 1. Depth  | 52                                    | 64                       |                             |                            | 81%                      |  |   |   |
|   |  | 2. Length   | 55                                    | 64                       |                             |                            | 86%                      |  |   |   |
|   | 4. Thalweg Condition                         | 1. Thalweg at upstream of meander bend  | 51                                    | 64                       |                             |                            | 80%                      |  |   |   |
| 2. Thalweg centering at downstream of meander |  | 52  | 64                                    | 81%                      |                             |                            |                          |  |   |   |
| <b>2. Bank</b>                                | 1. Scoured/Eroding                           | Bank lacking vegetative cover from poor growth and/or scour and erosion   |                                       |                          |                             |                            | 5                        | 55                                       | 98%                                       |   |
|   | 2. Undercut                                  | Banks undercut/overhanging  |                                       |                          | 0                           | 0                          | 100%                     |  |   | 100%  |
|   | 3. Mass Wasting                              | Bank slumping, caving, or collapse  |                                       |                          | 1                           | 17                         | 99%                      |  |   | 99%   |
|   |  |   |                                       | <b>Totals</b>            | 5                           | 72                         | 97%                      |  |   | 97%   |
| <b>3. Engineered Structures</b>               | 1. Overall Integrity                         | Structures physically intact with no dislodged boulders or logs   | 22                                    | 25                       |                             |                            | 88%                      |  |   |   |
|   | 2. Grade Control                             | Grade Control exhibiting maintenance of grade across the sill   | 34                                    | 34                       |                             |                            | 100%                     |  |   |   |
|   | 2a. Piping                                   | Structures Lacking any substantial flow underneath sills or arms  | 22                                    | 25                       |                             |                            | 88%                      |  |   |   |
|   | 3. Bank Protection                           | Bank erosion within the structures extent of influence does not exceed 15%  | N/A                                   | N/A                      |                             |                            | N/A                      |  |   |   |
|   | 4. Habitat                                   | Pool forming structures maintaining – Max Pool Depth: Mean Bankfull Depth Ratio $\geq$ 1.6 Rootwads/logs providing some cover at base flow. | N/A                                   | N/A                      |                             |                            | N/A                      |  |   |   |

**Table 5. Visual Stream Morphological Stability Assessment**  
**Reach ID – Tributary 1**  
**Assessed Length – 381 LF**

| 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 | % Performing as Intended | Number with Stabilizing Woody Vegetation | Footage with Stabilizing Woody Vegetation | Adjusted % for Stabilizing Woody Vegetation |
|---|--|---|---------------------------------------|--------------------------|-----------------------------|----------------------------|--------------------------|--|---|---|
| <b>1. Bed</b>                                 | 1. Vertical Stability (Riffle and Run Units) | 1. Sediment Deposition  |                                       |                          | 0                           | 0                          | 100%                     |  |   |   |
|   |  | 2. Degradation  |                                       |                          | 0                           | 0                          | 100%                     |  |   |   |
|   | 2. Riffle Condition                          | 1. Texture/Substrate  | 9                                     | 11                       |                             |                            | 81%                      |  |   |   |
|   | 3. Meander Pool Condition                    | 1. Depth  | 9                                     | 11                       |                             |                            | 81%                      |  |   |   |
|   |  | 2. Length   | 10                                    | 11                       |                             |                            | 90%                      |  |   |   |
|   | 4. Thalweg Condition                         | 1. Thalweg at upstream of meander bend  | 11                                    | 11                       |                             |                            | 100%                     |  |   |   |
| 2. Thalweg centering at downstream of meander |  | 11  | 11                                    | 100%                     |                             |                            |                          |  |   |   |
| <b>2. Bank</b>                                | 1. Scoured/Eroding                           | Bank lacking vegetative cover from poor growth and/or scour and erosion   |                                       |                          | 0                           | 0                          | 100%                     |  |   | 100%  |
|   | 2. Undercut                                  | Banks undercut/overhanging  |                                       |                          | 0                           | 0                          | 100%                     |  |   | 100%  |
|   | 3. Mass Wasting                              | Bank slumping, caving, or collapse  |                                       |                          | 0                           | 0                          | 100%                     |  |   | 100%  |
|   |  |   |                                       | <b>Totals</b>            | 0                           | 0                          | 100%                     |  |   | 100%  |
| <b>3. Engineered Structures</b>               | 1. Overall Integrity                         | Structures physically intact with no dislodged boulders or logs   | 2                                     | 2                        |                             |                            | 100%                     |  |   |   |
|   | 2. Grade Control                             | Grade Control exhibiting maintenance of grade across the sill   | 2                                     | 2                        |                             |                            | 100%                     |  |   |   |
|   | 2a. Piping                                   | Structures Lacking any substantial flow underneath sills or arms  | N/A                                   | N/A                      |                             |                            | N/A                      |  |   |   |
|   | 3. Bank Protection                           | Bank erosion within the structures extent of influence does not exceed 15%  | N/A                                   | N/A                      |                             |                            | N/A                      |  |   |   |
|   | 4. Habitat                                   | Pool forming structures maintaining – Max Pool Depth: Mean Bankfull Depth Ratio $\geq$ 1.6 Rootwads/logs providing some cover at base flow. | N/A                                   | N/A                      |                             |                            | N/A                      |  |   |   |



**Table 6. Vegetation Condition Assessment**

**Planted Acreage – 5 acres**

| Vegetation Category                           | Definitions  | Mapping Threshold | CCPV Depiction | Number of Polygons | Combined Acreage | % of Planted Acreage |
|---|--|-------------------|----------------|--------------------|------------------|----------------------|
| <b>1. Bare Areas</b>                          | Very Limited Cover of both woody and herbaceous material                                   | 0.01ac            | NA             | NA                 | NA               | NA                   |
| <b>2. Low Stem Density Areas</b>              | Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria | 0.01ac            | NA             | NA                 | NA               | NA                   |
| <b>3. Areas of Poor Growth Rates or Vigor</b> | Areas with woody stems of a size class that are obviously small given the monitoring year  | 0.01ac            | NA             | NA                 | NA               | NA                   |

**Easement Acreage – 52 acres**

| Vegetation Category                   | Definitions   | Mapping Threshold | CCPV Depiction  | Number of Polygons | Combined Acreage | % of Planted Acreage |
|---------------------------------------|---|-------------------|-----------------|--------------------|------------------|----------------------|
| <b>4. Invasive Areas of Concern</b>   | Areas or points (if too small to render as polygons on map scale) | 1000 sq ft        | See CCPV Legend | NA                 | NA               | NA                   |
| <b>2. Easement Encroachment Areas</b> | Areas or points (if too small to render as polygons on map scale) | NA                | See CCPV Legend | NA                 | NA               | NA                   |

**Table 6. Vegetation Condition Assessment Table**

**Planted Acreage – 5 acres**

| Vegetation Category       | Definitions  | Mapping Threshold | CCPV Depiction       | Number of Polygons | Combined Acreage | % of Planted Acreage |
|---------------------------|--|-------------------|----------------------|--------------------|------------------|----------------------|
| <b>1. Multiflora Rose</b> | Very Limited Cover of both woody and herbaceous material | 0.01 ac           | Pink Circle with dot | 39 points          | NA               | NA                   |
| <b>TOTAL</b>              |  |                   |                      |                    |                  |                      |
| <b>CUMULATIVE TOTAL</b>   |  |                   |                      |                    |                  |                      |

## Stream Station Photos (all photos recorded on April 16, 2014)



1 - Reach 1, 2, 3 - Cross Section 1 - Looking upstream



4 - Reach 1, 2, 3 - Cross Section 4 - Looking upstream



3 - Reach 1, 2, 3 - Cross Section 3 - Looking upstream



2 - Reach 1, 2, 3 - Cross Section 2 - Looking upstream



5 - Reach 1, 2, 3 - Cross Section 5 - Looking downstream



6 - Reach 1, 2, 3 - Cross Section 6 - Looking upstream



7 - Reach 1, 2, 3 - Cross Section 7 – Looking downstream



8 – Reach 1, 2, 3 - Cross Section 8 – Looking upstream



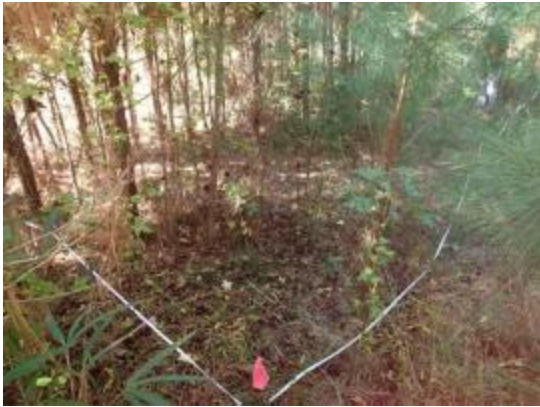
9 – Tributary 1 – Cross Section 1 - Looking upstream



10 - Tributary 1 – Cross Section 2 - Looking upstream

# Vegetation Monitoring Plot Photos

## MY-04 (2013) Monitoring Plots



Vegetation Plot 2



Vegetation Plot 5



Vegetation Plot 7

## MY05 (2014) Monitoring Plots



Vegetation Plot 2



Vegetation Plot 5



Vegetation Plot 7

MY-04 (2013) Monitoring Plots



Vegetation Plot 8



Vegetation Plot 9



Vegetation Plot 10

MY-05 (2014) Monitoring Plots



Vegetation Plot 8



Vegetation Plot 9



Vegetation Plot 10

MY-04 (2013) Monitoring Plots



Vegetation Plot 11

MY-05 (2014) Monitoring Plots



Vegetation Plot 11



Vegetation Plot 14



Vegetation Plot 14

## **Appendix C.**

### **Vegetation Plot Data**

**Table 7. Vegetation Plot Success by Project Asset Type**

| Plot # | Riparian Buffer Stems <sup>1</sup> | Stream/Wetland Stems <sup>2</sup> | Live Stakes | Invasives | Volunteers <sup>3</sup> | Total <sup>4</sup> | Unknown Growth Form |
|--------|------------------------------------|-----------------------------------|-------------|-----------|-------------------------|--------------------|---------------------|
| 0002   | n/a                                | 3                                 | 0           | 0         | 156                     | 159                | 0                   |
| 0005   | n/a                                | 30                                | 0           | 0         | 715                     | 745                | 0                   |
| 0007   | n/a                                | 20                                | 0           | 0         | 332                     | 353                | 1                   |
| 0008   | n/a                                | 9                                 | 0           | 0         | 105                     | 114                | 0                   |
| 0009   | n/a                                | 12                                | 0           | 0         | 542                     | 554                | 0                   |
| 0010   | n/a                                | 13                                | 0           | 0         | 88                      | 101                | 0                   |
| 0011   | n/a                                | 11                                | 0           | 0         | 396                     | 407                | 0                   |
| 0014   | n/a                                | 11                                | 0           | 0         | 42                      | 54                 | 0                   |

| Wetland/Stream Vegetation Totals |                                   |                         |                    | Riparian Buffer Vegetation Totals |  |                                    |                       |
|----------------------------------|-----------------------------------|-------------------------|--------------------|-----------------------------------|--|------------------------------------|-----------------------|
| (per acre)                       |                                   |                         |                    |                                   |  |                                    |                       |
| Plot #                           | Stream/Wetland Stems <sup>2</sup> | Volunteers <sup>3</sup> | Total <sup>4</sup> | Success Criteria Met?             |  | Riparian Buffer Stems <sup>1</sup> | Success Criteria Met? |
| 0002                             | 121                               | 28935                   | 6435               | No                                |  | n/a                                | ~                     |
| 0005                             | 1214                              | 13436                   | 30149              | Yes                               |  | n/a                                | ~                     |
| 0007                             | 809                               | 4249                    | 14285              | Yes                               |  | n/a                                | ~                     |
| 0008                             | 364                               | 21934                   | 4613               | Yes                               |  | n/a                                | ~                     |
| 0009                             | 486                               | 3561                    | 22420              | Yes                               |  | n/a                                | ~                     |
| 0010                             | 526                               | 16026                   | 4087               | Yes                               |  | n/a                                | ~                     |
| 0011                             | 445                               | 1740                    | 16471              | Yes                               |  | n/a                                | ~                     |
| 0014                             | 445                               | 12024                   | 2185               | Yes                               |  | n/a                                | ~                     |
| <b>Project Avg</b>               | <b>551</b>                        | 28935                   | 12581              | <b>Yes</b>                        |  | <b>n/a</b>                         | <b>~</b>              |

**Stem Class**

<sup>1</sup>Buffer Stems

<sup>2</sup>Stream/ Wetland Stems

<sup>3</sup>Volunteers

<sup>4</sup>Total

**Characteristics**

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

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

Native woody stems. Not planted. No vines.

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

**Color for Density**

|  |
|--|
| Exceeds requirements by 10%                  |
| Exceeds requirements, but by less than 10%   |
| Fails to meet requirements, by less than 10% |
| Fails to meet requirements by more than 10%  |



**Table 8.** CVS Stem Count Total and Planted with/without Livestakes by Plot and Species

DMS Project Code 221. Project Name: Little Beaver Creek

| Scientific Name                                       | Common Name                          | Species Type | Current Plot Data (MY6 2014) |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    | Annual Means |       |    |              |       |    |            |       |     |            |       |     |            |       |     |            |       |     |            |       |     |
|---|--------------------------------------|--------------|------------------------------|-------|----|--------------|-------|----|--------------|-------|----|--------------|-------|----|--------------|-------|----|--------------|-------|----|--------------|-------|----|--------------|-------|----|------------|-------|-----|------------|-------|-----|------------|-------|-----|------------|-------|-----|------------|-------|-----|
|   |                                      |              | E221-01-0002                 |       |    | E221-01-0005 |       |    | E221-01-0007 |       |    | E221-01-0008 |       |    | E221-01-0009 |       |    | E221-01-0010 |       |    | E221-01-0011 |       |    | E221-01-0014 |       |    | MY6 (2014) |       |     | MY5 (2013) |       |     | MY4 (2013) |       |     | MY3 (2009) |       |     | MY2 (2008) |       |     |
|   |                                      |              | PnoLS                        | P-all | T  | PnoLS        | P-all | T  | PnoLS        | P-all | T  | PnoLS        | P-all | T  | PnoLS        | P-all | T  | PnoLS        | P-all | T  | PnoLS        | P-all | T  | PnoLS        | P-all | T  | PnoLS      | P-all | T   | PnoLS      | P-all | T   | PnoLS      | P-all | T   | PnoLS      | P-all | T   | PnoLS      | P-all | T   |
| <i>Acer rubrum</i>                                    | Red maple                            | Tree         |                              |       | 19 |              |       | 25 |              |       | 2  |              |       | 1  |              |       | 5  |              |       |    |              |       | 42 |              |       | 6  |            |       | 100 |            |       | 2   |            |       |     |            |       |     |            |       | 15  |
| <i>Acer rubrum</i> var. <i>rubrum</i>                 | Red maple                            | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       | 5  |              |       |    |              |       |    |              |       |    |            |       | 5   |            |       |     |            |       | 33  |            |       | 72  |            |       | 235 |
| <i>Alnus serrulata</i>                                | Hazel alder                          | Shrub        |                              |       |    | 1            | 1     | 1  |              |       |    |              |       |    |              |       |    |              |       |    | 1            | 1     | 1  |              |       |    | 2          | 2     | 2   | 3          | 3     | 3   | 5          | 5     | 5   |            |       |     |            |       |     |
| <i>Amelanchier arborea</i>                            | Common serviceberry                  | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    | 1            | 1     | 1  |              |       |    |              |       |    |              |       |    | 1          | 1     | 1   | 1          | 1     | 1   |            |       |     |            |       |     |            |       |     |
| <i>Aronia arbutifolia</i>                             | Red chokeberry                       | Shrub        |                              |       |    | 3            | 3     | 3  |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    | 3          | 3     | 3   | 3          | 3     | 3   | 3          | 3     | 3   | 3          | 3     | 3   | 3          | 3     | 3   |
| <i>Aronia prunifolia</i>                              |                                      |              |                              |       |    |              |       |    | 1            | 1     | 1  |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    | 1          | 1     | 1   | 1          | 1     | 1   |            |       |     |            |       |     |            |       |     |
| <i>Baccharis halimifolia</i>                          | Eastern baccharis                    | Shrub        |                              |       | 1  |              |       |    |              |       |    |              |       |    |              |       | 1  |              |       | 1  |              |       | 1  |              |       |    |            |       | 3   |            |       | 3   |            |       | 5   |            |       | 7   |            |       | 2   |
| <i>Betula nigra</i>                                   | River birch                          | Tree         | 1                            | 1     | 1  |              |       |    | 1            | 1     | 1  | 1            | 1     | 1  |              |       |    | 2            | 2     | 2  |              |       |    | 3            | 3     | 3  | 8          | 8     | 8   | 9          | 9     | 9   | 10         | 10    | 11  |            |       | 6   |            |       | 6   |
| <i>Carpinus caroliniana</i>                           | American hornbeam                    | Tree         |                              |       |    |              |       |    |              |       |    |              |       | 1  |              |       |    |              |       |    |              |       |    |              |       |    |            |       | 1   |            |       |     |            |       |     |            |       | 94  |            |       |     |
| <i>Carpinus caroliniana</i> var. <i>caroliniana</i>   | Coastal american hornbeam            | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    | 1            | 1     | 1  | 1            | 1     | 1  | 1          | 1     | 1   | 1          | 1     | 1   | 1          | 1     | 3   | 1          | 1     | 3   | 1          | 1     | 1   |
| <i>Carya</i>  | Hickory                              | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    | 1            | 1     | 1  |              |       |    |              |       |    |              |       |    | 1          | 1     | 1   | 1          | 1     | 1   | 1          | 1     | 1   |            |       | 1   |            |       |     |
| <i>Cornus florida</i>                                 | Flowering dogwood                    | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |            |       |     |            |       |     | 3          | 3     | 3   | 2          | 2     | 2   |            |       |     |
| <i>Corylus americana</i>                              | American hazelnut                    | Shrub        |                              |       | 1  | 1            | 1     | 1  | 1            | 1     | 1  |              |       |    | 1            | 1     | 1  |              |       |    |              |       |    | 1            | 1     | 1  | 4          | 4     | 5   | 4          | 4     | 4   | 1          | 1     | 1   |            |       |     |            |       |     |
| <i>Diospyros virginiana</i>                           | Common persimmon                     | Tree         |                              |       |    |              |       |    | 1            | 2     | 2  | 2            | 2     | 2  | 2            | 2     | 9  | 1            | 1     | 1  |              |       |    | 1            | 1     | 1  | 6          | 6     | 14  | 5          | 5     | 5   | 6          | 6     | 7   |            |       |     |            |       | 4   |
| <i>Fraxinus pennsylvanica</i>                         | Green ash                            | Tree         |                              |       |    | 20           | 20    | 21 | 2            | 2     | 4  |              |       |    | 1            | 1     | 1  | 2            | 2     | 3  | 5            | 5     | 8  | 2            | 2     | 2  | 32         | 32    | 39  | 32         | 32    | 36  | 33         | 33    | 33  | 35         | 35    | 38  | 33         | 33    | 35  |
| <i>Hamamelis virginiana</i>                           | American witchhazel                  | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |            |       |     | 1          | 1     | 1   |            |       |     |            |       | 5   | 5          | 5     |     |
| <i>Hamamelis virginiana</i> var. <i>virginiana</i>    | American witchhazel                  | Tree         |                              |       |    |              |       |    | 4            | 4     | 4  |              |       |    | 3            | 3     | 3  | 3            | 3     | 3  | 1            | 1     | 1  |              |       |    | 11         | 11    | 11  | 11         | 11    | 11  | 11         | 11    | 11  | 10         | 10    | 10  | 6          | 6     | 6   |
| <i>Hypericum</i>                                      | St. Johnswort                        | Shrub        |                              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |            |       |     |            |       |     |            |       | 1   |            |       | 9   |            |       |     |
| <i>Ilex decidua</i> var. <i>decidua</i>               | Possum-haw                           | shrub        |                              |       |    |              |       |    |              |       |    | 1            | 1     | 1  |              |       |    |              |       |    |              |       |    |              |       |    | 1          | 1     | 1   | 3          | 3     | 3   | 6          | 6     | 6   |            |       |     |            |       |     |
| <i>Ilex opaca</i>                                     | American holly                       | Tree         |                              |       |    |              |       |    |              |       |    |              |       | 1  |              |       |    |              |       |    |              |       |    |              |       |    |            |       | 1   |            |       |     |            |       |     |            |       |     |            |       |     |
| <i>Juniperus virginiana</i> var. <i>virginiana</i>    | Eastern redcedar                     | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |            |       |     |            |       |     |            |       | 1   |            |       |     |            |       |     |
| <i>Liquidambar styraciflua</i>                        | Sweetgum                             | Tree         |                              |       | 63 |              |       | 67 |              |       | 27 |              |       | 99 |              |       | 46 |              |       | 56 |              |       | 31 |              |       | 17 |            |       | 194 |            |       | 144 |            |       | 753 |            |       | 176 |            |       | 347 |
| <i>Liriodendron tulipifera</i>                        | Tuliptree                            | Tree         |                              |       |    |              |       | 1  |              |       | 1  |              |       |    |              |       | 9  |              |       |    |              |       | 1  |              |       |    |            |       | 12  |            |       | 1   |            |       |     |            |       | 1   |            |       | 2   |
| <i>Liriodendron tulipifera</i> var. <i>tulipifera</i> | Tulip-tree, Yellow Poplar, Whitewood | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |            |       |     | 1          | 1     | 1   | 5          | 5     | 5   |            |       | 6   |            |       | 11  |
| <i>Morella cerifera</i>                               | Wax myrtle                           | shrub        |                              |       |    |              |       |    | 8            | 8     | 12 |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    | 8          | 8     | 12  | 8          | 8     | 9   | 8          | 8     | 8   | 11         | 11    | 11  | 10         | 10    | 11  |
| <i>Nyssa sylvatica</i>                                | Blackgum                             | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       | 35 |              |       |    |              |       |    |              |       |    |            |       | 35  |            |       |     |            |       | 1   |            |       | 2   |            |       |     |
| <i>Pinus taeda</i>                                    | Loblolly pine                        | Tree         |                              |       | 70 |              |       | 13 |              |       | 38 |              |       |    |              |       | 14 |              |       | 15 |              |       | 3  |              |       | 19 |            |       | 172 |            |       | 219 |            |       | 199 |            |       | 350 |            |       | 160 |
| <i>Planera</i>  | Planertree                           | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |            |       |     |            |       |     |            |       | 3   |            |       |     |            |       |     |
| <i>Platanus occidentalis</i>                          | American sycamore                    | Tree         |                              |       |    |              |       | 1  |              |       | 1  |              |       | 3  |              |       | 1  |              |       |    |              |       |    |              |       |    |            |       | 6   |            |       | 2   |            |       |     |            |       | 1   |            |       |     |
| <i>Platanus occidentalis</i> var. <i>occidentalis</i> | Sycamore, Plane-tree                 | Tree         | 1                            | 1     | 1  |              |       |    | 2            | 2     | 2  | 2            | 2     | 2  | 1            | 1     | 1  |              |       |    |              |       |    |              |       |    | 6          | 6     | 6   | 6          | 6     | 6   | 6          | 6     | 6   | 1          | 1     | 11  |            |       | 9   |
| <i>Prunus serotina</i>                                | Black cherry                         | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |            |       |     |            |       | 1   |            |       |     |            |       | 2   |            |       |     |
| <i>Prunus serotina</i> var. <i>serotina</i>           | Black cherry                         | Tree         |                              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |              |       |    |            |       |     |            |       |     |            |       | 2   |            |       |     |            |       |     |



**Appendix D.**  
**Stream Survey Data**

Project Name: Little Beaver Creek, MY5  
 Watershed: I  
 Cross Section: NA  
 Drainage Area: NA  
 Date: Mar-15  
 Crew: Boggs, Ward

### Cross Sections with Annual Overlays

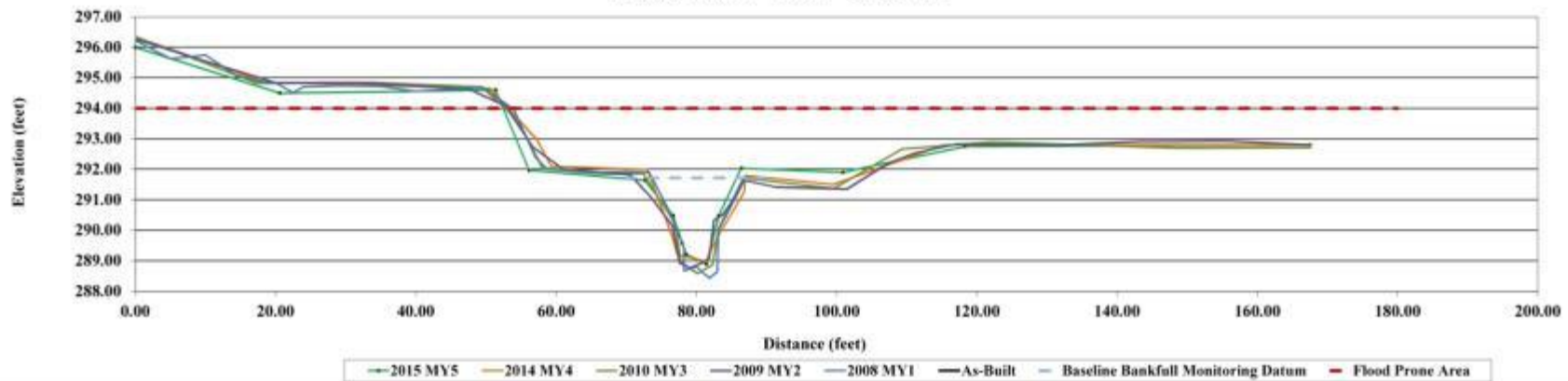
Photo of Cross-Section 1 - Riffle - Looking Upstream

Picture Taken March 31, 2015

| As-Built Survey* |       |        | 2008<br>2008 MY1 |        |        | 2009<br>2009 MY2 |        |        | 2010<br>2010 MY3 |        |        | 2014<br>2014 MY4 |        |        | 2015<br>2015 MY5 |        |        | Summary Data   |         |
|------------------|-------|--------|------------------|--------|--------|------------------|--------|--------|------------------|--------|--------|------------------|--------|--------|------------------|--------|--------|----------------|---------|
| Station          | Elev  | Notes  | Station          | Elev   | Notes  | Station          | Elev   | Notes  | Station          | Elev   | Notes  | Station          | Elev   | Notes  | Station          | Elev   | Notes  | Bankfull Elev. | BF Area |
|                  | 0.00  | 296.22 |                  | 0.00   | 296.27 |                  | 0.00   | 296.36 |                  | 0.00   | 296.35 |                  | 0.00   | 296.00 |                  | 0.00   | 296.00 | 291.72         | 18.8    |
|                  | 5.00  | 295.63 |                  | 11.04  | 295.47 |                  | 7.24   | 295.73 |                  | 18.55  | 294.83 |                  | 20.60  | 294.30 |                  | 20.60  | 294.30 | 15.9           |         |
|                  | 10.00 | 295.75 |                  | 20.11  | 294.83 |                  | 17.43  | 294.82 |                  | 50.60  | 294.66 |                  | 51.40  | 294.60 |                  | 51.40  | 294.60 | 294.5          |         |
|                  | 14.00 | 295.13 |                  | 31.79  | 294.84 |                  | 35.70  | 294.85 |                  | 57.20  | 292.99 |                  | 56.14  | 291.97 |                  | 56.14  | 291.97 | 117.4          |         |
|                  | 17.00 | 294.91 |                  | 41.33  | 294.71 |                  | 49.41  | 294.70 |                  | 59.30  | 292.10 |                  | 72.64  | 291.64 |                  | 72.64  | 291.64 | 2.8            |         |
|                  | 20.00 | 294.83 |                  | 47.43  | 294.65 |                  | 54.44  | 293.66 |                  | 73.00  | 291.99 |                  | 76.67  | 290.49 |                  | 76.67  | 290.49 | 1.2            |         |
|                  | 22.50 | 294.51 |                  | 52.75  | 294.10 |                  | 58.05  | 292.03 |                  | 76.50  | 289.86 |                  | 77.94  | 289.58 |                  | 77.94  | 289.58 | 13.4           |         |
|                  | 24.00 | 294.71 |                  | 56.75  | 292.71 |                  | 66.60  | 291.85 |                  | 77.30  | 289.20 |                  | 78.55  | 289.21 |                  | 78.55  | 289.21 | 7.4            |         |
|                  | 29.00 | 294.74 |                  | 60.95  | 292.00 |                  | 72.45  | 291.86 |                  | 81.18  | 288.99 |                  | 81.42  | 288.90 |                  | 81.42  | 288.90 | 1              |         |
|                  | 35.00 | 294.73 |                  | 70.38  | 291.82 |                  | 77.04  | 290.21 |                  | 82.81  | 289.69 |                  | 83.19  | 290.48 |                  | 83.19  | 290.48 | C5             |         |
|                  | 40.00 | 294.56 |                  | 73.54  | 291.09 |                  | 77.81  | 288.96 |                  | 86.80  | 291.25 |                  | 86.41  | 292.04 |                  | 86.41  | 292.04 |                |         |
|                  | 49.50 | 294.69 |                  | 76.60  | 290.15 |                  | 81.17  | 288.59 |                  | 87.00  | 291.80 |                  | 100.89 | 291.90 |                  | 100.89 | 291.90 |                |         |
|                  | 54.00 | 293.96 |                  | 77.67  | 288.93 |                  | 82.30  | 288.87 |                  | 99.50  | 291.50 |                  | 118.32 | 292.75 |                  | 118.32 | 292.75 |                |         |
|                  | 57.00 | 292.42 |                  | 78.11  | 288.77 |                  | 83.23  | 290.10 |                  | 115.20 | 292.80 |                  | 167.50 | 292.80 |                  | 167.50 | 292.80 |                |         |
|                  | 58.50 | 292.04 |                  | 80.90  | 288.95 |                  | 86.73  | 291.72 |                  | 167.50 | 292.80 |                  |        |        |                  |        |        |                |         |
|                  | 65.00 | 291.90 |                  | 81.84  | 289.10 |                  | 99.57  | 291.37 |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 70.00 | 291.93 |                  | 82.52  | 290.33 |                  | 109.31 | 292.67 |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 73.30 | 291.90 |                  | 83.73  | 290.51 |                  | 122.20 | 292.90 |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 76.30 | 296.55 |                  | 84.94  | 290.89 |                  | 148.91 | 292.70 |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 77.20 | 289.96 |                  | 86.67  | 291.65 |                  | 167.52 | 292.72 |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 78.00 | 289.62 |                  | 91.51  | 291.41 |                  |        |        |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 78.20 | 289.38 |                  | 101.45 | 291.16 |                  |        |        |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 78.20 | 288.67 |                  | 107.57 | 292.20 |                  |        |        |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 80.00 | 288.81 |                  | 111.16 | 292.53 |                  |        |        |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 81.00 | 288.59 |                  | 117.06 | 292.83 |                  |        |        |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 81.90 | 288.44 |                  | 131.38 | 292.79 |                  |        |        |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 83.00 | 288.64 |                  | 142.99 | 292.91 |                  |        |        |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 83.10 | 289.97 |                  | 155.43 | 292.93 |                  |        |        |                  |        |        |                  |        |        |                  |        |        |                |         |
|                  | 87.20 | 291.79 |                  | 167.26 | 292.80 |                  |        |        |                  |        |        |                  |        |        |                  |        |        |                |         |



Little Beaver Creek 2015  
 Cross Section 1 - Riffle - Sta. 11+25



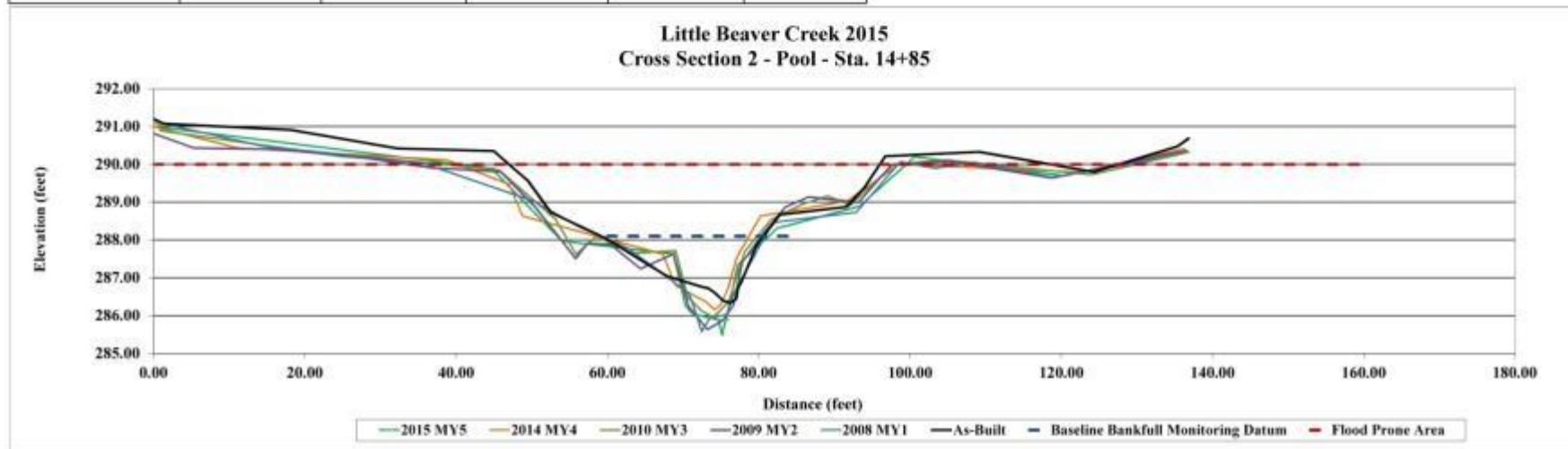
\*This cross section was moved after MY3, therefore MY3 is not represented on this plot.

|               |                          |
|---------------|--------------------------|
| Project Name  | Little Beaver Creek, MY5 |
| Watershed     | 2                        |
| Cross Section | NA                       |
| Ecology Area  | NA                       |
| Date          | Mar-15                   |
| Crew          | Boggs, Ward              |

Photo of Cross-Section 2 - Pool - Looking Upstream

Picture Taken March 31, 2015

| As-Built Survey |        |       | 2008     |        |       | 2009     |        |        | 2010     |        |        | 2014     |        |       | 2015     |        |       | Summary Data   |                   |
|-----------------|--------|-------|----------|--------|-------|----------|--------|--------|----------|--------|--------|----------|--------|-------|----------|--------|-------|----------------|-------------------|
| As-Built Survey |        |       | 2008 MY1 |        |       | 2009 MY2 |        |        | 2010 MY3 |        |        | 2014 MY4 |        |       | 2015 MY5 |        |       | Bankfull Elev. | Bank Area         |
| Station         | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes  | Station  | Elev   | Notes  | Station  | Elev   | Notes | Station  | Elev   | Notes | Bank Width     | Flood Prone Elev. |
| 0.00            | 291.21 | RPPNG | 1.09     | 291.18 | X2    | -5.43    | 291.41 | LP     | -5.68    | 291.48 | X 2 LP | 0.00     | 291.00 |       | 0.00     | 291.00 |       | 27.9           | 290.7             |
| 1.30            | 291.08 |       | 14.60    | 290.47 | X2    | -1.41    | 290.92 |        | 1.01     | 291.03 |        | 11.06    | 290.44 |       | 44.72    | 289.90 |       | 1.24           |                   |
| 18.20           | 290.91 |       | 35.30    | 290.06 | X2    | 5.39     | 290.43 |        | 8.94     | 290.89 |        | 38.74    | 290.12 |       | 53.99    | 287.97 |       | 2.6            |                   |
| 32.22           | 290.42 |       | 50.17    | 289.04 | X2    | 16.54    | 290.39 |        | 24.89    | 290.21 |        | 47.02    | 289.48 |       | 68.71    | 287.64 |       | 0.8            |                   |
| 44.98           | 290.36 |       | 56.52    | 288.32 | X2    | 27.09    | 290.19 |        | 37.38    | 290.02 |        | 48.80    | 288.63 |       | 59.33    | 286.25 |       | 36.1           |                   |
| 49.49           | 289.57 |       | 62.63    | 287.79 | X2BKI | 36.76    | 289.91 |        | 45.67    | 289.85 |        | 67.51    | 287.65 |       | 71.27    | 286.05 |       | 4.4            |                   |
| 52.54           | 288.73 |       | 70.82    | 286.60 | X2EOW | 45.94    | 289.80 |        | 53.11    | 288.56 |        | 69.05    | 286.79 |       | 74.70    | 285.89 |       | 1              |                   |
| 59.60           | 288.06 |       | 72.48    | 285.28 | X2TW  | 50.49    | 288.86 |        | 55.88    | 287.61 |        | 72.91    | 286.38 |       | 75.12    | 285.50 |       | C5             |                   |
| 67.81           | 287.05 |       | 73.53    | 285.93 | X2    | 53.83    | 287.51 |        | 58.50    | 288.10 | BKI    | 74.20    | 286.16 |       | 75.70    | 285.89 |       |                |                   |
| 72.53           | 286.76 |       | 75.79    | 286.04 | X2TW  | 57.40    | 287.92 |        | 63.27    | 287.65 |        | 74.95    | 286.29 |       | 77.25    | 287.35 |       |                |                   |
| 73.26           | 286.73 | LEW   | 76.62    | 286.56 | X2EOW | 60.40    | 287.88 | BKFL   | 69.04    | 287.72 |        | 75.95    | 286.72 |       | 82.46    | 288.31 |       |                |                   |
| 74.96           | 286.62 |       | 81.88    | 288.47 | X2BKI | 64.38    | 287.24 |        | 70.61    | 286.49 |        | 77.04    | 287.51 |       | 83.29    | 288.89 |       |                |                   |
| 75.34           | 286.40 |       | 82.90    | 288.74 | X2    | 68.73    | 287.63 |        | 72.48    | 286.13 |        | 80.27    | 288.65 |       | 100.60   | 290.20 |       |                |                   |
| 76.39           | 286.34 |       | 88.70    | 290.07 | X2    | 70.72    | 286.25 | TOE L  | 74.06    | 285.96 | TW     | 91.70    | 289.03 |       | 120.48   | 289.70 |       |                |                   |
| 77.64           | 286.45 |       | 103.32   | 289.90 | X2    | 73.21    | 285.64 | TW     | 75.99    | 286.36 |        | 98.55    | 290.00 |       | 136.00   | 290.40 |       |                |                   |
| 77.25           | 286.73 |       | 108.64   | 290.15 | X2    | 75.22    | 283.87 |        | 78.15    | 287.69 |        | 122.60   | 289.80 |       |          |        |       |                |                   |
| 77.73           | 286.89 |       | 118.77   | 289.67 | X2    | 76.71    | 286.29 | TOE R  | 81.65    | 288.54 | BKI    | 136.00   | 290.40 |       |          |        |       |                |                   |
| 79.78           | 287.88 |       | 128.36   | 289.99 | X2    | 77.83    | 287.42 |        | 85.67    | 288.94 |        |          |        |       |          |        |       |                |                   |
| 82.83           | 288.67 | BKI   | 136.62   | 290.36 | X2RPN | 80.81    | 288.23 |        | 89.09    | 289.17 |        |          |        |       |          |        |       |                |                   |
| 91.59           | 288.88 |       |          |        |       | 83.57    | 288.87 | BKFL R | 92.10    | 288.92 |        |          |        |       |          |        |       |                |                   |
| 94.00           | 289.29 |       |          |        |       | 86.56    | 289.14 |        | 97.87    | 290.01 |        |          |        |       |          |        |       |                |                   |
| 96.74           | 290.22 |       |          |        |       | 93.19    | 288.99 |        | 104.92   | 290.11 |        |          |        |       |          |        |       |                |                   |
| 109.15          | 290.33 |       |          |        |       | 97.58    | 289.58 |        | 123.94   | 289.73 |        |          |        |       |          |        |       |                |                   |
| 124.33          | 289.80 |       |          |        |       | 105.23   | 290.09 |        | 136.86   | 290.32 | X 2 RP |          |        |       |          |        |       |                |                   |
| 135.39          | 290.48 |       |          |        |       | 118.77   | 289.64 |        |          |        |        |          |        |       |          |        |       |                |                   |
| 136.86          | 290.68 |       |          |        |       | 136.62   | 290.56 | RP     |          |        |        |          |        |       |          |        |       |                |                   |



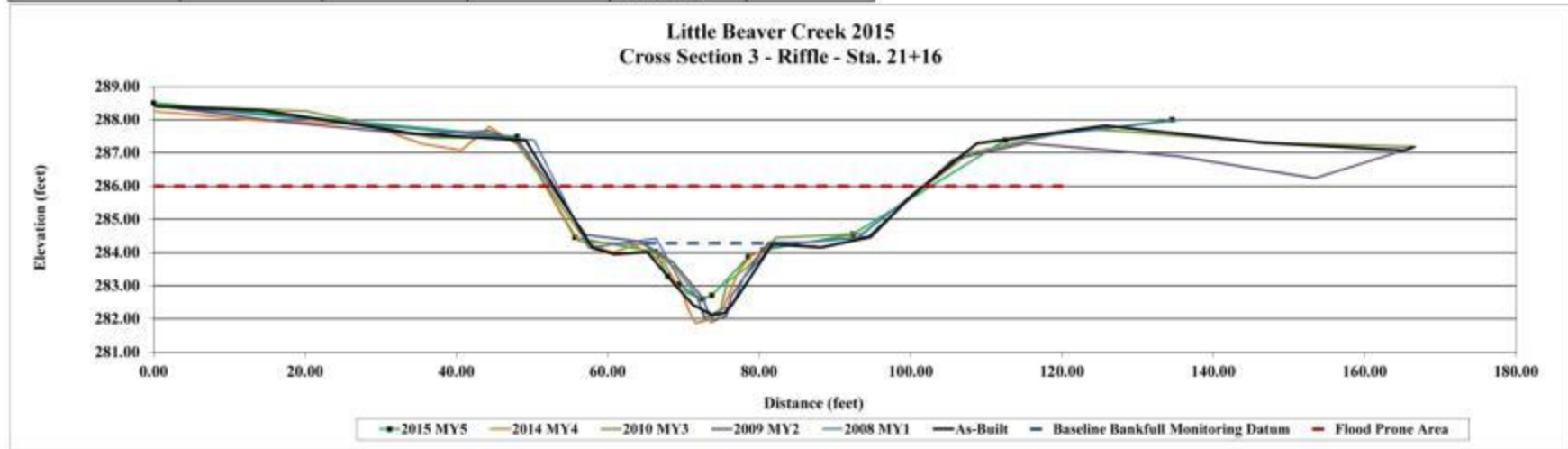
Project Name Little Beaver Creek, MYS  
 Watershed 3  
 Cross Section 3  
 Drainage Area NA  
 Date Mar-15  
 Crew Boggs, Ward

Photo of Cross-Section 3 - Riffle - Looking Upstream

Picture Taken March 31, 2015

| As-Built Survey |        |       | 2008     |        |       | 2009     |        |       | 2010     |        |       | 2014     |        |       | 2015     |        |       |
|-----------------|--------|-------|----------|--------|-------|----------|--------|-------|----------|--------|-------|----------|--------|-------|----------|--------|-------|
| As-Built Survey |        |       | 2008 MY1 |        |       | 2009 MY2 |        |       | 2010 MY3 |        |       | 2014 MY4 |        |       | 2015 MY5 |        |       |
| Station         | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes |
| 0.00            | 288.44 | LPNS  | 0.04     | 288.44 | XSL   | 0.00     | 288.44 | RP    | 0.00     | 288.44 | XSLP  | 0.00     | 288.26 |       | 0.00     | 288.51 |       |
| 0.55            | 288.40 |       | 26.60    | 287.91 | XSL   | 17.50    | 287.93 |       | 20.16    | 288.27 |       | 14.69    | 287.97 |       | 48.00    | 287.49 |       |
| 14.19           | 288.30 |       | 50.20    | 287.39 | XSL   | 34.63    | 287.56 |       | 36.88    | 287.46 |       | 22.01    | 287.91 |       | 55.64    | 284.45 |       |
| 34.61           | 287.58 |       | 57.46    | 284.15 | XSL   | 44.52    | 287.66 |       | 47.42    | 287.47 |       | 28.20    | 287.87 |       | 66.28    | 284.03 |       |
| 49.17           | 287.38 |       | 66.40    | 284.43 | XSL   | 48.45    | 287.29 |       | 57.25    | 284.32 |       | 35.37    | 287.28 |       | 67.92    | 283.50 |       |
| 53.76           | 285.66 |       | 70.36    | 282.82 | XSHKF | 57.10    | 284.54 |       | 64.79    | 284.25 | BKF   | 40.67    | 287.08 |       | 69.42    | 283.05 |       |
| 57.99           | 284.14 |       | 71.88    | 282.65 | XSHO  | 64.35    | 284.34 | BKF   | 68.97    | 283.53 |       | 44.32    | 287.79 |       | 72.55    | 282.61 |       |
| 60.86           | 283.96 |       | 72.75    | 282.01 | XSLTW | 68.70    | 283.71 |       | 71.45    | 282.81 |       | 49.14    | 287.10 |       | 73.75    | 282.72 |       |
| 65.21           | 284.02 | BKF   | 74.54    | 282.24 | XSL   | 72.44    | 282.68 | TOE L | 72.74    | 282.12 |       | 52.83    | 283.61 |       | 78.53    | 283.87 |       |
| 68.45           | 283.14 |       | 76.51    | 282.43 | XSHO  | 73.24    | 282.23 |       | 73.69    | 281.91 | TW    | 56.02    | 284.38 |       | 80.49    | 284.08 |       |
| 71.36           | 282.41 |       | 77.86    | 283.23 | XSHKF | 74.01    | 281.95 | TW    | 74.68    | 282.89 |       | 60.70    | 284.01 |       | 92.36    | 284.55 |       |
| 71.83           | 282.37 | LEW   | 81.70    | 284.22 | XSL   | 75.66    | 282.10 |       | 75.79    | 283.32 |       | 63.47    | 284.25 |       | 112.48   | 287.58 |       |
| 72.49           | 282.28 |       | 82.96    | 284.43 | XSL   | 76.30    | 282.70 | TOE R | 78.39    | 283.56 |       | 67.89    | 283.68 |       | 114.55   | 288.00 |       |
| 73.70           | 282.14 |       | 108.81   | 287.28 | XSL   | 78.40    | 283.40 |       | 82.24    | 284.45 | BKF   | 68.68    | 283.20 |       |          |        |       |
| 75.36           | 282.17 |       | 135.88   | 288.01 | XSL   | 81.19    | 284.31 | BKF   | 93.50    | 284.57 |       | 69.79    | 282.82 |       |          |        |       |
| 76.15           | 282.37 | REW   |          |        |       | 85.97    | 284.31 |       | 107.80   | 287.00 |       | 70.83    | 282.19 |       |          |        |       |
| 77.44           | 282.78 |       |          |        |       | 94.40    | 284.48 |       | 122.63   | 287.74 |       | 71.63    | 281.88 |       |          |        |       |
| 81.73           | 284.25 |       |          |        |       | 105.56   | 286.81 |       | 148.82   | 287.39 |       | 73.61    | 282.01 |       |          |        |       |
| 88.16           | 284.16 |       |          |        |       | 115.27   | 287.30 |       | 166.50   | 287.19 | XSHO  | 75.20    | 282.32 |       |          |        |       |
| 94.69           | 284.47 |       |          |        |       | 133.36   | 286.90 |       |          |        |       | 76.79    | 283.20 |       |          |        |       |
| 100.36          | 285.77 |       |          |        |       | 153.35   | 286.25 |       |          |        |       | 77.33    | 283.48 |       |          |        |       |
| 108.79          | 287.29 |       |          |        |       | 166.66   | 287.19 | RP    |          |        |       | 79.12    | 283.95 |       |          |        |       |
| 125.76          | 285.82 |       |          |        |       |          |        |       |          |        |       | 82.27    | 284.23 |       |          |        |       |
| 146.55          | 287.31 |       |          |        |       |          |        |       |          |        |       | 87.47    | 284.20 |       |          |        |       |
| 165.22          | 287.08 |       |          |        |       |          |        |       |          |        |       | 93.61    | 284.50 |       |          |        |       |
| 166.39          | 287.18 | RPN   |          |        |       |          |        |       |          |        |       | 100.47   | 286.16 |       |          |        |       |
|                 |        |       |          |        |       |          |        |       |          |        |       | 112.10   | 287.32 |       |          |        |       |
|                 |        |       |          |        |       |          |        |       |          |        |       | 136.17   | 287.46 |       |          |        |       |
|                 |        |       |          |        |       |          |        |       |          |        |       | 166.90   | 287.15 |       |          |        |       |

| Summary Data      |        |
|-------------------|--------|
| Bankfull Elev.    | 284.29 |
| BF Area           | 16.3   |
| BF Width          | 26.6   |
| Flood Prone Elev. | 286    |
| Flood Prone Width | 50.9   |
| Max Depth         | 26.6   |
| Mean Depth        | 0.6    |
| W/D Ratio         | 43.4   |
| FR                | 1.9    |
| Bank Height Ratio | 1      |
| Stream Type       | C5     |



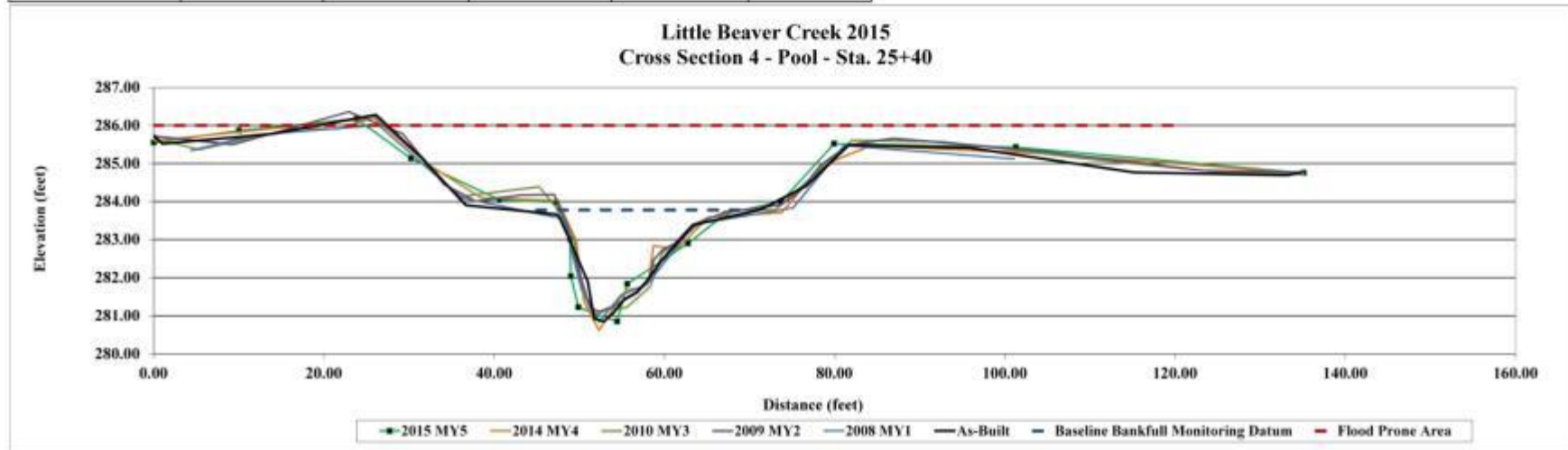
Project Name Little Beaver Creek, MY5  
 Watershed  
 Cross Section 4  
 Drainage Area NA  
 Date Mar-15  
 Crew Boggs, Ward

Photo of Cross-Section 4 - Pool - Looking Upstream

Picture Taken March 31, 2015

| As-Built Survey |        |       | 2008     |        |         | 2009     |        |       | 2010     |        |       | 2014     |        |       | 2015     |        |       |
|-----------------|--------|-------|----------|--------|---------|----------|--------|-------|----------|--------|-------|----------|--------|-------|----------|--------|-------|
| As-Built Survey |        |       | 2008 MY1 |        |         | 2009 MY2 |        |       | 2010 MY3 |        |       | 2014 MY4 |        |       | 2015 MY5 |        |       |
| Station         | Elev   | Notes | Station  | Elev   | Notes   | Station  | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes |
| 0.00            | 285.74 | RP/NA | 4.38     | 285.33 | NS4     | 0.00     | 285.72 | LP    | 0.00     | 285.66 | X4 LP | 0.00     | 285.60 |       | 0.00     | 285.55 |       |
| 1.03            | 285.52 |       | 11.69    | 285.75 | NS4     | 9.32     | 285.50 |       | 5.43     | 285.37 |       | 25.85    | 286.20 |       | 10.00    | 285.86 |       |
| 13.94           | 285.78 |       | 26.39    | 286.01 | NS4     | 22.94    | 286.36 |       | 16.39    | 285.92 |       | 32.10    | 285.00 |       | 23.86    | 286.18 |       |
| 26.12           | 286.28 |       | 36.19    | 284.10 | NS4     | 29.27    | 285.78 |       | 21.65    | 285.91 |       | 38.50    | 284.10 |       | 30.21    | 285.14 |       |
| 31.29           | 285.20 |       | 48.17    | 283.55 | NS4/OKJ | 34.09    | 284.46 |       | 28.06    | 286.23 |       | 47.50    | 284.05 |       | 40.64    | 284.05 |       |
| 36.68           | 283.91 |       | 50.03    | 281.89 | S41/OW  | 37.89    | 284.01 |       | 31.50    | 285.14 |       | 49.61    | 283.00 |       | 47.29    | 283.99 |       |
| 47.48           | 283.66 |       | 52.31    | 280.85 | S41/W   | 43.16    | 284.17 |       | 35.72    | 284.12 |       | 50.53    | 281.38 |       | 48.92    | 283.02 |       |
| 49.14           | 282.86 |       | 54.91    | 281.35 | S41/W   | 47.07    | 284.18 | OKJ   | 45.34    | 284.39 | OKJ   | 52.32    | 280.62 |       | 49.02    | 282.05 |       |
| 50.99           | 283.92 | LEW   | 57.97    | 281.83 | S41/OW  | 48.47    | 283.44 |       | 48.44    | 283.53 |       | 55.89    | 281.68 |       | 49.90    | 281.23 |       |
| 51.77           | 280.93 |       | 63.56    | 283.40 | NS4/OKJ | 50.26    | 281.96 | TOE L | 49.47    | 282.95 |       | 57.05    | 281.76 |       | 54.43    | 280.85 |       |
| 52.91           | 280.85 |       | 75.15    | 283.84 | NS4     | 51.28    | 281.21 |       | 50.28    | 281.88 |       | 58.20    | 282.04 |       | 55.64    | 281.84 |       |
| 53.97           | 281.06 |       | 81.12    | 285.47 | NS4     | 52.39    | 281.11 | TW    | 51.72    | 281.03 |       | 58.71    | 282.84 |       | 62.76    | 282.90 |       |
| 55.31           | 281.43 |       | 101.11   | 285.13 | NS4     | 54.21    | 281.27 |       | 53.49    | 281.17 | TW    | 61.54    | 282.76 |       | 67.24    | 283.68 |       |
| 56.77           | 281.63 |       |          |        |         | 56.92    | 281.62 |       | 55.54    | 281.21 |       | 65.12    | 283.60 |       | 72.71    | 284.00 |       |
| 58.02           | 281.94 | BEW   |          |        |         | 58.34    | 282.02 | TOE R | 58.33    | 281.77 |       | 73.78    | 283.71 |       | 79.93    | 285.52 |       |
| 59.70           | 282.46 |       |          |        |         | 58.79    | 282.49 |       | 59.73    | 282.65 |       | 78.45    | 284.95 |       | 101.29   | 285.43 |       |
| 63.41           | 283.39 | OKJ   |          |        |         | 59.87    | 282.75 |       | 61.44    | 282.92 |       | 84.13    | 285.46 |       | 135.10   | 284.76 |       |
| 71.34           | 283.79 |       |          |        |         | 63.26    | 282.90 |       | 64.72    | 283.54 |       | 105.50   | 285.25 |       |          |        |       |
| 76.63           | 284.41 |       |          |        |         | 63.34    | 283.40 | OKJ   | 69.12    | 283.78 |       | 135.10   | 284.75 |       |          |        |       |
| 81.67           | 285.49 |       |          |        |         | 67.06    | 283.72 |       | 73.00    | 283.78 | OKJ   |          |        |       |          |        |       |
| 95.84           | 285.41 |       |          |        |         | 72.71    | 283.92 |       | 79.41    | 285.06 |       |          |        |       |          |        |       |
| 115.21          | 284.77 |       |          |        |         | 75.81    | 284.25 |       | 82.05    | 285.61 |       |          |        |       |          |        |       |
| 133.15          | 284.69 |       |          |        |         | 78.38    | 284.96 |       | 92.78    | 285.57 |       |          |        |       |          |        |       |
| 134.77          | 284.77 | LP/NA |          |        |         | 81.63    | 285.48 |       | 109.32   | 285.13 |       |          |        |       |          |        |       |
|                 |        |       |          |        |         | 86.89    | 285.66 |       | 124.61   | 284.79 |       |          |        |       |          |        |       |
|                 |        |       |          |        |         | 103.94   | 285.33 |       | 135.09   | 284.72 | X4 RP |          |        |       |          |        |       |
|                 |        |       |          |        |         | 123.27   | 284.82 |       |          |        |       |          |        |       |          |        |       |
|                 |        |       |          |        |         | 135.06   | 284.77 | RP    |          |        |       |          |        |       |          |        |       |

| Summary Data      |        |
|-------------------|--------|
| Bankfull Elev.    | 283.78 |
| BF Area           | 30.6   |
| BF Width          | 22.1   |
| Flood Prone Elev. | 286.7  |
| Flood Prone Width | 135.1  |
| Max Depth         | 2.9    |
| Mean Depth        | 1.4    |
| W/D Ratio         | 15.9   |
| FR                | 6.1    |
| Bank Height Ratio | 1      |
| Stream Type       | C5     |

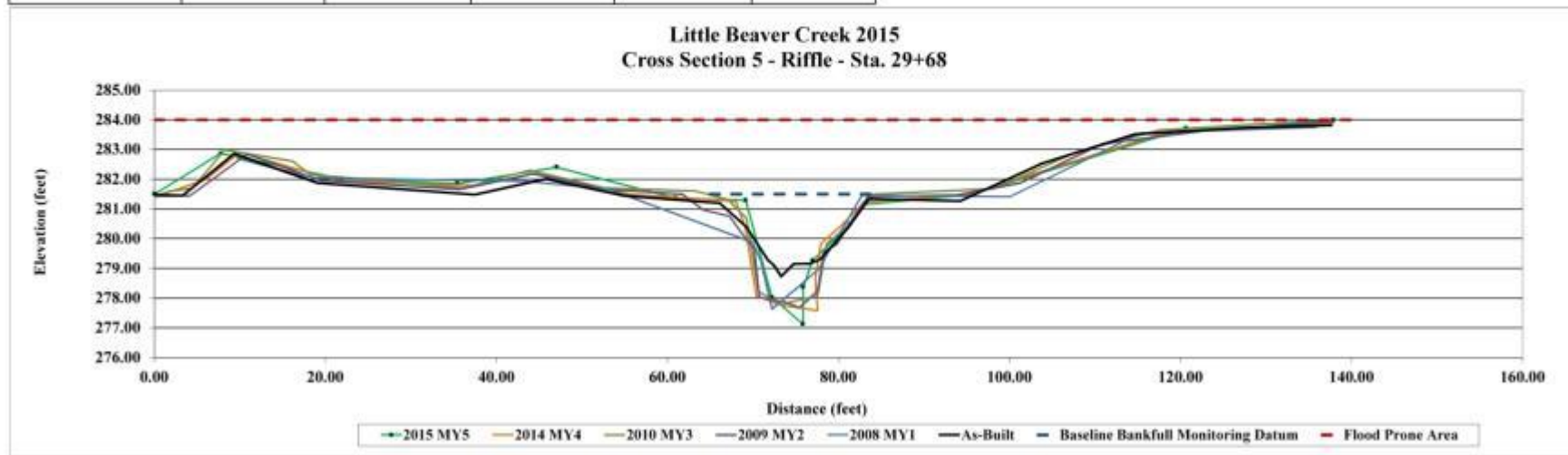


Project Name Little Beaver Creek, MY5  
 Watershed  
 Cross Section 5  
 Drainage Area NA  
 Date Mar-15  
 Crew Boggs, Ward

Photo of Cross-Section 5 - Riffle -  
 Looking Downstream

Picture Taken March 31, 2015

| As-Built Survey |        |       | 2008<br>2008 MY1 |        |         | 2009<br>2009 MY2 |        |       | 2010<br>2010 MY3 |        |       | 2014<br>2014 MY4 |        |       | 2015<br>2015 MY5 |        |       | Summary Data      |         |
|-----------------|--------|-------|------------------|--------|---------|------------------|--------|-------|------------------|--------|-------|------------------|--------|-------|------------------|--------|-------|-------------------|---------|
| Station         | Elev   | Notes | Station          | Elev   | Notes   | Station          | Elev   | Notes | Station          | Elev   | Notes | Station          | Elev   | Notes | Station          | Elev   | Notes | Bankfull Elev.    | BF Area |
| 0.00            | 281.56 | LPNG  | 9.76             | 282.70 | XSS     | 0.00             | 281.44 | LP    | 0.00             | 281.43 | X3 LP | 0.00             | 281.40 |       | 0.00             | 281.50 |       | 281.5             | 34.8    |
| 0.33            | 281.48 |       | 18.55            | 282.06 | XSS     | 4.16             | 281.45 |       | 3.60             | 281.99 |       | 6.00             | 282.00 |       | 7.80             | 282.87 |       | 285.86            | 36.3    |
| 3.33            | 281.45 |       | 43.37            | 281.94 | XSS     | 10.87            | 282.85 |       | 4.41             | 281.69 |       | 10.00            | 282.90 |       | 21.91            | 282.02 |       | 137.9             | 4.4     |
| 9.33            | 282.86 |       | 53.09            | 281.67 | XSS     | 19.52            | 281.56 |       | 8.21             | 282.98 |       | 21.50            | 281.95 |       | 35.43            | 281.86 |       | Mean Depth        | 1       |
| 19.32           | 281.88 |       | 70.01            | 279.87 | XSS0KJ  | 35.77            | 281.67 |       | 16.13            | 282.61 |       | 37.75            | 281.80 |       | 47.05            | 282.41 |       | W/D Ratio         | 37.9    |
| 37.50           | 281.49 |       | 70.93            | 279.27 | XSS     | 44.29            | 282.19 |       | 18.27            | 282.16 |       | 44.40            | 282.20 |       | 60.95            | 281.37 |       | FR                | 3.8     |
| 45.76           | 282.02 |       | 72.22            | 277.64 | XSS     | 52.80            | 281.67 |       | 36.12            | 281.71 |       | 55.60            | 281.50 |       | 69.16            | 281.30 |       | Bank Height Ratio | 1       |
| 54.98           | 281.45 |       | 74.65            | 278.22 | XSS     | 63.74            | 281.50 | BKJ   | 43.91            | 282.31 |       | 68.02            | 281.26 |       | 72.21            | 278.03 |       | Stream Type       | C5      |
| 66.10           | 281.20 | BKJ   | 77.75            | 279.06 | XSS0C0H | 64.15            | 280.98 |       | 52.85            | 281.70 |       | 69.08            | 280.38 |       | 75.88            | 277.13 |       |                   |         |
| 69.21           | 280.41 |       | 82.77            | 281.47 | XSS0KJ  | 67.25            | 280.77 |       | 63.32            | 281.61 |       | 70.42            | 278.08 |       | 75.88            | 278.37 |       |                   |         |
| 71.77           | 279.29 | LEW   | 100.07           | 281.42 | XSS     | 68.23            | 279.99 |       | 67.09            | 281.32 | BKJ   | 73.38            | 277.76 |       | 76.98            | 279.27 |       |                   |         |
| 72.47           | 279.11 | REW   | 115.41           | 283.56 | XSS     | 70.18            | 279.67 |       | 68.27            | 280.68 |       | 77.56            | 277.59 |       | 81.31            | 280.48 |       |                   |         |
| 75.33           | 278.74 |       | 135.85           | 283.75 | XSS     | 78.75            | 278.03 | FOU L | 78.75            | 278.23 |       | 77.27            | 278.63 |       | 82.97            | 281.15 |       |                   |         |
| 76.78           | 279.16 |       |                  |        |         | 73.75            | 277.88 |       | 73.38            | 277.78 |       | 77.95            | 279.83 |       | 95.43            | 281.49 |       |                   |         |
| 76.72           | 279.17 | REW   |                  |        |         | 75.46            | 277.69 | TW    | 74.75            | 277.90 | TW    | 80.12            | 280.40 |       | 102.97           | 282.15 |       |                   |         |
| 77.81           | 279.29 |       |                  |        |         | 77.48            | 278.22 |       | 77.56            | 278.07 |       | 83.05            | 281.24 |       | 120.66           | 283.72 |       |                   |         |
| 81.04           | 280.33 | BKJ   |                  |        |         | 77.61            | 278.35 | TOHR  | 78.61            | 279.83 |       | 95.20            | 281.50 |       | 137.90           | 284.00 |       |                   |         |
| 83.60           | 281.35 |       |                  |        |         | 78.32            | 279.56 |       | 80.90            | 280.38 |       | 118.50           | 283.60 |       |                  |        |       |                   |         |
| 94.31           | 281.27 |       |                  |        |         | 79.80            | 279.82 |       | 84.20            | 281.50 | BKJ   | 137.90           | 283.90 |       |                  |        |       |                   |         |
| 103.70          | 282.52 |       |                  |        |         | 81.46            | 280.59 |       | 94.10            | 281.68 |       |                  |        |       |                  |        |       |                   |         |
| 114.09          | 283.52 |       |                  |        |         | 83.50            | 281.43 | BKJ   | 96.13            | 281.69 |       |                  |        |       |                  |        |       |                   |         |
| 128.07          | 283.75 |       |                  |        |         | 93.87            | 281.47 |       | 107.88           | 282.92 |       |                  |        |       |                  |        |       |                   |         |
| 137.36          | 283.82 |       |                  |        |         | 101.20           | 281.88 |       | 117.43           | 283.65 |       |                  |        |       |                  |        |       |                   |         |
| 137.67          | 283.81 | LPNG  |                  |        |         | 108.84           | 283.19 |       | 129.61           | 283.86 |       |                  |        |       |                  |        |       |                   |         |
|                 |        |       |                  |        |         | 122.73           | 283.63 |       | 137.91           | 283.93 | X3 RP |                  |        |       |                  |        |       |                   |         |
|                 |        |       |                  |        |         | 138.67           | 283.79 |       |                  |        |       |                  |        |       |                  |        |       |                   |         |
|                 |        |       |                  |        |         | 138.98           | 283.94 |       |                  |        |       |                  |        |       |                  |        |       |                   |         |
|                 |        |       |                  |        |         | 137.81           | 283.92 | RP    |                  |        |       |                  |        |       |                  |        |       |                   |         |



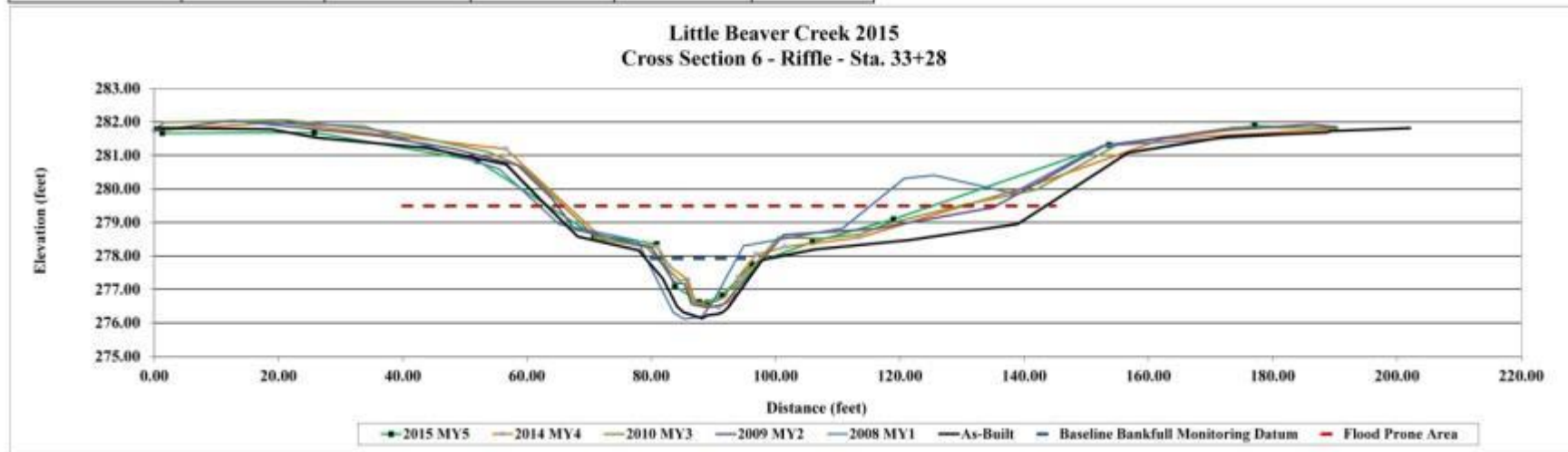


Project Name Little Beaver Creek, MY3  
 Watershed  
 Cross Section 6  
 Drainage Area NA  
 Date Mar-15  
 Crew Beggs, Ward

Photo of Cross-Section 6 - Riffle - Looking Upstream

Picture Taken March 31, 2015

| As-Built Survey |        |       | 2008<br>2008 MY1 |        |        | 2009<br>2009 MY2 |        |       | 2010<br>2010 MY3 |        |       | 2014<br>2014 MY4 |        |       | 2015<br>2015 MY5 |        |       | Summary Data   |         |
|-----------------|--------|-------|------------------|--------|--------|------------------|--------|-------|------------------|--------|-------|------------------|--------|-------|------------------|--------|-------|----------------|---------|
| Station         | Elev   | Notes | Station          | Elev   | Notes  | Station          | Elev   | Notes | Station          | Elev   | Notes | Station          | Elev   | Notes | Station          | Elev   | Notes | Bankfull Elev. | BF Area |
| 0.00            | 281.84 | RPNG  | 13.28            | 282.02 | X6     | 0.00             | 281.73 | LP    | 0.00             | 281.76 | X6 LP | 0.00             | 281.75 |       | 1.28             | 281.67 |       | 277.94         | 12.3    |
| 18.75           | 281.70 |       | 33.80            | 281.88 | X6     | 42.51            | 282.05 |       | 1.62             | 282.00 |       | 20.00            | 282.00 |       | 25.76            | 281.89 |       | 279.2          | 16.4    |
| 26.19           | 281.54 |       | 55.54            | 280.60 | X6     | 36.06            | 281.59 |       | 21.24            | 282.07 |       | -56.60           | 281.20 |       | 52.06            | 280.84 |       | 279.2          | 54.4    |
| 43.89           | 281.23 |       | 65.11            | 278.96 | X6HJK  | 48.28            | 281.20 |       | 39.11            | 281.69 |       | 72.30            | 278.50 |       | 59.77            | 278.62 |       | 1.3            | 0.8     |
| 56.64           | 280.74 |       | 77.75            | 278.46 | X6     | 58.49            | 280.72 |       | 53.78            | 281.11 |       | 81.00            | 278.28 |       | 80.82            | 278.26 |       | 21.7           | 3.3     |
| 62.25           | 279.67 |       | 83.53            | 276.31 | X6     | 64.05            | 279.71 |       | 59.38            | 280.66 |       | 82.96            | 277.70 |       | 83.78            | 277.10 |       | 1              | 1       |
| 68.18           | 278.59 |       | 85.26            | 276.12 | X6TW   | 67.61            | 278.80 |       | 71.27            | 278.53 |       | 85.89            | 277.29 |       | 87.68            | 276.63 |       |                |         |
| 77.93           | 278.17 |       | 88.15            | 276.20 | X6     | 80.05            | 278.25 | BKJ   | 59.17            | 278.28 | BKJ   | 87.14            | 276.59 |       | 88.92            | 276.63 |       |                |         |
| 81.90           | 277.32 |       | 89.95            | 276.65 | X6EOW  | 83.66            | 277.22 |       | 83.69            | 277.79 |       | 90.85            | 276.47 |       | 93.39            | 276.83 |       |                |         |
| 84.15           | 276.50 |       | 94.86            | 278.31 | X6     | 85.37            | 277.17 |       | 84.59            | 277.27 |       | 93.16            | 276.72 |       | 96.19            | 277.76 |       |                |         |
| 85.21           | 276.31 | LEW   | 110.84           | 278.84 | X6     | 86.43            | 276.57 | TOEL  | 85.73            | 277.31 |       | 95.98            | 277.58 |       | 105.89           | 278.42 |       |                |         |
| 86.12           | 276.27 |       | 120.71           | 280.32 | X6     | 89.13            | 276.46 | TW    | 86.41            | 276.67 |       | 96.85            | 278.05 |       | 114.92           | 279.30 |       |                |         |
| 88.17           | 276.14 |       | 125.50           | 280.42 | X6     | 91.70            | 276.57 | TOE R | 87.95            | 276.60 | TW    | 101.55           | 278.28 |       | 153.61           | 281.32 |       |                |         |
| 89.02           | 276.23 |       | 138.13           | 279.87 | X6     | 94.01            | 277.07 |       | 90.45            | 276.66 |       | 115.37           | 278.55 |       | 177.05           | 281.90 |       |                |         |
| 90.55           | 276.27 |       | 152.54           | 281.29 | X6     | 101.28           | 278.63 | BKJ   | 91.87            | 276.80 |       | 142.30           | 280.18 |       | 190.00           | 281.80 |       |                |         |
| 91.48           | 276.32 |       | 189.33           | 281.72 | X6RPIN | 115.97           | 278.81 |       | 92.40            | 276.99 |       | 162.40           | 281.50 |       |                  |        |       |                |         |
| 92.36           | 276.47 |       |                  |        |        | 134.98           | 279.45 |       | 93.67            | 277.14 |       | 190.00           | 281.80 |       |                  |        |       |                |         |
| 97.87           | 277.89 | BKJ   |                  |        |        | 153.02           | 281.31 |       | 100.42           | 278.56 | BKJ   |                  |        |       |                  |        |       |                |         |
| 106.30          | 278.20 |       |                  |        |        | 172.91           | 281.76 |       | 107.66           | 278.53 |       |                  |        |       |                  |        |       |                |         |
| 121.49          | 278.48 |       |                  |        |        | 186.18           | 281.93 |       | 111.57           | 278.65 |       |                  |        |       |                  |        |       |                |         |
| 138.98          | 278.96 |       |                  |        |        | 189.98           | 281.85 | RP    | 117.49           | 278.85 |       |                  |        |       |                  |        |       |                |         |
| 156.76          | 281.09 |       |                  |        |        |                  |        |       | 128.91           | 279.48 |       |                  |        |       |                  |        |       |                |         |
| 172.73          | 281.57 |       |                  |        |        |                  |        |       | 141.96           | 280.80 |       |                  |        |       |                  |        |       |                |         |
| 188.63          | 281.69 |       |                  |        |        |                  |        |       | 154.92           | 281.32 |       |                  |        |       |                  |        |       |                |         |
| 189.32          | 281.74 |       |                  |        |        |                  |        |       | 173.80           | 281.85 |       |                  |        |       |                  |        |       |                |         |
| 202.09          | 281.83 |       |                  |        |        |                  |        |       | 188.24           | 281.83 |       |                  |        |       |                  |        |       |                |         |
|                 |        |       |                  |        |        |                  |        |       | 190.03           | 281.83 | X6 RP |                  |        |       |                  |        |       |                |         |

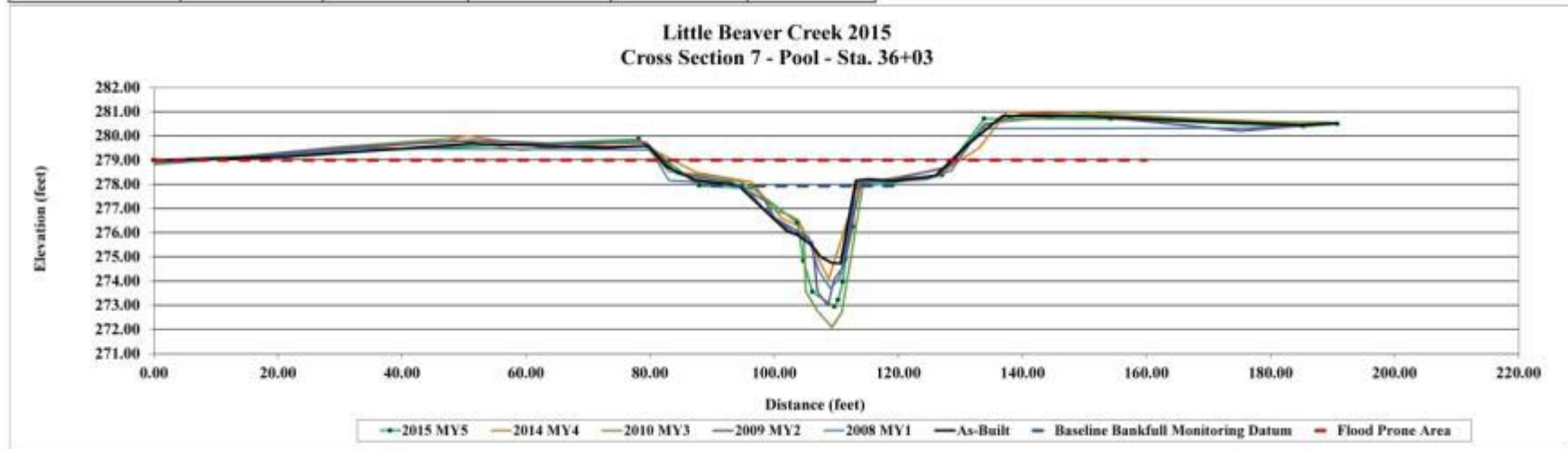


Project Name Little Beaver Creek, MY5  
 Watershed  
 Cross Section 7  
 Drainage Area NA  
 Date Mar-15  
 Crew Boggs, Ward

Photo of Cross-Section 7 - Pool - Looking Upstream

| As-Built Survey |        |       | 2008     |        |        | 2009     |        |       | 2010     |        |       | 2014     |        |       | 2015     |        |       |
|-----------------|--------|-------|----------|--------|--------|----------|--------|-------|----------|--------|-------|----------|--------|-------|----------|--------|-------|
| As-Built Survey |        |       | 2008 MY1 |        |        | 2009 MY2 |        |       | 2010 MY3 |        |       | 2014 MY4 |        |       | 2015 MY5 |        |       |
| Station         | Elev   | Notes | Station  | Elev   | Notes  | Station  | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes |
| 0.00            | 279.04 | LPN7  | 0.00     | 278.84 | X7 LPN | 0.00     | 279.00 | LP    | 0.00     | 278.90 | X7 LP | 0.00     | 278.90 |       | 0.00     | 279.00 |       |
| 0.51            | 279.01 |       | 33.87    | 279.49 | X7     | 38.98    | 279.04 |       | 6.78     | 278.97 |       | 18.50    | 279.60 |       | 78.18    | 279.87 |       |
| 21.57           | 278.15 |       | 80.04    | 279.43 | X7     | 27.27    | 279.46 |       | 9.10     | 279.03 |       | 50.70    | 280.00 |       | 87.91    | 277.95 |       |
| 51.28           | 278.69 |       | 82.98    | 278.17 | X7     | 51.48    | 279.82 |       | 30.67    | 279.56 |       | 62.30    | 279.56 |       | 96.35    | 277.85 |       |
| 72.89           | 278.52 |       | 93.22    | 278.00 | X7     | 64.37    | 279.60 |       | 47.46    | 279.88 |       | 79.15    | 279.60 |       | 103.71   | 276.41 |       |
| 79.63           | 279.60 |       | 95.72    | 277.74 | X7 BKJ | 79.27    | 279.73 |       | 59.29    | 279.41 |       | 87.80    | 278.50 |       | 104.70   | 274.84 |       |
| 82.59           | 278.74 |       | 98.35    | 276.99 | X7     | 84.35    | 278.44 |       | 78.35    | 279.82 |       | 96.30    | 278.10 |       | 106.15   | 273.55 |       |
| 87.04           | 278.19 |       | 99.37    | 276.86 | X7     | 93.18    | 278.09 |       | 83.08    | 278.54 |       | 101.25   | 276.60 |       | 109.69   | 272.94 |       |
| 94.24           | 277.96 | BKJ   | 100.51   | 276.50 | X7     | 98.41    | 277.36 | BKJ   | 90.68    | 278.31 |       | 104.50   | 276.20 |       | 110.29   | 273.22 |       |
| 98.16           | 276.99 |       | 104.62   | 275.71 | X7     | 100.05   | 276.62 |       | 94.59    | 278.12 |       | 108.80   | 274.10 |       | 111.05   | 273.97 |       |
| 102.16          | 276.05 |       | 105.51   | 275.84 | X7 BKJ | 104.88   | 275.89 |       | 96.51    | 277.84 | BKJ   | 113.75   | 278.10 |       | 111.45   | 274.88 |       |
| 103.93          | 275.91 | LEW   | 107.14   | 274.46 | X7     | 106.12   | 275.59 |       | 97.53    | 277.64 |       | 126.10   | 278.35 |       | 112.64   | 276.24 |       |
| 105.97          | 275.50 |       | 109.08   | 273.71 | X7 TW  | 106.96   | 273.56 | TOEL  | 100.27   | 276.99 |       | 133.00   | 279.50 |       | 113.13   | 277.86 |       |
| 107.48          | 275.00 |       | 110.65   | 274.18 | X7     | 108.65   | 272.99 | TW    | 102.39   | 276.73 |       | 137.55   | 281.00 |       | 127.04   | 278.38 |       |
| 109.21          | 274.77 |       | 112.52   | 276.79 | X7     | 109.62   | 274.05 |       | 103.97   | 276.51 |       | 190.60   | 280.50 |       | 133.82   | 280.71 |       |
| 110.70          | 274.71 |       | 113.12   | 278.09 | X7     | 111.04   | 274.57 |       | 104.82   | 275.88 |       |          |        |       | 154.16   | 280.71 |       |
| 111.47          | 275.85 | REW   | 124.31   | 278.21 | BP     | 113.90   | 278.05 | BKJ   | 105.08   | 275.57 |       |          |        |       | 185.25   | 280.40 |       |
| 113.14          | 278.16 |       | 128.63   | 278.60 | X7     | 119.43   | 278.21 |       | 106.95   | 272.78 |       |          |        |       | 190.80   | 280.50 |       |
| 115.19          | 278.22 |       | 133.27   | 280.31 | X7     | 128.11   | 278.74 |       | 109.27   | 272.10 | TW    |          |        |       |          |        |       |
| 119.54          | 278.15 |       | 176.97   | 280.34 | X7     | 133.95   | 280.45 |       | 110.89   | 272.72 |       |          |        |       |          |        |       |
| 126.02          | 278.37 |       | 190.04   | 280.94 | X7 BP  | 139.75   | 280.91 |       | 114.15   | 278.03 | BKJ   |          |        |       |          |        |       |
| 131.05          | 279.63 |       |          |        |        | 152.76   | 280.79 |       | 128.12   | 278.69 |       |          |        |       |          |        |       |
| 136.84          | 280.83 |       |          |        |        | 175.17   | 280.20 |       | 133.87   | 280.50 |       |          |        |       |          |        |       |
| 151.13          | 280.81 |       |          |        |        | 189.83   | 280.53 | BP    | 150.92   | 280.96 |       |          |        |       |          |        |       |
| 170.43          | 280.58 |       |          |        |        |          |        |       | 176.60   | 280.58 |       |          |        |       |          |        |       |
| 185.11          | 280.46 |       |          |        |        |          |        |       | 189.07   | 280.57 |       |          |        |       |          |        |       |
| 190.41          | 280.53 |       |          |        |        |          |        |       | 190.58   | 280.52 | X7 BP |          |        |       |          |        |       |
| 190.77          | 280.53 |       |          |        |        |          |        |       |          |        |       |          |        |       |          |        |       |

Picture Taken March 31, 2015



Project Name Little Beaver Creek, MY5  
 Watershed  
 Cross Section 8  
 Drainage Area NA  
 Date Mar-15  
 Crew Boggs, Ward

Photo of Cross-Section T8 - Riffle - Looking Upstream

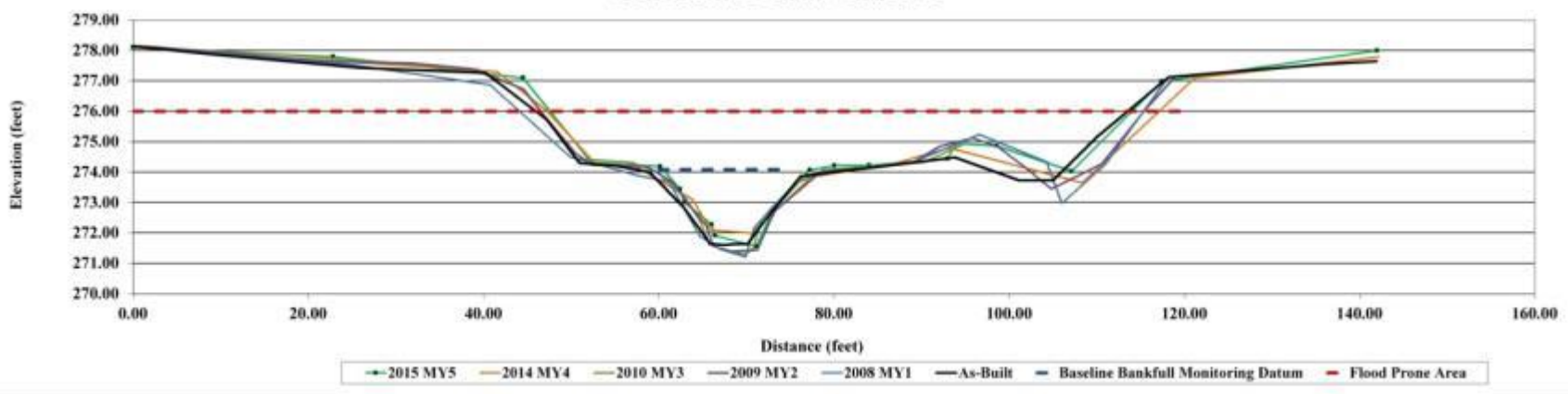
Picture Taken March 31, 2015

| As-Built Survey |        |       | 2008     |        |        | 2009     |        |       | 2010     |        |       | 2014     |        |       | 2015     |        |       |
|-----------------|--------|-------|----------|--------|--------|----------|--------|-------|----------|--------|-------|----------|--------|-------|----------|--------|-------|
| As-Built Survey |        |       | 2008 MY1 |        |        | 2009 MY2 |        |       | 2010 MY3 |        |       | 2014 MY4 |        |       | 2015 MY5 |        |       |
| Station         | Elev   | Notes | Station  | Elev   | Notes  | Station  | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes | Station  | Elev   | Notes |
| 0.00            | 278.13 | RPNR  | 0.00     | 278.13 | XRLPN  | 0.00     | 278.13 | LP    | -0.02    | 278.13 | XRLP  | 0.00     | 278.10 |       | 0.00     | 278.10 |       |
| 0.56            | 278.13 |       | 25.32    | 277.53 | XB     | 2.47     | 278.11 |       | 18.03    | 277.85 |       | 41.54    | 277.30 |       | 22.84    | 277.80 |       |
| 9.08            | 277.87 |       | 48.75    | 276.88 | XB     | 9.65     | 277.93 |       | 39.42    | 277.38 |       | 47.30    | 276.00 |       | 44.52    | 277.10 |       |
| 25.95           | 277.43 |       | 49.89    | 274.50 | XB     | 22.03    | 277.64 |       | 44.68    | 276.72 |       | 52.85    | 274.25 |       | 52.34    | 274.31 |       |
| 40.23           | 277.27 |       | 57.68    | 273.88 | XBHKJ  | 31.79    | 277.58 |       | 50.67    | 274.44 |       | 57.25    | 274.20 |       | 60.18    | 274.19 |       |
| 47.20           | 275.74 |       | 61.18    | 273.68 | XB     | 38.64    | 277.39 |       | 57.06    | 274.33 | BKJ   | 63.90    | 273.10 |       | 62.44    | 273.44 |       |
| 50.99           | 274.30 |       | 64.71    | 271.89 | XB     | 44.38    | 276.75 |       | 59.93    | 273.99 |       | 65.90    | 272.10 |       | 62.94    | 273.00 |       |
| 55.07           | 274.21 |       | 66.92    | 271.48 | XB     | 50.52    | 274.61 |       | 63.01    | 273.77 |       | 70.60    | 272.00 |       | 66.05    | 272.28 |       |
| 58.92           | 274.01 |       | 69.90    | 271.21 | XRLTW  | 52.39    | 274.23 |       | 64.65    | 272.44 |       | 77.40    | 273.85 |       | 66.40    | 273.92 |       |
| 62.83           | 272.85 |       | 70.92    | 272.19 | XRELOW | 58.74    | 274.18 |       | 65.79    | 271.65 |       | 86.50    | 274.25 |       | 71.14    | 271.56 |       |
| 65.58           | 273.76 | LEW   | 76.16    | 273.83 | XRELOW | 61.64    | 273.66 |       | 68.12    | 271.38 | TW    | 95.15    | 274.80 |       | 73.05    | 272.74 |       |
| 65.82           | 273.65 |       | 82.66    | 274.11 | XB     | 63.35    | 272.96 |       | 69.99    | 271.31 |       | 108.35   | 273.65 |       | 77.25    | 274.07 |       |
| 67.49           | 273.60 |       | 89.15    | 274.34 | XB     | 65.41    | 272.25 |       | 70.78    | 271.50 |       | 121.20   | 277.10 |       | 80.05    | 274.22 |       |
| 68.66           | 271.63 |       | 96.62    | 275.25 | XB     | 66.25    | 271.57 | TOEL  | 71.64    | 272.40 |       | 142.20   | 277.80 |       | 84.01    | 274.22 |       |
| 70.16           | 271.64 |       | 104.54   | 274.31 | XB     | 68.42    | 271.39 | TW    | 72.81    | 272.80 |       |          |        |       | 92.94    | 274.44 |       |
| 70.51           | 271.78 | HEW   | 104.30   | 274.11 | XB     | 71.24    | 271.44 | TOER  | 75.80    | 273.66 |       |          |        |       | 94.00    | 274.95 |       |
| 72.00           | 272.40 |       | 106.02   | 272.99 | XB     | 72.72    | 272.41 |       | 79.62    | 274.09 | BKJ   |          |        |       | 98.57    | 274.87 |       |
| 76.21           | 273.87 | BKJ   | 111.01   | 274.27 | XB     | 73.29    | 272.74 |       | 90.32    | 274.33 |       |          |        |       | 107.12   | 274.03 |       |
| 81.67           | 274.06 |       | 117.84   | 277.00 | XB     | 78.73    | 274.06 |       | 94.89    | 274.94 |       |          |        |       | 117.40   | 276.98 |       |
| 93.83           | 274.48 |       |          |        |        | 83.12    | 274.09 |       | 106.57   | 273.39 |       |          |        |       | 142.00   | 278.00 |       |
| 101.17          | 273.73 |       |          |        |        | 88.92    | 274.30 |       | 100.63   | 274.28 |       |          |        |       |          |        |       |
| 104.99          | 273.73 |       |          |        |        | 92.04    | 274.85 |       | 121.02   | 277.53 |       |          |        |       |          |        |       |
| 110.07          | 275.17 |       |          |        |        | 95.82    | 275.12 |       | 134.12   | 277.53 |       |          |        |       |          |        |       |
| 118.23          | 277.13 |       |          |        |        | 98.59    | 274.86 |       | 142.08   | 277.65 | XB RP |          |        |       |          |        |       |
| 135.88          | 277.55 |       |          |        |        | 101.85   | 274.15 |       |          |        |       |          |        |       |          |        |       |
| 141.94          | 277.65 |       |          |        |        | 104.80   | 273.44 |       |          |        |       |          |        |       |          |        |       |
|                 |        |       |          |        |        | 108.58   | 274.27 |       |          |        |       |          |        |       |          |        |       |
|                 |        |       |          |        |        | 115.42   | 276.02 |       |          |        |       |          |        |       |          |        |       |
|                 |        |       |          |        |        | 118.97   | 277.14 |       |          |        |       |          |        |       |          |        |       |

| Summary Data      |        |
|-------------------|--------|
| Bankfull Elev.    | 274.09 |
| BF Area           | 24.2   |
| BF Width          | 18.4   |
| Flood Prone Elev. | 276.64 |
| Flood Prone Width | 70.4   |
| Max Depth         | 2.5    |
| Mean Depth        | 1.3    |
| W/D Ratio         | 14     |
| ER                | 3.8    |
| Bank Height Ratio | 1      |
| Stream Type       | C5     |



Little Beaver Creek 2015  
 Cross Section 8 - Riffle - Sta. 38+95



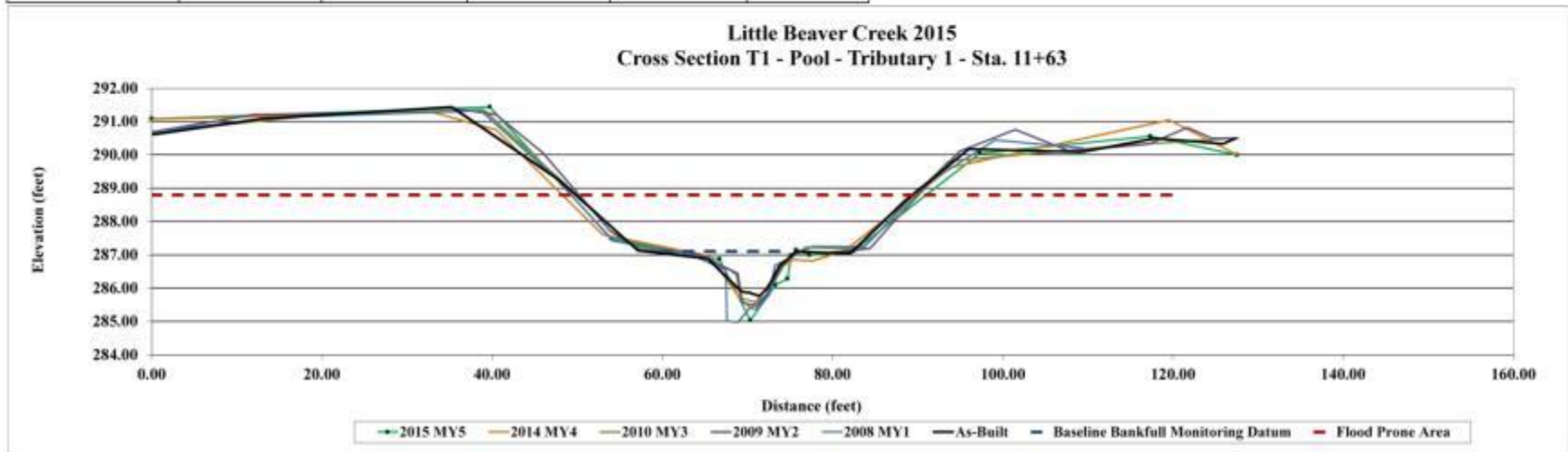
Project Name Little Beaver Creek, MY5  
 Watershed  
 Cross Section T1  
 Drainage Area NA  
 Date Mar-15  
 Crew Boggs, Ward

Photo of Cross-Section T1 - Pool - Looking Upstream

| As-Built Survey |        |        | 2008     |        |        | 2009     |        |       | 2010     |        |         | 2014     |        |       | 2015     |        |       |
|-----------------|--------|--------|----------|--------|--------|----------|--------|-------|----------|--------|---------|----------|--------|-------|----------|--------|-------|
| As-Built Survey |        |        | 2008 MY1 |        |        | 2009 MY2 |        |       | 2010 MY3 |        |         | 2014 MY4 |        |       | 2015 MY5 |        |       |
| Station         | Elev   | Notes  | Station  | Elev   | Notes  | Station  | Elev   | Notes | Station  | Elev   | Notes   | Station  | Elev   | Notes | Station  | Elev   | Notes |
| 0.00            | 290.62 | LPINT1 | 0.00     | 290.69 | T1LPIN | 0.00     | 290.69 | LP    | 0.07     | 290.68 | XT 1 LP | 0.00     | 291.08 |       | 0.00     | 291.09 |       |
| 0.39            | 290.63 |        | 13.85    | 291.12 | XT1    | 11.94    | 291.21 |       | 19.84    | 291.23 |         | 33.00    | 291.27 |       | 39.72    | 291.44 |       |
| 12.85           | 291.09 |        | 38.65    | 291.33 | XT1    | 24.13    | 291.26 |       | 39.00    | 291.36 |         | 40.47    | 290.75 |       | 53.99    | 287.50 |       |
| 35.25           | 291.44 |        | 47.67    | 289.25 | XT1    | 34.65    | 291.43 |       | 58.56    | 287.25 |         | 52.97    | 287.61 |       | 66.71    | 286.87 |       |
| 47.70           | 289.28 |        | 54.18    | 287.43 | XT1    | 40.39    | 291.22 |       | 64.95    | 286.96 | BKI     | 65.42    | 286.98 |       | 70.33    | 285.04 |       |
| 57.14           | 287.13 |        | 54.28    | 287.42 | XT1    | 46.09    | 290.03 |       | 67.90    | 286.56 |         | 67.38    | 286.35 |       | 73.27    | 286.10 |       |
| 65.34           | 286.89 | BKI    | 63.34    | 287.62 | XT1BKI | 53.82    | 287.74 |       | 68.70    | 286.39 |         | 69.11    | 285.69 |       | 74.70    | 286.29 |       |
| 69.17           | 285.92 | LEW    | 67.41    | 286.56 | XT1    | 57.40    | 287.14 |       | 69.22    | 285.71 |         | 70.41    | 285.39 |       | 75.12    | 286.98 |       |
| 69.46           | 283.89 |        | 67.50    | 286.10 | T1110W | 64.23    | 287.03 | BKI   | 71.06    | 285.58 | TW      | 73.90    | 286.60 |       | 75.70    | 287.13 |       |
| 70.22           | 285.87 |        | 67.55    | 285.02 | T1110W | 68.85    | 286.45 |       | 72.26    | 285.83 |         | 75.30    | 286.86 |       | 77.25    | 287.00 |       |
| 71.39           | 285.77 |        | 68.88    | 284.98 | XT1TW  | 68.36    | 285.58 | TOE L | 74.47    | 286.78 |         | 77.64    | 286.83 |       | 82.46    | 287.31 |       |
| 71.94           | 285.90 | REW    | 70.25    | 285.41 | XT1TW  | 71.06    | 285.48 | TW    | 76.82    | 287.23 | BKI     | 81.58    | 287.15 |       | 87.29    | 290.05 |       |
| 72.44           | 286.04 |        | 71.04    | 285.37 | XT1TW  | 72.15    | 285.78 | TOE R | 83.45    | 287.17 |         | 93.86    | 289.62 |       | 117.24   | 290.56 |       |
| 73.71           | 286.67 |        | 72.56    | 285.82 | T1110W | 74.08    | 286.71 |       | 93.65    | 289.81 |         | 119.53   | 291.05 |       | 127.50   | 290.00 |       |
| 75.78           | 287.11 |        | 73.20    | 286.68 | XT1BKI | 75.93    | 287.11 | BKI   | 114.00   | 290.29 |         | 127.50   | 290.00 |       |          |        |       |
| 78.39           | 287.07 |        | 77.75    | 287.26 | XT1BKI | 79.65    | 287.07 |       | 127.56   | 290.51 | XT 1 RP |          |        |       |          |        |       |
| 82.11           | 287.06 |        | 83.72    | 287.24 | XT1    | 84.39    | 287.20 |       |          |        |         |          |        |       |          |        |       |
| 88.47           | 288.63 |        | 90.12    | 288.59 | XT1    | 88.37    | 288.34 |       |          |        |         |          |        |       |          |        |       |
| 96.01           | 290.18 |        | 98.13    | 290.45 | XT1    | 94.97    | 290.12 |       |          |        |         |          |        |       |          |        |       |
| 109.21          | 290.09 |        | 109.52   | 290.21 | XT1    | 101.47   | 290.77 |       |          |        |         |          |        |       |          |        |       |
| 117.96          | 290.50 |        |          |        |        | 107.80   | 290.12 |       |          |        |         |          |        |       |          |        |       |
| 125.91          | 290.34 |        |          |        |        | 117.09   | 290.33 |       |          |        |         |          |        |       |          |        |       |
| 127.30          | 290.49 | RPINT1 |          |        |        | 123.67   | 290.83 |       |          |        |         |          |        |       |          |        |       |
|                 |        |        |          |        |        | 124.62   | 290.50 |       |          |        |         |          |        |       |          |        |       |
|                 |        |        |          |        |        | 127.63   | 290.51 | RP    |          |        |         |          |        |       |          |        |       |

| Summary Data      |        |
|-------------------|--------|
| Bankfull Elev.    | 287.11 |
| BF Area           | 11     |
| BF Width          | 19.2   |
| Flood Prone Elev. | 289.16 |
| Flood Prone Width | 44.9   |
| Max Depth         | 2.1    |
| Mean Depth        | 0.6    |
| W/D Ratio         | 33.6   |
| ER                | 2.3    |
| Bank Height Ratio | 1      |
| Stream Type       | C5     |

Picture Taken March 31, 2015



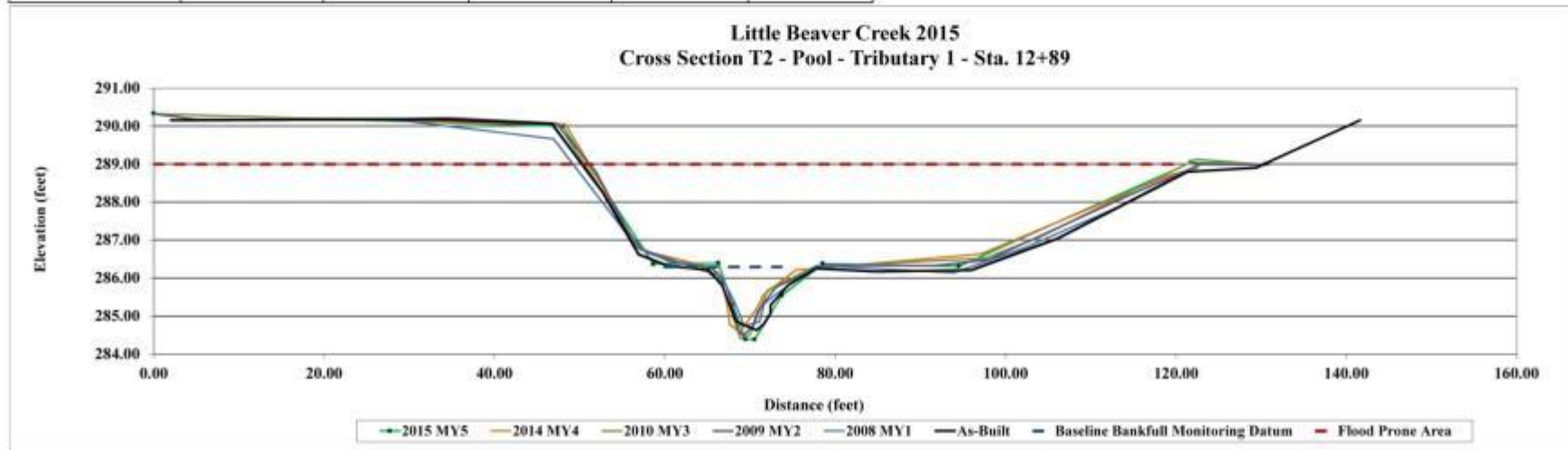
Project Name Little Beaver Creek, MY5  
 Watershed  
 Cross Section T2  
 Drainage Area NA  
 Date Mar-15  
 Crew Boggs, Ward

Photo of Cross-Section T2 - Pool - Looking Upstream

Picture Taken March 31, 2015

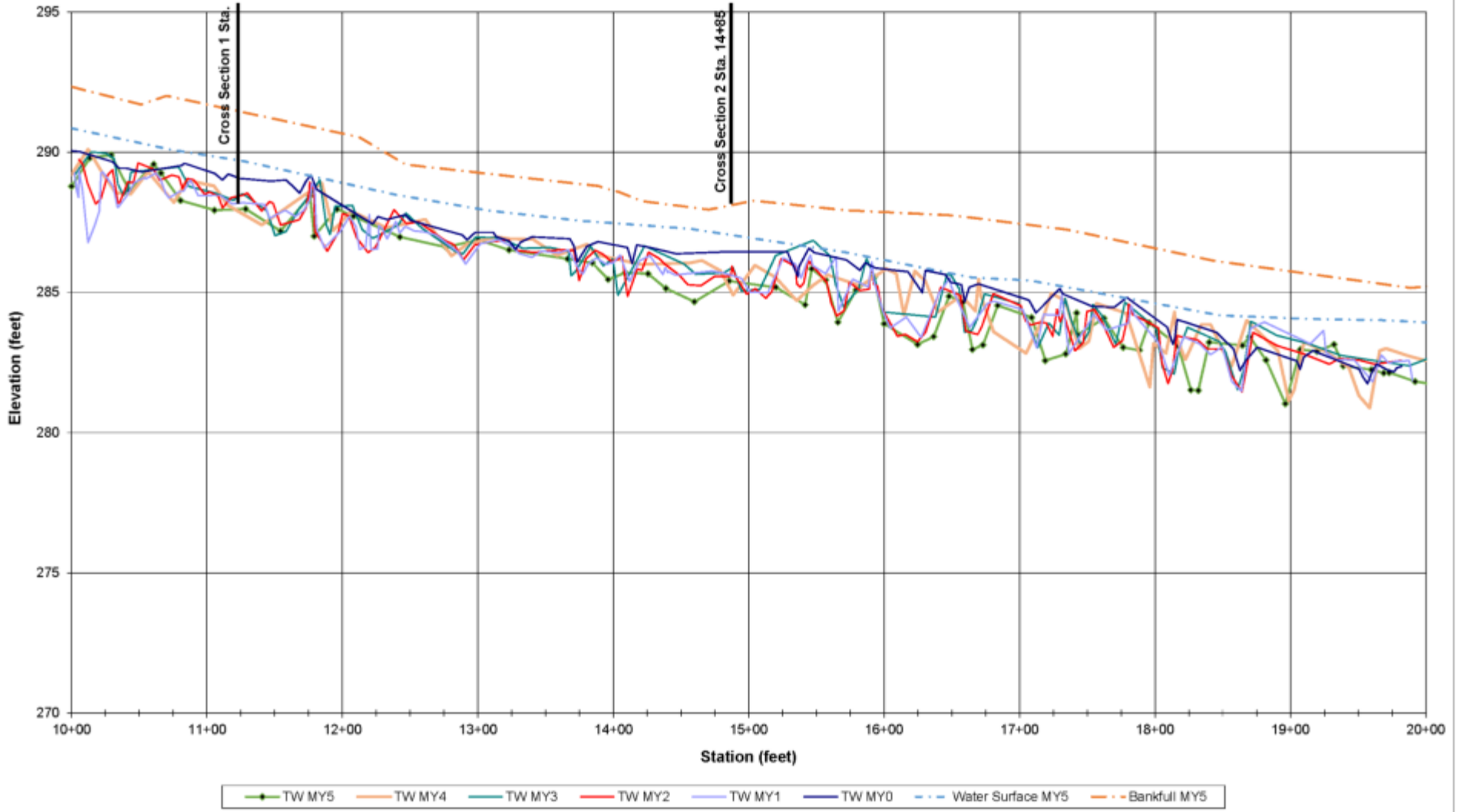
| As-Built Survey |        |         | 2008     |        |         | 2009     |        |       | 2010     |        |          | 2014     |        |       | 2015     |        |       |
|-----------------|--------|---------|----------|--------|---------|----------|--------|-------|----------|--------|----------|----------|--------|-------|----------|--------|-------|
| As-Built Survey |        |         | 2008 MY1 |        |         | 2009 MY2 |        |       | 2010 MY3 |        |          | 2014 MY4 |        |       | 2015 MY5 |        |       |
| Station         | Elev   | Notes   | Station  | Elev   | Notes   | Station  | Elev   | Notes | Station  | Elev   | Notes    | Station  | Elev   | Notes | Station  | Elev   | Notes |
| 2.80            | 290.16 | R/PINT2 | 29.05    | 290.15 | XT2     | 0.00     | 290.32 | LP    | 0.03     | 290.33 | XT 2 1 P | 29.07    | 290.14 |       | 0.00     | 290.33 |       |
| 15.71           | 290.17 |         | 46.95    | 289.67 | XT2     | 4.97     | 290.18 |       | 16.72    | 290.21 |          | 48.36    | 290.05 |       | 48.00    | 290.00 |       |
| 33.69           | 290.18 |         | 56.85    | 286.79 | XT2     | 22.13    | 290.16 |       | 32.94    | 290.19 |          | 57.06    | 286.75 |       | 58.64    | 286.37 |       |
| 46.73           | 290.07 |         | 66.58    | 286.05 | XT2/OKJ | 34.82    | 290.22 |       | 47.52    | 290.05 |          | 63.85    | 286.37 |       | 66.28    | 286.40 |       |
| 52.71           | 288.26 |         | 68.14    | 285.39 | T2/OKJ  | 47.28    | 290.07 |       | 56.93    | 286.83 |          | 66.71    | 285.86 |       | 67.92    | 285.30 |       |
| 56.88           | 286.64 |         | 69.29    | 284.74 | XT2     | 51.86    | 288.82 |       | 60.65    | 286.43 |          | 67.28    | 285.35 |       | 69.42    | 284.39 |       |
| 60.27           | 286.34 |         | 71.11    | 284.85 | XT2     | 55.59    | 287.23 |       | 64.04    | 286.39 | DKJ      | 67.63    | 284.78 |       | 70.53    | 284.38 |       |
| 65.08           | 286.21 |         | 71.62    | 285.31 | T2/OKJ  | 57.68    | 286.69 |       | 66.27    | 286.15 |          | 68.81    | 284.56 |       | 73.73    | 285.55 |       |
| 66.73           | 285.80 |         | 72.66    | 285.42 | XT2     | 60.91    | 286.43 |       | 68.81    | 284.43 | TW       | 69.56    | 284.81 |       | 78.43    | 286.38 |       |
| 67.64           | 285.27 | LEW     | 77.88    | 286.34 | XT2     | 65.64    | 286.26 | BKJ   | 68.87    | 284.41 |          | 71.06    | 285.31 |       | 84.49    | 286.31 |       |
| 68.30           | 284.88 |         | 83.88    | 286.14 | XT2     | 67.16    | 285.80 |       | 69.98    | 284.51 |          | 71.46    | 285.54 |       | 121.76   | 289.05 |       |
| 68.90           | 284.80 |         | 102.17   | 286.79 | XT2     | 68.21    | 285.09 | TOE L | 72.06    | 285.69 |          | 75.36    | 286.21 |       | 130.50   | 289.00 |       |
| 70.02           | 284.69 |         | 113.04   | 287.85 | XT2     | 68.65    | 284.61 |       | 77.49    | 286.30 | BKJ      | 97.18    | 286.64 |       |          |        |       |
| 70.78           | 284.63 |         | 122.50   | 288.08 | XT2     | 69.20    | 284.48 | TW    | 97.56    | 286.53 |          | 119.16   | 288.70 |       |          |        |       |
| 71.62           | 284.79 |         |          |        |         | 70.34    | 284.74 |       | 103.98   | 287.08 |          | 122.50   | 288.00 |       |          |        |       |
| 72.39           | 285.06 |         |          |        |         | 70.84    | 285.11 | TOE R | 122.34   | 289.13 |          |          |        |       |          |        |       |
| 72.40           | 285.29 | REW     |          |        |         | 71.06    | 285.77 |       | 130.76   | 288.88 | XT 2 RP  |          |        |       |          |        |       |
| 74.49           | 285.82 |         |          |        |         | 78.73    | 286.34 | BKJ   |          |        |          |          |        |       |          |        |       |
| 77.78           | 286.26 |         |          |        |         | 91.66    | 286.33 |       |          |        |          |          |        |       |          |        |       |
| 84.67           | 286.17 | OKJ     |          |        |         | 98.03    | 286.49 |       |          |        |          |          |        |       |          |        |       |
| 95.96           | 286.21 |         |          |        |         | 113.42   | 288.08 |       |          |        |          |          |        |       |          |        |       |
| 106.06          | 287.03 |         |          |        |         | 122.83   | 288.99 |       |          |        |          |          |        |       |          |        |       |
| 121.39          | 288.80 |         |          |        |         | 130.78   | 288.98 | RP    |          |        |          |          |        |       |          |        |       |
| 129.48          | 288.91 |         |          |        |         |          |        |       |          |        |          |          |        |       |          |        |       |
| 130.58          | 289.02 |         |          |        |         |          |        |       |          |        |          |          |        |       |          |        |       |
| 141.63          | 290.16 | L/PINT2 |          |        |         |          |        |       |          |        |          |          |        |       |          |        |       |

| Summary Data      |        |
|-------------------|--------|
| Bankfull Elev.    | 286.3  |
| BF Area           | 11     |
| BF Width          | 11.6   |
| Flood Prone Elev. | 288.21 |
| Flood Prone Width | 60.2   |
| Max Depth         | 1.9    |
| Mean Depth        | 0.9    |
| W:D Ratio         | 12.4   |
| ER                | 5.2    |
| Bank Height Ratio | 1      |
| Stream Type       | C5     |

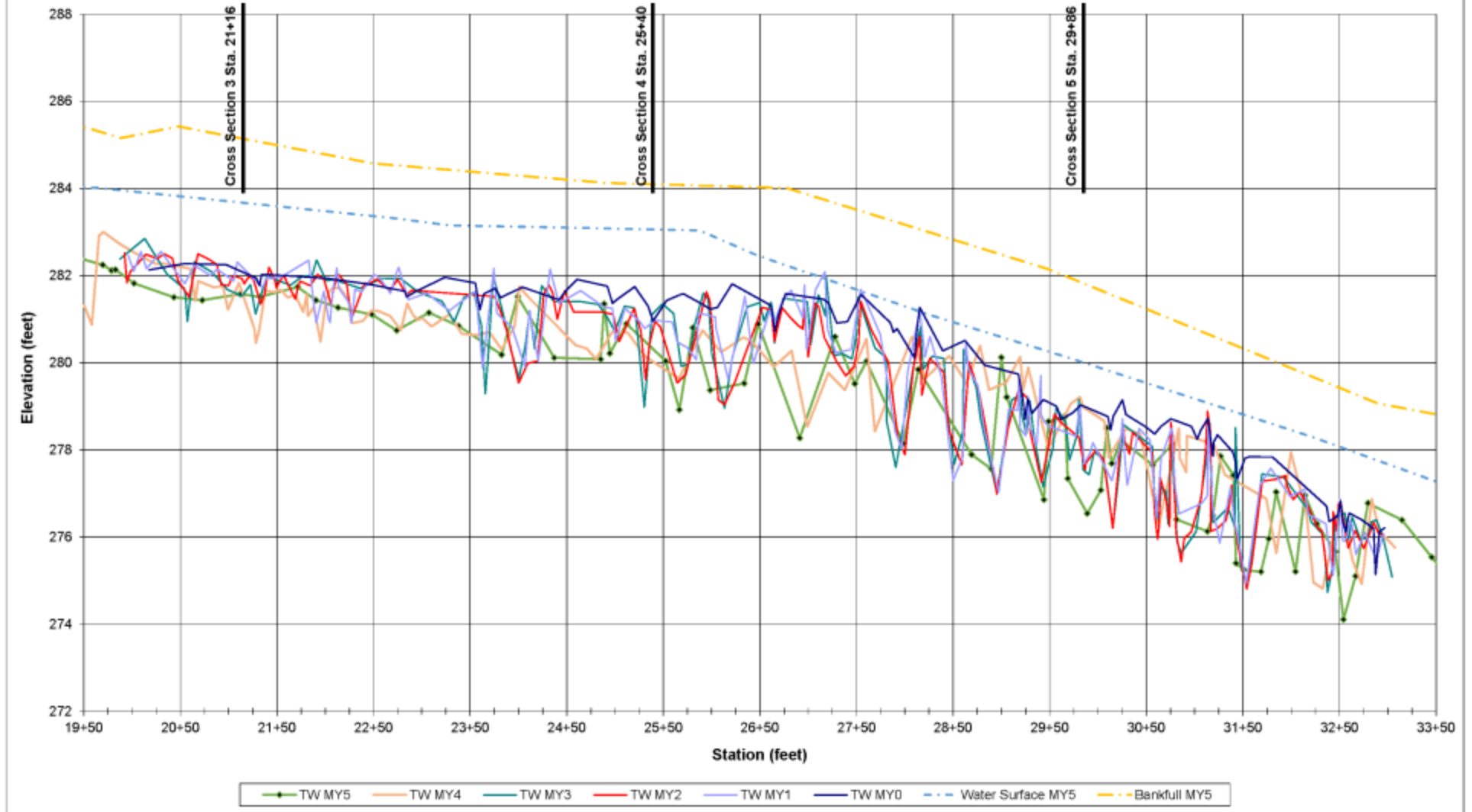


### Longitudinal Profiles with Annual Overlays

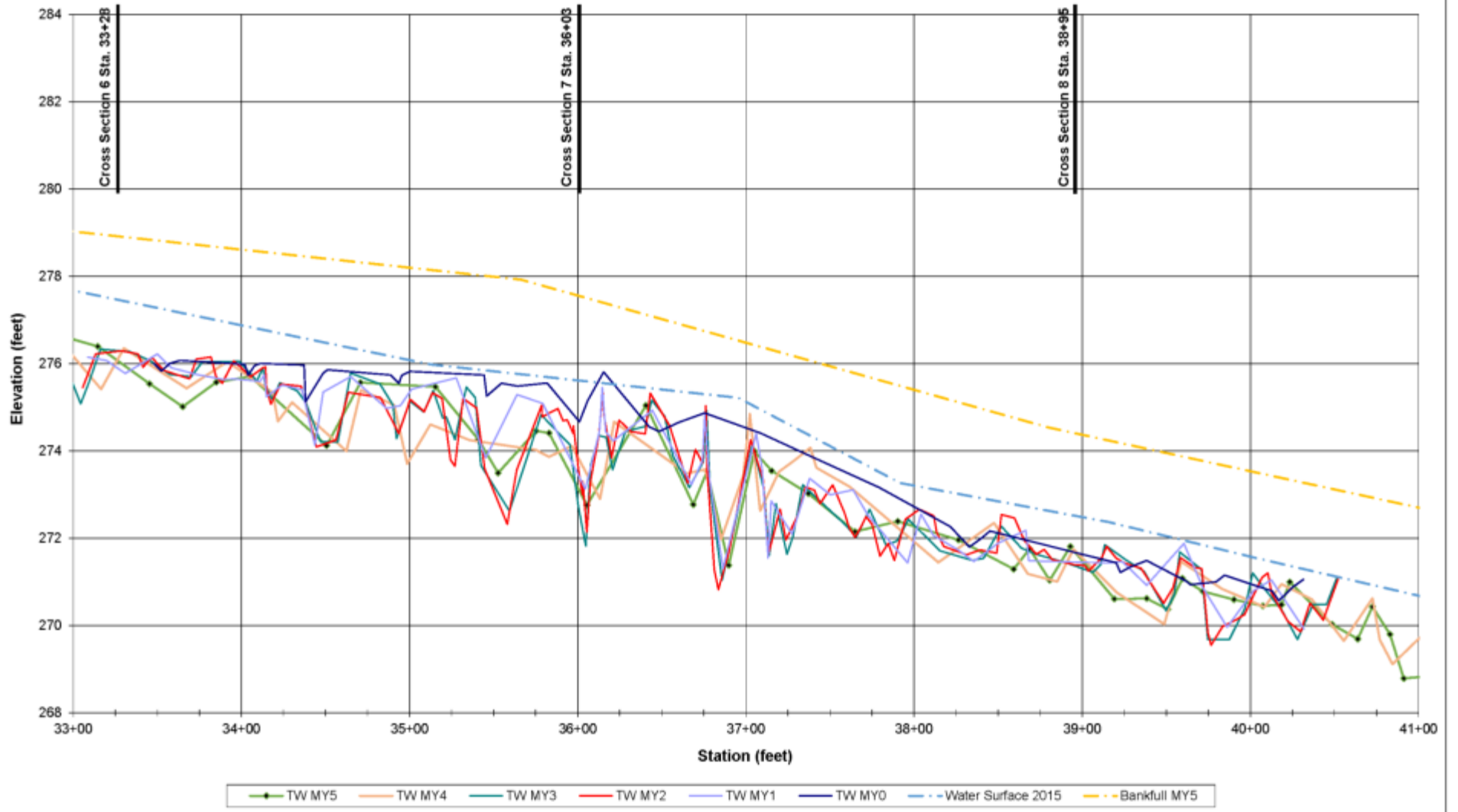
Little Beaver Creek  
Longitudinal Profile  
Reach 1: Station 10+00-19+90



Little Beaver Creek  
 Longitudinal Profile  
 Reach 2: Station 19+91-33+00

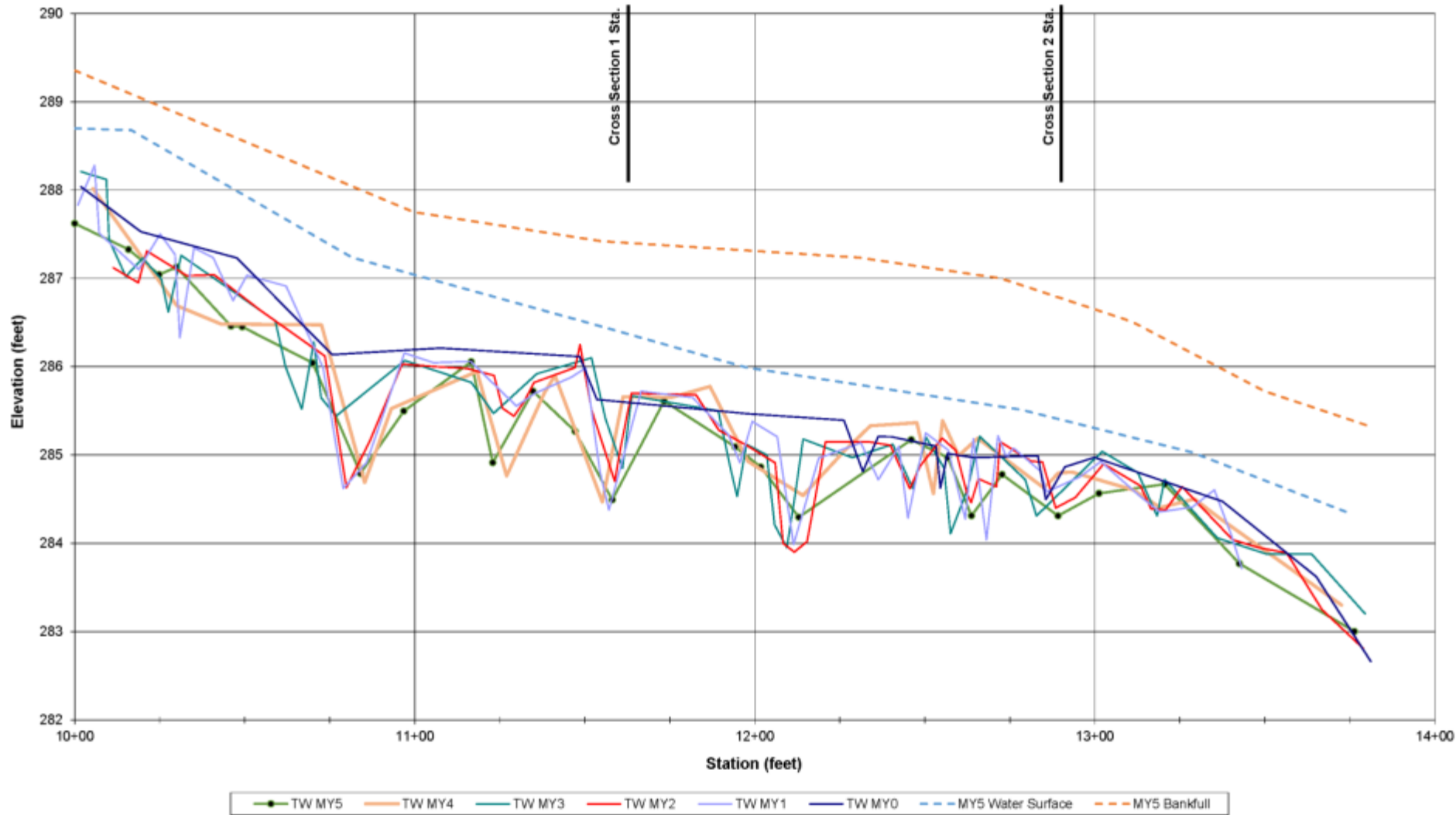


Little Beaver Creek  
 Longitudinal Profile  
 Reach 3A: Station 33+01-40+54

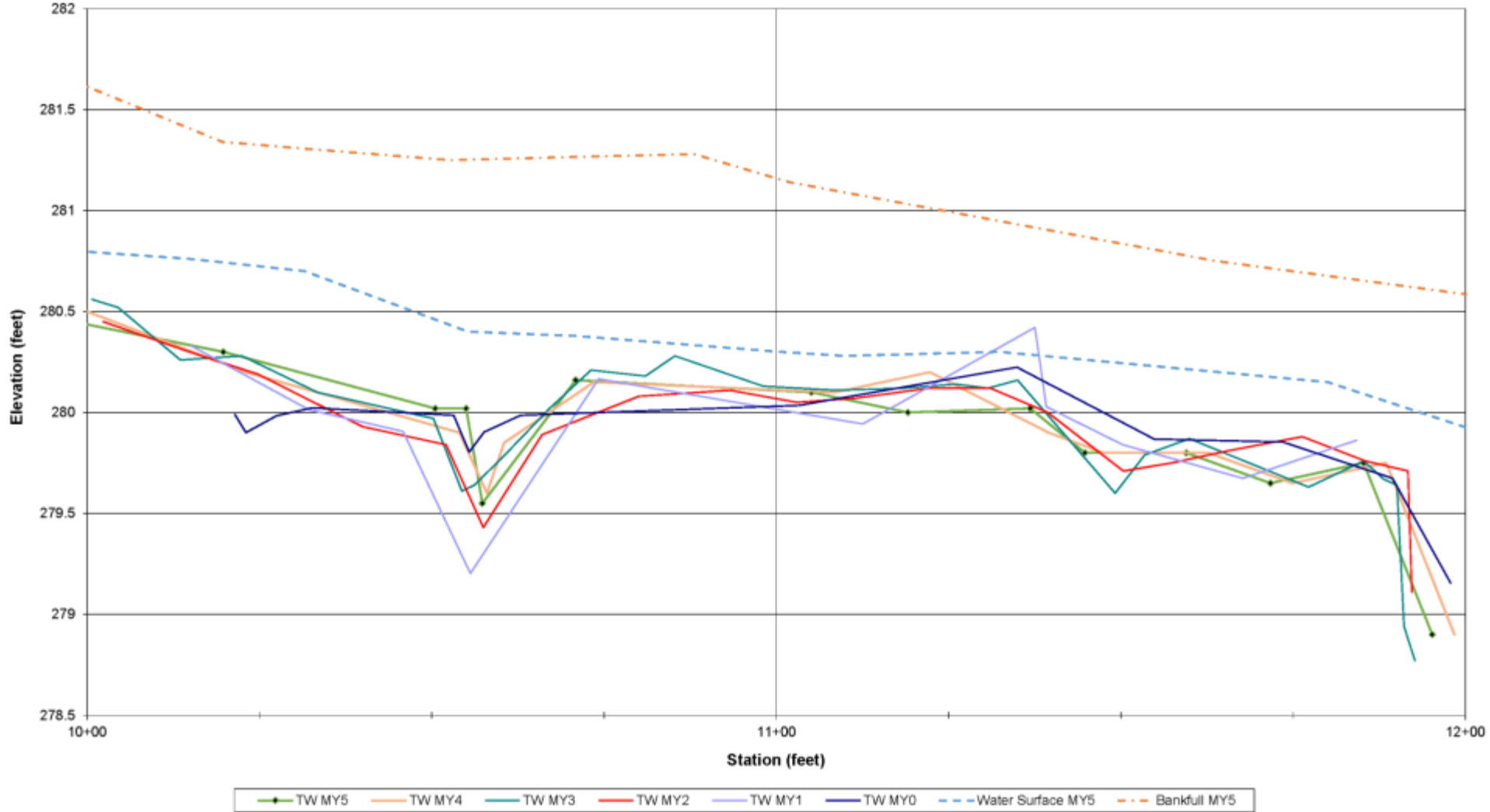




Little Beaver Creek  
 Longitudinal Profile  
 Tributary 1: Station 10+00-13+85



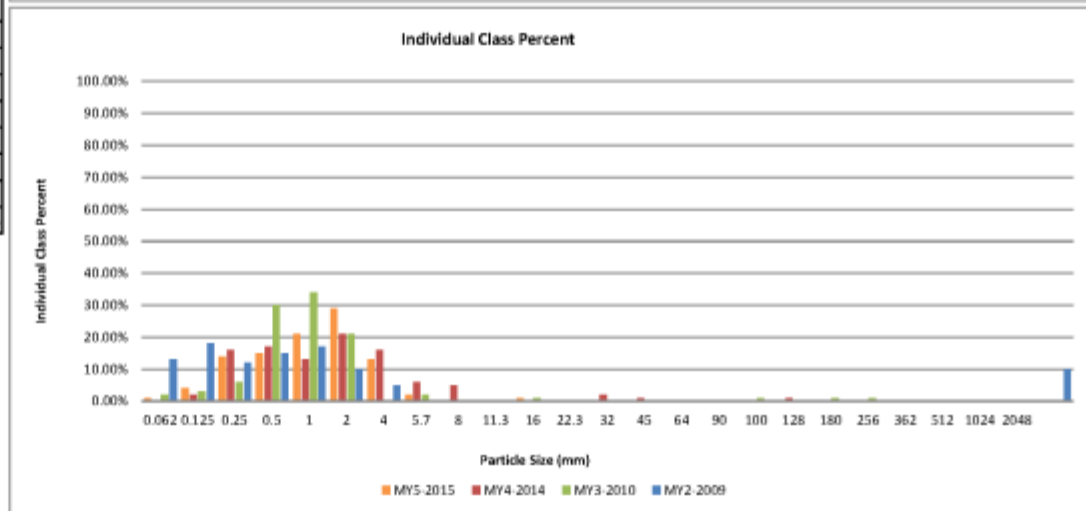
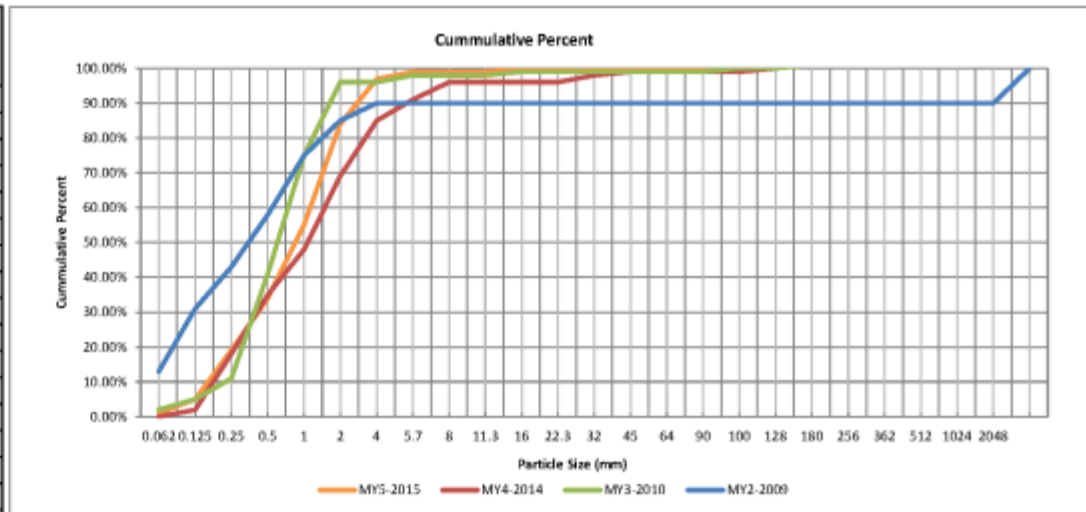
**Little Beaver Creek  
Longitudinal Profile  
Tributary 2: Station 10+00-12+00**



### Pebble Counts with Annual Overlays

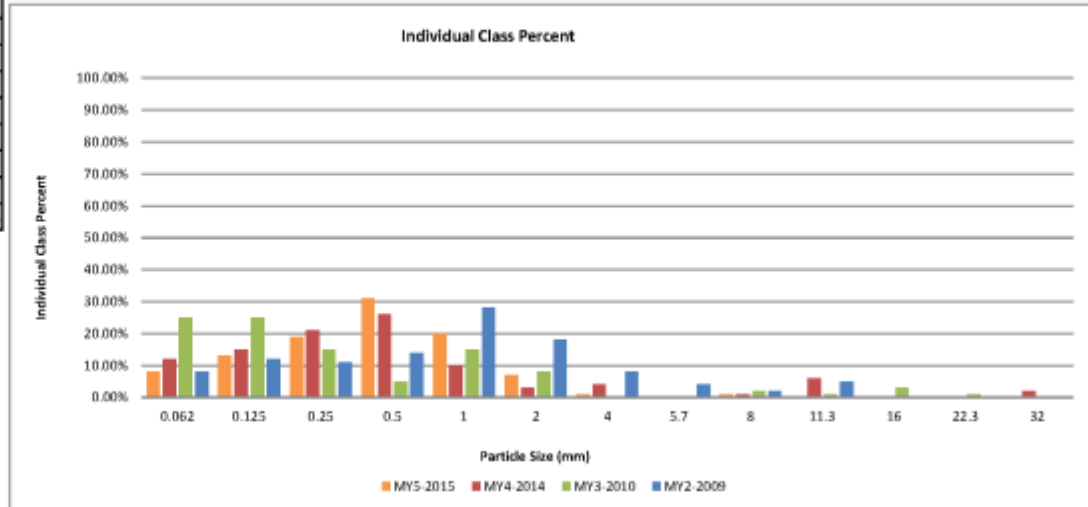
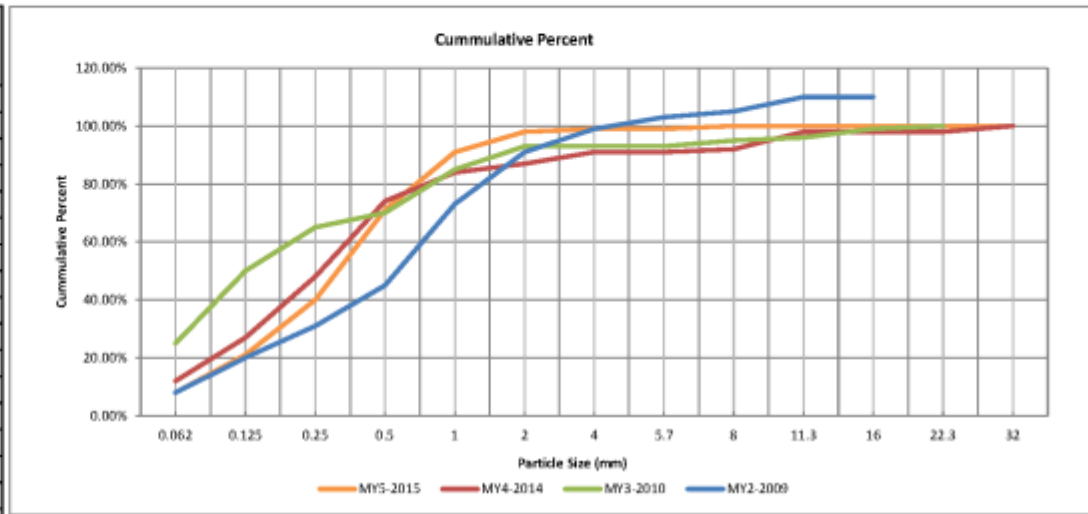
| Project Name: Little Beaver Creek<br>Cross Section 1 - Main Reach<br>Monitoring Year 5 - 2015 |                    |           |            |             |              |
|---|--------------------|-----------|------------|-------------|--------------|
| Desc.   | Material           | Size (MM) | Count      | % of Total  | Cumulative % |
| SAND  | silt/clay          | 0.062     | 1          | 1.00%       | 1.00%        |
|   | very fine sand     | 0.125     | 4          | 4.00%       | 5.00%        |
|   | fine sand          | 0.25      | 14         | 14.00%      | 19.00%       |
|   | medium sand        | 0.5       | 15         | 15.00%      | 34.00%       |
|   | coarse sand        | 1         | 21         | 21.00%      | 55.00%       |
|   | very coarse sand   | 2         | 29         | 29.00%      | 84.00%       |
| GRAVEL  | very fine gravel   | 4         | 13         | 13.00%      | 97.00%       |
|   | fine gravel        | 5.7       | 2          | 2.00%       | 99.00%       |
|   | fine gravel        | 8         | 0          | 0.00%       | 99.00%       |
|   | medium gravel      | 11.3      | 0          | 0.00%       | 99.00%       |
|   | medium gravel      | 16        | 1          | 1.00%       | 100.00%      |
|   | coarse gravel      | 22.3      |            | 0.00%       | 100.00%      |
|   | coarse gravel      | 32        |            | 0.00%       | 100.00%      |
|   | very coarse gravel | 45        |            | 0.00%       | 100.00%      |
|   | very coarse gravel | 64        |            | 0.00%       | 100.00%      |
|   | very coarse gravel | 90        |            | 0.00%       | 100.00%      |
| COBBLE  | small cobble       | 90        |            | 0.00%       | 100.00%      |
|   | medium cobble      | 128       |            | 0.00%       | 100.00%      |
|   | large cobble       | 180       |            | 0.00%       | 100.00%      |
|   | very large cobble  | 256       |            |             |              |
| BOULDER   | small boulder      | 362       |            |             |              |
|   | small boulder      | 512       |            |             |              |
|   | medium boulder     | 1024      |            |             |              |
|   | large boulder      | 2048      |            |             |              |
| <b>TOTAL % of whole count:</b>  |                    |           | <b>100</b> | <b>100%</b> | <b>100%</b>  |

| Summary Data |      |
|--------------|------|
| D50          | 0.85 |
| D84          | 2    |
| D95          | 3.6  |



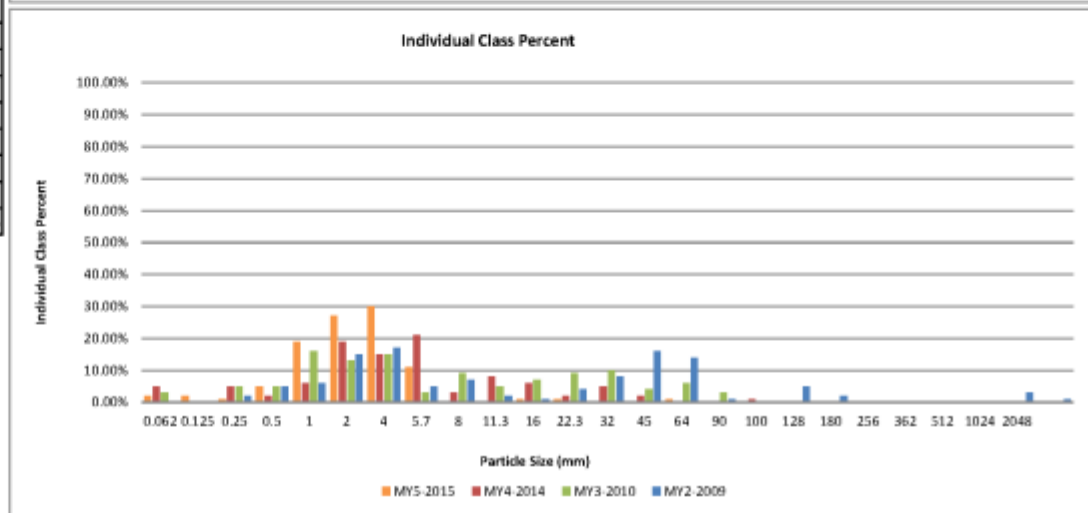
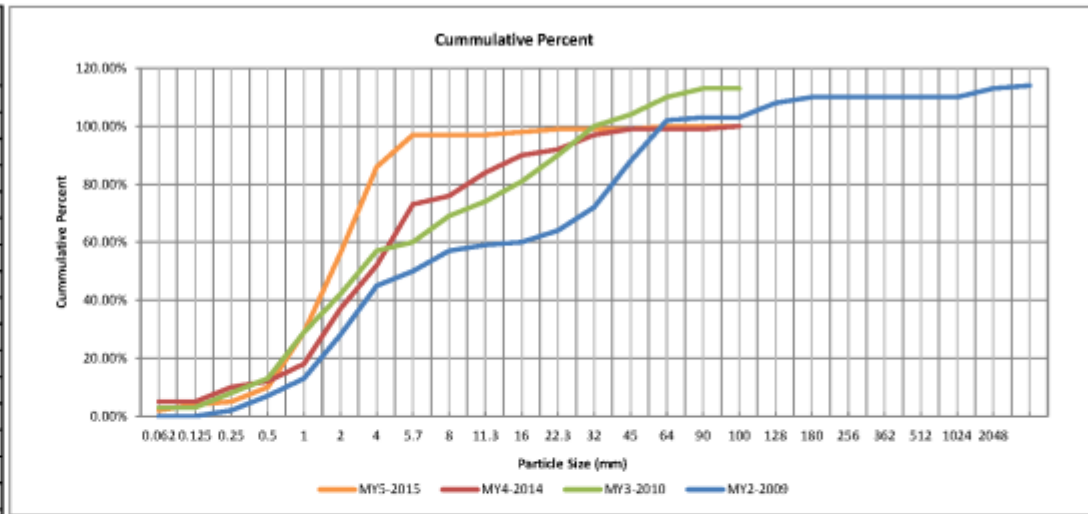
| Project Name: Little Beaver Creek<br>Cross Section 3 - Main Reach<br>Monitoring Year 5 - 2015 |                    |              |            |             |              |
|---|--------------------|--------------|------------|-------------|--------------|
| Desc.   | Material           | Size (MM)    | Count      | % of Total  | Cumulative % |
| SAND  | silt/clay          | 0.062        | 8          | 8.00%       | 8.00%        |
|   | very fine sand     | 0.125        | 13         | 13.00%      | 21.00%       |
|   | fine sand          | 0.25         | 19         | 19.00%      | 40.00%       |
|   | medium sand        | 0.5          | 31         | 31.00%      | 71.00%       |
|   | coarse sand        | 1            | 20         | 20.00%      | 91.00%       |
|   | very coarse sand   | 2            | 7          | 7.00%       | 98.00%       |
| GRAVEL  | very fine gravel   | 4            | 1          | 1.00%       | 99.00%       |
|   | fine gravel        | 5.7          |            | 0.00%       | 99.00%       |
|   | fine gravel        | 8            | 1          | 1.00%       | 100.00%      |
|   | medium gravel      | 11.3         |            | 0.00%       | 100.00%      |
|   | medium gravel      | 16           |            | 0.00%       | 100.00%      |
|   | coarse gravel      | 22.3         |            | 0.00%       | 100.00%      |
|   | coarse gravel      | 32           |            | 0.00%       | 100.00%      |
|   | very coarse gravel | 45           |            |             |              |
|   | very coarse gravel | 64           |            |             |              |
|   | COBBLE             | small cobble | 90         |             |              |
| medium cobble   |                    | 128          |            |             |              |
| large cobble  |                    | 180          |            |             |              |
| very large cobble   |                    | 256          |            |             |              |
| BOULDER   | small boulder      | 362          |            |             |              |
|   | small boulder      | 512          |            |             |              |
|   | medium boulder     | 1024         |            |             |              |
|   | large boulder      | 2048         |            |             |              |
| <b>TOTAL % of whole count:</b>  |                    |              | <b>100</b> | <b>100%</b> | <b>100%</b>  |

| Sumamry Data |      |
|--------------|------|
| D50          | 0.31 |
| D84          | 0.78 |
| D95          | 1.5  |



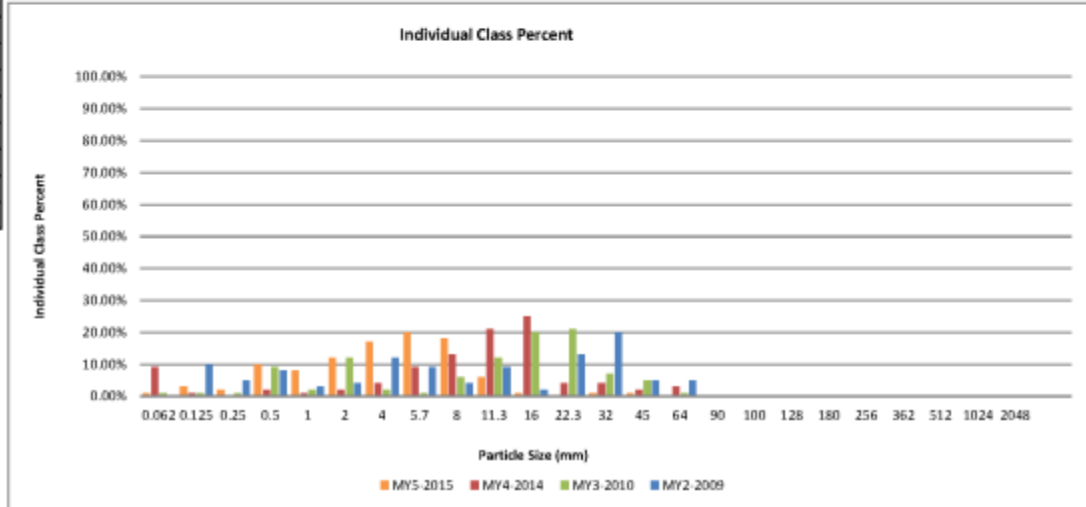
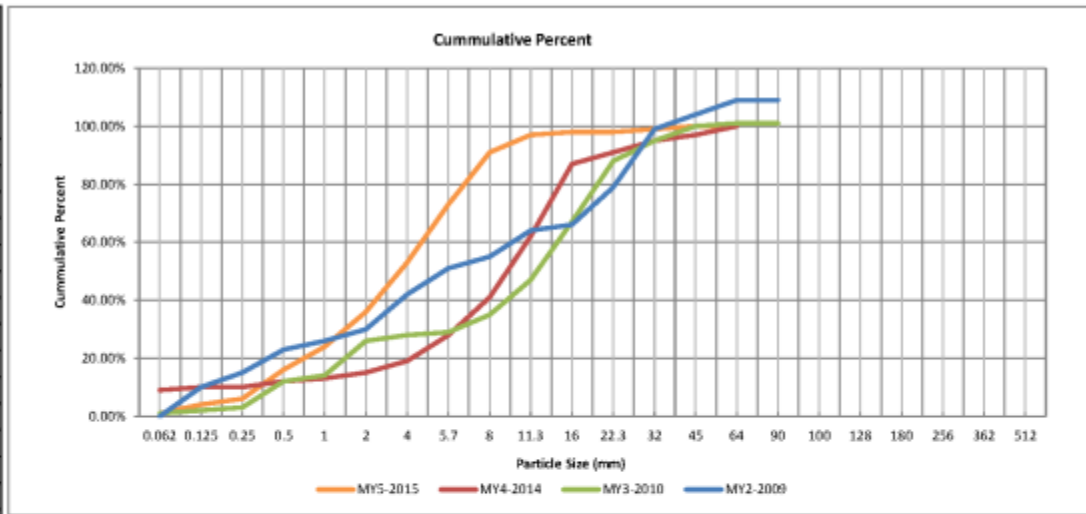
| Project Name: Little Beaver Creek<br>Cross Section 5 - Main Reach<br>Monitoring Year 5 - 2015 |                    |           |            |             |              |
|---|--------------------|-----------|------------|-------------|--------------|
| Desc.   | Material           | Size (MM) | Count      | % of Total  | Cumulative % |
| SAND  | silt/clay          | 0.062     | 2          | 2.00%       | 2.00%        |
|   | very fine sand     | 0.125     | 2          | 2.00%       | 4.00%        |
|   | fine sand          | 0.25      | 1          | 1.00%       | 5.00%        |
|   | medium sand        | 0.5       | 5          | 5.00%       | 10.00%       |
|   | coarse sand        | 1         | 19         | 19.00%      | 29.00%       |
|   | very coarse sand   | 2         | 27         | 27.00%      | 56.00%       |
| GRAVEL  | very fine gravel   | 4         | 30         | 30.00%      | 86.00%       |
|   | fine gravel        | 5.7       | 11         | 11.00%      | 97.00%       |
|   | fine gravel        | 8         |            | 0.00%       | 97.00%       |
|   | medium gravel      | 11.3      |            | 0.00%       | 97.00%       |
|   | medium gravel      | 16        | 1          | 1.00%       | 98.00%       |
|   | coarse gravel      | 22.3      | 1          | 1.00%       | 99.00%       |
|   | coarse gravel      | 32        |            | 0.00%       | 99.00%       |
|   | very coarse gravel | 45        |            | 0.00%       | 99.00%       |
|   | very coarse gravel | 64        | 1          | 1.00%       | 100.00%      |
|   | very coarse gravel | 90        |            | 0.00%       | 100.00%      |
| COBBLE  | small cobble       | 90        |            | 0.00%       | 100.00%      |
|   | medium cobble      | 128       |            | 0.00%       | 100.00%      |
|   | large cobble       | 180       |            |             |              |
| BOULDER   | very large cobble  | 256       |            |             |              |
|   | small boulder      | 362       |            |             |              |
|   | small boulder      | 512       |            |             |              |
|   | medium boulder     | 1024      |            |             |              |
| large boulder   | 2048               |           |            |             |              |
| <b>TOTAL % of whole count:</b>  |                    |           | <b>100</b> | <b>100%</b> | <b>100%</b>  |

| Summary Data |     |
|--------------|-----|
| D50          | 1.7 |
| D84          | 3.8 |
| D95          | 5.6 |



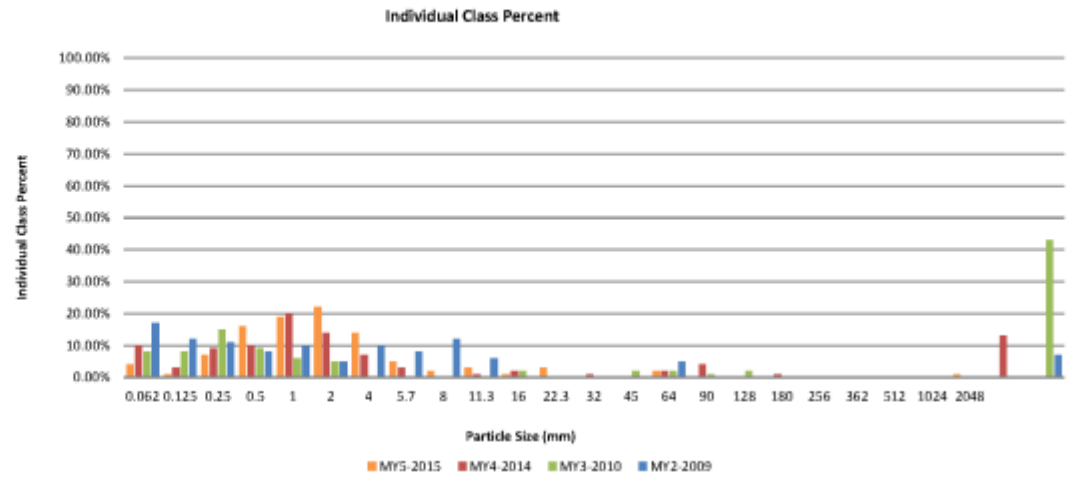
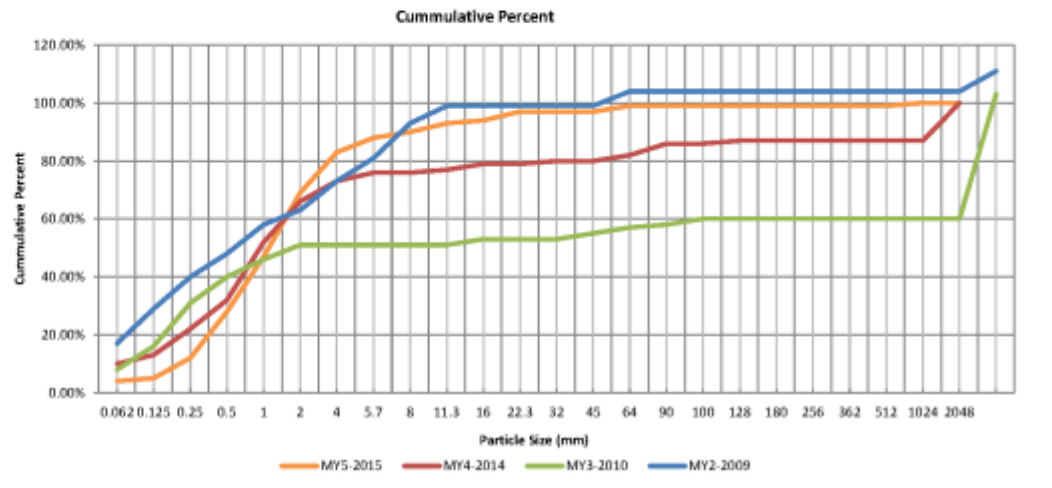
| Project Name: Little Beaver Creek<br>Cross Section 6 - Main Reach<br>Monitoring Year 5 - 2015 |                    |           |       |            |              |
|---|--------------------|-----------|-------|------------|--------------|
| Desc.   | Material           | Size (MM) | Count | % of Total | Cumulative % |
| SAND  | silt/clay          | 0.062     | 1     | 1.00%      | 1.00%        |
|   | very fine sand     | 0.125     | 3     | 3.00%      | 4.00%        |
|   | fine sand          | 0.25      | 2     | 2.00%      | 6.00%        |
|   | medium sand        | 0.5       | 10    | 10.00%     | 16.00%       |
|   | coarse sand        | 1         | 8     | 8.00%      | 24.00%       |
|   | very coarse sand   | 2         | 12    | 12.00%     | 36.00%       |
| GRAVEL  | very fine gravel   | 4         | 17    | 17.00%     | 53.00%       |
|   | fine gravel        | 5.7       | 20    | 20.00%     | 73.00%       |
|   | fine gravel        | 8         | 18    | 18.00%     | 91.00%       |
|   | medium gravel      | 11.3      | 6     | 6.00%      | 97.00%       |
|   | medium gravel      | 16        | 1     | 1.00%      | 98.00%       |
|   | coarse gravel      | 22.3      |       | 0.00%      | 98.00%       |
|   | coarse gravel      | 32        | 1     | 1.00%      | 99.00%       |
|   | very coarse gravel | 45        | 1     | 1.00%      | 100.00%      |
|   | very coarse gravel | 64        |       | 0.00%      | 100.00%      |
| COBBLE  | small cobble       | 90        |       |            |              |
|   | medium cobble      | 128       |       |            |              |
|   | large cobble       | 180       |       |            |              |
|   | very large cobble  | 256       |       |            |              |
| BOULDER   | small boulder      | 362       |       |            |              |
|   | small boulder      | 512       |       |            |              |
|   | medium boulder     | 1024      |       |            |              |
| TOTAL % of whole count:   |                    |           | 100   | 100%       | 100%         |

| Summary Data |     |
|--------------|-----|
| D50          | 3.5 |
| D84          | 7.2 |
| D95          | 9.9 |



| Project Name: Little Beaver Creek<br>Cross Section 8 - Main Reach<br>Monitoring Year 5 - 2015 |                    |           |            |             |              |
|---|--------------------|-----------|------------|-------------|--------------|
| Desc.   | Material           | Size (MM) | Count      | % of Total  | Cumulative % |
| SAND  | silt/clay          | 0.062     | 4          | 4.00%       | 4.00%        |
|   | very fine sand     | 0.125     | 1          | 1.00%       | 5.00%        |
|   | fine sand          | 0.25      | 7          | 7.00%       | 12.00%       |
|   | medium sand        | 0.5       | 16         | 16.00%      | 28.00%       |
|   | coarse sand        | 1         | 19         | 19.00%      | 47.00%       |
|   | very coarse sand   | 2         | 22         | 22.00%      | 69.00%       |
| GRAVEL  | very fine gravel   | 4         | 14         | 14.00%      | 83.00%       |
|   | fine gravel        | 5.7       | 5          | 5.00%       | 88.00%       |
|   | fine gravel        | 8         | 2          | 2.00%       | 90.00%       |
|   | medium gravel      | 11.3      | 3          | 3.00%       | 93.00%       |
|   | medium gravel      | 16        | 1          | 1.00%       | 94.00%       |
|   | coarse gravel      | 22.3      | 3          | 3.00%       | 97.00%       |
|   | coarse gravel      | 32        |            | 0.00%       | 97.00%       |
|   | very coarse gravel | 45        |            | 0.00%       | 97.00%       |
|   | very coarse gravel | 64        | 2          | 2.00%       | 99.00%       |
|   | very coarse gravel | 90        |            | 0.00%       | 99.00%       |
| COBBLE  | small cobble       | 90        |            | 0.00%       | 99.00%       |
|   | medium cobble      | 128       |            | 0.00%       | 99.00%       |
|   | large cobble       | 180       |            | 0.00%       | 99.00%       |
|   | very large cobble  | 256       |            | 0.00%       | 99.00%       |
| BOULDER   | small boulder      | 362       |            | 0.00%       | 99.00%       |
|   | small boulder      | 512       |            | 0.00%       | 99.00%       |
|   | medium boulder     | 1024      |            | 0.00%       | 99.00%       |
|   | large boulder      | 2048      | 1          | 1.00%       | 100.00%      |
| BEDROCK   |                    |           |            | 0.00%       | 100.00%      |
| <b>TOTAL % of whole count:</b>  |                    |           | <b>100</b> | <b>100%</b> | <b>100%</b>  |

| Summary Data |     |
|--------------|-----|
| D50          | 1.1 |
| D84          | 4.3 |
| D95          | 18  |



**Table 9. Stream Bank Erosion Pin Data**

Not Applicable



Table 10a and b. Baseline Stream Summary Data

| Table 10a. Baseline Stream Data Summary                                |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
|--|--------------------|----------------|----|-----|------------------------|-------|-------|-------|-----------------|---|--------------------------|------|-------------|------|-----------------|---|--------|------|--------|---------------------|------|--------|--------|-----------------|---|
| Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 1 |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Parameter  | Gauge <sup>2</sup> | Regional Curve |    |     | Pre-Existing Condition |       |       |       |                 |   | Reference Reach(es) Data |      |             |      |                 |   | Design |      |        | Monitoring Baseline |      |        |        |                 |   |
| Dimension and Substrate  |                    | LL             | UL | Eq. | Min                    | Mean  | Med   | Max   | SD <sup>5</sup> | n | Min                      | Mean | Med         | Max  | SD <sup>5</sup> | n | Min    | Med  | Max    | Min                 | Mean | Med    | Max    | SD <sup>5</sup> | n |
| Bankfull Width (ft)  |                    |                |    |     |                        |       | 11.2  |       |                 |   | 14                       |      | 14.4        | 16.7 |                 |   |        | 14.5 |        | 13.8                |      | 21.8   | 29.7   |                 |   |
| Floodprone Width (ft)  |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Bankfull Mean Depth (ft)   |                    |                |    |     |                        |       | 0.7   |       |                 |   | 0.8                      |      | 0.9         | 0.9  |                 |   |        | 1.04 |        | 1.2                 |      | 1.5    | 1.8    |                 |   |
| <sup>1</sup> Bankfull Max Depth (ft)                                   |                    |                |    |     |                        |       | 1.2   |       |                 |   | 1.4                      |      | 1.8         | 2    |                 |   |        | 2.3  |        | 2.3                 |      | 2.9    | 3.4    |                 |   |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )                       |                    |                |    |     |                        |       | 8     |       |                 |   | 12.2                     |      | 15.5        | 13.7 |                 |   |        | 15   |        | 25.1                |      | 29.7   | 34.2   |                 |   |
| Width/Depth Ratio  |                    |                |    |     |                        |       | 15.6  |       |                 |   | 16                       |      | 17.6        | 18   |                 |   |        | 14   |        | 7.6                 |      | 16.7   | 25.8   |                 |   |
| Entrenchment Ratio   |                    |                |    |     |                        |       | 2     |       |                 |   | 3                        |      | 6.1         | 13.6 |                 |   |        | >8   |        | 4.3                 |      | 7.8    | 11.2   |                 |   |
| <sup>1</sup> Bank Height Ratio   |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| <b>Profile</b>   |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Riffle Length (ft)   |                    |                |    |     |                        |       |       |       |                 |   | 4                        |      |             | 18   |                 |   |        |      |        | 17                  |      | 32     | 68     |                 |   |
| Riffle Slope (ft/ft)   |                    |                |    |     |                        | 0.009 |       | 0.067 |                 |   | 0.00033                  |      | 0.1125      |      |                 |   | 0.007  |      | 0.02   | 0.001               |      | 0.008  | 0.02   |                 |   |
| Pool Length (ft)   |                    |                |    |     |                        |       |       |       |                 |   | 6                        |      |             | 41.5 |                 |   |        |      |        | 0.0013              |      | 0.0027 | 0.0035 |                 |   |
| Pool Max depth (ft)  |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Pool Spacing (ft)  |                    |                |    |     |                        | 4     |       | 78    |                 |   | 14                       |      |             | 95.8 |                 |   | 36.5   |      | 58     | 31                  |      |        | 43     |                 |   |
| <b>Pattern</b>   |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Channel Beltwidth (ft)   |                    |                |    |     | 12                     |       |       | 16    |                 |   | 5                        |      |             | 40   |                 |   | 36     |      | 65     | 37.9                |      | 37.9   | 58.2   |                 |   |
| Radius of Curvature (ft)   |                    |                |    |     | 6                      |       |       | 12    |                 |   | 11                       |      |             | 90   |                 |   | 29     |      | 44     | 10.9                |      | 18.59  | 26.2   |                 |   |
| Rc Bankfull width (ft/ft)  |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Meander Wavelength (ft)  |                    |                |    |     |                        |       |       |       |                 |   | 14                       |      |             | 67   |                 |   | 46     |      | 83     | 68.7                |      | 98.5   | 80.1   |                 |   |
| Meander Width Ratio  |                    |                |    |     | 1.1                    |       |       | 1.4   |                 |   |                          |      |             |      |                 |   | 2.5    |      | 4.5    |                     |      |        |        |                 |   |
| <b>Transport parameters</b>  |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Reach Shear Stress (competency) lb/ft <sup>2</sup>                     |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Max part size (mm) mobilized at bankfull                               |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Stream Power (transport capacity) W/m <sup>2</sup>                     |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| <b>Additional Reach Parameters</b>                                     |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Rosgen Classification  |                    |                |    |     |                        |       |       | E4    |                 |   |                          |      | C4/C5       |      |                 |   |        |      | C4/C5  |                     |      |        |        |                 |   |
| Bankfull Velocity (fps)  |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Bankfull Discharge (cfs)   |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Valley length (ft)   |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Channel Thalweg length (ft)  |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Sinuosity (ft)   |                    |                |    |     |                        |       | 1     |       |                 |   |                          |      | 1.2-1.5     |      |                 |   |        |      | 1.3    |                     |      |        |        |                 |   |
| Water Surface Slope (Channel) (ft/ft)                                  |                    |                |    |     |                        |       | 0.011 |       |                 |   |                          |      | 0.011-0.025 |      |                 |   |        |      | 0.0066 |                     |      |        |        |                 |   |
| BF slope (ft/ft)   |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| <sup>2</sup> Bankfull Floodplain Area (acres)                          |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| <sup>4</sup> % of Reach with Eroding Banks                             |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Channel Stability or Habitat Metric                                    |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |
| Biological or Other  |                    |                |    |     |                        |       |       |       |                 |   |                          |      |             |      |                 |   |        |      |        |                     |      |        |        |                 |   |

Table 10a. Baseline Stream Data Summary  
 Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 2

| Parameter  | Gauge <sup>2</sup> | Regional Curve |    |     | Pre-Existing Condition |      |     |        |                 |   | Reference Reach(es) Data |      |             |        |                 |   | Design |       |     | Monitoring Baseline |       |        |        |                 |   |  |
|--|--------------------|----------------|----|-----|------------------------|------|-----|--------|-----------------|---|--------------------------|------|-------------|--------|-----------------|---|--------|-------|-----|---------------------|-------|--------|--------|-----------------|---|--|
|  |                    | LL             | UL | Eq. | Min                    | Mean | Med | Max    | SD <sup>5</sup> | n | Min                      | Mean | Med         | Max    | SD <sup>5</sup> | n | Min    | Med   | Max | Min                 | Mean  | Med    | Max    | SD <sup>5</sup> | n |  |
| <b>Dimension and Substrate</b>                     |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Bankfull Width (ft)                                |                    |                |    |     | 10.5                   |      |     | 15.1   |                 |   | 14                       |      | 14.4        | 16.7   |                 |   |        | 16.1  |     | 15.4                |       | 17.8   | 21.1   |                 |   |  |
| Floodprone Width (ft)                              |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Bankfull Mean Depth (ft)                           |                    |                |    |     | 0.9                    |      |     | 1.4    |                 |   | 0.8                      |      | 0.9         | 0.9    |                 |   |        | 1.15  |     | 17.9                |       | 20.4   | 22.8   |                 |   |  |
| <sup>1</sup> Bankfull Max Depth (ft)               |                    |                |    |     | 1.9                    |      |     | 2.5    |                 |   | 1.4                      |      | 1.8         | 2      |                 |   |        | 2.5   |     | 1.88                |       | 2.29   | 2.54   |                 |   |  |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )   |                    |                |    |     | 14.3                   |      |     | 14.8   |                 |   | 12.2                     |      | 15.5        | 13.7   |                 |   |        | 18.5  |     | 17.9                |       | 20.4   | 22.8   |                 |   |  |
| Width/Depth Ratio                                  |                    |                |    |     |                        |      |     |        |                 |   | 16                       |      | 17.6        | 18     |                 |   |        | 14    |     | 11.69               |       | 16.4   | 17.24  |                 |   |  |
| Entrenchment Ratio                                 |                    |                |    |     |                        |      |     | 1.4    |                 |   | 3                        |      | 6.1         | 13.6   |                 |   |        | >11   |     | 2.27                |       | 5.8    | 8.07   |                 |   |  |
| <sup>1</sup> Bank Height Ratio                     |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| <b>Profile</b>                                     |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Riffle Length (ft)                                 |                    |                |    |     |                        |      |     |        |                 |   | 4                        |      |             | 18     |                 |   |        |       |     | 17                  |       | 32     | 68     |                 |   |  |
| Riffle Slope (ft/ft)                               |                    |                |    |     | 0.009                  |      |     | 0.045  |                 |   | 0.00033                  |      |             | 0.1125 |                 |   |        | 0.005 |     | 0.015               | 0.001 | 0.008  | 0.02   |                 |   |  |
| Pool Length (ft)                                   |                    |                |    |     |                        |      |     |        |                 |   | 6                        |      |             | 41.5   |                 |   |        |       |     | 0.0013              |       | 0.0027 | 0.0035 |                 |   |  |
| Pool Max depth (ft)                                |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Pool Spacing (ft)                                  |                    |                |    |     | 30                     |      |     | 86     |                 |   | 14                       |      |             | 95.8   |                 |   |        | 36.5  |     | 80.5                | 31    |        | 43     |                 |   |  |
| <b>Pattern</b>                                     |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Channel Bellwidth (ft)                             |                    |                |    |     | 10                     |      |     | 37     |                 |   | 5                        |      |             | 40     |                 |   |        | 40    |     | 72                  | 32.2  |        | 61     | 45              |   |  |
| Radius of Curvature (ft)                           |                    |                |    |     | 6                      |      |     | 35     |                 |   | 11                       |      |             | 90     |                 |   |        | 32    |     | 48                  | 18.3  |        | 24.4   | 31.8            |   |  |
| Rc:Bankfull width (ft/ft)                          |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Meander Wavelength (ft)                            |                    |                |    |     | 40                     |      |     | 95     |                 |   | 14                       |      |             | 67     |                 |   |        | 51    |     | 91                  | 76.9  |        | 113.3  |                 |   |  |
| Meander Width Ratio                                |                    |                |    |     | 1                      |      |     | 1.9    |                 |   |                          |      |             |        |                 |   |        | 2.5   |     | 4.5                 |       |        |        |                 |   |  |
| <b>Transport parameters</b>                        |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Reach Shear Stress (competency) lb/ft <sup>2</sup> |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Max part size (mm) mobilized at bankfull           |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Stream Power (transport capacity) W/m <sup>2</sup> |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| <b>Additional Reach Parameters</b>                 |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Rosgen Classification                              |                    |                |    |     |                        |      |     | F4/G4  |                 |   |                          |      |             | C4/C5  |                 |   |        |       |     | C4/C5               |       |        |        |                 |   |  |
| Bankfull Velocity (fps)                            |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Bankfull Discharge (cfs)                           |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Valley length (ft)                                 |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Channel Thalweg length (ft)                        |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Sinuosity (ft)                                     |                    |                |    |     |                        |      |     | 1.1    |                 |   |                          |      | 1.2-1.5     |        |                 |   |        |       |     | 1.3                 |       |        |        |                 |   |  |
| Water Surface Slope (Channel) (ft/ft)              |                    |                |    |     |                        |      |     | 0.0055 |                 |   |                          |      | 0.011-0.025 |        |                 |   |        |       |     | 0.0066              |       |        |        |                 |   |  |
| BF slope (ft/ft)                                   |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| <sup>3</sup> Bankfull Floodplain Area (acres)      |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| <sup>4</sup> % of Reach with Eroding Banks         |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Channel Stability or Habitat Metric                |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |
| Biological or Other                                |                    |                |    |     |                        |      |     |        |                 |   |                          |      |             |        |                 |   |        |       |     |                     |       |        |        |                 |   |  |

Table 10a. Baseline Stream Data Summary  
 Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 3

| Parameter  | Gauge <sup>2</sup> | Regional Curve |    |     | Pre-Existing Condition |      |     |        |                 |   | Reference Reach(es) Data |      |     |      |                 |   | Design |      |     | Monitoring Baseline |      |        |        |                 |   |  |
|--|--------------------|----------------|----|-----|------------------------|------|-----|--------|-----------------|---|--------------------------|------|-----|------|-----------------|---|--------|------|-----|---------------------|------|--------|--------|-----------------|---|--|
|  |                    | LL             | UL | Eq. | Min                    | Mean | Med | Max    | SD <sup>5</sup> | n | Min                      | Mean | Med | Max  | SD <sup>5</sup> | n | Min    | Med  | Max | Min                 | Mean | Med    | Max    | SD <sup>5</sup> | n |  |
| <b>Dimension and Substrate</b>                     |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Bankfull Width (ft)                                |                    |                |    |     | 9.5                    |      |     | 15.5   |                 |   | 14                       |      |     | 14.4 | 16.7            |   |        | 17.1 | Max | 16.9                | Mean | 18.1   | Max    | 18.8            |   |  |
| Floodprone Width (ft)                              |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Bankfull Mean Depth (ft)                           |                    |                |    |     | 1.4                    |      |     | 2      |                 |   | 0.8                      |      |     | 0.9  | 0.9             |   |        | 1.22 | Max | 1.1                 | Mean | 1.4    | Max    | 1.8             |   |  |
| <sup>1</sup> Bankfull Max Depth (ft)               |                    |                |    |     | 2.1                    |      |     | 2.6    |                 |   | 1.4                      |      |     | 1.8  | 2               |   |        | 2.7  | Max | 1.75                | Mean | 2.41   | Max    | 3.23            |   |  |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )   |                    |                |    |     | 19.2                   |      |     | 21.9   |                 |   | 12.2                     |      |     | 15.5 | 13.7            |   |        | 21   | Max | 20.1                | Mean | 25.5   | Max    | 33.6            |   |  |
| Width/Depth Ratio                                  |                    |                |    |     |                        |      |     |        |                 |   | 16                       |      |     | 17.6 | 18              |   |        | 14   | Max | 10.48               | Mean | 13.41  | Max    | 17.24           |   |  |
| Entrenchment Ratio                                 |                    |                |    |     |                        |      |     |        |                 |   | 3                        |      |     | 6.1  | 13.6            |   |        | 3    | Max | 4.06                | Mean | 10.17  | Max    | 4.42            |   |  |
| <sup>1</sup> Bank Height Ratio                     |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| <b>Profile</b>                                     |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Riffle Length (ft)                                 |                    |                |    |     |                        |      |     |        |                 |   | 4                        |      |     |      | 18              |   |        |      |     |                     | 17   |        | 32     | 68              |   |  |
| Riffle Slope (ft/ft)                               |                    |                |    |     | 0.01                   |      |     | 0.07   |                 |   | 0.00083                  |      |     |      | 0.1125          |   |        |      |     | 0.001               |      | 0.008  | 0.02   |                 |   |  |
| Pool Length (ft)                                   |                    |                |    |     |                        |      |     |        |                 |   | 6                        |      |     |      | 41.5            |   |        |      |     | 0.0013              |      | 0.0027 | 0.0035 |                 |   |  |
| Pool Max depth (ft)                                |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Pool Spacing (ft)                                  |                    |                |    |     | 18                     |      |     | 122    |                 |   | 14                       |      |     |      | 95.8            |   |        |      |     | 31                  |      |        | 43     |                 |   |  |
| <b>Pattern</b>                                     |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Channel Beltwidth (ft)                             |                    |                |    |     | 9                      |      |     | 79     |                 |   | 5                        |      |     |      | 40              |   |        |      |     | 19.4                |      | 32.4   | 43.2   |                 |   |  |
| Radius of Curvature (ft)                           |                    |                |    |     | 4                      |      |     | 33     |                 |   | 11                       |      |     |      | 90              |   |        |      |     | 15.29               |      | 19.58  | 23.3   |                 |   |  |
| Rc:Bankfull width (ft/ft)                          |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Meander Wavelength (ft)                            |                    |                |    |     | 19                     |      |     | 135    |                 |   | 14                       |      |     |      | 67              |   |        |      |     | 78.8                |      |        | 123.3  |                 |   |  |
| Meander Width Ratio                                |                    |                |    |     | 1                      |      |     | 6.2    |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| <b>Transport parameters</b>                        |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Reach Shear Stress (competency) lb/ft <sup>2</sup> |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Max part size (mm) mobilized at bankfull           |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Stream Power (transport capacity) W/m <sup>2</sup> |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| <b>Additional Reach Parameters</b>                 |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Rosgen Classification                              |                    |                |    |     |                        |      |     | G4     |                 |   |                          |      |     |      |                 |   |        |      |     | CA/CS               |      |        |        |                 |   |  |
| Bankfull Velocity (fps)                            |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Bankfull Discharge (cfs)                           |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Valley length (ft)                                 |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Channel Thalweg length (ft)                        |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Sinuosity (ft)                                     |                    |                |    |     |                        |      |     | 1.1    |                 |   |                          |      |     |      | 1.2-1.5         |   |        |      |     |                     |      |        |        |                 |   |  |
| Water Surface Slope (Channel) (ft/ft)              |                    |                |    |     |                        |      |     | 0.0067 |                 |   |                          |      |     |      | 0.011-0025      |   |        |      |     |                     |      |        |        |                 |   |  |
| BF slope (ft/ft)                                   |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| <sup>3</sup> Bankfull Floodplain Area (acres)      |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| <sup>4</sup> % of Reach with Eroding Banks         |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Channel Stability or Habitat Metric                |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |
| Biological or Other                                |                    |                |    |     |                        |      |     |        |                 |   |                          |      |     |      |                 |   |        |      |     |                     |      |        |        |                 |   |  |

**Table 11a and b. Monitoring - Cross-Section Morphology Table**

| Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections) |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
|---|-----------------|--------|--------|--------|--------|-----|-----|-----------------|--------|--------|--------|--------|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|------------------|-----|-----|-----|-----|-----|-----|
| Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 1 (991 LF)                       |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Based on fixed baseline bankfull elevation  | Cross Section 1 |        |        |        |        |     |     | Cross Section 2 |        |        |        |        |     |     | Cross Section 3 |     |     |     |     |     |     | Cross Section 4 |     |     |     |     |     |     | Cross Section 5  |     |     |     |     |     |     |
|   | 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   | 291.72          | 291.72 | 291.72 | 291.72 | 291.72 |     |     | 288.10          | 288.10 | 288.10 | 288.10 | 288.10 |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Width (ft)   | 13.80           | 15.48  | 13.89  | 25.10  | 13.90  |     |     | 17.35           | 19.12  | 21.34  | 12.20  | 27.90  |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Floodprone Width (ft)   | 154.80          | 154.80 | 154.80 | 116.00 | 117.40 |     |     | 87.00           | 87.00  | 87.00  | 88.20  | 134.00 |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Mean Depth (ft)  | 1.80            | 1.45   | 1.81   | 1.00   | 1.20   |     |     | 0.99            | 0.96   | 0.85   | 0.90   | 0.90   |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Max Depth (ft)   | 3.40            | 2.89   | 3.13   | 2.70   | 2.80   |     |     | 2.21            | 2.34   | 3.14   | 1.90   | 2.40   |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )  | 25.10           | 22.40  | 25.09  | 24.90  | 18.30  |     |     | 17.23           | 18.39  | 18.04  | 20.10  | 21.60  |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Width/Depth Ratio  | 7.60            | 10.39  | 7.69   | 25.20  | 13.40  |     |     | 17.33           | 19.80  | 25.24  | 24.70  | 36.10  |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Entrenchment Ratio   | 11.20           | 10.00  | 11.09  | 4.60   | 7.40   |     |     | 5.04            | 4.55   | 4.03   | 4.40   | 4.40   |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Bank Height Ratio  | 1.00            | 1.00   | 1.00   | 1.00   | 1.00   |     |     | 1.00            | 1.00   | 1.00   | 1.00   | 1.00   |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Cross Sectional Area between end pins (ft <sup>2</sup> )  |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| d50 (mm)  | 0.81            | 0.36   | 0.6    |        | 0.35   |     |     | 0.57            | N/A    | N/A    | N/A    | N/A    |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Based on fixed baseline bankfull elevation  | Cross Section 6 |        |        |        |        |     |     | Cross Section 7 |        |        |        |        |     |     | Cross Section 8 |     |     |     |     |     |     | Cross Section 9 |     |     |     |     |     |     | Cross Section 10 |     |     |     |     |     |     |
|   | Base            | MY1    | MY2    | MY3    | MY4    | MY5 | MY+ | Base            | MY1    | MY2    | MY3    | MY4    | MY5 | MY+ | Base            | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base            | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base             | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Record elevation (datum) used   |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Width (ft)   |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Floodprone Width (ft)   |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Mean Depth (ft)  |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Max Depth (ft)   |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )  |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Width/Depth Ratio  |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Entrenchment Ratio   |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Bankfull Bank Height Ratio  |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| Cross Sectional Area between end pins (ft <sup>2</sup> )  |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |
| d50 (mm)  |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |     |     |     |     |     |     |                 |     |     |     |     |     |     |                  |     |     |     |     |     |     |

1. MY01 monitoring did not separate these parameters based on the separate reaches.

**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary  
Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 1 (991 LF)**

| Parameter  | Baseline |      | MY-1 |     |                 |                 | MY-2  |      |        |        | MY-3            |      |      |        | MY-4  |     |                 |       | MY-5   |       |     |       |                 |       |       |       |       |       |                 |        |  |
|--|----------|------|------|-----|-----------------|-----------------|-------|------|--------|--------|-----------------|------|------|--------|-------|-----|-----------------|-------|--------|-------|-----|-------|-----------------|-------|-------|-------|-------|-------|-----------------|--------|--|
|  | Min      | Mean | Med  | Max | SD <sup>1</sup> | SD <sup>2</sup> | Min   | Mean | Med    | Max    | SD <sup>1</sup> | n    | Min  | Mean   | Med   | Max | SD <sup>1</sup> | n     | Min    | Mean  | Med | Max   | SD <sup>1</sup> | n     | Min   | Mean  | Med   | Max   | SD <sup>1</sup> | n      |  |
| <b>Dimension and Substrate - Riffle only</b>     |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Bankfull Width (ft)                              |          |      |      |     |                 | 15.9            | 13.8  |      | 15.58  | 17.35  |                 |      | 27.9 | 17.26  | 19.12 |     |                 | 13.89 | 17.62  | 21.34 |     |       | 12.2            | 18.45 | 25.1  |       | 15.9  | 21.9  | 27.9            |        |  |
| Floodprone Width (ft)                            |          |      |      |     |                 | 117.4           | 87    |      | 120.5  | 154    |                 |      | 124  | 120.5  | 154   |     |                 | 87    | 120.5  | 154   |     |       | 88.2            | 102.1 | 116   |       | 117.4 | 120.7 | 124             |        |  |
| Bankfull Mean Depth (ft)                         |          |      |      |     |                 | 1.2             | 0.99  |      | 1.395  | 1.8    |                 |      | 0.8  | 1.289  | 1.455 |     |                 | 0.845 | 1.326  | 1.606 |     |       | 0.8             | 0.9   | 1     |       | 0.8   | 1     | 1.2             |        |  |
| Bankfull Max Depth (ft)                          |          |      |      |     |                 | 2.3             | 2.21  |      | 2.805  | 3.4    |                 |      | 2.6  | 2.56   | 2.88  |     |                 | 2.14  | 2.635  | 3.13  |     |       | 1.9             | 2.3   | 2.7   |       | 2.6   | 2.7   | 2.8             |        |  |
| Bankfull Cross Sectional Area (ft <sup>2</sup> ) |          |      |      |     |                 | 18.2            | 17.23 |      | 21.17  | 25.1   |                 |      | 21.6 | 20.4   | 23.4  |     |                 | 18.04 | 21.57  | 25.09 |     |       | 20.1            | 22.55 | 24.99 |       | 18.8  | 20.2  | 21.8            |        |  |
| Width/Depth Ratio                                |          |      |      |     |                 | 13.4            | 7.6   |      | 12.57  | 17.53  |                 |      | 36.1 | 15.24  | 19.89 |     |                 | 7.69  | 16.47  | 25.24 |     |       | 24.7            | 24.95 | 25.2  |       | 13.4  | 24.75 | 36.1            |        |  |
| Entrenchment Ratio                               |          |      |      |     |                 | 7.4             | 5.04  |      | 8.12   | 11.2   |                 |      | 4.4  | 7.275  | 10    |     |                 | 4.077 | 7.584  | 11.09 |     |       | 4.4             | 4.5   | 4.6   |       | 4.4   | 5.9   | 7.4             |        |  |
| Bank Height Ratio                                |          |      |      |     |                 | 1               | 1     |      | 1      | 1      |                 |      | 1    | 1      | 1     |     |                 | 1     | 1      | 1     |     |       | 1               | 6     | 11    |       | 1     | 1     | 1               |        |  |
| <b>Profile</b>                                   |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Riffle Length (ft)                               |          |      |      |     |                 | 0.85            | 3.77  |      | 18.61  | 109.38 |                 |      | 14.9 | 41     |       |     | 12              | 35    | 67     |       |     | 10.15 | 47.55           | 84.95 |       | 13.40 | 45.20 | 77.00 |                 |        |  |
| Riffle Slope (ft/ft)                             |          |      |      |     |                 | 0.036           | 0.04  |      | 1.7    |        |                 | 0.01 | 0.07 | 0.41   |       |     | 0.01            | 0.03  | 0.03   |       |     | 0.01  | 0.195           | 0.38  |       | 0.01  | 0.20  | 0.39  |                 |        |  |
| Pool Length (ft)                                 |          |      |      |     |                 | 9.86            | 40.88 |      | 73.65  |        |                 | 9    | 30   | 56     |       |     | 18              | 46    | 79     |       |     |       | 83              | 83    |       | 12.10 | 48.15 | 84.20 |                 |        |  |
| Pool Max depth (ft)                              |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Pool Spacing (ft)                                |          |      |      |     |                 | 3.77            | 18.1  |      | 97.6   |        |                 | 17   | 47.3 | 107    |       |     | 21              | 79    | 136    |       |     | 18.6  | 60.45           | 102.3 |       | 21.30 | 96.50 | 91.70 |                 |        |  |
| <b>Pattern</b>                                   |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Channel Beltwidth (ft)                           |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Radius of Curvature (ft)                         |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Rc: Bankfull width (ft/ft)                       |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Meander Wavelength (ft)                          |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Meander Width Ratio                              |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| <b>Additional Reach Parameters</b>               |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Rosgen Classification                            |          |      |      |     |                 |                 |       |      | C4/C5  |        |                 |      |      | C4     |       |     |                 |       | C4     |       |     |       |                 |       |       |       |       |       |                 | C4     |  |
| Channel Thalweg length (ft)                      |          |      |      |     |                 |                 |       |      | 991    |        |                 |      |      | 1033   |       |     |                 |       | 1033   |       |     |       |                 |       |       |       |       |       |                 | 1033   |  |
| Sinuosity (ft)                                   |          |      |      |     |                 |                 |       |      | 1.19   |        |                 |      |      | 1.24   |       |     |                 |       | 1.24   |       |     |       |                 |       |       |       |       |       |                 | 1.24   |  |
| Water Surface Slope (Channel) (ft/ft)            |          |      |      |     |                 |                 |       |      | 0.0067 |        |                 |      |      | 0.0065 |       |     |                 |       | 0.0071 |       |     |       |                 |       |       |       |       |       |                 | 0.0066 |  |
| BF slope (ft/ft)                                 |          |      |      |     |                 |                 |       |      | 0.0085 |        |                 |      |      | 0.0107 |       |     |                 |       | 0.01   |       |     |       |                 |       |       |       |       |       |                 | 0.011  |  |
| % R / Ru% / P% / G% / S%                         |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| % SC / Sa% / G% / C% / B% / Be%                  |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| % d16 / d35 / d50 / d84 / d95                    |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| % of Reach with Eroding Banks                    |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Channel Stability or Habitat Metric              |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |
| Biological or Other                              |          |      |      |     |                 |                 |       |      |        |        |                 |      |      |        |       |     |                 |       |        |       |     |       |                 |       |       |       |       |       |                 |        |  |

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

**Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)  
Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 2 (1309 LF)**

|  | Cross Section 3 |        |        |        |        |     |     | Cross Section 4 |        |        |        |        |     |     | Cross Section 5 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
|--|-----------------|--------|--------|--------|--------|-----|-----|-----------------|--------|--------|--------|--------|-----|-----|-----------------|--------|--------|--------|--------|--------|-----|------|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|
| Based on fixed baseline bankfull elevation               | 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                            | 284.29          | 284.29 | 284.29 | 284.29 | 284.29 |     |     | 283.78          | 283.78 | 283.78 | 283.78 | 283.78 |     |     | 281.58          | 281.58 | 281.58 | 281.58 | 281.58 | 281.58 |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Width (ft)                                      | 16.43           | 16.65  | 16.58  | 32.00  | 26.60  |     |     | 19.42           | 21.58  | 21.58  | 26.00  | 22.10  |     |     | 28.18           | 30.67  | 19.45  | 48.60  | 36.30  |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Floodprone Width (ft)                                    | 53.00           | 54.49  | 55.21  | 55.76  | 50.90  |     |     | 97.00           | 97.00  | 97.00  | 135.10 | 286.70 |     |     | 126.00          | 126.00 | 126.00 | 137.90 | 137.90 |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Mean Depth (ft)                                 | 1.36            | 1.31   | 0.97   | 0.70   | 0.60   |     |     | 1.23            | 1.24   | 1.30   | 1.10   | 1.40   |     |     | 1.56            | 1.27   | 1.89   | 1.00   | 1.00   |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Max Depth (ft)                                  | 2.53            | 2.36   | 2.34   | 2.40   | 2.60   |     |     | 2.71            | 2.68   | 2.75   | 3.30   | 2.90   |     |     | 3.93            | 3.78   | 3.72   | 3.90   | 4.40   |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )         | 19.10           | 18.54  | 16.06  | 21.40  | 16.30  |     |     | 23.93           | 26.88  | 28.15  | 27.60  | 30.60  |     |     | 43.98           | 38.96  | 36.36  | 39.00  | 34.80  |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Width/Depth Ratio                               | 14.16           | 14.95  | 17.13  | 47.90  | 43.40  |     |     | 4.98            | 4.49   | 4.40   | 24.50  | 15.90  |     |     | 13.04           | 24.14  | 18.26  | 42.30  | 37.90  |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Entrenchment Ratio                              | 3.23            | 3.27   | 3.33   | 1.70   | 1.90   |     |     | 20.61           | 22.84  | 22.99  | 5.30   | 6.90   |     |     | 4.47            | 4.11   | 6.46   | 3.40   | 3.80   |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Bank Height Ratio                               | 1.00            | 1.00   | 1.00   | 1.00   | 1.00   |     |     | 1.00            | 0.85   | 0.95   | 1.00   | 1.00   |     |     | 1.00            | 0.99   | 0.92   | 1.00   | 1.00   |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Cross Sectional Area between end pins (ft <sup>2</sup> ) |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| d50 (mm)   | 1.31            | 0.68   | 0.13   |        | 0.31   |     |     | 0.43            | N/A    | N/A    | N/A    | N/A    |     |     | 7.01            | 8      | 3.9    |        | 1.7    |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Based on fixed baseline bankfull elevation               | Base            | MY1    | MY2    | MY3    | MY4    | MY5 | MY+ | Base            | MY1    | MY2    | MY3    | MY4    | MY5 | MY+ | Base            | MY1    | MY2    | MY3    | MY4    | MY5    | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Record elevation (datum) used                            |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Width (ft)                                      |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Floodprone Width (ft)                                    |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Mean Depth (ft)                                 |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Max Depth (ft)                                  |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )         |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Width/Depth Ratio                               |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Entrenchment Ratio                              |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Bank Height Ratio                               |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Cross Sectional Area between end pins (ft <sup>2</sup> ) |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| d50 (mm)   |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |        |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |

1. MY-01 monitoring did not separate these parameters based on the separate reaches.  
2. This reach has two distinct slopes with the transition at approximate station 27+00.

**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary  
Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 2 (1309 LF)**

| Parameter  | Baseline |       |       |     |                 |                 | MY-1  |       |        |     |                 |   | MY-2 |       |       |     |                 |   | MY-3 |      |       |     |                 |   | MY-4  |        |        |     |                 |   | MY-5  |       |        |     |                 |   |
|--|----------|-------|-------|-----|-----------------|-----------------|-------|-------|--------|-----|-----------------|---|------|-------|-------|-----|-----------------|---|------|------|-------|-----|-----------------|---|-------|--------|--------|-----|-----------------|---|-------|-------|--------|-----|-----------------|---|
|  | Min      | Mean  | Med   | Max | SD <sup>a</sup> | SD <sup>a</sup> | Min   | Mean  | Med    | Max | SD <sup>a</sup> | n | Min  | Mean  | Med   | Max | SD <sup>a</sup> | n | Min  | Mean | Med   | Max | SD <sup>a</sup> | n | Min   | Mean   | Med    | Max | SD <sup>a</sup> | n | Min   | Mean  | Med    | Max | SD <sup>a</sup> | n |
| <b>Dimension and Substrate - Riffle only</b>     |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Bankfull Width (ft)                              | 32       | 26    | 40.6  |     | 15.9            | 16.43           | 22.31 | 28.18 |        |     |                 |   | 27.9 | 23.66 | 30.67 |     |                 |   | 26   | 33.3 | 40.6  |     |                 |   | 26    | 33.3   | 40.6   |     |                 |   | 22.10 | 29.2  | 36.38  |     |                 |   |
| Floodprone Width (ft)                            | 33.7     | 135.1 | 137.9 |     |                 | 117.4           | 53    | 89.5  | 126    |     |                 |   | 124  | 90.34 | 126   |     |                 |   | 55.7 | 96.8 | 137.9 |     |                 |   | 55.7  | 96.8   | 137.9  |     |                 |   | 30.90 | 168.8 | 286.70 |     |                 |   |
| Bankfull Mean Depth (ft)                         | 0.7      | 1.1   | 1     |     |                 | 1.2             | 1.16  | 1.36  | 1.56   |     |                 |   | 0.8  | 1.192 | 1.27  |     |                 |   | 0.7  | 0.9  | 1.1   |     |                 |   | 0.7   | 0.9    | 1.1    |     |                 |   | 0.60  | 1     | 1.40   |     |                 |   |
| Bankfull Max Depth (ft)                          | 2.4      | 3.2   | 3.9   |     |                 | 2.8             | 2.32  | 3.125 | 3.93   |     |                 |   | 2.6  | 3.068 | 3.775 |     |                 |   | 2.4  | 3.15 | 3.9   |     |                 |   | 2.4   | 3.15   | 3.9    |     |                 |   | 2.60  | 3.5   | 4.40   |     |                 |   |
| Bankfull Cross Sectional Area (ft <sup>2</sup> ) | 21.4     | 27.6  | 39    |     |                 | 18.8            | 19.1  | 31.54 | 43.98  |     |                 |   | 21.6 | 28.75 | 38.96 |     |                 |   | 21.4 | 30.2 | 39    |     |                 |   | 21.4  | 30.2   | 39     |     |                 |   | 16.30 | 25.55 | 34.80  |     |                 |   |
| Width/Depth Ratio                                | 47.9     | 24.5  | 42.3  |     |                 | 13.4            | 4.98  | 11.52 | 18.06  |     |                 |   | 36.1 | 14.32 | 24.14 |     |                 |   | 24.5 | 36.2 | 47.9  |     |                 |   | 24.5  | 36.2   | 47.9   |     |                 |   | 13.90 | 29.85 | 43.40  |     |                 |   |
| Entrenchment Ratio                               | 1.7      | 5.2   | 3.4   |     |                 | 7.4             | 3.25  | 11.93 | 20.03  |     |                 |   | 4.4  | 13.85 | 22.84 |     |                 |   | 1.7  | 3.45 | 5.2   |     |                 |   | 1.7   | 3.45   | 5.2    |     |                 |   | 1.90  | 4     | 6.10   |     |                 |   |
| Bank Height Ratio                                | 1        | 1     | 1     |     |                 | 1               | 1     | 1     | 1      |     |                 |   | 1    | 0.925 | 1     |     |                 |   | 1    | 1    | 1     |     |                 |   | 1     | 1      | 1      |     |                 |   | 1     | 1     | 1      |     |                 |   |
| <b>Profile</b>                                   |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Riffle Length (ft)                               |          |       |       |     |                 | 0.83            | 3.77  | 18.66 | 109.38 |     |                 |   |      | 15.6  | 50    |     |                 |   | 12   | 45   | 215   |     |                 |   | 9.366 | 62.343 | 115.32 |     |                 |   | 8.52  |       | 94.30  |     |                 |   |
| Riffle Slope (ft/ft)                             |          |       |       |     |                 | 0.036           | 0.04  | 0.04  | 0.17   |     |                 |   | 0.01 | 0.04  | 0.16  |     |                 |   | 0    | 0.02 | 0.07  |     |                 |   | 0.01  | 0.055  | 0.1    |     |                 |   | 0.01  |       | 0.02   |     |                 |   |
| Pool Length (ft)                                 |          |       |       |     |                 | 9.86            |       | 40.88 | 93.65  |     |                 |   | 37   | 41    | 97    |     |                 |   | 19   | 37   | 37    |     |                 |   | 21.22 | 43.89  | 64.36  |     |                 |   | 13.78 |       | 66.30  |     |                 |   |
| Pool Max depth (ft)                              |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Pool Spacing (ft)                                |          |       |       |     |                 | 3.77            | 18.66 | 97.59 |        |     |                 |   | 24   | 77.7  | 173   |     |                 |   | 33   | 18   | 238   |     |                 |   | 27.91 | 93.23  | 342.55 |     |                 |   | 21.36 |       | 156.40 |     |                 |   |
| <b>Pattern</b>                                   |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Channel Beltwidth (ft)                           |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Radius of Curvature (ft)                         |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Rc: Bankfull width (ft/ft)                       |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Meander Wavelength (ft)                          |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Meander Width Ratio                              |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| <b>Additional Reach Parameters</b>               |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Rosgen Classification                            |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Channel Thalweg length (ft)                      |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Sinuosity (ft)                                   |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Water Surface Slope (Channel) (ft/ft)            |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| BF slope (ft/ft)                                 |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| %R / %Ru / %P / %G / %S                          |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| %SC / %Sa / %G / %C / %B / %E                    |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| d16 / d35 / d50 / d84 / d95                      |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| % of Reach with Eroding Banks                    |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Channel Stability or Habitat Metric              |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |
| Biological or Other                              |          |       |       |     |                 |                 |       |       |        |     |                 |   |      |       |       |     |                 |   |      |      |       |     |                 |   |       |        |        |     |                 |   |       |       |        |     |                 |   |

\*MY-01 monitoring did not separate these parameters based on the separate reaches.  
\*\*This reach has two distinct slopes with the transition at approximate station 27+00.

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

**Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)  
Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 3A (732 LF)**

|  | Cross Section 6 |        |        |        |        |     |     | Cross Section 7 |        |        |        |        |     |     | Cross Section 8 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
|--|-----------------|--------|--------|--------|--------|-----|-----|-----------------|--------|--------|--------|--------|-----|-----|-----------------|--------|--------|--------|--------|-----|-----|------|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|
| <b>Based on fixed baseline bankfull elevation</b>        | 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                            | 277.94          | 277.94 | 277.94 | 277.94 | 277.94 |     |     | 277.93          | 277.93 | 277.93 | 277.93 | 277.93 |     |     | 274.09          | 274.09 | 274.09 | 274.09 | 274.09 |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Width (ft)                                      | 21.63           | 19.46  | 19.92  | 14.20  | 16.40  |     |     | 19.87           | 17.68  | 18.43  | 16.70  | 21.90  |     |     | 19.46           | 19.32  | 20.59  | 32.20  | 18.40  |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Floodprone Width (ft)                                    | 93.00           | 73.47  | 77.67  | 61.40  | 54.40  |     |     | 136.00          | 136.00 | 136.00 | 190.60 | 190.80 |     |     | 75.00           | 73.23  | 76.21  | 71.20  | 70.40  |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Mean Depth (ft)                                 | 1.18            | 1.07   | 0.96   | 0.90   | 0.80   |     |     | 1.91            | 1.96   | 2.62   | 1.70   | 1.90   |     |     | 1.21            | 1.43   | 1.29   | 0.80   | 1.30   |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Max Depth (ft)                                  | 2.34            | 1.79   | 1.68   | 1.50   | 1.30   |     |     | 4.29            | 4.72   | 5.83   | 3.30   | 5.00   |     |     | 2.68            | 2.67   | 2.78   | 2.10   | 2.30   |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )         | 23.54           | 20.82  | 19.02  | 12.40  | 12.30  |     |     | 38.85           | 34.68  | 48.27  | 28.90  | 40.60  |     |     | 23.62           | 27.63  | 26.50  | 23.60  | 24.20  |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Width/Depth Ratio                               | 18.35           | 18.19  | 20.86  | 16.40  | 21.70  |     |     | 10.40           | 9.01   | 7.04   | 9.80   | 11.80  |     |     | 16.08           | 13.51  | 15.99  | 40.40  | 14.80  |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Entrenchment Ratio                              | 4.40            | 4.03   | 3.90   | 4.30   | 3.30   |     |     | 7.96            | 8.82   | 8.46   | 11.40  | 8.70   |     |     | 3.84            | 3.79   | 3.70   | 2.20   | 3.80   |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Bank Height Ratio                               | 1.00            | 1.00   | 1.00   | 1.00   | 1.00   |     |     | 1.00            | 0.93   | 0.93   | 1.00   | 1.00   |     |     | 1.00            | 1.00   | 0.97   | 1.00   | 1.00   |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Cross Sectional Area between end pins (ft <sup>2</sup> ) |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| d50 (mm)   | 3.4             | 7.75   | 11.9   |        | 3.5    |     |     | 0.2             | N/A    | N/A    | N/A    | N/A    |     |     | 0.21            | 0.38   | 12.3   |        | 1.1    |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| <b>Based on fixed baseline bankfull elevation</b>        | Base            | MY1    | MY2    | MY3    | MY4    | MY5 | MY+ | Base            | MY1    | MY2    | MY3    | MY4    | MY5 | MY+ | Base            | MY1    | MY2    | MY3    | MY4    | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Record elevation (datum) used                            |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Width (ft)                                      |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Floodprone Width (ft)                                    |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Mean Depth (ft)                                 |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Max Depth (ft)                                  |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )         |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Width/Depth Ratio                               |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Entrenchment Ratio                              |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Bankfull Bank Height Ratio                               |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| Cross Sectional Area between end pins (ft <sup>2</sup> ) |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |
| d50 (mm)   |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |                 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |

1. MY-01 monitoring did not separate these parameters based on the separate reaches.  
2. This reach has two distinct slopes with the transition at approximate station 36+00.



**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary**  
**Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 1 (991 LF)**

| Parameter  | Baseline |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   | MY-1   |                 |       |     |                 | MY-2 |       |       |        |     | MY-3            |   |  |  |  | MY-4 |  |  |  |  | MY-5 |  |  |  |  |
|--|----------|-------|------|-----|-----------------|-----------------|-------|-------|-------|-----|-----------------|---|-------|-------|-------|-----------------|-----------------|---|-------|-------|-----------------|-----|-----------------|---|--------|-----------------|-------|-----|-----------------|------|-------|-------|--------|-----|-----------------|---|--|--|--|------|--|--|--|--|------|--|--|--|--|
|  | Min      | Mean  | Med  | Max | SD <sup>4</sup> | SD <sup>4</sup> | Min   | Mean  | Med   | Max | SD <sup>4</sup> | n | n     | Mean  | Med   | Max             | SD <sup>4</sup> | n | Min   | Mean  | Med             | Max | SD <sup>4</sup> | n | Min    | Mean            | Med   | Max | SD <sup>4</sup> | n    | Min   | Mean  | Med    | Max | SD <sup>4</sup> | n |  |  |  |      |  |  |  |  |      |  |  |  |  |
| <b>Dimension and Substrate - Rifle only</b>      |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Bankfull Width (ft)                              | 14.2     | 16.7  | 32.2 |     |                 | 15.9            | 19.46 |       |       |     |                 |   | 27.9  | 18.57 | 19.40 |                 |                 |   | 18.43 | 19.51 | 20.59           |     |                 |   | 14.2   | 23.2            | 32.2  |     |                 |      | 16.40 | 19.15 | 21.9   |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Floodprone Width (ft)                            | 61.4     | 198.6 | 71.2 |     |                 | 117.4           | 75    |       |       |     |                 |   | 124   | 114.6 | 156   |                 |                 |   | 78.21 | 116.1 | 156             |     |                 |   | 61.4   | 126             | 190.6 |     |                 |      | 34.40 | 122.6 | 190.8  |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Bankfull Mean Depth (ft)                         | 0.9      | 1.7   | 0.8  |     |                 | 1.2             | 1.18  |       |       |     |                 |   | 0.8   | 1.516 | 1.962 |                 |                 |   | 0.955 | 1.787 | 2.619           |     |                 |   | 0.8    | 1.25            | 1.7   |     |                 |      | 0.8   | 1.35  | 1.9    |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Bankfull Max Depth (ft)                          | 1.5      | 3.8   | 2.1  |     |                 | 2.8             | 2.34  |       |       |     |                 |   | 2.6   | 3.253 | 4.715 |                 |                 |   | 1.68  | 3.757 | 5.835           |     |                 |   | 1.5    | 2.65            | 3.8   |     |                 |      | 1.3   | 3.15  | 5      |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Bankfull Cross Sectional Area (ft <sup>2</sup> ) | 12.4     | 28.9  | 23.6 |     |                 | 18.8            | 23.62 |       |       |     |                 |   | 21.6  | 27.75 | 34.68 |                 |                 |   | 19.02 | 33.65 | 48.27           |     |                 |   | 12.4   | 20.45           | 28.9  |     |                 |      | 12.3  | 26.45 | 40.8   |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Width/Depth Ratio                                | 16.4     | 9.6   | 40.4 |     |                 | 13.4            | 18.4  |       |       |     |                 |   | 36.1  | 13.4  | 18.19 |                 |                 |   | 7.836 | 13.95 | 20.88           |     |                 |   | 9.6    | 25              | 40.4  |     |                 |      | 11.8  | 12.8  | 14     |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Entrenchment Ratio                               | 4.3      | 11.4  | 2.2  |     |                 | 7.4             | 3.84  |       |       |     |                 |   | 4.4   | 6.387 | 8.824 |                 |                 |   | 3.702 | 8.083 | 8.465           |     |                 |   | 2.2    | 6.8             | 11.4  |     |                 |      | 3.3   | 8     | 8.7    |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Bank Height Ratio                                | 1        | 1     | 1    |     |                 | 1               | 1     |       |       |     |                 |   | 1     | 0.963 | 1     |                 |                 |   | 0.975 | 0.987 | 1               |     |                 |   | 1      | 1               | 1     |     |                 |      | 1     | 1     | 1      |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| <b>Profile</b>                                   |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Rifle Length (ft)                                |          |       |      |     |                 | 0.85            | 3.77  |       |       |     |                 |   |       | 13.4  | 69    |                 |                 |   | 7     | 19    | 36              |     |                 |   | 8.1    | 30.735          | 93.41 |     |                 |      | 7.10  |       | 88.30  |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Rifle Slope (ft/ft)                              |          |       |      |     |                 | 0.096           |       | 0.04  | 1.7   |     |                 |   | 0.807 | 0.03  | 0.13  |                 |                 |   | 0     | 0.84  | 0.14            |     |                 |   | 0.801  | 0.0335          | 0.11  |     |                 |      | 0.82  |       | 0.03   |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Pool Length (ft)                                 |          |       |      |     |                 | 9.86            |       | 40.88 | 93.65 |     |                 |   | 10    | 27.4  | 54    |                 |                 |   | 23    | 50    | 111             |     |                 |   | 13.26  | 36.3            | 99.74 |     |                 |      | 21.50 |       | 80.170 |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Pool Max depth (ft)                              |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Pool Spacing (ft)                                |          |       |      |     |                 | 3.77            |       | 18.85 | 97.59 |     |                 |   | 15    | 37.7  | 73    |                 |                 |   | 28    | 76    | 115             |     |                 |   | 18.622 | 32.411          | 86.2  |     |                 |      | 19.90 |       | 22.80  |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| <b>Pattern</b>                                   |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Channel Beltwidth (ft)                           |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Radius of Curvature (ft)                         |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Rc: Bankfull width (ft/ft)                       |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Meander Wavelength (ft)                          |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Meander Width Ratio                              |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| <b>Additional Reach Parameters</b>               |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Rosgen Classification                            |          |       |      |     |                 |                 |       |       |       |     | C4C3            |   |       |       |       | C4              |                 |   |       |       | C4              |     |                 |   |        | C4              |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Channel Thalweg length (ft)                      |          |       |      |     |                 |                 |       |       |       |     | 732             |   |       |       |       | 790             |                 |   |       |       | 790             |     |                 |   |        | 800             |       |     |                 |      | 790   |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Sinuosity (ft)                                   |          |       |      |     |                 |                 |       |       |       |     | 1.17            |   |       |       |       | 1.26            |                 |   |       |       | 1.26            |     |                 |   |        | 1.26            |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Water Surface Slope (Channel) (ft/ft)            |          |       |      |     |                 |                 |       |       |       |     | 0.0069          |   |       |       |       | 0.0020/0.0127** |                 |   |       |       | 0.0014/0.0119** |     |                 |   |        | 0.0015/0.0116** |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| BF slope (ft/ft)                                 |          |       |      |     |                 |                 |       |       |       |     | 0.0058          |   |       |       |       | 0.0027/0.0132** |                 |   |       |       | 0.0034/0.0124** |     |                 |   |        | 0.0025/0.0125** |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| R% / Ru% / P% / G% / S%                          |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| SC% / Sa% / G% / C% / B% / Be%                   |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| d16 / d35 / d50 / d84 / d95                      |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| % of Reach with Eroding Banks                    |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Channel Stability or Habitat Metric              |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |
| Biological or Other                              |          |       |      |     |                 |                 |       |       |       |     |                 |   |       |       |       |                 |                 |   |       |       |                 |     |                 |   |        |                 |       |     |                 |      |       |       |        |     |                 |   |  |  |  |      |  |  |  |  |      |  |  |  |  |

\*MY-01 monitoring did not separate these parameters based on the separate reaches.  
 \*\*This reach has two distinct slopes with the transition at approximate station 27+00.

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

**Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)  
Little Beaver Creek Stream Restoration Project - EEP No. 221 - Tributary 1 (381 LF)**

|  | Cross Section Trib 1 |        |        |        |        |     |     | Cross Section Trib 2 |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
|--|----------------------|--------|--------|--------|--------|-----|-----|----------------------|--------|--------|--------|--------|-----|-----|------|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|
|  | 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 |
| <b>Based on fixed baseline bankfull elevation</b>        |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Record elevation (datum) used                            | 287.11               | 287.11 | 287.11 | 287.11 | 287.11 |     |     | 286.30               | 286.30 | 286.30 | 286.30 | 286.30 |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Width (ft)                                      | 12.48                | 14.08  | 15.07  | 18.08  | 19.20  |     |     | 9.46                 | 13.81  | 12.61  | 15.30  | 11.60  |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Floodprone Width (ft)                                    | 42.00                | 38.84  | 38.26  | 41.60  | 44.90  |     |     | 53.80                | 60.33  | 68.26  | 38.30  | 68.20  |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Mean Depth (ft)                                 | 0.83                 | 0.63   | 0.61   | 0.60   | 0.60   |     |     | 0.63                 | 0.66   | 0.79   | 0.60   | 0.90   |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Max Depth (ft)                                  | 2.04                 | 1.59   | 1.51   | 1.70   | 2.10   |     |     | 1.31                 | 1.82   | 1.89   | 1.70   | 1.90   |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )         | 10.66                | 8.82   | 9.21   | 18.40  | 11.00  |     |     | 5.96                 | 9.09   | 9.99   | 8.30   | 11.00  |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Width/Depth Ratio                               | 14.63                | 12.22  | 24.65  | 31.10  | 33.60  |     |     | 15.82                | 30.98  | 15.93  | 27.60  | 12.40  |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Entrenchment Ratio                              | 3.38                 | 2.37   | 2.54   | 2.30   | 2.30   |     |     | 5.61                 | 4.37   | 4.85   | 3.80   | 5.30   |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Bank Height Ratio                               | 1.00                 | 0.97   | 0.91   | 1.00   | 1.00   |     |     | 1.00                 | 0.98   | 0.99   | 1.00   | 1.00   |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Cross Sectional Area between end pins (ft <sup>2</sup> ) |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| d50 (mm)   | 0.59                 | N/A    | N/A    | N/A    | N/A    |     |     | 0.18                 | N/A    | N/A    | N/A    | N/A    |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| <b>Based on fixed baseline bankfull elevation</b>        |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Record elevation (datum) used                            |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Width (ft)                                      |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Floodprone Width (ft)                                    |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Mean Depth (ft)                                 |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Max Depth (ft)                                  |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )         |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Width/Depth Ratio                               |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Entrenchment Ratio                              |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Bankfull Bank Height Ratio                               |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| Cross Sectional Area between end pins (ft <sup>2</sup> ) |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |
| d50 (mm)   |                      |        |        |        |        |     |     |                      |        |        |        |        |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     |      |     |     |     |     |     |

**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary  
Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 1 (991 LF)**

| Parameter   | Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary<br>Little Beaver Creek Stream Restoration Project - EEP No. 221 - Reach 1 (991 LF) |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
|---|---|------|-----|-----|-----------------|-----------------|-----|------|-----|-----|-----------------|-------|---|------|-----|------|-----------------|-------|-----|-------|------|-----|-----------------|-------|-----|------|-----|-----|-----------------|------|-----|-------|-----|-----|-----------------|-------|--|
|   | Baseline  |      |     |     |                 | MY-1            |     |      |     |     | MY-2            |       |   |      |     | MY-3 |                 |       |     |       | MY-4 |     |                 |       |     | MY-5 |     |     |                 |      |     |       |     |     |                 |       |  |
| Dimension and Substrate - Riffle only                                 | Min   | Mean | Med | Max | SD <sup>1</sup> | SD <sup>2</sup> | Min | Mean | Med | Max | SD <sup>1</sup> | n     | n | Mean | Med | Max  | SD <sup>1</sup> | n     | Min | Mean  | Med  | Max | SD <sup>1</sup> | n     | Min | Mean | Med | Max | SD <sup>1</sup> | n    | Min | Mean  | Med | Max | SD <sup>1</sup> | n     |  |
| Bankfull Width (ft)   |   |      |     |     | 15.9            | 9.46            |     |      |     |     | 10.97           | 12.48 |   | 27.9 |     |      | 13.3            | 14    |     | 12.61 |      |     | 13.84           | 15.07 |     | 15.3 |     |     | 15.85           | 16.4 |     | 11.60 |     |     | 15.4            | 19.28 |  |
| Floodprone Width (ft)   |   |      |     |     | 117.4           | 42              |     |      |     |     | 47.5            | 53    |   | 124  |     |      | 49.59           | 69.33 |     | 38.28 |      |     | 49.73           | 61.2  |     | 45.9 |     |     | 52.1            | 58.3 |     | 44.9  |     |     | 52.55           | 80.2  |  |
| Bankfull Mean Depth (ft)  |   |      |     |     | 1.2             | 0.63            |     |      |     |     | 0.74            | 0.85  |   | 0.8  |     |      | 0.644           | 0.658 |     | 0.611 |      |     | 0.702           | 0.792 |     | 0.6  |     |     | 0.75            | 0.9  |     | 0.60  |     |     | 0.75            | 0.90  |  |
| Bankfull Max Depth (ft)   |   |      |     |     | 2.3             | 1.31            |     |      |     |     | 1.675           | 2.04  |   | 2.6  |     |      | 1.765           | 1.82  |     | 1.515 |      |     | 1.703           | 1.89  |     | 1.7  |     |     | 2.1             | 2.5  |     | 1.9   |     |     | 2               | 2.1   |  |
| Bankfull Cross Sectional Area (ft <sup>2</sup> )                      |   |      |     |     | 18.2            | 5.96            |     |      |     |     | 8.31            | 10.66 |   | 21.6 |     |      | 8.953           | 9.086 |     | 9.214 |      |     | 9.6             | 9.985 |     | 8.5  |     |     | 11.3            | 15.1 |     | 11    |     |     | 11              | 11    |  |
| Width/Depth Ratio   |   |      |     |     | 13.4            | 14.68           |     |      |     |     | 14.85           | 15.02 |   | 36.1 |     |      | 21.6            | 22.22 |     | 15.93 |      |     | 20.29           | 24.65 |     | 17.7 |     |     | 22.65           | 27.6 |     | 12.4  |     |     | 23              | 33.60 |  |
| Entrenchment Ratio  |   |      |     |     | 7.4             | 3.38            |     |      |     |     | 4.495           | 5.61  |   | 4.4  |     |      | 3.572           | 4.37  |     | 2.539 |      |     | 3.694           | 4.652 |     | 2.8  |     |     | 3.3             | 3.8  |     | 2.3   |     |     | 3.75            | 5.2   |  |
| Bank Height Ratio   |   |      |     |     | 1               | 1               |     |      |     |     | 1               | 1     |   | 1    |     |      | 0.976           | 0.976 |     | 0.911 |      |     | 0.95            | 0.989 |     | 1    |     |     | 1               | 1    |     | 1     |     |     | 1               | 1     |  |
| <b>Profile</b>  |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Riffle Length (ft)  |   |      |     |     |                 | 0.83            |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Riffle Slope (ft/ft)  |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Pool Length (ft)  |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Pool Max depth (ft)   |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Pool Spacing (ft)   |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| <b>Pattern</b>  |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Channel Beltwidth (ft)  |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Radius of Curvature (ft)  |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Rc: Bankfull width (ft/ft)  |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Meander Wavelength (ft)   |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Meander Width Ratio   |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| <b>Additional Reach Parameters</b>                                    |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Rosgen Classification   |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Channel Thalweg length (ft)   |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Sinuosity (ft)  |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Water Surface Slope (Channel) (ft/ft)                                 |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| BF slope (ft/ft)  |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| <sup>1</sup> R% / R <sub>u</sub> % / P% / G% / S%                     |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| <sup>2</sup> SC% / S <sub>a</sub> % / G% / C% / E% / B <sub>e</sub> % |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| <sup>3</sup> d16 / d35 / d50 / d64 / d95                              |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| <sup>4</sup> % of Reach with Eroding Banks                            |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Channel Stability or Habitat Metric                                   |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |
| Biological or Other   |   |      |     |     |                 |                 |     |      |     |     |                 |       |   |      |     |      |                 |       |     |       |      |     |                 |       |     |      |     |     |                 |      |     |       |     |     |                 |       |  |

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

## **Appendix E.**

### **Hydrologic Data**

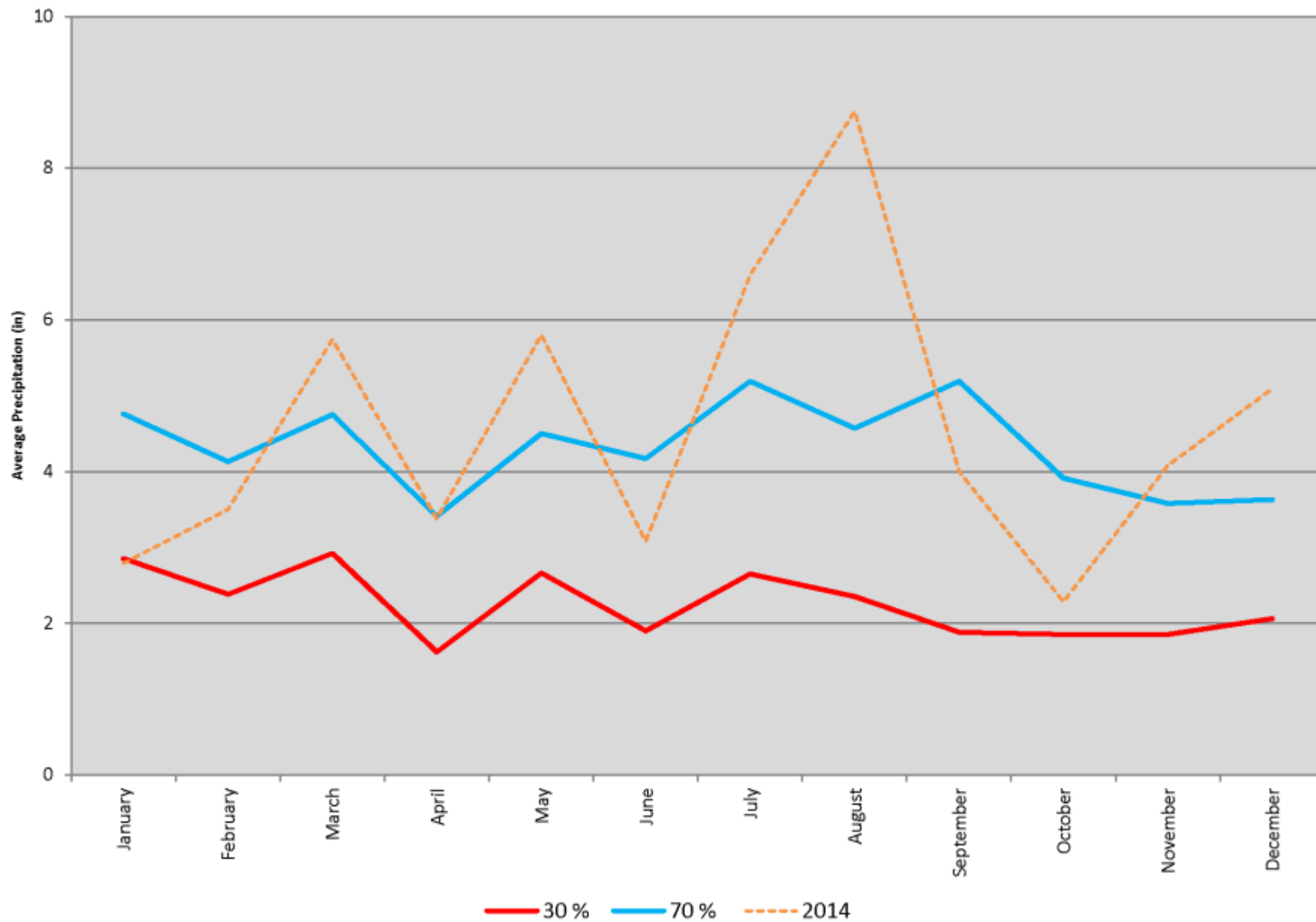
**Table 12. Verification of Bankfull Events**

| <b>Little Beaver Creek Stream and Wetland Restoration Site-Project No. 221</b> |                           |  |                |
|--|---------------------------|--|----------------|
| <b>Date of Data Collection</b>   | <b>Date of Occurrence</b> | <b>Method</b>                                | <b>Photo #</b> |
| 2006   | June 14, 2006             | Visual                                       | NA             |
| September 18, 2008   | September 7, 2008         | Visual (i.e. wrack lines)                    | NA             |
| April 1, 2014  | March 2014                | Observation of wrack lines in the floodplain | See below      |
| January 12, 2014   | January 12, 2014          | Visual Observation                           | See below      |



View of stream bankfull event on Little Beaver Creek.

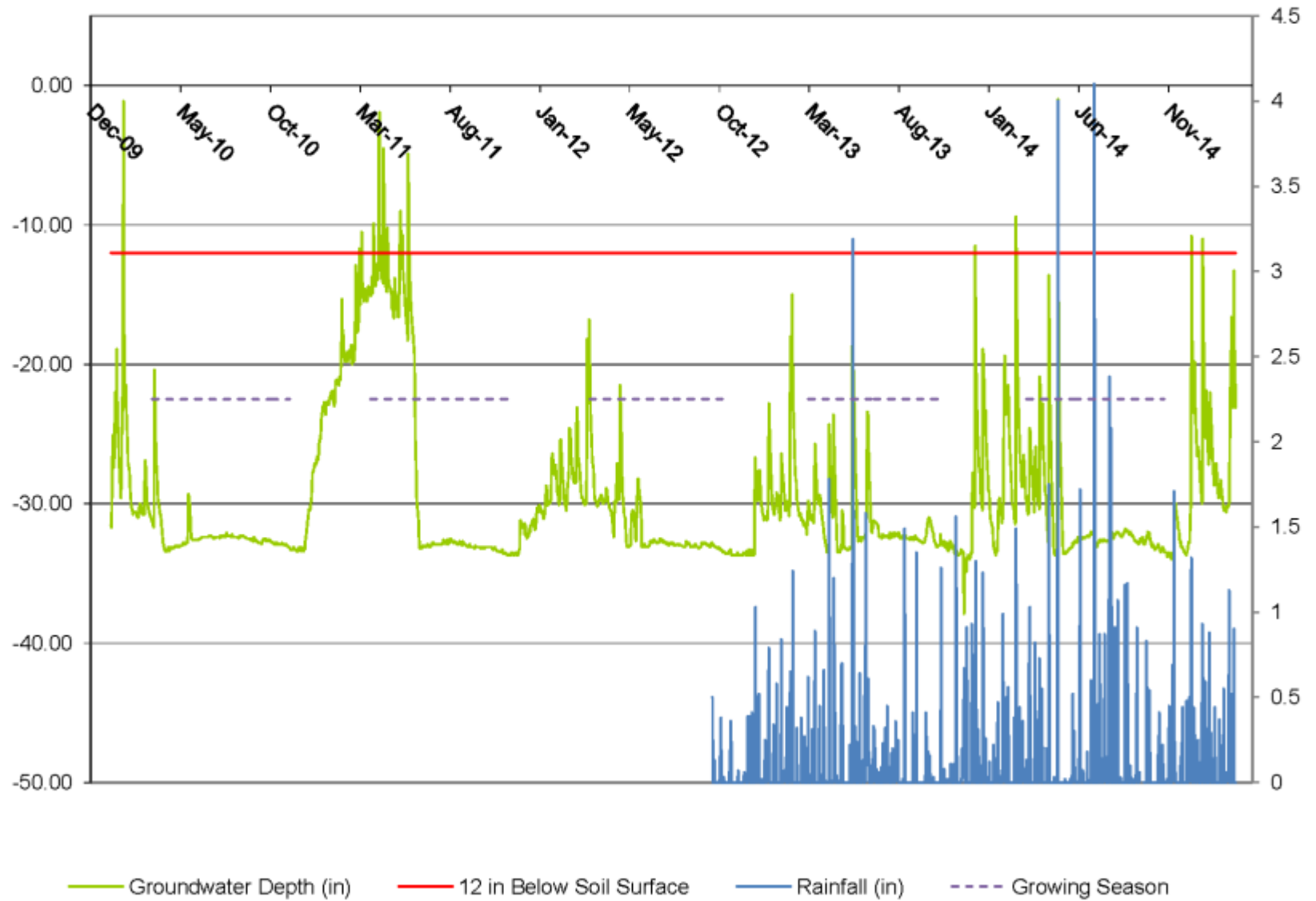
Little Beaver Creek 30-70 Percentile Graph for Rainfall 2014



Growing Season: March 25 to November 10 (230 days)  
(<http://agacis.rcc-acis.org/37183/wets/results>)

Rain Data: Station Apex  
(<http://www.nc-climate.ncsu.edu/services/request.php>)

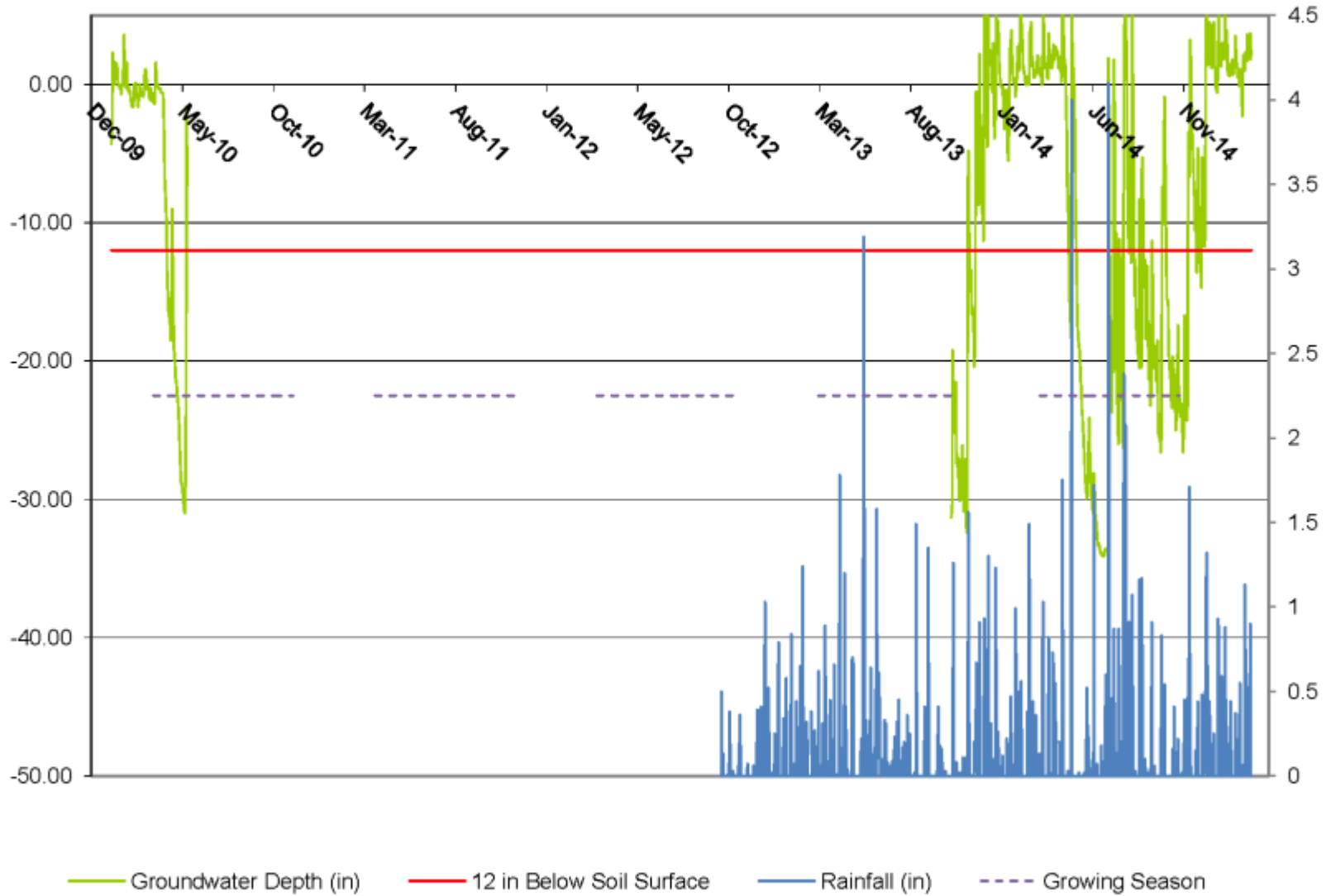
### Little Beaver Creek Gauge 2



Growing Season: March 25 to November 10 (230 days)  
(<http://agacis.rcc-acis.org/37183/wets/results>)

Rain Data: Station Apex  
(<http://www.nc-climate.ncsu.edu/services/request.php>)

### Little Beaver Creek Gauge 3

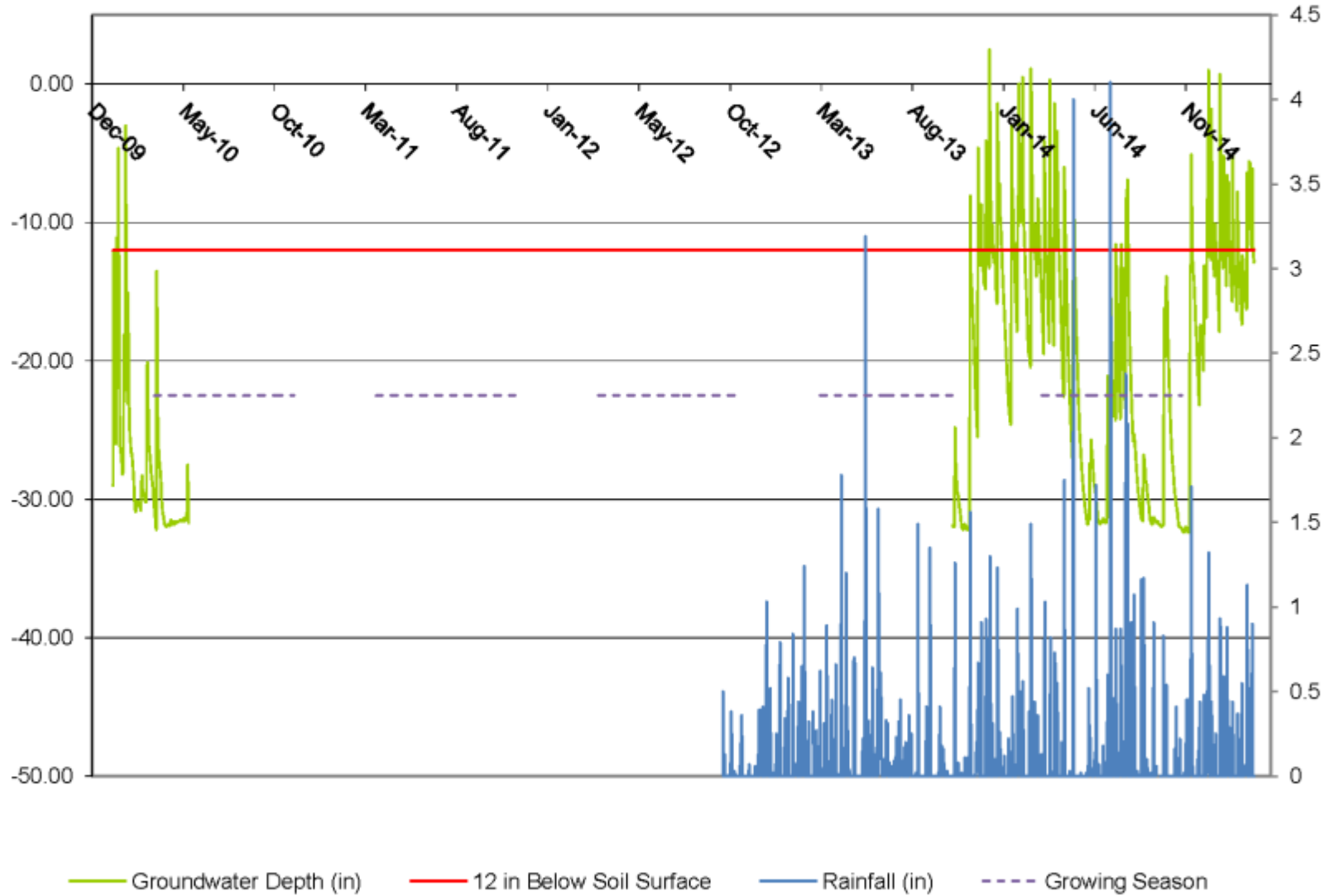


Growing Season: March 25 to November 10 (230 days)  
(<http://agacis.rcc-acis.org/37183/wets/results>)

Rain Data: Station Apex  
(<http://www.nc-climate.ncsu.edu/services/request.php>)



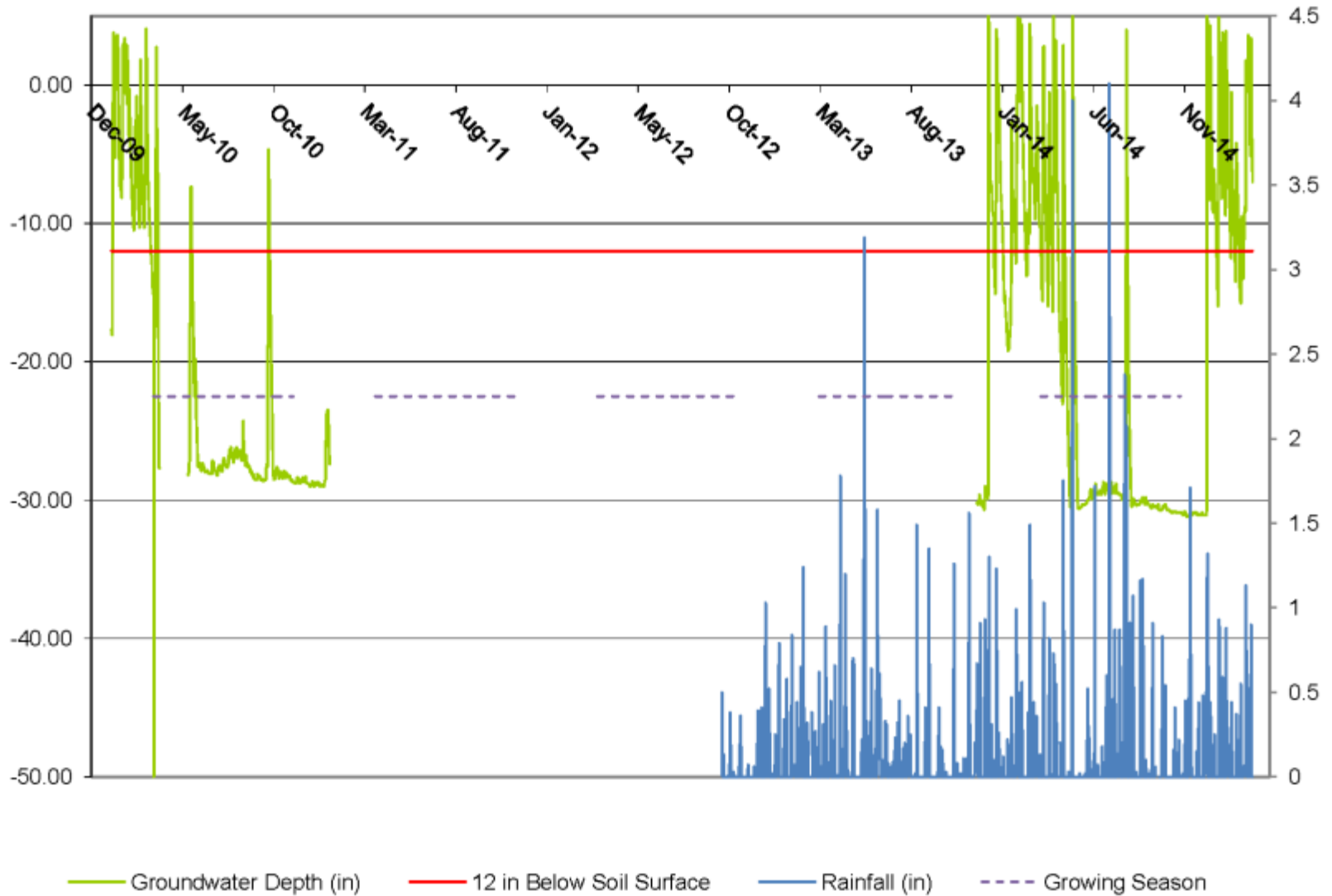
### Little Beaver Creek Gauge 4



Growing Season: March 25 to November 10 (230 days)  
(<http://agacis.rcc-acis.org/37183/wets/results>)

Rain Data: Station Apex  
(<http://www.nc-climate.ncsu.edu/services/request.php>)

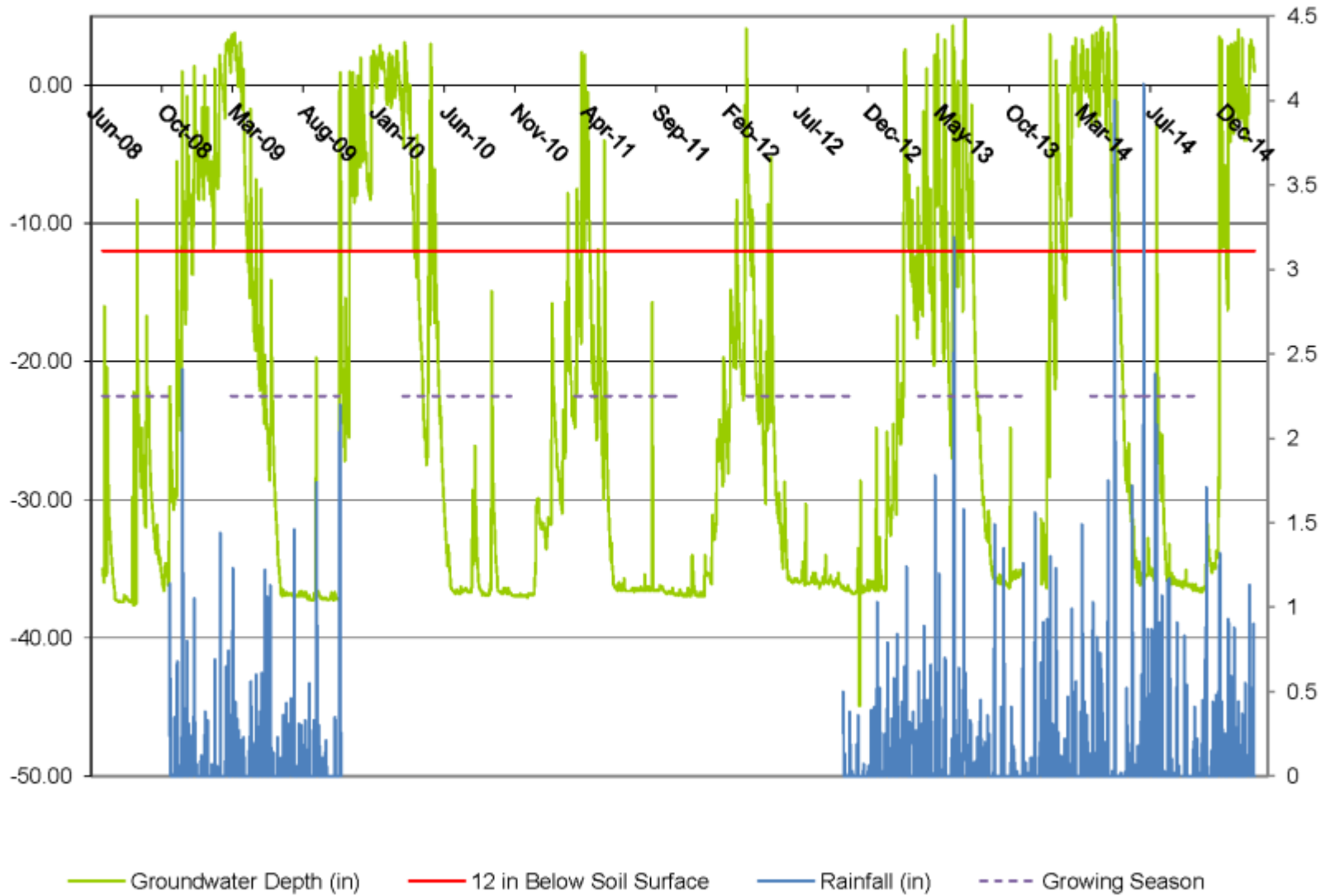
### Little Beaver Creek Gauge 5



Growing Season: March 25 to November 10 (230 days)  
(<http://agacis.rcc-acis.org/37183/wets/results>)

Rain Data: Station Apex  
(<http://www.nc-climate.ncsu.edu/services/request.php>)

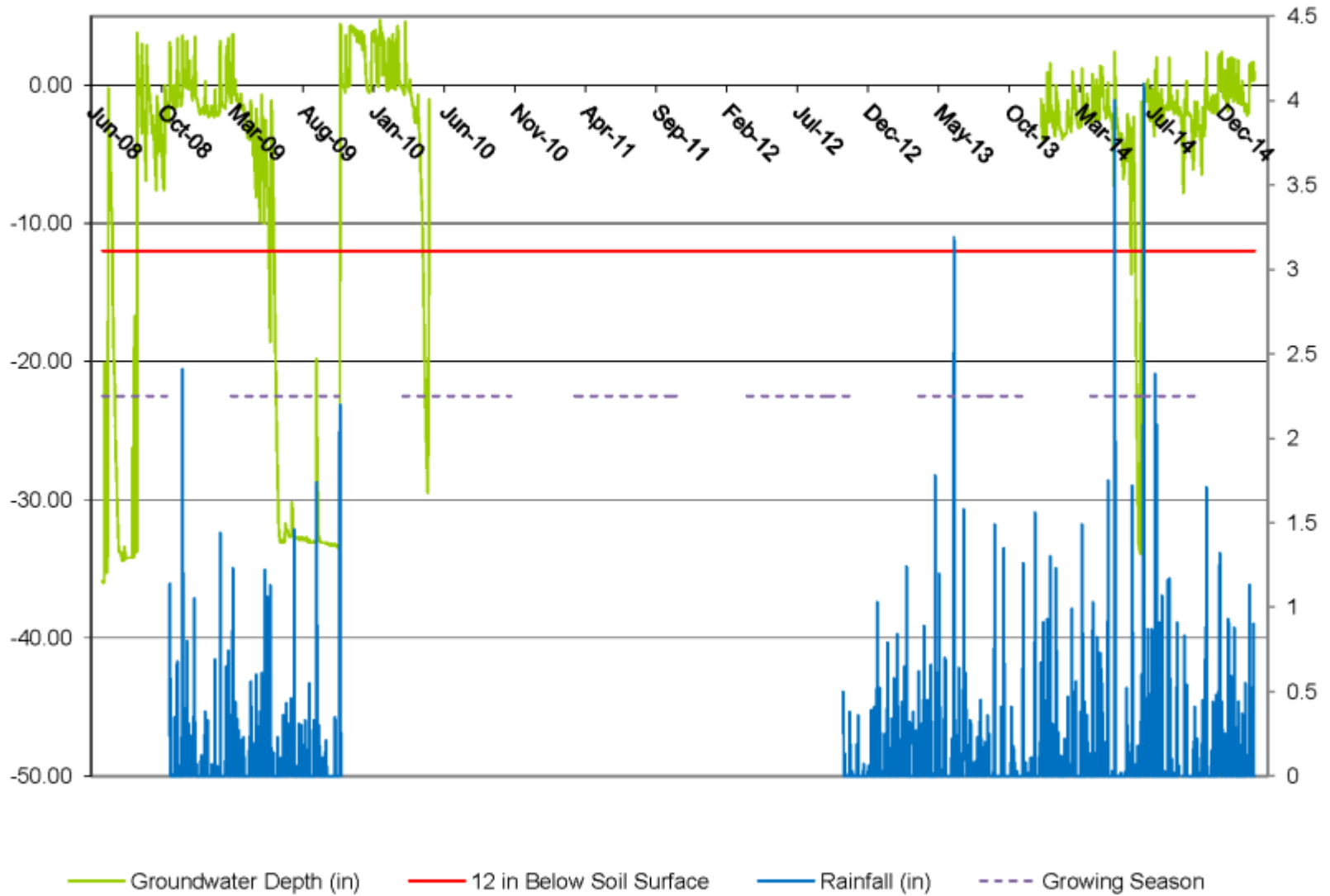
### Little Beaver Creek Gauge 6



Growing Season: March 25 to November 10 (230 days)  
(<http://agacis.rcc-acis.org/37183/wets/results>)

Rain Data: Station Apex  
(<http://www.nc-climate.ncsu.edu/services/request.php>)

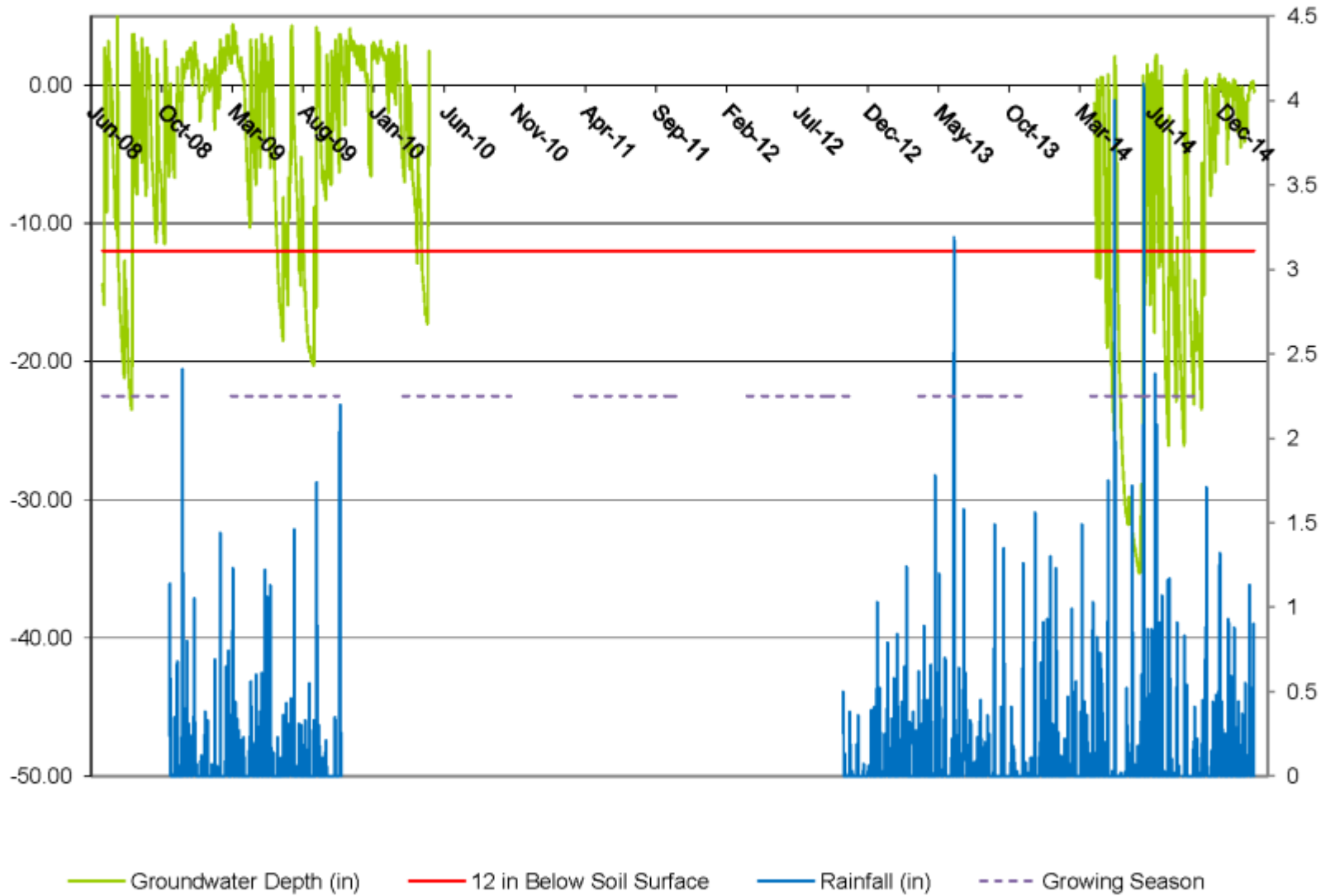
### Little Beaver Creek Gauge 7



Growing Season: March 25 to November 10 (230 days)  
(<http://agacis.rcc-acis.org/37183/wets/results>)

Rain Data: Station Apex  
(<http://www.nc-climate.ncsu.edu/services/request.php>)

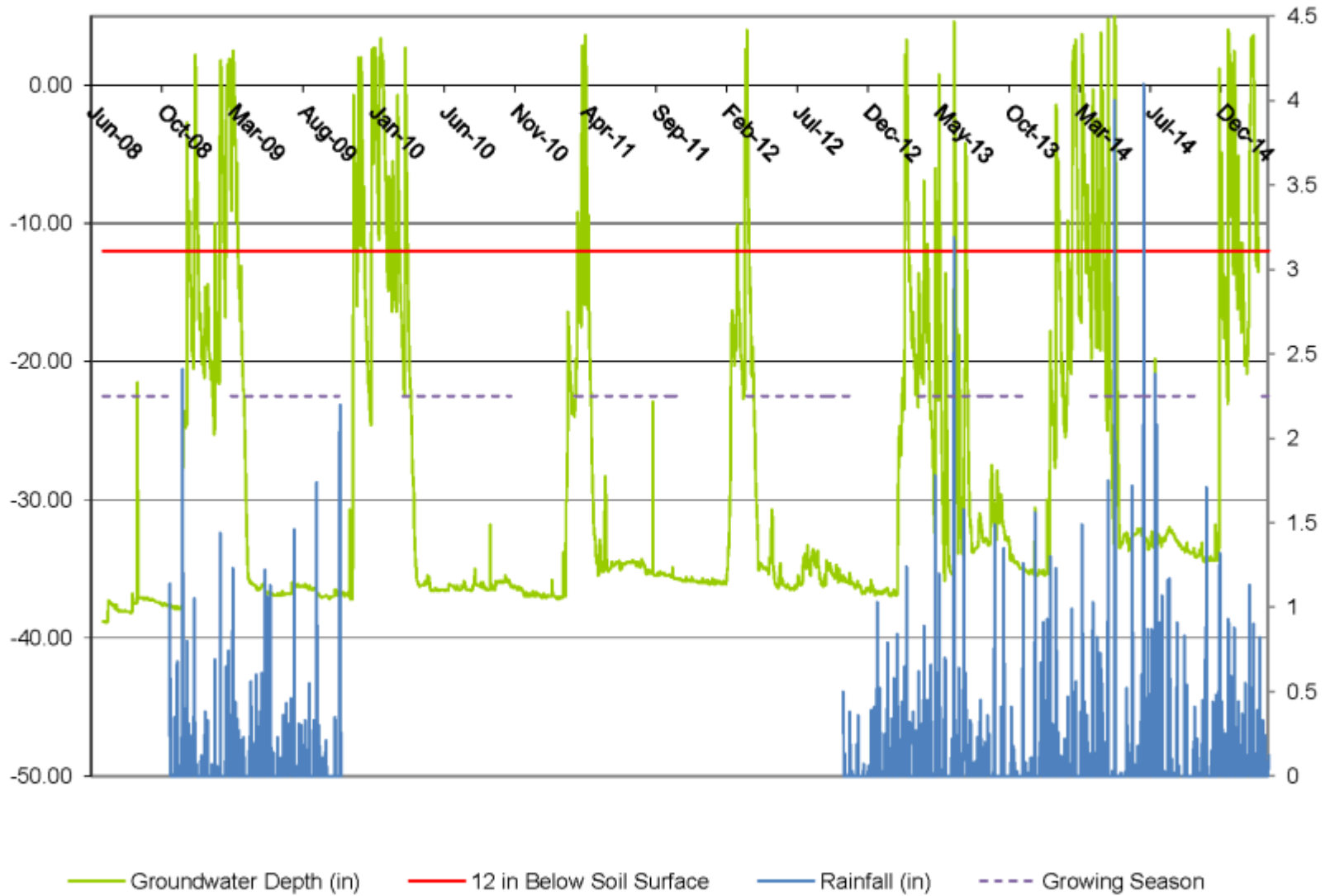
### Little Beaver Creek Gauge 8



Growing Season: March 25 to November 10 (230 days)  
(<http://agacis.rcc-acis.org/37183/wets/results>)

Rain Data: Station Apex  
(<http://www.nc-climate.ncsu.edu/services/request.php>)

### Little Beaver Creek Gauge 9



Growing Season: March 25 to November 10 (230 days)  
(<http://agacis.rcc-acis.org/37183/wets/results>)

Rain Data: Station Apex  
(<http://www.nc-climate.ncsu.edu/services/request.php>)

**Table 13. Wetland Hydrology Criteria Attainment**

Summary of Groundwater Gauge Results for Years 1 through 5

| Gauge # | 2007 (MY1)             |                  |                           | 2008 (MY2)             |                  |                           | 2009 (MY3)             |                  |                           | 2013(MY4)              |                  |                           | 2014 (MY5)             |                  |                           |
|---------|------------------------|------------------|---------------------------|------------------------|------------------|---------------------------|------------------------|------------------|---------------------------|------------------------|------------------|---------------------------|------------------------|------------------|---------------------------|
|         | Max # Consecutive Days | % Growing Season | Success Criteria Attained | Max # Consecutive Days | % Growing Season | Success Criteria Attained | Max # Consecutive Days | % Growing Season | Success Criteria Attained | Max # Consecutive Days | % Growing Season | Success Criteria Attained | Max # Consecutive Days | % Growing Season | Success Criteria Attained |
| 2       | *                      |                  |                           | *                      |                  |                           | *                      |                  |                           | 0                      | 0                | No                        | 1                      | 0.4%             | No                        |
| 3       | *                      |                  |                           | *                      |                  |                           | *                      |                  |                           | N/A                    |                  |                           | 48                     | 21%              | Yes                       |
| 4       | *                      |                  |                           | *                      |                  |                           | *                      |                  |                           | N/A                    |                  |                           | 8                      | 3.5%             | No                        |
| 5       | *                      |                  |                           | *                      |                  |                           | *                      |                  |                           | N/A                    |                  |                           | 8                      | 3.5%             | No                        |
| 6       | 28                     | 12%              | Yes                       | N/A                    |                  |                           | 35                     | 15%              | Yes                       | 21                     | 9%               | Yes                       | 48                     | 21%              | Yes                       |
| 7       | >29                    | >12.5%           | Yes                       | 65                     | 28%              | Yes                       | 81                     | 35%              | Yes                       | N/A                    |                  |                           | 118                    | 51%              | Yes                       |
| 8**     | >29                    | >12.5            | Yes                       | 75                     | 33%              | Yes                       | 99                     | 43%              | Yes                       | N/A                    |                  |                           | 11                     | 5%               | Yes                       |
| 9       | No                     |                  |                           | N/A                    |                  |                           | 15                     | 7%               | Yes                       | 5                      | 2%               | No                        | 7                      | 3%               | No                        |

\* - Gauge installed 1/15/10, incomplete growing season

\*\* - Gauge 8 was missing when monitoring re-commenced in the fall of 2013; A replacement gauge was installed in the vicinity of the former gauge location where wetland hydrology results are lower

N/A – insufficient data or data not available due to gauge failure or battery exhaustion

## **Appendix F.**

### 2013 Supplemental Monitoring Report