Newtown Stream and Wetland Restoration Project

Union County, North Carolina

DMS Project #94150

Contract No. 002025

MY-05 Monitoring Report

Data Collected: March & June 2015
Submitted: December 2015

Prepared for:
North Carolina Department of Environmental Quality
Division of Mitigation Services
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APPENDICES

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I. Executive Summary

The Newtown Stream and Wetland Restoration Site is located within the sub-basin 03-08-38 of the Catawba River Basin in Union County, North Carolina and contains Underwood Creek and one Unnamed Tributary (UT) to Underwood Creek. The restoration lengths of Underwood Creek (Main Channel) and UT to Underwood Creek (Tributary) are 1,273 and 4,075 feet, respectively, for a total project length of 5,348 feet (Figure 1). The project included restoration of 3.38 acres of riparian wetland and protection of an existing 0.15 acres of jurisdictional wetlands. The project site is owned by one property owner Mr. Frank W. Howey, Jr. The project is located within the HUC 03050103030020 (Lower Catawba Basin) of the South Atlantic-Gulf Region. NCDWQ classifies Underwood Creek (DWQ Stream Index Number 11-138-2-3-1) as class C. The 1.5 square mile watershed contributing drainage to the stream restoration segment is located in a rural setting. The land adjacent to the project streams is primarily used for agricultural practices and single family development. The floodplain is more confined in the upper reach of the project and opens up to a broad width for the majority of the project length. Vegetation typical of a Piedmont Alluvial Forest was planted throughout the conservation easement.

Project Goals:

- Improve water quality with the construction of stable stream banks and the establishment of a vegetated buffer
- Improve the stream function and habitat with the connection of the channelized and incised stream back to its floodplain
- Improve wetland hydrology with the functional uplift of the proposed channel
- Restore long-term stability with the restoration of channel pattern, profile and dimension
- Improve in-stream habitat with the installation of brush toes, root wads, constructed riffles, log vanes and rock cross vanes to enhance pool depths

Project Objectives:

- The restoration of 4,690 linear feet of Priority I, 558 feet of Priority II and 100 feet of Enhancement II in order to raise the stream bed elevation, reconnect the stream to its floodplain, restore pattern, and re-establish channel dimension on Underwood Creek and UT to Underwood Creek
- Restoration of 3.38 acres of wetlands through the functional uplift of the stream to improve wetland hydrology and the removal of depositional sediment from the wetland surface due to agricultural field soil wash
- Establish a minimum of 50 feet of riparian buffer along both sides of the entire stream length

Thirteen (13) vegetation plots were monitored using Level II of the CVS-DMS vegetation monitoring protocol (Version 4.2) which accounts for planted and natural stems. In MY-05, counting only planted stems and excluding livestakes, there are 398 stems/acre. Counting both natural and planted stems, excluding live stakes and exotics, there are 1192 stems/acre in MY-05. The success criterion for planted woody species is 320

stems/acre after MY-03. A mortality rate of ten percent will be allowed after MY-04 (288 stems/acre), with another ten percent allowed after MY-05 (260 stems/acre).

While all the vegetation plots combined meet the criteria for total planted stems, planted stem counts for plots 4, 6, 8, and 11 were below the threshold requirements of 260 stems (Table 7). Plots 4, 6, and 8 exceeded the stem density requirements when including natural stems. Volunteers observed within the plot 4 and 7 were eastern cottonwood (*Populus deltoides*) trees. Eastern cottonwood is abundant throughout the vicinity of the stream confluence and is sporadically abundant throughout the stream buffer corridor. Volunteers observed within plot 8 include eastern silverling (*Baccharus halimifolia*) which was observed scattered in the vicinity of plot 8. Other volunteer species observed within the conservation easement were black willow (*Salix nigra*), eastern sugarberry (*Celtis laevigata*), winged sumac (*Rhus copallinum*), and slippery elm (*Ulmus rubra*). Volunteer species densities are low within plots 6 and 11. Plot 6 is located in an area where wetland hydrology is present providing optimal conditions for a dominant herbaceous layer that outcompeted the woody plantings resulting in the low stem density. Planted species surviving within Plot 6 are river birch (*Betula nigra*), button bush (*Cephalanthus occidentalis*), green ash (*Fraxinus pennsylvanica*), and swamp chestnut oak (*Quercus michauxii*). One volunteer box elder was observed within Plot 6. Plot 11 is located within an area where the herbaceous layer is relatively sparse and conditions are dryer. Planted species surviving are persimmon (*Diospyros virginiana*), swamp chestnut oak, and silky dogwood. No volunteer stems were observed.

The vegetation problem areas consist of areas with low stem densities and the invasive exotic Johnsongrass vegetation. Low stem densities are in the vicinity of plots 6 and 11 where the herbaceous layer is dominant and in areas of the floodplain bench where herbaceous vegetation diversity was low and sparse. These areas of the floodplain bench correspond to areas where excavation of the new stream floodplain occurred. Soil compactness and nutrient deficiency may be a factor in the survival rate of woody stems in the areas of low stem densities.

Five species of invasive exotics were observed in the conservation easement including Chinese privet (*Ligustrum sinense*), Johnson grass (*Sorghum halapense*), Japanese stiltgrass (*Microstegium vimineum*), multiflora rose (*Rosa multiflora*), and Asian dayflower (*Murdannia keisak*). Chinese privet is present just upstream of the conservation easement along both reaches of stream. Chinese privet was treated with a foliar herbicidal application during MY-02. Treatment seems to have been a success for this species with only an occasional stem observed near the upstream extent of UT to Underwood Creek during MY-05. Johnson grass stands remain along the conservation easement in the vicinity of the stream confluence, however the stem densities a significantly less within the conservation easement since the foliar herbicidal treatment was applied during the MY-02. An occasional multiflora rose stem was observed in the vicinity of the wetland reference. Japanese stiltgrass was observed in small patches within the conservation easement mostly concentrating in shaded areas within the vicinity of the wetland preservation. Asian dayflower is wetland obligate species and was observed in some areas of the stream channel conducive to low flows throughout the

conservation easement. Although these invasive exotic species were observed and are given different ranks of severity, the functionality of the project is not expected to be impaired.

Supplemental plantings were established in April of 2015 within the conservation easement. See CCPV for depictions of the supplemental planting locations. A total of 445 3 gallon container supplemental plantings were established on April 17, 2015 with the following species and number of stems; 100 river birch's (*Betula nigra*), 100 sycamores (*Platanus occidentalis*), 50 tulip poplars (*Liriodendron tulipifera*), 10 northern red oaks (*Quercus rubra*), 75 overcup oaks (*Quercus lyrata*), 50 swamp chestnut oaks (*Quercus michauxii*), 50 white oaks (*Quercus alba*), and 10 willow oaks (*Quercus phellos*).

MY-05 Vegetation Problem Areas			
VPA #	**Station Number**	**Suspected Cause**	**Proposed Remedial Action**
1	See CCPV	Johnson grass is scattered in small patches and along the conservation easement boundary. The CCPV depicts areas where it is concentrated.	Johnson grass was treated on June 19, 2012 and August 14, 2012 throughout the CE. Treatment has reduced the stem density of the species within the conservation easement. .
2	See CCPV	Low stem densities were observed in patches throughout the conservation easement in areas where planted and natural stem densities were low.	Supplemental plantings were established in 2015.

Eleven RDS groundwater gauges (1-11) are located within the conservation easement. Gauges 1-8 were originally installed between February 2010 and April 2011. Three additional gauges (9-11) were installed in April of 2014 to evaluate the wetland extent near the conservation easement boundary. Gauge 6 malfunctioned during the monitoring period necessitating battery replacement but still resulting gauge failure therefore no groundwater data is available for this site. Although Gauge 6 failed during the 2015 growing season, it met wetland hydrology criteria during the previous monitoring years. Gauge failure may have been due to being inundated for an extended period of time. Gauge 4 and 5 malfunctioned near the end of the growing season, however still met wetland hydrology requirements earlier in the growing season. Although malfunctions occurred, nine of the ten groundwater gauges (Gauges 1-5, 7-8, and 10-11) met hydrological requirements; Gauge 9 did not meet hydrological requirements during the 2014 or 2015 monitoring period (Table 13).

Eleven bankfull events have been recorded for the project site since 2011 (Table 12). Water was observed through all of Underwood Creek and UT to Underwood Creek on March 26 & 27, June 9th, and August 25th. The pressure transducers installed in the

upper reach of UT to Underwood Creek in MY-04 were removed for downloading in the fall of 2014 and not re-installed.

The monitoring reach of Underwood Creek is stable with little change to the stream pattern and profile from baseline conditions in MY-00. Cross sections 2 and 3 on Underwood Creek have continued to narrow some due to the presence of thick herbaceous vegetation on the banks. Three Beaver dams were present at the time of the longitudinal survey in March between STA 15+80 and the confluence of with the Unnamed Tributary to Underwood Creek. The beaver dams were breached at the time of the visual assessment in June.

The monitoring reach of UT to Underwood Creek also displays little change to pattern, profile, and dimension since baseline conditions in MY-00. A comparison of the cross section data shows little change in geometry between MY-04 and MY-05 for all sections. As noted in previous monitoring years, the root ball from the fallen tree in the floodplain adjacent to cross section 1, continues to not be compromising the channel banks. A tree growing in the stream near STA 33+50 noted in MY-04 causing debris build up is still present and is not causing instability. A second tree at STA 30+25 is not presently causing erosion. The overall longitudinal profile of the stream continues to make minor adjustments when comparing MY-04 to MY-05 data, however the riffle and pool features are stable overall. Generally the log and stone riffles are performing well. One riffle at STA 10+50 continues to have base flow going under the top log however it is not compromising the structure.

Riffle substrate in non-constructed riffles is firm and is improving in coarseness with small gravels now present. The pebble counts at the monitoring cross sections at the riffles continue to show a material coarsening trend in both Underwood and UT to Underwood Creek.

Summary information/data related to the occurrence of items such as beaver or encroachment, and statistics related to performance of various project and monitoring elements, can be found in the tables and figures in the report appendices. Narrative background and supporting information formally found in these reports can be found in the mitigation and restoration plan documents available on DMS's website. All raw data supporting the tables and figures in the appendices is available from DMS upon request.

MY-05 Stream Problem Areas

PA	Station	Suspected Cause	Proposed Remedial Action
1	See CCPV	Tree growing in Stream	Recommend Removal
2	See CCPV	Tree growing in Stream	Recommend Removal

Newtown Vegetation Monitoring Summary 2011-2015						
Plot	Stems/Acre					
		2011	2012	2013	2014	2015
	As-Built	Year 1	Year 2	Year 3	Year 4	Year 5
1	567	567	567	567	567	567
2	607	728	688	607	567	647
3	607	607	526	486	526	526
4	567	445	243	202	202	162
5	607	809	809	809	809	809
6	850	243	202	202	202	202
7	809	526	283	283	283	283
8	769	486	283	162	121	121
9	850	526	526	526	526	526
10	526	567	364	364	364	364
11	526	324	283	283	283	202
12	567	567	405	405	364	324
13	567	607	526	405	486	445
Average	647	539	439	408	408	398

Table 12 Summary: Verification of Bankfull Events			
		Method	Number of Bankfull Events
2011	Year 1	Visual Observation	1
2012	Year 2	-	0
2013	Year 3	Crest Gauge	3
2014	Year 4	Transducer	6
2015	Year 5	Rainfall Data	1

Table 13 Summary: Newtown Hydrology Monitoring 2011-2015					
Max Hydroperiod (Growing Season March 23 to November 6, 228 days) Success Criterion: 5 percent					
Gauge	Max Consecutive Hydroperiod (percent of growing season)				
	2011	2012	2013	2014	2015
	Year 1	Year 2	Year 3	Year 4	Year 5
1	26	35	74	23	39
2	87	100	100	100	68
3	87	100	100	100	68
4	34	33	100	50	45
5	40	46	79	50	39
6	49	100	100	73	*
7	12	28	100	26	38
8	3	2	10	6	21
9	-	-	-	0	0
10	-	-	-	21	36
11	-	-	-	21	28
*-Gauge malfunction					

II. Methodology

Methodologies follow DMS monitoring report template Version 1.3 (01/15/10) and CVS vegetation monitoring protocol Version 4.2 (Lee et al 2008). Photos were taken with a digital camera. A Trimble Geo XT handheld unit with sub-meter accuracy was used to collect groundwater gauge locations, vegetation monitoring plot origins, and problem area locations. Cross sectional and longitudinal surveys were conducted using total station survey equipment. Data was entered into AutoCAD Civil3D to obtain dimensions of the cross sections and parameters applicable to the longitudinal profile. Reports were then generated to display summaries of the stream survey.

A. Vegetation Methodologies

Level II of the EEP-CVS protocol (Version 4.2) was used to collect data for MY-05. Data collected for these plots are in Appendix C.

B. Wetland Methodologies

There are a total of eleven RDS groundwater gauges within the conservation easement. Seven RDS groundwater monitoring gauges (1-3; 5-8) were installed in April of 2011. Gauge 4, the wetland reference gauge, was installed in February 2010. Gauge 9-11 were installed April 2014. Gauges are downloaded bi-monthly to ensure proper function throughout the growing season. Data is provided in an Excel spreadsheet along with incorporation of local rainfall data provided by the NC State Climate Office.

C. Stream Methodologies

Stream profile and cross-sections were surveyed using total station equipment and methods, and plotted using AutoCAD Civil3D. The longitudinal profile was generated using the MY-00 alignment. Cross sectional data was extracted based on a linear alignment between the end pins. Cross section bankfull elevations for yearly comparisons are based on the baseline bankfull elevation established for each cross section.

III. References

Lee, Michael T. Peet, Robert K. Roberts, Steven D., Wentworth, Thomas R. (2008). *CVS-EEP Protocol for Recording Vegetation Version 4.2.*

Weakley, Alan (2012). *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas*. http://www.herbarium.unc.edu/flora.htm. Working Draft November 2012.

Wolman, M.G., 1954. A Method of Sampling Coarse River-Bed Material, Transactions of American Geophysical Union 35:951-956.

Appendix A. Project Vicinity Map and Background Tables

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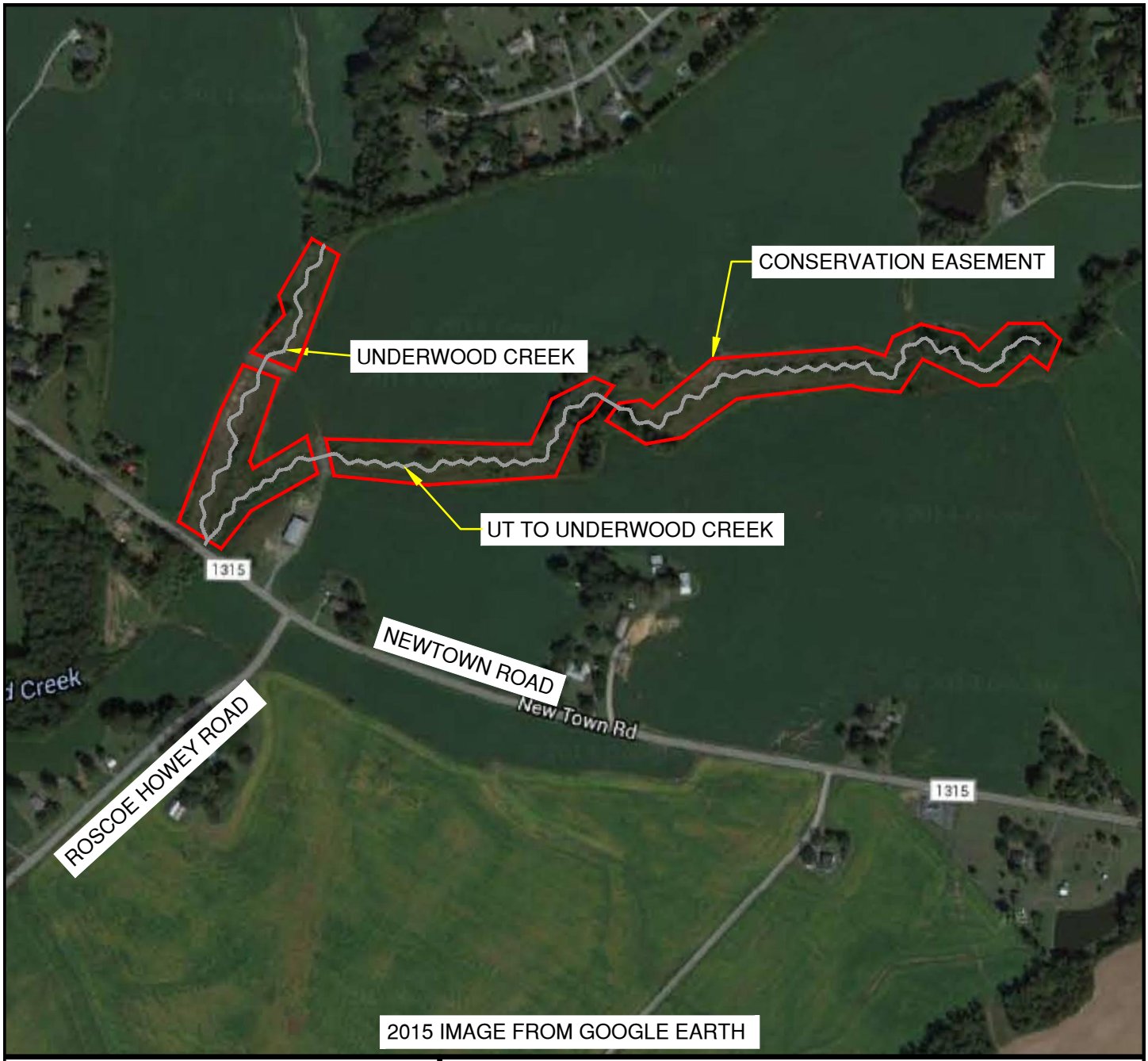

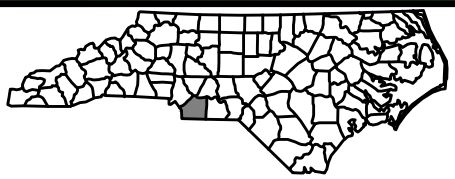

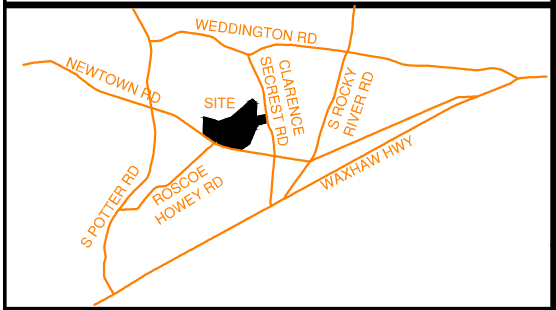

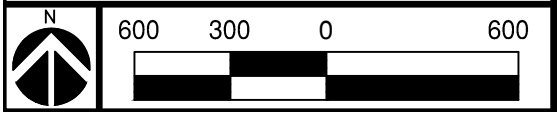

North Carolina Department of Environmental Quality - Department of Mitigation Services

Newtown Stream and Wetland Restoration Site
Union County, North Carolina

FIGURE 1
NEWTOWN STREAM AND WETLAND RESTORATION AERIAL VICINITY MAP

DATE: October 19, 2015

WARD CONSULTING ENGINEERS, PC

4805 Green Road Suite 100 (919) 870-0526
Raleigh, NC 27616-2848 FAX (919) 870-5359

Table 1. Project Components Newtown Stream and Wetland Restoration									
Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Mitigation Ratio	Mitigation Units	BMP Elements1	Comment
Underwood Creek	520	R	P2	558	5+00 - 10+58	1:1	558		
Underwood Creek	625	R	P1	715	11+16 - 19+06	1:1	715		58 LF easement exclusion for Stream Crossing
UT to Underwood Creek	3923	R	P1	3975	2+00 - 43+07	1:1	3975		125 LF easement exclusion for two (2) Stream Crossings
UT to Underwood Creek	100	E2		100	1+00 - 2+00	2.5:1	40		
Wetland	3.38	R	-	3.38		1:1	3.38		
Wetland	0.15	P	-	0.15		5:1	0.03		Preservation

1 = BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; Grassed Swale = S; LS = Level Spreader; NI = Natural Infiltration Area, O = Other; CF = Cattle Fencing; WS = Watering System; CH = Livestock Housing

Table 1b. Component Summations Newtown - DMS# 94150							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	5248	3.38					
Enhancement							
Enhancement I							
Enhancement II	100						
Creation							
Preservation		0.15					
HQ Preservation							
Totals (Feet/Acres)	**5348**	**3.41**					
MU Totals	**5288**	**3.41**					
	Non-Applicable						

Table 2. Project Activity and Reporting History

Newtown Stream and Wetland Restoration

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	June 2010	June 2010
Final Design – Construction Plans	July 2010	July 2010
Construction	-	April 2011
Bare root and livestake planting	-	April 2011
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	April 2011	May 2011
Year 1 Monitoring	October 2011	December 2011
Invasives Foliar Herbicidal Application	-	March, June & August 2012
Year 2 Monitoring	November 2012	November 2012
Year 3 Monitoring	September 2013	November 2013
Year 4 Monitoring	September 2014	October 2014
Supplemental Planting	-	April 2015
Year 5 Monitoring	November 2015	December 2015
Beaver Dam Removal	-	May 2015

Bolded items are examples of those items that are not standard, but may come up and should be included. Non-bolded items represent events that are standard components over the course of a typical project.

Table 3. Project Contacts Table Newtown - DMS # 94150	
Designer Primary project design POC	Ward Consulting Engineers, P.C. 4805 Green Road, Suite 100 Raleigh, NC 27616 Becky Ward 919-870-0526
Construction Contractor Construction contractor POC	RFG Construction 1907 Cambridge Dr Kinston, NC 28504 Robert Grady 252-559-6954
Survey Contractor Survey contractor POC	R.B. Pharr & Associates 420 Hawthorne Ln Charlotte, NC 28204 Justin Cloninger 704-376-2186
Planting Contractor Planting contractor POC	New Forest Services P.O. Box 255 Manistee, MI 49660 Brian Jarvinen 910-512-6754
Seeding Contractor Contractor point of contact	RFG Construction 1907 Cambridge Dr Kinston, NC 28504 Robert Grady 252-559-6954
Seed Mix Sources	Evergreen Seed - Fuquay Varina, NC 919-567-1333
Nursery Stock Suppliers	Arbor Gen - Blenheim, SC - South Carolina SuperTree Nursery 800-222-1290
Monitoring Performers	Ward Consulting Engineers, P.C. 4805 Green Rd, Suite 100 Raleigh, NC 27616
Stream Monitoring POC	Becky Ward 919-870-0526
Vegetation Monitoring POC	Chris Sheats - Three Oaks Engineering - 919-732-1300
Wetland Monitoring POC	Chris Sheats - Three Oaks Engineering - 919-732-1300

Table 4. Project Attribute Table Newtown Stream and Wetland Restoration		
Project County	Union	
Physiographic Region	Piedmont	
Ecoregion	Carolina Slate Belt	
Project River Basin	Catawba River Basin	
USGS HUC for Project (14 digit)	3050103030020	
NCDWQ Sub-basin for Project	03-08-38	
Within extent of DMS Watershed Plan?	No	
WRC Hab Class (Warm, Cool, Cold)	-	
% of project easement fenced or demarcated	100%	
Beaver activity observed during design phase?	No	
Restoration Component Attribute Table		
	Underwood Creek	**UT to Underwood Creek**
Drainage area	0.72 sq mi	0.74 sq mi
Stream order	-	-
Restored length (feet)	1273	3975
Perennial or Intermittent	Perennial	Perennial
Watershed type (Rural, Urban, Developing etc.)	Rural	Rural
Watershed LULC Distribution (e.g.)		
Residential	14%	
Ag-Row Crop	66%	
Ag-Livestock	-	
Forested	20%	
Etc.	-	
Watershed impervious cover (%)	-	
NCDWQ AU/Index number	11-138-2-3-1	N/A
NCDWQ classification	C	N/A
303d listed?	N	N
Upstream of a 303d listed segment?	N	N
Reasons for 303d listing or stressor	N/A	N/A
Total acreage of easement	16.43 Ac	
Total vegetated acreage within the easement	0.17 Ac	0.53 Ac
Total planted acreage as part of the restoration	14.3 Ac	
Rosgen classification of pre-existing	incised C4/E4	incised C4/E4 w/sections of G4
Rosgen classification of As-built	C4	C4
Valley type		
Valley slope	0.64%	0.63%
Valley side slope range (e.g. 2-3.%)	-	-
Valley toe slope range (e.g. 2-3.%)	-	-
Cowardin classification	-	-
Trout waters designation	N	N
Species of concern, endangered etc.? (Y/N)	N	N
Dominant soil series and characteristics		
Series	Chewacla	Chewacla
Depth	-	-
Clay%	-	-
K	-	-
T	-	-

Use N/A for items that may not apply. Use "-" for items that are unavailable and "U" for items that are unknown

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Appendix B. Visual Assessment Data

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Vegetation Plot Origins		
Plot Name	Northing	Easting
VP 1	448672.01	1507128.22
VP 2	448460.02	1506909.61
VP 3	448157.84	1506800.79
VP 4	447966.78	1506832.95
VP 5	448153.74	1507081.53
VP 6	448228.13	1507543.37
VP 7	448179.64	1507841.68
VP 8	448266.41	1508086.78
VP 9	448359.76	1508550.13
VP 10	448446.72	1508742.00
VP 11	448583.68	1508973.48
VP 12	448521.15	1509214.17
VP 13	448603.80	1509481.71

Cross Sections Underwood Creek				
	Left Pin		Right Pin	
	Northing	Easting	Northing	Easting
XS 1	448791.94	1507187.43	448790.30	1507136.44
XS 2	448657.90	1507124.68	448677.45	1507078.39
XS 3	448366.02	1506907.39	448404.06	1506885.52
XS 4	448140.89	1506841.37	448163.68	1506800.24
XS 5	448053.24	1506800.42	448089.27	1506775.75

Cross Sections UT to Underwood Creek				
	Left Pin		Right Pin	
	Northing	Easting	Northing	Easting
XS 1	448628.47	1509726.46	448682.84	1509702.58
XS 2	448532.49	1509448.30	448573.02	1509463.20
XS 3	448538.35	1509071.04	448597.67	1509099.72
XS 4	448538.71	1508911.29	448578.60	1508914.82
XS 5	448367.87	1508633.33	448431.03	1508619.55
XS 6	448264.34	1508171.97	448307.14	1508136.96
XS 7	448182.29	1508003.67	448221.68	1507995.64
XS 8	448177.18	1507786.94	448232.42	1507767.15
XS 9	448179.84	1507395.62	448237.37	1507413.75
XS 10	448103.36	1507024.96	448125.71	1506988.19

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

2015 IMAGE FROM GOOGLE EARTH

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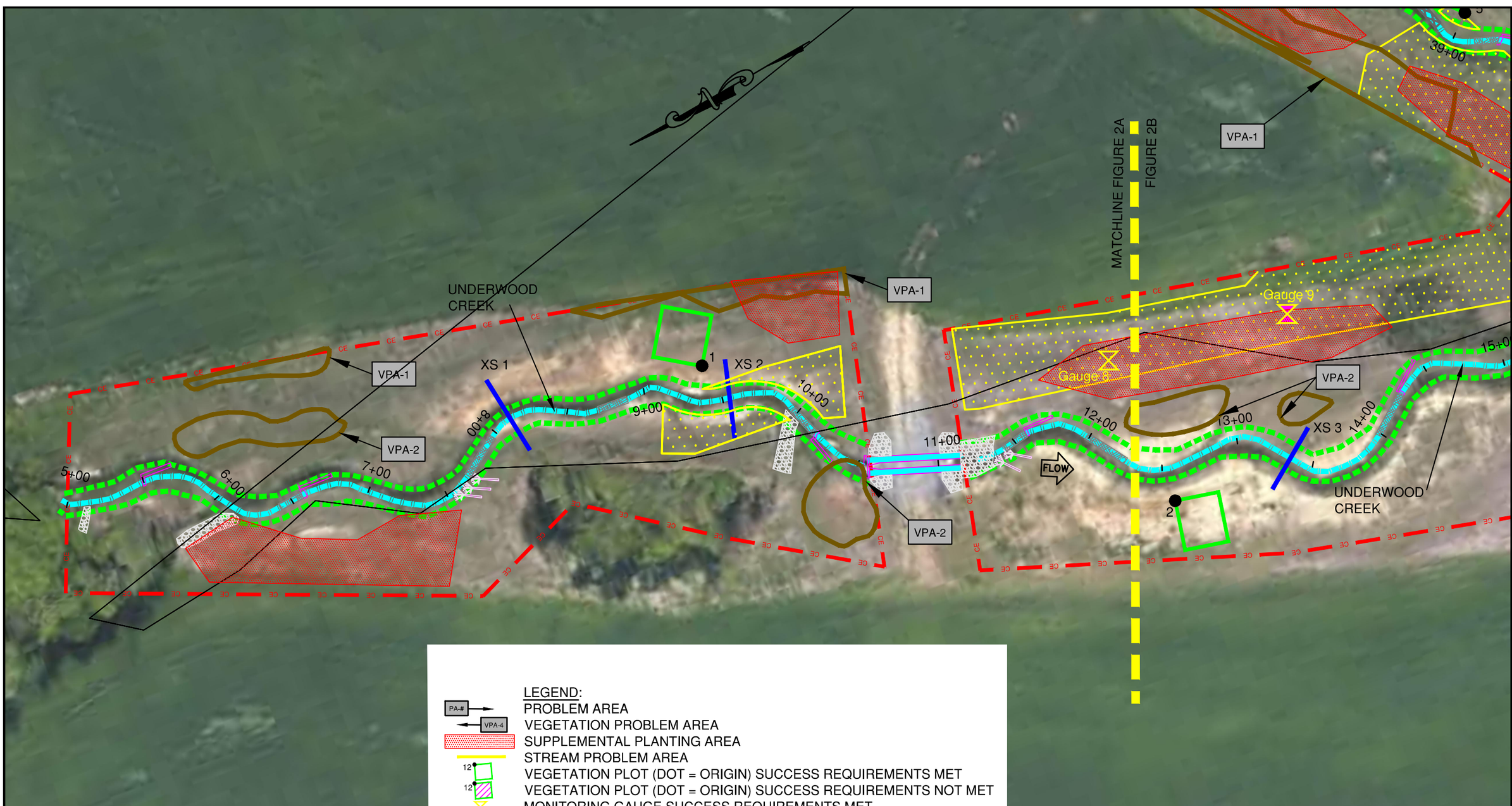
DEQ
Division of
Mitigation Services

NEWTOWN DMS# 94150
OVERALL CURRENT CONDITIONS PLAN VIEW
UNION COUNTY, NORTH CAROLINA

DATE: November 2015
REVISIONS:
PROJECT NAME: EBX NEWTOWN
DWG NAME: CCPV
SCALE: 1" = 200
CURRENT CONDITIONS PLAN VIEW
SHEET NO.
FIGURE 2



LEGEND:

- PROBLEM AREA (PA-# / VPA-4)
- VEGETATION PROBLEM AREA
- SUPPLEMENTAL PLANTING AREA
- STREAM PROBLEM AREA
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS MET (12)
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS NOT MET (12)
- MONITORING GAUGE SUCCESS REQUIREMENTS MET
- MONITORING GAUGE SUCCESS REQUIREMENT NOT MET
- CROSS SECTION
- AS-BUILT TOP OF BANK
- AS-BUILT THALWEG (2+00)
- CONSERVATION EASEMENT (CE)
- WETLAND RESTORATION
- EXISTING WETLAND
- AS-BUILT STRUCTURE
- AS-BUILT CONSTRUCTED RIFFLE
- AS-BUILT GRADE TRANSITION STRUCTURE
- ROOT WADS
- ROCK TOE
- BRUSH TOE
- RIP RAP PROTECTION

2015 IMAGE FROM GOOGLE EARTH

GRAPHIC SCALE

60 0 30 60 120 180

(IN FEET)
1 inch = 60 ft.

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DEQ
Division of
Mitigation Services

NEWTOWN
UNDERWOOD CREEK
UNION COUNTY, NORTH CAROLINA

DATE: November 2015

REVISIONS:

PROJECT NAME: EBX NEWTOWN

DWG NAME: CCPV

SCALE: 1" = 60'

CURRENT CONDITIONS PLAN VIEW

SHEET NO.

FIGURE 2A

MATCHLINE FIGURE 2A
FIGURE 2B

VPA-1
VPA-2
VPA-1
VPA-2

Gauge 1
Gauge 2
Gauge 3
Stream Gauge

XS 10
XS 4
XS 5
XS 3

5
4
3
2

UT TO UNDERWOOD CREEK
UNDERWOOD CREEK
WETLAND RESTORATION
NEWTOWN RD

FLOW

11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
19+06.37
39+00
40+00
41+00
42+00
43+00

LEGEND:

- PROBLEM AREA
- VEGETATION PROBLEM AREA
- SUPPLEMENTAL PLANTING AREA
- STREAM PROBLEM AREA
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS MET
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS NOT MET
- MONITORING GAUGE SUCCESS REQUIREMENTS MET
- MONITORING GAUGE SUCCESS REQUIREMENT NOT MET
- CROSS SECTION
- AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- CONSERVATION EASEMENT
- WETLAND RESTORATION
- EXISTING WETLAND
- AS-BUILT STRUCTURE
- AS-BUILT CONSTRUCTED RIFFLE
- AS-BUILT GRADE TRANSITION STRUCTURE
- ROOT WADS
- ROCK TOE
- BRUSH TOE
- RIP RAP PROTECTION

2015 IMAGE FROM GOOGLE EARTH

GRAPHIC SCALE

60 0 30 60 120 180

(IN FEET)
1 inch = 60 ft.

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Division of
Mitigation Services

NEWTOWN
UNDERWOOD CREEK
UNION COUNTY, NORTH CAROLINA

DATE: November 2015
REVISIONS:
PROJECT NAME: EBX NEWTOWN
DWG NAME: CCPV
SCALE: 1" = 60'

CURRENT CONDITIONS PLAN VIEW

SHEET NO.
FIGURE 2B

LEGEND:

- PROBLEM AREA
- VEGETATION PROBLEM AREA
- SUPPLEMENTAL PLANTING AREA
- STREAM PROBLEM AREA
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS MET
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS NOT MET
- MONITORING GAUGE SUCCESS REQUIREMENTS MET
- MONITORING GAUGE SUCCESS REQUIREMENT NOT MET
- CROSS SECTION
- AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- CONSERVATION EASEMENT
- WETLAND RESTORATION
- EXISTING WETLAND
- AS-BUILT STRUCTURE
- AS-BUILT CONSTRUCTED RIFFLE
- AS-BUILT GRADE TRANSITION STRUCTURE
- ROOT WADS
- ROCK TOE
- BRUSH TOE
- RIP RAP PROTECTION

VPA-1
VPA-2
UT TO UNDERWOOD CREEK
WETLAND RESTORATION
MATCHLINE FIGURE 2C
FIGURE 2D
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
XS 1
XS 2
13
Gauge 5
2015 IMAGE FROM GOOGLE EARTH

GRAPHIC SCALE

60 0 30 60 120 180

(IN FEET)
1 inch = 60 ft.

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NEWTOWN
UT to UNDERWOOD CREEK
UNION COUNTY, NORTH CAROLINA

DATE: November 2015

REVISIONS:

PROJECT NAME:
EBX NEWTOWN

DWG NAME:
CCPV

SCALE:
1" = 60'

CURRENT CONDITIONS PLAN VIEW

SHEET NO.
FIGURE 2C

LEGEND:

- PROBLEM AREA
- VEGETATION PROBLEM AREA
- SUPPLEMENTAL PLANTING AREA
- STREAM PROBLEM AREA
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS MET
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS NOT MET
- MONITORING GAUGE SUCCESS REQUIREMENTS MET
- MONITORING GAUGE SUCCESS REQUIREMENT NOT MET
- CROSS SECTION
- AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- CONSERVATION EASEMENT
- WETLAND RESTORATION
- EXISTING WETLAND
- AS-BUILT STRUCTURE
- AS-BUILT CONSTRUCTED RIFFLE
- AS-BUILT GRADE TRANSITION STRUCTURE
- ROOT WADS
- ROCK TOE
- BRUSH TOE
- RIP RAP PROTECTION

MATCHLINE FIGURE 2C
FIGURE 2D

MATCHLINE FIGURE 2D
FIGURE 2E

UT TO UNDERWOOD CREEK

WETLAND RESTORATION

WETLAND RESTORATION

WETLAND RESTORATION

Gauge 7

Gauge 11

Gauge 6

XS 5

XS 4

XS 3

VPA-2

12

11

10

9

13+00

14+00

15+00

16+00

17+00

18+00

19+00

20+00

21+00

22+00

23+00

2015 IMAGE FROM GOOGLE EARTH

GRAPHIC SCALE

60 0 30 60 120 180

(IN FEET)
1 inch = 60 ft.

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NEWTOWN
UT to UNDERWOOD CREEK
UNION COUNTY, NORTH CAROLINA

DATE: November 2015

REVISIONS:

PROJECT NAME:
EBX NEWTOWN

DWG NAME:
CCPV

SCALE:
1" = 60'

CURRENT CONDITIONS PLAN VIEW

SHEET NO.

FIGURE 2D

MATCHLINE FIGURE 2D
FIGURE 2E

MATCHLINE FIGURE 2E
FIGURE 2F

PA-1
PA-2
VPA-2
VPA-4

XS 6
XS 7
XS 8

22+00
23+00
24+00
25+00
26+00
27+00
28+00
29+00
30+00
31+00
32+00
33+00

6
7
8

UT TO UNDERWOOD CREEK

WETLAND RESTORATION

Gauge 2
Gauge 3
Gauge 4 Wetland Reference
Gauge 10

EXISTING WETLAND

CE

2015 IMAGE FROM GOOGLE EARTH

LEGEND:

- PA-# / VPA-4 — PROBLEM AREA / VEGETATION PROBLEM AREA
- SUPPLEMENTAL PLANTING AREA
- STREAM PROBLEM AREA
- 12 — VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS MET
- 12 — VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS NOT MET
- MONITORING GAUGE SUCCESS REQUIREMENTS MET
- MONITORING GAUGE SUCCESS REQUIREMENT NOT MET
- CROSS SECTION
- 2+00 — AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- CE — CONSERVATION EASEMENT
- WETLAND RESTORATION
- EXISTING WETLAND
- AS-BUILT STRUCTURE
- AS-BUILT CONSTRUCTED RIFFLE
- AS-BUILT GRADE TRANSITION STRUCTURE
- ROOT WADS
- ROCK TOE
- BRUSH TOE
- RIP RAP PROTECTION

GRAPHIC SCALE

60 0 30 60 120 180

(IN FEET)
1 inch = 60 ft.

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NEWTOWN
UT to UNDERWOOD CREEK
UNION COUNTY, NORTH CAROLINA

DATE: November 2015
REVISIONS:

PROJECT NAME: EBX NEWTOWN
DWG NAME: CCPV
SCALE: 1" = 60'

CURRENT CONDITIONS PLAN VIEW

SHEET NO.
FIGURE 2E

LEGEND:

- PROBLEM AREA
- VEGETATION PROBLEM AREA
- SUPPLEMENTAL PLANTING AREA
- STREAM PROBLEM AREA
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS MET
- VEGETATION PLOT (DOT = ORIGIN) SUCCESS REQUIREMENTS NOT MET
- MONITORING GAUGE SUCCESS REQUIREMENTS MET
- MONITORING GAUGE SUCCESS REQUIREMENT NOT MET
- CROSS SECTION
- AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- CONSERVATION EASEMENT
- WETLAND RESTORATION
- EXISTING WETLAND
- AS-BUILT STRUCTURE
- AS-BUILT CONSTRUCTED RIFFLE
- AS-BUILT GRADE TRANSITION STRUCTURE
- ROOT WADS
- ROCK TOE
- BRUSH TOE
- RIP RAP PROTECTION

MATCHLINE FIGURE 2E

FIGURE 2F

NEWTOWN RD

UT TO UNDERWOOD CREEK

VPA-1

VPA-2

XS 10

XS 9

XS 5

XS 4

Stream Gauge

Rain Gauge

Gauge 1

Gauge 2

WETLAND RESTORATION

WETLAND RESTORATION

UNDERWOOD CREEK

34+00

35+00

36+00

37+00

38+00

39+00

40+00

41+00

42+00

43+00

43+00.83

18+00

17+00

16+00

15+00

14+00

13+00

1

2

3

4

5

6

CE

GRAPHIC SCALE

60 0 30 60 120 180

(IN FEET)

1 inch = 60 ft.

2015 IMAGE FROM GOOGLE EARTH

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NEWTOWN
UT to UNDERWOOD CREEK
UNION COUNTY, NORTH CAROLINA

DATE: November 2015

REVISIONS:

PROJECT NAME: EBX NEWTOWN

DWG NAME: CCPV

SCALE: 1" = 60'

CURRENT CONDITIONS PLAN VIEW

SHEET NO.

FIGURE 2F

Table 5 **Visual Stream Morphology Stability Assessment**
Reach ID **Underwood Creek**
Assessed Length **1273**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0		100%			
		2. Degradation - Evidence of downcutting			0		100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	22	22			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	24	24			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	24	24			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	22	22			100%			
		2. Thalweg centering at downstream of meander (Glide)	22	22			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0		100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0		100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0		100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	6	6			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	5	5			100%			

Table 5 **Visual Stream Morphology Stability Assessment**
Reach ID **UT to Underwood Creek**
Assessed Length **3000**

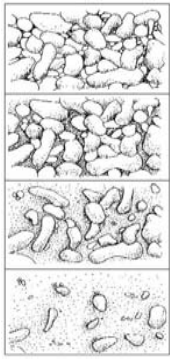
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0		100%			
		2. Degradation - Evidence of downcutting			0		100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	59	65			91%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	65	65			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	65	65			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	64	65			98%			
		2. Thalweg centering at downstream of meander (Glide)	59	63			94%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0		100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0		100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0		100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	19	19			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	18	18			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	17	18			94%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	17	17			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	16	16			100%			

Criteria, Definitions and Thresholds for Visual Stream Morphology Assessments

Major Channel Category	Channel Sub-Category	Metric	Definitions	Cataloging Threshold	CCPV Depiction
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)	*Aggradation refers to at least moderate increases in reach stored sediment. It is NOT simply constituted by minor fining of riffles or filling of pools at or below baseflow elevations. An aggrading reach is often characterized by sand or gravel bar formation/growth with associated fining of reach substrate and smoothing of the reach long profile. Bars/aggraded areas significant enough to deflect flow against banks should be catalogued. Repeat channel photopoints are a key tool in assessing project aggradation. (See photo exhibit 1 below for range of example bar development/aggradation)	Catalog only if feature has most of the characteristics described to the left (cell E11) and is at least 15 feet in length or 20% of the riffle/run length, whichever is less.	NA
		2. Degradation - Number and size of evident downcuts within Riffle/Run units.	Where projects have regularly-spaced engineered grade control, degredation/downcutting is expected only in short, discreet lengths. *Indicators include perched sill structures, channel bed "steps" in clay-rich parent material, evidence of bed retreat at the bank toe (parent material may be exposed); mobilization of coarse riffle substrate in to pools downstream, and perhaps riffles with run morphology. Long-profile surveys should support an assessment of bed degradation where the visual assessment and survey overlap.	Catalog only if feature has most of the characteristics described to the left (cell E12) and is at least 15 feet in length or 20% of the riffle/run length, whichever is less.	Dark Red or Purple Color to be certain to distinguish from Mass Wasting Color Code
	2. Riffle Condition	1. Texture	Riffles should maintain a coarseness similar to the design distribution. Significant fining of the riffle surface indicates non-attainment for the riffle. Repeat pebble counts should support an assessment of riffle fining where overlap occurs (see exhibit graphic 2 below describing embedding for gravel-cobble systems).	NA	NA
	3. **Meander Pool Condition**	1. Depth Sufficient?	This metric is used to assess meander pools and also step-pools along a Rosgen B-type channel reaches. For stepped reaches the pools will be evaluated and tallied here and under the Habitat Sub-Category below. The max pool bankfull depth should be 1.6 times the mean bankfull depth (Max Pool Depth : Mean Bankfull Depth > 1.6). The mean bankfull depth from the As-built/baseline survey can be utilized to make this determination. Exhibit 3 provides residual pool depths using the 1.6 multiplier for a range of mean channel riffle depths that typify restoration projects.	NA	NA
		2. Length appropriate?	This metric will only be applied to meander pools. The meander pool length should be >30% of the ~ linear centerline distance between the tail of the upstream riffle and the head of the downstream rifle.	NA	NA
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)?	This metric is used to characterize flow paths along riffle-run-pool transitions. The thalweg is expected to be against the outer bank in the bend apex, but vectors oriented towards the outer bank too far above the bend apex may indicate the potential for increased bank erosion. Similarly, the pool-glide-riffle transition is also expected to demonstrate flow path centering (Metric 4.2 below). The current-year thalweg rendered on the CCPV figure can assist in this assessment.	NA	NA
		2. Thalweg centering at downstream of meander bend (Glide)?	See Metric 4.1 above	NA	NA
2. Bank	**1. Scoured/Eroding Bank**	In order to better assess continued bank erosion risk, tallied bank segments are also characterized with respect to the proximity and integrated extent of stabilizing vegetation. Continued erosion risk for a given bank instability object is essentially adjusted downwards by adjacent mature vegetation and/or stabilizing roots. One or more mature trees in close proximity (e.g. 10 feet or less) or obvious integration of root mass within the bank failure are characteristics that would prompt the tallying of a given bank object into the additional sub-category related to risk of further instability (columns J-L of the actual data table). Essentially, the vegetative elements of rooting density and depth (e.g. from a BEHI assessment) need to be considered here.	Banks with evident scour /erosion	<table><tr><th>Bank Height</th><th>Minimum Length</th></tr><tr><td>>6</td><td>6</td></tr><tr><td>3-6</td><td>8</td></tr><tr><td><3</td><td>10</td></tr></table> See Footnote/Exhibt 5 below also This table provides a guide for working thresholds for bank erosion cataloging/mapping based on bank height. For the bank height ranges above, the minimum length of bank to be mapped and tallied is specified. For example, where banks are <3 feet high, only map an unstable segment if it is ≥ 10 feet.[5]	Yellow.
	2. Undercut		Banks undercut/overhanging to the extent that mass wasting appears likely? Does NOT include undercuts that modest, appear sustainable/stable and are providing habitat.		Orange.
	3. Mass Wasting		Bank slumping/calving/collapse?		Red.
3. Structures	**1. Overall Integrity**	The assessment of engineered structure performance should include all structures that provide grade control, bank protection, or habitat functions. These include Vanes, J-hooks, and rootwads, etc.	Bulk of structure physically intact with no dislodged boulders or logs?		Using callouts or some other means to maintain legibility, annotate structure with red "**S**" if structural failure has occurred
	2. Grade Control		Bed grade control maintained across the sill structure? No evident loss of bed elevation immediately upstream of structure? Some piping alone will not constitute a loss of grade control.		Using callouts or some other means to maintain legibility, annotate structure with red "**G**" if structure has lost grade control
	2a. Piping		Catalog structures lacking any substantial flow underneath sills or around arms?		Using callouts or some other means to maintain legibility, annotate structure with red "**P**" if significant piping has occurred
	3. Bank Protection		See exhibit 4 below for determining structural sphere of influence. If the amount of bank that is deemed to be actively eroding within the structures sphere of influence exceeds 15% of the total bank footage within the structures sphere of influence, then the structure should be classified as not providing adequate bank protection in the data table.		Using callouts or some other means to maintain legibility, annotate structure with red "**B**" if structure has failed to provide bank protection
	4. Habitat		Are pools maintained @ ~ Max Pool Depth : Mean Bankfull Depth > 1.6? For rootwads, habitat provision means interacting with baseflow and providing cover.		Using callouts or some other means to maintain legibility, annotate structure with red "**H**" if structure is not providing habitat

Exhibit 1. Examples of bar features warranting concerning related to cataloging item 1.1.1 of the assessment

Exhibit 2. Graphic depicting embedding of riffles with fine material



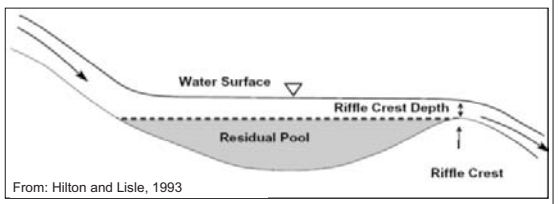
Progressing from top to bottom, the series of graphics to the left depicts the fining of interstial spaces between coarser particles. This describes increasing levels of embededness in riffles. The observer must have an understanding of the intended substrate distributions/texture of the bed for the projects riffles when assessing this. However, as a guideline for streams in the coarse gravel to cobble range, the 2nd panel from the top represents a visual guideline for the condition that would begin to elicit concern for this parameter, but still contains a good deal of coarse material. Progressing from that state to the conditions depicted in the the 3rd and 4th panel represents a visual que for significant emdedding.

From USEPA (EPA 841-B-97-003 - Nov 1997)

Exhibit 3. Residual Pool Depth Table - Relating 1.6 criterion for typical mean riffle depths to residual pool depths

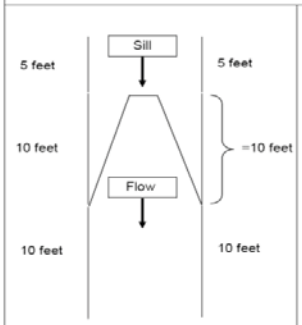
This residual pool table was provided in the event the tracking of bankfull at each pool feature to estimate a Dmax was inconvenient. Estimating the residual pool depth by measuring the max pool depth to water surface and subtracting the water depth at the riffle head may provide a more convenient way under certain circumstances to estimate in the field. For this reason the exhibit table provides a relationship between the 1.6 criterion applied to mean riffle depth for the site and the resulting residual pool depths.

Mean Riffle Depth D_{bkf}	Multiplier	Target Bankfull Pool Max	Residual Pool Depth
1.0	1.6	1.6	0.6
1.5	1.6	2.4	0.9
2.0	1.6	3.2	1.2
2.5	1.6	4.0	1.5
3.0	1.6	4.8	1.8
3.5	1.6	5.6	2.1
4.0	1.6	6.4	2.4
4.5	1.6	7.2	2.7
5.0	1.6	8.0	3.0



From: Hilton and Lisle, 1993

Exhibit 4. Extent of Structural Influence for Bank Protection



The drawing is a guideline for the extent of influence vane arms exert on stream banks. The bracketed segment (10ft) immediately adjacent to the vane arm is multiplied by 5 to determine the total length of bank influenced by a cross vane. This includes the bank length adjacent to each vane arm, 1 length (10 feet) below each van arm, and ½ length (5 feet) on each bank above the uppermost structural element (in this case the vane sill), yielding 50 feet in this example case. In this example a single arm vane or j-hook would only influence 25ft of bank.

If the amount of recent bank erosion observed within the extent of influence exceeds 15% then the structure is deemed not to be providing adequate bank protection. In the above examples this would amount to ~ 8 and 4 feet, respectively.

If in an earlier assessment the structure failed the 15% bank protection criteria but the erosion has subsequently stabilized, then the observer can use best professional judgment to determine if the structure is currently meeting the bank protection criteria.

5 = The above was developed because of the need to have a threshold given the large number of performers and to avoid spending time trying to catalog and map small objects that if excluded would have minimal overall impacts on the performance percentages. It is a guide that tries to strike a balance between the obvious need to have a threshold, yet provide confidence that the site conditions are accurately represented. For example, a scenario where 1 object nearly exceeding the threshold were to occur every 100 feet of bank height (which would be a high frequency and unlikely) with a bank height of 5 feet, would yield an error of ~3%. However, if the observer is encountering a truly high number of objects just below the threshold in the above table (e.g. > 1 per 100 feet of bank channel on average) and is concerned that the exclsuion of such objects is going to misrepresent the site conditions, then judgement should be applied and objects below the threshold may be cataloged. If a rare condition as described does occur and the thresholds are not utilized then a table footnote explaining this should be included.

Lastly, given the increase in overall area and the implications to stability, greater banks heights required smaller threshold minimums.

Table 6 Vegetation Condition Assessment

Planted Acreage[1] **14.3**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Brown Line	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Brown Line	10	0.54	3.8%
			Total	10	0.54	3.8%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Brown Line	0	0.00	0.0%
			Cumulative Total	10	0.54	3.8%

Easement Acreage[2] **16.43**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	100 SF	Brown Line	13	0.93	5.7%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	Brown Line	0	0.00	0.0%

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

2 = The acreage within the easement boundaries.

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

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

High Concern:				Low/Moderate Concern:	
Vines	**Genus/Species**	**Shrubs/Herbs**	**Genus/Species**	**Shrubs/Herbs**	**Genus/Species**
Kudzu	*Pueraria lobata*	Japanese Knotweed	Polygonum cuspidatum	Japanese Privet	Ligustrum Japonicum
Porcelain Berry	Ampelopsis brevipeduncu	Oriental Bittersweet	Celastrus orbiculatus	Glossy Privet	Ligustrum lucidum
Japanese Honeysuckle	Lonicera japonica	Multiflora Rose	Rosa multiflora	Fescue	Festuca spp.
Japanese Hops	Humulus japonicus	Russian olive	Elaeagnus angustifolia	English Ivy	Hedera helix
Wisterias	Wisteria spp.	Chinese Privet	Ligustrum sinense	Microstegium	Microstegium vimineum
Winter Creeper	Euonymus fortunei	Chinese Silvergrass	Miscanthus sinensis	Burning Bush	Euonymus alatus
Bush Killer (Watch List)	Cayratia japonica	Phragmites	Phragmites australis	Johnson Grass	Sorghum halepense
		Bamboos	Phyllostachys spp	Bush Honeysuckles	Lonicera, spp.
Trees		Sericea Lespedeza	Sericea Lespedeza	Periwinkles	Vinca minor
Tree of Heaven	Ailanthus altissima	Garlic Mustard (Watch List)	Alliaria petiolata	Morning Glories	Morning Glories
Mimosa	Albizia julibrissin	Cogon Grass (Watch List)	Imperata cylindrica	Bicolor Lespedeza (Watch List)	Lespedeza bicolor
Princess Tree	Paulownia tomentosa	Giant Reed (Watch List)	Arundo donax	Chinese Yams (Watch List)	Dioscorea oppositifolia
China Berry	Melia azedarach	Tropical Soda Apple (Watch List)	Solanum viarum	Air Potato (Watch List)	Dioscorea bulbifera
Callery Pear	Pyrus calleryana	Japanese Spirea (Watch List)	Spiraea japonica	Japanese Climbing Fern (Watch List)	Lygodium japonicum
White Mulberry	Morus alba	Japanese Barberry (Watch List)	Berberis thunbergii		
Tallow Tree (Watch List)	Triadica sebifera				

Stream Station Photos

Photo 1. Looking downstream at Underwood Creek XS-1

Photo 2. Looking downstream at Underwood Creek XS-2

Photo 3. Looking downstream at Underwood Creek XS-3

Photo 4. Looking downstream at Underwood Creek XS-4

Photo 5. Looking downstream at Underwood Creek XS-5

Photo 6. Looking downstream at UT to Underwood Creek XS-1

Photo 7. Looking downstream at UT to Underwood Creek XS-2

Photo 8. Looking downstream at UT to Underwood Creek XS-3

Photo 9. Looking downstream at UT to Underwood Creek XS-4

Photo 10. Looking downstream at UT to Underwood Creek XS-5

Photo 11. Looking downstream at UT to Underwood Creek XS-6

Photo 12. Looking downstream at UT to Underwood Creek XS-7

Photo 13. Looking downstream at UT to Underwood Creek XS-8

Photo 14. Looking downstream at UT to Underwood Creek XS-9

Photo 15. Looking downstream at UT to Underwood Creek XS-10

MY-00 Vegetation Plot Photos
April 22, 2011

Veg Plot 1

Veg Plot 2

Veg Plot 3

Veg Plot 4

MY-05 Vegetation Plot Photos
August 25, 2015

Veg Plot 1

Veg Plot 2

Veg Plot 3

Veg Plot 4

Veg Plot 5

Veg Plot 5

Veg Plot 6

Veg Plot 6

Veg Plot 7

Veg Plot 7

Veg Plot 8

Veg Plot 8

Veg Plot 9

Veg Plot 9

Veg Plot 10

Veg Plot 10

Veg Plot 11

Veg Plot 11

Veg Plot 12

Veg Plot 12

Veg Plot 13

Veg Plot 13

Appendix C. Vegetation Plot Data

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Table 7. Vegetation Plot Criteria Attainment		
Vegetation Plot ID	**Vegetation Survival Threshold Met?**	**Tract Mean**
VP1	Yes	69%
VP2	Yes	
VP3	Yes	
VP4	No	
VP5	Yes	
VP6	No	
VP7	Yes	
VP8	No	
VP9	Yes	
VP10	Yes	
VP11	No	
VP12	Yes	
VP13	Yes	

Report Prepared By	Chris Sheats
Date Prepared	10/19/2015 14:48

database name	TheCatenaGroup-2013-Newtown_D.mdb
database location	S:\Historical_backup\projects\2009\4143 (Newtown EBX)\2015 MY05\Submitted to WCE 2015
computer name	HBWS1
file size	51625984

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

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

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

Project Code	94150
project Name	Newtown Stream and Wetland Restoration
Description	Underwood Creek Stream Restoration in Union County southwest of Monroe, NC.
River Basin	Catawba
length(ft)	5317
stream-to-edge width (ft)	50
area (sq m)	49391.55
Required Plots (calculated)	13
Sampled Plots	13

DMS Project Code 94150. Project Name: Newtown Stream and Wetland Restoration

			Current Plot Data (MY5 2015)																				
			E94150-01-0001			E94150-01-0002			E94150-01-0003			E94150-01-0004			E94150-01-0005			E94150-01-0006			E94150-01-0007		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree																		1			
Acer rubrum	red maple	Tree			10																		
Acer rubrum var. rubrum	red maple	Tree																					
Asimina triloba	pawpaw	Tree																					
Baccharis	baccharis	Shrub																					
Baccharis glomeruliflora	silverling	Shrub Tree						6			5			5									
Baccharis halimifolia	eastern baccharis	Shrub																					
Betula nigra	river birch	Tree	7	7	7	3	3	3	5	5	5							1	1	1	1	1	1
Carpinus caroliniana	American hornbeam	Tree																					
Carpinus caroliniana var. caroliniana	Coastal American Horn	Tree																			1	1	1
Carya	hickory	Tree																					
Carya alba	mockernut hickory	Tree																					
Carya cordiformis	bitternut hickory	Tree																					
Celtis laevigata	sugarberry	Tree																					
Cephalanthus	buttonbush	Shrub																		1			
Cephalanthus occidentalis	common buttonbush	Shrub																1	1	1			
Cornus amomum	silky dogwood	Shrub																					
Diospyros virginiana	common persimmon	Tree												1									
Fraxinus	ash	Tree												4									
Fraxinus pennsylvanica	green ash	Tree							1	1	1							2	2	2	3	3	3
Ligustrum sinense	Chinese privet	Exotic																					
Liquidambar styraciflua	sweetgum	Tree																					
Nyssa sylvatica	blackgum	Tree																					
Pinus taeda	loblolly pine	Tree			1						1												
Platanus	sycamore	Tree												2									
Platanus occidentalis	American sycamore	Tree				3	3	3				2	2	2									
Platanus occidentalis var. occidentalis	Sycamore, Plane-tree	Tree													16	16	16				1	1	1
Populus	cottonwood																						14
Populus deltoides	eastern cottonwood	Tree						2			3			87			10						
Populus deltoides var. deltoides	eastern cottonwood																						
Pyrus calleryana	Callery pear	Exotic																					
Quercus	oak	Tree				1	1	1															
Quercus michauxii	swamp chestnut oak	Tree	7	7	7	9	9	9	5	5	5	2	2	2	1	1	1	1	1	1			
Quercus phellos	willow oak	Tree							2	2	2				3	3	3				1	1	1
Rhus copallinum	flameleaf sumac	shrub																					
Rhus copallinum var. copallinum	flameleaf sumac	shrub																					
Rosa multiflora	multiflora rose	Exotic																					
Rosa palustris	swamp rose	Shrub																					
Salix nigra	black willow	Tree												4									
Sambucus	elderberry	Shrub																					
Sambucus canadensis	Common Elderberry	Shrub																					
Ulmus alata	winged elm	Tree																					
Ulmus rubra	slippery elm	Tree																					
Unknown		Shrub or Tree																					
		Stem count	14	14	25	16	16	24	13	13	22	4	4	107	20	20	30	5	5	7	7	7	21
		size (ares)	1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	2	2	4	4	4	6	4	4	7	2	2	8	3	3	4	4	4	6	5	5	6
		Stems per ACRE	566.6	566.6	1012	647.5	647.5	971.2	526.1	526.1	890.3	161.9	161.9	4330	809.4	809.4	1214	202.3	202.3	283.3	283.3	283.3	849.8

	Current Plot Data (MY5 2015)																	
	E94150-01-0008			E94150-01-0009			E94150-01-0010			E94150-01-0011			E94150-01-0012			E94150-01-0013		
Scientific Name	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo																		
Acer rubrum																		
Acer rubrum var. rubrum																		
Asimina triloba																		
Baccharis						15												
Baccharis glomeruliflora			5															1
Baccharis halimifolia																		
Betula nigra																1	1	1
Carpinus caroliniana																		
Carpinus caroliniana var. caroliniana																		
Carya																		
Carya alba																		
Carya cordiformis																		
Celtis laevigata																		
Cephalanthus																		
Cephalanthus occidentalis																		
Cornus amomum										2	2	2				1	1	1
Diospyros virginiana				1	1	1	2	2	4	1	1	1	1	1	1	5	5	5
Fraxinus																		
Fraxinus pennsylvanica	1	1	1	3	3	3	2	2	8				2	2	2	2	2	7
Ligustrum sinense																		
Liquidambar styraciflua						46												
Nyssa sylvatica																		
Pinus taeda																		
Platanus																		
Platanus occidentalis																		
Platanus occidentalis var. occidentalis	1	1	1	2	2	2												
Populus						9												
Populus deltoides									1									7
Populus deltoides var. deltoides																		
Pyrus calleryana																		
Quercus							2	2	2									
Quercus michauxii	1	1	1	5	5	5				2	2	2	5	5	5	1	1	1
Quercus phellos				2	2	2	3	3	4							1	1	1
Rhus copallinum																		
Rhus copallinum var. copallinum																		
Rosa multiflora																		
Rosa palustris																		
Salix nigra																		
Sambucus																		
Sambucus canadensis																		
Ulmus alata																		
Ulmus rubra																		
Unknown																		
Stem count	3	3	8	13	13	83	9	9	19	5	5	5	8	8	8	11	11	24
size (ares)	1			1			1			1			1			1		
size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02		
Species count	3	3	4	5	5	8	4	4	5	3	3	3	3	3	3	6	6	8
Stems per ACRE	121.4	121.4	323.7	526.1	526.1	3359	364.2	364.2	768.9	202.3	202.3	202.3	323.7	323.7	323.7	445.2	445.2	971.2

	Annual Means																	
	MY5 (2015)			MY4 (2014)			MY3 (2013)			MY2 (2012)			MY1 (2011)			MY0 (2011)		
Scientific Name	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo			1															
Acer rubrum			10			2												
Acer rubrum var. rubrum						5												
Asimina triloba						1	1	1	1	4	4	4	14	14	14	16	16	16
Baccharis			15															
Baccharis glomeruliflora			22															
Baccharis halimifolia						79			30			34						
Betula nigra	18	18	18	18	18	21	17	17	17	17	17	17	20	20	20	24	24	24
Carpinus caroliniana																2	2	2
Carpinus caroliniana var. caroliniana	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	6	6	6
Carya																2	2	2
Carya alba						1												
Carya cordiformis						1												
Celtis laevigata				2	2	2	2	2	2	4	4	5	9	9	9	5	5	5
Cephalanthus			1															
Cephalanthus occidentalis	1	1	1	1	1	2	1	1	2	1	1	1						
Cornus amomum	3	3	3	3	3	5	3	3	3	3	3	3	4	4	4	3	3	3
Diospyros virginiana	10	10	13	10	10	12	10	10	10	11	11	11	19	19	19	26	26	26
Fraxinus			4															
Fraxinus pennsylvanica	16	16	27	16	16	31	16	16	18	17	17	19	17	17	17	20	20	20
Ligustrum sinense									1			1						
Liquidambar styraciflua			46			16			8			2						
Nyssa sylvatica						3												
Pinus taeda			2															
Platanus			2															
Platanus occidentalis	5	5	5	5	5	5	5	5	5	5	5	5	6	6	6	7	7	7
Platanus occidentalis var. occidentalis	20	20	20	20	20	20	20	20	20	20	20	20	21	21	21	21	21	21
Populus			23															
Populus deltoides			110									90						
Populus deltoides var. deltoides						94			91									
Pyrus calleryana						1												
Quercus	3	3	3	2	2	2	3	3	3	3	3	3	8	8	8	65	65	65
Quercus michauxii	39	39	39	39	39	40	39	39	39	41	41	41	41	41	41	1	1	1
Quercus phellos	12	12	13	14	14	15	13	13	13	14	14	14	12	12	12			
Rhus copallinum												2						
Rhus copallinum var. copallinum						4			1									
Rosa multiflora									1			1						
Rosa palustris						1						5						
Salix nigra			4			8			2									
Sambucus																		
Sambucus canadensis						41			3			13						
Ulmus alata						4			5									
Ulmus rubra						5						5						
Unknown																10	10	10
Stem count	128	128	383	131	131	422	131	131	276	141	141	297	173	173	173	208	208	208
size (ares)	13			13			13			13			13			13		
size (ACRES)	0.32			0.32			0.32			0.32			0.32			0.32		
Species count	11	11	23	12	12	28	13	13	22	13	13	22	12	12	12	14	14	14
Stems per ACRE	398.5	398.5	1192	407.8	407.8	1314	407.8	407.8	859.2	438.9	438.9	924.6	538.5	538.5	538.5	647.5	647.5	647.5

Appendix D. Stream Survey Data

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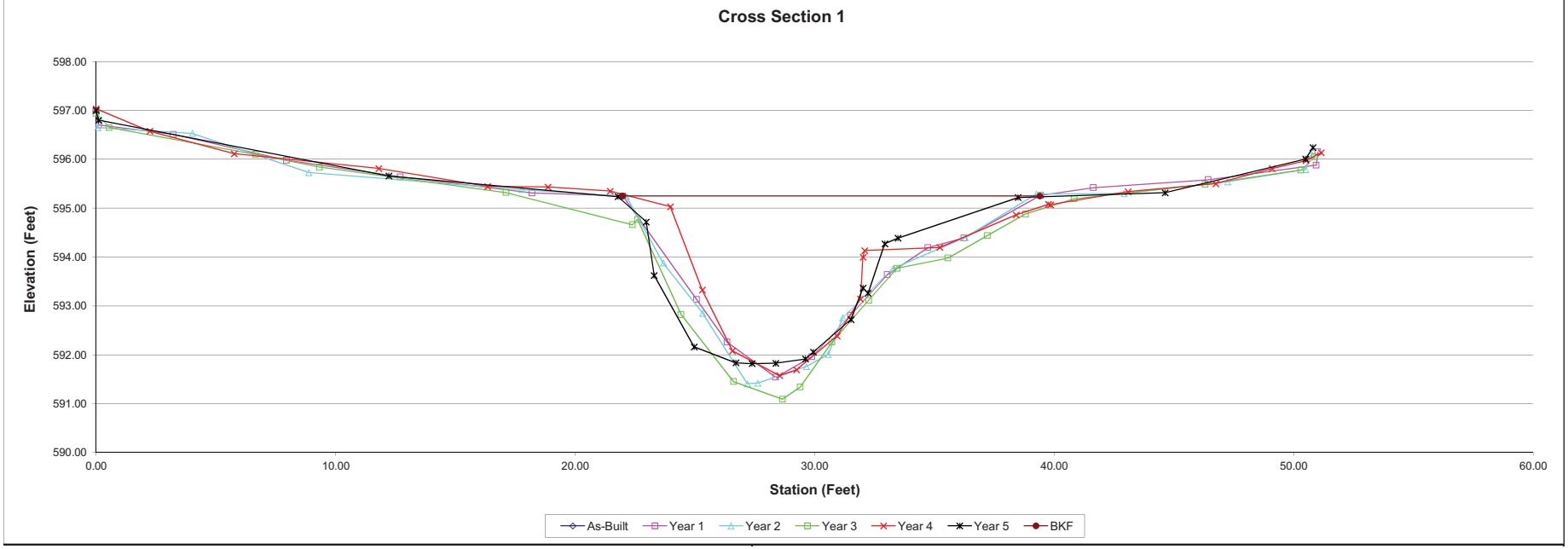
Project:	Underwood Creek
Cross Section:	Cross Section 1 (New for MY-01)
Feature	Pool
Station:	8+13
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)		31.4	33.0	38.1	29.9	30.8
W (BKF)		17.4	17.3	23.3	19.8	17.9
Max d		3.7	3.8	4.2	3.7	3.4
Mean d		1.8	1.9	1.6	1.5	1.7
W/D		9.7	9.1	14.3	13.1	10.4

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
			0.00	597.00	LPIN	0.00	597.00	LPIN		596.94	LPIN		597.04	Lpin		597	LPIN
			0.12	596.70		0.07	596.65		0.55	596.65		2.24	596.58		0.1	596.8	
			3.22	596.51		4.02	596.53		6.67	596.1		5.77	596.12		12.22	595.659	
			7.95	595.98		8.88	595.73		9.33	595.84		11.80	595.81		21.79	595.236	Bankfull left
			12.70	595.64		17.76	595.38		17.12	595.32		16.35	595.44		22.97	594.719	
			18.20	595.31		22.14	595.24	BL Bankfull	22.4	594.66		18.87	595.43		23.3	593.624	
			21.99	595.25	BANKFULL	23.68	593.88		22.61	594.77	TOBL bank	21.46	595.35	BL Bankfull	24.97	592.162	TOE L
			25.08	593.13	TOE L	25.33	592.85		24.43	592.82	TOE L	23.98	595.03		26.71	591.836	
			26.35	592.26		27.19	591.41	TOE L	26.62	591.45		25.31	593.33		27.39	591.818	TW
			28.38	591.54	TW	27.63	591.42	TW	28.66	591.09	TW	26.57	592.08		28.38	591.827	
			29.89	591.96		29.66	591.76		29.4	591.34		28.54	591.57	tw	29.62	591.915	
			31.51	592.81	TOE R	30.57	592.01	TOE R	30.73	592.26		29.24	591.69		29.95	592.055	TOE R
			33.04	593.64		31.17	592.76		32.26	593.11	TOE R	30.94	592.39		31.52	592.72	
			34.73	594.19		33.26	593.76		33.45	593.77	TOBR Ban	31.91	593.15	toer	32.02	593.365	
			36.24	594.39		36.29	594.40		35.57	593.98		32.02	594.00		32.23	593.258	
			39.44	595.26	R Bankfull I	39.26	595.29	R Bankfull I	37.22	594.44		32.09	594.13		32.93	594.273	
			41.64	595.42		42.93	595.30		38.81	594.88		35.23	594.20	TOBR	33.48	594.386	Bankfull right/TOBR
			46.44	595.58		47.24	595.54		40.84	595.19		38.42	594.86		38.5	595.217	
			50.95	595.88		50.50	595.79		46.31	595.49		39.76	595.08	Bankfull righ	44.64	595.315	
			51.02	596.15	RPIN	50.76	596.09	RPIN	50.31	595.78		39.85	595.07		50.5	596.005	
									50.89	596.05	RPIN	43.08	595.34		50.81	596.243	RPIN
												46.75	595.50				
												49.10	595.81				
												50.51	595.97				
												51.15	596.13	rpin			

Photo of XS-1, looking in the downstream direction



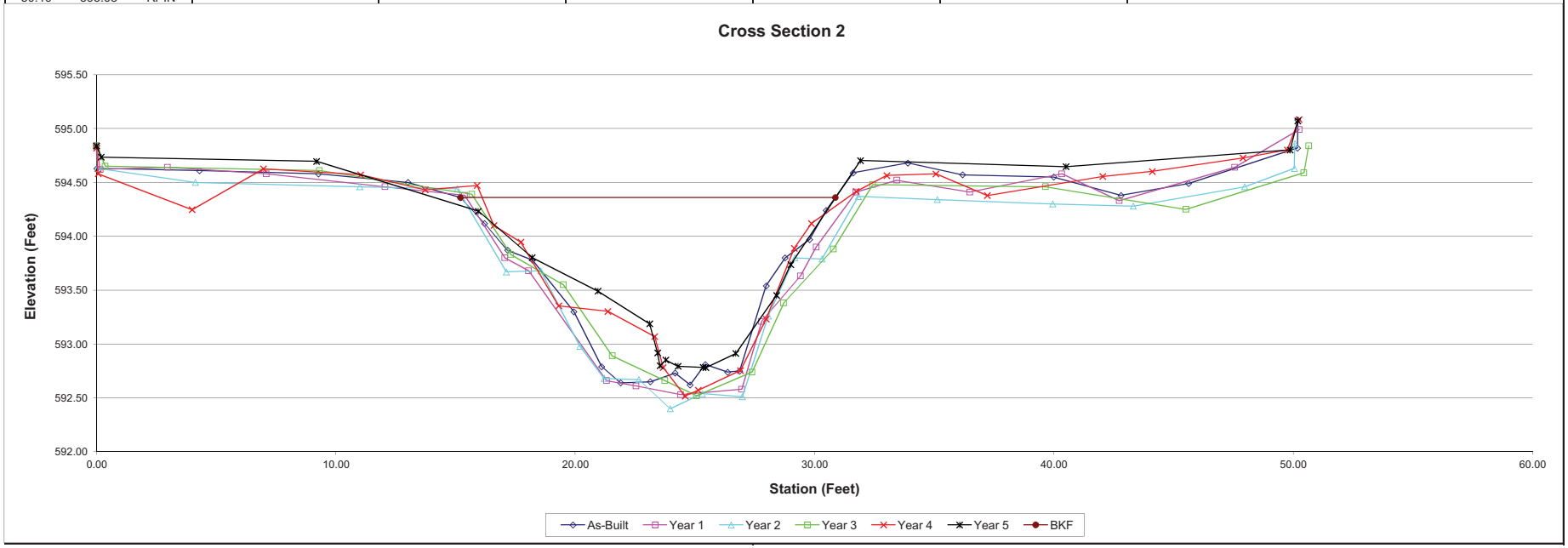
Project:	Underwood Creek
Cross Section:	Cross Section 2 (CS-1 in MY-00)
Feature	Riffle
Station:	9+54
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	16.1	18.3	18.4	18.1	14.8	11.6
W (BKF)	15.7	16.1	16.5	16.5	15.3	14.5
Max d	1.7	1.8	2.0	1.9	1.8	1.5
Mean d	1.0	1.1	1.1	1.1	1.0	0.8
W/D	15.2	14.2	14.9	15.1	15.8	18.3

Photo of XS-2, looking in the downstream direction

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	594.84	LPIN	0.00	594.84	LPIN	0.00	594.84	LPIN	0.00	594.84	LPIN		594.82	lpin		594.84	LPIN
0.01	594.63		0.15	594.62		0.03	594.63		0.36	594.65		0.06	594.58		0.19	594.735	
4.29	594.61		2.96	594.64		4.13	594.50		9.31	594.61		3.99	594.25		9.19	594.696	
9.27	594.58		7.09	594.58		11.00	594.46		15.68	594.39	3L Bankfull	6.97	594.63		15.95	594.233	Bankfull le
13.01	594.50		12.05	594.46		15.07	594.44	3L Bankfull	17.31	593.83		11.03	594.57		18.2	593.802	
15.20	594.36	BANKFULL	15.38	594.38	BANKFULL	17.12	593.67		19.51	593.55		13.73	594.43		20.95	593.491	
16.21	594.12		17.06	593.80		18.56	593.68		21.55	592.89	TOEL	15.90	594.47	bl bankfull l	23.11	593.188	
17.17	593.87		18.05	593.68		20.19	592.98		23.75	592.66		16.60	594.10		23.44	592.919	
18.21	593.78		21.31	592.66	TOE L	21.21	592.68	TOE L	25.07	592.52	TW	17.73	593.95		23.54	592.799	Toe L
19.94	593.30		22.54	592.61		22.66	592.67		27.39	592.74	TOER	19.31	593.36		23.78	592.852	
21.10	592.79	TOE L	24.41	592.53	TW	23.97	592.40		28.71	593.38		21.36	593.30		24.29	592.794	
21.89	592.64		26.96	592.58	TOE R	25.31	592.54	TW	30.79	593.88		23.32	593.07		25.34	592.784	
23.14	592.65		27.79	593.21		26.98	592.51	TOE R	32.43	594.48	R Bankfull l	23.67	592.78		25.46	592.781	TW
24.17	592.73		29.41	593.63		28.07	593.26		39.65	594.46		24.59	592.52	TW	26.71	592.912	TOE R
24.80	592.62	TW	30.07	593.90		29.17	593.80		45.52	594.25		25.14	592.57		28.41	593.452	
25.43	592.81		31.74	594.41	BANKFULL	30.31	593.79		50.45	594.59		26.90	592.76	toer	29	593.737	
26.36	592.74		33.44	594.52		31.83	594.37	R Bankfull l	50.65	594.84	RPIN	27.98	593.23		31.92	594.703	Bankfull right/TOBR
26.87	592.75	TOE R	36.49	594.41		35.13	594.34					29.15	593.89		40.51	594.647	
27.98	593.54		40.34	594.58		39.95	594.30					29.87	594.12		49.87	594.802	
28.77	593.80		42.73	594.33		43.32	594.28					31.74	594.42	r bankfull ri	50.19	595.071	RPIN
29.79	593.97		47.56	594.64		47.97	594.46					33.02	594.56				
30.48	594.24		50.25	594.99	RPIN	50.05	594.63					35.07	594.58				
31.61	594.59	BANKFULL RIGHT				50.07	594.86	RPIN				37.22	594.38				
33.90	594.68											42.04	594.56				
36.18	594.57											44.11	594.60				
39.99	594.55											47.90	594.73				
42.80	594.38											49.76	594.80				
45.62	594.49											50.24	595.09	rpin			
50.18	594.82																
50.19	595.08	RPIN															



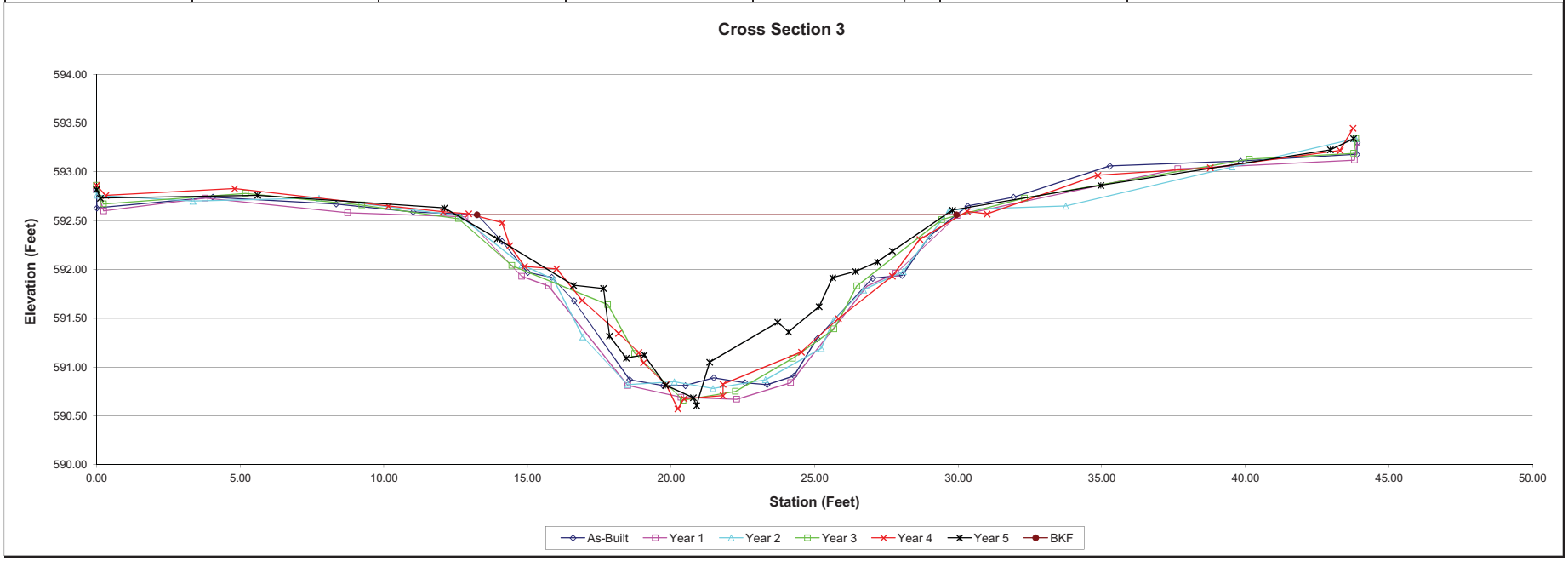
Project:	Underwood Creek
Cross Section:	Cross Section 3 (CS-2 in MY-00)
Feature	Riffle
Station:	13+36
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	18.1	20.3	18.7	16.6	17.2	15.8
W (BKF)	16.7	19.3	17.2	17.0	17.0	18.1
Max d	1.8	1.9	1.8	1.9	2.0	2.0
Mean d	1.1	1.0	1.1	1.0	1.0	0.9
W/D	15.4	18.4	15.8	17.3	16.8	20.8

Photo of XS-3 looking in the downstream direction

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	592.82	LPIN	0.00	592.82	LPIN	0.00	592.82	LPIN	0.00	592.86	LPIN		592.86	lpin		592.82	LPIN
0.01	592.63		0.25	592.60		0.01	592.76		0.24	592.67		0.32	592.76		0.13	592.731	
4.04	592.74		3.78	592.73		3.35	592.70		5.19	592.78		4.80	592.83		5.61	592.76	
8.34	592.67		8.75	592.58		7.74	592.73		9.24	592.66		10.16	592.65		12.11	592.63	Bankfull left
11.02	592.59		12.83	592.54	BANKFULL	12.65	592.55	BL Bankfull	12.60	592.52	BL Bankfull	12.06	592.59		13.95	592.315	
13.25	592.56	BANKFULL	14.80	591.93		14.80	592.05		14.46	592.04		12.96	592.57		16.61	591.837	
14.11	592.29		15.74	591.83		15.91	591.90		17.80	591.64		14.12	592.48	bl bankfull l	17.65	591.806	
15.01	591.97		18.50	590.81	TOE L	16.93	591.31		18.74	591.14	TOEL	14.39	592.24		17.86	591.319	Toe L
15.85	591.92		20.35	590.69	TW	18.49	590.82	TOE L	20.43	590.66	TW	14.90	592.03		18.44	591.093	
16.62	591.68		22.29	590.67		20.11	590.85	TW	22.25	590.75		16.02	592.01		19.07	591.124	
18.56	590.87	TOE L	24.17	590.84	TOE R	21.46	590.78		24.24	591.09	TOER	16.90	591.68		19.81	590.814	
19.72	590.81		26.83	591.83		23.29	590.87		25.68	591.39		18.17	591.35		20.78	590.686	
20.50	590.81	TW	27.83	591.96		25.23	591.19	TOE R	26.47	591.83		18.88	591.15		20.89	590.606	TW
21.49	590.89		29.96	592.55	BANKFULL	25.66	591.48		29.43	592.51	R Bankfull l	19.04	591.04	toel	21.35	591.05	
22.58	590.84		37.65	593.03		26.70	591.79		32.31	592.73		19.83	590.82		23.72	591.46	
23.35	590.82		43.80	593.12		28.09	591.98		40.14	593.13		20.24	590.57		24.09	591.361	Toe R
24.28	590.91	TOE R	43.89	593.30	RPIN	29.69	592.61	R Bankfull l	43.78	593.19		20.45	590.68	tw	25.16	591.62	
25.09	591.29					33.75	592.65		43.85	593.34	RPIN	21.81	590.71		25.63	591.916	
27.02	591.91					39.53	593.05					21.81	590.83		26.43	591.98	
28.05	591.94					43.82	593.34					24.54	591.15	toer	27.19	592.077	
29.00	592.34					43.84	593.34	RPIN				25.83	591.50		27.71	592.188	
30.33	592.65	BANKFULL RIGHT										27.71	591.93		29.8	592.608	Bankfull right/TOBR
31.93	592.74											28.66	592.31		34.97	592.862	
35.28	593.06											30.31	592.60	r bankfull ri	42.96	593.226	
39.83	593.11											31.01	592.57		43.77	593.34	RPIN
43.88	593.18											34.86	592.97				
43.89	593.30	RPIN										38.78	593.04				
												43.30	593.22				
												43.75	593.45	rpin			



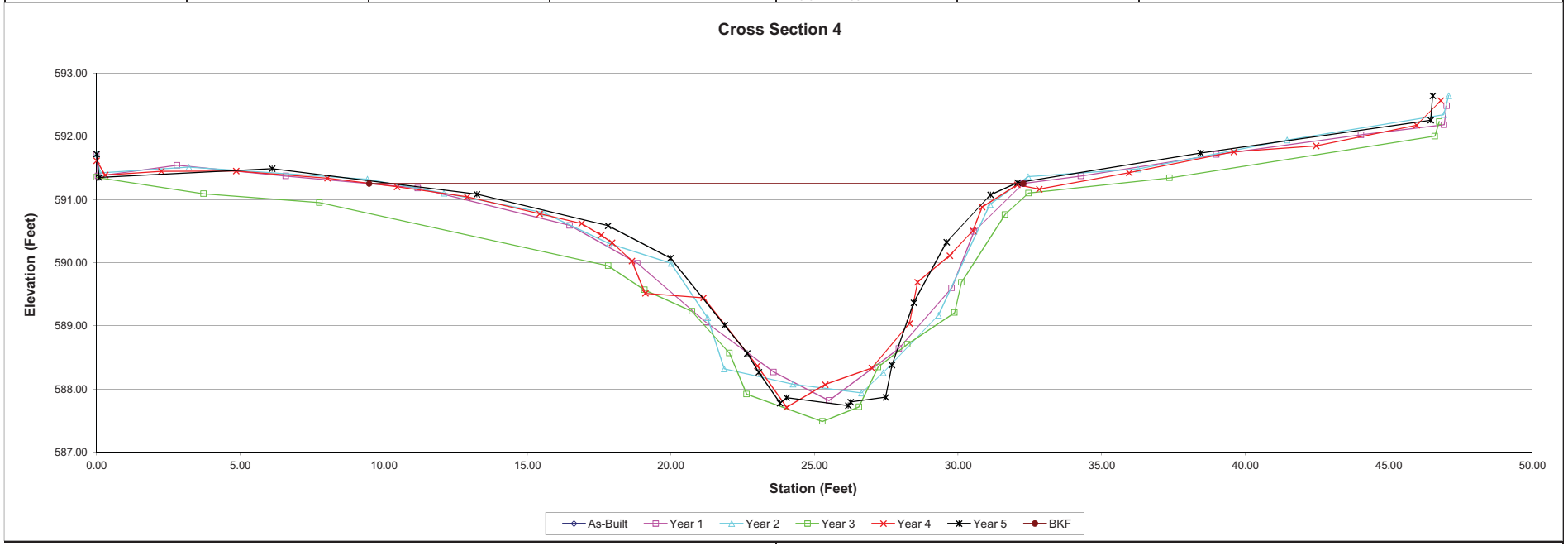
Project:	Underwood Creek
Cross Section:	Cross Section 4 (New for MY-01)
Feature	Pool
Station:	16+19
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)		33.8	33.4	35.4	30.5	27.2
W (BKF)		22.8	21.8	24.3	21.5	17.9
Max d		3.4	3.3	3.5	3.5	3.3
Mean d		1.5	1.5	1.5	1.4	1.5
W/D		15.3	14.3	16.7	15.2	11.8

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
			0.00	591.72	LPIN	0.00	591.72	LPIN	0.00	591.35	LPIN		591.62	lpin		591.72	LPIN
			0.05	591.37		0.12	591.42		3.73	591.09		0.30	591.39		0.09	591.346	
			2.81	591.54		3.21	591.51		7.76	590.95	BL Bankfull	2.25	591.45		6.11	591.488	
			6.59	591.37		9.43	591.32	BL Bankfull	17.82	589.95		4.86	591.45		13.24	591.084	Bankfull left
			11.19	591.18	BL Bankfull	12.09	591.10		19.08	589.57		8.04	591.34		17.81	590.586	
			16.48	590.59		15.57	590.79		20.74	589.23	TOEL	10.46	591.20		19.99	590.073	
			18.83	589.99		17.85	590.30		22.04	588.57		12.90	591.04		21.87	589.014	
			21.22	589.06	TOE L	20.00	589.99		22.64	587.92		15.43	590.77	bl bankfull l	22.66	588.567	
			23.58	588.27		21.28	589.13		25.28	587.49	TW	16.89	590.62		23.06	588.269	
			25.51	587.82	TW	21.86	588.32	TOE L	26.55	587.72		17.57	590.44		23.8	587.78	Toe L
			27.94	588.64		24.25	588.08		27.22	588.35		17.95	590.32		24.03	587.867	
			29.78	589.60	TOE R	26.64	587.94	TW	28.24	588.71		18.64	590.03		26.18	587.741	TW
			30.56	590.49		27.39	588.26	TOE R	29.88	589.21		19.11	589.52		26.26	587.798	Toe R
			32.27	591.25	BANKFULL	29.32	589.17		30.12	589.69		21.14	589.44	toel	27.48	587.873	
			34.28	591.37		31.11	590.92		31.64	590.76	R Bankfull l	23.01	588.37		27.7	588.381	
			39.00	591.71		32.44	591.36	R Bankfull l	32.46	591.10		24.03	587.71		28.46	589.366	
			44.04	592.02		36.27	591.48		37.37	591.34		25.37	588.07	tw	29.6	590.324	
			46.93	592.18		41.46	591.94		46.61	592.00		27.00	588.34		31.13	591.073	
			47.02	592.48	RPIN	46.92	592.34		46.76	592.23	RPIN	28.31	589.04		32.07	591.265	Bankfull right/TOBR
						47.09	592.64	RPIN				28.59	589.69	toer	38.45	591.735	
												29.71	590.11		46.46	592.253	
												30.52	590.51		46.53	592.64	RPIN
												30.84	590.88				
												32.06	591.23	r bankfull right			
												32.83	591.16				
												35.96	591.42				
												39.61	591.75				
												42.47	591.85				
												45.97	592.17				

Photo of XS-4, looking in the downstream direction



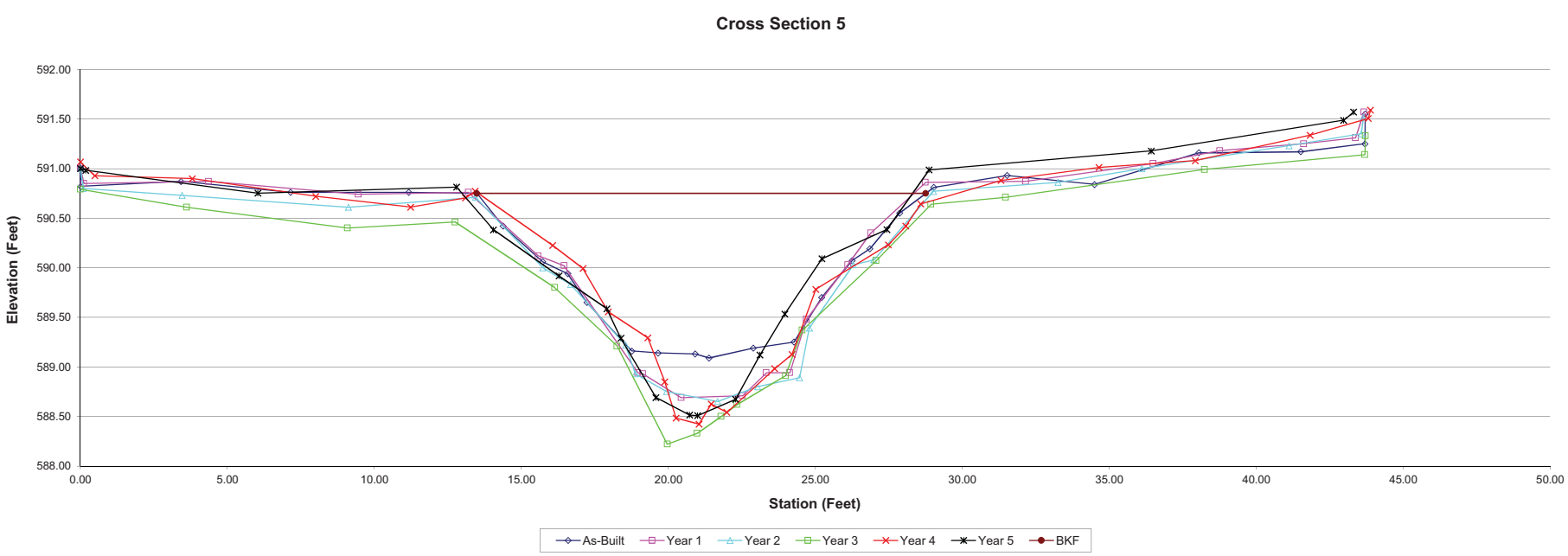
Project:	Underwood Creek
Cross Section:	Cross Section 5 (CS-3 in MY-00)
Feature	Riffle
Station:	17+13
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	15.9	17.5	19.7	16.7	17.5	18.0
W (BKF)	15.3	15.1	26.5	15.6	16.7	15.7
Max d	1.7	2.1	2.1	2.2	2.3	2.3
Mean d	1.0	1.2	0.7	1.1	1.1	1.1
W/D	14.7	13.1	35.6	14.6	15.8	13.7

Photo of XS-5, looking in the downstream direction

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	591.00	LPIN	0.00	591.00	LPIN	0.00	591.00	LPIN	0.00	590.79	LPIN		591.07	lpin		591	LPIN
0.01	590.82		0.12	590.85		0.10	590.80		3.62	590.61		0.49	590.93		0.18	590.982	
3.42	590.87		4.36	590.87		3.46	590.73		9.09	590.4		3.81	590.90		6.04	590.751	
7.15	590.76		9.46	590.74		9.12	590.61		12.75	590.46	L Bankfull	8.01	590.72		12.8	590.814	Bankfull left
11.17	590.76		13.20	590.76	BANKFULL	13.44	590.71	3L Bankfull	16.14	589.8		11.24	590.61		14.05	590.382	
13.49	590.75	BANKFULL	15.58	590.12		15.73	590.00		18.26	589.21		13.10	590.70		16.28	589.918	
14.38	590.42		16.46	590.02		16.68	589.83		19.97	588.22	TW	13.43	590.77	bl bankfull l	17.91	589.587	
15.73	590.06		18.97	588.94	TOE L	18.55	589.22		20.98	588.33		16.07	590.23		18.39	589.29	
16.58	589.94		19.14	588.93		18.88	588.93	TOE L	21.80	588.5		17.10	589.99		19.58	588.691	Toe L
17.23	589.65		20.44	588.69	TW	19.95	588.75		22.34	588.62		17.96	589.56		20.73	588.514	
18.76	589.16	TOE L	22.53	588.71		21.68	588.65	TW	23.99	588.91		19.31	589.29		21	588.509	TW
19.65	589.14		23.34	588.94		23.04	588.80		24.56	589.37		19.88	588.85	toel	22.29	588.672	Toe R
20.92	589.13		24.14	588.94	TOE R	24.47	588.89	TOE R	27.07	590.07		20.27	588.48		23.12	589.119	
21.39	589.09	TW	24.70	589.48		24.80	589.39		28.94	590.64	R Bankfull l	21.05	588.42		23.97	589.534	
22.89	589.19		26.11	590.03		26.29	590.03		31.48	590.71		21.46	588.63	tw	25.23	590.091	
24.28	589.25	TOE R	26.89	590.35		26.99	590.08		38.25	590.99		21.99	588.54		27.44	590.385	
25.22	589.70		28.75	590.86	BANKFULL	29.02	590.77	R Bankfull l	43.70	591.14		23.62	588.98		28.87	590.986	Bankfull right/TOBR
26.25	590.07		32.17	590.87		33.26	590.86		43.72	591.33	RPIN	24.21	589.13	toer	36.43	591.177	
26.86	590.19		36.50	591.05		36.11	591.00					25.02	589.78		42.98	591.487	
27.87	590.55		38.77	591.18		41.12	591.23					27.49	590.23		43.32	591.57	RPIN
29.03	590.81	BANKFULL	41.62	591.25		43.58	591.35					28.08	590.42				
31.53	590.93		43.38	591.31		43.65	591.52	RPIN				28.59	590.64	r bankfull right			
34.50	590.84		43.67	591.57	RPIN							31.32	590.88				
38.05	591.16											34.65	591.01				
41.52	591.17											37.93	591.08				
43.70	591.25											41.84	591.34				
43.71	591.55	RPIN										43.82	591.51				
												43.89	591.59	rpin			



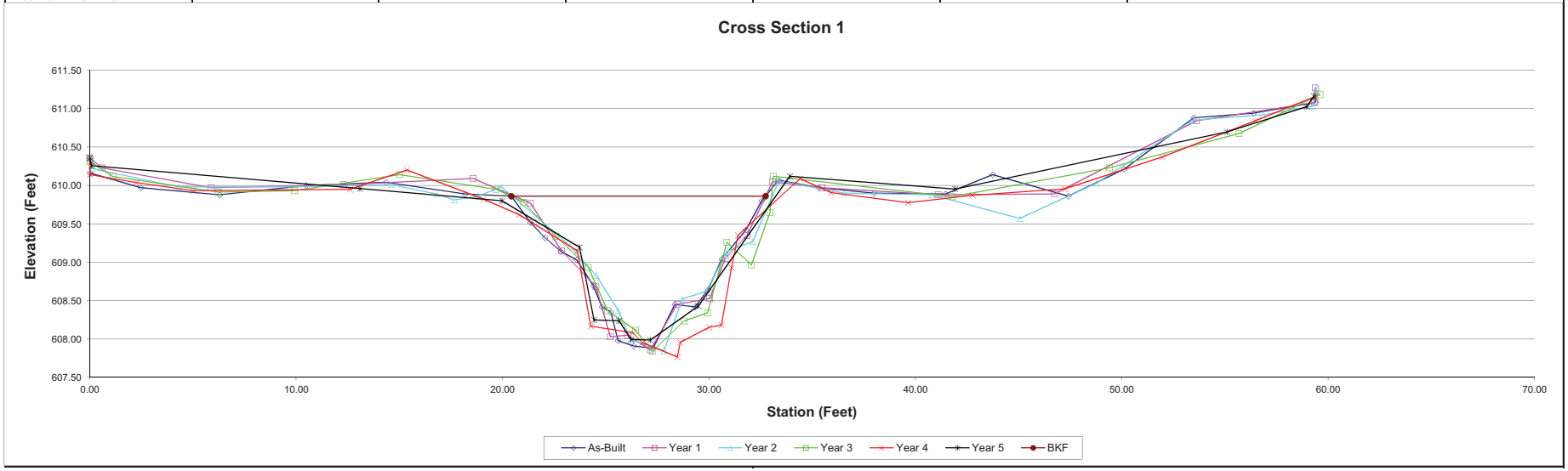
Project:	UT to Underwood Creek
Cross Section:	Cross Section 1 (Same as MY-00)
Feature	Riffle
Station:	6+40
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	13.1	13.2	12.5	12.5	15.3	12.6
W (BKF)	12.3	12.2	12.6	12.0	14.5	13.1
Max d	2.0	2.0	2.0	1.9	2.1	1.8
Mean d	1.1	1.1	1.0	1.0	1.1	1.0
W/D	11.6	11.3	12.7	11.5	13.8	13.6

Photo of XS-1, looking in the downstream direction

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
	610.36	LPIN		610.36	LPIN	0.00	610.36	LPIN		610.31	X1 LP		610.33	lpin		610.36	LPIN
0.01	610.16		0.58	610.23		0.13	610.22		1.12	610.12		0.01	610.14		0.08	610.259	
2.48	609.97		5.87	609.97		4.30	609.98		6.23	609.91		2.25	610.04		13.09	609.96	
6.28	609.88		12.30	610.01		9.70	609.98		9.92	609.93		5.01	609.93		19.98	609.8	Bankfull left
10.49	610.00		18.57	610.09		14.62	610.01		15.01	610.14		12.60	609.95		23.73	609.196	
14.36	610.04		21.36	609.77	BANKFULL	16.79	609.89		19.70	609.95		15.37	610.20		24.43	608.248	Toe L
18.19	609.89		22.86	609.15		17.67	609.81		21.02	609.78	L BANKFUL	19.08	609.82		25.64	608.24	
20.42	609.86	BANKFULL	24.52	608.68		18.83	609.86		22.59	609.34		20.81	609.62		26.23	607.995	
21.34	609.52		25.23	608.03	TOE L	19.93	609.98	3L Bankfull	24.16	608.93		23.63	609.15	bl bankfull l	27.16	607.987	TW
22.06	609.32		26.06	608.05		21.70	609.58		25.09	608.37	TOE L	24.28	608.17	toer	29.48	608.431	Toe R
22.82	609.14		27.16	607.86	TW	23.28	609.21		26.45	608.12		26.31	608.08		33.92	610.119	Bankfull right
23.59	609.03		28.45	608.45		24.54	608.83		27.26	607.84	X1 TW	26.77	607.96		41.93	609.953	
24.39	608.70		30.04	608.53	TOE R	25.61	608.37	TOE L	28.80	608.23		28.47	607.77	tw	55.1	610.697	
24.81	608.42	TOE L	30.79	609.05		26.21	607.99		29.93	608.34	TOE R	28.61	607.96		58.97	611.026	
25.25	608.35		31.85	609.35		27.82	607.85	TW	30.87	609.26		30.01	608.15	toer	59.31	611.16	RPIN
25.59	607.98		33.09	610.05	BANKFULL	28.71	608.52		32.06	608.97		30.60	608.18				
26.36	607.91	TW	35.49	609.97		29.87	608.62	TOE R	32.96	609.64		31.10	608.93				
27.30	607.88		41.11	609.88		30.88	609.14		33.13	610.12	R BANKFUL	31.41	609.35	r bankfull right			
28.35	608.45		46.74	609.89		32.13	609.27		41.79	609.86		34.42	610.09				
29.33	608.42		53.62	610.84		33.39	610.06	R Bankfull	49.41	610.23		35.92	609.91				
29.95	608.64	TOE R	59.35	611.08		36.54	609.90		55.69	610.68		39.65	609.78				
30.62	609.04		59.38	611.27	RPIN	40.79	609.88		59.62	611.18	X1 RP	42.77	609.87				
31.79	609.42					45.07	609.57					47.25	609.96				
32.56	609.80					48.79	610.03					51.97	610.37				
33.38	610.07	BANKFULL RIGHT				53.43	610.85					56.47	610.84				
35.33	609.97					56.84	610.92					59.40	611.16	rpin			
37.99	609.90					59.25	611.03										
41.46	609.89					59.44	611.27	RPIN									
43.74	610.14																
47.41	609.86																
50.12	610.21																
53.50	610.88																
56.38	610.94																
59.39	611.08																
59.40	611.20	RPIN															



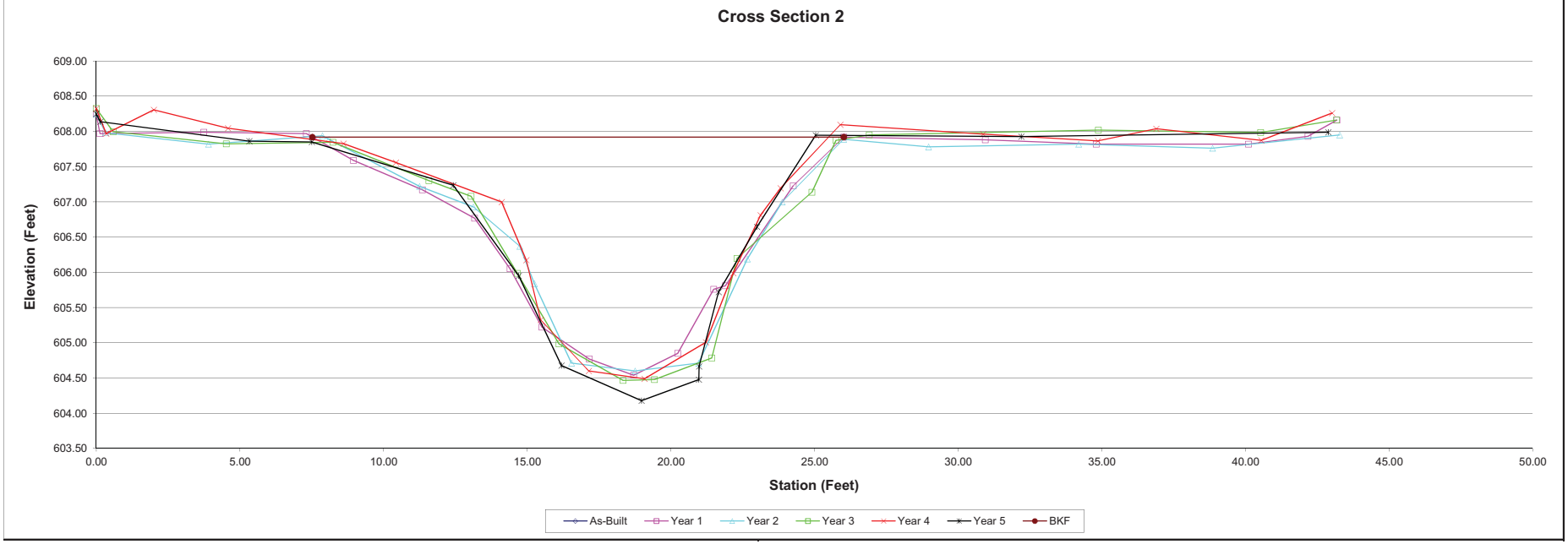
Project:	UT to Underwood Creek
Cross Section:	Cross Section 2 (New for MY-01)
Feature	Pool
Station:	10+32
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)		30.4	29.3	29.9	28.5	29.9
W (BKF)		18.5	17.8	17.5	18.6	17.4
Max d		3.4	3.3	3.4	3.4	3.7
Mean d		1.6	1.7	1.7	1.5	1.7
W/D		11.2	10.8	10.2	12.2	10.1

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
				608.25	LPIN	0.00	608.25	LPIN		608.33	LPIN		608.33	lpin		608.25	Lpin
			0.13	607.97		0.33	607.98		0.59	608.00		0.35	607.97		0.14	608.137	
			3.75	607.99		3.91	607.82		4.53	607.83		2.00	608.31		5.33	607.86	
			7.31	607.97	BANKFULL	7.87	607.94		8.24	607.85	3L Bankfull	4.58	608.04		7.5	607.85	TOBL
			8.95	607.59		8.10	607.89	3L Bankfull	11.58	607.30		8.60	607.83		12.43	607.237	
			11.35	607.17		11.25	607.22		13.05	607.08		10.43	607.56		14.71	605.95	ToeL
			13.17	606.77		13.12	606.93		14.66	605.99		14.11	607.00	bl bankfull l	16.19	604.676	TW
			14.40	606.05		14.74	606.37		16.11	604.99	TOEL	14.97	606.17		18.98	604.18	
			15.52	605.22	TOE L	15.25	605.84		18.34	604.47	CP	15.47	605.33	toel	20.98	604.478	ToeR
			17.16	604.77		16.54	604.71	TOE L	19.43	604.48	TW	17.14	604.60		20.99	604.667	
			18.71	604.54	TW	18.75	604.60	TW	21.43	604.78	TOER	19.08	604.49	tw	21.66	605.719	
			20.24	604.85		20.97	604.71	TOE R	22.30	606.20		21.22	605.01	toer	23	606.646	TOBR
			21.49	605.76		22.66	606.19		24.91	607.14		22.17	605.99		25.04	607.946	
			21.90	605.81	TOE R	23.88	607.00		25.75	607.87	R Bankfull l	23.12	606.81		32.2	607.926	
			24.26	607.23		26.01	607.89	R Bankfull l	26.91	607.95		23.82	607.19		42.89	607.987	Rpin
			26.02	607.92	BANKFULL	28.97	607.78		34.88	608.02		25.90	608.10	r bnakfull right			
			30.95	607.88		34.20	607.82		40.53	607.98		30.87	607.96				
			34.81	607.82		38.86	607.76		43.17	608.16	RPIN	34.87	607.86				
			40.11	607.82		43.28	607.95					36.90	608.04				
			42.18	607.93								40.55	607.87				
			43.19	608.16	RPIN							43.02	608.26	rpin			

Photo of XS-2, looking in the downstream direction



Project:	UT to Underwood Creek
Cross Section:	Cross Section 3 (CS-2 in MY-00)
Feature	Riffle
Station:	14+45
Date:	3/26/15
Crew:	SV, RC, CR

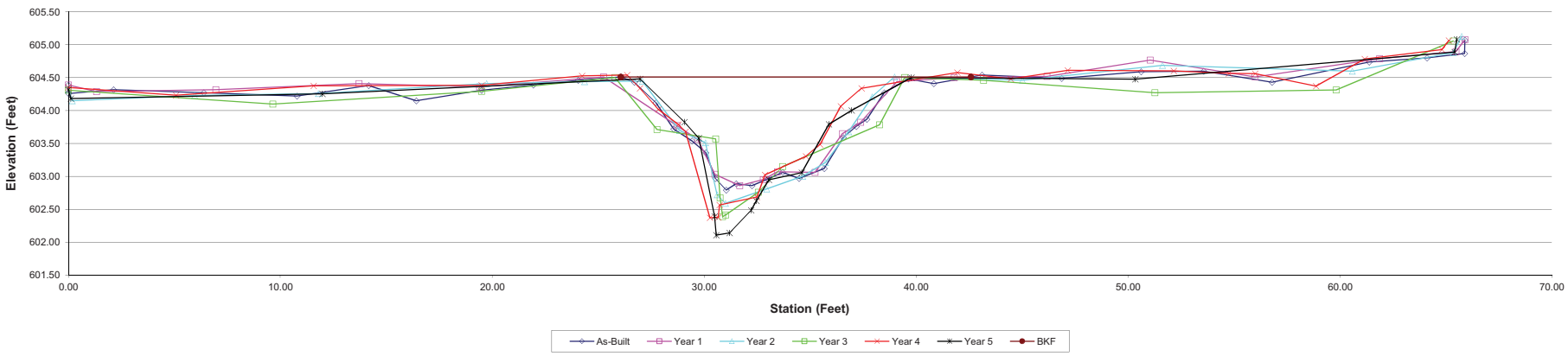
Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	13.4	13.2	13.0	13.9	12.4	12.6
W (BKF)	16.5	18.7	11.9	13.7	14.2	12.7
Max d	1.7	1.6	1.9	2.1	2.1	2.4
Mean d	0.8	0.7	1.1	1.0	0.9	1.0
W/D	20.4	26.6	10.9	13.4	16.3	12.8

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
	604.39	LPIN		604.39	LPIN	0.00	604.32	LPIN	0.00	604.31	LPIN		604.35	lpin		604.32	LPIN
0.01	604.26		1.33	604.29		0.18	604.15		9.65	604.10		5.08	604.24		0.12	604.184	
2.13	604.32		6.96	604.32		5.95	604.23		19.50	604.29		11.57	604.38		11.99	604.255	
6.38	604.27		13.71	604.41		11.79	604.26		25.79	604.51	3L Bankfull	19.50	604.39		26.98	604.481	ıkfull left, TC
10.78	604.22		19.40	604.36		19.73	604.41		27.78	603.71		24.24	604.53		29.07	603.827	
14.17	604.38		25.26	604.51	BANKFULL	24.35	604.44		30.54	603.57	TOE L	26.36	604.54	bl bankfull l	29.75	603.583	
16.41	604.15		28.72	603.77		27.08	604.45	3L Bankfull	30.75	602.67		26.97	604.34		30.49	602.393	
19.49	604.31		29.70	603.56		28.83	603.70		30.87	602.39	tw	27.84	604.02		30.57	602.105	Toe L
21.94	604.39		30.51	603.03	TOE L	30.06	603.51		31.01	602.41		28.78	603.79		31.2	602.139	TW
24.06	604.46		31.68	602.86	TW	30.61	602.72	TOE L	32.55	602.76		29.12	603.68		32.22	602.485	
26.07	604.51	BANKFULL	32.79	602.95		31.00	602.59	TW	33.71	603.15	TOE R	30.27	602.37	toel	32.46	602.629	Toe R
26.70	604.43		33.45	603.07		32.94	602.81		38.27	603.79		30.66	602.38	tw	33.05	602.948	
27.72	604.12		35.23	603.06	TOE R	34.64	603.00		39.46	604.51	R Bankfull l	30.72	602.57		34.61	603.057	
28.56	603.72		36.52	603.65		35.73	603.21	TOE R	43.19	604.46		32.49	602.69		35.89	603.791	
29.42	603.54		37.38	603.82		36.81	603.68		51.27	604.27		32.87	603.02		36.95	604.003	
30.07	603.36		39.10	604.44	BANKFULL	37.92	604.21		59.82	604.31		34.80	603.30		39.78	604.501	dull right, TOBR
30.53	602.97	TOE L	41.80	604.50		38.98	604.51	R Bankfull l	65.35	605.06	RPIN	35.47	603.49		50.34	604.477	
31.04	602.79		46.18	604.52		45.01	604.46					36.44	604.07		65.41	604.888	
31.51	602.89		51.05	604.77		51.62	604.69					37.42	604.34	ır bankfull ri	65.52	605.082	RPIN
32.26	602.86	TW	56.00	604.51		60.58	604.60					41.95	604.58				
33.00	602.96		61.87	604.79		65.34	604.88					44.46	604.48				
33.70	603.06		65.47	604.90		65.73	605.13	RPIN				47.16	604.61				
34.47	602.97		65.89	605.08	RPIN							52.16	604.61				
35.66	603.12	TOE R										54.75	604.57				
36.57	603.59											56.00	604.56				
37.18	603.76											58.87	604.37				
37.68	603.87											61.17	604.79				
38.50	604.27											64.81	604.93				
39.63	604.48	BANKFULL RIGHT										65.13	605.07	rpin			
40.84	604.41																
43.11	604.54																
46.87	604.49																
50.62	604.59																
53.56	604.60																
56.79	604.43																
61.38	604.74																
64.10	604.80																
65.88	604.87																
65.89	605.07	RPIN															

Photo of XS-3 looking in the downstream direction

Cross Section 3



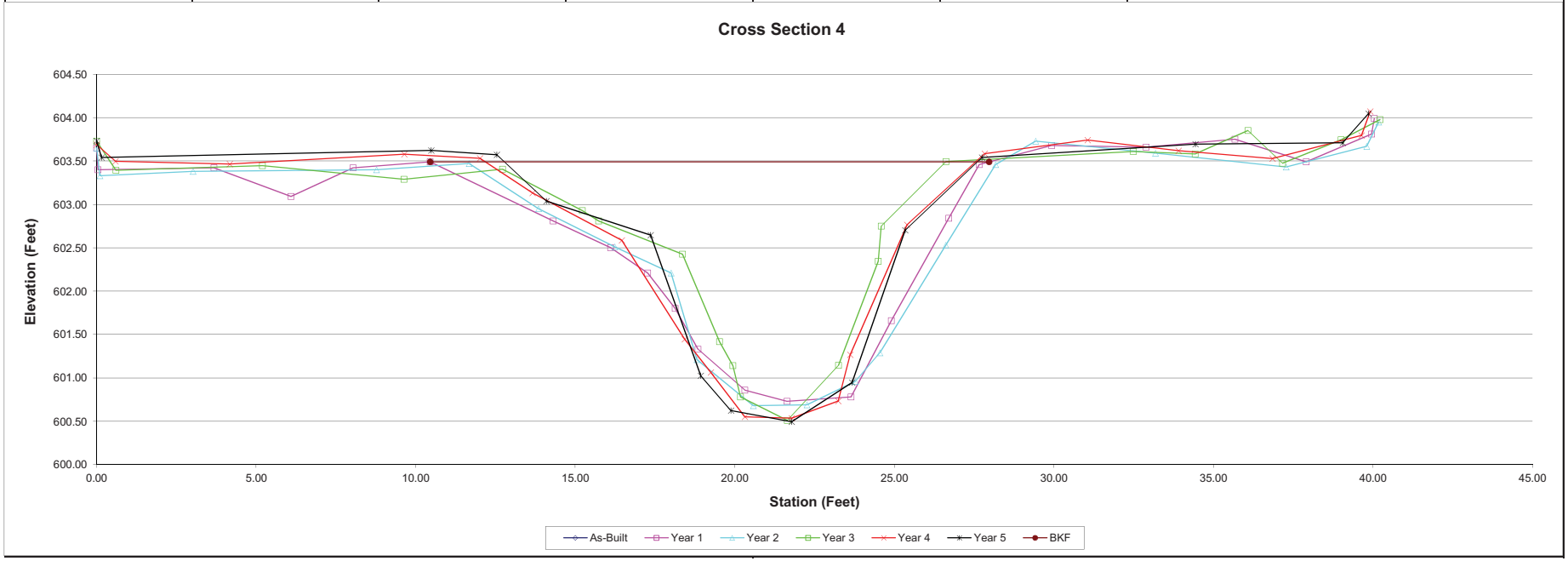
Project:	UT to Underwood Creek
Cross Section:	Cross Section 4 (New for MY-01)
Feature	Pool
Station:	16+30
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)		24.8	25.0	18.1	22.4	23.3
W (BKF)		17.5	16.6	13.9	15.4	16.6
Max d		2.8	2.8	3.0	3.0	3.1
Mean d		1.4	1.5	1.3	1.5	1.4
W/D		12.4	11.1	10.6	10.6	11.9

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
				603.65	LPIN	0.00	603.65	LPIN	0.00	603.73	LPIN		603.69	lpin		603.732	LPIN
			0.04	603.40		0.10	603.33		0.61	603.39		0.59	603.50		0.15	603.54	
			3.68	603.42		3.02	603.38		5.20	603.45		4.17	603.47		10.49	603.623	
			6.09	603.09		8.77	603.40		9.63	603.29		9.64	603.58		12.54	603.572	Bankfull left
			8.04	603.42		11.67	603.47	3L Bankfull	12.72	603.40	Bankfull Lef	12.01	603.53	bankfull left	14.1	603.039	
			10.45	603.49	BANKFULL	13.85	602.95		15.22	602.93		13.66	603.13		17.36	602.645	
			14.31	602.81		16.24	602.51		15.73	602.81		16.46	602.59	tobl	18.93	601.027	Toe L
			16.11	602.50		18.00	602.21		18.36	602.43		18.43	601.45	toel	19.88	600.623	
			17.27	602.21		18.81	601.21	TOE L	19.52	601.42		19.25	601.06		21.78	600.496	TW
			18.13	601.80		20.58	600.68		19.94	601.14	TOEL	20.32	600.55		23.68	600.946	Toe R
			18.85	601.33	TOE L	22.26	600.69	TW	20.18	600.78		21.78	600.54	tw	25.34	602.703	
			20.32	600.86		23.78	600.96		21.65	600.51	TW	23.24	600.74		27.75	603.539	Bankfull right, TOBR
			21.64	600.73	TW	24.55	601.29	TOE R	23.25	601.14	TOER	23.62	601.27		34.44	603.694	
			23.64	600.78		26.61	602.53		24.50	602.34		25.40	602.77		39.05	603.709	
			24.91	601.66	TOE R	28.17	603.46	R Bankfull	24.59	602.75		27.83	603.58	toer	39.86	604.046	RPIN
			26.71	602.84		29.43	603.73		26.62	603.49	R Bankfull	31.06	603.74				
			27.66	603.46	BANKFULL	33.18	603.59		32.49	603.61		33.91	603.62	r bankfull ri			
			29.93	603.68		37.28	603.43		34.43	603.58		36.85	603.53				
			32.89	603.66		39.80	603.67		36.08	603.85		39.64	603.80				
			35.67	603.75		40.18	603.95	RPIN	37.17	603.48		39.91	604.07	rpin			
			37.91	603.49					39.00	603.75							
			39.96	603.81					40.22	603.98	RPIN						
			40.04	603.99	RPIN												

Photo of XS-4, looking in the downstream direction



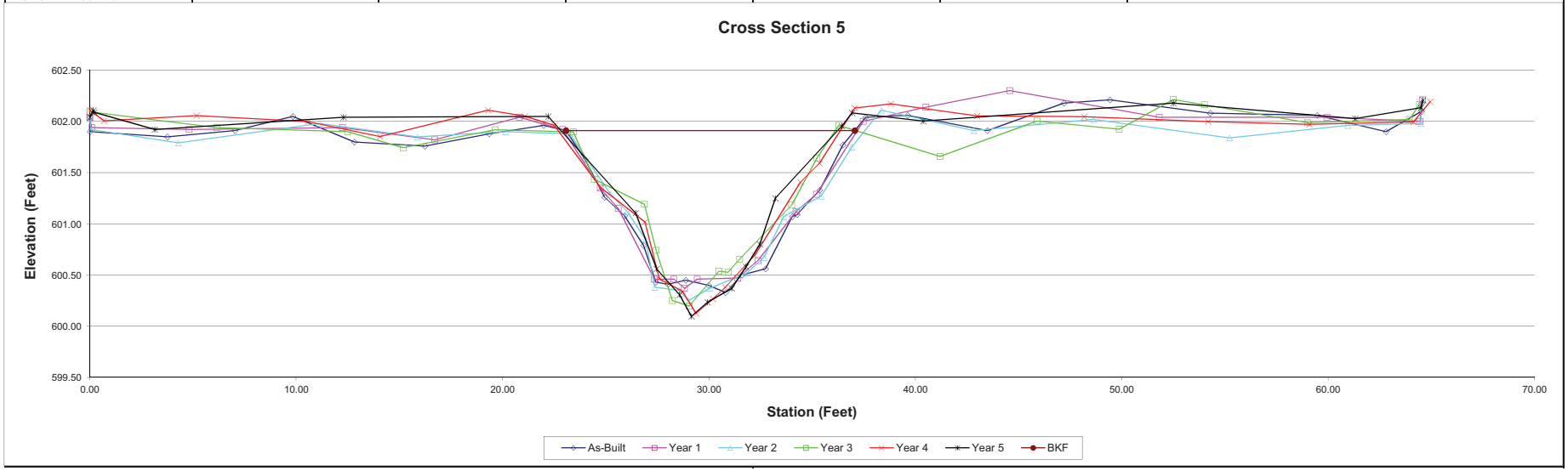
Project:	UT to Underwood Creek
Cross Section:	Cross Section 5 (CS-3 in MY-00)
Feature	Riffle
Station:	20+04
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	13.6	13.4	13.5	12.0	12.2	13.8
W (BKF)	14.0	14.2	14.3	14.9	13.7	14.6
Max d	1.6	1.5	1.7	1.7	1.8	2.0
Mean d	1.0	0.9	0.9	0.8	0.9	0.9
W/D	14.4	15.2	15.1	18.5	15.3	15.4

Photo of XS-5, looking in the downstream direction

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
	602.04	LPIN		602.04	LPIN	0.00	602.04	LPIN	0.00	602.10	LPIN		602.11	lpin		602.04	LPIN
0.01	601.90		0.10	601.94		0.05	601.92		6.15	601.94		0.69	602.01		0.17	602.106	
3.76	601.85		4.82	601.92		4.29	601.79		12.49	601.90		5.17	602.06		0.23	602.089	
7.03	601.91		12.25	601.94		11.13	601.98		15.19	601.74		10.57	602.00		3.15	601.921	
9.84	602.05		16.72	601.82		15.89	601.85		19.64	601.92		14.06	601.85		12.29	602.04	
12.83	601.80		20.82	602.04		20.15	601.90		23.43	601.90	3L Bankfull	19.30	602.11		22.21	602.048	Bankfull lef
16.24	601.76		22.92	601.92	BANKFULL	23.26	601.88	3L Bankfull	24.45	601.44		21.08	602.05		26.45	601.107	
19.36	601.88		24.74	601.35		25.24	601.29		26.87	601.19		22.51	601.96	bankfull left	27.47	600.56	Toe L
21.99	601.96		25.61	601.15		26.04	601.12		27.44	600.74		24.75	601.36	tobl	28.57	600.31	
23.08	601.91	BANKFULL	27.36	600.46	TOE L	26.92	600.85		28.23	600.25	TOEL	26.90	601.02		29.15	600.096	TW
24.00	601.63		28.30	600.46		27.38	600.38	TOE L	29.05	600.20	TW	27.60	600.46	toel	29.93	600.235	
24.95	601.26		28.81	600.37	TW	28.55	600.35		30.49	600.54	TOER	28.72	600.34		31.11	600.371	
25.91	601.08		29.43	600.46		29.01	600.25	TW	30.93	600.53		29.38	600.13	tw	31.8	600.579	Toe R
26.83	600.79		31.40	600.47		30.03	600.37		31.49	600.65		30.20	600.27		32.46	600.801	
27.43	600.43	TOE L	32.37	600.64	TOE R	31.86	600.52		34.01	601.18		30.79	600.38		33.22	601.25	
28.02	600.41		34.22	601.12		32.67	600.67	TOE R	35.24	601.64		32.21	600.69	toer	36.44	601.952	
28.88	600.45		35.21	601.29		33.63	601.07		36.29	601.96	R Bankfull	34.43	601.41	tobr	36.94	602.082	Bankfull right, TOBR
29.99	600.40		37.48	602.00	BANKFULL	35.44	601.27		41.20	601.66		35.35	601.59		40.38	602.004	
30.80	600.33	TW	40.52	602.14		36.92	601.75		45.89	602.00		37.07	602.13	ankfull righ	52.51	602.179	
31.59	600.50		44.57	602.30		38.35	602.11	R Bankfull	49.88	601.93		38.81	602.17		61.32	602.028	
32.75	600.56	TOE R	51.82	602.04		42.83	601.91		52.51	602.21		42.99	602.06		64.5	602.135	
34.04	601.07		59.94	602.04		48.63	602.02		54.01	602.16		48.19	602.05		64.6	602.207	RPIN
34.27	601.09		64.45	602.00		55.22	601.84		59.01	601.99		54.19	602.00				
35.37	601.33		64.58	602.21	RPIN	60.95	601.96		63.94	602.02		59.09	601.97				
36.49	601.77					64.50	601.98		64.43	602.17	RPIN	64.14	602.00				
37.60	602.04	BANKFULL RIGHT				64.51	602.14	RPIN				64.94	602.19	rpin			
39.63	602.06																
43.50	601.91																
47.20	602.18																
49.43	602.21																
54.28	602.08																
59.47	602.06																
62.81	601.90																
64.53	602.10																
64.54	602.18	RPIN															



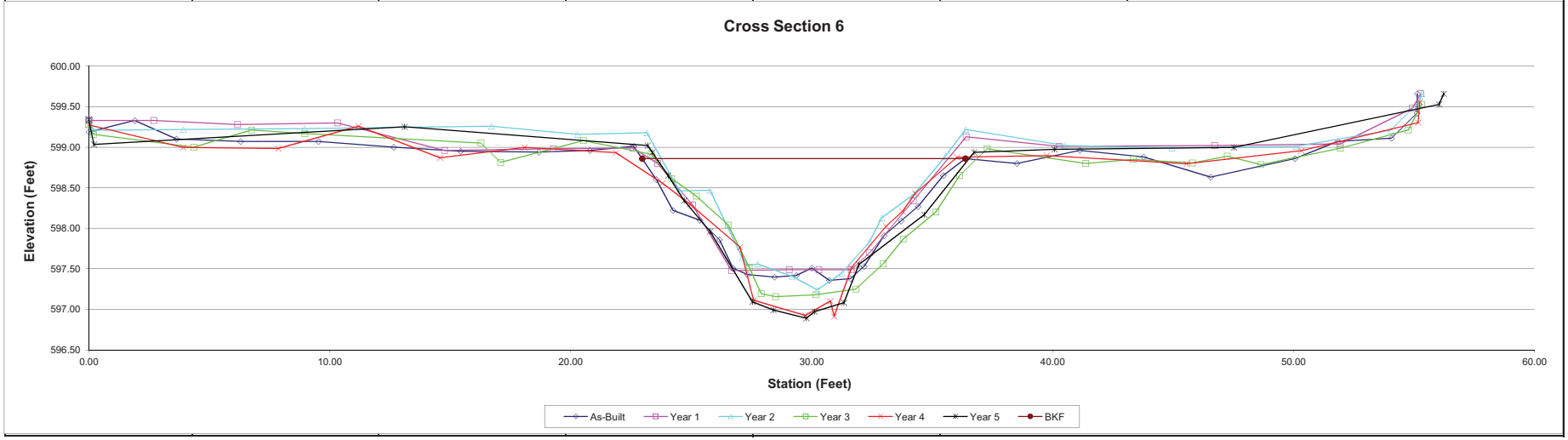
Project:	UT to Underwood Creek
Cross Section:	Cross Section 6 (CS-4 in MY-00)
Feature	Riffle
Station:	26+68
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	12.9	11.8	10.3	13.9	13.3	15.8
W (BKF)	13.4	12.4	11.7	13.4	13.7	13.4
Max d	1.5	1.4	1.6	1.7	1.9	2.0
Mean d	1.0	1.0	0.9	1.0	1.0	1.2
W/D	13.9	13.0	13.3	12.8	14.1	11.3

Photo of XS-6, looking in the downstream direction

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	599.34	LPIN	0.00	599.34	LPIN	0.00	599.34	LPIN		599.28	LPIN		599.28	lpin		599.34	LPIN
0.01	599.19		0.02	599.33		0.19	599.21		0.19	599.16		3.92	599.00		0.21	599.035	
1.91	599.33		2.70	599.33		3.92	599.22		4.36	599.00		7.86	598.98		13.1	599.251	
3.64	599.10		6.18	599.28		8.95	599.23		6.75	599.21		11.20	599.26		23.19	599.022	
6.29	599.07		10.32	599.30		16.71	599.26		8.97	599.17		14.57	598.87		23.388	598.936	Bankfull le
9.53	599.07		14.77	598.96		20.28	599.16		16.28	599.05		18.09	599.00		24.04	598.652	
12.65	599.00		19.29	598.98		23.16	599.18	3L Bankfull	17.09	598.81		21.87	598.93	bl bankfull l	24.71	598.344	
15.43	598.95		22.58	598.99	BANKFULL	24.52	598.46		20.53	599.08		23.81	598.56		25.78	597.962	
18.68	598.94		23.61	598.80		25.78	598.47		23.34	598.91	3L Bankfull	24.95	598.30		27.55	597.092	Toe L
20.80	598.96		25.06	598.29		27.11	597.64		24.19	598.61		27.03	597.77		28.42	596.991	
22.62	599.01	BANKFULL	26.68	597.48	TOE L	27.32	597.54	TOE L	25.22	598.40		27.59	597.11	toel	29.78	596.893	
23.56	598.60		29.07	597.49	TW	27.76	597.56		26.54	598.04		29.74	596.92		30.12	596.972	TW
24.24	598.22		30.30	597.49		29.18	597.41		27.41	597.52	TOEL	30.78	597.10		31.34	597.084	Toe R
25.35	598.10		31.65	597.49		30.23	597.24	TW	27.91	597.19		30.94	596.92	tw	31.96	597.553	
26.18	597.86		32.42	597.70	TOE R	31.26	597.45		28.50	597.16	TW	31.66	597.52	toer	34.67	598.167	
26.73	597.51	TOE L	34.22	598.34		32.39	597.83	TOE R	30.18	597.18		33.09	598.02		36.74	598.936	Bankfull right, TOBR
27.34	597.43		36.41	599.13	BANKFULL	32.91	598.13		31.84	597.25		33.77	598.21		40.08	598.974	
28.46	597.40		40.27	599.01		34.24	598.42		32.97	597.56	TOER	34.30	598.43		47.52	598.998	
29.36	597.42		46.73	599.02		35.56	598.89		33.81	597.87		36.04	598.88	r bankfull ri	56.04	599.527	
30.01	597.51		51.94	599.04		36.39	599.22	R Bankfull	35.16	598.20		39.76	598.90		56.24	599.66	RPIN
30.73	597.36	TW	54.94	599.48		40.52	599.02		36.14	598.65		45.56	598.80				
31.61	597.38		55.29	599.66	RPIN	44.95	598.99		37.29	598.98	R Bankfull	50.33	598.96				
32.18	597.53	TOE R				50.10	599.01		41.38	598.80		55.17	599.30				
33.00	597.91					54.03	599.21		43.34	598.85		55.24	599.56	rpin			
33.71	598.09					55.22	599.56		45.80	598.81							
34.41	598.27					55.32	599.66	RPIN	47.25	598.89							
35.47	598.65								48.64	598.79							
36.38	598.86	BANKFULL RIGHT							51.94	598.99							
38.52	598.80								54.77	599.21							
41.13	598.96								55.32	599.53	RPIN						
43.78	598.88																
46.56	598.63																
50.05	598.86																
51.84	599.07																
54.06	599.11																
55.13	599.42																
55.14	599.66	RPIN															



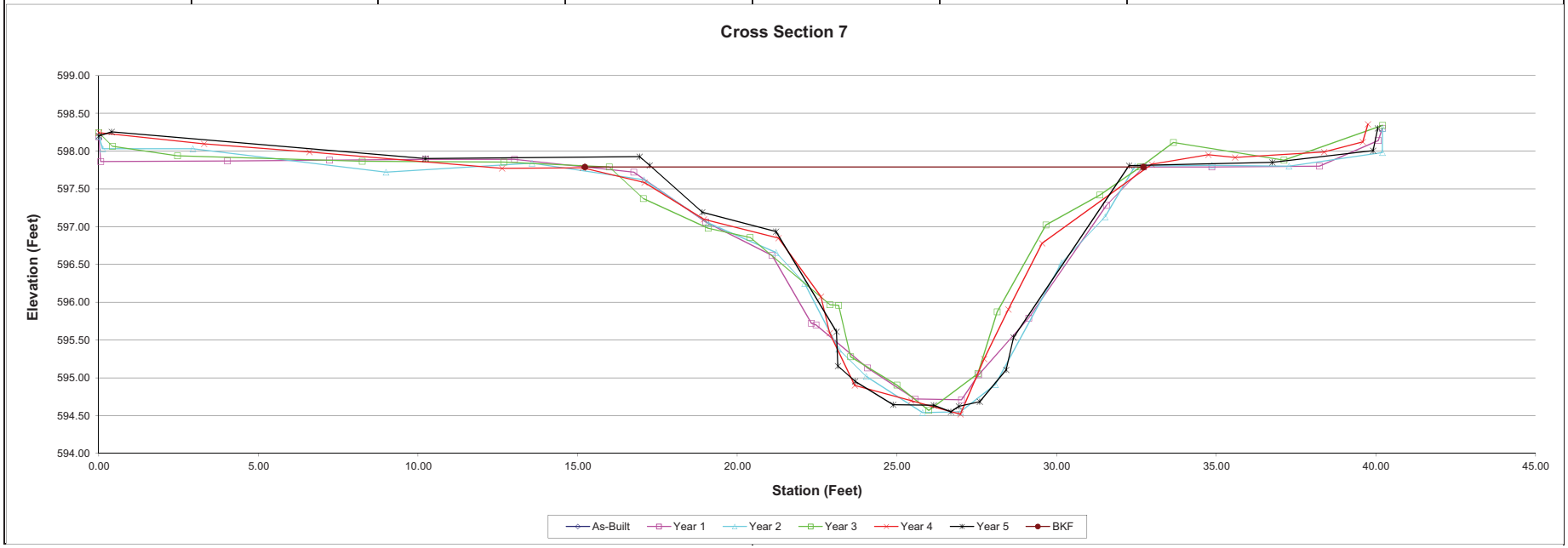
Project:	UT to Underwood Creek
Cross Section:	Cross Section 7 (New for MY-01)
Feature	Pool
Station:	28+82
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)		26.9	27.7	27.4	24.5	26.1
W (BKF)		17.5	18.1	17.7	20.7	15.1
Max d		3.1	3.3	3.4	3.3	3.3
Mean d		1.5	1.5	1.6	1.2	1.7
W/D		11.4	11.8	11.4	17.5	8.8

Photo of XS-7, looking in the downstream direction

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
			0.00	598.19	LPIN	0.00	598.20	LPIN		598.24	LPIN		598.24	lpin		598.2	LPIN
			0.06	597.86		0.12	598.03		0.43	598.06		3.29	598.10		0.4	598.254	
			4.03	597.87		2.94	598.03		2.47	597.94		6.60	597.99		10.23	597.901	
			7.23	597.88		8.99	597.72		8.25	597.87		12.63	597.77		16.94	597.926	
			10.24	597.89		13.57	597.84		12.69	597.86		15.15	597.78	bl bankfull l	17.25	597.81	Bankfull le
			13.02	597.89		17.07	597.62	3L Bankfull	15.99	597.79	3L Bankfull	17.09	597.58		18.9	597.191	
			16.76	597.72	3L Bankfull	19.08	597.05		17.06	597.37		18.95	597.10		21.21	596.936	
			19.01	597.06		21.21	596.66		19.09	596.98		21.29	596.85		23.11	595.61	
			21.09	596.62		22.11	596.25		20.40	596.86		22.62	596.08		23.15	595.156	Toe L
			22.32	595.72	TOE L	23.17	595.38	TOE L	22.90	595.97		22.89	595.59	toel	23.69	594.954	
			22.47	595.70		24.04	595.02		23.17	595.96	TOEL	23.68	594.90		24.88	594.643	TW
			24.08	595.13		25.80	594.54	TW	23.55	595.28		25.44	594.70		26.15	594.636	
			25.56	594.72		26.99	594.55		25.00	594.90		26.99	594.52	tw	26.69	594.552	
			27.02	594.71	TW	28.08	594.91	TOE R	26.00	594.57	TW	27.73	595.25		26.94	594.623	
			27.56	595.04		30.15	596.52		27.53	595.05		28.49	595.90	toer	27.59	594.684	Toe R
			29.13	595.79	TOE R	31.52	597.13		28.14	595.87	TOER	29.55	596.78		28.42	595.106	
			31.56	597.28		32.46	597.80	R Bankfull l	29.67	597.02		32.98	597.83	r bankfull ri	28.65	595.533	
			32.72	597.79	BANKFULL	34.86	597.81		31.36	597.42		34.75	597.95		32.27	597.809	Bankfull right, TOBR
			34.86	597.79		37.28	597.80		32.63	597.79		35.59	597.92		36.76	597.852	
			38.23	597.80		40.20	597.98		33.66	598.11	R Bankfull l	38.38	597.99		39.91	598.006	
			40.08	598.14		40.21	598.30	RPIN	37.12	597.88		39.59	598.12		40.06	598.3	RPIN
			40.20	598.30	RPIN				40.21	598.34	RPIN	39.75	598.36	rpin			



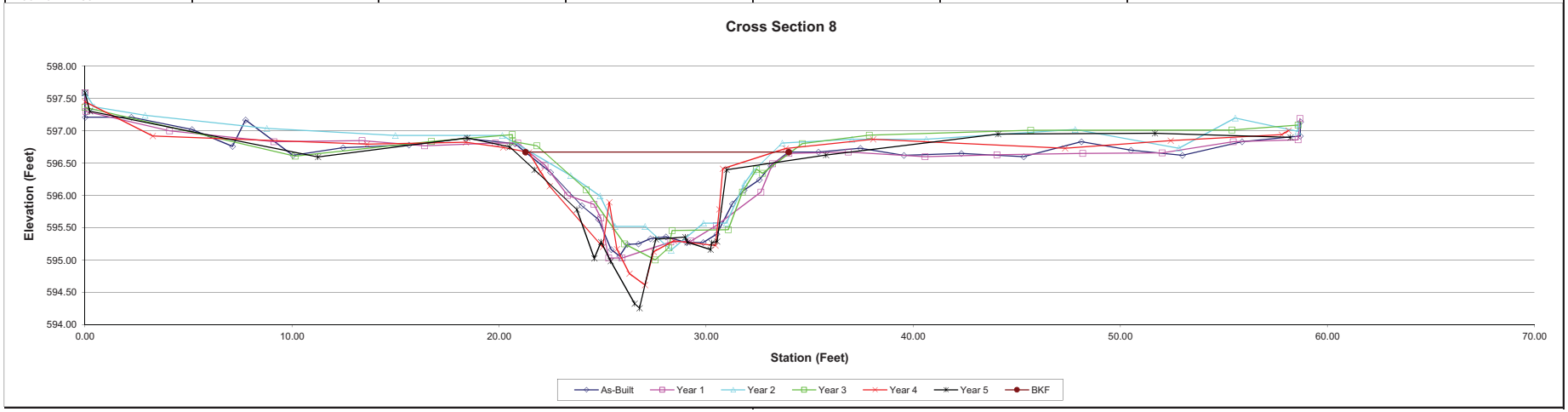
Project:	UT to Underwood Creek
Cross Section:	Cross Section 8 (CS-5 in MY-00)
Feature	Riffle
Station:	31+25
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	11.6	9.4	7.2	10.9	11.7	9.8
W (BKF)	12.7	11.0	10.0	12.5	11.9	9.3
Max d	1.6	1.4	1.3	1.7	2.1	2.1
Mean d	0.9	0.9	0.7	0.9	1.0	1.1
W/D	13.9	12.7	13.8	14.3	12.1	8.8

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	597.59	LPIN	0.00	597.59	LPIN	0.00	597.59	LPIN		597.36	LPIN		597.45	lpin		597.59	LPIN
0.01	597.21		0.05	597.30		0.45	597.37		10.15	596.61		3.28	596.92		0.24	597.305	
2.24	597.21		4.09	597.00		2.91	597.24		16.74	596.83		13.62	596.80		11.25	596.596	
5.17	597.02		9.12	596.83		8.78	597.04		20.64	596.94		18.39	596.82		18.46	596.892	
7.12	596.76		13.38	596.85		14.99	596.93		20.65	596.84	Bankfull left	20.20	596.74	bl bankfull l	20.51	596.75	
7.76	597.17		16.41	596.77		20.15	596.93	3L Bankfull	21.82	596.77		21.44	596.67		21.70	596.396	kfull left, TC
10.04	596.62		19.83	596.81		23.46	596.31		24.20	596.09		22.00	596.37		23.76	595.78	
12.46	596.74		20.91	596.81	BANKFULL	24.88	595.99		26.06	595.25	TOE L	22.44	596.14		24.60	595.027	
15.65	596.78		22.22	596.47		25.60	595.52	TOE L	27.55	595.00	TW	25.01	595.20	toel	24.93	595.278	
18.38	596.88		23.31	596.00		27.05	595.52		28.19	595.19		25.32	595.90		25.39	594.982	
20.76	596.80	BANKFULL	24.58	595.86		28.31	595.15	TW	28.36	595.46	TOE R	25.69	595.17		26.54	594.327	Toe L
22.48	596.36		24.91	595.65		29.87	595.57		31.07	595.47		26.30	594.79		26.78	594.254	TW
24.00	595.84		25.29	595.03	TOE L	30.97	595.57	TOE R	31.75	596.05		27.05	594.61	tw	27.57	595.319	Toe R
24.80	595.63		25.94	595.03	TW	31.85	596.19		32.43	596.41	ankfull Righ	27.46	595.13		28.99	595.355	
25.41	595.16	TOE L	28.29	595.28		32.29	596.38		32.72	596.34		28.44	595.30		29.09	595.276	
25.82	595.06	TW	29.27	595.29		33.67	596.81	R Bankfull	34.65	596.80		30.45	595.22	toer	30.22	595.161	
26.19	595.24		30.49	595.53	TOE R	37.04	596.87		37.88	596.93		30.64	595.78		30.26	595.268	
26.73	595.25		32.64	596.05		40.63	596.87		45.68	597.01		30.80	596.41	r bankfull ri	30.53	595.286	
27.31	595.33		33.21	596.49		47.82	597.02		55.39	597.01		33.84	596.73		30.99	596.396	full right, TOBR
28.06	595.36		34.00	596.65	BANKFULL	52.83	596.73		58.58	597.09	RPIN	38.06	596.87		35.79	596.624	
29.06	595.27		36.86	596.67		55.55	597.20					47.33	596.73		44.10	596.95	
29.86	595.27		40.57	596.60		58.57	596.99					52.43	596.85		51.67	596.96	
30.51	595.40	TOE R	44.04	596.63		58.58	597.11	RPIN				57.79	596.94		58.22	596.9	
31.27	595.87		48.18	596.65								58.13	597.01	rpin			
31.83	596.08		52.03	596.66													
32.56	596.24		55.45	596.83													
33.12	596.46		58.58	596.86													
33.98	596.67	BANKFULL	58.68	597.19	RPIN												
35.42	596.67																
37.44	596.73																
39.55	596.62																
42.32	596.65																
45.33	596.60																
48.12	596.83																
50.51	596.70																
53.00	596.62																
55.88	596.83																
58.69	596.92																
58.70	597.14	RPIN															

Photo of XS-8, looking in the downstream direction



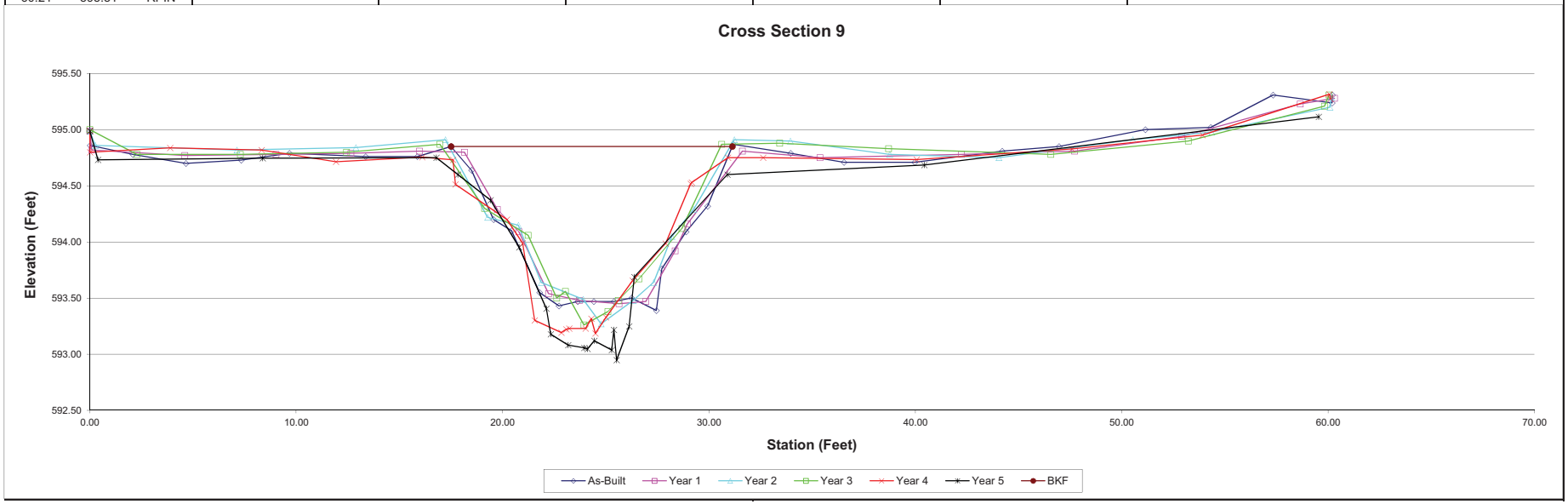
Project:	UT to Underwood Creek
Cross Section:	Cross Section 9 (CS-6 in MY-00)
Feature	Riffle
Station:	35+34
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	12.8	12.1	11.8	11.4	10.7	10.3
W (BKF)	13.6	13.5	13.6	13.5	13.1	13.1
Max d	1.5	1.4	1.6	1.6	1.5	1.7
Mean d	0.9	0.9	0.9	0.8	0.8	0.8
W/D	14.5	15.0	15.7	16.0	16.1	16.5

Photo of XS-9, looking in the downstream direction

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
	594.99	LPIN		594.99	LPIN	0.00	594.99	LPIN		595.00	LPIN		594.99	lpin		594.99	LPIN
0.01	594.86		0.09	594.82		0.26	594.86		2.29	594.78		0.01	594.80		0.4	594.731	
2.08	594.78		4.60	594.77		7.13	594.82		7.30	594.78		3.89	594.84		8.38	594.747	
4.66	594.70		9.03	594.78		12.89	594.84		12.44	594.80		8.32	594.82		16.8	594.75	
7.34	594.73		12.65	594.79		17.23	594.91	3L Bankfull	16.96	594.87	NKFULL LE	11.93	594.71		17.84	594.6	kfull left, TC
9.67	594.79		15.98	594.81		19.27	594.22		19.13	594.30		16.11	594.76		19.42	594.373	
13.36	594.76		18.15	594.80	BANKFULL	20.76	594.15		21.24	594.06		17.60	594.73	bankfull left	20.8	593.952	
15.87	594.76		19.75	594.29		21.88	593.64	TOE L	22.62	593.50	TOE L	17.72	594.51		22.13	593.406	
17.51	594.85	BANKFULL	20.79	594.09		23.91	593.49		23.05	593.56		20.21	594.20	tobl	22.34	593.179	
18.49	594.64		22.23	593.54	TOE L	24.77	593.27	TW	23.94	593.26	TW	20.97	593.99		23.18	593.082	Toe L
19.57	594.20		23.72	593.48	TW	26.33	593.48		25.11	593.38		21.56	593.30	toel	23.96	593.057	
20.43	594.10		25.65	593.45		27.32	593.64	TOE R	25.61	593.48		22.85	593.19		24.11	593.046	TW
21.80	593.55	TOE L	26.94	593.47	TOE R	28.21	594.05		26.61	593.67	TOE R	23.09	593.22		24.45	593.119	Toe R
22.73	593.43		28.36	593.92		29.26	594.29		28.69	594.12		23.23	593.23		25.29	593.037	
23.64	593.47		28.96	594.16		31.23	594.91	R Bankfull	30.62	594.87	NKFULL RI	24.03	593.23		25.39	593.217	
24.42	593.47	TW	31.62	594.81	BANKFULL	33.94	594.90		33.43	594.88		24.30	593.32		25.53	592.947	
25.40	593.47		35.38	594.75		38.76	594.78		38.71	594.83		24.50	593.19	tw	26.13	593.249	
26.25	593.50		42.24	594.78		44.05	594.75		46.57	594.78		25.01	593.33		26.39	593.688	
27.45	593.39	TOE R	47.72	594.81		50.54	594.91		53.23	594.90		26.31	593.66	toer	30.9	594.6	full right, TOBR
27.72	593.76		52.92	594.94		54.36	594.98		59.82	595.21		27.90	593.99		40.44	594.685	
28.89	594.09		58.65	595.23		60.09	595.20		60.05	595.31	RPIN	29.12	594.52		59.55	595.114	
29.93	594.32		60.32	595.28	RPIN	60.15	595.29	RPIN				29.17	594.53				
31.18	594.87	BANKFULL RIGHT										30.92	594.75	r bankfull right			
33.96	594.79											32.63	594.75				
36.54	594.71											40.06	594.73				
39.97	594.71											47.58	594.83				
44.21	594.81											53.91	594.95				
46.97	594.85											60.06	595.32				
51.14	595.00											60.11	595.28	rpin			
54.31	595.02																
57.33	595.31																
60.20	595.24																
60.21	595.31	RPIN															



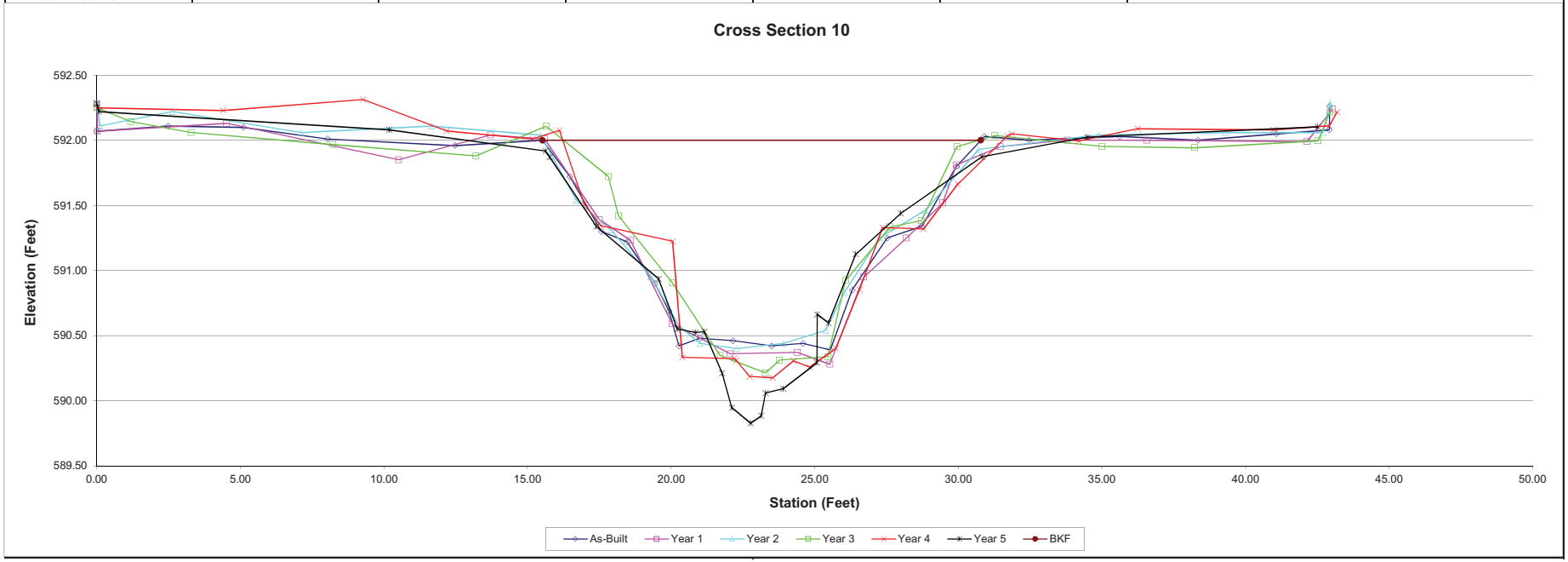
Project:	UT to Underwood Creek
Cross Section:	Cross Section 10 (CS-7 in MY-00)
Feature	Riffle
Station:	39+90
Date:	3/26/15
Crew:	SV, RC, CR

Summary (bankfull)

	MY0	MY1	MY2	MY3	MY4	MY5
A (BKF)	15.2	14.1	13.3	12.7	14.0	13.9
W (BKF)	15.3	15.0	14.8	14.3	14.7	15.0
Max d	1.6	1.6	1.5	1.7	1.7	2.0
Mean d	1.0	0.9	0.9	0.9	1.0	0.9
W/D	15.3	15.9	16.5	16.1	15.4	16.2

MY00-2011			MY01-2011			MY02-2012			MY03-2013			MY04-2014			MY05-2015		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
	592.28	LPIN		592.28	LPIN	0.00	592.28	LPIN		592.25	LPIN		592.25	lpin		592.28	LPIN
0.01	592.07		0.03	592.07		0.11	592.11		1.19	592.14		4.40	592.23		0.08	592.221	
2.48	592.11		4.52	592.13		2.64	592.22		3.29	592.06		9.27	592.31		10.19	592.08	
5.11	592.10		10.51	591.85		7.11	592.06		8.23	591.97		12.18	592.07		15.63	591.918	
8.04	592.01		13.72	592.04		11.66	592.11		13.21	591.88		15.17	592.01		15.78	591.87	Bankfull left
12.48	591.96		15.60	592.01	BANKFULL	15.45	592.04	BL Bankfull	15.65	592.11	Bankfull Left	16.12	592.08	bl bankfull l	17.4	591.337	
15.52	592.00	BANKFULL	17.51	591.39		16.70	591.54		17.82	591.72		16.98	591.51		19.57	590.935	
16.48	591.72		18.59	591.23		17.92	591.31		18.17	591.42		17.56	591.34		20.22	590.551	
17.58	591.30		20.04	590.59	TOE L	19.30	590.95		20.05	590.90		20.05	591.22		20.85	590.523	
18.47	591.22		22.06	590.36	TW	20.30	590.57	TOE L	21.71	590.35	TOE L	20.39	590.33	toel	21.16	590.529	
19.44	590.90		24.40	590.37		21.01	590.44		23.28	590.21	TW	22.19	590.32		21.78	590.21	Toe L
19.93	590.69		25.53	590.28	TOE R	22.29	590.40	TW	23.78	590.31		22.27	590.31		22.12	589.945	
20.28	590.42	TOE L	26.71	590.95		23.92	590.44		25.46	590.34	TOE R	22.73	590.19		22.77	589.827	TW
21.01	590.48		28.19	591.25		25.39	590.54	TOE R	26.08	590.93		23.54	590.18	tw	23.14	589.884	
22.16	590.46		29.46	591.52		26.03	590.83		27.63	591.33		24.26	590.31		23.29	590.059	Toe R
23.50	590.42	TW	29.94	591.81		27.26	591.25		28.72	591.38		24.83	590.26		23.91	590.092	
24.59	590.44		31.47	591.95	BANKFULL	28.85	591.46		29.96	591.95	ankfull Righ	25.74	590.40		25.08	590.292	
25.55	590.39	TOE R	33.80	592.00		30.71	591.93	R Bankfull	31.28	592.04		26.56	590.85		25.09	590.661	
26.31	590.85		36.58	592.00		34.88	592.04		35.00	591.95		27.37	591.33		25.48	590.597	
27.53	591.25		42.15	591.99		39.31	592.06		38.23	591.94		28.79	591.32	tobr	26.43	591.125	
28.74	591.34		43.03	592.24	RPIN	42.71	592.06		42.53	592.00		29.98	591.67		28	591.44	
29.94	591.80					42.95	592.29	RPIN	42.94	592.22	RPIN	31.71	592.04		30.83	591.873	Bankfull right, TOBR
30.91	592.03	BANKFULL RIGHT										31.88	592.05	ankfull righ	34.49	592.024	
32.47	592.00											34.19	592.00		42.52	592.104	
35.62	592.03											36.25	592.09				
38.35	592.00											40.98	592.08				
41.08	592.05											42.92	592.11				
42.92	592.08											43.19	592.22	rpin			
42.93	592.26	RPIN															

Photo of XS-10, looking in the downstream direction



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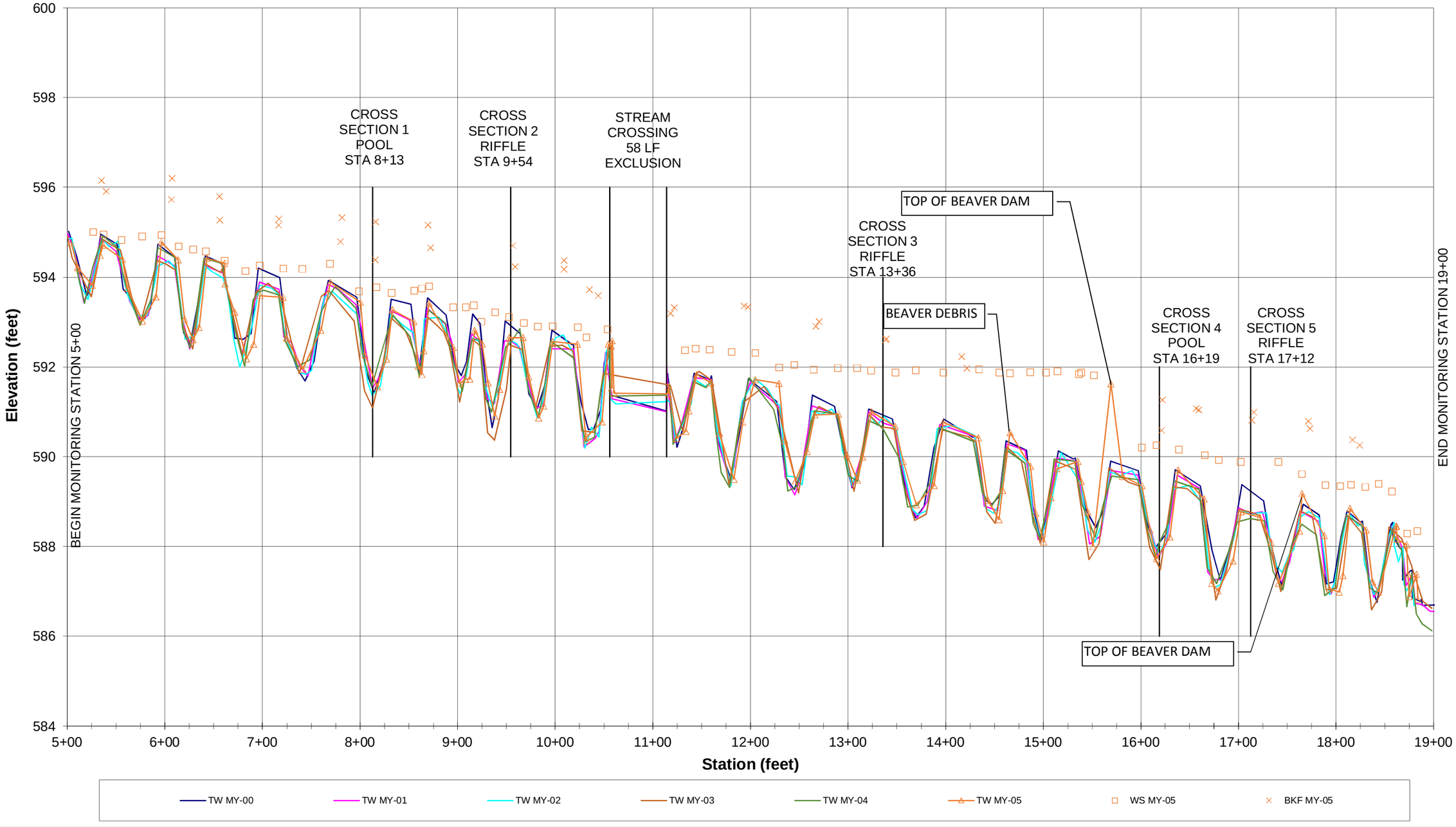
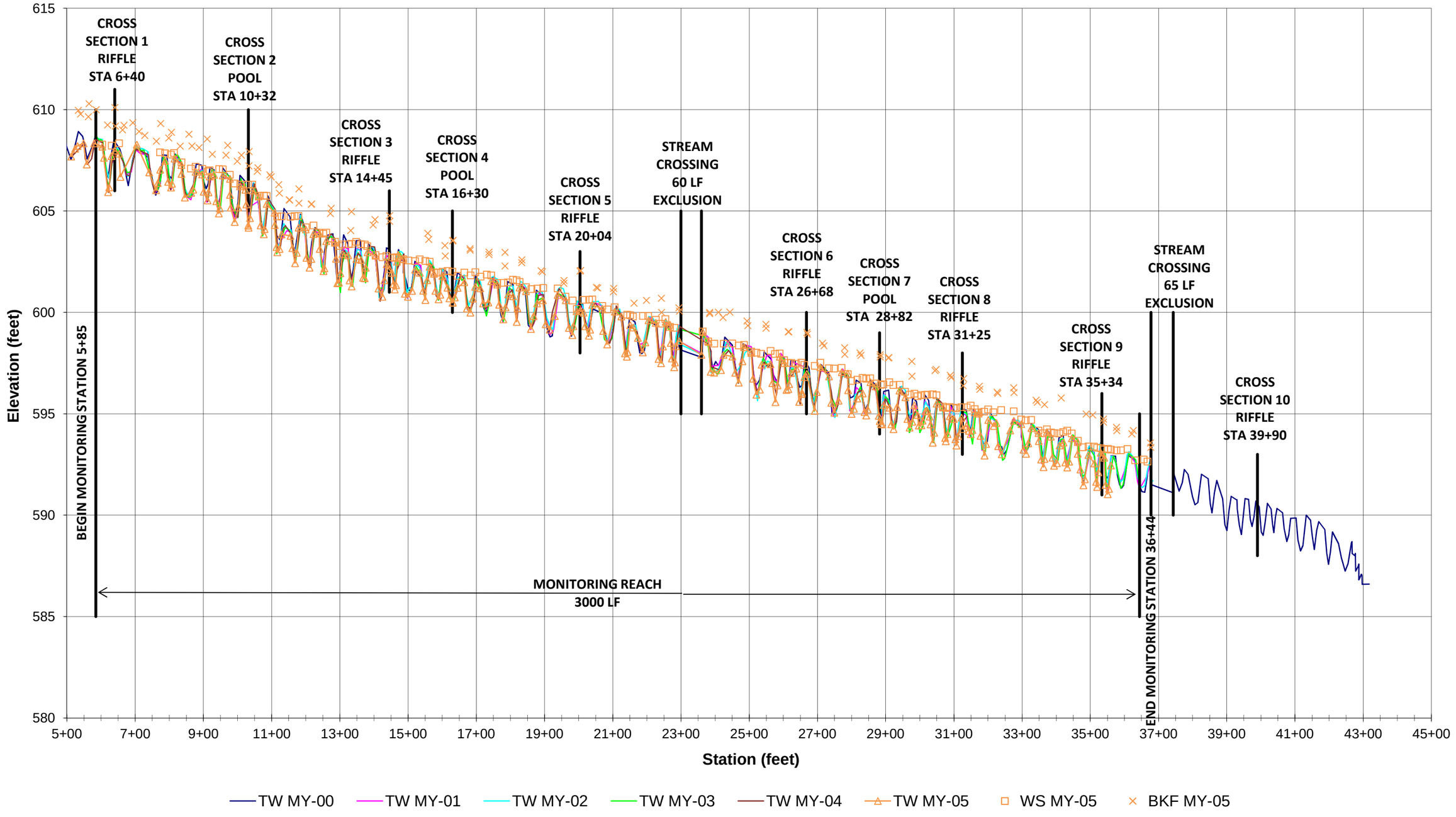
Underwood Creek (Newtown)
Longitudinal Profile
Main: Station 5+00 - 19+00

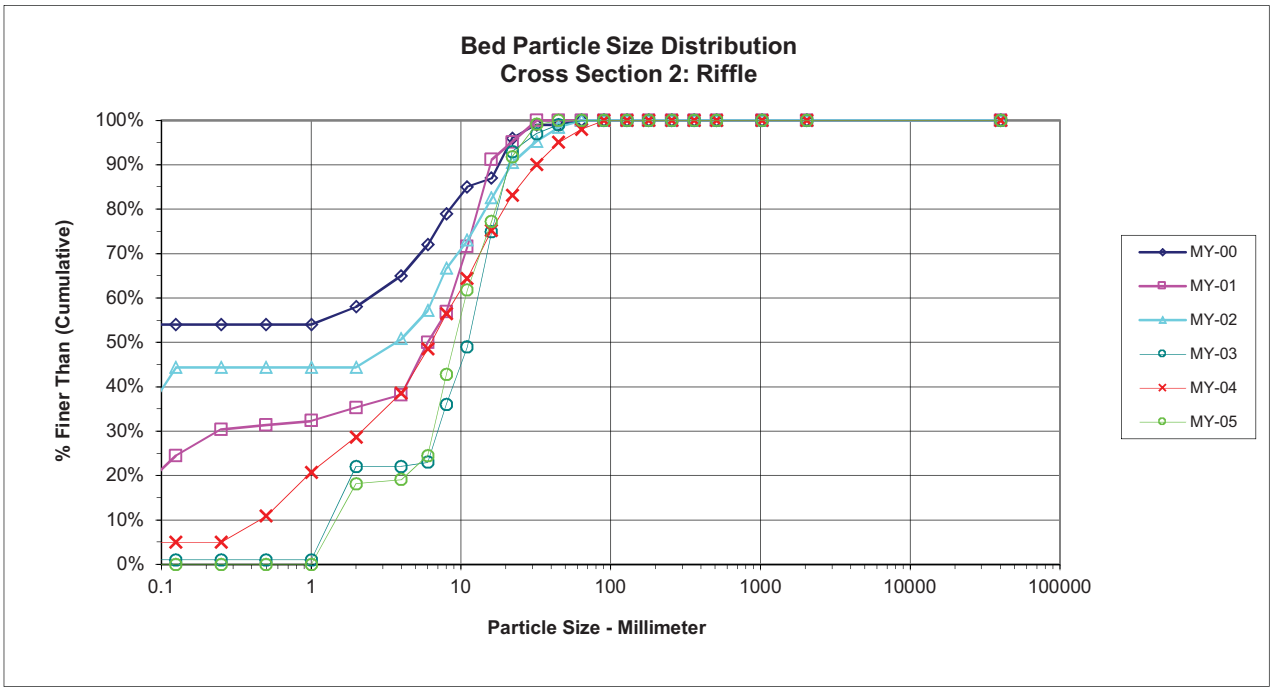


UT to Underwood Creek (Newtown)
Longitudinal Profile
Main Channel: Station 5+85- 36+44



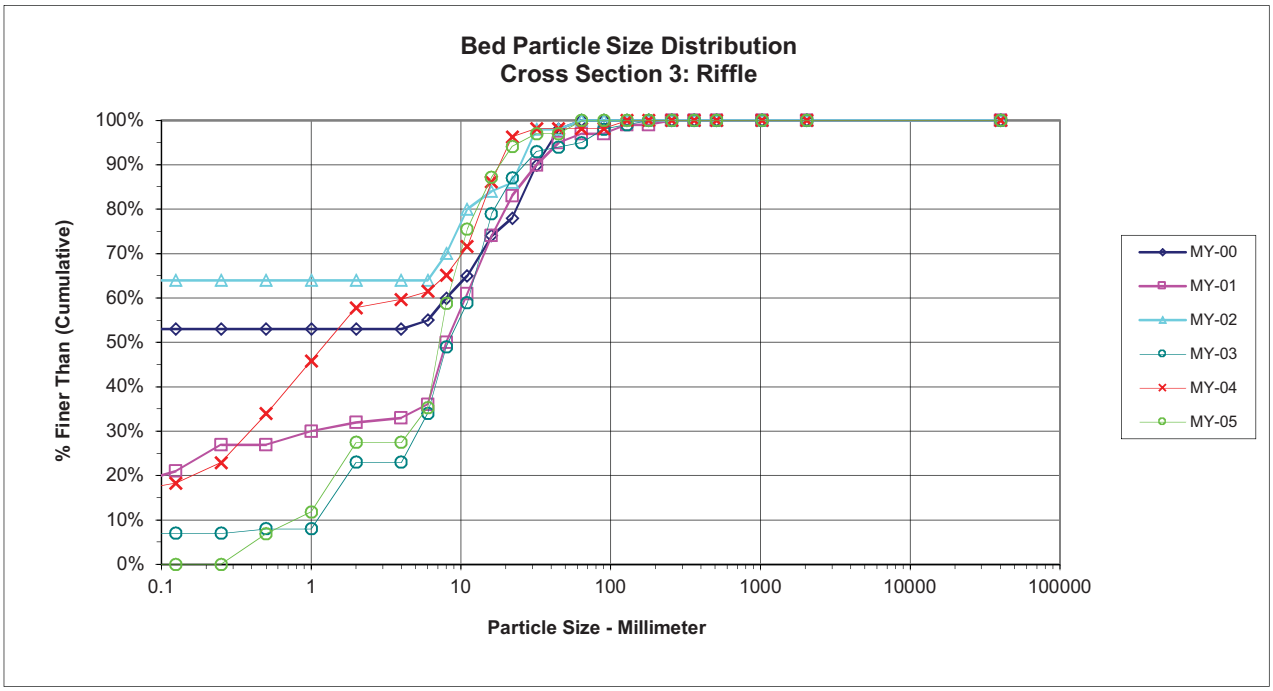
PEBBLE COUNT								
Project:	Underwood Creek					**Date:**	6/9/2015	
Location:	Cross Section #2							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C		0	0	0%	0%
	Very Fine	.062 - .125	S		0	0	0%	0%
	Fine	.125 - .25	A		0	0	0%	0%
	Medium	.25 - .50	N		0	0	0%	0%
	Coarse	.50 - 1.0	D		0	0	0%	0%
.04 -.08	Very Coarse	1.0 - 2.0	S	20	0	20	18%	18%
.08 - .16	Very Fine	2.0 - 4.0		1	0	1	1%	19%
.16 - .22	Fine	4.0 - 5.7	G	6	0	6	5%	25%
.22 - .31	Fine	5.7 - 8.0	R	20	0	20	18%	43%
.31 - .44	Medium	8.0 - 11.3	A	21	0	21	19%	62%
.44 - .63	Medium	11.3 - 16.0	V	17	0	17	15%	77%
.63 - .89	Coarse	16.0 - 22.6	E	16	0	16	15%	92%
.89 - 1.26	Coarse	22.6 - 32.0	L	8	0	8	7%	99%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	1	0	1	1%	100%
1.77 - 2.5	Very Coarse	45.0 - 64.0			0	0	0%	100%
2.5 - 3.5	Small	64 - 90	C		0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O		0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B		0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L		0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**110**	**0**	**110**	**100%**	**100%**

d16	d35	d50	d84	d95
1.9	7.2	9.1	18.8	26.4



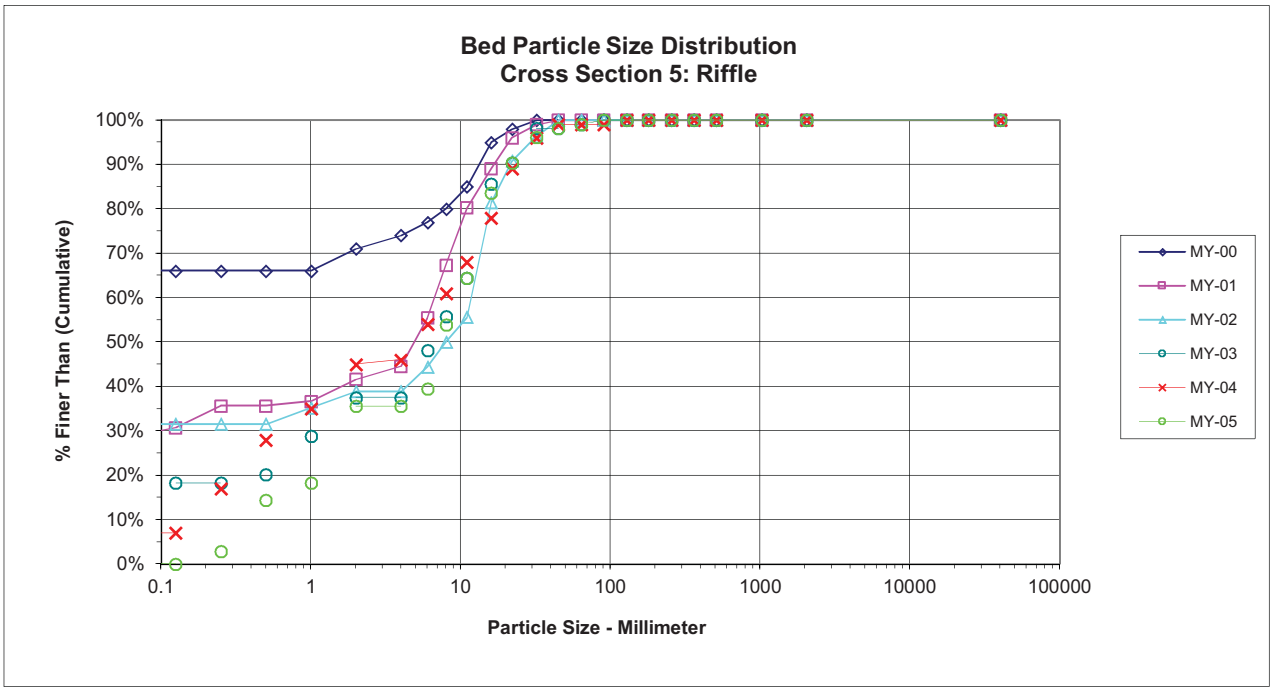
PEBBLE COUNT								
Project:	Underwood Creek					**Date:**	6/9/2015	
Location:	Cross Section #3							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C		0	0	0%	0%
	Very Fine	.062 - .125	S		0	0	0%	0%
	Fine	.125 - .25	A		0	0	0%	0%
	Medium	.25 - .50	N	7	0	7	7%	7%
	Coarse	.50 - 1.0	D	5	0	5	5%	12%
.04 -.08	Very Coarse	1.0 - 2.0	S	16	0	16	16%	27%
.08 - .16	Very Fine	2.0 - 4.0			0	0	0%	27%
.16 - .22	Fine	4.0 - 5.7	G	8	0	8	8%	35%
.22 - .31	Fine	5.7 - 8.0	R	24	0	24	24%	59%
.31 - .44	Medium	8.0 - 11.3	A	17	0	17	17%	75%
.44 - .63	Medium	11.3 - 16.0	V	12	0	12	12%	87%
.63 - .89	Coarse	16.0 - 22.6	E	7	0	7	7%	94%
.89 - 1.26	Coarse	22.6 - 32.0	L	3	0	3	3%	97%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S		0	0	0%	97%
1.77 - 2.5	Very Coarse	45.0 - 64.0		3	0	3	3%	100%
2.5 - 3.5	Small	64 - 90	C		0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O		0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B		0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L		0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**102**	**0**	**102**	**100%**	**100%**

d16	d35	d50	d84	d95
1.3	5.9	7.3	14.6	25.0



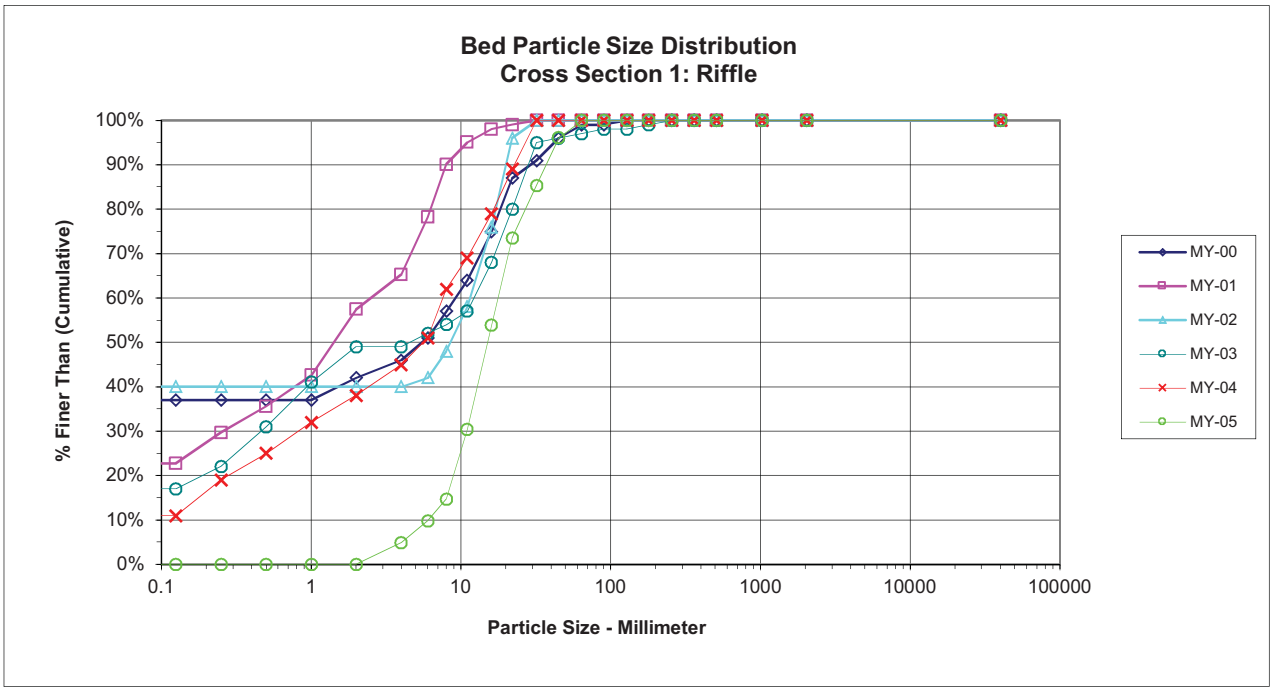
PEBBLE COUNT								
Project:	Underwood Creek					**Date:**	6/9/2015	
Location:	Cross Section #5							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C		0	0	0%	0%
	Very Fine	.062 - .125	S		0	0	0%	0%
	Fine	.125 - .25	A	3	0	3	3%	3%
	Medium	.25 - .50	N	12	0	12	12%	14%
	Coarse	.50 - 1.0	D	4	0	4	4%	18%
.04 -.08	Very Coarse	1.0 - 2.0	S	18	0	18	17%	36%
.08 - .16	Very Fine	2.0 - 4.0			0	0	0%	36%
.16 - .22	Fine	4.0 - 5.7	G	4	0	4	4%	39%
.22 - .31	Fine	5.7 - 8.0	R	15	0	15	14%	54%
.31 - .44	Medium	8.0 - 11.3	A	11	0	11	11%	64%
.44 - .63	Medium	11.3 - 16.0	V	20	0	20	19%	84%
.63 - .89	Coarse	16.0 - 22.6	E	7	0	7	7%	90%
.89 - 1.26	Coarse	22.6 - 32.0	L	6	0	6	6%	96%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	2	0	2	2%	98%
1.77 - 2.5	Very Coarse	45.0 - 64.0		1	0	1	1%	99%
2.5 - 3.5	Small	64 - 90	C	1	0	1	1%	100%
3.5 - 5.0	Small	90 - 128	O		0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B		0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L		0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**104**	**0**	**104**	**100%**	**100%**

d16	d35	d50	d84	d95
0.7	2.0	7.5	16.3	30.0



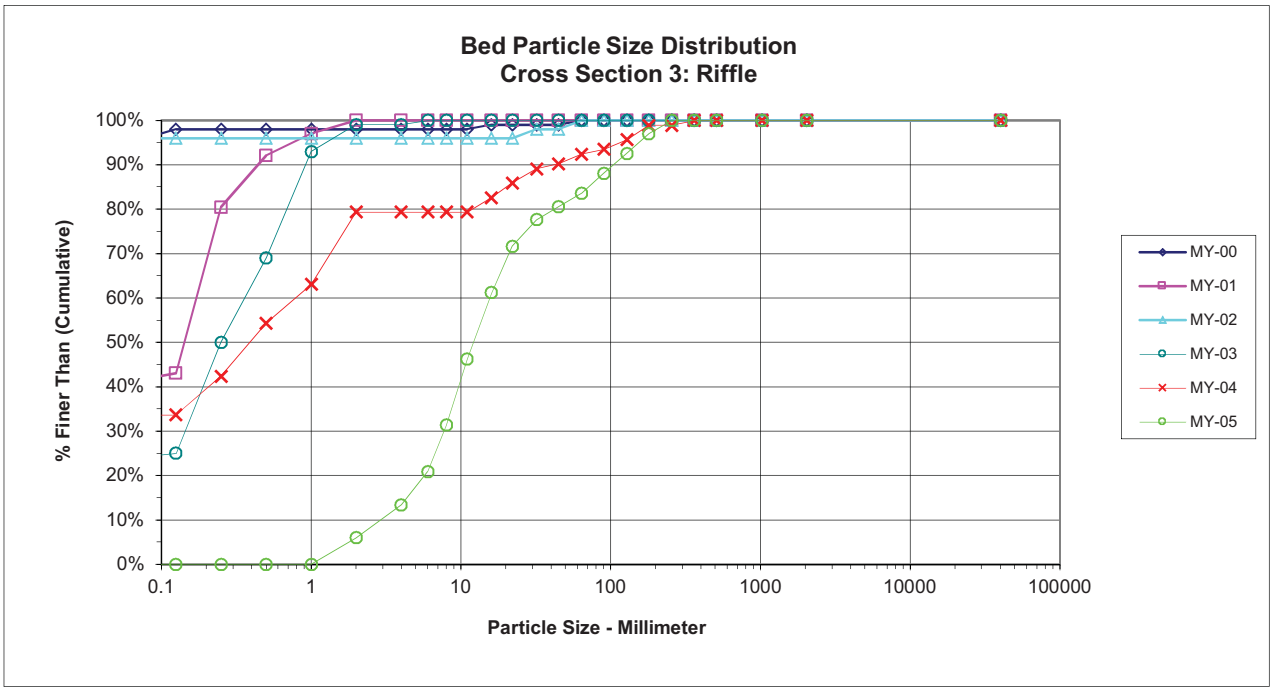
PEBBLE COUNT								
Project:	UT to Underwood Creek					**Date:**	3/24/2015	
Location:	Cross Section #1							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C		0	0	0%	0%
	Very Fine	.062 - .125	S		0	0	0%	0%
	Fine	.125 - .25	A		0	0	0%	0%
	Medium	.25 - .50	N		0	0	0%	0%
	Coarse	.50 - 1.0	D		0	0	0%	0%
.04 -.08	Very Coarse	1.0 - 2.0	S		0	0	0%	0%
.08 - .16	Very Fine	2.0 - 4.0		5	0	5	5%	5%
.16 - .22	Fine	4.0 - 5.7	G	5	0	5	5%	10%
.22 - .31	Fine	5.7 - 8.0	R	5	0	5	5%	15%
.31 - .44	Medium	8.0 - 11.3	A	16	0	16	16%	30%
.44 - .63	Medium	11.3 - 16.0	V	24	0	24	24%	54%
.63 - .89	Coarse	16.0 - 22.6	E	20	0	20	20%	74%
.89 - 1.26	Coarse	22.6 - 32.0	L	12	0	12	12%	85%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	11	0	11	11%	96%
1.77 - 2.5	Very Coarse	45.0 - 64.0		4	0	4	4%	100%
2.5 - 3.5	Small	64 - 90	C		0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O		0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B		0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L		0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**102**	**0**	**102**	**100%**	**100%**

d16	d35	d50	d84	d95
8.2	12.0	15.2	30.9	43.7



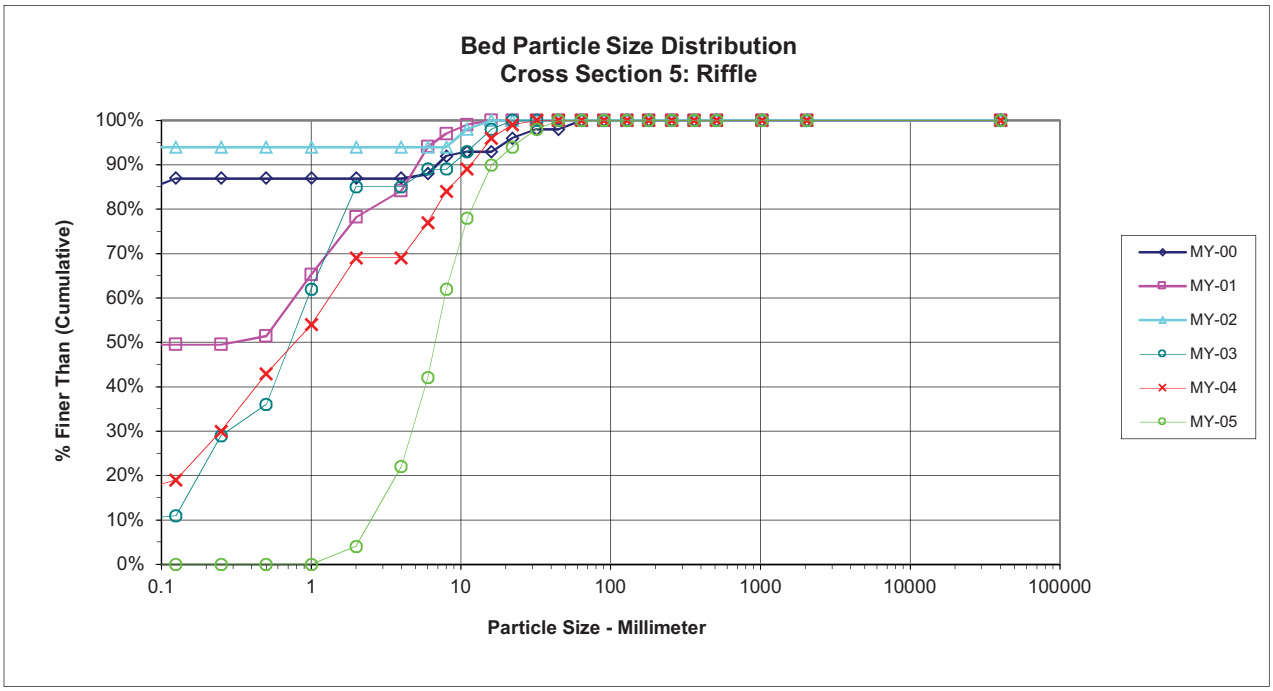
PEBBLE COUNT								
Project:	UT to Underwood Creek					**Date:**	3/24/2015	
Location:	Cross Section #3							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C		0	0	0%	0%
	Very Fine	.062 - .125	S		0	0	0%	0%
	Fine	.125 - .25	A		0	0	0%	0%
	Medium	.25 - .50	N		0	0	0%	0%
	Coarse	.50 - 1.0	D		0	0	0%	0%
.04 -.08	Very Coarse	1.0 - 2.0	S	8	0	8	6%	6%
.08 - .16	Very Fine	2.0 - 4.0		10	0	10	7%	13%
.16 - .22	Fine	4.0 - 5.7	G	10	0	10	7%	21%
.22 - .31	Fine	5.7 - 8.0	R	14	0	14	10%	31%
.31 - .44	Medium	8.0 - 11.3	A	20	0	20	15%	46%
.44 - .63	Medium	11.3 - 16.0	V	20	0	20	15%	61%
.63 - .89	Coarse	16.0 - 22.6	E	14	0	14	10%	72%
.89 - 1.26	Coarse	22.6 - 32.0	L	8	0	8	6%	78%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	4	0	4	3%	81%
1.77 - 2.5	Very Coarse	45.0 - 64.0		4	0	4	3%	84%
2.5 - 3.5	Small	64 - 90	C	6	0	6	4%	88%
3.5 - 5.0	Small	90 - 128	O	6	0	6	4%	93%
5.0 - 7.1	Large	128 - 180	B	6	0	6	4%	97%
7.1 - 10.1	Large	180 - 256	L	4	0	4	3%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**134**	**0**	**134**	**100%**	**100%**

d16	d35	d50	d84	d95
4.7	8.7	12.3	66.4	156.6



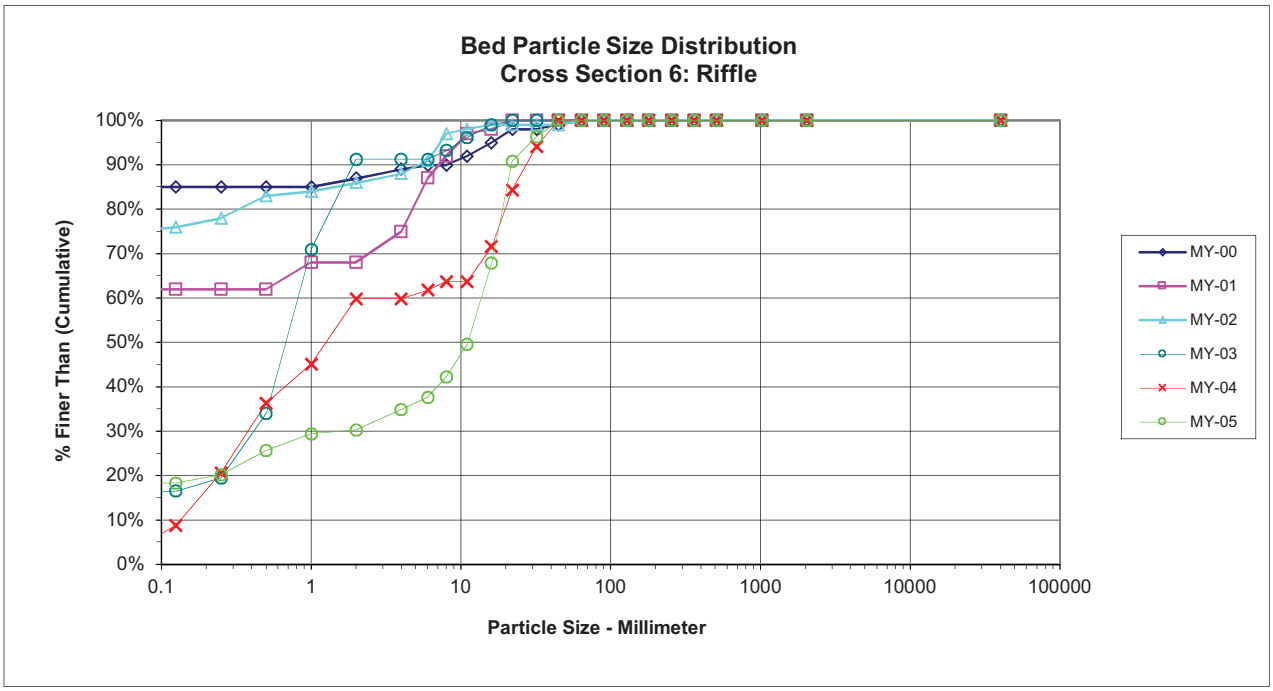
PEBBLE COUNT								
Project:	UT to Underwood Creek					**Date:**	3/24/2015	
Location:	Cross Section #5							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C		0	0	0%	0%
	Very Fine	.062 - .125	S		0	0	0%	0%
	Fine	.125 - .25	A		0	0	0%	0%
	Medium	.25 - .50	N		0	0	0%	0%
	Coarse	.50 - 1.0	D		0	0	0%	0%
.04 -.08	Very Coarse	1.0 - 2.0	S	4	0	4	4%	4%
.08 - .16	Very Fine	2.0 - 4.0		18	0	18	18%	22%
.16 - .22	Fine	4.0 - 5.7	G	20	0	20	20%	42%
.22 - .31	Fine	5.7 - 8.0	R	20	0	20	20%	62%
.31 - .44	Medium	8.0 - 11.3	A	16	0	16	16%	78%
.44 - .63	Medium	11.3 - 16.0	V	12	0	12	12%	90%
.63 - .89	Coarse	16.0 - 22.6	E	4	0	4	4%	94%
.89 - 1.26	Coarse	22.6 - 32.0	L	4	0	4	4%	98%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	2	0	2	2%	100%
1.77 - 2.5	Very Coarse	45.0 - 64.0			0	0	0%	100%
2.5 - 3.5	Small	64 - 90	C		0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O		0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B		0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L		0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**100**	**0**	**100**	**100%**	**100%**

d16	d35	d50	d84	d95
3.3	5.3	6.8	13.5	24.5



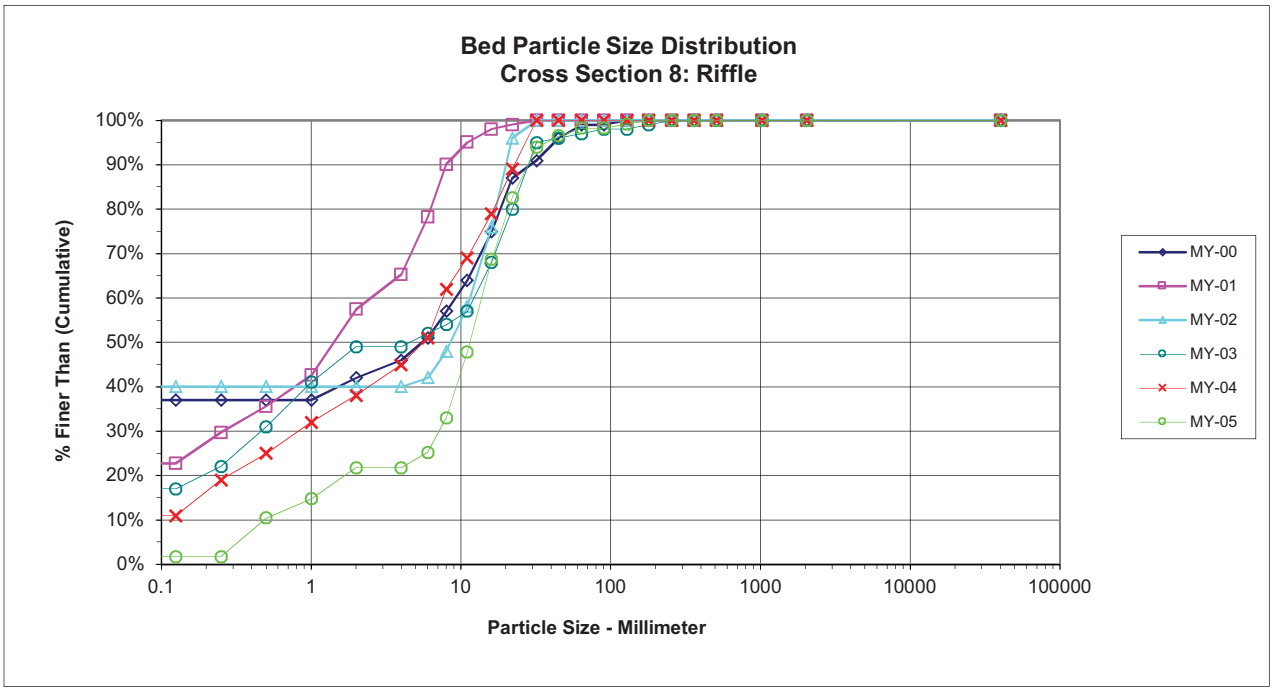
PEBBLE COUNT								
Project:	UT to Underwood Creek					**Date:**	6/9/2015	
Location:	Cross Section #6							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	20	0	20	18%	18%
	Very Fine	.062 - .125	S		0	0	0%	18%
	Fine	.125 - .25	A	2	0	2	2%	20%
	Medium	.25 - .50	N	6	0	6	6%	26%
	Coarse	.50 - 1.0	D	4	0	4	4%	29%
.04 -.08	Very Coarse	1.0 - 2.0	S	1	0	1	1%	30%
.08 - .16	Very Fine	2.0 - 4.0		5	0	5	5%	35%
.16 - .22	Fine	4.0 - 5.7	G	3	0	3	3%	38%
.22 - .31	Fine	5.7 - 8.0	R	5	0	5	5%	42%
.31 - .44	Medium	8.0 - 11.3	A	8	0	8	7%	50%
.44 - .63	Medium	11.3 - 16.0	V	20	0	20	18%	68%
.63 - .89	Coarse	16.0 - 22.6	E	25	0	25	23%	91%
.89 - 1.26	Coarse	22.6 - 32.0	L	6	0	6	6%	96%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	4	0	4	4%	100%
1.77 - 2.5	Very Coarse	45.0 - 64.0			0	0	0%	100%
2.5 - 3.5	Small	64 - 90	C		0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O		0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B		0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L		0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**109**	**0**	**109**	**100%**	**100%**

d16	d35	d50	d84	d95
0.1	4.1	11.1	20.2	29.6



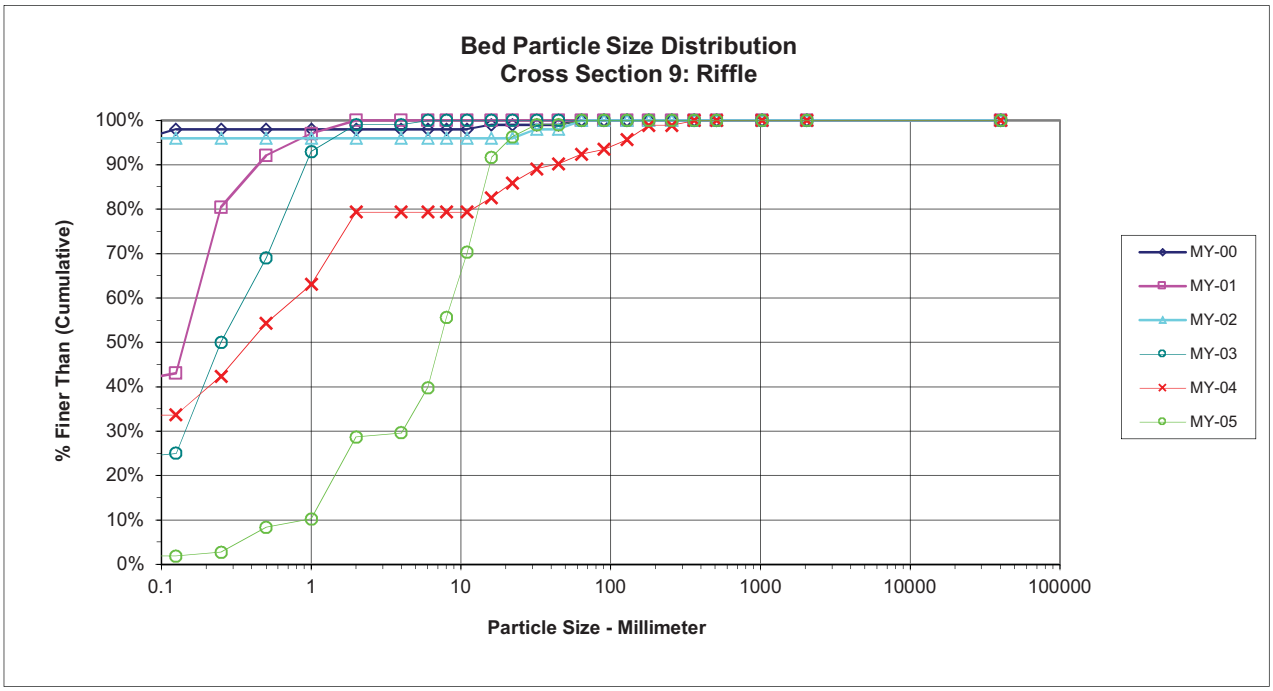
PEBBLE COUNT								
Project:	UT to Underwood Creek					**Date:**	6/9/2015	
Location:	Cross Section #8							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	2	0	2	2%	2%
	Very Fine	.062 - .125	S		0	0	0%	2%
	Fine	.125 - .25	A		0	0	0%	2%
	Medium	.25 - .50	N	10	0	10	9%	10%
	Coarse	.50 - 1.0	D	5	0	5	4%	15%
.04 -.08	Very Coarse	1.0 - 2.0	S	8	0	8	7%	22%
.08 - .16	Very Fine	2.0 - 4.0			0	0	0%	22%
.16 - .22	Fine	4.0 - 5.7	G	4	0	4	3%	25%
.22 - .31	Fine	5.7 - 8.0	R	9	0	9	8%	33%
.31 - .44	Medium	8.0 - 11.3	A	17	0	17	15%	48%
.44 - .63	Medium	11.3 - 16.0	V	24	0	24	21%	69%
.63 - .89	Coarse	16.0 - 22.6	E	16	0	16	14%	83%
.89 - 1.26	Coarse	22.6 - 32.0	L	13	0	13	11%	94%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	3	0	3	3%	97%
1.77 - 2.5	Very Coarse	45.0 - 64.0		2	0	2	2%	98%
2.5 - 3.5	Small	64 - 90	C		0	0	0%	98%
3.5 - 5.0	Small	90 - 128	O	1	0	1	1%	99%
5.0 - 7.1	Large	128 - 180	B	1	0	1	1%	100%
7.1 - 10.1	Large	180 - 256	L		0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**115**	**0**	**115**	**100%**	**100%**

d16	d35	d50	d84	d95
1.2	8.4	11.5	23.2	37.4



PEBBLE COUNT								
Project:	UT to Underwood Creek					**Date:**	6/9/2015	
Location:	Cross Section #9							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	2	0	2	2%	2%
	Very Fine	.062 - .125	S		0	0	0%	2%
	Fine	.125 - .25	A	1	0	1	1%	3%
	Medium	.25 - .50	N	6	0	6	6%	8%
	Coarse	.50 - 1.0	D	2	0	2	2%	10%
.04 -.08	Very Coarse	1.0 - 2.0	S	20	0	20	19%	29%
.08 - .16	Very Fine	2.0 - 4.0		1	0	1	1%	30%
.16 - .22	Fine	4.0 - 5.7	G	11	0	11	10%	40%
.22 - .31	Fine	5.7 - 8.0	R	17	0	17	16%	56%
.31 - .44	Medium	8.0 - 11.3	A	16	0	16	15%	70%
.44 - .63	Medium	11.3 - 16.0	V	23	0	23	21%	92%
.63 - .89	Coarse	16.0 - 22.6	E	5	0	5	5%	96%
.89 - 1.26	Coarse	22.6 - 32.0	L	3	0	3	3%	99%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S		0	0	0%	99%
1.77 - 2.5	Very Coarse	45.0 - 64.0		1	0	1	1%	100%
2.5 - 3.5	Small	64 - 90	C		0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O		0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B		0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L		0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**108**	**0**	**108**	**100%**	**100%**

d16	d35	d50	d84	d95
1.3	5.1	7.3	14.2	20.3



PEBBLE COUNT								
Project:	UT to Underwood Creek					**Date:**	6/9/2015	
Location:	Cross Section #10							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	2	0	2	2%	2%
	Very Fine	.062 - .125	S		0	0	0%	2%
	Fine	.125 - .25	A	4	0	4	4%	6%
	Medium	.25 - .50	N	10	0	10	10%	16%
	Coarse	.50 - 1.0	D	4	0	4	4%	20%
.04 -.08	Very Coarse	1.0 - 2.0	S	8	0	8	8%	27%
.08 - .16	Very Fine	2.0 - 4.0		2	0	2	2%	29%
.16 - .22	Fine	4.0 - 5.7	G	2	0	2	2%	31%
.22 - .31	Fine	5.7 - 8.0	R	7	0	7	7%	38%
.31 - .44	Medium	8.0 - 11.3	A	4	0	4	4%	42%
.44 - .63	Medium	11.3 - 16.0	V	12	0	12	12%	54%
.63 - .89	Coarse	16.0 - 22.6	E	19	0	19	19%	73%
.89 - 1.26	Coarse	22.6 - 32.0	L	22	0	22	22%	94%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	3	0	3	3%	97%
1.77 - 2.5	Very Coarse	45.0 - 64.0		2	0	2	2%	99%
2.5 - 3.5	Small	64 - 90	C		0	0	0%	99%
3.5 - 5.0	Small	90 - 128	O		0	0	0%	99%
5.0 - 7.1	Large	128 - 180	B	1	0	1	1%	100%
7.1 - 10.1	Large	180 - 256	L		0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B		0	0	0%	100%
14.3 - 20	Small	362 - 512	L		0	0	0%	100%
20 - 40	Medium	512 - 1024	D		0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R		0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**102**	**0**	**102**	**100%**	**100%**

d16	d35	d50	d84	d95
0.5	7.1	14.3	27.3	35.9

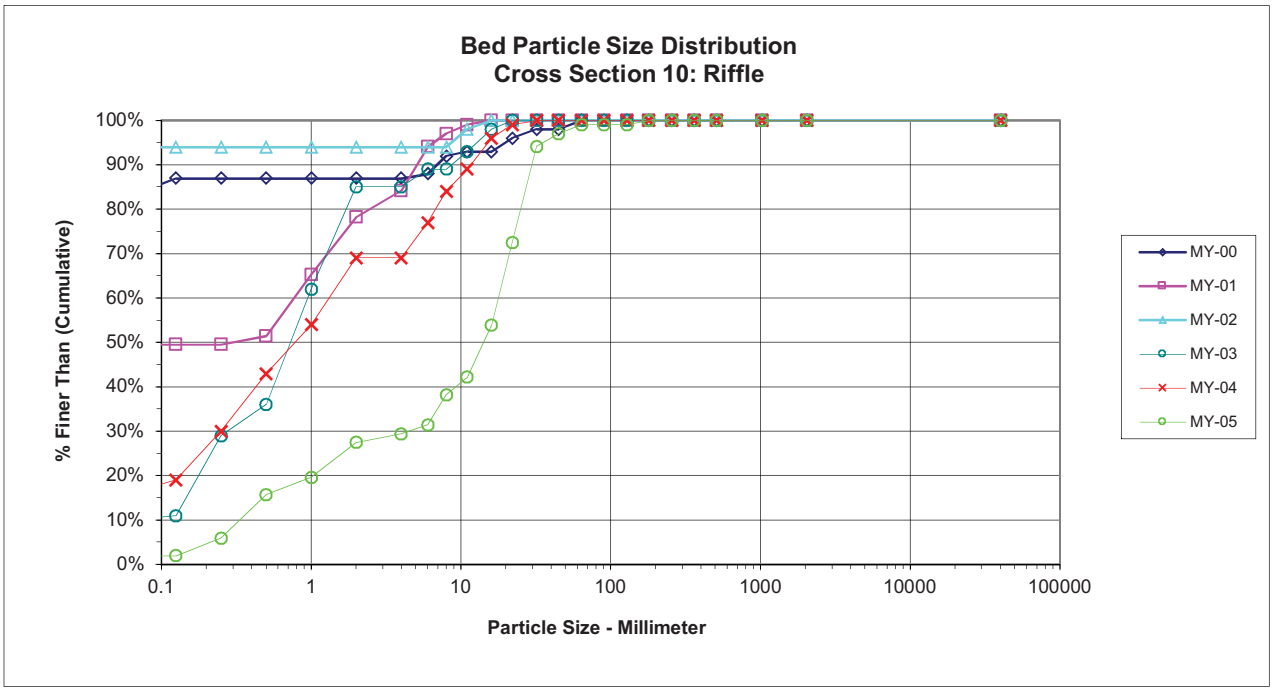


Table 10a. Baseline Stream Data Summary
Newtown - DMS# 94150 - Underwood Creek: 1273 feet

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					8.3	11.72		16.3			10	12.2		14.3				16		15.27	15.88	15.67	16.69	0.73	3
Floodprone Width (ft)					12	58		107									130	140	250	110.00	158.33	140.00	225.00	59.65	3
Bankfull Mean Depth (ft)					0.93	1.16		1.29			0.92	1.12		1.34				1.06		1.03	1.05	1.03	1.08	0.03	3
[1]Bankfull Max Depth (ft)					1.02	1.58		2.05										1.6		1.66	1.72	1.74	1.75	0.05	3
Bankfull Cross Sectional Area (ft^2)					10.5	13.3		19.6			12.2	13		13.4				17		15.81	16.67	16.11	18.10	1.25	3
Width/Depth Ratio					6.5	10.42		16.8			7.7	11.3		15.6				15		14.76	15.13	15.24	15.40	0.33	3
Entrenchment Ratio					1.47	4.65		7.71			2.9	6.5		8.6			8	9	16	7.20	9.87	8.94	13.48	3.24	3
[1]Bank Height Ratio					1.61	1.83		2.28			0.9	1		1.2				1		1	1	1	1	0	3
Profile																									
Riffle Length (ft)					6.33	37.84		106.87			4.03	14.18		23.61			10	21.696	58	7.36	20.81	20.51	31.54	5.58	22
Riffle Slope (ft/ft)					0.0001	0.0537		0.2384			0	0.0202		0.0815			0.0069	0.0125	0.0171	0.0034	0.01	0.01	0.03	0.01	22
Pool Length (ft)					19.07	55.73		119.93			18.51	32.11		58.03			19	35.957	54	17.45	34.81	34.92	52.82	7.61	24
Pool Max depth (ft)					2	2.31		3.1			1.7	2.47		3.1			2.4	3.5	4.5	2.76	3.40	3.43	4.04	0.37	24
Pool Spacing (ft)					34	91		245			29	48		84			37	63	110	31.47	55.97	54.57	78.46	10.48	22
Pattern																									
Channel Beltwidth (ft)					35	47.8		56			25	40		65			34	53	86	34		53	86		
Radius of Curvature (ft)					7	47		173			20	31		122			26	41	59	26		41	59		
Rc:Bankfull width (ft/ft)					0.06	0.04		0.148			0.016	0.0255		0.037			0.016	0.0255	0.037	0.016		0.0255	0.037		
Meander Wavelength (ft)					55	113.57		245			62	85.5		99			82	112	130	82		112	130		
Meander Width Ratio					1.84	2.52		2.95			2.1	3.3		5.4			2.1	3.3	5.4	2.1		3.3	5.4		
Transport parameters																									
Reach Shear Stress (competency) lb/ft^2						0.45												0.43			0.43				
Max part size (mm) mobilized at bankfull																		60			60				
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification						incised C4/E4						E4/C4						C4			C4				
Bankfull Velocity (fps)						4.05												3.3			3.3				
Bankfull Discharge (cfs)						55																			
Valley length (ft)						1110						542													
Channel Thalweg length (ft)						1149						650						1331			1331				
Sinuosity (ft)						1.04						1.2						1.3			1.3				
Water Surface Slope (Channel) (ft/ft)						0.006						0.0065						0.0048			0.0048				
BF slope (ft/ft)						0.0071						0.0114						0.0048			0.0048				
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

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

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10a. Baseline Stream Data Summary
Newtown - DMS# 94150 - UT to Underwood Creek: 3000 feet

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)					6.3	11.75		16			10	12.2		14.3				14		12.322	13.977	13.625	16.516	1.4652	7
Floodprone Width (ft)					19	109		352									95	160	220	95	172.86	135	280	76.095	7
Bankfull Mean Depth (ft)					0.73	1.12		1.56			0.92	1.12		1.34				0.98		0.8103	0.9506	0.963	1.0596	0.0775	7
[1]Bankfull Max Depth (ft)					1.1	1.92		2.6										1.4		1.46	1.64	1.61	1.98	0.17	7
Bankfull Cross Sectional Area (ft^2)					7.3	12.9		18.8			12.2	13		13.4				13.7		11.585	13.22	13.06	15.22	1.09	7
Width/Depth Ratio					5.4	11.21		19.8			7.7	11.3		15.6				14.3		11.629	14.87	14.37	20.38	2.68	7
Entrenchment Ratio					2	9.04		29.3			2.9	6.5		8.6			6.8	11	16	6.9727	12.44	8.84	22.72	5.77	7
[1]Bank Height Ratio					1.26	1.31		1.99			0.9	1		1.2				1		0.9419	0.98	0.98	1.00	0.03	7
Profile																									
Riffle Length (ft)					1.64	38.85		289.95			4.03	14.18		23.61			10	16.45	80	9.19	16.294	15.51	34.04	4.4599	64
Riffle Slope (ft/ft)					0.0002	0.021		0.121			0	0.0202		0.0815			0.0074	0.0158	0.057	0.0008	0.0175	0.0156	0.0556	0.011	60
Pool Length (ft)					8.87	54.34		435			18.51	32.11		58.03			14	30.242	53	19.68	30.254	28.74	51.91	7.7476	65
Pool Max depth (ft)					1.3	2.57		4.8			1.7	2.47		3.1			2.1	2.8	3.9	2.42	2.9651	2.92	3.68	0.2746	65
Pool Spacing (ft)					8.5	105		752			29	48		84			32	55	97	31.79	46.166	44.57	80.51	9.6963	63
Pattern																									
Channel Beltwidth (ft)					40	43.75		51			25	40		65			30	46	76	30		46	76		
Radius of Curvature (ft)					2.4	23		169			20	31		122			23	36	52	23		36	52		
Rc:Bankfull width (ft/ft)					0.002	0.0197		0.144			0.016	0.0255		0.037			0.016	0.0255	0.037	0.016		0.0255	0.037		
Meander Wavelength (ft)					80	126.5		190			62	85.5		99			72	98	113	72		98	113		
Meander Width Ratio					7.71	1.87		2.18			2.1	3.3		5.4			2.1	3.3	5.4	2.1		3.3	5.4		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2						0.41												0.28			0.28				
Max part size (mm) mobilized at bankfull																		38			38				
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification						incised C4/E4 w/sections of G4						E4/C4						C4			C4				
Bankfull Velocity (fps)						3.19												3.07			3.07				
Bankfull Discharge (cfs)						42																			
Valley length (ft)						3506						542													
Channel Thalweg length (ft)						4097						650						4100			4100				
Sinuosity (ft)						1.17						1.2						1.3			1.3				
Water Surface Slope (Channel) (ft/ft)						0.0054						0.0065						0.0048			0.0048				
BF slope (ft/ft)						0.0063						0.0114						0.0048			0.0048				
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

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

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Newtown - DMS# 94150 - Underwood Creek: 1273 feet

Parameter	Pre-Existing Condition							Reference Reach(es) Data						
[1]Ri% / Ru% / P% / G% / S%	38%	6%	48%	8%				28%	4%	60%	8%			
[1]SC% / Sa% / G% / C% / B% / Be%	2.16%	4.95%	81.62%	9.12%	0.43%	1.72%		0.91%	3%	81.59%	14%	0%	0.50%	
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	8.15	19.25	27.75	58.65	105.10			11.59	20.73	29.25	60.76	82.68		
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10														
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0														

Parameter	Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%	36%		59%		2%			24%		43%		2%		
[1]SC% / Sa% / G% / C% / B% / Be%														
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)														
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10														
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0														

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

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

2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates

3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary. The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions. ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design survey), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-constrution distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Newtown - DMS# 94150 - UT to Underwood Creek: 3000 feet

Parameter	Pre-Existing Condition							Reference Reach(es) Data						
[1]Ri% / Ru% / P% / G% / S%	39%	2%	53%	4%				28%	4%	60%	8%			
[1]SC% / Sa% / G% / C% / B% / Be%	0%	2%	92.81%	4.72%	0.47%	0%		0.9%	3%	81.6%	14.0%	0%	0.5%	
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	12.70	19.80	24.50	43.05	60.50			11.59	20.73	29.25	60.76	82.68		
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10														
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0														

Parameter	Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%	34%		64%		1%			34%		64%		1%		
[1]SC% / Sa% / G% / C% / B% / Be%														
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)														
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10														
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0														

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

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

2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates

3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary. The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions. ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design survey), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-constrution distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

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

Newtown - DMS# 94150 - Underwood Creek: 1273 feet

	Cross Section 1 (Pool) [New for MY-01]							Cross Section 2 (Riffle) [CS-1 in MY-00]							Cross Section 3 (Riffle) [CS-2 in MY-00]						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	N/A	595.25	595.25	595.25	595.25	591.25		594.36	594.36	594.36	594.36	594.36	594.36		592.56	592.56	592.56	592.56	592.56	592.56	
Bankfull Width (ft)	N/A	17.41	17.30	16.2	19.77	17.94		15.67	16.14	16.52	16.75	15.27	14.55		16.69	19.33	17.19	16.83	17.02	18.14	
Floodprone Width (ft)	N/A	205.00	205.00	205	205	180		140	140	140	140	140	140		225	225	225	225	225	225	
Bankfull Mean Depth (ft)	N/A	1.80	1.91	2.06	1.51	1.72		1.03	1.14	1.11	1.06	0.97	0.8		1.08	1.05	1.09	1.02	1.01	0.87	
Bankfull Max Depth (ft)	N/A	3.71	3.84	3.98	3.68	3.42		1.74	1.83	1.96	1.84	1.84	1.45		1.75	1.89	1.78	1.9	1.99	2.02	
Bankfull Cross Sectional Area (ft^2)	N/A	31.41	32.99	33.4	29.86	30.84		16.11	18.32	18.38	17.70	14.78	11.57		18.10	20.29	18.72	17.16	17.22	15.8	
Bankfull Width/Depth Ratio	N/A	9.65	9.07	7.86	13.09	10.39		15.24	14.22	14.85	15.85	15.77	18.3		15.40	18.42	15.78	16.5	16.83	20.82	
Bankfull Entrenchment Ratio	N/A	11.77	11.85	12.65	10.37	11.45		8.94	8.67	8.47	8.36	9.17	9.62		13.48	11.64	13.09	13.37	13.22	12.41	
Bankfull Bank Height Ratio	N/A	1.00	0.99	0.93	0.71	0.75		1.00	1.01	0.93	1.02	1.03	1		1.00	0.98	0.96	0.97	0.91	0.99	
Cross Sectional Area between end pins (ft^2)	N/A	82.74	83.89	88.73	80.53	86.27		39.17	40.67	41.37	37.31	38.63	32.9		33.48	36.13	36.24	34.73	35.83	31.53	
d50 (mm)	N/A	N/A	N/A	N/A	N/A	N/A		Silt	6	3.8	11.2	6.4	9.1		Silt	8	0.1	8.3	1.3	7.3	

	Cross Section 4 (Pool) [New for MY-01]							Cross Section 5 (Riffle) [CS-3 in MY-00]						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	N/A	591.25	591.25	591.25	591.25	591.25		590.75	590.75	590.75	590.75	590.75	590.75	
Bankfull Width (ft)	N/A	22.77	21.83	23.88	24.3	17.94		15.27	15.11	26.46	16.19	16.29	15.66	
Floodprone Width (ft)	N/A	180.00	180.00	180	180	180		110	110.00	110.00	110	110	110	
Bankfull Mean Depth (ft)	N/A	1.48	1.53	1.41	1.29	1.51		1.04	1.16	0.74	1.25	1.05	1.15	
Bankfull Max Depth (ft)	N/A	3.43	3.31	3.36	3.54	3.34		1.66	2.06	2.10	2.53	2.33	2.3	
Bankfull Cross Sectional Area (ft^2)	N/A	33.82	33.44	33.57	31.4	27.18		15.88	17.48	19.69	20.27	17.16	17.95	
Bankfull Width/Depth Ratio	N/A	15.34	14.25	16.99	18.81	11.84		14.69	13.06	35.56	12.93	15.47	13.66	
Bankfull Entrenchment Ratio	N/A	7.90	8.25	7.54	7.41	10.03		7.20	7.28	4.16	6.79	6.75	7.02	
Bankfull Bank Height Ratio	N/A	0.98	1.02	0.97	0.76	1.00		1.00	1.00	0.98	0.96	0.87	1.00	
Cross Sectional Area between end pins (ft^2)	N/A	65.07	68.31	68.55	74.5	65.2		34.16	35.76	38.13	37.96	37.59	34.03	
d50 (mm)	N/A	N/A	N/A	N/A	N/A	N/A		Silt	5	8	6.5	5	7.5	

1 = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

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

Newtown - DMS# 94150 - UT to Underwood Creek: 3000 feet

	Cross Section 1 (Riffle) [CS-1 in MY-00]							Cross Section 2 (Pool) [New for MY-01]							Cross Section 3 (Riffle) [CS-2 in MY-00]							Cross Section 4 (Pool) [New for MY-01]							Cross Section 5 (Riffle) [CS-3 in MY-00]						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	609.86	609.86	609.86	609.78	609.86	609.86		N/A	607.92	607.92	607.92	607.92	607.92		604.51	604.51	604.51	604.51	604.51	604.51		N/A	603.49	603.49	603.49	603.49	603.49		601.91	601.91	601.91	601.91	601.91	601.91	
Bankfull Width (ft)	12.32	12.18	12.61	11.99	14.51	13.1		N/A	18.49	34.62	24.13	18.62	17.39		16.52	17.17	11.9	13.67	14.21	12.69		N/A	17.5195	16.64	13.89	15.38	16.63		13.99	14.2403	14.30	14.93	13.67	14.6	
Floodprone Width (ft)	280	280	280	280	280	280		N/A	190	190	190	190	190		245	245	245	245	245	245		N/A	190	190	190	190	190		230	230	230	230	230	230	
Bankfull Mean Depth (ft)	1.06	1.08	0.99	1.04	1.06	0.96		N/A	1.65	0.92	1.3	1.53	1.72		0.81	0.77	1.09	0.85	0.87	0.99		N/A	1.41	1.50	1.3	1.45	1.4		0.97	0.94	0.94	0.81	0.89	0.95	
Bankfull Max Depth (ft)	1.98	2	2.01	1.94	2.09	1.81		N/A	3.38	3.32	3.45	3.43	3.67		1.72	1.65	1.92	2.12	2.14	2.38		N/A	2.76	2.81	2.98	2.96	3.08		1.58	1.54	1.66	1.71	1.78	1.95	
Bankfull Cross Sectional Area (ft^2)	13.06	13.16	12.53	12.5	15.32	12.6		N/A	30.43	32.00	31.42	28.51	29.9		13.38	13.19	13.02	11.64	12.43	12.58		N/A	24.79	24.95	18.13	22.37	23.28		13.61	13.3751	13.4945	12.05	12.23	13.82	
Bankfull Width/Depth Ratio	11.63	11.27	12.69	11.5	13.75	13.62		N/A	11.24	37.45	18.53	12.16	10.11		20.38	22.34	10.88	16.05	16.25	12.79		N/A	12.38	11.10	10.65	10.57	11.88		14.37	15.16	15.14	18.51	15.27	15.42	
Bankfull Entrenchment Ratio	22.72	22.99	22.20	23.35	19.29	21.37		N/A	10.27	5.49	7.87	10.21	10.93		14.83	14.27	20.59	17.92	17.24	19.31		N/A	10.85	11.42	13.68	12.36	11.42		16.45	16.15	16.09	15.4	16.83	15.75	
Bankfull Bank Height Ratio	0.98	0.95	1.06	1	0.66	1		N/A	1	0.99	0.97	0.73	1		0.94	0.96	0.97	1	0.92	0.99		N/A	0.99	0.99	0.97	0.69	0.99		1.00	1.01	0.98	0.99	0.69	1	
Cross Sectional Area between end pins (ft^2)	57.18	57.06	59.34	54.42	57.64	52.69		N/A	43.2436	44.0703	44.07	42.16	44.27		31.77	30.81	30.79	36.31	28.11	31.52		N/A	37.4425	37.4902	32.5	35.72	34.72		24.19	24.08	24.71	24.62	22.49	19.56	
d50 (mm)	5.60	1.5	8.6	4.7	5.7	15.2		N/A	N/A	N/A	N/A	N/A	N/A		Silt	0.10	0.1	0.3	0.4	12.3		N/A	N/A	N/A	N/A	N/A	N/A		Silt	0.3	0.1	0.8	0.8	6.8	
	Cross Section 6 (Riffle) [CS-4 in MY-00]							**Cross Section 7 (Pool) [New for MY-01]**							**Cross Section 8 (Riffle) [CS-5 in MY-00]**							**Cross Section 9 (Riffle) [CS-6 in MY-00]**							**Cross Section 10 (Riffle-NOT in Monitoring Reach) [CS-7 in MY-00]**						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	598.86	598.86	598.86	598.86	598.86	598.86		N/A	597.79	597.79	597.79	597.79	597.79		596.67	596.67	596.67	596.67	596.67	596.67		594.85	594.85	594.85	594.85	594.73	594.73		592.00	592	592	592	592	592	
Bankfull Width (ft)	13.42	12.38	11.71	13.38	13.73	13.35		N/A	17.5	18.08	17.67	20.71	15.12		12.71	10.96	9.97	12.49	11.9	9.29		13.62	13.47	13.63	13.53	13.15	13.06		15.26	17.8611	14.7913	14.31	14.69	15.03	
Floodprone Width (ft)	115	115	115	115	115	115		N/A	180	180	180	180	180		110	110	110	110	110	110		95	95	95	95	95	95		135	135	135	135	135	135	
Bankfull Mean Depth (ft)	0.96	0.95	0.88	1.04	0.97	1.18		N/A	1.54	1.53	1.55	1.18	1.72		0.91	0.88	0.72	0.87	0.99	1.05		0.94	0.90	0.87	0.84	0.82	0.79		1.00	0.85914	0.89803	0.89	0.93	0.93	
Bankfull Max Depth (ft)	1.50	1.38	1.62	1.7	1.95	2.04		N/A	3.08	3.25	3.38	3.27	3.26		1.61	1.44	1.32	1.67	2.06	2.14		1.46	1.4	1.58	1.59	1.55	1.65		1.61	1.72	1.5	1.69	1.73	2.04	
Bankfull Cross Sectional Area (ft^2)	12.92	11.77	10.32	13.94	13.35	15.8		N/A	26.87	27.70	27.39	24.52	26.06		11.59	9.66	7.20	10.9	11.75	9.78		12.80	12.13	11.80	11.43	10.75	10.35		15.22	15.35	13.28	12.71	13.7	13.93	
Bankfull Width/Depth Ratio	13.93	13.02	13.29	12.84	14.11	11.28		N/A	11.40	11.80	11.4	17.49	8.78		13.95	12.44	13.81	14.31	12.06	8.82		14.50	14.96	15.75	16.02	16.08	16.48		15.31	20.79	16.47	16.11	15.76	16.22	
Bankfull Entrenchment Ratio	8.57	9.29	9.82	8.6	8.38	86.13		N/A	10.29	9.96	10.19	8.69	11.9		8.65	10.03	11.03	8.81	9.24	11.84		6.97	7.05	6.97	7.02	7.23	7.27		8.84	7.56	9.13	9.43	9.19	8.98	
Bankfull Bank Height Ratio	1.00	1.09	1.20	1.03	1.01	0.96		N/A	0.98	0.95	1.05	1	0.97		1.00	1.13	1.26	1.08	0.88	1		0.95	0.94	1.04	1.01	0.66	0.94		0.98	0.92	1.02	0.98	0.66	1	
Cross Sectional Area between end pins (ft^2)	43.35	36.17	33.32	38.48	38.82	36.69		N/A	43.07	44.03	39.66	41.02	39.71		46.57	38.06	34.77	32.28	36.81	40.78		31.80	30.43	28.77	30	31.34	31.71		25.97	24.77	25.00	24.08	22.23	25.74	
d50 (mm)	Silt	0.1	0.1	0.7	1.3	11.1		N/A	N/A	N/A	N/A	N/A	N/A		Silt	4.4	1.4	1.8	1.7	11.5		Silt	2	7.4	4.6	6.4	7.3		Silt	4.8	0.7	9.7	0.4	14.3	

1 = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with DMS. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Newtown - DMS# 94150 - Underwood Creek: 1273 feet

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	15.272	15.878	15.667	16.694	0.7338	3	15.112	16.86	16.138	19.33	2.2	3	16.521	20.06	17.19	26.46	5.557	3	16.19	16.59	16.75	16.83	0.35	3	15.27	16.19	16.293	17.0213	0.8799	3	15.55	16.12	15.66	18.14	1.84	3
Floodprone Width (ft)	110	158.33	140	225	59.652	3	110	158.33	140	225	59.65	3	110	158.3	140	225	59.65	3	110	158.3	140	225	59.65	3	110	158.3	140	225	59.652	3	110.00	158.30	140.00	225.00	59.65	3
Bankfull Mean Depth (ft)	1.0281	1.0491	1.0349	1.0842	0.0306	3	1.0495	1.1138	1.135	1.157	0.057	3	0.7441	0.982	1.089	1.112	0.206	3	1.02	1.11	1.06	1.25	0.12	3	0.9681	1.011	1.0115	1.05325	0.0426	3	0.80	0.94	0.87	1.15	0.19	3
[1]Bankfull Max Depth (ft)	1.66	1.7167	1.74	1.75	0.0493	3	1.83	1.9267	1.89	2.06	0.119	3	1.78	1.947	1.96	2.1	0.16	3	1.84	2.09	1.9	2.53	0.39	3	1.843	2.053	1.988	2.327	0.2484	3	1.45	1.93	2.02	2.31	0.44	3
Bankfull Cross Sectional Area (ft^2)	15.806	16.671	16.108	18.099	1.2459	3	17.48	18.695	18.317	20.29	1.441	3	18.375	18.93	18.72	19.69	0.681	3	17.16	18.38	17.7	20.27	1.66	3	14.783	16.39	17.16	17.2162	1.3892	3	11.57	15.11	15.80	17.96	3.25	3
Width/Depth Ratio	14.757	15.131	15.238	15.398	0.3337	3	13.064	15.233	14.219	18.42	2.817	3	14.853	22.06	15.78	35.56	11.7	3	12.93	15.1	15.85	16.5	1.9	3	15.469	16.02	15.773	16.8286	0.7136	3	13.66	17.59	18.30	20.82	3.63	3
Entrenchment Ratio	7.2026	9.8721	8.9357	13.478	3.2408	3	7.2792	9.198	8.675	11.64	2.227	3	4.157	8.574	8.474	13.09	4.468	3	6.79	9.51	8.36	13.37	3.43	3	6.7515	9.713	9.1684	13.2187	3.2678	3	7.02	9.68	9.62	12.41	2.69	3
[1]Bank Height Ratio	1	1	1	1	0	3	0.9788	0.9982	1.0049	1.011	0.017	3	0.9337	0.957	0.955	0.981	0.024	3	0.950	0.980	0.970	1.020	0.030	3	0.8668	0.935	0.9074	1.03093	0.0855	3	0.989	1	1	1	0.006	3
Profile																																				
Riffle Length (ft)	7.36	20.81	20.51	31.54	5.58	22	8.58	21.40	19.56	35.95	6.11	22	7.34	22.88	22.73	38.30	7.23	21	8.09	19.47	18.64	34.57	6.74	23	6.91	19.04	17.44	35.26	6.02	22	17.17	24.74	24.74	36.26	5.778	10
Riffle Slope (ft/ft)	0.003	0.013	0.013	0.029	0.005	22	0.000	0.011	0.010	0.028	0.007	22	0.000	0.009	0.010	0.035	0.008	21	0.00	0.014	0.012	0.034	0.008	23	0.002	0.013	0.013	0.028	0.008	19	0.001	0.014	0.014	0.04	0.012	10
Pool Length (ft)	17.45	34.81	34.92	52.82	7.61	24	18.27	34.33	32.87	50.34	7.21	24	11.35	33.02	33.11	46.16	7.17	24	23.11	35.23	34.19	53.41	7.63	24	19.24	36.14	34.59	58.60	9.77	24	21.52	33.93	33.93	48.41	6.823	12
Pool Max depth (ft)	2.76	3.40	3.43	4.04	0.37	24	2.91	3.52	3.51	3.94	0.25	24	2.95	5.68	3.72	52.99	10.08	24	2.86	3.60	3.57	4.21	0.37	24	3.06	3.55	3.55	4.10	0.26	24	2.89	3.50	3.50	4.04	0.38	12
Pool Spacing (ft)	31.47	55.97	54.57	78.46	10.48	22	37.01	57.45	55.80	92.83	13.99	23	33.03	56.57	53.37	92.77	13.48	22	35.50	57.03	53.96	90.26	13.99	23	29.85	56.12	55.29	85.61	11.98	22	52.02	111.5	111.5	224.46	63.94	11
Pattern																																				
Channel Beltwidth (ft)	34		53	86																																
Radius of Curvature (ft)	26		41	59																																
Rc:Bankfull width (ft/ft)	0.016		0.0255	0.037																																
Meander Wavelength (ft)	82		112	130																																
Meander Width Ratio	2.1		3.3	5.4																																
Additional Reach Parameters																																				
Rosgen Classification	C4						C4						C4						C4						C4						C4					
Channel Thalweg length (ft)	1331						1331						1331						1331						1331						1331					
Sinuosity (ft)	1.3						1.3						1.3						1.3						1.3						1.3					
Water Surface Slope (Channel) (ft/ft)	0.0048						0.00485						0.00418						0.0048						0.0051						0.00484					
BF slope (ft/ft)	0.0048						0.00522						0.00550						0.0047						0.0051						0.00451					
[3]Ri% / Ru% / P% / G% / S%	24%		43%		2%		36%		64%		2%		38%		62%				34%		64%		0%		33%		67%				47%		53%			
[3]SC% / Sa% / G% / C% / B% / Be%													41%	8%	51%	0%	0%	0%	7%	20%	71%	2%	0%	0%	9%	34%	55%	2%	0%	0%	0%	27%	73%	0%	0%	0%
[3]d16 / d35 / d50 / d84 / d95 /													0.0855	0.394	3.954	16.91	30.22		1.12	5.23	8.66	18.13	39.67		0.29	1.6	4.24	19.24	32.22		1.285	5.014	7.953	16.57	27.13	
[2]% of Reach with Eroding Banks	0						3%						0%						0%						0%						0%					
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section 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 pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Newtown - DMS# 94150 - UT to Underwood Creek: 3000 feet

Parameter	Baseline*						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	12.322	13.977	13.625	16.516	1.4652	7	10.964	13.399	12.92	17.17	2.162	6	9.973	12.35	12.26	14.296	1.533	6	11.99	13.33	13.46	14.93	1.02	6	11.90396	13.5286	13.6964	14.515	0.926	6	9.29	12.68	13.08	14.6	1.786	6
Floodprone Width (ft)	95	172.86	135	280	76.095	7	95	179.17	172.5	280	81.33	6	95	179.2	172.5	280	81.33	6	95	179.2	172.5	280	81.33	6	95	179.1667	172.5	280	81.328	6	95	351.7	237.5	1150	398.2	6
Bankfull Mean Depth (ft)	0.8103	0.9506	0.963	1.0596	0.0775	7	0.7683	0.9202	0.92	1.081	0.102	6	0.7223	0.917	0.912	1.0941	0.126	6	0.81	0.91	0.86	1.04	0.1	6	0.817563	0.933715	0.93377	1.0555	0.0868	6	0.792	0.988	0.977	1.183	0.129	6
[1]Bankfull Max Depth (ft)	1.46	1.6371	1.61	1.98	0.1729	7	1.38	1.5683	1.49	2	0.234	6	1.32	1.685	1.64	2.01	0.249	6	1.59	1.79	1.71	2.12	0.2	6	1.545	1.9275	2.0005	2.141	0.2265	6	1.653	1.996	1.998	2.376	0.253	6
Bankfull Cross Sectional Area (ft^2)	11.585	13.225	13.057	15.215	1.0894	7	9.6643	12.215	12.65	13.38	1.408	6	7.2034	11.39	12.16	13.494	2.334	6	10.9	12.08	11.85	13.94	1.06	6	10.74725	12.6385	12.333	15.32	1.5665	6	9.785	12.49	12.59	15.8	2.221	6
Width/Depth Ratio	11.629	14.868	14.373	20.383	2.6834	7	11.266	14.864	13.99	22.34	3.956	6	10.876	13.59	13.55	15.748	1.754	6	11.5	14.87	15.16	18.5	2.52	6	12.06103	14.58763	14.6919	16.25	1.5976	6	8.82	13.07	13.21	16.48	2.786	6
Entrenchment Ratio	6.9727	12.435	8.8446	22.723	5.7683	7	7.0527	13.299	12.15	22.99	5.81	6	6.9689	14.45	13.56	22.205	6.158	6	7.02	13.52	12.1	23.35	6.45	6	7.226821	13.03354	13.0348	19.291	5.3102	6	7.274	26.95	17.53	86.13	29.44	6
[1]Bank Height Ratio	0.9419	0.979	0.9848	1	0.0254	7	0.9429	1.0123	0.982	1.125	0.077	6	0.9688	1.084	1.049	1.2576	0.118	6	0.99	1.02	1.01	1.08	0.03	6	0.657605	0.801414	0.78228	1.0082	0.1517	6	**0.94**	**0.981**	**0.993**	**1**	**0.025**	6
Profile																																				
Riffle Length (ft)	9.19	16.294	15.51	34.04	4.4599	64	6.49	15.282	13.94	47.85	6.63	64	4	17.06	16.56	36.16	4.884	64	6.84	15.21	15.21	24.78	4.64	64	4.11	14.74	14.49	43.65	6.17	63	10.28	13.19	18.96	29.08	4.321	38
Riffle Slope (ft/ft)	0.0008	0.0175	0.0156	0.0556	0.0110	60	0.0017	0.0178	0.0170	0.0586	0.0116	58	0.0014	0.0174	0.0147	0.0673	0.0132	51	0.0017	0.0197	0.0166	0.0607	0.0130	59	0.0007	0.0194	0.0195	0.0476	0.0101	51	0.003	0.012	0.01	0.039	0.009	38
Pool Length (ft)	19.68	30.254	28.74	51.91	7.7476	65	16.33	31.91	29.53	55.66	8.318	64	18.59	30.18	28.3	58.78	8.982	64	19.09	13.35	28.89	57.33	8.09	64	15.37	32.08	30.48	59.18	8.8	66	18.82	2.35	26.58	59.24	10.09	18
Pool Max depth (ft)	2.42	2.9651	2.92	3.68	0.2746	65	2.6	3.2741	3.167	12.61	1.218	64	0.38	2.99	2.94	4.57	0.50	64	1.63	3.05	2.95	12.09	1.28	64	1.8	3.05	3.11	4.37	0.54	66	2.306	3.106	3.093	4.073	0.438	18
Pool Spacing (ft)	31.79	46.166	44.57	80.51	9.6963	63	24.26	46.85	45.8	85.42	11.44	62	29.23	47.1	43.69	81.57	11.35	62	26.16	47.11	43.59	131.26	15.35	63	27.75	46.37	43.94	74.35	10.72	64	33.05	165.4	162.9	426.5	127.9	17
Pattern																																				
Channel Beltwidth (ft)	30		46	76																																
Radius of Curvature (ft)	23		36	52																																
Rc:Bankfull width (ft/ft)	0.016		0.0255	0.037																																
Meander Wavelength (ft)	72		98	113																																
Meander Width Ratio	2.1		3.3	5.4																																
Additional Reach Parameters																																				
Rosgen Classification	C4						C4						C4						C4						C-4						C4					
Channel Thalweg length (ft)	4100*						3000						3000						3000						3000						3000					
Sinuosity (ft)	1.3						1.3						1.3						1.3						1.3						1.3					
Water Surface Slope (Channel) (ft/ft)	0.0048						0.00529						0.00492						0.0045						0.0051						0.0051					
BF slope (ft/ft)	0.0048						0.00528						0.00512						0.005						0.0051						0.0052					
[3]Ri% / Ru% / P% / G% / S%	34%		64%		1%		33%		67%				36%		64%				33%		67%				31%		69%				38%		62%			
[3]SC% / Sa% / G% / C% / B% / Be%													59%	7%	34%	0%	0%	0%	11%	59%	29%	0%	0%		15%	39%	44%	1%	0%	0%	4%	11%	82%	3%	0%	0%
[4]d16 / d35 / d50 / d84 / d95 /													0.2974	0.964	2.952	7.4625	12.12		0.41	0.81	2.14	8.27	15.35		0.05	1.3	2.72	15.79	40.28		3.146	7.261	10.68	28.08	52.02	
[2]% of Reach with Eroding Banks	0						0						0%						0%						0%						0%					
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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

* - The Baseline calculations were performed for the entire restoration length and includes Cross Section 10 (CS-7 in MY-00) which is not in the monitoring Reach for UT to Underwood Creek

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 pave, disp = max subpave

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

Appendix E. Hydrologic Data

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Table 12. Verification of Bankfull Events			
Newtown - DMS# 94150			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo #**
25-Oct-11	-	Site Visit observing visible wrack lines	MY-01 #29-30
23-Aug-13	30-Jun-13	Gauge data	N/A
23-Aug-13	7-Jul-13	Gauge data	N/A
9-Oct-13	21-Sep-13	Gauge data	N/A
9-Sep-14	15-Apr-14	Transducer data	N/A
9-Sep-14	19-Apr-14	Transducer data	N/A
9-Sep-14	20-Apr-14	Transducer data	N/A
9-Sep-14	15-Jul-14	Transducer data	N/A
9-Sep-14	21-Jul-14	Transducer data	N/A
9-Sep-14	12-Aug-14	Transducer data	N/A
--	6-Aug-15	USGS Rainfall data*	N/A

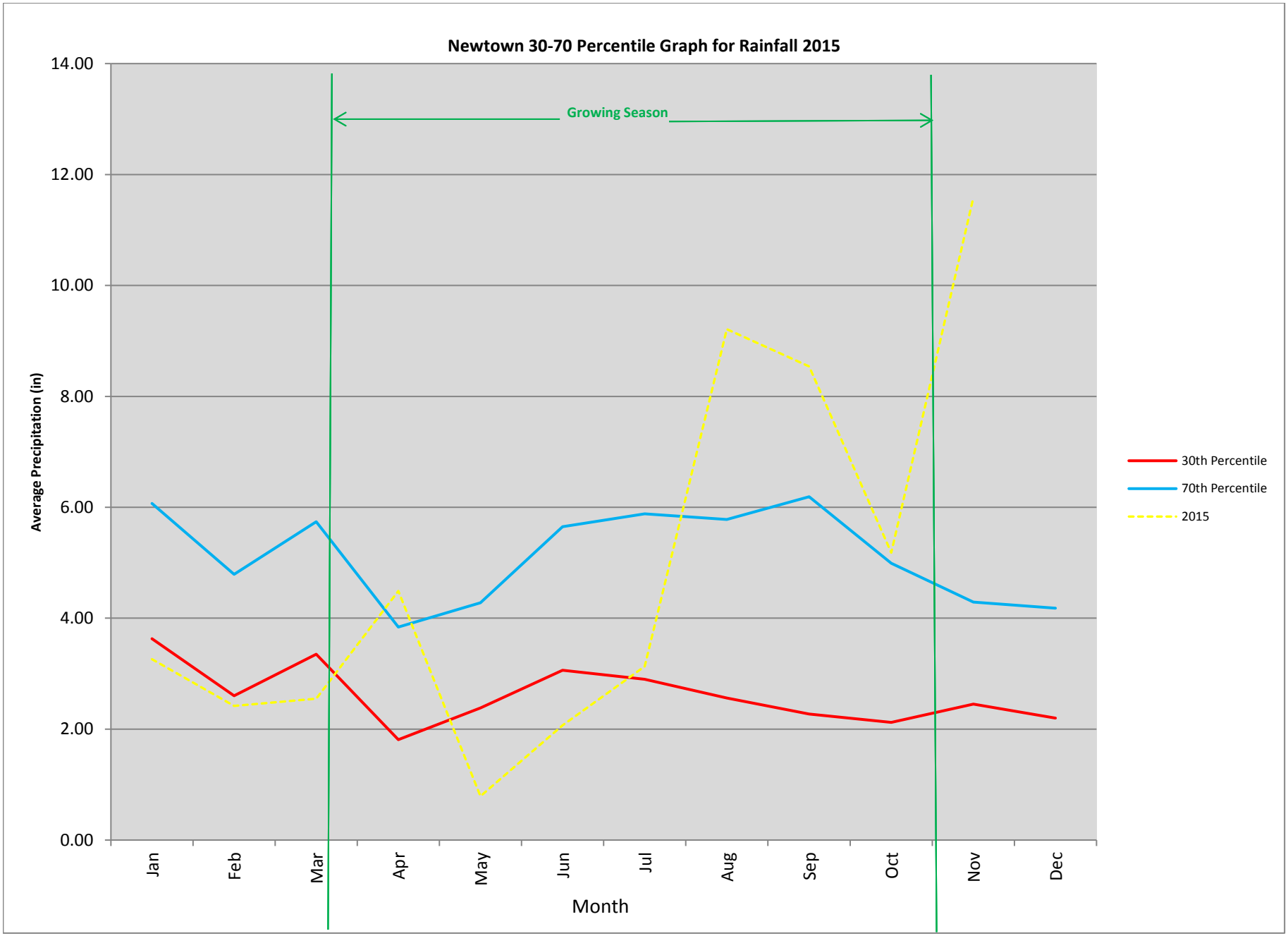
*The crest gauge did not have enough cork dust for an accurate reading during data collection in August 2015. USGS Station #345609080415145 approximately 4 miles Southwest of the project site recorded a 5-year storm event August 6, 2015, which exceeds bankfull.

Table 13. Wetland Criteria Attainment 2010-2015

	MY-01 (2011)			MY-02 (2012)			MY-03 (2013)			MY-04 (2014)			MY-05 (2015)		
Gauge #	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
1	59[a]	26	Yes	79	35	Yes	168	74	Yes	53[i]	23	Yes	90	39	Yes
2	198[b]	87	Yes	228	100	Yes	228	100	Yes	228	100	Yes	156	68	Yes
3	198[b]	87	Yes	228	100	Yes	228	100	Yes	228	100	Yes	156	68	Yes
4	77[c]	34	Yes	75[f]	33	Yes	228	100	Yes	113	50	Yes	103[l]	45	Yes
5	92[b]	40	Yes	105[g]	46	Yes	179	79	Yes	113[i]	50	Yes	90[m]	39	Yes
6	111[b]	49	Yes	228	100	Yes	228	100	Yes	167[i]	73	Yes	*	*	*
7	27[d]	12	Yes	64	28	Yes	228	100	Yes	59[j]	26	Yes	87	38	Yes
8	7[e]	3	**No**	5	2	**No**	22[h]	10	Yes	14	6	Yes	47	21	Yes
9	~	~	~	~	~	~	~	~	~	0[k]	0	**No**	0	0	**No**
10	~	~	~	~	~	~	~	~	~	49[k]	21	Yes	82	36	Yes
11	~	~	~	~	~	~	~	~	~	49[k]	21	Yes	63	28	Yes

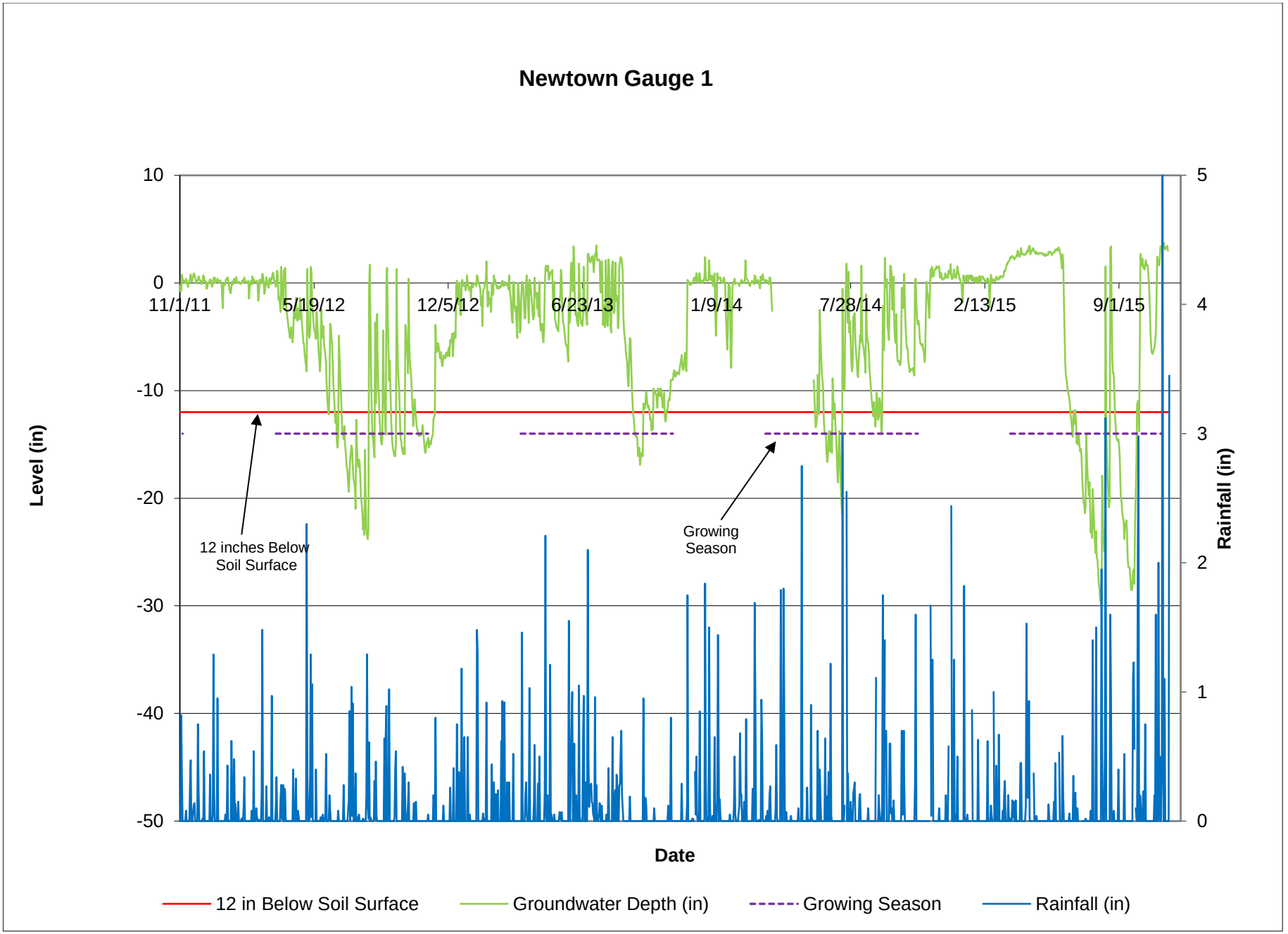
a – Gauge installed April 23, 2011 –197 days of growing season monitored
b – Gauge installed April 22, 2011 –198 days of growing season monitored
c – Gauge installed February 20, 2010; Data missing due to gauge failure - 217 days of growing season monitored
d – Gauge installed May 24, 2011 – 166 days of growing season monitored
e – Gauge installed August 13, 2011 –85 days of growing season monitored
f – Data missing due to gauge failure; new gauge installed March 26, 2012; 224 days of growing season monitored
g – Data missing due to gauge failure; 184 days of growing season monitored
h – Data missing due to gauge failure; 149 days of growing season monitored
i – Data missing due to gauge failure; 167 days of growing season monitored
j – Data missing due to gauge failure; 121 days of growing season monitored
k – Gauge installed April 3, 2014 – 217 days of growing season monitored
l – Data missing due to gauge failure; 156 days of growing season monitored
m - Data missing due to gauge failure; 209 days of growing season monitored
* – Gauge malfunction

Growing Season: March 23 to November 6 (source: http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=nc)



Growing Season: March 23 to November 6 (228 days)
(http://www.wcc.nrcs.usda.gov/cgibin/sate.pl?state=nc)

2011-2015 Rain Data: Station ID: 315771
(http://www.nc-climate.ncsu.edu/services/request.php)



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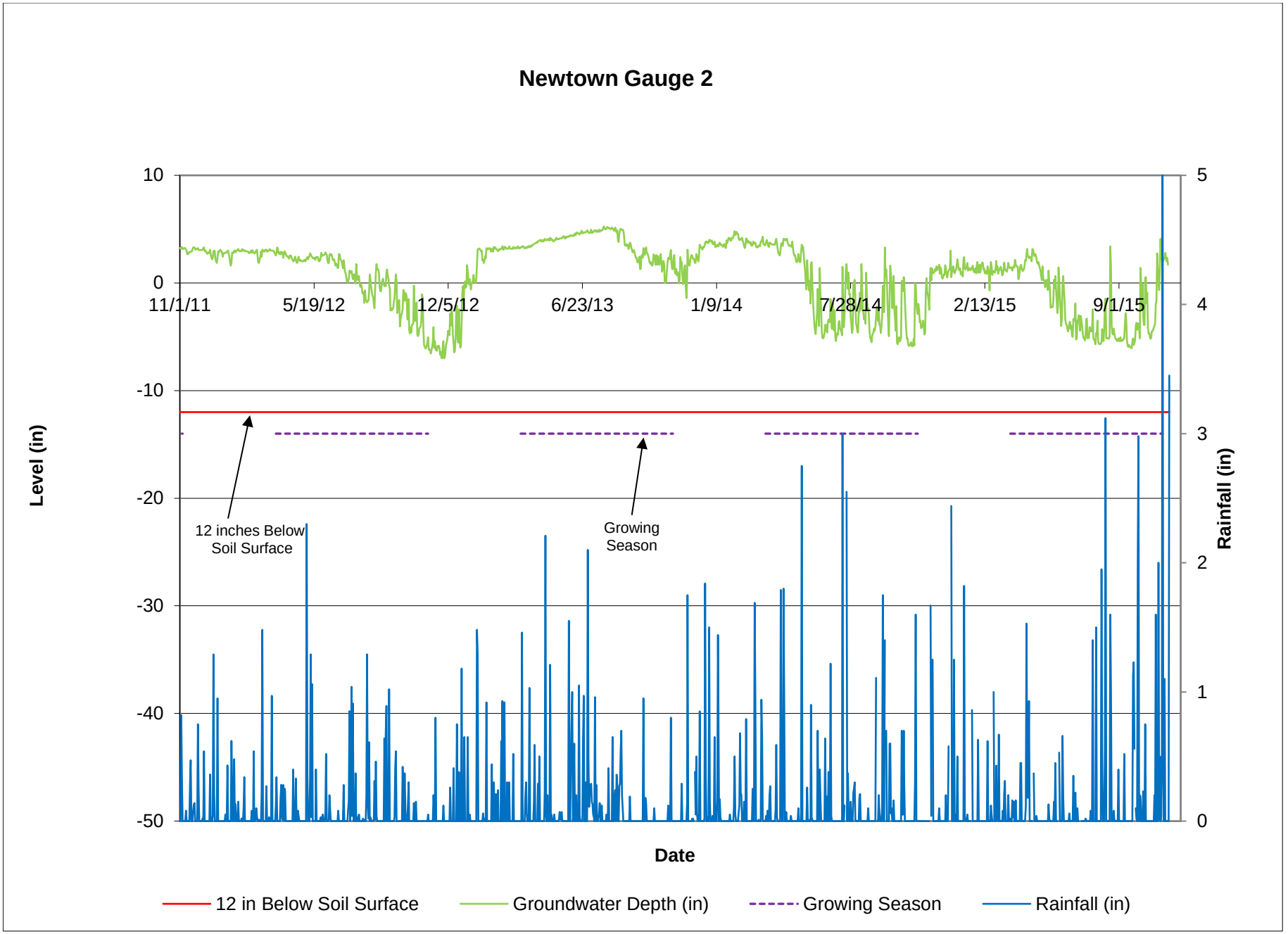

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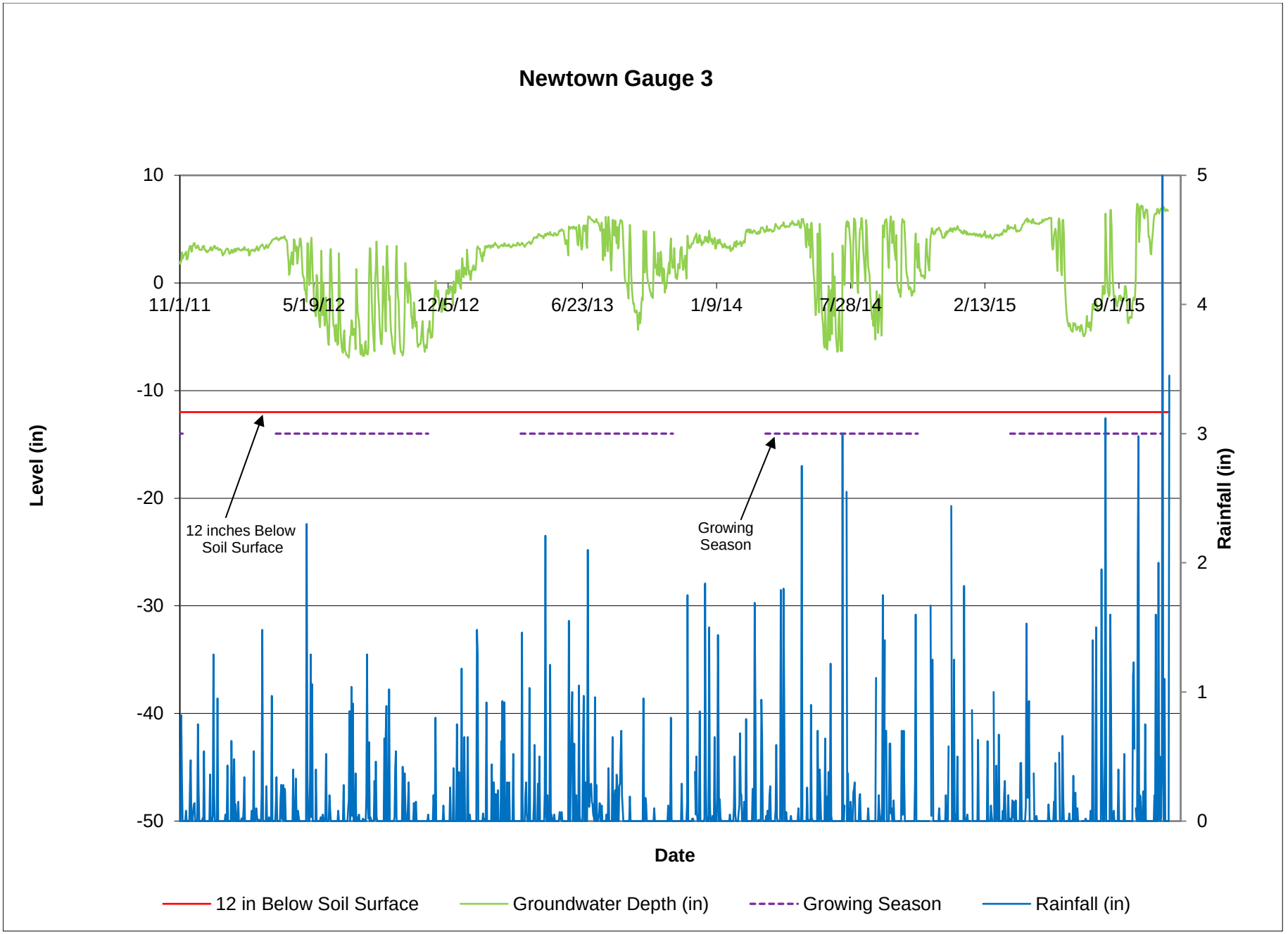

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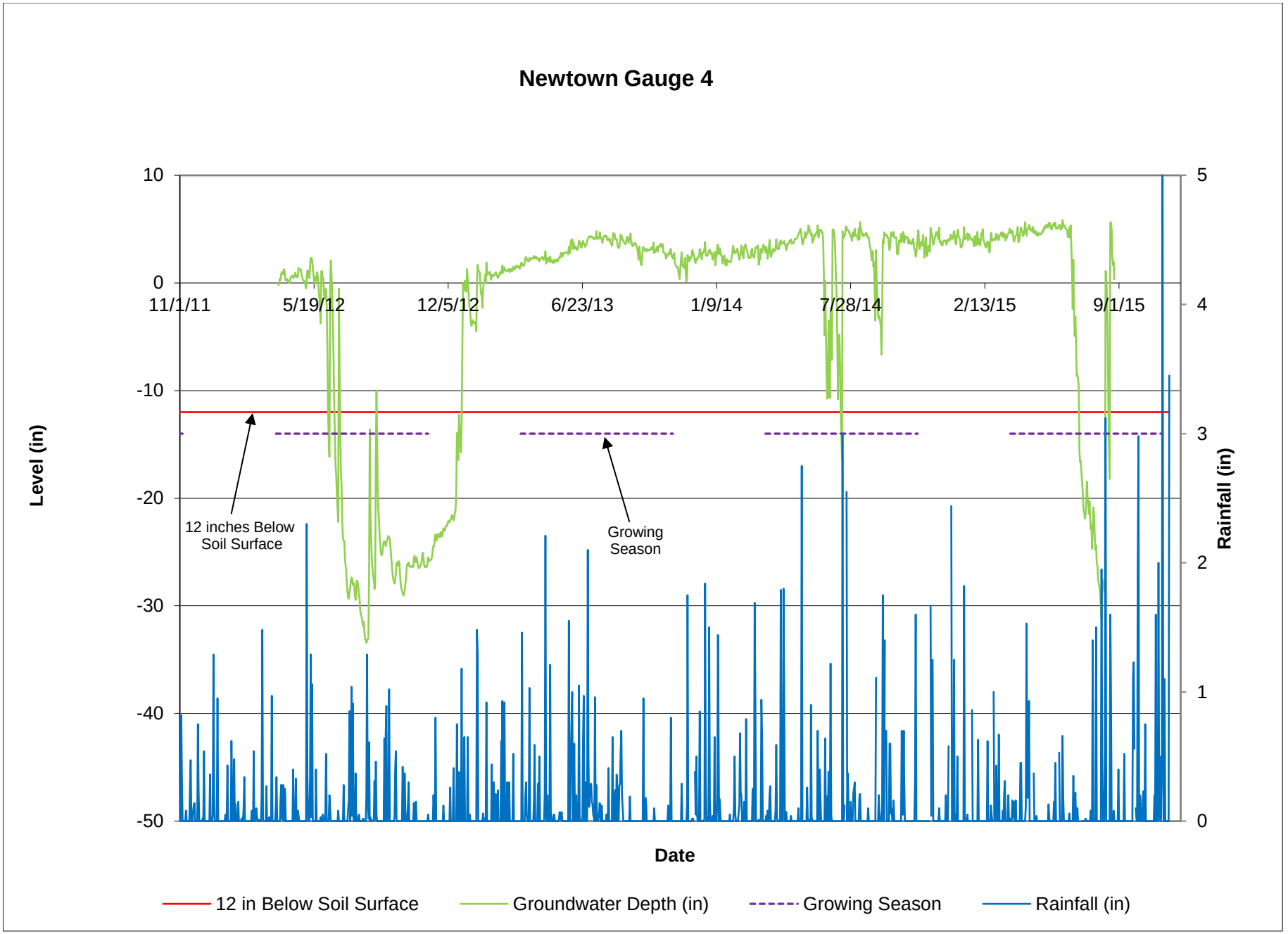

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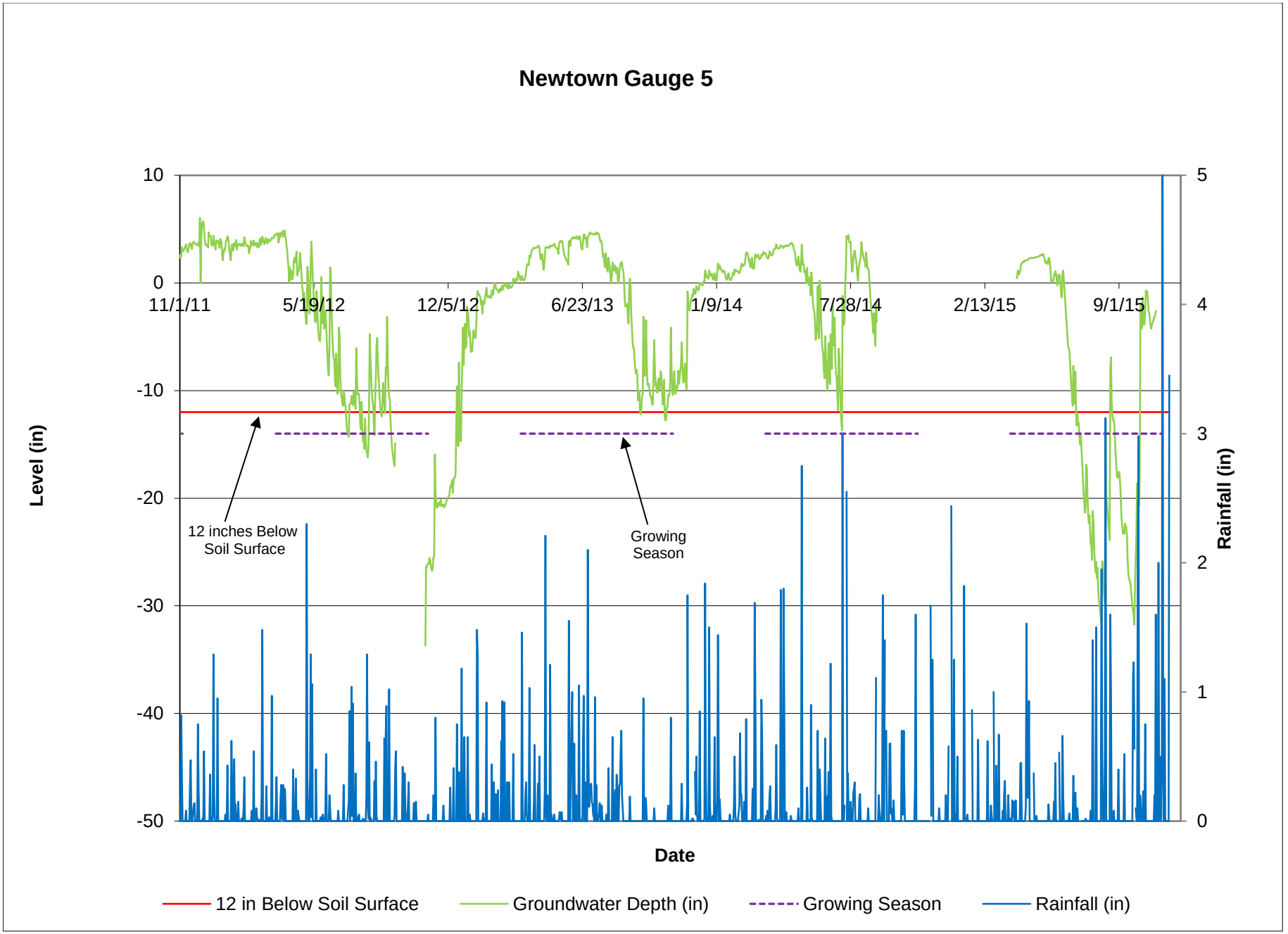

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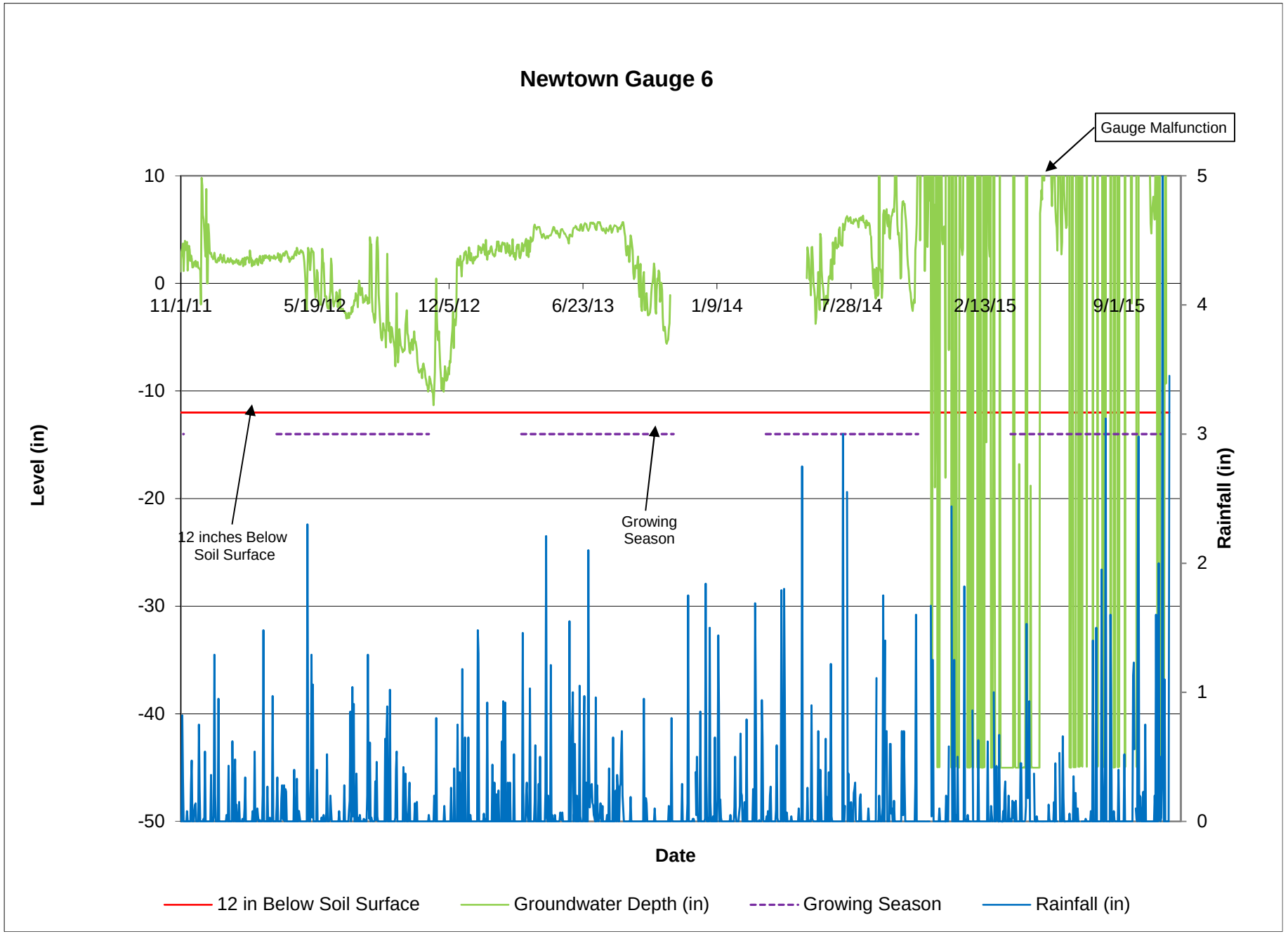

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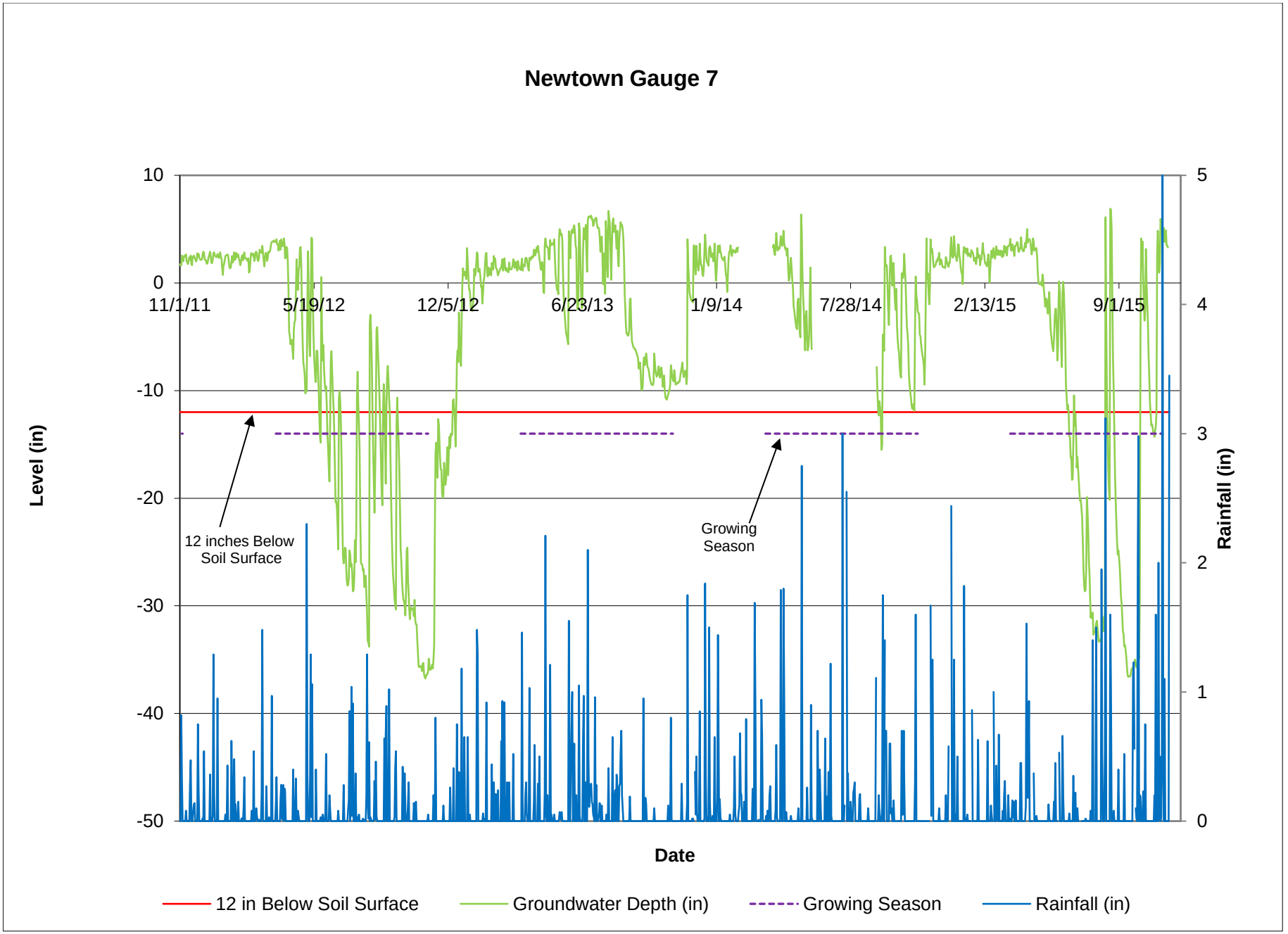

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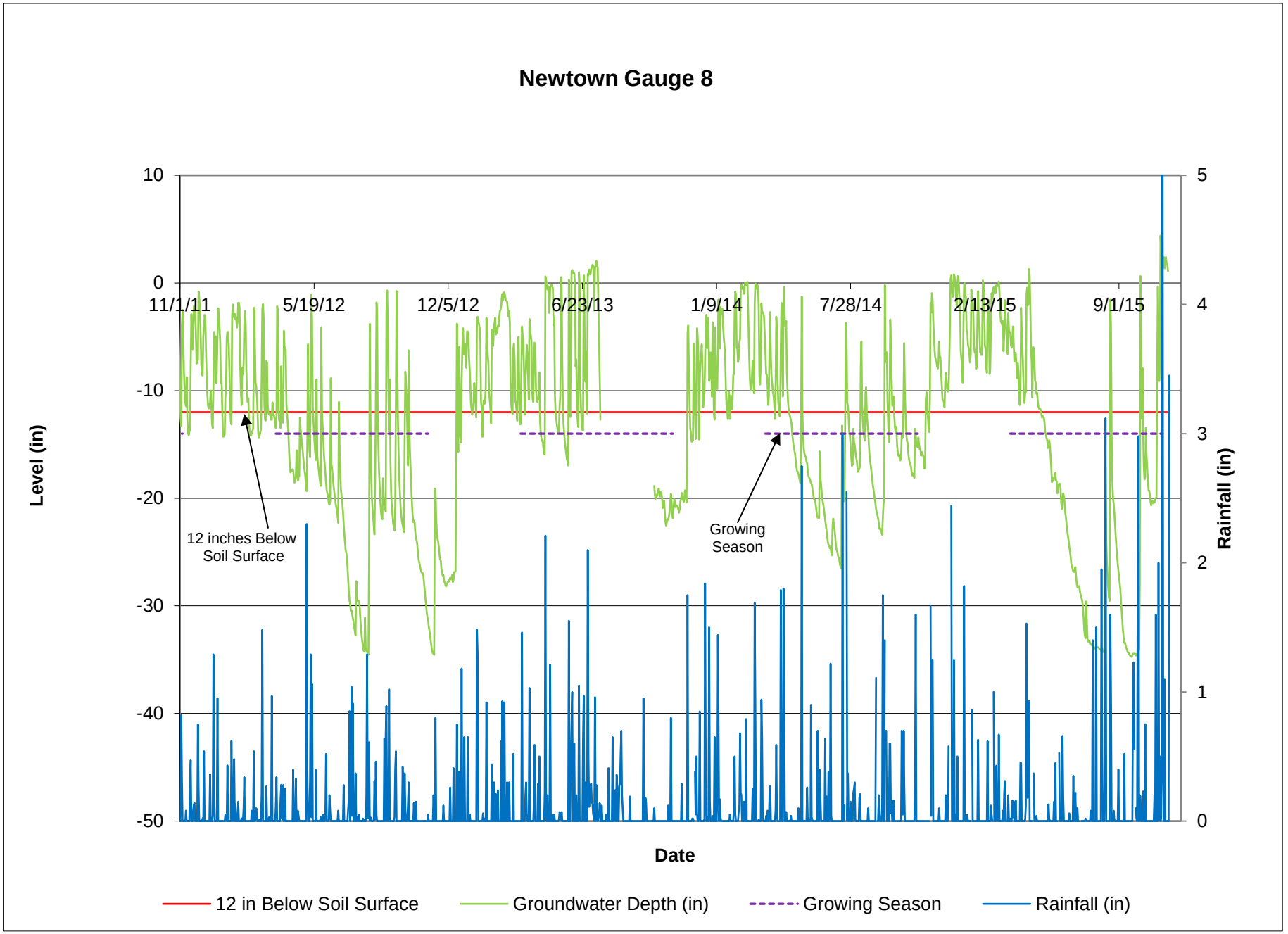

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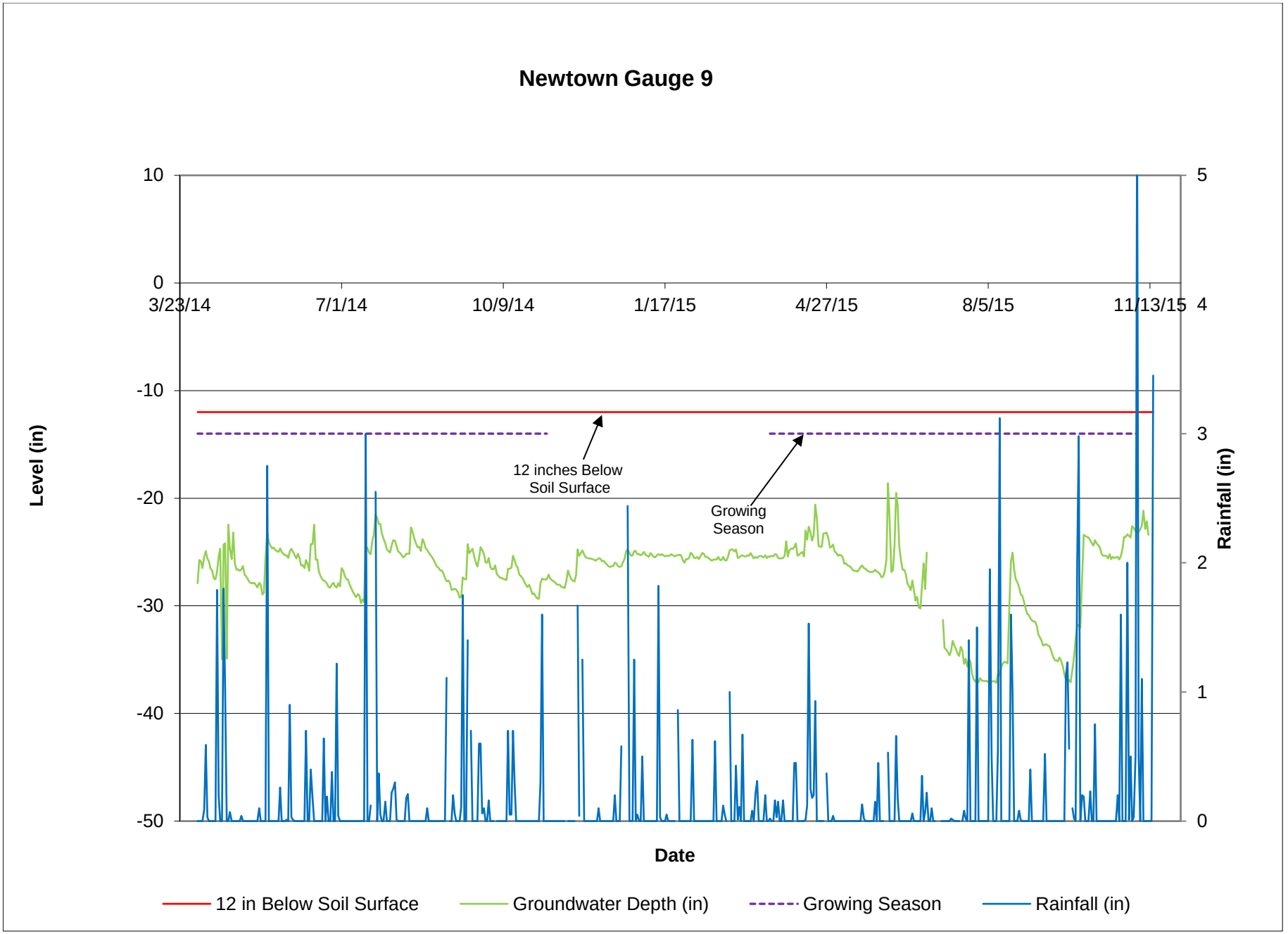

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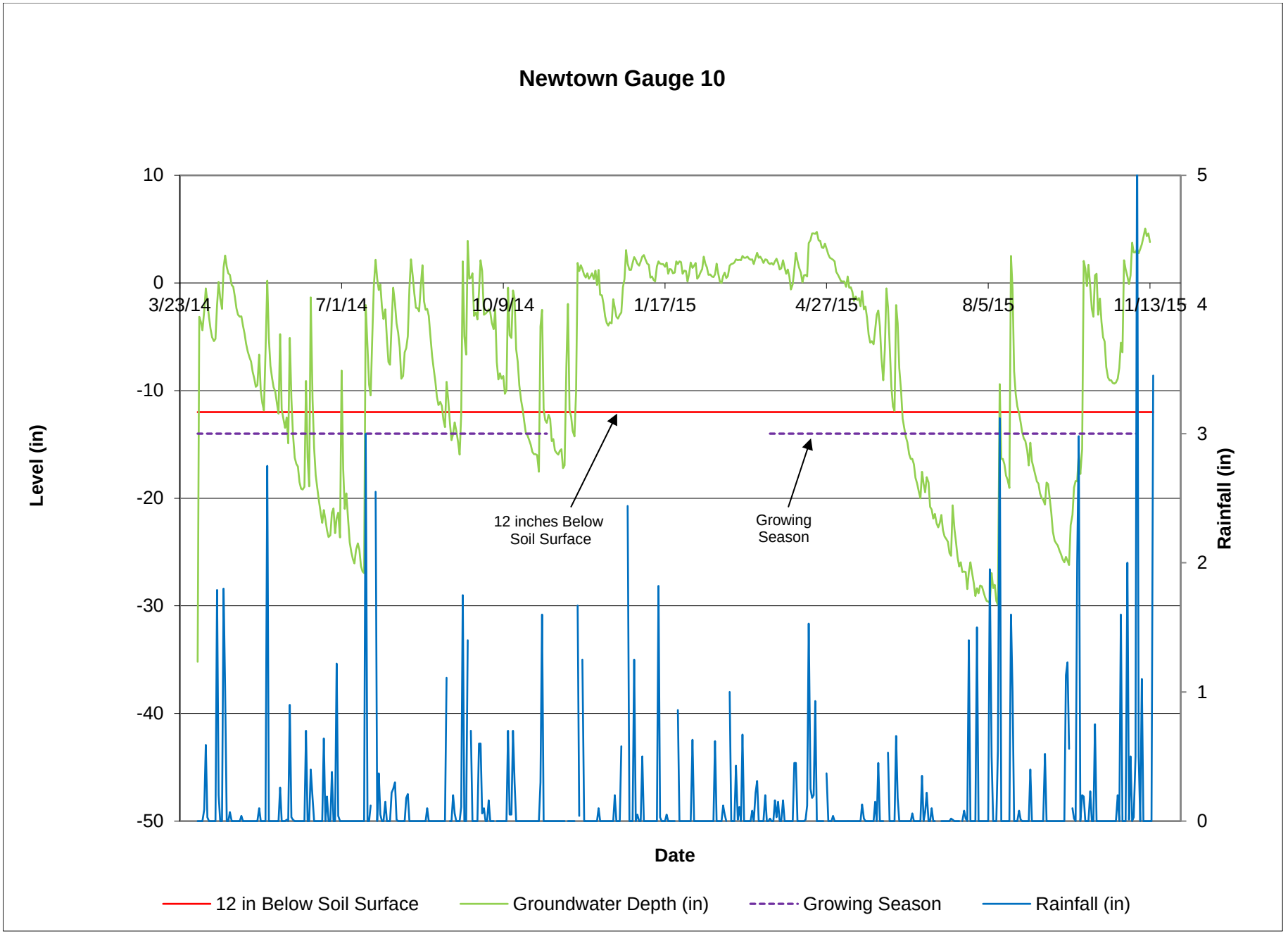

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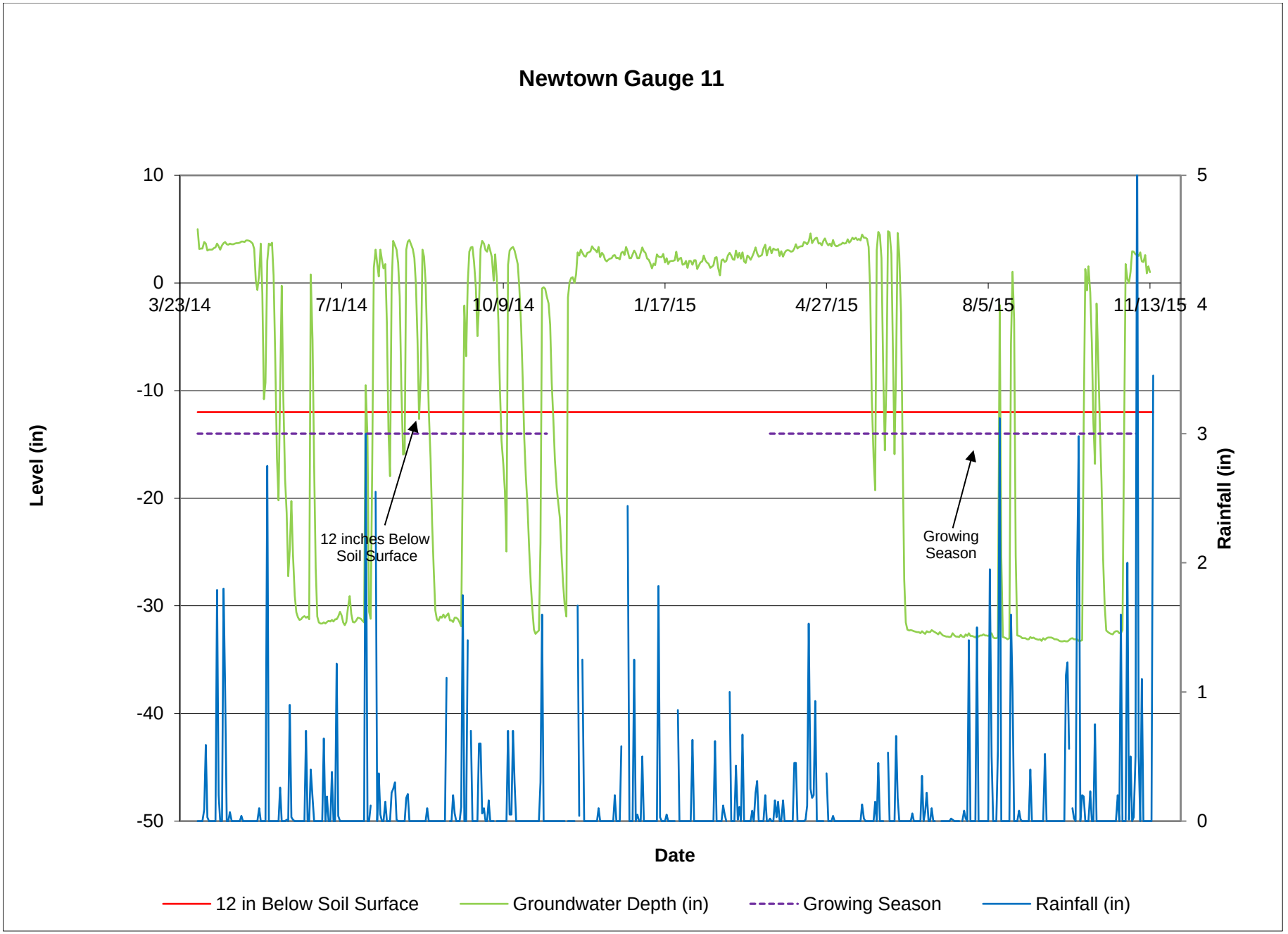

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