

North Fork Mountain Creek Monitoring Report

Monitoring Year 3 of 7

Stream and Wetland
EEP Contract No.002024
EEP Project No. 94151

Catawba County, NC
Data Collected: 3/21 – 11/13/2014
Submitted: January 2015



Submitted to:



NCDENR-EEP, 1652 Mail Service Center Raleigh NC 27699-1652

Prepared for:



Prepared by:



EQUINOX

balance through proper planning

Contents

- 1.0 Project Summary 1
 - 1.1. Project Setting and Background..... 1
 - 1.2. Project Approach 1
 - 1.3. Project Goals 1
 - 1.4. Success Criteria..... 2
 - 1.5. Project Performance..... 2
- 2.0 Methods..... 4
- 3.0 References..... 5
- Appendix A..... 6
- Appendix B 10
- Appendix C 45
- Appendix D..... 50
- Appendix E 119

1.0 PROJECT SUMMARY

1.1. Project Setting and Background

The North Fork Mountain Creek Stream and Wetland Mitigation Site was identified and developed through the North Carolina Ecosystem Enhancement Program (NCEEP) full delivery process. The site is located approximately six miles south of Catawba, North Carolina in southeastern Catawba County (Figure 1). The project lies within the Piedmont physiographic region (NCGS 2004) and USGS (2002) Level III ecoregion. The North Fork Mountain Creek watershed is within Catawba River Basin 14-digit Hydrologic Unit Code 03050101150030 and the North Carolina Division of Water Quality (NCDWQ) sub-basin 03-08-32 (NCDWQ 2010).

The mitigation site encompasses 17.2 acres containing 5,299 linear feet (lf) of stream channel and 4.44 acres of wetlands. The project consists of four reaches; reach 1 is on the mainstem of North Fork Mountain Creek, while reaches 2, 3, and 4 are on primary and secondary unnamed tributaries (UT1 and UT2) of North Fork Mountain Creek (Figure 2). An additional 0.97 acres of existing wetlands were preserved on the site; however, no mitigation credit is being claimed for this wetland preservation acreage per RFP 16-001117.

Prior to restoration the stream channels and wetlands were highly disturbed due to the presence of livestock that had unrestricted access to the riparian areas and stream channels. The riparian vegetation was decimated by overgrazing and trampling. The subsequently bare banks were then subject to severe erosion that was only exacerbated by hooves of the cattle.

1.2. Project Approach

Channel restoration involving improved pattern, dimension, and longitudinal profile was completed on all four stream reaches. Priority I and II approaches were applied to the mainstem North Fork Mountain Creek (Rosgen 1996; NCSRI 2004), while only a Priority II approach was used on the tributary reaches. A total of 1.17 acres of wetlands were restored along reaches 1, 2, 3, and 4, while 3.27 acres of wetlands were created along reaches 2 and 4 (Figure 2).

1.3. Project Goals

The primary and secondary project goals, as outlined in the 2011 restoration plan, are as follows:

Primary goals:

- Provide stable stream channels throughout 5,180 linear feet of channel restoration
- Restore riparian buffers throughout the project site
- Restore 1.16 acres of riparian wetland
- Create 3.03 acres of riparian wetland
- Provide permanent protection through conservation easement for the entire floodplain of North Fork Mountain Creek and its tributaries within the project area.
- Improve water quality by significantly reducing sediment loads from bank erosion and fencing out cattle.

Secondary goals:

- Increase the diversity and quantity of macrobenthos, salamanders, and fish by improving habitat and coarsening of the stream bed
- Improve vegetative communities and terrestrial habitat diversity
- Improve hydrology by increasing groundwater recharge, groundwater and surface water storage, and groundwater/surface water interaction.

1.4. Success Criteria

1.4.1. Stream

Success criteria pertain to the stability of the restored channel's dimension, pattern, and sediment transport. The restored channel must demonstrate the general maintenance of a stable cross-section and have hydrologic access to the floodplain over the monitoring period. The restoration reach should mimic reference reach conditions and the channel will be considered stable if there are little or insignificant changes from the as-built dimensions. Some change in stream dimension is natural and expected.

Traditionally, the success of a stream's pattern and dimension is determined utilizing the dimensionless ratios of reference reaches. The range of values for the dimensionless ratios of the reference reaches are applied to the design reaches. In this case, design reaches are deemed successful if the variability of its pattern and dimension remain within the range of the dimensionless ratios taken from the reference reaches, plus or minus one-half the value of that range. For the North Fork Mountain Creek restoration project, dimensionless ratios of the design reaches vary slightly from the dimensionless ratios of the reference reaches. As a result, the restoration will be determined to be successful if the dimensionless ratios of the pattern and dimension of the restoration reaches remain within their 'as-built' range, plus or minus one-half the value of the range of the dimensionless ratios of the reference reaches. Pattern features (bedform distributions and riffle/pool lengths and slopes) should demonstrate little adjustment within the 7-year monitoring period. In terms of sediment transport, no significant trend in the aggradational or depositional potential of the restoration reaches should occur over the monitoring period. A minimum of two-bankfull events must be documented by crest gage [data] within the standard monitoring period.

1.4.2. Wetland

As per USACE guidelines, wetlands exhibiting water within 12 inches of the surface consecutively between 5% and 12.5% of the growing season in most years may be considered wetlands (USACE 1987, 1992). The growing season at the North Fork Mountain Creek site extends from March 21 to November 11, a total of 236 days (NRCS 2012). Restored wetland hydrology is being compared to reference wetland hydrology both on-site and at the South Fork project (NCEEP Project No. 346, unpublished data). Based on data collected on-site, an 8% hydroperiod will be used as success criteria for this project.

1.5. Project Performance

This report presents the results of the Monitoring Year 3 (MY3) visual, morphological, vegetative, and groundwater data collected from 26 cross sections, 12 bank pin arrays, 2 crest gauges, 10 automated groundwater monitoring stations, 1 automated rain gauge, 14 vegetation monitoring plots, and 31 photographic reference locations; as specified in the approved Restoration Plan and Baseline Report (EBX2009, 2012). Per EEP's request, a 7-year monitoring protocol was adopted at the end of MY2. To meet requirements of this protocol, bank pin arrays were installed at 12 monitored pool cross section locations at the beginning of MY3 and will be monitored during each scheduled cross-section monitoring event.

Visual assessment of the site consisted of re-visiting 31 photographic reference locations (Appendix B), visually assessing the integrity of the channel and structures, assessing the establishment of planted and volunteer vegetation, and documenting the presence of invasive species. Seven additional problem areas were documented during MY3, bringing the total number of documented problem areas to 19 (Appendix B, Table 4). Problem areas consist of bed degradation, bank scour, stressed structures, and several bare areas with low stem densities.

Stream morphology data collected during MY3 indicates that, in general, the stream is stable and lacking in any significant change (Appendix D). Several noticeable changes were noted in the cross-section dimensions. These changes are relatively minor and do not exceed expectations of adjustment within the channel. A bulleted summary of those changes are outlined below:

- XS-9- An increase in bankfull width resulted in increased bankfull area
- XS-10- Berm formation along the left-descending bank resulted in decreased bankfull width and W/D ratio
- XS-11- Berm formation along the left-descending bank has resulted in a reduction in W/D ratio
- XS-18- Aggradation in the pool resulted in reduced max depth and bankfull area
- XS-19- The formation of a berm along the right-descending bank led to a decrease in bankfull area
- XS-21- Scour occurring in MY2 subsequently filled during MY3 resulting in decreased bankfull area and an increased width/depth (W/D) ratio
- XS-23- Aggradation along the left-descending bank resulted in decreased bankfull area and increased W/D Ratio.
- XS-24- Continued growth of a berm on the left-descending bank resulted in reduced bankfull width

A series of bank pin arrays were installed during January of MY3 at 12 pool cross-sections. The first data collection effort was performed in November of 2014 (MY3). A majority of the pins were buried under soft bank accretions. Erosion was limited to cross-section 4, 5, and 2, which had erosion rates of 0.10, 0.11, and 0.01 feet per year, respectively (Table 9). Erosion at XS-4 and XS-5 were associated with small, isolated areas of scour at the base of log-step structures. At XS-20, the higher rate of erosion was associated with the upper transect of pins, near the top of the bank. Visual observation of the bank indicated that scour was largely localized to the area around the bank pin and not the full extent of the bank. The lower transect of pins were buried in soft accretions. The missing pin at XS-10 was associated with a bank failure and may under-represent the amount of erosion at this cross-section. Substrate monitoring occurred at all riffle cross-sections, 14 total, as well as a reachwide pebble count for each reach. Reachwide data indicates that, overall, reaches 1-3 have coarsened over the monitoring period with the D_{50} residing in the fine and very fine gravel size classes. Reach 4 has grown finer over the monitoring period with D_{50} residing in the sand and silt size class. Given the heavy herbaceous vegetation established in the channel, it is not surprising that the channel is retaining fine substrate material.

Vegetation data collected during MY3 indicates that all 14 permanent vegetation monitoring plots are currently meeting the interim vegetative success criteria of 320 stems per acre (Table 5). Average stem density across all plots was 879 stems per acre during MY3, a 3% decrease in stem density from MY2 (Table 7b). A total of 22 species of woody species were documented within the vegetation plots. Although, several small depauperate areas of vegetation along the floodplain bench were noted (Figure 2), herbaceous vegetation is well established throughout the easement.

During MY3, eight of the ten original monitoring wells (MW) met the 8% hydroperiod success criteria (Table 12). Hydroperiods ranged from 0.8% to 50.4%. As in past years, both MW-4 and MW-5 failed to

meet hydrology success criteria. During early MY3 supplemental wells were installed to assess hydrology in the vicinity of the failing monitoring wells. All four supplemental monitoring wells met the 8% hydroperiod success criteria. EBX will continue to monitor the area for hydrology.

Precipitation at the Site was 35% lower than the Hickory NCCRONOs station and 22% lower than the South Fork Reference Wetland; however, data gaps in March in April resulted from equipment malfunction (Table 11). It is likely that precipitation at the site would be similar to both the NCCRONOS and South Fork Reference if data gaps were not present. Generally, MY3 was below average rainfall during the growing season. Total precipitation for the Hickory NCCRONOS station and South Fork Catawba reference wetland between March and October were 7% to 10% drier than the long term average totals for Catawba County.

Since project completion in June 2012 three bankfull events have occurred at the project site (Table 10). An initial bankfull event occurred in August 2012, which registered 0.58 feet above bankfull on UT1-Reach 2. The crest gauge on North Fork Mountain Creek- Reach 1 was damaged from the event and, as a consequence, the water level above bankfull could not be determined; however, the event was photo documented (Appendix B). A second event was documented using wrack lines in January 2013. The third event registered on the Reach 1 crest gauge as 0.33 feet above bankfull. The Reach 2 crest gauge did not register a bankfull event; however, photo-documentation of wrack lines along the reach indicated that a bankfull did occur on this reach as well (Appendix B).

Summary information/data related to the occurrence of such things 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. Additional background and supporting information can be found in the Baseline Monitoring Report (EBX 2012) and in the Mitigation Plan (EBX 2011) documents.

2.0 METHODS

Visual assessment of the stream was performed quarterly. Permanent photo station photos were collected during the initial visual assessment at the beginning of the monitoring year during leaf-off conditions. Additional photos of vegetation or stream problem areas were documented with photographs.

Geomorphological measurements were taken during low flow conditions using a Nikon NPR 332 Total Station. Three-dimensional coordinates associated with cross-sections were collected in the field and geo-referenced (NAD83 State Plane feet FIPS 3200). Morphological data was limited to 26 cross-sections, as no longitudinal profile is required during annual monitoring events. Survey data was imported into CAD, ArcGIS, and Excel for data processing and analysis. Channel substrate was characterized using a Wolman Pebble Count outlined in the Harrelson et al (1994) and processed using Microsoft Excel. Bank-pin arrays were installed at each pool cross-section. Pins were installed at three locations at each cross-section; the upper-third, at the cross-section, and the lower-third of the bend. The first set of pins was installed at the “normal” water line with an additional set of pins installed for each 2-foot increment of vertical bank. Once per monitoring year, starting in MY3, the length of exposed pin was recorded and the pin was reset flush with the bank.

Vegetation success is being monitored using 14 permanent monitoring plots. Vegetation monitoring follows the CVS-EEP Level 2 Protocol for Recording Vegetation, version 4.2 (Lee et al. 2008) and includes analysis of composition and density of planted species. Data is processed using the CVS data

entry tool. In the field, the four corners of each plot were permanently marked with rebar and photos of each plot are taken from the origin each monitoring year.

Precipitation data was collected using an Onset HOBO Data Logging Rain Gauge. Groundwater for hydrologic success of the restored wetlands was monitored using Onset HOBO U20 Water Level Loggers at a total of 14 monitoring wells. An additional logger was installed on site, above ground, for use as a barometric reference. Data loggers collected depth to groundwater daily and all data were processed using HOBOWare and analyzed using Microsoft Excel.

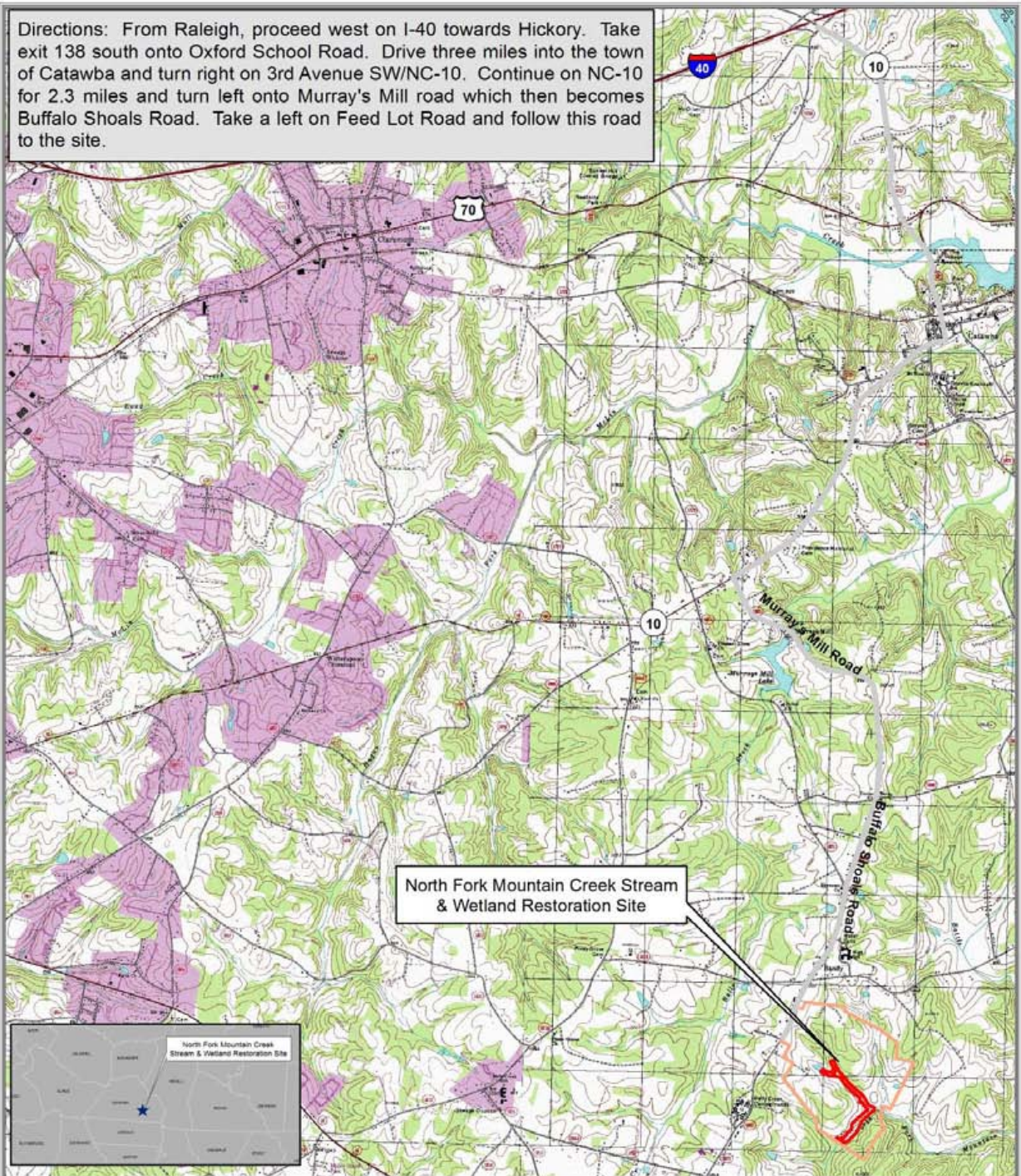
Bankfull events were documented with crest gauges. During quarterly visits to the site, the height of the corkline was recorded and cross-referenced with known bankfull elevations at each crest gauge.

3.0 REFERENCES

- EBX (Environmental Banc & Exchange). 2011. North Fork Mountain Creek Stream and Wetland Restoration, Restoration Plan, Catawba County, North Carolina. NCEEP Project No. 94151.
- EBX (Environmental Banc & Exchange). 2012. North Fork Mountain Creek Stream and Wetland Restoration Final Baseline Monitoring Document and As-Built Baseline Report. Catawba County, North Carolina. NCEEP Project Number 94151. Prepared by Stantec Consulting Services, Inc. for EBX. Raleigh.
- Harrelson, Cheryl, C. Rawlins and J. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Gen. Tech. Rep. RM-245. Rocky Mountain Forest and Range Experiment Station. USDA Forest Service. Fort Collins, Colorado.
- Lee, M.T., Peet, R.K., Roberts, S.D. and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. <http://cvs.bio.unc.edu/methods.htm>; accessed November 2008
- NCDWQ (North Carolina Division of Water Quality). 2010. Catawba River Basinwide Water Quality Plan.
- NCGS (North Carolina Geological Survey). 2004. Physiography of North Carolina. Map compiled by the Division of Land Resources. Raleigh.
- NCSRI (North Carolina Stream Restoration Institute). 2004. Stream Restoration: A Natural Channel Design Handbook. North Carolina Stream Restoration Institute and North Carolina Sea Grant. Raleigh. <http://www.bae.ncsu.edu/programs/extension/wqg/srp/guidebook.html>; accessed November 2012
- NRCS (Natural Resources Conservation Service). Accessed June 2012. Climate Analysis for Wetlands by County. <http://www.wcc.nrcs.usda.gov/climate/wetlands.html>
- Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.
- USGS (U.S. Geological Survey). 2002. Ecoregions of North Carolina and South Carolina. Color poster with map, descriptive text, summary tables, and photographs. Reston, Virginia.

Appendix A
General Tables and Figures

Directions: From Raleigh, proceed west on I-40 towards Hickory. Take exit 138 south onto Oxford School Road. Drive three miles into the town of Catawba and turn right on 3rd Avenue SW/NC-10. Continue on NC-10 for 2.3 miles and turn left onto Murray's Mill road which then becomes Buffalo Shoals Road. Take a left on Feed Lot Road and follow this road to the site.



North Fork Mountain Creek Stream & Wetland Restoration Site



**Figure 1. Vicinity and Topographic Features Map
North Fork Mountain Creek Mitigation Site**



- Property Boundary
- Easement
- Streams
- Roads

Table 1. Project Components North Fork Mountain Creek Stream & Wetland / Project No. 94151							
Project Component or Reach ID	Existing Feet/ Acres	Restoration Level	Approach	Restoration or Restoration Equivalent	Footage or Acreage	Mitigation Ratio	Mitigation Credits (WMUs/ SMUs)
NFMC-4	2,245	R	R (P1/P2)	R	2,231	1:1	2,231
UT1-1	698	R	R (P1)	R	698	1:1	698
UT1-2	1,542	R	R (P1)	R	1,756	1:1	1,756
UT2-3	598	R	R (P1)	R	614	1:1	614
Total SMUs							5,299
Wetland-R	-	R	R	R	1.2	1:1	1.17
Wetland-C	-	C	C	RE	3.27	2:1	1.64
Wetland-P	0.97	P	-	-	0.97	-	-
Total WMUs							2.81

¹W-R = wetlands restoration; W-C = wetlands creation; W-P = wetlands preservation.

²Wetland creation mitigation ratio was 2:1 as agreed upon with the USACE during the 401/404 permitting process (EBX 2012).

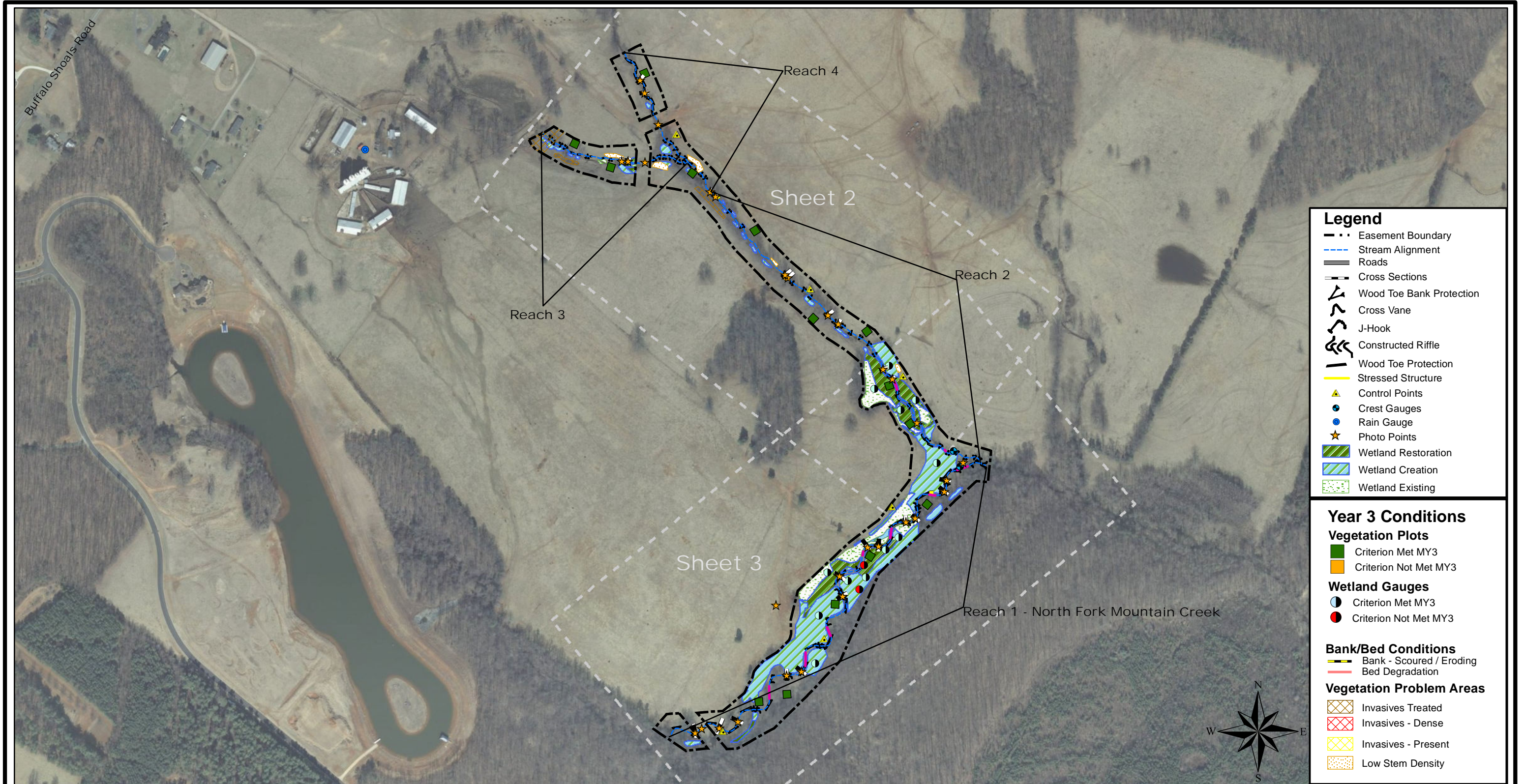
³Existing wetlands were preserved on the site, but no WMUs were credited to the project.

Table 2. Project Activity and Reporting History		
Activity or Report	Data Collection Complete	Completion or Delivery
Restoration Plan	Jul-11	Jul-11
Final Design - Construction Plans	N/A	Oct-11
Construction	N/A	May-12
Temporary S&E mix applied to entire project	N/A	May-12
Permanent seed mix applied to Reach	N/A	May-12
Mitigation Plan / As-Built (Year 0 Monitoring -	Jun-12	Aug-12
Exotic Invasive Plant Control	Jun-12	Jun-12
Year 1 Monitoring – 2012	Dec-12	Jan-13
Year 2 Monitoring – 2013	Nov-13	Nov-13
Year 3 Monitoring – 2014	Nov-14	Dec-14
Year 4 Monitoring – 2015		
Year 5 Monitoring – 2016		
Year 6 Monitoring – 2017		
Year 7 Monitoring – 2018		

Table 3. Project Contacts (NCEEP Project No. 94151)	
Contact	Provider Information
Designer	Stantec Consulting, Inc. 801 Jones Franklin Rd. Suite 300 Raleigh, NC 27606
Primary Project Design POC	David Bidelspach (919) 218-0864
Construction Contractor	North State Environmental, Inc. 2889 Lowery St. Winston-Salem, NC 27101
Construction Contractor POC	Darrell Westmoreland (336) 725-2010 Nate Martin (336) 725-2010
Planting Contractor 1	New Forest Services 313 Condon Road Manistee, MI 49660
Planting Contractor 1 POC	Brian Jarvinen (231) 590-9198
Planting Contractor 2	Strader Farms, LLC
Planting Contractor 2 POC	Kenneth Strader
Seed Mix Sources	Green Resource 5204 Highgreen Court Colfax, NC 27235
Nursery Stock Suppliers	ArborGen (Trees and Livestakes) Blenheim, SC Strader Farms (Livestakes)
Baseline Monitoring Performers (Year 0)	Stantec Consulting Services, Inc. 801 Jones Franklin Rd Suite 300 Raleigh, NC 27606
Stream Monitoring POC	Tim Taylor (704) 329-0900
Vegetation Monitoring POC	N/A
Wetland Monitoring POC	N/A
Annual Monitoring Performers (Year 1-7)	Equinox Environmental Consultation and Design, Inc. 37 Haywood St. Suite 100 Asheville, NC 28801
Stream Monitoring POC	Hunter Terrell (828) 253-6856
Vegetation Monitoring POC	Hunter Terrell (828) 253-6856
Wetland Monitoring POC	Hunter Terrell (828) 253-6856

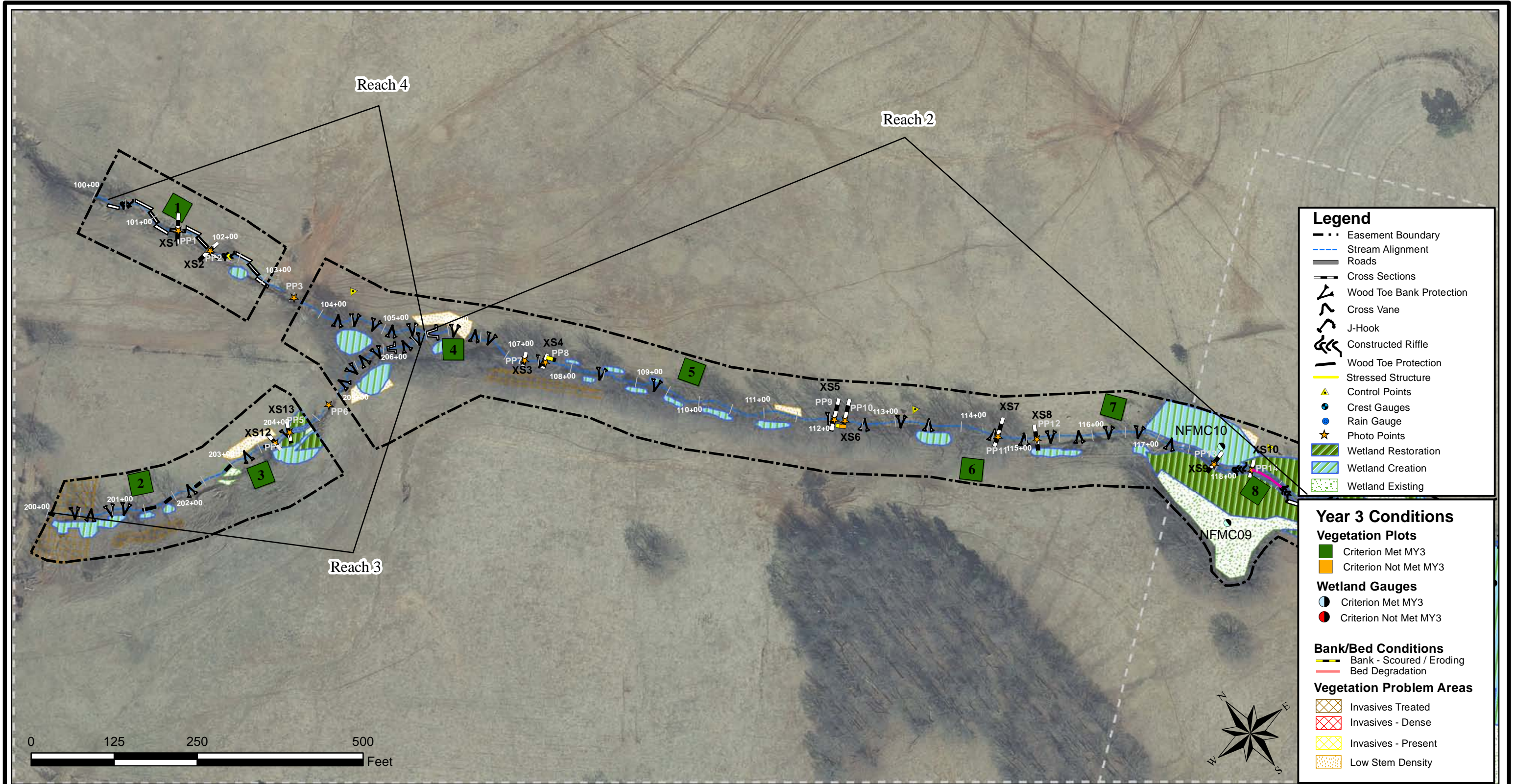
Appendix B
Visual Assessment Data

Figure 2. Integrated Current Condition Plan View



Prepared for	Project: North Fork Mountain Creek Stream and Wetland Restoration Year 3 Monitoring Catawba County, North Carolina	Notes: 1) 2010 Aerial Photo 2) Base Map Data Provided by Stantec.	Prepared by:
	Sheet 1 of 3		
	Date	Project Number	
	November 2014	NCEEP # 94151	

Figure 2. Integrated Current Condition Plan View





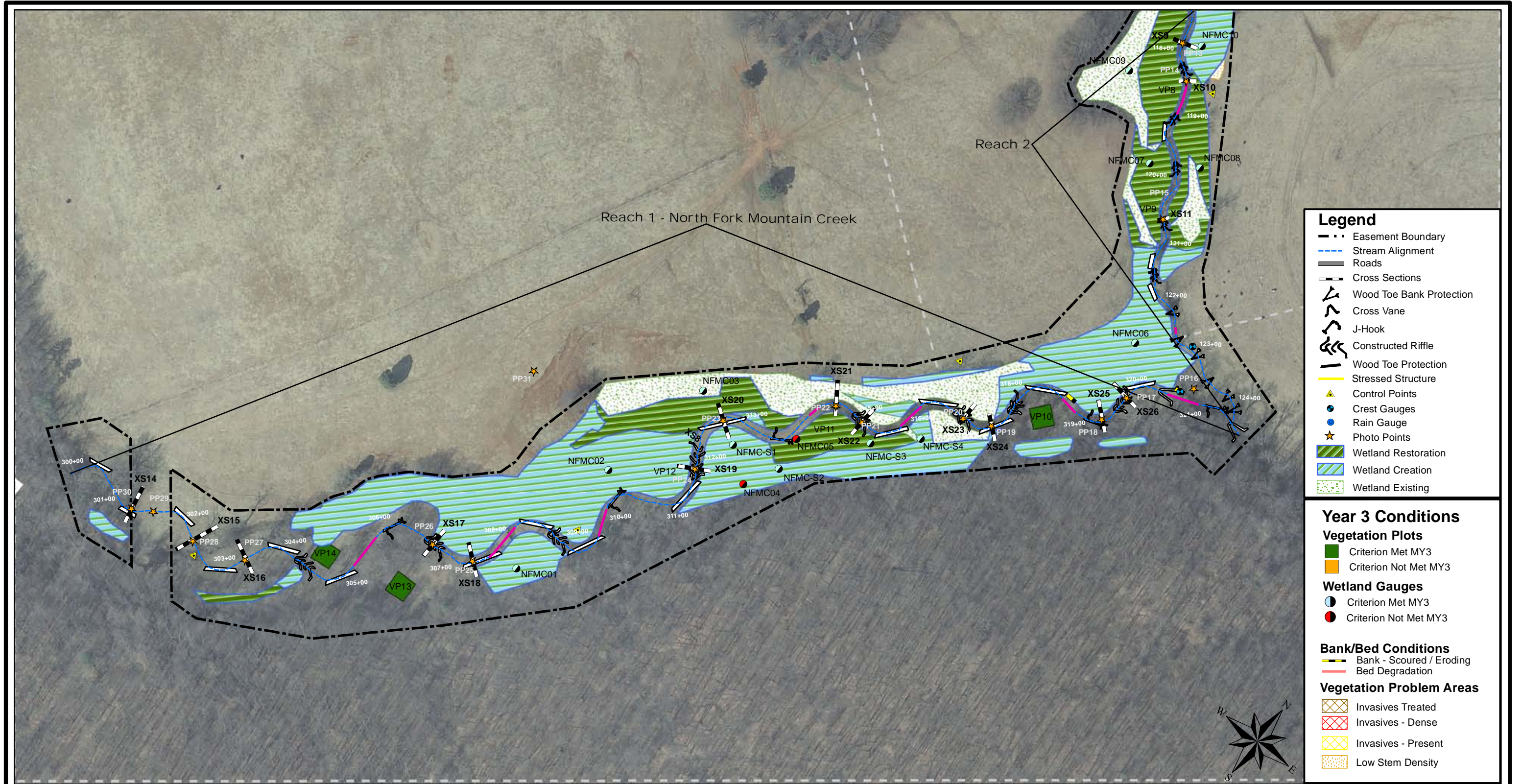
<p>Prepared for</p> 	<p>Project: North Fork Mountain Creek Stream and Wetland Restoration Year 3 Monitoring Catawba County, North Carolina</p> <p>Sheet 2 of 3</p> <p>Date November 2014</p>	<p>Notes: 1) 2010 Aerial Photo 2) Base Map Data Provided by Stantec.</p> <p>Project Number NCEEP # 94151</p>	<p>Prepared by</p> 
---	--	--	--

Figure 2. Integrated Current Condition Plan View





Prepared for	Project: North Fork Mountain Creek Stream and Wetland Restoration	Notes: 1) 2010 Aerial Photo 2) Base Map Data Provided by Stantec.	Prepared by
	Year 3 Monitoring Catawba County, North Carolina Sheet 3 of 3 Date November 2014	Project Number NCEEP # 94151	

Table 4. Problem Areas Table				
North Fork Mountain Creek Stream and Wetland / Project No. 94151				
Reach	STA	Problem Area Type	Feature	Description
1	305+50	Stream	Bed	Degradation
1	308+00	Stream	Bed	Degradation
1	310+00	Stream	Bed	Degradation
1	314+00	Stream	Bed	Degradation
1	315+75	Stream	Bed	Degradation
1	318+50	Stream	Bed/Bank	Degradation/Erosion
1	320+50	Stream	Bed	Degradation
1	320+60	Stream	Bank	Erosion/Scour
2	106+00	Vegetation	Bench	Bare Area
2	107+50	Stream	Bank	Erosion/Scour
2	111+50	Vegetation	Bench	Low Stem Density/Bare Area
2	112+25	Stream	Bank	Erosion/Scour
2	118+00	Vegetation	Bench	Low Stem Density/Bare Area
2	118+50	Stream	Bed	Headcut/Degradation
2	123+25	Stream	Riffle	Degradation
3	201+50	Vegetation	Easement	Exotic Invasive- Treated
3	203+50	Vegetation	Bench	Low Stem Density/Bare Area
4	101+50	Stream	Riffle/Structure	Stressed Structure
4	102+30	Stream	Structure	Stressed Structure

Reach 4 Permanent Photo Points



Reach 4 – Permanent Photo Point 1
Downstream
February 19, 2014



Reach 4 – Permanent Photo Point 2
Downstream
February 19, 2014

Reach 4 Permanent Photo Points



Reach 4 – Permanent Photo Point 3
Downstream
February 19, 2014



Reach 4 – Permanent Photo Point 3
Upstream
February 19, 2014

Reach 3 Permanent Photo Points



Reach 3 – Permanent Photo Point 4
Downstream
February 19, 2014



Reach 3 – Permanent Photo Point 5
Downstream
February 19, 2014

Reach 3 Permanent Photo Points



Reach 3 – Permanent Photo Point 6
Downstream
February 19, 2014



Reach 3 – Permanent Photo Point 6
Upstream
February 19, 2014

Reach 2 Permanent Photo Points



Reach 2 – Permanent Photo Point 7
Downstream
February 19, 2014



Reach 2 – Permanent Photo Point 8
Downstream
February 19, 2014

Reach 2 Permanent Photo Points



Reach 2 – Permanent Photo Point 9
Downstream
February 19, 2014



Reach 2 – Permanent Photo Point 10
Downstream
February 19, 2014

Reach 2 Permanent Photo Points



Reach 2 – Permanent Photo Point 11
Downstream
February 19, 2014



Reach 2 – Permanent Photo Point 12
Downstream
February 19, 2014

Reach 2 Permanent Photo Points



Reach 2 – Permanent Photo Point 13
Downstream
February 19, 2014



Reach 2 – Permanent Photo Point 14
Downstream
February 19, 2014

Reach 2 Permanent Photo Points



Reach 2 – Permanent Photo Point 15
Downstream
February 19, 2014



Reach 2 – Permanent Photo Point 16
North
February 19, 2014

Reach 2 Permanent Photo Points



Reach 2 – Permanent Photo Point 16
Northwest
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 16
Southwest
February 19, 2014



Reach 1 – Permanent Photo Point 17
Downstream
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 18
Downstream
February 19, 2014



Reach 1 – Permanent Photo Point 19
Downstream
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 20
Downstream
February 19, 2014



Reach 1 – Permanent Photo Point 21
Downstream
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 22
Downstream
February 19, 2014



Reach 1 – Permanent Photo Point 23
Downstream
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 24
Downstream
February 19, 2014



Reach 1 – Permanent Photo Point 25
Downstream
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 26
Downstream
February 19, 2014



Reach 1 – Permanent Photo Point 27
Downstream
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 28
Downstream
February 19, 2014



Reach 1 – Permanent Photo Point 29
Downstream
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 29
Upstream
February 19, 2014



Reach 1 – Permanent Photo Point 30
Downstream
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 31
Northeast
February 19, 2014



Reach 1 – Permanent Photo Point 31
Southeast
February 19, 2014

Reach 1 Permanent Photo Points



Reach 1 – Permanent Photo Point 31
South
February 19, 2014

Vegetation Plots



Vegetation Plot 1



Vegetation Plot 2

Vegetation Plots



Vegetation Plot 3



Vegetation Plot 4

Vegetation Plots



Vegetation Plot 5



Vegetation Plot 6

Vegetation Plots



Vegetation Plot 7



Vegetation Plot 8

Vegetation Plots



Vegetation Plot 9



Vegetation Plot 10

Vegetation Plots



Vegetation Plot 11



Vegetation Plot 12

Vegetation Plots



Vegetation Plot 13



Vegetation Plot 14

Representative Photos Documenting Bankfull Event



Reach 2 Sta. 114+75 – Wrack Lines



Reach 1 Sta. 320+75 – Wrack Lines

Representative Photo of Stream and Vegetation Area Requiring Observation



Reach 1 Sta. 305+50 – Riffle Degradation



Reach 2 Sta. 309+50– Riffle Degradation

Representative Photos of Stream and Vegetation Area Requiring Observation



Reach 2 Sta. 118+50—Bed Degradation with Headcut (Looking Downstream)



Reach 2 Sta. 107+50—Bed Degradation with Headcut (Looking Downstream)

Appendix C
Vegetation Plot Data

Table 5. Vegetation Plot Criteria Attainment North Fork Mountain Creek / Project No. 94151		
Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	100%
2	Yes	
3	Yes	
4	Yes	
5	Yes	
6	Yes	
7	Yes	
8	Yes	
9	Yes	
10	Yes	
11	Yes	
12	Yes	
13	Yes	
14	Yes	

Table 6. CVS Vegetation Plot Metadata North Fork Mountain Creek/Project No. 94151	
Report Prepared By	Owen Carson
Date Prepared	8/11/2014 12:44
database name	Equinox_2014_B_NFMC_MY3.mdb
database location	Z:\ES\NRI&M\EBX Monitoring\NF Mountain Creek\NFMC-MY3-2014\Data\Veg
computer name	FIELDTECH3-PC
file size	46088192
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	171300307
project Name	North Fork Mountain Creek
Description	
River Basin	Catawba
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	14

Table 7a. Planted and Total Stem Counts (Species by Plot with Annual Means)
North Fork Mountain Creek/Project No. 94151

		Current Plot Data (MY3 2014)																								
Scientific Name	Common Name	Species Type	Plot 1			Plot 2			Plot 3			Plot 4			Plot 5			Plot 6			Plot 7			Plot 8		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum var. rubrum	Red maple	Tree																								
Alnus serrulata	Hazel alder	Shrub										1	1	2											1	
Betula nigra	River birch	Tree																					4	4	4	
Carpinus caroliniana	American hornbeam	Tree																								
Carpinus caroliniana var. caroliniana	Coastal american hornbeam	Tree																								
Cephalanthus occidentalis	Common buttonbush	Shrub																								
Cornus amomum	Silky dogwood	Shrub	1	1	1				3	3	3															
Diospyros virginiana	Common persimmon	Tree																							3	
Fraxinus pennsylvanica	Green ash	Tree	1	1	1	4	4	4	1	1	1	9	9	9			1	1	1	4	4	4	2	2	2	
Juglans nigra	Black walnut	Tree							3	3	3	1	1	1												
Liquidambar styraciflua	Sweetgum	Tree			1																				31	
Liriodendron tulipifera	Tuliptree	Tree	3	3	3	2	2	2	5	5	5	2	2	2	9	9	9	6	6	6						
Liriodendron tulipifera var. tulipifera	Tulip-tree, Yellow Poplar	Tree																								
Nyssa sylvatica	Blackgum	Tree																								
Platanus occidentalis	American sycamore	Tree	1	1	1	3	3	3	2	2	2	12	12	12	4	4	4	1	1	1	15	15	15	12	12	12
Platanus occidentalis var. occidentalis	Sycamore, Plane-tree	Tree												4											2	
Prunus serotina var. serotina	Black cherry	Tree			1			1																	2	
Quercus	Oak	Tree																								
Quercus alba	White oak	Tree	5	5	5	1	1	1	1	1	1				6	6	6	4	4	4	3	3	3			
Quercus phellos	Willow oak	Tree	1	1	1	7	7	7	6	6	6	6	6	6	4	4	4	5	5	5	8	8	9	6	6	6
Quercus rubra	Northern red oak	Tree	3	3	3	1	1	1							2	2	2	1	1	1	2	2	2			
Quercus rubra var. rubra	Northern red oak	Tree			1																				1	
Rhus	Sumac	shrub																								
Rhus aromatica var. aromatica	Fragrant sumac	Shrub																								
Rhus glabra	Smooth sumac	shrub						1			6						1									
Salix nigra	Black willow	Tree						1						11											3	
Unknown		Shrub or Tree																								
	Stem count		15	15	18	18	18	21	21	21	27	31	31	51	25	25	28	18	18	51	32	32	34	24	24	33
	size (ares)		1			1			1			1			1			1			1			1		
	size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
	Species count		7	7	10	6	6	9	7	7	8	6	6	9	5	5	7	6	6	8	5	5	6	4	4	8
	Stems per ACRE		607.03	607.03	728.43	728.43	728.43	850	849.84	849.84	1092.7	1254.5	1254.5	2063.9	1011.7	1011.7	1133.1	728.43	728.43	2063.9	1295	1295	1375.93	971.25	971.25	1335.5

Appendix D
Stream Geomorphology Data

Table 8. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Sections) North Fork Mountain Creek Stream & Wetland / Project No. 94151 - Reach 1 (2,231 feet)																														
Dimension	Cross-Section 14 Pool						Cross-Section 15 Riffle						Cross-Section 16 Riffle						Cross-Section 17 Riffle						Cross-Section 18 Pool					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	890.9	890.9	890.9	890.9			889.7	889.7	889.7	889.7			889.4	889.4	889.4	889.4			886.6	886.6	886.6	886.6			886.2	886.2	886.2	886.2		
Bankfull Width (ft)	20.6	19.4	18.3	18.4			17.3	16.3	16.2	16.1			19.3	18.6	18.7	18.4			17.5	18.6	19.8	19.4			25.8	27.8	27.2	28.0		
Floodprone Width (ft)	59.3	>150.0	>150.0	>150			100.0	>150.0	>150.0	>150			55.7	>150.0	>150.0	>150			50.3	>150.0	>150.0	>150			53.3	>150.0	>150.0	>150		
Bankfull Mean Depth (ft)	1.2	1.3	1.4	1.3			1.2	1.0	1.0	1.0			1.3	1.2	1.2	1.2			1.4	1.2	1.2	1.2			1.4	1.3	1.3	1.2		
Bankfull Max Depth (ft)	3.1	3.0	3.0	3.1			2.2	2.1	2.2	2.2			2.3	2.2	2.2	2.2			2.3	2.2	2.6	2.8			3.4	3.6	3.5	3.2		
Bankfull Cross Sectional Area (ft ²)	25.6	25.0	25.5	24.7			19.9	17.0	16.7	15.9			25.4	22.4	22.5	21.8			23.9	23.0	23.8	24.0			35.1	36	34	32.2		
Bankfull Width/Depth Ratio	16.6	15.0	13.1	13.7			15.1	15.6	15.7	16.2			14.8	15.4	15.6	15.5			12.7	15.0	16.5	15.7			19.0	21.5	21.7	24.3		
Bankfull Entrenchment Ratio	2.9	7.7	8.2	8.6			5.8	9.2	9.3	9.3			2.9	8.1	8.0	8.2			2.9	8.1	7.6	7.7			2.1	5.4	5.5	5.4		
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Cross Sectional Area between End Pins (ft ²)	-	-	-	83.1			-	-	-	70.4			-	-	-	61.8			-	-	-	67.4			-	-	-	91.6		
d50 (mm)	-	-	-	-			-	-	-	10.0			-	-	-	17.0			-	-	-	18.0			-	-	-	-		

Table 8. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Sections) North Fork Mountain Creek Stream & Wetland / Project No. 94151 - Reach 1 (2,231 feet)																														
Dimension	Cross-Section 19 Riffle						Cross-Section 20 Pool						Cross-Section 21 Pool						Cross-Section 22 Riffle						Cross-Section 23 Riffle					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	883.0	883.0	883.0	883.0			882.6	882.6	882.6	882.6			880.6	880.6	880.6	880.6			880.0	880.0	880.0	880.0			878.2	878.2	878.2	878.2		
Bankfull Width (ft)	21.7	21.5	22.3	22.1			25.3	24.8	25.1	25.3			23.0	21.4	21.0	21.5			20.7	18.2	18.1	18.0			18.6	19.0	19.6	19.6		
Floodprone Width (ft)	100.0	>150.0	>150.0	>150.0			56.1	>150.0	>150.0	>150.0			54.5	>150.0	>150.0	>150.0			54.0	>150.0	>150.0	>150.0			39.5	>150.0	>150.0	>150.0		
Bankfull Mean Depth (ft)	1.2	1.1	1.0	1.0			1.5	1.2	1.1	1.1			1.5	1.5	1.5	1.3			1.1	1.1	1.1	1.1			1.2	1.1	1.1	1.0		
Bankfull Max Depth (ft)	2.1	2.1	2.1	2.2			3.3	2.9	3.0	3.0			3.4	3.4	4.1	3.1			2.2	1.9	2.2	2.3			2.4	2.3	2.5	2.5		
Bankfull Cross Sectional Area (ft ²)	25.8	23.9	23.3	22.5			36.7	30.3	28.8	28.3			34.2	31.5	31.9	27.8			22.0	19.6	19.6	19.9			22.7	21.0	21.0	19.8		
Bankfull Width/Depth Ratio	18.2	19.4	21.4	21.7			17.4	20.3	22.0	22.6			15.5	14.5	13.9	16.6			19.6	17.0	16.7	16.3			15.2	17.3	18.3	19.4		
Bankfull Entrenchment Ratio	4.6	7.0	6.7	6.8			2.2	6.0	6.0	5.9			2.4	7.0	7.1	7.0			2.6	8.2	8.3	8.3			2.1	7.9	7.6	7.7		
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Cross Sectional Area between End Pins (ft ²)	-	-	-	58.9			-	-	-	79.0			-	-	-	70.4			-	-	-	56.6			-	-	-	66.2		
d50 (mm)	-	-	-	12.0			-	-	-	-			-	-	-	-			-	-	-	29.0			-	-	-	8.9		

Table 8. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Sections) North Fork Mountain Creek Stream & Wetland / Project No. 94151 - Reach 1 (2,231 feet)																		
Dimension	Cross-Section 24 Pool						Cross-Section 25 Pool						Cross-Section 26 Riffle					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	877.8	877.8	877.8	877.8			876.2	876.2	876.2	876.2			875.2	875.2	875.2	875.2		
Bankfull Width (ft)	18.6	18.2	18.6	18.1			18.7	19.4	18.9	19.6			18.8	19.5	19.9	20.5		
Floodprone Width (ft)	42.3	>150.0	>150.0	>150.0			50.3	>150.0	>150.0	>150.0			50.1	>150.0	>150.0	>150.0		
Bankfull Mean Depth (ft)	1.1	1.1	1.1	1.1			1.4	1.4	1.3	1.2			1.0	1.0	1.0	1.0		
Bankfull Max Depth (ft)	2.5	2.5	2.7	2.6			3.0	3.2	3.0	2.9			1.6	2.5	2.3	2.7		
Bankfull Cross Sectional Area (ft ²)	21.2	20.7	20.5	19.4			26.2	26.3	25.3	24.4			19.4	19.8	19.9	19.6		
Bankfull Width/Depth Ratio	16.3	16.0	16.8	16.9			13.3	14.2	14.1	15.7			18.2	19.3	19.9	21.4		
Bankfull Entrenchment Ratio	2.3	8.2	8.1	8.3			2.7	7.7	7.9	7.7			2.7	7.7	7.5	7.3		
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Cross Sectional Area between End Pins	-	-	-	76.5			-	-	-	73.3			-	-	-	83.6		
d50 (mm)	-	-	-	-			-	-	-	-			-	-	-	29.0		

Table 8. Monitoring Data - Dimensional Morphology Summary

(Dimensional Parameters - Cross-Sections)

North Fork Mountain Creek Stream & Wetland / Project No. 94151 - Reach 2 (1,756 feet)

Dimension	Cross-Section 3 Riffle						Cross-Section 4 Pool						Cross-Section 5 Pool						Cross-Section 6 Riffle						Cross-Section 7 Pool					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	901.2	901.2	901.2	901.2			900.1	900.1	900.1	900.1			892.6	892.6	892.6	892.6			892.6	892.5	892.5	892.5			889.4	889.4	889.4	889.4		
Bankfull Width (ft)	12.8	14.4	14.5	14.0			10.9	9.3	10.8	10.3			9.6	9.8	10.2	10.0			12.0	11.4	12.1	11.6			15.0	12.7	13.6	13.5		
Floodprone Width (ft)	22.5	>25	>25	>23.1			22.2	>20	>20	>20			50.9	>50	>50	>50			45.8	>40	>40	>46.2			45.4	>40.0	>40.0	>45		
Bankfull Mean Depth (ft)	0.8	0.8	0.8	0.8			0.8	0.9	1.0	1.1			1.2	1.2	1.1	1.2			0.7	0.7	0.7	0.8			0.9	0.9	0.9	0.9		
Bankfull Max Depth (ft)	1.6	1.7	1.7	1.9			1.6	1.5	1.8	2.4			2.3	2.0	2.0	2.5			1.6	1.7	1.7	1.9			2.6	2.2	2.2	2.0		
Bankfull Cross Sectional Area (ft ²)	10.1	11.5	11.7	11.8			9.2	8.0	10.5	11.7			11.0	11.3	11.3	12.4			8.7	8.5	8.8	8.8			13.7	11.8	12.8	12.5		
Bankfull Width/Depth Ratio	16.2	18.0	17.9	16.5			13.0	10.9	11.2	9.1			8.3	8.4	9.1	8.1			16.6	15.2	16.5	15.3			16.5	13.6	14.5	14.5		
Bankfull Entrenchment Ratio	1.0	1.6	1.6	1.7			2.0	2.2	1.9	2.0			5.3	5.2	5.0	5.0			3.8	4.1	3.8	4.0			3.0	3.6	3.4	3.4		
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Cross Sectional Area between End Pins (ft ²)	-	-	-	64.6			-	-	-	40.9			-	-	-	76.8			-	-	-	8.8			-	-	-	73.1		
d50 (mm)	-	-	-	6.9			-	-	-	-			-	-	-	-			-	-	-	11.0			-	-	-	-		

N/A - Item does not apply.
 - Information unavailable.

Table 8. Monitoring Data - Dimensional Morphology Summary

(Dimensional Parameters - Cross-Sections)

North Fork Mountain Creek Stream & Wetland / Project No. 94151 - Reach 2 (1,756 feet)

Dimension	Cross-Section 8 Riffle						Cross-Section 9 Riffle						Cross-Section 10 Pool						Cross-Section 11 Riffle					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	888.9	888.9	888.9	888.9			883.4	883.4	883.4	883.4			882.8	882.8	882.8	882.8			878.7	878.7	878.7	878.7		
Bankfull Width (ft)	11.9	11.4	12.3	11.4			15.4	12.8	13.0	13.8			13.7	13.3	13.0	12.4			11.3	9.0	7.8	6.3		
Floodprone Width (ft)	50.0	>40.0	>40	>40			40.0	>40	>40	>38.7			30.0	>150.0	>150.0	>200			30.0	>150.0	>150.0	>150		
Bankfull Mean Depth (ft)	0.9	0.8	0.8	0.8			0.5	0.5	0.5	0.5			0.6	0.6	0.7	0.7			0.7	0.5	0.6	0.7		
Bankfull Max Depth (ft)	1.6	1.7	1.7	1.9			1.1	1.1	1.5	1.5			1.9	1.4	1.8	1.8			1.2	1.0	1.2	1.2		
Bankfull Cross Sectional Area (ft ²)	10.2	9.1	9.4	8.9			8.1	6.1	6.6	7.4			8.8	8.1	8.6	8.6			7.4	4.7	4.9	4.3		
Bankfull Width/Depth Ratio	13.9	14.3	16.0	14.7			29.0	26.8	25.9	25.9			21.3	21.8	19.8	17.8			17.1	17.0	12.4	9.1		
Bankfull Entrenchment Ratio	4.2	3.5	3.3	3.5			2.6	3.0	3.0	2.8			2.2	11.3	15.3	16.2			2.7	16.7	25.7	24.0		
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Cross Sectional Area between End Pins (ft ²)	-	-	-	30.4			-	-	-	46.8			-	-	-	28.1			-	-	-	15.0		
d50 (mm)	-	-	-	0.062			-	-	-	17.0			-	-	-	-			-	-	-	12.0		

- Information unavailable.
 *Elevation data was offset to match MY2 data

Table 8. Monitoring Data - Dimensional Morphology Summary
(Dimensional Parameters - Cross-Sections)
North Fork Mountain Creek Stream & Wetland / Project No. 94151 - Reach 3 (698 feet)

Dimension	Cross-Section 12 Riffle						Cross-Section 13 Pool					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	918.0	918.0	918.0	918.0			916.8	916.8	916.8	916.8		
Bankfull Width (ft)	7.2	8.3	7.9	7.5			8.1	7.6	8.6	8.8		
Floodprone Width (ft)	22.8	>30	>30	>20			33.2	>30	>30	>30		
Bankfull Mean Depth (ft)	0.6	0.5	0.5	0.5			1.1	1.2	1.1	1.0		
Bankfull Max Depth (ft)	1.0	0.9	0.9	0.8			2.2	2.1	2.0	1.9		
Bankfull Cross Sectional Area (ft ²)	4.2	3.8	3.8	3.5			9.1	9.4	9.4	9.0		
Bankfull Width/Depth Ratio	12.5	17.9	16.4	15.9			7.2	6.1	7.9	8.6		
Bankfull Entrenchment Ratio	3.2	2.7	2.8	2.8			4.1	4.4	3.9	3.8		
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Cross Sectional Area between End Pins (ft ²)	-	-	-	45.0			-	-	-	60.1		
d50 (mm)	-	-	-	0.062			-	-	-	-		

- Information unavailable.

*Elevation data was offset to match MY2 data

Table 8. Monitoring Data - Dimensional Morphology Summary
(Dimensional Parameters - Cross-Sections)
North Fork Mountain Creek Stream & Wetland / Project No. 94151 - Reach 4 (614 feet)

Dimension	Cross-Section 1 Riffle						Cross-Section 2 Pool					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	919.6	919.6	919.6	919.6			917.5	917.5	917.5	917.5		
Bankfull Width (ft)	7.8	8.4	8.4	8.5			7.1	10.2	10.8	8.1		
Floodprone Width (ft)	50.0	>40.0	>40.0	>40.0			34.2	>40.0	>40	24.3		
Bankfull Mean Depth (ft)	0.6	0.5	0.4	0.4			1.5	1.3	1.0	0.8		
Bankfull Max Depth (ft)	0.9	0.8	0.6	0.8			2.1	2.1	2	1.5		
Bankfull Cross Sectional Area (ft ²)	4.7	4.2	3.1	3.5			10.6	13.6	10.5	9.1		
Bankfull Width/Depth Ratio	12.8	16.5	22.8	20.3			4.8	7.7	11.2	12.9		
Bankfull Entrenchment Ratio	6.4	5.0	5.0	5.0			4.8	2.4	2.2	2.2		
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Cross Sectional Area between End Pins (ft ²)	-	-	-	12.5			-	-	-	52.6		
d50 (mm)	-	-	-	0.062			-	-	-	-		

- Information unavailable.

*Elevation data was offset to match MY2 data

Table 9. North Fork Mountain Creek Stream & Wetland / Project No.94151					
Bank Pin Arrays					
Cross Section #	Length of Exposed Pin (mm)			Rate	
	Upstream	At Cross Section	Downstream	mm/yr	ft/yr
2	0 ^B	0 ^B	0 ^B	0	0.00
4	-	0 ^B	5	0	0.01
5	70	14	9	31	0.10
7	0 ^B	0 ^B	0 ^B	0	0.00
10	0 ^B	0 ^B	M	0	0.00
13	0 ^B	0 ^B	0 ^B	0	0.00
14	0 ^B	0 ^B	M	0	0.00
18	0 ^B	0 ^B	0 ^B	0	0.00
20 (Lower Transect)	0 ^B	0 ^B	0 ^B	0	0.00
20 (Upper Transect)	50	0	54	35	0.11
21	0 ^B	9	0 ^B	3	0.01
24	0 ^B	0 ^B	0 ^B	0	0.00
25	-	0 ^B	0 ^B	0	0.00

- Pin not installed due to constraints in bank.

^B Buried with soft accretions on bank.

M - Missing

Cross Section 1 Reach 4 – Riffle

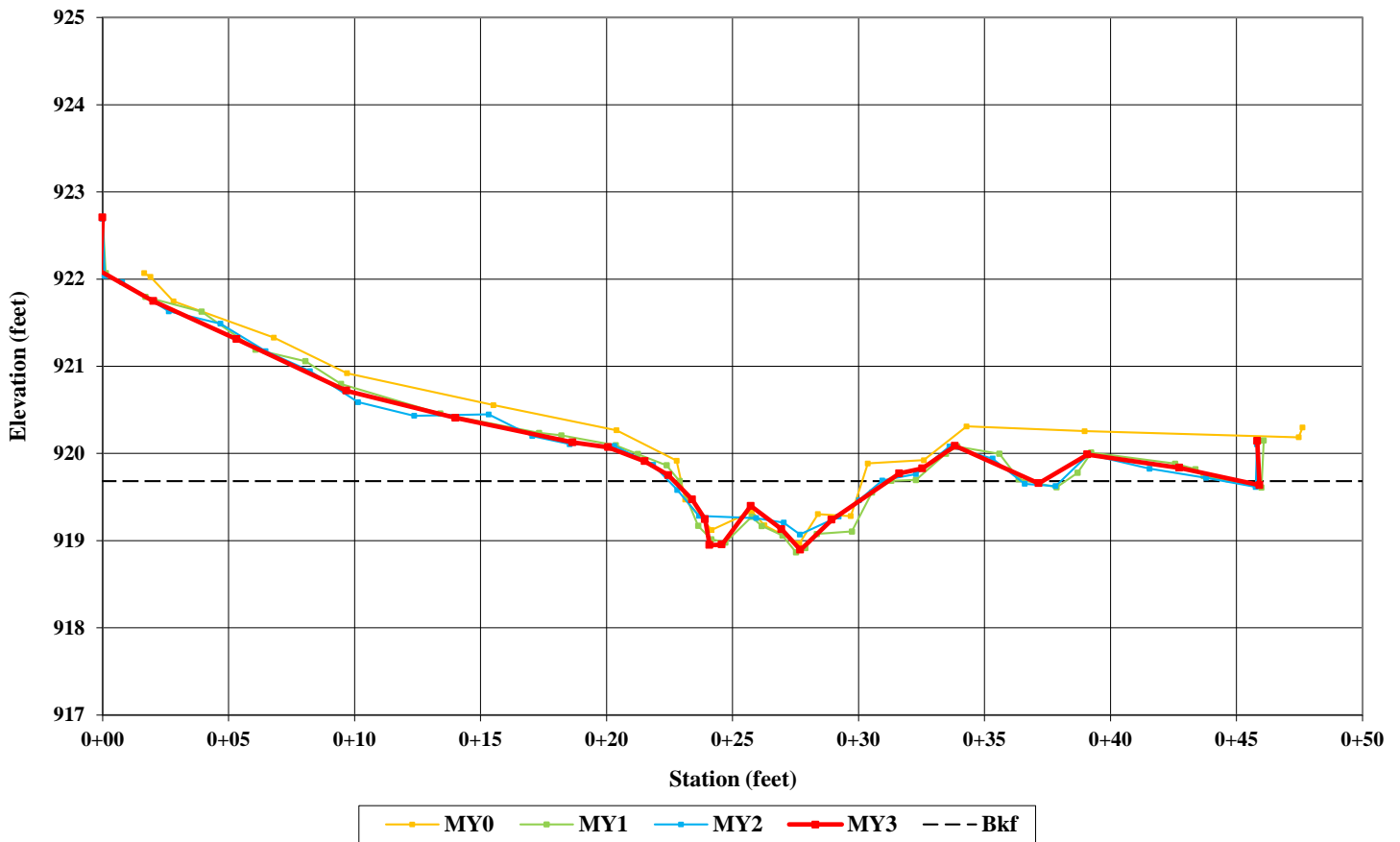


Left Bank Descending



Right Bank Descending

Cross Section 1 Reach 4 - Riffle Station 101+45



Cross Section 2 Reach 4 – Pool

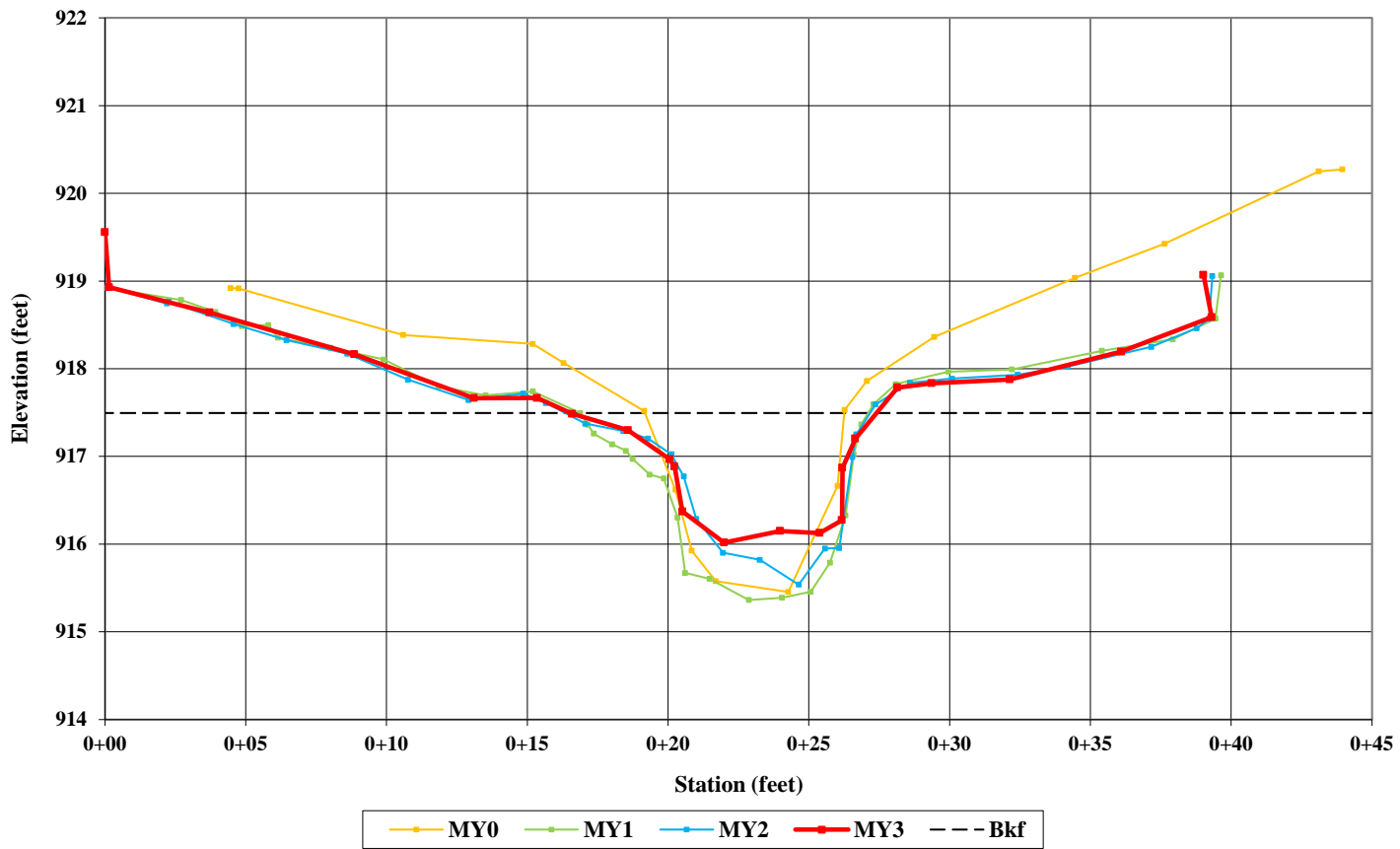


Left Bank Descending



Right Bank Descending

Cross Section 2
Reach 4 - Pool
Station 102+04



Cross Section 3 Reach 2 – Riffle

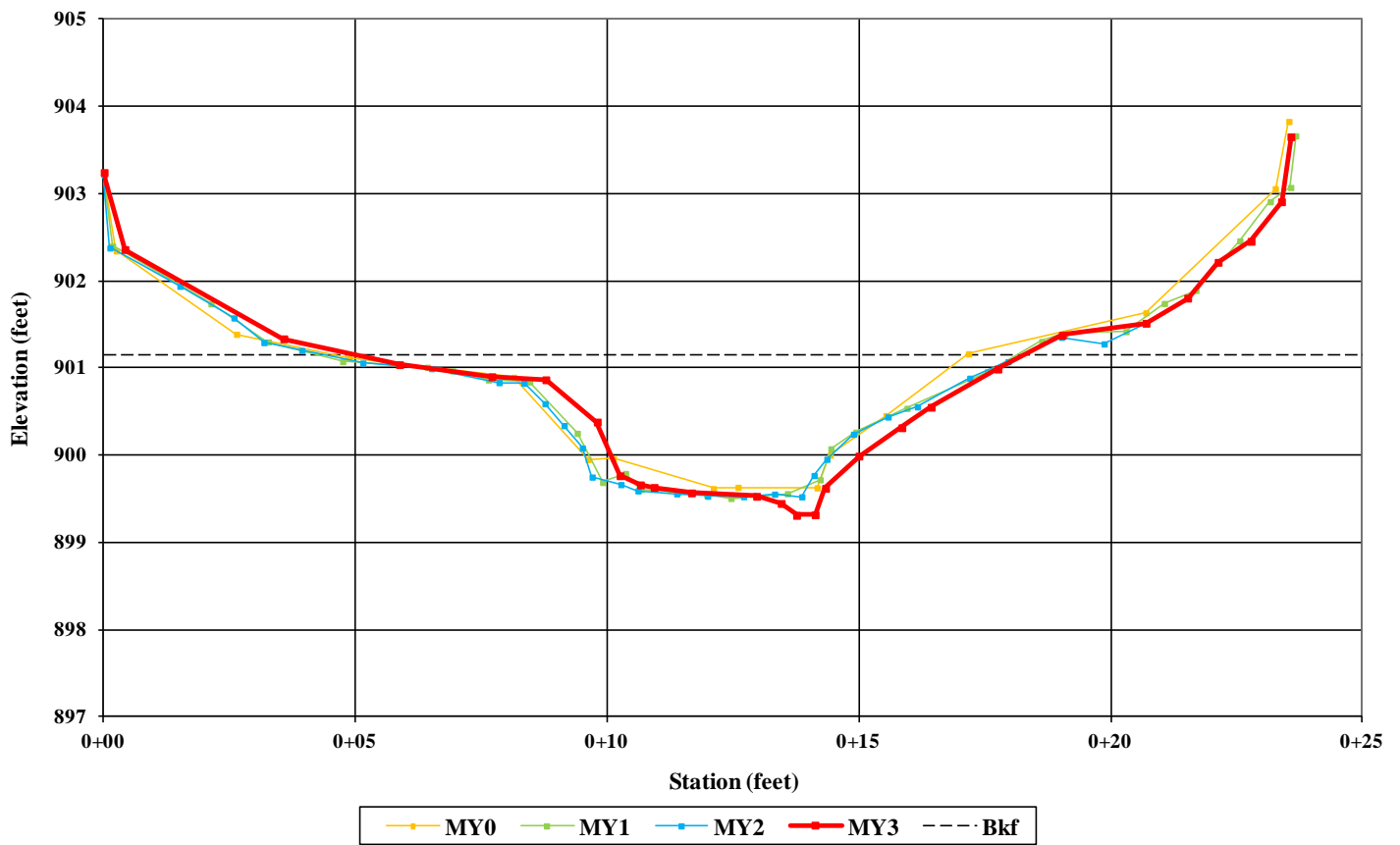


Left Bank Descending



Right Bank Descending

Cross Section 3
Reach 2 - Riffle
Station 107+28



Cross Section 4 Reach 2 – Pool

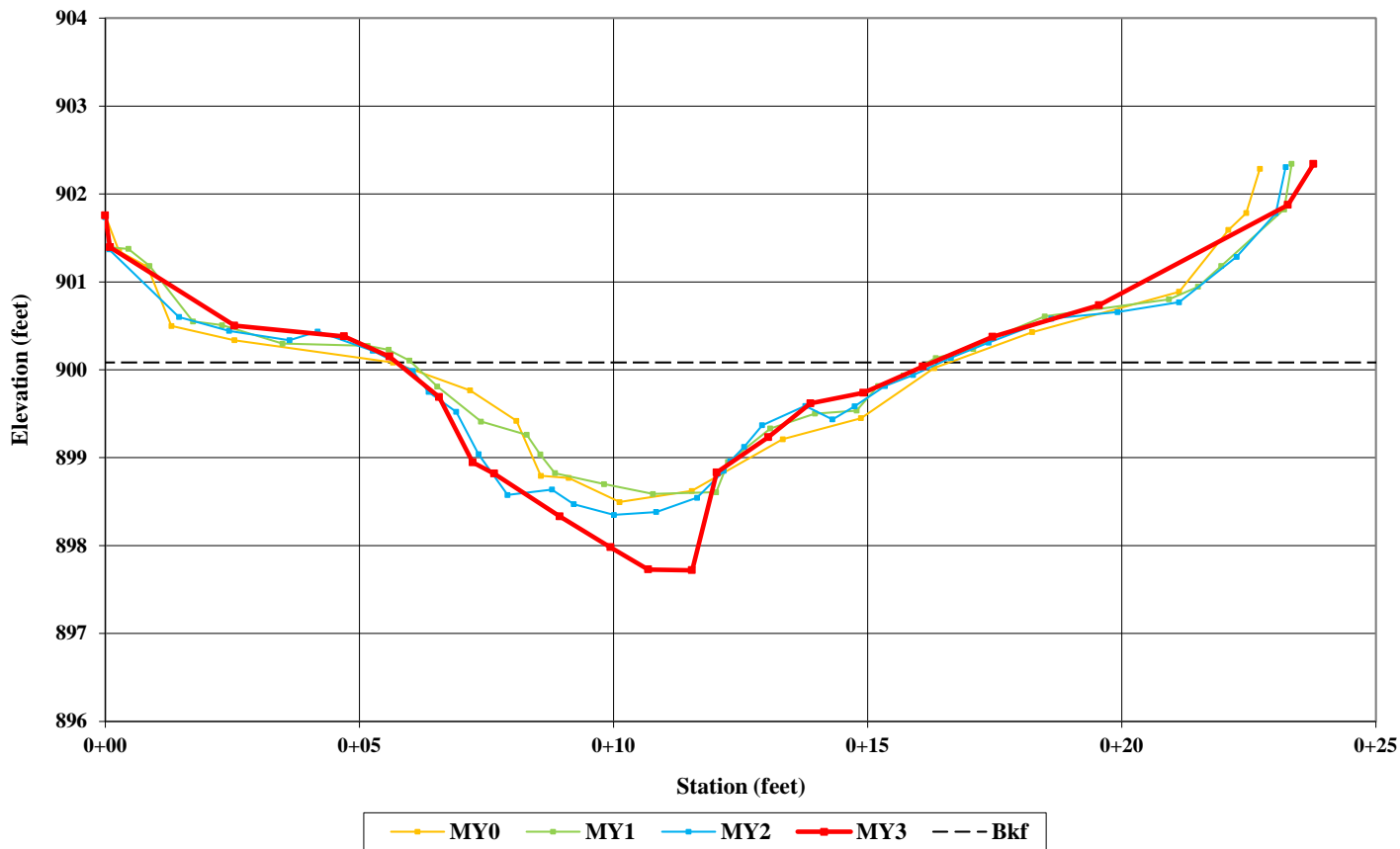


Left Bank Descending



Right Bank Descending

Cross Section 4
Reach 2 - Pool
Station 107+60



Cross Section 5 Reach 2 – Pool

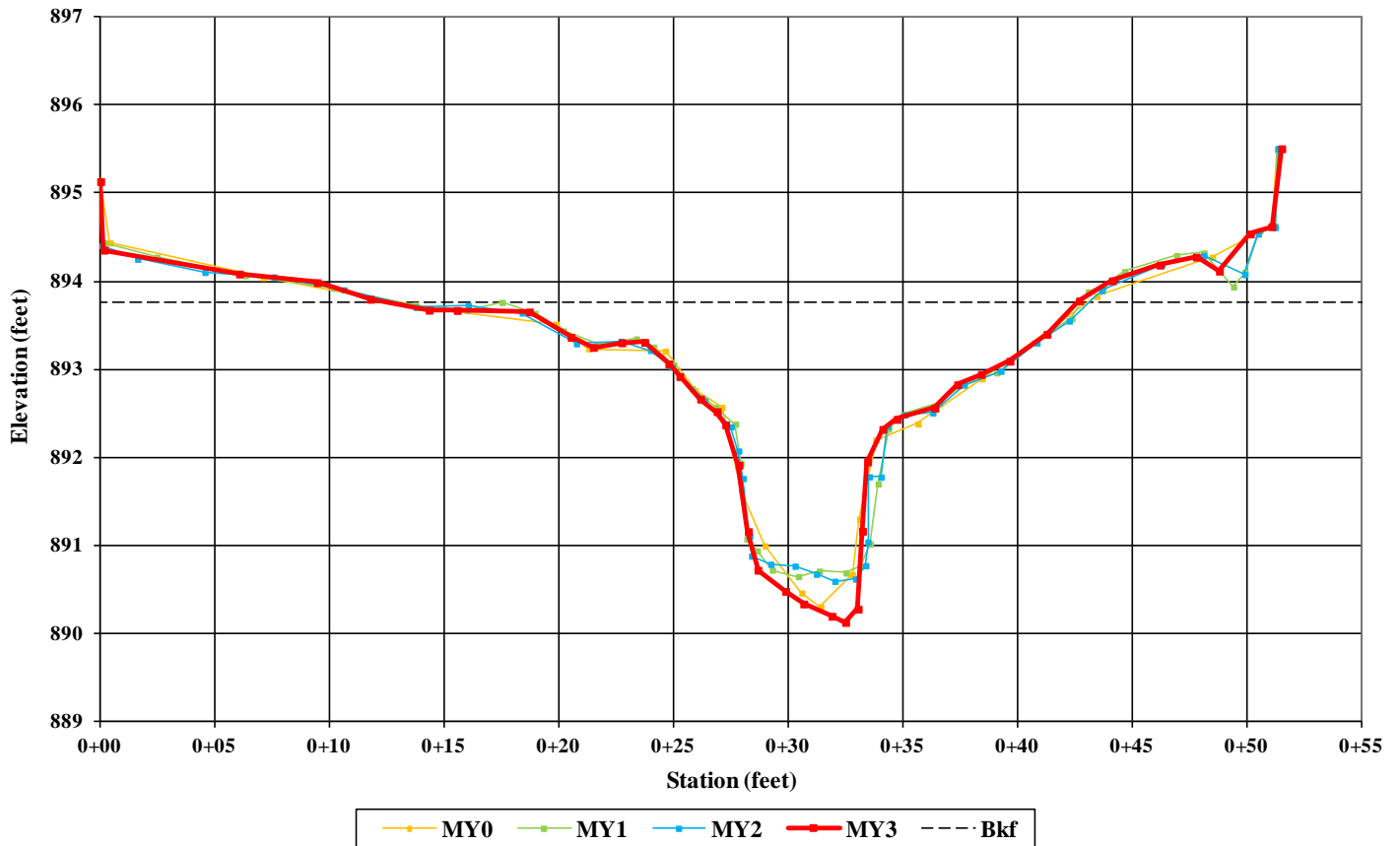


Left Bank Descending



Right Bank Descending

Cross Section 5
Reach 2 - Pool
Station 112+05



Cross Section 6 Reach 2 – Riffle

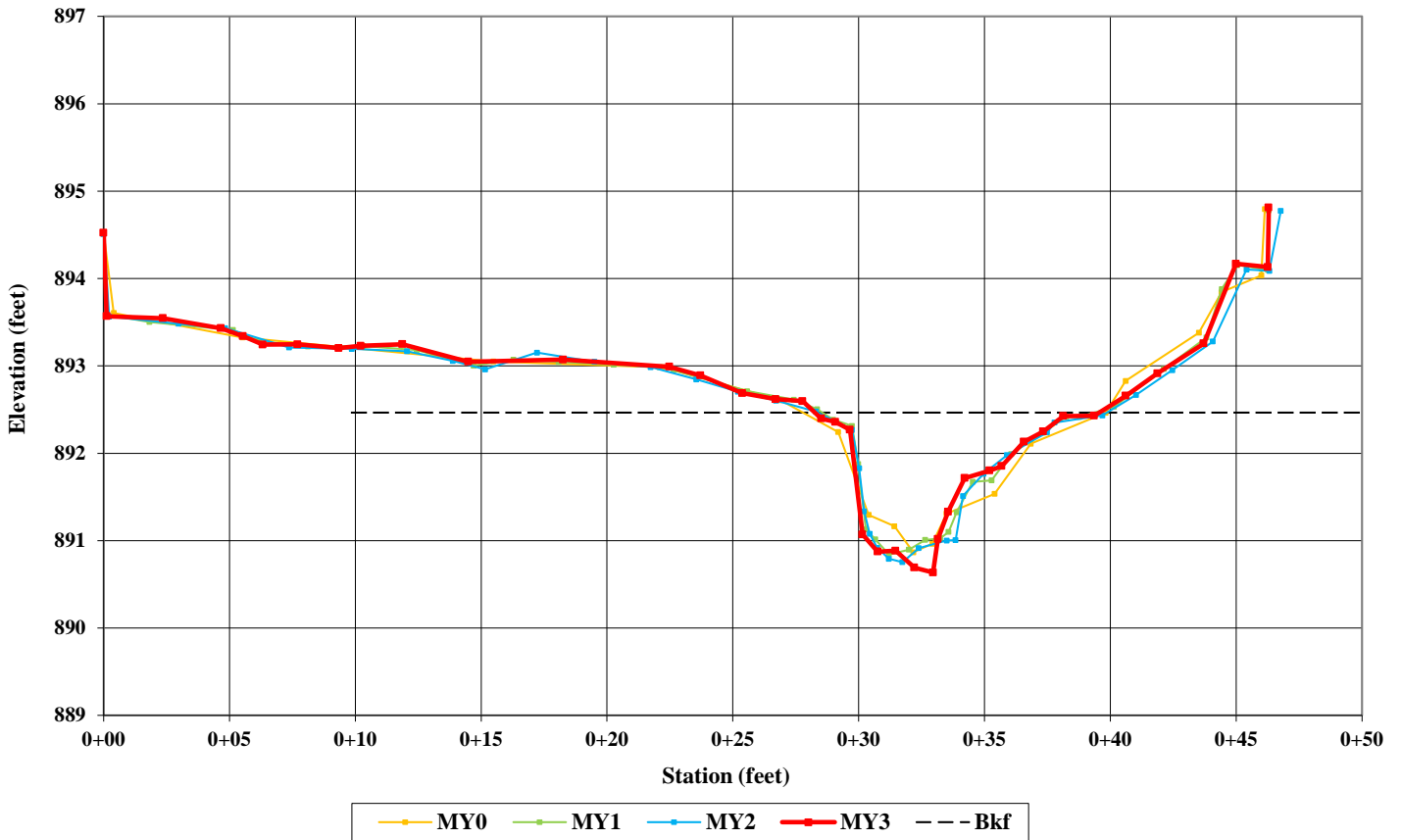


Left Bank Descending



Right Bank Descending

Cross Section 6
Reach 2 - Riffle
Station 112+22



Cross Section 7 Reach 2 – Pool

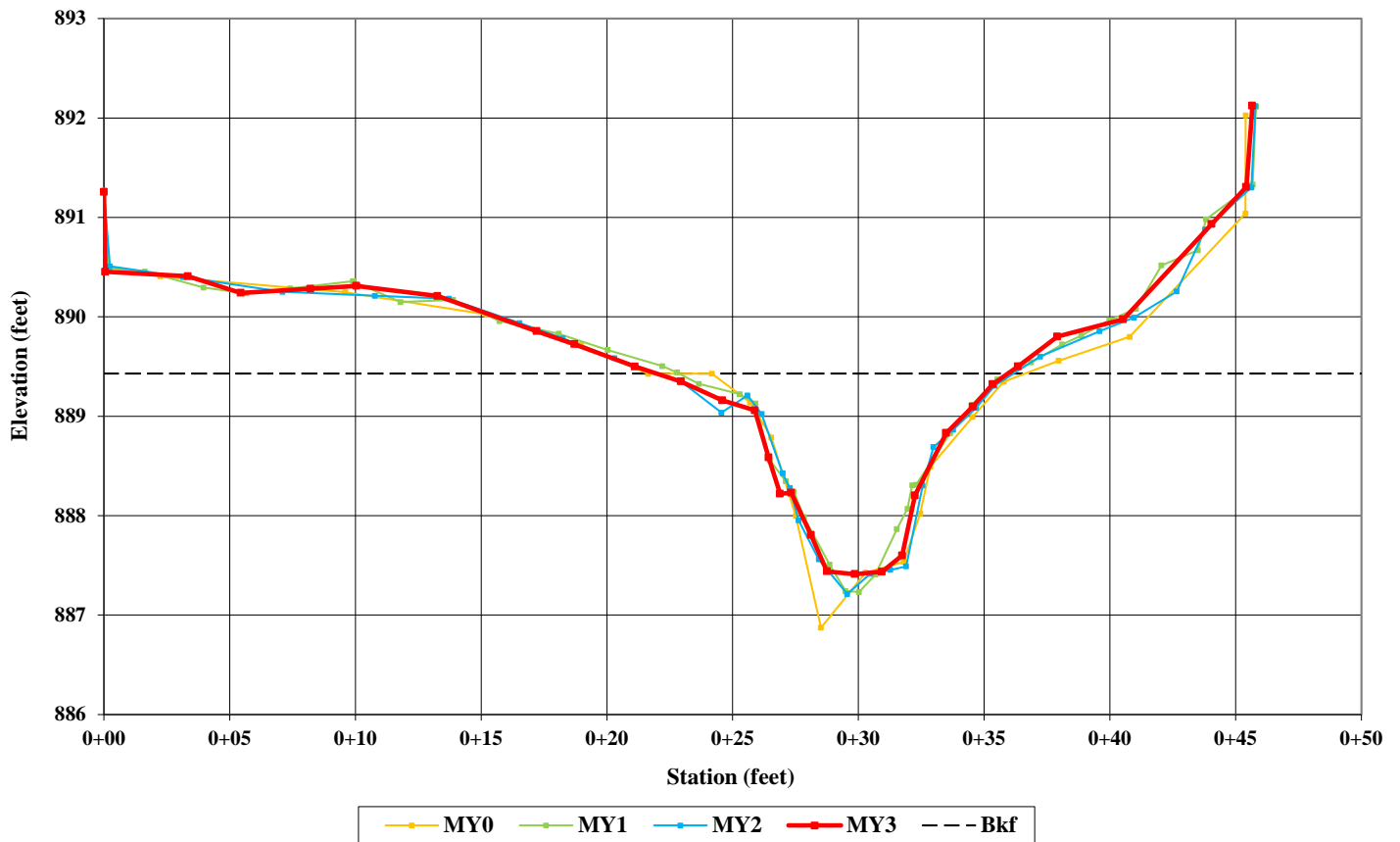


Left Bank Descending



Right Bank Descending

Cross Section 7
Reach 2 - Pool
Station 114+55



Cross Section 8 Reach 2 – Riffle

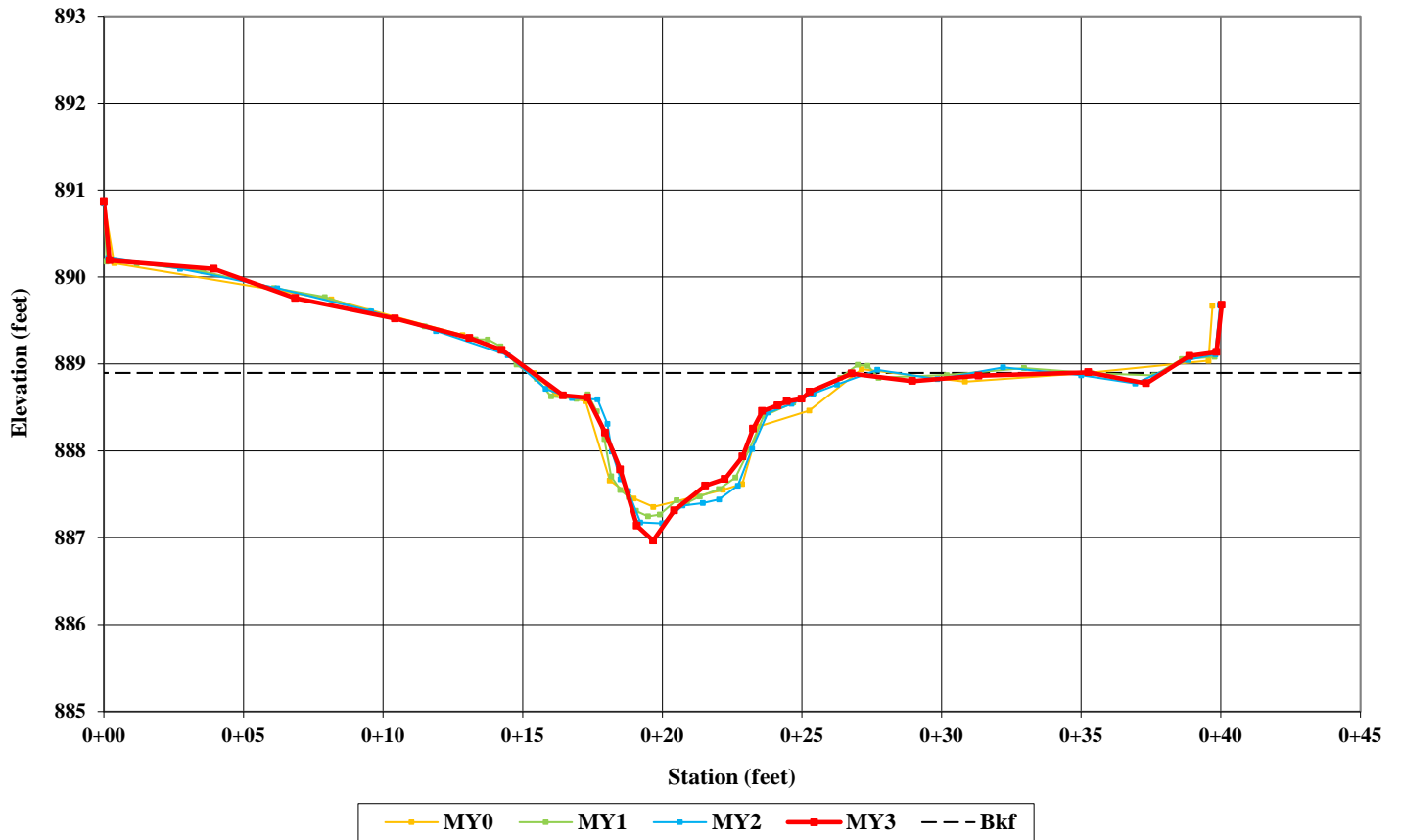


Left Bank Descending



Right Bank Descending

Cross Section 8 Reach 2 - Riffle Station 115+16



Cross Section 9 Reach 2 – Riffle

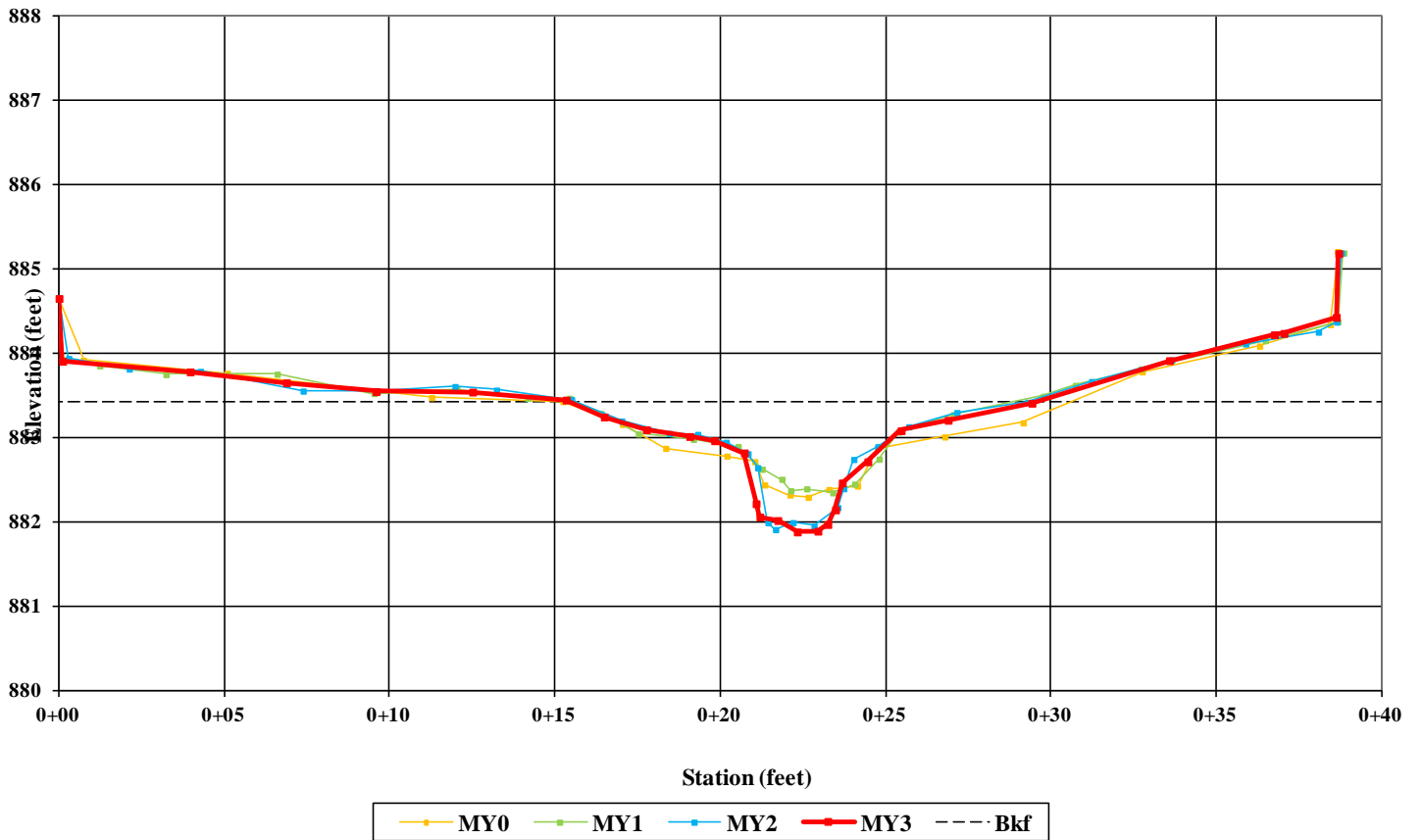


Left Bank Descending



Right Bank Descending

Cross Section 9
Reach 2 - Riffle
Station 117+94



Cross Section 10 Reach 2 – Pool

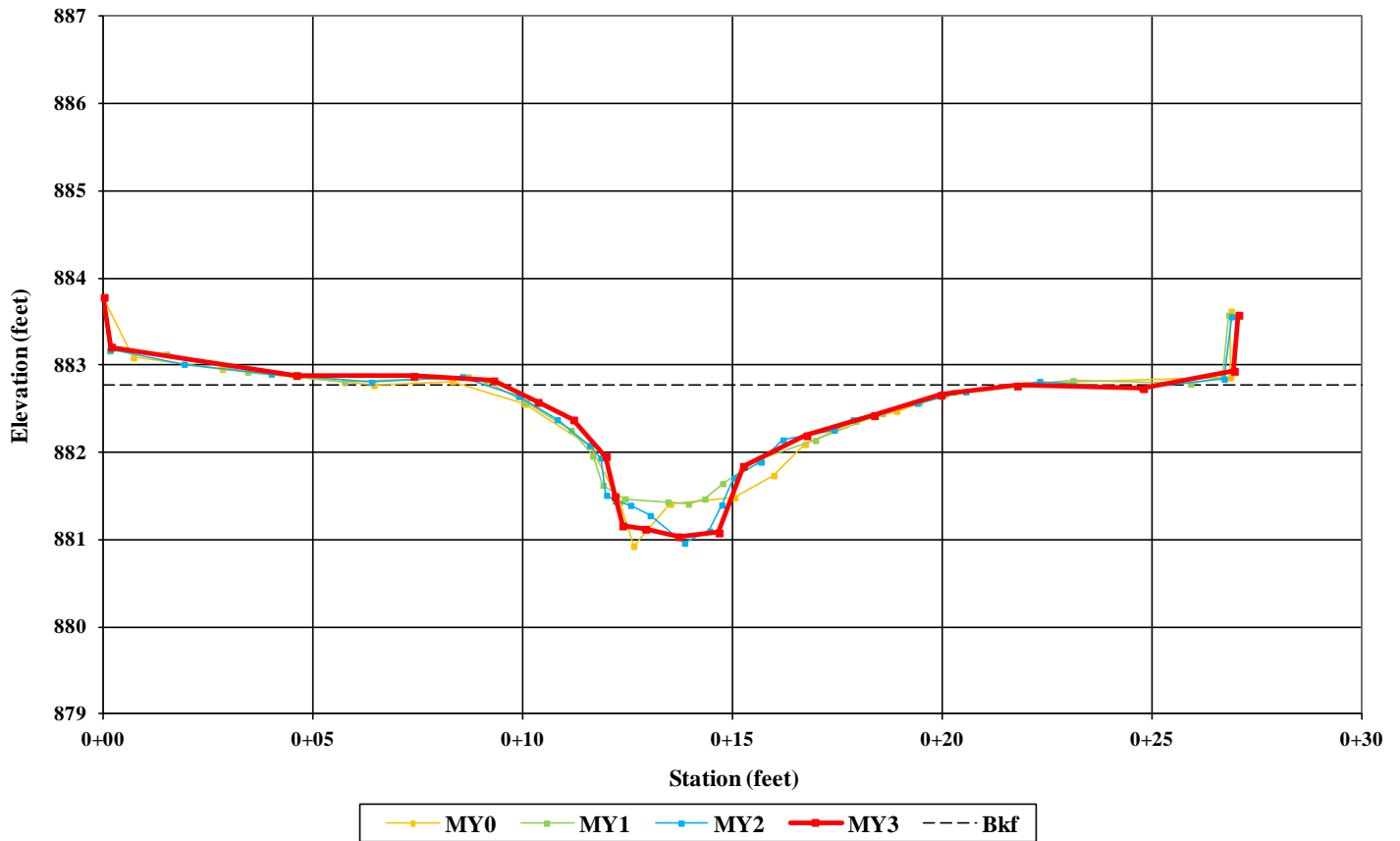


Left Bank Descending



Right Bank Descending

Cross Section 10
Reach 2 - Pool
Station 118+53



Cross Section 11 Reach 2 – Riffle

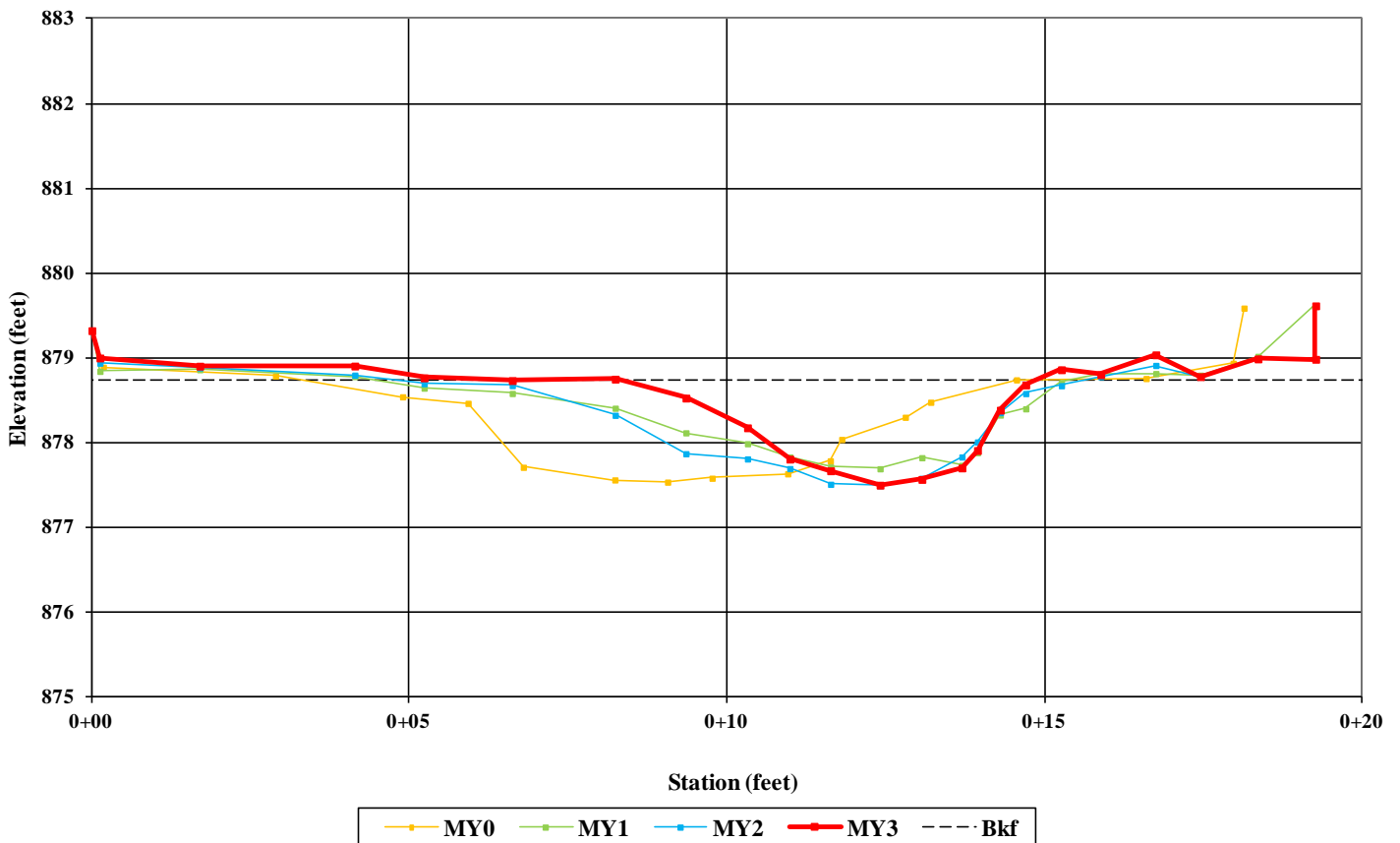


Left Bank Descending



Right Bank Descending

Cross Section 11
Reach 2 - Riffle
Station 120+73



*The shift represented in the above figure is due to an inconsistency in surveying the correct pins between monitoring years.

Cross Section 12 Reach 3 – Riffle

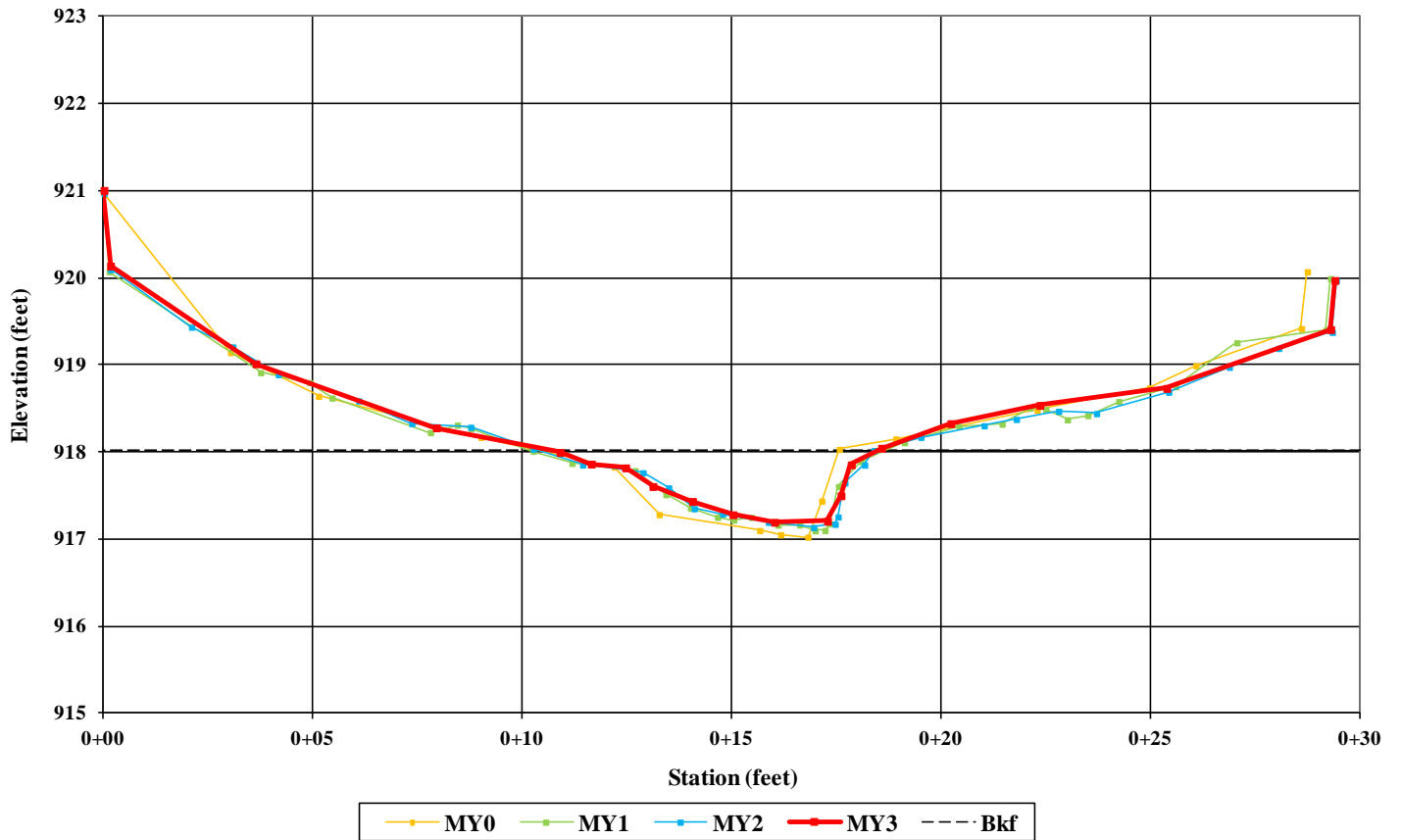


Left Bank Descending



Right Bank Descending

Cross Section 12 Reach 3 - Riffle Station 203+75



Cross Section 13 Reach 3 – Pool

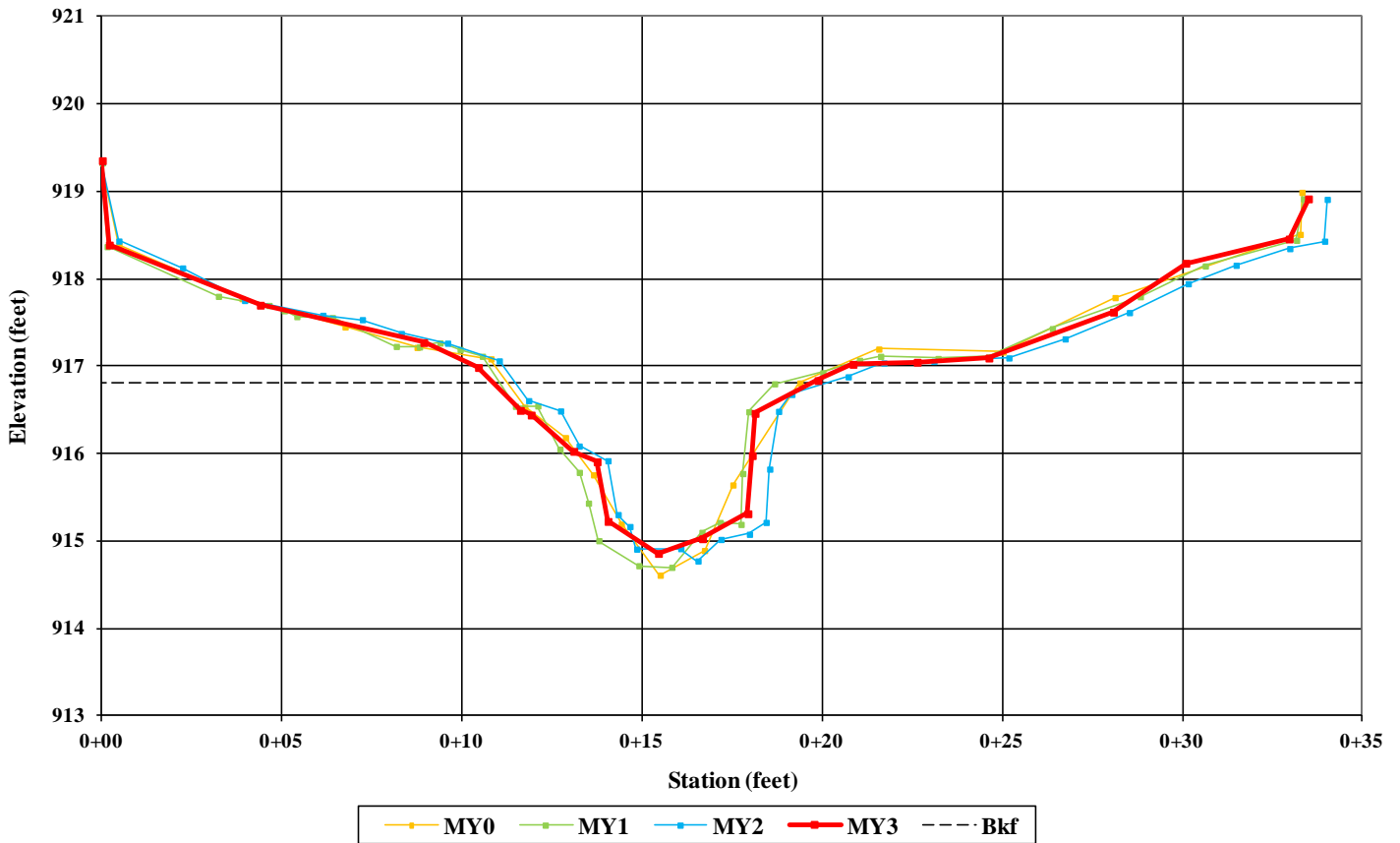


Left Bank Descending



Right Bank Descending

Cross Section 13 Reach 3 - Pool Station 204+01



Cross Section 14 Reach 1 – Pool

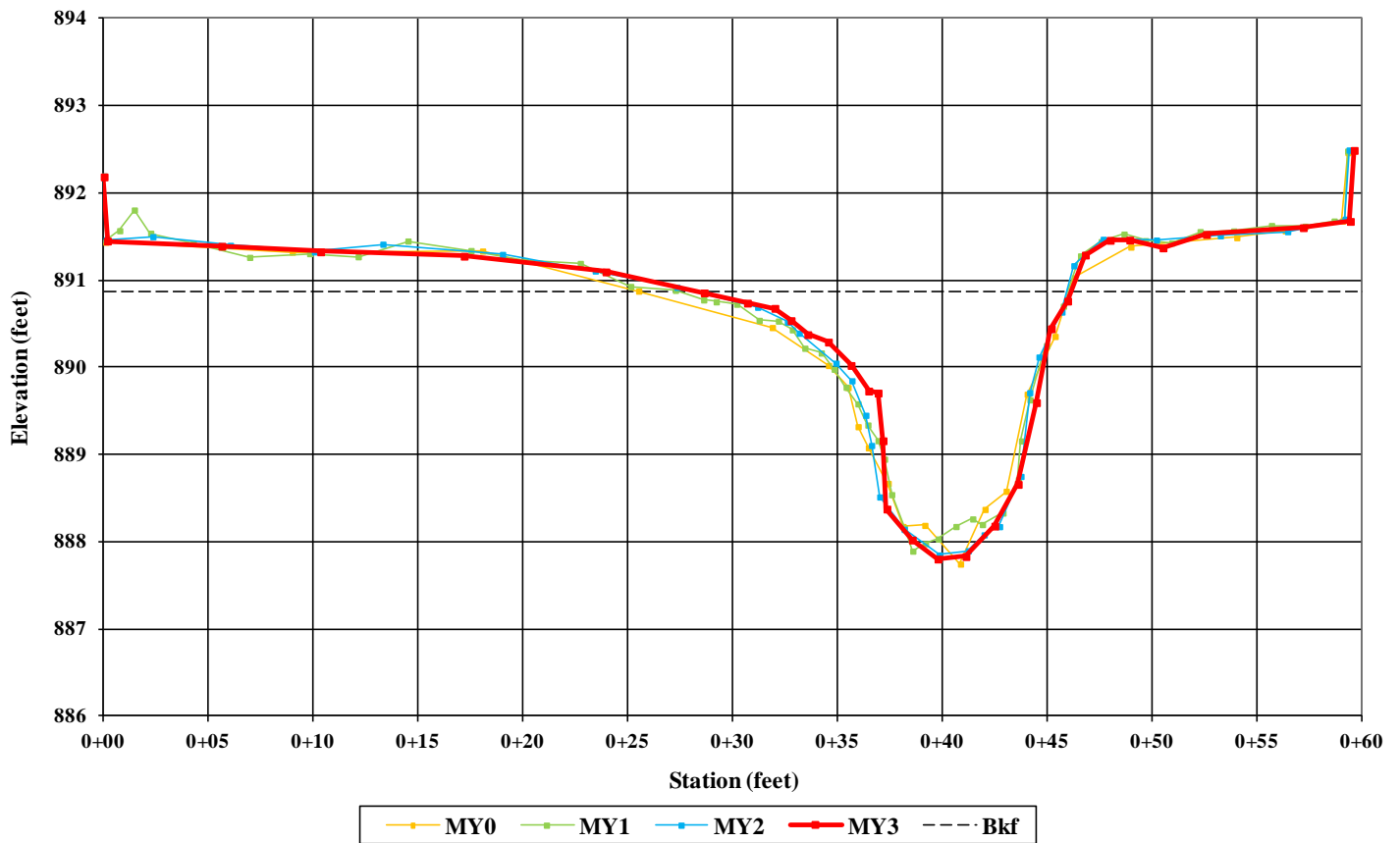


Left Bank Descending



Right Bank Descending

Cross Section 14
Reach 1 - Pool
Station 301+18



Cross Section 15 Reach 1 – Riffle

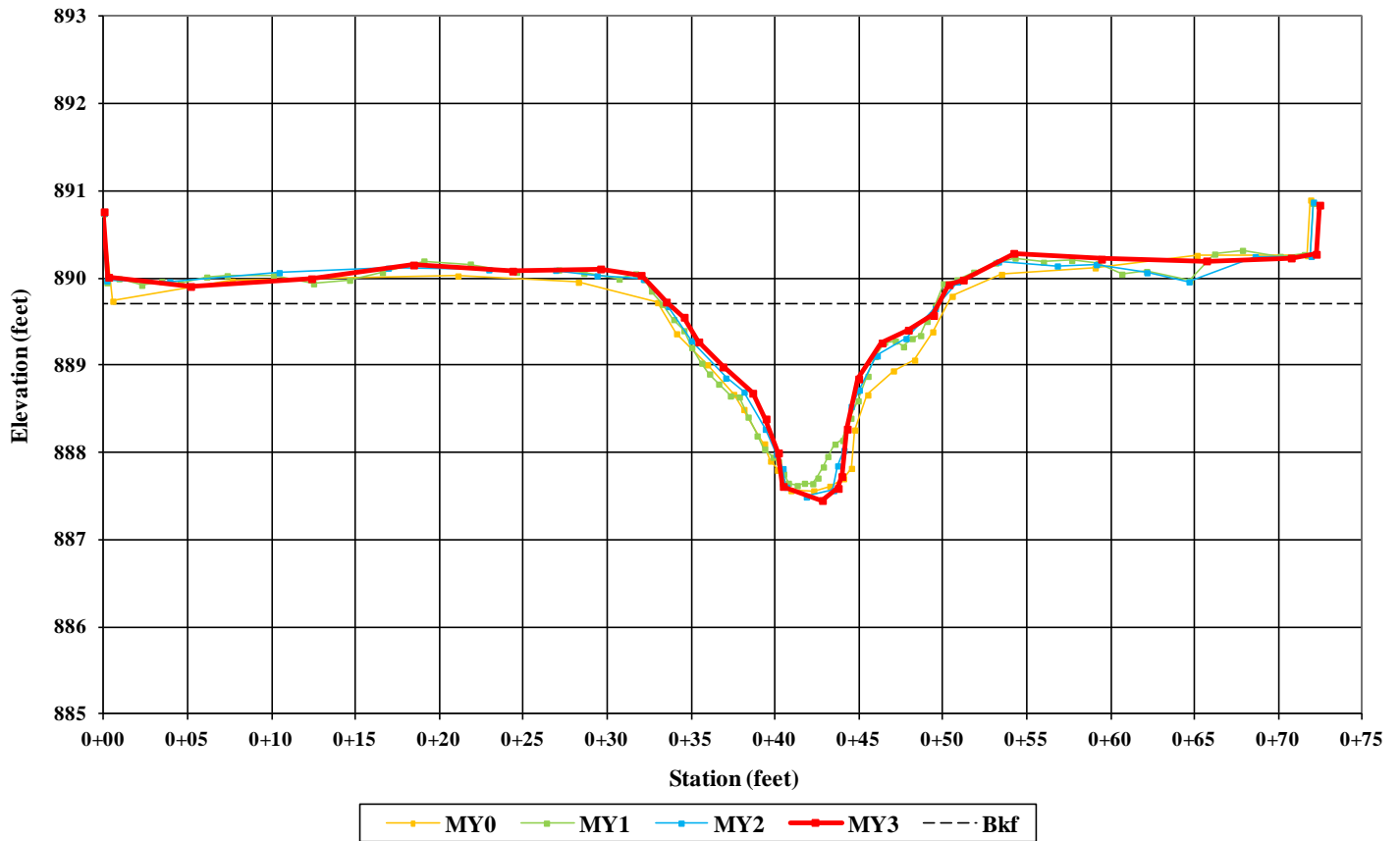


Left Bank Descending



Right Bank Descending

Cross Section 15
Reach 1 - Riffle
Station 302+33



Cross Section 16 Reach 1 – Riffle

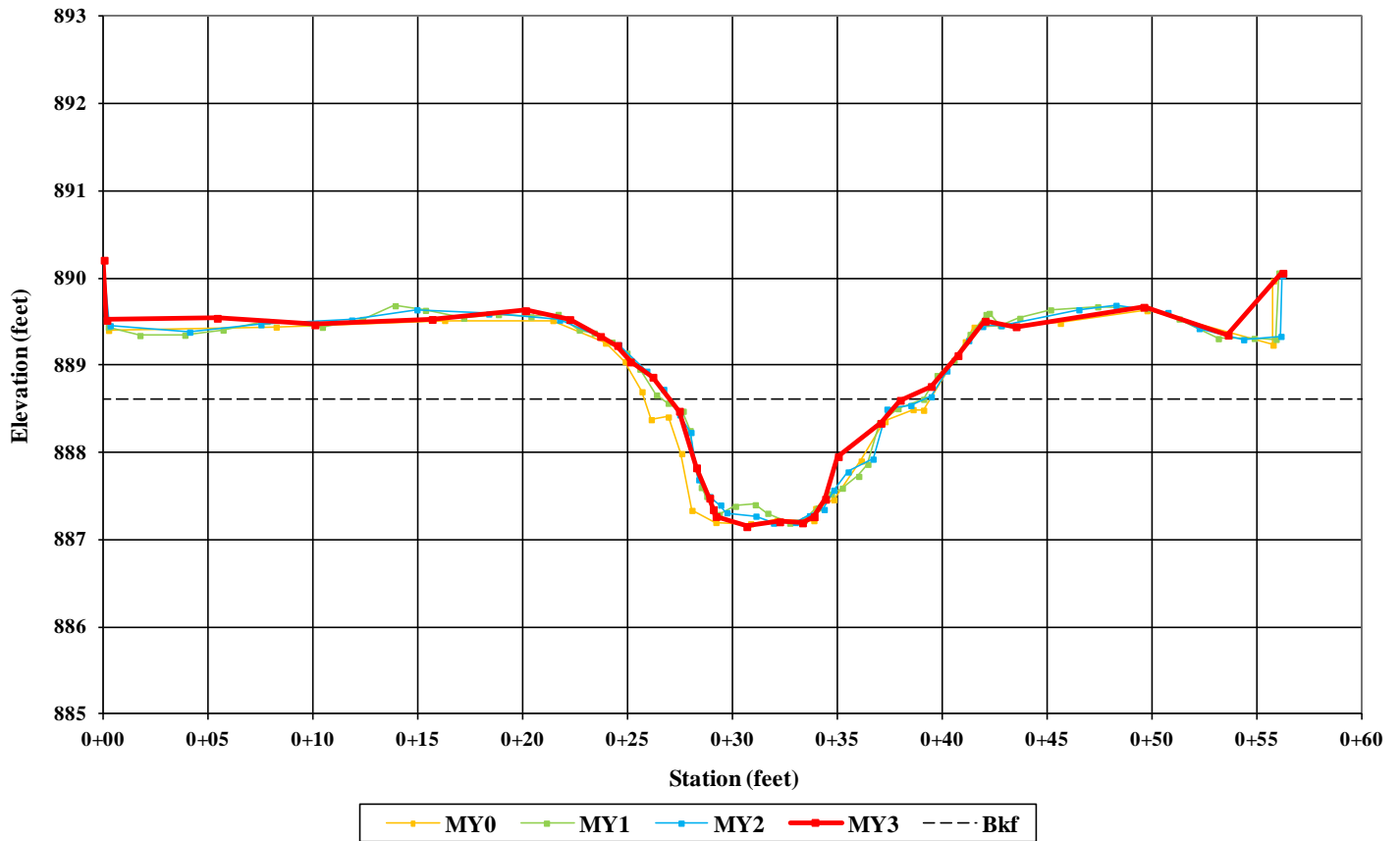


Left Bank Descending



Right Bank Descending

Cross Section 16 Reach 1 - Riffle Station 303 +38



Cross Section 17 Reach 1 – Riffle

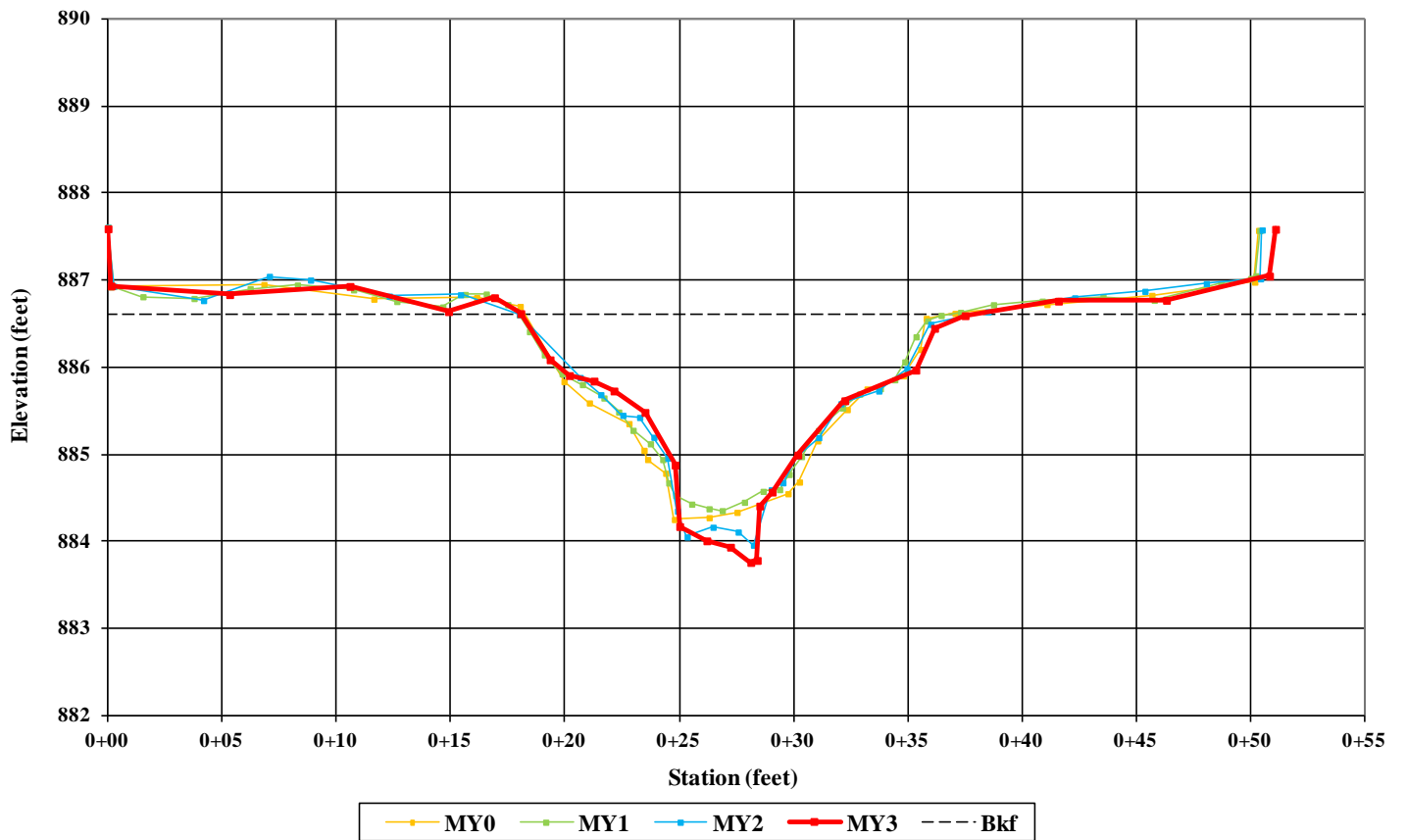


Left Bank Descending



Right Bank Descending

Cross Section 17 Reach 1 - Riffle Station 306 +69



Cross Section 18 Reach 1 – Pool

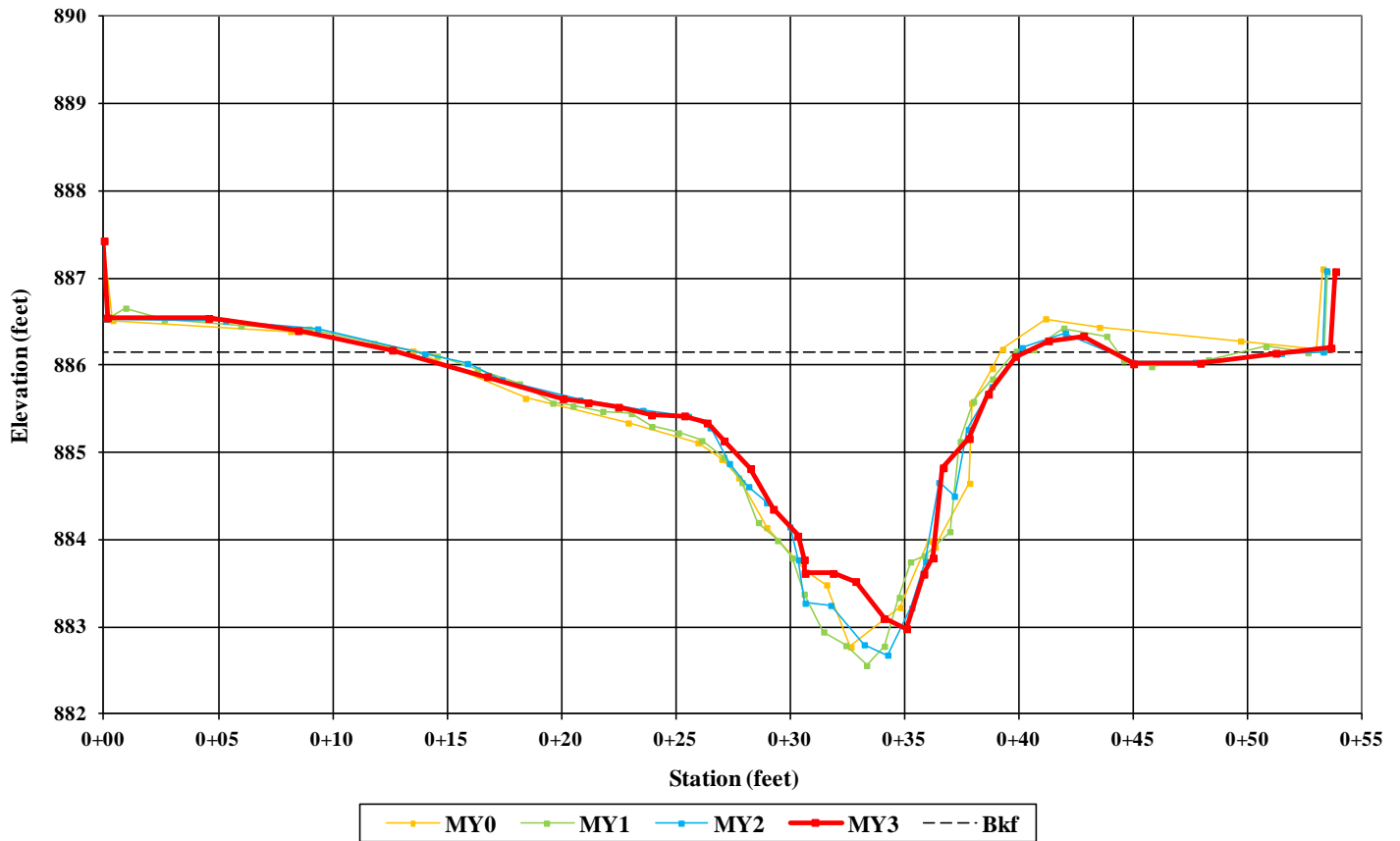


Left Bank Descending



Right Bank Descending

Cross Section 18 Reach 1 - Pool Station 307 +35



Cross Section 19 Reach 1 – Riffle

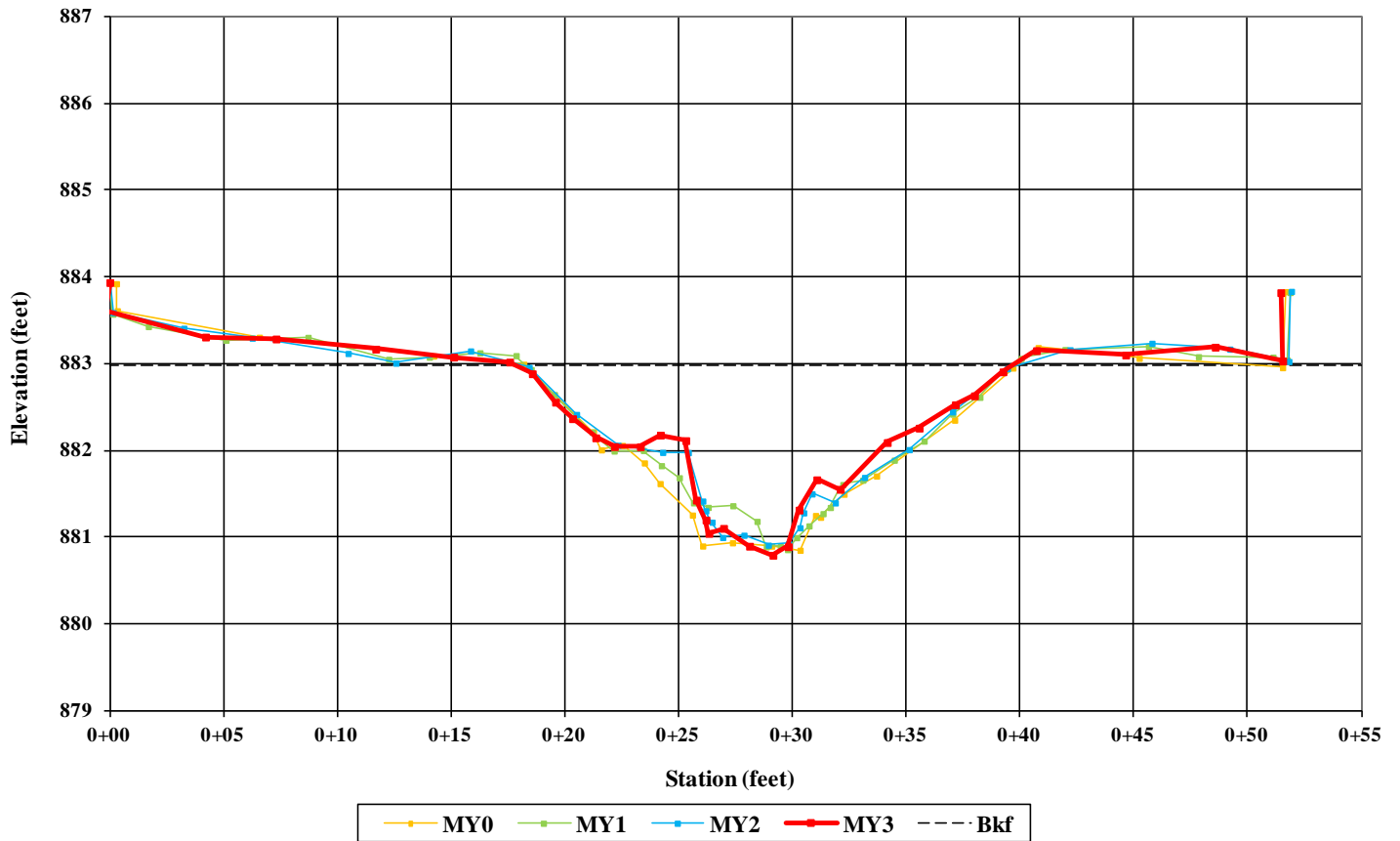


Left Bank Descending



Right Bank Descending

Cross Section 19 Reach 1 - Riffle Station 311 +76



Cross Section 20 Reach 1 – Pool

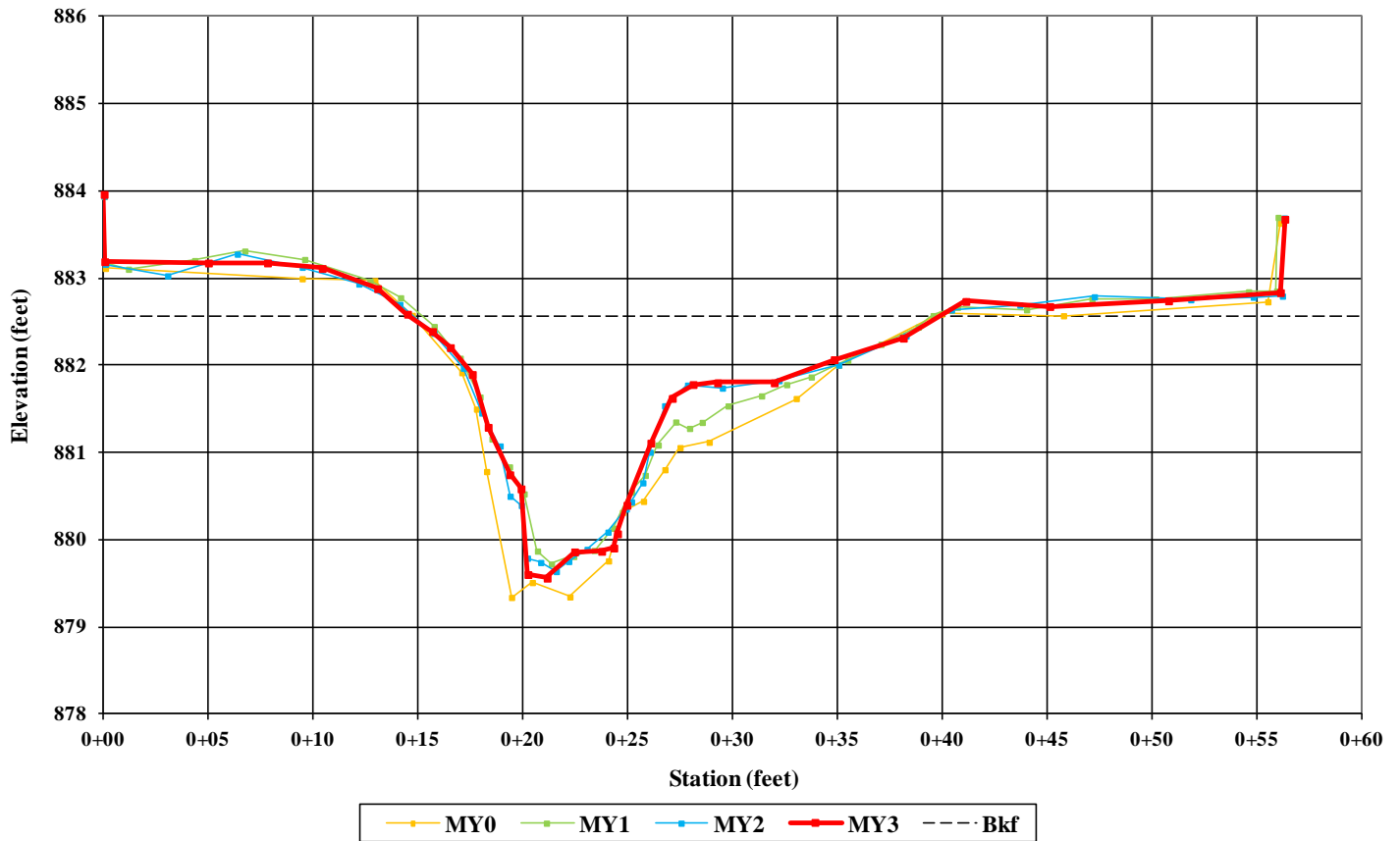


Left Bank Descending



Right Bank Descending

Cross Section 20
Reach 1 - Pool
Station 312 +64



Cross Section 21 Reach 1 – Pool

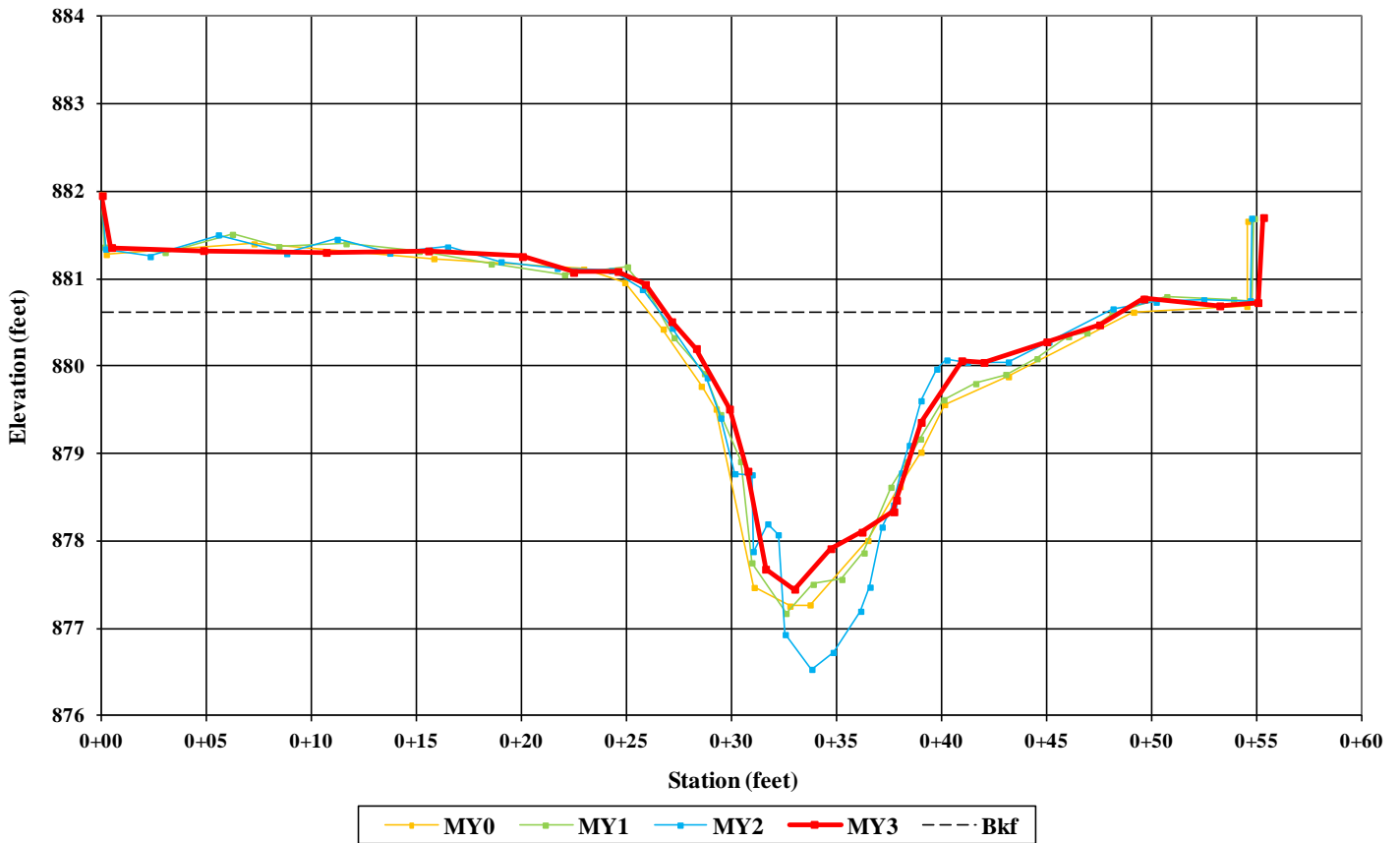


Left Bank Descending



Right Bank Descending

Cross Section 21 Reach 1 - Pool Station 314 +59



Cross Section 22 Reach 1 – Riffle

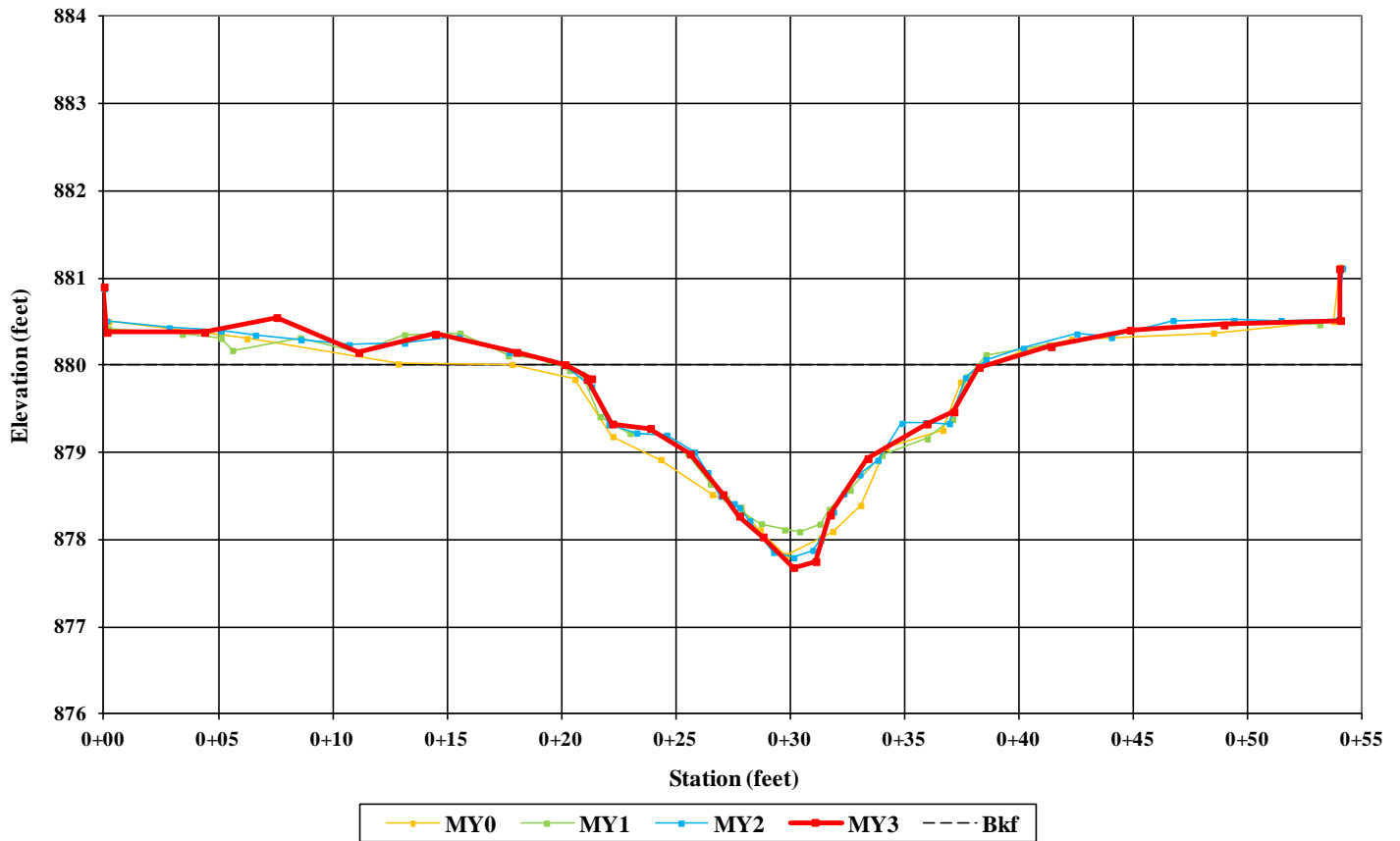


Left Bank Descending



Right Bank Descending

Cross Section 22 Reach 1 - Riffle Station 315 +07



Cross Section 23 Reach 1 – Riffle

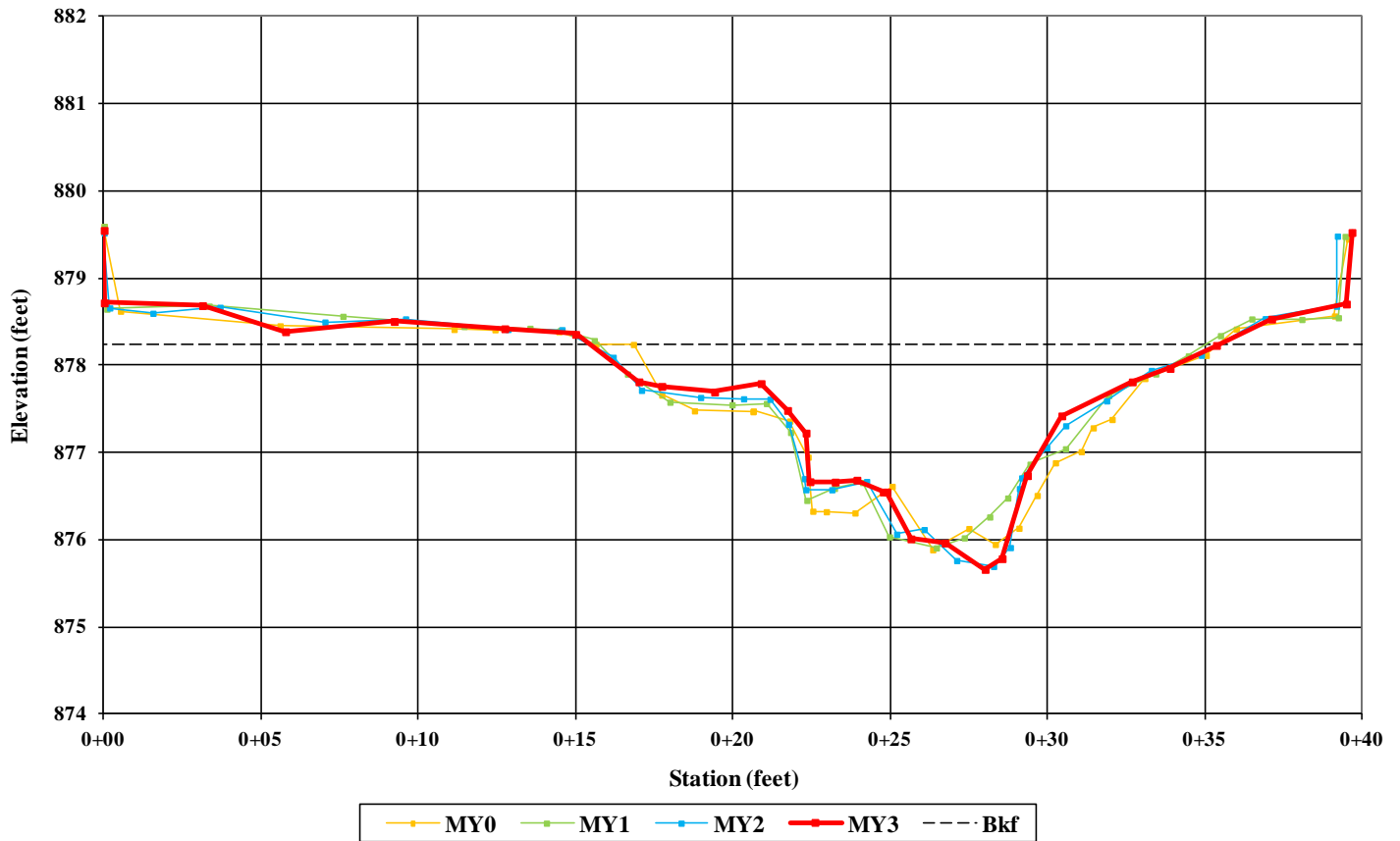


Left Bank Descending



Right Bank Descending

Cross Section 23
Reach 1 - Riffle
Station 316 +83



Cross Section 24 Reach 1 – Pool

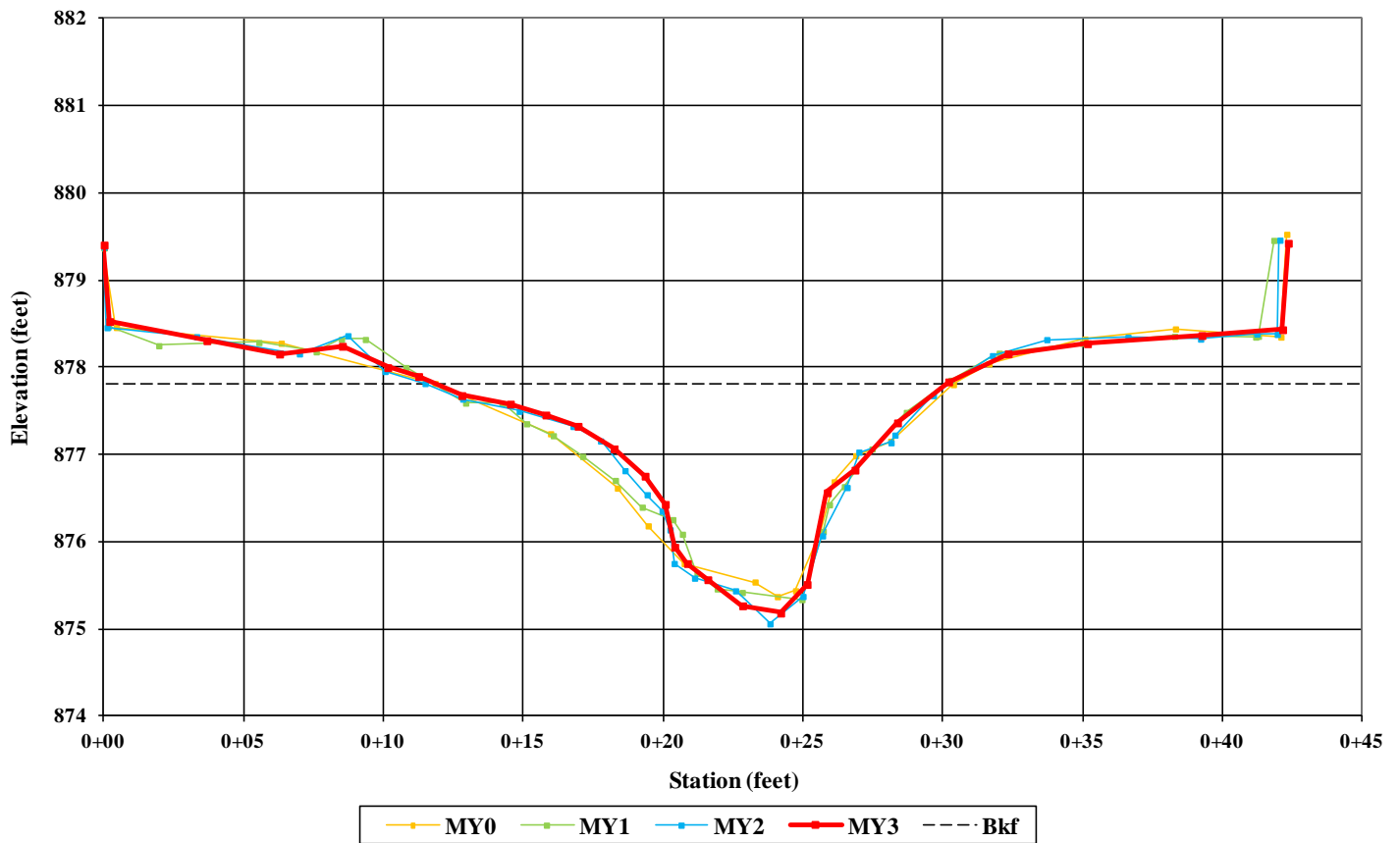


Left Bank Descending



Right Bank Descending

Cross Section 24
Reach 1 - Pool
Station 317 +28



Cross Section 25 Reach 1 – Pool

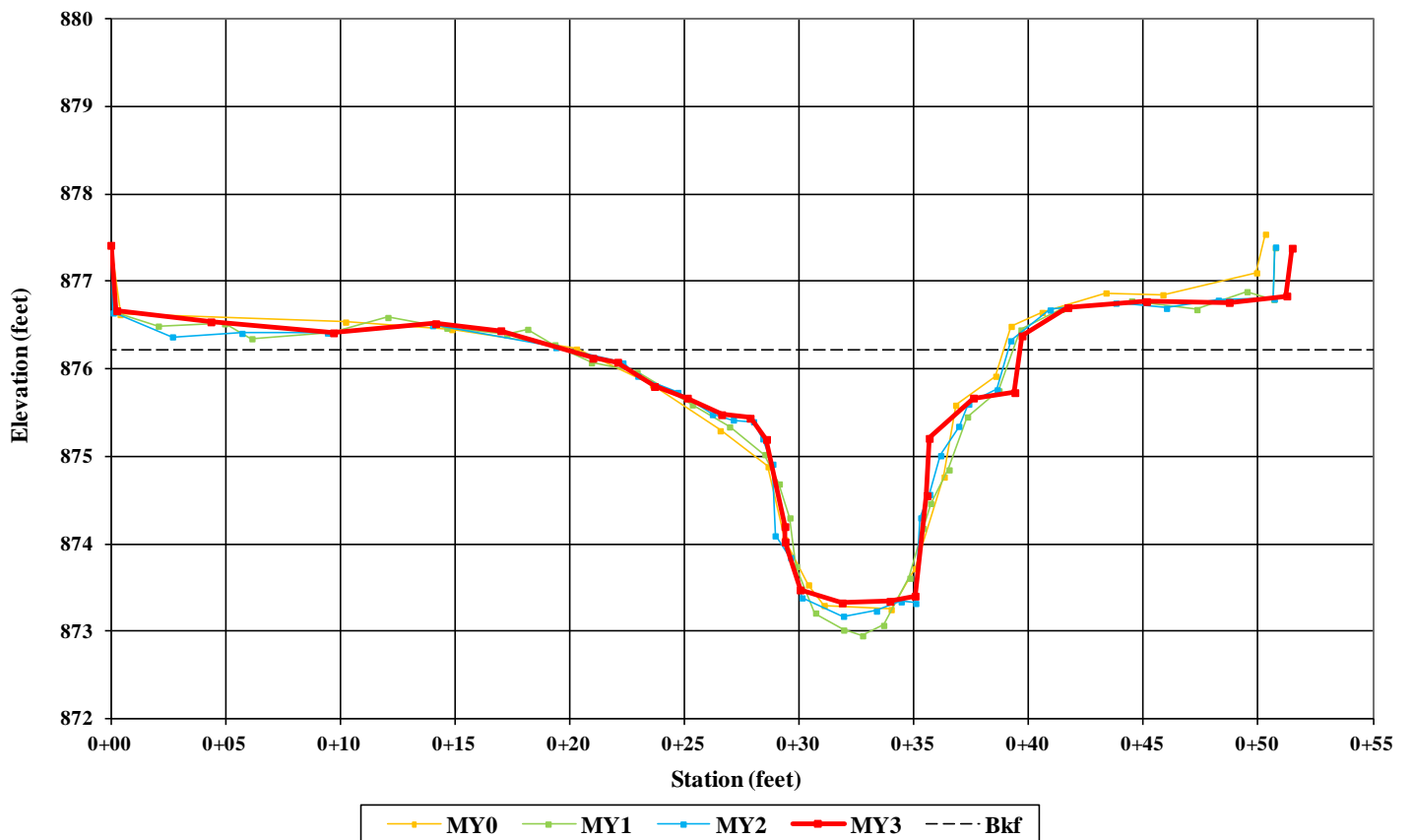


Left Bank Descending



Right Bank Descending

Cross Section 25 Reach 1 - Pool Station 319 +29



Cross Section 26 Reach 1 – Riffle

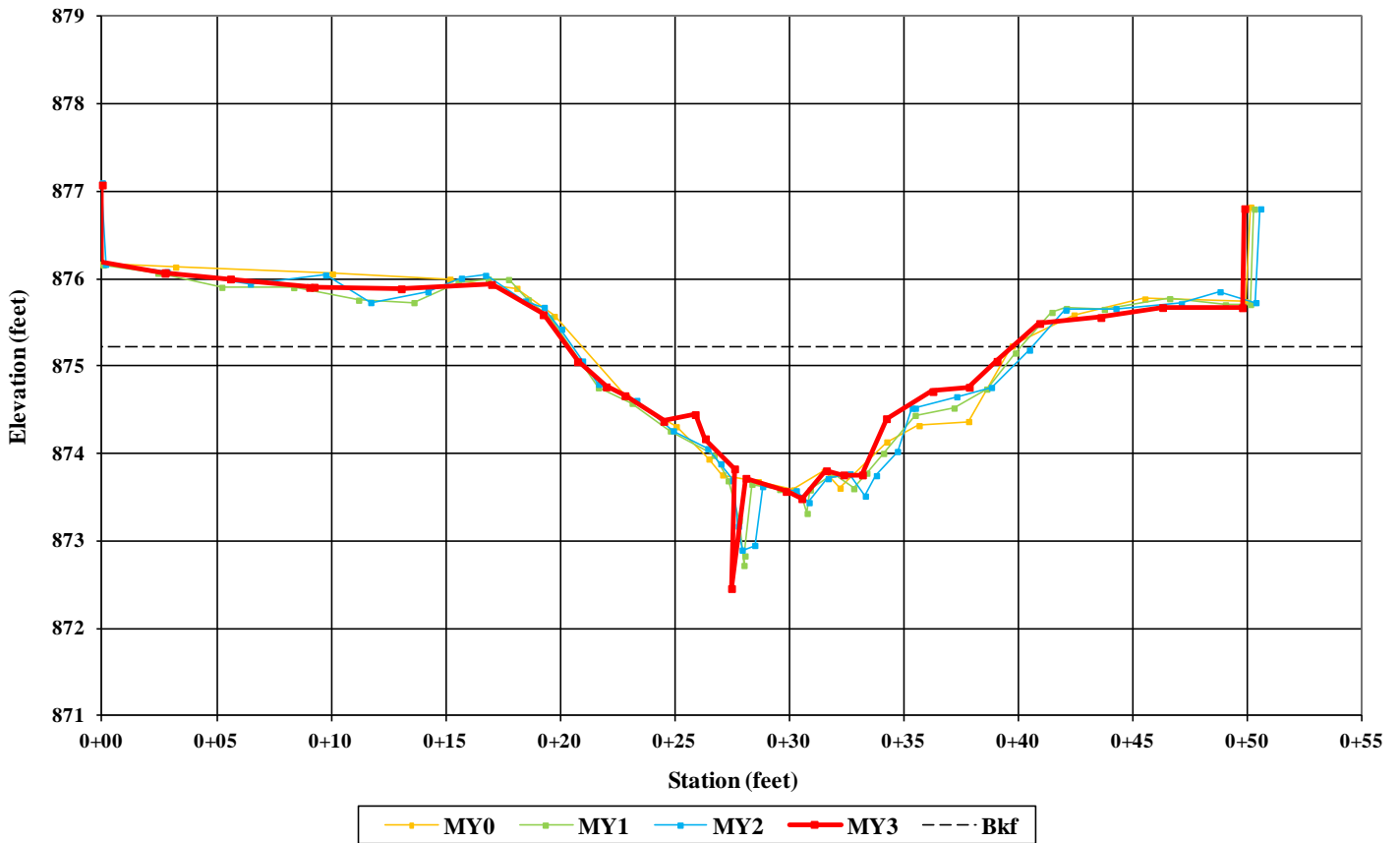


Left Bank Descending

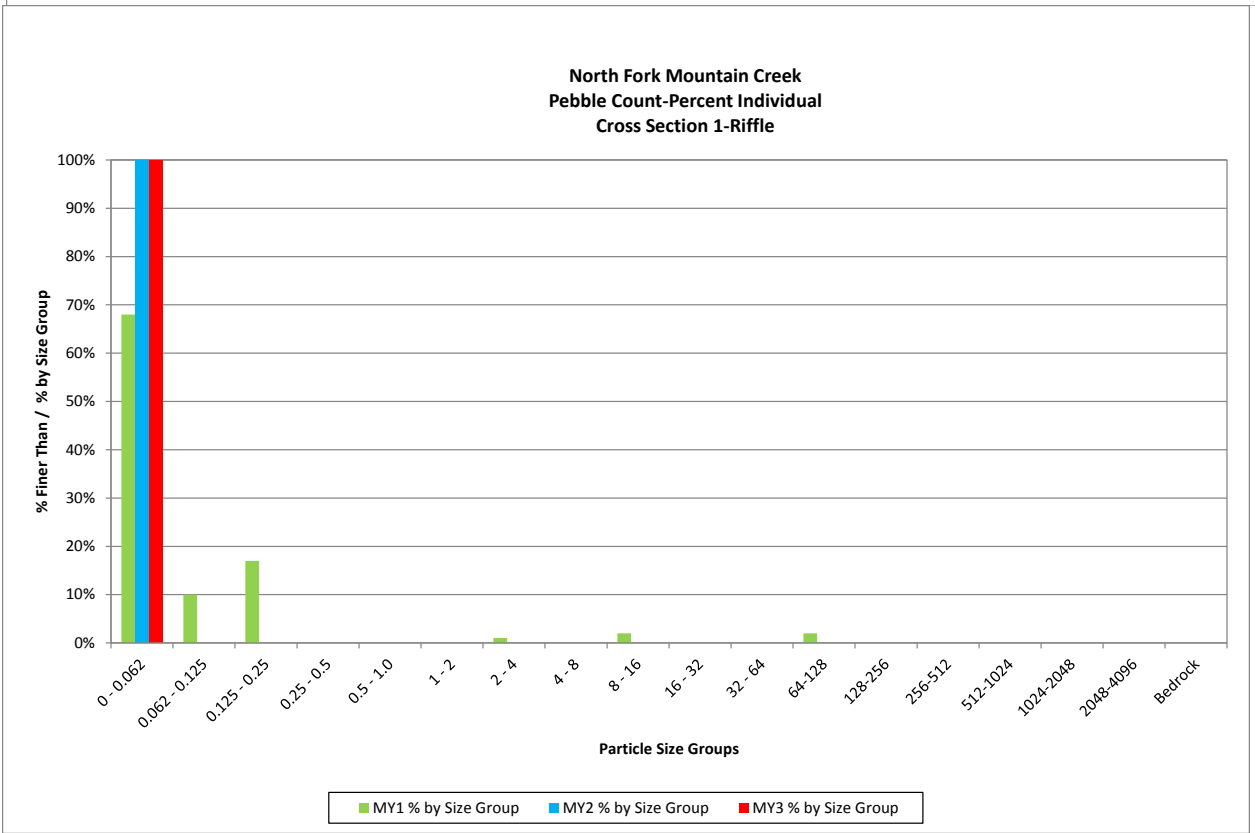
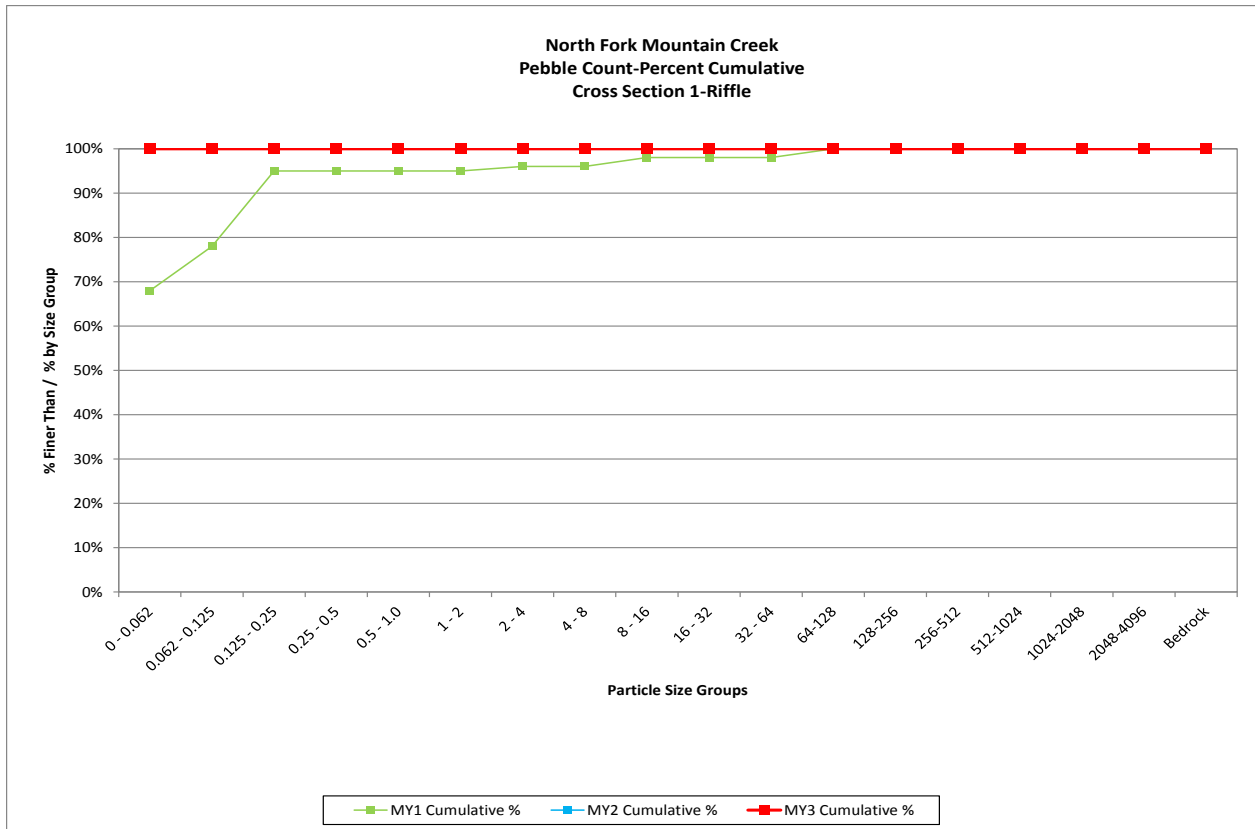


Right Bank Descending

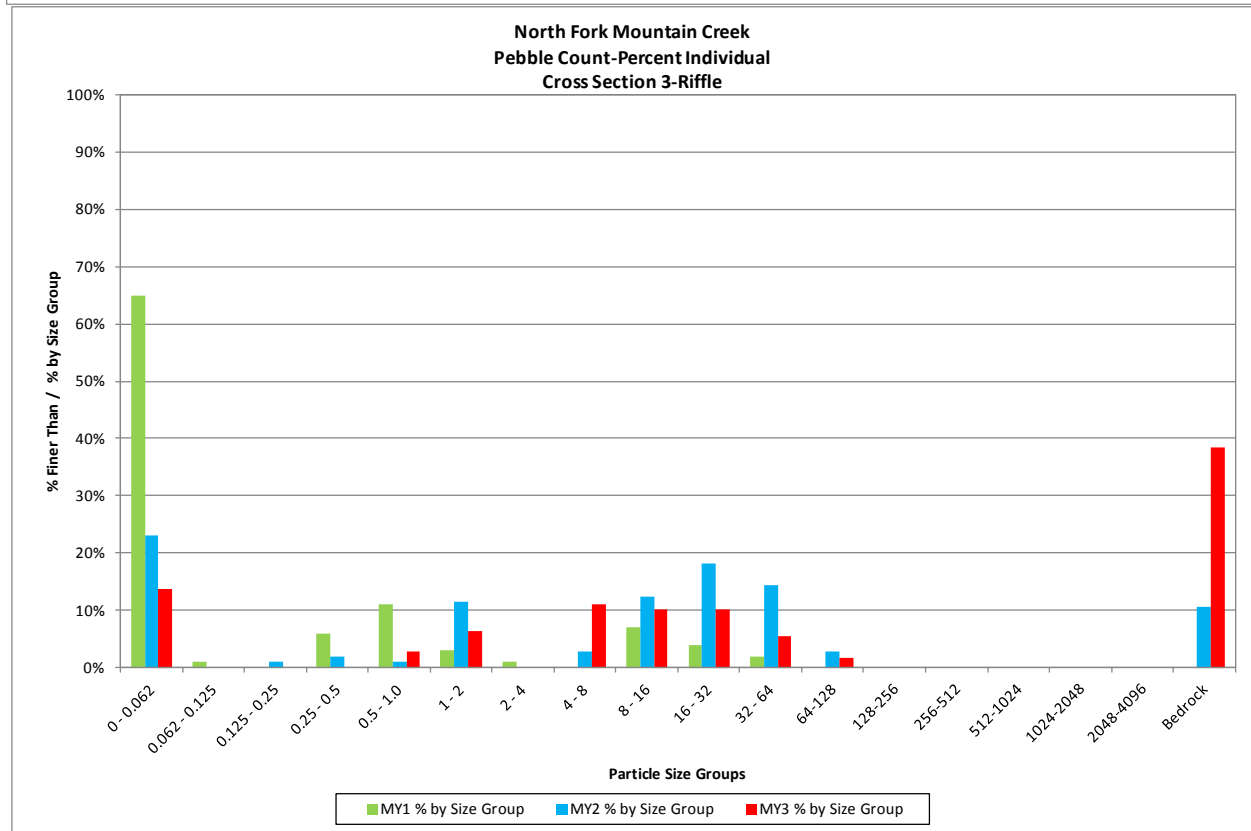
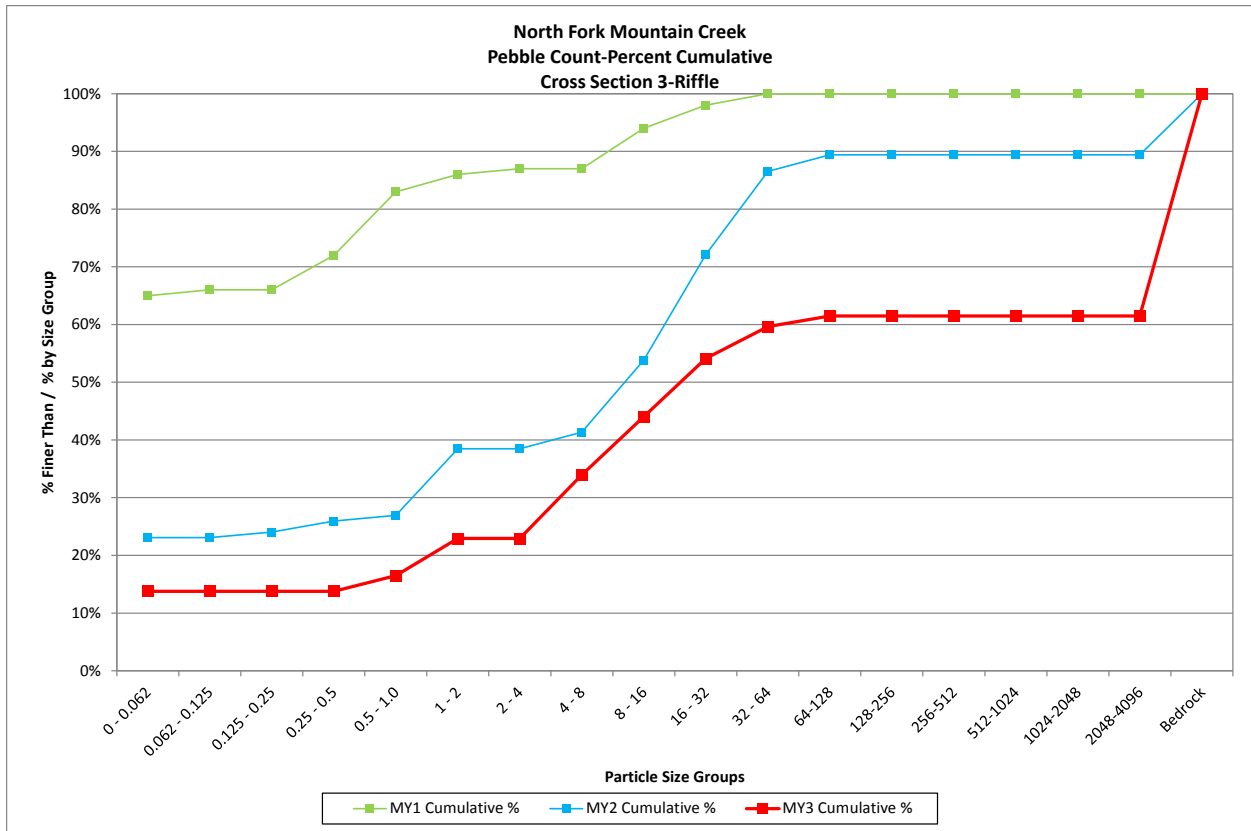
Cross Section 26 Reach 1- Riffle Station 319 +82



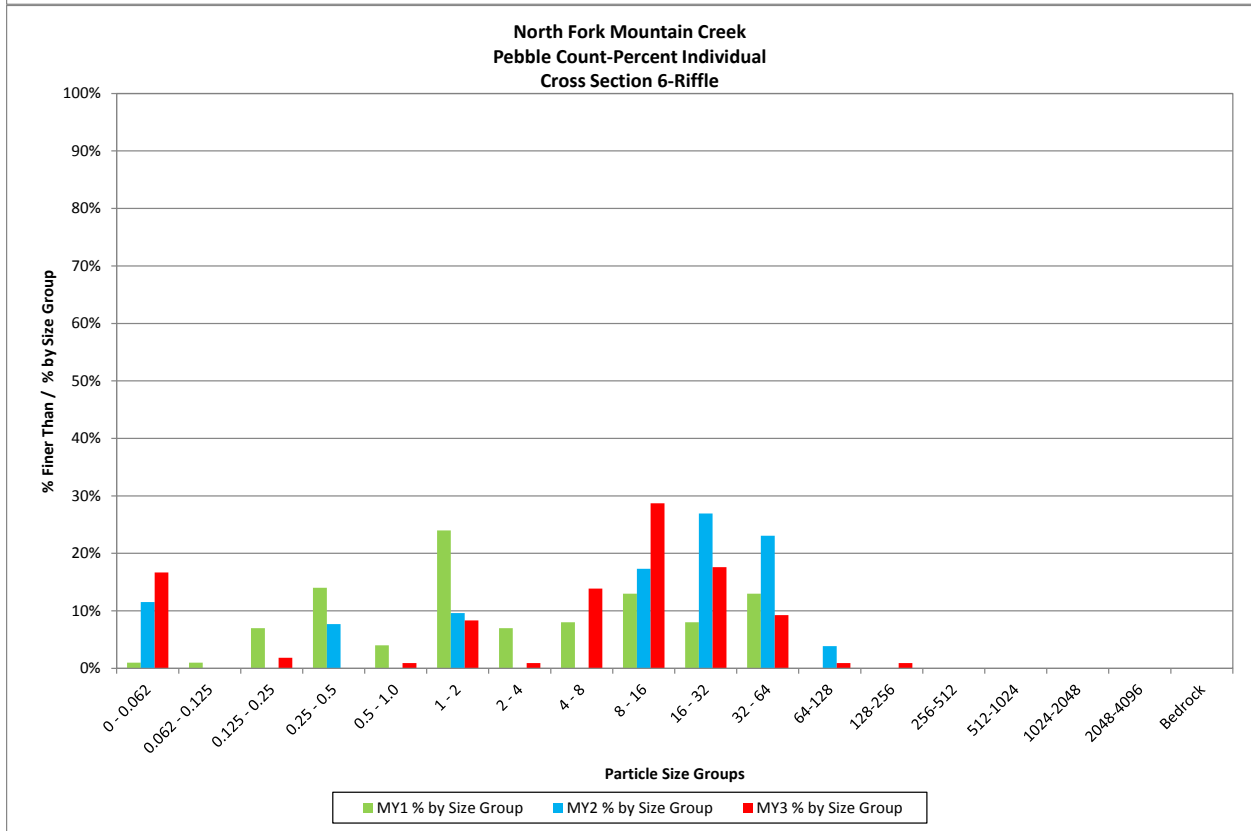
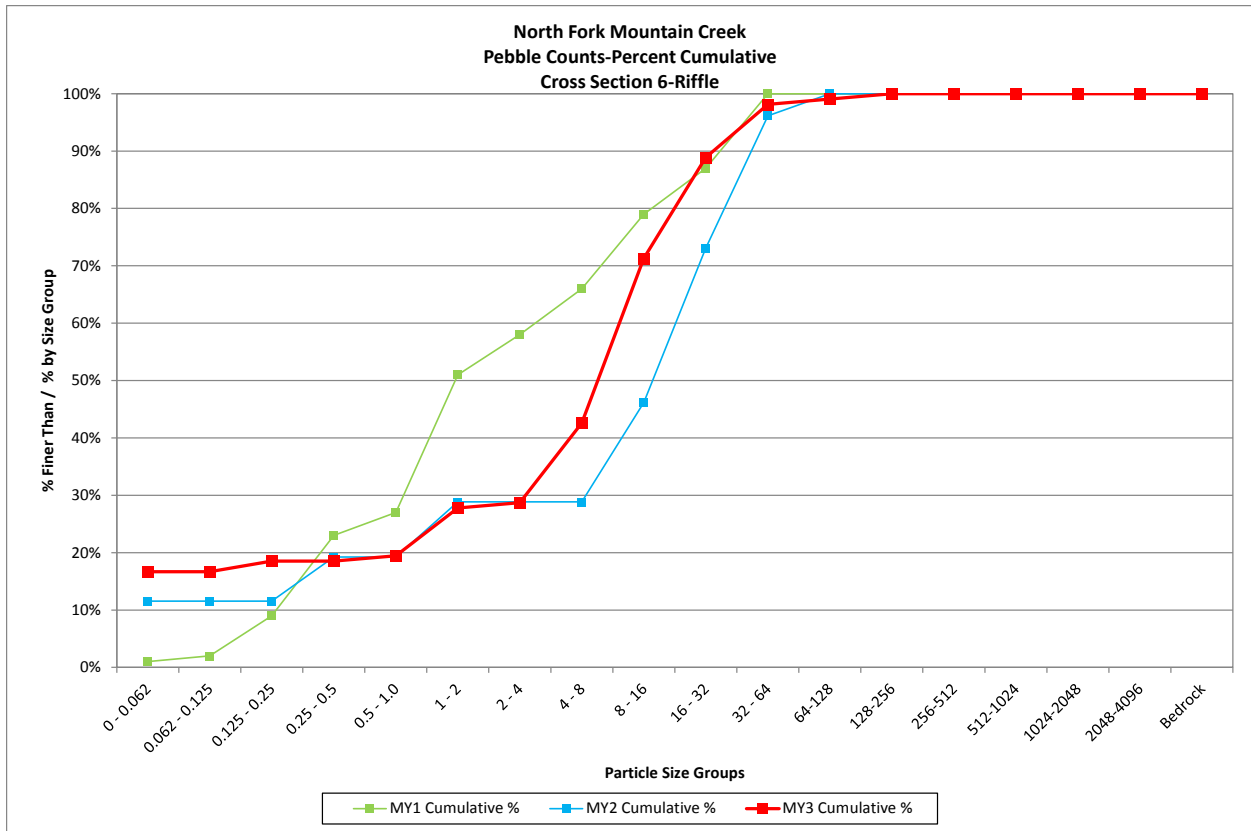
North Fork Mountain Creek			
Cross Section 1 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	105	100.0%	100%
0.062 - 0.125	0	0.0%	100%
0.125 - 0.25	0	0.0%	100%
0.25 - 0.5	0	0.0%	100%
0.5 - 1.0	0	0.0%	100%
1 - 2	0	0.0%	100%
2 - 4	0	0.0%	100%
4 - 8	0	0.0%	100%
8 - 16	0	0.0%	100%
16 - 32	0	0.0%	100%
32 - 64	0	0.0%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	105	100%	100%
		Summary Data	
		D50	0.062
		D84	0.062
		D95	0.062



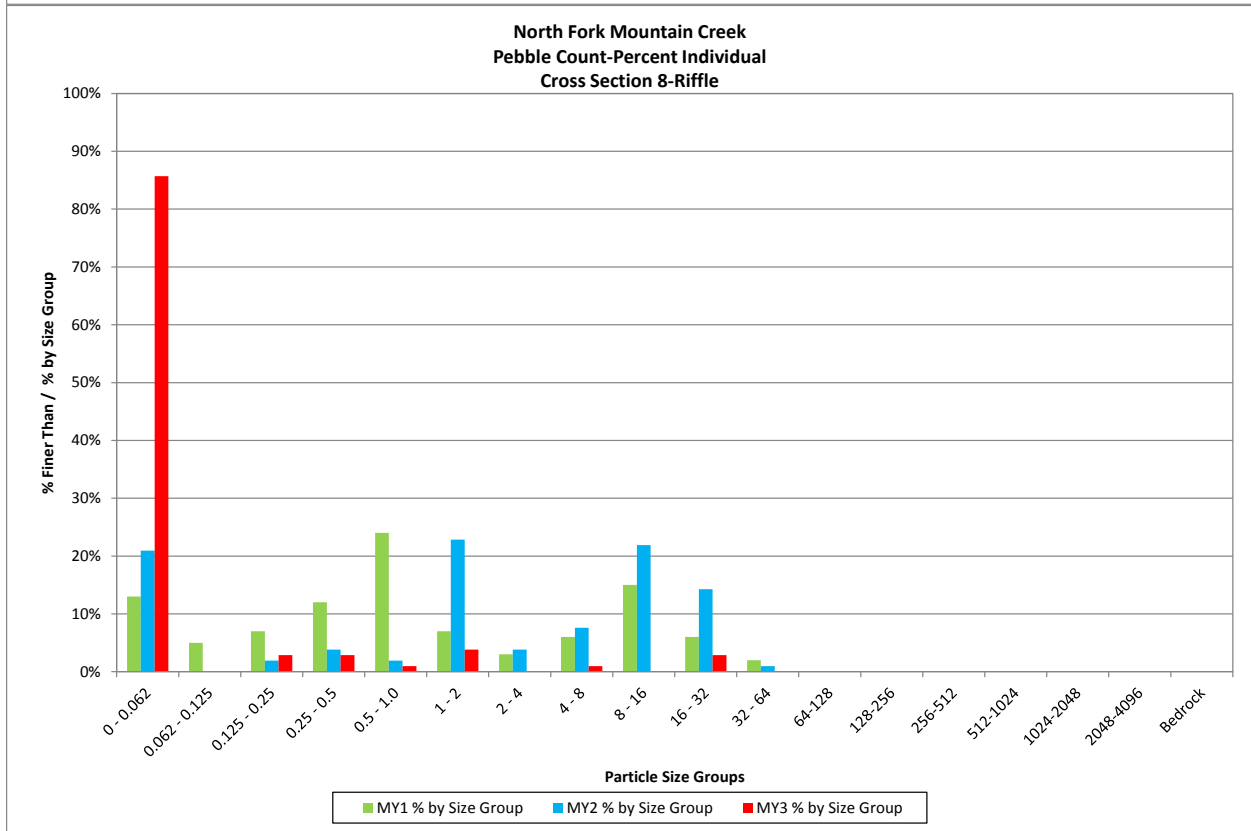
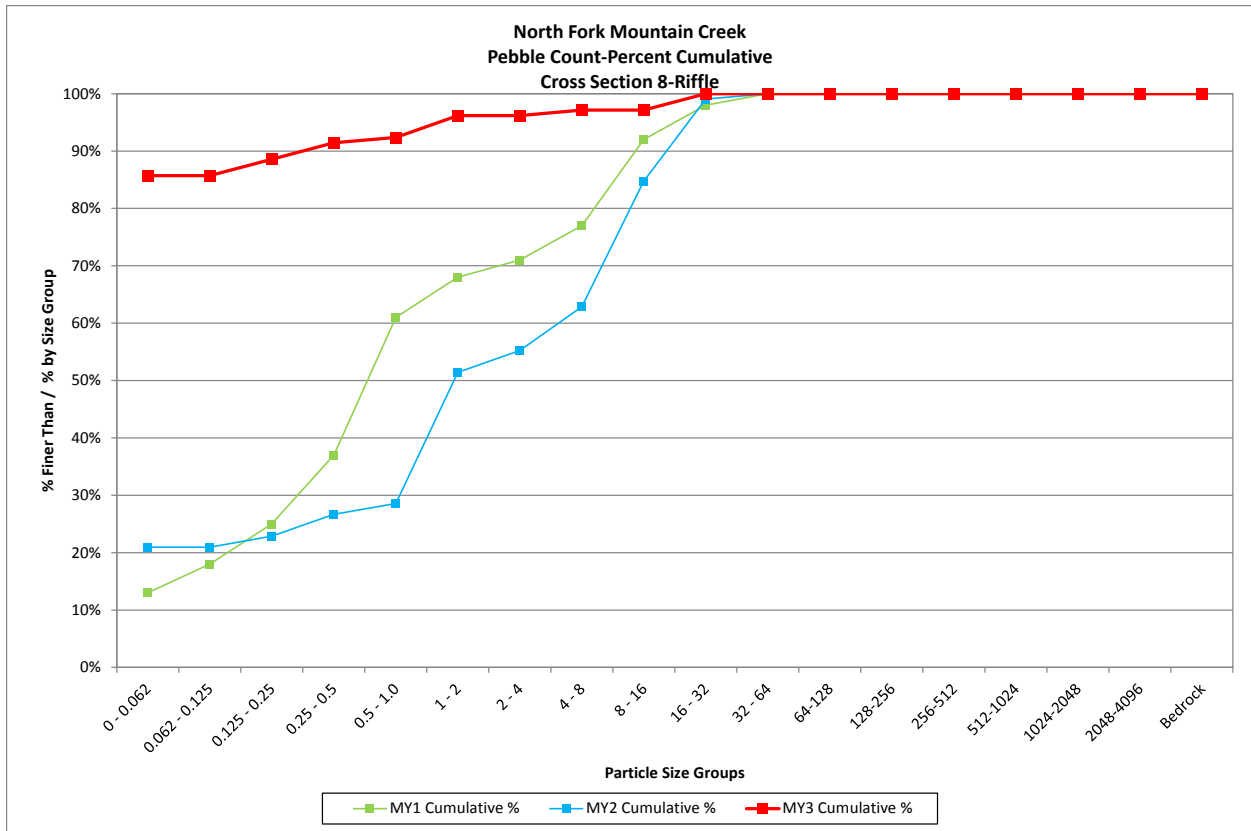
North Fork Mountain Creek			
Cross Section 3 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	15	13.8%	14%
0.062 - 0.125	0	0.0%	14%
0.125 - 0.25	0	0.0%	14%
0.25 - 0.5	0	0.0%	14%
0.5 - 1.0	3	2.8%	17%
1 - 2	7	6.4%	23%
2 - 4	0	0.0%	23%
4 - 8	12	11.0%	34%
8 - 16	11	10.1%	44%
16 - 32	11	10.1%	54%
32 - 64	6	5.5%	60%
64-128	2	1.8%	61%
128-256	0	0.0%	61%
256-512	0	0.0%	61%
512-1024	0	0.0%	61%
1024-2048	0	0.0%	61%
2048-4096	0	0.0%	61%
Bedrock	42	38.5%	100%
Total	109	100%	100%
		Summary Data	
		D50	6.9
		D84	28
		D95	44



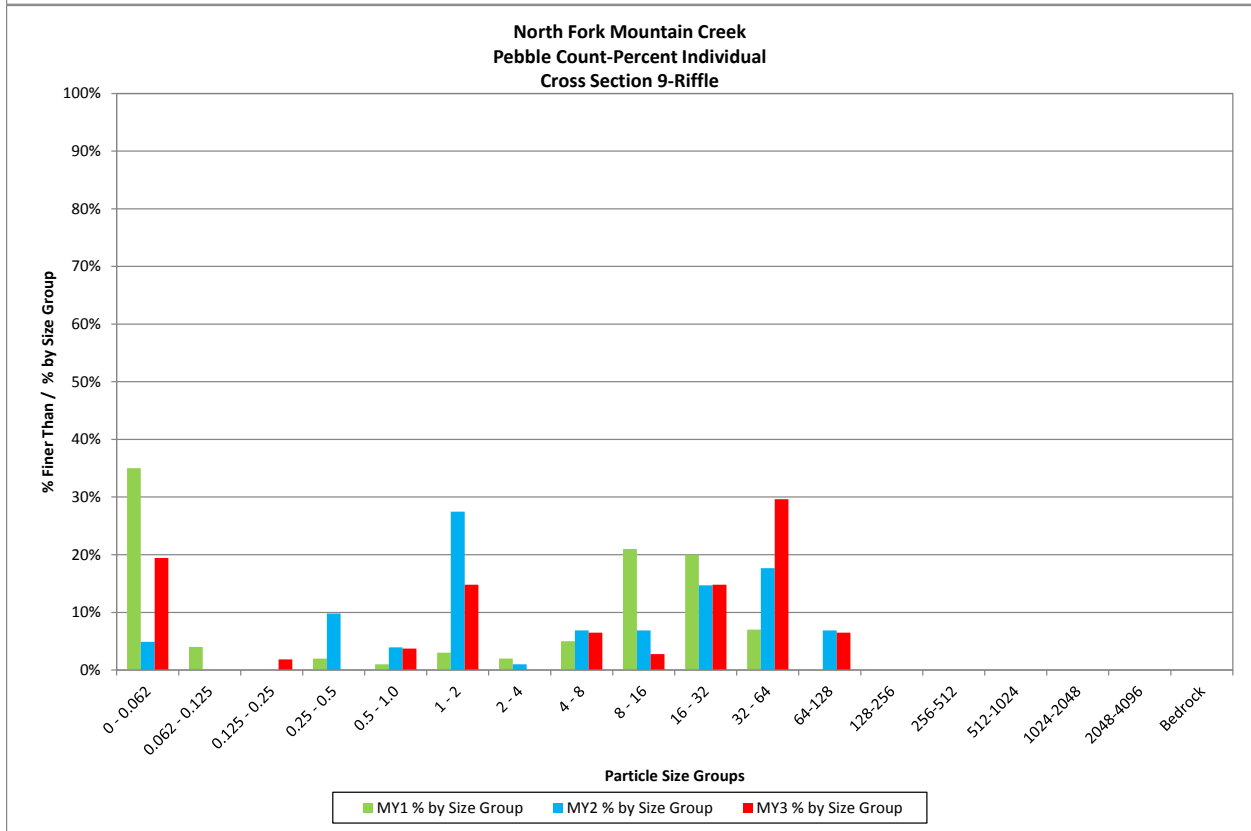
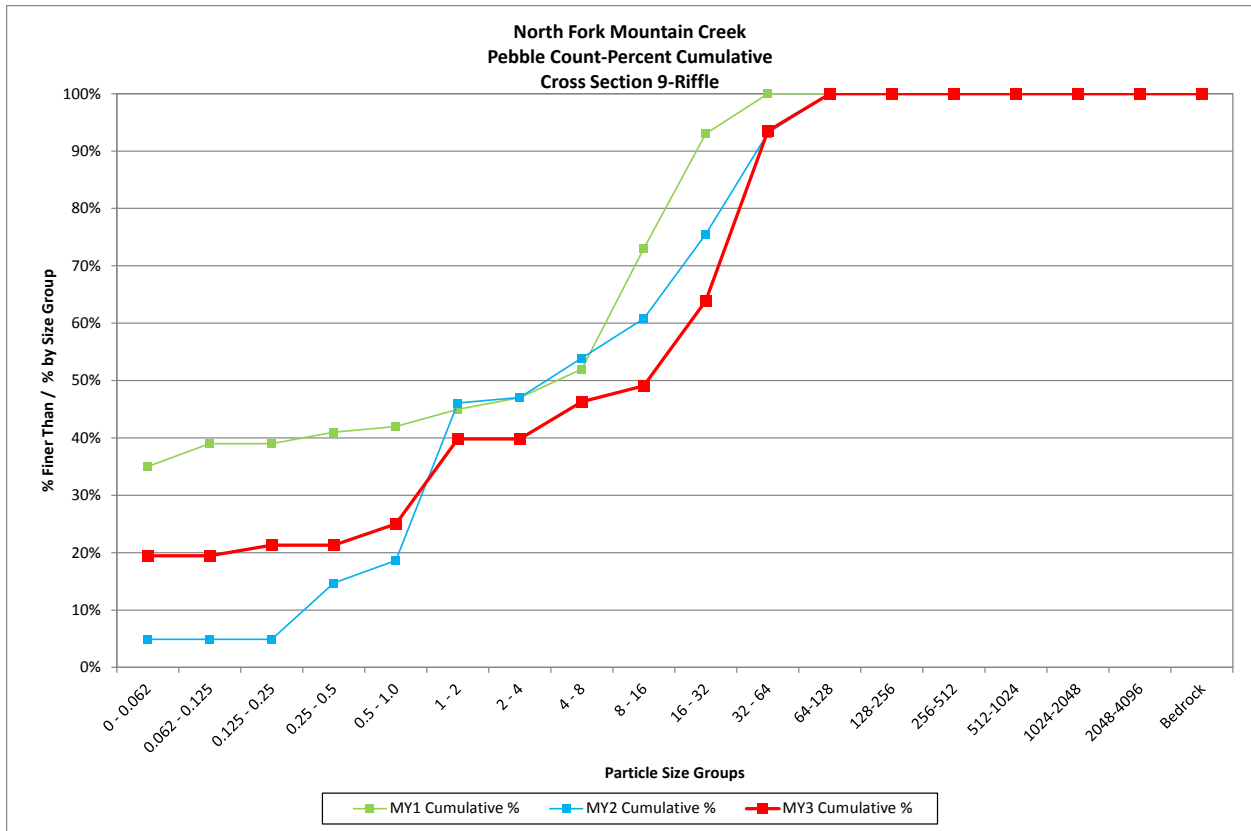
North Fork Mountain Creek			
Cross Section 6 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	18	16.7%	17%
0.062 - 0.125	0	0.0%	17%
0.125 - 0.25	2	1.9%	19%
0.25 - 0.5	0	0.0%	19%
0.5 - 1.0	1	0.9%	19%
1 - 2	9	8.3%	28%
2 - 4	1	0.9%	29%
4 - 8	15	13.9%	43%
8 - 16	31	28.7%	71%
16 - 32	19	17.6%	89%
32 - 64	10	9.3%	98%
64-128	1	0.9%	99%
128-256	1	0.9%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	108	100%	100%
		Summary Data	
		D50	11
		D84	25
		D95	52



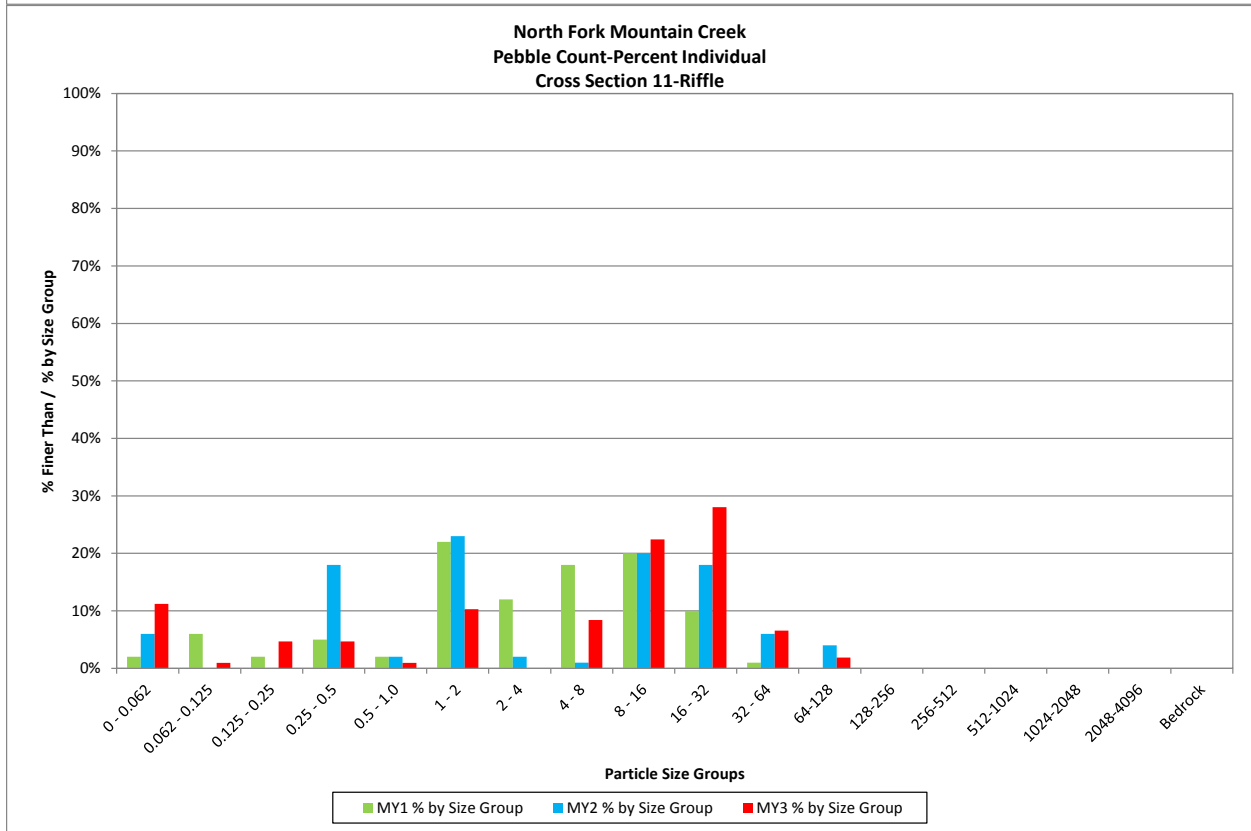
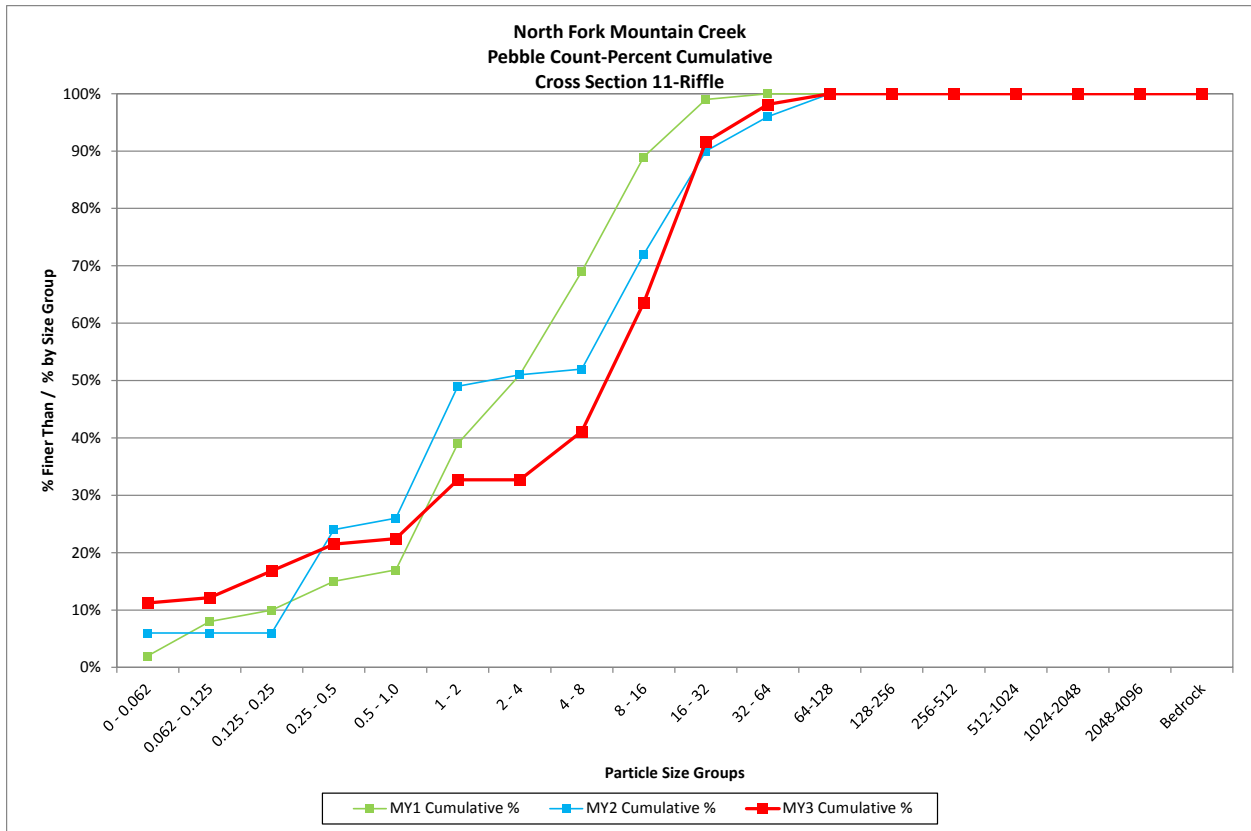
North Fork Mountain Creek			
Cross Section 8 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	90	85.7%	86%
0.062 - 0.125	0	0.0%	86%
0.125 - 0.25	3	2.9%	89%
0.25 - 0.5	3	2.9%	91%
0.5 - 1.0	1	1.0%	92%
1 - 2	4	3.8%	96%
2 - 4	0	0.0%	96%
4 - 8	1	1.0%	97%
8 - 16	0	0.0%	97%
16 - 32	3	2.9%	100%
32 - 64	0	0.0%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	105	100%	100%
		Summary Data	
		D50	0.062
		D84	0.062
		D95	1.6



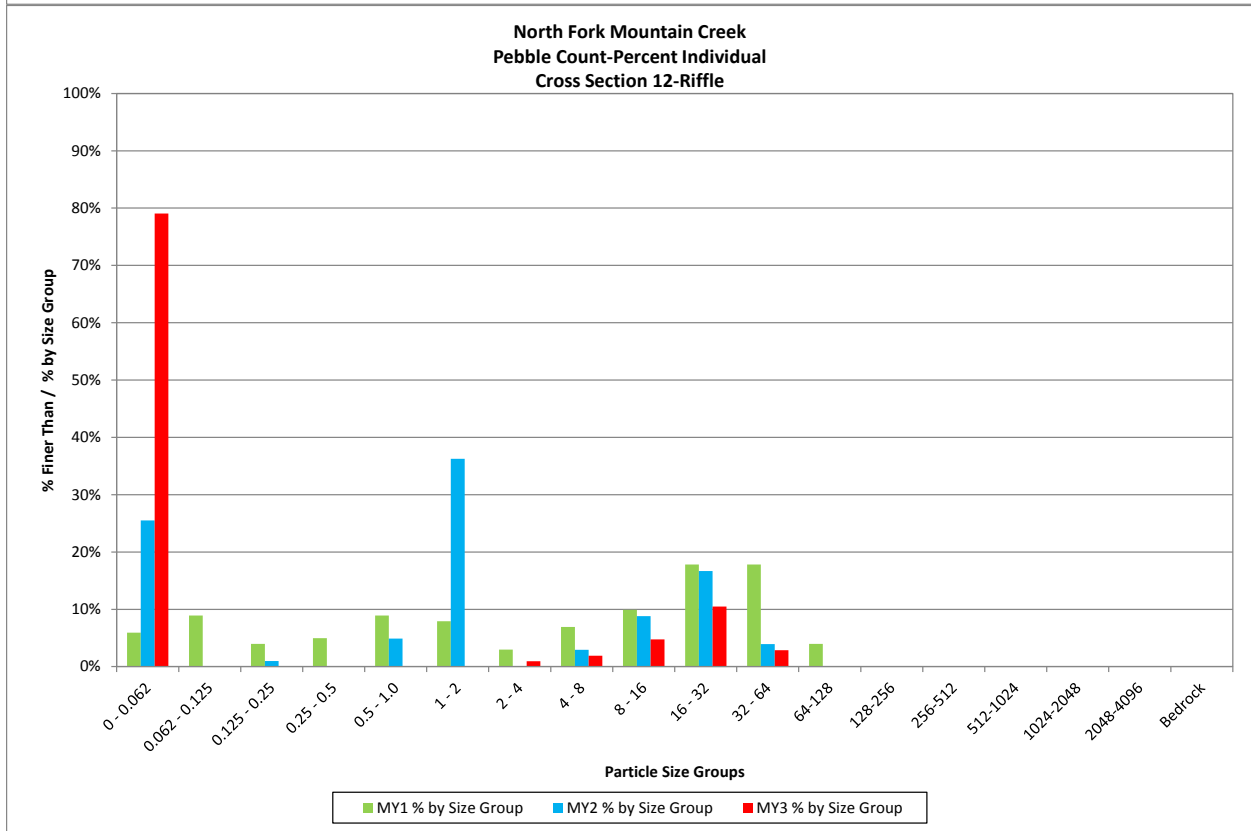
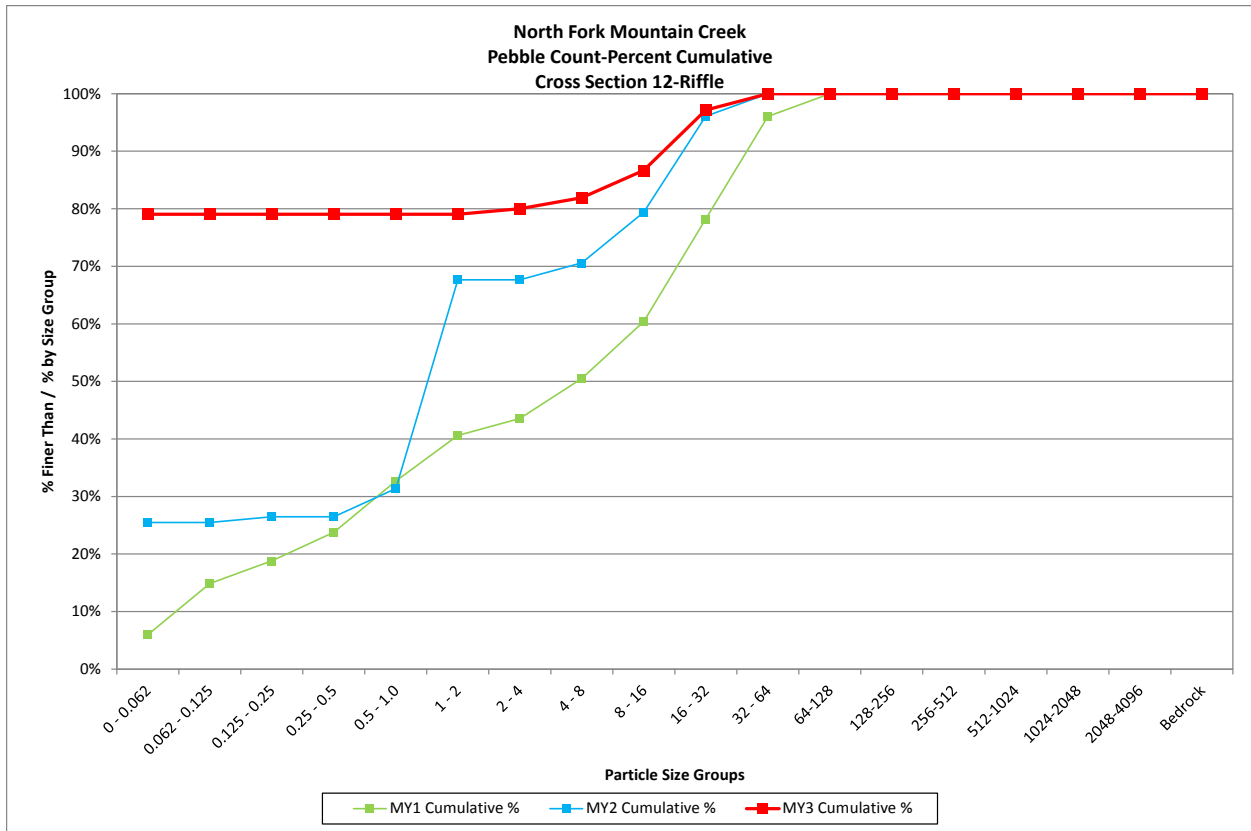
North Fork Mountain Creek			
Cross Section 9 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	21	19.4%	19%
0.062 - 0.125	0	0.0%	19%
0.125 - 0.25	2	1.9%	21%
0.25 - 0.5	0	0.0%	21%
0.5 - 1.0	4	3.7%	25%
1 - 2	16	14.8%	40%
2 - 4	0	0.0%	40%
4 - 8	7	6.5%	46%
8 - 16	3	2.8%	49%
16 - 32	16	14.8%	64%
32 - 64	32	29.6%	94%
64-128	7	6.5%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	108	100%	100%
		Summary Data	
		D50	17
		D84	53
		D95	77



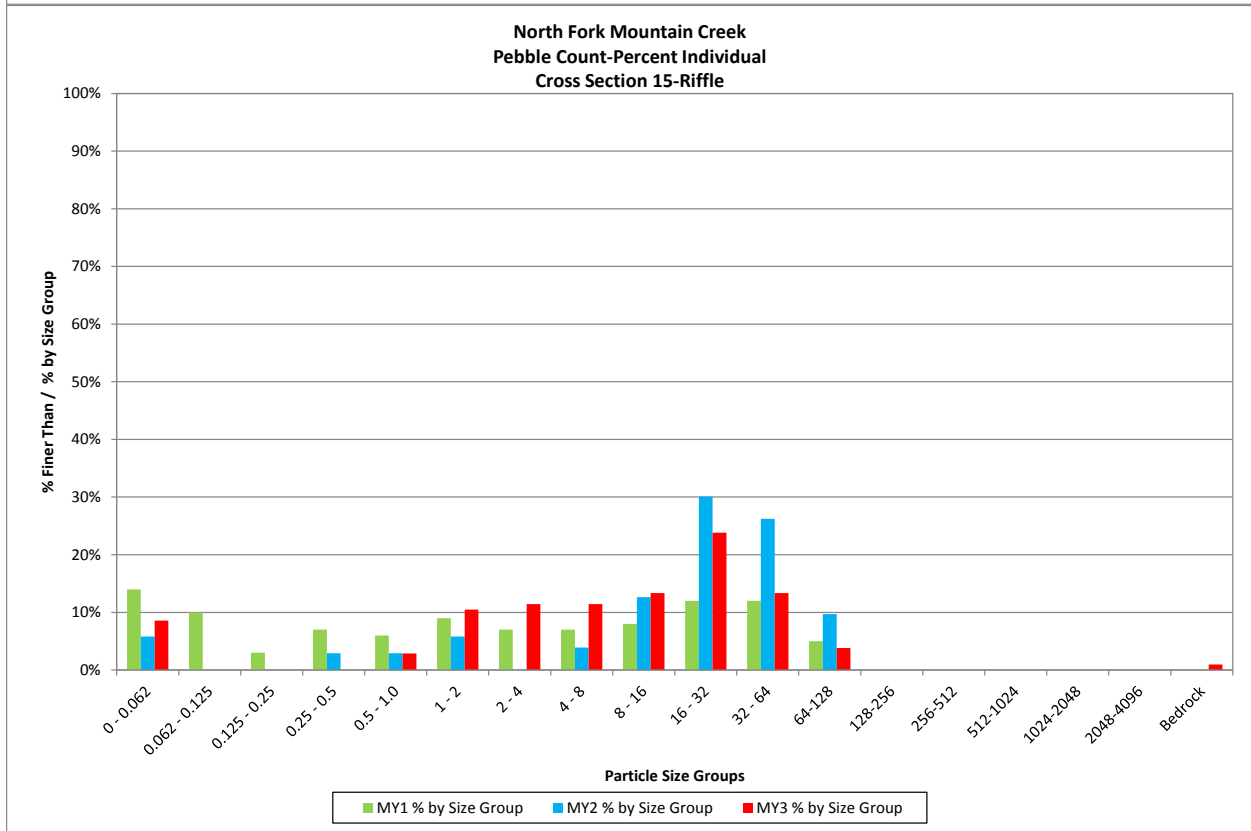
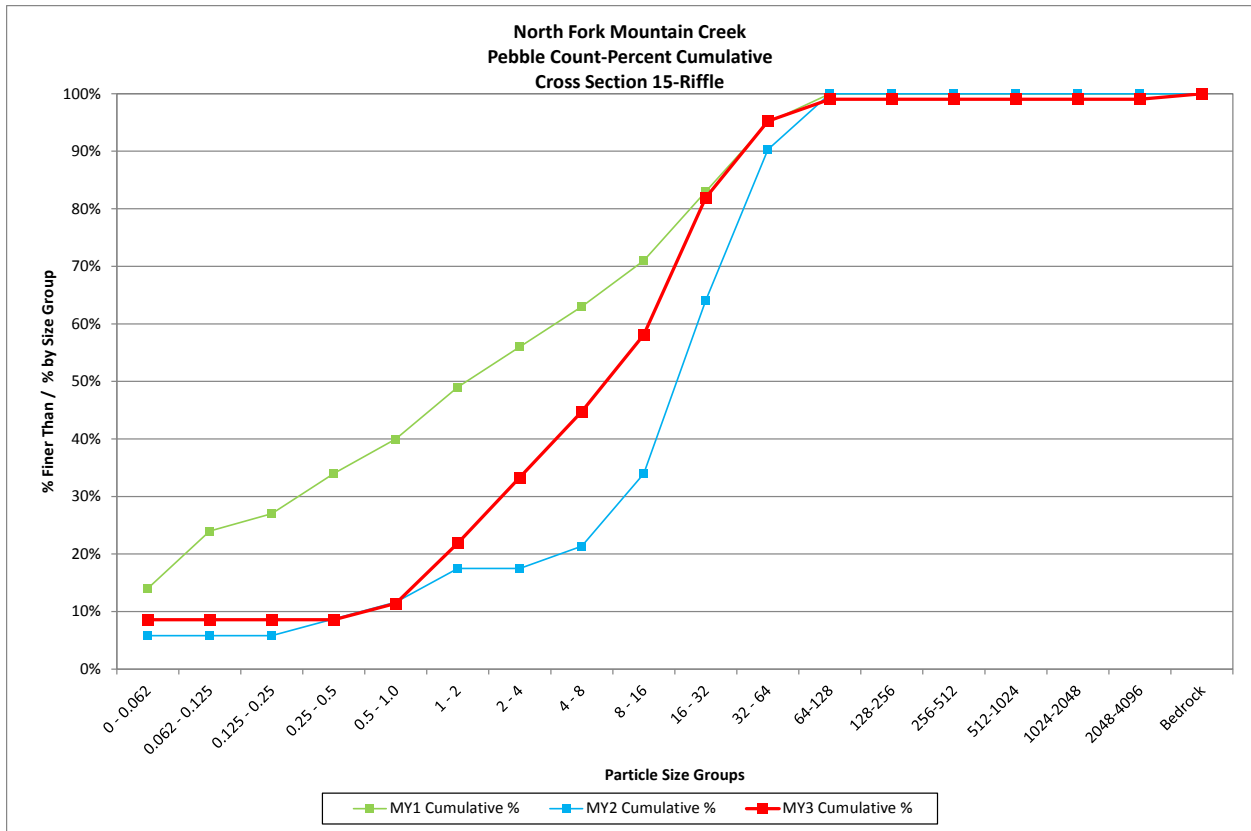
North Fork Mountain Creek			
Cross Section 11 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	12	11.2%	11%
0.062 - 0.125	1	0.9%	12%
0.125 - 0.25	5	4.7%	17%
0.25 - 0.5	5	4.7%	21%
0.5 - 1.0	1	0.9%	22%
1 - 2	11	10.3%	33%
2 - 4	0	0.0%	33%
4 - 8	9	8.4%	41%
8 - 16	24	22.4%	64%
16 - 32	30	28.0%	92%
32 - 64	7	6.5%	98%
64-128	2	1.9%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	107	100%	100%
		Summary Data	
		D50	12
		D84	25
		D95	39



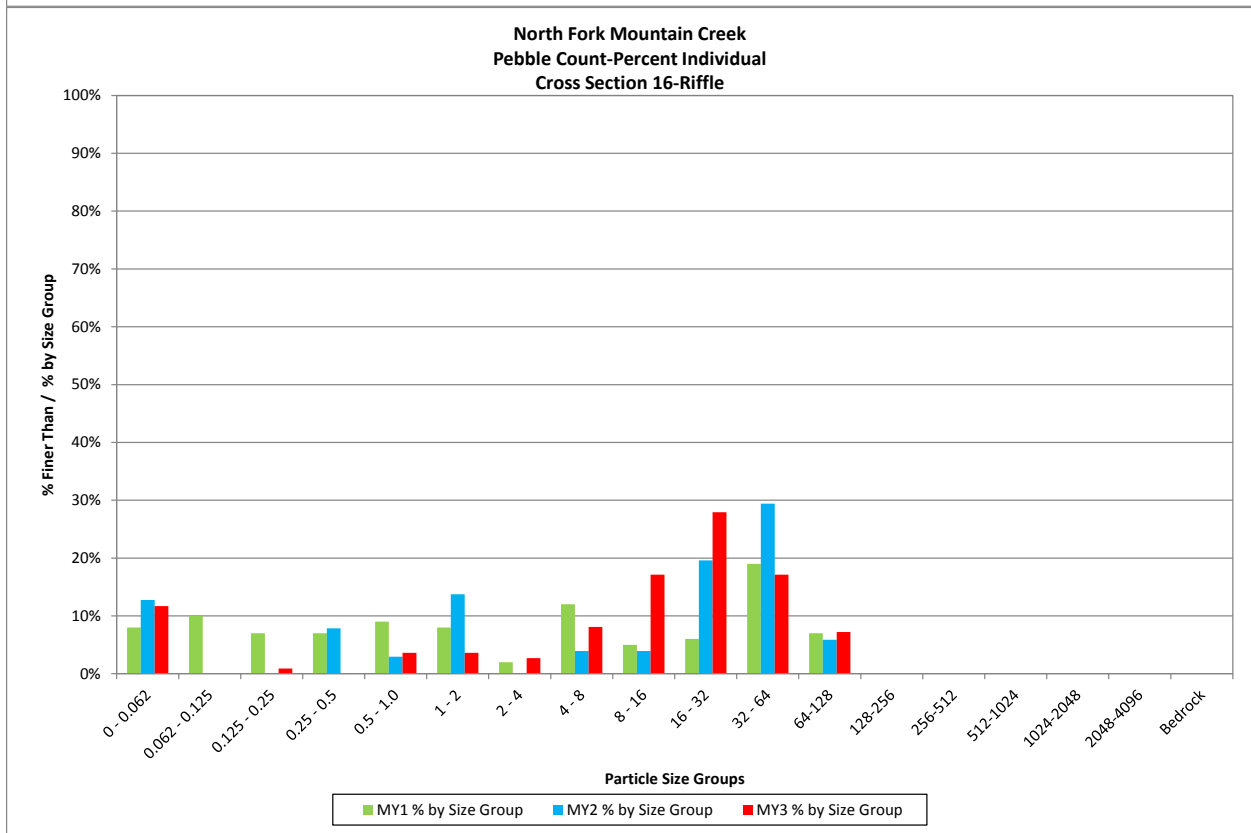
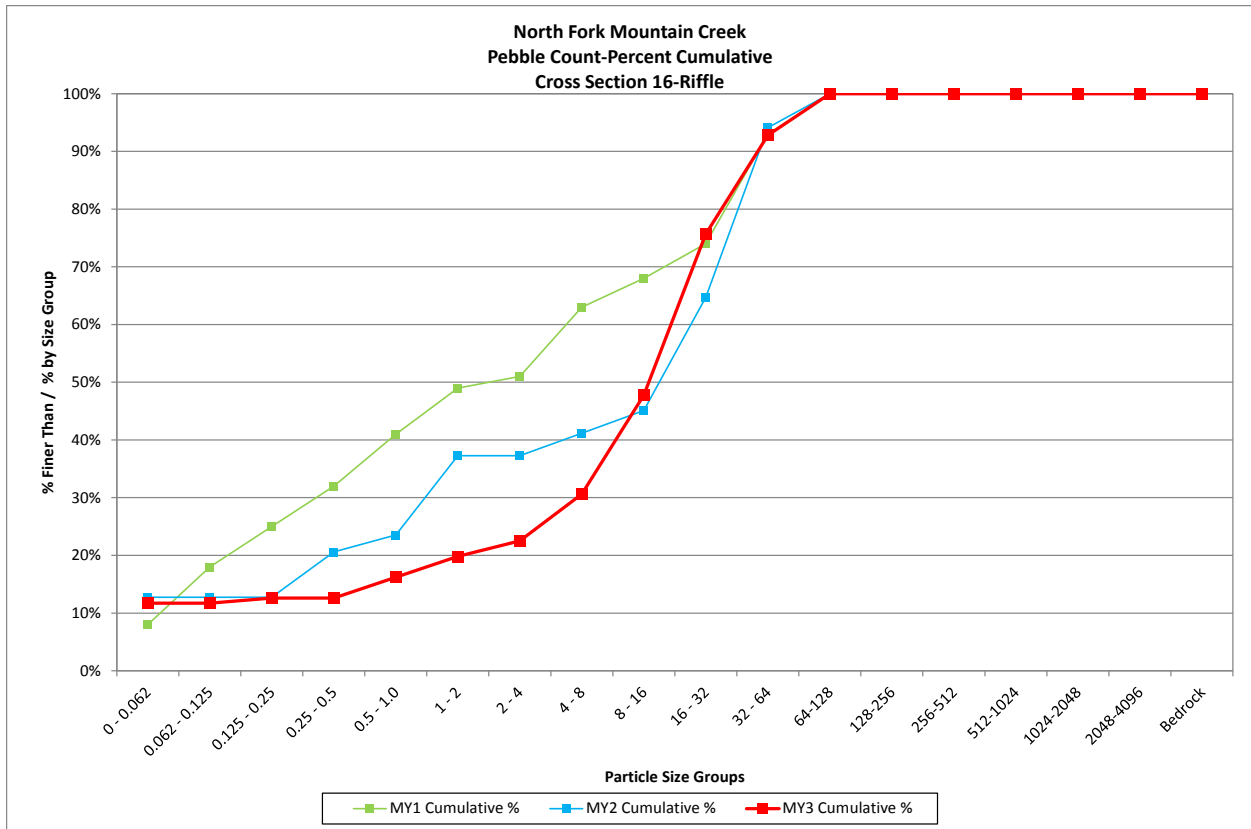
North Fork Mountain Creek			
Cross Section 12 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	83	79.0%	79%
0.062 - 0.125	0	0.0%	79%
0.125 - 0.25	0	0.0%	79%
0.25 - 0.5	0	0.0%	79%
0.5 - 1.0	0	0.0%	79%
1 - 2	0	0.0%	79%
2 - 4	1	1.0%	80%
4 - 8	2	1.9%	82%
8 - 16	5	4.8%	87%
16 - 32	11	10.5%	97%
32 - 64	3	2.9%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	105	100%	100%
		Summary Data	
		D50	0.062
		D84	12
		D95	28



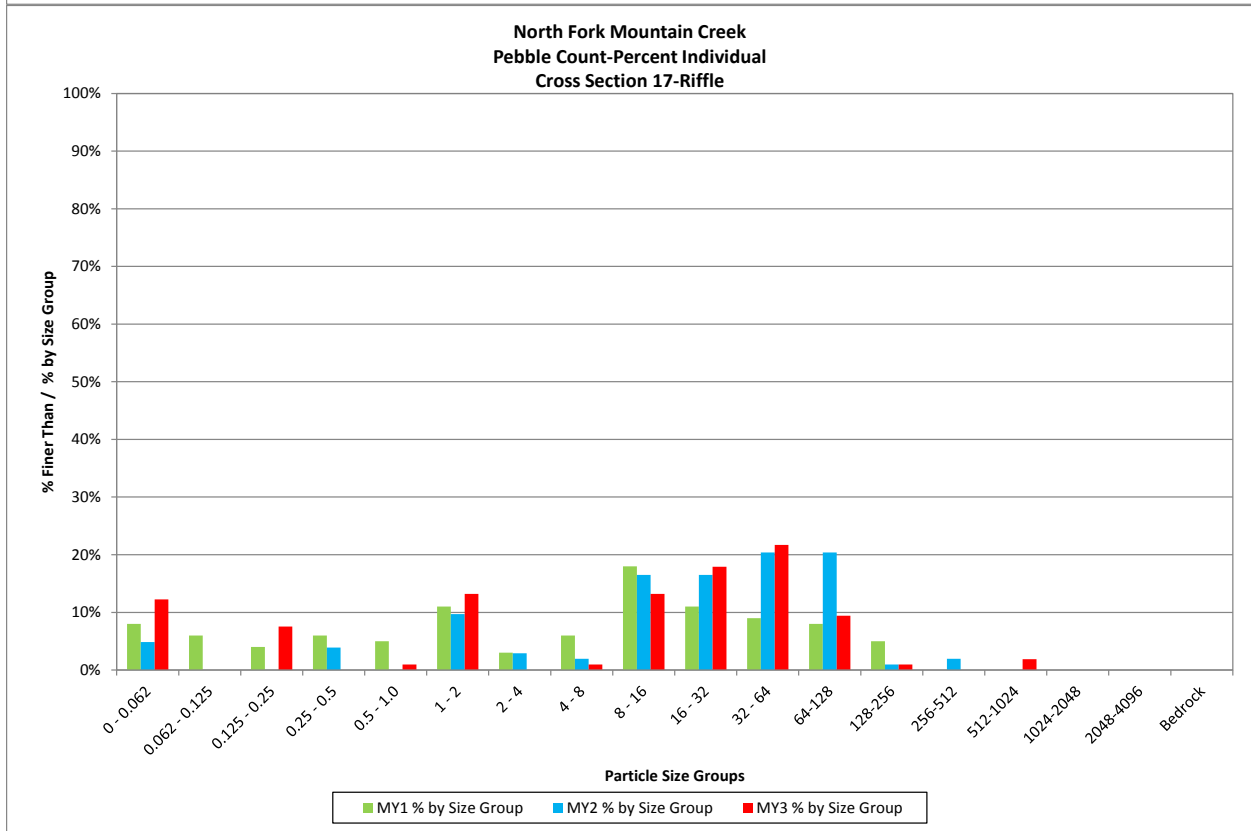
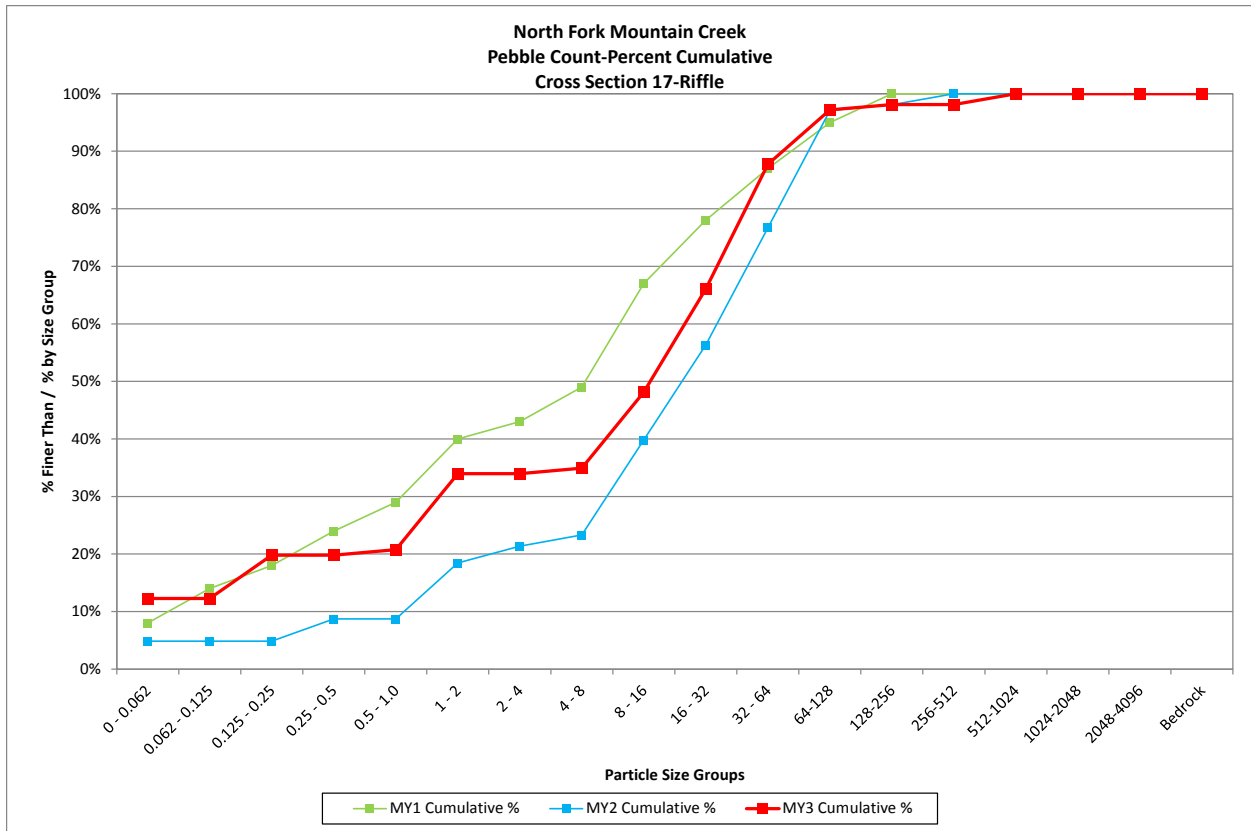
North Fork Mountain Creek			
Cross Section 15 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	9	8.6%	9%
0.062 - 0.125	0	0.0%	9%
0.125 - 0.25	0	0.0%	9%
0.25 - 0.5	0	0.0%	9%
0.5 - 1.0	3	2.9%	11%
1 - 2	11	10.5%	22%
2 - 4	12	11.4%	33%
4 - 8	12	11.4%	45%
8 - 16	14	13.3%	58%
16 - 32	25	23.8%	82%
32 - 64	14	13.3%	95%
64-128	4	3.8%	99%
128-256	0	0.0%	99%
256-512	0	0.0%	99%
512-1024	0	0.0%	99%
1024-2048	0	0.0%	99%
2048-4096	0	0.0%	99%
Bedrock	1	1.0%	100%
Total	105	100%	100%
		Summary Data	
		D50	10
		D84	33
		D95	56



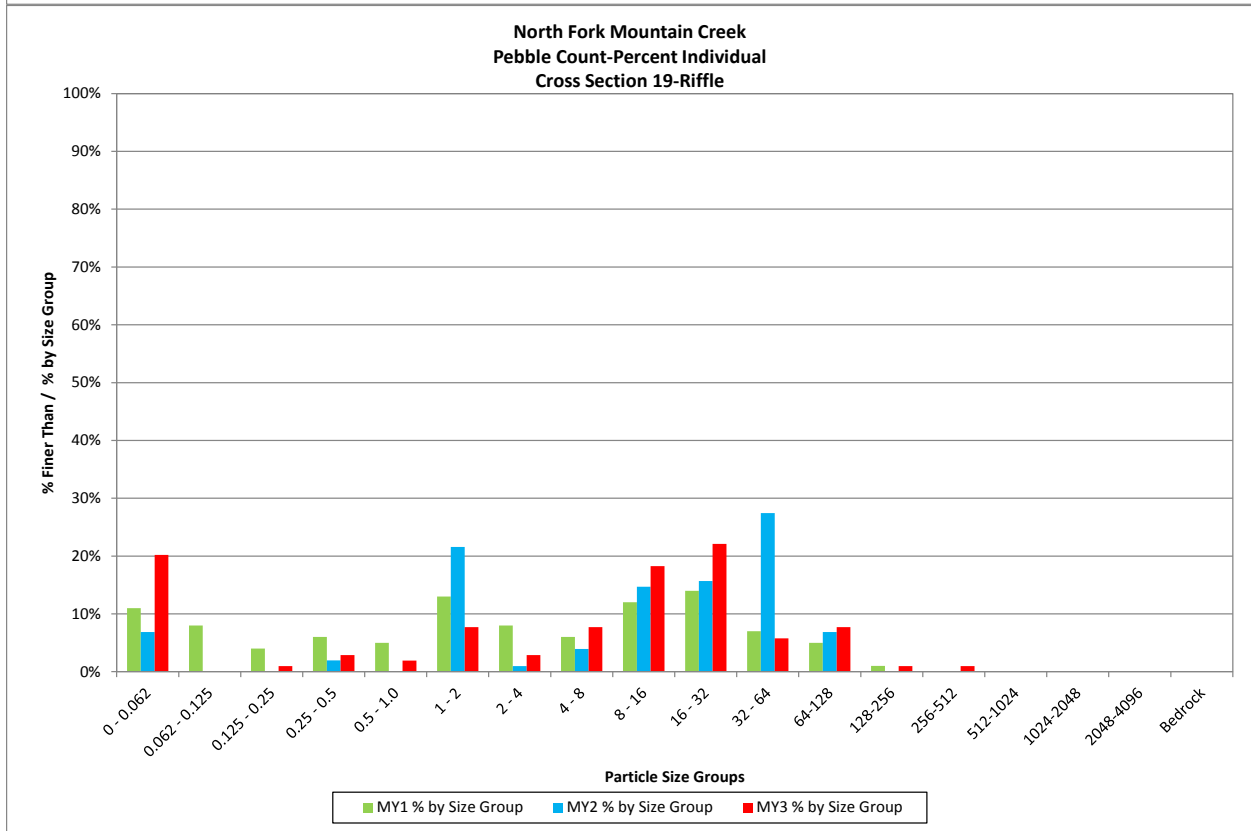
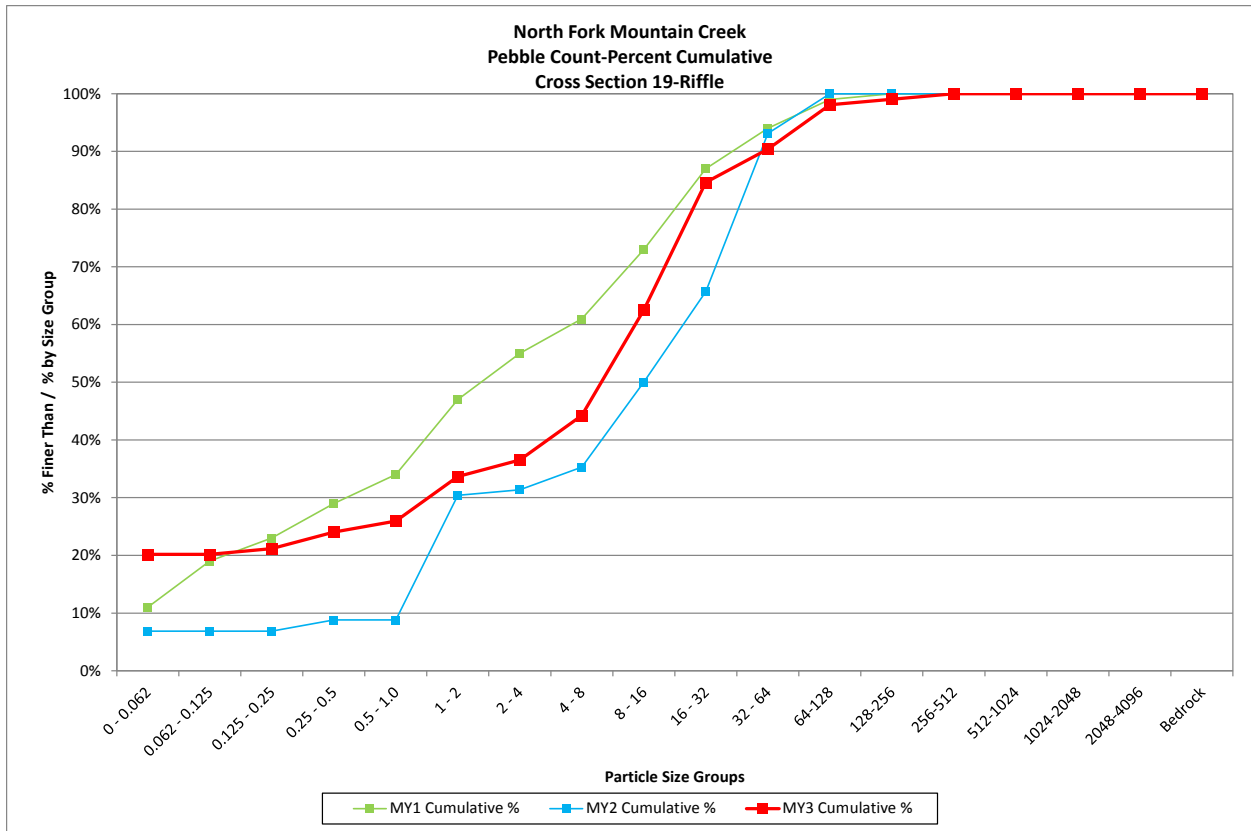
North Fork Mountain Creek			
Cross Section 16 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	13	11.7%	12%
0.062 - 0.125	0	0.0%	12%
0.125 - 0.25	1	0.9%	13%
0.25 - 0.5	0	0.0%	13%
0.5 - 1.0	4	3.6%	16%
1 - 2	4	3.6%	20%
2 - 4	3	2.7%	23%
4 - 8	9	8.1%	31%
8 - 16	19	17.1%	48%
16 - 32	31	27.9%	76%
32 - 64	19	17.1%	93%
64-128	8	7.2%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	111	100%	100%
		Summary Data	
		D50	17
		D84	44
		D95	74



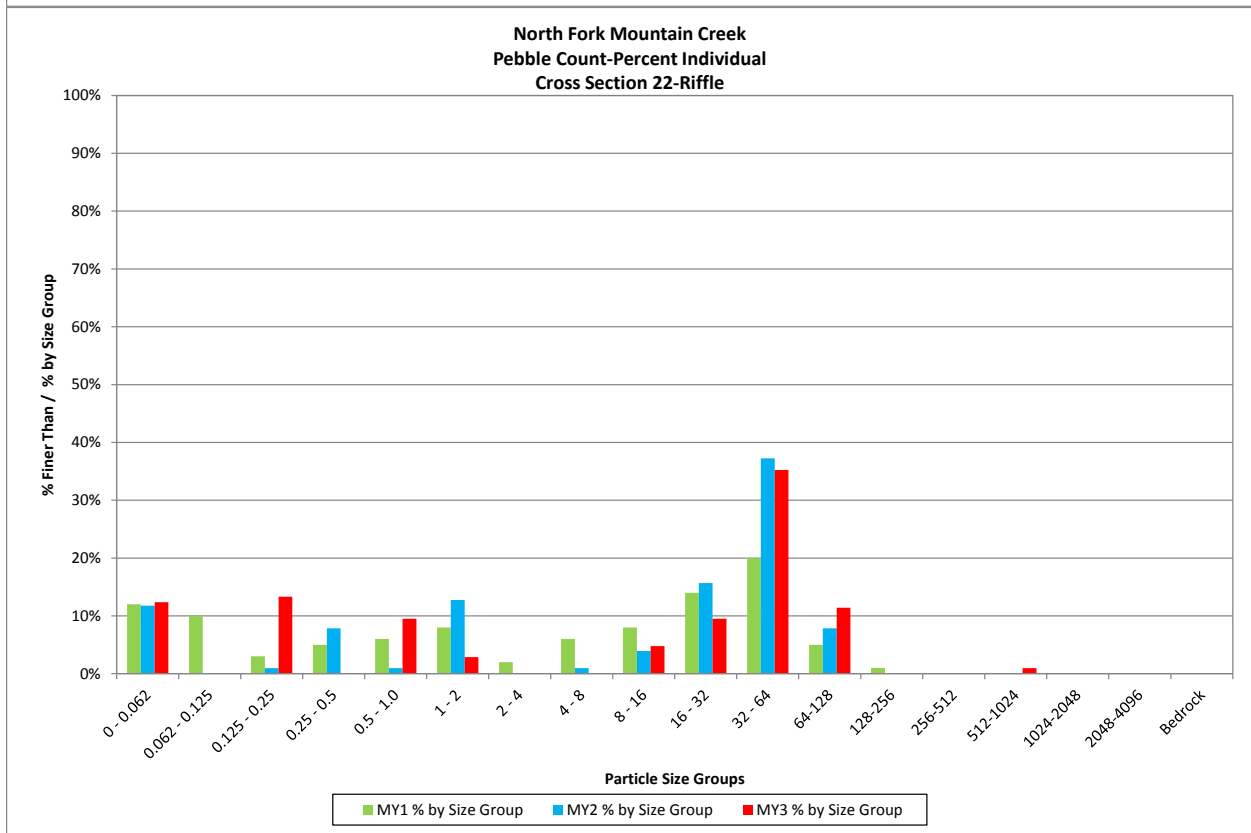
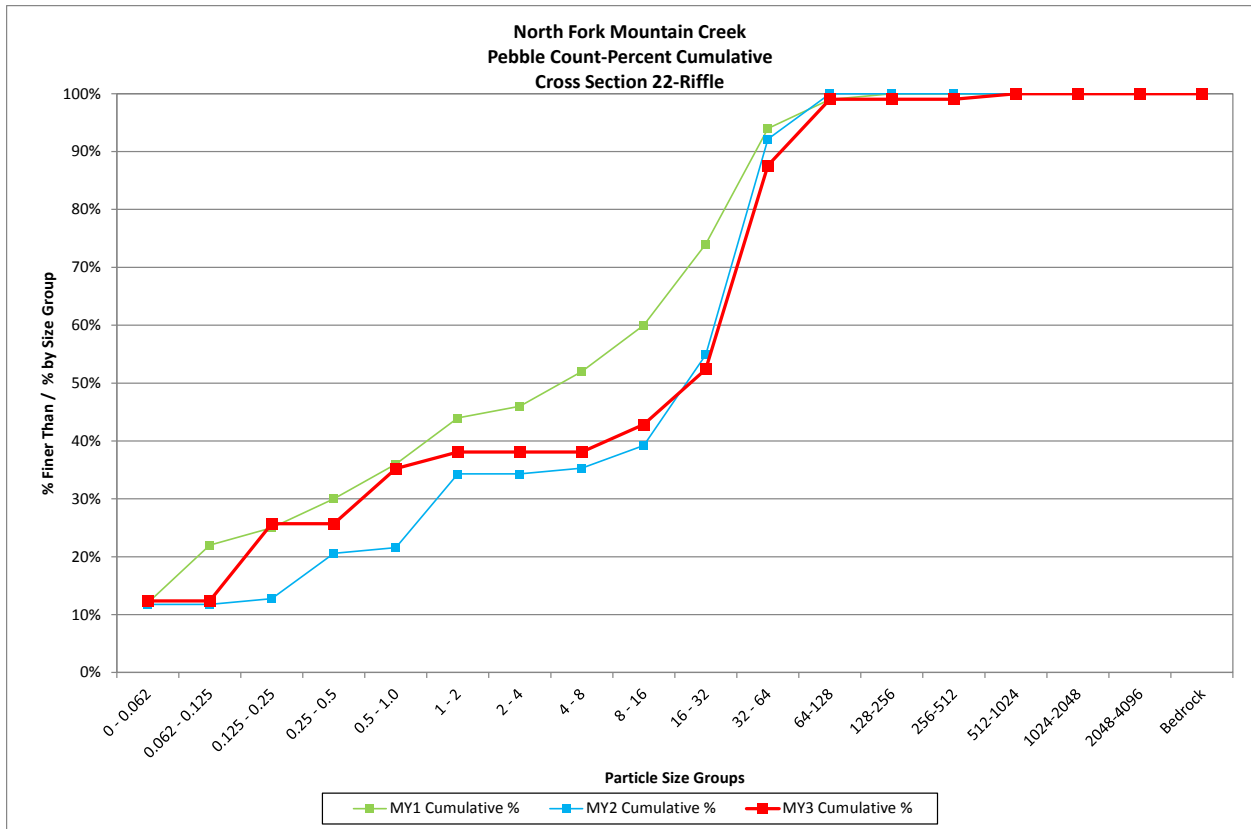
North Fork Mountain Creek			
Cross Section 17 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	13	12.3%	12%
0.062 - 0.125	0	0.0%	12%
0.125 - 0.25	8	7.5%	20%
0.25 - 0.5	0	0.0%	20%
0.5 - 1.0	1	0.9%	21%
1 - 2	14	13.2%	34%
2 - 4	0	0.0%	34%
4 - 8	1	0.9%	35%
8 - 16	14	13.2%	48%
16 - 32	19	17.9%	66%
32 - 64	23	21.7%	88%
64-128	10	9.4%	97%
128-256	1	0.9%	98%
256-512	0	0.0%	98%
512-1024	2	1.9%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	106	100%	100%
		Summary Data	
		D50	18
		D84	58
		D95	86



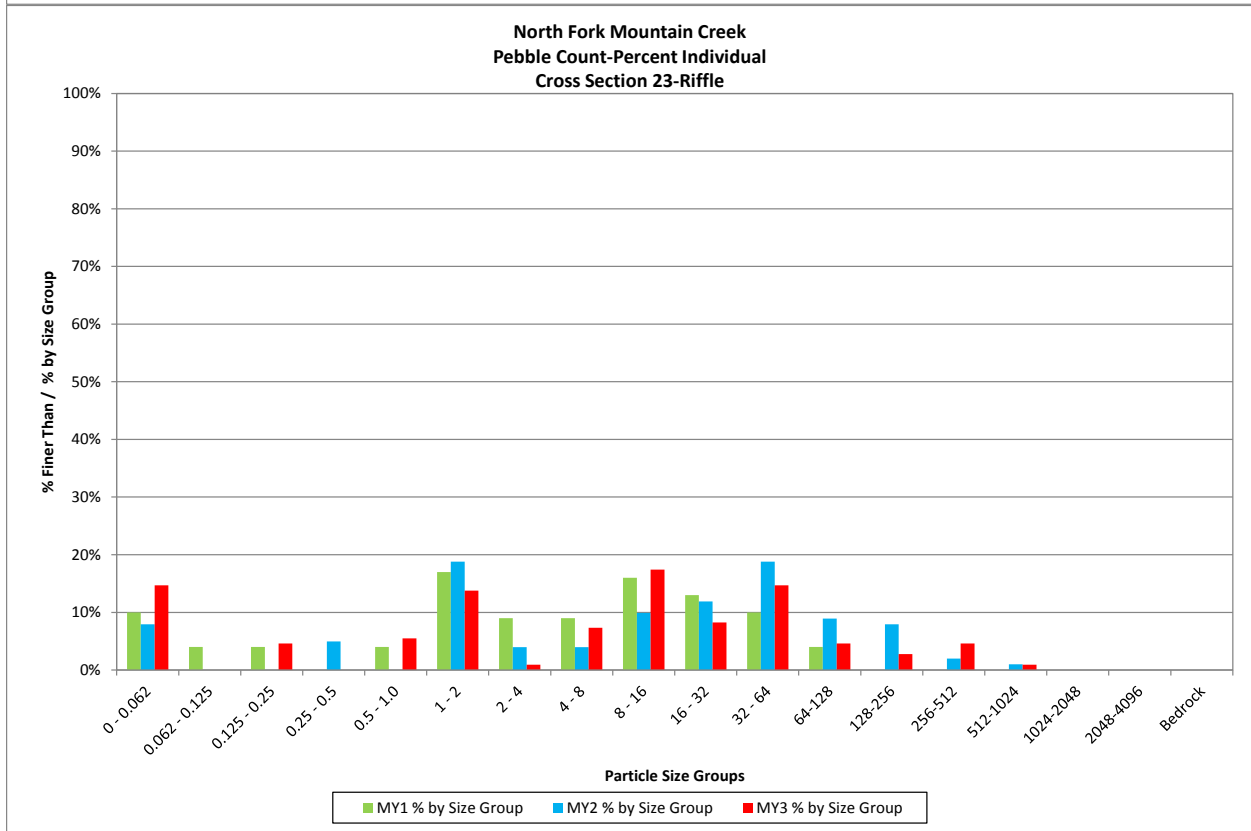
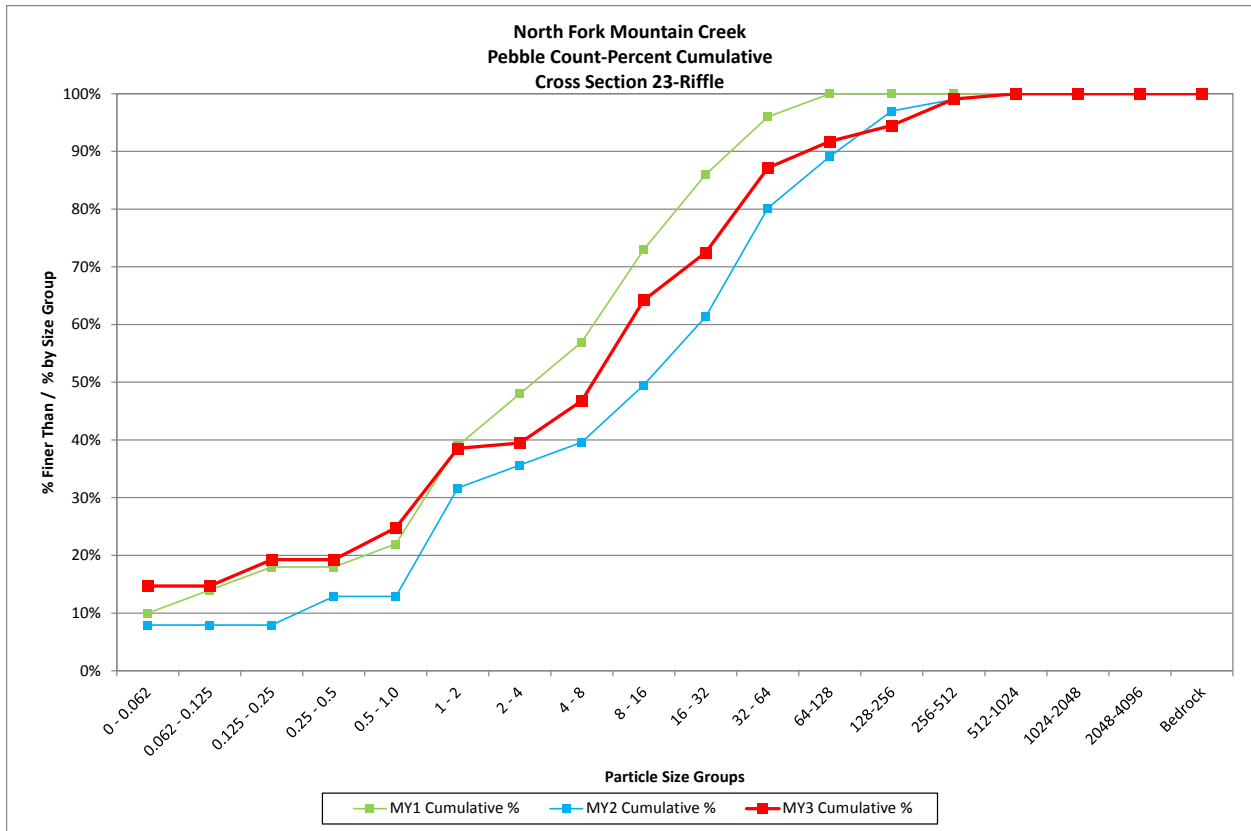
North Fork Mountain Creek			
Cross Section 19 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	21	20.2%	20%
0.062 - 0.125	0	0.0%	20%
0.125 - 0.25	1	1.0%	21%
0.25 - 0.5	3	2.9%	24%
0.5 - 1.0	2	1.9%	26%
1 - 2	8	7.7%	34%
2 - 4	3	2.9%	37%
4 - 8	8	7.7%	44%
8 - 16	19	18.3%	63%
16 - 32	23	22.1%	85%
32 - 64	6	5.8%	90%
64-128	8	7.7%	98%
128-256	1	1.0%	99%
256-512	1	1.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	104	100%	100%
		Summary Data	
		D50	12
		D84	31
		D95	84



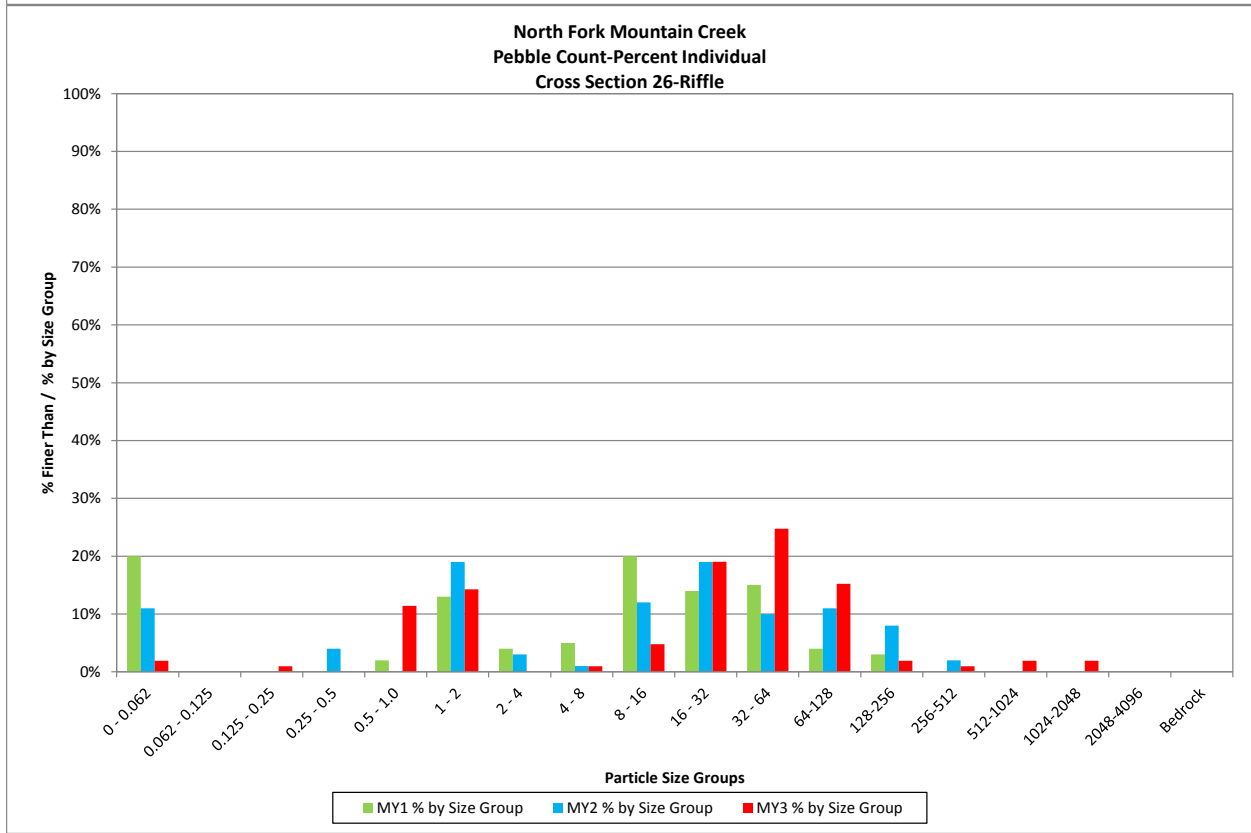
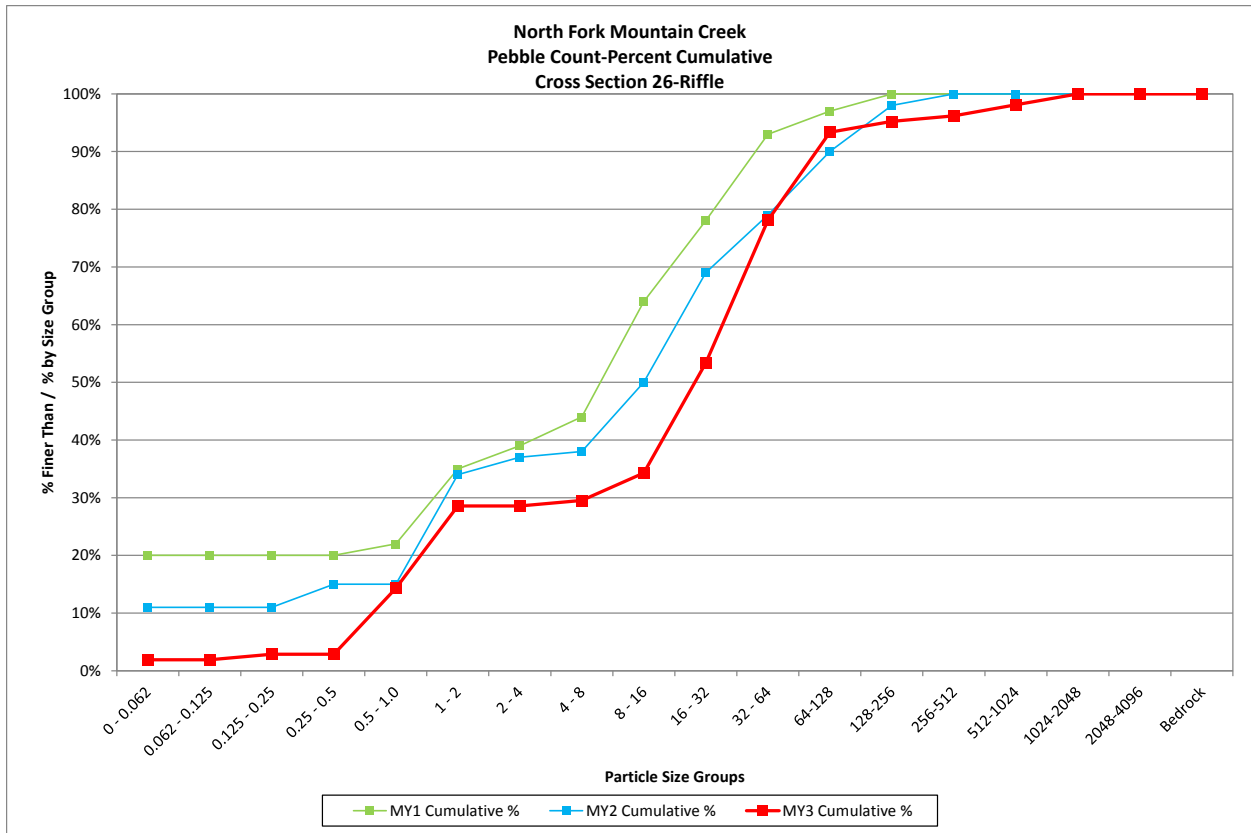
North Fork Mountain Creek			
Cross Section 22 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	13	12.4%	12%
0.062 - 0.125	0	0.0%	12%
0.125 - 0.25	14	13.3%	26%
0.25 - 0.5	0	0.0%	26%
0.5 - 1.0	10	9.5%	35%
1 - 2	3	2.9%	38%
2 - 4	0	0.0%	38%
4 - 8	0	0.0%	38%
8 - 16	5	4.8%	43%
16 - 32	10	9.5%	52%
32 - 64	37	35.2%	88%
64-128	12	11.4%	99%
128-256	0	0.0%	99%
256-512	0	0.0%	99%
512-1024	1	1.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	105	100%	100%
		Summary Data	
		D50	29
		D84	59
		D95	86



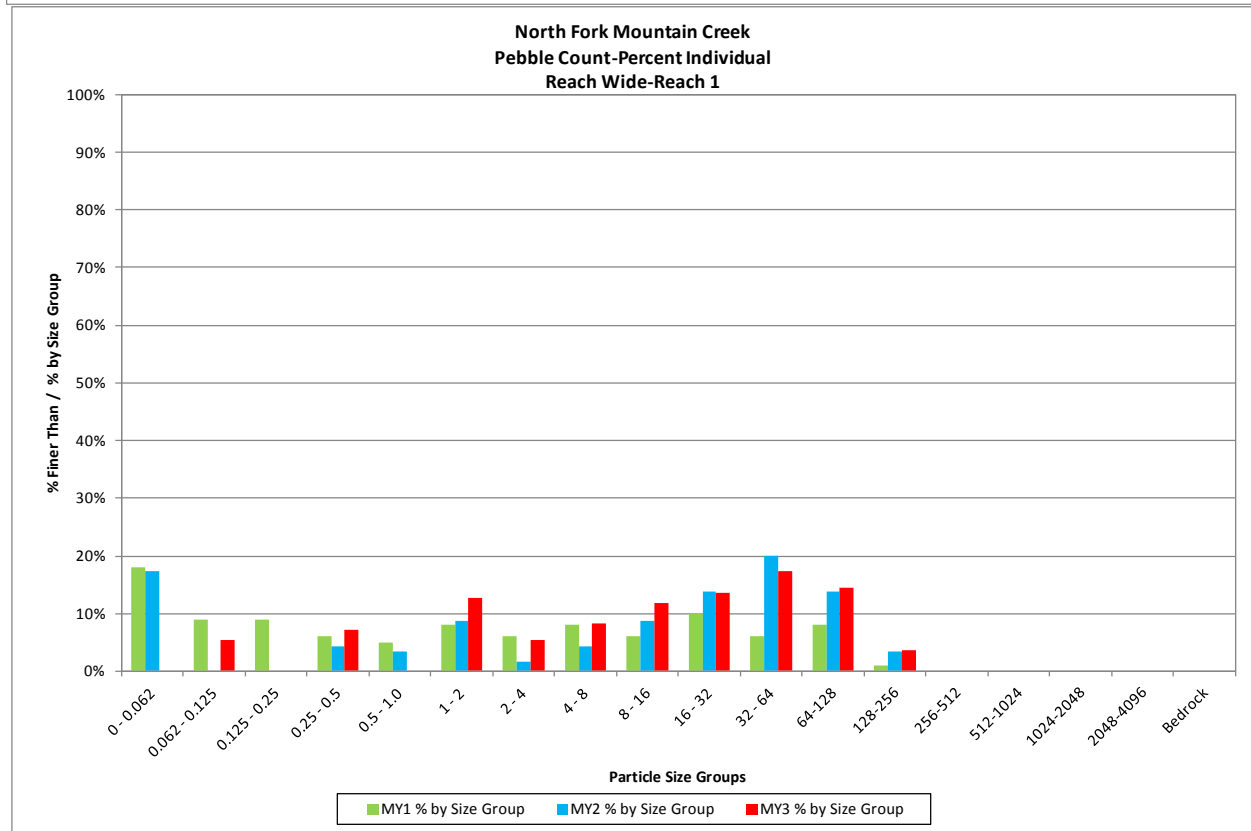
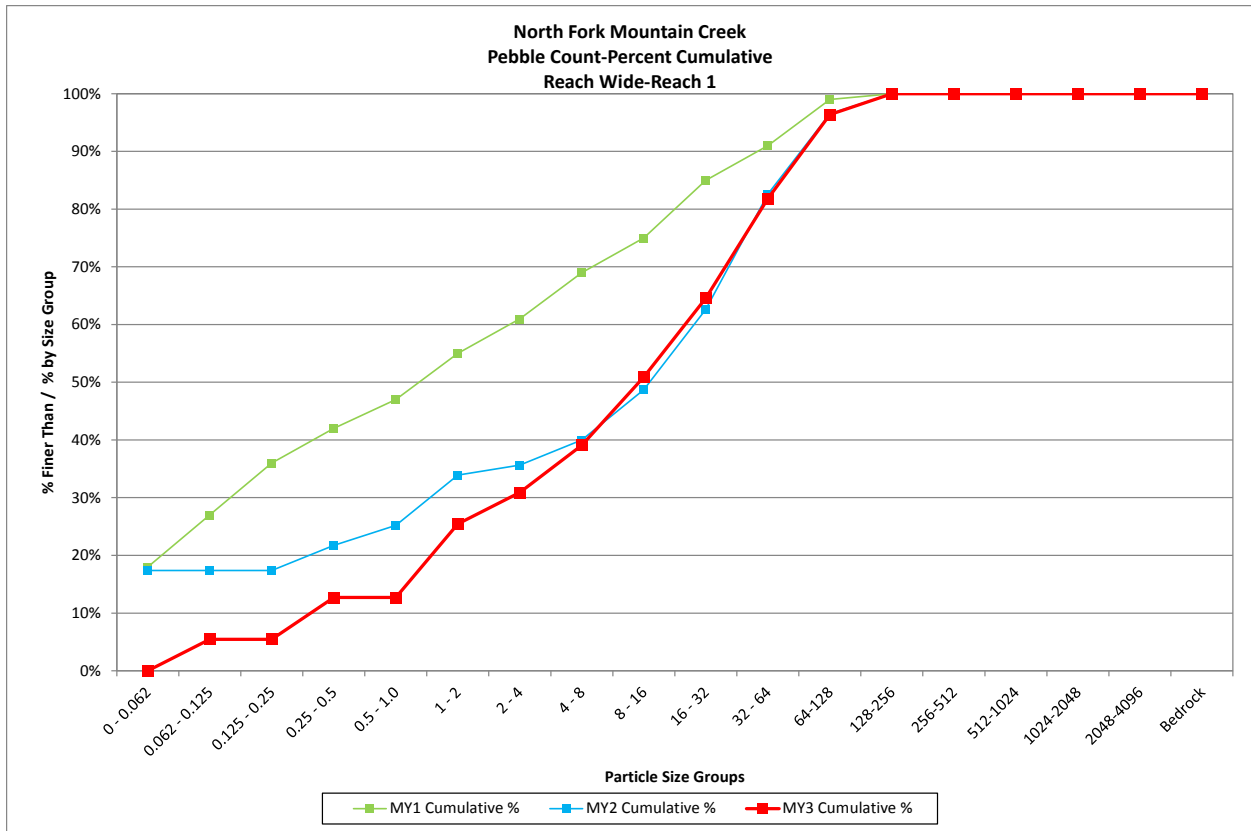
North Fork Mountain Creek			
Cross Section 23 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	16	14.7%	15%
0.062 - 0.125	0	0.0%	15%
0.125 - 0.25	5	4.6%	19%
0.25 - 0.5	0	0.0%	19%
0.5 - 1.0	6	5.5%	25%
1 - 2	15	13.8%	39%
2 - 4	1	0.9%	39%
4 - 8	8	7.3%	47%
8 - 16	19	17.4%	64%
16 - 32	9	8.3%	72%
32 - 64	16	14.7%	87%
64-128	5	4.6%	92%
128-256	3	2.8%	94%
256-512	5	4.6%	99%
512-1024	1	0.9%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	109	100%	100%
		Summary Data	
		D50	8.9
		D84	54
		D95	280



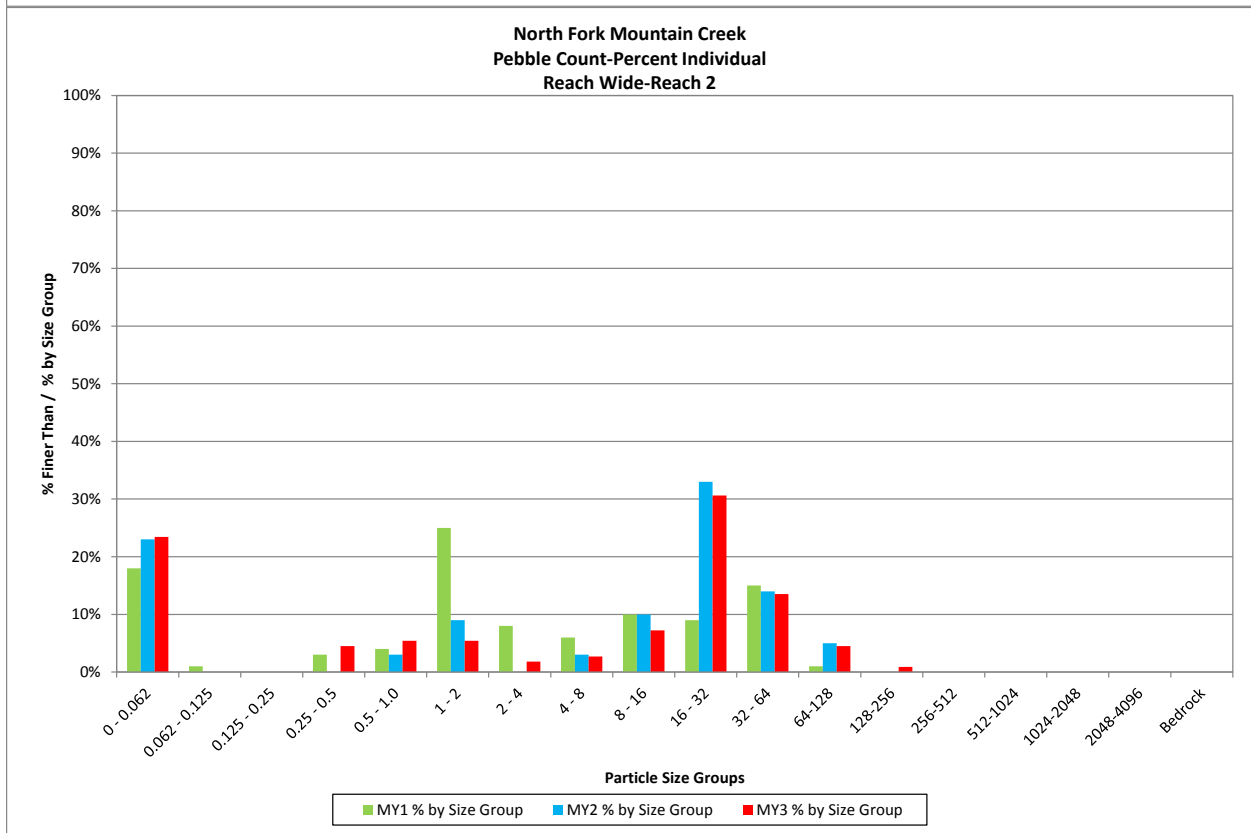
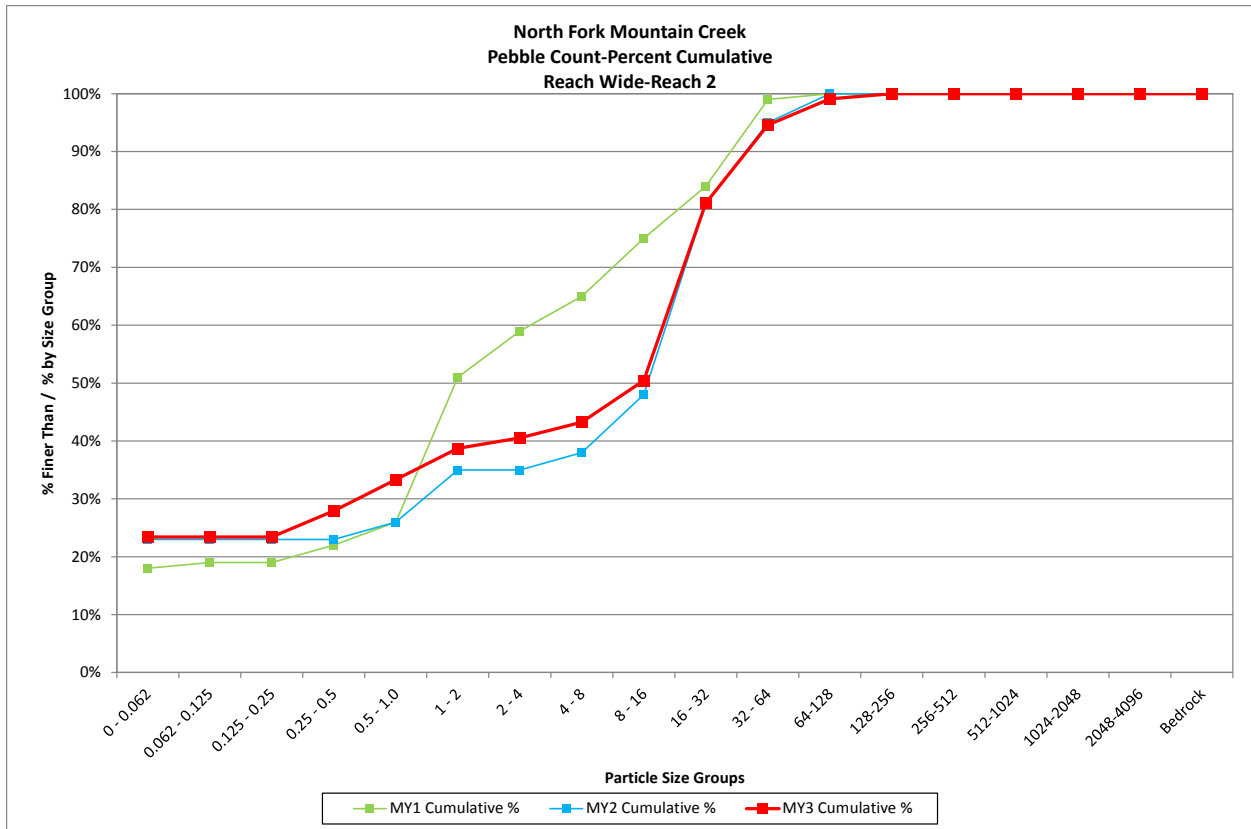
North Fork Mountain Creek			
Cross Section 26 - Riffle			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	2	1.9%	2%
0.062 - 0.125	0	0.0%	2%
0.125 - 0.25	1	1.0%	3%
0.25 - 0.5	0	0.0%	3%
0.5 - 1.0	12	11.4%	14%
1 - 2	15	14.3%	29%
2 - 4	0	0.0%	29%
4 - 8	1	1.0%	30%
8 - 16	5	4.8%	34%
16 - 32	20	19.0%	53%
32 - 64	26	24.8%	78%
64-128	16	15.2%	93%
128-256	2	1.9%	95%
256-512	1	1.0%	96%
512-1024	2	1.9%	98%
1024-2048	2	1.9%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	105	100%	100%
		Summary Data	
		D50	29
		D84	75
		D95	170



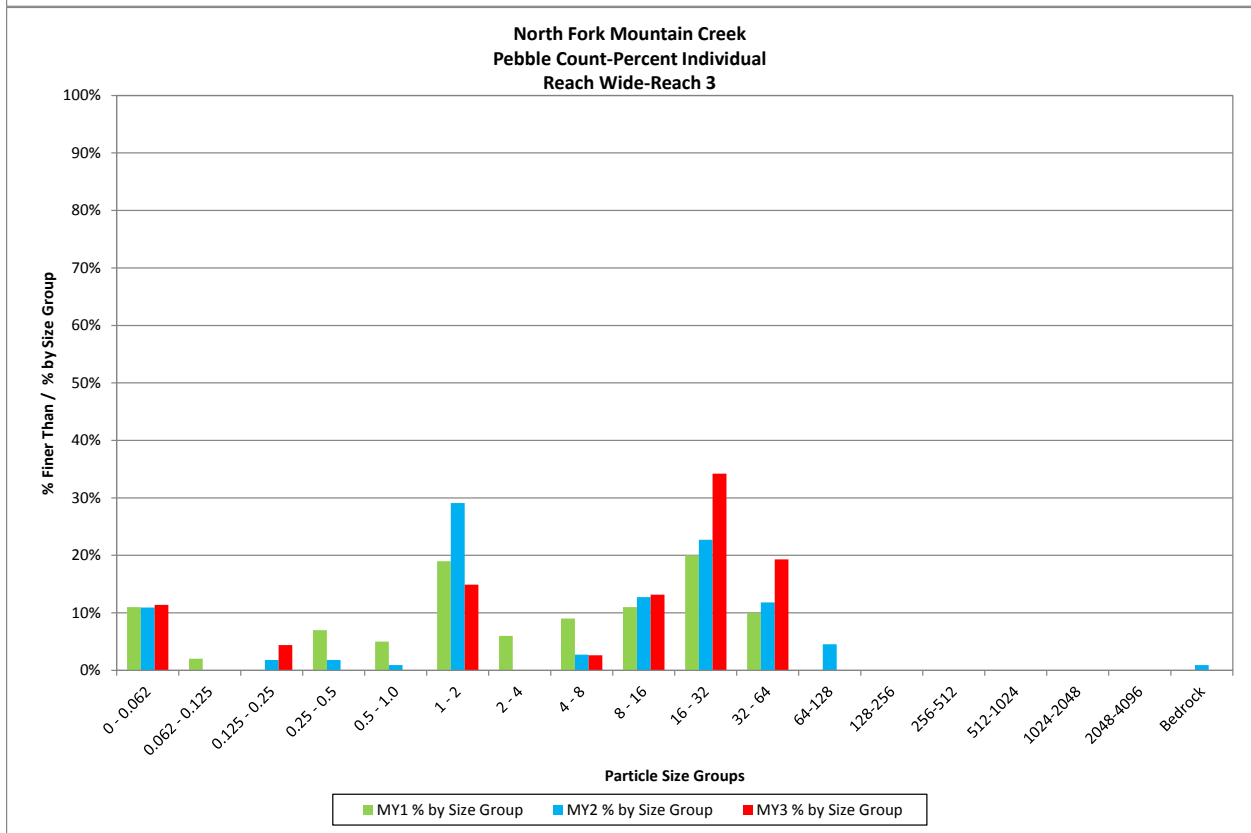
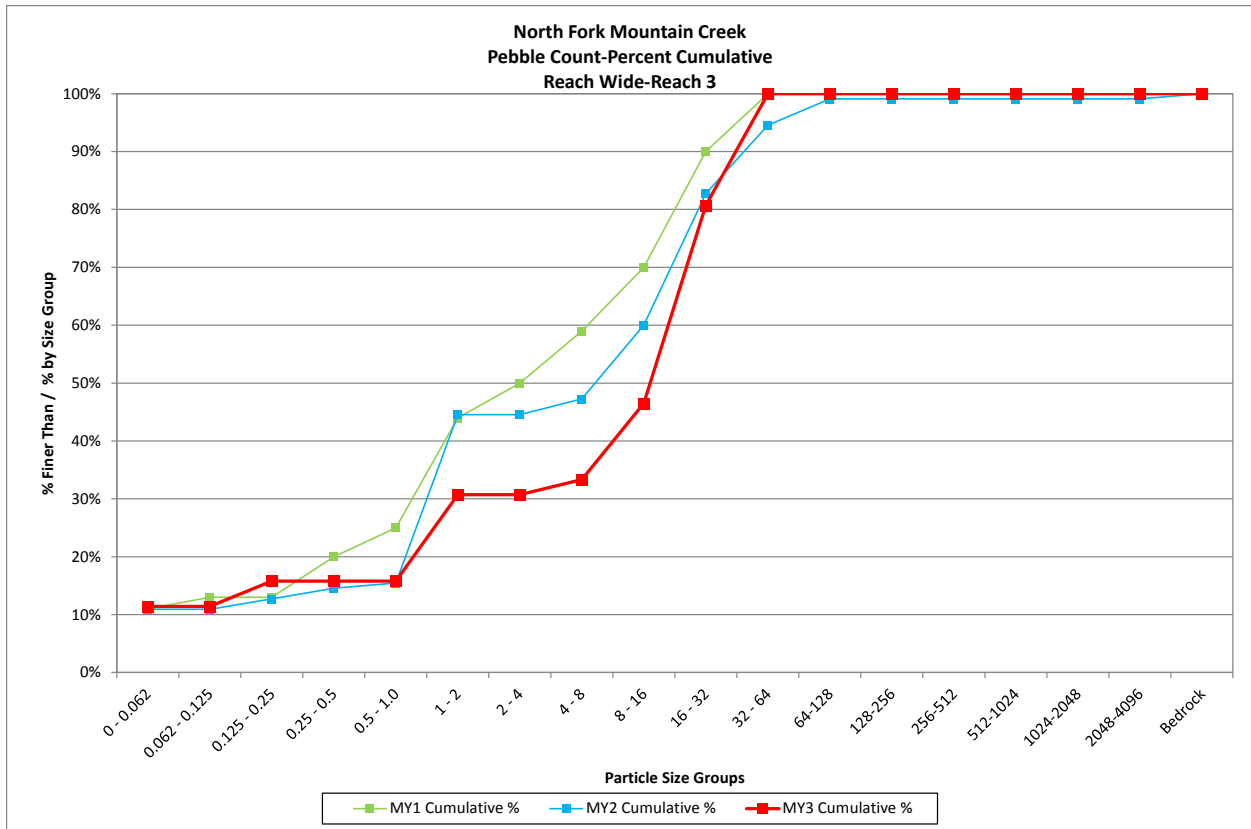
North Fork Mountain Creek			
Reach-Wide Count 1- Reach			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	0	0.0%	0%
0.062 - 0.125	6	5.5%	5%
0.125 - 0.25	0	0.0%	5%
0.25 - 0.5	8	7.3%	13%
0.5 - 1.0	0	0.0%	13%
1 - 2	14	12.7%	25%
2 - 4	6	5.5%	31%
4 - 8	9	8.2%	39%
8 - 16	13	11.8%	51%
16 - 32	15	13.6%	65%
32 - 64	19	17.3%	82%
64-128	16	14.5%	96%
128-256	4	3.6%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	110	100%	100%
		Summary Data	
		D50	15
		D84	70
		D95	120



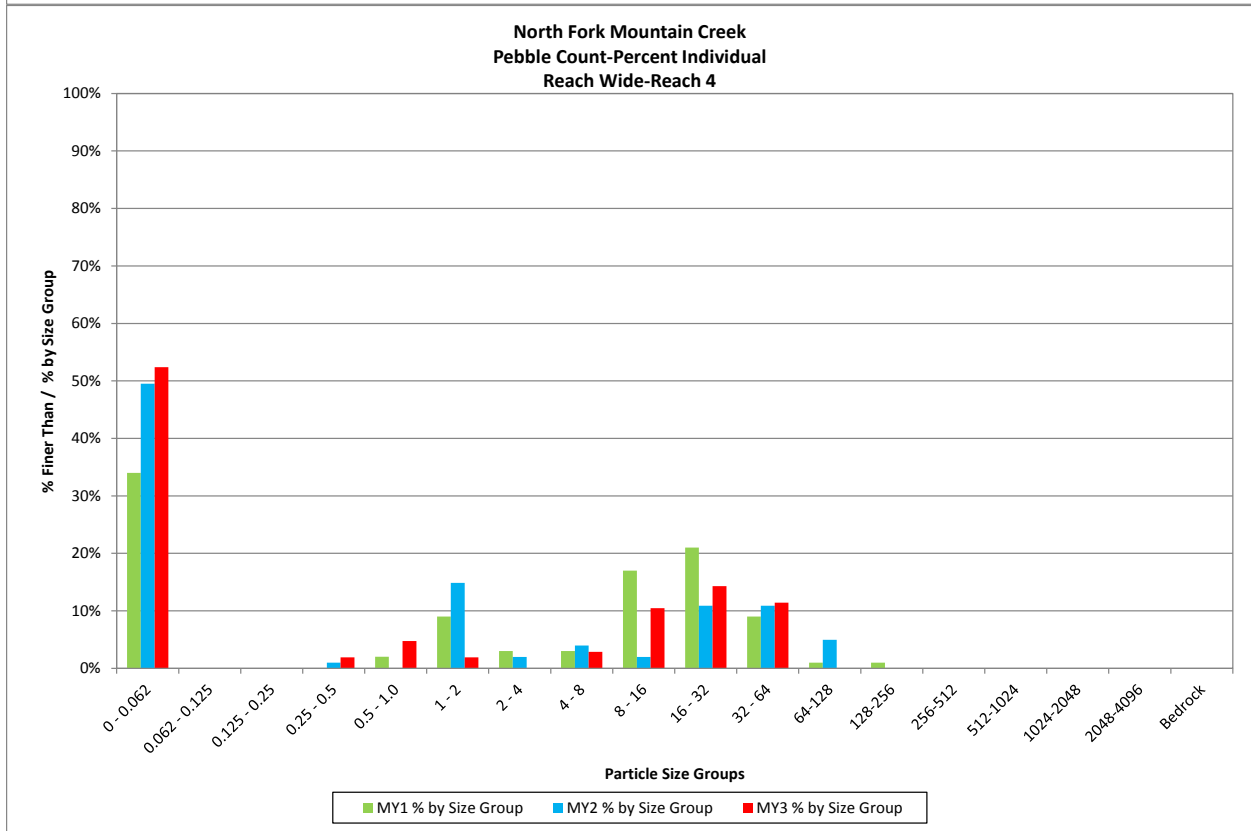
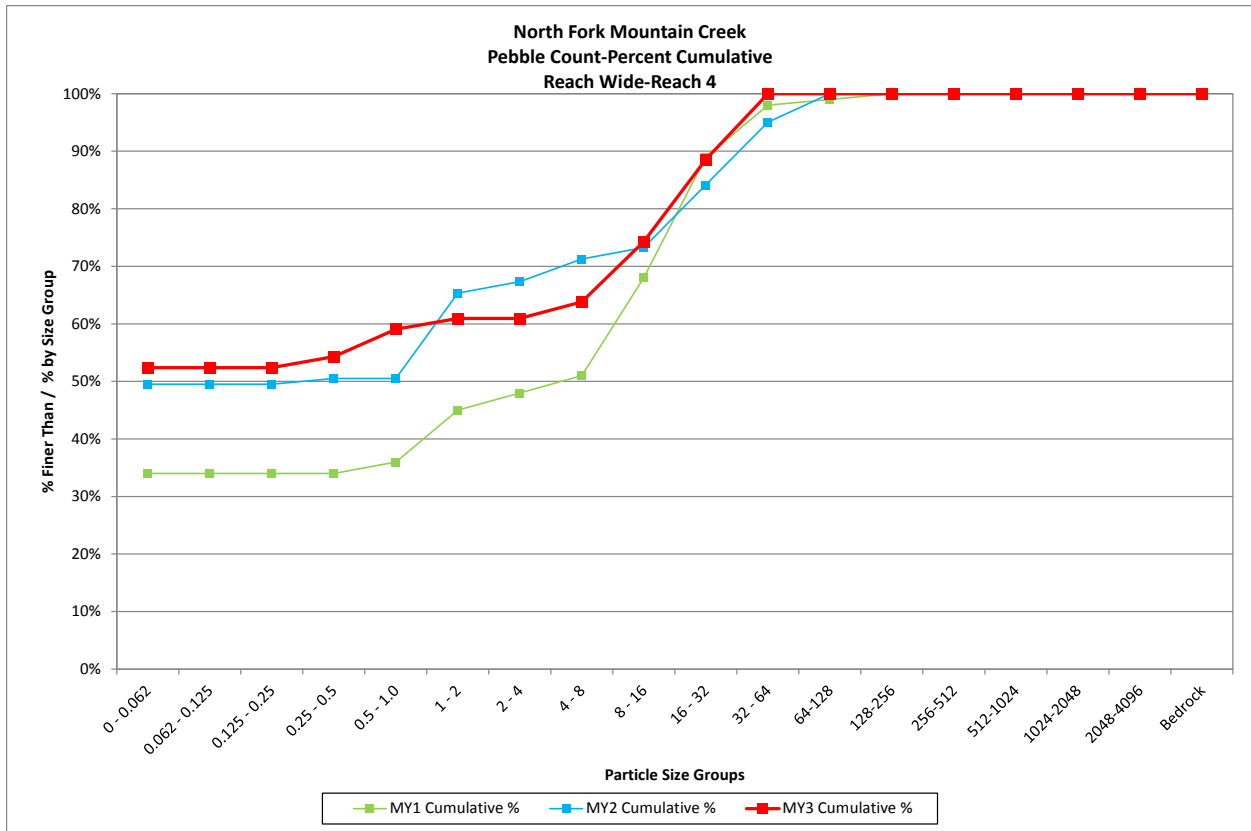
North Fork Mountain Creek			
Reach-Wide Count 2- Reach			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	26	23.4%	23%
0.062 - 0.125	0	0.0%	23%
0.125 - 0.25	0	0.0%	23%
0.25 - 0.5	5	4.5%	28%
0.5 - 1.0	6	5.4%	33%
1 - 2	6	5.4%	39%
2 - 4	2	1.8%	41%
4 - 8	3	2.7%	43%
8 - 16	8	7.2%	50%
16 - 32	34	30.6%	81%
32 - 64	15	13.5%	95%
64-128	5	4.5%	99%
128-256	1	0.9%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	111	100%	100%
		Summary Data	
		D50	15
		D84	35
		D95	66



North Fork Mountain Creek			
Reach-Wide Count 3- Reach			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	13	11.4%	11%
0.062 - 0.125	0	0.0%	11%
0.125 - 0.25	5	4.4%	16%
0.25 - 0.5	0	0.0%	16%
0.5 - 1.0	0	0.0%	16%
1 - 2	17	14.9%	31%
2 - 4	0	0.0%	31%
4 - 8	3	2.6%	33%
8 - 16	15	13.2%	46%
16 - 32	39	34.2%	81%
32 - 64	22	19.3%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	114	100%	100%
		Summary Data	
		D50	17
		D84	36
		D95	52



North Fork Mountain Creek			
Reach-Wide Count 4- Reach			
Monitoring Year - 2014; MY3			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	55	52.4%	52%
0.062 - 0.125	0	0.0%	52%
0.125 - 0.25	0	0.0%	52%
0.25 - 0.5	2	1.9%	54%
0.5 - 1.0	5	4.8%	59%
1 - 2	2	1.9%	61%
2 - 4	0	0.0%	61%
4 - 8	3	2.9%	64%
8 - 16	11	10.5%	74%
16 - 32	15	14.3%	89%
32 - 64	12	11.4%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	105	100%	100%
		Summary Data	
		D50	0.062
		D84	28
		D95	43



Appendix E
Hydrologic Data

Month/Year Recorded	Documentation ¹	North Fork Mountain Creek	UT1
		Reach 1	Reach 2
		(feet above bankfull)	(feet above bankfull)
Aug-12	Crest Gauge/Wrack Lines	-- ²	0.58
Jan-13	Wrack Lines	--	--
Feb-14	Wrack Lines/Crest Gauge	0.33	--

¹See Appendix D for photo documentation

²Crest Gauge was damaged from bankfull event; no reading was recorded.

Month	Catawba County ¹			NCCRONOS	North Fork Mountain Creek Precipitation (Inches) ²	South Fork Mountain Creek Precipitation (Inches) ³
	Average (inches)	Normal Limits		Hickory		
		(inches)		NC-CT-2 ¹ Station Precipitation		
		30 Percent	70 Percent	(inches)		
January	3.9	2.64	5.04	2.89	2.96	-
February	3.42	2.33	4.41	2.88	1.49	0.62
March	4.27	3.12	5.17	3.31	-	4.24
April	3.37	2.06	4.57	3.78	-	4.76
May	3.77	2.5	4.68	0.64	2.29	1.63
June	4.27	2.73	5.41	3.53	1.98	1.92
July	3.92	2.43	4.45	3.59	2.96	2.81
August	4	2.73	4.71	5.48	4.97	4.84
September	3.75	2.39	5.2	5.97	2.9	5.23
October	3.4	1.96	3.98	2.15	2.37	2.19
November	3.47	2.33	4.3	0.41	0.48	0.43 ⁴
December	3.21	2.17	3.96	-	-	-
Annual	44.75	40.76	47.22	---	---	---
Average	3.73	2.45	4.66	---	---	---
Period Total	---	---	---	34.63	22.4	28.67

¹ Source NRCS (2002); NCCRONOS (2012); data gap from 5/14-5/20; No data recorded from 11/15-12/31

² Rain gauge malfunction 2/20 - 5/22; Data from 11/15-12/31 will be presented in MY4

³ Rain gauge malfunction 1/1-2/19; No data collected from 11/14-12/31

⁴ Only includes data through 11/12/2014

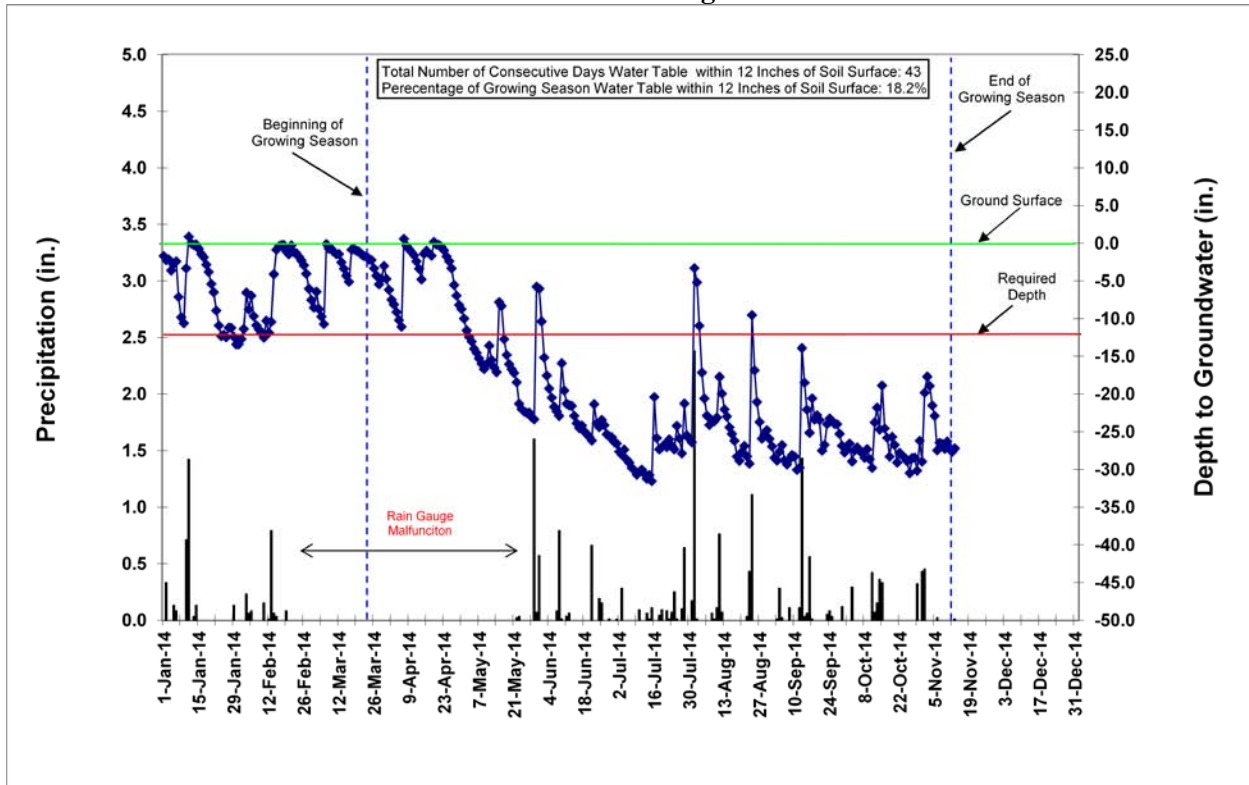
**Table 12. Wetland Gauge Attainment Data
Summary of Groundwater Monitoring Results
North Fork Mountain Creek Stream & Wetland / Project No. 94151**

Gauge ID	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)				
	Year 1 (2012)	Year 2 (2013)	Year 3 (2014)	Year 4 (2015)	Year 5 (2016)
NFMC-1	No/4 1.7 Percent	Yes/32 13.6 Percent	Yes/43 18.2 Percent		
NFMC-2	Yes/86 36.4 Percent	Yes/67 28.4 Percent	Yes/67 28.4 Percent		
NFMC-3	Yes/57 24.2 Percent	Yes/127 53.8 Percent	Yes/91 38.6 Percent		
NFMC-4	No/5 2.1 Percent	No/10 4.2 Percent	No/5 2.1 Percent		
NFMC-5	No/1 0.4 Percent	No/4 1.7 Percent	No/2 0.8 Percent		
NFMC-6	Yes/87 36.9 Percent	Yes/127 53.8 Percent	Yes/67 28.4 Percent		
NFMC-7	Yes/171 72.5 Percent	Yes/127 53.8 Percent	Yes/119 50.4 Percent		
NFMC-8	Yes/57 24.2 Percent	Yes/127 53.8 Percent	Yes/68 28.8 Percent		
NFMC-9	Yes/102 43.2 Percent	Yes/127 53.8 Percent	Yes/92 39.0 Percent		
NFMC-10	No/12 5.1 Percent	Yes/36 15.3 Percent	Yes/43 18.2 Percent		
NFMC-S-1	N/A	N/A	Yes/39 16.5 Percent		
NFMC-S-2	N/A	N/A	Yes/21 8.9 Percent		
NFMC-S-3	N/A	N/A	Yes/30 12.7 Percent		
NFMC-S-4	N/A	N/A	Yes/99 41.9 Percent		

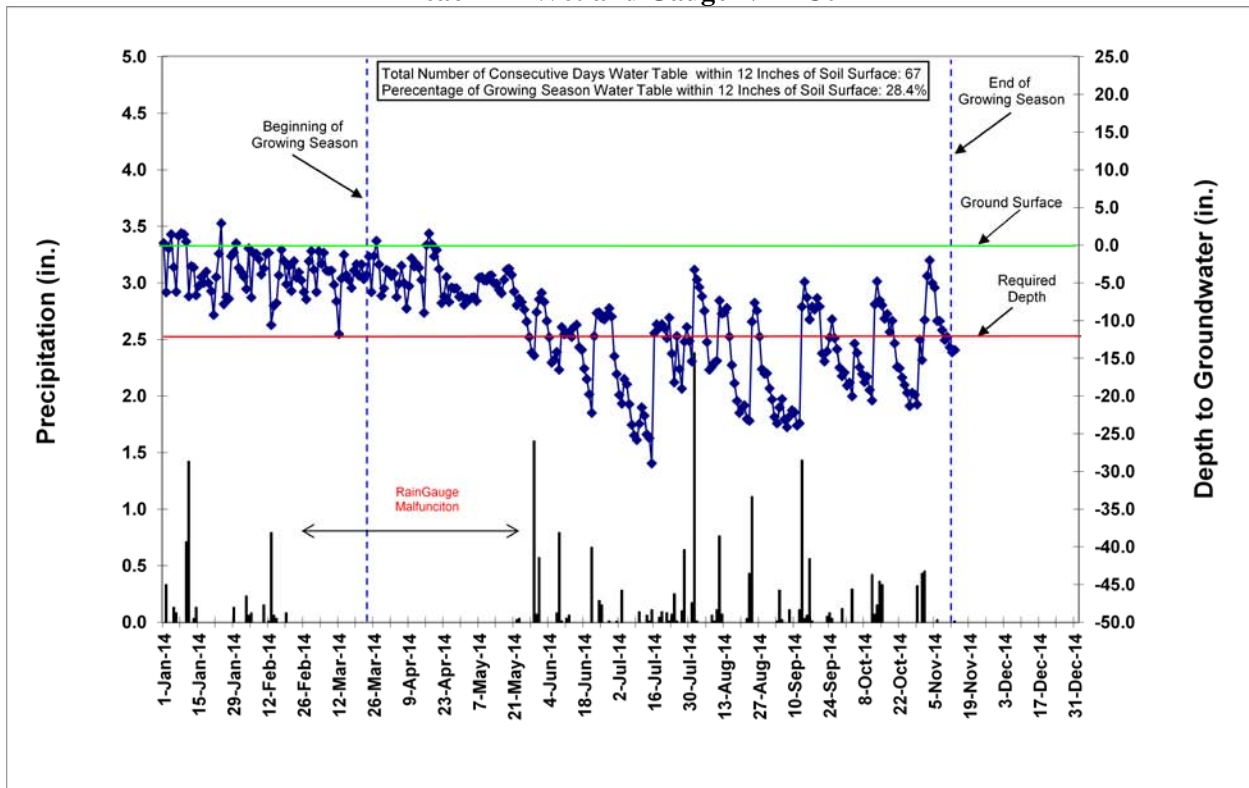
N/A - Information does not apply.

Hydrology Success Criteria = 8%

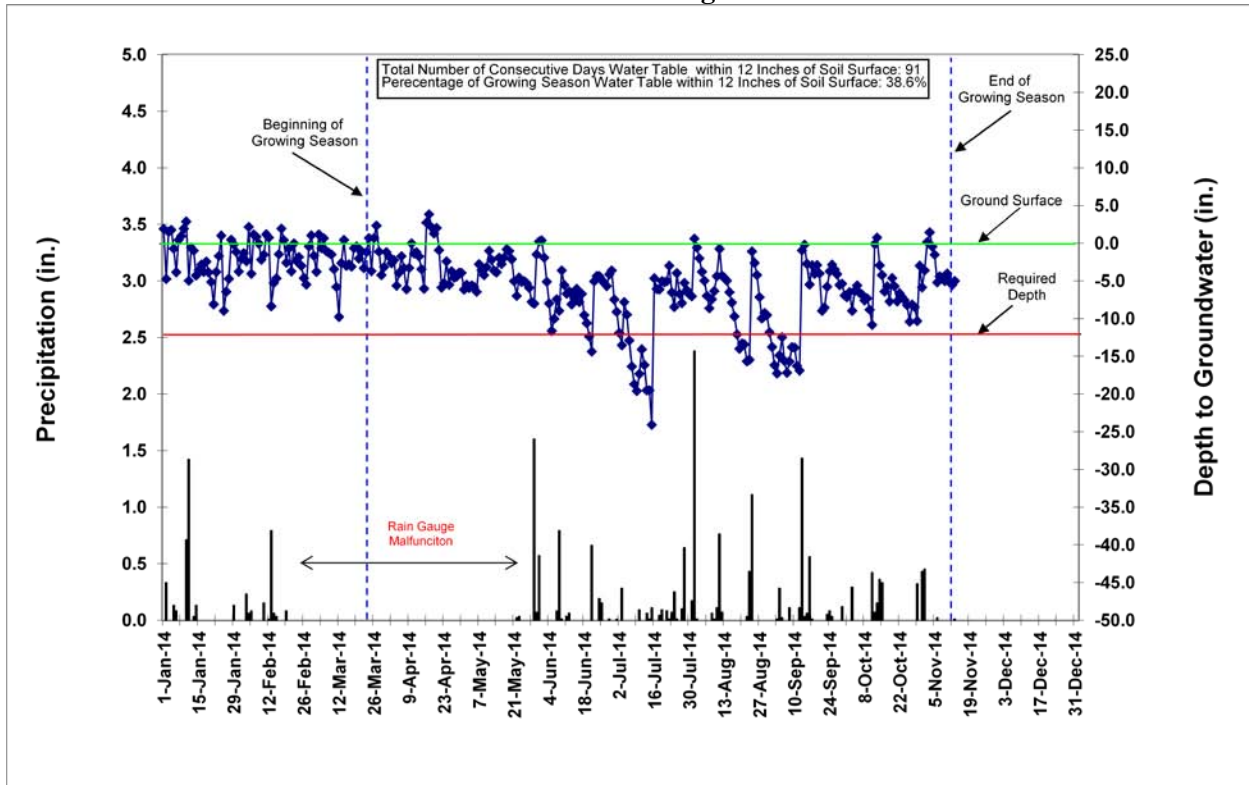
Reach 1 – Wetland Gauge NFMCO1



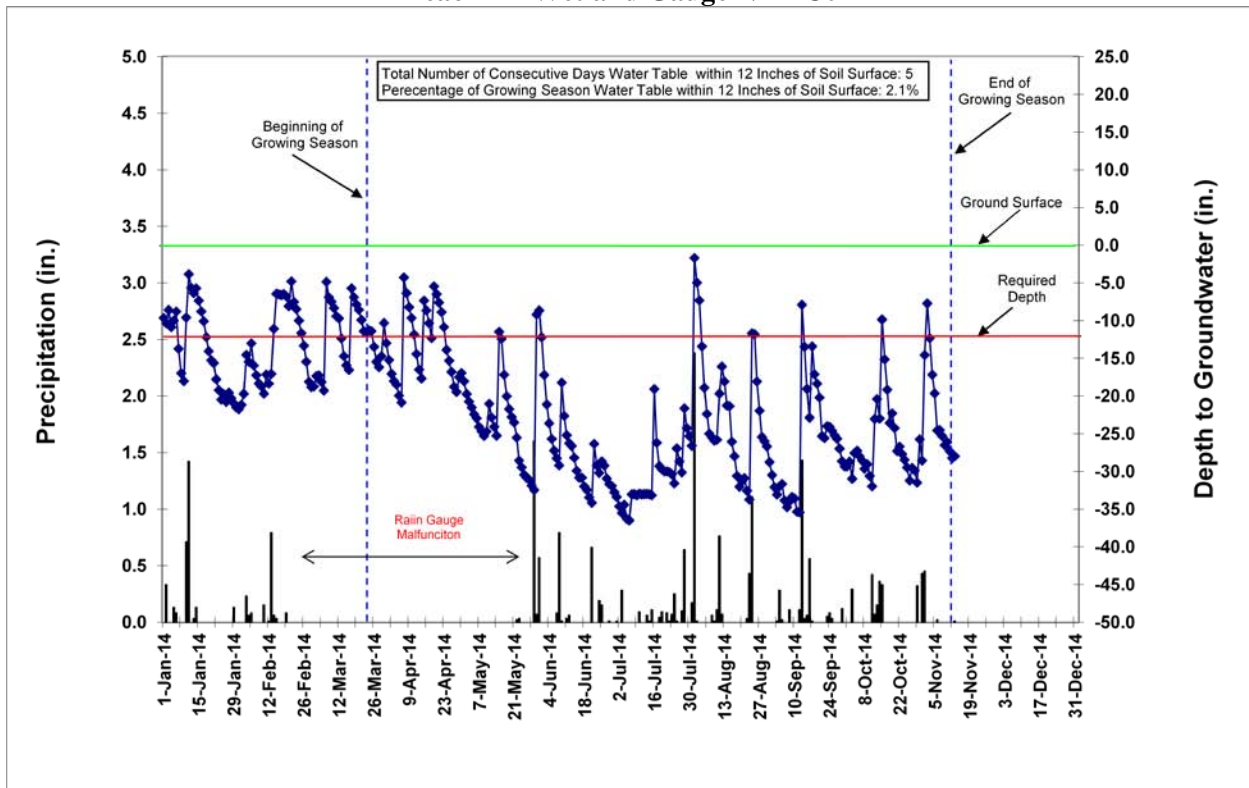
Reach 1 – Wetland Gauge NFMCO2



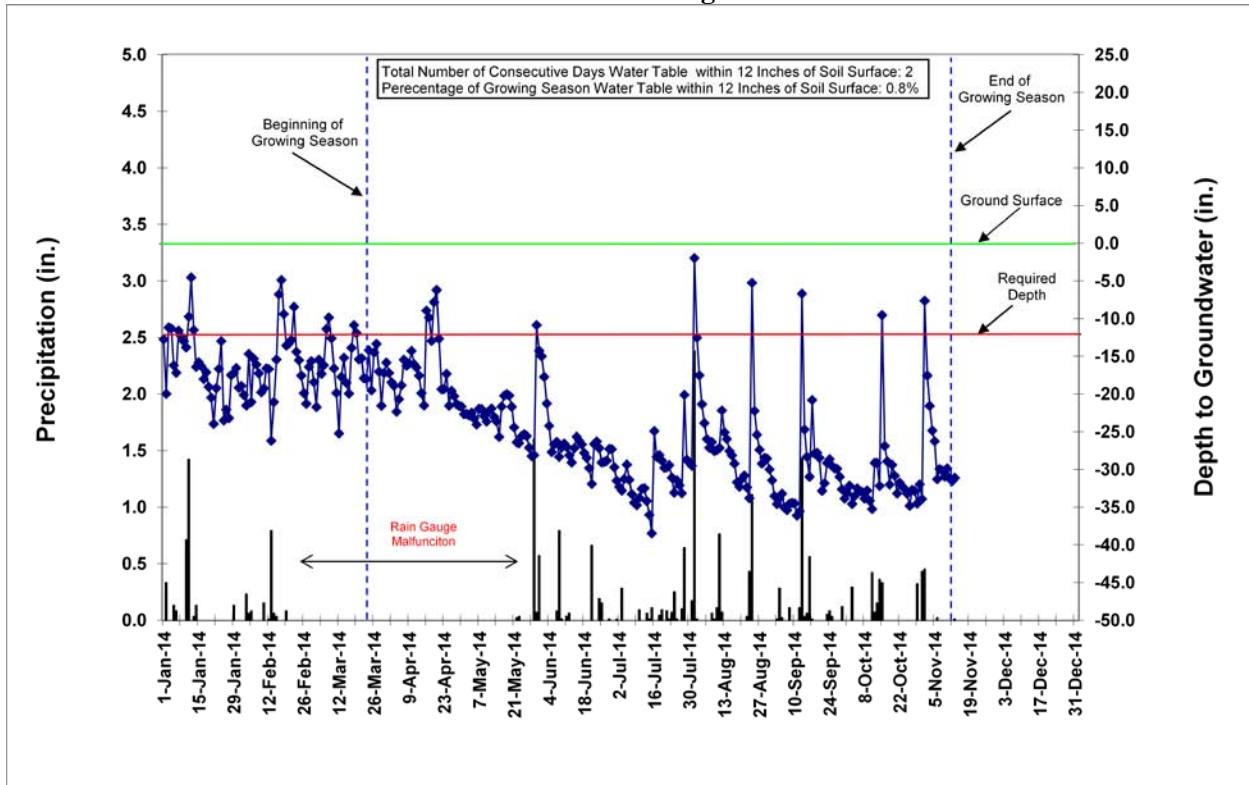
Reach 1 – Wetland Gauge NFMCO3



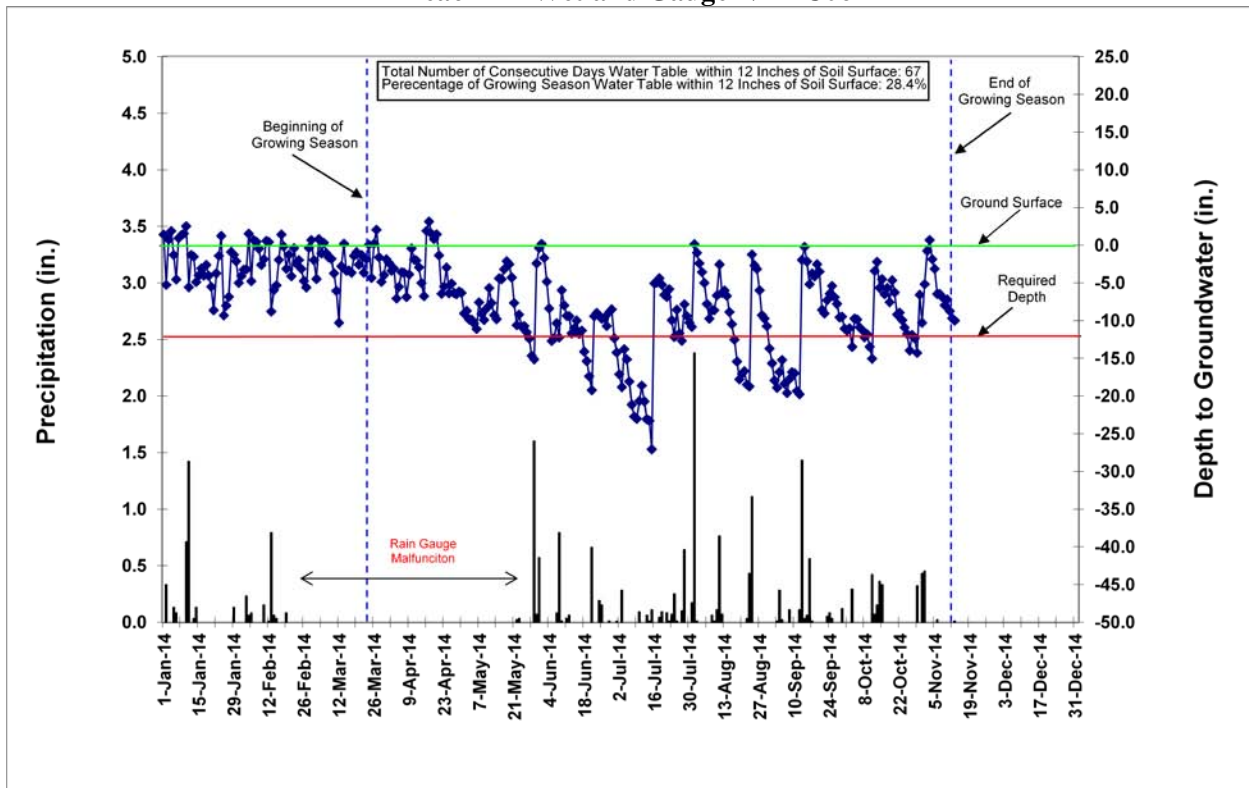
Reach 1 – Wetland Gauge NFMCO4



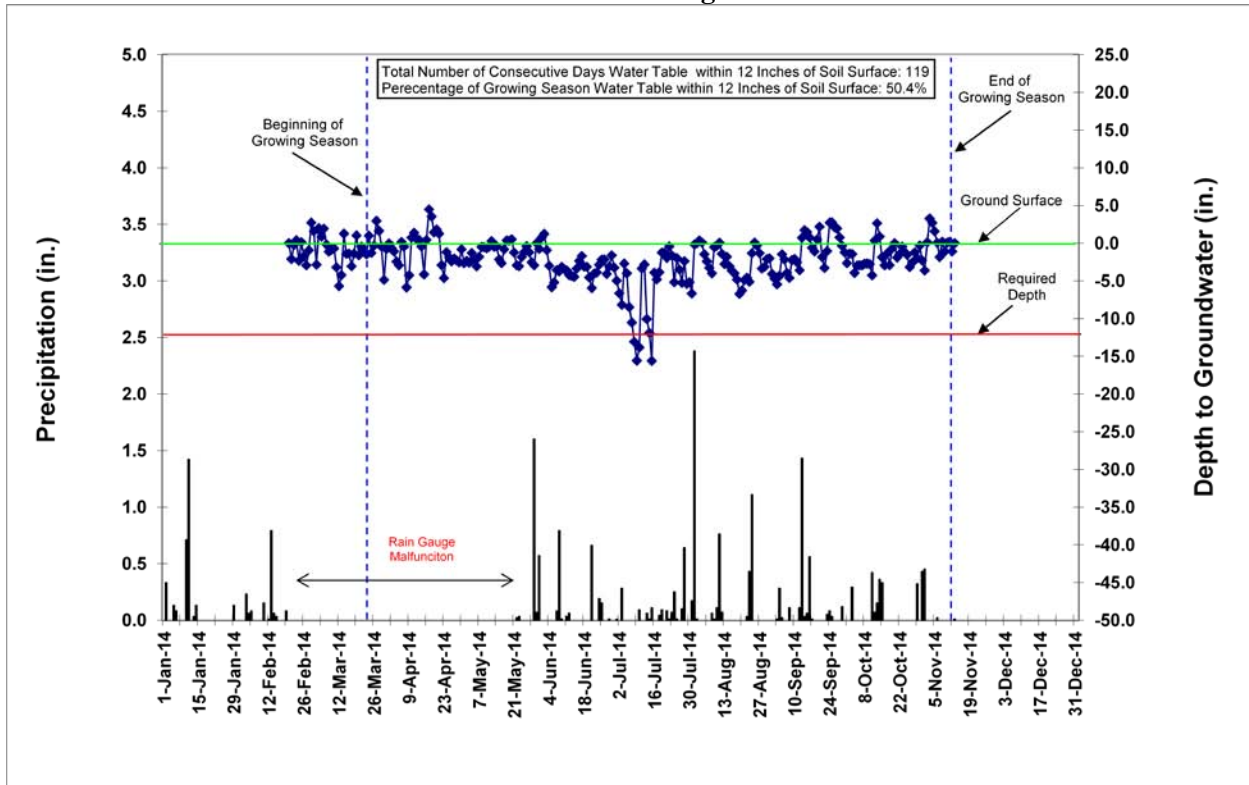
Reach 1 – Wetland Gauge NFMCO5



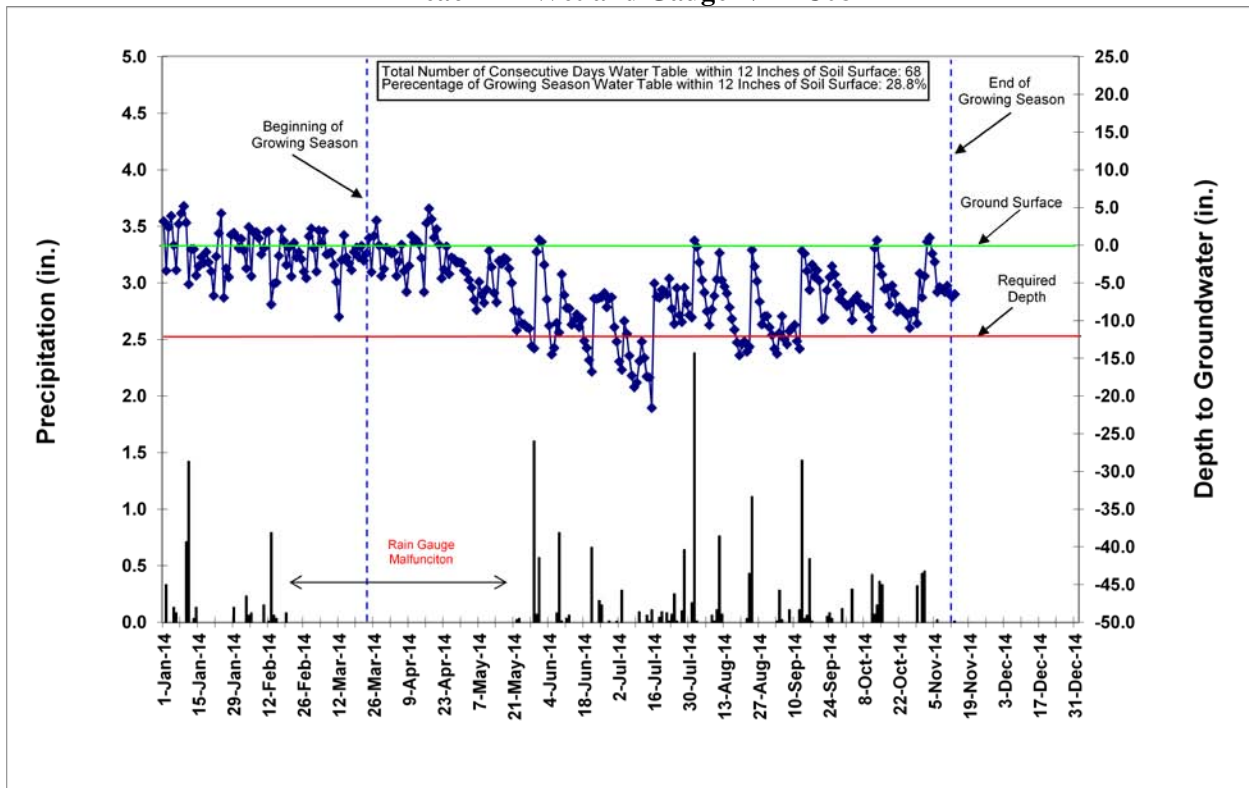
Reach 1 – Wetland Gauge NFMCO6



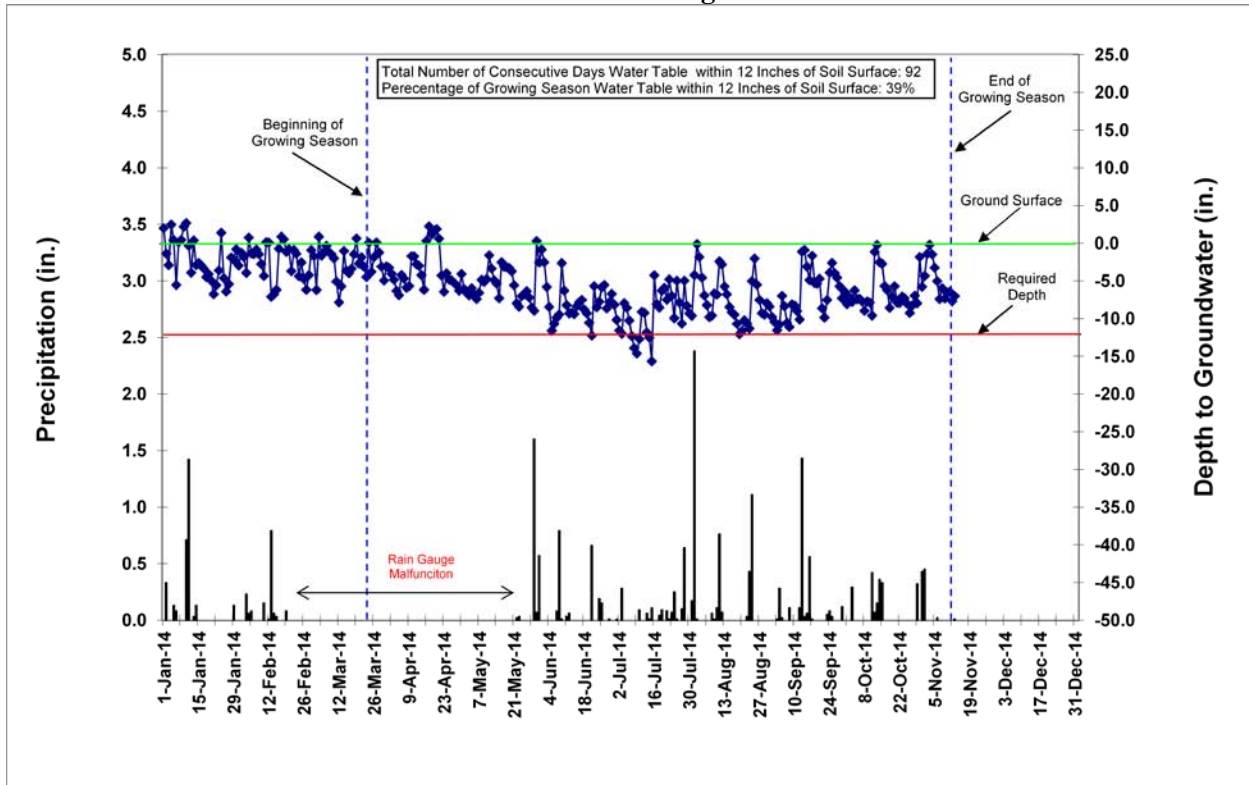
Reach 2 – Wetland Gauge NFMCO7



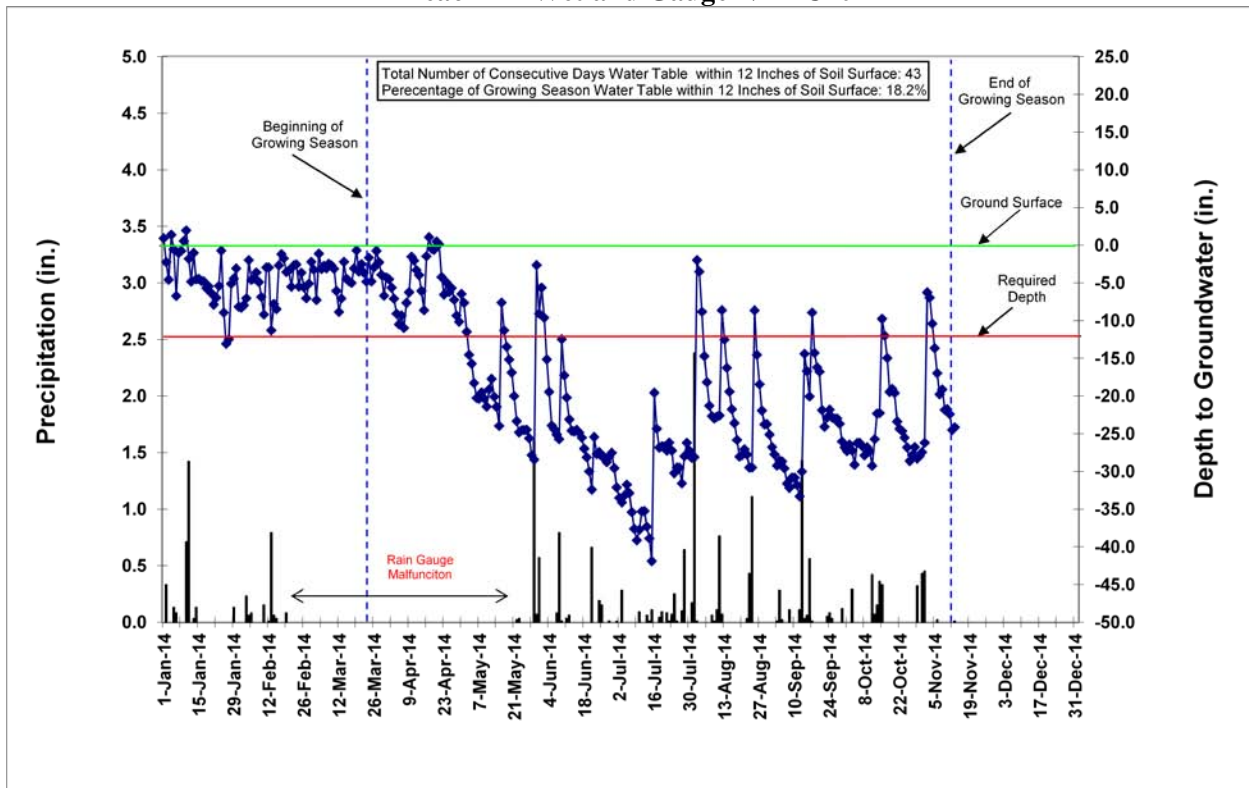
Reach 2 – Wetland Gauge NFMCO8



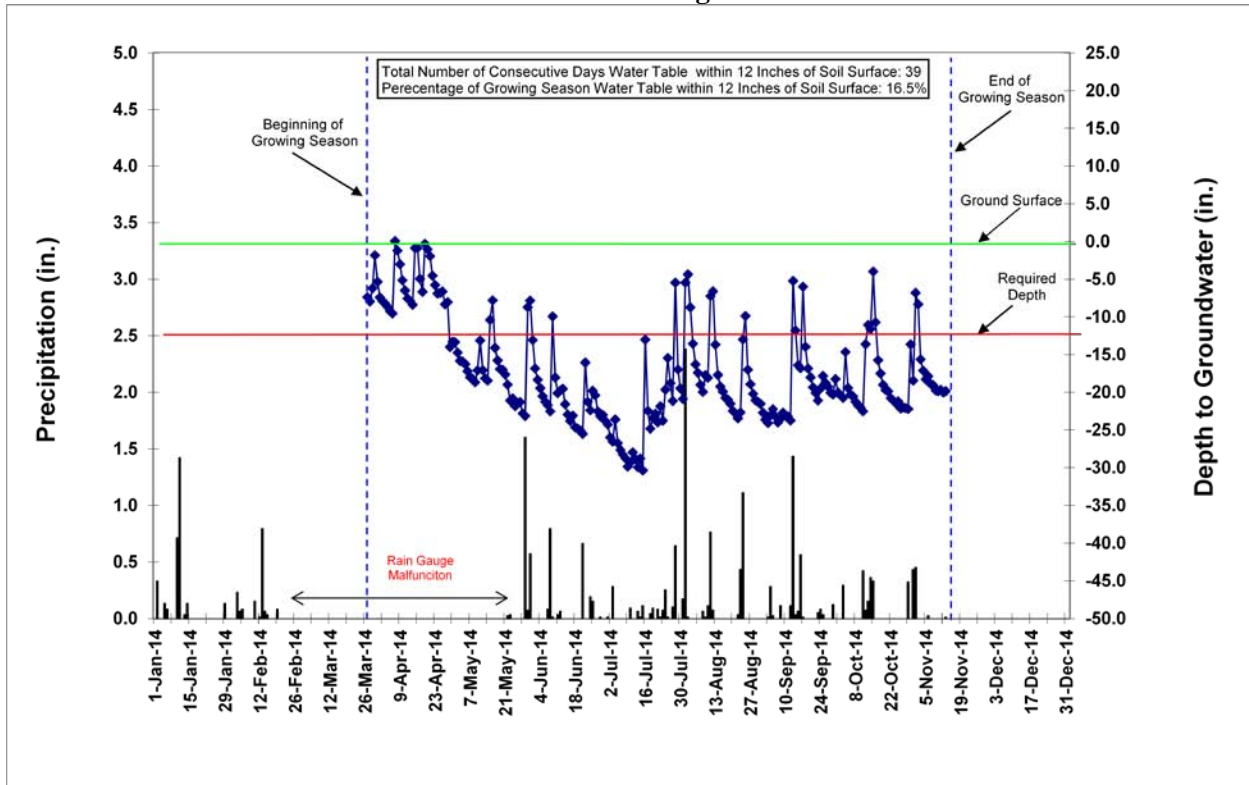
Reach 2 – Wetland Gauge NFMC09



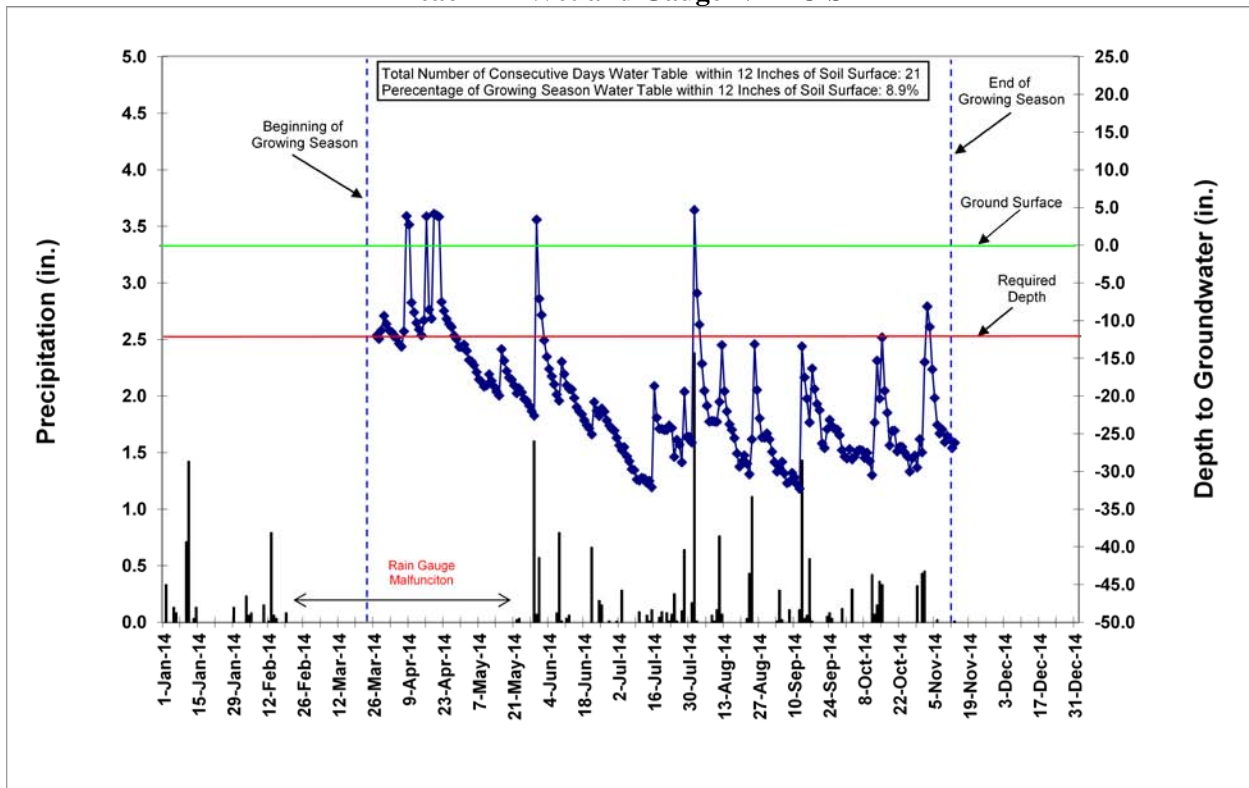
Reach 2 – Wetland Gauge NFMC10



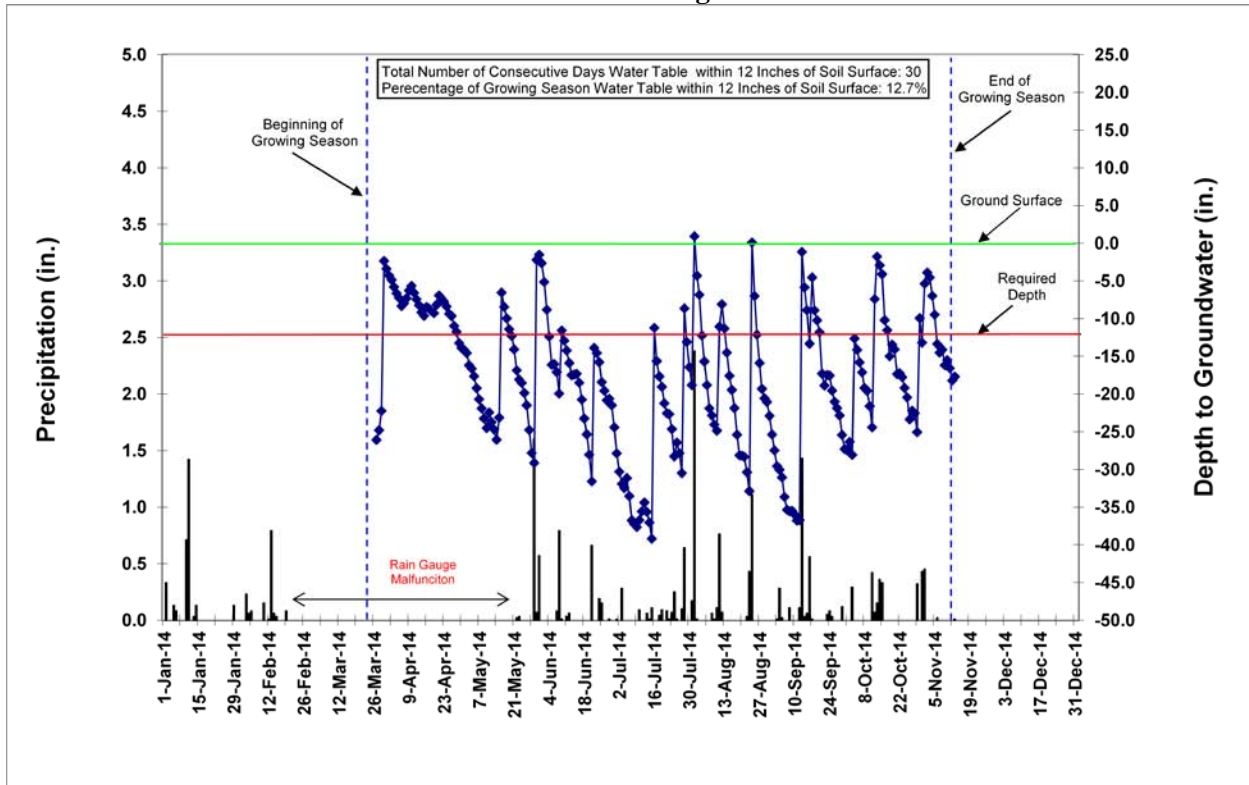
Reach 1 – Wetland Gauge NFMCS-1



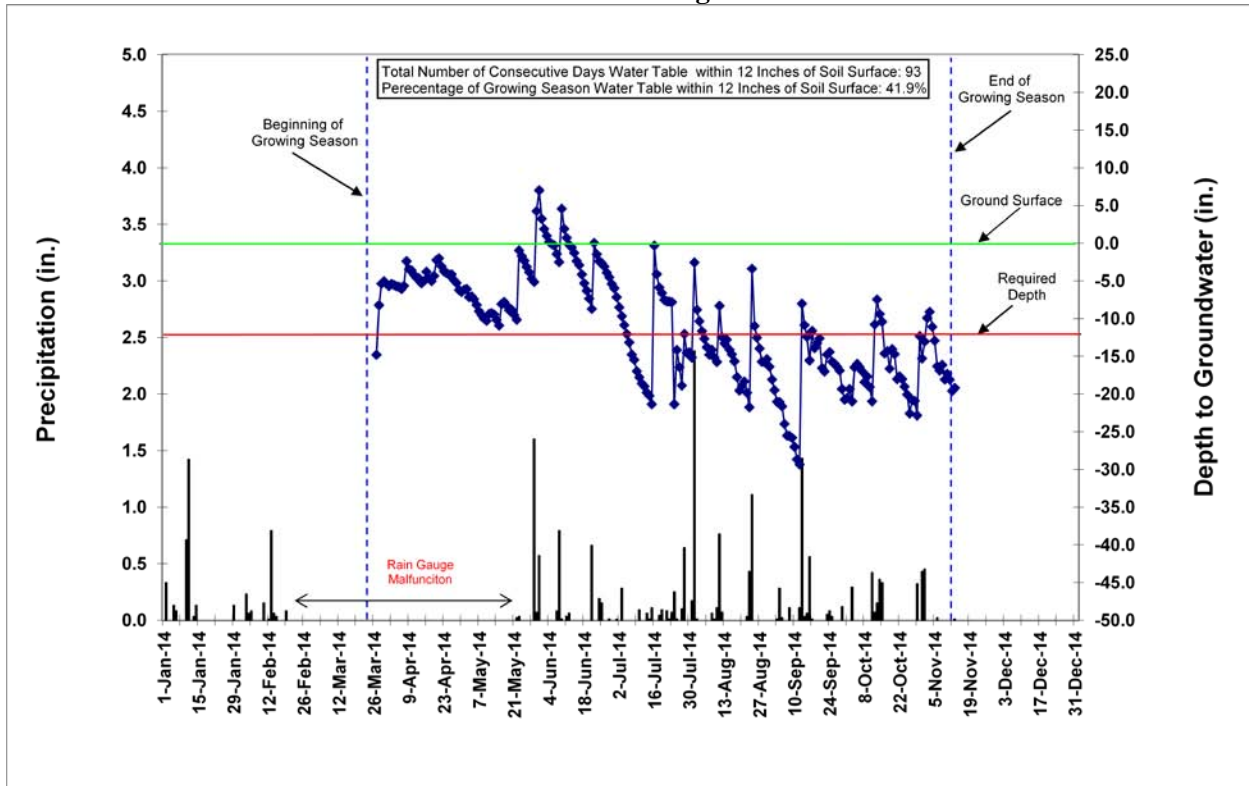
Reach 2 – Wetland Gauge NFMCS-2



Reach 2 – Wetland Gauge NFMCS3



Reach 2 – Wetland Gauge NFMCS4



South Fork Catawba – Reference Gauge

