SCALY BARK CREEK MITIGATION SITE
Stanly County, NC
DENR Contract 002030
EEP Project Number 94148

Monitoring Year 3 Annual Report

FINAL

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SCALY BARK CREEK MITIGATION SITE
Monitoring Year 3 Annual Report

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1.0 Executive Summary

The Scaly Bark Creek Mitigation Site, hereafter referred to as the Site, is located off of NC Highway 24/27 in the central portion of Stanly County, NC. The project site is approximately 2.6 miles southwest of downtown Albemarle, NC within the Rocky River watershed (North Carolina Division of Water Quality (NCDWQ) Subbasin 03-07-13) of the Yadkin River Basin (United States Geological Survey (USGS) Hydrologic Unit 03040105060030). The Site is located in the Carolina Slate Belt of the Piedmont Physiographic Province (USGS, 1998). Land use within the watershed is rural and is dominated by forestry, agriculture, and livestock operations; with approximately 60% of the watershed forested and 40% used for agriculture. The Site is located in an active cattle pasture surrounded by wooded lots, small agricultural operations, and rural residential areas within a 212-acre tract of land owned by Franchot Palmer.

Streams on the Site consist of Scaly Bark Creek, a third order stream, as well as six unnamed first and second order tributaries (UTs) to Scaly Bark Creek (UT1, UT1a, UT1b, UT2, UT3, and UT4). At the downstream limits of the project, the drainage area is 1,619 acres (2.5 square miles). Scaly Bark Creek (NCDWQ Index No. 13-17-31-2), which is the main creek on the project site, has been classified as Class C waters. Class C waters are protected for secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, agriculture, and other uses.

Mitigation work at the Site included full restoration on Scaly Bark Creek, the lower portion of UT1, and UT2. The remainder of the onsite streams were enhanced and preserved. All onsite riparian areas were planted with native species. Construction activities were completed in April 2011. A conservation easement is in place on the 26.6 acres of riparian corridor and stream resources to protect them in perpetuity. Directions and a map of the Site are provided in Figure 1.

1.1 Project Goals and Objectives

Prior to construction activities, the primary watershed stressor was the high sediment load received from the upstream watershed due to bank erosion and lack of erosion control during agricultural practices. Activities such as livestock trampling on the banks, vegetation maintenance and removal by the landowner, lack of riparian buffer to stabilize banks and filter runoff, and channel maintenance and straightening by the landowner, resulted in an unstable stream system. As a result of the aforementioned watershed and land activities, the Site had poor water quality due to sediment and fecal pollution, poor habitat due to lack of riparian vegetation and lack of in-stream bed diversity, and unstable geomorphic conditions. Tables 1 and 4 in Appendix 1 presents the Site's pre-restoration conditions in detail.

The primary objectives of the project were to decrease nutrient and fecal coliform levels, sediment input, and water temperature, increase dissolved oxygen concentrations, create appropriate in-stream and terrestrial habitat, and decrease channel velocities. These objectives were achieved by restoring 4,860 linear feet (LF) of perennial stream channel, enhancing 3,578 LF of perennial and intermittent stream channel, and preserving 700 LF of intermittent stream channel. Restoration of dimension, pattern, and profile was implemented for Scaly Bark Creek, the lower portion of UT1, and UT2; enhancement of profile and dimension, working within the existing channel, was implemented for the remaining portion of UT1, UT1a, UT1b, UT3, and a portion of UT4. The Site's riparian areas were also planted to stabilize streambanks, improve habitat, and protect water quality. Figure 2 and Table 1 present the restoration and enhancement design for the Site.

The following project goals were established to address the effects listed above in the executive summary from watershed and project site stressors:

- Remove harmful nutrients from creek flow, including fecal pollution;
- Reduce pollution of the creek by excess sediment;
- Increase dissolved oxygen concentrations;
- Improve stream bank stability;
- Improve in-stream habitat;
- Restore terrestrial habitat; and
- Improve aesthetics of the riparian corridor.

The project objectives to meet these goals were to:

- Fence out cattle from the riparian corridor to remove fecal contamination and eliminate bank trampling;
- Provide a floodplain for excess sediment to settle out while maintaining appropriate sediment transport through the design reach and eliminating sediment contributions from bank erosion in the project reaches;
- Provide aeration points at riffle and drop structures to increase dissolved oxygen;
- Provide riparian vegetation root mass to stabilize banks and to provide terrestrial habitat;
- Construct a geomorphically stable, self-maintaining channel to provide for stable stream form;
- Provide aquatic habitat bedform diversity in the form of riffles and pools, as well as terrestrial habitat with riparian planting; and
- Provide channel shading to reduce water temperatures which will improve habitat quality and help to improve dissolved oxygen concentrations.

1.2 Monitoring Year 3 Data Assessment

Annual monitoring and quarterly site visits were conducted during 2013 to assess the condition of the project. The stream restoration success criteria for the Site follows the approved success criteria presented in the Scaly Bark Mitigation Plan (Approved 7/15/2011).

1.2.1 Vegetative Assessment

A total of 29 vegetation plots were established during the baseline monitoring within the project easement area using standard 10 meter by 10 meter vegetation monitoring plots. Plots were randomly established within planted portions of the stream restoration and enhancement areas to capture the heterogeneity of the designed vegetative communities. The plot corners were marked and are recoverable either through field identification or with the use of a GPS unit. Reference photographs at the origin looking diagonally across the plot to the opposite corner were taken to capture the same reference photograph locations as the as-built. The final vegetative success criteria will be the survival of 260 planted stems per acre in the riparian corridor along restored and enhanced reaches at the end of monitoring year five (MY5). The interim measure of vegetative success for the Site will be the survival of at least 320 planted stems per acre at the end of monitoring year three (MY3). The Site was replanted following monitoring year one (MY1) as

discussed in the monitoring year two (MY2) report. Therefore, annual monitoring results are compared to MY2 results for site survival and mortality rates.

The MY3 vegetation survey was completed in July 2013. The 2013 vegetation assessment resulted in an average stem density of 339 stems per acre, which meets the required year three success criteria (320 stems per acre). The Site has an average survival rate of 92% compared to MY2; however, several plots resulted in a much lower survival rate as discussed below and on the Integrated Current Condition Plan View (CCPV) map. There was an average of eight stems per plot in MY3, similar to MY2 which had an average of nine stems per plot. However four plots which were on the lower end of criteria attainment during MY2 did not achieve success criteria for MY3. Three plots which did not reach success criteria in MY2 recovered after plants presumed dead or missing in MY2 were relocated or re-sprouted in MY3. A total of 16 of 29 plots met the MY3 success criteria requirement (Plots 1, 3, 4, 5, 7, 9, 12, 13, 14, 15, 17, 20, 21, 22, 23, and 24). Of the 13 plots which did not reach the MY3 success criteria, four met the MY5 success criteria. The low survival of remaining plots are presumably due to resource competition with thick herbaceous cover for or, in one case (Plot 16), excessively dry soil conditions. Most of the remaining plants in these plots have strong vigor ratings indicating that they are likely to survive in upcoming monitoring years. Volunteers are not included in the Site's stem density results; however, strong recruitment of volunteers was observed in MY3 at an average of 68 stems per acre. Please refer to Appendix 3 for vegetation summary tables and raw data tables and Appendix 2 for vegetation plot photographs and the vegetation condition assessment table.

The MY3 vegetation monitoring and visual assessment revealed several vegetation areas of concern. The non-native invasive shrub Tree of Heaven (*Ailanthus altissima)* is colonizing the right floodplain of UT1 reach 1, and UT1A. The non-native invasive shrub Chinese privet (*Ligustrum sinense)* is forming a dense colony at the upper end of the UT4 enhancement reach, and appearing as scattered seedlings around UT1 reach I and UT1A. The native invasive cattail (*Typha latifolia)* is colonizing within the active channel in UT1b. There are distinct areas with characteristically low herbaceous growth and dry soil conditions along UT1 reach 1 and Scaly Bark reach 2. Along UT4 and UT1b, there are distinct areas with exceptionally dense herbaceous cover affecting the survival rate of planted stems. The non-native invasive aquatic weed muskgrass (*Chara* sp.*)* was found in pools in Scaly Bark reach 1. Both non-native and native plant species (rice cut grass (*Leersia oryzoides)*, smartweed (*Polygonum hydropiperoides*), aquatic mint (*Mentha aquatic*), wartremoving herb (*Murdannia keisak*), and asian dayflower (*Commelina communis*)) were observed within several riffles in Scaly Bark reach 1 and reach 2 and UT2. Please refer to Appendix 2 and Figures 3.0-3.3 for the CCPV, which outlines these areas of concern.

Maintenance Plan

Areas with characteristically poor stem survival will be evaluated during Winter 2013/2014 to determine whether or not supplemental plantings will be required. Wildlands will plan to install 1" caliper trees or 1 gallon container saplings if supplemental tree installation is warranted. Herbicidal treatment of Tree of Heaven and Chinese privet are scheduled for October and November 2013. The treatment will consist of cutting and applying triclophyr directly to cut stumps. Visual assessment will be performed in 2014 to determine if any additional maintenance is necessary to promote survival of the remaining planted stems.

1.2.2 Stream Assessment

Morphological surveys for the MY3 were conducted in August and September 2013. All streams within the Site are stable with little to no erosion and have met the success criteria for MY3. Please refer to Appendix 2 for the visual assessment table, CCPV, and reference photographs. Refer to Appendix 4 for the morphological data and plots.

Riffle cross-sections surveyed along the restoration reaches appear stable and show little to no change in the bankfull area, maximum depth ratio, or width-to-depth ratio. All surveyed riffle cross-section dimensions fell within the parameters defined for channels of the appropriate Rosgen stream type. The surveyed longitudinal profile data for the stream restoration reaches illustrates that the bedform features are maintaining lateral and vertical stability. Profile measurements including riffle slope, riffle length, pool length, and pool-to-pool spacing were based on bed profile. The riffles are remaining steeper and shallower than the pools. The longitudinal profiles show that the bank height ratios remain very near to 1.0 for all of the restoration reaches. In-stream structures used to enhance channel habitat and stability on the outside bank of meander bends, such as root wads and brush toe, are providing stability and habitat as designed. Pattern data will only be completed in MY5 if there are indicators from the profile or dimensions that significant geomorphic adjustments have occurred. No changes were observed that indicated a change in the radius of curvature or channel belt width; therefore, pattern data is not included in the MY3 report.

In general, substrate materials in the restoration reaches indicate maintenance of coarser materials in the riffle features and finer particles in the pool features. In most riffle cross sections, the particle size distribution for MY3 is similar or larger than MY2.

At the end of MY5, two or more bankfull events must occur in separate years within the restored reaches. Multiple bankfull or greater events were recorded with the crest gage and through visual assessment during the MY3; therefore, the Site has partially achieved MY5 hydrology success criteria at this time.

1.3 Monitoring Year 3 Summary

Overall, the Site has met the required mitigation success criteria for MY3. All restored streams within the Site are stable and functioning as designed. Although 13 out of 29 of the individual vegetation plots did not meet the MY3 success criteria, the Site's overall average stem density was greater than the MY3 success criteria required. Of the 13 plots which did not reach the MY3 criteria of 320 stems per acre, only four meet the 260 stems per acre final measure of success. The Site has partially met the hydrology success criteria as of MY3.

Summary information/data related to various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the (formerly Restoration Plan) documents available on EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

2.0 Methodology

Geomorphic data collected followed the standards outlined in The Stream Channel Reference Site: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in the Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). Longitudinal and cross-sectional data were collected using

a total station and were georeferenced to established benchmarks and NC State Plane coordinates. Morphological surveys will be conducted using a total station tied to these geo-referenced (control) points. Reachwide pebble counts were conducted along each restored reach for channel classification. Cross-section substrate analyses conducted in each surveyed riffle followed the 100 count wetted perimeter methodology to characterize pavement. All CCPV mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using was Pathfinder and ArcView. Crest gages were installed during the baseline monitoring period in surveyed riffle cross-sections and are monitored quarterly. Hydrology attainment installation and monitoring methods are in accordance with the USACE (2003) standards. Vegetation monitoring protocols followed the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2006).

3.0 References

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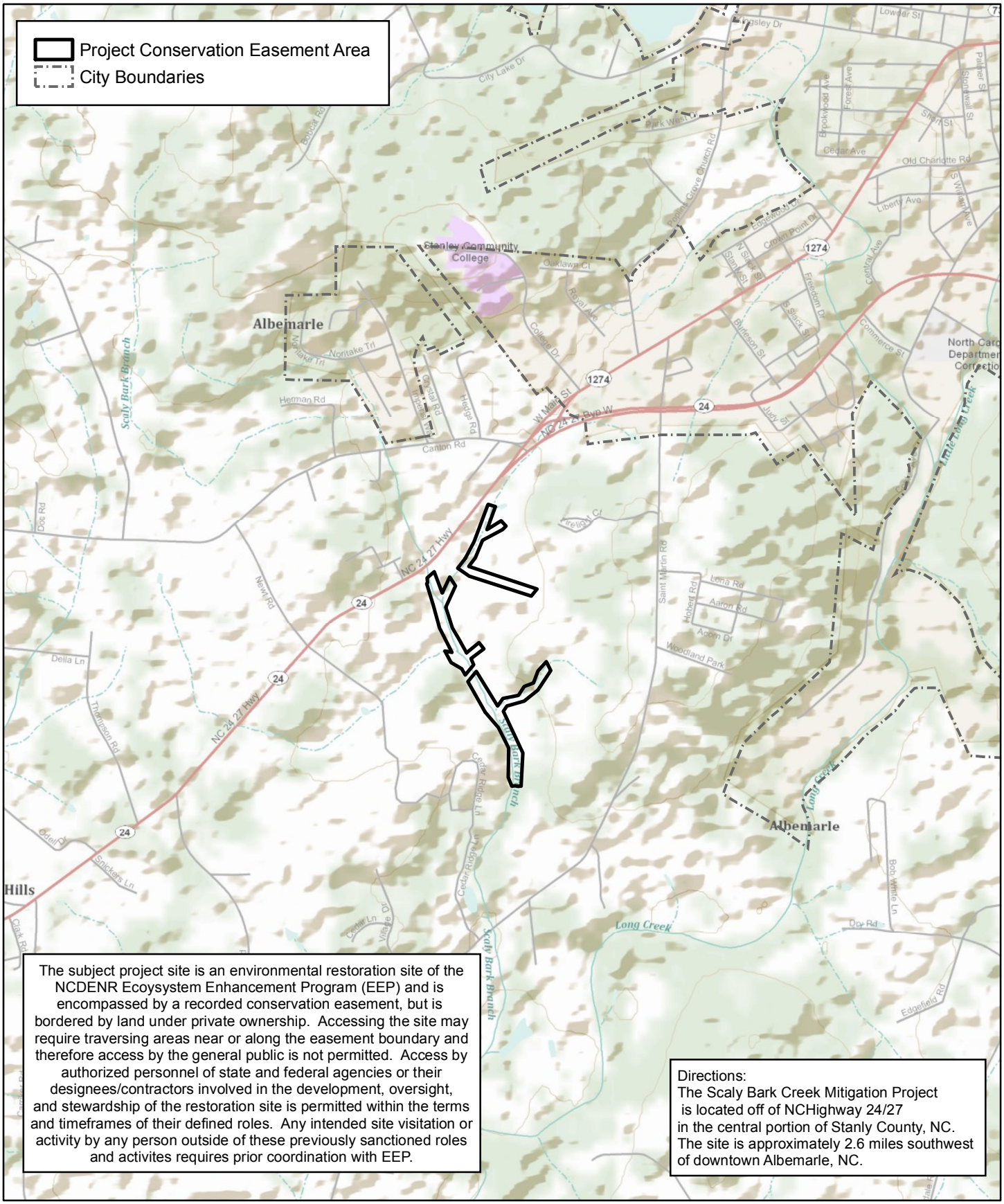
APPENDIX 1. General Tables and Figures



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0 1,000 2,000 Feet

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Figure 1. Project Vicinity Map
Scaly Bark Creek Mitigation Site
EEP Project Number 94148
Monitoring Year 3

Stanly County, NC

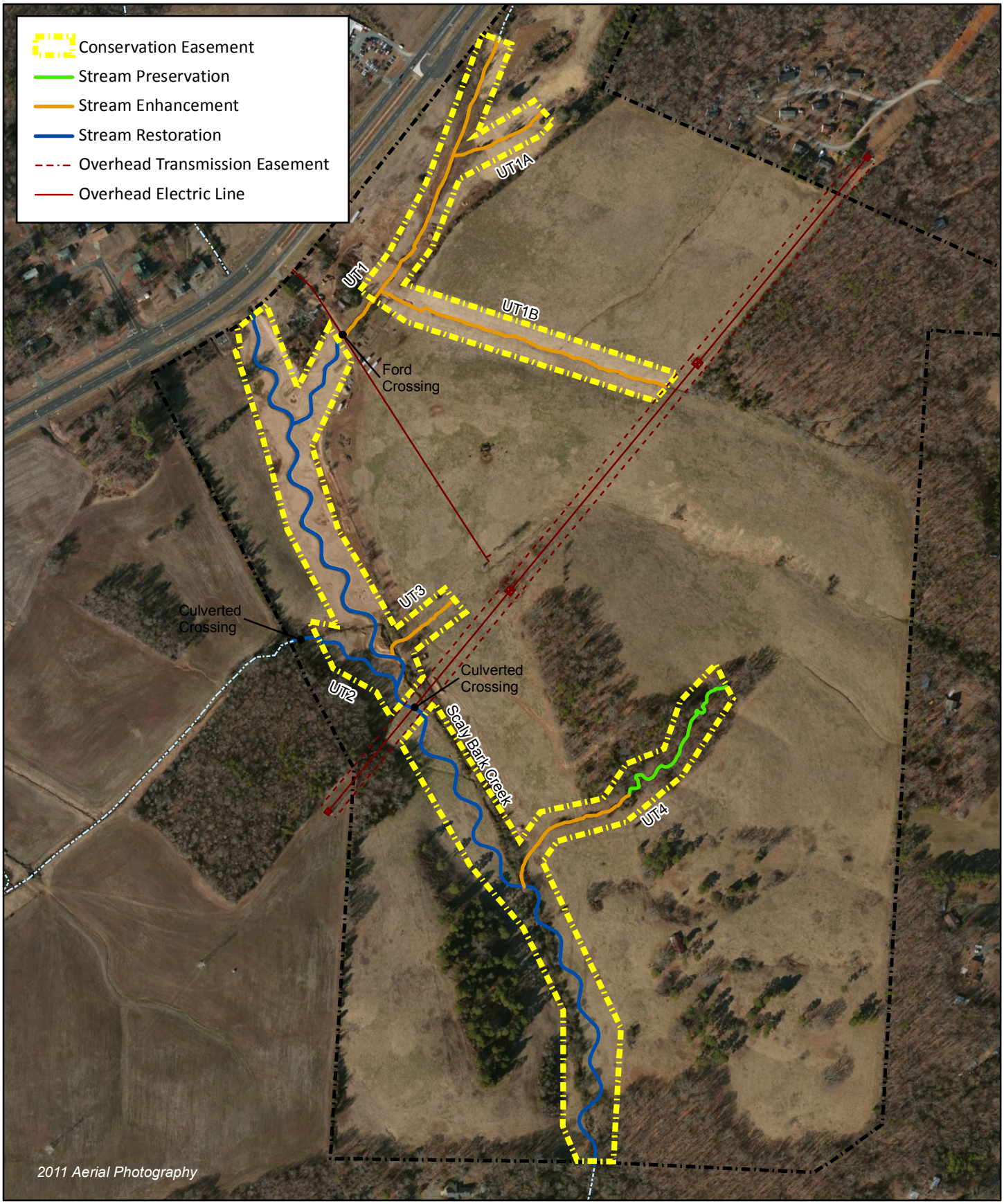

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Figure 2. Project Component/Asset Map
Scaly Bark Creek Mitigation Site
EEP Project Number 94148
Monitoring Year 3

Stanly County, NC

Table 1. Project Components and Mitigation Credits
Scaly Bark Creek Mitigation Site (EEP Project No.94148)
Monitoring Year 3

Mitigation Credits										
	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offet	Phosphorous Nutrient Offset	
Type	R	RE	R	RE	R	RE				
Totals	6,291	140	N/A	N/A	N/A	N/A		N/A	N/A	

Project Components

Reach ID	Stationing/ Location	Existing Footage (LF)	Approach	Restoration or Restoration Equivalent	Restoration Footage (LF)*	Mitigation Ratio
Scaly Bark Creek Reaches 1 & 2	100+00.00-141+71.79	3,600	Priority 1	Restoration	4,058	1:1
UT1 Reach 1	200+00.00-211+10.37	1,104	spot grading and planting	Enhancement II	1,098	2.5:1
UT1 Reach 2	213+10.37-217+32.36	330	Priority 1	Restoration	402	1:1
UT1a	302+78.00-306+68.00	390	spot grading and planting	Enhancement II	390	2.5:1
UT1b	400+10.00-412+08.00	1,198	spot grading and planting	Enhancement II	1,166	2.5:1
UT2	500+00.00-503+93.00	262	Priority 1	Restoration	400	1:1
UT3	600+00.00-603+26.00	282	spot grading and planting	Enhancement II	341	2.5:1
UT4	707+00.00-712+69.00	516	spot grading and planting	Enhancement II	583	2.5:1
UT4	700+00.00-707+00.00	700	spot grading and planting	Preservation	700	5:1

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)		Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine				
Restoration	4,860	-	-	-	-	-	-
Enhancement		-	-	-	-	-	-
Enhancement I	-						
Enhancement II	3,578						
Creation		-	-	-			
Preservation	700	-	-	-			-
High Quality Preservation	-	-	-	-			-

BMP Elements

Elements		Location		Purpose/Function		Notes			
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

BMP Elements

BR = Bioretention Cell; S F= Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer

*Linear footage excludes crossings.

Table 2. Project Activity and Reporting History
Scaly Bark Creek Mitigation Site (EEP Project No.94148)
Monitoring Year 3

Activity or Report	Date Collection Complete	Completion or Delivery
Mitigation Plan	May 2010	May 2010
Final Design - Construction Plans	December 2010	December 2010
Construction	April 2011	April 2011
Temporary S&E mix applied to entire project area*	April 2011	April 2011
Permanent seed mix applied to reach/segments	April 2011	April 2011
Containerized and B&B plantings for reach/segments	April 2011	April 2011
Baseline Monitoring Document (Year 0 Monitoring - baseline)	March 2011/April 2011	June 2011
Year 1 Monitoring	November 2011	November 2011
Year 2 Monitoring	September 2012	November 2012
Year 3 Monitoring	August/September 2013	November 2013
Year 4 Monitoring	2014	December 2014
Year 5 Monitoring	2015	December 2015

*Seed and mulch is added as each section of construction is completed.

Table 3. Project Contacts Table
Scaly Bark Creek Mitigation Site (EEP Project No.94148)
Monitoring Year 3

Designer	**Wildlands Engineering, Inc.**
	1430 South Mint Street, Suite 104
	Charlotte, NC 28203
Shawn Wilkerson	704.332.7754
Construction Contractor	**North State Environmental, Inc.**
	2889 Lowery Street
	Winston-Salem, NC 27101
Darrell Westmoreland	336.725.2010
Planting Contractor	**North State Environmental, Inc.**
	2889 Lowery Street
	Winston-Salem, NC 27101
Stephen Joyce	336.725.2010
Seeding Contractor	**North State Environmental, Inc.**
	2889 Lowery Street
	Winston-Salem, NC 27101
Stephen Joyce	336.725.2010
Seed Mix Sources	**Green Resource**
Nursery Stock Suppliers	
Bare Roots	**Dykes and Son Nursery**
Plugs	**Pinelands Nursery**
Live Stakes/Brush Mattress	**North State Environmental, Inc.**
Monitoring Performers	**Wildlands Engineering, Inc.**
Stream Monitoring, POC	Kirsten Y. Gimbert
Vegetation Monitoring, POC	704.332.7754, ext. 110

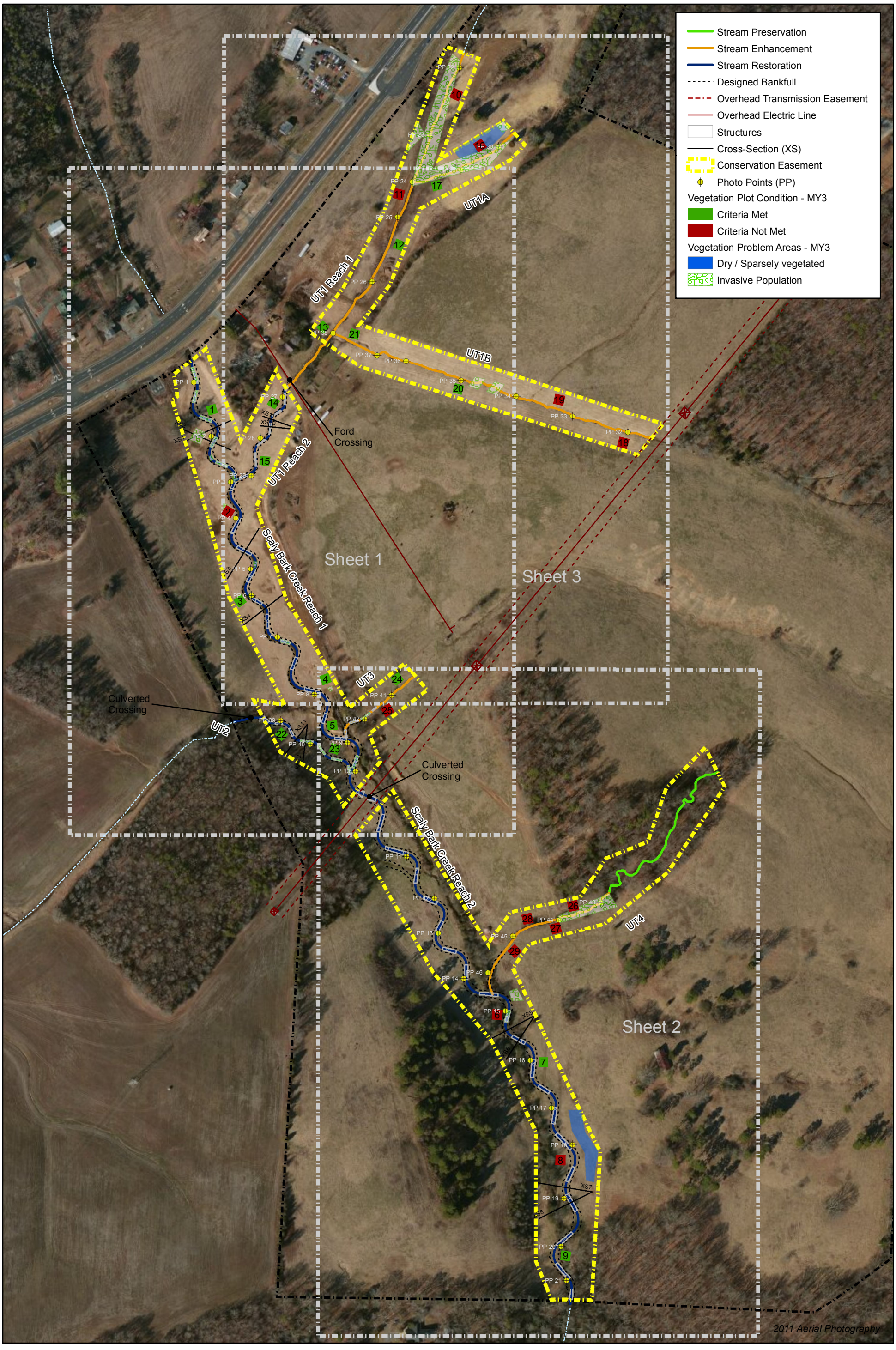
Table 4. Project Baseline Information and Attributes
Scaly Bark Creek Mitigation Site (EEP Project No.94148)
Monitoring Year 3

Project Information (Pre-Restoration)							
Project Name	Scaly Bark Creek Mitigation Site						
County	Stanly						
Project Area (acres)	26.6						
Project Coordinates (latitude and longitude)	35° 19' 38.338" N, 80° 14' 19.315"W						
Project Watershed Summary Information							
Physiographic Province	Piedmont						
River Basin	Yadkin						
USGS Hydrologic Unit 8-digit	03040105	USGS Hydrologic Unit 14-digit	03040105060030				
DWQ Sub-basin	Rocky River (03-07-13)						
Project Drainiage Area (acres)	1,619						
Project Drainage Area Percentage of Impervious Area	<10%						
CGIA Land Use Classification	U						
Reach Summary Information							
Parameters	**Scaly Bark**	**UT1**	**UT1a**	**UT1b**	**UT2**	**UT3**	**UT4**
Length of reach (linear feet) - Post-Restoration	4,058	1,500	390	1,166	400	341	583
Valley classification	VIII						
Drainage area (acres)	1,619	173	46	83	436	36	25
NCDWQ stream identification score	43.5	31	21.5	26.5	37.5	19.5	24
NCDWQ Water Quality Classification	C	-	-	-	-	-	-
Morphological Desription (stream type)	C4	Reach1: E4 Reach 2: C4	E4	C4b	C4	C4	Reach 1: B4 Reach 2: C4
Evolutionary trend (Simon's Model) - Pre- Restoration	Reach 1: Stage 2 Reach 2: Stage 3, 4 & 5	Reach 2: Stage 2 & 4	n/a	n/a	Stage 4	n/a	n/a
Underlying mapped soils	*BaB, BaD,BbB & BbD*		*GoC, GoF*		*KkB*	*MhB*	*Oa*
Drainage class	well drained		well-drained to excessively drained		moderately well-drained	moderate to moderately rapid	moderately well-drained
Soil Hydric status	No		No		No	No	Yes (inclusions)
Slope	gently sloping to steep uplands		gently sloping to strongly sloping		lower slopes	nearly level to gently sloping	nearly level
FEMA classification	Zone AE (downstream end of Scaly Bark only); all other areas were not mapped						
Native vegetation community	Piedmont Bottomland Forest						
Percent composition of exotic invasive vegetation - Post-Restoration	0%						

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No.27 and
Waters of the United States - Section 401	Yes	Yes	DWQ 401 Water Quality Certification
Endangered Species Act	Yes	Yes	Scaly Bark Mitigation Plan; studies found suitable habitat not present for
Historic Preservation Act	Yes	Yes	No historic resources were found to be impacted (letter from SHPO)
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	n/a	n/a
FEMA Floodplain Compliance	Yes	Yes	LOMR approved
Essential Fisheries Habitat	Yes	Yes	No adverse impacts to aquatic resources were found (letter from NCWRC)

U= Unknown

APPENDIX 2. Visual Assessment Data



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0 150 300 Feet

Figure 3.0 Integrated Current Condition Plan View (Key)
Scaly Bark Creek Mitigation Site
EEP Project Number 94148
Monitoring Year 3

Stanly County, NC

Figure 3.1 Integrated Current Condition Plan View (Sheet 1 of 3)
Scaly Bark Creek Mitigation Site
EEP Project Number 94148
Monitoring Year 3

Stanly County, NC

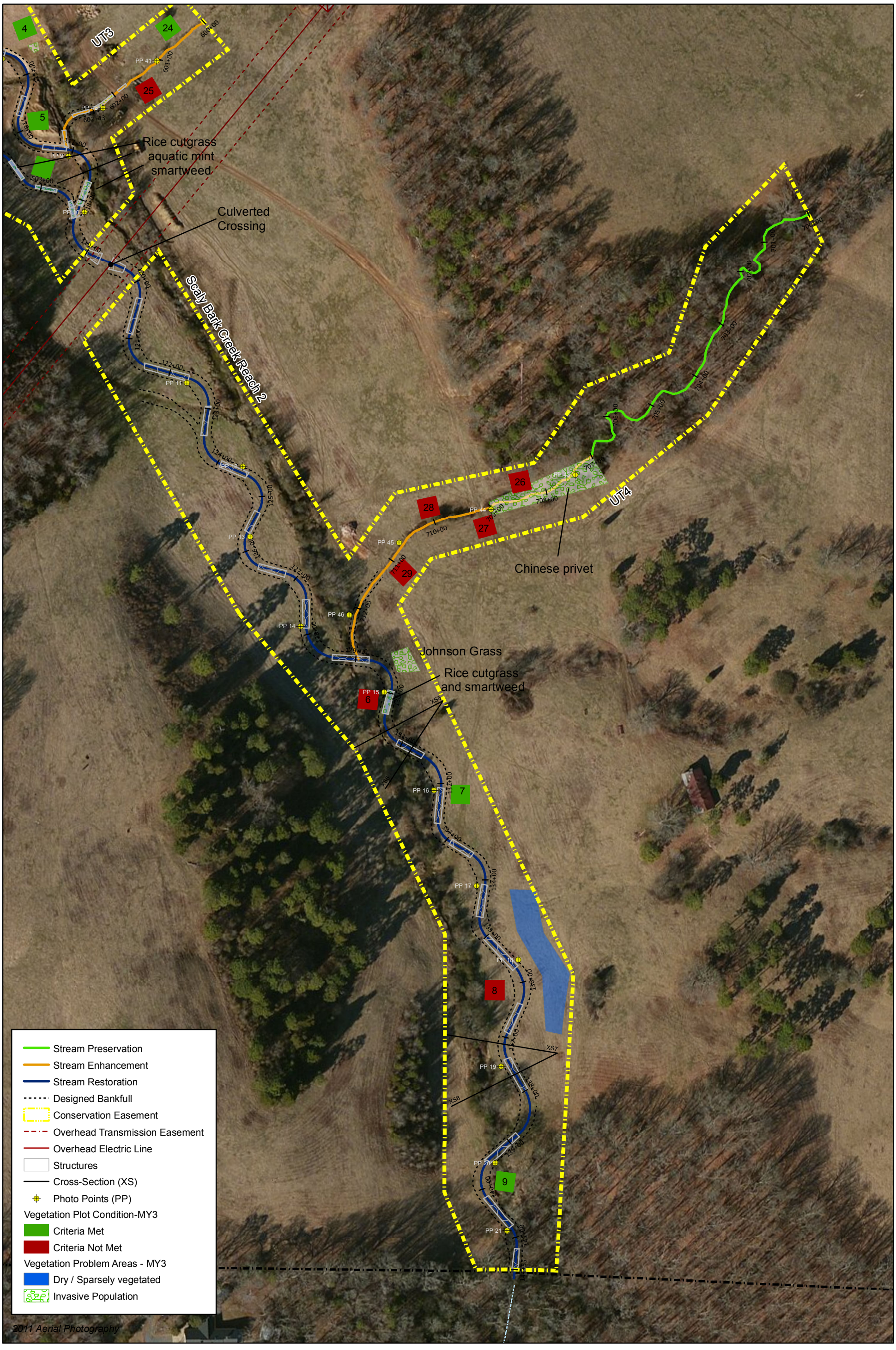

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Figure 3.2 Integrated Current Condition Plan View (Sheet 2 of 3)
Scaly Bark Creek Mitigation Site
EEP Project Number 94148
Monitoring Year 3

Stanly County, NC

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0 75 150 Feet

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Figure 3.3 Integrated Current Condition Plan View (Sheet 3 of 3)
Scaly Bark Creek Mitigation Site
EEP Project Number 94148
Monitoring Year 3

Stanly County, NC

Table 5a. Visual Stream Morphology Stability Assessment Table
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reaches 1 and 2 (4,058 LF)
Monitoring Year 3

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	37	37			100%			
	3. Meander Pool Condition	Depth Sufficient	37	37			100%			
		Lenth Appropriate	37	37			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	37	37			100%			
		Thalweg centering at downstream of meander bend (Glide)	37	37			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	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	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dilodged boulders or logs.	13	13			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	13	13			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	13	13			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	13	13			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	13	13			100%			

Table 5b. Visual Stream Morphology Stability Assessment Table
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2 (402 LF)
Monitoring Year 3

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	6	6			100%			
	3. Meander Pool Condition	Depth Sufficient	6	6			100%			
		Lenth Appropriate	6	6			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	6	6			100%			
		Thalweg centering at downstream of meander bend (Glide)	6	6			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	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	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dilodged boulders or logs.	n/a				n/a			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill								
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.								
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.								
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.								

n/a: Constructed riffles were built; no engineered structures were built on UT1

Table 5c. Visual Stream Morphology Stability Assessment Table
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2 (400 LF)
Monitoring Year 3

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	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	7	7			100%			
	3. Meander Pool Condition	Depth Sufficient	7	7			100%			
		Lenth Appropriate	7	7			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	7	7			100%			
		Thalweg centering at downstream of meander bend (Glide)	7	7			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	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	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dilodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	1	1			100%			

Table 6. Vegetation Condition Assessment Table
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Monitoring Year 3

Planted Acreage **25.4**

Vegetation Category	Definitions	Mapping Threshold (acres)	Number of Polygons	Combined Acreage	% of Planted Acreage*
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	2	0.4	2%
Low Stem Density Areas^	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	13	0.32	1%
		Total	**15**	**0.7**	**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	0	0	0%
		Cumulative Total	**15**	**0.7**	**3%**

Easement Acreage **26.6**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Planted Acreage
Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000	8	1.2	5%
Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	0	0	0%

^Acreage calculated from vegetation plots monitored for site.

Stream Photographs

	
Photo Point 1 – looking upstream (08/26/2013)	Photo Point 1 – looking downstream (08/26/2013)
	
Photo Point 2 – looking upstream (08/26/2013)	Photo Point 2 – looking downstream (08/26/2013)
	
Photo Point 3 – looking upstream (08/26/2013)	Photo Point 3 – looking downstream (08/26/2013)

	
Photo Point 4 – looking upstream (08/26/2013)	Photo Point 4 – looking downstream (08/26/2013)
	
Photo Point 5 – looking upstream (08/26/2013)	Photo Point 5 – looking downstream (08/26/2013)
	
Photo Point 6 – looking upstream (08/26/2013)	Photo Point 6 – looking downstream (08/26/2013)

	
Photo Point 7 – looking upstream (08/26/2013)	Photo Point 7 – looking downstream (08/26/2013)
	
Photo Point 8 – looking upstream (08/26/2013)	Photo Point 8 – looking downstream (08/26/2013)
	
Photo Point 9 – looking upstream (08/26/2013)	Photo Point 9 – looking downstream (08/26/2013)

	
Photo Point 10 – looking upstream (08/26/2013)	Photo Point 10 – looking downstream (08/26/2013)
	
Photo Point 11 – looking upstream (09/06/2013)	Photo Point 11 – looking downstream (09/06/2013)
	
Photo Point 12 – looking upstream (08/02/2013)	Photo Point 12 – looking downstream (08/02/2013)

	
Photo Point 13 – looking upstream (08/02/2013)	Photo Point 13 – looking downstream (08/02/2013)
	
Photo Point 14 – looking upstream (08/02/2013)	Photo Point 14 – looking downstream (08/02/2013)
	
Photo Point 15 – looking upstream (08/02/2013)	Photo Point 15 – looking downstream (08/02/2013)

	
Photo Point 16 – looking upstream (08/02/2013)	Photo Point 16 – looking downstream (08/02/2013)
	
Photo Point 17 – looking upstream (08/02/2013)	Photo Point 17 – looking downstream (08/02/2013)
	
Photo Point 18 – looking upstream (08/02/2013)	Photo Point 18 – looking downstream (08/02/2013)

	
Photo Point 19 – looking upstream (08/02/2013)	Photo Point 19 – looking downstream (08/02/2013)
	
Photo Point 20 – looking upstream (08/02/2013)	Photo Point 20 – looking downstream (08/02/2013)
	
Photo Point 21 – looking upstream (08/02/2013)	Photo Point 21 – looking downstream (08/02/2013)

	
Photo Point 22 – looking upstream (08/02/2013)	Photo Point 22 – looking downstream (08/02/2013)
	
Photo Point 23 – looking upstream (08/02/2013)	Photo Point 23 – looking downstream (08/02/2013)
	
Photo Point 24 – looking upstream (08/02/2013)	Photo Point 24 – looking downstream (08/02/2013)

	
Photo Point 25 – looking upstream (08/02/2013)	Photo Point 25 – looking downstream (08/02/2013)
	
Photo Point 26 – looking upstream (08/02/2013)	Photo Point 26 – looking downstream (08/02/2013)
	
Photo Point 27 – looking upstream (08/26/2013)	Photo Point 27 – looking downstream (08/26/2013)

	
Photo Point 28 – looking upstream (08/26/2013)	Photo Point 28 – looking downstream (08/26/2013)
	
Photo Point 29 – looking upstream (08/26/2013)	Photo Point 29 – looking downstream (08/26/2013)
	
Photo Point 30 – looking upstream (08/02/2013)	Photo Point 30 – looking downstream (08/02/2013)

	
Photo Point 31 – looking upstream (08/02/2013)	Photo Point 31 – looking downstream (08/02/2013)
	
Photo Point 32 – looking upstream (08/02/2013)	Photo Point 32 – looking downstream (08/02/2013)
	
Photo Point 33 – looking upstream (08/02/2013)	Photo Point 33 – looking downstream (08/02/2013)

	
Photo Point 34 – looking upstream (08/02/2013)	Photo Point 34 – looking downstream (08/02/2013)
	
Photo Point 35 – looking upstream (08/02/2013)	Photo Point 35 – looking downstream (08/02/2013)
	
Photo Point 36 – looking upstream (08/02/2013)	Photo Point 36 – looking downstream (08/02/2013)

	
Photo Point 37 – looking upstream (08/02/2013)	Photo Point 37 – looking downstream (08/02/2013)
	
Photo Point 38 – looking upstream (08/02/2013)	Photo Point 38 – looking downstream (08/02/2013)
	
Photo Point 39 – looking upstream (08/26/2013)	Photo Point 39 – looking downstream (08/26/2013)

	
Photo Point 40 – looking upstream (08/26/2013)	Photo Point 40 – looking downstream (08/26/2013)
	
Photo Point 41 – looking upstream (08/02/2013)	Photo Point 41 – looking downstream (08/02/2013)
	
Photo Point 42 – looking upstream (08/02/2013)	Photo Point 42 – looking downstream (08/02/2013)

	
Photo Point 43 – looking upstream (08/02/2013)	Photo Point 43 – looking downstream (08/02/2013)
	
Photo Point 44 – looking upstream (08/02/2013)	Photo Point 44 – looking downstream (08/02/2013)
	
Photo Point 45 – looking upstream (08/02/2013)	Photo Point 45 – looking downstream (08/02/2013)

	
Photo Point 46 – looking upstream (08/02/2013)	Photo Point 46 – looking downstream (08/02/2013)

Vegetation Photographs

	
Vegetation Plot 1 (7/11/2013)	Vegetation Plot 2 (7/11/2013)
	
Vegetation Plot 3 (7/11/2013)	Vegetation Plot 4 (7/9/2013)
	
Vegetation Plot 5 (7/9/2013)	Vegetation Plot 6 (7/8/2013)

	
Vegetation Plot 7 (7/10/2013)	Vegetation Plot 8 (7/10/2013)
	
Vegetation Plot 9 (7/10/2013)	Vegetation Plot 10 (7/11/2013)
	
Vegetation Plot 11 (7/10/2013)	Vegetation Plot 12 (7/10/2013)

	
Vegetation Plot 13 (7/9/2013)	Vegetation Plot 14 (7/11/2013)
	
Vegetation Plot 15 (7/11/2013)	Vegetation Plot 16 (7/11/2013)
	
Vegetation Plot 17 (7/10/2013)	Vegetation Plot 18 (7/9/2013)

	
Vegetation Plot 19 (7/9/2013)	Vegetation Plot 20 (7/9/2013)
	
Vegetation Plot 21 (7/10/2013)	Vegetation Plot 22 (7/11/2013)
	
Vegetation Plot 23 (7/9/2013)	Vegetation Plot 24 (7/9/2013)

Vegetation Plot 25 (7/9/2013)

Vegetation Plot 26 (7/8/2013)

Vegetation Plot 27 (7/8/2013)

Vegetation Plot 28 (7/8/2013)

Vegetation Plot 29 (7/8/2013)

APPENDIX 3. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Monitoring Year 3

Plot	MY3 Success Criteria Met (Y/N)	Tract Mean
1	Y	
2	N	
3	Y	
4	Y	
5	Y	
6	N	
7	Y	
8	N	
9	Y	
10	N	
11	N	
12	Y	
13	Y	
14	Y	
15	Y	55%
16	N	
17	Y	
18	N	
19	N	
20	Y	
21	Y	
22	Y	
23	Y	
24	Y	
25	N	
26	N	
27	N	
28	N	
29	N	

Table 8. CVS Vegetation Plot Metadata
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Monitoring Year 3

Report Prepared By	Alea Tuttle
Date Prepared	*7/16/2013 14:30*
database name	*ScalyBark_MY3.mdb*
database location	*Q:\ActiveProjects\005-02122 Scaly Bark Creek Mitigation Project\Monitoring\Monitoring Year 3\Vegetation Assessment*
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	*This worksheet, which is a summary of the project and the project data.*
Plots	*List of plots surveyed.*
Stem Count by Plot and Spp	*Unknown*
PROJECT SUMMARY----------	
Project Code	94148
project Name	Scaly Bark Creek
Description	Scaly Bark Creek Mitigation Site
length (ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	29

Table 9. Planted and Total Stem Counts
Scaly Bark Creek (NCEEP Project No. 94148)
Monitoring Year 3

			Current Plot Data (MY3 2013)																				
			94148-WE-0001			94148-WE-0002			94148-WE-0003			94148-WE-0004			94148-WE-0005			94148-WE-0006			94148-WE-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 floridanum	Southern Sugar Maple, Florida Maple	Tree	1	1	1				2	2	2	2	2	2	1	1	1				1	1	1
Acer rubrum	red maple	Tree																1	1	1			
Alnus serrulata	hazel alder	Shrub																					
Baccharis	baccharis	Shrub																					
Betula nigra	river birch	Tree	1	1	1							1	1	1									
Carpinus caroliniana	American hornbeam	Tree				1	1	1				1	1	1									
Carya	hickory	Tree																					
Carya cordiformis	bitternut hickory	Tree																					
Carya ovata	shagbark hickory	Tree																			1	1	1
Celtis	hackberry	Tree																1	1	1			
Celtis laevigata	sugarberry	Tree																			1	1	1
Celtis occidentalis	common hackberry	Tree																					
Cornus	dogwood	Shrub or Tree																					
Cornus amomum	silky dogwood	Shrub				1	1	1	2	2	2				1	1	1	1	1	1	1	1	1
Cornus florida	flowering dogwood	Tree	1	1	1	1	1	1							1	1	1				1	1	1
Diospyros virginiana	common persimmon	Tree																					
Fraxinus pennsylvanica	green ash	Tree				1	1	1	1	1	1	1	1	1				2	2	2			
Ilex opaca	American holly	Tree																					
Liquidambar styraciflua	sweetgum	Tree																			1	1	1
Liriodendron tulipifera	tuliptree	Tree	2	2	2	1	1	1	2	2	2				2	2	2						
Platanus occidentalis	American sycamore	Tree	3	3	3				1	1	1	2	2	2	3	3	3	2	2	2			
Quercus	oak	Tree																					
Quercus falcata	southern red oak	Tree																					
Quercus michauxii	swamp chestnut oak	Tree				1	1	1							1	1	1				1	1	1
Quercus nigra	water oak	Tree										2	2	2	2	2	2				1	1	1
Quercus phellos	willow oak	Tree							1	1	1				2	2	2				2	2	2
Quercus rubra	northern red oak	Tree	2	2	2																		
Salix sp.	willow	Shrub or Tree												12									
Salix nigra	black willow	Tree			3									1									
Sambucus canadensis	Common Elderberry	Shrub																					
Unknown	n/a																						
		Stem count	10	10	13	6	6	6	9	9	9	9	9	22	13	13	13	7	7	7	10	10	10
		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	6	6	7	6	6	6	6	6	6	6	6	8	8	8	8	5	5	5	9	9	9
		Stems per ACRE	405	405	526	243	243	243	364	364	364	364	364	890	526	526	526	283	283	283	405	405	405

Color Coding for Table

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total Stems

Table 9. Planted and Total Stem Counts
Scaly Bark Creek (NCEEP Project No. 94148)
Monitoring Year 3

			Current Plot Data (MY3 2013)																				
			94148-WE-0008			94148-WE-0009			94148-WE-0010			94148-WE-0011			94148-WE-0012			94148-WE-0013			94148-WE-0014		
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 floridanum	Southern Sugar Maple, Florida Maple	Tree	1	1	1	4	4	4	1	1	1	2	2	2	1	1	1	1	1	1			
Acer rubrum	red maple	Tree				5	5	5															
Alnus serrulata	hazel alder	Shrub																					
Baccharis	baccharis	Shrub																					
Betula nigra	river birch	Tree																					
Carpinus caroliniana	American hornbeam	Tree																					
Carya	hickory	Tree	1	1	1																		
Carya cordiformis	bitternut hickory	Tree																					
Carya ovata	shagbark hickory	Tree																1	1	1	2	2	2
Celtis	hackberry	Tree																1	1	1			
Celtis laevigata	sugarberry	Tree																			4	4	4
Celtis occidentalis	common hackberry	Tree																1	1	1			
Cornus	dogwood	Shrub or Tree																1	1	1			
Cornus amomum	silky dogwood	Shrub				1	1	1															
Cornus florida	flowering dogwood	Tree	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1
Diospyros virginiana	common persimmon	Tree				1	1	1															
Fraxinus pennsylvanica	green ash	Tree													2	2	2				1	1	1
Ilex opaca	American holly	Tree				1	1	1															
Liquidambar styraciflua	sweetgum	Tree				1	1	1															
Liriodendron tulipifera	tuliptree	Tree	2	2	2										1	1	1	4	4	4	2	2	2
Platanus occidentalis	American sycamore	Tree				6	6	6				1	1	1	5	5	5	2	2	2	2	2	2
Quercus	oak	Tree																					
Quercus falcata	southern red oak	Tree																					
Quercus michauxii	swamp chestnut oak	Tree																					
Quercus nigra	water oak	Tree							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Quercus phellos	willow oak	Tree							2	2	2	1	1	1	1	1	1						
Quercus rubra	northern red oak	Tree	1	1	1				1	1	1												
Salix sp.	willow	Shrub or Tree																					
Salix nigra	black willow	Tree																					
Sambucus canadensis	Common Elderberry	Shrub																					3
Unknown	n/a																						
		Stem count	6	6	6	20	20	20	7	7	7	7	7	7	13	13	13	13	13	13	13	13	16
		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	5	5	5	8	8	8	5	5	5	5	5	5	7	7	7	9	9	9	7	7	8
		Stems per ACRE	243	243	243	809	809	809	283	283	283	283	283	283	526	526	526	526	526	526	526	526	647

Color Coding for Table

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total Stems

Table 9. Planted and Total Stem Counts
Scaly Bark Creek (NCEEP Project No. 94148)
Monitoring Year 3

			Current Plot Data (MY3 2013)																				
			94148-WE-0015			94148-WE-0016			94148-WE-0017			94148-WE-0018			94148-WE-0019			94148-WE-0020			94148-WE-0021		
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 floridanum	Southern Sugar Maple, Florida Maple	Tree							1	1	1	4	4	4	1	1	1	6	6	6			
Acer rubrum	red maple	Tree																					
Alnus serrulata	hazel alder	Shrub																					
Baccharis	baccharis	Shrub			1																		
Betula nigra	river birch	Tree	1	1	1				1	1	1												
Carpinus caroliniana	American hornbeam	Tree	1	1	1																		
Carya	hickory	Tree																					
Carya cordiformis	bitternut hickory	Tree																					
Carya ovata	shagbark hickory	Tree																1	1	1	1	1	1
Celtis	hackberry	Tree				4	4	4															
Celtis laevigata	sugarberry	Tree	1	1	1																		
Celtis occidentalis	common hackberry	Tree																					
Cornus	dogwood	Shrub or Tree																					
Cornus amomum	silky dogwood	Shrub																					
Cornus florida	flowering dogwood	Tree	1	1	1				5	5	5												
Diospyros virginiana	common persimmon	Tree																					
Fraxinus pennsylvanica	green ash	Tree				1	1	1							1	1	1				5	5	5
Ilex opaca	American holly	Tree	1	1	1																		
Liquidambar styraciflua	sweetgum	Tree																					
Liriodendron tulipifera	tuliptree	Tree	1	1	1				2	2	2							1	1	1			
Platanus occidentalis	American sycamore	Tree				1	1	1							2	2	2				2	2	2
Quercus	oak	Tree																					
Quercus falcata	southern red oak	Tree																					
Quercus michauxii	swamp chestnut oak	Tree	1	1	1																		
Quercus nigra	water oak	Tree	1	1	1																		
Quercus phellos	willow oak	Tree																1	1	1			
Quercus rubra	northern red oak	Tree																					
Salix sp.	willow	Shrub or Tree																					
Salix nigra	black willow	Tree																					
Sambucus canadensis	Common Elderberry	Shrub																					20
Unknown	n/a																						
		Stem count	8	8	9	6	6	6	9	9	9	4	4	4	4	4	4	9	9	9	8	8	28
		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	8	8	9	3	3	3	4	4	4	1	1	1	3	3	3	4	4	4	3	3	4
		Stems per ACRE	324	324	364	243	243	243	364	364	364	162	162	162	162	162	162	364	364	364	324	324	1133

Color Coding for Table

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total Stems

Table 9. Planted and Total Stem Counts
Scaly Bark Creek (NCEEP Project No. 94148)
Monitoring Year 3

			Current Plot Data (MY3 2013)																				
			94148-WE-0022			94148-WE-0023			94148-WE-0024			94148-WE-0025			94148-WE-0026			94148-WE-0027			94148-WE-0028		
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 floridanum	Southern Sugar Maple, Florida Maple	Tree	2	2	2				3	3	3				1	1	1						
Acer rubrum	red maple	Tree			5																		
Alnus serrulata	hazel alder	Shrub																					
Baccharis	baccharis	Shrub																					
Betula nigra	river birch	Tree																1	1	1			
Carpinus caroliniana	American hornbeam	Tree																					
Carya	hickory	Tree																					
Carya cordiformis	bitternut hickory	Tree																					
Carya ovata	shagbark hickory	Tree				1	1	1	1	1	1												
Celtis	hackberry	Tree																					
Celtis laevigata	sugarberry	Tree							1	1	1				3	3	3	1	1	1			
Celtis occidentalis	common hackberry	Tree													1	1	1						
Cornus	dogwood	Shrub or Tree																					
Cornus amomum	silky dogwood	Shrub	2	2	2																		
Cornus florida	flowering dogwood	Tree	3	3	3				2	2	2										1	1	1
Diospyros virginiana	common persimmon	Tree																					
Fraxinus pennsylvanica	green ash	Tree							2	2	2						1						
Ilex opaca	American holly	Tree																					
Liquidambar styraciflua	sweetgum	Tree			2																1	1	1
Liriodendron tulipifera	tuliptree	Tree	1	1	1	3	3	3	1	1	1				1	1	1						
Platanus occidentalis	American sycamore	Tree				4	4	4												1	1	1	1
Quercus	oak	Tree																					
Quercus falcata	southern red oak	Tree																					
Quercus michauxii	swamp chestnut oak	Tree																					
Quercus nigra	water oak	Tree	1	1	1							3	3	3									
Quercus phellos	willow oak	Tree	1	1	1										1	1	1	1	1	1			
Quercus rubra	northern red oak	Tree	1	1	1							1	1	1				3	3	3			
Salix sp.	willow	Shrub or Tree																					
Salix nigra	black willow	Tree																					
Sambucus canadensis	Common Elderberry	Shrub																					
Unknown	n/a																						
		Stem count	11	11	18	8	8	8	10	10	10	4	4	4	7	7	8	6	6	7	3	3	3
		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	7	7	9	3	3	3	6	6	6	2	2	2	5	5	6	4	4	5	3	3	3
		Stems per ACRE	445	445	728	324	324	324	405	405	405	162	162	162	283	283	324	243	243	283	121	121	121

Color Coding for Table

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total Stems

Table 9. Planted and Total Stem Counts
Scaly Bark Creek (NCEEP Project No. 94148)
Monitoring Year 3

			Current Plot Data			Annual Summary											
			94148-WE-0029			MY3 (2013)			MY2 (2012)			MY1 (2011)			MY0 (2011)		
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**
Acer floridanum	Southern Sugar Maple, Florida Maple	Tree	1	1	1	36	36	36	46	46	46	57	57	57	104	104	104
Acer rubrum	red maple	Tree				6	6	11									
Alnus serrulata	hazel alder	Shrub										3	3	3	5	5	5
Baccharis	baccharis	Shrub						1									
Betula nigra	river birch	Tree				5	5	5	5	5	5	12	12	12	32	32	32
Carpinus caroliniana	American hornbeam	Tree				3	3	3	4	4	4						
Carya	hickory	Tree				1	1	1				1	1	1	3	3	3
Carya cordiformis	bitternut hickory	Tree							4	4	4	15	15	15	25	25	25
Carya ovata	shagbark hickory	Tree				8	8	8	21	21	21	5	5	5	12	12	12
Celtis	hackberry	Tree	1	1	1	7	7	7									
Celtis laevigata	sugarberry	Tree				11	11	11	17	17	17						
Celtis occidentalis	common hackberry	Tree				2	2	2	3	3	3	4	4	4	12	12	12
Cornus	dogwood	Shrub or Tree				1	1	1				2	2	2	2	2	2
Cornus amomum	silky dogwood	Shrub				9	9	9	9	9	9	11	11	11	11	11	11
Cornus florida	flowering dogwood	Tree				26	26	26	37	37	37	66	66	66	120	120	120
Diospyros virginiana	common persimmon	Tree				1	1	1									
Fraxinus pennsylvanica	green ash	Tree				17	17	18									
Ilex opaca	American holly	Tree				2	2	2	4	4	4	30	30	30	91	91	91
Liquidambar styraciflua	sweetgum	Tree				3	3	5	2	2	2	1	1	1	2	2	2
Liriodendron tulipifera	tuliptree	Tree				26	26	26	26	26	26	16	16	16	107	107	107
Platanus occidentalis	American sycamore	Tree				37	37	38	37	37	37	5	5	5	7	7	7
Quercus	oak	Tree							2	2	2	2	2	2			
Quercus falcata	southern red oak	Tree							1	1	1						
Quercus michauxii	swamp chestnut oak	Tree				4	4	4	3	3	3	19	19	19	34	34	34
Quercus nigra	water oak	Tree				15	15	15	14	14	14						
Quercus phellos	willow oak	Tree				13	13	13	17	17	17						
Quercus rubra	northern red oak	Tree	1	1	1	10	10	10	10	10	10						
Salix sp.	willow	Shrub or Tree						12									
Salix nigra	black willow	Tree						4									
Sambucus canadensis	Common Elderberry	Shrub						23									
Unknown	n/a								1	1	1	10	10	10	13	13	13
		Stem count	3	3	3	243	243	292	263	263	263	259	259	259	580	580	580
		size (ares)		1			29			29			29			29	
		size (ACRES)		0.02			0.72			0.72			0.72			0.72	
		Species count	3	3	3	22	22	26	20	20	20	17	17	17	16	16	16
		Stems per ACRE	121	121	121	339	339	407	367	367	367	361	361	361	809	809	809

Color Coding for Table

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total Stems

APPENDIX 4. Morphological Summary Data and Plots

Table 10a. Baseline Stream Data Summary
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reaches 1 and 2
Monitoring Year 3

Parameter	Gauge	Regional Curve						Pre-Restoration Condition				Reference Reach Data						Design				As-Built/Baseline					
		Reach 1			Reach 2			Reach 1		Reach 2		UT to Rocky Creek		Spencer Creek 1		Spencer Creek 2		Reach 1		Reach 2		Reach 1			Reach 2		
		LL	UL	Eq.	LL	UL	Eq.	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Med	Max	Min	Med	Max
Dimension and Substrate - Riffle																											
Bankfull Width (ft)	n/a							27.6		17.0	23.9	12.2		8.7		10.7	11.2	17.0		20.0		0.0	0.0	0.0	21.2	21.3	21.4
Floodprone Width (ft)								87.0		111.0	112.0	72.0		229.0		60.0	114+	37+		44+		0	0	0	200+	200+	200+
Bankfull Mean Depth								1.0		1.6	2.0	1.3		1.2		1.6	1.8	1.6		1.8		1.4	1.4	1.4	1.6	1.7	1.7
Bankfull Max Depth								2.6		2.8	3.0	1.8		1.9		2.1	2.6	2.3		2.5		0.0	0.0	0.0	2.3	2.4	2.6
Bankfull Cross-sectional Area (ft^2)								26.3		33.2	39.0	16.3		10.6		17.8	19.7	27.1		36.3		24.6	25.2	25.8	34.3	35.6	36.8
Width/Depth Ratio								29.0		10.6	12.0	9.1		7.3		5.8	7.1	10.7		11.0		13.0	13.0	13.0	12.2	12.8	13.3
Entrenchment Ratio								3.1		4.7	6.5	6.0		26.3		5.5	10.2	2.2+		2.2+		0	0	0	0	0	0
Bank Height Ratio								1.0		1.0	1.0	1.0		1.0		1.0		1.0		1.0		0.0	0.0	0.0	0.0	0.0	0.0
D50 (mm)								57.8		56.9	53.7	22.6		8.6		8.8											
Profile																											
Riffle Length (ft)	n/a							7 (min) - 22 (max)				N/P		N/P		N/P		20	52	10	63	17	35	55	30	49	69
Riffle Slope (ft/ft)								0.0180	0.0260	0.0033	0.0490	0.0606	0.0892	0.0100	0.0670	0.0130		0.0087	0.0204	0.0069	0.0203	0.0050	0.0136	0.0283	0.0023	0.0075	0.0188
Pool Length (ft)								31 (min) - 184 (max)				N/P		N/P		N/P		30	84	42	81	37	62	98	45	67	96
Pool Max Depth (ft)								2.26	2.85	2.22	3.31	2.2		2.5		3.3		3.5	4.5	4.0	5.5	3.4	4.3	6.1	3.6	4.6	5.5
Pool Spacing (ft)*								31	62	45	117	26	81	13	47	71		38	114	45	132	71	104	165	92	119	147
Pool Volume (ft^3)												-		-		-		-		-							
Pattern																											
Channel Beltwidth (ft)	n/a							52		54	69			24	52	38	41	60	120	80	140	60	-	120	80	-	140
Radius of Curvature (ft)								43	93	15	146			5	22	11	15	35	50	40	60	35	-	50	40	-	60
Rc:Bankfull Width (ft/ft)								1.6	3.4	0.9	6.1	n/a		0.6	2.5	1.3	1.4	2.1	2.9	2.0	3.0	2.1	-	2.9	2.0	-	3.0
Meander Wave Length (ft)								81	163	60	190			54	196	46	48	125	160	160	200	125	-	160	160	-	200
Meander Width Ratio								1.9		2.9	3.2			2.8	6	3.4	3.6	3.5	7.1	4.0	7.0	3.5	-	7.1	4.0	-	7.0
Substrate, Bed and Transport Parameters																											
Ri%/Ru%/P%/G%/S%	n/a																										
SC%/Sa%/G%/C%/B%/Be%																											
d16/d35/d50/d84/d95/d100								0.9/13.7/35.9/101.2/172.5/>2048				<0.063/2.4/22.6/120/256		0.1/3/8.6/77/180		<0.062/3/8.8/42/90						SC/SC/5.78/71.7/137/362			SC/7.6/21.5/83.2/151.8/362		
Reach Shear Stress (Competency) lb/ft^2								0.47		0.50-0.55								0.56		0.59		0.50	-	0.51	0.43	-	0.45
Max part size (mm) mobilized at bankfull								30-40		30-40								30	40	40	50	27	-	28	23	-	25
Stream Power (Capacity) W/m^2																											
Additional Reach Parameters																											
Drainage Area (SM)								1.09	1.65	2.38	2.53	1.10		0.50		0.96											
Impervious Cover Estimate (%)								27%				N/P		N/P		N/P											
Rosgen Classification								C4		C4		E4b		E3/C4		E4		C4		C4		C4			C4		
Bankfull Velocity (fps)		-	-	-	-	-	-	3.8		3.8	4.5							3.7		4.1		3.7			4.1		
Bankfull Discharge (cfs)		95	128	-	167	174	-					85		-		97		100		150							
Q-NFF regression								192		259																	
Q-USGS extrapolation	n/a							87	162	123	221																
Q-Mannings								80		85	96																
Valley Length (ft)								1480		2003		N/P		N/P		N/P		1480		2003							
Channel Thalweg Length (ft)								3600				N/P		N/P		N/P		4060				4058					
Sinuosity (ft)								1.1		1.0		N/P		N/P		N/P		1.2		1.2		2.7			0.0		
Water Surface Slope (ft/ft)								0.0087		0.0025	0.0051	N/P		N/P		N/P		0.0067		0.0053		0.0067			0.0049		
Bankfull Slope (ft/ft)								0.00568 (min) - 0.00944 (max)				N/P		N/P		N/P		0.0064		0.0056		0.0067			0.0050		

N/P: Data was not provided

*Design P:P spacing reported in the Restoration Plan included in-line pools, which are considered a habitat quality rather than a stability parameter, for evaluating for a channels profile stability. Subsequent monitoring years will evaluate pool Dmax for spacing.

Table 10b. Baseline Stream Data Summary
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2 and UT2
Monitoring Year 3

Parameter	Gauge	Regional Curve						Pre-Restoration Condition				Reference Reach Data						Design				As-Built/Baseline					
		UT1 Reach 2			UT2			UT1 Reach 2		UT2		UT to Rocky Creek		Spencer Creek 1		Spencer Creek 2		UT1 Reach 2		UT2		UT1 Reach 2			UT2		
		LL	UL	Eq.	LL	UL	Eq.	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Med	Max	Min	Med	Max
Dimension and Substrate - Riffle																											
Bankfull Width (ft)	n/a							10.6		13.3		12.2		8.7		10.7	11.2	11.0		12.0		12.1			13.0		
Floodprone Width (ft)								78.0		94.0		72.0		229.0		60.0	114+	24+		26+		200+			200+		
Bankfull Mean Depth								1.1		1.0		1.3		1.2		1.6	1.8	1.1		1.1		1.0			0.9		
Bankfull Max Depth								1.6		1.8		1.8		1.9		2.1	2.6	1.5		1.5		1.7			1.5		
Bankfull Cross-sectional Area (ft^2)								12.0		13.0		16.3		10.6		17.8	19.7	12.0		13.5		12.4			11.4		
Width/Depth Ratio								9.4		13.6		9.1		7.3		5.8	7.1	10.1		10.7		11.9			14.8		
Entrenchment Ratio								7.3		7.1		6.0		26.3		5.5	10.2	2.2+		2.2+		2.2+			2.2+		
Bank Height Ratio								1.3		1.2		1.0		1.0		1.0		1.0		1.0		1.0			1.0		
D50 (mm)								27.3		55.6		22.6		8.6		8.8											
Profile																											
Riffle Length (ft)	n/a							5	32	6	23	N/P		N/P		N/P		29	42	23	37	11	30	41	21	29	41
Riffle Slope (ft/ft)								0.0050	0.0250	0.0137	0.0740	0.0606	0.0892	0.0100	0.0670	0.0130		0.0153	0.0245	0.0162	0.0281	0.0150	0.0187	0.0233	0.0215	0.0230	0.0272
Pool Length (ft)								37	61	26	40	N/P		N/P		N/P		14	39	20	44	21	30	43	27	31	37
Pool Max Depth (ft)								1.36	1.87	1.71	2.07	2.20		2.50		3.30		2.3	3.5	2.2	3.5	2.5	3.3	4.0	2.9	3.1	3.5
Pool Spacing (ft)*								75	88	48	90	26	81	13	47	71		17	55	18	60	55	59	77	55	59	70
Pool Volume (ft^3)																											
Pattern																											
Channel Beltwidth (ft)	n/a							20		28				24	52	38	41	50	80	50	80	50	-	80	50	-	80
Radius of Curvature (ft)								22	83	23	89			5	22	11	15	25	33	25	34	25	-	33	25	-	34
Rc:Bankfull Width (ft/ft)								2.1	7.8	1.7	6.7	n/a		0.6	2.5	1.3	1.4	2.3	3.0	2.1	2.8	2.3	-	3.0	2.1	-	2.8
Meander Wave Length (ft)								45	93	39	113			54	196	46	48	80	100	90	120	80	-	100	90	-	120
Meander Width Ratio								1.9		2.1				2.8	6.0	3.4	3.6	4.5	7.3	4.2	6.7	4.5	-	7.3	4.2	-	6.7
Substrate, Bed and Transport Parameters																											
Ri%/Ru%/P%/G%/S%	n/a																										
SC%/Sa%/G%/C%/B%/Be%																											
d16/d35/d50/d84/d95/d100								SC/0.9/27.3/94.6/158.4/>2048		16.0/30/55.6/128/164.4/>2048		<0.063/2.4/22.6/120/256		0.1/3/8.6/77/180		<0.062/3/8.8/42/90						0.025/16/37.24/104.7/157.1/362			SC/8.8/16.9/75.9/152/512		
Reach Shear Stress (Competency) lb/ft^2								0.7		0.52								0.61		0.67		0.55			0.68		
Max part size (mm) mobilized at bankfull								50-60		30-40								40	50	50	60	31			39		
Stream Power (Capacity) W/m^2																											
Additional Reach Parameters																											
Drainage Area (SM)	n/a							0.47		0.68		1.10		0.50		0.96											
Impervious Cover Estimate (%)								33%		4%		N/P		N/P		N/P											
Rosgen Classification								E4		C4		E4b		E3/C4		E4		C4		C4		C4			C4		
Bankfull Velocity (fps)		-	-	-	-	-	-	4.2		3.8								4.2		3.7		4.2			3.7		
Bankfull Discharge (cfs)		52			67			50		50		85		-		97		50		50							
Q-NFF regression								79		103																	
Q-USGS extrapolation								42	85	31	65																
Q-Mannings								47		52																	
Valley Length (ft)								358		356		N/P		N/P		N/P		358		356							
Channel Thalweg Length (ft)								330		262		N/P		N/P		N/P		422		393		402			400		
Sinuosity (ft)								1.0		1.1		N/P		N/P		N/P		1.1		1.1		1.1			1.1		
Water Surface Slope (ft/ft)								0.0130		0.0189		N/P		N/P		N/P		0.0107		0.0113		0.0101			0.0121		
Bankfull Slope (ft/ft)								0.0119		0.0177		N/P		N/P		N/P		0.0097		0.0116		0.0094			0.0130		

N/P: Data was not provided

*Design P:P spacing reported in the Restoration Plan included in-line pools, which are considered a habitat quality rather than a stability parameter, for evaluating for a channels profile stability. Subsequent monitoring years will evaluate pool Dmax for spacing.

Table 11. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross-Section)
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reaches 1 and 2, UT1 Reach 2, and UT2
Monitoring Year 3

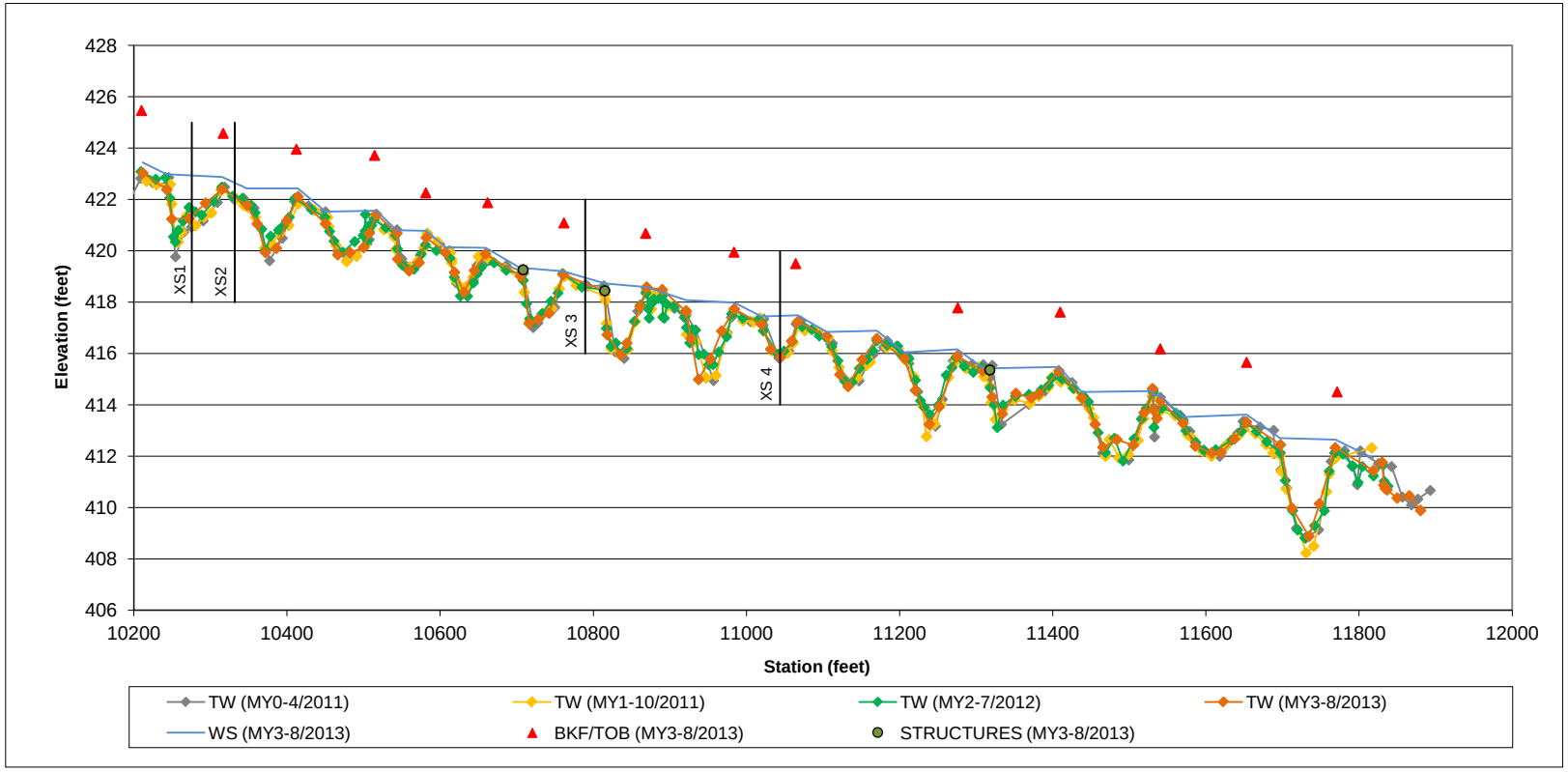
	Scaly Bark Reach 1																							
	Cross-Section 1 (Pool)						Cross-Section 2 (Riffle)						Cross-Section 3 (Riffle)						Cross-Section 4 (Pool)					
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
based on fixed bankfull elevation																								
Bankfull Width (ft)	21.13	19.61	19.37	20.34			17.86	17.70	24.65	18.60			18.29	18.29	19.09	19.14			24.12	25.80	23.52	27.50		
Floodprone Width (ft)	n/a	n/a	n/a	n/a			200+	200+	200+	200+			200+	200+	200+	200+			n/a	n/a	n/a	n/a		
Bankfull Mean Depth (ft)	1.83	1.78	1.69	1.68			1.38	1.3	1.09	1.25			1.41	1.37	1.31	1.26			1.87	1.69	1.87	1.61		
Bankfull Max Depth (ft)	3.48	3.37	2.84	2.95			2.20	2.04	2.26	2.49			2.20	2.26	2.22	2.42			3.67	3.36	3.38	3.54		
Bankfull Cross-Sectional Area (ft^2)	38.63	34.95	32.79	34.09			24.64	23.07	26.83	23.19			25.82	24.15	24.96	24.04			45.17	43.63	43.9	44.43		
Bankfull Width/Depth Ratio	11.55	11	11.45	12.14			12.95	13.57	22.66	14.93			12.95	13.31	14.6	15.25			12.88	15.26	12.59	17.11		
Bankfull Entrenchment Ratio	n/a	n/a	n/a	n/a			2.2+	2.2+	2.2+	2.2+			2.2+	2.2+	2.2+	2.2+			n/a	n/a	n/a	n/a		
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		
d50 (mm)							27	42	22	76			30	30	45	48								
	Scaly Bark Reach 2																							
	Cross-Section 5 (Pool)						Cross-Section 6 (Riffle)						Cross-Section 7 (Pool)						Cross-Section 8 (Riffle)					
based on fixed bankfull elevation	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
Bankfull Width (ft)	26.64	27.41	30.69	27.28			21.35	26.65	23.60	23.00			24.73	24.54	25.02	23.75			21.20	21.37	22.50	21.11		
Floodprone Width (ft)	n/a	n/a	n/a	n/a			200+	200+	200+	200+			n/a	n/a	n/a	n/a			200+	200+	200+	200+		
Bankfull Mean Depth (ft)	1.96	1.97	1.8	1.98			1.61	1.27	1.5	1.45			1.95	1.89	1.8	1.9			1.74	1.65	1.59	1.74		
Bankfull Max Depth (ft)	4.63	4.40	4.46	4.52			2.27	2.25	2.38	2.34			3.9	3.66	3.61	3.91			2.6	2.60	2.68	2.69		
Bankfull Cross-Sectional Area (ft^2)	52.24	53.92	55.28	54.05			34.33	33.76	35.45	33.41			48.29	46.34	45.09	45.16			36.79	35.25	35.80	36.74		
Bankfull Width/Depth Ratio	13.58	13.93	17.04	13.77			13.28	21.04	15.71	15.84			12.67	12.99	13.88	12.49			12.22	12.96	14.14	12.13		
Bankfull Entrenchment Ratio	n/a	n/a	n/a	n/a			2.2+	2.2+	2.2+	2.2+			n/a	n/a	n/a	n/a			2.2+	2.2+	2.2+	2.2+		
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		
d50 (mm)							45	57	38	35									23	49	33	58		
	UT1 Reach 2												UT2											
	Cross-Section 9 (Pool)						Cross-Section 10 (Riffle)						Cross-Section 11 (Pool)						Cross-Section 12 (Riffle)					
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
based on fixed bankfull elevation																								
Bankfull Width (ft)	18.21	26.61	17.60	16.89			12.14	11.85	12.20	10.17			15.38	14.82	16.98	15.24			12.99	13.03	13.00	11.97		
Floodprone Width (ft)	n/a	n/a	n/a	n/a			200+	200+	200+	200+			n/a	n/a	n/a	n/a			200+	200+	200+	200+		
Bankfull Mean Depth (ft)	1.53	1.23	1.33	1.31			1.02	0.96	0.97	0.86			1.51	1.40	1.4	1.43			0.88	0.90	0.99	0.95		
Bankfull Max Depth (ft)	3.26	2.98	2.73	3.02			1.73	1.64	1.73	1.61			2.90	2.62	2.87	3.01			1.46	1.53	1.71	1.57		
Bankfull Cross-Sectional Area (ft^2)	27.95	26.61	23.47	22.1			12.39	11.40	11.8	10.17			23.28	20.79	23.82	21.87			11.40	11.73	12.89	11.43		
Bankfull Width/Depth Ratio	11.87	17.62	13.2	12.91			11.89	12.32	12.61	13.64			10.16	10.57	12.11	10.62			14.82	14.47	13.11	12.54		
Bankfull Entrenchment Ratio	n/a	n/a	n/a	n/a			2.2+	2.2+	2.2+	2.2+			n/a	n/a	n/a	n/a			2.2+	2.2+	2.2+	2.2+		
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		
d50 (mm)							48	39	12	56									35	15	41	27		

Table 12a. Monitoring Data - Stream Reach Data Summary
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 1
Monitoring Year 3

Parameter	As-Built/Baseline			MY-1			MY-2			MY-3			MY-4			MY-5		
	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max
Dimension and Substrate - Riffle																		
Bankfull Width (ft)	17.86	18.08	18.29	17.70	18.00	18.29	19.09	21.87	24.65	18.60	18.87	19.14						
Floodprone Width (ft)	200+	200+	200+	200+	200+	200+	200+	200+	200+	200+	200+	200+						
Bankfull Mean Depth	1.4	1.4	1.4	1.3	1.3	1.4	1.1	1.2	1.3	1.3	1.3	1.3						
Bankfull Max Depth	2.2	2.2	2.2	2.0	2.2	2.3	2.2	2.2	2.3	2.4	2.5	2.5						
Bankfull Cross-sectional Area (ft^2)	24.6	25.2	25.8	23.1	23.6	24.2	25.0	25.9	26.8	23.2	23.6	24.0						
Width/Depth Ratio	13.0	13.0	13.0	13.3	13.4	13.6	14.6	18.6	22.7	14.9	15.1	15.3						
Entrenchment Ratio	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+						
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						
D50 (mm)																		
Profile																		
Riffle Length (ft)	17	35	55	22	34	52	16	30	67	25	36	54						
Riffle Slope (ft/ft)	0.0050	0.0136	0.0283	0.0052	0.0149	0.0332	0.0055	0.0133	0.0372	0.0087	0.0190	0.0323						
Pool Length (ft)	37	62	98	39	63	89	32	56	82	38	65	99						
Pool Max Depth (ft)	3.4	4.3	6.1	3.4	3.9	6.8	3.2	4.1	6.6	3.6	4.4	6.6						
Pool Spacing (ft)	71	104	165	67	103	160	72	100	165	71	106	170						
Pool Volume (ft^3)																		
Pattern																		
Channel Beltwidth (ft)	60	-	120															
Radius of Curvature (ft)	35	-	50															
Rc:Bankfull Width (ft/ft)	2.1	-	2.9															
Meander Wave Length (ft)	125	-	160															
Meander Width Ratio	3.5	-	7.1															
Additional Reach Parameters																		
Rosgen Classification	C4			C4			C4			C4								
Channel Thalweg Length (ft)	1886			1886			1886			1886								
Sinuosity (ft)	1.3			1.3			1.3			1.3								
Water Surface Slope (ft/ft)	0.0067			0.0069			n/a[1]			0.0072								
Bankfull Slope (ft/ft)	0.0067			0.0069			0.0071			0.0070								
Ri%/Ru%/P%/G%/S%																		
SC%/Sa%/G%/C%/B%/Be%																		
d16/d35/d50/d84/d95/d100	SC/SC/6/72/137/362			SC/SC/22/101/165/512			SC/SC/23/97/170/256			6/12/23/114/164/362								
% of Reach with Eroding Banks				0%			0%			0%								

[1] Water surface slope wasn't calculated because there was little to no baseflow during Year 2 Monitoring.

Longitudinal Profile Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 1
Monitoring Year 3



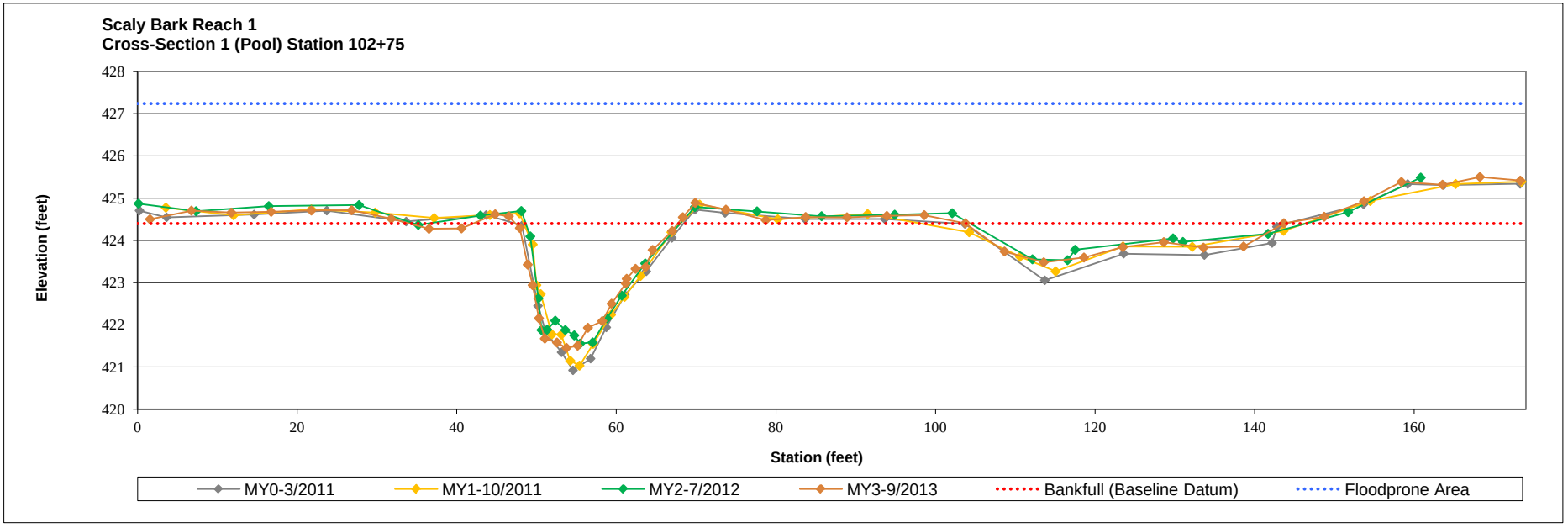
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 1, Cross-Section 1 (Pool)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed HUC	NCDWQ Subbasin 03-07-13
XS ID	1
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, IE, KB

Summary Data	
Bankfull Elevation (ft)	424.40
Bankfull Cross-Sectional Area (ft2)	34.09
Bankfull Width (ft)	20.34
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	n/a
Max Depth at Bankfull (ft)	2.95
Mean Depth at Bankfull (ft)	1.68
W/D Ratio	12.14
Entrenchment Ratio	n/a
Bank Height Ratio	1.1
Stream Type	n/a

Cross-Section 1: View Upstream

Cross-Section 1: View Downstream



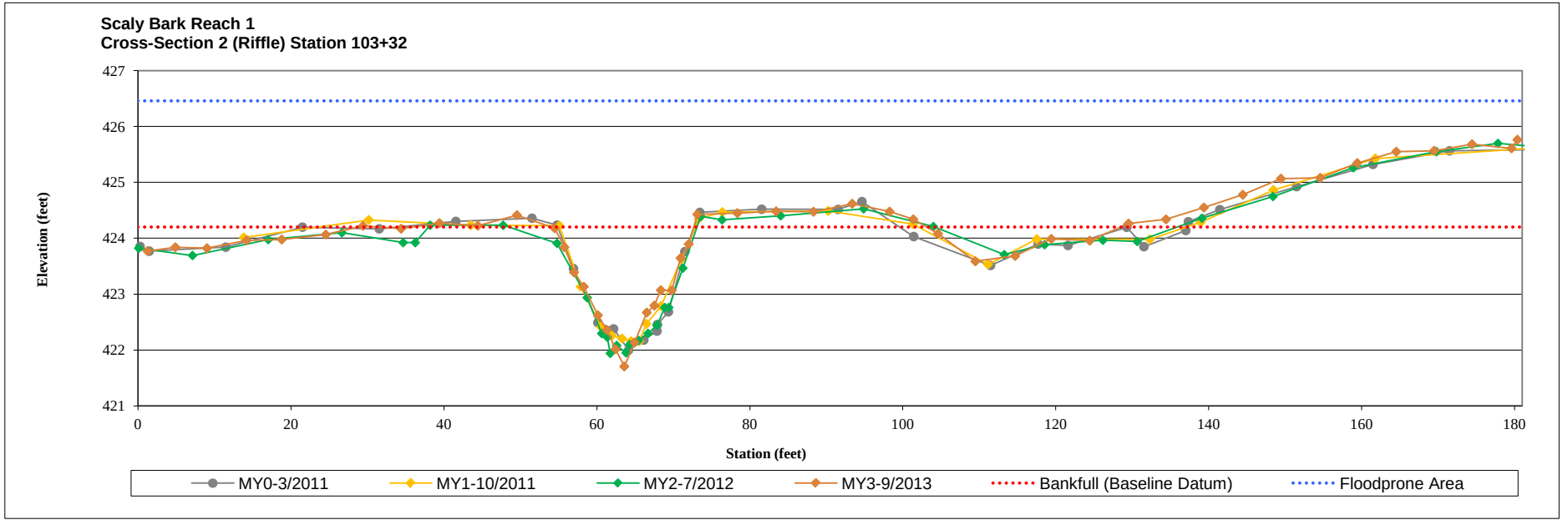
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 1, Cross-Section 2 (Riffle)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed HUC	NCDWQ Subbasin 03-07-13
XS ID	2
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, IE, KB

Summary Data	
Bankfull Elevation (ft)	424.20
Bankfull Cross-Sectional Area (ft2)	23.19
Bankfull Width (ft)	18.6
Flood Prone Area Elevation (ft)	426.69
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	2.49
Mean Depth at Bankfull (ft)	1.25
W/D Ratio	14.93
Entrenchment Ratio	>2.2
Bank Height Ratio	1.0
Stream Type	C

Cross-Section 2: View Upstream

Cross-Section 2: View Downstream



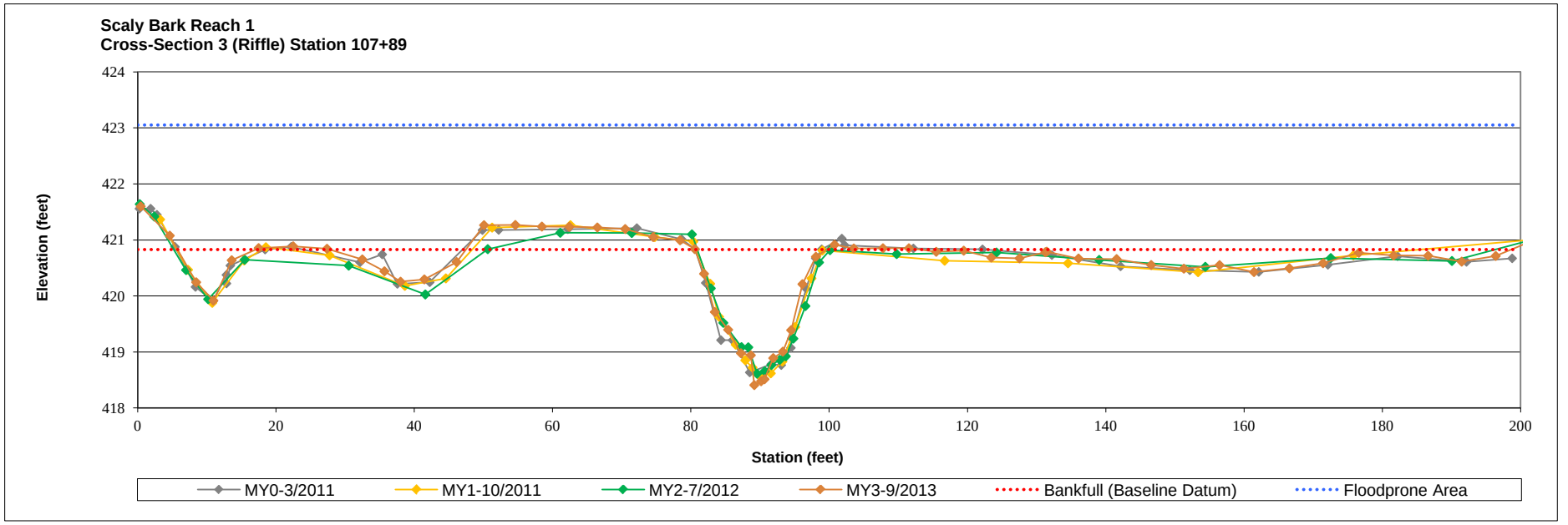
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 1, Cross-Section 3 (Riffle)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed HUC	NCDWQ Subbasin 03-07-13
XS ID	3
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, IE, KB

Summary Data	
Bankfull Elevation (ft)	420.83
Bankfull Cross-Sectional Area (ft2)	24.04
Bankfull Width (ft)	19.14
Flood Prone Area Elevation (ft)	423.25
Flood Prone Width (ft)	201.26
Max Depth at Bankfull (ft)	2.42
Mean Depth at Bankfull (ft)	1.26
W/D Ratio	15.25
Entrenchment Ratio	10.51
Bank Height Ratio	1.00
Stream Type	C

Cross-Section 3: View Upstream

Cross-Section 3: View Downstream



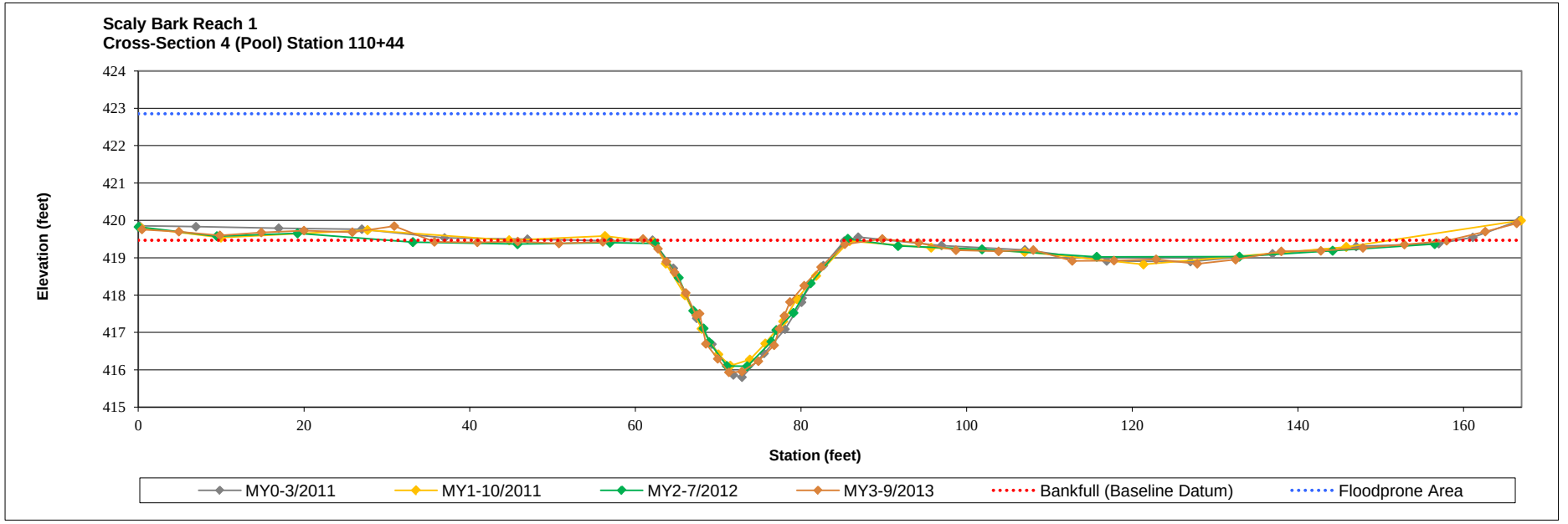
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 1, Cross-Section 4 (Pool)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed HUC	NCDWQ Subbasin 03-07-13
XS ID	4
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, IE, KB

Summary Data	
Bankfull Elevation (ft)	419.47
Bankfull Cross-Sectional Area (ft2)	44.43
Bankfull Width (ft)	27.57
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	n/a
Max Depth at Bankfull (ft)	3.54
Mean Depth at Bankfull (ft)	1.61
W/D Ratio	17.11
Entrenchment Ratio	n/a
Bank Height Ratio	1.00
Stream Type	n/a

Cross-Section 4: View Upstream

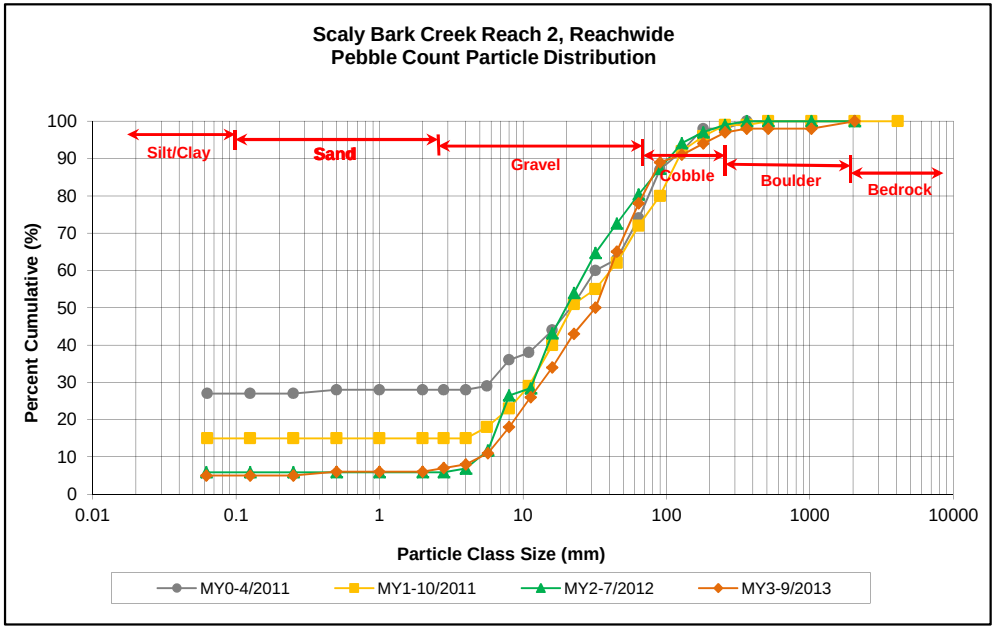
Cross-Section 4: View Downstream

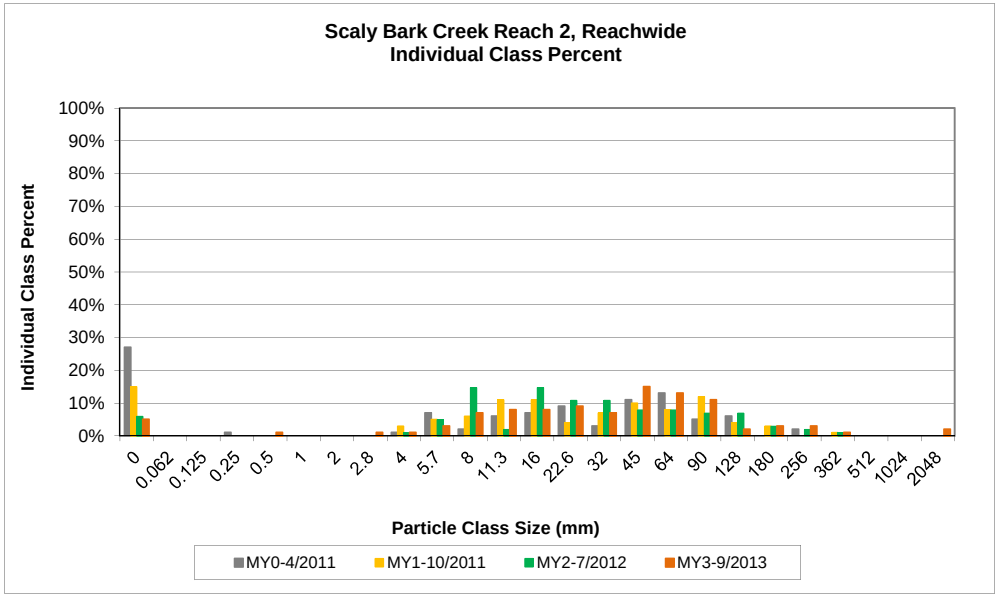


Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 2, Reachwide
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count			Scaly Bark Reach 2 Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		5	5	5	5
SAND	Very fine	0.062	0.125					5
	Fine	0.125	0.250					5
	Medium	0.250	0.500					5
	Coarse	0.5	1.0		1	1	1	6
	Very Coarse	1.0	2.0					6
GRAVEL	Very Fine	2.0	2.8					6
	Very Fine	2.8	4.0		1	1	1	7
	Fine	4.0	5.7	1		1	1	8
	Fine	5.7	8.0	2	1	3	3	11
	Medium	8.0	11.3	2	5	7	7	18
	Medium	11.3	16.0	2	6	8	8	26
	Coarse	16.0	22.6	2	6	8	8	34
	Coarse	22.6	32	4	5	9	9	43
	Very Coarse	32	45	3	4	7	7	50
	Very Coarse	45	64	6	9	15	15	65
COBBLE	Small	64	90	11	2	13	13	78
	Small	90	128	9	2	11	11	89
	Large	128	180	2		2	2	91
	Large	180	256	2	1	3	3	94
BOULDER	Small	256	362	3		3	3	97
	Small	362	512	1		1	1	98
	Medium	512	1024					98
	Large/Very Large	1024	2048					98
BEDROCK	Bedrock	2048	>2048		2	2	2	100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	Silt/Clay
D_{50} =	45.00
D_{84} =	109.06
D_{95} =	287.34
D_{100} =	>2048

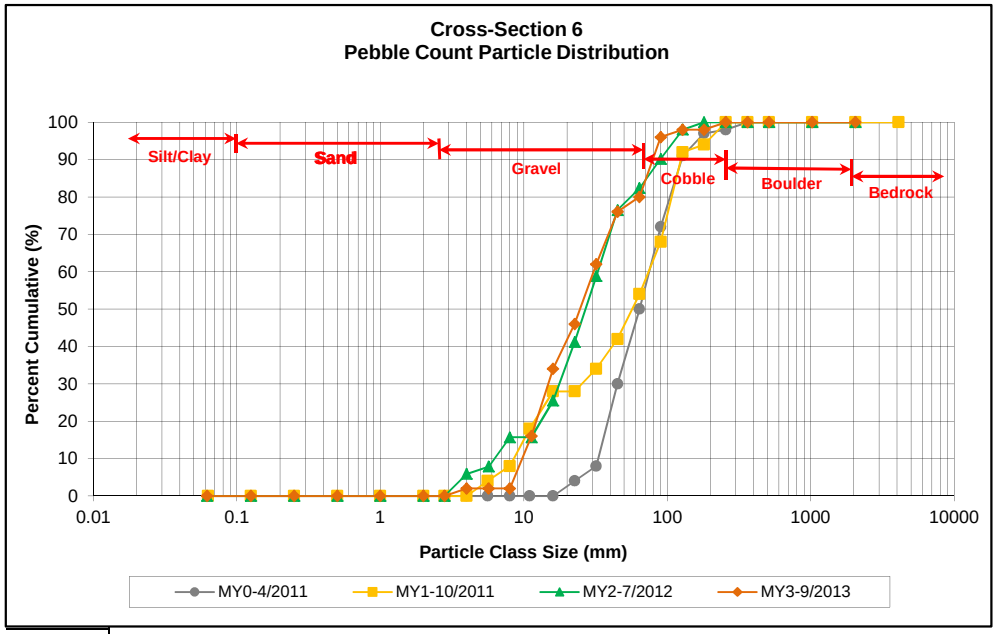


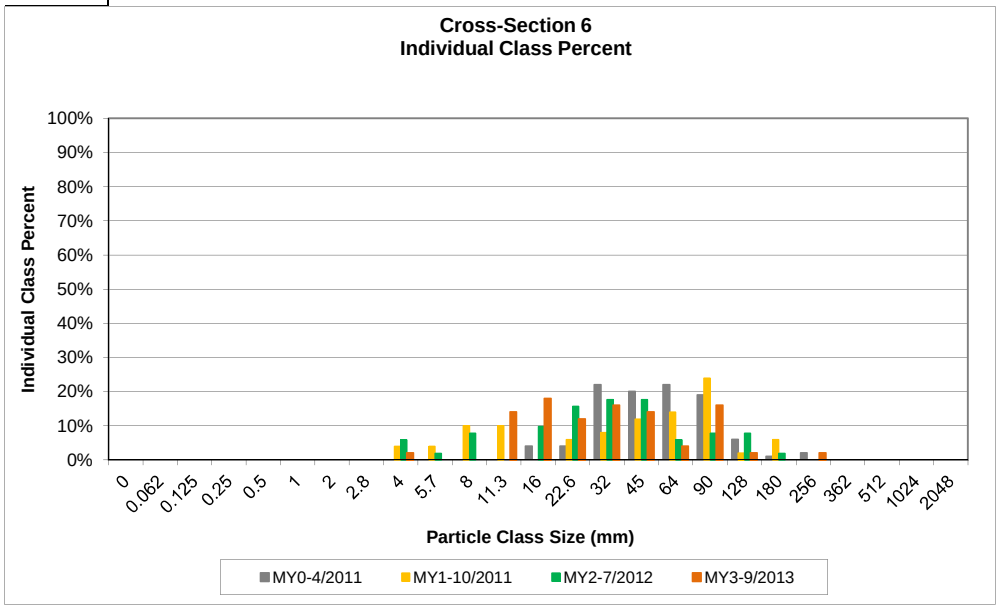


Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 6 (Riffle)
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count	Cross-Section 6 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.250	0.500			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.7	2	2	2
	Fine	5.7	8.0			2
	Medium	8.0	11.3			2
	Medium	11.3	16.0	14	14	16
	Coarse	16.0	22.6	18	18	34
	Coarse	22.6	32	12	12	46
	Very Coarse	32	45	16	16	62
	Very Coarse	45	64	14	14	76
COBBLE	Small	64	90	4	4	80
	Small	90	128	16	16	96
	Large	128	180	2	2	98
	Large	180	256			98
BOULDER	Small	256	362	2	2	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	100	100	100

Cross-Section 6 Channel materials (mm)	
D_{16} =	16.00
D_{35} =	23.26
D_{50} =	34.85
D_{84} =	98.28
D_{95} =	125.21
D_{100} =	362.00

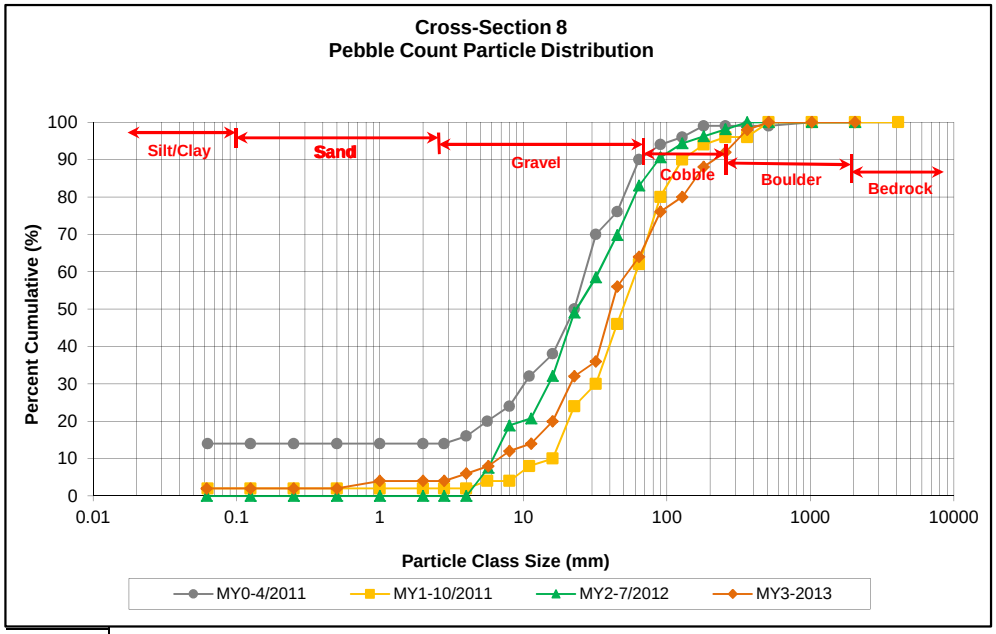




Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 8 (Riffle)
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count	Cross-Section 8 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	2	2
SAND	Very fine	0.062	0.125			2
	Fine	0.125	0.250			2
	Medium	0.250	0.500			2
	Coarse	0.5	1.0			2
	Very Coarse	1.0	2.0	2	2	4
GRAVEL	Very Fine	2.0	2.8			4
	Very Fine	2.8	4.0			4
	Fine	4.0	5.7	2	2	6
	Fine	5.7	8.0	2	2	8
	Medium	8.0	11.3	4	4	12
	Medium	11.3	16.0	2	2	14
	Coarse	16.0	22.6	6	6	20
	Coarse	22.6	32	12	12	32
	Very Coarse	32	45	4	4	36
	Very Coarse	45	64	20	20	56
COBBLE	Small	64	90	8	8	64
	Small	90	128	12	12	76
	Large	128	180	4	4	80
	Large	180	256	8	8	88
BOULDER	Small	256	362	4	4	92
	Small	362	512	6	6	98
	Medium	512	1024	2	2	100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 8	
Channel materials (mm)	
D_{16} =	17.95
D_{35} =	41.32
D_{50} =	57.58
D_{84} =	214.66
D_{95} =	430.52
D_{100} =	1024.00



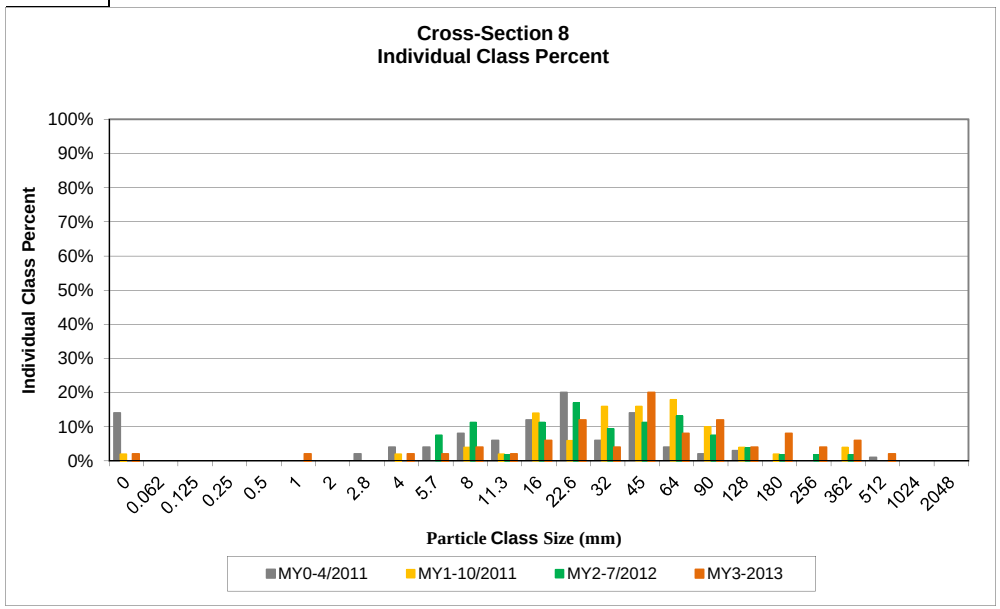
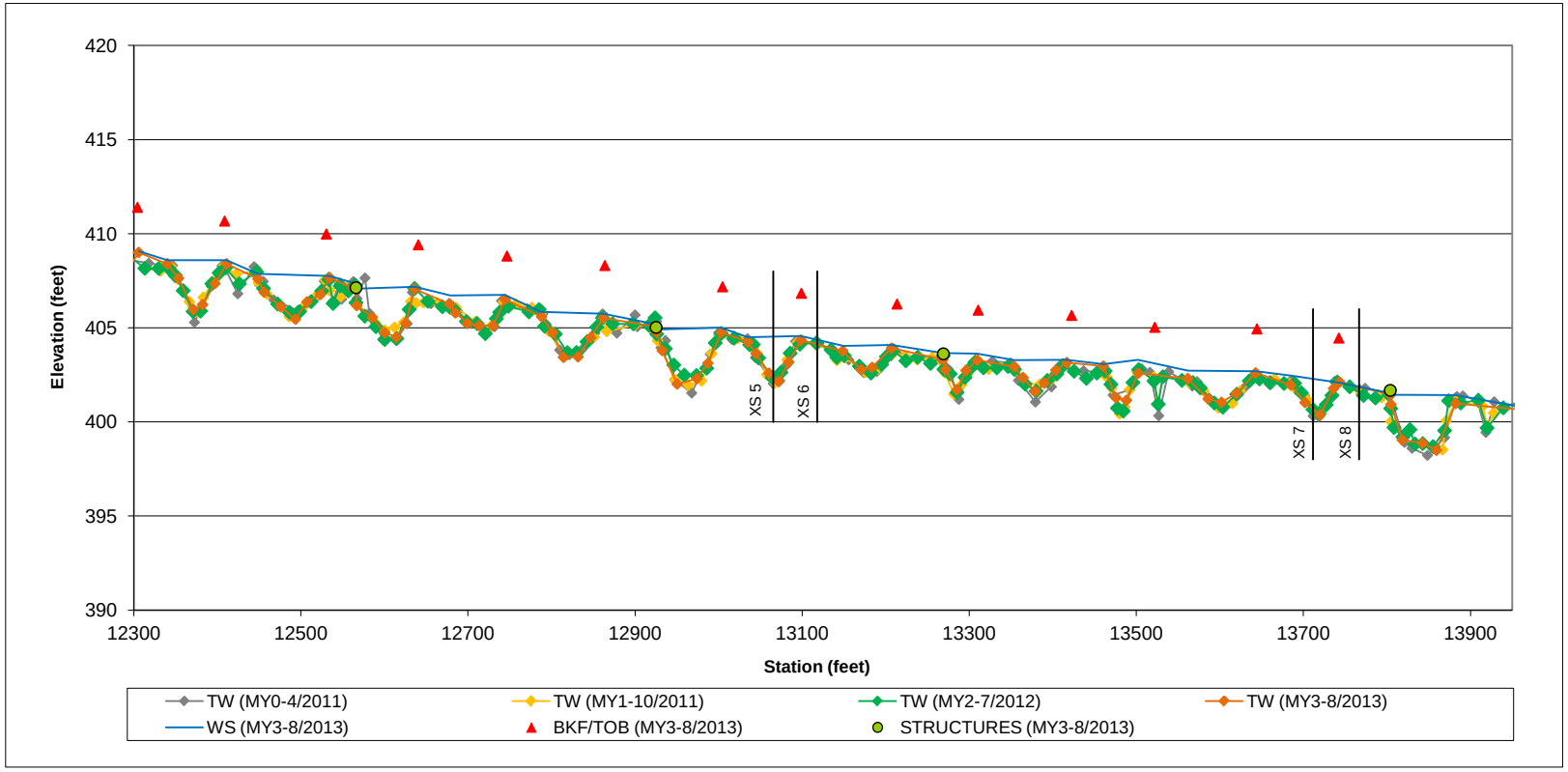


Table 12b. Monitoring Data - Stream Reach Data Summary
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 2
Monitoring Year 3

Parameter	As-Built/Baseline			MY-1			MY-2			MY-3			MY-4			MY-5		
	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max
Dimension and Substrate - Riffle																		
Bankfull Width (ft)	21.20	21.28	21.35	21.37	24.01	26.65	22.50	23.05	23.60	21.11	22.06	23.00						
Floodprone Width (ft)	200+	200+	200+	200+	200+	200+	200+	200+	200+	200+	200+	200+						
Bankfull Mean Depth	1.6	1.7	1.7	1.3	1.5	1.7	1.5	1.5	1.6	1.45	1.60	1.74						
Bankfull Max Depth	2.3	2.4	2.6	2.3	2.4	2.6	2.4	2.5	2.7	2.34	2.52	2.69						
Bankfull Cross-sectional Area (ft^2)	34.3	35.6	36.8	33.8	34.5	35.3	35.5	35.6	35.8	33.41	35.08	36.74						
Width/Depth Ratio	12.2	12.8	13.3	13.0	17.0	21.0	14.1	14.9	15.7	12.13	13.99	15.84						
Entrenchment Ratio	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+	2.2+						
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						
D50 (mm)																		
Profile																		
Riffle Length (ft)	30	49	69	24	41	66	25	42	67	28	44	69						
Riffle Slope (ft/ft)	0.0023	0.0075	0.0188	0.0041	0.0091	0.0168	0.0051	0.0107	0.0265	0.0043	0.0115	0.0214						
Pool Length (ft)	45	67	96	43	65	82	24	51	72	41	69	86						
Pool Max Depth (ft)	3.6	4.6	5.5	3.5	4.4	5.2	3.6	4.5	5.4	4.0	4.8	6.1						
Pool Spacing (ft)	92	119	147	91	109	154	93	113	140	85	115	137						
Pool Volume (ft^3)																		
Pattern																		
Channel Beltwidth (ft)	80	-	140															
Radius of Curvature (ft)	40	-	60															
Rc:Bankfull Width (ft/ft)	2.0	-	3.0															
Meander Wave Length (ft)	160	-	200															
Meander Width Ratio	4.0	-	7.0															
Additional Reach Parameters																		
Rosgen Classification	C4			C4			C4			C4								
Channel Thalweg Length (ft)	2220			2220			2220			2200								
Sinuosity (ft)	1.1			1.1			1.1			1.1								
Water Surface Slope (ft/ft)	0.0049			0.0046			n/a[1]			0.0050								
Bankfull Slope (ft/ft)	0.0050			0.0048			0.0049			0.0048								
Ri%/Ru%/P%/G%/S%																		
SC%/Sa%/G%/C%/B%/Be%																		
d16/d35/d50/d84/d95/d100	SC/8/22/83/152/362			SC/SC/21/101/165/512			SC/SC/28/108/200/512			18/41/58/215/431/1024								
% of Reach with Eroding Banks				0%			0%			0%								

[1] Water surface slope wasn't calculated because there was little to no baseflow during Year 2 Monitoring.

Longitudinal Profile Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2
Monitoring Year 3



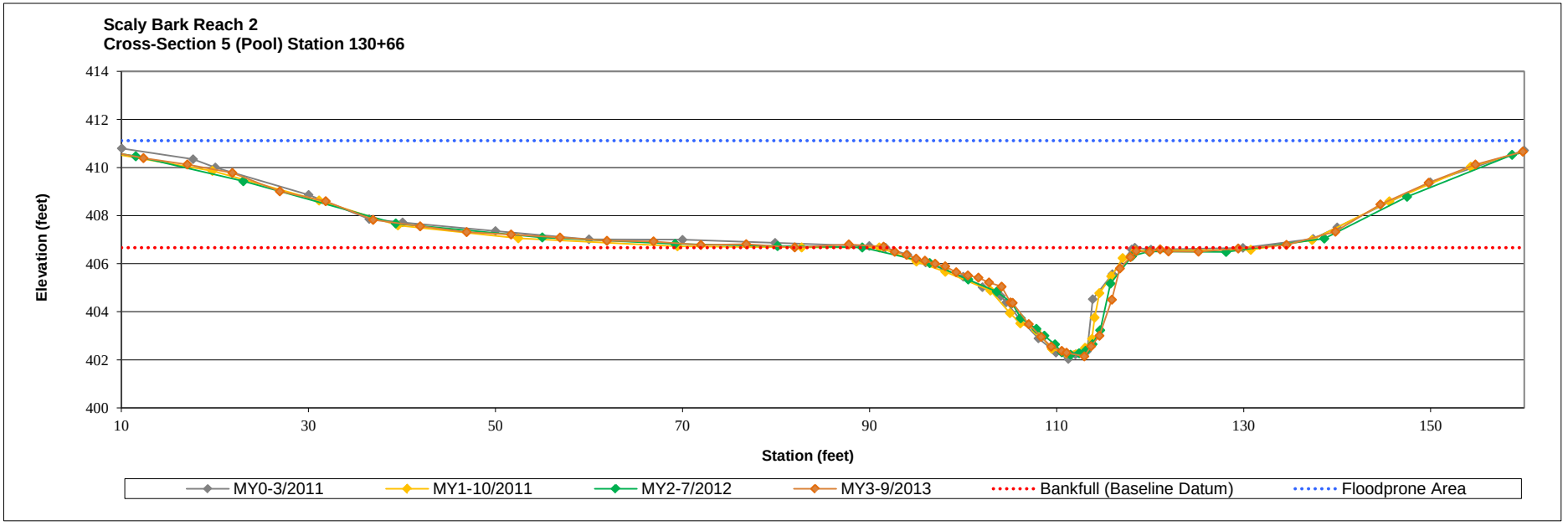
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 5 (Pool)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed	NCDWQ Subbasin 03-07-13
XS ID	5
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, KB, AT

Summary Data	
Bankfull Elevation (ft)	406.67
Bankfull Cross-Sectional Area (ft2)	54.05
Bankfull Width (ft)	27.28
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	n/a
Max Depth at Bankfull (ft)	4.52
Mean Depth at Bankfull (ft)	1.98
W/D Ratio	13.77
Entrenchment Ratio	n/a
Bank Height Ratio	1.0
Stream Type	n/a

Cross-Section 5: View Upstream

Cross-Section 5: View Downstream



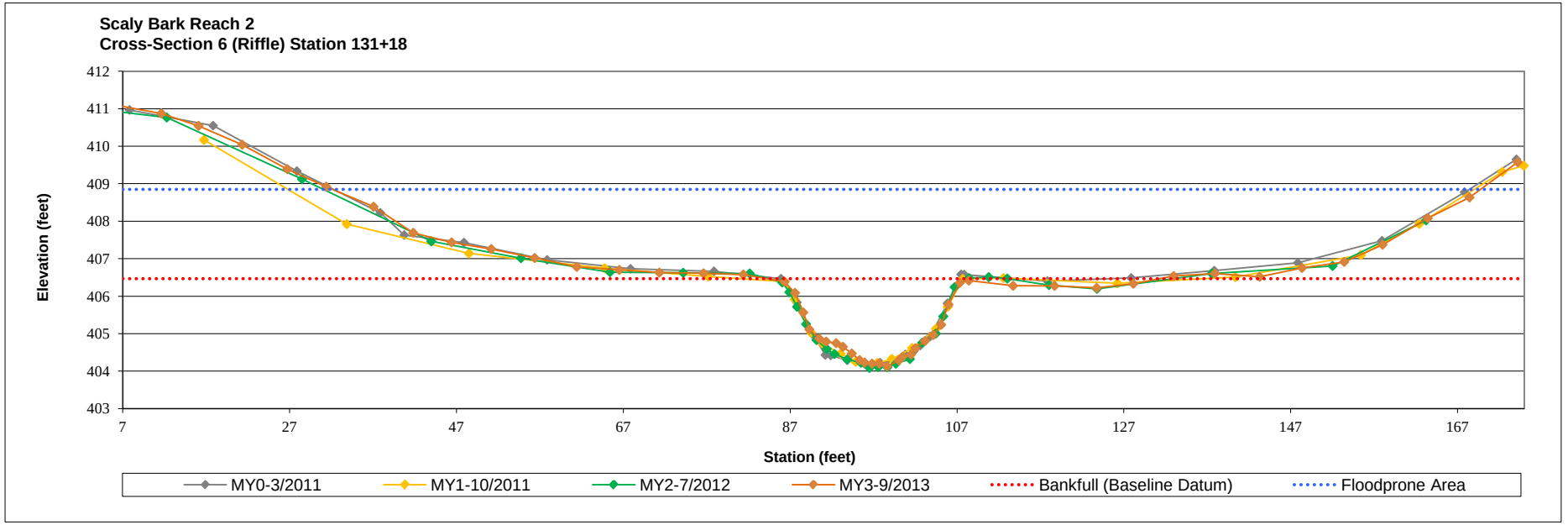
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 6 (Riffle)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed HUC	NCDWQ Subbasin 03-07-13
XS ID	6
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, KB, AT

Summary Data	
Bankfull Elevation (ft)	406.47
Bankfull Cross-Sectional Area (ft2)	33.41
Bankfull Width (ft)	23.00
Flood Prone Area Elevation (ft)	408.81
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	2.34
Mean Depth at Bankfull (ft)	1.45
W/D Ratio	15.84
Entrenchment Ratio	2.2+
Bank Height Ratio	1.0
Stream Type	C

Cross-Section 6: View Upstream

Cross-Section 6: View Downstream



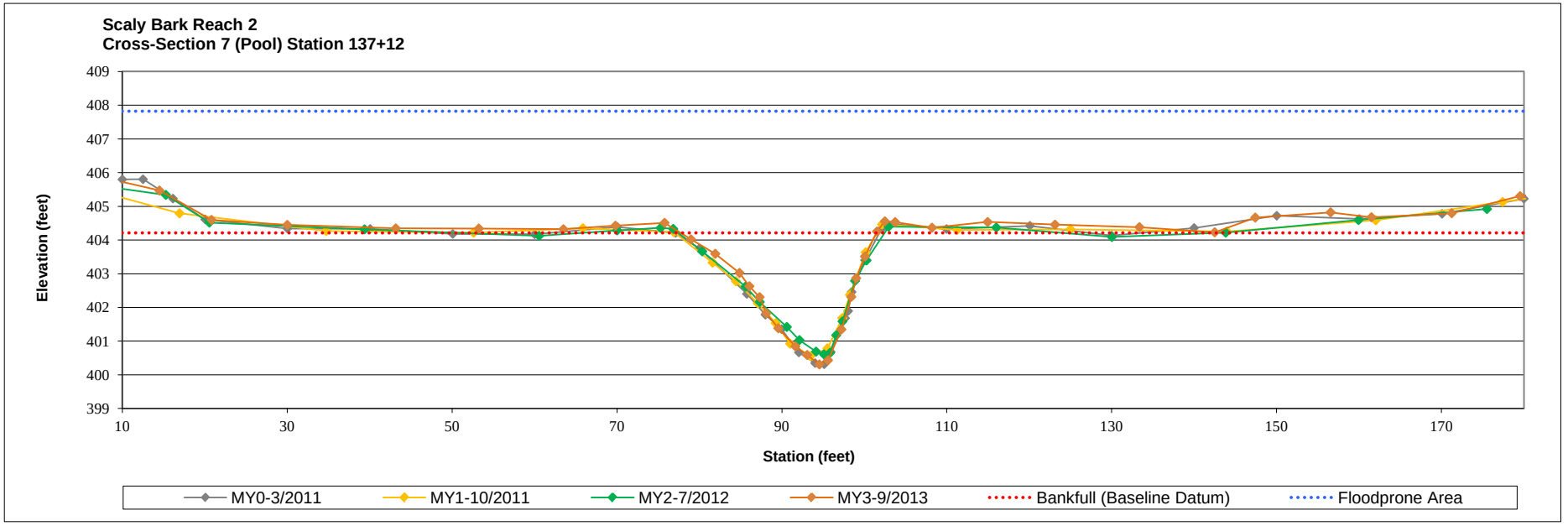
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 7 (Pool)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed HUC	NCDWQ Subbasin 03-07-13
XS ID	7
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, KB, AT

Summary Data	
Bankfull Elevation (ft)	404.21
Bankfull Cross-Sectional Area (ft2)	45.16
Bankfull Width (ft)	23.75
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	n/a
Max Depth at Bankfull (ft)	3.91
Mean Depth at Bankfull (ft)	1.90
W/D Ratio	12.49
Entrenchment Ratio	n/a
Bank Height Ratio	1.1
Stream Type	n/a

Cross-Section 7: View Upstream

Cross-Section 7: View Downstream



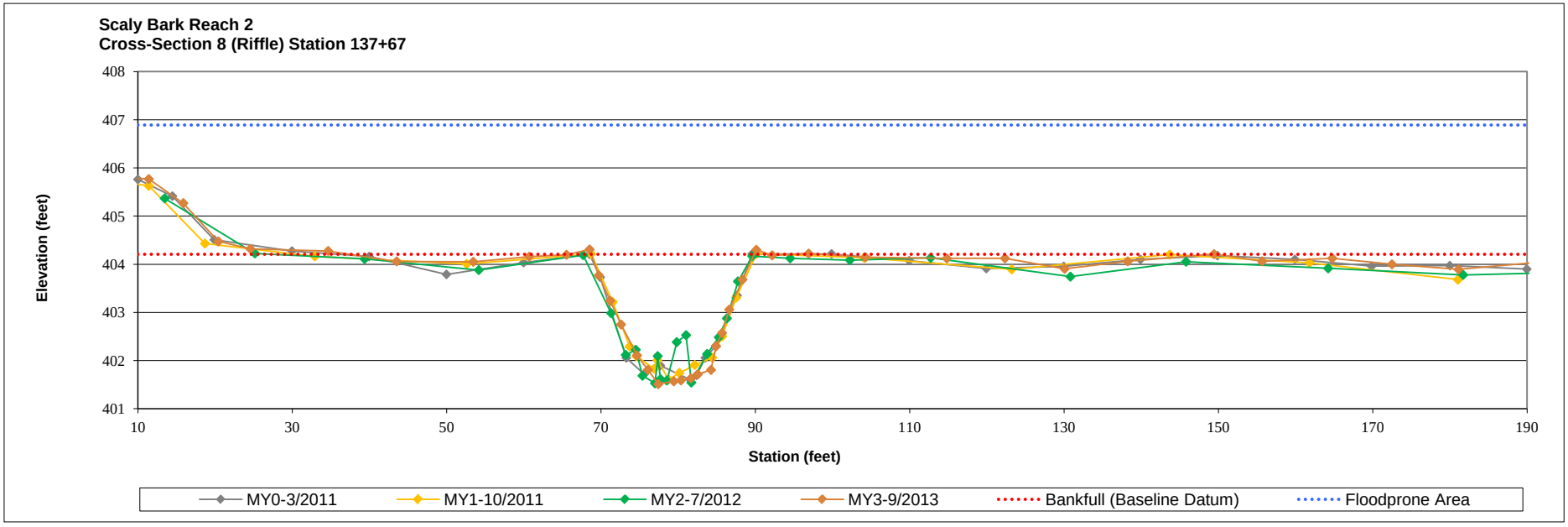
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 8 (Riffle)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed HUC	NCDWQ Subbasin 03-07-13
XS ID	8
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, KB, AT

Summary Data	
Bankfull Elevation (ft)	404.21
Bankfull Cross-Sectional Area (ft2)	36.74
Bankfull Width (ft)	21.11
Flood Prone Area Elevation (ft)	404.21
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	2.69
Mean Depth at Bankfull (ft)	1.74
W/D Ratio	12.13
Entrenchment Ratio	2.2+
Bank Height Ratio	1.0
Stream Type	C

Cross-Section 8: View Upstream

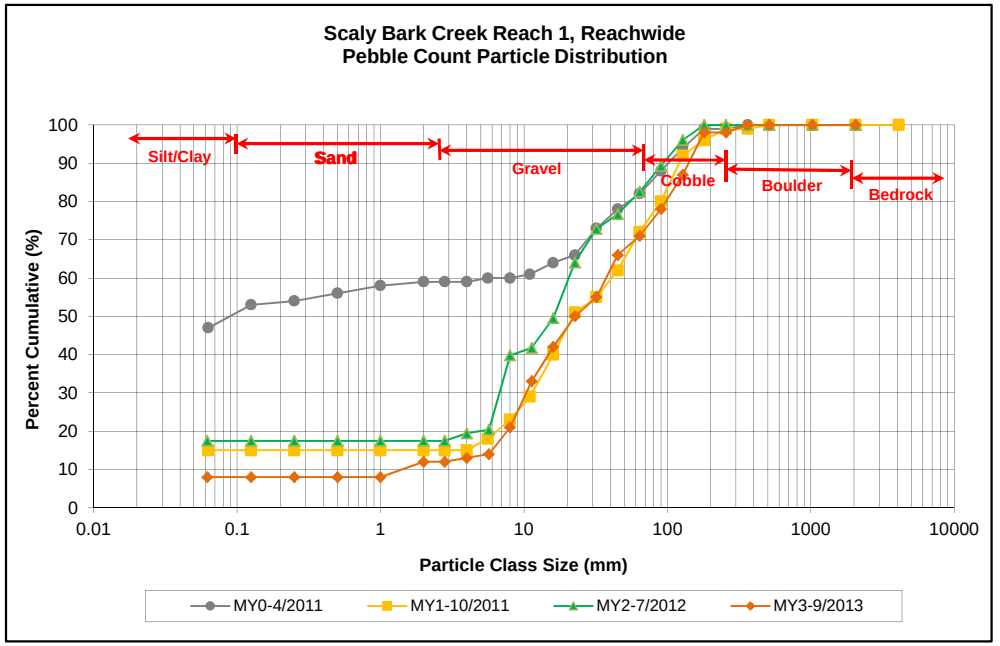
Cross-Section 8: View Downstream

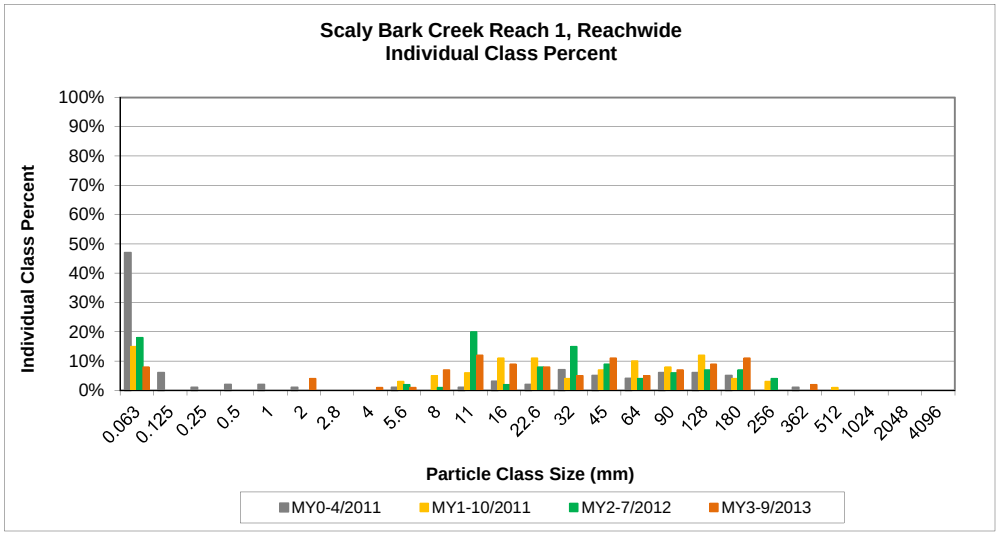


Reachwide and Cross-Section Pebble Count Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 1, Reachwide
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count			Scaly Bark Reach 1 Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		8	8	8	8
SAND	Very fine	0.062	0.125					8
	Fine	0.125	0.250					8
	Medium	0.250	0.500					8
	Coarse	0.5	1.0					8
	Very Coarse	1.0	2.0	1	3	4	4	12
GRAVEL	Very Fine	2.0	2.8					12
	Very Fine	2.8	4.0		1	1	1	13
	Fine	4.0	5.7		1	1	1	14
	Fine	5.7	8.0	2	5	7	7	21
	Medium	8.0	11.3	2	10	12	12	33
	Medium	11.3	16.0	3	6	9	9	42
	Coarse	16.0	22.6	4	4	8	8	50
	Coarse	22.6	32	2	3	5	5	55
	Very Coarse	32	45	8	3	11	11	66
	Very Coarse	45	64	3	2	5	5	71
COBBLE	Small	64	90	5	2	7	7	78
	Small	90	128	8	1	9	9	87
	Large	128	180	10	1	11	11	98
	Large	180	256					98
BOULDER	Small	256	362	2		2	2	100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	6.20
D_{35} =	11.96
D_{50} =	22.60
D_{84} =	113.82
D_{95} =	164.02
D_{100} =	362.00

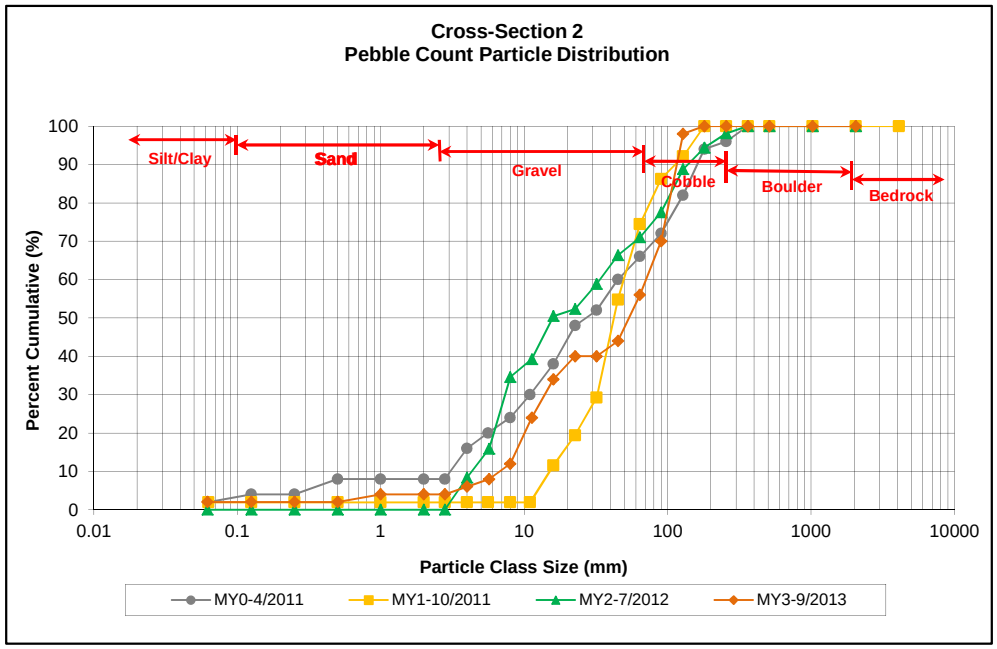


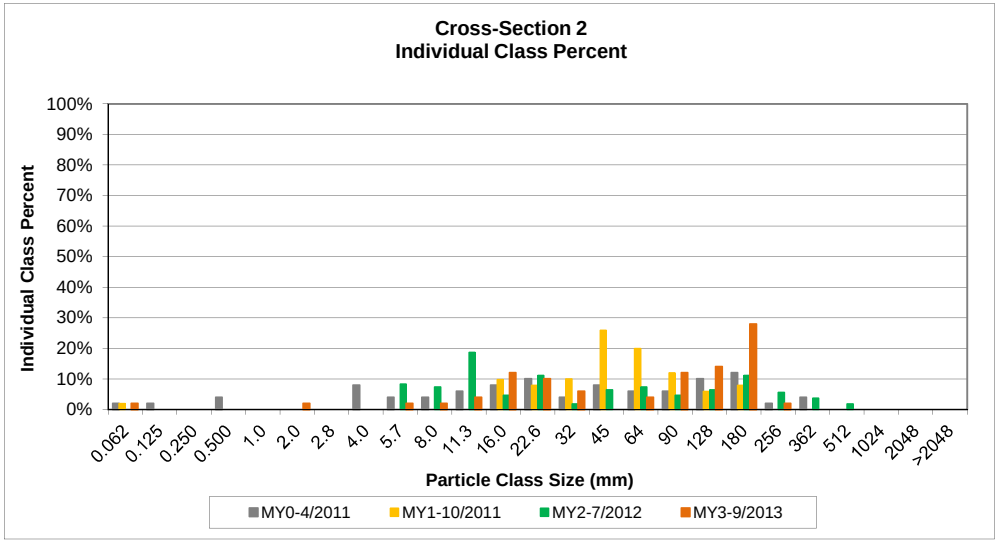


Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 1, Cross-Section 2 (Riffle)
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count	Cross-Section 2 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	2	2
SAND	Very fine	0.062	0.125			2
	Fine	0.125	0.250			2
	Medium	0.250	0.500			2
	Coarse	0.5	1.0			2
	Very Coarse	1.0	2.0	2	2	4
GRAVEL	Very Fine	2.0	2.8			4
	Very Fine	2.8	4.0			4
	Fine	4.0	5.7	2	2	6
	Fine	5.7	8.0	2	2	8
	Medium	8.0	11.3	4	4	12
	Medium	11.3	16.0	12	12	24
	Coarse	16.0	22.6	10	10	34
	Coarse	22.6	32	6	6	40
	Very Coarse	32	45			40
	Very Coarse	45	64	4	4	44
COBBLE	Small	64	90	12	12	56
	Small	90	128	14	14	70
	Large	128	180	28	28	98
	Large	180	256	2	2	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 2	
Channel materials (mm)	
D_{16} =	12.46
D_{35} =	23.95
D_{50} =	75.89
D_{84} =	151.79
D_{95} =	173.54
D_{100} =	256.00

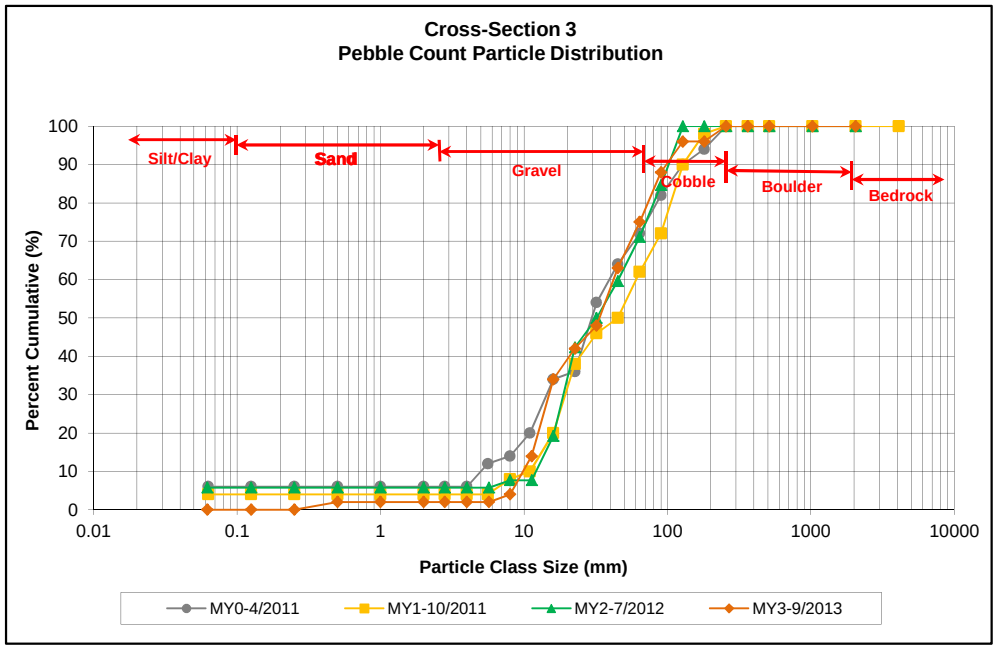




Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 1, Cross-Section 3 (Riffle)
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count	Cross-Section 3 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.250	0.500			0
	Coarse	0.5	1.0	2	2	2
	Very Coarse	1.0	2.0			2
GRAVEL	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.7			2
	Fine	5.7	8.0			2
	Medium	8.0	11.3	2	2	4
	Medium	11.3	16.0	10	10	14
	Coarse	16.0	22.6	20	20	33
	Coarse	22.6	32	8	8	41
	Very Coarse	32	45	6	6	47
	Very Coarse	45	64	16	16	63
COBBLE	Small	64	90	12	12	75
	Small	90	128	14	14	88
	Large	128	180	8	8	96
	Large	180	256			96
BOULDER	Small	256	362	4	4	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**102**	**100**	**100**

Cross-Section 3 Channel materials (mm)	
D_{16} =	16.65
D_{35} =	24.33
D_{50} =	48.07
D_{84} =	114.82
D_{95} =	171.76
D_{100} =	362.00



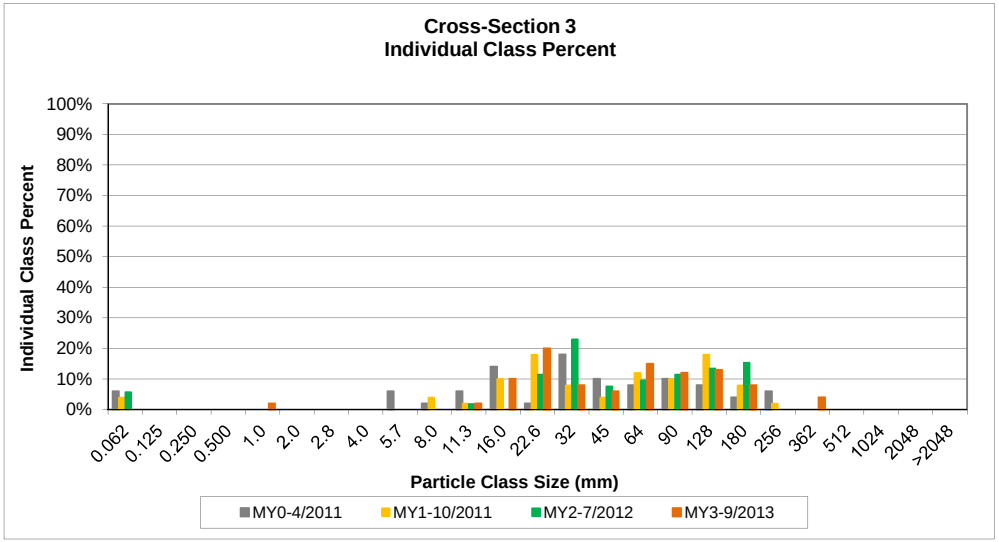
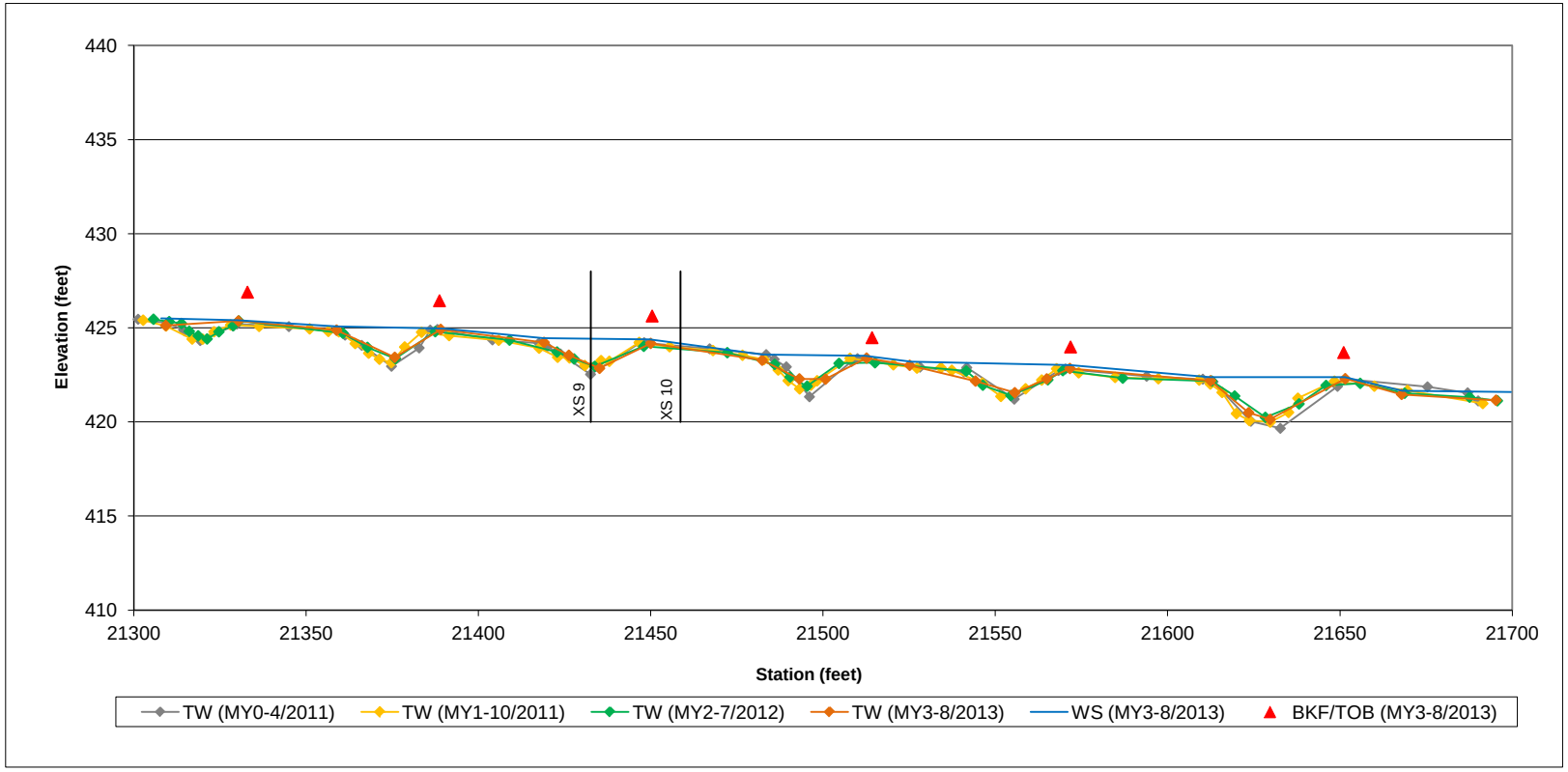


Table 12c. Monitoring Data - Stream Reach Data Summary
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2
Monitoring Year 3

Parameter	As-Built/Baseline			MY-1			MY-2			MY-3			MY-4			MY-5		
	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max
Dimension and Substrate - Riffle																		
Bankfull Width (ft)		12.1			11.9			12.2			0.0							
Floodprone Width (ft)		200+			200+			200+			200+							
Bankfull Mean Depth		1.0			1.0			1.0			0.0							
Bankfull Max Depth		1.7			1.6			1.7			0.0							
Bankfull Cross-sectional Area (ft^2)		12.4			11.4			11.8			0.0							
Width/Depth Ratio		11.9			12.3			12.6			0.0							
Entrenchment Ratio		2.2+			2.2+			2.2+			2.2+							
Bank Height Ratio		1.0			1.0			1.0			0.0							
D50 (mm)																		
Profile																		
Riffle Length (ft)	11	30	41	6	31	44	8	24	44	13	31	44						
Riffle Slope (ft/ft)	0.0150	0.0187	0.0233	0.0132	0.0161	0.0272	0.0104	0.0172	0.0280	0.0159	0.0246	0.0306						
Pool Length (ft)	21	30	43	19	27	40	15	27	31	22	31	46						
Pool Max Depth (ft)	2.5	3.3	4.0	2.3	2.9	3.8	2.2	2.7	3.4	2.6	2.9	3.1						
Pool Spacing (ft)	55	59	77	55	59	79	49	59	73	58	64	75						
Pool Volume (ft^3)																		
Pattern																		
Channel Beltwidth (ft)	50	-	80															
Radius of Curvature (ft)	25	-	33															
Rc:Bankfull Width (ft/ft)	2.3	-	3.0															
Meander Wave Length (ft)	80	-	100															
Meander Width Ratio	4.5	-	7.3															
Additional Reach Parameters																		
Rosgen Classification		C4			C4			C4			C4							
Channel Thalweg Length (ft)		399			399			399			399							
Sinuosity (ft)		1.1			1.1			1.1			1.1							
Water Surface Slope (ft/ft)		0.0101			0.0100			n/a[1]			0.0100							
Bankfull Slope (ft/ft)		0.0094			0.0092			0.0096			0.0101							
Ri%/Ru%/P%/G%/S%																		
SC%/Sa%/G%/C%/B%/Be%																		
d16/d35/d50/d84/d95/d100	SC/16/37/105/157/362			SC/26/38/94/191/256			SC/4/9/96/152/362			SC/1/11/102/156/512								
% of Reach with Eroding Banks					0%			0%			0%							

[1] Water surface slope wasn't calculated because there was little to no baseflow during Year 2 Monitoring.

Longitudinal Profile Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2
Monitoring Year 3



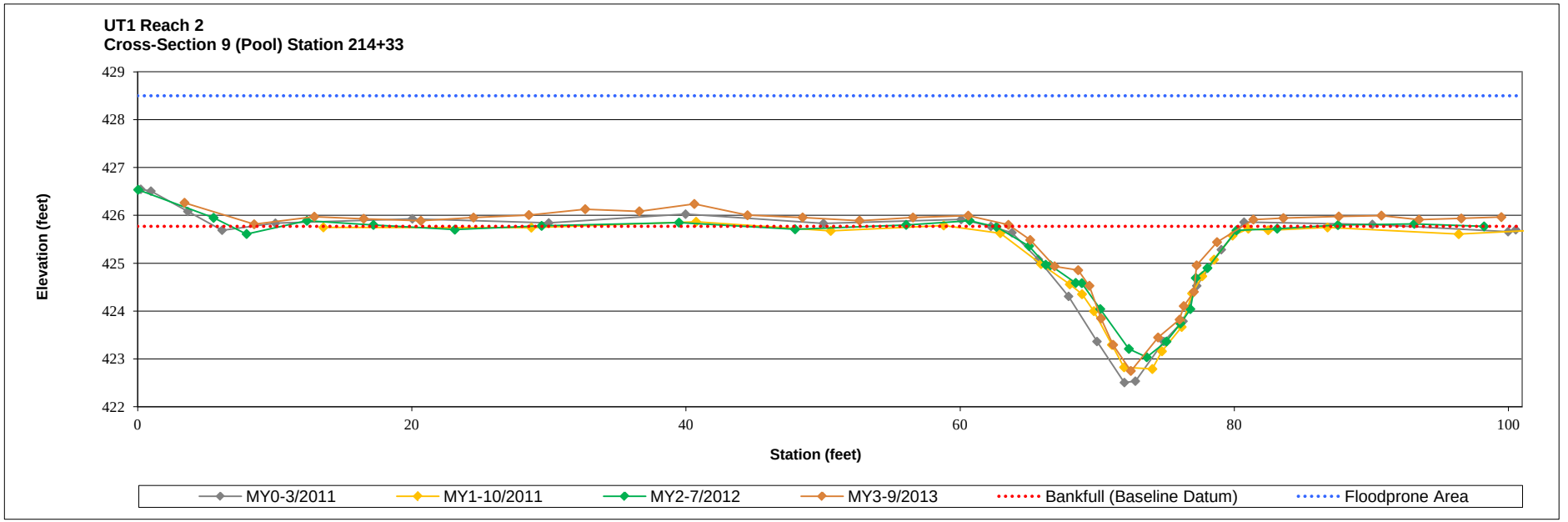
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2, Cross-Section 9 (Pool)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed	NCDWQ Subbasin 03-07-13
XS ID	9
Drainage Area	2.5 sq.mi
Date	7/2012
Field Crew	Wildlands Engineering, IE, JM

Summary Data	
Bankfull Elevation (ft)	425.77
Bankfull Cross-Sectional Area (ft2)	22.10
Bankfull Width (ft)	16.89
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	n/a
Max Depth at Bankfull (ft)	3.02
Mean Depth at Bankfull (ft)	1.31
W/D Ratio	12.91
Entrenchment Ratio	n/a
Bank Height Ratio	1.0
Stream Type	C

Cross-Section 9: View Upstream

Cross-Section 9: View Downstream (7/25/2012)



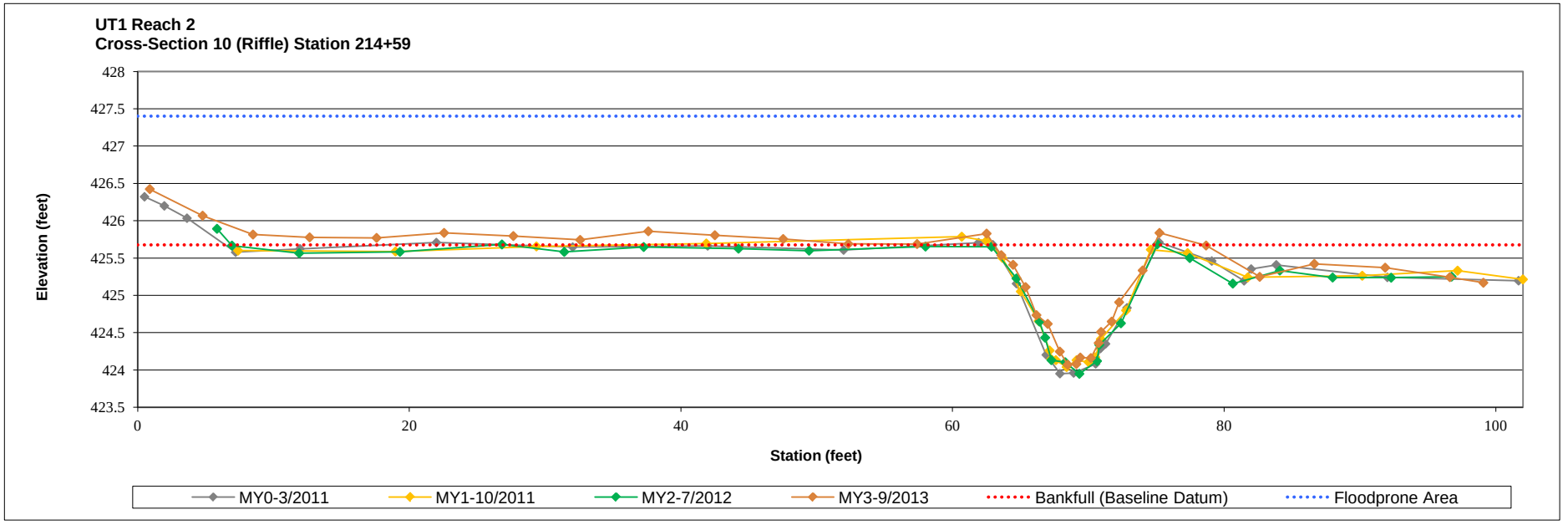
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2, Cross-Section 10 (Riffle)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed	NCDWQ Subbasin 03-07-13
XS ID	10
Drainage Area	2.5 sq.mi
Date	7/2012
Field Crew	Wildlands Engineering, IE, JM

Summary Data	
Bankfull Elevation (ft)	425.68
Bankfull Cross-Sectional Area (ft2)	10.17
Bankfull Width (ft)	11.78
Flood Prone Area Elevation (ft)	427.29
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	1.61
Mean Depth at Bankfull (ft)	0.86
W/D Ratio	13.64
Entrenchment Ratio	2.2+
Bank Height Ratio	1.0
Stream Type	C

Cross-Section 10: View Upstream (7/25/2012)

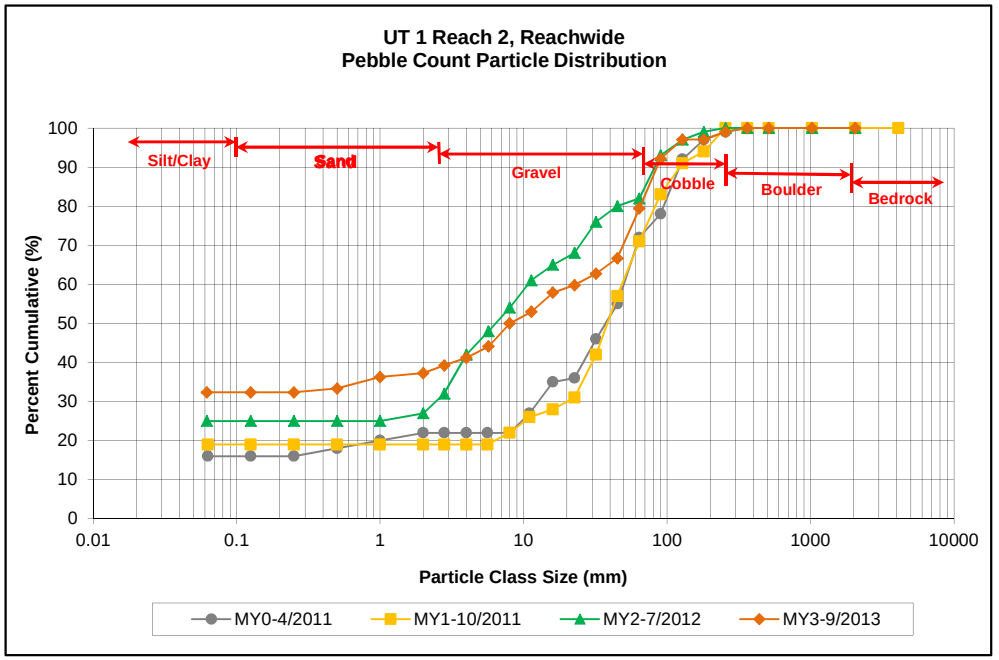
Cross-Section 10: View Downstream (7/25/2012)

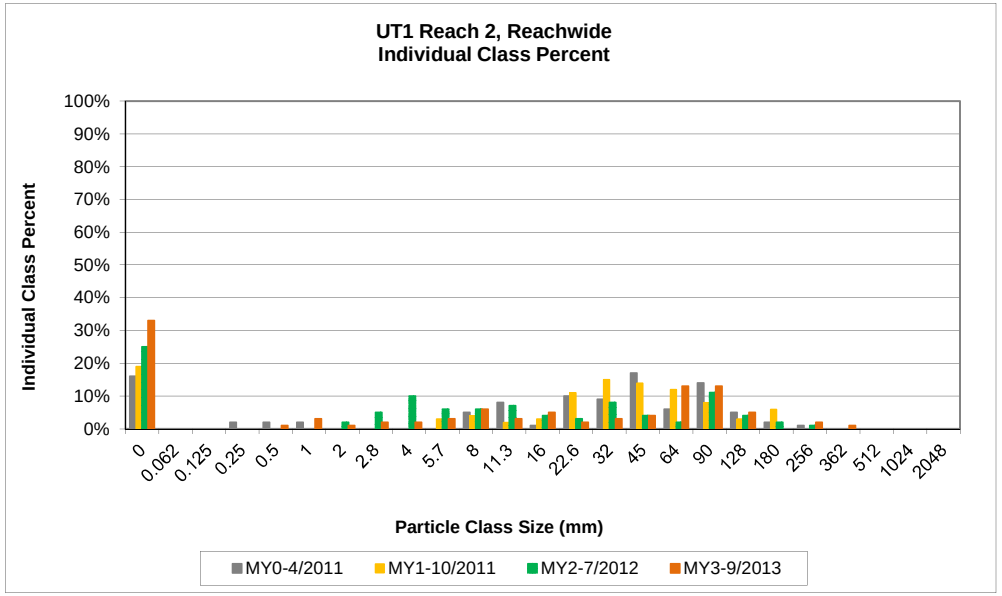


Reachwide and Cross-Section Pebble Count Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2, Reachwide
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count			UT1 Reach 2 Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	9	24	33	32	32
SAND	Very fine	0.062	0.125					32
	Fine	0.125	0.250					32
	Medium	0.250	0.500					32
	Coarse	0.5	1.0	1		1	1	33
	Very Coarse	1.0	2.0	1	2	3	3	36
GRAVEL	Very Fine	2.0	2.8		1	1	1	37
	Very Fine	2.8	4.0		2	2	2	39
	Fine	4.0	5.7	1	1	2	2	41
	Fine	5.7	8.0		3	3	3	44
	Medium	8.0	11.3	4	2	6	6	50
	Medium	11.3	16.0		3	3	3	53
	Coarse	16.0	22.6	1	4	5	5	58
	Coarse	22.6	32	1	1	2	2	60
	Very Coarse	32	45	2	1	3	3	63
	Very Coarse	45	64	2	2	4	4	67
COBBLE	Small	64	90	13		13	13	79
	Small	90	128	12	1	13	13	92
	Large	128	180	4	1	5	5	97
	Large	180	256					97
BOULDER	Small	256	362	1	1	2	2	99
	Small	362	512		1	1	1	100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**52**	**50**	**102**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	1.48
D_{50} =	11.00
D_{84} =	102.17
D_{95} =	155.99
D_{100} =	512

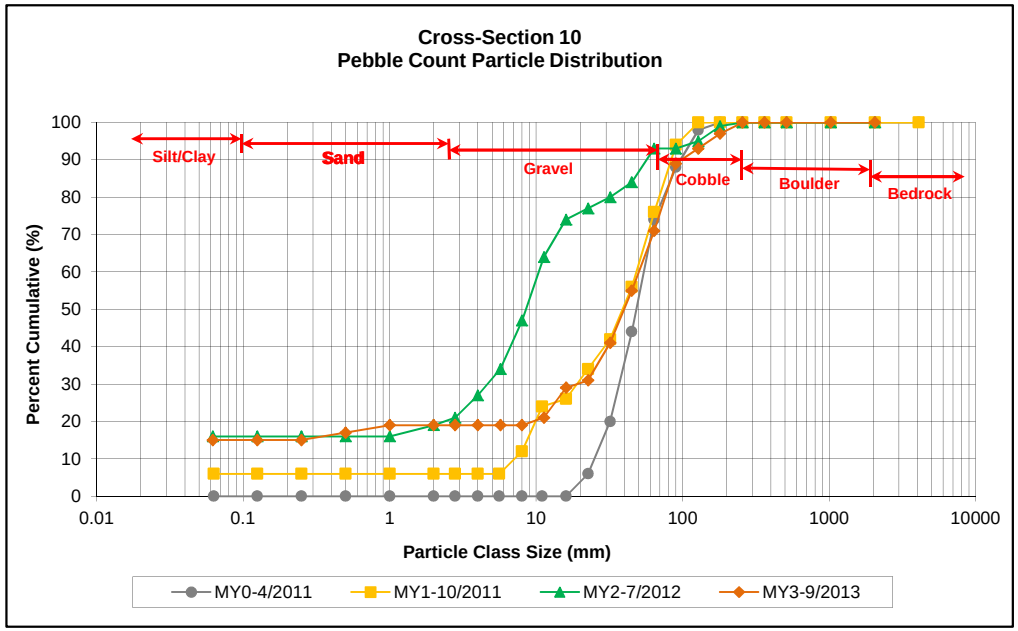


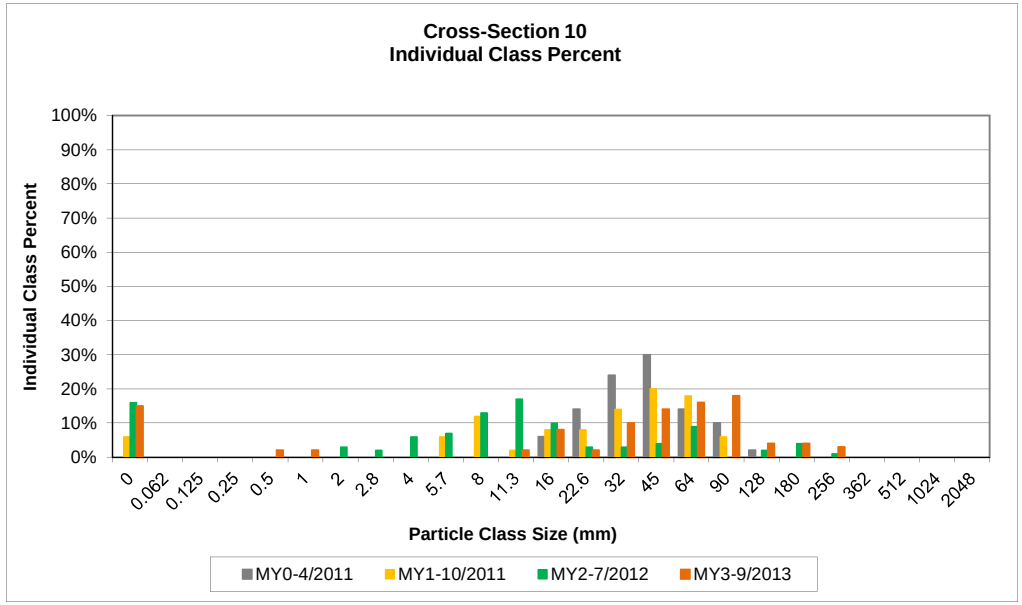


Reachwide and Cross-Section Pebble Count Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2, Cross-Section 10 (Riffle)
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count	Cross-Section 10 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	15	15	15
SAND	Very fine	0.062	0.125			15
	Fine	0.125	0.250			15
	Medium	0.250	0.500			15
	Coarse	0.5	1.0	2	2	17
	Very Coarse	1.0	2.0	2	2	19
GRAVEL	Very Fine	2.0	2.8			19
	Very Fine	2.8	4.0			19
	Fine	4.0	5.7			19
	Fine	5.7	8.0			19
	Medium	8.0	11.3			19
	Medium	11.3	16.0	2	2	21
	Coarse	16.0	22.6	8	8	29
	Coarse	22.6	32	2	2	31
	Very Coarse	32	45	10	10	41
	Very Coarse	45	64	14	14	55
COBBLE	Small	64	90	16	16	71
	Small	90	128	18	18	89
	Large	128	180	4	4	93
	Large	180	256	4	4	97
BOULDER	Small	256	362	3	3	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	100	100	100

Cross-Section 10	
Channel materials (mm)	
D_{16} =	0.71
D_{35} =	36.68
D_{50} =	56.44
D_{84} =	116.07
D_{95} =	214.66
D_{100} =	362.00





Longitudinal Profile Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2
Monitoring Year 3

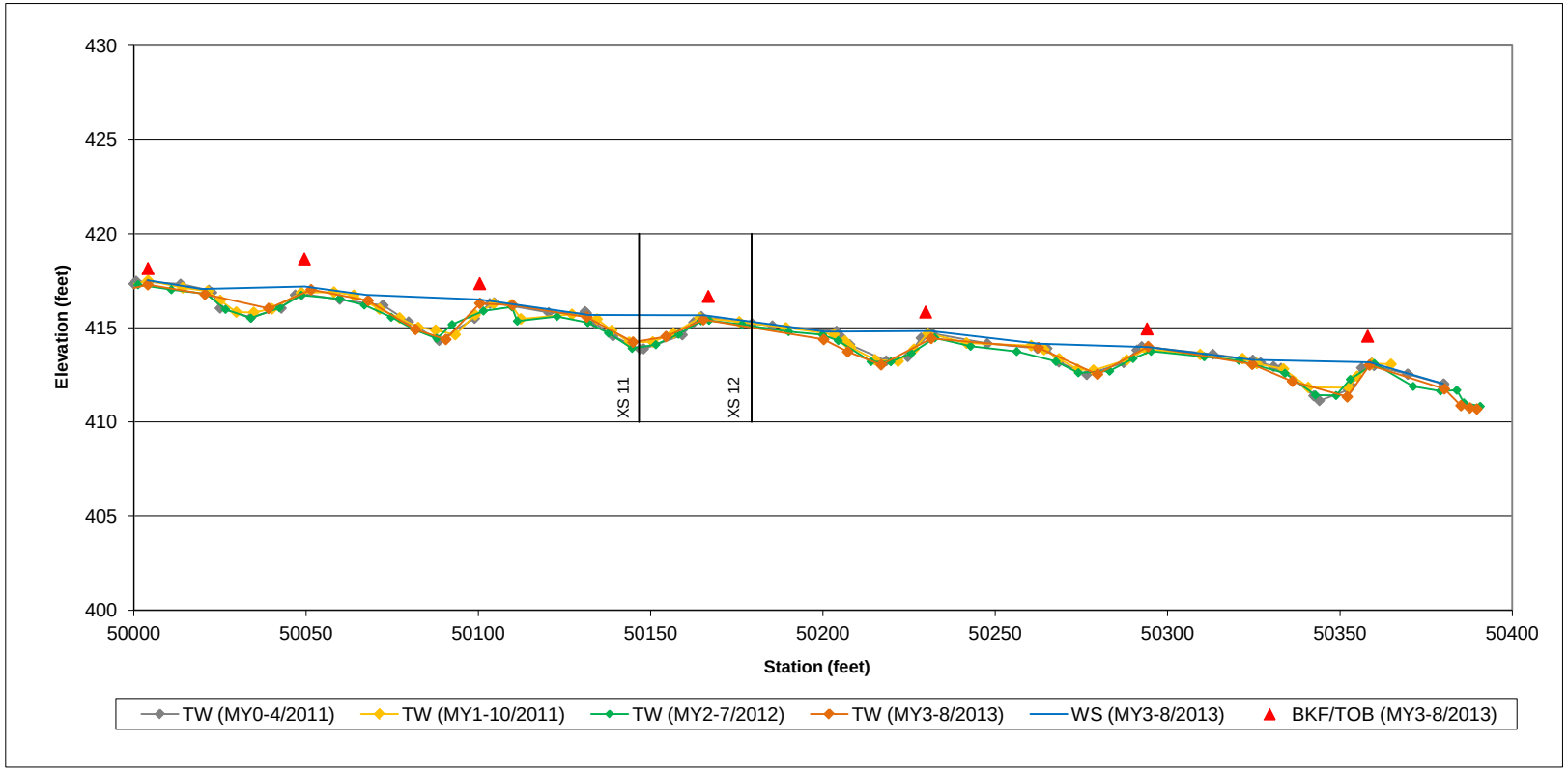


Table 12d. Monitoring Data - Stream Reach Data Summary
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2
Monitoring Year 3

Parameter	As-Built/Baseline			MY-1			MY-2			MY-3			MY-4			MY-5		
	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max
Dimension and Substrate - Riffle																		
Bankfull Width (ft)		13.0			13.0			13.0			0.0							
Floodprone Width (ft)		200+			200+			200+			200+							
Bankfull Mean Depth		0.9			0.9			1.0			0.0							
Bankfull Max Depth		1.5			1.5			1.7			0.0							
Bankfull Cross-sectional Area (ft^2)		11.4			11.7			12.9			0.0							
Width/Depth Ratio		14.8			14.5			13.1			0.0							
Entrenchment Ratio		2.2+			2.2+			2.2+			2.2+							
Bank Height Ratio		1.0			1.0			1.0			0.0							
D50 (mm)																		
Profile																		
Riffle Length (ft)	21	29	41	16	26	38	18	23	33	17	30	35						
Riffle Slope (ft/ft)	0.0215	0.0230	0.0272	0.0187	0.0264	0.0543	0.0190	0.0267	0.0369	0.0157	0.0306	0.0349						
Pool Length (ft)	27	31	37	28	31	37	27	33	39	31	32	34						
Pool Max Depth (ft)	2.9	3.1	3.5	2.5	3.0	3.3	3.0	3.2	3.4	2.2	2.7	3.2						
Pool Spacing (ft)	55	59	70	51	58	78	54	57	75	50	64	77						
Pool Volume (ft^3)																		
Pattern																		
Channel Beltwidth (ft)	50	-	80															
Radius of Curvature (ft)	25	-	34															
Rc:Bankfull Width (ft/ft)	2.1	-	2.8															
Meander Wave Length (ft)	90	-	120															
Meander Width Ratio	4.2	-	6.7															
Additional Reach Parameters																		
Rosgen Classification		C4			C4			C4			C4							
Channel Thalweg Length (ft)		380			380			380			380							
Sinuosity (ft)		1.1			1.1			1.1			1.1							
Water Surface Slope (ft/ft)		0.0121			0.0121			n/a[1]			0.0123							
Bankfull Slope (ft/ft)		0.0130			0.0130			0.0127			0.0133							
Ri%/Ru%/P%/G%/S%																		
SC%/Sa%/G%/C%/B%/Be%																		
d16/d35/d50/d84/d95/d100		SC/9/17/76/152/512			SC/6/14/77/157/362			SC/13/25/94/163/362			SC/14/27/109/171/362							
% of Reach with Eroding Banks					0%			0%			0%							

[1] Water surface slope wasn't calculated because there was little to no baseflow during Year 2 Monitoring.

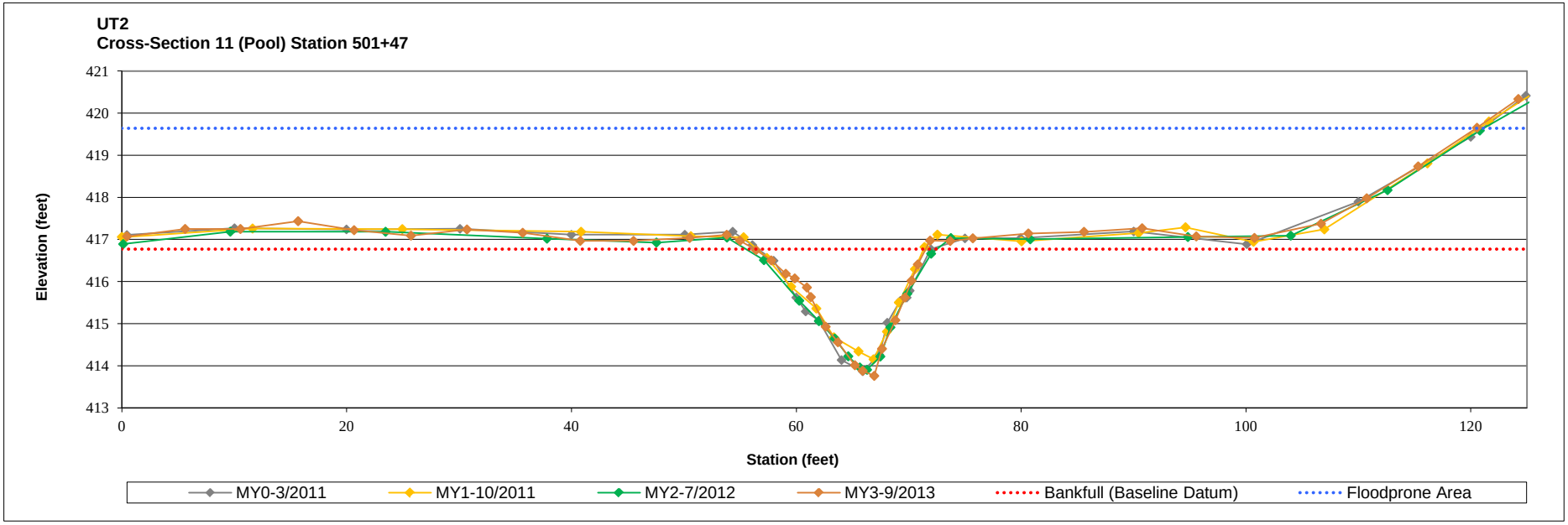
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2, Cross-Section 11 (Pool)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed	NCDWQ Subbasin 03-07-13
XS ID	11
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, IE, EN

Summary Data	
Bankfull Elevation (ft)	416.77
Bankfull Cross-Sectional Area (ft2)	21.87
Bankfull Width (ft)	15.24
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	n/a
Max Depth at Bankfull (ft)	3.01
Mean Depth at Bankfull (ft)	1.43
W/D Ratio	10.62
Entrenchment Ratio	n/a
Bank Height Ratio	1.1
Stream Type	n/a

Cross-Section 11: View Upstream

Cross-Section 11: View Downstream



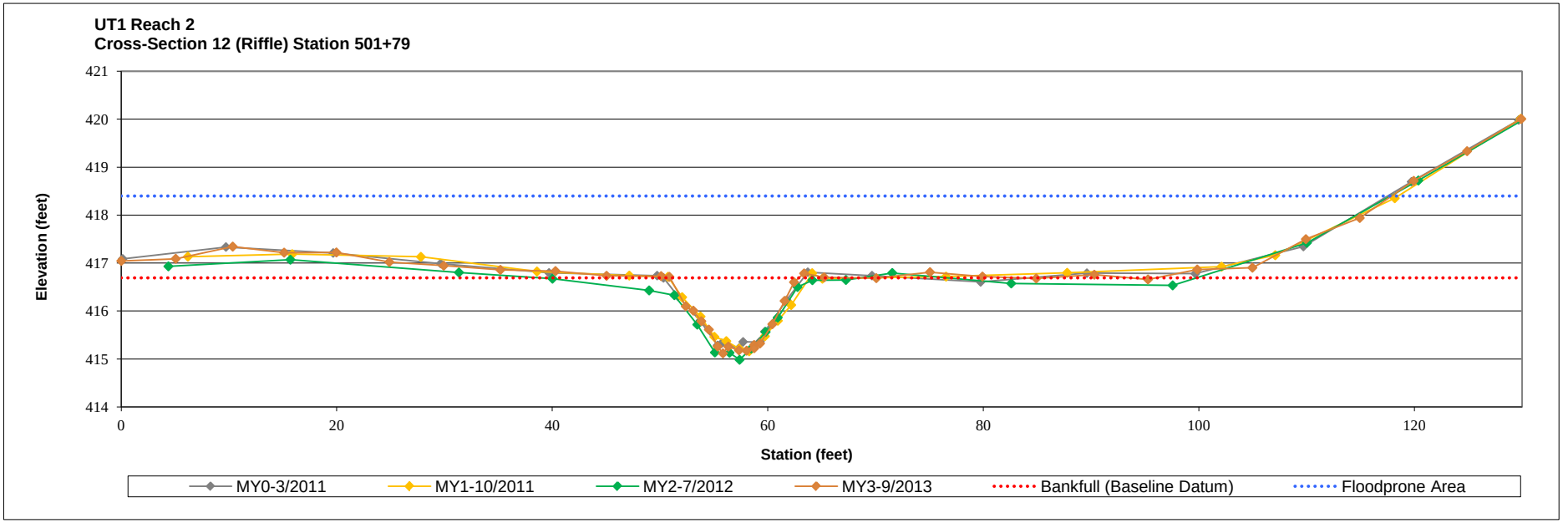
Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2, Cross-Section 12 (Riffle)
Monitoring Year 3

River Basin	Yadkin 03040105
Watershed	NCDWQ Subbasin 03-07-13
XS ID	12
Drainage Area	2.5 sq.mi
Date	9/2013
Field Crew	Wildlands Engineering, IE, EN

Summary Data	
Bankfull Elevation (ft)	416.69
Bankfull Cross-Sectional Area (ft2)	11.43
Bankfull Width (ft)	11.97
Flood Prone Area Elevation (ft)	418.27
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	1.57
Mean Depth at Bankfull (ft)	0.95
W/D Ratio	12.54
Entrenchment Ratio	2.2+
Bank Height Ratio	1.0
Stream Type	C

Cross-Section 12: View Upstream

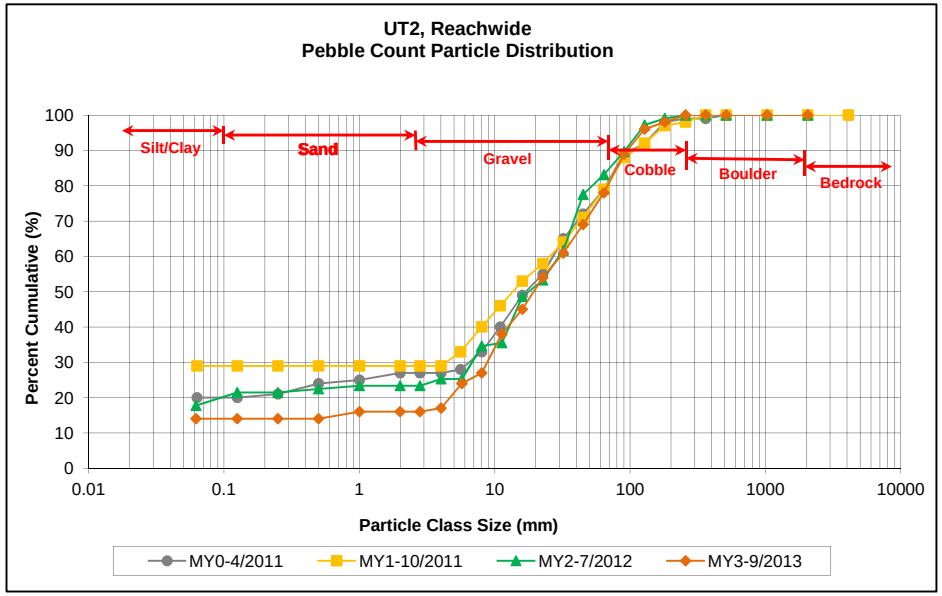
Cross-Section 12: View Downstream

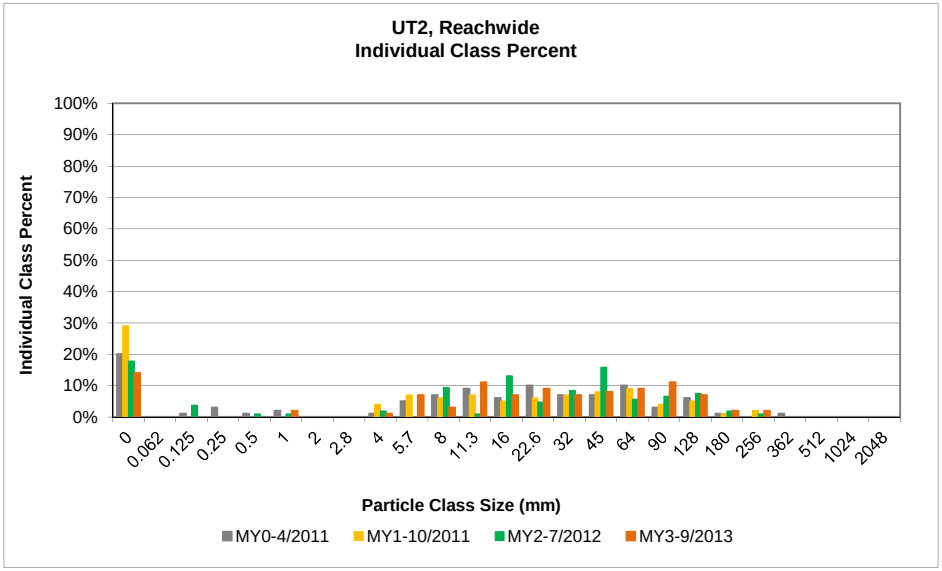


Reachwide and Cross-Section Pebble Count Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2, Reachwide
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count			UT2 Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	12	14	14	14
SAND	Very fine	0.062	0.125					14
	Fine	0.125	0.250					14
	Medium	0.250	0.500					14
	Coarse	0.5	1.0					14
	Very Coarse	1.0	2.0	1	1	2	2	16
GRAVEL	Very Fine	2.0	2.8					16
	Very Fine	2.8	4.0					16
	Fine	4.0	5.7		1	1	1	17
	Fine	5.7	8.0	1	6	7	7	24
	Medium	8.0	11.3	1	2	3	3	27
	Medium	11.3	16.0	5	6	11	11	38
	Coarse	16.0	22.6	2	5	7	7	45
	Coarse	22.6	32	1	8	9	9	54
	Very Coarse	32	45	5	2	7	7	61
	Very Coarse	45	64	8		8	8	69
COBBLE	Small	64	90	6	3	9	9	78
	Small	90	128	9	2	11	11	89
	Large	128	180	5	2	7	7	96
	Large	180	256	2		2	2	98
BOULDER	Small	256	362	2		2	2	100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	14.45
D_{50} =	27.42
D_{84} =	109.06
D_{95} =	171.44
D_{100} =	362

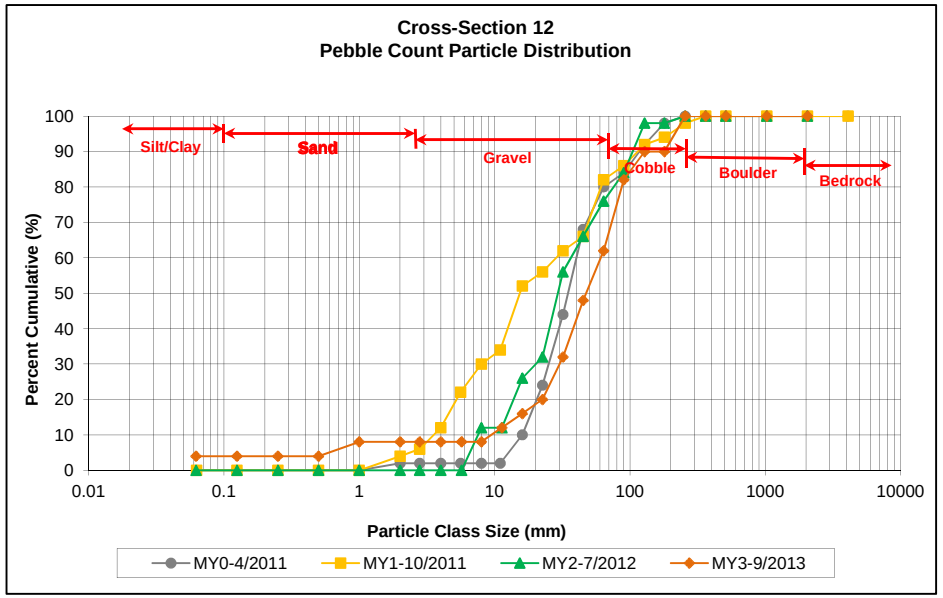




Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2, Cross-Section 12 (Riffle)
Monitoring Year 3

Particle Class		Diameter (mm)		Particle Count	Cross-Section 12 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	4	4	4
SAND	Very fine	0.062	0.125			4
	Fine	0.125	0.250			4
	Medium	0.250	0.500			4
	Coarse	0.5	1.0			4
	Very Coarse	1.0	2.0	4	4	8
GRAVEL	Very Fine	2.0	2.8			8
	Very Fine	2.8	4.0			8
	Fine	4.0	5.7			8
	Fine	5.7	8.0			8
	Medium	8.0	11.3			8
	Medium	11.3	16.0	4	4	12
	Coarse	16.0	22.6	4	4	16
	Coarse	22.6	32	4	4	20
	Very Coarse	32	45	12	12	32
	Very Coarse	45	64	16	16	48
COBBLE	Small	64	90	14	14	62
	Small	90	128	20	20	82
	Large	128	180	8	8	90
	Large	180	256			90
BOULDER	Small	256	362	10	10	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 12	
Channel materials (mm)	
D_{16} =	22.60
D_{35} =	48.07
D_{50} =	67.19
D_{84} =	139.39
D_{95} =	304.42
D_{100} =	362.00



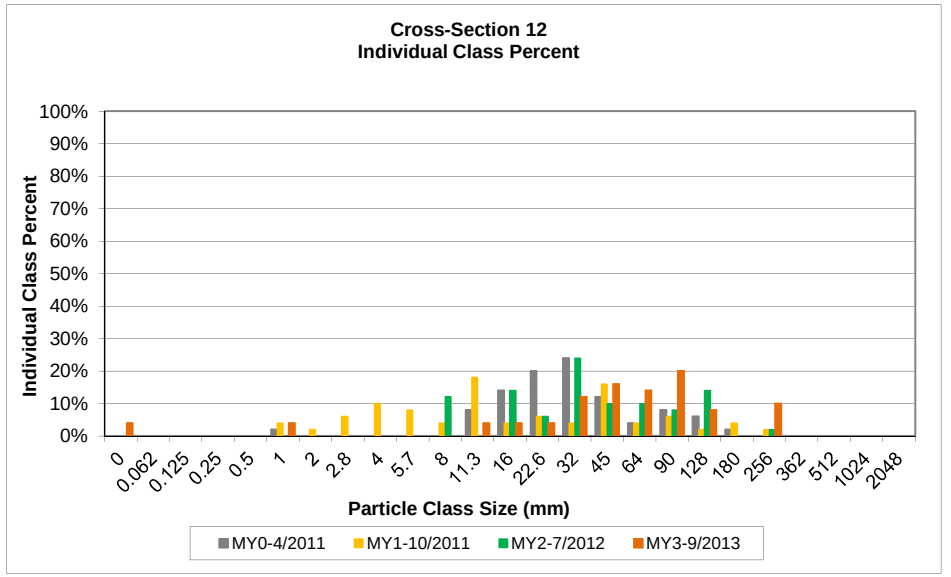


Table 13. Hydrology Summary Data
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Monitoring Year 3

Reach	Date Recorded	Date of Occurrence	Gage Reading (ft)	Bankfull Event Met
Scaly Bark	2/6/2013	u	2.05	Y
	5/2/2013	u	2.35	Y
	7/10/2013	u	3.3	Y
UT1				
	7/11/2013	u	4+	Y
UT2	2/6/2013	u	0.8	Y
	7/11/2013	u	1.7	Y