SCALY BARK CREEK MITIGATION SITE

Stanly County, NC
DENR Contract 002030
EEP Project Number 94148

Baseline Monitoring Document and As-Built Baseline Report

FINAL
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APPENDICES

EXECUTIVE SUMMARY

The Scaly Bark Creek Mitigation Site, hereafter referred to as the Site, is located in rural Stanly County, southwest of Albemarle, NC, in the Yadkin River Basin (United States Geological Survey (USGS) Hydrologic Unit 03040105). 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 4,875 linear feet (LF) of perennial stream channel, enhancing 3,587 LF of perennial and intermittent stream channel, and preserving 700 LF of intermittent stream channel. The Site's riparian areas were also planted to stabilize streambanks, improve habitat, and protect water quality.

Pre-Construction Site Conditions

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 consists 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).

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. Table 5 in Appendix 2 presents the pre-restoration conditions in detail for the Site.

Restoration Approach and Implementation

The project site restoration plan restored a high quality of riparian function to the streams and riparian corridors on the Site. The ecological uplift can be summarized as starting from cattle-impacted streams and moving to stable channels in a protected riparian corridor. 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. Figure 2 and Table 1 present the restoration and enhancement design for the Site.

The final restoration plan was submitted and accepted by the Ecosystem Enhancement Program (EEP) in May of 2010. Construction activities were completed by North State Environmental in April 2011. The baseline monitoring and as-built survey were

completed between March and April of 2011. There were no significant deviations reported in the project elements in comparison to the design plans. A few field changes were made based on field conditions during construction, including a slight alignment shift on the downstream 50 LF of UT3 and UT4 for a more stable tie-in to Scaly Bark Reach 1 and the replacement of some root wad structures with brush toe based on recent successes at other project sites. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

Monitoring

Baseline monitoring (Year 0 of 5) was conducted in March and April of 2011. The first annual monitoring assessment (Year 1 of 5) will be completed in the fall of 2011. The Site will be monitored for a total of five (5) years, with the final monitoring activities conducted in 2015 and the close-out in 2016. Monitoring will consist of collecting morphological, vegetative, and hydrological data on an annual basis to assess the project success based on the restoration goals and objectives. The success of the Site will be assessed using measurements of the stream channel's dimension, pattern, profile, substrate composition, permanent photographs, vegetation, and surface water hydrology. Any areas with identified high priority problems, such as streambank instability, aggradation/degradation, or lack of vegetation establishment will be evaluated on a case-by-case basis. The problem areas will be visually noted and remedial actions will be discussed with EEP staff to determine a plan of action. A proposal of work will be submitted if remediation of an area is required.

1.0 Project Goals, Background and Attributes

1.1 Project Location and Setting

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 (USGS Hydrologic Unit 03040105060030). The project 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. A conservation easement has been recorded to protect the 26.6 acres of riparian corridor and stream resources in perpetuity. 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. Directions and a map of the Site are provided in Figure 1.

1.2 Project Goals and Objectives

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 are 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.

1.3 Project Structure, Restoration Type and Approach

1.3.1 Project Structure

Please refer to Figure 2 for the project component/asset map for the monitoring and restoration feature exhibits on Scaly Bark Creek and its tributaries and Table 1 for the project component and mitigation credit information.

1.3.2 Restoration Type and Approach

The project site restoration plan restored a high quality of riparian function to the streams and riparian corridors on the project site. The ecological uplift can be summarized as starting from cattle-impacted streams and moving to stable channels in a protected riparian corridor. 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.

Scaly Bark Creek as well as sections of UT 1 and UT 2 were improved to provide a stable, protected aquatic and terrestrial habitat. A Rosgen Priority 1 type restoration was utilized to create a new stable, functional stream channel based on reference reach and sediment transport analysis. The channel beds were raised slightly and meandering channels were constructed with stable cross-sections. A Rosgen C channel type was constructed for Scaly Bark Creek and portions of UT1 and UT2 with width/depth ratios near 12, at the low end of the range for Rosgen C channels. The channel will be allowed to narrow over time as bank vegetation is established to approach a Rosgen E channel type. Gradual bank slopes of 2:1 were designed to provide adequate rooting area and stability for plant establishment. By using gradual bank slopes and keeping the top widths of the channels narrow, the width of the channel bottom will be effectively narrowed allowing for a minimal base flow and will improve in-stream habitat. Table 5 provides a summary of the design geomorphic values for the restoration reaches.

The remaining upstream portion of UT1 as well as UT1a, UT1b, UT3, and part of UT4 were enhanced by removing invasive species, permanently fencing out cattle, spot repairing bank erosion, enhancing bed form, and restoring a native riparian buffer. Log and boulder sill structures were utilized in these tributaries as needed in order to provide increased bed stabilization and in-stream habitat. However, few structures were needed due to the prevalence of shallow bedrock knick points in these channels. The uppermost reach of UT4 is stable and flows through a mature forest. This upper reach has been fenced out from cattle access and preserved.

As a final stage of construction, riparian stream buffers were planted and restored to the dominant natural plant community that exists within the project watershed. This natural community within and adjacent to the project easement was classified as Piedmont Bottomland Forest and was determined based on existing canopy and herbaceous species (Schafale and Weakley, 1990). Proposed plant and seed materials were placed on stream banks and bench areas as well as from the tops of banks out to the project easement limits.

These areas were planted with bare root trees, live stakes, and a seed mixture of permanent herbaceous vegetation ground cover.

A permanent seed mixture of native herbaceous and grass species was also to all disturbed areas within the project easement. The herbaceous seed mixture was chosen that would provide quick stabilization of constructed stream banks, benches, and side slopes. These species will also provide early habitat value through rapid growth of ground cover to the tops of banks and floodplain areas.

1.3 Project History, Contacts and Attribute Data

Scaly Bark Creek was restored by Wildlands Engineering, Inc. (WEI) through a full-delivery contract with NCEEP. Tables 2, 3, and 4 provide detailed information regarding the Project Activity and Reporting History, Project Contacts, and Project Baseline Information and Attributes.

2.0 Success Criteria

The stream restoration success criteria for the project site follows the approved success criteria presented in the EEP Mitigation Plan Template (version 2.0, 03/27/08) and the Stream Mitigation Guidelines issued in April 2003 by the United States Army Corps of Engineers (USACE) and NCDWQ. Annual monitoring and quarterly site visits will be conducted to assess the condition of the finished project. The preservation reach on UT4 will be documented through photographs only to verify that no significant degradational changes are occurring in the stream channel or riparian corridor. The stability of the enhancement reaches will also be documented through photographs and the vegetation of these reaches will be assigned specific success criteria listed in Section 2.2. The stream restoration sections of the project will be assigned specific success criteria components for stream morphology, vegetation, and hydrology.

2.1 Hydrology

2.1.1 Streams

Stream hydrology attainment will be monitored in accordance to the USACE (2003) standards. At the end of the five (5) year monitoring period, two (2) or more bankfull events must occur in separate years within the restoration reach.

2.2 Morphological Parameters and Channel Stability

2.2.1 Dimension

Riffle cross-sections on the restoration reaches should be stable and should show little change in bankfull area, maximum depth ratio and width-to-depth ratio. Riffle cross-sections should fall within the parameters defined for channels of the appropriate Rosgen stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a vertically incising thalweg or eroding channel banks. Changes in the channel that indicate a movement toward stability or enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth. Remedial action would not be taken if channel changes indicate a movement toward stability.

2.2.2 Pattern and Profile

Longitudinal profile data for the stream restoration reaches should show that the bedform features are remaining stable. The riffles should be steeper and shallower than the pools, while the pools should be deep with flat water surface slopes. The relative percentage of riffles and pools should not change significantly from the design parameters. Adjustments in length and slope of run and glide features are expected and will not be considered a sign of instability. The longitudinal profiles should show that the bank height ratios remains very near to 1.0 for all of the restoration reaches.

2.2.3 Substrate

Substrate materials in the restoration reaches should indicate a progression toward or the maintenance of coarser materials in the riffle features and smaller particles in the pool features.

2.2.4 Sediment Transport

The channels' subpavement should not illustrate an indication of a significant trend toward aggradation or degradation within the restored channels.

2.3 Vegetation

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 year five (5) of the monitoring period. 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 year three (3) of the monitoring period. The extent of invasive species coverage will also be monitored and controlled as necessary.

2.4 Photograph Reference Points

Permanent reference photographs will provide qualitative visual assessments. Photographs should capture significant changes in the stream channel over the monitoring years.

2.5 Schedule and Reporting

Monitoring reports will be prepared in the fall of each year of monitoring and submitted to EEP. Based on the EEP Monitoring Report Template (version 1.2, 11/16/06), the monitoring reports will include the following:

1. Project background which includes project objectives, project structure, restoration type and approach, location and setting, history and background.
2. As-built topographic plans of major project elements including such items as grade control structures, vegetation plots, monitoring cross-sections, and crest gage.
3. Photographs showing views of the restored Site taken from fixed point stations.
4. Assessment of the stability of the project based on the cross-sections and longitudinal profile, where applicable.
5. Vegetative data as described above including the identification of any invasion by undesirable plant species.
6. A description of damage by animals or vandalism.
7. Maintenance issues and recommended remediation measures will be detailed and documented.

8. Wildlife observations.

3.0 Monitoring Plan

Monitoring reports will be prepared in the fall of each year of monitoring and submitted to EEP. These reports will be based on the EEP Monitoring Report Template (version 1.2, 11/16/06). Annual Monitoring will be conduction for the monitoring parameters as noted below for five (5) years following constructions, unless otherwise directed.

3.1 Hydrology

3.1.1 Streams

Three (3) crest gauges were installed within the Site on each of the following reaches: Scaly Bark Creek, UT1 Reach 2, and UT2 to monitor the occurrence of bankfull or greater flow events. The gauges will be monitored on a quarterly basis to record the high water mark on the crest gauge, reset gauges, and carry out necessary maintenance. Should gauge malfunction occur, observations of rack lines and deposition may serve to augment gauge observations.

3.2 Stream

In order to ensure the Site meets regulatory stream success criteria, stream dimension, pattern, and profile will be monitored annually for five (5) years for restoration reaches (Scaly Bark, UT1 Reach 2, and UT2). The enhancement reaches (UT1 Reach 1, UT1a, UT1b, UT3, and UT4) will be visually monitored for stream stability along the entire reaches. Geomorphic and stream assessments should be performed following guidelines outlined in the Stream Channel Reference Sites: An Illustrated Guide to Field Techniques (Harrelson et al., 1994), methodologies utilized in the Rosgen stream assessment and classification document (Rosgen, 1994 and 1996), and in the Stream Restoration a Natural Channel Design Handbook (Doll et al, 2003). Scaly Bark Creek's hydraulic and geomorphic data for existing condition, reference reaches, design, and as-built conditions are presented in Tables 5 and 6.

3.2.1 Dimension

A total of 12 permanent cross-sections were established with the Scaly Bark Mitigation Site to represent the restored reach stream types and capture the variability in the dimensional features along the reaches. Eight (8) cross-sections were established on Scaly Bark Creek's main channel; four (4) cross-sections (two (2) riffle and two (2) pool) were established on Reach 1 and four (4) cross-sections (two (2) riffle and two (2) pool) were established on Reach 2. Two (2) cross-sections were established on both UT1 Reach 2 and UT2 (one (1) riffle and one (1) pool).

Cross-sections were established approximately 20 bankfull width lengths apart or two (2) every 1000 LF, depending on the stream size. Permanent monuments have been established that are recoverable either through field identification or with the use of a GPS unit. Each assessment following the initial as-built survey will include re-surveying the same permanent cross-sections. Cross-section surveys will detail the stream, bank, and floodplain topography of the channel including, but not limited to top of bank, bankfull, breaks in slope, water's edge, and the channel thalweg. Reference photographs looking upstream and downstream at

each cross-section were taken with the as-built. Subsequent assessments following the initial as-built survey will capture the same reference photograph locations. Data will be processed in CAD and analyzed using RiverMorph and Microsoft Excel.

3.2.2 Pattern and Profile

Four (4) separate longitudinal profile will be conducted along Scaly Bark Creek Reach 1 (1886 LF) and Reach 2 (2220 LLF), UT1 Reach 2 (399 LF), and UT2 (380). The beginning and end of each longitudinal profile have been established that are recoverable either through field identification or with the use of a GPS unit. Each longitudinal profile survey following the initial as-built survey will include re-surveying the same profile. The location of bedform features, in-stream structures, water surface, bankfull, top of bank, and permanent benchmarks will be collected at each survey. Data will be processed in CAD and analyzed using RiverMorph and Microsoft Excel.

Stream pattern was assessed and ranges were defined for Scaly Bark Creek Reaches 1 and 2, UT1 Reach 2, and UT2. Stream pattern assessment will only be conducted in monitoring year five (5). Data will be processed in CAD and analyzed using Microsoft Excel.

3.2.3 Visual Assessment

Visual assessments will be conducted along all restoration, enhancement, and preservation reaches each year to obtain qualitative geomorphic data. Each visual assessment evaluation after the baseline survey will include re-evaluation along the same profile.

3.2.4 Bank Stability Assessment

The Bank Erodibility Hazard Index (BEHI) and Near Bank Stress (NBS) analysis will be conducted on all restoration, enhancement, and preservation reaches where this assessment was conducted in the existing conditions survey. The detailed information collected in this analysis will be used to assess the physical properties of the stream bank and to determine possible sources of bank erosion with respect to the stress associated with the velocity in that portion of the channel. The BEHI and NBS assessment will only be conducted in monitoring year five (5).

3.3 Vegetation

Planted woody vegetation will be monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2008) to monitor and assess the planted woody vegetation. A total of 29 vegetation plots were established 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 have been 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 with the as-built. Subsequent assessments following baseline survey will capture the same reference photograph locations.

3.4 Photograph Reference Points

A total of 46 permanent photograph reference points were established within the project easement area. Permanent photographic reference points established along the stream and easement areas will be used to support the qualitative visual assessments for the annual monitoring and to qualitatively evaluate channel aggradation or degradation, bank erosion, and success of riparian vegetation. The photograph points have been marked and are recoverable either through field identification or with the use of a GPS unit. Photographs looking upstream and downstream at each photo point were taken with the as-built. Subsequent assessments following the baseline survey will capture the same reference photograph locations.

4.0 Maintenance and Contingency Plans

Any identified high priority problem areas, such as streambank instability, aggradation/degradation, or lack of vegetation establishment will be evaluated on a case-by-case basis. The problem areas will be visually noted and remedial actions will be discussed with NCEEP staff to determine a plan of action. A proposal of work will be submitted if remediation of an area is required.

4.1 Vegetation

Vegetative problem areas will be mapped and included in the Current Condition Plan View (CCPV) as part of the annual vegetation assessment. Vegetation problems areas may include planted vegetation not meeting success criteria, persistent invasive species, barren areas with little to no herbaceous cover, or grass suffocation/crowding of planted stems. Appropriate remedial actions will be determined with NCEEP correspondence. A proposal of work will be submitted if remediation of an area is required.

Prior to restoration, Chinese privet (*Ligustrum sinense)*, the on-site dominant shrub species, along with sporadic occurrences of Lespedeza (*Lespedeza sp.*) were observed throughout the entire reaches of Scaly Bark Creek and UT2. Mechanical extraction of privet and lespedeza was performed in tandem with stream restoration activities. Long term management of these species with herbicide should be applied prior to the fruiting season of adjacent native shrubs and trees to avoid minimal damage.

4.2 Stream

Stream problem areas will be mapped and included in the CCPV as past of the annual stream assessment. Stream problems areas may include bank erosion, structure failure, beaver dams, aggradation/degradation, etc. Appropriate remedial actions will be determined with NCEEP correspondence. A proposal of work will be submitted if remediation of an area is required.

5.0 As-Built Condition (Baseline)

The Scaly Bark Creek Mitigation Site construction and as-built survey were completed during March and April 2011. The survey included locating the channel boundaries, structures, cross-sections, and monitoring features such as photo points, vegetation plots, and crest gauges. For comparison purposes, the baseline monitoring divided the reach assessments in the same way they were established for design parameters: Scaly Bark Creek Reach 1 and Reach 2, UT1 Reach 1 and Reach 2, UT1a, UT1b, UT2, UT3, and UT4.

5.1 As-Built/Record Drawings

A half size as-built plan is located in Appendix 4 with the pre-construction, design and post-construction locations and alignments for the project. Field adjustments made to the design plans during construction include re-aligning the downstream 50 LF of UT3 and UT4 at its confluence with Scaly Bark Creek Reach 1 based on field conditions. A few habitat structures were exchanged, such as brush toe to replace some root wads, based on recent performance in other restoration projects. The following sections further detail field adjustments in comparison to the design plans.

5.2 Baseline Data Assessment

3.2.1 Morphological State of the Channel

Morphological data for the as-built profile was collected in March 2011. Please refer to Appendix 2 for summary data tables, morphological plots, and stream photographs.

Profile

The baseline (MY-0) profile numbers are closely matched to the design parameters. The plotted longitudinal profile and related summary data can be found in Appendix 2.

The center culvert in the Scaly Bark Creek crossing outside the conservation easement was lowered slightly to allow for a centered baseflow channel. Because of this field change, the next downstream riffle was also lowered slightly so that water would not back up into the culvert pipes.

Riffles were depicted as a straight line, consistent slope in the design profile with rock and log riffle features to be installed during construction for habitat variability. The as-built profile reflects the installation of log and rock sills with micro-pools interspersed in the riffle and thalweg deviations included.

During construction, pools were excavated deeper than the design profile at some locations. Deeper pools are generally considered to have better habitat characteristics. In some areas, due to the radius of curvature and length of bend, a few pools had to be excavated slightly shallower than the design profile indicated to allow for the point bar slope to smoothly tie into the pool excavation. Where a J-hook structure was used to set the tail of riffle elevation, a scour pool was typically excavated immediately downstream of the J-hook. This excavation shifted the deepest part of the pool closer to the upstream end of the pool, rather than closer to the apex of the pool as shown in the design profile.

The as-built range for pool-to-pool spacing differs from the design range summarized in the Restoration Plan report for a few reasons. The lower end of the design range was fulfilled by designing in-line pools at log sill structures to break up long riffles. These in-line pools were intended to be shallower than meander bend pools. During construction, different riffle and micro-pool habitats were selected based on field conditions. Many of these shallower pools were constructed, but only the deeper meander bend pools were used to calculate pool-to-pool spacing from the as-built survey data. At the upper end of the design range for pool-to-pool spacing, the apex-to-apex distance was measured in designing the channel profile within

the design range. During construction, the deepest part of the pool was excavated in some areas closer to the upstream portion of the pool when a scour hole was constructed downstream of a J-hook at tail of riffle, or the deepest part of the pool was excavated slightly downstream of the apex of a pool. These slight shifts of the deepest point in a pool have resulted in some pool-to-pool spacing measurements falling outside the design range. These shifts are not considered significant, and the design intent has still been fulfilled in the constructed conditions.

Dimension

The baseline (MY-0) dimension numbers are closely matched to the design parameters. Summary data and cross-section plots can be found in Appendix 2.

The main deviation from the design parameters is in the range of width to depth ratios. The design range for width to depth ratios was in the 10 to 11 range. As-built ratios reflect a range between 11.9 and 14.8, typically between 12 and 13. The top width of the channel was constructed slightly wider than the design typical sections to make bank slopes slightly less steep than 2:1. In recent construction projects, a bank slope less steep than 2:1 has proved to be more stable and more favorable for rooting plants. The width to depth ration still falls in the lower end of a Rosgen C channel range, which is consistent with the design intent for the channels on the site.

Pattern

The baseline (MY-0) radius of curvature and channel belt width numbers are similar to design objectives for all three (3) reaches. Pattern data will be completed in MY-5 if there are any indicators through the profile or dimensions that significant geomorphic adjustments have occurred.

In-stream structures such as root wads and brush toe were used to enhance channel habitat and stability on the outside bank of meander bends. During construction, areas where root wads had been designed were replaced with brush toe treatment because recent construction experience on other projects has shown than brush toe provides more effective bend protection. Brush toe was installed in outer banks adjacent to the apex of pools and not in banks corresponding to glide or run features. In some areas, large boulders or shallow bedrock was encountered at the outside of bends and so neither root wads nor brush toe could be installed.

Sediment Transport

Sediment transport data are reported in Table 5 in Appendix 2. As-built shear stresses are similar to design parameters and should reduce the risk of further erosion along all three restoration reaches.

3.2.2 Vegetation

The baseline monitoring (MY-0 of 5) vegetative survey was completed in April 2011. The baseline vegetation monitoring resulted in an average survivability of 810 stems per acre, which is greater than the design density required. There was an average of 20 stems per plot.

Please refer to Appendix 3 for vegetation summary tables, raw data tables, and vegetation plot photographs.

3.2.3 Photo Documentation

Permanent photographs locations were recorded using a sub-meter Trimble GPS. These photographs can be found in Appendix 2.

3.2.4 Hydrology

No bankfull events were recorded with the crest gauge during the baseline data gathering.

9.0 References

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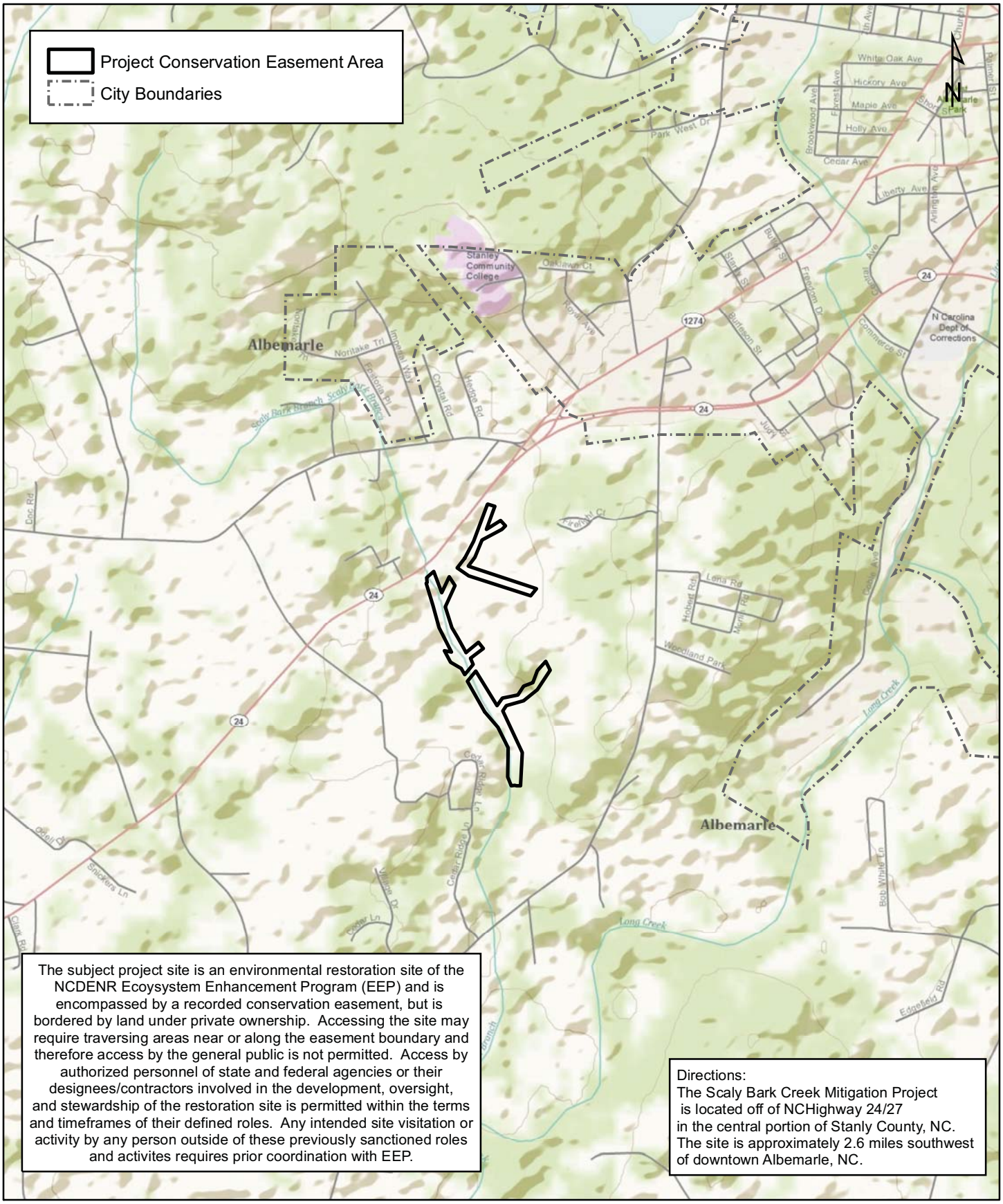
APPENDIX 1. General Tables and Figures



The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight, and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activites requires prior coordination with EEP.

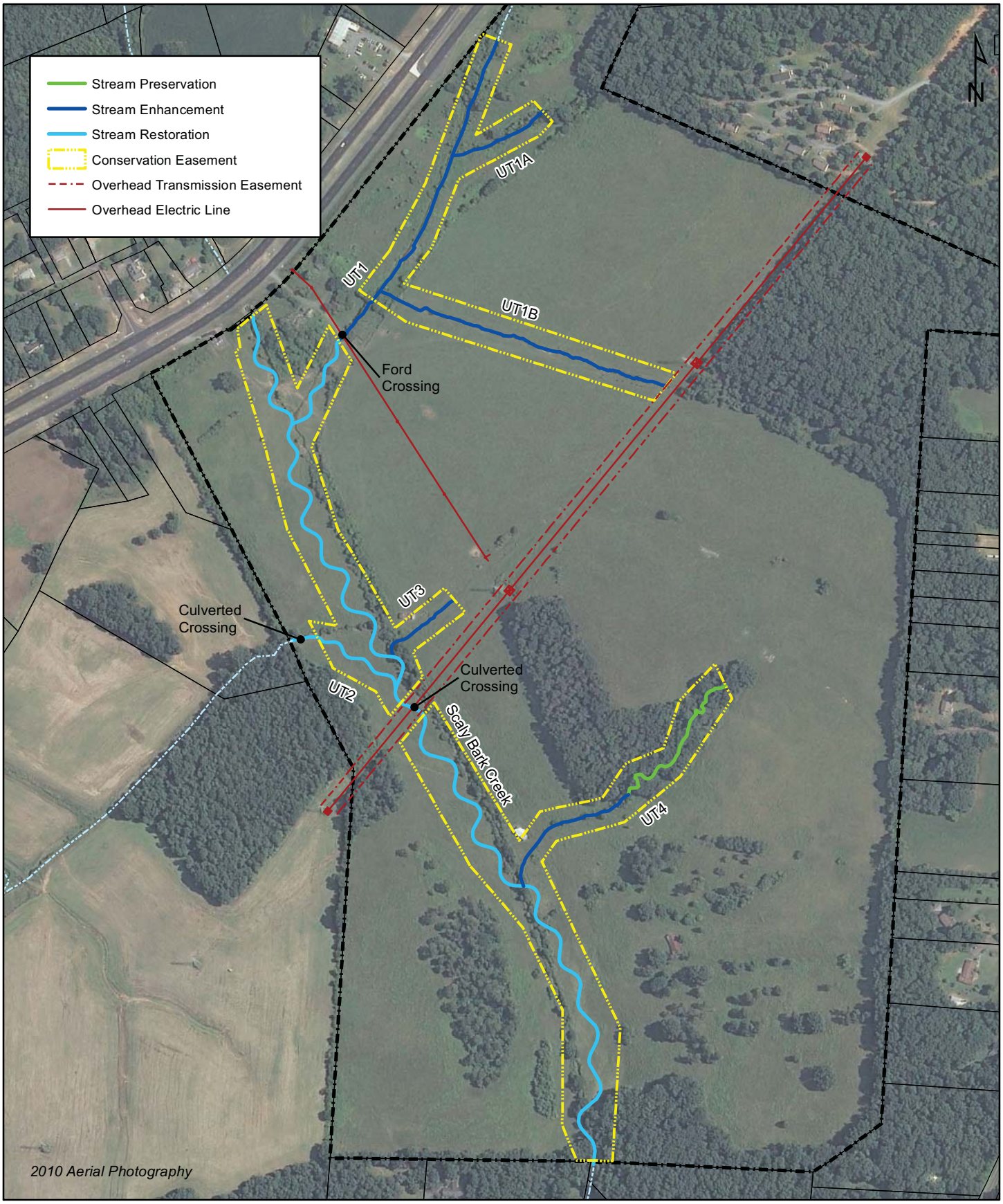
Directions:
The Scaly Bark Creek Mitigation Project is located off of NCHighway 24/27 in the central portion of Stanly County, NC. The site is approximately 2.6 miles southwest of downtown Albemarle, NC.

WILDLANDS ENGINEERING

Ecosystem Enhancement PROGRAM

0 1,000 2,000 Feet

Figure 1. Vicinity Map
Scaly Bark Creek Mitigation Site
EEP Project Number 94148
Monitoring Year 0 of 5
Stanly County, NC



WILDLANDS ENGINEERING

Ecosystem Enhancement PROGRAM

0 250 500 Feet

Figure 2. Project Component/Asset Map
Scaly Bark Creek Mitigation Site
EEP Project Number 94148
Monitoring Year 0 of 5

Stanly County, NC

Appendix 1. General Tables and Figures
Table 1. Project Components and Mitigation Credits
Scaly Bark Creek Mitigation Site (EEP Project No.94148)
Monitoring Year 0 of 5

Mitigation Credits										
	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offet	Phosphorous Nutrient Offset	
Type	R	RE	R	RE	R	RE				
Totals	4,875	1,575	N/A	N/A	N/A	N/A		N/A	N/A	

Project Components

Reach ID	Stationing/ Location	Exisitng 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	213+10.37-217+32.36	330	Priority 1	Restoration	422	1:1
UT1 Reach 2	200+00.00-211+10.37	1,104	spot grading and planting	Enhancement II	1,104	2.5:1
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	1,198	2.5:1
UT2	500+00.00-503+93.00	262	Priority 1	Restoration	414	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	4,875	-	-	-	-	-	-
Enhancement		-	-	-	-	-	-
Enhancement I	-						
Enhancement II	3,587						
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

Appendix 1. General Tables and Figures
Table 2. Project Activity and Reporting History
Scaly Bark Creek Mitigation Site (EEP Project No.94148)
Monitoring Year 0 of 5

Activity or Report	Date Collection Complete	Completion or Delivery
Mitigation Plan	May 2010	May 2010
Final Design - Construction Plans	Dec 2010	Dec 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	Sept 2011	Dec 2011
Year 2 Monitoring	2012	Dec 2012
Year 3 Monitoring	2013	Dec 2013
Year 4 Monitoring	2014	Dec 2014
Year 5 Monitoring	2015	Dec 2015

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

Appendix 1. General Tables and Figures
Table 3. Project Contact Table
Scaly Bark Creek Mitigation Site (EEP Project No.94148)
Monitoring Year 0 of 5

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	704.336.725.2010
Planting Contractor	**North State Environmental, Inc.**
	2889 Lowery Street
	Winston-Salem, NC 27101
Stephen Joyce	704.336.725.2010
Seeding Contractor	**North State Environmental, Inc.**
	2889 Lowery Street
	Winston-Salem, NC 27101
Stephen Joyce	704.336.725.2010
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

Appendix 1. General Tables and Figures
Table 4. Project Baseline Information and Attributes
Scaly Bark Creek Mitigation Site (EEP Project No.94148)
Monitoring Year 0 of 5

Project Information							
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	Scaly Bark Creek: 27%, UT1: 33%, UT1a: 2%, UT1b: 13%, UT2: 4%, UT3: 0%, UT4: 0%						
CGIA Land Use Classification	U						
Reach Summary Information							
Parameters	**Scaly Bark Creek**	**UT1**	**UT1a**	**UT1b**	**UT2**	**UT3**	**UT4**
Length of reach (linear feet) - Post-Restoration	4,058	1,526	390	1,198	414	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 DWQ 401 Water Quality Certification No. 3689
Waters of the United States - Section 401	Yes	Yes	
Endangered Species Act	Yes	Yes	Scaly Bark Mitigation Plan; studies found suitable habitat not present for listed species
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	CLOMR approved
Essential Fisheries Habitat	Yes	Yes	No adverse impacts to aquatic resources were found (letter from NCWRC)

U= Unknown

APPENDIX 2. Morphological Summary and Data Plots

Appendix 2. Morphological Summary Data and Plots
Table 5a. Baseline Stream Data Summary
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reaches 1 and 2
Monitoring Year 0 of 5

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		17.9	18.1	18.3	21.2	21.3	21.4
Floodprone Width (ft)								87.0		111.0	112.0	72.0		229.0		60.0	114+	37+		44+		200+	200+	200+	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		2.2	2.2	2.2	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+		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	1.0	1.0
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	38	-	40	30	-	35
Stream Power (Capacity) W/m^2																											
Additional Reach Parameters																											
Drainage Area (SM)	n/a							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								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				1886			2220		
Sinuosity (ft)								1.1		1.0		N/P		N/P		N/P		1.2		1.2		1.3			1.1		
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.

Appendix 2. Morphological Summary Data and Plots
Table 5b. Baseline Stream Data Summary
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2 and UT2
Monitoring Year 0 of 5

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								#N/A/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	40			50		
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		399			380		
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		

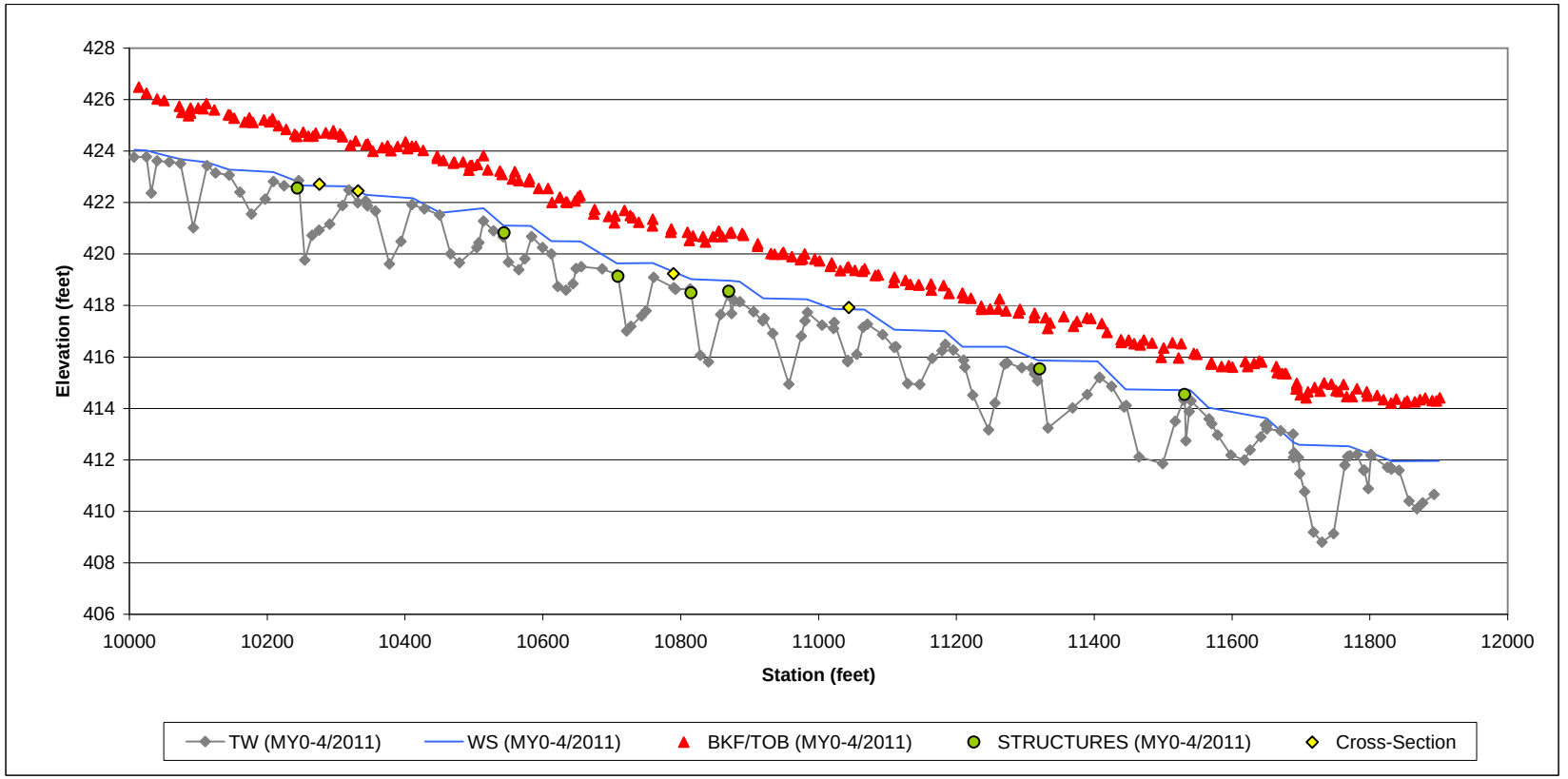
N/P: Data was not provided

*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.

Appendix 2. Morphological Summary Data and Plots
Table 6. Morphology and Hydraulic Monitoring 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 0 of 5

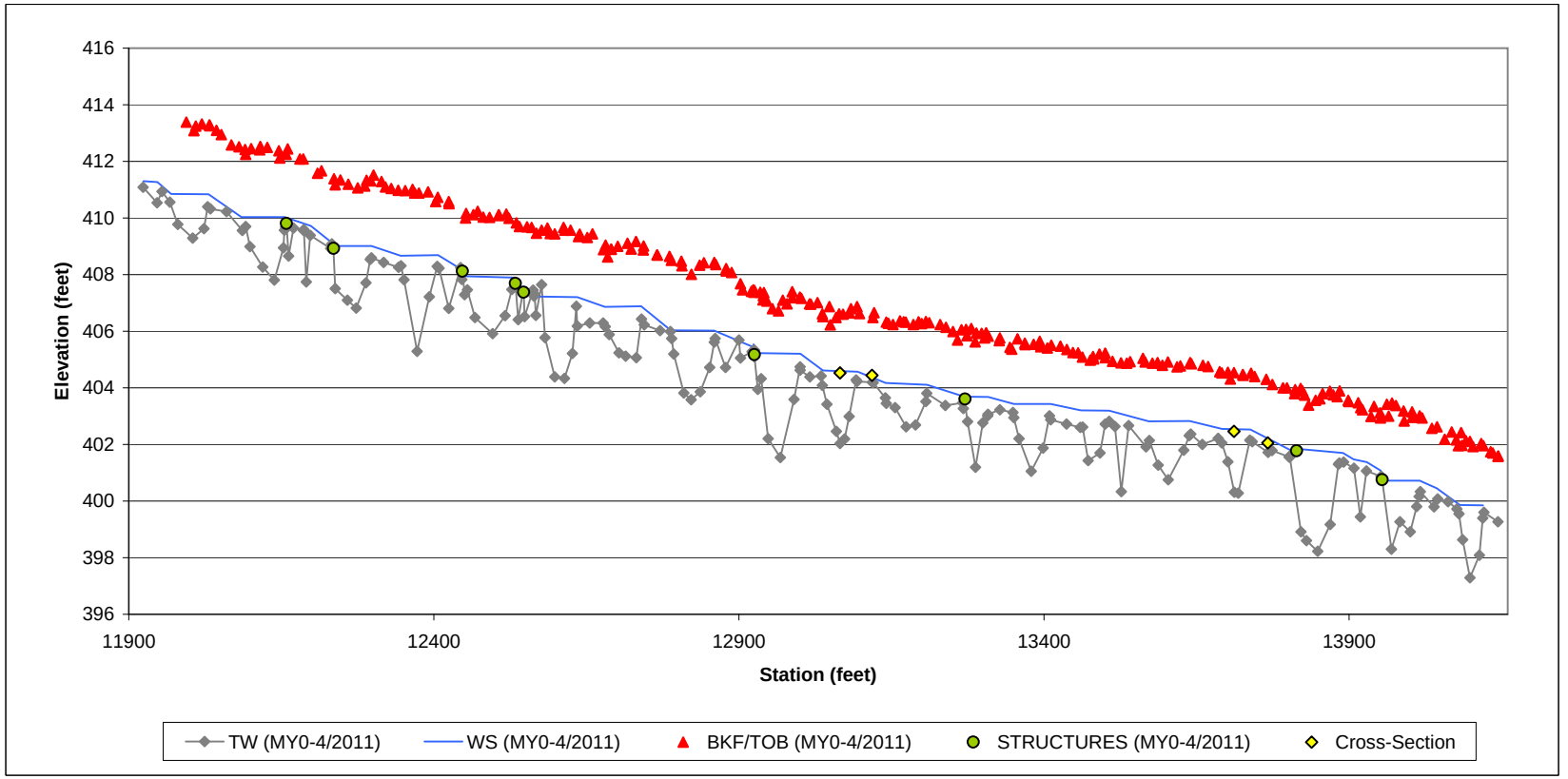
	Scaly Bark Reach 1																							
	Cross-Section 1 (Pool)						Cross-Section 2 (Riffle)						Cross-Section 3 (Riffle)						Cross-Section 4 (Pool)					
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
based on fixed bankfull elevation																								
Bankfull Width (ft)	21.13						17.86						18.29						24.12					
Floodprone Width (ft)	n/a						200+						200+						n/a					
Bankfull Mean Depth (ft)	1.83						1.38						1.41						1.87					
Bankfull Max Depth (ft)	3.48						2.20						2.20						3.67					
Bankfull Cross-Sectional Area (ft^2)	38.63						24.64						25.82						45.17					
Bankfull Width/Depth Ratio	11.55						12.95						12.95						12.88					
Bankfull Entrenchment Ratio	n/a						2.2+						2.2+						n/a					
Bankfull Bank Height Ratio	1.00						1.00						1.00						1.00					
d50 (mm)							26.89						29.62											
	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						21.35						24.73						21.2					
Floodprone Width (ft)	n/a						200+						n/a						200+					
Bankfull Mean Depth (ft)	1.96						1.61						1.95						1.74					
Bankfull Max Depth (ft)	4.63						2.27						3.9						2.6					
Bankfull Cross-Sectional Area (ft^2)	52.24						34.33						48.29						36.79					
Bankfull Width/Depth Ratio	13.58						13.28						12.67						12.22					
Bankfull Entrenchment Ratio	n/a						2.2+						n/a						2.2+					
Bankfull Bank Height Ratio	1.00						1.00						1.00						1.00					
d50 (mm)							45												23					
	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						12.14						15.38						12.99					
Floodprone Width (ft)	n/a						200+						n/a						200+					
Bankfull Mean Depth (ft)	1.53						1.02						1.51						0.88					
Bankfull Max Depth (ft)	3.26						1.73						2.90						1.46					
Bankfull Cross-Sectional Area (ft^2)	27.95						12.39						23.28						11.40					
Bankfull Width/Depth Ratio	11.87						11.89						10.16						14.82					
Bankfull Entrenchment Ratio	n/a						2.2+						n/a						2.2+					
Bankfull Bank Height Ratio	1.00						1.00						1.00						1.00					
d50 (mm)							48												35					

Appendix 2. Morphological Summary Data and Plots
Figure 3a. Longitudinal Profile Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 1
Monitoring Year 0 of 5



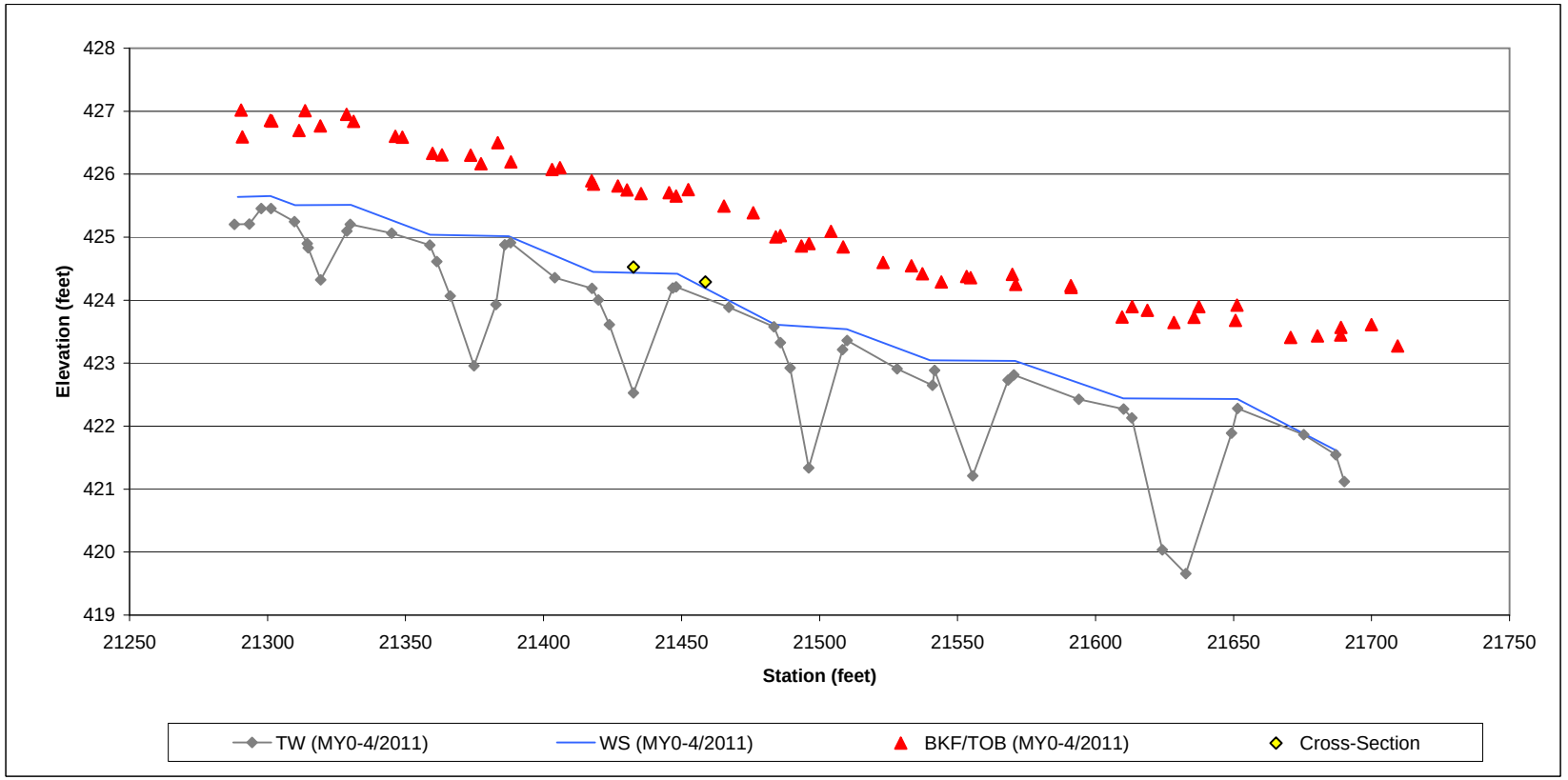
BKF=-0.0067*STA+493.29
WS=-0.0067*STA+491.48

Appendix 2. Morphological Summary Data and Plots
Figure 3b. Longitudinal Profile Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2
Monitoring Year 0 of 5



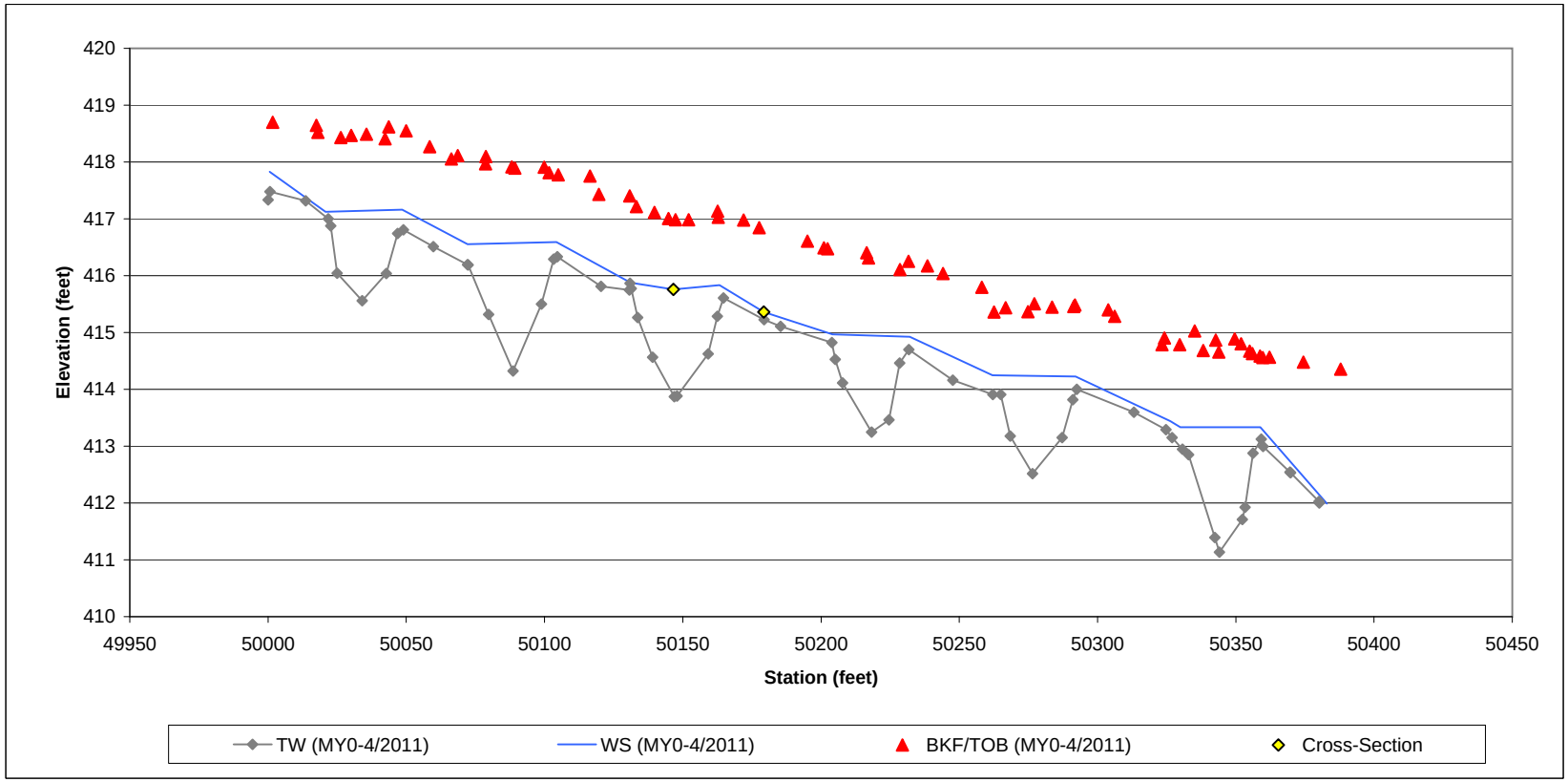
BKF=-0.005*STA+472.07
WS=-0.0049*STA+468.94

Appendix 2. Morphological Summary Data and Plots
Figure 3c. Longitudinal Profile Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2
Monitoring Year 0 of 5



BKF=-0.0094*STA+626.7
WS=-0.0101*STA+640.85

Appendix 2. Morphological Summary Data and Plots
Figure 3d. Longitudinal Profile Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2
Monitoring Year 0 of 5



BKF=-0.0121*STA+1023
WS=-0.013*STA+1067.8

Appendix 2. Morphological Summary Data and Plots
Figure 4a. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 1, Cross-Section 1 (Pool)
Monitoring Year 0 of 5

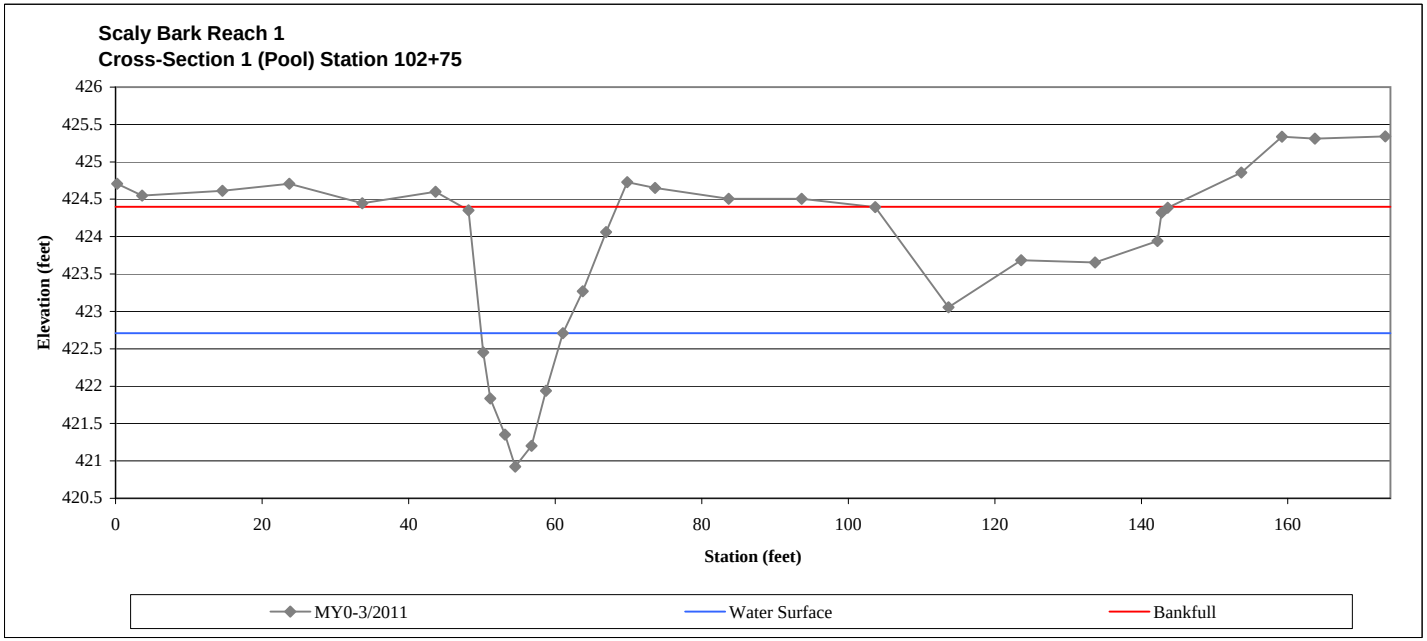
River Basin	Yadkin
Watershed	Rocky River
XS ID	1
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	424.4
Bankfull Cross-Sectional Area (ft2)	38.63
Bankfull Width (ft)	21.13
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	n/a
Max Depth at Bankfull (ft)	3.48
Mean Depth at Bankfull (ft)	1.83
W/D Ratio	11.55
Entrenchment Ratio	n/a
Bank Height Ratio	1
Stream Type	n/a

Cross-Section 1: View Upstream (4/27/2011)

Cross-Section 1: View Downstream (4/27/2011)

Station	Elevation	Station	Elevation
0.24	424.71	142.19	423.94
3.63	424.55	142.79	424.32
14.60	424.61	143.61	424.39
23.71	424.71	153.65	424.86
33.66	424.45	159.18	425.34
43.68	424.60	163.69	425.31
48.17	424.35	173.28	425.34
50.18	422.45		
51.15	421.83		
53.14	421.35		
54.57	420.92		
56.77	421.20		
58.74	421.94		
61.07	422.71		
63.76	423.27		
66.96	424.06		
69.85	424.73		
73.63	424.65		
83.66	424.51		
93.63	424.51		
103.67	424.39		
113.70	423.06		
123.59	423.69		
133.70	423.65		



Appendix 2. Morphological Summary Data and Plots
Figure 4b. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 1, Cross-Section 2 (Riffle)
Monitoring Year 0 of 5

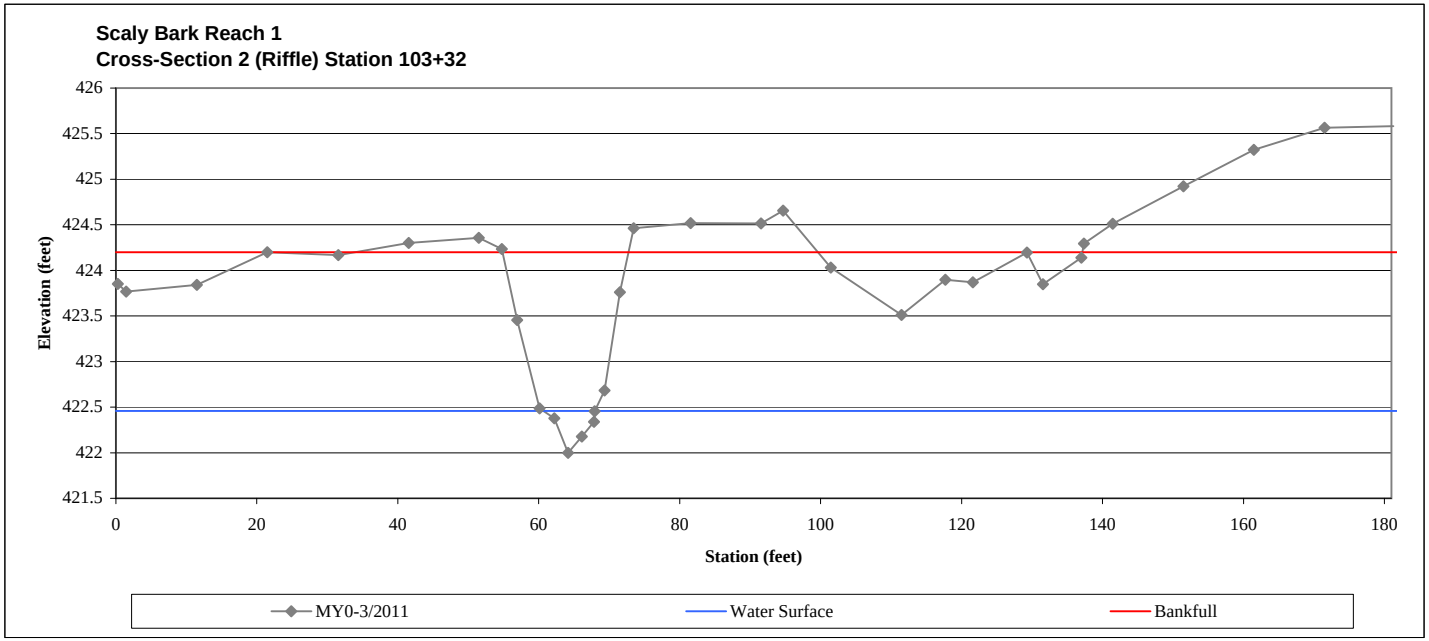
River Basin	Yadkin
Watershed	Rocky River
XS ID	2
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	424.2
Bankfull Cross-Sectional Area (ft2)	24.64
Bankfull Width (ft)	17.86
Flood Prone Area Elevation (ft)	426.4
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	2.2
Mean Depth at Bankfull (ft)	1.38
W/D Ratio	12.95
Entrenchment Ratio	2.2+
Bank Height Ratio	1
Stream Type	C

Cross-Section 2: View Upstream (4/27/2011)

Cross-Section 2: View Downstream (4/27/2011)

Station	Elevation	Station	Elevation
0.27	423.85	121.60	423.87
1.47	423.77	129.29	424.20
11.47	423.84	131.53	423.85
21.50	424.20	137.00	424.14
31.54	424.17	137.34	424.30
41.56	424.30	141.45	424.51
51.51	424.36	151.50	424.92
54.78	424.23	161.48	425.32
56.94	423.46	171.49	425.56
60.13	422.49	181.26	425.58
62.19	422.38		
64.15	422.00		
66.13	422.18		
67.86	422.34		
67.91	422.46		
69.35	422.68		
71.51	423.76		
73.46	424.46		
81.55	424.52		
91.54	424.52		
94.66	424.66		
101.43	424.03		
111.47	423.51		
117.70	423.90		



Appendix 2. Morphological Summary Data and Plots
Figure 4c. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 1, Cross-Section 3 (Riffle)
Monitoring Year 0 of 5

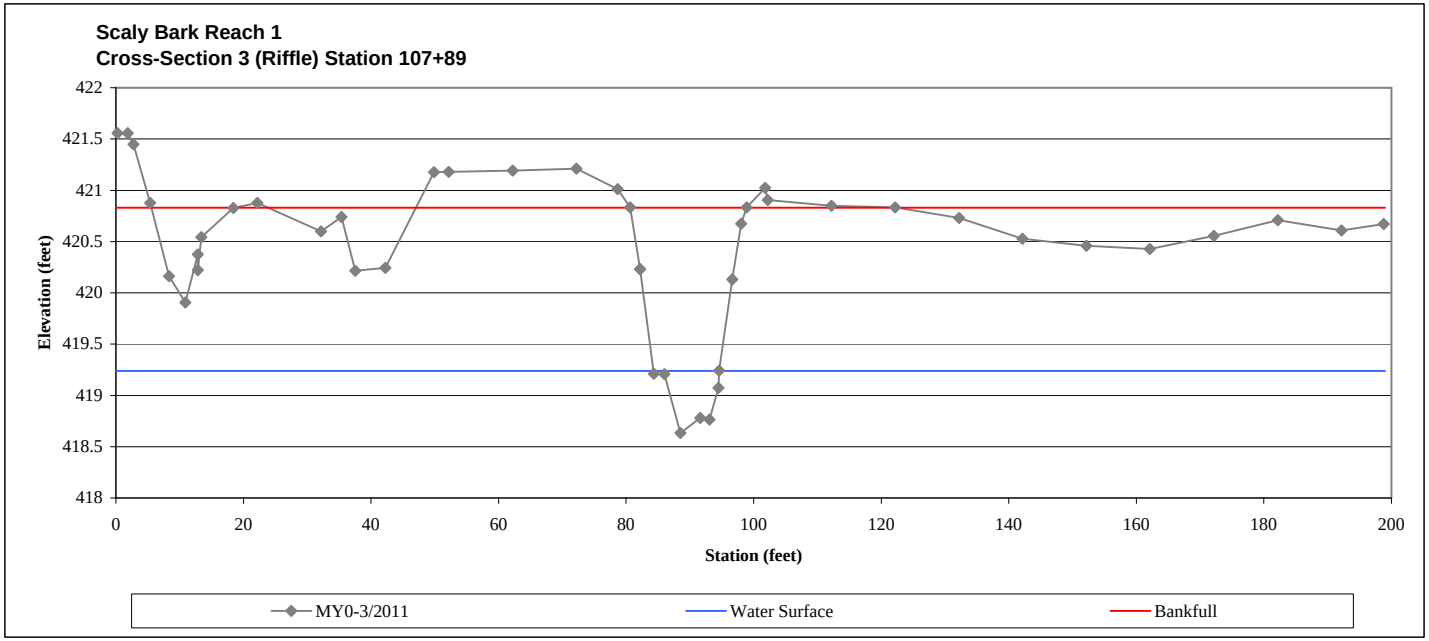
River Basin	Yadkin
Watershed	Rocky River
XS ID	3
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	420.83
Bankfull Cross-Sectional Area (ft2)	25.82
Bankfull Width (ft)	18.29
Flood Prone Area Elevation (ft)	423.03
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	2.20
Mean Depth at Bankfull (ft)	1.41
W/D Ratio	12.95
Entrenchment Ratio	2.2+
Bank Height Ratio	1.00
Stream Type	C

Cross-Section 3: View Upstream (4/27/2011)

Cross-Section 3: View Downstream (4/27/2011)

Station	Elevation	Station	Elevation
0.24	421.56	86.02	419.21
1.86	421.56	88.51	418.63
2.77	421.45	91.62	418.78
5.38	420.88	93.07	418.77
8.35	420.16	94.46	419.07
10.89	419.91	94.58	419.24
12.82	420.38	96.66	420.13
12.83	420.22	98.05	420.67
13.39	420.54	98.92	420.83
18.42	420.83	101.83	421.02
22.19	420.88	102.22	420.91
32.14	420.60	112.18	420.85
35.36	420.74	122.18	420.83
37.55	420.22	132.21	420.73
42.23	420.24	142.14	420.53
49.85	421.18	152.16	420.46
52.20	421.18	162.13	420.43
62.20	421.19	172.13	420.56
72.18	421.21	182.20	420.71
78.67	421.01	192.17	420.61
80.61	420.83	198.78	420.67
82.17	420.23		
82.17	420.23		
84.35	419.21		



Appendix 2. Morphological Summary Data and Plots
Figure 4d. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 1, Cross-Section 4 (Pool)
Monitoring Year 0 of 5

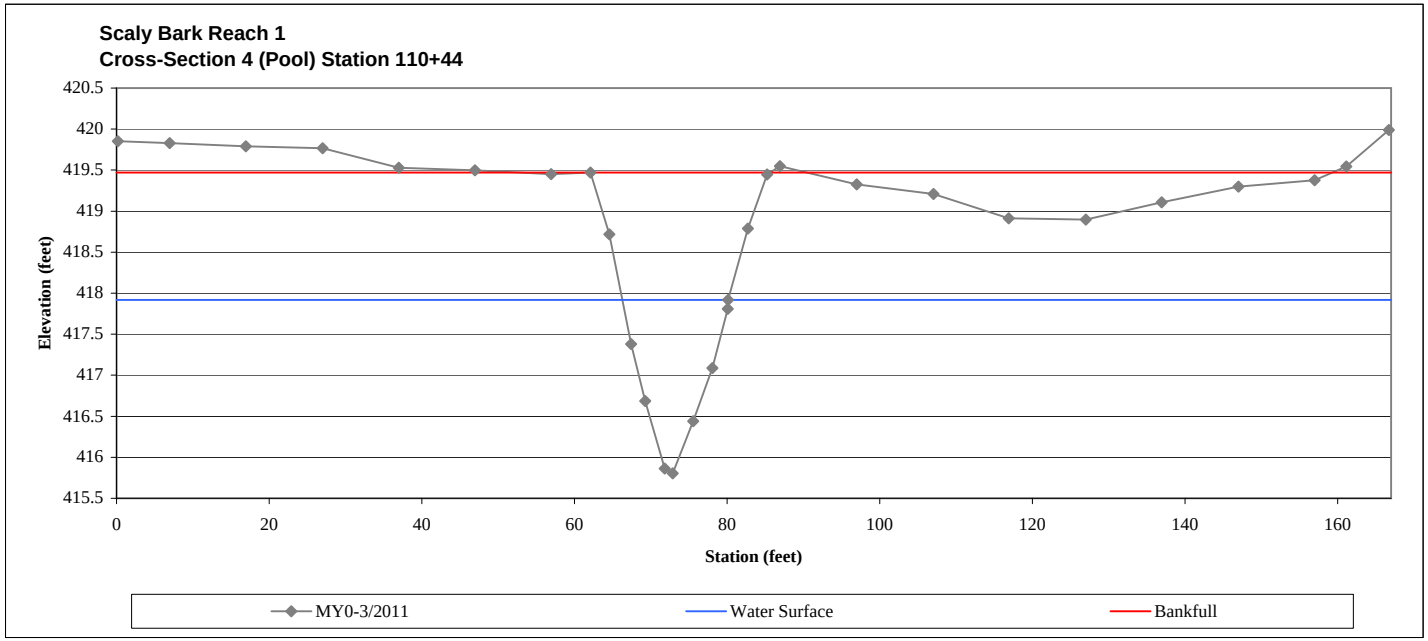
River Basin	Yadkin
Watershed	Rocky River
XS ID	4
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	419.47
Bankfull Cross-Sectional Area (ft2)	45.17
Bankfull Width (ft)	24.12
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	n/a
Max Depth at Bankfull (ft)	3.67
Mean Depth at Bankfull (ft)	1.87
W/D Ratio	12.88
Entrenchment Ratio	n/a
Bank Height Ratio	1.00
Stream Type	n/a

Cross-Section 4: View Upstream (4/27/2011)

Cross-Section 4: View Downstream (4/27/2011)

Station	Elevation	Station	Elevation
0.15	419.85	136.93	419.11
6.96	419.83	147.02	419.30
16.95	419.79	157.00	419.38
26.99	419.77	161.11	419.55
36.97	419.53	166.69	419.99
46.98	419.50		
56.95	419.45		
62.08	419.47		
64.59	418.72		
67.41	417.38		
69.25	416.69		
71.84	415.86		
72.88	415.80		
75.54	416.44		
78.07	417.09		
80.07	417.81		
80.14	417.92		
82.71	418.79		
85.23	419.45		
86.91	419.55		
96.97	419.33		
107.04	419.21		
116.91	418.91		
127.02	418.90		



Appendix 2. Morphological Summary Data and Plots
Figure 4e. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 5 (Pool)
Monitoring Year 0 of 5

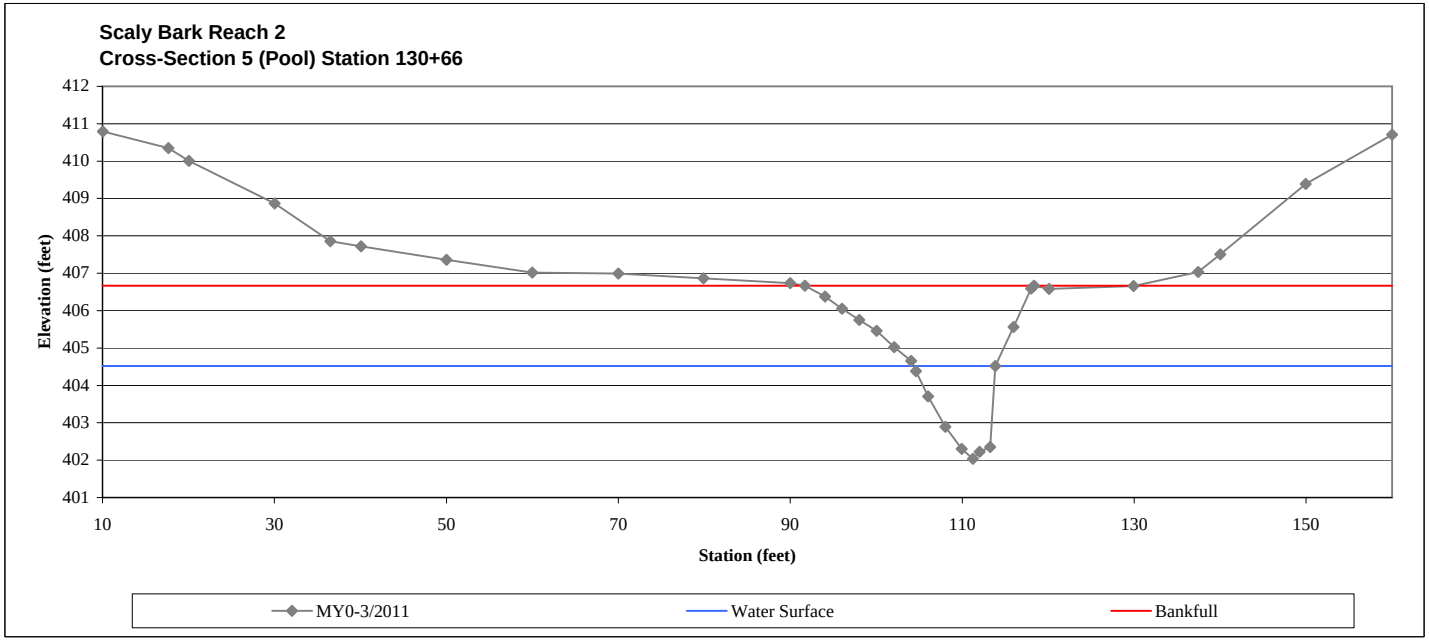
River Basin	Yadkin
Watershed	Rocky River
XS ID	5
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	406.67
Bankfull Cross-Sectional Area (ft2)	52.24
Bankfull Width (ft)	26.64
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	4.63
Mean Depth at Bankfull (ft)	1.96
W/D Ratio	13.58
Entrenchment Ratio	2.2+
Bank Height Ratio	1.00
Stream Type	n/a

Cross-Section 5: View Upstream

Cross-Section 5: View Downstream

Station	Elevation	Station	Elevation
10.04	410.80	113.25	402.35
17.67	410.35	113.86	404.52
20.05	410.00	115.96	405.56
30.02	408.86	118.03	406.59
36.50	407.86	118.36	406.67
40.07	407.72	120.09	406.58
50.00	407.36	129.92	406.66
60.00	407.02	137.43	407.03
70.00	406.99	140.00	407.51
79.90	406.87	149.95	409.39
89.97	406.74	159.99	410.71
91.70	406.67		
94.05	406.38		
96.00	406.05		
98.01	405.75		
100.02	405.46		
102.07	405.02		
104.04	404.65		
104.60	404.39		
106.03	403.71		
108.05	402.89		
109.93	402.30		
111.25	402.03		
112.01	402.22		



Appendix 2. Morphological Summary Data and Plots
Figure 4f. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 6 (Riffle)
Monitoring Year 0 of 5

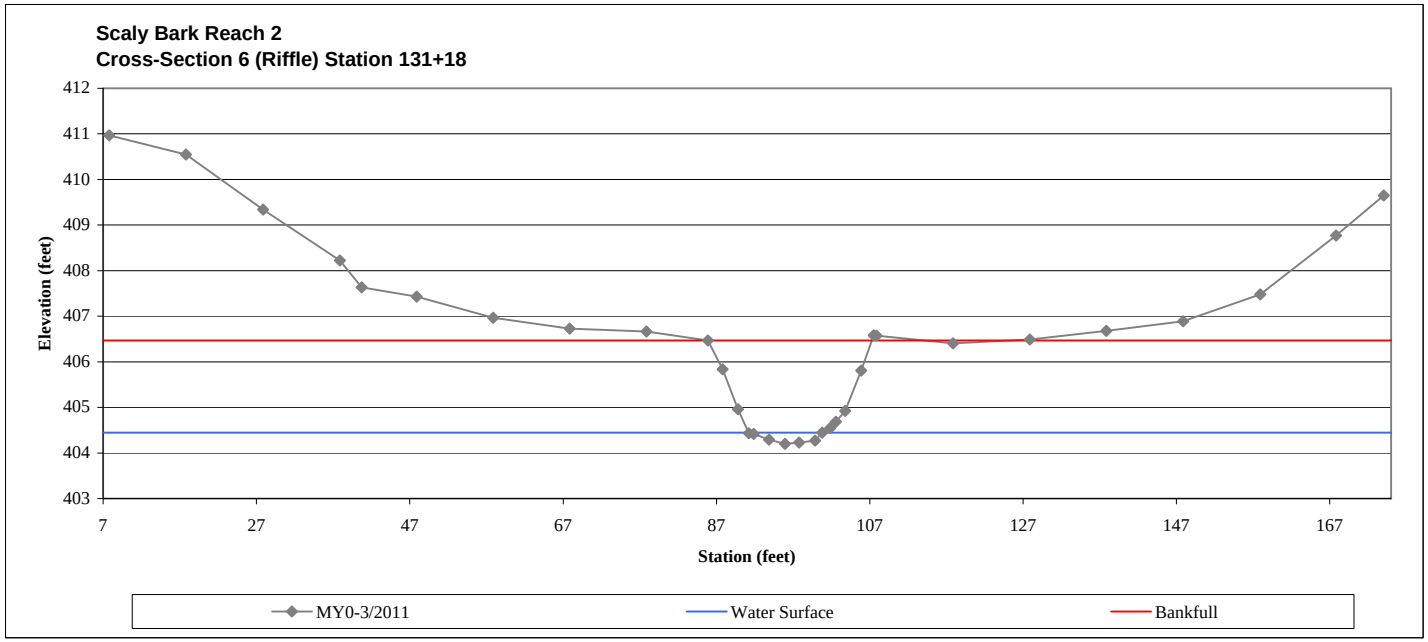
River Basin	Yadkin
Watershed	Rocky River
XS ID	6
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	406.47
Bankfull Cross-Sectional Area (ft2)	34.33
Bankfull Width (ft)	21.35
Flood Prone Area Elevation (ft)	408.74
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	2.27
Mean Depth at Bankfull (ft)	1.61
W/D Ratio	13.28
Entrenchment Ratio	2.2+
Bank Height Ratio	1.00
Stream Type	C

Cross-Section 6: View Upstream

Cross-Section 6: View Downstream

Station	Elevation	Station	Elevation
7.81	410.97	107.87	406.58
17.83	410.55	117.84	406.40
27.87	409.34	127.88	406.49
37.88	408.22	137.84	406.68
40.74	407.63	147.85	406.89
47.90	407.43	157.94	407.48
57.87	406.97	167.84	408.77
67.86	406.73	174.06	409.65
77.87	406.66		
85.90	406.47		
87.80	405.83		
89.79	404.96		
91.21	404.43		
91.86	404.42		
93.84	404.29		
95.93	404.20		
97.77	404.23		
99.85	404.27		
100.80	404.45		
101.85	404.54		
102.60	404.68		
103.79	404.93		
105.86	405.81		
107.49	406.58		



Appendix 2. Morphological Summary Data and Plots
Figure 4g. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 7 (Pool)
Monitoring Year 0 of 5

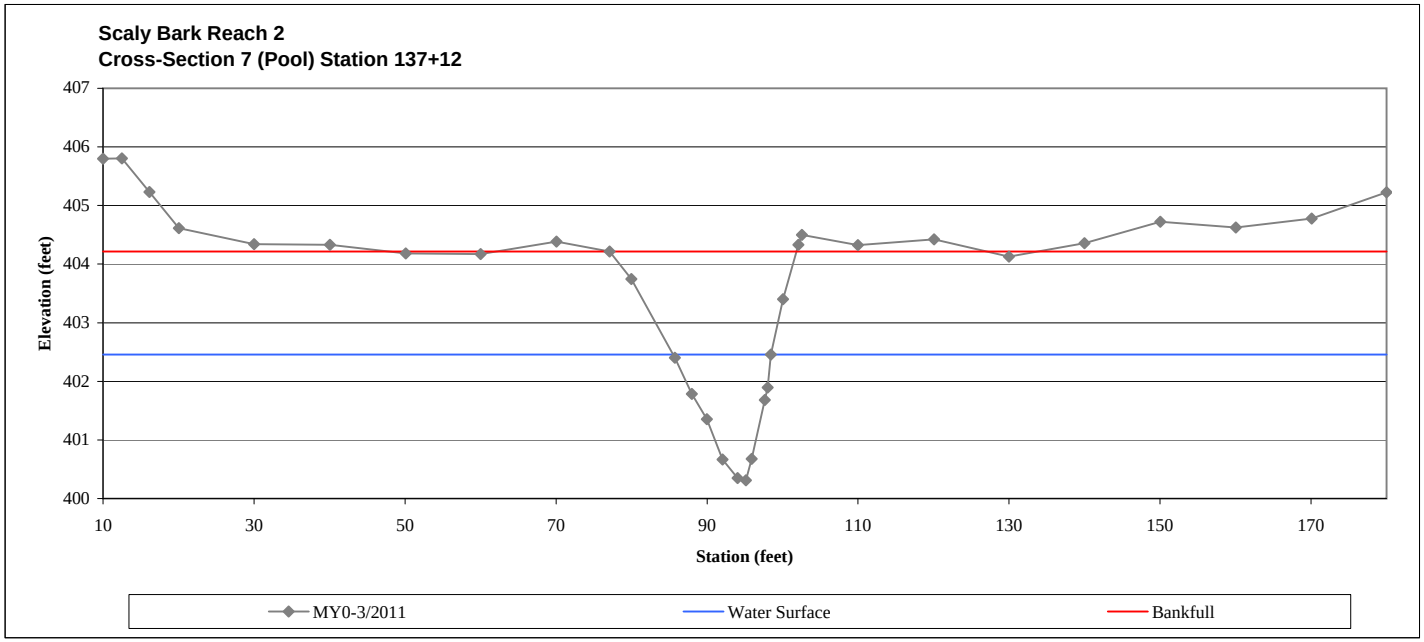
River Basin	Yadkin
Watershed	Rocky River
XS ID	7
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	404.21
Bankfull Cross-Sectional Area (ft2)	48.29
Bankfull Width (ft)	24.73
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	3.90
Mean Depth at Bankfull (ft)	1.95
W/D Ratio	12.67
Entrenchment Ratio	2.2+
Bank Height Ratio	1.00
Stream Type	n/a

Cross-Section 7: View Upstream

Cross-Section 7: View Downstream

Station	Elevation	Station	Elevation
10.00	405.80	109.97	404.33
12.51	405.80	120.08	404.42
16.14	405.23	130.00	404.13
20.05	404.61	140.00	404.36
30.02	404.34	150.02	404.72
40.06	404.33	160.05	404.62
50.08	404.18	170.08	404.78
60.01	404.17	180.00	405.23
70.04	404.39		
77.11	404.21		
79.99	403.75		
85.75	402.40		
88.00	401.78		
89.97	401.35		
92.06	400.66		
94.03	400.35		
95.13	400.31		
95.93	400.68		
97.67	401.68		
98.04	401.90		
98.46	402.46		
100.08	403.40		
102.09	404.33		
102.58	404.50		



Appendix 2. Morphological Summary Data and Plots
Figure 4h. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 8 (Riffle)
Monitoring Year 0 of 5

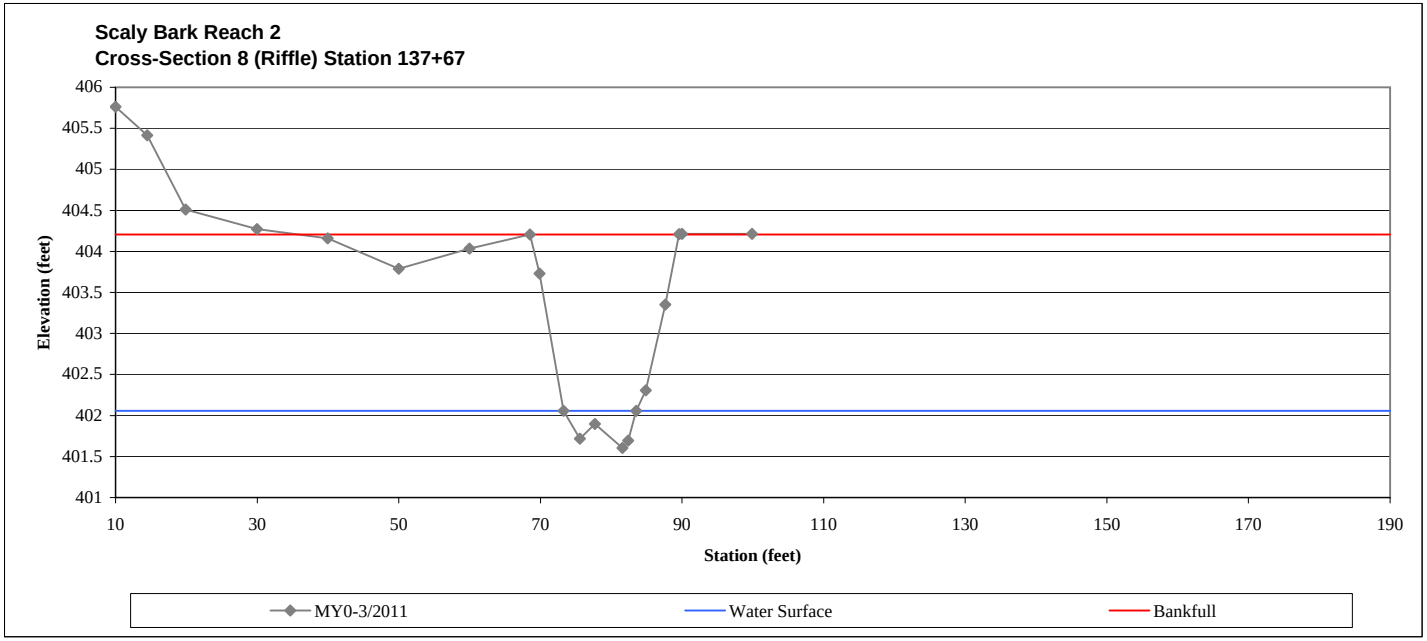
River Basin	Yadkin
Watershed	Rocky River
XS ID	8
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	404.21
Bankfull Cross-Sectional Area (ft2)	36.79
Bankfull Width (ft)	21.20
Flood Prone Area Elevation (ft)	406.81
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	2.60
Mean Depth at Bankfull (ft)	1.74
W/D Ratio	12.22
Entrenchment Ratio	2.2+
Bank Height Ratio	1.00
Stream Type	C

Cross-Section 8: View Upstream

Cross-Section 8: View Downstream

Station	Elevation	Station	Elevation
10.00	405.76	149.88	404.18
14.47	405.41	159.92	404.10
19.89	404.51	169.86	403.96
29.96	404.27	179.99	403.97
39.96	404.16	189.97	403.90
49.98	403.79		
59.98	404.03		
68.52	404.21		
69.90	403.73		
73.29	402.06		
75.59	401.72		
77.69	401.90		
81.58	401.60		
82.38	401.69		
83.51	402.06		
84.88	402.31		
87.64	403.35		
89.58	404.21		
89.99	404.22		
99.88	404.22		
109.95	404.08		
119.93	403.91		
129.96	403.96		
139.91	404.10		



Appendix 2. Morphological Summary Data and Plots
Figure 4i. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2, Cross-Section 9 (Pool)
Monitoring Year 0 of 5

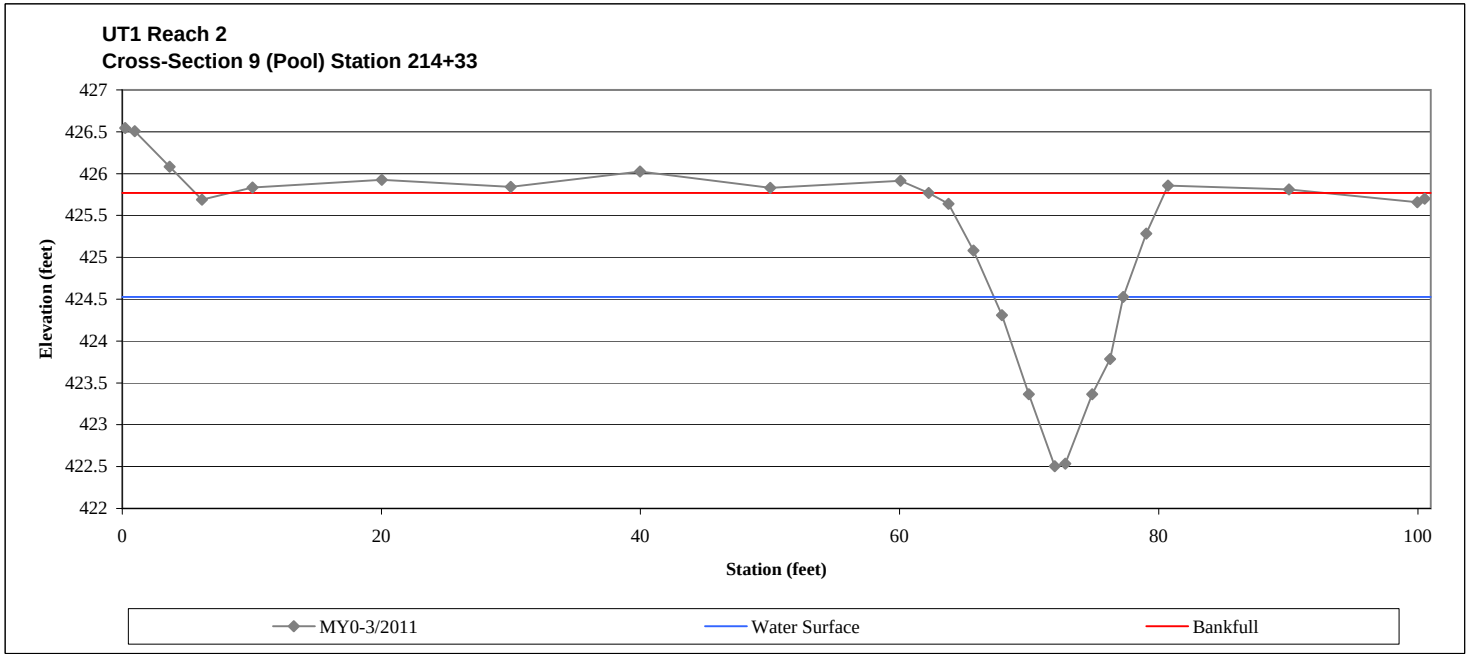
River Basin	Yadkin
Watershed	Rocky River
XS ID	9
Drainage Area	2.5 sq.mi
Date	Apr-11
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	425.77
Bankfull Cross-Sectional Area (ft2)	27.95
Bankfull Width (ft)	18.21
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	3.26
Mean Depth at Bankfull (ft)	1.53
W/D Ratio	11.87
Entrenchment Ratio	n/a
Bank Height Ratio	1.00
Stream Type	C

Cross-Section 9: View Upstream (4/27/2011)

Cross-Section 9: View Downstream (4/27/2011)

Station	Elevation	Station	Elevation
0.23	426.55	100.53	425.70
0.97	426.51		
3.66	426.08		
6.16	425.69		
10.05	425.84		
20.04	425.93		
29.99	425.84		
39.97	426.03		
50.03	425.83		
60.07	425.91		
62.24	425.77		
63.78	425.64		
65.70	425.08		
67.91	424.31		
69.98	423.36		
71.98	422.51		
72.78	422.54		
74.86	423.36		
76.26	423.79		
77.26	424.53		
79.05	425.28		
80.71	425.86		
90.07	425.81		
99.97	425.66		



Appendix 2. Morphological Summary Data and Plots
Figure 4j. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2, Cross-Section 10 (Riffle)
Monitoring Year 0 of 5

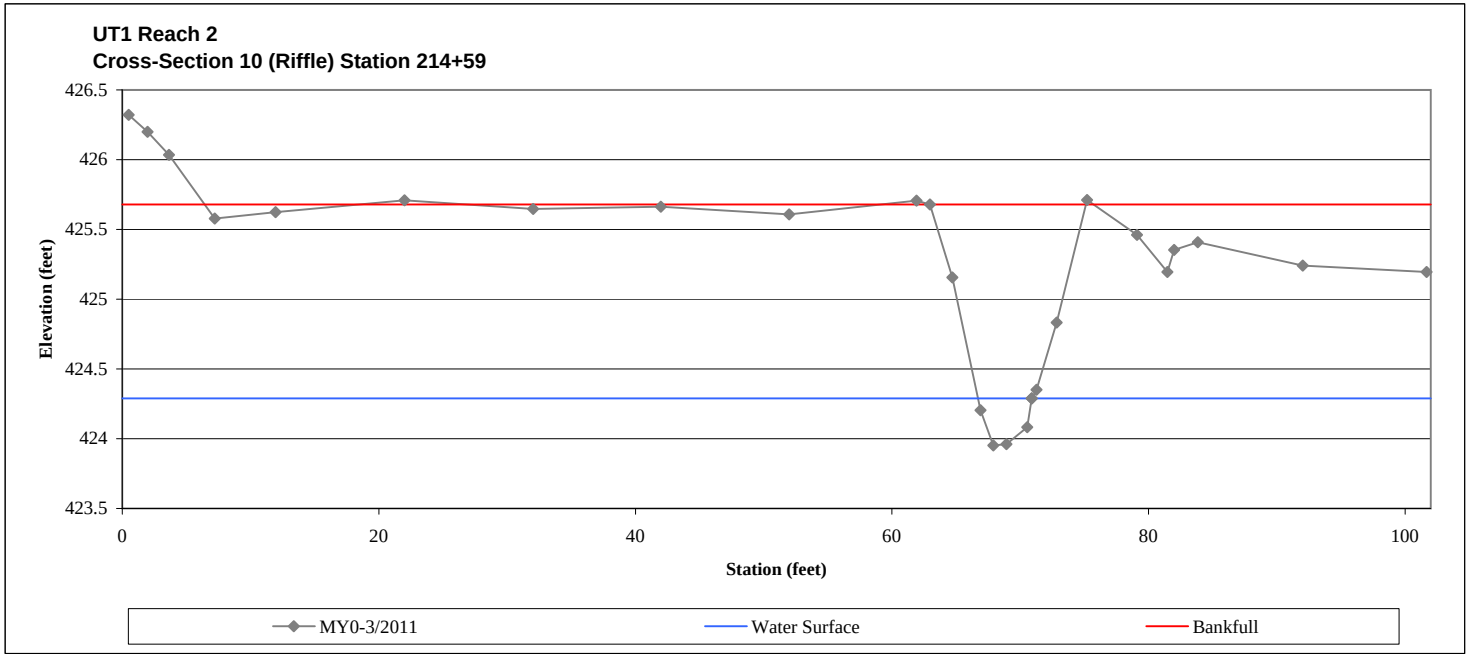
River Basin	Yadkin
Watershed	Rocky River
XS ID	10
Drainage Area	2.5 sq.mi
Date	Apr-11
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	425.68
Bankfull Cross-Sectional Area (ft2)	12.39
Bankfull Width (ft)	12.14
Flood Prone Area Elevation (ft)	427.41
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	1.73
Mean Depth at Bankfull (ft)	1.02
W/D Ratio	11.89
Entrenchment Ratio	n/a
Bank Height Ratio	1.00
Stream Type	C

Cross-Section 10: View Upstream (4/27/2011)

Cross-Section 10: View Downstream (4/27/2011)

Station	Elevation	Station	Elevation
0.50	426.32	83.84	425.41
1.96	426.20	92.02	425.24
3.63	426.03	101.68	425.20
7.21	425.58		
11.95	425.62		
21.99	425.71		
32.03	425.65		
41.97	425.66		
51.98	425.61		
61.92	425.71		
62.97	425.68		
64.71	425.16		
66.90	424.20		
67.91	423.95		
68.92	423.96		
70.54	424.08		
70.89	424.29		
70.89	424.29		
71.27	424.35		
72.85	424.83		
75.20	425.71		
79.09	425.46		
81.47	425.20		
81.99	425.35		



Appendix 2. Morphological Summary Data and Plots
Figure 4k. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2, Cross-Section 11 (Pool)
Monitoring Year 0 of 5

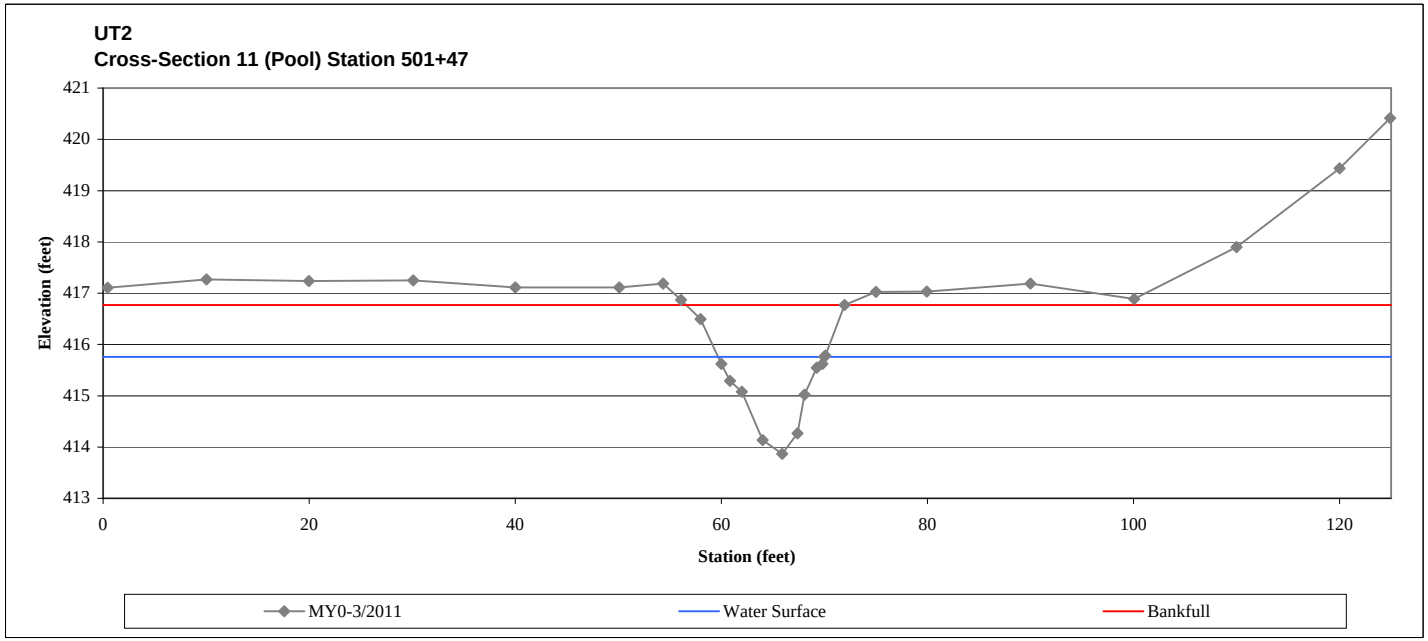
River Basin	Yadkin
Watershed	Rocky River
XS ID	11
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	416.77
Bankfull Cross-Sectional Area (ft2)	23.28
Bankfull Width (ft)	15.38
Flood Prone Area Elevation (ft)	n/a
Flood Prone Width (ft)	n/a
Max Depth at Bankfull (ft)	2.90
Mean Depth at Bankfull (ft)	1.51
W/D Ratio	10.16
Entrenchment Ratio	n/a
Bank Height Ratio	1.00
Stream Type	n/a

Cross-Section 11: View Upstream (4/27/2011)

Cross-Section 11: View Downstream (4/27/2011)

Station	Elevation	Station	Elevation
0.45	417.11	100.07	416.89
10.02	417.27	110.00	417.90
19.98	417.24	119.99	419.44
30.08	417.25	124.90	420.41
39.99	417.11		
50.08	417.11		
54.34	417.19		
56.09	416.87		
57.98	416.50		
59.99	415.62		
60.83	415.29		
62.00	415.08		
64.02	414.14		
65.91	413.87		
67.38	414.26		
68.09	415.02		
69.26	415.54		
69.82	415.62		
69.99	415.76		
70.09	415.78		
71.96	416.77		
75.00	417.03		
79.95	417.03		
90.01	417.19		



Appendix 2. Morphological Summary Data and Plots
Figure 4l. Cross-Section Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2, Cross-Section 12 (Riffle)
Monitoring Year 0 of 5

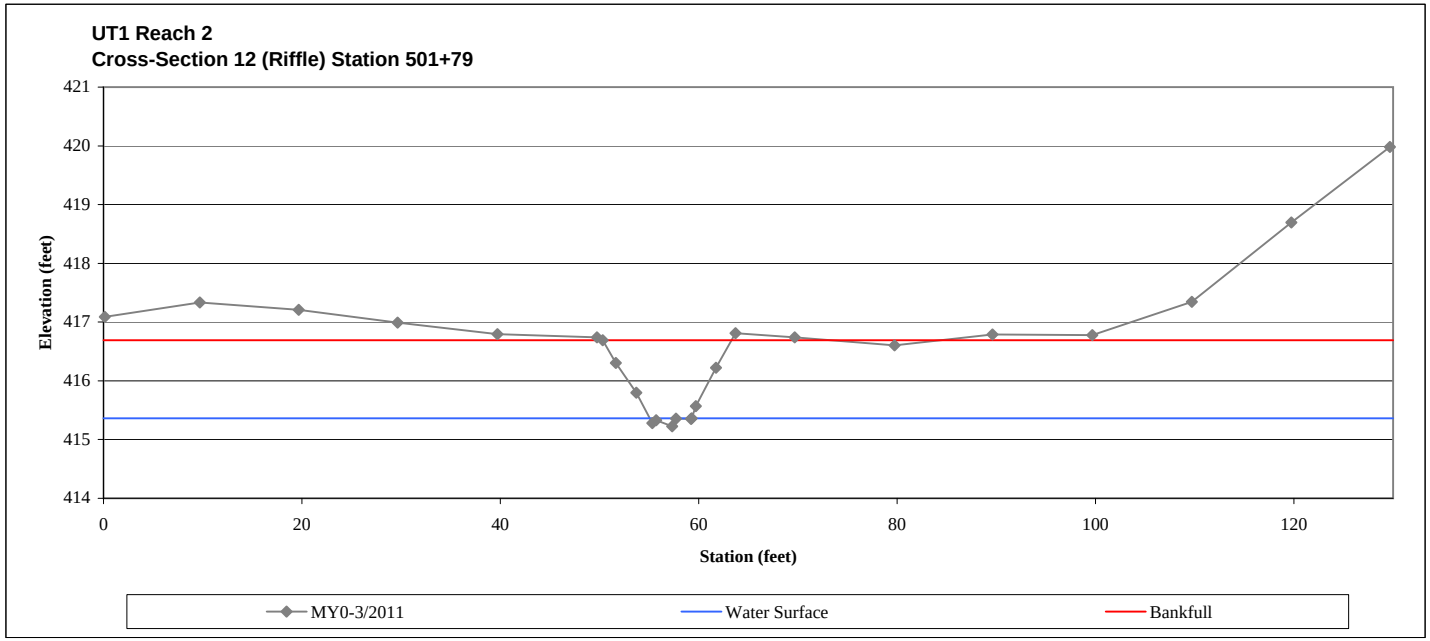
River Basin	Yadkin
Watershed	Rocky River
XS ID	12
Drainage Area	2.5 sq.mi
Date	4/2011
Field Crew	Dewberry

Summary Data	
Bankfull Elevation (ft)	416.69
Bankfull Cross-Sectional Area (ft2)	11.40
Bankfull Width (ft)	12.99
Flood Prone Area Elevation (ft)	418.16
Flood Prone Width (ft)	200+
Max Depth at Bankfull (ft)	1.46
Mean Depth at Bankfull (ft)	0.88
W/D Ratio	14.82
Entrenchment Ratio	2.2+
Bank Height Ratio	1.00
Stream Type	C

Cross-Section 12: View Upstream (4/27/2011)

Cross-Section 12: View Downstream (4/27/2011)

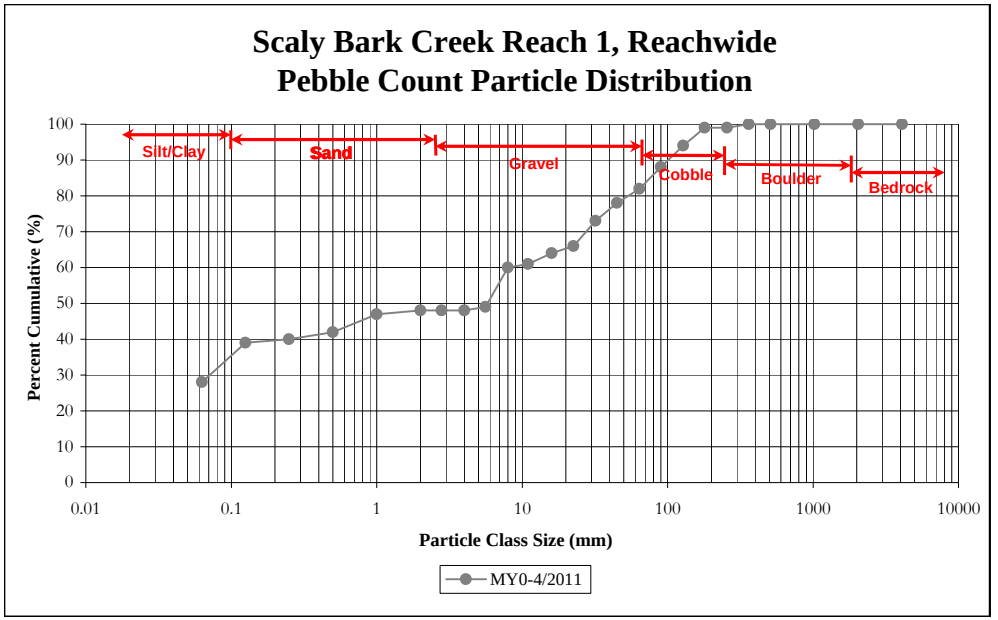
Station	Elevation	Station	Elevation
0.14	417.09	129.68	419.98
9.72	417.34		
19.67	417.21		
29.64	416.99		
39.70	416.80		
49.73	416.74		
50.32	416.69		
51.66	416.31		
53.72	415.80		
55.33	415.28		
55.72	415.33		
57.33	415.23		
57.71	415.36		
59.23	415.35		
59.28	415.36		
59.72	415.57		
61.75	416.23		
63.71	416.81		
69.67	416.74		
79.75	416.61		
89.61	416.79		
99.67	416.78		
109.70	417.34		
119.73	418.70		

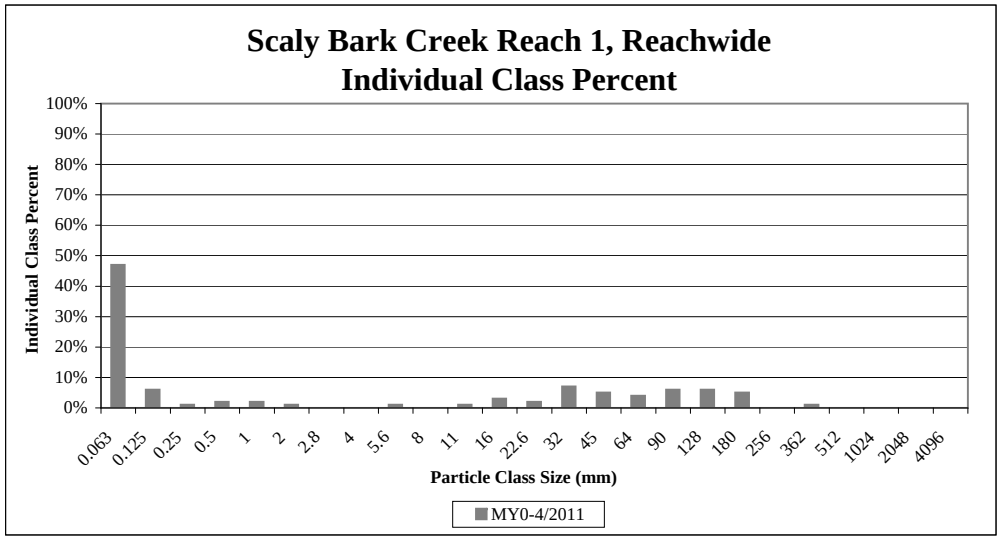


Appendix 2. Morphological Summary Data and Plots
Figure 5a. Reachwide and Cross-Section Pebble Count Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 1, Reachwide
Monitoring Year 0 of 5

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	2	26	28	28	28
SAND	Very fine	0.062	0.125	1	10	11	11	39
	Fine	0.125	0.250		1	1	1	40
	Medium	0.250	0.500	2		2	2	42
	Coarse	0.5	1.0		5	5	5	47
	Very Coarse	1.0	2.0		1	1	1	48
GRAVEL	Very Fine	2.0	2.8					48
	Very Fine	2.8	4.0					48
	Fine	4.0	5.7		1	1	1	49
	Fine	5.7	8.0	5	6	11	11	60
	Medium	8.0	11.3	1		1	1	61
	Medium	11.3	16.0	3		3	3	64
	Coarse	16.0	22.6	2		2	2	66
	Coarse	22.6	32	7		7	7	73
	Very Coarse	32	45	5		5	5	78
	Very Coarse	45	64	4		4	4	82
COBBLE	Small	64	90	6		6	6	88
	Small	90	128	6		6	6	94
	Large	128	180	5		5	5	99
	Large	180	256					99
BOULDER	Small	256	362	1		1	1	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} =	Silt/Clay
D_{50} =	5.78
D_{84} =	71.70
D_{95} =	137.03
D_{100} =	362.00

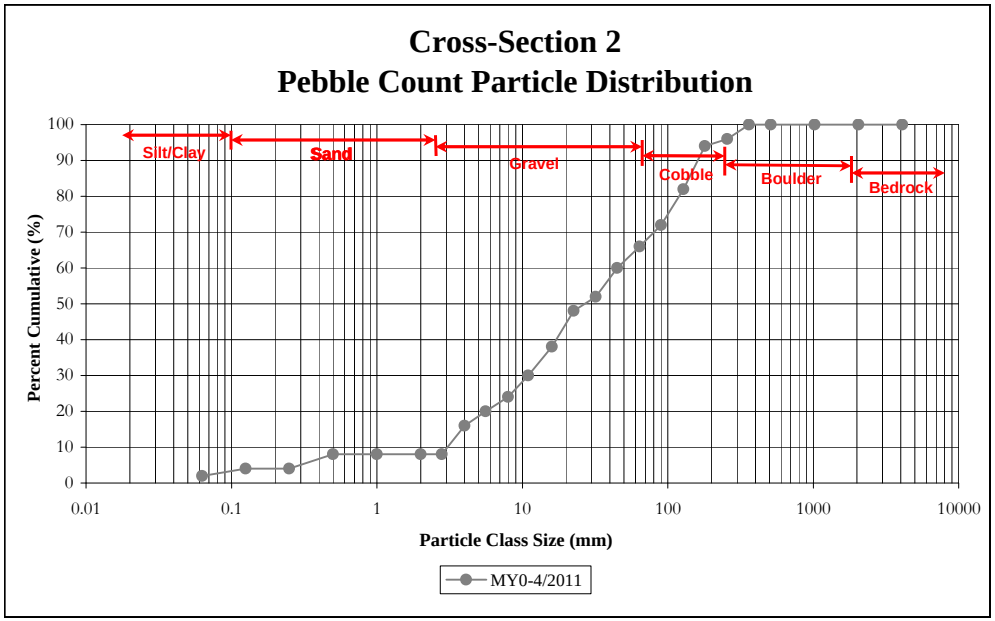


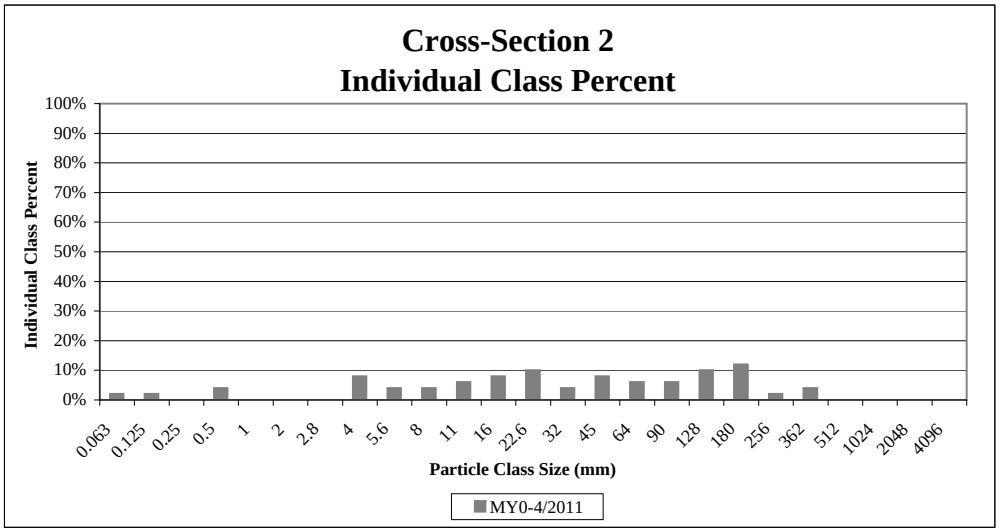


Appendix 2. Morphological Summary Data and Plots
Figure 5b. Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 1, Cross-Section 2 (Riffle)
Monitoring Year 0 of 5

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	2	4
	Fine	0.125	0.250			4
	Medium	0.250	0.500	4	4	8
	Coarse	0.5	1.0			8
	Very Coarse	1.0	2.0			8
GRAVEL	Very Fine	2.0	2.8			8
	Very Fine	2.8	4.0	8	8	16
	Fine	4.0	5.7	4	4	20
	Fine	5.7	8.0	4	4	24
	Medium	8.0	11.3	6	6	30
	Medium	11.3	16.0	8	8	38
	Coarse	16.0	22.6	10	10	48
	Coarse	22.6	32	4	4	52
	Very Coarse	32	45	8	8	60
	Very Coarse	45	64	6	6	66
COBBLE	Small	64	90	6	6	72
	Small	90	128	10	10	82
	Large	128	180	12	12	94
	Large	180	256	2	2	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	**100**	**100**	**100**

Cross-Section 2 Channel materials (mm)	
D_{16} =	4.00
D_{35} =	13.90
D_{50} =	26.89
D_{84} =	135.48
D_{95} =	214.66
D_{100} =	362.00

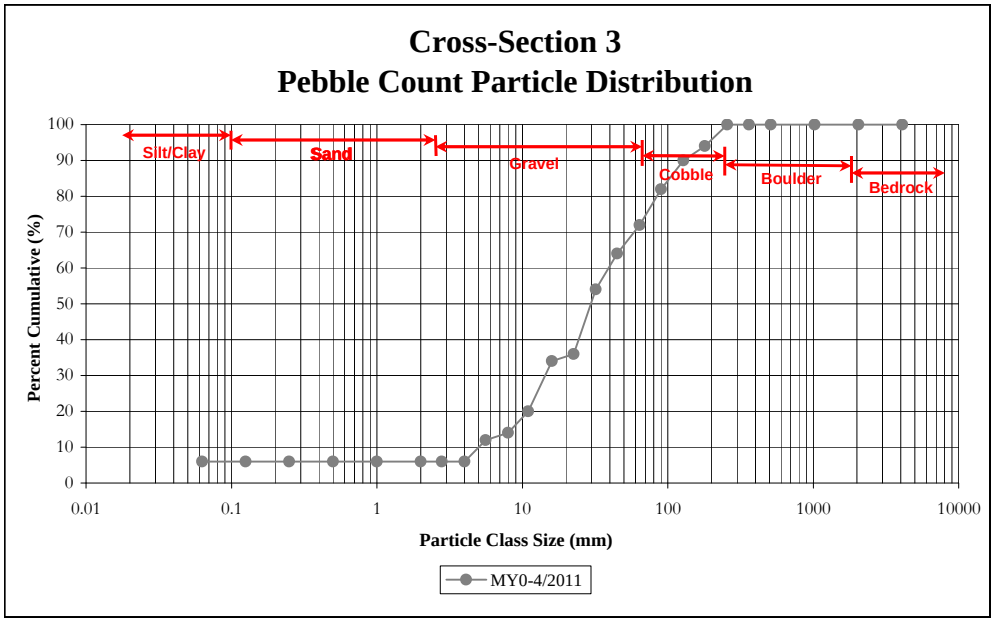


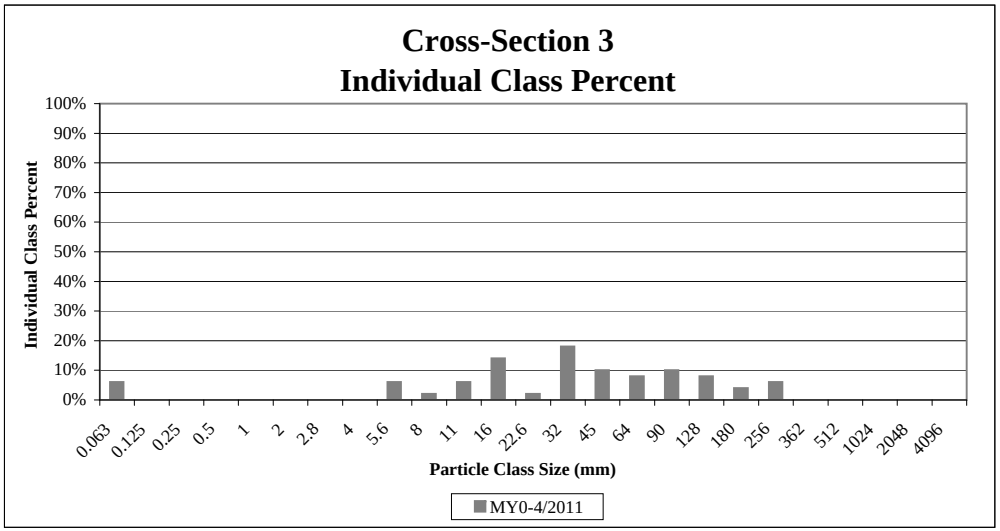


Appendix 2. Morphological Summary Data and Plots
Figure 5c. Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 1, Cross-Section 3 (Riffle)
Monitoring Year 0 of 5

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	6	6	6
SAND	Very fine	0.062	0.125			6
	Fine	0.125	0.250			6
	Medium	0.250	0.500			6
	Coarse	0.5	1.0			6
	Very Coarse	1.0	2.0			6
GRAVEL	Very Fine	2.0	2.8			6
	Very Fine	2.8	4.0			6
	Fine	4.0	5.7	6	6	12
	Fine	5.7	8.0	2	2	14
	Medium	8.0	11.3	6	6	20
	Medium	11.3	16.0	14	14	34
	Coarse	16.0	22.6	2	2	36
	Coarse	22.6	32	18	18	54
	Very Coarse	32	45	10	10	64
	Very Coarse	45	64	8	8	72
COBBLE	Small	64	90	10	10	82
	Small	90	128	8	8	90
	Large	128	180	4	4	94
	Large	180	256	6	6	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 3 Channel materials (mm)	
D_{16} =	8.90
D_{35} =	19.02
D_{50} =	29.62
D_{84} =	98.28
D_{95} =	190.88
D_{100} =	256.00

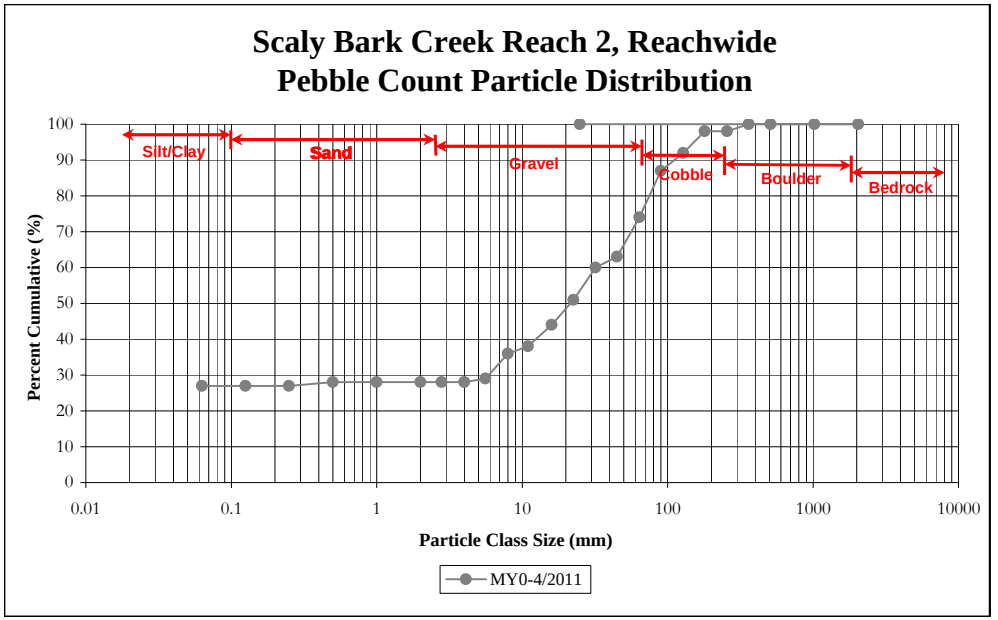


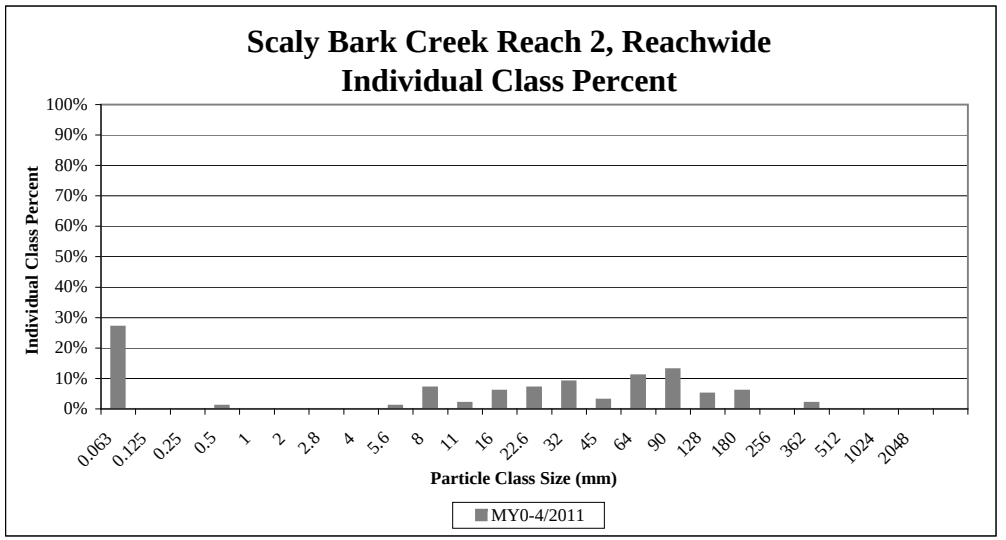


Appendix 2. Morphological Summary Data and Plots
Figure 5d. Reachwide and Cross-Section Pebble Count Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reach 2, Reachwide
Monitoring Year 0 of 5

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	22	27	27	27
SAND	Very fine	0.062	0.125					27
	Fine	0.125	0.250					27
	Medium	0.250	0.500		1	1	1	28
	Coarse	0.5	1.0					28
	Very Coarse	1.0	2.0					28
GRAVEL	Very Fine	2.0	2.8					28
	Very Fine	2.8	4.0					28
	Fine	4.0	5.7		1	1	1	29
	Fine	5.7	8.0	1	6	7	7	36
	Medium	8.0	11.3		2	2	2	38
	Medium	11.3	16.0	2	4	6	6	44
	Coarse	16.0	22.6	2	5	7	7	51
	Coarse	22.6	32	6	3	9	9	60
	Very Coarse	32	45	3		3	3	63
	Very Coarse	45	64	8	3	11	11	74
COBBLE	Small	64	90	10	3	13	13	87
	Small	90	128	5		5	5	92
	Large	128	180	6		6	6	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} =	Silt/Clay
D_{35} =	7.60
D_{50} =	21.51
D_{84} =	83.19
D_{95} =	151.79
D_{100} =	362

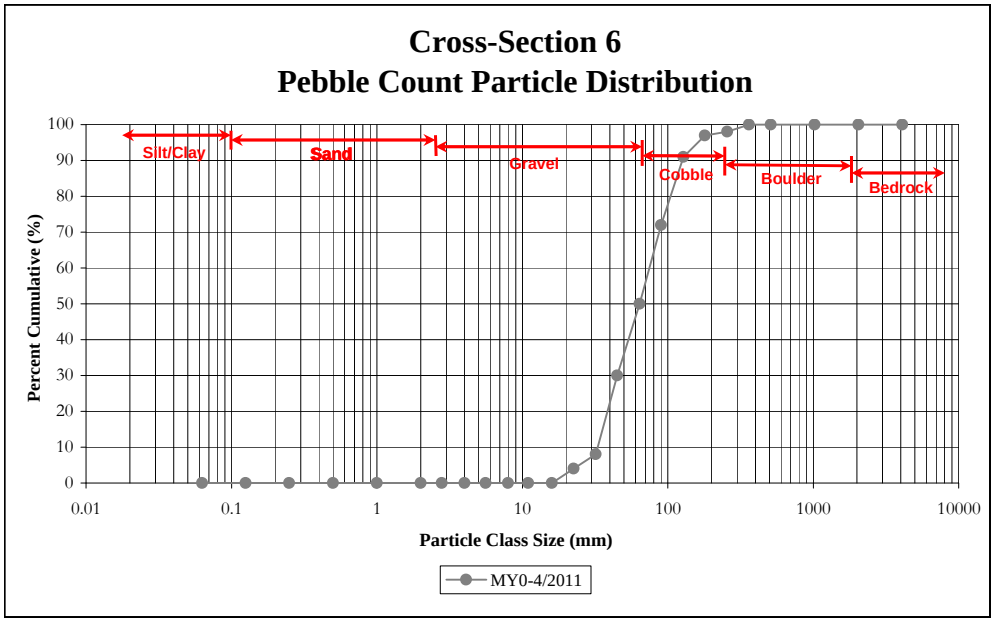


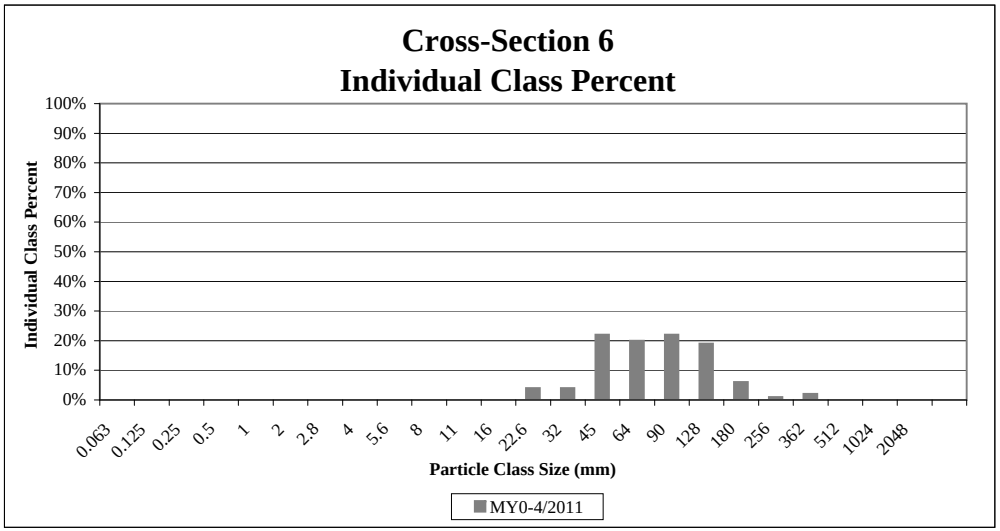


Appendix 2. Morphological Summary Data and Plots
Figure 5e. Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 6 (Riffle)
Monitoring Year 0 of 5

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			0
	Fine	5.7	8.0			0
	Medium	8.0	11.3			0
	Medium	11.3	16.0	4	4	4
	Coarse	16.0	22.6	4	4	8
	Coarse	22.6	32	22	22	30
	Very Coarse	32	45	20	20	50
	Very Coarse	45	64	22	22	72
COBBLE	Small	64	90	19	19	91
	Small	90	128	6	6	97
	Large	128	180	1	1	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 6	
Channel materials (mm)	
D_{16} =	25.65
D_{35} =	34.85
D_{50} =	45.00
D_{84} =	79.38
D_{95} =	113.82
D_{100} =	256.00

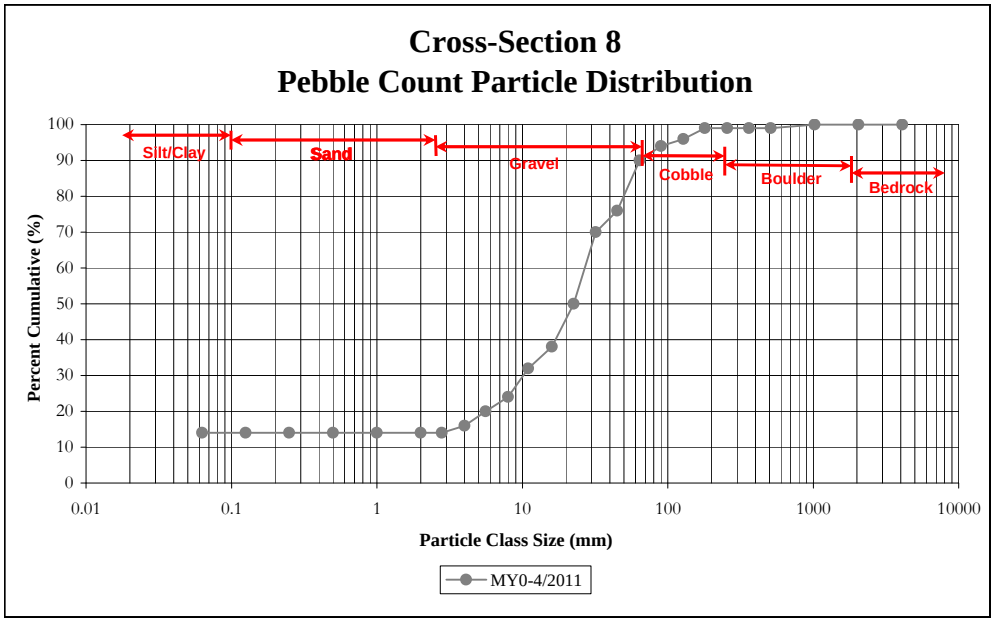


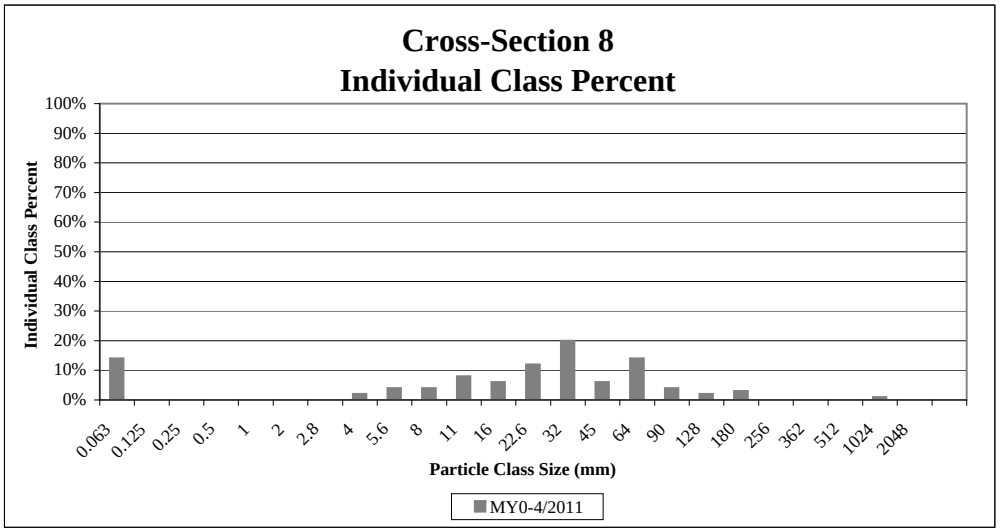


Appendix 2. Morphological Summary Data and Plots
Figure 5f. Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Reach 2, Cross-Section 8 (Riffle)
Monitoring Year 0 of 5

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	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			14
GRAVEL	Very Fine	2.0	2.8			14
	Very Fine	2.8	4.0	2	2	16
	Fine	4.0	5.7	4	4	20
	Fine	5.7	8.0	4	4	24
	Medium	8.0	11.3	8	8	32
	Medium	11.3	16.0	6	6	38
	Coarse	16.0	22.6	12	12	50
	Coarse	22.6	32	20	20	70
	Very Coarse	32	45	6	6	76
	Very Coarse	45	64	14	14	90
COBBLE	Small	64	90	4	4	94
	Small	90	128	2	2	96
	Large	128	180	3	3	99
	Large	180	256			99
BOULDER	Small	256	362			99
	Small	362	512			99
	Medium	512	1024	1	1	100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 8	
Channel materials (mm)	
D_{16} =	4.00
D_{35} =	13.27
D_{50} =	22.60
D_{84} =	55.03
D_{95} =	107.33
D_{100} =	1024.00

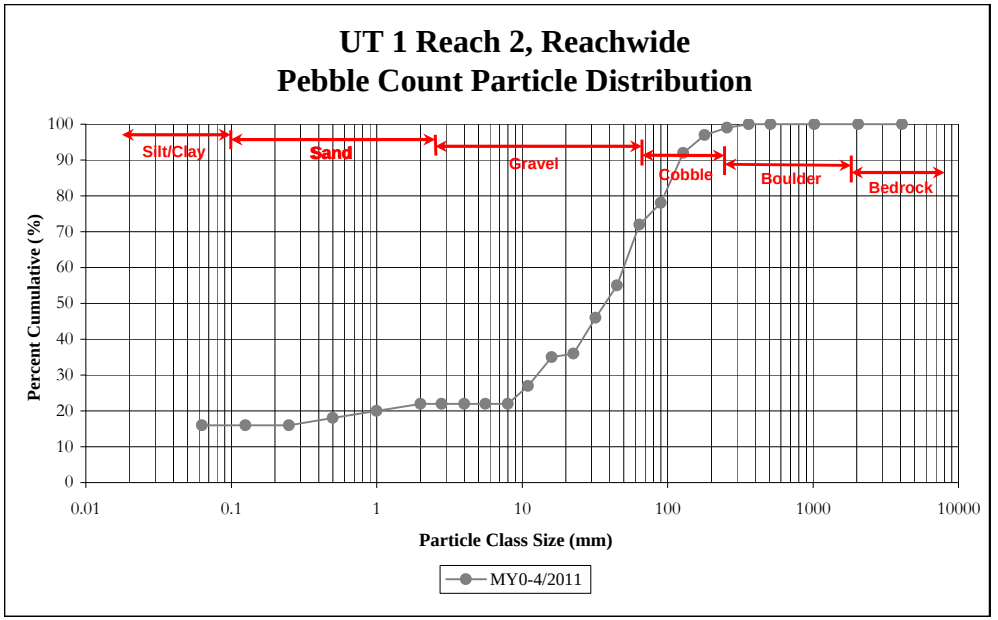


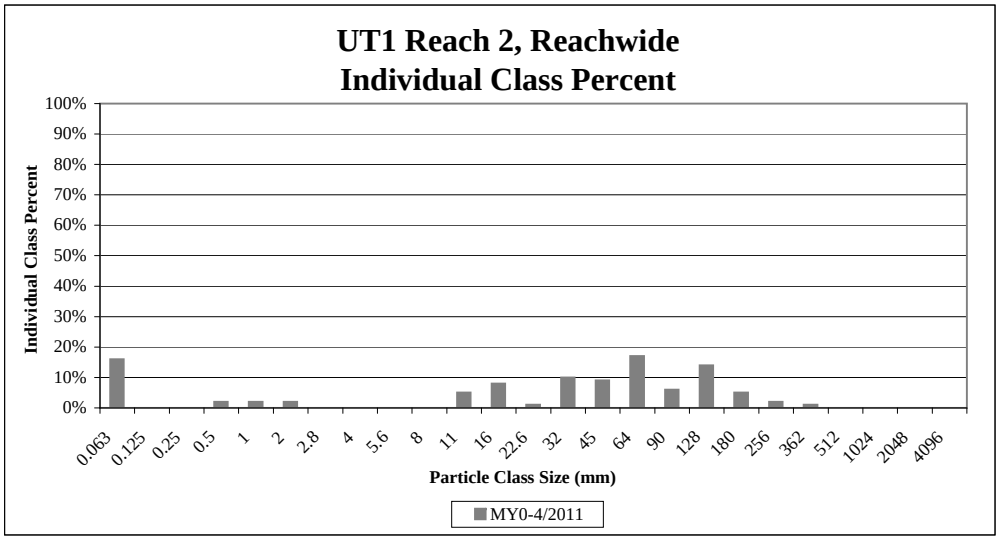


Appendix 2. Morphological Summary Data and Plots
Figure 5g. Reachwide and Cross-Section Pebble Count Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2, Reachwide
Monitoring Year 0 of 5

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		16	16	16	16
SAND	Very fine	0.062	0.125					16
	Fine	0.125	0.250					16
	Medium	0.250	0.500		2	2	2	18
	Coarse	0.5	1.0		2	2	2	20
	Very Coarse	1.0	2.0		2	2	2	22
GRAVEL	Very Fine	2.0	2.8					22
	Very Fine	2.8	4.0					22
	Fine	4.0	5.7					22
	Fine	5.7	8.0					22
	Medium	8.0	11.3		5	5	5	27
	Medium	11.3	16.0	1	7	8	8	35
	Coarse	16.0	22.6		1	1	1	36
	Coarse	22.6	32	6	4	10	10	46
	Very Coarse	32	45	4	5	9	9	55
	Very Coarse	45	64	15	2	17	17	72
COBBLE	Small	64	90	4	2	6	6	78
	Small	90	128	12	2	14	14	92
	Large	128	180	5		5	5	97
	Large	180	256	2		2	2	99
BOULDER	Small	256	362	1		1	1	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**

Cross-Section 10	
Channel materials (mm)	
D_{16} =	0.25
D_{35} =	16.00
D_{50} =	37.24
D_{84} =	104.66
D_{95} =	157.05
D_{100} =	362

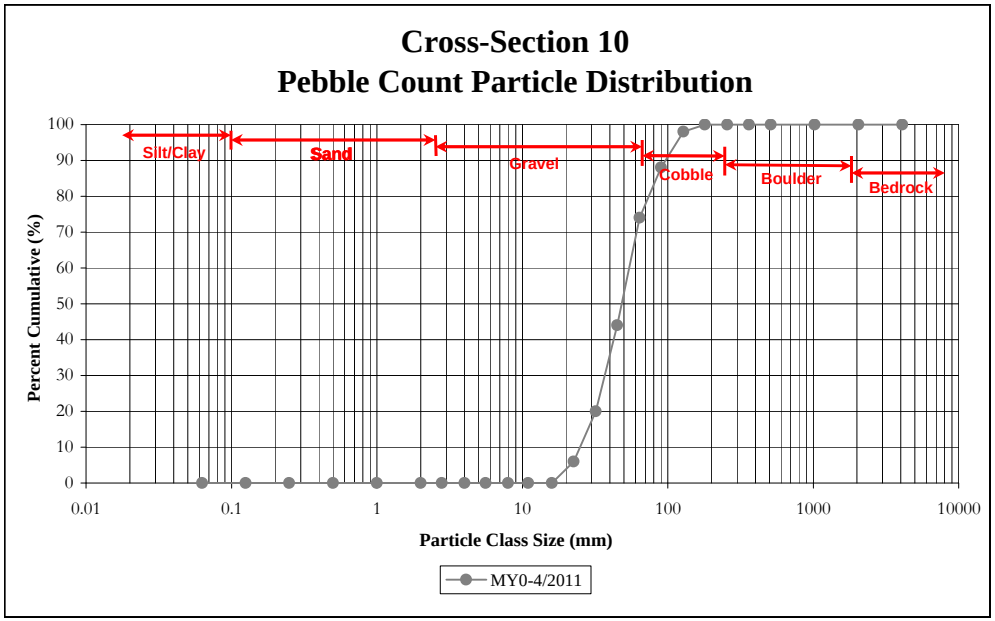


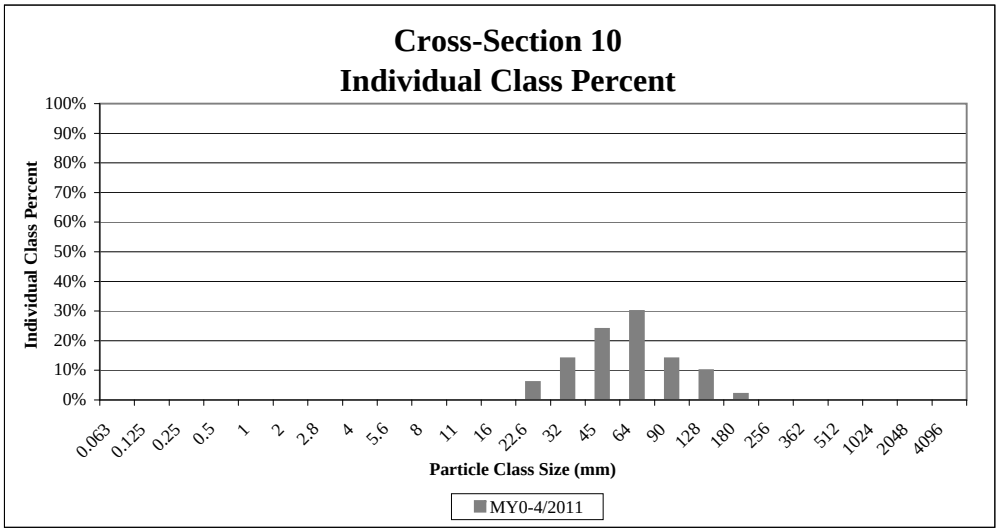


Appendix 2. Morphological Summary Data and Plots
Figure 5h. Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1 Reach 2, Cross-Section 10 (Riffle)
Monitoring Year 0 of 5

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			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			0
	Fine	5.7	8.0			0
	Medium	8.0	11.3			0
	Medium	11.3	16.0			0
	Coarse	16.0	22.6	6	6	6
	Coarse	22.6	32	14	14	20
	Very Coarse	32	45	24	24	44
	Very Coarse	45	64	30	30	74
COBBLE	Small	64	90	14	14	88
	Small	90	128	10	10	98
	Large	128	180	2	2	100
	Large	180	256			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 10 Channel materials (mm)	
D_{16} =	28.97
D_{35} =	39.60
D_{50} =	48.28
D_{84} =	81.65
D_{95} =	115.16
D_{100} =	180.00

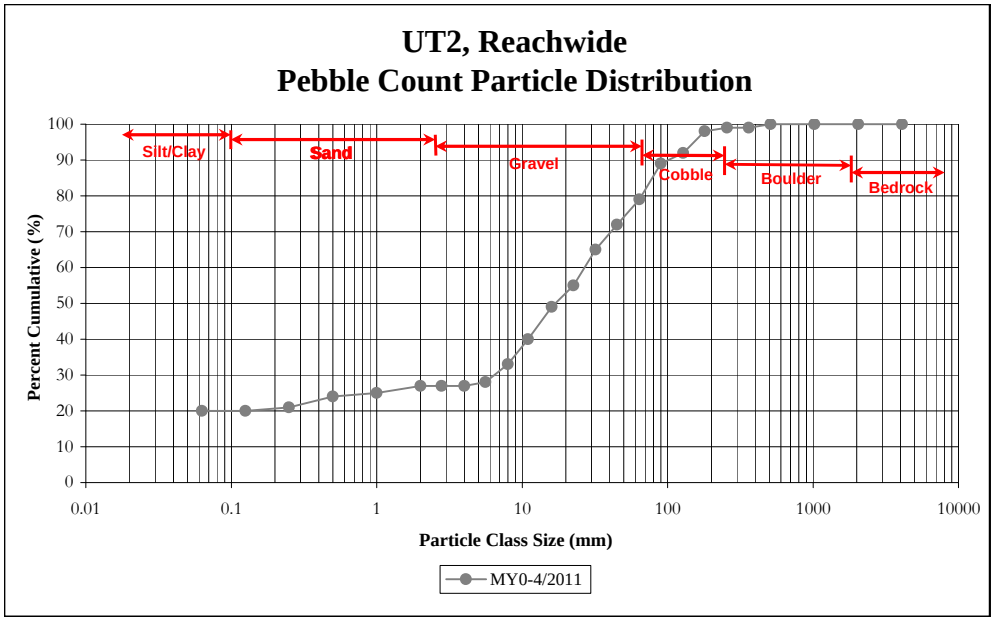


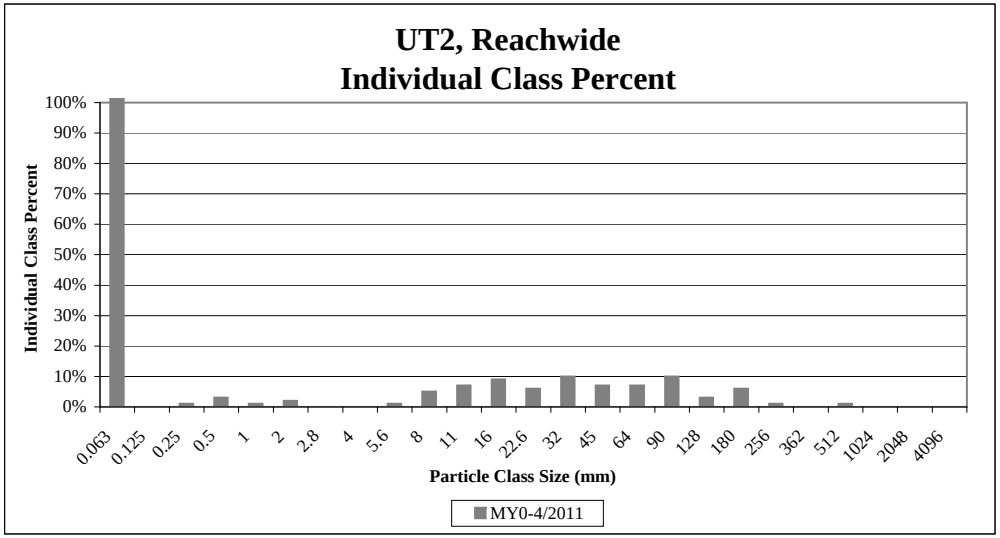


Appendix 2. Morphological Summary Data and Plots
Figure 5i. Reachwide and Cross-Section Pebble Count Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2, Reachwide
Monitoring Year 0 of 5

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		20	20	20	20
SAND	Very fine	0.062	0.125					20
	Fine	0.125	0.250		1	1	1	21
	Medium	0.250	0.500		3	3	3	24
	Coarse	0.5	1.0		1	1	1	25
	Very Coarse	1.0	2.0	2		2	2	27
GRAVEL	Very Fine	2.0	2.8					27
	Very Fine	2.8	4.0					27
	Fine	4.0	5.7		1	1	1	28
	Fine	5.7	8.0	1	4	5	5	33
	Medium	8.0	11.3	2	5	7	7	40
	Medium	11.3	16.0	2	7	9	9	49
	Coarse	16.0	22.6	1	5	6	6	55
	Coarse	22.6	32	8	2	10	10	65
	Very Coarse	32	45	7		7	7	72
	Very Coarse	45	64	6	1	7	7	79
COBBLE	Small	64	90	10		10	10	89
	Small	90	128	3		3	3	92
	Large	128	180	6		6	6	98
	Large	180	256	1		1	1	99
BOULDER	Small	256	362					99
	Small	362	512	1		1	1	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} =	8.76
D_{50} =	16.95
D_{84} =	75.89
D_{95} =	151.79
D_{100} =	512

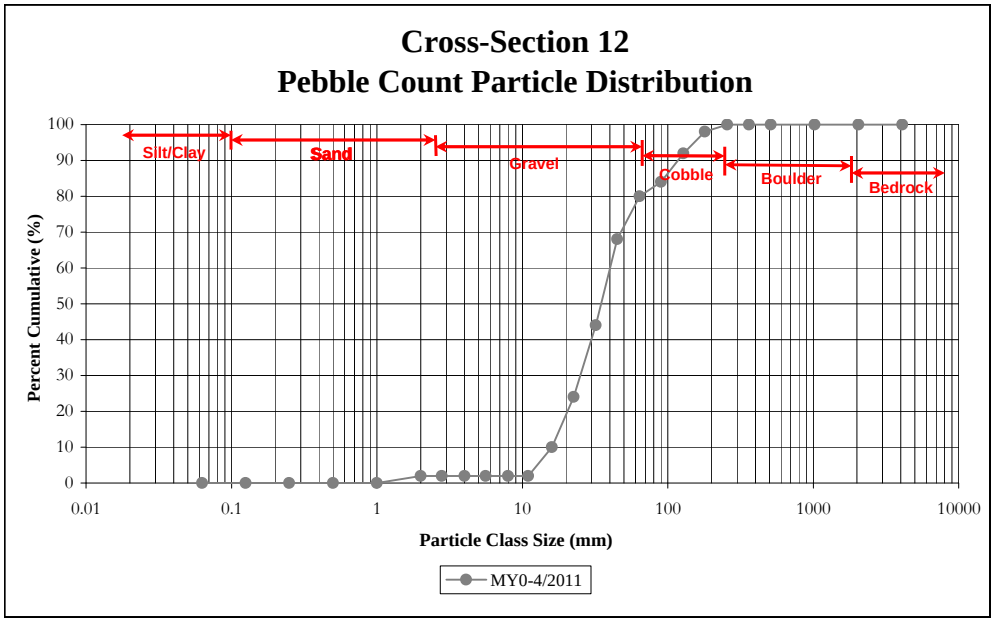


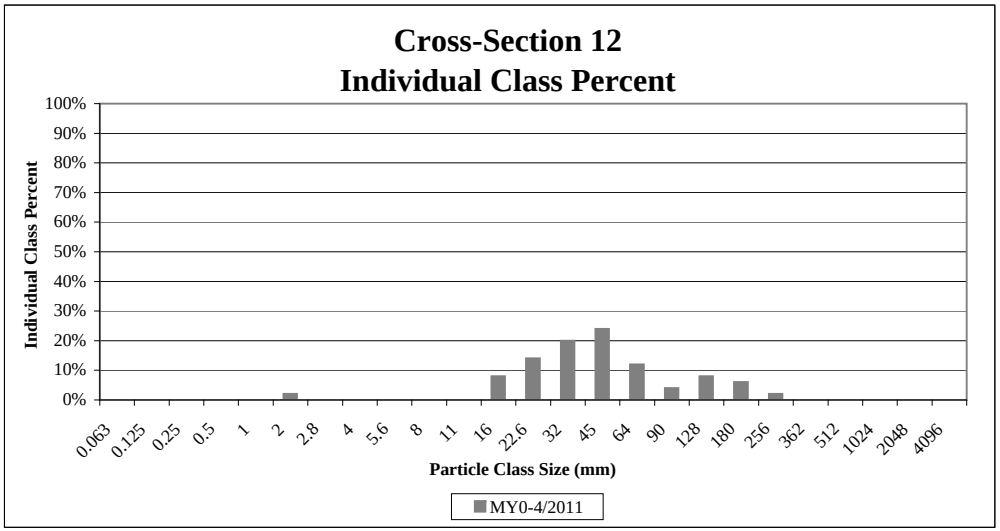


Appendix 2. Morphological Summary Data and Plots
Figure 5j. Reachwide and Cross-Section Substrate Plots
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2, Cross-Section 12 (Riffle)
Monitoring Year 0 of 5

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			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	2	2	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
	Medium	11.3	16.0	8	8	10
	Coarse	16.0	22.6	14	14	24
	Coarse	22.6	32	20	20	44
	Very Coarse	32	45	24	24	68
	Very Coarse	45	64	12	12	80
COBBLE	Small	64	90	4	4	84
	Small	90	128	8	8	92
	Large	128	180	6	6	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 12	
Channel materials (mm)	
D_{16} =	18.55
D_{35} =	27.36
D_{50} =	34.85
D_{84} =	90.00
D_{95} =	151.79
D_{100} =	256.00





Stream Photographs

Photo Point 1 – looking upstream (04/27/2011)

Photo Point 1 – looking downstream (04/27/2011)

Photo Point 2 – looking upstream (04/27/2011)

Photo Point 2 – looking downstream (04/27/2011)

Photo Point 3 – looking upstream (04/27/2011)

Photo Point 3 – looking downstream (04/27/2011)

Photo Point 4 – looking upstream (04/27/2011)

Photo Point 4 – looking downstream (04/27/2011)

Photo Point 5 – looking upstream (04/27/2011)

Photo Point 5 – looking downstream (04/27/2011)

Photo Point 6 – looking upstream (04/27/2011)

Photo Point 6 – looking downstream (04/27/2011)

Photo Point 7 – looking upstream (04/27/2011)

Photo Point 7 – looking downstream (04/27/2011)

Photo Point 8 – looking upstream (04/27/2011)

Photo Point 8 – looking downstream (04/27/2011)

Photo Point 9 – looking upstream (04/27/2011)

Photo Point 9 – looking downstream (04/27/2011)

Photo Point 10 – looking upstream (04/27/2011)

Photo Point 10 – looking downstream (04/27/2011)

Photo Point 11 – looking upstream (04/27/2011)

Photo Point 11 – looking downstream (04/27/2011)

Photo Point 12 – looking upstream (04/27/2011)

Photo Point 12 – looking downstream (04/27/2011)

Photo Point 13 – looking upstream (04/27/2011)

Photo Point 13 – looking downstream (04/27/2011)

Photo Point 14 – looking upstream (04/27/2011)

Photo Point 14 – looking downstream (04/27/2011)

Photo Point 15 – looking upstream (04/27/2011)

Photo Point 15 – looking downstream (04/27/2011)

Photo Point 16 – looking upstream (04/27/2011)

Photo Point 16 – looking downstream (04/27/2011)

Photo Point 17 – looking upstream (04/27/2011)

Photo Point 17 – looking downstream (04/27/2011)

Photo Point 18 – looking upstream (04/27/2011)

Photo Point 18 – looking downstream (04/27/2011)

	
Photo Point 19 – looking upstream (04/27/2011)	Photo Point 19 – looking downstream (04/27/2011)
	
Photo Point 20 – looking upstream (04/27/2011)	Photo Point 20 – looking downstream (04/27/2011)
	
Photo Point 21 – looking upstream (04/27/2011)	Photo Point 21 – looking downstream (04/27/2011)

	
Photo Point 22 – looking upstream (04/19/2011)	Photo Point 22 – looking downstream (04/19/2011)
	
Photo Point 23 – looking upstream (04/19/2011)	Photo Point 23 – looking downstream (04/19/2011)
	
Photo Point 24 – looking upstream (04/19/2011)	Photo Point 24 – looking downstream (04/19/2011)

	
Photo Point 25 – looking upstream (04/19/2011)	Photo Point 25 – looking downstream (04/19/2011)
	
Photo Point 26 – looking upstream (04/19/2011)	Photo Point 26 – looking downstream (04/19/2011)
	
Photo Point 27 – looking upstream (04/19/2011)	Photo Point 27 – looking downstream (04/19/2011)

	
Photo Point 28 – looking upstream (04/19/2011)	Photo Point 28 – looking downstream (04/19/2011)
	
Photo Point 29 – looking upstream (04/19/2011)	Photo Point 29 – looking downstream (04/19/2011)
	
Photo Point 30 – looking upstream (04/19/2011)	Photo Point 30 – looking downstream (04/19/2011)

	
Photo Point 31 – looking upstream (04/19/2011)	Photo Point 31 – looking downstream (04/19/2011)
	
Photo Point 32 – looking upstream (04/19/2011)	Photo Point 32 – looking downstream (04/19/2011)
	
Photo Point 33 – looking upstream (04/19/2011)	Photo Point 33 – looking downstream (04/19/2011)

	
Photo Point 34 – looking upstream (04/19/2011)	Photo Point 34 – looking downstream (04/19/2011)
	
Photo Point 35 – looking upstream (04/19/2011)	Photo Point 35 – looking downstream (04/19/2011)
	
Photo Point 36 – looking upstream (04/19/2011)	Photo Point 36 – looking downstream (04/19/2011)

	
Photo Point 37 – looking upstream (04/19/2011)	Photo Point 37 – looking downstream (04/19/2011)
	
Photo Point 38 – looking upstream (04/19/2011)	Photo Point 38 – looking downstream (04/19/2011)
	
Photo Point 39 – looking upstream (04/27/2011)	Photo Point 39 – looking downstream (04/27/2011)

Photo Point 40 – looking upstream (04/27/2011)

Photo Point 40 – looking downstream (04/27/2011)

Photo Point 41 – looking upstream (04/27/2011)

Photo Point 41 – looking downstream (04/27/2011)

Photo Point 42 – looking upstream (04/27/2011)

Photo Point 42 – looking downstream (04/27/2011)

	
Photo Point 43 – looking upstream (04/27/2011)	Photo Point 43 – looking downstream (04/27/2011)
	
Photo Point 44 – looking upstream (04/27/2011)	Photo Point 44 – looking downstream (04/27/2011)
	
Photo Point 45 – looking upstream (04/27/2011)	Photo Point 45 – looking downstream (04/27/2011)

	
Photo Point 46 – looking upstream (04/27/2011)	Photo Point 46 – looking downstream (04/27/2011)

APPENDIX 3. Vegetation Plot Data

Appendix 3. Vegetation Assessment
Table 7a. Planted and Total Stem Counts (Species by Plot with Annual Means)
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Scaly Bark Creek Reaches 1 and 2
Monitoring Year 0 of 5

			Current Data (MY0-4/2011)																		Annual Means	
			Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9		Current Mean	
Species	**Common Name**	**Type**	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
Acer floridanum	Southern Sugar Maple	T	3	3	3	3	2	2	3	3	3	3	1	1	2	2	5	5	3	3	**2.78**	**2.78**
Alnus serrulata	Tag Alder	T/S	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	**0.11**	**0.11**
Betula nigra	River Birch	T	1	1	2	2	2	2	1	1	1	1	0	0	3	3	1	1	1	1	**1.33**	**1.33**
Carya sp.	Hickory	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
Carya cordiformis	Bitternut Hickory	T	1	1	0	0	0	0	0	0	0	0	1	1	3	3	2	2	0	0	**0.78**	**0.78**
Carya ovata	Shagbark Hickory	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	**0.22**	**0.22**
Celtis occidentalis	Hackberry	T/S	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	**0.22**	**0.22**
Cornus sp.	Dogwood	S	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.22**	**0.22**
Cornus amomum	Silky Dogwood	S	1	1	1	1	2	2	0	0	1	1	1	1	1	1	0	0	2	2	**1.00**	**1.00**
Cornus florida	Flowering Dogwood	T/S	2	2	4	4	2	2	5	5	4	4	2	2	1	1	2	2	2	2	**2.67**	**2.67**
Ilex opaca	American Holly	T/S	2	2	2	2	0	0	2	2	2	2	2	2	1	1	4	4	3	3	**2.00**	**2.00**
Liquidambar styraciflua	Sweet Gm	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
Liriodendron tulipifera	Tulip Poplar	T	6	6	6	6	4	4	3	3	5	5	4	4	0	0	0	0	0	0	**3.11**	**3.11**
Platanus occidentalis	Sycamore	T	0	0	1	1	2	2	0	0	1	1	1	1	0	0	0	0	1	1	**0.67**	**0.67**
Quercus michauxii	Swamp Chestnut Oak	T	2	2	4	4	6	6	8	8	4	4	0	0	2	2	1	1	0	0	**3.00**	**3.00**
Unknown sp.	Unknown		3	3	0	0	0	0	0	0	0	0	3	3	1	1	1	1	0	0	**0.89**	**0.89**
Plot Area (acres)			**0.0247**																			
Species Count			**10**	**10**	**8**	**8**	**7**	**7**	**6**	**6**	**9**	**9**	**9**	**9**	**9**	**9**	**7**	**7**	**7**	**7**	**8**	**8**
Stem Count			**23**	**23**	**23**	**23**	**20**	**20**	**22**	**22**	**22**	**22**	**16**	**16**	**15**	**15**	**16**	**16**	**14**	**14**	**19**	**19**
Stems per Acre			**931**	**931**	**931**	**931**	**810**	**810**	**891**	**891**	**891**	**891**	**648**	**648**	**607**	**607**	**648**	**648**	**567**	**567**	**769**	**769**

Type=**S**hrub or **T**ree
P = Planted
T = Total

Appendix 3. Vegetation Assessment
Table 7b. Planted and Total Stem Counts (Species by Plot with Annual Means)
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT1, UT1a, UT1b
Monitoring Year 0 of 5

			Current Data (MY0-3/2011)																								Annual Means	
			Plot 10		Plot 11		Plot 12		Plot 13		Plot 14		Plot 15		Plot 16		Plot 17		Plot 18		Plot 19		Plot 20		Plot 21		Current Mean	
Species	**Common Name**	**Type**	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
Acer floridanum	Southern Sugar Maple	T	4	4	4	4	4	4	5	5	3	3	3	3	4	4	4	4	11	11	5	5	4	4	4	4	**4.58**	**4.58**
Alnus serrulata	Tag Alder	T/S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
Betula nigra	River Birch	T	0	0	0	0	0	0	0	0	4	4	3	3	1	1	1	1	0	0	0	0	0	0	0	0	**0.75**	**0.75**
Carya sp.	Hickory	T	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	**0.25**	**0.25**
Carya cordiformis	Bitternut Hickory	T	1	1	1	1	1	1	1	1	0	0	2	2	1	1	1	1	0	0	0	0	1	1	1	1	**0.83**	**0.83**
Carya ovata	Shagbark Hickory	T	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1	**0.67**	**0.67**
Celtis occidentalis	Hackberry	T/S	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	**0.50**	**0.50**
Cornus sp.	Dogwood	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
Cornus amomum	Silky Dogwood	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
Cornus florida	Flowering Dogwood	T/S	5	5	6	6	5	5	5	5	3	3	5	5	6	6	6	6	5	5	10	10	4	4	6	6	**5.50**	**5.50**
Ilex opaca	American Holly	T/S	4	4	3	3	4	4	4	4	2	2	2	2	4	4	4	4	5	5	5	5	4	4	3	3	**3.67**	**3.67**
Liquidambar styraciflua	Sweet Gm	T	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.08**	**0.08**
Liriodendron tulipifera	Tulip Poplar	T	6	6	6	6	7	7	8	8	6	6	6	6	6	6	6	6	0	0	1	1	5	5	6	6	**5.25**	**5.25**
Platanus occidentalis	Sycamore	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
Quercus michauxii	Swamp Chestnut Oak	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
Unknown sp.	Unknown		0	0	0	0	0	0	0	0	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	**0.25**	**0.25**
Plot Area (acres)			**0.0247**																									
Species Count			**8**	**8**	**7**	**7**	**7**	**7**	**6**	**6**	**7**	**7**	**9**	**9**	**7**	**7**	**7**	**7**	**3**	**3**	**6**	**6**	**6**	**6**	**7**	**7**	**7**	**7**
Stem Count			**23**	**23**	**22**	**22**	**23**	**23**	**24**	**24**	**21**	**21**	**24**	**24**	**23**	**23**	**23**	**23**	**21**	**21**	**23**	**23**	**19**	**19**	**22**	**22**	**22**	**22**
Stems per Acre			**931**	**931**	**891**	**891**	**931**	**931**	**972**	**972**	**850**	**850**	**972**	**972**	**931**	**931**	**931**	**931**	**850**	**850**	**931**	**931**	**769**	**769**	**891**	**891**	**904**	**904**

Type=**S**hrub or **T**ree
P = Planted
T = Total

Appendix 3. Vegetation Assessment
Table 7c. Planted and Total Stem Counts (Species by Plot with Annual Means)
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
UT2, UT3, UT4
Monitoring Year 0 of 5

			Current Data (MY0-4/2011)																Annual Means	
			Plot 22		Plot 23		Plot 24		Plot 25		Plot 26		Plot 27		Plot 28		Plot 29		Current Mean	
Species	**Common Name**	**Type**	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
Acer floridanum	Southern Sugar Maple	T	2	2	1	1	6	6	4	4	2	2	3	3	3	3	3	3	**3.00**	**3.00**
Alnus serrulata	Tag Alder	T/S	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	**0.50**	**0.50**
Betula nigra	River Birch	T	3	3	3	3	0	0	0	0	4	4	0	0	1	1	0	0	**1.38**	**1.38**
Carya sp.	Hickory	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
Carya cordiformis	Bitternut Hickory	T	0	0	0	0	1	1	1	1	0	0	0	0	2	2	4	4	**1.00**	**1.00**
Carya ovata	Shagbark Hickory	T	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	**0.25**	**0.25**
Celtis occidentalis	Hackberry	T/S	0	0	0	0	0	0	0	0	3	3	0	0	1	1	0	0	**0.50**	**0.50**
Cornus sp.	Dogwood	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
Cornus amomum	Silky Dogwood	S	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.25**	**0.25**
Cornus florida	Flowering Dogwood	T/S	3	3	0	0	5	5	7	7	1	1	9	9	2	2	3	3	**3.75**	**3.75**
Ilex opaca	American Holly	T/S	2	2	2	2	4	4	4	4	4	4	3	3	4	4	6	6	**3.63**	**3.63**
Liquidambar styraciflua	Sweet Gm	T	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	**0.13**	**0.13**
Liriodendron tulipifera	Tulip Poplar	T	4	4	2	2	4	4	4	4	1	1	0	0	1	1	0	0	**2.00**	**2.00**
Platanus occidentalis	Sycamore	T	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	**0.13**	**0.13**
Quercus michauxii	Swamp Chestnut Oak	T	4	4	3	3	0	0	0	0	0	0	0	0	0	0	0	0	**0.88**	**0.88**
Unknown sp.	Unknown		0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	**0.25**	**0.25**
Plot Area (acres)			**0.0247**																	
Species Count			**8**	**8**	**8**	**8**	**6**	**6**	**6**	**6**	**7**	**7**	**3**	**3**	**8**	**8**	**4**	**4**	**6**	**6**
Stem Count			**22**	**22**	**15**	**15**	**21**	**21**	**21**	**21**	**16**	**16**	**15**	**15**	**15**	**15**	**16**	**16**	**18**	**18**
Stems per Acre			**891**	**891**	**607**	**607**	**850**	**850**	**850**	**850**	**648**	**648**	**607**	**607**	**607**	**607**	**648**	**648**	**714**	**714**

Type=**S**hrub or **T**ree
P = Planted
T = Total

Appendix 3. Vegetation Assessment
Table 8. CVS Vegetation Tables - Metadata
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Monitoring Year 0 of 5

Report Prepared By	Kirsten Gimbert
Date Prepared	*5/2/2011 9:30*
database name	*CVS_EEP_DataEntry_v204.mdb*
database location	*Q:\ActiveProjects\005-02122 Scaly Bark Creek Mitigation Project\Monitoring\Baseline Monitoring\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.*
Vigor	*Frequency distribution of vigor classes.*
Vigor by Spp	*Frequency distribution of vigor classes listed by species.*
Damage	*List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.*
Damage by Spp	*Damage values tallied by type for each species.*
Damage by Plot	*Damage values tallied by type for each plot.*
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

Appendix 3. Vegetation Assessment
Table 9. CVS Vegetation Tables - Vigor by Species
Scaly Bark Creek Stream Restoration (EEP Project No. 94148)
Monitoring Year 0 of 5

	Species	**4**	**3**	**2**	**1**	**0**	**Missing**
	Acer floridanum	104					
	Alnus serrulata	5					
	Betula nigra	31	1				
	Carya cordiformis	24	1				
	Carya ovata	12					
	Celtis occidentalis	12					
	Cornus amomum	11					
	Cornus florida	118	1	1			
	Liquidambar styraciflua	2					
	Quercus michauxii	27	5	2			
	Ilex opaca	32	58	1			
	Cornus	2					
	Carya	3					
	Unknown	104	1	2			
	Platanus occidentalis	7					
	Unknown	11	2				
TOT:	**16**	**505**	**69**	**6**			

vigor	**Count**	**Percent**
2	6	1
3	69	11.9
4	505	87.1

Appendix 3. Vegetation Assessment
Table 10. CVS Vegetation Tables - Damage by Species
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Monitoring Year 0 of 5

	Species	All Damage Categories	(no damage)	Broken Stems	Dry Stems
	Acer floridanum	104	104		
	Alnus serrulata	5	5		
	Betula nigra	32	31	1	
	Carya	3	3		
	Carya cordiformis	25	24		1
	Carya ovata	12	12		
	Celtis occidentalis	12	12		
	Cornus	2	2		
	Cornus amomum	11	11		
	Cornus florida	120	117		3
	Ilex opaca	91	31		60
	Liquidambar styraciflua	2	2		
	Liriodendron tulipifera	107	104		3
	Platanus occidentalis	7	7		
	Unknown	34	27	2	5
	Unknown	13	11	1	1
TOT:	**16**	**580**	**503**	**4**	**73**

Damage	Count	Percent Of Stems
(no damage)	503	86.7
Site Too Dry	73	12.6
[Enter other damage]	4	0.7

Appendix 3. Vegetation Assessment
Table 11. CVS Vegetation Tables - Stem Count by Plot and Species
Scaly Bark Creek Mitigation Site (EEP Project No. 94148)
Monitoring Year 0 of 5

	Species	Total Stems	# plots	avg# stems	plot 1	plot 2	plot 3	plot 4	plot 5	plot 6	plot 7	plot 8	plot 9	plot 10	plot 11	plot 12	plot 13	plot 14	plot 15	plot 16	plot 17	plot 18	plot 19	plot 20	plot 21	plot 22	plot 23	plot 24	plot 25	plot 26	plot 27	plot 28	plot 29
	Acer floridanum	104	29	4	3	3	2	3	3	1	2	5	3	4	4	4	5	3	3	4	4	11	5	4	4	2	1	6	4	2	3	3	3
	Alnus serrulata	5	3	2					1																	2	2						
	Betula nigra	32	16	2	1	2	2	1	1		3	1	1					4	3	1	1					3	3			4		1	
	Carya	3	3	1														1	1				1										
	Carya cordiformis	25	17	1	1					1	3	2		1	1	1	1		2	1	1			1	1			1	1			2	4
	Carya ovata	12	11	1									2	1	1	1				1	1		1	1	1			1	1				
	Celtis occidentalis	12	10	1						1	1			1	1	1	1		1						1					3		1	
	Cornus	2	1	2	2																												
	Cornus amomum	11	8	1	1	1	2		1	1	1		2													2							
	Cornus florida	120	28	4	2	4	2	5	4	2	1	2	2	5	6	5	5	3	5	6	6	5	10	4	6	3		5	7	1	9	2	3
	Ilex opaca	91	28	3	2	2		2	2	2	1	4	3	4	3	4	4	2	2	4	4	5	5	4	3	2	2	4	4	4	3	4	6
	Liquidambar styraciflua	2	2	1										1																1			
	Liriodendron tulipifera	107	23	5	6	6	4	3	5	4				6	6	7	8	6	6	6	6		1	5	6	4	2	4	4	1		1	
	Platanus occidentalis	7	6	1		1	2		1	1			1														1						
	Quercus michauxii	34	9	4	2	4	6	8	4		2	1														4	3						
	Unknown	13	8	2	3					3	1	1						2	1								1					1	
TOT:	**16**	**580**	**16**		**23**	**23**	**20**	**22**	**22**	**16**	**15**	**16**	**14**	**23**	**22**	**23**	**24**	**21**	**24**	**23**	**23**	**21**	**23**	**19**	**22**	**22**	**15**	**21**	**21**	**16**	**15**	**15**	**16**

Vegetation Photographs

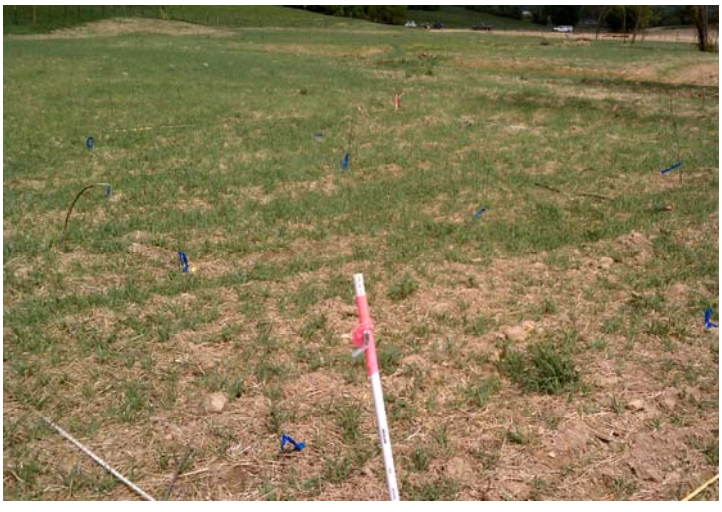
Vegetation Plot 1 (4/25/2011)

Vegetation Plot 2 (4/25/2011)

Vegetation Plot 3 (4/25/2011)

Vegetation Plot 4 (4/25/2011)

Vegetation Plot 5 (4/25/2011)



Vegetation Plot 6 (04/27/2011)

Vegetation Plot 7 (4/27/2011)

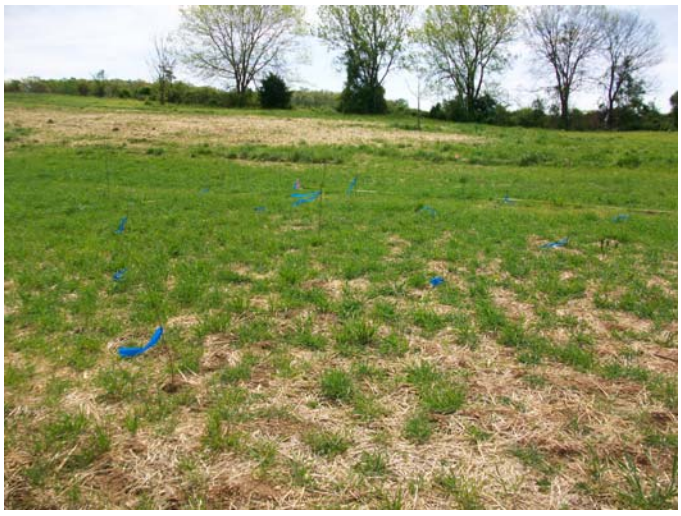
Vegetation Plot 8 (4/27/2011)

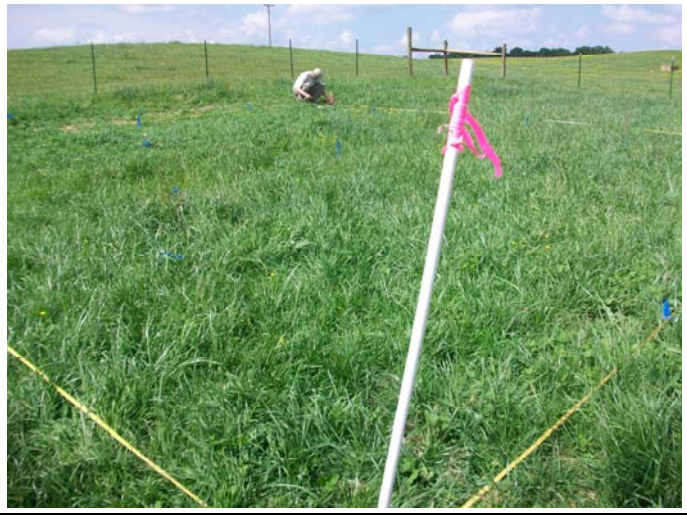
Vegetation Plot 9 (4/27/2011)

Vegetation Plot 10 (4/18/2011)

Vegetation Plot 11 (4/18/2011)

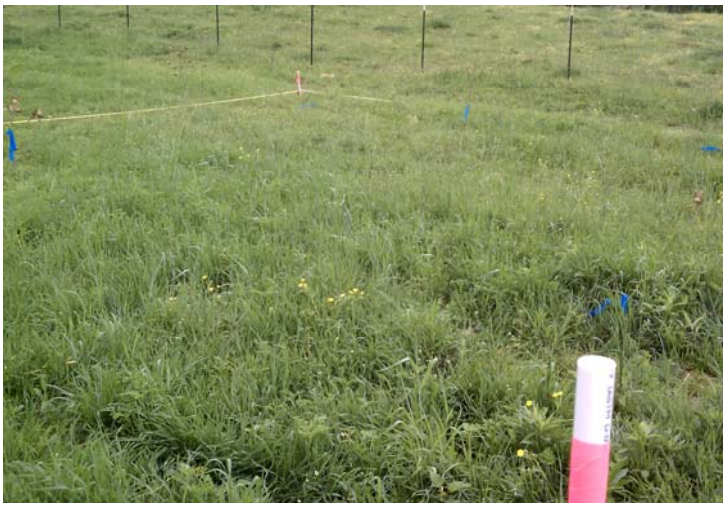
Vegetation Plot 12 (4/18/2011)

	
Vegetation Plot 13 (4/18/2011)	Vegetation Plot 14 (4/18/2011)
	
Vegetation Plot 15 (4/18/2011)	Vegetation Plot 16 (4/18/2011)
	
Vegetation Plot 17 (4/18/2011)	Vegetation Plot 18 (4/18/2011)

	
Vegetation Plot 19 (4/18/2011)	Vegetation Plot 20 (4/18/2011)
	
Vegetation Plot 21 (4/18/2011)	Vegetation Plot 22 (4/25/2011)
	
Vegetation Plot 23 (4/25/2011)	Vegetation Plot 24 (4/25/2011)

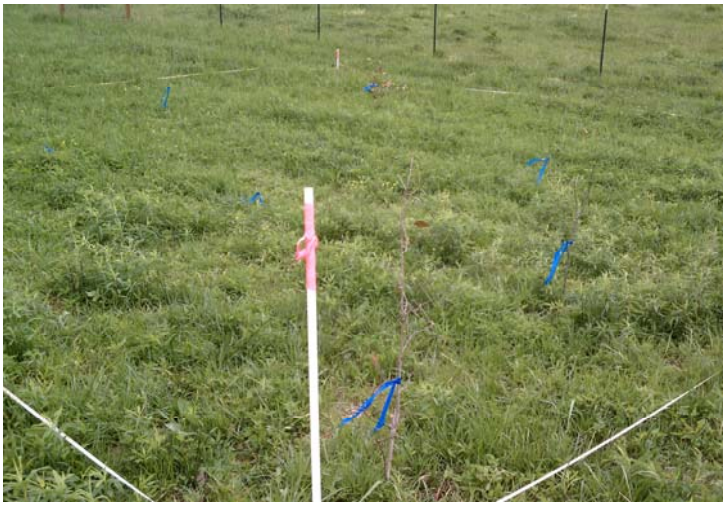
Vegetation Plot 25 (4/25/2011)

Vegetation Plot 26 (4/27/2011)



Vegetation Plot 27 (4/27/2011)

Vegetation Plot 28 (4/27/2011)



Vegetation Plot 29 (4/27/2011)

APPENDIX 4. As-Built Plan Sheets