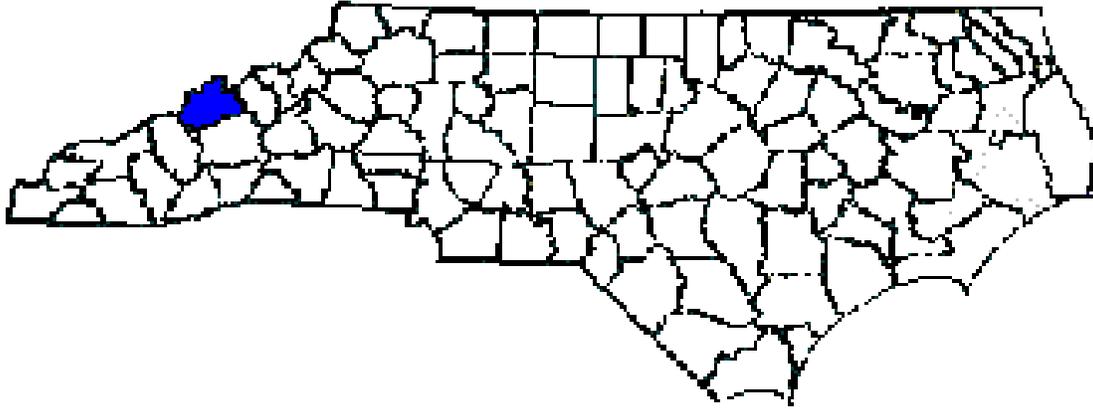


ANNUAL REPORT FOR 2014



**Middle Fork Creek Site A Mitigation Site
Madison County
TIP No. R-2518A
COE Action ID: SAW-2007-2197-357/300
DWR #: 20071134**



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November 2014

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SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the Year 2014 at the Middle Fork Creek Site A Mitigation Site in Madison County. The North Carolina Department of Transportation (NCDOT) completed this project in January 2009 (Sta. 10+50 to 11+50) and May 2011 (Sta. 13+20 to 14+20). This report provides the monitoring results for the fifth formal year of monitoring (Year 2014). The Year 2014 monitoring period was the fifth of five scheduled years of monitoring on the Middle Fork Creek Site A Mitigation Site (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring at the Middle Fork Creek Site A, it has met the required monitoring protocols for the fifth formal year of monitoring on the stream and the third formal year of monitoring on the planted vegetation. It was agreed by the Regulatory Agencies and NCDOT during the March 25, 2014 Annual Monitoring Meeting that the longitudinal profile could be discontinued for the remainder of the five year monitoring period due to heavy vegetation within the channel. In lieu of doing the longitudinal profile, visual inspection of the channel stability throughout the reach and photo documentation at the permanent photo point locations would be completed. All other monitoring activities will continue to be completed throughout the five year monitoring period. The channel throughout the stream site is stable at this time.

The streambank and buffer area were planted in March 2012 with live stakes and bareroot seedlings. The planted vegetation is surviving at this time. NCDOT proposes to discontinue stream monitoring but will continue vegetation monitoring at the Middle Fork Creek Site A Mitigation Site until 2016.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2014 at the Middle Fork Creek Site A Mitigation Site. Site A is located on US 19 in Madison County at Sta. 19+80 -L- Rt. and Lt. and Sta. 21+40 -L- Lt. (Figure 1). The Middle Fork Creek Site A was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2518A in Madison County.

The mitigation site provided approximately 239 linear feet of stream restoration, 476 linear feet of stream enhancement, and 479 linear feet of stream preservation. Construction was completed during January 2009 (Sta. 10+50 to 11+50) and May 2011 (Sta. 13+20 to 14+20) by the NCDOT. Stream restoration involved installing several in-stream cross vane structures and planting the riparian buffer zone.

1.2 Purpose

In order for a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2014 at the Middle Fork Creek Site A Mitigation Site. Hydrologic monitoring was not required for this site.

1.3 Project History

January 2009	Construction Completed (Sta. 10+50 to 11+50)
October 2009	As-Built Survey Completed (Sta. 10+50 to 11+50)
March 2009	Site Planted (Type I only)
November 2010	Stream Channel Monitoring (Year 1)
May 2011	Construction Completed (Sta. 13+20 to 14+20)
November 2011	As-Built Survey Completed (Sta. 13+20 to 14+20)
November 2011	Stream Channel Monitoring (Year 2)
March 2012	Site Planted (Type I and II)
September 2012	Vegetation Monitoring (Year 1)
November 2012	Stream Channel Monitoring (Year 3)
February 2013	Live Staked Preservation Area Between PP#3 & PP#4
March 2013	Bankfull Monitoring Gauge Installed
August 2013	Vegetation Monitoring (Year 2)
November 2013	Stream Channel Monitoring (Year 4)
July 2014	Sprayed Small Patch of Japanese Knotweed
July 2014	Vegetation Monitoring (Year 3)
November 2014	Stream Channel Monitoring (Year 5)

1.4 Debit Ledger

The entire Middle Fork Creek Site A stream mitigation site was used for the R-2518A project to compensate for unavoidable stream impacts.

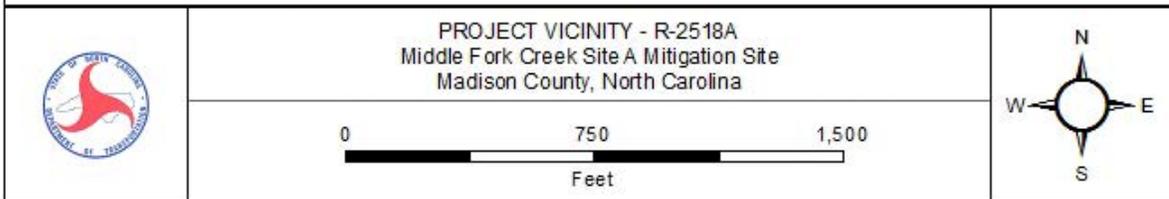


Figure 1. Vicinity Map

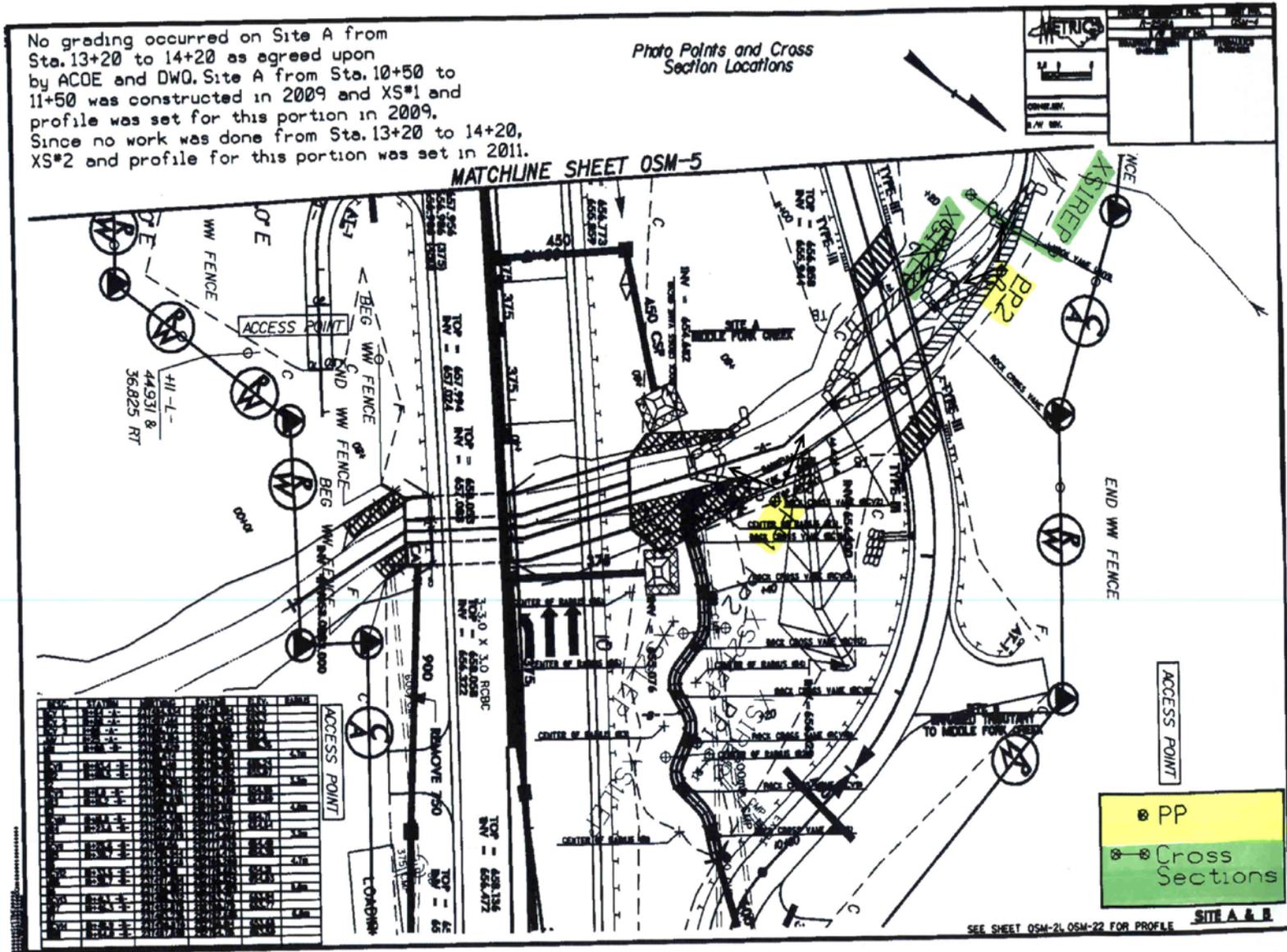
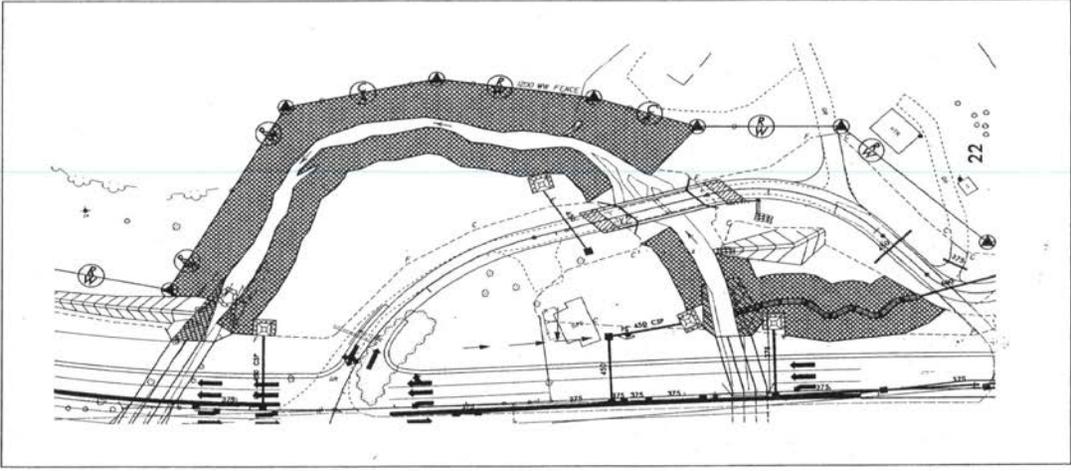


Figure 2. Site A Map

	PROJECT REFERENCE NO.	SHEET NO.
	R-2508A	EC-54-CW037
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	

.42 HECTARE STREAMBANK REFORESTATION



SEE RF-2, RF-3 AND PROJECT SPECIAL PROVISIONS

Figure 5. Site A Reforestation Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

The permittee shall monitor the restoration and enhancement mitigation sites following the Level 1 protocols outlined in the "Stream Mitigation Guidelines," dated April 2003 with the following exceptions:

1. Pebble counts shall not be conducted.
2. Two cross sections shall be conducted for streams less than 500 linear feet and five (5) cross sections shall be conducted for streams greater than 500 linear feet.
3. Riparian success shall be by visual inspection of plant survival. Photos will be taken and comments noted on plant survival.

The permittee shall monitor the preservation sites by visual inspection. Photos will be taken and comments noted on plant survival. The monitoring shall be conducted annually for a minimum of five (5) years after final planting. The monitoring results shall be submitted to DWR in a final report within sixty (60) days after completing monitoring. After 5 years the NCDOT shall contact the DWR to schedule a site visit to "close out" the mitigation site.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The restoration of the Middle Fork Creek Site A Mitigation Site involved installing several in-stream cross vane structures and planting the riparian buffer zone.

2.2.2 Monitoring Conditions

The objective of the Middle Fork Creek Site A stream restoration was to restore a B4c stream as identified in Rosgen's Applied River Morphology. A total of two cross sections (one in a riffle and one in a pool) were surveyed. For this report, only cross sections containing riffles were used in the comparison of channel morphology presented below in Table 1 (Site A).

Table 1. Abbreviated Morphological Summary (Middle Fork Creek Site A)

Variable	Proposed	Cross-Section #2 (Riffle)	Cross-Section #2 (Riffle)	Cross-Section #2 (Riffle)	Cross-Section #2 (Riffle)
		2011	2012	2013	2014
Drainage Area (mi ²)	12.8	12.8	12.8	12.8	12.8
Bankfull Cross Sectional Area (ft ²)	72	23.87	22.57	17.56	11.6
Maximum Bankfull Depth (ft.)	2.9 – 3.7	2.3	2.28	1.77	1.31
Width of the Floodprone Area (ft.)	50	28.98	28.26	19.64	16.7
Bankfull Mean Depth (ft.)	2.45	1.68	1.56	1.22	0.82
Width/Depth Ratio	12	8.46	9.28	11.77	17.22
Entrenchment Ratio	1.7	2.04	1.95	1.37	1.18
Bankfull Width (ft.)	29.4	14.21	14.48	14.36	14.12

* Riffle values are used for classification purposes, pool values are shown in Appendix A.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of two cross sections and the longitudinal profile of the Middle Fork Creek Site A established by NCDOT after construction. The length of the profile along the Middle Fork Creek Site A was approximately 652 linear feet. Two cross sections were established during the as-built monitoring years. Cross section locations were subsequently based on the stationing of the longitudinal profile and are presented below. The location of the cross sections and longitudinal profile (see 2010 – 2013 monitoring reports) are shown in Appendix A.

Middle Fork Creek Site A Cross-Sections:

- ◆ Cross-Section #1: Middle Fork Creek Site A, Station 240+50, midpoint of pool
- ◆ Cross-Section #2: Middle Fork Creek Site A, Station 1158+00, midpoint of riffle

Based on comparisons of the As-Built to the monitoring data, all of the cross sections appear stable with little or no active bank erosion. Graphs of the cross sections are presented in Appendix A. Future survey data will vary depending on actual location of rod placement and alignment; however, this information should remain similar in appearance.

It was agreed by the Regulatory Agencies and NCDOT during the March 25, 2014 Annual Monitoring Meeting that the longitudinal profile could be discontinued for the remainder of the five year monitoring period due to heavy vegetation within the channel. In lieu of doing the longitudinal profile, visual inspection of the channel stability throughout the reach and photo documentation at the permanent photo point locations would be completed. All other monitoring activities will continue to be completed throughout the five year monitoring

period. Beaver dams were noted upstream of Cross Section #1 and up and downstream of Cross Section #2 at Site A. USDA has been contacted to trap the beavers and remove the dams. Pebble counts were not required per the permit conditions and therefore were not completed. Two bankfull events were documented with a surface water gauge at Site A during the 2014 monitoring year.

3.0 VEGETATION: MIDDLE FORK CREEK SITE A

3.1 Description of Species

The following tree species were planted on the streambank:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species were planted in the buffer area:

Liriodendron tulipifera, Yellow Poplar

Platanus occidentalis, Sycamore

Fraxinus pennsylvanica, Green Ash

Quercus alba, White Oak

3.2 Results of Vegetation Monitoring

Streambank & Buffer Vegetation: The streambank reforestation was completed in March 2012. The Year 3 vegetation monitoring evaluation noted: Type I: Black Willow, Silky Dogwood and Type II: Sycamore, Green Ash, Tulip Poplar and White Oak were surviving at the time of the monitoring evaluation. It was noted during the 2014 monitoring evaluation that the power line easement within Site A had been sprayed. A small patch of Japanese Knotweed located adjacent to the bridge crossing at Sam Fox Road was sprayed on July 23, 2014.

3.3 Conclusions

NCDOT will continue to monitor the planted vegetation in 2015.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The Middle Fork Creek Site A Mitigation Site has met the required monitoring protocols for the fifth formal year of monitoring on the stream and the third formal year of monitoring on the planted vegetation. The channel throughout the stream site is stable and the planted vegetation is surviving at this time. NCDOT proposes to discontinue stream monitoring but will continue vegetation monitoring at the Middle Fork Creek Site A Mitigation Site until 2016.

5.0 REFERENCES

Stream Mitigation Plan, US Highway 19, R-2518A On-Site Mitigation
Madison County, North Carolina, August 2006.

Design Plans for R-2518A, US 19 from I-26 to 0.8 KM east of the Yancey Co.
Line, Stream Mitigation (Preservation, Enhancement, and Restoration),
HSMM.

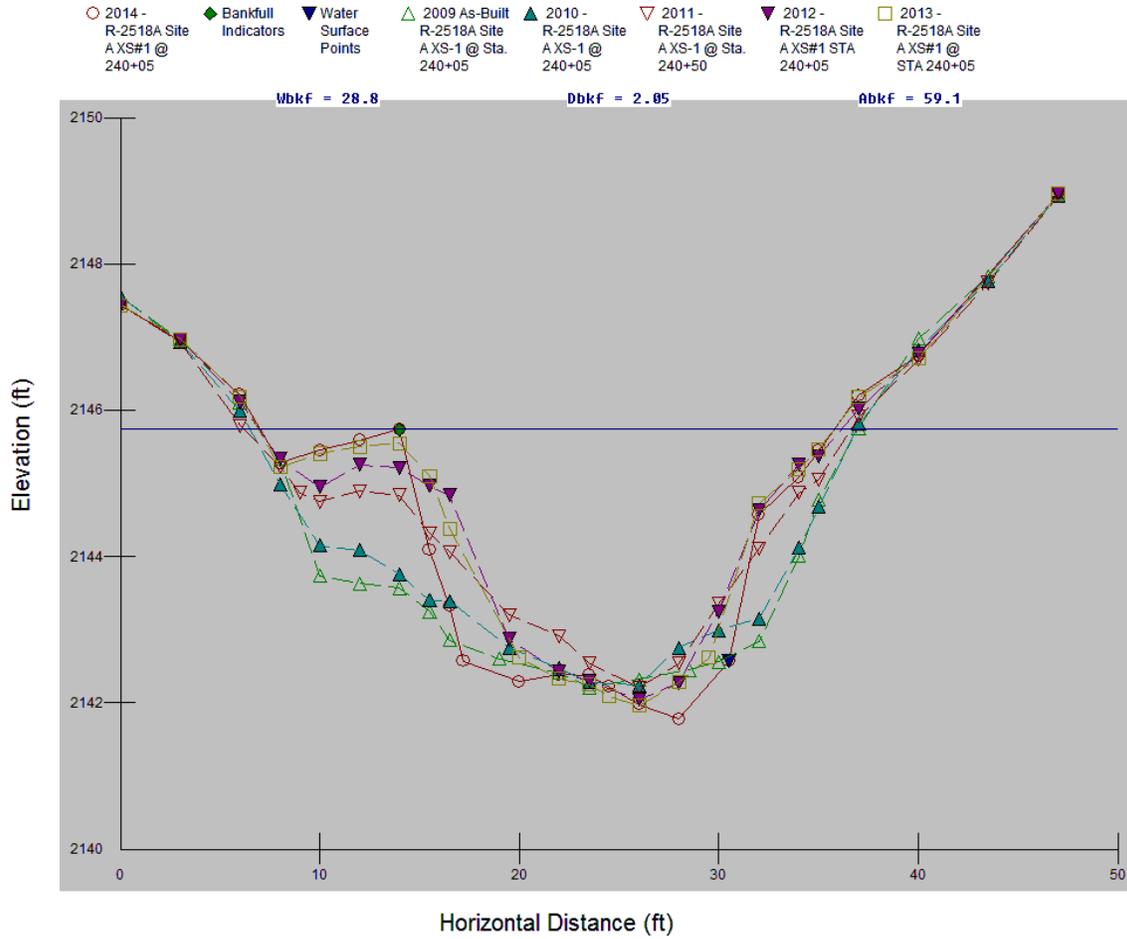
North Carolina Department of Transportation (NCDOT), April 29, 2008. 404 and
401 Individual Permits for R-2518A and R-2518B (ACOE Permit No. 2007-
2197-357/300 and DWR Project No. 20071134, Individual Certification No.
3706).

Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa
Springs, Colorado.

US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines.
Prepared with cooperation from the US Environmental Protection Agency,
NC Wildlife Resources Commission, and the NC Division of Water
Resources.

APPENDIX A
CROSS SECTIONS

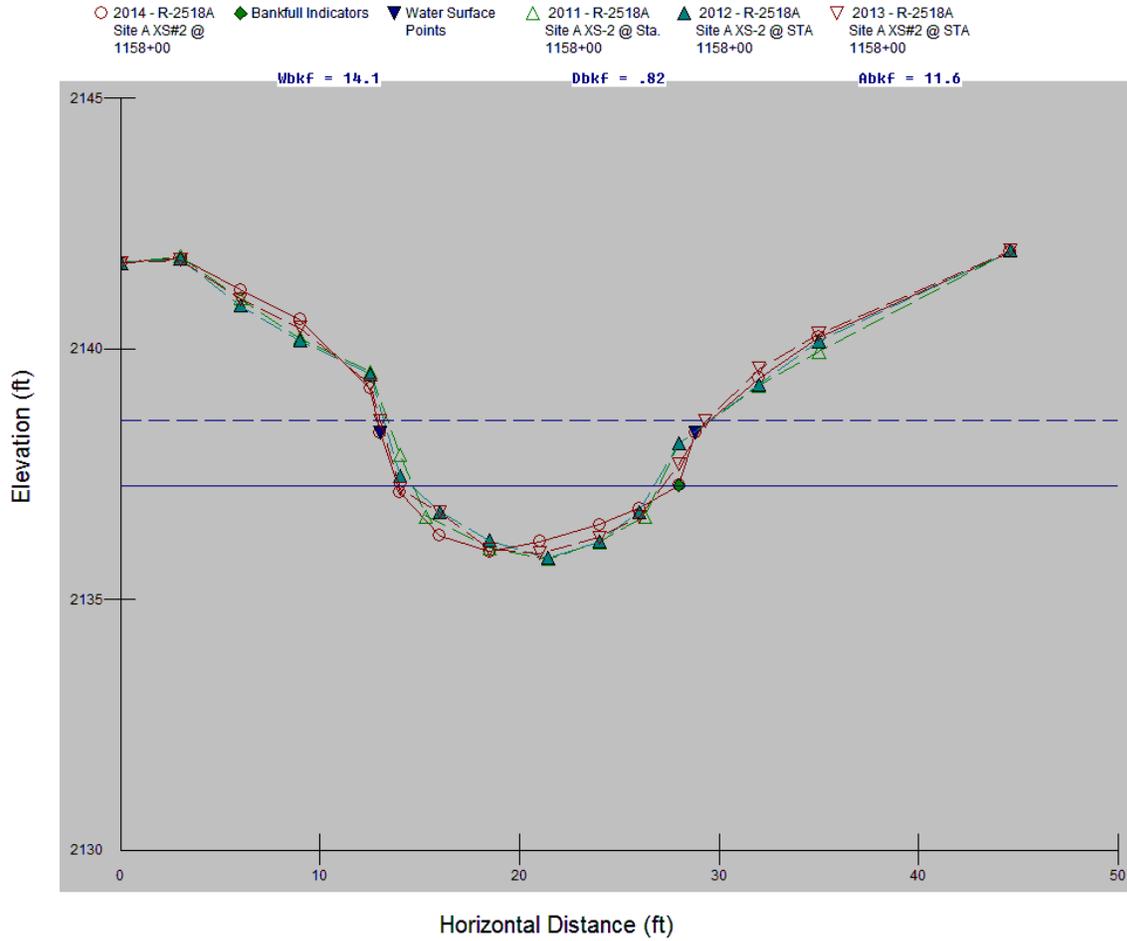
R-2518A Site A XS#1 @ 240+05



Site A: Cross-Section #1 (Pool) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft²)	24.28	31.38	37.74	45.61	57.53
Maximum Bankfull Depth (ft.)	1.85	2.68	3.21	3.59	3.96
Bankfull Mean Depth (ft.)	1.11	1.25	1.72	2.17	2.64
Bankfull Width (ft.)	21.94	25.17	21.97	21	21.79

*According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.

R-2518A Site A XS#2 @ 1158+00



Site A: Cross-Section #2 (Riffle) Abbreviated Morphological Summary				
	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft ²)	23.87	22.57	17.56	11.6
Maximum Bankfull Depth (ft.)	2.3	2.28	1.77	1.31
Width of the Floodprone Area (ft.)	28.98	28.26	19.64	16.7
Bankfull Mean Depth (ft.)	1.68	1.56	1.22	0.82
Width/Depth Ratio	8.46	9.28	11.77	17.22
Entrenchment Ratio	2.04	1.95	1.37	1.18
Bankfull Width (ft.)	14.21	14.48	14.36	14.12

APPENDIX B
SITE PHOTOGRAPHS

Middle Fork Creek Site A



Photo Point #1 (Upstream)



Photo Point #1 (Downstream)



Photo Point #2 (Upstream)



Photo Point #2 (Downstream)



Photo Point #3 (Upstream)



Photo Point #3 (Downstream)

November 2014

Middle Fork Creek Site A



Photo Point #4 (Upstream)



Photo Point #4 (Downstream)



Photo Point #5 (Upstream)



Photo Point #5 (Downstream)



Beaver dam upstream of Cross Section #1



Beaver dam upstream of Cross Section #2

November 2014

Middle Fork Creek Site A



Vegetation Overview Photo



Vegetation Overview Photo



Vegetation Overview Photo



Vegetation Overview Photo



Power Line Easement



Power Line Easement