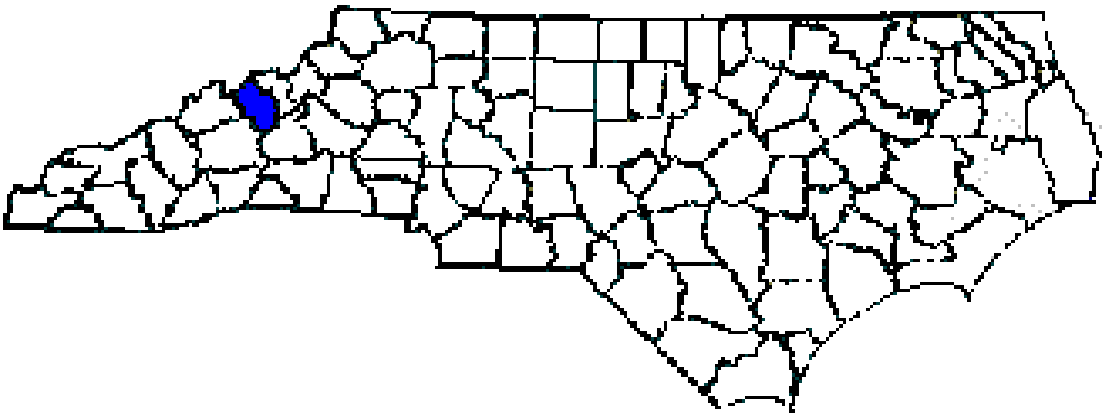
ANNUAL REPORT FOR 2011



Bald Creek Site #4 Mitigation Site
Yancey County
TIP No. R-2518B

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North Carolina Department of Transportation
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SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the Year 2011 at the Bald Creek Site #4 Mitigation Site in Yancey County. The North Carolina Department of Transportation (NCDOT) completed this project in June 2009. This report provides the monitoring results for the second formal year of monitoring (Year 2011). The Year 2011 monitoring period was the second of five scheduled years of monitoring on the Bald Creek Site #4 Mitigation Site (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring at Bald Creek Site #4, it has met the required monitoring protocols for the second formal year of monitoring. The channel throughout the stream enhancement site is stable at this time. The streambank and buffer area have not been planted for the second year of monitoring. NCDOT plans on planting the streambank and buffer area by April 2012. NCDOT will monitor the planted vegetation once it is established. NCDOT will continue stream monitoring at the Bald Creek Site #4 Mitigation Site for 2012.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2011 at the Bald Creek Site #4 Mitigation Site. Site #4 is located on US 19 in Yancey County at Sta. 135+60 to Sta. 138+05 -L- (Figure 1). The Bald Creek Site #4 was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2518B in Yancey County.

The mitigation site provided approximately 814 linear feet of stream enhancement. Construction was completed during June 2009 by the North Carolina Department of Transportation (NCDOT). Stream enhancement involved installing several in-stream cross vane structures and planting the riparian buffer zone. A rock vane structure with some root wads was installed on the left bank in the only bend along this reach.

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 2011 at the Bald Creek Site #4 Mitigation Site. Hydrologic monitoring was not required for this site.

1.3 Project History

June 2009	Construction Completed
October 2009	As-Built Survey Completed
November 2010	Stream Channel Monitoring (Year 1)
November 2011	Stream Channel Monitoring (Year 2)

1.4 Debit Ledger

The entire Bald Creek Site #4 stream mitigation site was used for the R-2518B project to compensate for unavoidable stream impacts.

Figure 1. Vicinity Map

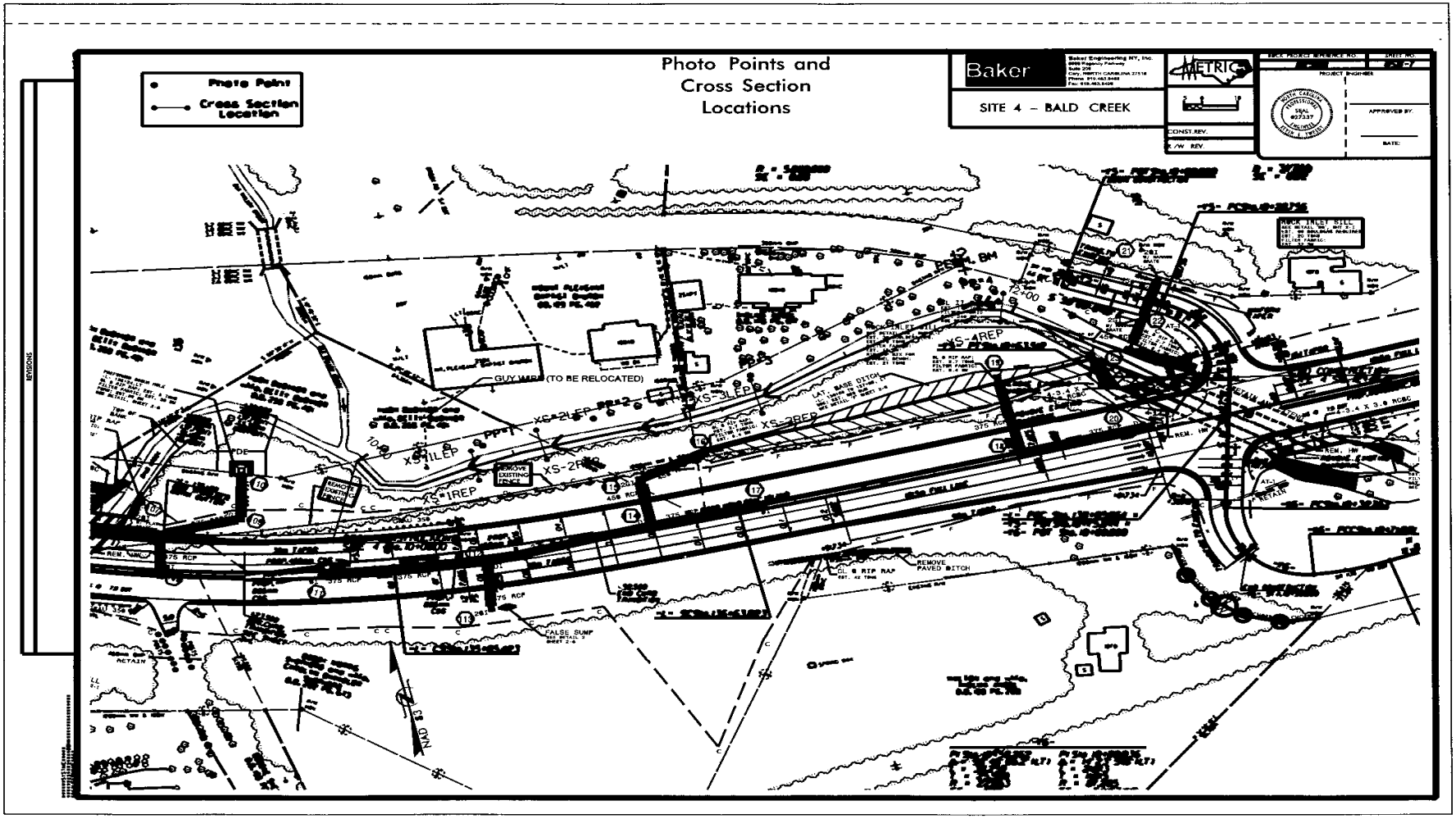

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Figure 2. Site #4 Map

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 DWQ in a final report within sixty (60) days after completing monitoring. After 5 years the NCDOT shall contact the DWQ to schedule a site visit to "close out" the mitigation site.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The enhancement of Bald Creek Site #4 Mitigation Site involved installing several in-stream cross vane structures and planting the riparian buffer zone. A rock vane structure with some root wads was installed on the left bank in the only bend along this reach.

2.2.2 Monitoring Conditions

The objective of the Bald Creek Site #4 stream enhancement was to enhance a C4 stream as identified in Rosgen's Applied River Morphology. A total of four cross sections (two in a riffle and two 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 #4).

Table 1. Abbreviated Morphological Summary (Bald Creek Site #4)

Variable	Proposed	Cross-Section #2 (Riffle)	Cross-Section #3 (Riffle)	Min. – Max Values (Riffle Sections Only)
		2011	2011	2011
Drainage Area (mi^2)	**8.4**	8.4	8.4	8.4
Bankfull Cross Sectional Area (ft^2)	**50**	50.03	18.56	18.56 – 50.03
Maximum Bankfull Depth (ft)	**2.6**	3.14	1.66	1.66 – 3.14
Width of the Floodprone Area (ft)	**> 50**	38	28.38	28.38 – 38
Bankfull Mean Depth (ft)	**2**	1.87	1.26	1.26 – 1.87
Width/Depth Ratio	**14**	14.34	11.74	11.74 – 14.34
Entrenchment Ratio	**> 3.0**	1.42	1.92	1.42 – 1.92
Bankfull Width (ft)	**25.2**	26.82	14.79	14.79 – 26.82

* 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 four cross sections and the longitudinal profile of Bald Creek Site #4 established by NCDOT after construction. The length of the profile along Bald Creek Site #4 was approximately 400 linear feet. Four cross sections were established during the as-built monitoring year. 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 are shown in Appendix A.

Bald Creek Site #4 Cross-Sections:

- Cross-Section #1: Bald Creek Site #4, Station 113+04, midpoint of pool
- Cross-Section #2: Bald Creek Site #4, Station 181+00, midpoint of riffle
- Cross-Section #3: Bald Creek Site #4, Station 387+05, midpoint of riffle
- Cross-Section #4: Bald Creek Site #4, midpoint of pool

Based on comparisons of the As-Built data to 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. The longitudinal profile showed that the channel was stable for the 2011 monitoring evaluation. Pebble counts were not required per the permit conditions and therefore were not completed.

3.0 VEGETATION: BALD CREEK SITE #4

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: Reforestation has not been completed as of the Year 2 monitoring evaluation.

3.3 Conclusions

NCDOT plans on planting the streambank and buffer area by April 2012. NCDOT will monitor the planted vegetation once it is established.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The Bald Creek Site #4 Mitigation Site has met the required monitoring protocols for the second formal year of monitoring. The channel throughout the stream enhancement site is stable at this time. NCDOT plans on planting the streambank and buffer area by April 2012. NCDOT will monitor the planted vegetation once it is established. NCDOT will continue monitoring the Bald Creek Site #4 Mitigation Site in 2012.

5.0 REFERENCES

Stream Mitigation Plan, US Highway 19, R-2518B On-Site Mitigation Yancey County, North Carolina, February 2007.

Stream Mitigation Plan Sheets for R-2518B, US 19 from east of the Madison County line to SR 1336, Stream Mitigation (Preservation, Enhancement, and Restoration), Buck Engineering.

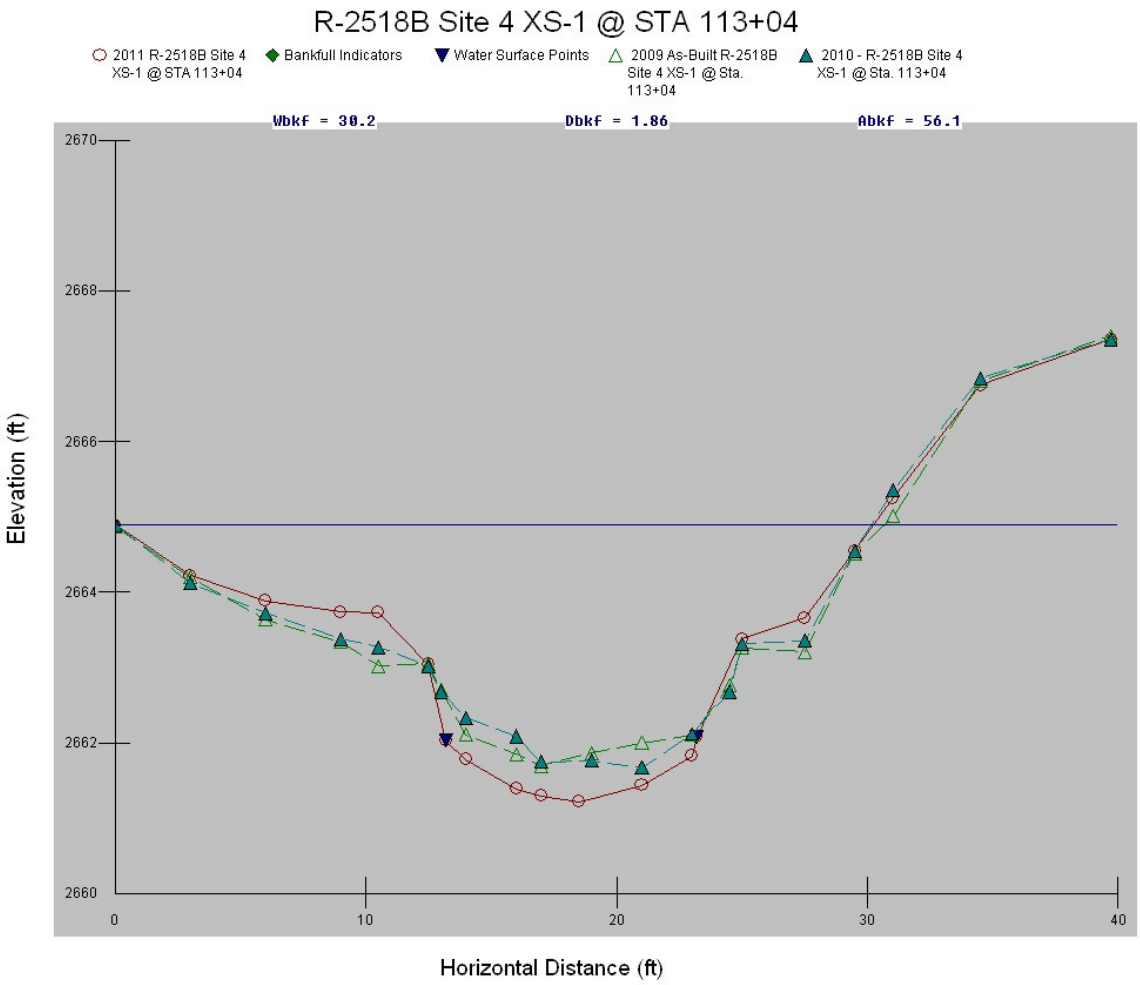
North Carolina Department of Transportation (NCDOT), April 29, 2008. 404 and 401 Individual Permits for R-2518A and R-2518B (ACOE Permit No. 2007-2197-357/300 and DWQ Project No. 20071134, Individual Certification No. 3706).

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 Quality.

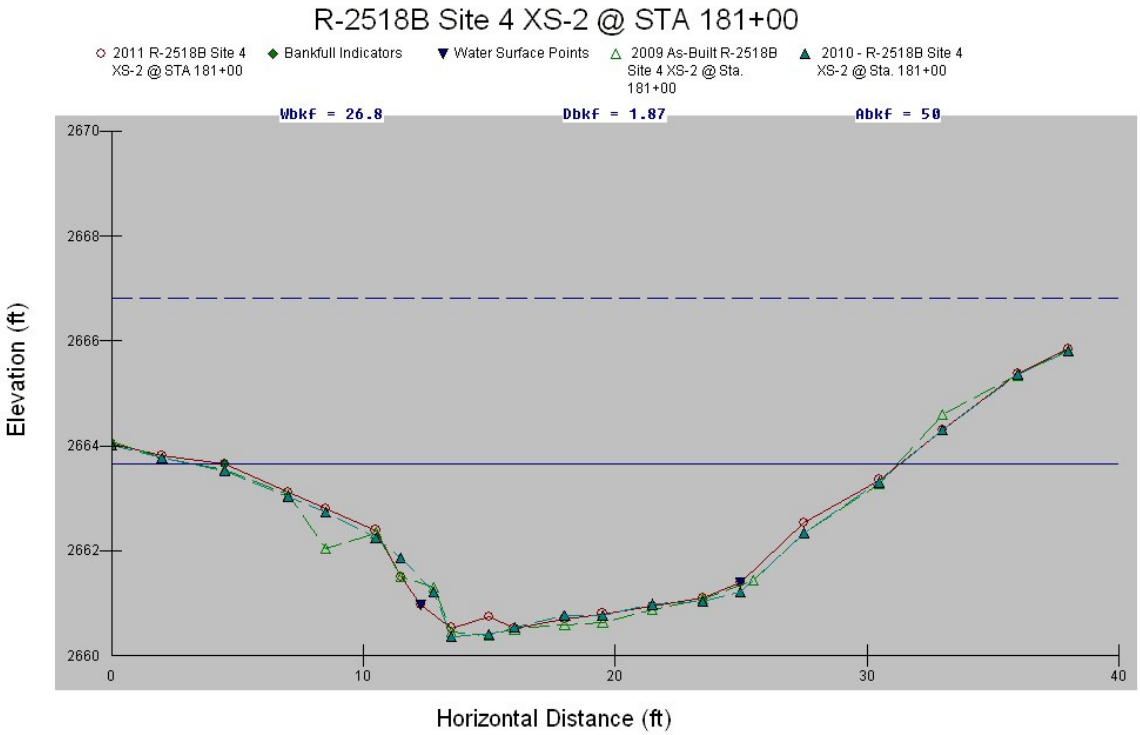
APPENDIX A

CROSS SECTIONS AND LONGITUDINAL PROFILE

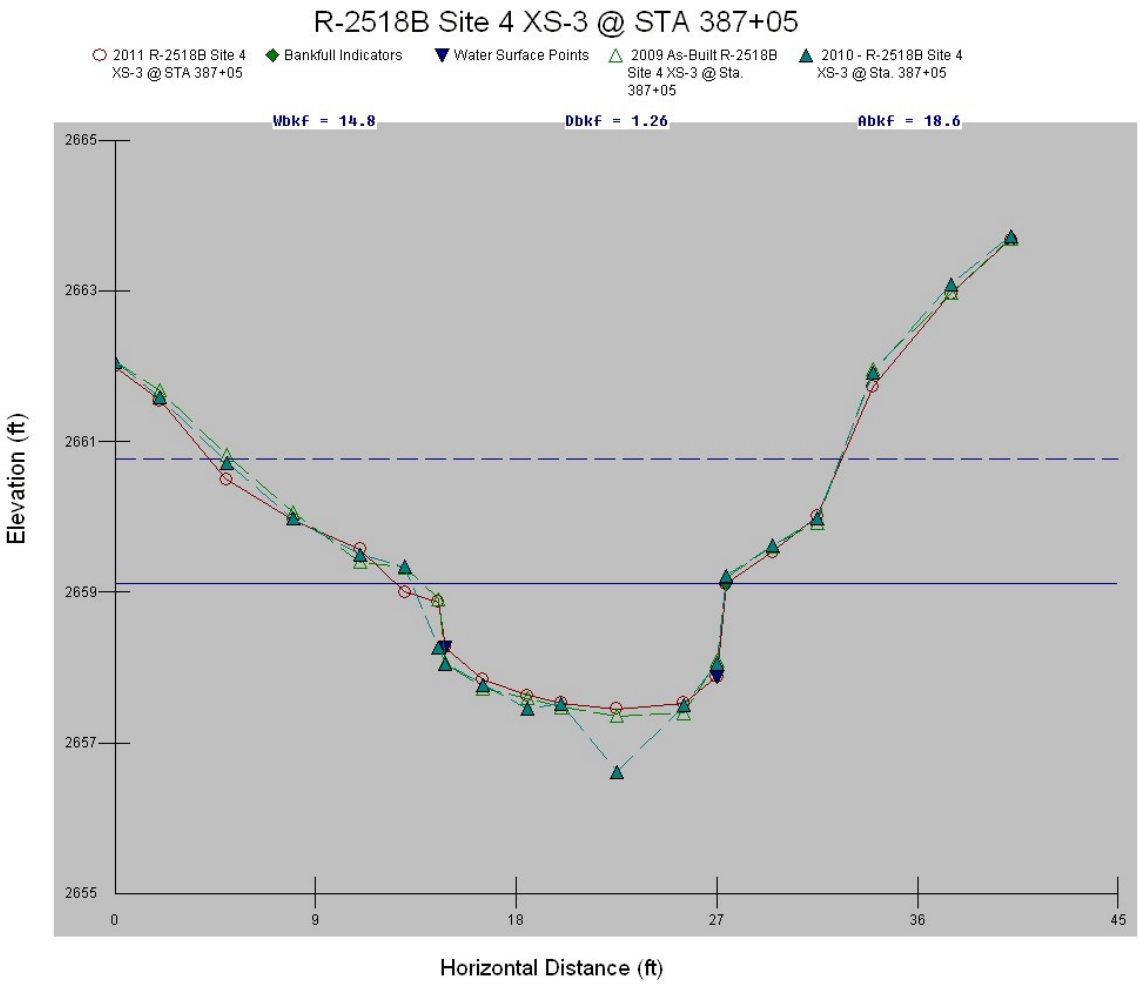


Site #4: Cross-Section #1 (Pool) Abbreviated Morphological Summary*					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	54.78	56.12			
Maximum Bankfull Depth (ft.)	3.22	3.67			
Bankfull Mean Depth (ft.)	1.82	1.86			
Bankfull Width (ft.)	30.14	30.23			

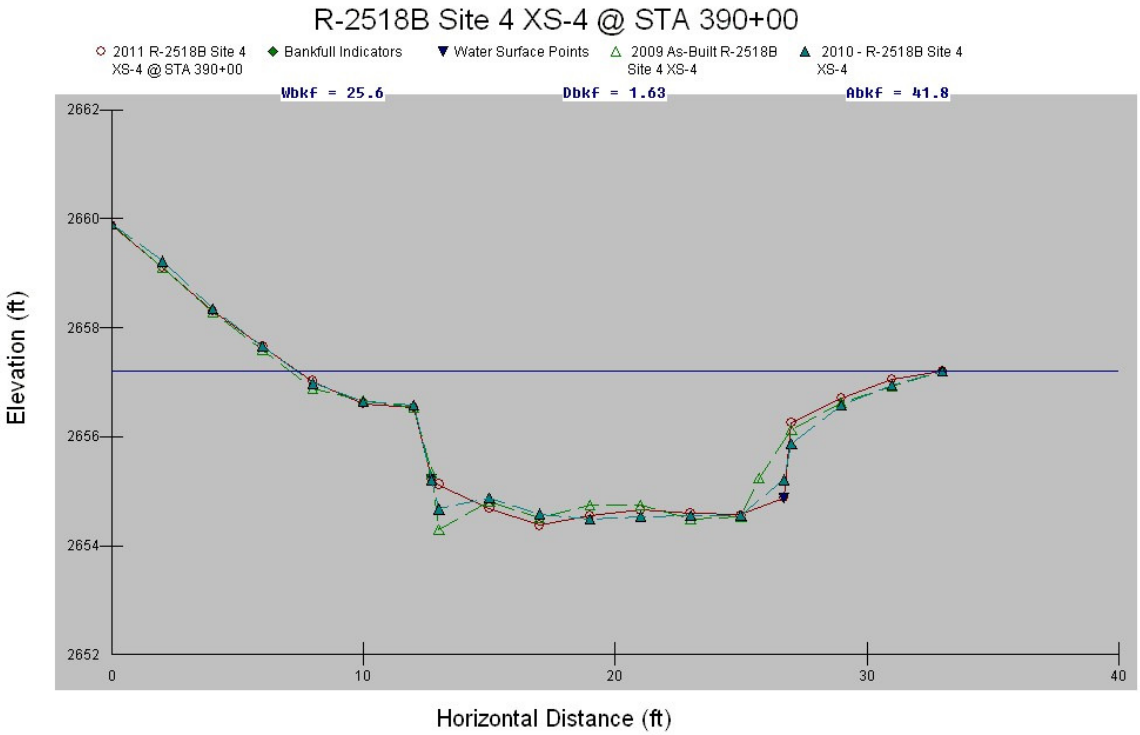
* According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.



Site #4: Cross-Section #2 (Riffle) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	47.84	50.03			
Maximum Bankfull Depth (ft.)	3.17	3.14			
Width of the Floodprone Area (ft.)	38	38			
Bankfull Mean Depth (ft.)	1.8	1.87			
Width/Depth Ratio	14.75	14.34			
Entrenchment Ratio	1.43	1.42			
Bankfull Width (ft.)	26.55	26.82			



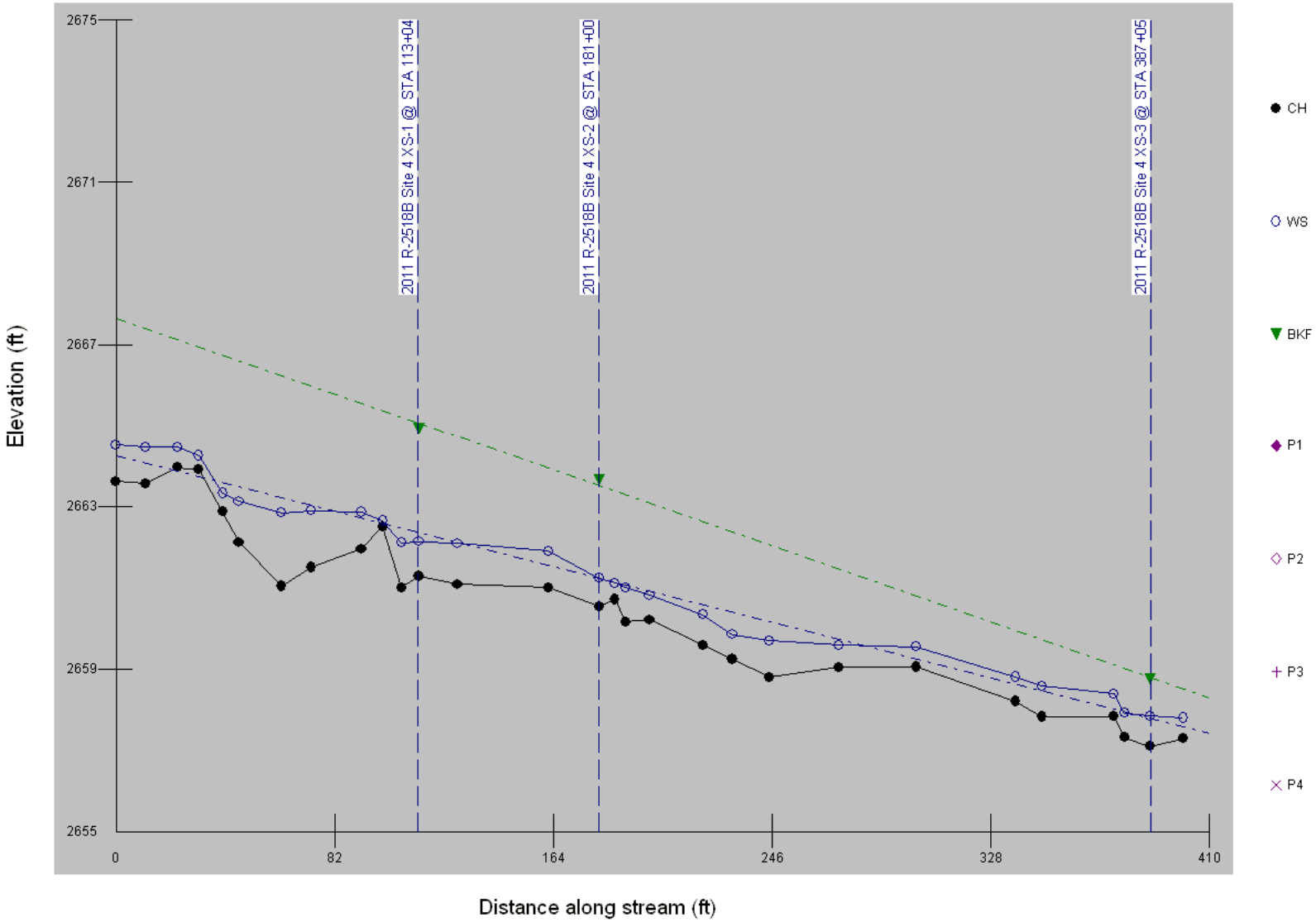
Site #4: Cross-Section #3 (Riffle) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	23.26	18.56			
Maximum Bankfull Depth (ft.)	2.6	1.66			
Width of the Floodprone Area (ft.)	32.87	28.38			
Bankfull Mean Depth (ft.)	1.63	1.26			
Width/Depth Ratio	8.73	11.74			
Entrenchment Ratio	2.31	1.92			
Bankfull Width (ft.)	14.23	14.79			



Site #4: Cross-Section #4 (Pool) Abbreviated Morphological Summary*					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	42.48	41.78			
Maximum Bankfull Depth (ft.)	2.73	2.84			
Bankfull Mean Depth (ft.)	1.65	1.63			
Bankfull Width (ft.)	25.69	25.6			

* 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.

2011 R-2518B Site 4 Profile



APPENDIX B

SITE PHOTOGRAPHS

Bald Creek Site #4

Photo Point #1 (Upstream)

Photo Point #1 (Downstream)

Photo Point #2 (Upstream)

Photo Point #2 (Downstream)

Photo Point #3 (Upstream)
November 2011

Photo Point #3 (Downstream)

Bald Creek Site #4

Photo Point #4 (Upstream)
November 2011

Photo Point #4 (Downstream)