ANNUAL REPORT FOR 2007
(Year 5)

Fork Creek Tributaries Stream Mitigation Site (Deaton Site)
Randolph County
EEP Project No. 110

Submitted to:

NCDENR EEP
1619 Mail Service Center
Raleigh, NC 27699-1619

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DEATON STREAM RESTORATION
2007 MONITIORING REPORT

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I. EXECUTIVE SUMMARY/PROJECT ABSTRACT

The following report summarizes the stream monitoring activities that have occurred during 2007 at the Deaton Site. The site is located in southeastern Randolph County, North Carolina. This site was designed during 2001 and constructed in 2003 by the North Carolina Department of Transportation (NCDOT). This report provides the monitoring results for the fourth documented year of monitoring. The Deaton Site will be monitored through 2008 or until success criteria are met.

The Deaton Site was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2417. This site provides 5,050 linear feet of stream mitigation credit. Per a letter from the Ecosystem Enhancement Program (EEP) to NCDOT dated August 25, 2004, EEP has accepted the transfer of all off-site mitigation projects. The EEP will be responsible for fulfilling the monitoring requirements and future remediation for this project.

Two unnamed tributaries to Fork Creek were restored as a result of this project; both remain stable. The 2007 vegetation monitoring of the restored riparian buffers revealed an average density of 331 trees per acre, which is above the 260 trees per acre minimum requirement after five growing seasons. Based on surveyed cross sections and profile surveys, and bed material analysis the Deaton channels are stable and meeting success criteria. USGS gauge data indicate the Deaton Site has met the hydrology criteria. Several small problem areas were observed. However, no remedial actions are proposed at this time.

II. PROJECT BACKGROUND

A. LOCATION AND SETTING

The Deaton stream restoration site is situated along two unnamed tributaries (UTs) to Fork Creek, immediately adjacent to Erect Road (SR 1003) in the southeastern portion of Randolph County, North Carolina (Figure 1). It is approximately six miles (9.7 kilometers) southeast of Coleridge and nearly one mile (1.6 kilometers) north of Erect. The Deaton Site was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2417 in Lee County, North Carolina.

The mitigation project covers approximately 5,050 linear feet of unnamed tributaries (UT) to Fork Creek, identified as the northern UT and the southern UT in this report. Priority Level I and II restorations were completed along both tributaries. Construction involved establishing a new planform and bed elevation along each reach. Cross vanes were installed for grade control and bank stability. The adjacent streambanks were re-sloped to reduce erosion. It also included the installation of native vegetation and livestock management practices, including a 50-foot riparian buffer and at-grade stream crossings in several locations.

B. PROJECT RESTORATION COMPONENTS

According to the Deaton approved stream mitigation plan, the following objectives were proposed:

- Protection of riparian zone vegetation by fencing livestock out of the easement area and installing watering tanks, stream crossings, etc.;
- Enhancement of overall stream stability by establishing the correct width to depth ratio, reducing entrenchment, sloping banks, and planting woody vegetation along the northern UT and southern UT tributaries to Fork Creek;
- Installation of rock cross vanes along eroding sections of the creek to stabilize the bed elevation and provide habitat diversity;
- Enhancement of in-stream habitat by constructing a series of cross vanes;
- Establishment of the proper width/depth by narrowing the channel and establishing a floodplain; and
- Planting of native trees, shrubs, and ground cover in the riparian zone that will help to stabilize the stream banks, establish shade, and provide wildlife cover and food.

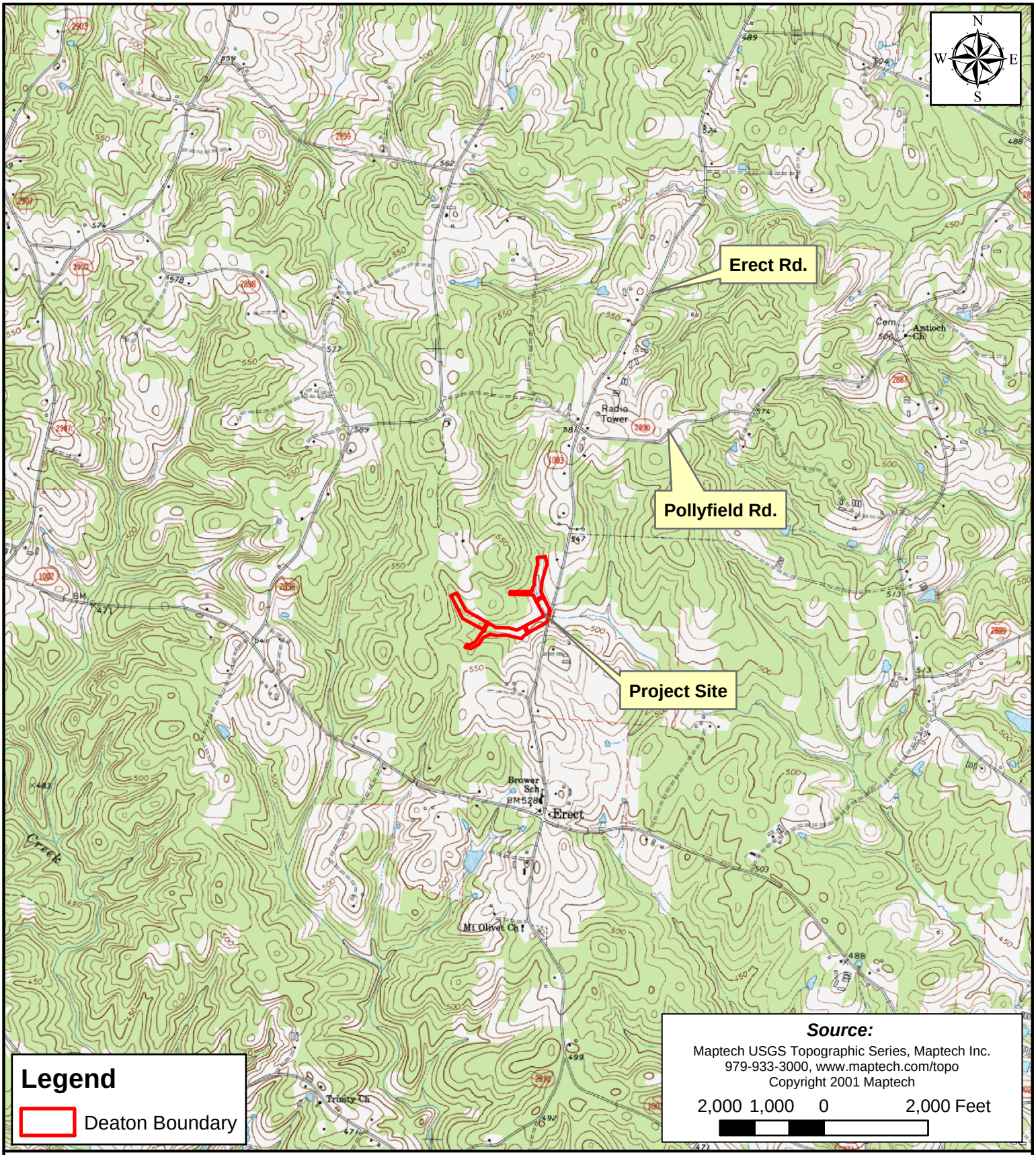
Based on the 2007 stream surveys these objectives are being met.

Additional details regarding the restoration components of the project are provided in Table 1.

Table I. Project Restoration Components

Project Segment	Mitigation Type	Approach	Linear Footage	Stationing	Comment
Reach I (Southern Tributary)	R	PI/PII	2,687 ft	0+00 to 26+87	Level Priority I and Priority II restoration was performed on both streams
Reach II (Northern Tributary)	R	PI/PII	1,366 ft	0+00 to 13+66	Level Priority I and Priority II restoration was performed on both streams

R=Restoration, PI=Priority I, PII=Priority II



Ecosystem Enhancement Program

FIGURE 01
VICINITY MAP

Deaton Stream Mitigation Site
Randolph County, North Carolina

C. PROJECT HISTORY AND BACKGROUND

The construction of the Deaton site was completed in January 2003 and was planted the following February. Table II describes the Deaton Mitigation project history. Table III gives contact information of past Deaton monitoring performers.

Table II. Deaton Project History

Date	Activity
January 2003	Construction Completed
February 2003	Site Planted
Fall 2003	Year 1 Monitoring
Fall 2004	Year 2 Monitoring
Fall 2005	Year 3 Monitoring
Fall 2006	Year 4 Monitoring
Fall 2007	Year 5 Monitoring

Table III. Project Contact Table

Monitoring Performers (2003 and 2004)	Mulkey Engineers & Consultants 6750 Tryon Road Cary, North Carolina 27511
Monitoring Performers (2005)	Earth Tech 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607
Stream Monitoring POC (2005)	Ron Johnson (919) 854-6210
Monitoring Performers (2006 and 2007)	WK Dickson & Co., Inc. 3101 John Humphries Wynd Raleigh, NC 27612
Stream Monitoring POC (2006 and 2007)	Daniel Ingram (919) 782-0495

Table IV. Project Background Table

Project County	Randolph
Drainage Area	
Southern Tributary	0.15 sq. mi.
Northern Tributary	0.5 sq. mi.
Drainage impervious cover estimate (%)	
Northern unnamed tributary	<1%
Southern unnamed tributary	<1%
Stream order	
Northern unnamed tributary	1st order
Southern unnamed tributary	1st order
Physiographic region	Piedmont
Ecoregion	Carolina Slate Belt (45c)
Rosgen classification of As-built	C4
Dominant soil types	Callison and Lignum
Reference site ID	N/A
USGS HUC for Project	USGS Unit: 03030003 (Deep River)
NCDWQ sub-basin for project	03-06-09
NCDWQ classification for project and reference	C (Fork Creek and unnamed tributaries)
Any portion of project segment upstream of a 303(d) listed segment?	No
Reasons for 303d listing or stressor N/A	N/A
Percent of project easement fenced 100	100%

D. MONITORING PLAN VIEW

A series of monitoring devices have been installed on site. A total of eight (8) individual cross-sections were located. Cross-sections were plotted from left to right facing downstream. Each cross-section is also a designated photographic point that is photographed annually. There are six (6) permanent photo points located at various points along the length of the channel. Two (2) vegetation-monitoring plots are located within the riparian easement of the Deaton Stream Restoration project. Each vegetation plot has two permanent photo points. The locations of all monitoring devices are shown on Figures 2a and 2b (Monitoring Plan View).

Feature	Northing	Easting
X1LPIN	1802235.88	663184.51
X1RPIN	1802203.27	663158.61
X2LPIN	1802650.31	662720.39
X2RPIN	1802621.6	662676.14
X3LPIN	1803465.85	662486.53
X3RPIN	1803443.93	662427.7
STLP	1802197.09	663236.32

Start ST Longitudinal Profile (STLP)

Cross Section #1

Photo Point 6

Photo Point 5

Photo Point 4

Cross Section #2

Cross Section #3

South Tributary

South Tributary

MATCHLINE - FIGURE 2b

MATCHLINE - FIGURE 2b

Vegetation Plot #2

Vegetation Photo Point 2A

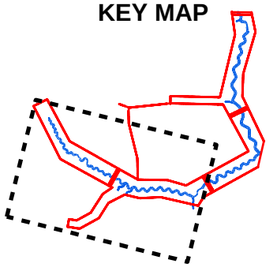
Vegetation Photo Point 2B

Station	Restoration
10+00 to 14+00	Priority 1
14+00 to 17+00	Priority 2
17+00 to 27+00	Priority 1
27+00 to 30+00	Priority 2
30+00 to 35+00	Priority 1

LEGEND

- Fence
- Stream Crossing
- Stream Channel
- Cross Vane

KEY MAP



Ecosystem Enhancement Program

N

0 50 100 Feet

FIGURE 2a
YEAR-5 MONITORING REPORT
DEATON STREAM RESTORATION
UT's to Fork Creek
Randolph County, North Carolina
NOV 2007

Station	Restoration
35+00 to 51+00	Priority 2
51+00 to 62+00	Priority 1
62+00 to 45+00	Priority 2

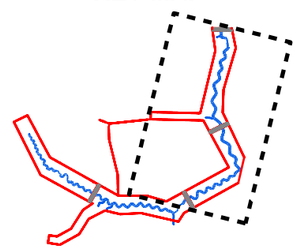
Feature	Northing	Easting
X4LPIN	1803776.9	662684.71
X4RPIN	1803763.44	662642
X5LPIN	1803811.81	662725.15
X5RPIN	1803819.13	662666.25
X6LPIN	1803896.64	663009.05
X6RPIN	1803932.51	663052.31
X7LPIN	1803806	663456.24
X7RPIN	1803840.21	663462.04
X8LPIN	1803831.83	663574.19
X8RPIN	1803866.42	663545.6
Vegplot1 NW	1803836.85	663303.28
Vegplot1 NE	1803836.96	663334.4
Vegplot1 SE	1803861.98	663335.03
Vegplot1 SW	1803862.66	663304.39
Vegplot2 N	1803512.3	662595.44
Vegplot2 E	1803534.62	662607.07
Vegplot2 S	1803546.09	662584.15
Vegplot2 W	1803524.04	662572.3
ELP	1804024.63	662810.76
NTLP	1803863.19	663945.28

Vegetation Photo Point 2B
Vegetation Plot #2
Vegetation Photo Point 2A
MATCHLINE - FIGURE 2a
Start NT Longitudinal Profile (NTLP)
Cross Section #7
Cross Section #8
Photo Point 1
North Tributary
Vegetation Plot #1
Vegetation Photo Point 1B
Vegetation Photo Point 1A
Photo Point 3
Cross Section #4
Cross Section #5
South Tributary
Cross Section #6
Photo Point 2
North Tributary
Erect Rd. SR 1003
End Longitudinal Profile (ELP)

LEGEND

- Fence
- Stream Crossing
- Stream Channel
- Cross Vane

KEY MAP



Ecosystem Enhancement Program

0 50 100 Feet

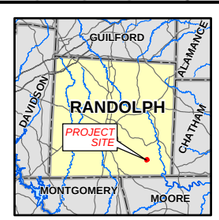


FIGURE 2b
YEAR-5 MONITORING REPORT
DEATON STREAM RESTORATION
UT's to Fork Creek
Randolph County, North Carolina
NOV **2007**

III. PROJECT CONDITION AND MONITORING RESULTS

The following results included in this report are summarized due to monitoring activities carried out during August 2007 at the Deaton Stream Restoration Site.

A. VEGETATION ASSESSMENT

Planted zones related to the stream restoration consist of the riparian buffer zone and the stream banks. The planted stream bank initiates at the normal base flow elevation and extends to the top of bank or interface with the floodplain. The riparian buffer zone begins at the top of the bank and continues out perpendicular to the immediate channel following the general pattern of the meandering channel.

1. Soil Data

Table V. Deaton Farm Preliminary Soil Data

Series	Max Depth (in.)	% Clay on Surface	K	T	OM %
Callison	40	4 – 20	0.43	3	0.5 - 2
Lignum	60	10 – 25	0 .3	4	0.5 - 2

2. Vegetative Problem Areas

No vegetation problem areas were identified at this site during this monitoring period.

3. Stem Counts

Using the previously established plots, two plots were surveyed August 27, 2007 for the 2007-monitoring season. No reference area was studied; therefore no comparisons could be made to reference conditions. Vegetation monitoring plots at Deaton Farm consists of two 50 ft x 50 ft plots. All planted woody stems are identified and counted. Each planted stem is flagged with colored ribbon annually. Tree species planted include green ash (*Fraxinus pennsylvanica*), willow oak (*Quercus phellos*), water oak (*Quercus nigra*), laurel oak (*Quercus laurifolia*), and southern red oak (*Quercus falcata*) (**Table VI**). No shrubs were planted at this site. The 2007 vegetation monitoring shows an average tree density of 331 trees per acre. This average exceeds the minimum success criteria of 260 trees per acre after five growing seasons.

4. Vegetation Conclusions

Across the site the vegetation is good. The banks have well established silky dogwood (*Cornus amomum*) and black willow (*Salix nigra*) and are very stable due to the vegetative cover. The buffer adjacent to the channel banks is dominated by green ash (*Fraxinus pennsylvanica*) and sycamore (*Platanus occidentalis*) as well as a number of oaks(*Quercus* sp). Natural regenerations in the buffer includes slippery elm (*Ulmus rubra*), sweet gum (*Liquidambar styriciflua*), black cherry (*Prunus serotina*), and eastern baccharis (*Baccharis halimifolia*), and red maple (*Acer rubrum*). Exotic species are present but appear to be minimally represented over the site. Herbaceous species include: soft rush (*Juncus effusus*), fescue (*Festuca* sp), Canada goldenrod (*Solidago canadensis*), beaked panicgrass (*Panicum anceps*), American burnweed (*Erechtites hieraciifolia*), dog fennel (*Eupatorium capillifolium*), smartweed (*Polygonum pennsylvanicum*), ragweed (*Ambrosia artemisifolia*). The fescue increased in occurrence with distance from the channel and in highest near the pasture fences. Shade from the trees and seedlings are decreasing occurrence and vigor of the fescue and it does not appear to be negatively impacting the site. The

exotic species includes multiflora rose (Rosa multiflora), Chinese privet (*Ligustrum sinense*) and Nepalese brown-top (*Microstegium vimineum*). Because of the limited occurrence control would be less extensive. Given the invasive nature of these species, a long-term view should be taken to determine if any control is needed.

Exhibit Table VI: Stem Counts For Each Species Arranged By Plot
Deaton 2007 - Monitoring Year 5

Species		Plots		Year 1 Totals	Year 2 Totals	Year 3 Totals	Year 4 Totals	Year 5 Totals	*Year 5 Survival
Scientific Name	**Common Name**	**VP 1**	**VP 2**						
Shrubs									
No Shrubs were planted									
Trees									
Fraxinus pennsylvanica	Green ash	5	7	11	15	13	12	12	109%
Quercus falcata	Southern red oak	0	1	1	1	9	1	1	100%
Quercus laurifolia	Laurel oak	0	0	8	3	4	0	0	0%
Quercus nigra	Water oak	3	1	6	2	1	3	4	67%
Quercus phellos	Willow oak	11	10	22	16	14	21	21	95%
Planted Stems Survival Summary Data		**Stems per Plot**		**Average**					
Trees per Plot - Year 1		23	25	24.0					
Trees per Plot - Year 2		17	22	19.5					
Trees per Plot - Year 3		22	19	20.5					
Trees per Plot - Year 4		19	18	18.5					
Trees per Plot - Year 5		19	19	19.0					
		Percent Survival		**Average**					
Year 1-Percent Survival		NA	NA	NA					
Year 2-Percent Survival		74 %	88 %	81%					
Year 3-Percent Survival		96 %	76 %	86%					
Year 4-Percent Survival		83 %	72 %	77%					
Year 5-Percent Survival		83 %	76 %	79%					
		Stems per Acre		**Average**					
Trees per Acre - Year 1		401	436	418					
Trees per Acre - Year 2		296	383	340					
Trees per Acre - Year 3		383	331	357					
Trees per Acre - Year 4		331	314	322					
Trees per Acre - Year 5		331	331	331					

Plot are 2500 square feet
**Survival based on Year 1 stem count*

5. Vegetation Plot Photos

Photos of the vegetation plots are located in Appendix B. Photos were taken at permanent vegetation photo points located at each vegetation plot. All vegetation photo point locations are shown on the Deaton Monitoring Plan Views (Figures 2a and 2b).

B. STREAM ASSESSMENT

1. Success Criteria

The success criteria, as defined by federal guidelines for stream mitigation, includes the following main parameters: no less than two bankfull events for the five-year monitoring period, reference photos, plant survival analyses, and channel stability analyses.

Natural streams are dynamic systems that are in a constant state of change. Longitudinal profile and cross section surveys may differ somewhat from year to year. Natural channel stability is achieved by allowing the stream to develop a proper dimension, pattern, and profile such that, over time, channel features are maintained and the stream system neither aggrades nor degrades. A stable stream consistently transports its sediment load; however, there may be local deposition and scour. Channel instability occurs when the scouring process leads to degradation, or excessive sediment deposition results in aggradation. The following surveys were conducted in support of the monitoring assessment:

- Longitudinal Profile Survey. This survey addressed the overall slope of the reach, as well as slopes of bed features including riffles, runs, pools, and glides. The surveys are compared on a yearly basis to note changes in the profile. The longitudinal profile may adjust slightly from year to year. Significant changes may require additional monitoring.

- Cross Section Surveys. These surveys are conducted to assess cross-sectional geometry including entrenchment ratio, cross-sectional area, and width to depth ratio. The entrenchment ratio is a computed index value used to describe the degree of vertical containment. The width to depth ratio is an index value which describes the shape of the channel cross section.

2. Stream Description

The proposed design for the southern UT to Fork Creek was an E4 stream type. A total of five cross sections (two pools and three riffles) were surveyed along the tributary. Survey data indicate that the channel is stable and there has been little change in physical parameters since construction. Overall the channel appears to be narrowing and deepening slightly. Bed material analysis (pebble count) data indicate riffle bed materials are becoming coarser.

The proposed design for the northern UT to Fork Creek was an E4 stream type. Three cross sections (one pool and two riffles) were surveyed along the tributary. Survey data indicates that the channel is stable and there has been little change in physical parameters. Overall the channel appears to be widening slightly. Pebble count data indicated a slight change in riffle bed material.

A comparison of channel morphology is presented in Table VII.

Table VII. 2007 Deaton Abbreviated Morphological Summary

Variable		Southern Tributary (Combined Cross Sections # 1 Thru #5)					
		Pre-Const.	Year 1	Year 2	Year 3	Year 4	Year 5
Drainage Area (mi^2)		0.15	0.15	0.15	0.15	0.15	0.15
Bankfull Width (ft)	Mean	3 – 20	14.3	10.0	12.0	13.0	9.8
Bankfull Mean Depth (ft)	Mean	0.4 – 1.3	0.6	0.6	0.8	0.7	0.74
Width/Depth Ratio	Mean	6.5	30.9	31.1	15.6	18.6	14.96
Bankfull Cross Sectional Area (ft^2)	Mean	2 – 18	8.2	5.9	9.8	9.4	7.14
Maximum Bankfull Depth (ft)	Mean	0.8 – 2.7	1.4	1.2	1.6	1.7	1.58
Width of Floodprone Area (ft)	Mean	8 – 160	44	46	NA	34.6	39.6
Entrenchment Ratio	Mean	2.6	4.2	6.3	4.1	2.5	4.2
Bank Height Ratio	Mean	NA	1.00	1.00	NA	1.00	1.04
Slope		0.008 – 0.02	0.014	0.015	0.03	0.016	0.016
Particle Sizes (Riffle Sections)							
D_{16} (mm)		0.1	<0.0062	<0.0062	NA	<0.0062	<0.0062
D_{35} (mm)		1	0.31	<0.0062	NA	6	<0.0062
D_{50} (mm)		9	6.6	2.0	0.5	12	8.7
D_{84} (mm)		29	23	16	18.4	27.5	41
D_{95} (mm)		128	42	38	NA	NA	77

NA-Historical data not available at the final submission of this report.

(Table VII continued)

Variable		Northern Tributary (Combined Cross Sections #6 Thru #8)					
		Pre-Const.	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Drainage Area (mi^2)		0.35	0.35	0.35	0.35	0.35	0.35
Bankfull Width (ft)	Mean	3 – 20	13.1	14.6	13.6	15.0	15.6
Bankfull Mean Depth (ft)	Mean	0.4 – 1.3	1.06	1.0	1.0	0.9	0.86
Width/Depth Ratio	Mean	10.2	14	18.3	13.8	16.7	19.13
Bankfull Cross Sectional Area (ft^2)	Mean	2 – 18	13.8	14.8	13.8	13.7	13.67
Maximum Bankfull Depth (ft)	Mean	0.8 – 2.7	1.9	2	1.8	1.9	2.0
Width of Floodprone Area (ft)	Mean	8 – 160	70	70	NA	37	45.0
Entrenchment Ratio	Mean	4.9	5.7	4.7	3.0	2.6	2.9
Bank Height Ratio (BHR)	Mean	NA	1.02	1.00	NA	1.00	1.00
Slope (ft/ft)		0.008 – 0.02	0.008	0.008	0.02	0.006	0.0057
Particle Sizes (Riffle Sections)							
D_{16} (mm)		0.1	<0.0062	<0.0062	NA	<0.0062	<0.0062
D_{35} (mm)		1	4.8	<0.0062	NA	3.4	7.6
D_{50} (mm)		9	9.9	<0.0062	0.4	7.2	11
D_{84} (mm)		29	29	23	16.3	27.5	42
D_{95} (mm)		128	49	41	NA	NA	73

NA-Historical data not available at the final submission of this report.

3. 2007 Stream Assessment Results

The assessment included the survey of eight cross sections associated with both tributaries, as well as the longitudinal profiles. Approximately 1410 linear feet of channel was surveyed along the northern UT. Approximately 2086 linear feet of channel was surveyed along the southern UT. Both 2007 northern and southern tributary longitudinal profiles are presented in Appendix A. After analysis of the longitudinal profiles and comparing them to the baseline data, some aggradation and degradation has taken place over the past five years. This is a natural function of the channel.

- Cross Section #1. Southern UT, Station 0+69, midpoint of pool
- Cross Section #2. Southern UT, Station 8+63, midpoint of riffle
- Cross Section #3. Southern UT, Station 19+00, midpoint of riffle

- Cross Section #4. Southern UT, Station 23+36, midpoint of riffle
- Cross Section #5. Southern UT, Station 24+17, midpoint of pool
- Cross Section #6. Northern UT, Station 4+51, midpoint of pool
- Cross Section #7. Northern UT, Station 5+76, midpoint of riffle
- Cross Section #8. Northern UT, Station 10+91, midpoint of riffle

The cross sections were established during the 2003 monitoring survey and were compared to later surveys to determine the extent of aggradation or degradation. All of the cross sections surveyed in monitoring 5 appear stable with little or no bank erosion. Only cross section numbers 2 and 3 had noticeable incision and erosion over the five year monitoring period but is not considered a problem. The 2007 cross sections are presented in Appendix A. Due to different interpretations of bankfull elevations, some parameters may appear to have significant change during the monitoring period. In 2006 and 2007 bankfull was assumed to be at the top of the low bank.

Pebble counts were conducted at each riffle cross section to determine the composition of bed material during the monitoring period. The comparison of pre-construction bed material data with subsequent monitoring data indicates that a drop in particle size in years 2 and 3 may have been temporary. Charts noting the particle size distributions are presented for the northern and southern UTs in Figures 3 and 4.

Figure 3. 2007 Deaton South Particle Size Distribution

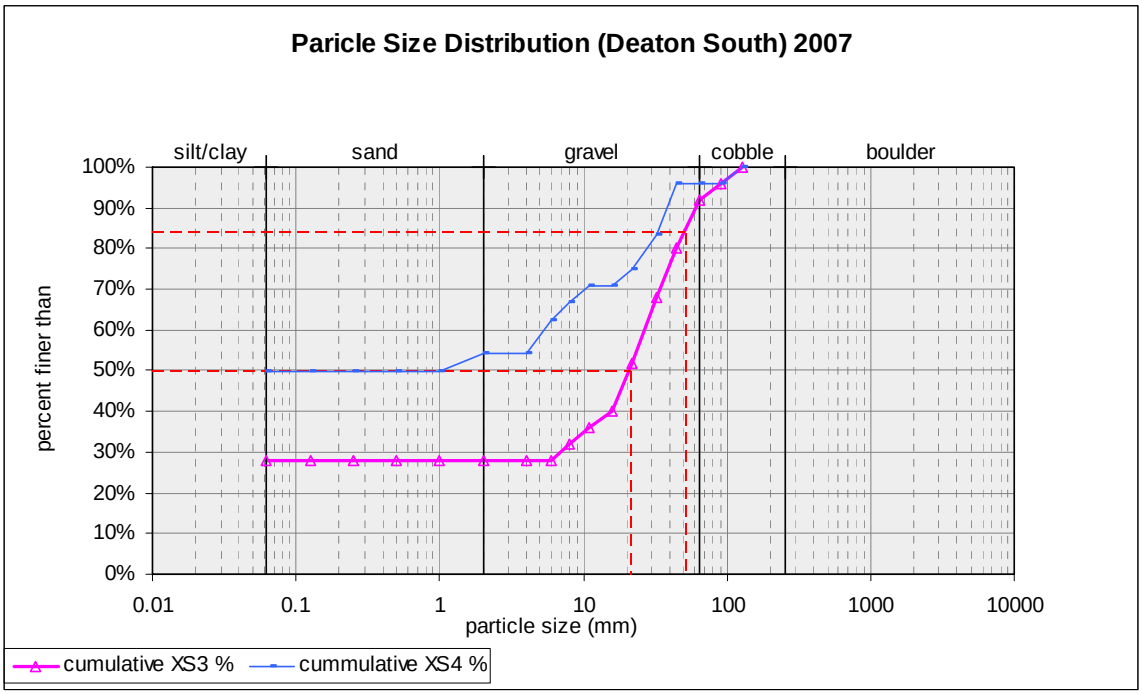
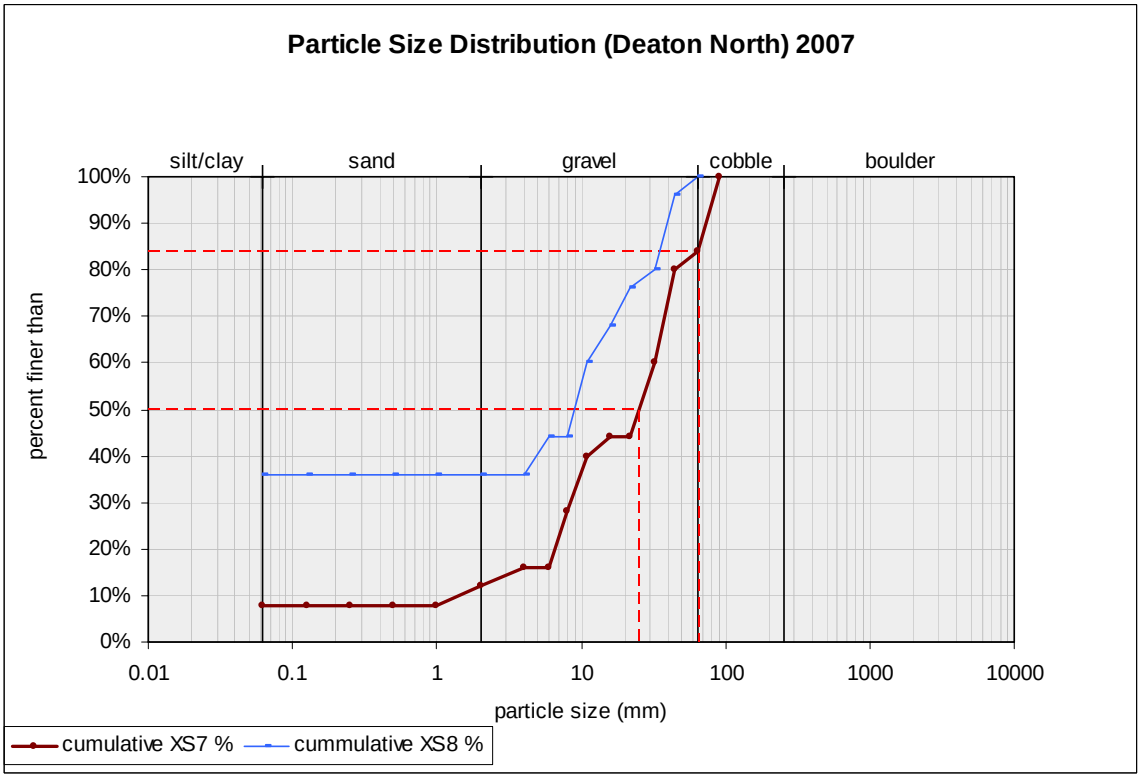


Figure 4. 2007 Deaton North Particle Size Distribution

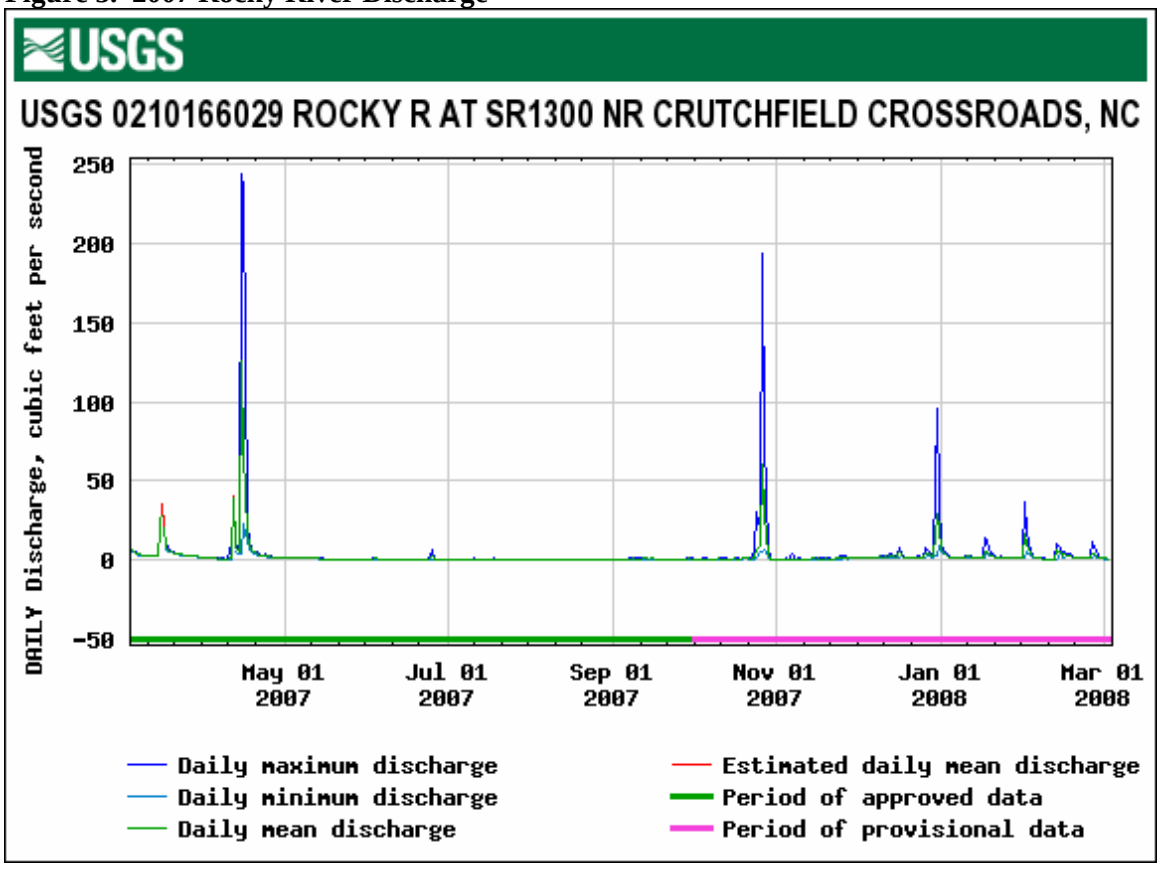


Climatic Data and Stream Flow Analysis

Monitoring requirements state that at least two bankfull discharge events must be documented during the five year monitoring period in order for the project to be deemed successful. No stream gauging station exists on Fork Creek or the two unnamed tributaries restored as a result of this project. A crest gauge was set up in Fall of 2007 at corrdinates X: 1804467.621, Y: 682801.607. Previous monitoring reports identified the Rocky River USGS stream gauge (02126000) as a suitable gauge to make inferences about flow events at the Deaton project site (Figure 5). This stream gauge has been used to establish the occurrence of bankfull flows for the history of this project. The technique used involves the comparison of discharge data at the gauge site with North Carolina Rural Piedmont discharge regional curve predictions of bankfull discharge. The number of flow events that exceeded the regional curve prediction of bankfull discharge at the gauge was assumed to be the number of bankfull or out-of-bank flow events at the project site. The technique described above utilizing the Rocky River stream gauge would indicate that multiple bankfull or out-of-bank events occurred during 2007. Field observations of bankfull flows at Deaton include wrack lines and flattened vegetation

It is not possible to definitively establish the occurrence of a bankfull flow event at the project site utilizing the above methodology.

Figure 5. 2007 Rocky River Discharge



4. Stream Problem Areas

In the course of 2007 monitoring activities three problem areas were identified. These areas are discussed below in Table VIII and can be located on the Deaton Current Conditions Plan View figures in Appendix C. Photos of each problem area are also located in Appendix C.

Table VIII. Stream Problem Areas
Deaton Farm Stream Restoration Site (EEP Project No. 110)

Feature Issue	Station Numbers	Suspected Cause	Photo Number
Rock Cross Vane Failure	28+10 (South)	Improper installation, boulders have become displaced and are in mid-channel.	PA #1
Erosion on right bank	33+60 (South)	Lack of bank stabilization	PA #2
Rock Cross Vane Failure	59+00 (North)	Improper installation, boulders have become displaced and are in mid-channel.	PA #3

The current problem areas are considered to be no threat to the success of this project. The displaced boulders from the rock cross vanes could create debris jams and/or minor bed erosion such as scouring and head cuts. Other minor areas of erosion and aggradation were noted during field investigations. These areas were deemed minor and no threat to channel stability or project goals. Problem areas mentioned in the 2006 year 4 monitoring report were reexamined during the monitoring activities and appeared to be stable.

5. Stream Conclusions

Overall, both UTs on the Deaton Stream Restoration Site remain stable. Few problems were observed during the 2007 monitoring activities. Minor areas of bank erosion exist along both stream reaches but are no threat. Two rock cross vane structures are recorded as problem areas due to failure. These structures have become displaced resulting in movement of the rock boulders to mid-channel. No corrective actions are recommended to fix these structures simply because it is no threat to this project being successful.

According to the federal guidelines for stream mitigation, the Deaton Stream Restoration Site has achieved the success criteria. Two bankfull events have occurred over the five year monitoring period. Reference photos have been taken throughout the project easement. Longitudinal profiles and cross sectional surveys show that both stream reaches are stable. The vegetation has also exceeded the success criteria with 331 trees per acre well over the 260 trees per acre requirement after 5 monitoring periods.

6. Deaton Current Conditions Plan View

An assessment of the stability of the channel was preformed on August 27, 2007, by WK Dickson and Co., Inc. Several areas of concern were observed and documented including structure failure and bank erosion. These problem areas are called out on the Deaton Current Conditions Plan View which is located in Appendix C.

7. Fixed Photo Station Photos

Photos from established photo points were collected on August 27, 2007 during the stream monitoring activities. These photos are included in Appendix B.

8. Stream Problem Area Photos

Representative photos of each category of stream problem area were taken and are shown in Appendix C.

RECOMMENDATIONS

The only recommendation for the Deaton Stream Restoration Site is to carry through with regulatory closeout on the project and other than that there are no recommendations for the Deaton Stream Restoration Site. Deaton Stream Restoration Site has achieved the federal guidelines for being success during a five year monitoring period.

References:

USACOE (2003) *Stream Mitigation Guidelines*. USACOE, USEPA, NCWRC, NCDENR-DWQ

USACOE (1987) *Corps of Engineers Wetlands Delineation Manual*. Tech report Y-87-1. AD/A176.

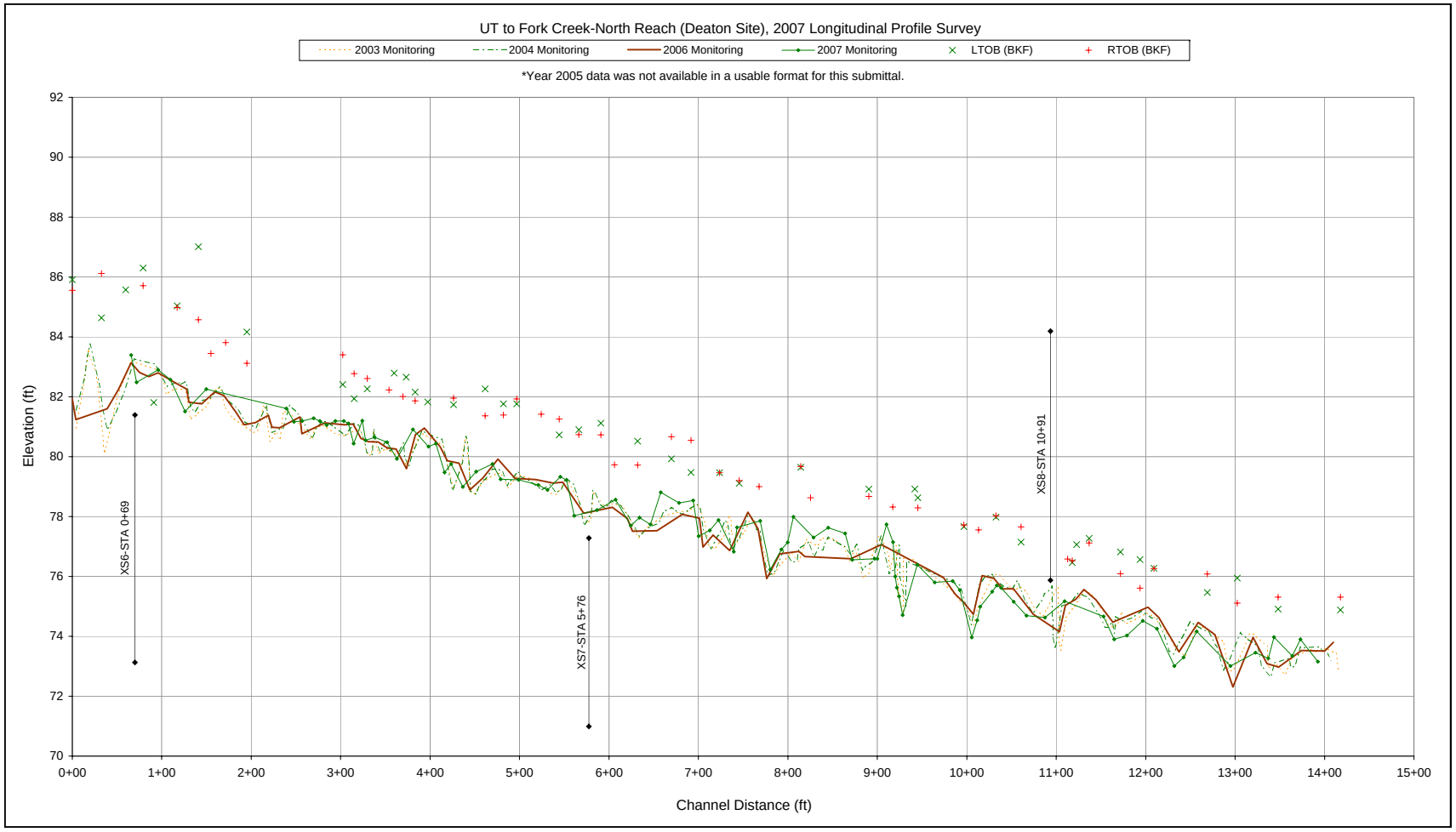
Rosgen, D.L. (1996) *Applied River Morphology*. Wildland Hydrology Books, Pagosa Springs, Co.

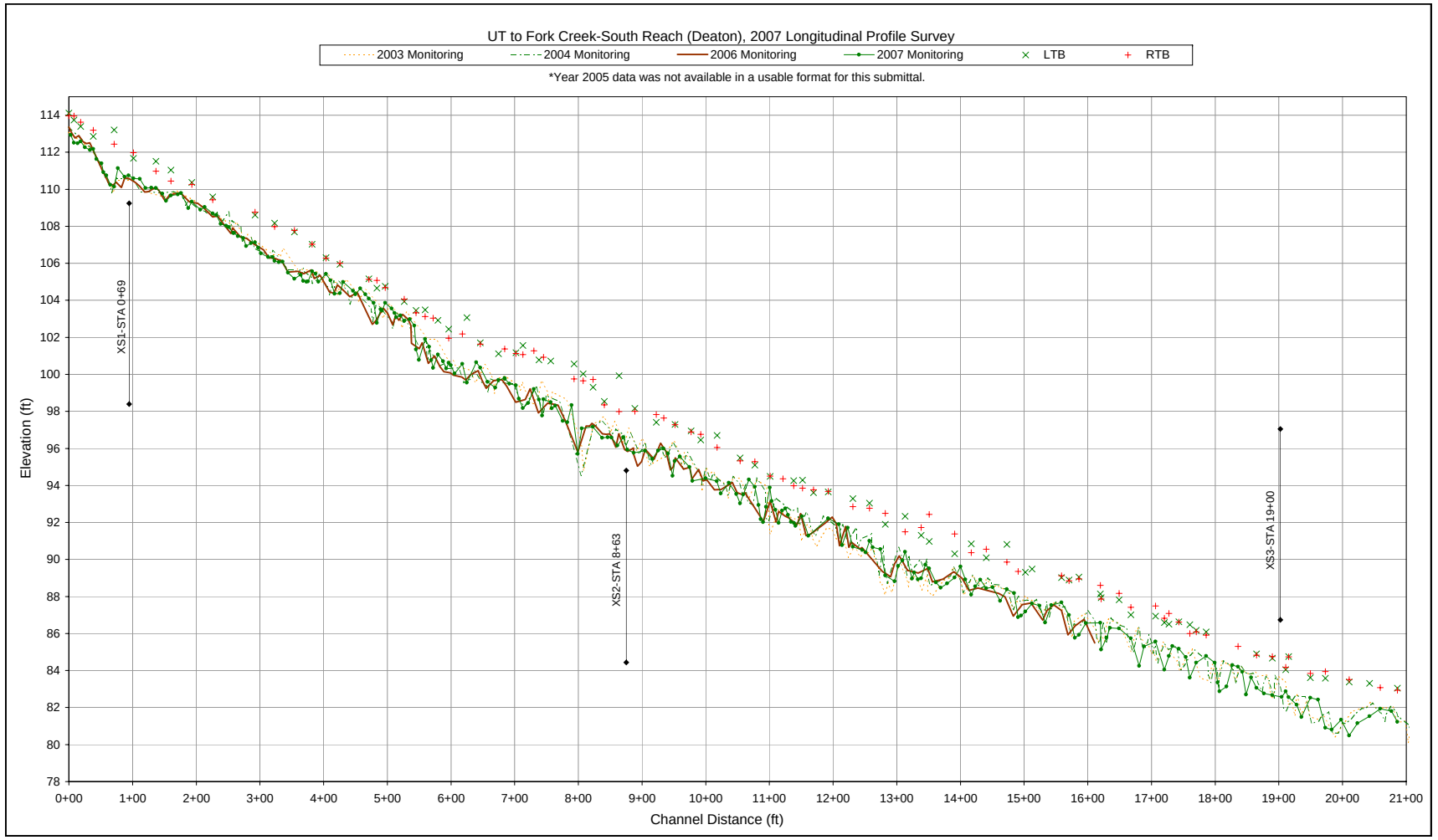
Radford, A.E., H.E. Ahles and F.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press, Chapel Hill, North Carolina.

APPENDIX A

DEATON 2007 (YEAR 5)
LONGITUDINAL PROFILES AND CROSS SECTIONS

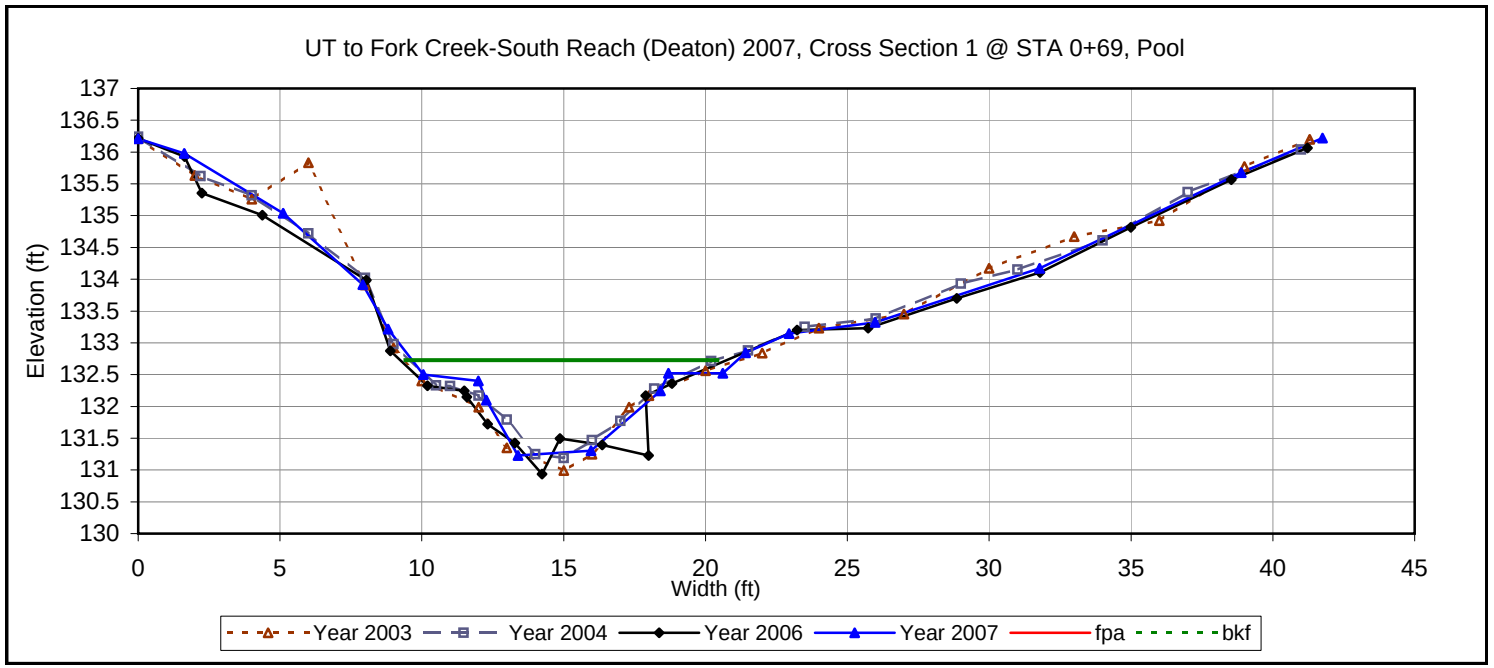
Deaton Site Longitudinal Profile Plots




UT to Fork Creek-South Reach (Deaton), 2007 Longitudinal Profile Survey
2003 Monitoring
2004 Monitoring
2006 Monitoring
2007 Monitoring
LTB
RTB
*Year 2005 data was not available in a usable format for this submittal.
Elevation (ft)
Channel Distance (ft)
XS1-STA 0+69
XS2-STA 8+63
XS3-STA 19+00

Looking at Left Bank.

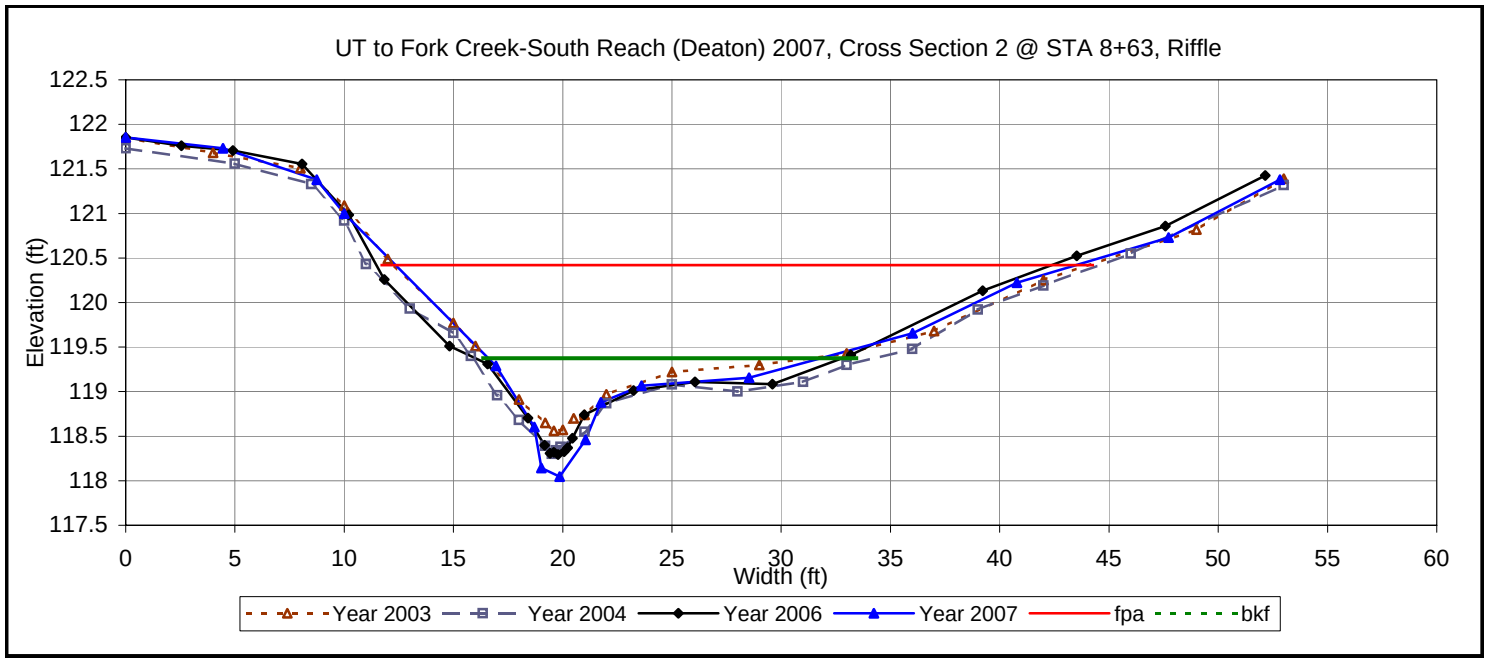
Looking at Right Bank.



*Year 2005 data was not available in a usable format for this submittal.

Looking at Left Bank.

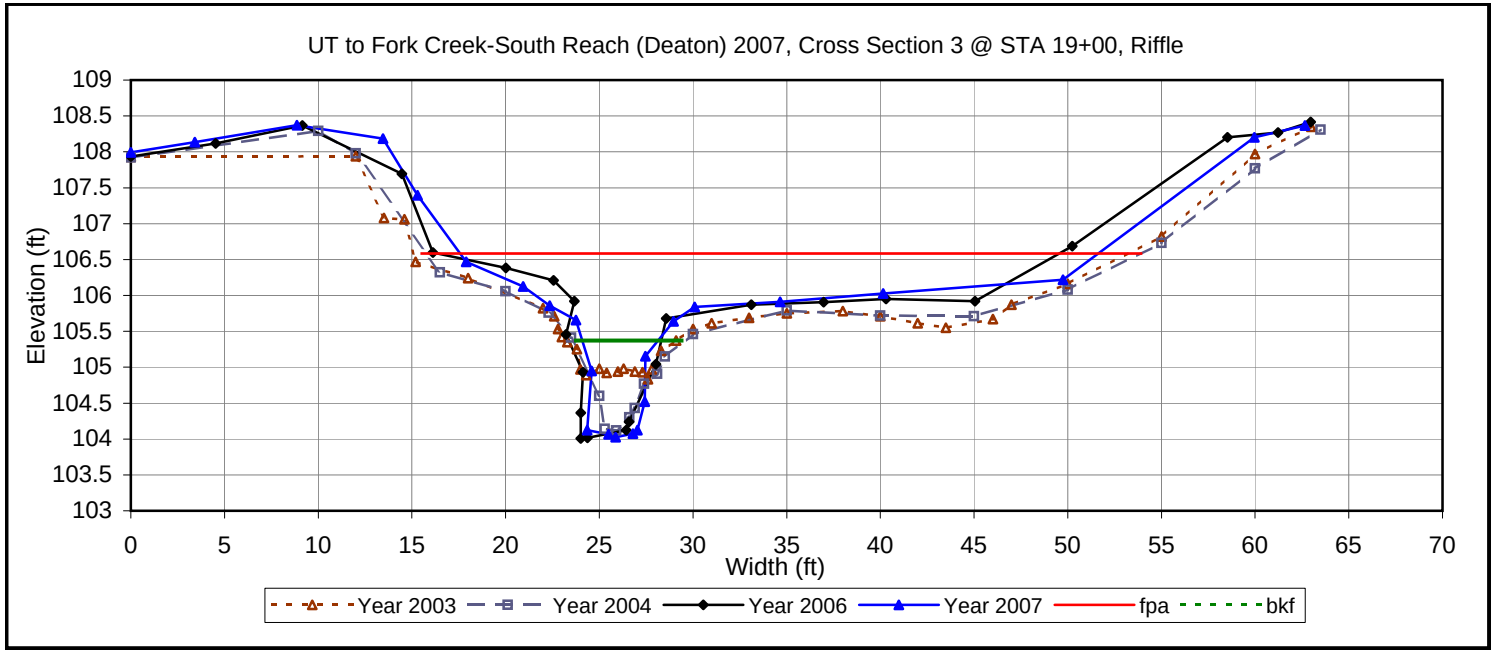
Looking at Right Bank.



*Year 2005 data was not available in a usable format for this submittal.

Looking at Left Bank.

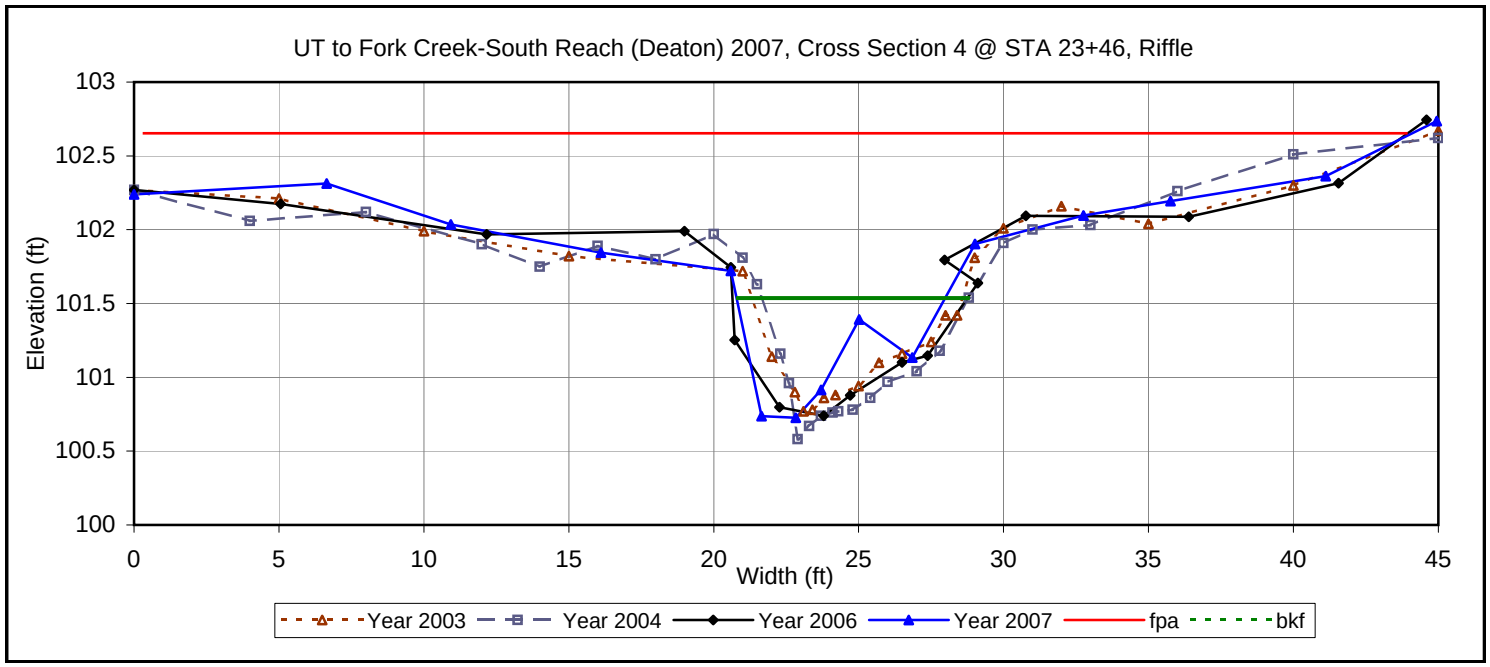
Looking at Right Bank.



*Year 2005 data was not available in a usable format for this submittal.

Looking at Left Bank.

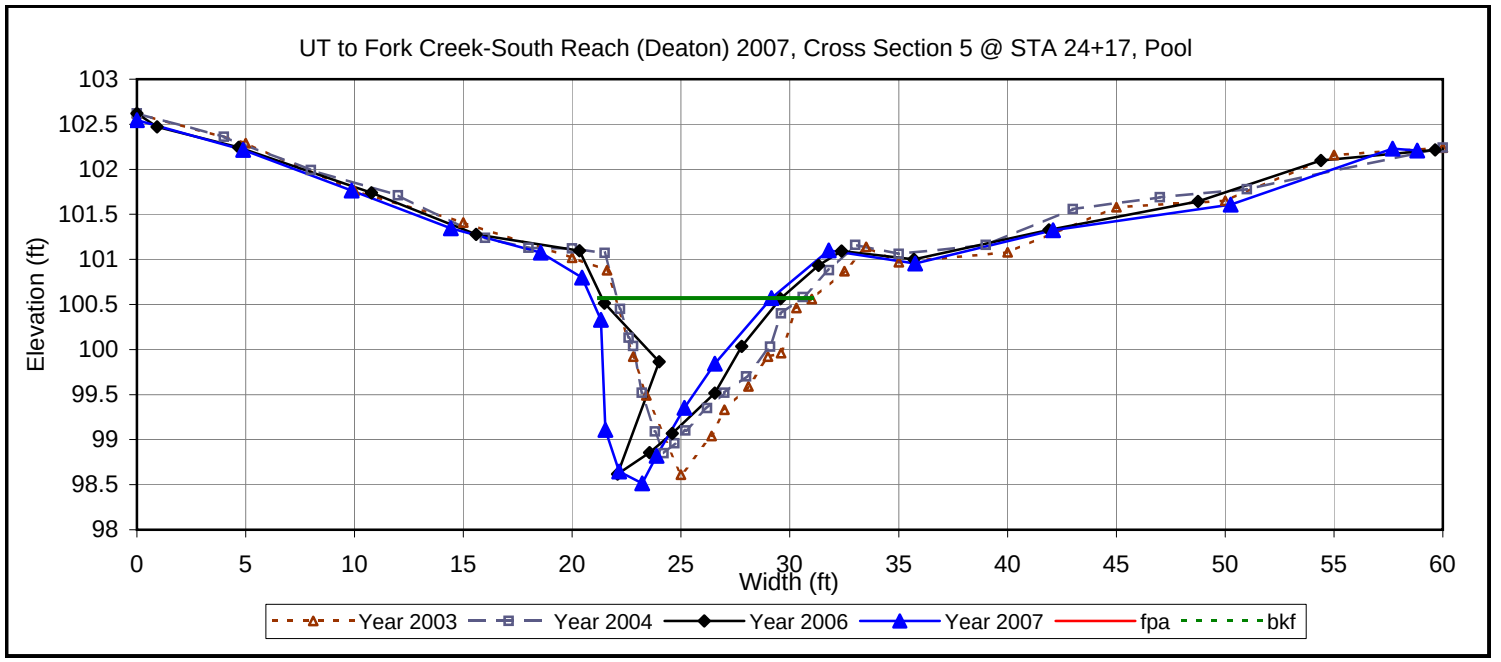
Looking at Right Bank.



*Year 2005 data was not available in a usable format for this submittal.

Looking at Left Bank.

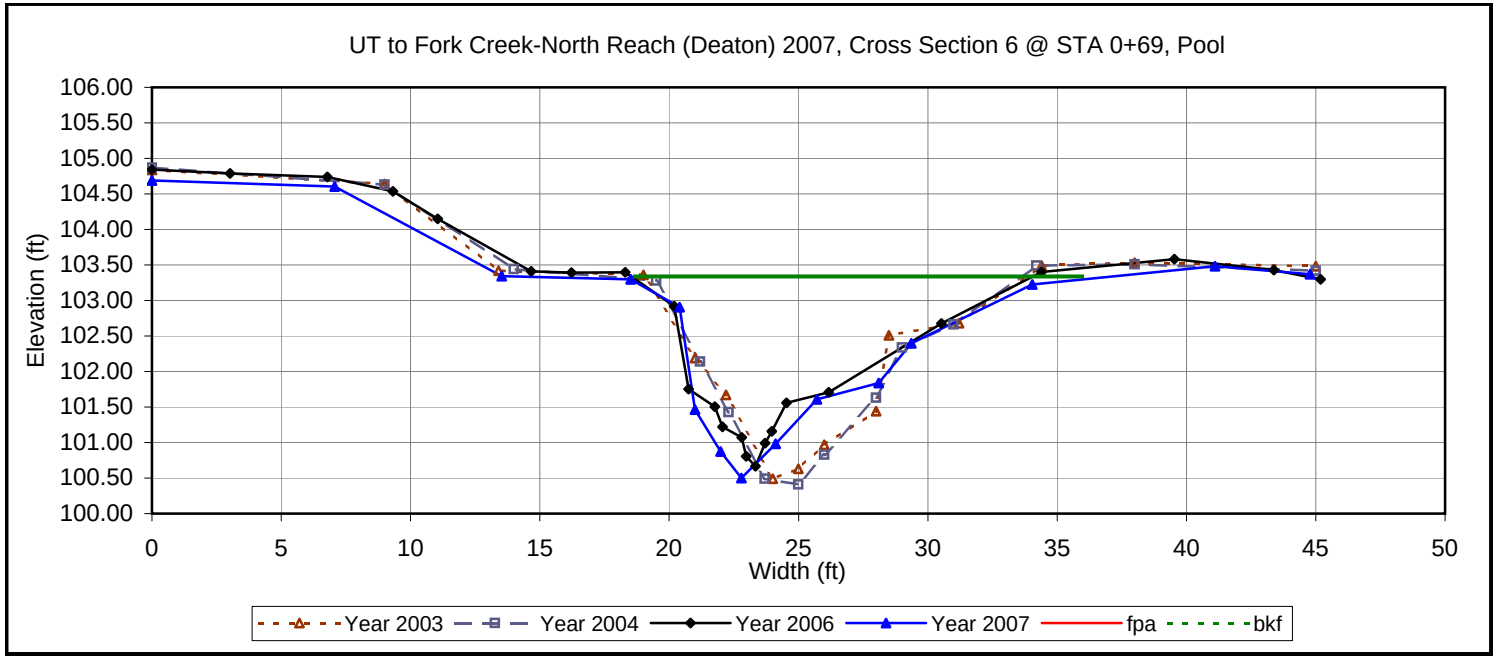
Looking at Right Bank.



*Year 2005 data was not available in a usable format for this submittal.

Looking at Left Bank.

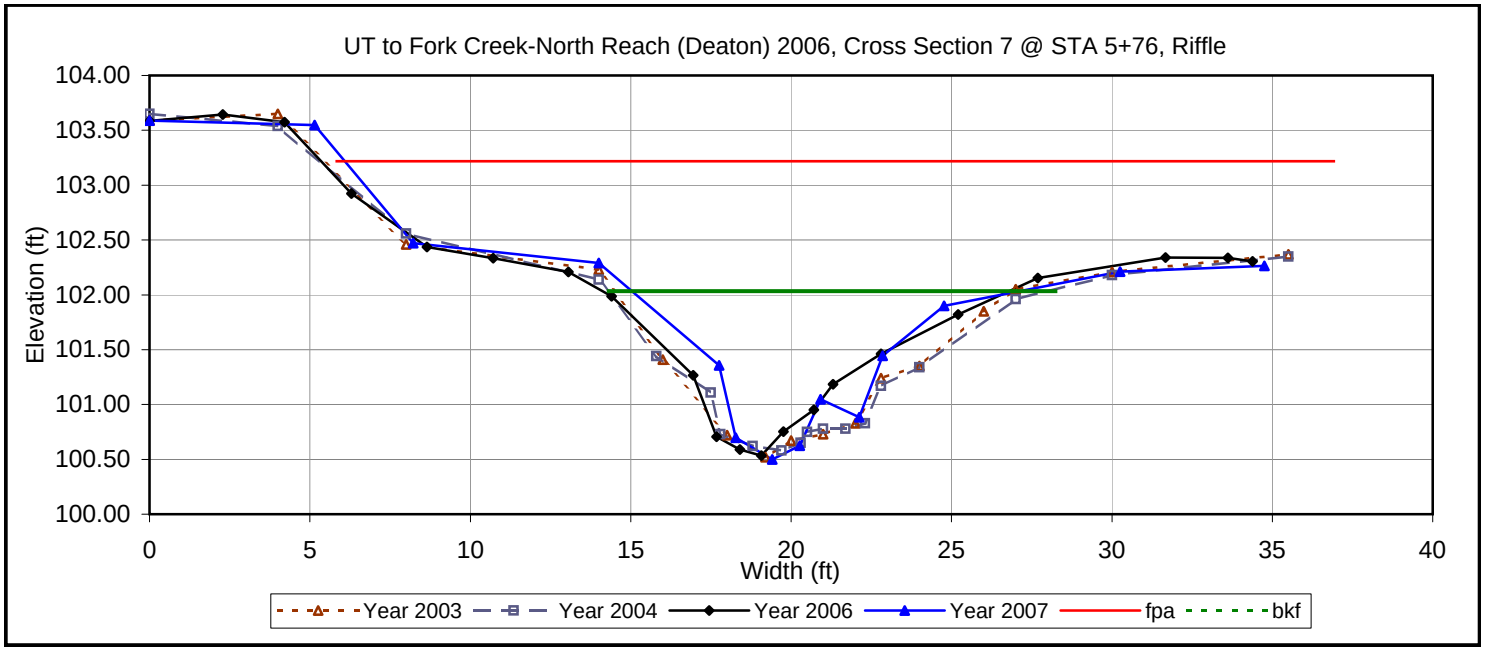
Looking at Right Bank.



*Year 2005 data was not available in a usable format for this submittal.

Looking at Left Bank.

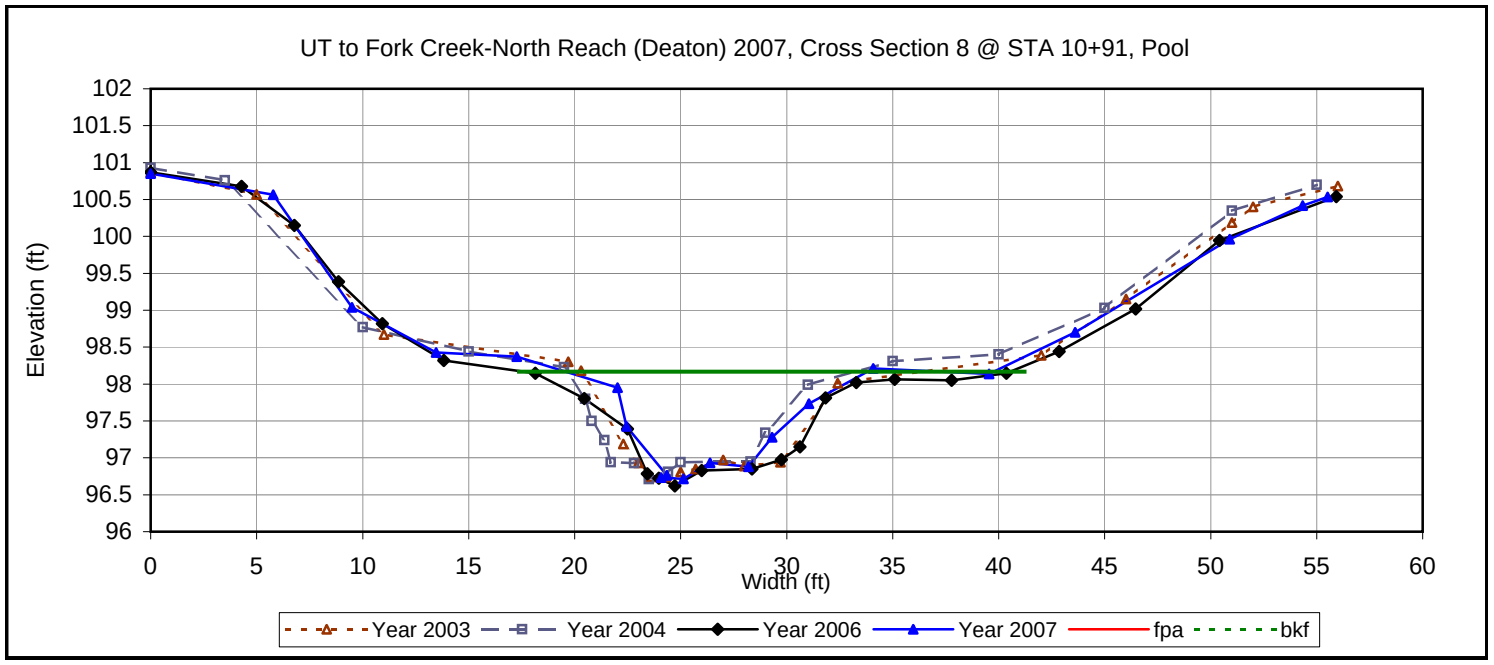
Looking at Right Bank.



*Year 2005 data was not available in a usable format for this submittal.

Looking at Left Bank.

Looking at Right Bank.



*Year 2005 data was not available in a usable format for this submittal.

APPENDIX B

DEATON 2007 (YEAR 5)
FIXED PHOTO POINTS AND VEGETATION PHOTOS

Photo Point #1 STA 61+25 Looking Downstream

Photo Point #1 STA 61+25 Looking Upstream

Photo Point #2 STA 51+50 Looking Upstream

Photo Point #2 STA 51+50 Looking Downstream

Photo Point #3 STA 31+80 Looking Downstream

Photo Point #3 STA 31+80 Looking Upstream

Photo Point #4 21+80 Looking Downstream

Photo Point #4 STA 21+80 Looking Upstream

Photo Point #5 STA 18+50 Looking Downstream

Photo Point #5 STA 18+50 Looking Upstream

Photo Point #6 STA 13+80 Looking Downstream

Photo Point #6 STA 13+80 Looking Upstream

Vegetation Photo Point 1A

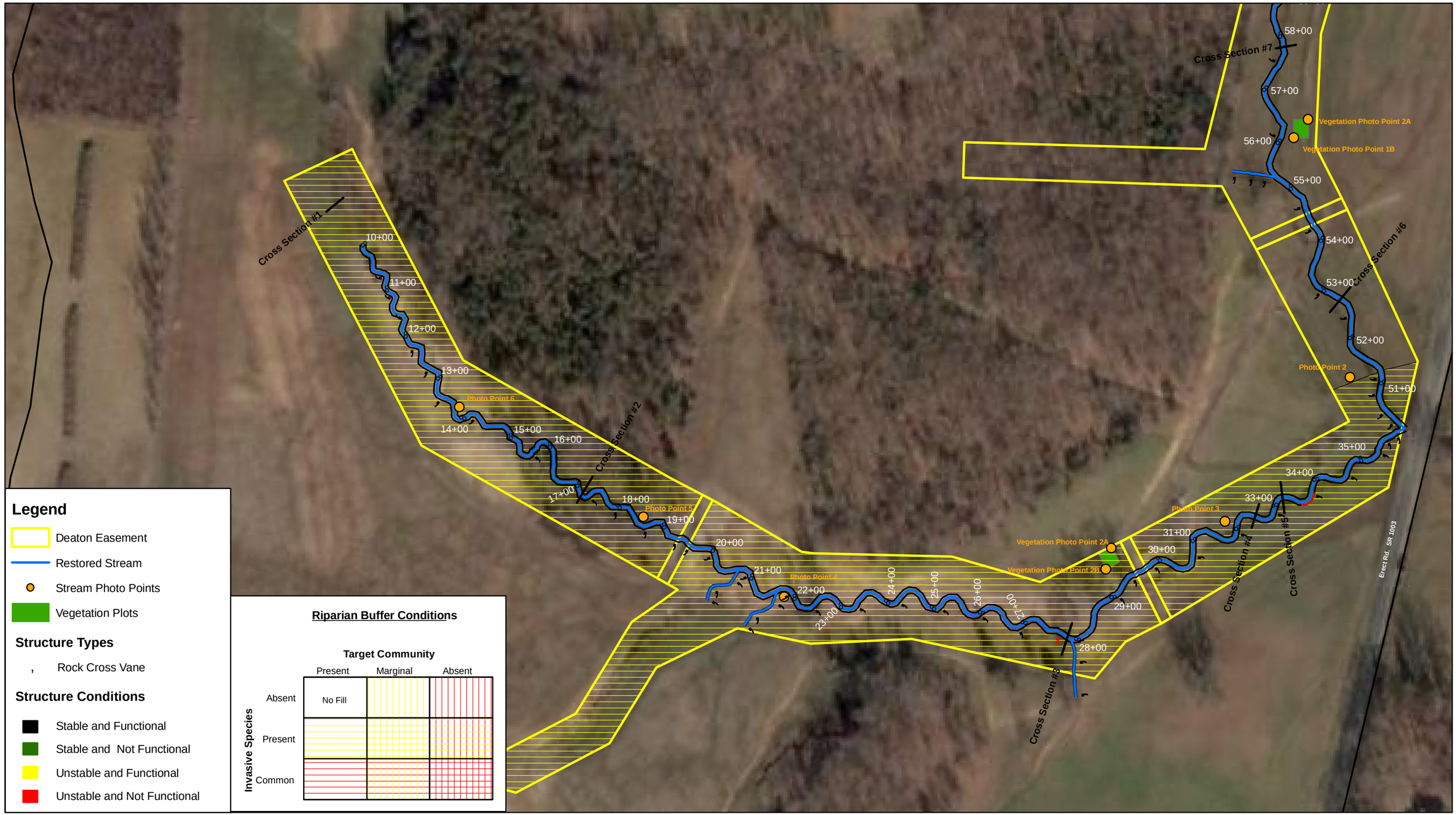
Vegetation Photo Point 1B

Vegetation Photo Point 2A

Vegetation Photo Point 2B

APPENDIX C

DEATON 2007 (YEAR 5)
DEATON CURRENT CONDITIONS PLAN VIEW AND PROBLEM AREA PHOTOS



Ecosystem Enhancement Program

Deaton Current Conditions Plan View A
Southern Tributary
Year 5 Monitoring
November 2007

0 75 150 300 Feet

64+00
63+00
62+00
61+00
Photo Point 1
60+00
Cross Section #8
59+00
58+00
Cross Section #7
57+00
Vegetation Photo Point 2A
56+00
Vegetation Photo Point 1B
55+00
Erect Rd. SR 1003
54+00
Cross Section #6
53+00
52+00
Photo Point 2
51+00
35+00

Legend

- Deaton Easement
- Restored Stream
- Stream Photo Points
- Vegetation Plots

Structure Types

- Rock Cross Vane

Structure Conditions

- Stable and Functional
- Stable and Not Functional
- Unstable and Functional
- Unstable and Not Functional

Riparian Buffer Conditions

Invasive Species \ Target Community	Present	Marginal	Absent
Absent	No Fill		
Present			
Common			

Ecosystem Enhancement Program

Deaton Current Conditions Plan View B
Southern Tributary
Year 5 Monitoring
November 2007

0 75 150 300 Feet

PA # 1 RCV structure failure. Boulders in mid-channel.
STA 28+10 (South Trib.)

Pa #2 Right bank erosion @ STA 33+60 (South Trib.)

PA # 3 RCV structure failure. Boulders in mid-channel.
STA 59+00 (North Trib.)