Project Closeout Summary—Deaton Site (2008)

Project ID & Status

Project Name/Number: **Deaton (Fork Creek & UTs)**
EEP ID : 110
County: Randolph
Project Type: Stream Restoration & Enhancement (DOT Transfer)
Current Status: 5 Years of Monitoring complete

Project Setting & Classifications

Basin: Deep River of Cape Fear
Physiographic Region: Piedmont
Drainage: Southern Trib (0.15 SM)
Northern Trib (0.5 SM)
Watershed: Rural Pasture, Imp cover <1%
Ecoregion: Carolina Slate Belt
USGS Hydro Unit: 03030003
NCDWQ Subbasin: 03-06-09
Thermal Regime: Warm
Trout Water: No

Project Timeline

Milestone	Date
Construction Completed	Jan 2003
Site Planted	Feb 2003
Monitoring Year-1	Fall 2003
Monitoring Year-2	Fall 2004
Monitoring Year-3	Fall 2005
Monitoring Year-4	Fall 2006
Monitoring Year-5	Fall 2007

Table 1. Project Restoration Components and Mitigation Assets

Stream			Asset Data						
	Drainage/Hydrology Component	Restoration Component	Asset Map #	Approach		Level	Ratio Multip	Feet	SMU
	South Branch Main (SBM)	Segment 1 (09+00 to 10+00)	1	Fence/Plant		EII	0.50	150	75
	South Branch Main (SBM)	Segment 2	2	P1/PII		R	1.00	2560	2560
	South Branch Trib 1 (SBM @20+00)	Segment 1 (Upper 550)	3	Fence/Plant		EII	0.50	550	275
	South Branch Trib 1 (SBM @20+00)	Segment 2 (Lower 85')	4	P2		R	1.00	150	150
	North Branch Main (NBM)	Segment 1	5	P1		R	1.00	1407	1407
	North Branch Trib 1 (NBM @55+55)	Segment 1 (Upper 400)	6	Fence/Plant		EII	0.50	400	200
	North Branch Trib 1 (SBM @55+55)	Stabilize lateral channel	7	Fence/Structures/Plant Aug		EI	0.67	60	40

Asset Summary

Level	Ratio	Multip	Feet	SMU
R	1:1	1.00	4117	4117
EI	1.5:1	0.67	60	40
EII	2:1	0.50	1100	550
			5277	**4707**

Project Background and Summary

The mitigation project includes approximately 5,400 linear feet of unnamed tributaries (UT) to Fork Creek, identified as the northern UT and the southern UT and their tributaries. Priority Level I and II restoration approaches were used to convert degraded and incised E and G channels to stable Bc, and E/C channels. 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.

Goals and Objectives

1. Protection of riparian zone vegetation and restored channels by excluding livestock and installing watering tanks, stream crossings, etc.;
2. Enhancement of overall stream stability by establishing the correct width to depth ratio, reducing entrenchment, sloping banks, and installing plantings
3. Stabilize the channel bed and provide habitat diversity through the use and proper placement of stream structures;
4. 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.

Success Criteria

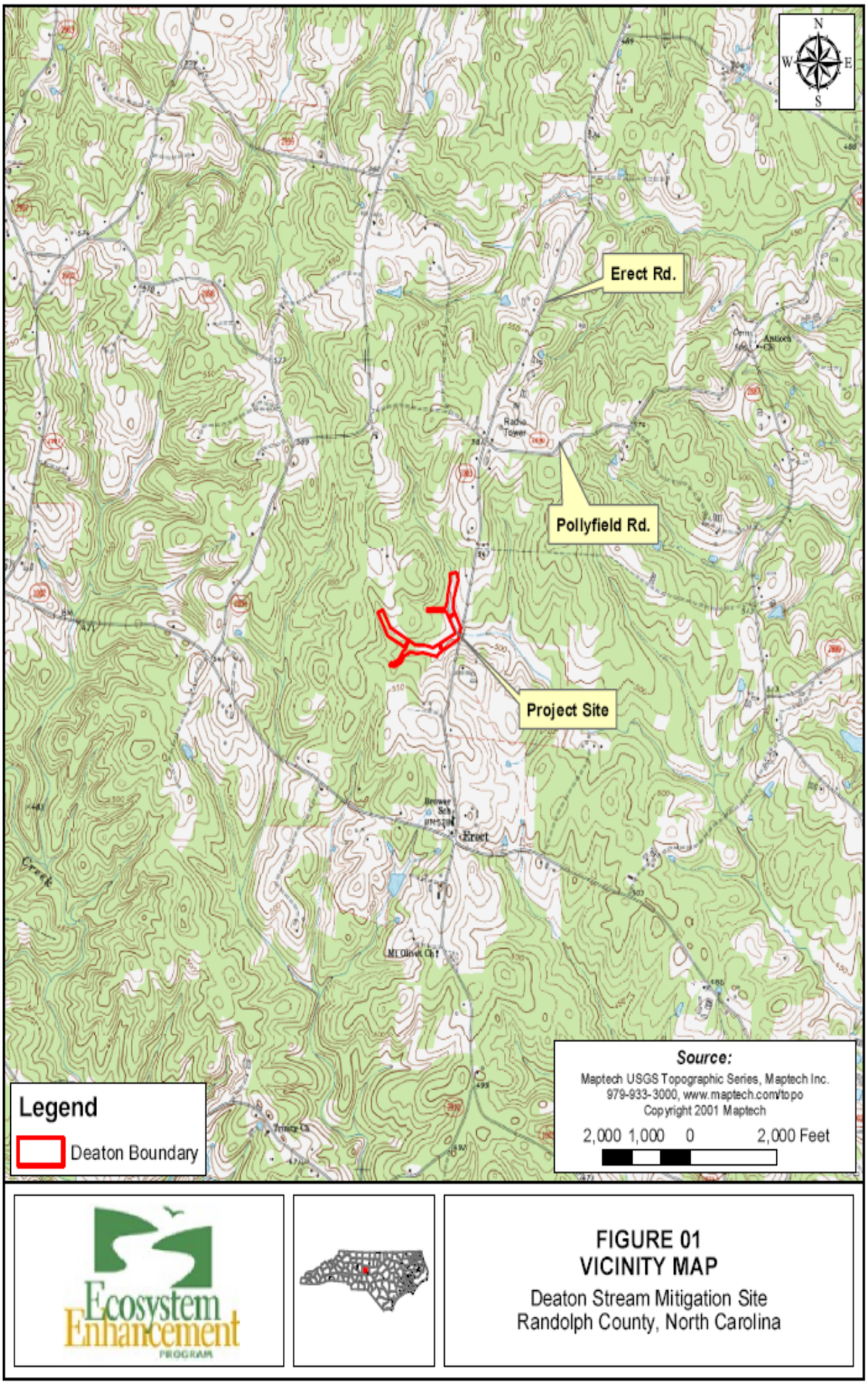
Natural streams are dynamic systems that are in a constant state of change. Longitudinal profile and cross section surveys may differ somewhat from year to year. Natural channel stability is achieved by allowing the stream to develop a proper dimension, pattern, and profile such that, over time, channel features are maintained and the stream does not demonstrate systemic degradational or aggradational trends. 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 systemic degradation, or excessive sediment deposition results in systemic 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.

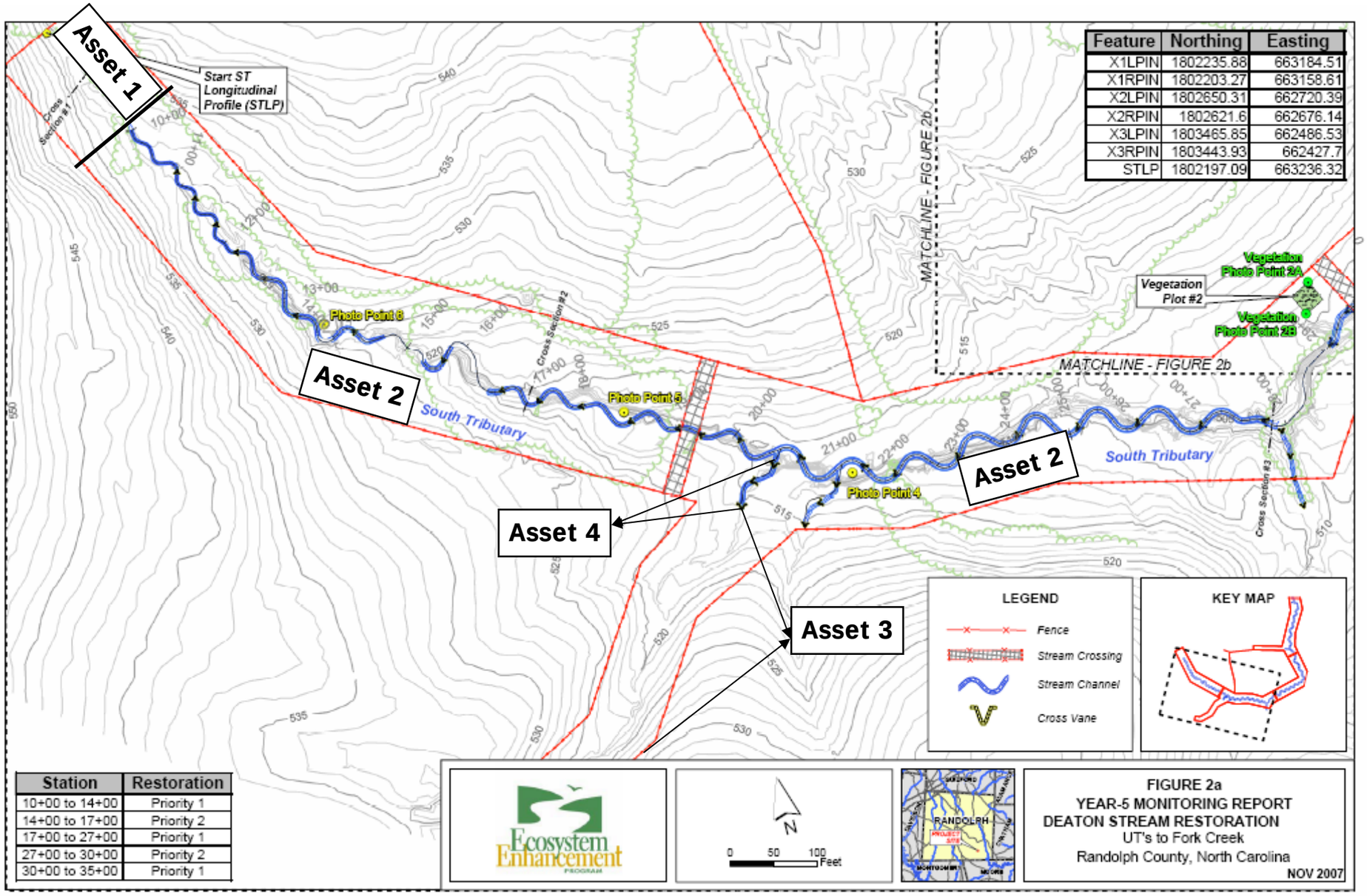
Cross Section Surveys. These surveys are conducted to assess cross-sectional geometry including entrenchment ratio, cross-sectional area, and width to depth ratio. The entrenchment ratio is a computed index value used to describe the degree of vertical containment. The width to depth ratio is an index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

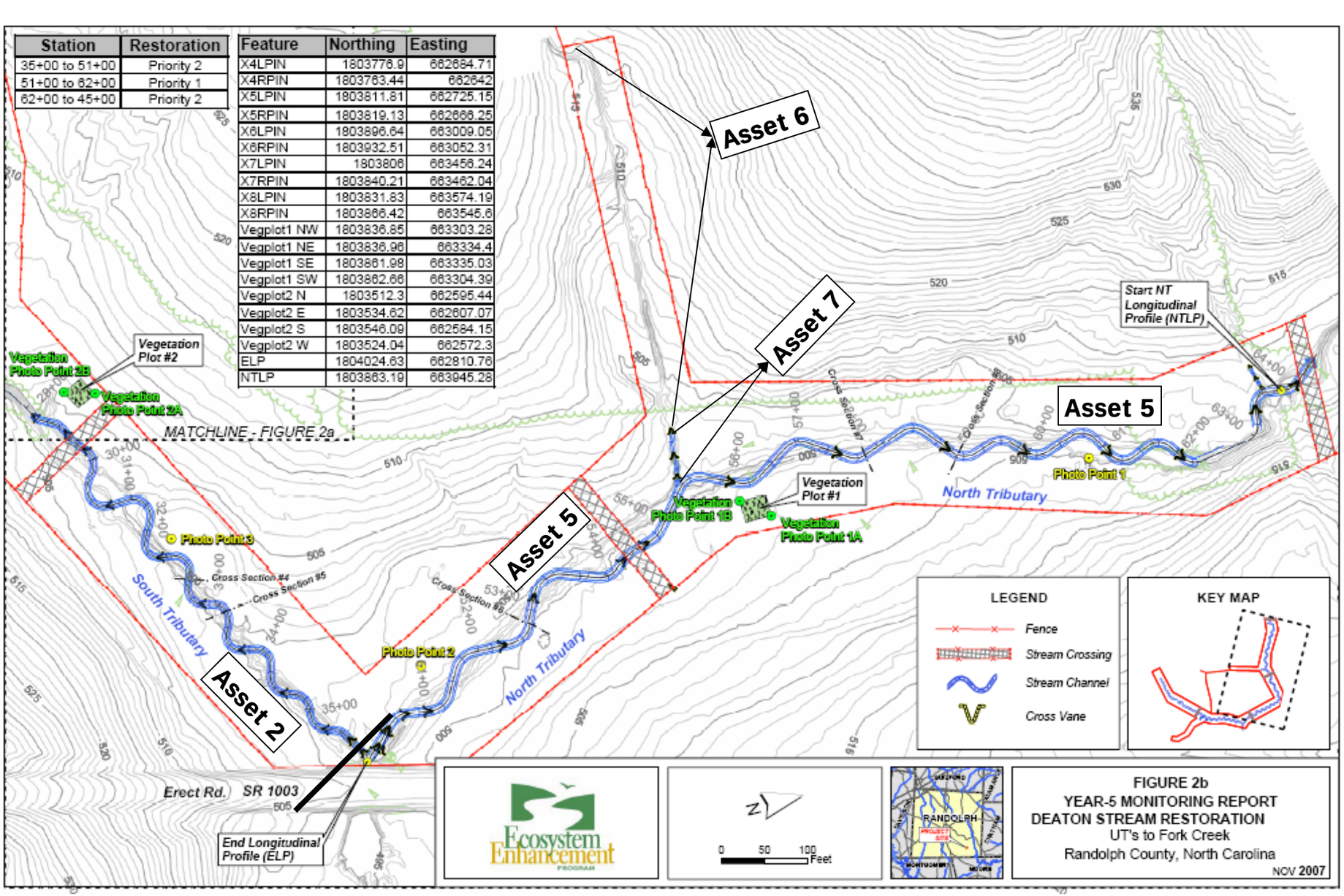
Substrate Data. The channels substrate should indicate particle size distributions appropriate for the bedform type (e.g. riffle/pool)

Project Vicinity Map



The Deaton Stream Restoration is located along 2 UTs to South Fork Creek adjacent to Erect Road (SR 1003) in the southern corner of Randolph County. It is 6 miles southeast of Coleridge and 1 mile north of Erect.


Asset 1
Start ST Longitudinal Profile (STLP)
Asset 2
South Tributary
Photo Point 8
Photo Point 5
Photo Point 4
Asset 4
Asset 3
Asset 2
South Tributary
MATCHLINE - FIGURE 2b
MATCHLINE - FIGURE 2b
Vegetation Plot #2
Vegetation Photo Point 2A
Vegetation Photo Point 2B
Cross Section #1
Cross Section #2
Cross Section #3
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
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
RANDOLPH
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 1803778.9 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
Asset 6
Asset 7
Asset 5
Asset 5
Asset 2
Start NT Longitudinal Profile (NTLP)
Vegetation Plot #2
Vegetation Photo Point 2B
Vegetation Photo Point 2A
MATCHLINE - FIGURE 2a
Vegetation Plot #1
Vegetation Photo Point 1B
Vegetation Photo Point 1A
Photo Point 1
Photo Point 3
Photo Point 2
North Tributary
South Tributary
North Tributary
Cross Section #4
Cross Section #5
Cross Section #6
Cross Section #7
Erect Rd. SR 1003
End Longitudinal Profile (ELP)
LEGEND
Fence
Stream Crossing
Stream Channel
Cross Vane
KEY MAP
RANDOLPH
0 50 100 Feet
Ecosystem Enhancement Program
FIGURE 2b
YEAR-5 MONITORING REPORT
DEATON STREAM RESTORATION
UT's to Fork Creek
Randolph County, North Carolina
NOV 2007

Pre-Construction Site Conditions

Post-Construction Site Conditions- 2007 Photos

Top of South tributary

South tributary Station ~19+00

South tributary Station ~24+00

Top of North tributary

North tributary Station ~5+63

North tributary Station ~11+00

Morphological Stability

Dimension and Profile

The projects dimension exhibited some minor localized instability through the course of the monitoring period, but overall the reaches were stable. The value of direct morphological measurement of extremely small channel sizes typical of a true headwater is of limited value, because of the sensitivity of the measurement system. In other words, on channels as small as those on the Deaton Site, particularly the Southern Branch, variations in survey/rod placement can create a good deal of variability in ratios such as the W/D or ER and monitoring on future projects with very small channels may be better assessed visually. However, the data and cross-section overlays indicate stability, (see plots on the following pages). The calculated cross-sectional areas were consistent over the monitoring period. The W/D ratios varied and indicated an overly wide system early on in monitoring, but this has as much to do with the aforementioned measurement sensitivity in small channels and how this can be magnified in the case of ratio data that is dependent upon 2 measured variables. The ER, BHRs and W/D ratios demonstrated stable stream forms. An area near station 19+00 on the Southern Tributary was subject to a headcut, which has since stabilized, but impacted the channels cross-section in that area. However, the projects profile does not indicate any systemic loss of bed elevation. Overall profile slopes maintained consistency and the bed retained bedform diversity/ definition (see profile figures).

Substrate Data

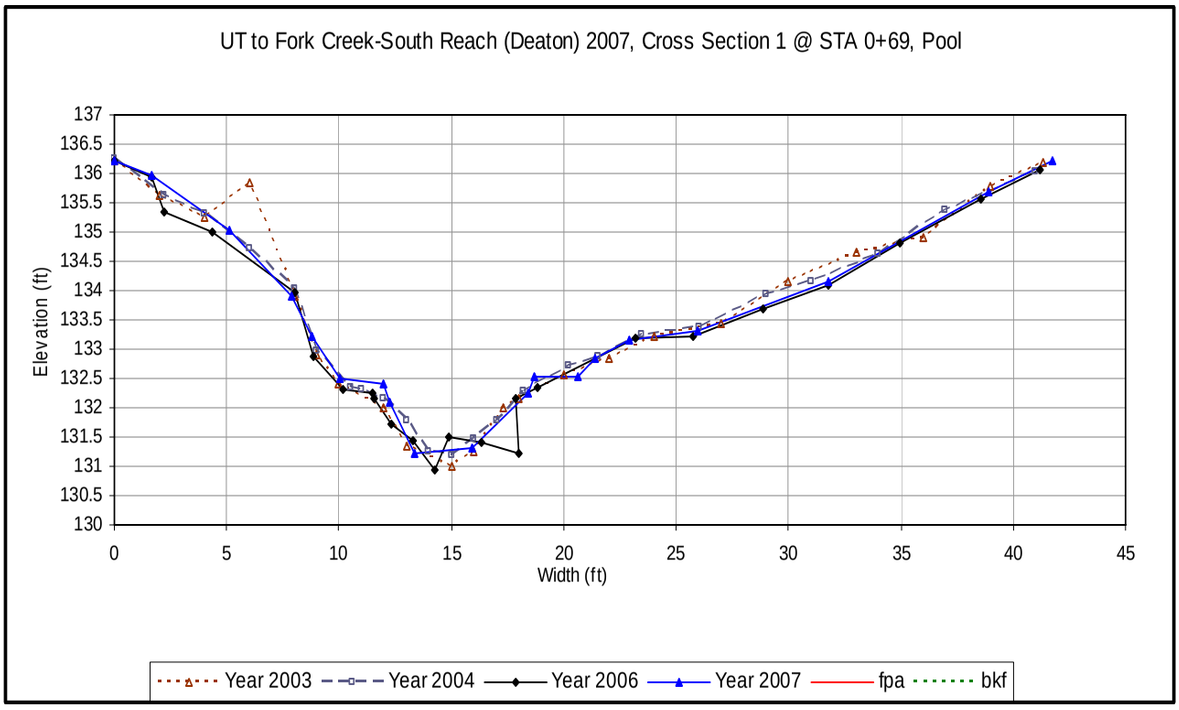
The particle distributions collected from riffle cross-sections indicated a coarseness in keeping with the sampling conducted as part of the design with a D50 within the range of medium gravel and a D84 within the range of coarse to very coarse gravel.

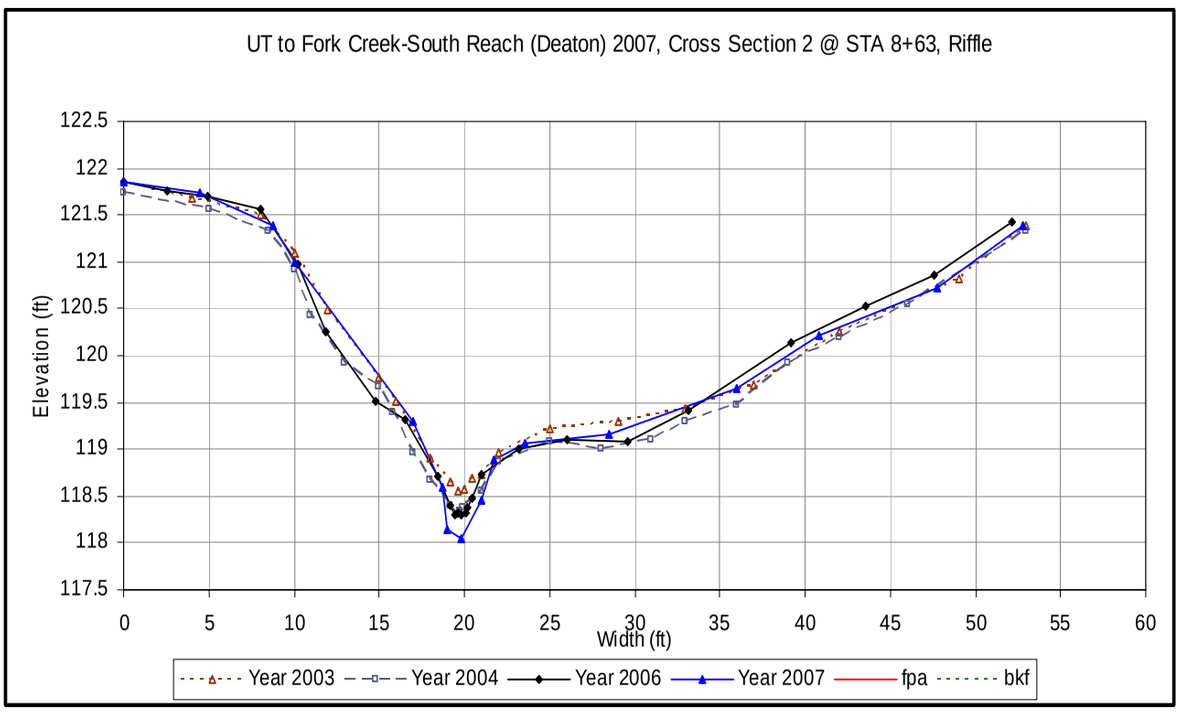
General Stability

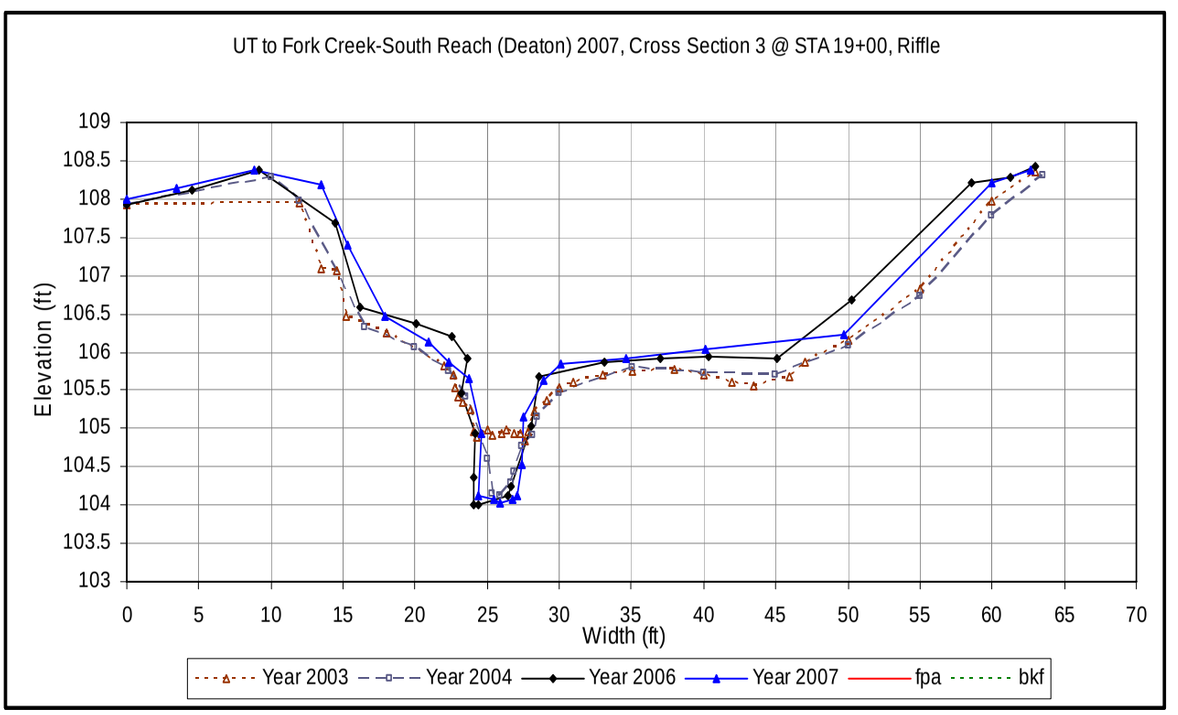
The site exhibited little bank erosion and these small headwater channels are surrounded by a densely vegetated woody buffer.

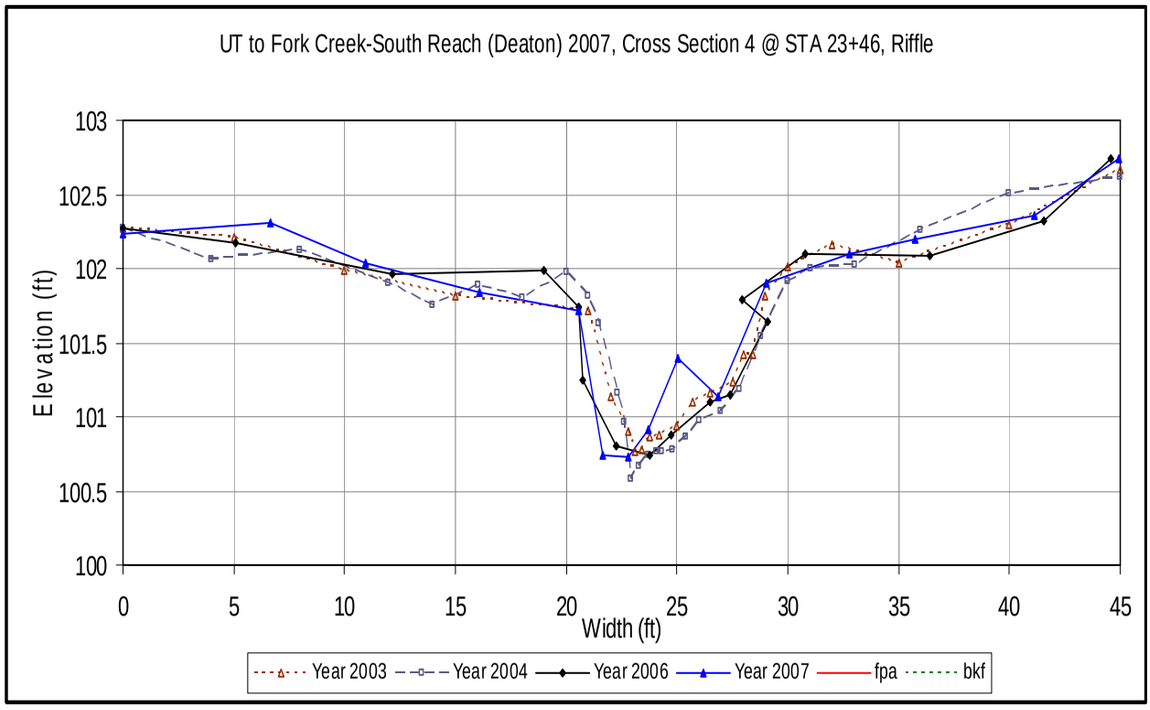
Hydrology

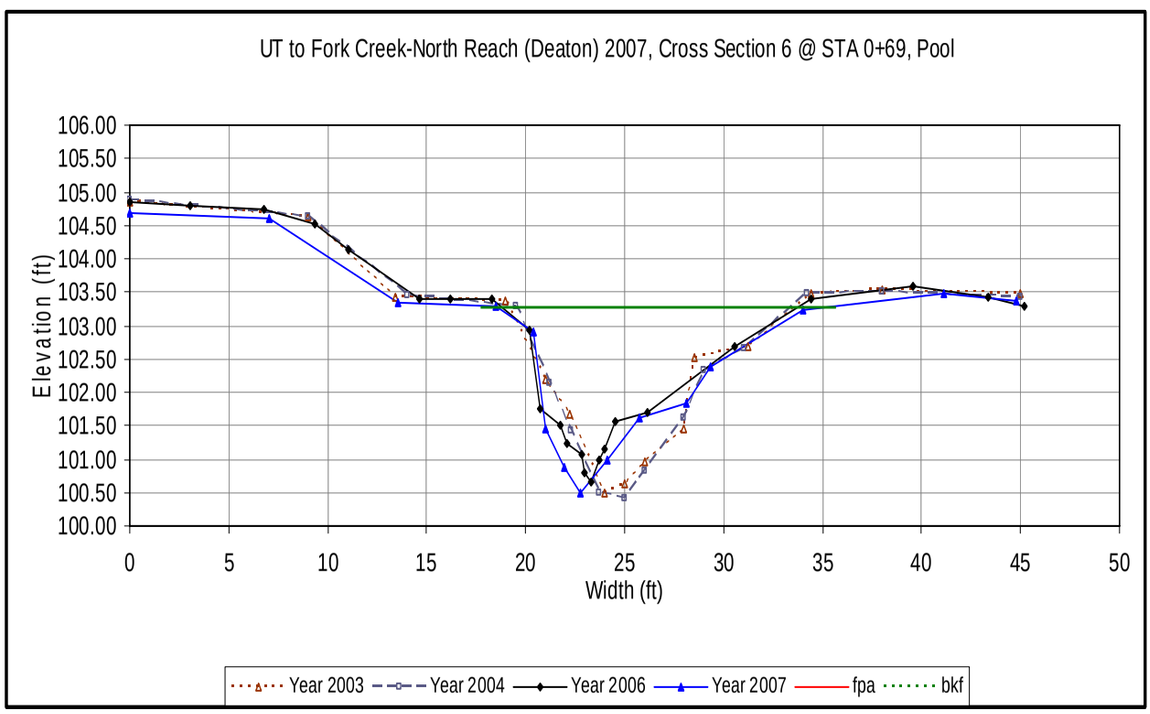
The data record from the monitoring reports indicate that the surrogate gauge used likely produced 2 events in 2003, 2 in 2005 and 2 between 2006 and 2007 for a total of six possible overbank events.

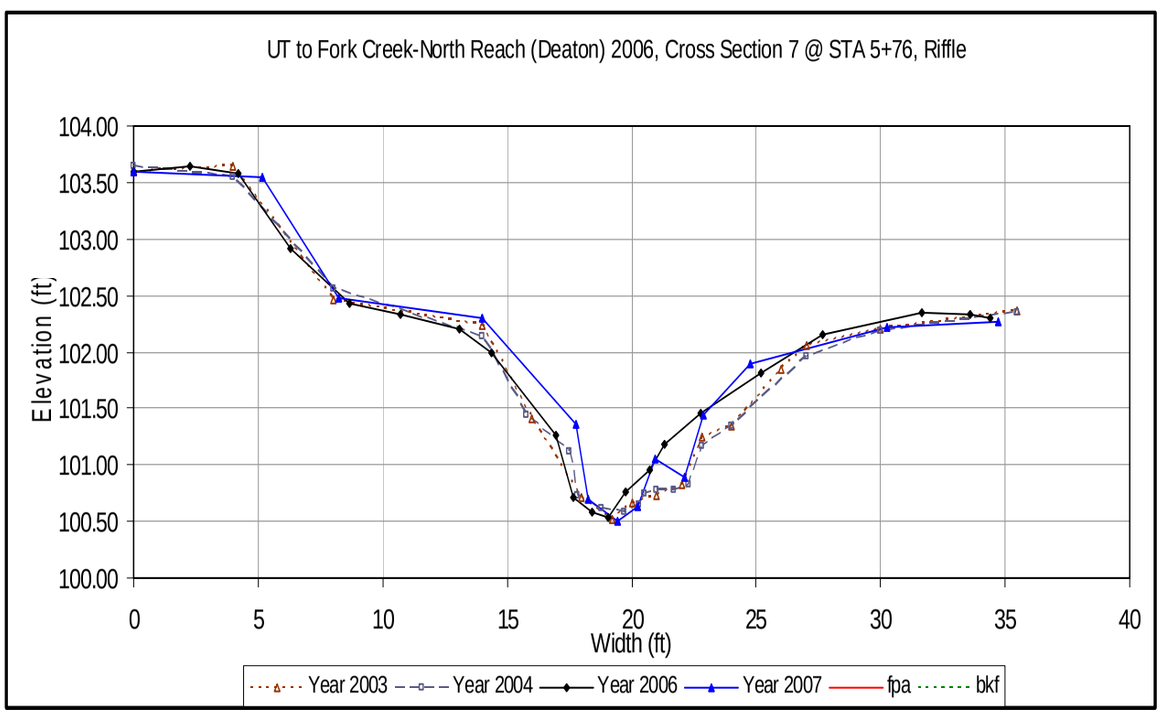

UT to Fork Creek-South Reach (Deaton) 2007, Cross Section 1 @ STA 0+69, Pool
Elevation (ft)
137
136.5
136
135.5
135
134.5
134
133.5
133
132.5
132
131.5
131
130.5
130
0
5
10
15
20
25
30
35
40
45
Width (ft)
Year 2003
Year 2004
Year 2006
Year 2007
fpa
bkf

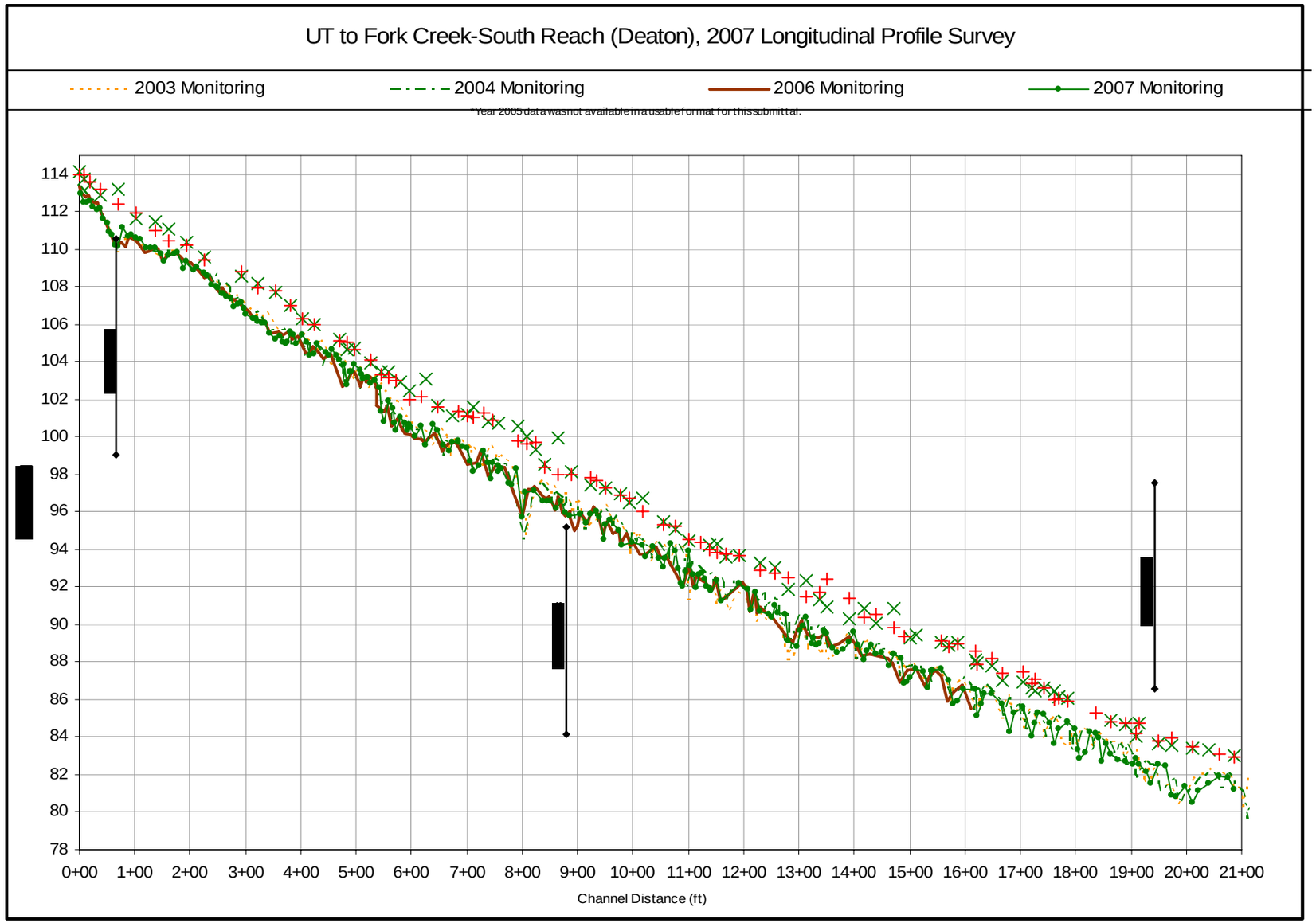

UT to Fork Creek-South Reach (Deaton) 2007, Cross Section 2 @ STA 8+63, Riffle
Elevation (ft)
122.5
122
121.5
121
120.5
120
119.5
119
118.5
118
117.5
0
5
10
15
20
25
30
35
40
45
50
55
60
Width (ft)
Year 2003
Year 2004
Year 2006
Year 2007
fpa
bkf

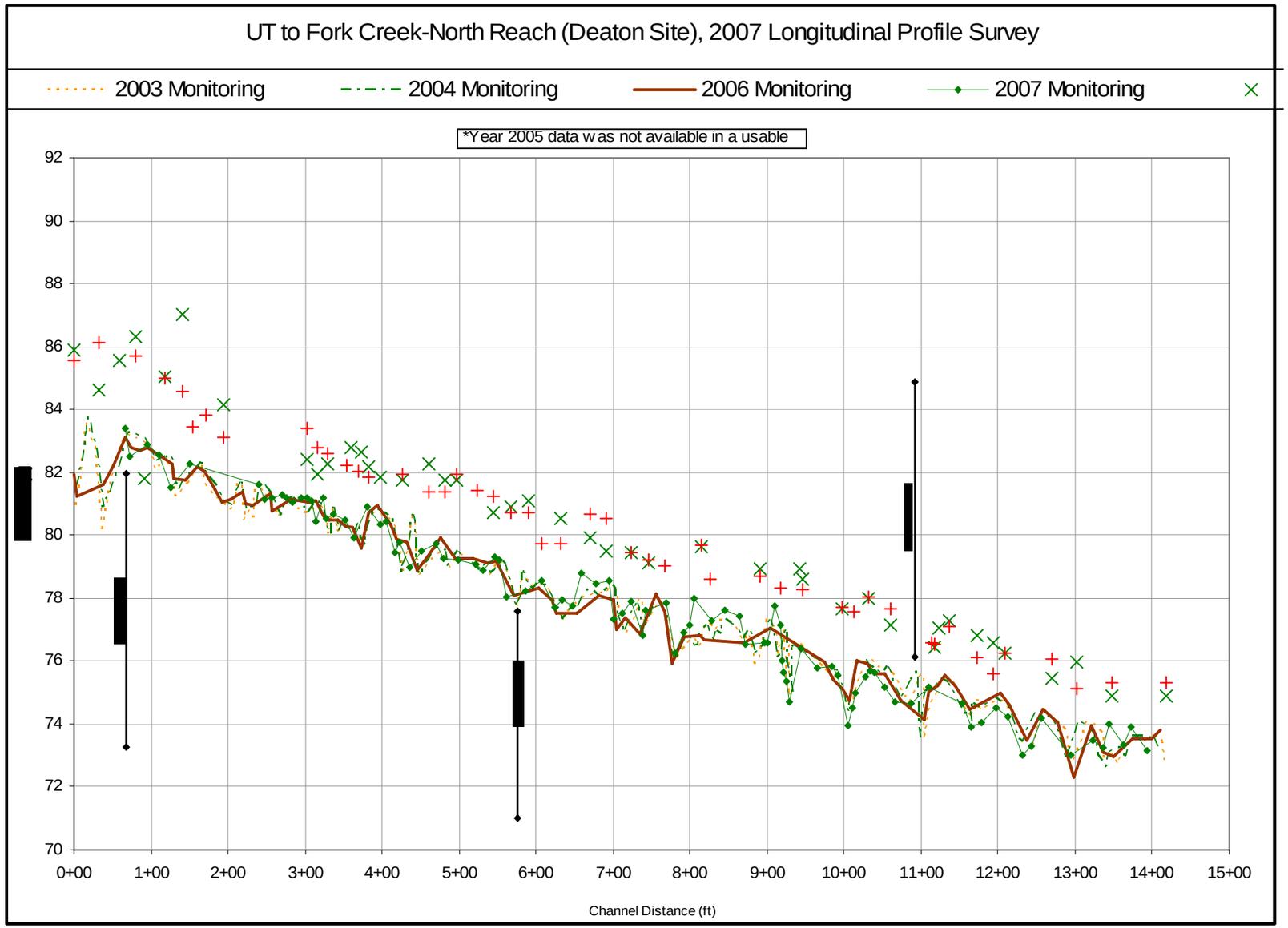

UT to Fork Creek-South Reach (Deaton) 2007, Cross Section 3 @ STA 19+00, Riffle
Elevation (ft)
109
108.5
108
107.5
107
106.5
106
105.5
105
104.5
104
103.5
103
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Width (ft)
Year 2003
Year 2004
Year 2006
Year 2007
fpa
bkf


UT to Fork Creek-South Reach (Deaton) 2007, Cross Section 4 @ STA 23+46, Riffle
Elevation (ft)
Width (ft)
Year 2003
Year 2004
Year 2006
Year 2007
fpa
bkf


UT to Fork Creek-North Reach (Deaton) 2007, Cross Section 6 @ STA 0+69, Pool
Elevation (ft)
Width (ft)
Year 2003
Year 2004
Year 2006
Year 2007
fpa
bkf


UT to Fork Creek-North Reach (Deaton) 2006, Cross Section 7 @ STA 5+76, Riffle
Elevation (ft)
Width (ft)
Year 2003
Year 2004
Year 2006
Year 2007
fpa
bkf


UT to Fork Creek-South Reach (Deaton), 2007 Longitudinal Profile Survey
2003 Monitoring
2004 Monitoring
2006 Monitoring
2007 Monitoring
*Year 2005 data was not available in a usable format for this submittal.
114
112
110
108
106
104
102
100
98
96
94
92
90
88
86
84
82
80
78
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
21+00
Channel Distance (ft)


UT to Fork Creek-North Reach (Deaton Site), 2007 Longitudinal Profile Survey
2003 Monitoring
2004 Monitoring
2006 Monitoring
2007 Monitoring
*Year 2005 data was not available in a usable
92
90
88
86
84
82
80
78
76
74
72
70
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
13+00
14+00
15+00
Channel Distance (ft)

2008 Deaton Vegetation Data

Summary

The data for year 2 in plot 1 indicates excessive mortality occurred between years 1 and 2, but was then corrected with additional planting. In general, although the table indicates substantial mortality has occurred during years 1-4, the data also demonstrates the project has met all the minimum density requirements for years 3 (320), 4 (288) and 5 (260), with an average stem density of 331.0 stems per acre in year 5.

Table 1

Stem Counts Per Acre By Plot				
			Plots	
MY	CY	Ave	1	2
Y1	2003	**418.5**	401	436
Y2	2004	**339.5**	296	383
Y3	2005	**357.0**	383	331
Y4	2006	**322.5**	331	314
Y5	2007	**331.0**	331	331