

# Snow Creek

Stokes County, NC

Ecosystem Enhancement Program Project # 344

Draft Closeout Summary Report, 21 May 2010



**Abstract:** The Snow Creek project is located in the Upper Dan River watershed of the Roanoke River Basin. Construction of ~ 4,800 feet of stream restoration and enhancement (Figure 2), and riparian planting were completed in early 2005. Success monitoring data were collected annually through 2009 beginning in 2005 and 2006 for channel morphology and vegetative success, respectively.

The Snow Creek project has demonstrated geomorphic stability despite at least 6 overbank flow events (Figure 3) and an apparent high sediment load. The 2009 visual assessment indicated 23 of 25 vane structures lacked scour or piping, all constructed pools (N = 19) were sufficiently deep, and no bank length was actively eroding (URS Corporation, 2010). Approximately 500 feet of bed aggradation and a reduction of riffles from 16 (As-built) to 10 was also documented and related to sediment loading.

Vegetative success at the project is generally good. 2009 CVS protocol survey data indicated 10 of 11 fixed plots (Figure 8) exceeded the success criteria of 260 stems per acre for planted stems, with one plot (#10) not surveyed due to damage. 2009 mean planted and total (including volunteers) densities were 1,207 and 1,649 stems per acre, respectively. Although the majority of tallied planted stems were silky dogwood and black willow, 2009 survey data documented 12 different woody species. Visual assessment by EEP staff in April 2010 revealed two buffer areas that will require supplemental planting in the winter of 2010-11 (Figure 8). The two planting areas comprise ~ 1.7 acres of the total easement area (less As-built bankfull channel area) of ~ 11.9 acres, or ~ 14%. Additionally, easement fencing damaged by a large flood in February 2010 will be repaired.

**Introduction:**

Table 1: Snow Creek Project Attributes

Drainage area (upstream) Snow Ck	28 miles <sup>2</sup>
Drainage area (upstream) Unnamed Tributary	0.9 miles <sup>2</sup>
Ecoregion	Northern Inner Piedmont (45e)
As-built stream classification	Rosgen C4 type
Dominant soil types	Toccoa and Riverview
NCDWQ sub-basin	ROA01 22-20
Any portion of project 303d listed	No

Table 2: Snow Creek Project Timeline

	Entity	Date Complete
Restoration plan	Ecologic Associates	September 2002
Construction	Shamrock Environmental	January 2005
Riparian planting	Wheat Swamp Landscaping	March 2005
Year 1 monitoring	Ecologic Associates	September 2005
Year 2 monitoring	URS Corporation	December 2006
Year 3 monitoring	URS Corporation	December 2007
Year 4 monitoring	URS Corporation	December 2008
Year 5 monitoring	URS Corporation	December 2009



Figure 1: Snow Creek Location Map with 2008 aerial photo base. Access at end of Krishna Road (triangle symbol) via Tom Shelton Road on the North side of the site.

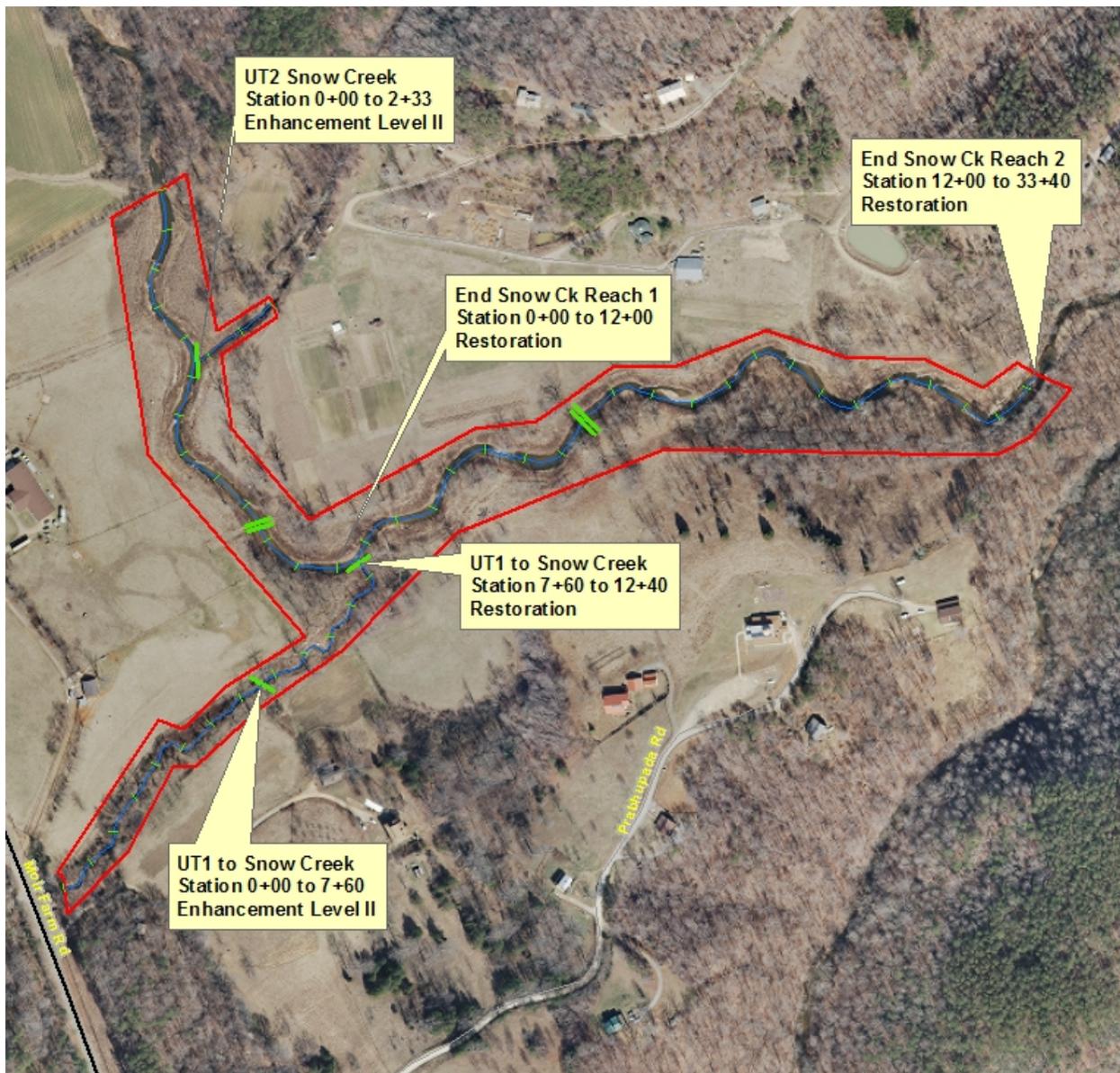


Figure 2: Snow Creek mitigation assets. Reach breaks heavy green lines, fords double green lines, thin green tick marks channel centerline stationing at 100 ft intervals interpreted from 2008 air photos.

Table 3: Snow Creek Components and Mitigation Assets

	Component	Level	Ratio	Feet	SMU
Snow Creek	Reach 1	Restoration	1.0	1,190	1,190
--	Reach 2	Restoration	1.0	2,130	2,130
UT1	Upstream	Enhancement II	2.5	760	304
--	Downstream	Restoration	1.0	480	480
UT2	--	Enhancement II	2.5	233	93
<b>Asset Summary</b>		Restoration	1.0	3,800	3,800
		Enhancement II	2.5	993	397
					<b>4,197</b>

**Results:**

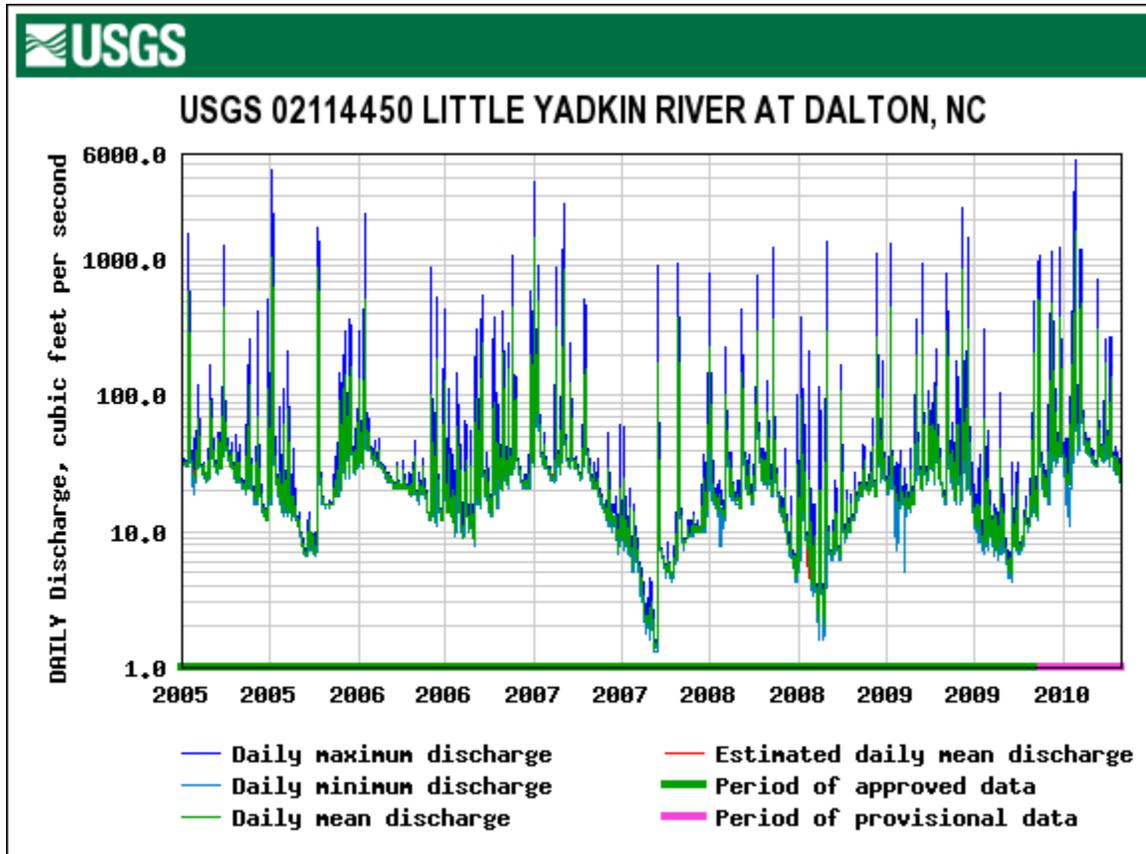


Figure 3: Snow Creek reference discharge data January 1st 2005 through May 1st 2010. Based on the drainage area, bankfull events are inferred at discharges above approximately 1,300 cfs. The gauge record documents 6 events above 2,000 cfs with large storms in July 2005, January 2007, and January 2010. Also note very low flows in fall 2007 and 2008. Station is located approximately 20 miles from the project site with a drainage area of 42.8 miles<sup>2</sup>.

Table 4: Snow Creek Riffle Particle Size Information

	Pre-project	Design	2009 Survey
Riffle d50	19.5mm--coarse gravel	No change	6.9--fine gravel
Riffle d84	36.0mm--very coarse gravel	No change	49.5--very coarse gravel

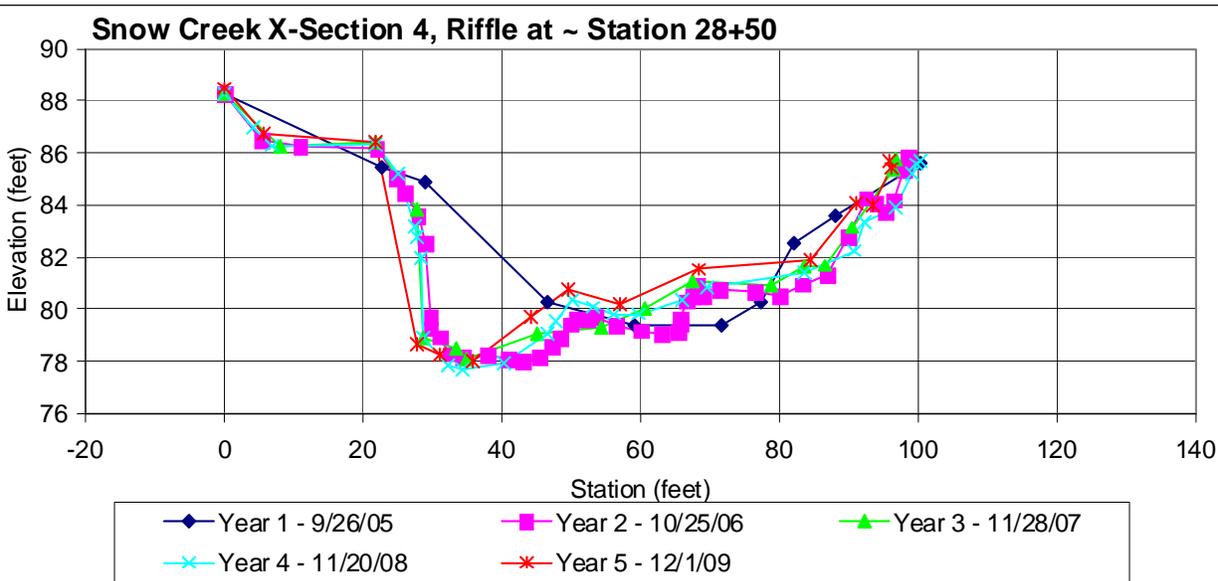
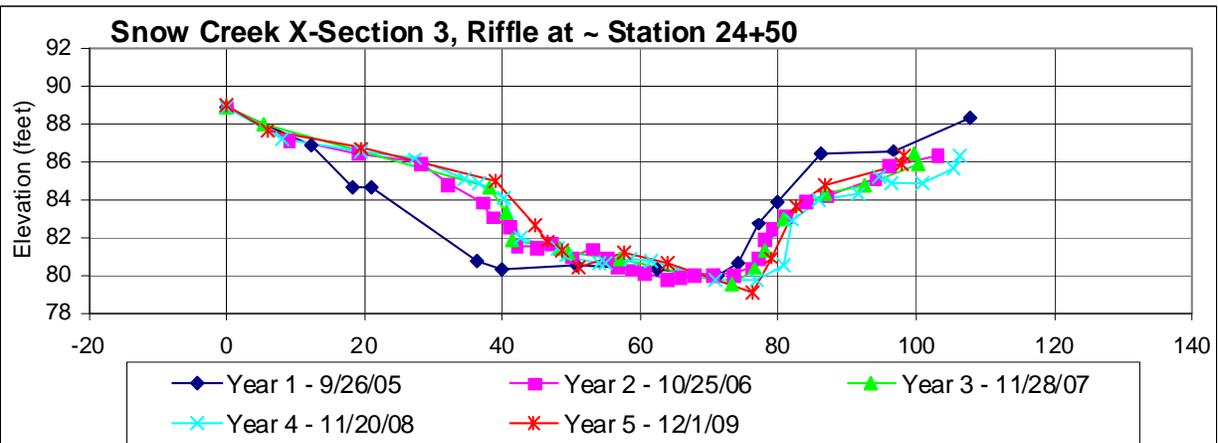
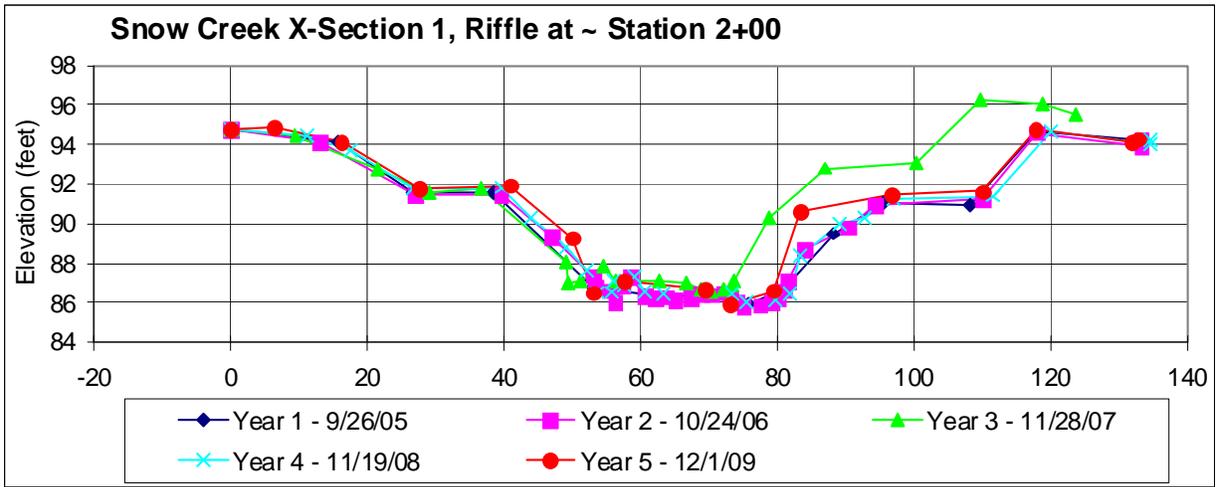


Figure 4: Snow Creek repeat riffle X-section surveys. Time series document a maintenance of riffle thalweg elevations and some channel filling in the form of bank building (narrowing). Note lack of bottom-left-bank survey point in X-Section 4 year-1 data. Year-1 data is the As-built datum.

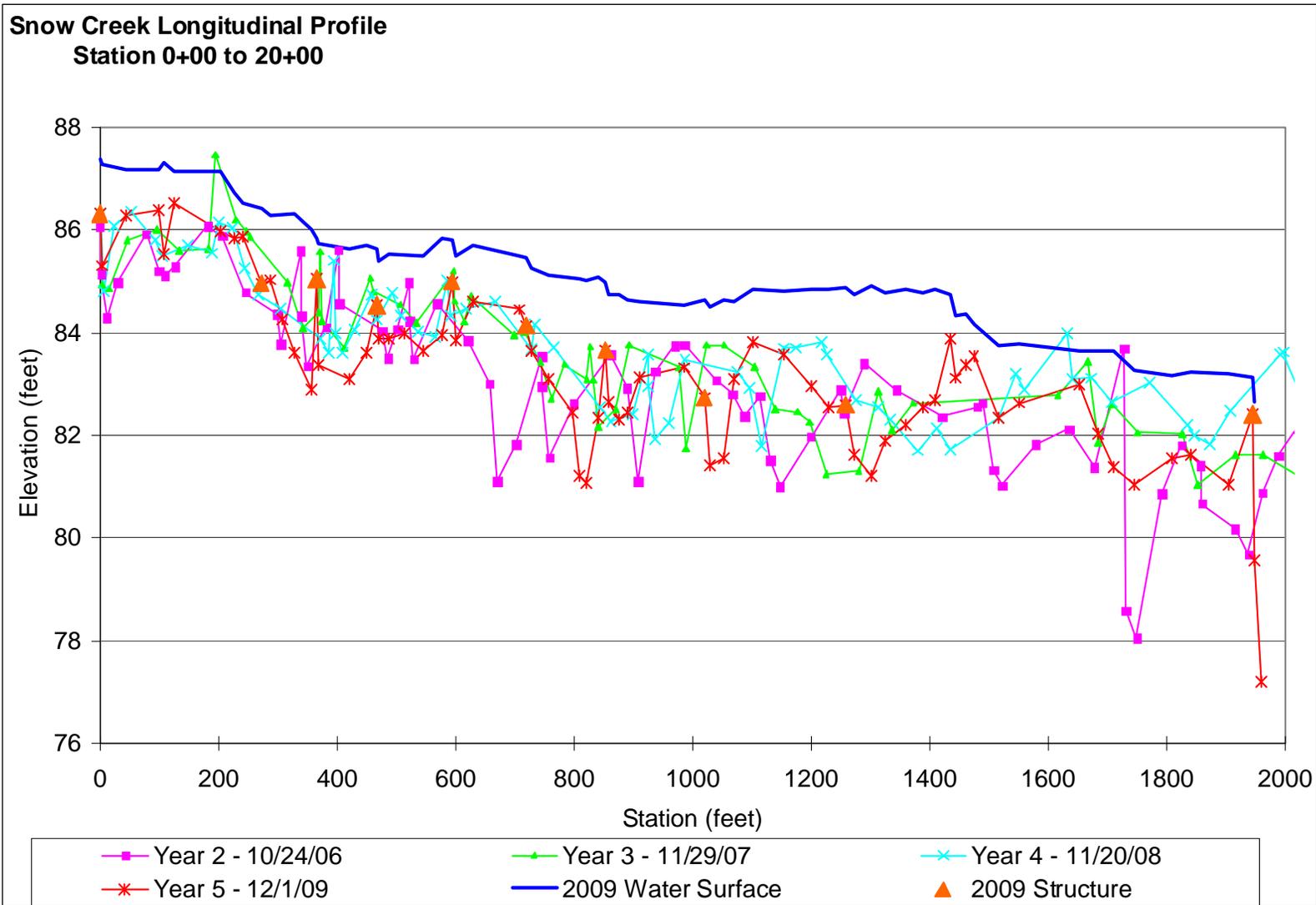


Figure 5: Snow Creek repeat longitudinal profile surveys. Time series indicates riffle-pool morphology and bed elevations have generally been maintained. Year 1/As-built data (designer) could not be rectified with subsequent surveys (monitoring firm) for the purposes of comparable overlays.

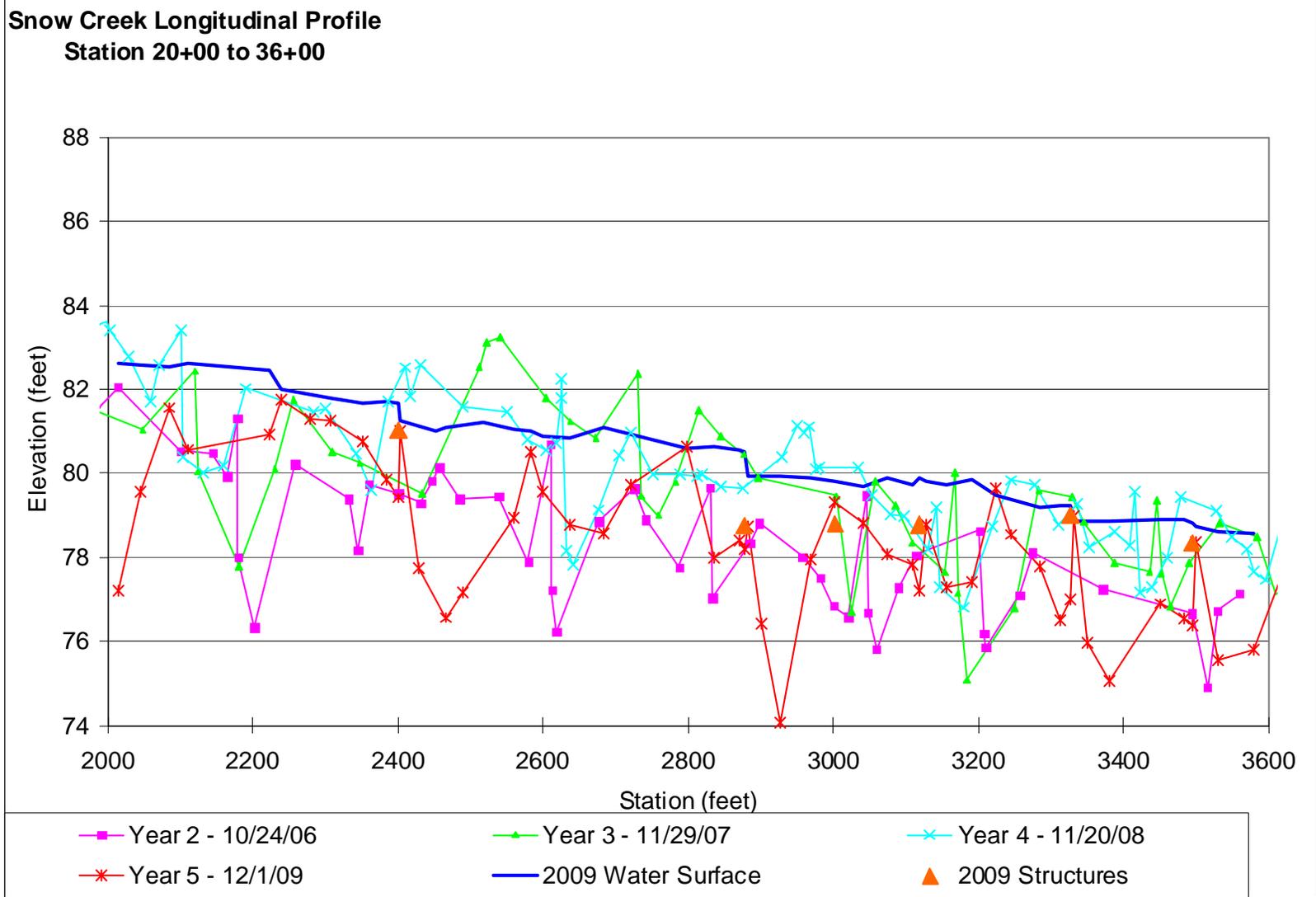


Figure 6: Snow Creek repeat longitudinal profile surveys. Time series indicates riffle-pool morphology and bed elevations have generally been maintained. Year 1/As-built data (designer) could not be rectified with subsequent surveys (monitoring firm) for the purposes of comparable overlays.

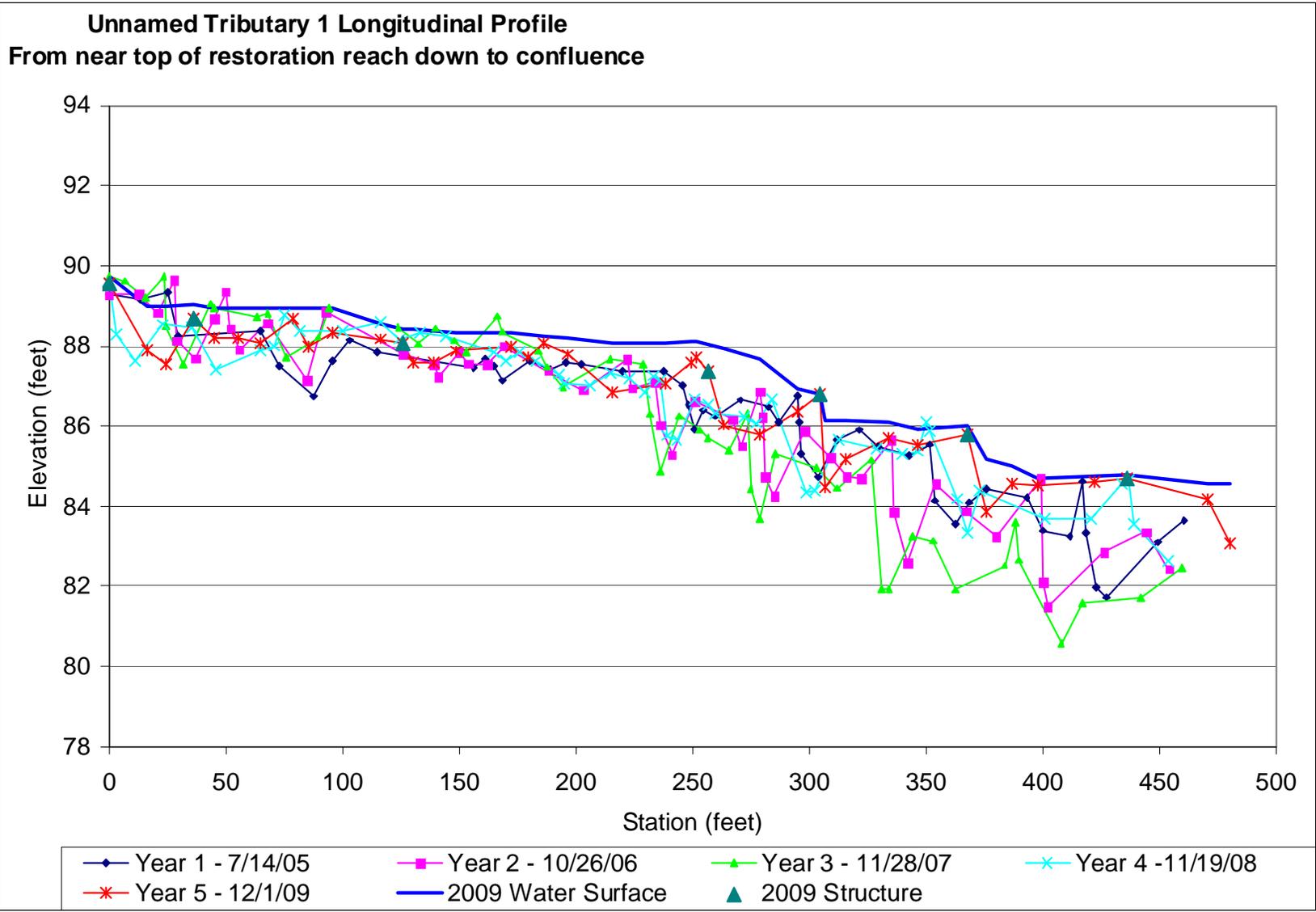


Figure 7: Unnamed Tributary 1 repeat longitudinal profile surveys. Time series indicates riffle-pool morphology and bed elevations have generally been maintained.

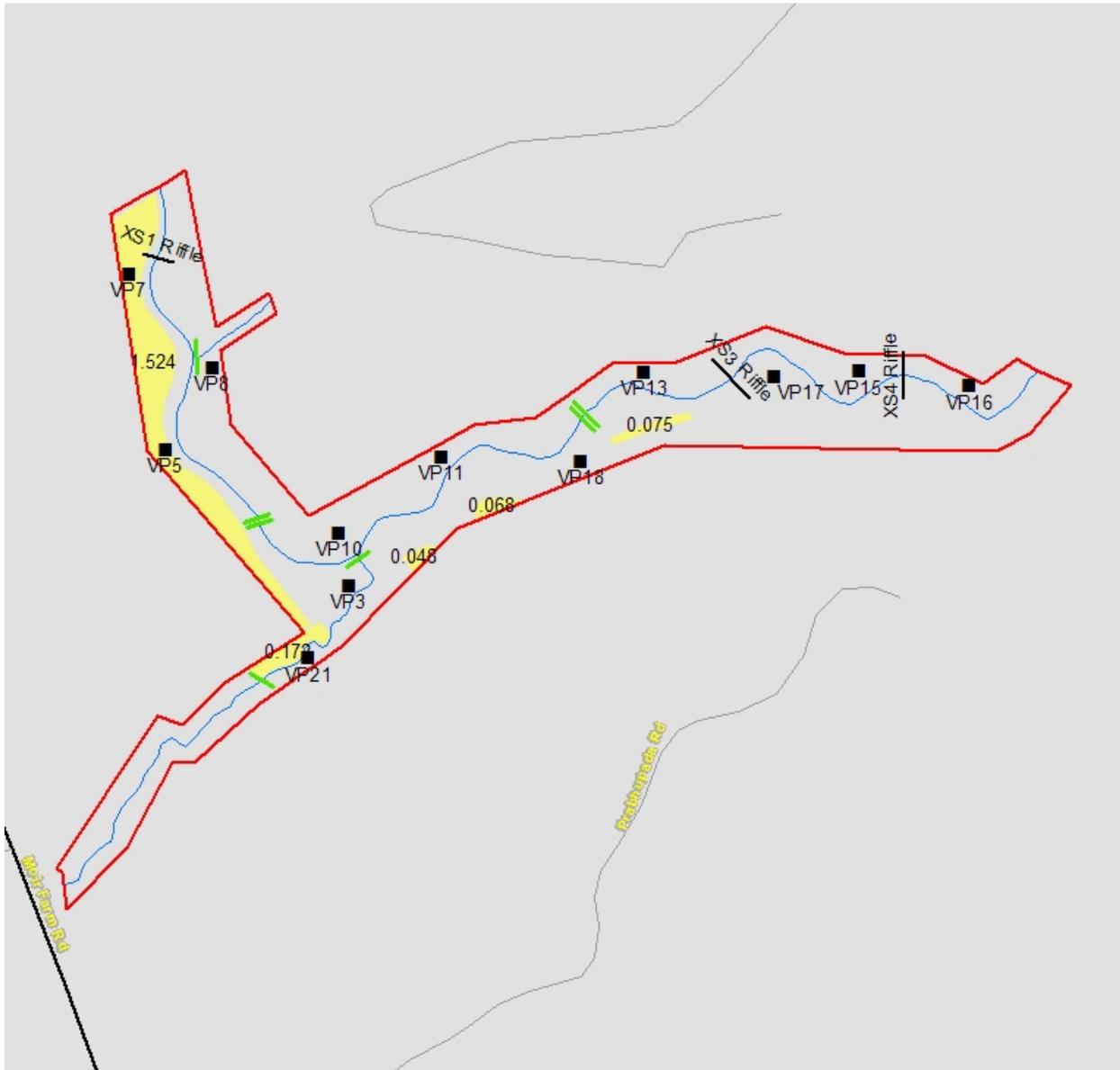


Figure 8: Snow Creek vegetation monitoring plot approximate locations (black squares) and buffer areas lacking appreciable woody stems (yellow polygons with acreages). The three areas identified in Snow Creek Reach 2 area less than 1/10<sup>th</sup> acre in size.

Table 5: Snow Creek 2009 Vegetation Survey Data<sup>1</sup>

Common Name	Plot #3		Plot #5		Plot #7		Plot #8		Plot #11		Plot #13		Plot #15		Plot #16		Plot #17		Plot #18		Plot #21		
	Planted stems	Total stems																					
Boxelder																							
Alder																							
Hazel alder			1	1																			
Red chokeberry			1	1																			
River birch																							
Eastern redbud																							
Silky dogwood	51	51	1	45	15	27	3	33	57	61	38	38	3	3	13	13	11	11	19	19	18	18	
Flowering dogwood																			4	4			
Hawthorn																							
Common persimmon																							
Tuliptree																							
Blackgum							2	2															
Virginia pine								7															
American sycamore																				2	2	6	6
Plum																							
Black cherry																				1	1		
Northern red oak							1	1															
Black oak	1	1																					
Smooth sumac																							
Black willow	5	5	10	10	7	23	20	20	16	34	6	6	2	2	13	13	5	5	2	2	17	17	
Common elderberry													1	1							3	3	
Stem Count	57	57	13	57	22	50	26	63	73	95	44	44	6	6	26	26	16	16	28	28	47	47	
Stems Per Acre	2307	2307	256	2307	890	2023	1052	2550	2954	3845	1781	1781	243	243	1052	1052	648	648	1133	1133	1902	1902	

1—Plot #10 was damaged prior to 2009 vegetation collection and does not appear in the table. No stems were found.

**Conclusion:**

The Snow Creek restoration and enhancement project has demonstrated geomorphic stability over the 5 years since construction was completed. 10 of 12 fixed vegetation monitoring plots also indicated success based on 2009 planted stem counts that exceeded 260 per acre. However, visual inspection of the entire riparian buffer in April 2010 revealed 2 areas totaling approximately 1.7 acres that will require supplemental planting. Additionally, a large flood in January 2010 damaged portions of the easement fencing adjacent to the leftbank along Snow Creek Reach 1 and Unnamed Tributary 2. EEP proposes the project for regulatory closure pending documentation of planting and fence repair completed by winter 2010-11, with subsequent documentation of visual inspection through 2011.