

Purlear Creek - Phase II Stream Restoration Annual Monitoring Report

Monitoring Year: 2009

Measurement Year: 4

As-built Date: 2005

NCEEP Project Number: 010559701



Submitted to: NCDENR-Ecosystem Enhancement Program
1619 Mail Service Center
Raleigh, NC 27699-1619

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**PURLEAR CREEK - PHASE II STREAM RESTORATION
2009 MONITORING REPORT**

**CONDUCTED FOR THE NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**



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I. Executive Summary/Project Abstract

This report represents monitoring year 4 for the Purlear Creek Phase II stream restoration project in Wilkes County, North Carolina. The project is comprised of two reaches. The upper reach is Reach 4 and the lower reach is Reach 1. Phase II of the Purlear Creek stream and wetland restoration project strived to restore stream reaches and enhance adjacent riparian wetlands. Both streams lie within an area that is actively used for cattle grazing. The alignments of the channels indicated that the channels had been straightened and channelized in the past. The designer used a Priority I approach to restore Reach 4 and a Priority II approach for Reach 1. For both reaches, in-stream structures such as A-Vane, Cross-Vanes, and J-Hooks were installed to provide additional stability to the channel and root wads were installed to provide additional habitat. The objectives of the Phase II restoration were:

- Restore wetland hydrology by increasing the frequency and duration of overbank flows into the adjacent wetland and raise groundwater elevations influenced by the base flow elevation of the stream
- Improve in-stream habitat
- Stabilize streambanks and reduce sedimentation to downstream reaches
- Fence cattle out of the stream and riparian area
- Reestablish a viable riparian forest community

Four vegetation monitoring plots in the riparian buffer of the Phase II project were surveyed. Plot numbering is consistent with numbering from the Vegetation Baseline Data post-construction monitoring report. Estimated planted stem density was 613 stems per acre. Vegetation survival thresholds were met in all four plots. Little mortality was seen from the previous year. Vegetation was vigorous and healthy. No vegetative problem areas were observed. Vegetation data is presented in Appendix C of this report.

The channel has remained stable since construction. The majority of channel banks are well-covered with vegetation. Study reaches show no significant changes in channel pattern. The channel profile did not change significantly from the as built condition with the exception of some aggradation along the upstream portion of Reach 4 and just upstream of a beaverdam in Reach 1. The aggradation observed in Reach 4 was likely caused by excess sediment from upstream sources. This aggradation is illustrated in the longitudinal profile and cross sections 1, 2, and 3 in Appendix D of this report. The cross sectional areas and dimensions of the remaining cross sections were comparable to the as built conditions. All of the permanent cross sections appear to be stable. No significant erosion was observed along the study reaches. One problem area was identified in Reach 1. Problem area 3 (PA 3) consists of a beaver dam on Reach 1 that was first observed in 2007. The beaver dam was still intact during the August 2009 survey and October 2009 photographs. The beaver dam is backing up water, obstructing flow, and trapping sediment upstream of the dam.

The restored wetland along Reach 4 exceeded minimal conditions for hydrology during the 2009 monitoring period. Wetland data is presented in Appendix E of this report.

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly

found in these reports can be found in the mitigation and restoration plan documents available on EEPs website. All raw data supporting the table and figures in the appendices is available from EEP upon request.

II. Methodology Section

Monitoring methods used are based on US Army Corps of Engineering and NC Division of Water Quality Guides as referenced below.

The taxonomic standard for vegetation used in this report was based on “Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas”, by Alan S. Weakley. The vegetation monitoring protocol used for collecting vegetation data was the CVS-EEP Protocol for Recording Vegetation Version 4.0 (Lee et al. 2006).

III. References

Harman, W.H. et al. 1999. *Bankfull Hydraulic Geometry Relationships for North Carolina Streams*. AWRA Wildland Hydrology Symposium Proceedings. Edited By: D.S. Olsen and J.P. Potyondy. AWRA Summer Symposium. Bozeman, MT.

Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2006. *CVS-EEP Protocol for Recording Vegetation*, Version 4.0 (<http://cvs.bio.unc.edu/methods.htm>)

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

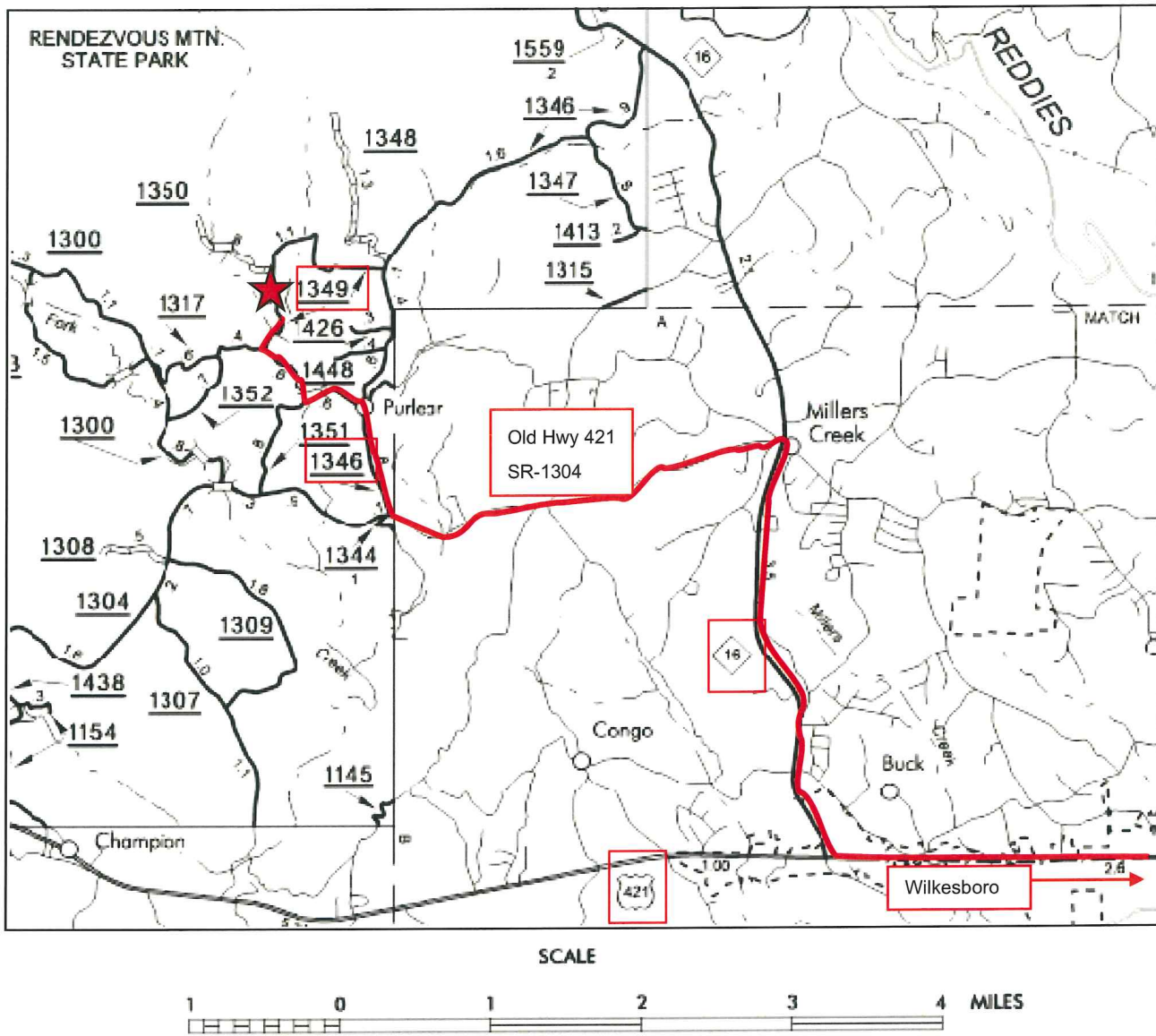
USACOE (2003) *Stream Mitigation Guidelines*. USACOE, USEPA, NCWRC, NCDENR-DWQ

Weakley, Alan S., *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas*

APPENDIX A-
General Figures and Plan Views

1. Project Location Map
2. Project Setting Map
3. Current Condition Plan Views

Figure 1. Project Location

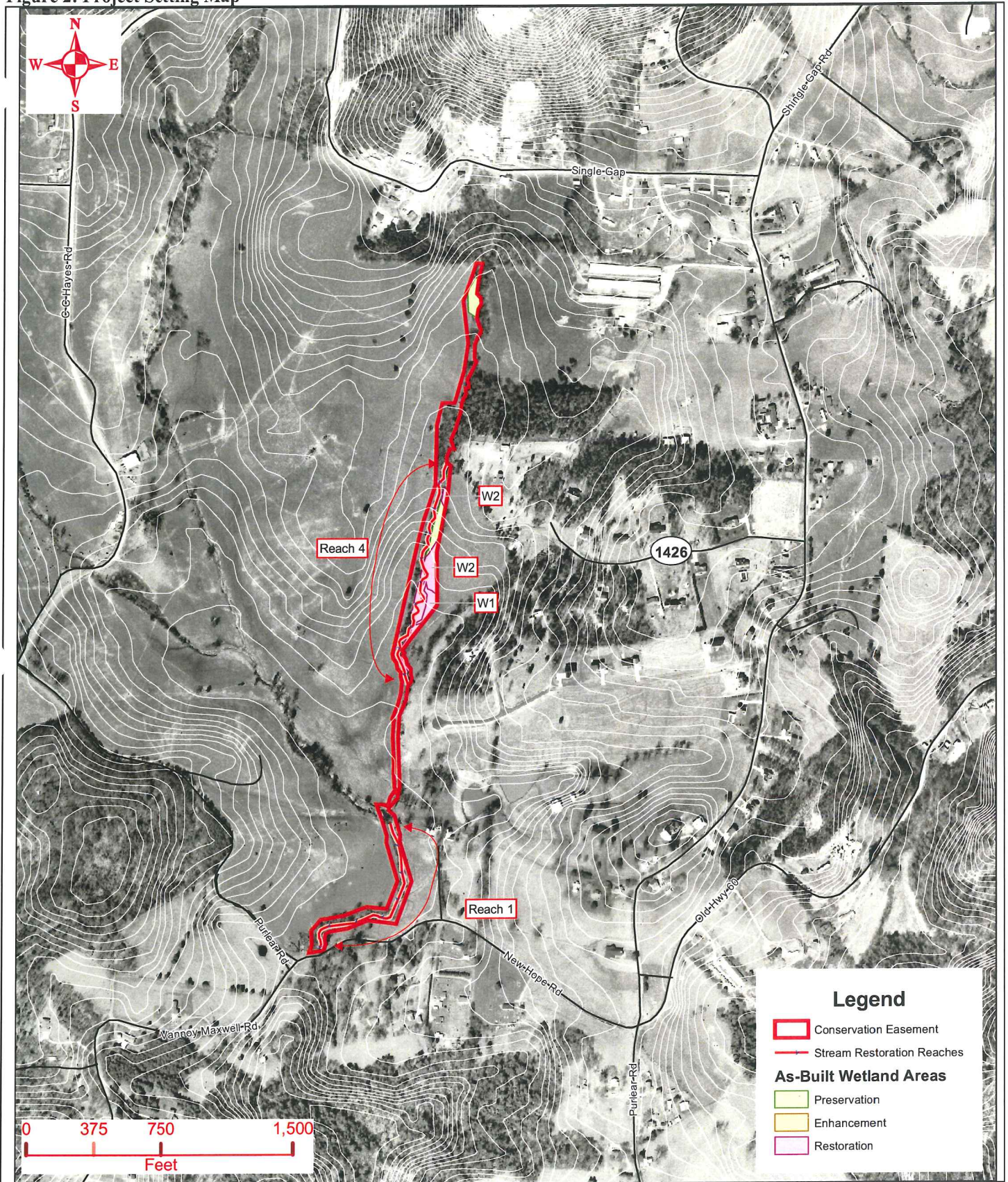



Directions from Hwy. 421 in Wilkesboro:

From Wilkesboro on Hwy. 421, turn right onto NC-16. Follow NC-16 for 3.5 miles to the Miller’s Creek intersection. Turn left onto Old Hwy. 421 (SR-1304) and follow for 2.6 miles. Turn right onto Purlear Road (SR-1346) and follow for 0.8 miles. You will come to a stop sign at a church, turn left to stay on Purlear Road (also called New Hope Road). Follow Purlear Road for 0.6 miles until the intersection with Vannoy Maxwell Road. Project begins at this intersection and continues through the intersection with CC Hayes Road (SR- 1349).

Contact the EEP Project Manager for access and landowner notification instructions. Access is not permitted to this site without prior approval.

Figure 2: Project Setting Map



	Project Purlear Creek Phase II Stream and Wetland Restoration – Year 0 Monitoring 2006 Wilkes County, North Carolina	Date 6/5/06	Project Number 010559701
	Prepared For:		

APPENDIX B-
General Project Tables

1. Project Restoration Components
2. Project Activity and Reporting History
3. Project Contact Table
4. Project Background Table

**Table II. Project Activity and Reporting History
Purlear Creek Phase II / Project ID 010559701**

Activity or Report	Scheduled Completion	Data Collection Complete	Actual Completion or Delivery	Comments
Restoration Plan			April 2004	
Final Design – 90%	March 2004	--	May 2004	
Construction	Spring 2005	--	Spring 2006	Construction delay due to delay in obtaining easement and multiple bids
Temporary S&E mix applied to entire project area	--	--	--	
Permanent seed mix applied	--	--	--	
Containerized and B&B plantings for reach/segments 1&2	--	--	January 2006	
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	December 2005	--	May 2006	Delay in planting
Year 1 monitoring	December 2006	October 2006	December 2006	
Year 2 Monitoring	December 2007	October 2007	December 2007	Survey completed in August, photo points completed in October
Year 3 Monitoring	December 2008	October 2008	December 2008	Survey completed in July, photo points and additional survey completed in October
Year 4 Monitoring	December 2009	October 2009	December 2009	Survey completed in September, photo points completed in October
Year 5 Monitoring	--	--	--	
Year 5+ Monitoring	--	--	--	

Table III. Project Contact Table		
Purlear Creek Phase II / Project ID 010559701		
Designer	P.O. Box 33068	
Kimley-Horn and Associates	Raleigh, NC 27636-3068	
Primary Designer POC	Will Wilhelm, P.E.	(704) 319-7684
Construction Contractor	220 Stoneridge Drive, Suite 405	
L-J, INC	Columbia, SC 29210	
Primary Contractor POC	Richard Goodwin	(803) 929-1181
Planting Contractor	P.O. Box 655	
HARP	Newell, NC 28126	
Planting contractor POC	Jim Matthews, Ph.D.	(704) 841-2841
Seeding Contractor		
UNKNOWN		
Planting contractor POC	UNKNOWN	
Seed Mix Sources	UNKNOWN	
Nursery Stock Suppliers	UNKNOWN	
Monitoring Performers		
North Carolina State University	Campus Box 7625 Raleigh, NC 27606	
Stream Monitoring POC	Zan Price	828-545-8347
Vegetation Monitoring POC	Karen Hall	919-515-8242
Wetland Monitoring POC	Zan Price	828-545-8347

**Table IV. Project Background Table
Purlear Creek Phase II / Project ID 010559701**

Project County	Wilkes	
Drainage Area	Reach 1	3.0 mi ²
	Reach 4	0.4 mi ²
Drainage impervious cover estimate (%)	Reach 1	< 5%
	Reach 4	< 5%
Stream Order	Reach 1	3
	Reach 4	1
Physiographic Region	Piedmont	
Ecoregion	Northern Inner Piedmont	
Rosgen Classification of As-built	Reach 1	C4/1
	Reach 4	C4
Cowardin Classification	PEM01E	
Dominant soil types	Chewacla loam (CkA); Pacolet Sandy clay loam (PcC2); Pacolet sandy loam (PaD); Wehadkee loam (WhA)	
Reference site ID	Upstream 1; Upper Big Warrior Creek; Basin Creek	
USGS HUC for Project and Reference	03040101 (All project and reference reaches)	
NCDWQ Sub-basin for Project and Reference	03-07-01 (All project and reference reaches)	
NCDWQ classification for Project and Reference	Project Reaches & Upstream 1 Reference	12-31-1-8-(2)
	Upper Warrior Creek	12-29-1 (2)
	Basin Creek	12-46-2-2
Any portion of any project segment 303d listed?	No	
Any portion of any project segment upstream of a 303d listed segment?	N/A	
Reasons for 303d listing or stressor	N/A	
% of project easement fenced	100%	

APPENDIX C-
Vegetation Assessment Data

1. Vegetation Plot Mitigation Success Summary Table
2. CVS Summary Tables
3. Vegetation Monitoring Plot Photos

Table 5. Vegetation Plot Mitigation Success Summary Table

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
Purl2-01-0001	Yes	100%
Purl2-01-0003	Yes	100%
Purl2-01-0006	Yes	100%
Purl2-01-0007	Yes	100%

Table 6. Vegetation Metadata

Report Prepared By Nathan Buchanan
Date Prepared 12/9/2009 7:57:26 PM

database name CVS_EEP_EntryTool_v220.mdb
database location C:\Users\nathan\Desktop
computer name NXP

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----

Metadata This worksheet, which is a summary of the project and the project data. Each project is listed with its PLANTED stems, for each year. This excludes live stakes and lists stems per acre.
Proj, planted Each project is listed with its TOTAL stems, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems. Listed in stems per acre.
Proj, total stems List of plots surveyed.
Plots Frequency distribution of vigor classes.
Vigor Frequency distribution of vigor classes listed by species.
Vigor by Spp List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage Damage values tallied by type for each species.
Damage by Spp Damage values tallied by type for each plot.
Damage by Plot Count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp

PROJECT SUMMARY-----

Project Code Purl2
project Name Purlear 2
Description downstream 3000 feet
River Basin
length(ft)
stream-to-edge
width (ft)
area (sq m)
Required Plots (calculated)
Sampled Plots

Table 7: Stem Count Total and Planted by Plot and Species

EOP Project Code 295. Project Name : Purtear 2

Scientific Name	Common Name	Species Type	Current Plot Data (MY4 2009)						Annual Means																	
			295-01-0001		295-01-0003		295-01-0006		295-01-0007		MY4 (2009)		MY3 (2008)		MY2 (2007)		MY1 (2006)									
			P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T						
Acer	maple																									
Acer rubrum	red maple	Tree						33																		
Asimina triloba	pawpaw	Shrub Tree																								
Betula nigra	river birch	Tree					1																			
Celtis laevigata	sugarberry	Shrub Tree																								
Celtis occidentalis	common hackberry	Shrub Tree					4																			
Cephalanthus occidentalis	common buttonbush	Shrub Tree																								
Cercis canadensis	eastern redbud	Shrub Tree					1																			
Cornus	dogwood	Shrub Tree																								
Cornus amomum	silky dogwood	Shrub																								
Cornus florida	flowering dogwood	Shrub Tree					2																			
Diospyros virginiana	common persimmon	Tree					3																			
Juglans nigra	black walnut	Tree																								
Juniperus virginiana	eastern redcedar	Tree																								
Ligustrum	privet	Shrub Tree																								
Lindodendron tulipifera	tuliptree	Tree					1																			
Morus alba	white mulberry	Shrub Tree																								
Morus rubra	red mulberry	Tree																								
Nyssa sylvatica	blackgum	Tree																								
Pinus	pine	Tree																								
Pinus strobus	eastern white pine	Tree																								
Platanus occidentalis	American sycamore	Tree					2																			
Populus deltoides	eastern cottonwood	Tree																								
Prunus serotina	black cherry	Shrub Tree																								
Quercus	oak	Shrub Tree																								
Quercus alba	white oak	Tree					2																			
Quercus michauxii	swamp chestnut oak	Tree					3																			
Quercus phellos	willow oak	Tree					2																			
Quercus rubra	northern red oak	Tree					1																			
Salix nigra	black willow	Tree																								
Unknown		unknown																								
Stem count			0	11	11	0	10	10	1	14	47	0	18	118	1	53	186	1	113	217	0	108	229	1	151	152
size (ares)			1			1						0.5				3.5			7			7			7	
size (ACRES)			0.02			0.02				0.02						0.09			0.17			0.17			0.17	
Species count			0	5	5	0	5	5	1	5	6	0	5	7	1	14	16	1	19	25	0	16	19	1	15	15
Stems per ACRE			0	445.2	445.2	0	404.7	404.7	40.47	566.6	1902	0	1457	9551	11.56	612.8	2151	5.781	653.3	1255	0	624.4	1324	5.781	873	878.7

2009 Purlear Phase II Vegetation Monitoring Plot Photos



Plot 01, Nov. 6, 2009



Plot 03, Nov. 6, 2009



Plot 06, Nov. 6, 2009



Plot 07, Nov. 6, 2009

APPENDIX D-
Stream Assessment Data

1. Purlear Creek Photo Log
2. Visual Morphological Stability Assessment Tables
3. Verification of Bankfull Events
4. Cross section and Pebble Count Plots and Raw Data
Tables
5. Longitudinal Profiles

2009 Purlear Phase II Photo Log – Reach 1

Oct. 6, 2008



Oct. 29, 2009



P1. Reach 1 – Start and X7 looking upstream



P2. Reach 1 – Start and X7 looking downstream

Oct. 6, 2008



Oct. 29, 2009



P3. Reach 1 – X8 looking upstream



P4. Reach 1 – X8 looking downstream



P5. Reach 1 – X9 looking upstream

Oct. 6, 2008



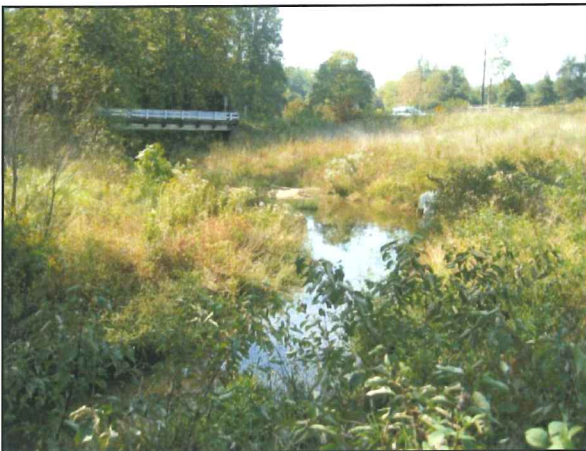
Oct. 29, 2009



P6. Reach 1 – X9 looking downstream



P7. Reach 1 – X10 looking upstream



P8. Reach 1 – X10 looking downstream

Oct. 6, 2008



Oct. 29, 2009



P9. Reach 1 – End Project looking upstream



P10. Reach 1 – End Project looking downstream

2009 Purlear Phase II Photo Log – Reach 4

Oct. 7, 2008



Oct. 29, 2009



P11. Reach 4 – Start looking upstream



P12. Reach 4 – Start and X1 looking downstream

Oct. 7, 2008



Oct. 29, 2009



P13. Reach 4 – X1 looking upstream



P14. Reach 4 – X1 looking downstream



P15. Reach 4 – X2 looking upstream

Oct. 7, 2008



Oct. 29, 2009



P16. Reach 4 – X2 looking downstream



P17. Reach 4 – X3 looking upstream



P18. Reach 4 – X3 looking downstream

Oct. 7, 2008



Oct. 29, 2009



P19. Reach 4 – X4 looking upstream



P20. Reach 4 – X4 looking downstream



P21. Reach 4 – X5 looking upstream

Oct. 7, 2008



Oct. 29, 2009



P22. Reach 4 – X5 looking downstream



P23. Reach 4 – X6 looking upstream



P24. Reach 4 – X6 looking downstream

Oct. 7, 2008



Oct. 29, 2009



P25. Reach 4 – Bridge looking upstream



P26. Reach 4 – Bridge looking downstream



P27. Reach 4 – End of reach looking upstream

Oct. 7, 2008



Oct. 29, 2009



P28. Reach 4 – End of reach looking downstream

Table B2. Visual Morphological Stability Assessment
Purlear Creek Phase II / Project ID 010559701
Reach 1 (1140 Feet)

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-built	Total Number/feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1 Present?	7	13	NA	54%	54%
	2 Armor stable (e.g. no displacement)?	7	13	NA	54%	
	3 Facet grade appears stable?	7	13	NA	54%	
	4 Minimal evidence of embedding/fining?	7	13	NA	54%	
	5 Length appropriate?	7	13	NA	54%	
B. Pools	1 Present? (e.g not subject to severe aggrad. or migrat.?)	11	12	NA	92%	92%
	2 Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	11	12	NA	92%	
	3 Length appropriate?	11	12	NA	92%	
C. Thalweg	1 Upstream of meander bend (run/inflection) centering?	5	5	NA	100%	100%
	2 Downstream of meander (glide/inflection) centering?	5	5	NA	100%	
D. Meanders	1 Outer bend in state of limited/controlled erosion?	4	4	NA	100%	100%
	2 Of those eroding, # w/concomitant point bar formation?	--	--	NA		
	3 Apparent Rc within spec?	4	4	NA	100%	
	4 Sufficient floodplain access and relief?	4	4	NA	100%	
E. Bed General	1 General channel bed aggradation areas (bar formation)	1100	1140	1/40*	96%	98%
	2 Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0/0	100%	
F. Bank	1 Actively eroding, wasting, or slumping bank	NA	NA	0/0	100%	100%
G. Vanes	1 Free of back or arm scour?	3	3	NA	100%	100%
	2 Height appropriate?	3	3	NA	100%	
	3 Angle and geometry appear appropriate?	3	3	NA	100%	
	4 Free of piping or other structural failures?	3	3	NA	100%	
H. Wads/ Boulders	1 Free of scour?	1	1	NA	100%	100%
	2 Footing stable?	1	1	NA	100%	

*Note:Aggradation observed upstream of beaver dam

Reach 4 (1480 Feet)

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-built	Total Number/feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1 Present?	28	35	NA	80%	70%
	2 Armor stable (e.g. no displacement)?	28	35	NA	80%	
	3 Facet grade appears stable?	28	35	NA	80%	
	4 Minimal evidence of embedding/fining?	10	35	NA	29%	
	5 Length appropriate?	28	35	NA	80%	
B. Pools	1 Present? (e.g not subject to severe aggrad. or migrat.?)	32	34	NA	94%	91%
	2 Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	29	34	NA	85%	
	3 Length appropriate?	32	34	NA	94%	
C. Thalweg	1 Upstream of meander bend (run/inflection) centering?	27	27	NA	100%	100%
	2 Downstream of meander (glide/inflection) centering?	27	27	NA	100%	
D. Meanders	1 Outer bend in state of limited/controlled erosion?	27	27	NA	100%	100%
	2 Of those eroding, # w/concomitant point bar formation?	--	--	NA		
	3 Apparent Rc within spec?	27	27	NA	100%	
	4 Sufficient floodplain access and relief?	27	27	NA	100%	
E. Bed General	1 General channel bed aggradation areas (bar formation)	1040	440	1/440*	70%	85%
	2 Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0/0	100%	
F. Bank	1 Actively eroding, wasting, or slumping bank	NA	NA	0/0	100%	100%
G. Vanes	1 Free of back or arm scour?	29	29	NA	100%	100%
	2 Height appropriate?	29	29	NA	100%	
	3 Angle and geometry appear appropriate?	29	29	NA	100%	
	4 Free of piping or other structural failures?	29	29	NA	100%	
F. Wads/ Boulders	1 Free of scour?	--	--			--
	2 Footing stable?	--	--			

Table V. Verification of Bankfull Events			
Purlear Creek Phase II / Project ID 010559701			
Date of Data Collection	Date of Occurrence	Method	Photo #
Monthly	6/28/2006	On-site transducer/data logger	
Monthly	7/31/2006	On-site transducer/data logger	
8/27/2008	8/27/2008	Proximal USGS Gage Resource*	
5/27/2009	5/27/2009	Proximal USGS Gage Resource*	

*Bankfull event verified at two proximal USGS gage sites in Wilkes County (Reddies Rivers, North Wilkesboro and Elk Creek, Elkville, NC) using the rural Piedmont regional curve developed by NCSU (Harman et al 1999).

Project Name	Purlear Phase II
Cross Section	X1 Reach 4
Feature	Riffle
Date	8/31/2009
Crew	Price, Geenen

2005 As-Built Survey			2006 MY - 01			2007 MY - 02			2008 MY - 03			2009 MY - 04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
117.77	1,331.85	PIN	5.64	1329.16	(FENCE)				17.23	1328.83	x1p08	17.23	1328.83	XS1-LP-09
117.77	1,331.63	FP	17.23	1328.83	(X1LP)				19.19	1328.64	x108	19.84	1328.69	XS1-09
109.28	1,331.09	FP	17.36	1328.76	(X1)				27.59	1328.88	x108	26.4	1328.86	XS1-09
95.26	1,330.52	FP	23.76	1328.76	(X1)				29.42	1328.71	x108	33.58	1328.86	XS1-09
85.02	1,329.87	FP	31.25	1328.72	(X1)				32.92	1328.81	x108	40.26	1328.97	XS1-09
75.69	1,328.96	RB	42.9	1329.13	(X1)				38.42	1328.9	x108	45.85	1329.47	XS1-09
70.35	1,328.43	RB	53.14	1329.08	(X1)				43.32	1329.07	x108	50.47	1329.24	XS1-09
66.26	1,328.15	RB	59.16	1328.56	(X1)				46.82	1329.08	x108	54.51	1329.06	XS1-09
65	1,327.95	REW	60.2	1328.49	(X1W)				50.64	1329.11	x108	55.26	1329	XS1-09
63.68	1,327.51	SB	60.32	1328.21	(X1)				54.1	1328.93	x108	57.21	1328.89	XS1-09
63.18	1,327.34	SB	62.31	1327.67	(X1)				56.08	1328.82	x108	58.79	1328.92	XS1-09
62.93	1,327.67	SB	62.88	1327.52	(X1)				56.8	1328.65	x108	60.22	1328.63	XS1-09
62.21	1,328.02	LEW	64.47	1327.39	(X1)				58.19	1328.59	x108	62.97	1328.53	XS1-09
61.05	1,328.20	LB	65.19	1327.94	(X1)				58.74	1328.51	x108	64.39	1328.43	XS1-09
57.02	1,328.68	BKF	66.04	1328.16	(X1)				59.34	1328.33	x108	66.06	1328.68	XS1-09
52.68	1,329.10	FP	68.46	1328.35	(X1)				60.88	1328.43	x108	68.51	1328.48	XS1-09
31.35	1,328.73	FP	68.93	1328.53	(X1W)				62.15	1328.43	x108	69.95	1328.8	XS1-09
17.4	1,328.62	FP	70.21	1328.55	(X1)				63.3	1328.16	x108	72.34	1328.85	XS1-09
17.23	1,328.85	PIN1	74.98	1328.98	(X1)				64.01	1328.2	x108	74.39	1328.97	XS1-09
			82.27	1329.53	(X1)				65.08	1328.45	x108	75.92	1329.18	XS1-09
			88.95	1330.03	(X1)				65.99	1328.38	x108	79.6	1329.54	XS1-09
			93.72	1330.48	(X1)				66.45	1328.25	x108	83.9	1329.82	XS1-09
			101.98	1330.7	(X1)				66.85	1328.22	x108	88.15	1330.11	XS1-09
			117.2	1331.87	(X1RP)				67.41	1328.47	x108	92.24	1330.37	XS1-09
			117.43	1331.64	(X1)				68.13	1328.79	x1w08	101.72	1330.75	XS1-09
									68.98	1328.54	x108	108.9	1331.09	XS1-09
									69.95	1328.39	x108	114.82	1331.49	XS1-09
									70.94	1328.48	x108			
									72.04	1328.53	x108			
									73.39	1328.68	x108			
									74.98	1328.83	x108			
									77.04	1329.19	x108			
									78.86	1329.39	x108			
									81.75	1329.53	x108			
									86.27	1329.69	x108			
									89.78	1330.01	x108			
									93.84	1330.38	x108			
									98.97	1330.51	x108			
									104.74	1330.92	x108			
									110.63	1331.14	x108			
									115.42	1331.51	x108			
									117.37	1331.86	x1rp08			

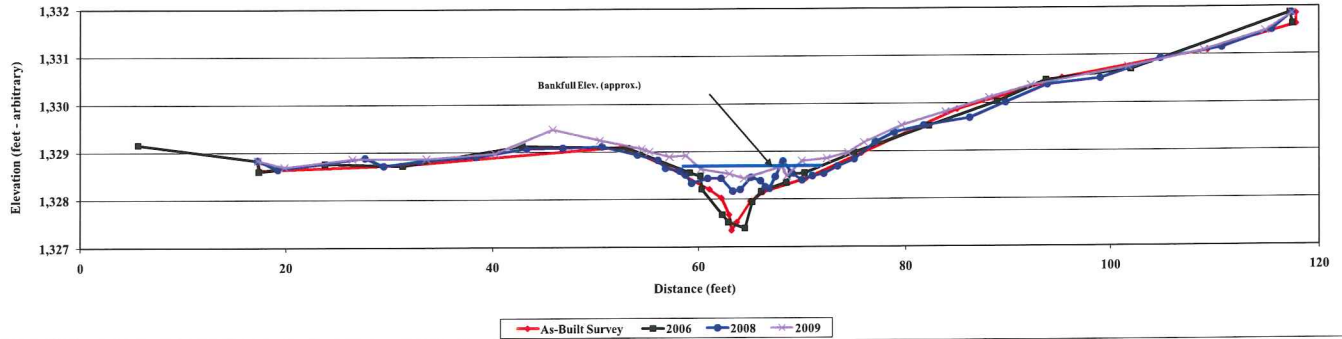


Photo of Cross-Section #1 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	7.31	6.7		3.8	1.1
Width	17.5	11.1		17.3	9.7
Mean Depth	0.4	0.6		0.2	0.1
Max Depth	1.3	1.3		0.5	0.3
w/d ratio	41.8	18.3		78.8	86.0
FPW	72	72		72	72
ER (greater than)	4.1	6.5		4.2	7.4
Stream Type	C			C	

Note: Area computations for each year relative to as-built bankfull elevation

Reach 4 Riffle Cross-Section #1 - Station 1+20 Purlear Phase II



Project Name	Purlear Phase II
Cross Section	X2 Reach 4
Feature	Pool
Date	8/31/2009
Crew	Price, Geenen

2005 As-Built Survey			2006 MY - 01			2007 MY - 02			2008 MY - 03			2009 MY - 04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
100.11	1,330.72	PIN	7.78	1329.25	(X2LP)	7.78	1328.25	XS2LP07	7.78	1329.24	x2lp08	7.78	1329.28	XS2-LP-09
99.88	1,330.56	FP	7.98	1329.04	(X2)	9.05	1328.97	XS2	8.7	1328.97	x208	9.56	1328.95	XS2-09
93.3	1,330.13	FP	18.22	1328.76	(X1)	12.73	1328.8	XS2	17.71	1328.77	x208	16.79	1328.83	XS2-09
81.2	1,329.58	FP	22.73	1328.92	(X2)	19.36	1328.89	XS2	28.03	1328.73	x208	20.8	1328.88	XS2-09
73.76	1,328.91	RB	32.76	1328.75	(X2)	25.81	1328.88	XS2	36.33	1328.89	x208	26.27	1328.81	XS2-09
71.44	1,328.67	RB	40.84	1328.76	(X2)	31.5	1328.86	XS2	43.29	1328.67	x208	29.64	1328.67	XS2-09
69.83	1,327.90	RB	45.94	1328.43	(X2)	38.54	1328.79	XS2	47.57	1328.18	x208	36.6	1328.76	XS2-09
69.31	1,326.80	SB	52.71	1327.85	(X2)	44.09	1328.57	XS2	53.03	1327.89	x208	41.45	1328.76	XS2-09
69.12	1,326.79	SB	60.34	1327.88	(X2)	51.57	1327.83	XS2	56.76	1327.92	x208	45.61	1328.42	XS2-09
68.12	1,326.74	SB	62.44	1327.78	(X2)	59.22	1327.93	XS2	58.82	1327.92	x208	47.98	1328.59	XS2-09
67.64	1,326.88	SB	64.16	1327.64	(X2W)	66.44	1326.94	XS2	60.96	1327.98	x208	48.42	1328.22	XS2-09
67.02	1,326.96	LEW	66.24	1327.1	(X2)	67.57	1326.93	XS2	61.78	1328.04	x208	48.41	1328.11	XS2-09
65.28	1,327.20	LB	67.14	1326.81	(X2)	68.61	1327.18	XS2W	63.25	1327.87	x208	50.36	1328.07	XS2-09
63.12	1,327.85	BKF	68.2	1328.88	(X2)	69.73	1328.94	XS2	63.78	1327.67	x208	52.49	1328.04	XS2-09
56.23	1,327.70	LB	69.11	1328.95	(X2)	69.92	1328.95	XS2	64.66	1327.54	x208	54.1	1328.15	XS2-09
46.24	1,328.35	FP	69.35	1327.59	(W)	69.97	1328.28	XS2	65.54	1327.64	x208	56.06	1328.05	XS2-09
31.83	1,328.75	FP	69.38	1327.64	(X2W)	78.86	1329.54	XS2	66.47	1327.56	x208	57.7	1328.13	XS2-09
7.86	1,329.03	FP	69.74	1327.93	(X2)	85.67	1330.02	XS2	67.16	1327.5	x208	58.64	1328.13	XS2-09
7.78	1,329.29	PIN	70.93	1328.69	(X2)	90.6	1330.28	XS2	67.6	1327.09	x208	60.33	1328.13	XS2-09
			72.44	1328.88	(X2)	97.94	1330.36	XS2	68.13	1326.78	x208	61.96	1328.27	XS2-09
			75.98	1329.11	(X2)	98.38	1330.19	XS2	68.92	1328.74	x208	64.02	1328.02	XS2-09
			80.54	1329.56	(X2)	99.42	1330.76	XS2RP07	69.25	1327.89	x2w08	65.08	1327.87	XS2-09
			86.94	1330	(X2)				69.82	1327.96	x208	65.45	1327.73	XS2-09
			95.87	1330.26	(X2)				70.85	1328.59	x208	66.36	1327.73	XS2-09
			99.34	1330.53	(X2)				72.25	1328.87	x208	67.66	1327.56	XS2-09
			99.47	1330.74	(X2RP)				75.17	1328.97	x208	68.64	1327.82	XS2-09
									76.88	1329.21	x208	69.16	1327.95	XS2-09
									83.79	1329.7	x208	70.45	1328.29	XS2-09
									87.53	1330.01	x208	71.43	1328.62	XS2-09
									92.41	1330.23	x208	72.71	1328.94	XS2-09
									98.38	1330.53	x208	73	1328.93	XS2-09
									99.56	1330.74	x2rp08	75.12	1329.07	XS2-09
												79.32	1329.29	XS2-09
												87.22	1330.1	XS2-09

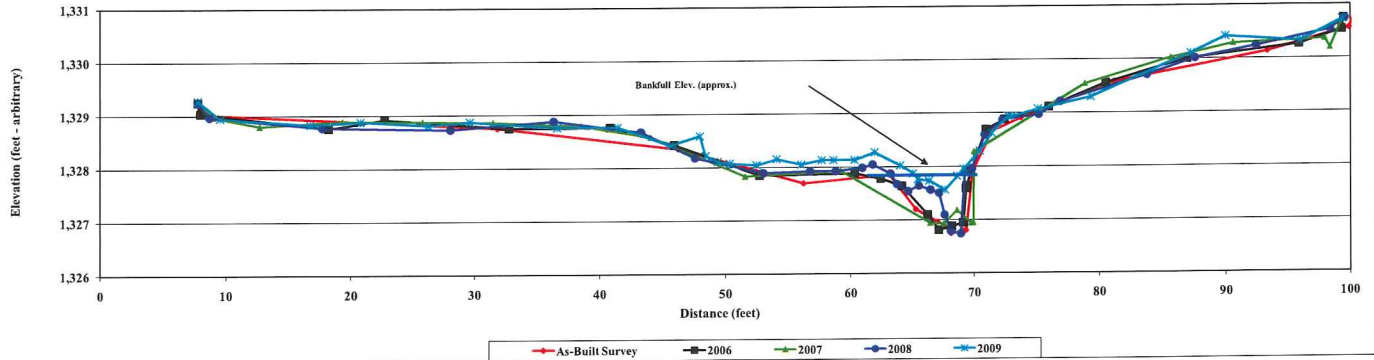


Photo of Cross-Section #2 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	4.9	4.2	5.9	2.7	0.5
Width	6.2	9.4	10.8	7.5	4.6
Mean Depth	0.8	0.4	0.6	0.4	0.1
Max Depth	1.1	1.0	0.9	1.1	0.3

Note: Area computations for each year relative to as-built bankfull elevation

Reach 4 Pool Cross Section #2 - Station 1+60
Purlear Phase II



Project Name Purlear Phase II
 Cross Section X3 Reach 4
 Feature Riffle
 Date 9/1/2009
 Crew Price, Geenen

2005 As-Built Survey			2006 MY - 01			2007 MY - 02			2008 MY - 03			2009 MY - 04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
91.67	1,323.51	PIN	15.76	1322.23 (X3LP)	15.76	1322.1 XS3LP07	15.32	1322.1	xs3lp08	15.76	1322.09	XS3-LP-09		
91.18	1,323.06	FP	16.1	1322.08 (X3)	29.41	1321.84 XS3	23.41	1321.56	xs308	18.34	1321.34	XS3		
77.99	1,322.45	FP	19.34	1321.63 (X3)	45.06	1321.95 XS3	29.06	1321.98	xs308	22.22	1321.56	XS3		
63.63	1,322.15	FP	27.75	1321.94 (X3)	47.42	1321.68 XS3	33.6	1321.95	xs308	27.99	1321.98	XS3		
55.9	1,321.72	RB	34.36	1321.99 (X3)	48.28	1320.36 XS3	37.53	1321.95	xs308	29.66	1321.81	XS3		
53.13	1,321.52	BKF	38.43	1321.9 (X3)	49.84	1320.58 XS3	40.91	1321.97	xs308	35.16	1322.13	XS3		
52.12	1,321.46	RB	45.03	1321.99 (X3)	50.95	1321.1 XS3W	44.88	1321.93	xs308	39.56	1322.09	XS3		
51.27	1,321.06	REW	46.65	1321.95 (X3)	52.31	1321.49 XS3	45.76	1321.93	xs308	43.45	1322.3	XS3		
51.19	1,320.98	SB	47.79	1321.96 (X3)	54.73	1321.89 XS3	46.97	1321.85	xs308	45.82	1322.15	XS3		
50.61	1,320.84	SB	48.68	1320.5 (X3)	58.65	1321.96 XS3	47.75	1321.54	xs3w08	46.92	1322	XS3		
50	1,320.48	SB	49.75	1320.3 (X3)	61.92	1322.18 XS3	47.79	1321.55	xs308	47.16	1321.8	XS3		
49.3	1,320.26	SB	51.01	1320.44 (X3)	67.72	1322.16 XS3	48	1321.25	xs308	47.46	1321.56	XS3		
48.67	1,320.24	SB	51.33	1321.31 (X3W)	74.34	1322.28 XS3	48.54	1321.27	xs308	48.87	1321.32	XS3		
48.13	1,320.75	SB	52.02	1321.58 (X3)	80.09	1322.56 XS3	49.13	1320.98	xs308	49.12	1320.87	XS3		
48.1	1,321.09	LEW	53.06	1321.63 (X3)	85.99	1322.86 XS3	49.69	1320.8	xs308	49.71	1321	XS3		
47.8	1,321.58	LB	54.49	1321.76 (X3)	90.85	1323.37 XS3RP07	50.71	1320.88	xs308	49.9	1321.1	XS3		
47.03	1,321.69	LB	57.36	1321.84 (X3)			50.89	1321.24	xs308	49.98	1321.21	XS3		
44.63	1,321.74	BKF	62.5	1322.32 (X3)			51.77	1321.34	xs308	50.48	1321.29	XS3		
42.38	1,321.75	FP	74.83	1322.38 (X3)			53.15	1321.6	xs308	50.93	1321.26	XS3		
15.91	1,322.05	FP	79.14	1322.51 (X3)			55.99	1321.79	xs308	51.54	1321.48	XS3		
			90.72	1323.07 (X3)			58.25	1321.64	xs308	51.93	1321.7	XS3		
			90.85	1323.43 (X3RP)			61.55	1322.11	xs308	52.11	1321.69	XS3		
			101.55	1323.98 (FENCE)			63.46	1322.11	xs308	53.36	1321.69	XS3		
							67.41	1322.09	xs308	57.46	1321.88	XS3		
							72.24	1322.01	xs308	59.46	1322.13	XS3		
							77.26	1322.3	xs308	63.77	1322.32	XS3		
							84.06	1322.87	xs308	68.5	1322.49	XS3		
							87.3	1322.85	xs308	75.48	1322.55	XS3		
							90.46	1323.08	xs308	75.55	1322.59	XS3		
							90.91	1323.42	xs3rp08	81.93	1322.74	XS3		
										89.92	1323.05	XS3		
										90.8	1323.42	XS3-RP-09		

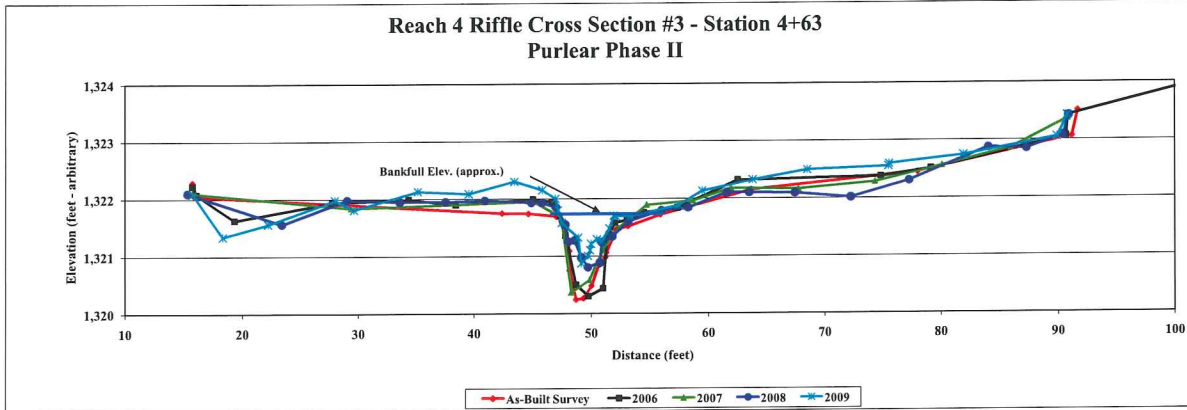


Photo of Cross-Section #3 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	4.93	4.8	4.3	3.2	2.1
Width	10.3	7.8	7.3	9.0	6.2
Mean Depth	0.5	0.6	0.6	0.4	0.3
Max Depth	1.5	1.4	1.4	0.9	0.9
w/d ratio	21.5	12.9	12.3	25.3	18.7
FPW	72	72	72	72	72
ER (greatest)	7.0	9.2	9.9	8.0	11.6
Stream Type	C	C	C	C	C

Note: Area computations for each year relative to as-built bankfull elevation

Reach 4 Riffle Cross Section #3 - Station 4+63
 Purlear Phase II



Project Name Purlear Phase II
 Cross Section X4 Reach 4
 Feature Pool
 Date 9/1/2009
 Crew Price, Geenen

2005 As-Built Survey			2006 MY - 01			2007 MY - 02			2008 MY - 03			2009 MY - 04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
86.06	1,319.58	PIN	16.74	1317.58	(XS4LP)	16.74	1317.54	XS4LP07	16.9	1317.58	xs4lp08	16.93	1317.56	XS4-LP-09
85.66	1,319.38	FP	17.07	1317.4	(XS4)	17.59	1317.2	XS4	18.27	1317.32	xs408	19.66	1317.27	XS4
65.6	1,318.58	RB	19.98	1317.37	(XS4)	23.92	1317.08	XS4	23.41	1317.25	xs408	23.85	1317.39	XS4
51.23	1,317.95	RB	25.97	1317.14	(XS4)	27.86	1317.13	XS4	26.92	1317.25	xs408	28.61	1317.2	XS4
42.27	1,317.21	RB	27.77	1317.12	(XS4)	31.51	1316.45	XS4	28.51	1317.01	xs408	31.36	1316.78	XS4
39.8	1,316.73	RB	30.99	1316.51	(XS4)	32	1316.31	XS4	29.23	1316.84	xs408	32.03	1316.47	XS4
38.93	1,316.45	RB	31.88	1316.41	(XS4W)	32.79	1315.99	XS4	30.21	1316.7	xs408	33.87	1316.44	XS4
38.54	1,316.00	REW	32.4	1316.41	(W)	33.23	1315.96	XS4	31.22	1316.61	xs408	34.12	1315.31	XS4
38.45	1,315.38	SB	32.82	1316.12	(XS4)	33.32	1315.96	XS4W	31.48	1316.45	xs4w08	34.95	1315.11	XS4
37.98	1,315.07	SB	34.12	1315.16	(XS4)	33.58	1315.38	XS4	32.18	1316.37	xs408	35.72	1314.91	XS4
36.93	1,314.71	SB	36.17	1314.62	(XS4)	33.78	1315.19	XS4	32.88	1316.17	xs408	36.13	1314.73	XS4
35.98	1,314.79	SB	37.87	1314.43	(XS4)	35.01	1314.92	XS4	33.51	1316.88	xs408	36.82	1314.59	XS4
35.23	1,315.06	SB	38.47	1315.52	(XS4)	36.01	1314.62	XS4	34.04	1315.07	xs408	37.4	1314.48	XS4
34.06	1,315.36	SB	39.11	1316.47	(XS4W)	36.61	1314.35	XS4	34.64	1315.04	xs408	37.49	1314.43	XS4
32.92	1,316.00	LEW	39.16	1316.43	(W)	37.35	1314.54	XS4	35.66	1314.76	xs408	37.98	1316.14	XS4
32.45	1,316.30	LB	39.72	1316.59	(XS4)	38.56	1315.98	XS4W	36.26	1314.89	xs408	38.15	1316.49	XS4
30.05	1,316.95	BKF	41.42	1316.83	(XS4)	40.29	1316.84	XS4	37.08	1314.48	xs408	38.7	1316.57	XS4
26.53	1,317.38	FP	44.62	1317.11	(XS4)	42.32	1317.03	XS4	38.14	1314.62	xs408	39.02	1316.56	XS4
16.74	1,317.86	PIN	50.85	1317.54	(XS4)	45.01	1317.13	XS4	38.46	1316.14	xs408	40.16	1316.63	XS4
			60.8	1318.2	(XS4)	47.82	1317.36	XS4	39.7	1316.45	xs408	41.19	1316.8	XS4
			78.19	1318.53	(XS4)	49.29	1317.58	XS4	40.39	1316.65	xs408	43.81	1317.03	XS4
			85.18	1319.1	(XS4)	52.83	1317.85	XS4	41.7	1316.92	xs408	48.11	1317.5	XS4
			85.21	1319.35	(X4RP)	57.51	1318.12	XS4	43	1317.21	xs408	53.59	1317.88	XS4
						62.01	1318.21	XS4	44.9	1317.18	xs408	64.75	1318.41	XS4
						69.14	1318.53	XS4	46.02	1317.25	xs408	75.01	1318.69	XS4
						75.72	1318.5	XS4	51.12	1317.52	xs408	83.77	1319.03	XS4
						80.75	1318.87	XS4	57.15	1317.8	xs408	85.01	1319.33	XS4-RP-09
						85.1	1319.34	XS4RP07	62	1318.24	xs408			
									69.23	1318.5	xs408			
									76.5	1318.57	xs408			
									82.87	1319.01	xs408			
									85.22	1319.34	xs4rp08			

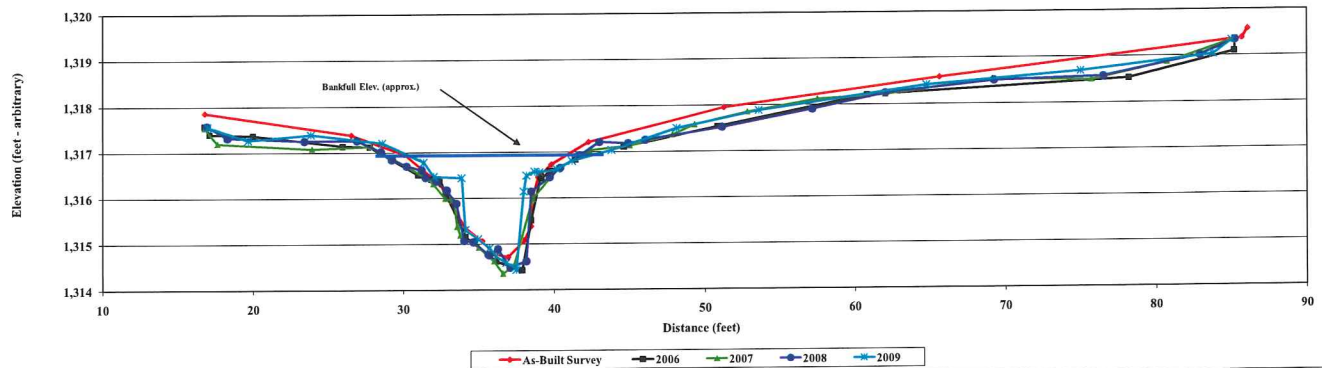


Photo of Cross-Section #4 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	12.1	14.2	13.3	13.6	10.6
Width	11.3	13.7	11.8	13.2	12.6
Mean Depth	1.1	1.0	1.1	1.0	0.8
Max Depth	2.2	2.5	2.6	2.5	2.5

Note: Area computations for each year relative to as-built bankfull elevation

Reach 4 Pool Cross Section #4 - Station 7+60
 Purlear Phase II



Project Name	Parlear Phase II
Cross Section	X5 Reach 4
Feature	Riffle
Date	9/1/2009
Crew	Price, Geenen

2005 As-Built Survey			2006 MY - 01			2007 MY - 02			2008 MY - 03			2009 MY - 04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
110.02	1,316.20	pin	10.83	1313.57	(XSLP)	10.83	1313.46	XSSLP07	10.83	1313.53	xs5p08	11	1313.56	XSSLP09
102.75	1,315.64	fp	10.91	1313.27	(X5)	11.63	1313.28	XS5	12.27	1313.42	xs508	16.75	1313.34	XS5
92.16	1,314.95	fp	17.77	1313.28	(X5)	20.79	1313.12	XS5	17.16	1313.27	xs508	23.74	1313.14	XS5
81.44	1,314.59	fp	23.07	1312.94	(X5)	33.37	1313.31	XS5	22.89	1312.96	xs508	29.89	1313.25	XS5
74.22	1,314.33	fp	30.97	1313.18	(X5)	38.89	1313.02	XS5	27.7	1313.07	xs508	35.47	1313.33	XS5
66.38	1,313.72	fp	34.95	1313.26	(X5)	41.33	1312.34	XS5	32.02	1313.31	xs508	38	1313.24	XS5
61.91	1,313.55	fp	37.93	1313.13	(X5)	42.53	1312.17	XS5W	34.91	1313.33	xs508	40.08	1312.95	XS5
59.1	1,313.40	fp	39.65	1313.01	(X5)	42.7	1311.89	XS5	38.42	1313.19	xs508	40.87	1312.65	XS5
55.78	1,313.32	fp	40.54	1312.53	(X5W)	43.49	1311.61	XS5	40.35	1312.73	xs508	41.99	1312.6	XS5
53.39	1,313.03	bank	42.01	1312.21	(X5)	44.58	1311.45	XS5	41.65	1312.36	xs508	42.86	1312.48	XS5
51.29	1,312.71	bkf	43.08	1311.83	(X5)	45.09	1311.34	XS5	42.85	1312.19	xs508	43.18	1312.43	XS5
48.64	1,312.32	bank	44.24	1311.2	(X5)	45.93	1311.49	XS5	43.15	1311.8	xs508	44.2	1311.57	XS5
47.5	1,312.04	row	45.97	1311.49	(X5)	47.07	1311.58	XS5	43.99	1311.42	xs508	44.46	1311.39	XS5
46.58	1,311.78	sb	47.65	1311.95	(X5)	47.2	1311.7	XS5	45.09	1311.45	xs508	45.17	1311.37	XS5
44.05	1,311.73	sb	49.4	1312.38	(X5)	47.56	1312.19	XS5W	46.8	1311.47	xs508	45.9	1311.44	XS5
42.73	1,311.96	lew	50.24	1312.33	(X5)	50.13	1312.51	XS5	45.86	1311.75	xs508	46.07	1311.7	XS5
41.16	1,312.48	bkf	50.45	1312.59	(W)	52.53	1312.68	XS5	47.11	1311.54	xs508	47.06	1312.15	XS5
39.69	1,313.09	fp	50.6	1312.53	(X5W)	54.53	1313.18	XS5	47.47	1312.05	xs508	48	1312.29	XS5
38.51	1,313.20	fp	51.5	1312.58	(X5)	58.42	1313.22	XS5	47.57	1312.44	xs5w08	50.38	1312.32	XS5
34.85	1,313.37	fp	53.37	1313.06	(X5)	62.83	1313.45	XS5	48.6	1312.48	xs508	55.61	1313.16	XS5
30.28	1,313.31	fp	59.63	1313.24	(X5)	68.06	1313.91	XS5	49.52	1312.42	xs508	64.92	1313.53	XS5
25.38	1,313.05	fp	77.64	1314.23	(X5)	75.46	1314.38	XS5	50.62	1312.54	xs508	76.75	1314.33	XS5
17	1,313.36	fp	82.2	1314.89	(X5)	80.78	1314.41	XS5	52.31	1312.77	xs508	92.61	1314.97	XS5
10.83	1,313.67	pin	106.85	1315.43	(X5)	86.72	1314.67	XS5	53.6	1313.04	xs508	103.81	1315.51	XS5
			107.92	1315.74	(X5)	86.84	1314.7	XS5	57.31	1313.29	xs508	110.13	1316.07	XSSRP09
			109.86	1315.83	(X5)	92.79	1315.05	XS5	62.71	1313.59	xs508			
			110.1	1316.05	(XSRP)	97.55	1315.33	XS5	67.62	1313.64	xs508			
						103.86	1315.54	XS5	73.57	1314.11	xs508			
						110.01	1316.06	XSSRP07	79.95	1314.33	xs508			
									87.59	1314.59	xs508			
									94.74	1315.07	xs508			
									100.07	1315.47	xs508			
									106.67	1315.77	xs508			
									110.11	1316.06	xs5p08			

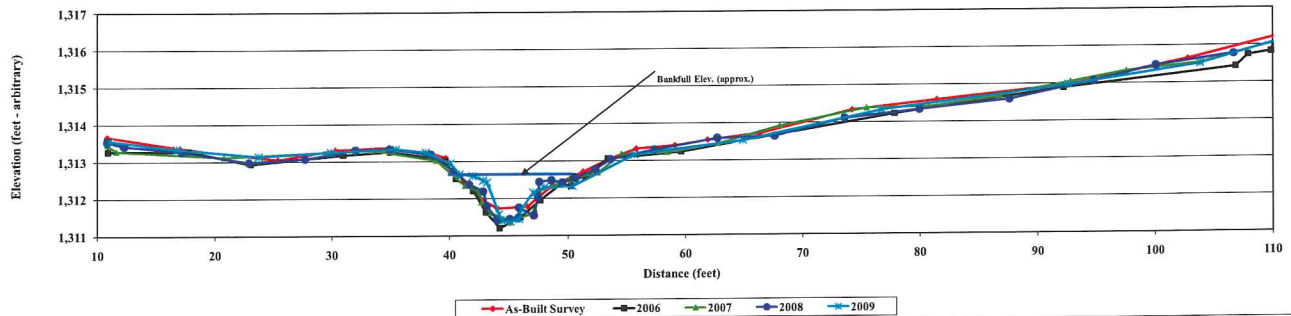


Photo of Cross-Section #5 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	5.1	7.0	6.2	5.6	4.6
Width	10.1	9.9	8.8	10.1	10.1
Mean Depth	0.5	0.7	0.7	0.6	0.5
Max Depth	0.9	1.4	1.3	1.2	1.2
w/d ratio	20.0	14.0	12.5	18.2	22.0
FPW	46	46	46	46	46
ER (greater than)	4.5	4.6	5.2	4.6	4.6
Stream Type	C	C	C	C	C

Note: Area computations for each year relative to as-built bankfull elevation

Reach 4 Riffle Cross Section #5 - Station 10+75 Parlear Phase II



Project Name	Purlear Phase II
Cross Section	X6 Reach 4
Feature	Pool
Date	9/1/2009
Crew	Price, Geenen

2005 As-Built Survey			2006 MY - 01			2007 MY - 02			2008 MY - 03			2009 MY - 04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
81.7	1,317.03	pin	8.38	1312.56	(X6LP)	8.38	1312.56	XS6LP07	8.42	1312.53	xs6p08	8.4	1312.51	XS6LP09
81.4	1,316.76	ltr	8.66	1312.34	(X6)	9.1	1312.23	XS6	10.21	1312.37	xs608	13.16	1312.23	XS6
75.58	1,315.65	ltr	19.08	1312.32	(X6)	16.76	1312.26	XS6	15.51	1312.36	xs608	21.29	1312.19	XS6
72.33	1,315.15	ltr	24.98	1311.9	(X6)	24.8	1311.86	XS6	22.9	1312.01	xs608	26.86	1311.98	XS6
69.35	1,314.59	ltr	28.31	1312.42	(VP)	31.31	1312.17	XS6	27.15	1311.88	xs608	32.47	1312.29	XS6
66.62	1,313.85	ltr	32.95	1312.31	(X6)	34.29	1311.78	XS6	29.43	1312.16	xs608	34.68	1312.08	XS6
63.33	1,313.45	fp	34.6	1311.98	(X6)	35.56	1311.37	XS6	31.47	1312.19	xs608	35.16	1311.81	XS6
60.21	1,312.96	fp	35.25	1311.73	(X6W)	36.38	1311.21	XS6W	32.69	1312.14	xs608	35.15	1311.76	XS6
54.73	1,312.81	fp	36.27	1311.08	(X6)	36.47	1310.52	XS6	34.25	1311.81	xs608	35.9	1311.54	XS6
49.3	1,312.59	fp	37	1310.38	(X6)	37.11	1310.23	XS6	35.74	1311.43	xs608	36.22	1310.8	XS6
44.76	1,312.46	fp	38.41	1310.63	(X6)	37.62	1310.34	XS6	36.12	1310.74	xs608	36.75	1310.29	XS6
42.6	1,312.18	bkf	38.95	1310.63	(X6)	38.89	1310.83	XS6	36.7	1310.16	xs608	36.85	1310.41	XS6
40.3	1,311.31	rew	40.57	1310.93	(X6)	39.78	1310.89	XS6	36.88	1310.51	xs608	37.13	1310.15	XS6
39.48	1,311.24	sb	40.98	1311.56	(X6)	39.94	1311.14	XS6W	37.85	1310.79	xs608	37.82	1310.39	XS6
38.18	1,310.79	sb	41.22	1311.66	(X6W)	40.79	1311.54	XS6	38.54	1310.92	xs608	38.41	1310.49	XS6
35.85	1,311.34	lew	41.51	1311.73	(W)	42.22	1312.02	XS6	39.47	1311.15	xs608	38.72	1310.67	XS6
34.24	1,312.03	bkf	42.22	1311.86	(X6)	44.77	1312.3	XS6	39.58	1311.46	xs6w08	39.32	1311	XS6
32.85	1,312.43	fp	42.62	1312.12	(X6)	47.77	1312.42	XS6	39.85	1311.6	xs608	39.97	1311.26	XS6
23.46	1,312.32	fp	44.48	1312.48	(X6)	50.04	1312.57	XS6	41.39	1311.75	xs608	40.42	1311.74	XS6
25.86	1,312.11	fp	51.78	1312.55	(X6)	52.96	1312.69	XS6	42.52	1312.12	xs608	41.48	1311.84	XS6
20.04	1,312.31	fp	61.93	1313.13	(X6)	56.14	1312.75	XS6	43.77	1312.3	xs608	44.57	1312.24	XS6
14.4	1,312.43	fp	65.97	1313.54	(X6)	56.25	1312.75	XS6	45.64	1312.38	xs608	50.15	1312.6	XS6
8.38	1,312.74	pin	72	1315.14	(X6)	56.25	1312.73	XS6	48.28	1312.4	xs608	58.86	1313.02	XS6
			81.56	1316.69	(X6)	59.75	1312.87	XS6	50.3	1312.49	xs608	69.54	1314.64	XS6
			81.72	1316.85	(X6RP)	59.96	1312.96	XS6	52.32	1312.58	xs608	78.3	1316.11	XS6
						63.53	1313.39	XS6	54.76	1312.6	xs608	81.82	1316.84	XS6RP09
						66.39	1313.6	XS6	57.57	1312.73	xs608			
						66.41	1313.6	XS6	60.01	1312.9	xs608			
						66.55	1313.55	XS6	62.67	1313.11	xs608			
						68.28	1314.24	XS6	64.99	1313.6	xs608			
						70.95	1314.74	XS6	66.81	1313.99	xs608			
						73.14	1315.26	XS6	68.92	1314.52	xs608			
						76.31	1315.65	XS6	70.68	1314.72	xs608			
						80.24	1316.55	XS6	72.56	1315.21	xs608			
						81.85	1316.88	XS6RP07	76.34	1315.79	xs608			

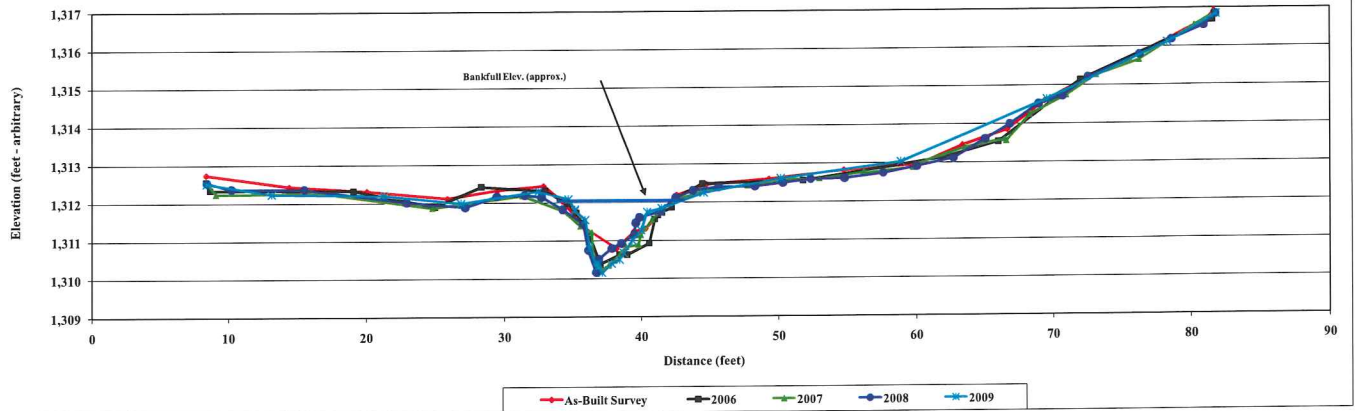


Photo of Cross-Section #6 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	6.1	7.9	8.2	7.0	7.0
Width	8.4	8.0	10.9	9.8	9.0
Mean Depth	0.7	1.0	0.8	0.7	0.8
Max Depth	1.3	1.7	1.9	1.9	2.0

Note: Area computations for each year relative to as-built bankfull elevation

Reach 4 Pool Cross Section #6 - Station 11+45
Purlear Phase II



Project Name	Purlear Phase II
Cross Section	X7 Reach 1
Feature	Riffle
Date	8/31/2009
Crew	Price, Geenen

2005 As-Built Survey			2006 MV - 01			2007 MV - 02			2008 MV - 03			2009 MV - 04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
4.14	1,296.68	PIN	4.14	1296.95	(xs7lp)	4.14	1296.87	XS7LP07	4.14	1296.9	XS7LP08	4.14	1296.9	XS7LP-09
10.94	1,296.08	FP	4.35	1296.75	(XS7)	5.59	1296.68	XS7	4.58	1296.82	XS7	5.28	1296.69	XS7-09
14.68	1,296.00	BKF	4.41	1296.68	(XS7)	12.56	1296.1	XS7	10.36	1296.34	XS7	9.01	1296.53	XS7-09
17.92	1,295.53	LB	4.44	1296.81	(xs7lp)	17.89	1295.67	XS7	13.87	1296.17	XS7	13	1296.17	XS7-09
19.92	1,294.67	LEW	4.47	1296.68	(xs7)	19.88	1294.86	XS7	16.66	1296.05	XS7	15.03	1296.18	XS7-09
20.73	1,294.26	SB	16.35	1295.94	(xs7)	20.22	1294.69	XS7W	18.16	1295.55	XS7	16.89	1295.99	XS7-09
21.43	1,294.15	SB	19.81	1294.83	(xs7w)	20.75	1294.19	XS7	18.19	1295.66	XS7	18.24	1295.65	XS7-09
22.51	1,294.14	SB	20.84	1294.55	(xs7)	22.18	1294.2	XS7	20.38	1294.53	XS7W	19.3	1295.31	XS7-09
25.25	1,294.52	SB	21.6	1294.27	(xs7)	24.17	1294.56	XS7	21.19	1294.18	XS7	20.31	1294.1	XS7-09
27.08	1,294.55	REW	22.66	1294.2	(xs7)	26.01	1294.64	XS7	22.58	1294.2	XS7	20.7	1293.93	XS7-09
29.64	1,294.55	BAR	24.19	1294.4	(xs7)	26.33	1294.72	XS7W	24.48	1294.51	XS7W	21.49	1293.84	XS7-09
30.81	1,294.45	REW	25.22	1294.56	(xs7)	28.93	1294.8	XS7	25.79	1294.63	XS7	22.28	1293.77	XS7-09
31.63	1,294.83	RB	26.4	1294.79	(xs7)	31.51	1294.97	XS7	29.5	1294.77	XS7	22.66	1293.83	XS7-09
33.31	1,295.29	RB	29.1	1294.72	(xs7)	32.17	1294.99	XS7	32	1295.11	XS7	23.32	1294.68	XS7-09
36.13	1,295.95	BKF	30.53	1294.85	(xs7)	33.86	1295.54	XS7	36.4	1296.02	XS7	23.51	1293.97	XS7-09
39.53	1,296.27	TOB	31.14	1294.78	(xs7)	34.82	1295.87	XS7	43.44	1296.74	XS7	23.96	1294.09	XS7-09
46.18	1,296.88	FP	31.78	1294.84	(xs7w)	36.67	1296.25	XS7	53.2	1297.19	XS7	24.61	1294.56	XS7-09
53.26	1,297.07	FP	33.61	1295.28	(xs7)	39.33	1296.5	XS7	53.68	1297.25	XS7RP08	25.62	1294.75	XS7-09
53.95	1,297.16	FP	36.1	1295.85	(xs7)	41.6	1296.65	XS7	26.28	1294.77	XS7-09	27.31	1295.03	XS7-09
102.6	1,296.75	PIN	36.76	1295.94	(xs7)	44.18	1296.9	XS7	28.01	1295.17	XS7-09	28.01	1295.17	XS7-09
			46.41	1296.86	(xs7)	47.37	1296.99	XS7	29.85	1294.88	XS7-09	32.37	1295.37	XS7-09
			52.03	1296.91	(xs7)	49.42	1296.97	XS7	32.6	1295.23	XS7-09	33.01	1295.31	XS7-09
			53.48	1297.14	(xs7rp)	51.69	1297.19	XS7	34.64	1295.8	XS7-09	36.43	1296.04	XS7-09
			53.61	1297.16	(XS7)	53.05	1297.23	XS7RP07	37.86	1296.25	XS7-09	40.51	1296.51	XS7-09
									43.33	1396.73	XS7-09	43.33	1396.73	XS7-09
									46.21	1297.08	XS7-09	46.21	1297.08	XS7-09
									49.37	1296.97	XS7-09	49.37	1296.97	XS7-09
									52.09	1297.09	XS7-09	52.09	1297.09	XS7-09
									53.43	1297.22	XS7-RP-09	53.43	1297.22	XS7-RP-09

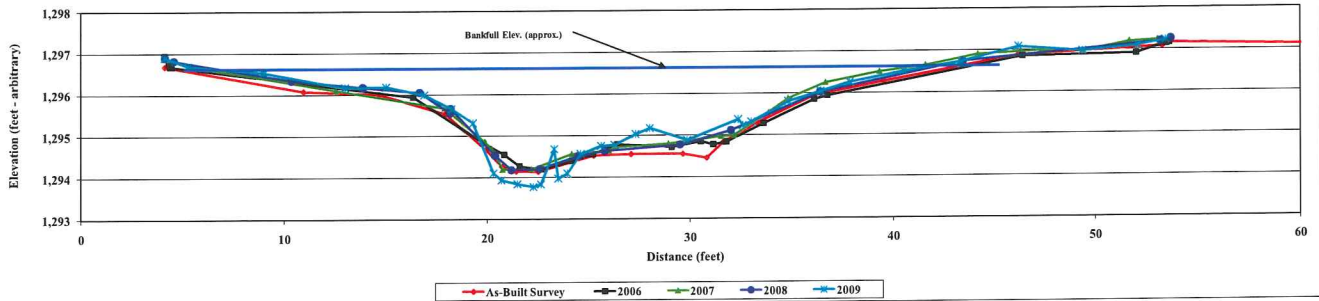


Photo of Cross-Section #7 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	49.9	50.7	46.9	47.1	46.0
Width	35.2	42.3	40.0	39.3	39.2
Mean Depth	1.4	1.2	1.2	1.2	1.2
Max Depth	2.7	2.7	2.7	2.7	3.1
w/d ratio	24.9	35.2	34.2	32.8	33.4
FPW	100	100	100	100	100
ER (greater than)	2.8	2.4	2.5	2.5	2.6
Stream Type	C	C	C	C	C

Note: Area computations for each year relative to as-built bankfull elevation

Reach 1 Riffle Cross Section #7 - Station 1+65 Purlear Phase II



Project Name Purlear Phase II
 Cross Section XS Reach 1
 Feature Riffle
 Date 8/31/2009
 Crew Price, Geemen

2005 As-Built Survey			2006 MY - 01			2007 MY - 02			2008 MY - 03			2009 MY - 04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
8.13	1,297.15	FP	8.02	1297.31	(XS8)	8.13	1297.27	XS8LP07	8.13	1297.04	XS8LP08	8.13	1297.22	XS8-LP-09
12.7	1,296.87	TOB	8.04	1297.07	(xs8)	8.52	1297.15	XS8	8.5	1297.16	XS8	8.76	1297.08	XS8-09
15.42	1,296.17	LB	8.13	1297.19	(xs8lp)	11.41	1297.01	XS8	11.55	1297.02	XS8	10.84	1297	XS8-09
17.31	1,295.55	BKF	8.48	1297.31	(xs8lp)	15.04	1296.34	XS8	13.09	1296.8	XS8	12.5	1296.83	XS8-09
20.04	1,294.44	LB	13.33	1296.61	(xs8)	18.1	1295.03	XS8	16.3	1295.84	XS8	12.87	1296.76	XS8-09
21.04	1,293.58	LB	20.27	1294.29	(xs8)	21.05	1293.82	XS8	17.31	1295.55	XS8	15.29	1296.37	XS8-09
21.57	1,293.15	LEW	21.45	1293.11	(xs8sw)	21.91	1293.04	XS8W	19.78	1294.69	XS8	16.34	1295.85	XS8-09
22.43	1,292.75	SB	21.73	1292.86	(xs8)	22.01	1292.73	XS8	21.23	1293.5	XS8w	18.7	1295	XS8-09
28.17	1,292.20	SB	23.43	1292.23	(xs8)	23.02	1292.28	XS8	22.01	1292.83	XS8	19.53	1294.66	XS8-09
30.63	1,292.18	SB	24.95	1292.04	(xs8)	25.45	1292.16	XS8	22.21	1293.07	XS8	20.4	1294.28	XS8-09
32.27	1,292.78	SB	26.5	1292.17	(xs8)	28.24	1292.08	XS8	23.1	1292.44	XS8	21.23	1293.76	XS8-09
33.06	1,293.12	REW	29.2	1292.11	(xs8)	28.49	1292.07	XS8	24.62	1292.2	XS8	21.54	1292.97	XS8-09
34.43	1,293.82	RB	30.34	1292.04	(xs8)	29.05	1292.06	XS8	26.78	1292.02	XS8	22.86	1292.78	XS8-09
36.58	1,294.43	RB	32.5	1293.06	(xs8w)	30.35	1292.24	XS8	28.71	1292.11	XS8	23.74	1292.35	XS8-09
38.39	1,294.73	RB	33.24	1293.28	(xs8)	32.59	1292.62	XS8	30.2	1292.21	XS8	24.89	1292.43	XS8-09
41.05	1,295.27	RB	37.4	1294.58	(xs8)	33.14	1293.06	XS8W	31.82	1292.64	XS8	26.74	1292.16	XS8-09
46.1	1,295.97	RB	40.6	1295.05	(xs8)	33.67	1293.19	XS8	32.03	1292.74	XS8w	28.4	1292.14	XS8-09
52.69	1,296.35	FP	49.77	1296.18	(xs8)	34.22	1293.82	XS8	32.05	1293.03	XS8	28.62	1292.08	XS8-09
56.9	1,296.31	FP	56.87	1296.55	(XS8)	36.3	1294.23	XS8	32.85	1293.67	XS8	29.98	1292.06	XS8-09
56.99	1,296.55	PIN	56.98	1296.42	(xs8fp)	38.25	1294.66	XS8	33.56	1293.69	XS8	30.76	1292.36	XS8-09
			57.01	1296.21	(xs8)	40.93	1295.03	XS8	35.4	1294.18	XS8	31.88	1292.34	XS8-09
						43.22	1295.45	XS8	40.1	1295.09	XS8	32.81	1292.66	XS8-09
						46.93	1295.96	XS8	47.43	1296.12	XS8	33.72	1293.68	XS8-09
						49.65	1296.27	XS8	56.68	1296.23	XS8RP08	34.91	1294.11	XS8-09
						55.76	1296.36	XS8	57.17	1296.53		35.99	1294.22	XS8-09
						56.98	1296.49	XS8RP07				37.52	1294.61	XS8-09
												38.33	1294.73	XS8-09
												40.46	1294.93	XS8-09
												41.66	1295.16	XS8-09
												44.09	1295.66	XS8-09
												47.06	1296.07	XS8-09
												49.6	1296.21	XS8-09
												51.72	1296.32	XS8-09
												53.7	1296.36	XS8-09
												54.9	1296.43	XS8-09

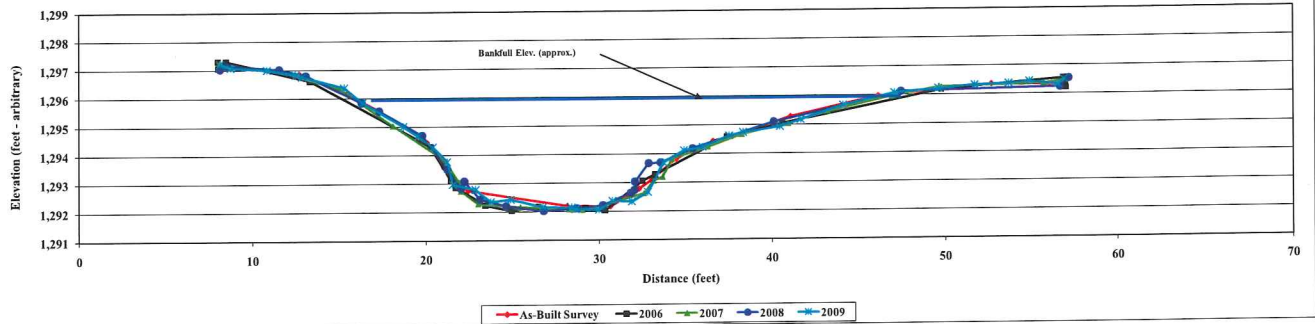


Photo of Cross-Section #8 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	48.59	53.4	51.4	48.2	50.3
Width	23.7	27.3	25.1	25.0	25.3
Mean Depth	2.0	2.0	2.0	1.9	2.0
Max Depth	3.4	3.5	3.5	3.5	3.5
w/d ratio	11.6	13.9	12.3	12.9	12.7
FPW	98	98	98	98	98
ER (greater than)	4.1	3.6	3.9	3.9	3.9
Stream Type	C	C	C	C	C

Note: Area computations for each year relative to as-built bankfull elevation

Reach 1 Riffle Cross Section # 8 - Station 4+60 Purlear Phase II



Project Name	Purfair Phase II
Cross Section	X9 Reach 1
Feature	Pool
Date	8/31/2009
Crew	Price, Clemen

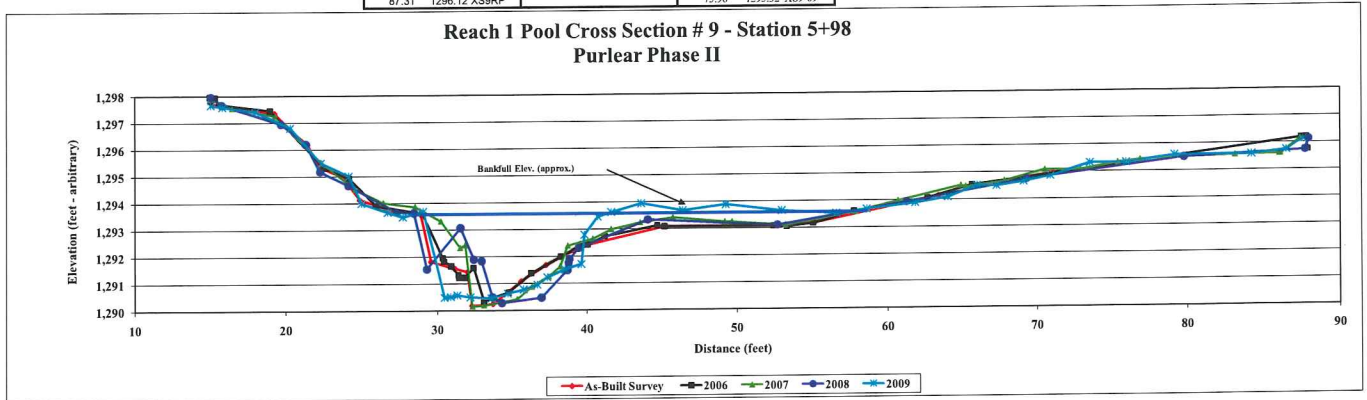
2005 As-Built Survey			2006 MY-01			2007 MY-02			2008 MY-03			2009 MY-04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
15.04	1,297.97	PIN	14.99	1297.97	(XS9)	15.04	1297.91 XS9LP07		15.04	1297.97 XS9LP08		15.04	1297.66 XS9LP-09	
15.23	1,297.66	FP	15.04	1297.82	(xs9fp)	16.46	1297.55 XS9		15.75	1297.67 XS9		15.81	1297.59 XS9-09	
19.23	1,297.36	TOB	15.32	1297.95	(xs9fp)	19.27	1297.26 XS9		19.68	1296.95 XS9		17.97	1297.42 XS9-09	
21.42	1,296.18	LB	15.59	1297.7	(xs9)	22.34	1295.51 XS9		21.31	1296.2 XS9		20.29	1296.81 XS9-09	
22.24	1,295.34	LB	18.96	1297.46	(xs9)	24.56	1294.52 XS9		22.25	1295.16 XS9		22.29	1295.5 XS9-09	
23.72	1,295.00		22.51	1295.34	(xs9)	26.43	1294.01 XS9		24.11	1294.66 XS9		24.14	1295.01 XS9-09	
24.86	1,294.13	LB	24.16	1294.94	(xs9)	28.53	1293.86 XS9		27.31	1293.66 XS9		24.98	1293.99 XS9-09	
26.98	1,293.74	LB	25.83	1293.91	(xs9)	30.25	1293.32 XS9		28.45	1293.63 XS9		26.72	1293.66 XS9-09	
28.87	1,293.59	BKF	29	1293.62	(xs9)	31.53	1292.33 XS9W		29.3	1291.54 XS9		27.73	1293.48 XS9-09	
29.57	1,291.82	SB	30.36	1291.96	(xs9)	31.88	1292.43 XS9W		31.56	1293.07 XS9		29.07	1293.68 XS9-09	
31.18	1,291.56	SB	30.45	1291.83	(xs9)	32.35	1290.15 XS9		32.44	1291.89 XS9		30.49	1290.48 XS9-09	
32.01	1,291.44	SB	30.93	1291.66	(xs9)	33.12	1290.18 XS9		32.96	1291.83 XS9W		30.91	1290.5 XS9-09	
32.31	1,290.18	SB	31.41	1291.33	(xs9)	35.34	1290.41 XS9		33.7	1290.48 XS9		31.35	1290.56 XS9-09	
33.71	1,290.24	SB	31.45	1291.23	(xs9)	36.32	1290.87 XS9		34.32	1290.27 XS9		32.23	1290.49 XS9-09	
35.6	1,291.08	SB	31.84	1291.23	(xs9)	37.44	1291.25 XS9		36.97	1290.46 XS9		33.62	1290.45 XS9-09	
37.26	1,291.68	SB	32.42	1291.59	(xs9)	38.22	1291.62 XS9		38.7	1291.48 XS9		34.72	1290.62 XS9-09	
38.26	1,291.99	SB	33.11	1290.36	(xs9)	38.72	1292.39 XS9W		38.78	1291.76 XS9		35.77	1290.77 XS9-09	
39.11	1,292.20	REW	33.62	1290.46	(xs9)	40.39	1292.64 XS9		38.84	1291.85 XS9W		36.7	1290.94 XS9-09	
40.1	1,292.43	PB	34.77	1290.67	(xs9)	41.64	1292.99 XS9		39.45	1292.3 XS9		37.36	1291.22 XS9-09	
45.22	1,293.09	PB	36.27	1291.38	(xs9)	43.56	1293.23 XS9		44.06	1293.34 XS9		38.55	1291.51 XS9-09	
52.49	1,293.08	PB	38.26	1291.99	(xs9w)	45.73	1293.41 XS9		52.68	1293.11 XS9		39.64	1291.7 XS9-09	
55.08	1,293.18	PB	39.7	1292.45	(xs9)	49.19	1293.25 XS9		61.26	1293.93 XS9		39.84	1292.79 XS9-09-WS	
63.39	1,294.14	RB	40.05	1292.43	(XS9)	49.66	1293.24 XS9		69.31	1294.74 XS9		40.72	1293.46 XS9-09	
71.06	1,294.96	TOB	41.19	1292.74	(xs9)	53.21	1293.11 XS9		79.79	1295.5 XS9		41.64	1293.62 XS9-09	
			44.7	1293.13	(xs9)	57.79	1293.57 XS9		87.69	1295.73 XS9		43.63	1293.67 XS9-09	
			45.18	1293.09	(XS9)	60.7	1293.97 XS9		87.9	1296.12 XS9RP08		46.4	1293.67 XS9-09	
			52.44	1293.08	(XS9)	64.9	1294.52 XS9					49.26	1293.88 XS9-09	
			53.3	1293.06	(xs9)	65.21	1294.48 XS9					52.97	1293.64 XS9-09	
			55.04	1293.18	(XS9)	67.82	1294.68 XS9					56.59	1293.53 XS9-09	
			57.77	1293.6	(xs9)	70.53	1295.08 XS9					58.62	1293.67 XS9-09	
			62.67	1294.07	(xs9)	72.91	1295.07 XS9					61.85	1293.89 XS9-09	
			65.65	1294.54	(xs9)	75.39	1295.33 XS9					64.03	1294.09 XS9-09	
			71.5	1294.98	(xs9)	76.89	1295.43 XS9					65.97	1294.51 XS9-09	
			87.44	1296.19	(XS9)	78.57	1295.47 XS9					67.28	1294.49 XS9-09	
			87.76	1296.2	(xs9rp)	83.1	1295.56 XS9					69.11	1294.65 XS9-09	
						86.01	1295.59 XS9					70.91	1294.85 XS9-09	
						86.07	1295.61 XS9					73.54	1295.31 XS9-09	
						87.31	1296.12 XS9RP					75.96	1295.32 XS9-09	



Photo of Cross-Section #9 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	33.8	31.5	28.6	30.2	28.0
Width	29.2	28.8	29.3	28.6	12.6
Mean Depth	1.2	1.1	1.0	1.1	2.2
Max Depth	3.4	3.2	3.4	3.3	3.1

Note: Area computations for each year relative to as-built bankfull elevation



Project Name	Purlear Phase II
Cross Section	X10 Reach 1
Feature	Pool
Date	8/31/2009
Crew	Price, Greenen

2005 As-Built Survey			2006 MY - 01			2007 MY - 02			2008 MY - 03			2009 MY - 04		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
20.66	1,291.11	FP	20.66	1290.84	(xs10lp)	20.66	1290.79 XS10LP07	19.47	1290.84 XS10	20.69	1290.82 XS10-LP-09			
23.41	1,290.38		20.79	1290.84	(xs10lp)	21.47	1290.64 XS10	20.66	1290.77 XS10LP08	21.54	1290.6 XS10-09			
30.71	1,289.00	BKF	21.02	1290.71	(xs10)	24.39	1290.12 XS10	23.56	1290.22 XS10	24.63	1290.45 XS10-09			
32.26	1,288.49	LB	24.2	1290.22	(xs10)	28.27	1289.34 XS10	28.18	1289.3 XS10	28	1289.38 XS10-09			
33.14	1,288.08	LB	31.52	1288.9	(xs10)	34.36	1287.9 XS10	30.69	1288.84 XS10	32.63	1288.52 XS10-09			
36.25	1,288.00	PB	33.17	1288.14	(xs10)	38.01	1287.79 XS10	33.22	1287.99 XS10	36.96	1288.16 XS10-09			
39.16	1,287.71	PB	35.2	1287.97	(xs10)	41.36	1287.51 XS10	40.21	1287.93 XS10	37.69	1288.01 XS10-09			
40.58	1,287.54	LEW	35.24	1289	(XS10)	42.3	1287.32 XS10W	41.36	1287.3 XS10	38.84	1288.43 XS10-09			
41.62	1,287.43		38.14	1287.71	(XS10)	42.61	1287.33 XS10	42.51	1287.23 XS10W	39.99	1288.48 XS10-09			
43.73	1,287.13	SB	38.35	1287.82	(xs10)	44.68	1286.73 XS10	42.79	1287.08 XS10	41.31	1287.78 XS10-09			
47.1	1,286.89	SB	40.87	1287.53	(xs10)	45.04	1286.65 XS10	43.84	1286.83 XS10	42.45	1287.56 XS10-09			
49.89	1,286.55	SB	41.46	1287.43	(xs10)	48.4	1286.03 XS10	45.66	1286.57 XS10	42.67	1287.38 XS10-09			
51.74	1,286.09	SB	42.08	1287.38	(xs10)	50.07	1285.87 XS10	48.15	1286.43 XS10	43.31	1287.07 XS10-09			
52.47	1,286.52	SB	42.93	1287.22	(xs10)	50.94	1286.3 XS10	49.75	1286.05 XS10	43.38	1287.09 XS10-09			
52.93	1,287.35	REVW	45.03	1286.84	(xs10)	52.14	1286.69 XS10	50.17	1286.07 XS10	44.99	1286.89 XS10-09			
54.1	1,287.80	RB	46.14	1286.77	(xs10)	53.11	1287.2 XS10W	52.03	1285.91 XS10	46.44	1286.66 XS10-09			
55.81	1,288.28	RB	47.73	1286.58	(xs10)	54.4	1287.68 XS10	52.2	1286.38 XS10	47.74	1286.22 XS10-09			
62.51	1,289.83	RB	49.21	1286.38	(xs10)	56.21	1288.33 XS10	53.15	1287.31 XS10	48.78	1286.06 XS10-09			
65.03	1,290.78	RB	49.9	1286.36	(xs10)	58.3	1288.86 XS10	53.48	1286.93 XS10	49.37	1286.46 XS10-09			
68.78	1,291.69	TOB	51.68	1286.06	(xs10)	60.73	1289.23 XS10	56.67	1287.89 XS10	50.1	1286.4 XS10-09			
73.09	1,292.24	FP	52.52	1286	(xs10)	63.16	1289.79 XS10	57.56	1287.82 XS10	50.8	1286.04 XS10-09			
77.12	1,292.61	FP	53.26	1287.49	(xs10)	64.73	1290.49 XS10	60.21	1289.19 XS10	51.31	1286.28 XS10-09			
80.49	1,292.67	FP	53.3	1287.43	(xs10wp)	67.08	1291.11 XS10	64.02	1290.05 XS10	51.79	1286.96 XS10-09			
80.55	1,293.33	PN	56	1288.08	(xs10)	69.1	1291.53 XS10	67.19	1291 XS10	52.89	1287.55 XS10-09			
			57.86	1288.84	(xs10)	70.26	1291.89 XS10	69.29	1291.6 XS10	53.29	1287.82 XS10-09			
			58.71	1288.84	(xs10)	73.12	1291.94 XS10	72.12	1291.77 XS10	54.66	1287.87 XS10-09			
			61.96	1289.66	(xs10)	75.4	1292.23 XS10	76.55	1292.36 XS10	56.23	1288.06 XS10-09			
			67.43	1291.37	(xs10)	77.51	1292.41 XS10	80.82	1292.71 XS10	57.03	1288.25 XS10-09			
			70.2	1291.79	(xs10)	79.71	1292.74 XS10	81.04	1293.19 XS10RP08	57.79	1288.61 XS10-09			
			73.97	1292.25	(xs10)	80.82	1293.18 XS10RP07			62.42	1289.65 XS10-09			
			79.41	1293.33	(XS10)					64.78	1290.72 XS10-09			
			80.7	1293.22	(xs10wp)					67.13	1291.35 XS10-09			
										69.17	1291.66 XS10-09			
										73.88	1292.2 XS10-09			
										74.28	1292.2 XS10-09			

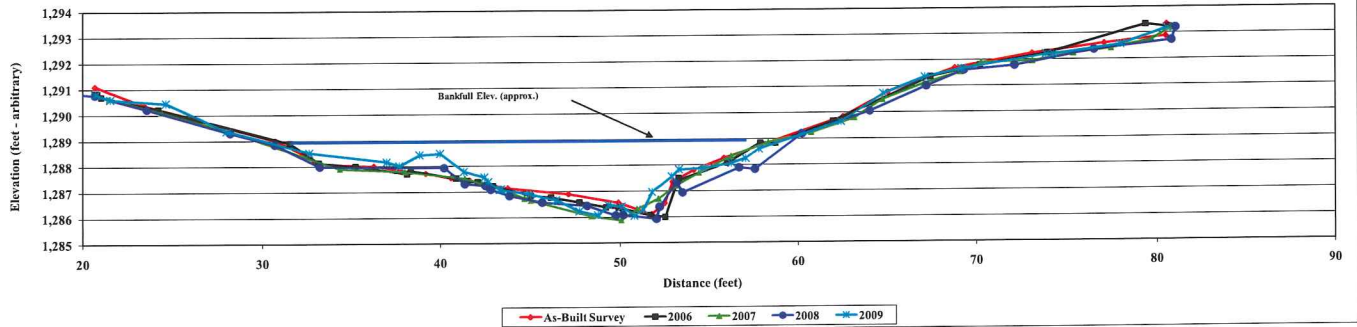


Photo of Cross-Section #10 - Looking Downstream

	As-Built	2006	2007	2008	2009
Area	40.0	42.4	45.2	46.1	38.0
Width	28.3	34.5	30.0	29.4	29.8
Mean Depth	1.4	1.2	1.5	1.6	1.3
Max Depth	2.9	3.0	3.1	3.1	3.0

Note: Area computations for each year relative to as-built bankfull elevation

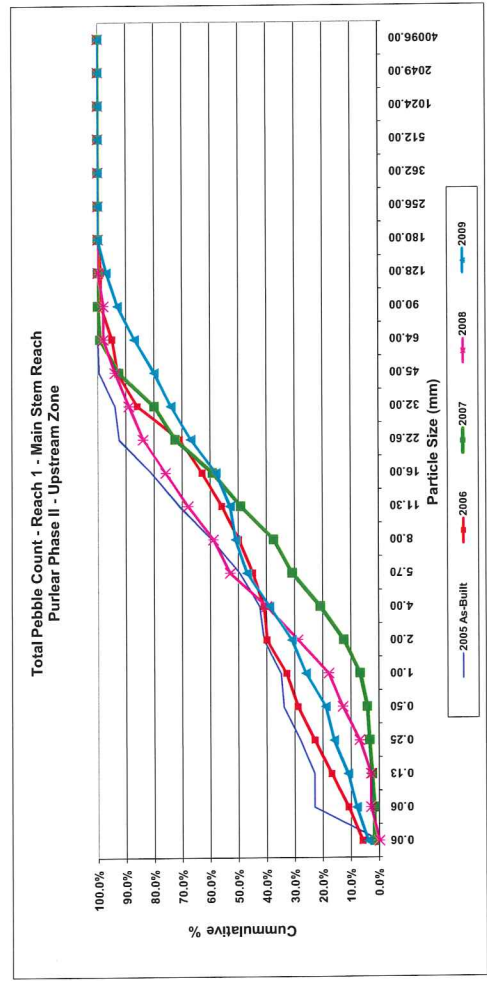
Reach 1 Pool Cross Section #10 - Station 9+93 Purlear Phase II



Project Name: Purlear Phase II
 Cross Section: Reach 1 - Main Stem Reach
 Feature: Upstream Zone - Active Bed
 Date: 10/20/2009
 Price:

Description SH/Clay	2005 As-Built				2006				2007				2008				2009			
	Material	Size (mm)	Pool	Riffle	Cum %	%	Pool	Riffle	Cum %	%	Pool	Riffle	Cum %	%	Pool	Riffle	Cum %	%		
Sand	slit/silt	0.063	0	0	0.0%	0.0%	3	3	6.0%	1.7%	1	1	1.7%	0.0%	0	0	0.0%	0.0%		
	very fine sand	0.062	37	9	23.0%	5.0%	5	0	5.0%	11.0%	0	0	11.0%	3.0%	3	4	3.0%	4.0%		
	fine sand	0.125	0	0	0.0%	0.0%	4	2	6.0%	17.0%	0	1	17.0%	0.8%	0	0	0.8%	3.0%		
	medium sand	0.25	7	3	5.0%	28.0%	5	1	6.0%	23.0%	1	0	23.0%	3.5%	3	1	4.0%	7.0%		
	course sand	0.50	9	3	6.0%	34.0%	5	1	6.0%	29.0%	1	0	29.0%	6.2%	2	2	6.0%	13.0%		
G	very coarse sand	1.0	0	2	1.0%	35.0%	3	1	4.0%	33.0%	3	0	33.0%	6.7%	3	4	5.0%	18.0%		
	fine gravel	2.0	5	7	6.0%	41.0%	5	2	7.0%	40.0%	3	4	40.0%	12.5%	6	5	11.0%	29.0%		
	fine gravel	4.0	0	1	1.5%	42.5%	0	4	1.0%	41.0%	4	6	41.0%	20.8%	7	4	8.0%	31.0%		
	fine gravel	5.7	4	10	7.0%	49.5%	4	4	4.0%	45.0%	4	8	45.0%	30.8%	7	6	13.0%	50.0%		
	medium gravel	8.0	1	19	10.0%	59.5%	2	3	5.0%	50.0%	4	4	50.0%	37.5%	3	3	6.0%	59.0%		
F	medium gravel	11.3	4	19	11.5%	71.0%	3	3	6.0%	56.0%	5	9	56.0%	49.2%	4	2	2.0%	47.0%		
	course gravel	16.0	8	8	10.0%	81.0%	1	6	7.0%	63.0%	2	10	63.0%	59.2%	4	7	8.0%	68.0%		
	course gravel	22.6	8	15	11.5%	92.5%	2	6	8.0%	71.0%	8	8	71.0%	72.5%	3	5	8.0%	84.0%		
	very coarse gravel	32	3	0	1.5%	94.0%	2	13	15.0%	86.0%	6	3	86.0%	80.0%	2	5	5.0%	89.0%		
	very coarse gravel	45	6	5	5.5%	99.5%	3	4	7.0%	93.0%	5	10	93.0%	92.5%	1	4	5.0%	94.0%		
Cobble	small cobble	64	1	0	0.5%	100.0%	1	0	2.0%	95.0%	2	6	95.0%	99.2%	0	4	4.0%	98.0%		
	medium cobble	90	0	0	0.0%	100.0%	2	2	4.0%	99.0%	1	0	99.0%	100.0%	0	3	3.0%	98.0%		
	large cobble	128	0	0	0.0%	100.0%	0	1	1.0%	99.0%	0	0	99.0%	100.0%	1	2	2.0%	97.0%		
	very large cobble	180	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	100.0%	100.0%	0	0	0.0%	100.0%		
	small boulder	256	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	100.0%	100.0%	0	0	0.0%	100.0%		
Boulder	small boulder	362	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	100.0%	100.0%	0	0	0.0%	100.0%		
	medium boulder	512	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	100.0%	100.0%	0	0	0.0%	100.0%		
	large boulder	1024	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	100.0%	100.0%	0	0	0.0%	100.0%		
	very large boulder	2049	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	100.0%	100.0%	0	0	0.0%	100.0%		
	bedrock	40096	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	100.0%	100.0%	0	0	0.0%	100.0%		
TOTAL / % of whole count		100	100	100.0%		50	50	100.0%		70	70	100.0%		48	52	100.0%				

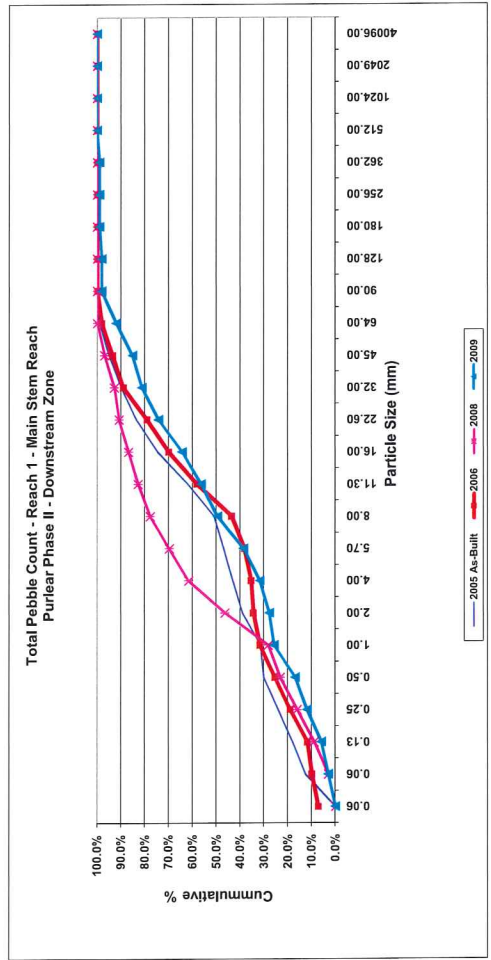
	d16	d35	d50	d84	d95
2005 As-Built	0.08	6.99	21.39	41.41	41.41
2006	0.17	1.93	9.65	37.01	77.00
2007	3.78	8.60	14.12	43.62	62.94
2008	1.20	4.01	6.39	27.30	60.12
2009	0.38	3.93	8.95	67.36	131.50
2010					



Project Name Purlear Phase II
Cross Section Reach 1 - Lower Area
Feature Downstream Zone - Active Bed
Date 10/29/2009
Crew Price

Description	Material	2005 As-Built			2006			2008			2009			
		Pool	Riffle	Cum %	Pool	Riffle	%	Pool	Riffle	%	Pool	Riffle	%	
Sand	silty/clay	0	0	0.0%	8	0	7.3%	0	0	0.0%	0	0	0.0%	
	very fine sand	0.062	0	0.0%	8	0	7.3%	0	0	0.0%	0	0	0.0%	
	fine sand	0.125	10	12.5%	2	1	2.7%	3	0	3.0%	3	0	3.0%	
	medium sand	0.25	6	5.5%	6	2	7.3%	4	2	6.1%	2	1	3.0%	
	course sand	0.50	9	6.0%	24.0%	6	2	7.3%	5	2	16.2%	5	1	5.9%
Gravel	very course sand	1.0	3	6.0%	30.0%	6	1	6.4%	2	5	23.2%	4	1	5.0%
	very fine gravel	2.0	5	1.5%	31.8%	5	2	6.4%	4	1	5.1%	5	4	8.9%
	fine gravel	4.0	8	7.5%	39.0%	2	1	2.7%	10	8	18.2%	1	1	2.0%
	medium gravel	5.7	2	4.0%	43.0%	1	0	0.9%	9	6	15.2%	3	4	6.9%
	large gravel	8.0	3	4.0%	47.0%	1	2	2.7%	7	7	14.5%	3	4	6.9%
Cobble	medium gravel	11.3	9	11.0%	51.0%	6	0	5.5%	3	5	8.1%	4	7	10.9%
	course gravel	16.0	8	12.5%	62.0%	6	10	14.5%	2	3	5.8%	5	2	6.9%
	very course gravel	22.6	5	9.0%	74.5%	8	5	11.8%	1	3	4.0%	7	7	9.9%
	small cobble	32	3	10.0%	83.5%	2	8	9.1%	0	4	4.0%	5	5	9.9%
	medium cobble	45	3	10.0%	90.0%	2	9	10.0%	0	2	2.0%	3	4	6.9%
Boulder	very course gravel	64	2	5.0%	95.0%	1	4	4.5%	2	2	4.0%	1	3	4.0%
	small cobble	90	0	4.0%	99.0%	0	5	4.5%	3	0	3.0%	2	5	6.9%
	large cobble	128	0	1.0%	100.0%	0	2	1.8%	0	0	0.0%	4	2	5.9%
	very large cobble	180	0	0.0%	100.0%	0	0	0.0%	0	0	0.0%	0	2	5.9%
	small boulder	256	0	0.0%	100.0%	0	0	0.0%	0	0	0.0%	1	0	1.0%
Bedrock	small boulder	362	0	0.0%	100.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%
TOTAL / % of whole count	4096	100	100.0%	57	53	100%	49	50	100%	51	50	100%		

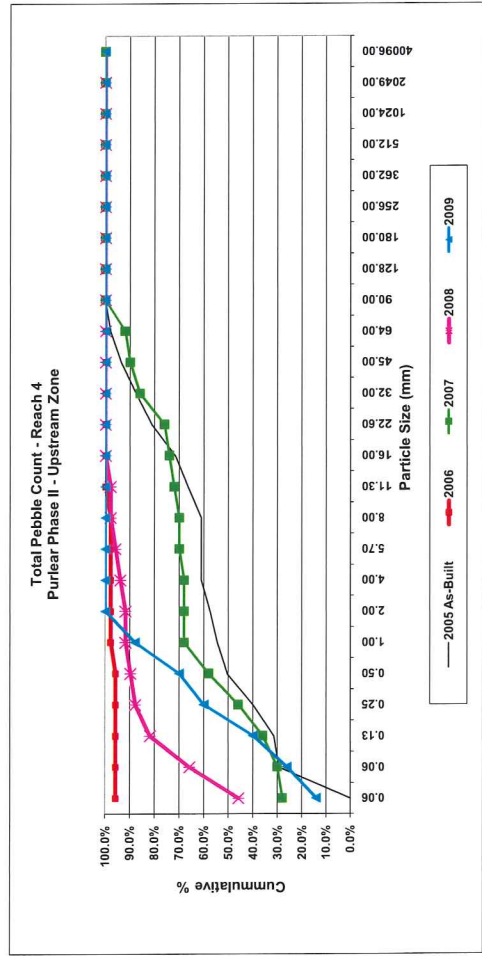
	d15	d35	d50	d84	d95
2005 As-Built	0.15	2.20	8.95	28.16	54.50
2006	0.30	3.93	11.40	32.80	61.25
2007	NA	NA	NA	NA	NA
2008	0.37	2.05	3.43	15.29	46.70
2009	0.69	5.81	9.94	49.86	92.73
2010	0.00	0.00	0.00	0.00	0.00



Project Name Purlear Phase II
Cross Section Reach 4 - Upstream Zone
Feature Active Bed
Date 10/30/2009
Crew Price, Church

Description Silt/Clay	2005 As-Built				2006				2007				2008				2009			
	Material	Size (mm)	Pool	Rifle	%	Cum %	Pool	Rifle	%	Cum %	Pool	Rifle	%	Cum %	Pool	Rifle	%	Cum %		
Sand	silt/clay	0.061	0	0	0.0%	0.0%	25	23	96.0%	96.0%	0	5	28.0%	28.0%	13	10	46.0%	46.0%		
	very fine sand	0.062	32	27	29.5%	29.5%	0	0	0.0%	96.0%	0	0	0.0%	30.0%	4	6	20.0%	66.0%		
	fine sand	0.125	4	4	2.0%	31.5%	0	0	0.0%	96.0%	2	1	6.0%	36.0%	4	4	16.0%	82.0%		
	medium sand	0.25	8	9	8.5%	40.0%	0	0	0.0%	96.0%	4	1	10.0%	46.0%	2	4	6.0%	88.0%		
	course sand	0.50	11	10	10.5%	50.5%	0	0	0.0%	96.0%	6	0	12.0%	58.0%	4	1	2.0%	90.0%		
	very course sand	1.0	6	2	4.0%	54.5%	0	0	0.0%	98.0%	4	1	10.0%	68.0%	0	1	2.0%	92.0%		
	fine gravel	2.0	6	6	3.0%	57.5%	0	0	0.0%	98.0%	0	0	0.0%	68.0%	2	4	12.0%	100.0%		
	fine gravel	4.0	2	5	3.5%	61.0%	0	0	0.0%	98.0%	0	0	0.0%	68.0%	0	0	0.0%	94.0%		
	medium gravel	8.0	0	0	0.0%	61.0%	0	0	0.0%	98.0%	0	1	2.0%	70.0%	0	0	0.0%	96.0%		
	medium gravel	11.3	4	7	5.5%	66.5%	0	0	0.0%	100.0%	0	1	2.0%	72.0%	0	0	0.0%	98.0%		
Cobble	course gravel	16.0	3	7	9.5%	71.5%	0	0	0.0%	100.0%	0	1	2.0%	74.0%	0	0	0.0%	100.0%		
	course gravel	22.6	3	3	8.1%	81.0%	0	0	0.0%	100.0%	0	1	2.0%	76.0%	0	0	0.0%	100.0%		
	very course gravel	32	2	10	6.5%	87.5%	0	0	0.0%	100.0%	0	5	10.0%	86.0%	0	0	0.0%	100.0%		
	small cobble	45	5	7	6.0%	93.5%	0	0	0.0%	100.0%	0	2	4.0%	90.0%	0	0	0.0%	100.0%		
	small cobble	64	8	1	4.5%	98.0%	0	0	0.0%	100.0%	0	0	0.0%	92.0%	0	0	0.0%	100.0%		
	medium cobble	90	2	2	2.0%	100.0%	0	0	0.0%	100.0%	0	4	8.0%	100.0%	0	0	0.0%	100.0%		
	large cobble	128	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%		
	very large cobble	180	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%		
	small boulder	256	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%		
	small boulder	362	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%		
Boulder	medium boulder	512	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%		
	large boulder	1024	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%		
	very large boulder	2049	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%		
	bedrock	40096	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%		
TOTAL / % of whole count		100	100	100.0%	100.0%	25	25	100.0%	100.0%	25	25	100.0%	100.0%	25	25	100.0%	100.0%			

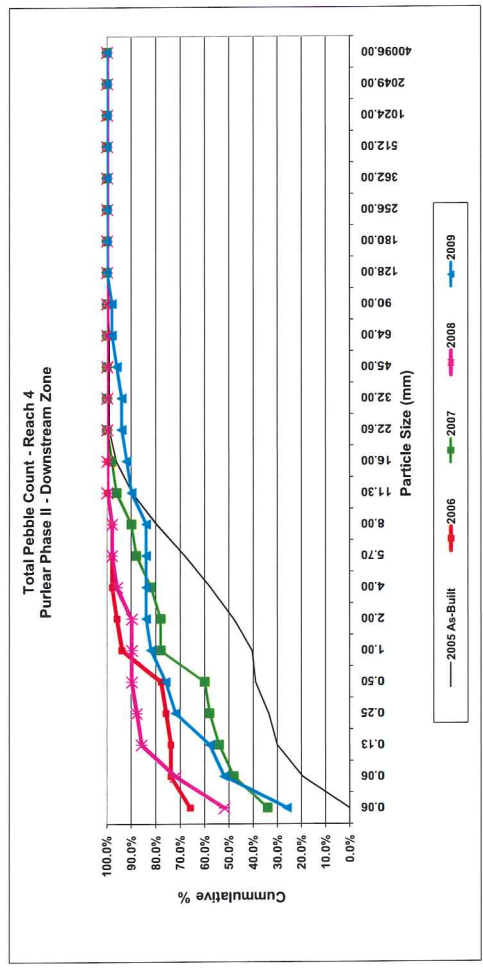
	d16	d35	d50	d84	d95
2005 As-Built	0.08	0.26	0.73	32.47	62.00
2006	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.17	0.50	36.26	89.00
2008	0.06	0.06	0.07	0.25	5.85
2009	0.07	0.15	0.28	1.33	2.38
2010					



Project Name Purlear Phase II
Cross Section Reach 4 - Downstream Zone
Feature Active Bed
Date 10/30/2009
Crew Price, Church

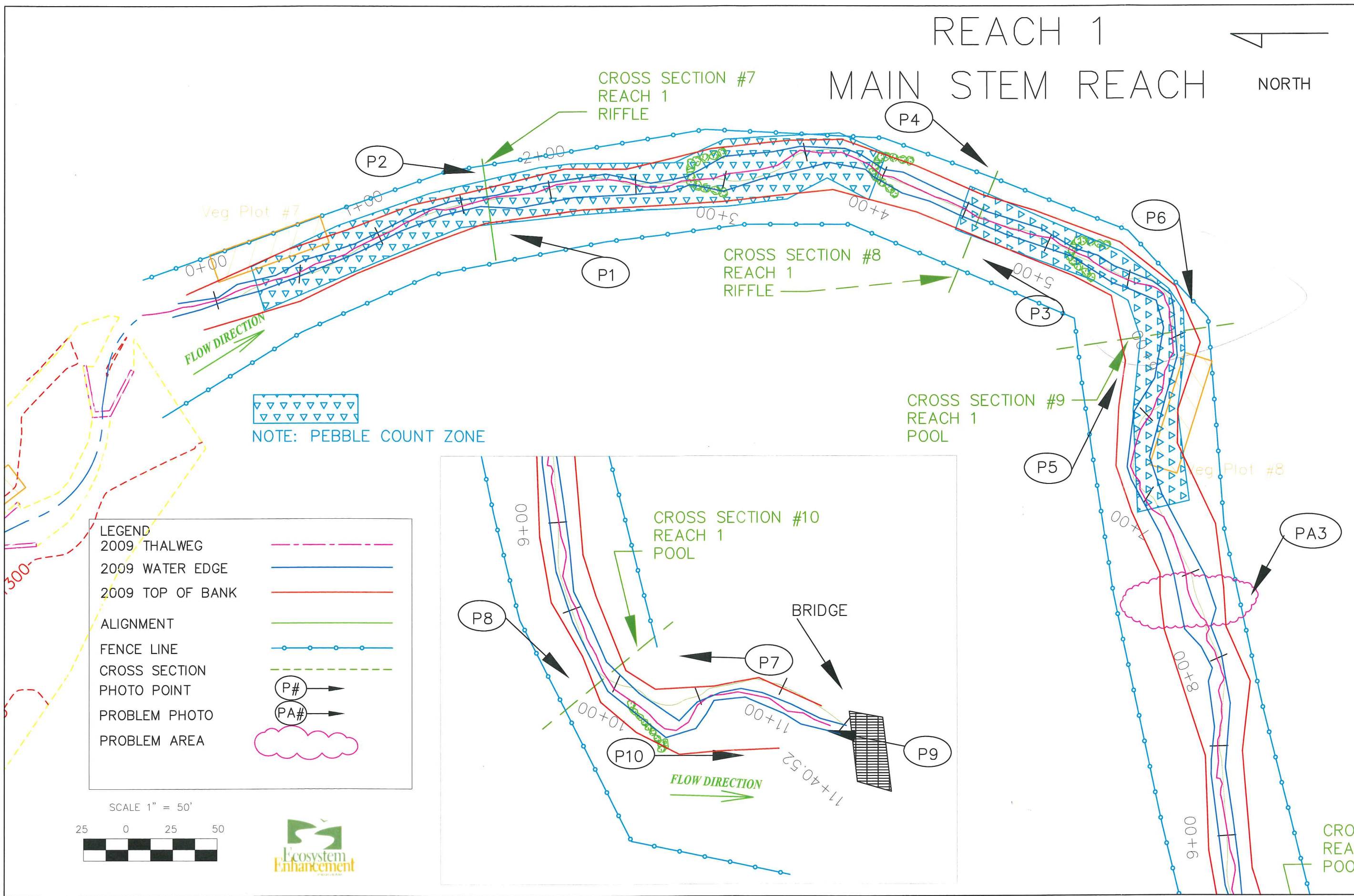
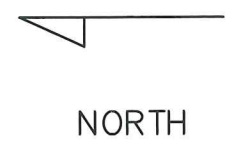
Description	2005 As-Built					2006					2007					2008					2009				
	Material	Size (mm)	Pool	Riffle	%	Cum %	Pool	Riffle	%	Cum %	Pool	Riffle	%	Cum %	Pool	Riffle	%	Cum %	Pool	Riffle	%	Cum %			
Silt/Clay	stilt/clay	0.061	0	0	0.0%	0.0%	11	22	66.0%	66.0%	11	6	34.0%	34.0%	15	11	52.0%	52.0%	10	3	26.0%	26.0%			
	very fine sand	0.062	23	16	19.5%	19.5%	3	1	8.0%	74.0%	5	2	14.0%	48.0%	4	6	20.0%	72.0%	7	6	26.0%	76.0%			
	fine sand	0.125	17	4	10.5%	30.0%	0	0	0.0%	74.0%	3	0	0.0%	74.0%	0	3	14.0%	86.0%	2	1	6.0%	92.0%			
	medium sand	0.25	7	0	3.5%	33.5%	1	0	2.0%	76.0%	1	1	4.0%	80.0%	0	1	2.0%	82.0%	3	4	14.0%	96.0%			
Sand	course sand	0.50	8	3	5.5%	39.0%	1	0	2.0%	78.0%	1	0	0.0%	78.0%	1	0	2.0%	80.0%	1	1	4.0%	84.0%			
	very course sand	1.0	3	0	1.5%	40.5%	7	1	16.0%	94.0%	2	7	18.0%	78.0%	0	0	0.0%	90.0%	0	3	6.0%	96.0%			
	fine gravel	2.0	5	10	7.5%	48.0%	1	0	2.0%	96.0%	0	0	0.0%	96.0%	0	0	0.0%	96.0%	0	0	0.0%	96.0%			
	medium gravel	4.0	9	9	9.5%	57.5%	1	0	2.0%	98.0%	0	2	4.0%	82.0%	1	2	6.0%	96.0%	0	0	0.0%	96.0%			
Gravel	fine gravel	5.7	6	15	11.5%	69.0%	0	0	0.0%	98.0%	0	1	2.0%	96.0%	0	0	0.0%	98.0%	0	0	0.0%	98.0%			
	medium gravel	8.0	11	12	11.5%	80.5%	0	0	0.0%	98.0%	0	2	6.0%	88.0%	0	0	0.0%	98.0%	0	0	0.0%	98.0%			
	medium gravel	11.3	3	17	10.0%	89.5%	0	0	0.0%	98.0%	1	2	6.0%	96.0%	0	0	0.0%	98.0%	2	1	5.0%	99.0%			
	course gravel	16.0	3	10	6.5%	96.0%	0	0	0.0%	100.0%	0	1	2.0%	98.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
Cobble	course gravel	22.6	4	2	3.0%	99.0%	0	0	0.0%	100.0%	1	0	0.0%	100.0%	0	0	0.0%	100.0%	0	1	2.0%	99.0%			
	very course gravel	32	0	0	0.0%	99.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
	small cobble	45	0	0	0.0%	99.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
	medium cobble	90	0	2	1.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
Boulder	large cobble	128	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
	very large cobble	180	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
	small boulder	256	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
	medium boulder	362	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
Bedrock	medium boulder	512	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
	large boulder	1024	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%	0	0	0.0%	100.0%			
TOTAL / % of whole count			100	100	100.0%		25	25	100.0%		25	25	100.0%		25	25	100.0%		25	25	100.0%				

	d16	d45	d84	d95
2005 As-Built	0.09	0.48	3.39	11.45
2006	silt	silt	silt	2.25
2007	silt	0.06	0.12	5.52
2008	silt	0.06	0.06	0.17
2009	silt	0.07	0.09	46.50
2010				

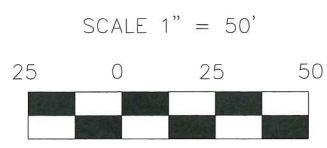


REACH 1

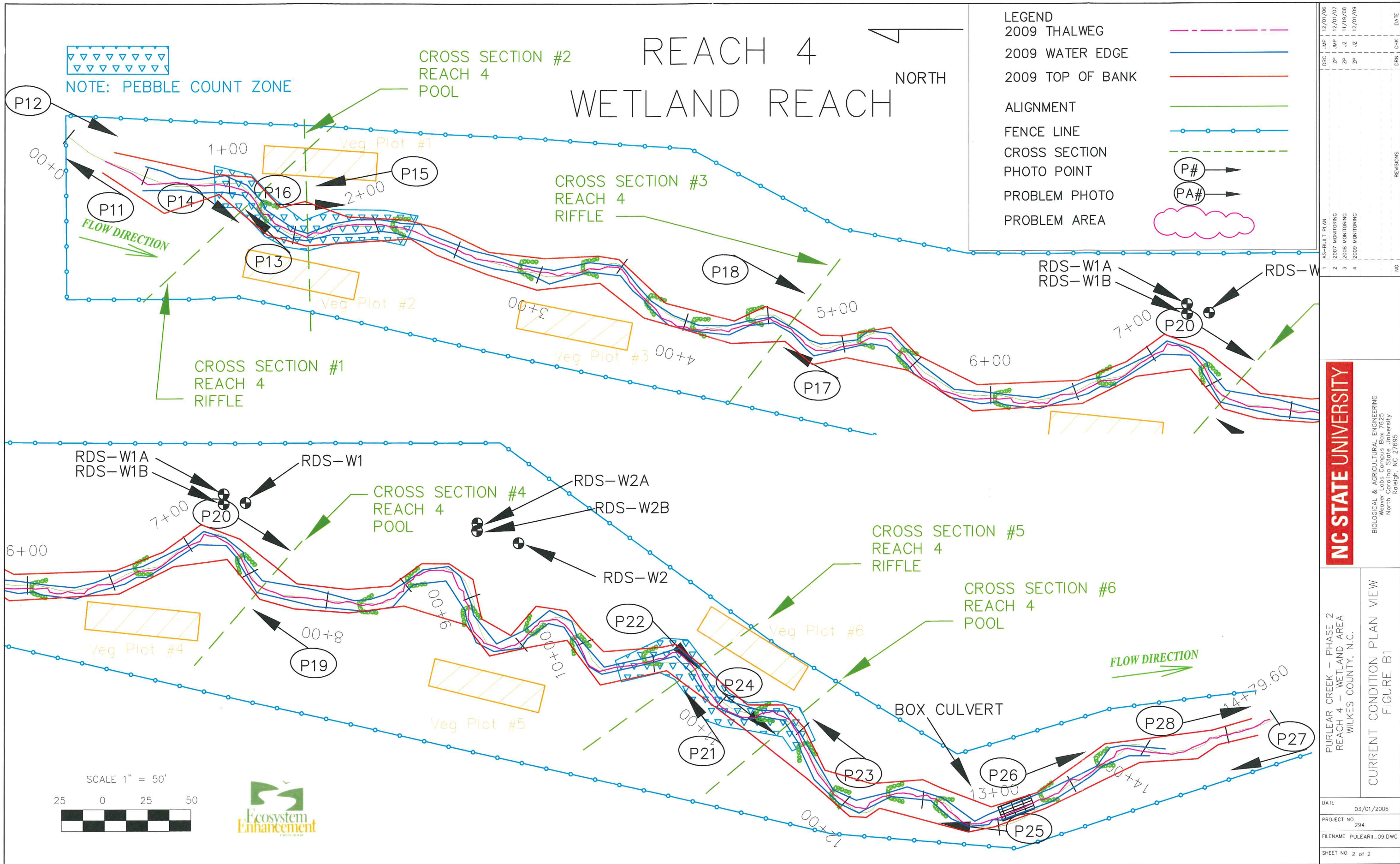
MAIN STEM REACH



LEGEND	
2009 THALWEG	--- (dashed magenta)
2009 WATER EDGE	— (solid blue)
2009 TOP OF BANK	— (solid red)
ALIGNMENT	— (solid green)
FENCE LINE	· · · (dotted blue)
CROSS SECTION	- - - (dashed green)
PHOTO POINT	○ → (circle with arrow)
PROBLEM PHOTO	○ → (circle with arrow)
PROBLEM AREA	☁ (pink cloud)



12/01/06	DATE
12/01/07	DATE
11/19/08	DATE
DRN	CHK
NO	NO
AS-BUILT PLAN	NO
2007 MONITORING	NO
2008 MONITORING	NO
NC STATE UNIVERSITY	
BIOLOGICAL & AGRICULTURAL ENGINEERING Weaver Labs Campus Box 7625 North Carolina State University Raleigh, NC 27695	
PURLEAR CREEK - PHASE 2 REACH 1 - MAIN STEM REACH WILKES COUNTY, N.C.	
CURRENT CONDITION PLAN VIEW FIGURE B2	
03/01/2006	DATE
294	PROJECT NO.
PURLEAR1_09.DWG	FILENAME
MONITORING 1 of 2	SHEET NO.



NO.	REVISIONS	DATE
1	AS-BUILT PLAN	12/01/06
2	2007 MONITORING	12/01/07
3	2008 MONITORING	11/19/08
4	2009 MONITORING	12/01/09

NC STATE UNIVERSITY

BIOLOGICAL & AGRICULTURAL ENGINEERING
 Weaver Labs Campus Box 7625
 North Carolina State University
 Raleigh, NC 27695

PURLEAR CREEK - PHASE 2
 REACH 4 - WETLAND AREA
 WILKES COUNTY, N.C.

CURRENT CONDITION PLAN VIEW
 FIGURE B1

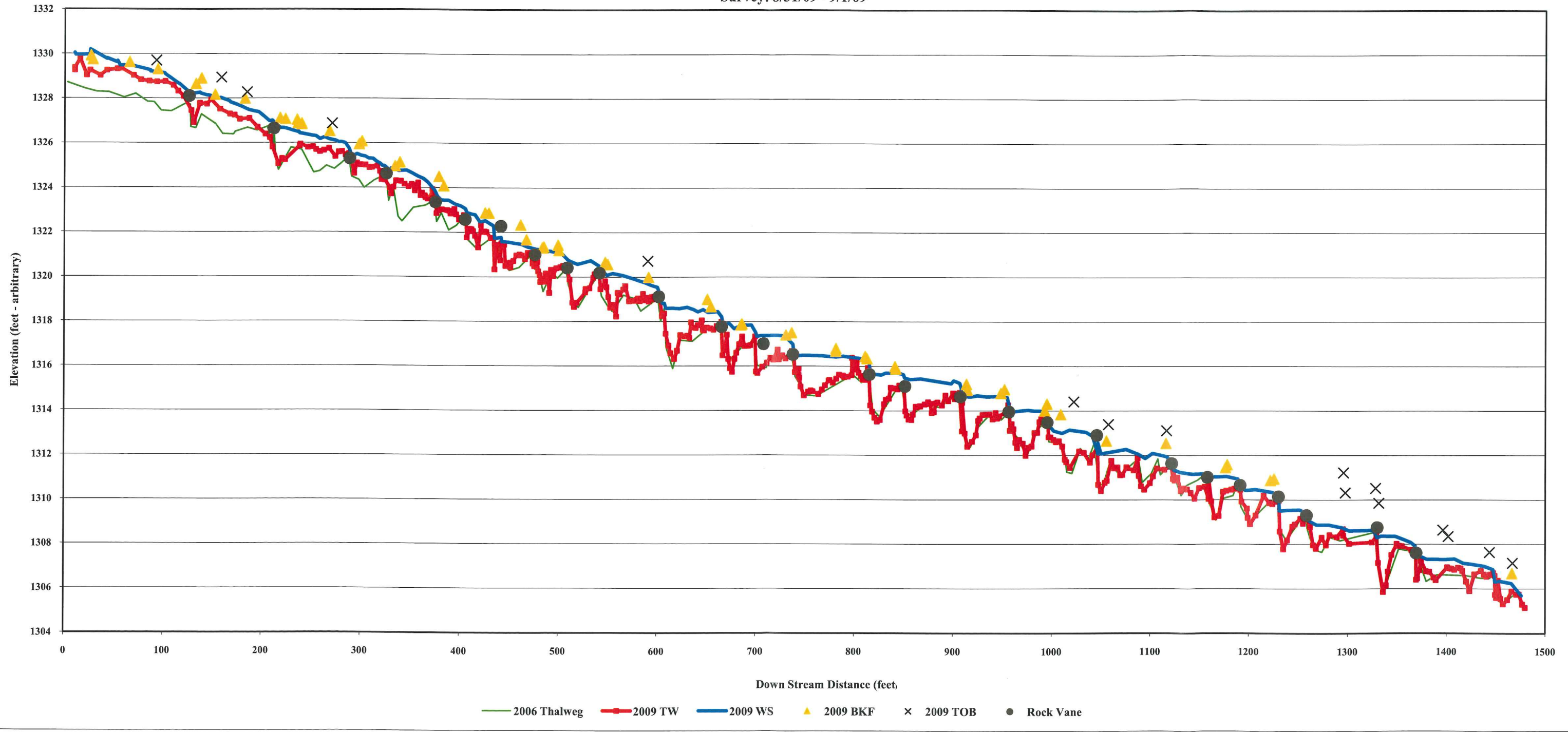
DATE	03/01/2006
PROJECT NO.	294
FILENAME	PURLEAR1_09.DWG
SHEET NO.	2 of 2

Purlear Phase II
Longitudinal Profile
2009 - Reach 1
Main Channel
Survey: 8/31/09



— 2006 Thalweg ■ 2009 TW — 2009 Water ▲ 2009 BKF × 2009 TOB ■ 2009 Beaverdam ● Rock Vane

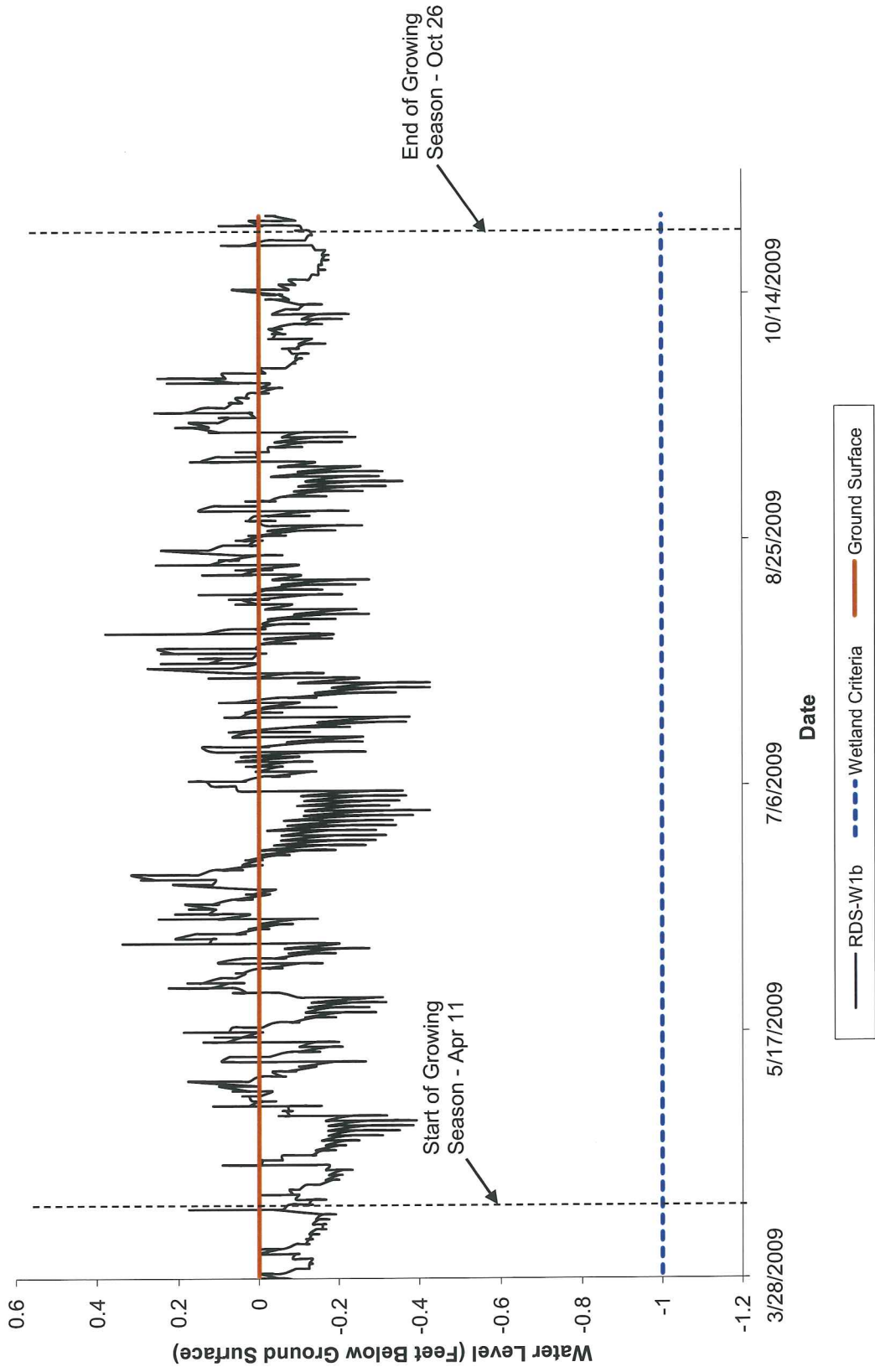
Purlear Phase II
Longitudinal Profile
2009 - Reach 4
Wetland Area
Survey: 8/31/09 - 9/1/09



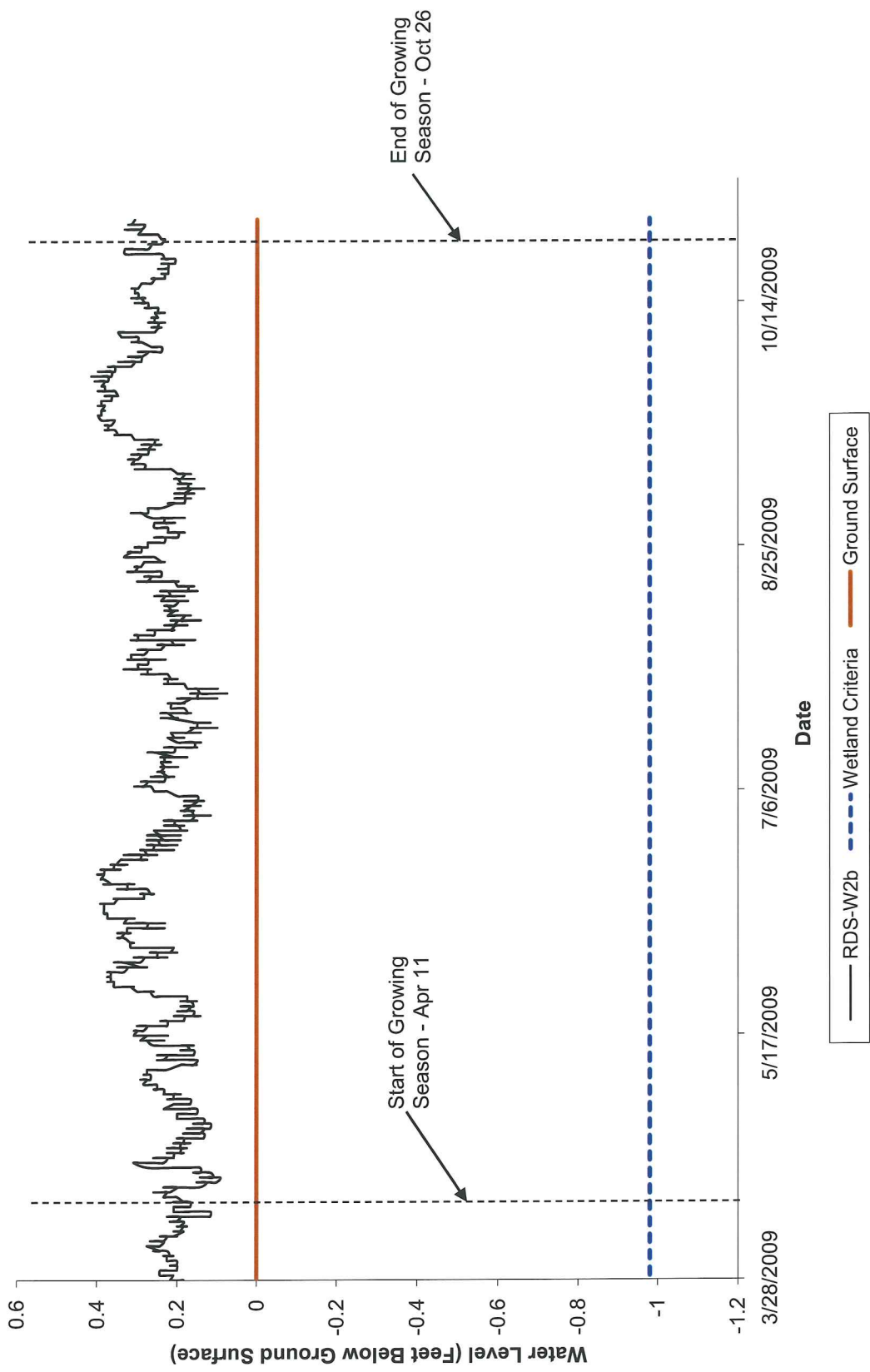
APPENDIX E-
Wetland Assessment Data

1. Water Level Plots
2. Wetland Hydrology Criteria Attainment

Monitoring Well RDS-W1b



Monitoring Well RDS-W2b



Wetland Hydrology Criteria Attainment

Summary of Groundwater Gauge Results for Years 1 through 5					
Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)				
	Year 1 (2006)	Year 2 (2007)	Year 3 (2008)	Year 4 (2009)	Year 5 (2010)
RDS-W1	no data	yes/72 days 36%	yes/168 days 85%	yes/198 days 100%	
RDS-W2	no data	no data	yes/198 days 100%	yes/198 days 100%	

1. Monitoring wells did not function properly in year 1 for both wells and year 2 for RDS-W2.