Stricker Branch Stream Restoration Project
Contract # D06054-G

County:	Cabarrus
Cataloging Unit:	Yadkin 03040105; Targeted Watershed 020040
Monitoring Firm POC:	Mid-Atlantic Mitigation, LLC Rich Mogensen (704) 782-4133
Prepared For:	Ecosystem Enhancement Program

Year 2 (2009) Monitoring Report

Mid-Atlantic Mitigation, LLC
AN EARTHMARK COMPANY

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1.0 EXECUTIVE SUMMARY/PROJECT ABSTRACT

On behalf of the North Carolina Ecosystem Enhancement Program (NCEEP), Mid-Atlantic Mitigation, LLC (MAM) with technical assistance from Kimley-Horn and Associates (KHA) restored, enhanced and preserved 2,924 linear feet of stream on Stricker Branch in downtown Concord, NC. Construction of the project began in April 2007 with removal of the concrete spillway and drainage of a former mill pond, and continued into January 2008 with final planting completed in February 2008. The Stricker Branch Stream Restoration Project (Project) will provide NCEEP with approximately 2,924 Stream Mitigation Units (SMUs).

Stricker Branch was designed using a Rosgen Priority I restoration approach in the old pond bed and a Priority II restoration approach for all existing stream channel. All designed channels are Rosgen C4/5. The project is divided into three sections, the Lower Section below Sign Drive, the Middle Section between Sign Drive and the old pond spillway, and the Upper Section which includes the relic pond area.

Upper Section: The concrete spillway of the mill pond was removed and the remaining water drained from the pond. This was completed in Spring of 2007 and the pond area was allowed to "dry out" for approximately 6 months. Priority I restoration was done on this section. There is a rip rap spillway between the storm water BMP pond outside of the easement and the new channel. Work on the pond area was completed in January 2008, which completed the project.

Middle Section: Priority II stream restoration was done in this section. There are two rip rap areas protecting storm water out fall pipes. There is also a sewer line crossing upstream of the culvert and bridge at Sign Drive with two A-vane, step pool structures in this area, which are not part of the conservation easement or restoration. A runoff swale was incorporated as a storm water feature by digging a shallow channel for the runoff to enter the stream, which was then protected with matting, seeding and live stakes.

Lower Section: Work below Sign Drive was completed first, with completion in August of 2007. This section of the project has had ample time to stabilize and has already held up well through several bank full events as documented in the photo log in Appendix E. Priority II restoration was done in this section, with the exception of two sewer line crossings which are not included in the restoration or the conservation easement. A constructed swale diverts storm water from an adjacent parking lot to a stabilized outlet, before entering the stream.

Based on the As-built drawing, and subsequent survey work the Stricker Branch Site yields 2,924 stream mitigation units (2,129 lf R x 1 = 2,129 priority II R; 795 lf R x 1 = 795 priority I R; 2,129 + 795 = 2,924 SMUs). Several easements bisect the project including Duke Power (60 feet), City and County sewer (totaling 60 feet and 60 feet, respectively), and a crossing for the primary land owner (30 feet). While the entire reach from McGill Road to the confluence of Irish Buffalo Creek is approximately 3,200 feet,

these easements along with constructability issues, especially in the former pond area reduced the final SMU's from 3,000 feet to 2,924. One 30 foot section of the city sewer has been decommissioned, but removal of the areal pipe and accompanying easement for inclusion into the project will require negotiations with the City of Concord. City representatives have not been responsive to this proposal in the past year.

Monitoring Plan
The second year of monitoring for the Project began on July 24^{h}, 2009 with stem counts in vegetation plots, photos and pebble counts. Survey work was completed on September 16th and 17th. Strategies and methodologies laid out in the Monitoring Plan will be followed for a minimum of five years of monitoring. The stream will be monitored for stability of dimension, pattern, and profile using standard practices including permanent cross sections, longitudinal profile, and pebble counts. Standardized, permanent (10m by 10m) vegetation plots will be monitored for species diversity and survival. Monitoring data will be analyzed to determine what remedial actions if any are required and any remedial actions proposed will be detailed in the following monitoring report.

2.0 PROJECT BACKGROUND

2.1 LOCATION AND SETTING

The Stricker Branch Stream Restoration Site (Site) is located in the City of Concord, Cabarrus County, North Carolina on McGill Avenue next to the Gibson Mill redevelopment project off Highway 29. A location map is included as Figure 1. The project site is located in the HUC 03040105 and in the urbanized EEP Targeted Watershed 03040105020040 of the Yadkin River Basin and the 03-07-12 sub-basin. The project watershed is approximately 1.6 sq. mi. flowing into Irish Buffalo Creek, a 303(d)-listed stream. The majority of the Site consisted of highly unstable, incised and straightened stream channel which had been highly altered, degraded, and entrenched with almost no woody vegetation. The upper section of the project area was historically an impounded water supply for the former textile mill. This former textile mill has been purchased for redevelopment into a mixed use commercial and residential project, now known as Gibson Mill. The lower section was deeply entrenched/incised and highly unstable with strong visible evidence of actively failing banks. This section was sparsely wooded and contained invasive species such as Chinese Privet.

2.2 STRUCTURE AND OBJECTIVES

The objective of the restoration approach was to restore the site to a more naturally functioning stream system designed to address impairment issues typically associated with highly disturbed urban stream systems. The goals include:

- The project will provide ecological, functional lift to the existing system by restoring the stream and riparian habitat to a stable stream type and vegetative community that is appropriate for its particular valley and watershed conditions.

- Water quality will be improved by reducing sediment load through stabilization, and nutrient and other pollutant input will be reduced through the addition of forested riparian buffers planted with native species.
- Forested buffers and reconnection with an active floodplain bench will improve channel hydraulics and system capacity.
- Improvements to the ecosystem include the addition of in-stream habitat using in-stream structures and bank revetments such as root wads and log vanes.
- By providing an appropriate mix of native forest vegetation to create an appropriate canopy and under story, the soil structure will improve, leaf litter will be established to support aquatic and terrestrial ecosystems, and shading and cooling will provide improved water quality.

Together, these improvements will provide functional uplift for the watershed as a whole.

The dimension, pattern, and profile were restored using Rosgen Priority I and II natural channel design techniques, which stabilized the banks and added flood storage and habitat diversity. The objective of using these techniques was:

- To create a stable bank full dimension and allow greater than bank full storm events access to the floodplain.
- To create a pattern that is appropriate and stable for the given stream and valley types.
- Stream profile was adjusted to decrease the slope by adding length. This improves the channel's ability to handle the sediment load without aggrading or degrading.
- The plan also incorporates the use of storm water BMPs located both outside and inside the conservation easement to attenuate and treat runoff from the surrounding development and associated impervious surfaces.

The stream restoration project and associated conservation easement are surrounded by a larger project involving the redevelopment of the old textile mill by South Paw Investors. The stream buffer design will help control access to the restored channel while allowing for some passive public access and visibility to the restored channel. A water quality detention pond located at the upstream end of the project site was constructed in conjunction with the stream restoration efforts. South Paw Investors will be responsible for the pond and its associated maintenance, which is not within the conservation easement.

Table I. Project Mitigation Structure and Objectives Table

MITIGATION SUMMARY					
RESTORATION TYPE		**PRIORITY 1 (1:1)**	**PRIORITY 2 (1:1)**	**TOTAL MUs**	**% RESTORATION**
STREAM	LENGTH (FEET)	795	2129	2924	100%
	MITIGATION UNITS	795	2129		

Table II. Project Activity and Reporting History

Activity or Report	Calendar Year of Completion or Planned Completion	Actual Completion Date
Restoration Plan	January 2007	January 2007
Construction	February 2007*	January 2008
Temporary /Permanent seeding	February 2007	February 2008
Containerized Plantings	March 2007	February 2008
Mitigation Plan	May 2007	March 2008
Year 1 Monitoring	December 2007	October 2008
Year 2 Monitoring	December 2008	October 2009
Year 3 Monitoring	December 2009	
Year 4 Monitoring	December 2010	
Year 5 Monitoring	December 2011	

***Project was delayed for approximately 2 months by difficult land closings and city access agreements. Original contractor broke ground in April 2007. Disagreements pertaining to construction scope and quality arose between MAM and original contractor in August 2007. New contractor was assigned to project in November 2007.**

Table III. Project Contacts

Project Manager Mid-Atlantic Mitigation, LLC	1960 Derita Road Concord, NC 28027 Rich Mogensen (704) 782-4133
Designer Kimley-Horn and Associates Inc.	4651 Charlotte Park Dr Suite 300 Charlotte, NC 28217 Will Wilhelm (704) 333-5131
Construction Contractor Earthwork Inc. GW Liles Construction Co. Inc.	343 Chapman Drive Sanford, NC 27330 Dan Wood (919) 718-6812 325 McGill Ave. Suite 120 Concord, NC 28026
Planting & Seeding Contractor HARP Seed mixes provided by IKEX Nursery Stock provided by Native Roots Nursery (Formerly Southern Shade)	9305-D Monroe Road Charlotte, NC 28270 Alan Peoples (704) 841-2841
Monitoring Performers Mid-Atlantic Mitigation, LLC	1960 Derita Road Concord, North Carolina 28027 Christine Cook (704) 782-4140

3.0 PROJECT CONDITION AND MONITORING RESULTS

3.1 VEGETATION ASSESSMENT

3.1.1 Soil Data

Table IV. Preliminary Soil Data

Series	Max Depth (in)	% Clay on Surface	K	T	OM %
Chewacla-	70	18 - 35	.28	5	1-4

3.1.2 Vegetative Problem Areas

No notable vegetative problem areas were identified at this time. No invasive species problems were observed. The site is stabilized and vegetated with native woody and herbaceous species.

3.1.3 Stem Counts

Four hardwood planting zones were established as follows: Zone 1 – Stream Bank; Zone 2- Riparian/Bank full Bench; Zone 3 – Transitional; and Zone 4 – Upland. Live stakes were installed along the new constructed channel within Zones 1 and 2; and in some areas of Zone 3. Plantings were spaced approximately 3 feet apart and differed in sizes ranging from 0.25" to 2" in diameter and 2' to 5' in height. Zones 2 – 4 consist of bare root seedlings in the first half of the lower section and 1 gallon containerized plants, which were planted 3' to 12' apart throughout the project. A reduction in the percentage of nuisance vegetation in areas with existing vegetation to less than 15% will indicate establishment of native wetland vegetation. Study plots showing that the composition and density of vegetation in the restoration areas compares closely to the reference areas will indicate restoration success for vegetation. Success will be gauged by stem counts of planted species. Stem counts of over 320 woody stems per acre after 3 years and 260 stems per acre after 5 years will be considered successful. Photos taken at established photo points should indicate maturation of riparian vegetation community. Photographs will help to capture the health of the planted vegetation and the severity of any invasive or exotic species that establish within the site. Permanent vegetative plots have been established at 6 locations. The success of vegetation plantings will be measured through stems counts. These plots will be used to sample primarily Zones 1 through 3. Each plot covers 100 square meters for tree counts. Within each plot, a 1 meter plot will be sampled to measure herbaceous coverage. During the counts, the health of the vegetation will be noted. In addition to stem counts, the samples will inventory species diversity to allow for comparison between the reference and restoration wetlands and track the percent cover of nuisance species. The vegetation survey will occur during the growing season.

On July 24th, 2009, the second year-vegetative monitoring was performed on the established vegetative plots.

Exhibit Table V: Stem Counts for Each Species Arranged by Plot												
Species	Plots						Initial Totals	Year 1 Totals	Year 2 Totals	Year 3 Totals	Year 4 Totals	Survival %
	1	2	3	4	5	6						
Alnus serrulata					1	2	7	5	3			42.8%
Aronia arbutiflora	1	1		1	1		4	3	4			100.0%
*Betula nigra**	2	4			1	2	7	8	9			>100.0%
Celtis laevigata			1				3	1	1			33.3%
Cephalanthus occidentalis							1	0	0			0.0%
Cornus amomum				2	2		25	4	4			16.0%
Fraxinus pennsylvanica		1					2	1	1			50.0%
Hamamelis virginiana	1	7					8	8	8			100%
Liriodendron tulipifera	2			1	1		7	5	4			71.4%
Nyssa biflora		1		1	1	1	5	4	4			80.0%
Populus deltoides *	7			2			0	4	9			-
Quercus michauxii				1			1	1	1			100.0%
Quercus nigra	3	3			1		5	5	7			100.0%
Quercus phellos		3	3				6	6	6			100.0%
Quercus sp.							7	1	0			
*Salix nigra**		1	7	4	5	2	14	12	19			>100.0%
*Ulmus alata**					1				1			-
Totals	16	21	11	12	14	7	101	63	81			80.2%
Totals w/o vols.	9	18	10	10	13	7	101	63	67			66.3%

*4 volunteers – *Betula nigra*; 3 – *Salix nigra*; All *Populus deltoids* and *Ulmus alata* volunteers

	Initial	2008	2009	2010	2011	2012
Plot 1	480	360	360			
Plot 2	680	680	720			
Plot 3	560	440	400			
Plot 4	720	440	320			
Plot 5	720	240	480			
Plot 6	840	200	280			
Total	687	367	427			
Total w/Vols.	-	420	540			

3.1.4 Vegetation Assessment Summary

Vegetation success will be defined as tree survival to meet 320 stems per acre after three years and 260 stems per acre after five years inside the permanent vegetative plots. Herbaceous cover greater than 75% coverage after five years will be considered successful.

Plot 1 has lost three planted individuals but is host to several small Cottonwood volunteer seedlings. These cottonwood individuals are noted on the grid for future tracking. Herbaceous cover was greater than 75%, with wetland species, primarily *Juncus effuses,* dominating. Excluding cottonwoods, Plot 1 currently contains 360 stems per acre. If managed properly cottonwoods are native, desirable volunteers well suited to the on-site conditions.

Plot 2 lost no planted individuals. A large river birch on the outer limits of the plot (not included in the baseline count) is now being included in the annual count. Two additional river birch and one black willow volunteer were noted in the plot this year and added to the grid. Herbaceous cover was greater than 75% and similar in composition to Plot 1. Stems per acre for plot 2 is 720 with 0% mortality.

Plot 3 lost one planted individual in addition to the four individuals lost last year. This is reasonable mortality for Year 2 along with 100% survival of live stakes. One new black willow volunteer was noted this year and added to the grid. Herbaceous cover is greater than 75% and dominated with upland dry meadow species like dog fennel. Plot 3 contains 400 stems per acre not including volunteers.

Plot 4 continues to sustain damage from sand deposition from bankfull events. The sand deposition has killed most of the livestakes in the north east quadrant of the plot. Because the problem in this area is deposition, not erosion, replacement livestakes are not necessary and given the hostile conditions in this plot any replanting would potentially be self defeating. Two cottonwood volunteers and two black willow volunteers are present in the plot and have been added to the grid. Currently, not counting volunteers, the plot has 320 stems per acre, which is low for year 2. Including the volunteers in this count brings the stems per acre to 480. Rather then suggesting a replant for this plot, it may be more effective to move the plot five feet south along the stream bank out of the range of the sand deposition area. Outside of the sand deposition area the plot demonstrates greater than 75% cover with a composition similar to Plot 3, above.

Plot 5 lost three planted individuals in addition to four individuals declared dead last year. Seven individuals lost last year among dense herbaceous growth were easily identified this year. One river birch volunteer has grown out of the stump of a dead transplanted alder. This plot now contains 480 stems per acre without counting volunteers. Plot 5 is no longer dominated by *polygonum* as in year one, but still contains greater than 75% cover with mixed grasses dominating.

Plot 6 was difficult to count last year due to dense herbaceous growth, the hope was that more individuals would be found surviving in Year 2. Only two individuals not found last year were found in this years count. In addition, the plot was subject to scouring during an over bank event. This plot is in bad shape with 0% cover in the scour area and high mortality of planted stems. The scour damage will be repaired and the plot will be replanted with gallon size trees this winter. The current stems per acre calculation for plot 6 is 280, with no volunteers present and less than 50% cover. Areas were cover is not disturbed are dominated by *polygonum pennsylvanicum* though not to the same degree as Year 1.

Overall, the Year 2 plant count indicates 66% survival and 427 stems per acre for the site. Even with the poor performance of Plot 6 this rate of survival and stems per acre is right on target for Year 2.

In Appendix A, the vegetative survey data tables show the actual counts of each species found per plot. Stressed and dead plants were also noted. The herbaceous cover plant community was monitored in a 1 m by 1 m square at one corner of each plot. Each herbaceous quadrant showed at least 75% cover and all were at or close to 100%.

3.2 CHANNEL STABILITY ASSESSMENT

3.2.1 Cross Sections

Monitoring Year 2 has been marked by extreme sand deposition most notably below both bridges at McGill Ave. and at Sign Drive, sand deposits fluctuate throughout the entire project. Depth of CS 1 (Pool) shows an average decrease in depth of 0.96 feet since As-built and minor scour was present on the left bank which has already re-vegetated. On CS 2 (Riffle) both the cross section survey and the pebble count indicate an increase in course sand. Large amounts of sand have been deposited on the left bank. CS 3 showed some scouring on the left bank in Year 1 and this area seems to be cutting its own bankfull bench. A vegetated swale has also formed in this area where there is often standing water along the left bank. CS 4 actually showed a reduction in sand deposition within the pool and stable bank/bankfull bench pattern. CS 5 and 6 are located at the end of the upper section (former pond area) where the concrete weir was removed. CS 5 shows some scouring on the right bank. A small scour hole is present, but should re-vegetate on its own given time. CS 6 shows a similar scouring pattern as CS 5 but has stabilized and re-vegetated. The Cross Section plots are located in Appendix B.

3.2.2 Bank Full Events

A Crest Stage Gage (CSG) was originally located near Vegetation Plot 2, below Sign Drive in the lower section of the project, on stream bank left. The gage was routinely getting buried in sand and debris and was therefore moved to stream bank right where the elevation is slightly higher and there is less sand deposition. Two bankfull events registered on the CSG and were documented in April right before the gage was moved

and then in July, after the gage was moved. The lowest documented bankfull event occurred with rainfall of approximately 0.42 inches on April 14th, 2009; however water levels were still slightly elevated from a storm earlier that week (April 11th) which delivered approximately 1.85 inches. Also, the data for April 15th is missing for the Concord, NC gage as listed on the SCO website. Rainfall records indicated three significant events between April 16th and the CSG being checked again on July 24th. Rainfall of 1.9 inches on June 6th, 3.48 inches on July 10th, and 6.31 inches on July 23rd, were all recorded during this 3 month period and most likely resulted in bankfull events. Documentation is shown in the Bank Full Event Photo Log in Appendix E and in the table below. Rain fall data is also presented in table form in Appendix E.

Exhibit Table VI. Bankfull Events

Site Visit Date	Associated Rainfall Event Date	Rainfall Amount (Inches)	Method Documented
4/14-16-/2009	4/11/2009, 4/14/2009	1.85/ 0.42	CSG - Photos
7/24/2009	7/23/2009	6.31	CSG - photos

3.2.3 Longitudinal Profiles

Flash flood type rainfall events and related bankfull events which are common in urbanized areas have produced some changes in the stream profile. Generally, large amounts of sand have and will likely continue working through the system and moving downstream. Parts of the profile show signs of stabilizing while others remain highly variable. Evidence of severe sand deposition is most notable below the bridge at Sign Drive. The system is designed to continue moving this sand downstream during bankfull events and is expected to do so.

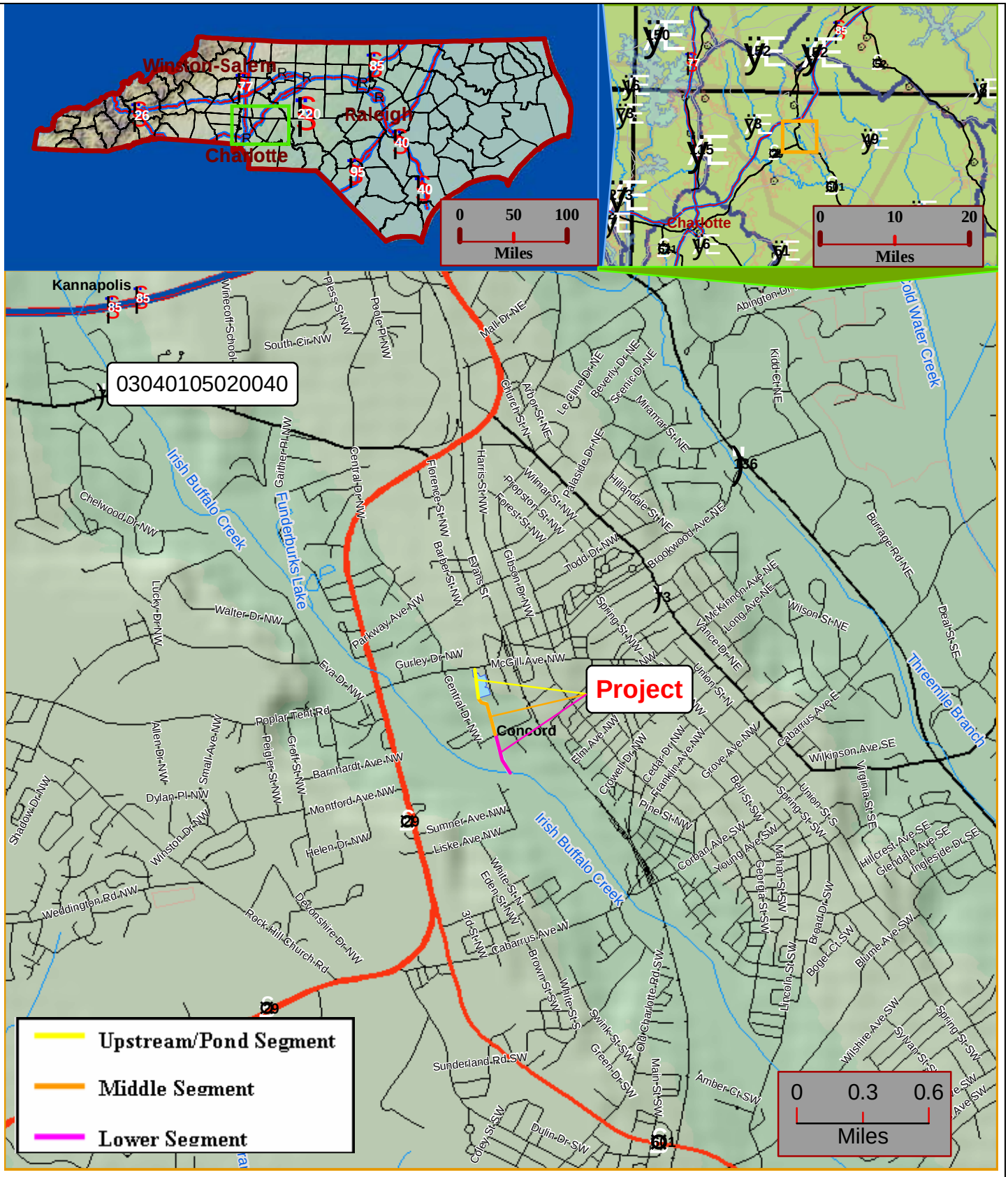
Bed material was also sampled at one riffle in each section on Cross Sections 2, 3, and 5. Cross Section 5, in the upper section, indicated an increase in coarse sand and fine gravel and a relatively even distribution of larger bed material. Cross Section 3, in the middle section, indicates a shift in particle sizes from small cobble and medium gravel to medium gravel and coarse sand. Cross Section 2, in the lower section, is still dominated by coarse to fine gravel and shows a similar composition as Year 1 but with an increase in coarse sand. In Year 1, accumulation of sand was most noticeable in the middle section. Some of this sand in the middle section is still noticeable, but new sand deposition is now most noticeable in the lower section below the bridge at Sign Drive. As mentioned above, this sand is expected to continue migrating downstream.

3.2.4 Site Summary and Remedial Actions

Overall, the stream channel has stabilized well and weathered multiple bankfull events. Sudden, severe, flash flood type events are typical of urbanized streams. Areas that sustained damage due to bankfull conditions were repaired by hand along several rills in the middle section. Other repairs, which are documented in the photo log include removal of two island bars formed around washed out alder transplants below McGill Road. These

islands were causing bank erosion on the right bank due to the shift in flow. The herbaceous vegetative cover has also developed a healthy and diverse community throughout most of the site. The planted trees and shrubs have also done well and are supplemented by an existing buffer community which will provide a seed source for volunteers well suited to the current site conditions.

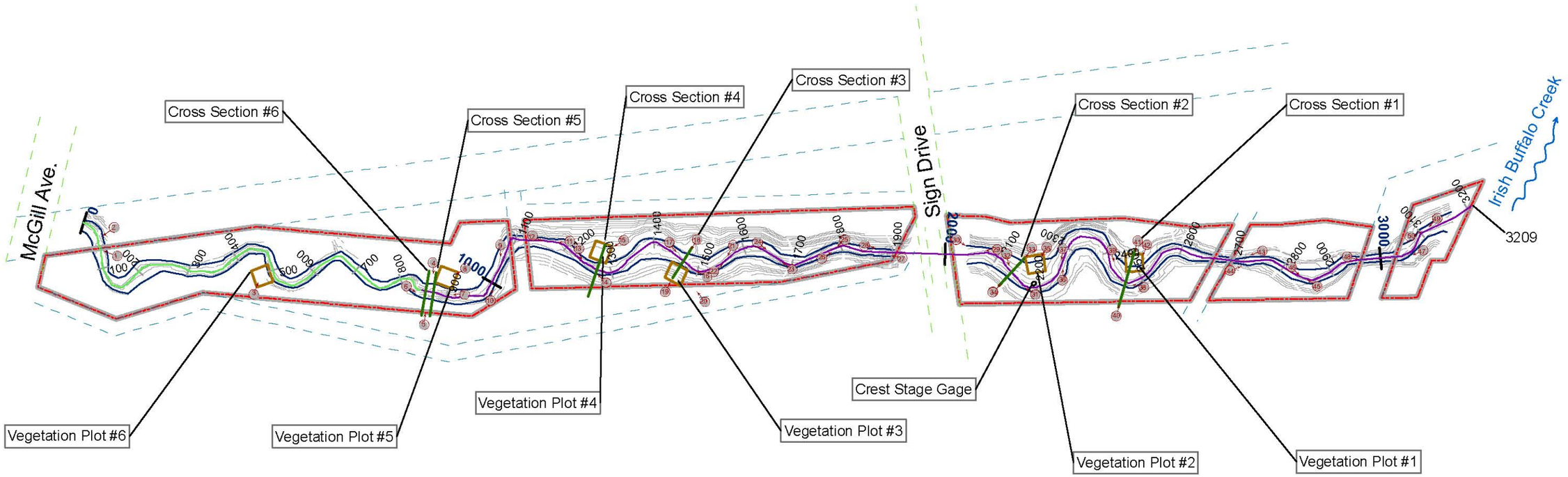
Damage repair and replanting will be done in Plot 6 this fall/winter. A 90 degree angle has developed in the stream at approximately station 204+50. Large concrete debris was left in place at the time of construction and may be the cause of this sharp bend. This debris will be removed prior to the next growing season and stabilized with live stakes. The area between station 201 and station 204 will be carefully observed this winter to determine if remedial work is necessary or if the area is progressing towards a stable and vegetated state.



Title	Project Site Vicinity Map

Prepared For: Ecosystem Enhancement Program

Project	Stricker Branch Stream Restoration Cabarrus County, North Carolina	
Date	**Project Number**	**Figure**
1/5/07	018285002	1



Title	Stricker Branch Monitoring Map
Prepared For: **Mid-Atlantic Mitigation, LLC.**	**Project**: Stricker Branch Stream Restoration Cabarrus County, North Carolina

Date	**KHA Project Number**	**Figure**
3/11/08	018285002	2

Prepared by Chris Tinklenberg / Jason Diaz

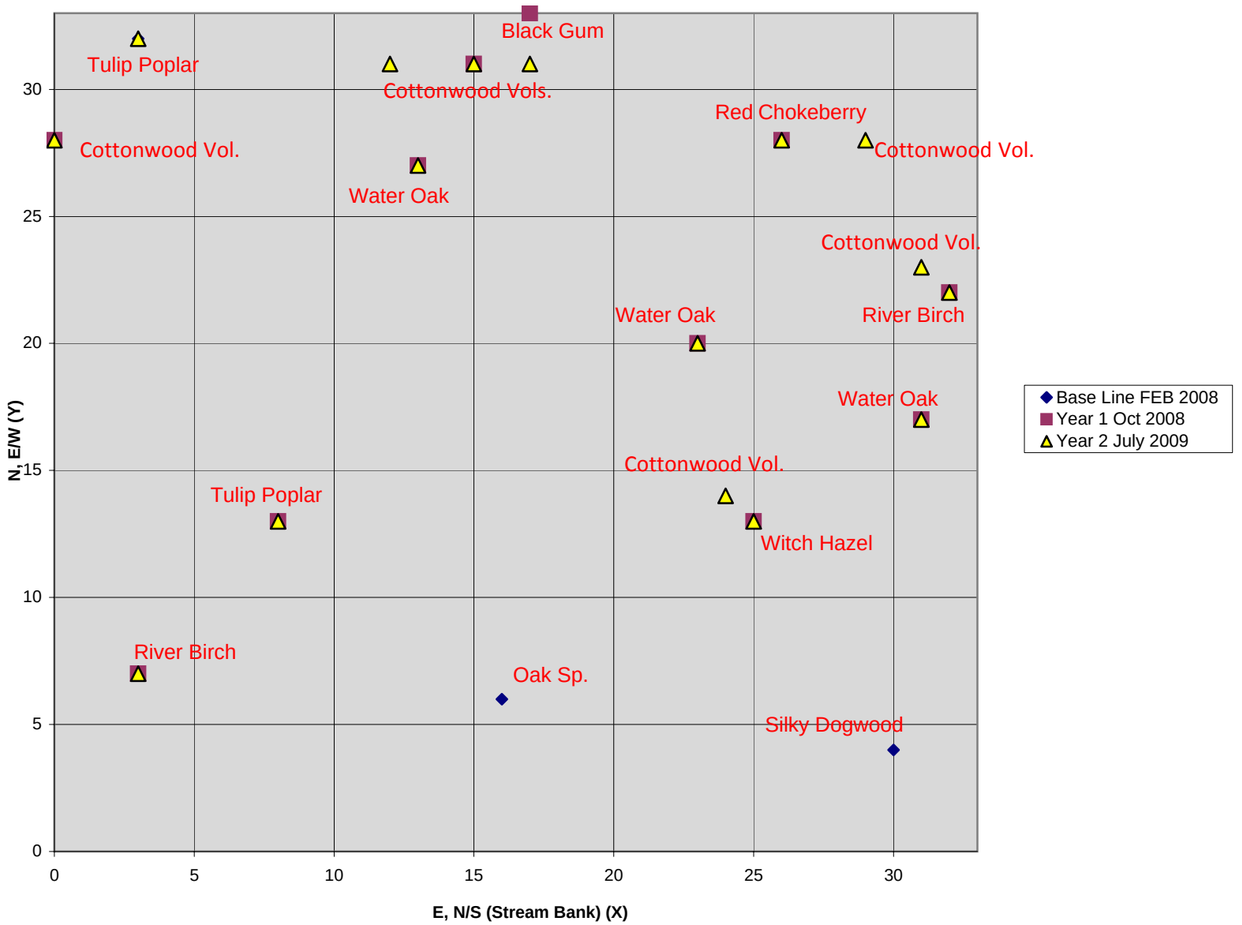
Kimley-Horn and Associates, Inc.

APPENDIX A: VEGETATION DATA

VP 1

X	Y	Species	X	Y	Year 1	X	Y	Year 2	X	Y	Year 3	X	Y	Year 4	X	Y	Year 5
3	7	River Birch	3	7	Alive	3	7	Alive									
3	32	Tulip Poplar			Dead	3	32	Alive									
8	13	Tulip Poplar	8	13	Alive	8	13	Alive									
13	27	Water Oak	13	27	Alive	13	27	Alive									
16	6	Oak Sp.			Couldn't find			Dead									
17	33	Black Gum	17	33	Alive, Stressed			Dead									
23	20	Water Oak	23	20	Alive, Stressed	23	20	Alive									
25	13	Witch Hazel	25	13	Alive, Stressed	25	13	Alive									
26	28	Red Choke Berry	26	28	Alive	26	28	Alive									
30	4	Silky Dogwood			Couldn't find			Dead									
31	17	Water Oak	31	17	Alive	31	17	Alive									
32	22	River Birch	32	22	Alive	32	22	Alive									
		Cottonwood Vol	0	28	Alive	0	28	Alive									
		Cottonwood Vol	15	31	Alive	15	31	Alive									
		Cottonwood Vol				12	31	Alive									
		Cottonwood Vol				17	31	Alive									
		Cottonwood Vol				29	28	Alive									
		Cottonwood Vol				31	23	Alive									
		Cottonwood Vol				24	14	Alive									

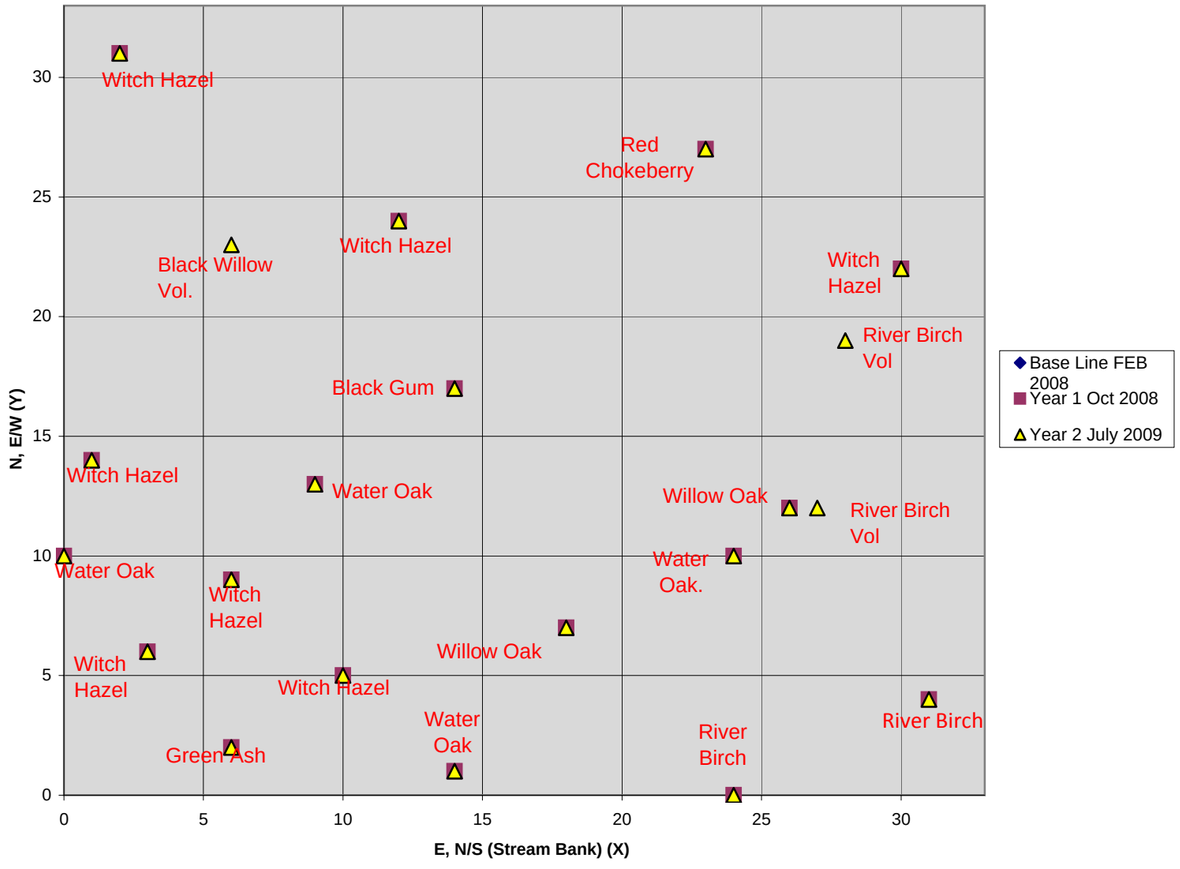
	Initial	2008	2009	2010	2011	2012
SPA	480	360	360			
SPA w/ Vols	-	440	640			



X	Y	Species	X	Y	Year1	X	Y	Year 2	X	Y	Year 3	X	Y	Year 4	X	Y	Year 5
0	10	Water Oak	0	10	Alive	0	10	Alive									
1	14	Witch Hazel	1	14	Alive	1	14	Alive, stressed									
2	31	Witch Hazel	2	31	Alive	2	31	Alive, stressed									
3	6	Witch Hazel	3	6	Alive	3	6	Alive, stressed									
6	9	Witch Hazel	6	9	Alive	6	9	Alive									
6	2	Green Ash	6	2	Alive	6	2	Alive									
9	13	Willow Oak	9	13	Alive	9	13	Alive									
10	5	Witch Hazel	10	5	Alive	10	5	Alive, stressed									
12	24	Witch Hazel	12	24	Alive	12	24	Alive, stressed									
14	17	Black Gum	14	17	Alive, stressed	14	17	Alive									
14	1	Water Oak	14	1	Alive	14	1	Alive									
18	7	Willow Oak	18	7	Alive, stressed	18	7	Alive									
23	27	Red Chokeberry	23	27	Alive	23	27	Alive									
24	10	Water Oak	24	10	Alive	24	10	Alive									
26	12	Willow Oak	26	12	Alive	26	12	Alive									
30	22	Witch Hazel	30	22	Alive	30	22	Alive, stressed									
31	4	River Birch	31	4	Alive	31	4	Alive									
		River Birch vol*	24	0	Alive	24	0	Alive									
		River Birch vol			Alive	28	19	Alive									
		River Birch vol			Alive	27	12	Alive									
		Black Willow vol			Alive	6	23	Alive									

Fairly large river birch right on the line, not counted in baseline?*

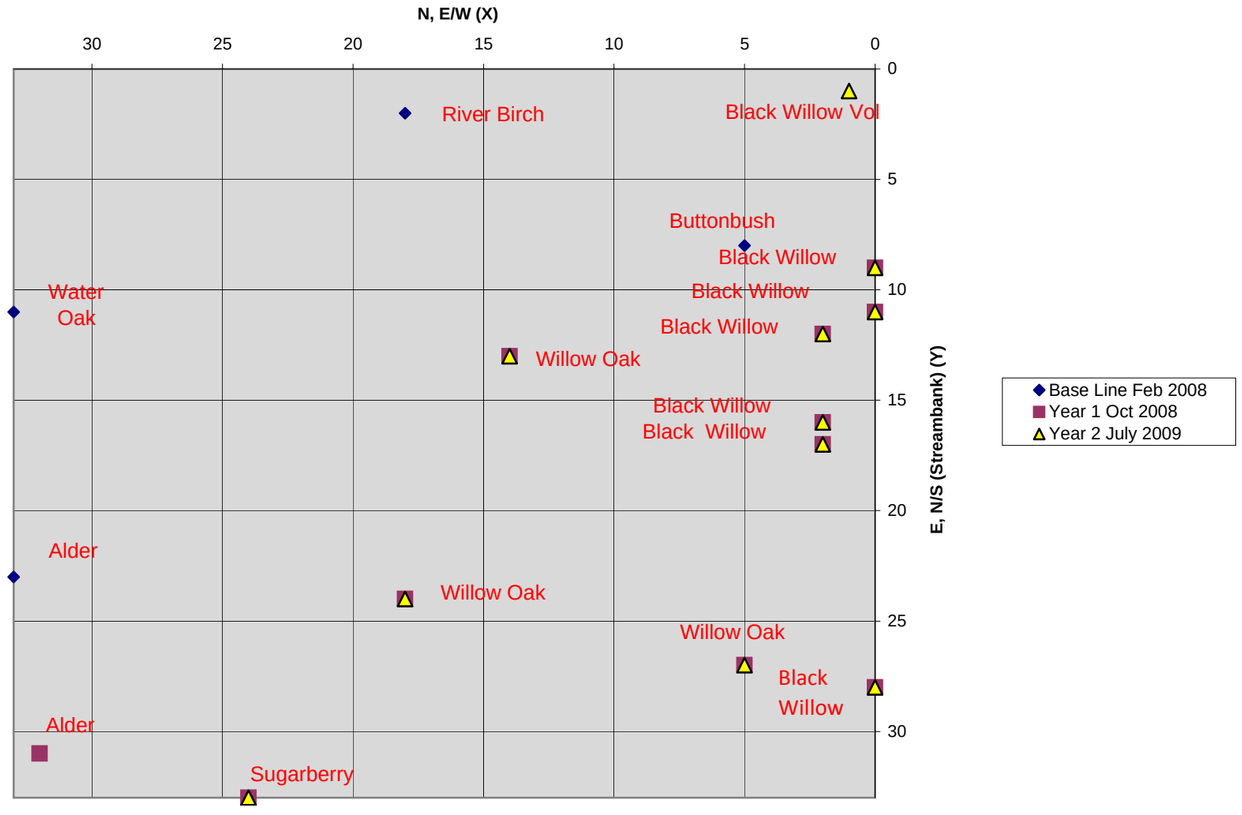
	Initial	2008	2009	2010	2011	2012
SPA	720	680	720			
SPA w/ Vols	-	720	840			



X	Y	Species	X	Y	Year 1	X	Y	Year 2	X	Y	Year 3	X	Y	Year 4	X	Y	Year 5
18	2	River Birch			Dead			Dead									
5	8	Button Bush			Dead			Dead									
0	9	Black Willow LS	0	9	Alive	0	9	Alive									
0	11	Black Willow LS	0	11	Alive	0	11	Alive									
33	11	Water Oak			Dead			Dead									
2	12	Black Willow LS	2	12	Alive	2	12	Alive									
14	13	Willow Oak	14	13	Dead	14	13	Alive									
2	16	Black Willow LS	2	16	Alive	2	16	Alive									
2	17	Black Willow LS	2	17	Alive	2	17	Alive									
33	23	Alder			Dead			Dead									
18	24	Willow Oak	18	24	Alive	18	24	Alive									
5	27	Willow Oak	5	27	Alive	5	27	Alive									
32	31	Alder	32	31	Alive			Dead									
24	33	Sugarberry	24	33	Alive	24	33	Alive									
		Black Willow LS*	0	28	Alive	0	28	Alive									
		Black Willow vol.				1	1	Alive									

*black willow live stake on line, not counted in baseline

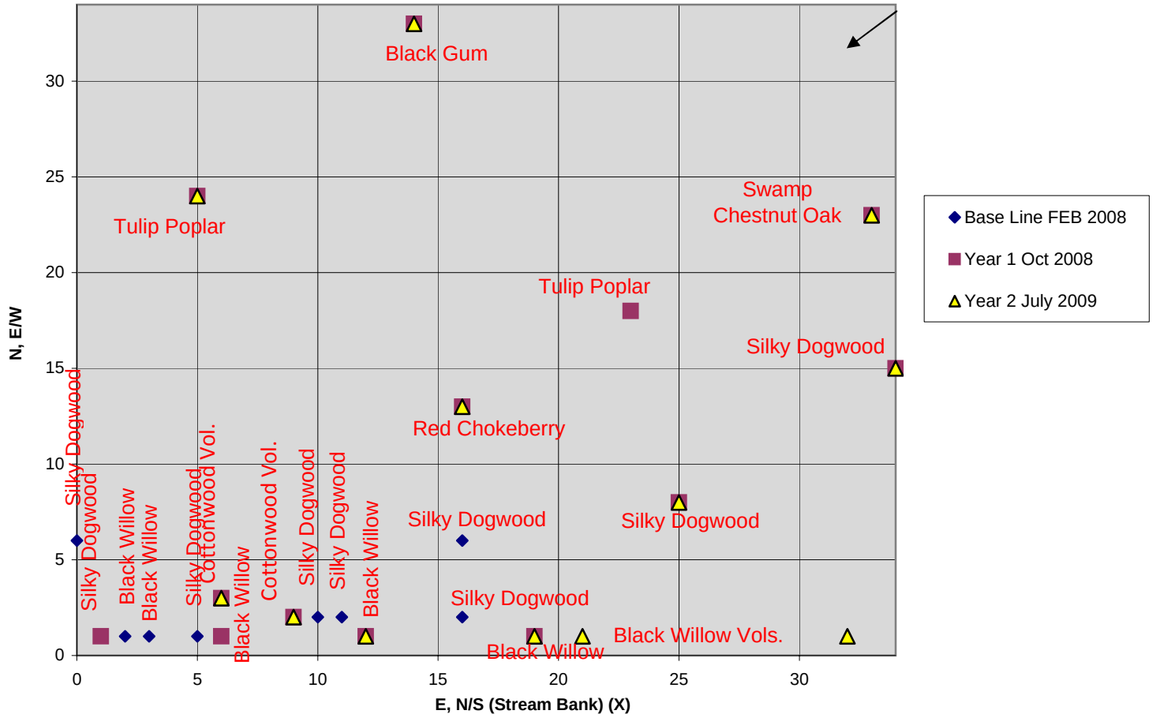
	Initial	2008	2009	2010	2011	2012
SPA	600	440	400			
SPA w/ Vols	-	440	440			



X	Y	Species	X	Y	Year 1	X	Y	Year 2	X	Y	Year 3	X	Y	Year 4	X	Y	Year 5
0	6	Silky Dogwood			Dead			Dead									
1	1	Silky Dogwood LS	1	1	Alive			Dead									
2	1	Black Willow LS			Dead			Dead									
3	1	Black Willow LS			Dead			Dead									
5	24	Tulip Poplar	5	24	Alive	5	24	Alive									
5	1	Silky Dogwood LS			Dead			Dead									
6	1	Black Willow LS	6	1	Alive			Dead									
10	2	Silky Dogwood LS			Dead			Dead									
11	2	Silky Dogwood LS			Dead			Dead									
12	1	Black Willow LS	12	1	Alive	12	1	Alive									
14	33	Black Gum	14	33	Alive, stressed	14	33	Alive, stressed									
16	13	Red Chokeberry	16	13	Alive	16	13	Alive									
16	6	Silky Dogwood			Coludn't find			Dead									
16	2	Silky Dogwood LS			Dead			Dead									
19	1	Black Willow LS	19	1	Alive	19	1	Alive									
23	18	Tulip Poplar	23	18	Alive			Dead									
25	8	Silky Dogwood	25	8	Alive	25	8	Alive									
33	23	Swamp Chestnut Oak	33	23	Alive	33	23	Alive									
34	15	Silky Dogwood	34	15	Alive	34	15	Alive									
		Cottonwood Vol.	6	3	Alive	6	3	Alive									
		Cottonwood Vol.	9	2	Alive	9	2	Alive									
		Black willow Vol.				21	1	Alive									
		Black willow Vol.				32	1	Alive									

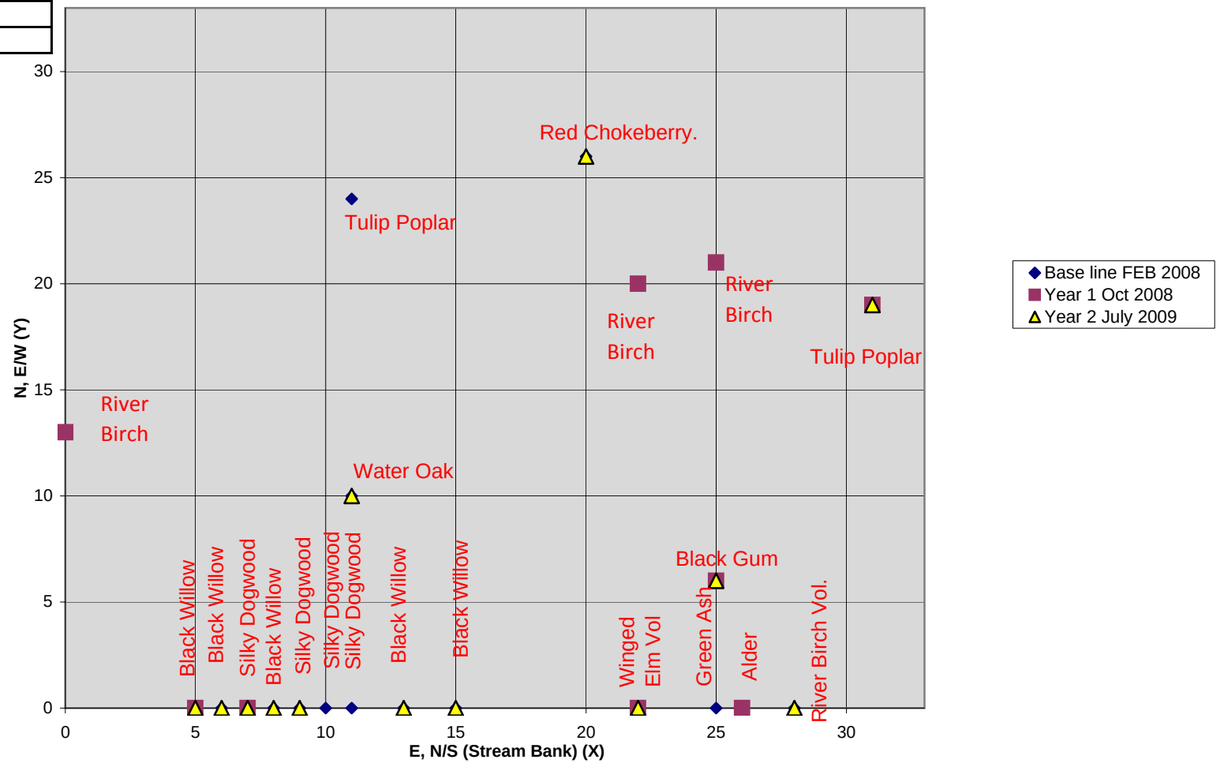
The north east quadrant of this plot has been subject to several wash outs and continues to be inundated with sand and debris, which are hostile to vegetation.
Propose moving this plot slightly south west

	Initial	2008	2009	2010	2011	2012
SPA	760	440	320			
SPA w/ Vols	-	520	480			



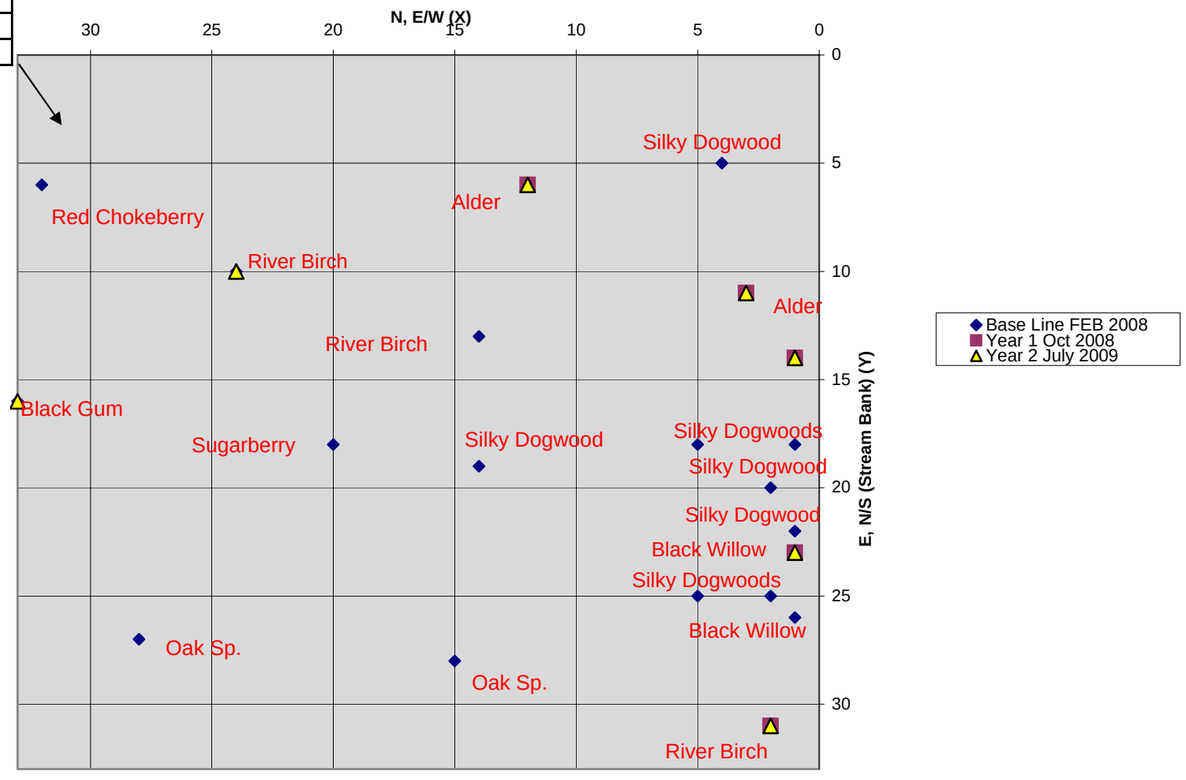
X	Y	Species	X	Y	Year 1	X	Y	Year 2	X	Y	Year 3	X	Y	Year 4	X	Y	Year 5
5	0	Black Willow LS	5	0	Alive	5	0	Alive									
6	0	Black Willow LS			Dead	6	0	Alive									
7	0	Silky Dogwood LS	7	0	Alive	7	0	Alive									
8	0	Black Willow LS			Dead	8	0	Alive									
9	0	Silky Dogwood LS			Dead	9	0	Alive									
10	0	Silky Dogwood LS			Dead			Dead									
11	24	Tulip Poplar			Couldn't find			Dead									
11	10	Water Oak			Couldn't find	11	10	Alive									
11	0	Silky Dogwood LS			Dead			Dead									
13	0	Black Willow LS			Dead	13	0	Alive									
15	0	Black Willow LS			Dead	15	0	Alive									
20	26	Red Chokeberry			Couldn't find	20	26	Alive									
22	0	Alder Transplant	22	0	Alive	22	0	Alive									
25	6	Black Gum	25	6	Alive	25	6	Alive									
25	0	Green Ash Transplant			Dead			Dead									
26	0	Alder Transplant	26	0	Alive			Dead									
28	0	Alder Transplant			Dead			Dead									
31	19	Tulip Poplar	31	19	Alive	31	19	Alive									
		River Birch vol	22	20	Alive			Dead									
		River Birch vol	25	21	Alive			Dead									
		River Birch vol	0	13	Alive			Dead									
		River Birch vol				28	0	Alive									
		Winged Elm vol				22	0	Alive									

	Initial	2008	2009	2010	2011	2012
SPA	720	240	480			
SPA w/ Vols	-	240	560			



X	Y	Species	X	Y	Year 1	X	Y	Year 2	X	Y	Year 3	X	Y	Year 4	X	Y	Year 5
2	31	River Birch	2	31	Alive	2	31	Alive									
1	23	Black Willow	1	23	Alive	1	23	Alive									
1	22	Silky Dogwood LS			Dead			Dead									
2	20	Silky Dogwood LS			Dead			Dead									
1	18	Silky Dogwood LS			Dead			Dead									
1	14	Black Willow	1	14	Alive	1	14	Alive									
3	11	Alder Transplant	3	11	Alive	3	11	Alive									
4	5	Silky Dogwood			Dead			Dead									
1	26	Silky Dogwood LS			Dead			Dead									
2	25	Silky Dogwood LS			Dead			Dead									
5	18	Silky Dogwood			Dead			Dead									
5	25	Silky Dogwood			Dead			Dead									
12	6	Alder Transplant	12	6	Alive	12	6	Alive, stressed									
14	13	River Birch			Couldn't find			Dead									
14	19	Silky Dogwood			Couldn't find			Dead									
15	28	Oak Sp.			Couldn't find			Dead									
28	27	Oak Sp.			Couldn't find			Dead									
20	18	Sugarberry			Couldn't find			Dead									
24	10	River Birch			Couldn't find	24	10	Alive									
32	6	Red Chokeberry			Couldn't find			Dead									
33	16	Black Gum			Couldn't find	33	16	Alive									

	Initial	2008	2009	2010	2011	2012
SPA	840	200	280			
SPA w/ Vols	-	200	280			



Hardwood Tree and Shrub Planting Year 1 Totals for Stricker Branch Stream Restoration Site

Scientific Name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Species Total	
Alnus serrulata			0		1	2	3	
Aronia arbutifolia	1	1		1	1	0	4	
*Betula nigra**	2	4	0		1	2	9	
Celtis laevigata			1	0		0	1	
Cephalanthus occidentalis			0				0	
Cornus amomum	0		0	2	2	0	4	1 livestakes
Fraxinus pennsylvanica		1			0		1	
Hamamelis virginiana	1	7					8	
Lindera benzoin							0	
Liriodendron tulipifera	2	0		1	1		4	
Nyssa slyvatica	0	1		1	1	1	4	
*Populus deltoides**	7			2			9	100% volunteers
Quercus michauxii		0	0	1	0	0	1	
Quercus nigra	3	3			1		7	
Quercus phellos		3	3				6	
*Ulmus alata**					1		1	
*Salix nigra**		1	7	4	5	2	19	9 livestakes
Total	16	21	11	12	14	7	**81**	

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Species Total
% Survival	75%	100%	67%	42%	67%	33%	**62%**
Stem Per Acre	360	720	400	320	480	280	427
SPA w/ volunteers*	640	840	440	480	560	280	540

Total SPA by Year	**Initial**	**2008**	**2009**	**2010**	**2011**	**2012**
SPA	687	367	427			
SPA w/ Vols.	-	420	540			

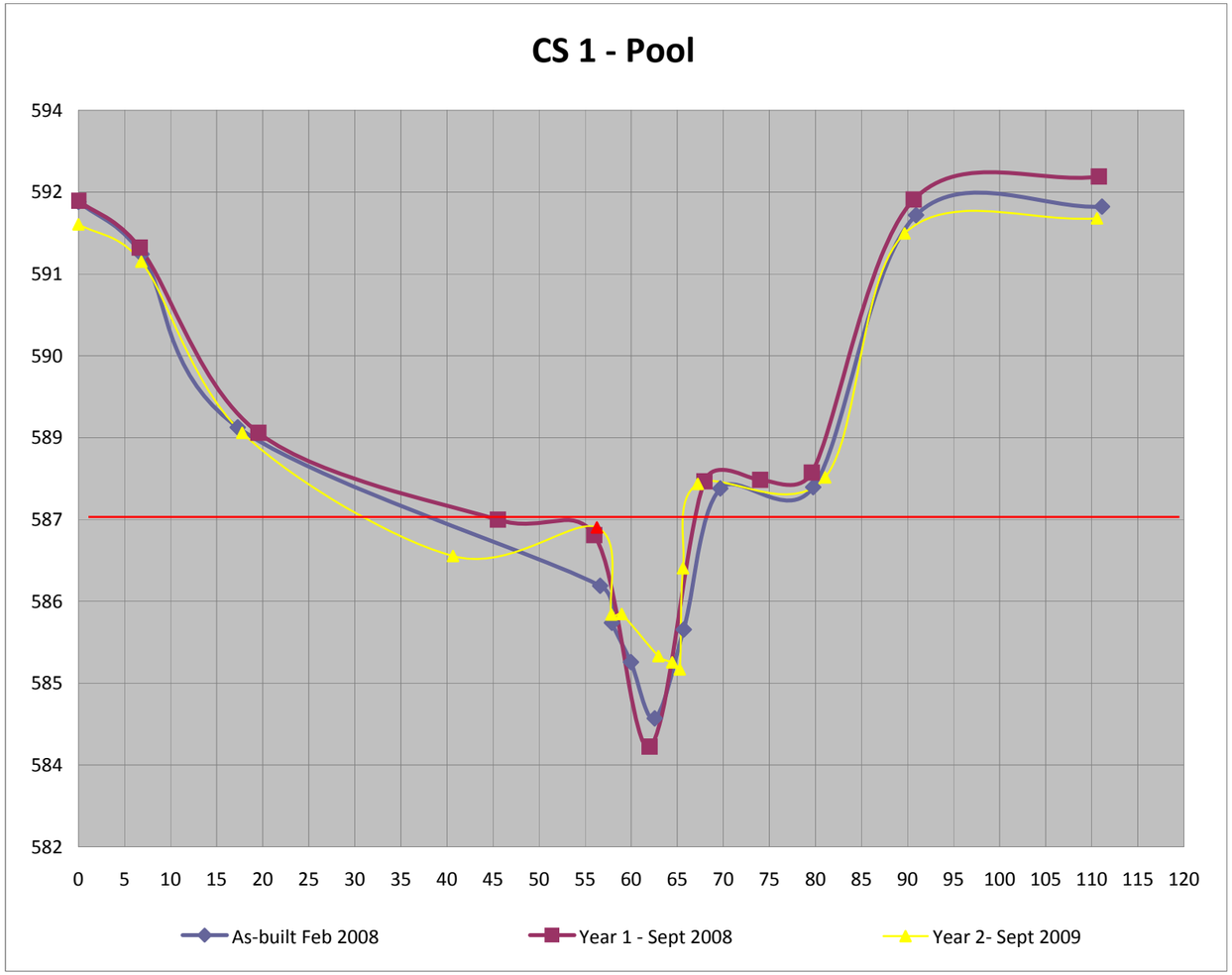
	Initial	2008	2009	2010	2011	2012
Plot 1	480	360	360			
Plot 2	680	680	720			
Plot 3	560	440	400			
Plot 4	720	440	320			
Plot 5	720	240	480			
Plot 6	840	200	280			
Total	687	367	427			
Total w/Vols.	-	420	540			

APPENDIX B: CROSS SECTIONS

CS1 - Survey Data

As-built Feb 2008			Year 1 - Sept 2008			Year 2 - Sept 2009			Year 3 - Sept 2010			Year 4 - Sept 2011			Year 5 - Sept 2012		
Station	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**
0	592.291		0	592.309		0.00	591.951										
6.86	591.498		6.65	591.595		6.82	591.383										
17.28	588.863		19.54	588.78		17.76	588.781										
56.64	586.454	BKF	45.55	587.457		40.66	586.906										
57.91	585.892		56.01	587.221	BKF	56.28	587.342	BKF									
59.98	585.292		62	584.008	tw	57.85	586.017										
62.55	584.435	tw	67.96	588.04	bkf	58.97	586.024	LEW									
65.7	585.789		74.02	588.065		62.95	585.385										
69.67	587.935	bkf	79.63	588.174		64.47	585.290										
79.75	587.955		90.68	592.325		65.26	585.184	tw									
90.93	592.089		110.79	592.677		65.62	586.722										
111.12	592.219					67.24	588.002	bkf									
						81.06	588.102										
						89.68	591.813										
						110.58	592.043										

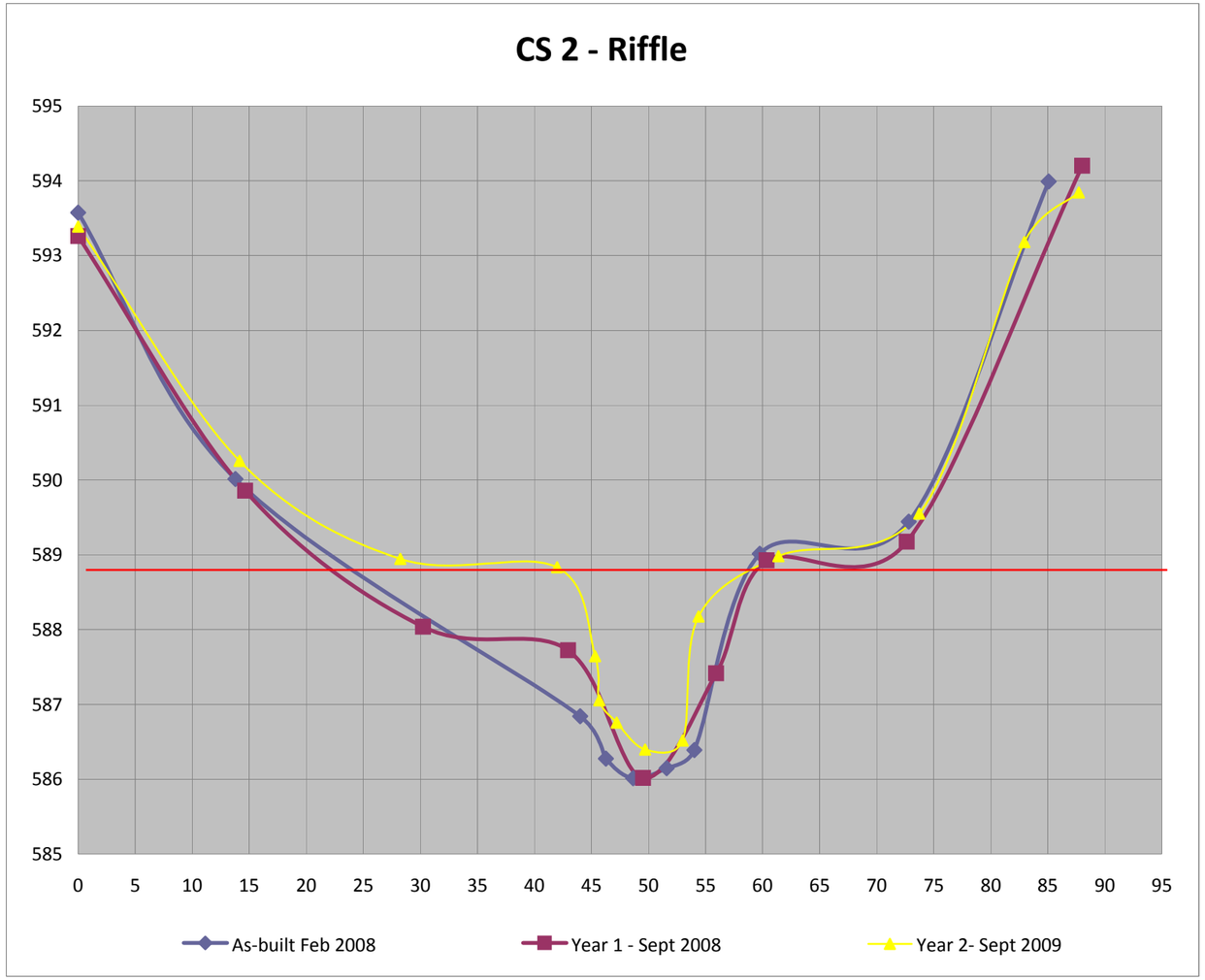
Summary Data Table	As-built 2008	MY1 2008	MY2 2009	MY3 2010	MY4 2011	MY5 2012
Bankfull Cross Sectional Area:	26.24	28.07	15.62			
Bankfull Width:	13.03	11.95	10.96			
Bankfull Max Depth:	2.57	2.99	1.82			



CS2 - Survey Data

As-built Feb 2008			Year 1 - Sept 2008			Year 2 - Sept 2009			Year 3 - Sept 2010			Year 4 - Sept 2011			Year 5 - Sept 2012		
Station	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**
0	593.575		0	593.260		0.00	593.387										
13.79	590.013		14.64	589.857		14.16	590.257										
44	586.84	bkf	30.24	588.037		28.25	588.946										
46.27	586.274		42.96	587.723	BKF	41.99	588.834	bkf									
48.65	586.014	tw	49.54	586.016	tw	45.33	587.645										
51.6	586.146		55.94	587.416		45.69	587.053	LEW									
54.02	586.388		60.35	588.925	bkf	47.20	586.755										
59.75	589.013	bkf	72.65	589.173		49.71	586.397	TW									
72.81	589.444		88.01	594.202		52.98	586.517										
85.08	593.991					54.38	588.174										
						61.39	588.980	bkf									
						73.73	589.552										
						82.96	593.182										
						87.72	593.842										

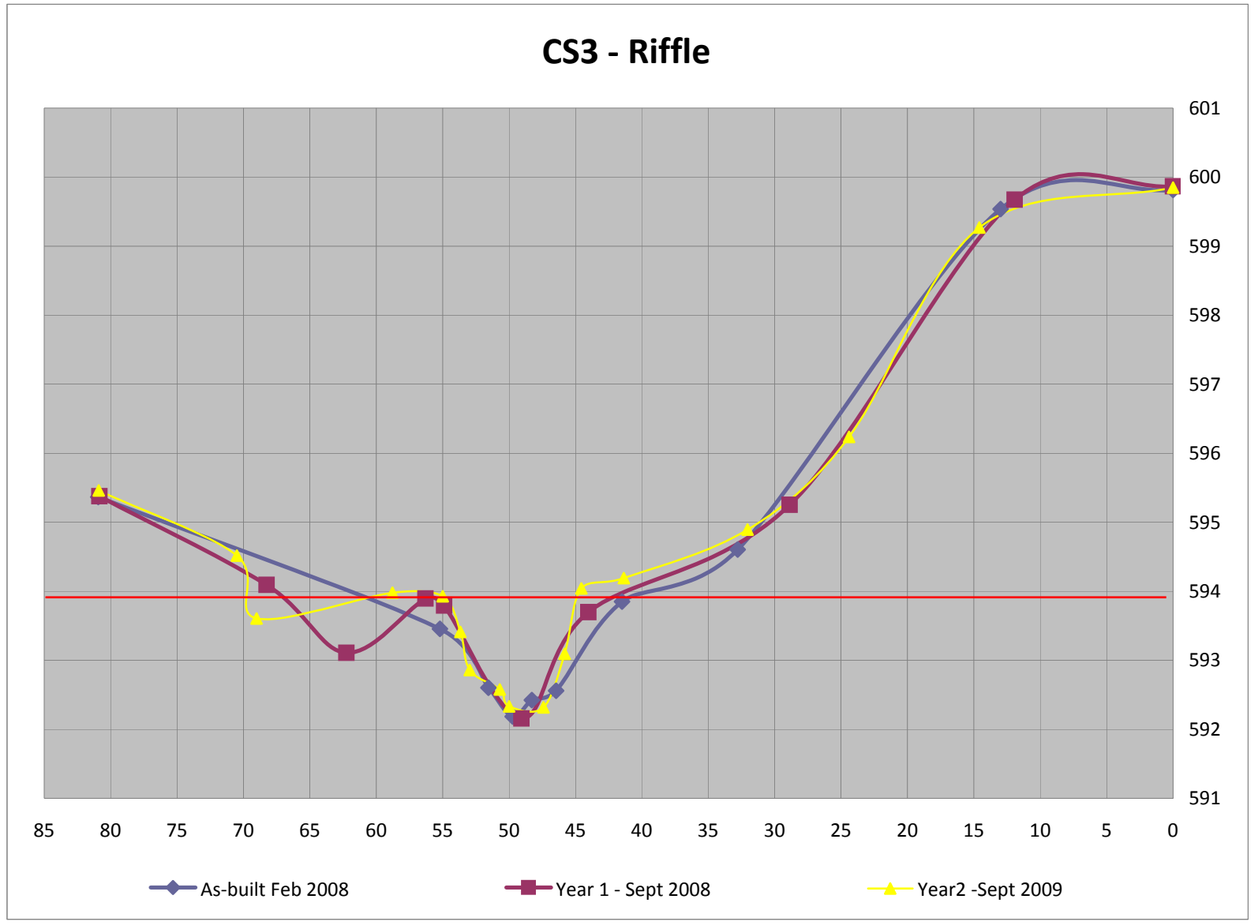
Summary Data Table	As-built 2008	MY1 2008	MY2 2009	MY3 2010	MY4 2011	MY5 2012
Bankfull Cross Sectional Area:	36.92	40.74	39.64			
Bankfull Width:	15.75	17.39	19.40			
Bankfull Max Depth:	2.99	2.98	2.60			



CS3 - Survey Data

As-built Feb 2008			Year 1 - Sept 2008			Year 2 - Sept 2009			Year 3 - Sept 2010			Year 4 - Sept 2011			Year 5 - Sept 2012		
Station	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**
0	599.816		0	599.864		0.00	599.849										
12.98	599.537		11.92	599.673		14.59	599.270										
32.79	594.604		28.86	595.251		24.40	596.236										
41.49	593.849	bkf	44.03	593.696	bkf	32.04	594.894										
46.45	592.558		49.06	592.155	tw	41.35	594.189										
48.29	592.422		54.87	593.793	bkf	44.55	594.041	bkf									
49.72	592.187	tw	56.28	593.895		45.81	593.093										
51.55	592.602		62.23	593.107		47.40	592.318	tw									
55.2	593.456	bkf	68.24	594.091		50.00	592.331										
80.93	595.365		80.83	595.377		50.69	592.576										
						52.96	592.858										
						53.66	593.410										
						55.00	593.929	bkf									
						58.77	593.977										
						69.00	593.605										
						70.49	594.516										
						80.89	595.462										

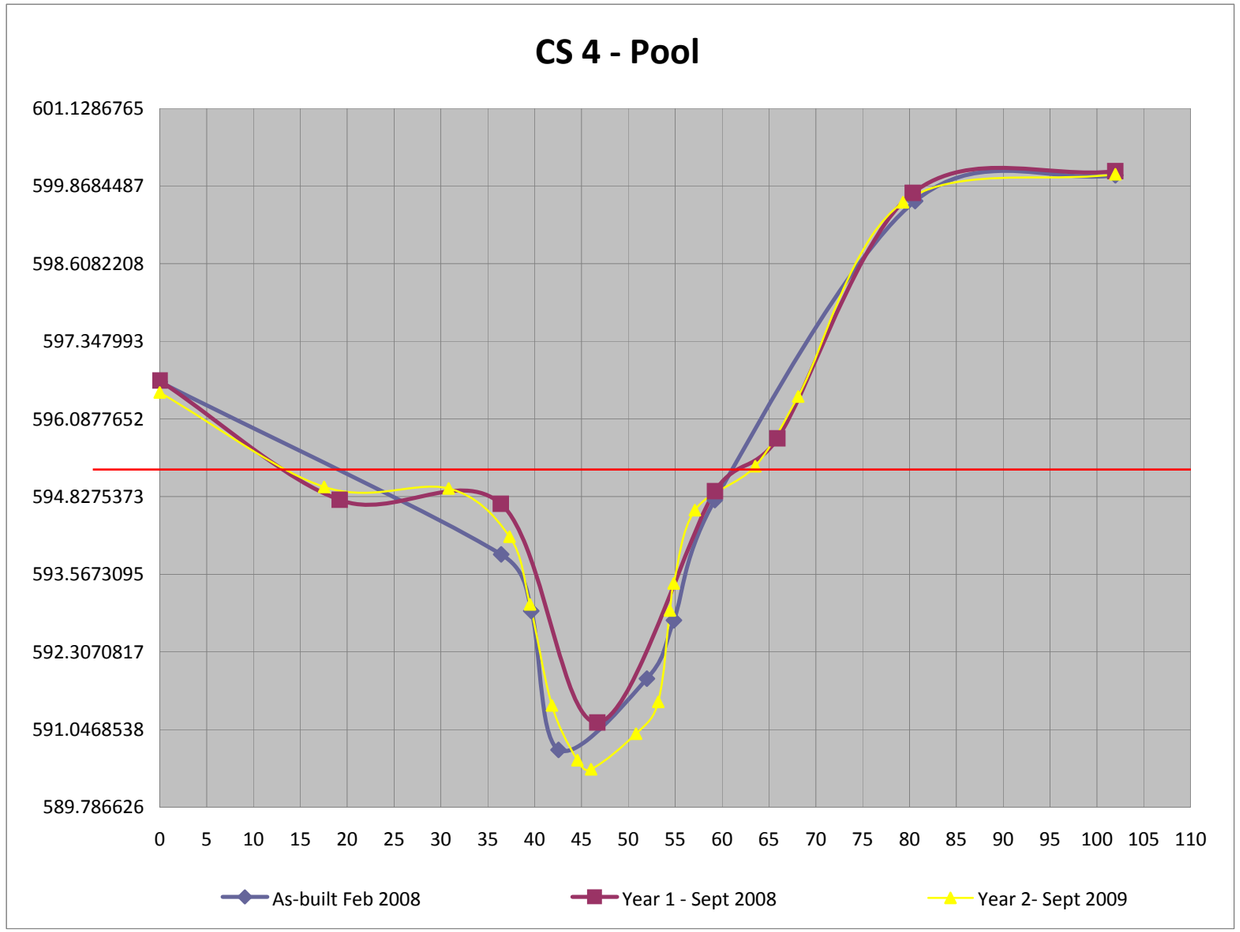
Summary Data Table	As-built 2008	MY1 2008	MY2 2009	MY3 2010	MY4 2011	MY5 2012
Bankfull Cross Sectional Area:	19.51	15.70	13.80			
Bankfull Width:	13.71	10.84	10.45			
Bankfull Max Depth:	1.81	1.85	1.68			



CS4 - Survey Data

As-built Feb 2008			Year 1 - Sept 2008			Year 2 - Sept 2009			Year 3 - Sept 2010			Year 4 - Sept 2011			Year 5 - Sept 2012		
Station	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**
0	596.689		0	596.71		0.00	596.519										
36.42	593.891	bkf	19.22	594.777		17.53	594.986										
39.65	592.972		36.41	594.71	bkf	30.83	594.961										
42.56	590.716	tw	46.69	591.161	tw	37.33	594.176	BKF									
51.98	591.873		59.27	594.913	bkf	39.50	593.079	LEW									
54.86	592.818		65.91	595.772		41.85	591.437										
59.22	594.771	bkf	80.37	599.757		44.56	590.548										
80.6	599.623		101.98	600.108		46.03	590.400	tw									
101.98	600.043					50.82	590.981										
						53.19	591.497										
						54.43	592.979	REW									
						54.85	593.420										
						57.11	594.609	BKF									
						63.55	595.319										
						68.12	596.453										
						79.31	599.602										
						101.97	600.057										

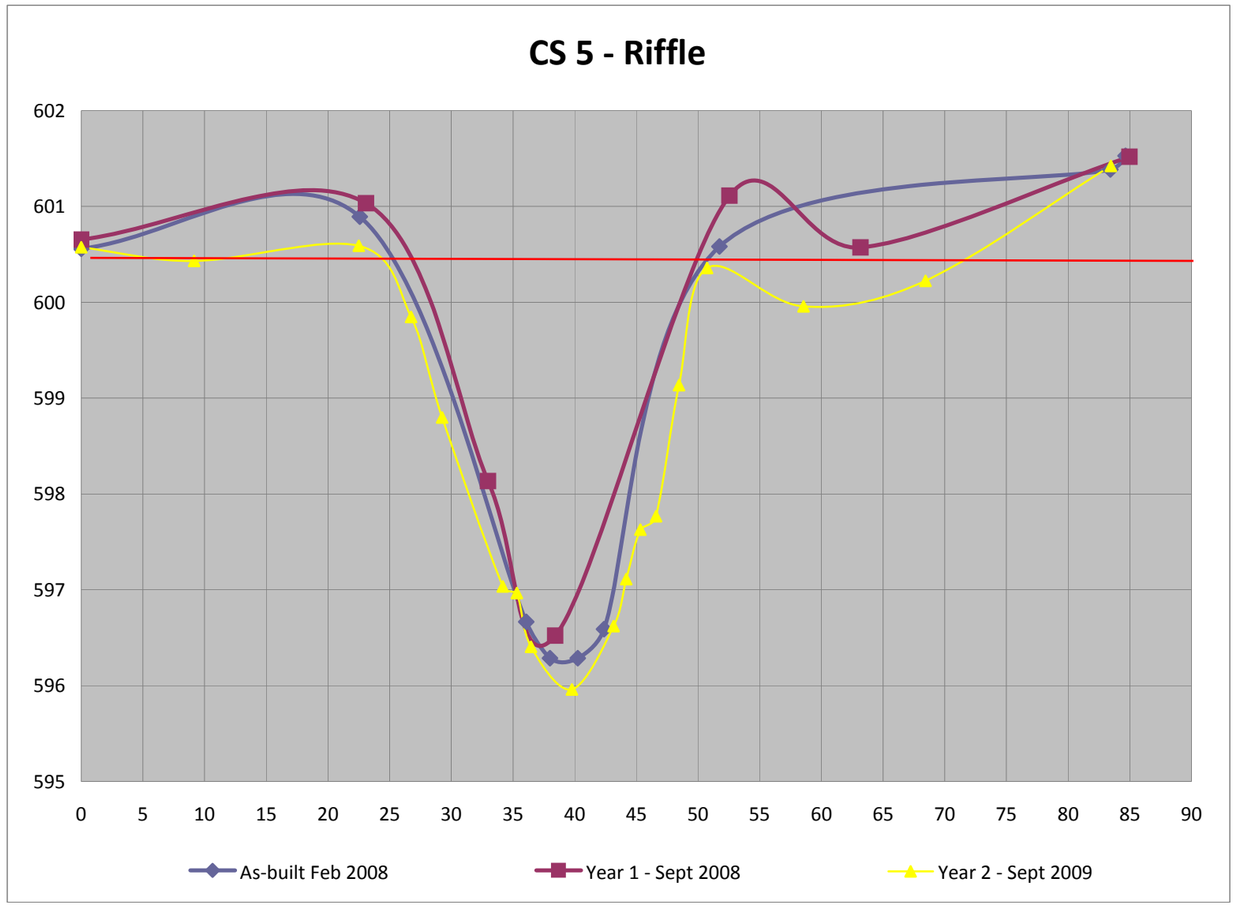
Summary Data Table	As-built 2008	MY1 2008	MY2 2009	MY3 2010	MY4 2011	MY5 2012
Bankfull Cross Sectional Area:	76.68	68.89	71.43			
Bankfull Width:	22.80	22.86	19.78			
Bankfull Max Depth:	4.28	3.84	4.60			



CS5 - Survey Data

As-built Feb 2008			Year 1 - Sept 2008			Year 2 - Sept 2009			Year 3 - Sept 2010			Year 4 - Sept 2011			Year 5 - Sept 2012		
Station	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**
0	600.558		0	600.653		0.00	600.573										
22.58	600.893	bkf	23.1	601.034	bkf	9.15	600.433										
36.07	596.665		32.99	598.134		22.50	600.590	bkf									
38	596.286	tw	38.43	596.52	tw	26.74	599.846										
40.24	596.287		52.55	601.113	bkf	29.26	598.799										
42.38	596.59		63.19	600.572		34.17	597.035										
51.74	600.581	bkf	84.99	601.519		35.31	596.965										
83.42	601.385					36.46	596.404	LEW									
84.65	601.527					39.78	595.960	tw									
						43.15	596.620										
						44.19	597.110										
						45.33	597.628										
						46.60	597.768										
						48.45	599.135										
						50.74	600.359	bkf									
						58.56	599.957										
						68.44	600.224										
						83.46	601.423										

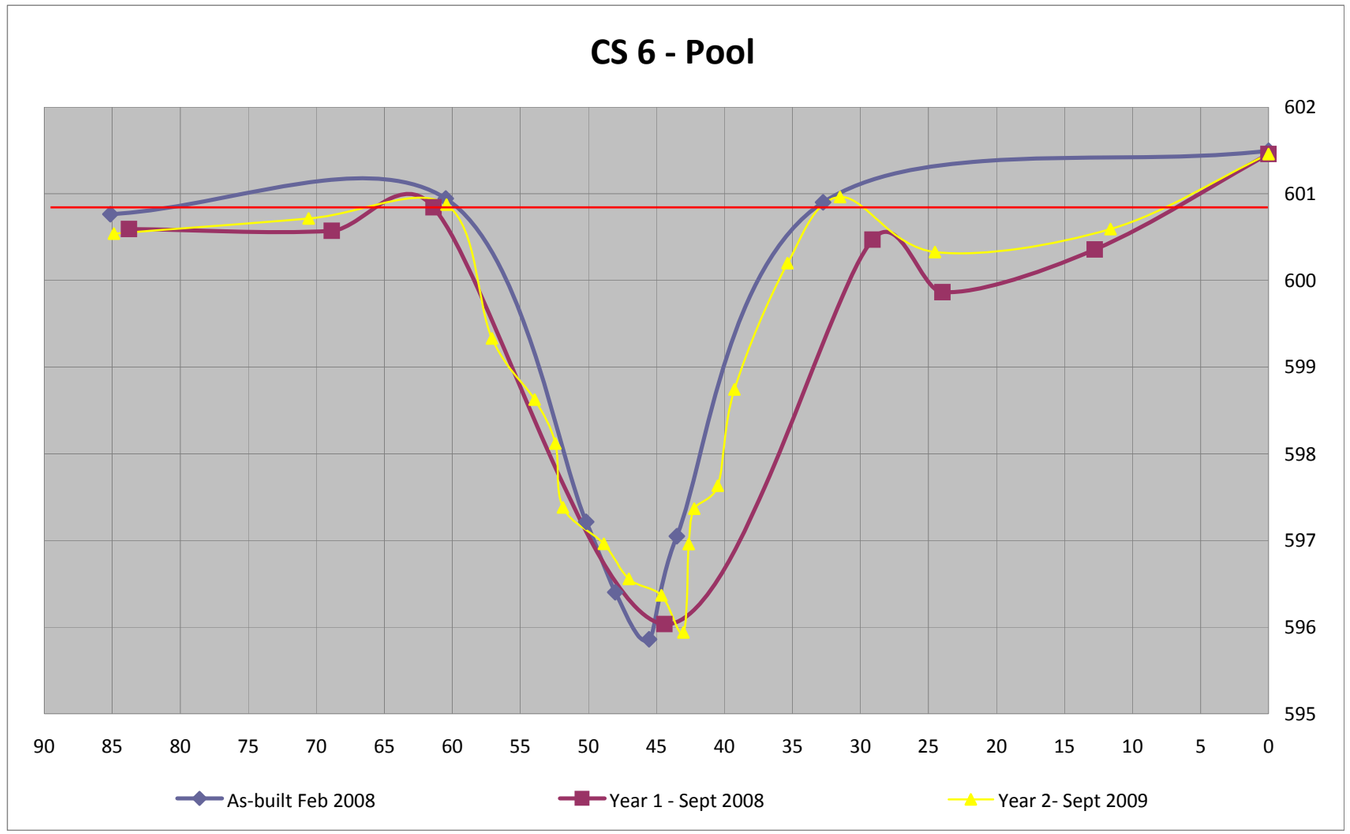
Summary Data Table	As-built 2008	MY1 2008	MY2 2009	MY3 2010	MY4 2011	MY5 2012
Bankfull Cross Sectional Area:	96.46	92.01	100.64			
Bankfull Width:	29.16	29.45	28.24			
Bankfull Max Depth:	4.21	3.98	4.54			



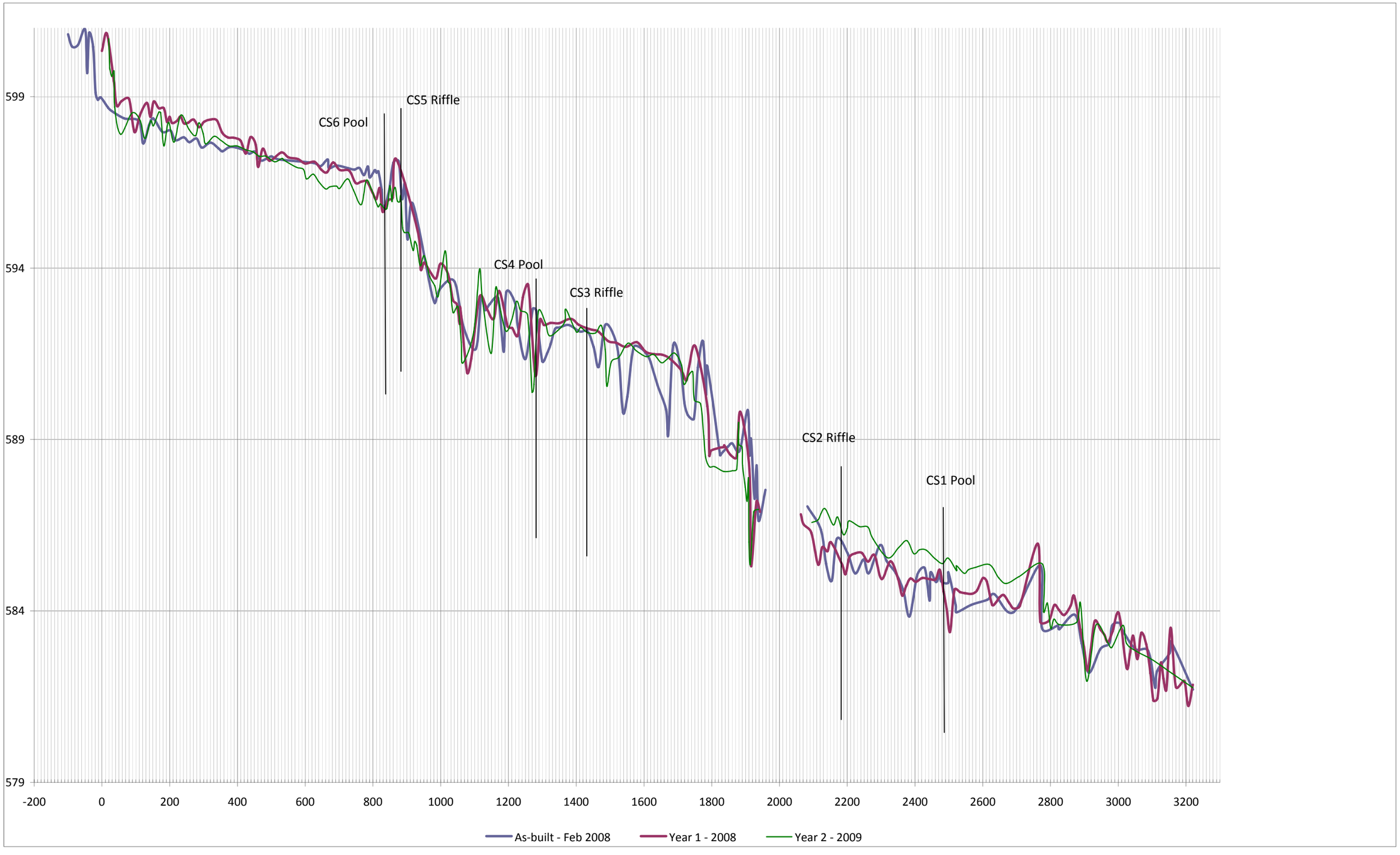
CS6 - Survey Data

As-built Feb 2008			Year 1 - Sept 2008			Year 2 - Sept 2009			Year 3 - Sept 2010			Year 4 - Sept 2011			Year 5 - Sept 2012		
Station	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**	**Station**	**Elevation**	**Feature**
0	601.497		0	601.459		0	601.457										
32.74	600.9	bkf	12.77	600.355		11.62	600.591										
43.49	597.049		23.97	599.864		24.52	600.328										
45.54	595.86	tw	29.1	600.47	bkf	31.5	600.962	bkf									
48.03	596.402		44.4	596.036	tw	35.37	600.199										
50.16	597.215		61.38	600.842	bkf	39.26	598.743										
60.49	600.944	bkf	68.85	600.571		40.49	597.632										
85.14	600.764		83.76	600.593		42.22	597.365	LEW									
						42.63	596.959										
						43.02	595.937	tw									
						44.62	596.368										
						47.02	596.555	REW									
						48.86	596.962										
						51.86	597.380										
						52.42	598.119										
						53.95	598.626										
						57.08	599.330										
						60.42	600.874	bkf									
						70.57	600.715										
						84.88	600.539										

Summary Data Table	As-built 2008	MY1 2008	MY2 2009	MY3 2010	MY4 2011	MY5 2012
Bankfull Cross Sectional Area:	111.97	125.79	114.94			
Bankfull Width:	27.75	32.28	28.92			
Bankfull Max Depth:	5.14	4.96	5.06			

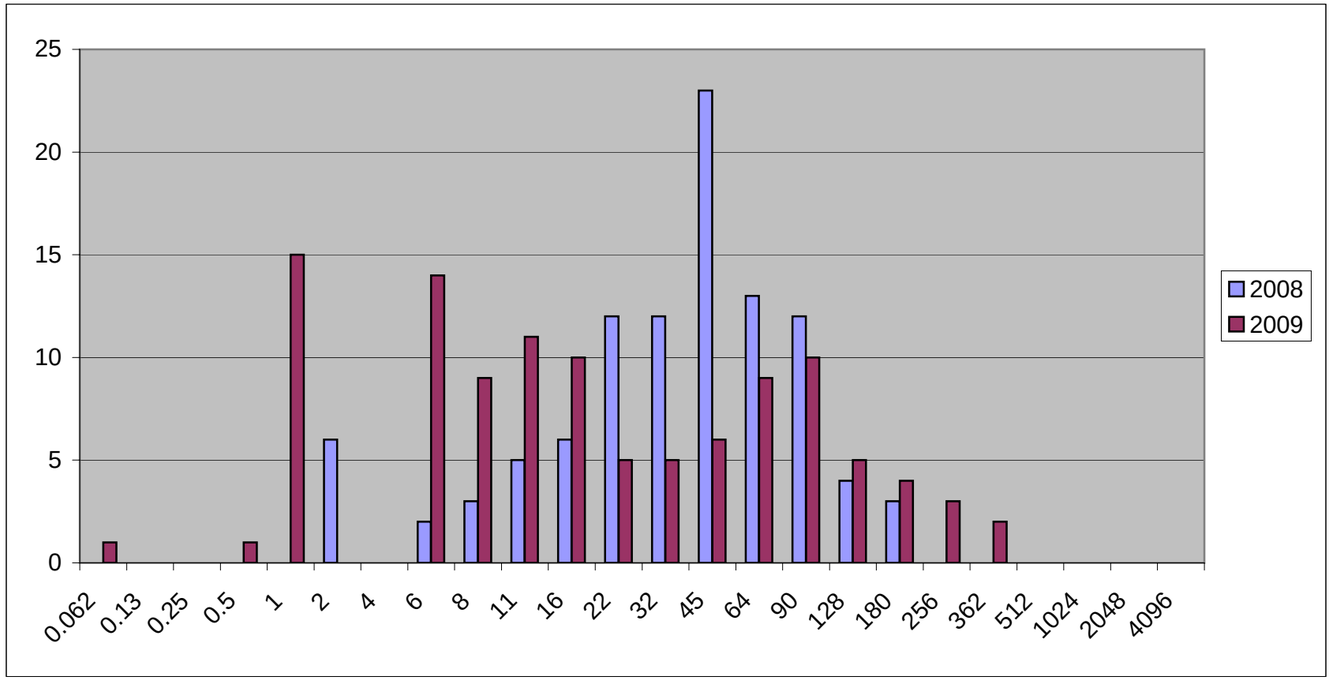


APPENDIX C: PROFILE SURVEY AND PEBBLE COUNTS


599
594
589
584
579
-200
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
CS6 Pool
CS5 Riffle
CS4 Pool
CS3 Riffle
CS2 Riffle
CS1 Pool
As-built - Feb 2008
Year 1 - 2008
Year 2 - 2009

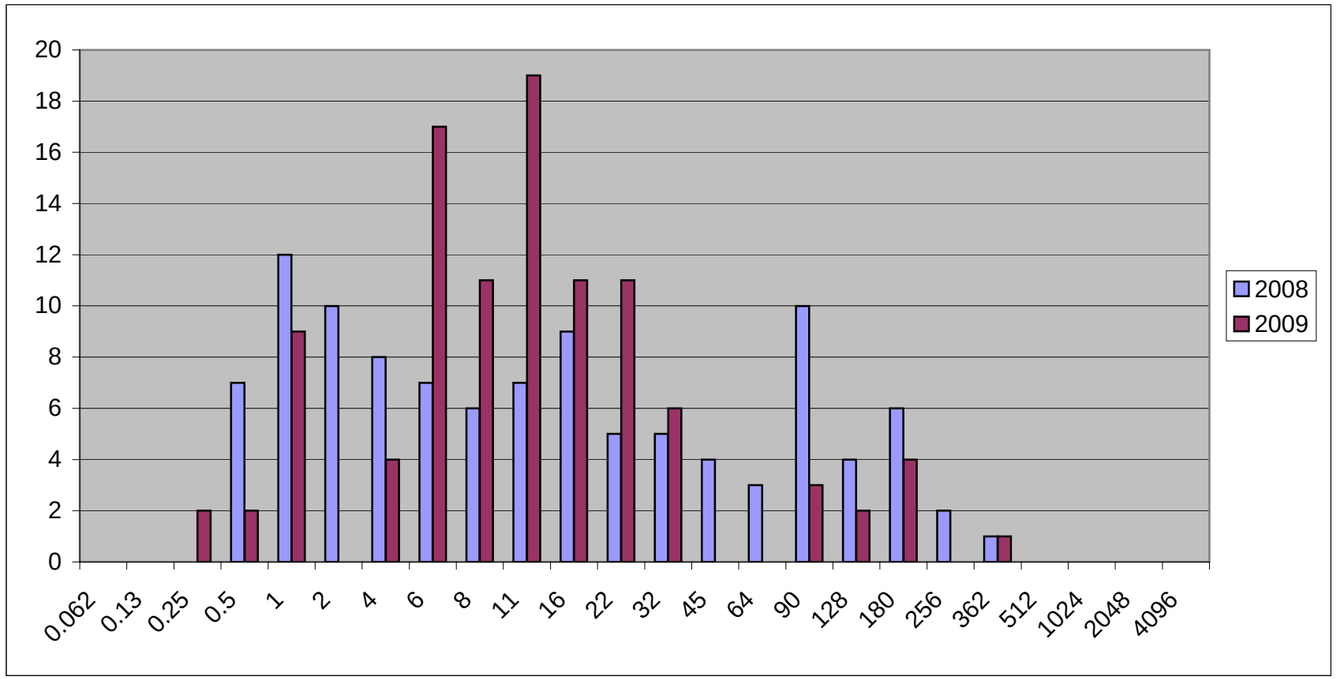
(XS-5) Stricker Pebble Count Data			Year	Year
Riffle Pebble Count			2008	2009
Material	Size Range (mm)		Count	Count
silt/clay	0	0.062	0	1
very fine sand	0.062	0.13	0	0
fine sand	0.13	0.25	0	0
medium sand	0.25	0.5	0	1
coarse sand	0.5	1	0	15
very coarse sand	1	2	6	0
very fine gravel	2	4	0	0
fine gravel	4	6	2	14
fine gravel	6	8	3	9
medium gravel	8	11	5	11
medium gravel	11	16	6	10
coarse gravel	16	22	12	5
coarse gravel	22	32	12	5
very coarse gravel	32	45	23	6
very coarse gravel	45	64	13	9
small cobble	64	90	12	10
medium cobble	90	128	4	5
large cobble	128	180	3	4
very large cobble	180	256	0	3
small boulder	256	362	0	2
small boulder	362	512	0	0
medium boulder	512	1024	0	0
large boulder	1024	2048	0	0
very large boulder	2048	4096	0	0
bedrock			0	0
		Total Particle Count:	101	110

Year		Size percent less than (mm)					Percent by substrate type					
	D16	D35	D50	D84	D95		silt/clay	sand	gravel	cobble	boulder	bedrock
2008	11.110	22.947	34.207	69.378	106.860		0.00%	5.94%	75.25%	18.81%	0.00%	0.00%
2009	4.0701157	7.6254743	12.77861	79.6049358	172.4903		0.91%	14.55%	62.73%	20.00%	1.82%	0.00%



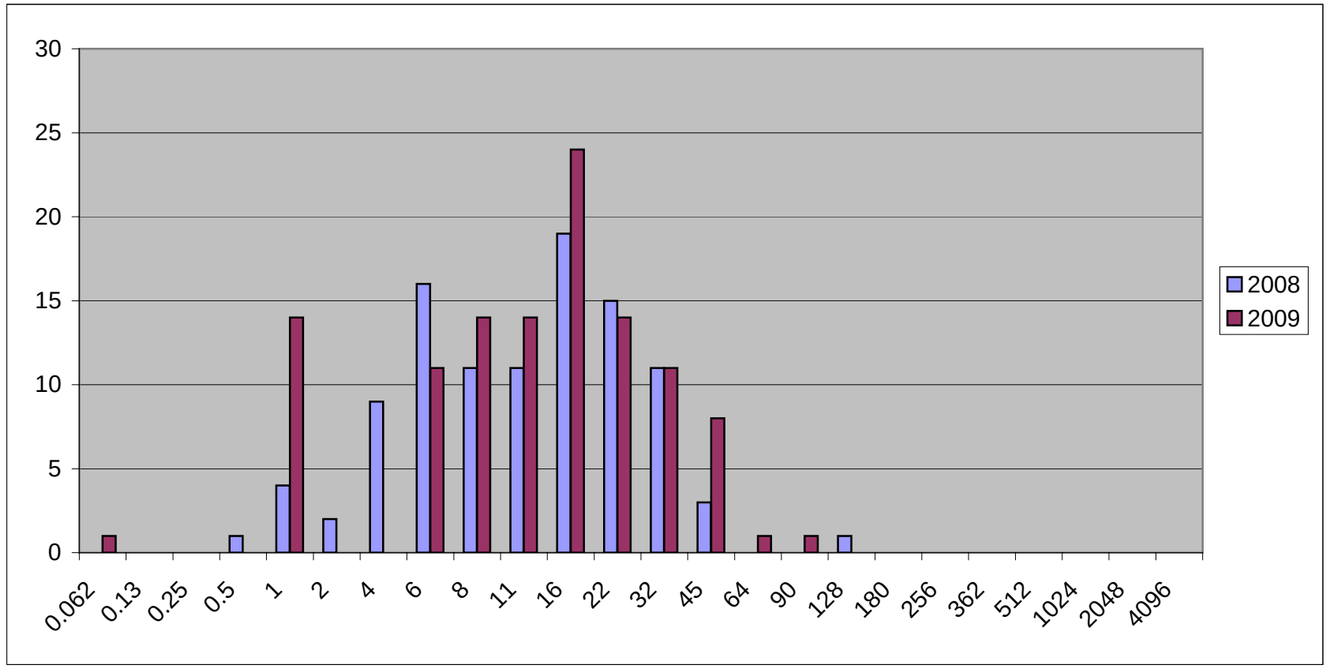
(XS-3)	Stricker Pebble Count Data		Year	Year
Riffle Pebble Count			2008	2009
Material	Size Range (mm)		Count	Count
silt/clay	0	0.062	0	0
very fine sand	0.062	0.13	0	0
fine sand	0.13	0.25	0	2
medium sand	0.25	0.5	7	2
coarse sand	0.5	1	12	9
very coarse sand	1	2	10	0
very fine gravel	2	4	8	4
fine gravel	4	6	7	17
fine gravel	6	8	6	11
medium gravel	8	11	7	19
medium gravel	11	16	9	11
coarse gravel	16	22	5	11
coarse gravel	22	32	5	6
very coarse gravel	32	45	4	0
very coarse gravel	45	64	3	0
small cobble	64	90	10	3
medium cobble	90	128	4	2
large cobble	128	180	6	4
very large cobble	180	256	2	0
small boulder	256	362	1	1
small boulder	362	512	0	0
medium boulder	512	1024	0	0
large boulder	1024	2048	0	0
very large boulder	2048	4096	0	0
bedrock			0	0
		Total Particle Count:	106	102

Year		Size percent less than (mm)					Percent by substrate type					
	D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
2008	0.889	4.023	9.170	78.634	157.948	0.00%	27.36%	50.94%	20.75%	0.94%	0.00%
2009	3.5553707	6.2727787	8.8463583	21.7971308	125.7655	0.00%	12.75%	77.45%	8.82%	0.98%	0.00%



(XS-2)	Stricker Pebble Count Data		Year	Year
Riffle Pebble Count			2008	2009
Material	Size Range (mm)		Count	Count
silt/clay	0	0.062	0	1
very fine sand	0.062	0.13	0	0
fine sand	0.13	0.25	0	0
medium sand	0.25	0.5	1	0
coarse sand	0.5	1	4	14
very coarse sand	1	2	2	0
very fine gravel	2	4	9	0
fine gravel	4	6	16	11
fine gravel	6	8	11	14
medium gravel	8	11	11	14
medium gravel	11	16	19	24
coarse gravel	16	22	15	14
coarse gravel	22	32	11	11
very coarse gravel	32	45	3	8
very coarse gravel	45	64	0	1
small cobble	64	90	0	1
medium cobble	90	128	1	0
large cobble	128	180	0	0
very large cobble	180	256	0	0
small boulder	256	362	0	0
small boulder	362	512	0	0
medium boulder	512	1024	0	0
large boulder	1024	2048	0	0
very large boulder	2048	4096	0	0
bedrock			0	0
		Total Particle Count:	103	113

Year		Size percent less than (mm)					Percent by substrate type				
	D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
2008	4.049	6.670	10.232	21.319	30.771	0.00%	6.80%	92.23%	0.97%	0.00%	0.00%
2009	4.481	7.926	11.438	24.301	38.518	0.88%	12.39%	85.84%	0.88%	0.00%	0.00%



APPENDIX D: PHOTO LOGS

Photo Point 1

Photo Point 2

Photo Point 3 – Veg. Plot 6

Photo Point 4

Photo Point 5

Photo Point 6

Photo Point 7

Photo Point 9 – Veg. Plot 5

Photo Point 10

Photo Point 11

Photo Point 12

Photo Point 13

Photo Point 14

Photo Point 15

Photo Point 16 – Veg. Plot 4

Photo Point 17

Photo Point 18

Photo Point 19

Photo Point 20

Photo Point 21 – Veg. Plot 3

Photo Point 22

Photo Point 23

Photo Point 24

Photo Point 25

Photo Point 26

Photo Point 27

Photo Point 28

Photo Point 29

Photo Point 30

Photo Point 31

Photo Point 32

Photo Point 33

Photo Point 34

Photo Point 35

Photo Point 36 – Veg. Plot 2

Photo Point 37

Photo Point 38

Photo Point 39

Photo Point 40

Photo Point 41

Photo Point 42 – Veg. Plot 1

Photo Point 43

Photo Point 44

Photo Point 45

Photo Point 46

Photo Point 47

Photo Point 49

Problem Area at Station 229, right bank will be live staked this winter and watched.

Small scour hole on XS 5, right bank

Swale parallel with Stream channel runs through XS 3, is vegetated and appears stable.

Sand deposition below bridge at Sign Drive

Sand deposition in XS 2

Scour and silt in XS 1, mostly re-vegetated

Small problem area just downstream of XS 1, will be live staked and watched

Repairs on Rills in Middle Section


04/16/2009


04/16/2009


04/16/2009

Area at start of easement below McGill Ave has repaired itself to a reasonable degree without intervention

Other “rough” areas just below McGill Ave. will be live staked again and watched

Alder tree had dislodged from the bank and developed into a center bar island, which has now been removed.

APPENDIX E: BANKFULL EVENTS AND RAINFALL


04/16/2009


04/16/2009


07/24/2009

Rack Lines and Debris


09/30/2009


09/30/2009

STATE CLIMATE OFFICE OF NORTH CAROLINA
NC CRONOS Database
Data retrieval from 311975 - Concord for past 181 day(s)
128 records for this period of record (71.1% data available; 52 missing records)

Date/Time	2m Daily Precipitation (in)
4/3/2009	0.1
4/4/2009	0
4/6/2009	0.04
4/7/2009	0
4/8/2009	0
4/9/2009	0
4/10/2009	0
4/11/2009	1.85
4/13/2009	0.01
4/14/2009	0.42
4/16/2009	0
4/17/2009	0
4/20/2009	0.53
4/21/2009	0
4/23/2009	0
4/24/2009	0
4/25/2009	0
4/26/2009	0
4/27/2009	0
4/28/2009	0
4/29/2009	0
4/30/2009	0
5/1/2009	0
5/3/2009	0.1
5/4/2009	0
5/5/2009	0.37
5/7/2009	0.81
5/8/2009	0.07
5/10/2009	0.41
5/14/2009	0
5/15/2009	0
5/16/2009	0.03
5/18/2009	0.3
5/19/2009	0
5/21/2009	0
5/22/2009	0
5/23/2009	0
5/24/2009	0.82
5/25/2009	0.09
5/28/2009	0.03
5/29/2009	
6/1/2009	0
6/2/2009	0
6/3/2009	0
6/4/2009	0

6/5/2009	0.9
6/6/2009	1.9
6/8/2009	0
6/9/2009	0
6/10/2009	0
6/11/2009	0.24
6/14/2009	0.08
6/15/2009	0
6/20/2009	0
6/22/2009	0
6/23/2009	0
6/24/2009	0
6/25/2009	0
6/26/2009	0
6/27/2009	0
6/28/2009	0
6/29/2009	0
7/3/2009	0
7/4/2009	0
7/7/2009	0
7/8/2009	0
7/10/2009	3.48
7/11/2009	0
7/15/2009	0
7/16/2009	0
7/17/2009	0
7/19/2009	0
7/20/2009	0
7/21/2009	0
7/22/2009	0.02
7/23/2009	6.31
7/24/2009	0.72
7/25/2009	0
7/26/2009	0
7/27/2009	0
7/28/2009	0
7/29/2009	1.18
7/30/2009	0
7/31/2009	0.07
8/5/2009	0
8/6/2009	0.5
8/7/2009	0
8/8/2009	0
8/9/2009	0
8/10/2009	0
8/11/2009	0
8/12/2009	0.6
8/13/2009	0.08
8/14/2009	0
8/15/2009	0
8/17/2009	0
8/19/2009	0

8/20/2009	0
8/22/2009	0
8/24/2009	0
8/25/2009	0
8/26/2009	0
8/27/2009	0
8/28/2009	0
8/29/2009	0
8/30/2009	0
8/31/2009	0.07
9/1/2009	0.08
9/2/2009	0
9/3/2009	0
9/5/2009	0
9/7/2009	0
9/8/2009	0
9/9/2009	0.01
9/10/2009	0.28
9/15/2009	0
9/17/2009	0.46
9/18/2009	0.15
9/19/2009	0.08
9/20/2009	0.18
9/22/2009	0
9/23/2009	0
9/24/2009	0.01
9/25/2009	0
9/26/2009	0.03
9/27/2009	0.42
9/28/2009	0
9/29/2009	0