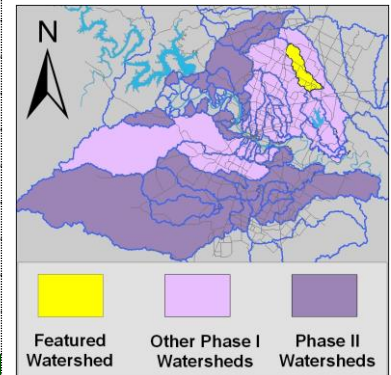


# Harris Branch Watershed

## Summary Sheet

Catchment	Total area	11 sq. miles						
	Area in recharge	0						
	Creek length	11 miles						
Demographics	Receiving water	Gilleland Creek						
	2000 population	10,173						
	2030 projected population	23,867						
Land Use	30 year projected % increase	235 %						
	Impervious cover (2003 estimate)	8.0 %						
Overall EII Scores	Impervious cover (2013 estimate)	18.6 %						
		1999	2002	2005	2008	2009	2011	2013
		59	61	58	62	62	51	59



### Flow Regime\* for Sample Sites on Harris Branch

Site	Site Name	2000	2002					2005					2006	2008					2009					2010	2011					2013				
		Jun Bio	Feb WQ	Feb Bio	May WQ	Aug WQ	Nov WQ	Mar WQ	Jun WQ	Jun Bio	Sep WQ	Dec WQ	Feb WQ	Feb WQ	May WQ	Jun Bio	Sep WQ	Dec WQ	Feb WQ	May WQ	May Bio	Oct WQ	Dec WQ	Dec WQ	Mar WQ	Jun WQ	Jun Bio	Sep WQ	Jan WQ	Apr WQ	May Bio	Jun WQ	Jun Bio	Sep WQ
1199	Crystal Bend	B	B	B	B	B	B	B	B	B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B	n	n	n	B	B	B	B	B	B
888	Cameron	B	B	B	B	B	B	B	B	B	n	B																						
1201	Boyce	B	B	B	B	B	B	B	B	B	B		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	

\* B = baseflow n = no flow S = storm flow blue = Samples were taken light blue = Samples were not taken blank = not visited

### Index scores\* for Harris Branch Sites by Year

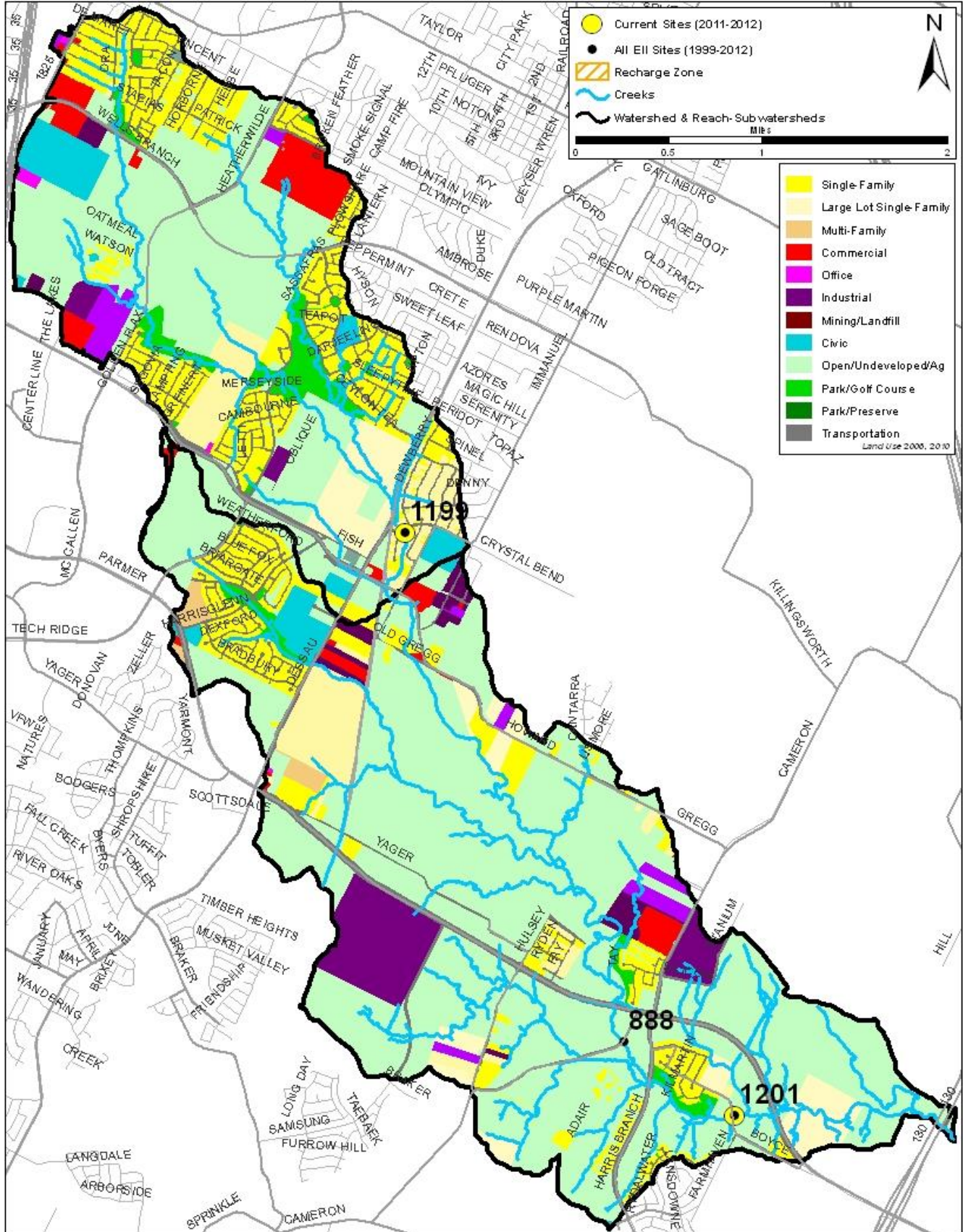
Reach	Site	Site Name	Year	Water Quality	Sediment**	Contact Recreation	Non-Contact Rec.	Physical Integrity	Aquatic Life	Benthic subindex	Diatom subindex	Total EII Score
HRS1	888	Harris Branch Creek @ Cameron Road	2002	36	84	89	58	65	59	75	42	65
HRS1	1201	Harris Branch Creek @ Boyce Lane	2002	34	84	78	68	67	48	65	30	63
HRS2	1199	Harris Branch Creek @ Crystal Bend Drive	2002	31	84	79	40	50	47	70	23	55
HRS1	888	Harris Branch Creek @ Cameron Road	2005	38	87	34	53	54	82	82		58
HRS1	1201	Harris Branch Creek @ Boyce Lane	2005	32	87	53	58	58	66	94	37	59
HRS2	1199	Harris Branch Creek @ Crystal Bend Drive	2005	34	87	33	67	53	69	74	64	57
HRS1	1201	Harris Branch Creek @ Boyce Lane	2008	31	82	63	71	63	80	97	63	65
HRS2	1199	Harris Branch Creek @ Crystal Bend Drive	2008	36	82	25	68	58	80	82	77	58
HRS1	1201	Harris Branch Creek @ Boyce Lane	2009	34	80	35	63	70	90	93	87	62
HRS2	1199	Harris Branch Creek @ Crystal Bend Drive	2009	47	80	32	72	57	84	90	77	62
HRS1	1201	Harris Branch Creek @ Boyce Lane	2011	25	82	38	66	45	73	89	56	55
HRS2	1199	Harris Branch Creek @ Crystal Bend Drive	2011	44	82	46	50	57				47
HRS1	1201	Harris Branch Creek @ Boyce Lane	2013	27	87	37	72	57	72	88	55	59
HRS2	1199	Harris Branch Creek @ Crystal Bend Drive	2013	34	87	25	70	57	80	87	73	59

\* blank cells indicate parameter was not collected, blank row indicate site was dropped \*\*sediment samples only collected at the downstream site

100-87.5 Excellent 87.5-75 V. Good 75-62.5 Good 62.5-50 Fair 50-37.5 Marginal 37.5-25 Poor 25-12.5 Bad 12.5-0 V. Bad

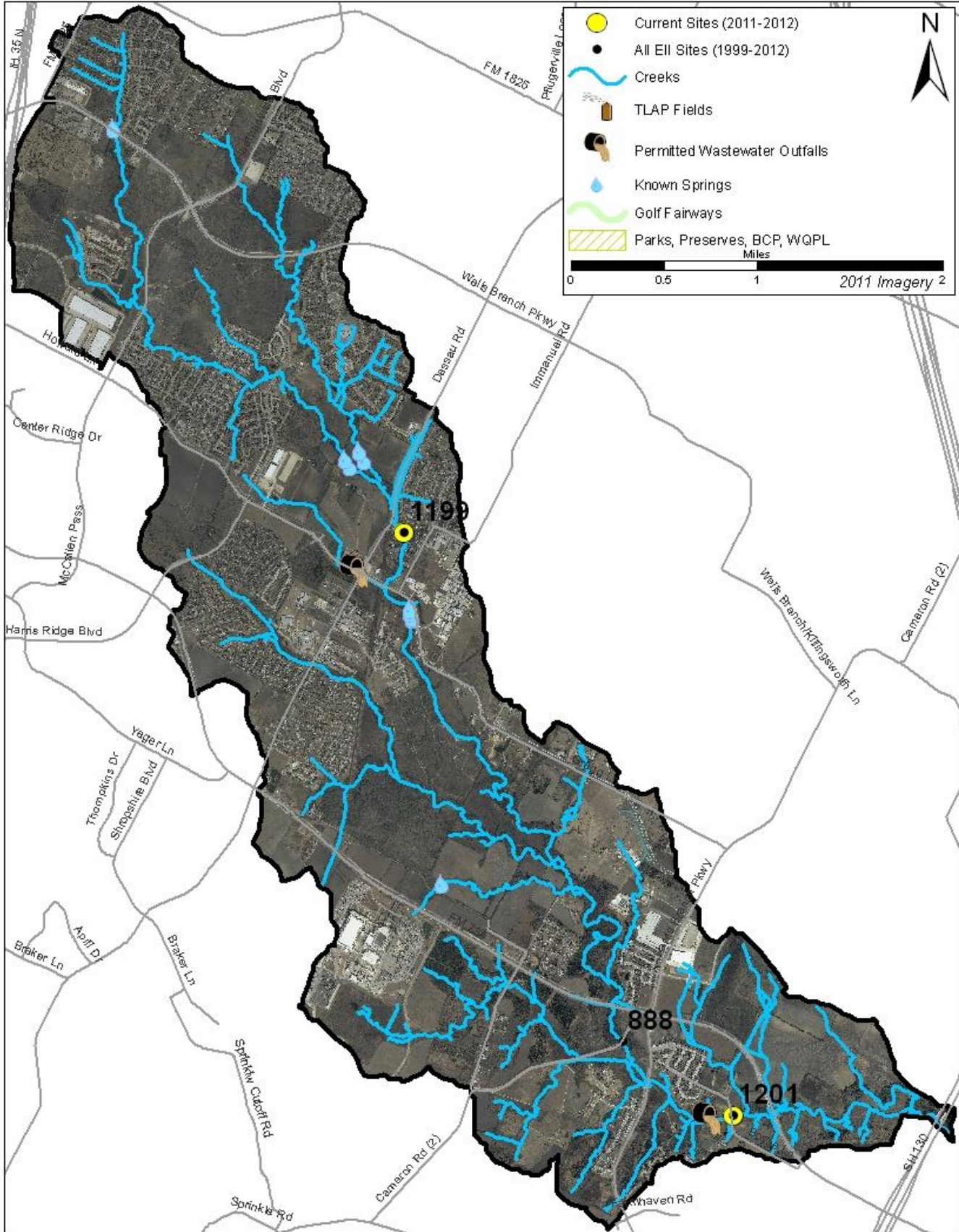
# Harris Branch Watershed

## Land Use Map



# Harris Branch Watershed

## Aerial Map



# Harris Branch Watershed

## Water Quality Data – Temperature, Conductivity, pH, Dissolved Oxygen & E. coli for 2013 Sample Sites (Downstream to Upstream)

Qualifiers to the left of value:	>	greater than	Qualifiers to the right of value:	(blank)	Useable
	<	less than		S	Exceeds standard range
	< J	less than detection limit		R	Rejected, failed QC
	J	Estimated			

Site Name	Site #	Reach	Date	Temp. Value	Temp. flag	Cond. Value	Cond. flag	pH Value	pH flag	D.O. Value	D.O. flag	E.coli Value	E.coli flag
Harris Branch @ Boyce Ln	1201	HRS1	01/22/2013	12.9		856		8.10		10.6			
Harris Branch @ Boyce Ln	1201	HRS1	04/24/2013	16.4		752		8.03		8.2		214.2	
Harris Branch @ Boyce Ln	1201	HRS1	06/26/2013	26.6		738		7.53		3.6	R	689.3	
Harris Branch @ Boyce Ln	1201	HRS1	09/26/2013	25.1		873		7.66		5.0		172.5	
<b>Site 1201 Mean</b>				<b>20.2</b>		<b>805</b>		<b>7.83</b>		<b>6.8</b>		<b>358.7</b>	
Harris Branch @ Crystal Bend	1199	HRS2	01/22/2013	13.5		900		7.83		10.4		727.0	
Harris Branch @ Crystal Bend	1199	HRS2	04/24/2013	15.0		768		7.85		9.4		686.7	
Harris Branch @ Crystal Bend	1199	HRS2	06/26/2013	24.9		784		7.87		6.6	R	1119.9	
Harris Branch @ Crystal Bend	1199	HRS2	09/26/2013	22.5		820		7.73		6.1		686.7	
<b>Site 1199 Mean</b>				<b>19.0</b>		<b>818</b>		<b>7.82</b>		<b>8.1</b>		<b>805.1</b>	
<b>Watershed Mean</b>				<b>19.6</b>		<b>811</b>		<b>7.83</b>		<b>7.5</b>		<b>613.8</b>	

Orange highlighting indicates that the value exceeds one standard deviation from the mean of all E.I.I. sites combined.

Summary Statistics for all 2013 – 2014 E.I.I. Sites Combined.					
Parameter	2013-2014 Average	2013-2014 Minimum	2013-2014 Maximum	1 Standard Deviation Above	1 Standard Deviation Below
Temperature (C°)	19.6	8.6	34.0	25.8	
Conductivity (uS/cm)	711	107	1783	942	
pH (Standard units)	7.86	6.96	8.97	8.19	7.52
D.O. (mg/l)	8.1	1.2	30.5	11.4	4.8
E.coli. (col/100ml)	435	1	4840	1127	

# Harris Branch Watershed

## Water Quality Data – Ammonia, Nitrate / Nitrite, Ortho-Phosphorus, Total Suspended Solids & Turbidity for 2013 Sample Sites (Downstream to Upstream)

Qualifiers to the left of value:	>	greater than	Qualifiers to the right of value:	(blank)	Useable
	<	less than		S	Exceeds standard range
	< J	less than detection limit		R	Rejected, failed QC
	J	Estimated			

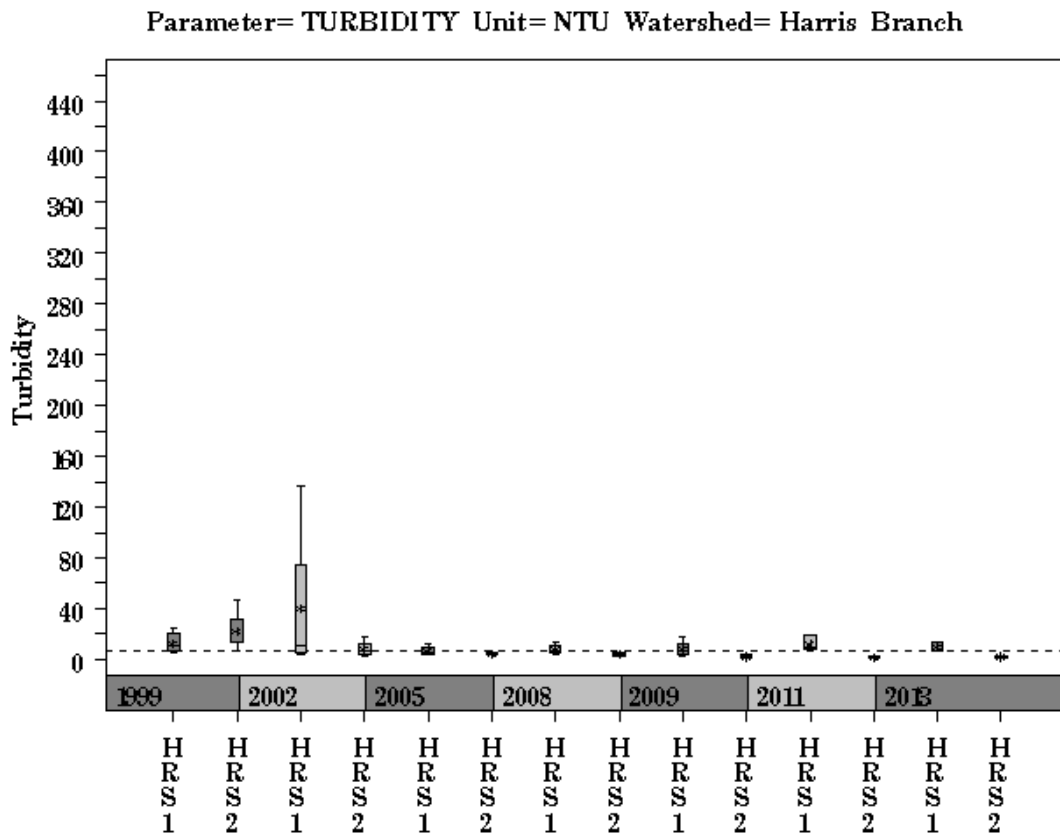
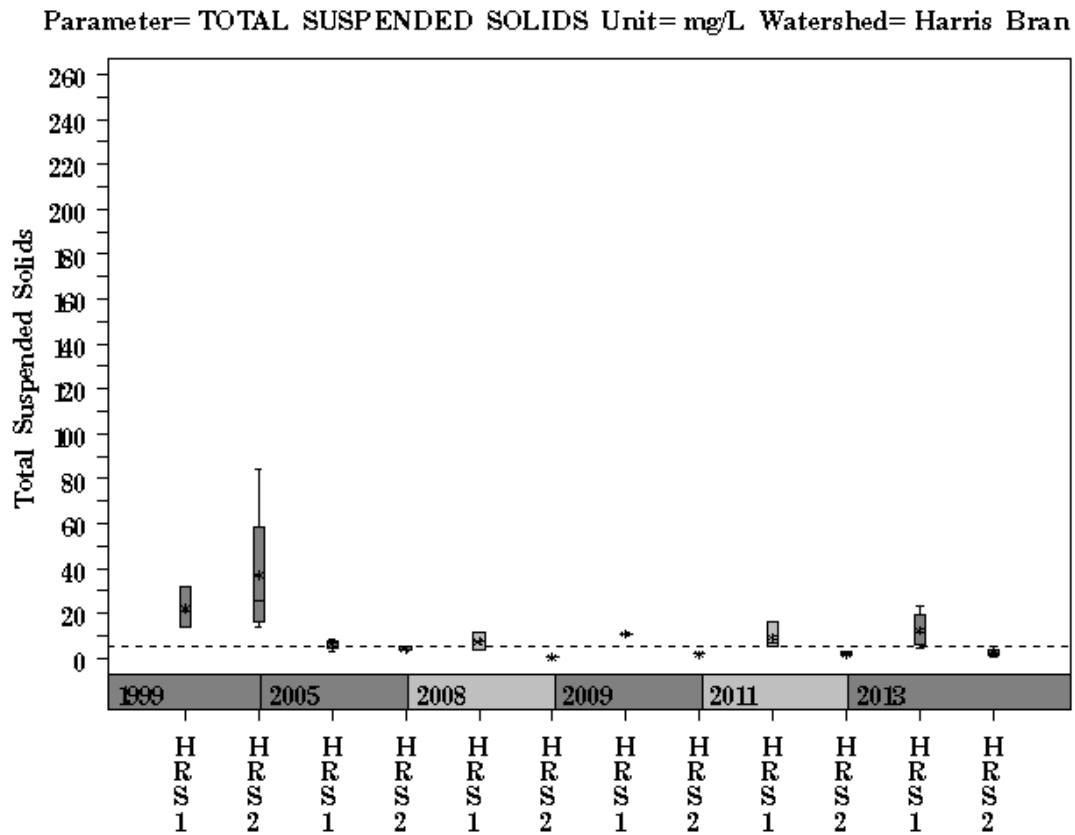
Site Name	Site #	Reach	Date	NH3-N		NO3/NO2		Ortho-P		T.S.S.		Turb.	
				<> Value	flag	<> Value	flag	<> Value	flag	<> Value	flag	<> Value	flag
Harris Branch @ Boyce Ln	1201	HRS1	01/22/2013	0.074		5.30		0.403		7.1		7.2	
Harris Branch @ Boyce Ln	1201	HRS1	04/24/2013	0.026	R	6.31		0.597		16.0		7.9	R
Harris Branch @ Boyce Ln	1201	HRS1	06/26/2013	2.250		2.65		0.315		4.5		7.1	
Harris Branch @ Boyce Ln	1201	HRS1	09/26/2013	0.070		11.50		0.131		23.6		14.0	
<b>Site 1201 Mean</b>				0.605		6.44		0.362		12.8		9.0	
Harris Branch @ Crystal Bend	1199	HRS2	01/22/2013	0.052		0.92		J 0.007		2.1		2.7	
Harris Branch @ Crystal Bend	1199	HRS2	04/24/2013	0.040	R	0.91		0.017		5.6		4.6	R
Harris Branch @ Crystal Bend	1199	HRS2	06/26/2013	0.061		0.80		0.042		2.3		2.7	
Harris Branch @ Crystal Bend	1199	HRS2	09/26/2013	<J 0.008		0.27		0.053 R		<J 1.0		1.3	
<b>Site 1199 Mean</b>				0.040		0.73		0.030		2.8		2.8	
<b>Watershed Mean</b>				0.323		3.58		0.196		7.8		5.9	

Orange highlighting indicates that the value exceeds one standard deviation from the mean of all E.I.I. sites combined.

Summary Statistics for all 2013 – 2014 E.I.I. Sites Combined.				
Parameter	2013-2014 Mean	2013-2014 Minimum	2013-2014 Maximum	1 Standard Deviation Above
NH3-M (mg/l)	0.031	0.008	2.250	0.150
NO3-N (mg/l)	1.16	0.01	16.30	4.02
Ortho-P (mg/l)	0.041	0.004	1.360	0.164
TSS (mg/l)	5.6	1.0	70.0	15.3
Turbidity (NTU)	4.5	0.0	97.1	13.2

# Harris Branch Watershed

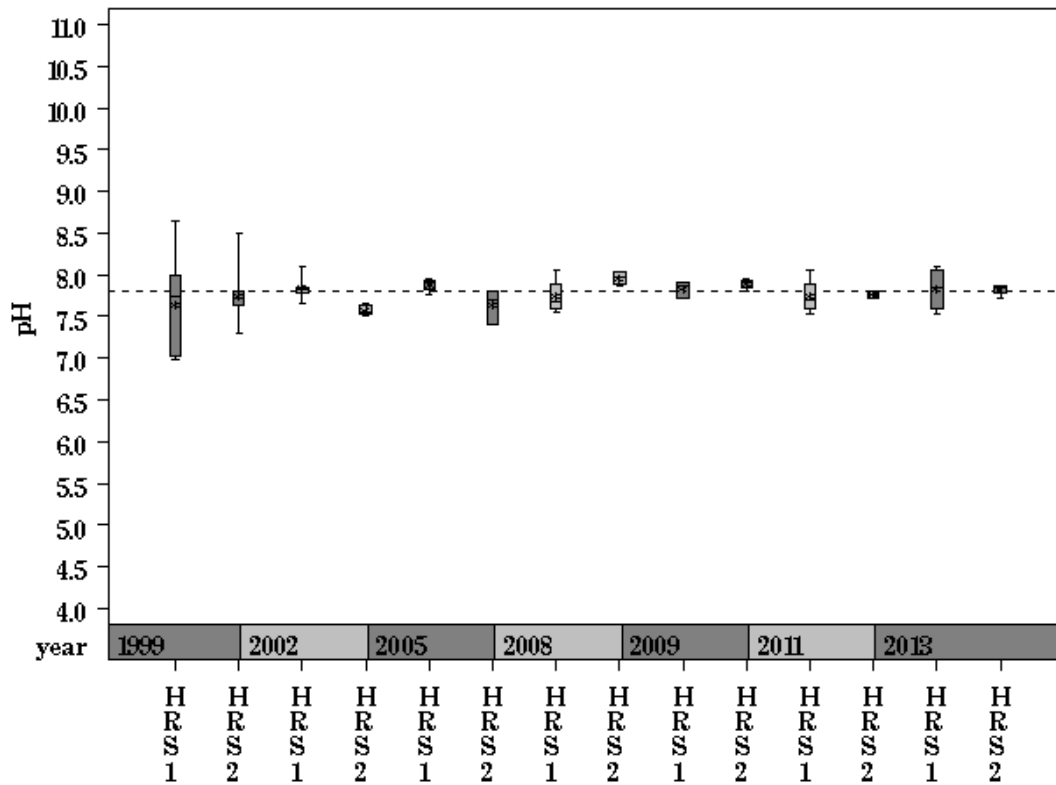
Data Summary Graphs – Total Suspended Solids and Turbidity (Downstream to Upstream by Year)



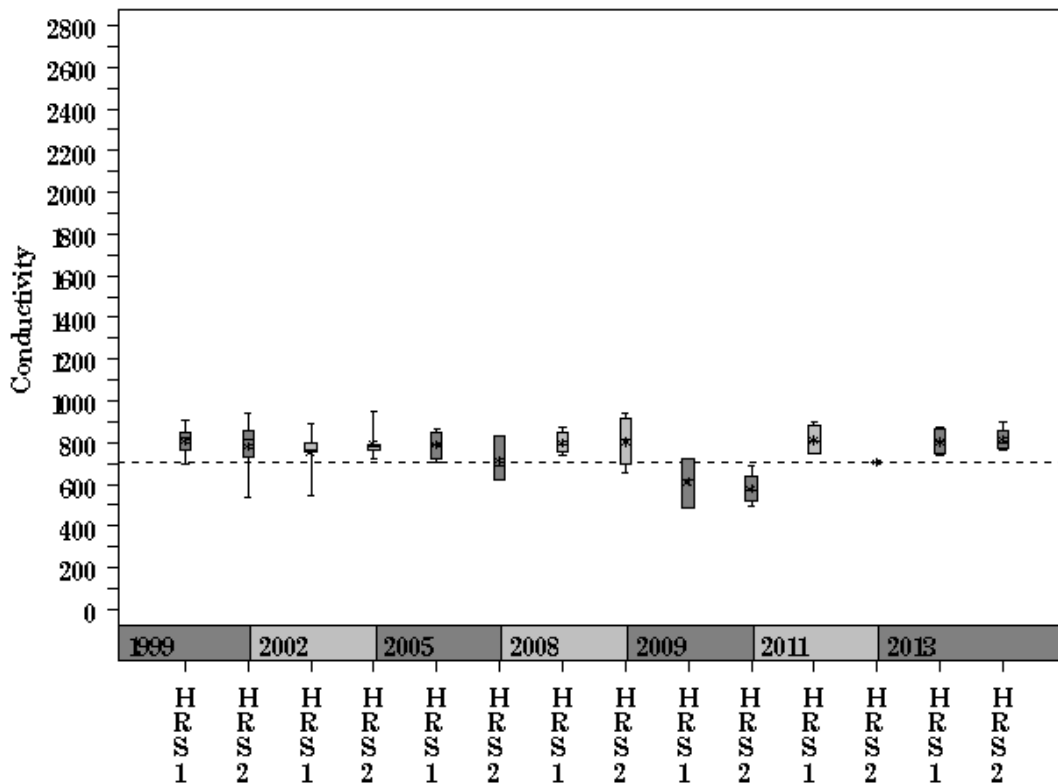
# Harris Branch Watershed

Data Summary Graphs – pH and Conductivity (Downstream to Upstream by Year)

Parameter= PH Unit= Standard units Watershed= Harris Branch



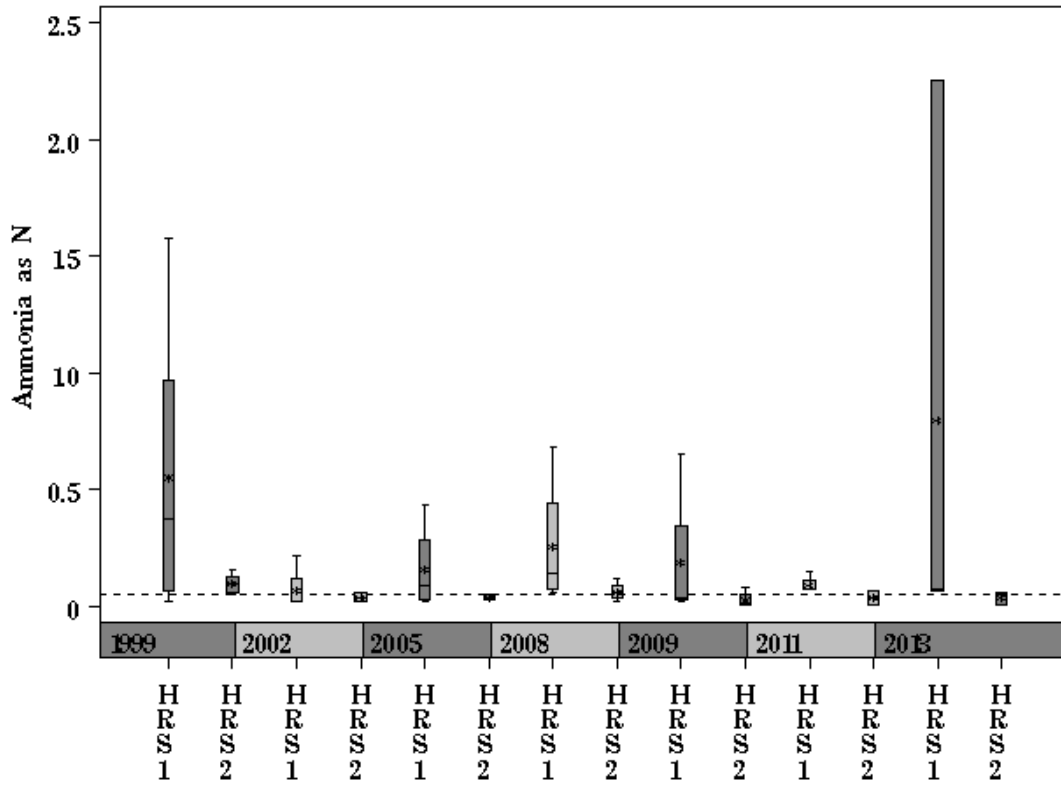
Parameter= CONDUCTIVITY Unit= uS/cm Watershed= Harris Branch



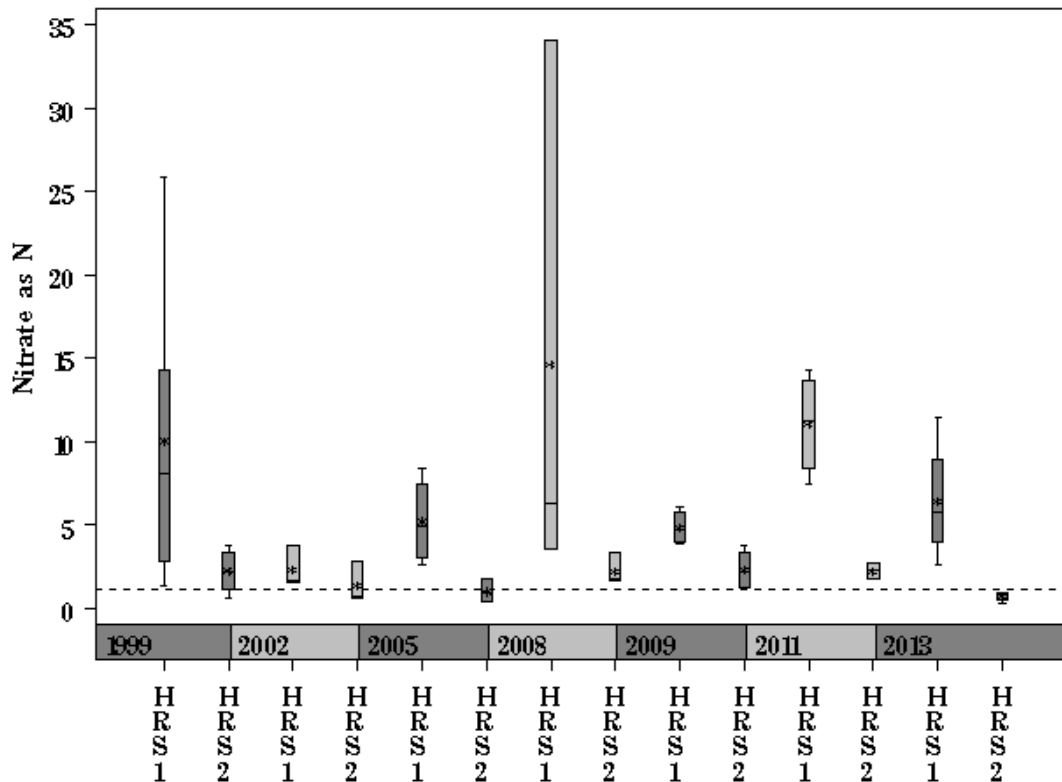
# Harris Branch Watershed

Data Summary Graphs – Ammonia and Nitrate/Nitrite (Downstream to Upstream by Year)

Parameter= AMMONIA AS N Unit= mg/L Watershed= Harris Branch



Parameter= NITRATE AS N Unit= mg/L Watershed= Harris Branch

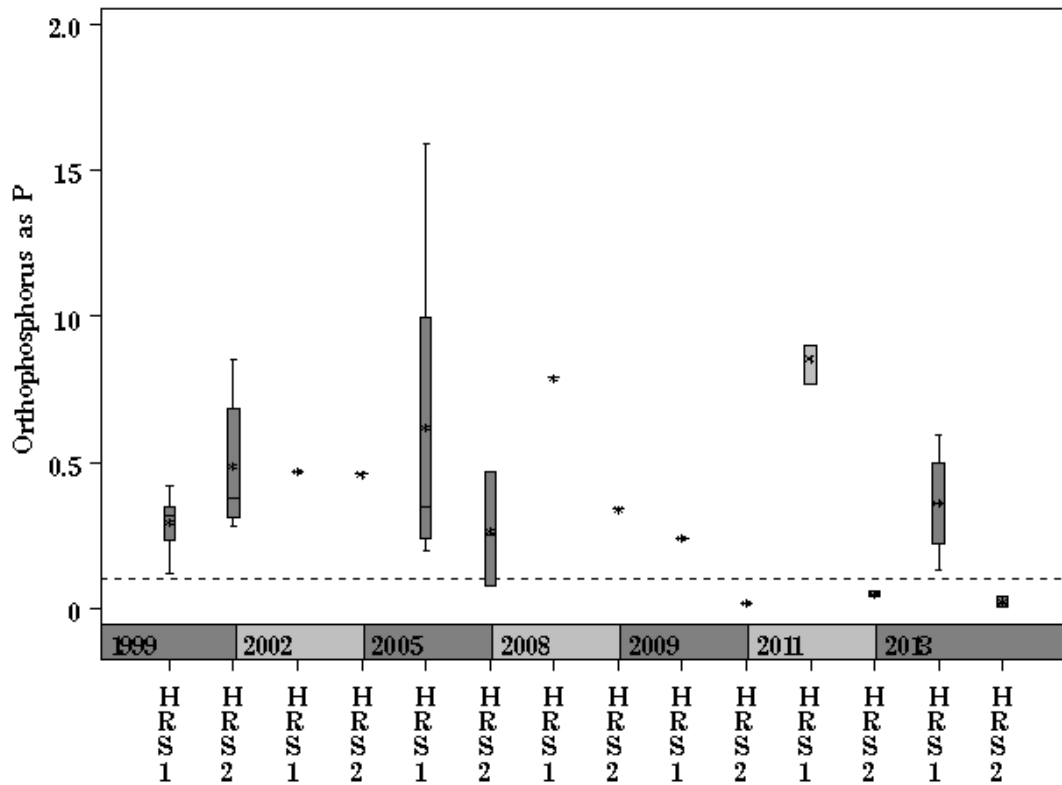




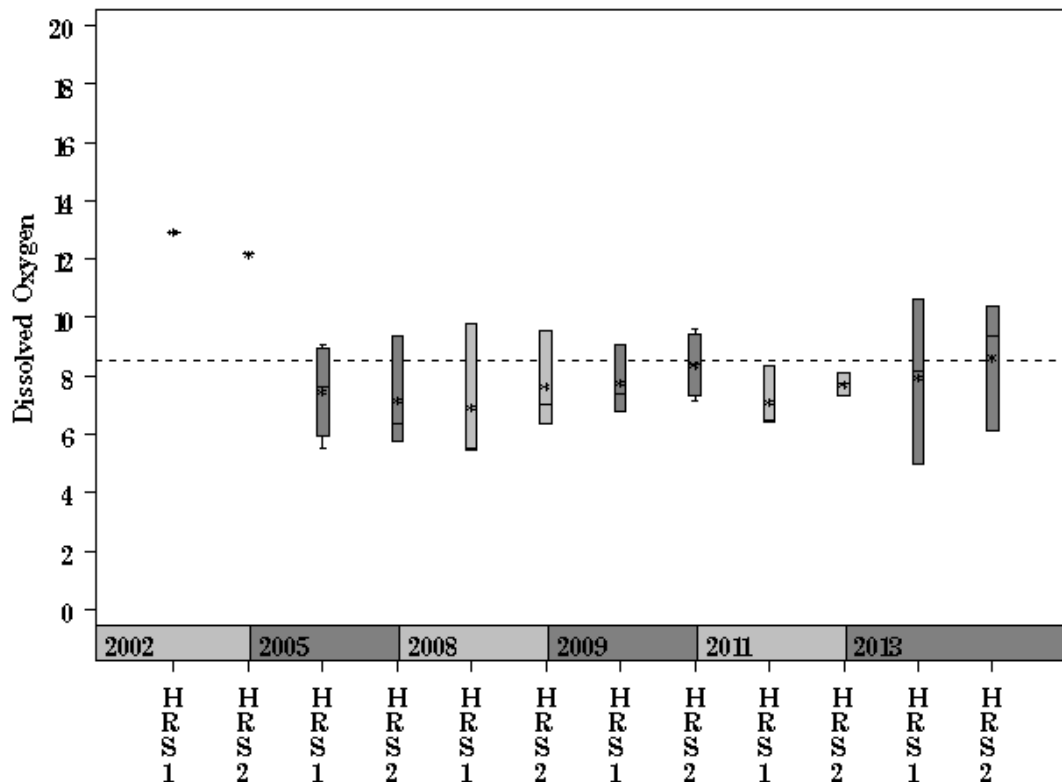
# Harris Branch Watershed

Data Summary Graphs – Orthophosphate and Dissolved Oxygen (Downstream to Upstream by Year)

Parameter= ORTHOPHOSPHORUS AS P Unit= mg/L Watershed= Harris Branch

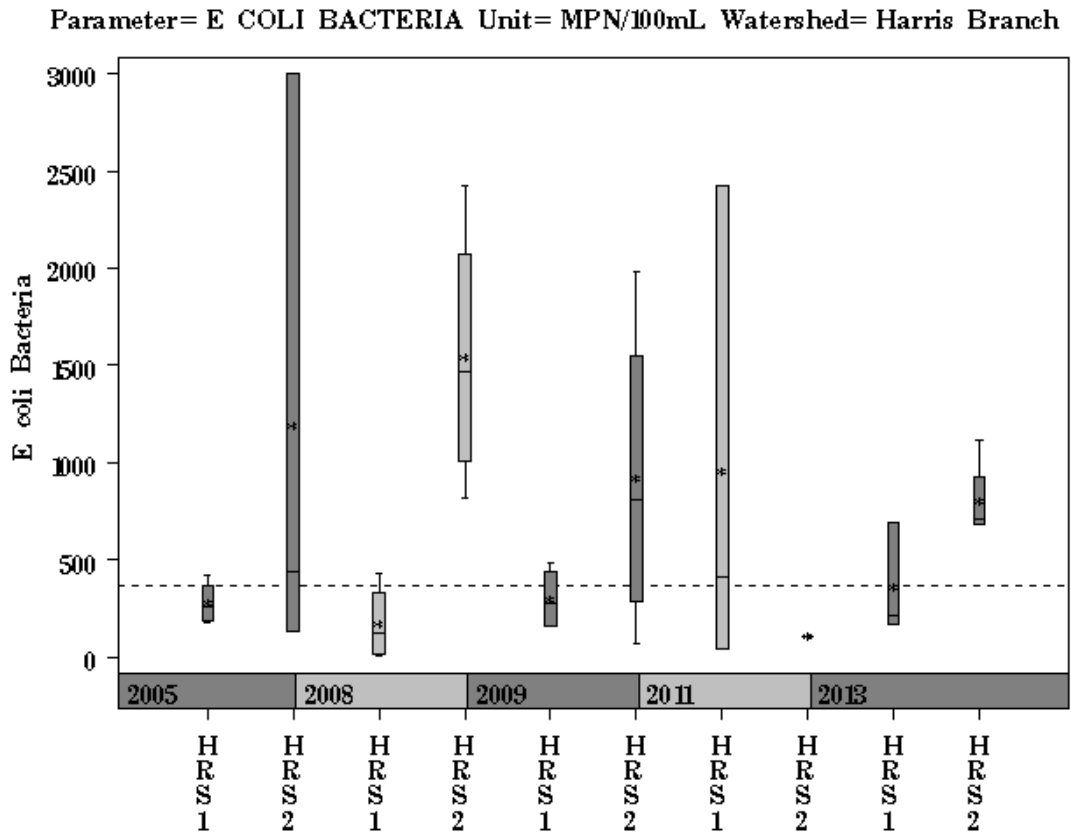


Parameter= DISSOLVED OXYGEN Unit= mg/L Watershed= Harris Branch



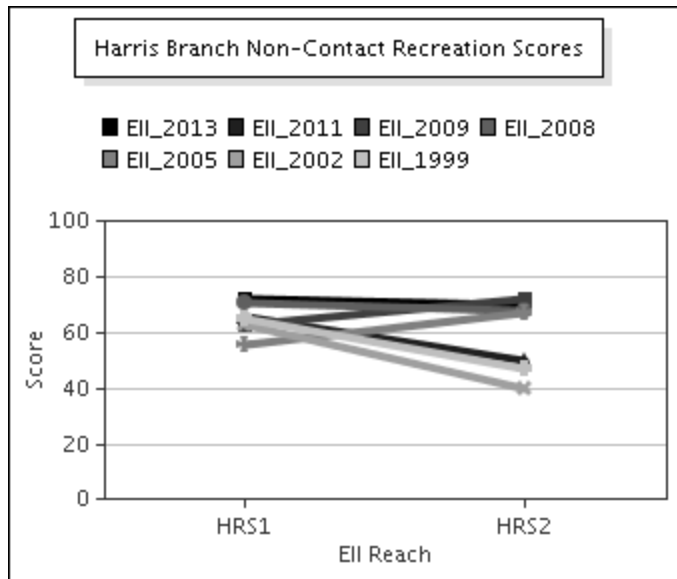
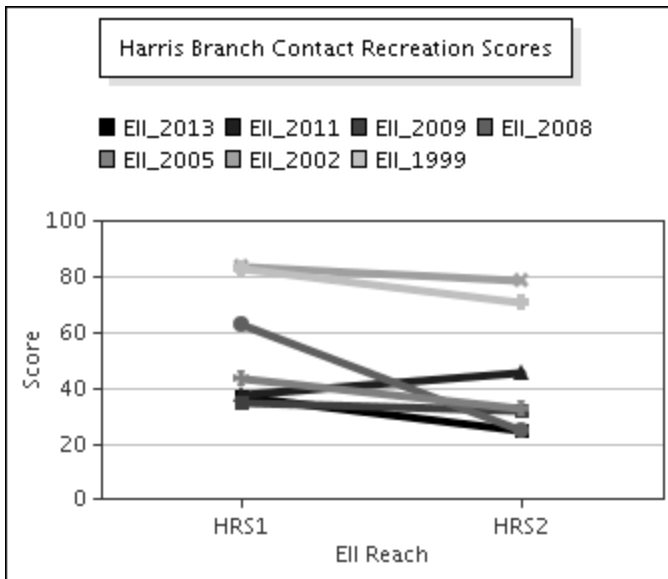
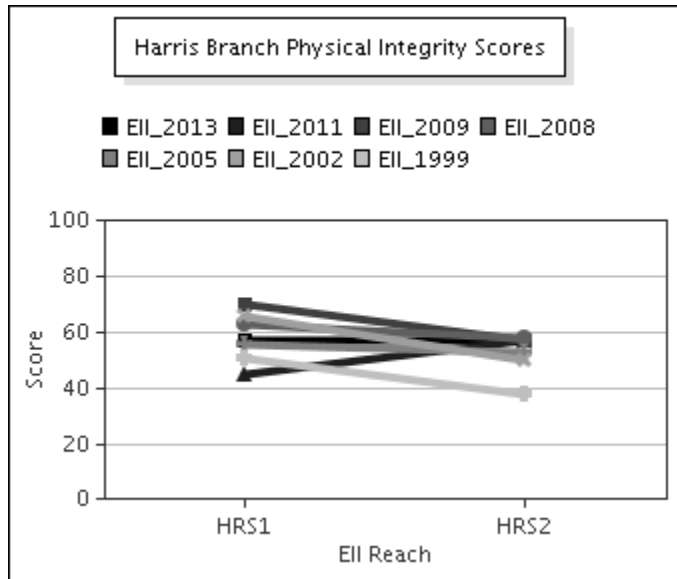
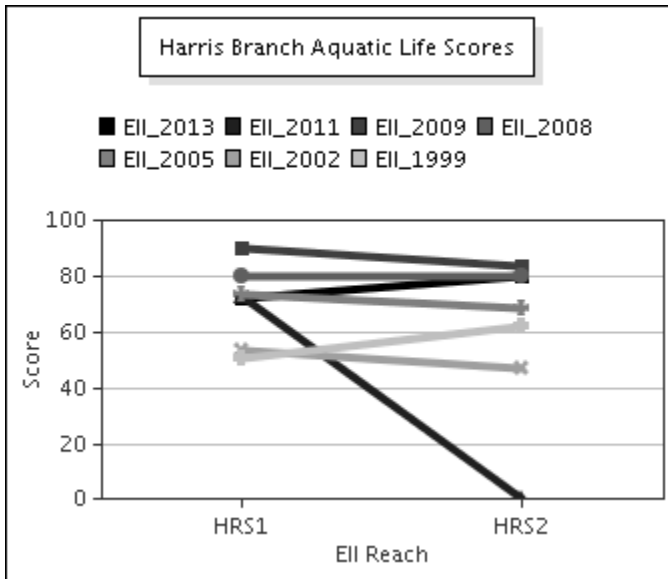
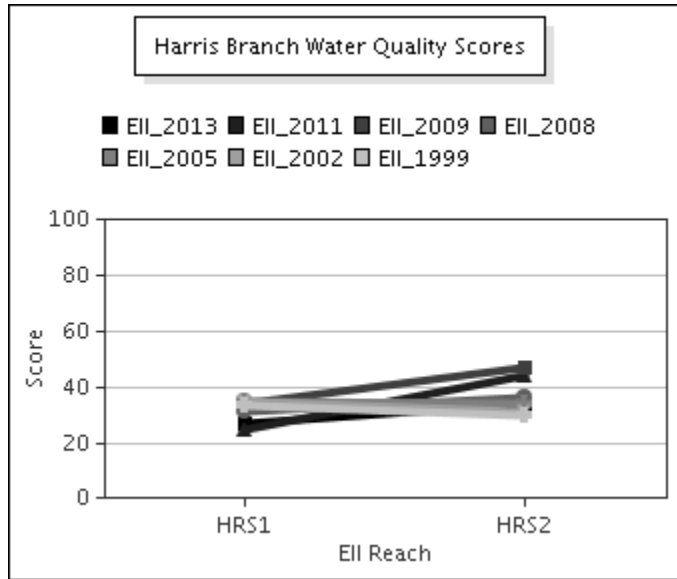
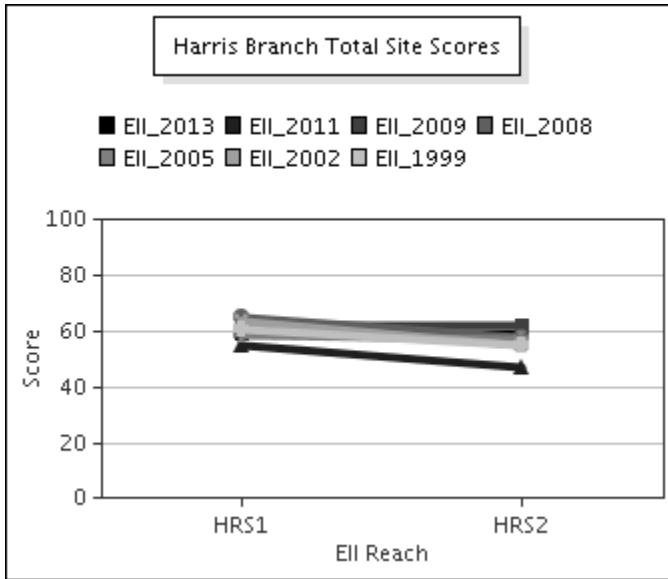
# Harris Branch Watershed

Data Summary Graphs – *E.coli* (Downstream to Upstream by Year)



# Harris Branch Watershed

## Score Summary – Reach scores for each sample year



# Harris Branch Watershed

## Benthic Macroinvertebrates – Taxa List, Pollution Tolerance Index & Functional Feeding Group for 2013 Sample Sites (Downstream to Upstream)

Benthic Macroinvertebrate ID	PTI	FFG	Harris Branch @ Boyce Ln (Site 1201)	Harris Branch @ Crystal Bd (Site 1199)
<i>Helicopsyche</i> sp.	2	SC	6	
<i>Hexacylloepus ferrugineus</i>	2	SC,CG	2	
<i>Hydroptila</i> sp.	2	SC,PI		3
<i>Microcyllloepus pusillus</i>	2	SC,CG	9	
<i>Thraulodes gonzalesi</i>	2	SC,CG		1
<i>Camelobaetidium</i> sp.	4	CG		1
<i>Fallicon quilleri</i>	4	SC,CG	73	135
<i>Simulium</i> sp.	4	FC	2	34
<i>Smicridea</i> sp.	4	FC	2	
<i>Argia</i> sp.	6	P	1	5
<i>Cheumatopsyche</i> sp.	6	FC	85	94
Chironomidae	6	P,FC	13	37
<i>Corbicula fluminea</i>	6	FC	1	
<i>Limonia</i> sp.	6	SH	1	
Tanypodinae	6	P		11
<i>Caenis</i> sp.	7	SC,CG	1	1
<i>Helisoma trivolvis</i>	7	SC		1
<i>Stenelmis</i> sp.	7	SC,CG	5	
Hirudinea	8	P	1	
Oligochaeta	8	CG	2	
<i>Physella</i> sp.	9	SC		5
<i>Trepobates</i> sp.	10	P		1
<i>Dugesia</i> sp.		P,CG	9	

# Harris Branch Watershed

## Benthic Macroinvertebrates – Metric Summary for 2013 Sample Sites (Downstream to Upstream)

Scoring Metric	Harris Branch @ Boyce Ln (Site 1201)	Harris Branch @ Crystal Bd (Site 1199)
Number of Taxa *	15	12
Hilsenhoff Biotic Index *	5.0	5.0
Number of Ephemeroptera Taxa *	2	4
Percent of Total as Chironomidae *	6	15
Number of EPT Taxa *	5	6
Percent of Total as EPT *	79	71
Percent of Total as Predator *	11	16
Number of Intolerant Taxa *	6	5
Percent Dominance (Top 3 Taxa) *	81	81
EPT / EPT + Chironomidae	1	1
Number of Diptera Taxa	3	2
Number of Non-Insect Taxa	3	2
Number of Organisms	212	329
Percent Dominance (Top 1 Taxa)	40	41
Percent of Total as Collector / Gatherer	48	42
Percent of Total as Dominant Guild (FFG)	48	53
Percent of Total as Elmidae	8	0
Percent of Total as Filterers	48	53
Percent of Total as Grazers (PI & SC)	45	44
Percent of Total as Tolerant Organisms	0	2
Percent of Trichoptera as Hydropsychidae	94	97
Ratio of Intolerant : Tolerant Organisms	0.86	1.12
TCEQ Qualitative Aquatic Life Use Score	26	20
TCEQ Quantitative Aquatic Life Use Score	29	29

\* **EII scoring parameter: Nine metric parameters are used in the calculation of the EII Benthic Subindex score. Other metrics are shown to supplement evaluation.**

1. # of Taxa: Higher diversity (number of taxa) correlates with greater biological integrity. The average number of taxa per site for 2013/2014 samples was 15; the lowest value was 5 and the highest value was 30.
2. Hilsenhoff Biotic Index (HBI): HBI values range from 0 to 10. Low HBI values reflect a higher abundance of taxa that are sensitive to organic (nutrient) pollution, thus a lower level of this type of pollution. The average HBI per site for 2013/2014 samples was 5.4; the lowest value was 3.7 and the highest value was 8.1.
3. # of Ephemeroptera taxa: A higher number of Ephemeroptera (mayfly) taxa correlates with greater biological integrity. The average number of taxa per site for 2013/2014 samples was 2; the lowest value was 0 and the highest value was 7.
4. % of total as Chironomidae: The percentage of the sample represented by the Dipteran family Chironomidae will increase with a decrease in biological integrity. The average percent Chironomidae per site for 2013/2014 samples was 16%; the lowest value was 0% and the highest value was 77%.
5. # of EPT Taxa: A higher number of Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly) taxa correlates with greater biological integrity. The average number of EPT taxa per site for 2013/2014 samples was 4; the lowest value was 0 and the highest value was 12.
6. % of total as EPT: The percentage of the sample represented by the insect orders Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly) will decrease with a decrease in biological integrity. The average percent EPT taxa per site for 2013/2014 samples was 46%; the lowest value was 0% and the highest value was 89%.
7. % of total as Predator: The percentage of the sample represented by predators is variable with regard to biological integrity. The average percent predator per site for 2013/2014 samples was 31%; the lowest value was 3% and the highest value was 82%.
8. # of Intolerant Taxa: A higher number of pollution intolerant taxa correlates with greater biological integrity. The average number of intolerant taxa per site for 2013/2014 samples was 5; the lowest value was 0 and the highest value was 15.
9. % Dominance (top 3 taxa): The percentage of the sample represented by the three most abundant taxa will increase with a decrease in biological integrity. The average percent of sample dominated by the top three taxa per site for 2013/2014 samples was 72%; the lowest value was 39% and the highest value was 96%.

# Harris Branch Watershed

## Diatoms – Taxa List & Pollution Tolerance Index for 2013 Sample Sites (Downstream to Upstream)

Diatom Species Name	PTI	Harris Branch @ Boyce Ln (Site 1201)	Harris Branch @ Crystal Bd (Site 1199)
<i>Amphora inariensis</i>	4		99
<i>Achnanthes exigua</i>	3	2	
<i>Achnantheidium minutissimum</i>	3		2
<i>Achnantheidium pyrenaicum</i>	3	1	
<i>Amphora pediculus</i>	3	7	86
<i>Cocconeis pediculus</i>	3		24
<i>Cymbella affinis</i>	3		1
<i>Gyrosigma nodiferum</i>	3	1	
<i>Halamphora montana</i>	3	4	1
<i>Nitzschia fonticola</i>	3	1	
<i>Reimeria sinuata</i>	3	58	184
<i>Rhoicosphenia abbreviata</i>	3		36
<i>Achnantheiopsis lanceolata</i>	2	4	3
<i>Cyclotella meneghiniana</i>	2		1
<i>Cymatopleura solea</i>	2		2
<i>Halamphora veneta</i>	2	3	
<i>Melosira varians</i>	2	1	
<i>Navicula ingenua</i>	2	7	
<i>Navicula recens</i>	2	9	
<i>Navicula sanctaecrucis</i>	2	5	
<i>Nitzschia amphibia</i>	2	4	7
<i>Nitzschia inconspicua</i>	2	115	
<i>Pleurosira laevis</i>	2	2	
<i>Tryblionella calida</i>	2	1	
<i>Gomphonema parvulum</i>	1	2	
<i>Cocconeis placentula</i> var. <i>lineata</i>		107	54
<i>Eolimna minima</i>		151	
<i>Geissleria cummerowii</i>		4	
<i>Kolbesia ploenensis</i>		9	
<i>Navicula rostellata</i>		1	
<i>Terpsinoe musica</i>		1	

# Harris Branch Watershed

## Diatoms – Metric Summary for 2013 Sample Sites (Downstream to Upstream)

Scoring Metric	Harris Branch @ Boyce Ln (Site 1201)	Harris Branch @ Crystal Bd (Site 1199)
<i>Cymbella</i> Richness	1	2
Number of organisms	500	500
Number of taxa	24	13
Percent motile taxa	29	1
Percent similarity to reference condition	11	22
Pollution tolerance index	2.32	3.19

\* **EII scoring parameter:** Four metric parameters are used in the calculation of the EII Diatom Subindex score: *Cymbella* richness, percent motile taxa, percent similarity to reference condition and pollution tolerance index. Number of taxa is non-scoring, but is shown to supplement evaluation. The number of organisms is typically a sample of 500, but occasionally differs due to sample conditions.

1. *Cymbella* Richness: The Cymbelloid taxa include species in the genus *Cymbella*, in addition to some species belonging to the genera *Cymbellopsis*, *Cymbopleura*, *Encyonema*, *Encyonemopsis*, *Navicymbula* and *Reimeria*. Their presence highlights the presence of sensitive species, especially with regard to impervious cover, and this value increases with an increase in overall water quality. The average number of Cymbelloid taxa per site for 2013/2014 samples was 3; the lowest value was 0 and the highest value was 7.
2. % Motile Taxa: This is a siltation index showing the relative abundance of genera that are able to move towards the surface if covered by silt. A higher percentage is indicative of a degraded condition caused by increased silt pollution. The average percent motile taxa per site for 2013/2014 samples was 16%; the lowest value was 0% and the highest value was 77%.
3. % similarity to reference condition: This percentage compares a site to reference sites that are selected based on having low percent impervious cover. A higher percentage reflects greater biological integrity. The average percent similarity per site for 2013/2014 samples was 31%; the lowest value was 6% and the highest value was 57%.
4. Pollution Tolerance Index (PTI): This is a total value for a sample, which is a function of the abundance of each taxon (usually species) in a sample and the individual PTI's for each of those taxa. Individual PTI's for each taxon range from 1 (most pollution tolerant) to 4 (most pollution sensitive), thus higher total PTI's for a site reflect greater biological integrity. The average PTI per site for 2013/2014 samples was 2.76; the lowest value was 1.70 and the highest value was 3.45.

# Harris Branch Watershed

## Site Photographs



1199\_t00-us-03\_27\_2002



1199\_t00-ds-03\_27\_2002



1199\_t00-us-06\_16\_2008



888\_t00-us-02\_28\_2002



888\_t00-ur-02\_28\_2002



# Harris Branch Watershed

## Site Photographs



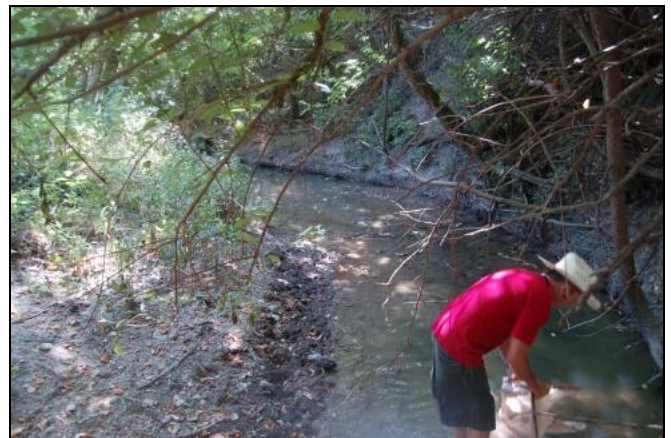
1201\_t00-ur-06\_17\_2005



1201\_t00-ds-06\_17\_2005



1201\_t00-us-06\_17\_2008



1201\_t00-ds-06\_17\_2008



1201\_t00-us-05\_28\_2009



1201\_t00-ds-05\_28\_2009

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