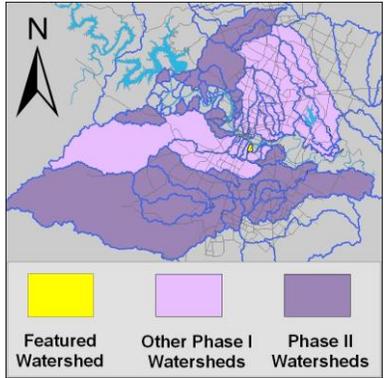


Harpers Branch Watershed

Summary Sheet

Catchment	Total area	1 square miles				
	Area in recharge	none				
	Creek length	1 mile				
	Receiving water	Town Lake				
Demographics	2000 population	2,963				
	2030 projected population	3,316				
	30 year projected % increase	12 %				
Land Use	Impervious cover (2003 estimate)	53.4 %				
	Impervious cover (2013 estimate)	52.2 %				
Overall EII Scores	2000	2003	2006	2009	2011	2013
	48	47	46	46	36	45



Flow Regime* for Sample Sites on Harpers Branch Upstream to Downstream

Site	Site Name	2001		2003				2006				2009				2010		2011			2013								
		Feb	Feb	Feb	Mar	Mar	May	Sep	Dec	Feb	May	Jul	Aug	Nov	Feb	May	May	Oct	Dec	Dec	Mar	Jun	Jun	Sep	Jan	Apr	Jun	Jun	Sep
484	Riverside	B	B	B	B	B	B	B	B																				
844	Woodland	B	B	B	B	B	B	B	B	B	B	n	B	n	B	B	B	B	B	B	n	n	n	B	B	B	B	B	
855	Fairlawn	B	B																										
877	Windoak	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 Harpers Branch Sites by Year

Reach	Site	Site Name	Year	Water Quality	Sediment**	Contact Rec.	Non-Contact Rec.	Physical Integrity	Aquatic Life	Benthic subindex	Diatom subindex	Total EII Score
HRP1	484	Harpers Branch Creek @ Riverside Dr	2000	46	59	63	57	27	30	29	31	47
HRP1	844	Harpers Branch Creek @ Woodland Ave	2000	41	59	67	79	38	22	27	16	51
HRP1	855	Harpers Branch Creek @ Fairlawn	2000		59		64	49	19	29	9	48
HRP1	877	Harpers Branch Creek @ Windoak Drive	2000		59		52	25	21	31	11	39
HRP1	484	Harpers Branch Creek @ Riverside Dr	2003	46	57	70	31	36	19	19	18	43
HRP1	844	Harpers Branch Creek @ Woodland Ave	2003	45	57	47	65	56	33	30	35	51
HRP1	844	Harpers Branch Creek @ Woodland Ave	2006	39	51	33	66	46	43	26	60	46
HRP1	844	Harpers Branch Creek @ Woodland Ave	2009	36	54	25	76	39	46	22	70	46
HRP1	844	Harpers Branch Creek @ Woodland Ave	2011	32	58	44	28	34	17	17		36
HRP1	844	Harpers Branch Creek @ Woodland Ave	2013	45	30	25	66	51	52	41	63	45

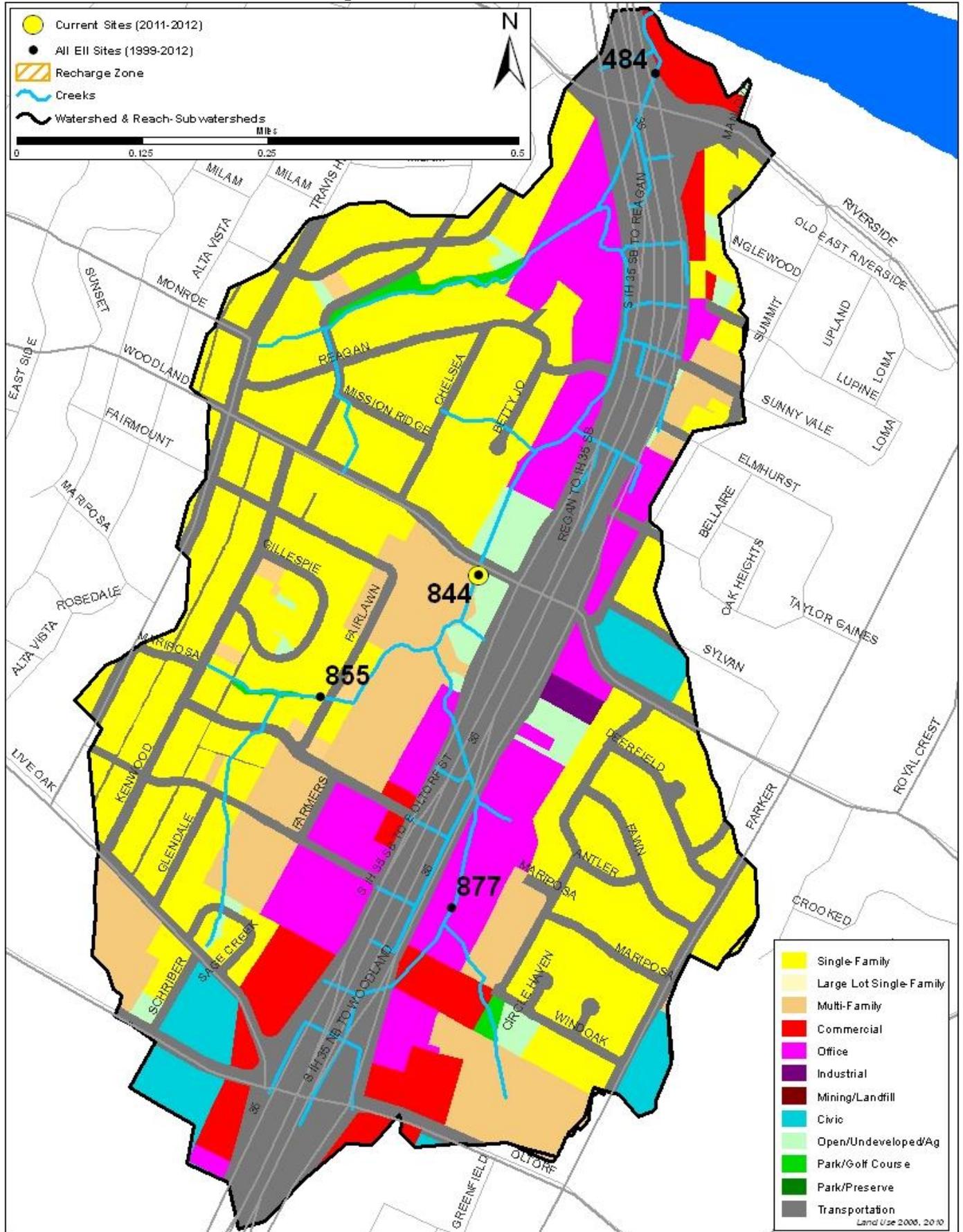
* blank cells indicate parameter was not collected, blank row indicate site was dropped

**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

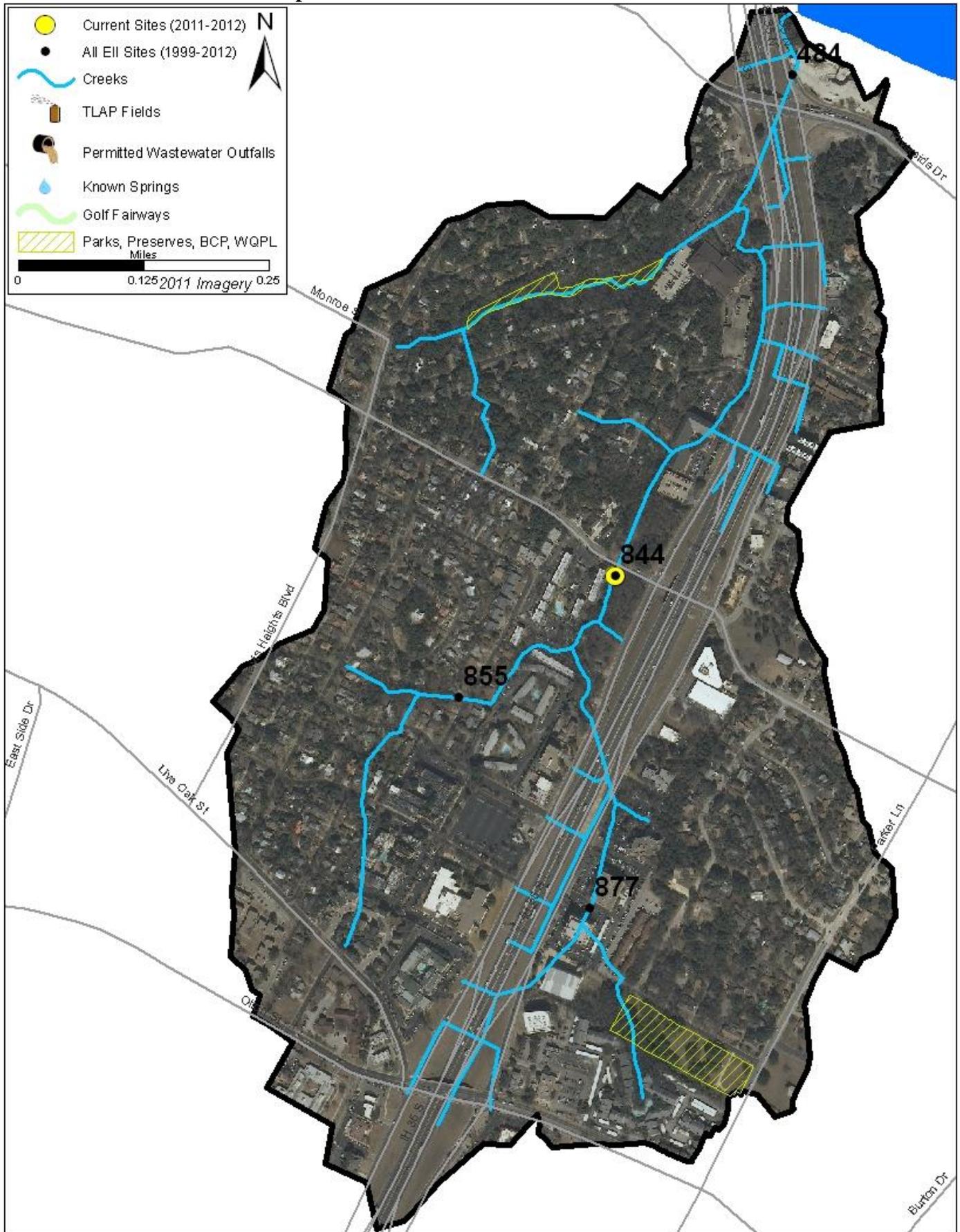
Harpers Branch Watershed

Land Use Map



Harpers Branch Watershed

Aerial Map



Harpers 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	<i>E. coli</i> Value	<i>E. coli</i> flag
Harpers Branch @ Woodland	844	HRP1	01/22/2013	14.8		722		7.46		4.7	R	770.1	
Harpers Branch @ Woodland	844	HRP1	04/24/2013	15.2		740		7.45		5.3		920.8	
Harpers Branch @ Woodland	844	HRP1	06/26/2013	24.4		754		7.38		4.2		1299.7	
Harpers Branch @ Woodland	844	HRP1	09/26/2013	23.0		741		7.37		3.4		> 2419.6	
Site 844 Mean				19.3		739		7.42		4.4		1352.6	
Watershed Mean				19.3		739		7.42		4.4		1352.6	

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
<i>E. coli</i> . (col/100ml)	435	1	4840	1127	

Harpers 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			

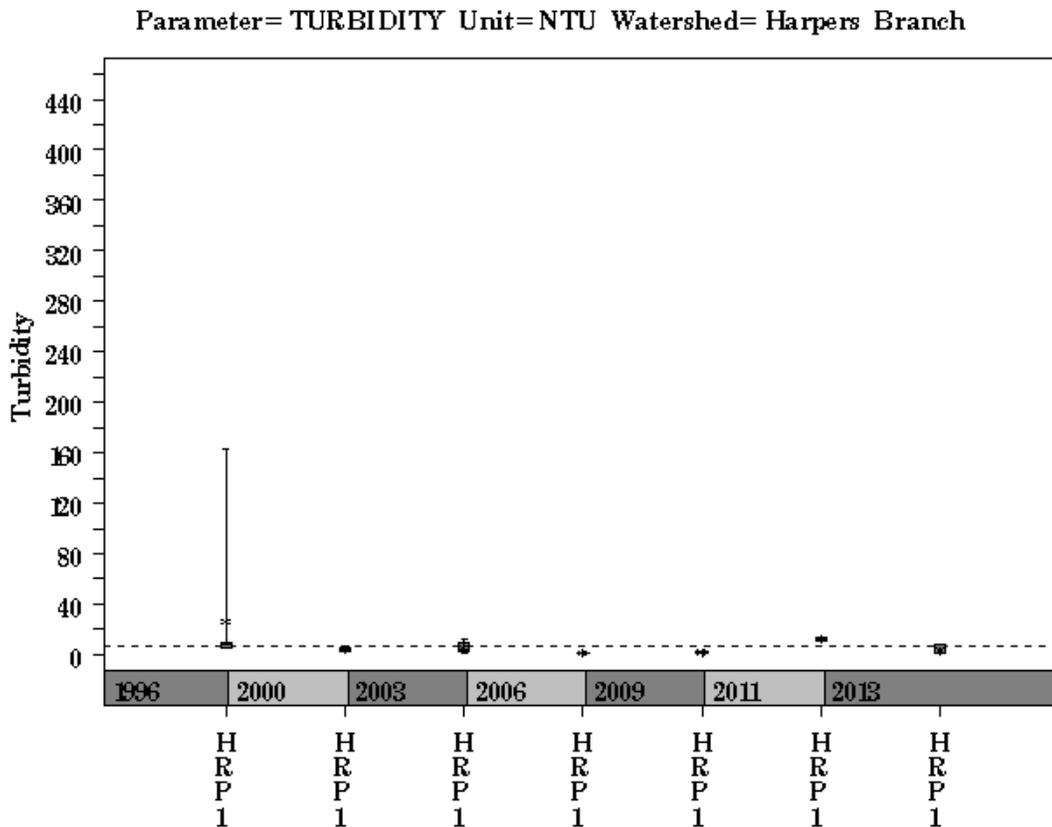
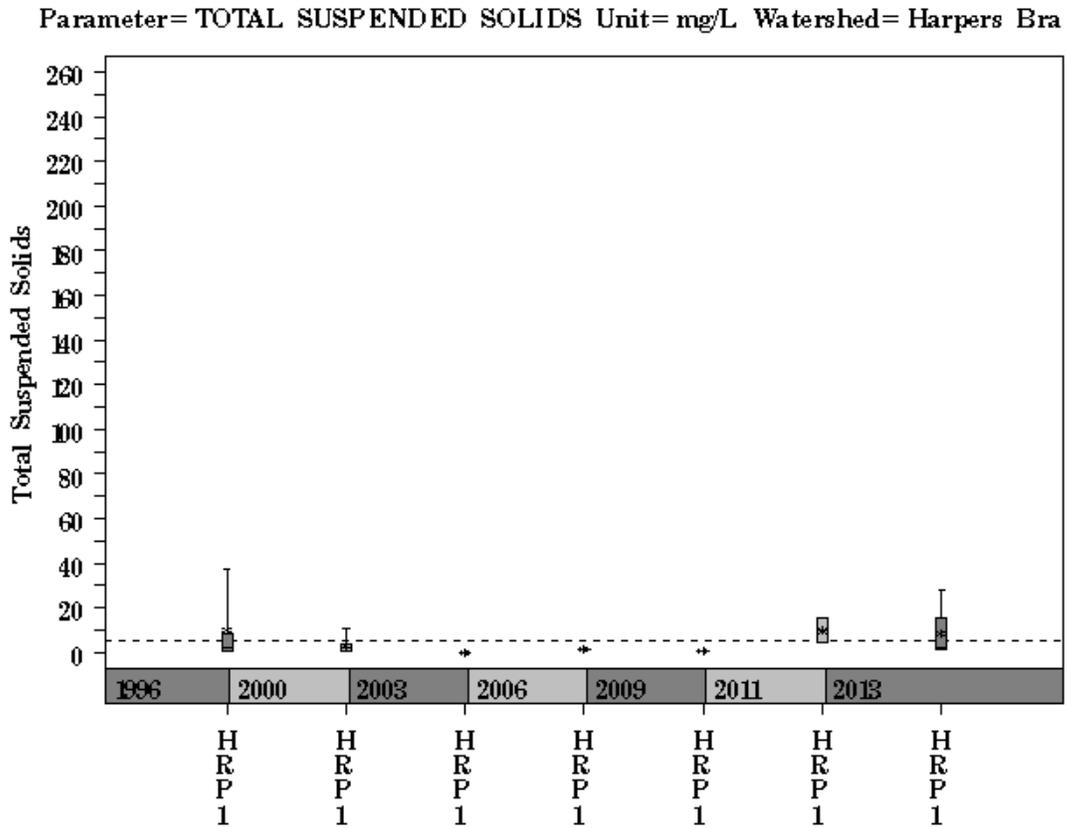
Site Name	Site #	Reach	Date	NH3-N		NO3/NO2		Ortho-P		T.S.S.		Turb.	
				<> Value	flag	<> Value	flag	<> Value	flag	<> Value	flag	<> Value	flag
Harpers Branch @ Woodland	844	HRP1	01/22/2013	J	0.020		0.82		0.022	<J	1.2		1.1
Harpers Branch @ Woodland	844	HRP1	04/24/2013	J	0.014	R	0.71		0.029		28.2		5.5 R
Harpers Branch @ Woodland	844	HRP1	06/26/2013		0.030		0.43		0.015		1.3		1.4
Harpers Branch @ Woodland	844	HRP1	09/26/2013	<J	0.008		1.13		0.007		3.2		7.9
Site 844 Mean					0.018		0.77		0.018		8.5		4.0
Watershed Mean					0.018		0.77		0.018		8.5		4.0

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

Harpers Branch Watershed

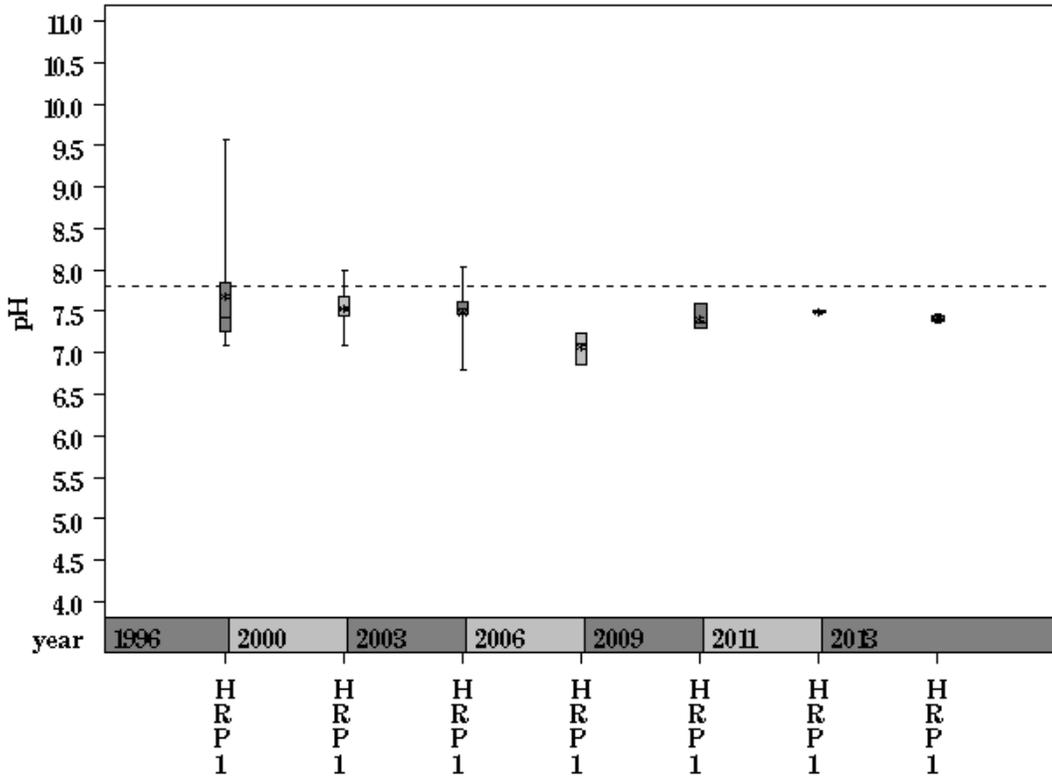
Data Summary Graphs – Total Suspended Solids and Turbidity (Downstream to Upstream by Year)



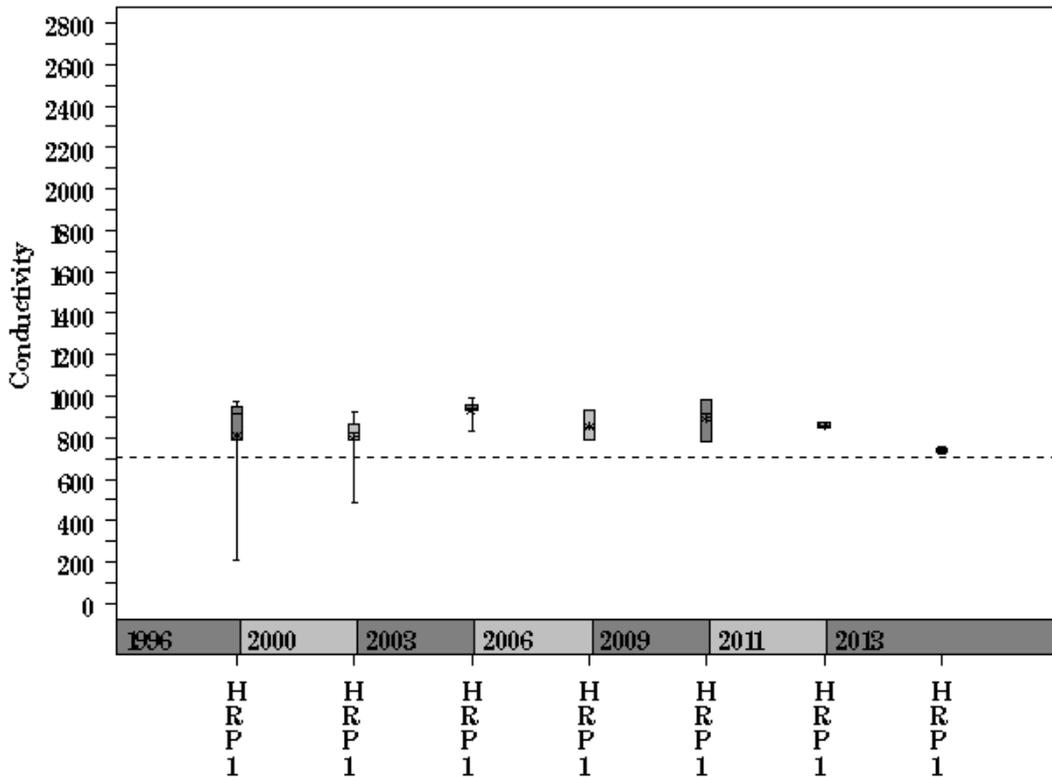
Harpers Branch Watershed

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

Parameter=PH Unit= Standard units Watershed= Harpers Branch



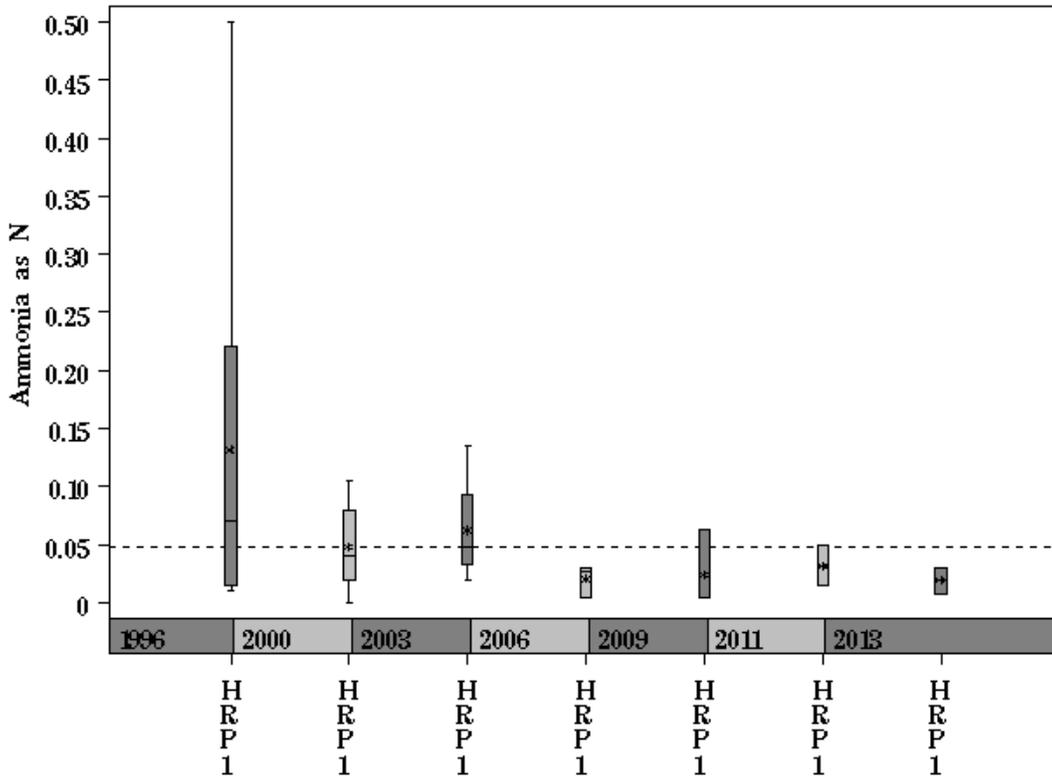
Parameter= CONDUCTIVITY Unit= uS/cm Watershed= Harpers Branch



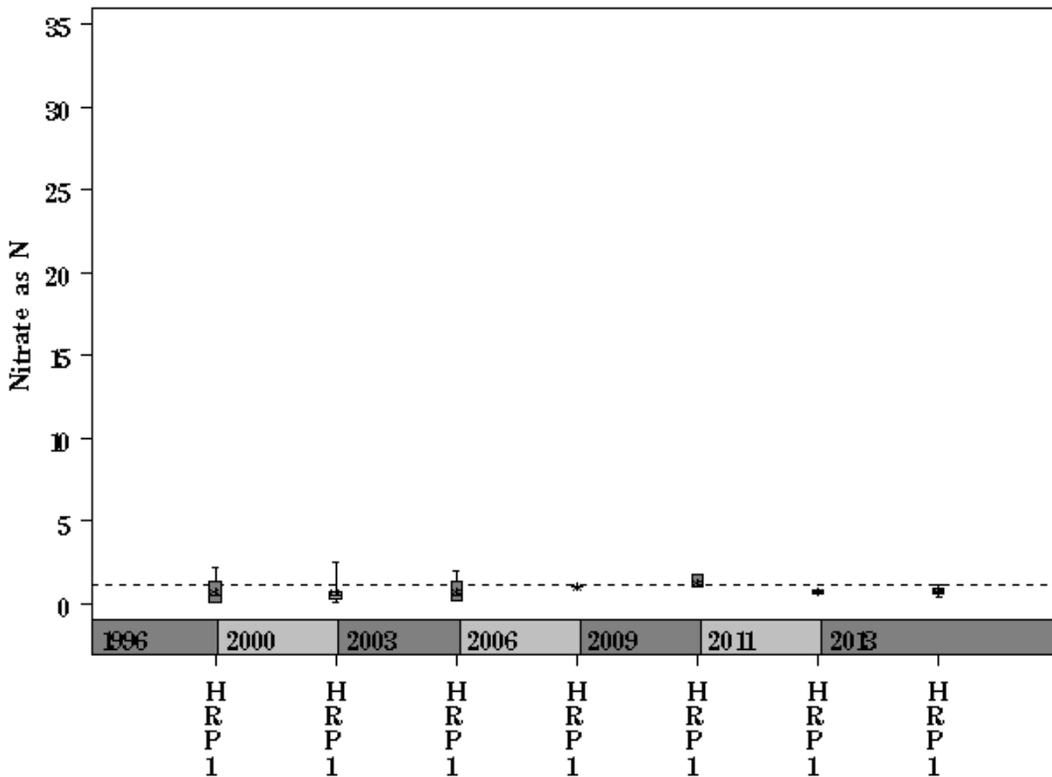
Harpers Branch Watershed

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

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

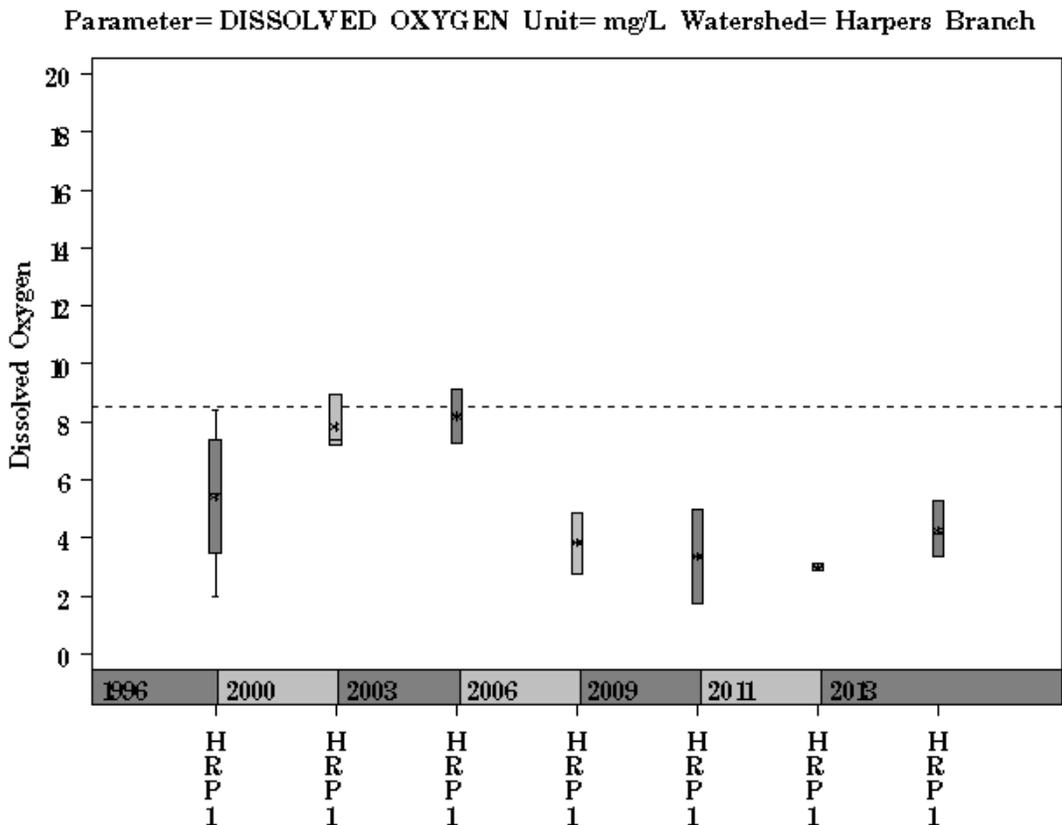
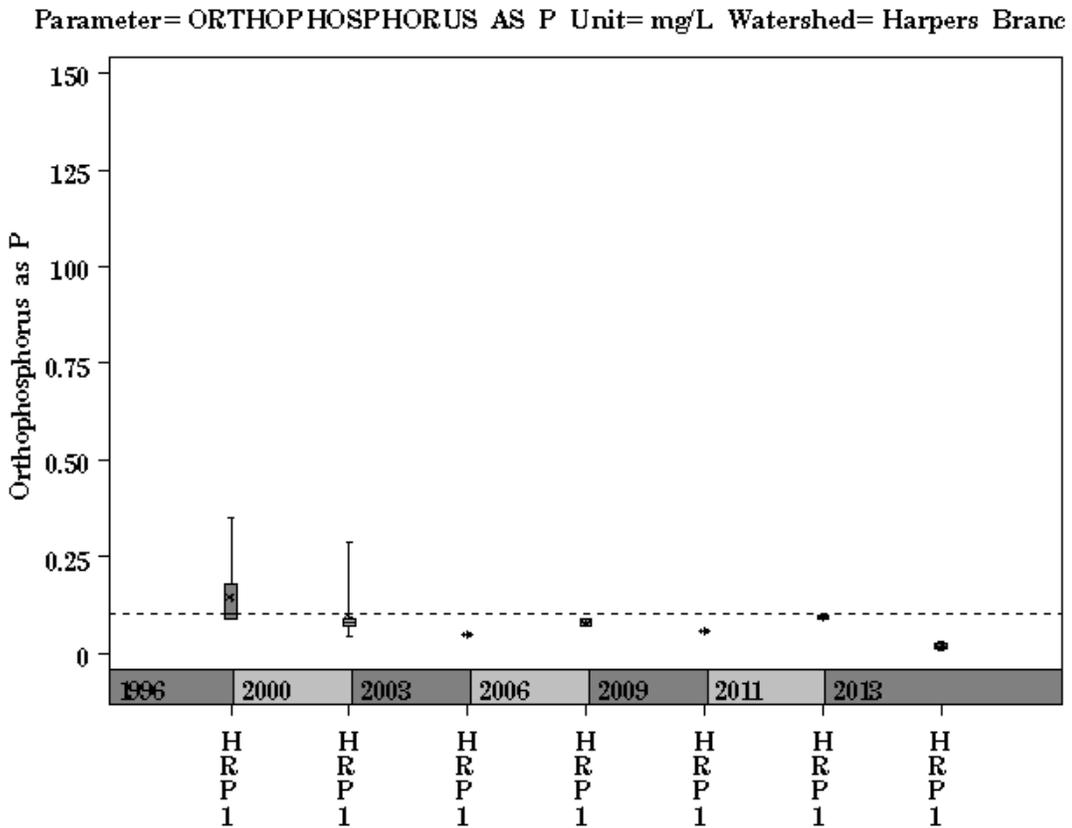


Parameter= NITRATE AS N Unit= mg/L Watershed= Harpers Branch



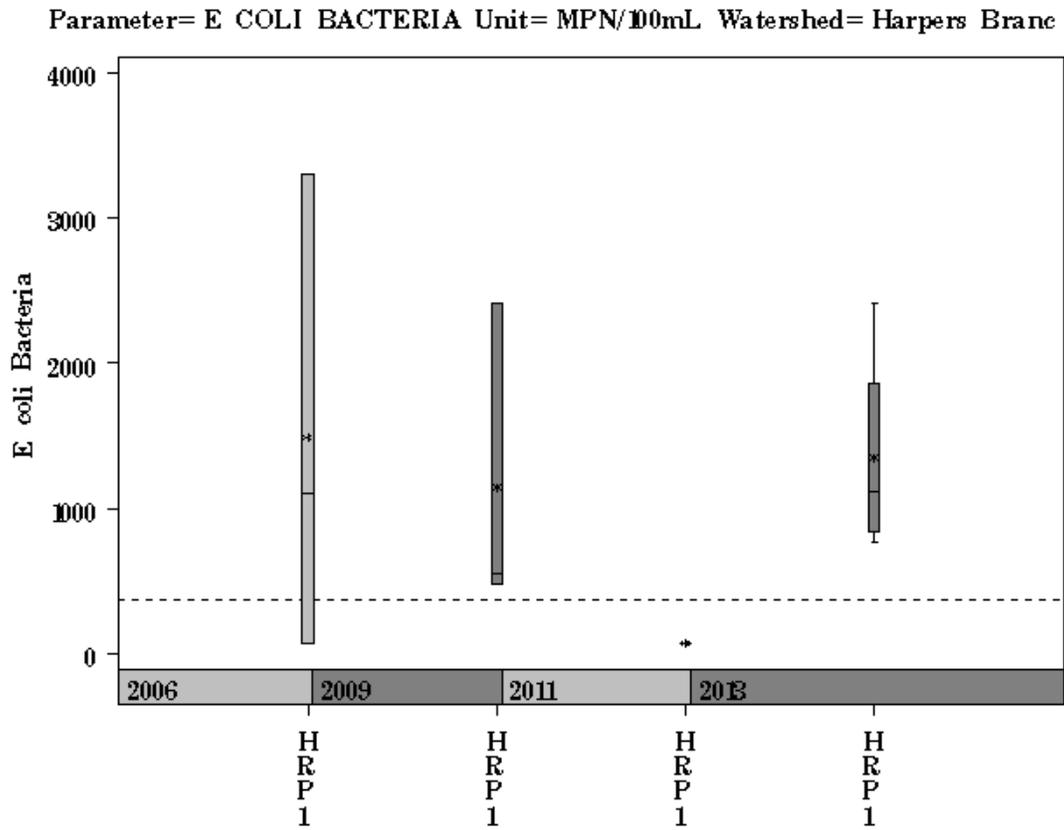
Harpers Branch Watershed

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



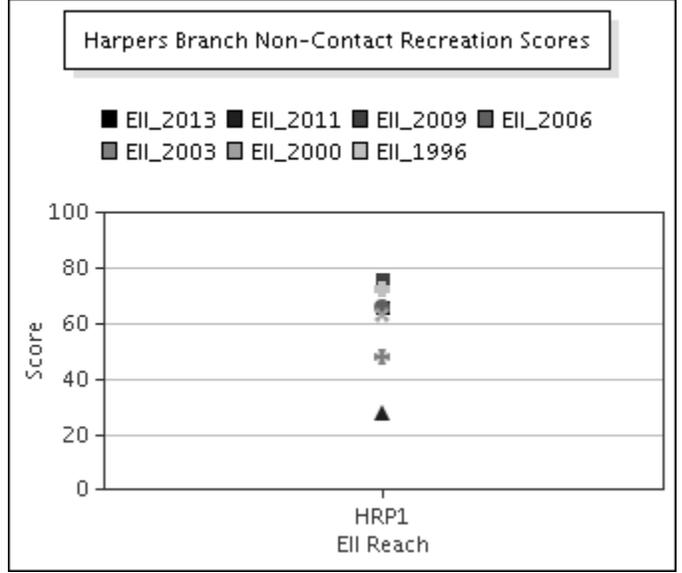
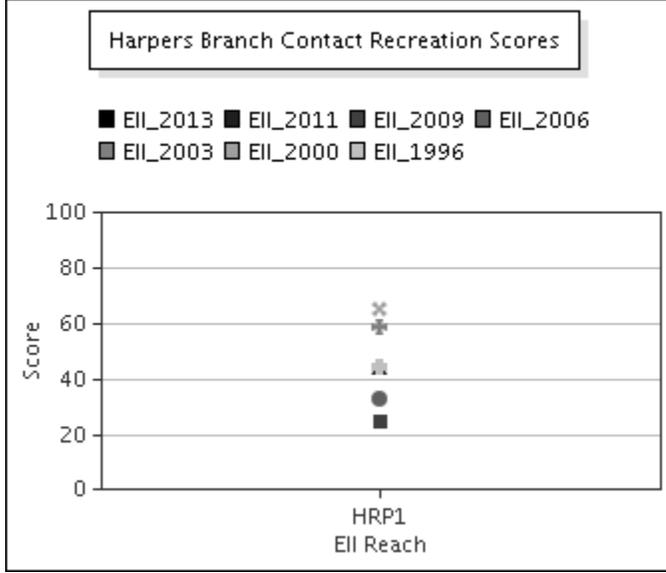
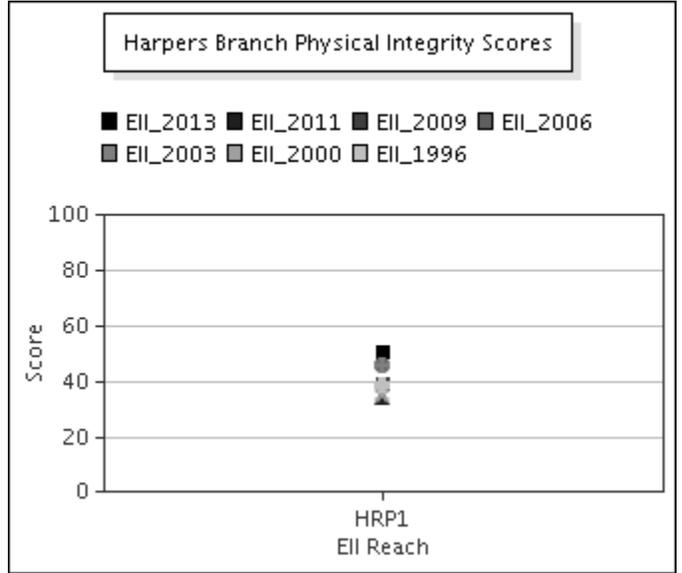
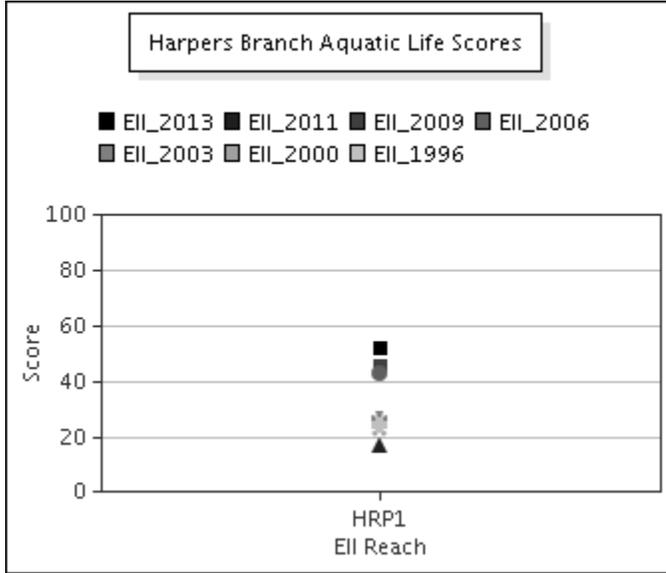
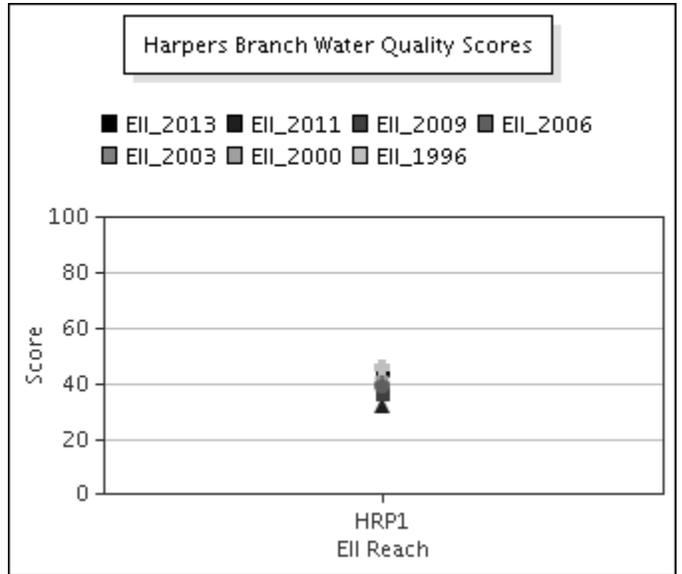
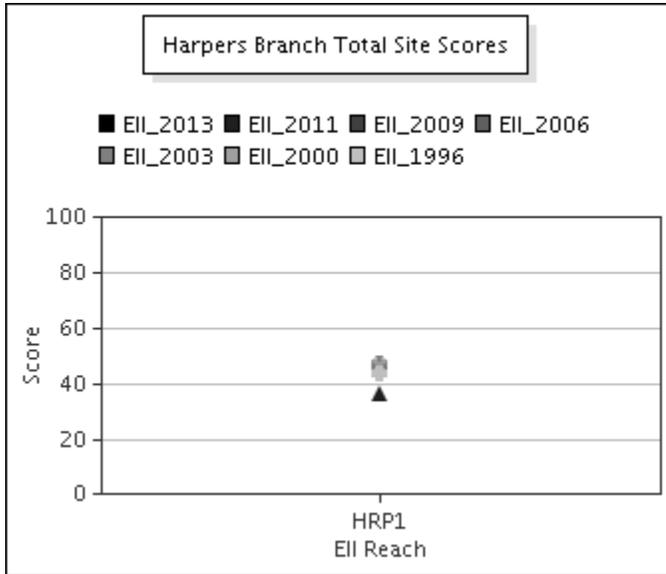
Harpers Branch Watershed

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



Harpers Branch Watershed

Score Summary – Reach scores for each sample year



Harpers Branch Watershed

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

Benthic Macroinvertebrate ID	PTI	FFG	Harpers Branch @ Woodland (Site 844)
<i>Fallceon quilleri</i>	4	SC,CG	12
<i>Argia</i> sp.	6	P	21
<i>Microvelia</i> sp.	6	P	1
Tanypodinae	6	P	4
<i>Ferrissia</i> sp.	7	SC	6
Oligochaeta	8	CG	6
<i>Tipula</i> sp.	8	SH,CG	1
<i>Physella</i> sp.	9	SC	1
<i>Dugesia</i> sp.		P,CG	27

Harpers Branch Watershed

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

Scoring Metric	Harpers Branch @ Woodland (Site 844)
Number of Taxa *	9
Hilsenhoff Biotic Index *	6.0
Number of Ephemeroptera Taxa *	1
Percent of Total as Chironomidae *	5
Number of EPT Taxa *	1
Percent of Total as EPT *	15
Percent of Total as Predator *	67
Number of Intolerant Taxa *	1
Percent Dominance (Top 3 Taxa) *	76
EPT / EPT + Chironomidae	1
Number of Diptera Taxa	2
Number of Non-Insect Taxa	4
Number of Organisms	79
Percent Dominance (Top 1 Taxa)	34
Percent of Total as Collector / Gatherer	58
Percent of Total as Dominant Guild (FFG)	67
Percent of Total as Elmidae	0
Percent of Total as Filterers	5
Percent of Total as Grazers (PI & SC)	24
Percent of Total as Tolerant Organisms	1
Percent of Trichoptera as Hydropsychidae	0
Ratio of Intolerant : Tolerant Organisms	0.30
TCEQ Qualitative Aquatic Life Use Score	18
TCEQ Quantitative Aquatic Life Use Score	23

* **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%.

Harpers Branch Watershed

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

Diatom Species Name	PTI	Harpers Branch @ Woodland (Site 844)
<i>Amphora inariensis</i>	4	31
<i>Amphora pediculus</i>	3	125
<i>Denticula kuetzingii</i>	3	2
<i>Gomphonema affine</i>	3	2
<i>Pinnularia gibba</i>	3	5
<i>Rhoicosphenia abbreviata</i>	3	158
<i>Tabularia fasciculata</i>	3	2
<i>Achnantheiopsis lanceolata</i>	2	15
<i>Cyclotella meneghiniana</i>	2	7
<i>Luticola goeppertiana</i>	2	1
<i>Navicula menisculus</i>	2	1
<i>Navicula recens</i>	2	1
<i>Nitzschia amphibia</i>	2	10
<i>Nitzschia inconspicua</i>	2	10
<i>Achnanthes rupestoides</i>		5
<i>Cocconeis placentula</i> var. <i>lineata</i>		6
<i>Eolimna minima</i>		119

Harpers Branch Watershed

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

Scoring Metric	Harpers Branch @ Woodland (Site 844)
<i>Cymbella</i> Richness	0
Number of organisms	500
Number of taxa	17
Percent motile taxa	5
Percent similarity to reference condition	17
Pollution tolerance index	2.96

* **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.

Harpers Branch Watershed

Site Photographs



844_t00-us-02_16_2001



844_t00-ds-02_16_2001



844_t00-ds-03_11_2003



844_t00-us-03_11_2003



844_t00-us-07_12_2006



844_t00-us1-07_12_2006

Harpers Branch Watershed

Site Photographs



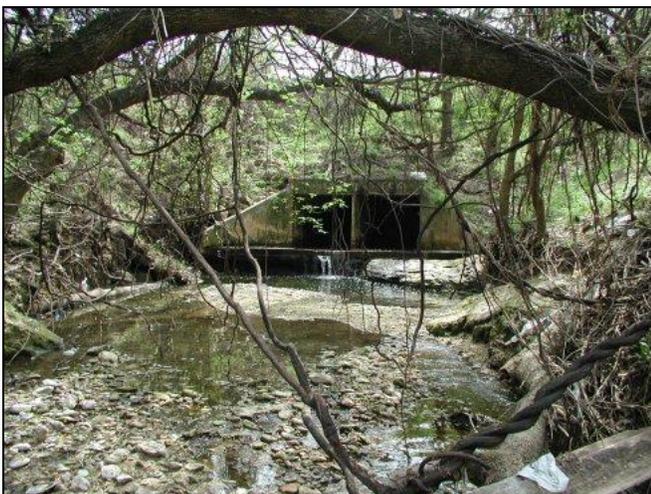
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844-t00-ds-05-29-2009



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