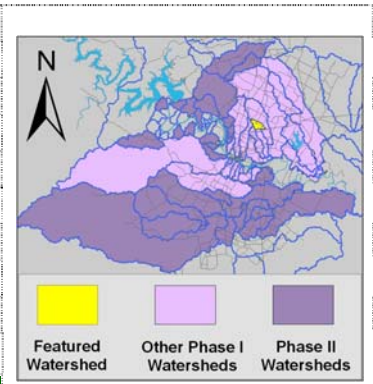


Buttermilk Branch Watershed

Watershed Overview

Catchment	Total area	2 square miles					
	Area in recharge	none					
	Creek length	2 miles					
	Receiving water	Little Walnut					
Demographics	2000 population	10,533					
	2030 projected population	11,661					
	30 year projected % increase	11 %					
Land Use	Impervious cover (2003 estimate)	49.6 %					
	Impervious cover (2013 estimate)	59.4 %					
Overall EII Scores	2000	2003	2006	2009	2011	2013	2015
	64	54	55	48	42	50	55



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

Site	2001		2003						2006					2009					2010	2011				2013					2015				
	Feb	Feb	Feb	Mar	Mar	May	Sep	Dec	Feb	May	Jul	Aug	Nov	Feb	May	Jun	Oct	Dec	Dec	Mar	Jun	Jun	Sep	Jan	Apr	May	Jun	Sep	Jan	Apr	Jul	Sep	
	WQ	Bio	WQ	WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	WQ	WQ	
852	B	B																															
3861									B	B	B	B	B	n	B	B	B	B	B	B	n	n	n	B	B	B	B	B	B	B	B	B	B
782	B	B	B	B	B	B	B	n	n	B	B	n	n	n	n	n	n	B	n	n	n	n	n	n	n	n	n	n	B	B	B	n	
783	B	B	B	B	B	B	B																										
851	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	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 Buttermilk Branch Sites by Year

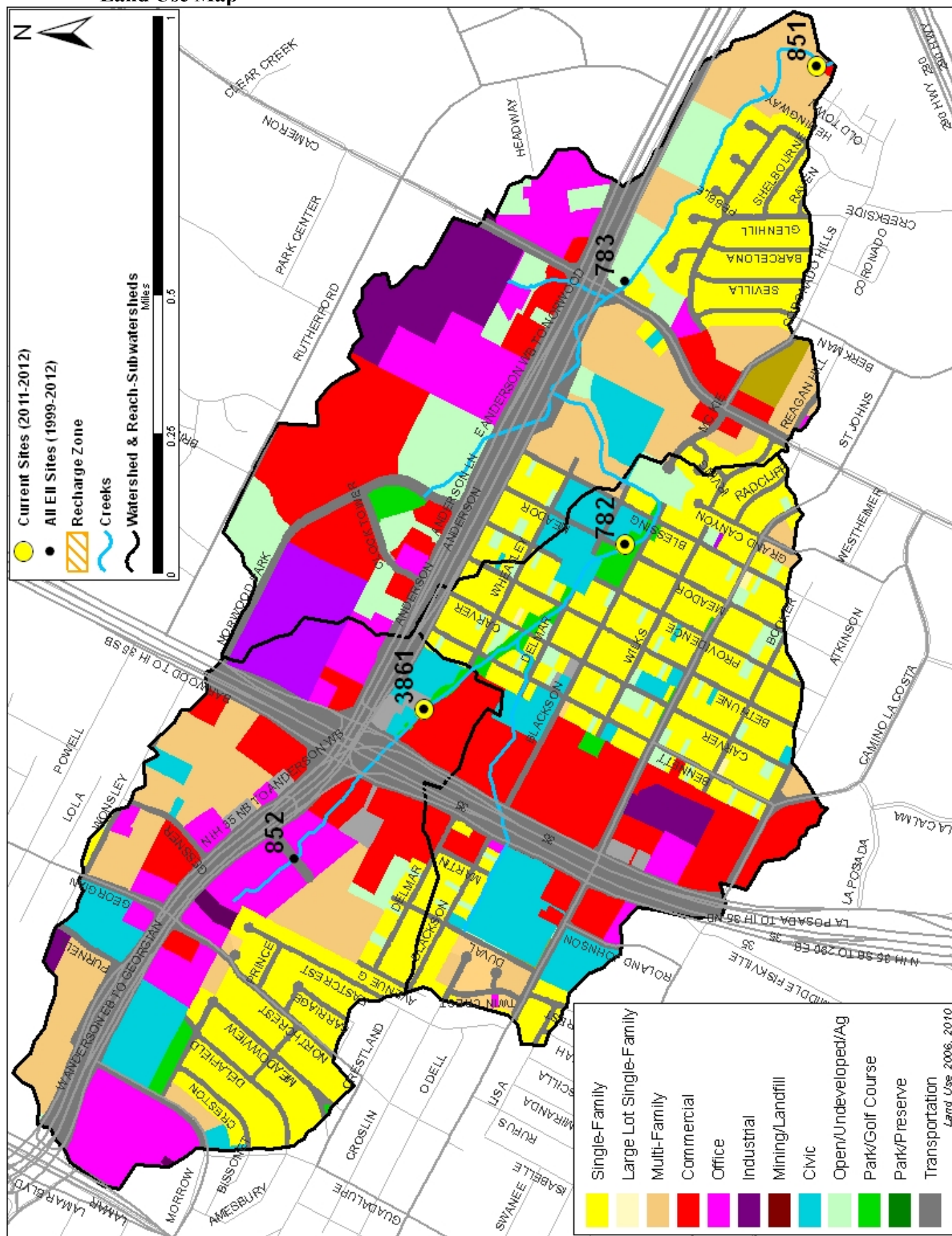
Reach	Site	Site Name	Year	Water Quality	Sediment**	Contact Recreation	Non-Contact Rec.	Physical Integrity	Aquatic Life	Benthic subindex	Diatom subindex	Total EII Score
BMK1	783	Buttermilk Creek @ Cameron Road	2000	60	91	79	69	36	51	53	48	64
BMK1	851	Buttermilk Creek @ Little Walnut Cr	2000	67	91	78	78	41	68	84	51	71
BMK2	782	Buttermilk Creek @ Providence Ave	2000	56	91	76	72	31	20	35	4	58
BMK3	852	Buttermilk Creek @ Chevy Chase Rd	2000		91		83	31	29	35	23	59
BMK1	783	Buttermilk Creek @ Cameron Road	2003	47	70	65	54	51	55	31	78	57
BMK1	851	Buttermilk Creek @ Little Walnut Cr	2003	61	70	33	58	42	48		48	52
BMK2	782	Buttermilk Creek @ Providence Ave	2003	53	70	58	60	40	29	24	33	52
BMK1	851	Buttermilk Creek @ Little Walnut Creek	2006	60	70	31	77	53	75	69	80	61
BMK2	782	Buttermilk Creek @ Providence Ave	2006	51	70	34	78	46	56	52	59	56
BMK3	3861	Buttermilk Creek @ Victory Christian Ctr.	2006	37	70	25	71	53	36	22	49	49
BMK1	851	Buttermilk Creek @ Little Walnut Creek	2009	71	61	27	57	39	92	99	84	58
BMK2	782	Buttermilk Creek @ Providence Ave	2009	56	61	25	47	37				38
BMK3	3861	Buttermilk Creek @ Victory Christian Ctr.	2009	50	61	25	63	42	53	28	77	49
BMK1	851	Buttermilk Creek @ Little Walnut Cr	2011	67	68	35	43	31	69	70	67	52
BMK2	782	Buttermilk Creek @ Providence Ave	2011		68		43	33				36
BMK3	3861	Buttermilk Creek @ Victory Christian Ctr.	2011	51	68	28	32	31				35
BMK1	851	Buttermilk Creek @ Little Walnut Creek	2013	63	66	27	75	43	88	88	87	60
BMK2	782	Buttermilk Creek @ Providence Ave	2013		66		40	46				38
BMK3	3861	Buttermilk Creek @ Victory Christian Ctr.	2013	48	66	25	61	52	42	45	39	49
BMK1	851	Buttermilk Creek @ Little Walnut Creek	2015	54	69	32	78	47	74	77	70	59
BMK2	782	Buttermilk Creek @ Providence Ave	2015	48	69	25	73	49	71	63	78	56
BMK3	3861	Buttermilk Creek @ Victory Christian Ctr.	2015	46	69	25	64	48	56	75	37	51

* 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

Land Use Map



Buttermilk Branch Watershed

Aerial Map



Buttermilk Branch Watershed

Water Quality Data – Temperature, Conductivity, pH, Dissolved Oxygen & *E. coli* for 2015 Sample Sites (Downstream to Upstream)

Qualifiers to the left of the value	>	Greater than	Qualifiers to the right of the value	(blank)	Useable
	<	Less than		S	Exceeds standard range
	<J	Less than detected limit		R	Rejected, failed QC
	J	Estimated			

Watershed	Site	E.I.I. Reach	Date	Temp.	Cond.	pH	D.O.	E. Coli
				flag	flag	flag	flag	flag
Buttermilk	851	BMK1	01/14/2015	8.5	634	8.35	12.6	129.6
Buttermilk	851	BMK1	04/15/2015	21.4	656	8.19	11.3	365.4
Buttermilk	851	BMK1	07/10/2015	27.3	743	8.08	10.3	
Buttermilk	851	BMK1	07/14/2015	26.3	747	8.07	9.8	1986.3
Buttermilk	851	BMK1	09/09/2015	26.6	673	8.07	7.8	920.8
BMK1 Mean				22.0	691	8.15	10.4	850.5
Buttermilk	782	BMK2	01/14/2015	10.1	160	7.61	10.6	2419.6
Buttermilk	782	BMK2	04/15/2015	21.8	809	7.45	10.2	816.4
Buttermilk	782	BMK2	07/10/2015	27.4	871	7.53	10.4	
Buttermilk	782	BMK2	07/14/2015	27.7	887	7.45	9.1	770.1
BMK2 Mean				21.8	682	7.51	10.1	1335.4
Buttermilk	3861	BMK3	01/14/2015	14.9	822	7.03	5.8	2419.6
Buttermilk	3861	BMK3	04/15/2015	20.0	846	7.08	3.4	1986.3
Buttermilk	3861	BMK3	07/10/2015	23.9	848	7.26	5.0	
Buttermilk	3861	BMK3	07/14/2015	24.0	842	7.24	4.4	2419.6
Buttermilk	3861	BMK3	09/09/2015	24.0	855	7.00	1.9	1046.2
BMK3 Mean				21.4	842	7.12	4.1	1967.9
Buttermilk Branch Mean				21.7	742	7.60	8.0	1389.1

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

Summary Statistics for all 2015-2016 E.I.I. Sites Combined					
Parameter	2015-2016 Average	2015-2016 Minimum	2015-2016 Maximum	1 Standard Deviation Above	1 Standard Deviation Below
Temperature (C°)	20.7	5.8	34.2	27.5	
Conductivity (uS/cm)	722	160	3549	955	
pH (Standard units)	7.86	5.85	10.25	8.24	7.47
D.O. (mg/l)	7.9	0.1	18.7	10.4	5.5
<i>E. Coli</i> (col/100ml)	316.1	1.0	2420.0	883.7	

Buttermilk Branch Watershed

Water Quality Data – Ammonia, Nitrate / Nitrite, Ortho-Phosphorus, Total Suspended Solids & Turbidity for 2015 Sample Sites (Downstream to Upstream)

Qualifiers to the left of the value	>	Greater than	Qualifiers to the right of the value	(blank)	Useable
	<	Less than		S	Exceeds standard range
	<J	Less than detected limit		R	Rejected, failed QC
	J	Estimated			

Watershed	Site	EII Reach	Date	NH3-N	NO3/NO2	Ortho-P	T.S.S	Turb.
				flag	flag	flag	flag	flag
Buttermilk	851	BMK1	01/14/2015	<J 0.008	1.50	<J 0.004	<J 1.0	1.8 R
Buttermilk	851	BMK1	04/15/2015	<J 0.008	2.81	<J 0.004	<J 1.1	1.8
Buttermilk	851	BMK1	07/10/2015					
Buttermilk	851	BMK1	07/14/2015	<J 0.008	6.72	<J 0.004	<J 1.1	1.1 R
Buttermilk	851	BMK1	09/09/2015	0.020	4.35	<J 0.004	2.0	3.5 R
BMK1 Mean				0.011	3.84	0.004	1.3	2.1
Buttermilk	782	BMK2	01/14/2015	<J 0.008	3.09	<J 0.004	<J 1.0	4.3 R
Buttermilk	782	BMK2	04/15/2015	<J 0.008	4.17	<J 0.004	9.9	5.0
Buttermilk	782	BMK2	07/10/2015					
Buttermilk	782	BMK2	07/14/2015	0.020	8.34	<J 0.004	2.1	2.8 R
BMK2 Mean				0.012	5.20	0.004	4.3	4.0
Buttermilk	3861	BMK3	01/14/2015	<J 0.008	4.46	<J 0.004	<J 1.0	1.2 R
Buttermilk	3861	BMK3	04/15/2015	0.039	4.98	0.020	1.2	1.7
Buttermilk	3861	BMK3	07/10/2015					
Buttermilk	3861	BMK3	07/14/2015	<J 0.008	7.47	<J 0.004	<J 1.0	1.1 R
Buttermilk	3861	BMK3	09/09/2015	<J 0.008	6.06	<J 0.004	<J 1.0	3.1 R
BMK3 Mean				0.016	5.74	0.008	1.0	1.8
Buttermilk Branch Mean				0.013	4.90	0.005	2.0	2.5

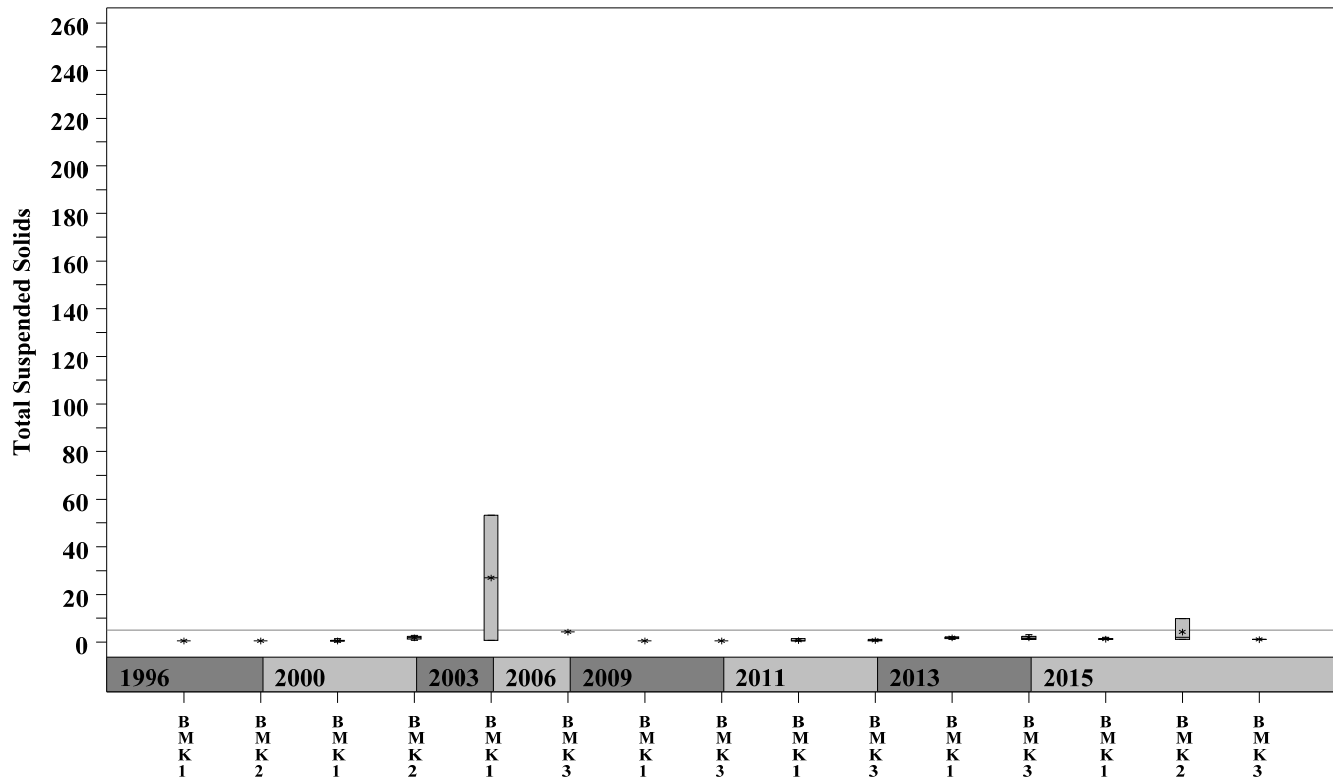
Gray highlighting indicates that the value exceeds one standard deviation from the mean of all E.I.I. sites combined.

Summary Statistics for all 2015-2016 E.I.I. Sites Combined				
Parameter	2015-2016 Average	2015-2016 Minimum	2015-2016 Maximum	1 Standard Deviation Above
NH3-N (mg/l)	0.018	0.008	0.881	0.085
NO3-N (mg/l)	1.14	0.01	12.0	3.16
Ortho-P (mg/l)	0.016	0.004	0.661	0.08
T.S.S. (mg/l)	3.7	1.0	58.2	9.7
Turbidity (NTU)	4.4	0.2	98.6	11.7

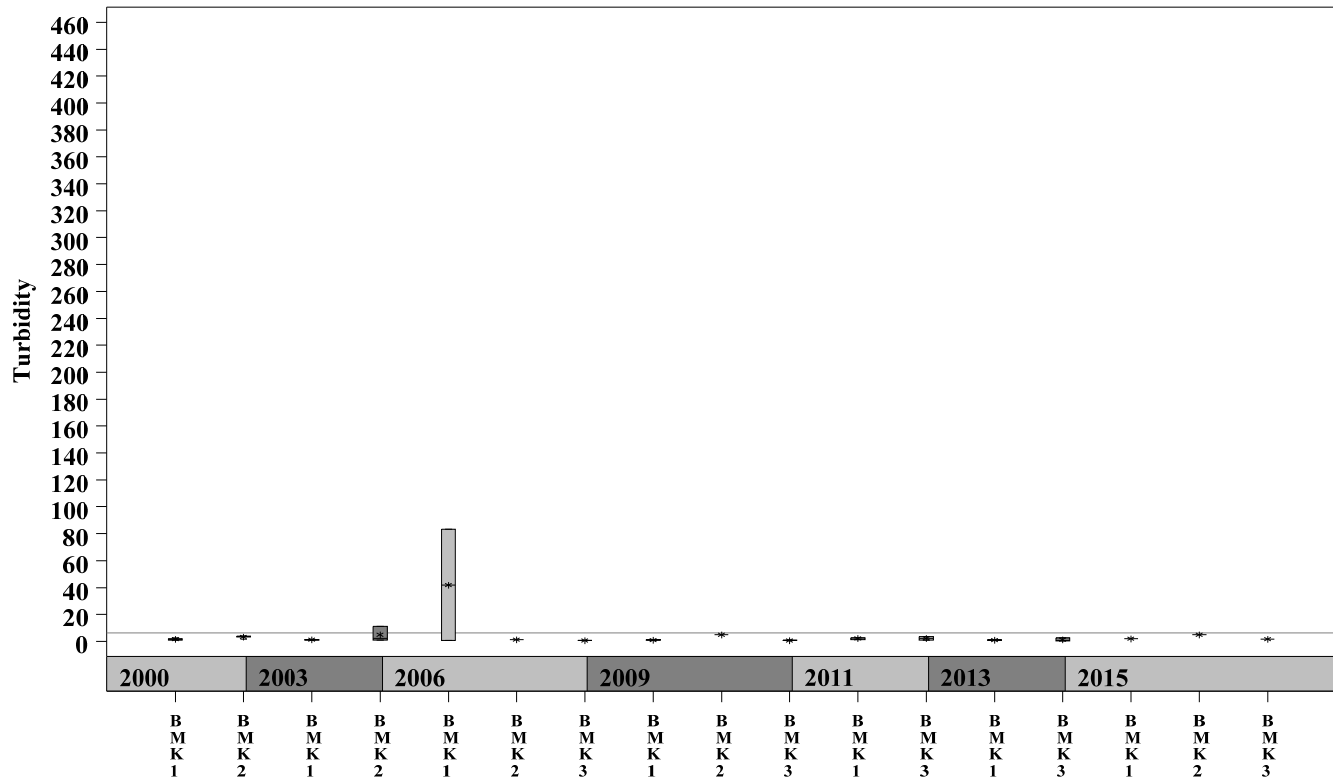
Buttermilk Branch Watershed

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

Parameter = TOTAL SUSPENDED SOLIDS Unit = mg/L Watershed = Buttermilk Branch



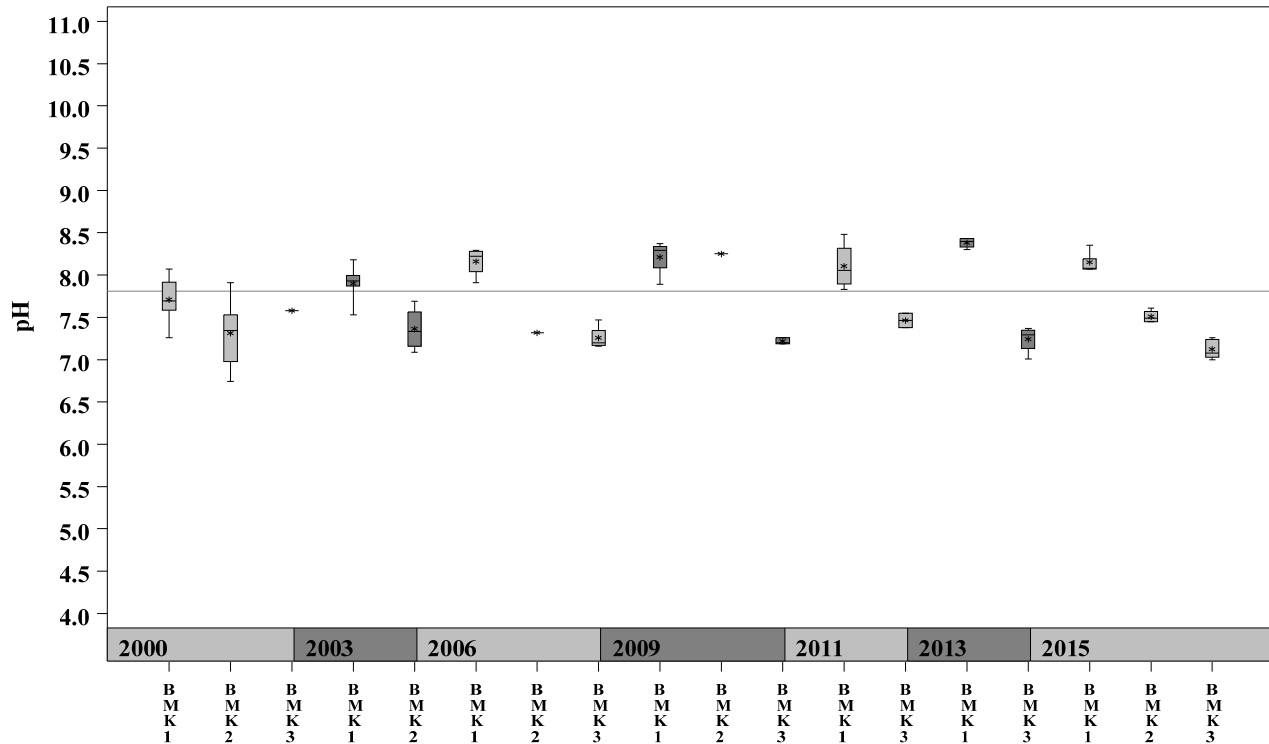
Parameter = TURBIDITY Unit = NTU Watershed = Buttermilk Branch



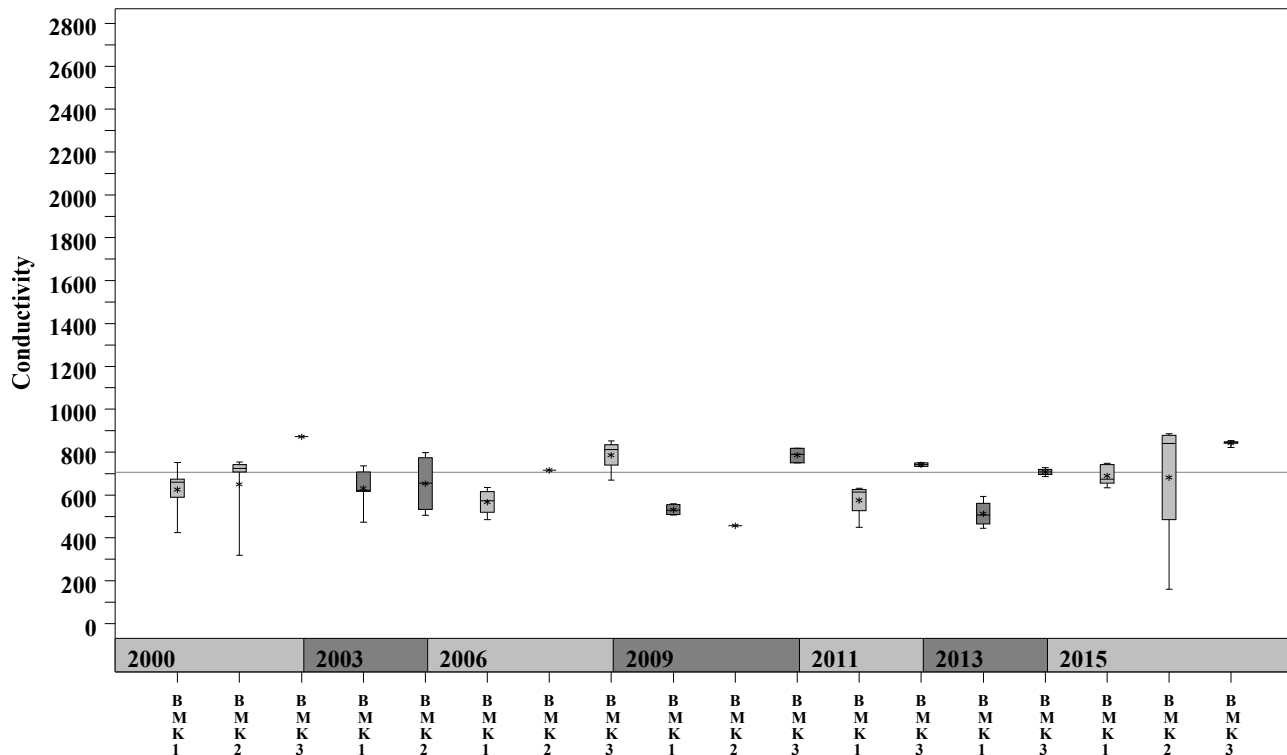
Buttermilk Branch Watershed

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

Parameter = pH Unit = Standard Units Watershed = Buttermilk Branch



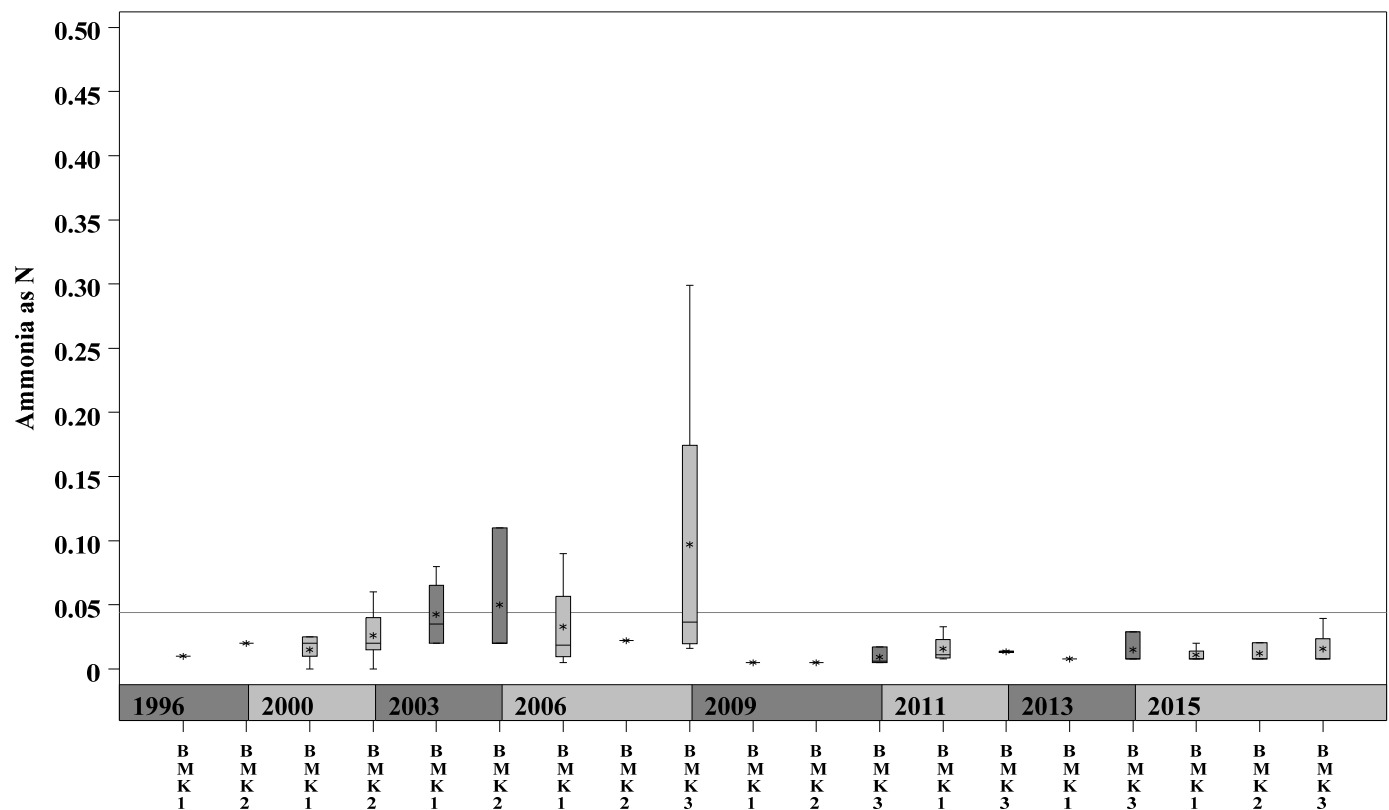
Parameter = CONDUCTIVITY Unit = uS/cm Watershed = Buttermilk Branch



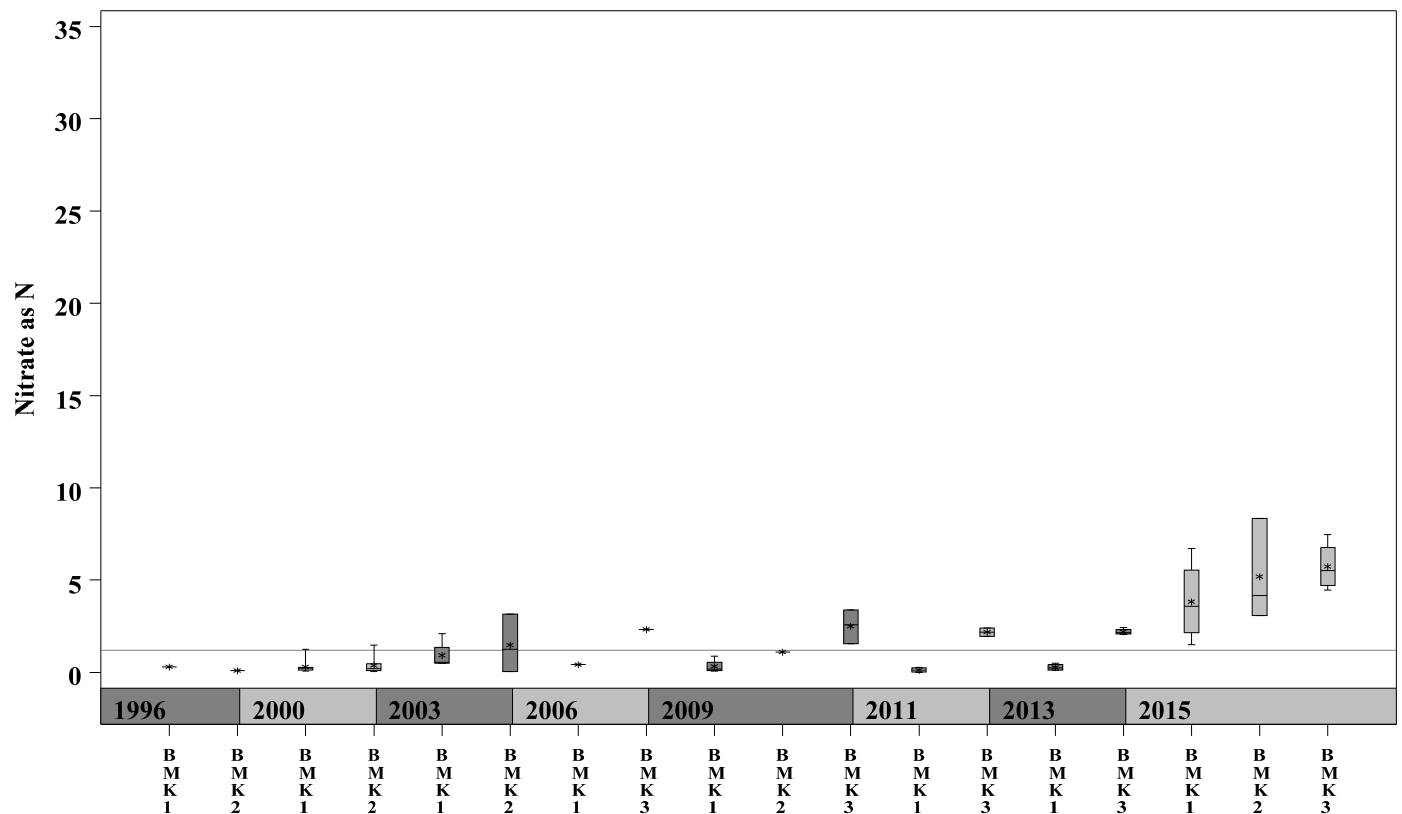
Buttermilk Branch Watershed

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

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



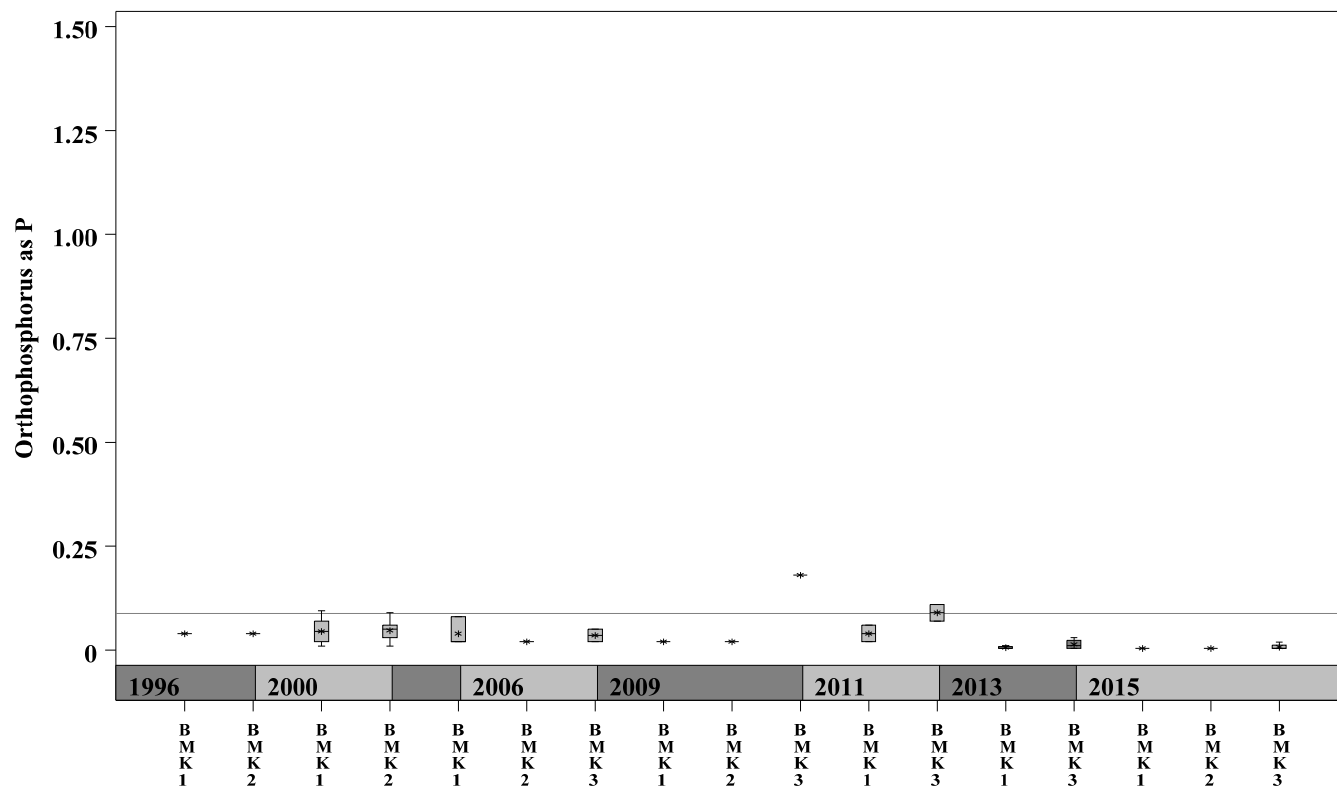
Parameter=NITRATE AS N Unit=mg/L Watershed=Buttermilk Branch



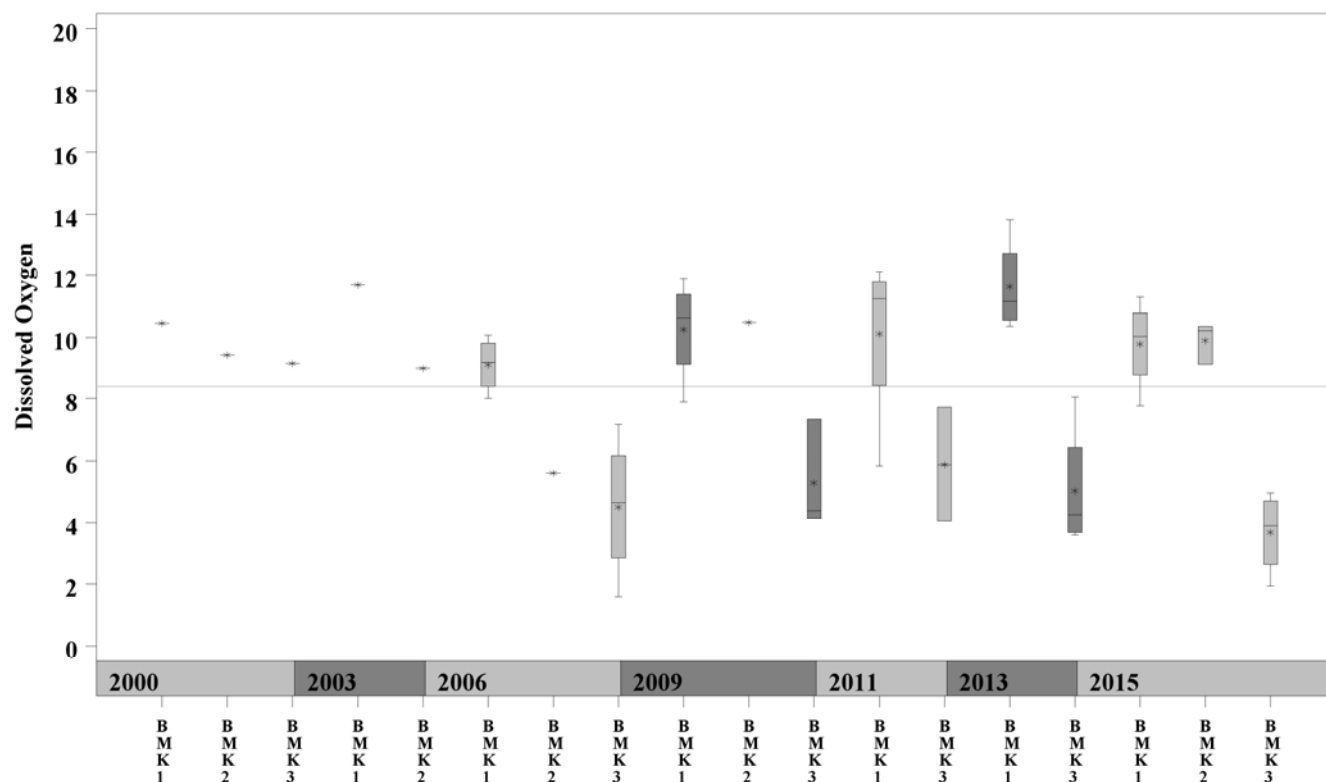
Buttermilk Branch Watershed

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

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

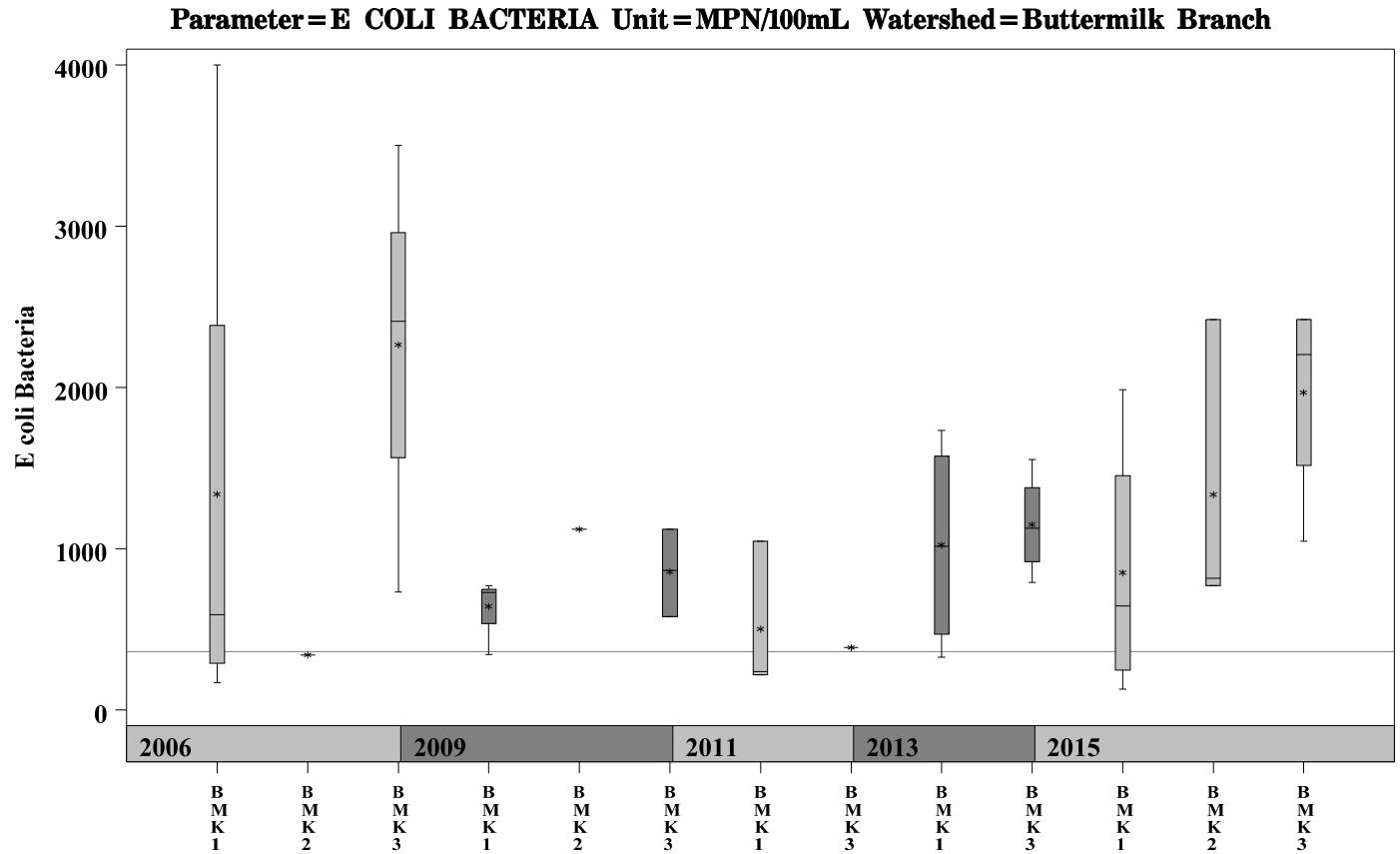


Parameter = DISSOLVED OXYGEN Unit = mg/L Watershed = Buttermilk Branch



Buttermilk Branch Watershed

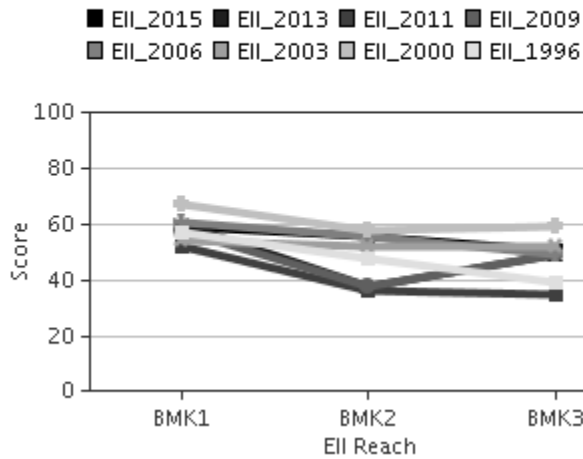
Data Summary Graphs – *E.coli* (Downstream to Upstream by Year)



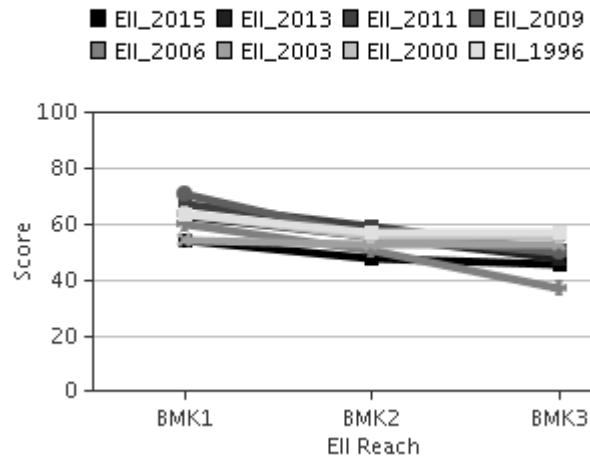
Buttermilk Branch Watershed

Score Summary – Reach scores for each sample year

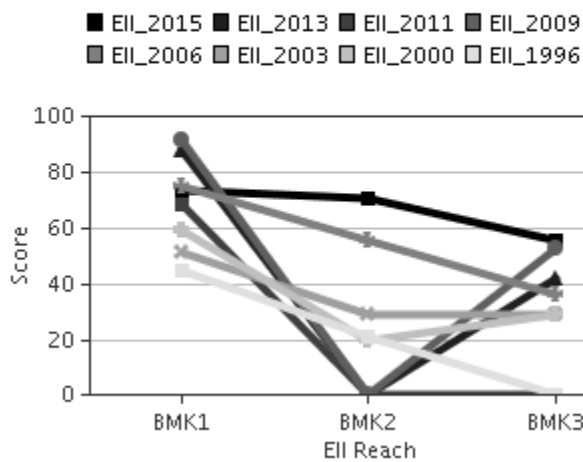
Buttermilk Branch Total Site Scores



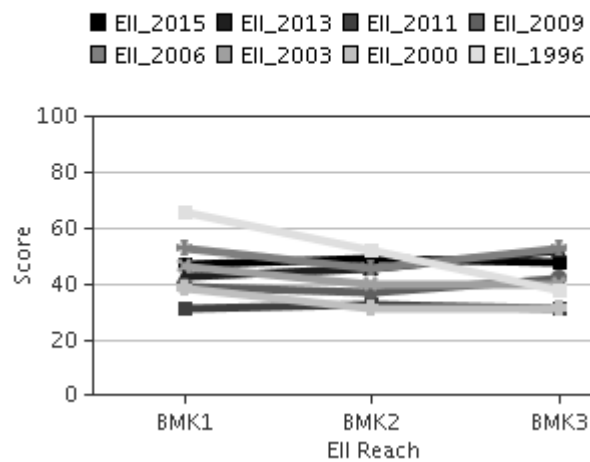
Buttermilk Branch Water Quality Scores



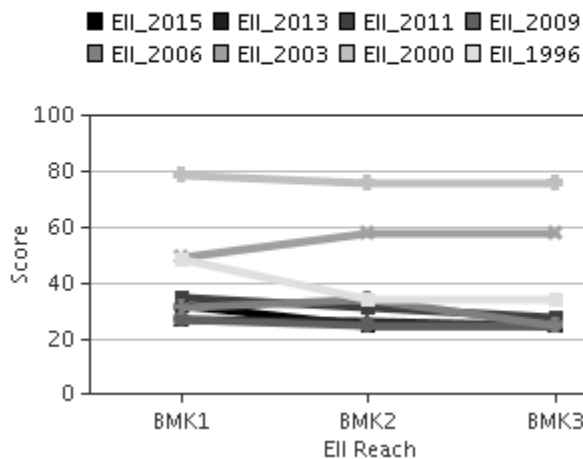
Buttermilk Branch Aquatic Life Scores



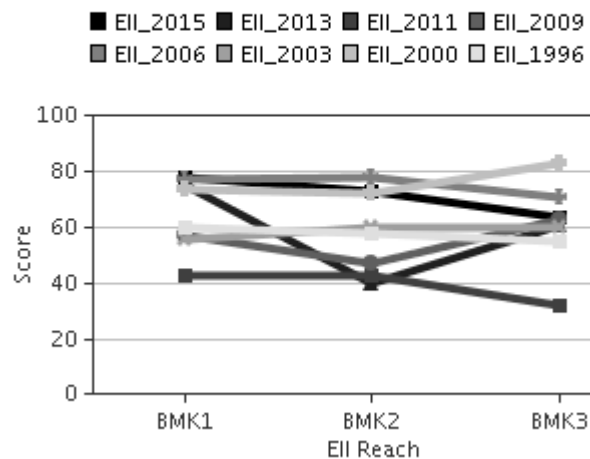
Buttermilk Branch Physical Integrity Scores



Buttermilk Branch Contact Recreation Scores



Buttermilk Branch Non-Contact Recreation Scores



Buttermilk Branch Watershed

Benthic Macroinvertebrates – Taxa List, Pollution Tolerance Index & Functional Feeding Group for 2015 Sample Sites (Downstream to Upstream)

Benthic Macroinvertebrates - Buttermilk Branch			BMK @ VCC (3861) 07/10/2015 (WRE)	BMK @ Providence (782) 07/10/2015 (WRE)	BMK @ LWA (851) 07/10/2015 (WRE)
Benthic Macroinvertebrate ID	PTI	FFG			
Chimarra	2	FC	2		3
Farrodes Texanus	2	CG,SC			1
Helicopsyche	2	SC			2
Callibaetis	4	CG		4	1
Camelobaetidius	4	CG	49		39
Dolichopodidae	4	P			2
Fallceon	4	CG,SC	292	44	41
Ostracoda	4	CG,FC			10
Simulium	4	FC	1		7
Petrophila (Moth)	5	SC		2	
Tricorythodes	5	CG		1	
Uvarus	5	P		2	
Argia	6	P	14	19	22
Cheumatopsyche	6	FC	16		2
Chironomidae	6	FC,P	55	62	84
Ephydriidae	6	P			2
Hetaerina	6	P			10
Tanypodinae	6	P	12	29	124
Caenis	7	CG,SC		1	
Ferrissia	7	SC	1	1	
Stenelmis	7	CG,SC			2
Caloparyphus/Euparyphus	8	CG,SC			1
Hirudinea	8	P	17	2	1
Oligochaeta	8	CG	1		2
Tipula	8	CG,SH		1	1
Berosus	9	CG		4	
Copelatus	9	P		1	
Physella	9	SC	88	11	
Belostoma	10	P	1	1	
Laccophilus	10	P		3	
Dugesia		CG,P			5
Pantala		P		2	

Buttermilk Branch Watershed

Site Photographs



782_t00-ds-02_16_2001



782_t00-us-07_05_2006



782_t00-ds-07_05_2006



782-t00-dr-06-03-2009



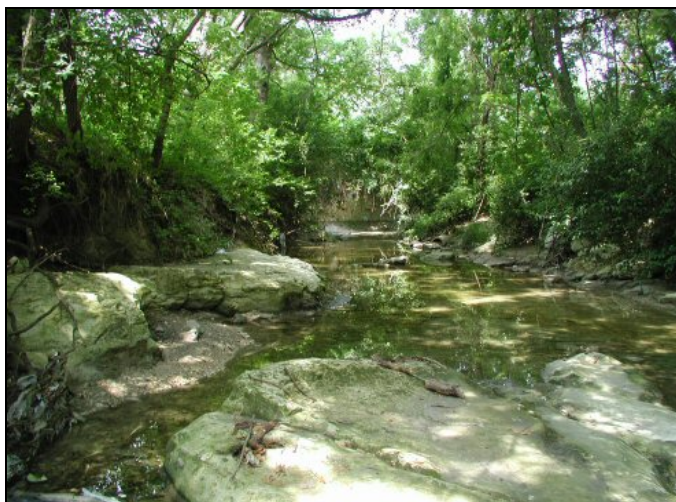
783_t00-ds-02_19_2003



783_t00-us-02_19_2003

Buttermilk Creek Watershed

Site Photographs



851_t00-us-05_14_2003



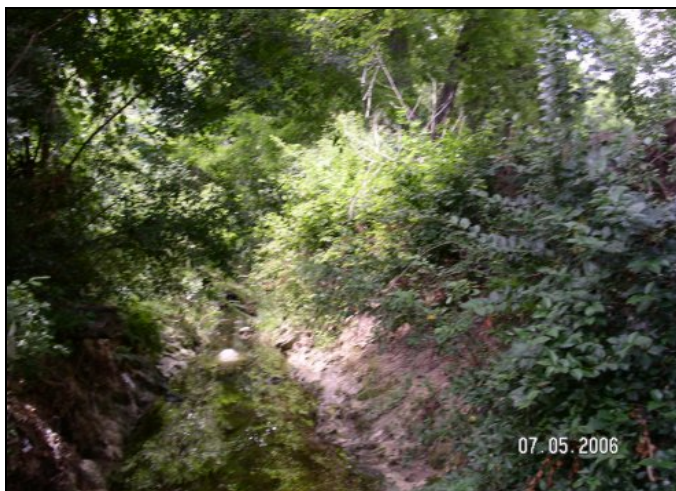
851-t00-ds-06-02-2009



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852_t00-ds-02_15_2001



3861_t00-ds-07_05_2006



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