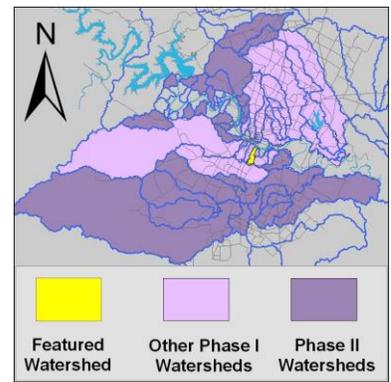


Blunn Creek Watershed

Summary Sheet

Catchment	Total area	1 square mile				
	Area in recharge	none				
	Creek length	3 miles				
	Receiving water	Town Lake				
Demographics	2000 population	6,000				
	2030 projected population	6,810				
	30 year projected % increase	14 %				
Land Use	Impervious cover (2003 estimate)	38.5 %				
	Impervious cover (2013 estimate)	48.1 %				
Overall EII Scores	2000	2003	2006	2009	2011	2013
	57	61	61	59	56	63



Flow Regime* for Sample Sites on Blunn Creek

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	Jun	Oct	Dec	Dec	Mar	Jun	Jun	Sep	Jan	Apr	May	Jun	Sep
		WQ	Bio	WQ	WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	Bio	WQ
362	Long Bow	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	n	B	B	B	B	B
363	Willow Run	B	B																										
364	upstream of Big Stacy Pool	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	n	n	n	B	B	B	B
180	Riverside Dr	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	n	n	n	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 Blunn Creek 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
BLU1	180	Blunn Creek @ Riverside Drive	2000	49	69	45	66	40	31	31	31	50
BLU2	364	Blunn Creek Upstream of Big Stacy	2000	51	69	80	68	41	55	35	74	61
BLU3	362	Blunn Creek @ Long Bow	2000	47	69	78	73	47	44	29	58	60
BLU3	363	Blunn Creek @ Willow Run	2000	49	69	90	49	28	48	38	58	56
BLU1	180	Blunn Creek @ Riverside Drive	2003	47	71	73	63	67	37	44	50	60
BLU2	364	Blunn Creek Upstream of Big Stacy	2003	51	71	48	72	47	40	43	37	55
BLU3	362	Blunn Creek @ Long Bow	2003	49	71	66	86	85	46	54	37	67
BLU1	180	Blunn Creek @ Riverside Drive	2006	47	67	44	79	51	60	45	74	58
BLU2	364	Blunn Creek Upstream of Big Stacy	2006	52	67	35	73	72	57	44	70	59
BLU3	362	Blunn Creek @ Long Bow	2006	55	67	39	94	79	70	53	87	67
BLU1	180	Blunn Creek @ Riverside Drive	2009	58	63	37	63	50	45	24	66	53
BLU2	364	Blunn Creek Upstream of Big Stacy	2009	53	63	31	81	43	69	53	85	57
BLU3	362	Blunn Creek @ Long Bow	2009	59	63	33	88	75	78	60	95	66
BLU1	180	Blunn Creek @ Riverside Drive	2011	61	72	68	50	57	40	31	48	58
BLU2	364	Blunn Creek Upstream of Big Stacy	2011	62	72	36	53	61	20	20		51
BLU3	362	Blunn Creek @ Long Bow	2011	50	72	36	80	66	52	37	67	64
BLU1	180	Blunn Creek @ Riverside Drive	2013	49	69	25	85	67	67	63	70	60
BLU2	364	Blunn Creek Upstream of Big Stacy	2013	50	69	25	83	65	64	44	83	59
BLU3	362	Blunn Creek @ Long Bow	2013	56	69	31	97	83	79	62	95	69

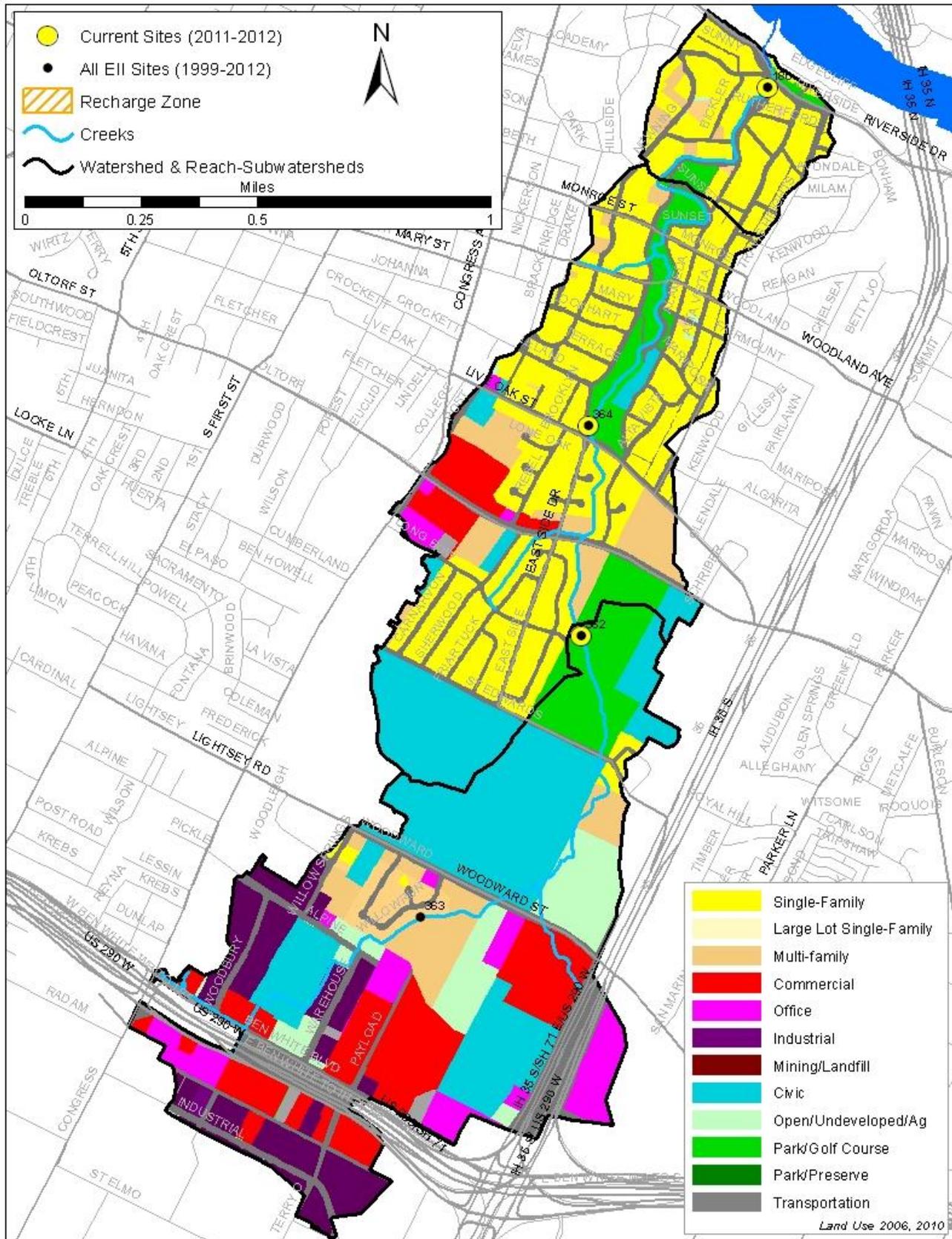
* blank cells indicate parameter was not collected, blank row indicate site was dropped

**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

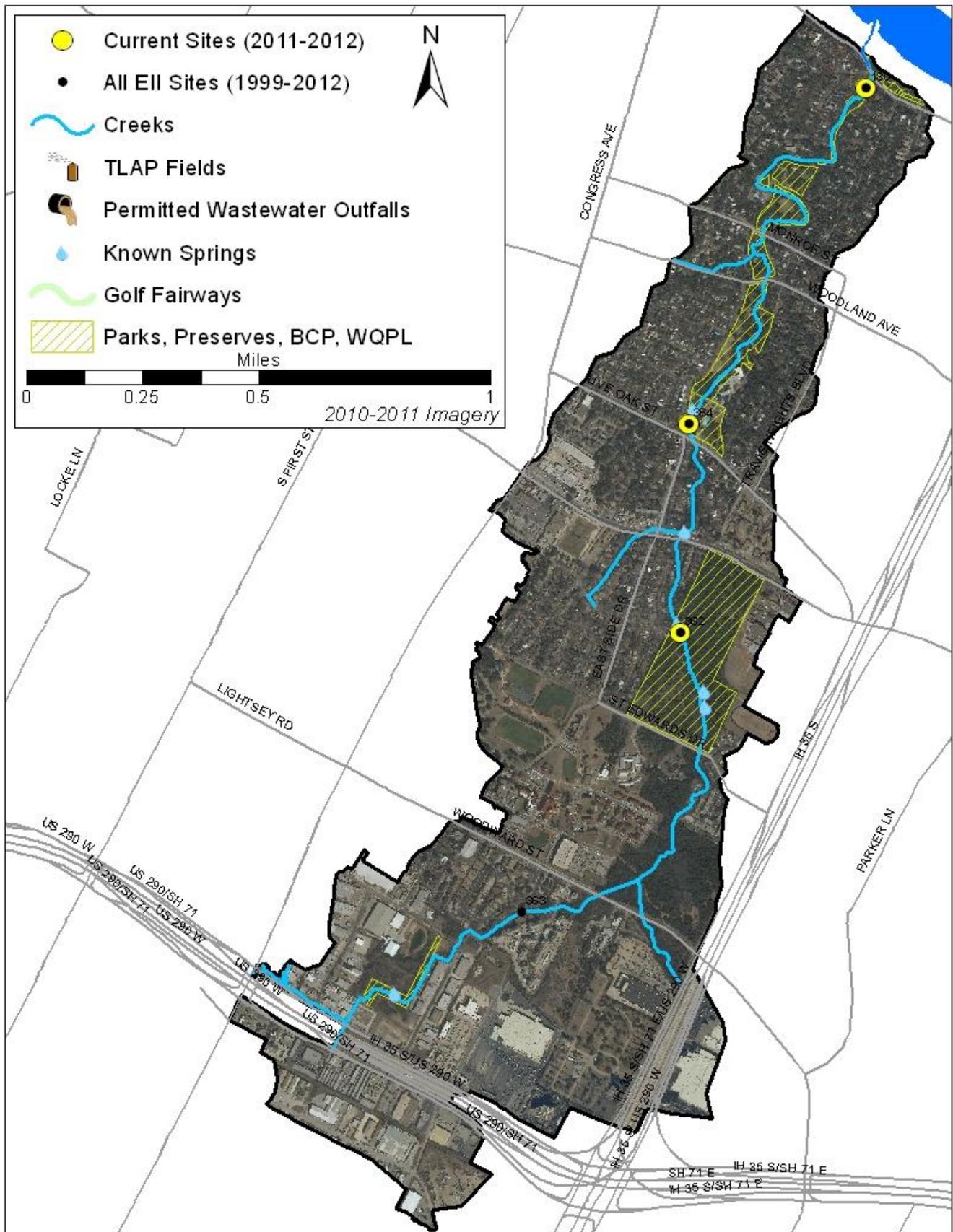
Blunn Creek Watershed

Land Use Map



Blunn Creek Watershed

Aerial Map



Blunn Creek 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
Blunn @ Riverside Dr	180	BLU1	01/22/2013	13.5		1278		7.76		8.8	R	686.7	
Blunn @ Riverside Dr	180	BLU1	04/24/2013	16.1		1111		7.59		6.6		2419.6	>
Blunn @ Riverside Dr	180	BLU1	06/26/2013	25.5		1014		7.39		5.4		686.7	
Blunn @ Riverside Dr	180	BLU1	09/26/2013	22.5		865		7.11		3.8		648.8	
Site 180 Mean				19.4		1067		7.46		6.2		1110.5	
Blunn us Big Stacy Pool	364	BLU2	01/22/2013	12.6		647		7.86		9.4	R	579.4	
Blunn us Big Stacy Pool	364	BLU2	04/24/2013	15.5		602		7.68		6.9		1553.1	
Blunn us Big Stacy Pool	364	BLU2	06/26/2013	25.1		616		7.38		3.5		1732.9	
Blunn us Big Stacy Pool	364	BLU2	09/26/2013	23.4		537		7.39		5.4		2419.6	
Site 364 Mean				19.1		601		7.58		6.3		1571.3	
Blunn @ Long Bow	362	BLU3	01/22/2013	11.0		681		7.79		7.4	R	488.4	
Blunn @ Long Bow	362	BLU3	04/24/2013	14.7		664		7.83		7.4		727.0	
Blunn @ Long Bow	362	BLU3	06/26/2013	25.7		634		7.06		1.6		88.4	
Blunn @ Long Bow	362	BLU3	09/26/2013	22.3		615		7.48		4.9		866.4	
Site 362 Mean				18.4		648		7.54		5.3		542.6	
Watershed Mean				19.0		772		7.53		5.9		1074.8	

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	

Blunn Creek 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		
Blunn @ Riverside Dr	180	BLU1	01/22/2013	J	0.011		0.31	J	0.005		2.6		2.6
Blunn @ Riverside Dr	180	BLU1	04/24/2013	J	0.009	R	0.07		0.028		4.7		6.8 R
Blunn @ Riverside Dr	180	BLU1	06/26/2013		0.035	<J	0.01		0.019		3.3		2.3
Blunn @ Riverside Dr	180	BLU1	09/26/2013	<J	0.008	<J	0.01		0.024	R	31.0		8.3
Site 180 Mean					0.016		0.10		0.019		10.4		5.0
Blunn us Big Stacy Pool	364	BLU2	01/22/2013	J	0.017		0.85		0.017		3.0		3.7
Blunn us Big Stacy Pool	364	BLU2	04/24/2013	J	0.008	R	0.71		0.020		2.7		1.2 R
Blunn us Big Stacy Pool	364	BLU2	06/26/2013		0.029		0.30		0.016		2.9		2.6
Blunn us Big Stacy Pool	364	BLU2	09/26/2013	<J	0.008		0.35		0.027		2.2		2.8
Site 364 Mean					0.016		0.55		0.020		2.7		2.6
Blunn @ Long Bow	362	BLU3	01/22/2013		0.043		0.60	<J	0.004		1.4		2.0
Blunn @ Long Bow	362	BLU3	04/24/2013	J	0.010	R	0.48		0.007		1.6		1.6 R
Blunn @ Long Bow	362	BLU3	06/26/2013		0.078	<J	0.01	<J	0.004		2.7		7.7
Blunn @ Long Bow	362	BLU3	09/26/2013		0.012		0.18	<J	0.004		1.7		3.1
Site 362 Mean					0.036		0.32		0.005		1.8		3.6
Watershed Mean					0.022		0.32		0.014		5.0		3.7

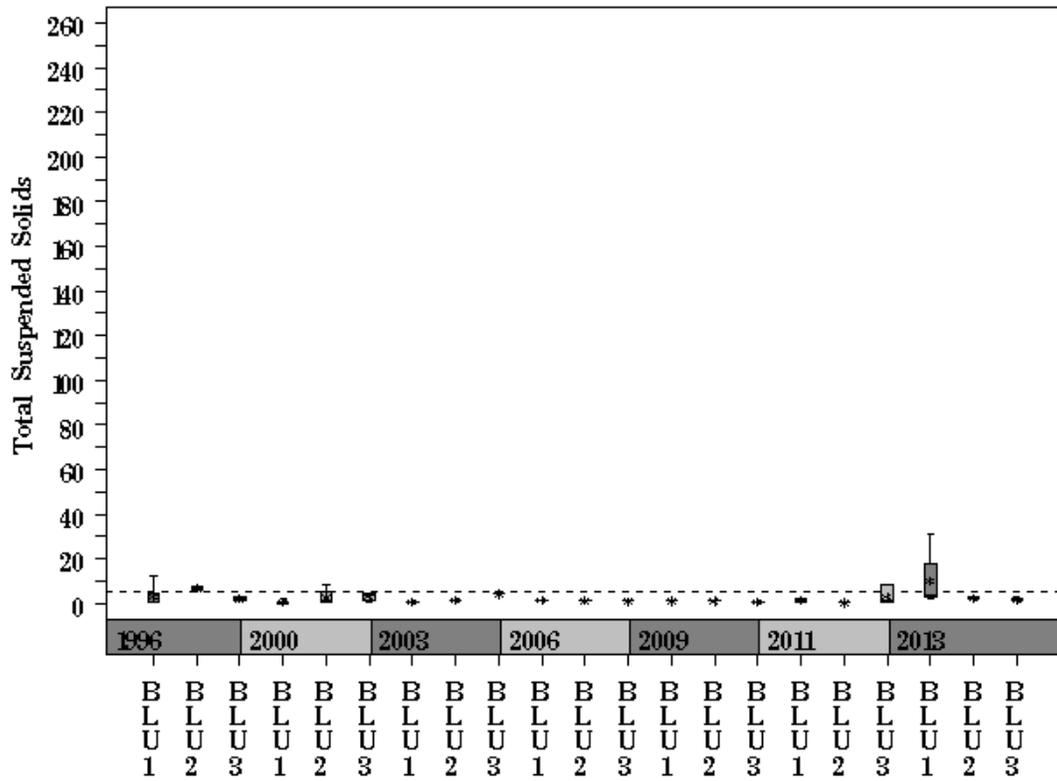
Orange highlighting indicates that the value exceeds one standard deviation from the mean of all E.I.I. sites combined.

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

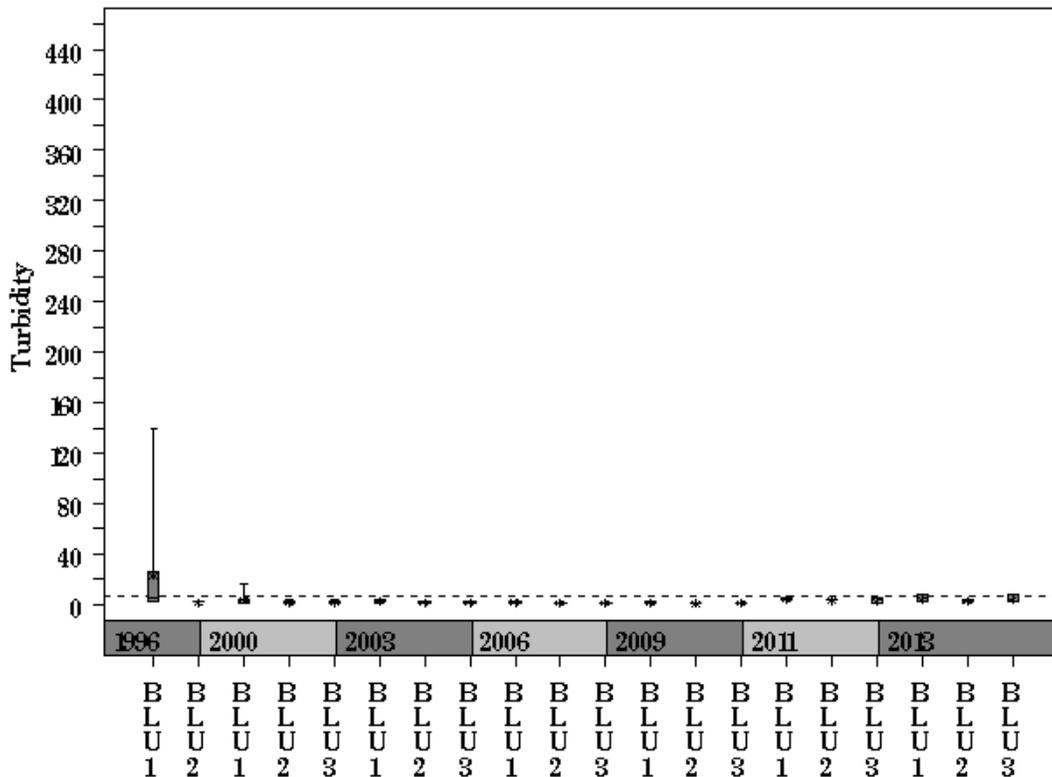
Blunn Creek Watershed

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

Parameter= TOTAL SUSPENDED SOLIDS Unit= mg/L Watershed= Blunn



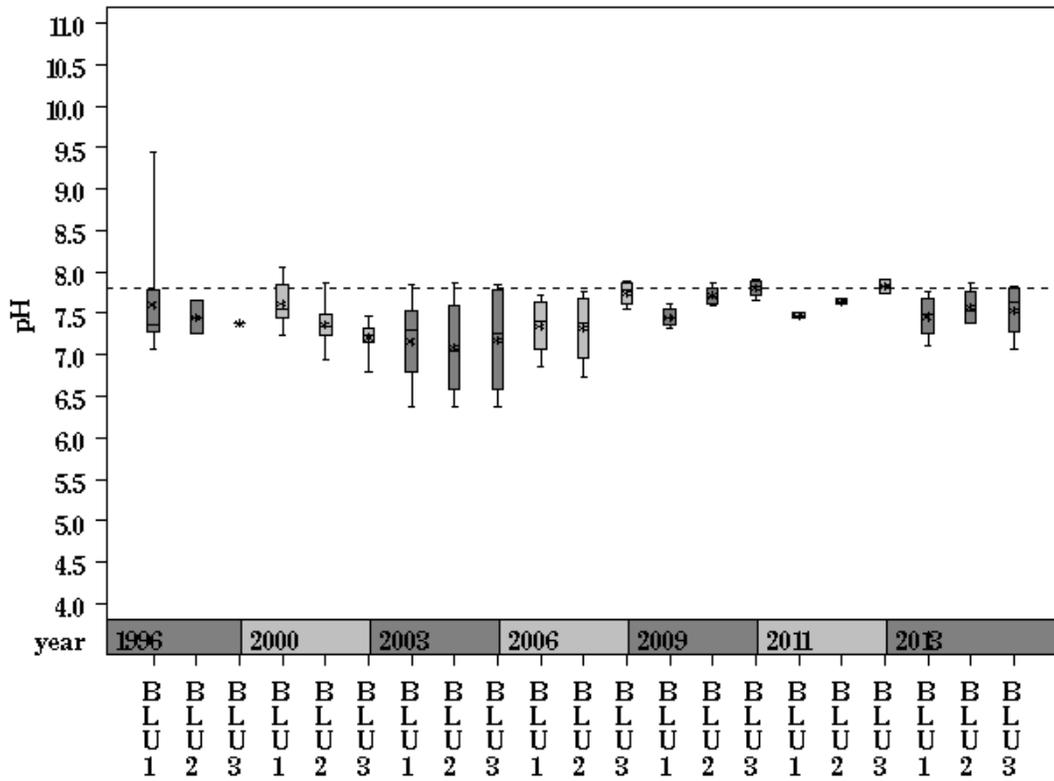
Parameter= TURBIDITY Unit= NTU Watershed= Blunn



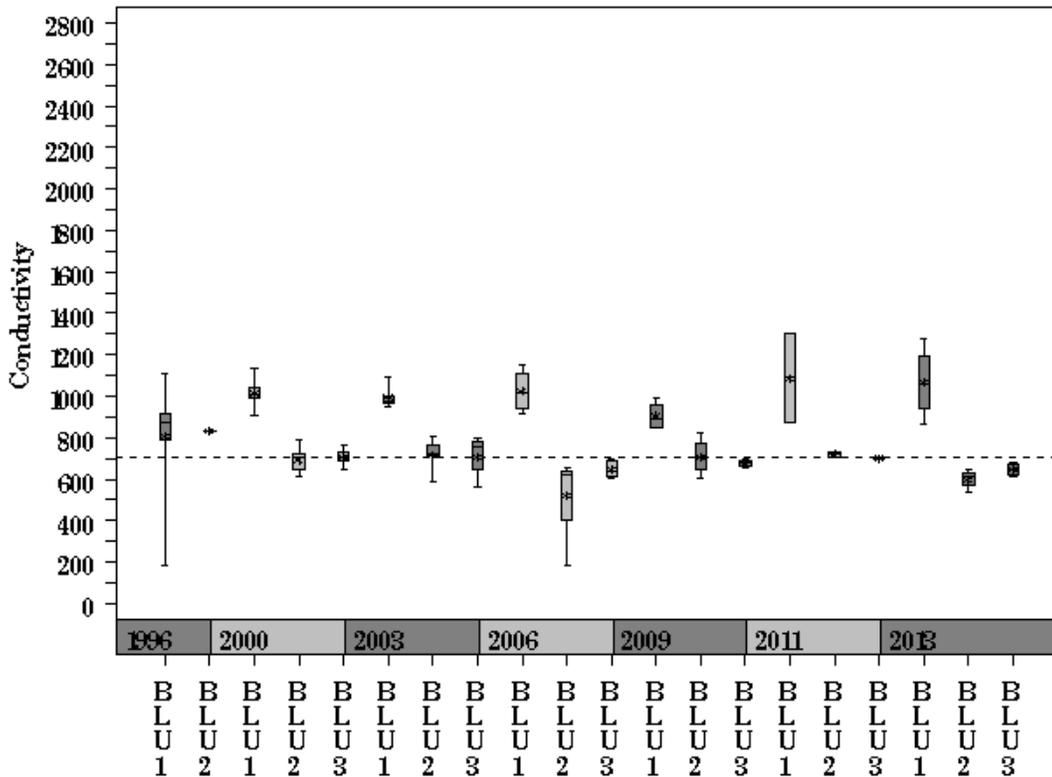
Blunn Creek Watershed

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

Parameter= PH Unit= Standard units Watershed= Blunn



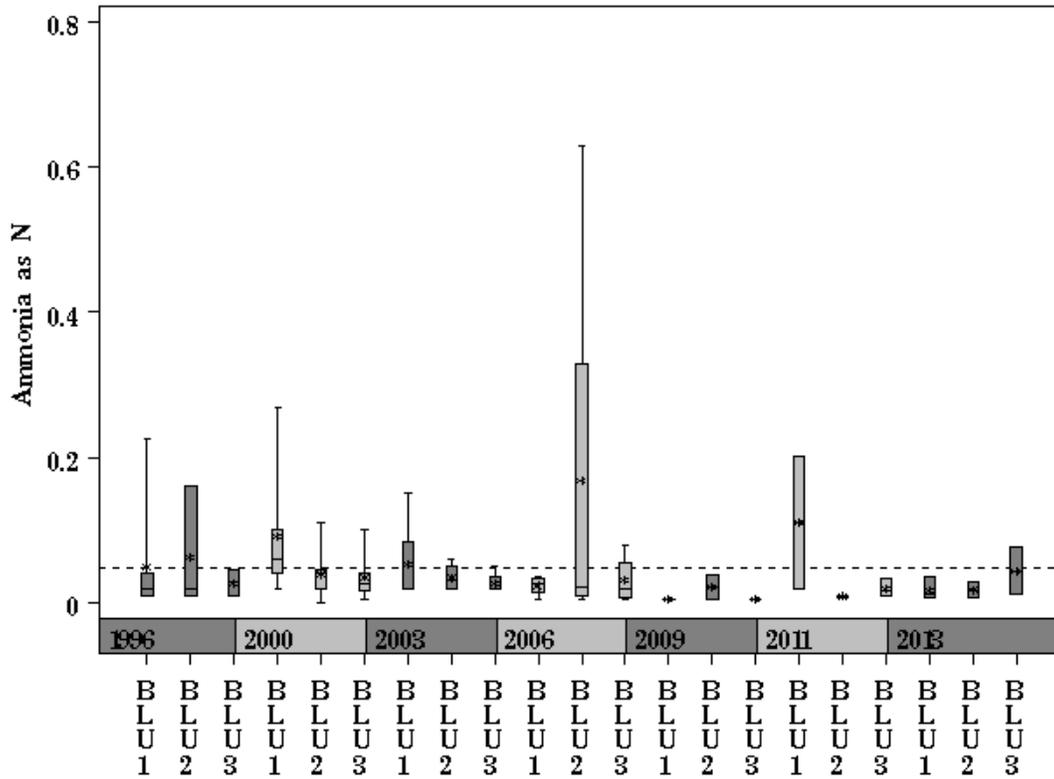
Parameter= CONDUCTIVITY Unit= uS/cm Watershed= Blunn



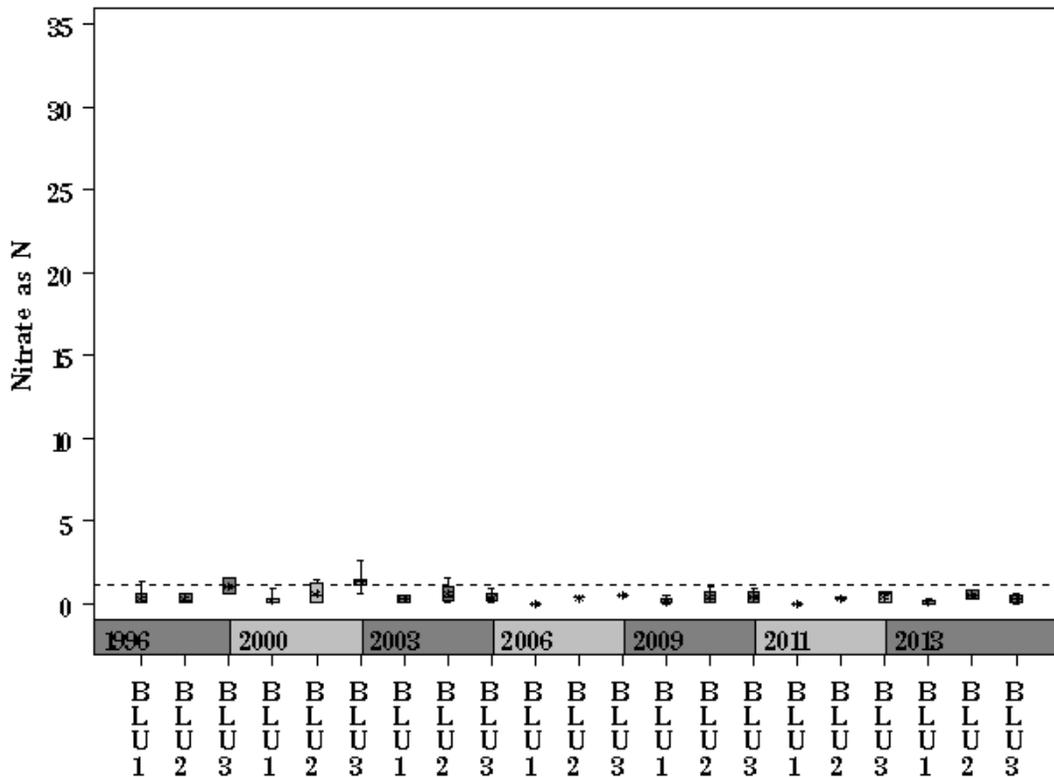
Blunn Creek Watershed

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

Parameter= AMMONIA AS N Unit= mg/L Watershed= Blunn



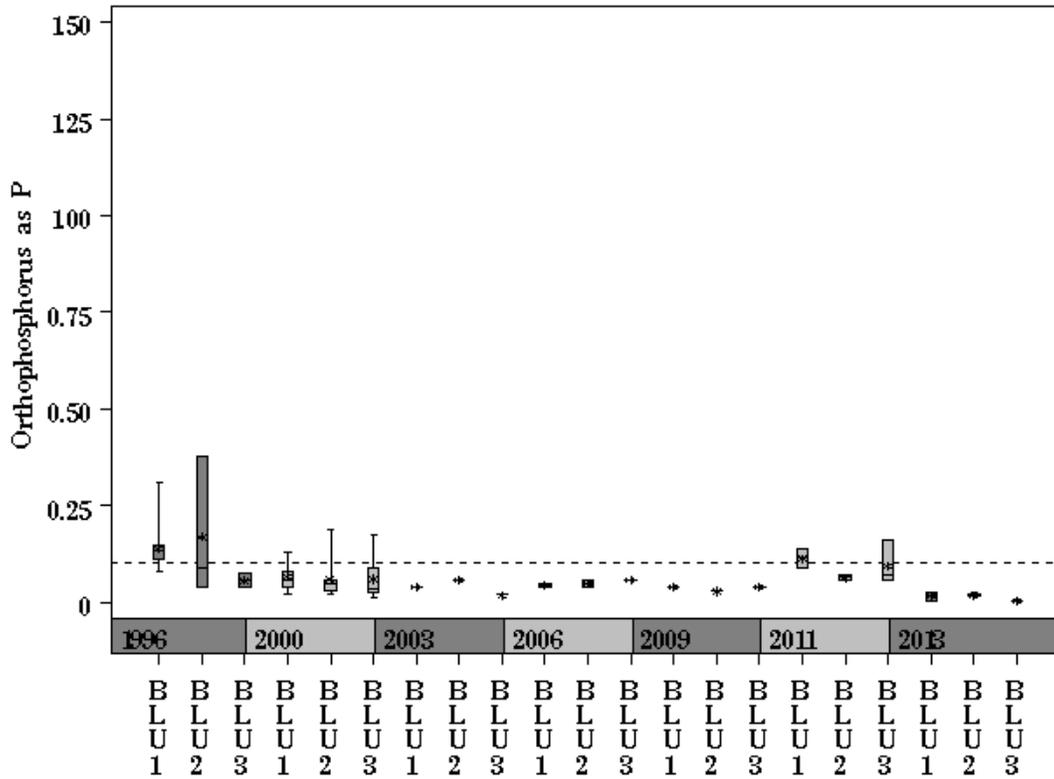
Parameter= NITRATE AS N Unit= mg/L Watershed= Blunn



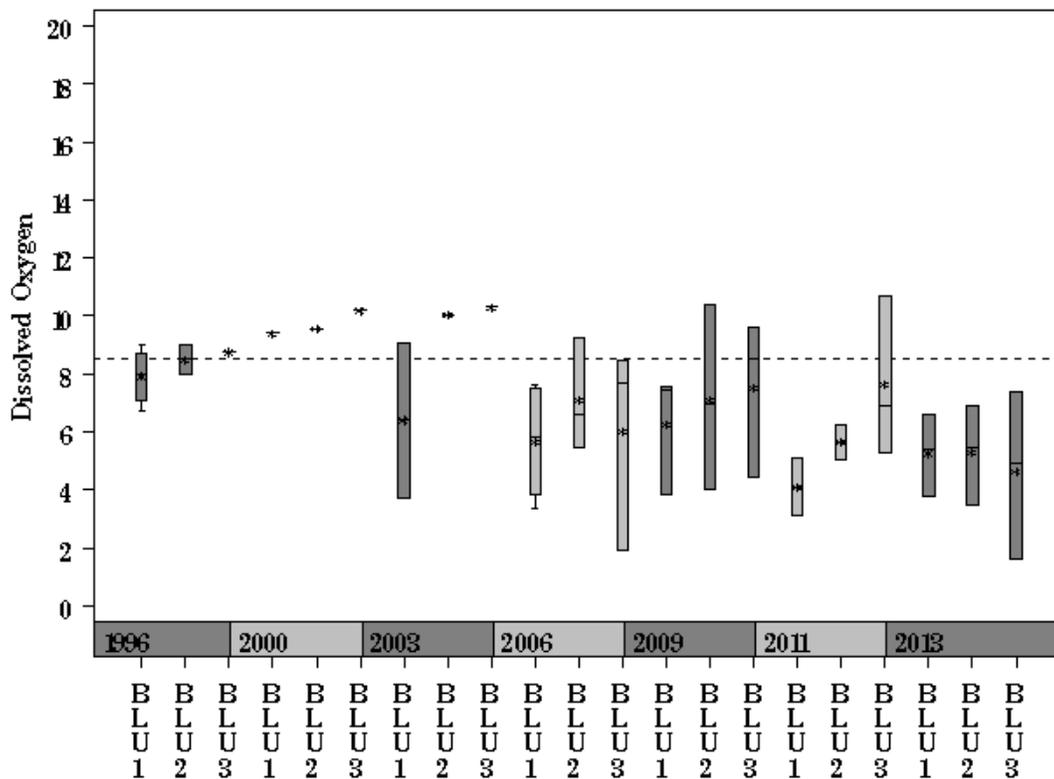
Blunn Creek Watershed

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

Parameter= ORTHOPHOSPHORUS AS P Unit= mg/L Watershed= Blunn

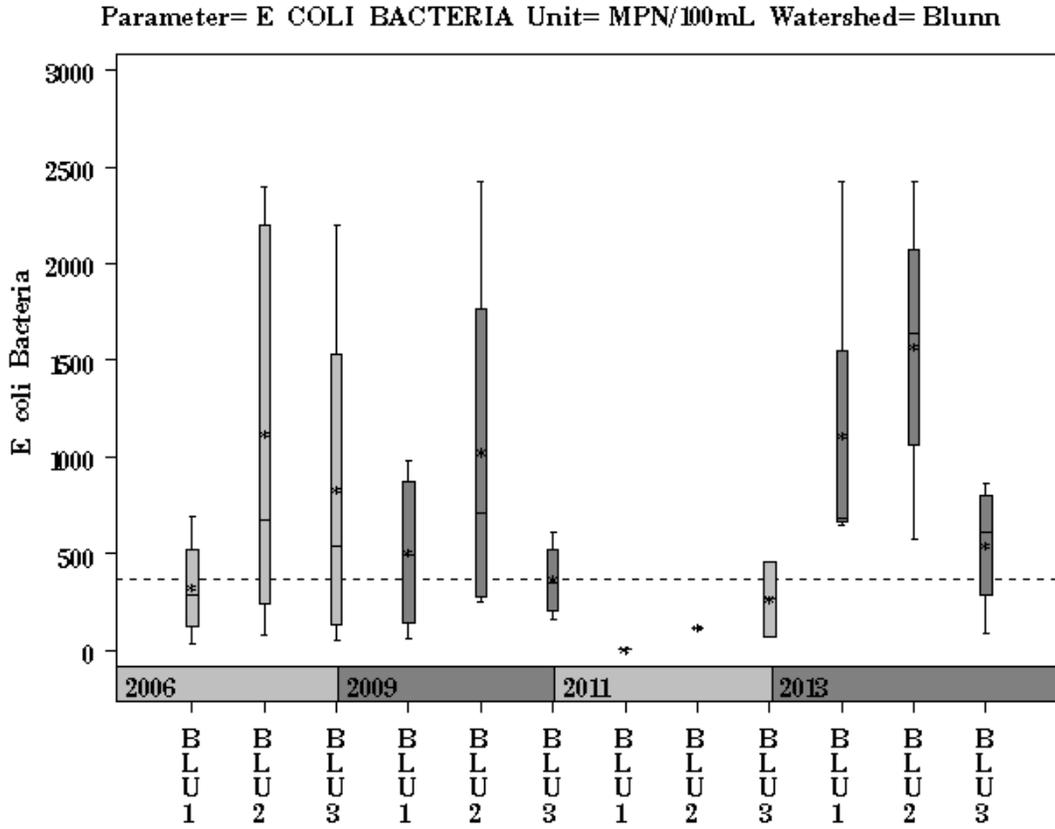


Parameter= DISSOLVED OXYGEN Unit= mg/L Watershed= Blunn



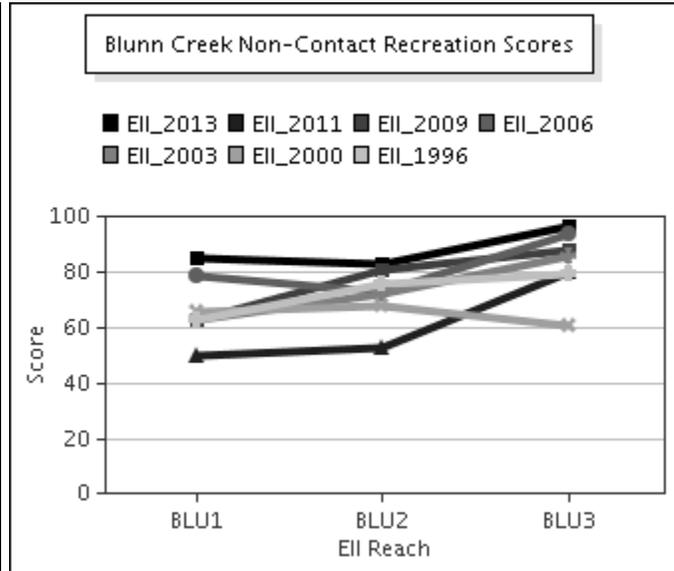
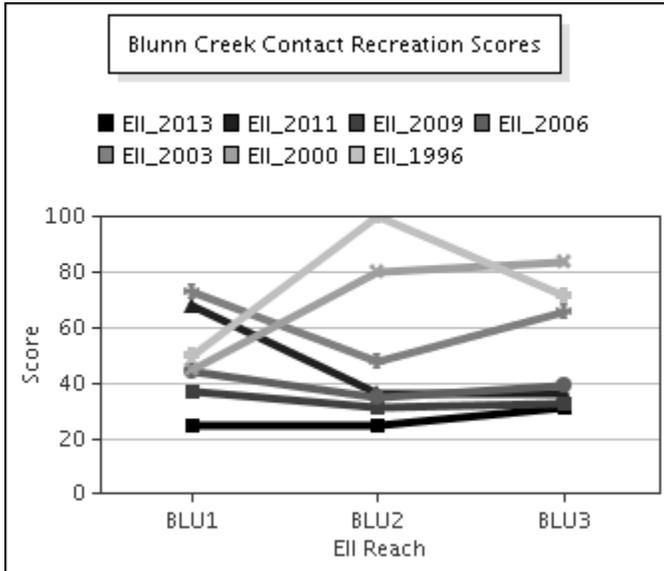
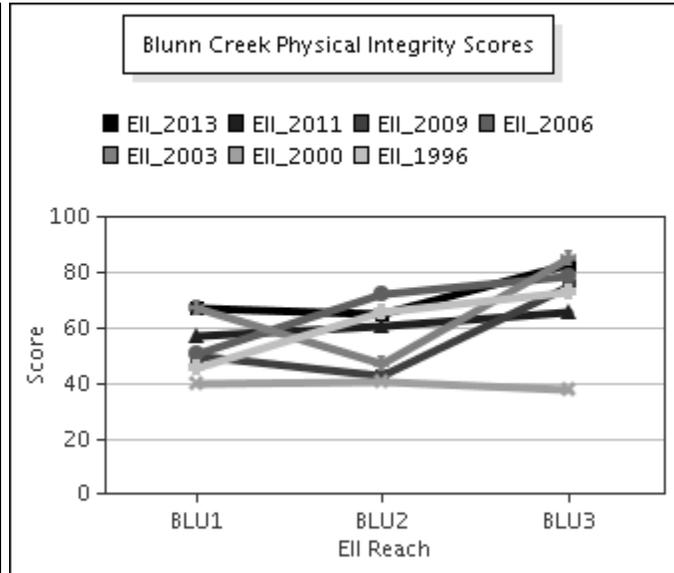
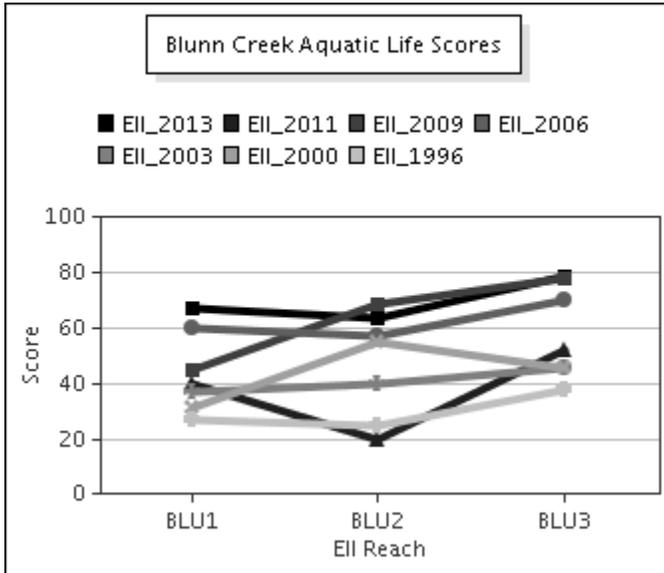
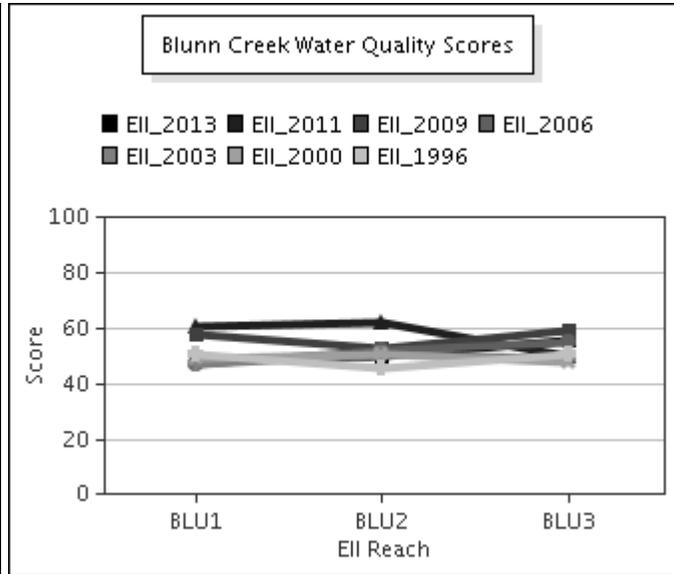
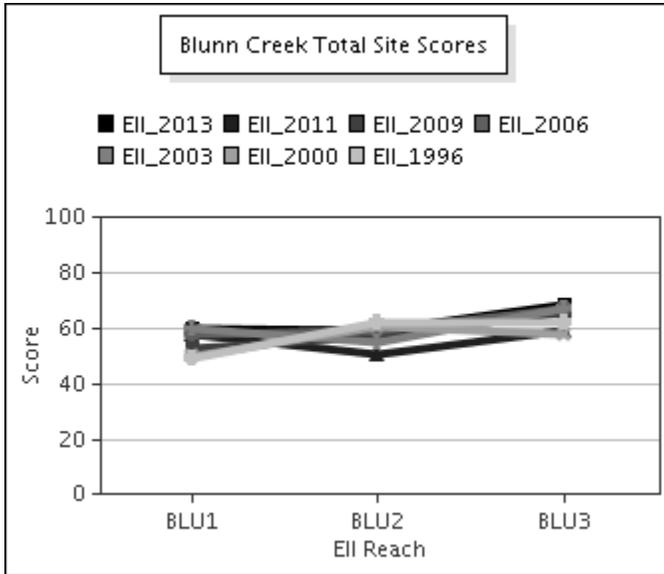
Blunn Creek Watershed

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



Blunn Creek Watershed

Score Summary – Reach scores for each sample year



Blunn Creek Watershed

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

Benthic Macroinvertebrate ID	PTI	FFG	Blunn @ Riverside Dr (Site 180)	Blunn us Big Stacy Pool (Site 364)	Blunn @ Long Bow (Site 362)
<i>Chimarra</i> sp.	2	FC	1		1
<i>Fallceon quilleri</i>	4	SC,CG	350	61	330
<i>Argia</i> sp.	6	P	6	10	2
<i>Cheumatopsyche</i> sp.	6	FC	2	4	44
Chironomidae	6	P,FC	52	74	57
<i>Limonia</i> sp.	6	SH		1	
<i>Microvelia</i> sp.	6	P		2	1
<i>Rhagovelia</i> sp.	6	P		1	4
Hirudinea	8	P	1	2	
Oligochaeta	8	CG		3	1
<i>Tipula</i> sp.	8	SH,CG	1		
<i>Physella</i> sp.	9	SC	4	1	
<i>Trepobates</i> sp.	10	P	2		
<i>Dugesia</i> sp.		P,CG	12	15	23
<i>Melanoides tuberculatus</i>		SC	1		

Blunn Creek Watershed

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

Scoring Metric	Blunn @ Riverside Dr (Site 180)	Blunn us Big Stacy Pool (Site 364)	Blunn @ Long Bow (Site 362)
Number of Taxa *	11	11	9
Hilsenhoff Biotic Index *	4.4	5.3	4.5
Number of Ephemeroptera Taxa *	1	1	1
Percent of Total as Chironomidae *	12	43	12
Number of EPT Taxa *	3	2	3
Percent of Total as EPT *	82	37	81
Percent of Total as Predator *	17	60	19
Number of Intolerant Taxa *	2	1	2
Percent Dominance (Top 3 Taxa) *	96	86	93
EPT / EPT + Chironomidae	1	0	1
Number of Diptera Taxa	2	2	1
Number of Non-Insect Taxa	4	4	2
Number of Organisms	432	174	463
Percent Dominance (Top 1 Taxa)	81	43	71
Percent of Total as Collector / Gatherer	84	45	76
Percent of Total as Dominant Guild (FFG)	84	60	76
Percent of Total as Elmidae	0	0	0
Percent of Total as Filterers	13	45	22
Percent of Total as Grazers (PI & SC)	82	36	71
Percent of Total as Tolerant Organisms	1	1	0
Percent of Trichoptera as Hydropsychidae	67	100	98
Ratio of Intolerant : Tolerant Organisms	5.16	0.62	3.03
TCEQ Qualitative Aquatic Life Use Score	24	15	20
TCEQ Quantitative Aquatic Life Use Score	29	27	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.**

- # 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.
- 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.
- # 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.
- % 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%.
- # 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.
- % 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%.
- % 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%.
- # 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.
- % 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%.

Blunn Creek Watershed

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

Diatom Species Name	PTI	Blunn @ Riverside Dr (Site 180)	Blunn us Big Stacy Pool (Site 364)	Blunn @ Long Bow (Site 362)
<i>Amphora inariensis</i>	4		57	7
<i>Diploneis oblongella</i>	4	2		
<i>Fragilaria parasitica</i>	4			1
<i>Achnanthydium minutissimum</i>	3	15		42
<i>Amphipleura pellucida</i>	3			1
<i>Amphora libyca</i>	3		2	
<i>Amphora pediculus</i>	3	132	314	198
<i>Caloneis bacillum</i>	3			3
<i>Caloneis ventricosa</i>	3		2	
<i>Cymatopleura elliptica</i>	3		3	2
<i>Cymbella hustedtii</i>	3			8
<i>Cymbella laevis</i>	3			2
<i>Denticula kuetzingii</i>	3	3	10	14
<i>Encyonema silesiacum</i>	3	4	3	4
<i>Epithemia adnata</i>	3		2	
<i>Fragilaria capucina</i>	3			4
<i>Geisslera decussis</i>	3			2
<i>Gomphonema affine</i>	3		1	4
<i>Gomphonema pumilum</i>	3	1		
<i>Navicula capitata</i> var. <i>hungarica</i>	3	2		
<i>Navicula cryptocephala</i>	3	1		2
<i>Navicula cryptotenella</i>	3			2
<i>Navicula kotschy</i>	3	1		2
<i>Navicula rhynchocephala</i>	3			1
<i>Nitzschia dissipata</i>	3			5
<i>Nitzschia linearis</i>	3		2	1
<i>Nitzschia recta</i>	3	3		
<i>Pinnularia viridis</i>	3		1	
<i>Reimeria sinuata</i>	3	1	2	32
<i>Rhoicosphenia abbreviata</i>	3	27	6	19
<i>Stauroneis smithii</i>	3			1
<i>Tabularia fasciculata</i>	3	2		
<i>Achnantheiopsis lanceolata</i>	2	69	14	14
<i>Bacillaria paradoxa</i>	2	1		2
<i>Campylodiscus hibernicus</i>	2		9	
<i>Craticula cuspidata</i>	2			1
<i>Cyclotella meneghiniana</i>	2	1	2	4
<i>Cymatopleura solea</i>	2		4	18
<i>Encyonema minutum</i>	2	2	13	9
<i>Fallacia monoculata</i>	2	1		1
<i>Gomphonema angustatum</i>	2			2
<i>Luticola goeppertiana</i>	2		2	1
<i>Melosira varians</i>	2	3		
<i>Navicula recens</i>	2	1		3
<i>Navicula veneta</i>	2		3	
<i>Nitzschia amphibia</i>	2	5	4	2
<i>Nitzschia inconspicua</i>	2	139		2
<i>Sellaphora laevis</i>	2		4	
<i>Surirella angusta</i>	2			4
<i>Synedra ulna</i>	2		4	5
<i>Gomphonema parvulum</i>	1	1		4
<i>Cocconeis placentula</i> var. <i>lineata</i>		5	35	38
<i>Eolimna minima</i>		75		10
<i>Kolbesia ploenensis</i>				22
<i>Navicula rostellata</i>				1
<i>Stauroneis borrichii</i>		2		
<i>Terpsinoe musica</i>			1	
<i>Tryblionella debilis</i>		1		

Blunn Creek Watershed

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

Scoring Metric	Blunn @ Riverside Dr (Site 180)	Blunn us Big Stacy Pool (Site 364)	Blunn @ Long Bow (Site 362)
<i>Cymbella</i> Richness	3	3	5
Number of organisms	500	500	500
Number of taxa	27	25	42
Percent motile taxa	31	3	6
Percent similarity to reference condition	19	19	35
Pollution tolerance index	2.47	3.00	2.84

* **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.

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Site Photographs



180_t00-ds-02_22_2001



180_t00-ds-07_11_2006



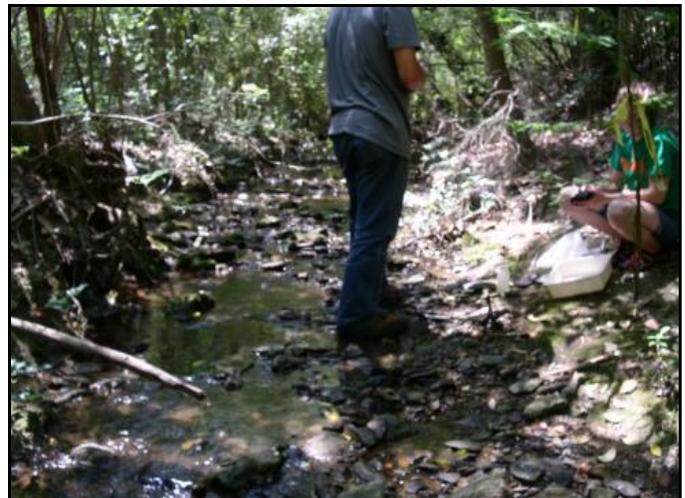
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362_t00-us-07_11_2006



362-t00-ur-06-01-2009

Blunn Creek Watershed

Site Photographs



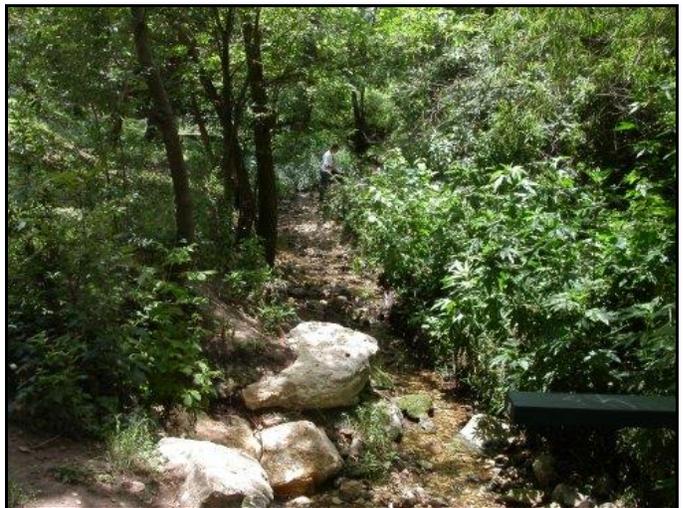
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364_t00-us- 12_18_2000



364_t00-us1-07_05_2006



364-t00-ur-06-01-2009



364-t00-us-06-01-2009

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