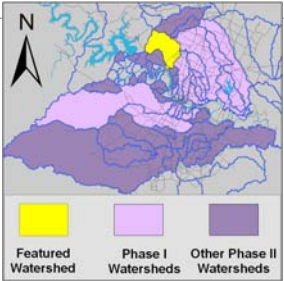


Bull Creek Watershed

Watershed Overview

Catchment	Total area	24.7 sq. miles					
	Area in recharge	16.3 sq. miles					
	Creek length	11 miles					
	Receiving water	Lake Austin					
Demographics	2000 population	43,709					
	2030 projected population	69,716					
	30 year projected % increase	60 %					
Land Use	Impervious cover (2003 estimate)	13.6 %					
	Impervious cover (2013 estimate)	20.9 %					
Overall EII Scores	2001	2004	2007	2010	2012	2014	2016
	76	81	85	82	80	77	83



Flow Regime* for Sample Sites on Bull Creek

Site	2001					2004						2007					2010			
	Mar	Mar	Jun	Sep	Dec	Mar	May	May	Jun	Oct	Dec	Feb	May	Jun	Sep	Dec	Mar	May	May	Oct
	WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	Bio	WQ
151	B	B	B	B	B	B	B	B	B	B	B						B	B	B	B
1164																	B	B	B	B
349							B	B				B	B	B	B	B	B	B	B	B
920	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
347	B	B			B	B	B	B	B	B	B	B	B	B	B	B				
350	B	B	B	B	B	B	B	B	B	B	B						B	B	B	B

Flow Regime* for Sample Sites on Bull Creek (Cont.)

Site	2011		2012				2014						2016				
	Dec	Mar	Apr	May	Jul	Sep	Jan	Apr	May	Jun	Jul	Sep	Jan	Apr	Jun	Jul	Sep
	WQ	WQ	Bio	Bio	WQ	WQ	WQ	WQ	Bio	Bio	WQ	WQ	WQ	WQ	WQ	WQ	WQ
151	B	B		B	B	B	B	B	B		B	B	B	B	B	B	B
1164	B	B		B	B	B	B	B	B		B	B	B	B	B	B	B
349	B	B		B	B	B	B	B	B		B	B	B	B	B	B	B
920	B	B	B		n	B	B	B	B		B	B	B	B	B	B	B
347													B	B	B	B	B
350	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 Bull Creek Sites by Year

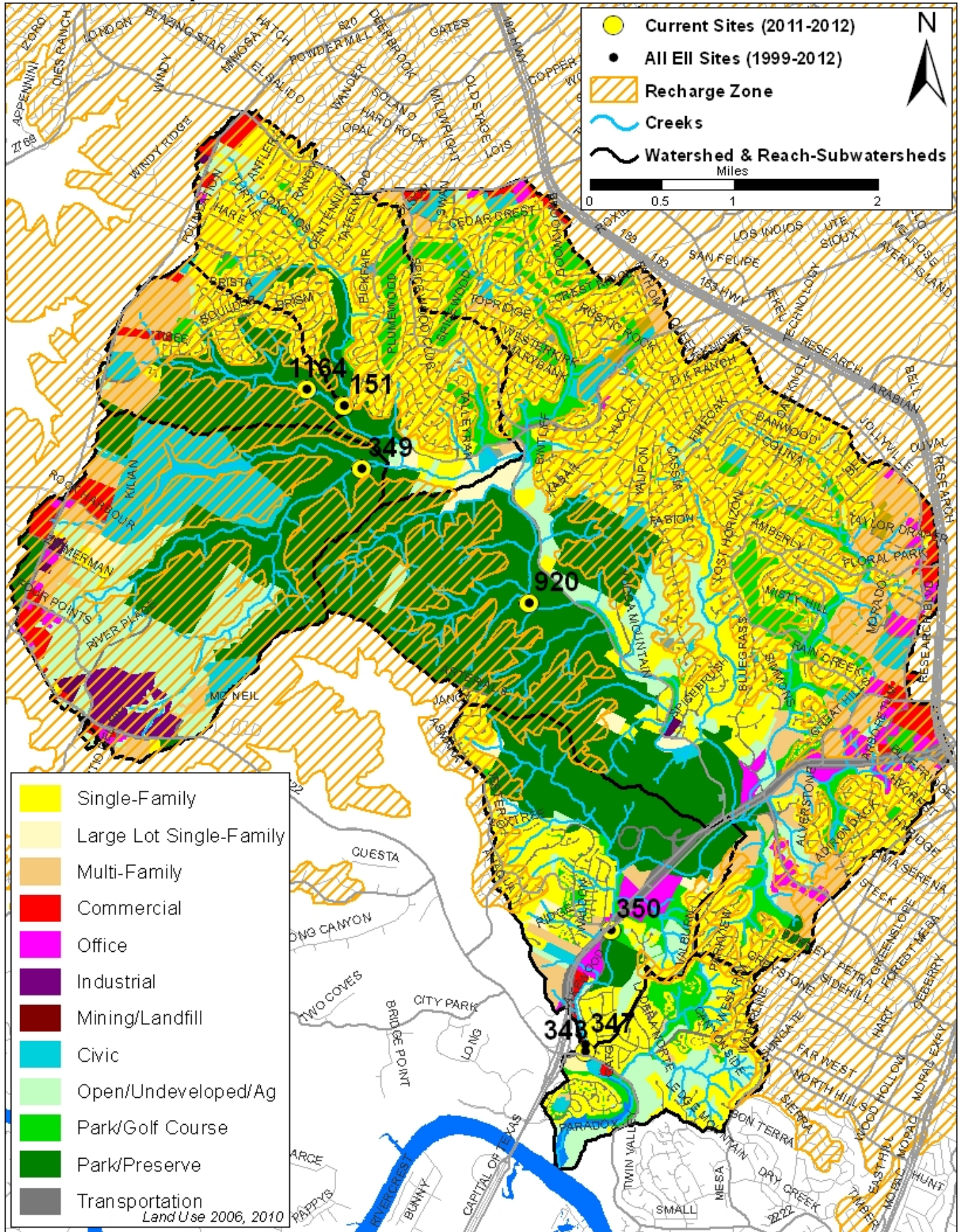
Reach	Site	Site Name	Year	Water Quality	Sediment **	Contact Rec.	Non-Contact Rec.	Physical Integrity	Aquatic Life	Benthic subindex	Diatom subindex	Total EII Score
BUL1	347	Bull Creek US of West Bull Creek	1996	70	88	97	90	79	95	95	95	87
BUL1	350	Bull Creek @ Loop 360 1st Crossing	1996	71	88	97	81	61	92	84	100	82
BUL2	920	Bull Creek @ St. Ed's Park US of dam	1996	63	88	75	93	82	90	91	89	82
BUL5	151	Trib 6 @ Bull Creek (EG)	1996	51	88	87	80	91	76	84	67	79
BUL1	347	Bull Creek US of West Bull Creek	2001	63	65	91	92	88	62	64	59	72
BUL1	350	Bull Creek @ Loop 360 1st Crossing	2001	59	65	87	83	58	87	91	82	70
BUL2	920	Bull Creek @ St. Ed's Park US of dam	2001	60	65	93	81	88	86	88	83	74
BUL5	151	Trib 6 @ Bull Creek (EG)	2001	44	65	92	93	81	83	99	66	73
BUL1	347	Bull Creek US of West Bull Creek	2004	62	84	63	93	88	96	94	97	81
BUL1	350	Bull Creek @ Loop 360 First Crossing	2004	73	84	67	89	80	97	94	100	82
BUL2	920	Bull Creek @ St. Ed's Park US of dam	2004	70	84	72	91	85	95	95	94	83
BUL5	151	Trib 6 @ Bull Creek (EG)	2004	60	84	66	99	87	80	83	77	79
BUL1	347	Bull Creek US of West Bull Creek	2007	69	81	63	91	78	92	84	100	79
BUL2	920	Bull Creek @ St. Ed's Park US of dam	2007	74	81	85	92	90	91	95	86	86
BUL3	349	Bull Creek US of Trib 7 (Franklin)	2007	89	81	93	98	83	98	97	99	90
BUL1	350	Bull Creek @ Loop 360 First Crossing	2010	68	67	71	96	74	93	85	100	78
BUL2	920	Bull Creek @ St. Ed's Park US of dam	2010	73	67	96	97	89	92	84	99	86
BUL3	349	Bull Creek US of Trib 7 (Franklin)	2010	91	67	92	100	93	93	94	92	89
BUL4	1164	Trib 5 DS Hanks Tract Property Line	2010	73	67	87	93	73	82	73	90	79
BUL5	151	Trib 6 @ Bull Creek (EG)	2010	67	67	86	86	87	91	98	83	81
BUL1	350	Bull Creek @ Loop 360 First Crossing	2012	65	73	44	96	85	96	100	92	77
BUL2	920	Bull Creek @ St. Ed's Park US of dam	2012	67	73	69	98	92	96	100	92	83
BUL3	349	Bull Creek US of Trib 7 (Franklin)	2012	81	73	83	94	92	83	78	88	84
BUL4	1164	Trib 5 DS Hanks Tract Property Line	2012	61	73	61	97	92	95	100	89	80
BUL5	151	Trib 6 @ Bull Creek (EG)	2012	55	73	75	80	92	97	100	94	79
BUL1	350	Bull Creek @ Loop 360 First Crossing	2014	68	61	46	85	68	98	98	97	71
BUL2	920	Bull Creek @ St. Ed's Park US of dam	2014	76	61	94	92	83	97	96	98	84
BUL3	349	Bull Creek US of Trib 7 (Franklin)	2014	82	61	76	97	91	98	96	100	84
BUL4	1164	Trib 5 DS Hanks Tract Property Line	2014	61	61	52	87	78	97	96	97	73
BUL5	151	Trib 6 @ Bull Creek (EG)	2014	60	61	73	68	90	91	100	82	74
BUL1	350	Bull Creek @ Loop 360 First Crossing	2016	72	80	55	83	84	96	97	95	78
BUL2	920	Bull Creek @ St. Edwards Park US of dam	2016	77	80	73	91	95	93	94	91	85
BUL3	349	Bull Creek US of Trib 7 (Franklin)	2016	83	80	73	100	93	97	94	100	88
BUL4	1164	Trib 5 DS Hanks Tract Property Line	2016	64	80	63	99	88	91	87	95	81
BUL5	151	Trib 6 @ Bull Creek (EG)	2016	58	80	71	94	95	92	97	87	82

* 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

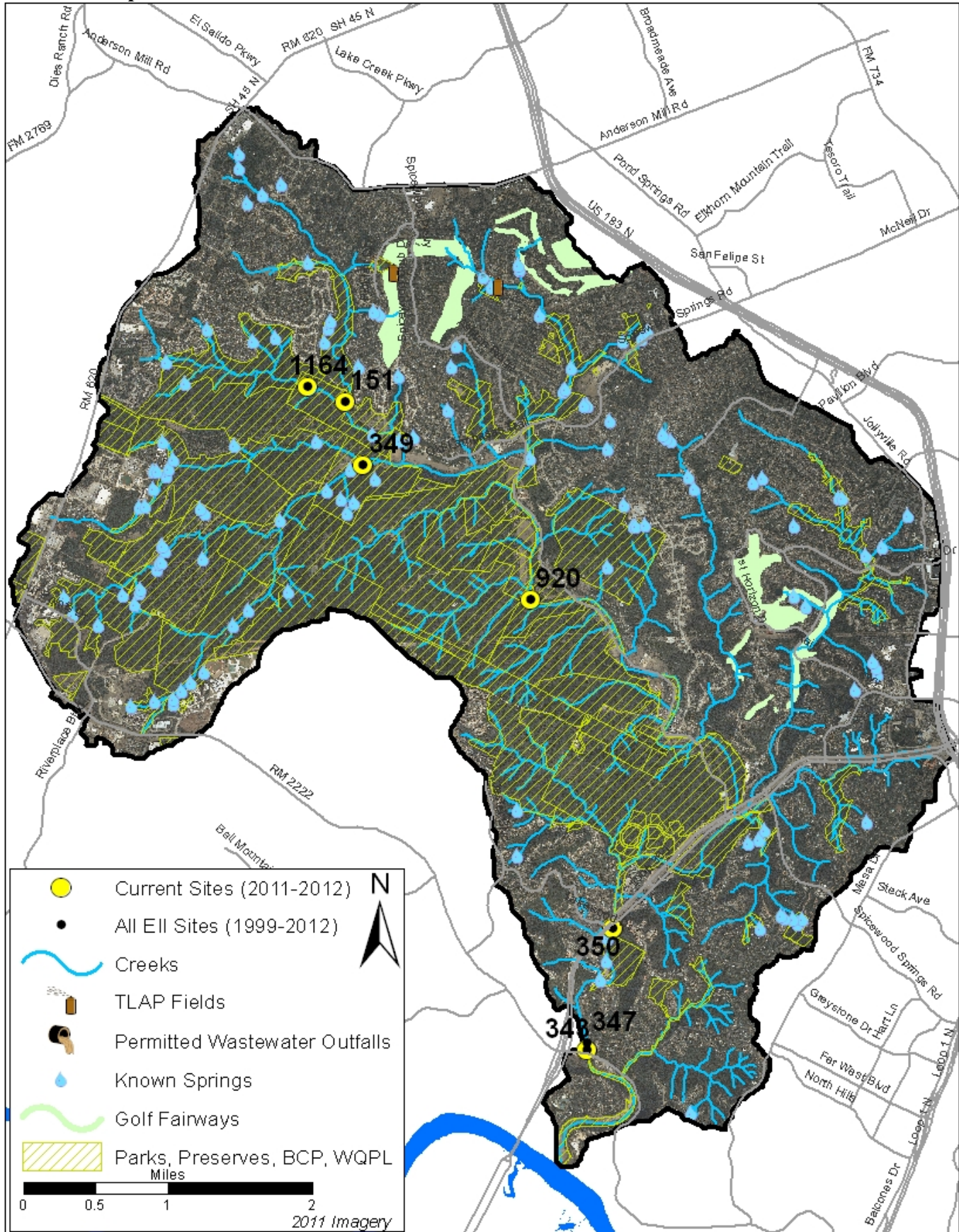
Bull Creek Watershed

Land Use Map



Bull Creek Watershed

Aerial Map



Bull Creek Watershed

Water Quality Data – Temperature, Conductivity, pH, Dissolved Oxygen & E. coli for 2016 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. Reach	Date	Temp. flag	Cond. flag	pH flag	D.O. flag	E. Coli flag
Bull	350	BUL1	01/12/2016	12.4	650	8.16	11.2	16.1
Bull	350	BUL1	04/12/2016	20.5	610	8.10	9.0	144.0
Bull	350	BUL1	06/21/2016	26.0	575	7.97	7.6	
Bull	350	BUL1	07/12/2016	28.6	537	8.10	7.6	345.0
Bull	350	BUL1	09/13/2016	28.0	529	7.10	8.5	71.7
BUL1 Mean				23.1	580	7.89	8.8	144.2
Bull	920	BUL2	01/12/2016	12.9	655	8.08	10.7	11.0
Bull	920	BUL2	04/12/2016	20.0	629	8.06	7.5	30.9
Bull	920	BUL2	06/21/2016	24.8	606	7.97	8.0	
Bull	920	BUL2	07/12/2016	27.5	547	8.02	7.5	137.0
Bull	920	BUL2	09/13/2016	27.1	564	7.07	8.5	48.0
BUL2 Mean				22.5	600	7.84	8.5	56.7
Bull	349	BUL3	01/12/2016	13.8	562	7.62	8.1	44.1
Bull	349	BUL3	04/12/2016	17.5	548	7.52	5.8	178.0
Bull	349	BUL3	06/21/2016	24.1	553	7.57	7.2	
Bull	349	BUL3	07/12/2016	22.6	556	7.53	6.2	7.45
Bull	349	BUL3	09/13/2016	23.3	539	6.19	5.8	32.7
BUL3 Mean				20.3	551	7.29	6.6	65.6
Bull	1164	BUL4	01/12/2016	12.6	651	7.55	8.2	162.0
Bull	1164	BUL4	04/12/2016	17.9	652	7.47	6.5	114.0
Bull	1164	BUL4	06/21/2016	23.1	639	7.72	7.9	
Bull	1164	BUL4	07/12/2016	22.9	650	7.50	6.4	16.8
Bull	1164	BUL4	09/13/2016	22.3	636	6.47	6.5	46.2
BUL4 Mean				19.8	646	7.34	7.1	84.75
Bull	151	BUL5	01/12/2016	12.9	1062	7.81	10.9	29.6
Bull	151	BUL5	04/12/2016	17.8	1035	7.81	9.0	32.0
Bull	151	BUL5	06/21/2016	23.0	968	7.85	8.5	
Bull	151	BUL5	07/12/2016	23.2	966	7.64	7.9	104.0
Bull	151	BUL5	09/13/2016	22.8	941	6.44	8.1	43.1
BUL5 Mean				19.9	994	7.51	8.9	52.2
Bull Mean				21.1	674	7.57	8.0	80.7

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
E. Coli (col/100ml)	316.1	1.0	2420.0	883.7	

Bull Creek Watershed

Water Quality Data – Ammonia, Nitrate / Nitrite, Ortho-Phosphorus, Total Suspended Solids & Turbidity for 2016 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
Bull	350	BUL1	01/12/2016	<J 0.008	0.56	<J 0.004	<J 1.0	0.5 R
Bull	350	BUL1	04/12/2016	<J 0.008	0.24	<J 0.004	<J 1.0	0.7
Bull	350	BUL1	06/21/2016					
Bull	350	BUL1	07/12/2016	0.027	0.12	<J 0.004	<J 1.1	1.9 R
Bull	350	BUL1	09/13/2016	<J 0.008	0.05	<J 0.004	1.1	1.3
BUL1 Mean				0.013	0.24	0.004	1.1	1.1
Bull	920	BUL2	01/12/2016	<J 0.008	0.62	<J 0.004	<J 1.1	0.6 R
Bull	920	BUL2	04/12/2016	<J 0.008	0.19	<J 0.004	<J 1.0	1.3
Bull	920	BUL2	06/21/2016					
Bull	920	BUL2	07/12/2016	<J 0.008	0.08	<J 0.004	<J 1.0	1.6 R
Bull	920	BUL2	09/13/2016	<J 0.008	0.07	<J 0.004	1.0	1.8
BUL2 Mean				0.008	0.24	0.004	1.0	1.3
Bull	349	BUL3	01/12/2016	<J 0.008	0.15	<J 0.004	<J 1.0	0.9 R
Bull	349	BUL3	04/12/2016	<J 0.008	0.04	<J 0.004	<J 1.0	1.5
Bull	349	BUL3	06/21/2016					
Bull	349	BUL3	07/12/2016	<J 0.008	0.06	<J 0.004	<J 1.0	1.6 R
Bull	349	BUL3	09/13/2016	<J 0.008	0.04	<J 0.004	<J 1.0	1.7
BUL3 Mean				0.008	0.07	0.004	1.0	1.4
Bull	1164	BUL4	01/12/2016	<J 0.008	0.84	<J 0.004	1.2	0.6 R
Bull	1164	BUL4	04/12/2016	<J 0.008	0.68	<J 0.004	<J 1.0	0.4
Bull	1164	BUL4	06/21/2016					
Bull	1164	BUL4	07/12/2016	<J 0.008	0.65	<J 0.004	<J 1.0	0.9 R
Bull	1164	BUL4	09/13/2016	<J 0.008	0.62	<J 0.004	<J 1.0	1.7
BUL4 Mean				0.008	0.70	0.004	1.1	0.9
Bull	151	BUL5	01/12/2016	<J 0.008	1.53	<J 0.004	<J 1.0	1.9 R
Bull	151	BUL5	04/12/2016	<J 0.008	1.06	<J 0.004	1.4	0.5
Bull	151	BUL5	06/21/2016					
Bull	151	BUL5	07/12/2016	<J 0.008	0.79	<J 0.004	<J 1.0	0.6 R
Bull	151	BUL5	09/13/2016	<J 0.008	0.96	<J 0.004	<J 1.0	0.9
BUL5 Mean				0.008	1.08	0.004	1.1	1.0
Bull Mean				0.009	0.46	0.004	1.0	1.1

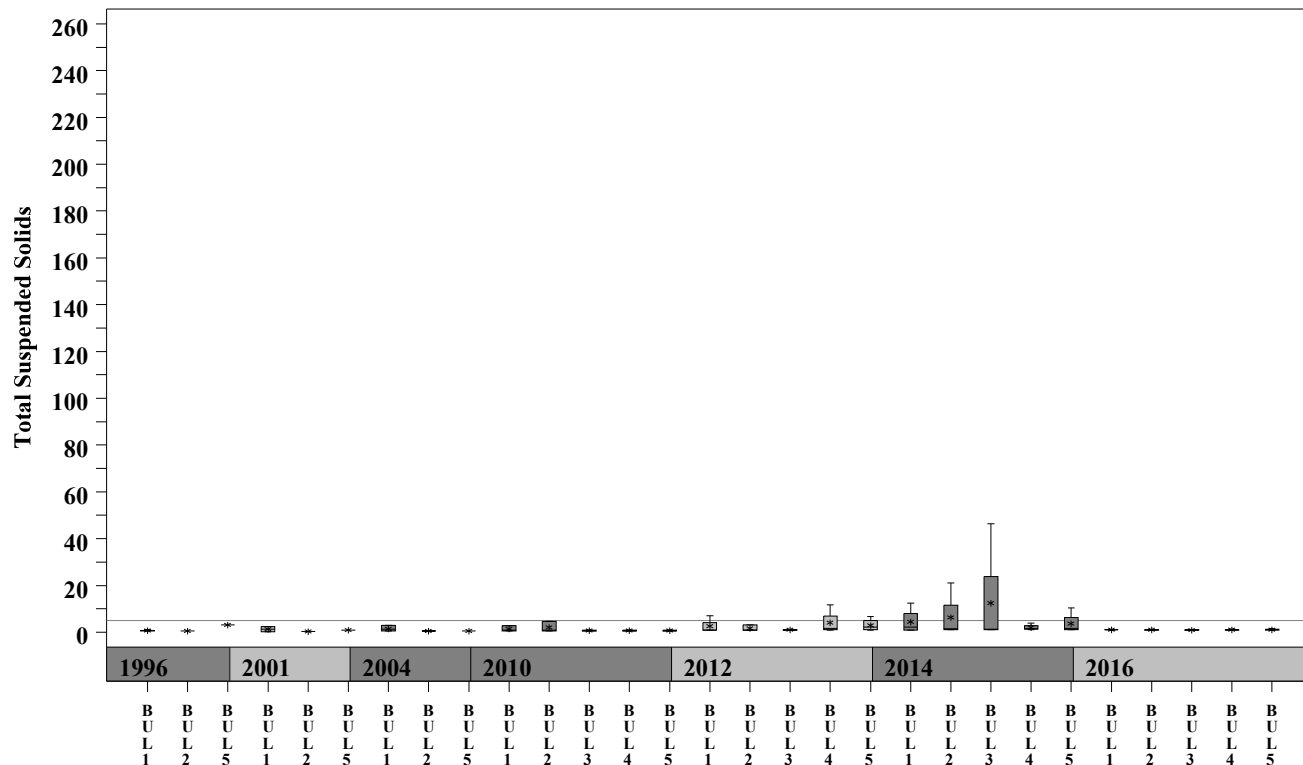
Gray highlighting indicates that the value exceeds one standard deviation from the mean of all E.I.I. sites combined.

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
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

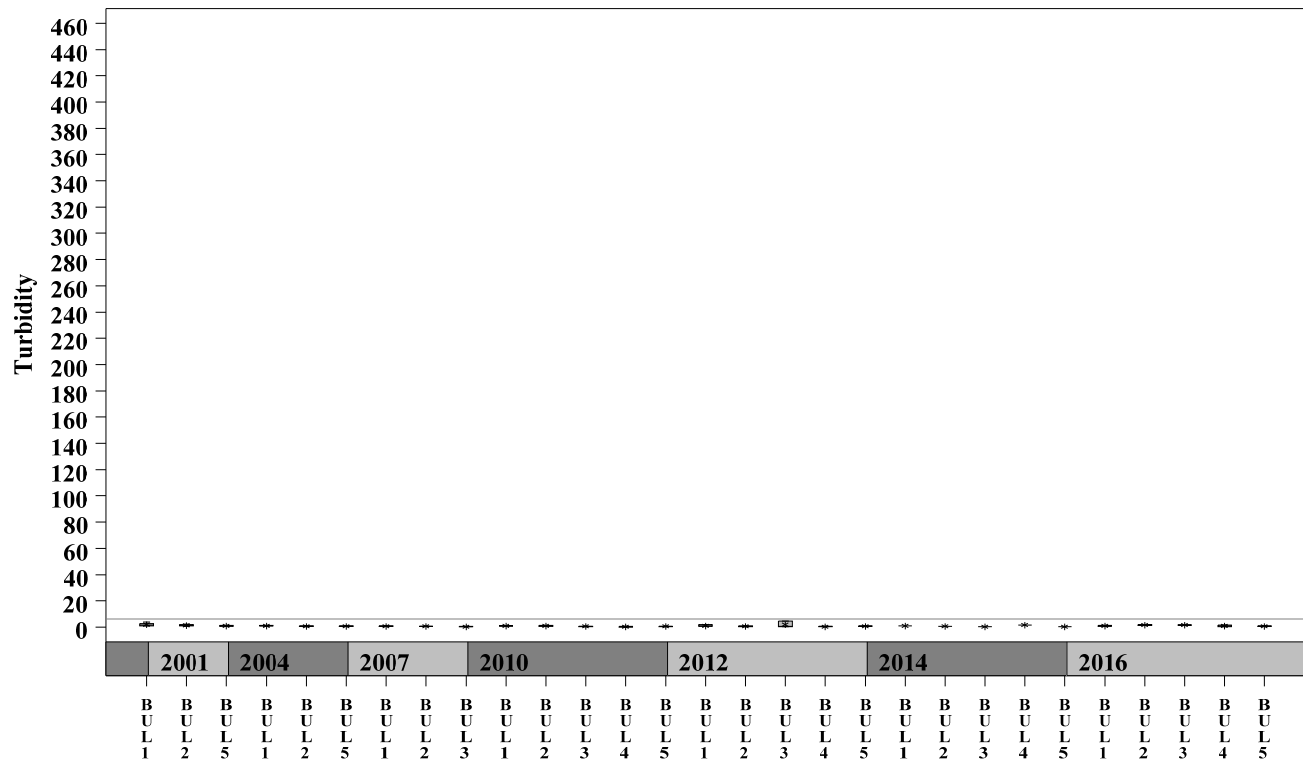
Bull Creek Watershed

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

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



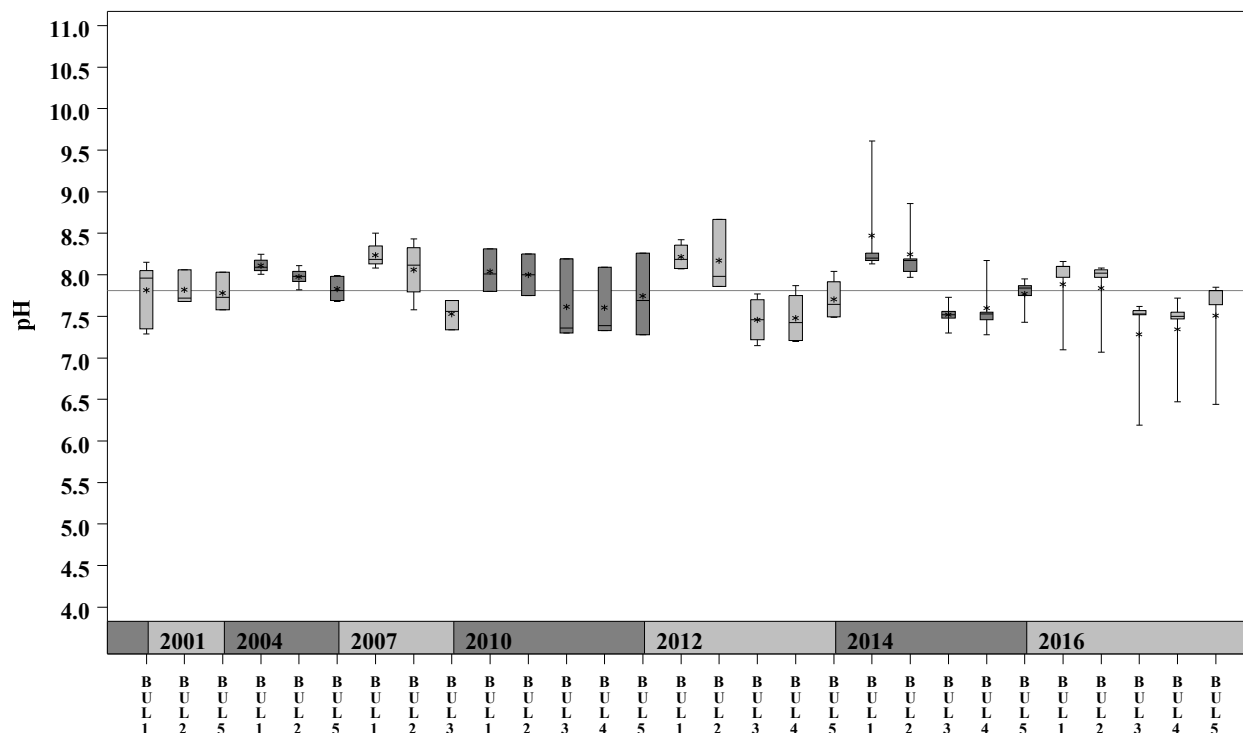
Parameter = TURBIDITY Unit = NTU Watershed = Bull



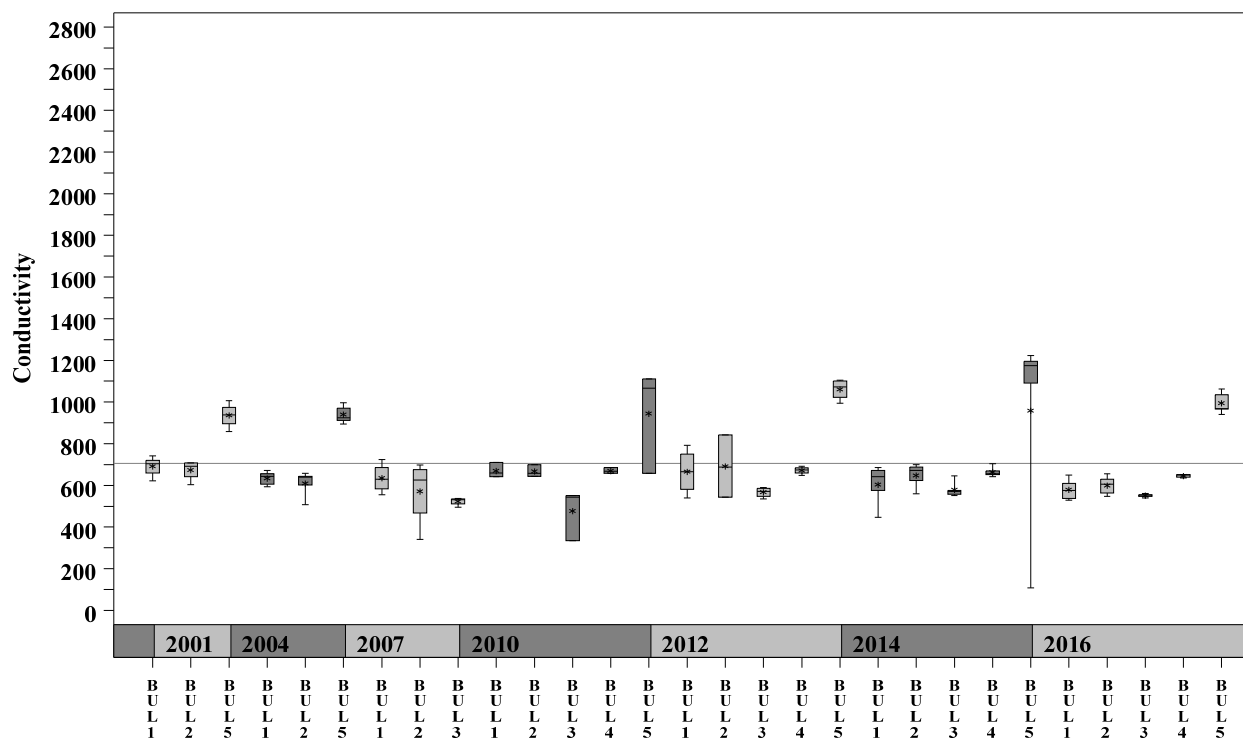
Bull Creek Watershed

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

Parameter=pH Unit=Standard Units Watershed=Bull



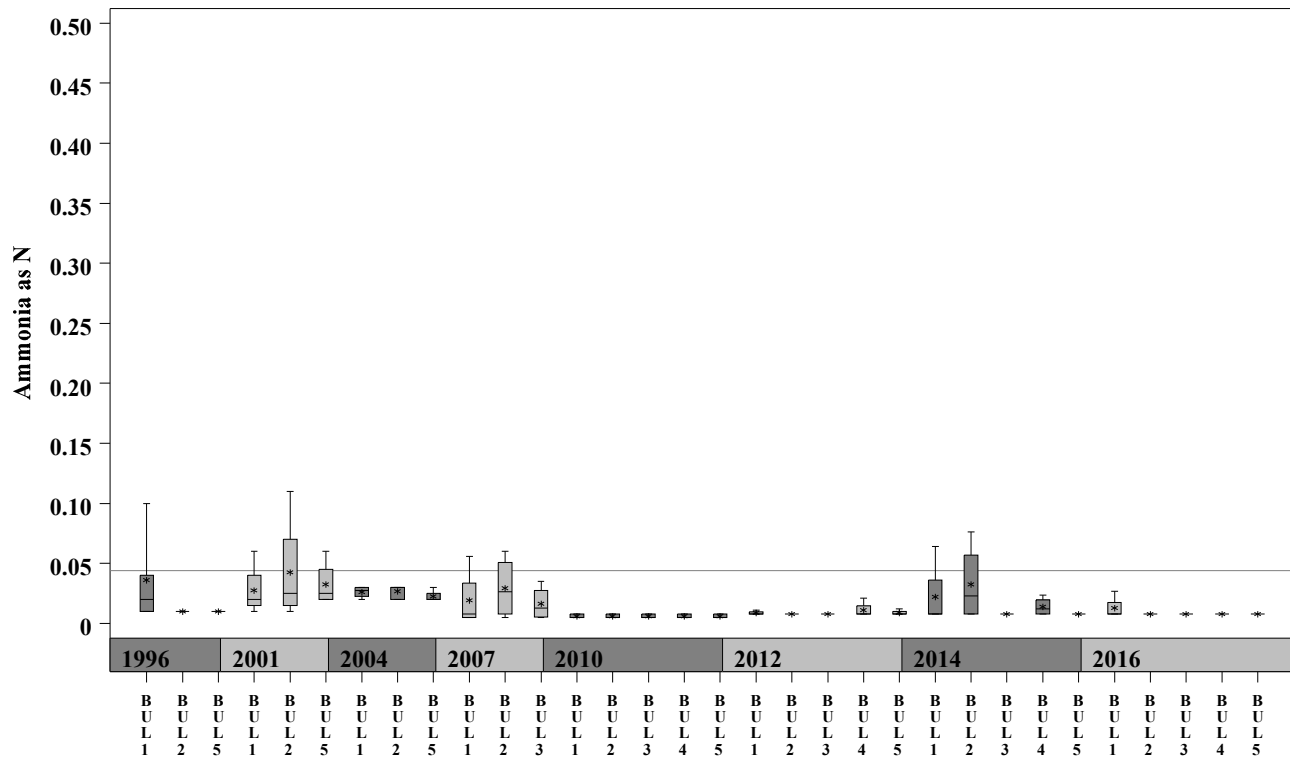
Parameter=CONDUCTIVITY Unit=uS/cm Watershed=Bull



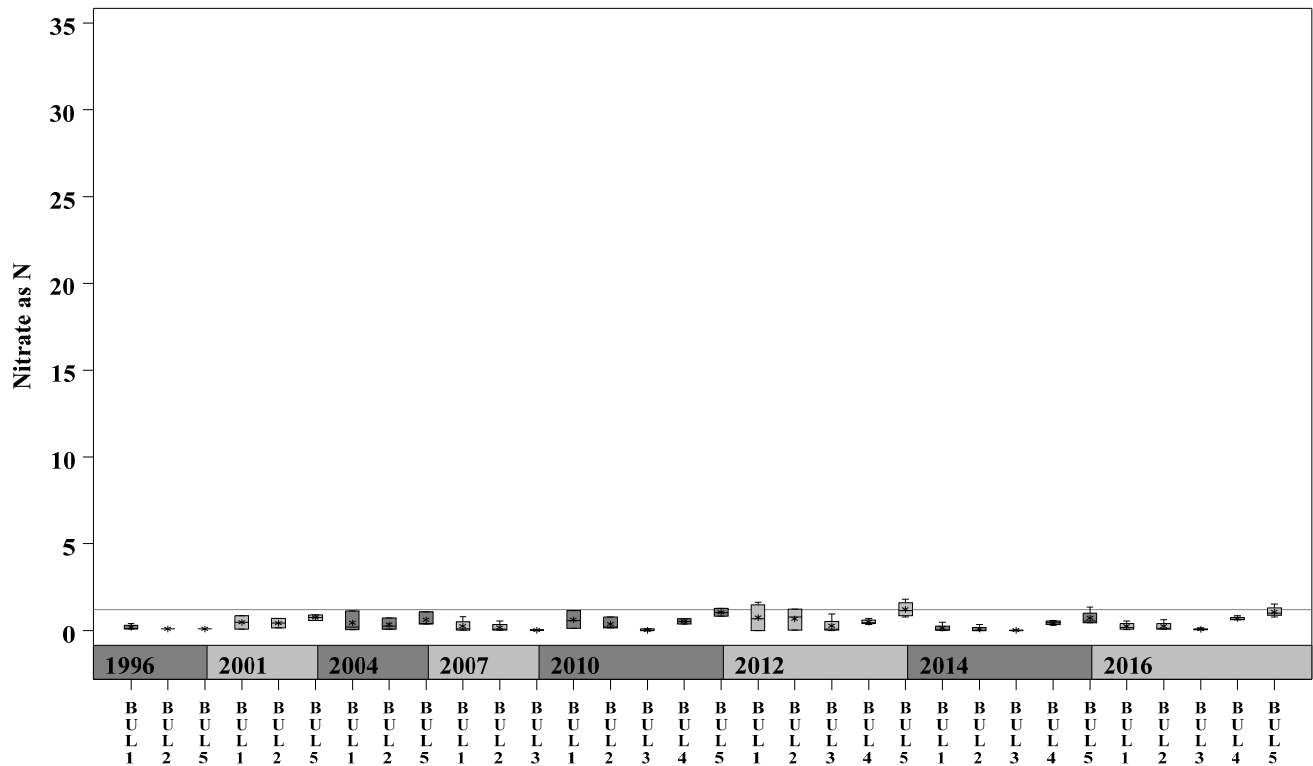
Bull Creek Watershed

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

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



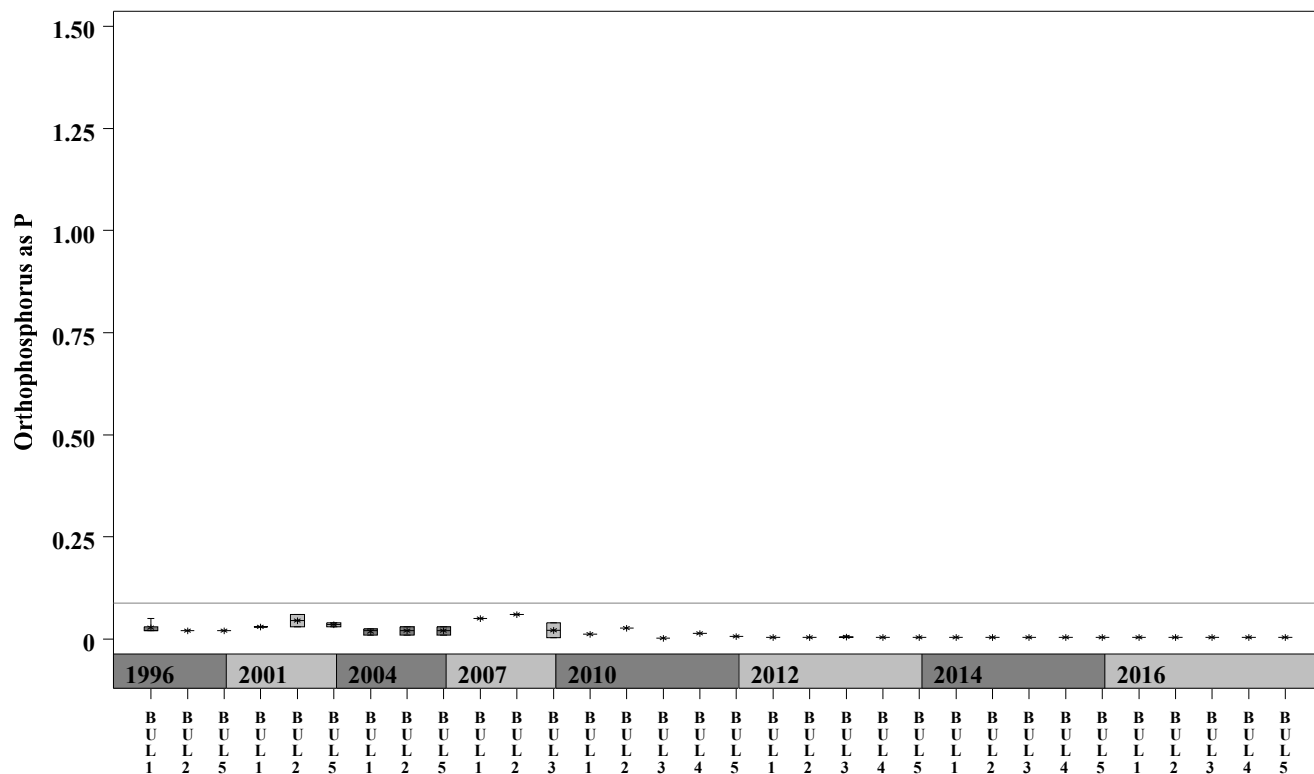
Parameter = NITRATE AS N Unit = mg/L Watershed = Bull



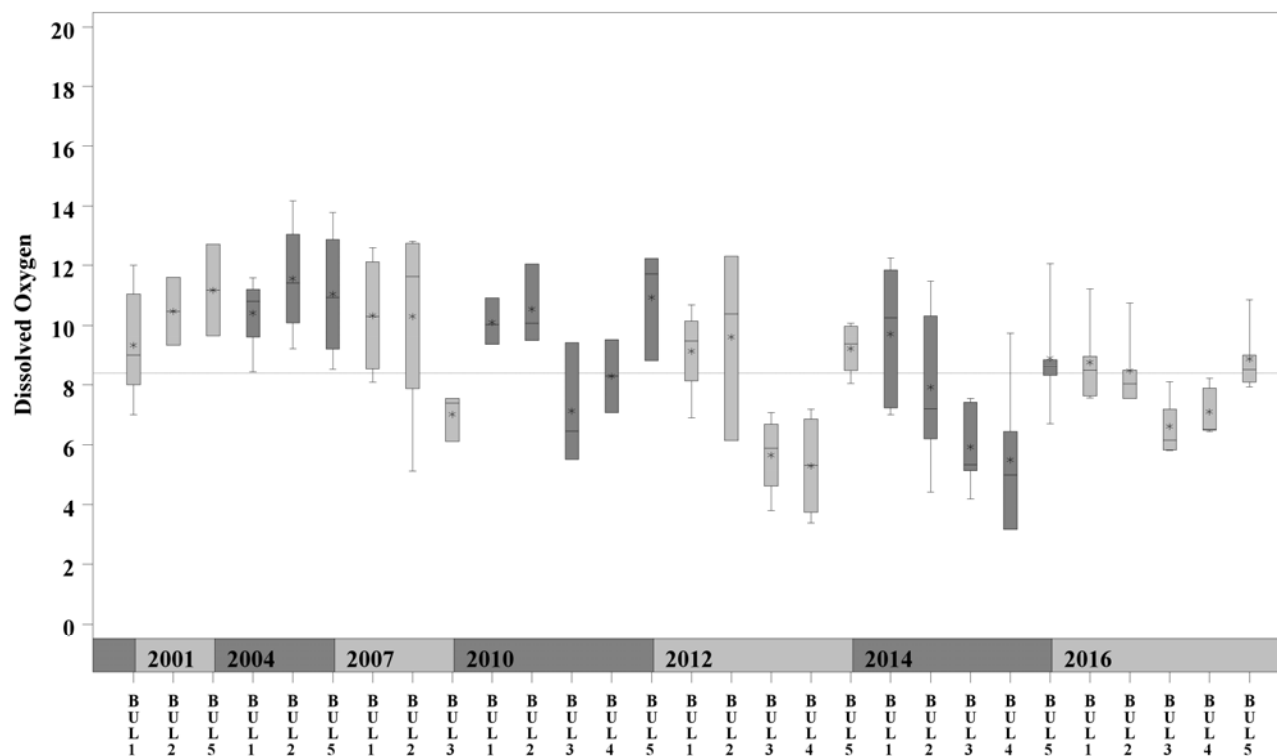
Bull Creek Watershed

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

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



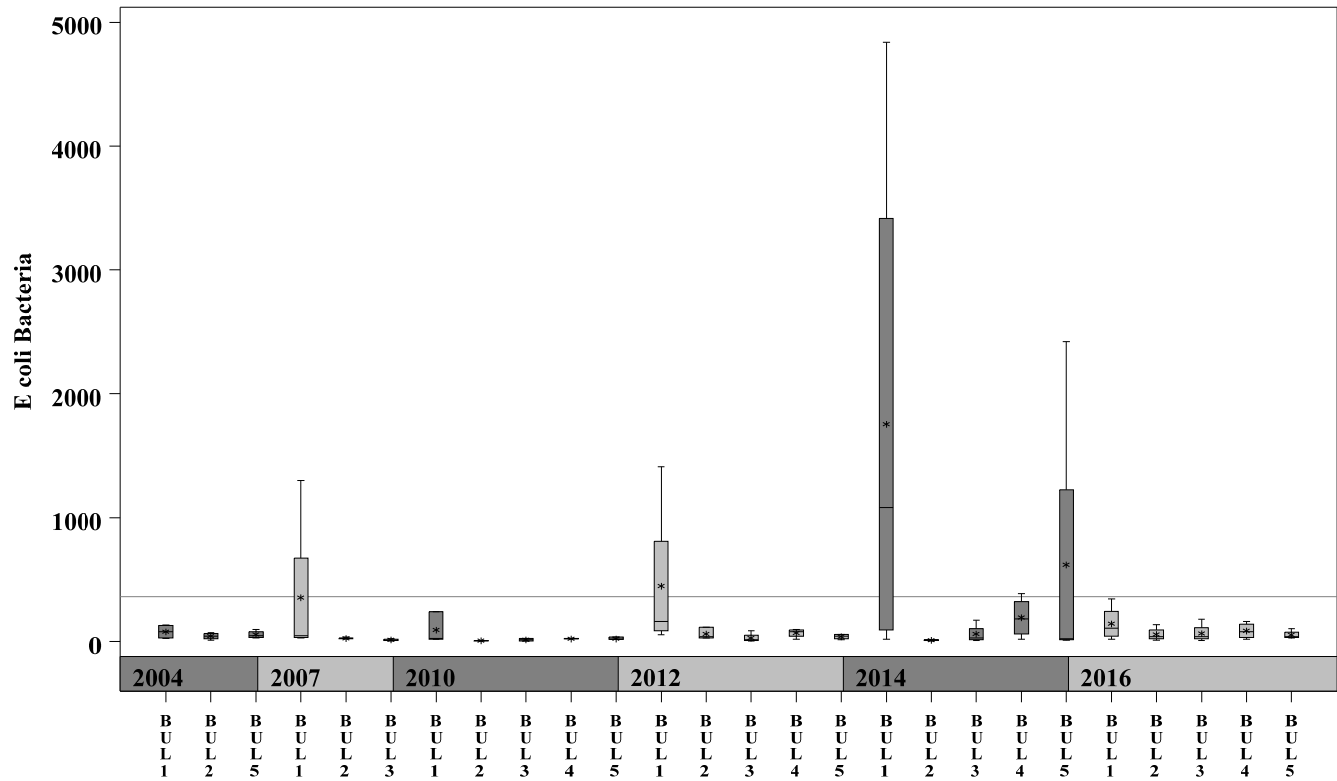
Parameter = DISSOLVED OXYGEN Unit = mg/L Watershed = Bull



Bull Creek Watershed

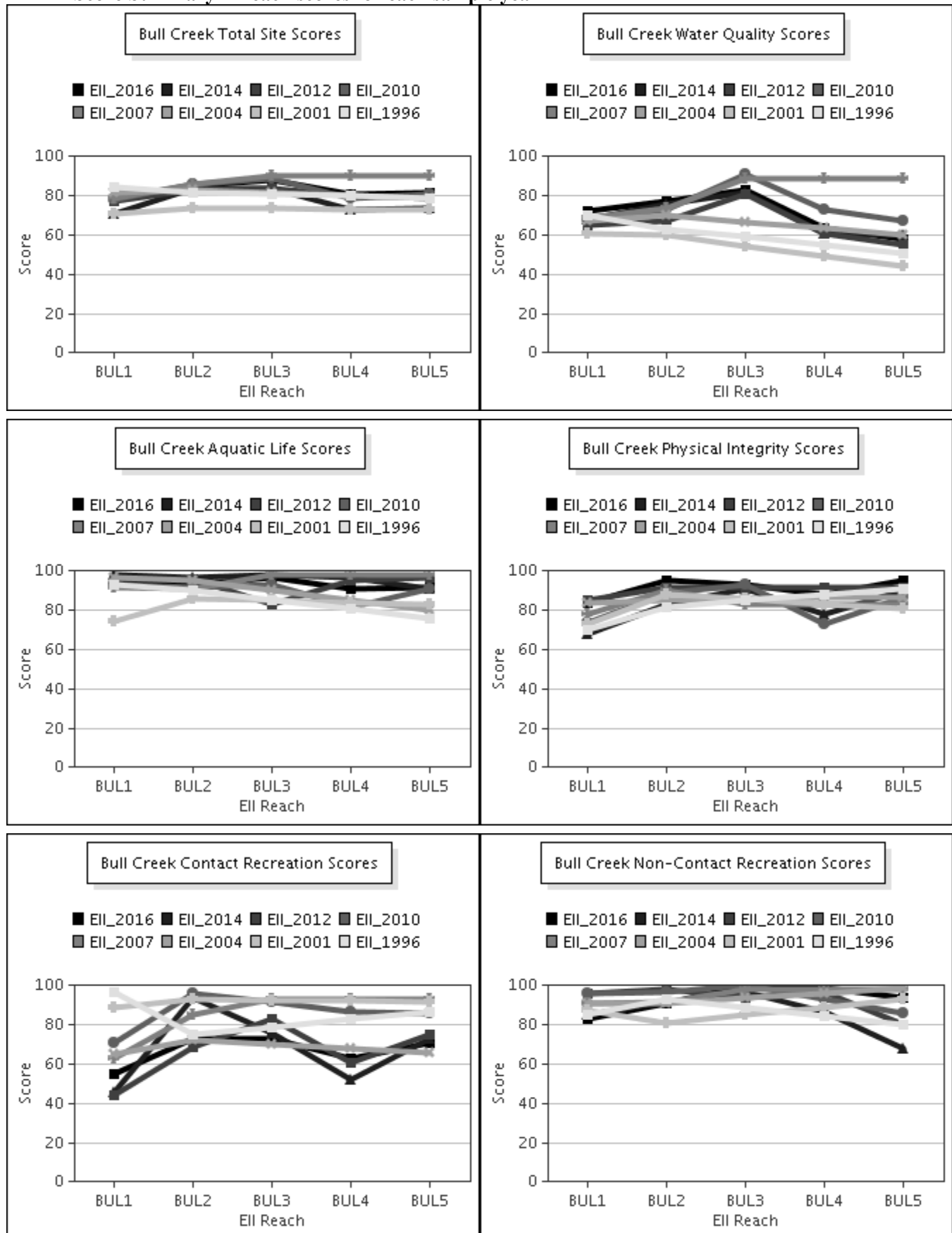
Data Summary Graphs – *E.coli* (Downstream to Upstream by Year)

Parameter=E COLI BACTERIA Unit=MPN/100mL Watershed = Bull



Bull Creek Watershed

Score Summary – Reach scores for each sample year



Bull Creek Watershed

Benthic Macroinvertebrates – Taxa List, Pollution Tolerance Index & Functional Feeding Group for 2016 Sample Sites (Downstream to Upstream)

Benthic Macroinvertebrates - Bull Creek			BUL Trib 6 @ BUL (151) 06/21/2016 (WRE)	BUL Trib 5 ds Hanks (1164) 06/21/2016 (WRE)	BUL us Trib 7 (349) 06/21/2016 (WRE)	BUL @ St Edwards us Dam (920) 06/21/2016 (WRE)	BUL @ LOOP360 (350) 06/21/2016 (WRE)
Benthic Macroinvertebrate ID	PTI	FFG					
Perlesta	0	P					1
Chimarra	2	FC	45	32	106	45	8
Helicopsyche	2	SC	3				
Hydroptila	2	PI,SC		5			
Microcylloepus Pusillus	2	CG,SC	1			13	26
Phylloicus Ornatus	2	SH	1				
Polycentropus / Cernotina	3	FC,P			1		
Suragina Concinna	3	P		1			
Xiphocentron	3	FC	1	6			
Baetodes	4	SC	23		2	29	11
Camelobaetidius	4	CG	2		8	17	27
Fallceon	4	CG,SC	22	13	9	52	31
Macrelmis	4	CG,SC	1			2	
Ostracoda	4	CG,FC					1
Psephenus	4	SC	2	5	10		
Simulium	4	FC	7	12	147	127	16
Aquarius	5	P			1		
Lutrochus	5	CG			1	1	3
Petrophila (Moth)	5	SC				1	1
Argia	6	P	13	19	8	5	
Brechmorhoga Mendax	6	P	2		3		1
Cheumatopsyche	6	FC	41	56	74	37	26
Chironomidae	6	FC,P	22	21	13	49	31
Corydalus Cornutus	6	P				1	2
Hemerodromia	6	CG,P		1			
Hydracarina	6		2	1	4	7	9
Rhagovelia	6	P	1	1	10		
Stenonema Femoratum	6	CG,SC	1		1		
Tanypodinae	6	P				2	
Stenelmis	7	CG,SC	1	2	2	2	2
Caloparyphus/Euparyphus	8	CG,SC		1	1		2
Hirudinea	8	P					1
Hyaella	8	CG,SH	3				
Oligochaeta	8	CG	1	3			2
Physella	9	SC			1		
Tropisternus	10	P			1		
Cambaridae		CG		1			
Dugesia		CG,P	9	1	1	1	2
Melanoides Tuberculatus		SC					1

Bull Creek Watershed

Site Photographs



1164_00-ur-05_26_2010



1164_00-ds-05_26_2010



151_00-us-05_26_2010



151_00-ds-05_26_2010



349_00-us-05_26_2010



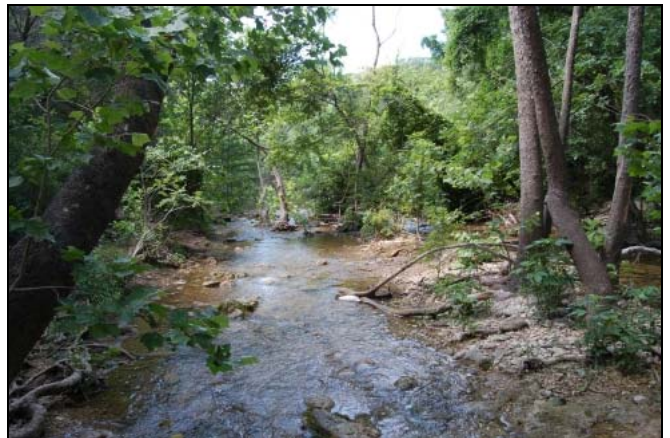
349_00-ds-05_26_2010

Bull Creek Watershed

Site Photographs



920_00-us-05_26_2010



920_00-ds-05_26_2010



350_00-us-05_26_2010



350_00-ds-05_26_2010



347_us_06_18_2007



347_ds_06_18_2007