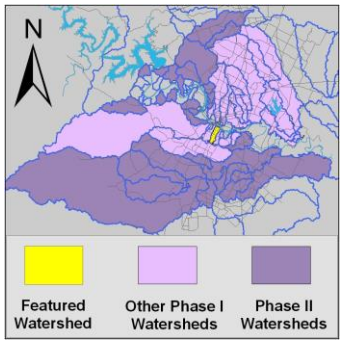
East Bouldin Creek Watershed

Summary Sheet

Catchment	Total area	2 square miles				
	Area in recharge	none				
	Creek length	4 miles				
	Receiving water	Town Lake				
Demographics	2000 population	10,455				
	2030 projected population	12,490				
	30 year projected % increase	19 %				
Land Use	Impervious cover (2003 estimate)	46.4 %				
	Impervious cover (2013 estimate)	54.4 %				
Overall EII Scores	2000	2003	2006	2009	2011	2013
	50	55	53	47	37	58



Flow Regime* for Sample Sites on East Bouldin 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	M-J	Jun	Jun	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	Bio	WQ
121	Alpine	B	B	B	B	B	B	n	n	B	B	B	n	n	n	n	n	B	B	n	n	n	n	n	B	n	n	n	n	n
119	Elizabeth	B	B	B	B	B	B	B	B	B	B	B	n	B	n	B	B	B	B	B	B	B	B	n	B	B		B	B	B
120	S Austin Center	B	B	B	B	B	B	B	n																					
115	Riverside	B	B	B	B	B	B	B	n																					
1338	Post Oak									B	B	B	n	n	n	n	n	B	B	B	B	n	n	n						
5401	Christopher																								B	B	B	n		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 East Bouldin Creek Sites by Year

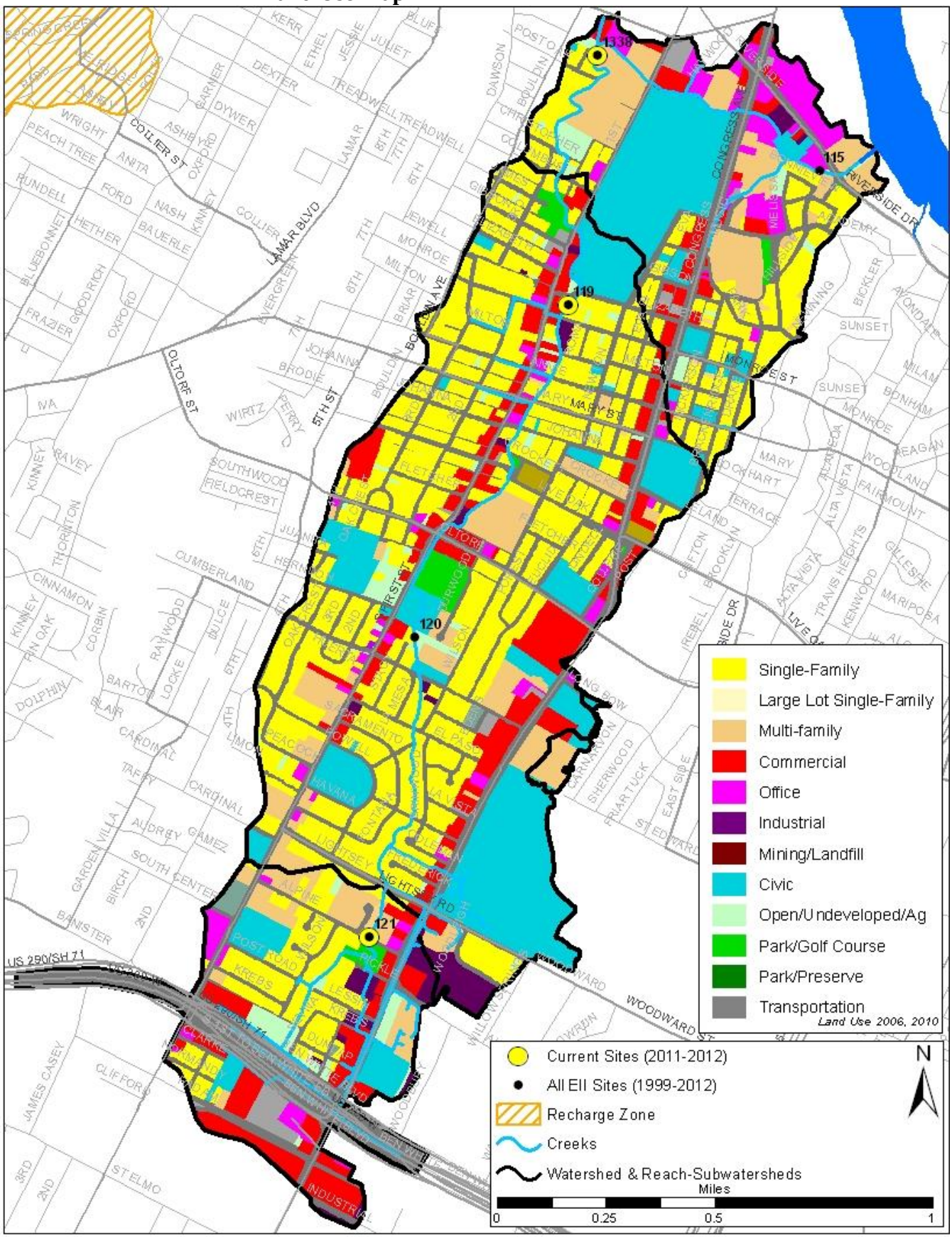
Reach	Site	Site Name	Year	Water Quality	Sediment**	Contact Recreation	Non-Contact Rec.	Physical Integrity	Aquatic Life	Benthic subindex	Diatom subindex	**Total EII Score**
EBO1	115	East Bouldin Creek @ Riverside Dr	2000	39	62	53	49	30	29	35	23	44
EBO2	119	East Bouldin Creek @ Elizabeth St	2000	51	62	57	56	88	29	27	30	57
EBO2	120	East Bouldin Creek @ South Austin Center	2000	55	62	59	67	31	26	27	25	50
EBO3	121	East Bouldin Creek Downstream of W. Alpine	2000	61	62	76	49	22	29	33	25	50
EBO1	115	East Bouldin Creek @ Riverside Dr	2003	35	68	40	46	57	35	52	18	47
EBO2	119	East Bouldin Creek @ Elizabeth St	2003	43	68	52	88	69	22	16	28	57
EBO2	120	East Bouldin Creek @ South Austin Center	2003	54	68	49	71	46	26	26	25	52
EBO3	121	East Bouldin Creek Downstream of W. Alpine	2003	56	68	83	83	46	34	26	42	62
EBO1	1338	East Bouldin Creek @ Post Oak	2006	59	42	34	83	57	57	47	66	55
EBO2	119	East Bouldin Creek @ Elizabeth St	2006	55	42	52	77	60	58	57	58	57
EBO3	121	East Bouldin Creek Downstream of W. Alpine	2006	51	42	43	58	47	26	27	25	45
EBO1	1338	East Bouldin Creek @ Post Oak	2009	59	61	33	57	57				45
EBO2	119	East Bouldin Creek @ Elizabeth St	2009	50	61	37	52	52	51	32	70	51
EBO3	121	East Bouldin Creek Downstream of W. Alpine	2009	68	61	38	20	45	47	47		47
EBO1	1338	East Bouldin Creek @ Post Oak	2011	50		27	40	48				33
EBO2	119	East Bouldin Creek @ Elizabeth St	2011	50		46	42	40	56	25	87	47
EBO3	121	East Bouldin Creek Downstream of W. Alpine	2011				42	30				24
EBO1	5401	East Bouldin Creek @ Christopher	2013	62	62	43	66	68	73	55	90	62
EBO2	119	East Bouldin Creek @ Elizabeth St	2013	45	62	26	73	63	65	55	75	56
EBO3	121	East Bouldin Creek Downstream of W. Alpine	2013	71	62	53	68	48	26	11	41	55

* 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

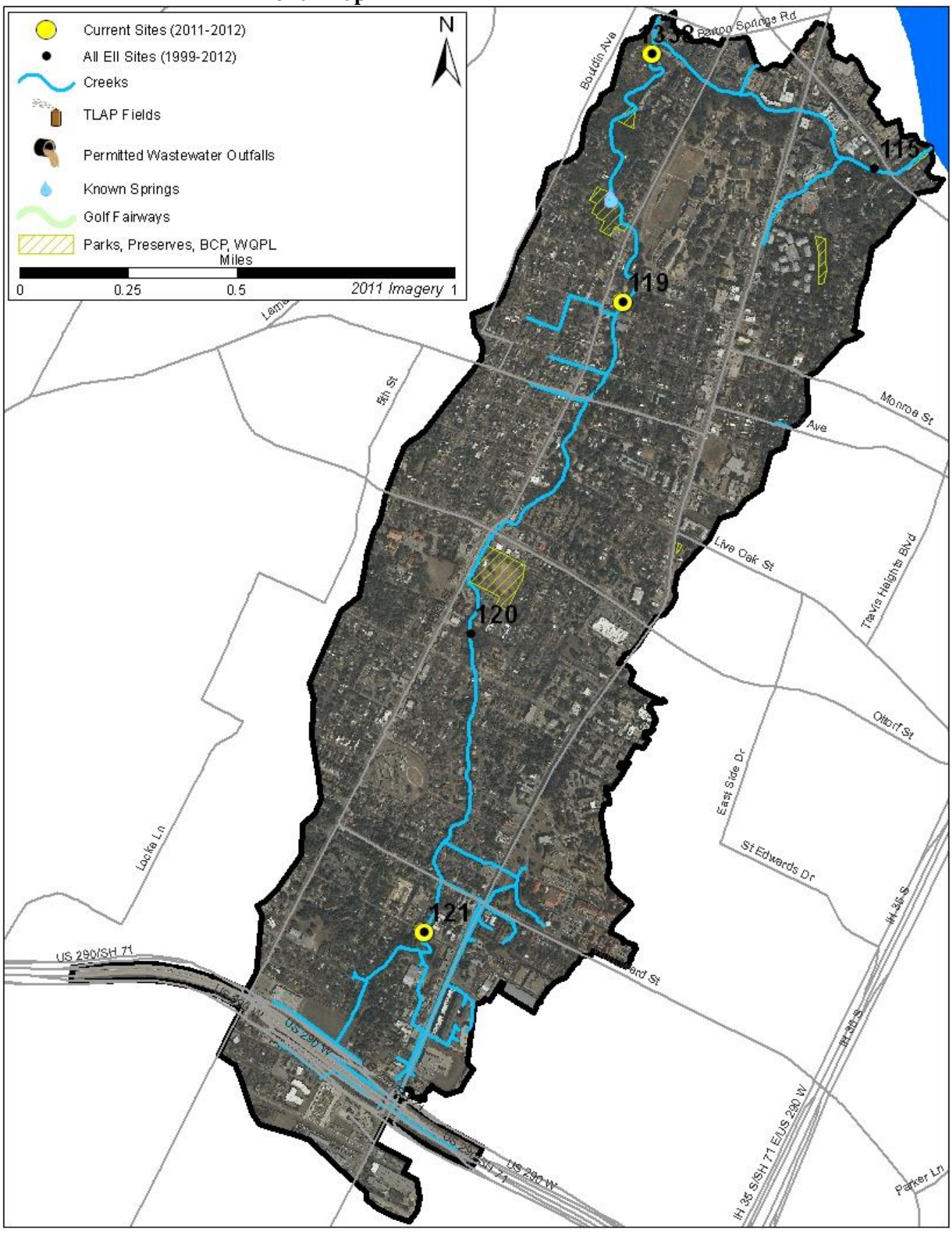
East Bouldin Creek Watershed

Land Use Map



East Bouldin Creek Watershed

Aerial Map



East Bouldin 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:			Qualifiers to the right of value:		
	>	greater than		(*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. <>	Temp. Value	Temp. flag	Cond. <>	Cond. Value	Cond. flag	pH <>	pH Value	pH flag	D.O. <>	D.O. Value	D.O. flag	*E.coli* <>	*E.coli* Value	*E.coli* flag
East Bouldin @ Christopher	5401	EBO1	01/22/2013		11.8			867			7.94			8.8	R		149.7	
East Bouldin @ Christopher	5401	EBO1	04/24/2013		16.5			851			7.76			7.0			198.9	
East Bouldin @ Christopher	5401	EBO1	09/26/2013		24.1			529			7.51			5.8			198.9	
Site 5401 Mean					17.5			749			7.74			7.2			182.5	
East Bouldin @ Elizabeth St	119	EBO2	01/22/2013		11.8			812			7.62			7.4	R		410.6	
East Bouldin @ Elizabeth St	119	EBO2	04/24/2013		14.5			816			7.73			6.4			980.4	
East Bouldin @ Elizabeth St	119	EBO2	06/26/2013		25.5			691			7.33			3.0			2419.6	
East Bouldin @ Elizabeth St	119	EBO2	09/26/2013		23.0			668			7.56			3.5			1203.3	
Site 119 Mean					18.7			747			7.56			5.1			1253.5	
East Bouldin ds West Alpine Rd	121	EBO3	01/22/2013		18.3			633			7.75			11.4			67.7	
Site 121 Mean					18.3			633			7.75			11.4			67.7	
Watershed Mean					18.2			733			7.65			6.7			703.6	

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

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

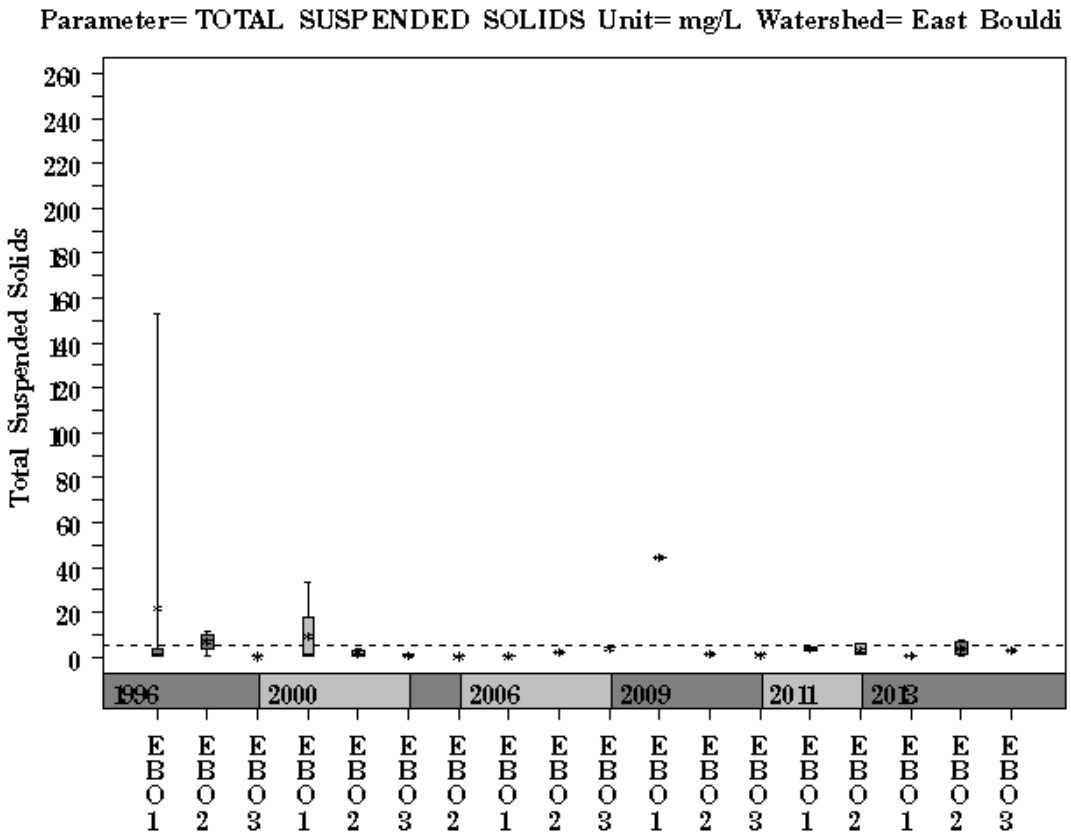
				NH3-N			NO3/NO2			Ortho-P			T.S.S.			Turb.		
Site Name	Site #	Reach	Date	< >	Value	flag	< >	Value	flag	< >	Value	flag	< >	Value	flag	< >	Value	flag
East Bouldin @ Christopher	5401	EBO1	01/22/2013	J	0.012			0.43		<J	0.004		<J	1.0			1.8	
East Bouldin @ Christopher	5401	EBO1	04/24/2013	J	0.018	R		0.62			0.028		<J	1.0			0.9	R
East Bouldin @ Christopher	5401	EBO1	09/26/2013	<J	0.008			0.03			0.024	R	<J	1.0			3.6	
Site 5401 Mean					0.013			0.36			0.019			1.0			2.1	
East Bouldin @ Elizabeth St	119	EBO2	01/22/2013		0.073			1.07		J	0.008		<J	1.0			2.4	
East Bouldin @ Elizabeth St	119	EBO2	04/24/2013		0.038	R		0.84			0.028			7.8			2.8	R
East Bouldin @ Elizabeth St	119	EBO2	06/26/2013		0.046			0.08			0.015			1.3			1.9	
East Bouldin @ Elizabeth St	119	EBO2	09/26/2013		0.087			0.06			0.015			5.8			13.0	
Site 119 Mean					0.061			0.52			0.017			4.0			5.0	
East Bouldin ds West Alpine Rd	121	EBO3	01/22/2013	<J	0.008		J	0.01		<J	0.004			3.0			2.4	
Site 121 Mean					0.008			0.01			0.004			3.0			2.4	
Watershed Mean					0.036			0.39			0.016			2.7			3.6	

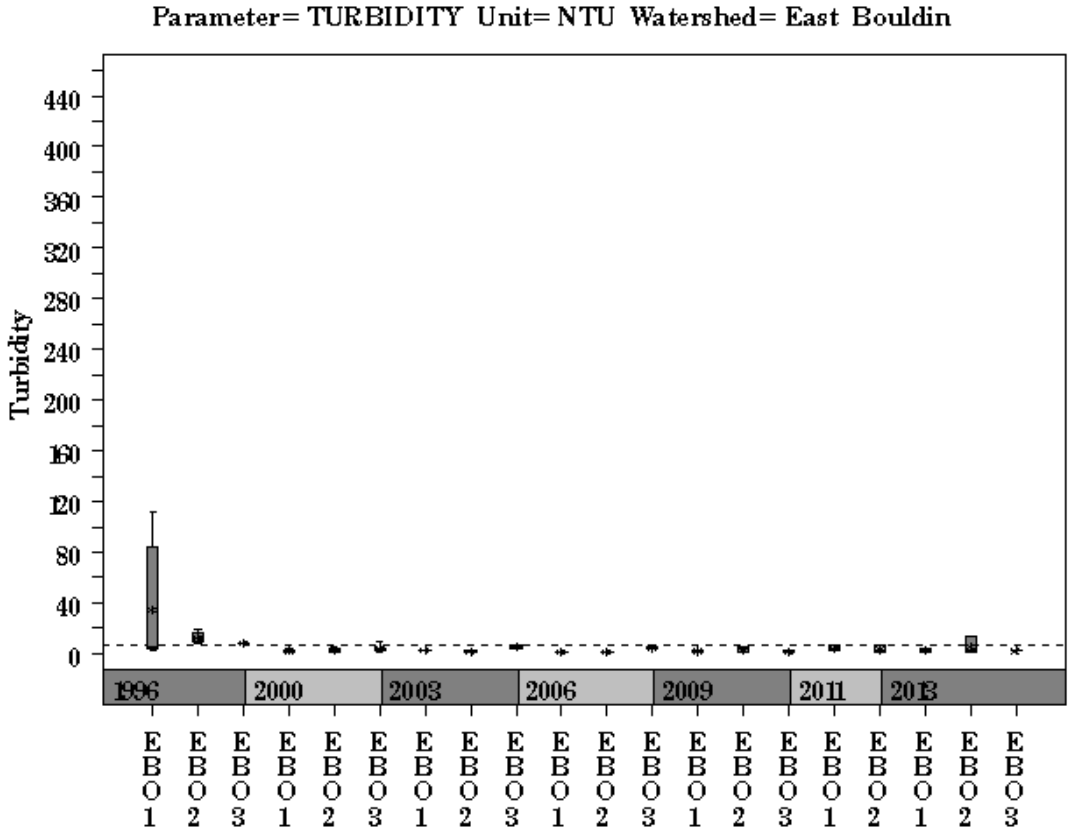
Orange highlighting indicates that the value exceeds one standard deviation from the mean of all E.I.I. sites combined.

Summary Statistics for all 2013 – 2014 E.I.I. Sites Combined.				
Parameter	2013-2014 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

East Bouldin Creek Watershed

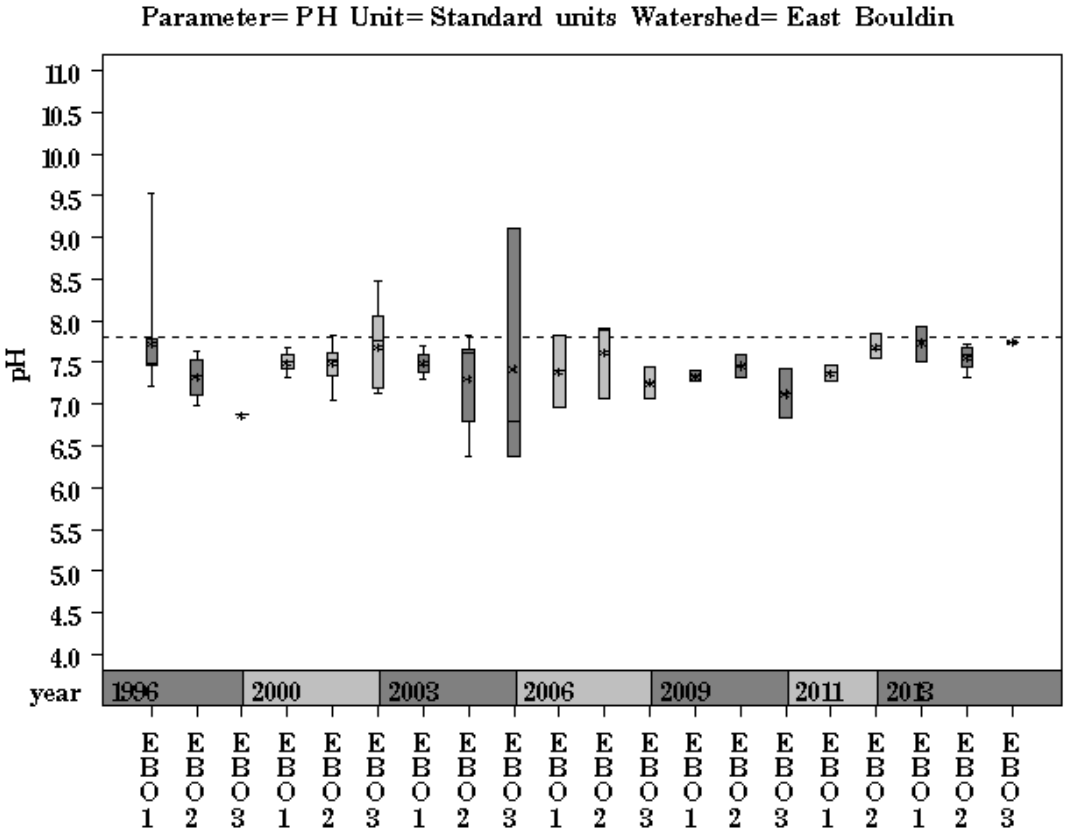
Data Summary Graphs – Total Suspended Solids and Turbidity (Downstream to Upstream by Year)

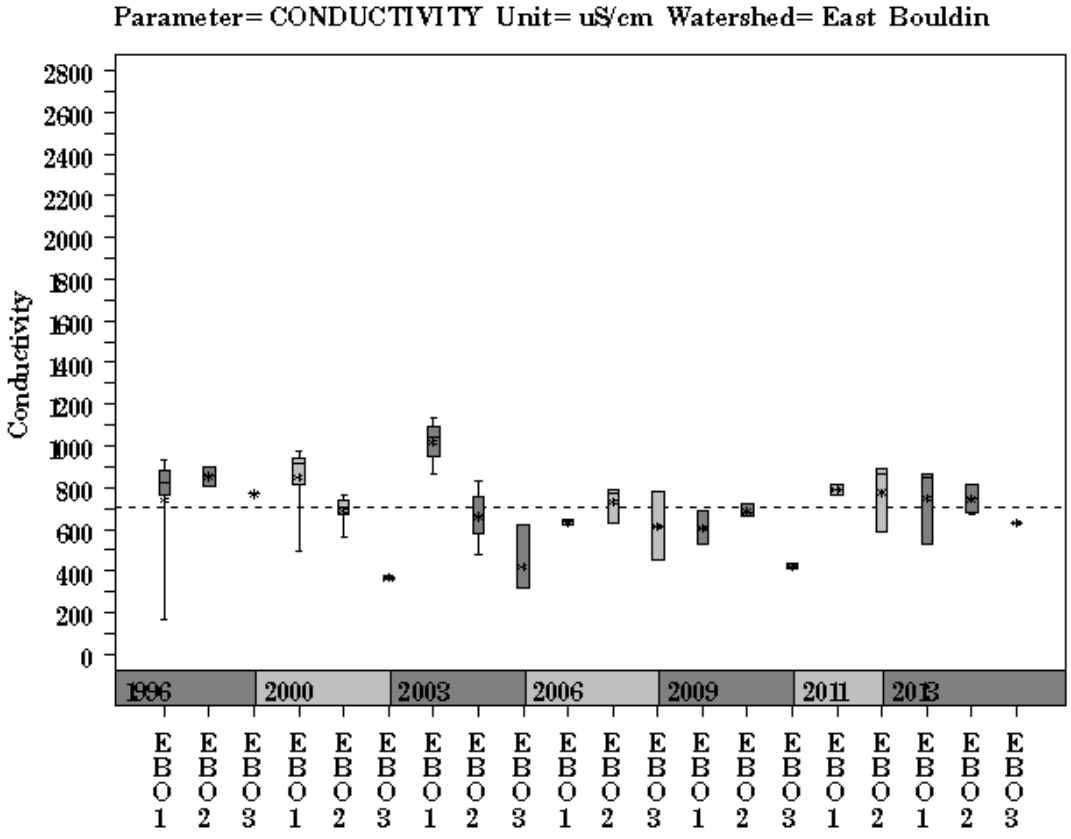




East Bouldin Creek Watershed

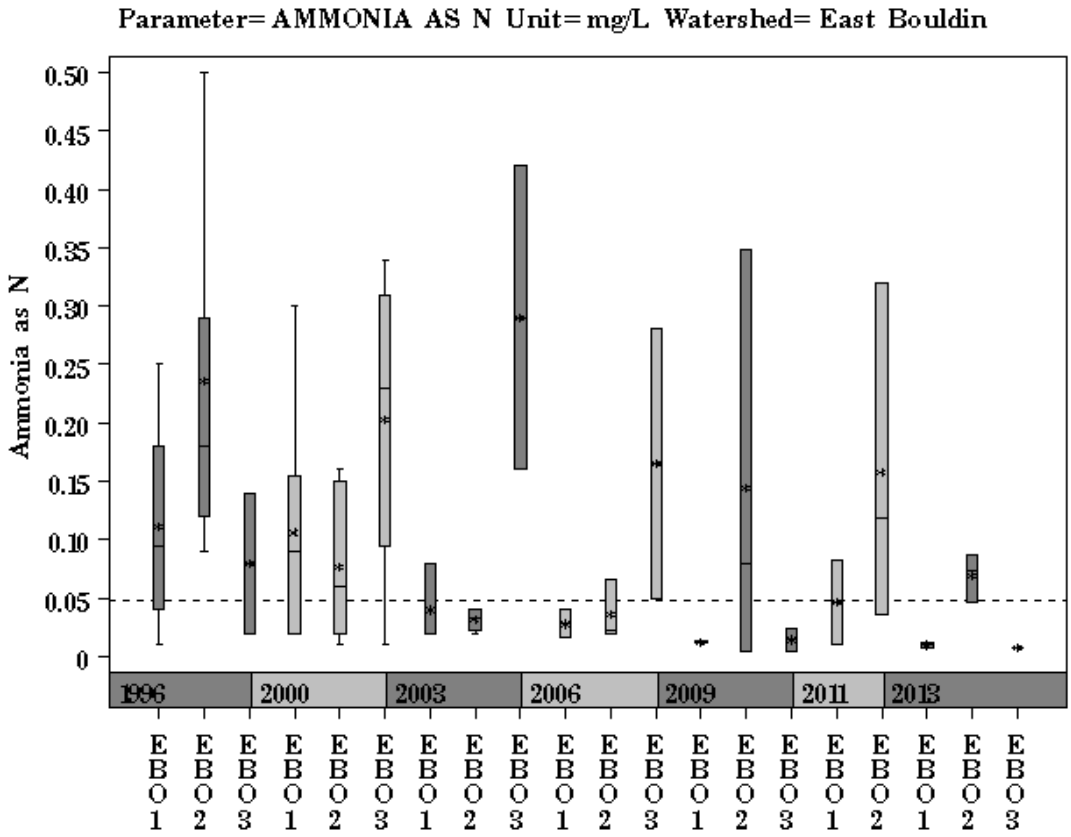
Data Summary Graphs – pH and Conductivity (Downstream to Upstream by Year)

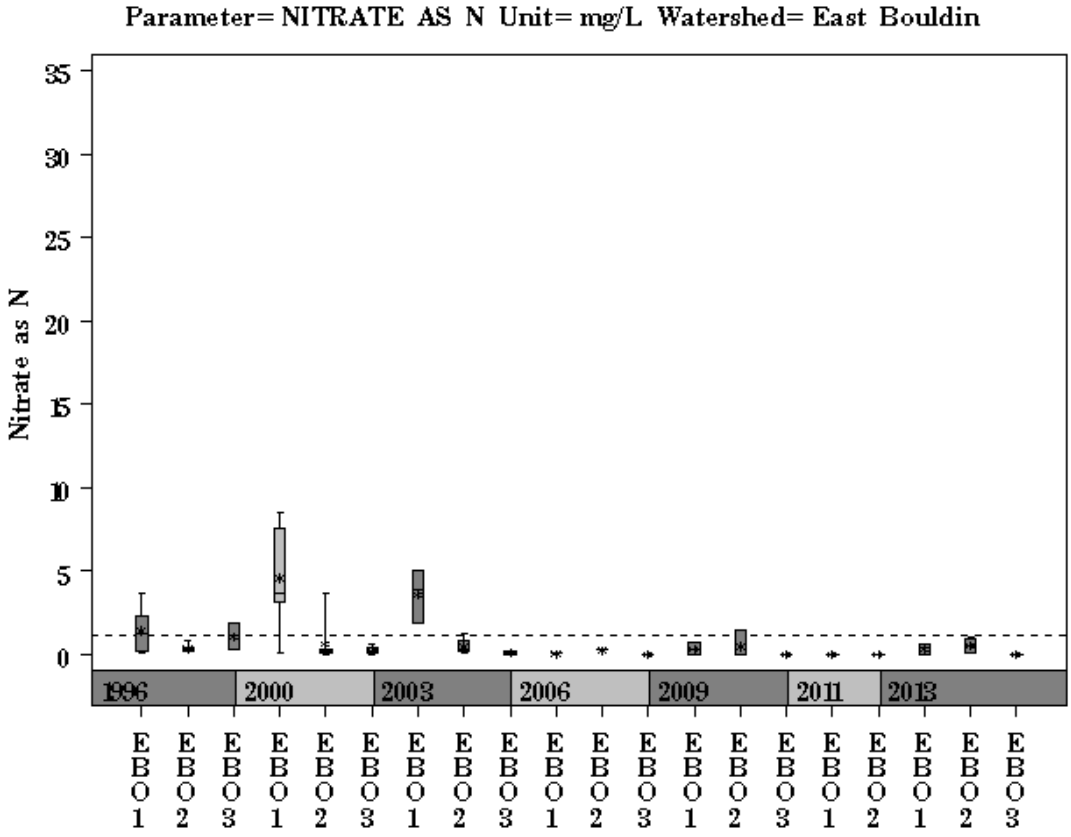




East Bouldin Creek Watershed

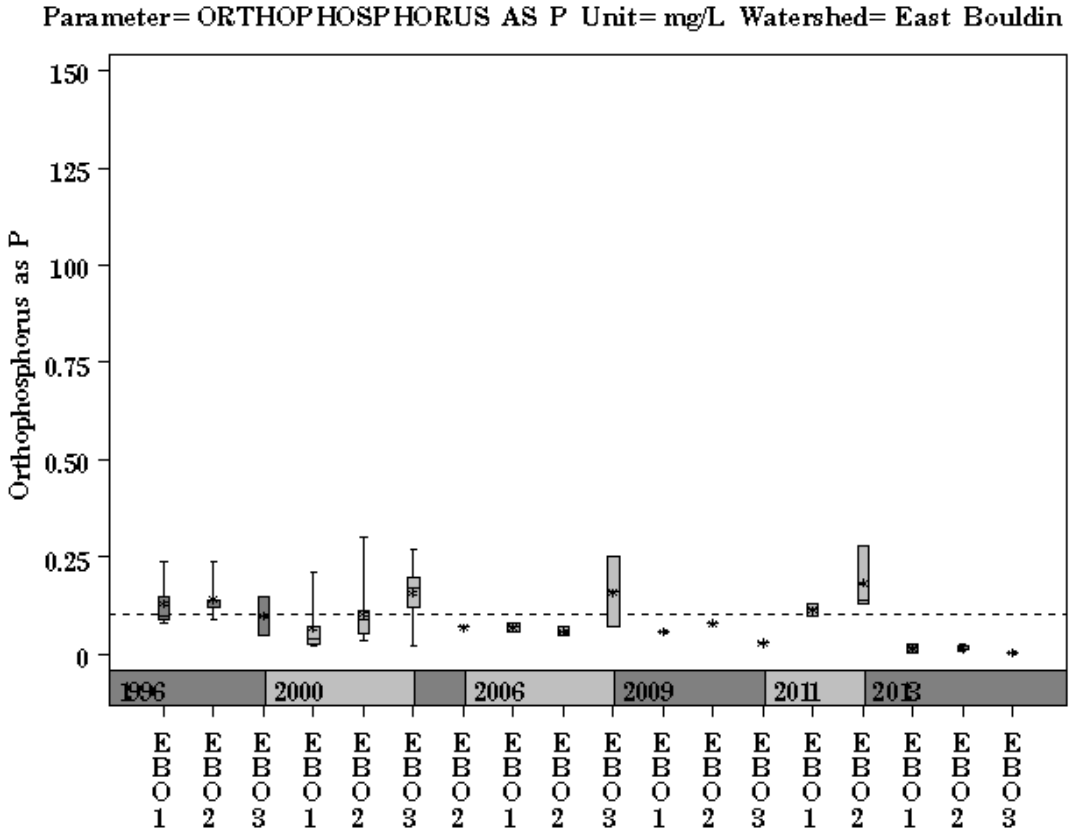
Data Summary Graphs – Ammonia and Nitrate/Nitrite (Downstream to Upstream by Year)

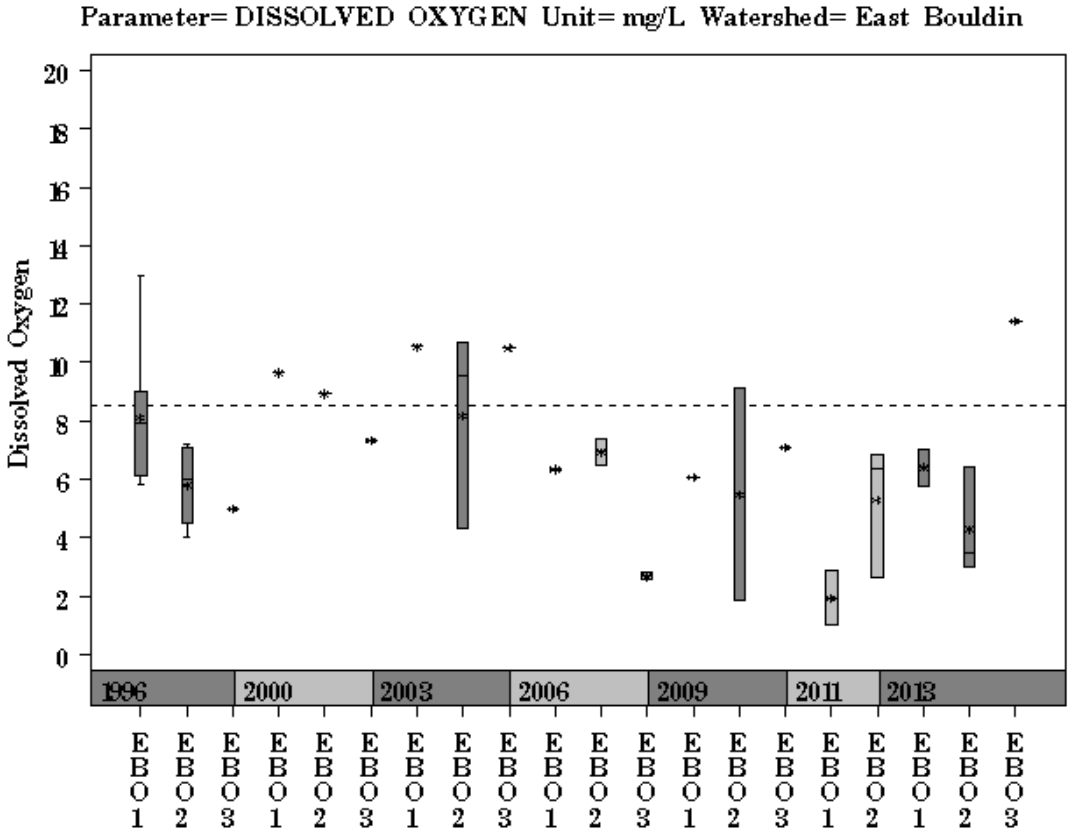




East Bouldin Creek Watershed

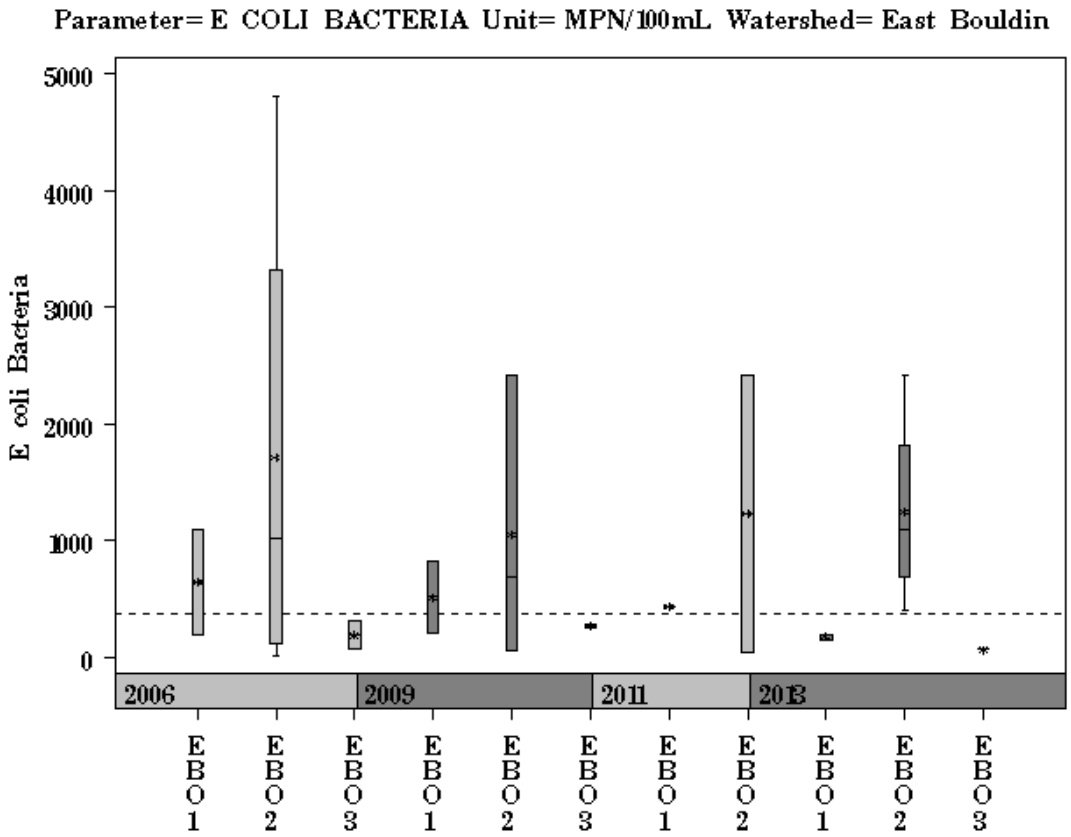
Data Summary Graphs – Orthophosphate and Dissolved Oxygen (Downstream to Upstream by Year)





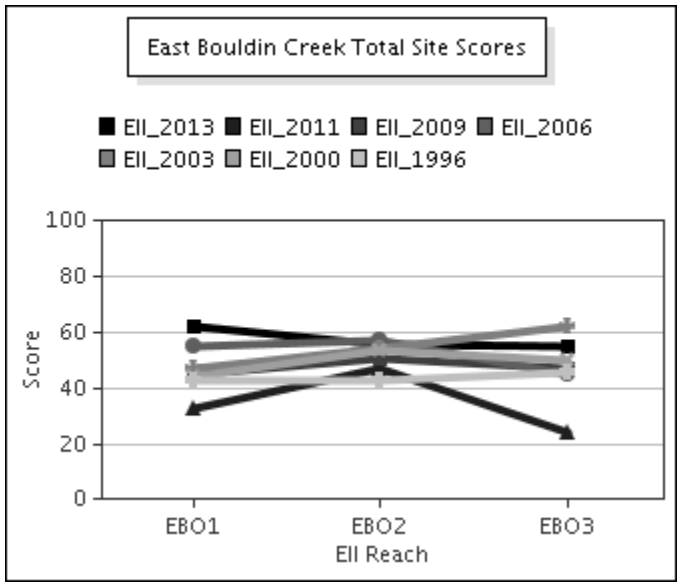
East Bouldin Creek Watershed

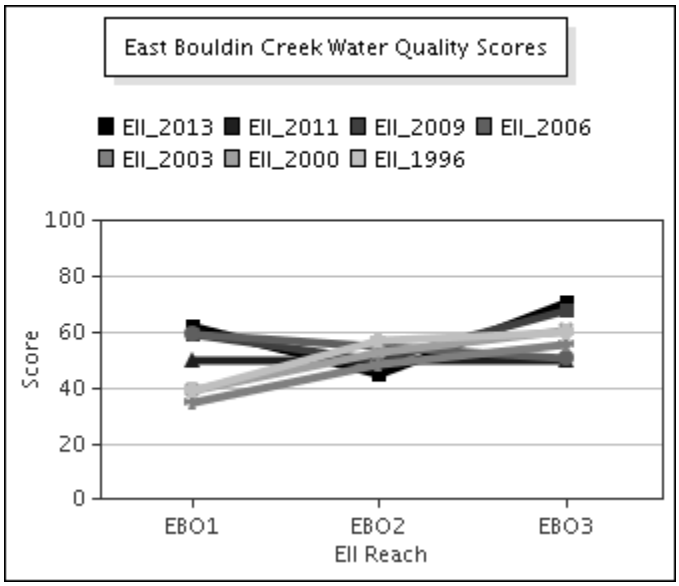
Data Summary Graphs – *E.coli* (Downstream to Upstream by Year)

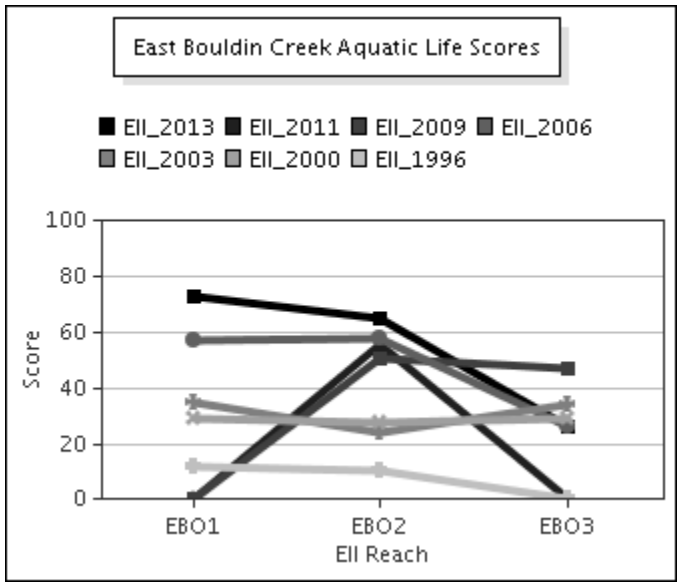


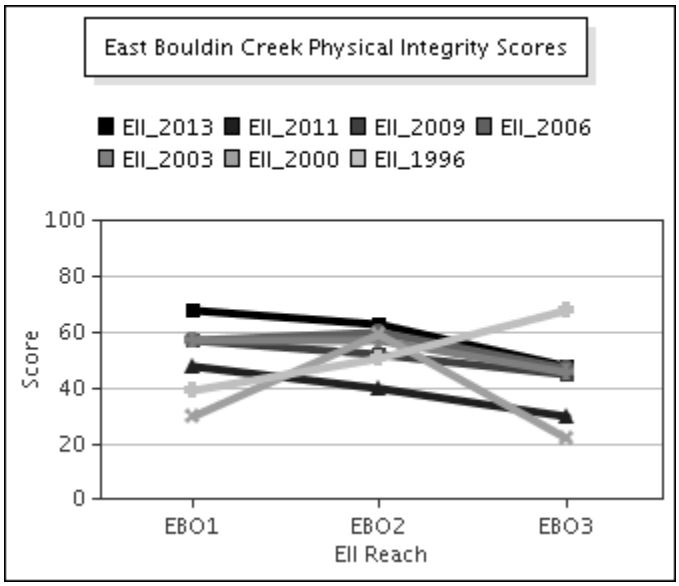
East Bouldin Creek Watershed

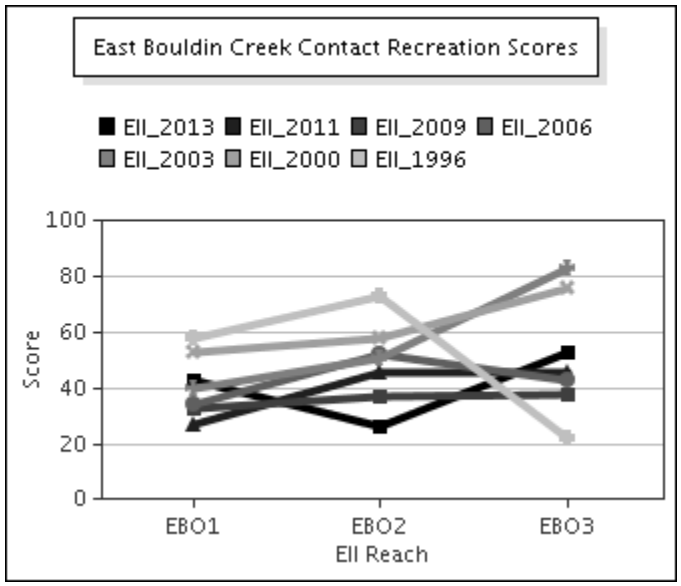
Score Summary – Reach scores for each sample year

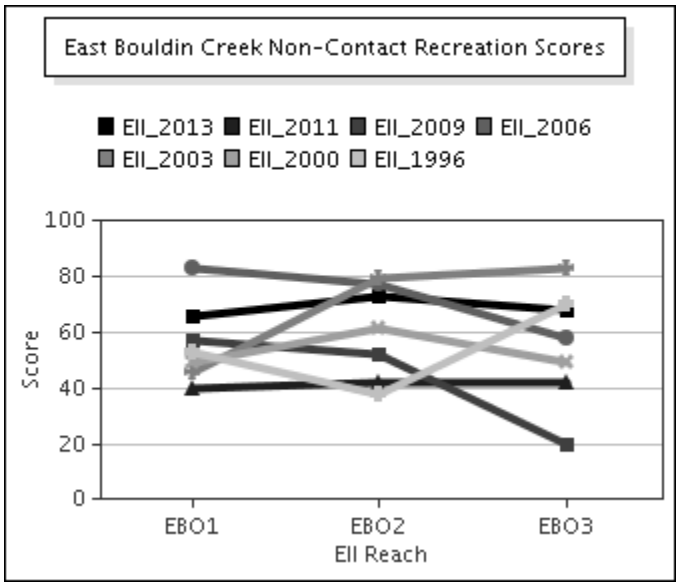












East Bouldin Creek Watershed

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

Benthic Macroinvertebrate ID	PTI	FFG	East Bouldin @ Christopher (Site 5401)	East Bouldin @ Elizabeth St (Site 119)	East Bouldin ds West Alpine Rd (Site 121)
Fallceon quilleri	4	SC,CG	90	182	
Simulium sp.	4	FC	2		
Argia sp.	6	P	17	4	
Cheumatopsyche sp.	6	FC	306	9	
Chironomidae	6	P,FC	100	23	45
Hydracarina	6				3
Tanypodinae	6	P	4	5	1
Scirtidae	7	SH,SC,CG		1	
Oligochaeta	8	CG		4	6
Physella sp.	9	SC	36		3
Trepobates sp.	10	P	1		
Dugesia sp.		P,CG	58	44	2

East Bouldin Creek Watershed

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

Scoring Metric	East Bouldin @ Christopher (Site 5401)	East Bouldin @ Elizabeth St (Site 119)	East Bouldin ds West Alpine Rd (Site 121)
Number of Taxa *	8	7	5
Hilsenhoff Biotic Index *	5.9	4.4	6.4
Number of Ephemeroptera Taxa *	1	1	0
Percent of Total as Chironomidae *	17	10	77
Number of EPT Taxa *	2	2	0
Percent of Total as EPT *	64	70	0
Percent of Total as Predator *	29	28	80
Number of Intolerant Taxa *	2	1	0
Percent Dominance (Top 3 Taxa) *	81	92	90
EPT / EPT + Chironomidae	1	1	0
Number of Diptera Taxa	2	1	1
Number of Non-Insect Taxa	2	2	4
Number of Organisms	614	272	60
Percent Dominance (Top 1 Taxa)	50	67	75
Percent of Total as Collector / Gatherer	24	85	13
Percent of Total as Dominant Guild (FFG)	67	85	80
Percent of Total as Elmidae	0	0	0
Percent of Total as Filterers	67	14	77
Percent of Total as Grazers (PI & SC)	21	67	5
Percent of Total as Tolerant Organisms	6	0	5
Percent of Trichoptera as Hydropsychidae	100	100	0
Ratio of Intolerant : Tolerant Organisms	0.19	3.95	0.00
TCEQ Qualitative Aquatic Life Use Score	17	19	17
TCEQ Quantitative Aquatic Life Use Score	29	29	15

*** 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%.

East Bouldin Creek Watershed

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

Diatom Species Name	PTI	East Bouldin @ Christopher (Site 5401)	East Bouldin @ Elizabeth St (Site 119)	East Bouldin ds West Alpine Rd (Site 121)
Amphora inariensis	4		10	
Achnanthes exigua	3			35
Achnanthidium minutissimum	3	162	110	4
Achnanthidium pyrenaicum	3	2	7	2
Amphora libyca	3	1		
Amphora pediculus	3	22	117	13
Caloneis bacillum	3			2
Cymbella affinis	3	3		
Denticula kuetzingii	3	34	2	
Encyonema silesiacum	3	2		
Eunotia bilunaris	3			5
Fragilaria capucina	3	4		
Geisslera decussis	3	6		
Gomphonema affine	3	3		
Gophonema angustum	3			2
Gomphonema clavatum	3			2
Halamphora montana	3	10	1	5
Navicula cryptocephala	3	1		4
Navicula cryptotenella	3			5
Navicula kotschyi	3		1	
Navicula radiosa	3	2		2
Navicula rhynchocephala	3	2		
Nitzschia fonticola	3			10
Nitzschia linearis	3			2
Pinnularia microstauron	3			2
Reimeria sinuata	3	4	10	
Rhoicosphenia abbreviata	3	1	34	2
Achnantheiopsis lanceolata	2	98	36	6
Cyclotella meneghiniana	2	2		5
Diadesmis confervacea	2	1		
Encyonema minutum	2	8		
Gomphonema angustatum	2			2
Melosira varians	2	19		
Navicula menisculus	2	1		
Navicula recens	2		1	
Navicula trivialis	2			1
Navicula veneta	2		2	11
Nitzschia amphibia	2	2	4	24
Nitzschia clausii	2			3
Nitzschia inconspicua	2	20	2	
Sellaphora pupula	2	6		45
Surirella angusta	2	2		
Synedra ulna	2	4		
Tryblionella apiculata	2	2		
Gomphonema parvulum	1	35		
Navicula arvensis	1			158
Nitzschia palea	1			16
Sellaphora seminulum	1			11
Achnanthes rupestoides			10	
Achnanthidium gracillimum				2
Cocconeis plancentula var. *lineata*		2	103	
Eolimna minima		31	50	118
Navicula antonii		6		
Navicula rostellata				1
Stauroneis borrichii		2		

East Bouldin Creek Watershed

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

Scoring Metric	East Bouldin @ Christopher (Site 5401)	East Bouldin @ Elizabeth St (Site 119)	East Bouldin ds West Alpine Rd (Site 121)
Cymbella Richness	4	1	0
Number of organisms	500	500	500
Number of taxa	33	17	30
Percent motile taxa	10	2	59
Percent similarity to reference condition	39	40	11
Pollution tolerance index	2.49	2.90	1.77

*** 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.


115_t00-us-02_13_2001


115_t00-us-03_11_2003


119_t00-us-07_05_2006


119-t00-ds-06-01-2009

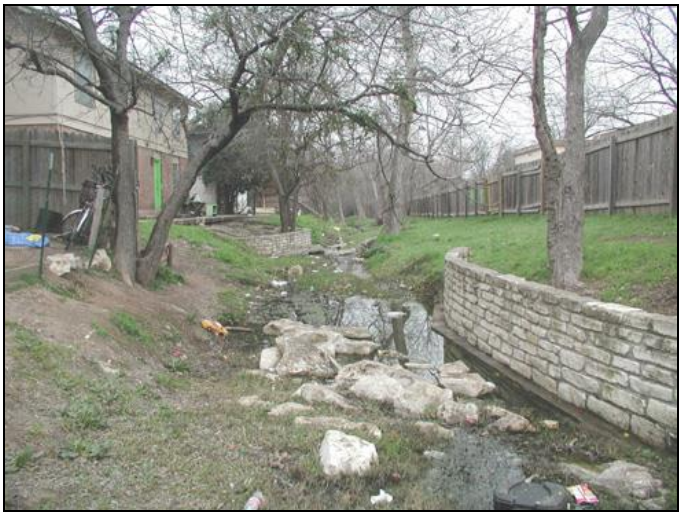

120_t00-ds-02_13_2001


120_t00-ur-03_10_2003

East Bouldin Creek Watershed

Site Photographs

120_t00-us-02_13_2001



121_t00-ds-02_12_2001

121_t00-us-07_05_2006

121_t00-ds-06_03_2009

1338_t00-us1-07_06_2006

1338_t00-ds-06_03_2009

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