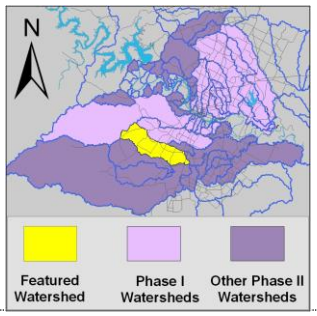
Slaughter Creek Watershed

Summary Sheet

Catchment	Total area	30.7 sq. miles					
	Area in recharge	10.7 sq. miles					
	Creek length	18 miles					
	Receiving water	Onion Creek					
Demographics	2000 population	33,471					
	2030 projected population	76,579					
	30 year projected % increase	129 %					
Land Use	Impervious cover (2003 estimate)	9.0 %					
	Impervious cover (2013 estimate)	19.4 %					
Overall EII Scores	2001	2004	2007	2010	2012	2014	
	75	65	77	79	70	77	



Flow Regime* for Sample Sites on Slaughter Creek

Site	Site Name	1999	2001						2004						2007					2010				2011	2012				2014					
		Jan	Jan	Mar	Mar	Jun	Sep	Dec	Mar	May	May	Jun	Oct	Dec	Feb	May	Jun	Sep	Dec	Mar	May	May	Oct	Dec	Mar	Apr	Jul	Sep	Jan	Apr	May	Jun	Jul	Sep
		WQ	Bio	WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	Bio	WQ	WQ	WQ	Bio	Bio	WQ	WQ
623	FM 1826								B			B	n	B	B	B	B	B	B	B	B	B	B	n	B	B	B	n	B	B	B		B	n
1086	Young	B	B	B	S	n	n	B	B	B	B	B	n	B																					
1084	Trib @ HWY 45	B	B	B	B	n	B	B	B	n		B	n	B																					
1085	Escarpment	B	B	B	B	n	n	B	n	n		n	n	B																					
1082	Pine Vly	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B		B	B	B
1083	River Oaks	B	B	B	B	n	B	B	B	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 Slaughter Creek Sites by Year

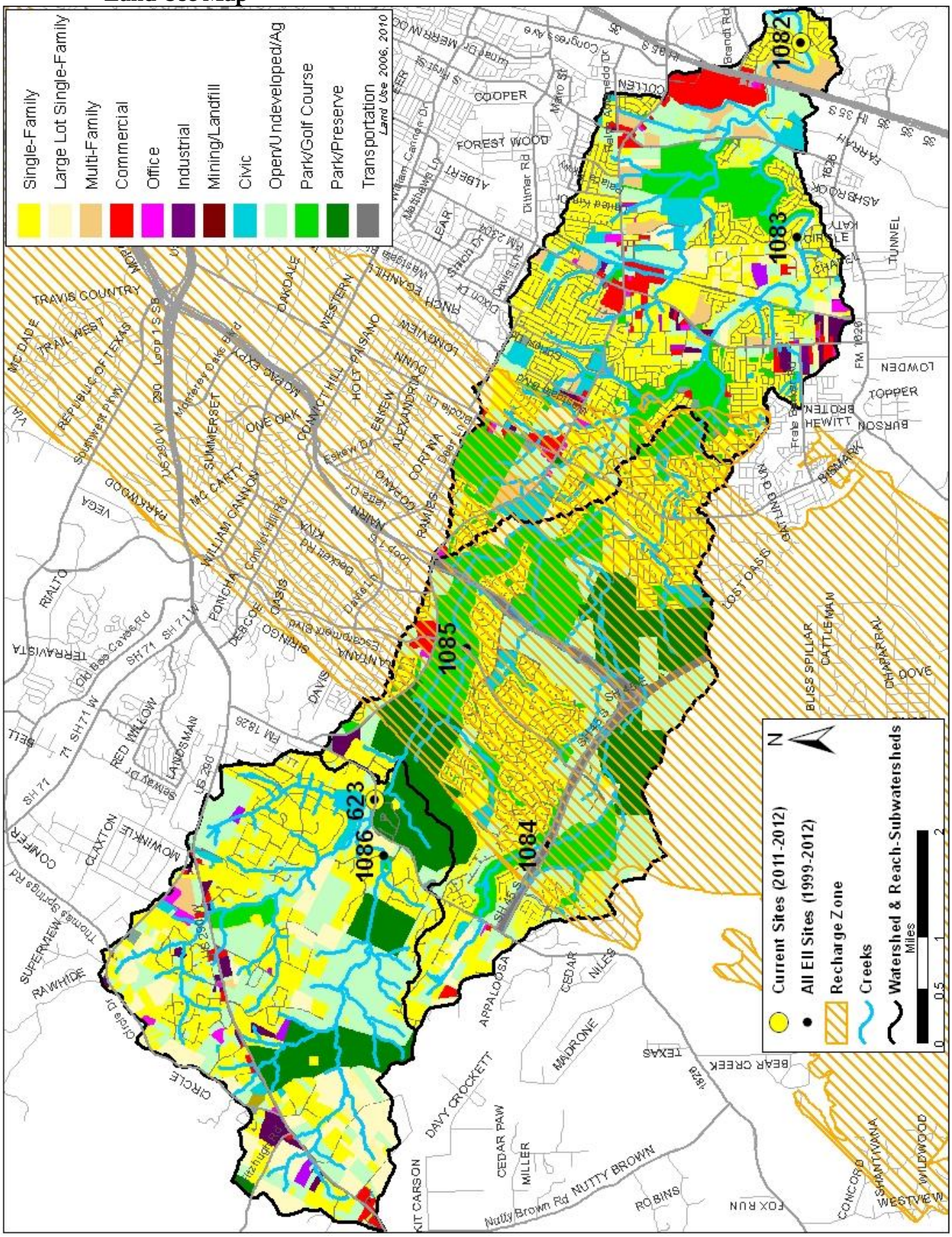
Reach	Site	Site Name	Year	Water Quality	Sediment**	Contact Rec.	Non-Contact Rec.	Physical Integrity	Aquatic Life	Benthic subindex	Diatom subindex	Total EII Score
SLA1	1082	Slaughter Creek @ Pine Valley Drive	1998	73	70	82	63	71	63	67	58	70
SLA1	1083	Slaughter Creek @ River Oaks Drive	1998	74	70	88	77	83	67	61	72	77
SLA2	1084	Slaughter Creek Branch @ Hwy 45 West	1998	70	70	86	46	74	62	72	52	68
SLA2	1085	Slaughter Creek @ Escarpment Blvd	1998	73	70	95	93	89	83	75	90	84
SLA3	1086	Slaughter Creek @ Young Lane	1998	75	70	87	96	80	68	67	68	79
SLA1	1082	Slaughter Creek @ Pine Valley Drive	2001	62	86	96	58	70	43	40	45	66
SLA1	1083	Slaughter Creek @ River Oaks Drive	2001	47	86	82	88	74	56	46	65	69
SLA2	1084	Slaughter Creek Branch @ Hwy 45 West	2001	67	86	87	80	72	59	57	61	72
SLA2	1085	Slaughter Creek @ Escarpment Blvd	2001	63	86	88	91	85	68	52	83	76
SLA3	1086	Slaughter Creek @ Young Lane	2001	75	86	48	100	96	75	70	80	75
SLA1	1082	Slaughter Creek @ Pine Valley Drive	2004	62	83	67	78	95	60	50	70	74
SLA1	1083	Slaughter Creek @ River Oaks Drive	2004	64	83	48	83	76	54	48	60	68
SLA2	1084	Slaughter Creek Branch @ Hwy 45 West	2004	60	83	62	78	43				54
SLA2	1085	Slaughter Creek @ Escarpment Blvd	2004	54	83	47	68	64				53
SLA3	1086	Slaughter Creek @ Young Lane	2004	67	83	51	93	82	82	80	84	76
SLA1	1082	Slaughter Creek @ Pine Valley Drive	2007	62	81	79	78	85	61	46	75	74
SLA3	623	Slaughter Creek @ FM 1826 (USGS)	2007	68	81	82	85	71	88	83	93	79
SLA1	1082	Slaughter Creek @ Pine Valley Drive	2010	74	80	77	79	78	70	61	78	76
SLA3	623	Slaughter Creek @ FM 1826 (USGS)	2010	74	80	89	86	68	91	95	87	81
SLA1	1082	Slaughter Creek @ Pine Valley Drive	2012	70	74	75	53	72	76	77	75	70
SLA3	623	Slaughter Creek @ FM 1826 (USGS)	2012	61	74	42	63	78	94	87	100	69
SLA1	1082	Slaughter Creek @ Pine Valley Drive	2014	76	75	81	79	82	81	79	83	79
SLA3	623	Slaughter Creek @ FM 1826 (USGS)	2014	66	75	75	78	65	84	78	90	74

* 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

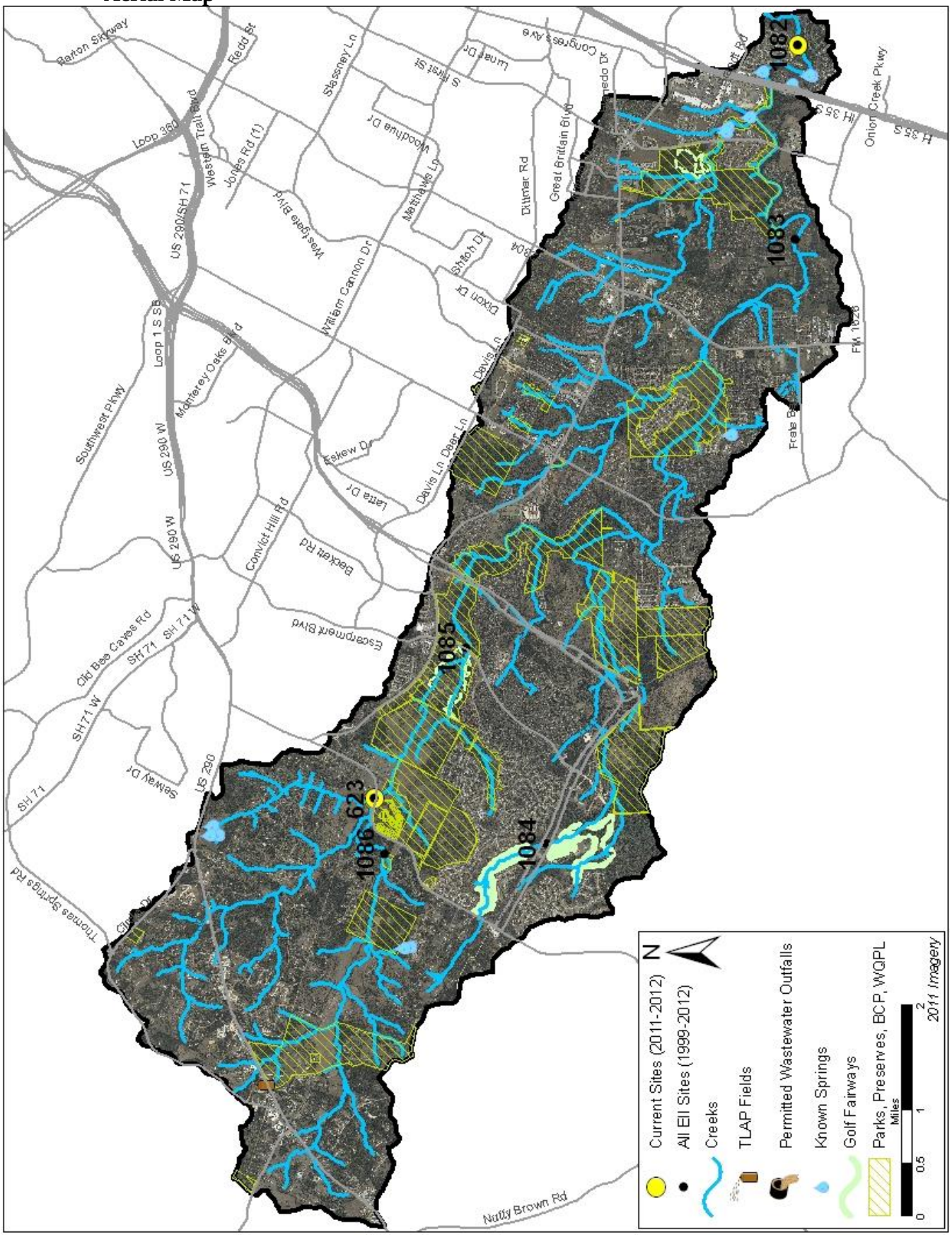
Slaughter Creek Watershed

Land Use Map



Slaughter Creek Watershed

Aerial Map



Slaughter Creek Watershed

Water Quality Data – Temperature, Conductivity, pH, Dissolved Oxygen & *E. coli* for 2014 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
Slaughter @ Pine Valley Dr	1082	SLA1	01/15/2014		12.6			563			8.25			9.6			1.0	
Slaughter @ Pine Valley Dr	1082	SLA1	04/17/2014		16.2			344			7.62			6.9			42.4	
Slaughter @ Pine Valley Dr	1082	SLA1	06/11/2014		30.1			368			8.78			7.1				
Slaughter @ Pine Valley Dr	1082	SLA1	07/02/2014		30.7			315			7.56			4.3			17.3	
Slaughter @ Pine Valley Dr	1082	SLA1	09/10/2014														59.1	
Site 1082 Mean					22.4			398			8.05			7.0			30.0	
Slaughter @ FM 1826	623	SLA3	01/15/2014		10.6			853			7.97			9.2			82.0	
Slaughter @ FM 1826	623	SLA3	04/17/2014		17.4			957			7.81			8.2			2.0	
Slaughter @ FM 1826	623	SLA3	05/05/2014		25.7			939			7.41			6.6				
Slaughter @ FM 1826	623	SLA3	07/02/2014		27.2			893			7.80			7.0			38.8	
Site 623 Mean					20.2			911			7.75			7.8			40.9	
Watershed Mean					21.3			654			7.90			7.4			34.7	

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 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	

Slaughter Creek Watershed

Water Quality Data – <u>Ammonia, Nitrate / Nitrite, Ortho-Phosphorus, Total Suspended Solids & Turbidity for 2014 Sample Sites</u> (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		

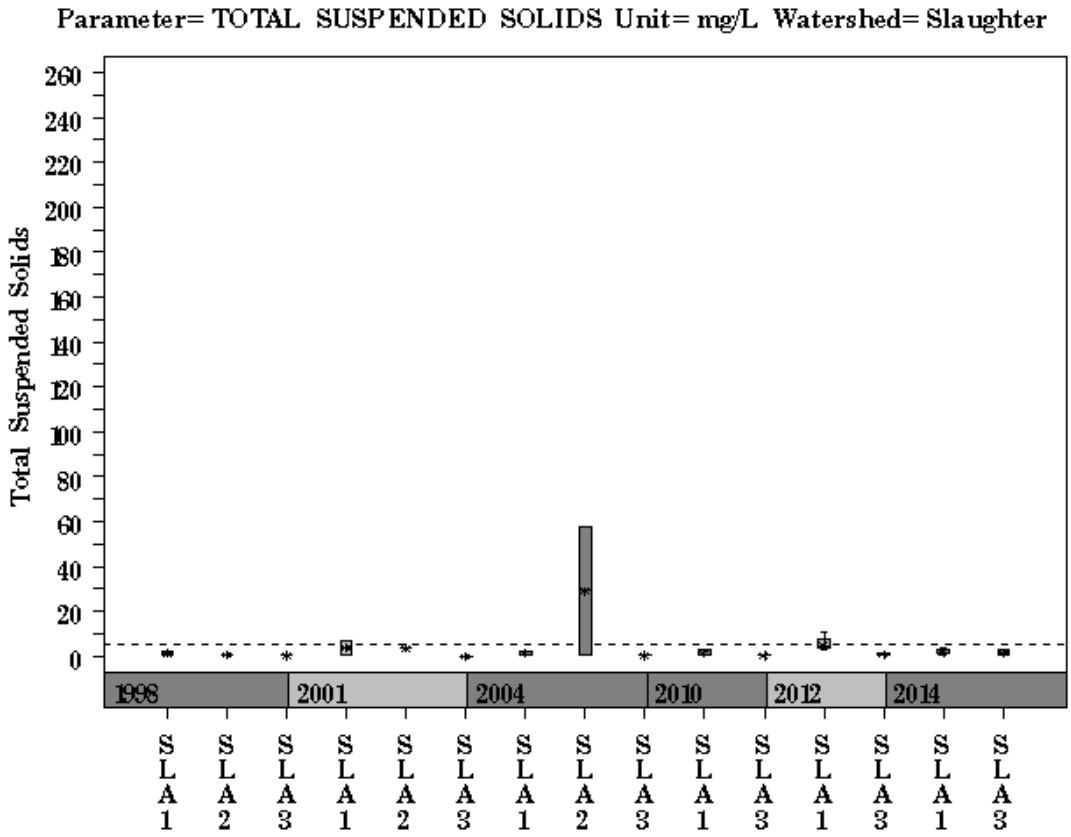
				NH3-N			NO3/NO2			Ortho-P			T.S.S.			Turb.		
Site Name	Site #	Reach	Date	< >	Value	flag	< >	Value	flag	< >	Value	flag	< >	Value	flag	< >	Value	flag
Slaughter @ Pine Valley Dr	1082	SLA1	01/15/2014	<J	0.008		<J	0.01			0.016	R	<J	1.04			0.9	R
Slaughter @ Pine Valley Dr	1082	SLA1	04/17/2014		0.105			0.07		<J	0.004			4.16			6.2	R
Slaughter @ Pine Valley Dr	1082	SLA1	06/11/2014															
Slaughter @ Pine Valley Dr	1082	SLA1	07/02/2014		0.062			0.05			0.034			1.48			1.7	
Slaughter @ Pine Valley Dr	1082	SLA1	09/10/2014		0.081		<J	0.01			0.021			1.22			3.2	R
Site 1082 Mean					0.064			0.03			0.019			1.98			3.0	
Slaughter @ FM 1826	623	SLA3	01/15/2014	<J	0.008			0.35		<J	0.004		<J	1.04			0.6	R
Slaughter @ FM 1826	623	SLA3	04/17/2014		0.107		<J	0.01		<J	0.004			1.30			1.5	R
Slaughter @ FM 1826	623	SLA3	05/05/2014															
Slaughter @ FM 1826	623	SLA3	07/02/2014	<J	0.008			0.01			0.004			2.65			2.1	
Site 623 Mean					0.041			0.12			0.004			1.66			1.4	
Watershed Mean					0.054			0.07			0.012			1.84			2.3	

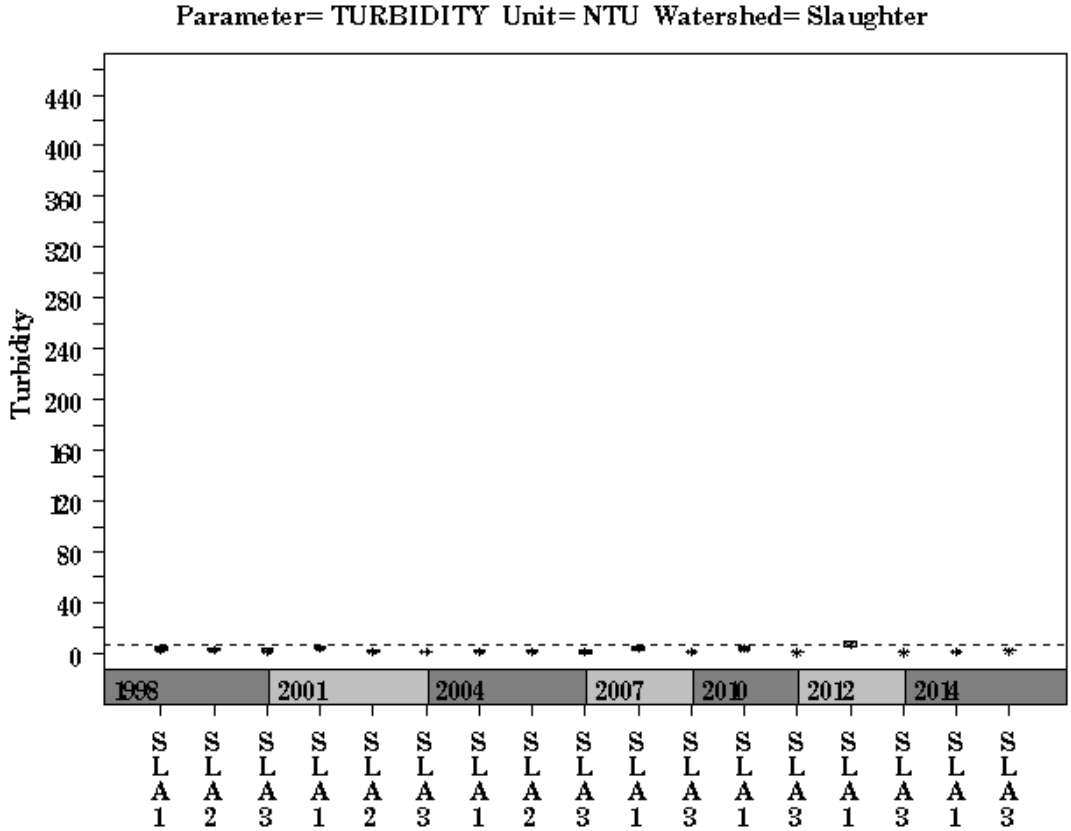
Orange highlighting indicates that the value exceeds one standard deviation from the mean of all E.I.I. sites combined.

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

Slaughter Creek Watershed

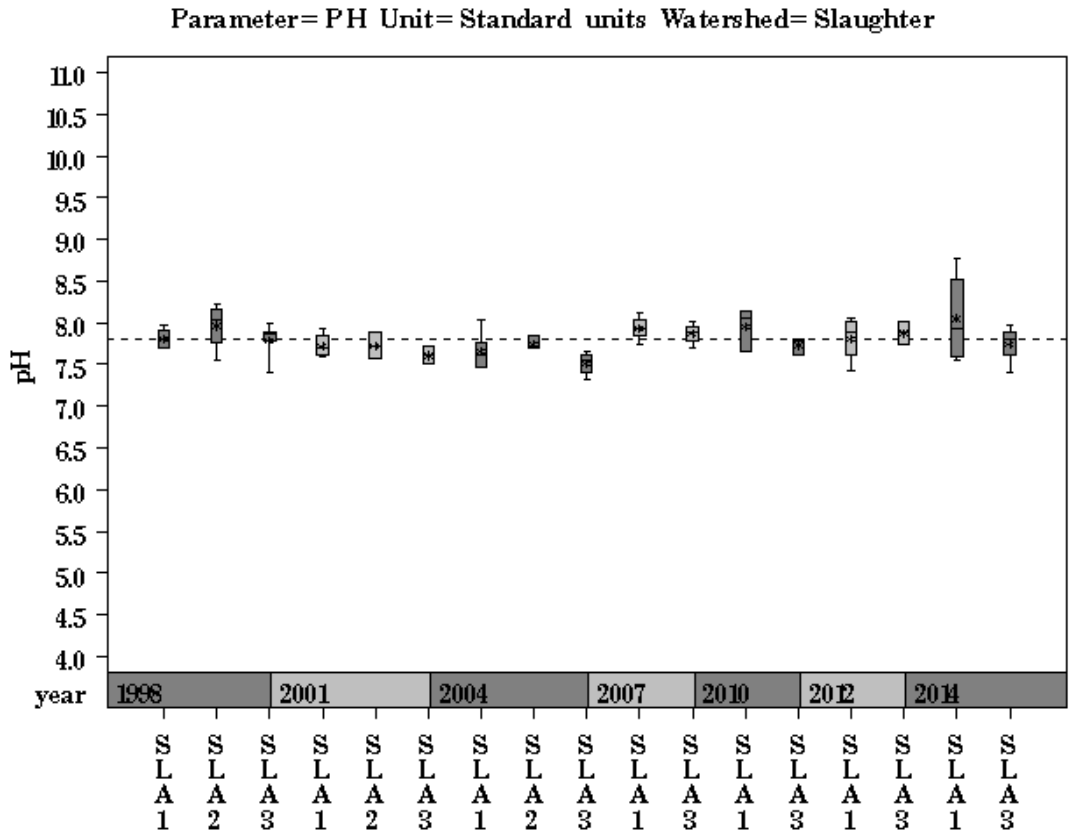
Data Summary Graphs – Total Suspended Solids and Turbidity (Downstream to Upstream by Year)

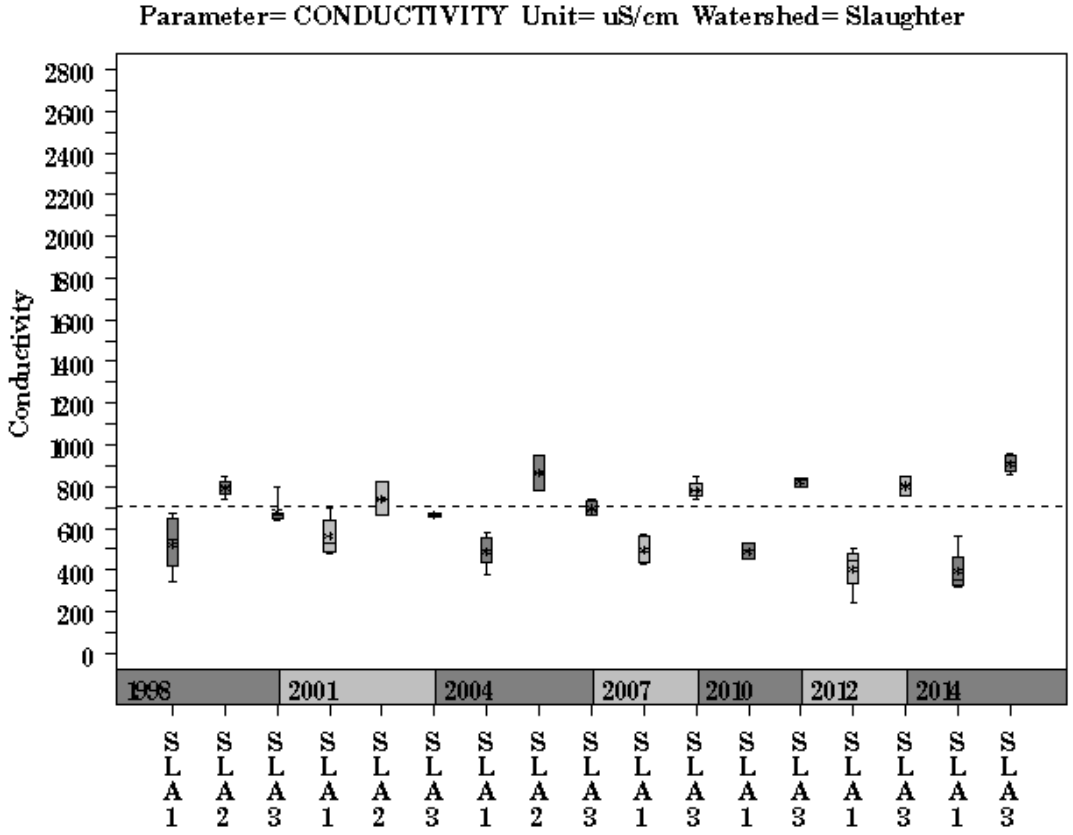




Slaughter Creek Watershed

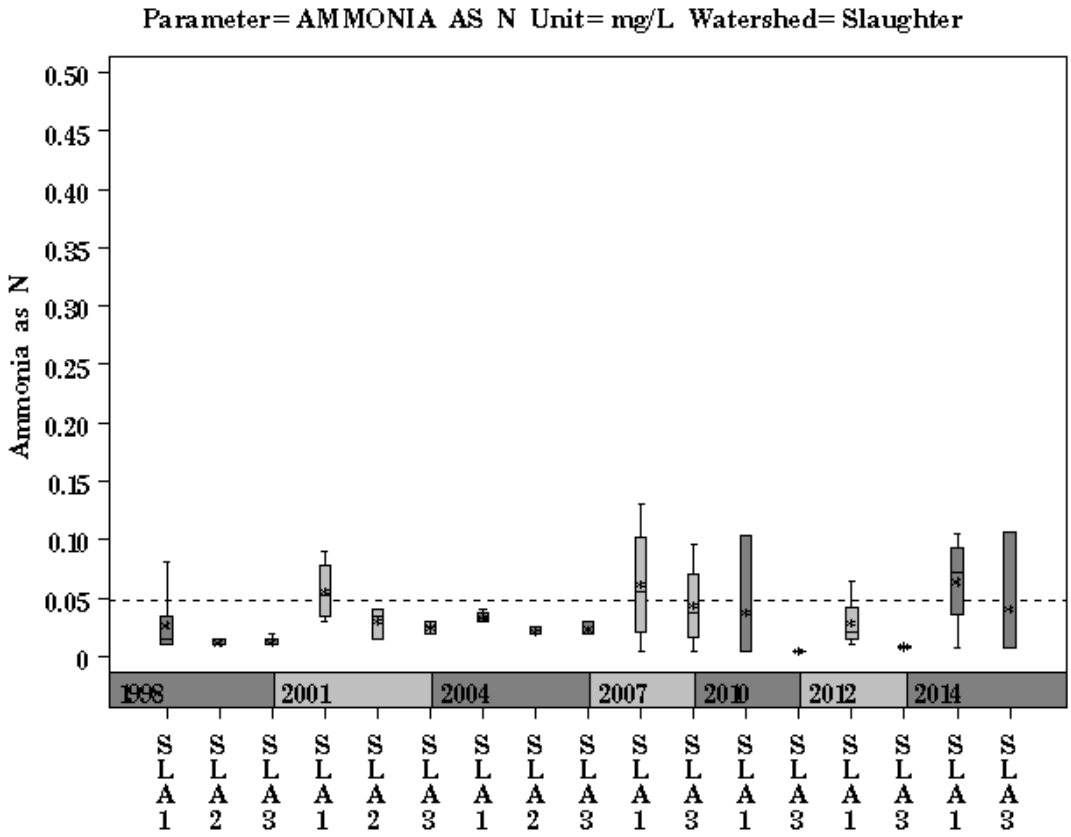
Data Summary Graphs – pH and Conductivity (Downstream to Upstream by Year)

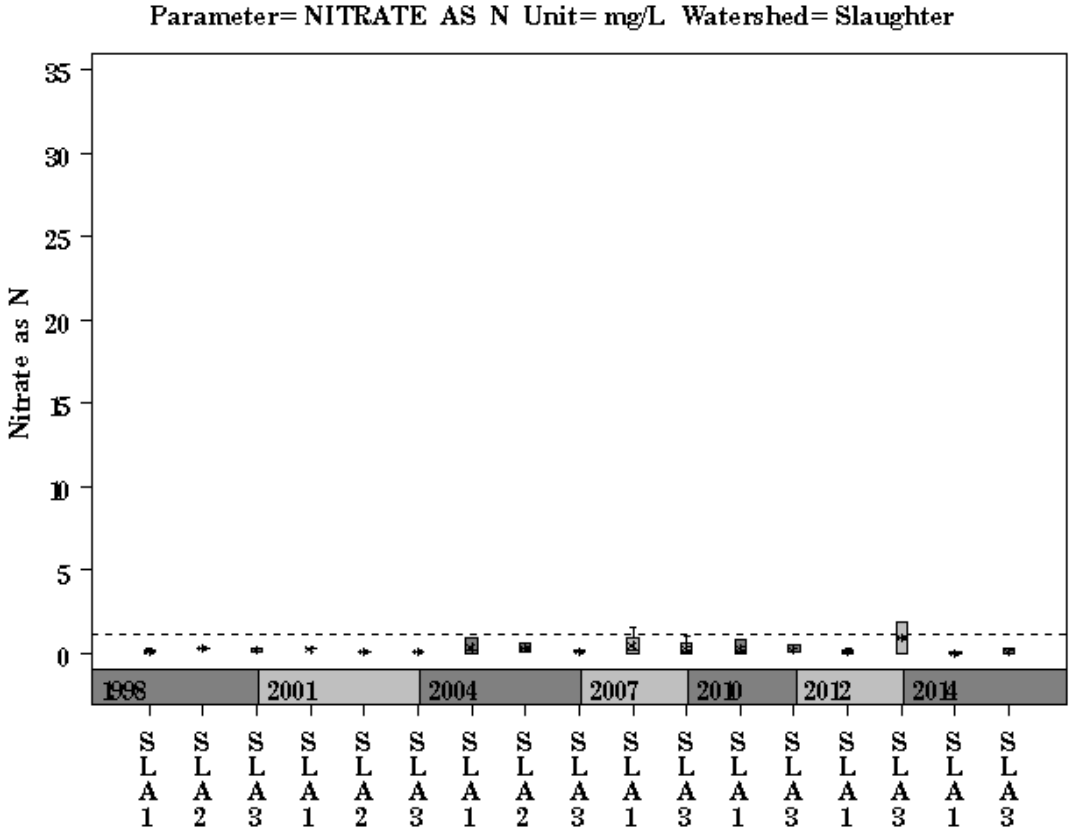




Slaughter Creek Watershed

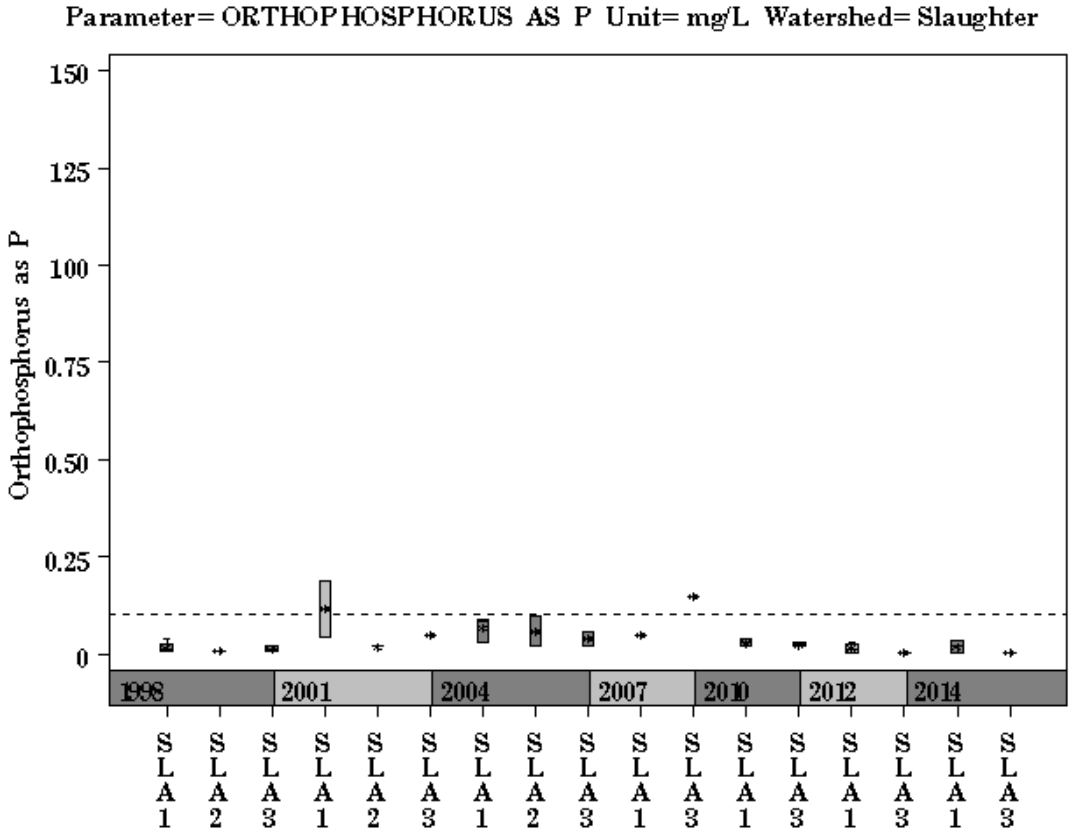
Data Summary Graphs – Ammonia and Nitrate/Nitrite (Downstream to Upstream by Year)

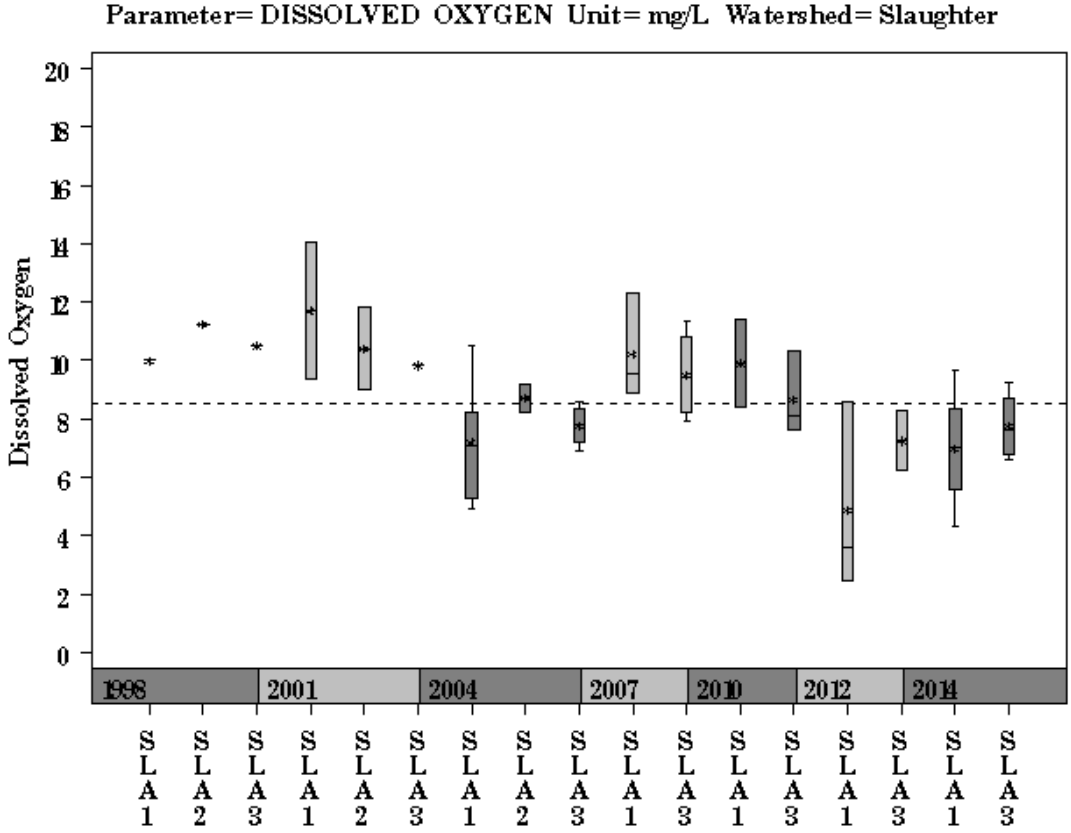




Slaughter Creek Watershed

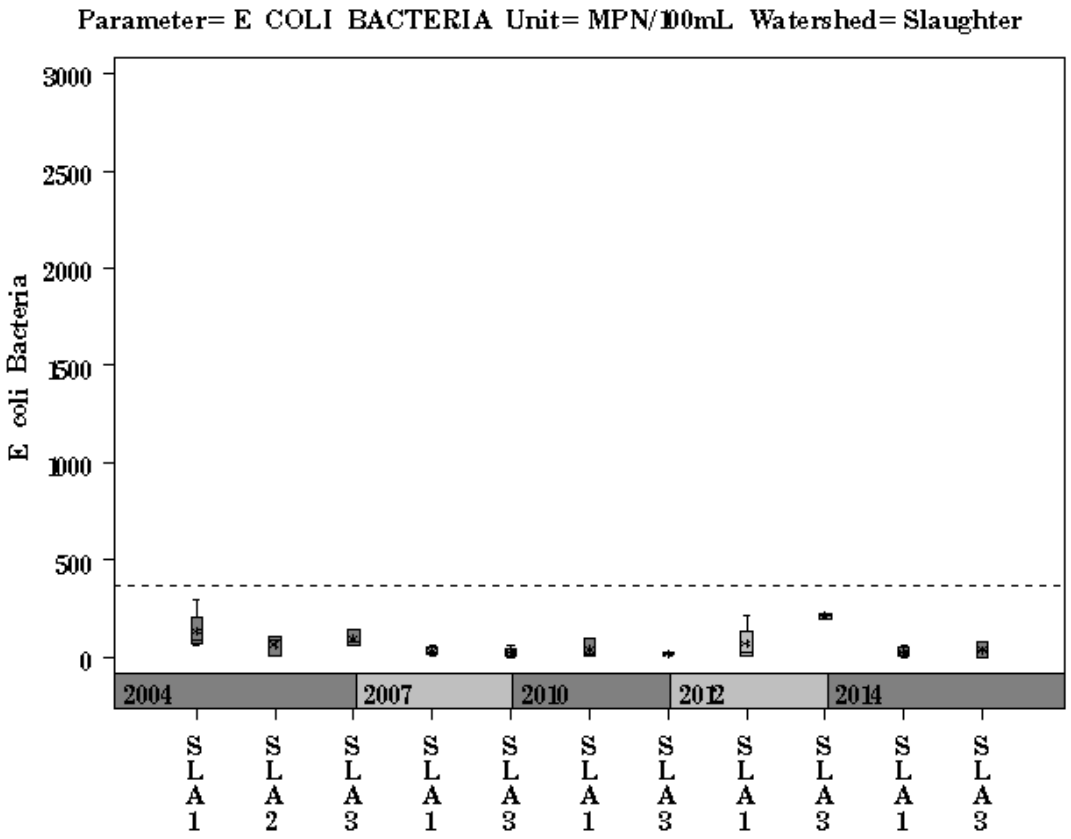
Data Summary Graphs – Orthophosphate and Dissolved Oxygen (Downstream to Upstream by Year)





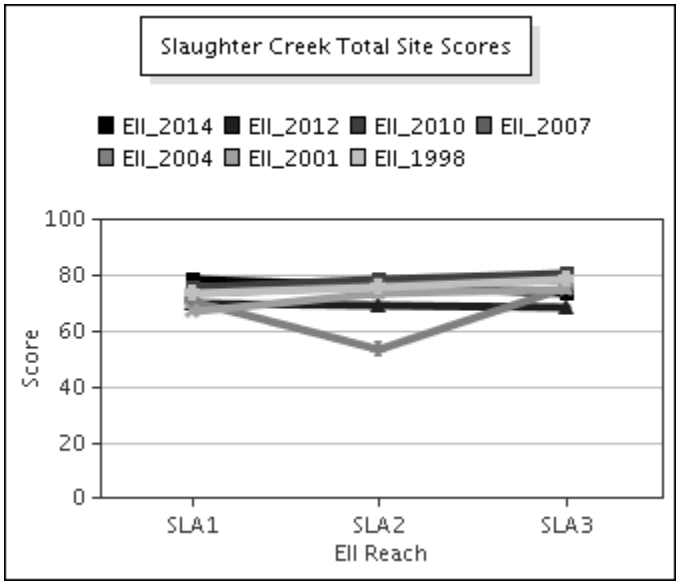
Slaughter Creek Watershed

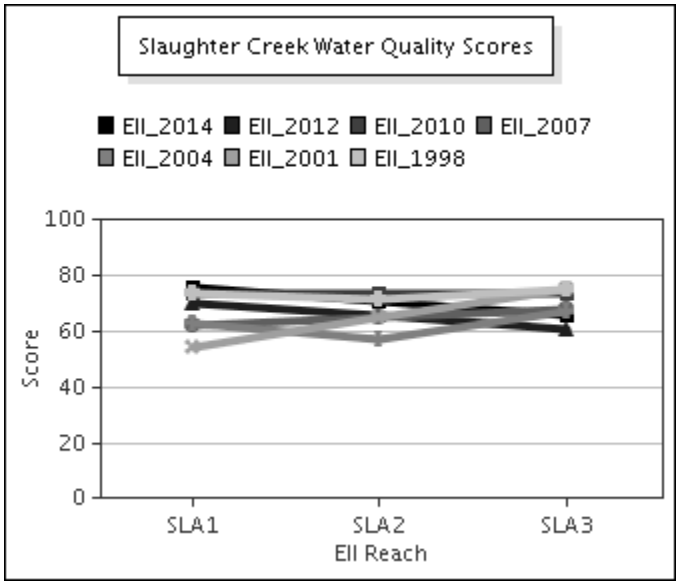
Data Summary Graphs – *E.coli* (Downstream to Upstream by Year)

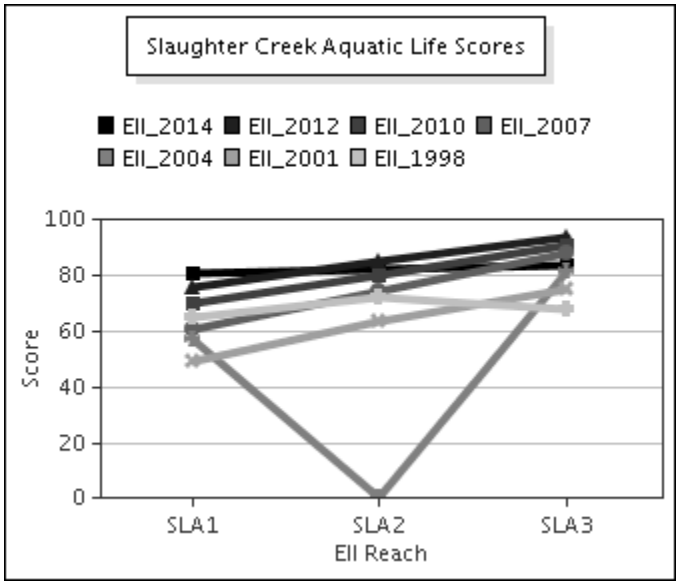


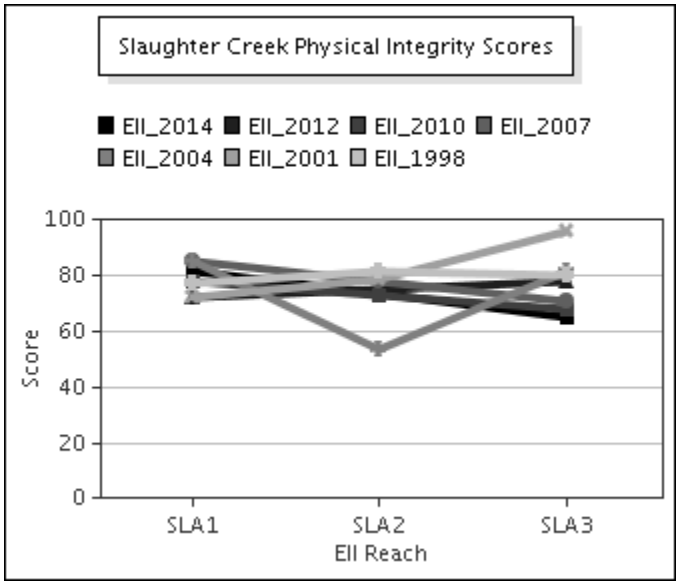
Slaughter Creek Watershed

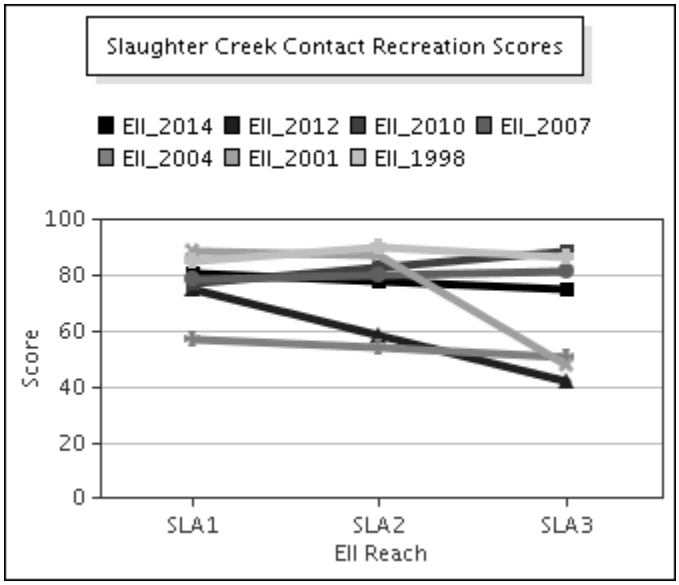
Score Summary – Reach scores for each sample year

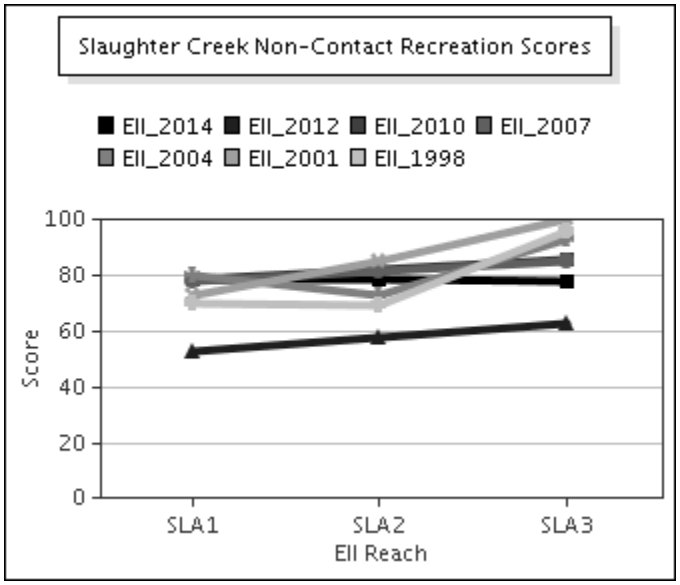












Slaughter Creek Watershed

Benthic Macroinvertebrates – Taxa List, Pollution Tolerance Index & Functional Feeding Group for 2014 Sample Sites (Downstream to Upstream)

Benthic Macroinvertebrate ID	PTI	FFG	Slaughter @ Pine Valley Dr (Site 1082)	Slaughter @ FM 1826 (Site 623)
Chimarra sp.	2	FC	7	
Hydroptila sp.	2	SC,PI	1	
Callibaetis sp.	4	CG		2
Camelobaetidius sp.	4	CG	1	
Fallceon quilleri	4	SC,CG	20	116
Ostracoda	4	FC,CG		49
Simulium sp.	4	FC	4	
Argia sp.	6	P	10	13
Brechmorhoga mendax	6	P		1
Cheumatopsyche sp.	6	FC	30	4
Chironomidae	6	P,FC	77	14
Corbicula fluminea	6	FC	1	
Hydracarina	6			3
Microvelia sp.	6	P	2	12
Neoporus sp.	6	P		5
Rhagovelia sp.	6	P	3	
Tanypodinae	6	P	10	4
Caenis sp.	7	SC,CG	2	
Stenelmis sp.	7	SC,CG	1	
Cladocera	8	FC	1	
Hyalella sp.	8	SH,CG	12	1
Oligochaeta	8	CG	5	
Peltodytes sp.	8	SH,PI,P		1
Physella sp.	9	SC		1
Dugesia sp.		P,CG	33	2
Hydra sp.			3	

Slaughter Creek Watershed

Benthic Macroinvertebrates – Metric Summary for 2014 Sample Sites (Downstream to Upstream)

Scoring Metric	Slaughter @ Pine Valley Dr (Site 1082)	Slaughter @ FM 1826 (Site 623)
Number of Taxa *	17	14
Hilsenhoff Biotic Index *	5.8	4.6
Number of Ephemeroptera Taxa *	3	2
Percent of Total as Chironomidae *	39	8
Number of EPT Taxa *	6	3
Percent of Total as EPT *	27	54
Percent of Total as Predator *	61	23
Number of Intolerant Taxa *	5	3
Percent Dominance (Top 3 Taxa) *	63	79
EPT / EPT + Chironomidae	0	1
Number of Diptera Taxa	2	1
Number of Non-Insect Taxa	5	5
Number of Organisms	222	228
Percent Dominance (Top 1 Taxa)	35	51
Percent of Total as Collector / Gatherer	33	75
Percent of Total as Dominant Guild (FFG)	61	75
Percent of Total as Elmidae	0	0
Percent of Total as Filterers	58	31
Percent of Total as Grazers (PI & SC)	11	51
Percent of Total as Tolerant Organisms	0	0
Percent of Trichoptera as Hydropsychidae	79	100
Ratio of Intolerant : Tolerant Organisms	0.21	2.83
TCEQ Qualitative Aquatic Life Use Score	19	21
TCEQ Quantitative Aquatic Life Use Score	21	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.**

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%.

Slaughter Creek Watershed

Diatoms – Taxa List & Pollution Tolerance Index for 2014 Sample Sites (Downstream to Upstream)

Diatom Species Name	PTI	Slaughter @ Pine Valley Dr (Site 1082)	Slaughter @ FM 1826 (Site 623)
Amphora inariensis	4	8	
Eunotia arcus	4		2
Achnanthidium affine	3		8
Achnanthidium alteragracillimum	3		15
Achnanthidium minutissimum	3	4	198
Achnanthidium pyrenaicum	3		4
Amphora pediculus	3	26	
Aulacoseira granulata	3	1	
Brachysira vitrea	3		12
Caloneis bacillum	3	1	
Cocconeis pediculus	3	21	
Cymbella laevis	3		2
Denticula kuetzingii	3	3	144
Encyonema evergladianum	3		48
Encyonema silesiacum	3	1	2
Epithemia turgida	3	1	
Gomphonema affine	3	6	
Navicula cryptotenella	3		2
Navicula kotschyi	3	4	
Nitzschia sinuata var. *tabellaria*	3	17	
Reimeria sinuata	3	269	
Diadesmis confervacea	2	1	
Gomphonema angustatum	2	2	10
Nitzschia amphibia	2	22	16
Gomphonema parvulum	1		8
Amphora copulata		4	
Aulacoseira valida		2	
Cocconeis placentula var. *euglypta*		64	7
Cymbella excisa		1	
Cymbella neoleptoceros			2
Cymbella turgidula		3	
Delicata delicatula		7	8
Gomphonema mclaughlinii		2	2
Navicula lanceolata			2
Ulnaria acus		3	
Ulnaria ulna		27	8

Slaughter Creek Watershed

Diatoms – Metric Summary for 2014 Sample Sites (Downstream to Upstream)

Scoring Metric	Slaughter @ Pine Valley Dr (Site 1082)	Slaughter @ FM 1826 (Site 623)
Cymbella Richness	3	4
Number of organisms	500	500
Number of taxa	25	20
Percent motile taxa	9	4
Percent similarity to reference condition	28	43
Pollution tolerance index	2.96	2.92

* **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.

Slaughter Creek Watershed

Site Photographs

1082_ds_07_13_2007

1082_us_07_13_2007

1082_00-ds-05_27_2010

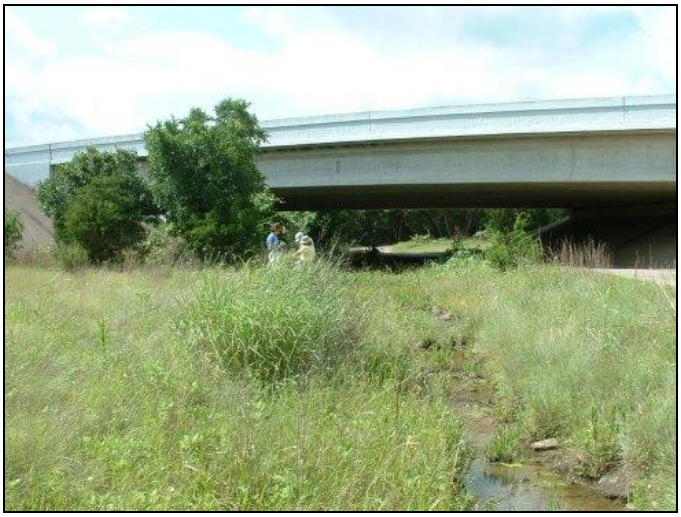
1082_00-us-05_27_2010

1083_t00-ur-05_24_2004

1083_t00-us-05_24_2004

Slaughter Creek Watershed

Site Photographs



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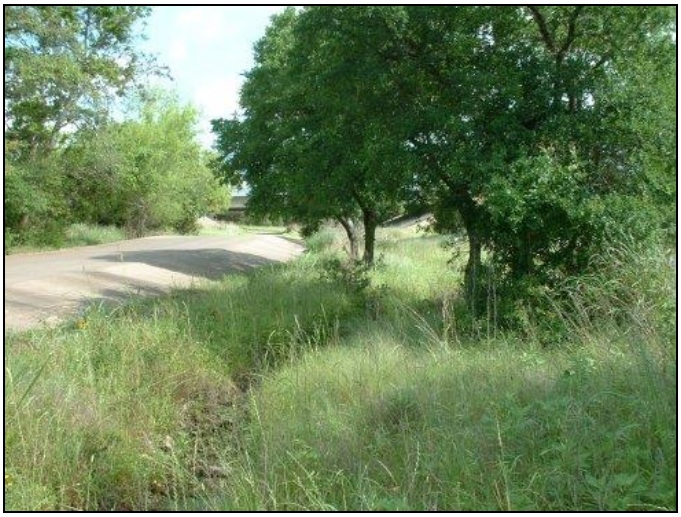

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623_ds_06_20_2007

623_us_06_20_2007

623_00-ds-05_28_2010

623_00-us-05_28_2010

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