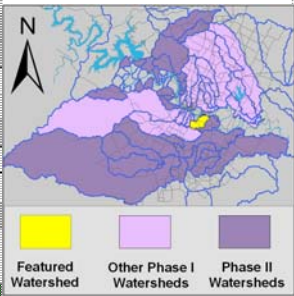


# Country Club Creek (east and west) Watershed

## Watershed Overview

Catchment	Total area	5 square miles													
	Area in recharge	none													
	Creek length	7 miles													
Demographics	Receiving water	Colorado River													
	2000 population	14,620													
	2030 projected population	15,903													
Land Use	30 year projected % increase	9 %													
	Impervious cover (2003 estimate)	East 19.0 %		West 30.5%											
	Impervious cover (2013 estimate)	East 26.5 %		West 45.3%											
Overall EII Scores	west 2000 east	60	55	54	47	51	42	51	47	47	25	65	54	55	62



### Flow Regime\* for Sample Sites on Country Club East

Site	2001		2003					2006					2009					2010		2011					2013					2015						
	Feb	Feb	Feb	Mar	Mar	May	Sep	Dec	Feb	May	Jul	Aug	Nov	Feb	May	May	Oct	Dec	Dec	Mar	Jun	Jun	Sep	Jan	Apr	May	Jun	Sep	Jan	Apr	May	Jul	Sep			
848	B	B	B	B	B	B	B	B																												
1475									B	n	n	n	B	n	n	n	n	B	n	n	n	n	n	n	n	n	n	n	n	n	n	B	B	B	n	n

### Flow Regime\* for Sample Sites on Country Club West

Site	2001		2003					2006					2009					2010		2011					2013					2015					
	Feb	Feb	Feb	Mar	Mar	May	Sep	Dec	Feb	May	Jul	Aug	Nov	Feb	May	May	Jun	Oct	Dec	Dec	Mar	Jun	Jun	Sep	Jan	Apr	May	Jun	Sep	Jan	Apr	May	Jul	Sep	
850	B	B	B	B	B	B	B	B	B	B	B	n	B	B	B		B	B	B	B	B	B	B	n	B	B	B	n	B	B	B		B	B	
849																									B	n	n	n	n	B	B	B	B	n	
1474	B	B	B	B	B	B	B	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n

\* B = baseflow    n = no flow    S = storm flow    blue = Samples were taken    light blue = Samples were not taken    blank = not visited

### Index scores\* for Country Club East sites by year

Reach	Site	Site Name	Year	Water Quality	Sediment t**	Contact Rec.	Non-Contact Rec.	Physical Integrity	Aquatic Life	Benthic subindex	Diatom subindex	Total EII Score
CCE1	848	East Country Club Creek ds of Grove Dr	2000		87		53	31	48	53	43	55
CCE1	848	East Country Club Creek ds of Grove Dr	2003	51	70	59	58	35	29	20	37	47
CCE1	1475	East Country Club @ ACC	2006	54	85	43	45	24				42
CCE1	1475	East Country Club @ ACC	2009	50	79	25	45	60	23	23		47
CCE1	1475	East Country Club @ ACC	2011				37	39				25
CCE1	1475	East Country Club @ ACC	2013		69		65	82				54
CCE1	1475	East Country Club @ ACC	2015	45	79	32	65	57	53	40	65	55

### Index scores\* for Country Club West sites by year

Reach	Site	Site Name	Year	Water Quality	Sediment t**	Contact Rec.	Non-Contact Rec.	Physical Integrity	Aquatic Life	Benthic subindex	Diatom subindex	Total EII Score
CCW1	1474	West Country Club @ Krieg Fields	2000	52	87	72	78	52	43	44	42	64
CCW2	850	West Country Club Creek @ East Oltorf	2000	54	87	73	71	26	22	29	14	56
CCW1	1474	West Country Club @ Krieg Fields	2003	50	70	57	81	57	49	35	63	61
CCW2	850	West Country Club Creek @ East Oltorf	2003	48	70	51	54	55	42	36	48	53
CCW1	1474	West Country Club @ Krieg Fields	2006		66		53	52				43
CCW2	850	West Country Club Creek @ East Oltorf	2006	58	66	39	78	59	46	41	51	58
CCW1	1474	West Country Club @ Krieg Fields	2009	55	69	28	58	53				44
CCW2	850	West Country Club Creek @ East Oltorf	2009	50	69	34	78	57	64	43	84	59
CCW1	1474	West Country Club @ Krieg Fields	2011				57	34				30
CCW2	850	West Country Club Creek @ East Oltorf	2011	56		42	74	58	54	34	73	57
CCW1	849	West Country Club Cr. @ Crossing Place	2013	69	75	83	58	45	62	44	79	65
CCW2	850	West Country Club Creek @ East Oltorf	2013	65	75	38	76	47	79	85	73	63
CCW1	849	West Country Club Cr. @ Crossing Place	2015	59	75	30	63	61	73	81	65	60
CCW2	850	West Country Club Creek @ East Oltorf	2015	59	75	35	78	61	73	73	72	64

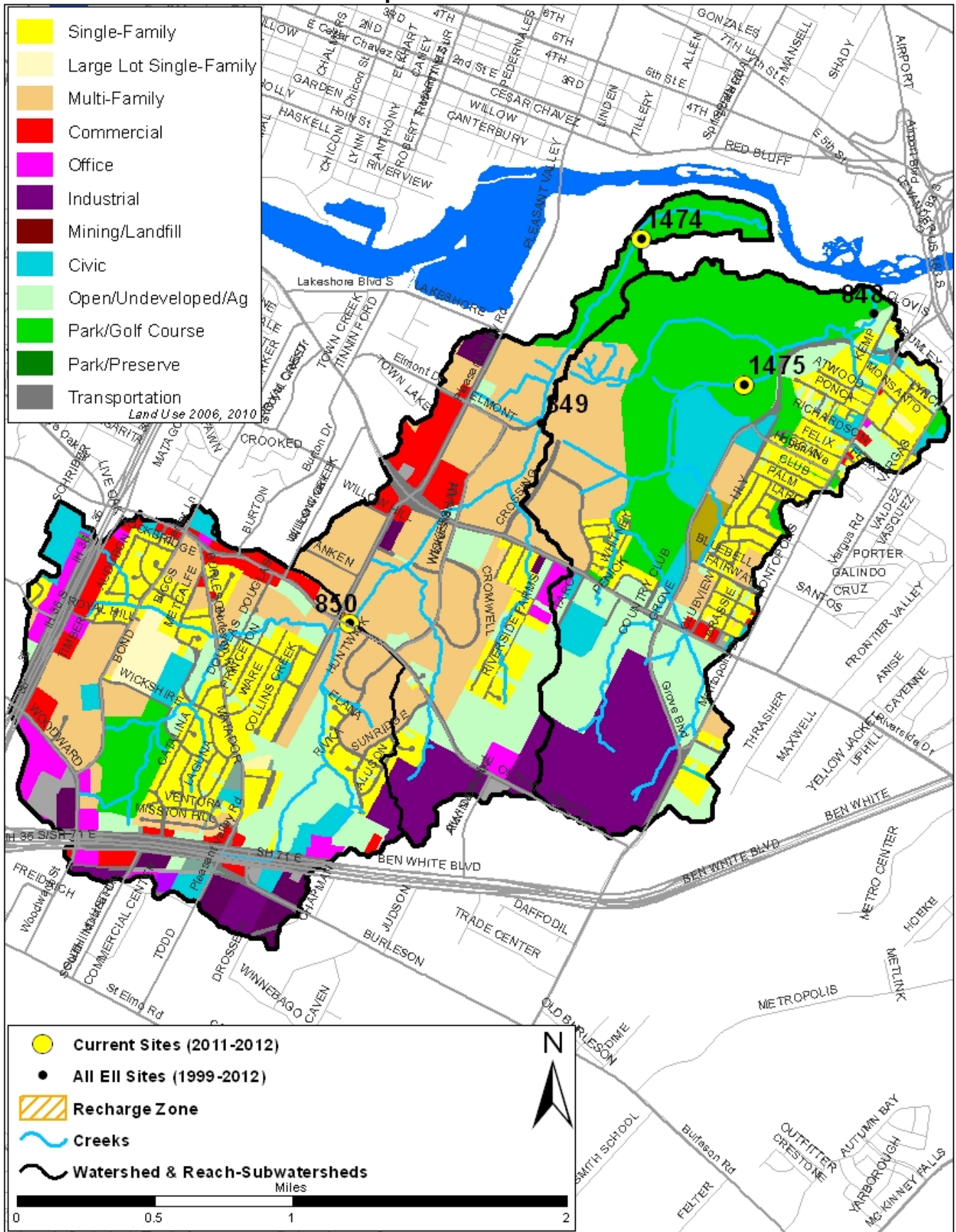
\* blank cells indicate parameter was not collected, blank row indicate site was dropped

\*\*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

# Country Club Creek Watershed

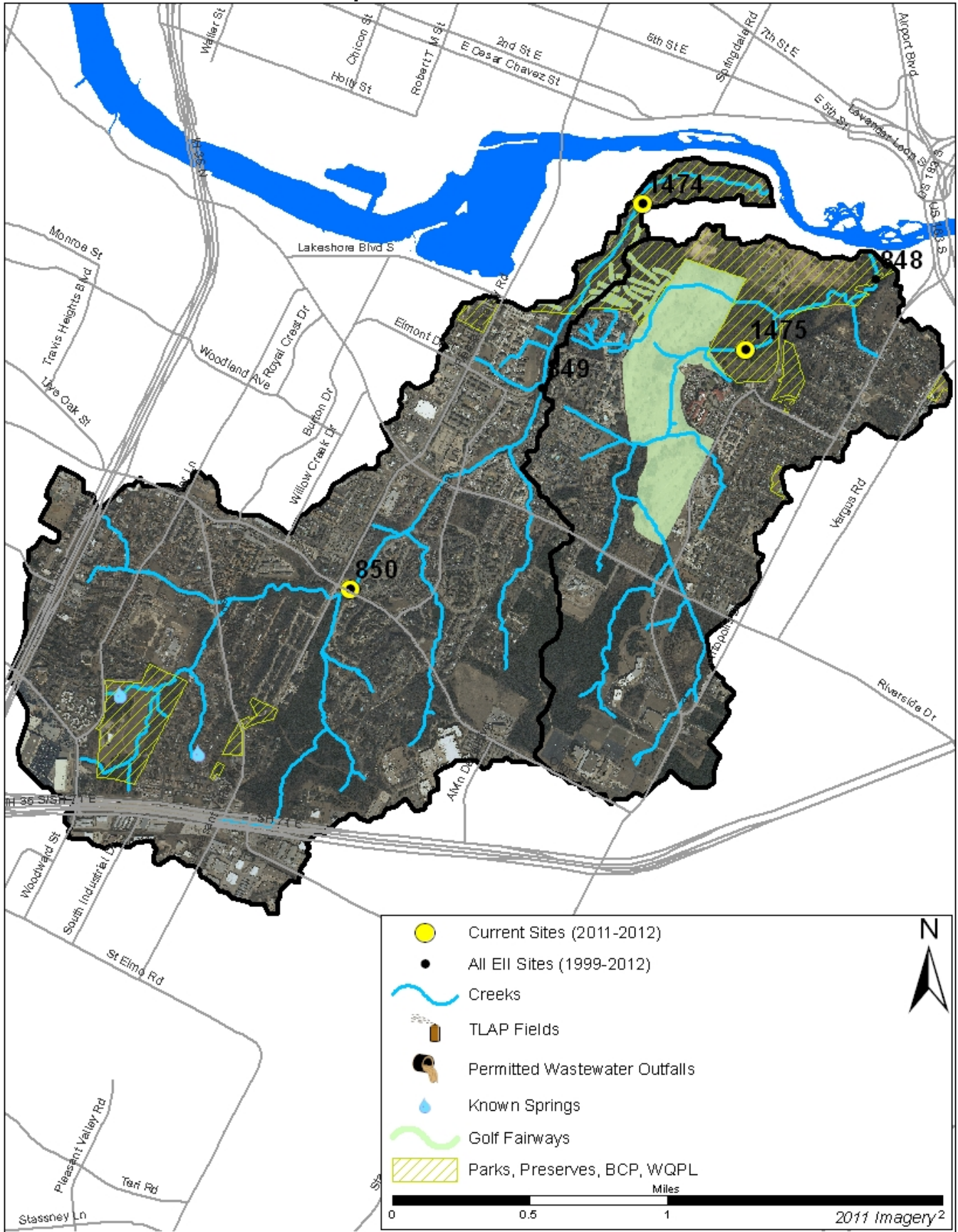
## Land Use Map





# Country Club Creek Watershed

## Aerial Map



# Country Club Creek Watershed

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

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

Watershed	Site	EII Reach	Date	Temp. <small>flag</small>	Cond. <small>flag</small>	pH <small>flag</small>	D.O. <small>flag</small>	E. Coli <small>flag</small>
Country Club E	1475	CCE1	01/14/2015	6.5	951	7.93	11.8	770.1
Country Club E	1475	CCE1	04/15/2015	19.6	1147	8.16	8.2	248.9
Country Club E	1475	CCE1	05/04/2015	20.3	1201	8.07	7.2	
CCE1 Mean				15.4	1100	8.05	9.1	509.5
Country Club East Mean				15.4	1100	8.05	9.1	509.5

Watershed	Site	EII Reach	Date	Temp. <small>flag</small>	Cond. <small>flag</small>	pH <small>flag</small>	D.O. <small>flag</small>	E. Coli <small>flag</small>
Country Club W	849	CCW1	01/14/2015	7.2	607	7.97	11.7	290.9
Country Club W	849	CCW1	04/15/2015	23.2	620	7.80	7.6	488.4
Country Club W	849	CCW1	05/05/2015	22.3	615	7.73	4.8	
Country Club W	849	CCW1	07/14/2015	31.1	624	8.09	9.4 R	435.2
CCW1 Mean				20.9	616	7.90	8.4	404.8
Country Club W	850	CCW2	01/14/2015	7.4	685	7.98	11.1	198.9
Country Club W	850	CCW2	04/15/2015	21.6	719	8.06	8.6	435.2
Country Club W	850	CCW2	05/05/2015	26.0	698	7.92	6.7	
Country Club W	850	CCW2	07/14/2015	28.6	699	7.92	7.8 R	178.2
Country Club W	850	CCW2	09/09/2015	28.4	556	7.91	9.7	547.5
CCW Mean				22.4	671	7.96	8.8	339.9
Country Club West Mean				21.8	648	7.93	8.6	367.8

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	

# Country Club Creek Watershed

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

<b>Qualifiers to the left of the value</b>	>	Greater than	<b>Qualifiers to the right of the value</b>	(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
Country Club E	1475	CCE1	01/14/2015	<J 0.008	0.05	0.062	1.5	3.7 R
Country Club E	1475	CCE1	04/15/2015	0.036	0.13	0.120	15.1	22.3
Country Club E	1475	CCE1	05/04/2015					
<b>CCE1 Mean</b>				0.022	0.09	0.091	8.3	13.0
<b>Country Club East Mean</b>				0.022	0.09	0.091	8.3	13.0

Watershed	Site	EII Reach	Date	NH3-N	NO3/NO2	Ortho-P	T.S.S.	Turb.
				<> flag	<> flag	<> flag	<> flag	<> Flag
Country Club W	849	CCW1	01/14/2015	<J 0.008	0.29	<J 0.004	3.9	6.5 R
Country Club W	849	CCW1	04/15/2015	0.057	0.03	<J 0.004	10.2	11.9
Country Club W	849	CCW1	05/05/2015					
Country Club W	849	CCW1	07/14/2015	0.021	<J 0.01	<J 0.004	2.9	2.9 R
<b>CCW1 Mean</b>				0.029	0.11	0.004	5.7	7.1
Country Club W	850	CCW2	01/14/2015	<J 0.008	0.43	<J 0.004	<J 1.1	2.0 R
Country Club W	850	CCW2	04/15/2015	<J 0.008	0.10	<J 0.004	2.6	4.4
Country Club W	850	CCW2	05/05/2015					
Country Club W	850	CCW2	07/14/2015	<J 0.008	0.41	<J 0.004	4.1	6.0 R
Country Club W	850	CCW2	09/09/2015	0.028	<J 0.01	<J 0.004	4.8	8.5 R
<b>CCW Mean</b>				0.013	0.24	0.004	3.2	5.2
<b>Country Club West Mean</b>				0.020	0.18	0.004	4.2	6.0

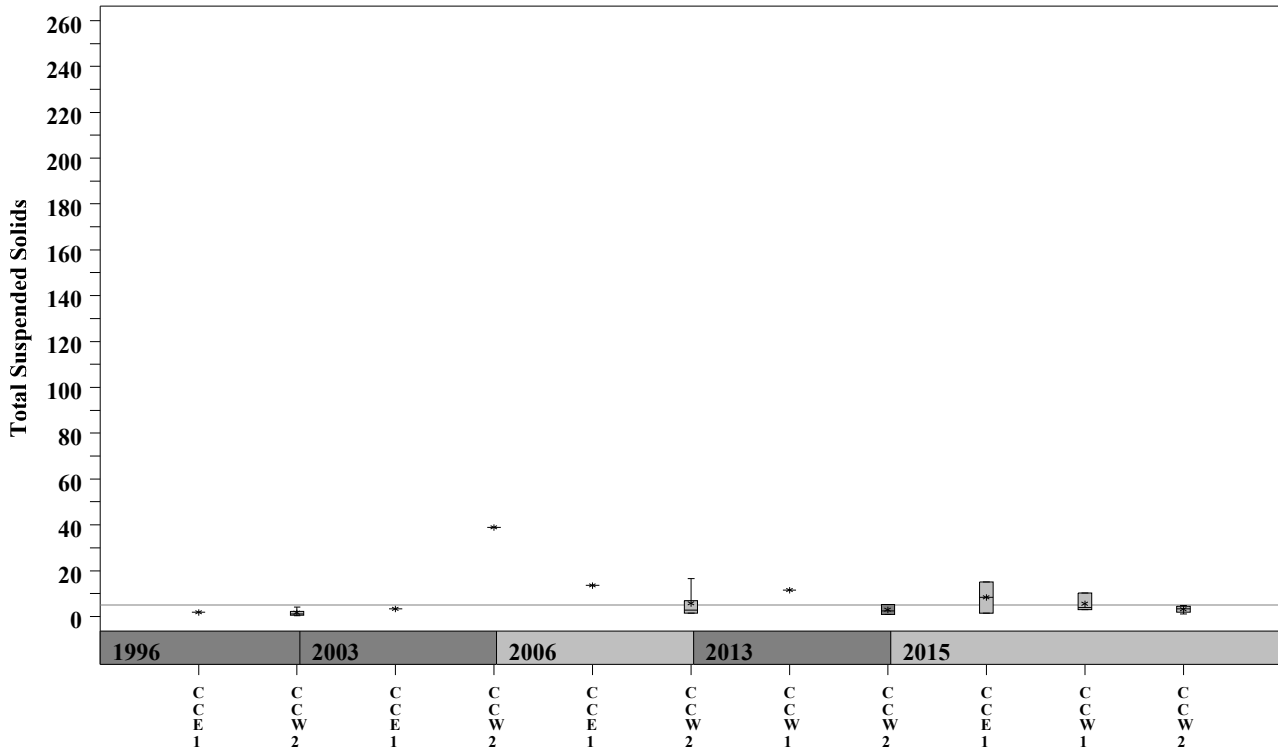
Gray highlighting indicates that the value exceeds one standard deviation from the mean of all E.I.I. sites combined.

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

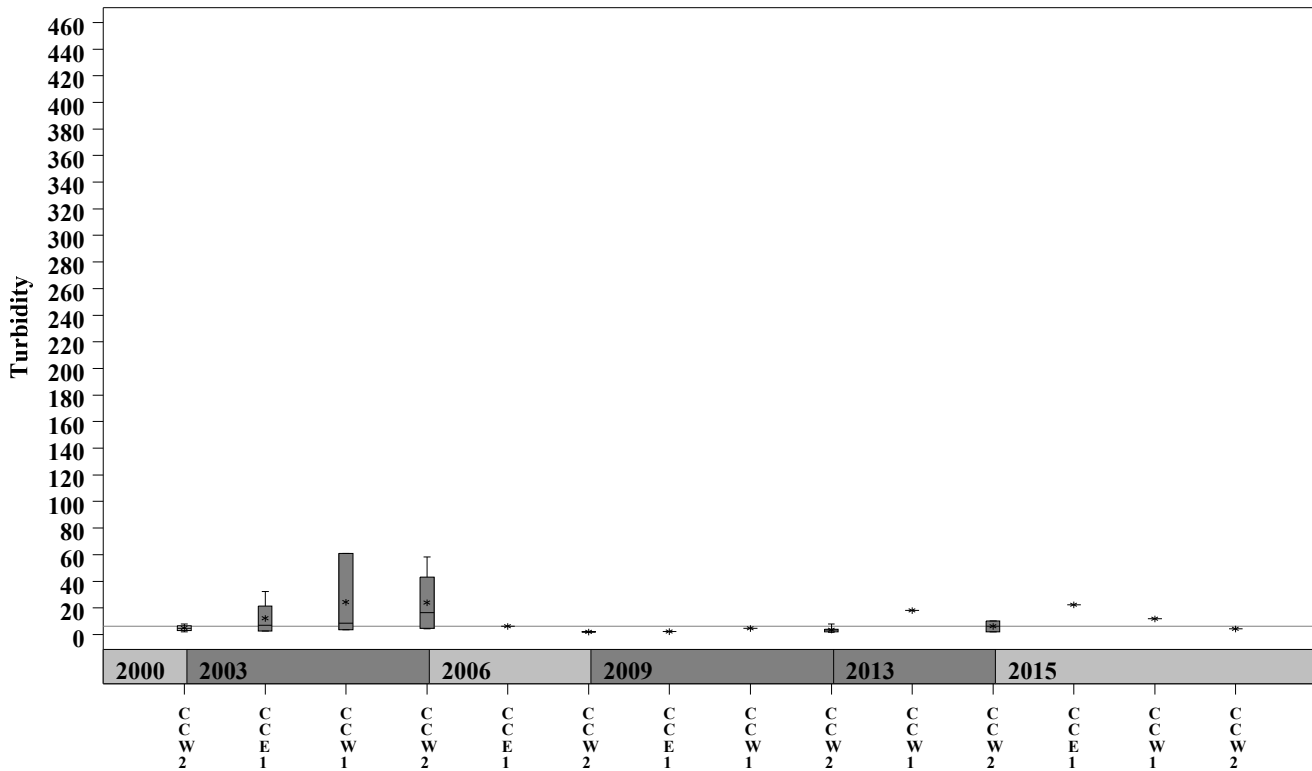
# Country Club Creek Watershed

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

Parameter = TOTAL SUSPENDED SOLIDS Unit = mg/L Watershed = Country Club



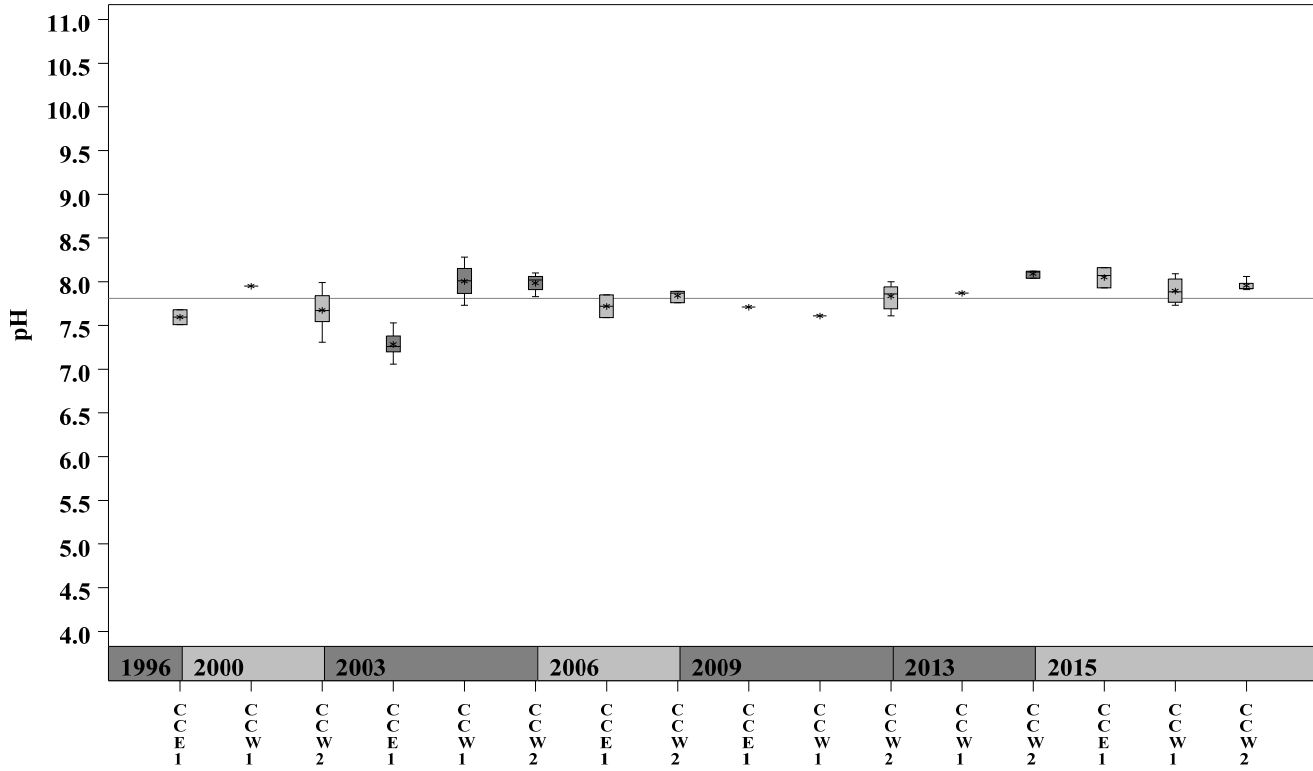
Parameter = TURBIDITY Unit = NTU Watershed = Country Club



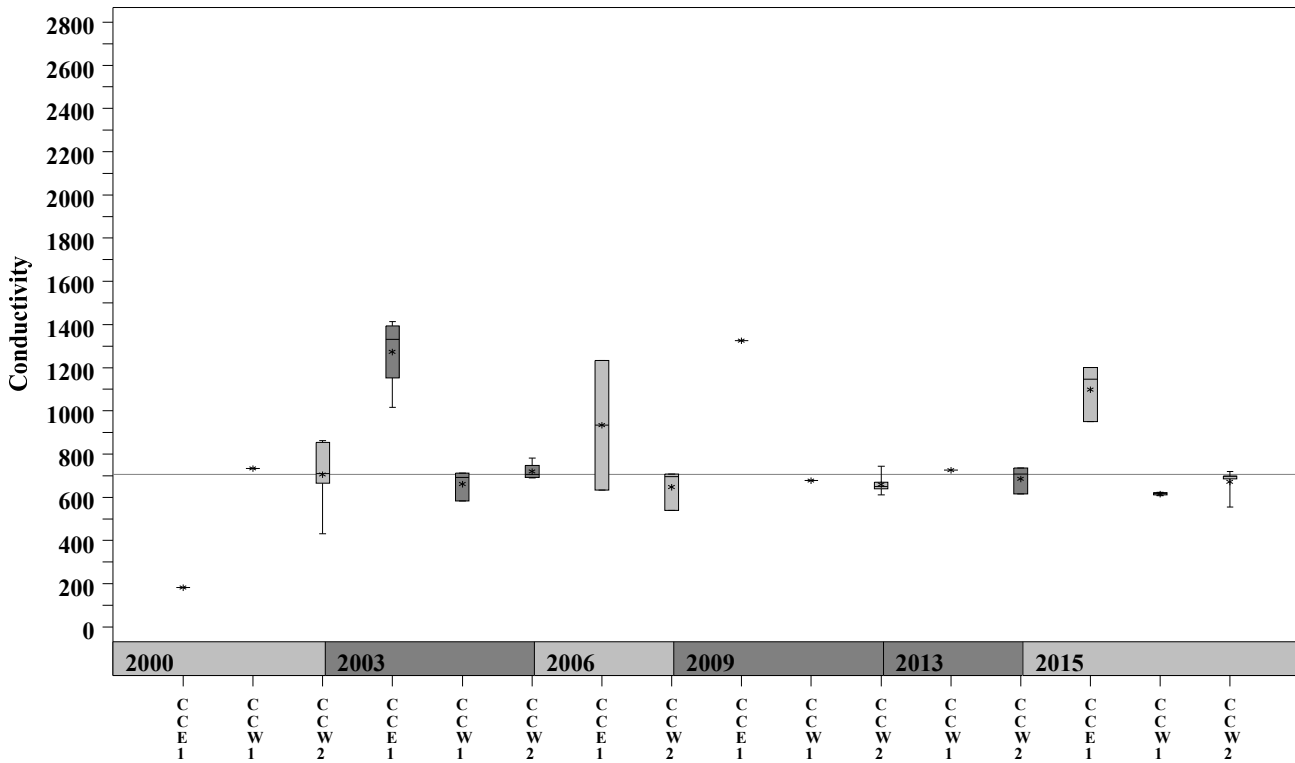
# Country Club Creek Watershed

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

Parameter = pH Unit = Standard Units Watershed = Country Club



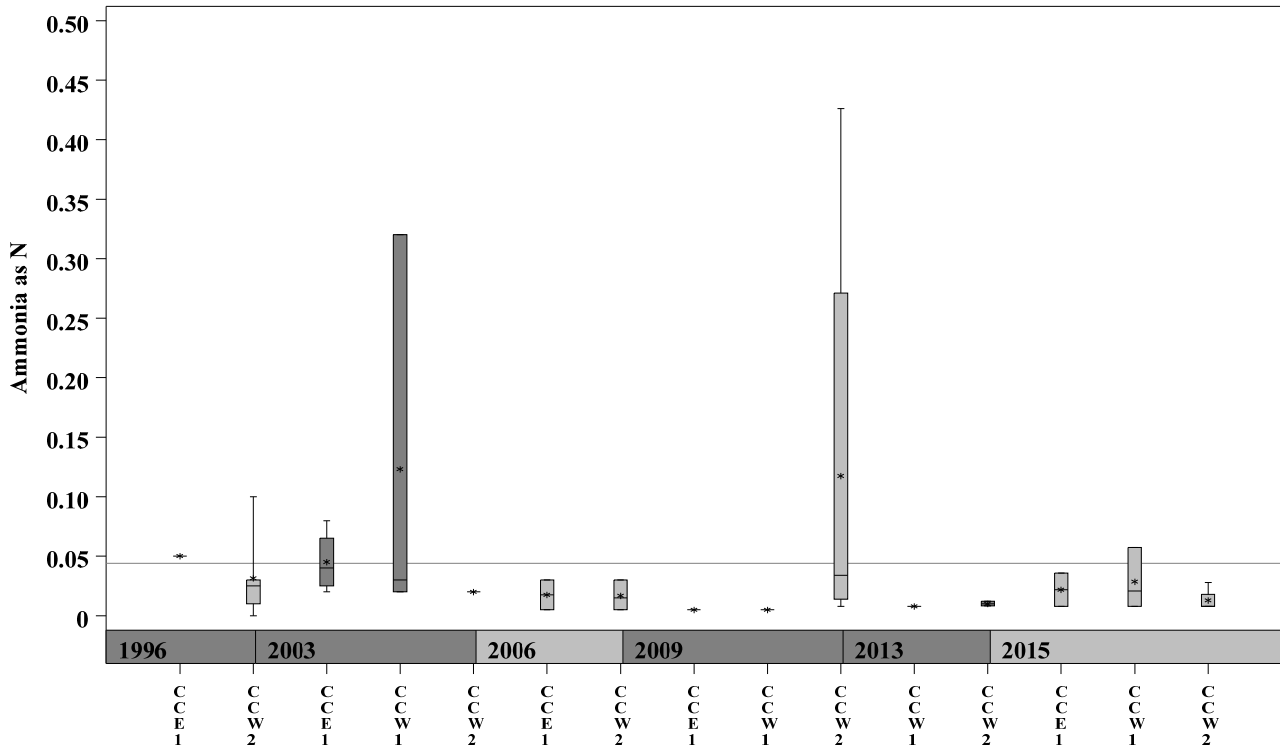
Parameter = CONDUCTIVITY Unit = uS/cm Watershed = Country Club



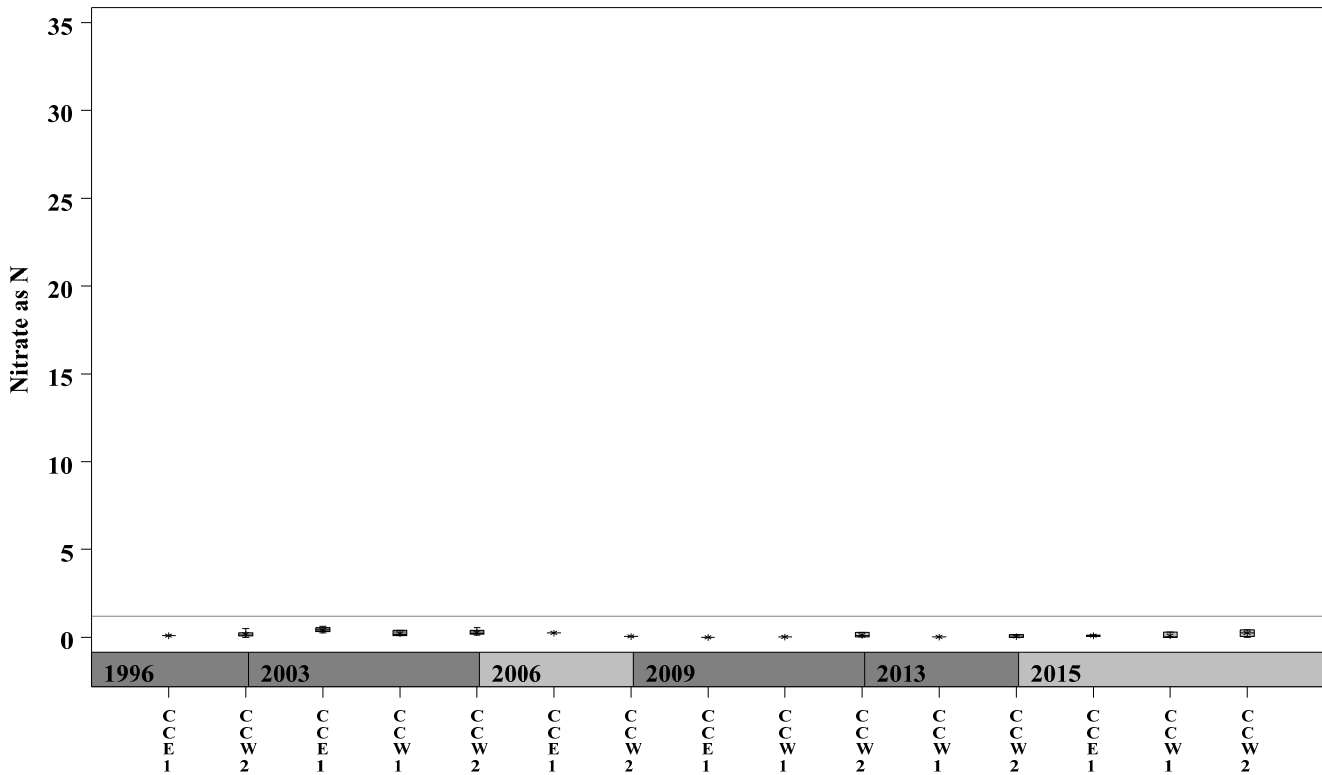
# Country Club Creek Watershed

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

Parameter = AMMONIA AS N Unit = mg/L Watershed = Country Club



Parameter = NITRATE AS N Unit = mg/L Watershed = Country Club

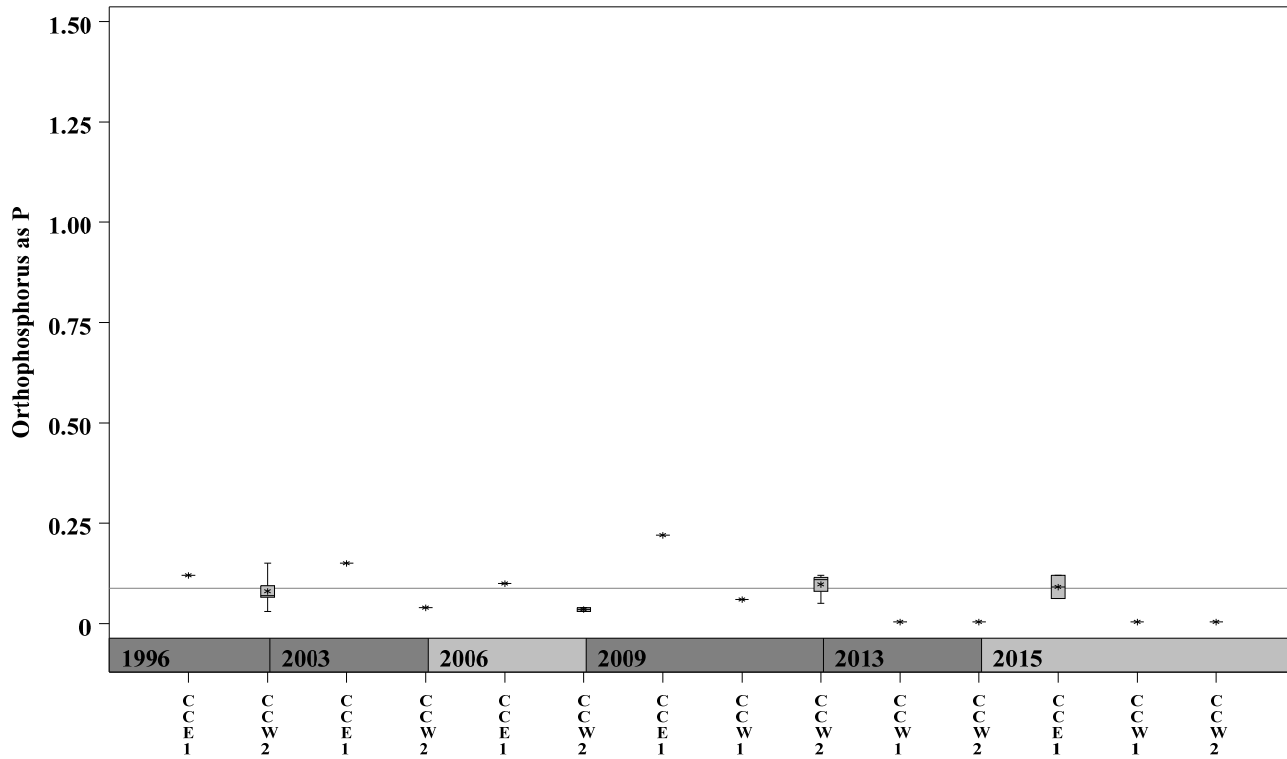




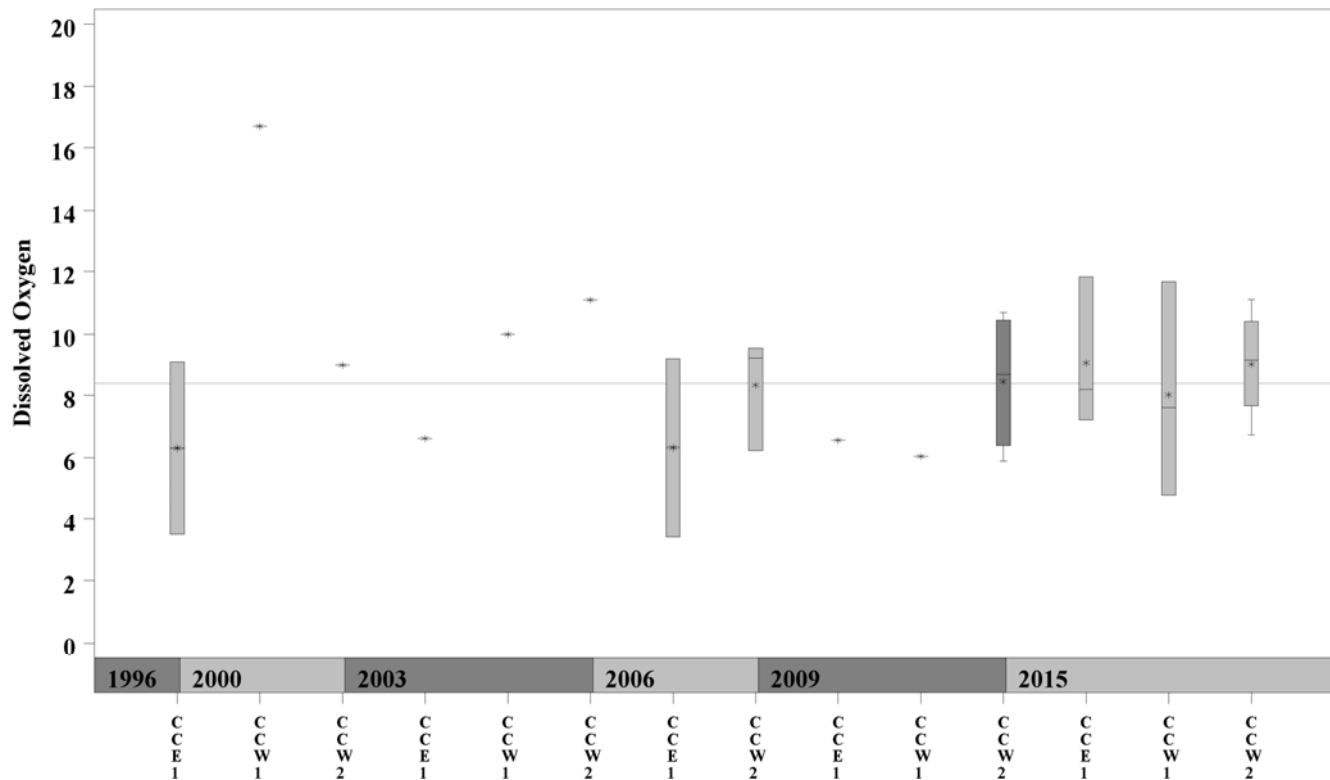
# Country Club Creek Watershed

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

Parameter = ORTHOPHOSPHORUS AS P Unit = mg/L Watershed = Country Club



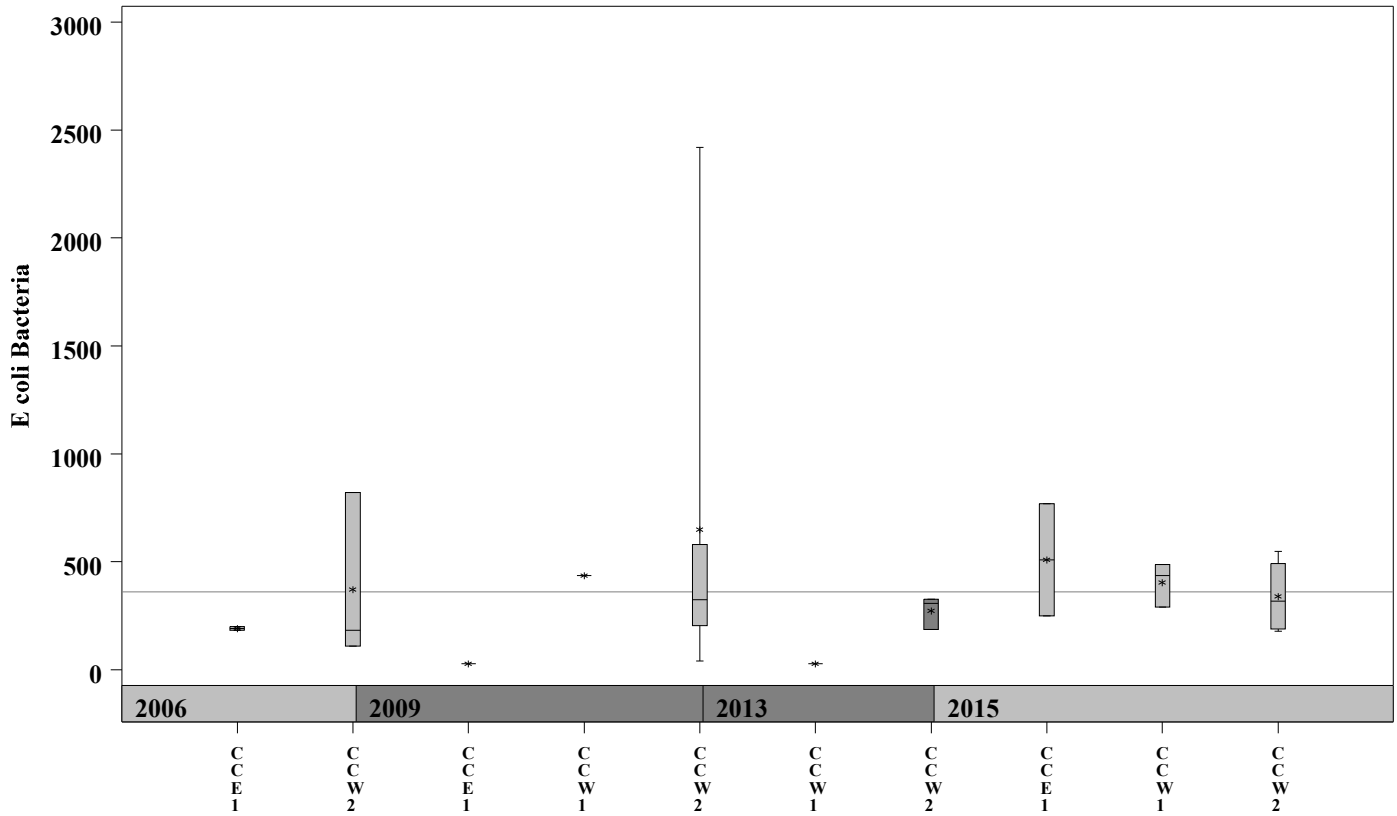
Parameter = DISSOLVED OXYGEN Unit = mg/L Watershed = Country Club



# Country Club Creek Watershed

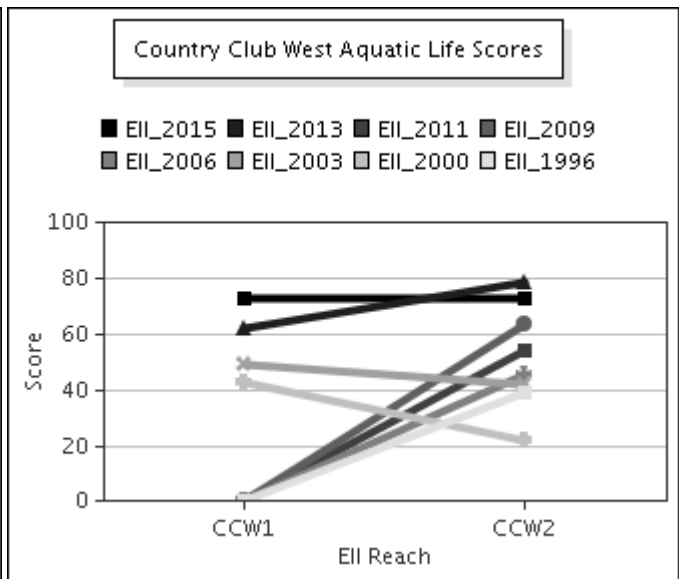
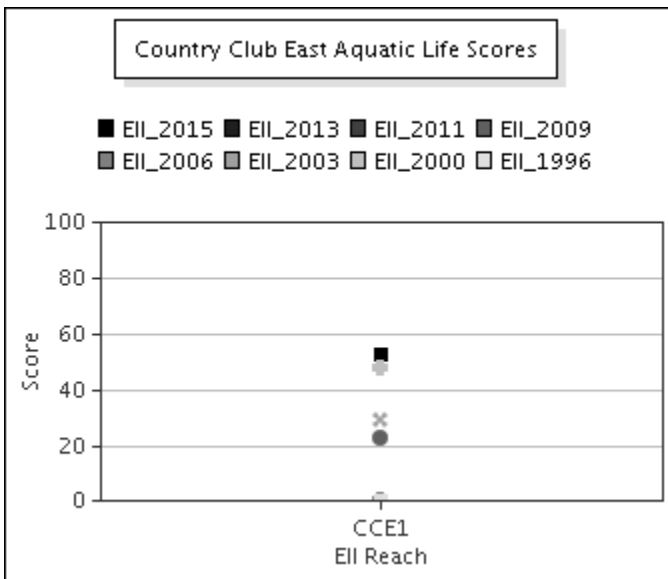
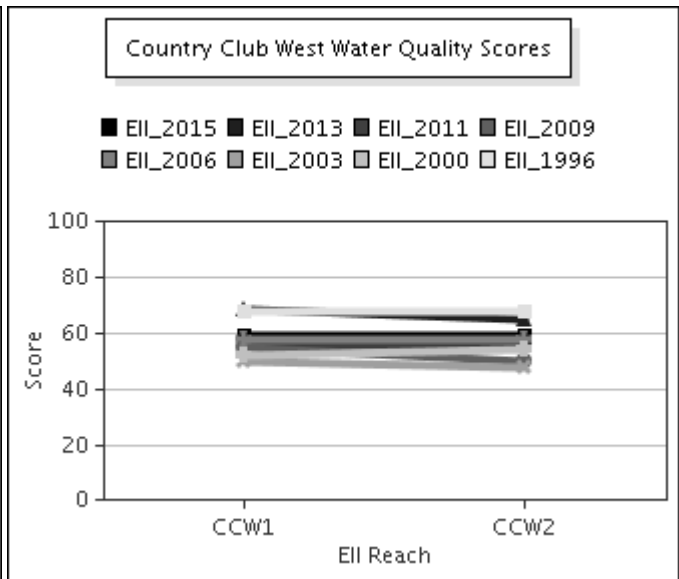
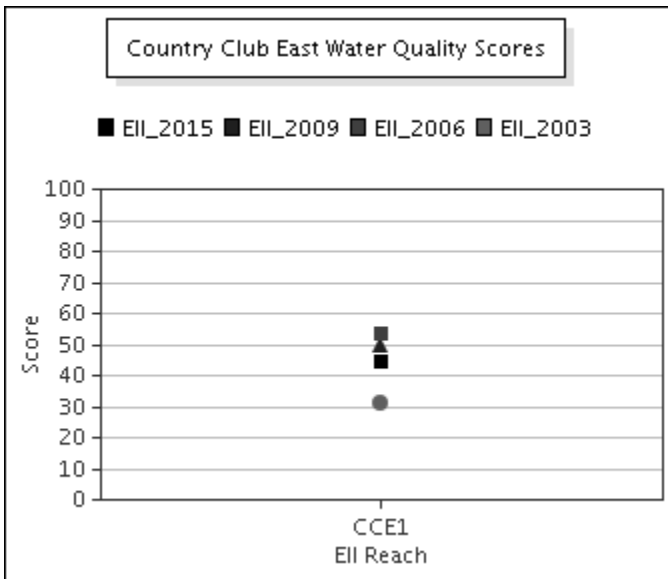
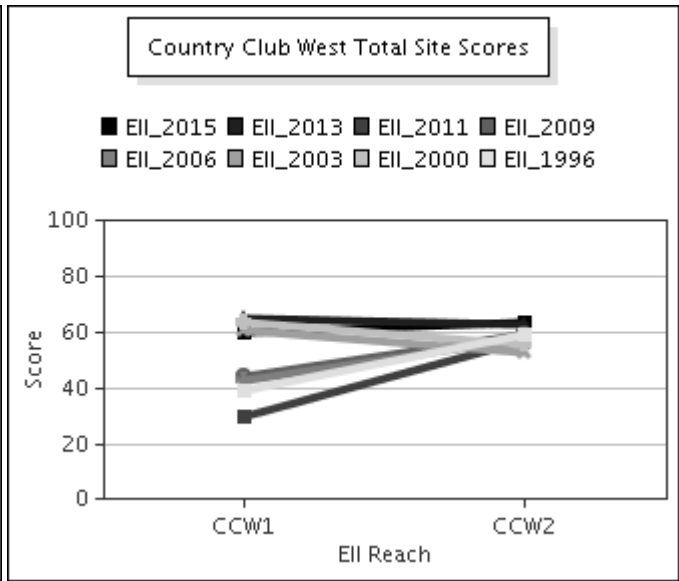
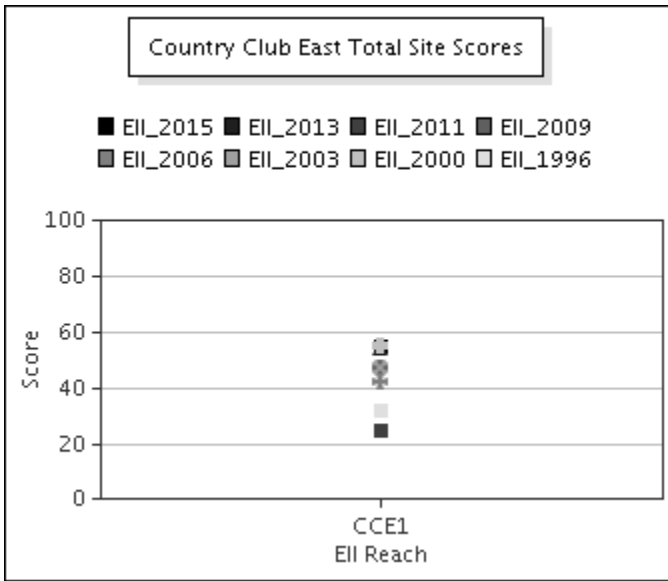
Data Summary Graphs – *E.coli* (Downstream to Upstream by Year)

Parameter = E COLI BACTERIA Unit = MPN/100mL Watershed = Country Club



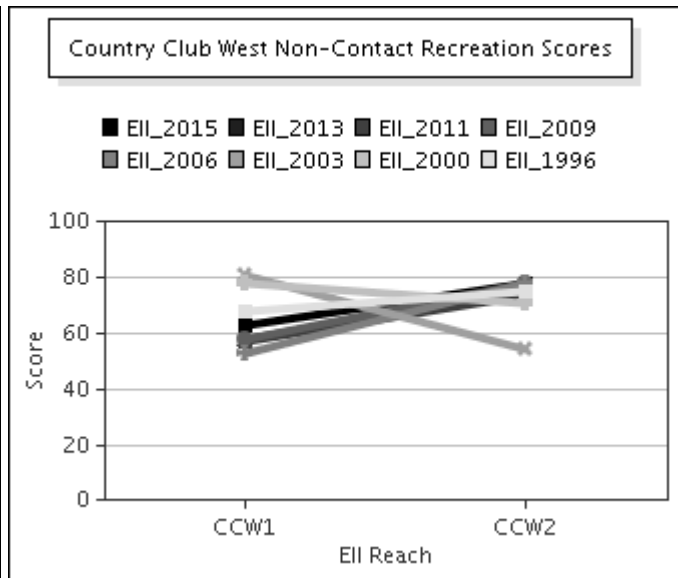
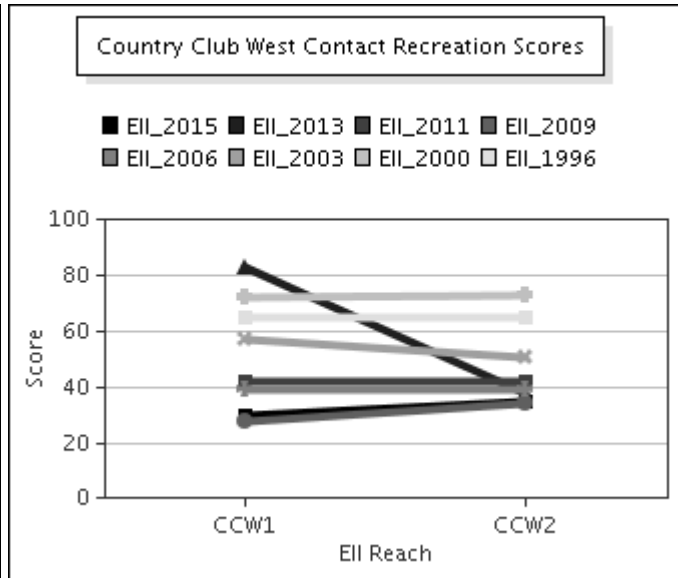
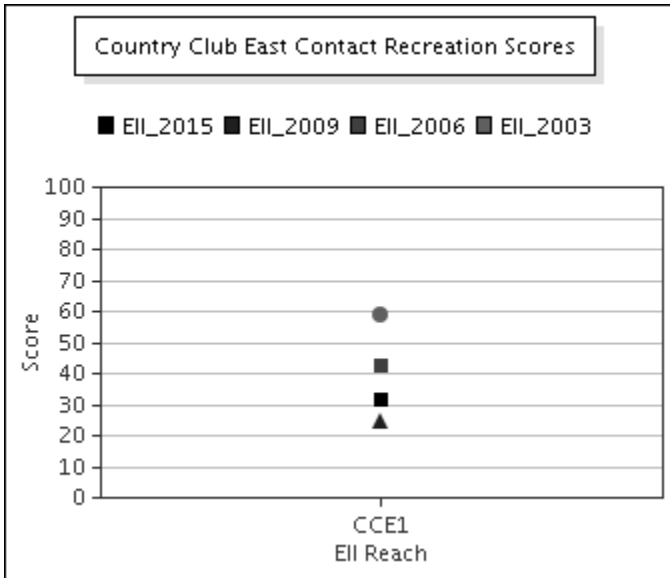
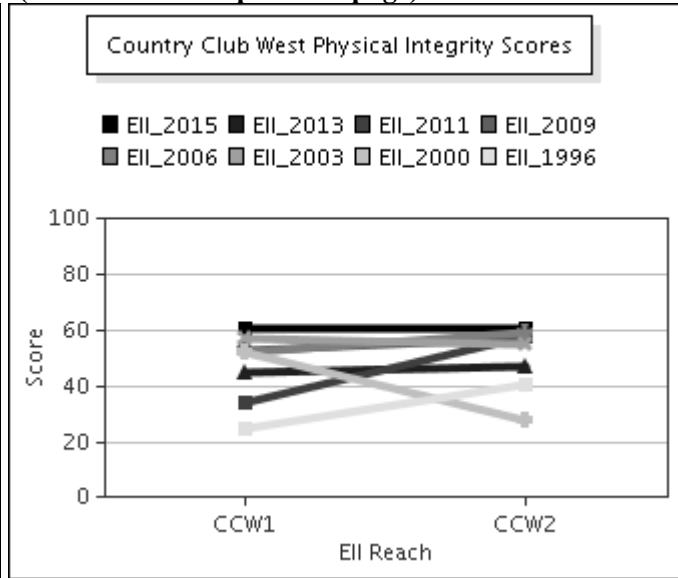
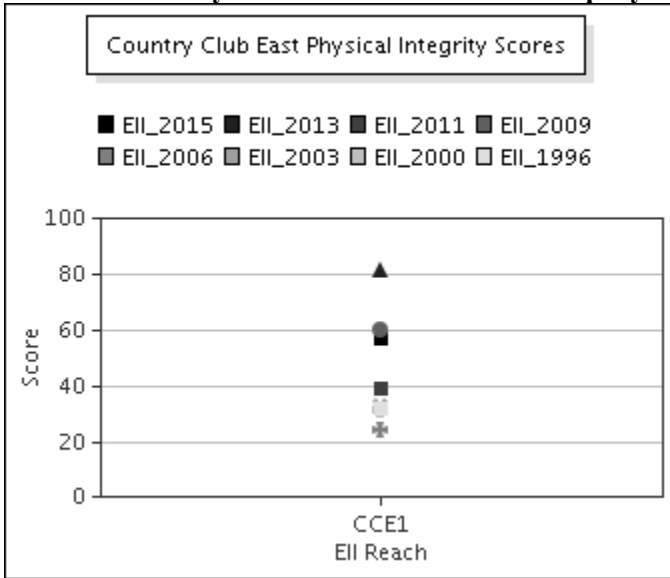
# Country Club Creek Watershed

## Score Summary – Reach scores for each sample year



# Country Club Creek Watershed

Score Summary – Reach scores for each sample year (Continued from previous page)



# Country Club Creek Watershed

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

Benthic Macroinvertebrates - Country Club West			CCW @ E Oltorf (850) 07/09/2015 (WRE)	CCW @ Crossing Plc (849) 05/05/2015 (WRE)
Benthic Macroinvertebrates ID	PTI	FFG		
Chimarra	2	FC	7	
Microcylloepus Pusillus	2	CG,SC		1
Fallceon	4	CG,SC	141	240
Neochoroterpes	4	CG	4	1
Simulium	4	FC	2	67
Argia	6	P	32	1
Brechmorhoga Mendax	6	P	1	
Cheumatopsyche	6	FC	23	85
Chironomidae	6	FC,P	14	36
Hetaerina	6	P		4
Tanypodinae	6	P	2	22
Caenis	7	CG,SC		1
Hyalella	8	CG,SH		3
Physella	9	SC	1	5
Dugesia		CG,P	4	1

Benthic Macroinvertebrates - Country Club East			CCE @ ACC (1475) 05/04/2015 (WRE)
Benthic Macroinvertebrates ID	PTI	FFG	
Copepoda	4	SC	1
Fallceon	4	CG,S C	3
Cheumatopsyche	6	FC	3
Chironomidae	6	FC,P	16
Enallagma	6	P	1
Fossaria	6	SC	1
Tanypodinae	6	P	5
Oligochaeta	8	CG	1
Berosus	9	CG	1
Physella	9	SC	123
Caecidotea		CG	48
Dugesia		CG,P	7



# Country Club Creek Watershed

## Site Photographs



1475\_t00-us-07\_06\_2006



1475-t00-us-05-29-2009



848\_t00-ds-12\_14\_2000



848\_t00-us-12\_14\_2000



848\_t00-ds-03\_13\_2003



848\_t00-us-03\_13\_2003



# Country Club Creek Watershed

## Site Photographs



849\_t00-ds-02\_16\_2001



849\_t00-us-02\_16\_2001



850\_t00-us-12\_14\_2000



850-t00-ur-06-01-2009



1474\_t00-us-07\_06\_2006



1474-t00-us-05-29-2009