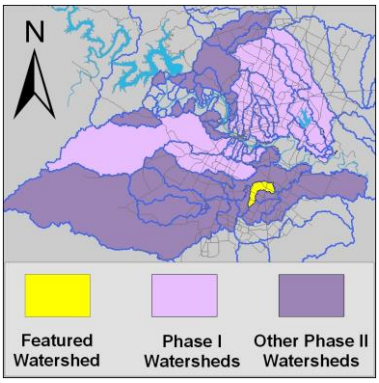
Cottonmouth Creek Watershed

Summary Sheet

Catchment	Total area	5 sq. miles
	Area in recharge	0
	Creek length	7 miles
	Receiving water	Onion Creek
Demographics	2000 population	420
	2030 projected population	3,312
	30 year projected % increase	689 %
Land Use	Impervious cover (2003 estimate)	7.3 %
	Impervious cover (2013 estimate)	6.0 %

Overall EII Scores	1999	2002	2005	2008	2010	2012	2014
	56	56	53	68	71	66	61



Flow Regime* for Sample Sites on Cottonmouth Creek

Site	Site Name	2002					2005					2008					2010				2011	2012				2014				
		Feb	Feb	May	Aug	Nov	Mar	Jun	Jun	Sep	Dec	Feb	May	Jun	Sep	Dec	Mar	May	May	Oct	Dec	Mar	May	Jul	Sep	Jan	Apr	May	Jul	Sep
		WQ	Bio	WQ	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	Bio	WQ	WQ	WQ	Bio	WQ	WQ	WQ	WQ	Bio	WQ	WQ
1205	Colton-Bluff Springs Rd	n		n	n																									
1206	D G Collins	B	B	n	B	B	B	B	B	n	n	B	B	n	n	n	B	B	B	B	n	B	B	n	B	B	B	B	B	n
1207	Colton Rd	B	B	n	n	B	B	n	B	n	n																			

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

Index scores* for Cottonmouth Creek sites by year

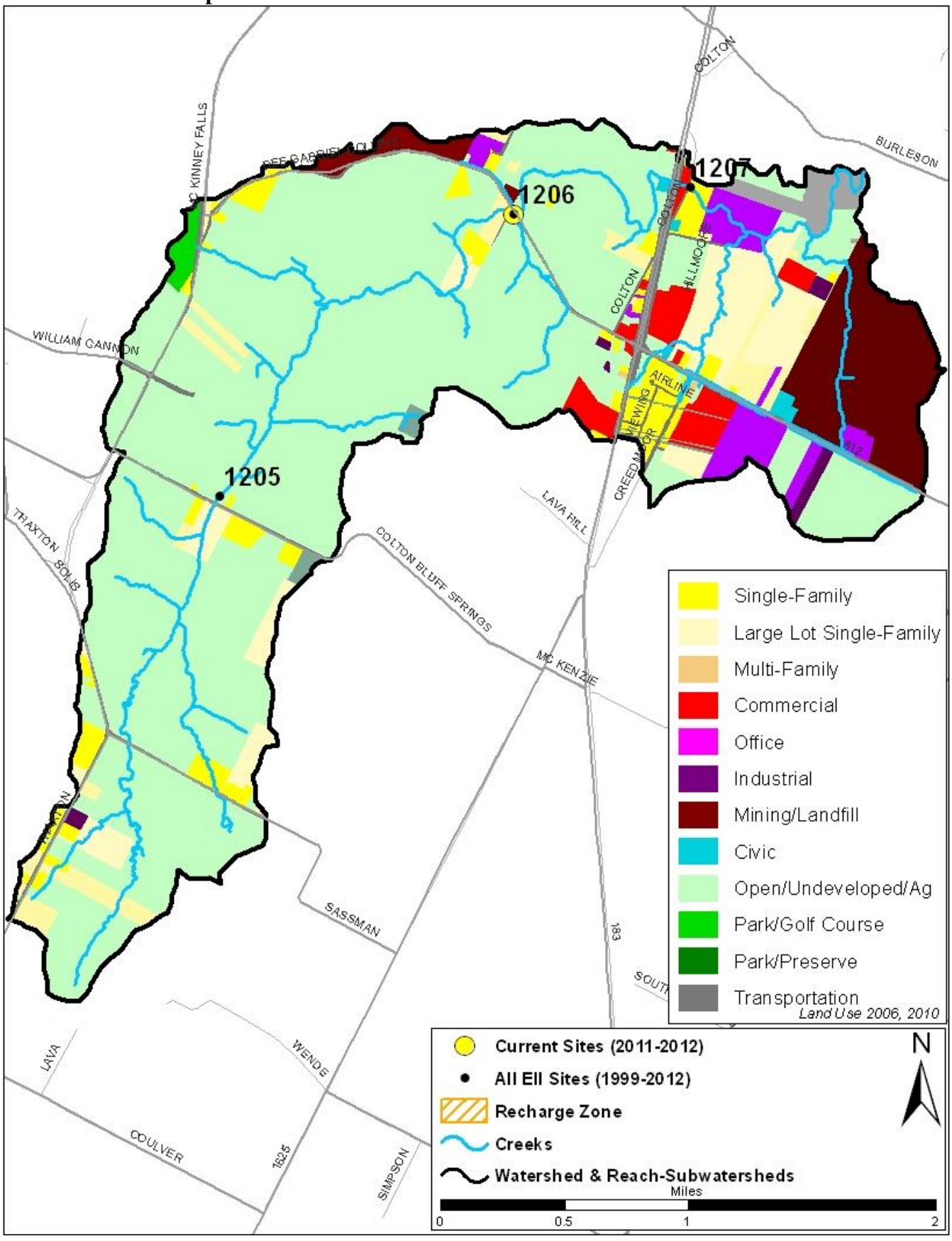
Reach	Site	Site Name	Year	Water Quality	Sediment**	Contact Rec.	Non-Contact Rec.	Physical Integrity	Aquatic Life	Benthic subindex	Diatom subindex	Total EII Score
CTM1	1205	Cottonmouth Creek @ Colton-Bluff Springs	1999	65	83	99	65	58				62
CTM1	1206	Cottonmouth Creek @ Dee Gabriel Collins	1999	48	83	96	77	56				60
CTM1	1207	Cottonmouth Creek @ Colton Road	1999	53	83	68	32	33				45
CTM1	1205	Cottonmouth Creek @ Colton-Bluff Springs	2002		64		72	55				48
CTM1	1206	Cottonmouth Creek @ Dee Gabriel Collins	2002	40	64	65	78	62	29	40	18	56
CTM1	1207	Cottonmouth Creek @ Colton Road	2002	48	64	92	52	57	34	45	23	58
CTM1	1206	Cottonmouth Creek @ Dee Gabriel Collins	2005	36	68	37	57	51	44	39	49	49
CTM1	1207	Cottonmouth Creek @ Colton Road	2005	53	68	45	59	61	61		61	58
CTM1	1206	Cottonmouth Creek @ Dee Gabriel Collins	2008	67	81	47	77	68	65	65		68
CTM1	1206	Cottonmouth Creek @ Dee Gabriel Collins	2010	65	76	86	73	54	71	74	68	71
CTM1	1206	Cottonmouth Creek @ Dee Gabriel Collins	2012	49	82	69	67	62	68	97	38	66
CTM1	1206	Cottonmouth Creek @ Dee Gabriel Collins	2014	56	81	80	74	34	42	32	52	61

* 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

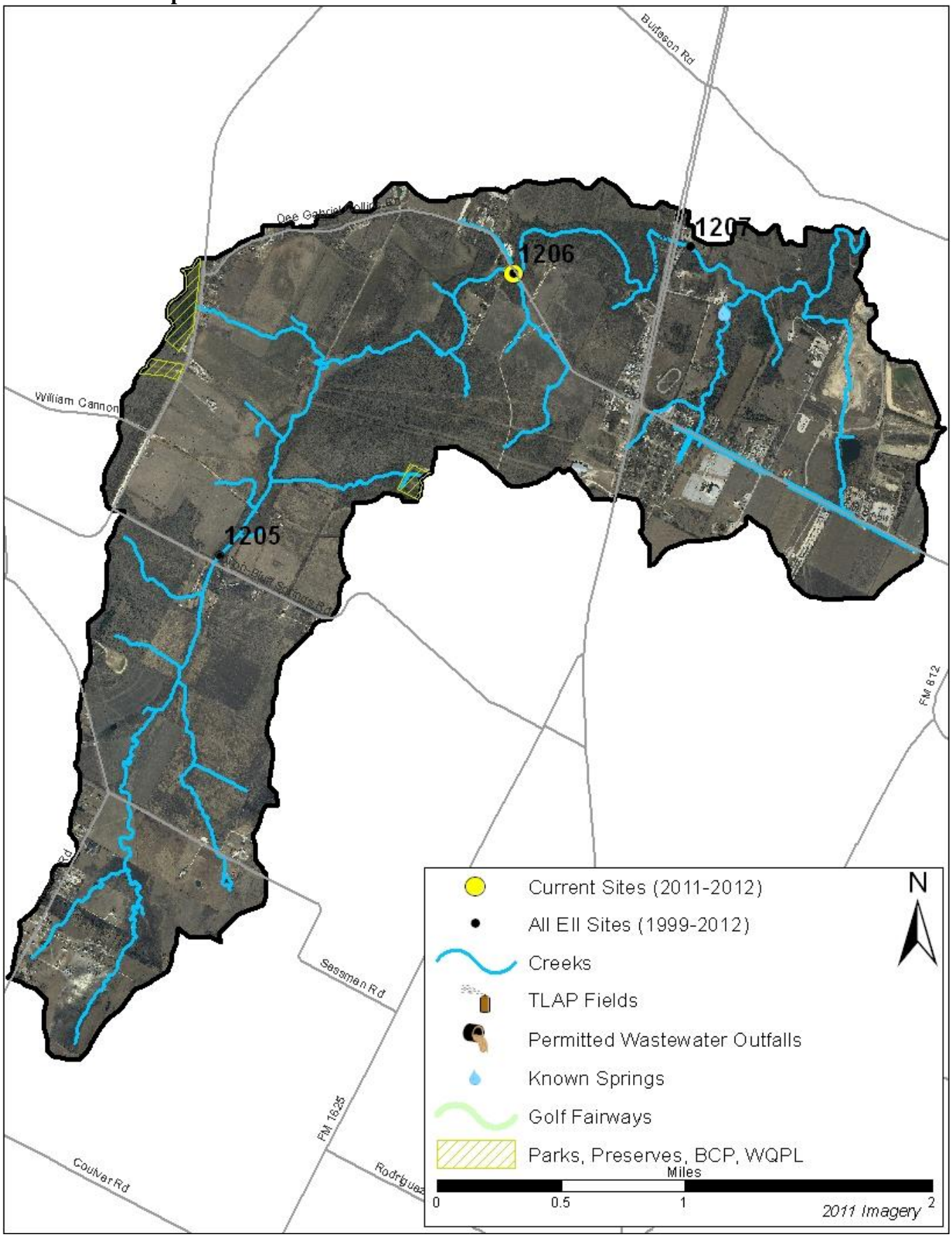
Cottonmouth Creek Watershed

Land Use Map



Cottonmouth Creek Watershed

Aerial Map



Cottonmouth 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
Cottonmouth @ D G Collins	1206	CTM1	01/15/2014		14.1			688			8.38						17.3	
Cottonmouth @ D G Collins	1206	CTM1	04/17/2014		18.0			852			8.04			5.0			58.3	
Cottonmouth @ D G Collins	1206	CTM1	05/06/2014		20.3			844			7.51			5.6				
Cottonmouth @ D G Collins	1206	CTM1	07/02/2014		24.0			787			7.61			5.8			20.1	
Site 1206 Mean					19.1			793			7.89			5.5			31.9	
Watershed Mean					19.1			793			7.89			5.5			31.9	

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	

Cottonmouth Creek Watershed

Water Quality Data – Ammonia, Nitrate / Nitrite, Ortho-Phosphorus, Total Suspended Solids & Turbidity 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		

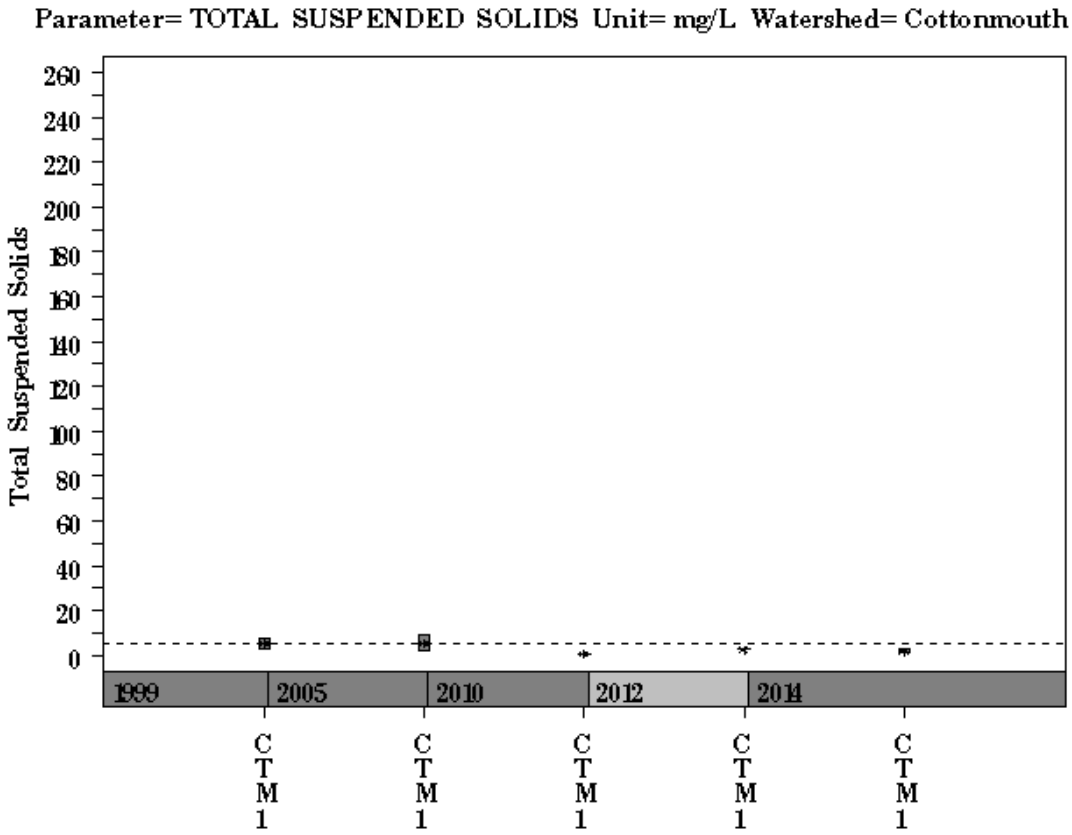
Site Name	Site #	Reach	Date	NH3-N < >	NH3-N Value	NH3-N flag	NO3/NO2 < >	NO3/NO2 Value	NO3/NO2 flag	Ortho-P < >	Ortho-P Value	Ortho-P flag	T.S.S. < >	T.S.S. Value	T.S.S. flag	Turb. < >	Turb. Value	Turb. flag
Cottonmouth @ D G Collins	1206	CTM1	01/15/2014	<J	0.008			1.69		<J	0.004			1.7			4.9	R
Cottonmouth @ D G Collins	1206	CTM1	04/17/2014		0.036			1.07			0.011	R		1.1			1.7	R
Cottonmouth @ D G Collins	1206	CTM1	05/06/2014															
Cottonmouth @ D G Collins	1206	CTM1	07/02/2014	<J	0.008			1.04			0.009			3.3			2.3	
Site 1206 Mean					0.017			1.27			0.008			2.0			3.0	
Watershed Mean					0.017			1.27			0.008			2.0			3.0	

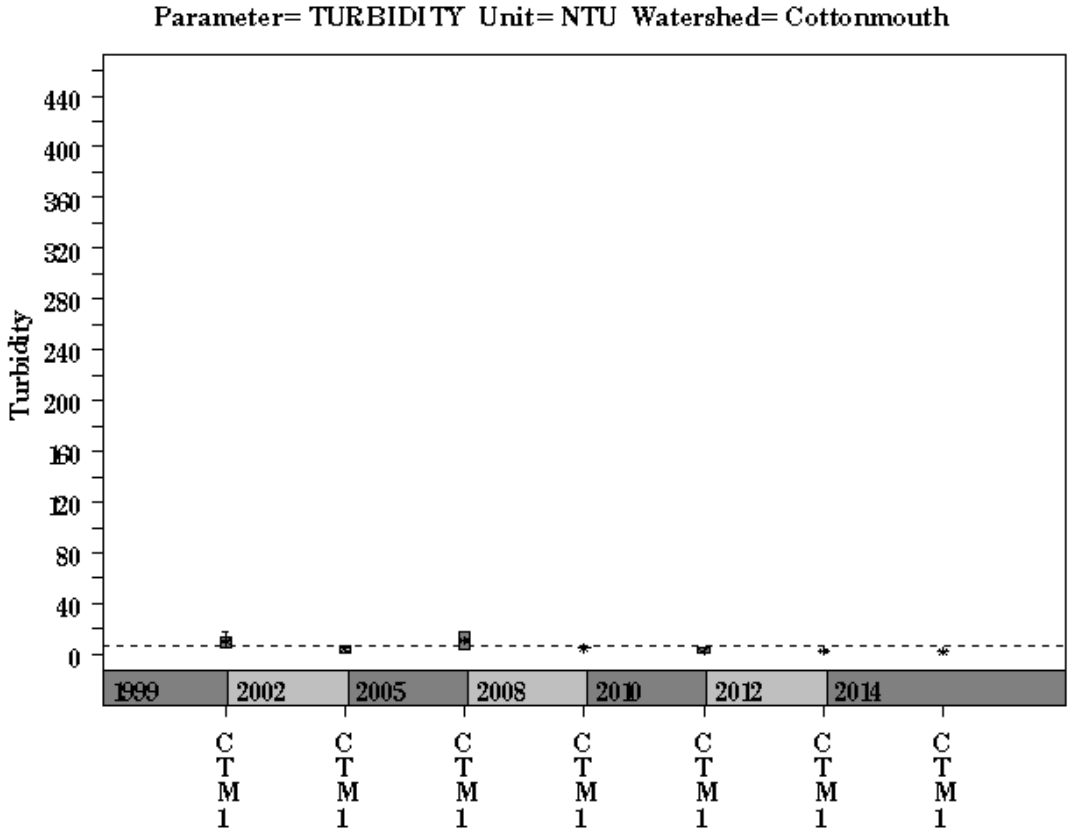
Orange highlighting indicates that the value exceeds one standard deviation from the mean of all E.I.I. sites combined.

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

Cottonmouth Creek Watershed

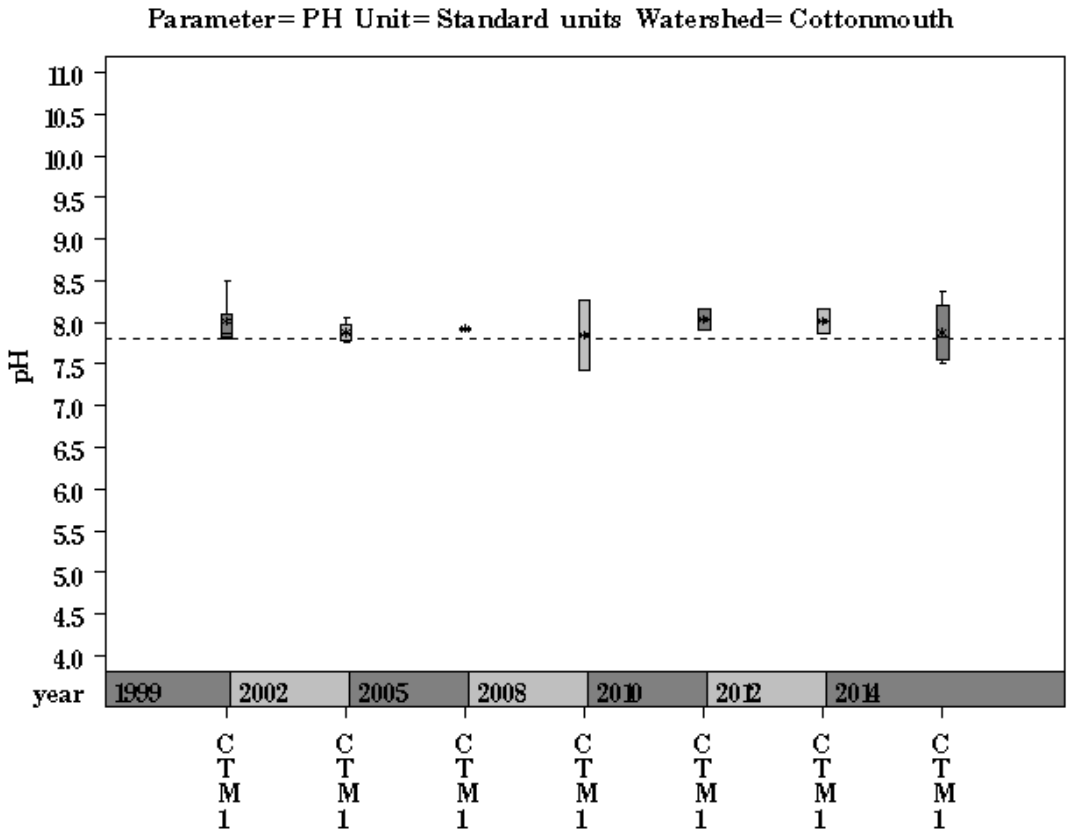
Data Summary Graphs – Total Suspended Solids and Turbidity (Downstream to Upstream by Year)

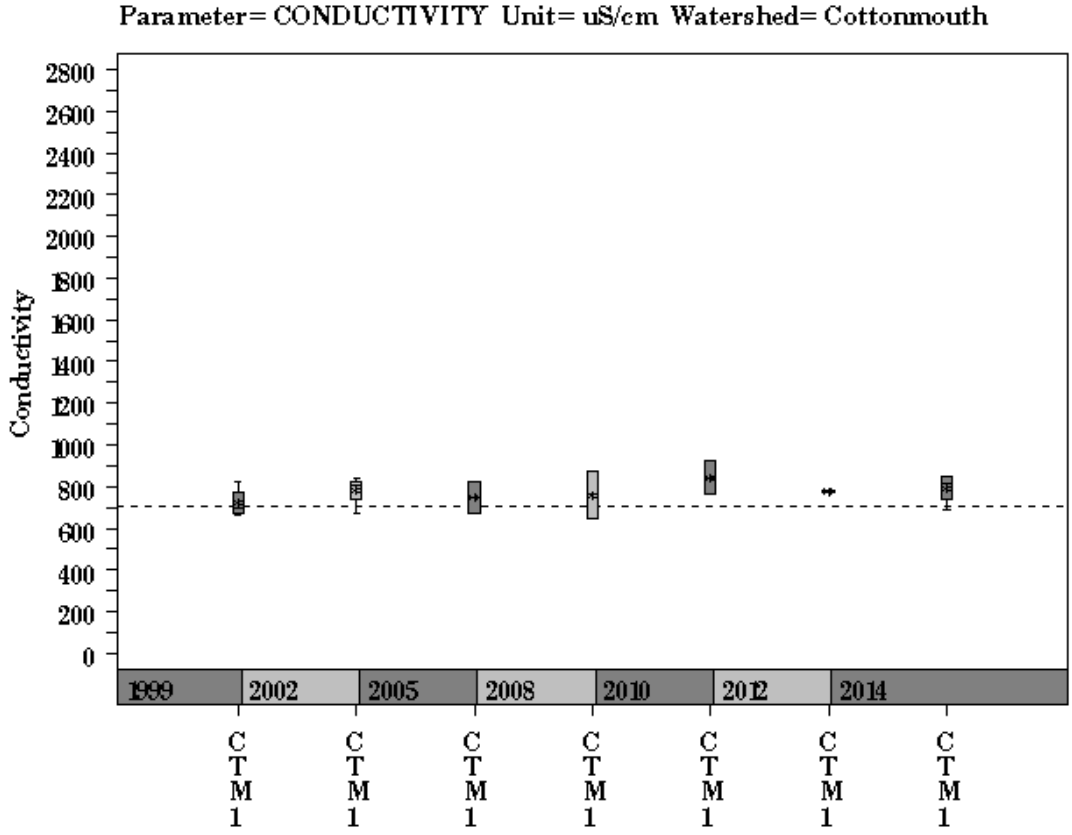




Cottonmouth Creek Watershed

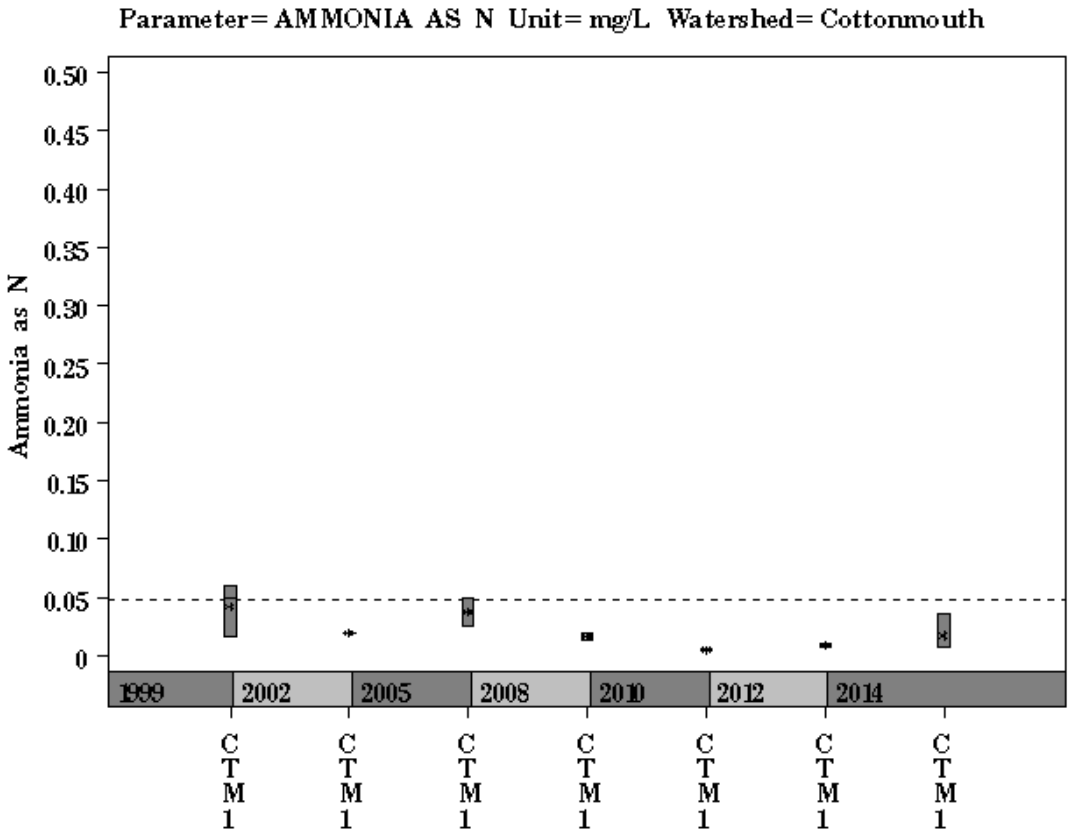
Data Summary Graphs – pH and Conductivity (Downstream to Upstream by Year)

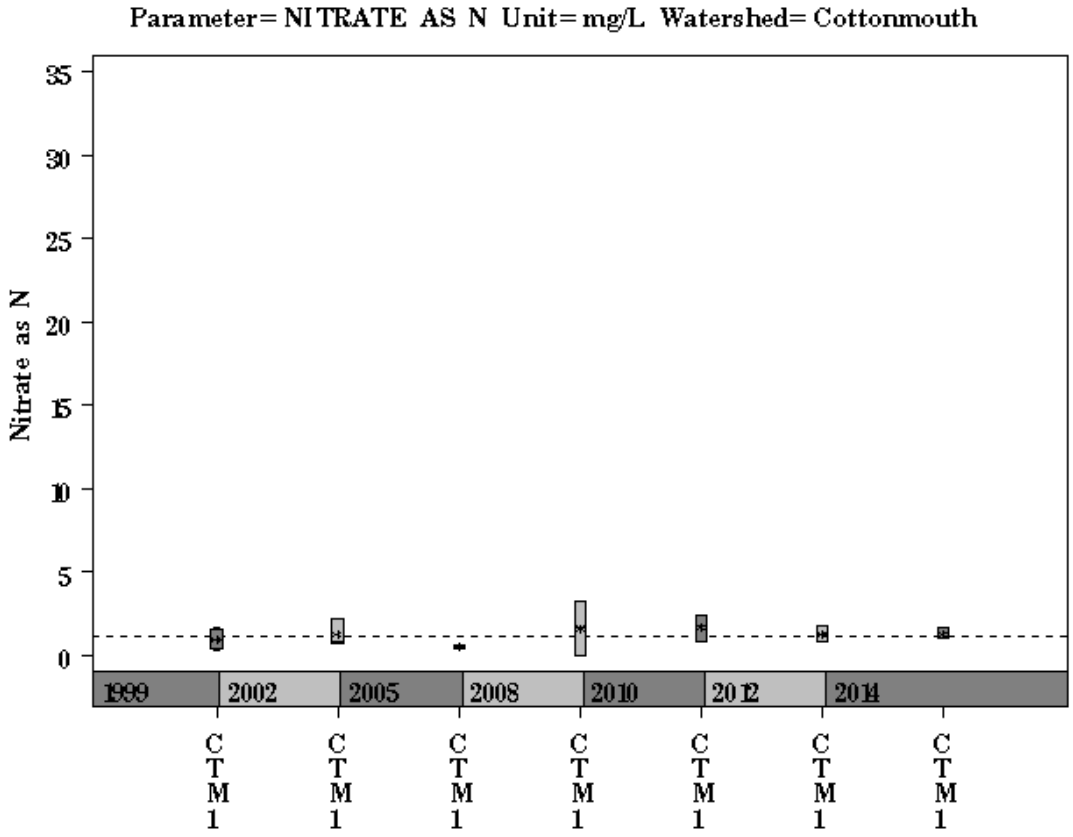




Cottonmouth Creek Watershed

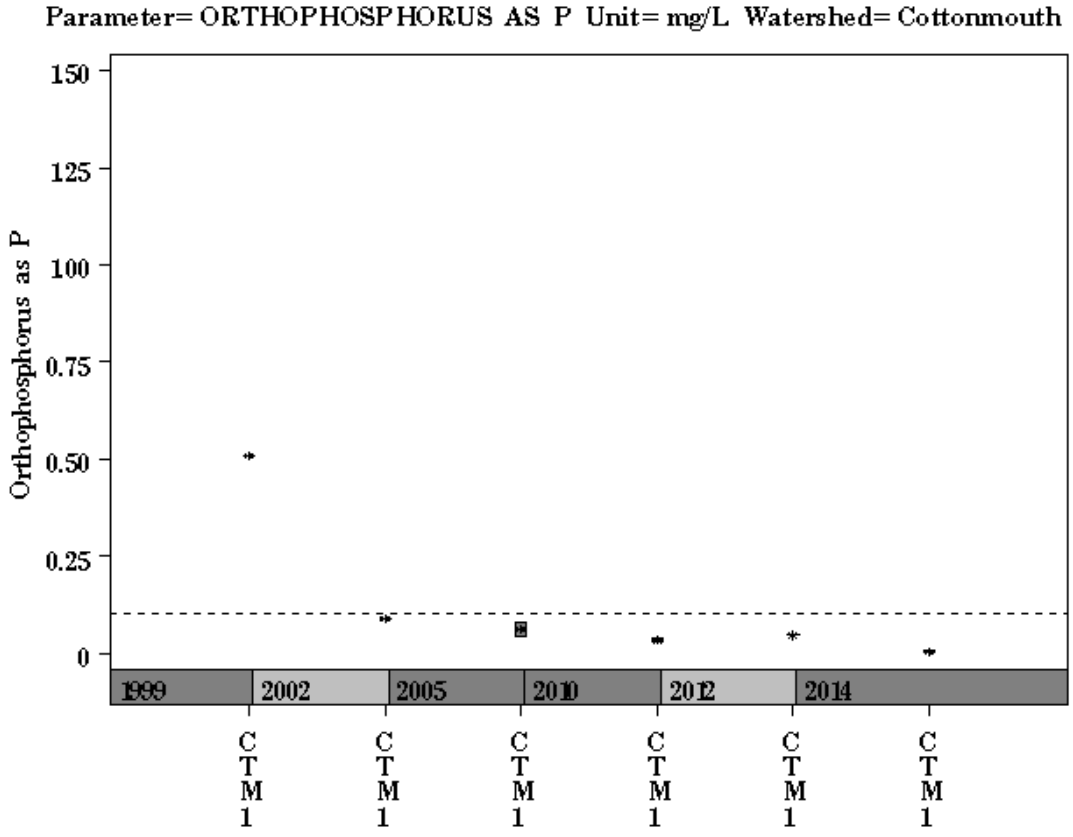
Data Summary Graphs – Ammonia and Nitrate/Nitrite (Downstream to Upstream by Year)

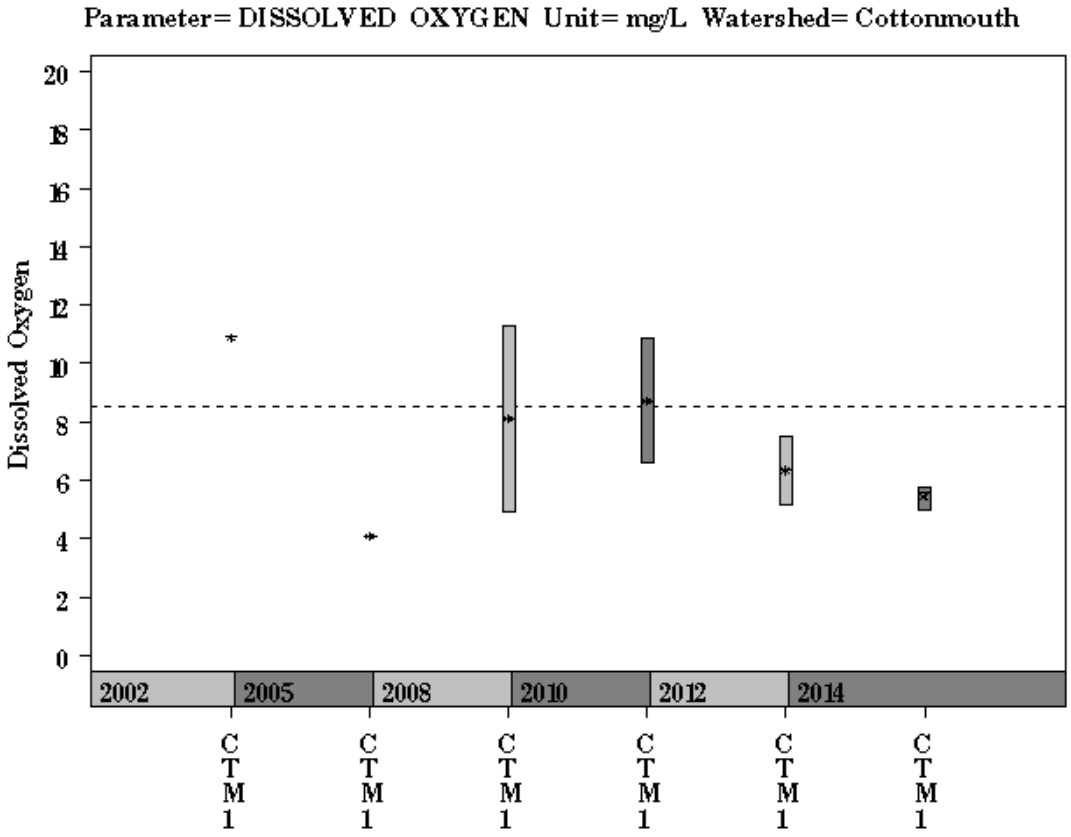




Cottonmouth Creek Watershed

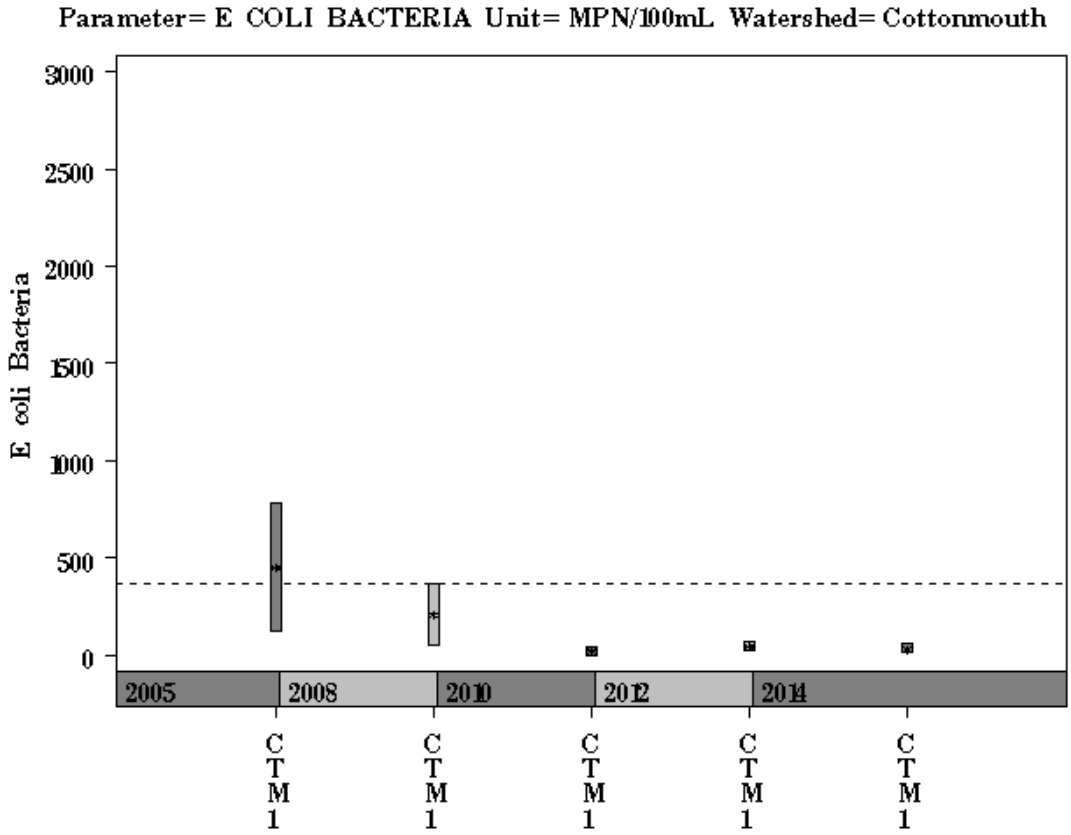
Data Summary Graphs – <u>Orthophosphate</u> and <u>Dissolved Oxygen</u> (Downstream to Upstream by Year)





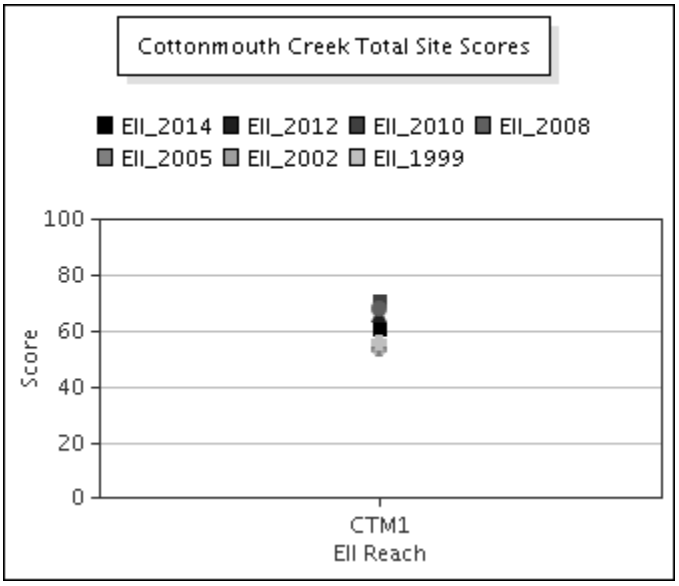
Cottonmouth Creek Watershed

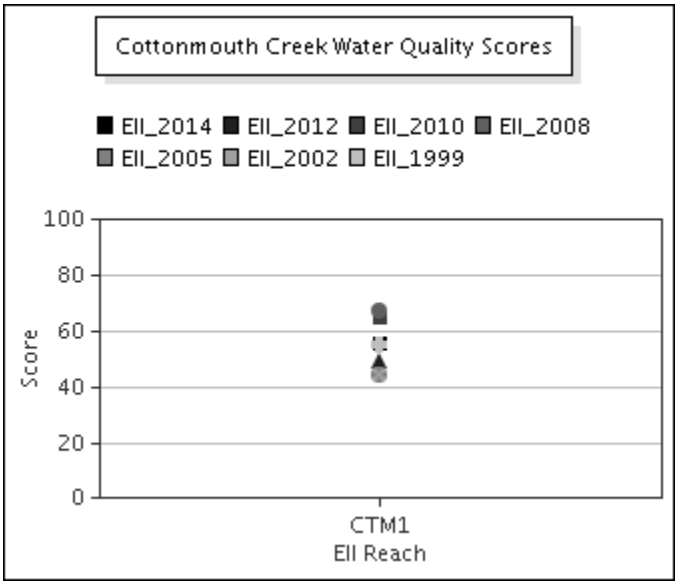
Data Summary Graphs – *E.coli* (Downstream to Upstream by Year)

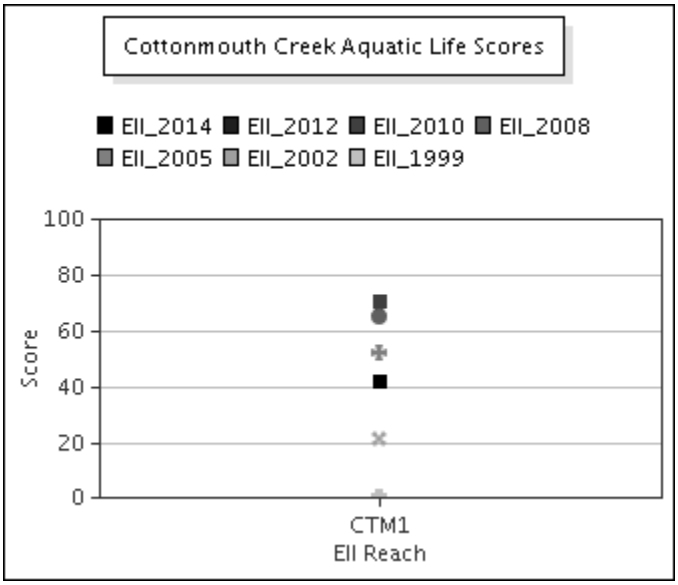


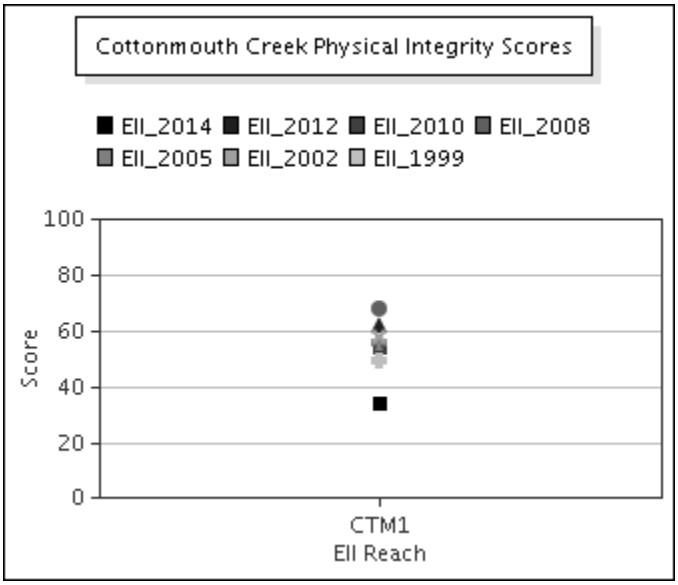
Cottonmouth Creek Watershed

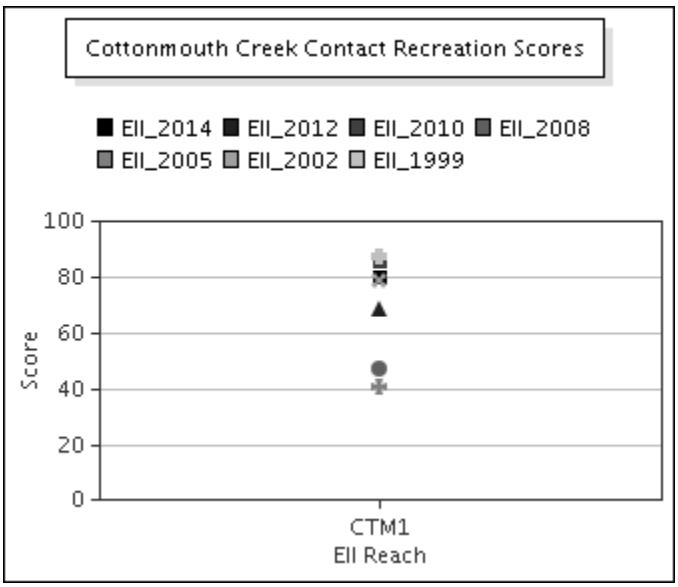
Score Summary – Reach scores for each sample year

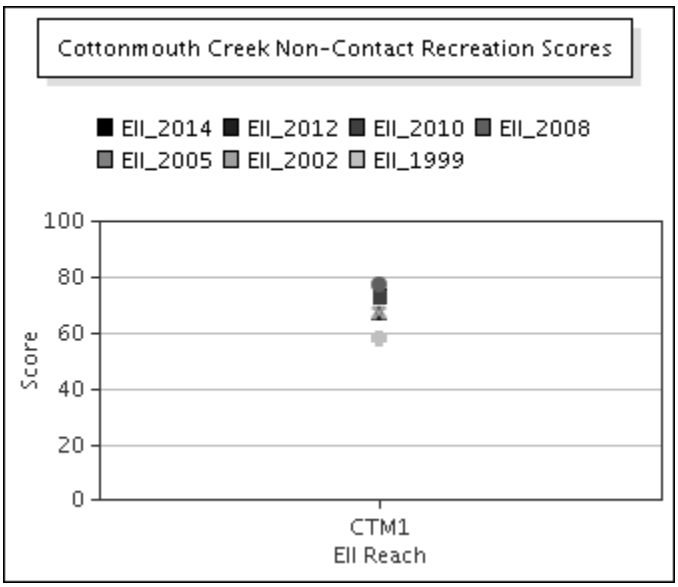












Cottonmouth Creek Watershed

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

Benthic Macroinvertebrate ID	PTI	FFG	Cottonmouth @ D G Collins (Site 1206)
Argia sp.	6	P	1
Cheumatopsyche sp.	6	FC	10
Chironomidae	6	P,FC	2
Microvelia sp.	6	P	9
Tanypodinae	6	P	2
Anopheles sp.	8	FC	1
Oligochaeta	8	CG	1
Physella sp.	9	SC	23
Hydra sp.			1

Cottonmouth Creek Watershed

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

Scoring Metric	Cottonmouth @ D G Collins (Site 1206)
Number of Taxa *	8
Hilsenhoff Biotic Index *	7.5
Number of Ephemeroptera Taxa *	0
Percent of Total as Chironomidae *	8
Number of EPT Taxa *	1
Percent of Total as EPT *	20
Percent of Total as Predator *	28
Number of Intolerant Taxa *	0
Percent Dominance (Top 3 Taxa) *	84
EPT / EPT + Chironomidae	1
Number of Diptera Taxa	2
Number of Non-Insect Taxa	3
Number of Organisms	50
Percent Dominance (Top 1 Taxa)	46
Percent of Total as Collector / Gatherer	2
Percent of Total as Dominant Guild (FFG)	46
Percent of Total as Elmidae	0
Percent of Total as Filterers	30
Percent of Total as Grazers (PI & SC)	46
Percent of Total as Tolerant Organisms	46
Percent of Trichoptera as Hydropsychidae	100
Ratio of Intolerant : Tolerant Organisms	0.00
TCEQ Qualitative Aquatic Life Use Score	18
TCEQ Quantitative Aquatic Life Use Score	19

*** 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%.

Cottonmouth Creek Watershed

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

Diatom Species Name	PTI	Cottonmouth @ D G Collins (Site 1206)
Achnanthidium minutissimum	3	4
Amphora ovalis	3	2
Amphora pediculus	3	2
Caloneis bacillum	3	18
Denticula elegans	3	2
Denticula subtilis	3	4
Diploneis parma	3	3
Gomphonema affine	3	3
Halamphora montana	3	2
Navicula radiosa	3	1
Navicula tripunctata	3	9
Nitzschia linearis	3	1
Reimeria sinuata	3	22
Achnantheiopsis lanceolata	2	130
Fragilaria capucina var. *mesolepta*	2	4
Halamphora veneta	2	3
Navicula recens	2	4
Navicula symmetrica	2	8
Navicula veneta	2	4
Nitzschia amphibia	2	90
Nitzschia microcephala	2	115
Nitzschia paleacea	2	1
Sellaphora laevissima	2	4
Surirella brebissonii	2	9
Tryblionella apiculata	2	16
Tryblionella levidensis	2	2
Gomphonema parvulum	1	2
Amphora copulata		5
Cocconeis placentula var. *euglypta*		2
Eolimna minima		18
Placoneis exigua		3
Ulnaria acus		1
Ulnaria ulna		6

Cottonmouth Creek Watershed

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

Scoring Metric	Cottonmouth @ D G Collins (Site 1206)
Cymbella Richness	1
Number of organisms	500
Number of taxa	33
Percent motile taxa	53
Percent similarity to reference condition	11
Pollution tolerance index	2.15

* **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.

Cottonmouth Creek Watershed

Site Photographs

1205_t00-ds1-06_20_2000

1205_t00-ds-03_28_2002

1207_t00-ds-03_28_2002

1207_t00-us-06_15_2005

1207_t00-ds-06_15_2005

1207_t00-ur-06_15_2005

Cottonmouth Creek Watershed

Site Photographs

1206_t00-ds-06_20_2000

1206_t00-ds-03_28_2002

1206_t00-us-06_15_2005

1206_t0-ds-06_17_2008

1206_00-us-05_18_2010

1206_00-ds-05_18_2010

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